

FLIGHT MANUAL

LEONARDO AERMACCHI

M-346AJT



Manual Version 1.0.1_4r1 - August 2026

TABLE OF CONTENTS

1. INTRODUCTION	8
2. INSTALLATION	10
2.1 SETUP	11
3. SUPPORT	13
3.1 SKUNKCRAFTS UPDATER SUPPORT	13
3.2 X-PLANE.ORG - FORUM SUPPORT	14
4. GLOSSARY	16
5. AIRCRAFT DESCRIPTION	19
5.1 AIRCRAFT DIMENSIONS	20
5.2 BASIC INFO	21
5.3 EXTERIOR LIGHTS	22
5.4 FUEL	23
5.4.1 FUEL SYSTEM ARRANGEMENT	24
5.5 EJECTION SEAT	25
5.6 COCKPIT LAYOUT	26
5.6.1 FRONT INSTRUMENT PANEL	27
5.6.1.1 FRONT INSTRUMENT PANEL DESCRIPTION	28
5.6.1.2 FRONT SIDE CONSOLES	29
5.6.2 REAR CREW STATION	30
5.6.2.1 REAR CREW STATION DESCRIPTION	31
5.6.2.2 REAR SIDE CONSOLES	32
5.7 FLIGHT CONTROL SYSTEM	33
5.7.1 NORMAL LAW	33
5.7.2 DIRECT LINK	33
5.7.3 CAREFREE HANDLING AND WARNINGS	33
5.7.4 FCS INDICATIONS	34
5.8 ANTI-ICE SYSTEM	35
5.8.1 WHAT IS PROTECTED	35
5.8.2 RAIN REMOVAL AND DEMIST	35
5.9 IN/GPS ALIGNMENT	36
5.9.1 ALIGNMENT	36
5.9.2 ALIGNMENT METHODS	36
5.9.3 ENTERING ALIGNMENT DATA	36
5.9.4 WHAT THE IN/GPS FORMAT SHOWS	37
5.10 ELECTRICAL POWER SYSTEM	38
5.10.1 SOURCES	38
5.10.2 BUSES	38
5.10.3 IN PRACTICE	38
5.10.4 SCHEMATIC	39
5.11 ENVIRONMENTAL CONTROL AND OXYGEN	40
5.11.1 PRESSURISATION	40
5.11.2 BLEED AIR	40
5.11.3 OXYGEN	40
5.12 MISSION COMPUTER AND SYMBOL GENERATOR	41

5.13 MID-AIR COLLISION AVOIDANCE SYSTEM	42
5.14 HYDRAULIC POWER	44
5.14.1 WHAT EACH SYSTEM DRIVES	44
5.14.2 PRESSURE INDICATION	44
5.14.3 WHAT DEPENDS ON IT	44
5.14.4 SCHEMATIC	45
5.15 NOSE WHEEL STEERING	46
5.15.1 LOW AND HIGH	46
5.15.2 POWER SUPPLY	46
5.15.3 AURAL WARNINGS	46
5.16 SPEEDBRAKE	47
6. LIMITATIONS AND SPEEDS	49
6.1 SPEED LIMITATIONS	49
6.2 STALL SPEEDS	49
6.3 TAKE OFF	49
6.4 LOAD FACTOR	49
6.5 APPROACH AND LANDING	49
6.6 WEIGHTS	50
6.7 POWERPLANT AND SYSTEMS	50
6.8 PERFORMANCE	50
7. NORMAL PROCEDURES	52
7.1 COCKPIT PREPARATION	52
7.1.1 INITIAL SWITCHES POSITIONS	52
7.1.2 FRONT LEFT PANEL	52
7.1.3 FRONT CENTER PANEL	53
7.1.4 FRONT RIGHT PANEL	54
7.1.5 REAR LEFT PANEL	55
7.1.6 REAR CENTER PANEL	56
7.1.7 REAR RIGHT PANEL	57
7.2 START UP SEQUENCE	58
7.2.1 FRONT COCKPIT	60
7.2.2 REAR COCKPIT	61
7.3 BEFORE TAXI	62
7.3.1 TAXI	62
7.4 BEFORE TAKE OFF	63
7.4.1 TAKE OFF	63
7.5 BEFORE LANDING	64
7.5.1 TOUCH AND GO / GO AROUND	64
7.5.2 LANDING	64
7.5.3 AFTER LANDING	64
7.6 SHUTDOWN	65
8. EMERGENCY PROCEDURES	67
8.1 ENGINE AND APU	67
8.1.1 FIRE	67
8.1.2 FAILURE, FLAMEOUT AND RELIGHT	68

8.1.2.1 INDICATIONS	68
8.2 FLIGHT CONTROL DEGRADATION	69
8.2.1 DIRECT LINK	69
8.2.2 RECOVERY	69
8.2.3 A FAIL	69
8.2.4 EMERG	69
8.2.5 TRIM RUNAWAY	69
8.3 ELECTRICAL FAILURE	70
8.3.1 INDICATIONS	70
8.3.2 ACTIONS	70
8.3.3 WHAT EACH BUS CARRIES	70
8.4 GROUND PROXIMITY RECOVERY	71
8.4.1 RECOVERY	71
8.5 PARS - PILOT ACTIVATED RECOVERY SYSTEM	72
8.6 JETTISON	73
8.7 EMERGENCY LANDING GEAR EXTENSION	74
8.8 LOSS OF PRESSURISATION	75
8.8.1 ACTIONS	75
8.9 EJECTION	76
8.9.1 BEFORE FLIGHT	76
8.9.2 TO EJECT	76
9. AVIONICS AND SYSTEMS	78
9.1 FRONT AND REAR COCKPIT	78
9.2 P.D.U. - PILOT DISPLAY UNIT	79
9.2.1 P.D.U. - PILOT DISPLAY UNIT - AP	81
9.2.2 P.D.U. - PILOT DISPLAY UNIT - ILS	82
9.3 G.H.D - GET HOME DISPLAY (24,92)	83
9.4 ENGINES INDICATORS (S.E.F.D) (35,103)	84
9.5 SURFACES INDICATORS (T.F.G.D) (26,27,28,94,95,96)	85
10. U.F.C.P. - UP FRONT CONTROL PANEL (23,91)	87
10.1 COMMUNICATIONS	88
10.1.1 COMM1 / COMM2 MENU	88
10.2 IFF	89
10.3 FPL (FLIGHT PLAN)	90
10.3.1 FLIGHTPLAN PAGE	91
10.3.2 ADD STEERING POINT PAGE	92
10.3.3 ADD SP PAGE	93
10.3.4 ADD SP PAGE	94
10.4 SP (STEERING POINT) PAGE	95
10.5 WP PAGE	96
10.5.1 NEW MARK PAGE	98
10.5.2 NEW WP PAGE	99
10.5.3 NEW WP LAT/LONG MODE PAGE	100
10.5.4 NEW WP BRG/RNG MODE PAGE	101
10.5.5 REF PT PAGE	103

10.6 DATA PAGE	104
10.6.1 DATA PAGE 2	105
10.6.2 DATA PAGE 3	106
10.6.3 DATA FUEL LIMITS PAGE	106
10.6.4 DATA HEIGHT PAGE	107
10.6.5 GPWS SETTINGS PAGE	108
10.6.6 EGI PAGE	109
10.7 AP/FD PAGE (AUTO PILOT)	110
10.8 TACAN PAGE	111
10.9 VOR/ILS PAGE	111
10.10 CLOCK PAGE	112
10.11 AUTO PILOT/FLIGHT DIRECTOR IN DETAIL	113
11. M.F.D - MULTI FUNCTION DISPLAY (34,102)	116
11.1 MFD MENU 1	117
11.2 MFD MENU 2	118
11.3 FCS FORMAT - PAGE 1	119
11.3.1 FCS FORMAT - PAGE 2	120
11.4 SP FORMAT	121
11.4.1 TYPE SELECTION	122
11.4.2 APT (AIRPORT) SELECTION	123
11.4.3 FPL (FLIGHT PLAN) SELECTION	124
11.5 STATUS FORMAT	125
11.6 SYS FORMAT	126
11.6.1 SYS FORMAT - FUEL PAGE	127
11.7 MAP/TSD FORMAT	128
11.8 HSI FORMAT	129
11.8.1 HSI FORMAT - ACTIVE NAV SOURCE	130
11.8.2 HSI FORMAT - SECONDARY NAV SOURCE	131
11.8.3 HSI FORMAT - NAV SOURCES DISPLAYED	132
11.9 CADI FORMAT	133
11.9.1 CADI AP/FD	135
11.9.2 CADI AP/FD KNOBS	136
11.9.3 CADI ILS LOCALIER	137
11.10 IN/GPS FORMAT	138
11.10.1 EGI SET	141
11.11 COMM1 AND COMM2 FORMAT	143
11.12 FCR	144
11.13 HSD	145
11.14 CNI	146
11.14.1 COMM 1 SET SUBPAGE	147
11.14.2 FREQ SET SUBPAGE	148
11.14.3 CHAN SET SUBPAGE	149
11.14.4 COMM 1 LIST SUBPAGE	150
11.14.5 VOR/ILS SET SUBPAGE	151
11.14.6 VOR/ILS LIST SUBPAGE	152

11.14.7 VOR/ILS FREQ SET SUBPAGE	153
11.14.8 TACAN SET SUBPAGE	154
11.14.9 TACAN CHAN SET SUBPAGE	156
11.14.10 TACAN LIST SUBPAGE	157
11.14.11 IFF SET SUBPAGE	158
11.14.12 M1, M2, M3A, MS SET SUBPAGE	159
12. DATA TRANSFER CARTRIDGE	161
12.1 DATA CARTRIDGE EDITOR	161
12.2 COMM Adjustment	162
12.3 NAV-AID Adjustment	163
12.4 WPT Adjustment	164
12.4.1 WPT Addition Option 1	165
12.4.2 WPT Addition Option 2	166
12.4.3 WPT Edit	167
12.5 DWSIM MISSION EDITOR	168
13. VR SUPPORT	170
14. VARIOUS	172
15. AURAL WARNINGS AND CAUTIONS	174
15.1 AURAL MESSAGES	174
15.2 WARNING AND CAUTION MESSAGES	175
16. DISPLAY SYMBOLS	178
16.1 STEERPOINT SYMBOLS	178
17. CUSTOM COMMANDS	180
17.1 HOTAS - CONTROL STICK	180
17.2 HOTAS - THROTTLE	180
17.3 FRONT COCKPIT - LEFT CONSOLE	180
17.4 FRONT COCKPIT - MAIN PANEL	181
17.5 FRONT COCKPIT - CENTRE PANEL	182
17.6 FRONT COCKPIT - RIGHT CONSOLE	182
17.7 FRONT COCKPIT - EJECTION SEAT	183
17.8 REAR COCKPIT	184
17.9 AIRCRAFT MENU AND GROUND EQUIPMENT	186

PAGE INTENTIONALLY LEFT BLANK

1. INTRODUCTION

Welcome to the DeltaWing Simulations (DWSim) Leonardo Aermacchi M-346AJT add-on for X-Plane. We are proud to bring this amazing training aircraft to X-Plane.

The Leonardo Aermacchi M-346AJT, is one of the world's most sophisticated trainer jet, in use by many of the world's air forces. The M-346 Master trainer is flown by:

Italian Air Force (ITAF)	Hellenic Air Force (HAF)
Israeli Air Force (IAF)	Qatar Emiri Air Force (QEAF)
Republic of Singapore Air Force (RSAF)	Turkmenistan Air Force
Polish Air Force (PAF)	

The prime focus of this add-on is to provide simmers with an aircraft that they can fly in simulated demonstration air shows and to familiarise them with the operation of the aircraft in the simulated X-Plane environment. A big focus for the team was to take advantage of X-Plane's sophisticated flight modelling capabilities and to match the real aircraft's performance as closely as possible. This combination makes it possible to fly an aircraft designed to be fundamentally unstable, and thus be very manoeuvrable. Various optional aircraft equipment types have also been included, with more to come.

Please check DWSim's site, pages and channels for news regarding new updates and developments.

The development team consists of:

Kostas D. Koronakis (Graphic Design, 3D modelling, Textures, Sound editing, Product Testing)
Dimitris Koronakis (Lead Programmer, product tester)
Andrzej Borysewicz (3D modeling, product testing)

The entire team would like to thank our friends in the Simulation community. We are supremely grateful for your continued support and encouragement!

We would also like to thank Leonardo company for trusting us to develop this beautiful jet.

DeltaWing Simulations

Internet Site : www.deltawingsim.com

email : info@deltawingsimulations.com

support : support@deltawingsimulations.com

Facebook Page : https://www.facebook.com/?ref=tn_tnmn



Aermacchi

M-346



LEONARDO

DeltaWing Simulations © 2020-2026

FOR FLIGHT SIM ENTERTAINMENT ONLY - DO NOT USE IN REAL OPERATIONS !

PAGE INTENTIONALLY LEFT BLANK

2. INSTALLATION

To install the package, simply unzip it and put resulting folder into X-Plane/Aircrafts folder. If you prefer you can create sub-folder called My Aircraft (or any name you like) in X-Plane/Aircraft folder.

After opening the package, you will see Activation Window, type in or paste serial number you received when you purchased the package, Press Activate and Restart X-Plane or reload the aircraft.

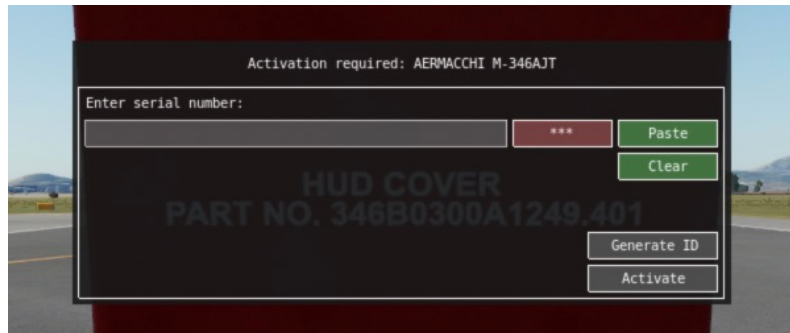


Figure 3



Figure 2

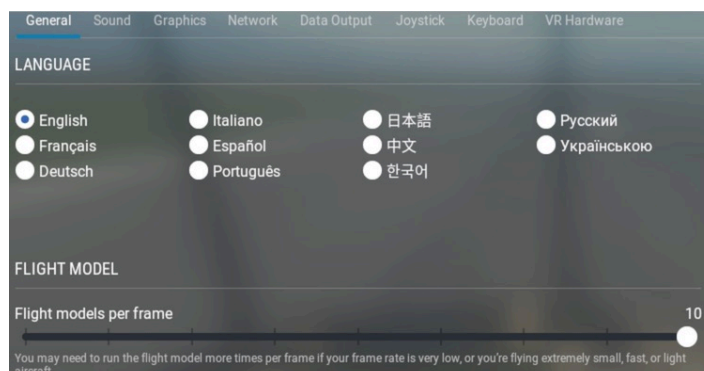


Figure 1

Another important setting is to adjust the “Flight Models Per Frame” option to “10” in order to have smooth experience with the simulation.

2.1 SETUP

There are several things we need to be aware of for proper operating of the aircraft.

Please set No Failures in X-Plane (Failures Submenu in AIRCRAFT Menu) by pressing “Fix All Systems” and make sure that “Set mean time between failures” radio box is NOT checked.

If you want the jet to be ready for takeoff on, check the “Start with engines running” checkbox. Otherwise you start the flight with “Cold and Dark” cockpit.



Figure 4

FOV (Field of View), the higher the number, the more distortion BUT also you will see more objects at one in the cockpit. We recommend that FOV in a range 75-90.

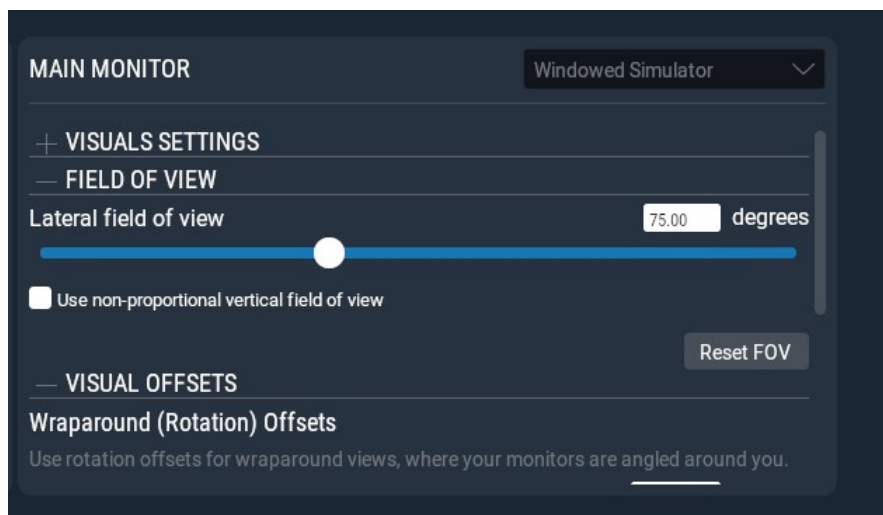


Figure 5

PAGE INTENTIONALLY LEFT BLANK

3. SUPPORT

3.1 SKUNKCRAFTS UPDATER SUPPORT

M-346 Package supports SkunkCrafts Updater.

IT IS VERY IMPORTANT YOU HAVE THE LATEST VERSION OF THE PACKAGE to avoid frustration and unnecessary posts in forums. Please read below carefully and follow directions

Copy your DWSim_M346_prefs.txt file located in main package folder and paste somewhere outside of the X-Plane folder. After Updater ran, just replace new DWSim_M346_prefs.txt file with the one you just saved. RESTART X-Plane and authenticate

The purpose of using SkunkCrafts Updater is to save time and servers load when updating the package after we push an Update. Update usually has much less files than the original package that is in the org store and it is much faster for everybody to upload some files than the whole package. The whole package also gets uploaded to org store but much less frequently, usually every few months, while our updates available via SkunkCrafts Updater are quite frequent.

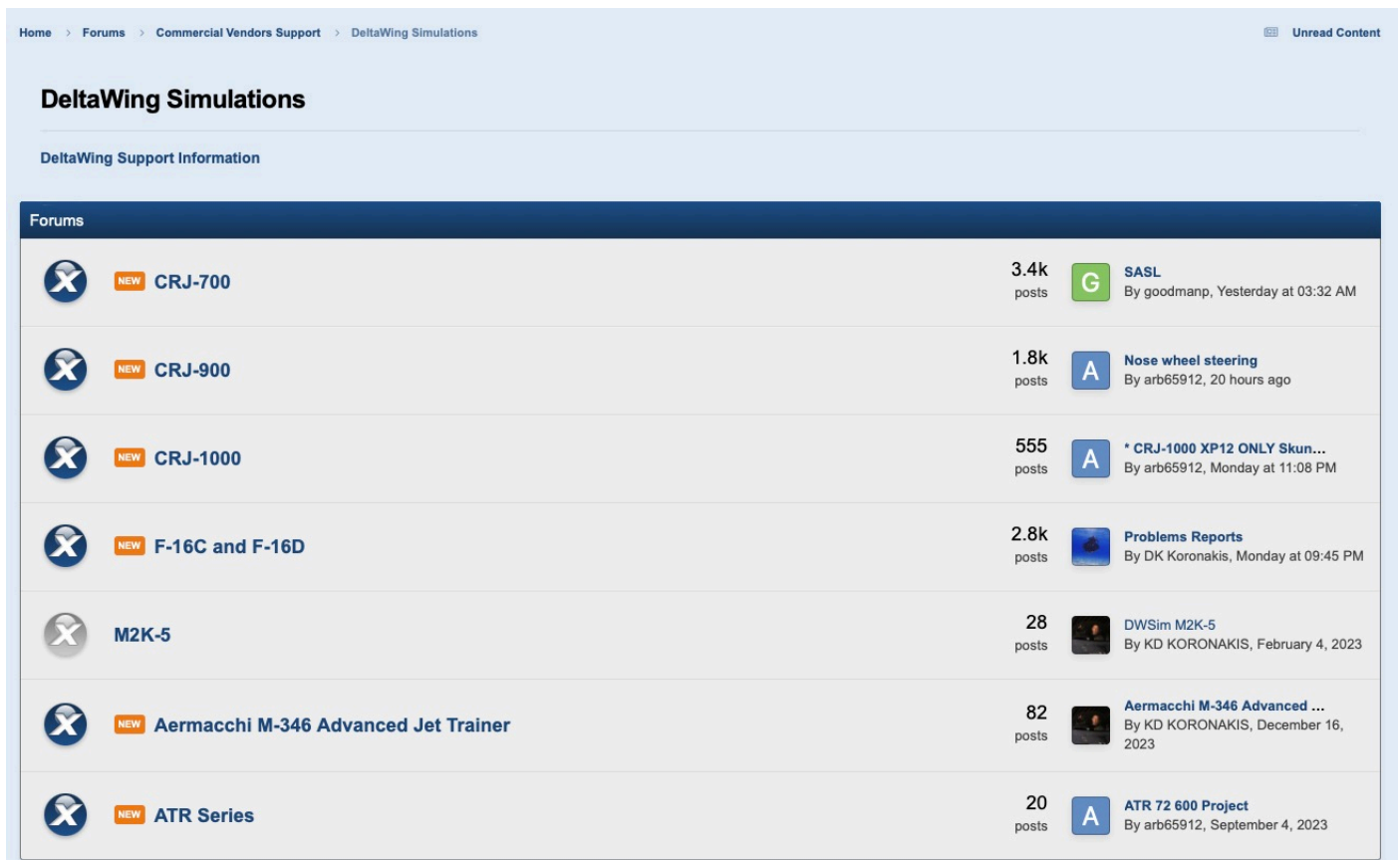
Below is the link to the Updater Standalone software in XPlane.org forums

[SkunkCrafts Updater Standalone client](#)

3.2 X-PLANE.ORG - FORUM SUPPORT

Please use org forums for support and reporting problems as well as general observations and wishes, link below :

<https://forums.x-plane.org/index.php?/forums/forum/585-deltawing-simulations/>



Home > Forums > Commercial Vendors Support > DeltaWing Simulations

Unread Content

DeltaWing Simulations

DeltaWing Support Information

Forums

Topic	Posts	Thumbnail	Author	Time
 NEW CRJ-700	3.4k posts		SASL	By goodmanp, Yesterday at 03:32 AM
 NEW CRJ-900	1.8k posts		Nose wheel steering	By arb65912, 20 hours ago
 NEW CRJ-1000	555 posts		* CRJ-1000 XP12 ONLY Skun...	By arb65912, Monday at 11:08 PM
 NEW F-16C and F-16D	2.8k posts		Problems Reports	By DK Koronakis, Monday at 09:45 PM
 M2K-5	28 posts		DWSim M2K-5	By KD KORONAKIS, February 4, 2023
 NEW Aermacchi M-346 Advanced Jet Trainer	82 posts		Aermacchi M-346 Advanced ...	By KD KORONAKIS, December 16, 2023
 NEW ATR Series	20 posts		ATR 72 600 Project	By arb65912, September 4, 2023

Figure 6

PAGE INTENTIONALLY LEFT BLANK

4. GLOSSARY

A

A/A	Air to Air
A/G	Air to Ground
A/P	Autopilot
A/Z	Alphabetic (A–Z) entry mode on the UFCP keypad
AC	Alternating Current
ACM	Air Combat Manoeuvring
AFT	Rear cockpit — the rear crew station
ALT	Altitude — autopilot altitude-hold mode
ANTI-G	Anti-G system
AOA	Angle of Attack
AP	Autopilot
AP/FD	Autopilot / Flight Director
APP	Approach — autopilot vertical mode
APT	Airport
APU	Auxiliary Power Unit
ATU	Aircraft Transducer Unit — the standby heading and position reference
AWG	Aural Warning Generator

B

BAL	Balance — MFD bezel rocker
BARO	Barometric altimeter setting
BATT	Battery
BCN	Beacon — anti-collision light
BE	Best Endurance
BINGO	Bingo fuel — minimum fuel to recover to base
BRG	Bearing
BRG/RNG	Bearing / Range
BRT	Brightness
BU	Back-up

C

CADI	Combined Attitude Director Indicator
CDM	Course Deviation Marker
CH / CHAN	Channel
CNI	Communication, Navigation, Identification
COMM	Communications radio
COMM1 / COMM2	The two radio transceivers
CPL	Coupled — HSD range coupled to the FCR
CRS	Course
CTR	Contrast
CVRT	Covert

D

DA	Decision Altitude
DAS	Defensive Aids System
DC	Direct Current
DCL	Declutter
DCPL	Decoupled — HSD range independent of the FCR
DEL	Delete
DEMIST	Windshield demisting
DH	Decision Height
DMAX	Deck Maximum
DME	Distance Measuring Equipment
DMIN	Deck Minimum
DTC	Data Transfer Cartridge

E

E/W	East / West
ECM	Electronic Counter-Measures
ECS	Environmental Control System
EGI	Embedded GPS / Inertial navigation unit
EGT	Exhaust Gas Temperature

EI	Engine Indicator
ELEV	Elevation
EMERG	Emergency
ENG	Engine
ENT	Enter
EPM	Electronic Protective Measures
ESC	Escape
EST. ERROR	Estimated position error — IN/GPS format
EXTG	Extinguisher

F

FC	Flight Controls — indicator prefix on the surfaces indicators, as EI is on the engine indicators
FCC	Flight Control Computer
FCR	Fire Control Radar
FCS	Flight Control System
FD	Flight Director
FF	Fuel Flow
FLIR	Forward Looking Infra-Red
FLT	Flight
FLTA	Forward Looking Terrain Avoidance
FN	Function key — UFCP bezel
FN1 to FN8	The eight function keys on the UFCP
FORM	Formation lights
FOV	Field of View
FPA	Flight Path Angle
FPL	Flight Plan
FPM	Flight Path Marker
FREQ	Frequency
FTG	Fuel To Go
FWD	Front cockpit — the front crew station
FZ	Freeze

G

GEN	Generator
GHD	Get Home Display
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
GS	Ground Speed; also Glide Slope, according to context

H

HAF	Hellenic Air Force
HDG	Heading
HMD	Helmet Mounted Display
HNAV	Horizontal Navigation — autopilot lateral mode
HOTAS	Hands On Throttle And Stick
HSD	Horizontal Situation Display
HSI	Horizontal Situation Indicator
HUD	Head-Up Display
HYD	Hydraulic
HYDT	Hydraulic Temperature

I

IAF	Israeli Air Force
ICS	Intercommunication System
IDENT	Identification — IFF
IFF	Identification Friend or Foe
IH	Indicated Height
ILS	Instrument Landing System
IN	Inertial Navigation
IN/GPS	Inertial Navigation and GPS — the MFD format carrying the EGI and ATU solution
INOP	Inoperative
INST	Instrument lighting
ITAF	Italian Air Force

J
 JOKER Joker fuel — fuel-state warning above Bingo

K
 KIAS Knots Indicated Airspeed
 KTAS Knots True Airspeed

L
 L/R Left / Right
 LAT/LONG Latitude / Longitude
 LBS/MIN Pounds per minute — fuel flow
 LDG Landing
 LEF Leading Edge Flap
 LOC Localizer
 LT Light

M
 M3A Mode 3/A — IFF
 MAP/TSD Map / Tactical Situation Display — MFD format
 MASS Master Armament Safety Switch
 MB Millibar
 MC Mode C — IFF
 MCSG Mission Computer and Symbol Generator
 MFD Multi-Function Display
 MIDCAS Mid-Air Collision Avoidance System
 MKR Marker beacon
 MNT Monitor
 MRK Mark
 MS Mode S — IFF
 MSD Minimum Safe Distance
 MSL Mean Sea Level

N
 N/A Not available
 N/S North / South
 NAV Navigation
 NDB Non-Directional Beacon
 NH High-pressure compressor speed
 NL Low-pressure compressor speed
 NVG Night Vision Goggles

O
 OAT Outside Air Temperature
 OBOGS On Board Oxygen Generating System
 OFS Offset — offset waypoint
 OXY Oxygen

P
 PAF Polish Air Force
 PARS Pilot Activated Recovery System
 PDU Pilot Display Unit
 PG Page
 PT Point — as in REF PT, reference point
 PTT Push To Talk
 PWR Power

Q
 QEAF Qatar Emiri Air Force

R
 RALT Radar Altimeter
 REF PT Reference Point

RF Radio Frequency
 RMVL Removal — rain removal
 RNG Range
 ROC Rate of Climb
 RPT Reference Point
 RSAF Republic of Singapore Air Force
 RWR Radar Warning Receiver

S
 SB Data entry and manipulation key on the UFCP
 SEFD Standby Engine and Flight Display — the engines indicators
 SEL Select
 SH Screen Height
 SK Soft Key — MFD bezel
 SK1 to SK20 The twenty soft keys around the MFD bezel
 SMS Stores Management System
 SOV Shut-Off Valve
 SP Steering Point
 SPS Standard Positioning Service — the civil GPS service
 SQ Squelch
 STBY Standby
 SURF Surfaces
 SYS Systems

T
 T/O Take Off
 T9 Predictive numeric text entry on the UFCP keypad
 TACAN / TCN Tactical Air Navigation
 TCT Tactical
 TEF Trailing Edge Flap
 TGP Targeting Pod
 TGT Target
 TH Threshold Height
 TOT Time On Target
 TR Transmit / Receive
 TR+G Transmit / Receive plus Guard
 TRK SAT. Tracked satellites — IN/GPS format
 TSD Tactical Situation Display
 TTG Time To Go

U
 UFCP Up-Front Control Panel
 USBL Usable — fuel
 UTC Coordinated Universal Time

V
 VAR Magnetic variation
 VHF Very High Frequency
 VOL Volume
 VOR VHF Omnidirectional Range
 VOX Voice-activated transmission
 VR Virtual Reality
 VS Vertical Speed

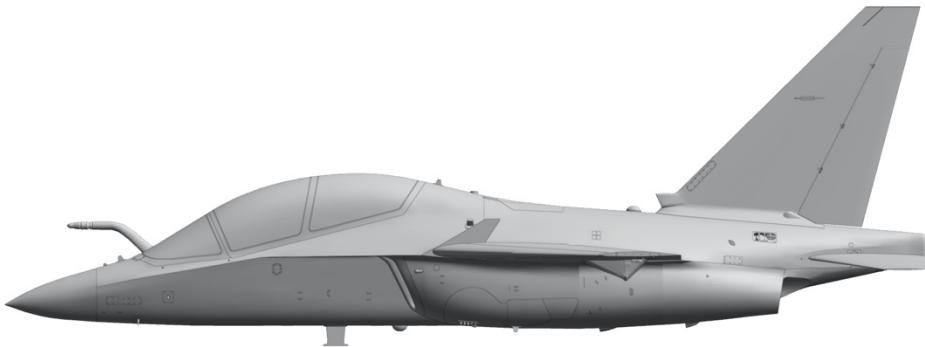
W
 WP / WPT Waypoint

X
 X / Y TACAN channel bands
 XFER Transfer — fuel

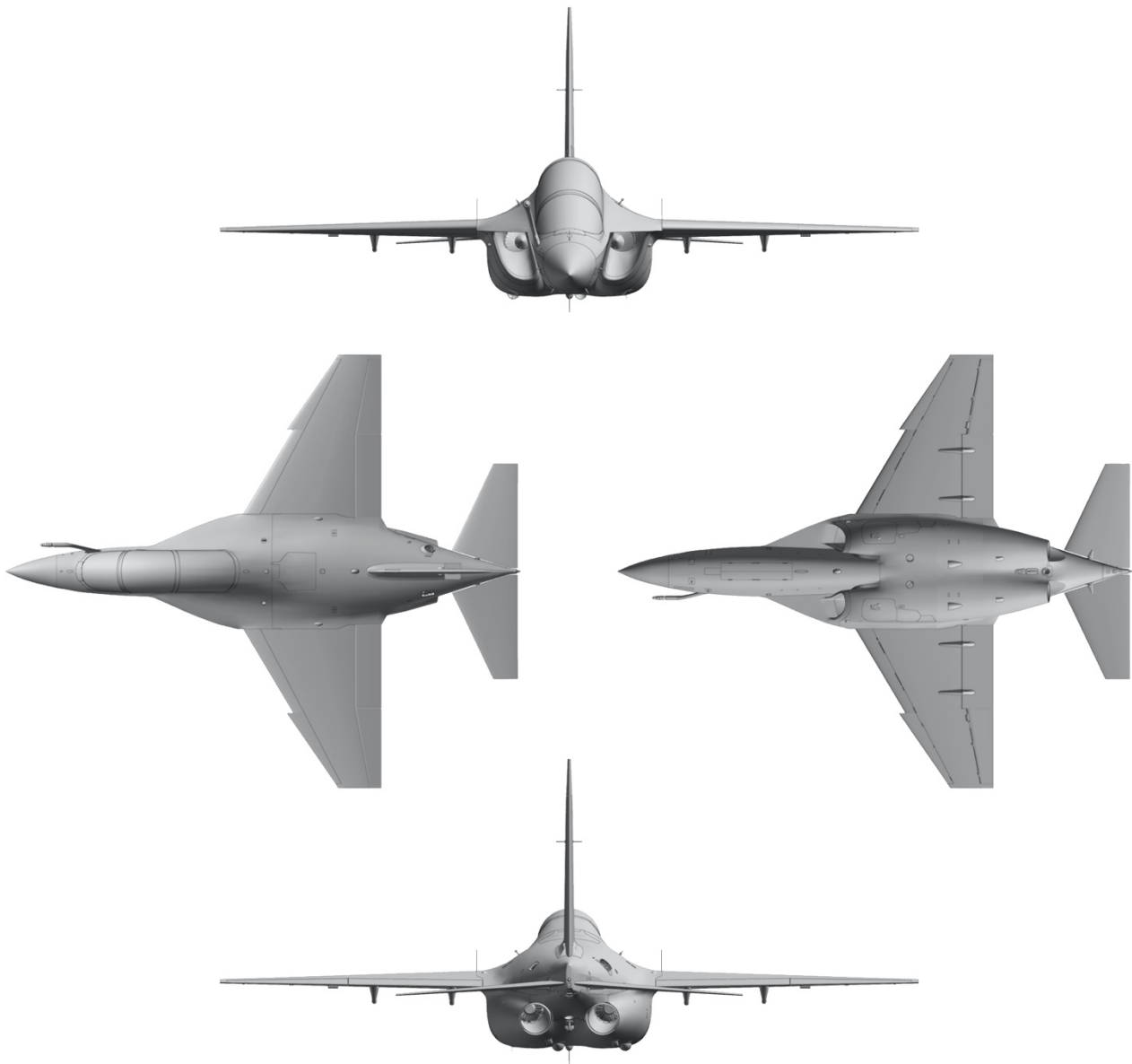
PAGE INTENTIONALLY LEFT BLANK

5. AIRCRAFT DESCRIPTION

The Advanced Jet Trainer



5.1 AIRCRAFT DIMENSIONS



Wing Span	: 9.72m – 31.9 ft
Length	: 11.49m – 37.7 ft
Height	: 4.76m to 4.98m – 15.6 ft to 16.3 ft
Maximum Level Speed	: 1090 km/h – 590 KTAS
Service Ceiling	: 13,714 m – 45000 ft
PowerPlant	: 2 Honeywell F124 – GA – 200 Turbofans
Thrust	: 2 x 2850 kg – 2 x 6280 lb
Crew	: 2

5.2 BASIC INFO

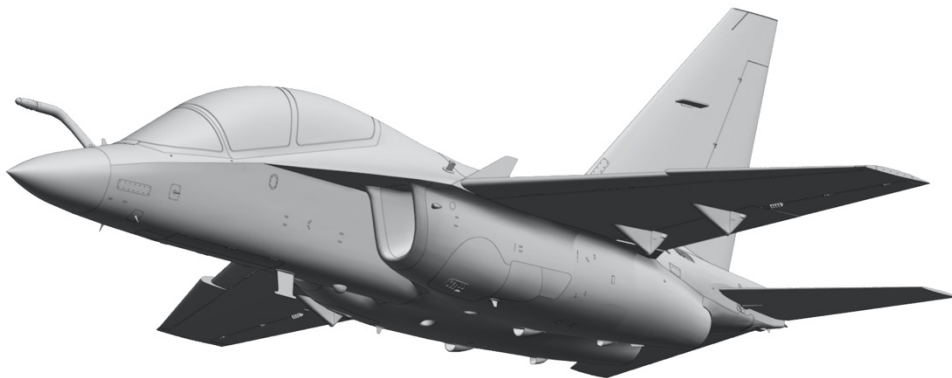
The Aermacchi M-346AJT (Advanced Jet Trainer) is a twin engine, transonic, two seat jet trainer aircraft designed for advanced pilot training and light combat.

The first flight of M-346 was performed in year 2004 and it is currently owned and operated by the Air Forces of Italy, Greece, Poland, Singapore, Israel and Turkmenistan.

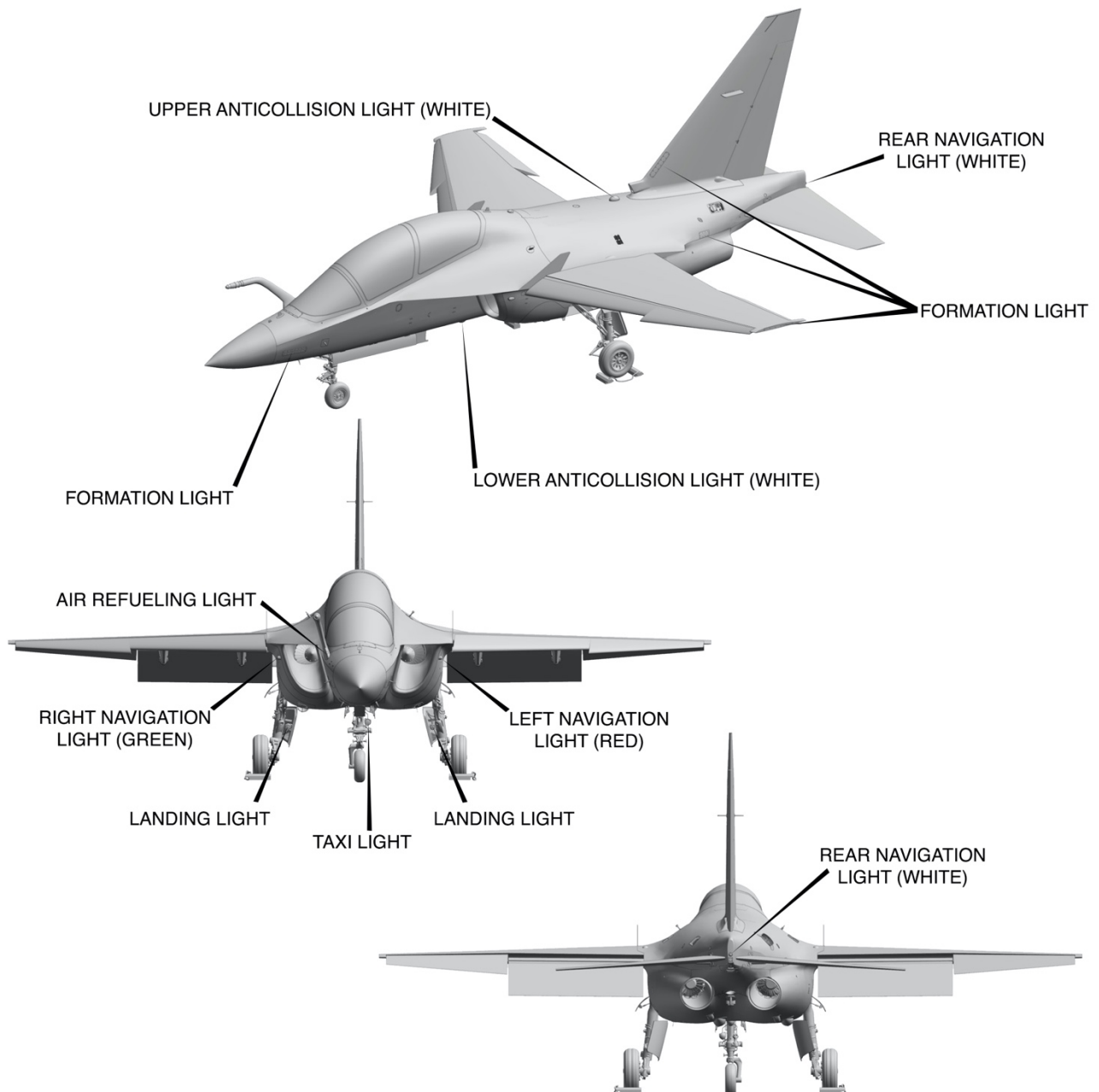
The M-346 was designed as an introductory stage before modern fighter jets, in order to provide pilots the necessary capabilities for this transition.

It incorporates HOTAS, advanced avionics including 3 MFD screens and a full authority quadruplex digital fly by wire flight control system which allows the jet to use various limitations in order to simulate various different fighter jet profiles.

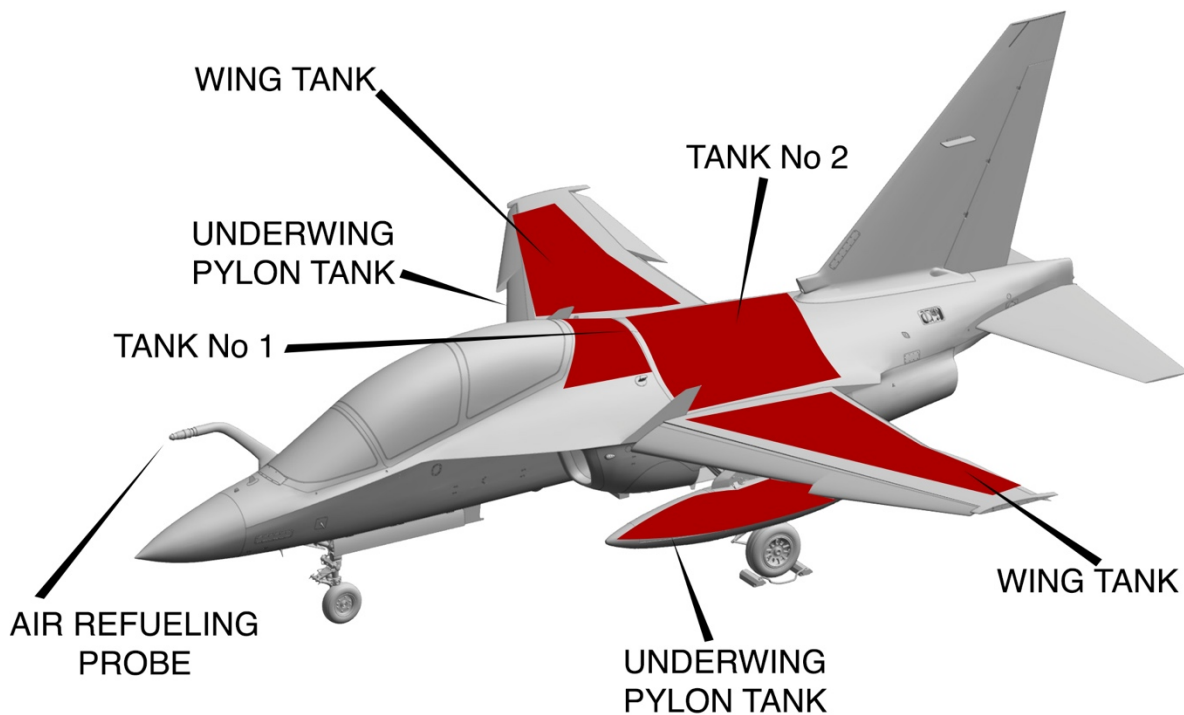
M-346 also includes the PARS system which is a pilot activated recovery system. When pressed by the pilot, it recovers the jet by returning it in straight and level flight.



5.3 EXTERIOR LIGHTS



5.4 FUEL



Fuel is carried in four internal tanks and, when fitted, two pylon tanks. Tank No 2 is the largest by a wide margin and the wing tanks feed inboard, so the figure that matters in flight is the total rather than any single tank.

Each side has its own boost pump. The left pump is powered from the LH AC main bus and the right pump from the RH AC main bus, so losing one AC main bus costs one pump and not the other. The ELECTRICAL POWER SYSTEM section describes which failures take a main bus with them.

Three thresholds are set on the UFCP and called by the MCSG: JOKER 1 and JOKER 2 as advisory fuel states, and BINGO as the minimum to recover to base. With the MCSG off line none of the three is called, which is covered in the MISSION COMPUTER AND SYMBOL GENERATOR section. The FUEL LOW warning is separate and still sounds, because it follows tank contents rather than a figure the pilot set.

TANKS	KG	LB
Tank No 1	180	396
Tank No 2	1200	2640
Wing Tank X 2	310	682
Totals	2000	4400
Pylon Tank X 2	500	1100
Totals	3000	6600

Table 1

5.4.1 FUEL SYSTEM ARRANGEMENT

The tanks are shown on the aircraft above. The diagram below shows how the system is arranged: what each tank holds, which boost pump feeds which engine, and where the warning thresholds sit.

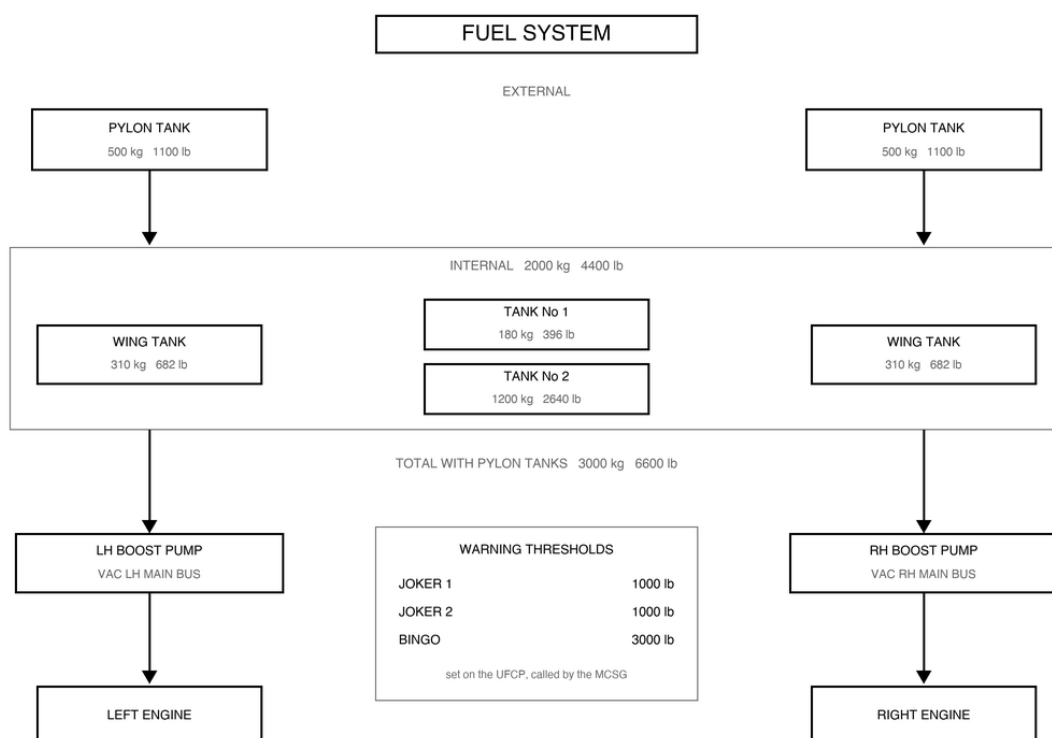


Figure 17

5.5 EJECTION SEAT



1. EJECTION SEAT SYSTEM ARM LEVER
2. EJECTION SEAT HANDLE SAFETY PIN
3. EJECTION SEAT LEVER
4. PILOT'S OXYGEN SWITCH
5. BU/NORM SWITCH
6. SEAT MANUAL SEPARATION
7. SHOULDER STRAPS RELEASE

5.6 COCKPIT LAYOUT

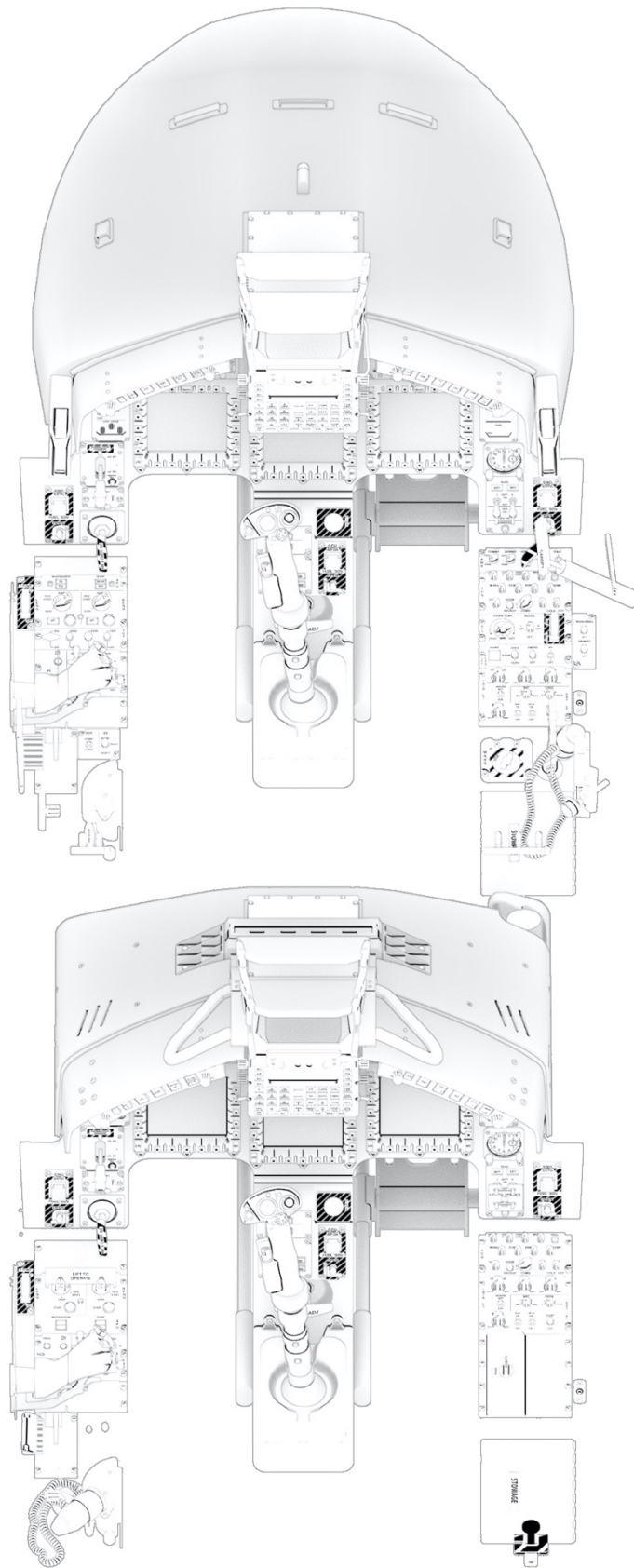


Figure 7

5.6.1 FRONT INSTRUMENT PANEL

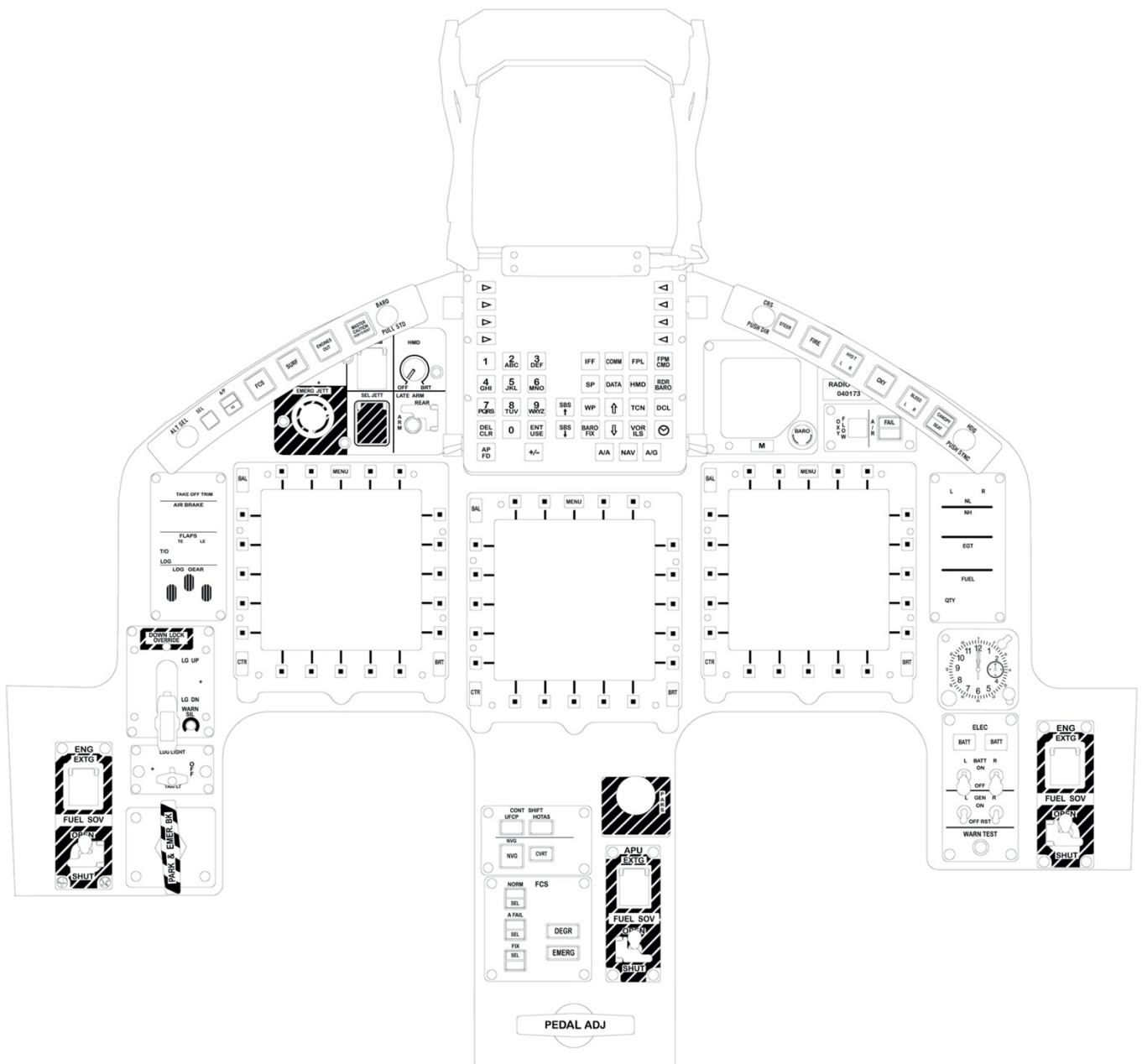


Figure 8

5.6.1.1 FRONT INSTRUMENT PANEL DESCRIPTION

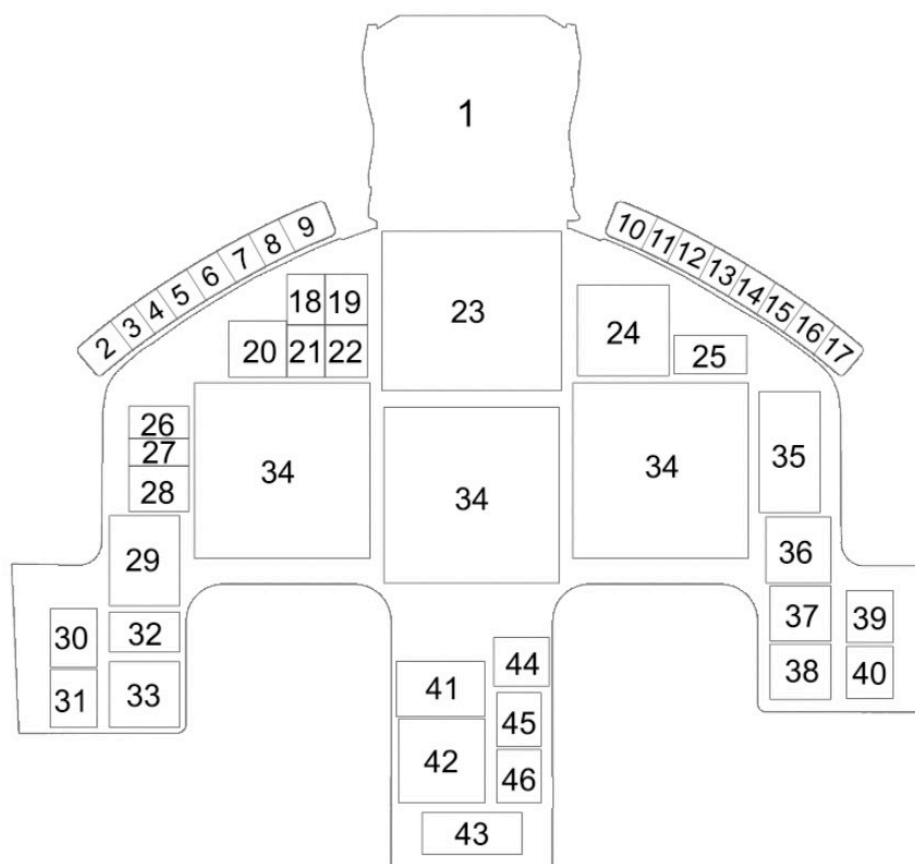


Figure 9

1.	P.D.U. - Pilot Display Unit	24.	Get Home Display (GHD)
2.	ALT SEL Knob	25.	OXYGEN Flow Indicator
3.	ALT SEL Light	26.	SPEEDBRAKE Indicator
4.	A/P Push Button / Light	27.	FLAPS / SLATS Indicator
5.	FCS Warning Light	28.	LANDING GEAR Lights
6.	SURF Warning Light	29.	LANDING GEAR Lever
7.	ENGINES OUT Warning Light	30.	Left Engine Fuel Fire Extinguisher Button
8.	MASTER CAUTION Push Button / Warning Light	31.	Left Engine Fuel Shutoff Switch
9.	BARO Knob / Pull Button	32.	TAXI / LANDING Lights Switch
10.	CRS Knob / Push Button	33.	Emergency / Parking Brake
11.	STEER Light	34.	M.F.D - Multi Function Display
12.	FIRE Warning Light	35.	Standby Engine / Fuel Display
13.	HYDT L/R Warning Light	36.	Clock
14.	OXY Warning Light	37.	Electrical Control Panel - Battery
15.	BLEED L/R Warning Light	38.	Electrical Control Panel - Generators
16.	CANOPY / SEAT Warning Lights	39.	Right Engine Fuel Fire Extinguisher Button
17.	HDG Knob / Push Button	40.	Right Engine Fuel Shutoff Switch
18.	REAL / SIM	41.	Control Shift Panel / NVG Control Panel
19.	HMD	42.	FCS Control Panel
20.	EMERGENCY JETTISON	43.	Pedals Adjustment
21.	SELECTIVE JETTISON	44.	PARS
22.	LATE ARM	45.	A.P.U. Fuel Fire Extinguisher Button
23.	UP Front Control Panel (UFCP)	46.	A.P.U. Fuel Shutoff Switch

Table 2

5.6.1.2 FRONT SIDE CONSOLES

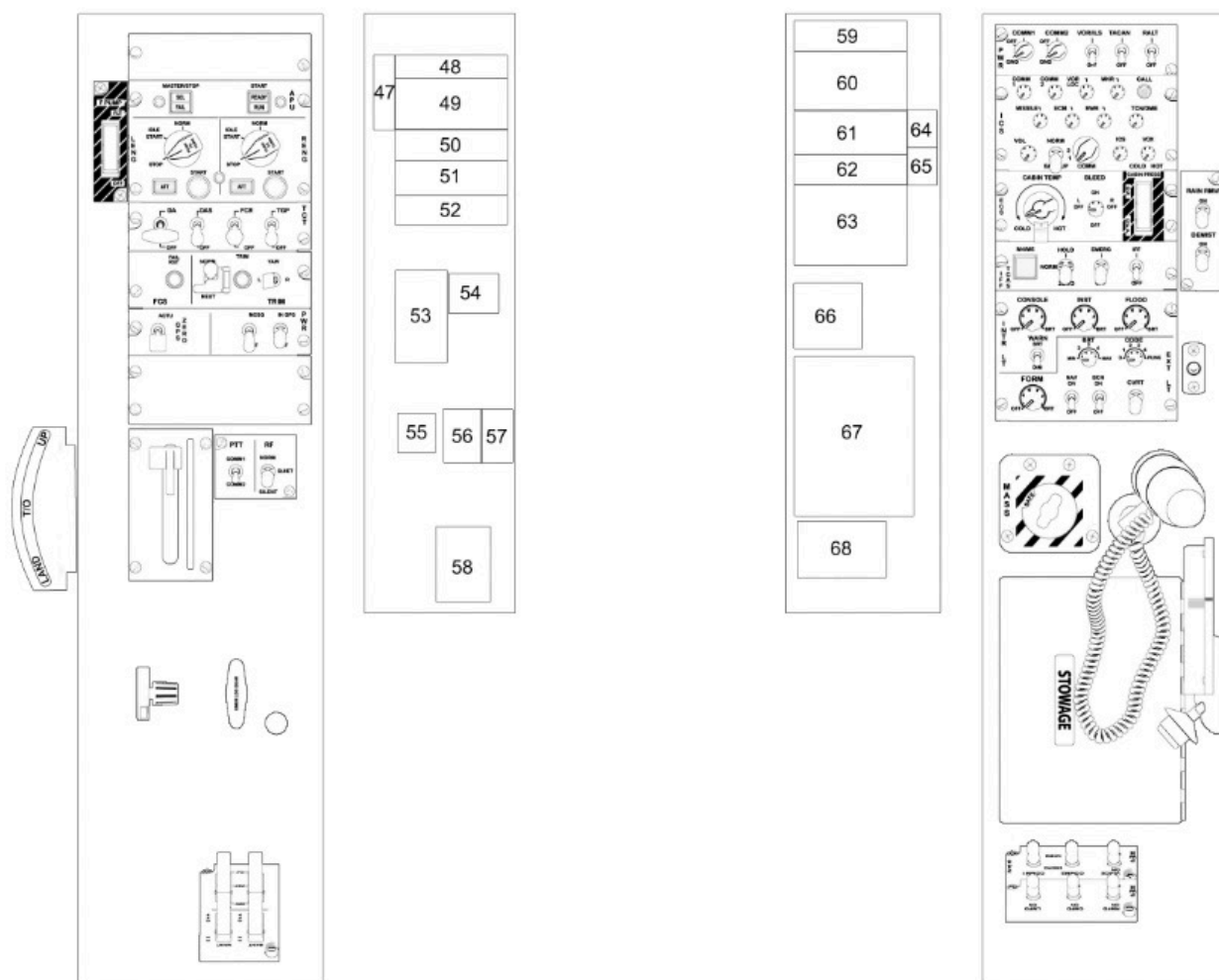


Figure 10

47.	FUEL PUMP Control Panel	58.	Ground Services Control Panel
48.	APU Control Panel	59.	COMM / NAV PWR Control Panel
49.	ENGINE START Control Panel	60.	AUDIO Control Panel
50.	TCT Control Panel	61.	Cabin Temperature / Pressure Control Panel
51.	FCS / TRIM Control Panel	62.	IFF Control Panel
52.	GPS Control panel	63.	Lights Control Panel
53.	FLAPS Lever	64.	RAIN REMOVAL Switch
54.	PTT / RF	65.	DEMIST Switch
55.	AIR REFUELING Light	66.	MASS Control Panel
56.	LANDING GEAR EMERGENCY	67.	Stowage Compartment
57.	ANTI-G Valve Push Button	68.	MFD / COMM Control Panel

Table 3

5.6.2 REAR CREW STATION

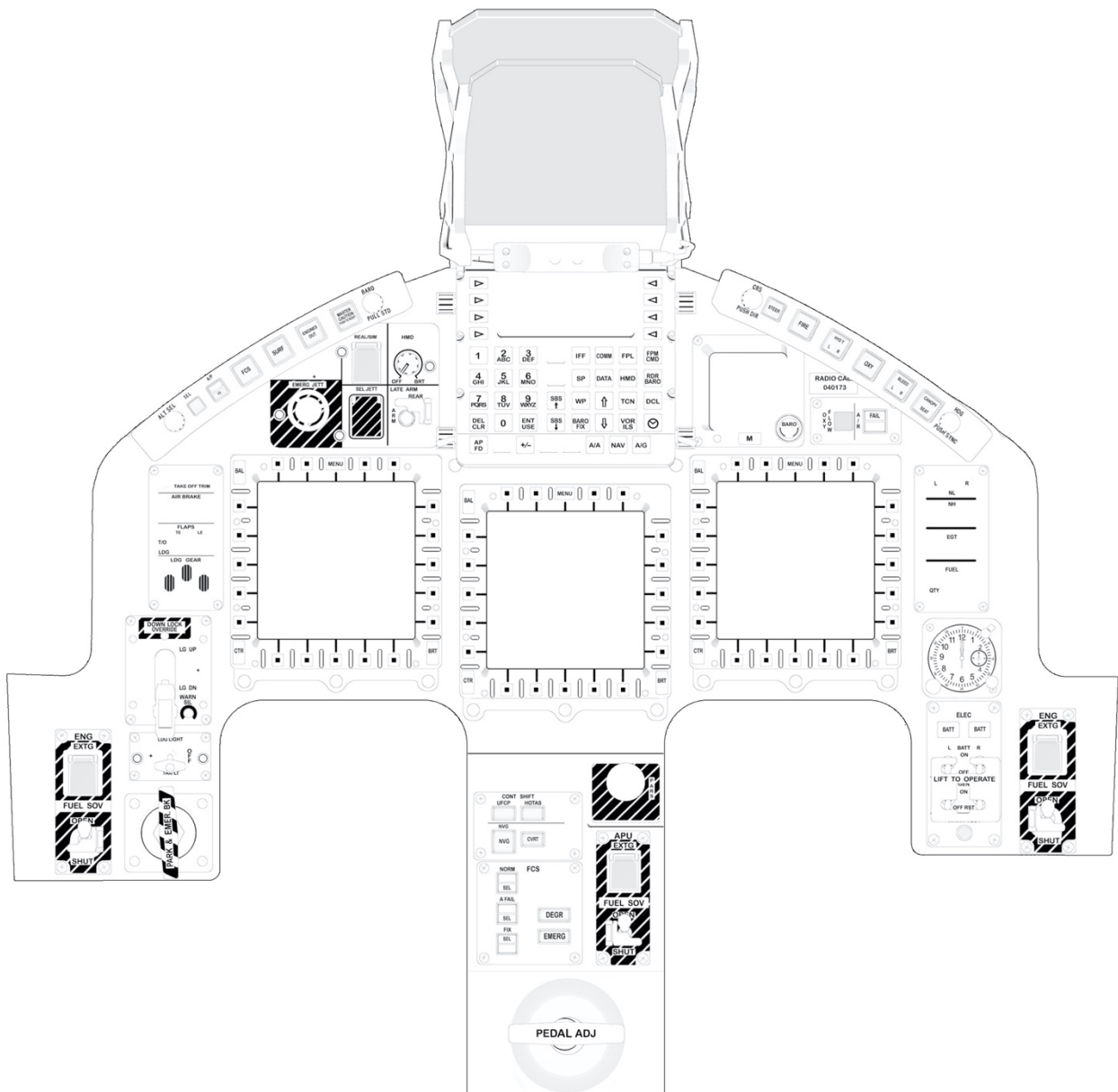


Figure 11

5.6.2.1 REAR CREW STATION DESCRIPTION

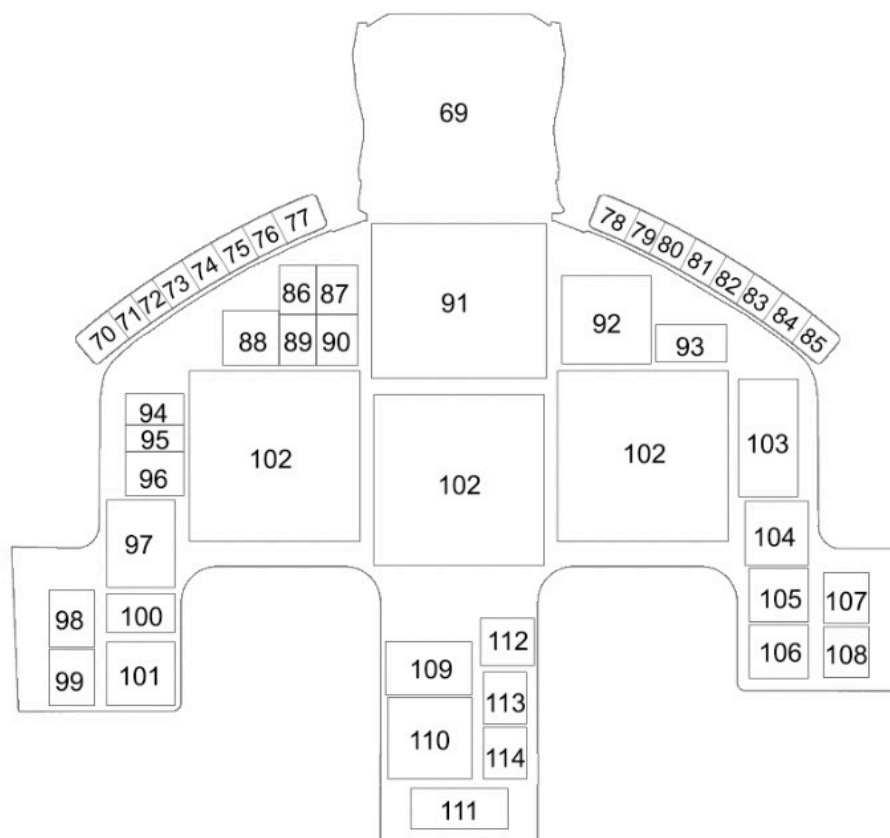


Figure 12

69.	P.D.U. - Pilot Display Unit	92.	Get Home Display (GHD)
70.	ALT SEL Knob	93.	OXYGEN Flow Indicator
71.	ALT SEL Light	94.	SPEEDBRAKE Indicator
72.	A/P Push Button / Light	95.	FLAPS / SLATS Indicator
73.	FCS Warning Light	96.	LANDING GEAR Lights
74.	SURF Warning Light	97.	LANDING GEAR Lever
75.	ENGINES OUT Warning Light	98.	Left Engine Fuel Fire Extinguisher Button
76.	MASTER CAUTION Push Button / Warning Light	99.	Left Engine Fuel Shutoff Switch
77.	BARO Knob / Pull Button	100.	TAXI / LANDING Lights Switch
78.	CRS Knob / Push Button	101.	Emergency / Parking Brake
79.	STEER Light	102.	M.F.D - Multi Function Display
80.	FIRE Warning Light	103.	Standby Engine / Fuel Display
81.	HYDT L/R Warning Light	104.	Clock
82.	OXY Warning Light	105.	Electrical Control Panel - Battery
83.	BLEED L/R Warning Light	106.	Electrical Control Panel - Generators
84.	CANOPY / SEAT Warning Lights	107.	Right Engine Fuel Fire Extinguisher Button
85.	HDG Knob / Push Button	108.	Right Engine Fuel Shutoff Switch
86.	REAL / SIM	109.	Control Shift Panel / NVG Control Panel
87.	HMD	110.	FCS Control Panel
88.	EMERGENCY JETTISON	111.	Pedals Adjustment
89.	SELECTIVE JETTISON	112.	PARS
90.	LATE ARM	113.	A.P.U. Fuel Fire Extinguisher Button
91.	UP Front Control Panel (UFCP)	114.	A.P.U. Fuel Shutoff Switch

Table 4

5.6.2.2 REAR SIDE CONSOLES

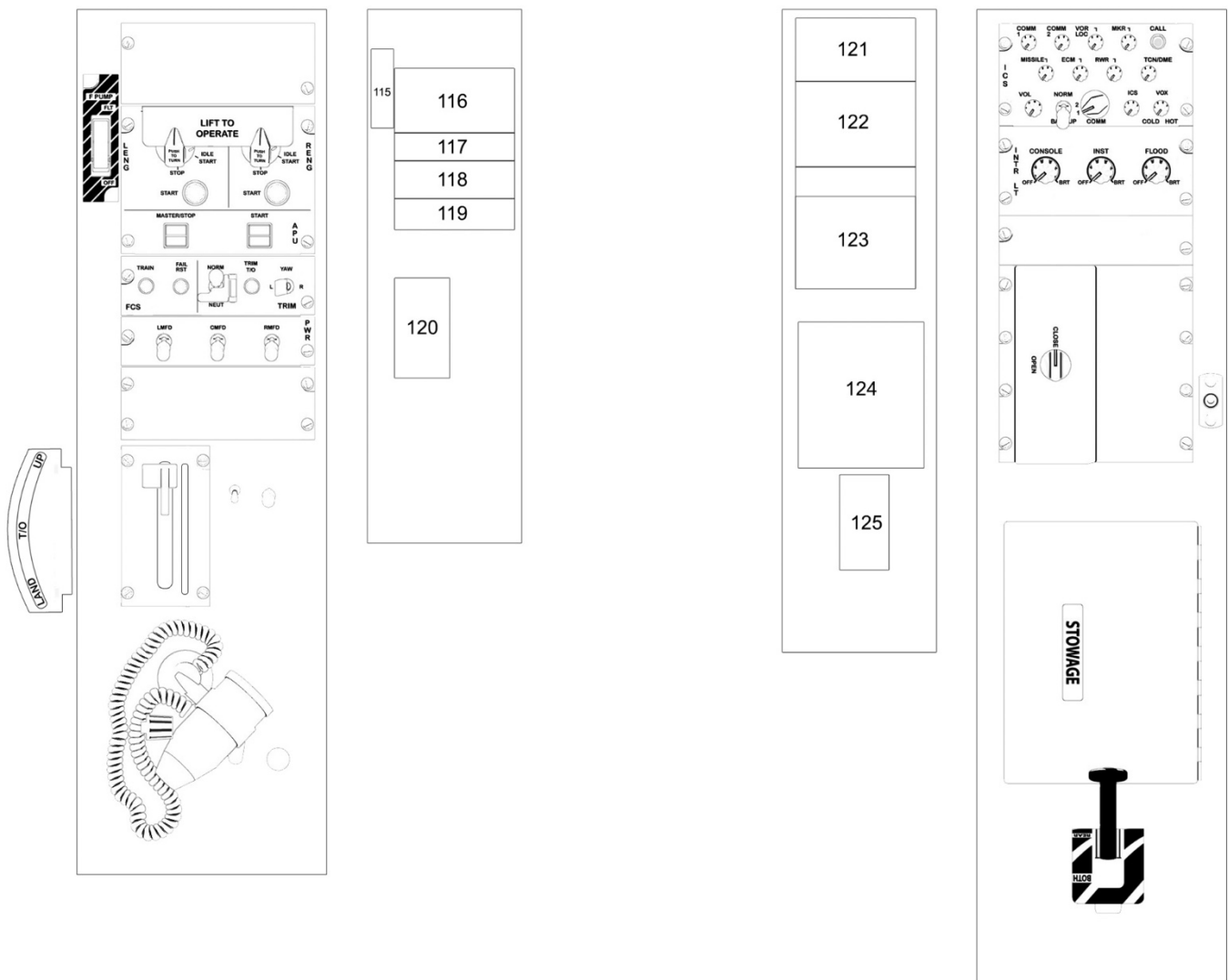


Figure 13

115.	FUEL PUMP Control Panel	121.	COMM / NAV PWR Control Panel
116.	ENGINE START Control Panel	122.	Lights Control Panel
117.	APU Control Panel	123.	Compartment
118.	FCS / TRIM Control Panel	124.	Stowage
119.	MFD Control panel	125.	EJECTION SEQUENCE Lever
120.	FLAPS Lever		

Table 5

5.7 FLIGHT CONTROL SYSTEM

The M-346 has no mechanical connection between the stick and the control surfaces. A full authority quadruplex digital fly-by-wire Flight Control Computer reads the stick, the trim and the aircraft's own motion sensors, and drives the horizontal tail, the ailerons and the rudder directly. What the stick asks for is a manoeuvre, not a surface deflection.

The FCC is built from four channels, A to D, each with a main and a backup electrical supply. The control laws run for as long as at least one of those eight supplies is live. If all of them are lost the FCC stops driving the surfaces altogether.

5.7.1 NORMAL LAW

Above 75 KIAS the aircraft is flown in normal law. In pitch the stick and the pitch trim command normal acceleration; in roll the stick commands a roll rate. The FCC then works out the surface deflection needed to produce it and trims itself continuously in all three axes.

- Pitch command authority builds with airspeed up to a maximum of +8.5 g and –3 g, and the pitch rate that gets there is limited to roughly 25 degrees per second nose up and a much lower rate nose down.
- An angle of attack limiter holds the aircraft to 25 degrees AOA positive and 15 degrees negative. The positive limit tightens by up to 5 degrees when full roll is applied, and is relaxed by up to 10 degrees with the gear down or below 100 KIAS, so that approach AOA remains available.
- Roll rate is commanded up to 360 degrees per second, reduced progressively as angle of attack rises and as airspeed falls.
- The rudder pedals command sideslip rather than rudder angle, and the authority given to them is washed out as angle of attack increases. The FCC damps yaw and holds the aircraft in balance without pilot input.
- The slats are scheduled automatically by angle of attack and Mach number with the flaps up, and by flap position with the flaps out. There is no slat lever.
- Flap load relief: if the flap placard speed is exceeded (230 KIAS with T/O selected, 200 KIAS with LAND selected) the flaps retract automatically without the lever moving, and redeploy about 10 knots below the limit.

5.7.2 DIRECT LINK

Below 55 KIAS in flight the FCC reverts to direct link. The stick then drives the surfaces directly: there is no g command, no roll rate command, no angle of attack limiting and no envelope protection of any kind. Between 55 and 75 KIAS the two laws are blended in proportion, so the protections fade in and out rather than switching. On the ground roll and yaw are always direct.

The reversion is annunciated as DIRECT LINK on the PDU, in the same green as the rest of the head up symbology, and in a red box on the CADI format of the MFD. No other format shows it. It is called aurally as well: DIRECT LINK once on entry, after which ENVELOPE takes over and the two alternate, because below 55 KIAS the envelope warning is active too.

5.7.3 CAREFREE HANDLING AND WARNINGS

In normal law the FCC will not let the aircraft be flown out of its envelope, but it warns before it intervenes. Angle of attack monitoring is armed below 100 KIAS or with the landing gear down:

- STALL: Between 17 and 22 degrees angle of attack. Displayed on the PDU and the MFD, called out aurally, and it raises MASTER CAUTION. The autopilot disconnects.
- ENVELOPE: Above 22 degrees angle of attack, or below 55 KIAS in flight. Displayed and called out in the same way, and it raises MASTER CAUTION.

5.7.4 FCS INDICATIONS

The FCS panel (42 front cockpit, 110 rear cockpit) shows what the flight control system is doing:

- NORM: The aircraft is being flown in normal law.
- DEGR: The system has reverted to direct link.
- A FAIL: One or more of the four FCC channels has lost both of its electrical supplies. The remaining channels carry on flying the aircraft.
- EMERG: All four channels are unpowered and the FCC is no longer driving the control surfaces.

A FAIL and EMERG both illuminate the FCS caption on the glareshield and trigger MASTER CAUTION. The same information appears on the FCS format of the MFD as FCS STATUS (NO FAIL or FAIL) and FCS MODE (NORM or DIRECT), alongside flight control surface positions, trim settings, hydraulic pressures and tyre temperatures.

5.8 ANTI-ICE SYSTEM

The anti-ice system is fully automatic. There is no anti-ice switch in either cockpit and nothing for the crew to select: the system is powered from the LH essential DC bus through the air conditioning system's controller, and it runs whenever that bus is live.

5.8.1 WHAT IS PROTECTED

- Both angle of attack vanes.
- Both engine air intakes and cowlings.
- The windshield.
- All three pitot heads and all three static ports (front cockpit, rear cockpit and standby).

Everything above is heated together, as a single system. There is no separate engine and airframe selection and no partial state: it is either running or it is not.

In practice anti-ice comes on with the LH essential bus during cockpit preparation and stays on for the rest of the flight. Losing that bus removes anti-ice protection along with everything else that bus feeds.

5.8.2 RAIN REMOVAL AND DEMIST

Two guarded switches on the right console deal with the windshield itself rather than with icing. Both cockpits work the same pair, so either pilot can operate them.

- RAIN REMOVAL: Directs engine bleed air over the windshield to clear rain. An aural RAIN REMOVAL message confirms the selection, a reminder that the system is drawing bleed air from the engines. Selecting the switch again turns it off.
- DEMIST: The switch is modelled and moves under its guard, but it has no effect on the windshield in this version.

5.9 IN/GPS ALIGNMENT

Navigation is provided by an EGI (Embedded GPS/Inertial unit), supported by an ATU (Attitude and Heading Reference Unit) as an independent attitude and heading source.

The EGI is brought on line with the guarded IN/GPS switch on the PWR panel, on the left console of each cockpit. The switch needs the EGI electrical bus powered before it will do anything, so it is selected after the aircraft has electrical power.

5.9.1 ALIGNMENT

The inertial platform has to find true north before it can navigate, and that takes time. From power up the EGI runs STANDBY for a few seconds, then GC ALIGN while it gyrocompasses. The header reads IN/GPS ALIGNMENT throughout. When it finishes, IN MODE reads NAV READY in green and the header returns to IN/GPS. NAV is then commanded by the pilot, either with NAV on the IN/GPS format or EGI NAV on the UFCP.

How long the alignment takes depends on the satellites. With a healthy fix aiding the filter it settles in well under a minute; with no usable fix it is several minutes of gyrocompassing, and with no fix and no position entered it does not converge at all. Until it finishes the EGI is not a navigation source, so an HSI set to EGI shows no bearing or distance.

Two further modes exist for a solution that is usable but not yet complete. DEG-NAV READY is shown in amber once the alignment is good enough to navigate on, and accepting it enters DEG-NAV. The alignment is not abandoned when this is done: it keeps converging underneath and the mode upgrades itself to NAV when it completes.

5.9.2 ALIGNMENT METHODS

The gyrocompass alignment can be shortened, or replaced, by telling the platform what it would otherwise have to work out. All of them need the EGI powered:

- GC: Restarts the full gyrocompass alignment from the beginning.
- FAST: Shortens the alignment that is running, trading accuracy for time.
- IFA: In flight alignment, aligning against the satellites. Offered from standby, airborne.
- SH: Stored heading. Uses a true heading entered by the pilot instead of gyrocompassing for it, so only a short settle remains. Needs latitude, longitude and heading all entered.
- BATH: Best Available Magnetic Heading. Uses the heading the aircraft already has, so no heading needs entering. Needs latitude and longitude.
- DEG NAV: Accepts the degraded solution and navigates on it while the alignment continues.

An aircraft started with the engines already running begins aligned, in NAV.

5.9.3 ENTERING ALIGNMENT DATA

Present latitude, present longitude and true heading are entered either on the UFCP EGI page, reached from the second DATA page, or on the EGI SET page of the IN/GPS format. Both write to the same place and validate the same way; only the way the digits are collected differs. PPOS on the UFCP fills both coordinates from the aircraft's own position, which is the quick way in on the ground and the way out of a mistyped entry.

5.9.4 WHAT THE IN/GPS FORMAT SHOWS

The IN/GPS format on the MFD is the status page for the whole navigation set. Values shown in cyan come from the ATU, the rest from the EGI:

- EGI POSITION and ATU LATITUDE: Present position in latitude and longitude.
- EGI MAG HDG, ATU MAG HDG and EGI TRUE HDG: Magnetic and true heading from each source.
- EGI MAG VAR and ATU MAG VAR: Magnetic variation, with the hemisphere letter.
- MSL ALT: Barometric altitude in feet.
- IN MODE, GPS MODE and ATU MODE: The operating mode of each unit.
- TRK SAT. and EST.ERROR: Satellites tracked and the estimated position error in feet.
- DAY and UTC: Date and coordinated universal time, both taken from the simulator.

Comparing the EGI and ATU rows is the practical use of this page: the two are independent sources, so a disagreement between them is what tells you one of them is wrong.

5.10 ELECTRICAL POWER SYSTEM

The electrical system is split down the middle. There is a left side and a right side, each fed by its own engine generator through its own transformer rectifier, and each with its own battery. An APU generator and a ground power unit can supply either side. What survives a failure depends on which side is lost and on which of the two bus levels the equipment sits.

5.10.1 SOURCES

- LEFT and RIGHT GENERATOR: The normal source in flight, one per engine, each feeding its own AC main bus and, through a transformer rectifier, its own DC main bus.
- APU GENERATOR: Supplies the aircraft on the ground and during engine start.
- GROUND POWER: Supplies the aircraft with the engines and APU shut down.
- LEFT and RIGHT BATTERY: The last resort. Each battery has its own contactor and bus tie, so a single battery can hold up its own side, or both sides through the tie.

5.10.2 BUSES

Each side carries an AC main bus, a DC main bus and a DC essential bus, with a middle main bus between them. The essential buses are the ones that matter in a failure: they are the last to be lost, and they carry what the aircraft needs to keep flying rather than what makes it comfortable.

Two examples of what that means in practice, both described elsewhere in this manual. The anti-ice system hangs off the LH essential DC bus, so losing that bus removes all ice protection with no separate warning. The four flight control computer channels are paired across the sides, A and D on one supply group and B and C on the other, which is why a single bus failure lights A FAIL rather than EMERG: half the channels are gone, and the other half carry on flying the aircraft.

Loss of a main bus, a battery going off line and a generator dropping off are each annunciated as an amber caution on the MFD. They are listed in the AURAL WARNINGS AND CAUTIONS chapter.

5.10.3 IN PRACTICE

Cockpit preparation brings the batteries on first, which wakes the essential buses and with them the displays, the flight control computers and the anti-ice system. The APU generator then takes over so the engines can be started, and each engine generator picks up its own side as it comes up to speed. The BATT captions on the glareshield are lit while a side is running on battery alone, and go out once a generator is carrying it.

5.10.4 SCHEMATIC

The diagram below shows the whole system. GCU is the generator control unit and TRU the transformer rectifier that turns 115 VAC into 28 VDC. The contactors are the switches that make or break each connection: G and T on each generator line, LTC and RTC below the transformer rectifiers, LEBC and REBC feeding the essential buses, LBC and RBC feeding the battery buses, MBTC between the two DC main buses, EGPC for ground power, and STC and AGC for the APU starter and generator.

The pair of contactors on each generator line is what makes the system tolerant of a single failure. G connects a generator to its own AC main bus; T connects that bus across to the other side. Lose one generator and its G opens, but the bus stays alive through the T contactors from the opposite generator, or from ground power through the EGPC. The MBTC does the same one level down, letting a single transformer rectifier carry both DC main buses.

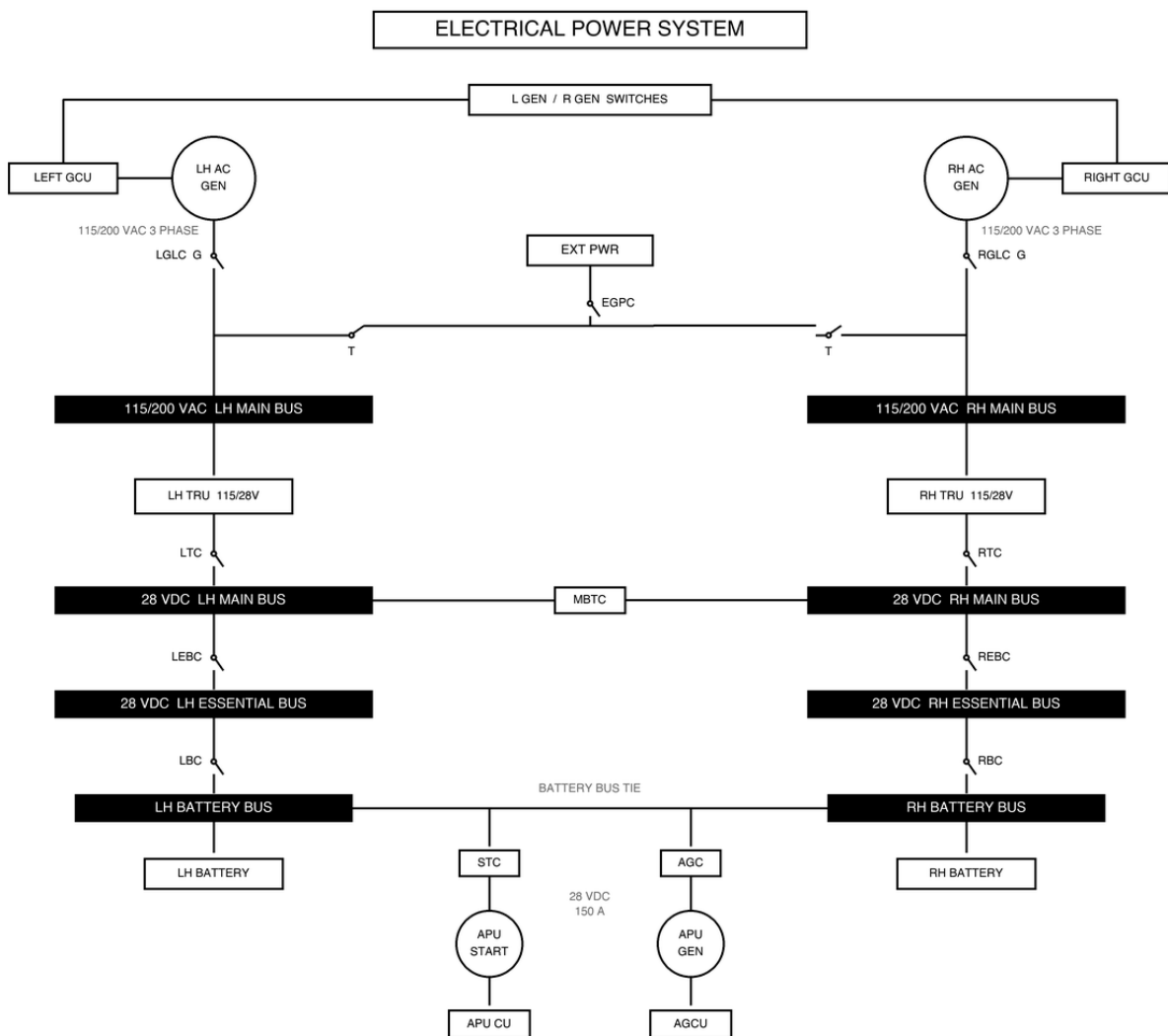


Figure 18

5.11 ENVIRONMENTAL CONTROL AND OXYGEN

Bleed air from the engines, or from the APU on the ground, pressurises and conditions the cockpit and supplies the oxygen system. Like the anti-ice system, it runs itself: the crew select bleed air and temperature and the controllers do the rest.

5.11.1 PRESSURISATION

The cockpit is unpressurised up to 8,000 ft, so up to that height the cabin altitude follows the aircraft. Above it the cabin is held at 8,000 ft until the differential pressure reaches its working value of about 3.5 psi, after which cabin altitude climbs slowly with the aircraft, reaching roughly 25,000 ft cabin altitude at the aircraft's ceiling.

Cabin altitude, differential pressure and the rate the cabin is climbing or descending are all modelled and shown on the SYS format of the MFD. A slow or a rapid depressurisation drives the cabin towards aircraft altitude at its own rate: a slow leak takes minutes, a rapid one is immediate.

5.11.2 BLEED AIR

Bleed air available from each engine falls with altitude and with engine speed, and taking it costs thrust. The bleed selection isolates the left, the right or the APU supply. The APU can supply bleed air on the ground with the engines shut down.

5.11.3 OXYGEN

The M-346 carries no oxygen bottles. An OBOGS unit, an On Board Oxygen Generating System, makes oxygen from bleed air for as long as it has electrical power, so there is no quantity to check before flight and nothing to run out of.

Each cockpit has its own oxygen supply and its own flow indicator, the blinker that shows a breath being taken. The indicator only moves while that cockpit's oxygen is selected on.

5.12 MISSION COMPUTER AND SYMBOL GENERATOR

The MCSG is the box that draws the cockpit. Every symbol on the MFDs, the PDU and the head down displays is generated by it, which is why it is the first line on the MFD STATUS format: with the MCSG powered that line reads GO, and without it N/A.

It needs two things: the RH DC main bus, and its own MCSG switch on the PWR panel. Losing that bus takes the MCSG with it, along with the VOR/ILS and TACAN receivers, the ice detector and the rear cockpit left MFD and HUD. Selecting the switch off does the same thing on its own, which is worth remembering before wondering where the fuel warnings went.

The MCSG also owns the fuel warnings. JOKER 1, JOKER 2 and BINGO are called only while it is powered, so with the MCSG off line the fuel figures set on the UFCP will pass without a word. The FUEL LOW warning is separate and still sounds, because it is tied to the tank contents rather than to a figure the pilot set.

5.13 MID-AIR COLLISION AVOIDANCE SYSTEM

MIDCAS watches the traffic around the aircraft and tells the pilot when something is going to come too close. It advises and nothing more. There are no resolution advisories, no coordination with the other aircraft, and no authority over the flight path: the cue it gives is a direction, not a command. PARS is the only system on this aircraft that flies it.

WHAT IT SEES

MIDCAS is fed by the IFF. With the IFF switched in and the set powered it runs cooperative surveillance, seeing traffic all round out to 10 NM and 10,000 ft above or below. It refreshes once a second.

With the IFF out, or its set unpowered, the system falls back to what the radar can see for itself. That is a 45 degree cone either side of the nose, and nothing else. Traffic behind the wing line is invisible in this condition, and the UFCP label reads DEGD to say so. On the ground the system stands down to STBY, because every aircraft taxiing nearby would otherwise be inside the alerting distance.

THE FOUR LEVELS

- SURVEILLANCE. Inside the volume and being tracked. No indication.
- PROXIMATE. Within 6 NM and 1,200 ft. Still no alert, but the aircraft is close enough to be worth knowing about.
- REMAIN WELL CLEAR. Projected to breach the miss distance. The traffic symbol turns amber.
- AVOID. Projected to come close enough to matter and running out of time. The symbol turns red and a direction is given.

SENSITIVITY FOLLOWS CLOSURE, NOT ALTITUDE

Airline systems set their sensitivity by altitude, because airliners close on each other at predictable speeds. Two M-346s do not. A single fixed setting would either fill the display with alerts in a head on pass at 840 kt of closure, or leave it silent until half a mile in a slow rejoin. MIDCAS therefore bands its sensitivity by closure rate, so that the warning always arrives with roughly twenty seconds in hand:

- Up to 150 kt of closure: alerts at 30 and 18 seconds, 0.20 NM miss distance, 400 ft.
- Up to 400 kt: alerts at 35 and 20 seconds, 0.40 NM, 600 ft.
- Up to 800 kt: alerts at 32 and 20 seconds, 0.75 NM, 850 ft.
- Above 800 kt: alerts at 30 and 18 seconds, 1.20 NM, 1,200 ft.

Traffic that will pass wide is filtered out before any of this is applied, however fast it is closing. A high speed crosser that will miss by a comfortable margin is not a threat and does not raise an alert.

WHICH WAY IT TELLS YOU TO GO

The cue is chosen to open the miss distance fastest, rather than being vertical every time:

- Head on, within 15 degrees of the nose: RIGHT, following the rules of the air.
- On the beam, between 75 and 105 degrees: CLIMB or DESCEND, whichever moves the aircraft away from where the traffic will be. In that geometry a turn takes too long to move the miss distance at all.

- Anywhere else: a turn away from the traffic.

FORMATION

A friendly aircraft held within 1 NM at less than 100 kt of closure for ten seconds together is treated as a formation mate and dropped back to proximate, alert suppressed. The dwell has to be sustained, so a fast pass that happens to be slow closing for a moment will not mute a real threat. Without this the system would be unusable on the sortie the aircraft actually flies, which is the reason the pilot is given an off switch at all.

CONTROLS AND INDICATIONS

- FN2 on the second UFCP DATA page switches the system on and off. The label beside the key reads MIDCAS ON, OFF, DEGD or STBY.
- On the HSD, traffic is coloured by level: amber for remain well clear, red for avoid. Traffic carrying no alert keeps its normal identification colour.
- The voice is inhibited below 400 ft above ground, on the same principle as the ground proximity inhibits. The visual indication remains at all heights.

5.14 HYDRAULIC POWER

There are two independent hydraulic systems, one driven by each engine. Between them they move the flight control surfaces, the landing gear, the flaps, the brakes and the nosewheel. Each system holds its own pressure, and the two are shown side by side on the SYS format of the MFD.

5.14.1 WHAT EACH SYSTEM DRIVES

The primary flight controls are driven by both systems, so a single hydraulic failure does not take any of them away. The utilities are split between the two, which is what decides what is left after a failure:

- BOTH SYSTEMS: horizontal tail, ailerons, rudder and the leading edge surfaces.
- SYSTEM 1 ONLY: trailing edge surfaces and the wheel brakes.
- SYSTEM 2 ONLY: parking and emergency brake, nosewheel steering, speedbrake, and the landing gear legs and doors.

The two braking paths deliberately sit on opposite systems. Losing system 1 costs the normal wheel brakes but leaves the parking and emergency brake, and losing system 2 costs the emergency brake but leaves the normal ones.

5.14.2 PRESSURE INDICATION

Each system reads out in bar on the MFD SYS format, and the figure is coloured by value. Green from 160 to 217 bar is normal. Amber from 105 to 160 or from 217 to 265 is a caution, either a system falling away or one running high. Red below 105 or above 265 is a failure or an overpressure. The HYDT L and R warning lights on the front instrument panel annunciate the same condition.

5.14.3 WHAT DEPENDS ON IT

Landing gear, flaps and wheel brakes all need hydraulic pressure and will not operate without it. The gear runs off system 2, so a system 2 failure is the one that costs a normal gear extension: see the emergency landing gear procedure in the EMERGENCY PROCEDURES chapter. Flight controls are not hydraulically actuated in this simulation, so they remain available.

5.14.4 SCHEMATIC

The diagram below shows both systems and the utilities each one drives. The bar beneath it is the pressure scale used on the MFD, with the colour bands marked.

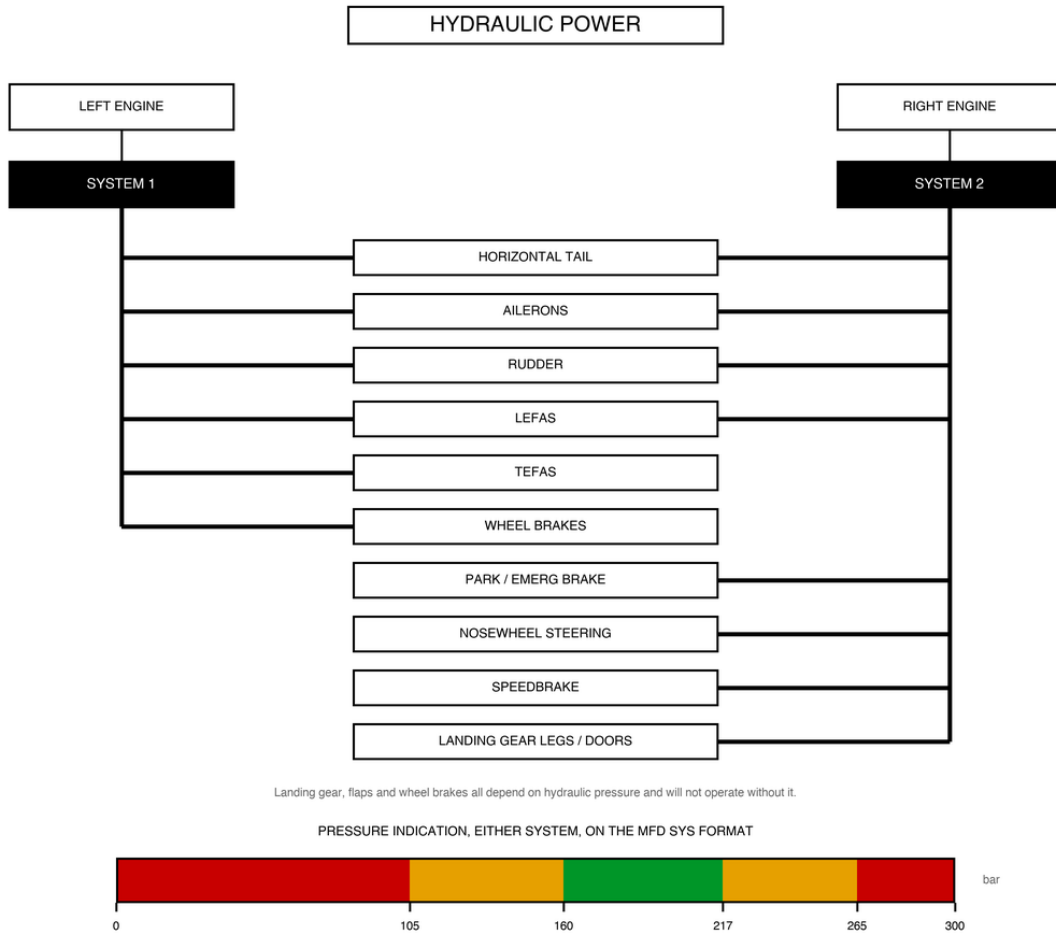


Figure 19

5.15 NOSE WHEEL STEERING

The nose wheel is steered through the flight control computer rather than by any direct link from the pedals, and it does not follow them until the pilot engages it. Hydraulic system 2 powers it, alongside the parking and emergency brake and the speedbrake, so a loss of that system takes the steering with it. The aircraft limit for engaging the steering is 50 KIAS.

There are two ways to engage it, and both bring it up in LOW:

- The bottom button on the control stick, which toggles the steering on and off. This is a front cockpit control only – the rear stick does not have it.
- The STEER button (11) on the right glareshield. Pressed with the steering off it engages it; pressed again with the steering already engaged it changes the authority instead, so it will never switch the steering off. The rear cockpit has the same button (79), and it is the only way the rear seat can engage the steering.

A voice message confirms the engagement. Once engaged the rudder pedals steer the nose wheel. With the system off the pedals do nothing on the ground, and displacing them in that state calls STEER NOT ENGAGED – a reminder, not a fault.

5.15.1 LOW AND HIGH

Two steering authorities are available:

- LOW gives five degrees either side of centre. This is the taxi and take-off setting, fine enough to hold a centreline at speed without the aircraft darting.
- HIGH gives fifty degrees either side of centre, for turning into a parking space or reversing direction inside the width of a runway.

The steering always engages in LOW, whichever control engaged it, so HIGH is always a deliberate second action. The STEER button swaps between the two while the steering is engaged, and the ST LOW and ST HI captions show which authority is selected; both are out when the steering is disengaged. Both cockpits drive the same state, so either crew member can change the authority.

Do not select HIGH with the throttles fully forward. Fifty degrees of nose wheel at take-off power will take the aircraft off the paved surface, and the STEER HIGH warning sounds for as long as that combination exists.

5.15.2 POWER SUPPLY

Both the stick button and the STEER button are read by the nose wheel steering control module. With that module unpowered neither control does anything at all: the steering cannot be engaged, the mode cannot be changed and the caption lights stay out. The flight control computer drops the steering on the same condition, which leaves the aircraft to be steered on differential braking alone.

5.15.3 AURAL WARNINGS

Three messages belong to the system:

- STEER ENGAGEMENT confirms that the steering has just been engaged.
- STEER NOT ENGAGED sounds when the pedals are displaced on the ground with the steering off.
- STEER HIGH sounds while the throttles are fully forward with HIGH selected.

The last two report a condition rather than an action, and both are inhibited in flight: they sound only with weight on wheels.

5.16 SPEEDBRAKE

The speedbrake is driven by hydraulic system 2, alongside the parking and emergency brake and the nose wheel steering, and it takes about two and a half seconds to run either way. Full travel is fifty degrees. Its position is shown on the SPEEDBRAKE indicator (26) in the front cockpit and (94) in the rear, which reads the surface rather than the switch.

TRAVEL LIMIT WITH THE FLAPS OUT

With the flaps at LAND the speedbrake is limited to forty degrees. The limit is applied to the surface, not to the switch: selecting LAND with the speedbrake already beyond forty degrees runs it back to that figure on its own, and taking the flaps out of LAND returns the full fifty degrees if it was the limiter that reduced it. The switch is not moved either way, so the position to trust is the indicator.

AIRBRAKE WARNING

AIRBRAKE sounds when the speedbrake is doing something the pilot probably did not intend. It needs the surface more than ten degrees out, airborne and above 5 KCAS, and then either of:

- the throttles at MIL or beyond, which is the speedbrake fighting full thrust; or
- the landing configuration – gear down and flaps LAND – with more than half throttle, which is the approach being flown against its own drag.

A third path is a disagreement: if the surface fails to follow the selection by more than ten percent for three seconds, the same message sounds. That one is a fault indication rather than a technique reminder, and hydraulic system 2 is the first thing to check.

PAGE INTENTIONALLY LEFT BLANK

6. LIMITATIONS AND SPEEDS

Figures below are those modelled by this add-on.

6.1 SPEED LIMITATIONS

LIMIT	SPEED
V_{ne} Never exceed	585 KIAS
V_{no} Maximum structural cruising	400 KIAS
M_{mo} Maximum operating Mach	0.95
Landing gear extended / operating	200 KIAS
Flaps T/O	230 KIAS
Flaps LAND	200 KIAS
Nose wheel steering engage	below 50 KIAS
Maximum braking effectiveness	150 kt ground speed

Table 6

6.2 STALL SPEEDS

CONFIGURATION	SPEED
Clean	110 KIAS
Landing configuration	90 KIAS

Table 7

6.3 TAKE OFF

REFERENCE	SPEED
V_1 Decision speed	110 KIAS
V^R Rotation speed	120 KIAS
V_2 Take-off safety speed	130 KIAS

Table 8

6.4 LOAD FACTOR

CONDITION	LIMIT
Maximum positive	+8.5 g
Maximum negative	-3 g

Table 9

6.5 APPROACH AND LANDING

REFERENCE	VALUE
V^{REF} Reference landing speed	95 KCAS
Optimum approach angle of attack	10°
Angle of attack bracket, low / high	8° / 12°
Maximum crosswind component	30 kt

Table 10

6.6 WEIGHTS

ITEM	WEIGHT
Empty weight	10,196 lb / 4,625 kg
Normal take-off weight	14,771 to 16,094 lb / 6,700 to 7,300 kg
Maximum take-off weight	20,943 lb / 9,500 kg
Maximum landing weight	approximately maximum take-off weight
Maximum internal fuel	4,400 lb / 2,000 kg
Maximum fuel with pylon tanks	6,600 lb / 3,000 kg

Table 11

6.7 POWERPLANT AND SYSTEMS

ITEM	LIMIT
Engines	2 x Honeywell F124-GA-200
Thrust, each engine	6,280 lb
Maximum EGT	850 °C
Hydraulic system pressure	3,000 psi
Flap deflection, T/O / LAND	20° / 40°
Slat deflection	25°
Speedbrake extend / retract time	2.5 s

Table 12

6.8 PERFORMANCE

ITEM	VALUE
Maximum level speed	590 KTAS / 1090 km/h
Service ceiling	45,000 ft / 13,714 m

Table 13

PAGE INTENTIONALLY LEFT BLANK

7. NORMAL PROCEDURES

7.1 COCKPIT PREPARATION

7.1.1 INITIAL SWITCHES POSITIONS

7.1.2 FRONT LEFT PANEL

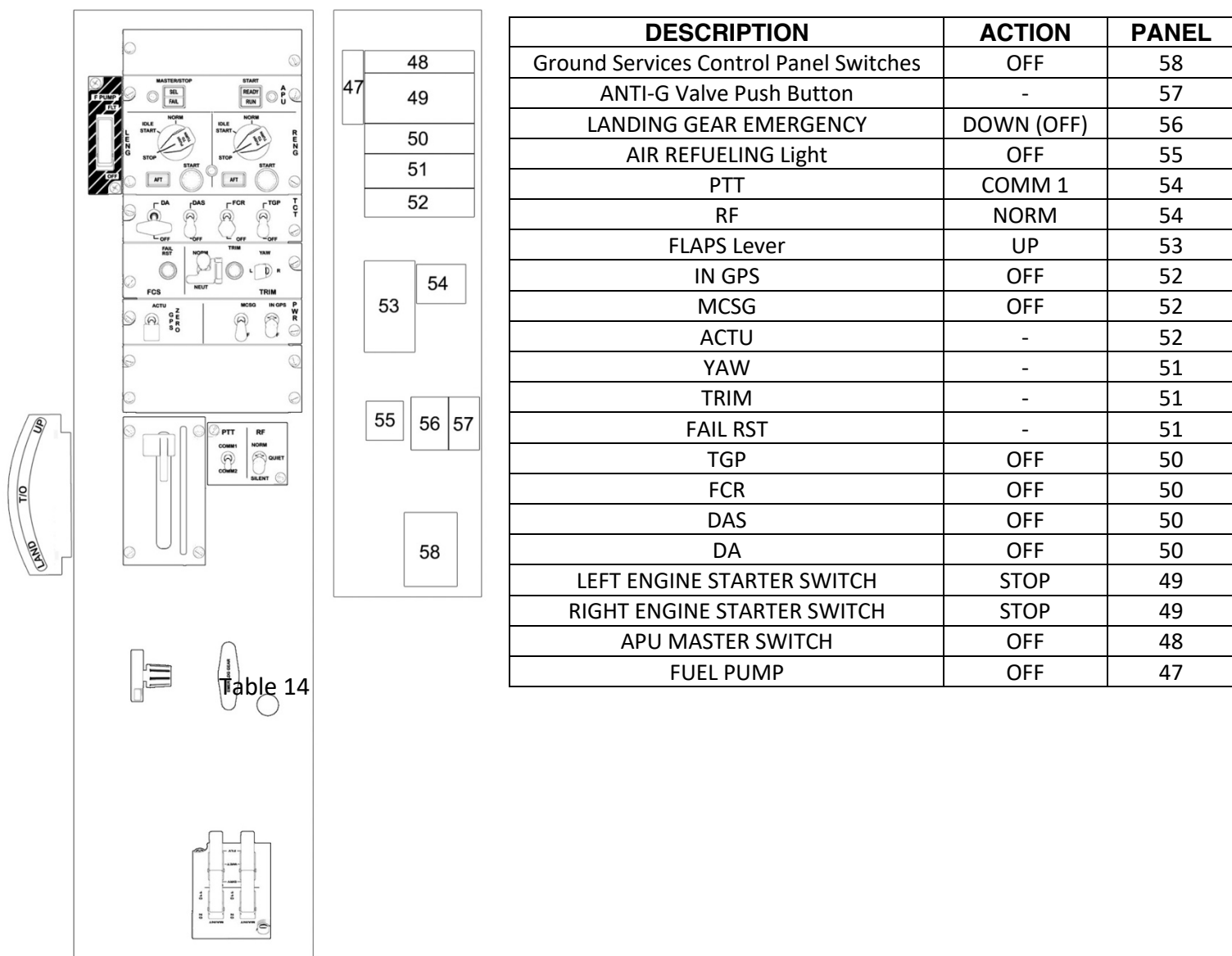


Figure 14

7.1.3 FRONT CENTER PANEL

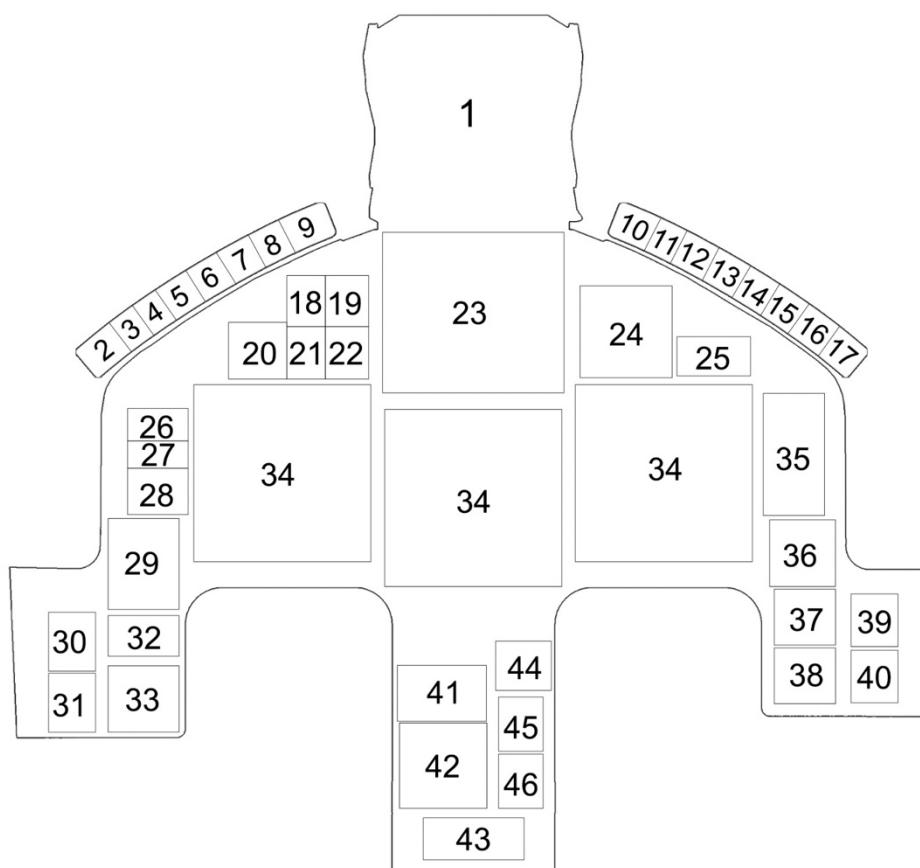


Figure 15

DESCRIPTION	ACTION	PANEL
ENG EXTG	-	30
FUEL SOV	OPEN	31
PARKING / EMERGENCY BRAKE	ARMED	33
LANDING / TAXI LIGHTS	OFF	32
LANDING GEAR LEVER	DOWN	29
APU EXTG	-	45
FUEL SOV	OPEN	46
BATT L / R	OFF	37
GEN L / R	OFF	38
ENG EXTG	-	39
FUEL SOV	OPEN	40

Table 15

7.1.4 FRONT RIGHT PANEL

DESCRIPTION	ACTION	PANEL
COMM1, COMM 2	AS REQUIRED	59
VOR/ILS, TACAN, RALT	AS REQUIRED	59
COMM 1, COMM 2, VOR/LOC, MKR	AS REQUIRED	60
CALL	-	60
MISSILE , ECM, RWR, TCN/DME	AS REQUIRED	60
VOL	AS REQUIRED	60
NORM	-	60
COMM	-	60
ICS	AS REQUIRED	60
VOX	AS REQUIRED	60
CABIN TEMP	AS REQUIRED	61
BLEED	OFF	61
CABIN PRESS	ON	61
IFF	NORM	62
CONSOLE, INST, FLOOD, WARN BRT	AS REQUIRED	63
BRT, CODE	AS REQUIRED	63
FORM, NAV, BCN, CVRT	AS REQUIRED	63
RAIN RMVL	AS REQUIRED	64
DEMIST	AS REQUIRED	65
MASS	SAFE	66
STOWAGE	-	67
MFD, COMM POWER SWITCHES	ON	68

Table 16

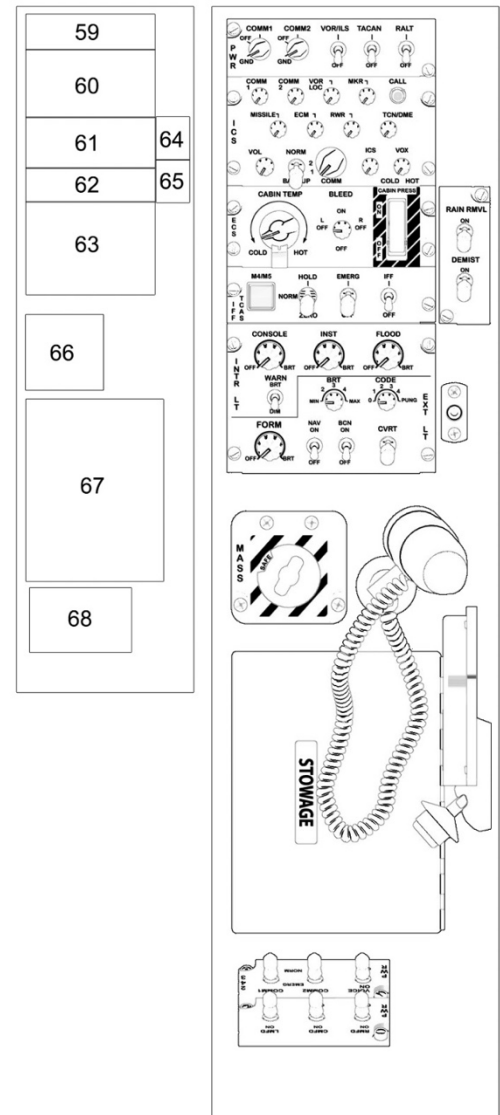
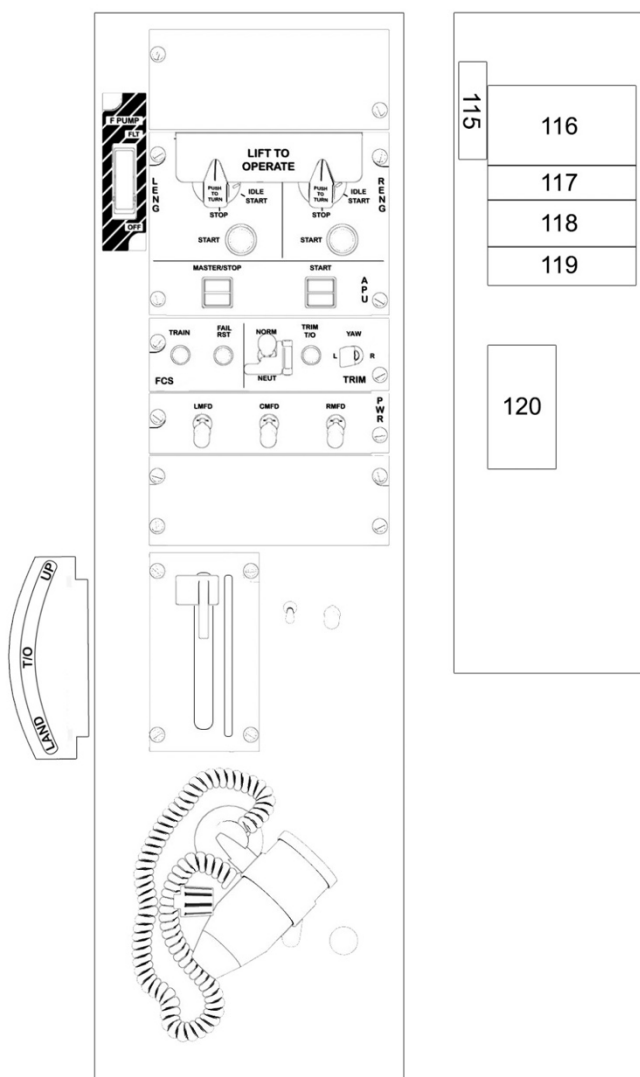


Figure 16

7.1.5 REAR LEFT PANEL



DESCRIPTION	ACTION	PANEL
FLAPS LEVER	UP	120
LMFD, CMFD, RMFD	ON	119
YAW	-	118
TRIM	-	118
FAIL RST	-	118
TRAIN	-	118
APU	OFF	116
ENGINE START LEFT	NORM	116
ENGINE START RIGHT	NORM	116
FUEL PUMP	FLT	115

Table 17

Figure 20

7.1.6 REAR CENTER PANEL

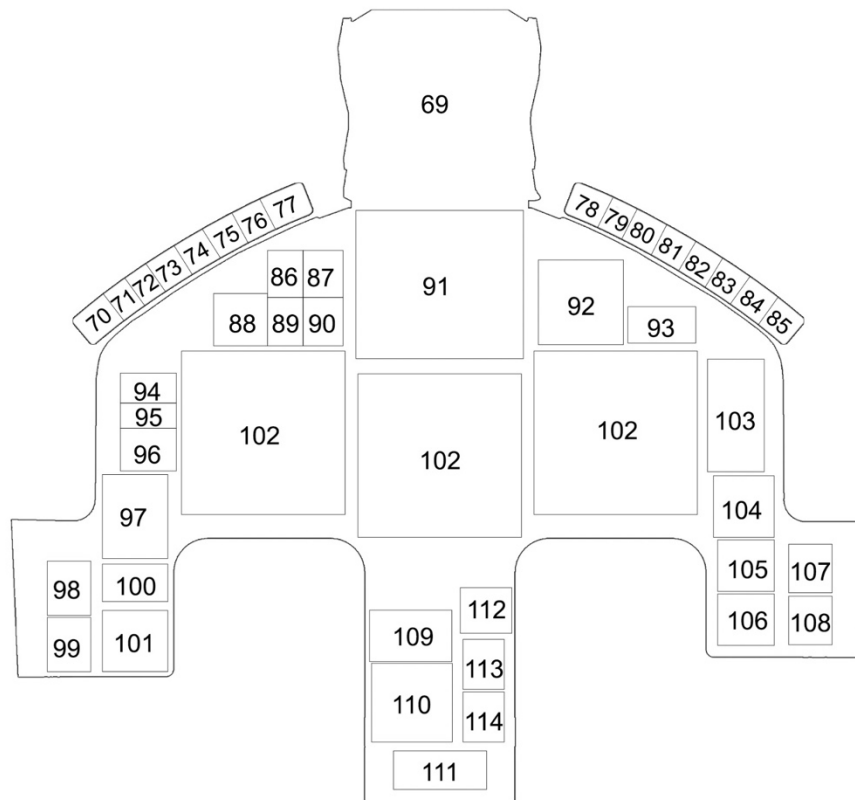


Figure 21

DESCRIPTION	ACTION	PANEL
ENG EXTG	-	98
FUEL SOV	OPEN	99
PARKING / EMERGENCY BRAKE	ARMED	101
LANDING / TAXI LIGHTS	OFF	100
LANDING GEAR LEVER	DOWN	97
APU EXTG	-	113
FUEL SOV	OPEN	114
BATT L / R	OFF	105
GEN L / R	OFF	106
ENG EXTG	-	107
FUEL SOV	OPEN	108

Table 18

7.1.7 REAR RIGHT PANEL

DESCRIPTION	ACTION	PANEL
COMM1, COMM2, VOR/LOC, MKR	AS REQUIRED	121
CALL	-	121
MISSILE, ECM, PWR, TCN/DME	AS REQUIRED	121
VOL	AS REQUIRED	121
NORM	-	121
COMM	-	121
ICS	AS REQUIRED	121
VOX	AS REQUIRED	121
CONSOLE, INST, FLOOD	AS REQUIRED	122
STORAGE SPACE	-	123
STOWAGE	-	124
EJECTION SEQUENCE LEVER	AS REQUIRED	125

Table 19

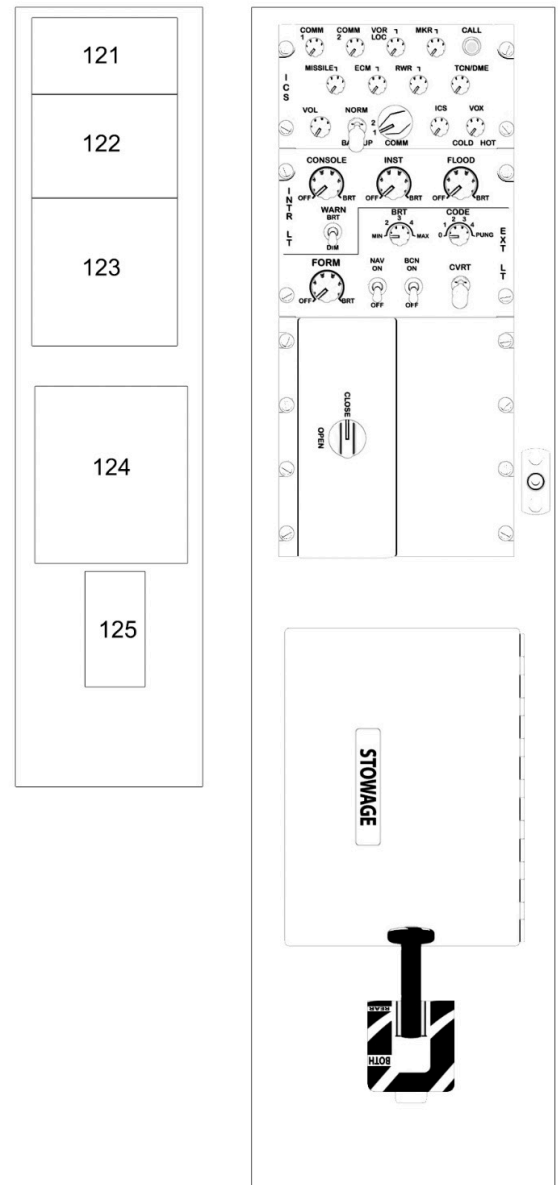


Figure 22

7.2 START UP SEQUENCE

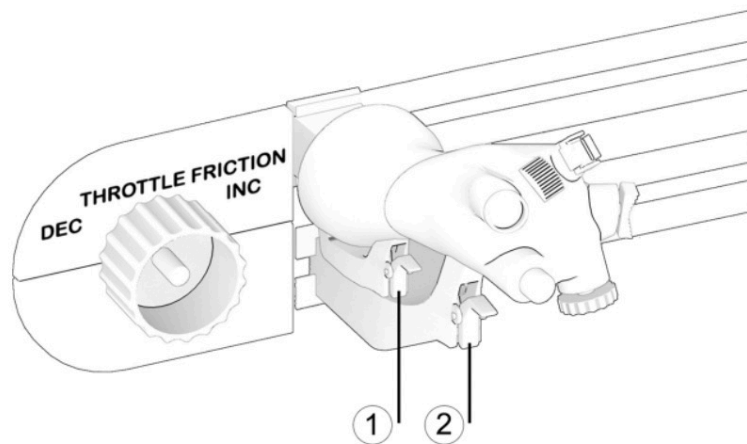
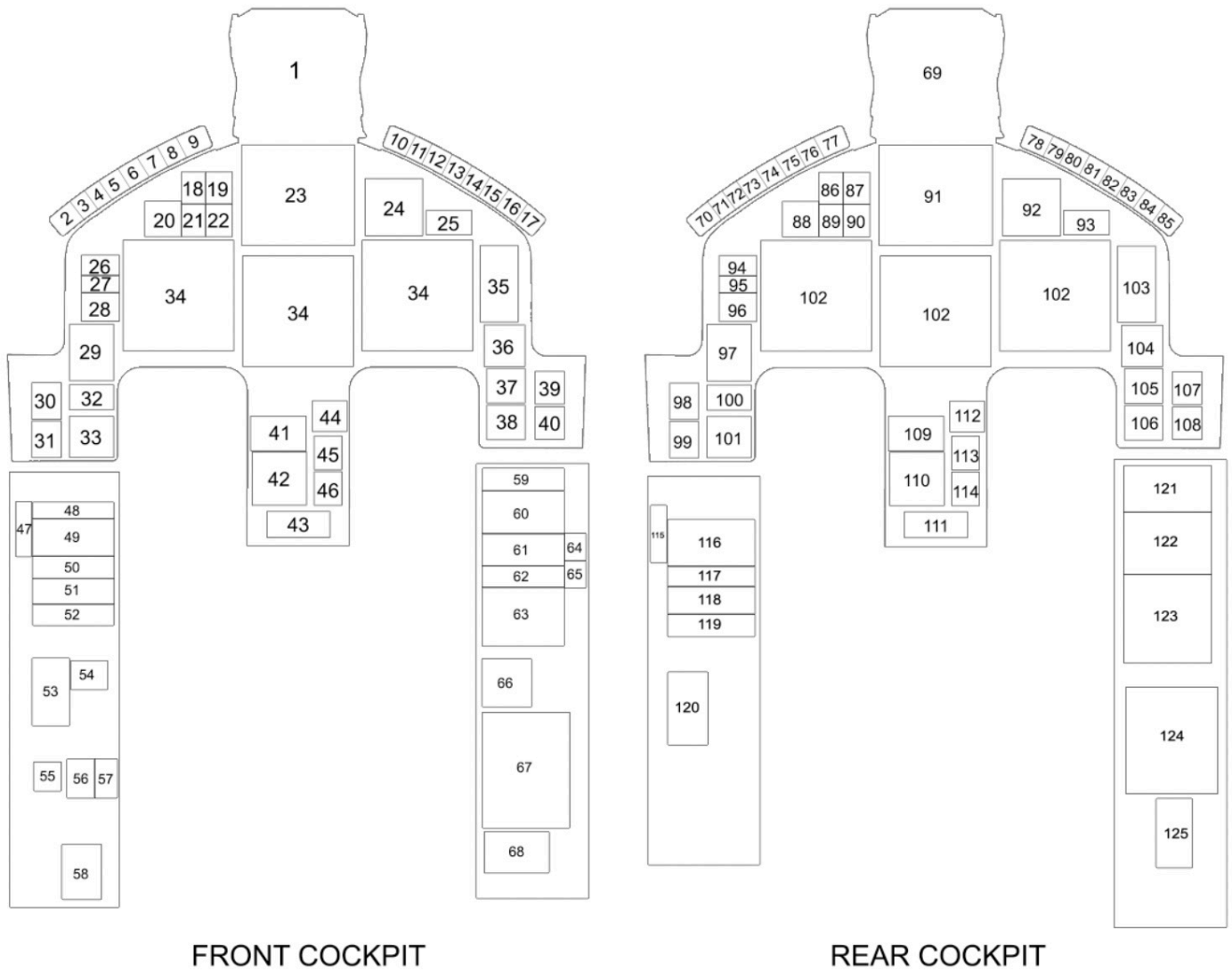


Figure 23

Both engines are started from the APU, one at a time, right engine first. The start is largely automatic: there is no fuel lever, no manual ignition and no starter to switch off. The pilot sets the conditions, presses the start button and watches the temperature.

ELECTRICAL POWER

Selecting both BATTERY switches (37) to ON wakes the essential buses, and with them the displays, the flight control computers and the anti-ice system. Both BATT captions light: each side is on its own battery with no generator behind it. Select both GENERATOR switches (38) to ON. Nothing happens yet; they pick up their sides as the engines come up to speed.

FUEL

Open the FUEL PUMP cover (47) and select the pump to FLT.

The fuel pump must be on before the first start. Fuel is introduced only if the pump is running or the other engine is already turning. With neither, the starter will motor the engine and it will never light, and no caption will tell you why.

APU

With the APU FUEL SOV (48) open the RDY caption lights and the APU is ready to start. Select APU MASTER (48) to SEL, then press APU START (48). The RUN caption flashes while the APU spools, which takes about ten seconds, and goes steady at 100 percent with an aural APU RUNNING to confirm it. The APU generator comes on line by itself at 100 percent and both BATT captions go out. There is no APU generator switch.

If the FAIL caption lights and APU FAIL is heard, the APU has not started. There is no automatic retry.

AVIONICS AND NAVIGATION

With the APU carrying the aircraft, bring the avionics up. Select VOICE POWER, COMM 1 and COMM 2 to ON, and VOR/ILS, TACAN and RALT to ON, on the PWR panel (59). The IN/GPS switch powers the EGI, which is in navigation mode as soon as it has power, and MCSG powers the symbol generator that draws every display. VOICE POWER is what speaks the aural warnings: with it off the captions and MFD boxes still appear, but nothing is said. Set the radios and the IFF as required, then arm the UFCP and set up the displays before the engines are started, while it is quiet.

ENGINE START

Start the right engine first, then the left. For each engine:

- Move the throttle from CUT OFF to IDLE with the small switch on the throttle itself. The start arms with the throttle at IDLE; with it still at CUT OFF the START caption will not light.
- Move the engine state selector (49) to START. The START caption lights steady, continuous ignition comes on automatically and the throttle is locked out.
- Press the ENGINE START button (49). The START caption begins to flash: the starter is turning.
- Watch NH rise on the engines indicators. Fuel is introduced automatically at NH 15 percent.
- Watch EGT. The limit is 850 °C and the display turns the reading red above it. If EGT is climbing towards the limit, shut the start down with the engine state selector.
- When the engine reaches idle the starter cuts out on its own, continuous ignition goes off and the START caption goes out. There is nothing to switch off.

- Move the engine state selector to RUN. The throttle now has the engine. Stable ground idle is NL 25.5 percent and NH 56.5 percent, and that side's generator picks up its own bus.

From the second start onwards the running engine is itself a fuel source, so the start will proceed even with the fuel pump selected off.

AFTER BOTH ENGINES ARE RUNNING

Take the APU off line. Check both generators carrying their sides and both BATT captions out. Idle is scheduled automatically, low on the ground and high in the air; there is no idle selector in the cockpit.

Starting with the canopy open is allowed, but expect an aural CANOPY UNSAFE once either engine passes 90 percent NH.

EJECTION SEAT

Set the oxygen selector on the seat to ON. It has three positions, OFF, ON and OVRD, and the back-up (BU) supply is left OFF for a normal start. The flow blinker moves with each breath while oxygen is selected; there is no quantity to check, because the OBOGS makes its own. Arm the ejection seat once you are strapped in and the safety pin is out. The SEAT caption on the right glareshield stays lit until it is armed, and an aural FWD SEAT NOT ARMED or AFT SEAT NOT ARMED is heard if the aircraft is moving faster than 10 kt with a seat still safe. Both cockpits are called separately, so an occupied rear seat has to be armed too.

7.2.1 FRONT COCKPIT

DESCRIPTION	ACTION	PANEL
EXTERNAL WALK AROUND INSPECTION	CHECK	-
REMOVE BEFORE FLIGHT EXTERNAL FLAGS	REMOVE	-
COCKPIT LADDER	REMOVE	-
CHOCKS	PLACE	-
OXYGEN SELECTOR	ON	-
OXYGEN BACK-UP (BU)	OFF	-
COCKPIT CANOPY	CLOSE	-
COCKPIT PREPARATION	CHECK	-
LEFT/RIGHT BATTERY	ON	37
LEFT/RIGHT GENERATOR	ON	38
FUEL PUMP	FLT	47
APU MASTER	SEL	48
APU START	ON	48
INTERNAL / EXTERNAL LIGHTS	AS REQUIRED	63
COMM 1	COMM1	59
COMM 2	COMM2	59
VOICE POWER	ON	59
VOR/ILS, TACAN, RALT	ON	59
MCSG	ON	-
COMM 1, COMM 2	AS REQUIRED	60
VOR/LOC, MKR, MISSILE, ECM, RWR, TCN/DME, VOL	AS REQUIRED	60
COMM TYPE	NORM	60
COMM	1	60
ICS	AS REQUIRED	60
VOX	AS REQUIRED	60
CABIN TEMP	AS REQUIRED	61
BLEED	ON	61

CABIN PRESS	ON	61
RAIN RMVL	AS REQUIRED	64
DEMIST	AS REQUIRED	65
IFF	AS REQUIRED	62
UP FRONT CONTROL PANEL	ARMED	23
GET HOME DISPLAY	AS REQUIRED	24
MULTI FUNCTION DISPLAYS	MOVE TO IDLE	-
FRONT COCKPIT RIGHT THROTTLE	IDLE (SMALL SWITCH)	49
RIGHT ENGINE STATE SELECTOR	START	49
RIGHT ENGINE START BUTTON	PRESS	49
RIGHT ENGINE STATE SELECTOR (WHEN STARTED)	RUN	49
FRONT COCKPIT LEFT THROTTLE	IDLE (SMALL SWITCH)	49
LEFT ENGINE STATE SELECTOR	START	49
LEFT ENGINE START BUTTON	PRESS	49
LEFT ENGINE STATE SELECTOR (WHEN STARTED)	RUN	49
APU MASTER	AS REQUIRED	48
EJECTION SEAT	ARM	-
FLAPS LEVER	AS REQUIRED	53

Table 20

7.2.2 REAR COCKPIT

DESCRIPTION	ACTION	PANEL
COCKPIT PREPARATION	CHECK	-
COMM 1, COMM 2	AS REQUIRED	121
VOR/LOC, MKR, MISSILE, ECM, RWR, TCN/DME, VOL	AS REQUIRED	121
COMM TYPE	NORM	121
COMM	1	121
ICS	AS REQUIRED	121
VOX	AS REQUIRED	121
INTERNAL LIGHTS	AS REQUIRED	122
UP FRONT CONTROL PANEL	AS REQUIRED	91
GET HOME DISPLAY	ARMED	92
MULTI FUNCTION DISPLAYS	AS REQUIRED	102

Table 21

7.3 BEFORE TAXI

DESCRIPTION	ACTION	PANEL
FLAP LEVER	T/O	53
SPEEDBRAKE	OUT/IN	-
T/O TRIM BUTTON	PRESS	51
FCS NORM	CHECK	42
ALTIMETER	SET AND CHECK	24
BINGO FUEL	SET	-
SEAT SAFETY PIN	REMOVE	-
CHOCKS	REMOVE	-
NOSE WHEEL STEERING	ON	-
TAXI / LANDING LIGHTS	TAXI LT	32
PARKING BRAKE	OFF	33

Table 22

7.3.1 TAXI

DESCRIPTION	ACTION	PANEL
BRAKES CHECK	CHECK	-

Table 23

7.4 BEFORE TAKE OFF

DESCRIPTION	ACTION	PANEL
TAKE OFF DATA	REVIEW	-
OXYGEN FLOW	CHECK	25
FCS	CHECK	42
TAKE OFF TRIM	CHECK	51
FLAPS	T/O	53
SPEEDBRAKE	IN	-
LDG / TAXI LT	LDG	32

Table 24

7.4.1 TAKE OFF

DESCRIPTION	ACTION	PANEL
ENGINE THROTTLES	FULL	-
BRAKES	RELEASE	-
ROTATE AT PREDETERMINED SPEED	ROTATE	-
LANDING GEAR LEVER	UP < 200 KIAS	29
LANDING GEAR RED LIGHT	CHECK OFF	29
FLAP LEVER (T/O < 230 KIAS - LAND < 200 KIAS)	UP < 230 KIAS	53

Table 25

7.5 BEFORE LANDING

DESCRIPTION	ACTION	PANEL
LANDING GEAR LEVER	DOWN < 200 KIAS	29
LANDING GEAR LIGHTS - 3 GREEN	CHECK	28
TAXI / LANDING LIGHTS	LDG LIGHT	32
FLAP LEVER (T/O < 230 KIAS - LAND < 200 KIAS)	LAND	53

Table 26

7.5.1 TOUCH AND GO / GO AROUND

DESCRIPTION	ACTION	PANEL
ENGINE THROTTLES	FULL	-
SPEEDBRAKE	CHECK IN	-
LANDING GEAR LEVER	UP < 200 KIAS	29
LANDING GEAR RED LIGHT	CHECK OFF	29
FLAP LEVER (T/O < 230 KIAS - LAND < 200 KIAS)	UP	53

Table 27

7.5.2 LANDING

DESCRIPTION	ACTION	PANEL
SPEEDBRAKE	AS REQUIRED	-
NOSE WHEEL STEERING	< 50 KIAS	-

Table 28

7.5.3 AFTER LANDING

DESCRIPTION	ACTION	PANEL
SEAT SAFETY PIN	INSERTED	-
SEAT LIGHT	CHECK	-
FLAP LEVER (T/O < 230 KIAS - LAND < 200 KIAS)	LAND	53
SPEEDBRAKE	IN	-

Table 29

7.6 SHUTDOWN

DESCRIPTION	ACTION	PANEL
PARKING BRAKE	ON	33
LEFT ENGINE START SWITCH	STOP	49
LDG / TAXI LT	OFF	32
VOR / ILS	OFF	59
TACAN	OFF	59
RALT	OFF	59
IFF	OFF	62
RAIN RMVL	OFF	64
DEMIST	OFF	65
RIGHT ENGINE START SWITCH	STOP	49
FRONT COCKPIT LEFT THROTTLE	STOP	-
FRONT COCKPIT RIGHT THROTTLE	STOP	-
IN/GPS	OFF	52
RADIO V/UHF	OFF	59
HUD	OFF	23
COMM1, COMM2	OFF	60
NAV LIGHTS	OFF	63
BCN LIGHTS	OFF	63
L & R GENERATORS	OFF	38
L & R BATTERIES	OFF	37

Table 30

PAGE INTENTIONALLY LEFT BLANK

8. EMERGENCY PROCEDURES

8.1 ENGINE AND APU

8.1.1 FIRE

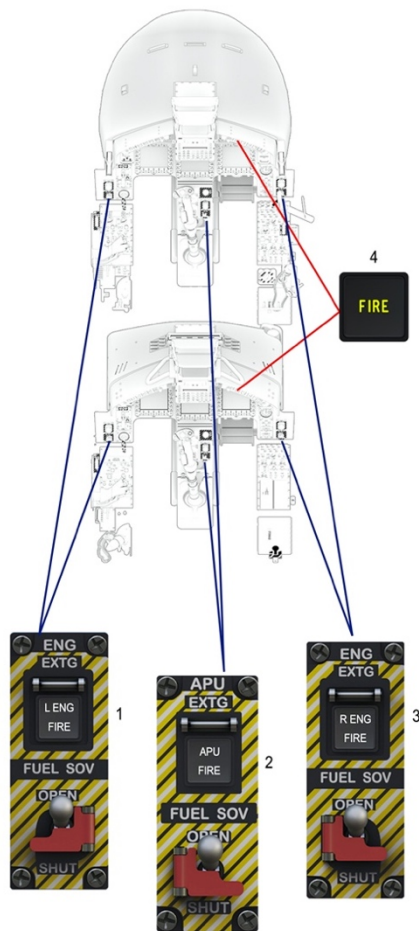


Figure 25

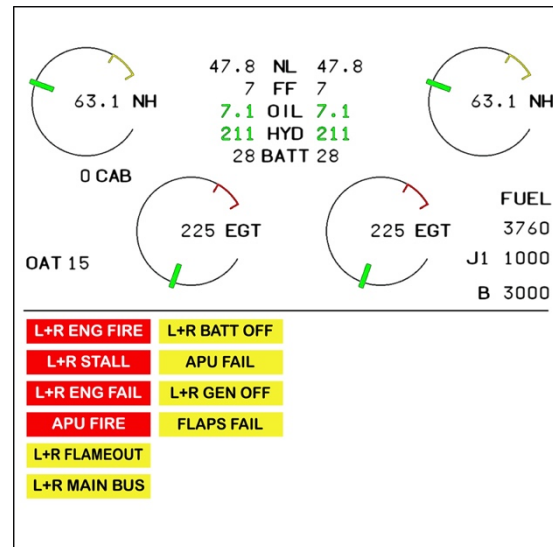


Figure 24

In case of a fire in one of the two engines or APU, the “FIRE” indicator (12,80) lits, the corresponding indicator (1,2,3) of that engine lits and a visual confirmation is show on the “SYS” page of MFD.

To extinguish the fire:

1. Lift the corresponding “FUEL SOV” cover
2. Move the “FUEL SOV” switch into “SHUT” position
3. Lift the corresponding “ENG EXT” cover
4. press the “ENG FIRE” button

Each of the three detectors, left engine, right engine and APU, is powered separately. A detector without electrical power cannot report a fire and gives no indication that it has stopped watching, so an electrical failure quietly removes fire detection from that engine.

8.1.2 FAILURE, FLAMEOUT AND RELIGHT

The M-346 flies perfectly well on one engine. The flight control computer damps yaw and holds the aircraft in balance without pilot input, so an engine failure asks far less of the pilot than it would in a conventionally controlled jet. The work is in identifying which engine has gone and in not shutting down the good one.

8.1.2.1 INDICATIONS

- L ENG FAIL or R ENG FAIL in red on the MFD, or L FLAMEOUT or R FLAMEOUT in amber. Either raises MASTER CAUTION and is called aurally.
- A compressor stall appears as L STALL or R STALL in red, and low oil pressure as L OIL LP or R OIL LP.
- NL, NH, EGT and fuel flow for the failed engine fall away on the engines indicators. This is the clearest confirmation of which side has gone.
- That side's generator drops off line and L GEN OFF or R GEN OFF appears. The remaining generator and the batteries carry the aircraft.
- Bleed air available falls, which affects pressurisation and ice protection.

IMMEDIATE ACTIONS

- IDENTIFY the failed engine on the engines indicators. Confirm it against NH and fuel flow, not against which way the aircraft feels.
- THROTTLE, failed engine, to CUT OFF using the small switch on the throttle.
- MAINTAIN flying speed. SPEED LOW is called below 140 KIAS clean, 110 KIAS with flaps at T/O and 80 KIAS with flaps at LAND.

If there is any sign of fire or damage, do not attempt a relight. Run the engine fire drill instead.

RELIGHT

A relight uses the same sequence as a ground start, and the same automatic steps: continuous ignition comes on with the selector, fuel is introduced by itself, and the starter cuts out when the engine lights.

- FUEL PUMP: Confirm ON. With the pump off and only one engine turning, the relight will motor and never light.
- ENGINE STATE SELECTOR, failed engine, to START. Continuous ignition comes on and the throttle is locked out.
- NH: Check at or above 15 percent. Below that the engine will not take fuel.
- ENGINE START button: Press. Watch EGT against the 850 °C limit.
- WHEN IT LIGHTS: Selector to RUN, then advance the throttle slowly and let the engine stabilise before asking anything of it.

IF IT WILL NOT RELIGHT

Land as soon as practical. Fly the approach at VREF, 95 KCAS, and remember that the aircraft is down to one generator and reduced bleed air: ice protection and pressurisation are both weaker than normal, and a second failure has much less behind it.

8.2 FLIGHT CONTROL DEGRADATION

The flight control system degrades in one way only, and it is a speed condition rather than a failure: below 55 KIAS in flight the computer hands the surfaces straight to the stick. Everything else the FCS panel can tell you is about electrical power, not about the control laws.

8.2.1 DIRECT LINK

Normal law is fully in charge at 75 KIAS and above, fades out between 75 and 55, and is gone below 55. In direct link there is no g command, no roll rate command, no angle of attack limiting, no envelope protection and no auto trim. The aircraft will do exactly what the stick asks of it, including departing.

DIRECT LINK appears on the PDU in the same green as the rest of the head up symbology, and in a red box on the CADI format of the MFD. The aural calls DIRECT LINK once, then ENVELOPE takes over and the two alternate.

8.2.2 RECOVERY

- ACCELERATE. Normal law returns on its own as the speed comes back, fully restored by 75 KIAS. There is nothing to reset and no switch to cycle.
- HELP THE AIRCRAFT DO IT. Put the surfaces where the nose is already trying to go rather than fighting it. Unloading towards the nose down attitude the aircraft is asking for is what builds speed; holding the nose up against it is what keeps you there.
- FLY SMOOTHLY until it is back. With no protection, a large input at low speed is the one thing that turns a slow aeroplane into a departed one.

A normal approach never enters direct link. VREF is 95 KCAS, comfortably inside normal law, so seeing DIRECT LINK on an approach means you are far slower than you should be.

8.2.3 A FAIL

A FAIL means one or more of the four flight control computer channels has lost both of its electrical supplies. It does not change how the aircraft flies: the control laws run on the remaining channels exactly as they do on four. Treat it as what it is, an electrical annunciation, and check the electrical system for what else went with it.

8.2.4 EMERG

EMERG means the flight control computer has no electrical power at all. Because the four channels are fed from the left essential, right essential and both battery buses, that only happens after a total electrical failure, at which point the displays have gone too. It is an electrical emergency rather than a flight control one, and the answer is to restore power.

8.2.5 TRIM RUNAWAY

- TRIM NORM: Lift the guard and select out of NORM. Pitch, roll and yaw trim run back to centre over about three seconds and are held there for as long as the switch is out.
- FLY THE AIRCRAFT on the stick from there. With the switch out of NORM the trim is centred and will not move, so a heavy aircraft will need holding.
- RETURN TO NORM when you want trim back. It works again immediately. The switch is there to centre the trim surfaces, not to disable them for the rest of the flight.

8.3 ELECTRICAL FAILURE

The electrical system is split left and right, so most failures cost you one side rather than the aircraft. What matters is knowing which side has gone and what went with it. The system itself is described in AIRCRAFT DESCRIPTION; this section is about what to do.

8.3.1 INDICATIONS

- L MAIN BUS or R MAIN BUS, L GEN OFF or R GEN OFF, L BATT OFF or R BATT OFF, all amber on the MFD with MASTER CAUTION.
- The BATT caption on the glareshield lights while that side is running on its battery alone.
- A FAIL on the FCS panel if the loss took flight control computer channels with it. The STATUS format shows which channels are still GO.

8.3.2 ACTIONS

- IDENTIFY the affected side from the caption, and confirm it on the STATUS format.
- GENERATOR, affected side: OFF, then ON. Cycling the switch attempts a reset and is worth doing before assuming the generator is lost.
- IF IT WILL NOT COME BACK: Start the APU. Its generator comes on line by itself at 100 percent and will carry the side. There is no altitude limit on starting it.
- CHECK what the failed bus carried, from the table below, and cross check anything you are relying on before you need it.
- LAND as soon as practical, and sooner if both generators are lost. On batteries alone only the essential buses remain.

8.3.3 WHAT EACH BUS CARRIES

- LEFT MAIN: The front left MFD, the PDU, the radio altimeter, forward flood lights, left landing light and formation lights.
- RIGHT MAIN: The MCSG, VOR/ILS, TACAN, the ice detector, the rear left MFD and rear PDU, and the right landing light. Losing it also silences JOKER and BINGO, which the MCSG owns.
- LEFT ESSENTIAL: All air conditioning and pressurisation control, and with it the anti-ice system; COMM 1 and the backup radio panel; flight control computer channels A and D.
- RIGHT ESSENTIAL: COMM 2 and the intercom, flight control computer channels B and C, the DC fuel pump and the hydraulic warning.
- BATTERY BUSES: Fire detection and extinguishing, the flight control computers' backup supplies, the engine fuel shut off valves and the standby airspeed indicator. These are the last to go.

Losing the left essential bus removes ice protection with no separate warning, and losing the right main bus removes the fuel warnings you may be relying on. Neither announces itself as anything other than a bus caption.

8.4 GROUND PROXIMITY RECOVERY

The ground proximity warning system watches the flight path against the terrain and calls out when it does not like what it sees. Every one of its calls means the same thing: the aircraft is going somewhere it should not, and the answer is height.

THE CALLS AND WHAT THEY MEAN

- PULL UP: The flight path is closing on terrain ahead. The most urgent call the system makes.
- SINK RATE: Descending too fast for the height above the ground.
- TERRAIN: Terrain is closing faster than the aircraft can clear it.
- DONT SINK: Height is being lost after take off.
- TOO LOW GEAR, TOO LOW FLAPS, TOO LOW TERRAIN: Too close to the ground for the configuration or the speed being flown.
- GLIDESLOPE: Below the glideslope on an ILS approach. The call gets louder and more insistent the further below it you go.

The full trigger conditions are in the AURAL WARNINGS AND CAUTIONS chapter. The calls stop as soon as the condition clears, so silence is the confirmation that the recovery is working.

8.4.1 RECOVERY

- THROTTLES: Maximum. Do this first and think afterwards.
- WINGS: Level. Bank costs lift and turns the climb into a turn.
- PITCH: Up, and pull firmly. In normal law the angle of attack limiter will not let you exceed 25 degrees, so the aircraft can be flown to the limit of what it has without departing. Pull to the limit and hold it.
- DRAG: Airbrake in. Leave the gear and flaps where they are until terrain clearance is assured; changing configuration while climbing away costs more than it gains.
- HOLD IT until the calls stop and the terrain is behind you, not until the picture merely looks better.

On a GLIDESLOPE call, do not chase the beam by descending. Level off or go around. Below the glideslope on an approach is where the ground is.

IF THE SYSTEM IS SWITCHED OFF

The five ground proximity modes can be turned off individually on the UFCP GPWS settings page. Turning any one off is called out as GPWS OFF, and with all five off the system calls GPWS on its own to tell you it is not watching. There is no reason to fly with them off.

PULL UP is inhibited above 7,500 ft radio altitude, on the ground, and with the landing gear down. The gear inhibit matters: on an approach with the gear down, the system will not give you its most urgent call.

8.5 PARS – PILOT ACTIVATED RECOVERY SYSTEM

PARS is an automatic recovery function of the Flight Control Computer. It is intended for recovery from an unusual attitude or from spatial disorientation, when the pilot is not able to establish a safe flight path by hand.

PARS is commanded by the PARS button on the lower centre panel (44 front cockpit, 112 rear cockpit). A single press engages it. There is no arming step and no switch to inhibit it, and it can be commanded from either cockpit.

While PARS is engaged:

- It takes full command of pitch and roll. Stick inputs from both cockpits, and any autopilot or flight director mode, are ignored for as long as it is active.
- In roll it commands the aircraft towards wings level, applying more aileron the further the aircraft is from level and reaching full deflection at 30 degrees of bank.
- In pitch it commands nose up to raise the flight path, the command reducing as the flight path angle rises.
- No rudder command is applied.
- Thrust is NOT controlled. The throttles remain with the pilot.

Because PARS does not control thrust, a POWER aural warning is heard while it is engaged if the airspeed is decaying. Advance the throttles as required.

PARS disengages automatically once the aircraft reaches +3 degrees of pitch attitude. A PARS DISENGAGEMENT aural message is heard and normal control is returned to the pilot.

PARS levels the wings and raises the nose. It does not fly the aircraft to a safe altitude and it has no terrain awareness. Recovery from a low altitude unusual attitude still depends on the height available at the moment the button is pressed.

8.6 JETTISON

The EMERGENCY JETTISON push button is on the top left of the main panel in both cockpits. It needs no arming and has no guard.

A single press releases every jettisonable external store. There is no selective jettison: the button does not choose between stations, and there is no store-by-store selection anywhere in the cockpit.

Because either crew member can command it, an aural message announces which cockpit did: FWD EMERG JETTISON PUSH BUTTON or AFT EMERG JETTISON PUSH BUTTON. Expect it whenever the other pilot uses the button.

Jettisoned stores are released immediately and cannot be recovered. Check that the aircraft is clear of other traffic and, on the ground, of personnel before pressing it.

8.7 EMERGENCY LANDING GEAR EXTENSION

If the landing gear will not come down normally, it can be released to fall under its own weight. The EMERGENCY LANDING GEAR handle is on the left console under a guard, and there is one in each cockpit.

Lift the guard and pull the handle. The gear is commanded down and all three legs extend under their own weight, taking about five seconds. Returning the handle to its normal position restores ordinary retraction, so a handle pulled by mistake is not a one way action.

Free fall extension puts the gear down. It cannot put it up again while the handle is pulled, and there is nothing to check on the panel beyond the gear indications themselves. Confirm three greens before landing.

TWO CONTROLS THAT GO WITH IT

- DOWN LOCK OVERRIDE: The gear lever cannot be raised on the ground. This guarded button overrides that lock, which is how the gear is cycled with the aircraft on jacks. It has no use in flight, where the lever moves freely.
- GEAR WARNING SILENCER: Press and hold to mute the gear warning. It silences the warning, it does not clear the condition that caused it.

8.8 LOSS OF PRESSURISATION

The cockpit is unpressurised to 8,000 ft and then held at about 3.5 psi differential, reaching roughly 25,000 ft cabin altitude at the aircraft's ceiling. Both a slow leak and a rapid decompression are modelled, and they behave differently.

- SLOW: The cabin drifts up towards aircraft altitude over minutes. Easy to miss, because nothing else changes.
- RAPID: The cabin goes to aircraft altitude at once, with the differential pressure lost in the same moment.

Nothing warns you. There is no cabin altitude caption and no aural call for a pressurisation failure. The only indication is the cabin altitude, cabin rate and differential pressure readouts on the SYS format of the MFD, so a slow leak will only be found by looking.

8.8.1 ACTIONS

- OXYGEN: Select OVRD. This is what that third position on the seat selector is for. It supplies oxygen under pressure rather than on demand.
- DESCEND: Bring the aircraft down to an altitude where the cabin is habitable without pressure. The cabin follows the aircraft once the differential is gone, so descending fixes the cabin as directly as it fixes the aircraft.
- LAND: As soon as practical. The OBOGS keeps making oxygen for as long as it has bleed air and power, so there is no supply clock running, but the cause of the leak is not going to improve.

8.9 EJECTION

Each cockpit has its own ejection handle. There is nothing to select first and no sequence to set: pulling the handle fires the seat.

8.9.1 BEFORE FLIGHT

The seat is made live in two steps, both covered in the start up sequence. The safety pin is removed, and the seat is armed. The SEAT caption on the right glareshield stays lit until the seat is armed, and an aural FWD SEAT NOT ARMED or AFT SEAT NOT ARMED is heard if the aircraft is moving faster than 10 kt with a seat still safe. Each cockpit is called separately.

8.9.2 TO EJECT

Pull the ejection handle. Wings level and nose up improves the outcome if there is height and time to arrange it, and neither is a condition of the seat working.

Ejection ends the flight. There is no way back into the aircraft afterwards and the simulation does not offer one.

PAGE INTENTIONALLY LEFT BLANK

9. AVIONICS AND SYSTEMS

9.1 FRONT AND REAR COCKPIT LAYOUT

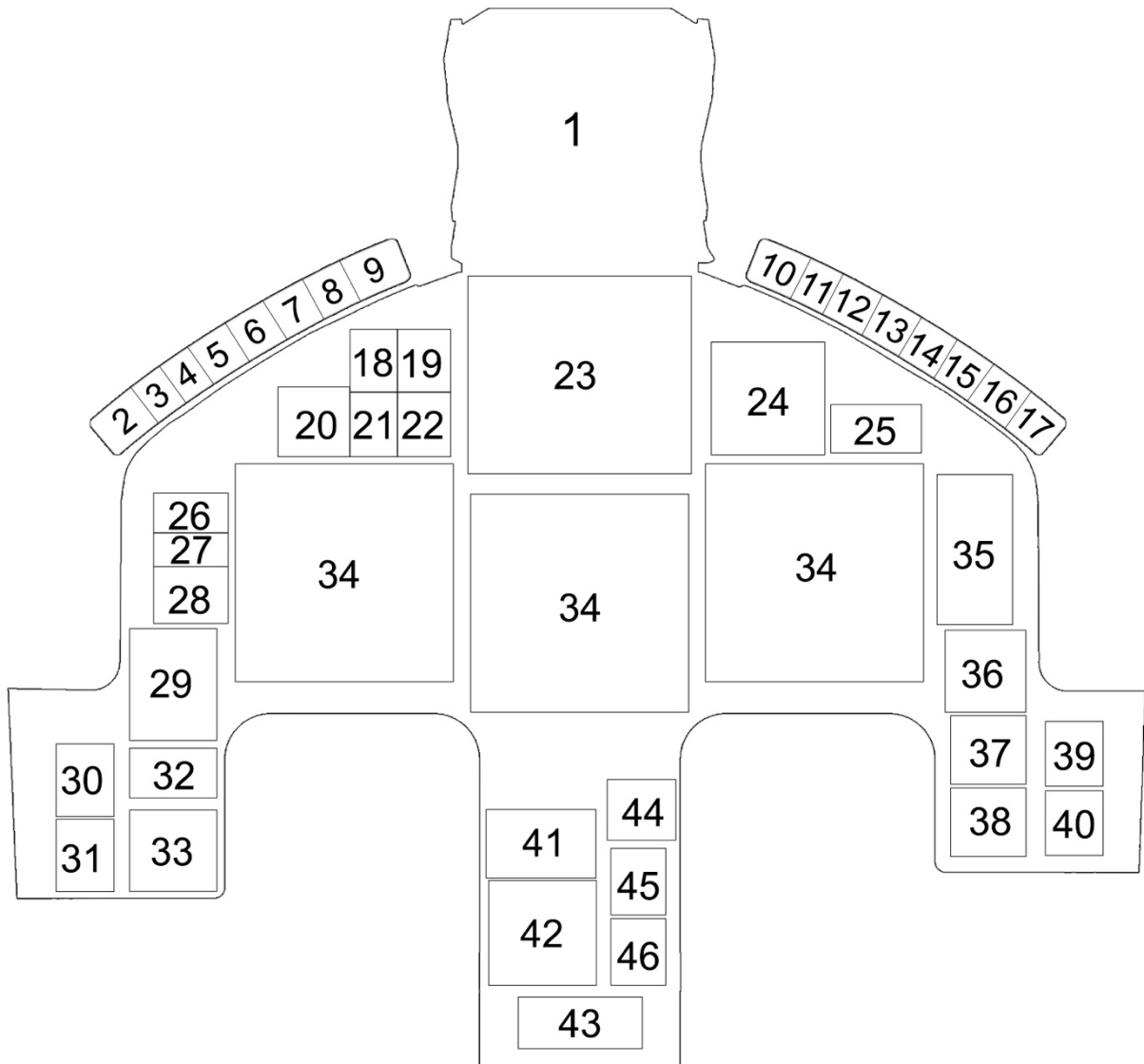


Figure 26

Numbers in brackets after a heading identify the item on the cockpit layout diagrams. The first number refers to the front cockpit and the second to the rear, so the UFCP at (23,91) is item 23 in the front cockpit and item 91 in the rear. The numbered items are listed in full in FRONT INSTRUMENT PANEL DESCRIPTION and FRONT SIDE CONSOLES for the front cockpit, and in REAR CREW STATION DESCRIPTION and REAR SIDE CONSOLES for the rear.

9.2 P.D.U. – PILOT DISPLAY UNIT

The P.D.U. has a plethora of different symbols as it can be seen by the images in the P.D.U. section.

Pitch ladder(16) is located in the center of the PDU display and it is showing the current pitch and roll attitude of the aircraft. Slaved with the pitch ladder is the FPM or CDM(17) according to what is being selected.

Heading stripe(18) is located at the top of the display and it is indicating the current flying heading, the autopilot pre-selected heading(20) and the true north direction(19).

On the top left of the display there is the calibrated speed(15), the current mach number(14), the current G forces(13) and the maximum G forces(12).

Below them there is the current angle of attack(11) readout and scale, the current tuned vor/ils(10), the bearing and distance from the active nav source(9) and the time left to arrive to the active nav source(8).

On the top right of the display there is the barometric altimeter(1), the radio altimeter(2) and the barometric pressure(3). Below that there is the current feet per minute(4) readout and scale, the current ground speed(5) and the Zulu time(6).

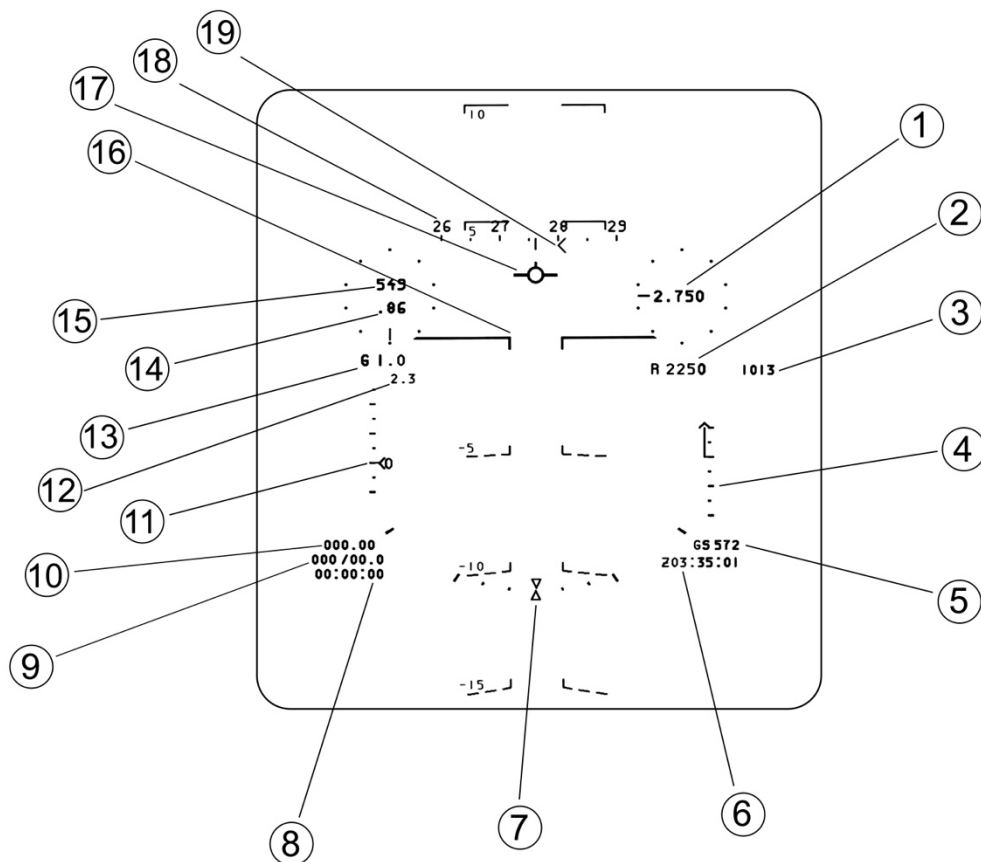


Figure 27

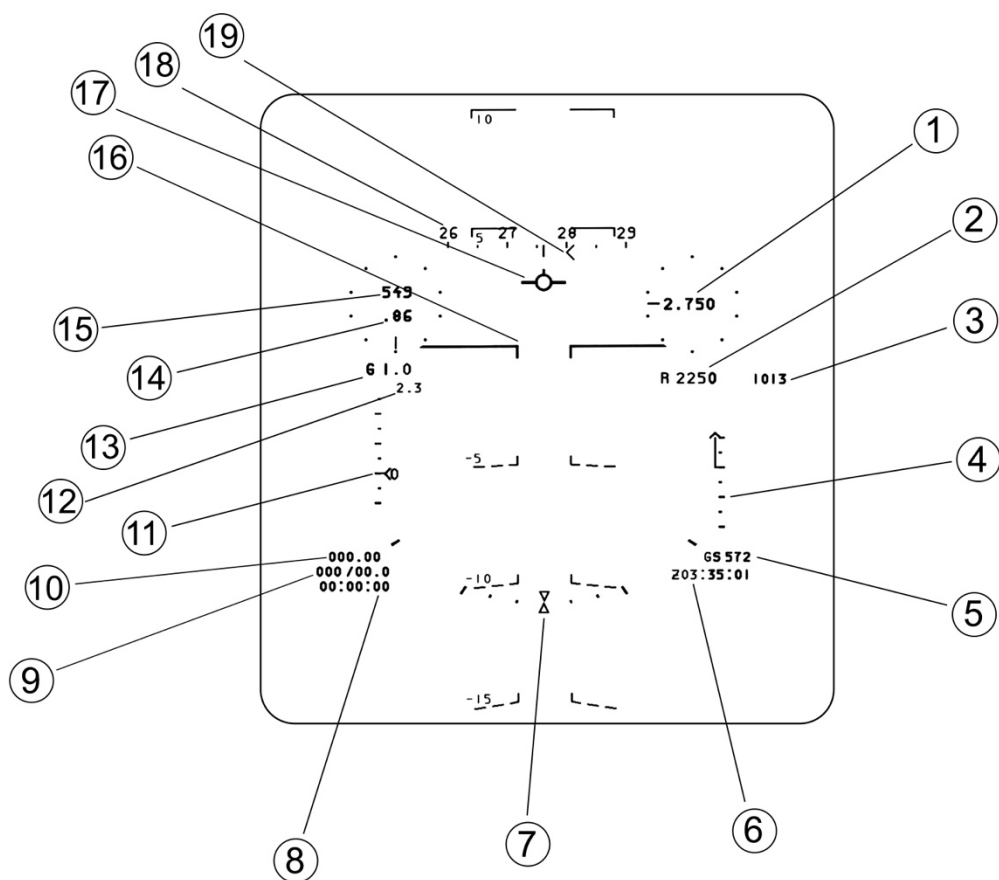


Figure 28

DISPLAY	EXPLANATION
1	Barometric Altimeter
2	Radio Altimeter
3	Barometric Pressure (milibar)
4	Vertical Speed Indicator
5	Ground Speed Readout
6	Zulu Time
7	Roll Indicator
8	Time to Selected NAV Source
9	Bearing and Distance to Selected Nav Source
10	Frequency of VOR-ILS
11	Angle of Attack Indicator
12	MAX G Force Readout
13	Current G Force Readout
14	Current Mach Speed
15	Current Calibrated Air Speed
16	Pitch Ladder
17	Flight Path Marker
18	Heading Stripe
19	True North Direction

Table 31

9.2.1 P.D.U. – PILOT DISPLAY UNIT – AP

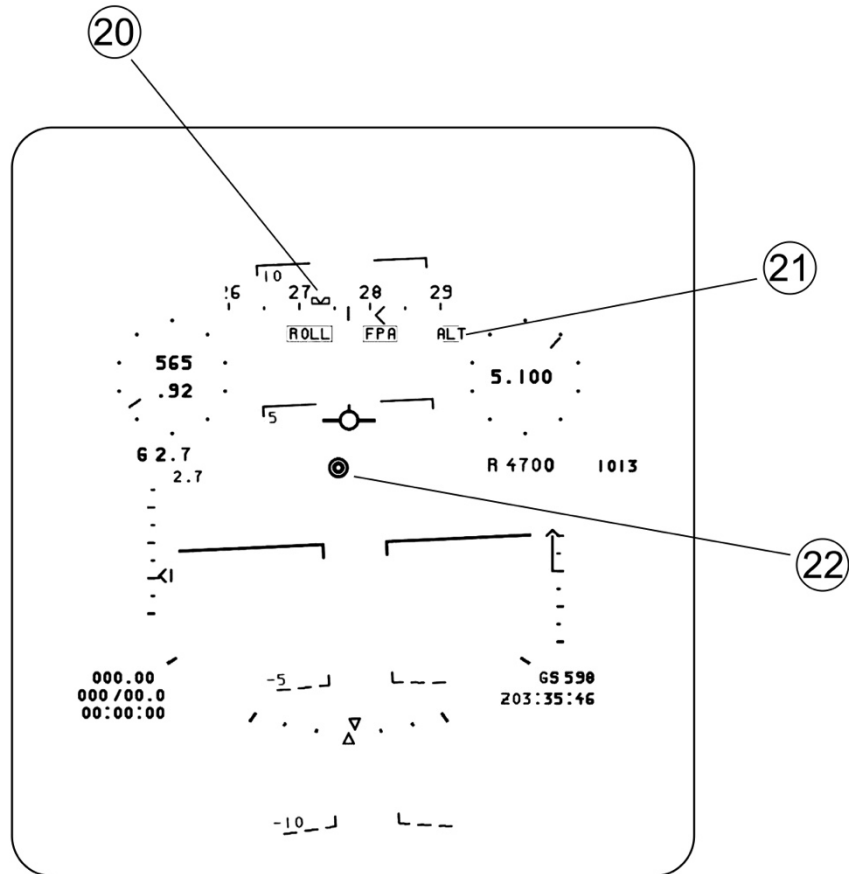


Figure 29

DISPLAY	EXPLANATION
20	Auto Pilot Pre-Selected Heading
21	Auto Pilot FMA
22	Flight Director

Table 32

When activating the flight director or the autopilot, the P.D.U. is being populated with some extra symbols. These are the vertical and lateral autopilot FMAs (21) and the flight director circle(22) that is guiding you on the vertical and lateral position required to achieve the desired pitch and roll attitude.

9.2.2 P.D.U. – PILOT DISPLAY UNIT – ILS

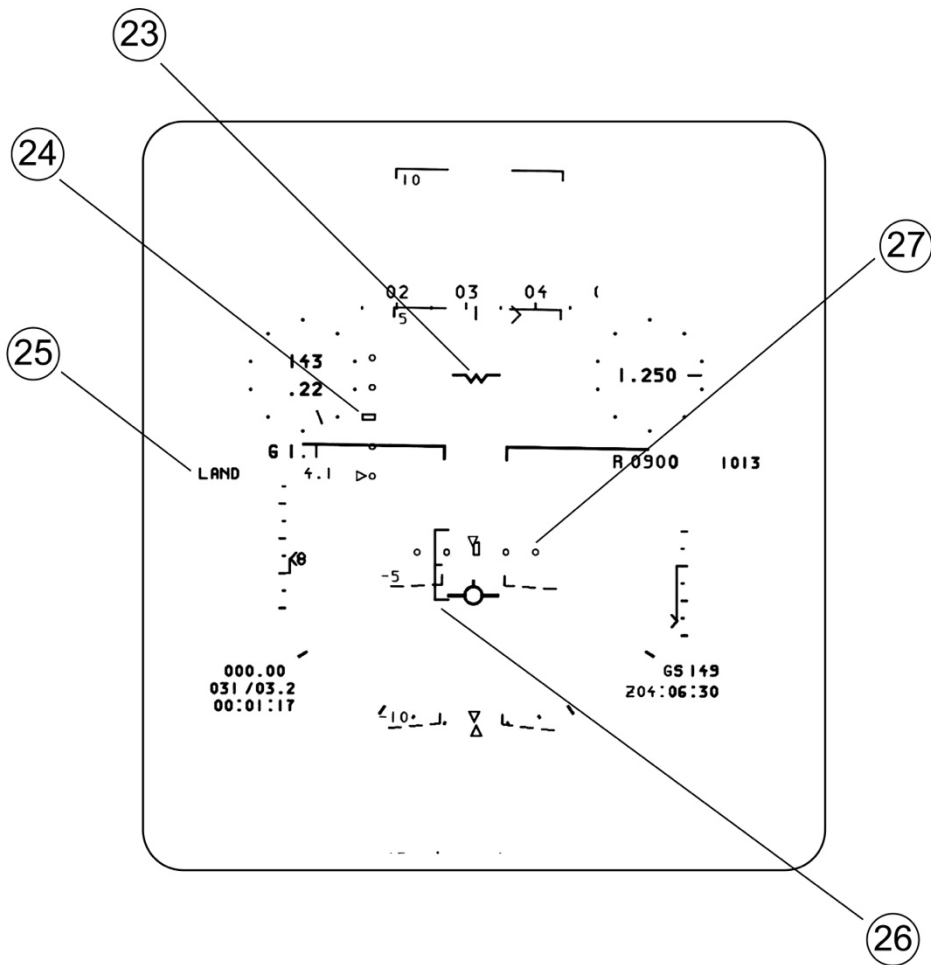


Figure 30

DISPLAY	EXPLANATION
23	Actual Nose Position
24	Glideslope Indicator
25	Flaps Position
26	Angle of Attack Bracket
27	Localizer Indicator

Table 33

If the currently tuned VOR/ILS is selected as an active nav source and it has a glide slope signal or localizer signal, it is then being displayed on the P.D.U..

With the nose wheel gear down and locked the landing attitude bracket (26) will be present in the display. For optimal landing angle to be achieved, flight path marker must be set in the middle, which represents 10 degrees angle of attack, the bottom marker means 8 degrees angle of attack and the top marker means 12 degrees angle of attack. Also, on the display there is the current flaps position (25). These are the LAND and T/O positions.

9.3 G.H.D – GET HOME DISPLAY (24,92)

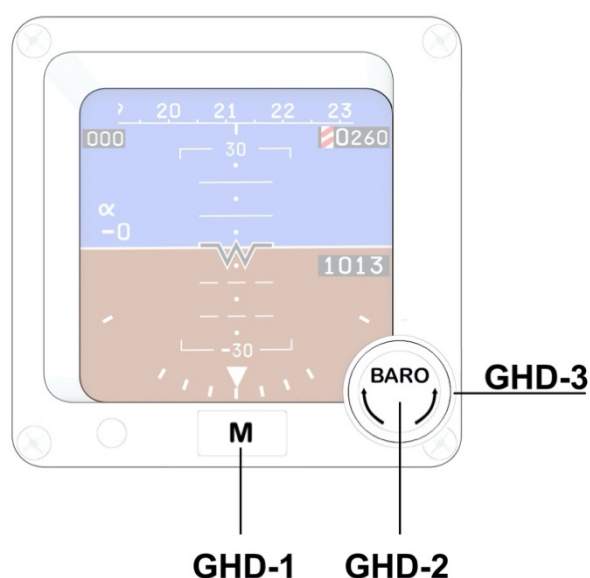


Figure 31

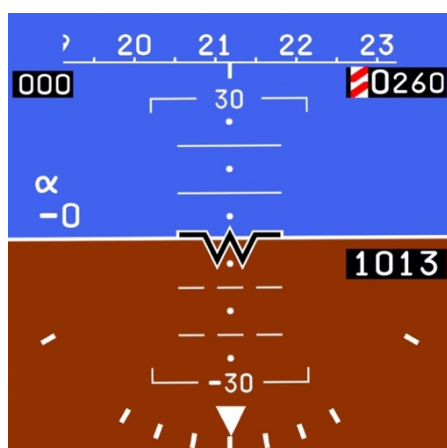


Figure 32



Figure 33



Figure 34

GHD, (Get Home Display) is located on the right side of the front and rear cockpit panels and it provides an individual artificial horizon along with BARO adjustments, compass and angle of attack.

By pressing GHD-1 key, the “BARO TYPE / SET BRT” menu appears. Movement between those two options is achieved by using the rotary GHD-3 key. Pressing the GHD-2 key while on “BARO TYPE”, switches between InHg and MB formats. Pressing the GHD-2 key while on “SET BRT”, the “SET BRT” option is displayed and by using the GHD-3 rotary key the brightness of the display can be increased or decreased.

9.4 ENGINES INDICATORS (S.E.F.D) (35,103)

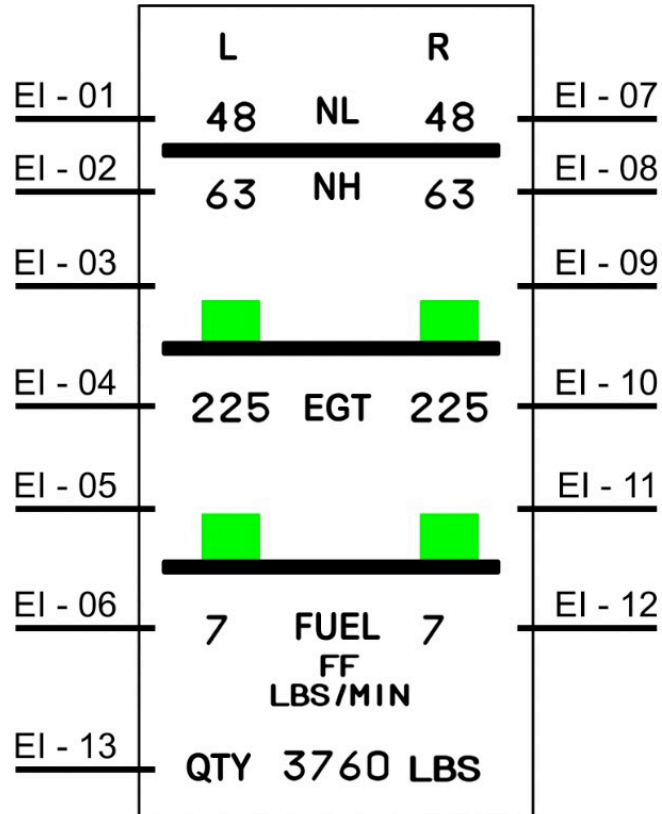


Figure 35

INDICATOR	EXPLANATION
EI - 01	Left Engine High Pressure Compressor
EI - 02	Left Engine Low Pressure Compressor
EI - 03	Left Engine NH Flags
EI - 04	Left Engine Gas temperature in C
EI - 05	Left Engine EGT Flags
EI - 06	Left Engine Fuel Flow in LBS/MIN
EI - 07	Right Engine High Pressure Compressor
EI - 08	Right Engine Low Pressure Compressor
EI - 09	Right Engine NH Flags
EI - 10	Right Engine Gas Temperature in C
EI - 11	Right Engine EGT Flags
EI - 12	Right Engine Fuel Flow in LBS/MIN
EI - 13	Total Fuel Quantity in LBS

Table 34

9.5 SURFACES INDICATORS (T.F.G.D) (26,27,28,94,95,96)

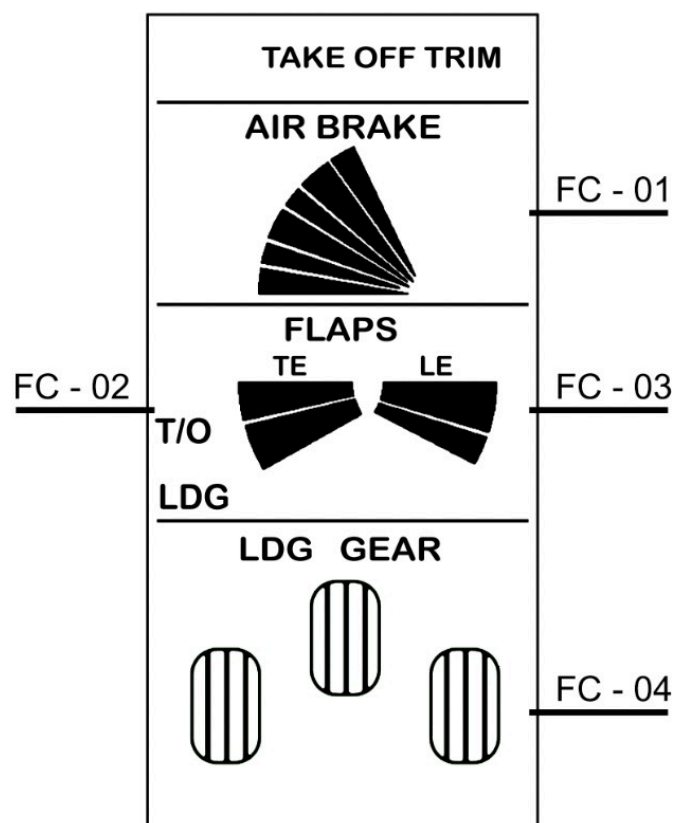


Figure 36

INDICATOR	EXPLANATION
FC – 01	Air Brake Extension Status
FC – 02	Flaps
FC – 03	Slats
FC – 04	Landing Gear Indication

Table 35

PAGE INTENTIONALLY LEFT BLANK

10. U.F.C.P. – UP FRONT CONTROL PANEL (23,91)

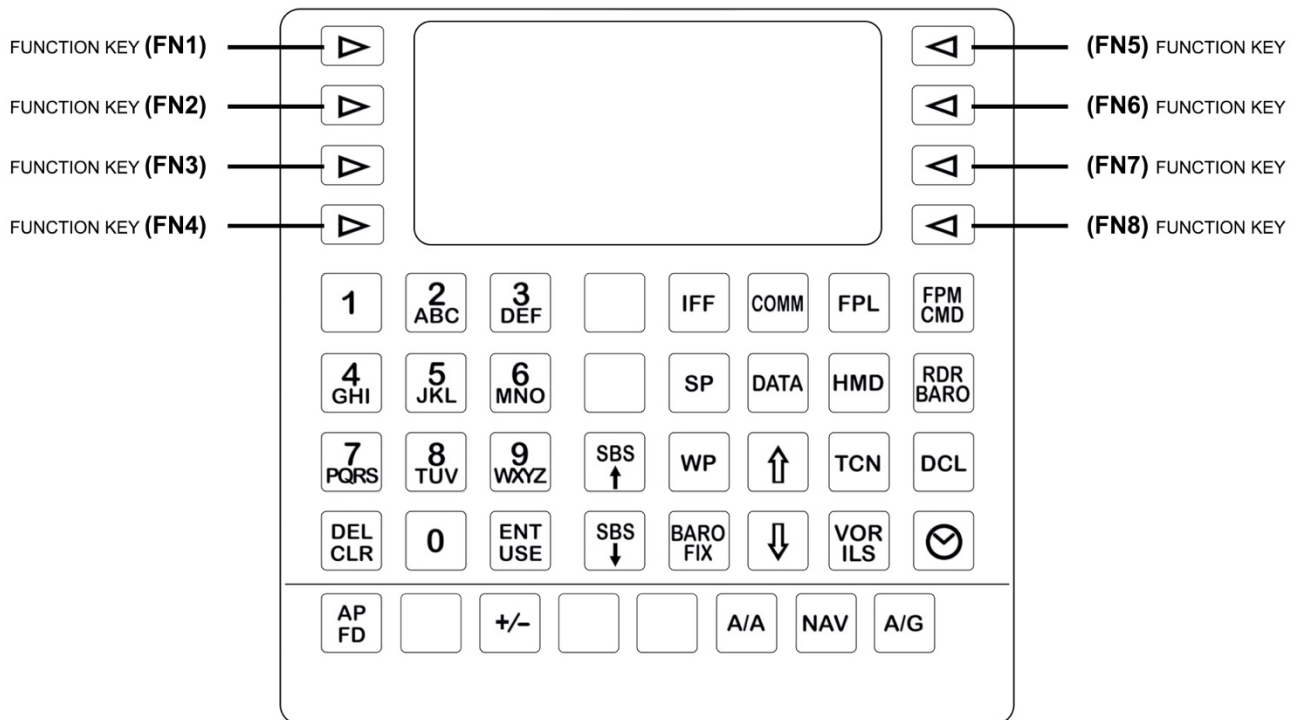


Figure 37

The U.F.C.P. unit is located below the PDU and can be used in order to add/update data, communications, navigation and various other parameters.

The U.F.C.P. consists of 8 function keys, 35 data entry and manipulation keys (SB) and a 4 line LED dot matrix display unit.

The U.F.C.P. has a number of different formats available that are vital to the performance of the plane and the different systems that can be interacted through the U.F.C.P.

10.1 COMMUNICATIONS

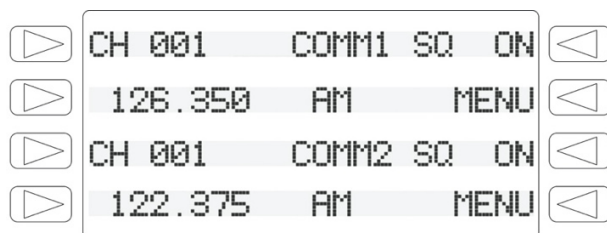


Figure 38

BUTTON	FUNCTION
FN – 1	Channel Change of COMM1
FN – 2	Frequency Change of COMM1
FN – 3	Channel Change of COMM2
FN – 4	Frequency Change of COMM2
FN – 5	SQ ON/OFF for COMM1
FN – 6	COMM1 Format
FN – 7	SQ ON/OFF for COMM2
FN – 8	COMM2 Format

Table 36

In the default format page of the U.F.C.P. there is the COMM format page which is displaying the current selected channel and frequency of both COMM1 and COMM2 on the left side of the display in the corresponding Function key (FN1 & FN2 for COMM1 and FN3 & FN4 for COMM2), on the right side of the display there is the MENU selection of each COMM (FN6 & FN8).

10.1.1 COMM1 / COMM2 MENU

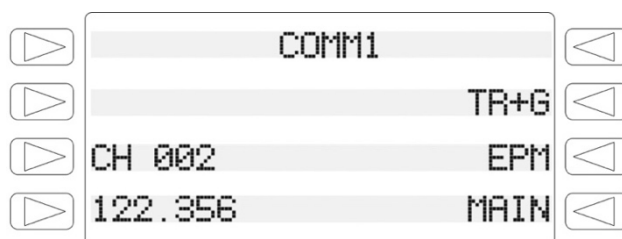


Figure 39

BUTTON	FUNCTION
FN – 3	Changes COMM Channel
FN – 4	Changes COMM Frequency and stores the frequency in the selected channel
FN – 6	Cycles between modes “TR+G” (transmit, receive, ground), “TR” (transmit, receive), “G” (ground)
FN – 8	Returns to COMM Page

Table 37

When entering into the MENU of any of the two COMMs, on the left side, there is the channel and frequency currently selected for the COMM (FN3 & FN4) and on the right side there is the TR (Transmit Receive) and G (Guard) selection for the said channel (FN6). The EPM option (currently INOP) and the MAIN selection (FN8) which brings the COMM main format page.

10.2 IFF

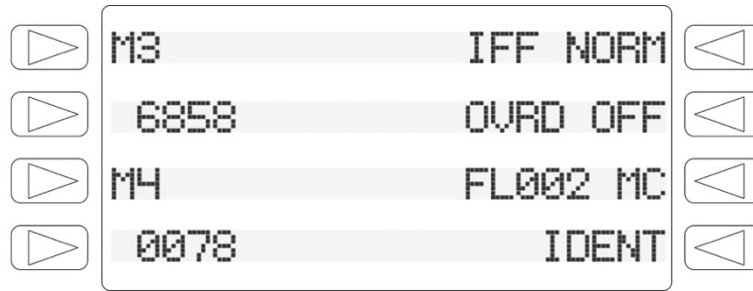


Figure 40

BUTTON	FUNCTION
FN – 2	Changes the IFF (transponder) code
FN – 4	NOT USED
FN – 5	Cycles the IFF modes (STBY/NORM)
FN – 6	Cycles Override (ON/OFF)
FN – 8	SQUAWK IDENT

Table 38

On the left side of the display there are the IFF Modes (M1, M3, M4, MS).

By pressing the Function key next to each Mode name will set that mode as the active one.

The usage of Function key next to each number, allows the edit of the number for that corresponding mode.

On the right side there are the NORM and STBY mode of the IFF which can be changed using the FN5 key.

IFF MC mode with can be selected using the FN7 key.

IDENT function can be engaged by using the FN8 key.

With the usage of up and down arrow keys in the U.F.C.P., IFF Modes that may not be visible in the page are displayed and the scroll between the two pages available is allowed.

10.3 FPL (FLIGHT PLAN)

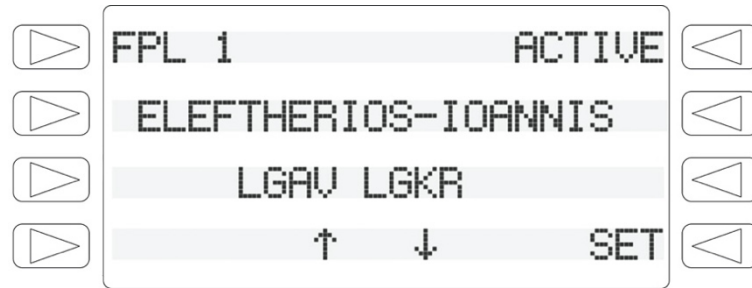


Figure 41

BUTTON	FUNCTION
LINE 1 – RIGHT	Displays “ACTIVE” when flight-plan is selected by pressing “SET” button
FN – 8	Selects, makes active the current flight-plan and moves to “FLIGHTPLAN PLAGE”
ARROW UP	Cycles upwards between saved flight-plans
ARROW DOWN	Cycles downwards between saved flight-plans

Table 39

In the main page of the FPL format, pilot can scroll through all of the currently available Flight plans by using the up and down arrow keys. (The flight plan will ONLY be visible here if it is placed inside the /DWSimFlightplans folder that is located in your main X-Plane folder. This flight plan NEEDS to be a .fms format file).

A flight plan can be selected as the active one by using the FN8 key (If a flight plan is already being selected, the “ACTIVE” flag will be visible next to the FN5 key on the top right. If that is the case pilot can SET the flight plan using the FN8 key. That action will NOT overwrite current progress).

On the top left of the page next to the FN1 there is the number of the flight plan currently viewing and in the middle of the display there are the departure and arrival airports of the flight plan, both in names and identifiers.

10.3.1 FLIGHTPLAN PAGE



Figure 42

BUTTON/LINE	FUNCTION
LINE 1 – LEFT	Displays the “SP” indication when current SP is ACTIVE
FN – 4	Moves to “ADD STEERING POINT” page in order to add a new SP
FN – 8	Moves to “FPL” main page
ARROW UP	Cycles upwards between flight-plan’s steering points
ARROW DOWN	Cycles downwards between flight-plan’s steering points

Table 40

Currently flying towards SP is identified by the highlighted SP flag next to FN1.

F followed by a number and identifier, is the SP of the flight plan currently being viewed in the display.

Scrolling through all the SPs that are inside the selected flight plan can be done by using the up and down arrow keys.

Second display line shows the time the jet will be over the currently viewing SP.

Third display line that shows the speed indication next to FN7 key is currently INOP.

FN4 displays the subpage that allows adding an SP either before or after the current SP.

FN8 displays the FPL format page.

10.3.2 ADD STEERING POINT PAGE

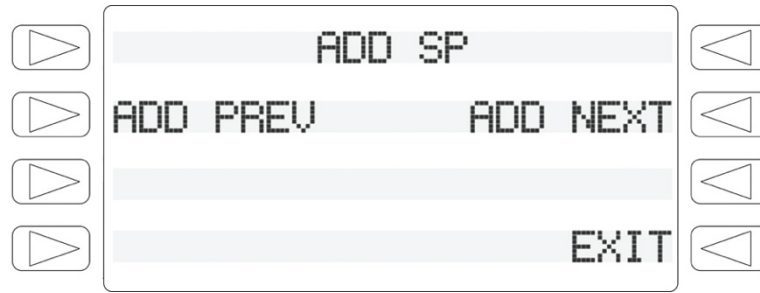


Figure 43

BUTTON	FUNCTION
FN – 2	Moves to “ADD SP” page and adds the SP in the previous position of current SP
FN – 6	Moves to “ADD SP” page and adds the SP in the next position of current SP
FN – 8	Moves to “FPL” main page

Table 41

In this page an SP can be added either before or after the SP currently viewed, That is being done by using either FN2 key to add an SP before the one currently viewing or FN6 key to add it after it

FN8 key to exit the ADD SP subpage and go back to the FLIGHTPLAN subpage.

10.3.3 ADD SP PAGE

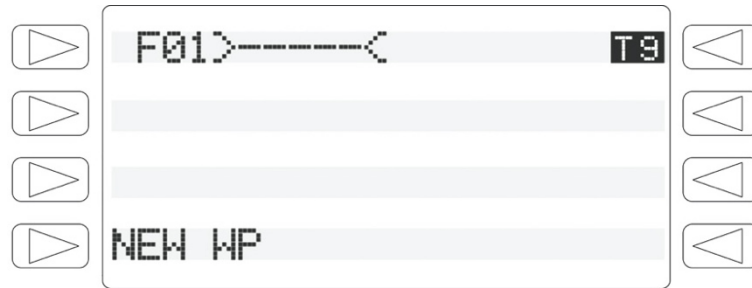


Figure 44

BUTTON/LINE	FUNCTION
LINE 1	SP name can be written with the use of numeric keys (predictive text)
FN – 4	Moves to “NEW WP” page 1 (If typed SP cannot be found)
FN 2,3,4,6,7,8	Selection of corresponding SP and move to “NEW SP” page 2
FN – 5	Cycles numeric keys function between numbers and letters (T9, A/Z)

Table 42

When adding a new SP there are two different options:

The first one is to add an SP that already exists in the navigation database. This can be done by either typing the number of said SP or the identifier of it and then ENT key to select.

The second option is by pressing the FN4 key. This displays the ADD SP PAGE and allows to add a new waypoint.

The T9 or A/Z highlighted option next to FN5, lets user choose between typing numbers or letters in the U.F.C.P.

NOTE : In case of letter typing. For example to type the letter C, number 2 on the keypad must be pressed 3 times). The U.F.C.P. has predictive text. So in case of a typed letter “A”, all available options that include this letter(s) will be shown. After completing the typing of the number or the letters of the wanted SP, ENT key adds it on the current flight plan.

10.3.4 ADD SP PAGE

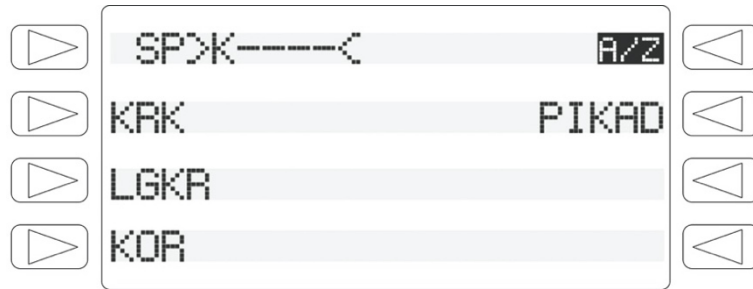


Figure 45

BUTTON/LINE	FUNCTION
LINE 1	Displays currently typed SP for search
FN – 5	Cycles numeric keys function between numbers and letters (T9, A/Z)
FN – 2,3,4,6,7,8	Select the corresponding SP

Table 43

After completing the typing of the number or the letters of the wanted SP and selecting it by pressing the corresponding FN key, ENT key adds it on the current flight plan.

NOTES :

1. *You can create your own flight plans with .fms extension either using XP or websites and store them in the folder : "XP12/DWSimFlightplans"*
2. *You cannot create new flight plan directly from UFCP.*

10.4 SP (STEERING POINT) PAGE

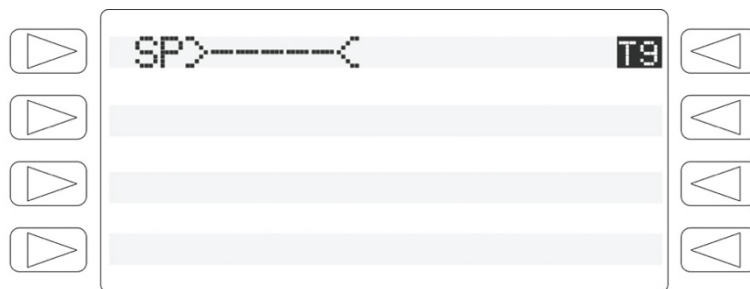


Figure 46

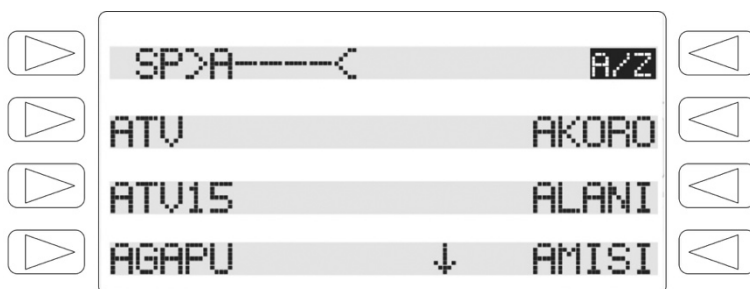


Figure 47

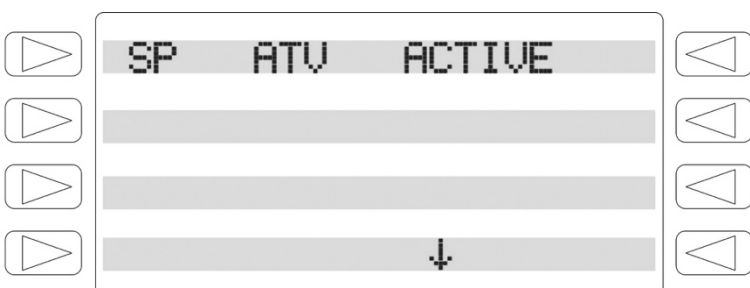


Figure 48

BUTTON/LINE	FUNCTION
LINE 1	Displays currently typed SP for search
FN – 5	Cycles numeric keys function between numbers and letters (T9, A/Z)
FN – 2,3,4,6,7,8	Selects the corresponding SP from database to be as active Next.

Table 44

This is the page from which an SP can be manually selected as an active one.

The predictive text functionality is present here as well, and desired SP can be selected either by using numbers or letters, which can be changed via FN 5 key.

After successfully typing the number or name of the desired SP, the FN key next to the predicted SP name activates it and after 2 seconds of inactivity returns automatically to main menu.

10.5 WP PAGE

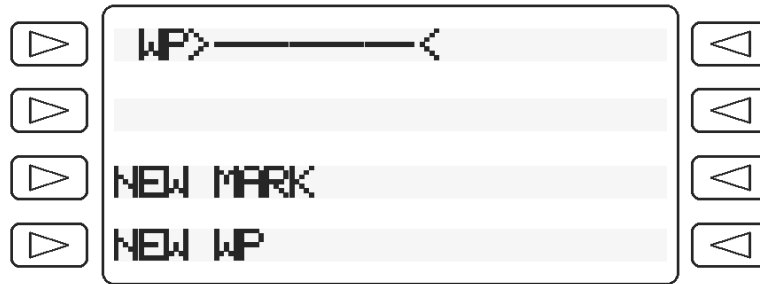


Figure 49

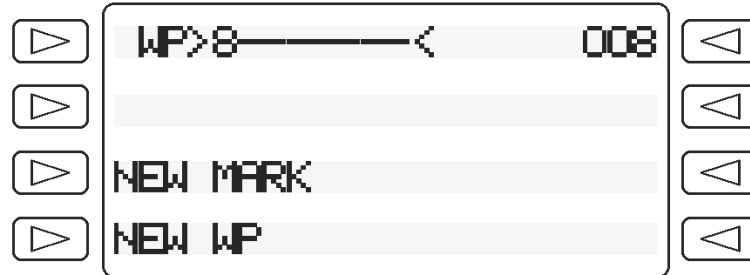


Figure 50

BUTTON/LINE	FUNCTION
LINE 1	WP Input
FN – 3	Moves to NEW MARK page
FN – 4	Moves to NEW WP page
FN – 5, 6, 7	Selects the found WP

Table 45

First inputting the desired WP number (like above using digits).

Second, IF the typed WP is in the database a selection will appear next to FN5, which is then used to select the typed WP.

After the selection of the desired WP, the WP INFO format is displayed, which is the information page of the selected WP.

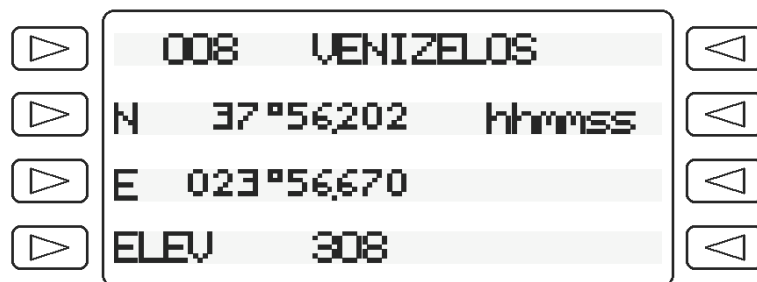


Figure 51

BUTTON/LINE	FUNCTION
LINE 1	Displays the WP Number and Name in the Database
LINE 2	Displays the LAT of selected WP
LINE 3	Displays the LON of selected WP
LINE 4	Displays the ELEV of selected WP

Table 46

Here the details of the WP are displayed (name of the WP, latitude, longitude and elevation).

When arriving to this page from the ADD NEW WP menu, the currently found navaid can be entered to the FLIGHTPLAN upon selection.

10.5.1 NEW MARK PAGE

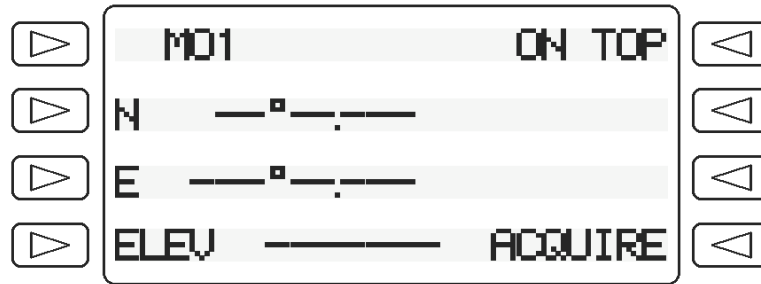


Figure 52

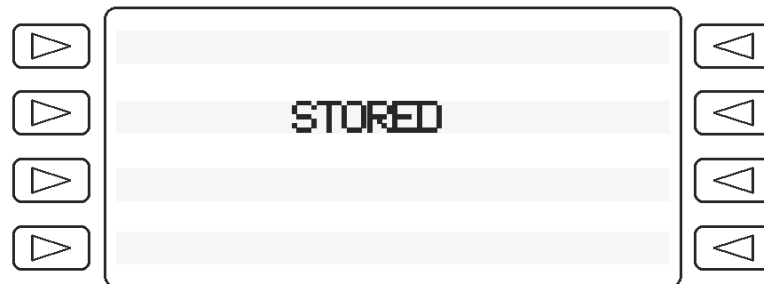


Figure 53

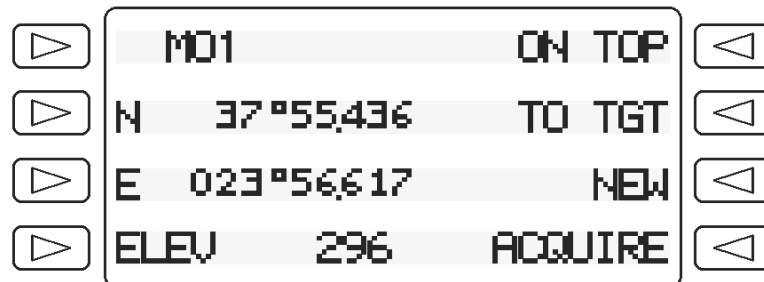


Figure 54

BUTTON/LINE	FUNCTION
LINE 1	Mark Number and acquisition type.
LINE 2	Acquired Mark Latitude
LINE 3	Acquired Mark Longitude
LINE 4	Acquired Mark Elevation
FN - 6	INOP
FN - 7	After acquisition(NEW) it moves to the next free MARK point.
FN - 8	Acquires Mark when clicked.

Table 47

First pressing FN8 while flying acquires the current Latitude, Longitude and Elevation and stores them in the selected Mark number. After acquisition STORED is displayed for approximately 2 seconds and after that the acquired MARK information is displayed

When a MARK has been acquired, pressing FN7 will increment the MARK number to the next empty MARK number in the database.

10.5.2 NEW WP PAGE

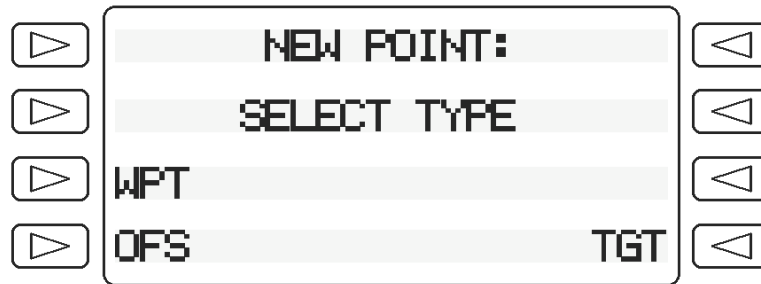


Figure 55

BUTTON/LINE	FUNCTION
FN – 3	Moves to NEW WP WPT page
FN – 4, 8	INOP

Table 48

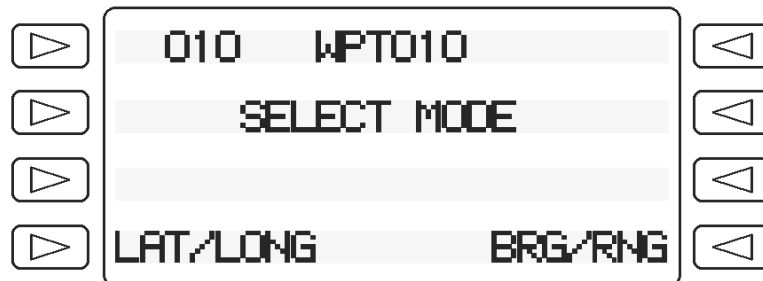


Figure 56

BUTTON/LINE	FUNCTION
FN – 4	Moves to NEW WP WPT LAT/LONG page
FN – 8	Moves to NEW WP WPT BRG/RNG page

Table 49

First pressing FN3 selects WPT as the type for the NEW WP creation. Second is the creation mode selection, pressing FN4 selects LAT/LONG as the creation mode and pressing FN8 selects BRG/RNG as the creation mode.

10.5.3 NEW WP LAT/LONG MODE PAGE



Figure 57



Figure 58

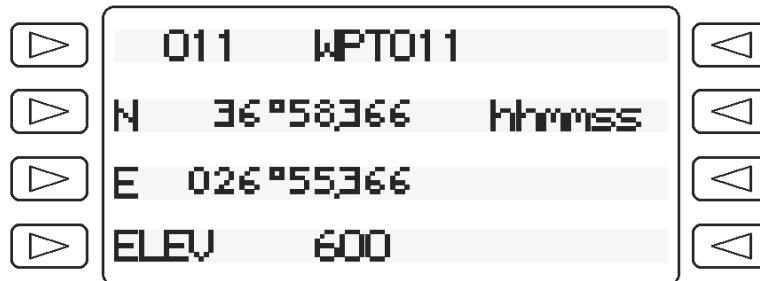


Figure 59

BUTTON/LINE	FUNCTION
FN – 2	Selects Latitude as an input field.
FN – 3	Selects Longitude as an input field.
FN – 4	Selects Elevation as an input field.
FN – 6, 7	INOP

Table 50

In order to create a new WP using the LAT/LONG mode, all the necessary fields must be filled correct. Line 2 and 3 is for the Latitude and Longitude respectively, IF the input field does not contain all the necessary digits the computer will auto fill them respecting each field's validity(Check Examples below). Line 4 is to input the Elevation. When the last of the three fields are filled, STORED will be displayed for about 2 seconds and then the WPT INFO page will be displayed.

When editing the coordinates lines (Line 2 or 3) pressing the plus-minus button changes the cardinal direction in the corresponding line(N/S on Line 2 and E/W on Line 3).

Coordinates Input Examples:

INPUT	RESULT
N 2665	N 26°05.000'
N 9034	N 09°34.000'
E 2654	E 026°54.000'
E 1548	E 154°80.000'

Table 51

10.5.4 NEW WP BRG/RNG MODE PAGE

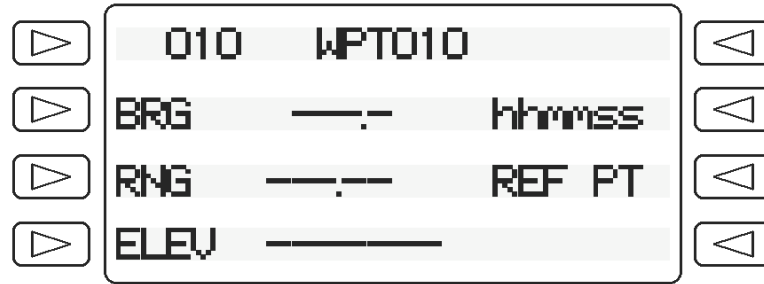


Figure 60

BUTTON/LINE	FUNCTION
FN – 2	Selects Bearing as an input field.
FN – 3	Selects Range as an input field.
FN – 4	Selects Elevation as an input field.
FN – 7	Moves to REF PT page
FN – 6	INOP

Table 52

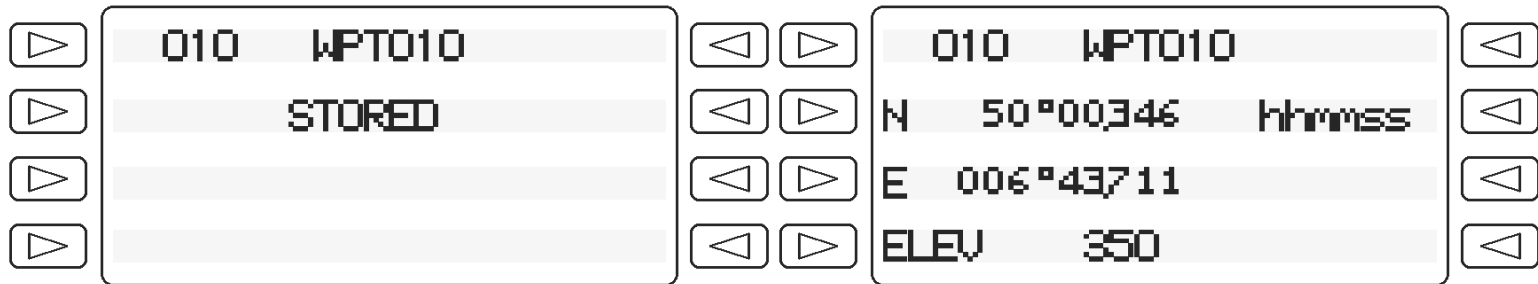


Figure 61

Figure 62

BUTTON/LINE	FUNCTION
FN – 2	Selects Latitude as an input field.
FN – 3	Selects Longitude as an input field.
FN – 4	Selects Elevation as an input field.
FN – 6, 7	INOP

Table 53

Creating a WP using BRG/RNG mode requires a reference point(REF PT) in order to use the bearing and range from it to create the new WPT(any point in the database, including X-Plane airport/navaid and plane database can be used as a REF PT)

In order to create a new WP using the BRG/RNG mode, all the necessary fields must be filled correct and a REF PT(Reference Point) MUST be selected.

The input of the bearing(BRG) is happening in line 2. The input of range(RNG) is happening in line 3. The input of elevation(ELEV) is happening in line 4.

A Reference Point(REF PT) MUST be selected in order for the NEW WPT to be created using the BRG/RNG mode. When the last of the three fields are filled and a REF PT is selected, STORED will be displayed for about 2 seconds and then the WPT INFO page will be displayed.

When editing the coordinates lines (Line 2 or 3) pressing the plus-minus button changes the cardinal direction in the corresponding line(N/S on Line 2 and E/W on Line 3).

10.5.5 REF PT PAGE

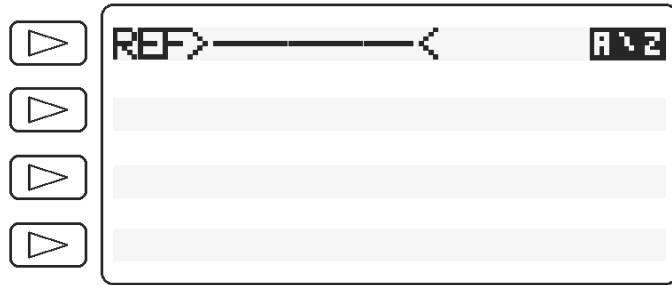


Figure 63

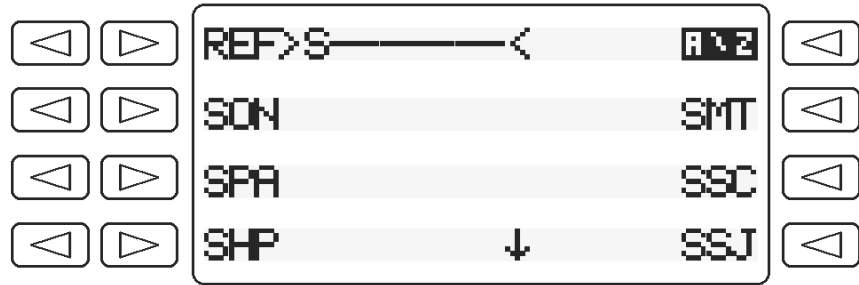


Figure 64

BUTTON/LINE	FUNCTION
FN – 2	Selects Latitude as an input field.
FN – 3	Selects Longitude as an input field.
FN – 4	Selects Elevation as an input field.
FN – 6, 7	INOP

Table 54

This is the page from which a REF PT can be selected for the NEW WPT BRG/RNG MODE page.

The predictive text functionality is present here as well, and desired REF PT can be searched either by using numbers or letters or both, which can be changed via FN 5 key.

After successfully typing the number or name of the desired PT, the FN key next to the predicted PT name selects it and returns to the NEW WPT BRG/RNG MODE page.

10.6 DATA PAGE

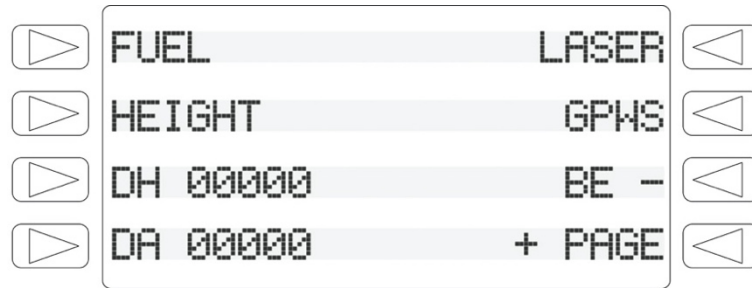


Figure 65

BUTTON/LINE	FUNCTION
FN – 1	Enters the Fuels Limits Page
FN – 2	Enters the Height Page
FN – 3	Edits Decision Height
FN – 4	Edits Decision Altitude
FN – 5	INOP
FN – 6	GPWS Settings Page
FN – 7	INOP
FN – 8	Enters the 2 nd DATA page

Table 55

In this page, various systems of the jet can be selected for adjustments.

In the first DATA page pilot can select : FUEL subpage (FN1), HEIGHT subpage (FN2), DH (Decision Height) and DA (Decision Altitude) via FN4 key and GPWS (FN6).

FN8 key displays the second DATA format page.

10.6.1 DATA PAGE 2

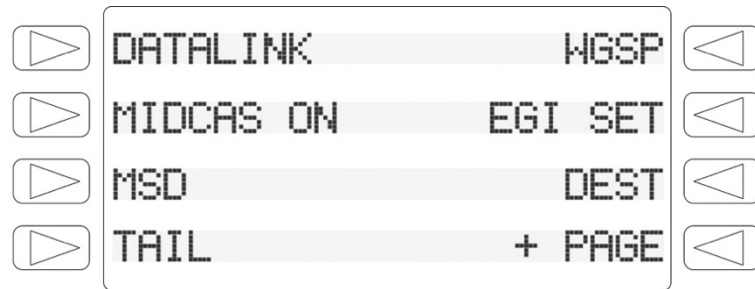


Figure 66

BUTTON/LINE	FUNCTION
FN – 1	INOP
FN – 2	Toggles MIDCAS ON / OFF
FN – 3	INOP
FN – 4	INOP
FN – 5	INOP
FN – 6	Opens the EGI alignment page
FN – 7	INOP
FN – 8	Enters the 3 rd DATA Page

Table 56

FN1, FN3, FN4, FN5 and FN7 are INOP.

FN2 switches the MIDCAS traffic collision avoidance system on and off. It has no page of its own: the label beside the key reads MIDCAS ON or MIDCAS OFF, and changes as it is pressed.

FN8 will displays the third and last page of DATA format.

10.6.2 DATA PAGE 3

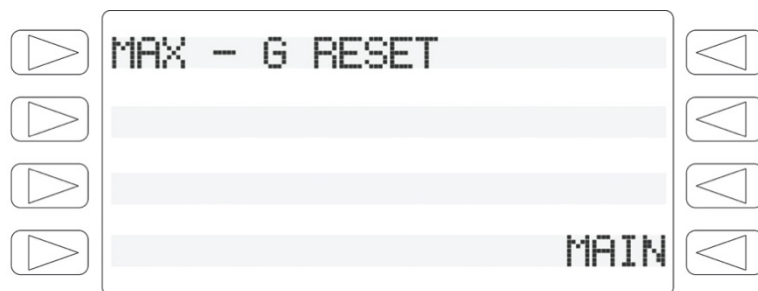


Figure 67

BUTTON	FUNCTION
FN – 1	Resets MAX G
FN - 8	Enters the MAIN DATA page

Table 57

10.6.3 DATA FUEL LIMITS PAGE

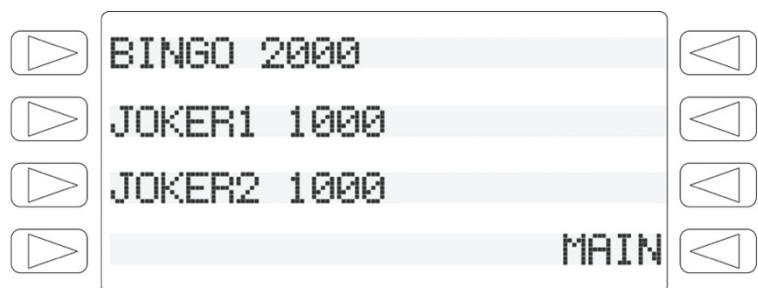


Figure 68

BUTTON	FUNCTION
FN – 1	Edits BINGO fuel amount
FN – 2	Edits JOKER1 fuel amount
FN – 3	Edits JOKER2 fuel amount
FN – 8	Returns to DATA Main Page

Table 58

Here the three fuel indicators (BINGO, JOKER1, JOKER2) can be changed by pressing the FN key next to them and then using the numbers on the keypad and pressing ENT in order to confirm the change.

FN8 key displays the first page of the DATA format.

10.6.4 DATA HEIGHT PAGE

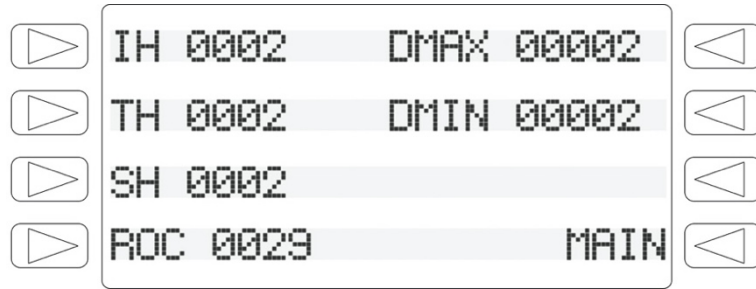


Figure 69

BUTTON/LINE	FUNCTION
FN – 1	Edits IH
FN – 2	Edits TH
FN – 3	Edits SH
FN – 4	Edits ROC
FN – 5	Edits DMAX
FN – 6	Edits DMIN
FN – 8	Returns to DATA main Page

Table 59

Here the height indicators (IH, TH, SH, ROC, DMAX, DMIN) can be changed by pressing the FN key next to them. Then adjusting them by using the numbers on the keypad and finally by pressing ENT in order to confirm the change.

FN8 key you will get back to the first page of the DATA format.

10.6.5 GPWS SETTINGS PAGE

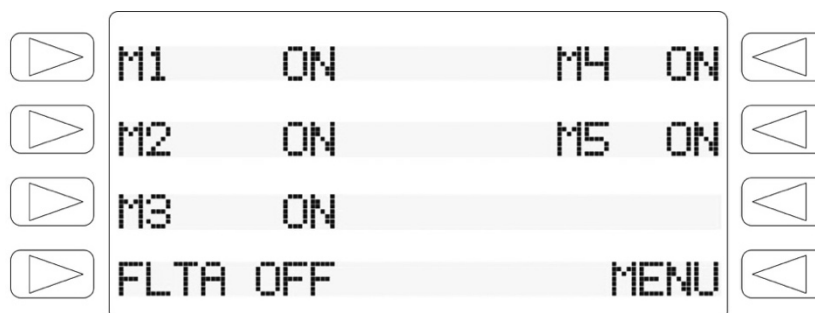


Figure 70

GPWS Format page displays the different GPWS modes. In this page it is possible to toggle ON and OFF the different modes, by clicking the FN key next to the corresponding mode.

Mode1 is responsible for the Pull Up and Sink Rate audio warnings.

Mode2 is responsible for the Terrain audio warning.

Mode3 is responsible for the Don't Sink audio warning after Take-Off.

Mode4 is responsible for the Too Low Terrain, Too Low Gear and Too Low Flaps audio warnings.

Mode5 is responsible for the Glideslope audio warning.

BUTTON/LINE	FUNCTION
FN – 1	Toggles GPWS M1 Mode ON/OFF
FN – 2	Toggles GPWS M2 Mode ON/OFF
FN – 3	Toggles GPWS M3 Mode ON/OFF
FN – 4	INOP
FN – 5	Toggles GPWS M4 Mode ON/OFF
FN – 6	Toggles GPWS M5 Mode ON/OFF
FN – 8	Returns to DATA main Page

Table 60

*NOTE : Turning off one or more of GPWS modes, will also disable the warnings that are provided. It is **NOT** recommended to do so.*

10.6.6 EGI PAGE

The EGI page carries the three values the inertial platform needs before it can align without satellites: present latitude, present longitude and true heading. It is reached from the second DATA page with FN6.

FN2, FN3 and FN4 open the three rows for entry. Digits shift in from the right in the same way as a waypoint, and the same validation applies, so a latitude beyond 90 degrees or a longitude beyond 180 is refused rather than stored. FN6 PPOS fills both coordinate rows from the aircraft's own position, which is the quick way in on the ground and the way out of a mistyped entry. With no satellite fix there is no present position to offer and the rows are dashed instead.

FN7 BATH commands a best available magnetic heading alignment. It needs a position but not a heading, which is the whole difference from a stored heading alignment, so it is offered as soon as both coordinate rows are filled. It is much quicker than a full gyrocompass and slower than a stored heading. STORED flashes beside the key to confirm it was taken.

FN8 SH commands a stored heading alignment, which uses the heading just entered instead of gyrocompassing for it. It is offered only once all three values are in, because starting from a half filled set would be worse than letting the gyrocompass run. STORED flashes beside the key to confirm it was taken.

FN5 sits beside the IN MODE readout and acts on what it says. An alignment that finishes leaves the platform in NAV READY, which means it is good but not yet in use. FN5 is what puts it into use: IN MODE changes to NAV and the UFCP returns to the main page. Until then the EGI page stays up, so a finished alignment is never taken off the screen before it has been accepted. Pressed in any other mode FN5 does nothing, and the page stays where it is. If the platform is offering DEG NAV READY, FN5 accepts that instead.

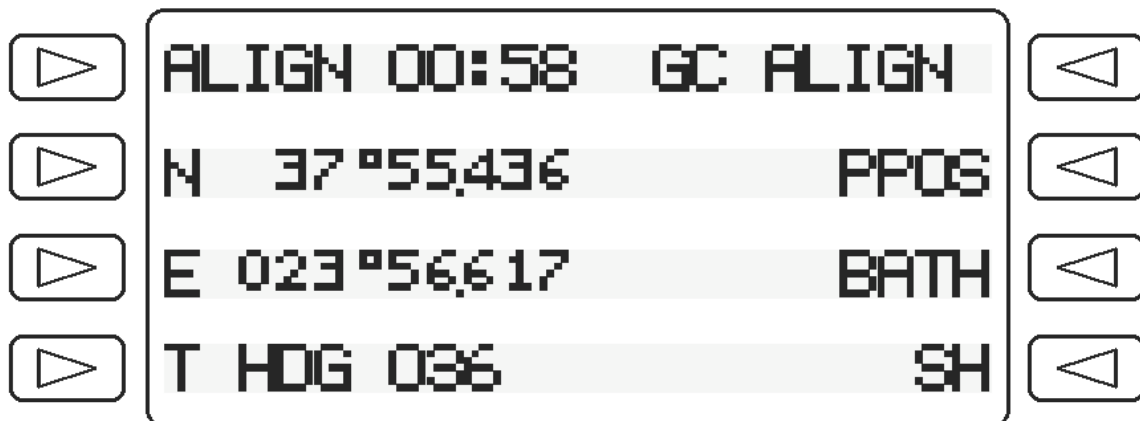


Figure 71

BUTTON	FUNCTION
FN – 2	Enters present latitude
FN – 3	Enters present longitude
FN – 4	Enters true heading
FN – 5	EGI NAV. Enters NAV from NAV READY
FN – 6	PPOS. Fills latitude and longitude from the aircraft position
FN – 7	BATH. Aligns on the aircraft's present magnetic heading
FN – 8	SH. Stored heading alignment, once all three values are entered

Table 61

10.7 AP/FD PAGE (AUTO PILOT)



Figure 72

BUTTON	FUNCTION
FN – 1,2,3,4,5,6,7,8	Selects Auto Pilot Functions

Table 62

In this page, the active vertical, lateral modes for the autopilot and the flight director can be selected.

If autopilot is not active and a lateral mode is selected, it will automatically activate the lateral flight director of the jet (this will happen both in P.D.U. and C.A.D.I. MFD format).

If a vertical mode is selected, the same will happen with the vertical flight director.

In order to de-activate the vertical or lateral flight director, the already activated autopilot/flight director for lateral or vertical modes must be selected again.

If flight director is activated both vertical and lateral, both vertical and lateral modes must be selected to fully de-activate both flight-directors.

If there is no active nav source, the AP/FD format page will display ONLY HDG and ROLL modes for lateral flying and ALT, FPA and VS for vertical flying.

If EGI or TACAN is selected as a nav source, the HNAV will be also visible for the lateral flying.

If VOR or ILS is selected, no HNAV is displayed, but LOC for lateral and APP for vertical flying.

If any of the three modes is selected (HNAV, LOC, APP), and then nav source is changed, the AP/FD mode will revert back to the default modes, which are ROLL for lateral and FPA for vertical.

NOTES :

- When AP is not activated, all above selections will activate the flight director of each selected mode.
- HNAV mode is available ONLY if primary NAV SOURCE is EGI or TACAN.
- LOC and APP modes are available ONLY if primary NAV SOURCE if VOR/ILS.

10.8 TACAN PAGE



Figure 73

BUTTON	FUNCTION
FN – 2	Edits TACAN Channel
FN – 6	Cycles between X and Y

Table 63

TACAN channel can be changed by pressing the FN2 key and change the TACAN band by pressing the FN6 key.

10.9 VOR/ILS PAGE



Figure 74

BUTTON/LINE	FUNCTION
FN – 2	Edits VOR/ILS Frequency
LINE – 3	INOP
LINE – 4	Displays Type and Name of NAVAID

Table 64

In this page, the frequency currently tuned in navaid can be changed by using the FN2 key.

10.10 CLOCK PAGE

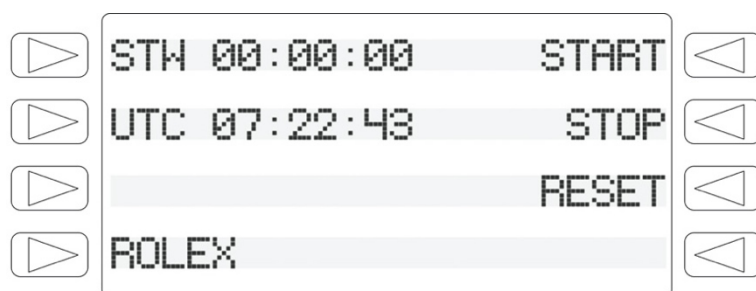


Figure 75

BUTTON/LINE	FUNCTION
LINE – 1	Displays Chronometer
LINE – 2	Displays UTC Time
FN – 5	Starts Chronometer
FN – 6	Stops Chronometer
FN – 7	Resets Chronometer

Table 65

Here a clock is presented with a stop watch next to FN1 and the UTC time next to FN2.

Stop watch can be started by using FN5, can be stopped by using FN6 and can be reset by using FN7.

10.11 AUTO PILOT/FLIGHT DIRECTOR IN DETAIL

Autopilot/flight director

The autopilot/flight director of the Leonardo Aermacchi M-346 Advanced Jet Trainer has 4 modes for lateral flying and 4 modes for vertical flying.

Lateral Modes

The lateral modes available by default are: HDG and ROLL. When EGI or TACAN is selected as a nav source the available modes are: HDG, ROLL & HNAV. When VOR or ILS is selected as a nav source the available modes are: HDG, ROLL & LOC.

When using the HDG mode, the lateral flight director will command a roll in the direction that is the closest to the pre-selected heading by 180 degrees.

When using the ROLL mode, the lateral flight director will command a roll in order to keep the roll degrees the jet was flying at, when activating either the mode or the autopilot, whichever comes last.

When using the HNAV mode the lateral flight director will command a roll in order to follow the active flight plan, if EGI is selected as an active nav source, or in order to intercept the selected localizer course (if TACAN is selected as an active nav source).

When using the LOC mode, if a localizer signal is not received then HDG mode is automatically activated and LOC mode is armed, upon receiving a localizer signal the HDG mode is disengaged and the LOC mode is engaged, the lateral flight director will command a roll in order to intercept the localizer of the VOR or ILS (when VOR or ILS is selected as an active nav source).

Vertical Modes

The vertical modes available by default are: ALT, FPA & VS. When VOR or ILS is selected as an active nav source the available modes are: ALT, FPA, VS & APP.

When using the ALT mode, the vertical flight director will command a pitch movement in order to hold the preselected altitude. If the ALT mode is engaged and the difference between the preselected altitude and the current altitude is greater than 1000 feet and the pitch angle of the flight path marker is within 1 degree of the horizon line, then the flight director will command a pitch movement in order to maintain the altitude the jet was flying on activation, if the flight path marker is greater than 1 degree of the horizon line on the positive or the negative side, then the flight director will command a pitch movement in order to maintain the angle of the flight path marker when it was engaged, until it reaches the preselected altitude.

When using the FPA mode the vertical flight director will command pitch movement in order to hold the Flight Path Angle on the moment of activation until it reaches the preselected altitude. When within 1000 feet of the preselected altitude the ALT mode will automatically activate.

When using the VS mode the vertical flight director will command a pitch movement in order to hold the Vertical Speed on the moment of activation until it reaches the preselected altitude. When within 1000 feet of the preselected altitude the ALT mode will automatically activate.

When using the APP mode, it will automatically also activate the LOC mode for the lateral, if a glide slope signal is not received then ALT mode is activated and GS mode is armed, upon receiving a signal from a glide slope transmitter the GS MODE is activated which will make the vertical flight director will command a pitch movement in order to follow the glide slope indicator received from the VOR or ILS.

PAGE INTENTIONALLY LEFT BLANK

11. M.F.D – MULTI FUNCTION DISPLAY (34,102)

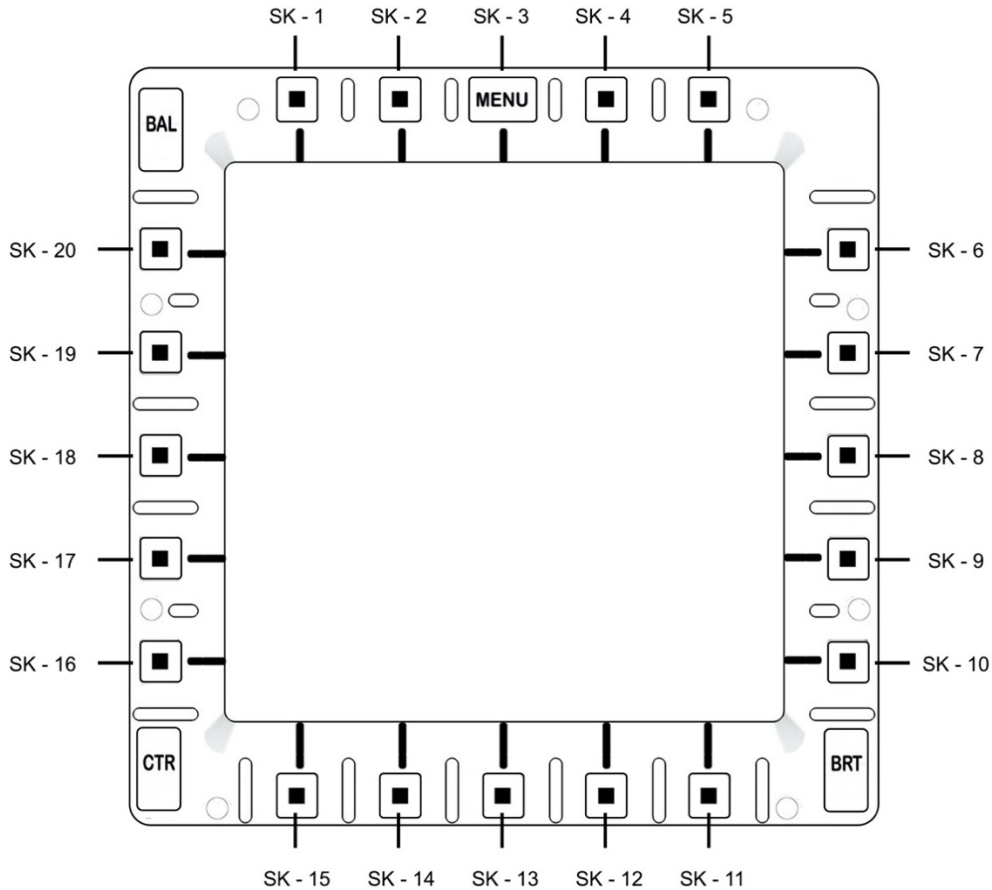


Figure 76

Each cockpit has 3 MFD display units. They are located below the UFCP.

Each MFD consists of 20 soft keys, 3 rocker switches and a display.

There are 3 rocker keys that control : BAL (balance) currently INOP, CTR (contrast), BRT (brightness).

SK – 3 is used only for cycling between MENU 1 and MENU 2. When SK – 3 is pressed and if no further action is done, after 5 seconds menu is hidden.

With a single press of SK3 button, MENU options are displayed and with a double press of SK3 button, MENU2 options are displayed. In both MENUs any the displayed available MFD formats can be selected by pressing the corresponding SK key next to it, some of them are currently INOP as it can be seen by the two tables below each MENU image. The currently selected MFD format can be seen with a box around it. If no other SK is pressed when the MENU options are visible, the MENU options will disappear after 5 seconds.

11.1 MFD MENU 1

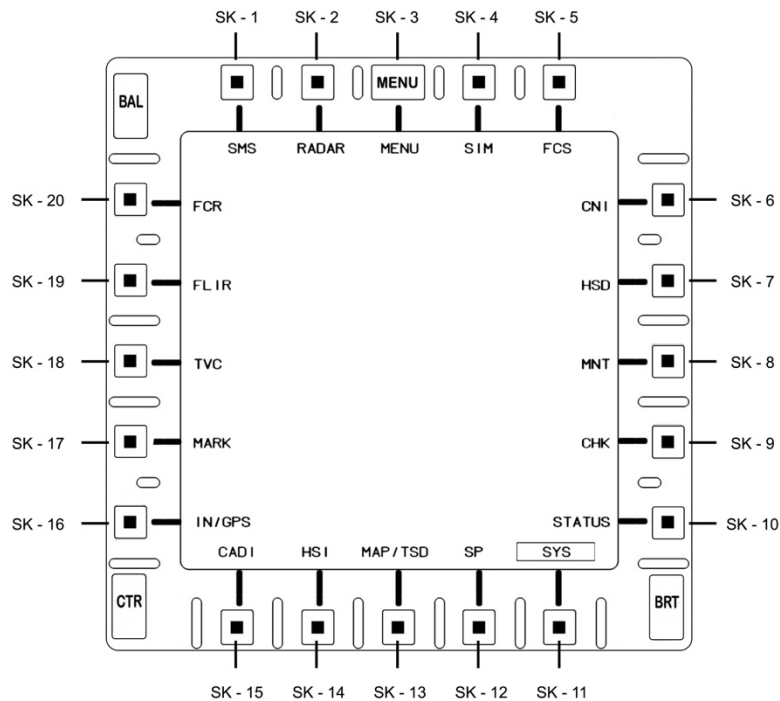


Figure 77

SOFT - KEY	ACTION	FUNCTION
SK - 01	SMS	INOP
SK - 02	RADAR	INOP
SK - 03	MENU	Cycles between MENU 1 and MENU 2
SK - 04	SIM	INOP
SK - 05	FCS	Selects the FCS (Flight Control Surfaces) Format
SK - 06	CNI	Selects the CNI (Comms Navigation IFF) Format
SK - 07	HSD	Selects HSD Format
SK - 08	MNT	INOP
SK - 09	CHK	INOP
SK - 10	STATUS	Selects the Status Format
SK - 11	SYS	Selects the Systems Format
SK - 12	SP	Selects the SP Format
SK - 13	MAP/TSD	Selects the MAP Format
SK - 14	HSI	Selects the HSI Format
SK - 15	CADI	Selects the CADI Format
SK - 16	IN/GPS	Selects the IN/GPS Format
SK - 17	MARK	INOP
SK - 18	HUDR	Selects the HUD Repeater Format
SK - 19	FLIR	INOP
SK - 20	FCR	Selects the FCR Format

Table 66

11.2 MFD MENU 2

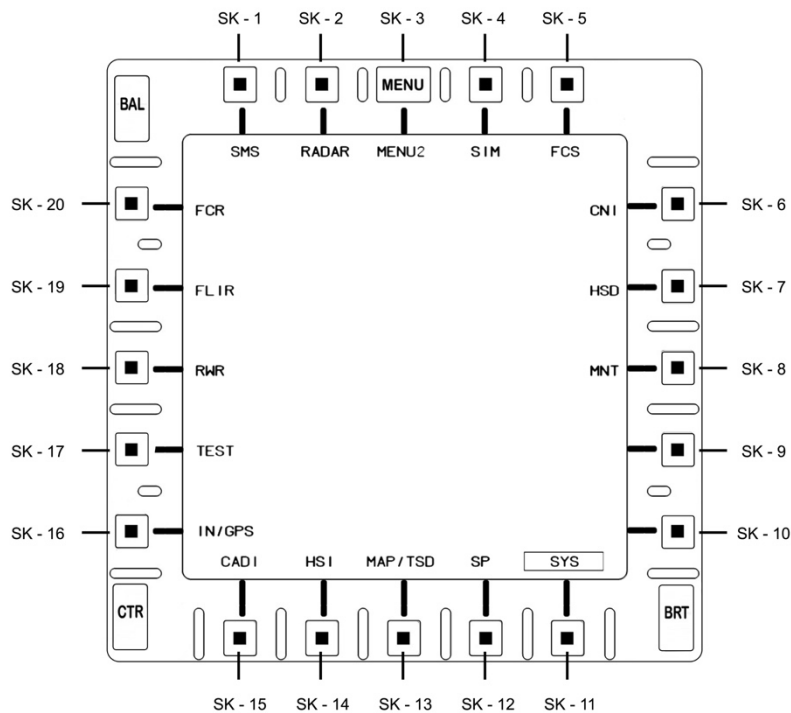


Figure 78

SOFT - KEY	ACTION	FUNCTION
SK – 01	SMS	INOP
SK – 02	RADAR	INOP
SK – 03	MENU2	Cycles between MENU 1 and MENU 2
SK – 04	SIM	INOP
SK – 05	FCS	Selects the FCS (Flight Control Surfaces) Format
SK – 06	CNI	Selects the CNI (Comms Navigation IFF) Format
SK – 07	HSD	Selects HSD Format
SK – 08	MNT	INOP
SK – 09	-	INOP
SK – 10	-	INOP
SK – 11	SYS	Selects the Systems Format
SK – 12	SP	Selects the SP Format
SK – 13	MAP/TSD	Selects the MAP Format
SK – 14	HSI	Selects the HSI Format
SK – 15	CADI	Selects the CADI Format
SK – 16	IN/GPS	Selects the IN/GPS Format
SK – 17	TEST	INOP
SK – 18	RWR	INOP
SK – 19	FLIR	INOP
SK – 20	FCR	Selects the FCR Format

Table 67

11.3 FCS FORMAT - PAGE 1

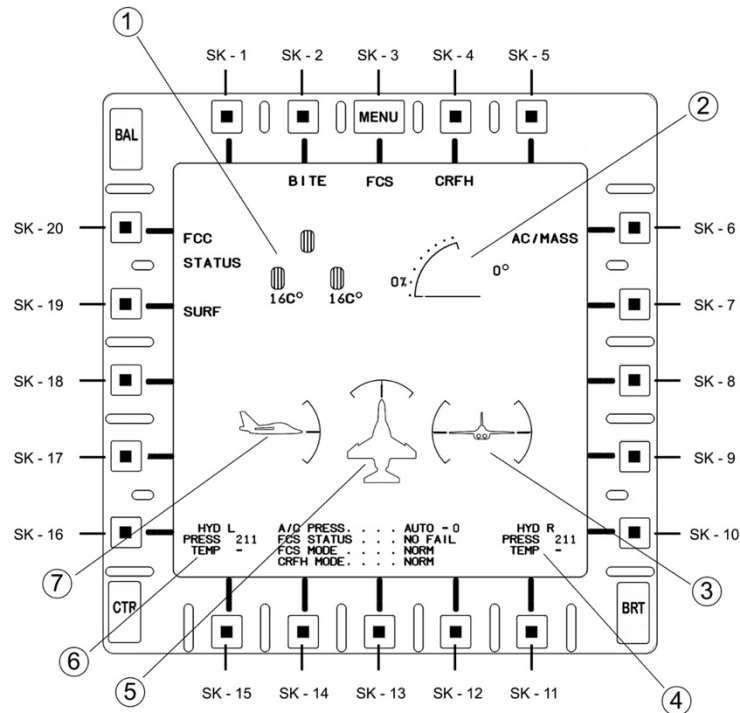


Figure 79

FCS – Flight Control Surfaces format displays the setup and condition of flight control surfaces, tire temperature, trim settings, speed-brake extension and status.

Cycling between PAGE 1 and PAGE 2 is done by pressing SK-19.

The main FCS Format page displays information regarding landing gear, current position (Green: landing gear down, White: landing gear up) and landing gear brake temperature (1) as well as the current position of the air brake, both in percentage and degrees (2).

In addition this page displays the current position of pitch trim (7), yaw trim (5) and roll trim (3). At the lower part on both left and right sides of the page, current pressure of the left (6) and right (4) hydraulic system is displayed.

11.3.1 FCS FORMAT - PAGE 2

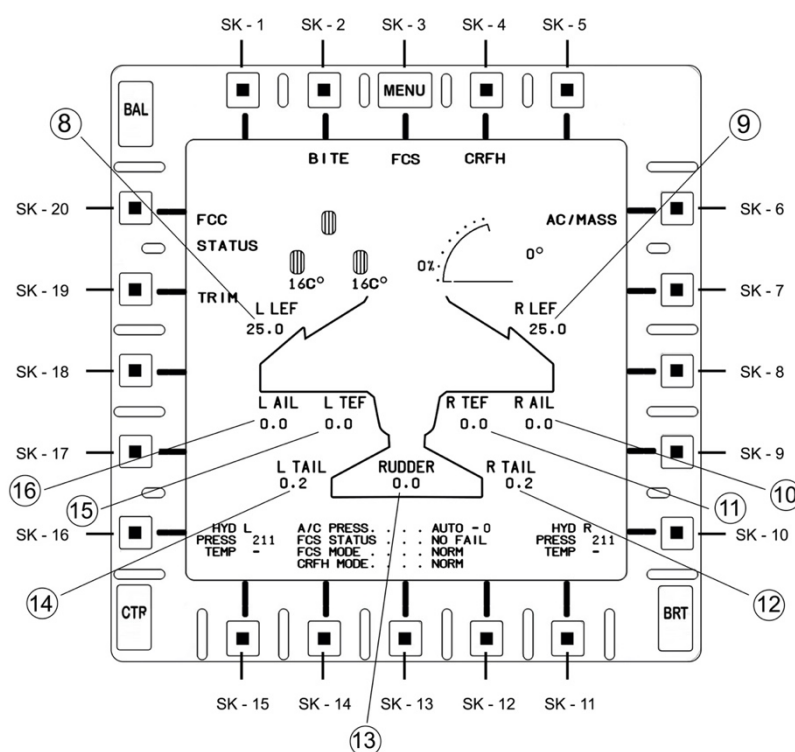


Figure 80

In Surfaces FCS format page in addition of landing gear, speed brake & hydraulic systems information, the current degrees of each control surface is displayed. These are the Leading Edge Flaps (LEF) for the left (8) & right (9) wing, the ailerons for the left (16) & right (10) wing, the Trailing Edge Flaps (TEF) for the left (15) & right (11) wing, the tail elevator for the left (14) & right (12) elevator and the rudder (13).

POSITION	FUNCTION
1	Tire Temperature
2	Air Brake Extension Indicator
3	Roll Trim
4	Right Hydraulic Pressure
5	Yaw Trim
6	Left Hydraulic Pressure
7	Pitch Trim
8	Left Leading Edge Flap Indication
9	Right Leading Edge Flap Indication
10	Right Aileron Indication
11	Right Trailing Edge Flap Indication
12	Right Tail Elevator Indication
13	Rudder Indication
14	Left Tail Elevator Indication
15	Left Trailing Edge Flap Indication
16	Left Aileron Indication

Table 68

11.4 SP FORMAT

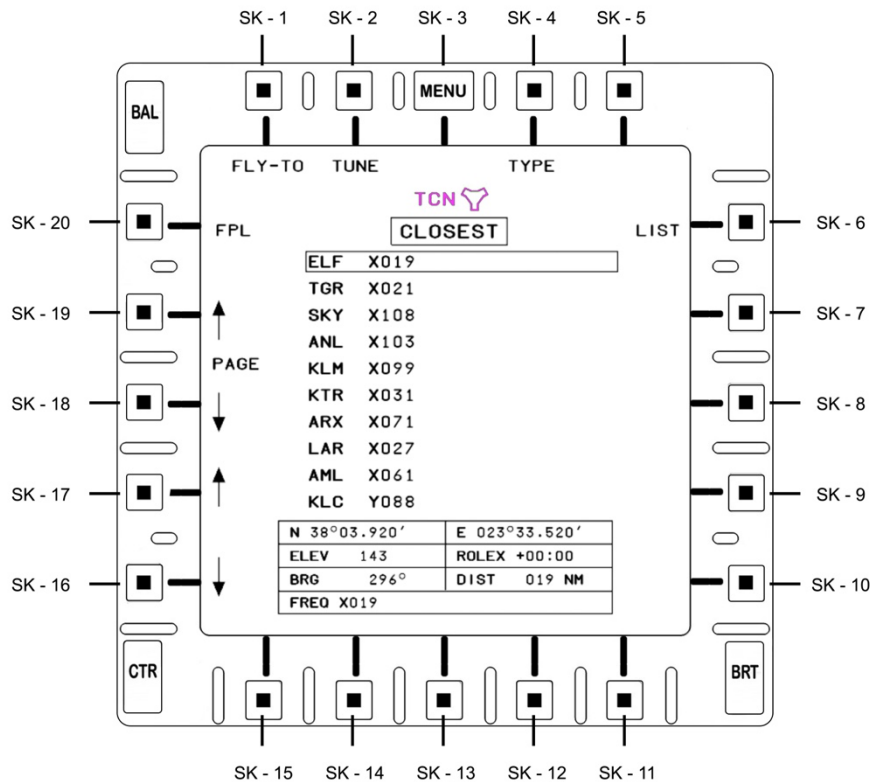


Figure 81

SOFT - KEY	FUNCTION
SK – 01	Sets as active the selected steering point
SK – 02	Tunes the selected TACAN, VOR or ILS
SK – 04	Opens the type selection page
SK – 06	Toggles between the full list and the closest entries
SK – 16	Moves the selection down the list
SK – 17	Moves the selection up the list
SK – 18	Selects next list page
SK – 19	Selects prev list page
SK – 20	Selects FPL list

Table 69

In SP format page the selected type of point is listed, and any point in that list can be searched and set as the active steering point. Ten types are available: TACAN, VOR, ILS, NDB and airports come from the navigation database, waypoints and marks from the pilot banks, and reference points, targets and offsets from the data cartridge. The symbol each type draws on the HSD and the MAP/TSD is listed in the DISPLAY SYMBOLS chapter.

11.4.1 TYPE SELECTION

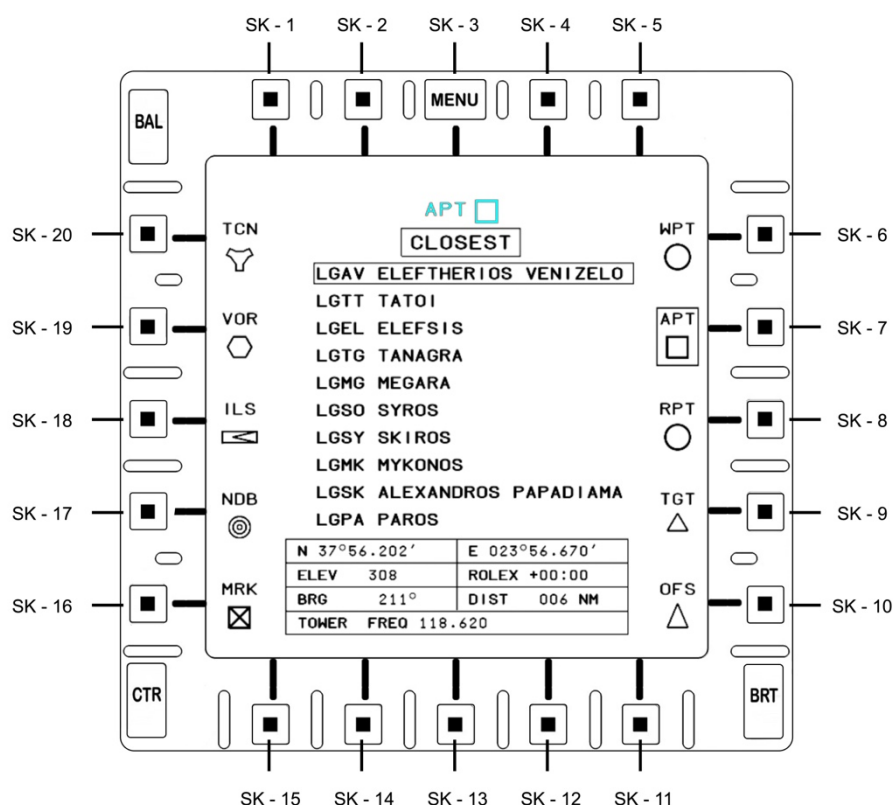


Figure 82

SOFT - KEY	FUNCTION
SK – 06	Lists the pilot waypoint bank (WPT)
SK – 07	Lists airports (APT)
SK – 08	Lists reference points from the cartridge (RPT)
SK – 09	Lists targets from the cartridge (TGT)
SK – 10	Lists offsets from the cartridge (OFS)
SK – 16	Lists marks M01 to M99 (MRK)
SK – 17	Lists NDB beacons
SK – 18	Lists ILS
SK – 19	Lists VOR
SK – 20	Lists TACAN (TCN)

Table 70

The type selection page is modal. While it is displayed only SK-03 MENU remains available, and the page closes as soon as a type is chosen, returning to the list with the selection reset to the first entry.

11.4.2 APT (AIRPORT) SELECTION

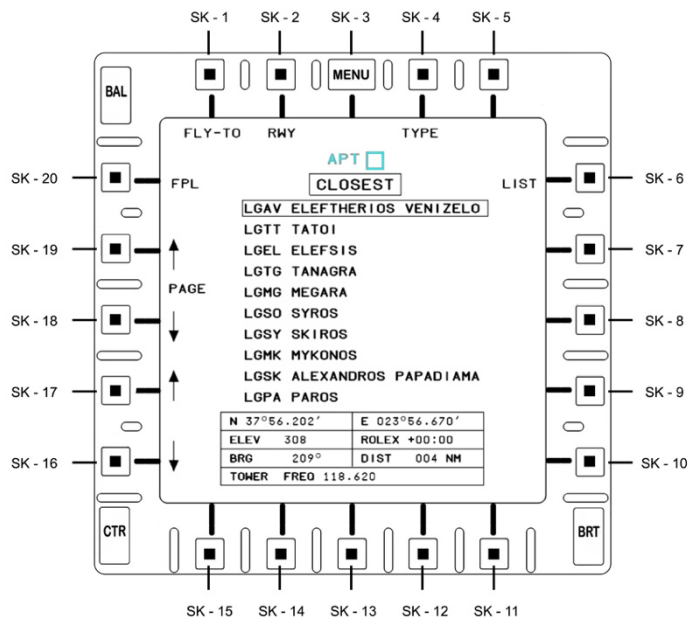


Figure 83

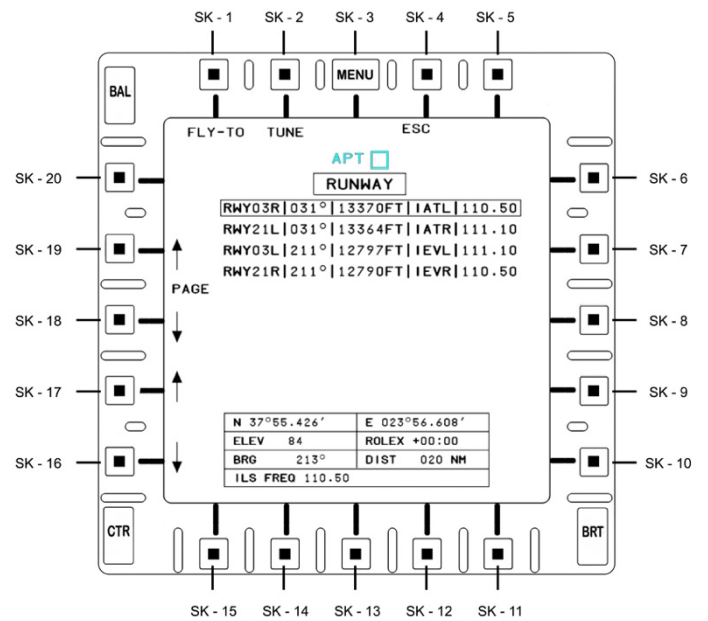


Figure 84

Figure 83

SOFT - KEY	FUNCTION
SK – 02	Displays highlighted airport runways (Figure 71)

Table 71

Figure 84

SOFT - KEY	FUNCTION
SK – 02	Tunes into selected ILS
SK – 04	Returns to Airport list

Table 72

11.4.3 FPL (FLIGHT PLAN) SELECTION

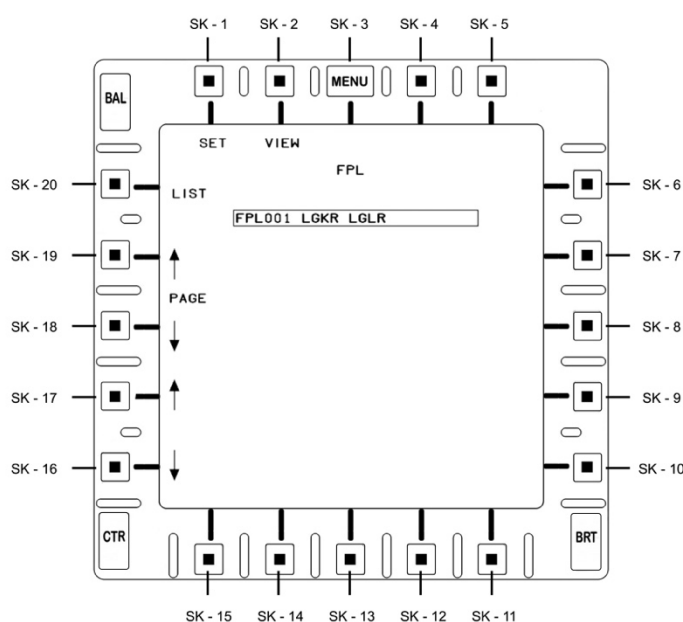


Figure 85

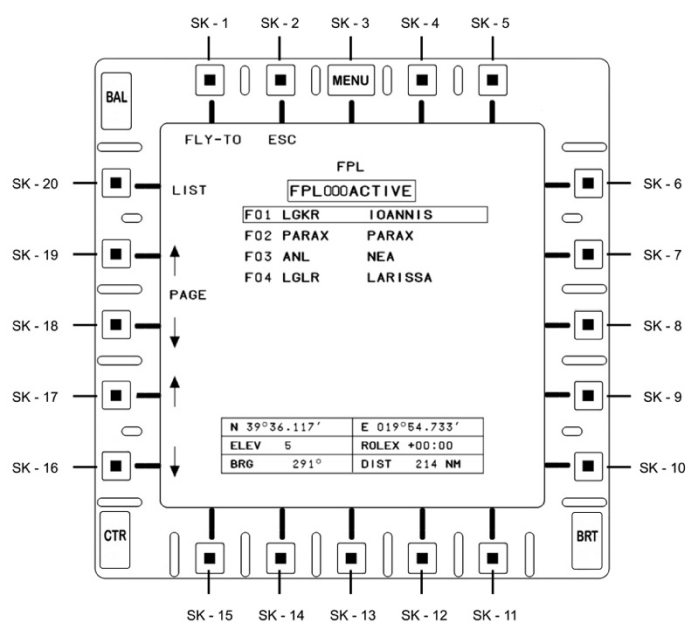


Figure 86

Figure 85

SOFT - KEY	FUNCTION
SK – 01	Sets highlighted flightplan as active
SK – 02	Shows details of highlighted flightplan (Figure 73)
SK – 20	Returns to previous selected list type

Table 73

Figure 86

SOFT - KEY	FUNCTION
SK – 01	Sets highlighted SP as active
SK – 02	Returns to flightplan list
SK – 20	Returns to previous selected list type

Table 74

11.5 STATUS FORMAT

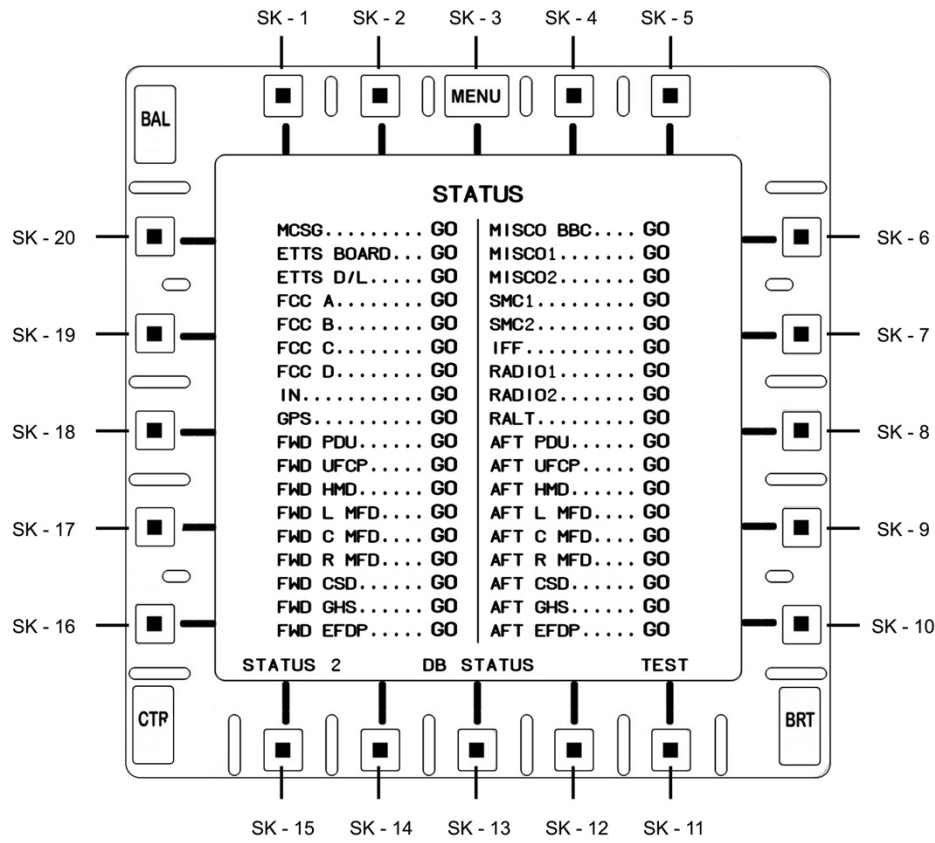


Figure 87

STATUS Format displays the current status of the different systems of the jet. When a system is ready to go, a GO indication will be displayed next to it. When a system is not ready to go or if the jet does not know in what state the system is in, a N/A indication will be displayed next to it.

11.6 SYS FORMAT

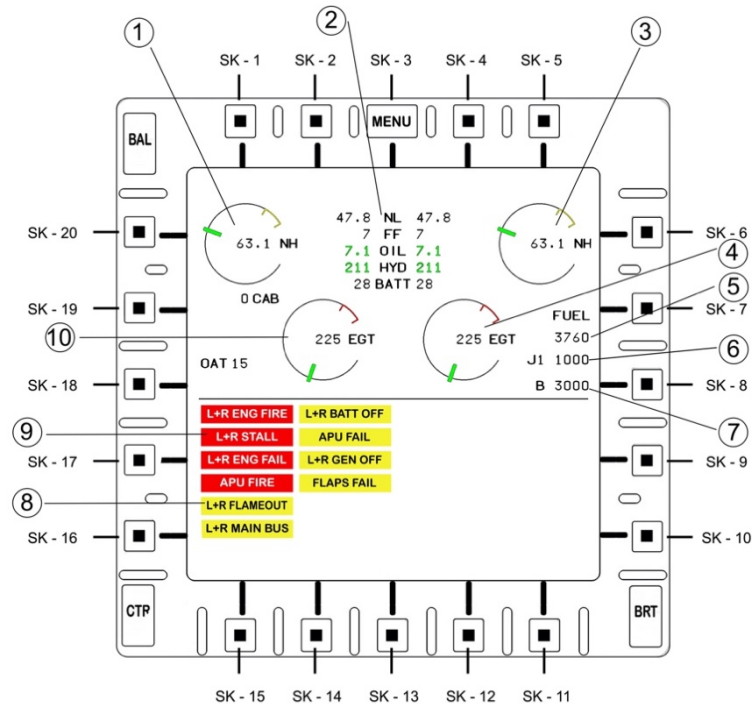


Figure 88

POSITION	DISPLAY
1	Left Engine NH
2	Left and Right Engines (NL, FF, OIL Temperature, HYD Pressure, Battery Volts)
3	Right Engine NH
4	Right Engine EGT
5	Total Internal Fuel
6	Joker 1 Fuel Indication
7	Bingo Fuel Indication
8	Warning Indicators
9	Critical Warning Indicators
10	Left Engine EGT

Table 75

The main SYS Format page displays information of the most vital systems of the Jet as well as any failure that might occur during the flight. These vital systems include indications for the left & right engine, such as NH (left: 1, right: 3), NL, EGT (left: 10, right: 4), FF (Fuel Flow in Lb/Minute), OIL temperature, HYD pressure & BATT voltage as well as the Total Fuel (5), BINGO (7), JOKER1 (6) on the right side of the display. A white line is splitting the display between the systems information and the fault messages. The fault messages are displayed in the second half of the display and include Warnings (RED), Cautions (YELLOW), Advisories (CYAN).

11.6.1 SYS FORMAT – FUEL PAGE

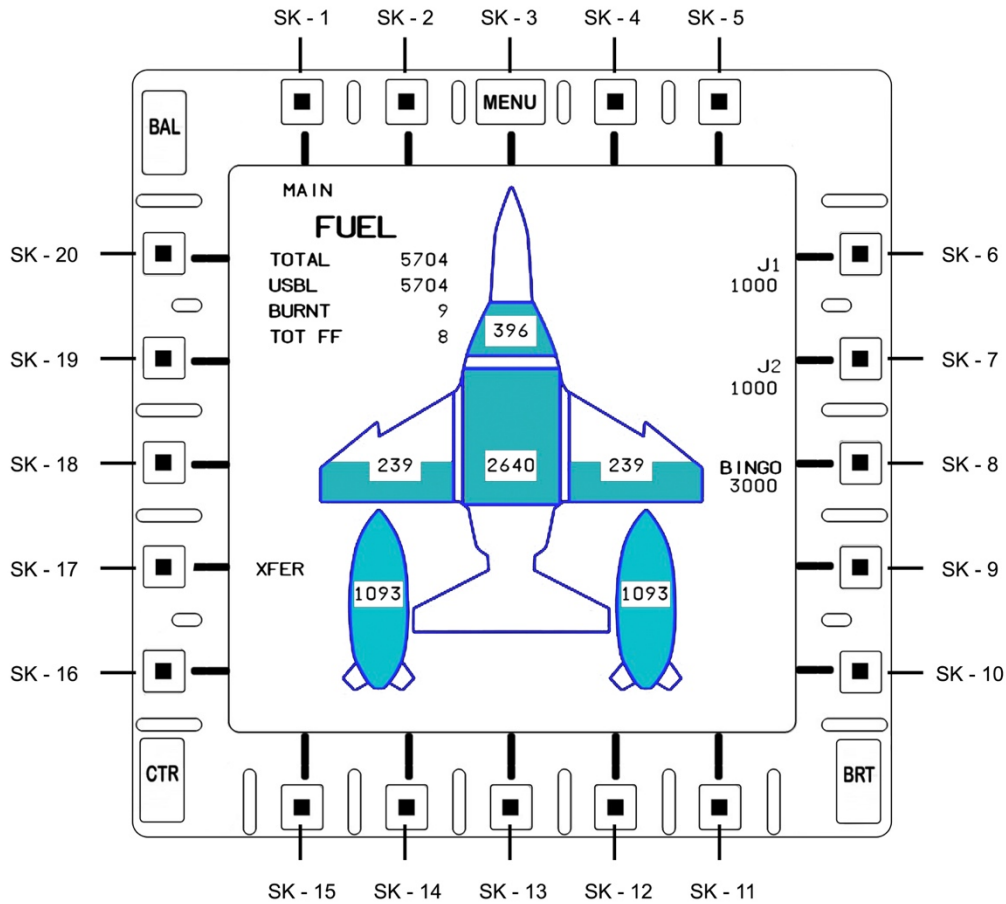


Figure 89

The Fuel SYS Format page displays the available fuel in the different tanks of the plane, both internal & external (if available). A small table on the top left is displaying fuel information such as TOTAL fuel currently in the jet, max USBL (Usable) fuel available in the jet, total amount of fuel that is BURNT up until now and Total Fuel Flow (TOT FF), this includes both engines. Pressing SK1 will select the SYS Format main page.

11.7 MAP/TSD FORMAT

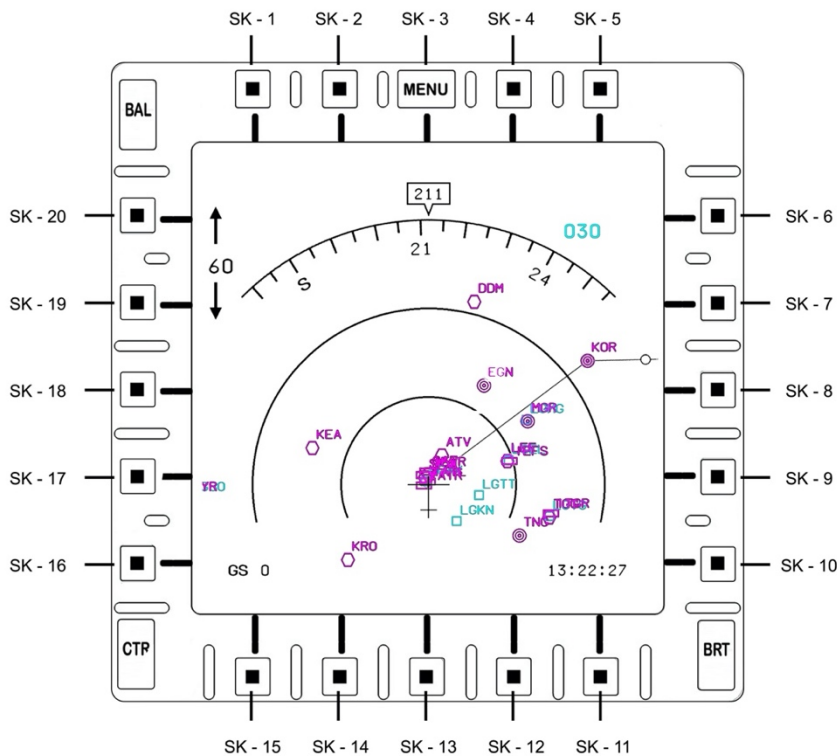


Figure 91

SYMBOL	MEANING
	AIRPORT
	TACAN
	NDB
	VOR / DME
	ILS
	STEERING POINT
	ACTIVE STEERING POINT
	FLIGHT PLAN LINE

Figure 90

The MAP/TSD format displays the available Airports, Tacan stations, NDB beacons, VOR/DME stations, ILS stations, both active & not active Steering Points (SP) and the flight plan line.

Minimum available range for the MAP/TSD Format is 15 nautical miles and maximum is 120 nautical miles. Pressing SK19 will decrease the range by half while pressing SK20 will increase double the current range selected. The current MAP/TSD Format range is displayed between the range up and range down arrows. The heading currently being flown is displayed inside a box in the centre of the compass and the pre-selected heading is displayed in cyan colouring in the right side of the display. The Ground Speed (GS) and current Local Time are displayed on the lower end of the display.

SOFT - KEY	ACTION	FUNCTION
SK - 19	ZOOM OUT	ZOOMS OUT THE MAP
SK - 20	ZOOM IN	ZOOMS IN THE MAP

Table 76

11.8 HSI FORMAT

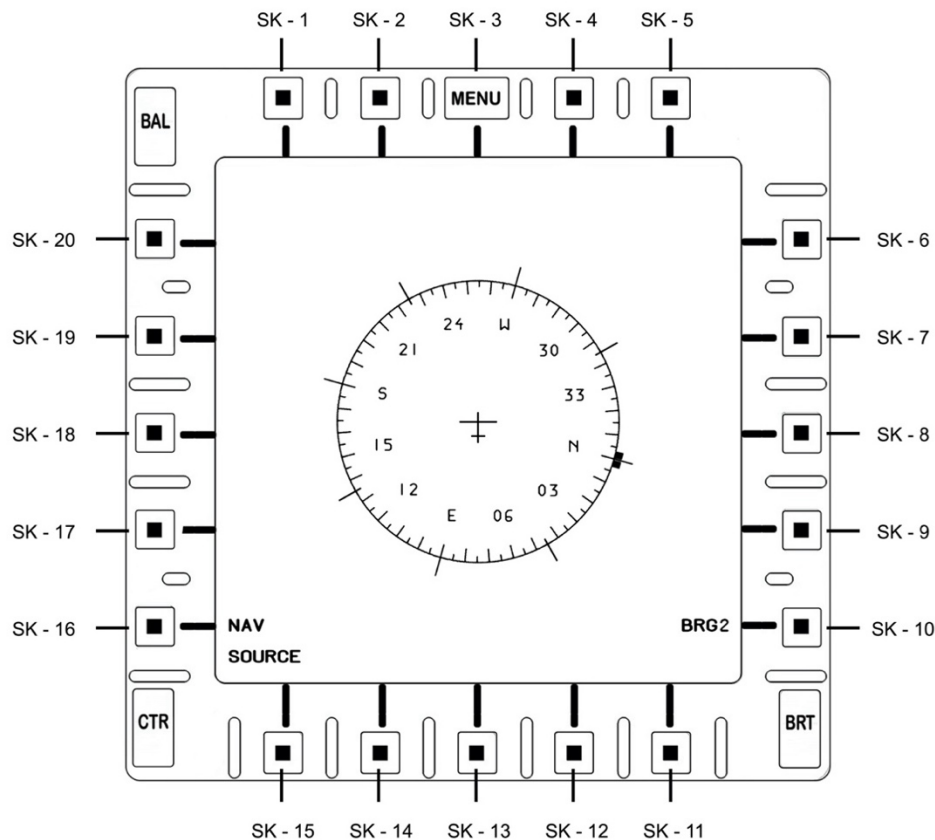


Figure 92

SOFT - KEY	ACTION	FUNCTION
SK - 16	NAV SOURCE	Selects Nav Source
SK - 10	BRG2	Shows Secondary Nav Source to Select From

Table 77

HSI Format is displaying heading that is currently being flown, the pre-selected heading, the active nav source and the bearing 2 source.

Pressing SK16, in the HSI Format, displays all available nav source options to select as an active nav source, by pressing the corresponding SK. These are the EGI on SK16, TACAN on SK17 and the VOR/ILS on SK18. Pressing SK1 will de-select any selected active nav source.

Pressing SK10, in the HSI Format, displays all available bearing 2 source options to select as an active bearing 2 source, by pressing the corresponding SK. These are the EGI on SK10, TACAN on SK9 and the VOR/ILS on SK8. Pressing SK1 will de-select any selected active bearing 2 source.

Something to be noted is that if any of the three options available is selected as an active nav source, then said option will not show up on the bearing 2 source and vice versa.

VOR-ILS and TACAN can be used only as primary or secondary navigation sources. Not in both.

11.8.1 HSI FORMAT – ACTIVE NAV SOURCE

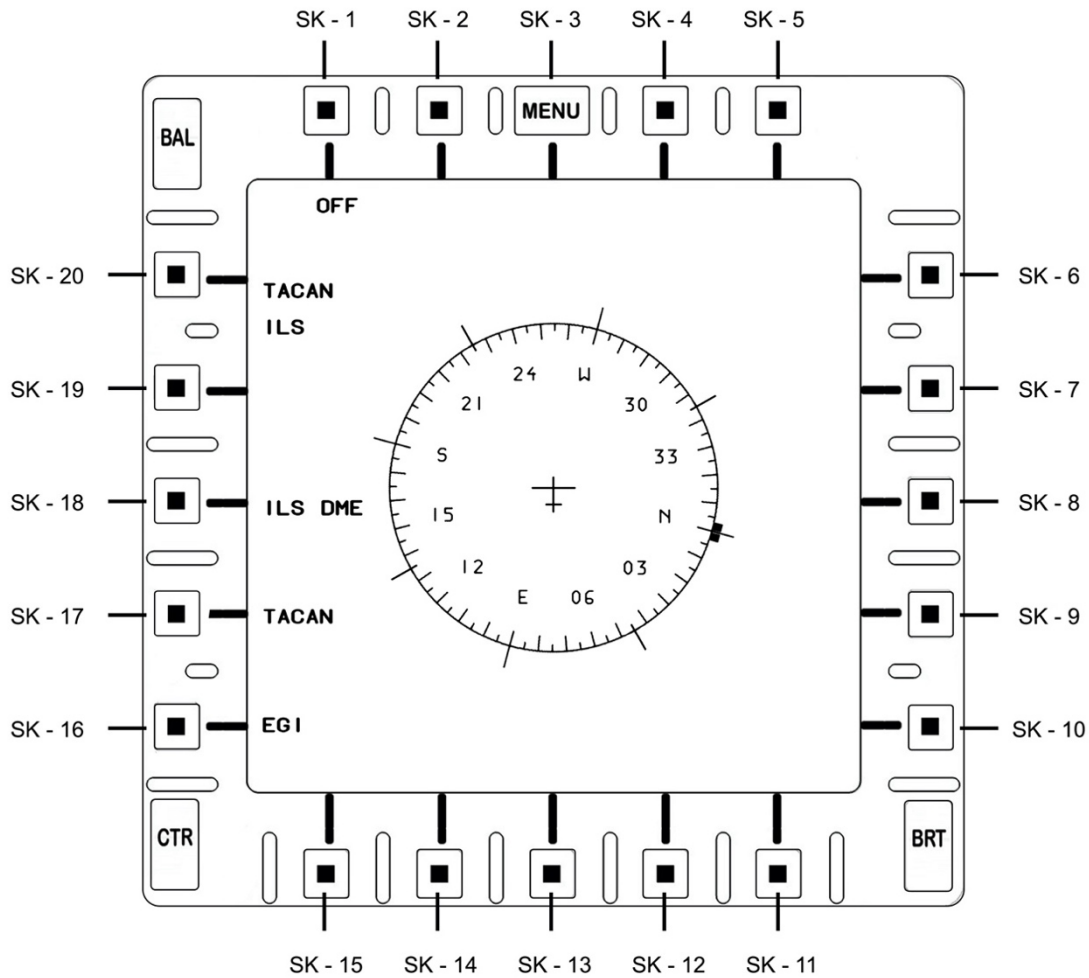


Figure 93

SOFT – KEY	ACTION	FUNCTION
SK – 16	EGI	Select EGI as Active Nav Source
SK – 17	TACAN	Select TACAN as Active Nav Source
SK – 18	ILS / DME	Select ILS / DME as Active Nav Source

Table 78

Pressing the corresponding SK next to the desired nav source, will select said nav source and display the HSI Format page with the necessary information. The information that will be provided may vary depending on the selected nav source. The miles readout, Fuel To Go (FTG) in Lbs, Time To Go (TTG, Hours : Minutes) and the type of the selected nav source, are displayed no matter the nav source currently selected. Having VOR/ILS or TACAN nav source selected will display the frequency of the nav source type next to it. Having EGI as the selected nav source, will display the name of the SP currently being flown to. In the compass the white arrow is displaying the selected course for the nav source, as well as the localizer that is represented by the bar and the dots in the middle of the arrow, and the green arrow is representing the bearing to the selected nav source. If a glide slope signal is received, then a glide slope indicator will be displayed on the left side of the HSI Format.

11.8.2 HSI FORMAT – SECONDARY NAV SOURCE

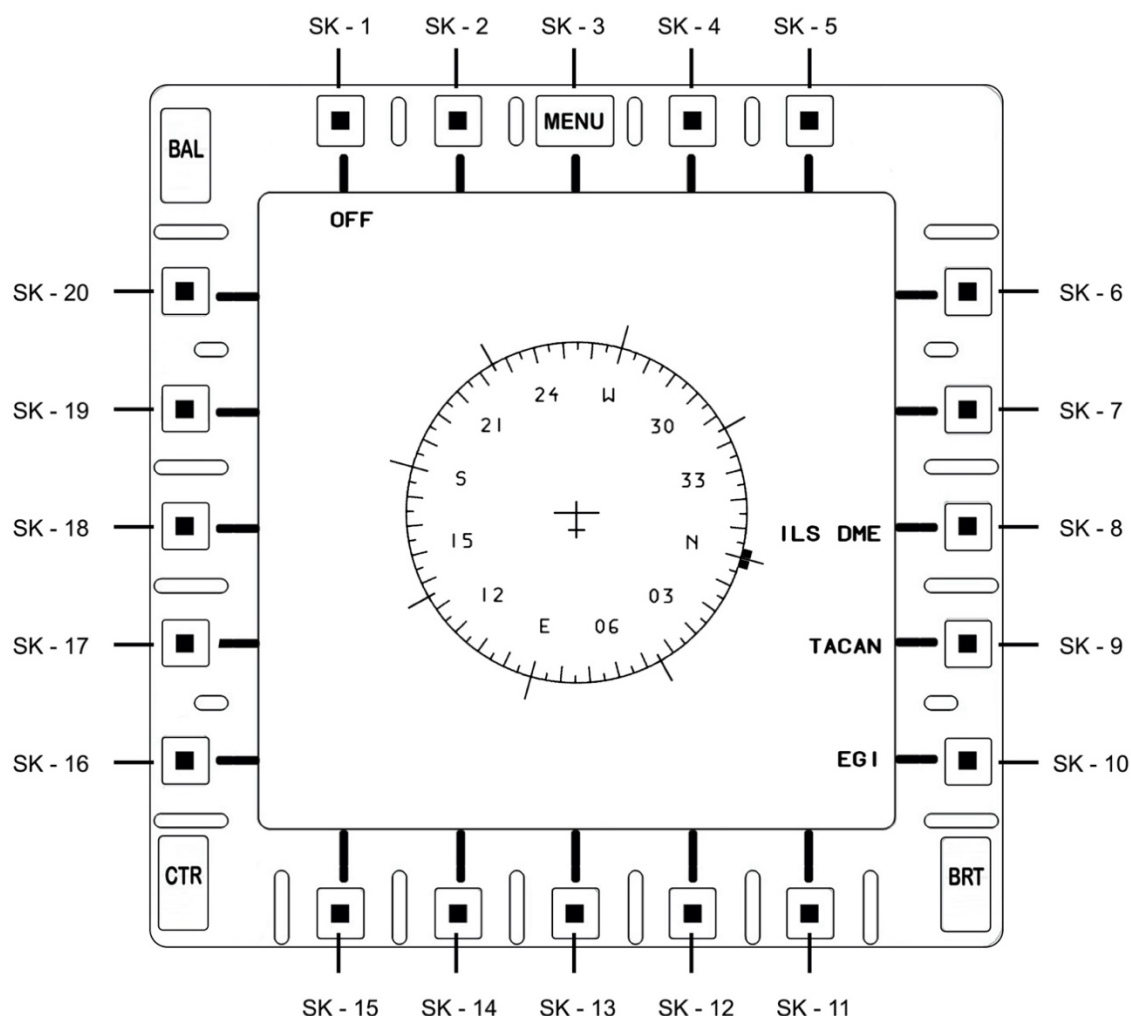


Figure 94

SOFT – KEY	ACTION	FUNCTION
SK – 1	OFF	Returns to previous options
SK – 8	ILS / DME	Selects the current VOR / ILS as secondary Nav Source
SK – 9	TACAN	Selects the current TACAN as secondary Nav Source
SK – 10	EGI	Selects the current EGI as secondary Nav Source

Table 79

Pressing the corresponding SK next to the desired bearing 2 source will select the said source as a bearing 2 source. After the selection of the bearing 2 source, the HSI Format will display the selected bearing 2 source in yellow, displaying the type of the source as well as the name or the frequency of it. In the compass of the HSI the yellow markings are displaying the bearing to the bearing 2 source.

11.8.3 HSI FORMAT – NAV SOURCES DISPLAYED

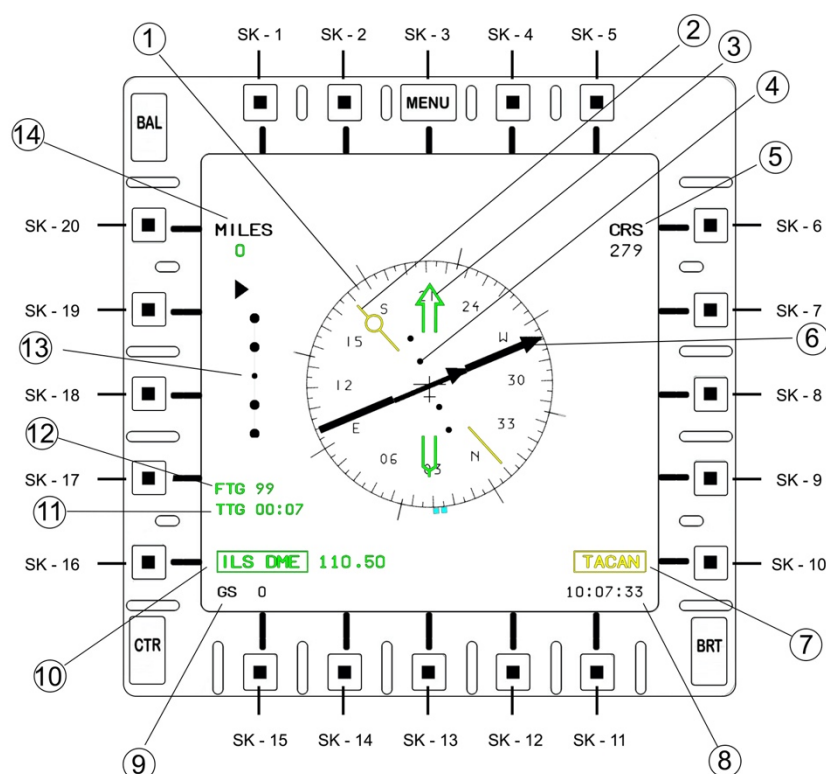


Figure 97

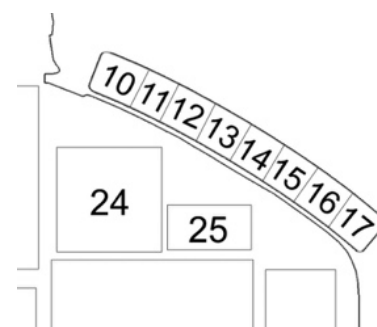


Figure 95

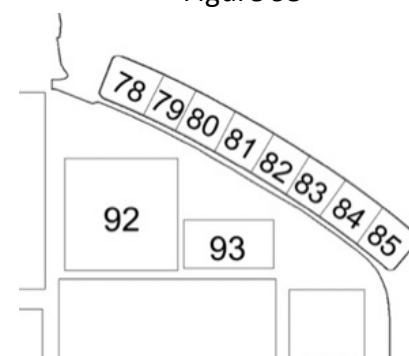


Figure 96

POSITION	DISPLAY
1	Compass
2	Secondary NAV AID Bearing
3	Active NAV AID Bearing
4	Active NAV AID Localizer (if available)
5	Active NAV AID Course Readout. It can be adjusted by rotating knobs No 10 or No 78
6	Active NAV AID Course Arrow
7	Secondary Selected NAV AID Type and Name (if available)
8	Local Time
9	Ground Speed Readout
10	Active Selected NAV AID Type and Frequency
11	Estimated Time Needed to Arrive at Active Selected NAV AID (HH:MM)
12	Estimated Fuel Needed to Arrive at Active Selected NAV AID
13	Active Selected NAV AID Glideslope (if available)
14	Distance From Active Selected NAV AID in Miles

Table 80

NOTE : Same type of NAV AID cannot be selected on both Active and Secondary at the same time.

11.9 CADI FORMAT

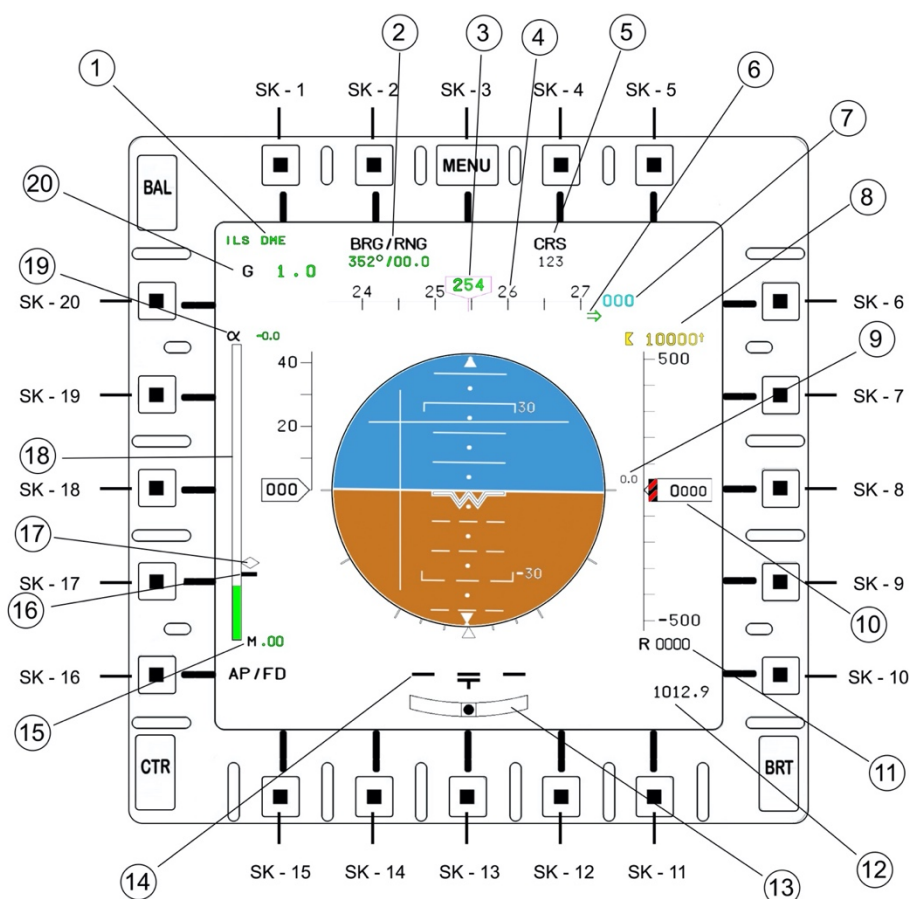


Figure 98

POSITION SOFT - KEY	DISPLAY
1	Selected Active NAV AID Type
2	Selected Active NAV AID Bearing and Range (in miles)
3	Current Heading of the Jet
4	Heading Stripe
5	Selected Active NAV AID Course
6	True North Position Direction
7	Auto Pilot Pre-Selected Heading
8	Auto Pilot Pre-Selected Altitude
9	Feet Per Minute
10	Barometric Altitude
11	Radio Altitude (up to FL100)
12	Barometric Setting
13	Side Slip Indicator
14	Turn Rate Indicator
15	Mach Readout Indicator
16	Optimum Alpha Position
17	Best Endurance Alpha Position
18	Current Alpha Indicator
19	Current Alpha Readout
20	Current G Force
SK - 16	Displays CADI PAGE 2 for Autopilot Settings

Table 81

CADI Format displays a variety of necessary indications for the continuing flight of the jet. These indications include the heading stripe (4, that is showing the currently flown heading, the pre-selected heading and the true north direction), the pre-selected altitude (8), the barometric altitude (10), the radio altitude (11, up to 10000 feet), the vertical speed readout (9), the barometric setting (12), the side slip indicator (13), the turn rate indicator (14), the current mach number (15), the calibrated airspeed stripe, the current angle of attack indicator (18) and current angle of attack readout (19), the optimum angle of attack position (16), the best endurance alpha position (17), the current G Forces on the jet (20) and the active nav source(1) together with the bearing and range to it (2) and the set course (5). In addition, if autopilot or any flight director is activated, the flight directors will be displayed in magenta inside the attitude indicator and if the active nav source has a localizer or a glide slope signal the corresponding indicator will also be displayed.

Pressing SK16, while in the CADI Format, displayed the available autopilot/flight director modes. Pressing the corresponding SK button will activate said autopilot/flight director mode and then display the CADI Format main page. Pressing SK1 will display the CADI Format main page, without choosing any of the autopilot/flight director modes.

11.9.1 CADI AP/FD

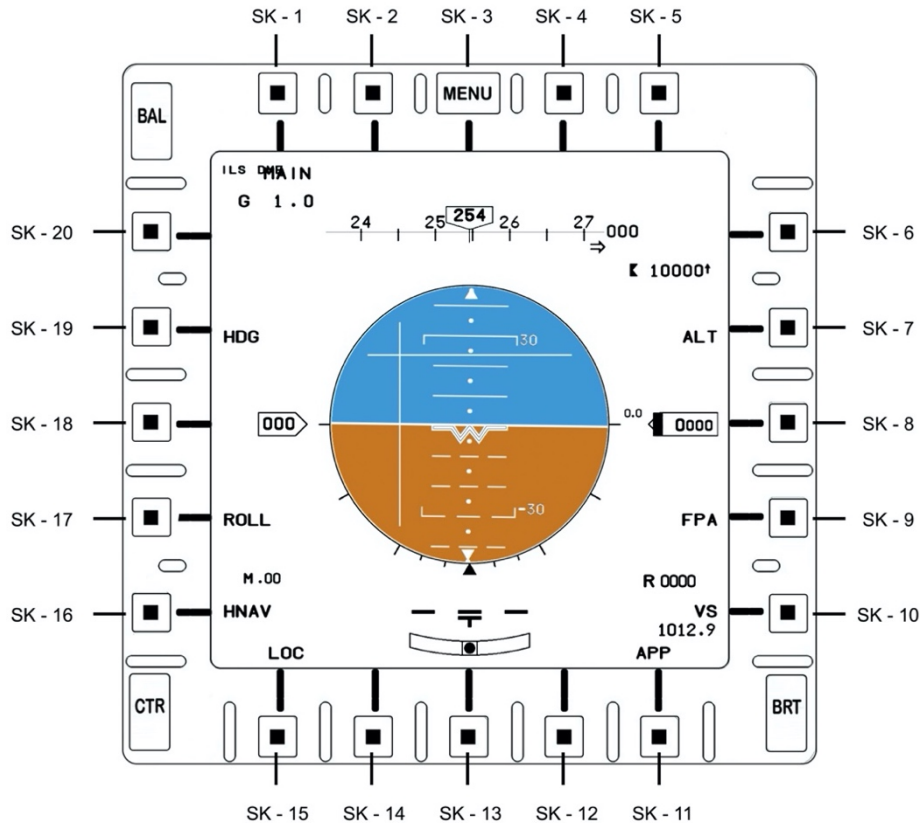


Figure 99

SOFT – KEY	DISPLAY
SK – 1	Returns to CADI Page 1
SK – 7	Selects Altitude Hold as Active Vertical Mode (within 1000feet)
SK – 9	Selects Flight Path Angle as Active Vertical Mode and Altitude Hold as Armed Vertical Mode
SK – 10	Selects Vertical Speed as Active Vertical Mode and Altitude Hold as Armed Vertical Mode (holds the vertical speed of Jet on selection)
SK – 11	Selects Altitude Hold as Active Vertical Mode, Glideslope as Armed Vertical Mode, Heading as Active Lateral Mode and Localizer as Armed Lateral Mode
SK – 15	Selects heading as Active Lateral Mode and Localizer as Armed Lateral Mode
SK – 16	Selects Horizontal Navigation as Active Lateral Mode (Flight Plan)
SK – 17	Selects Roll Hold as Active Lateral Mode
SK – 19	Selects Heading Hold as Active Lateral Mode

Table 82

NOTES :

- When AP is not activated, all above selections will activate the flight director of each selected mode.
- HNAV mode is available ONLY if primary NAV SOURCE is EGI or TACAN.
- LOC and APP modes are available ONLY if primary NAV SOURCE if VOR/ILS.

11.9.2 CADI AP/FD KNOBS

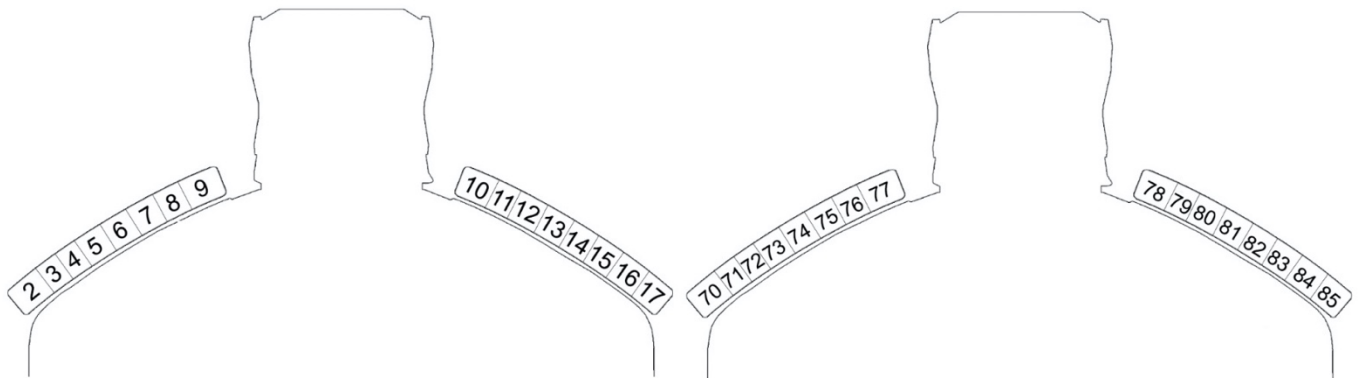


Figure 100

SOFT - KEY	ACTION
2	Altitude Selection (Front Cockpit)
17	Heading Selection (Front Cockpit)
70	Altitude Selection (Rear Cockpit)
85	Heading Selection (Rear Cockpit)

Table 83

11.9.3 CADI ILS LOCALIER

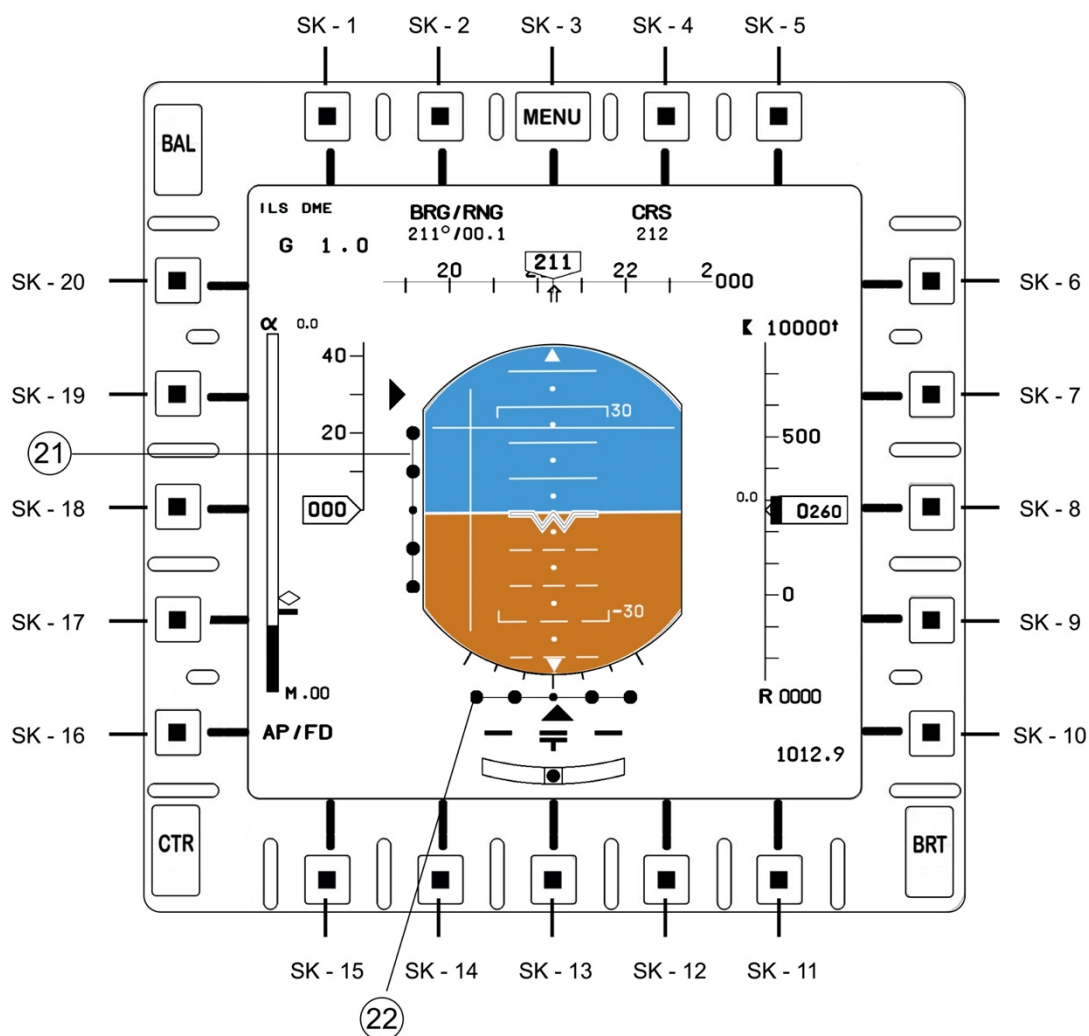


Figure 101

SOFT - KEY	DISPLAY
21	Selected Active NAV AID Glideslope (if available)
22	Selected Active NAV AID Localizer (if available)

Table 84

11.10 IN/GPS FORMAT

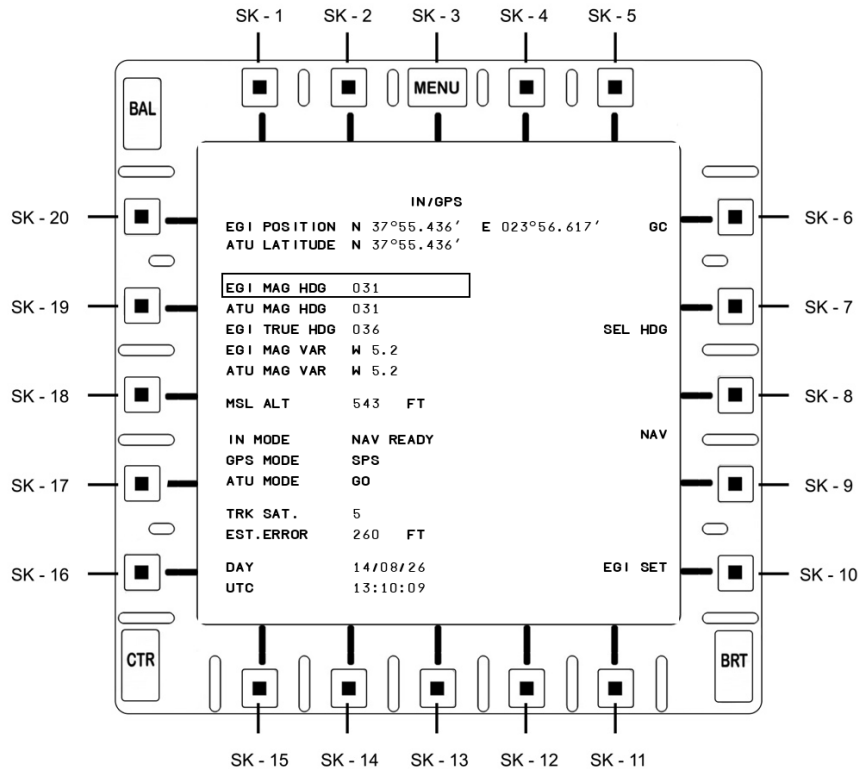


Figure 102

IN/GPS Format is displaying the current position, heading and barometric altitude of the Jet, as well as the current Day and the UTC time.

The IN/GPS format shows what the navigation units are doing. The EGI rows carry its position, true heading and magnetic variation; the ATU rows carry the same from the independent attitude and heading unit, so the two can be compared against each other. IN MODE reads the alignment state, GPS MODE the satellite service in use, and TRK SAT. and EST.ERROR the number of satellites tracked and the position error that follows from them. MSL ALT, UTC and the date complete the page.

The soft keys command the alignment, and which of them appear depends on what the EGI is doing. All four are blank in NAV, because the aircraft is navigating and there is nothing left to align or insert. None of them does anything unless the EGI is powered.

SOFT - KEY	FUNCTION
SK - 06	GC. Restarts the full gyrocompass alignment
SK - 07	FAST while an alignment is running, SEL HDG once it is complete
SK - 08	The best mode currently available: IFA airborne from standby, DEG NAV on a degraded solution, NAV when the alignment is complete
SK - 10	EGI SET. Opens the alignment data entry page

Table 85

The figure above is the format once the alignment is complete. While it is still running the header reads IN/GPS ALIGNMENT, IN MODE reads GC ALIGN, and the position and error fields

stay empty because there is no solution to put in them yet. FAST replaces SEL HDG for as long as there is an alignment left to shorten.

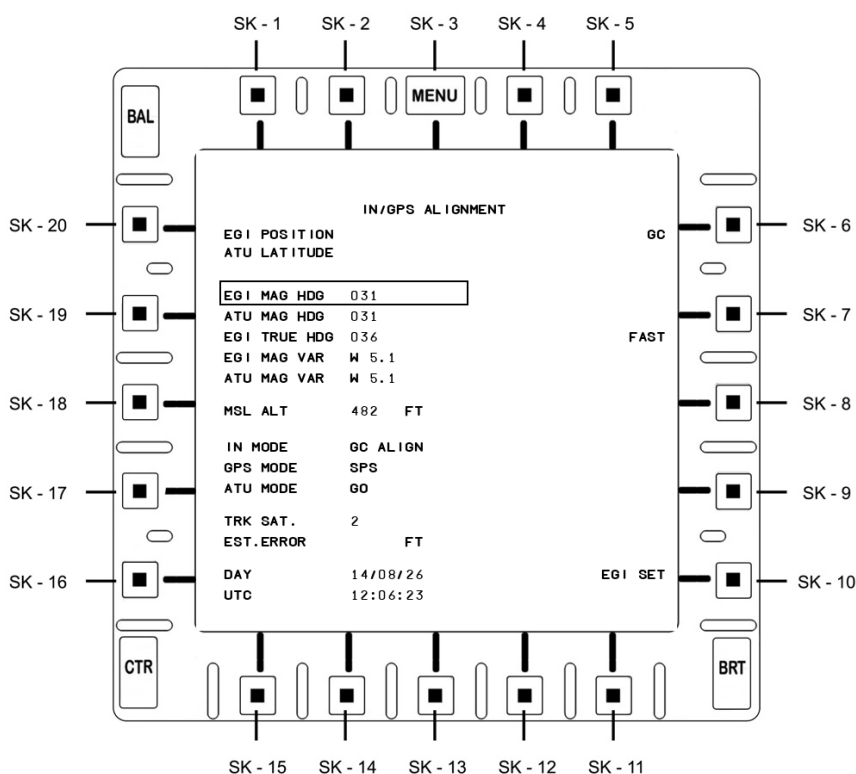


Figure 103

Once the alignment is far enough along to be usable, IN MODE reads DEG-NAV READY in amber and DEG NAV appears on the soft keys. Accepting it navigates on that solution straight away, and the alignment carries on underneath until it can upgrade itself to NAV.

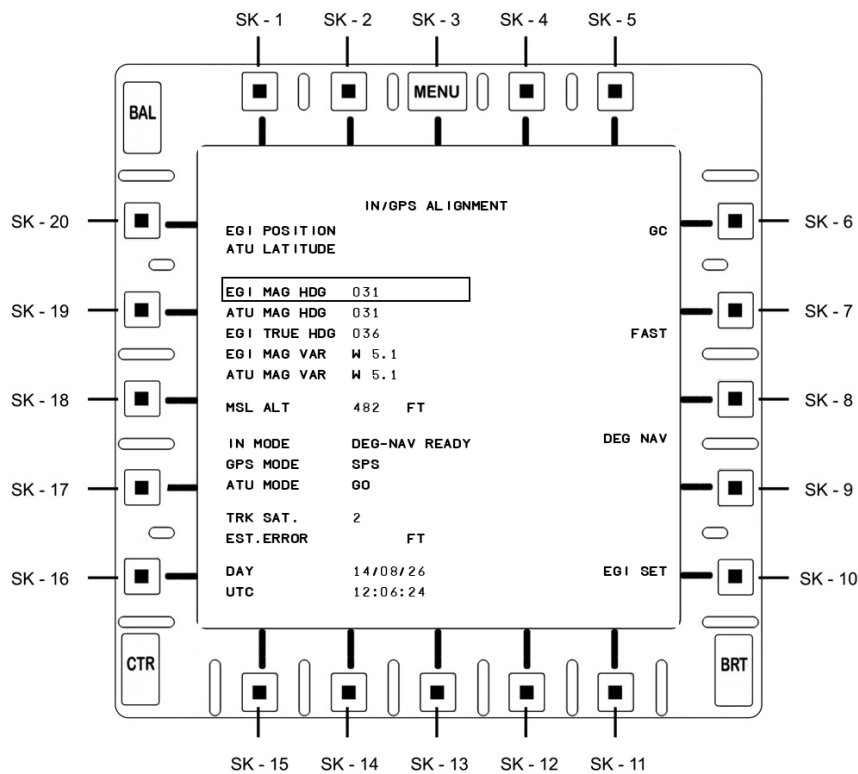


Figure 104

In NAV the page offers nothing at all: every soft key is blank, because the aircraft is navigating and there is neither an alignment left to command nor data left to insert. IN MODE is no longer drawn green once NAV is entered.

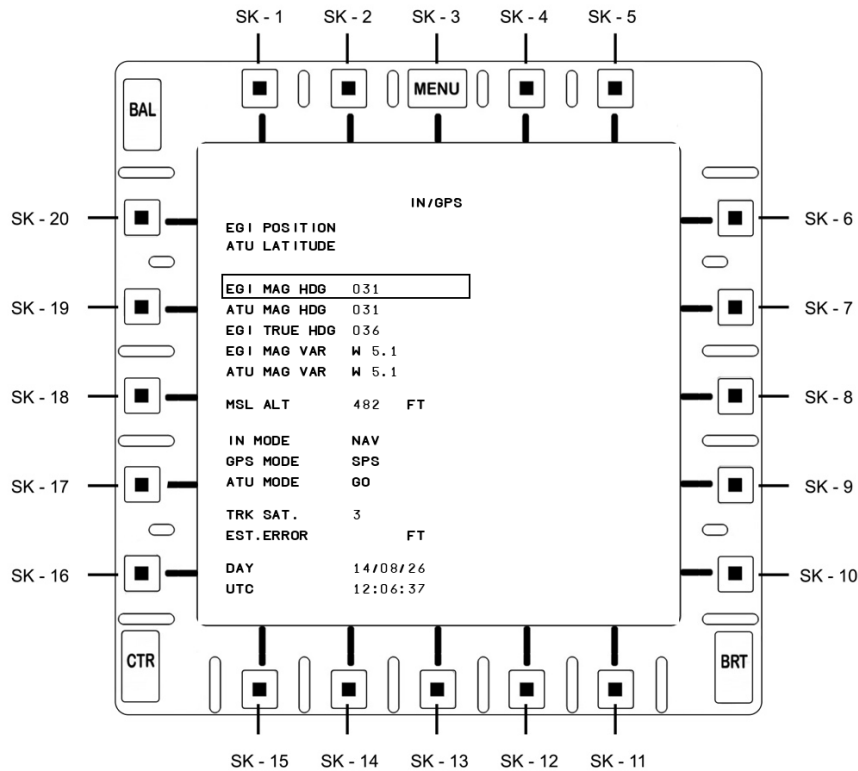


Figure 105

11.10.1 EGI SET

EGI SET enters the same three values as the UFCP EGI page, and writes them to the same place. The difference is only in how the digits are collected: here they are typed left to right on the keypad, the house style of the CNI and COMM pages, while the UFCP fills each row from the right.

The page opens on latitude. ENT commits the row and moves to longitude, then to true heading, and closes itself after the third. SK13 carries the hemisphere and follows the row being edited, reading N/S for a latitude and E/W for a longitude, and blank for a heading which has neither. DEL removes the last digit and ESC leaves without storing.

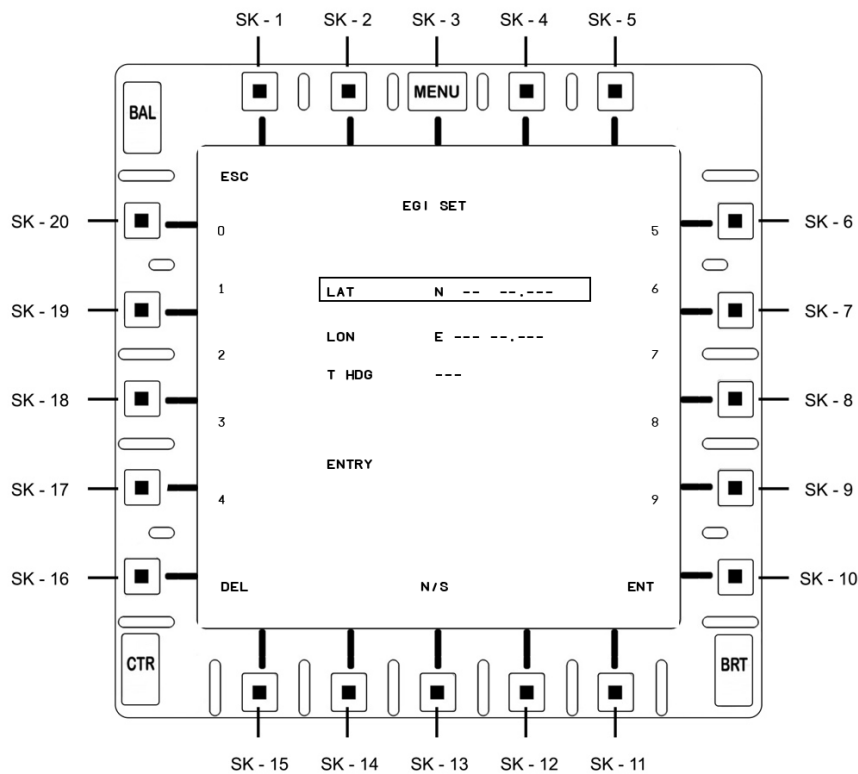


Figure 106

SOFT - KEY	FUNCTION
SK – 01	ESC. Leaves the page without storing
SK – 11	ENT. Commits the row and moves to the next
SK – 13	Hemisphere. N/S for latitude, E/W for longitude
SK – 15	DEL. Removes the last digit entered
SK – 06 to SK – 10	Digits 5 to 9
SK – 16 to SK – 20	Digits 4, 3, 2, 1 and 0

Table 86

11.11 COMM1 AND COMM2 FORMAT

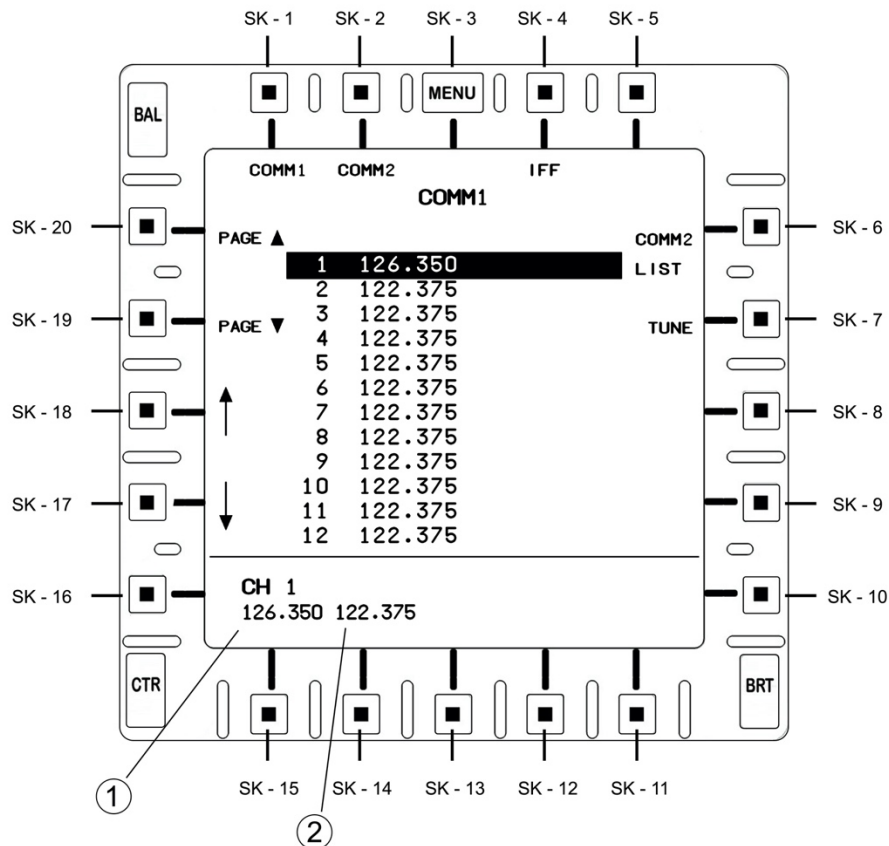


Figure 107

SOFT - KEY	DISPLAY
1	Displays the Active Frequency of Current COMM (COMM1 or COMM2)
2	Displays the Active Frequency of Opposite COMM (COMM1 or COMM2)
SK - 6	Cycles Between COMM1 and COMM2 Frequencies List
SK - 7	Tunes the Highlighted Frequency to the Selected COMM1 or COMM2
SK - 17	Moves the Cursor Downwards Inside the Frequencies List
SK - 18	Moves the Cursor Upwards Inside the Frequencies List
SK - 19	Moves to the Next Frequencies list Page
SK - 20	Moves to the Previous Frequencies List Page

Table 87

11.12 FCR

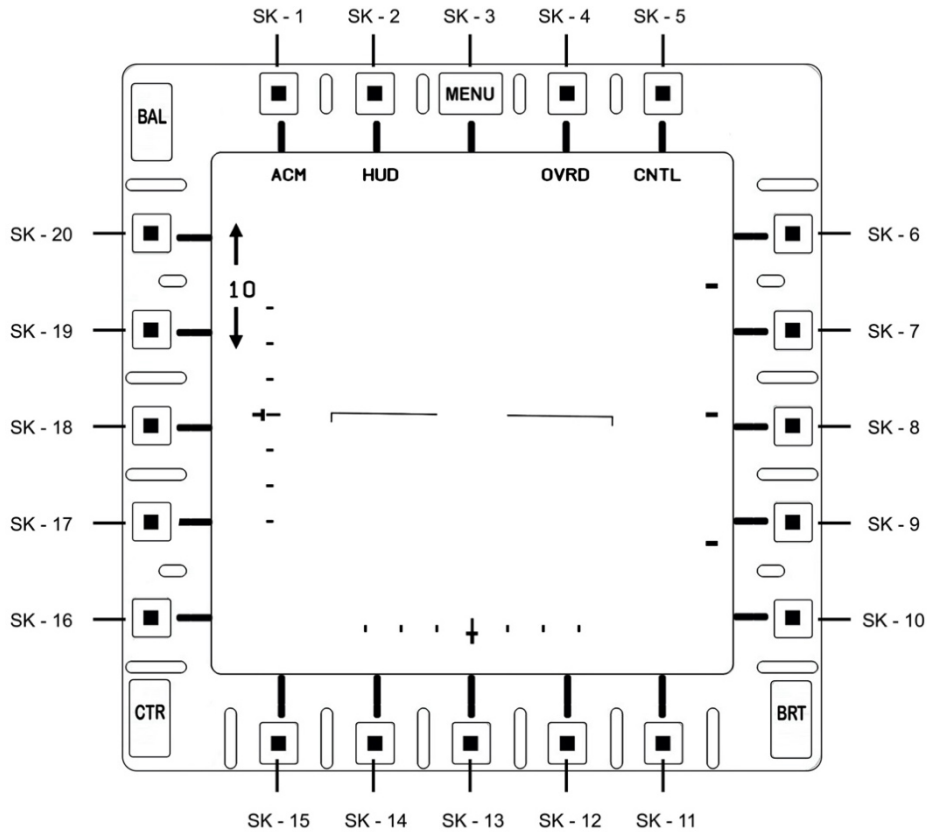


Figure 108

SOFT - KEY	FUNCTION
SK - 20	FCR Range UP
SK - 19	FCR Range Down

Table 88

FCR Format is displaying the roll attitude of the jet, the range of the simulated radar and any target might be in front of the jet in the corresponding spot on the display. Pressing SK 19 will decrease the range by half & pressing SK20 will double the range.

11.13 HSD

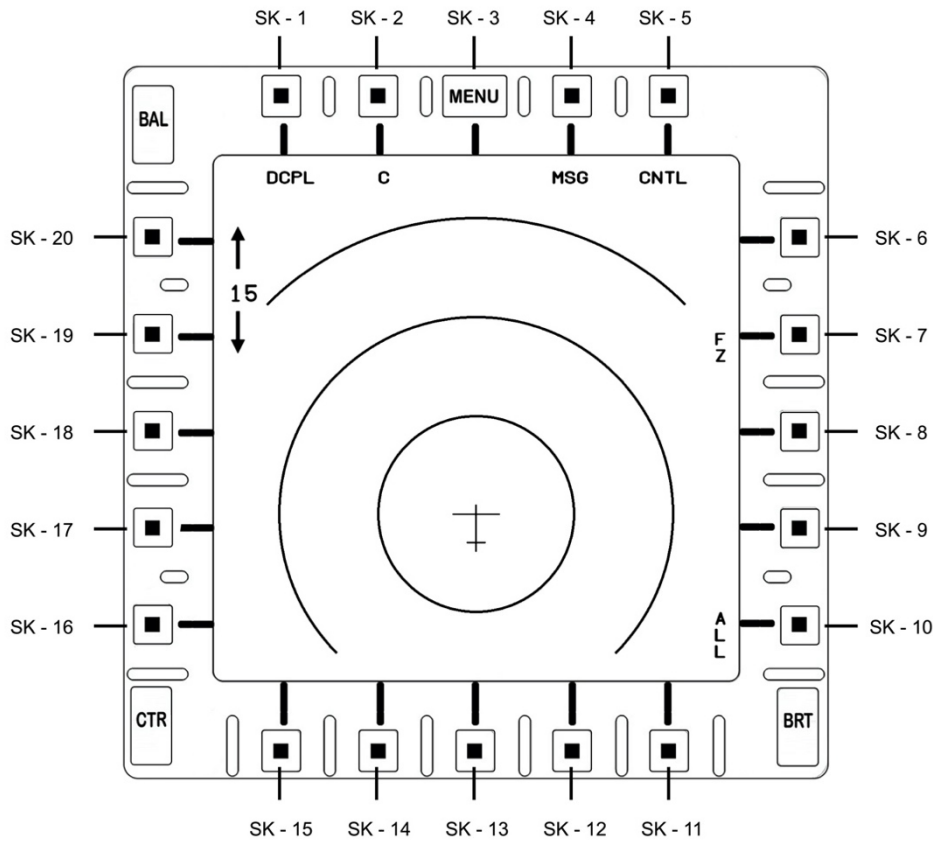


Figure 109

BUTTON	FUNCTION
SK – 20	HSD Range Up
SK – 19	HSD Range Down
SK – 7	HSD Freeze

Table 89

HSD Format is displaying the current flight plan loaded, and all the aircrafts within the selected range. Pressing SK1 will connect the HSD Format range to the range of the FCR(CPL), which means that the HSD range can only be changed by changing the FCR range. Pressing SK1 will disconnect the HSD Format range from the FCR Format range(DCPL). Pressing SK7 will freeze the HSD display and the movement of the plane will not affect what is being displayed on it. Pressing SK19 will decrease the range of the HSD Format by half and pressing SK20 will double the range of the HSD Format.

11.14 CNI

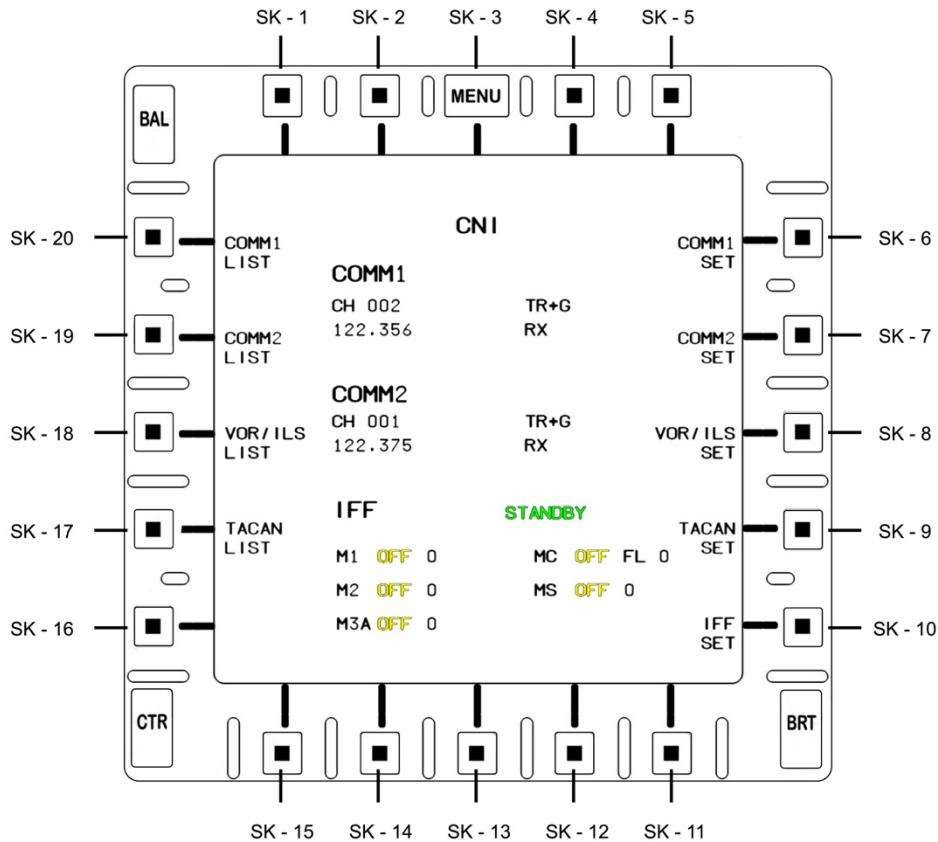


Figure 110

SOFT - KEY	ACTION	FUNCTION
SK - 06	COMM 1 SET	Selects the COMM 1 SET Subpage
SK - 07	COMM 2 SET	Selects the COMM 2 SET Subpage
SK - 08	VOR/ILS SET	Selects the VOR/ILS SET Subpage
SK - 09	TACAN SET	Selects the TACAN SET Subpage
SK - 10	IFF SET	Selects the IFF SET Subpage
SK - 11	COMM 1 LIST	Selects the COMM 1 LIST Subpage
SK - 12	COMM 2 LIST	Selects the COMM 2 LIST Subpage
SK - 13	VOR/ILS LIST	Selects the VOR/ILS LIST Subpage
SK - 14	TACAN LIST	Selects the TACAN LIST Subpage

Table 90

Main CNI Format page is displaying the current tuned in Comm1 & Comm2 channel and frequency together with the corresponding transmit/receive mode in the upper half. In the bottom half of the main CNI Format page, information in regard to the IFF system is being displayed, such as the current state of the IFF system(STANDBY or NORM), the frequencies for each IFF mode and if the modes are selected or not.

11.14.1 COMM 1 SET SUBPAGE

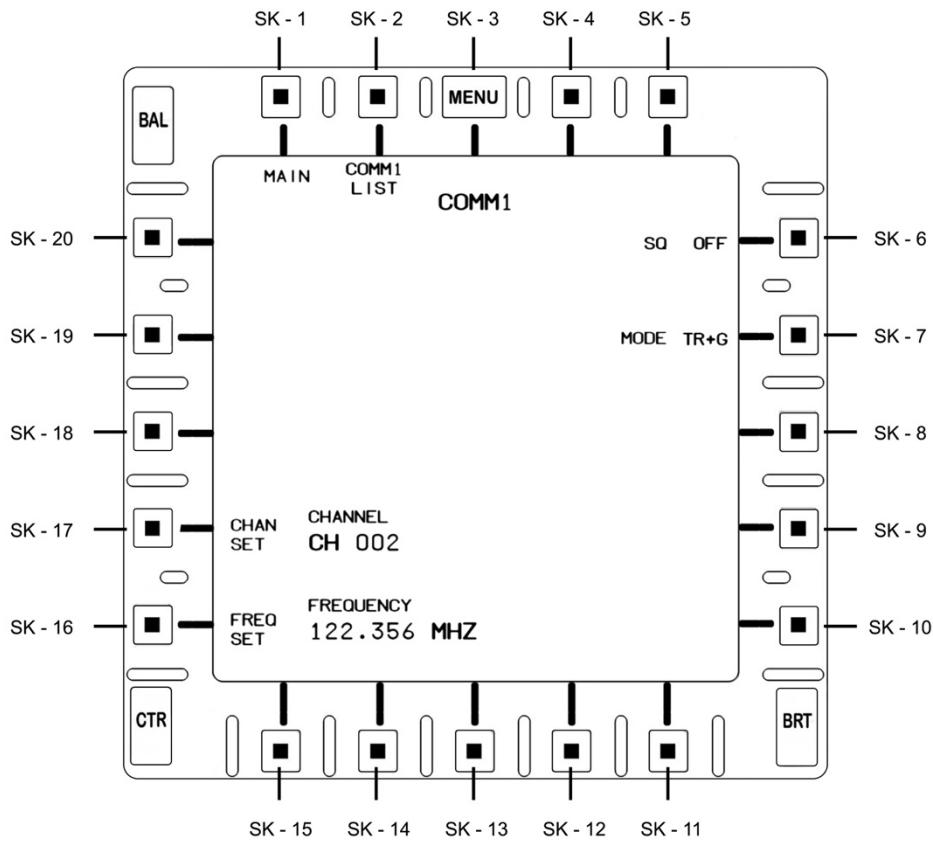


Figure 111

SOFT – KEY	ACTION	FUNCTION
SK – 01	MAIN	Returns to CNI Format Page
SK – 02	COMM 1 LIST	Selects the COMM 1 LIST Subpage
SK – 06	SQ	Toggles the squelch indication only
SK – 07	MODE	Cycles between TR – TR+G – G Modes
SK – 16	FREQ SET	Selects the Frequency set Subpage
SK – 17	CHAN SET	Selects the Channel set Subpage

Table 91

COMM1 SET sub page is displaying the selected COMM1 channel, frequency and the transmitting/receiving mode. Pressing SK1 returns to the CNI Format main page. Pressing SK2 is displaying the COMM1 LIST sub page. Pressing SK16 displays the FREQ SET sub page. The COMM1 FREQ SET sub page is displaying the selected COMM1 channel and frequency while in the meantime allowing for a new frequency to be entered using the corresponding SK to type it and then using SK11 to enter it. While in the FREQ SET sub page pressing SK1 will return to the COMM1 SET sub page and pressing SK15 will delete the last entry. Pressing SK17 in the COMM1 SET sub page will display the CHAN SET sub page. COMM2 SET sub page are working exactly like COMM1 SET sub page.

11.14.2 FREQ SET SUBPAGE

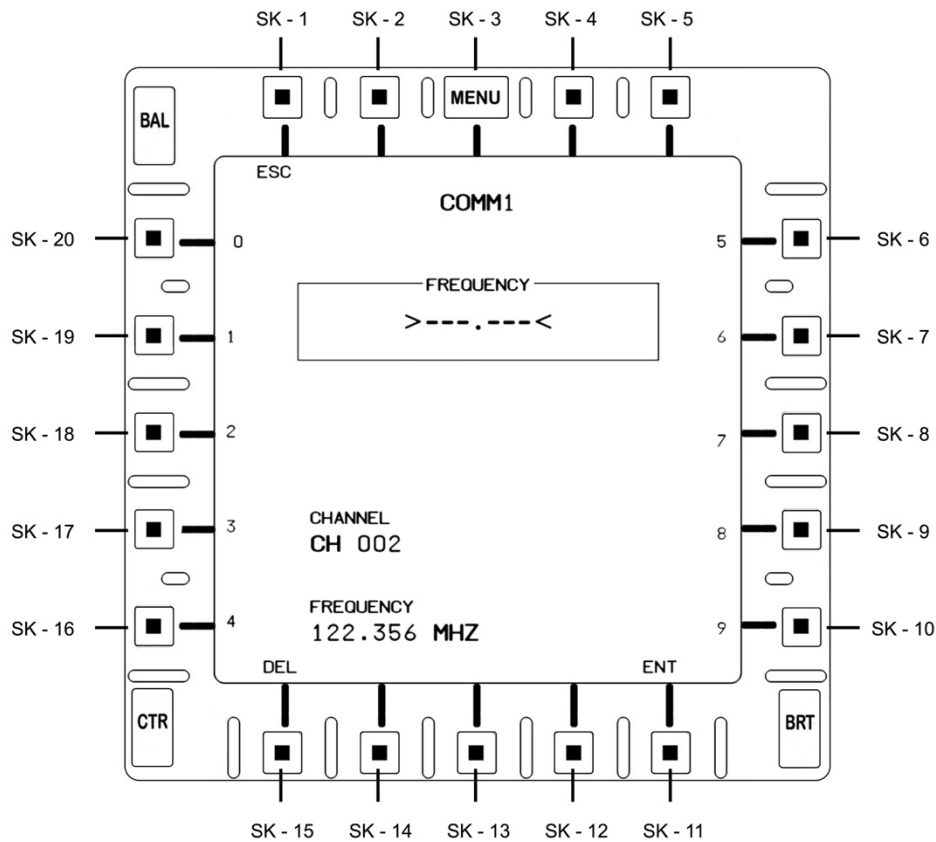


Figure 112

SOFT - KEY	ACTION	FUNCTION
SK - 01	ESC	Returns to COMM1 Set Subpage
SK - 06	5	Inputs No 5
SK - 07	6	Inputs No 6
SK - 08	7	Inputs No 7
SK - 09	8	Inputs No 8
SK - 10	9	Inputs No 9
SK - 11	ENT	Enters the Typed Frequency to the Selected COMM
SK - 15	DEL	Deletes Last Typed Digit
SK - 16	4	Inputs No 4
SK - 17	3	Inputs No 3
SK - 18	2	Inputs No 2
SK - 19	1	Inputs No 1
SK - 20	0	Inputs No 0

Table 92

11.14.3 CHAN SET SUBPAGE

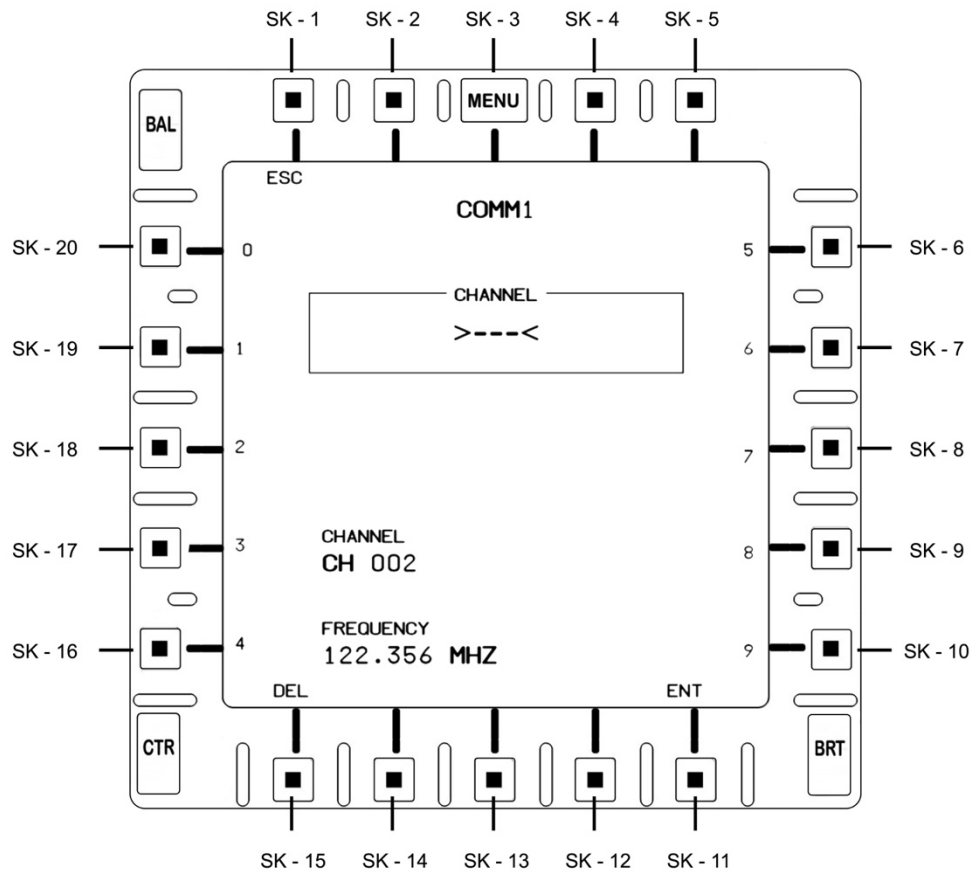


Figure 113

SOFT – KEY	ACTION	FUNCTION
SK – 01	ESC	Returns to COMM1 Set Subpage
SK – 06	5	Inputs No 5
SK – 07	6	Inputs No 6
SK – 08	7	Inputs No 7
SK – 09	8	Inputs No 8
SK – 10	9	Inputs No 9
SK – 11	ENT	Enters the Typed Channel to the Selected COMM
SK – 15	DEL	Deletes Last Typed Digit
SK – 16	4	Inputs No 4
SK – 17	3	Inputs No 3
SK – 18	2	Inputs No 2
SK – 19	1	Inputs No 1
SK – 20	0	Inputs No 0

Table 93

11.14.4 COMM 1 LIST SUBPAGE

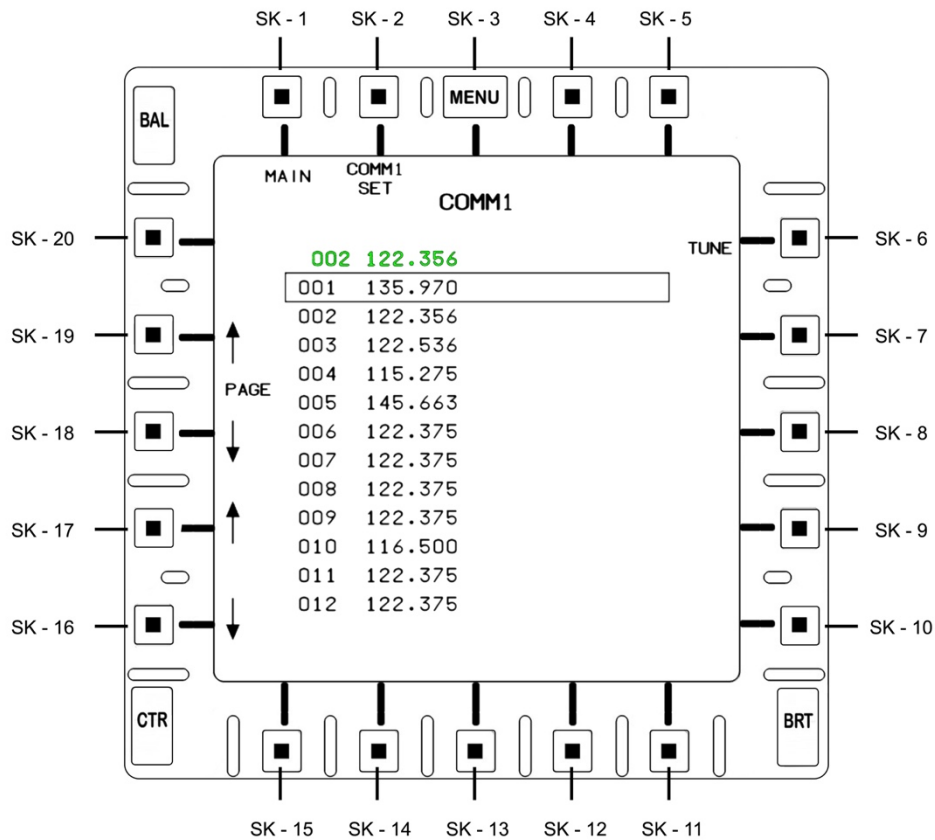


Figure 114

SOFT - KEY	ACTION	FUNCTION
SK - 01	MAIN	Returns to CNI Format
SK - 02	COMM 1 SET	Returns to COMM 1 Set Subpage
SK - 06	TUNE	Tunes the Selected COMM Frequency
SK - 16	SEL CH NEXT	Selects the Next Channel of the list
SK - 17	SEL CH PREV	Selects the Previous Channel on the list
SK - 18	SEL PG NEXT	Selects the Next List Page
SK - 19	SEL PG PREV	Selects the Previous List Page

Table 94

COMM1 LIST sub page is displaying the full list of COMM1 channels with the corresponding saved frequency as well as the currently selected channel and frequency, a new channel can be selected by moving the rectangle cursor to the desired channel number. Pressing SK1 will return to the CNI Format main page. Pressing SK2 will display the COMM1 SET sub page. Pressing SK16 will increment the selected channel number and pressing SK17 will decrement it. Pressing SK18 will increment the current viewing page and pressing SK19 will decrement it. If the channel currently selected is not the same as the channel the cursor is pointing at, then it can be tuned using SK6(TUNE will only appear if the channel the cursor is currently on is NOT the same as the channel already selected). COMM2 LIST sub page is working exactly like COMM1 LIST sub page.

11.14.5 VOR/ILS SET SUBPAGE

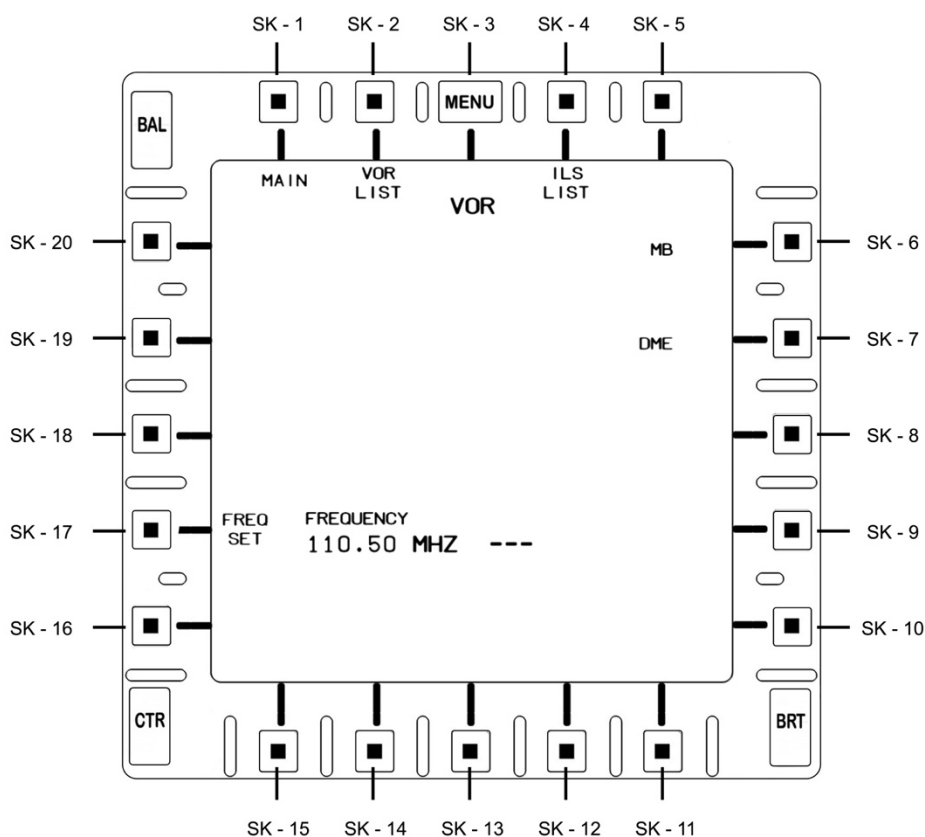


Figure 115

SOFT – KEY	ACTION	FUNCTION
SK – 01	MAIN	Returns to CNI Format
SK – 02	VOR LIST	Selects the VOR LIST Subpage
SK – 04	ILS LIST	Selects the ILS LIST Subpage
SK – 06	MB	INOP
SK – 07	DME	INOP
SK – 17	FREQ SET	Selects the FREQ SET Subpage

Table 95

VOR/ILS SET sub page is displaying the currently tuned in VOR/ILS. The top of the display will show VOR or ILS depending on the type of navaid currently tuned in to. Pressing SK1 will return to the CNI Format main page. Pressing SK2 will display the VOR LIST, while pressing SK4 will display the ILS LIST. Pressing SK17 displays the FREQ SET sub page. The VOR/ILS FREQ SET sub page is displaying the selected VOR/ILS frequency while in the meantime allowing for a new frequency to be entered using the corresponding SK to type it and then using SK11 to enter it.

11.14.6 VOR/ILS LIST SUBPAGE

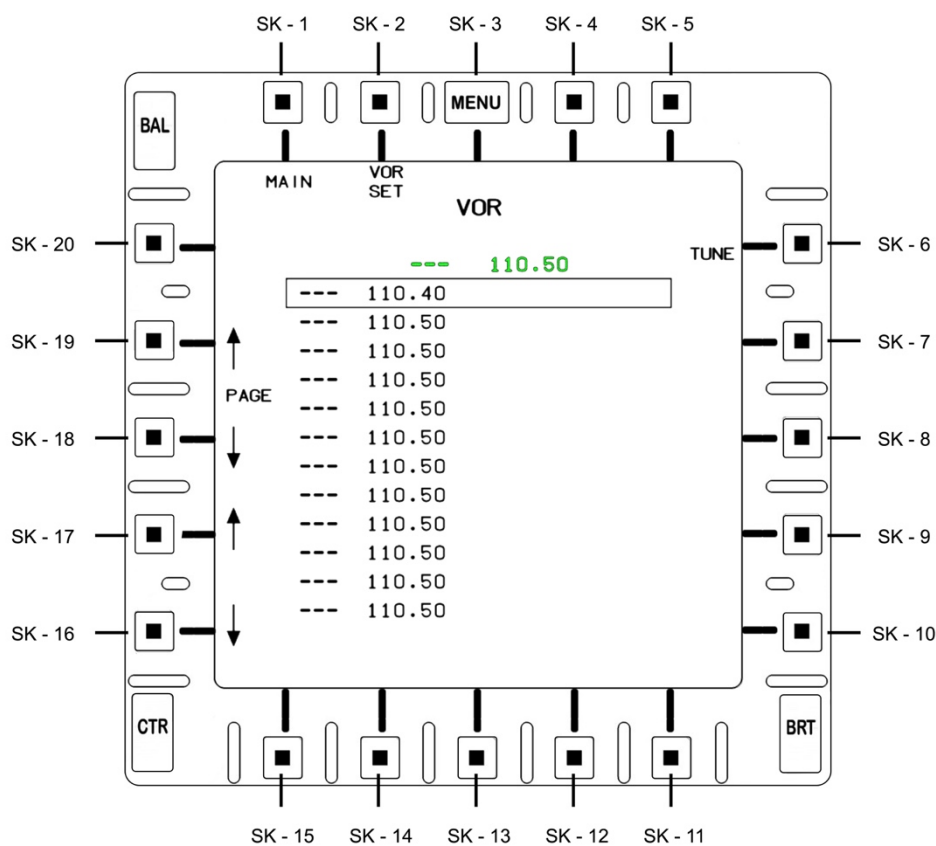


Figure 116

SOFT - KEY	ACTION	FUNCTION
SK - 01	MAIN	Returns to CNI Format
SK - 02	VOR/ILS SET	Returns to VOR/ILS Set Subpage
SK - 06	TUNE	Tunes the Selected VOR/ILS Frequency
SK - 16	SEL CH NEXT	Selects the Next Channel on the List
SK - 17	SEL CH PREV	Selects the Previous Channel on the List
SK - 18	SEL PG NEXT	Selects the Next List Page
SK - 19	SEL PG PREV	Selects the Previous List Page

Table 96

VOR/ILS sub page is displaying the currently tuned in VOR/ILS as well as a list of other VOR or ILS frequencies that have been saved on memory. VOR/ILS List works the same as COMM1 & COMM2 LIST, with the difference being that if the navaid tuned in is a VOR, the title of the display is VOR and if it is an ILS the title is ILS. In addition, SK2 will display VOR SET or ILS SET according to the tuned in navaid type, however both options will display the VOR/ILS SET sub page.

NOTE : VOR/ILS list displays the frequency list of the currently selected NAVAID type (VOR or ILS).

11.14.7 VOR/ILS FREQ SET SUBPAGE

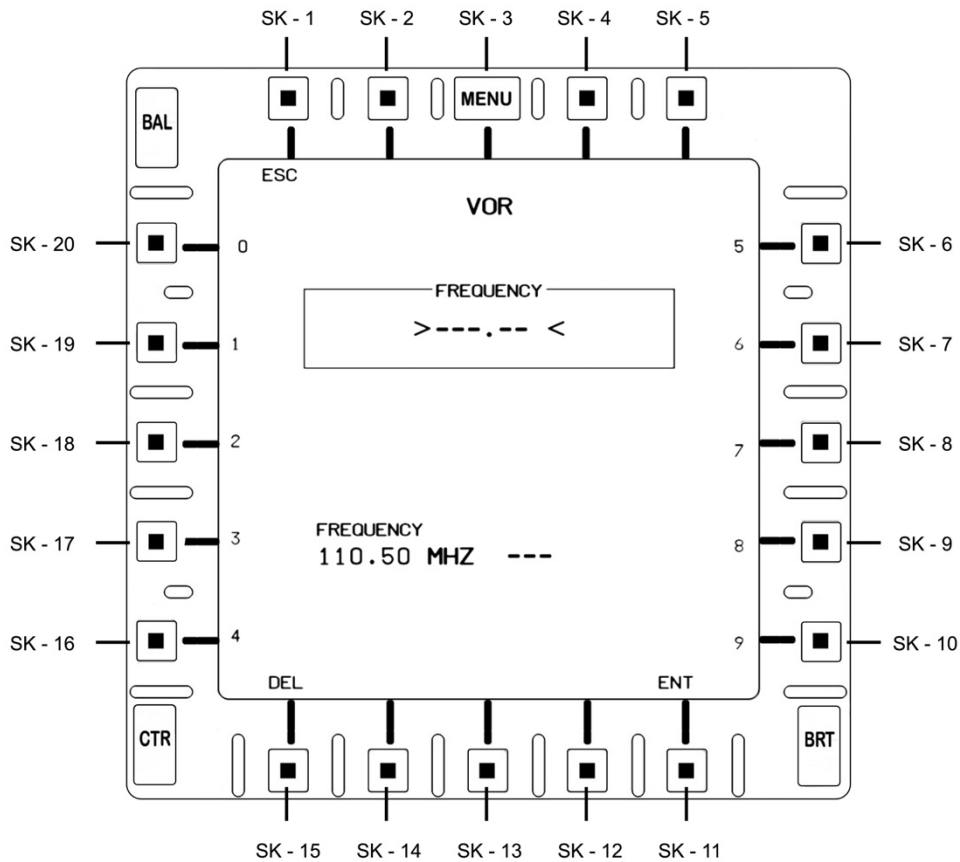


Figure 117

SOFT - KEY	ACTION	FUNCTION
SK - 01	ESC	Returns to VOR/ILS Subpage
SK - 06	5	Inputs No 5
SK - 07	6	Inputs No 6
SK - 08	7	Inputs No 7
SK - 09	8	Inputs No 8
SK - 10	9	Inputs No 9
SK - 11	ENT	Enters the Typed Channel to the Selected VOR/ILS
SK - 15	DEL	Deletes last Typed Digit
SK - 16	4	Inputs No 4
SK - 17	3	Inputs No 3
SK - 18	2	Inputs No 2
SK - 19	1	Inputs No 1
SK - 20	0	Inputs No 0

Table 97

11.14.8 TACAN SET SUBPAGE

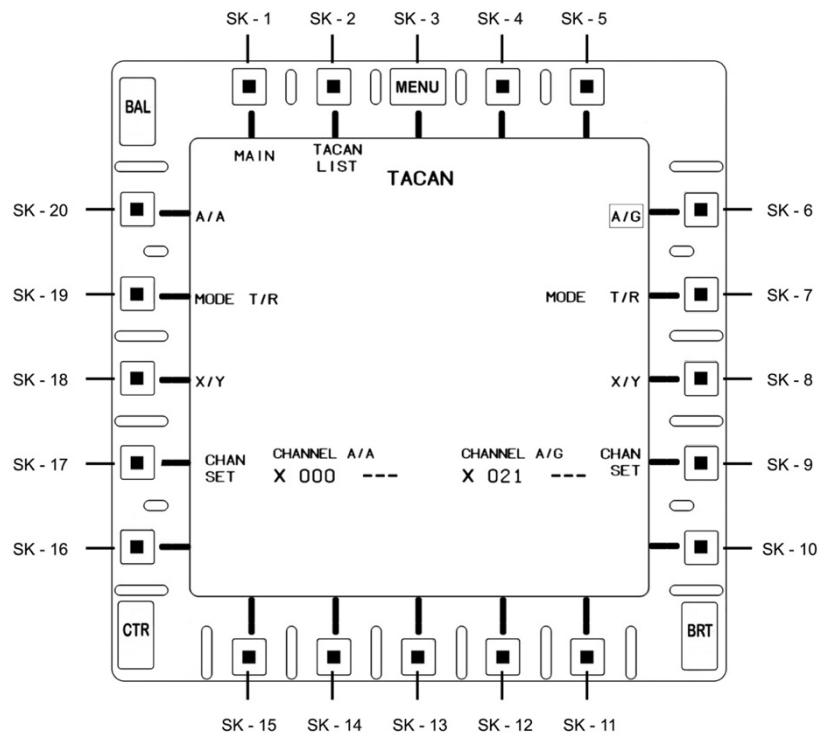


Figure 118

SOFT - KEY	ACTION	FUNCTION
SK - 01	MAIN	Returns to CNI Format Page
SK - 02	TACAN LIST	Selects TACAN LIST Subpage
SK - 06	A/G	AIR TO GROUND Channel Selection
SK - 07	MODE	Transmit / Receive Mode Selection
SK - 08	X/Y	Cycle Between A/G X and Y Modes
SK - 09	CHAN SET	A/G Channel Set Subpage
SK - 17	CHAN SET	A/A Channel Set Subpage
SK - 18	X/Y	Cycle Between A/A X and Y Modes
SK - 19	MODE	Transmit / Receive Mode Selection
SK - 20	A/A	AIR TO AIR Channel Selection

Table 98

TACAN SET sub page is displaying the A/A channel and the A/G channel, allowing to have to an active and a backup TACAN channel set for quick changing, in addition the TACAN SET sub page displays the transmit/receive mode of each TACAN channel. Pressing SK1 will return to the CNI Format main page. Pressing SK2 will display the TACAN LIST sub page.

Pressing SK6 will select the A/G TACAN as the active channel. Pressing SK7 will change the transmit and receive mode of the A/G TACAN channel. Pressing SK8 will change the A/G TACAN channel band from X to Y and vice versa. Pressing SK9 will display the CHAN SET sub page for the A/G TACAN channel.

The TACAN CHAN SET sub page is displaying the selected A/G & A/A TACAN frequencies while in the meantime allowing for a new frequency to be entered using the corresponding SK to type it and then using SK11 to enter it. Pressing SK17 to SK20 will achieve the same but for the A/A TACAN channel.

NOTE : A/A and A/G modes provide 2 different TACAN channels to use.

11.14.9 TACAN CHAN SET SUBPAGE

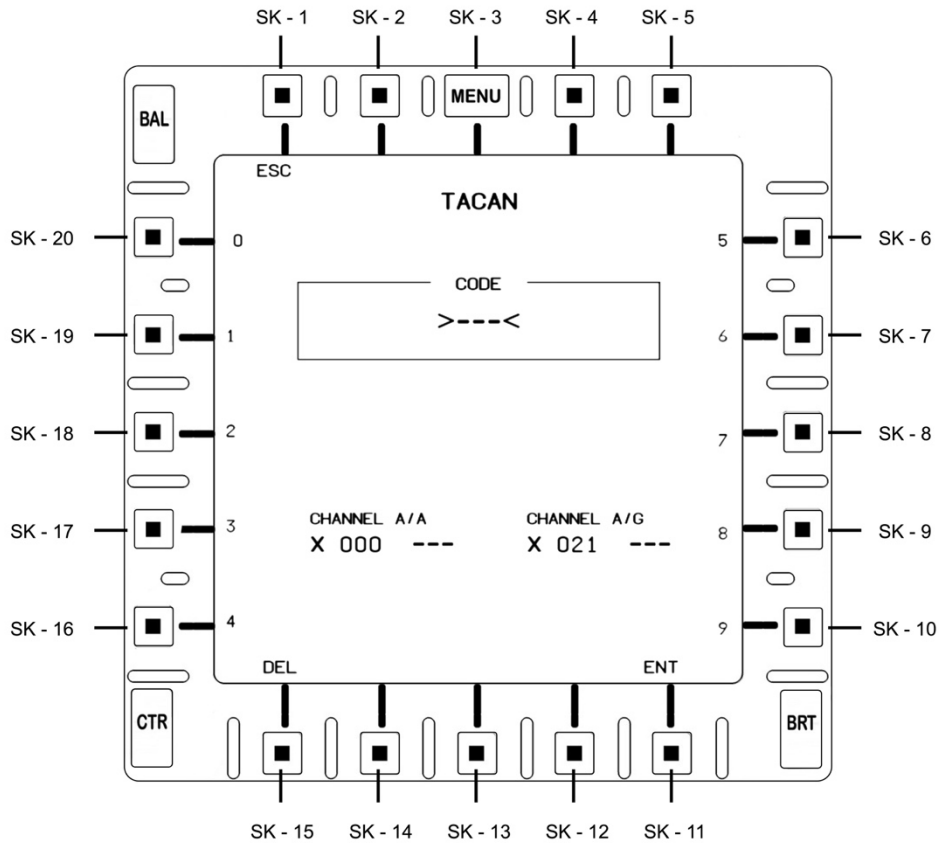


Figure 119

SOFT - KEY	ACTION	FUNCTION
SK - 01	ESC	Returns to TACAN Subpage
SK - 06	5	Inputs No 5
SK - 07	6	Inputs No 6
SK - 08	7	Inputs No 7
SK - 09	8	Inputs No 8
SK - 10	9	Inputs No 9
SK - 11	ENT	Enters the Typed Channel to the Selected TACAN
SK - 15	DEL	Deletes last Typed Digit
SK - 16	4	Inputs No 4
SK - 17	3	Inputs No 3
SK - 18	2	Inputs No 2
SK - 19	1	Inputs No 1
SK - 20	0	Inputs No 0

Table 99

11.14.10 TACAN LIST SUBPAGE

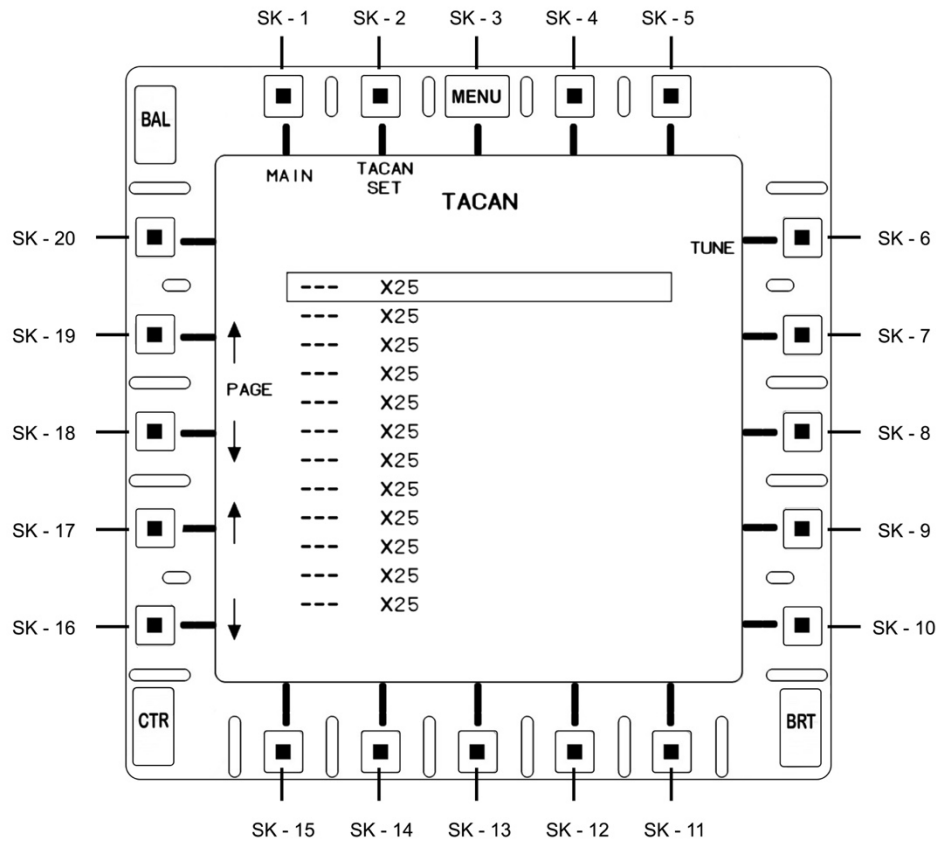


Figure 120

SOFT - KEY	ACTION	FUNCTION
SK - 01	MAIN	Returns to CNI Format Page
SK - 02	TACAN SET	Returns to TACAN Set Subpage
SK - 06	TUNE	Tunes the Selected TACAN Frequency
SK - 16	SEL CH NEXT	Selects the Next Channel on the List
SK - 17	SEL CH PREV	Selects the Previous Channel on the List
SK - 18	SEL PG NEXT	Selects the Next List Page
SK - 19	SEL PG PREV	Selects the Previous List Page

Table 100

TACAN LIST sub page is displaying the currently tuned in TACAN station as well as a list of 100 other TACANs station that have been saved on the memory. TACAN LIST works the same as COMM1, COMM2, VOR/ILS LIST.

11.14.11 IFF SET SUBPAGE

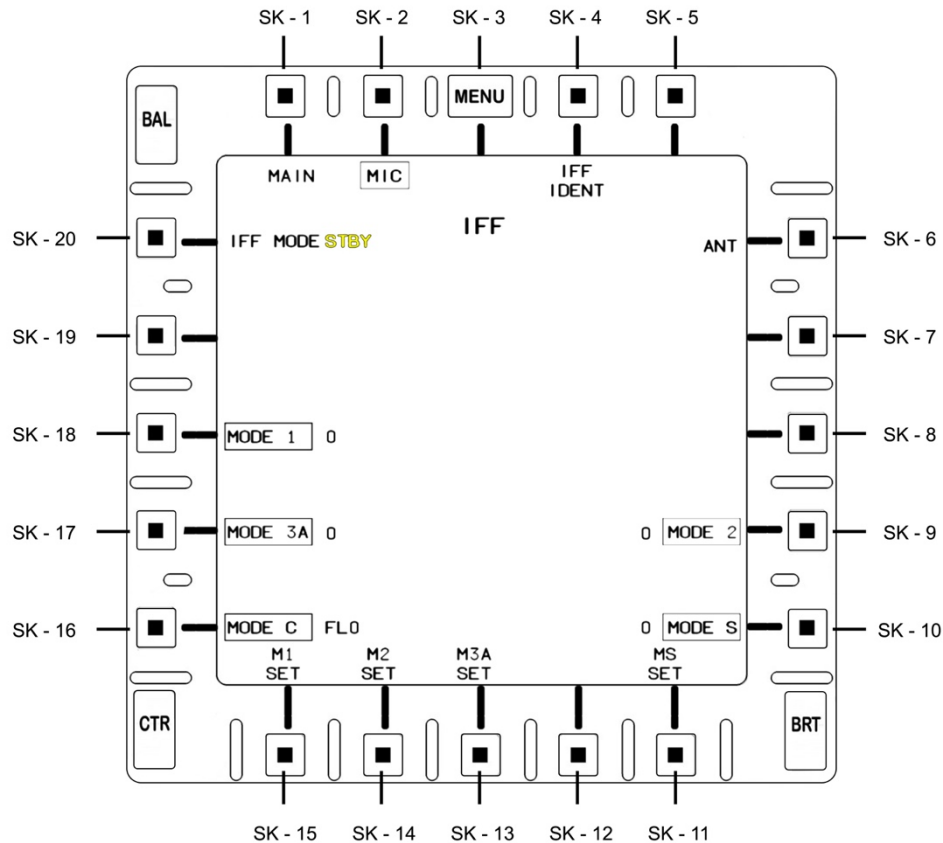


Figure 121

SOFT - KEY	ACTION	FUNCTION
SK - 01	MAIN	Returns to CNI Format Page
SK - 02	MIC	INOP
SK - 04	IFF IDENT	Commences IFF IDENT Action
SK - 06	ANT	INOP
SK - 09	MODE 2	Cycles MODE 2 between On and OFF
SK - 10	MODE S	Cycles MODE S between ON and OFF
SK - 11	MS SET	Selects Mode S SET Subpage
SK - 13	M3A SET	Selects Mode 3A SET Subpage
SK - 14	M2 SET	Selects Mode 2 SET Subpage
SK - 15	M1 SET	Selects Mode 1 SET Subpage
SK - 16	MODE C	Cycles MODE C between ON and OFF
SK - 17	MODE 3A	Cycles MODE 3A between ON and OFF
SK - 18	MODE 1	Cycles MODE 1 between ON and OFF
SK - 20	IFF MODE	Cycles IFF MODE between NORMAL and STAND BY

Table 101

IFF SET sub page is displaying the current state of the IFF(STBY, NORM), mode 1 code, mode 3A code, mode C code, mode 2 code and mode S code. Pressing SK1 will return to the CNI Format main page. Pressing SK11 will display a calculator that allows to enter a new frequency for Mode S. Pressing SK13 will display a calculator that allows to enter a new frequency for Mode 3A. Pressing SK14 will display a calculator that allows to enter a new frequency for Mode 2. Pressing SK15 will display a calculator that allows to enter a new frequency for Mode 1. The calculator on all of the above mentions works like the ones from COMM1, COMM2, VOR/ILS, TACAN SET sub pages.

11.14.12 M1, M2, M3A, MS SET SUBPAGE

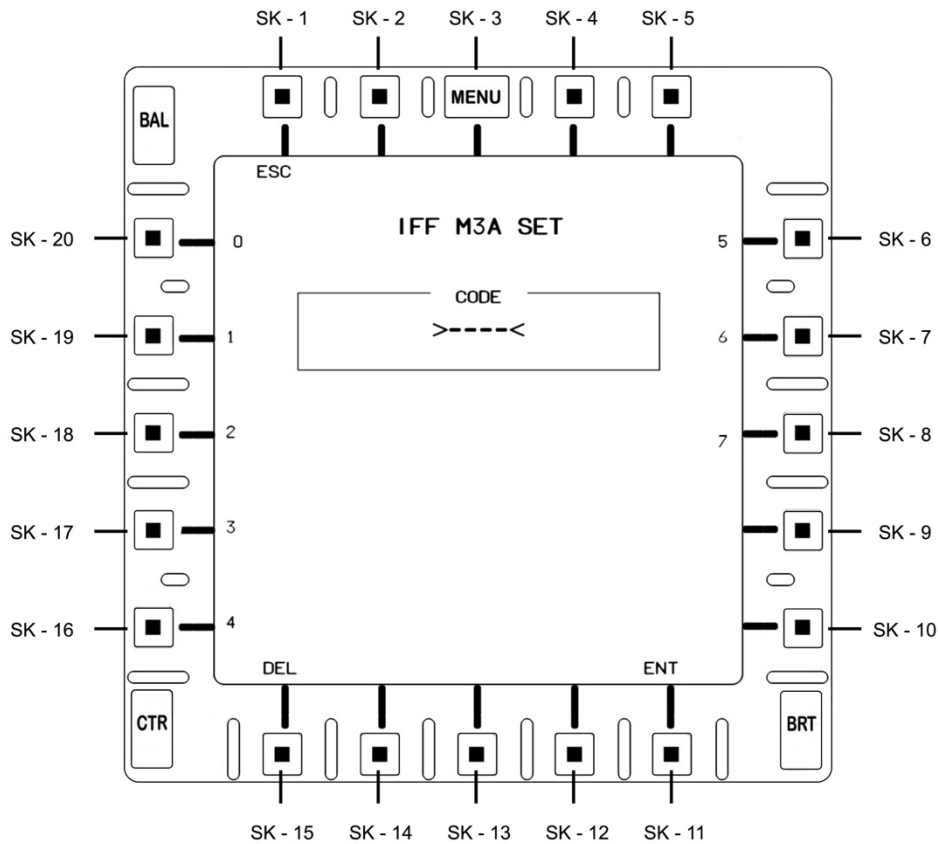


Figure 122

SOFT - KEY	ACTION	FUNCTION
SK - 01	ESC	Returns to IFF Set Subpage
SK - 06	5	Inputs No 5
SK - 07	6	Inputs No 6
SK - 08	7	Inputs No 7
SK - 11	ENT	Enters the Typed Code to Selected IFF Mode
SK - 15	DEL	Deletes Last Typed Digit
SK - 16	4	Inputs No 4
SK - 17	3	Inputs No 3
SK - 18	2	Inputs No 2
SK - 19	1	Inputs No 1
SK - 20	0	Inputs No 0

Table 102

PAGE INTENTIONALLY LEFT BLANK

12. DATA TRANSFER CARTRIDGE

A data transfer cartridge is the mission data a pilot carries out to the aircraft: radio presets, navigation aid channels and steerpoints, prepared on the ground instead of typed into the cockpit. There are two ways to prepare it for this aircraft, and only the first is part of the M-346AJT package.

12.1 DATA CARTRIDGE EDITOR

The Data Cartridge Editor is included with this add-on. Nothing else has to be installed and nothing has to be bought. Open it from X-Plane's aircraft menu, entry DATA CARTRIDGE EDITOR. The window can be moved, resized and minimised, and it stays where you put it.

It has five tabs, and between them they hold everything the aircraft recalls in flight:

- COMMS: The COMM 1 and COMM 2 preset channels, selected with the COMM 1 / COMM 2 buttons inside the tab.
- VOR, ILS and TACAN: The preset channel for each of those receivers.
- WPT: The pilot waypoint bank.

Every tab holds 100 slots, shown 51 to a page with a page-flip button for the rest. Click a slot to edit it, type the value and confirm; the entry is written to the aircraft's own configuration straight away, so it is still there the next time you fly. These are the same banks the UFCP and the MFD recall, so a preset entered here is a preset you can call up in the air.

A waypoint carries a name of up to 10 characters, a latitude, a longitude and an elevation. It can be typed in full, or you can use LOOKUP on the ident step: enter an airport ICAO code or a navaid ident and the position is taken from the aircraft's own navigation database, while the name stays whatever you called it. DELETE takes two clicks, so a waypoint cannot be lost with a single misplaced one.

The sections that follow work through the editor tab by tab, with pictures.

12.2 COMM Adjustment

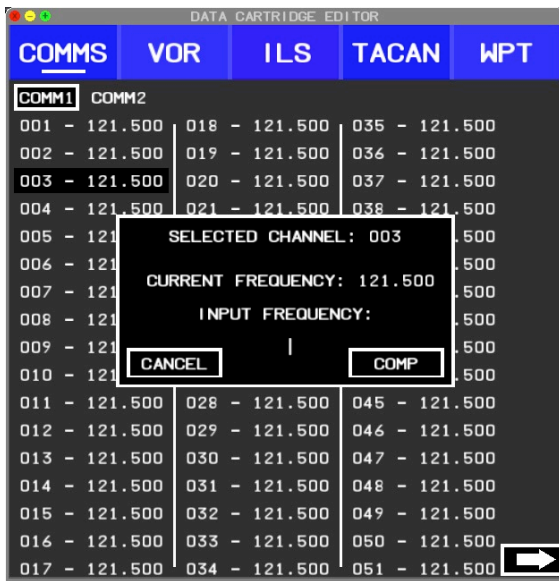


Figure 123



Figure 124

To adjust a COMM frequency :

- Select COMM1 or COMM2 list
- Click on the specific frequency for adjustment
- Enter frequency by using the keyboard
- Click COMP to proceed or CANCEL to abort
- By clicking COMP you can preview the old and new frequency
- Click CONFIRM to make the change or CANCEL to abort the procedure

12.3 NAV-AID Adjustment



Figure 125



Figure 126

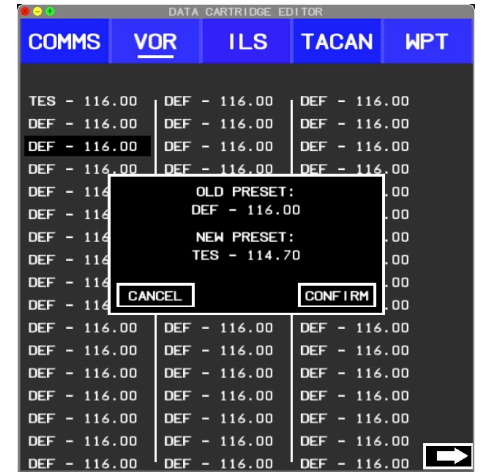


Figure 127

To adjust a NAV-AID frequency/name :

Select VOR or ILS or TACAN

Click on the specific frequency for adjustment

Enter the name by using the keyboard

Click NEXT to proceed or CANCEL to abort

Enter frequency by using the keyboard (if on TACAN window, use X and Y to change the band)

Click COMP to proceed or CANCEL to abort

By clicking COMP you can preview the old and new frequency

Click CONFIRM to make the change or CANCEL to abort the procedure

12.4 WPT Adjustment

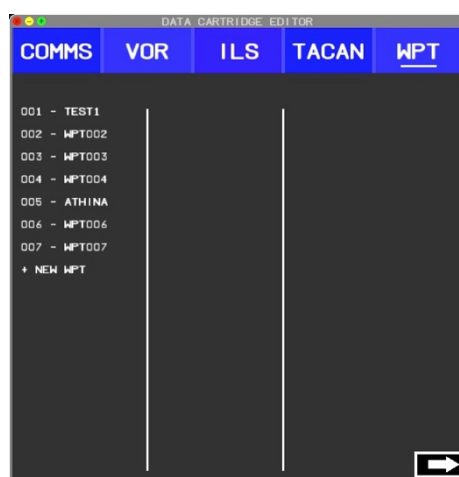


Figure 128

The Waypoints list can be edited via the Data Cartridge Editor WPT tab.

Click on the WPT tab in order for the WPT page to be visible.

New Waypoints can be added and existing ones can be edited or removed.

There are two options on how a waypoint is added or edited.

The first one is to use a lookup on the pre-existing X-Plane airport/navaid database.

The second option is to add using specific Coordinates(Latitude, Longitude, Elevation)

12.4.1 WPT Addition Option 1

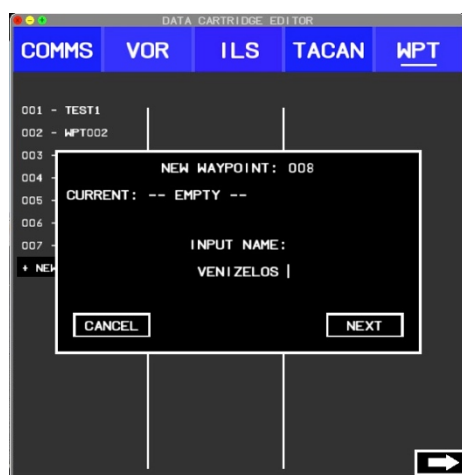


Figure 129

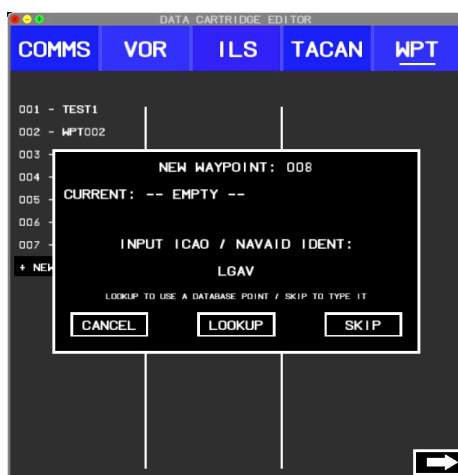


Figure 130



Figure 131



Figure 132

- To add a new WPT using option 1:
- Click + NEW WPT button on the end of the list.
- Enter the desired name using the keyboard(Up to 10 chars).
- Click NEXT to proceed or CANCEL to abort.
- Enter the desired name for the airport/navaid using the keyboard.
- Click LOOKUP to search the X-Plane database or CANCEL to abort.
- From the list select the desired airport/navaid(In case of nav aids having the same name more than one will appear).
- Click CONFIRM to complete the WPT addition or CANCEL to abort the procedure.

12.4.2 WPT Addition Option 2

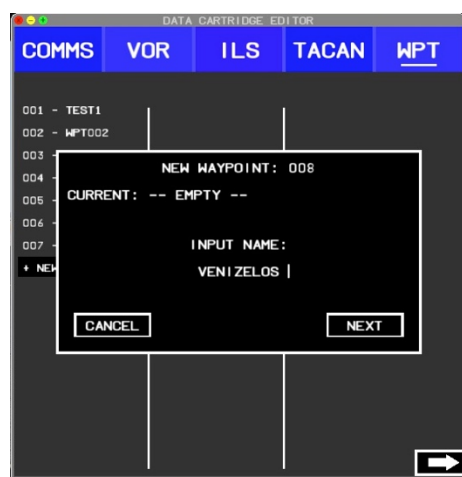


Figure 134

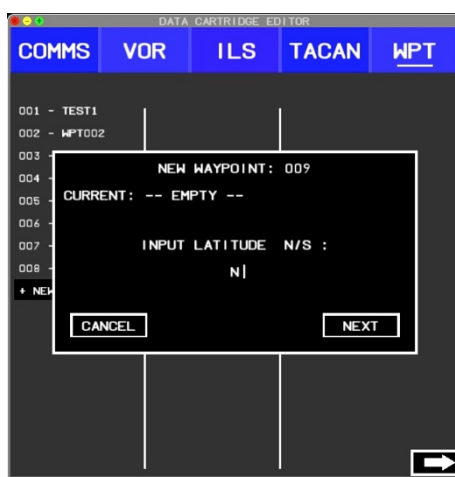


Figure 133

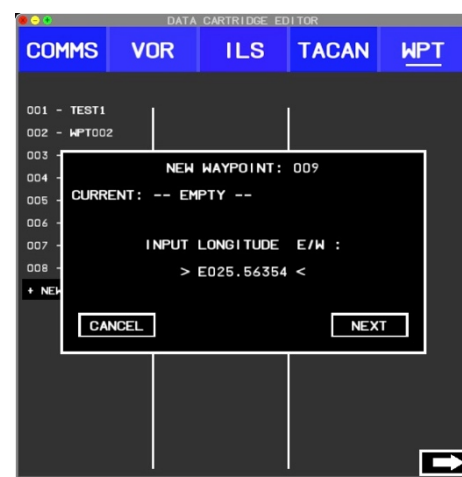


Figure 135

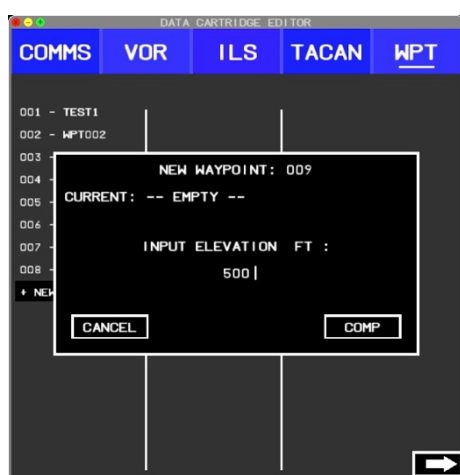


Figure 136

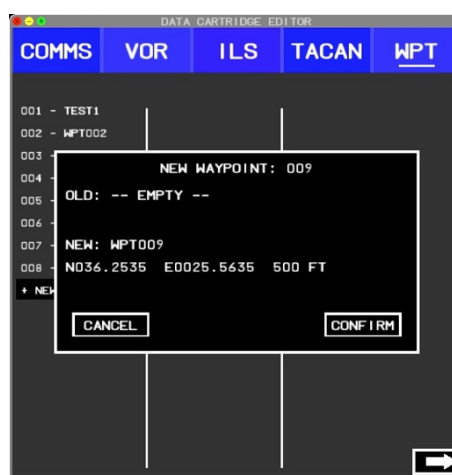


Figure 137

To add a new WPT using option 2:

Click + NEW WPT button on the end of the list.

Enter the desired name using the keyboard(Up to 10 chars).

Click NEXT to proceed or CANCEL to abort.

Enter the desired Latitude using the keyboard(To change N/S just press N or S on the keyboard).

Click NEXT to proceed or CANCEL to abort.

Enter the desired Longitude using the keyboard(To change E/W just press E or W on the keyboard).

Click NEXT to proceed or CANCEL to abort.

Enter the desired Elevation using the keyboard.

Click COMP to proceed or CANCEL to abort.

Click CONFIRM to complete the WPT addition or CANCEL to abort the procedure.

12.4.3 WPT Edit

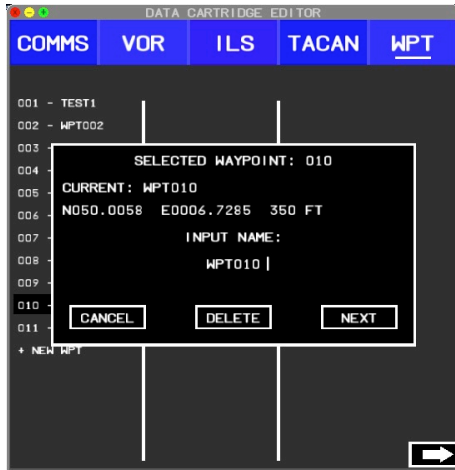


Figure 139

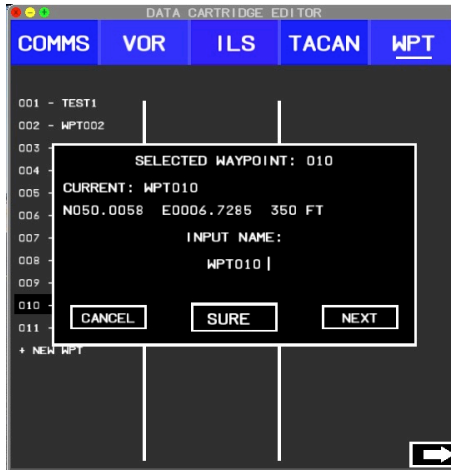


Figure 138

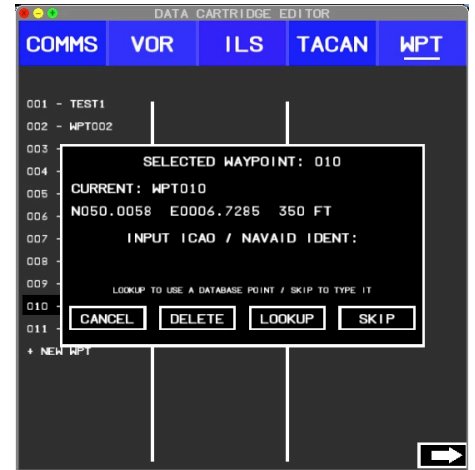


Figure 140

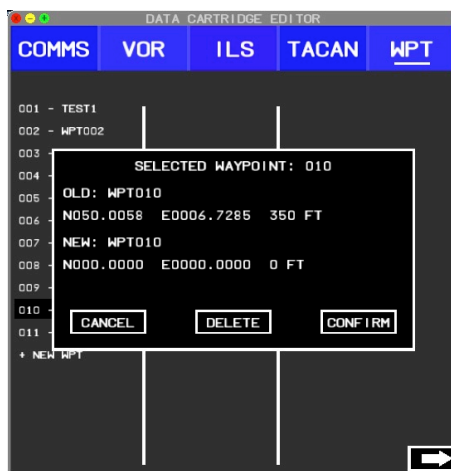


Figure 141

To edit a WPT:

Click on any WPT name.

Enter the desired name using the keyboard(Up to 10 chars).

Click NEXT to proceed, CANCEL to abort or DELETE and then SURE to delete the WPT.

Make the desired changed, EITHER by using an airport/navaid from the X-Plane database OR by using specific coordinates(Latitude,Longitude,Elevation)

Click CONFIRM to complete the WPT edit, CANCEL to abort the procedure or DELETE and then SURE to delete the WPT.

12.5 DWSIM MISSION EDITOR

The DWSim Mission Editor is a SEPARATE DeltaWing Simulations product. It is NOT included with the M-346AJT and is NOT required to fly it. Everything in this section applies only if you own the Mission Editor as well. Without it, use the Data Cartridge Editor above. Nothing in the aircraft is locked behind it.

If you do have it, the Mission Editor plans a whole mission rather than a list of presets, and sends the result to the aircraft as a cartridge while X-Plane is running. There is still no cartridge to insert in the cockpit and no loading time to wait for: the data is simply there.

What a cartridge carries

- **MISSION:** Name, notes and a start position, altitude, heading and speed. This is stored for reference only. Loading a cartridge never moves the aircraft.
- **STEERPOINTS:** The flight plan and the points that go with it. Navigation points, reference points, targets and offsets each have their own slots.
- **WAYPOINTS:** Up to 100, delivered straight into the pilot waypoint bank. These are the same waypoints the Data Cartridge Editor's WPT tab edits and the UFCP recalls, so a cartridge and hand entry fill one list rather than two.
- **MARKS:** Up to 99, into the M01 to M99 mark bank. Missions saved before the mark tab was widened still load: their marks are read from the older slots and placed in the same bank.
- **CNI PRESETS:** 100 preset channels each for COMM 1, COMM 2, VOR, ILS and TACAN, the same five banks the Data Cartridge Editor works on.

What happens when a cartridge is loaded

The navigation points replace the active flight plan. They appear on the UFCP SP page and are drawn as the route on the moving map. Marks, reference points, targets and offsets are drawn as individual symbols and are not joined into the route. The symbols themselves are in the DISPLAY SYMBOLS chapter.

The CNI presets replace the aircraft's recallable preset banks, and preset 1 of each radio is tuned as the active frequency. The M-346 has a single shared VOR/ILS receiver, so although both banks are filled only one active frequency can be tuned: ILS preset 1 takes priority over VOR preset 1.

Waypoints and marks keep their own numbers wherever possible. Where two want the same number the one already placed keeps it and the other takes the lowest free number, because losing a number matters less than quietly overwriting a point somebody put there. The next free number moves on as well, so the first mark acquired in the air does not land on top of one the cartridge just delivered.

A cartridge only replaces the banks it actually carries. Loading a radios only cartridge leaves your waypoints and marks exactly as they were, so a tape that was never meant to touch them cannot wipe them.

As with the Data Cartridge Editor, everything a cartridge delivers is written to the aircraft's own configuration files, so it stays in effect across a reload until something replaces it, either another cartridge or your own edits in the editor.

Each part of a cartridge is applied independently. A cartridge with unusable radio presets will still load its steerpoints, and vice versa.

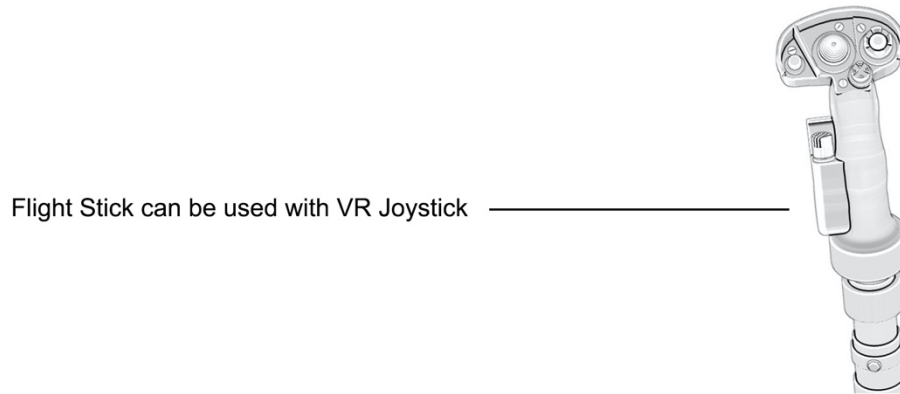
PAGE INTENTIONALLY LEFT BLANK

13. VR SUPPORT

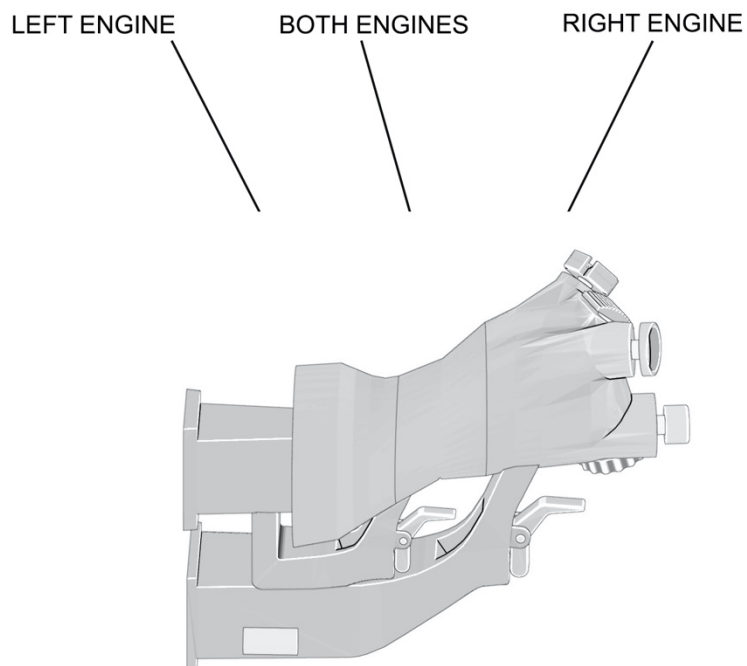
Our jet is fully compatible with VR.

To move between front and rear stations when using VR, you can click on the transportation spot which is always located in front of you.

HOTAS :



Throttle can be used with VR Joystick and has 3 grab positions :



PAGE INTENTIONALLY LEFT BLANK

14. VARIOUS



Click here to move between front and rear stations



Click here to REMOVE safety pin from Ejection Seat



Click here to SET safety pin TO Ejection Seat



Visors move up and down by using :
 mac : (FN +) SHIFT + F2 for front Pilot
 mac : (FN +) SHIFT + F3 for rear Pilot
 windows : (FN +) SHIFT + F2 for front Pilot
 windows : (FN +) SHIFT + F3 for rear Pilot



Cockpit Pressure Switch ON/OFF

Canopy Open/Close Switch



Aircraft menu has the following options :
 REFUEL PROBE (only when landed)
 REMOVE BEFORE FLIGHT FLAGS (only when landed)
 LADDER TOGGLE (only when landed and canopy open)
 CHOCKS TOGGLE (only when landed)
 DATA CARTRIDGE EDITOR
 POP UP INSTRUMENT DISPLAYS
 SHOW CREW (FWD/AFT)

Figure 143

PAGE INTENTIONALLY LEFT BLANK

15. AURAL WARNINGS AND CAUTIONS

The Aural Warning Generator speaks to both cockpits. A message is heard once unless its condition returns, and a more urgent message interrupts a less urgent one. The tables below list every message the aircraft can play and what brings it on.

15.1 AURAL MESSAGES

GROUND PROXIMITY WARNINGS

MESSAGE	WHEN IT IS HEARD
PULL UP	The flight path is closing on terrain ahead. Inhibited above 7,500 ft radio altitude, on the ground, and with the gear down.
SINK RATE	Rate of descent is excessive for the height above the ground. Active below 2,500 ft radio altitude.
TERRAIN	Terrain is closing faster than the aircraft can clear it. Active below about 8,000 ft radio altitude.
DONT SINK	Height is being lost after take off, between 50 and 1,000 ft radio altitude.
TOO LOW GEAR	Below 500 ft radio altitude and below M 0.35, descending faster than 300 ft/min, with the landing gear not down.
TOO LOW FLAPS	Gear down but flaps not at LAND, between 30 and 250 ft radio altitude, below M 0.295, descending faster than 300 ft/min.
TOO LOW TERRAIN	The same two cases above their Mach thresholds: too close to the ground for the speed being flown.
GLIDESLOPE SOFT	More than half a dot below the glideslope inside 1,000 ft radio altitude.
GLIDESLOPE LOUD	Further below the glideslope, and closer in, than the soft call.
GPWS	All five ground proximity modes are switched off.
GPWS OFF	A ground proximity mode has been switched off on the UFCP GPWS settings page.

Table 103

FLIGHT ENVELOPE

MESSAGE	WHEN IT IS HEARD
STALL	Angle of attack between 17 and 22 degrees. See the FLIGHT CONTROL SYSTEM section.
ENVELOPE	Angle of attack above 22 degrees, or below 55 KIAS in flight.
DIRECT LINK	The flight control system has reverted to direct link.
SPEED	Mach 0.93 or above.
SPEED LOW	Airborne and slow for the configuration: below 140 KIAS clean, 110 KIAS with flaps at T/O, or 80 KIAS with flaps at LAND.
AIRBRAKE	The airbrake is out with the throttles at military or above, or with power applied in the landing configuration. Also called if the airbrake position disagrees with the selection for longer than a few seconds.
POWER	PARS is engaged and the airspeed is decaying. PARS does not control thrust.

Table 104

ENGINES AND APU

MESSAGE	WHEN IT IS HEARD
LEFT ENGINE FIRE	A left engine fire has been detected.
RIGHT ENGINE FIRE	A right engine fire has been detected.
LEFT ENGINE FLAMEOUT	The left engine has flamed out.
RIGHT ENGINE FLAMEOUT	The right engine has flamed out.
APU FIRE	An APU fire has been detected.
APU FAIL	The APU has failed to start, or has failed while running.
APU RUNNING	The APU has reached running speed.

Table 105

FUEL

MESSAGE	WHEN IT IS HEARD
JOKER 1	Total fuel has fallen below the JOKER 1 figure set on the UFCP fuel limits page.
JOKER 2	Total fuel has fallen below the JOKER 2 figure.

MESSAGE	WHEN IT IS HEARD
BINGO	Total fuel has fallen below the BINGO figure.
FUEL LOW	Tanks 1 and 2 together are below 930 lb, regardless of what is set on the UFCP.

Table 106

ALTITUDE AND APPROACH

MESSAGE	WHEN IT IS HEARD
DECISION ALTITUDE	Radio altitude has reached the decision altitude set on the UFCP.
MINIMUMS	Radio altitude has reached 500 ft above the set decision altitude.
MINIMUM HEIGHT	Barometric altitude has reached the decision height set on the UFCP.
MAXIMUM DECK	Barometric altitude has reached the maximum deck set on the UFCP HEIGHT page.
MINIMUM DECK	Barometric altitude has fallen to the minimum deck.
ALTITUDE	More than 200 ft away from a captured preselected altitude.
ALTITUDE ALERTER	Within 1,000 ft of the preselected altitude with ALT armed.

Table 107

AUTOPILOT AND RECOVERY

MESSAGE	WHEN IT IS HEARD
AUTOPILOT ON	The autopilot has been engaged.
AUTOPILOT OFF	The autopilot has been disengaged by the pilot.
AUTOPILOT	The autopilot has disengaged on its own.
PARS DISENGAGEMENT	PARS has recovered the aircraft and handed control back.

Table 108

CONFIGURATION AND GROUND

MESSAGE	WHEN IT IS HEARD
STEER NOT ENGAGED	Rudder input on the ground with nosewheel steering not engaged.
STEER ENGAGEMENT	Nosewheel steering has been engaged.
STEER HIGH	Throttles fully forward with nosewheel steering in HI.
CANOPY UNSAFE	The canopy is not closed with either engine above 90 percent NH. Repeats up to ten times.
ICE	Icing conditions have been detected.
RAIN REMOVAL	Rain removal has been selected on.
FWD SEAT NOT ARMED	The front seat safety pin is still in with the aircraft moving faster than 10 kt.
AFT SEAT NOT ARMED	The rear seat safety pin is still in with the aircraft moving faster than 10 kt.
FWD EMERG JETTISON PUSH BUTTON	The front cockpit has commanded an emergency jettison.
AFT EMERG JETTISON PUSH BUTTON	The rear cockpit has commanded an emergency jettison.

Table 109

15.2 WARNING AND CAUTION MESSAGES

Failures are also shown as text in a coloured box on the MFD. Red is a warning that needs action now; amber is a caution. Both raise MASTER CAUTION on the glareshield, which is cancelled with the MASTER CAUTION button. A left and right pair that fails together is shown as a single L+R entry.

RED - WARNINGS

MESSAGE	MEANING
L ENG FIRE	Fire detected in the left engine.
R ENG FIRE	Fire detected in the right engine.
L STALL	Left engine compressor stall.
R STALL	Right engine compressor stall.
L ENG FAIL	Left engine has failed.
R ENG FAIL	Right engine has failed.
L OIL LP	Left engine oil pressure low.
R OIL LP	Right engine oil pressure low.
APU FIRE	Fire detected in the APU.

Table 110

AMBER - CAUTIONS

MESSAGE	MEANING
L FLAMEOUT	Left engine has flamed out.
R FLAMEOUT	Right engine has flamed out.
L MAIN BUS	Left main electrical bus lost.
R MAIN BUS	Right main electrical bus lost.
L BATT OFF	Left battery off line.
R BATT OFF	Right battery off line.
APU FAIL	APU failure.
L GEN OFF	Left generator off line.
R GEN OFF	Right generator off line.
FLAPS FAIL	Flap actuator failure.

Table 111

PAGE INTENTIONALLY LEFT BLANK

16. DISPLAY SYMBOLS

Steerpoints, waypoints and marks are drawn on the HSD and on the MAP/TSD format of the MFD. The symbol says what kind of point it is. All of them are white except the reference point, which is yellow.

16.1 STEERPOINT SYMBOLS

SYMBOL	MEANING	WHERE IT COMES FROM
	Steerpoint	A point of the active flight plan. The one being flown to is drawn as a plain ring.
	Reference point	A reference point from a data cartridge. Yellow, and the only symbol that is not white.
	Initial point	The initial point of the flight plan.
	Diversion	A diversion point of the flight plan.
	Waypoint	A waypoint from the pilot waypoint bank, entered on the UFCP, in the Data Cartridge Editor, or delivered by a cartridge.
	Mark	A mark from the M01 to M99 bank, acquired in flight from the UFCP or delivered by a cartridge. Air and ground marks share the symbol.
	Target or offset	A target or an offset from a data cartridge. Every kind of target and every kind of offset shares this symbol.

Table 112

Points appear on the map only while the display is powered by the MCSG. Where two kinds of point share a symbol, as targets and offsets do, the SP format is what tells them apart: select the type and the list shows only points of that kind.

PAGE INTENTIONALLY LEFT BLANK

17. CUSTOM COMMANDS

Every control in the aircraft can be bound to a joystick, a throttle or a keyboard key. The commands below are the aircraft's own, listed as X-Plane shows them under Settings, Keyboard and Joystick. They are in addition to the standard X-Plane commands, which work as usual.

Each command is listed in full, exactly as X-Plane shows it. Search on the whole name.

17.1 HOTAS - CONTROL STICK

COMMAND	FUNCTION
DWSim/m346/stick/bottom_button	FWD Cockpit Stick Nose Wheel Steering Toggle
DWSim/m346/stick/bottom_trigger	FWD Cockpit Stick Bottom Trigger
DWSim/m346/stick/nav_mark_designation	FWD Cockpit Stick
DWSim/m346/stick/thumb_hat_fwd	FWD Cockpit Stick Thumb Hat Comm1 PTT
DWSim/m346/stick/thumb_hat_in	FWD Cockpit Stick Thumb Hat IFF IDENT
DWSim/m346/stick/thumb_hat_right	FWD Cockpit Stick Thumb Hat Right
DWSim/m346/stick/thumb_hat_rwd	FWD Cockpit Stick Thumb Hat Comm2 PTT
DWSim/m346/stick/top_left_button	FWD Cockpit Stick Top Left Button
DWSim/m346/stick/top_right_4way_hat_down	FWD Cockpit Stick Top Right 4Way Hat Down
DWSim/m346/stick/top_right_4way_hat_left	FWD Cockpit Stick Top Right 4Way Hat Left
DWSim/m346/stick/top_right_4way_hat_right	FWD Cockpit Stick Top Right 4Way Hat Right
DWSim/m346/stick/top_right_4way_hat_up	FWD Cockpit Stick Top Right 4Way Hat Up
DWSim/m346/stick/top_trigger	FWD Cockpit Stick Top Trigger
DWSim/m346/stick/trim_left_wing_down	FWD Cockpit Stick Trim Left Wing Down
DWSim/m346/stick/trim_nose_down	FWD Cockpit Stick Trim Nose Down
DWSim/m346/stick/trim_nose_up	FWD Cockpit Stick Trim Nose Up
DWSim/m346/stick/trim_right_wing_down	FWD Cockpit Stick Trim Right wing Down

Table 113

17.2 HOTAS - THROTTLE

COMMAND	FUNCTION
DWSim/m346/hotas/throttle/left/fuel_trigger_command	Left Throttle Trigger
DWSim/m346/hotas/throttle/right/fuel_start_command	Left Throttle Fuel Start
DWSim/m346/hotas/throttle/right/fuel_stop_command	Left Throttle Fuel Stop
DWSim/m346/hotas/throttle/right/fuel_trigger_command	Right Throttle Trigger

Table 114

17.3 FRONT COCKPIT - LEFT CONSOLE

COMMAND	FUNCTION
DWSim/m346/left_panel/apu/button_start_command	FWD Cockpit APU Start Button
DWSim/m346/left_panel/apu/button_stop_command	FWD Cockpit APU Master/Stop Button
DWSim/m346/left_panel/button_air_refuel_light_down_command	Refuel Probe Light Brightnes Down Command
DWSim/m346/left_panel/button_air_refuel_light_up_command	Refuel Probe Light Brightnes Up Command
DWSim/m346/left_panel/button_ptt_command	FWD Cockpit Communications PTT Toggle
DWSim/m346/left_panel/eng/button_leftselector_down_command	FWD Cockpit Left Engine State Rotator Left Click
DWSim/m346/left_panel/eng/button_leftselector_up_command	FWD Cockpit Left Engine State Rotator Right Click
DWSim/m346/left_panel/eng/button_rightselector_down_command	FWD Cockpit Right Engine State Rotator Left Click
DWSim/m346/left_panel/eng/button_rightselector_up_command	FWD Cockpit Right Engine State Rotator Right Click
DWSim/m346/left_panel/eng/button_startleft_command	FWD Cockpit Left Engine Start Button
DWSim/m346/left_panel/eng/button_startright_command	FWD Cockpit Right Engine Start Button
DWSim/m346/left_panel/fcs/button_emergencylg_command	FWD Cockpit Emergency Landing Gear Handle
DWSim/m346/left_panel/fcs/button_failrst_command	FWD Cockpit Fail Reset Button
DWSim/m346/left_panel/flaps/handle_down_command	FWD Cockpit Flaps Down Switch
DWSim/m346/left_panel/flaps/handle_land_command	FWD Cockpit Flaps Position LAND
DWSim/m346/left_panel/flaps/handle_retracted_command	FWD Cockpit Flaps Position Retracted
DWSim/m346/left_panel/flaps/handle_to_command	FWD Cockpit Flaps Position TO
DWSim/m346/left_panel/flaps/handle_up_command	FWD Cockpit Flaps Up Switch
DWSim/m346/left_panel/fpump/button_fpump_command	FWD Cockpit Fuel Pump Switch
DWSim/m346/left_panel/fpump/button_fpump_cover_command	FWD Cockpit Fuel Pump Cover
DWSim/m346/left_panel/pwr/button_ingps_command	FWD Cockpit IN GPS Switch
DWSim/m346/left_panel/pwr/button_mcs_g_command	FWD Cockpit MCSG Switch
DWSim/m346/left_panel/trim/button_norm_command	FWD Cockpit Trim State Switch
DWSim/m346/left_panel/trim/button_norm_cover_command	FWD Cockpit Trim State Cover
DWSim/m346/left_panel/trim/button_trim_command	FWD Cockpit Set Trim To Take Off
DWSim/m346/left_panel/trim/button_yaw_left_command	FWD Cockpit Yaw Trim Left Switch
DWSim/m346/left_panel/trim/button_yaw_right_command	FWD Cockpit Yaw Trim Right Cover
DWSim/m346/left_panel/zero_gps/button_actu_command	FWD Cockpit Zero GPS Switch
DWSim/m346/left_panel_back/button_leng_command	FWD Cockpit Left Engine Switch
DWSim/m346/left_panel_back/button_leng_cover_command	FWD Cockpit Left Engine Cover
DWSim/m346/left_panel_back/button_maint1_command	FWD Cockpit Left Maint Switch
DWSim/m346/left_panel_back/button_maint1_cover_command	FWD Cockpit Left Maint Cover
DWSim/m346/left_panel_back/button_maint2_command	FWD Cockpit Right Maint Switch

COMMAND	FUNCTION
DWSim/m346/left_panel_back/button_maint2_cover_command	FWD Cockpit Right Maint Cover
DWSim/m346/left_panel_back/button_reng_command	FWD Cockpit Right Engine Switch
DWSim/m346/left_panel_back/button_reng_cover_command	FWD Cockpit Right Engine Cover

Table 115

17.4 FRONT COCKPIT - MAIN PANEL

COMMAND	FUNCTION
DWSim/m346/main_panel/apu/button_extg_command	FWD Cockpit APU Engine Fire Button
DWSim/m346/main_panel/apu/button_extg_cover_command	FWD Cockpit APU Engine Fire Cover
DWSim/m346/main_panel/apu/button_fuelsov_command	FWD Cockpit APU FUEL SOV Button
DWSim/m346/main_panel/apu/button_fuelsov_cover_command	FWD Cockpit APU FUEL SOV Cover
DWSim/m346/main_panel/baro/button_mode_command	FWD Cockpit GHD MODE Button
DWSim/m346/main_panel/baro/rotary_baro_down_command	FWD Cockpit GHD BARO Rotate Left Command
DWSim/m346/main_panel/baro/rotary_baro_push_command	FWD Cockpit GHD BARO Push In
DWSim/m346/main_panel/baro/rotary_baro_up_command	FWD Cockpit GHD BARO Rotate Right Command
DWSim/m346/main_panel/button_down_landing_lights_command	FWD Cockpit Taxi Lights Down Switch
DWSim/m346/main_panel/button_downlockoverride_command	FWD Cockpit Down Lock Override Button
DWSim/m346/main_panel/button_gearwarningsilencer_command	FWD Cockpit Landing Gear Warning Silencer Button
DWSim/m346/main_panel/button_landing_gear_command	FWD Cockpit Landing Gear Lever
DWSim/m346/main_panel/button_parking_brake_command	FWD Cockpit Parking Brake
DWSim/m346/main_panel/button_up_landing_lights_command	FWD Cockpit Taxi Lights Up Switch
DWSim/m346/main_panel/center_mfd/button_bal_down_command	FWD Center MFD BAL Button Down Command
DWSim/m346/main_panel/center_mfd/button_bal_up_command	FWD Center MFD BAL Button Up Command
DWSim/m346/main_panel/center_mfd/button_brt_down_command	FWD Center MFD BRT Button Down Command
DWSim/m346/main_panel/center_mfd/button_brt_up_command	FWD Center MFD BRT Button Up Command
DWSim/m346/main_panel/center_mfd/button_ctr_down_command	FWD Center MFD CTR Button Down Command
DWSim/m346/main_panel/center_mfd/button_ctr_up_command	FWD Center MFD CTR Button Up Command
DWSim/m346/main_panel/centerlow/button_pars_command	PARS Emergency Hit
DWSim/m346/main_panel/elec/button_lbatt_command	FWD Cockpit Left Battery Switch
DWSim/m346/main_panel/elec/button_lgen_command	FWD Cockpit Left Generator Switch
DWSim/m346/main_panel/elec/button_rbatt_command	FWD Cockpit Right Battery Switch
DWSim/m346/main_panel/elec/button_rgen_command	FWD Cockpit Right Generator Switch
DWSim/m346/main_panel/elec/button_warntest_command	FWD Cockpit Warn Test Buttin
DWSim/m346/main_panel/left_brow/alt_sel_left_command	FWD Cockpit Alt Sel Knob Left
DWSim/m346/main_panel/left_brow/alt_sel_right_command	FWD Cockpit Alt Sel Knob Right
DWSim/m346/main_panel/left_brow/ap_command	FWD Cockpit AP Button Click
DWSim/m346/main_panel/left_brow/baro_std_left_command	FWD Cockpit Baro STD Knob Left
DWSim/m346/main_panel/left_brow/baro_std_pull_command	FWD Cockpit Baro STD Knob Pull
DWSim/m346/main_panel/left_brow/baro_std_right_command	FWD Cockpit Baro STD Knob Right
DWSim/m346/main_panel/left_brow/master_caution_push_command	FWD Cockpit Master Caution Button
DWSim/m346/main_panel/left_brow/sel_command	FWD Cockpit SEL Button Click
DWSim/m346/main_panel/left_mfd/button_bal_down_command	FWD Left MFD BAL Button Down Command
DWSim/m346/main_panel/left_mfd/button_bal_up_command	FWD Left MFD BAL Button Up Command
DWSim/m346/main_panel/left_mfd/button_brt_down_command	FWD Left MFD BRT Button Down Command
DWSim/m346/main_panel/left_mfd/button_brt_up_command	FWD Left MFD BRT Button Up Command
DWSim/m346/main_panel/left_mfd/button_ctr_down_command	FWD Left MFD CTR Button Down Command
DWSim/m346/main_panel/left_mfd/button_ctr_up_command	FWD Left MFD CTR Button Up Command
DWSim/m346/main_panel/legine/button_extg_command	FWD Cockpit Left Engine Fire Button
DWSim/m346/main_panel/legine/button_extg_cover_command	FWD Cockpit Left Engine Fire Cover
DWSim/m346/main_panel/legine/button_fuelsov_command	FWD Cockpit Left FUEL SOV Button
DWSim/m346/main_panel/legine/button_fuelsov_cover_command	FWD Cockpit Left FUEL SOV Cover
DWSim/m346/main_panel/legine/button_extg_command	FWD Cockpit Right Engine Fire Button
DWSim/m346/main_panel/legine/button_extg_cover_command	FWD Cockpit Right Engine Fire Cover
DWSim/m346/main_panel/legine/button_fuelsov_command	FWD Cockpit Right FUEL SOV Button
DWSim/m346/main_panel/legine/button_fuelsov_cover_command	FWD Cockpit Right FUEL SOV Cover
DWSim/m346/main_panel/right_brow/crs_left_command	FWD Cockpit CRS Knob Left
DWSim/m346/main_panel/right_brow/crs_push_command	FWD Cockpit CRS Knob Push
DWSim/m346/main_panel/right_brow/crs_right_command	FWD Cockpit CRS Knob Right
DWSim/m346/main_panel/right_brow/hdg_left_command	FWD Cockpit HDG Knob Left
DWSim/m346/main_panel/right_brow/hdg_push_command	FWD Cockpit HDG Knob Push
DWSim/m346/main_panel/right_brow/hdg_right_command	FWD Cockpit HDG Knob Right
DWSim/m346/main_panel/right_brow/steer_command	FWD Cockpit Nose Wheel Steer Mode Button Click
DWSim/m346/main_panel/right_mfd/button_bal_down_command	FWD Right MFD BAL Button Down Command
DWSim/m346/main_panel/right_mfd/button_bal_up_command	FWD Right MFD BAL Button Up Command
DWSim/m346/main_panel/right_mfd/button_brt_down_command	FWD Right MFD BRT Button Down Command
DWSim/m346/main_panel/right_mfd/button_brt_up_command	FWD Right MFD BRT Button Up Command
DWSim/m346/main_panel/right_mfd/button_ctr_down_command	FWD Right MFD CTR Button Down Command
DWSim/m346/main_panel/right_mfd/button_ctr_up_command	FWD Right MFD CTR Button Up Command
DWSim/m346/main_panel/topleft/button_emergjett_command	FWD Emergency Jettison Hit

Table 116

17.5 FRONT COCKPIT - CENTRE PANEL

COMMAND	FUNCTION
DWSim/m346/center_panel/icp/button_0_command	FWD Cockpit UFCP Keypad 0 Button
DWSim/m346/center_panel/icp/button_1_command	FWD Cockpit UFCP Keypad 1 Button
DWSim/m346/center_panel/icp/button_2_command	FWD Cockpit UFCP Keypad 2 Button
DWSim/m346/center_panel/icp/button_3_command	FWD Cockpit UFCP Keypad 3 Button
DWSim/m346/center_panel/icp/button_4_command	FWD Cockpit UFCP Keypad 4 Button
DWSim/m346/center_panel/icp/button_5_command	FWD Cockpit UFCP Keypad 5 Button
DWSim/m346/center_panel/icp/button_6_command	FWD Cockpit UFCP Keypad 6 Button
DWSim/m346/center_panel/icp/button_7_command	FWD Cockpit UFCP Keypad 7 Button
DWSim/m346/center_panel/icp/button_8_command	FWD Cockpit UFCP Keypad 8 Button
DWSim/m346/center_panel/icp/button_9_command	FWD Cockpit UFCP Keypad 9 Button
DWSim/m346/center_panel/icp/button_aa_command	FWD Cockpit UFCP SB AA Button
DWSim/m346/center_panel/icp/button_ag_command	FWD Cockpit UFCP SB AG Button
DWSim/m346/center_panel/icp/button_ap_command	FWD Cockpit UFCP Keypad AP/FD Button
DWSim/m346/center_panel/icp/button_baro_command	FWD Cockpit UFCP SB BARO Button
DWSim/m346/center_panel/icp/button_clock_command	FWD Cockpit UFCP SB CLOCK Button
DWSim/m346/center_panel/icp/button_comm_command	FWD Cockpit UFCP SB COMM Button
DWSim/m346/center_panel/icp/button_data_command	FWD Cockpit UFCP SB DATA Button
DWSim/m346/center_panel/icp/button_dcl_command	FWD Cockpit UFCP SB DCL Button
DWSim/m346/center_panel/icp/button_del_command	FWD Cockpit UFCP Keypad DEL Button
DWSim/m346/center_panel/icp/button_down_command	FWD Cockpit UFCP SB DOWN Button
DWSim/m346/center_panel/icp/button_ent_command	FWD Cockpit UFCP Keypad ENT Button
DWSim/m346/center_panel/icp/button_fpl_command	FWD Cockpit UFCP SB FPL Button
DWSim/m346/center_panel/icp/button_fpm_command	FWD Cockpit UFCP SB FPM Button
DWSim/m346/center_panel/icp/button_front_pilot_command	Go to the FWD pilot position
DWSim/m346/center_panel/icp/button_hmd_command	FWD Cockpit UFCP SB HMD Button
DWSim/m346/center_panel/icp/button_hud_power_command	FWD Cockpit UFCP Left Side Power On/Off Toggle
DWSim/m346/center_panel/icp/button_iff_command	FWD Cockpit UFCP SB IFF Button
DWSim/m346/center_panel/icp/button_nav_command	FWD Cockpit UFCP SB NAV Button
DWSim/m346/center_panel/icp/button_plus_command	FWD Cockpit UFCP Keypad PLUS/MINUS Button
DWSim/m346/center_panel/icp/button_rdr_command	FWD Cockpit UFCP SB RDR Button
DWSim/m346/center_panel/icp/button_rear_pilot_command	Go to the AFT pilot position
DWSim/m346/center_panel/icp/button_sbs_power_command	FWD Cockpit UFCP Right Side SBS Power On/Off Toggle
DWSim/m346/center_panel/icp/button_sbsdown_command	FWD Cockpit UFCP Keypad SBS Down Button
DWSim/m346/center_panel/icp/button_sbsup_command	FWD Cockpit UFCP Keypad SBS Up Button
DWSim/m346/center_panel/icp/button_sp_command	FWD Cockpit UFCP SB SP Button
DWSim/m346/center_panel/icp/button_tcn_command	FWD Cockpit UFCP SB TCN Button
DWSim/m346/center_panel/icp/button_up_command	FWD Cockpit UFCP SB UP Button
DWSim/m346/center_panel/icp/button_vor_command	FWD Cockpit UFCP SB VOR Button
DWSim/m346/center_panel/icp/button_wp_command	FWD Cockpit UFCP SB WP Button
DWSim/m346/center_panel/icp/function_1_command	FWD Cockpit UFCP Function 1 Button
DWSim/m346/center_panel/icp/function_2_command	FWD Cockpit UFCP Function 2 Button
DWSim/m346/center_panel/icp/function_3_command	FWD Cockpit UFCP Function 3 Button
DWSim/m346/center_panel/icp/function_4_command	FWD Cockpit UFCP Function 4 Button
DWSim/m346/center_panel/icp/function_5_command	FWD Cockpit UFCP Function 5 Button
DWSim/m346/center_panel/icp/function_6_command	FWD Cockpit UFCP Function 6 Button
DWSim/m346/center_panel/icp/function_7_command	FWD Cockpit UFCP Function 7 Button
DWSim/m346/center_panel/icp/function_8_command	FWD Cockpit UFCP Function 8 Button
DWSim/m346/center_panel/icp/rotary_brt_down_command	FWD Cockpit UFCP Left Side Display BRT Down Command
DWSim/m346/center_panel/icp/rotary_brt_up_command	FWD Cockpit UFCP Left Side Display BRT Up Command
DWSim/m346/center_panel/icp/rotary_contrast_down_command	FWD Cockpit UFCP Right Side Display Contrast Down Command
DWSim/m346/center_panel/icp/rotary_contrast_up_command	FWD Cockpit UFCP Right Side Display Contrast Up Command
DWSim/m346/center_panel/icp/rotary_raster_brt_down_command	FWD Cockpit UFCP Left Side Raster BRT Down Command
DWSim/m346/center_panel/icp/rotary_raster_brt_up_command	FWD Cockpit UFCP Left Side Raster BRT Up Command
DWSim/m346/center_panel/icp/rotary_raster_contrast_down_command	FWD Cockpit UFCP Right Side Raster Contrast Down Command
DWSim/m346/center_panel/icp/rotary_raster_contrast_up_command	FWD Cockpit UFCP Right Side Raster Contrast Up Command

Table 117

17.6 FRONT COCKPIT - RIGHT CONSOLE

COMMAND	FUNCTION
DWSim/m346/right_panel/button_canopy_command	Canopy Open/Close Toggle
DWSim/m346/right_panel/cabin_pressure_command	Canopy Pressure Lever
DWSim/m346/right_panel/canopy_switch_command	Canopy Open/Close Switch
DWSim/m346/right_panel/ics/button_backup_command	FWD Cockpit ICS Backup Switch
DWSim/m346/right_panel/ics/button_call_command	FWD Cockpit ICS Call Switch

COMMAND	FUNCTION
DWSim/m346/right_panel/ics/button_vox_down_command	FWD Cockpit ICS VOX Knob Left Click
DWSim/m346/right_panel/ics/button_vox_up_command	FWD Cockpit ICS VOX Knob Right Click
DWSim/m346/right_panel/ics/rotary_comm1_down_command	FWD Cockpit ICS Comm1 Knob Left Click
DWSim/m346/right_panel/ics/rotary_comm1_up_command	FWD Cockpit ICS Comm1 Knob Right Click
DWSim/m346/right_panel/ics/rotary_comm2_down_command	FWD Cockpit ICS Comm2 Knob Left Click
DWSim/m346/right_panel/ics/rotary_comm2_up_command	FWD Cockpit ICS Comm2 Knob Right Click
DWSim/m346/right_panel/ics/rotary_comm_command_down	FWD Cockpit ICS Comm Knob Rotate Down
DWSim/m346/right_panel/ics/rotary_comm_command_up	FWD Cockpit ICS Comm Knob Rotate Up
DWSim/m346/right_panel/ics/rotary_ecm_down_command	FWD Cockpit ICS ECM Knob Left Click
DWSim/m346/right_panel/ics/rotary_ecm_up_command	FWD Cockpit ICS ECM Knob Right Click
DWSim/m346/right_panel/ics/rotary_ics_down_command	FWD Cockpit ICS ICS Knob Left Click
DWSim/m346/right_panel/ics/rotary_ics_up_command	FWD Cockpit ICS ICS Knob Right Click
DWSim/m346/right_panel/ics/rotary_missile_down_command	FWD Cockpit ICS Missile Knob Left Click
DWSim/m346/right_panel/ics/rotary_missile_up_command	FWD Cockpit ICS Missile Knob Right Click
DWSim/m346/right_panel/ics/rotary_mkr_down_command	FWD Cockpit ICS MKR Knob Left Click
DWSim/m346/right_panel/ics/rotary_mkr_up_command	FWD Cockpit ICS MKR Knob Right Click
DWSim/m346/right_panel/ics/rotary_rwr_down_command	FWD Cockpit ICS RWR Knob Left Click
DWSim/m346/right_panel/ics/rotary_rwr_up_command	FWD Cockpit ICS RWR Knob Right Click
DWSim/m346/right_panel/ics/rotary_tcndme_down_command	FWD Cockpit ICS TCN DME Knob Left Click
DWSim/m346/right_panel/ics/rotary_tcndme_up_command	FWD Cockpit ICS TCN DME Knob Right Click
DWSim/m346/right_panel/ics/rotary_vol_down_command	FWD Cockpit ICS Vol Knob Left Click
DWSim/m346/right_panel/ics/rotary_vol_up_command	FWD Cockpit ICS Vol Knob Right Click
DWSim/m346/right_panel/ics/rotary_vorloc_down_command	FWD Cockpit ICS VOR LOC Knob Left Click
DWSim/m346/right_panel/ics/rotary_vorloc_up_command	FWD Cockpit ICS VOR LOC Knob Right Click
DWSim/m346/right_panel/iff/button_emerg_command	FWD Cockpit IFF TCAS Emerg Click
DWSim/m346/right_panel/iff/button_hold_down_command	FWD Cockpit IFF TCAS Hold Down Click
DWSim/m346/right_panel/iff/button_hold_up_command	FWD Cockpit IFF TCAS Hold Up Click
DWSim/m346/right_panel/iff/button_iff_command	FWD Cockpit IFF TCAS IFF Click
DWSim/m346/right_panel/iff/button_m4m5_command	FWD Cockpit IFF TCAS M4M5 Button
DWSim/m346/right_panel/intrlt/button_bcn_command	FWD Cockpit INTR LT BCN Click
DWSim/m346/right_panel/intrlt/button_cvrt_command	FWD Cockpit INTR LT CVRT Click
DWSim/m346/right_panel/intrlt/button_nav_command	FWD Cockpit INTR LT Nav Click
DWSim/m346/right_panel/intrlt/button_warnbrt_command	FWD Cockpit INTR LT WARN BRT Click
DWSim/m346/right_panel/intrlt/rotary_brt_down_command	FWD Cockpit INTR LT BRT Down Click
DWSim/m346/right_panel/intrlt/rotary_brt_up_command	FWD Cockpit INTR LT BRT Up Click
DWSim/m346/right_panel/intrlt/rotary_code_down_command	FWD Cockpit INTR LT Code Down Click
DWSim/m346/right_panel/intrlt/rotary_code_up_command	FWD Cockpit INTR LT Code Up Click
DWSim/m346/right_panel/intrlt/rotary_console_down_command	FWD Cockpit INTR LT CONSOLE Knob Down Click
DWSim/m346/right_panel/intrlt/rotary_console_up_command	FWD Cockpit INTR LT CONSOLE Knob Up Click
DWSim/m346/right_panel/intrlt/rotary_flood_down_command	FWD Cockpit INTR LT FLOOD Knob Down Click
DWSim/m346/right_panel/intrlt/rotary_flood_up_command	FWD Cockpit INTR LT FLOOD Knob Up Click
DWSim/m346/right_panel/intrlt/rotary_form_down_command	FWD Cockpit INTR LT Form Down Click
DWSim/m346/right_panel/intrlt/rotary_form_up_command	FWD Cockpit INTR LT Form Up Click
DWSim/m346/right_panel/intrlt/rotary_inst_down_command	FWD Cockpit INTR LT INTS Knob Down Click
DWSim/m346/right_panel/intrlt/rotary_inst_up_command	FWD Cockpit INTR LT INTS Knob Up Click
DWSim/m346/right_panel/mass/rotary_mass_down_command	FWD Cockpit INTR LT Mass Down Click
DWSim/m346/right_panel/mass/rotary_mass_up_command	FWD Cockpit INTR LT Mass Up Click
DWSim/m346/right_panel/pwr/button_comm1_down_command	FWD Cockpit PWR Comm1 Down Click
DWSim/m346/right_panel/pwr/button_comm1_up_command	FWD Cockpit PWR Comm1 Up Click
DWSim/m346/right_panel/pwr/button_comm2_down_command	FWD Cockpit PWR Comm2 Down Click
DWSim/m346/right_panel/pwr/button_comm2_up_command	FWD Cockpit PWR Comm2 Up Click
DWSim/m346/right_panel/pwr/button_ralt_command	FWD Cockpit PWR RALT Click
DWSim/m346/right_panel/pwr/button_tacan_command	FWD Cockpit PWR TACAN Click
DWSim/m346/right_panel/pwr/button_vorils_command	FWD Cockpit PWR VOR ILS Click
DWSim/m346/right_panel/rainrmvl/button_demist_command	FWD Cockpit Demist Switch
DWSim/m346/right_panel/rainrmvl/button_rainrmvl_command	FWD Cockpit Rain Removal Switch
DWSim/m346/right_panel/temp/button_cabinpress_command	FWD Cockpit ECS Cabin Pressure Switch Click
DWSim/m346/right_panel/temp/button_cabinpress_cover_command	FWD Cockpit ECS Cabin Pressure Cover Click
DWSim/m346/right_panel/temp/rotary_bleed_down_command	FWD Cockpit ECS Cabin Bleed Air Knob Up Click
DWSim/m346/right_panel/temp/rotary_bleed_up_command	FWD Cockpit ECS Cabin Bleed Air Knob Up Click
DWSim/m346/right_panel/temp/rotary_cabintemp_down_command	FWD Cockpit ECS Cabin Temperature Knob Down Click
DWSim/m346/right_panel/temp/rotary_cabintemp_up_command	FWD Cockpit ECS Cabin Temperature Knob Up Click
DWSim/m346/right_panel_back/pwr/button_cmfd_command	FWD Cockpit Right Back CMFD Toggle
DWSim/m346/right_panel_back/pwr/button_comm1_command	FWD Cockpit Right Back Comm1 Toggle
DWSim/m346/right_panel_back/pwr/button_comm2_command	FWD Cockpit Right Back Comm2 Toggle
DWSim/m346/right_panel_back/pwr/button_lmfd_command	FWD Cockpit Right Back LMFD Toggle
DWSim/m346/right_panel_back/pwr/button_rmfd_command	FWD Cockpit Right Back RMFD Toggle
DWSim/m346/right_panel_back/pwr/button_voice_command	FWD Cockpit Right Back Voice Toggle

Table 118

17.7 FRONT COCKPIT - EJECTION SEAT

COMMAND	FUNCTION
DWSim/m346/ejection_seat/arm_seat_command	Arm the Seat

COMMAND	FUNCTION
DWSim/m346/ejection_seat/bu_down_command	Seat BU Switch Down
DWSim/m346/ejection_seat/bu_up_command	Seat BU Switch Up
DWSim/m346/ejection_seat/eject_command	Ejection Handle Command
DWSim/m346/ejection_seat/oxygen_down_command	Seat Oxygen Switch Down
DWSim/m346/ejection_seat/oxygen_up_command	Seat Oxygen Switch Up
DWSim/m346/ejection_seat/safety_pin1_arm_command	Remove Before Flight Seat Pin

Table 119

17.8 REAR COCKPIT

COMMAND	FUNCTION
DWSim/m346/aft/center_panel/icp/button_0_command	AFT Cockpit UFCP Keypad 0 Button
DWSim/m346/aft/center_panel/icp/button_1_command	AFT Cockpit UFCP Keypad 1 Button
DWSim/m346/aft/center_panel/icp/button_2_command	AFT Cockpit UFCP Keypad 2 Button
DWSim/m346/aft/center_panel/icp/button_3_command	AFT Cockpit UFCP Keypad 3 Button
DWSim/m346/aft/center_panel/icp/button_4_command	AFT Cockpit UFCP Keypad 4 Button
DWSim/m346/aft/center_panel/icp/button_5_command	AFT Cockpit UFCP Keypad 5 Button
DWSim/m346/aft/center_panel/icp/button_6_command	AFT Cockpit UFCP Keypad 6 Button
DWSim/m346/aft/center_panel/icp/button_7_command	AFT Cockpit UFCP Keypad 7 Button
DWSim/m346/aft/center_panel/icp/button_8_command	AFT Cockpit UFCP Keypad 8 Button
DWSim/m346/aft/center_panel/icp/button_9_command	AFT Cockpit UFCP Keypad 9 Button
DWSim/m346/aft/center_panel/icp/button_aa_command	AFT Cockpit UFCP SB AA Button
DWSim/m346/aft/center_panel/icp/button_ag_command	AFT Cockpit UFCP SB AG Button
DWSim/m346/aft/center_panel/icp/button_ap_command	AFT Cockpit UFCP Keypad AP/FD Button
DWSim/m346/aft/center_panel/icp/button_baro_command	AFT Cockpit UFCP SB BARO Button
DWSim/m346/aft/center_panel/icp/button_clock_command	AFT Cockpit UFCP SB CLOCK Button
DWSim/m346/aft/center_panel/icp/button_comm_command	AFT Cockpit UFCP SB COMM Button
DWSim/m346/aft/center_panel/icp/button_data_command	AFT Cockpit UFCP SB DATA Button
DWSim/m346/aft/center_panel/icp/button_dcl_command	AFT Cockpit UFCP SB DCL Button
DWSim/m346/aft/center_panel/icp/button_del_command	AFT Cockpit UFCP Keypad DEL Button
DWSim/m346/aft/center_panel/icp/button_down_command	AFT Cockpit UFCP SB DOWN Button
DWSim/m346/aft/center_panel/icp/button_ent_command	AFT Cockpit UFCP Keypad ENT Button
DWSim/m346/aft/center_panel/icp/button_fpl_command	AFT Cockpit UFCP SB FPL Button
DWSim/m346/aft/center_panel/icp/button_fpm_command	AFT Cockpit UFCP SB FPM Button
DWSim/m346/aft/center_panel/icp/button_hmd_command	AFT Cockpit UFCP SB HMD Button
DWSim/m346/aft/center_panel/icp/button_hud_power_command	AFT Cockpit UFCP Left Side Power On/Off Toggle
DWSim/m346/aft/center_panel/icp/button_iff_command	AFT Cockpit UFCP SB IFF Button
DWSim/m346/aft/center_panel/icp/button_nav_command	AFT Cockpit UFCP SB NAV Button
DWSim/m346/aft/center_panel/icp/button_plus_command	AFT Cockpit UFCP Keypad PLUS/MINUS Button
DWSim/m346/aft/center_panel/icp/button_rdr_command	AFT Cockpit UFCP SB RDR Button
DWSim/m346/aft/center_panel/icp/button_sbs_power_command	AFT Cockpit UFCP Right Side SBS Power On/Off Toggle
DWSim/m346/aft/center_panel/icp/button_sbsdown_command	AFT Cockpit UFCP Keypad SBS Down Button
DWSim/m346/aft/center_panel/icp/button_sbsup_command	AFT Cockpit UFCP Keypad SBS Up Button
DWSim/m346/aft/center_panel/icp/button_sp_command	AFT Cockpit UFCP SB SP Button
DWSim/m346/aft/center_panel/icp/button_tcn_command	AFT Cockpit UFCP SB TCN Button
DWSim/m346/aft/center_panel/icp/button_up_command	AFT Cockpit UFCP SB UP Button
DWSim/m346/aft/center_panel/icp/button_vor_command	AFT Cockpit UFCP SB VOR Button
DWSim/m346/aft/center_panel/icp/button_wp_command	AFT Cockpit UFCP SB WP Button
DWSim/m346/aft/center_panel/icp/function_1_command	AFT Cockpit UFCP Function 1 Button
DWSim/m346/aft/center_panel/icp/function_2_command	AFT Cockpit UFCP Function 2 Button
DWSim/m346/aft/center_panel/icp/function_3_command	AFT Cockpit UFCP Function 3 Button
DWSim/m346/aft/center_panel/icp/function_4_command	AFT Cockpit UFCP Function 4 Button
DWSim/m346/aft/center_panel/icp/function_5_command	AFT Cockpit UFCP Function 5 Button
DWSim/m346/aft/center_panel/icp/function_6_command	AFT Cockpit UFCP Function 6 Button
DWSim/m346/aft/center_panel/icp/function_7_command	AFT Cockpit UFCP Function 7 Button
DWSim/m346/aft/center_panel/icp/function_8_command	AFT Cockpit UFCP Function 8 Button
DWSim/m346/aft/center_panel/icp/rotary_brt_down_command	AFT Cockpit UFCP Left Side Display BRT Down Command
DWSim/m346/aft/center_panel/icp/rotary_brt_up_command	AFT Cockpit UFCP Left Side Display BRT Up Command
DWSim/m346/aft/center_panel/icp/rotary_contrast_down_command	AFT Cockpit UFCP Right Side Display Contrast Down Command
DWSim/m346/aft/center_panel/icp/rotary_contrast_up_command	AFT Cockpit UFCP Right Side Display Contrast Up Command
DWSim/m346/aft/center_panel/icp/rotary_raster_brt_down_command	AFT Cockpit UFCP Left Side Raster BRT Down Command
DWSim/m346/aft/center_panel/icp/rotary_raster_brt_up_command	AFT Cockpit UFCP Left Side Raster BRT Up Command
DWSim/m346/aft/center_panel/icp/rotary_raster_contrast_down_command	AFT Cockpit UFCP Right Side Raster Contrast Down Command
DWSim/m346/aft/center_panel/icp/rotary_raster_contrast_up_command	AFT Cockpit UFCP Right Side Raster Contrast Up Command
DWSim/m346/aft/ejection_seat/arm_seat_command	Arm the Seat
DWSim/m346/aft/ejection_seat/bu_down_command	Seat BU Switch Down
DWSim/m346/aft/ejection_seat/bu_up_command	Seat BU Switch Up
DWSim/m346/aft/ejection_seat/eject_command	Ejection Handle Command

COMMAND	FUNCTION
DWSim/m346/aft/ejection_seat/oxygen_down_command	Seat Oxygen Switch Down
DWSim/m346/aft/ejection_seat/oxygen_up_command	Seat Oxygen Switch Up
DWSim/m346/aft/ejection_seat/safety_pin1_arm_command	Remove Before Flight Seat Pin
DWSim/m346/aft/left_panel/apu/button_start_command	AFT Cockpit APU Start Button
DWSim/m346/aft/left_panel/apu/button_stop_command	AFT Cockpit APU Master/Stop Button
DWSim/m346/aft/left_panel/eng/button_leftselector_down_command	AFT Cockpit Left Engine State Rotator Left Click
DWSim/m346/aft/left_panel/eng/button_leftselector_up_command	AFT Cockpit Left Engine State Rotator Right Click
DWSim/m346/aft/left_panel/eng/button_rightselector_down_command	AFT Cockpit Right Engine State Rotator Left Click
DWSim/m346/aft/left_panel/eng/button_rightselector_up_command	AFT Cockpit Right Engine State Rotator Right Click
DWSim/m346/aft/left_panel/eng/button_startleft_command	AFT Cockpit Left Engine Start Button
DWSim/m346/aft/left_panel/eng/button_startright_command	AFT Cockpit Right Engine Start Button
DWSim/m346/aft/left_panel/eng/cover_command	Engines Lift to Operate
DWSim/m346/aft/left_panel/fcs/button_emergencylg_command	AFT Cockpit Emergency Landing Gear Handle
DWSim/m346/aft/left_panel/fcs/button_failrst_command	AFT Cockpit Fail Reset Button
DWSim/m346/aft/left_panel/fpump/button_fpump_command	AFT Cockpit Fuel Pump Switch
DWSim/m346/aft/left_panel/fpump/button_fpump_cover_command	AFT Cockpit Fuel Pump Cover
DWSim/m346/aft/left_panel/pwr/button_cmfd_command	AFT Cockpit Left Panel CMFD Toggle
DWSim/m346/aft/left_panel/pwr/button_lmfd_command	AFT Cockpit Left Panel LMFD Toggle
DWSim/m346/aft/left_panel/pwr/button_rmfd_command	AFT Cockpit Left Panel RMFD Toggle
DWSim/m346/aft/left_panel/trim/button_norm_command	AFT Cockpit Trim State Switch
DWSim/m346/aft/left_panel/trim/button_norm_cover_command	AFT Cockpit Trim State Cover
DWSim/m346/aft/left_panel/trim/button_trim_command	AFT Cockpit Set Trim To Take Off
DWSim/m346/aft/left_panel/trim/button_yaw_left_command	AFT Cockpit Yaw Trim Left Switch
DWSim/m346/aft/left_panel/trim/button_yaw_right_command	AFT Cockpit Yaw Trim Right Cover
DWSim/m346/aft/main_panel/apu/button_extg_command	AFT Cockpit APU Engine Fire Button
DWSim/m346/aft/main_panel/apu/button_extg_cover_command	AFT Cockpit APU Engine Fire Cover
DWSim/m346/aft/main_panel/apu/button_fuelsov_command	AFT Cockpit APU FUEL SOV Button
DWSim/m346/aft/main_panel/apu/button_fuelsov_cover_command	AFT Cockpit APU FUEL SOV Cover
DWSim/m346/aft/main_panel/baro/button_mode_command	AFT Cockpit GHD MODE Button
DWSim/m346/aft/main_panel/baro/rotary_baro_down_command	AFT Cockpit GHD BARO Rotate Left Command
DWSim/m346/aft/main_panel/baro/rotary_baro_push_command	AFT Cockpit GHD BARO Push In
DWSim/m346/aft/main_panel/baro/rotary_baro_up_command	AFT Cockpit GHD BARO Rotate Right Command
DWSim/m346/aft/main_panel/button_batt_cover_command	Elect Lift to Operate
DWSim/m346/aft/main_panel/button_downlockoverride_command	AFT Cockpit Down Lock Override Button
DWSim/m346/aft/main_panel/button_gearwarningsilencer_command	AFT Cockpit Landing Gear Warning Silencer Button
DWSim/m346/aft/main_panel/center_mfd/button_bal_down_command	AFT Center MFD BAL Button Down Command
DWSim/m346/aft/main_panel/center_mfd/button_bal_up_command	AFT Center MFD BAL Button Up Command
DWSim/m346/aft/main_panel/center_mfd/button_brt_down_command	AFT Center MFD BRT Button Down Command
DWSim/m346/aft/main_panel/center_mfd/button_brt_up_command	AFT Center MFD BRT Button Up Command
DWSim/m346/aft/main_panel/center_mfd/button_ctr_down_command	AFT Center MFD CTR Button Down Command
DWSim/m346/aft/main_panel/center_mfd/button_ctr_up_command	AFT Center MFD CTR Button Up Command
DWSim/m346/aft/main_panel/centerlow/button_pars_command	PARS Emergency Hit
DWSim/m346/aft/main_panel/elec/button_lbatt_command	AFT Cockpit Left Battery Switch
DWSim/m346/aft/main_panel/elec/button_lgen_command	AFT Cockpit Left Generator Switch
DWSim/m346/aft/main_panel/elec/button_rbatt_command	AFT Cockpit Right Battery Switch
DWSim/m346/aft/main_panel/elec/button_rgen_command	AFT Cockpit Right Generator Switch
DWSim/m346/aft/main_panel/elec/button_warntest_command	AFT Cockpit Warn Test Buttin
DWSim/m346/aft/main_panel/left_mfd/button_bal_down_command	AFT Left MFD BAL Button Down Command
DWSim/m346/aft/main_panel/left_mfd/button_bal_up_command	AFT Left MFD BAL Button Up Command
DWSim/m346/aft/main_panel/left_mfd/button_brt_down_command	AFT Left MFD BRT Button Down Command
DWSim/m346/aft/main_panel/left_mfd/button_brt_up_command	AFT Left MFD BRT Button Up Command
DWSim/m346/aft/main_panel/left_mfd/button_ctr_down_command	AFT Left MFD CTR Button Down Command
DWSim/m346/aft/main_panel/left_mfd/button_ctr_up_command	AFT Left MFD CTR Button Up Command
DWSim/m346/aft/main_panel/lengine/button_extg_command	AFT Cockpit Left Engine Fire Button
DWSim/m346/aft/main_panel/lengine/button_extg_cover_command	AFT Cockpit Left Engine Fire Cover
DWSim/m346/aft/main_panel/lengine/button_fuelsov_command	AFT Cockpit Left FUEL SOV Button
DWSim/m346/aft/main_panel/lengine/button_fuelsov_cover_command	AFT Cockpit Left FUEL SOV Cover
DWSim/m346/aft/main_panel/renge/button_extg_command	AFT Cockpit Right Engine Fire Button
DWSim/m346/aft/main_panel/renge/button_extg_cover_command	AFT Cockpit Right Engine Fire Cover
DWSim/m346/aft/main_panel/renge/button_fuelsov_command	AFT Cockpit Right FUEL SOV Button
DWSim/m346/aft/main_panel/renge/button_fuelsov_cover_command	AFT Cockpit Right FUEL SOV Cover
DWSim/m346/aft/main_panel/right_brow/steer_command	AFT Cockpit Nose Wheel Steer Mode Button Click
DWSim/m346/aft/main_panel/right_mfd/button_bal_down_command	AFT Right MFD BAL Button Down Command
DWSim/m346/aft/main_panel/right_mfd/button_bal_up_command	AFT Right MFD BAL Button Up Command
DWSim/m346/aft/main_panel/right_mfd/button_brt_down_command	AFT Right MFD BRT Button Down Command
DWSim/m346/aft/main_panel/right_mfd/button_brt_up_command	AFT Right MFD BRT Button Up Command
DWSim/m346/aft/main_panel/right_mfd/button_ctr_down_command	AFT Right MFD CTR Button Down Command
DWSim/m346/aft/main_panel/right_mfd/button_ctr_up_command	AFT Right MFD CTR Button Up Command
DWSim/m346/aft/right_panel/ejectionsequence/lever_down_command	Eject Selection Lever Down
DWSim/m346/aft/right_panel/ejectionsequence/lever_up_command	Eject Selection Lever Up
DWSim/m346/aft/right_panel/ics/button_backup_command	AFT Cockpit ICS Backup Switch
DWSim/m346/aft/right_panel/ics/button_call_command	AFT Cockpit ICS Call Switch
DWSim/m346/aft/right_panel/ics/button_vox_down_command	AFT Cockpit ICS VOX Knob Left Click
DWSim/m346/aft/right_panel/ics/button_vox_up_command	AFT Cockpit ICS VOX Knob Right Click
DWSim/m346/aft/right_panel/ics/rotary_comm1_down_command	AFT Cockpit ICS Comm1 Knob Left Click
DWSim/m346/aft/right_panel/ics/rotary_comm1_up_command	AFT Cockpit ICS Comm1 Knob Right Click

COMMAND	FUNCTION
DWSim/m346/aft/right_panel/ics/rotary_comm2_down_command	AFT Cockpit ICS Comm2 Knob Left Click
DWSim/m346/aft/right_panel/ics/rotary_comm2_up_command	AFT Cockpit ICS Comm2 Knob Right Click
DWSim/m346/aft/right_panel/ics/rotary_comm_command_down	AFT Cockpit ICS Comm Knob Rotate Down
DWSim/m346/aft/right_panel/ics/rotary_comm_command_up	AFT Cockpit ICS Comm Knob Rotate Up
DWSim/m346/aft/right_panel/ics/rotary_ecm_down_command	AFT Cockpit ICS ECM Knob Left Click
DWSim/m346/aft/right_panel/ics/rotary_ecm_up_command	AFT Cockpit ICS ECM Knob Right Click
DWSim/m346/aft/right_panel/ics/rotary_ics_down_command	AFT Cockpit ICS ICS Knob Left Click
DWSim/m346/aft/right_panel/ics/rotary_ics_up_command	AFT Cockpit ICS ICS Knob Right Click
DWSim/m346/aft/right_panel/ics/rotary_missile_down_command	AFT Cockpit ICS Missile Knob Left Click
DWSim/m346/aft/right_panel/ics/rotary_missile_up_command	AFT Cockpit ICS Missile Knob Right Click
DWSim/m346/aft/right_panel/ics/rotary_mkr_down_command	AFT Cockpit ICS MKR Knob Left Click
DWSim/m346/aft/right_panel/ics/rotary_mkr_up_command	AFT Cockpit ICS MKR Knob Right Click
DWSim/m346/aft/right_panel/ics/rotary_rwr_down_command	AFT Cockpit ICS RWR Knob Left Click
DWSim/m346/aft/right_panel/ics/rotary_rwr_up_command	AFT Cockpit ICS RWR Knob Right Click
DWSim/m346/aft/right_panel/ics/rotary_tcndme_down_command	AFT Cockpit ICS TCN DME Knob Left Click
DWSim/m346/aft/right_panel/ics/rotary_tcndme_up_command	AFT Cockpit ICS TCN DME Knob Right Click
DWSim/m346/aft/right_panel/ics/rotary_vol_down_command	AFT Cockpit ICS Vol Knob Left Click
DWSim/m346/aft/right_panel/ics/rotary_vol_up_command	AFT Cockpit ICS Vol Knob Right Click
DWSim/m346/aft/right_panel/ics/rotary_vorloc_down_command	AFT Cockpit ICS VOR LOC Knob Left Click
DWSim/m346/aft/right_panel/ics/rotary_vorloc_up_command	AFT Cockpit ICS VOR LOC Knob Right Click
DWSim/m346/aft/right_panel/intrlt/button_warnbrt_command	AFT Cockpit INTR LT WARN BRT Click
DWSim/m346/aft/right_panel/intrlt/rotary_console_down_command	AFT Cockpit INTR LT CONSOLE Knob Down Click
DWSim/m346/aft/right_panel/intrlt/rotary_console_up_command	AFT Cockpit INTR LT CONSOLE Knob Up Click
DWSim/m346/aft/right_panel/intrlt/rotary_flood_down_command	AFT Cockpit INTR LT FLOOD Knob Down Click
DWSim/m346/aft/right_panel/intrlt/rotary_flood_up_command	AFT Cockpit INTR LT FLOOD Knob Up Click
DWSim/m346/aft/right_panel/intrlt/rotary_inst_down_command	AFT Cockpit INTR LT INTS Knob Down Click
DWSim/m346/aft/right_panel/intrlt/rotary_inst_up_command	AFT Cockpit INTR LT INTS Knob Up Click

Table 120

17.9 AIRCRAFT MENU AND GROUND EQUIPMENT

COMMAND	FUNCTION
DWSim/m346/crew/aft_pilot_toggle_command	Rear Pilot Show Hide
DWSim/m346/crew/fwd_pilot_toggle_command	Forward Pilot Show Hide
DWSim/m346/external/choks_toggle_command	Toggle The Choks On/Off
DWSim/m346/external/ladder_toggle_command	Toggle The Ladder On/Off
DWSim/m346/external/rbf_toggle_command	Toggle The RBFs On/Off
DWSim/m346/external/refuel_toggle_command	Toggle The Refuel Probe On/Off
DWSim/m346/menu/popUpPopOut	Pop Out All The Visible Pop Ups
DWSim/m346/menu/toggleCommNavEditorWindow	Toggle the Data Cartridge Editor window On/Off

Table 121

PAGE INTENTIONALLY LEFT BLANK

Thank you for your support and enjoy the Flight !



Aermacchi

M-346

