FLIGHT MANUAL

F-16 C&D

BLOCK 52+

MULTIROLE FIGHTER



Manual Version v1.7.0_0b - September 2026

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1. INTRODUCTION

Welcome to the DeltaWing Simulations (DWSim) F-16C and F-16D Block 52+ add-ons for X-Plane. We are proud to bring this amazing aircraft to X-Plane and our goal is to capture its beautiful lines, unique features, and sophisticated systems in order to give you some sense of what flying these magnificent aircraft is really like.

> **APPLIES TO:** this manual covers both the single seat F-16C and the two seat F-16D, Block 52+. Everything in it applies to both aircraft unless a section, a note or a table entry names one of them. Where the two differ the difference is stated where it matters, rather than in a separate manual.

The F-16, is one of the world's most popular fighter jets, in use by many of the world's air forces. Although its basic design dates from the 1970s, it is still in production today with new variants being developed.

After the initial "A" single seat model, the F-16 "C" model was put into production in 1984 and has been continuously improved since then. So called "block" numbers indicate updated versions of the aircraft as further variants of each model. This DWSim F-16 represents the "C" and "D" Block 52+ aircraft — the single seat C and the two seat D. The "Plus" designation indicates upgrades to the aircraft's weapons system, including the pilot's Helmet-Mounted Cueing System, which is modelled in the DWSim F-16.

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, while layering on top of that its famous fly-by-wire (FBW) system. 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.

Future versions of DWSim F-16s are planned with more advanced systems and different variants. Please check DWSim's sites, pages and channels for news regarding these developments.

The development team consists of:

Kostas D. Koronakis (Graphic Design, 3D modelling, Textures)
Andrzej Borysewicz (3D modeling, product testing)
Gary Hunter (Flight model, product tester)
Dimitris Koronakis (Programmer, product tester)

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

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2. GLOSSARY

A

AAM	Air-to-Air Missile (an SMS operating mode)
ACM	Air Combat Mode (the radar's dogfight acquisition modes)
ADI	Attitude Director Indicator
ALOW	Altitude Low (the CARA low-altitude warning setting)
ALT	Altitude (ALT BLK); Alternate (ALT GEAR handle)
AMRAAM	Advanced Medium-Range Air-to-Air Missile (AIM-120)
AOA	Angle of Attack
ARM	Master arm armed: weapons can be released
ASE	Allowable Steering Error (HUD air-to-air circle)
ATC	Air Traffic Control
ATT	Attitude (ATT/FPM; the INS knob's attitude-only position)

B

BARO	Barometric (altitude)
BIT	Built-In Test

C

CARA	Combined Altitude Radar Altimeter
CAT	Category (CAT I / CAT III stores configuration)
CCIP	Continuously Computed Impact Point
CCRP	Continuously Computed Release Point
CFT	Conformal Fuel Tank
CMDS	Countermeasures Dispensing Set (chaff and flares)
CNTL	Control (an MFD control page)
CPL	Coupled (HSD range follows the FCR range)
CRS	Course

D

DBU	Digital Backup (flight control mode)
DCLT	Declutter (FCR page)
DCPL	Decoupled (HSD range set on the HSD)
DCS	Data Control Switch (ICP: up / down, SEQ, RTN)
DED	Data Entry Display
DGFT	Dogfight (air-to-air master mode)
DMS	Display Management Switch
DTC	Data Transfer Cartridge (the tape)
DTE	Data Transfer Equipment

E

EEGS	Enhanced Envelope Gunsight
EGI	Embedded GPS / INS (the navigation system)
ELEV	Elevation
ENTR	Enter (ICP key)
EPU	Emergency Power Unit

F

FCR	Fire Control Radar
FLCS	Flight Control System
FPM	Flight Path Marker

G

G/S	Ground Speed
GPS	Global Positioning System

H

HMCS	Helmet Mounted Cueing System (the JHMCS DED pages)
HOTAS	Hands On Throttle And Stick
HSD	Horizontal Situation Display
HSI	Horizontal Situation Indicator
HUD	Head Up Display

I

ICP	Integrated Control Panel
IFF	Identification Friend or Foe
ILS	Instrument Landing System
INS	Inertial Navigation System
INV	Inventory (the stores page, from a weapons mode)

J

JHMCS	Joint Helmet Mounted Cueing System

K

KCAS	Knots Calibrated Airspeed
KIAS	Knots Indicated Airspeed

L

LAT	Latitude
LNG	Longitude

M

MAGV	Magnetic Variation
MFD	Multi Function Display
MPD	Mission Planning Data (a DTE file set)
MPO	Manual Pitch Override
MRGS	Multiple Reference Gunsight (the EEGS lines)
MSL	Missile (missile override mode); Mean Sea Level

N

NVG	Night Vision Goggles
NVIS	Night Vision Imaging System (NVG-compatible lighting)
NWS	Nose Wheel Steering

O

OBOGS	On-Board Oxygen Generating System
OFLY	Over Fly (a MARK mode)
OSB	Option Select Button

P

PROF	Profile (weapon delivery profile)

R

RBF	Remove Before Flight
RCL	Recall (ICP key)

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RDY	Ready
RPM	Revolutions Per Minute (engine) / Rounds Per Minute (gun)
RTN	Return (ICP switch)
RWR	Radar Warning Receiver

S

S-J	Selective Jettison
SALT	System Altitude
SEQ	Sequence (steering point sequencing)
SIM	Simulate: master arm training position, no release
SMS	Stores Management System
SOI	Sensor Of Interest
STBY	Standby
STPT	Steering Point

T

TACAN	Tactical Air Navigation
TGT	Target
THDG	True Heading
TMS	Target Management Switch
TOS	Time Over Steerpoint

U

UHF	Ultra High Frequency
UKN	Unknown (RWR contact that cannot be identified)

V

VHF	Very High Frequency
VOR	VHF Omnidirectional Range
VVI	Vertical Velocity Indicator

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3. COCKPIT LAYOUT

The single-seat cockpit, with every panel named. The names here are the ones the rest of this manual uses; each panel's section says what its controls do. Front panel first, then the left console from front to back, then the right console and the right auxiliary panel.

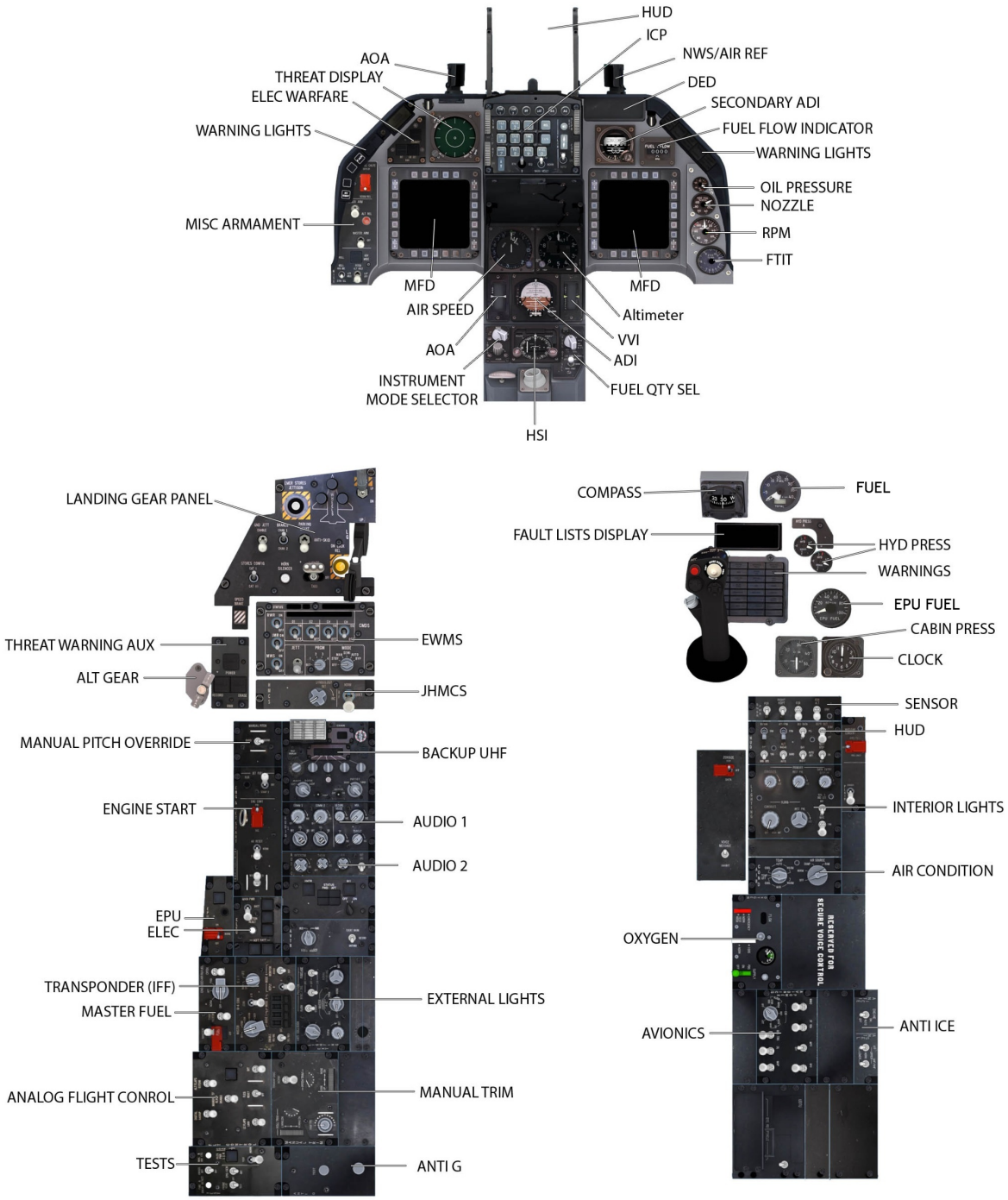


Figure 1 — Cockpit layout

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FRONT PANEL

HUD, ICP and DED: the head-up display and, below it, the Integrated Control Panel with the Data Entry Display to its right — the pilot's keyboard and its screen for radios, steerpoints, TACAN, ILS and the alignment (AVIONICS AND DISPLAYS). The HUD's own switches are on the right console (HUD CONTROL PANEL).

MFDs: the two multifunction displays either side of the centre, with their twenty option buttons (MFD). Between them the airspeed indicator, the ADI, the altimeter and the VVI; below the ADI the HSI, with the instrument mode selector to its left and the fuel quantity selector to its right.

Left of the left MFD: the AOA indicator, the threat display (RWR) with the electronic warfare panel beside it, the warning lights and the miscellaneous armament panel with the MASTER ARM and the autopilot switches.

Right of the right MFD: the standby ADI, the fuel flow indicator, the warning lights, and the engine column — oil pressure, nozzle position, RPM and FTIT.

On the glareshield: the AOA and approach indexers either side of the HUD (INDEXERS), the NWS / AIR REF lamp and the warning lights.

LEFT CONSOLE

Forward: the landing gear panel with the gear handle, the emergency stores jettison button and the ALT GEAR handle; the EWMS (chaff / flare) panel; the JHMCS panel with the helmet brightness; the threat warning auxiliary panel with the RWR POWER button.

Middle: manual pitch override, the engine start panel, the backup UHF radio, the two audio panels, the EPU and ELEC panels, the transponder (IFF), master fuel and the external lights panel.

Aft: the analog flight control panel, the manual trim panel, the tests panel and the anti-G connection.

RIGHT CONSOLE

Forward: the sensor power panel and the HUD control panel, the interior lights panel, the air conditioning panel.

Aft: the oxygen panel, the avionics power panel (with the EGI knob), the anti-ice panel and the space reserved for secure voice.

RIGHT AUXILIARY PANEL

The standby compass, the fuel quantity indicator, the fault list display, the two hydraulic pressure gauges and the warnings panel, the EPU fuel gauge, the cabin pressure gauge and the clock.

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3.1 PARTIALLY SIMULATED PANELS

Not every control in the cockpit is modelled to the same depth. The plate below marks in red the panels that are PARTIALLY simulated: the panel is there, its switches move and some of them work, but at least one function printed on it does nothing. Everything not marked is either fully modelled or a plain fitting with no function to model.

What partial means, panel by panel, is stated in each system's own section: a function that is not implemented is called NOT MODELLED there, in so many words, rather than left for the reader to discover. The general rule is that a switch always moves and always animates; whether anything happens behind it is what the section tells you.

> **NOTE:** This plate is the original 2023 artwork and marks the state of the aircraft at that time. Several of the panels it shades have since been completed — the HUD control panel, the JHMCS panel and the RWR are examples — so where the plate and a system section disagree, the section is right.

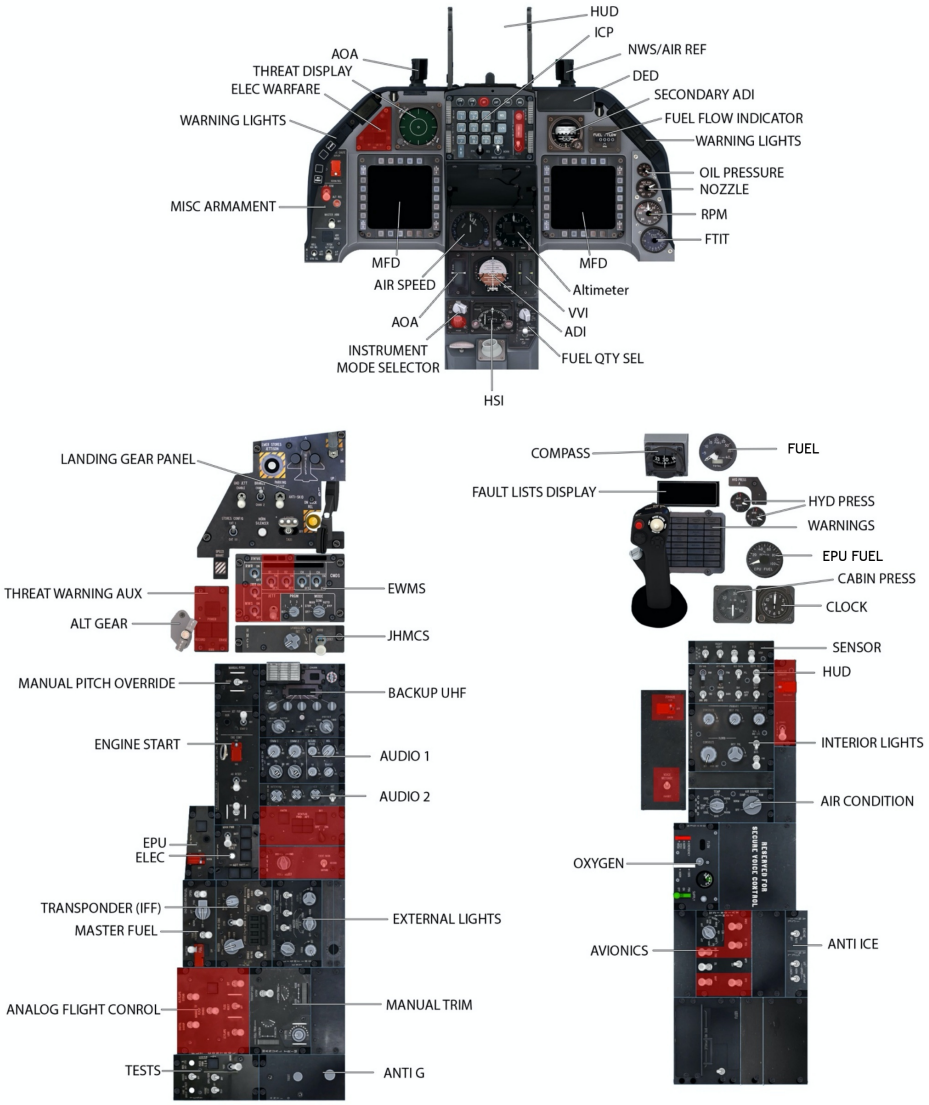


Figure 2 — Partially simulated panels

3.2 BACK SEAT COCKPIT — F-16D

APPLIES TO: F-16D only. The F-16C is single seat and has no rear cockpit.

The back seat carries almost the same configuration as the front, with fewer controls on the left and right consoles.

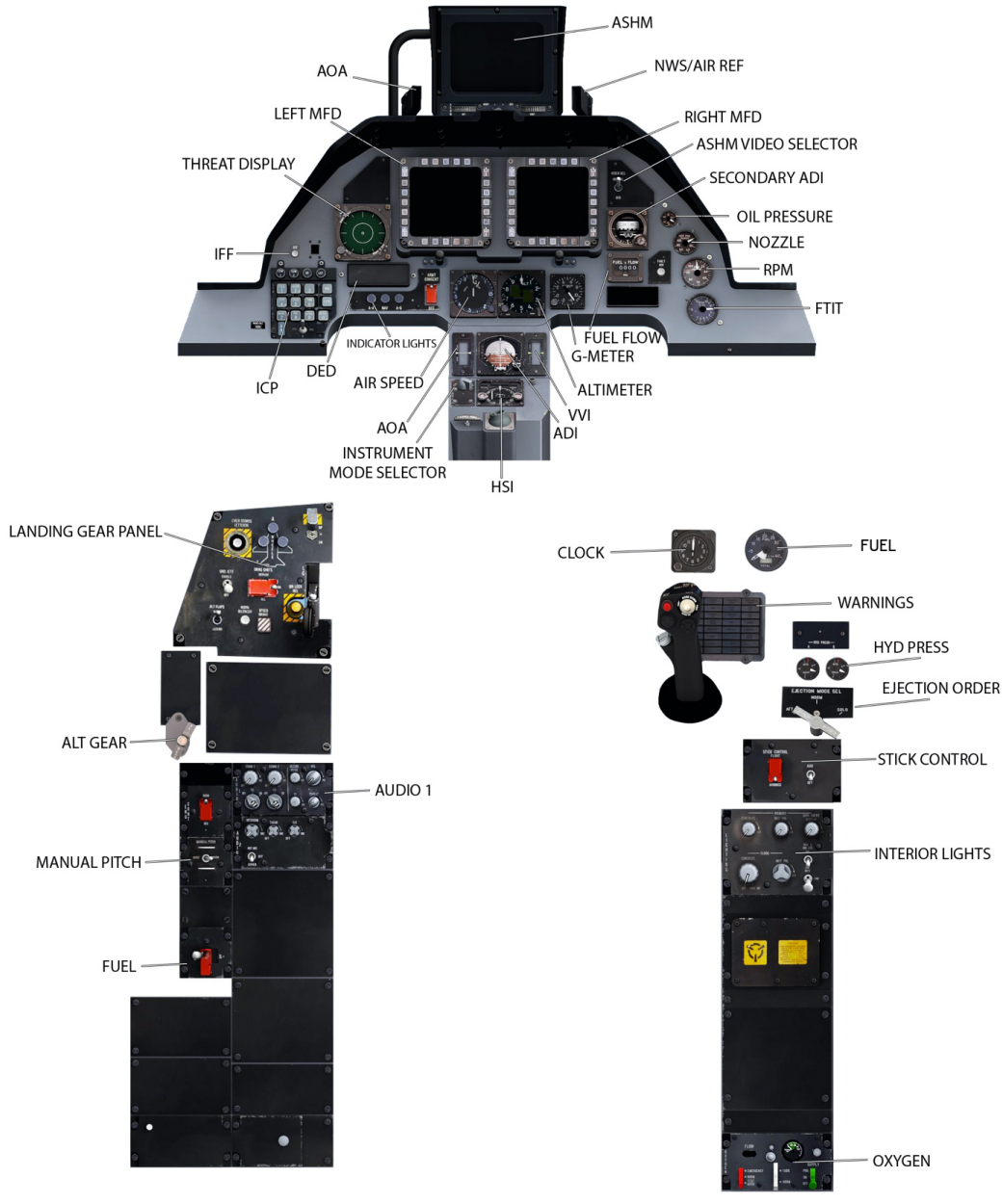


Figure 3 — F-16D back seat cockpit layout

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On the left rear console are the audio volumes for the communications and navigation aids, together with the manual pitch override and the master fuel switch. Those are connected to the front seat controls.

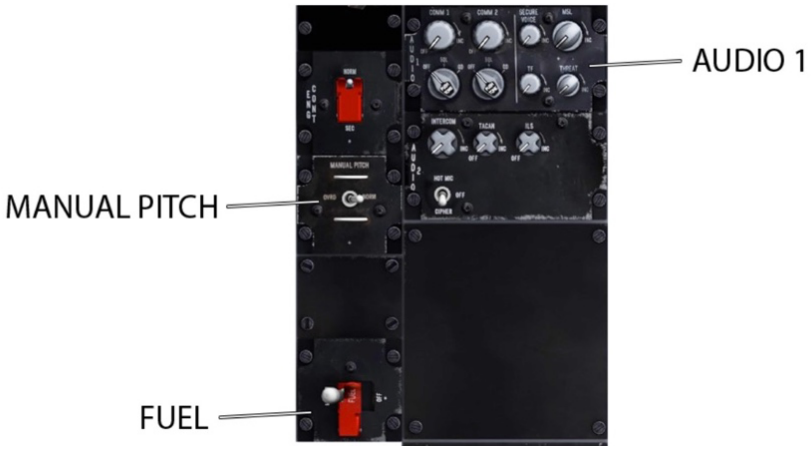


Figure 4 — F-16D back seat, left rear console

On the left forward console are the following:

1. Landing gear lights
2. Hook switch
3. Drag chute switch (when a tail with a chute is fitted)
4. Landing gear lever
5. Speed brake deploy indicator
6. Horn silencer
7. Alternate gear lever
8. Alternate flaps switch
9. Ground jettison
10. Emergency jettison

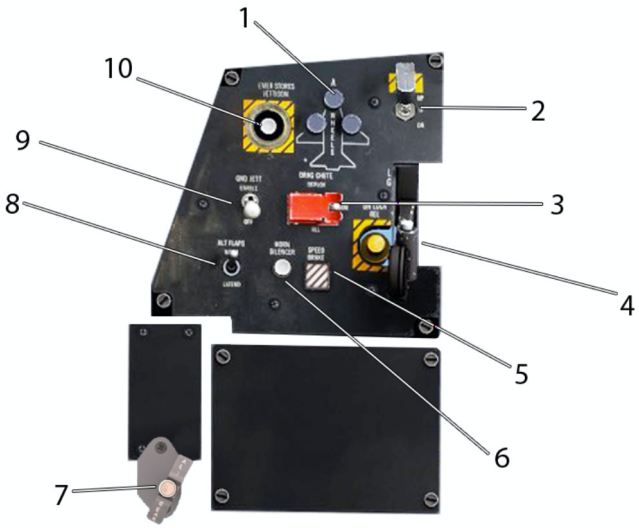


Figure 5 — F-16D back seat, left forward console

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On the right rear console are the interior lighting controls for the back seat instruments and the oxygen control for the back seat pilot. The lighting controls work as described under INTERNAL LIGHTS in the AIRCRAFT SYSTEMS chapter, and are independent of the front seat.



Figure 6 — F-16D back seat, right rear console

On the right forward console are the following:

1. Clock
2. Fuel indicator
3. Fault indicators
4. Hydraulic pressure
5. Ejection sequence selector



Figure 7 — F-16D back seat, right forward console

NOTE: The rear cockpit repeats the front seat displays. The rear MFDs follow the front ones, and the rear ICP writes to the same DED.

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4. AVIONICS AND DISPLAYS

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4.1 DED

DED MAIN SCREEN

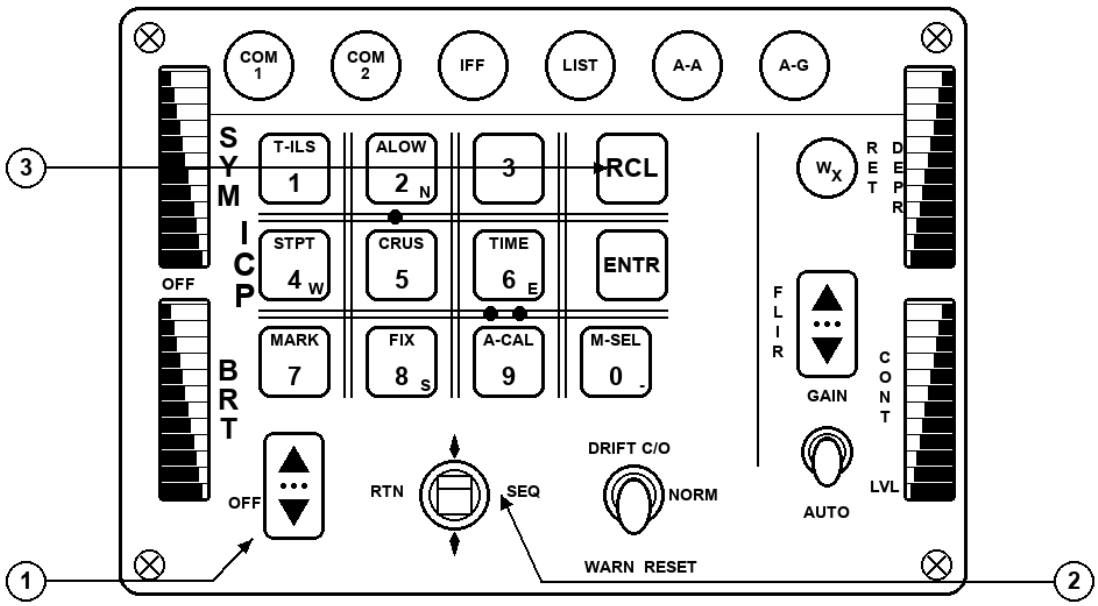


Figure 8 — INTEGRATED CONTROL PANEL (ICP)

1	DED increment rocker — scrolls the selection marked by the double arrows on the DED
2	Data Control Switch (DCS) — up, down, SEQ and RTN
3	RCL key — resets the current field

Table 1 — INTEGRATED CONTROL PANEL (ICP) callouts

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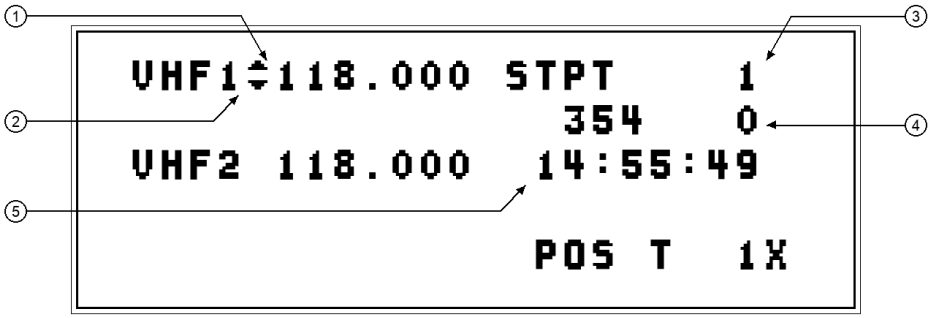


Figure 9 — DED MAIN SCREEN

1	VHF1 frequency
2	Double arrows — the marked selection can be scrolled with the increment rocker on the ICP
3	STPT — the steering point currently selected
4	Bearing and distance to the selected steering point
5	Current time

Table 2 — DED MAIN SCREEN callouts

On the main DED screen you can use the ICP Data Control Switch (2) up/down in order to navigate between “VHF1”, “VHF2” and “STPT”.
To change the preset number of the frequency shown at (1) on the DED, use the increment rocker (1) on the ICP.
Active frequency is the frequency that has the double arrow symbol (2).
Also when navigated into “STPT” position, active frequency remains the previous position of the arrows indicator (2).
By using the ICP Data Control Switch (2) on “RTN” you always return to the DED main screen.
By using ICP button (3) “RCL” you reset the current field.

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4.1.1 VHF COMMUNICATIONS FREQUENCY SETUP

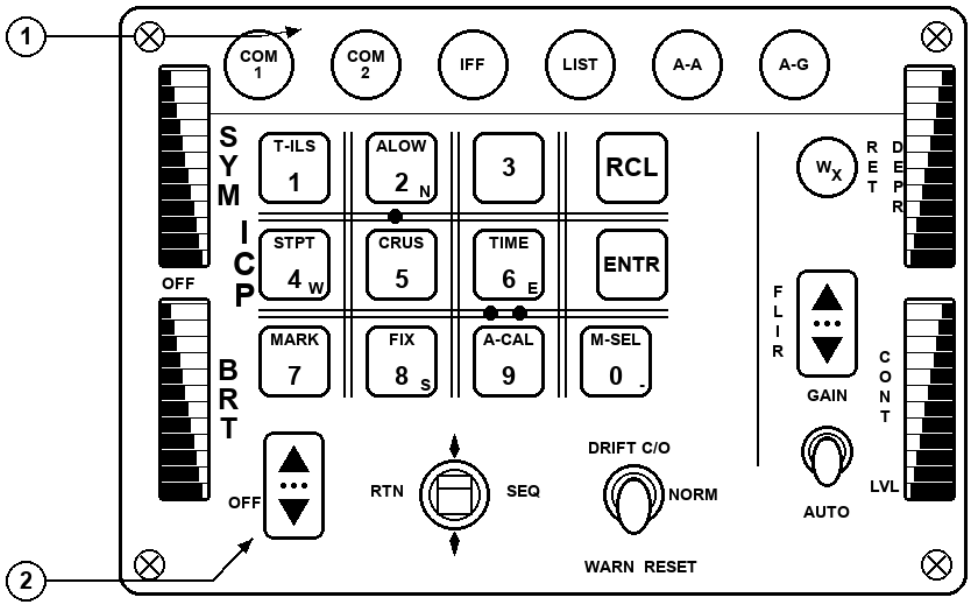


Figure 10 — INTEGRATED CONTROL PANEL (ICP)

1	COM 1 and COM 2 keys — select the radio to tune
2	DED increment rocker — steps through channels 1 to 99

Table 3 — INTEGRATED CONTROL PANEL (ICP) callouts

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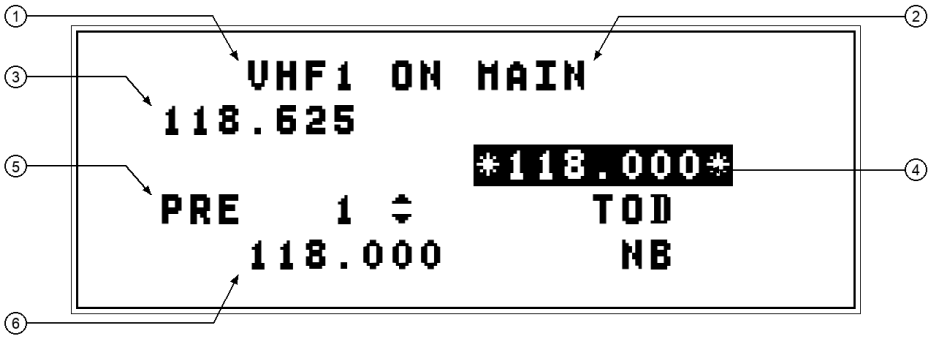


Figure 11 — VHF COMMUNICATIONS FREQUENCY SETUP

1	VHF1 ON — shows whether this COM radio is active
2	MAIN — shows whether the main or the backup radio is in use
3	The frequency currently tuned
4	Input field — enter a preset number from 1 to 99 to select it, or enter a frequency to overwrite the one currently selected
5	PRE — the preset currently selected. The double arrows mean it can be changed with the DED increment rocker
6	The frequency assigned to the selected preset

Table 4 — VHF COMMUNICATIONS FREQUENCY SETUP callouts

To set VHF frequency :

1. Press “COM 1” (1) for comm radio 1 or “COM 2” (1) for comm radio 2 on ICP and on DED screen, using keypad, then enter the frequency.
2. Press “ENTER” on ICP to store the typed frequency on selected channel preset.
3. To navigate between 1..99 frequency channels use the up and down arrows on ICP (2)
4. The double arrow symbol indicates which frequency is currently active

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4.1.2 BACKUP VHF COMMUNICATIONS

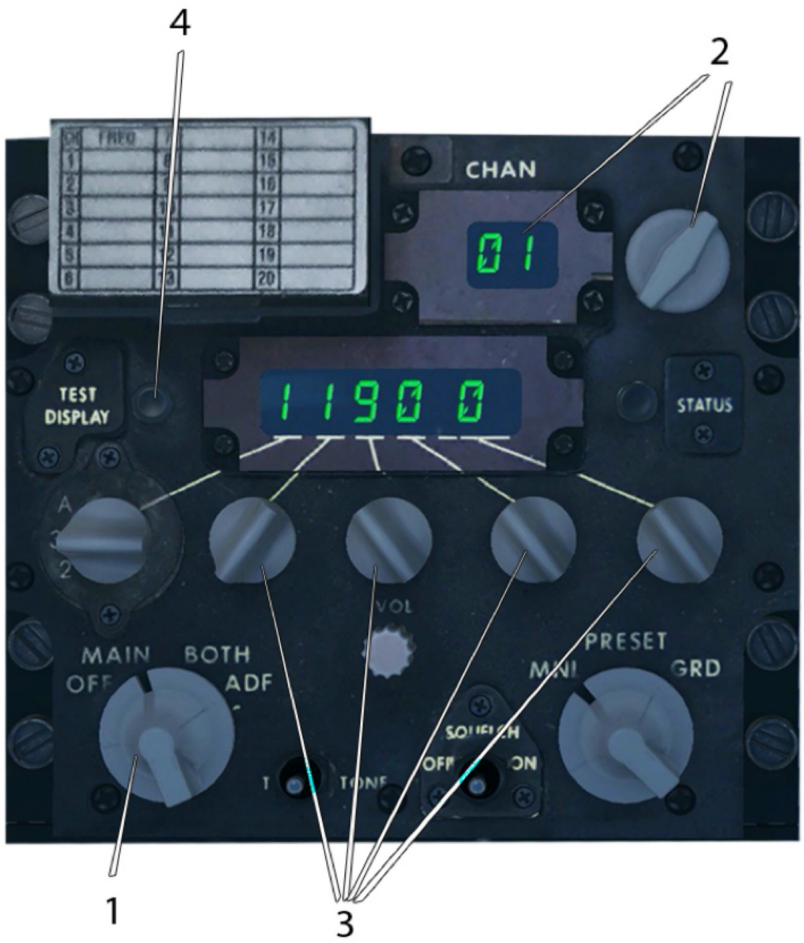


Figure 12 — Backup VHF control panel

Normally, communications frequencies are entered through the ICP, in DED.

In case of ICP or DED failure, the pilot has the option to switch to backup VHF communications.

WARNING: When operating and selecting a frequency in backup VHF system, it automatically overrides the ICP - DED entered frequency.

1. Turn to “MAIN” position in order to switch the VHF Backup System ON.
2. Use channel select switch in order to choose a preset frequency.
3. Use 4 switches to enter desired frequency.
4. Press “TEST DISPLAY” button to check LCD lights in panel.

Please note that when you enter a new frequency in a preselected channel, it is automatically stored in the channel and can be used in the future by just selecting the specific channel.

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4.1.3 BINGO FUEL SETUP

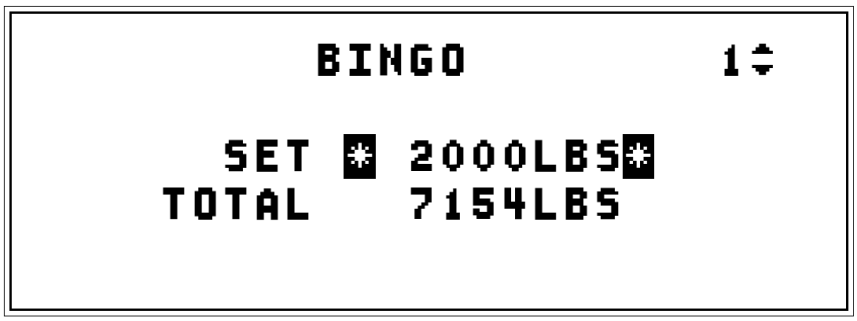


Figure 13 — BINGO FUEL SETUP

To set the BINGO FUEL ALERT (“Bingo Fuel”, is the minimum quantity of fuel required for an aircraft to make it to its planned airfield).
1. Press “LIST” on the ICP
2. Press “2” in the keypad. Then by using keypad you type the fuel quantity you wish the alarm to sound.
3. Press “ENTER” on the ICP.
To cancel the operation at any moment, press the “RTN” switch on ICP

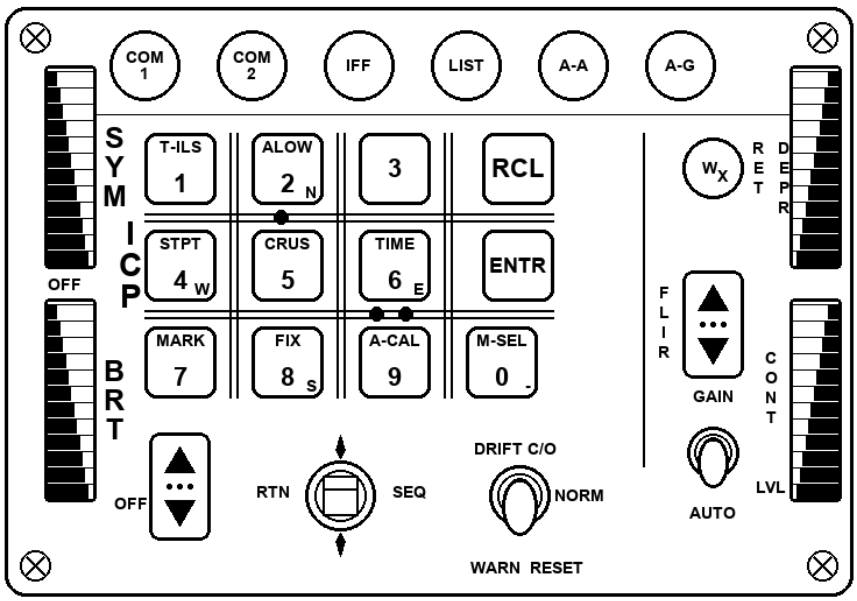


Figure 14 — INTEGRATED CONTROL PANEL (ICP)

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4.1.4 ALTITUDE ALERT SETUP

The ALOW page sets the CARA ALOW: the radar altitude below which the aircraft warns you. The value shows on the HUD as the AL line under the radar altimeter box (HUD IN NAV MODE), and descending through it with the gear up raises the altitude warning. It needs the radar altimeter on (HUD CONTROL PANEL).

To set it: from the DED main page press 2 on the ICP keypad to open the ALOW page. The asterisks sit on the MSL FLOOR row; type the altitude in feet and press ENTR (1) on the ICP. RTN cancels at any point.

CARA ALOW (1): the heading of the page. On this aircraft the value lives on the row below it.

MSL FLOOR (2): the altitude entered, in feet: the floor the warning is set to.

TF ADV (MSL) (3): the terrain-following advisory altitude. Not modelled; the row is display only.

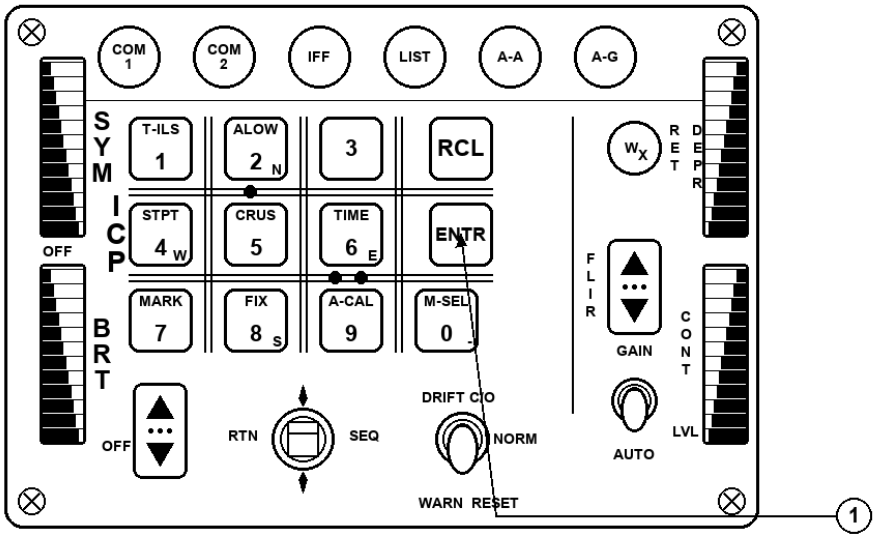


Figure 15 — INTEGRATED CONTROL PANEL (ICP)

1	ENTR key — stores the entered altitude

Table 5 — INTEGRATED CONTROL PANEL (ICP) callouts



Figure 16 — ALOW - ALTITUDE WARNINGS

1	CARA ALOW — the radar altimeter low altitude warning
2	MSL FLOOR — the altitude entered, in feet
3	TF ADV (MSL) — terrain following advisory (not modelled)

Table 6 — ALOW - ALTITUDE WARNINGS callouts

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4.1.5 STEERING POINT

Steering points (STPT) are called the fixed positions (in degrees, minutes) that can be used for manual navigation or autopilot navigation.

In order to enter or change the position of each steering point, you must follow the steps below:

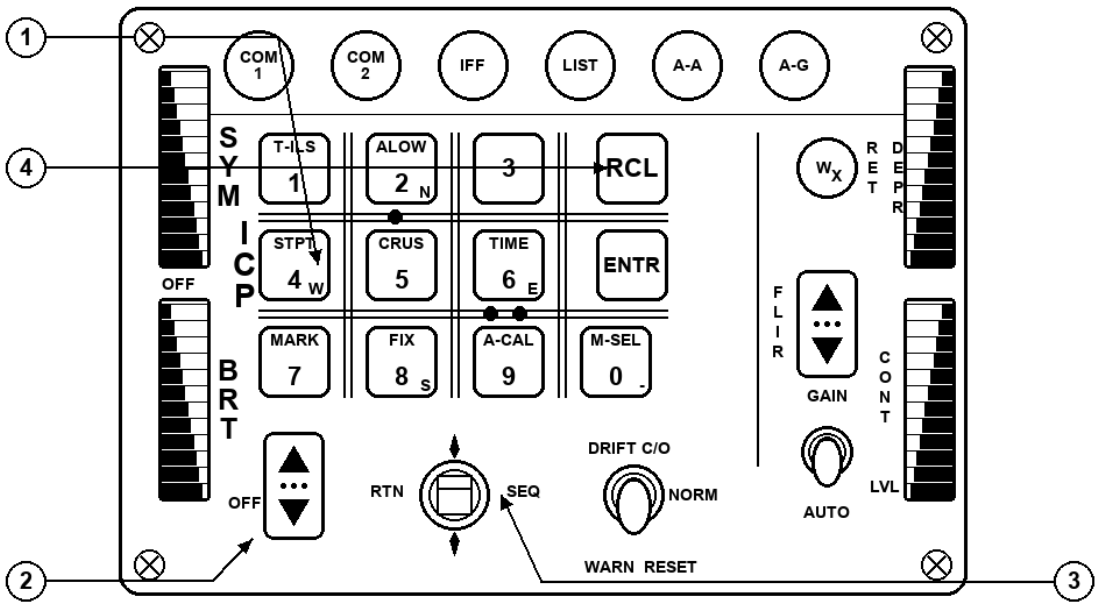


Figure 17 — INTEGRATED CONTROL PANEL (ICP)

1	STPT key (ICP key 4) — opens the steering point page
2	DED increment rocker — steps the steering point number
3	Data Control Switch (DCS) — SEQ selects MAN or AUTO; up and down move between LAT, LNG and ELEV
4	RCL key — corrects a mistake in a line

Table 7 — INTEGRATED CONTROL PANEL (ICP) callouts

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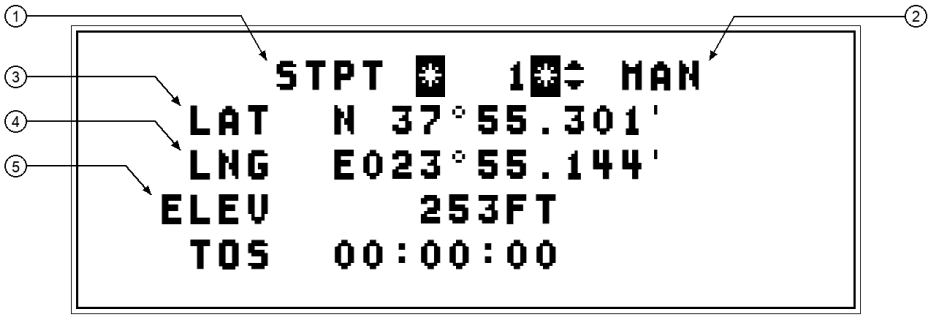


Figure 18 — STEERING POINT

1	STPT page heading and its scroll arrows
2	MAN / AUTO — whether the steering point increments manually or automatically
3	LAT — the latitude indication and input field of the steering point
4	LNG — the longitude indication and input field
5	ELEV — the elevation indication and input field

Table 8 — STEERING POINT callouts

1. If not already in the “DED” main screen menu, press the Data Control Switch (3) on “RTN”.
2. Press “4” ICP key (1) to enter “DED” steering point menu.
3. Choose the number of steering point you want to add/change either by using switch (2) or by typing the number and pressing "ENTR”.
4. You can choose between MAN/AUTO by pressing switch (3) on “SEQ”. On “MAN” mode, steering points have to be selected manually and on “AUTO” mode they are changed automatically.
5. Using ICP switch (3) up/down, you can navigate between LAT/LNG/ELEV fields.
6. On “LAT” selected, you must press first on ICP the corresponding key for “N”, “S”, then you enter degrees (2 digits), minutes (5 digits) and you press “ENTR”.
7. On “LNG” selected, you must press first on ICP the corresponding key for “E”, “W”, then you enter degrees (3 digits), minutes (5 digits) and you press “ENTR”.
8. On “ELEV” selected, you enter the elevation and you press “ENTR”.

You can use ICP key (4) in order to correct a mistake in a line.

NOTE: To enter a steerpoint as coordinates or from a navaid, use the kneepad's COORDINATES app (COORDINATES); to load a whole flight plan, its FLIGHT PLAN app (FLIGHT PLAN).

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4.1.6 TIME PAGE

The TIME page is the clock. From the DED main page press the TIME key (6) on the ICP to open it; RTN returns to the main page.

SYSTEM: the system time, hours, minutes and seconds, from the simulator's Zulu clock.

HACK: the stopwatch. Not modelled; the field reads 00:00:00.

DELTA TOS: the correction applied to the time over steerpoint. Not modelled; the field reads -00:00:00.

MM/DD/YY: today's date. The month and day come from the simulator; the year from the computer's clock, since X-Plane keeps no year of its own.

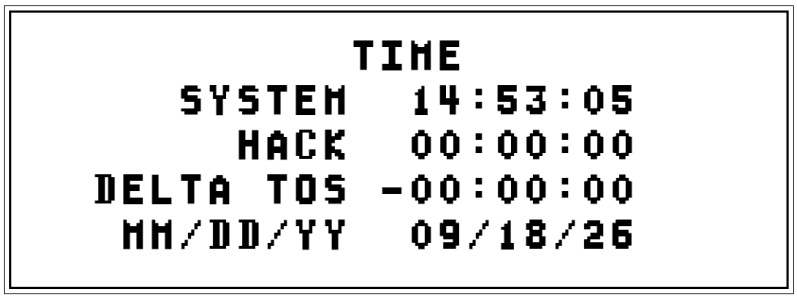


Figure 19 — TIME PAGE

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4.1.7 MARK PAGE

From this DED MODE you can mark a location's coordinates.

1. If not on main DED screen, press the RTN.
2. Press the MARK button of ICP to move in the MARK screen.

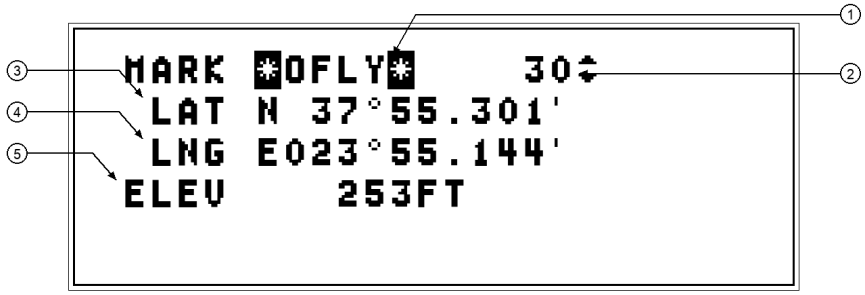


Figure 20 — MARK SCREEN

1	The MARK mode currently selected — OFLY, FCR or HUD
2	MARK — the mark number
3	LAT — the latitude indication of the captured mark
4	LNG — the longitude indication of the captured mark
5	ELEV — the elevation indication of the captured mark

Table 9 — MARK SCREEN callouts

It works in 3 modes :

a.OFLY (over fly). Marks the coordinates of your jet's current location.

b.FCR (uses FCR cursor). You can use the FCR cursor, move it into a desired spot and you can mark this spot.

c.HUD (uses jet's HUD projection position). Marks up to 40nm ahead of your jet's flightpath.

3. Use ICP button 1 to change between the 3 modes of MARK.
4. Press "Stick TMS Switch Forward" to complete the MARK.

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To program the “Stick TMS Switch Forward” key in your keyboard or joystick, you must go into XP settings, keyboard, type “tms” on search and assign the key you prefer.

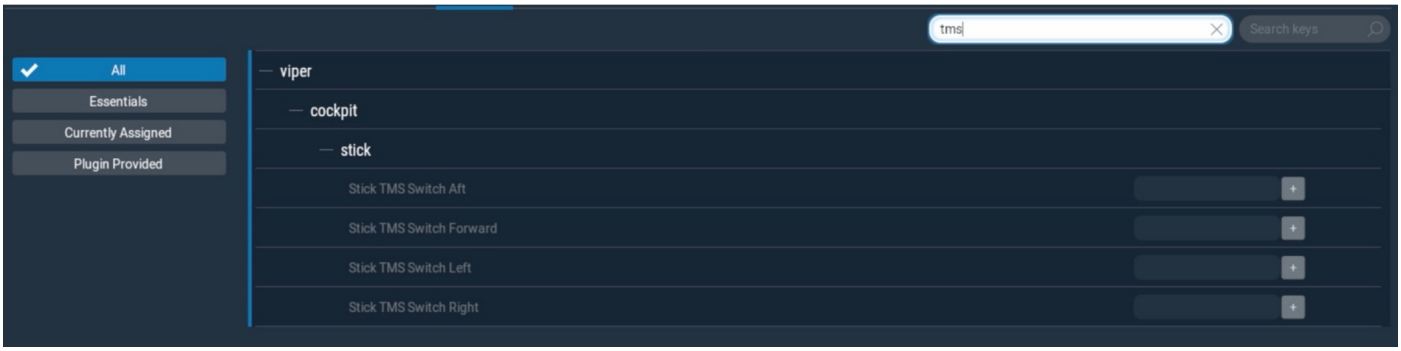


Figure 21 — Assigning the TMS switch in X-Plane settings

5. Press the RTN again to return to main DED screen.

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4.1.8 FIX PAGE

The FIX page takes a position fix to correct the navigation system. Press FIX (key 8) on the ICP from the DED main screen.

The page shows the fix source alongside the FIX legend, the steering point the fix is taken against, DELTA — the distance between the aircraft's computed position and the fix — and the current SYS ACCUR and GPS ACCUR states.

The fix source is selected with ICP key 1 and offers the same three modes as the MARK page: OFLY (over fly), FCR (using the radar cursor) and HUD.

NOTE: The FIX page cannot be entered while the EGI is aligning.

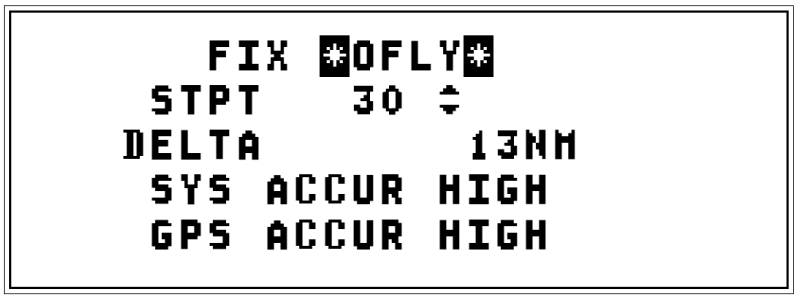


Figure 22 — FIX - POSITION FIX

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4.1.9 T/ILS PAGE

The T/ILS page tunes the TACAN and the ILS. Press T-ILS (key 1) on the ICP.

The top line shows the TACAN mode and the ILS state. CHAN and BAND carry the TACAN channel and its band, FRQ the ILS frequency, CRS the selected course, and CMD STRG the command steering state.

A reverse video pair of asterisks marks the field the keypad will write to. Move between fields with the ICP up/down switch, type the value on the keypad and press ENTR. RTN leaves the page.

NOTE: Only one field is marked at a time. The asterisks show where keypad entry will go, so check them before typing.

For the procedure that uses this page in flight, see VOR/TACAN NAVIGATION AND ILS LANDINGS in the AIRCRAFT SYSTEMS chapter.

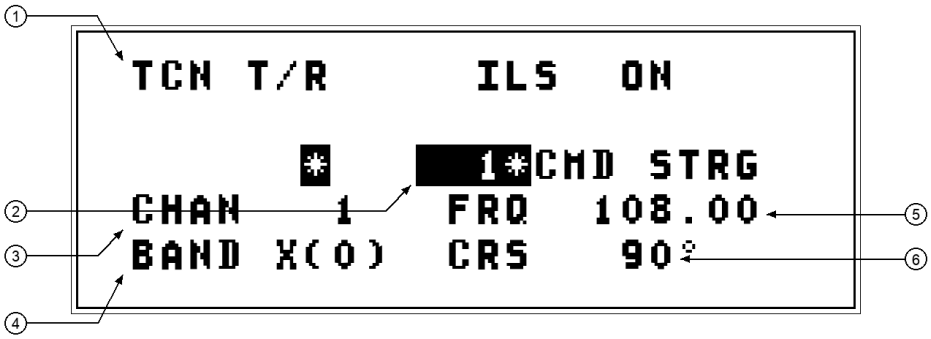


Figure 23 — T/ILS - TACAN AND ILS

1	TCN T/R — the current TACAN mode. T transmit, R receive
2	Input field — the default input position. The system works out whether the entry is a TACAN channel, a TACAN band or an ILS frequency
3	CHAN — the current TACAN channel
4	BAND — the current TACAN band, X or Y. Change it with 0 on the keypad
5	FRQ — the ILS frequency
6	CRS — the course for the ILS

Table 10 — T/ILS - TACAN AND ILS callouts

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4.1.10 LIST PAGE

The LIST page is the DED's index of sub-pages. Press LIST on the ICP to reach it, and RTN to leave.

The page offers twelve entries: 1 DEST, 2 BNGO, 3 VIP and R INTG on the first row; 4 NAV, 5 MAN, 6 INS and E DLNK on the second; 7 CMDS, 8 MODE, 9 VRP and 0 MISC on the third. Press the matching ICP key.

Seven entries are implemented on this aircraft: 1 DEST DIR, 2 BINGO FUEL SETUP, 4 NAV STATUS, 5 MAN, 6 INS, 7 CMDS BINGO and 0 MISC; each has its own page in this chapter. The other five are shown at reduced brightness and have no effect.

The LIST page is available only with battery power on and the backup VHF system OFF.

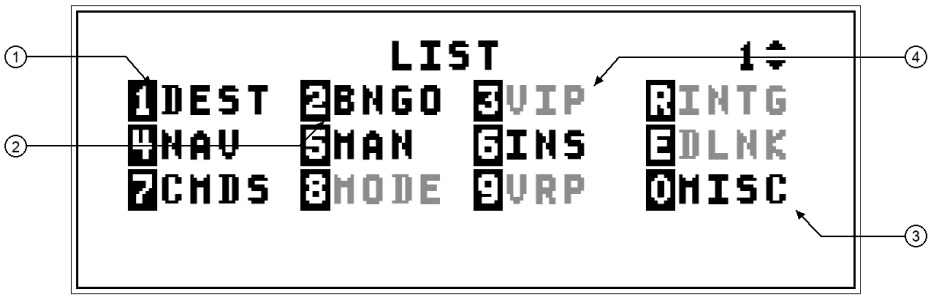


Figure 24 — DED LIST PAGE

1	DEST — press 1 on the ICP keypad to open the DEST DIR page
2	BNGO — press 2 on the ICP keypad to open the BINGO page
3	MISC — press 0 on the ICP keypad to open the MISC list page
4	Entries shown at reduced brightness are not implemented

Table 11 — DED LIST PAGE callouts

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4.1.11 NAV STATUS AND NAV COMMANDS

From the LIST page press 4 to reach NAV STATUS.

NAV STATUS reports the navigation solution: SYS ACCUR and GPS ACCUR give the system and GPS accuracy states, MSN DUR the mission duration, and KEY VALID the crypto key state.

Moving the ICP Data Control Switch (DCS) to SEQ moves to the second page, NAV COMMANDS, and moving it to SEQ again returns to NAV STATUS.

NAV COMMANDS offers FILTER MODE, together with RESET GPS and ZEROIZE GPS.

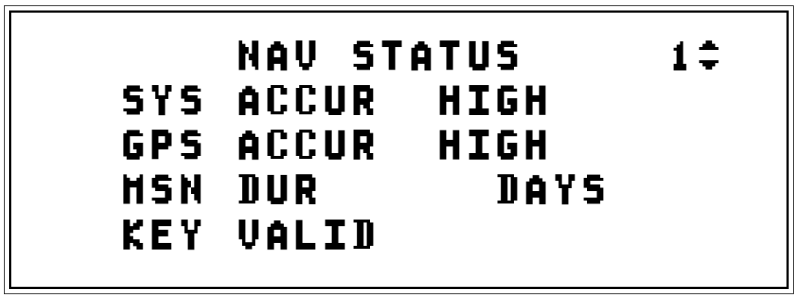


Figure 25 — NAV STATUS



Figure 26 — NAV COMMANDS

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4.1.12 MISC PAGE

From the LIST page press 0 to reach the MISC page, which collects the avionics functions that do not belong to a page of their own.

Twelve entries are listed, four to a row, each against its ICP key. Four are implemented: 2 MAGV, 6 GPS, 8 BULL and R HMCS (press RCL); each has its own page in this chapter.

NOTE: An entry drawn at reduced brightness is unavailable — the function is not implemented on this aircraft.

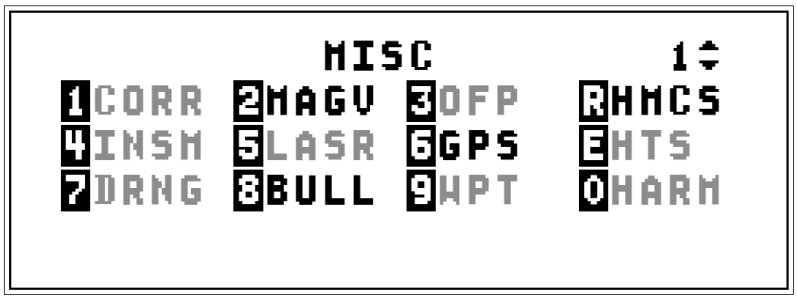


Figure 27 — MISC - MISCELLANEOUS

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4.1.13 EGI PAGE

The EGI page appears automatically while the navigation system is aligning, and replaces the normal DED display until alignment ends.

The top line shows the elapsed alignment time and the accuracy figure, which counts up as the alignment improves, together with the readiness state. LAT and LNG hold the present position, which the pilot enters from the ICP. SALT is the system altitude, THDG the true heading and G/S the ground speed, all computed by the aircraft.

NOTE: While the EGI is aligning the DED will not accept the FIX page or the other navigation pages.

For the alignment procedure itself, see EGI ALIGN in the NORMAL PROCEDURES chapter.

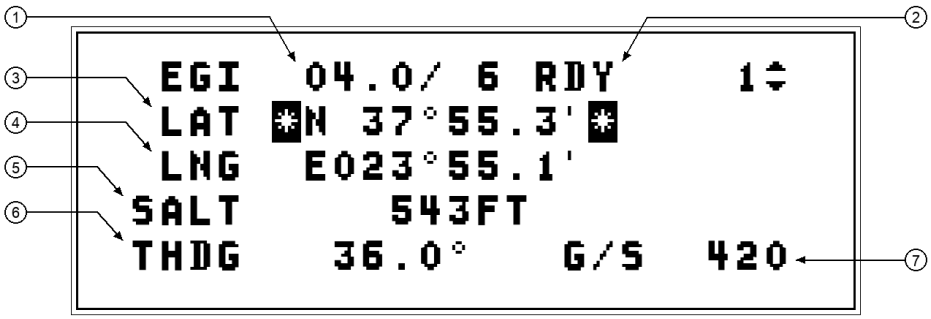


Figure 28 — EGI ALIGNMENT

1	Elapsed alignment time and the accuracy figure, which counts up as the alignment improves
2	RDY — the readiness state
3	LAT — present position latitude, entered by the pilot from the ICP
4	LNG — present position longitude, entered by the pilot from the ICP
5	SALT — system altitude, computed by the aircraft
6	THDG — true heading, computed by the aircraft
7	G/S — ground speed, computed by the aircraft

Table 12 — EGI ALIGNMENT callouts

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4.1.14 HMCS DISPLAY AND HMCS ALIGN

From the DED MISC page press RCL to reach HMCS DISPLAY, which sets the helmet system's blanking, declutter and RWR display options. SEQ moves to HMCS ALIGN, which performs the alignment a cold start needs before the helmet will show the steerpoint diamond or a locked target.

For what each field means and the symbology they control, see JHMCS — HELMET-MOUNTED CUEING SYSTEM in this chapter.

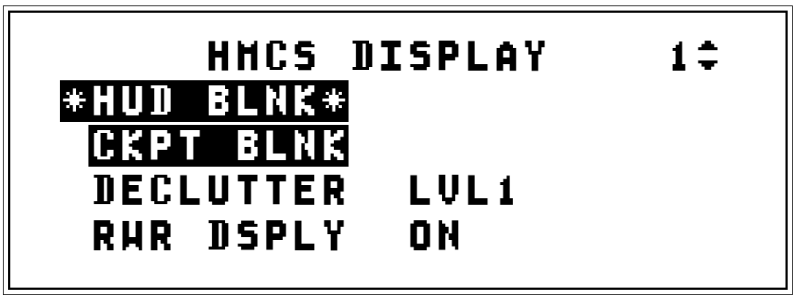


Figure 29 — HMCS DISPLAY

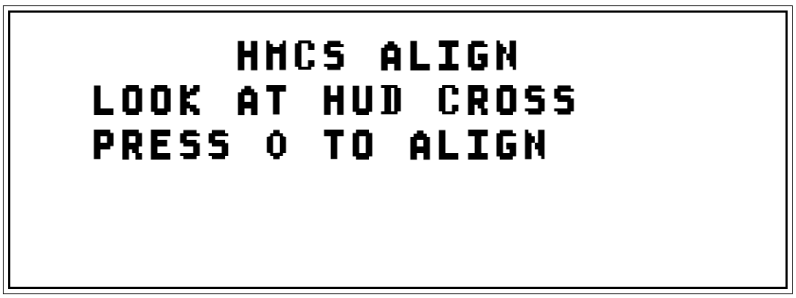


Figure 30 — HMCS ALIGN

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4.1.15 DEST DIR PAGE

From the LIST page press 1. The page shows the current steerpoint — its number in the asterisks on the top line, then LAT, LNG, ELEV and TOS exactly as the STEERING POINT page shows them. Type a steerpoint number (1 to 99) and press ENTR: that point becomes the current steerpoint and the steering goes direct to it, the same as stepping to it with INC/DEC. A number that holds no stored point is ignored.

A pair of reverse-video asterisks marks the field the keypad writes to; the DCS rocker moves them to the next field, digits build the entry in place, ENTR accepts it and RCL throws it away. RTN leaves the page.

NOTE: TOS, the time over steerpoint, is not modelled and reads 00:00:00, as on the STEERING POINT page.

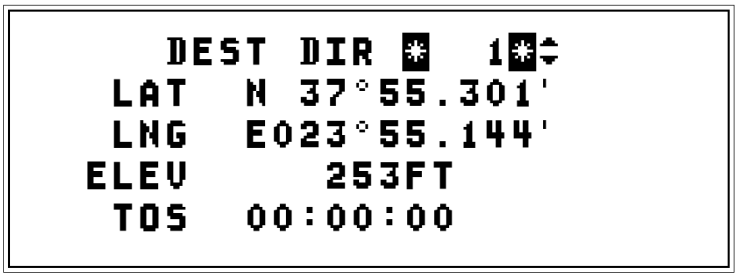


Figure 31 — DEST DIR

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4.1.16 MAN PAGE

From the LIST page press 5. The page holds one value, WSPAN: the wingspan, in feet, that the gun sight assumes for the target. It sets the width of the EEGS funnel — the funnel is as wide as this span would appear at each range — so a wingspan matched to the target makes the funnel a range gauge (see HUD IN EEGS MODE). The aircraft starts at 35 ft; type a value of 1 to 999 and press ENTR.

A pair of reverse-video asterisks marks the field the keypad writes to; the DCS rocker moves them to the next field, digits build the entry in place, ENTR accepts it and RCL throws it away. RTN leaves the page.

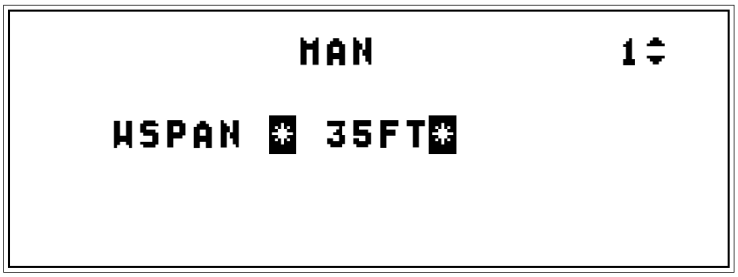


Figure 32 — MAN - TARGET WINGSPAN

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4.1.17 INS PAGE

From the LIST page press 6. The page is the EGI page's layout outside an alignment (while one runs the EGI page takes the display instead — see EGI PAGE): the elapsed time and the accuracy figure, 6 once aligned and 99 before, then the INS knob position — OFF, NAV or ATT — where the EGI page prints RDY; LAT and LNG the present position; SALT the system altitude, THDG the true heading and G/S the ground speed. Every field is display only; RTN leaves the page.

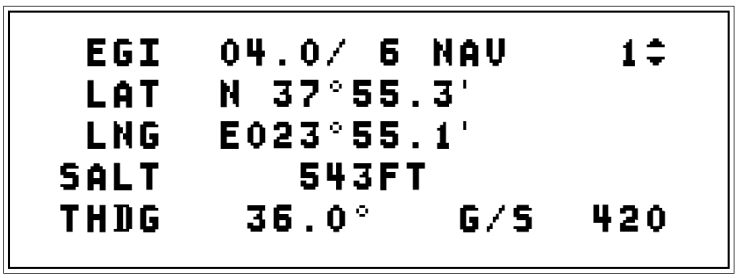


Figure 33 — INS

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4.1.18 CMDS BINGO PAGE

From the LIST page press 7. Four fields, in DCS rocker order: CH and FL, the chaff and flare counts at which the countermeasures system would call bingo (two digits and ENTR each, 10 to start with); FDBK and REQCTR, ON or OFF, toggled with keypad 0 (M-SEL) while the asterisks are on them.

A pair of reverse-video asterisks marks the field the keypad writes to; the DCS rocker moves them to the next field, digits build the entry in place, ENTR accepts it and RCL throws it away. RTN leaves the page.

> **NOTE:** The page stores its settings but the countermeasures system does not act on them — no bingo warning is raised and the feedback and request-counter switches change nothing. The chaff and flare program pages (SEQ on the real aircraft) are not modelled.

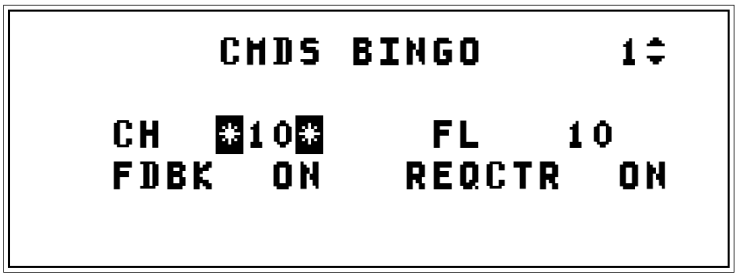


Figure 34 — CMDS BINGO

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4.1.19 MAGV PAGE

From the MISC page press 2. The first field reads AUTO or MAN and toggles with keypad 0 (M-SEL): in AUTO the magnetic variation shown is the simulator's own at the aircraft's position; MAN keeps a value of your own, and starts from the automatic one so nothing changes until you enter a number. To enter one, move the asterisks to the MAGV row with the DCS rocker, press 6 for east or 4 for west (the keypad's E and W), then the variation without its decimal point — 6, 4, 2 is E 4.2 degrees — and ENTR.

A pair of reverse-video asterisks marks the field the keypad writes to; the DCS rocker moves them to the next field, digits build the entry in place, ENTR accepts it and RCL throws it away. RTN leaves the page.

> **NOTE:** The MAN value is stored and displayed but not used: the aircraft's headings and bearings keep the simulator's variation whichever mode is selected.

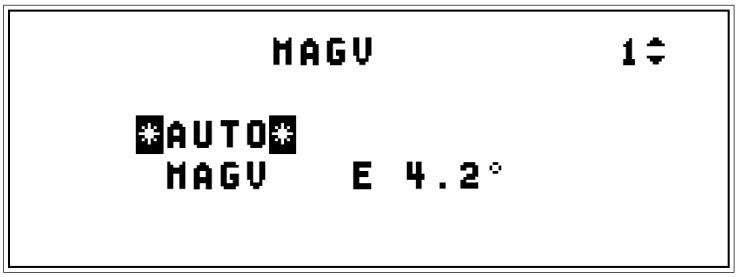


Figure 35 — MAGV - MAGNETIC VARIATION

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4.1.20 GPS PAGE

From the MISC page press 6. The page repeats the GPS words of NAV STATUS: SYS ACCUR and GPS ACCUR, both HIGH, and KEY VALID. This aircraft has no GPS degradation model, so the words never change; the page is display only. RTN leaves the page.

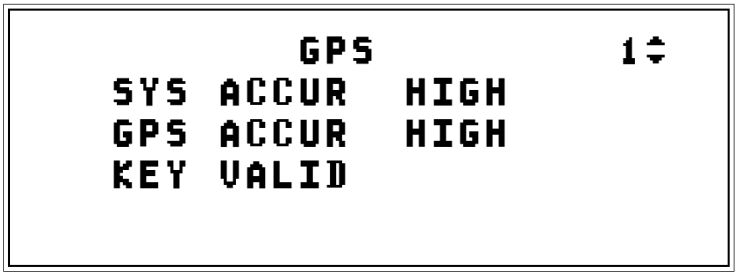


Figure 36 — GPS

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4.1.21 BULLSEYE PAGE

From the MISC page press 8. The bullseye is a stored steerpoint used as a common reference: with the page's BULLSEYE field switched on (keypad 0 toggles it, and the word shows in reverse video while on) the HUD's status field, under the master mode, and the helmet's show your own bearing and range FROM that point — bearing magnetic, range in nautical miles — in place of the fuel words (see HUD IN NAV MODE). The BULL line names the steerpoint used, 25 unless changed: move the asterisks to it with the DCS rocker and either step through the stored points with INC/DEC or type a number (1 to 99, a stored point) and press ENTR; RCL drops a half-typed number. RTN leaves the page.



Figure 37 — BULLSEYE

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4.2 MFD

The two multifunction displays either side of the front panel carry the radar, the horizontal situation display, the stores pages and the jettison pages. Each is worked from the twenty option select buttons around it — OSB 01 to OSB 05 across the top, OSB 06 to OSB 10 down the right side, OSB 11 to OSB 15 along the bottom from right to left and OSB 16 to OSB 20 up the left side — and from the two rockers at the corners. This is the main menu; the pages it leads to follow.

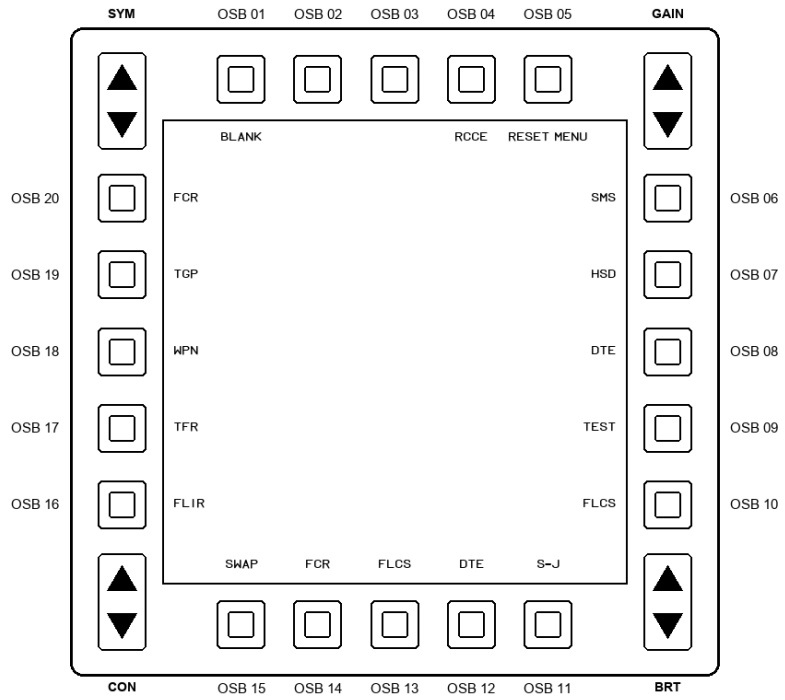


Figure 38 — MFD MAIN MENU

THE MAIN MENU

Selecting a page: press its button and the page opens. Every page is a toggle — pressing the page's own name again, on the main menu or in the bottom row where it has one, returns the display to the main menu.

Pages that work: BLANK (OSB 01), SMS (OSB 06), HSD (OSB 07), FCR (OSB 14 and OSB 20), S-J (OSB 11), DTE — the data cartridge (OSB 08 / 12), TEST — the fault list (OSB 09) and SWAP (OSB 15). RESET MENU (OSB 05) opens a reset page whose options are not implemented. Each page has its own section.

Pages that do nothing: RCCE, FLCS, FLIR, TFR, WPN and TGP are listed but not implemented — pressing one bounces the display back to the main menu, which is what every unimplemented option does throughout the MFD.

THE BOTTOM ROW

The five buttons along the bottom are the quick-access row and stay on every page. The two displays carry different fixed rows: on the left MFD OSB 11 to OSB 15 read S-J, DTE, FLCS, FCR and SWAP; on the right MFD S-J, TEST, HSD, SMS and SWAP. The figure shows the left display.

SWAP (OSB 15): exchanges what the two displays are showing.

S-J (OSB 11): the selective jettison page, from anywhere (SELECTIVE JETTISON).

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ROCKERS AND POP-UPS

SYM and GAIN at the top corners, CON and BRT at the bottom, set the display's symbology and gain, contrast and brightness.

Pop-up displays: a click on the top left screw of the left MFD, or the top right screw of the right MFD, opens that display as a window that can be moved and resized; the pop-up can carry its buttons and drop its bezel (SETTINGS).

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4.2.1 HSD MODE

The horizontal situation display is a map of the tactical situation around the aircraft, seen from above with the aircraft at the reference point: the flight plan's steerpoints and their legs, the radar's field of regard as two blue lines, the contacts the radar holds and, with the data link on, the contacts it does not.

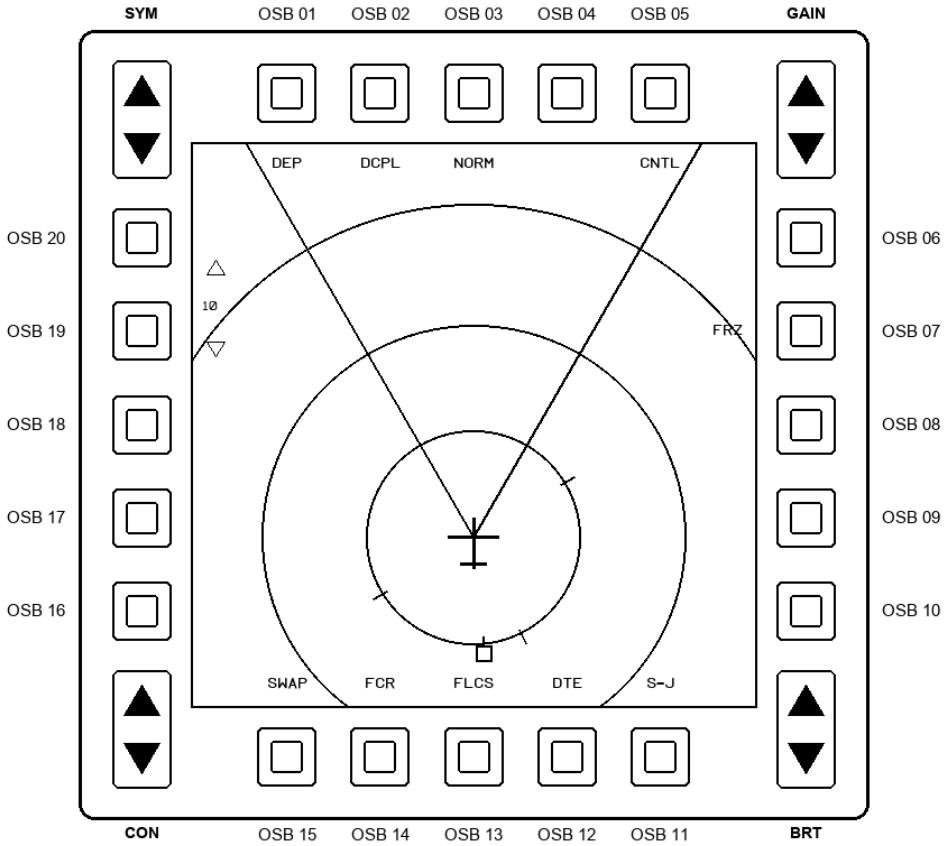


Figure 39 — MFD - HSD, DEPRESSED DECOUPLED

DEP / CEN (OSB 01): where the aircraft sits on the map. DEP (depressed) puts it near the bottom so most of the display is ahead; CEN puts it in the centre and shows all round. Switching also resets the range — 15 nautical miles in DEP, 10 in CEN.

CPL / DCPL (OSB 02): coupled or decoupled from the radar. Coupled, the HSD range follows the FCR range and the range buttons do nothing; decoupled, the range is set here.

NORM / EXP1 / EXP2 (OSB 03): the expansion. NORM is 1:1, EXP1 doubles the scale and EXP2 quadruples it.

Range (OSB 19 down, OSB 20 up): in DCPL only, each press halves or doubles the range — 15 to 240 nautical miles in DEP, 10 to 160 in CEN. The current range is printed beside the arrows on the left.

Data link: with the DL knob on the avionics power panel on, and the IFF not in IN or OUT, the aircraft reported by the link appear as contacts outside the radar's own coverage.

> **NOTE:** FRZ (OSB 07) is drawn but not modelled. The bottom row is the programmable quick-access row; after a SWAP the HSD comes back at NORM.

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THE CONTROL PAGE

CNTL (OSB 05) opens the HSD control page, which decides what the map shows. The map stays on the display underneath; the option buttons change to twelve on/off selections, each shown in reverse video while it is on — every one is on to start with — and CNTL itself highlighted. Pressing CNTL again returns to the normal page. The settings belong to each display and move with a SWAP.

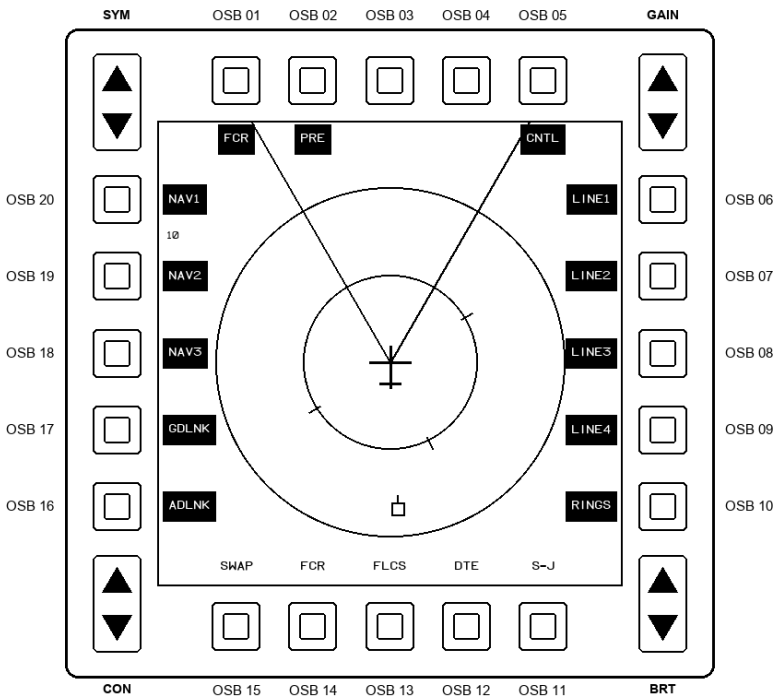


Figure 40 — MFD - HSD CONTROL PAGE

FCR (OSB 01): the radar's field of regard and the contacts it holds, with their history.

PRE (OSB 02): the preplanned threats the data cartridge carries, with their threat rings.

RINGS (OSB 10): the range rings and the compass rose.

NAV1 (OSB 20): the flight plan's steerpoints and their legs.

ADLNK (OSB 16): the air picture the data link reports.

> **NOTE:** NAV2, NAV3, LINE1 to LINE4 and GDLNK toggle and highlight, but switch nothing: this aircraft has no second or third route, geographic lines or air-to-ground data link to show. The range, DEP / CEN, CPL / DCPL and FRZ cannot be changed from the control page.

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4.2.2 FCR MODE

The fire control radar page shows what the radar sees ahead of the aircraft as a B-scope: azimuth across the display, range up it, with the antenna's position on the scales at the left and the bottom. It is the page from which a target is designated for the air-to-air weapons and the HUD.

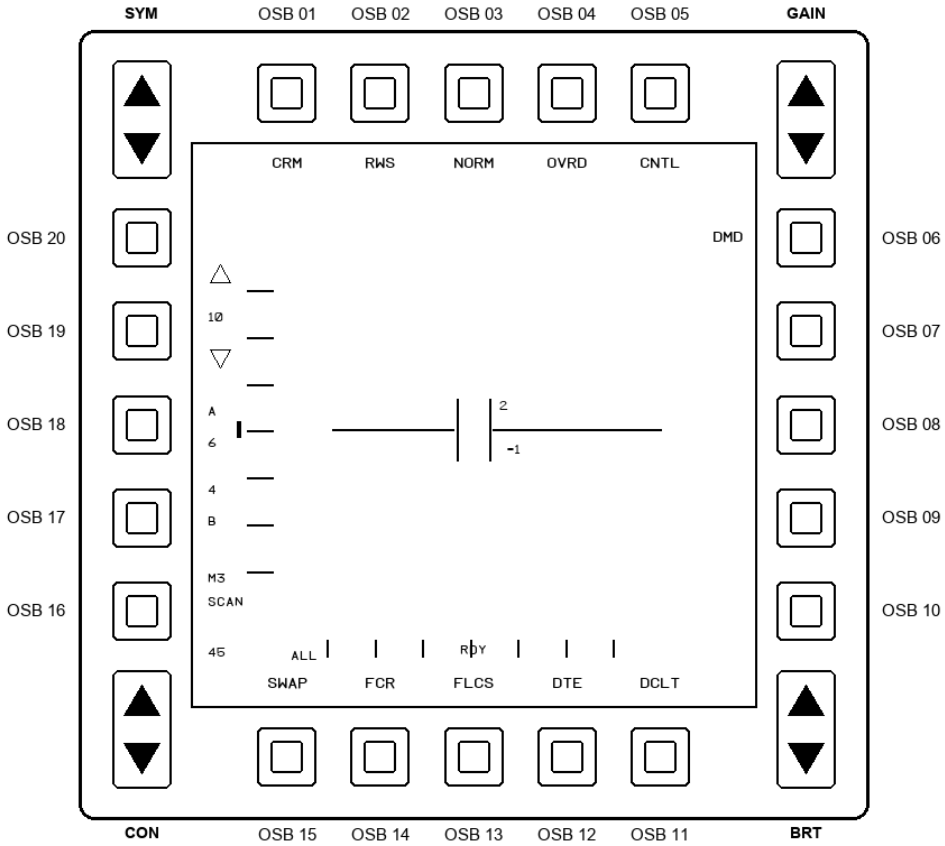


Figure 41 — MFD - FCR (FIRE CONTROL RADAR)

WHAT THE RADAR SEES

Every aircraft the simulator reports that lies inside the scan — within the selected azimuth and within the selected range — is painted as a contact as the antenna sweeps over it, with its altitude beside it, and fades as history when the antenna has moved on. The antenna sweeps continuously across the azimuth and steps through the bars in elevation; the ANT ELEV knob on the throttle tilts the whole pattern up or down.

Range (OSB 19 down, OSB 20 up): 10, 20, 40, 80 or 160 nautical miles; the scale is printed at the left. Changing range clears the history.

Azimuth (OSB 18): A1, A3 or A6 — the antenna sweeps 10, 30 or 60 degrees either side of the nose.

Bar (OSB 17): 1B, 2B or 4B — how many elevation bars the pattern covers before it repeats; more bars see more of the sky and take longer to come round.

NORM / EXP (OSB 03): the expanded picture doubles the scale.

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DESIGNATING A TARGET

The radar cursor is moved with the throttle's cursor commands. Put it over a contact and press the target management switch (TMS) forward on the stick to designate it — with the radar as the sensor of interest; otherwise TMS forward takes a mark (MARK PAGE). The same designation is available as the command FCR BUG TARGET, and FCR BUG NEXT TARGET and FCR BUG PREVIOUS TARGET step it through the contacts inside the scan without moving the cursor (CUSTOM COMMANDS). The designated target is the one the HUD's air-to-air symbology, the helmet and the missiles use.

In dogfight the radar runs its own acquisition modes and the page shows it: OSB 01 reads ACM and OSB 02 the submode — NO RAD, 20 (30 × 20), BORE or 60 (10 × 60) — which is cycled by pressing OSB 02 or selected on the HOTAS; see HUD IN EEGS MODE. Every dogfight entry starts in NO RAD.

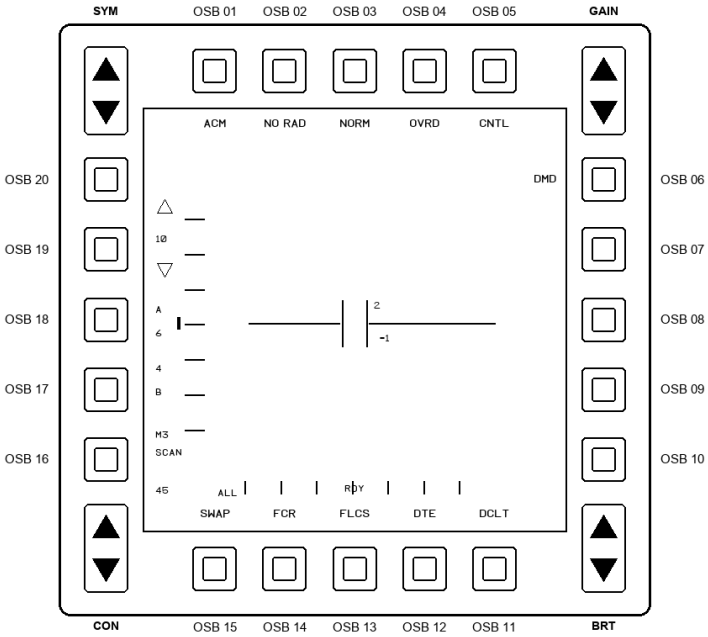


Figure 42 — MFD - FCR IN ACM (DOGFIGHT)

NOTE: CRM, RWS, OVRD and DMD are drawn as on the real page and are display only; the radar has one search mode.

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THE CONTROL PAGES

CNTL (OSB 05) opens the radar's control pages. The radar keeps running but its picture is not drawn; the top row stays as on the normal page with CNTL highlighted, and each option shows its setting under its name. A press steps a setting to its next value. PAGE (OSB 10) turns between the two pages, and CNTL returns to the radar picture. The settings belong to the radar, so both displays show the same ones.

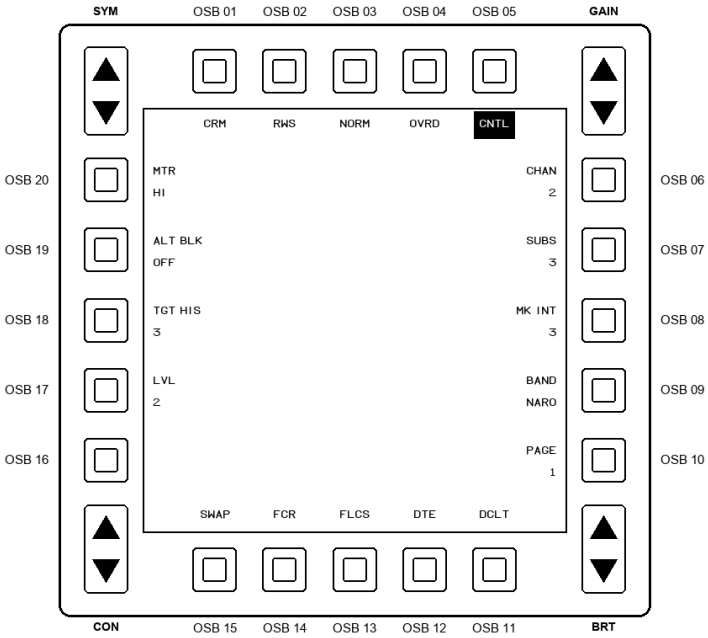


Figure 43 — MFD - FCR CONTROL PAGE 1

TGT HIS (OSB 18): how many past positions — 1 to 4 — trail behind each contact as history, on this page and on the HSD.

CHAN, SUBS, MK INT, BAND (OSB 06 to 09), LVL, ALT BLK and MTR (OSB 17, 19, 20): shown and stepped through their values — channel 2 and LVL 2 at power-up as on the real radar — but not acted on; this radar has no channels, clutter filters or blanker to set. MTR stays at HI.

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Page 2: BCN DLY (OSB 08), the CPL / DCPL scan-volume coupling for the interrogator (OSB 09) and MTS (OSB 16, 2 at power-up). CPL / DCPL and MTS step like the others and are likewise not acted on; BCN DLY opens nothing.

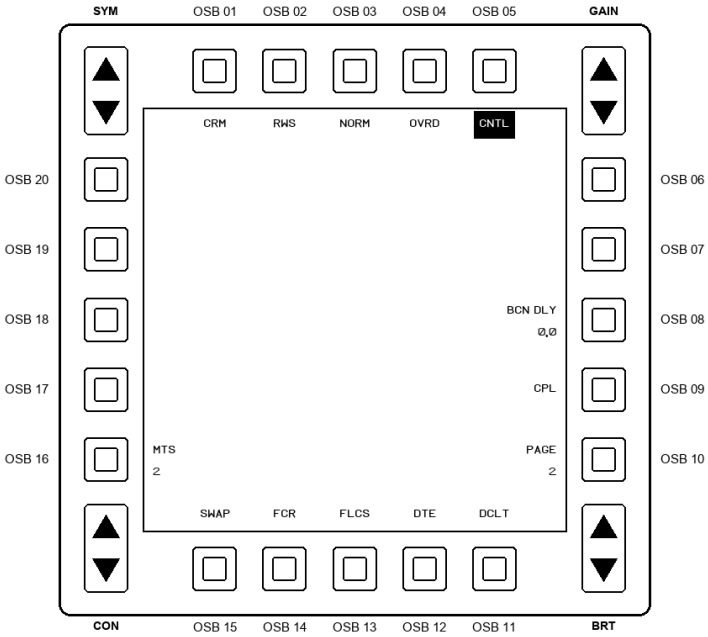


Figure 44 — MFD - FCR CONTROL PAGE 2

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DECLUTTER

On the radar page OSB 11 reads DCLT in place of S-J. Pressing it clears the option names from the left, top and right edges — the buttons keep working where they are — and highlights DCLT; the range scale, the bottom row and the status words stay. A second press brings the names back. The setting belongs to the radar page, not to the display, so it is kept across page changes.

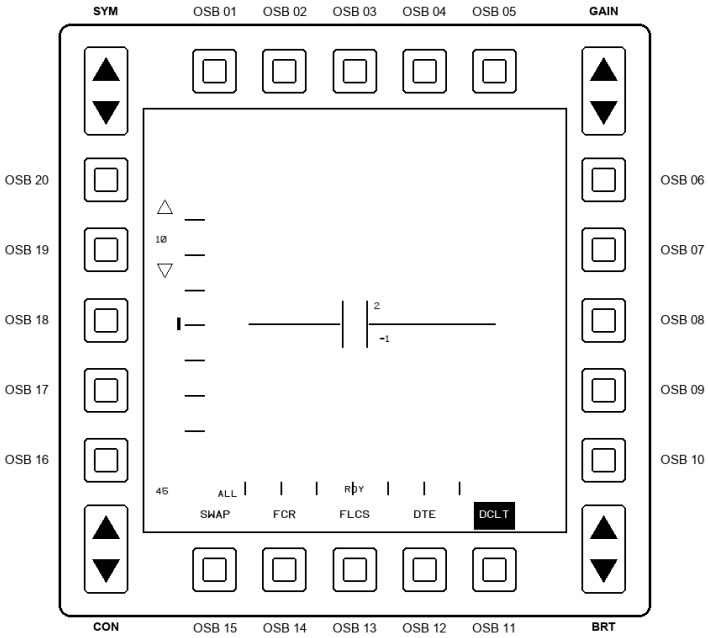


Figure 45 — MFD - FCR, DECLUTTERED (DCLT)

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THE SYMBOLOGY

The numbered picture below keys the radar symbology; the two that follow show how a contact's symbol reads its identity and its coverage.

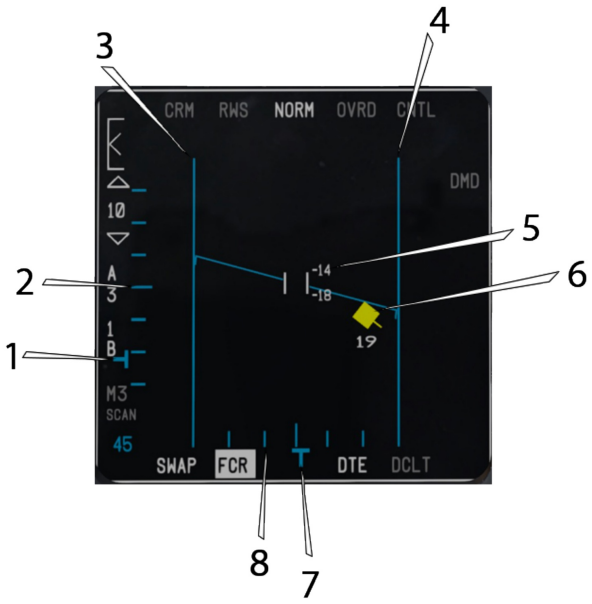


Figure 46 — FCR symbology

1	Vertical radar antenna angle (caret)
2	Vertical radar antenna scale, in degrees of 10
3	Left azimuth limit of radar antenna
4	Right azimuth limit of radar antenna
5	FCR crosshair, with the upper and lower altitude limit of the radar at that distance
6	Visible target in radar, and barometric altitude of target
7	Horizontal radar antenna angle (caret)
8	Horizontal radar antenna scale, in degrees of 10

Table 13 — FCR symbology callouts

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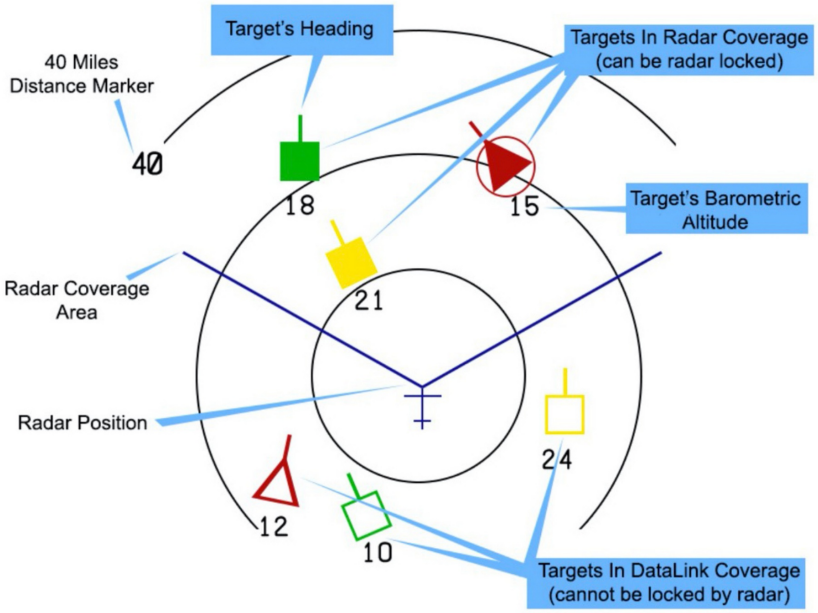


Figure 47 — HSD threat symbology



Figure 48 — Target symbols

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SENSOR OF INTEREST

The radar takes cursor and designation commands only while it is the sensor of interest. When it is not, the page carries the NOT SOI legend, as below; DMS on the stick cycles the sensor of interest between the HUD and the displays, and the HUD shows an asterisk beside its G readout while it holds it.

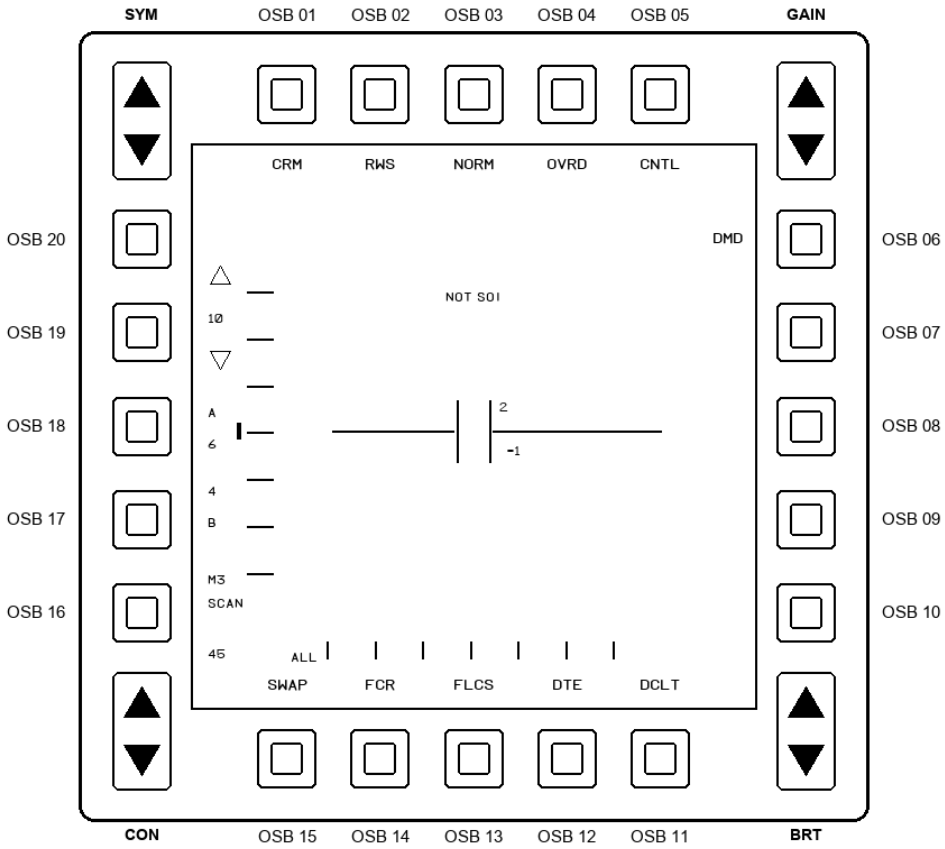


Figure 49 — MFD - FCR, NOT SOI

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4.2.3 AIR TO GROUND WEAPONS MODE

The air-to-ground page is the stores page in the air-to-ground master mode: it selects the bomb, the delivery mode and the release options, and its values are what the HUD's CCIP picture and the release use (HUD IN AIR TO GROUND MODE).

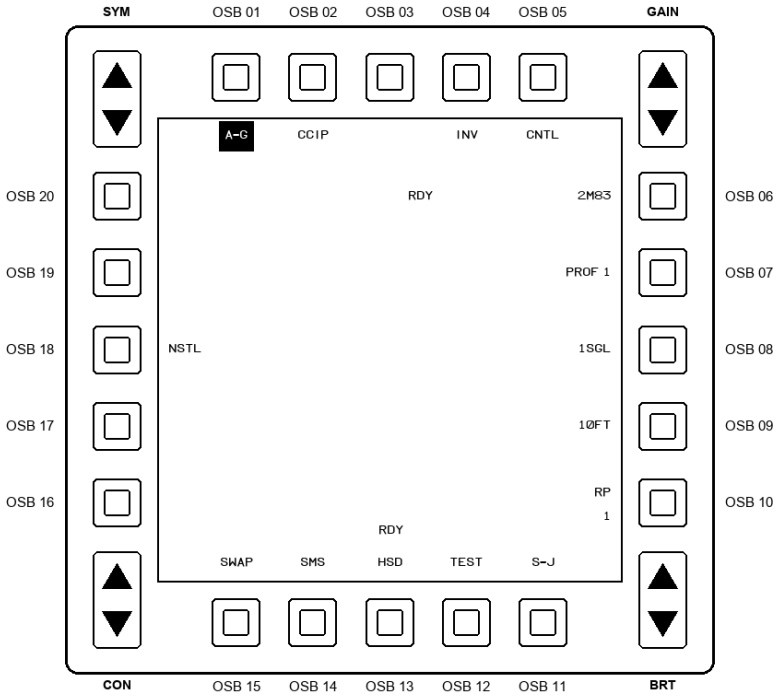


Figure 50 — MFD - AIR TO GROUND

A-G (OSB 01): the master mode, boxed while the page is the weapons page.

Delivery mode (OSB 02): the current mode; pressing it opens the delivery menu — CCIP, CCRP, DTOS, LADD and MAN on OSB 16 to OSB 20 — and the choice is stored in the profile in use. CCIP is the mode this aircraft flies: whichever is selected, the HUD shows the CCIP picture.

INV (OSB 04): the stores inventory, without leaving the mode (INVENTORY).

Bomb selection (OSB 06): the count and type of the bombs selected — 2M83 is two Mk 83s; pressing it steps to the other type carried (Mk 83 or Mk 84).

Profile (OSB 07): PROF 1 or PROF 2. Each profile holds its own delivery mode, pairing, pulses, spacing and fuze setting, so two attacks can be set up in advance and swapped with one press.

Pairing (OSB 08): 1SGL releases one bomb per pulse, 1PAIR one from each side.

Spacing (OSB 09): the distance between bombs in a ripple, in feet. Pressing it opens a keypad on the buttons — digits on OSB 06 to OSB 10 and OSB 16 to OSB 20, ENTR, RTN and RCL across the top; 10 to 990 feet.

Release pulses (OSB 10): RP and the number of pulses per press of the pickle, 1 to 7, set on the same keypad.

Fuze (OSB 18): NOSE, TAIL or NSTL (nose and tail), stepped with each press.

RDY: printed against a station that is loaded and ready.

NOTE: CNTL (OSB 05) is display only. The bottom row is the programmable quick-access row.

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4.2.4 DOGFIGHT AND MISSILE OVERRIDE

Dogfight (DGFT) and missile override (MSL) are the air-to-air master modes, selected on the dogfight / missile override switch on the throttle rather than from an MFD menu. Each puts its own stores page on the MFD; the HUD follows (HUD IN EEGS MODE and HUD IN AIR TO AIR MODE).

DOGFIGHT

The dogfight page is the gun and the short-range missile together. The numbers refer to the option buttons.

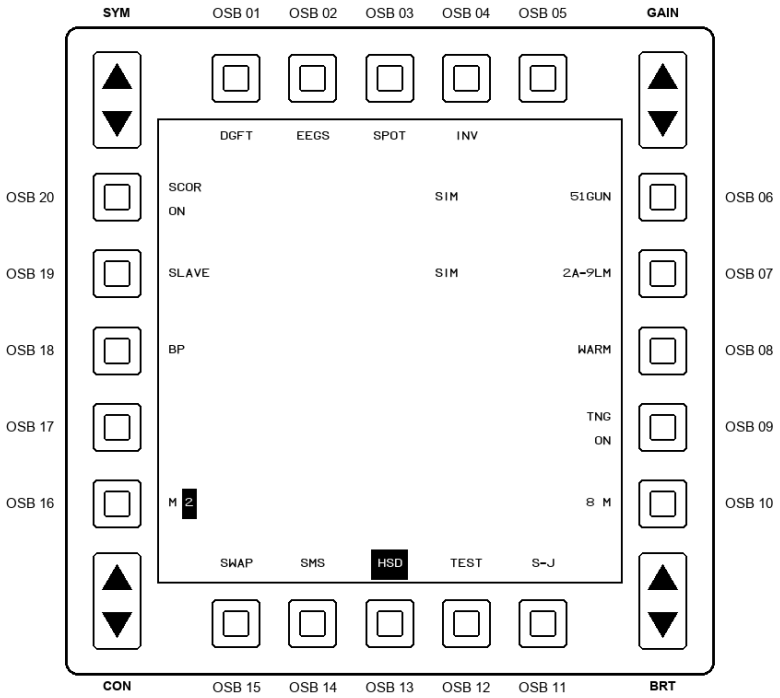


Figure 51 — MFD - DOGFIGHT MASTER MODE

DGFT (OSB 01): the master mode.

EEGS (OSB 02): the gunnery sub-mode. Display only — the LCOS, SNAP and SSLC sight options are not modelled.

SPOT / SCAN (OSB 03): the AIM-9 seeker field of view, toggled with each press.

INV (OSB 04): the stores inventory (INVENTORY).

Gun rounds (OSB 06): the rounds remaining in tens, 51GUN for a full drum. Display only.

Missile (OSB 07): the count and type of the selected missile, 2A-9LM for two AIM-9M Sidewinders (A120C is the AIM-120C); pressing it steps to the other missile type carried.

TNG (OSB 09) and SCOR (OSB 20): the training and scoring options, toggled with each press.

Station rows (OSB 16 and OSB 10): the missile rails of each wing — a number for a rail carrying the selected type, M for the other type, blank for empty; the selected rail in reverse video. Either button steps the selection along its wing.

BP / TD (OSB 18): the AIM-9 circuit, bypass or threshold detect, toggled with each press.

SLAVE / BORE (OSB 19): the missile seeker's line of sight — slaved to the radar's target, or boresighted along the nose.

The station rows read stations 1, 2, 3 on the left wing and 7, 8, 9 on the right. In the figure the AIM-9s on stations 2 and 8 are selected — station 2 next to fire — and the AIM-120s on the tips read M. After a launch the selection moves to the next rail of the same type, inboard to outboard and alternating wings, and changes type only when the selected type is gone.

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NOTE: No option on the dogfight page is boxed. The reverse video box marks the page the MFD had selected before the master mode was entered, and it stays in the bottom row.

MISSILE OVERRIDE

Missile override is the same page with the gun and its sighting options removed: MSL at OSB 01, and of the options above only SPOT / SCAN, INV, the missile, the station readouts, BP / TD and SLAVE / BORE remain.

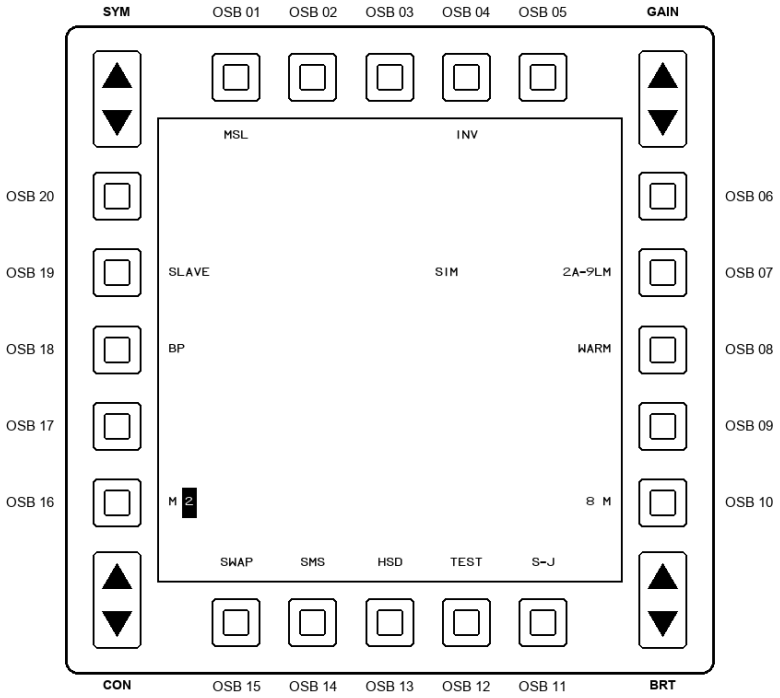


Figure 52 — MFD - MISSILE OVERRIDE (AAM)

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THE GUN PAGE

In the air-to-air master mode selected on the ICP, OSB 01 of the stores page toggles the operating mode between AAM and GUN. The GUN page selects the gun alone: OSB 01 reads GUN, OSB 02 the gunnery sub-mode EEGS, OSB 06 the round count in tens with the gun status beside it, and OSB 20 SCOR. The HUD changes to the EEGS gun sight with EEGS as its mode legend and the radar goes to ACM, exactly as in dogfight, and the weapon release button is inhibited; in AAM the trigger is inhibited instead. The operating mode last selected is remembered and recalled the next time air-to-air is entered.

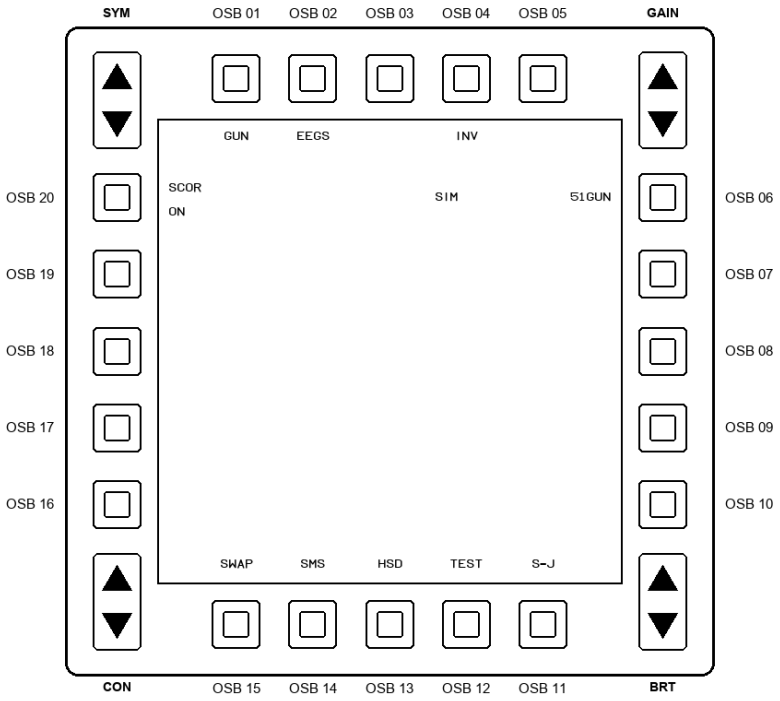


Figure 53 — MFD - A-A GUN PAGE (EEGS)

NOTE: The bottom row of these pages shows the pilot's own programmable option assignment. The assignment in the figures is an example.

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4.2.5 SMS — STORES MANAGEMENT

The SMS page shows what the aircraft is carrying and on which station. Reach it from the MFD main menu, or from a weapons master mode with the INV option.

The stations are laid out as the wing is seen from above: the centreline station at the top, then the inboard, mid, outboard and tip stations spreading down and outward on each side. Each station shows its rack on the first line and its store on the second. An empty station shows dashes in place of both.

The internal gun and its ammunition are shown at the upper left and are always present.

Selecting a station: the button beside each station selects it and boxes it — OSB 16 to OSB 19 for stations 1 to 4 on the left, OSB 03 for the centreline station 5, OSB 07 to OSB 10 for stations 6 to 9 on the right, OSB 20 for the gun. Several stations can be selected together.

CHNG (OSB 06): appears once every selected station carries the same rack. The loadout change page it opens is not complete on this aircraft; stores are changed from the kneepad's LOADOUT app. STBY (OSB 01) is drawn as on the real page and does nothing; CLR (OSB 05) clears the selection.

> **NOTE:** Entering the SMS page clears any station selection already made. Pressing SMS again returns the display to the main menu.

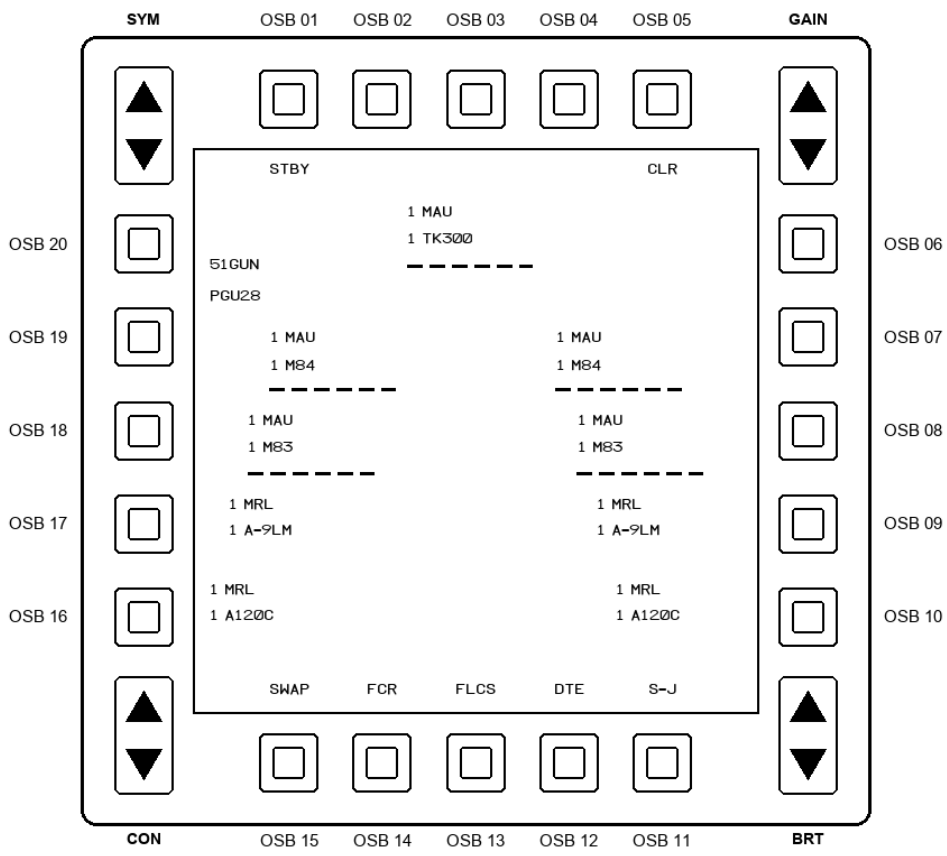


Figure 54 — MFD - SMS, STORES LOADED

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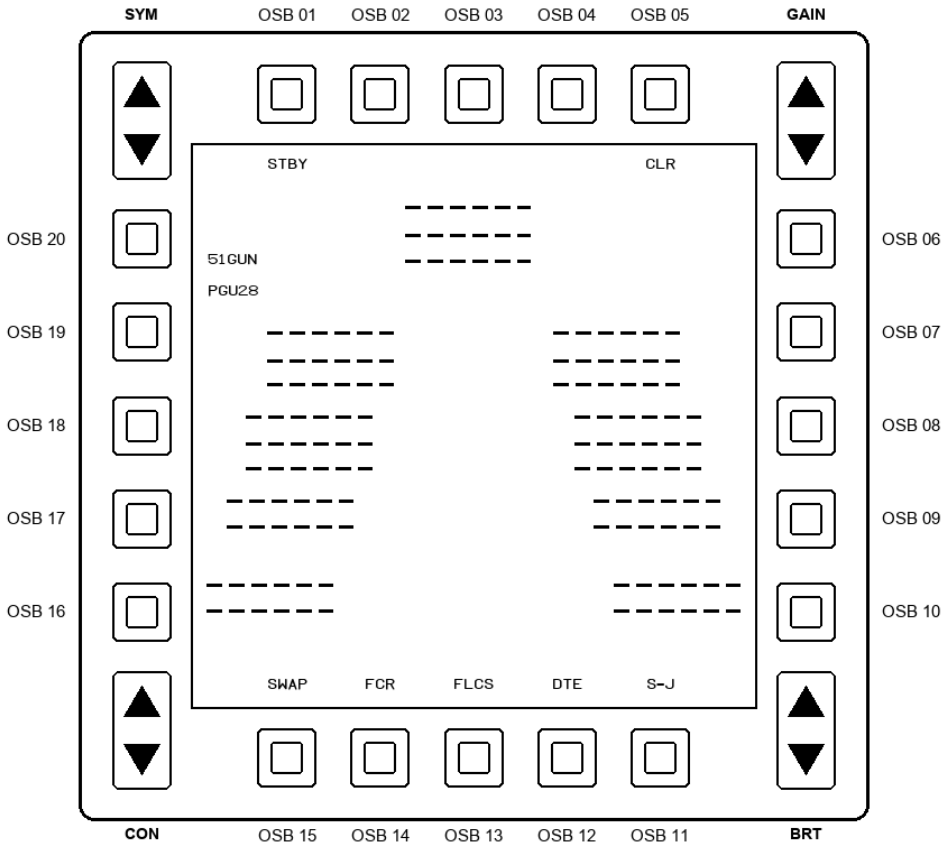


Figure 55 — MFD - SMS, NO STORES

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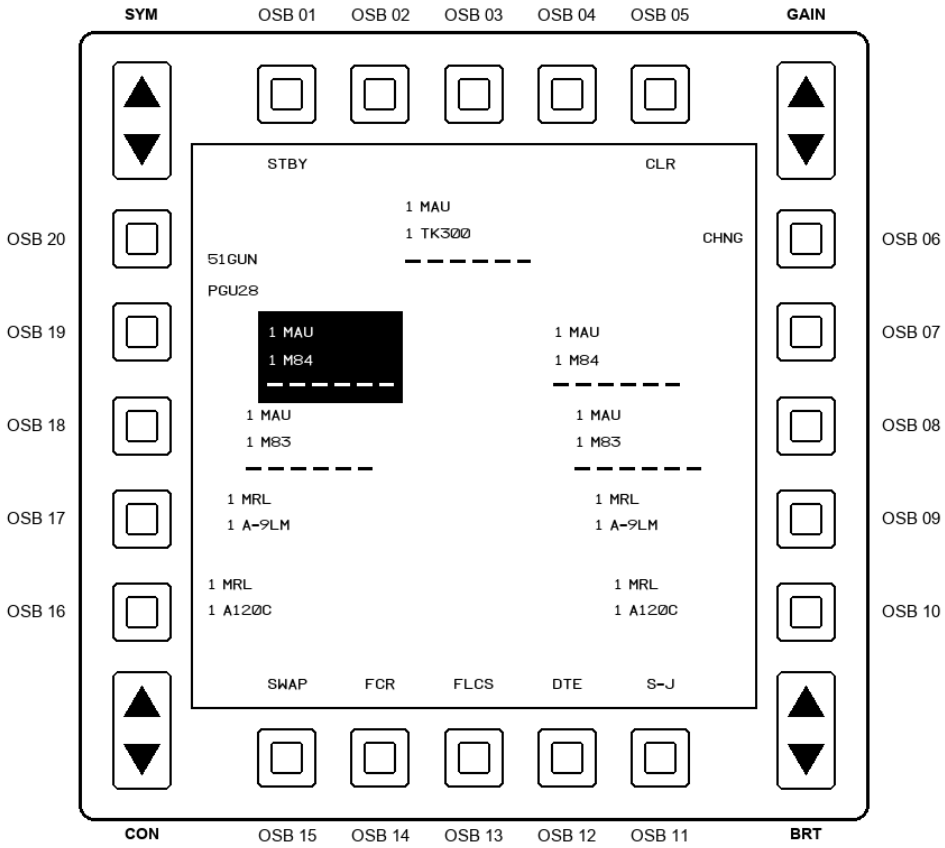


Figure 56 — MFD - SMS, STATION SELECTED

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4.2.6 INVENTORY (INV)

INV appears on the weapons master mode pages — air-to-ground, dogfight and missile override — and shows the full stores inventory without leaving the weapons mode.

Pressing INV displays the stores layout in the same form as the SMS page. Pressing INV again returns the display to the weapons mode it was called from.

NOTE: Calling the inventory clears any station selection already made.

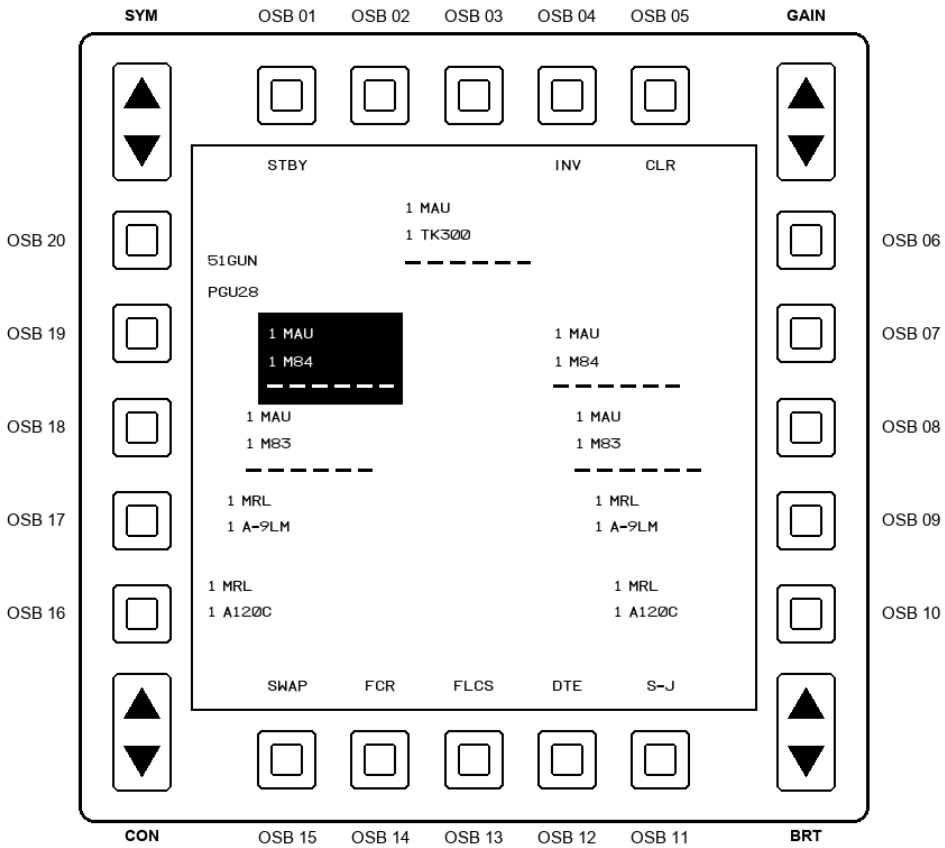


Figure 57 — MFD - INVENTORY

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4.2.7 SELECTIVE JETTISON (S-J)

The S-J page jettisons chosen stores. It is reached with OSB 11, which is available from every MFD page.

Only the pylons that can be selectively jettisoned are shown, as empty fields. Select the stations to jettison, then use STBY (OSB 01) and CLR (OSB 05).

NOTE: Entering the page clears any station selection already made, so a selection cannot be carried in from another page by accident. Pressing S-J again leaves the page.

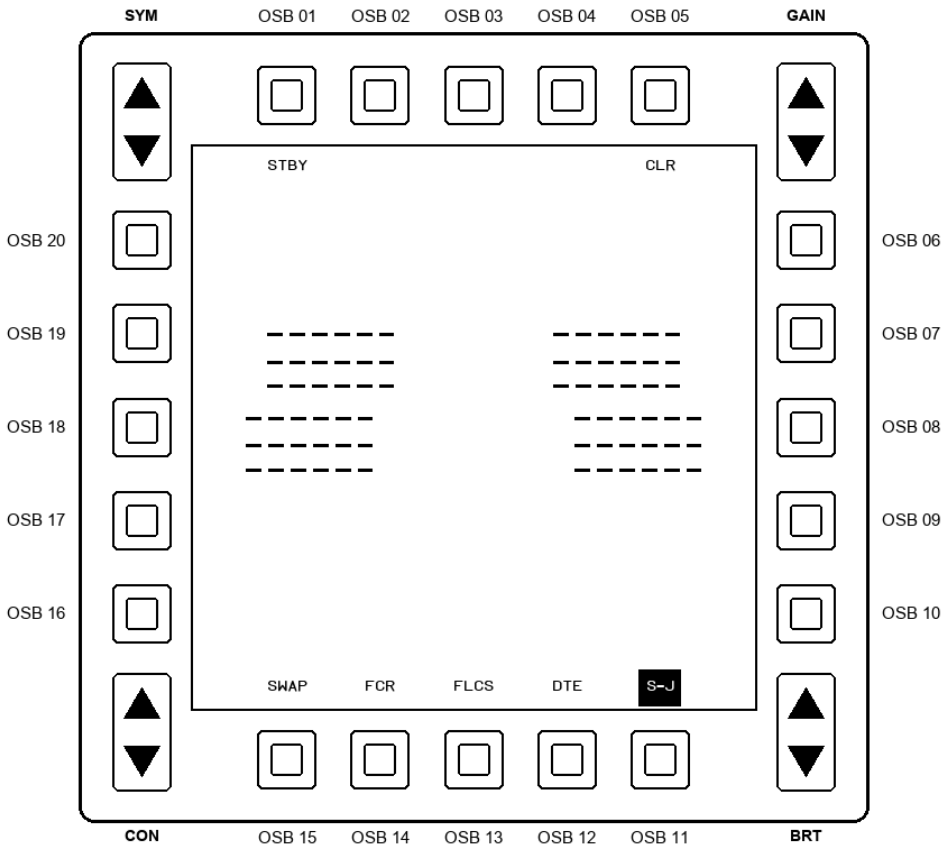


Figure 58 — MFD - SELECTIVE JETTISON

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4.2.8 EMERGENCY JETTISON

Emergency jettison releases the aircraft's stores without selection.

> **WARNING:** Emergency jettison is an aircraft-level action, not an MFD one. Both MFDs switch to the emergency jettison page together, and on the F-16D both rear cockpit displays follow. Leaving the page returns each display to whatever it was showing before, independently.

The GND JETT ENABLE switch on the left auxiliary console arms jettison on the ground. See also chapter 10, EMERGENCY PROCEDURES.

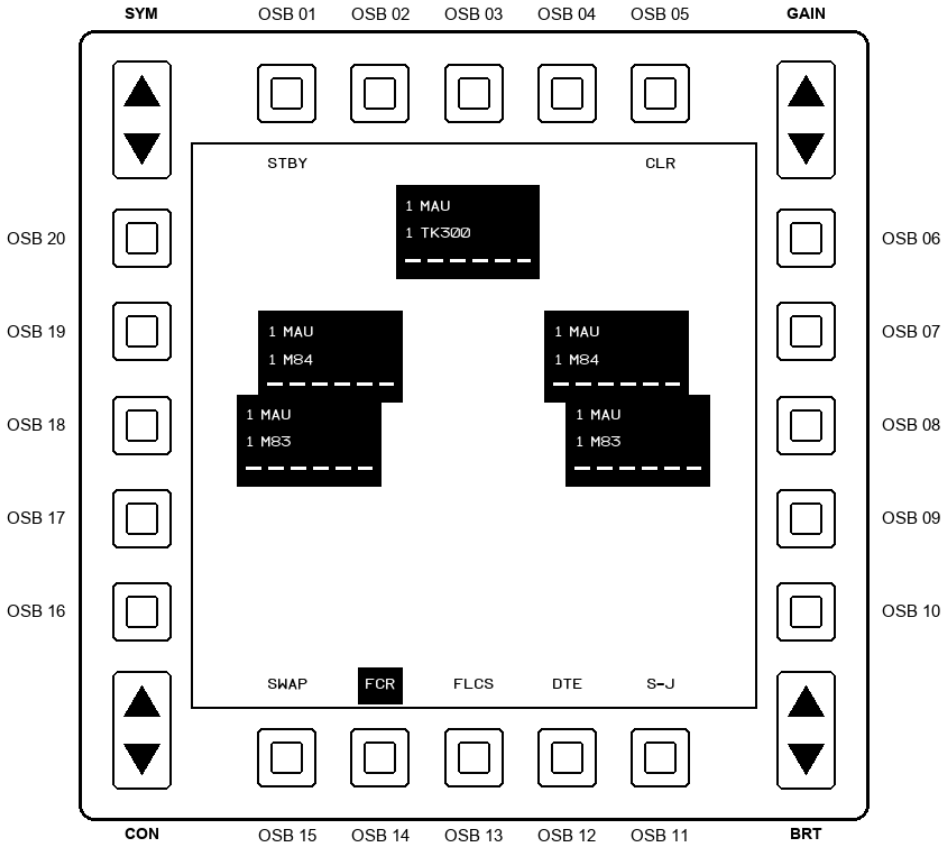


Figure 59 — MFD - EMERGENCY JETTISON

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4.2.9 DTE — DATA TRANSFER

The DTE page is the data transfer cartridge. The cartridge is a tape: one inserted from the kneepad's FLIGHT PLAN app (FLIGHT PLAN) or its DTC EDITOR app (DTC EDITOR), or one sent by the DWSim Mission Editor. Reach the page from the MFD main menu (OSB 08) or the DTE button in the bottom row. The figure shows a tape inserted.

DTC ID: in the centre, the inserted tape's ID — its mission name, up to twelve characters — or dashes with no tape in.

LOAD (OSB 03): transfers everything on the tape, MPD then COMM, each name highlighting in turn as it goes.

MPD (OSB 20): Mission Planning Data — the mission, its bases and the steerpoint database — transferred on its own. Shown only when the tape carries it.

COMM (OSB 19): the radio presets, the TACAN channel and the ILS frequency, transferred on its own. Shown only when the tape carries them.

PAGE (OSB 10): turns to page 2 and back. Page 2 lists nothing this aircraft's tapes carry.

BIT (OSB 01): not modelled.

> **NOTE:** A tape sent by the Mission Editor loads as it arrives, and LOAD applies it again. A tape inserted from the kneepad or the DTC EDITOR loads only when LOAD, MPD or COMM is pressed, as on the real aircraft.

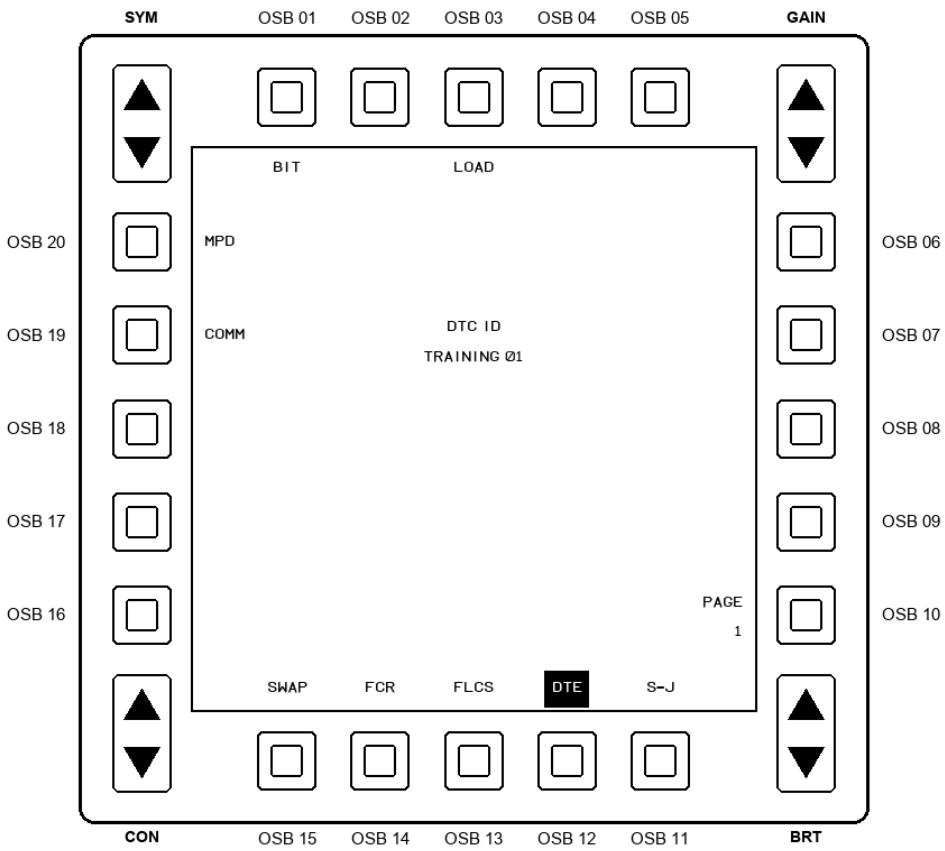


Figure 60 — MFD - DTE (DATA TRANSFER)

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4.2.10 TEST — BUILT-IN TEST

The TEST page carries the Maintenance Fault List — the aircraft's record of what has failed during the flight — with the built-in test selections around it. Reach it from the MFD main menu (OSB 09).

The fault list: one row per fault — the subsystem, a three-letter code for the fault, how many times it has occurred (up to 9) and when it first did, in minutes and seconds of the flight. The display's font has no colon, so 3:12 prints as 3 12. The takeoff (TOF) and landing (LAND) are recorded as events.

What reports to it: the flight control system (FLCS) — its sensor and computer faults, and failed, jammed or separated control surfaces — and the two hydraulic systems (HYD); see FLIGHT CONTROL SYSTEM. The list holds fifteen faults; when it is full a new flight control fault replaces the last row.

CLR (OSB 03): clears the list. A fault still present comes straight back, and cleared in flight the takeoff is recorded again at the present time.

BIT1 (OSB 01) and the subsystems: MFDS, RALT, TGP, FLIR and TFR down the right, RSU, INS, SMS, FCR and DTE up the left. A press highlights the name for a moment; the tests themselves are not modelled.

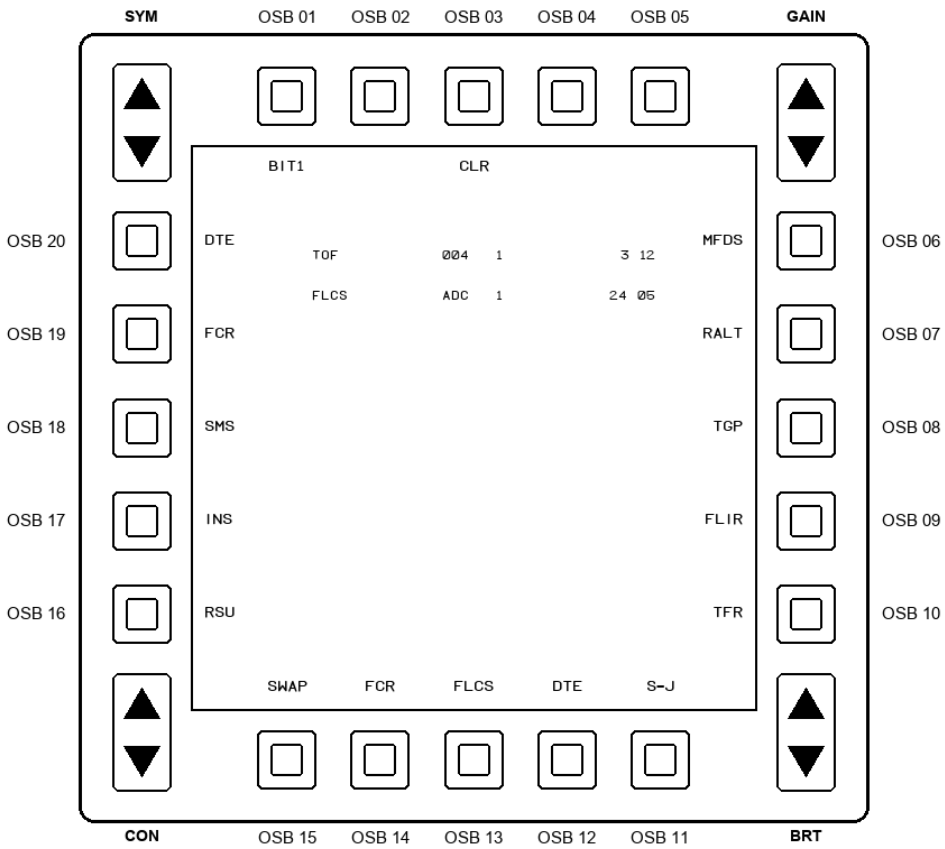


Figure 61 — MFD - TEST (BUILT-IN TEST)

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4.2.11 BLANK

BLANK turns the display off without turning the MFD off, for example to remove a light source at night. Select it from the MFD main menu.

The screen clears to the word BLANK and no option legends are shown.

> **NOTE:** The option buttons still work. Pressing the top left button, which selected BLANK, returns the display to the main menu.

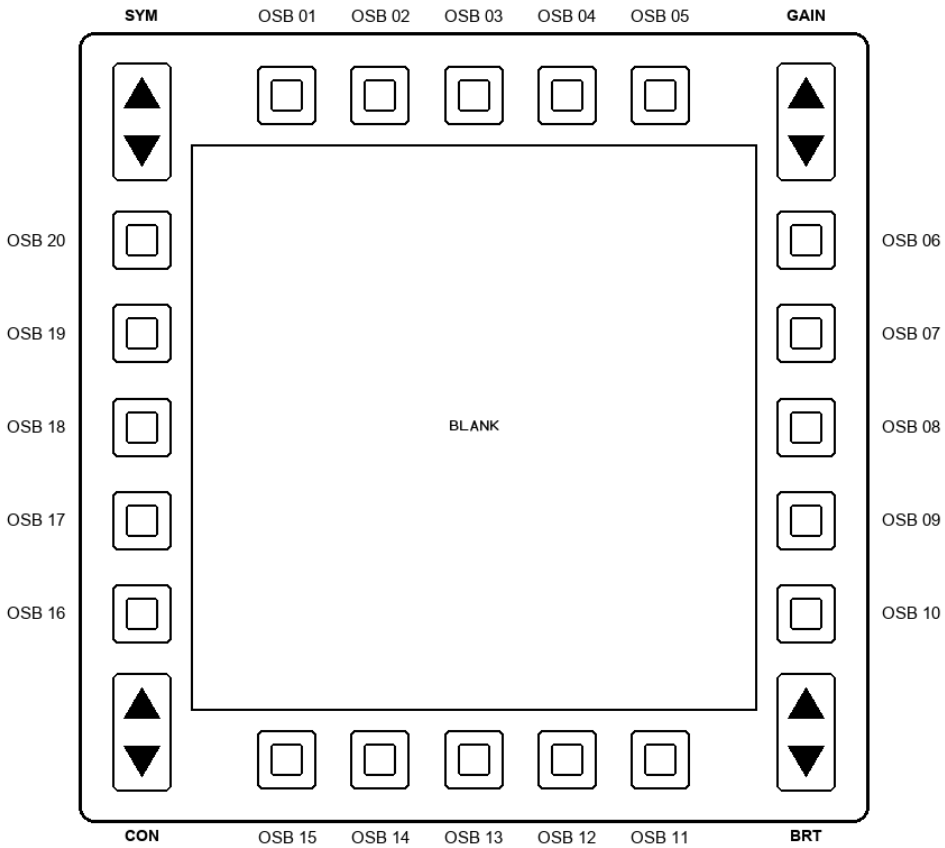


Figure 62 — MFD - BLANK

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4.3 HUD SYMBOLOGY

The head-up display is described first in its navigation mode, which carries the symbology common to every other mode, and then mode by mode. The panel that configures it follows.

4.3.1 HUD IN NAV MODE

The navigation picture is the base every other mode is built on: the attitude reference, the flight path marker, the speed, altitude and heading scales and the steerpoint data stay on the glass in every mode, and each mode draws its own symbology over them. The numbers refer to the figure.

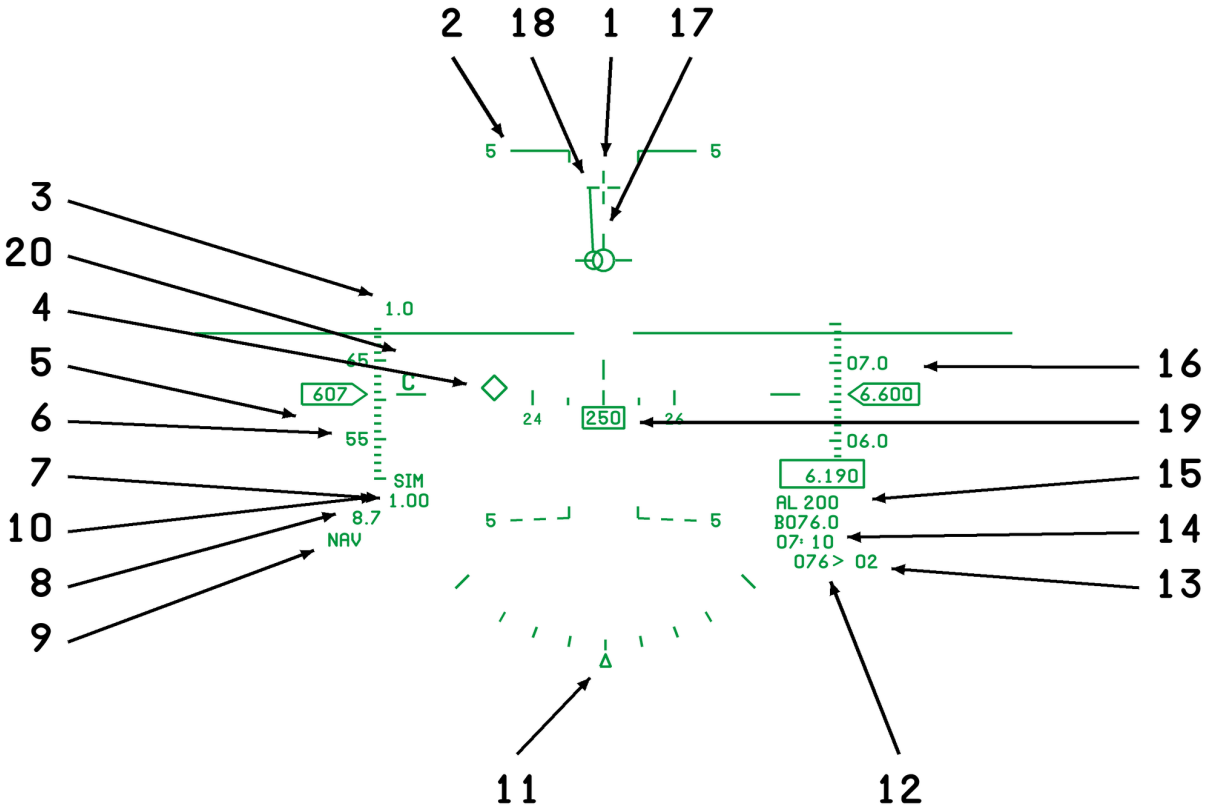


Figure 63 — HUD in NAV mode

1	Crosshair
2	Pitch ladder
3	Current G-force
4	Selected STPT
5	Air speed
6	Speed tape
7	Master ARM mode
8	Max G
9	HUD mode
10	Mach number
11	Roll indicator
12	Distance to current STPT
13	Current STPT
14	Time to selected STPT
15	Radio altimeter
16	Altimeter
17	Flight path
18	STPT bearing
19	Heading
20	Speed mode

Table 14 — HUD in NAV mode callouts

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ATTITUDE AND FLIGHT PATH

Crosshair (1): the boresight cross is the fuselage reference line — the direction the nose is pointing. It is fixed on the glass, and every symbol that stands for something in the outside world (the attitude bars, the flight path marker, the steerpoint diamond) is placed relative to it.

Flight path (17): the flight path marker shows where the aircraft is actually going. It is the projection of the inertial velocity vector, so it sits below the cross by the angle of attack and drifts left or right of it with wind and sideslip; in a turn it sinks further under G. Put it on a point on the ground and that is where you will arrive. When the velocity vector leaves the field of view the marker parks at the edge with an X drawn through it. DRIFT C/O on the ICP cages it to the HUD centre line horizontally; the FPM switch on the HUD control panel selects ATT/FPM (attitude bars and marker), FPM (marker only) or OFF.

Pitch ladder (2): bars every 5 degrees, solid above the horizon and dashed below, each carrying its angle; the horizon is the long bar with a gap for the flight path marker. The ladder rolls with the aircraft and is caged to the flight path marker sideways, so pitch is read where the marker sits on it: the marker on the horizon line means a level flight path, whatever the nose is doing. With the gear down a dashed reference line is added just below the horizon (see HUD IN ILS/LANDING MODE).

Roll indicator (11): the bank scale at the bottom of the glass and its pointer, which slides along the scale and tilts with bank. With SCALES at VV/VAH it is replaced by bank marks at 15, 30, 45 and 60 degrees drawn around the flight path marker, and with DED DATA selected the DED repeater takes its place.

SPEED

Air speed (5) and speed tape (6): the boxed number is the current airspeed and the scale beside it moves against the box — a label every 50 knots, as two digits (45 reads 450), and a tick every 10. Below 45 knots the box reads 00. SCALES at OFF removes the tape and keeps the box.

Speed mode (20): the letter beside the box says what the number is — C calibrated airspeed, T true airspeed, G ground speed — and follows the VELOCITY switch on the HUD control panel.

Mach number (10): drawn in NAV only; the other modes remove it.

Current G-force (3) and Max G (8): the load factor now, and the highest reached since the last WARN RESET on the ICP (max G is NAV only). While the EGI is aligning the word ALIGN stands in for max G. An asterisk beside the G readout shows that the HUD is the sensor of interest.

ALTITUDE

Altimeter (16): the boxed altitude with its scale — a label every 500 feet, in thousands (06.5 is 6,500 ft), and a tick every 100. What the box shows is set by the ALTITUDE switch on the HUD control panel: BARO gives the system (barometric) altitude; RADAR gives the radar altitude, with an R flag beside the box; AUTO uses the radar altitude below 1,200 feet above the ground and the barometric altitude above it.

Radio altimeter (15): the boxed number at the top of the lower right data block is the radar altitude, and the AL line under it is the CARA ALOW floor set on the DED ALOW page (see ALTITUDE ALERT SETUP). Descending through the floor with the gear up raises the altitude warning.

HEADING

Heading (19): the scale across the middle of the glass moves under the caret — a label every 10 degrees, as two digits (25 reads 250), and a tick every 5 — and the box beneath it holds the current heading. The whole block is referenced to the flight path marker: it follows the marker sideways and slides down the glass as the marker sinks, which keeps it clear of the marker in a nose-high approach.

STEERPOINT DATA

Selected STPT (4): the steerpoint diamond marks where the selected steerpoint is in the outside world, projected onto the glass the same way as the flight path marker, so it sits on the point itself. When the steerpoint is outside the field of view the diamond is held at the edge with an X through it.

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STPT bearing (18): the small circle with a stalk hung on the flight path marker points its stalk towards the steerpoint and slides to the side the steerpoint is on, so a glance at the marker tells you which way to turn.

Distance to current STPT (12), current STPT (13) and time to selected STPT (14): the bottom line of the data block reads distance > steerpoint number (076>02 is 76 nautical miles to steerpoint 2), and the line above it the time to go at the present ground speed, in minutes and seconds. Between AL and the time is the slant range: B and the straight-line distance to the steerpoint allowing for the height difference to its elevation, or F and the range to the locked target when the radar has one.

MODE LEGENDS

Master ARM mode (7) and HUD mode (9): the top left corner shows the master arm state — SIM or ARM, nothing at OFF — and the master mode, NAV here; the other modes replace it with CCIP or DGFT, and the ILS picture with the ILS legend. Under them is the status field: FUEL when the total fuel is below the BINGO setting from the DED BINGO page, or the bullseye bearing and range when the BULL DED page has it switched on.

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4.3.2 HUD CONTROL PANEL

The HUD control panel, on the right side of the front panel, sets what the head-up display shows and how bright it is. The numbered switches are described first, then the rest of the panel from the top down.

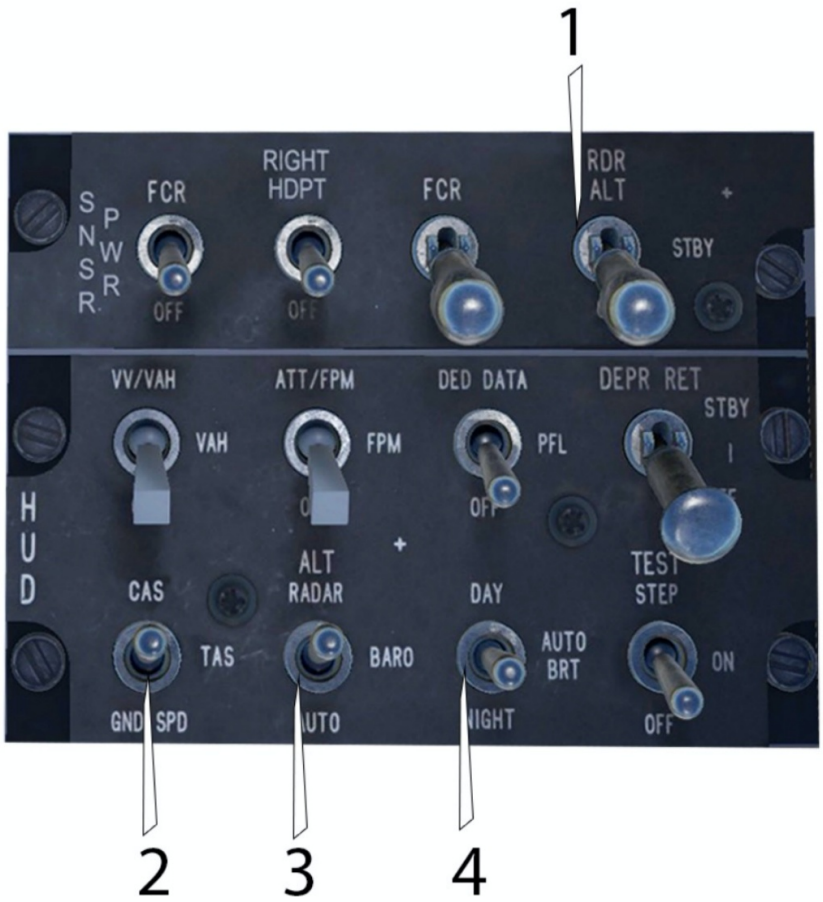


Figure 64 — HUD control panel

1	Radar altimeter — ON / OFF
2	Calibrated speed / true air speed / ground speed
3	Radar altimeter / baro altimeter
4	Day HUD / AUTO / Night HUD

Table 15 — HUD control panel callouts

Radar altimeter (1): RDR ALT, STBY, OFF — powers the radar altimeter. At RDR ALT the lower right data block carries the radar altitude; at STBY the block shows the system altitude instead; at OFF the readout is blank. The ALOW floor and the altitude warning need it on.

Velocity (2): CAS, TAS, GND SPD — what the airspeed box shows, flagged C, T or G beside the box.

Altitude (3): RADAR, BARO, AUTO — what the altitude box shows. RADAR is the radar altitude with an R flag beside the box, BARO the system altitude, AUTO the radar altitude below 1,200 feet above the ground and the barometric altitude above it.

Brightness (4): DAY, AUTO, NIGHT — the symbology brightness range. DAY is full brightness and NIGHT two thirds of it; AUTO picks one or the other from the cockpit lighting level. The SYM wheel on the ICP sets the brightness within the range.

SCALES: VV/VAH, VAH, OFF. At VAH the airspeed, altitude and heading scales are drawn beside their boxes. VV/VAH adds a vertical velocity scale to the left of the altitude scale (NAV only) and swaps the roll scale for bank marks around the flight path marker. OFF removes the scales and leaves the digital readouts.

FPM: ATT/FPM, FPM, OFF. ATT/FPM draws the attitude bars and the flight path marker, FPM the marker alone, OFF neither.

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DED/PFLD: DED DATA, PFL, OFF. DED DATA repeats the current DED page in the lower part of the glass, where the roll scale normally is. PFL only removes the roll scale — this aircraft has no pilot fault list display, so the position is not modelled beyond that.

DEPR RET: STBY, PRI, OFF. The manual bombing reticle — a dot with two circles — drawn on the HUD centre line and depressed below the boresight cross by the RET DEPR wheel on the ICP, 0 to 260 mil. PRI adds the primary reticle to the normal symbology; STBY shows the standby reticle on its own and removes everything else.

NOTE: The TEST switch is not modelled.

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4.3.3 HUD IN ILS/LANDING MODE

The ILS picture is the navigation picture with the landing aids added. It is selected with the instrument mode selector at either ILS position (see VOR, TACAN AND ILS); the mode legend then reads ILS in place of the master arm state, and the Mach number and max G readouts, which are NAV only, disappear. The gear adds the AOA bracket and the approach reference line whichever mode is selected, and lifts the heading scale to the top of the glass, above the boresight cross, so it stays clear of the landing symbology.

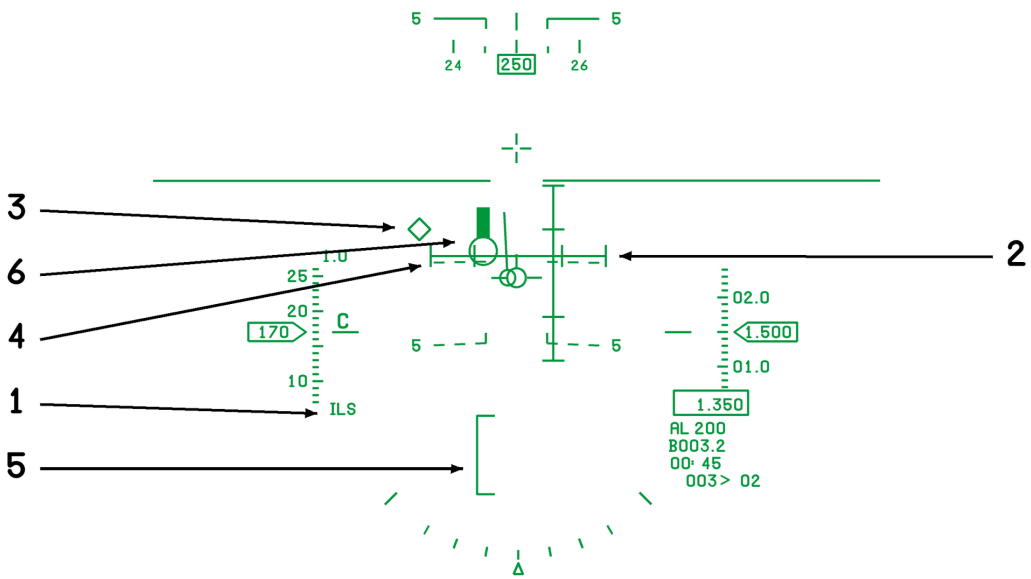


Figure 65 — HUD in ILS / landing mode

1	HUD mode
2	ILS crosshair
3	Selected STPT
4	-2.5 degrees help line
5	AOA bracket
6	Command steering (CMDS)

Table 16 — HUD in ILS / landing mode callouts

HUD mode (1): the ILS legend, top left, where NAV shows the master arm state.

ILS crosshair (2): the localizer bar (vertical) and the glide slope bar (horizontal), each with tick marks along its length. The localizer bar moves left or right of the flight path marker by the localizer deviation and the glide slope bar up or down by the glide slope deviation, so with both bars through the marker the aircraft is on the beam. Without a localizer signal the vertical bar gives way to a dotted scale to the left of the marker; without a glide slope the horizontal bar becomes a dotted scale above it.

Command steering (6): the circle with the stalk is the steering cue. It sits at the combined localizer and glide slope deviation, and flying the flight path marker into it brings the aircraft onto both beams at once. Before the glide slope is captured only the localizer steering is shown.

AOA bracket (5): the bracket to the left of the flight path marker is the angle of attack reference for the approach, shown with the gear down. The marker centred in the bracket is on speed, 13 degrees; marker above the bracket, the aircraft is fast; marker below it, slow.

-2.5 degrees help line (4): the dashed line on the ladder just below the horizon is the glide path reference for a normal approach. Keep the flight path marker on it and the aircraft flies a descent of between two and a half and three degrees — on a 3-degree glide slope the marker sits on the line with the glide slope bar through it.

Selected STPT (3): the steerpoint diamond, as in NAV. With a steerpoint set at the runway threshold it marks the touchdown point before the ILS bars are usable.

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4.3.4 HUD IN EEGS MODE (AA DOGFIGHT MODE)

Selecting the dogfight (DGFT) master mode puts the HUD into the Enhanced Envelope Gun Sight (EEGS) — the gun-aiming picture described here, distinct from the missile picture under HUD IN AIR TO AIR MODE. The mode legend reads DGFT; the Mach number and maximum-G readout the NAV HUD carries are not shown, only the current G-force remains. The same picture, with EEGS as the master mode text in place of DGFT, appears in the air-to-air master mode when the stores page's operating mode is switched to GUN — see DOGFIGHT AND MISSILE OVERRIDE. The figure shows the sight with an ACM lock held; the numbers refer to it.

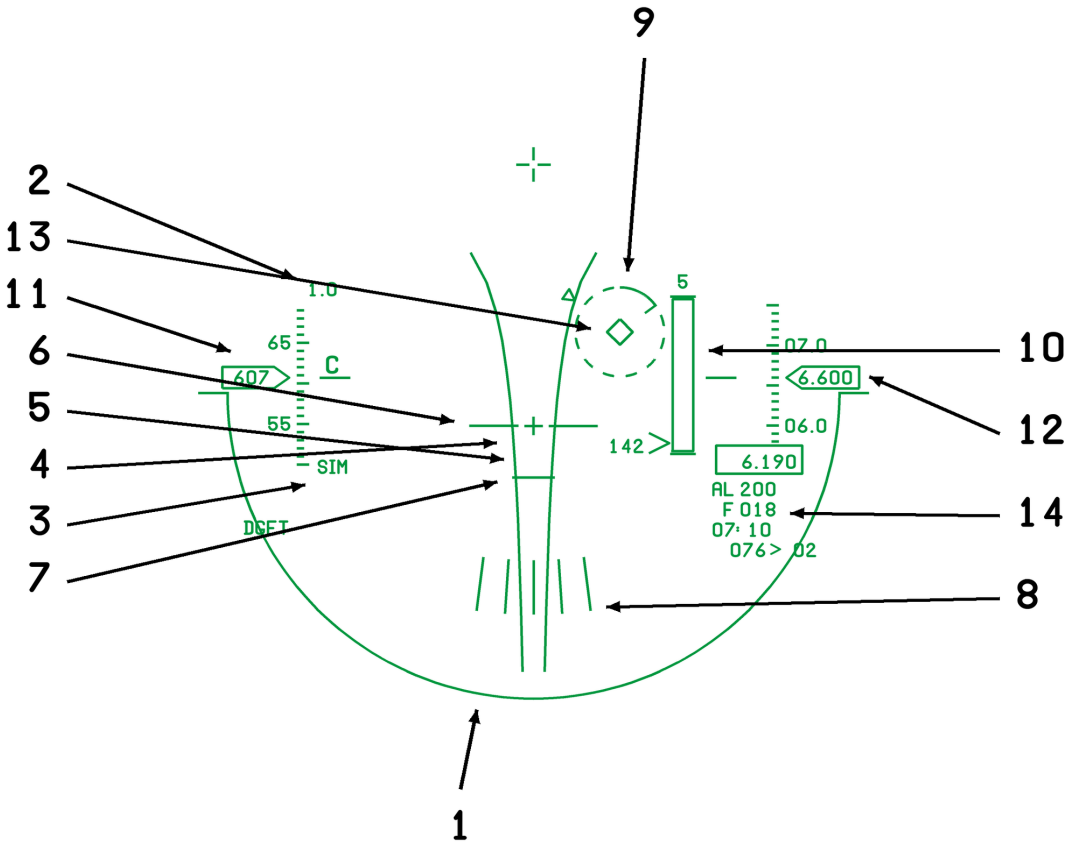


Figure 66 — HUD in EEGS mode

1	Boresight ring
2	Current G-force
3	Weapons status — SIM, OFF, ARM
4	Funnel
5	1 G pipper cross
6	Out-of-plane manoeuvre lines
7	9 G bar
8	MRGS lines
9	Target Designator Arc
10	Missile range scale and closure rate
11	Airspeed
12	Altitude
13	Missile diamond
14	Target range

Table 17 — HUD in EEGS mode callouts

THE FUNNEL

The funnel is the path a bullet fired now would trace against the sight: it curves and narrows with the aircraft's own body rates and load factor, so a target held inside it is being led correctly. With no target designated the funnel and its MRGS lines are all the sight shows. The wingspan the funnel is drawn for — the width it would have at each range — is set on the DED MAN page (LIST 5), 35 ft to start with.

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MRGS — the multiple reference gunsight lines — are the five lines at the funnel's lower end. They lengthen as the nose rate increases, giving a sense of turn rate without a locked target.

THE T

Once a target is tracked, the funnel gains a small cross on its centreline at the target's own range — the 1 G pipper — with a short line either side. Those two lines shrink as range closes and are the potential manoeuvre available in one bullet time of flight. A further rung across the funnel, the 9 G bar, marks the extra lead needed for a hard 7.3 g break. Together the cross, its two side lines and the bar are the sight's T.

THE TARGET DESIGNATOR ARC

A locked target carries its own symbol, independent of the funnel: a dashed circle with a solid arc sweeping clockwise from the top, reading the target's range on a clock face — a full sweep at 12,000 ft, closing by the hour for every 1,000 ft nearer. A caret outside the circle shows the target's aspect — at the top for head-on, at the bottom flying away — and two short parallel lines above the circle warn that the target is outside the arc's own range scale.

The locked target's range prints twice. In the lower-right data block (14) it takes the place of the steerpoint slant range, prefixed F for the fire control radar — in nautical miles to a tenth from one mile out, in hundreds of feet inside that. On the missile range scale beside the altitude scale (10) a caret rides the bar at the target's range, with the closure rate in knots printed beside it; without a lock the bar stays but the caret and the closure are blank.

> **NOTE:** The sight has five levels, matching what is known about the target: the funnel and MRGS alone with no lock; the T once a lock is held; a blended lead solution shortly after; and, a little longer after that, a refined solution that also accounts for the target's own manoeuvring. The picture above shows a locked, tracking solution — the level a held lock settles into.

THE MISSILE DIAMOND

With an AIM-9 aboard a small diamond (13) marks the missile's seeker line of sight. Uncued it sits 3 degrees below the gun cross, on the missile boresight — the same spot the BORE acquisition cross marks. With SLAVE selected on the stores page (the default) and an ACM lock held, the AIM-9M this aircraft carries slaves its seeker to the radar and the diamond moves onto the locked target, as in the figure. BORE on the stores page keeps it on the boresight.

ACM RADAR ACQUISITION

The radar in dogfight always starts in NO RAD — not radiating, no automatic lock — and is switched with the target management switch (TMS) on the stick: right for a wide 30 × 20 degree scan centred on the HUD, forward for BORE, which acquires whatever is directly ahead of the gun cross — or, with the helmet sight on, directly ahead of the helmet — and aft to break an existing lock or, from NO RAD, to select a narrow 10 × 60 degree vertical scan. Whichever submode is selected, the nearest contact within its scan volume is acquired automatically.

The active submode is shown on the HUD, and the three figures that follow show each cue on the whole sight, before any lock is held: with no target the funnel and the MRGS lines are all the EEGS draws, the missile diamond sits on its boresight, the range scale has no caret and the lower-right block keeps the steerpoint's B range. The MFD fire control radar page shows the submode too — its top two option buttons read ACM and the submode while dogfight is selected, and pressing the submode button cycles it the same way the switch does (the page is shown under FCR MODE). Nothing extra is drawn in 30 × 20.

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NO RAD: the words NO RAD sit above the gun cross while the radar is not radiating — the state every entry into dogfight starts from, and the state a break-lock returns to.

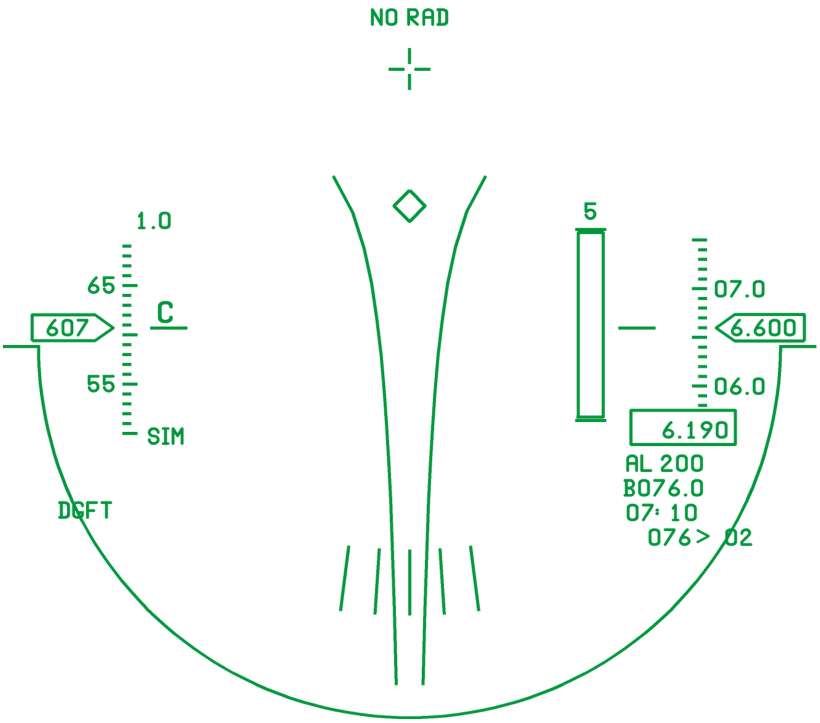


Figure 67 — DGFT with the ACM radar in NO RAD

BORE: a cross marks the acquisition spot 3 degrees below the gun cross — one radar beam width, out to 20 nautical miles. With the helmet sight on, the spot follows the helmet line of sight instead and the cue moves to the visor.

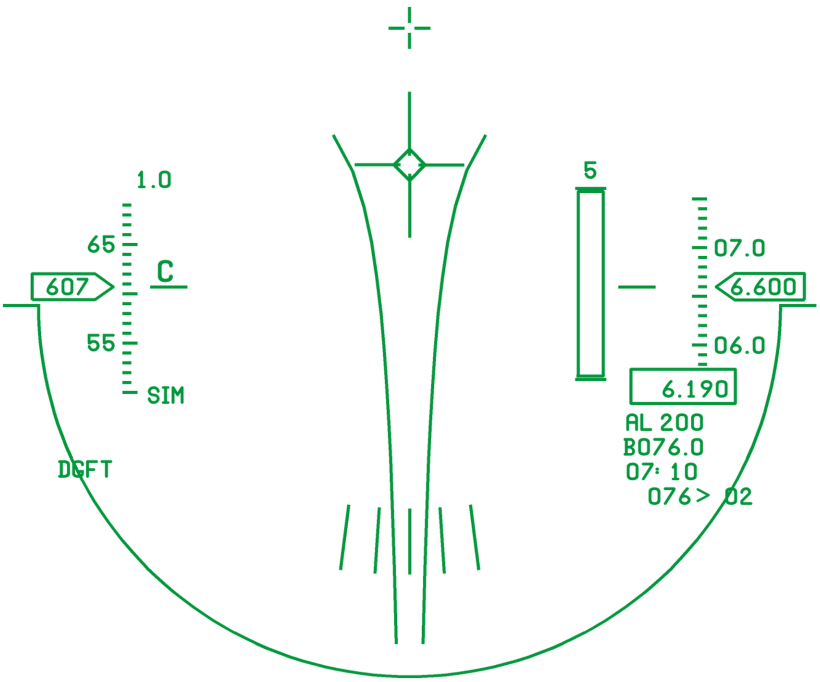


Figure 68 — DGFT in BORE

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10 × 60: a vertical line runs from the gun cross to the bottom of the glass, the centreline of the 10 degree wide, 60 degree tall scan — for a target that is above or below the nose in a turning fight.

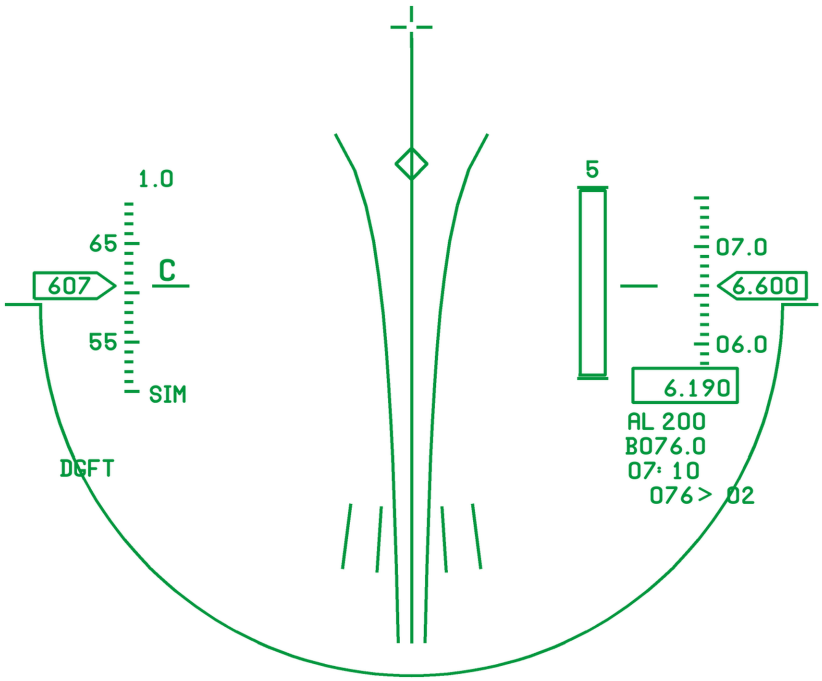


Figure 69 — DGFT in 10 x 60

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4.3.5 HUD IN AIR TO GROUND MODE

Selecting an air-to-ground weapon puts the HUD into CCIP — continuously computed impact point. The picture is the navigation picture with the bomb fall line and the impact point added; the mode legend reads CCIP and, as in every mode but NAV, the Mach number and max G are removed.

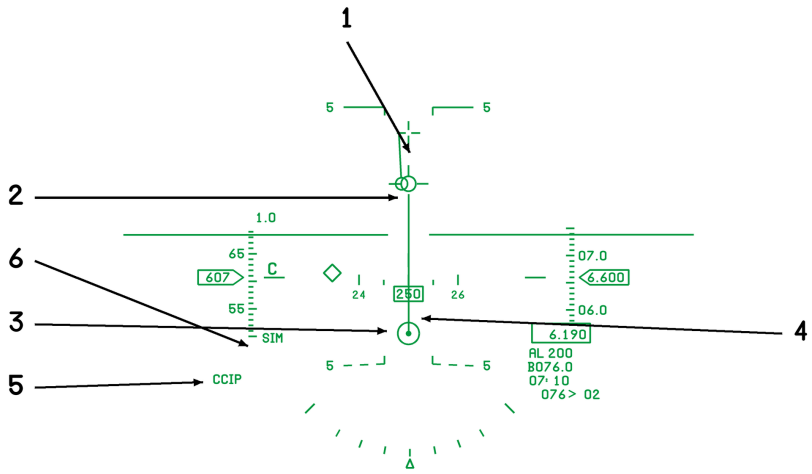


Figure 70 — HUD in air to ground mode, CCIP

1	Flight path
2	Distance line
3	Bomb drop indicator
4	Target point
5	CCIP mode
6	Master Arm switch

Table 18 — HUD in air to ground mode, CCIP callouts

Flight path (1): the flight path marker, as in NAV — the direction the aircraft is moving, which is the direction a bomb starts out in.

Distance line (2): the bomb fall line drops from the flight path marker to the impact point. Its length is the computed fall of a bomb released now, from the true airspeed, the height above the ground and the pitch attitude: it grows with height, shrinks with airspeed, and shrinks again the further the nose is pitched away from level.

Bomb drop indicator (3) and target point (4): the ring at the end of the line is the impact point — where a bomb released now would land — and the dot at its centre the aiming point. To deliver, fly so that the target moves down the fall line into the ring, and release as the dot crosses it.

CCIP mode (5): the mode legend.

Master Arm switch (6): on the left console; its position is shown top left on the HUD — ARM or SIM, nothing at OFF. Missiles and the gun fire only at ARM.

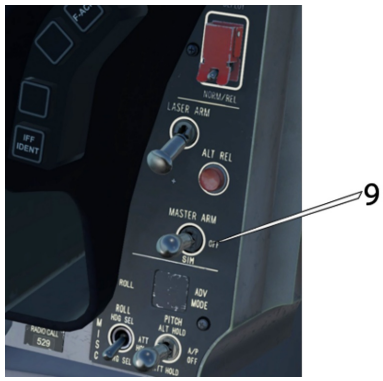


Figure 71 — Weapons Master Arm switch

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4.3.6 INDEXERS

Two small displays sit either side of the HUD frame on the glareshield: the AOA indexer on the left and the approach indexer on the right. Both are lit only with power on the aircraft.

AOA INDEXER

The left indexer shows the angle of attack against the approach band, so the approach can be flown by symbol without reading the gauge. Three symbols, one lit at a time:



Figure 72 — AOA indexer symbols

Amber chevron, pointing up: angle of attack at or below 11.5 degrees — fast; raise the nose.

Green ring: between 11.5 and 14 degrees — on speed.

Red chevron, pointing down: 14 degrees or more — slow; lower the nose.

The same information is carried by the AOA bracket on the HUD with the gear down (HUD IN ILS/LANDING MODE) and by the AOA gauge left of the airspeed indicator.

APPROACH INDEXER

The right indexer carries the nosewheel steering and air refuelling lamps:

NWS: nosewheel steering is engaged and the aircraft is on the ground. It goes out at lift-off even if steering is still selected.

RDY: the air refuelling door is open and the aircraft is ready to take fuel.

DISC: the AIR REFUEL switch is at OPEN but the door is not open — while it travels, or after a disconnect.

NOTE: The AR lamp (fuel flowing) is not modelled and never lights.



Figure 73 — AOA and approach indexers

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4.3.7 JHMCS — HELMET-MOUNTED CUEING SYSTEM

The Joint Helmet-Mounted Cueing System (JHMCS) projects symbology onto the pilot's visor, so that targets and steering can be seen away from the head-up display. Outside VR the same picture is drawn as a full-screen overlay, conformal with the outside view, since there is no physical helmet to carry it.

The JHMCS switch and its brightness control are on the left auxiliary console. The helmet itself is fitted from the kneepad's PILOT app (PILOT); with no helmet selected the switch has no effect. With the helmet on and the system on, look away from the HUD to see the symbology follow the head. The numbers refer to the figure.

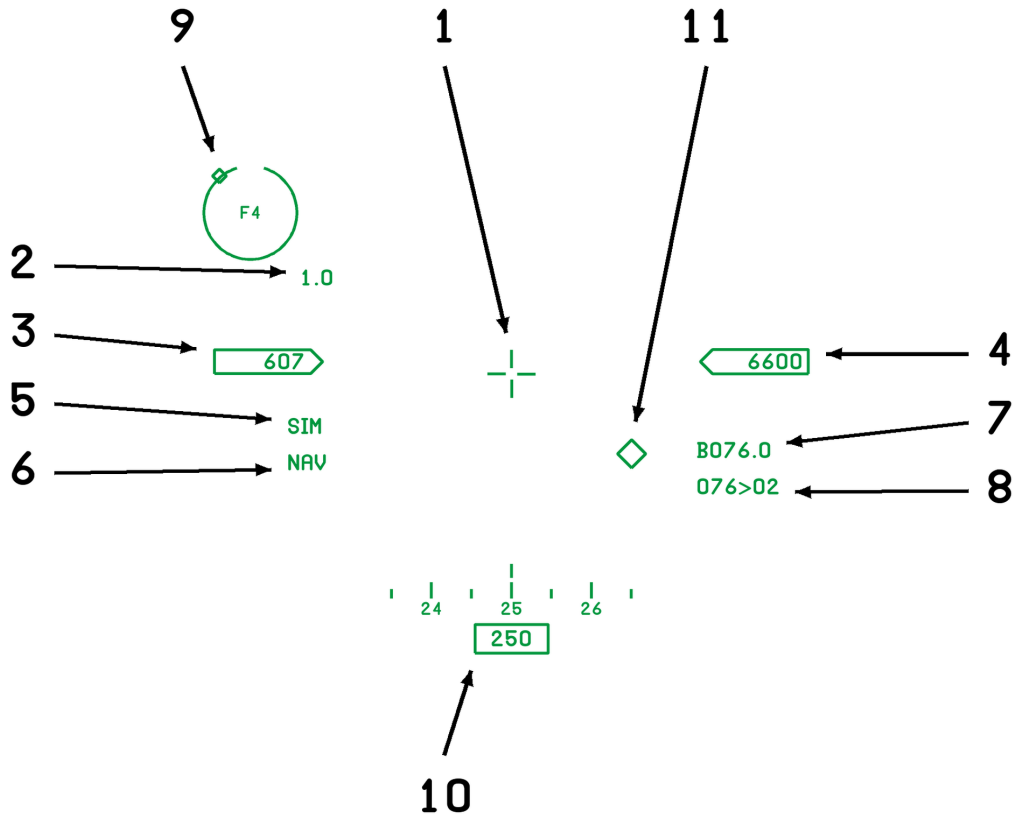


Figure 74 — JHMCS symbology, helmet sight in NAV

1	Aiming crosshair
2	Current G-force
3	Airspeed
4	Altitude
5	Master ARM mode
6	HUD mode
7	Slant range to target or steerpoint
8	Distance and number to steerpoint
9	Radar warning receiver threat circle
10	Heading
11	Steerpoint diamond

Table 19 — JHMCS symbology, helmet sight in NAV callouts

SYMBOLOGY

Aiming crosshair (1): the helmet line of sight — where the head is pointing. It is the centre of the display, and every position-locked symbol is placed by its true angle off it. In dogfight with BORE selected the radar acquires along it.

Current G-force (2): the load factor, top left, as on the HUD.

Airspeed (3): the boxed airspeed. The source and floor follow the same rules as the HUD's own speed box — calibrated airspeed below 60 kt, with the gear down or in DOGFIGHT, and a 48 kt floor.

Altitude (4): the boxed altitude, on the right.

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Master ARM mode (5) and HUD mode (6): the master arm state — SIM or ARM — and the master mode the HUD itself is in: NAV, CCIP, DGFT, AAM or the selected missile type (SRM/MRM).

Slant range to target or steerpoint (7): F and the range to the radar's locked target, or B and the straight-line range to the steerpoint, as in the HUD's lower right data block.

Distance and number to steerpoint (8): distance > steerpoint number, as on the HUD (076>02 is 76 nautical miles to steerpoint 2).

Radar warning receiver threat circle (9): a circle around the aiming cross with a gap at the helmet's own line-of-sight bearing. The closest emitter the radar warning receiver is showing appears as a diamond on the circle's rim, labelled with its RWR symbol, so a threat can be located by turning the head toward the gap and finding the diamond.

> **NOTE:** With several threats the diamond shows the one the RWR ranks highest — the most lethal first (a radar guiding a missile, then one tracking, then one searching), and between equals the closest. A silent emitter is not a threat. The ALR-56M's own hand-off logic is not modelled.

Heading (10): the magnetic heading tape and boxed heading at the bottom of the display, matching the HUD.

Steerpoint diamond (11): the selected steerpoint, placed on the real-world point it marks so it stays there as the head turns. In air-to-air the locked target's box is drawn the same way. A symbol that falls outside the visor's field of view is caged to its edge and crossed out.

> **NOTE:** Until the system has been aligned, the position-locked symbols — the steerpoint diamond and the target box — are withheld and the visor reads ALIGN instead. Starting with the engine already running aligns the system automatically; a cold start does not. See ALIGNMENT below.

BLANKING AND DECLUTTER

Two areas can each be blanked independently, so the helmet display does not obscure the HUD or clutter the panels below it: the HUD area, over the head-up display's own glass, and the cockpit area, below the glareshield and over the side consoles. Both are toggled from the HMCS DISPLAY page — see below — and both default ON.

Three declutter levels remove symbology in stages: level 1 shows everything; level 2 drops the RWR circle and the steerpoint line; level 3 leaves only the aiming cross, an air-to-air target and the heading. The level is set from the same DED page.

A long press — half a second or more — on the DMS switch aft toggles the helmet symbology on and off entirely. A short press keeps its existing function, cycling the sensor of interest.

THE HMCS DISPLAY AND HMCS ALIGN PAGES

From the DED MISC page, press RCL to reach HMCS DISPLAY. The DCS rocker moves the selection between HUD BLNK, CKPT BLNK, DECLUTTER and RWR DSPLY; INC, DEC or keypad 0 changes the selected field. SEQ moves to HMCS ALIGN.

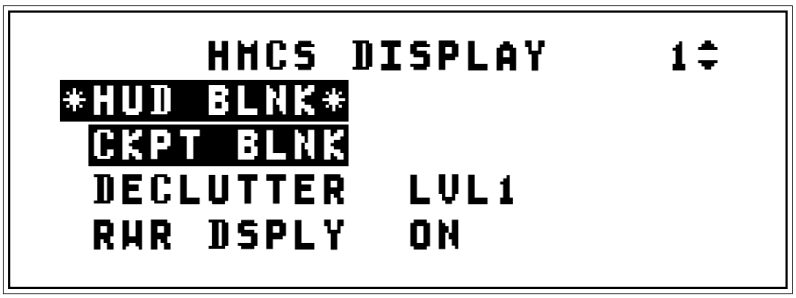


Figure 75 — HMCS DISPLAY

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ALIGNMENT

A cold start — the engine not yet running when the aircraft loads — leaves the helmet system unaligned: the visor shows ALIGN and withholds the steerpoint diamond and the target box. Starting with the engine already running aligns it automatically. To align by hand, open HMCS ALIGN, look inside the HUD field of view and press 0 (M-SEL).

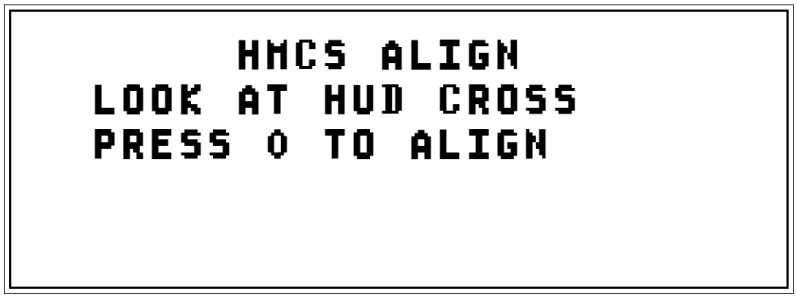


Figure 76 — HMCS ALIGN

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4.3.8 HUD IN AIR TO AIR MODE

Selecting an air-to-air weapon puts the HUD into its missile mode. This is not the dogfight gun sight described under HUD IN EEGS MODE — there is no funnel, and the display is built around the steering circle instead.

The ASE circle — Allowable Steering Error — is centred on the glass and appears only with a bugged target. Its radius follows the launch envelope: widest in the middle of the envelope, shrinking towards both the maximum and the minimum range. A wide circle is a permissive shot, a small one is a marginal one.

The scale on the right is the range to the bugged target. The figure at the top is the maximum range of the selected missile, the caret rides down the scale as the range closes, and the number beside the caret is the closure rate.

The target designator box sits on the bugged target itself, world-locked through the aircraft's attitude, for any radar lock — no missile need be carried. Inside it the missile seeker symbol follows the missile selected: a diamond for the AIM-9, a diamond with a cross for the AIM-120.

When the target is outside the HUD's field of view the box is replaced by the target locator line: a short line from the boresight cross pointing toward the target, with the angle off the nose in degrees at its end. Turn toward the line until the box reappears.

> **NOTE:** The mode legend, the Mach number and the maximum-G readout are ALL absent in this mode — the aircraft draws them only in NAV. What is left is the flight path marker, the attitude, the speed and altitude boxes, the heading and the air-to-air symbology.

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NOTE: The steering dot is not modelled. The reference confirms one exists but gives no lead-angle computation, so it is left out rather than invented.

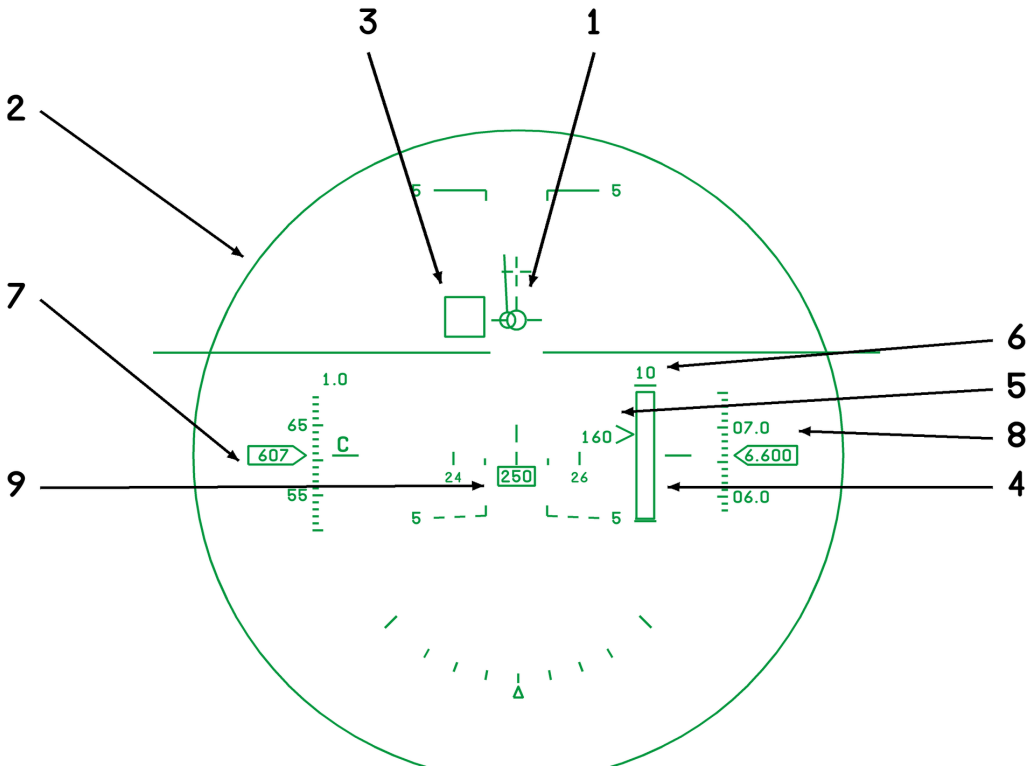


Figure 77 — HUD in air-to-air mode, ASE circle

1	Flight path marker
2	ASE circle
3	Target designator box
4	Missile range scale
5	Closure rate
6	Maximum range
7	Airspeed
8	Altitude
9	Heading

Table 20 — HUD in air-to-air mode, ASE circle callouts

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5. AIRCRAFT SYSTEMS

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5.1 EXTERNAL LIGHTS

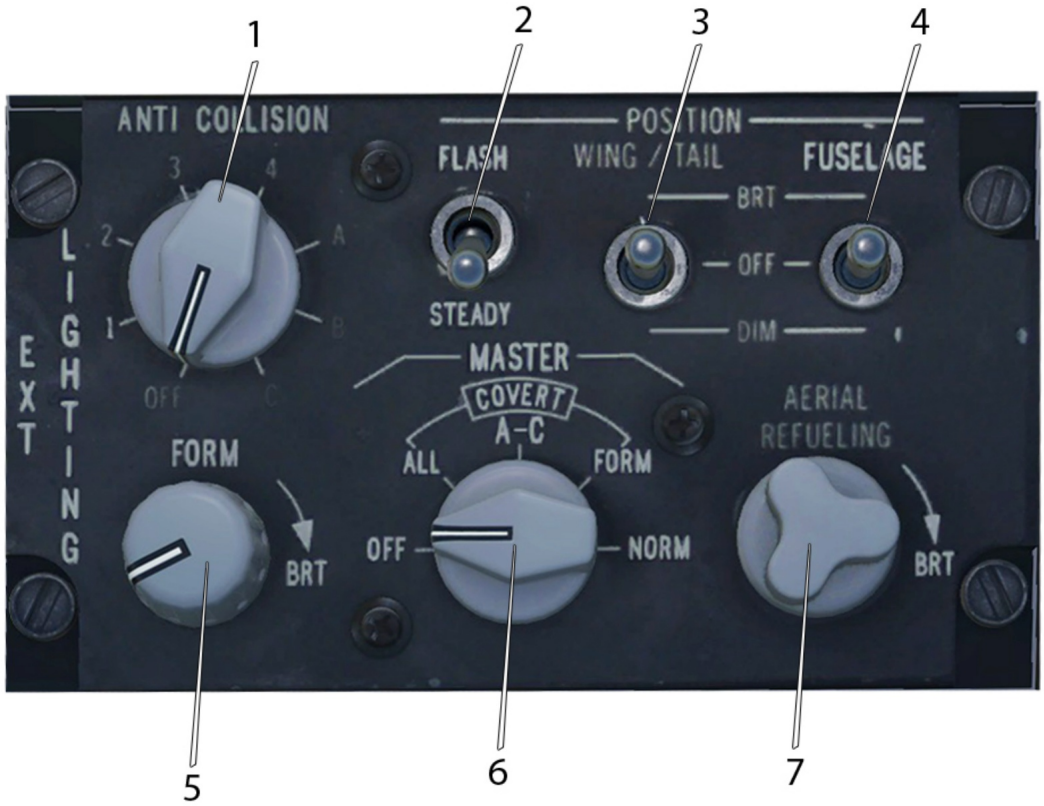


Figure 78 — Exterior lighting panel

1	Anti collision light — flashes per cycle
2	Flash / Steady — switches the POSITION lights between flashing and steady
3	Wing / tail lights — DIM, OFF, BRT
4	Fuselage lights — DIM, OFF, BRT
5	Formation lights brightness
6	Active lights — ALL, ANTI COLLISION, FORMATION, NORMAL
7	Aerial refuelling — lights the air refuelling door on top of the jet

Table 21 — Exterior lighting panel callouts

Through the “EXT LIGHTING” panel you can control the jet’s external lights.

1. Anti Collision Light. This is the light located on top of the tail and you can adjust how many times it flashes per cycle. This option is used in formation flights in order to identify each jet.
2. Flash / Steady. Select either steady lights or flashing lights.
3. Wing / Tail Lights DIM/OFF/BRT.
4. Fuselage Lights DIM/OFF/BRT.
5. Formation lights brightness.
6. Set active lights : ALL / ANTI COLLISION / FORMATION / NORMAL.

7. Aerial Refuelling. Lights the air refuelling door on the top of the jet.

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5.2 INTERNAL LIGHTS

The LIGHTING panel on the right console controls every light inside the cockpit. The knobs are numbered on the figure; the switch below them is described after.

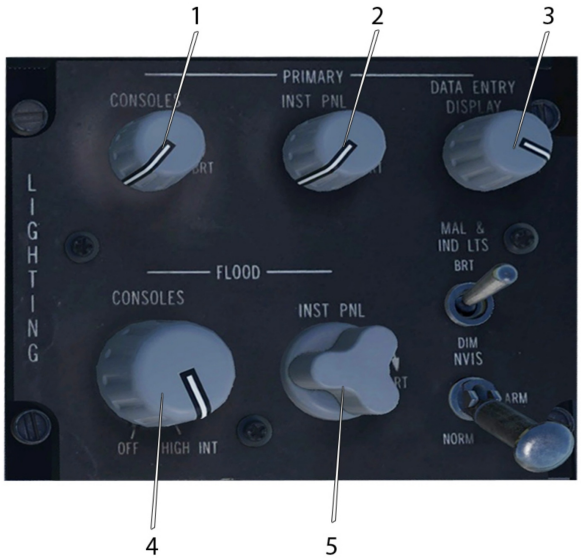


Figure 79 — Interior lighting panel

1	Consoles — lights the labels of the instruments and panels
2	INST PNL — lights the instruments
3	DED light adjustment
4	Flood lights, consoles — side consoles
5	Flood lights, INST PNL — front panels

Table 22 — Interior lighting panel callouts

Consoles (1): the PRIMARY CONSOLES knob lights the labels of the instruments and panels on both consoles — the backlighting of the legends themselves.

INST PNL (2): the PRIMARY INST PNL knob lights the instruments on the front panel and their indicators.

DATA ENTRY DISPLAY (3): the brightness of the DED.

FLOOD CONSOLES (4) and FLOOD INST PNL (5): the flood lamps that wash the side consoles and the front panel, independently of the legend lighting. The flood lamps themselves are movable fittings on the canopy sills: in the stowed position they are OFF whatever the knobs say, so if the floods do not come on, swing the lamps out first.

MAL & IND LTS: BRT or DIM for the warning, caution and indicator lamps.

NOTE: The NVIS position of the MAL & IND LTS switch is not modelled.

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5.3 FUEL QTY MANAGEMENT

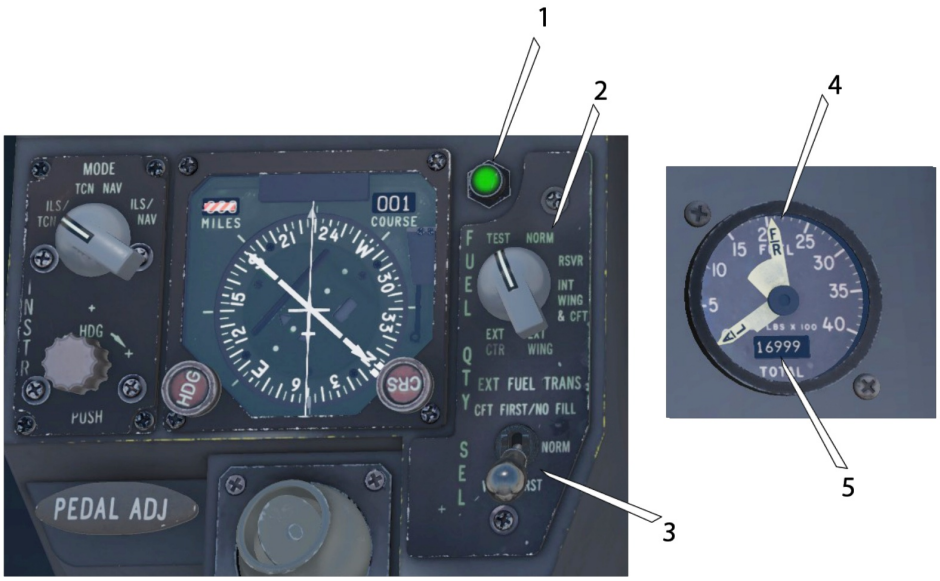


Figure 80 — Fuel quantity indicator and selector

1	Test light
2	Quantity select switch — TEST, NORM, RSVR, INT WING & CFT, EXT WING, EXT CTR
3	External fuel transfer switch — CFT FIRST/NO FILL, NORM, WING FIRST
4	Fuel quantity indicator — Forward Right (FR) and Aft Left (AL) needles, LBS x 100
5	TOTAL — digital readout of total fuel

Table 23 — Fuel quantity indicator and selector callouts

FUEL QTY SEL is located on the right side of pedestal and it consists of test light (1), quantity select switch (2), external fuel transfer (3) and indicator gauge (4) with Forward Right (FR), Aft left (AL) needles and a digital display of the total fuel, including any external tanks.

Switch (2) has the following positions:

TEST - Shows green light on, FR, AL at 20 position and 6000 in total fuel.

NORM - FR shows the total quantity of F-1, F-2 and the right wing tank.
- AL shows the total quantity of A-1 and the left wing tank.

RSVR - FR shows the quantity of the forward reserve.
- AL shows the quantity of the aft reserve.

INT WING & CFT - FR shows the quantity of the right wing tank.
- AL shows the quantity of the left wing tank.

EXT WING - FR shows the quantity of the right external wing tank.
- AL shows the quantity of the left external wing tank.

EXT CTR - FR shows the quantity of the centreline external tank.

External Fuel Transfer Switch (3) has 3 positions:

CFT FIRST/NO FILL - The CFTs are used before any external fuel, and cannot be refuelled. After them the centerline tank, then the external wing tanks.

NORM - External fuel goes into the internal wing tanks, centerline first, then the external wing tanks. The CFTs are not used while external fuel remains.

WING FIRST - External fuel goes into the internal wing tanks, the external wing tanks first, then the centerline tank. The CFTs are not used while external fuel remains.

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External fuel never goes to the engine directly or into the CFTs. It transfers into the internal wing tanks. A CFT transfers into the wing tank on its side and is used before the internal wing tanks. Fuel then flows from the wing tanks to the fuselage tanks (F-1, F-2 and A-1) and on to the reservoirs, so the fuselage tanks stay full until the wing tank fuel is gone. With the air refuelling door open the external tanks are depressurised and do not transfer.

NOTE: The automatic forward fuel transfer that trims the centre of gravity is not modelled, and the two wing tanks are drawn down together.

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5.4 TRANSPONDER

The IFF panel on the left console is the transponder. It replies to air traffic control with the mode 3/A code set on the wheels and, when enabled, with altitude.



Figure 81 — IFF / transponder panel

1	MASTER knob — turns the IFF on
2	Code wheels — set the 4 digit code

Table 24 — IFF / transponder panel callouts

MASTER (1): OFF or ON. With MASTER off the transponder does not reply, whatever the other switches are set to.

Code wheels (2): the four MODE 3 wheels set the 4-digit squawk.

ENABLE M3/MS: selects what the transponder replies with when MASTER is on — the mode 3/A code alone, the code with altitude (mode C), or nothing.

IDENT: the IFF IDENT button sends the ident pulse; the IFF IDENT indicator lights while it does.

NOTE: The M-4 CODE, C & I, MODE 4 REPLY and MONITOR switches are fitted but not modelled.

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5.5 RWR

The radar warning receiver display, at the top left of the front panel beside the left MFD, shows the radars that are illuminating you, each at its bearing from the nose, with its type code and what mode it is in.



Figure 82 — Radar warning receiver display, beside the left MFD

Switching on: press the POWER button on the threat warning auxiliary panel, forward on the left console. The RWR needs the engine running; it comes up powered on a running-engine start and off from cold and dark.



Figure 83 — Threat warning auxiliary panel (POWER), left console

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The scope: own aircraft at the centre, the nose at the top. A symbol at the top of the display is a radar straight ahead; at the bottom, straight behind. Distance from the centre is not range but lethality: a radar in search or acquisition sits along the outside of the display; one that is tracking you moves in to just outside the dashed circle and is boxed; one guiding a missile moves inside the circle and is ringed by a flashing circle. A chevron over the symbol marks an airborne radar. The highest-priority threat -- missile guidance before track before search, then the strongest signal -- carries a diamond; up to sixteen threats are shown, highest priority first. In the figure: a MiG-29 searching dead ahead, an F-16 tracking from ten o'clock, a Mirage 2000 guiding a missile from four o'clock and the priority threat, an unknown radar searching from astern.

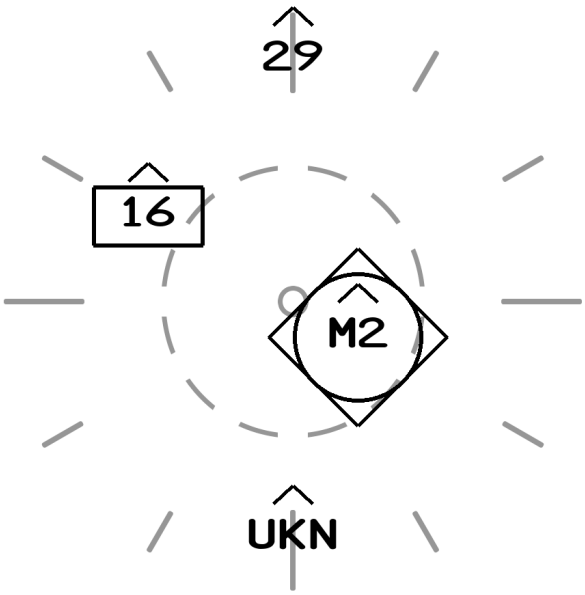


Figure 84 — RWR scope, drawn from the plugin: four emitters, the Mirage 2000 the priority threat

The codes: each symbol is the two-character code of the radar's aircraft -- M2 for a Mirage 2000, F4 for an F-4, and so on. The full list is in the next section. A type the receiver does not know is shown as UKN.

Where the picture comes from: with the DWSim Mission Editor running a mission, every AI aircraft carries a radar of its own, and the scope shows exactly those whose radar has you in its scan volume (search) or in its track file (track), and a radar guiding an AIM-120 at you shows as missile guidance until the missile hits, misses or loses you; with the editor installed but no mission running, nothing is emitting and the scope stays empty. Without the Mission Editor there is nothing to say who is emitting: every aircraft the simulator reports within 40 nautical miles is shown as a radar in search, and the RWR stays silent.

Coverage: the antennas see all round in azimuth but only 45 degrees above and below the aircraft's wings. A radar that ends up directly above or below the fuselage -- in a steep bank or a hard pull -- drops off the scope, lock and launch warnings included, until it is back inside that band.

Tones: a short triple chirp when a new radar appears, a steady beeping while any radar is tracking you, and a fast warble while one is guiding a missile at you (the warble replaces the beeping). They are heard inside the cockpit only, and their volume is the THREAT knob on the upper audio panel, which starts at maximum; X-Plane's master volume applies on top.

Brightness follows the cockpit lighting. The display also has a pop-up window, whose look is set on the kneepad (SETTINGS).

> **NOTE:** The priority threat is also shown on the helmet display as a circle around the aiming cross with its code on the rim at its bearing (JHMCS).
>
> **NOTE:** Of the RWR control panels' buttons only POWER is modelled. PRIORITY and OPEN modes, HANDOFF, UNKNOWN, SEARCH, ALTITUDE, TGT SEP, SYS TEST, the launch and activity lamps and ground or naval radars are not.

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5.5.1 List of RWR codes

AV AV88 Harrier
11 F111
13 C130
14 F14
15 F15
16 F16
17 C17
18 F18
37 AJS
52 B52
B1 B1
E2 E2D
E3 E3
E6 EA-6B
F2 F2 TORNADO
F4 F4
F5 F5
KC KC130
KC KC135
KC KC135MPRS
M2 MIRAGE 2000
19 MIG 19
21 MIG 21
22 TU22
23 MIG23
24 SU24
25 MIG25
29 J11
29 MIG29
29 SU27
29 SU33
30 SU30
39 SU39
39 SU25
31 MIG31
34 SU34
50 KJ2000
50 A50
76 IL76
78 IL78
95 TU95
AN AN26
AN AN30
BJ TU160
TU TU142

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5.6 VOR/TACAN NAVIGATION AND ILS LANDINGS

The aircraft navigates on TACAN, VOR and ILS through the DED and flies the result on the HSI, the HUD and the standby ADI. The numbers refer to the figure.

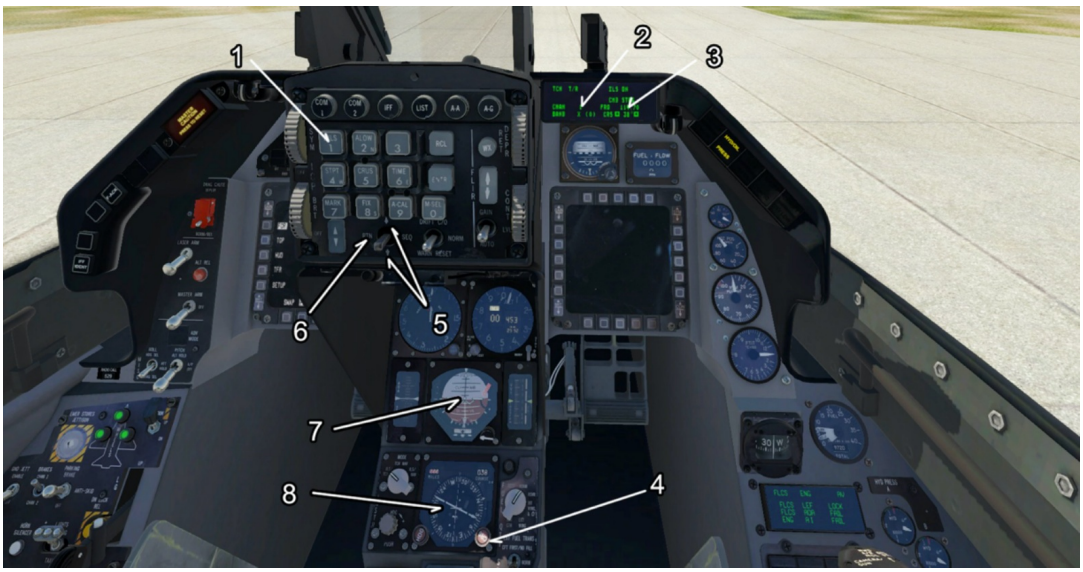


Figure 85 — Navigation controls and displays

Tuning (1, 2, 3, 5, 6): press T-ILS on the ICP (1) to open the T/ILS page. Enter a TACAN channel in the scratchpad (2), or move the asterisks down to FRQ (3) with the DCS rocker (5) and enter an ILS or VOR frequency, then to CRS for the course. RTN (6) cancels at any point. The page itself is described under T/ILS PAGE.

Instrument mode selector (9): the knob left of the HSI chooses what the HSI and the HUD fly. TCN and ILS/TCN put the TACAN on the HSI — course deviation, TO/FROM and distance from the tuned station; NAV and ILS/NAV put the steerpoint on it. The two ILS positions add the ILS bars to the HUD (HUD IN ILS/LANDING MODE); the other two leave the HUD in NAV.

HSI (8): the course is set with the CRS knob (4) and the heading bug with the HDG knob; the bug is what the autopilot flies in HDG SEL (AUTOPILOT). Without a usable station the OFF flag shows and the range window is blanked.

Backup ILS (7): the standby ADI carries localizer and glide slope needles of its own, so an ILS can be flown with the HUD off.

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5.7 MANUAL TRIM

The MANUAL TRIM panel on the left console trims the three axes by hand. Trim is normally flown from the hat on the stick; the panel does the same thing with wheels and shows where the trim is.

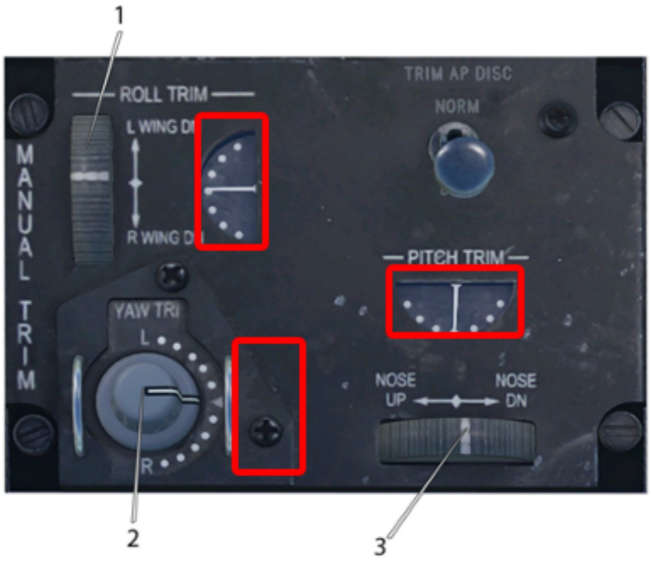


Figure 86 — Manual trim panel

Roll trim (1): the ROLL TRIM wheel, L WING DN to R WING DN, with its position shown on the indicator beside it.

Yaw trim (2): the YAW TRIM knob, L to R.

Pitch trim (3): the PITCH TRIM wheel, NOSE UP to NOSE DN, with its indicator above it.

Resetting: the areas outlined in red are click spots. A click on the roll or pitch indicator, or beside the yaw knob, returns that axis to zero.

TRIM AP DISC: NORM or DISC. At DISC the autopilot cannot be engaged and drops out if it was (AUTOPILOT).

> **WARNING:** Incorrect trim settings can create severe instability and may make it impossible to take off or fly. Check the trim is centred before take-off.

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5.8 AUTOPILOT

The autopilot is two switches on the miscellaneous armament panel, left of the left MFD, one for pitch and one for roll, plus the TRIM AP DISC switch on the manual trim panel that arms it. Each switch is a three-position toggle with the centre position off; moving it away from centre engages that mode and captures the current value.

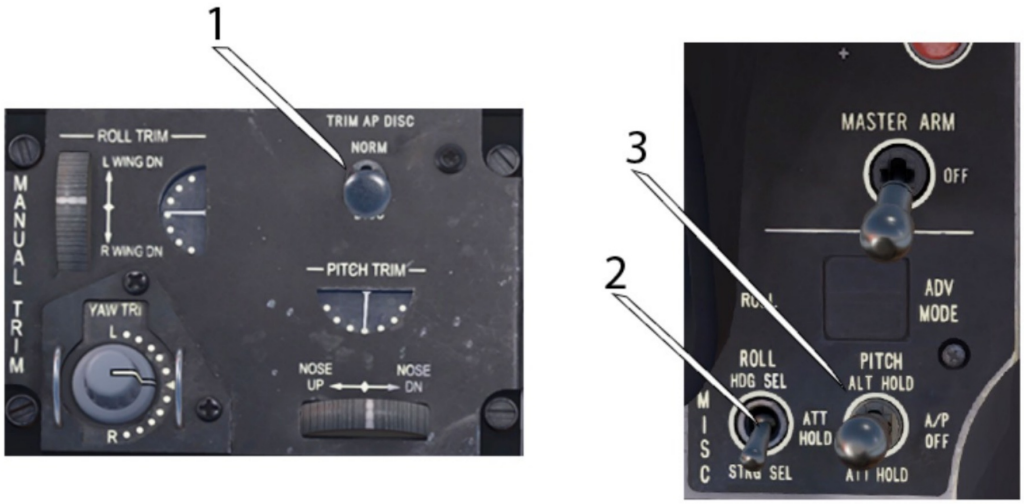


Figure 87 — Autopilot panel

1	TRIM AP DISC switch, on the manual trim panel — NORM or DISC
2	ROLL switch — HDG SEL, ATT HOLD, STRG SEL
3	PITCH switch — ALT HOLD, ATT HOLD, A/P OFF

Table 25 — Autopilot panel callouts

TRIM AP DISC (1): must be at NORM for the autopilot to engage. Moving it to DISC drops both channels.

ROLL (2): ATT HOLD holds the bank angle at the moment of engagement. HDG SEL turns onto the heading bug on the HSI and holds it, with up to 30 degrees of bank. STRG SEL turns onto the selected steerpoint and holds the bearing to it, with up to 45 degrees of bank.

PITCH (3): ALT HOLD captures the barometric altitude at engagement (to the nearest 10 ft) and holds it, commanding up to 8 degrees of pitch to get back to it. ATT HOLD holds the flight path angle at engagement. A/P OFF is the centre.

Stick override: a stick input beyond about 40 percent in pitch, roll or yaw disengages the autopilot and returns the pitch switch to A/P OFF.

NOTE: The autopilot flies through the flight control system — the stick moves with it — and does not touch the throttle.

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5.9 CAUTION AND WARNING LIGHTS

The caution light panel is on the right side of the instrument panel and the warning lights are grouped around it. MASTER CAUTION comes on with any caution panel legend; the red warning lights do not trigger it. Pressing MASTER CAUTION resets the light, and it comes on again for the next caution. The individual legends stay lit while their condition holds.

NOTE: MASTER CAUTION cannot be reset while ELEC SYS is lit. It goes out when the electrical fault clears.

NOTE: Not every legend below illuminates for a condition on this aircraft. Several are wired to the lamp test and to the power-up and power-down sweeps only. The legends are listed in full so that the panel can be read, and so that a light seen in the cockpit can be identified.

WARNING LIGHTS

ENG FIRE	Engine fire detected.
ENGINE	Engine fault.
HYD/OIL PRESS	Hydraulic or oil pressure outside limits.
FLCS	Flight control system fault.
DBU ON	Digital backup flight control law engaged. Not modelled on this aircraft — see FLIGHT CONTROL SYSTEM.
TO/LDG CONFIG	Takeoff or landing configuration warning.
CANOPY	Canopy not closed and locked.
OXY LOW	Oxygen quantity low.
EPU	Emergency power unit running.
ECM	Electronic countermeasures active.

Table 26 — WARNING LIGHTS

CAUTION PANEL

AVIONICS FAULT	Avionics fault.
ANTI SKID	Anti-skid braking unavailable.
ATF NOT ENGAGED	Automatic terrain following not engaged.
BUC	Backup fuel control in use.
CABIN PRESS	Cabin pressure outside limits.
CADC	Central air data computer fault.
EEC	Electronic engine control fault.
ELEC SYS	Electrical system fault.
ENGINE FAULT	Engine caution.
EQUIP HOT	Avionics equipment overheating.
FLCS FAULT	Flight control system caution.
FWD FUEL LOW	Forward fuel tank low.
AFT FUEL LOW	Aft fuel tank low.
HOOK	Arrestor hook not up and locked.
IFF	Identification friend or foe fault.
INLET ICING	Engine inlet icing.
NUCLEAR	Nuclear store status.
NWS FAIL	Nose wheel steering failed.
FUEL OIL HOT	Fuel or oil temperature high.
OBOGS	On-board oxygen generating system fault.
OVERHEAT	Overheat detected.
PROBE HEAT	Pitot probe heating fault.
RADAR ALT	Radar altimeter fault.
SEAT NOT ARMED	Ejection seat safety lever is SAFE (up).
SEC	Secondary engine control in use.
STORES CONFIG	Stores configuration disagrees with the aircraft.

Table 27 — CAUTION PANEL

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MAIN POWER PANEL

MAIN GEN	Main generator on line.
STBY GEN	Standby generator on line.
EPU GEN	Emergency power unit generator on line.
EPU PMG	EPU permanent magnet generator.
FLCS PMG	Flight control permanent magnet generator.
FLCS RLY	Flight control relay.
TO FLCS	Power routed to the flight control system.
MAIN PWR FAIL	Main electrical power failed.

Table 28 — MAIN POWER PANEL

The FLCS PWR block shows the four flight control power channels. The lamp test switch illuminates every legend on these panels at once and is the quickest check that the panel is powered.

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5.10 COUNTERMEASURES

The countermeasures dispenser controls are on the left auxiliary console, with the release button on the left wall.

The panel carries four arming switches, CMD 01 to CMD 04. Chaff and flares are armed with two of them, as described under GENERAL NOTES. The flares button on the left wall releases countermeasures.

> **NOTE:** Dispenser programmes are not modelled. Programme and mode selection, burst counts and intervals have no effect; release uses X-Plane's own countermeasure system, so the quantity carried is whatever the loadout provides.

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5.11 AUDIO AND INTERCOM PANELS

Two audio panels are on the left console. They set the volume of the radios and of the aural cues, and are independent of the X-Plane volume settings.

The upper panel carries the secure voice controls together with the missile, terrain following and threat tone volumes. The lower panel carries the intercom volume and the TACAN and ILS identification volumes.

> **NOTE:** On the F-16D the rear cockpit has its own audio panel on the left rear console, described under BACK SEAT COCKPIT.

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5.12 OXYGEN, ANTI-ICE AND DEFOG

This section collects the smaller environmental and anti-icing controls. Each appears on the aircraft's own checklists.

OXYGEN: the oxygen regulator is on the right console, with a supply lever, a diluter lever and an emergency pressure selector. The on-board oxygen generating system switch is on the left console. An OXY LOW warning and an OBOGS caution appear on the light panels. The OXYGEN PSI indication is not modelled and always reads zero.

ANTI-ICE: the anti-ice switch is on the right console. The probe heat switch is set on the BEFORE TAKEOFF checklist and has a PROBE HEAT caution legend.

DEFOG: the defog control sets airflow to the canopy.

> **NOTE:** Terrain following is not modelled on this aircraft. The MFD offers a TFR option, the ALOW page shows a TF ADV field and the aircraft's checklist mentions a manual TF flyup switch, but none of them drives a terrain following system.

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5.13 FLIGHT CONTROL SYSTEM

The F-16 is flown through a digital four-channel fly-by-wire flight control system. There is no direct mechanical link from the stick to the surfaces: the flight control computer reads the stick, the pedals, the trim panel, air data, rate gyros, accelerometers and the inertial system, and commands the horizontal tails, the flaperons and the rudder.

Pitch is carried by the horizontal tails moving together, roll by the flaperons, and yaw by the rudder, with the aileron-rudder interconnect coordinating turns.

> **NOTE:** This section describes how the flight control system behaves and what the pilot selects and sees. It does not tabulate the schedules the system flies to. Those are simulated to the aircraft's published performance and are read in the cockpit — on the head-up display, on the angle of attack indexer and on the fault lights — rather than from this manual.

GAIN SETS

The flight control system runs one of two sets of gains, and they are not merely louder or quieter versions of each other — the pitch axis is a different command system in each.

CRUISE gains: selected with the landing gear handle UP and the ALT FLAPS and AIR REFUEL switches stowed, or with either of those switches selected at higher airspeeds. Pitch is a g command system: neutral stick commands 1 g to the flight path, not a fixed attitude.

TAKEOFF AND LANDING gains: selected with the gear handle DOWN, or with the ALT FLAPS or the AIR REFUEL switch selected at lower airspeeds. Pitch becomes a pitch RATE command system.

> **NOTE:** The airspeed condition applies to the ALT FLAPS and AIR REFUEL switches only. It does not apply to the landing gear handle, which selects takeoff and landing gains at any speed. Weight on wheels plays no part in the selection.

ANGLE OF ATTACK AND G LIMITING

The flight control system limits angle of attack and load factor together, on a single schedule: the load factor the stick can command falls as angle of attack rises, and at the angle of attack limit the schedule allows 1 g and no manoeuvring command at all. That is how the limiter holds maximum angle of attack — by running the available g down to nothing, rather than by pinning the stick.

In cruise gains the pitch axis passes the pilot's command through untouched over the normal manoeuvring range, and blends progressively into an angle of attack command as the limit is approached. In takeoff and landing gains that handover begins lower, and the maximum angle of attack available at 1 g is correspondingly lower.

Negative load factor is limited as well, and the limit is relaxed at low airspeed.

The limiter cannot be flown through. Full aft stick at the limit produces the limit and nothing more, which is what lets the aircraft be flown into the buffet without departing.

STORES CONFIGURATION — CAT I AND CAT III

The STORES CONFIG switch selects the limiter category. CAT I is the clean and lightly loaded configuration. CAT III is selected for heavy, high-inertia loadings and trades manoeuvring authority for departure resistance on all three axes.

In CAT III the commanded load factor and the maximum angle of attack both fall, and both are scheduled on gross weight — the heavier the aircraft, the less of each is allowed. Roll rate is reduced as well. Selecting CAT III with a light aircraft therefore costs far less than selecting it near maximum gross weight.

> **NOTE:** STORES CONFIG has no effect in takeoff and landing gains. The rudder authority limiter is the one exception — it stays active on approach, always on the CAT I schedule.

RUDDER AUTHORITY

Pedal authority is progressively reduced with increasing angle of attack, because that is the regime in which rudder input departs the aircraft. Full pedal is available over the normal manoeuvring range and authority washes out to zero before the angle of attack limit is reached. In CAT III the reduction begins much earlier and reaches zero much sooner, which is the largest single difference the pilot will feel between the two categories.

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NOTE: This applies to the pilot's pedal command only. The aileron-rudder interconnect, the stability augmentation and the trim authority are not reduced.

MANUAL PITCH OVERRIDE

The MPO switch overrides the angle of attack limiter well above the normal limit, so that the pilot can command nose-down pitch in a deep stall. It is held down; releasing it restores normal limiting. On the F-16D the switch is repeated on the rear left console.

LEADING AND TRAILING EDGE FLAPS

The trailing edge flaps are fully down at low airspeed and retract progressively as speed increases, reaching the faired position well below the maximum. They are scheduled automatically and need no pilot action. The leading edge flaps are scheduled with angle of attack and Mach.

FLIGHT CONTROL FAULTS

The air data and angle of attack inputs to the flight control computer are triplex, and their faults come in pairs: losing one channel is a different fault from losing two, with different consequences and different lights. Both are armable from X-Plane's own Failures menu, mean time between failures included.

FLCS faults latch. They hold until FLCS RESET is pressed, and the malfunction procedures depend on that: a fault whose cause has cleared goes out on reset, and one whose cause is still present re-latches on the spot and the indication stays on. FLCS BIT reports the same fault set, and its result latches until another BIT is run.

STANDBY GAINS: a dual air data failure drops the flight control system onto standby gains, which are fixed rather than scheduled with airspeed, with the leading edge flaps driven to a fixed position. The FLCS warning light and the FLCS FAULT caution both illuminate. The aircraft is still flyable, but the handling is now tailored to one point in the envelope and will feel wrong away from it — hold a moderate airspeed, avoid the low end, and land as soon as practical.

DIGITAL BACKUP: the DBU switch on the left console selects the digital backup mode, and the DBU ON warning light annunciates it. The preflight check — select BACKUP, check that all surfaces respond normally, then OFF — is performable as published.

NOTE: The digital backup control law itself is deliberately not simulated. Selecting BACKUP annunciates the mode and the surfaces go on responding normally; it does not degrade the handling. What DBU changes about the gains and the limiters is not something we can source, and inventing flight behaviour would be worse than leaving it out.

CONTROL SURFACE AND HYDRAULIC FAILURES

The flight control computer drives the flaperons, the horizontal tails and the rudder itself, so their failures are modelled by the aircraft. They can be armed from X-Plane's Failures menu — the flaperon (aileron), elevator and rudder failures and their jams, the wing, horizontal and vertical stabiliser separations and the two hydraulic pumps.

Failed: the actuator has lost its signal or its pressure, and the surface moves smoothly back to neutral and stays there, whatever the stick asks.

Jammed: the surface holds the deflection it had when it jammed. A flaperon that jams at full roll deflection stays there — the worst case.

Separated: the structure has left the aircraft and X-Plane removes it aerodynamically; the flight control computer simply stops commanding it.

The left and right flaperon and tail failures act on their own side. X-Plane's elevator failures are not per side, so an elevator failure fails both tails; either rudder failure fails the aircraft's single rudder.

Hydraulics: the surfaces are powered by two independent hydraulic systems, A and B, and one is enough to fly. With one lost the surfaces keep their full travel but move more slowly; with both lost every surface fails and goes to neutral, and the aircraft can no longer be controlled. The two pressure gauges read A and B separately.

A failed, jammed or separated surface, or the loss of both hydraulic systems, lights the FLCS warning light and the FLCS FAULT caution; a single hydraulic loss shows on its gauge and the HYD/OIL PRESS light. Every one is recorded on the MFD

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fault list (TEST PAGE). Unlike the FLCS faults above they do not latch: when the failure is repaired — or the aircraft respawned — the surface returns to normal and the lights go out without an FLCS RESET.

NOTE: The emergency hydraulic supply from the EPU is not modelled, so a dual hydraulic failure is permanent until it is repaired. How much slower a single system moves the surfaces is our estimate; the reference gives no figure.

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6. WEAPONS

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6.1 AIR TO AIR/GROUND WEAPONS

NOTE : From V 1.2 in order to add/remove external fuel tanks (except from CFT's) you must use the XP weapons menu :

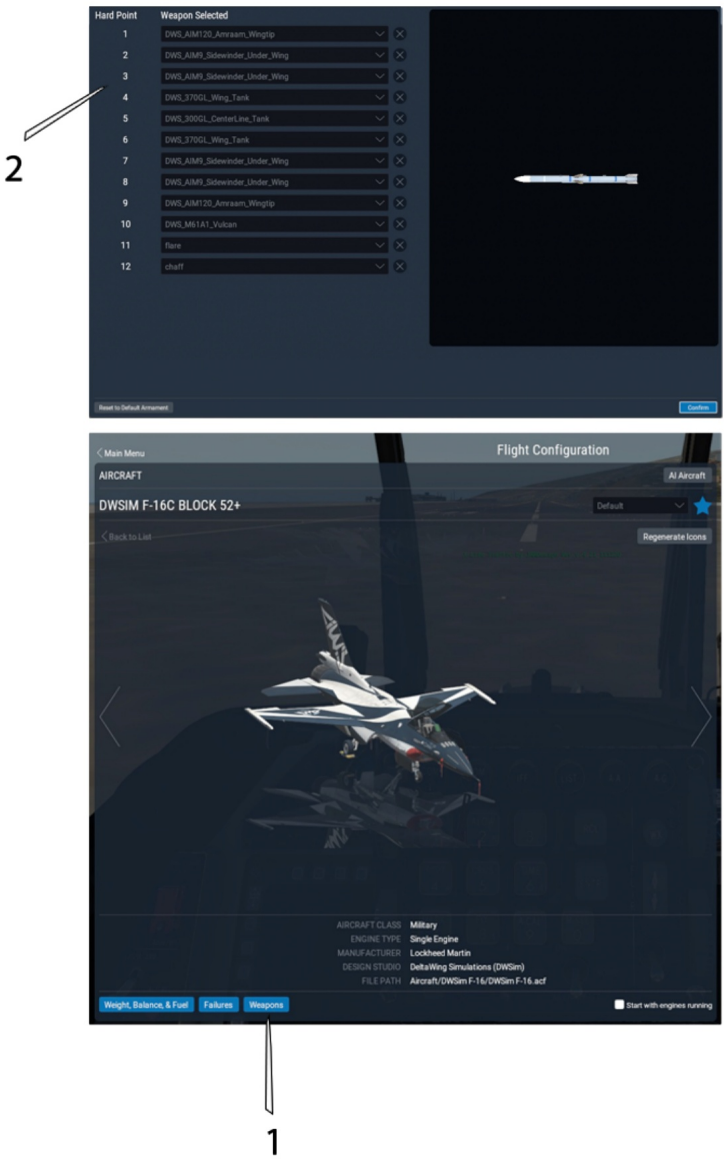


Figure 88 — X-Plane weapons configuration

1	Weapons selection
2	Weapons menu — the fuel tank or load carried on each station

Table 29 — X-Plane weapons configuration callouts

On aircraft load, you can choose weapons (1) and then from weapons menu (2) you can choose each type of fuel tank or load. In menu (2) you can use the positions as followed :

Station 1 – Air to Air Missiles
Station 2 – Air to Air Missiles
Station 3 – Air to Air Missiles / Bombs
Station 4 – Air to Air Missiles / Wing loads (fuel) / Bombs
Station 5 – Centerline load (fuel or pod)

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Station 6 – Air to Air Missiles / Wing loads (fuel) / Bombs
Station 7 - Air to Air Missiles / Bombs
Station 8 - Air to Air Missiles
Station 9 - Air to Air Missiles

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Loading Stations

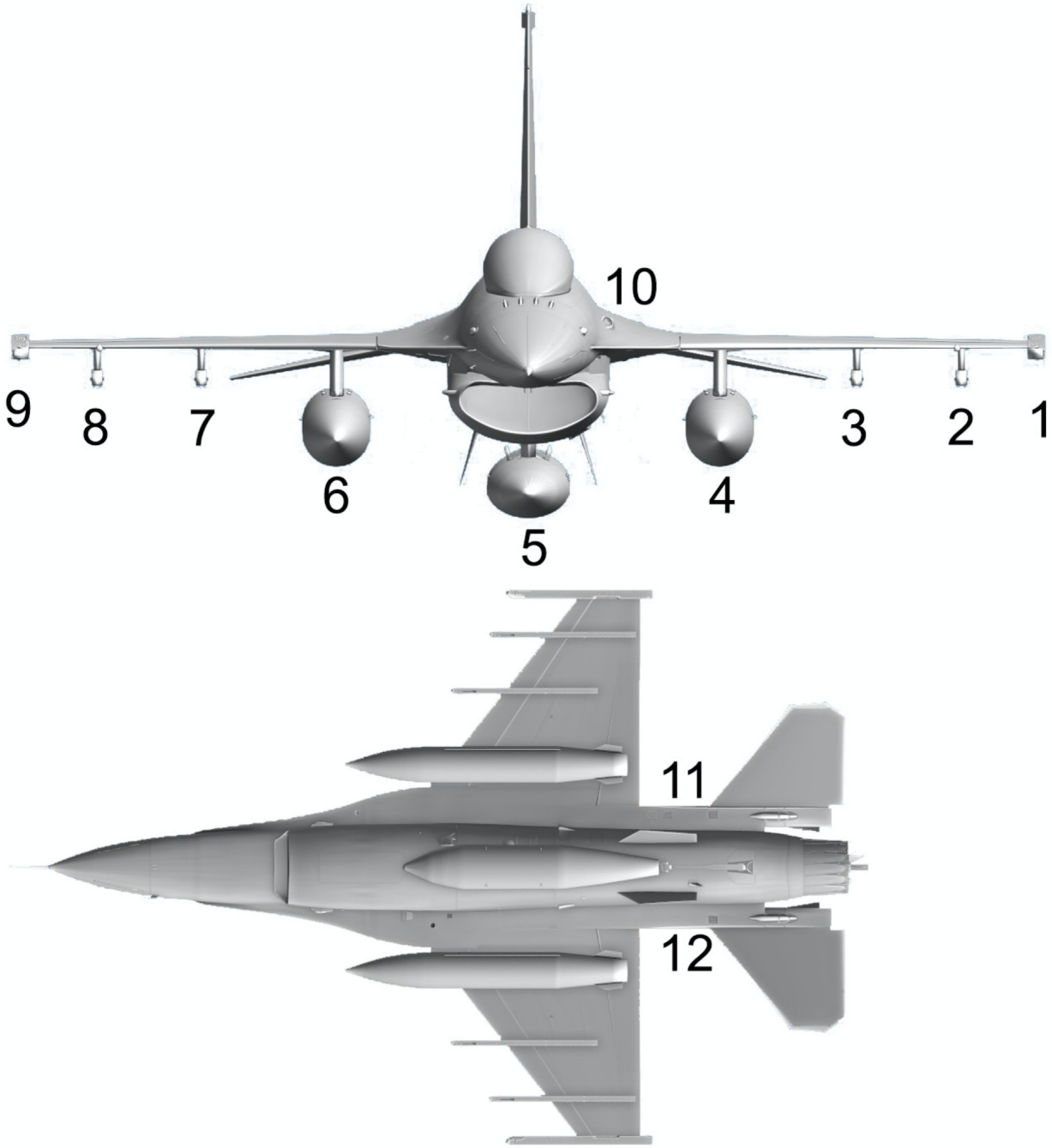


Figure 89 — Station numbering

NOTE : Stations 10, 11 and 12 must NOT be changed. You can always press the “Reset to Default Armament” button to reset the loadout of your jet.

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6.2 20mm M61 GATLING GUN

Figure 90 — 20 mm M61 gun and AIM-9M Sidewinder

Mass : 830 lb – 370 kg
Ammunition : 320 lb – 145 kg
Rate of Fire : 6000 rounds per minute

AIM – 9M SIDEWINDER



Mass : 188 lb – 85 kg
Length : 9 ft – 3 m
Warhead : 20 pounds – 9 kg
Max Speed : Mach 2.5
Range : > 0.6 miles < 22 miles

AIM – 120C AMRAAM



Figure 91 — AIM-120C AMRAAM

Mass : 335 lb – 152 kg
Length : 12 ft – 3.7 m
Warhead : 40 pounds – 18 kg
Max Speed : Mach 4
Range : > 0.6 miles < 90 miles

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Figure 92 — MK-83 and MK-84 general purpose bombs

MK-83



Mass : 1014 lb – 459 kg
Length : 119.49 inches – 3 m
Warhead : 445 lb – 202 kg

MK-84



Mass : 2039 lb – 925 kg
Length : 129 inches – 3.28 m
Warhead : 945 lb – 429 kg

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7. KNEEPAD

The pilot's kneepad is a rugged tablet strapped to the pilot's leg: the aircraft's own menu for loadout, pilot setup, checklists, flight plans and data tapes, coordinates, camera views, HOTAS axes and settings — and, with DeltaWing Simulations' Mission Editor installed, the Mission Editor itself. Everything is done by clicking the screen as you would tap a real one.



Figure 93 — The kneepad tablet on the pilot's leg

1	PILOT'S KNEEPAD lever — shows and stows the tablet
2	Rubber edge — click to turn the tablet between portrait and landscape

Table 30 — Kneepad tablet callouts

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SHOWING AND HIDING

PILOT'S KNEEPAD lever (1): on the inboard edge of the left console, beside the seat. ON shows the tablet on the pilot's leg, OFF stows it (command viper/cockpit/shoulder_harness). The tablet runs on its own battery, so it works with the aircraft cold and dark; its screen brightness follows the light in the cockpit.

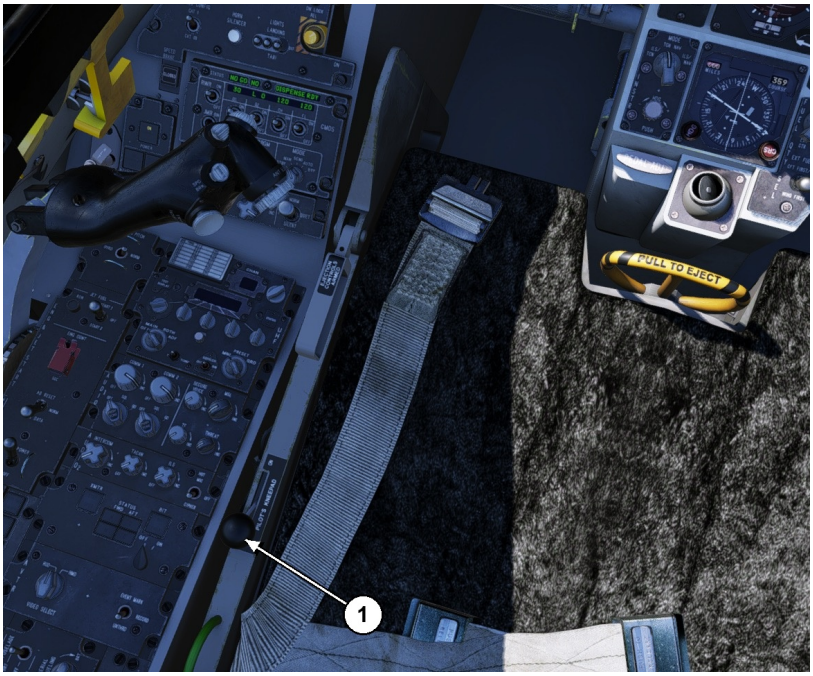


Figure 94 — The kneepad stowed

1	PILOT'S KNEEPAD lever — at OFF, the tablet stowed

Table 31 — Kneepad stowed callouts

THE POP-UP

The same tablet also opens as a window. The command viper/Menu (Open Plane Menu) opens and closes it; assign it to a key or button in X-Plane's settings. The pop-out icon in the tablet's status bar, beside the clock, does the same (see the home screen below), and in the window it puts the tablet back. In X-Plane's menu for this aircraft, DATA CARTRIDGE (KNEEPAD) opens the window on the FLIGHT PLAN app and DATA CARTRIDGE EDITOR opens it on the DTC EDITOR app. The window can be moved and resized like any X-Plane pop-up. It is not a copy: it shows the same apps in the same state as the tablet on the leg, and turns with it.

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THE HOME SCREEN



Figure 95 — Kneepad home screen

Status bar: the Zulu date-time group on the left (e.g. 231432Z SEP), a green UNCLASSIFIED banner in the middle and the local time on the right, with the pop-out icon just to its left. Tap the icon to pop the tablet out into a window; tap it in the window to put the tablet back. It is shown in every app.

Apps: the nine tiles open LOADOUT, PILOT, CHECKLISTS, FLIGHT PLAN, DTC EDITOR, COORDINATES, CAMERA, HOTAS AXES and SETTINGS, each described in the sections that follow. A tenth, MISSION EDITOR, appears only while the Mission Editor plugin is running (MISSION EDITOR); the portrait home screen then puts the apps in rows of four.

Zulu: the Zulu time to the second, with the local time under it.

Data cartridge: the ID of the tape in the cartridge slot, or No cartridge. Click it to open FLIGHT PLAN.

Start-up state: the state the aircraft will load in next time. Click it to open SETTINGS.

Inside an app, HOME at the top left returns to the home screen, and so does the bar at the bottom edge of the screen. A list longer than the screen scrolls: drag it up or down, or use the mouse wheel.

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PORTRAIT AND LANDSCAPE

The tablet sits on a swivel. Click its rubber edge (2) to turn it a quarter turn between portrait and landscape, or use the command viper/menu/kneepad_rotate. Every app lays itself out for the new shape: the home screen puts the apps in a row of five and one of four (two rows of five with the Mission Editor), and CHECKLISTS shows the list of checklists beside the open one.

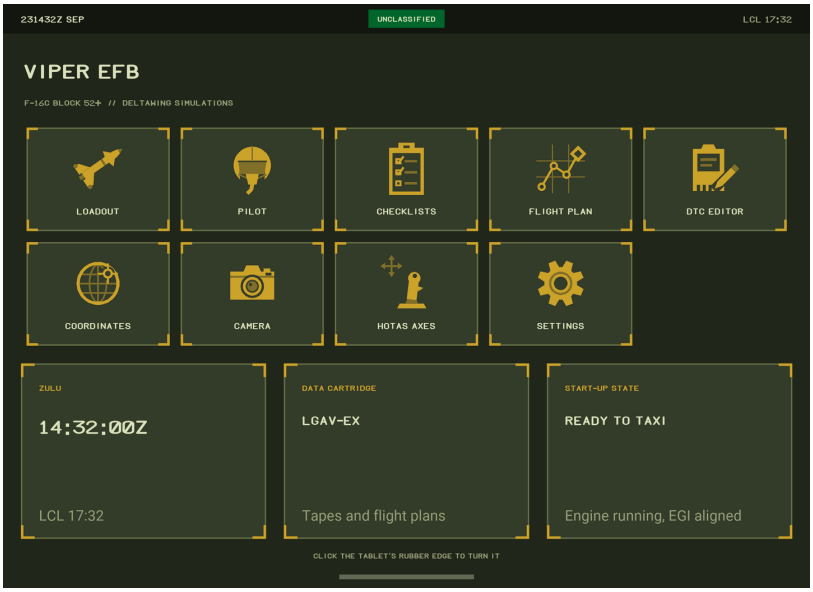


Figure 96 — Kneepad home screen, the tablet turned to landscape

DAY AND NIGHT

By day the tablet is olive and amber; at night it turns to green on black so it does not spoil the pilot's night vision. The choice is on the SETTINGS app: AUTO, the default, changes over as the sun goes down, or DAY and NIGHT hold one look.



Figure 97 — Kneepad home screen, night lighting

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SAVE AS DEFAULT

LOADOUT, PILOT and SETTINGS end with a SAVE AS DEFAULT button, which keeps that app's choices for the next flight; the tablet confirms with SAVED AS DEFAULT. Without it a change lasts until the aircraft is reloaded. The tablet's own orientation and day / night choice are kept without asking.

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7.1 LOADOUT

LOADOUT fits the optional equipment and the ground equipment. Each row is a switch: click it to change it.

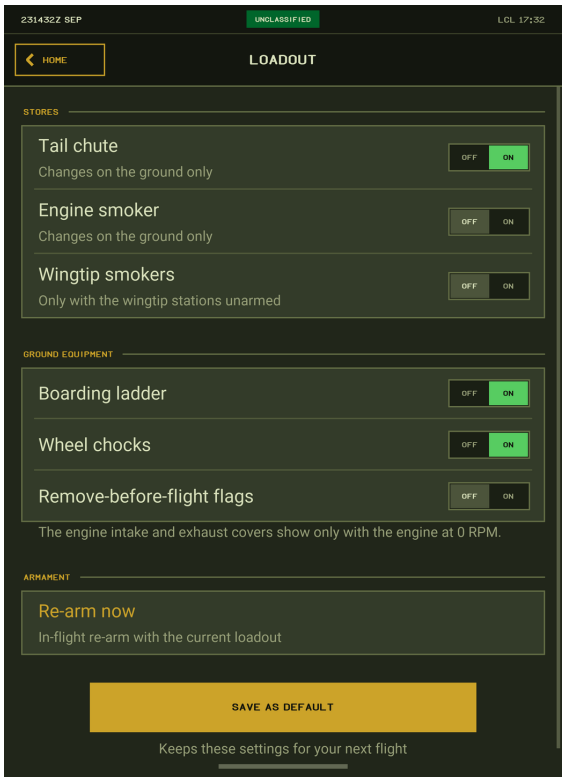


Figure 98 — Kneepad LOADOUT app

STORES

Tail chute: fits the drag chute. It can be changed on the ground only.

Engine smoker: fits the engine smoke system. It can be changed on the ground only.

Wingtip smokers: fits the wingtip smoke pods. The wingtip stations must carry no missiles.

> **NOTE:** The conformal fuel tanks are not on the kneepad. They come with the aircraft: load the with-CFT variant in X-Plane to fly with them, and the jet carries more fuel.

GROUND EQUIPMENT

Boarding ladder: shows whether the ladder is out. The ladder deploys and stows by itself: it appears whenever the jet is on the ground with the canopy open, and stows otherwise. The switch cannot override it.

Wheel chocks: the main wheel chocks, fitted by the ground crew. They appear only when the jet is on the ground with the engine shut down, the wheels stopped and the PARKING BRAKE set. Switched on at any other time, they appear once those conditions are met.

Remove-before-flight flags: the RBF covers and flags. The same conditions apply, and the flags are pulled as soon as one of them is no longer met. The engine intake and exhaust covers show only with the engine at 0 RPM.

ARMAMENT

Re-arm now: re-arms the aircraft with its current loadout, through X-Plane's own re-arm. It works in flight too.

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7.2 PILOT

PILOT dresses the pilot figure. Click an option to select it; the selected one is lit.

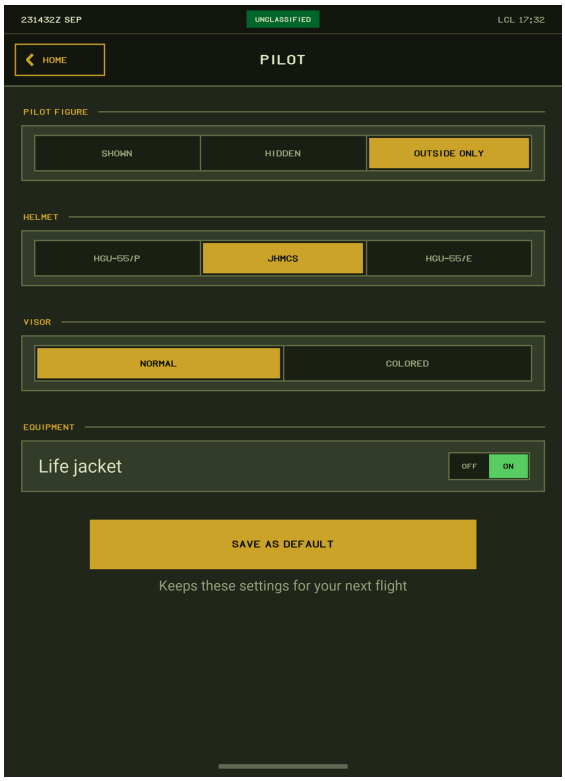


Figure 99 — Kneepad PILOT app

Pilot figure: SHOWN keeps the pilot in the seat, HIDDEN removes him, and OUTSIDE ONLY shows him from outside views only, so the cockpit view stays clear.

Helmet: HGU-55/P, JHMCS or HGU-55/E. The JHMCS is the only helmet that carries the helmet-mounted symbology; with another helmet fitted the JHMCS switch on the left console has no effect (JHMCS).

Visor: NORMAL (dark) or COLORED.

Equipment: the life jacket, on or off.

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7.3 CHECKLISTS

CHECKLISTS carries the aircraft's normal checklists, sixteen of them in four groups: COCKPIT INTERIOR CHECK (left console, left auxiliary console, instrument panel, right auxiliary console, right console), START, TAXI AND TAKEOFF, and LANDING AND SHUTDOWN. Beside each checklist is how many of its items are ticked, or DONE.

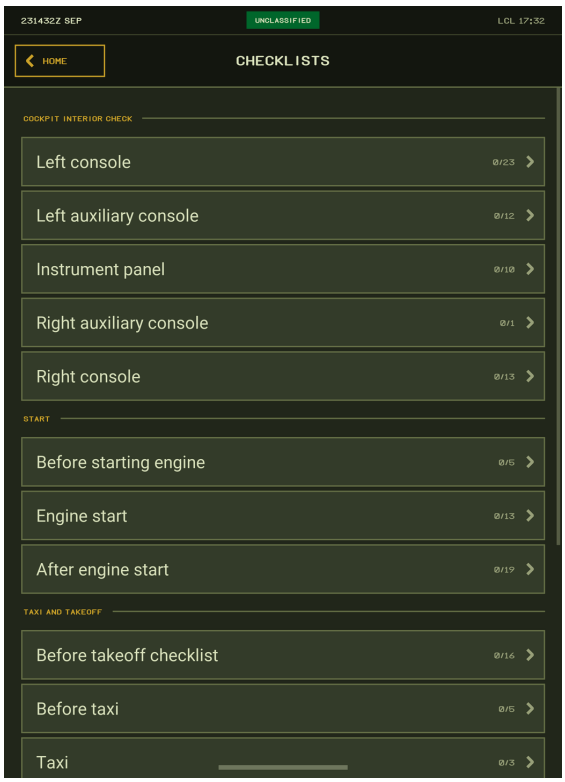


Figure 100 — Kneepad CHECKLISTS app, the list of checklists

Click a checklist to open it. Each item reads as on a printed checklist, the item on the left and the action on the right; click it to tick it, and again to clear the tick. RESET clears the whole checklist and NEXT CHECKLIST moves on to the one after it. In portrait the back button at the top left, labelled CHECKLISTS, returns to the list; in landscape the list stays on the left and the open checklist is beside it.

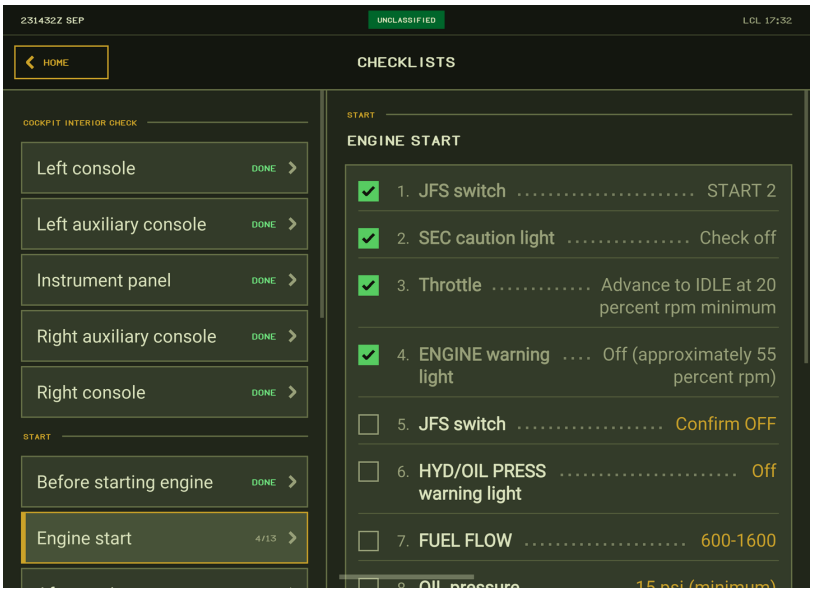


Figure 101 — Kneepad CHECKLISTS app in landscape, a checklist part done

NOTE: The ticks are kept while the aircraft is loaded, not from one flight to the next.

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7.4 FLIGHT PLAN

FLIGHT PLAN lists two kinds of file: flight plans in X-Plane's .fms format, and data tapes — the aircraft's data transfer cartridge, as a file. Both live in the folder DWSimFlightplans at the top of the X-Plane installation, beside the Aircraft and Resources folders; create it if it is not there. The item DATA CARTRIDGE (KNEEPAD) in X-Plane's menu for this aircraft opens the pop-up straight on this app.

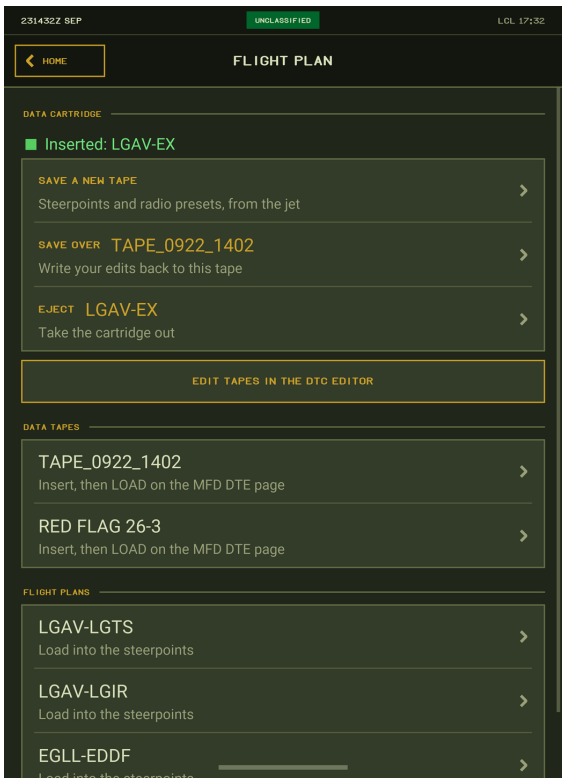


Figure 102 — Kneepad FLIGHT PLAN app, a data tape inserted

DATA CARTRIDGE

The first line shows the tape in the cartridge slot, INSERTED and its ID, or No cartridge inserted. A tape holds a mission: its name, the steerpoint database — all 99 slots, steerpoints, markpoints, threats and targets — and the radio presets, TACAN channel and ILS frequency. It is the same file the DWSim Mission Editor sends, so a tape from the editor can be kept and flown again without it.

SAVE A NEW TAPE: writes the aircraft's present state — the steerpoints and presets as they are now — to a new tape named for the date and time. A route built on the DED or loaded from an .fms is kept this way.

SAVE OVER: shown after a tape from the folder has been inserted. Load it, change the steerpoints on the DED or the presets on the radio pages, then SAVE OVER writes the aircraft's state back into that tape, keeping its mission name so the DTC ID does not change.

EJECT: shown while a tape is inserted; removes it from the slot. What was loaded stays loaded.

EDIT TAPES IN THE DTC EDITOR: opens the DTC EDITOR app, where what is on a tape is changed (DTC EDITOR).

DATA TAPES

Click a tape to insert it in the cartridge slot. Nothing reaches the avionics yet — the MFD DTE page shows the tape's ID, and LOAD there transfers it (DTE PAGE), as on the real aircraft. A tape the Mission Editor sends still loads on arrival.

FLIGHT PLANS

Click a flight plan to load it: its waypoints become the steerpoints on the DED, and every steerpoint loaded before is cleared. Build the plan in any planner that exports X-Plane 11 or 12 .fms files and drop the file in the folder; a file in another format is refused with a message. The COORDINATES app enters single steerpoints as coordinates instead (COORDINATES).

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7.5 DTC EDITOR

DTC EDITOR edits a tape itself, without the aircraft: a tape can be built on the ground from nothing. The item DATA CARTRIDGE EDITOR in X-Plane's menu for this aircraft opens the pop-up straight on it, and it opens on the tape already in the cartridge slot if no other is open.

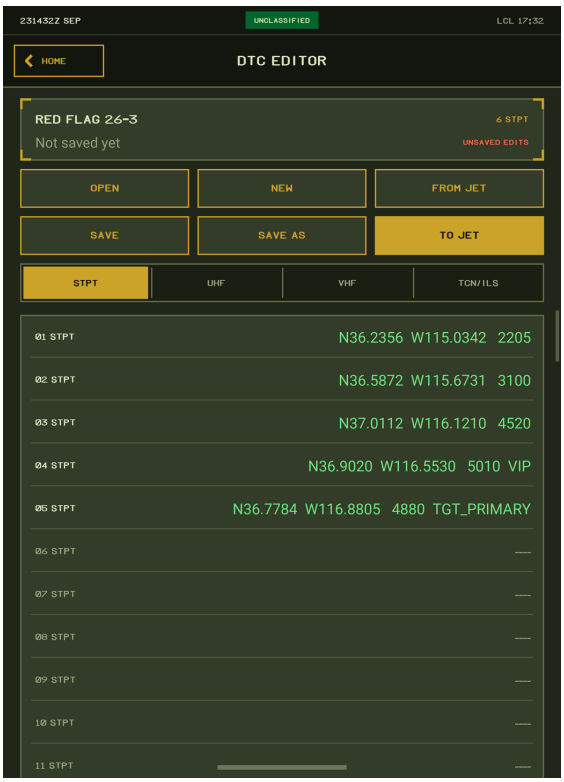


Figure 103 — Kneepad DTC EDITOR app, a tape open

The plate at the top names the open tape, its file, how many steerpoints it holds and, in red, UNSAVED EDITS when it has changed since it was saved.

OPEN: lists the tapes in the folder; click one to open it.

NEW: starts an empty tape.

FROM JET: reads the aircraft's present steerpoints and presets into the editor.

SAVE: writes the tape back to its file. SAVE AS asks for a new file name on the keypad; .json is added.

TO JET: inserts the tape being edited in the cartridge slot. Then press LOAD on the DTE page (DTE PAGE). The editor never touches the aircraft by itself.

The tabs under the buttons are the tape's contents: STPT (all 99 steerpoint slots), UHF and VHF (20 presets each) and TCN/ILS (the TACAN channel, the ILS frequency and the mission name).

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EDITING A ROW



Figure 104 — Kneepad DTC EDITOR app, editing a steerpoint

Click a row to edit it. A keypad opens and the row's fields are asked one at a time, with an example of what is expected and the step (STEP 1/4). For a steerpoint they are the latitude and longitude, as decimal degrees with an optional N / S / E / W, the elevation in feet, and the type, which is picked from a list of buttons (NONE for a plain steerpoint). ENTR accepts a field and moves to the next; a value the tape cannot hold is refused with the reason. CNCL leaves the row and CLEAR ROW empties it. The computer's keyboard types into the field as well.

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7.6 COORDINATES

COORDINATES turns a position into a steerpoint: type it, or look up a navaid or airport, and load it into the steerpoint selected on the DED.



Figure 105 — Kneepad COORDINATES app, typing a longitude

Click a field to type into it; a keypad opens, and the computer's keyboard works too. ENTR accepts the field, CNCL closes it, DEL deletes the last character and +/- changes the sign.

Latitude and Longitude: decimal degrees, negative for south and west (+/-).

Navaid or airport: an identifier (e.g. LGAV), looked up in X-Plane's navigation data. It fills in the position and the elevation.

Latitude min.sec and Longitude min.sec: minutes and seconds, written as 56.11, which refine the minutes of the position above.

The FOR THE DED box shows the result in the DED's own form — degrees and decimal minutes — with the elevation in feet. LOAD INTO STPT loads it into the steerpoint selected on the DED (its number is on the button). The same figures can also be typed into the DED by hand (STEERING POINT).

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7.7 CAMERA

CAMERA moves the pilot's head to a set viewpoint, for screenshots and video. The lit view is where the head is now.

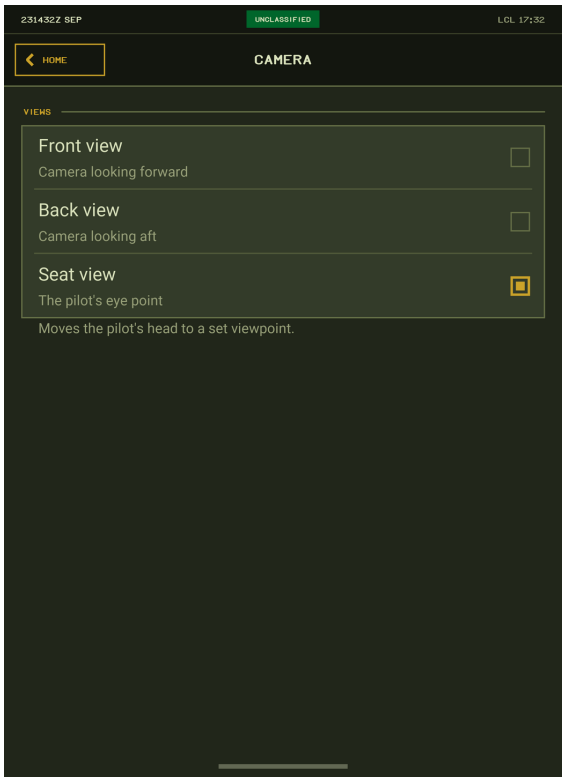


Figure 106 — Kneepad CAMERA app

Front view: the camera looking forward.

Back view: the camera looking aft.

Seat view: the pilot's own eye point.

Any view is left by selecting another camera in X-Plane.

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7.8 HOTAS AXES

X-Plane lets an add-on define commands but not joystick axis functions, so the slewing and rotary controls a real HOTAS has as axes — the radar cursor, the antenna elevation and manual range knobs — and the four ICP thumbwheels are assigned here instead.



Figure 107 — Kneepad HOTAS AXES app

Assigning an axis: in X-Plane's joystick settings leave the axis set to none. Click DETECT beside the function, which lights and reads MOVE IT NOW, and move the control within six seconds. The axis number and its live value appear, and the choice is saved at once. If nothing moved the app says so. ALSO ASSIGNED IN X-PLANE, in red, warns that the axis still has a function in X-Plane and will act twice.

CURSOR X and CURSOR Y: the radar cursor, always in rate mode — the control's deflection from centre is the slewing speed, like the real cursor control.

ANT ELEV and MAN RNG: the antenna elevation and manual range knobs. MAN RNG is read but has no effect yet: the gun sight's manual ranging is not modelled.

ICP SYM, ICP BRT, ICP RET DEPR and ICP CONT: the four ICP thumbwheels — HUD symbology brightness, DED and ICP backlight, standby reticle depression and HUD contrast.

INVERT reverses an axis. On the knobs and wheels the next button chooses POSITION — the control's position is the setting, the default — or RATE, for a spring-centred control whose deflection moves the setting. CLEAR removes the assignment. The hat and button commands for the same functions keep working alongside.

NOTE: The assignments are kept in the aircraft's LoadOut Presets folder, in hotas_axes.txt.

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7.9 SETTINGS

SETTINGS holds the sound effects, the start-up state, the pop-up instrument windows and the tablet's own look. The page is longer than the screen; drag it up to reach the rest.

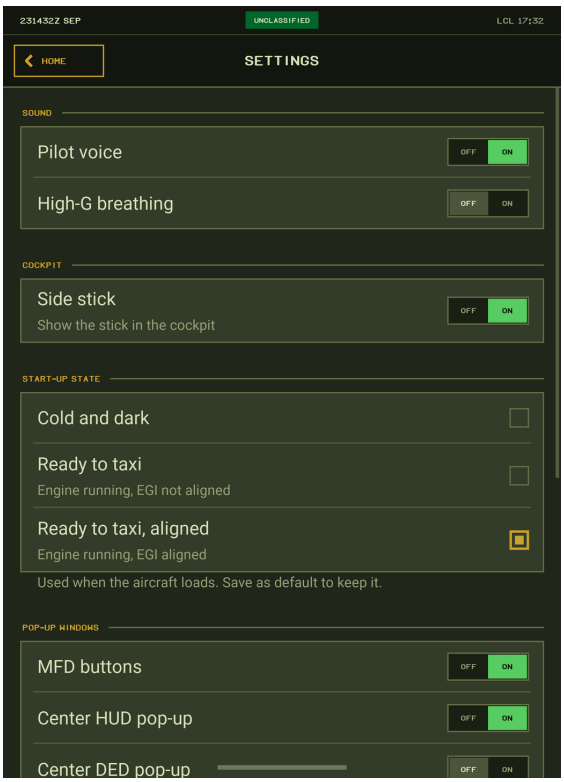


Figure 108 — Kneepad SETTINGS app

SOUND

Pilot voice and High-G breathing: the two sound effects, on or off.

COCKPIT

Side stick: shows or hides the side stick, for a better view of the switches behind it.

START-UP STATE

How the cockpit is set up the next time the aircraft loads; SAVE AS DEFAULT keeps the choice.

Cold and dark: everything off.

Ready to taxi: the engine running, the EGI not aligned.

Ready to taxi, aligned: the engine running and the EGI fully aligned.

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POP-UP WINDOWS

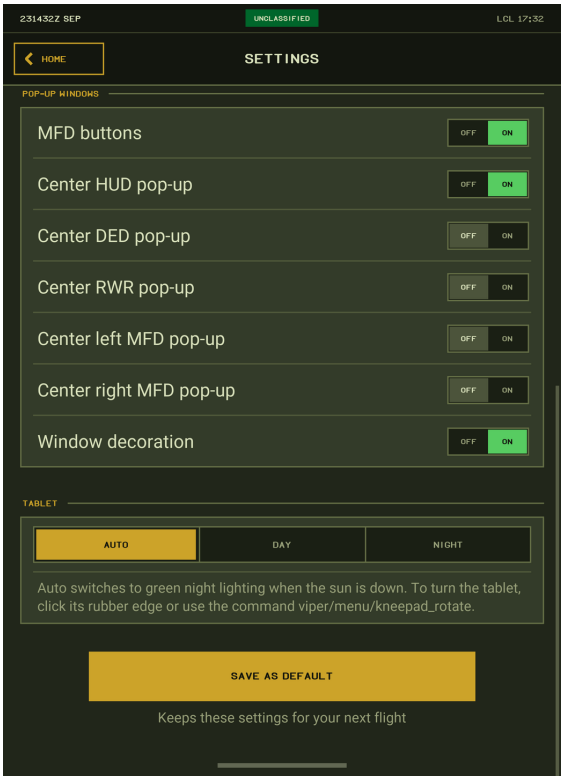


Figure 109 — Kneepad SETTINGS app, scrolled to the pop-up windows and the tablet

The HUD, DED, RWR and both MFDs can each be opened as a window of their own (MFD). These switches set how those windows look.

MFD buttons: draws the option buttons around the MFD pop-ups, so the page can be worked from the window itself.

Center HUD / DED / RWR / left MFD / right MFD pop-up: shows only the screen of that pop-up, centred in the window, without its bezel.

Window decoration: gives the pop-up windows X-Plane's title bar and frame; off, they are bare screens.

TABLET

AUTO, DAY and NIGHT: the tablet's look (DAY AND NIGHT, in KNEEPAD). The tablet remembers this choice by itself; SAVE AS DEFAULT is not needed for it.

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7.10 MISSION EDITOR

MISSION EDITOR puts DeltaWing Simulations' Mission Editor on the tablet, so a mission can be loaded, started and followed on the map from the cockpit. The Mission Editor is a separate plugin: the app appears on the home screen only while it is installed and running, and it needs X-Plane 12.1.0 or later.



Figure 110 — Kneepad home screen with the Mission Editor running, landscape

ON THE TABLET

The editor's screen is 16:9, so the app is landscape only: opening it turns the tablet to landscape, and the editor fills the screen between the title bar and the bar at the bottom edge. Click it as you would the rest of the tablet; the mouse wheel works on it as it does in the editor's window.

On the tablet the editor is a view-and-fly subset: the map, with pan, zoom and information cards; the steerpoint lists, read only; LOAD MISSION and LOAD DTC; START / END MISSION; and INSTANT DOGFIGHT. Building and editing a mission is done in its desktop window. Nothing on the tablet needs typing, and the computer's keyboard does not reach it.

It is the same editor, not a copy: it is either on the tablet or in its desktop window, never both. The editor's own DESKTOP button sends it to the desktop window; the tablet then shows TAP TO OPEN, and a click brings it back.

Leaving the app: HOME closes the editor, and nothing pops up over the cockpit; Plugins > DWSim Mission Editor > Show Mission Editor in X-Plane's menu opens it again as a window. Turning the tablet to portrait or stowing the kneepad takes the editor off the tablet too, and it comes back when the tablet is turned or taken out again with the app still open. In portrait the app says Landscape only, with a TURN TO LANDSCAPE button.

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IN THE POP-UP

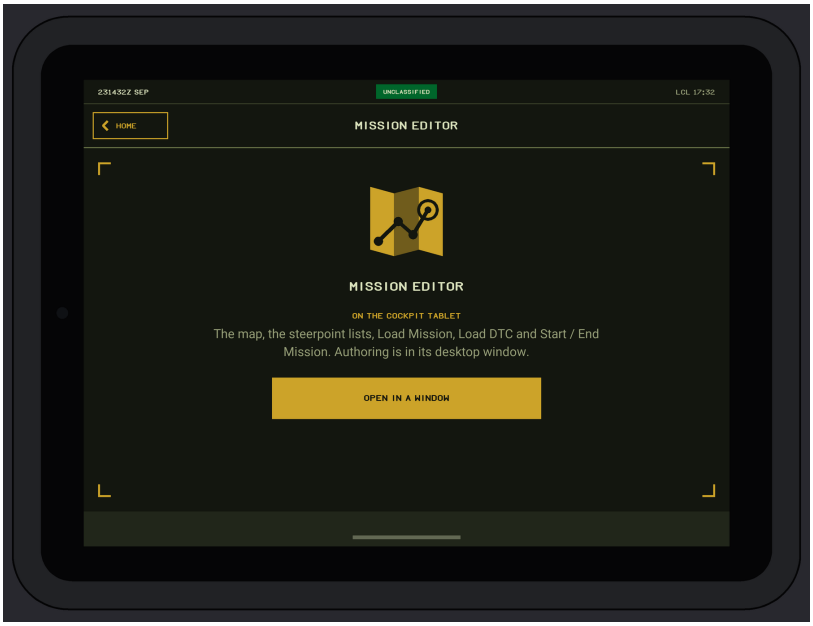


Figure 111 — Kneepad MISSION EDITOR app in the pop-up window

The kneepad pop-up does not show the editor itself. Its MISSION EDITOR app says where the editor is and moves it:

On the cockpit tablet: OPEN IN A WINDOW moves the editor to its desktop window, where missions are built.

Not on the tablet: PUT IT ON THE TABLET moves it back onto the tablet on the pilot's leg.

> **NOTE:** LOAD DTC sends the mission's data tape to the aircraft. Unlike a tape inserted from FLIGHT PLAN, it is loaded at once — the steerpoints and the radio presets — with no LOAD on the MFD DTE page; it stays in the cartridge slot, and the DTE page can transfer it again (DTE PAGE).

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8. LIMITATIONS

The figures below are those the simulated aircraft is built to, and apply to both the F-16C and the F-16D except where a figure names one of them. Flight control system limits — the load factor and angle of attack schedules, the flap schedules and the gain sets — are described in FLIGHT CONTROL SYSTEM rather than tabulated here. Load factor and angle of attack limits are CAT I; this aircraft flies in CAT I at all times.

WEIGHTS

Empty weight	**18,900 lb**
Maximum gross weight	**48,000 lb**
Internal fuel, without CFTs	**7,154 lb**
Internal fuel, with CFTs	**F-16C 10,220 lb / F-16D 10,000 lb**

Table 32 — Weights

SPEED AND MACH

Maximum Mach number	**M 2.05**
Maximum airspeed	**800 KCAS**
Stall speed, clean	**170 KIAS**
Stall speed, landing configuration	**130 KIAS**
Stall warning angle of attack	**10° AOA**

Table 33 — Speed and Mach

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9. NORMAL PROCEDURES

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9.1 COCKPIT PREPARATION, STARTUP and basic SETUP

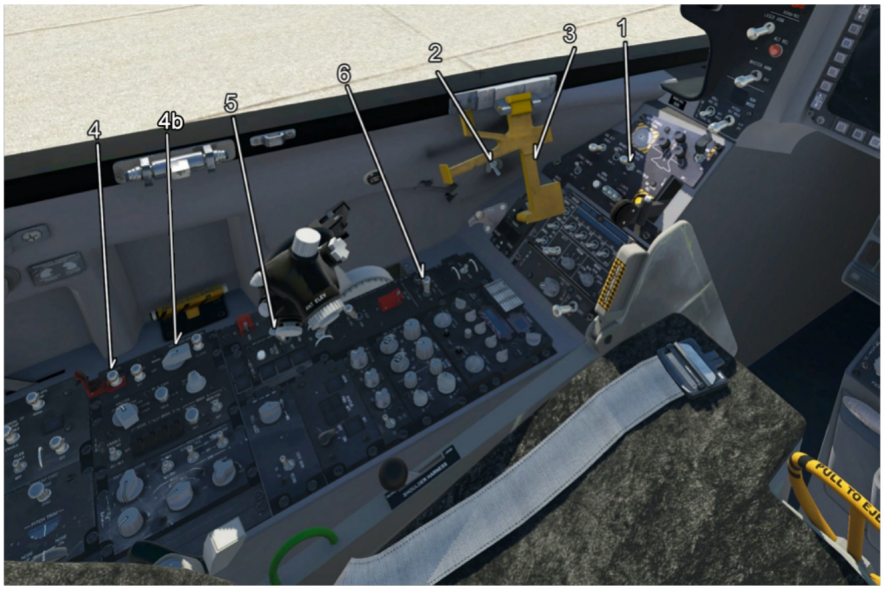


Figure 112 — Cockpit before start

1 - Set brake to “PARKING BRAKE” position
2 - Push canopy switch to close canopy (if open)
3 - Push “SPIDER” to secure canopy switch
4 - Set “MASTER FUEL” to ON position and close switch guard
4b – Set “ENGINE FEED AIR” to NORM position
5 - Set power to “MAIN PWR” position
6 - Set engine start to “START 2” position
7 - Wait until engine RPM reaches 20% and
8 - Wait until “SEC” indication turns off
9 - Click on the Throttle trigger



Figure 113 — Brakes, canopy and initial switches

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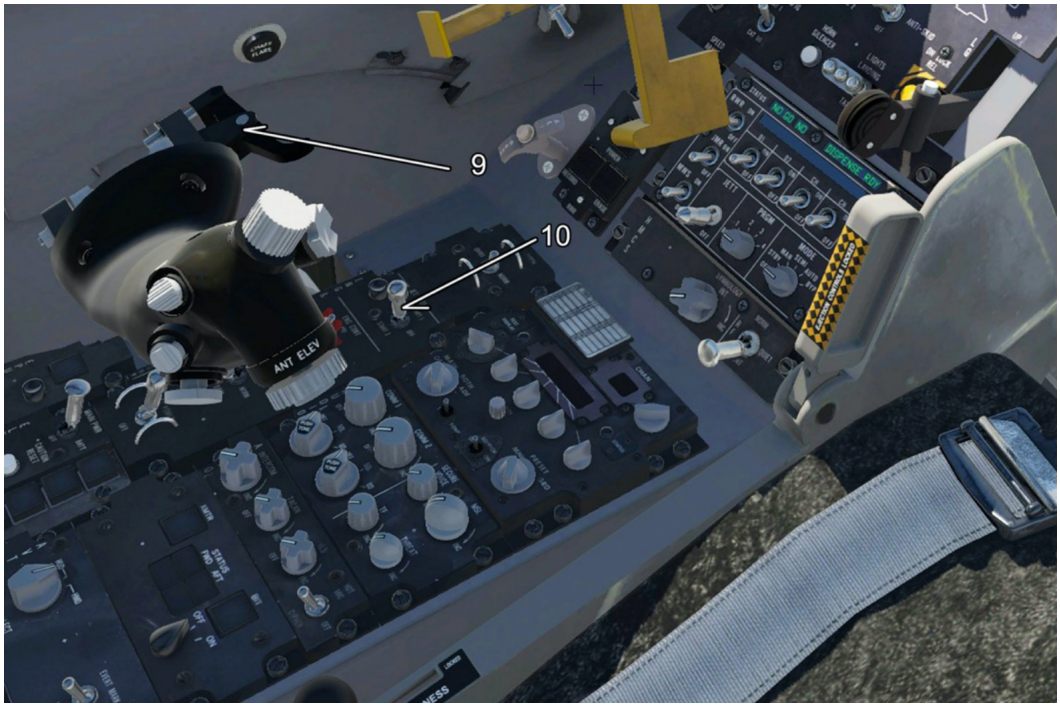


Figure 114 — Electrical power

Startup sequence complete when start switch (10) automatically returns to “OFF” position.



Figure 115 — Engine start sequence

11 - Turn MFD screens on
12 - Adjust brightness of DED display
13 - Adjust brightness for the consoles and the instrument panel
14 - Adjust brightness for the flood lights

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Figure 116 — Avionics power up

15 - Adjust brightness for MFD screens
16 - Adjust HUD brightness and symbology
17 - ARM ejection seat
18 - Rotate the knob to adjust the secondary ADI and press the button to cage it. The cage button is momentary and does not stay caged.



Figure 117 — Display and lighting setup

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9.2 EGI ALIGN (navigation system)

The EGI — the embedded GPS/INS — has to be aligned before it will navigate: without an alignment there is no steerpoint diamond on the HUD, no position on the DED and ALIGN stands in for max G on the HUD. The knob is on the avionics power panel, right console.



Figure 118 — EGI mode selector

OFF: the system is off.

STOR HDG: a stored-heading alignment. If the heading and position were stored at the last shutdown (see below) the alignment takes 30 seconds; without a store it runs the full 10 minutes.

NORM: a full alignment, 4 minutes. This is the normal cold start.

NAV: the aligned system navigates. Selected once the DED reads RDY.

IN FLT ALIGN (AUTO / MAN) and ATT: an in-flight alignment if the system is lost airborne — 30 seconds with a valid store, 10 minutes without. The DED shows the INFLT ALGN page while it runs.

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THE ALIGNMENT

Move the knob from OFF to NORM. The DED opens the EGI page and the timer starts.

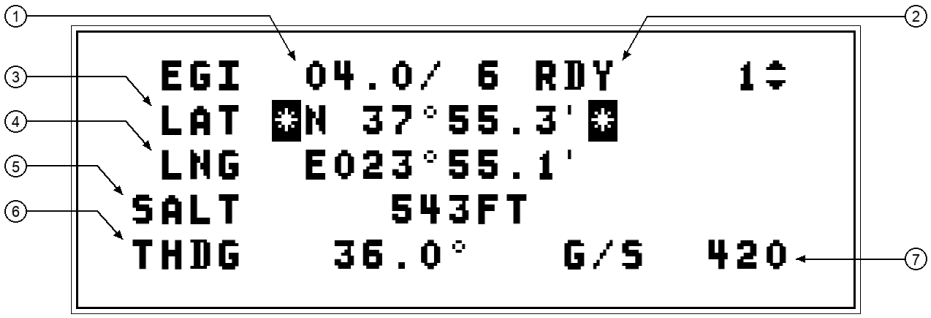


Figure 119 — EGI ALIGNMENT

1	Elapsed alignment time and the accuracy figure, which counts up as the alignment improves
2	RDY — the readiness state
3	LAT — present position latitude, entered by the pilot from the ICP
4	LNG — present position longitude, entered by the pilot from the ICP
5	SALT — system altitude, computed by the aircraft
6	THDG — true heading, computed by the aircraft
7	G/S — ground speed, computed by the aircraft

Table 34 — EGI ALIGNMENT callouts

Elapsed time and accuracy (1): the minutes since the alignment began, and beside them the accuracy figure, which counts down from 99 as the alignment converges. RDY (2) appears when it passes 70; at 6 the alignment is as good as it gets.

LAT and LNG (3, 4): the position the system believes. It should be entered from the ICP — press the DCS rocker to the row, type the hemisphere letter and the digits, ENTR — and it matters: the position keyed here is the position the EGI starts from, and an error entered here is carried through the flight as an offset on everything the EGI reports.

SALT (5), THDG (6) and G/S (7): system altitude, true heading and ground speed, computed by the aircraft; they settle during the alignment and need no entry.

When RDY shows, turn the knob to NAV. The steerpoint diamond and the helmet's position-locked symbols appear (JHMCS).

STORING THE HEADING

To be able to use STOR HDG next time, shut down with the system aligned: with the engine running and the aircraft stationary, turn the knob from NAV back through NORM to STOR HDG and then OFF. The heading and position are written to disk and read back at the next start. Moving the aircraft or shutting the engine down first invalidates the store.

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9.3 TAXI

The steps below are the BEFORE TAXI and TAXI checklists carried on the pilot's kneepad.

BEFORE TAXI

1. CANOPY — CLOSE AND LOCK
2. ALTIMETER AND ALTITUDE INDICATIONS — SET AND CHECK
3. EXTERIOR LIGHTS — AS REQUIRED
4. INDEXER BRIGHTNESS — INCREASE AS REQUIRED
5. EGI KNOB — NAV
6. CHOCKS (GROUND CREW) — REMOVE (X-Plane ground handling menu)

TAXI

1. BRAKES AND NWS — CHECK
2. HEADING — CHECK
3. FLIGHT INSTRUMENTS — CHECK FOR PROPER OPERATION

NOTES

— Nose wheel steering is engaged from the stick; the NWS legend on the right indexer lights when it is active.

— The left and right indexer brightness knobs are separate. After a cold and dark start both are fully dark, so the AOA and NWS legends will not be visible until they are turned up.

— The boarding ladder deploys and stows automatically whenever the aircraft is on the ground with the canopy open. The wheel chocks are set and removed from X-Plane's ground handling menu.

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9.4 TAKE OFF

The BEFORE TAKEOFF checklist below is the one carried on the pilot's kneepad.

BEFORE TAKEOFF

1. ALT FLAPS SWITCH — NORM
2. MANUAL TF FLYUP SWITCH — ENABLE
3. TRIM — CHECK PITCH/YAW CENTERED AND ROLL AS REQUIRED
4. ENGINE CONTROL SWITCHES — PRI / NORM (GUARDS DOWN)
5. SPEEDBRAKE — CLOSED
6. CANOPY — CLOSE AND LOCKED
7. FUEL QTY SEL KNOB — NORM
8. STORES CONFIG SWITCH — AS REQUIRED
9. GND JETT ENABLE SWITCH — AS REQUIRED
10. PROBE HEAT SWITCH — PROBE HEAT
11. EJECTION SAFETY LEVER — ARM (DOWN)
12. FLIGHT CONTROLS — CYCLE
13. OIL PRESSURE — CHECK PSI
14. ALOW MSL FLOOR DATA — CHECK
15. ALL WARNING AND CAUTION LIGHTS — CHECK

NOTES

— With the landing gear handle down the flight control system is in its takeoff and landing gains, where pitch is a rate command rather than a g command. It returns to the cruise law when the gear is raised.

— The trailing edge flaps are fully down for takeoff and retract on their own as speed builds. No action is required — they are scheduled automatically and there is no flap lever.

— Rotation and climb-out speeds vary with gross weight and stores. Compute them for the loaded configuration before departure.

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9.5 LANDING

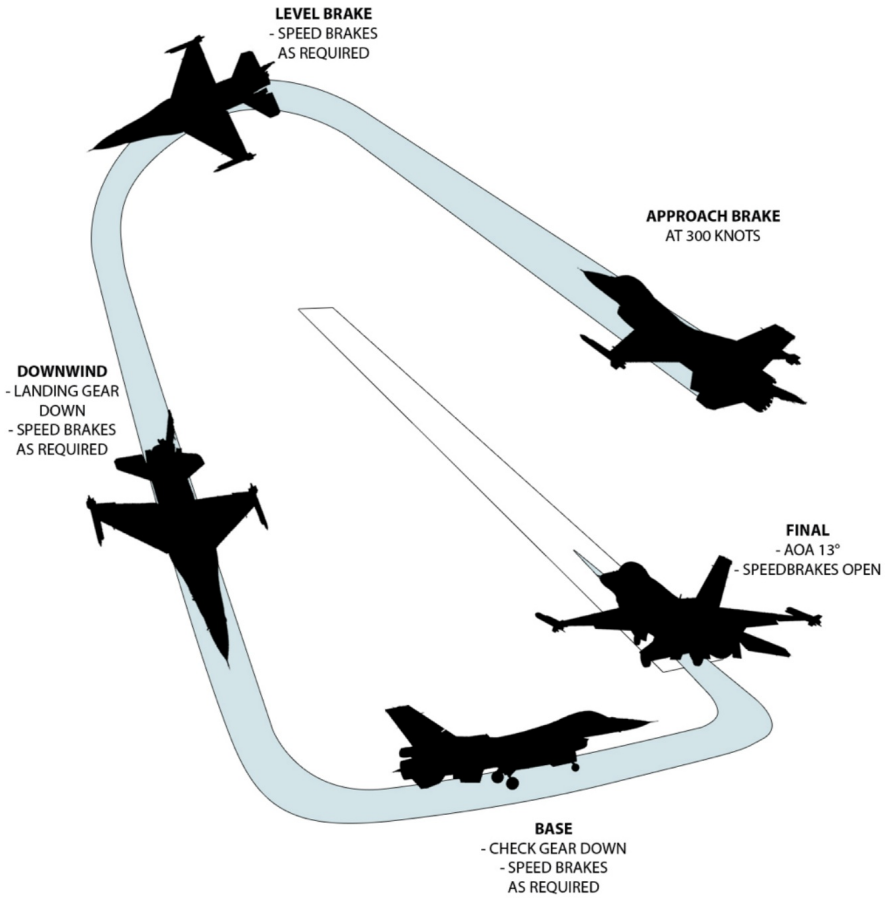


Figure 120 — Landing configuration

Landing begins with a runway approach at approximately 300 knots.
At the end of the runway begin the “LEVEL BRAKE”. At this point speed brakes must be opened to adjust speed.
Next step is the “DOWNWIND” leg where the landing gear is extended.
Next on the “BASE” leg, check the landing gear is down and speed brakes are as required.
On “FINAL”, the ideal approach is 13° AOA
On touchdown, if needed, deploy the chute.

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9.6 ENGINE SHUTDOWN

In order to shut down the jet's engine:

1.Set brake to "PARKING BRAKE" position.
2.Turn off taxi lights
3.Turn off MFD monitors
4.Set throttle to idle and then press the detent trigger on the throttle
5.Set master fuel to OFF
6.Turn off external lights
7.Turn off internal lights
8.Set main power to OFF
9.Open the canopy

The boarding ladder deploys by itself once the aircraft is on the ground with the canopy open (LOADOUT).

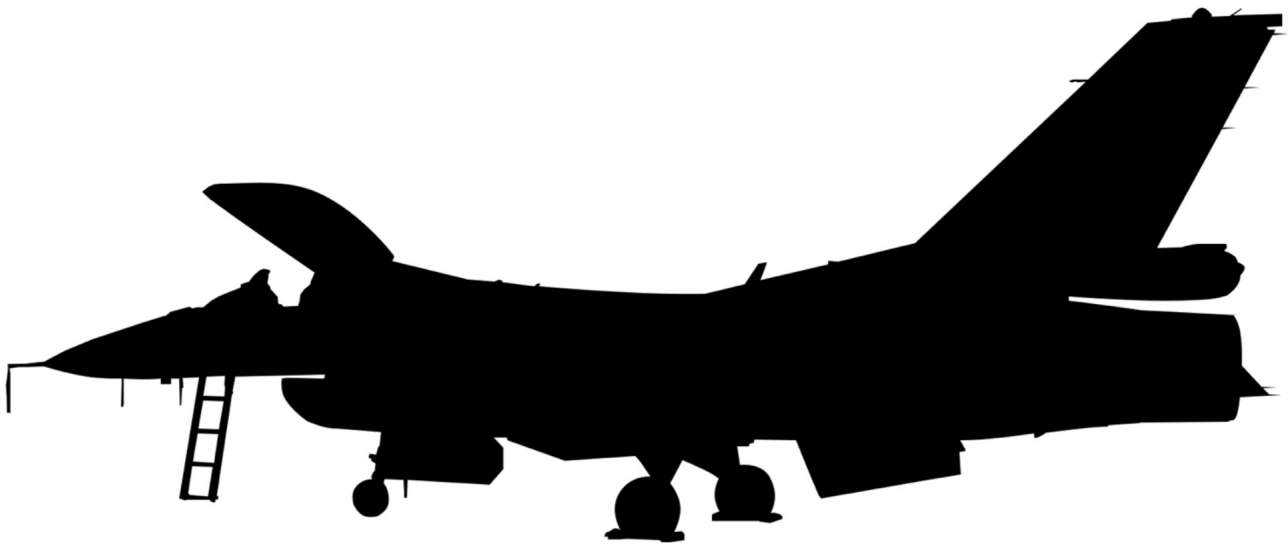


Figure 121 — Engine shutdown controls

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10. EMERGENCY PROCEDURES

This chapter covers the emergency systems modelled on this aircraft and what each control does.

ALTERNATE GEAR EXTENSION

The ALT GEAR lever lowers the landing gear when the normal system is unavailable. On this aircraft it also extends the arrestor hook.

EMERGENCY POWER UNIT (EPU)

The EPU switch is on the left console under a guard. The EPU and EPU AIR indications light when it is running.

EMERGENCY JETTISON

The emergency jettison control releases the aircraft's stores. The GND JETT ENABLE switch on the left auxiliary console arms jettison on the ground.

CANOPY JETTISON

The canopy jettison handle releases the canopy. The canopy may also be opened normally from the canopy switch.

EJECTION

The ejection handle initiates ejection. The ejection safety lever must be ARM (down) for the seat to be live; it is set to ARM on the BEFORE TAKEOFF checklist and to SAFE (up) after landing.

DRAG CHUTE

The drag chute switch is on the left auxiliary console, set to NORM or REL as required after touchdown. A chute must be fitted to the aircraft from the kneepad LOADOUT page for it to deploy.

NOTES

— The emergency controls above are those this aircraft models. Engine, hydraulic and electrical failure procedures are not covered.

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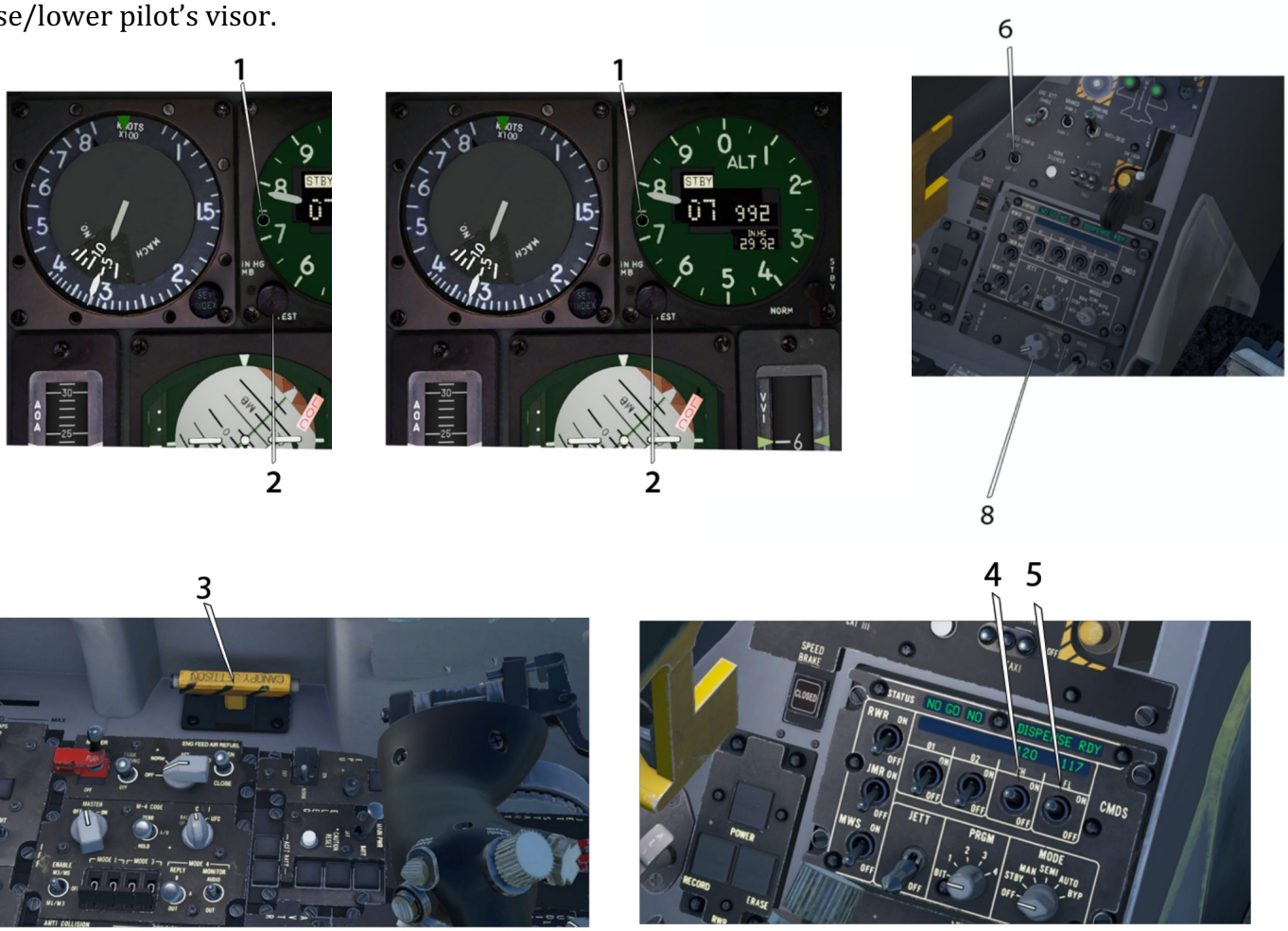
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11. GENERAL NOTES

Figure 122 — Cockpit controls referred to in the general notes

By pressing default X-Plane's "X" smoke shortcut and if you have smokers loaded on the wingtips, you can begin your airshow with smoke effect.
You can switch altimeter setting between mbar and hPa by pressing at point 1 (as shown below) and then by rotating knob 2 you can adjust the value.
When the jet is loaded with wing fuel tanks, switch (6) into CAT III. This limits load factor, maximum angle of attack and roll rate, each scheduled on gross weight — see FLIGHT CONTROL SYSTEM.
An alternate gear (7) lever can be used to lower the landing gear and arrestor hook.
If you have JHMCS selected for the pilot, you can use this rotary (8) switch to turn on brightness of JHMCS HUD.
You can use lever (3) in order to manually eject canopy.
With switches 4 and 5 you can arm CHAFFS (4) and FLARES (5) countermeasures, and you can see how many are left of each one on the above panels.
You can use shortcut "**FN**"+"**SHIFT**"+"**F11**" for MAC or "**SHIFT**"+"**F11**" for WINDOWS to raise/lower pilot's visor.



In order for your jet to work properly and all functions to be available, you should take a moment to setup the extra commands we have added.
To do this, you must go in the X-Plane's settings and then keyboard or joystick and search for "viper" commands. Then you can assign each one to the keyboard key or joystick key of your choice :

1	Altimeter setting — press to switch between mbar and hPa
2	Altimeter adjustment knob
3	Manual canopy eject lever
4	CHAFF arming switch
5	FLARE arming switch
6	CAT I / CAT III switch
7	Alternate gear lever — lowers the gear and the arrestor hook
8	JHMCS brightness rotary

Table 35 — Cockpit controls referred to in the general notes callouts

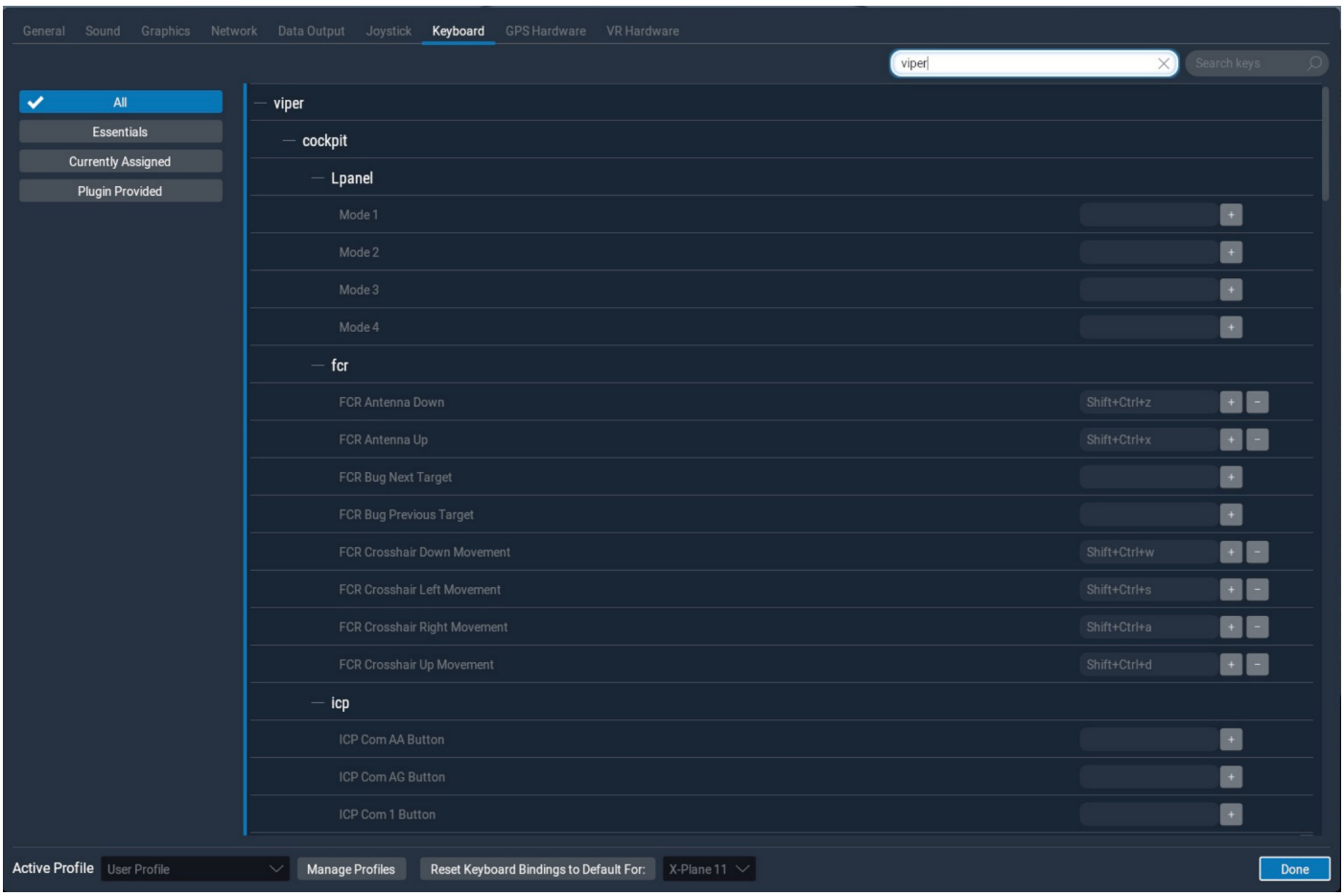


Figure 123 — Assigning aircraft commands in X-Plane settings

VERY IMPORTANT NOTE :

- DO NOT USE EXPERIMENTAL MODEL

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12. CUSTOM COMMANDS

Every command below can be bound to a keyboard key or a joystick button. In X-Plane, open Settings, then Keyboard or Joystick, and search for **viper** to list them all, or paste a full command path from this appendix to find one directly.

APPLIES TO: the commands in the first part work on both the F-16C and the F-16D. The second part lists the commands the F-16D adds for its rear cockpit; they are not present on the single seat aircraft.

F-16C AND F-16D (552)

HOTAS - stick and throttle (40)

DWSim/viper/HOTAS/sidestick/display_management_switch/dms_aft	HOTAS Side Stick DMS Aft
DWSim/viper/HOTAS/sidestick/display_management_switch/dms_fwd	HOTAS Side Stick DMS Fwd
DWSim/viper/HOTAS/sidestick/display_management_switch/dms_left	HOTAS Side Stick DMS Left
DWSim/viper/HOTAS/sidestick/display_management_switch/dms_right	HOTAS Side Stick DMS Right
DWSim/viper/HOTAS/sidestick/tms_aft	HOTAS Side Stick TMS Switch Aft
DWSim/viper/HOTAS/sidestick/tms_forward	HOTAS Side Stick TMS Switch Forward
DWSim/viper/HOTAS/sidestick/tms_left	HOTAS Side Stick TMS Switch Left
DWSim/viper/HOTAS/sidestick/tms_right	HOTAS Side Stick TMS Switch Right
DWSim/viper/HOTAS/sidestick/trigger/first_detent	HOTAS Side Stick Trigger First Detent
DWSim/viper/HOTAS/sidestick/trigger/second_detent	HOTAS Side Stick Trigger Second Detent
DWSim/viper/HOTAS/sidestick/trim/trim_left_wing_down	HOTAS Side Stick Trim Button Left Wind Down
DWSim/viper/HOTAS/sidestick/trim/trim_nose_down	HOTAS Side Stick Trim Button Nose Down
DWSim/viper/HOTAS/sidestick/trim/trim_nose_up	HOTAS Side Stick Trim Button Nose Up
DWSim/viper/HOTAS/sidestick/trim/trim_right_wing_down	HOTAS Side Stick Trim Button Right Wing Down
DWSim/viper/HOTAS/sidestick/weapons_release/wep_rel_button	HOTAS Side Stick Weapon Release Button
DWSim/viper/HOTAS/throttle/comms/comms_switch_down	HOTAS Throttle Comms Switch VHF 2 Transmit, Down Position
DWSim/viper/HOTAS/throttle/comms/comms_switch_left	HOTAS Throttle Comms Switch Ident Transmit, Left Position
DWSim/viper/HOTAS/throttle/comms/comms_switch_right	HOTAS Throttle Comms Switch Ident Transmit, Right Position
DWSim/viper/HOTAS/throttle/comms/comms_switch_up	HOTAS Throttle Comms Switch VHF 1 Transmit, Up Position
DWSim/viper/HOTAS/throttle/detent/fuel_start	The throttle position after the Throttle Detent, Fuel engaged
DWSim/viper/HOTAS/throttle/detent/fuel_stop	The throttle position before the Throttle Detent, Fuel cut-off
DWSim/viper/HOTAS/throttle/dogfight/ATA_posision	HOTAS Throttle Dogfight Air To Air Position
DWSim/viper/HOTAS/throttle/dogfight/off_posision	HOTAS Throttle Dogfight Off Position
DWSim/viper/HOTAS/throttle/dogfight/on_posision	HOTAS Throttle Dogfight On Position
DWSim/viper/HOTAS/throttle/man_rng/decrease	HOTAS Throttle MAN RNG knob, decrease (hold)
DWSim/viper/HOTAS/throttle/man_rng/increase	HOTAS Throttle MAN RNG knob, increase (hold)
DWSim/viper/HOTAS/throttle/radar/antenna_elevation_down	HOTAS Throttle ANT ELEV knob, antenna down (hold)
DWSim/viper/HOTAS/throttle/radar/antenna_elevation_up	HOTAS Throttle ANT ELEV knob, antenna up (hold)
DWSim/viper/HOTAS/throttle/radar/radar_cursor_down	HOTAS Throttle Radar Down Movement
DWSim/viper/HOTAS/throttle/radar/radar_cursor_left	HOTAS Throttle Radar Left Movement
DWSim/viper/HOTAS/throttle/radar/radar_cursor_right	HOTAS Throttle Radar Right Movement
DWSim/viper/HOTAS/throttle/radar/radar_cursor_up	HOTAS Throttle Radar Cursor Up Movement
DWSim/viper/HOTAS/throttle/radar/radar_range_down	HOTAS Throttle Radar Range Down
DWSim/viper/HOTAS/throttle/radar/radar_range_up	HOTAS Throttle Radar Range Up
DWSim/viper/HOTAS/throttle/speedbrake/speedbrake_full	HOTAS Throttle Speedbrake switch, Hold to increase speebrakes Position
DWSim/viper/HOTAS/throttle/speedbrake/speedbrake_off	HOTAS Throttle Speedbrake switch Off Position
DWSim/viper/HOTAS/throttle/speedbrake/speedbrake_open	HOTAS Throttle Speedbrake switch, Hold current speedbrake Position
DWSim/viper/master_arm/off	Master Arm Off Position
DWSim/viper/master_arm/on	Master Arm On Position
DWSim/viper/master_arm/sim	Master Arm Sim Position

Table 36 — HOTAS - stick and throttle

ICP and DED (39)

viper/cockpit/icp/circle_buttons_aa	ICP Com AA Button
viper/cockpit/icp/circle_buttons_ag	ICP Com AG Button
viper/cockpit/icp/circle_buttons_com_1	ICP Com 1 Button
viper/cockpit/icp/circle_buttons_com_2	ICP Com 2 Button
viper/cockpit/icp/circle_buttons_iff	ICP Com IFF Button
viper/cockpit/icp/circle_buttons_list	ICP Com LIST Button
viper/cockpit/icp/circle_buttons_wx	ICP CB WX Button
viper/cockpit/icp/rotate_1_down	ICP Top Left Wheel Down
viper/cockpit/icp/rotate_1_up	ICP Top Left Wheel Up
viper/cockpit/icp/rotate_2_down	ICP Bottom Left Wheel Down
viper/cockpit/icp/rotate_2_up	ICP Bottom Left Wheel Up
viper/cockpit/icp/rotate_3_down	ICP Top Right Wheel Down
viper/cockpit/icp/rotate_3_up	ICP Top Right Wheel Up
viper/cockpit/icp/rotate_4_down	ICP Bottom Right Wheel Down
viper/cockpit/icp/rotate_4_up	ICP Bottom Right Wheel Up
viper/cockpit/icp/square_buttons_0	ICP SB 0 Button
viper/cockpit/icp/square_buttons_1	ICP SB 1 Button
viper/cockpit/icp/square_buttons_2	ICP SB 2 Button
viper/cockpit/icp/square_buttons_3	ICP SB 3 Button
viper/cockpit/icp/square_buttons_4	ICP SB 4 Button
viper/cockpit/icp/square_buttons_5	ICP SB 5 Button
viper/cockpit/icp/square_buttons_6	ICP SB 6 Button
viper/cockpit/icp/square_buttons_7	ICP SB 7 Button
viper/cockpit/icp/square_buttons_8	ICP SB 8 Button
viper/cockpit/icp/square_buttons_9	ICP SB 9 Button
viper/cockpit/icp/square_buttons_entr	ICP SB ENTR Button
viper/cockpit/icp/square_buttons_rcl	ICP SB RCL Button
viper/cockpit/icp/square_buttons_updown_1_down	ICP DED Decrement Button
viper/cockpit/icp/square_buttons_updown_1_up	ICP DED Increment Button
viper/cockpit/icp/square_buttons_updown_2_down	ICP HUD FLIR Down Button
viper/cockpit/icp/square_buttons_updown_2_up	ICP HUD FLIR Up Button
viper/cockpit/icp/switch_1_down	ICP Data Control Switch Down
viper/cockpit/icp/switch_1_left	ICP Data Control Switch Left
viper/cockpit/icp/switch_1_right	ICP Data Control Switch Right
viper/cockpit/icp/switch_1_up	ICP Data Control Switch Up
viper/cockpit/icp/switch_2_down	ICP Warning Reset Switch
viper/cockpit/icp/switch_2_up	ICP Drift Cutout Switch
viper/cockpit/icp/switch_3_down	ICP GAIN SWITCH DOWN
viper/cockpit/icp/switch_3_up	ICP GAIN SWITCH UP

Table 37 — ICP and DED

MFD (58)

viper/cockpit/lmfd_popup	Front Left MFD Pop Up
viper/cockpit/mfdL/button01	Left MFD OSB 01
viper/cockpit/mfdL/button02	Left MFD OSB 02
viper/cockpit/mfdL/button03	Left MFD OSB 03
viper/cockpit/mfdL/button04	Left MFD OSB 04
viper/cockpit/mfdL/button05	Left MFD OSB 05
viper/cockpit/mfdL/button08	Left MFD OSB 20
viper/cockpit/mfdL/button09	Left MFD OSB 06
viper/cockpit/mfdL/button10	Left MFD OSB 19
viper/cockpit/mfdL/button11	Left MFD OSB 07
viper/cockpit/mfdL/button12	Left MFD OSB 18
viper/cockpit/mfdL/button13	Left MFD OSB 08
viper/cockpit/mfdL/button14	Left MFD OSB 17
viper/cockpit/mfdL/button15	Left MFD OSB 09
viper/cockpit/mfdL/button16	Left MFD OSB 16
viper/cockpit/mfdL/button17	Left MFD OSB 10
viper/cockpit/mfdL/button18bottom	Left MFD CON DOWN Button
viper/cockpit/mfdL/button18top	Left MFD CON UP Button
viper/cockpit/mfdL/button19bottom	Left MFD BRT DOWN Button
viper/cockpit/mfdL/button19top	Left MFD BRT UP Button
viper/cockpit/mfdL/button20	Left MFD OSB 15
viper/cockpit/mfdL/button21	Left MFD OSB 14
viper/cockpit/mfdL/button22	Left MFD OSB 13
viper/cockpit/mfdL/button23	Left MFD OSB 12
viper/cockpit/mfdL/button24	Left MFD OSB 11

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viper/cockpit/mfdL/button6bottom	Left MFD SYM DOWN Button
viper/cockpit/mfdL/button6top	Left MFD SYM UP Button
viper/cockpit/mfdL/button7bottom	Left MFD GAIN DOWN Button
viper/cockpit/mfdL/button7top	Left MFD GAIN UP Button
viper/cockpit/mfdR/button01	RIGHT MFD OSB 01
viper/cockpit/mfdR/button02	RIGHT MFD OSB 02
viper/cockpit/mfdR/button03	RIGHT MFD OSB 03
viper/cockpit/mfdR/button04	RIGHT MFD OSB 04
viper/cockpit/mfdR/button05	RIGHT MFD OSB 05
viper/cockpit/mfdR/button08	RIGHT MFD OSB 20
viper/cockpit/mfdR/button09	RIGHT MFD OSB 06
viper/cockpit/mfdR/button10	RIGHT MFD OSB 19
viper/cockpit/mfdR/button11	RIGHT MFD OSB 07
viper/cockpit/mfdR/button12	RIGHT MFD OSB 18
viper/cockpit/mfdR/button13	RIGHT MFD OSB 08
viper/cockpit/mfdR/button14	RIGHT MFD OSB 17
viper/cockpit/mfdR/button15	RIGHT MFD OSB 09
viper/cockpit/mfdR/button16	RIGHT MFD OSB 16
viper/cockpit/mfdR/button17	RIGHT MFD OSB 10
viper/cockpit/mfdR/button18bottom	RIGHT MFD CON DOWN Button
viper/cockpit/mfdR/button18top	RIGHT MFD CON UP Button
viper/cockpit/mfdR/button19bottom	RIGHT MFD BRT DOWN Button
viper/cockpit/mfdR/button19top	RIGHT MFD BRT UP Button
viper/cockpit/mfdR/button20	RIGHT MFD OSB 15
viper/cockpit/mfdR/button21	RIGHT MFD OSB 14
viper/cockpit/mfdR/button22	RIGHT MFD OSB 13
viper/cockpit/mfdR/button23	RIGHT MFD OSB 12
viper/cockpit/mfdR/button24	RIGHT MFD OSB 11
viper/cockpit/mfdR/button6bottom	RIGHT MFD SYM DOWN Button
viper/cockpit/mfdR/button6top	RIGHT MFD SYM UP Button
viper/cockpit/mfdR/button7bottom	RIGHT MFD GAIN DOWN Button
viper/cockpit/mfdR/button7top	RIGHT MFD GAIN UP Button
viper/cockpit/rmfd_popup	Front Right MFD Pop Up

Table 38 — MFD

FCR and radar (6)

viper/cockpit/fcr/fcr_antenna_down	FCR Antenna Down
viper/cockpit/fcr/fcr_antenna_up	FCR Antenna Up
viper/cockpit/fcr/fcr_ch_target_bug	FCR Bug Target
viper/cockpit/fcr/fcr_ch_target_bug_next	FCR Bug Next Target
viper/cockpit/fcr/fcr_ch_target_bug_previous	FCR Bug Previous Target
viper/radar/radar_cursor_terrain_lock	HUD Mark cursor Locked on Terrain or HUD

Table 39 — FCR and radar

Left console (137)

viper/cockpit/LPanel/aileron_trim_center	Aileron Trim Center
viper/cockpit/LPanel/pitch_trim_center	Pitch Trim Center
viper/cockpit/LPanel/yaw_trim_center	Yaw Trim Center
viper/cockpit/Lpanel/ab_reset_down	AB Reset Down
viper/cockpit/Lpanel/ab_reset_up	AB Reset Up
viper/cockpit/Lpanel/air_refuel_door	Air Refuel Door
viper/cockpit/Lpanel/air_refueling_lights_brightness_down	Air Refueling Lights Brightness Down
viper/cockpit/Lpanel/air_refueling_lights_brightness_up	Air Refueling Lights Brightness Up
viper/cockpit/Lpanel/alt_flaps_down	Alt Flaps Down
viper/cockpit/Lpanel/alt_flaps_up	Alt Flaps Up
viper/cockpit/Lpanel/anti_collision_light_selector_down	Anti Collision Light Selector Down
viper/cockpit/Lpanel/anti_collision_light_selector_up	Anti Collision Light Selector Up
viper/cockpit/Lpanel/anti_g_test	Anti G Test
viper/cockpit/Lpanel/audio1_secure_voice_down	Audio Secure Voice Down
viper/cockpit/Lpanel/audio1_secure_voice_msl_down	Audio Secure Voice MSL Down
viper/cockpit/Lpanel/audio1_secure_voice_msl_up	Audio Secure Voice MSL Up
viper/cockpit/Lpanel/audio1_secure_voice_tf_down	Audio Secure Voice TF Down
viper/cockpit/Lpanel/audio1_secure_voice_tf_up	Audio Secure Voice TF Up
viper/cockpit/Lpanel/audio1_secure_voice_threat_down	Audio Secure Voice Threat Down
viper/cockpit/Lpanel/audio1_secure_voice_threat_up	Audio Secure Voice Threat Up
viper/cockpit/Lpanel/audio1_secure_voice_up	Audio Secure Voice Up
viper/cockpit/Lpanel/audio2_ils_down	Audio ILS Down
viper/cockpit/Lpanel/audio2_ils_up	Audio ILS Up

viper/cockpit/Lpanel/audio2_intercom_down	Audio Intercom Down
viper/cockpit/Lpanel/audio2_intercom_up	Audio Intercom Up
viper/cockpit/Lpanel/audio2_tacan_down	Audio TACAN Down
viper/cockpit/Lpanel/audio2_tacan_up	Audio TACAN Up
viper/cockpit/Lpanel/bit_down	BIT Down
viper/cockpit/Lpanel/bit_up	BIT Up
viper/cockpit/Lpanel/com1_volume_down	Com 1 Volume Down
viper/cockpit/Lpanel/com1_volume_tone_down	Com 1 Volume Tone Done
viper/cockpit/Lpanel/com1_volume_tone_up	Com 1 Volume Tone Up
viper/cockpit/Lpanel/com1_volume_up	Com 1 Volume Up
viper/cockpit/Lpanel/com2_volume_down	Com 2 Volume Down
viper/cockpit/Lpanel/com2_volume_tone_down	Com 2 Volume Tone Done
viper/cockpit/Lpanel/com2_volume_tone_up	Com 2 Volume Tone Up
viper/cockpit/Lpanel/com2_volume_up	Com 2 Volume Up
viper/cockpit/Lpanel/ded_selector_down	DED Selector Down
viper/cockpit/Lpanel/ded_selector_up	DED Selector Up
viper/cockpit/Lpanel/digital_backup_down	Digital Backup Down
viper/cockpit/Lpanel/digital_backup_up	Digital Backup Up
viper/cockpit/Lpanel/enable_m3_ms_down	Enable M3 MS Down
viper/cockpit/Lpanel/enable_m3_ms_up	Enable M3 MS Up
viper/cockpit/Lpanel/eng_cont	Eng Cont Switch
viper/cockpit/Lpanel/eng_cont_protect	Eng Cont Guard
viper/cockpit/Lpanel/engine_feed_down	Engine Feed Down
viper/cockpit/Lpanel/engine_feed_up	Engine Feed Up
viper/cockpit/Lpanel/epu_gen_down	EPU Gen Down
viper/cockpit/Lpanel/epu_gen_up	EPU Gen Up
viper/cockpit/Lpanel/epu_protect1	EPU Guard Left
viper/cockpit/Lpanel/epu_protect2	EPU Guard Right
viper/cockpit/Lpanel/epu_switch_down	EPU Switch Down
viper/cockpit/Lpanel/epu_switch_up	EPU Switch Up
viper/cockpit/Lpanel/fbw_override	MPO - Manual Pitch Override (FLCS limiter override)
viper/cockpit/Lpanel/fire_detect	Fire Detect
viper/cockpit/Lpanel/flaps_lock_down	Flaps Lock Down
viper/cockpit/Lpanel/flaps_lock_up	Flaps Lock Up
viper/cockpit/Lpanel/flcs_reset_down	FLCS Reset Down
viper/cockpit/Lpanel/flcs_reset_up	FLCS Reset Up
viper/cockpit/Lpanel/formation_lights_brightness_down	Formation Lights Brightness Down
viper/cockpit/Lpanel/formation_lights_brightness_up	Formation Lights Brightness Up
viper/cockpit/Lpanel/formation_lights_mode_down	Formation Lights Mode Down
viper/cockpit/Lpanel/formation_lights_mode_up	Formation Lights Mode Up
viper/cockpit/Lpanel/hot_mic_down	Hot Mic Down
viper/cockpit/Lpanel/hot_mic_up	Hot Mic Up
viper/cockpit/Lpanel/ind_lts	IND LTS
viper/cockpit/Lpanel/jet_start_down	Jet Start Down
viper/cockpit/Lpanel/jet_start_up	Jet Start Up
viper/cockpit/Lpanel/m4_code_down	MODE 4 Code Down
viper/cockpit/Lpanel/m4_code_up	MODE 4 Code Up
viper/cockpit/Lpanel/main_battery_down	Main Battery Switch Down
viper/cockpit/Lpanel/main_battery_reset	Main Battery Reset
viper/cockpit/Lpanel/main_battery_up	Main Battery Switch Up
viper/cockpit/Lpanel/maint_down	Maint Down
viper/cockpit/Lpanel/maint_up	Maint Up
viper/cockpit/Lpanel/man_f_dis_down	MAN F Dis Down
viper/cockpit/Lpanel/man_f_dis_up	MAN F Dis Up
viper/cockpit/Lpanel/master_fuel	Master Fuel
viper/cockpit/Lpanel/master_fuel_protect	Master Fuel Guard
viper/cockpit/Lpanel/master_iff_down	Master IFF Down
viper/cockpit/Lpanel/master_iff_up	Master IFF Up
viper/cockpit/Lpanel/max_power_down	Max Power Switch Down
viper/cockpit/Lpanel/max_power_up	Max Power Switch Up
viper/cockpit/Lpanel/mode1_click	Mode 1
viper/cockpit/Lpanel/mode2_click	Mode 2
viper/cockpit/Lpanel/mode3_click	Mode 3
viper/cockpit/Lpanel/mode4_click	Mode 4
viper/cockpit/Lpanel/mode4_monitor	MODE 4 Monitor
viper/cockpit/Lpanel/mode4_reply_down	MODE 4 Reply Down
viper/cockpit/Lpanel/mode4_reply_up	MODE 4 Reply Up
viper/cockpit/Lpanel/obogs_down	Obogs Down
viper/cockpit/Lpanel/obogs_up	Obogs Up
viper/cockpit/Lpanel/position_lights_flash_down	Position Lights Flash Down
viper/cockpit/Lpanel/position_lights_flash_up	Position Lights Flash Up

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viper/cockpit/Lpanel/position_lights_wing_fuselage_down	Position Lights Wing Fuselage Down
viper/cockpit/Lpanel/position_lights_wing_fuselage_up	Position Lights Wing Fuselage Up
viper/cockpit/Lpanel/position_lights_wing_tail_down	Position Lights Wing Tail Down
viper/cockpit/Lpanel/position_lights_wing_tail_up	Position Lights Wing Tail Up
viper/cockpit/Lpanel/pro_heat_down	Probe Heat Down
viper/cockpit/Lpanel/pro_heat_up	Probe Heat Up
viper/cockpit/Lpanel/radio2_rot_down	Radio Knob 2 Down
viper/cockpit/Lpanel/radio2_rot_up	Radio Knob 2 Up
viper/cockpit/Lpanel/radio3_rot_down	Radio Knob 3 Down
viper/cockpit/Lpanel/radio3_rot_up	Radio Knob 3 Up
viper/cockpit/Lpanel/radio4_rot_down	Radio Knob 4 Down
viper/cockpit/Lpanel/radio4_rot_up	Radio Knob 4 Up
viper/cockpit/Lpanel/radio5_rot_down	Radio Knob 5 Down
viper/cockpit/Lpanel/radio5_rot_up	Radio Knob 5 Up
viper/cockpit/Lpanel/radio_chan_down	Radio Channel Switch Down
viper/cockpit/Lpanel/radio_chan_up	Radio Channel Switch Up
viper/cockpit/Lpanel/radio_rot1_down	Radio Knob 1 Down
viper/cockpit/Lpanel/radio_rot1_up	Radio Knob 1 Up
viper/cockpit/Lpanel/radio_select_mode_down	Radio Select Mode Down
viper/cockpit/Lpanel/radio_select_mode_up	Radio Select Mode Up
viper/cockpit/Lpanel/radio_select_preset_down	Radio Select Preset Down
viper/cockpit/Lpanel/radio_select_preset_up	Radio Select Preset Up
viper/cockpit/Lpanel/radio_select_vol_down	Radio Select Volume Down
viper/cockpit/Lpanel/radio_select_vol_up	Radio Select Volume Up
viper/cockpit/Lpanel/radio_status	Radio Status
viper/cockpit/Lpanel/radio_test_display	Radio Test Display
viper/cockpit/Lpanel/recording_down	Recording Down
viper/cockpit/Lpanel/recording_up	Recording Up
viper/cockpit/Lpanel/tank_inverting	Tank Inverting
viper/cockpit/Lpanel/trim_ap_down	Trim AP Down
viper/cockpit/Lpanel/trim_ap_up	Trim AP Up
viper/cockpit/Lpanel/trim_nose_down	Trim Nose Down
viper/cockpit/Lpanel/trim_nose_up	Trim Nose Up
viper/cockpit/Lpanel/trim_roll_down	Trim Roll Down
viper/cockpit/Lpanel/trim_roll_up	Trim Roll Up
viper/cockpit/Lpanel/video_select_down	Video Select Down
viper/cockpit/Lpanel/video_select_up	Video Select Up
viper/cockpit/Lpanel/xmtr_down	XMTR Key Down
viper/cockpit/Lpanel/xmtr_up	XMTR Key Up
viper/cockpit/Lpanel/yaw_trim_down	Trim Yaw Down
viper/cockpit/Lpanel/yaw_trim_up	Trim Yaw Up
viper/cockpit/Lwall/canopy_switch	Canopy Switch
viper/cockpit/Lwall/flares_button	Flares Button

Table 40 — Left console

Left auxiliary console (54)

viper/cockpit/CLpanel/alt_hold_down	Alt Hold Down
viper/cockpit/CLpanel/alt_hold_up	Alt Hold Up
viper/cockpit/CLpanel/alt_rel	ALT Rel
viper/cockpit/CLpanel/chute	Chute Switch
viper/cockpit/CLpanel/chute_protector	Chute Protector
viper/cockpit/CLpanel/cmds_01_down	CMD 01 Switch Down
viper/cockpit/CLpanel/cmds_01_up	CMD 01 Switch Up
viper/cockpit/CLpanel/cmds_02_down	CMD 02 Switch Down
viper/cockpit/CLpanel/cmds_02_up	CMD 02 Switch Up
viper/cockpit/CLpanel/cmds_03_down	CMD 03 Switch Down
viper/cockpit/CLpanel/cmds_03_up	CMD 03 Switch Up
viper/cockpit/CLpanel/cmds_04_down	CMD 04 Switch Down
viper/cockpit/CLpanel/cmds_04_up	CMD 04 Switch Up
viper/cockpit/CLpanel/floodlight1_down	Left Flood Light Down
viper/cockpit/CLpanel/floodlight1_up	Left Flood Light Up
viper/cockpit/CLpanel/front_lights_down	Front Lights Down
viper/cockpit/CLpanel/front_lights_up	Front Lights Up
viper/cockpit/CLpanel/gear_alt	Landing Gear Alt
viper/cockpit/CLpanel/gnd_jett_enable_down	Ground Jetisson Enable Down
viper/cockpit/CLpanel/gnd_jett_enable_up	Ground Jetisson Enable Up
viper/cockpit/CLpanel/hook	Hook Switch
viper/cockpit/CLpanel/horn_silancer	Horn Silancer
viper/cockpit/CLpanel/jett_down	Jett Switch Down

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viper/cockpit/CLpanel/jett_up	Jett Switch Up
viper/cockpit/CLpanel/jhmcs_brightness_down	JHMCS Brightness Down
viper/cockpit/CLpanel/jhmcs_brightness_up	JHMCS Brightness Up
viper/cockpit/CLpanel/jhmcs_switch_down	JHMCS Switch Down
viper/cockpit/CLpanel/jhmcs_switch_up	JHMCS Switch Up
viper/cockpit/CLpanel/jmr_down	JMR Switch Down
viper/cockpit/CLpanel/jmr_up	JMR Switch Up
viper/cockpit/CLpanel/landing_gear_click	Landing Gear Lever
viper/cockpit/CLpanel/landing_gear_lock_rel	Landing Gear Lock Rel
viper/cockpit/CLpanel/laser_arm_down	Laser Arm Down
viper/cockpit/CLpanel/laser_arm_up	Laser Arm Up
viper/cockpit/CLpanel/master_arm_down	Master Arm Down
viper/cockpit/CLpanel/master_arm_up	Master Arm Up
viper/cockpit/CLpanel/mode_down	Mode Switch Down
viper/cockpit/CLpanel/mode_up	Mode Switch Up
viper/cockpit/CLpanel/mws_down	MWS Switch Down
viper/cockpit/CLpanel/mws_up	MWS Switch Up
viper/cockpit/CLpanel/parking_brake_chan_down	Parking Brake Channel Down
viper/cockpit/CLpanel/parking_brake_chan_up	Parking Brake Channel Up
viper/cockpit/CLpanel/parking_brake_down	Parking Brake Down
viper/cockpit/CLpanel/parking_brake_up	Parking Brake Up
viper/cockpit/CLpanel/prgm_down	Program Switch Down
viper/cockpit/CLpanel/prgm_up	Program Switch Up
viper/cockpit/CLpanel/pwr_down	PWR Switch Down
viper/cockpit/CLpanel/pwr_up	PWR Switch Up
viper/cockpit/CLpanel/roll_sel_down	Roll Sel Down
viper/cockpit/CLpanel/roll_sel_up	Roll Sel Up
viper/cockpit/CLpanel/rwr_power_command	RWR Power Button Command
viper/cockpit/CLpanel/stores_config_down	Stores Config Down
viper/cockpit/CLpanel/stores_config_up	Stores Config Up
viper/cockpit/CLpanel/stores_jetisson	Stores Jetisson

Table 41 — Left auxiliary console

Right console (89)

viper/cockpit/CRpanel/floodlight2_down	Right Flood Light Down
viper/cockpit/CRpanel/floodlight2_up	Right Flood Light Up
viper/cockpit/CRpanel/pull_to_cage_pull	Pull To Cage Pull
viper/cockpit/CRpanel/pull_to_cage_turn_down	Pull To Cage Turn Down
viper/cockpit/CRpanel/pull_to_cage_turn_up	Pull To Cage Turn Up
viper/cockpit/Rpanel/air_con_air_source_down	Air Condition Air Source Down
viper/cockpit/Rpanel/air_con_air_source_up	Air Condition Air Source Up
viper/cockpit/Rpanel/air_con_mode_down	Air Condition Mode Down
viper/cockpit/Rpanel/air_con_mode_up	Air Condition Mode Up
viper/cockpit/Rpanel/anti_ice_down	Anti Ice Down
viper/cockpit/Rpanel/anti_ice_up	Anti Ice Up
viper/cockpit/Rpanel/avionics_align_down	Avionics Align Down
viper/cockpit/Rpanel/avionics_align_up	Avionics Align Up
viper/cockpit/Rpanel/avionics_dl_down	Avionics DL Down
viper/cockpit/Rpanel/avionics_dl_up	Avionics DL Up
viper/cockpit/Rpanel/avionics_gps_down	Avionics GPS Down
viper/cockpit/Rpanel/avionics_gps_up	Avionics GPS Up
viper/cockpit/Rpanel/avionics_map_down	Avionics Map Down
viper/cockpit/Rpanel/avionics_map_up	Avionics Map Up
viper/cockpit/Rpanel/avionics_mfd_down	Avionics MFD Down
viper/cockpit/Rpanel/avionics_mfd_up	Avionics MFD Up
viper/cockpit/Rpanel/avionics_mmc_down	Avionics MMC Down
viper/cockpit/Rpanel/avionics_mmc_up	Avionics MMC Up
viper/cockpit/Rpanel/avionics_sta_down	Avionics STA Down
viper/cockpit/Rpanel/avionics_sta_up	Avionics STA Up
viper/cockpit/Rpanel/avionics_ufc_down	Avionics UFC Down
viper/cockpit/Rpanel/avionics_ufc_up	Avionics UFC Up
viper/cockpit/Rpanel/consoles_flood_light_down	Console Flood Lights Down
viper/cockpit/Rpanel/consoles_flood_light_up	Console Flood Lights Up
viper/cockpit/Rpanel/consoles_light_down	Console Lights Down
viper/cockpit/Rpanel/consoles_light_up	Console Lights Up
viper/cockpit/Rpanel/ded_light_down	DED Light Down
viper/cockpit/Rpanel/ded_light_up	DED Light Up
viper/cockpit/Rpanel/hud_altitude_mode_down	HUD Altitude Mode Down
viper/cockpit/Rpanel/hud_altitude_mode_up	HUD Altitude Mode Up

viper/cockpit/Rpanel/hud_brightness_mode_down	HUD Brightness Mode Down
viper/cockpit/Rpanel/hud_brightness_mode_up	HUD Brightness Mode Up
viper/cockpit/Rpanel/hud_ded_down	HUD DED Down
viper/cockpit/Rpanel/hud_ded_up	HUD DED Up
viper/cockpit/Rpanel/hud_depr_ret_down	HUD DEPR RET Down
viper/cockpit/Rpanel/hud_depr_ret_up	HUD DEPR RET Up
viper/cockpit/Rpanel/hud_fpm_down	HUD FPM Down
viper/cockpit/Rpanel/hud_fpm_up	HUD FPM Up
viper/cockpit/Rpanel/hud_speed_mode_down	HUD Speed Mode Down
viper/cockpit/Rpanel/hud_speed_mode_up	HUD Speed Mode Up
viper/cockpit/Rpanel/hud_test_down	HUD TEST Down
viper/cockpit/Rpanel/hud_test_up	HUD TEST Up
viper/cockpit/Rpanel/hud_vah_down	HUD VAH Down
viper/cockpit/Rpanel/hud_vah_up	HUD VAH Up
viper/cockpit/Rpanel/iff_antenna_down	IFF Antenna Down
viper/cockpit/Rpanel/iff_antenna_up	IFF Antenna Up
viper/cockpit/Rpanel/indicator_lights_down	Indicator Lights Down
viper/cockpit/Rpanel/indicator_lights_up	Indicator Lights Up
viper/cockpit/Rpanel/instrument_panel_light_down	Instrument Panel Lights Down
viper/cockpit/Rpanel/instrument_panel_light_up	Instrument Panel Lights Up
viper/cockpit/Rpanel/instruments_light_down	Instrument Lights Down
viper/cockpit/Rpanel/instruments_light_up	Instrument Lights Up
viper/cockpit/Rpanel/map_data_storage_click	Map Data Storage Click
viper/cockpit/Rpanel/nuclear_switch	Nuclear Switch
viper/cockpit/Rpanel/nuclear_switch_guard	Nuclear Guard
viper/cockpit/Rpanel/nvision_mode_down	Night Vision Mode Down
viper/cockpit/Rpanel/nvision_mode_up	Night Vision Mode Up
viper/cockpit/Rpanel/oxygen_100_down	Oxygen Quantity Down
viper/cockpit/Rpanel/oxygen_100_up	Oxygen Quantity Up
viper/cockpit/Rpanel/oxygen_mode_down	Oxygen Mode Down
viper/cockpit/Rpanel/oxygen_mode_up	Oxygen Mode Up
viper/cockpit/Rpanel/oxygen_suply_down	Oxygen Supply Down
viper/cockpit/Rpanel/oxygen_suply_up	Oxygen Supply Up
viper/cockpit/Rpanel/plain_down	Plain Down
viper/cockpit/Rpanel/plain_up	Plain Up
viper/cockpit/Rpanel/seat_adjust_down	Seat Adjust Down
viper/cockpit/Rpanel/seat_adjust_up	Seat Adjust Up
viper/cockpit/Rpanel/sensor_fcr_down	Sensor FCR Down
viper/cockpit/Rpanel/sensor_fcr_up	Sensor FCR Up
viper/cockpit/Rpanel/sensor_left_hdtp_down	Sensor Left HDTP Down
viper/cockpit/Rpanel/sensor_left_hdtp_up	Sensor Left HDTP Up
viper/cockpit/Rpanel/sensor_rdr_alt_down	Sensor Radar Altitude Down
viper/cockpit/Rpanel/sensor_rdr_alt_up	Sensor Radar Altitude Up
viper/cockpit/Rpanel/sensor_right_hdtp_down	Sensor Right HDTP Down
viper/cockpit/Rpanel/sensor_right_hdtp_up	Sensor Right HDTP Up
viper/cockpit/Rpanel/udtu_down	UDTU Down
viper/cockpit/Rpanel/udtu_up	UDTU Up
viper/cockpit/Rpanel/uhf_antenna_down	UHF Antenna Down
viper/cockpit/Rpanel/uhf_antenna_up	UHF Antenna Up
viper/cockpit/Rpanel/voice_message_down	Voice Messages Down
viper/cockpit/Rpanel/voice_message_up	Voice Messages Up
viper/cockpit/Rpanel/zeroize_switch_down	Zeroize Switch Down
viper/cockpit/Rpanel/zeroize_switch_guard	Zeroize Guard
viper/cockpit/Rpanel/zeroize_switch_up	Zeroize Switch Up

Table 42 — Right console

Centre panel (20)

viper/cockpit/Cpanel/alt_hg_down	Altitude HG Down
viper/cockpit/Cpanel/alt_hg_up	Altitude HG Up
viper/cockpit/Cpanel/altitude_mode	Altitude Mode
viper/cockpit/Cpanel/altitude_mode_sel	Altitude Mode Select
viper/cockpit/Cpanel/fuel_sel_down	Fuel Select Down
viper/cockpit/Cpanel/fuel_sel_up	Fuel Select Up
viper/cockpit/Cpanel/fuel_trans_down	Fuel Transfer Down
viper/cockpit/Cpanel/fuel_trans_up	Fuel Transfer Up
viper/cockpit/Cpanel/hdg_down	Heading Down
viper/cockpit/Cpanel/hdg_up	Heading Up
viper/cockpit/Cpanel/horizon_knob_down	Horizon Knob Down
viper/cockpit/Cpanel/horizon_knob_up	Horizon Knob Up
viper/cockpit/Cpanel/hsi_crs_down	HSI Course Down
viper/cockpit/Cpanel/hsi_crs_up	HSI Course Up
viper/cockpit/Cpanel/hsi_hdg_down	HSI Heading Down
viper/cockpit/Cpanel/hsi_hdg_up	HSI Heading Up
viper/cockpit/Cpanel/mach_green_marker_set_down	Mach Green Marker Set Down
viper/cockpit/Cpanel/mach_green_marker_set_up	Mach Green Marker Set Up
viper/cockpit/Cpanel/nav_mode_down	Nav Mode Down
viper/cockpit/Cpanel/nav_mode_up	Nav Mode Up

Table 43 — Centre panel

Lighting (4)

viper/cockpit/lit/left_indexer_down	Left Indexer Down
viper/cockpit/lit/left_indexer_up	Left Indexer Up
viper/cockpit/lit/right_indexer_down	Right Indexer Down
viper/cockpit/lit/right_indexer_up	Right Indexer Up

Table 44 — Lighting

Kneepad and menu (66)

viper/Menu	Open Plane Menu
viper/menu/data_cartridge	Data Cartridge — open the kneepad pop-up on the FLT PLAN / tapes page
viper/menu/data_cartridge_editor	Data Cartridge Editor — open/close the tape editor window
viper/menu/option_arms	Arms Option
viper/menu/option_backseat_backview	Rear Seat Back View Option
viper/menu/option_backseat_frontview	Rear Seat Front View Option
viper/menu/option_backseat_seatview	Rear Seat Seat View Option
viper/menu/option_cft	Cft Option
viper/menu/option_chocks	Chocks Option
viper/menu/option_cold_and_dark	Cold And Dark Option
viper/menu/option_colorvisor	Coloured Visor Option
viper/menu/option_decor	Decor Option
viper/menu/option_ded_screen_centered	DED Centered Option
viper/menu/option_enginesmoker	Engine Smoker Option
viper/menu/option_extpilotonly	Ext Only Pilot Option
viper/menu/option_flightplans_line01	FPL 01 Option
viper/menu/option_flightplans_line02	FPL 02 Option
viper/menu/option_flightplans_line03	FPL 03 Option
viper/menu/option_flightplans_line04	FPL 04 Option
viper/menu/option_flightplans_line05	FPL 05 Option
viper/menu/option_flightplans_line06	FPL 06 Option
viper/menu/option_flightplans_line07	FPL 07 Option
viper/menu/option_flightplans_line08	FPL 08 Option
viper/menu/option_flightplans_line09	FPL 09 Option
viper/menu/option_flightplans_line10	FPL 10 Option
viper/menu/option_flightplans_line11	FPL 11 Option
viper/menu/option_flightplans_line12	FPL 12 Option
viper/menu/option_flightplans_next	FLT PLN Next Option
viper/menu/option_flightplans_prev	FLT PLN Prev Option
viper/menu/option_frontseat_backview	Front Seat Back View Option
viper/menu/option_frontseat_frontview	Front Seat Front View Option
viper/menu/option_frontseat_seatview	Front Seat Seat View Option
viper/menu/option_gloves	Gloves Option
viper/menu/option_hgu	HGU Helmet Option

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viper/menu/option_hi_g_breath	High G Breath Option
viper/menu/option_hidepilot	Hide Pilot Option
viper/menu/option_hud	HUD Option
viper/menu/option_hud_pop_up	HUD Pop Up
viper/menu/option_hud_screen_centered	HUD Centered Option
viper/menu/option_jhmcs	JHMCS Helmet Option
viper/menu/option_ladder	Ladder Option
viper/menu/option_lifejacket	Life Jacket Option
viper/menu/option_lmfd_screen_centered	LMFD Centered Option
viper/menu/option_mfd_buttons	MFD Pop Up Buttons Option
viper/menu/option_normalvisor	Normal Visor Option
viper/menu/option_oldtype	Old Type Helmet Option
viper/menu/option_pilotvoice	Pilot Voice Option
viper/menu/option_popup	Plane Pop Up Toggle Option
viper/menu/option_popup_options_list	Pop Up Options
viper/menu/option_rbf	RBF Option
viper/menu/option_re_arm	Re-Arm Kneepad Command
viper/menu/option_ready_to_taxi_no_al	Ready to Taxi Without Alignment Option
viper/menu/option_ready_to_taxi_with_al	Ready to Taxi With Alignment Option
viper/menu/option_return_page	MFD Pop Up Option Return
viper/menu/option_rmfd_screen_centered	RMFD Centered Option
viper/menu/option_rwr_screen_centered	RWR Centered Option
viper/menu/option_save	Plane Menu Save Option
viper/menu/option_save_audio	Various Save Option
viper/menu/option_save_loadout	Loadout Save Option
viper/menu/option_save_pilot	Pilot Save Option
viper/menu/option_showpilot	Show Pilot Option
viper/menu/option_sidebag	Side Bag Option
viper/menu/option_sidestick	Side Stick Option
viper/menu/option_tailchute	Tail Chute Option
viper/menu/option_vrcockpit	Vr Friendly Manipulators Toggle
viper/menu/option_wingtipsmokers	Wing Tip Smoker Option

Table 45 — Kneepad and menu

Pilot (15)

viper/pilot/pilot_knee_pad_checklist_1	Checklist 1
viper/pilot/pilot_knee_pad_checklist_2	Checklist 2
viper/pilot/pilot_knee_pad_checklist_3	Checklist 3
viper/pilot/pilot_knee_pad_checklist_4	Checklist 4
viper/pilot/pilot_knee_pad_checklist_5	Checklist 5
viper/pilot/pilot_knee_pad_checklist_6	Checklist 6
viper/pilot/pilot_knee_pad_checklist_7	Checklist 7
viper/pilot/pilot_knee_pad_checklist_8	Checklist 8
viper/pilot/pilot_knee_pad_checklists	Checklists Option
viper/pilot/pilot_knee_pad_fltplan	Flight Plan option
viper/pilot/pilot_knee_pad_loadout	Loadout Option
viper/pilot/pilot_knee_pad_main	Return Option
viper/pilot/pilot_knee_pad_options	Cinematic Options
viper/pilot/pilot_knee_pad_pilot	Pilot Setup
viper/pilot/pilot_knee_pad_various	Various Option

Table 46 — Pilot

Systems (3)

viper/systems/iff/in_command	IFF In
viper/systems/iff/out_command	IFF Out
viper/systems/soi/soi_selector	SOI Selector

Table 47 — Systems

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Other cockpit controls (21)

viper/cockpit/back_cockpit	Back Cockpit Selection
viper/cockpit/brakingSystem/doubleToeBraking	Double Toe Braking
viper/cockpit/canopyjettisonhandle	Canopy Jetisson Handle
viper/cockpit/dedpopup	Front DED Pop Up
viper/cockpit/defog_down	Defog Down
viper/cockpit/defog_up	Defog Up
viper/cockpit/ejection_handle	Ejection Handle
viper/cockpit/ejection_seat_lock	Ejection Seat Arm
viper/cockpit/emergency_jettison	Emergency Jettison
viper/cockpit/front_cockpit	Front Cockpit Selection
viper/cockpit/hand_rest_back_down	Hand Rest Back Down
viper/cockpit/hand_rest_back_up	Hand Rest Back Up
viper/cockpit/hand_rest_forward	Hand Rest Forward
viper/cockpit/iff_ident_button	IFF Ident
viper/cockpit/master_caution_reset	Master Caution Reset
viper/cockpit/rwspopup	Front RWR Pop Up
viper/cockpit/shoulder_harness	Pilot's Kneepad
viper/cockpit/spider_click	Spider Click
viper/cockpit/throttle/detent	Throttle Detent
viper/cockpit/throttle_down	Throttle Down
viper/cockpit/throttle_up	Throttle Up

Table 48 — Other cockpit controls

F-16D ONLY — REAR COCKPIT (272)

ICP and DED (31)

viper/cockpit/icp/ASHM_video_sel	ASHM Video Select
viper/cockpit2/icp/circle_buttons_com_1	ICP Com 1 Button
viper/cockpit2/icp/circle_buttons_com_2	ICP Com 2 Button
viper/cockpit2/icp/circle_buttons_iff	ICP Com IFF Button
viper/cockpit2/icp/circle_buttons_list	ICP Com LIST Button
viper/cockpit2/icp/rotate_1_down	ICP Rear Top Left Wheel Down
viper/cockpit2/icp/rotate_1_up	ICP Rear Top Left Wheel Up
viper/cockpit2/icp/rotate_2_down	ICP Rear Bottom Left Wheel Down
viper/cockpit2/icp/rotate_2_up	ICP Rear Bottom Left Wheel Up
viper/cockpit2/icp/rotate_3_down	ICP Rear Top Right Wheel Down
viper/cockpit2/icp/rotate_3_up	ICP Rear Top Right Wheel Up
viper/cockpit2/icp/rotate_4_down	ICP Rear Bottom Right Wheel Down
viper/cockpit2/icp/rotate_4_up	ICP Rear Bottom Right Wheel Up
viper/cockpit2/icp/square_buttons_0	ICP SB 0 Button
viper/cockpit2/icp/square_buttons_1	ICP SB 1 Button
viper/cockpit2/icp/square_buttons_2	ICP SB 2 Button
viper/cockpit2/icp/square_buttons_3	ICP SB 3 Button
viper/cockpit2/icp/square_buttons_4	ICP SB 4 Button
viper/cockpit2/icp/square_buttons_5	ICP SB 5 Button
viper/cockpit2/icp/square_buttons_6	ICP SB 6 Button
viper/cockpit2/icp/square_buttons_7	ICP SB 7 Button
viper/cockpit2/icp/square_buttons_8	ICP SB 8 Button
viper/cockpit2/icp/square_buttons_9	ICP SB 9 Button
viper/cockpit2/icp/square_buttons_entr	ICP SB ENTR Button
viper/cockpit2/icp/square_buttons_rcl	ICP SB RCL Button
viper/cockpit2/icp/square_buttons_updown_1_down	ICP SB UPDOWN DOWN Button
viper/cockpit2/icp/square_buttons_updown_1_up	ICP SB UPDOWN UP Button
viper/cockpit2/icp/switch_1_down	ICP RTN SWITCH DOWN
viper/cockpit2/icp/switch_1_left	ICP RTN SWITCH LEFT
viper/cockpit2/icp/switch_1_right	ICP RTN SWITCH RIGHT
viper/cockpit2/icp/switch_1_up	ICP RTN SWITCH UP

Table 49 — ICP and DED

MFD (58)

viper/cockpit2/lmfd_popup	Rear Left MFD pop up
viper/cockpit2/mfdL/button01	Left MFD OSB 01
viper/cockpit2/mfdL/button02	Left MFD OSB 02
viper/cockpit2/mfdL/button03	Left MFD OSB 03

viper/cockpit2/mfdL/button04	Left MFD OSB 04
viper/cockpit2/mfdL/button05	Left MFD OSB 05
viper/cockpit2/mfdL/button08	Left MFD OSB 20
viper/cockpit2/mfdL/button09	Left MFD OSB 06
viper/cockpit2/mfdL/button10	Left MFD OSB 19
viper/cockpit2/mfdL/button11	Left MFD OSB 07
viper/cockpit2/mfdL/button12	Left MFD OSB 18
viper/cockpit2/mfdL/button13	Left MFD OSB 08
viper/cockpit2/mfdL/button14	Left MFD OSB 17
viper/cockpit2/mfdL/button15	Left MFD OSB 09
viper/cockpit2/mfdL/button16	Left MFD OSB 16
viper/cockpit2/mfdL/button17	Left MFD OSB 10
viper/cockpit2/mfdL/button18bottom	Left MFD CON DOWN Button
viper/cockpit2/mfdL/button18top	Left MFD CON UP Button
viper/cockpit2/mfdL/button19bottom	Left MFD BRT DOWN Button
viper/cockpit2/mfdL/button19top	Left MFD BRT UP Button
viper/cockpit2/mfdL/button20	Left MFD OSB 15
viper/cockpit2/mfdL/button21	Left MFD OSB 14
viper/cockpit2/mfdL/button22	Left MFD OSB 13
viper/cockpit2/mfdL/button23	Left MFD OSB 12
viper/cockpit2/mfdL/button24	Left MFD OSB 11
viper/cockpit2/mfdL/button6bottom	Left MFD SYM DOWN Button
viper/cockpit2/mfdL/button6top	Left MFD SYM UP Button
viper/cockpit2/mfdL/button7bottom	Left MFD GAIN DOWN Button
viper/cockpit2/mfdL/button7top	Left MFD GAIN UP Button
viper/cockpit2/mfdR/button01	RIGHT MFD OSB 01
viper/cockpit2/mfdR/button02	RIGHT MFD OSB 02
viper/cockpit2/mfdR/button03	RIGHT MFD OSB 03
viper/cockpit2/mfdR/button04	RIGHT MFD OSB 04
viper/cockpit2/mfdR/button05	RIGHT MFD OSB 05
viper/cockpit2/mfdR/button08	RIGHT MFD OSB 20
viper/cockpit2/mfdR/button09	RIGHT MFD OSB 06
viper/cockpit2/mfdR/button10	RIGHT MFD OSB 19
viper/cockpit2/mfdR/button11	RIGHT MFD OSB 07
viper/cockpit2/mfdR/button12	RIGHT MFD OSB 18
viper/cockpit2/mfdR/button13	RIGHT MFD OSB 08
viper/cockpit2/mfdR/button14	RIGHT MFD OSB 17
viper/cockpit2/mfdR/button15	RIGHT MFD OSB 09
viper/cockpit2/mfdR/button16	RIGHT MFD OSB 16
viper/cockpit2/mfdR/button17	RIGHT MFD OSB 10
viper/cockpit2/mfdR/button18bottom	RIGHT MFD CON DOWN Button
viper/cockpit2/mfdR/button18top	RIGHT MFD CON UP Button
viper/cockpit2/mfdR/button19bottom	RIGHT MFD BRT DOWN Button
viper/cockpit2/mfdR/button19top	RIGHT MFD BRT UP Button
viper/cockpit2/mfdR/button20	RIGHT MFD OSB 15
viper/cockpit2/mfdR/button21	RIGHT MFD OSB 14
viper/cockpit2/mfdR/button22	RIGHT MFD OSB 13
viper/cockpit2/mfdR/button23	RIGHT MFD OSB 12
viper/cockpit2/mfdR/button24	RIGHT MFD OSB 11
viper/cockpit2/mfdR/button6bottom	RIGHT MFD SYM DOWN Button
viper/cockpit2/mfdR/button6top	RIGHT MFD SYM UP Button
viper/cockpit2/mfdR/button7bottom	RIGHT MFD GAIN DOWN Button
viper/cockpit2/mfdR/button7top	RIGHT MFD GAIN UP Button
viper/cockpit2/rmfd_popup	Rear Right MFD pop up

Table 50 — MFD

Left console (31)

viper/cockpit2/Lpanel/ASIU_down	Rear ASIU Down
viper/cockpit2/Lpanel/ASIU_up	Rear ASIU Up
viper/cockpit2/Lpanel/audio1_secure_voice_down	Rear Secure Voice Down
viper/cockpit2/Lpanel/audio1_secure_voice_msl_down	Rear Secure Voice MSL Down
viper/cockpit2/Lpanel/audio1_secure_voice_msl_up	Rear Secure Voice MSL Up
viper/cockpit2/Lpanel/audio1_secure_voice_tf_down	Rear Secure Voice TF Down
viper/cockpit2/Lpanel/audio1_secure_voice_tf_up	Rear Secure Voice TF Up
viper/cockpit2/Lpanel/audio1_secure_voice_threat_down	Rear Voice Threat Down
viper/cockpit2/Lpanel/audio1_secure_voice_threat_up	Rear Voice Threat Up
viper/cockpit2/Lpanel/audio1_secure_voice_up	Rear Secure Voice Up
viper/cockpit2/Lpanel/audio2_ils_down	Rear ILS Volume Down
viper/cockpit2/Lpanel/audio2_ils_up	Rear ILS Volume Up
viper/cockpit2/Lpanel/audio2_intercom_down	Rear Intercom Volume Down
viper/cockpit2/Lpanel/audio2_intercom_up	Rear Intercom Volume Up
viper/cockpit2/Lpanel/audio2_tacan_down	Rear Tacan Volume Down
viper/cockpit2/Lpanel/audio2_tacan_up	Rear Tacan Volume Up
viper/cockpit2/Lpanel/avionics_down	Rear Avionics Down
viper/cockpit2/Lpanel/avionics_up	Rear Avionics Up
viper/cockpit2/Lpanel/com1_volume_down	Rear Com1 Volume Down
viper/cockpit2/Lpanel/com1_volume_tone_down	Rear Com1 Tone Volume Down
viper/cockpit2/Lpanel/com1_volume_tone_up	Rear Com1 Tone Volume Up
viper/cockpit2/Lpanel/com1_volume_up	Rear Com1 Volume Up
viper/cockpit2/Lpanel/com2_volume_down	Rear Com2 Volume Down
viper/cockpit2/Lpanel/com2_volume_tone_down	Rear Com2 Tone Volume Down
viper/cockpit2/Lpanel/com2_volume_tone_up	Rear Com2 Tone Volume Up
viper/cockpit2/Lpanel/com2_volume_up	Rear Com2 Volume Up
viper/cockpit2/Lpanel/ejection_seq_down	Rear Ejection Sequence Down
viper/cockpit2/Lpanel/ejection_seq_up	Rear Ejection Sequence Up
viper/cockpit2/Lpanel/hot_mic_down	Rear Hot Mic Down
viper/cockpit2/Lpanel/hot_mic_up	Rear Hot Mic Up
viper/cockpit2/Lpanel/stic_av_protect	Rear Stick AV Protect

Table 51 — Left console

Left auxiliary console (8)

viper/cockpit2/CLpanel/armtconsent	Rear Arm T Consent
viper/cockpit2/CLpanel/armtconsent_protector	Rear Arm T Consent Protector
viper/cockpit2/CLpanel/floodlight1_down	Rear Left Green Flood Light Down
viper/cockpit2/CLpanel/floodlight1_up	Rear Left Green Flood Light Up
viper/cockpit2/CLpanel/gnd_jett_enable	Rear Ground Jetisson Enable
viper/cockpit2/CLpanel/horn_silancer	Rear Horn Silancer
viper/cockpit2/CLpanel/stores_config	Rear Stores Config
viper/cockpit2/CLpanel/stores_jetisson	Rear Panel Stores Jetisson

Table 52 — Left auxiliary console

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Right console (27)

viper/cockpit2/CRpanel/floodlight2_down	Rear Right Green Flood Light Down
viper/cockpit2/CRpanel/floodlight2_up	Rear Right Green Flood Light Up
viper/cockpit2/CRpanel/pull_to_cage_pull	Rear Pull To Cage Pull
viper/cockpit2/CRpanel/pull_to_cage_turn_down	Rear Pull To Cage Turn Down
viper/cockpit2/CRpanel/pull_to_cage_turn_up	Rear Pull To Cage Turn Up
viper/cockpit2/Rpanel/consoles_flood_light_down	Rear Consoles Flood Lights Down
viper/cockpit2/Rpanel/consoles_flood_light_up	Rear Consoles Flood Lights Up
viper/cockpit2/Rpanel/consoles_light_down	Rear Consoles Light Down
viper/cockpit2/Rpanel/consoles_light_up	Rear Consoles Light Up
viper/cockpit2/Rpanel/ded_light_down	Rear DED Light Down
viper/cockpit2/Rpanel/ded_light_up	Rear DED Light Up
viper/cockpit2/Rpanel/indicator_lights_down	Rear Indicator Lights Down
viper/cockpit2/Rpanel/indicator_lights_up	Rear Indicator Lights Up
viper/cockpit2/Rpanel/instrument_panel_light_down	Rear Instrument Panel Light Down
viper/cockpit2/Rpanel/instrument_panel_light_up	Rear Instrument Panel Light Up
viper/cockpit2/Rpanel/instruments_light_down	Rear Instrumetns Light Down
viper/cockpit2/Rpanel/instruments_light_up	Rear Instrumetns Light Up
viper/cockpit2/Rpanel/nvision_mode_down	Rear Night Vision Mode Down
viper/cockpit2/Rpanel/nvision_mode_up	Rear Night Vision Mode Up
viper/cockpit2/Rpanel/oxygen_100_down	Rear Oxygen Quatnity Down
viper/cockpit2/Rpanel/oxygen_100_up	Rear Oxygen Quatnity Up
viper/cockpit2/Rpanel/oxygen_mode_down	Rear Oxygen Mode Down
viper/cockpit2/Rpanel/oxygen_mode_up	Rear Oxygen Mode Up
viper/cockpit2/Rpanel/oxygen_suply_down	Rear Oxygen Supply Down
viper/cockpit2/Rpanel/oxygen_suply_up	Rear Oxygen Supply Up
viper/cockpit2/Rpanel/seat_adjust_down	Rear Seat Adjust Down
viper/cockpit2/Rpanel/seat_adjust_up	Rear Seat Adjust Up

Table 53 — Right console

Centre panel (15)

viper/cockpit2/Cpanel/alt_hg_down	Rear Altitude HG Down
viper/cockpit2/Cpanel/alt_hg_up	Rear Altitude HG Up
viper/cockpit2/Cpanel/altitude_mode	Rear Altitude Mode
viper/cockpit2/Cpanel/altitude_mode_sel	Rear Altitude Mode Selection
viper/cockpit2/Cpanel/g_force_reset	Rear G-Force Reset
viper/cockpit2/Cpanel/horizon_knob_down	Rear Horizon Knob Down
viper/cockpit2/Cpanel/horizon_knob_up	Rear Horizon Knob Up
viper/cockpit2/Cpanel/hsi_crs_down	Rear HSI Course Down
viper/cockpit2/Cpanel/hsi_crs_up	Rear HSI Course Up
viper/cockpit2/Cpanel/hsi_hdg_down	Rear HSI Heading Down
viper/cockpit2/Cpanel/hsi_hdg_up	Rear HSI Heading Up
viper/cockpit2/Cpanel/mach_green_marker_set_down	Rear Mach Green Marker Down
viper/cockpit2/Cpanel/mach_green_marker_set_up	Rear Mach Green Marker Up
viper/cockpit2/Cpanel/nav_mode_down	Rear Nav Mode Down
viper/cockpit2/Cpanel/nav_mode_up	Rear Nav Mode Up

Table 54 — Centre panel

Lighting (4)

viper/cockpit2/lit/left_indexer_down	Rear Left Indexer Down
viper/cockpit2/lit/left_indexer_up	Rear Left Indexer Up
viper/cockpit2/lit/right_indexer_down	Rear Right Indexer Down
viper/cockpit2/lit/right_indexer_up	Rear Right Indexer Up

Table 55 — Lighting

Kneepad and menu (66)

viper/Menu2	Open Plane Menu
viper/menu/option_ASHM	ASHM Option
viper/menu/option_topelec	Top Elec Option
viper/menu2/option_ASHM	ASHM Option
viper/menu2/option_arms	Arms Option
viper/menu2/option_backseat_backview	Rear Seat Back View Option
viper/menu2/option_backseat_frontview	Rear Seat Front View Option
viper/menu2/option_backseat_seatview	Rear Seat Seat View Option

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viper/menu2/option_cft	Cft Option
viper/menu2/option_chocks	Chocks Option
viper/menu2/option_cold_and_dark	Cold And Dark Option
viper/menu2/option_colorvisor	Coloured Visor Option
viper/menu2/option_decor	Decor Option
viper/menu2/option_ded_screen_centered	DED Centered Option
viper/menu2/option_enginesmoker	Engine Smoker Option
viper/menu2/option_extpilotonly	Ext Only Pilot Option
viper/menu2/option_flightplans_line01	FPL 01 Option
viper/menu2/option_flightplans_line02	FPL 02 Option
viper/menu2/option_flightplans_line03	FPL 03 Option
viper/menu2/option_flightplans_line04	FPL 04 Option
viper/menu2/option_flightplans_line05	FPL 05 Option
viper/menu2/option_flightplans_line06	FPL 06 Option
viper/menu2/option_flightplans_line07	FPL 07 Option
viper/menu2/option_flightplans_line08	FPL 08 Option
viper/menu2/option_flightplans_line09	FPL 09 Option
viper/menu2/option_flightplans_line10	FPL 10 Option
viper/menu2/option_flightplans_line11	FPL 11 Option
viper/menu2/option_flightplans_line12	FPL 12 Option
viper/menu2/option_flightplans_next	FLT PLN Next Option
viper/menu2/option_flightplans_prev	FLT PLN Prev Option
viper/menu2/option_frontseat_backview	Front Seat Back View Option
viper/menu2/option_frontseat_frontview	Front Seat Front View Option
viper/menu2/option_frontseat_seatview	Front Seat Seat View Option
viper/menu2/option_gloves	Gloves Option
viper/menu2/option_hgu	HGU Helmet Option
viper/menu2/option_hi_g_breath	High G Breath Option
viper/menu2/option_hidepilot	Hide Pilot Option
viper/menu2/option_hud	HUD Option
viper/menu2/option_hud_pop_up	HUD Pop Up
viper/menu2/option_hud_screen_centered	HUD Centered Option
viper/menu2/option_jhmcs	JHMCS Helmet Option
viper/menu2/option_ladder	Ladder Option
viper/menu2/option_lifejacket	Life Jacket Option
viper/menu2/option_lmfd_screen_centered	LMFD Centered Option
viper/menu2/option_mfd_buttons	MFD Pop Up Buttons Option
viper/menu2/option_normalvisor	Normal Visor Option
viper/menu2/option_oldtype	Old Type Helmet Option
viper/menu2/option_pilotvoice	Pilot Voice Option
viper/menu2/option_popup	Plane Pop Up Toggle Option
viper/menu2/option_popup_options_list	Pop Up Options
viper/menu2/option_rbf	RBF Option
viper/menu2/option_ready_to_taxi_no_al	Ready to Taxi Without Alignment Option
viper/menu2/option_ready_to_taxi_with_al	Ready to Taxi With Alignment Option
viper/menu2/option_return_page	MFD Pop Up Buttons Option
viper/menu2/option_rmfd_screen_centered	RMFD Centered Option
viper/menu2/option_rwr_screen_centered	RWR Centered Option
viper/menu2/option_save	Plane Menu Save Option
viper/menu2/option_save_audio	Audio Save Option
viper/menu2/option_save_loadout	Loadout Save Option
viper/menu2/option_save_pilot	Pilot Save Option
viper/menu2/option_showpilot	Show Pilot Option
viper/menu2/option_sidebag	Side Bag Option
viper/menu2/option_sidestick	Side Stick Option
viper/menu2/option_tailchute	Tail Chute Option
viper/menu2/option_topelec	Top Elec Option
viper/menu2/option_wingtipsmokers	Wing Tip Smoker Option

Table 56 — Kneepad and menu

Pilot (15)

viper/pilot/pilot2_knee_pad_checklist_1	Checklist 1
viper/pilot/pilot2_knee_pad_checklist_2	Checklist 2
viper/pilot/pilot2_knee_pad_checklist_3	Checklist 3
viper/pilot/pilot2_knee_pad_checklist_4	Checklist 4
viper/pilot/pilot2_knee_pad_checklist_5	Checklist 5
viper/pilot/pilot2_knee_pad_checklist_6	Checklist 6
viper/pilot/pilot2_knee_pad_checklist_7	Checklist 7
viper/pilot/pilot2_knee_pad_checklist_8	Checklist 8
viper/pilot/pilot2_knee_pad_checklists	Checklists Option
viper/pilot/pilot2_knee_pad_fltplan	Flight Plan option
viper/pilot/pilot2_knee_pad_loadout	Loadout Option
viper/pilot/pilot2_knee_pad_main	Return Option
viper/pilot/pilot2_knee_pad_options	Options
viper/pilot/pilot2_knee_pad_pilot	Pilot Setup
viper/pilot/pilot2_knee_pad_various	Various Option

Table 57 — Pilot

Other cockpit controls (17)

viper/cockpit/fault_ack_button	Rear Fault Ack Button
viper/cockpit2/ASHM_brt_down	ASHM Brightness Down
viper/cockpit2/ASHM_brt_up	ASHM Brightness Up
viper/cockpit2/ASHM_cont_down	ASHM Contrast Down
viper/cockpit2/ASHM_cont_up	ASHM Contrast Up
viper/cockpit2/ASHM_mode_down	ASHM Mode Down
viper/cockpit2/ASHM_mode_up	ASHM Mode Up
viper/cockpit2/dedpopup	Rear DED Pop Up
viper/cockpit2/ejection_handle	Rear Ejection Handle
viper/cockpit2/ejection_seat_lock	Rear Ejection Seat Arm
viper/cockpit2/hand_rest_back_down	Rear Hand Rest Back Down
viper/cockpit2/hand_rest_back_up	Rear Hand Rest Back Up
viper/cockpit2/hand_rest_forward	Rear Hand Rest Forward
viper/cockpit2/iff_ident_button	Rear IFF Ident
viper/cockpit2/rwspopup	Rear RWR Pop Up
viper/cockpit2/shoulder_harness	Rear Kneepad Toggle
viper/cockpit2/side_pocket	Rear Side Pocket

Table 58 — Other cockpit controls

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