DCS GUIDE

F/A-18C HORNET LOT 20

BY CHUCK

LAST UPDATED: 31/08/2019

TABLE OF CONTENTS

Special thanks to Paul "Goldwolf" Whittingham for creating the guide icons.

The **McDonnell Douglas F/A-18 Hornet** is a twin-engine, supersonic, all-weather, carrier-capable, multirole combat jet, designed as both a fighter and attack aircraft (hence the F/A designation). Designed by McDonnell Douglas (now Boeing) and Northrop, the F/A-18 was derived from the latter's YF-17 in the 1970s for use by the United States Navy and Marine Corps.

The Hornet is highly maneuverable, owing to its good thrust-to-weight ratio, digital fly-by-wire control system, and leading-edge extensions, which allow the Hornet to remain controllable at high angles of attack. The trapezoidal wing has a 20-degree sweepback on the leading edge and a straight trailing edge. The wing has full-span, leading-edge flaps and the trailing edge has single-slotted flaps and ailerons over the entire span. The Hornet is also notable for having been designed to reduce maintenance, and as a result, has required far less downtime than its heavier counterparts, the F-14 Tomcat and the A-6 Intruder. Its mean time between failures is three times greater than any other Navy strike aircraft, and requires half the maintenance time. Its General Electric F404 engines were also innovative in that they were designed with operability, reliability, and maintainability first. The engine, while unexceptional in rated performance, demonstrates exceptional robustness under various conditions and is resistant to stall and flameout. The F404 engine connects to the airframe at only 10 points and can be replaced without special equipment; a four-person team can remove the engine within 20 minutes.

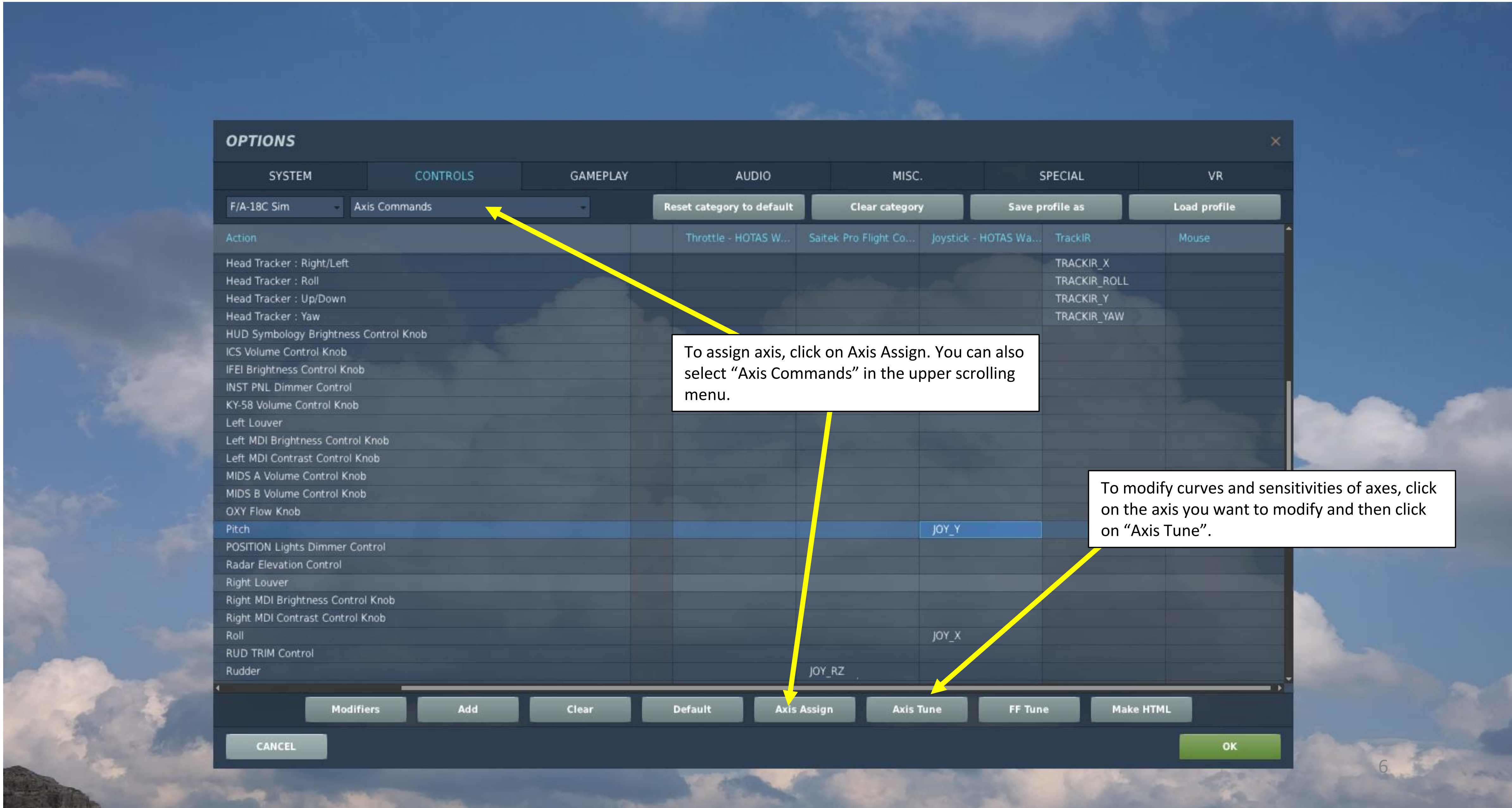
The F/A-18 has a top speed of Mach 1.8 (1,034 knots, 1,190 mph or 1,915 km/h at 40,000 ft or 12,200 m). It can carry a wide variety of bombs and missiles, including air-to-air and air-to-ground, supplemented by the 20-mm M61 Vulcan cannon. It is powered by two General Electric F404 turbofan engines, which give the aircraft a high thrust-to-weight ratio. The F/A-18 has excellent aerodynamic characteristics, primarily attributed to its leading-edge extensions (LEX). The fighter's primary missions are fighter escort, fleet air defense, suppression of enemy air defenses, air interdiction, close air support, and aerial reconnaissance. Its versatility and reliability have proven it to be a valuable carrier asset, though it has been criticized for its lack of range and payload compared to its earlier contemporaries, such as the Grumman F-14 Tomcat in the fighter and strike fighter role, and the Grumman A-6 Intruder and LTV A-7 Corsair II in the attack role.

The DCS Hornet we have at the moment is the "C" version, also known as "Legacy" or "Charlie" Hornet. As early access progresses and more weapons and sensors are integrated, the Hornet will become one of the most versatile aircraft, being able to precisely drop unguided bombs, fire short and long-range air-to-air missiles like the Sidewinder and the AMRAAM, and eventually use an ATFLIR targeting pod, HARMs, SLAM-ERs and other high-tech systems of the kind. The cockpit feels modern with its DDIs (Digital Display Indicator) AMPCD (Advanced Multi-Purpose Color Display), Moving Map and Heads-Up Display. There is a lot of functionality embedded in all of these pages and the UFC (Up-Front Controller) is instinctive enough to make even the most complicated tasks relatively straightforward. The Hornet seems to have been designed to be a Jack of all Trades that could be used in more or less any type of mission, which makes it a great choice for those who want to do different things.

The F/A-18C is an incredible product, even if it is still being developed. Carrier operations are stressful and require an ungodly amount of hours of practice before being any good at all. It is genuinely the most stressful thing I've ever done in DCS, air-to-air refueling included. The flight model by itself is something completely different. The FCS (Flight Control System) needs to be studied and understood if you want to fly "with it" instead of fighting "against it". Yes, you will have to tame the beast. That's part of its charm.

This aircraft gives you a great sense of power, purpose and achievement. Learning to fly it properly is no easy task but the aircraft has such character that it makes the whole experience very rewarding. Once you get that exhilarating feeling of catching the third wire during a difficult carrier landing… you'll understand what I'm talking about.

Note: In your controls, make sure you check your "Trim" controls since the default version of the game has your trim hat set to changing your view rather than trim the aircraft. Since most of you are probably equipped with a TRACKIR already, I suggest you make sure the Trim Hat Switch is set up properly.

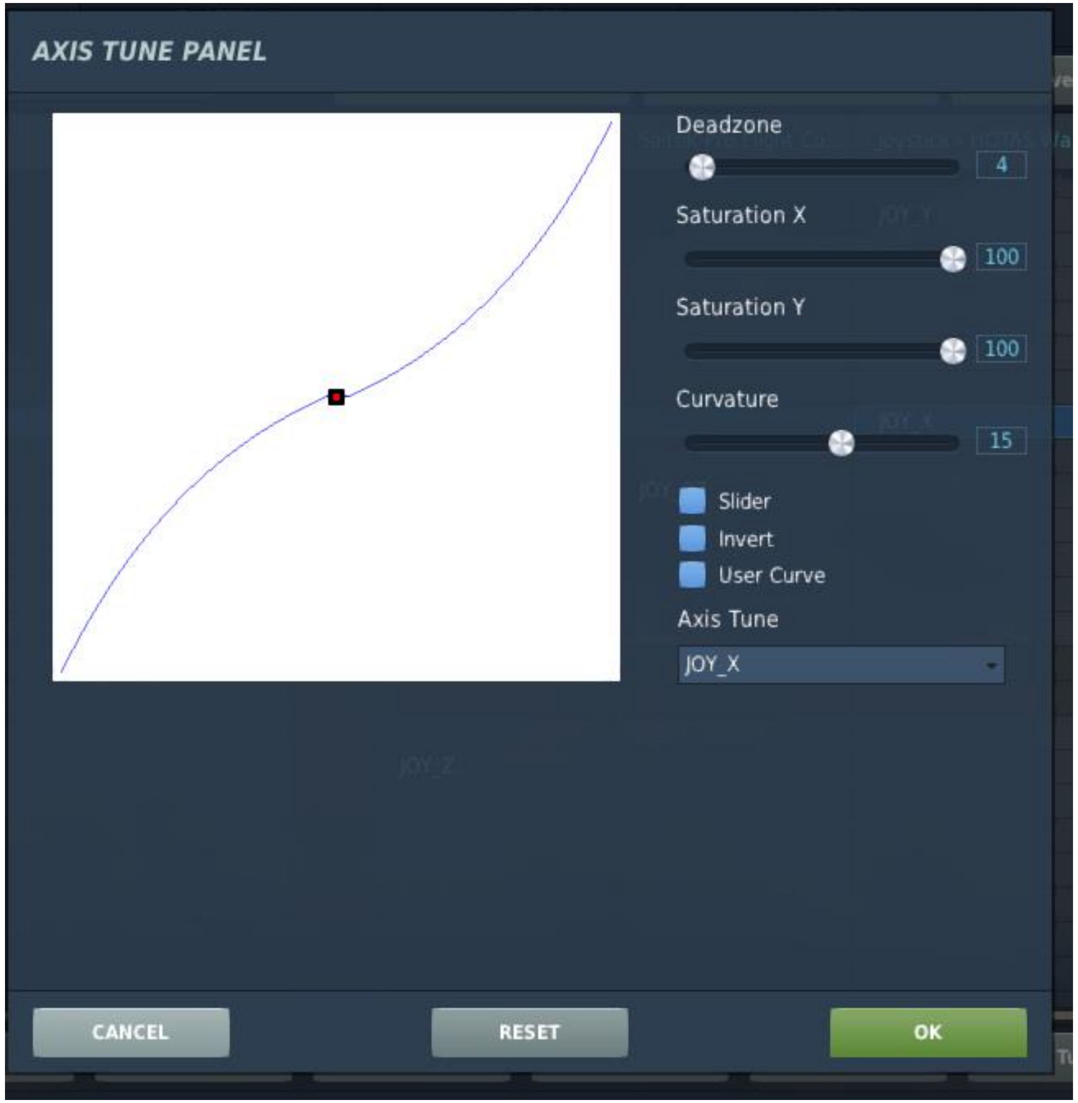


Bind the following axes:

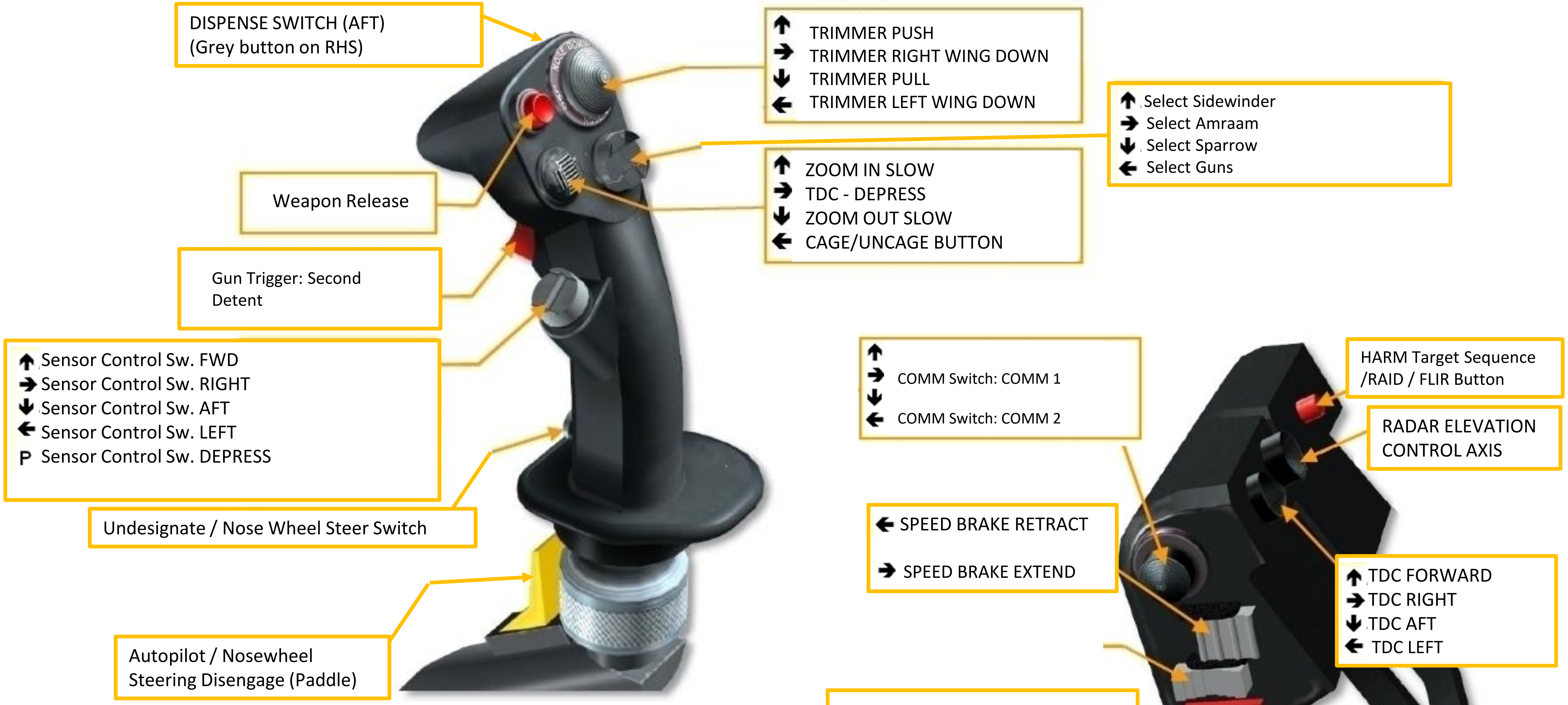
- PITCH (DEADZONE AT 4, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 15)
- ROLL (DEADZONE AT 4, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 15)
- RUDDER (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 10)
- THRUST – CONTROLS ENGINE RPM
- WHEEL BRAKE LEFT / RIGHT

NOTE

A small deadzone in the PITCH and ROLL axis must be set via the AXIS TUNE menu. Why? Because the autopilot will not be able to engage if the stick is not completely centered, and most sticks are not completely zeroed by definition (even the Thrustmaster Warthog). If you don't set a deadzone, you run into the risk of not being able to engage your autopilot since your stick will always be detected as "not completely centered" even if the position offset is negligible.



WHAT YOU NEED MAPPED



+ TOE BRAKES (MAPPED ON PEDALS)

WHAT YOU NEED MAPPED

Redkite also has a nice profile that you can use that is closer to the real Hornet stick and throttle setup. Link: https://youtu.be/iKLrnJpc8I4

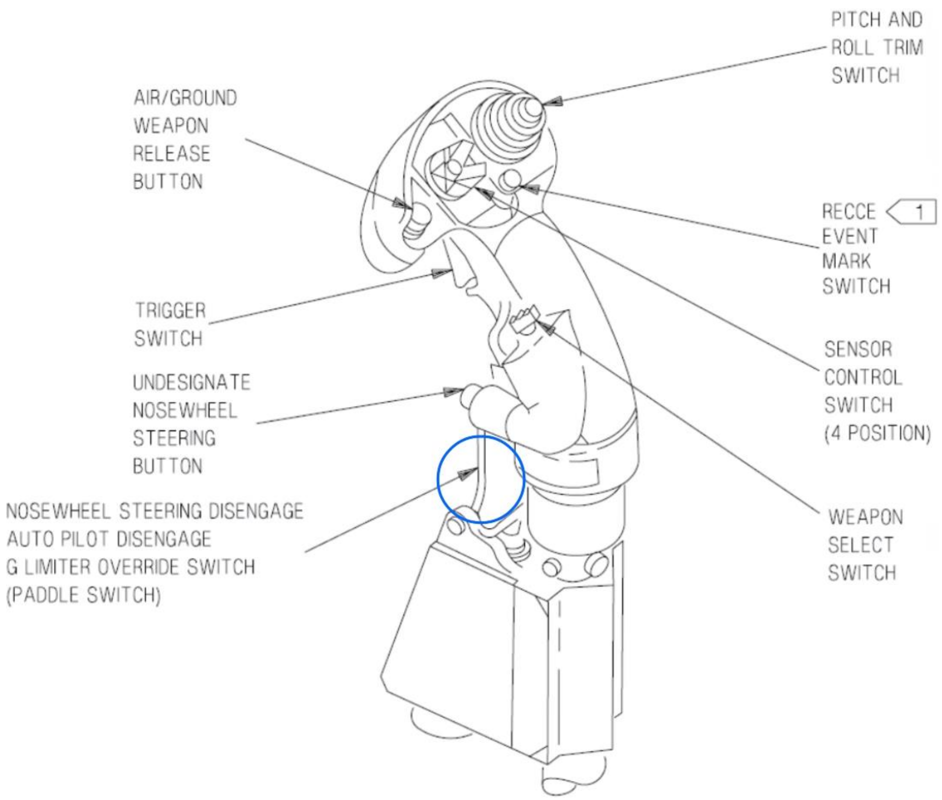


Figure 2-13. Control Stick

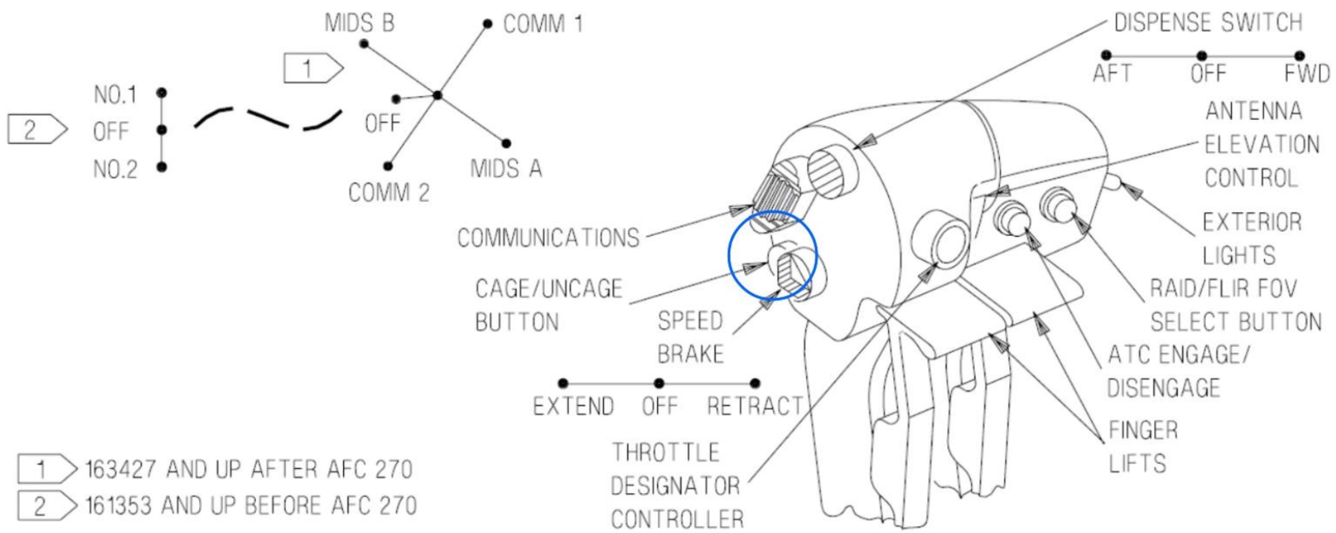
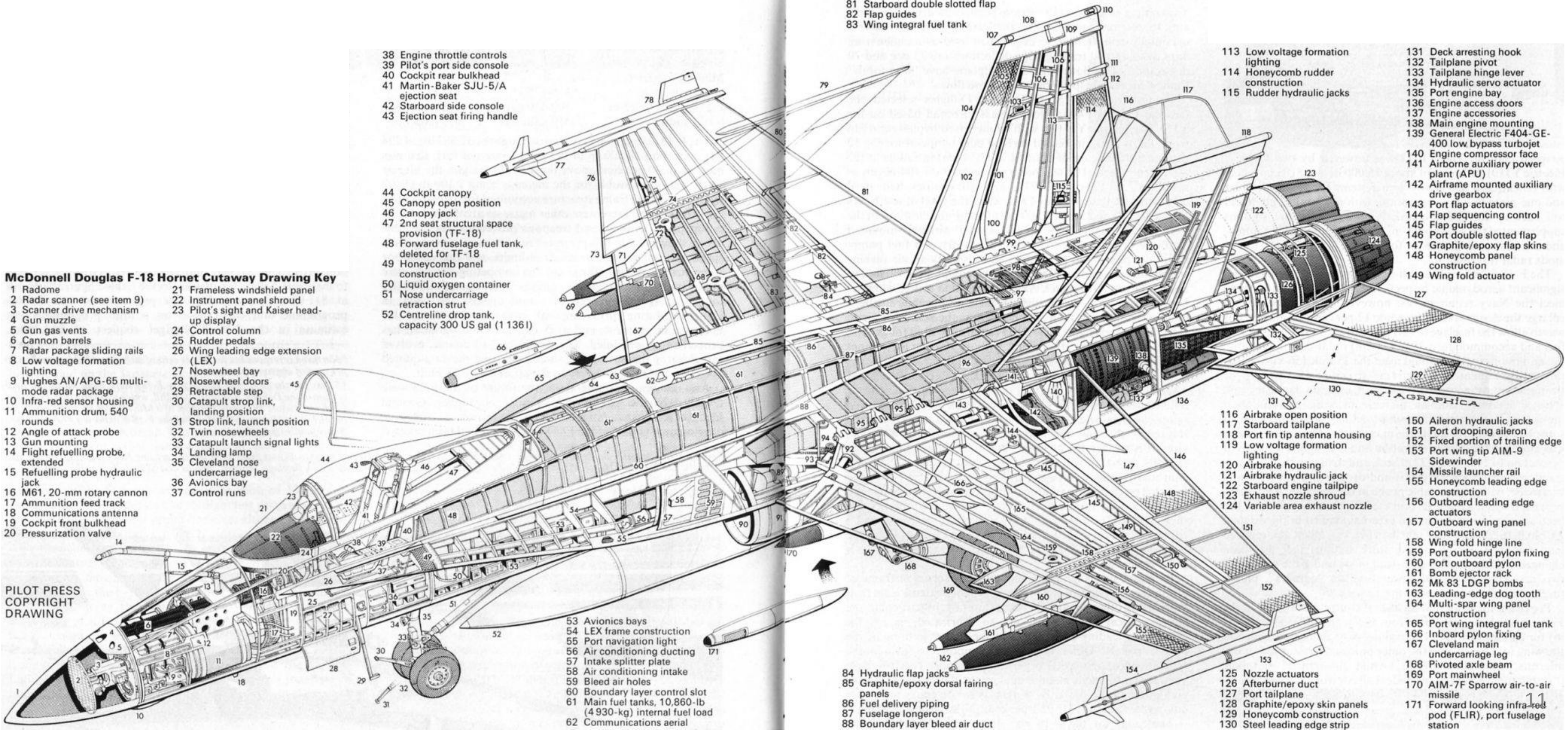


Figure 2-2. Throttle Grips


G-LIM 5.6G

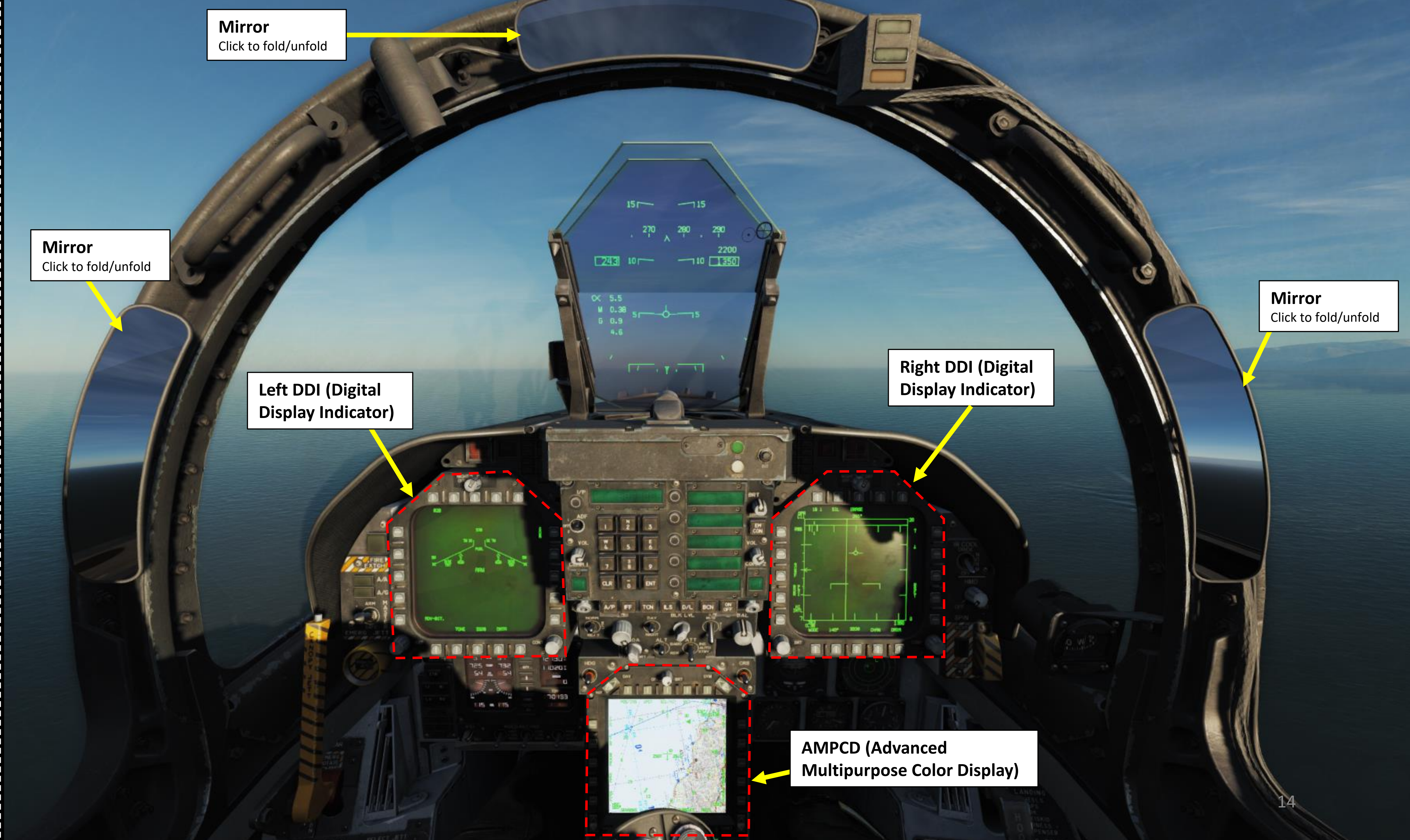
McDonnell Douglas F-18 Hornet Cutaway Drawing Key

1 Radome
2 Radar scanner (see item 9)
3 Scanner drive mechanism
4 Gun muzzle
5 Gun gas vents
6 Cannon barrels
7 Radar package sliding rails
8 Low voltage formation lighting
9 Hughes AN/APG-65 multi-mode radar package
10 Infra-red sensor housing
11 Ammunition drum, 540 rounds
12 Angle of attack probe
13 Gun mounting
14 Flight refuelling probe, extended
15 Refuelling probe hydraulic jack
16 M61, 20-mm rotary cannon
17 Ammunition feed track
18 Communications antenna
19 Cockpit front bulkhead
20 Pressurization valve
21 Frameless windshield panel
22 Instrument panel shroud
23 Pilot's sight and Kaiser head-up display
24 Control column
25 Rudder pedals
26 Wing leading edge extension (LEX)
27 Nosewheel bay
28 Nosewheel doors
29 Retractable step
30 Catapult strop link, landing position
31 Strop link, launch position
32 Twin nosewheels
33 Catapult launch signal lights
34 Landing lamp
35 Cleveland nose undercarriage leg
36 Avionics bay
37 Control runs
38 Engine throttle controls
39 Pilot's port side console
40 Cockpit rear bulkhead
41 Martin-Baker SJU-5/A ejection seat
42 Starboard side console
43 Ejection seat firing handle
44 Cockpit canopy
45 Canopy open position
46 Canopy jack
47 2nd seat structural space provision (TF-18)
48 Forward fuselage fuel tank, deleted for TF-18
49 Honeycomb panel construction
50 Liquid oxygen container
51 Nose undercarriage retraction strut
52 Centreline drop tank, capacity 300 US gal (1 136 l)
53 Avionics bays
54 LEX frame construction
55 Port navigation light
56 Air conditioning ducting
57 Intake splitter plate
58 Air conditioning intake
59 Bleed air holes
60 Boundary layer control slot
61 Main fuel tanks, 10,860-lb (4 930-kg) internal fuel load
62 Communications aerial
63 Bleed air outlet louvres
64 Starboard leading edge extension
65 External fuel tank, capacity 610 US gal (2 309 l)
66 Laser spot tracker pod (LST), starboard fuselage station
67 Starboard inboard wing pylon
68 Pylon mounting
69 Mk 83 low drag general purpose (LDGP) bombs (A-18)
70 Bomb ejector rack
71 Starboard outer wing pylon
72 Pylon fixing
73 Leading edge dog-tooth
74 Wing fold hinge line
75 Outboard leading edge actuator
76 Drooping leading edge
77 Starboard wing tip missile launcher rail
78 AIM-9L Sidewinder air-to-air missile
79 Outer wing panel folded position
80 Starboard drooping aileron
81 Starboard double slotted flap
82 Flap guides
83 Wing integral fuel tank
84 Hydraulic flap jacks
85 Graphite/epoxy dorsal fairing panels
86 Fuel delivery piping
87 Fuselage longeron
88 Boundary layer bleed air duct
89 Air conditioning plant
90 Port intake
91 Intake ducting
92 Leading edge flap hydraulic jack
93 Flap sequencing control unit
94 Control cable runs
95 Wing attachment pin joints
96 Rear fuselage fuel tank
97 APU exhaust duct
98 Starboard engine bay
99 Fin attachment fixing
100 Fin construction
101 Fuel jettison pipe
102 Graphite/epoxy skin
103 Anti-collision light
104 Steel leading edge strip
105 Honeycomb panel
106 Aerial tuners
107 Electronic countermeasures aerials (ECM)
108 Fin tip antenna housing
109 Communications aerial
110 Radar warning receiver
111 Tail navigation light
112 Fuel jettison
113 Low voltage formation lighting
114 Honeycomb rudder construction
115 Rudder hydraulic jacks
116 Airbrake open position
117 Starboard tailplane
118 Port fin tip antenna housing
119 Low voltage formation lighting
120 Airbrake housing
121 Airbrake hydraulic jack
122 Starboard engine tailpipe
123 Exhaust nozzle shroud
124 Variable area exhaust nozzle
125 Nozzle actuators
126 Afterburner duct
127 Port tailplane
128 Graphite/epoxy skin panels
129 Honeycomb construction
130 Steel leading edge strip
131 Deck arresting hook
132 Tailplane pivot
133 Tailplane hinge lever
134 Hydraulic servo actuator
135 Port engine bay
136 Engine access doors
137 Engine accessories
138 Main engine mounting
139 General Electric F404-GE-400 low bypass turbojet
140 Engine compressor face
141 Airborne auxiliary power plant (APU)
142 Airframe mounted auxiliary drive gearbox
143 Port flap actuators
144 Flap sequencing control
145 Flap guides
146 Port double slotted flap
147 Graphite/epoxy flap skins
148 Honeycomb panel construction
149 Wing fold actuator
150 Aileron hydraulic jacks
151 Port drooping aileron
152 Fixed portion of trailing edge
153 Port wing tip AIM-9 Sidewinder
154 Missile launcher rail
155 Honeycomb leading edge construction
156 Outboard leading edge actuators
157 Outboard wing panel construction
158 Wing fold hinge line
159 Port outboard pylon fixing
160 Port outboard pylon
161 Bomb ejector rack
162 Mk 83 LDGP bombs
163 Leading-edge dog tooth
164 Multi-spar wing panel construction
165 Port wing integral fuel tank
166 Inboard pylon fixing
167 Cleveland main undercarriage leg
168 Pivoted axle beam
169 Port mainwheel
170 AIM-7F Sparrow air-to-air missile
171 Forward looking infra-red pod (FLIR), port fuselage station




JHMCS (Joint Helmet-Mounted Cueing System)

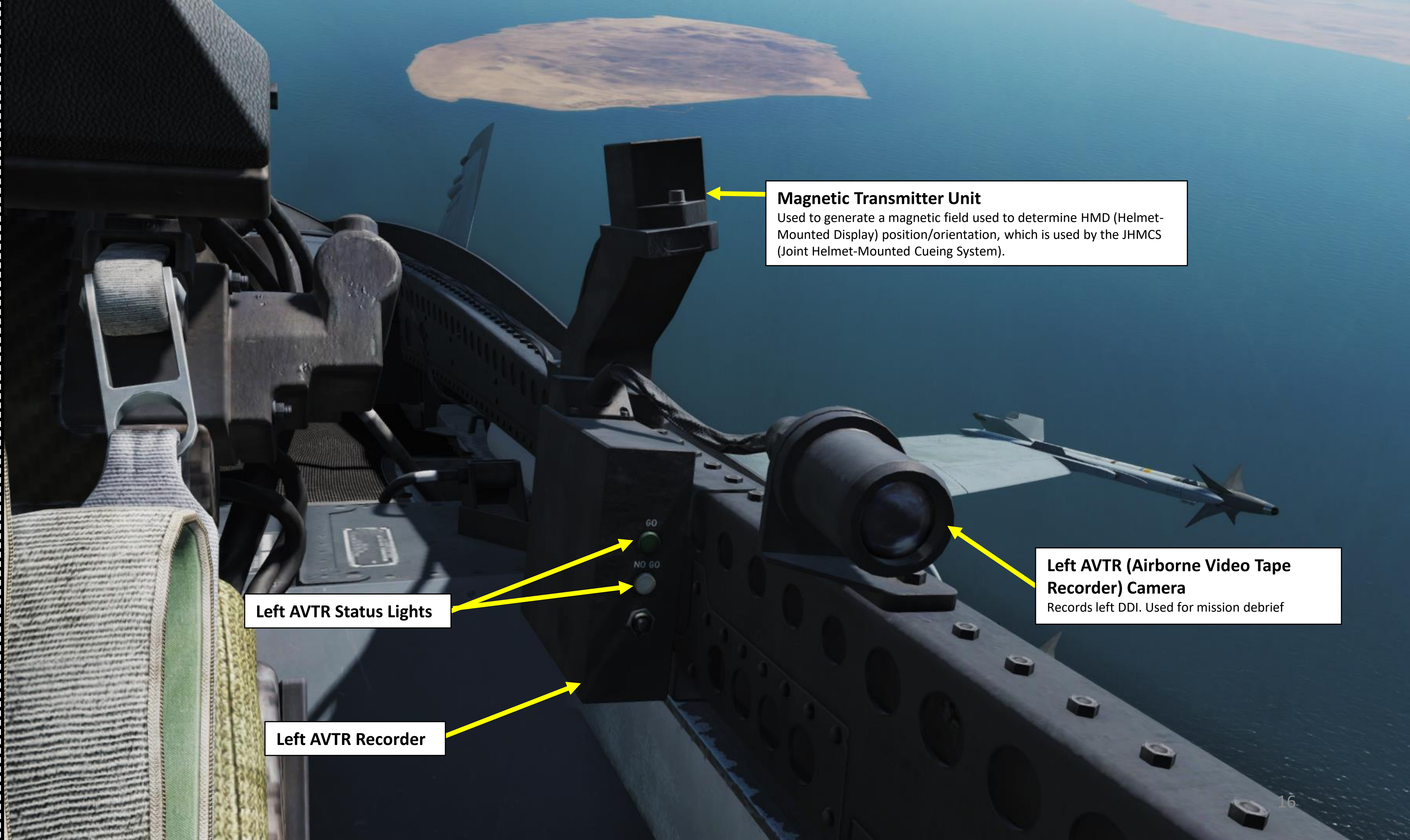
TIP: Pilot body can be toggled on/off by pressing “RSHIFT+P”

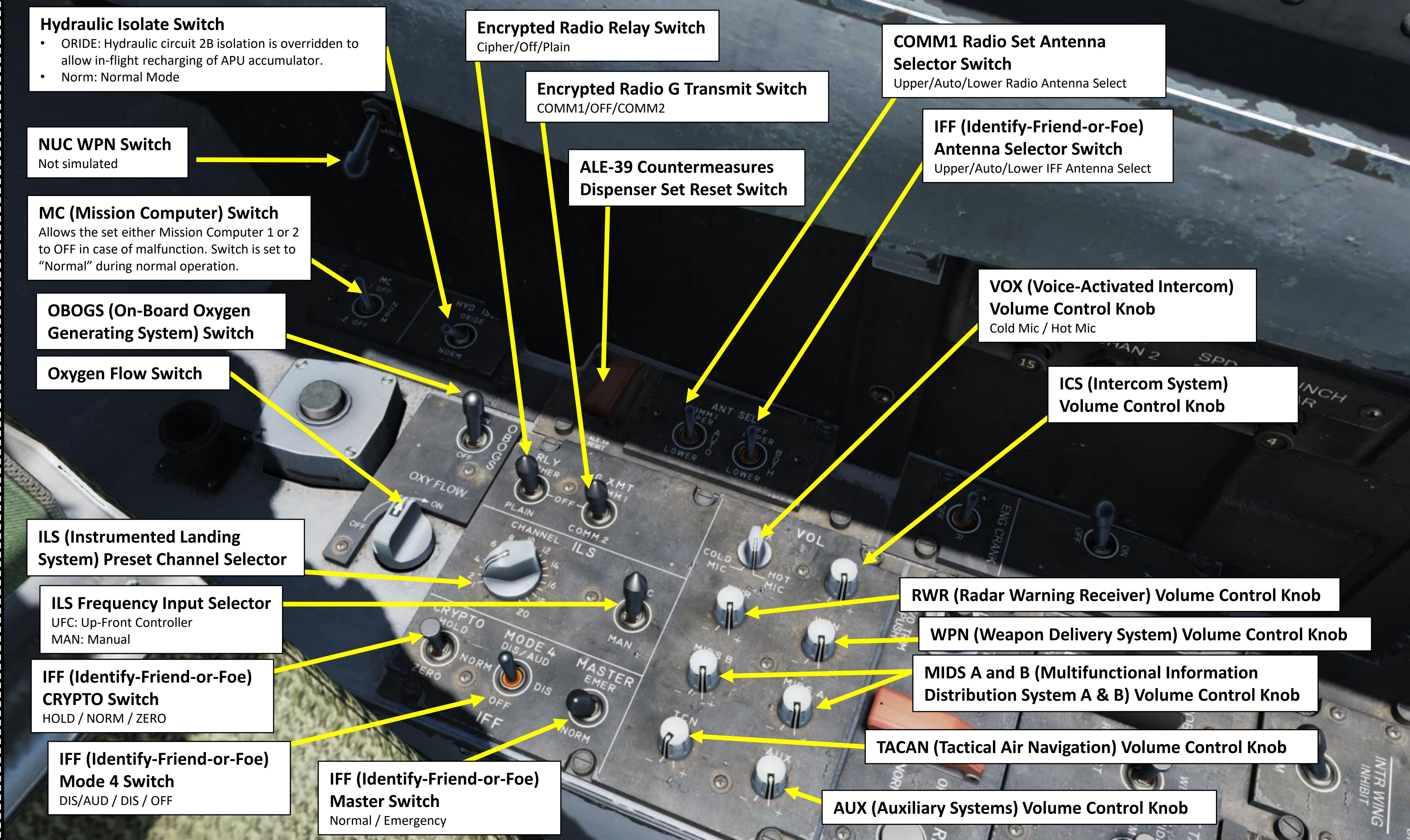

Mirror
Click to fold/unfold
Mirror
Click to fold/unfold
Mirror
Click to fold/unfold
Left DDI (Digital Display Indicator)
Right DDI (Digital Display Indicator)
AMPCD (Advanced Multipurpose Color Display)

"Towel Rack" Handles

When the F-18 is catapulted from its carrier, the pilot doesn't hold the flight stick yet; he grabs a handle instead nicknamed "towel rack" or "towel rail".

The F/A-18 being the first fly-by-wire airplane to operate off the carrier, its flight control computers will seek the optimum angle-of-attack (8.1 alpha) off the catapult, which means that the pilot doesn't have to touch anything during the catapult launch. Once the aircraft is airborne and the initial AOA is set, the pilot then grabs the stick.


Magnetic Transmitter Unit
Used to generate a magnetic field used to determine HMD (Helmet-Mounted Display) position/orientation, which is used by the JHMCS (Joint Helmet-Mounted Cueing System).
GO
NO GO
Left AVTR Status Lights
Left AVTR (Airborne Video Tape Recorder) Camera
Records left DDI. Used for mission debrief
Left AVTR Recorder



Hydraulic Isolate Switch
- ORIDE: Hydraulic circuit 2B isolation is overridden to allow in-flight recharging of APU accumulator.
- Norm: Normal Mode

NUC WPN Switch
Not simulated

MC (Mission Computer) Switch
Allows the set either Mission Computer 1 or 2 to OFF in case of malfunction. Switch is set to "Normal" during normal operation.

OBOGS (On-Board Oxygen Generating System) Switch

Oxygen Flow Switch

ILS (Instrumented Landing System) Preset Channel Selector

ILS Frequency Input Selector
UFC: Up-Front Controller
MAN: Manual

IFF (Identify-Friend-or-Foe) CRYPTO Switch
HOLD / NORM / ZERO

IFF (Identify-Friend-or-Foe) Mode 4 Switch
DIS/AUD / DIS / OFF

IFF (Identify-Friend-or-Foe) Master Switch
Normal / Emergency

Encrypted Radio Relay Switch
Cipher/Off/Plain

Encrypted Radio G Transmit Switch
COMM1/OFF/COMM2

ALE-39 Countermeasures Dispenser Set Reset Switch

COMM1 Radio Set Antenna Selector Switch
Upper/Auto/Lower Radio Antenna Select

IFF (Identify-Friend-or-Foe) Antenna Selector Switch
Upper/Auto/Lower IFF Antenna Select

VOX (Voice-Activated Intercom) Volume Control Knob
Cold Mic / Hot Mic

ICS (Intercom System) Volume Control Knob

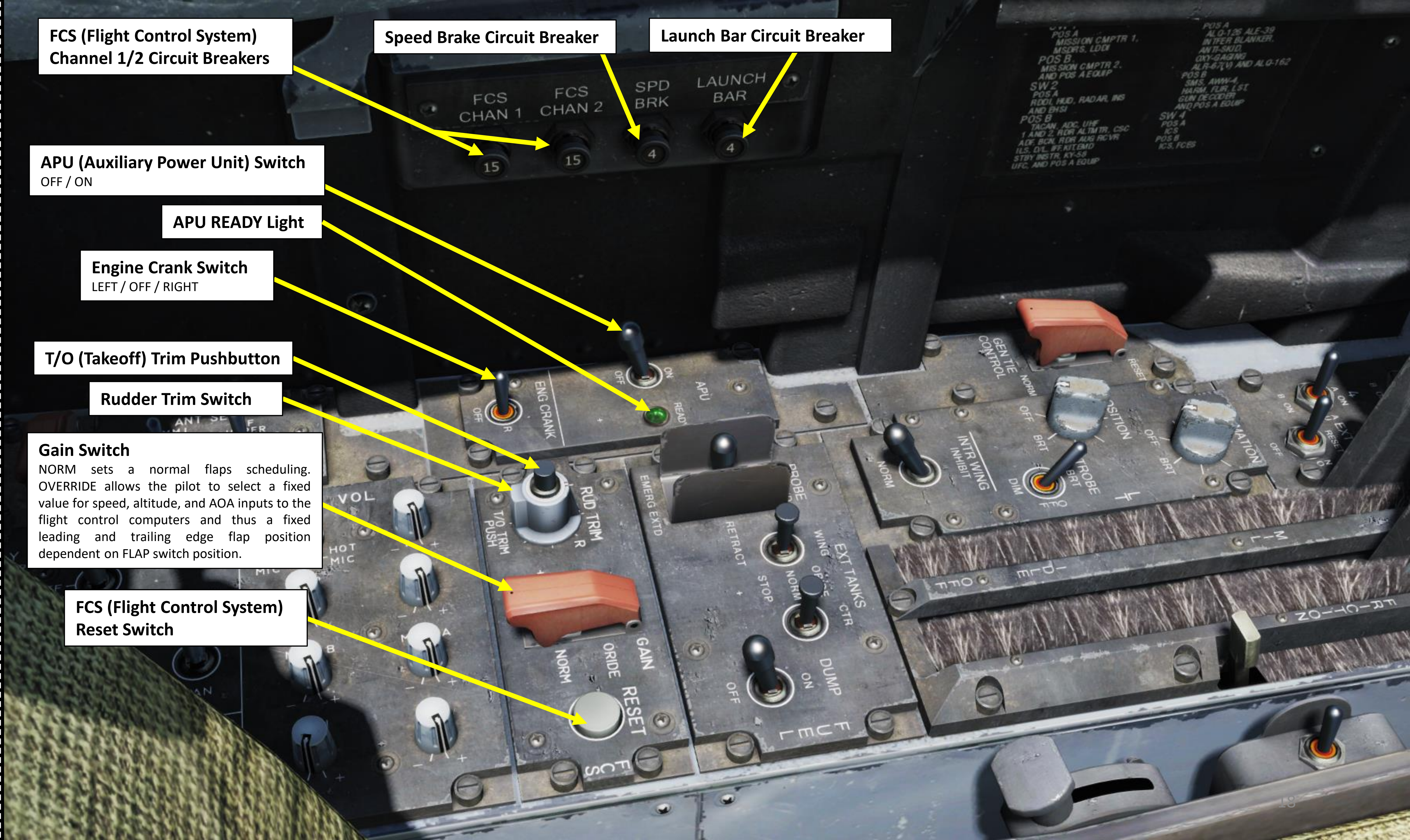
RWR (Radar Warning Receiver) Volume Control Knob

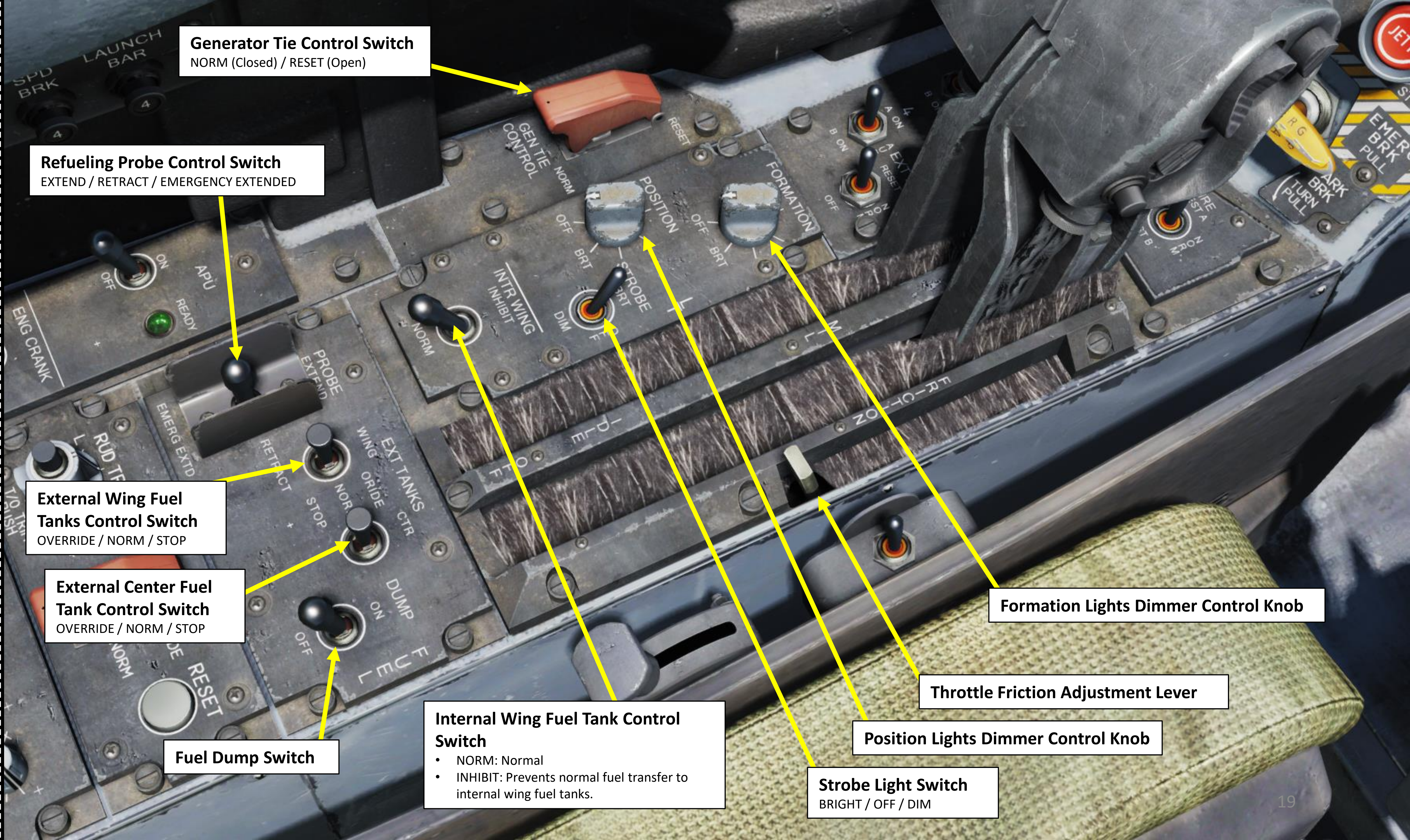
WPN (Weapon Delivery System) Volume Control Knob

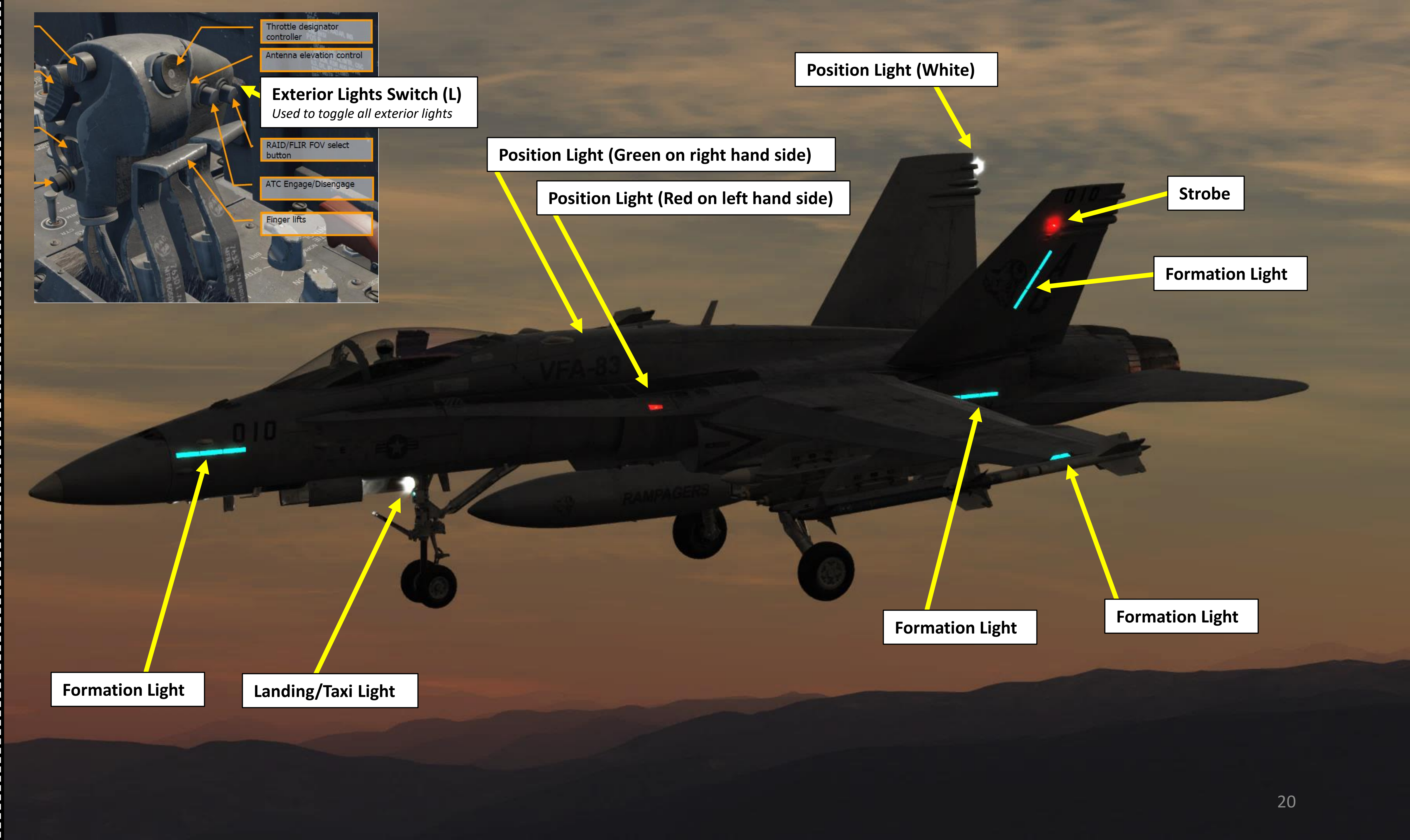
MIDS A and B (Multifunctional Information Distribution System A & B) Volume Control Knob

TACAN (Tactical Air Navigation) Volume Control Knob

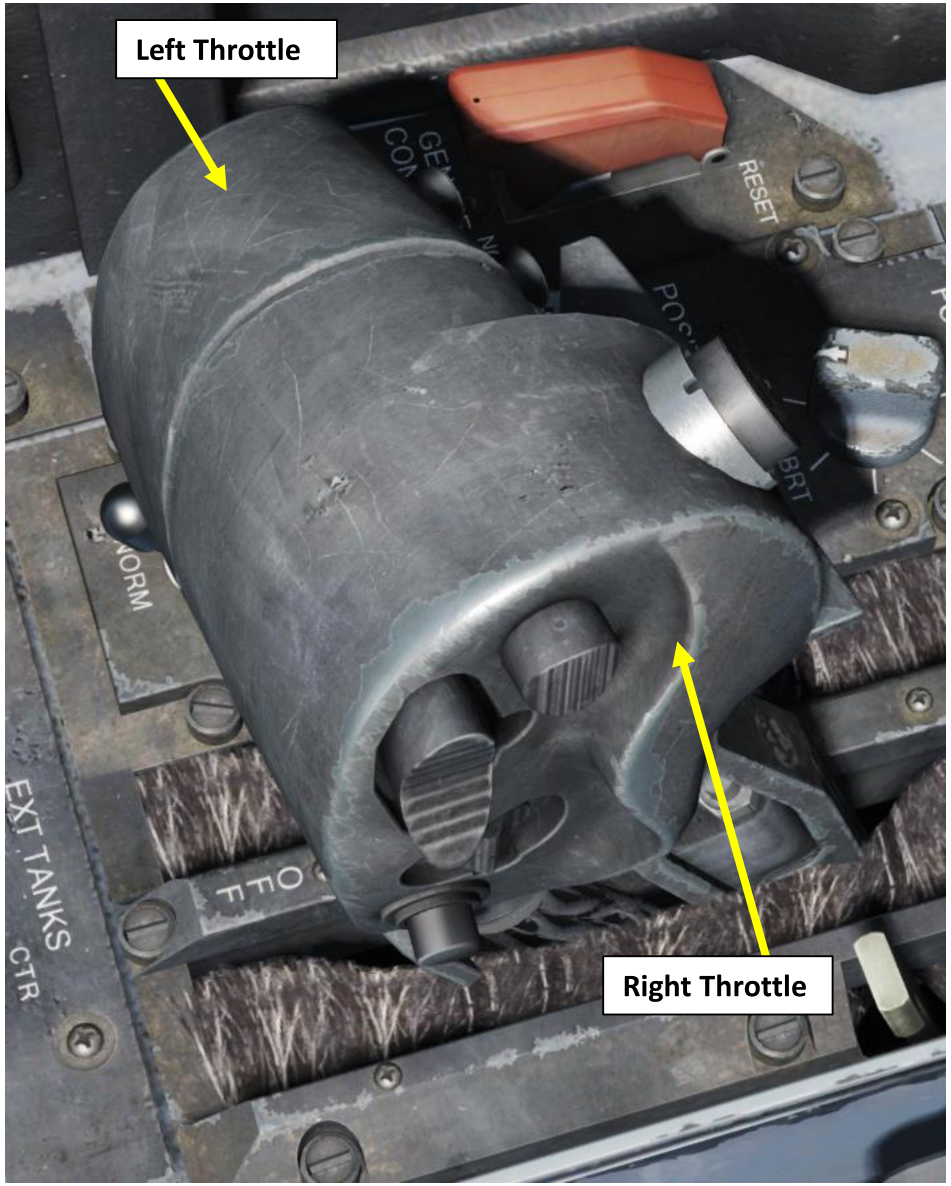
AUX (Auxiliary Systems) Volume Control Knob

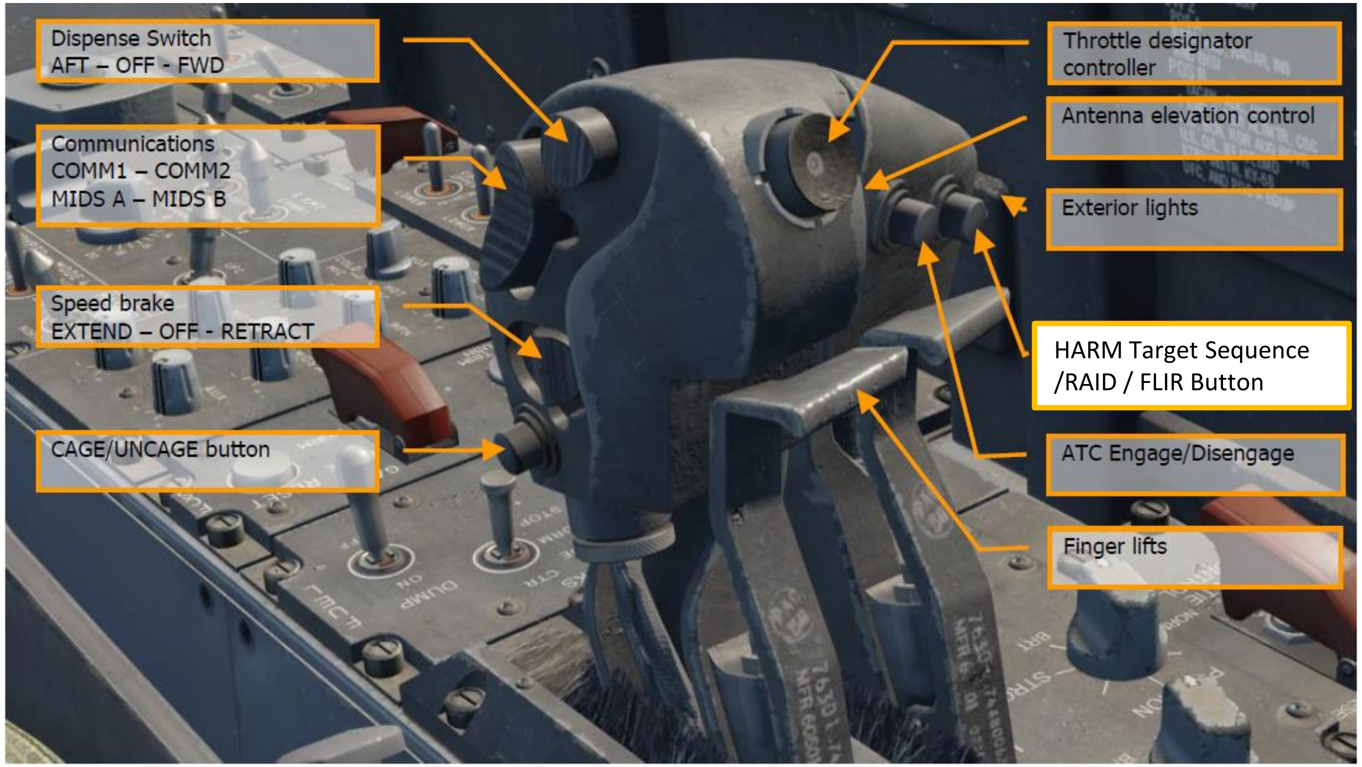

FCS (Flight Control System) Channel 1/2 Circuit Breakers
Speed Brake Circuit Breaker
Launch Bar Circuit Breaker
APU (Auxiliary Power Unit) Switch
OFF / ON
APU READY Light
Engine Crank Switch
LEFT / OFF / RIGHT
T/O (Takeoff) Trim Pushbutton
Rudder Trim Switch
Gain Switch
NORM sets a normal flaps scheduling. OVERRIDE allows the pilot to select a fixed value for speed, altitude, and AOA inputs to the flight control computers and thus a fixed leading and trailing edge flap position dependent on FLAP switch position.
FCS (Flight Control System) Reset Switch
FCS CHAN 1
FCS CHAN 2
SPD BRK
LAUNCH BAR


Generator Tie Control Switch
NORM (Closed) / RESET (Open)
Refueling Probe Control Switch
EXTEND / RETRACT / EMERGENCY EXTENDED
External Wing Fuel Tanks Control Switch
OVERRIDE / NORM / STOP
External Center Fuel Tank Control Switch
OVERRIDE / NORM / STOP
Fuel Dump Switch
Internal Wing Fuel Tank Control Switch
• NORM: Normal
• INHIBIT: Prevents normal fuel transfer to internal wing fuel tanks.
Strobe Light Switch
BRIGHT / OFF / DIM
Position Lights Dimmer Control Knob
Throttle Friction Adjustment Lever
Formation Lights Dimmer Control Knob

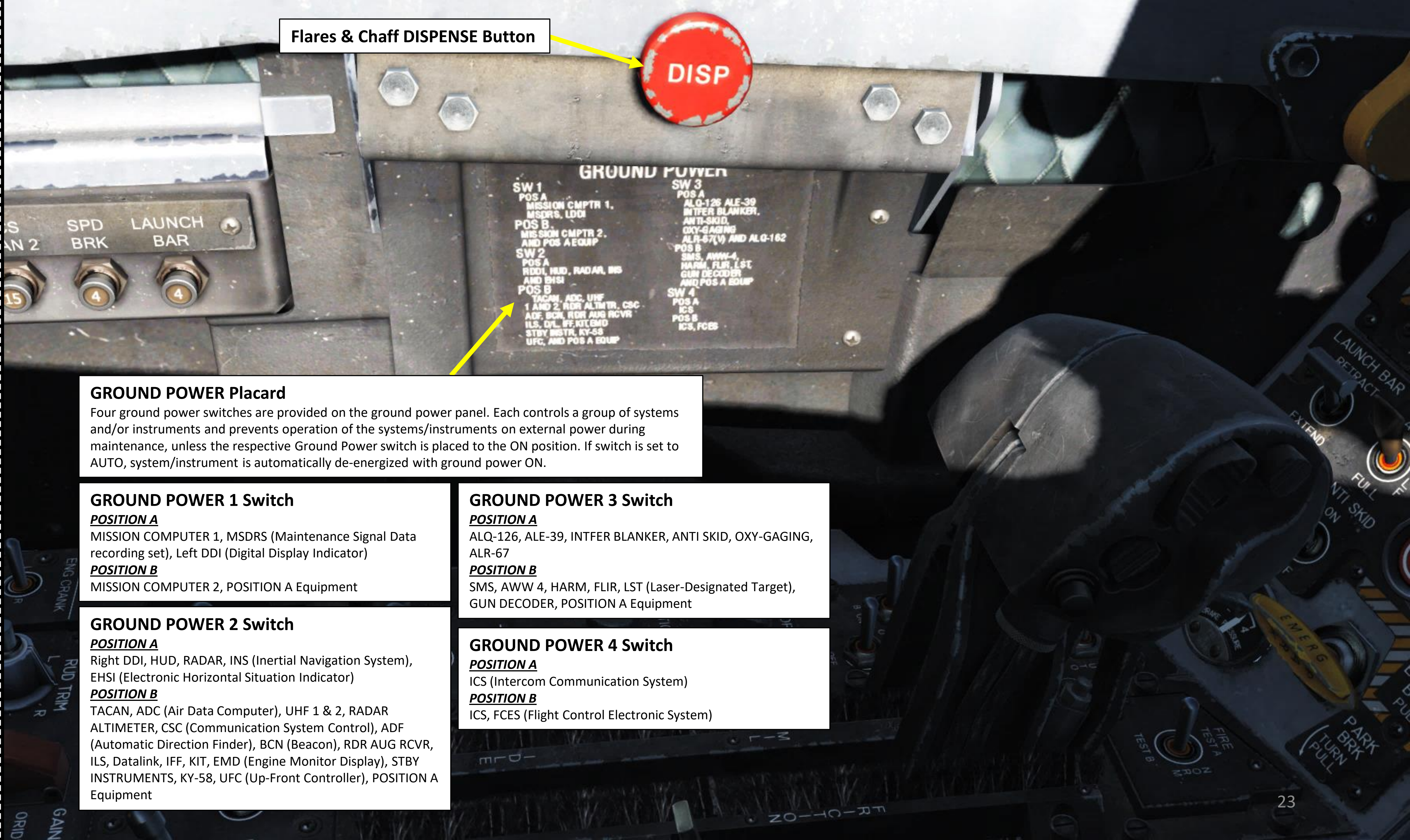

Throttle designator controller
Antenna elevation control
Exterior Lights Switch (L)
Used to toggle all exterior lights
RAID/FLIR FOV select button
ATC Engage/Disengage
Finger lifts
Position Light (White)
Position Light (Green on right hand side)
Position Light (Red on left hand side)
Strobe
Formation Light
Formation Light
Formation Light
Formation Light
Landing/Taxi Light

Night Vision Goggles (NVG) Controls:
- *RSHIFT+H: On/Off*
- *RSHIFT+RALT+H: Gain Night Vision Goggles Down*
- *RSHIFT+RCTRL+H: Gain Night Vision Goggles Up*





Finger lifts act as a stopper that prevents throttles from accidentally going from IDLE to OFF once engines are started. In order to shut down an engine, finger lifts are raised by pressing "0" for right throttle and "9" for left throttle.



Flares & Chaff DISPENSE Button

GROUND POWER Placard

Four ground power switches are provided on the ground power panel. Each controls a group of systems and/or instruments and prevents operation of the systems/instruments on external power during maintenance, unless the respective Ground Power switch is placed to the ON position. If switch is set to AUTO, system/instrument is automatically de-energized with ground power ON.

GROUND POWER 1 Switch

POSITION A

MISSION COMPUTER 1, MSDRS (Maintenance Signal Data recording set), Left DDI (Digital Display Indicator)

POSITION B

MISSION COMPUTER 2, POSITION A Equipment

GROUND POWER 2 Switch

POSITION A

Right DDI, HUD, RADAR, INS (Inertial Navigation System), EHSI (Electronic Horizontal Situation Indicator)

POSITION B

TACAN, ADC (Air Data Computer), UHF 1 & 2, RADAR ALTIMETER, CSC (Communication System Control), ADF (Automatic Direction Finder), BCN (Beacon), RDR AUG RCVR, ILS, Datalink, IFF, KIT, EMD (Engine Monitor Display), STBY INSTRUMENTS, KY-58, UFC (Up-Front Controller), POSITION A Equipment

GROUND POWER 3 Switch

POSITION A

ALQ-126, ALE-39, INTFER BLANKER, ANTI SKID, OXY-GAGING, ALR-67

POSITION B

SMS, AWW 4, HARM, FLIR, LST (Laser-Designated Target), GUN DECODER, POSITION A Equipment

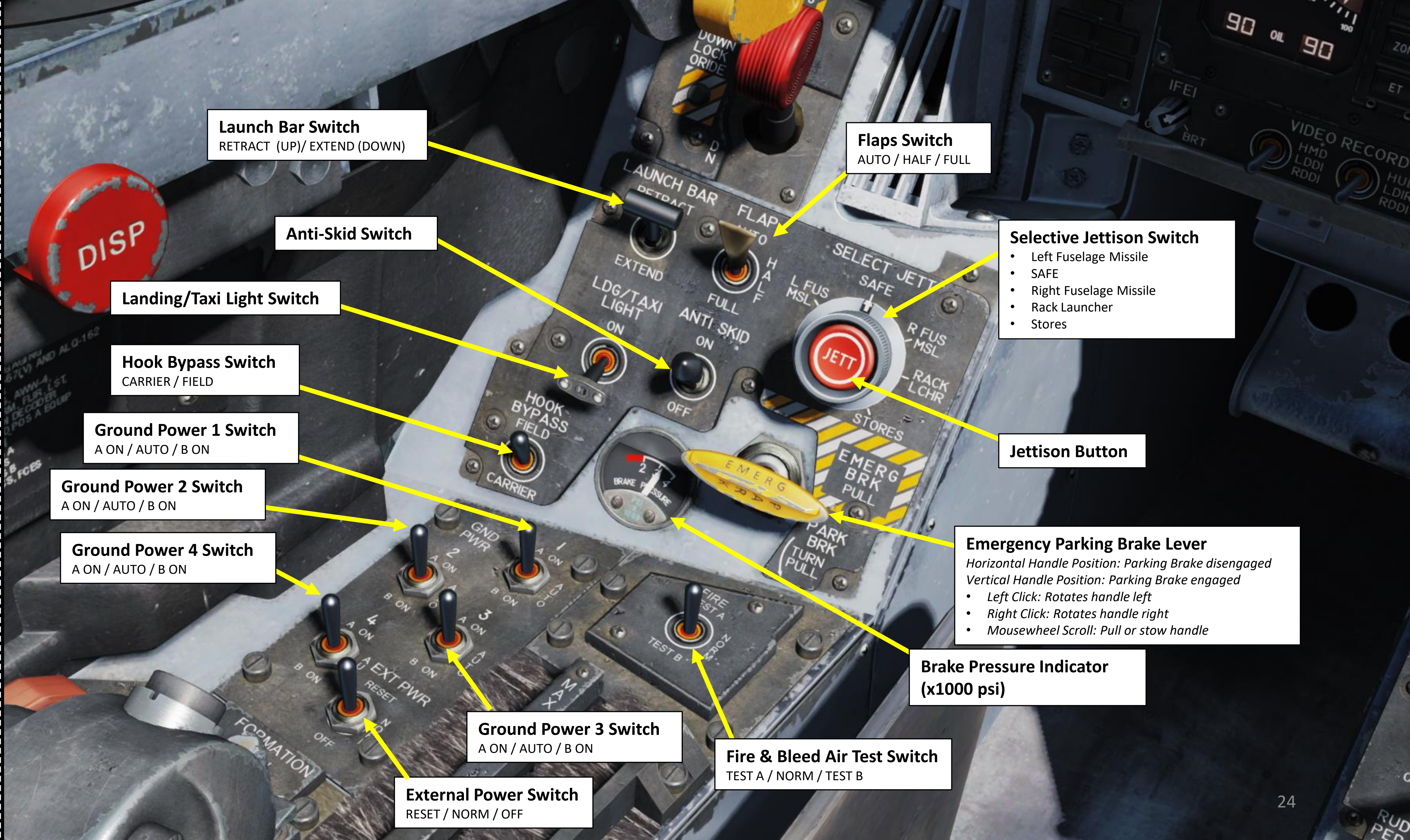
GROUND POWER 4 Switch

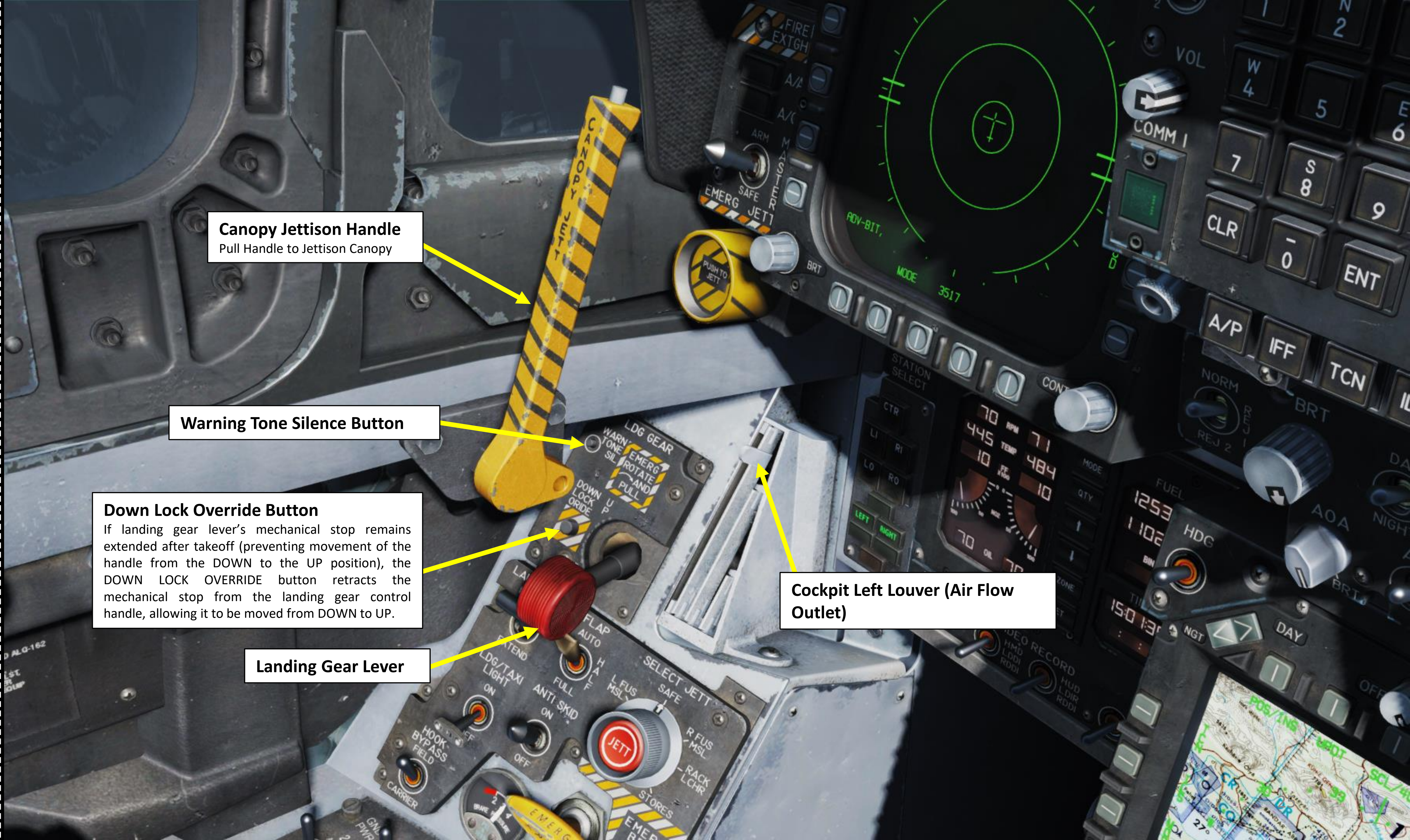
POSITION A

ICS (Intercom Communication System)

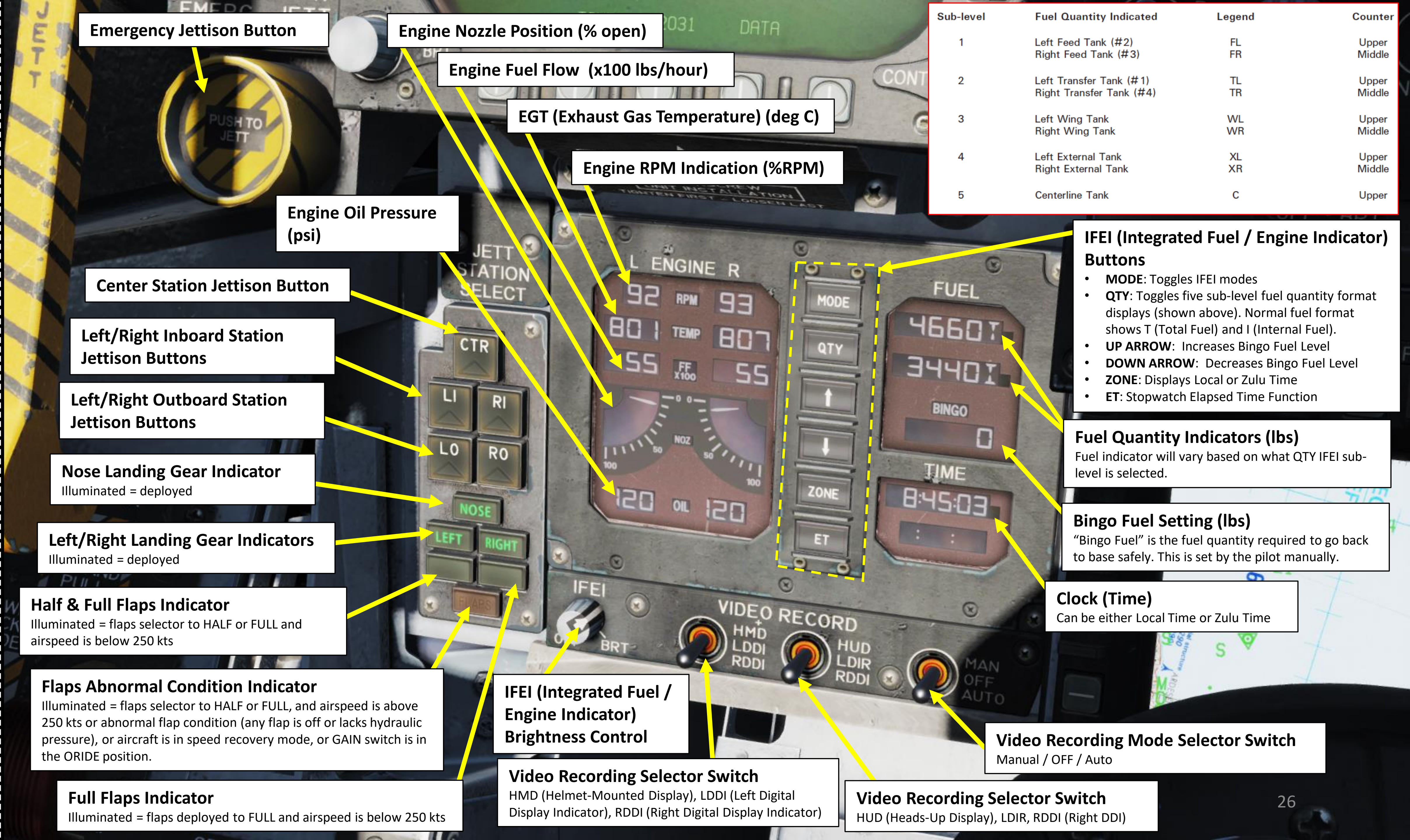
POSITION B

ICS, FCES (Flight Control Electronic System)


Launch Bar Switch
RETRACT (UP)/ EXTEND (DOWN)
Anti-Skid Switch
Landing/Taxi Light Switch
Hook Bypass Switch
CARRIER / FIELD
Ground Power 1 Switch
A ON / AUTO / B ON
Ground Power 2 Switch
A ON / AUTO / B ON
Ground Power 4 Switch
A ON / AUTO / B ON
Ground Power 3 Switch
A ON / AUTO / B ON
External Power Switch
RESET / NORM / OFF
Fire & Bleed Air Test Switch
TEST A / NORM / TEST B
Brake Pressure Indicator
(x1000 psi)
Flaps Switch
AUTO / HALF / FULL
Selective Jettison Switch
• Left Fuselage Missile
• SAFE
• Right Fuselage Missile
• Rack Launcher
• Stores
Jettison Button
Emergency Parking Brake Lever
Horizontal Handle Position: Parking Brake disengaged
Vertical Handle Position: Parking Brake engaged
• *Left Click: Rotates handle left*
• *Right Click: Rotates handle right*
• *Mousewheel Scroll: Pull or stow handle*


Canopy Jettison Handle
Pull Handle to Jettison Canopy
Warning Tone Silence Button
Down Lock Override Button
If landing gear lever's mechanical stop remains extended after takeoff (preventing movement of the handle from the DOWN to the UP position), the DOWN LOCK OVERRIDE button retracts the mechanical stop from the landing gear control handle, allowing it to be moved from DOWN to UP.
Landing Gear Lever
Cockpit Left Louver (Air Flow Outlet)

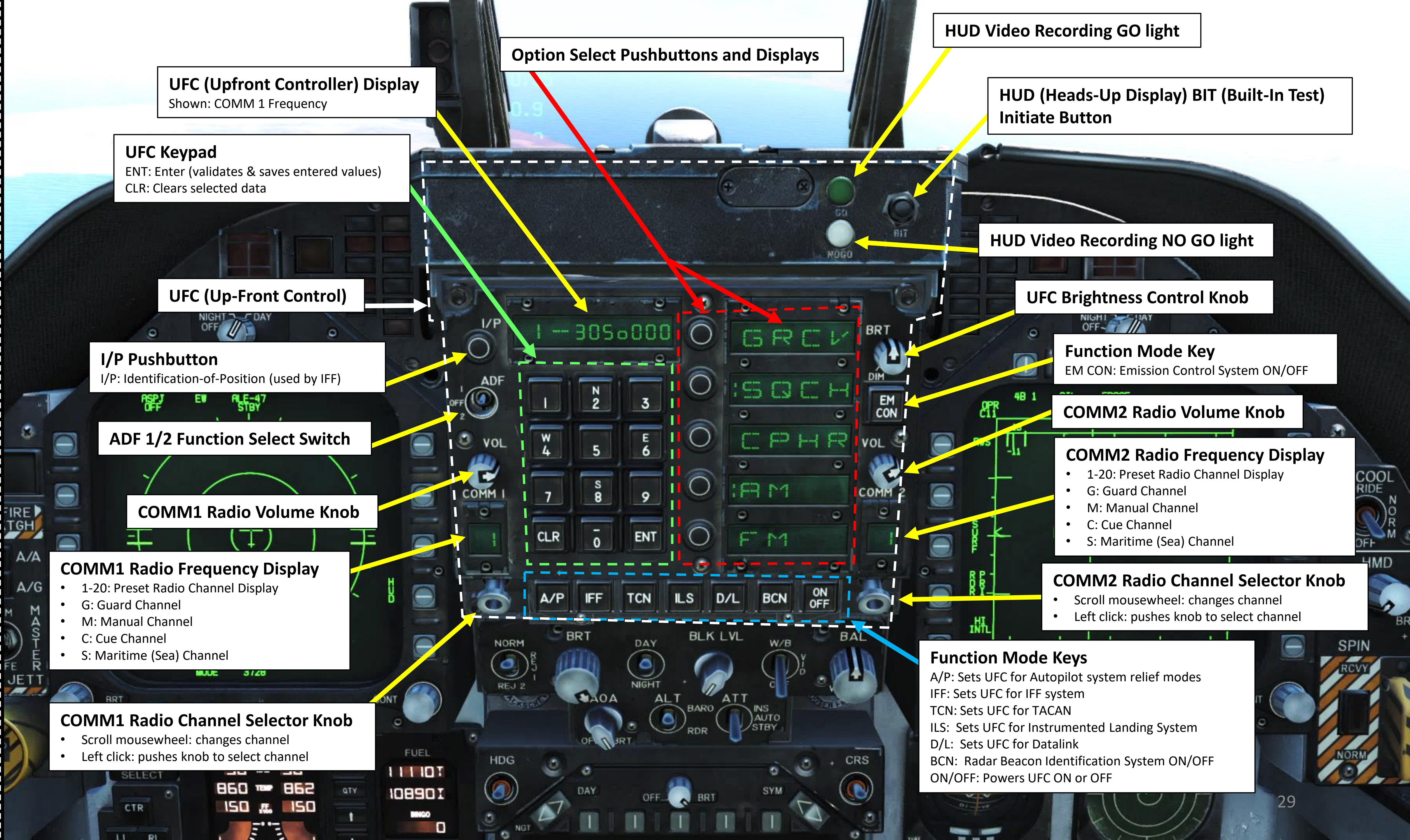
Sub-level	Fuel Quantity Indicated	Legend	Counter
1	Left Feed Tank (#2) Right Feed Tank (#3)	FL FR	Upper Middle
2	Left Transfer Tank (#1) Right Transfer Tank (#4)	TL TR	Upper Middle
3	Left Wing Tank Right Wing Tank	WL WR	Upper Middle
4	Left External Tank Right External Tank	XL XR	Upper Middle
5	Centerline Tank	C	Upper



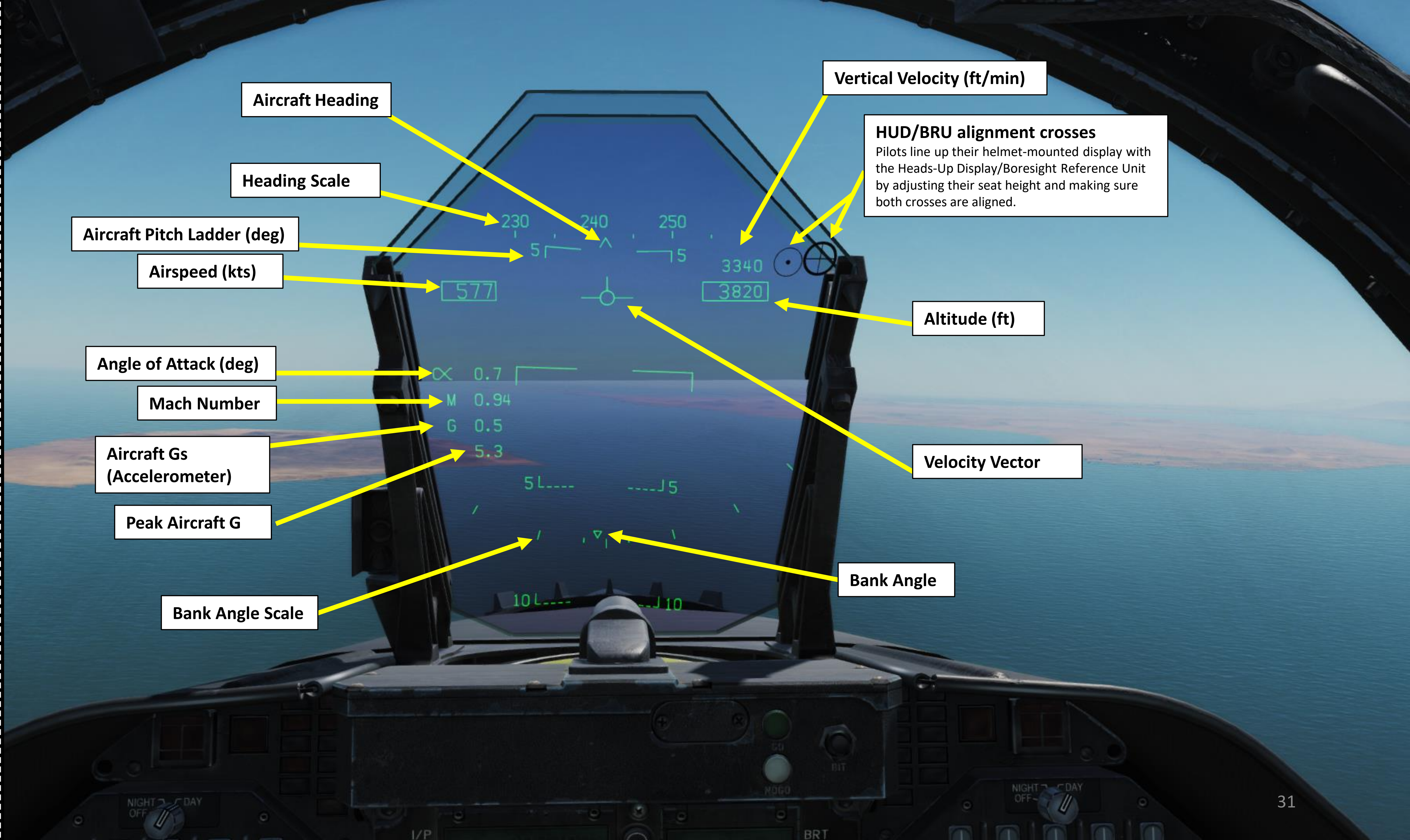

A/G (Air-to-Ground) Master Mode Button
A/A (Air-to-Air) Master Mode Button
Fire Extinguisher Discharge Pushbutton
DDI (Digital Display Indicator) Power Switch
OFF / Night Mode / Day Mode
DDI OSBs (Option Select Buttons)
These buttons select different options and menus in various Tactical and Support pages
DDI Contrast Knob
Master Arm Switch
DDI Brightness Knob

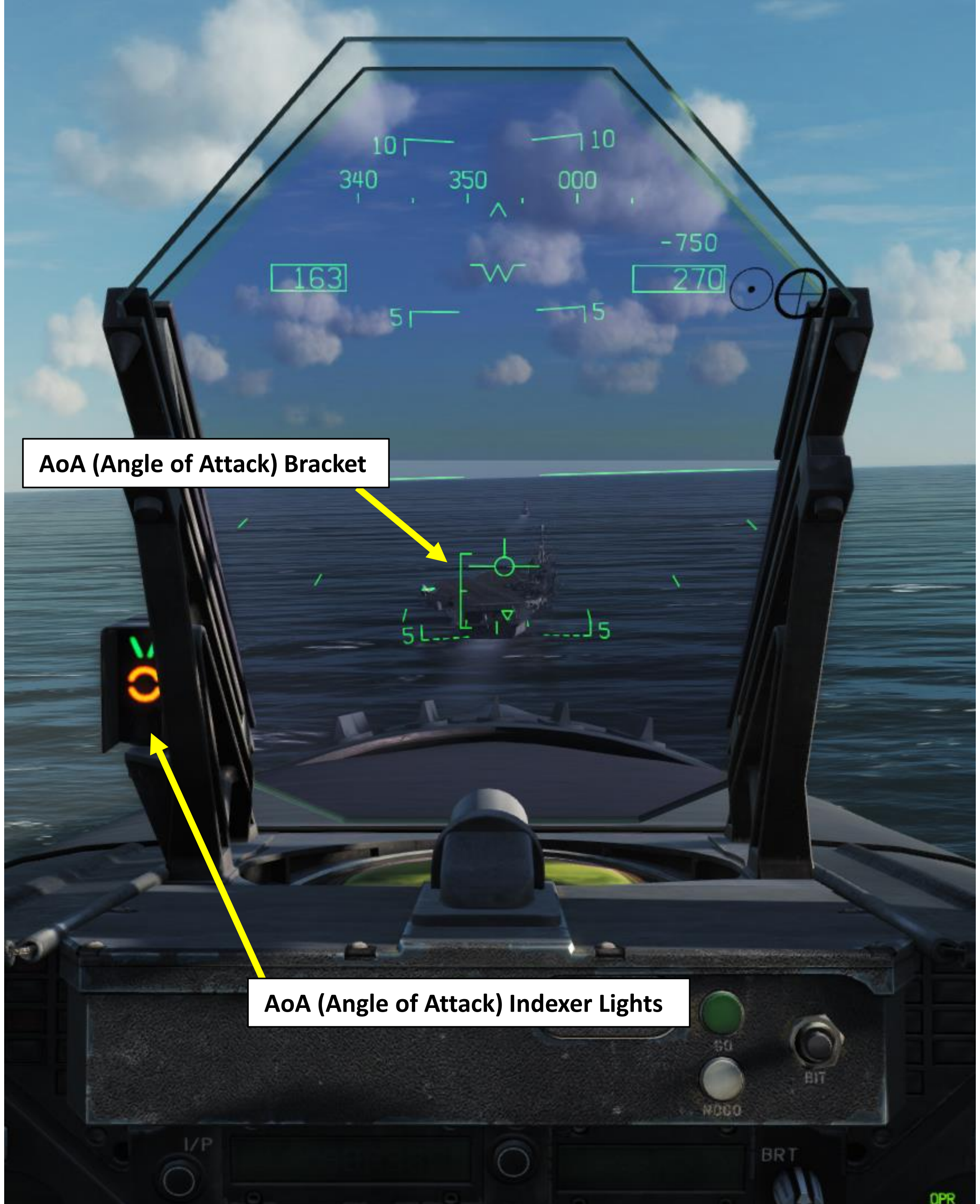
Left Warning/Caution Advisory Lights

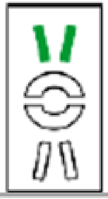
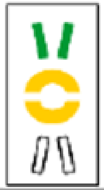
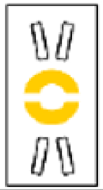
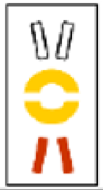
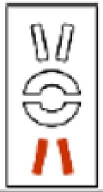
GO: Successful BIT (Built-In Test) of ALQ-165 (ASPJ, Airborne Self Protection Jammer). Remains illuminated until BIT mode is deselected.	**NO GO**: Unsuccessful BIT (Built-In Test) of ALQ-165 (ASPJ, Airborne Self Protection Jammer). Remains illuminated until BIT mode is deselected. ALQ-126 jammer is inoperable.
L BLEED: Left engine bleed air valve is automatically closed due to the Fire & Bleed Air Test switch or bleed air leak or fire has been detected in left engine bleed air ducting.	**R BLEED**: Right engine bleed air valve is automatically closed due to the Fire & Bleed Air Test switch or bleed air leak or fire has been detected in left engine bleed air ducting.
SPD BRK: Speed brake is not fully retracted	**STBY**: ALQ-165 (ASPJ) is set to STBY (Standby) on the ECM (Electronic Countermeasure) panel.
L BAR: Launch bar malfunction; nose gear cannot retract. Launch bar can only be extended with weight on wheels.	**REC**: Indicates aircraft is being illuminated by a threat's radar.
L BAR: Launch bar extended with weight on wheels.	**XMIT**: Lit when ECM Jammer is transmitting.
	ASPJ OH: ALQ-165 (ASPJ, Airborne Self Protection Jammer) is Overheating


UFC (Upfront Controller) Display
Shown: COMM 1 Frequency
Option Select Pushbuttons and Displays
HUD Video Recording GO light
HUD (Heads-Up Display) BIT (Built-In Test) Initiate Button
UFC Keypad
ENT: Enter (validates & saves entered values)
CLR: Clears selected data
HUD Video Recording NO GO light
UFC (Up-Front Control)
UFC Brightness Control Knob
I/P Pushbutton
I/P: Identification-of-Position (used by IFF)
Function Mode Key
EM CON: Emission Control System ON/OFF
COMM2 Radio Volume Knob
ADF 1/2 Function Select Switch
COMM2 Radio Frequency Display
• 1-20: Preset Radio Channel Display
• G: Guard Channel
• M: Manual Channel
• C: Cue Channel
• S: Maritime (Sea) Channel
COMM1 Radio Volume Knob
COMM1 Radio Frequency Display
• 1-20: Preset Radio Channel Display
• G: Guard Channel
• M: Manual Channel
• C: Cue Channel
• S: Maritime (Sea) Channel
COMM2 Radio Channel Selector Knob
• Scroll mousewheel: changes channel
• Left click: pushes knob to select channel
Function Mode Keys
A/P: Sets UFC for Autopilot system relief modes
IFF: Sets UFC for IFF system
TCN: Sets UFC for TACAN
ILS: Sets UFC for Instrumented Landing System
D/L: Sets UFC for Datalink
BCN: Radar Beacon Identification System ON/OFF
ON/OFF: Powers UFC ON or OFF
COMM1 Radio Channel Selector Knob
• Scroll mousewheel: changes channel
• Left click: pushes knob to select channel


HUD Symbology Brightness Selector Knob
Day mode increases brightness, while night mode has reduced brightness
HUD Symbology Brightness Control
HUD Symbology Reject Switch
• REJ 1 removes aircraft Mach number, aircraft Gs, bank angle and pointer, airspeed box, altitude box, peak positive G and required ground speed cue from the HUD.
• REJ 2 removes all REJ 1 symbology plus heading scale, current heading indication, command heading marker, NAV/TACAN range, and ET/CD timer.
HUD (Heads-Up Display) Control Panel
AoA (Angle of Attack) Indexer Brightness Control
Altitude Switch
Selects whether barometric altimeter (BARO) or radar altimeter (RDR) altitude is displayed on the HUD
Black Level Control
Adjusts NFLR (or NAVFLIR, Navigation Forward-Looking Infrared) video plus or minus half a shade of gray per increment when rotated.
HUD Video Control Switch
• Enables NFLR (or NAVFLIR, Navigation Forward-Looking Infrared) video to be displayed on the HUD with selectable polarity (white hot / black hot)
• Modes: OFF / VIDEO / W/B (White/Black)
HUD Balance Control
Adjusts the HUD stroke brightness relative to the raster brightness.
Attitude Source Selector Knob
• Selects which source is used to determine aircraft attitude in the EADI (Electronic Attitude Display Indicator) DDI page.
• Modes: INS (Inertial Navigation System) / Automatic / Standby


Aircraft Heading
Heading Scale
Aircraft Pitch Ladder (deg)
Airspeed (kts)
Angle of Attack (deg)
Mach Number
Aircraft Gs (Accelerometer)
Peak Aircraft G
Bank Angle Scale
Vertical Velocity (ft/min)
HUD/BRU alignment crosses
Pilots line up their helmet-mounted display with the Heads-Up Display/Boresight Reference Unit by adjusting their seat height and making sure both crosses are aligned.
Altitude (ft)
Velocity Vector
Bank Angle

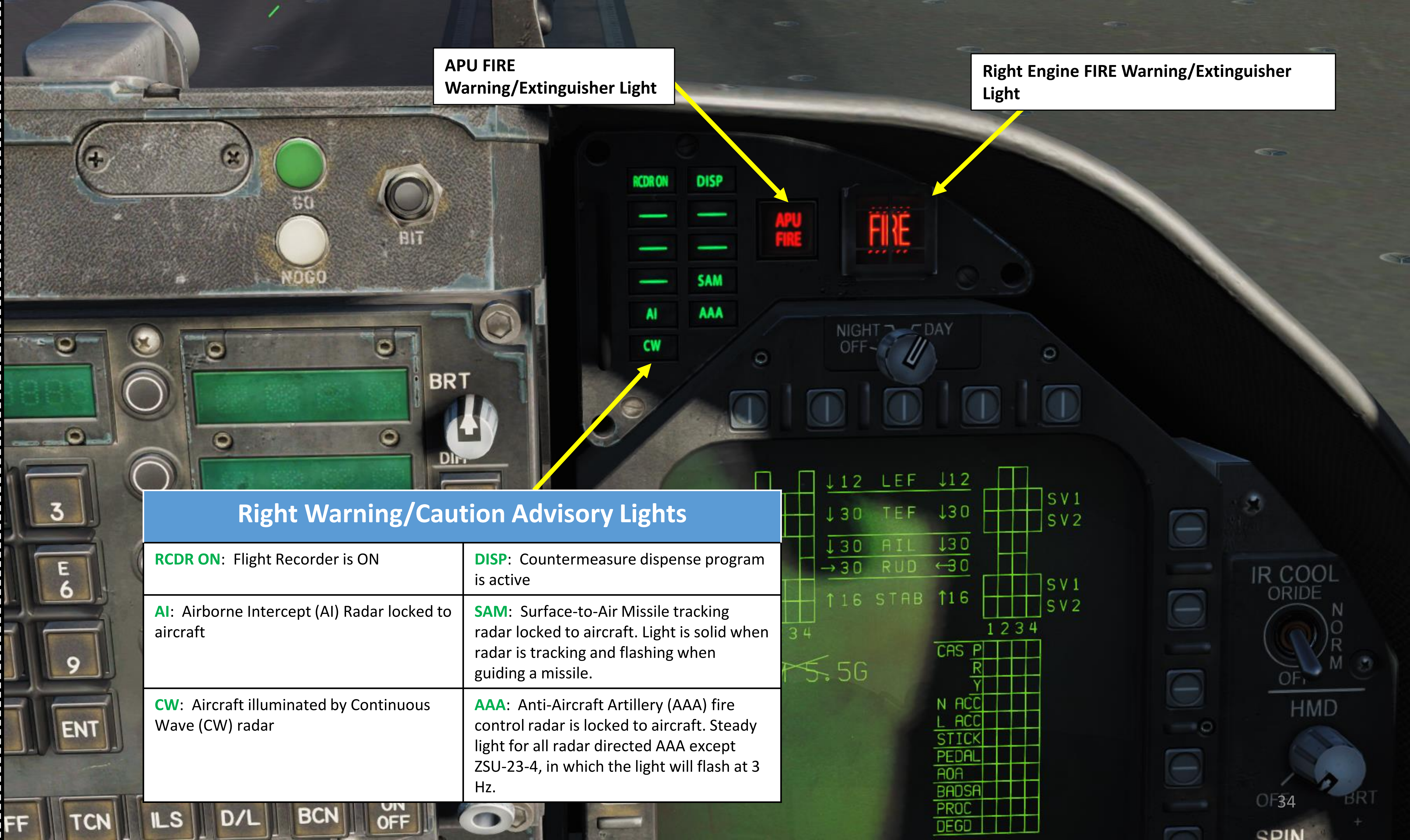


SYMBOL	AIRSPEED	AOA
	Slow	9.3° to 90.00°
	Slightly slow	8.8° to 9.3°
	On speed	7.4° to 8.8°
	Slightly fast	6.9° to 7.4°
	Fast	0° to 6.9°

LOCK light
Illuminates when radar has locked target. Single Target Track (STT) and target within Rmax range (maximal missile range).

SHOOT light
Illuminates when weapon release interlocks are satisfied.
- Steady light: indicates that missile is within Rmax range, or that gun target is within a firing solution.
- Flashing light: indicates that missile is within Rne (No Escape missile range)

Strobe light
Flashes when missile shot is valid.

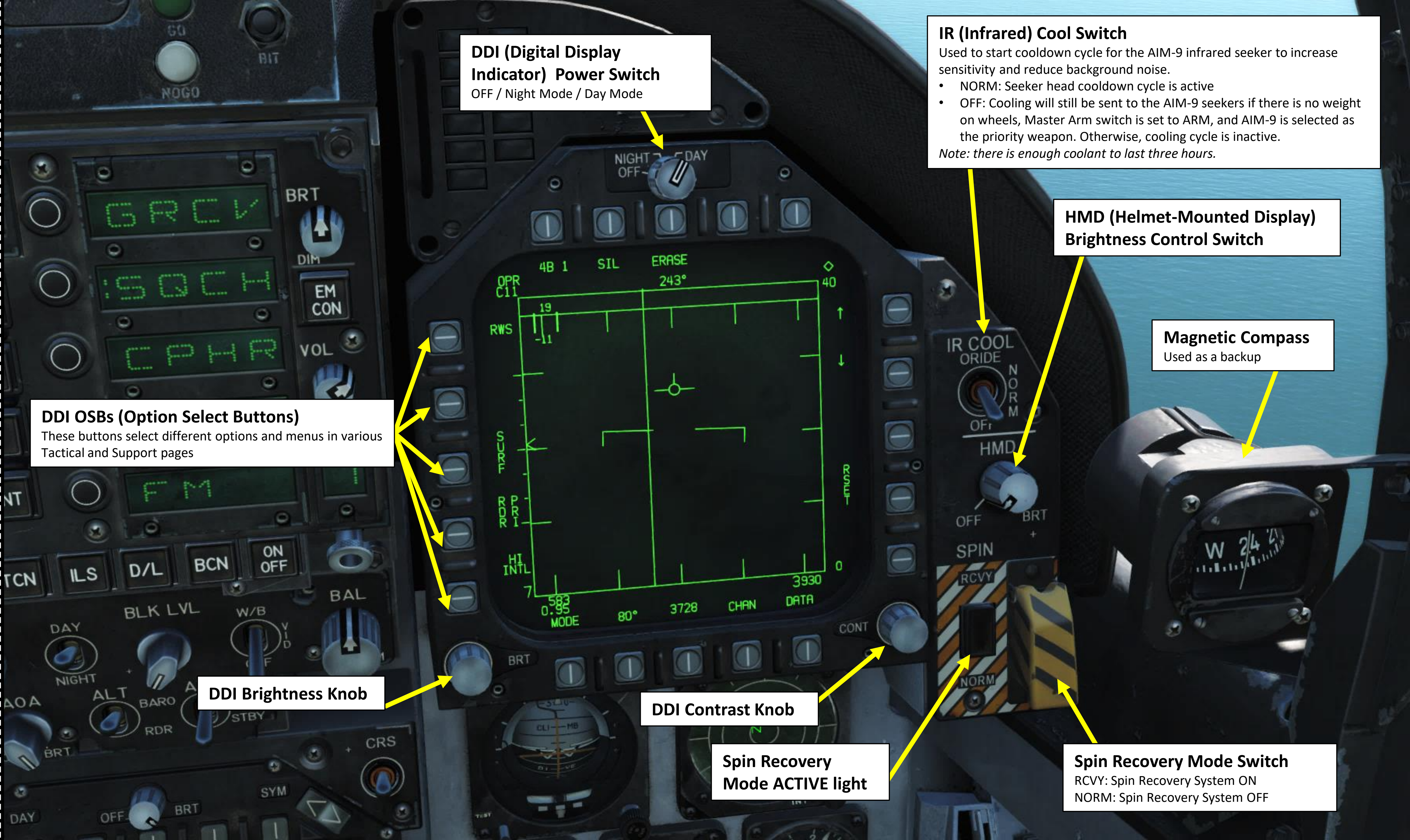


APU FIRE Warning/Extinguisher Light

Right Engine FIRE Warning/Extinguisher Light

Right Warning/Caution Advisory Lights

RCDR ON: Flight Recorder is ON	**DISP**: Countermeasure dispense program is active
AI: Airborne Intercept (AI) Radar locked to aircraft	**SAM**: Surface-to-Air Missile tracking radar locked to aircraft. Light is solid when radar is tracking and flashing when guiding a missile.
CW: Aircraft illuminated by Continuous Wave (CW) radar	**AAA**: Anti-Aircraft Artillery (AAA) fire control radar is locked to aircraft. Steady light for all radar directed AAA except ZSU-23-4, in which the light will flash at 3 Hz.



DDI (Digital Display Indicator) Power Switch
OFF / Night Mode / Day Mode

IR (Infrared) Cool Switch
Used to start cooldown cycle for the AIM-9 infrared seeker to increase sensitivity and reduce background noise.

- NORM: Seeker head cooldown cycle is active
- OFF: Cooling will still be sent to the AIM-9 seekers if there is no weight on wheels, Master Arm switch is set to ARM, and AIM-9 is selected as the priority weapon. Otherwise, cooling cycle is inactive.

Note: there is enough coolant to last three hours.

HMD (Helmet-Mounted Display) Brightness Control Switch

Magnetic Compass
Used as a backup

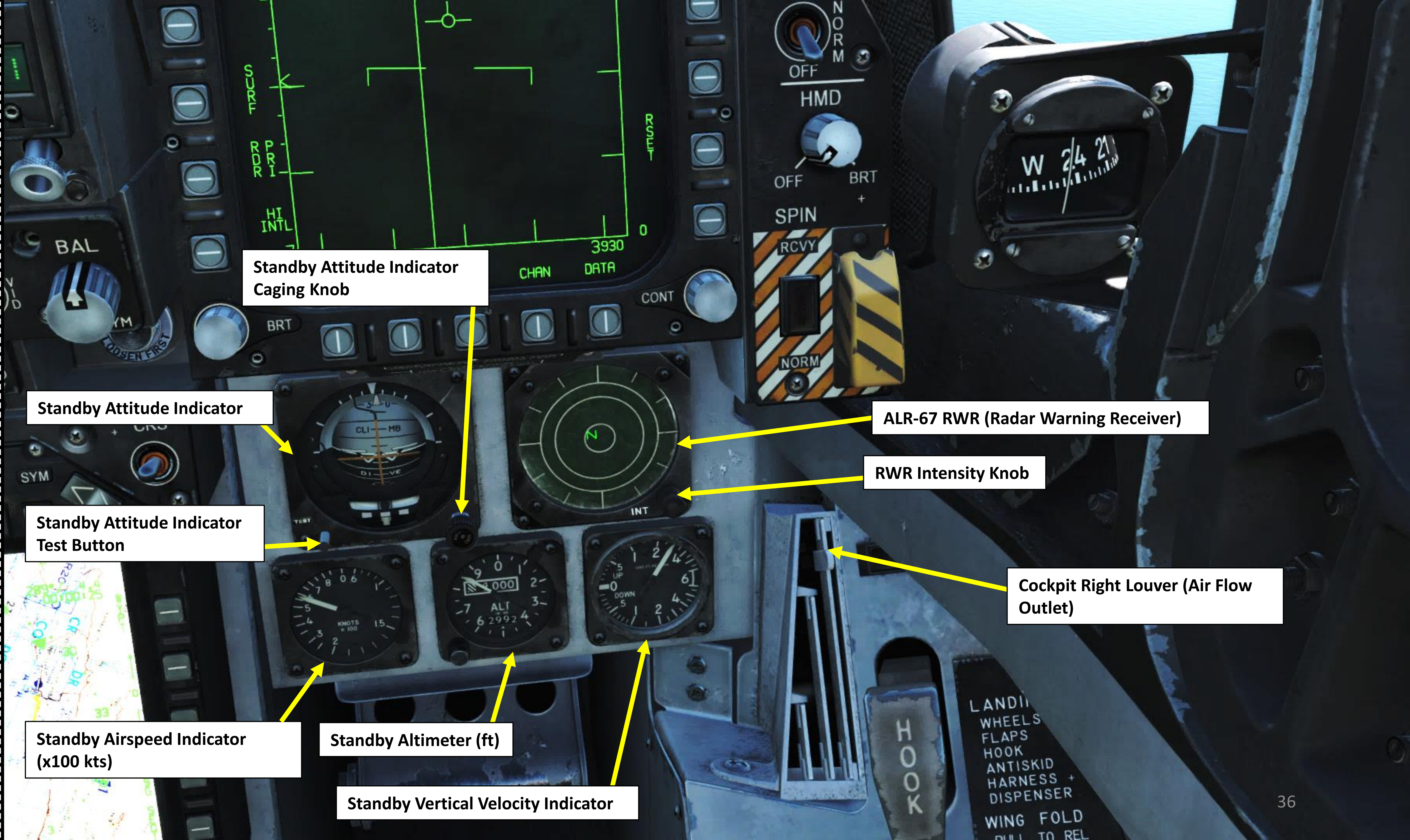
DDI OSBs (Option Select Buttons)
These buttons select different options and menus in various Tactical and Support pages

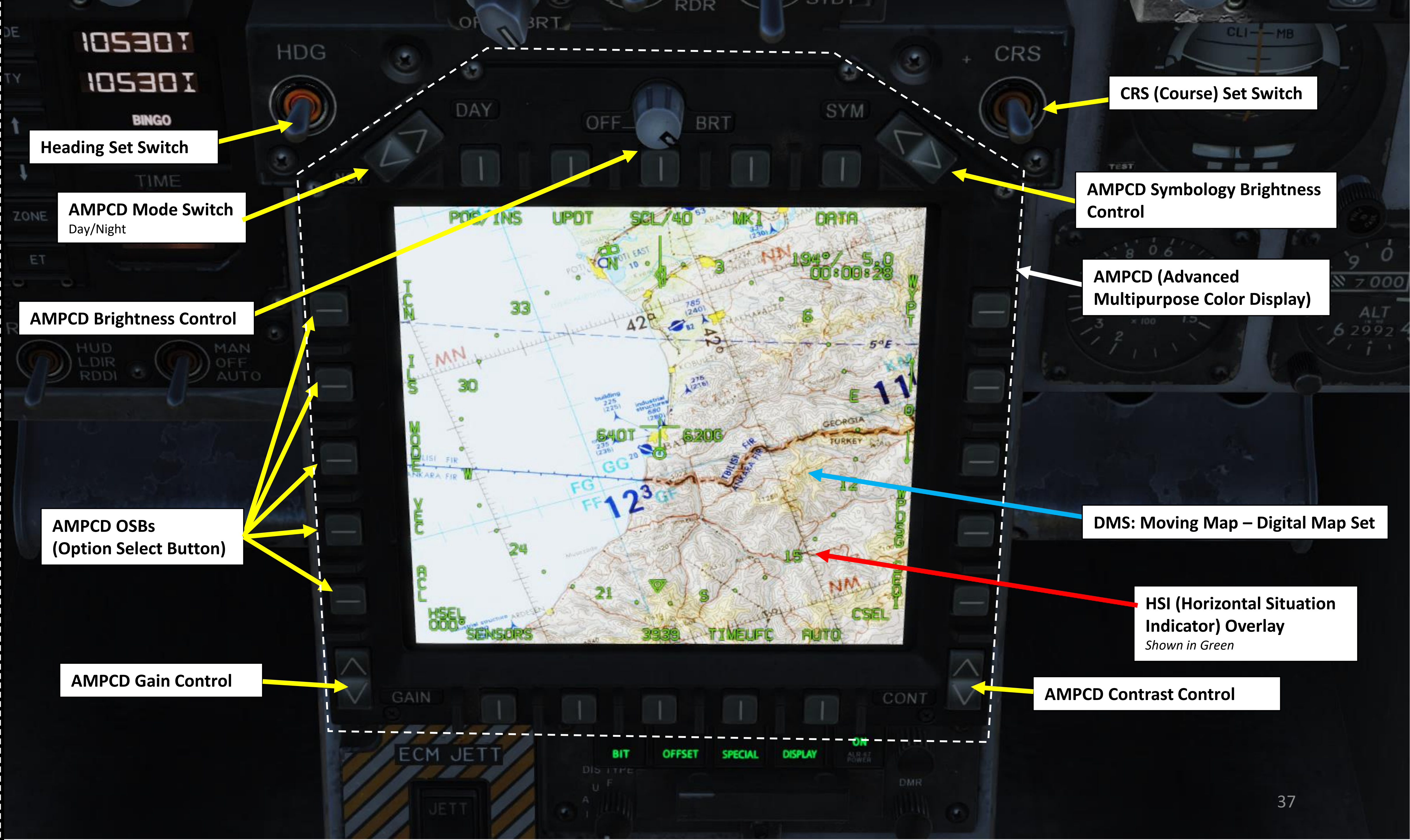
DDI Brightness Knob

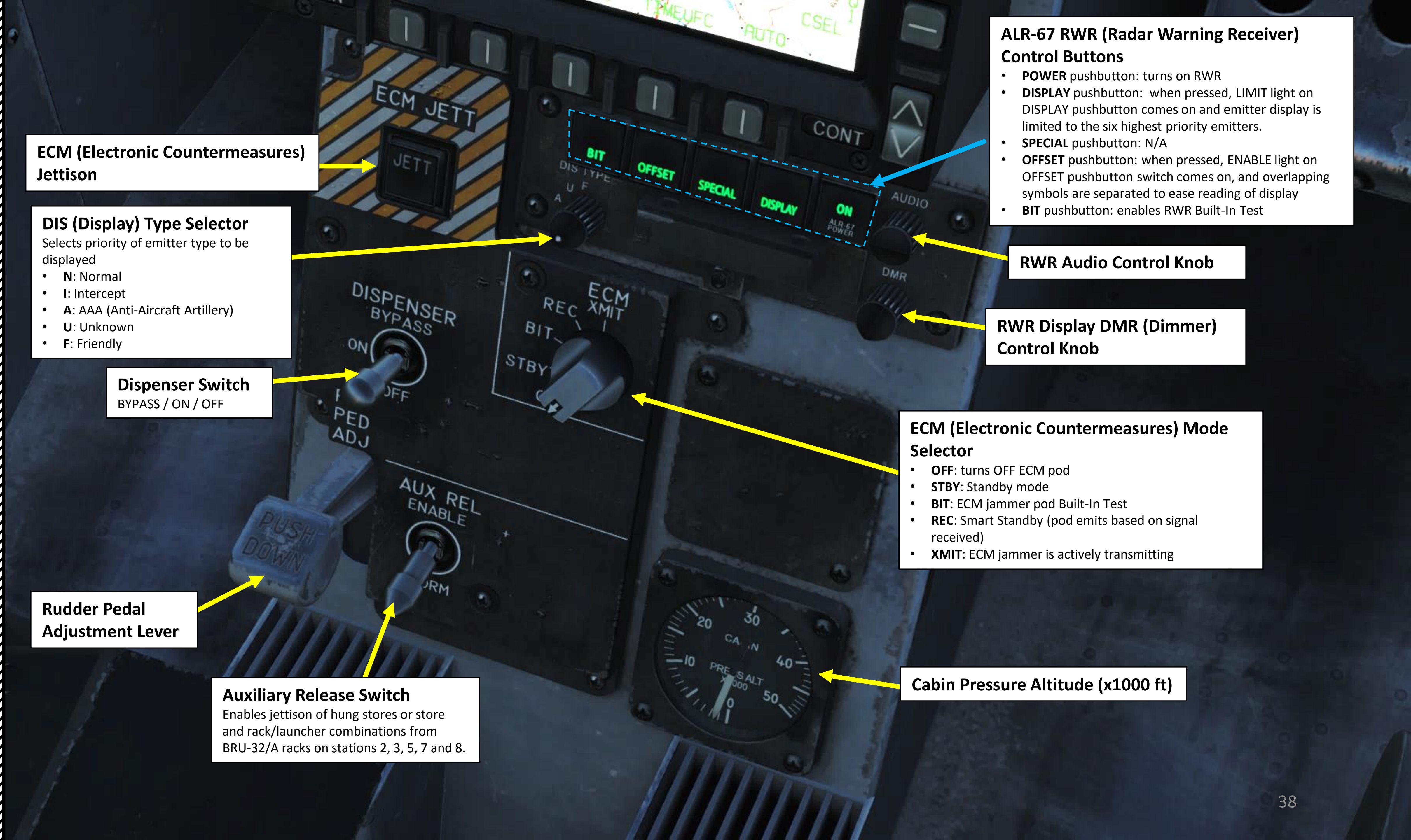
DDI Contrast Knob

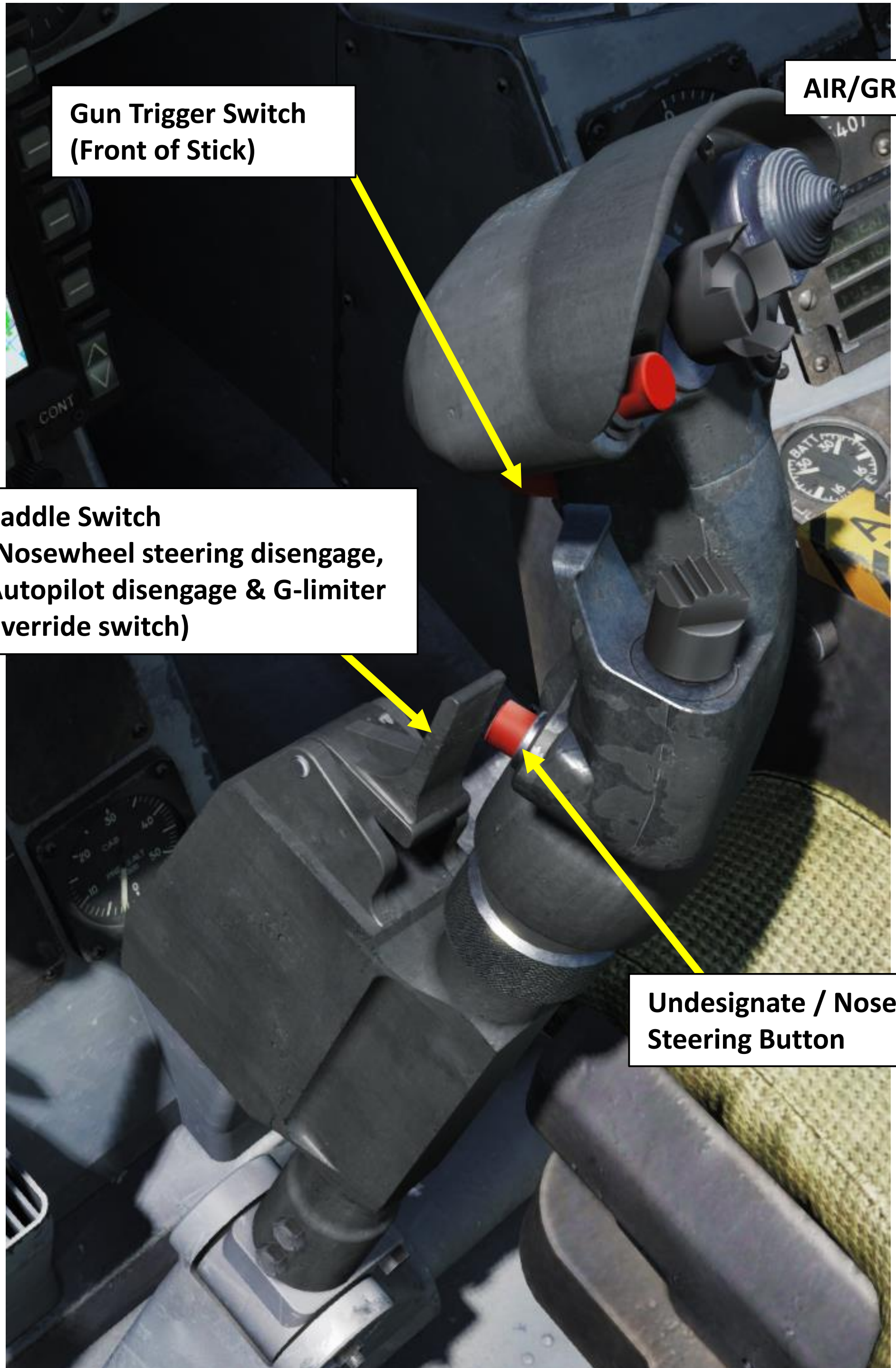
Spin Recovery Mode ACTIVE light

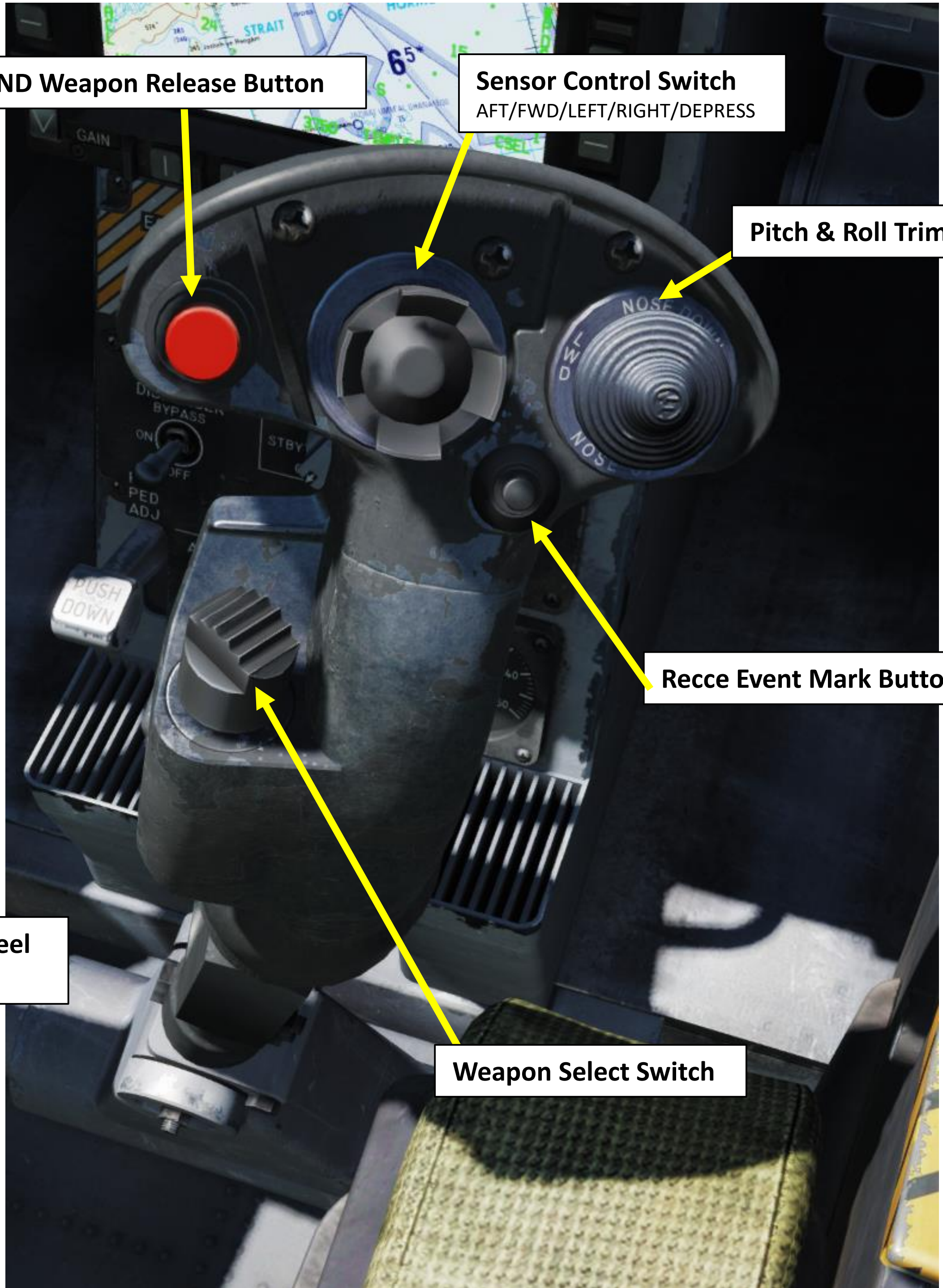
Spin Recovery Mode Switch
RCVY: Spin Recovery System ON
NORM: Spin Recovery System OFF

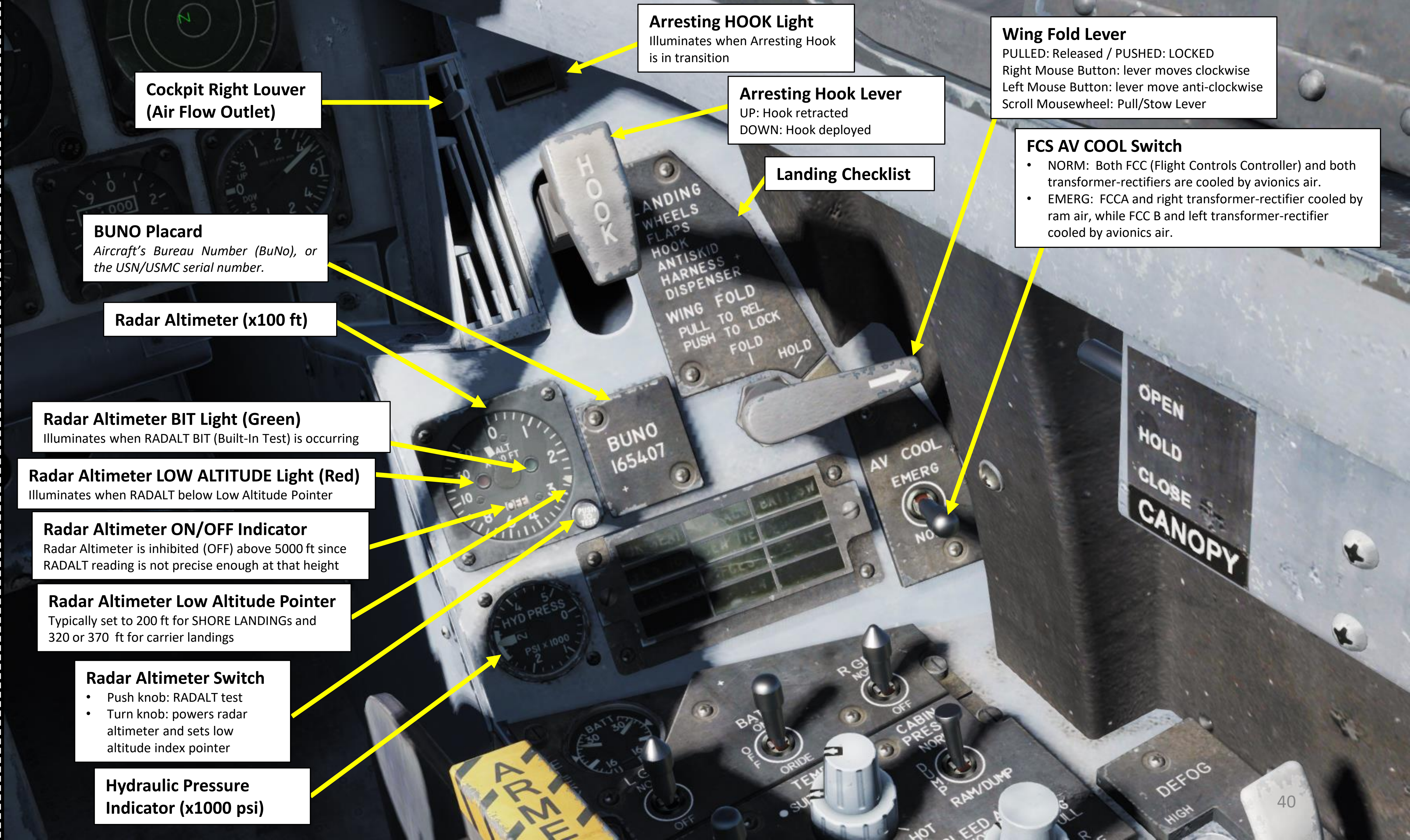

Standby Attitude Indicator Caging Knob
Standby Attitude Indicator
Standby Attitude Indicator Test Button
Standby Airspeed Indicator (x100 kts)
Standby Altimeter (ft)
Standby Vertical Velocity Indicator
ALR-67 RWR (Radar Warning Receiver)
RWR Intensity Knob
Cockpit Right Louver (Air Flow Outlet)

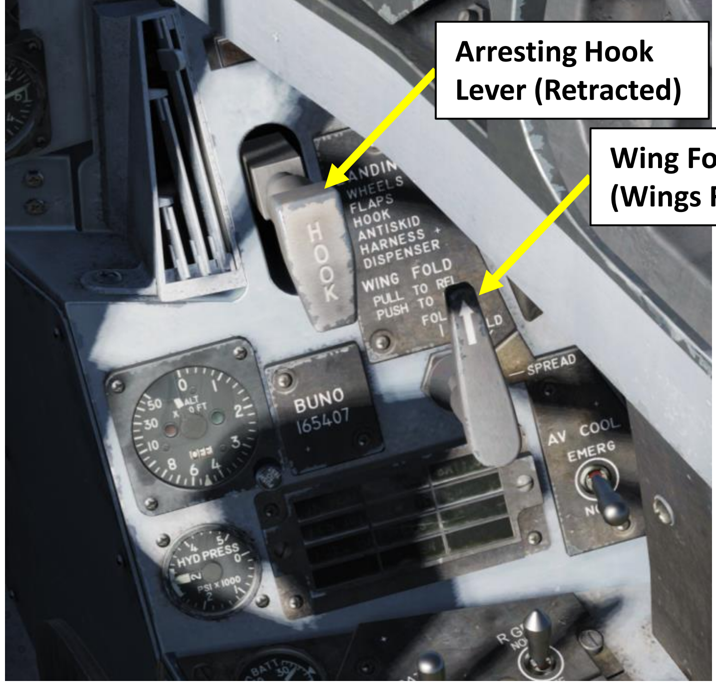

Heading Set Switch
AMPCD Mode Switch
Day/Night
AMPCD Brightness Control
AMPCD OSBs
(Option Select Button)
AMPCD Gain Control
CRS (Course) Set Switch
AMPCD Symbology Brightness Control
AMPCD (Advanced Multipurpose Color Display)
DMS: Moving Map – Digital Map Set
HSI (Horizontal Situation Indicator) Overlay
Shown in Green
AMPCD Contrast Control


ALR-67 RWR (Radar Warning Receiver) Control Buttons
• **POWER** pushbutton: turns on RWR
• **DISPLAY** pushbutton: when pressed, LIMIT light on DISPLAY pushbutton comes on and emitter display is limited to the six highest priority emitters.
• **SPECIAL** pushbutton: N/A
• **OFFSET** pushbutton: when pressed, ENABLE light on OFFSET pushbutton switch comes on, and overlapping symbols are separated to ease reading of display
• **BIT** pushbutton: enables RWR Built-In Test
ECM (Electronic Countermeasures) Jettison
DIS (Display) Type Selector
Selects priority of emitter type to be displayed
• **N**: Normal
• **I**: Intercept
• **A**: AAA (Anti-Aircraft Artillery)
• **U**: Unknown
• **F**: Friendly
RWR Audio Control Knob
RWR Display DMR (Dimmer) Control Knob
Dispenser Switch
BYPASS / ON / OFF
ECM (Electronic Countermeasures) Mode Selector
• **OFF**: turns OFF ECM pod
• **STBY**: Standby mode
• **BIT**: ECM jammer pod Built-In Test
• **REC**: Smart Standby (pod emits based on signal received)
• **XMIT**: ECM jammer is actively transmitting
Rudder Pedal Adjustment Lever
Auxiliary Release Switch
Enables jettison of hung stores or store and rack/launcher combinations from BRU-32/A racks on stations 2, 3, 5, 7 and 8.
Cabin Pressure Altitude (x1000 ft)


Gun Trigger Switch (Front of Stick)
Paddle Switch (Nosewheel steering disengage, Autopilot disengage & G-limiter override switch)
Undesignate / Nosewheel Steering Button


AIR/GROUND Weapon Release Button
Sensor Control Switch
AFT/FWD/LEFT/RIGHT/DEPRESS
Pitch & Roll Trim Hat Switch
Recce Event Mark Button
Weapon Select Switch

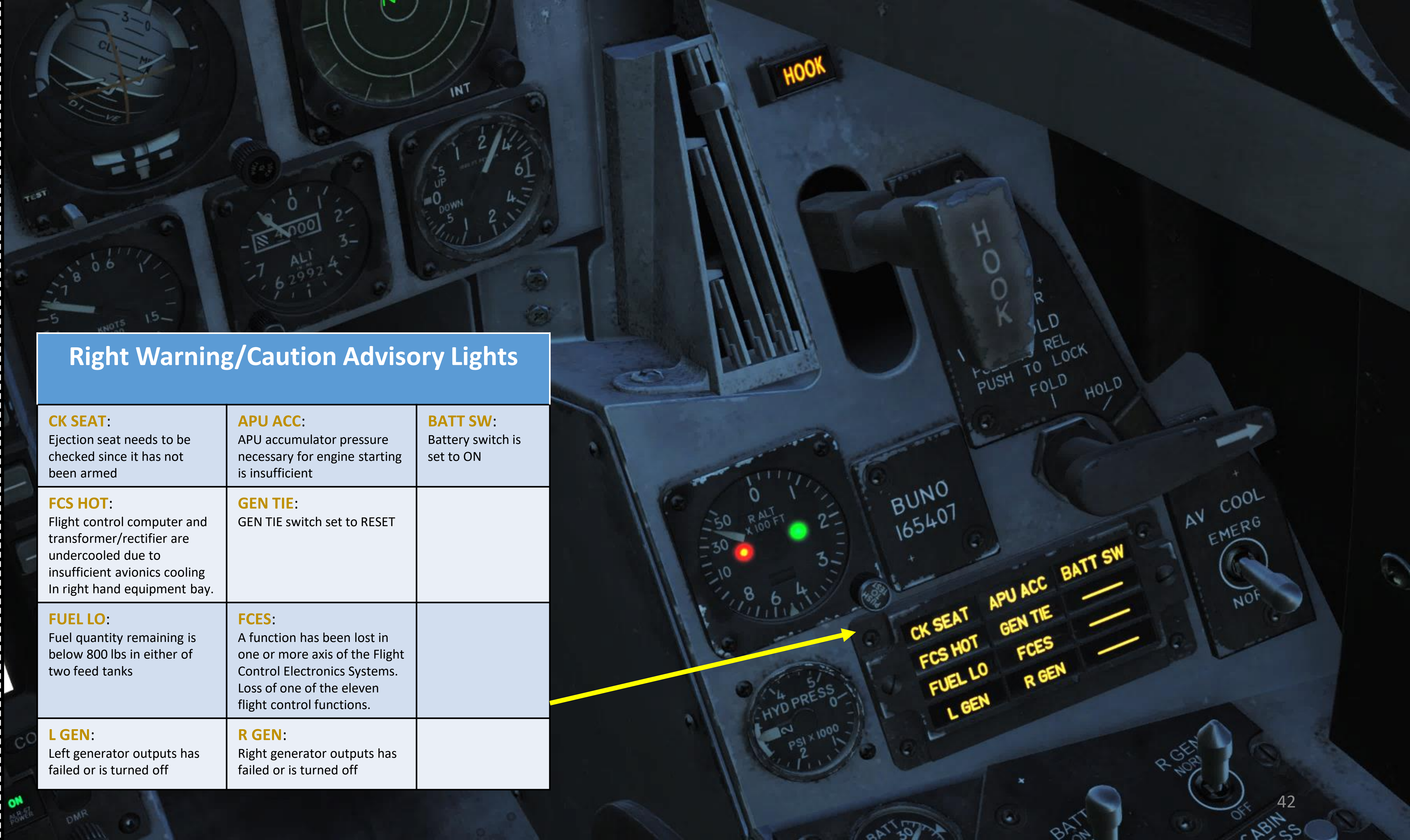

Arresting HOOK Light
Illuminates when Arresting Hook is in transition
Cockpit Right Louver (Air Flow Outlet)
Arresting Hook Lever
UP: Hook retracted
DOWN: Hook deployed
Wing Fold Lever
PULLED: Released / PUSHED: LOCKED
Right Mouse Button: lever moves clockwise
Left Mouse Button: lever move anti-clockwise
Scroll Mousewheel: Pull/Stow Lever
FCS AV COOL Switch
• NORM: Both FCC (Flight Controls Controller) and both transformer-rectifiers are cooled by avionics air.
• EMERG: FCCA and right transformer-rectifier cooled by ram air, while FCC B and left transformer-rectifier cooled by avionics air.
Landing Checklist
BUNO Placard
Aircraft's Bureau Number (BuNo), or the USN/USMC serial number.
Radar Altimeter (x100 ft)
Radar Altimeter BIT Light (Green)
Illuminates when RADALT BIT (Built-In Test) is occurring
Radar Altimeter LOW ALTITUDE Light (Red)
Illuminates when RADALT below Low Altitude Pointer
Radar Altimeter ON/OFF Indicator
Radar Altimeter is inhibited (OFF) above 5000 ft since RADALT reading is not precise enough at that height
Radar Altimeter Low Altitude Pointer
Typically set to 200 ft for SHORE LANDINGs and 320 or 370 ft for carrier landings
Radar Altimeter Switch
• Push knob: RADALT test
• Turn knob: powers radar altimeter and sets low altitude index pointer
Hydraulic Pressure Indicator (x1000 psi)
HOOK
LANDING
WHEELS
FLAPS
HOOK
ANTISKID
HARNESS
DISPENSER
WING FOLD
PULL TO REL
PUSH TO LOCK
FOLD
HOLD
BUNO
165407
AV COOL
EMERG
OPEN
HOLD
CLOSE
CANOPY
HYD PRESS
PSI x 1000
DEFOG


Arresting Hook Lever (Retracted)
Wing Fold Lever (Wings Folded)


Arresting Hook In Transition
Wing Fold Lever (Wings Spread)
Arresting Hook Lever (Deployed)

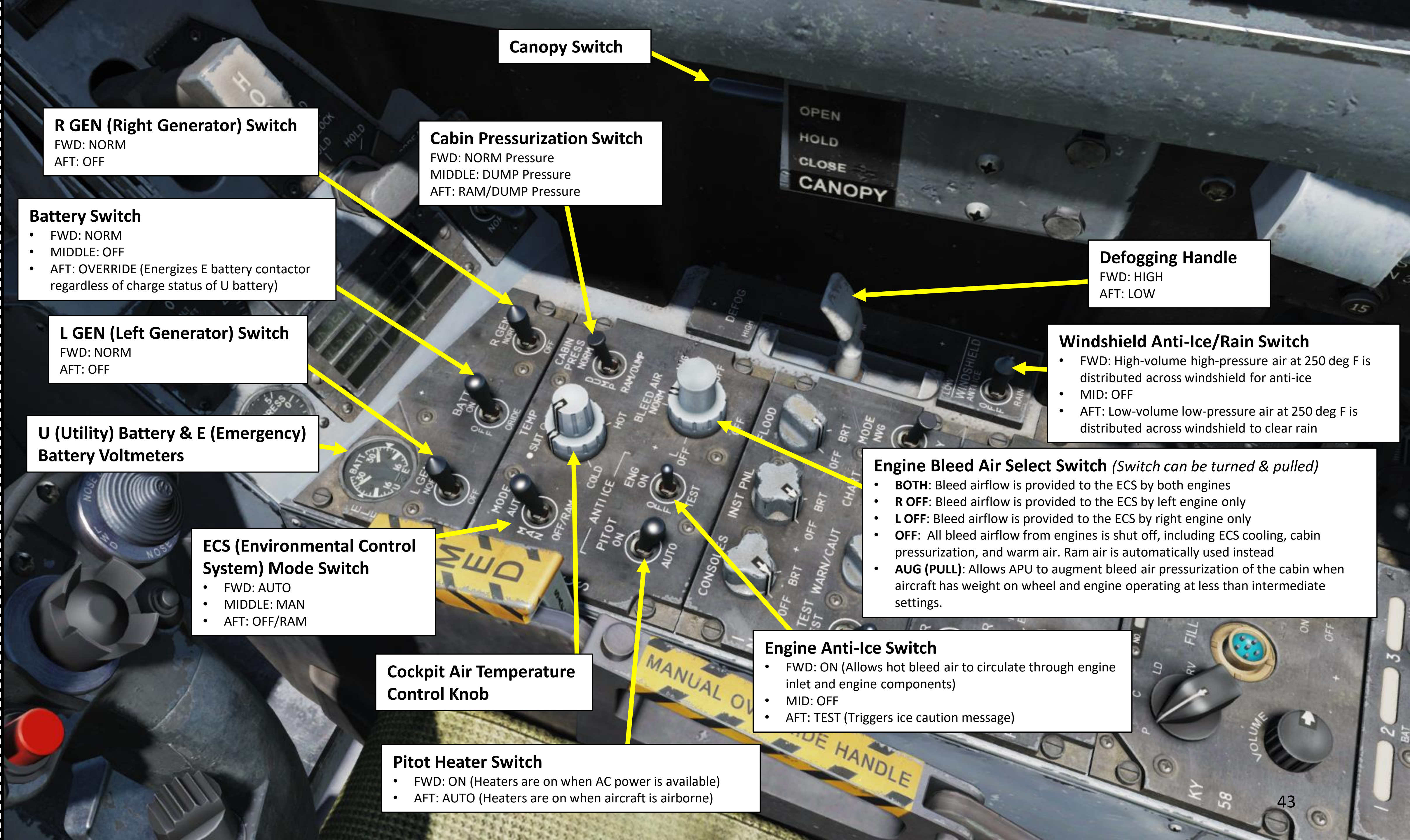

Wings (Spread)
Arresting Hook (Deployed)


Wings (Folded)
On aircraft carriers, wing folding is used to save space on the hangar deck.



Right Warning/Caution Advisory Lights

CK SEAT: Ejection seat needs to be checked since it has not been armed	**APU ACC**: APU accumulator pressure necessary for engine starting is insufficient	**BATT SW**: Battery switch is set to ON
FCS HOT: Flight control computer and transformer/rectifier are undercooled due to insufficient avionics cooling In right hand equipment bay.	**GEN TIE**: GEN TIE switch set to RESET	
FUEL LO: Fuel quantity remaining is below 800 lbs in either of two feed tanks	**FCES**: A function has been lost in one or more axis of the Flight Control Electronics Systems. Loss of one of the eleven flight control functions.	
L GEN: Left generator outputs has failed or is turned off	**R GEN**: Right generator outputs has failed or is turned off	


Canopy Switch
OPEN
HOLD
CLOSE
CANOPY
R GEN (Right Generator) Switch
FWD: NORM
AFT: OFF
Cabin Pressurization Switch
FWD: NORM Pressure
MIDDLE: DUMP Pressure
AFT: RAM/DUMP Pressure
Battery Switch
• FWD: NORM
• MIDDLE: OFF
• AFT: OVERRIDE (Energizes E battery contactor regardless of charge status of U battery)
Defogging Handle
FWD: HIGH
AFT: LOW
L GEN (Left Generator) Switch
FWD: NORM
AFT: OFF
Windshield Anti-Ice/Rain Switch
• FWD: High-volume high-pressure air at 250 deg F is distributed across windshield for anti-ice
• MID: OFF
• AFT: Low-volume low-pressure air at 250 deg F is distributed across windshield to clear rain
U (Utility) Battery & E (Emergency) Battery Voltmeters
Engine Bleed Air Select Switch (Switch can be turned & pulled)
• BOTH: Bleed airflow is provided to the ECS by both engines
• R OFF: Bleed airflow is provided to the ECS by left engine only
• L OFF: Bleed airflow is provided to the ECS by right engine only
• OFF: All bleed airflow from engines is shut off, including ECS cooling, cabin pressurization, and warm air. Ram air is automatically used instead
• AUG (PULL): Allows APU to augment bleed air pressurization of the cabin when aircraft has weight on wheel and engine operating at less than intermediate settings.
ECS (Environmental Control System) Mode Switch
• FWD: AUTO
• MIDDLE: MAN
• AFT: OFF/RAM
Engine Anti-Ice Switch
• FWD: ON (Allows hot bleed air to circulate through engine inlet and engine components)
• MID: OFF
• AFT: TEST (Triggers ice caution message)
Cockpit Air Temperature Control Knob
Pitot Heater Switch
• FWD: ON (Heaters are on when AC power is available)
• AFT: AUTO (Heaters are on when aircraft is airborne)

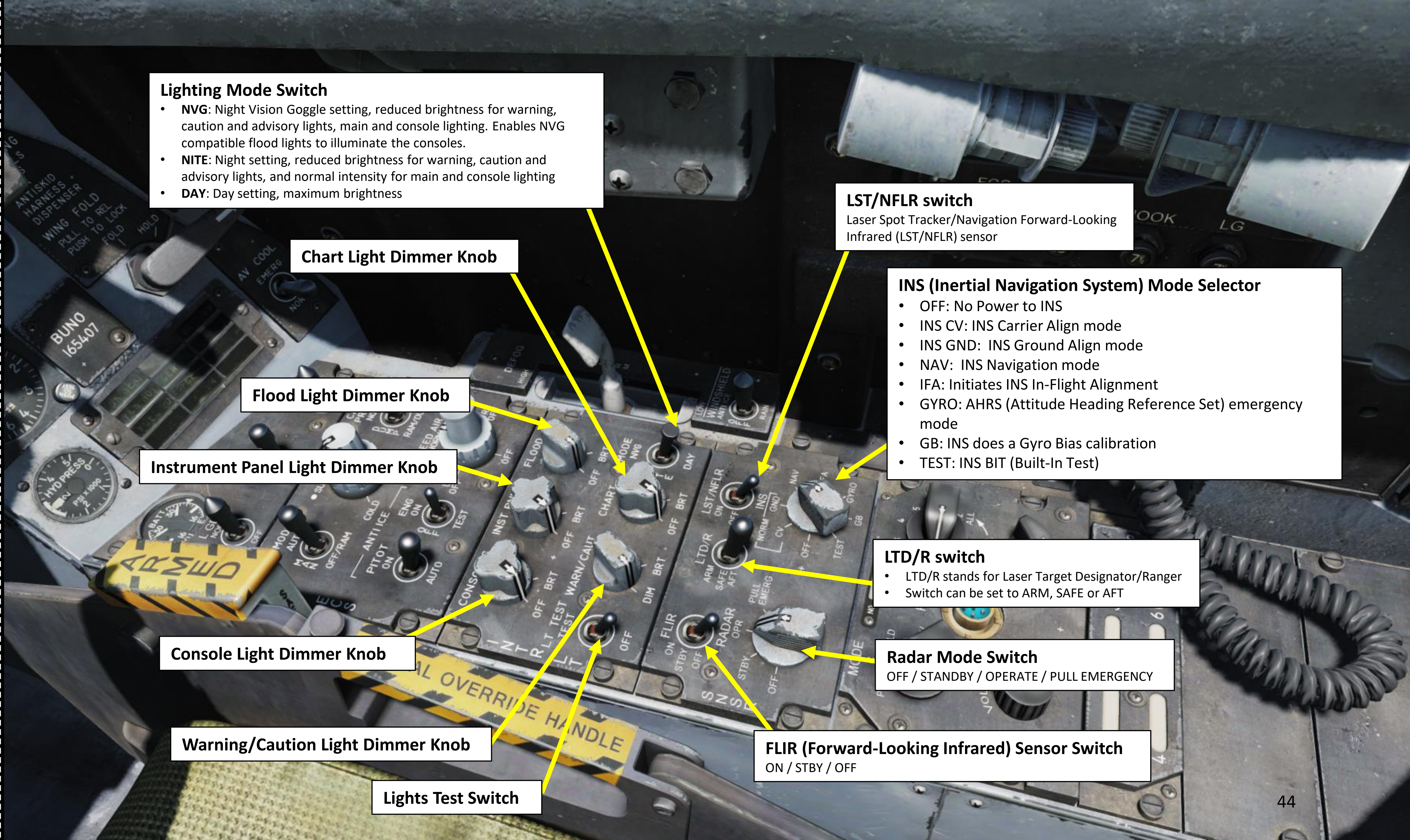

Lighting Mode Switch
- **NVG**: Night Vision Goggle setting, reduced brightness for warning, caution and advisory lights, main and console lighting. Enables NVG compatible flood lights to illuminate the consoles.
- **NITE**: Night setting, reduced brightness for warning, caution and advisory lights, and normal intensity for main and console lighting
- **DAY**: Day setting, maximum brightness

Chart Light Dimmer Knob

Flood Light Dimmer Knob

Instrument Panel Light Dimmer Knob

Console Light Dimmer Knob

Warning/Caution Light Dimmer Knob

Lights Test Switch

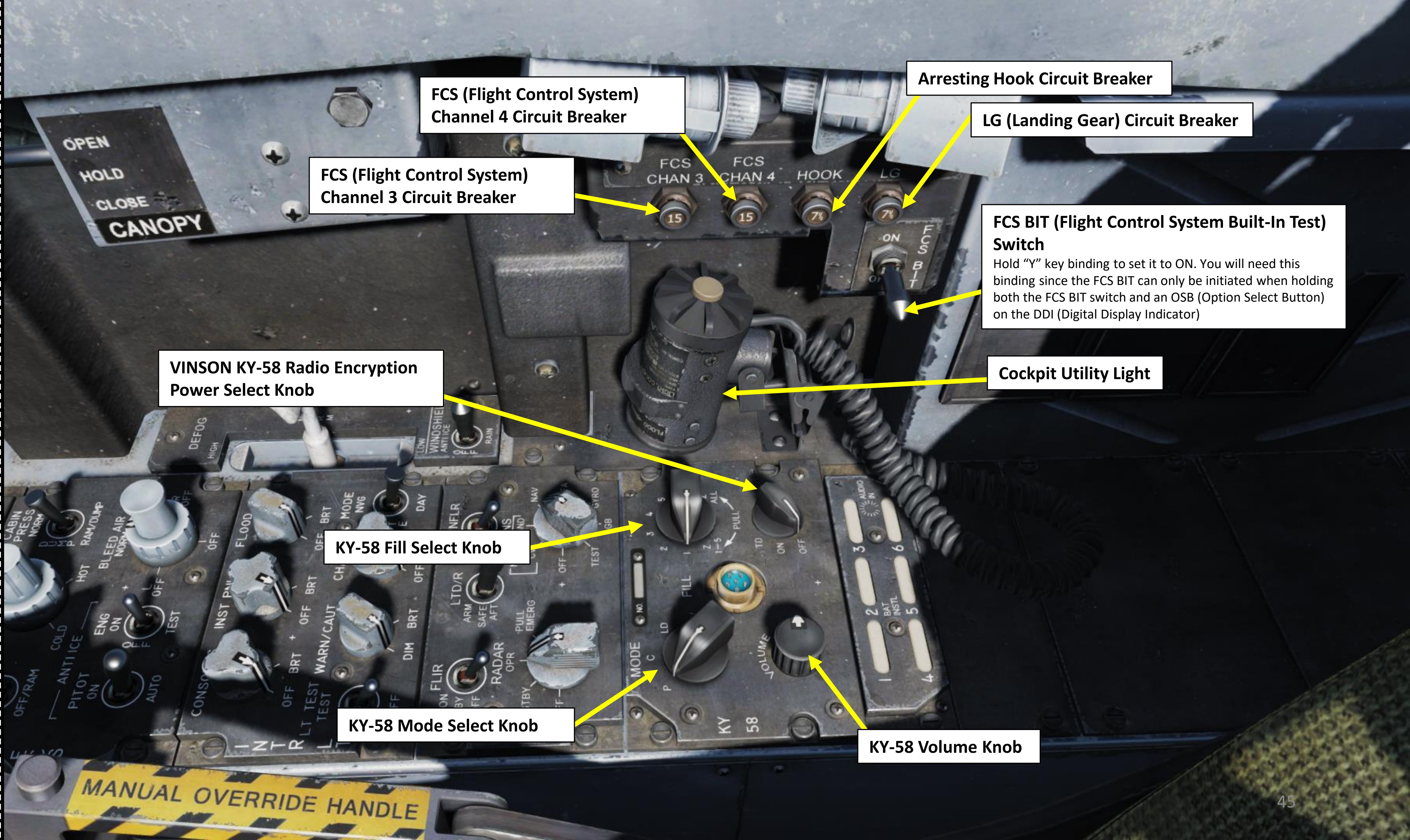
LST/NFLR switch
Laser Spot Tracker/Navigation Forward-Looking Infrared (LST/NFLR) sensor

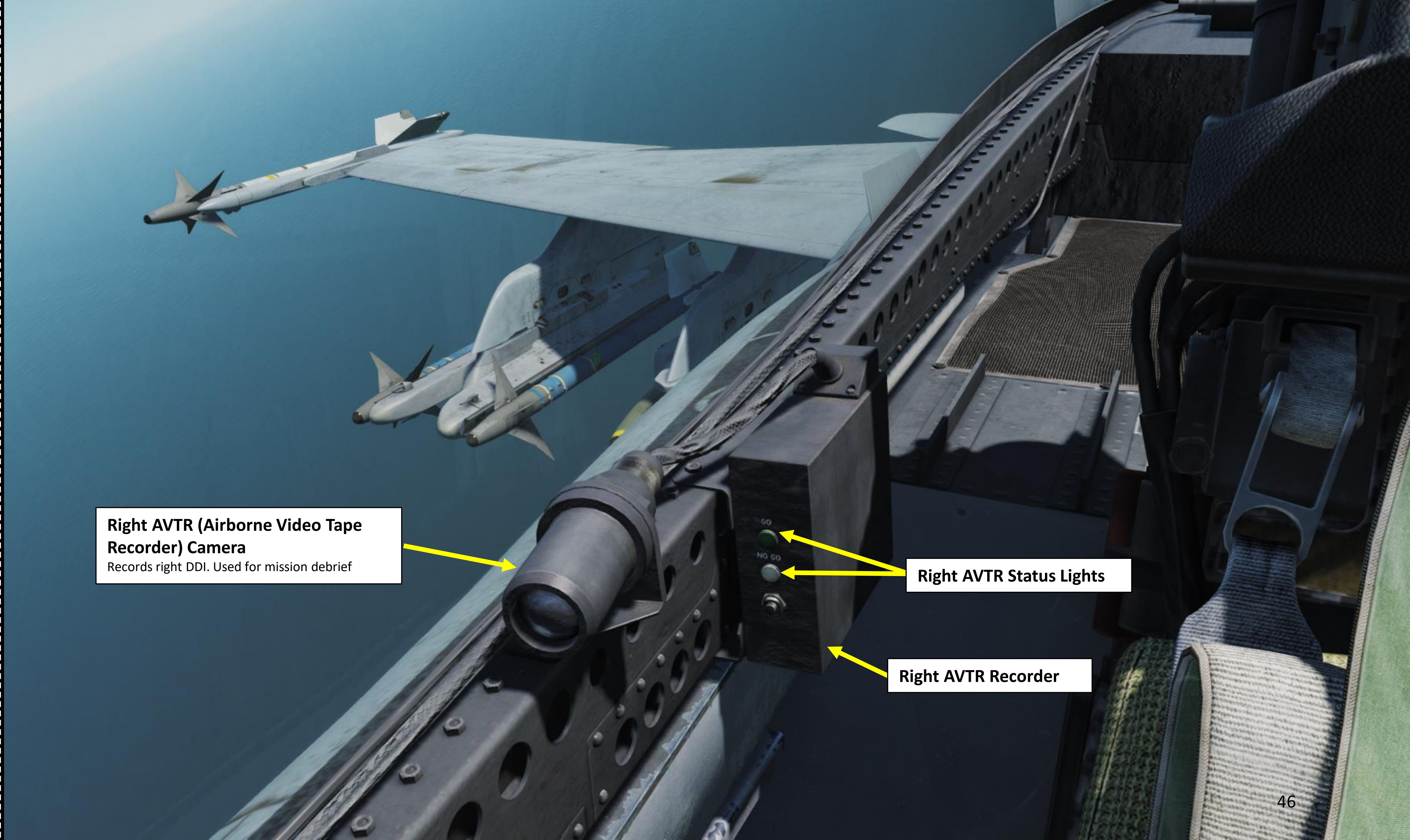
INS (Inertial Navigation System) Mode Selector
- OFF: No Power to INS
- INS CV: INS Carrier Align mode
- INS GND: INS Ground Align mode
- NAV: INS Navigation mode
- IFA: Initiates INS In-Flight Alignment
- GYRO: AHRS (Attitude Heading Reference Set) emergency mode
- GB: INS does a Gyro Bias calibration
- TEST: INS BIT (Built-In Test)

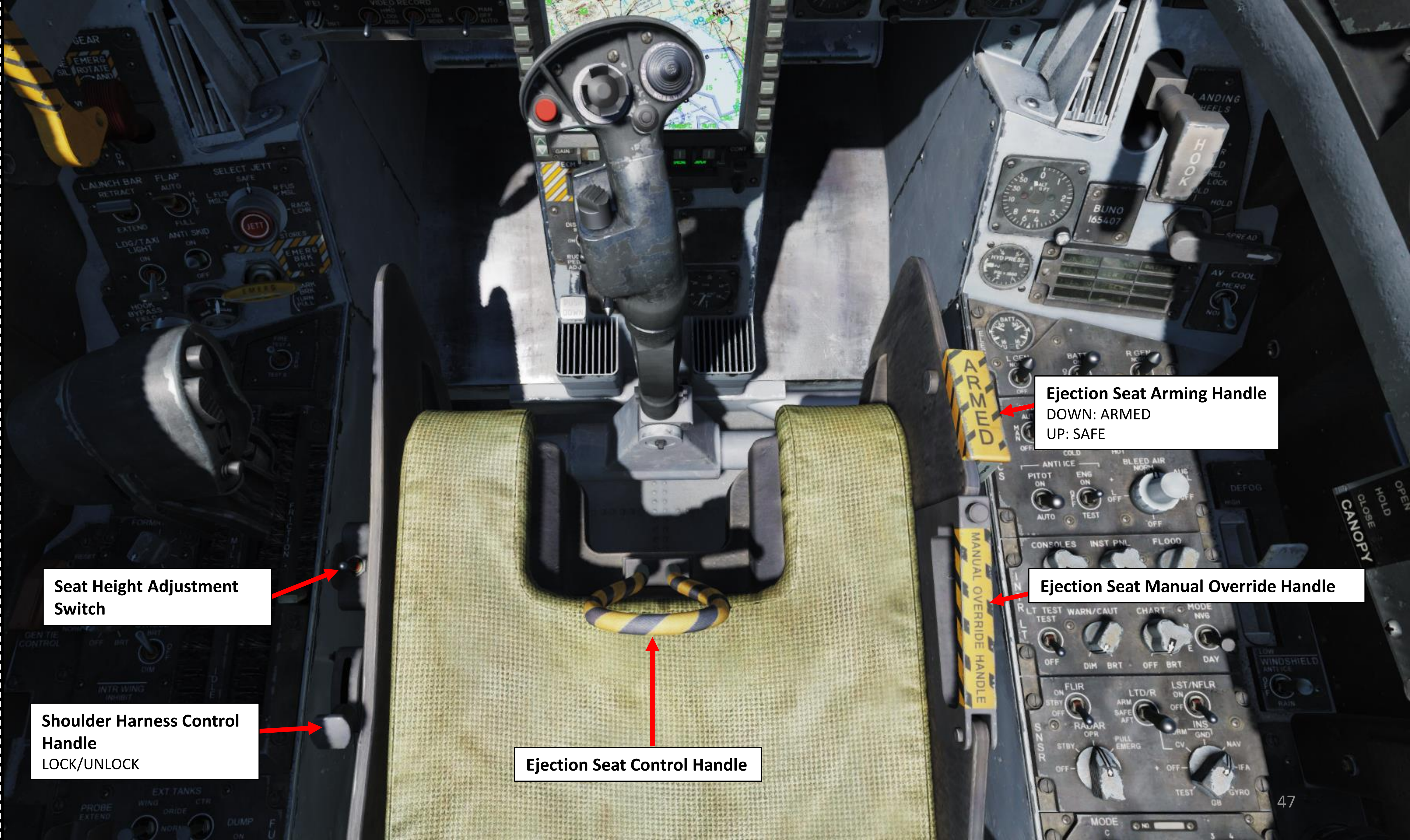
LTD/R switch
- LTD/R stands for Laser Target Designator/Ranger
- Switch can be set to ARM, SAFE or AFT

Radar Mode Switch
OFF / STANDBY / OPERATE / PULL EMERGENCY

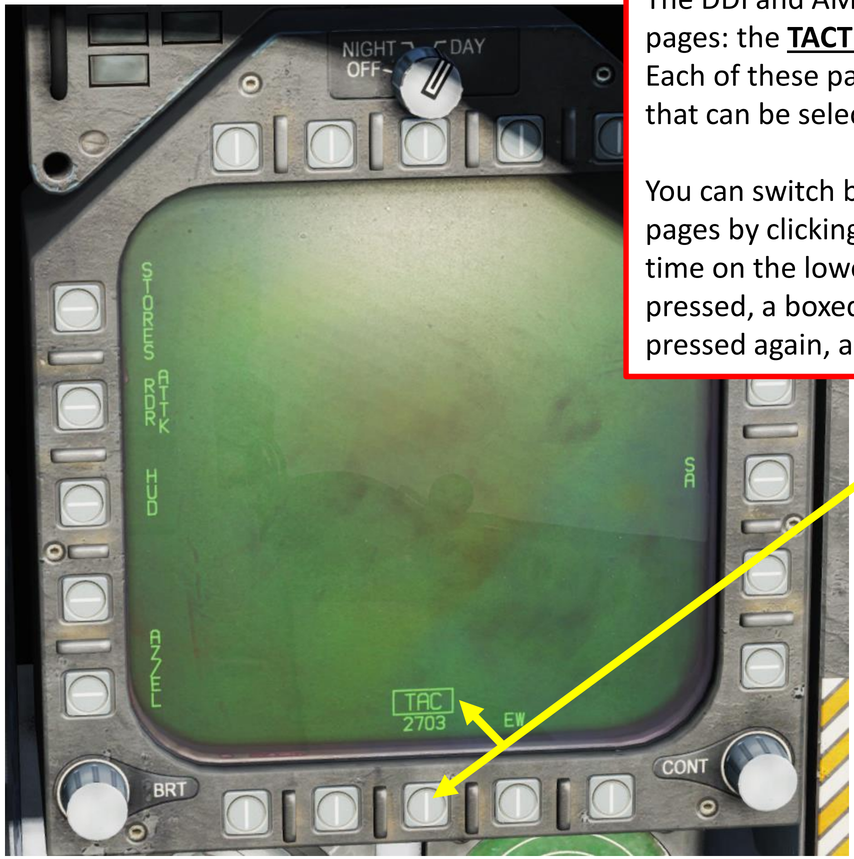
FLIR (Forward-Looking Infrared) Sensor Switch
ON / STBY / OFF


FCS (Flight Control System) Channel 4 Circuit Breaker
Arresting Hook Circuit Breaker
LG (Landing Gear) Circuit Breaker
FCS (Flight Control System) Channel 3 Circuit Breaker
FCS BIT (Flight Control System Built-In Test) Switch
Hold "Y" key binding to set it to ON. You will need this binding since the FCS BIT can only be initiated when holding both the FCS BIT switch and an OSB (Option Select Button) on the DDI (Digital Display Indicator)
Cockpit Utility Light
VINSON KY-58 Radio Encryption Power Select Knob
KY-58 Fill Select Knob
KY-58 Mode Select Knob
KY-58 Volume Knob
OPEN
HOLD
CLOSE
CANOPY
FCS CHAN 3
FCS CHAN 4
HOOK
LG
FCS BIT
MANUAL OVERRIDE HANDLE

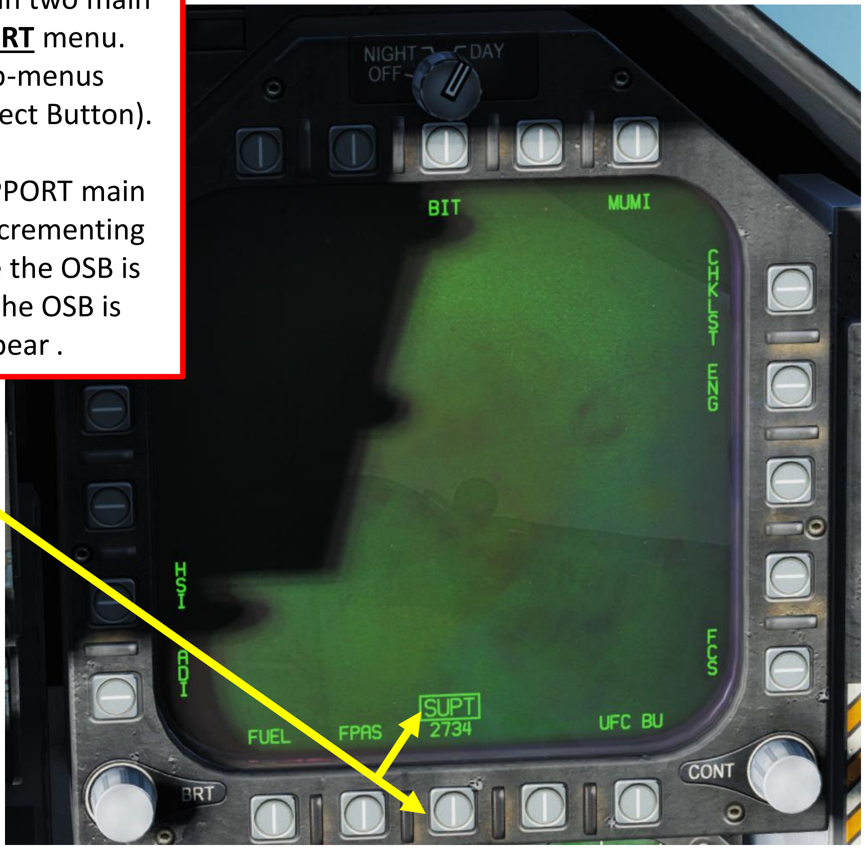

Right AVTR (Airborne Video Tape Recorder) Camera
Records right DDI. Used for mission debrief
GO
NO GO
Right AVTR Status Lights
Right AVTR Recorder


Ejection Seat Arming Handle
DOWN: ARMED
UP: SAFE
Ejection Seat Manual Override Handle
Seat Height Adjustment Switch
Shoulder Harness Control Handle
LOCK/UNLOCK
Ejection Seat Control Handle

TACTICAL MENU



SUPPORT MENU



The DDI and AMPCD pages can be divided in two main pages: the **TACTICAL** menu and the **SUPPORT** menu. Each of these pages contains their own sub-menus that can be selected with OSBs (Option Select Button).

You can switch between TACTICAL and SUPPORT main pages by clicking on the OSB next to the incrementing time on the lower section of the DDI. Once the OSB is pressed, a boxed TAC menu will appear. If the OSB is pressed again, a boxed SUPT menu will appear .

STORES sub-menu
Showcases what stores & equipment is loaded on the aircraft

RDR ATTK sub-menu
Radar display page

HUD sub-menu
Heads-Up Display repeater page

AZ/EL sub-menu (N/A)
Azimuth/Elevation page

EW sub-menu
Early Warning page (includes Radar Warning Receiver display)

SA sub-menu
Situational Awareness page

HSI sub-menu
Horizontal Situation Indicator

ADI sub-menu
EADI (Electronic Attitude Display Indicator) page

FUEL sub-menu
Fuel page

FPAS sub-menu
Flight Performance Advisory System

UFC BU sub-menu (N/A)
Up-Front Controller Back-up page

MIDS sub-menu
Multifunctional Information Distribution System page

ENG sub-menu
Engine Data page

CHKLST sub-menu
Checklist page

FCS sub-menu
Flight Control System page

MUMI sub-menu (N/A)
Memory Unit Mission Initialization page

BIT sub-menu
Built-In Test page


STORES sub-menu


HUD sub-menu

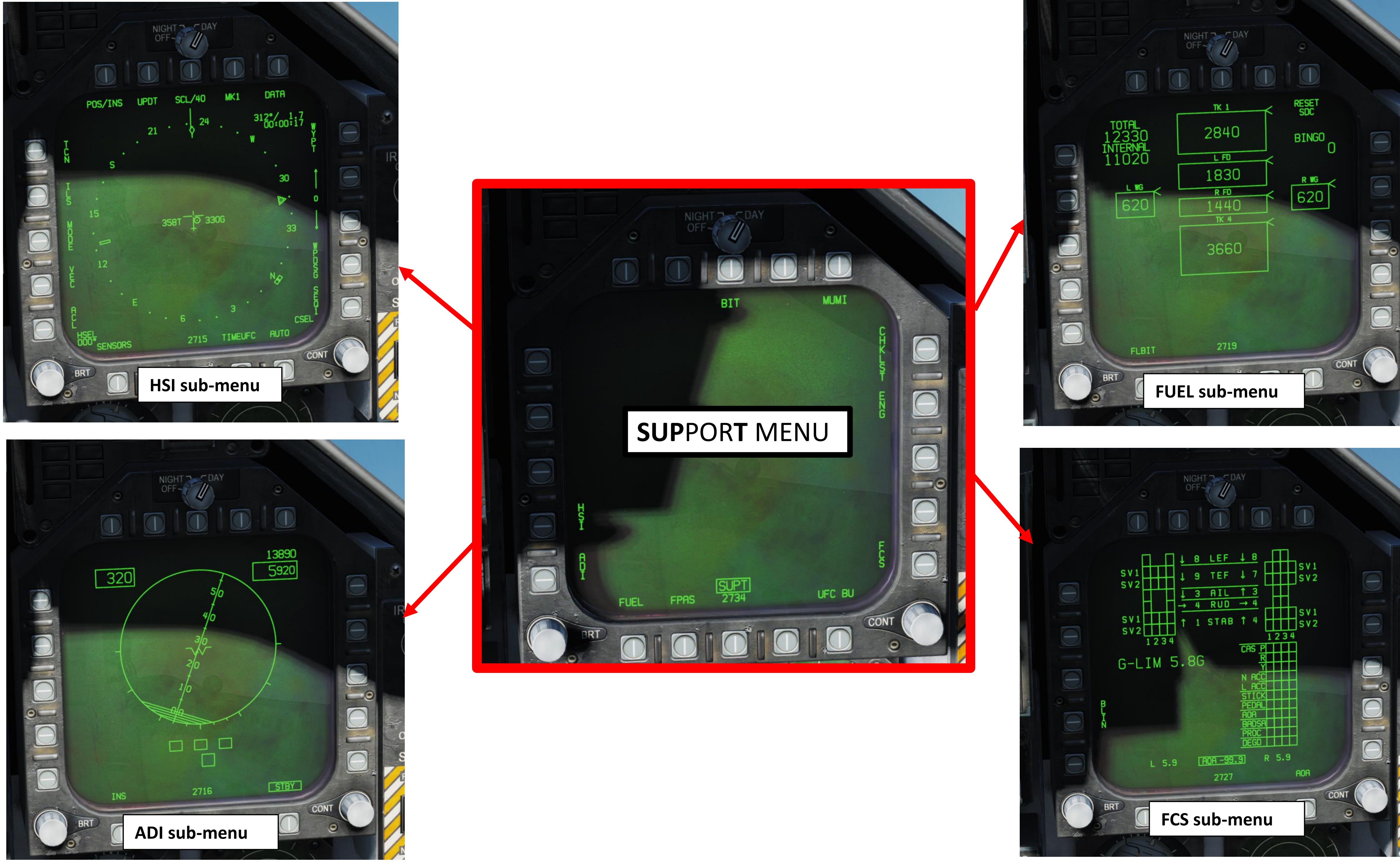

TACTICAL MENU


RDR ATTK sub-menu

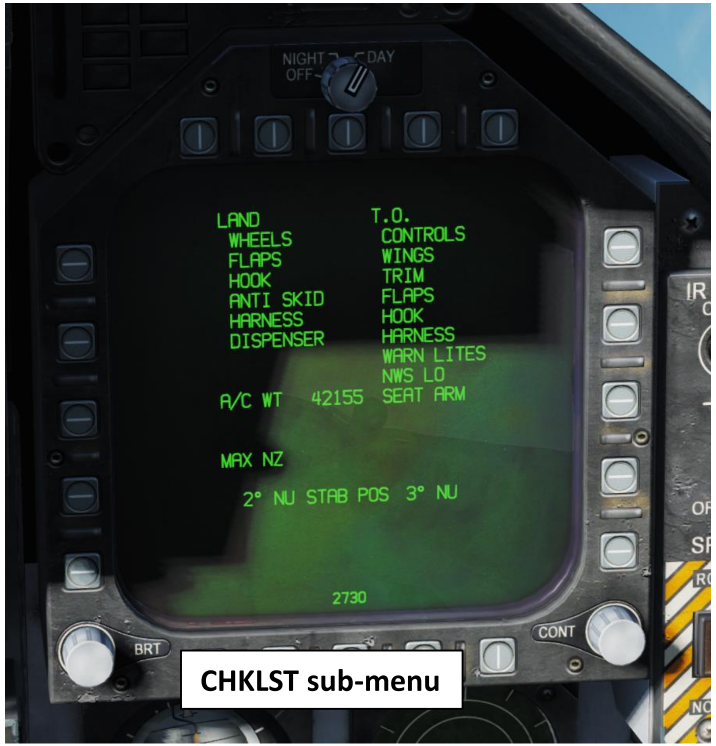

EW sub-menu


NIGHT
DAY
OFF
MAP
DCLTR
SCL/40
MK2
DCNTR
147/ 1.7
00:00:14
SENSR
C 2
TGT
30
33
N
W
3
0.6
24
6
21
E
S
12
15
C: 60
F: 30
01: 0
02: 0
UKN
369 / 155
BRA 328/16
SEQ 1
EXP
STEP
2039
TXDSG
AUTO
BRT
CONT
SA sub-menu


NIGHT
DAY
OFF
STORES
RDR ATTK
HUD
AZ/EL
SA
TAC
2703
EW
BRT
CONT
TACTICAL MENU


HSI sub-menu
ADI sub-menu
SUPPORT MENU
FUEL sub-menu
FCS sub-menu

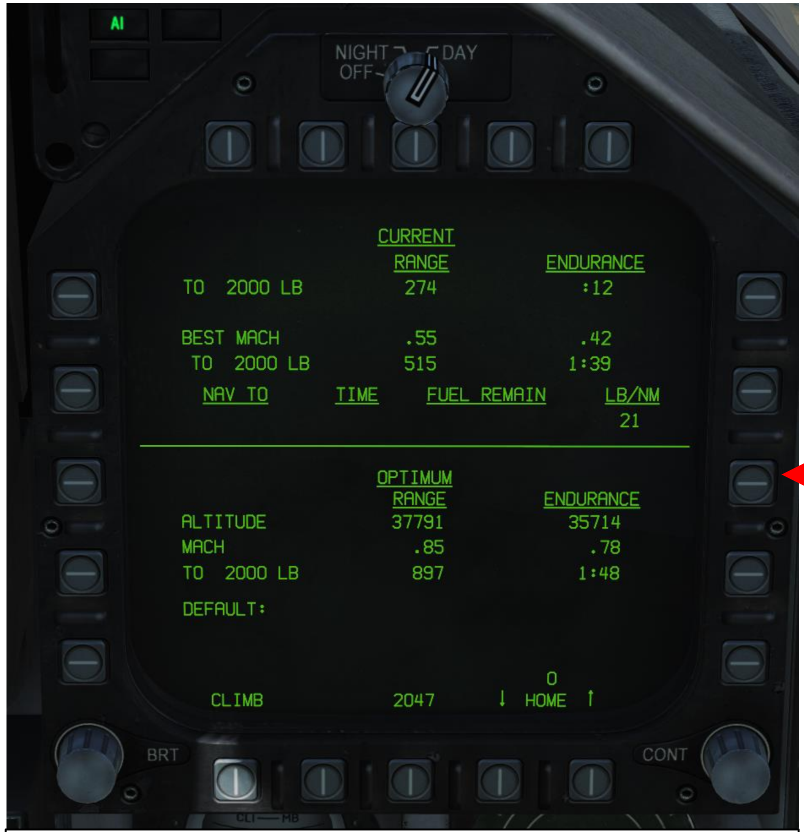
ENG sub-menu



CHKLST sub-menu

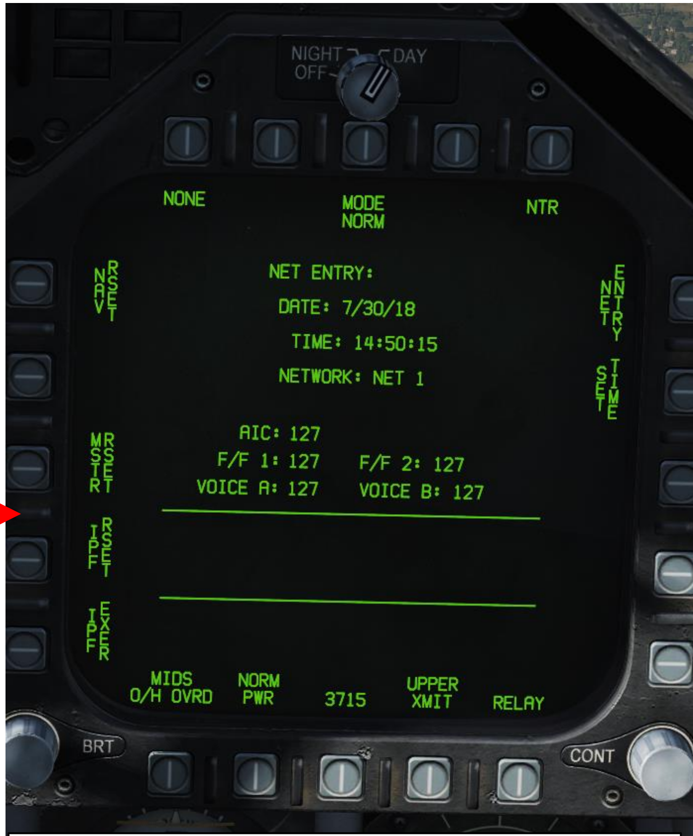
SUPPORT MENU

BIT sub-menu



FPAS sub-menu

Flight Performance Advisory System (FPAS) Page. The FPAS advises the pilot of the altitude and airspeed corresponding to maximum inflight fuel efficiency based on current operating conditions. The range and airspeed data provided by FPAS appears on the FPAS DDI page from the SUPT menu.



MIDS sub-menu

The Multifunctional Information Distribution System (MIDS) is the NATO name for the communication component of Link-16 Datalink System. MID is an advanced command, control, communications, computing and intelligence (C4I) system incorporating high-capacity, jam-resistant, digital communication links for exchange of near real-time tactical information, including both data and voice, among air, ground, and sea elements. MIDS is intended to support key theater functions such as surveillance, identification, air control, weapons engagement coordination and direction for all Services.

For DDI, MPCD, UFC and HUD operation, Backy51 created a nice guide for it. It's a useful resource.

Forum link:
https://forums.eagle.ru/showthread.php?t=212389

Abbreviated Aircrew Checklist link:
https://www.digitalcombatsimulator.com/en/files/3300819/

The Question: How do I do that on the DDI/UFC?

Well my gouge has the answer for the following tasks:

- Waypoint Entry
- Waypoint Insert
- Waypoint Delete

- Coordinate Entry
- Designate Target Waypoint
- Convert Navigation Waypoint to Target

- Waypoint Elevation Change
- Carrier Night Lighting
- Catapult Launch

- Altimeter Settings
- TACAN Operation
- Active Pause

- COMM1/COMM2 Radio
- Checklists
- AOA Indexer Signals

- Setting Time Over Target (TOT)
- Setting Constant Groundspeed (GSPD) for Target Waypoint
- Display ZULU Time of Day (ZTOD) on DDI/HUD

- Display Six Minute Countdown (CD) timer on DDI/HUD
- Display Elapsed Time (ET) timer on DDI/HUD
- Set ZULU Date

I also included the "DASH-1" DDI Data Tree Extracts for the following:

- Waypoint Data Tree Extract
- GRID RDDI Data Tree Extract

- A/C Data Tree Extract
- HSI Data Tree Extract

As the F-18C develops, I hope to include more avionics goodness for your button pushing pleasure and in the process you'll learn to be a more effective Warfighter by mastering your systems!

Many of the tasks I've included above are undocumented as of now and may be changed, broken, etc., as future Hornet builds are released.

I included a Kneeboard folder to allow you to drop it straight into your Saved Games folder. Read the readme.txt file and you should be set.

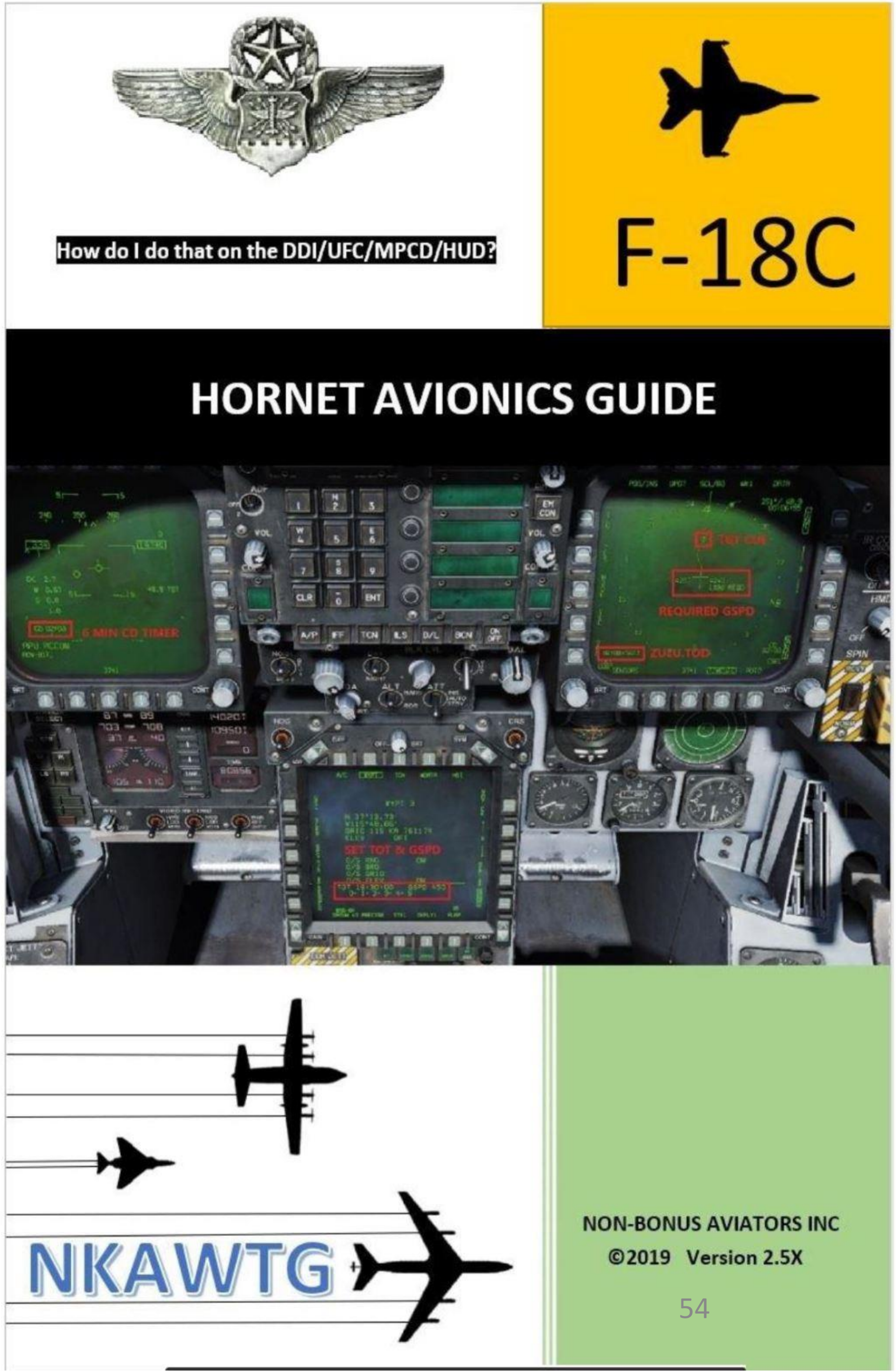
Knowledge is Power in the fighter world, so start filling your clue bag today!
Comments, requests and feedback is always welcome.

Cheers,

Backy 51

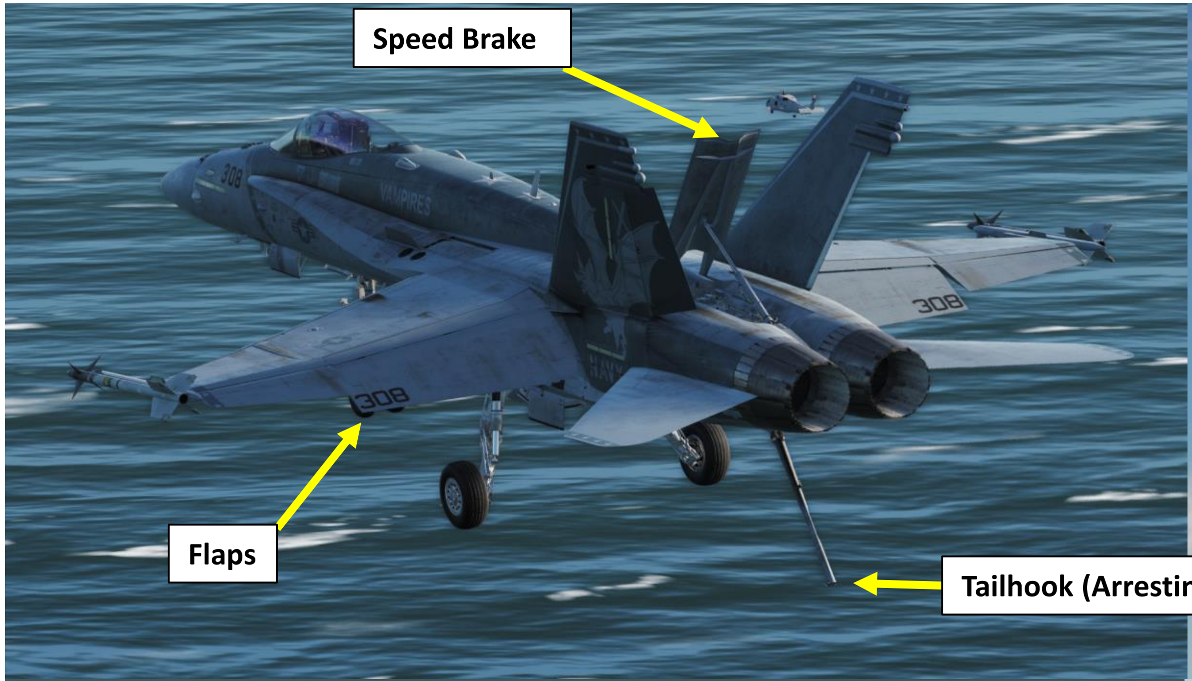
DOWNLOAD LINK:
https://www.digitalcombatsimulator.c...files/3300819/

I don't need no stinkin' GPS!

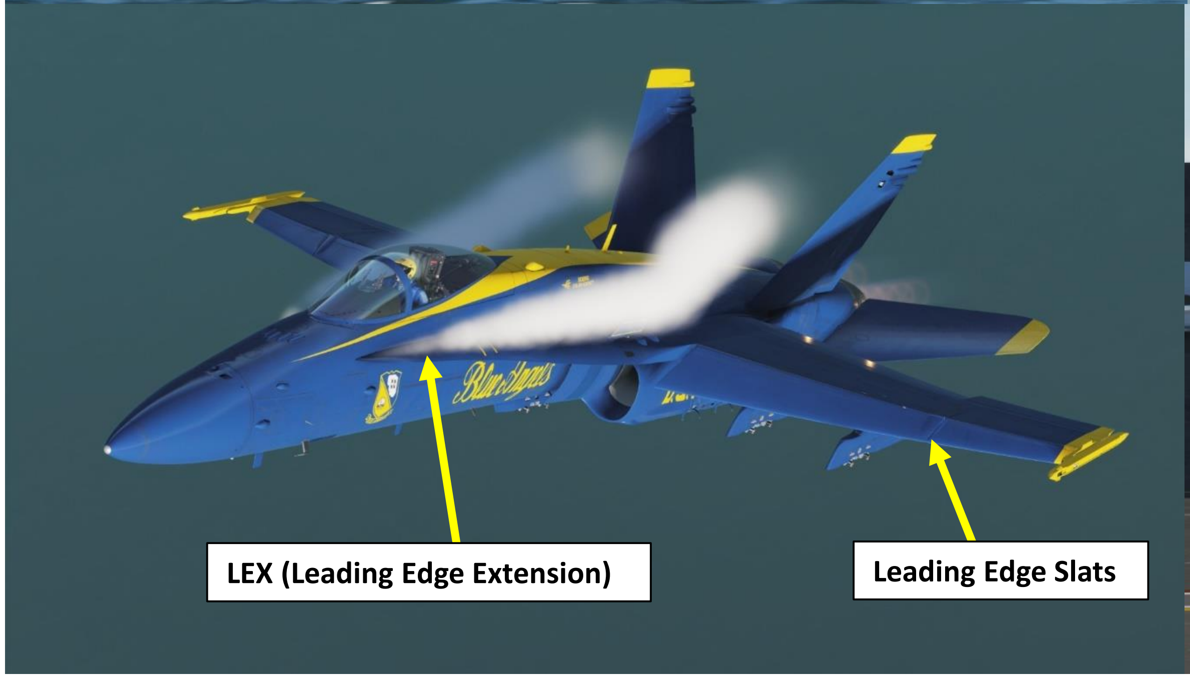



M61A2 Vulcan Gun

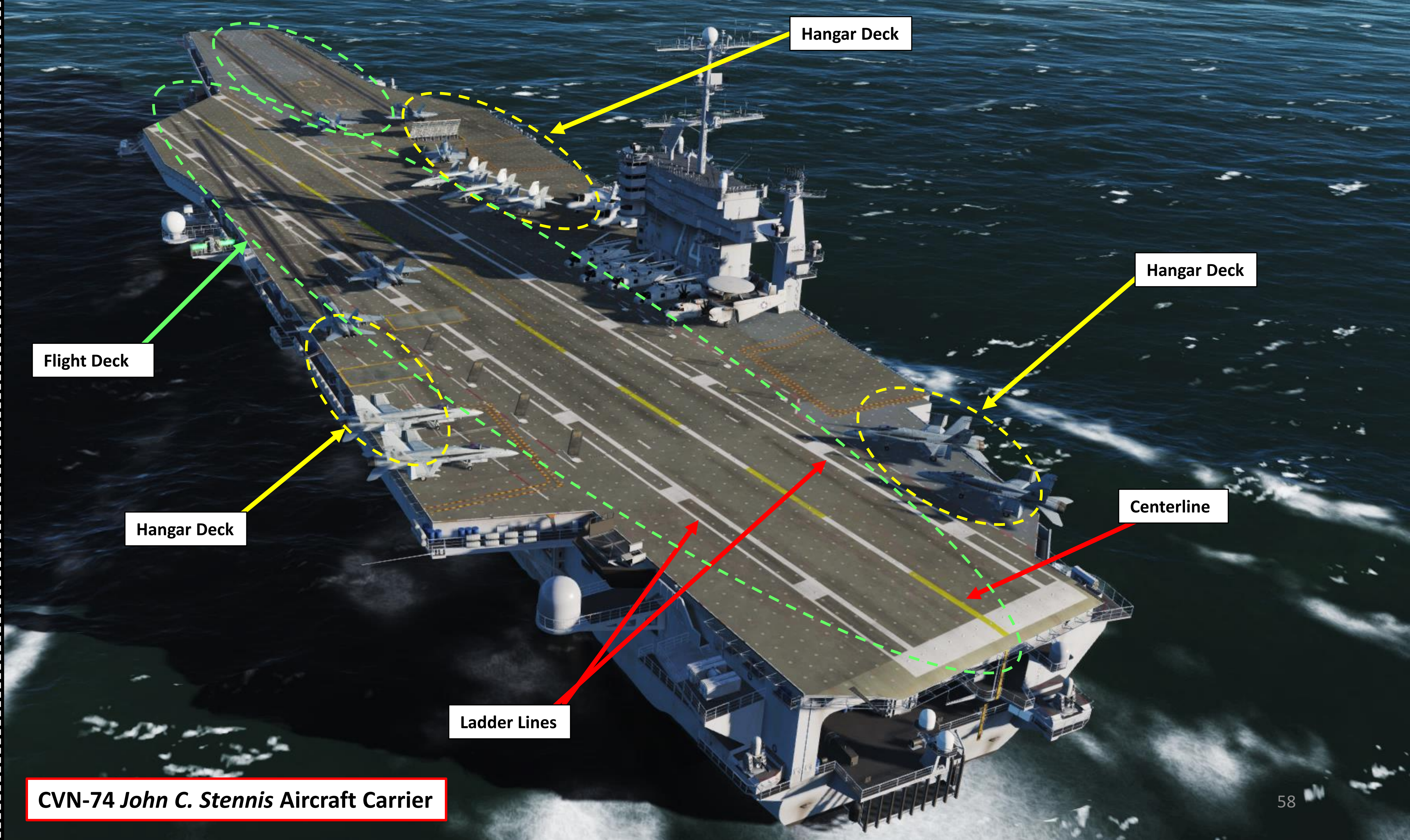

d13): 3, rejoin
308
VFA-37
Landing Gear Angle of Attack Indexer


Speed Brake
Flaps
Tailhook (Arresting Hook)

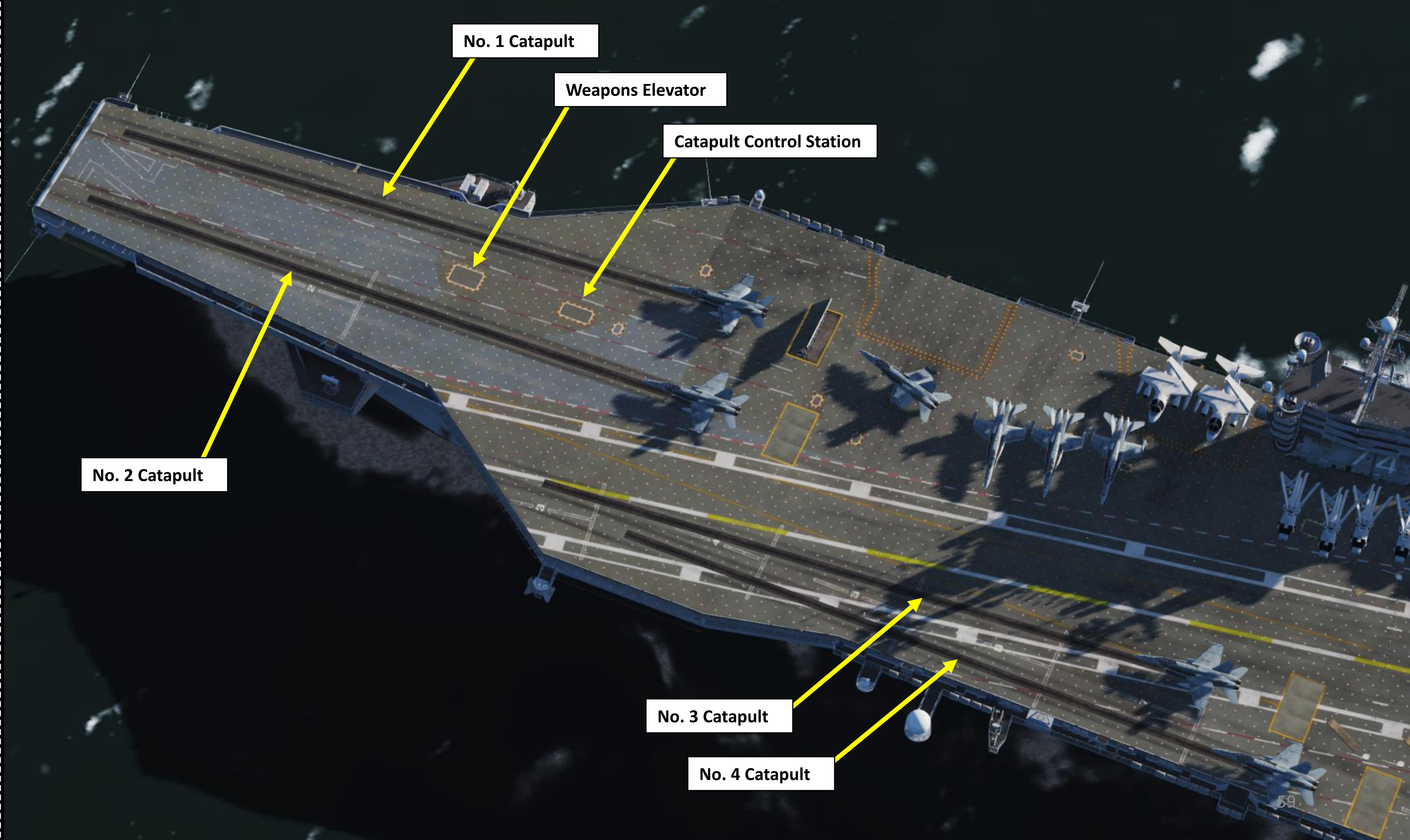

Launch Bar
(Retracted)

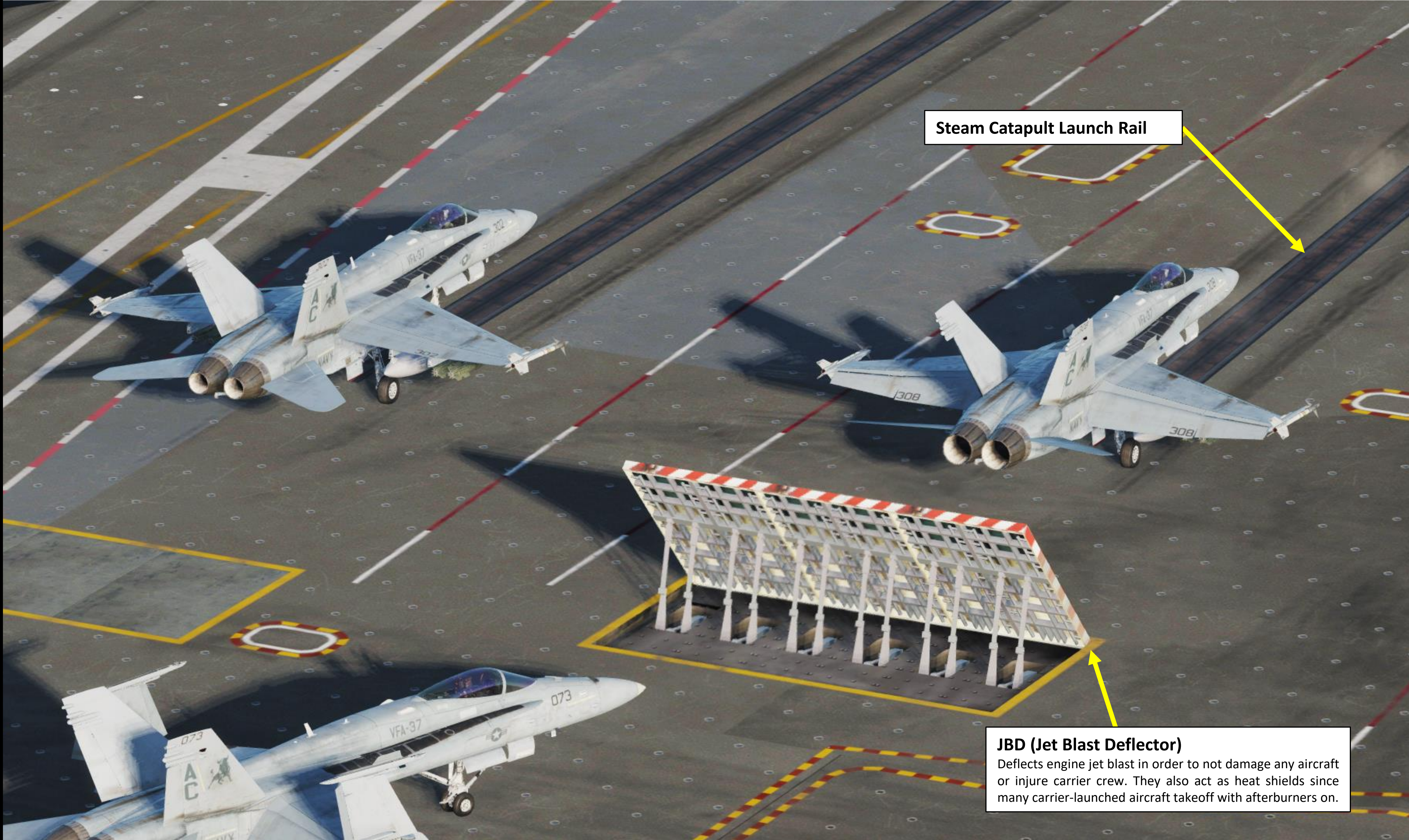

LEX (Leading Edge Extension)
Leading Edge Slats


Launch Bar
(Hooked in catapult shuttle)
Catapult Shuttle



CVN-74 *John C. Stennis* Aircraft Carrier

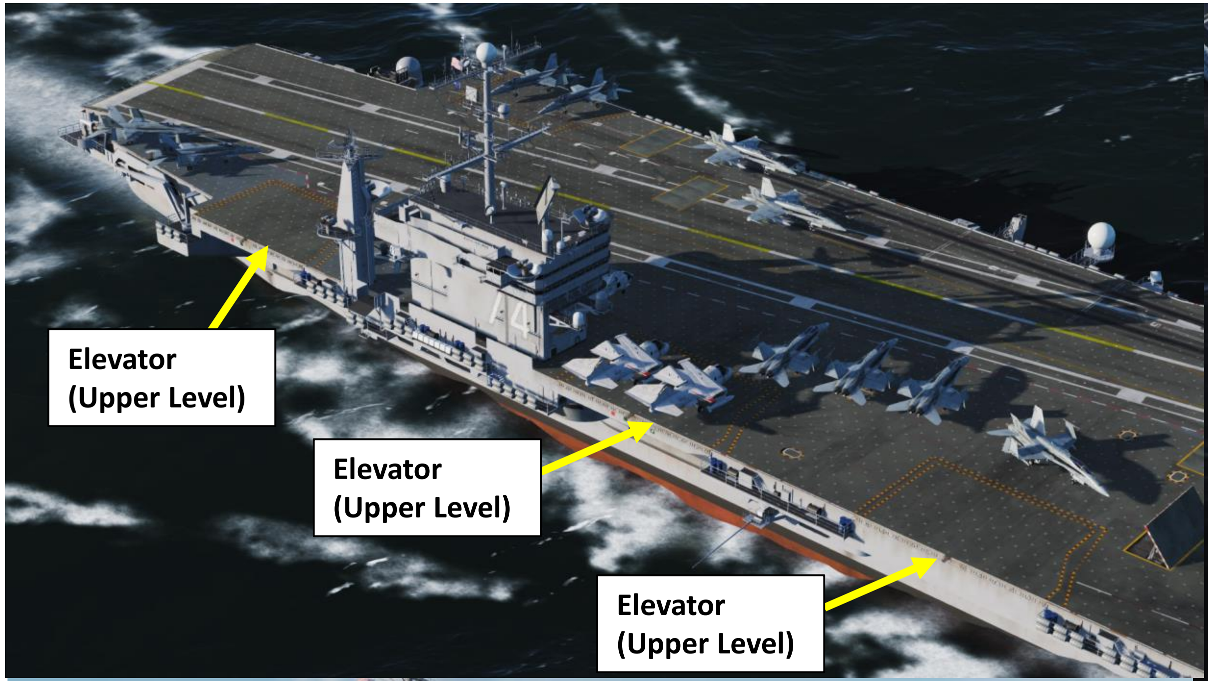

No. 1 Catapult
Weapons Elevator
Catapult Control Station
No. 2 Catapult
No. 3 Catapult
No. 4 Catapult

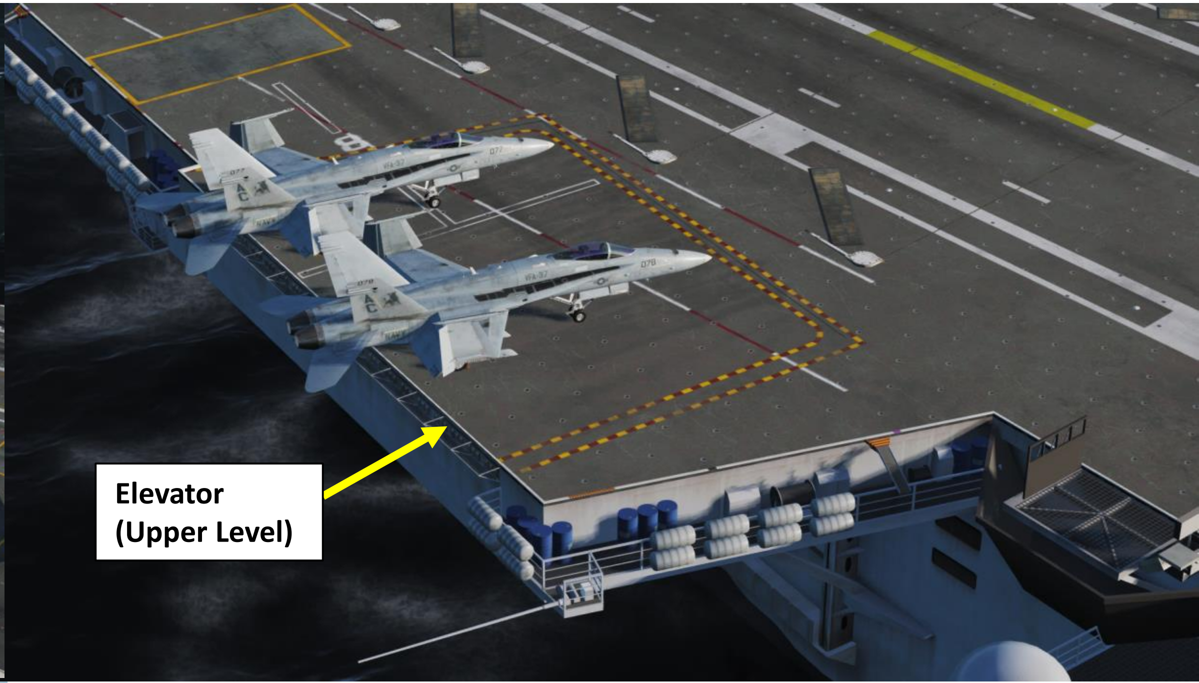


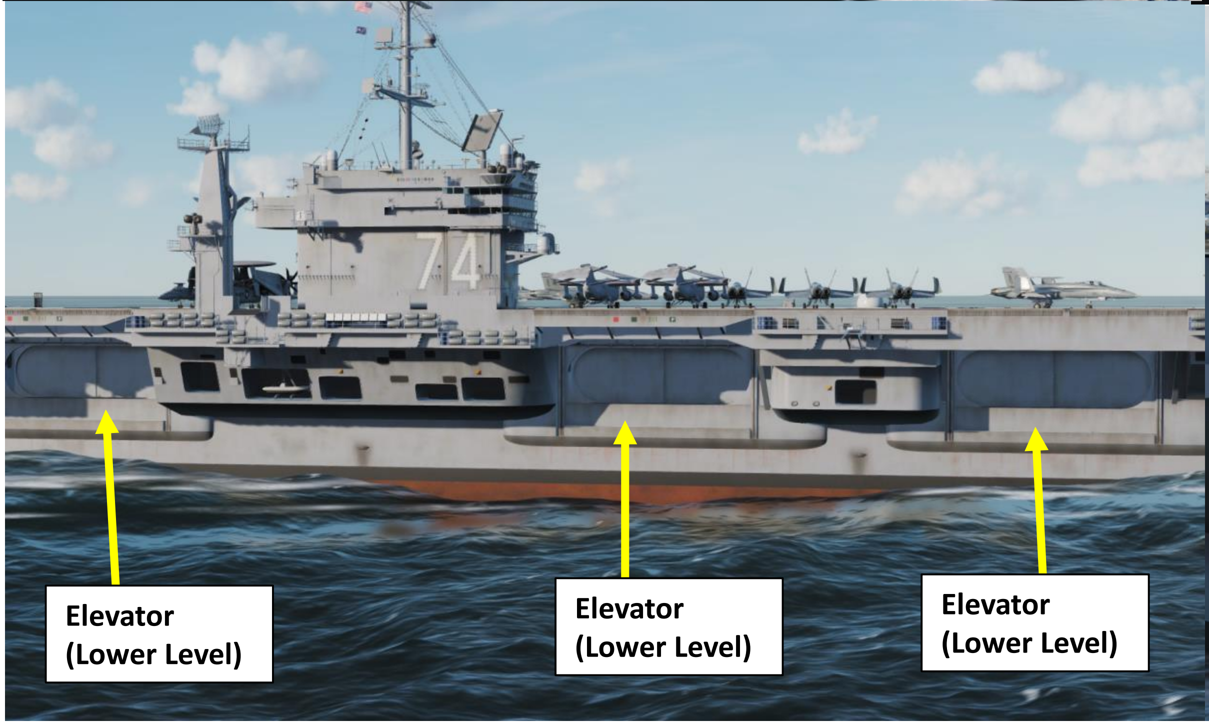
JBD (Jet Blast Deflector)

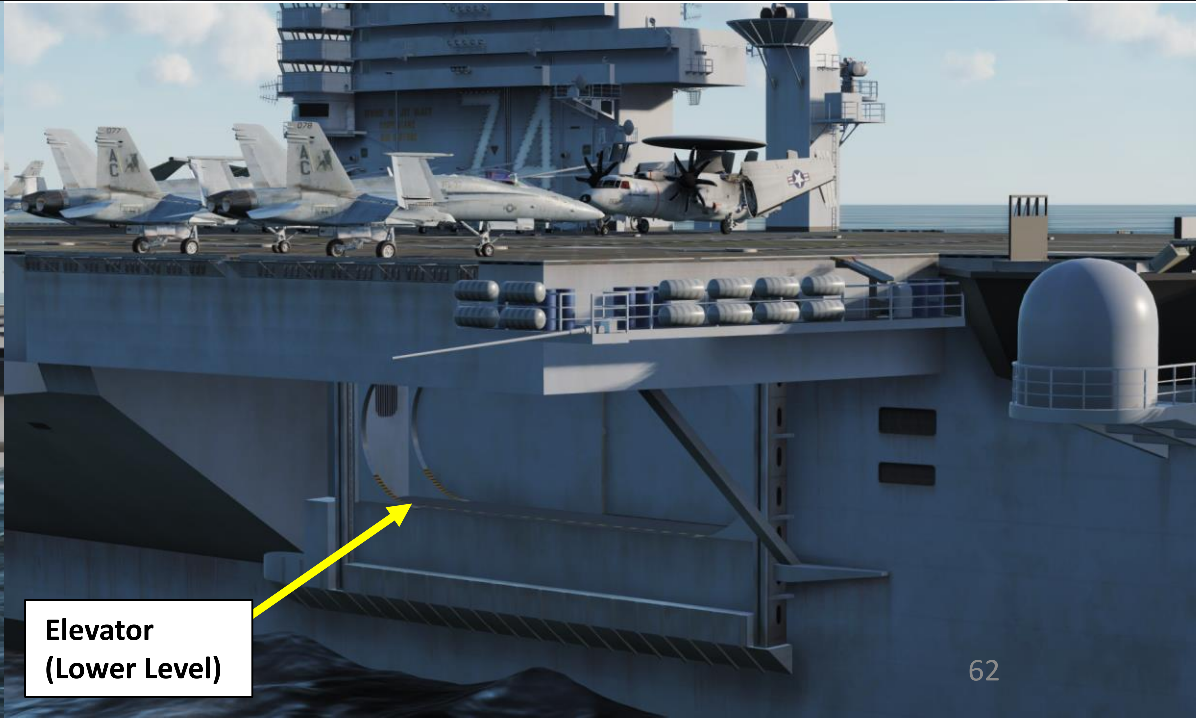
Deflects engine jet blast in order to not damage any aircraft or injure carrier crew. They also act as heat shields since many carrier-launched aircraft takeoff with afterburners on.


"The Island"
Building used to direct flight operations
Primary Flight Control
Bridge
Flag Bridge


Elevator (Upper Level)
Elevator (Upper Level)
Elevator (Upper Level)

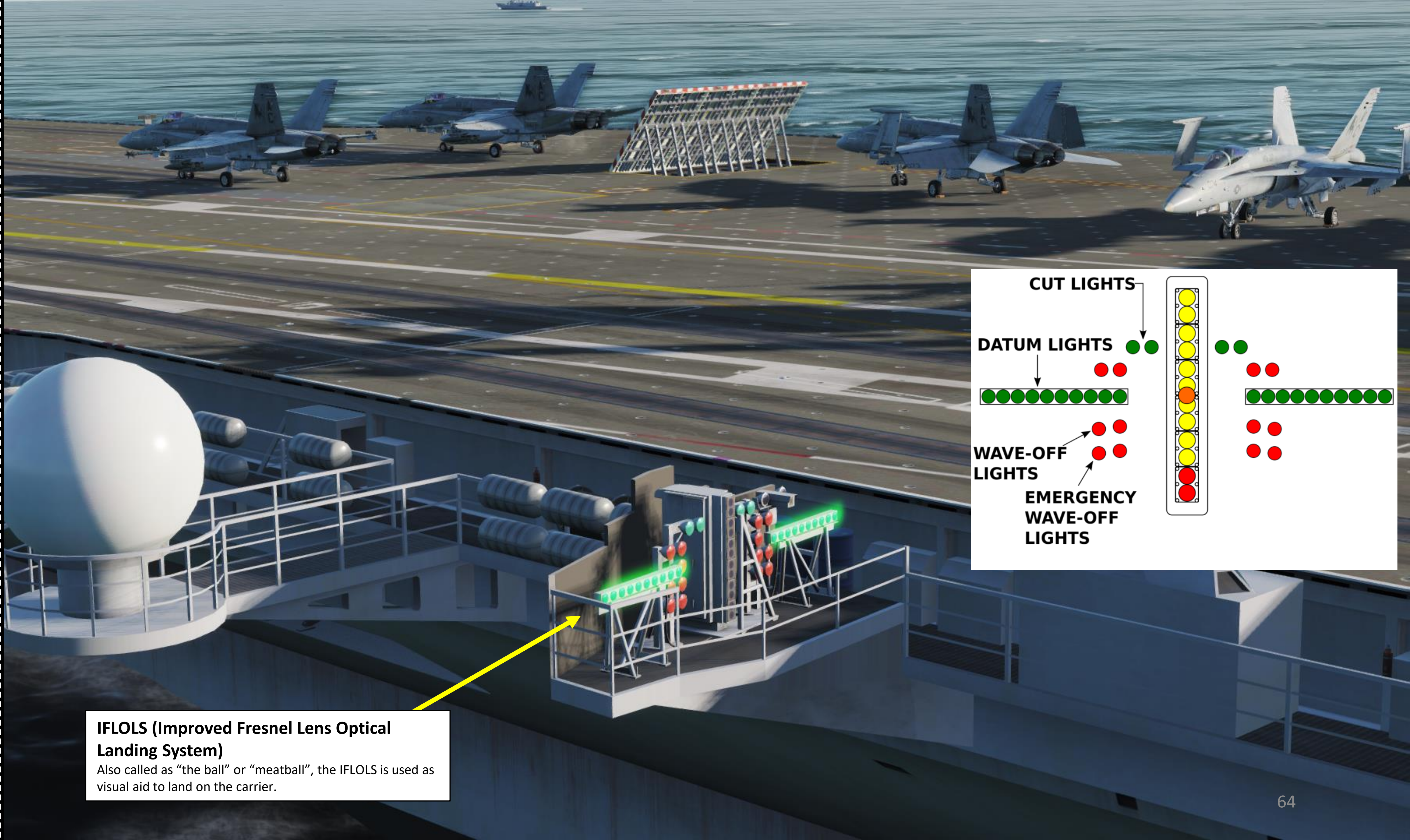

Elevator (Upper Level)


Elevator (Lower Level)
Elevator (Lower Level)
Elevator (Lower Level)


Elevator (Lower Level)

Arresting Wires

These wires are used to help the aircraft brake when landing on the carrier. The aircraft hook catches one of these wires and brings the aircraft to a full stop. When landing, you have to aim for the third wire. The first wire landing is a short landing, while a fourth wire landing is a long one.

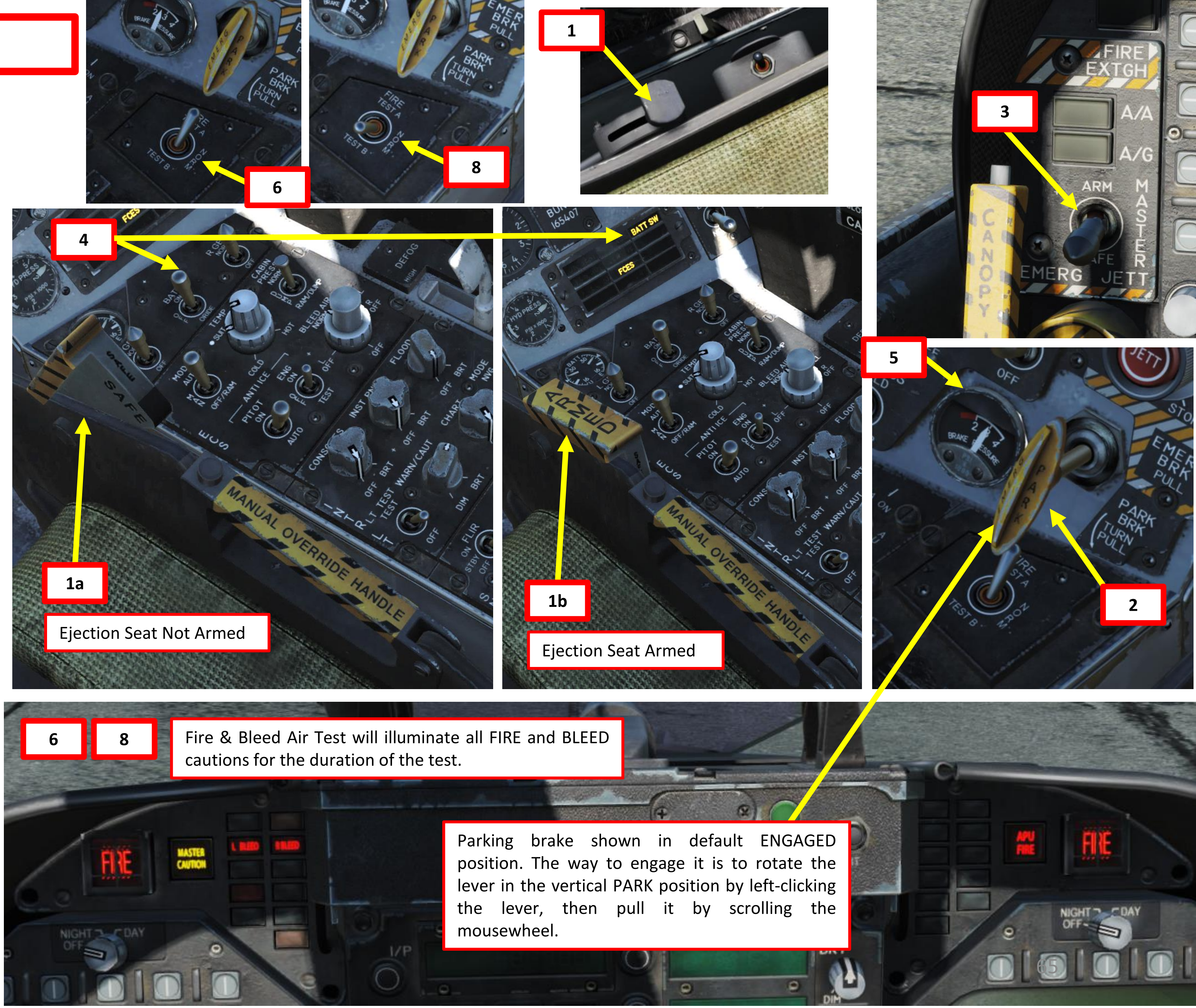


IFLOLS (Improved Fresnel Lens Optical Landing System)

Also called as "the ball" or "meatball", the IFLOLS is used as visual aid to land on the carrier.

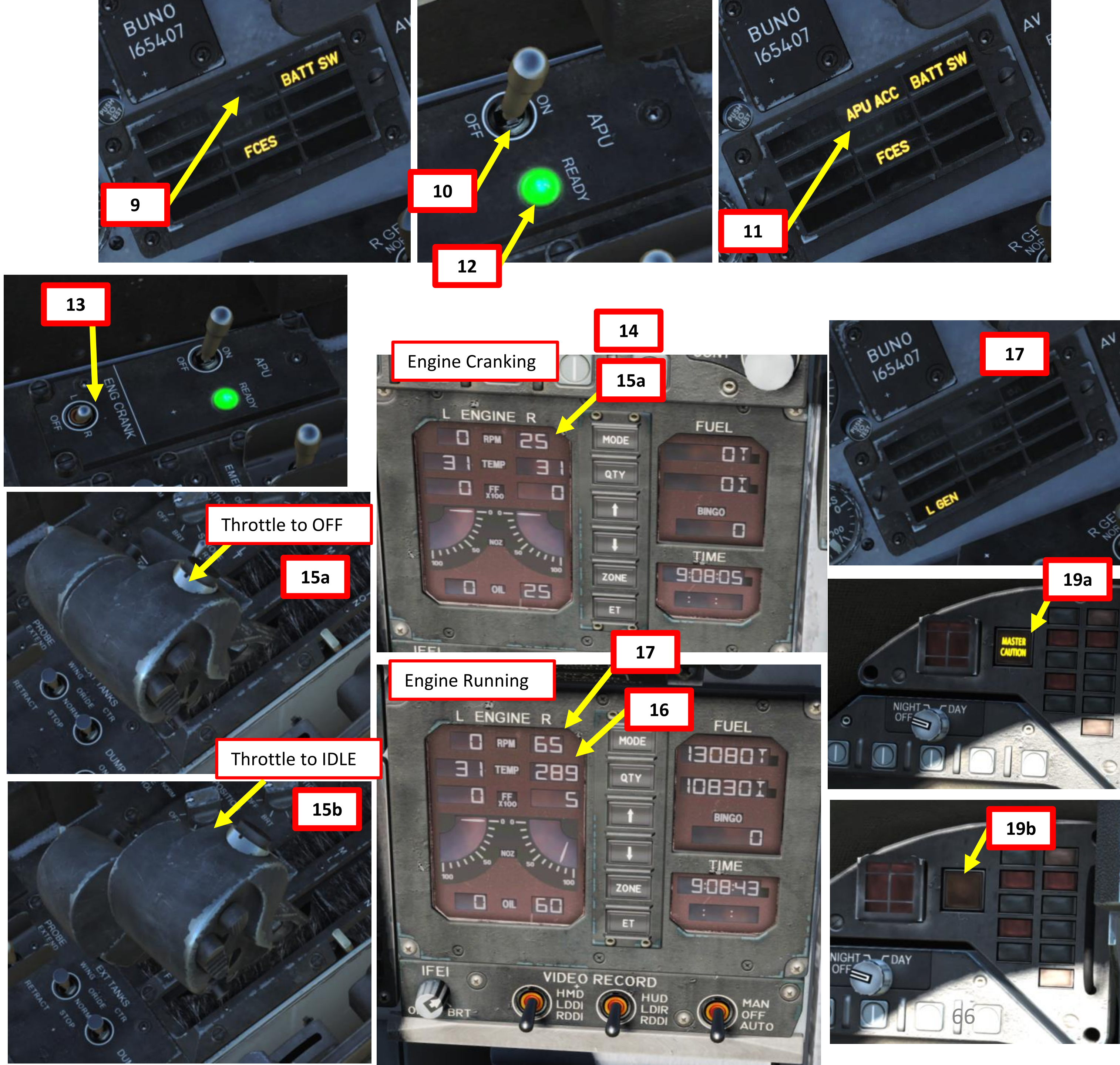
PRE-START-UP

1. **Set Ejection Seat** Lever – **DOWN & ARMED**
   Set Harness Lever - FWD
2. **Parking Brake** Lever – **ENGAGED**
3. **MASTER ARM** switch – **SAFE**
4. **Battery** Switch – ON (Right Click)
   Note: This will power the engine igniters, canopy and IFEI (Integrated Fuel / Engine Indicator) panel.
5. Check that **hydraulic brake pressure** gauge displays at least **3000** psi
6. (Optional) Right click and hold **Fire & Bleed Air Test** switch to the "**Channel A**" (Forward) position to start the Fire/Bleed Air Test for Detection Loop A.
   - Wait for the aural warnings sequence to finish before releasing the switch. The switch will be sprung back to the middle position on release. You should hear "Engine Fire Left, Engine Fire Left, Engine Fire Right, Engine Fire Right, APU Fire, APU Fire, Bleed Air Left, Bleed Air Left, Bleed Air Right, Bleed Air Right!"
   - Left and right engine bleed air switches will be automatically closed during and after the test. We will have to re-open them later on.
7. (Optional) Cycle **Battery** switch to **OFF** (left click), then back to ON (right click) to rewind test audio tape. Alternatively, you can wait 10 seconds for the tape to rewind.
8. (Optional) Left click and hold **Fire & Bleed Air Test** switch to the "**Channel B**" (Aft) position to start the Fire/Bleed Air Test for Detection Loop B. Wait for the aural warnings sequence to finish before releasing the switch. The switch will be sprung back to the middle position.



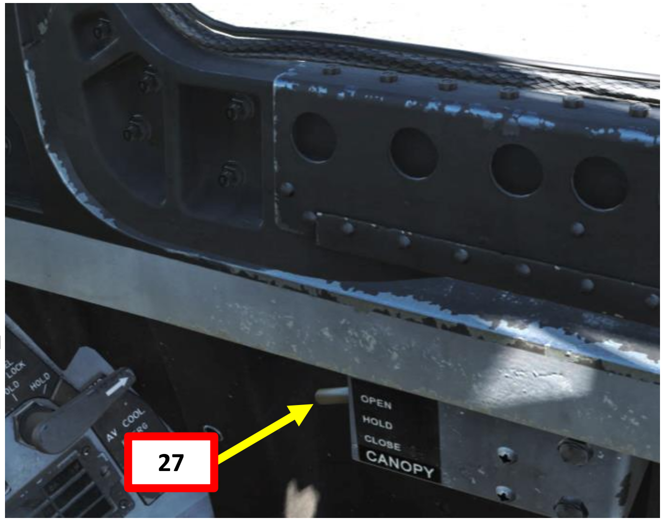
START-UP PROCEDURE

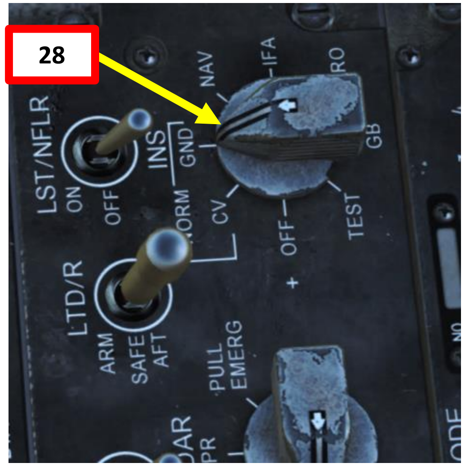
9. Verify that **no APU ACC** (Auxiliary Power Unit Accumulator) caution is visible on the Standby Caution Panel.
10. Left click on the **APU** switch to set it to **ON** (FWD) to start the APU (Auxiliary Power Unit)
11. Verify that the **APU ACC** caution is **visible** on the Standby Caution Panel and that the APU starts spooling up. In real life, the Plane Captain (PC) would give you this confirmation, but in DCS you can just listen for the APU spooling sound.
12. Once **APU green light** illuminates, the APU is now running. The APU will provides air pressure for the F404 engines' pneumatic ATS (Air Turbine Starter).
13. Start right engine first by setting **Engine Crank switch** – **R** (RIGHT) using right-click.
    Note: It's good practice to start the right engine since it provides most of the hydraulic pressure available for the brakes.
14. **Right Engine cranking** will begin as the AMAD (Airframe Mounted Accessory Drive), which is pneumatically connected to the APU's starter, transmits power from the ATS to the engine. Engine RPM will rise to approx. 25 % RPM.
15. When **Right Engine RPM reaches 25 %**, press **RSHIFT+HOME** to move the right throttle from the OFF detent to the IDLE detent to open the fuel valves and introduce fuel. Igniters will kick in and trigger an engine lightoff.
16. Verify that **EGT** (Exhaust Gas Temperature) **does not exceed 750** deg C until engine stabilizes.
17. Wait for **Right Engine RPM** to stabilize around **60-65 %** RPM. Confirm that right generator is running by checking that the **R GEN** caution is **extinguished**.
18. During engine start, the **GPWS** (Ground Proximity Warning System) and **Flight Controls voice alert system** will do a **BIT** (Built-In Test). Don't worry, that's normal. You will hear "Roll Left, Roll Left! Flight Controls, Flight Controls!" and a "Deedle deedle" sound.
19. **Reset MASTER CAUTION** pushbutton by pressing it.

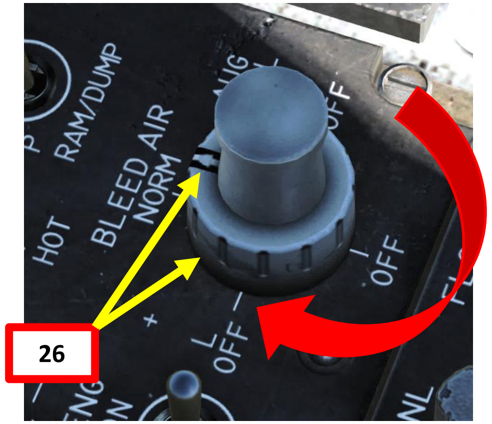


START-UP PROCEDURE

20. Power **Left and Right DDIs** (Digital Display Indicator) by setting each DDI knob to **DAY** (right click).
21. Turn on **AMPCD** (Advance Multi-Purpose Color Display) by setting its **Brightness knob to the right**
22. Turn **HUD brightness** control lever **right** to power Heads-Up Display.
23. Turn **BLK LVL** knob to the **right**
24. Set **ALT** switch to **RDR** to use the radar altimeter as an altitude reference
25. Set **ATT** switch to **AUTO**
26. Right-click **Bleed Air Switch** to rotate it **360 degrees clockwise from NORMAL back to NORMAL** to re-open engine bleed air valves. You should hear the ECS (Environmental Control System) kick in as engine bleed air valves open.
27. Left click and hold **CANOPY** switch to **CLOSE** to close canopy.
28. Start **INS** (Inertial Navigation System) **Alignment**. **GND** (**Ground**) alignment takes about 4 minutes, **CV** (**Carrier**) takes about 2 minutes.
    a) If you are on the **ground**, set **INS Selector** switch to **GND INS** (Ground) to start the INS alignment phase
    b) If you are on an aircraft carrier set **INS Selector** switch to **CV INS** (Carrier) to start the INS alignment phase

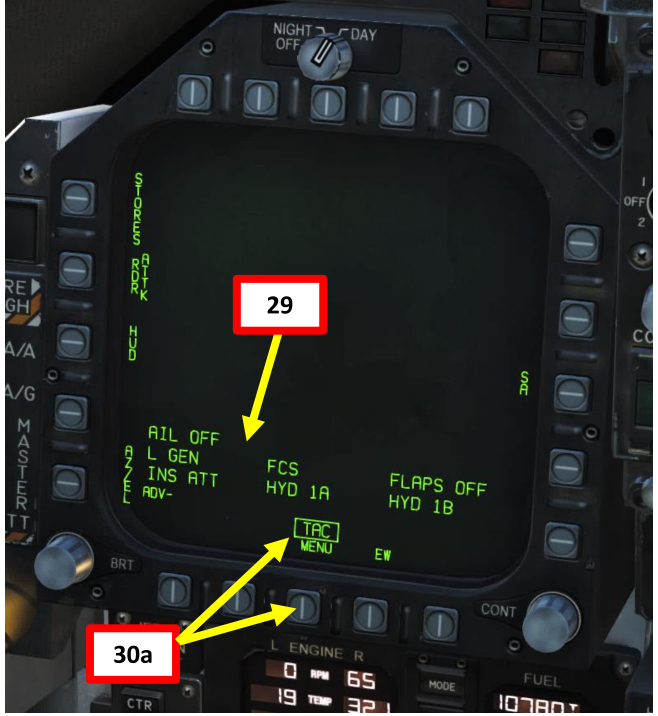


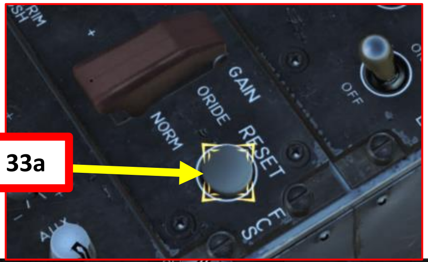


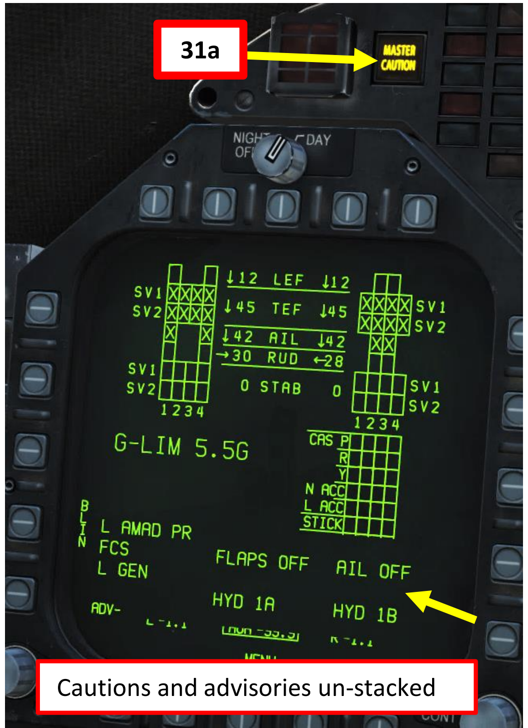


START-UP PROCEDURE

29. Verify that there are no **cautions for engine 2** (like HYD 2A, HYD 2B, R GEN)
30. Set left DDI (Digital Display Indicator) to the FCS (Flight Control System) page
    a) Press the OSB (Option Select Button) under **TAC (Tactical) MENU** to select the **SUPT (Support) MENU**
    b) Press the **OSB** next to **FCS**
31. Press the **MASTER CAUTION** pushbutton **two times** to re-stack the cautions and advisories together. The FCS page will then be more visible.
32. The “X”s on the FCS page indicate a FCS system error. In our case, the errors are probably due to wing droop caused by the aircraft being parked for too long.
33. Press the **FCS RESET** button to reset FCS faults. “X”s should disappear.
34. On the right DDI, the BIT FAILURES (Built-In Test) page is displayed. Press the **OSB** next to **STOP** to stop the indications from blinking.

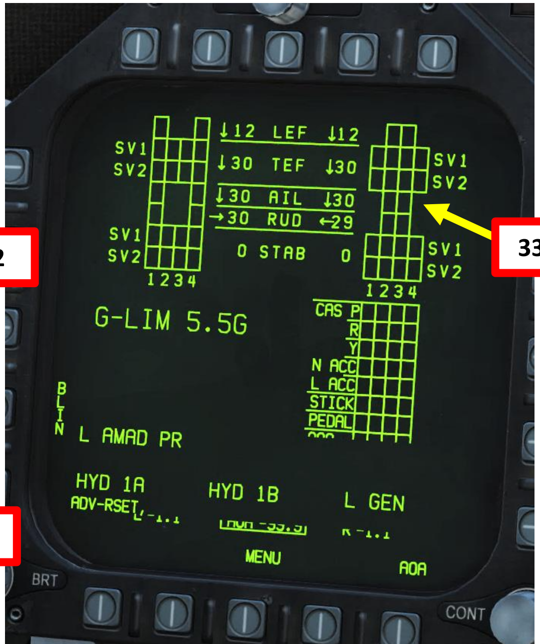






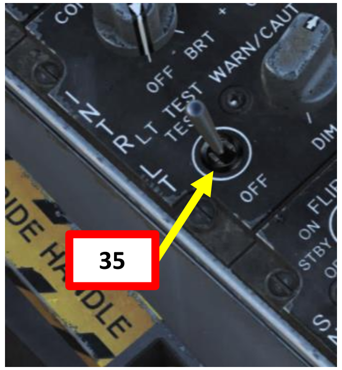
Cautions and advisories un-stacked

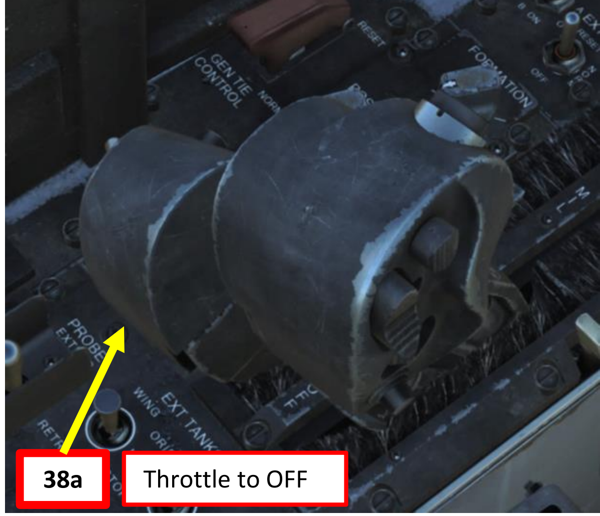
Cautions and advisories re-stacked



START-UP PROCEDURE

35. Hold the **LIGHTS TEST** switch to test lights. Make sure cautions illuminate properly, then release the switch.
36. Start left engine first by setting **Engine Crank switch** – **L** (LEFT) using left-click.
37. **Left Engine cranking** will begin as the AMAD (Airframe Mounted Accessory Drive), which is pneumatically connected to the APU's starter, transmits power from the ATS to the engine. Engine RPM will rise to approx. 25 % RPM.
38. When **Left Engine RPM reaches 25 %**, press **RALT+HOME** to move the left throttle from the OFF detent to the IDLE detent to open the fuel valves and introduce fuel. Igniters will kick in and trigger an engine lightoff.
39. Verify that **EGT** (Exhaust Gas Temperature) **does not exceed 750** deg C until engine stabilizes.
40. Wait for **Left Engine RPM** to stabilize around **60-65 %** RPM. Confirm that left generator is running by checking that the **L GEN** caution is **extinguished**.

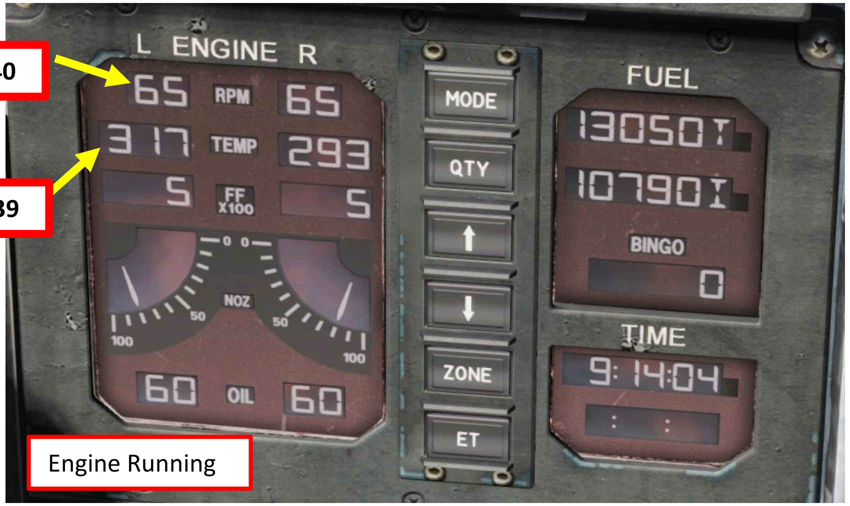


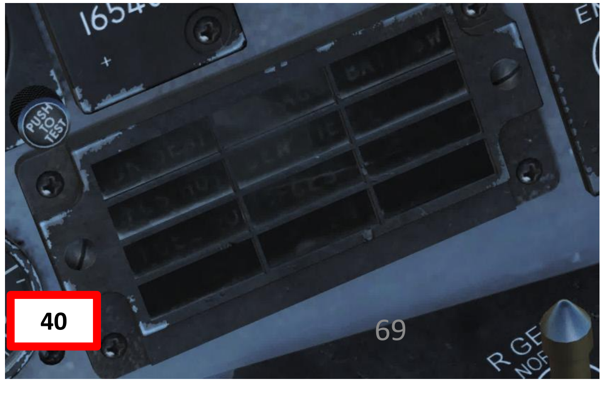


38a

40

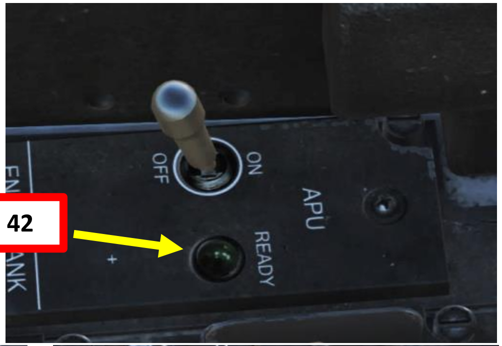
39

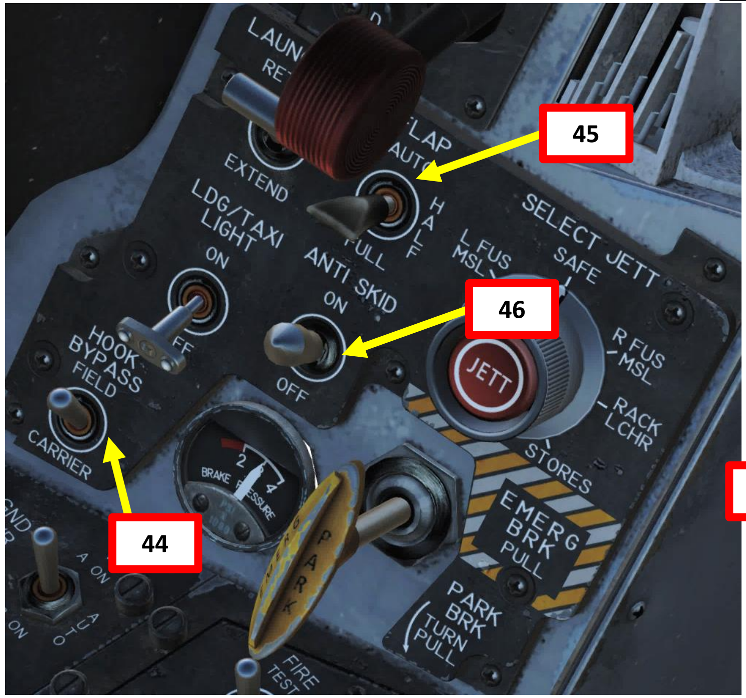


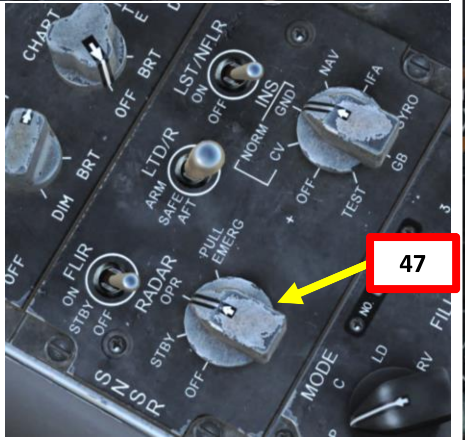


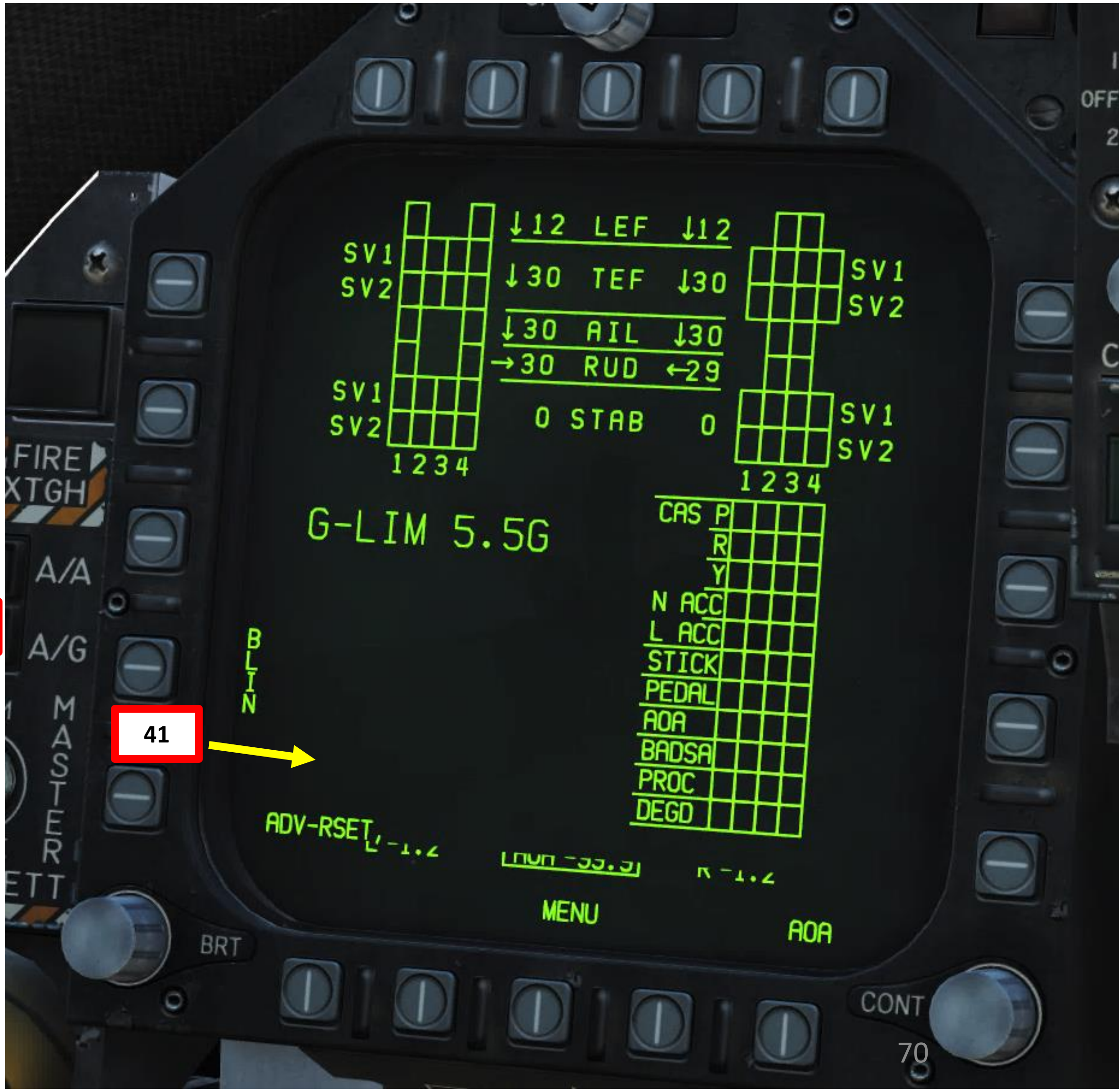
START-UP PROCEDURE

41. Verify that there are **no cautions for engine 1** (like HYD 1A, HYD 1B, L GEN)
42. Following the second engine start, the APU (Auxiliary Power Unit) will shutdown automatically approximately 1 minute after both engines are stabilized to IDLE.
43. Set **OBOGS** (On-Board Oxygen Generating System) switch – **ON**
44. Set **HOOK BYPASS** switch to **FIELD** if operating on an airfield or to **CARRIER** if operating on an aircraft carrier.
45. Set **FLAPS** lever to **HALF**
46. **ANTI-SKID** switch **ON** if operating on a **ground airfield**
    ANTI-SKID switch **OFF** if operating on a **carrier**
47. Set **RADAR** switch to **OPERATE**



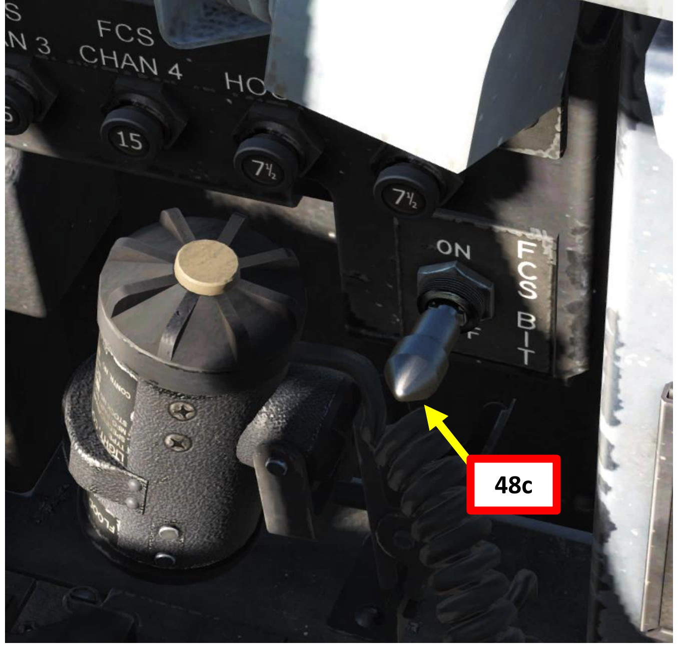






START-UP PROCEDURE

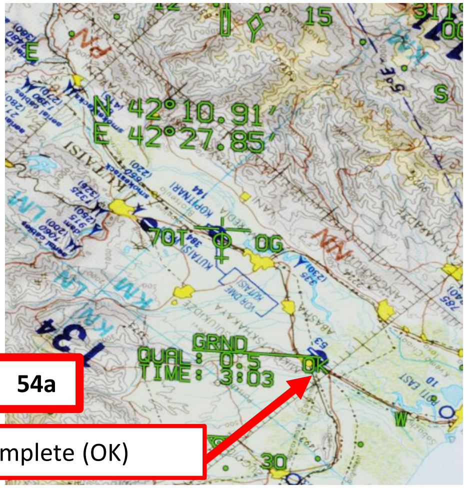
48. Run FCS BIT Test
    a) On the BIT FAILURES page, click the OSB next to **FCS-MC** to enter the Flight Control System – Mission Computer Built-In Test page
    b) MC1 and MC2 status should be GO. FCSA and FCSB status should be PBIT GO. This means the FCS BIT Test needs to be performed.
    c) Press and **hold "Y"** key binding to hold the **FCS BIT** switch to ON (UP) position.
    d) While FCS BIT switch is held (Y), press **the OSB next to "FCS"** to start the FCS BIT test. FCSA and FCSB status will be "IN TEST" for the duration of the test.
49. Flight controls will move for the duration of the test. Test will be complete when the **FCSA and FCSB status will be GO**.



Flight control surfaces will move automatically during FCS BIT Test

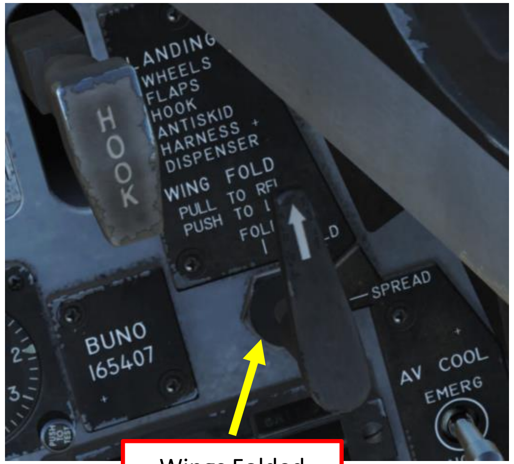
START-UP PROCEDURE

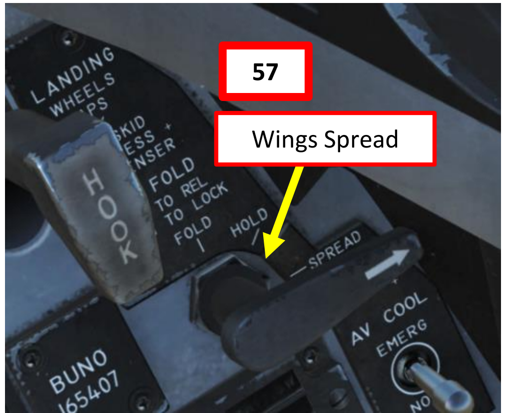
50. Set ZULU time in the cockpit. On the AMPCD, press the **OSB** next to the **TIMEUFC**. Then, go on the UFC (Up-Front Controller) and press the **OSB** next to **ZTOD** to display ZULU time on the Heads-Up Display.
51. Press the **T/O TRIM** button to set the aircraft trim for takeoff configuration.
52. Set **PITOT HEAT** switch – **AUTO** (only use ON in case of icing conditions on ground since AUTO inhibits Pitot Heat on ground to maximize available power on takeoff)
53. You can monitor the INS (Inertial Navigation System) Ground Alignment progress on the AMPCD. The GRND QUAL timer displays the time remaining in seconds.
54. Once OK appears next to GRND QUAL, the INS alignment is complete. Then, set the **INS selector to NAV**



START-UP PROCEDURE

55. Set HUD repeater on the left DDI
    a) Press the OSB next to MENU to enter the TAC page
    b) Press the OSB next to HUD
56. Set FCS page on right DDI
    a) Press the OSB next to MENU twice to enter the FCS page
    b) Press the OSB next to FCS
57. Verify that WINGS FOLD lever is in the SPREAD position (they may be folded if you start from an aircraft carrier). If wings are folded, just right click on the lever to set it to SPREAD, wait for the wings to deploy all the way and confirm visually that the wings are deployed properly. Then, scroll mousewheel to push the WING FOLD lever IN (PUSHED). The WING UNLK caution should disappear on the HUD Repeater once wings are spread and locked.





START-UP PROCEDURE

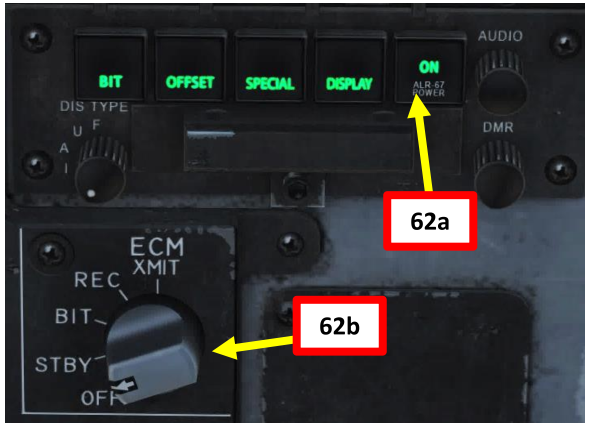
58. Verify Aircraft Position (Waypoint 0)
    a) Press F10 to open map and set your mouse cursor over your aircraft position. Map coordinates will appear in the upper left of the screen.

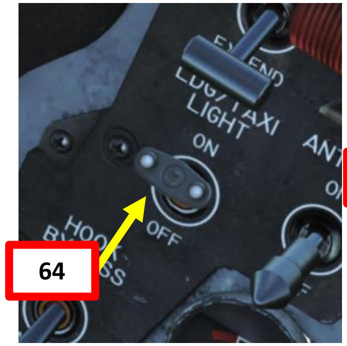
    COORDINATES (deg, minutes, sec): 24 °14’53’’ North 54 °33’20’’ East

    b) On the AMPCD, press the OSB next to DATA
    c) In the WYPT (Waypoint) page, see the WYPT 0 (aircraft position) coordinates and make sure that they match.

START-UP PROCEDURE

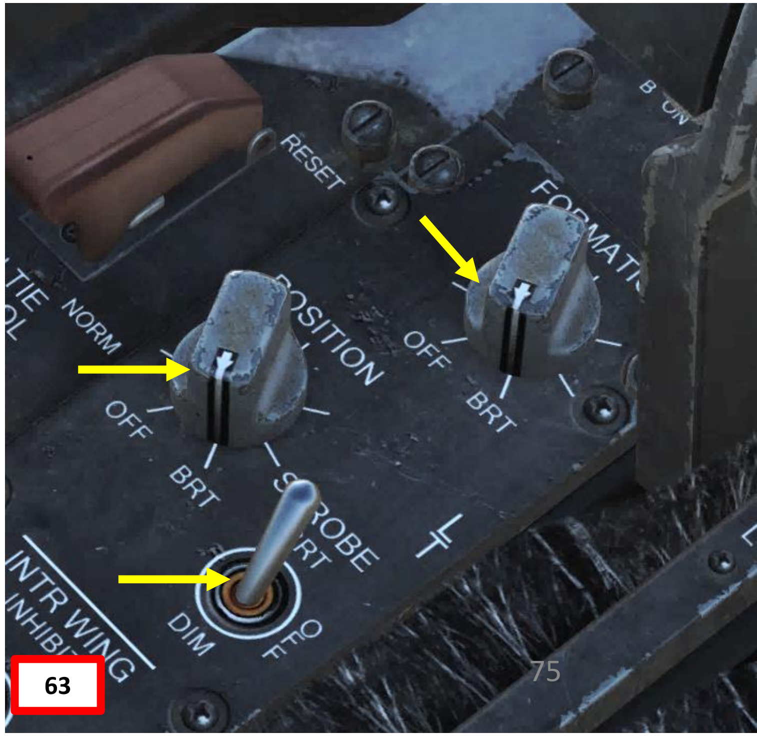
59. Set **Radar Altimeter** warning index to **200** ft if you intend to takeoff from a ground airfield (shore) or **80** ft from a carrier.
60. Uncage Standby Attitude Indicator. Red flag should be removed.
61. Set **BINGO FUEL** (minimum fuel needed to return to base) based on your mission profile by using the UP or DOWN arrow buttons on the IFEI panel. Usually I set 8000 lbs.
62. Press the **ALR-67 PWR** button to power the Radar Warning Receiver (RWR) and set ECM selector to STBY. Also set DISPENSER switch to ON (Middle).
63. Set **STROBE** switch ON, **POSITION** LIGHTS switch to **BRT** and FORMATION LIGHTS to BRT.
64. Set **LANDING/TAXI** light switch – ON (UP)
65. Left click on **Parking Brake lever** to **disengage** it (PUSHED = DISENGAGED).





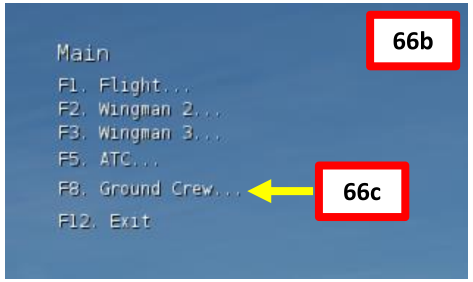
Parking Brake Engaged (Out/Pulled)

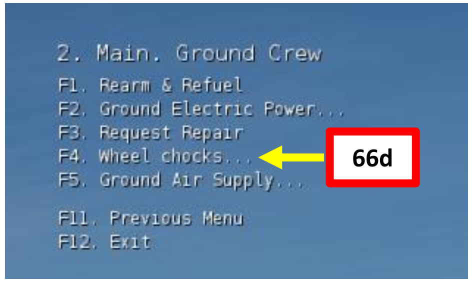
Parking Brake Disengaged (In/Pushed)



START-UP PROCEDURE

66. Remove **chocks** if installed (this is usually the case when operating on an aircraft carrier)
    a) Make sure your canopy is open to communicate to the ground crew
    b) Press “****” (communication menu binding) to contact ground crew
    c) Press “**F8**” to select “**Ground Crew”**
    d) Press “**F4**” to select “**Wheel Chocks**”
    e) Press “**F2**” to “**Remove** Wheel Chocks”.





START-UP PROCEDURE

67. If operating from a carrier, the takeoff trim button set previously will have adjusted the stabilators at around 12 degrees nose up, which is not optimal for catapult takeoffs. Adjust takeoff trim with the **stabilator trim** on your HOTAS **as per the table shown to the right**. As an example, for a weight of 49828 lbs, we would set our stabilator to 19 deg nose up.

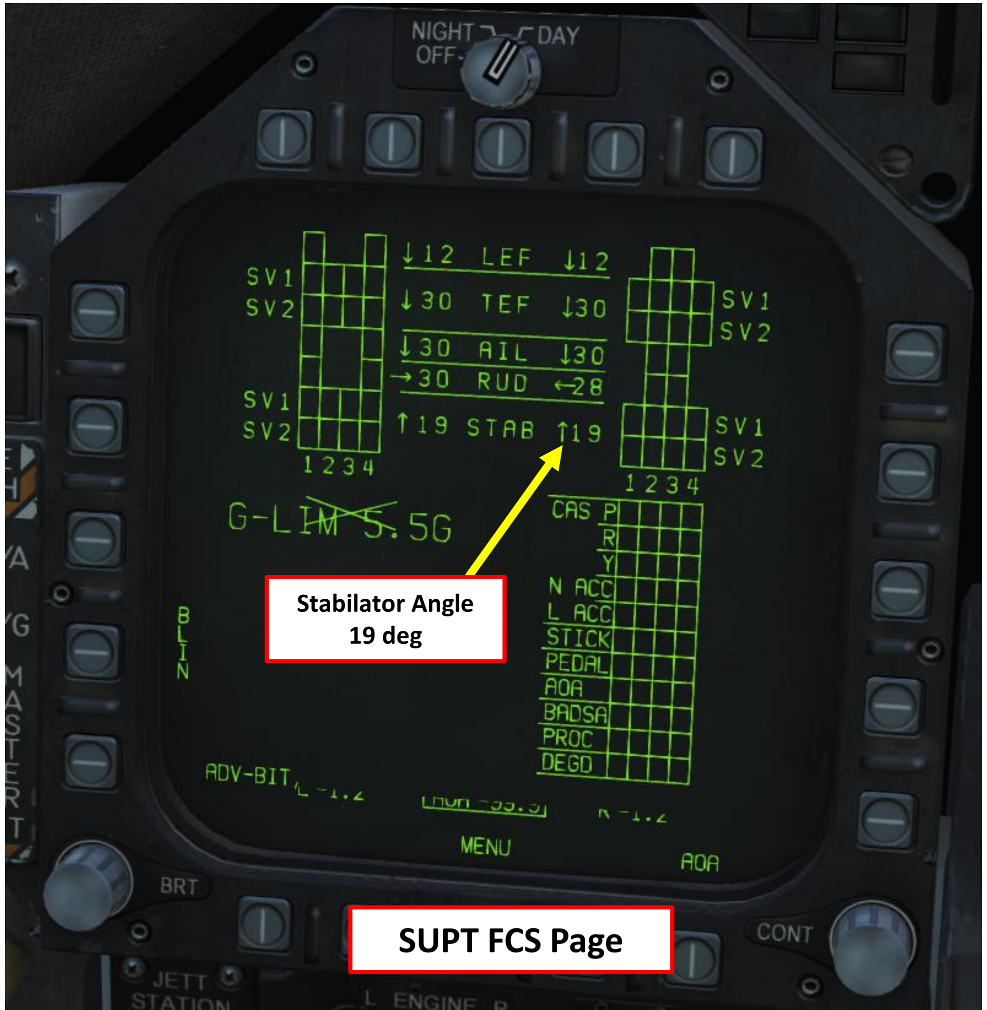
- Note 1: You can consult your stabilator angle on the SUPT (Support) FCS (Flight Control System) page
- Note 2: You can consult your weight on the SUPT (Support) CHKLST (Checklist) page
- Note 3: The Max Takeoff Weight of the Hornet is 51,900 lbs

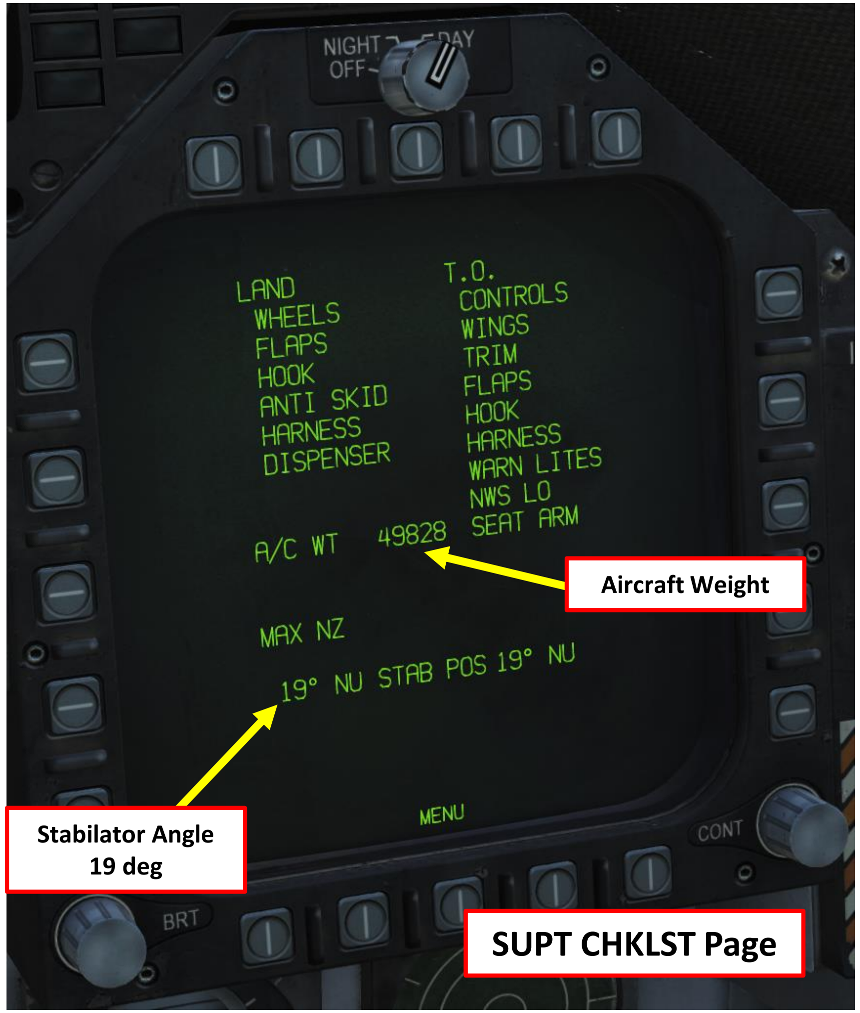
CATAPULT LONGITUDINAL TRIM

WEIGHT BOARD	NOSE UP TRIM
44,000 LBS AND BELOW	16 °
45,000 – 48,000 LBS	17 °
49,000 LBS AND ABOVE	19 °

NOTE

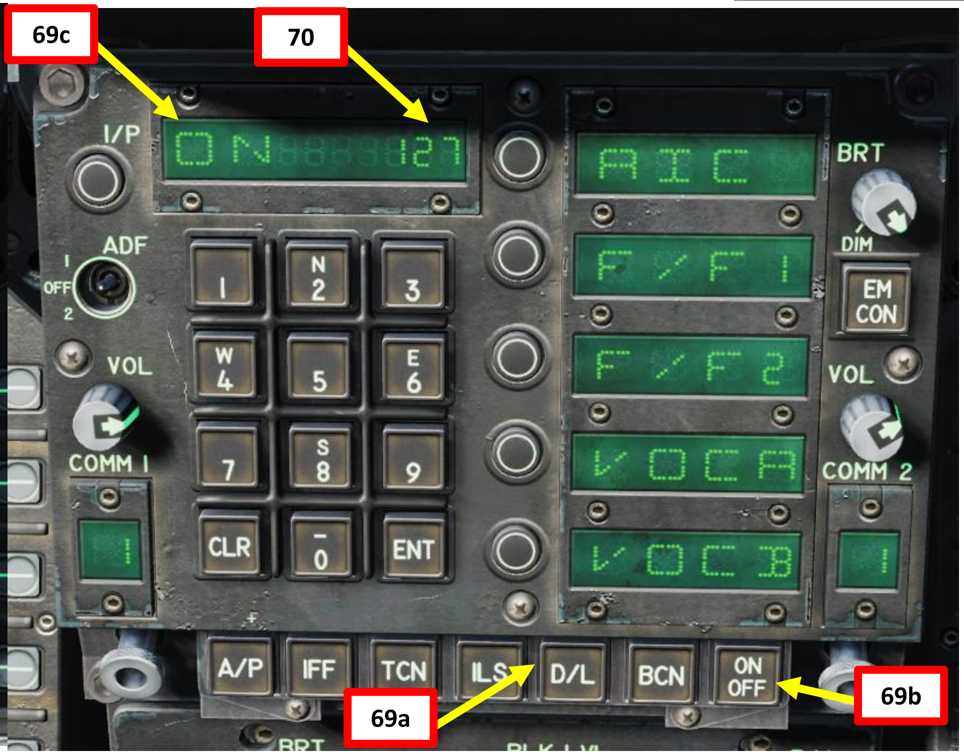
AIRCRAFT BEING LAUNCHED AT GROSS WEIGHTS OF 43,000 LBS AND ABOVE SHOULD TRIM BY 3 ° NOSE UP IF ADVISED TO EXPECT 10 KNOTS OR LESS EXCESS ENDSPEED.





START-UP PROCEDURE

68. Power Up IFF (Identify-Friend-or-Foe) system by pressing the IFF Button, then holding the ON button on the UFC for a few seconds. When « ON » is displayed, the IFF has been powered up correctly.
69. Power Up Datalink system by pressing the D/L Button, then holding the ON button on the UFC for a few seconds. When « ON » is displayed, the IFF has been powered up correctly.
70. On UFC, set desired Datalink Frequency by entering it on the scratchpad, then pressing « ENT ». 127 is used by default, you can keep it.
71. Verify on MIDS SUPT page that Datalink information is correct (Network, AIC, F/F, Voice frequencies).

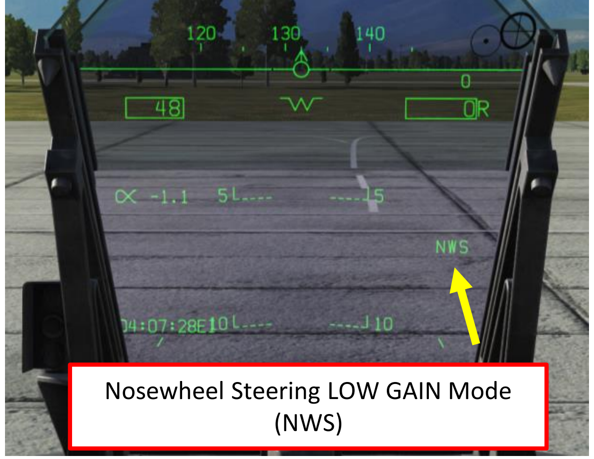


SHORE TAKEOFF

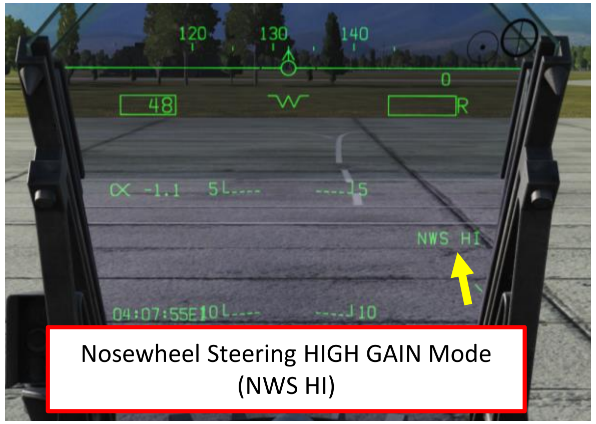
1. Ensure Anti-Skid Switch is set to ON (UP Position), and Flaps are HALF (MIDDLE position), chocks are removed, Launch Bar is RETRACTED and Parking Brake is released
2. Throttle up and start taxiing
3. Aircraft is steered using the nosewheel steering (NWS), controlled with rudder pedals.
    - The default **NWS LOW GAIN** Mode allows **+/- 16** deg and is displayed as **NWS** on the HUD.
    - The **NWS HIGH GAIN** Mode allows **+/- 75 deg** steering, which is useful on aircraft carriers or small spaces. You can activate it by pressing and holding the «Undesignate /Nosewheel Steer Switch» (key binding: « S ») button on your HOTAS. This steering mode is displayed as **NWS HI** on the HUD.

Paddle Switch
(Nosewheel steering disengage, Autopilot disengage & G-limiter override switch)

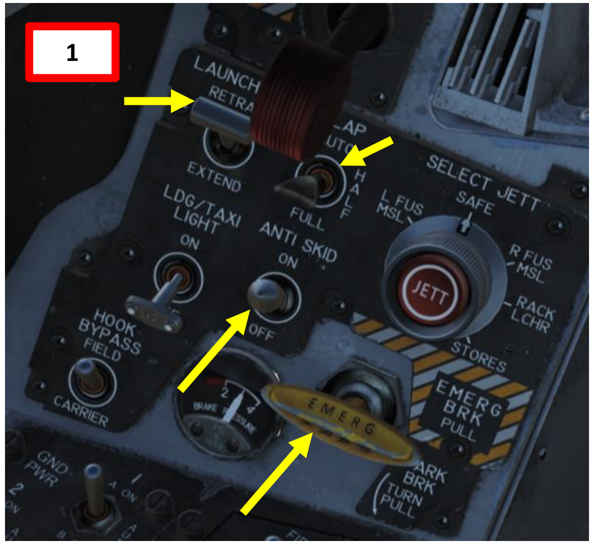
Undesignate / Nosewheel Steering Button

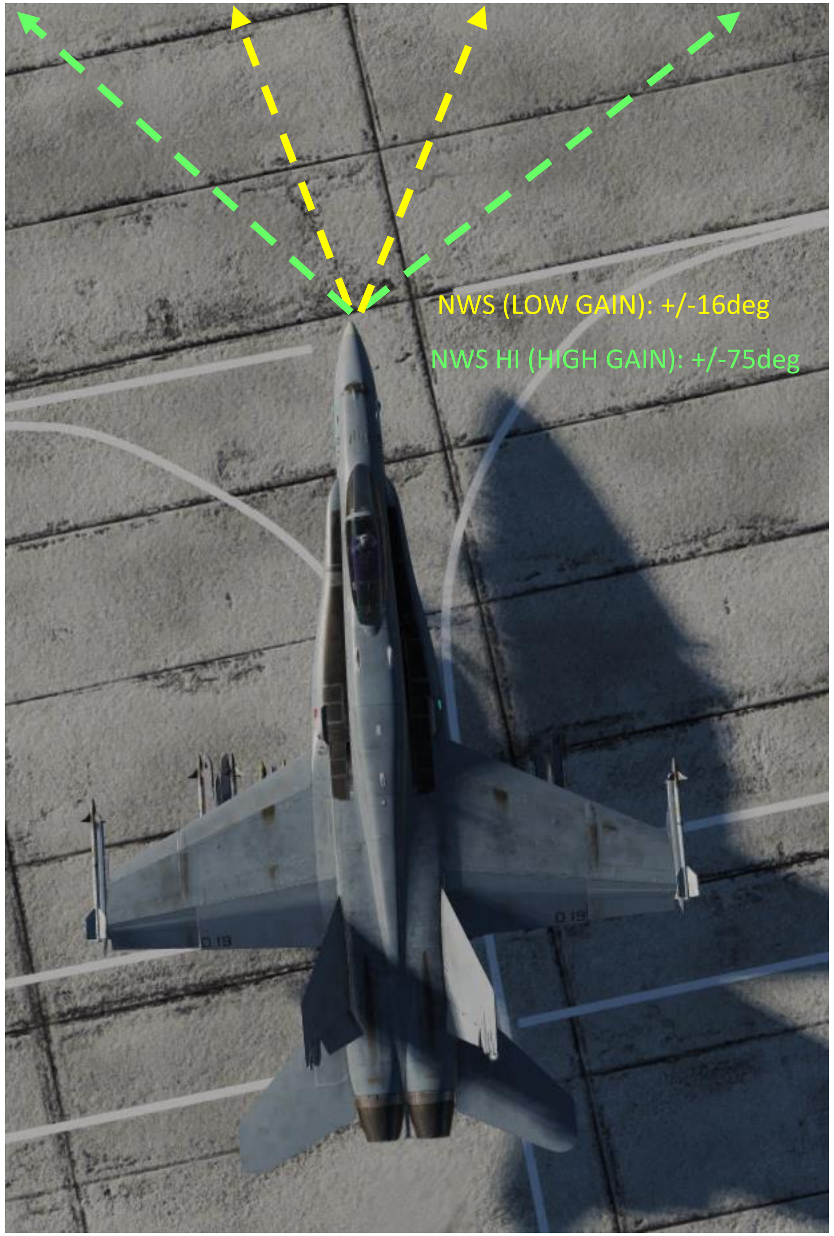


Nosewheel Steering LOW GAIN Mode
(NWS)



Nosewheel Steering HIGH GAIN Mode
(NWS HI)





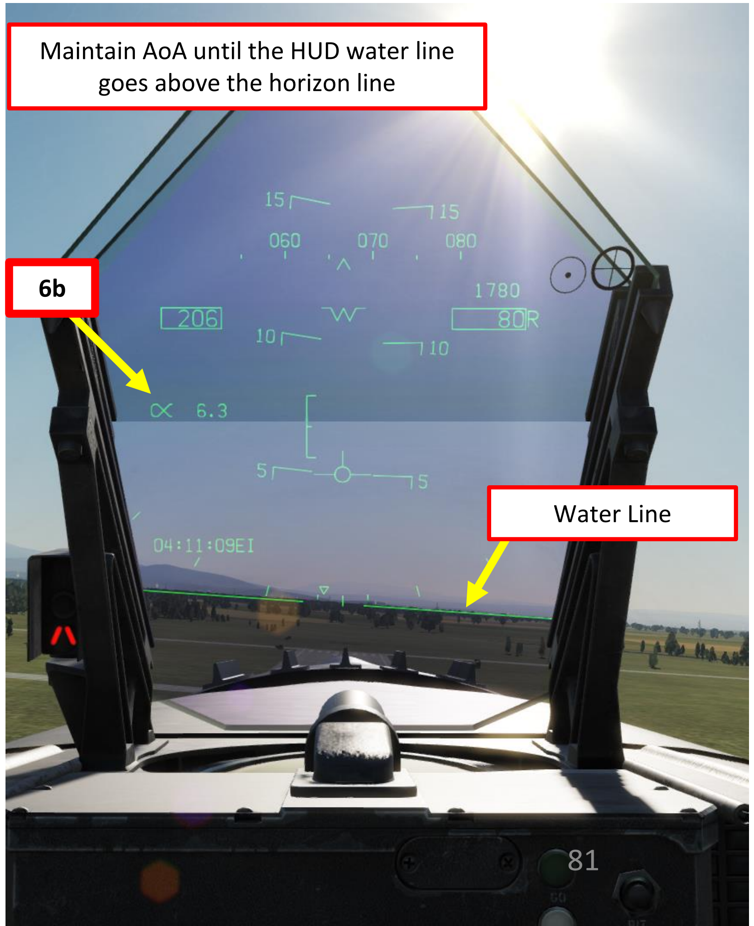
SHORE TAKEOFF

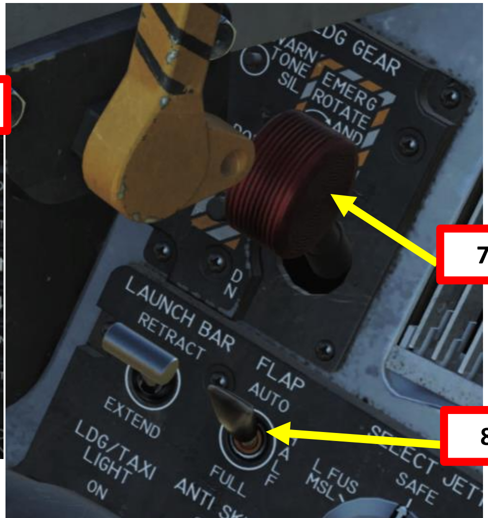
F/A-18C HORNET

PART 5 – TAKEOFF

SHORE TAKEOFF

4. Once lined up on the runway, hold brakes and throttle up to 80 % RPM
5. Release brakes and set throttle fully forward to engage afterburners
6. When reaching approx. 150 kts, hold stick back to set an aircraft pitch of 7 degrees AoA
7. Once you have a positive climb, raise landing gear up before reaching 240 kts
8. Set Flaps lever – AUTO
9. Set ALTITUDE Switch to BARO once reaching an altitude of 3000 ft to use Barometric Altitude as a reference for your HUD.

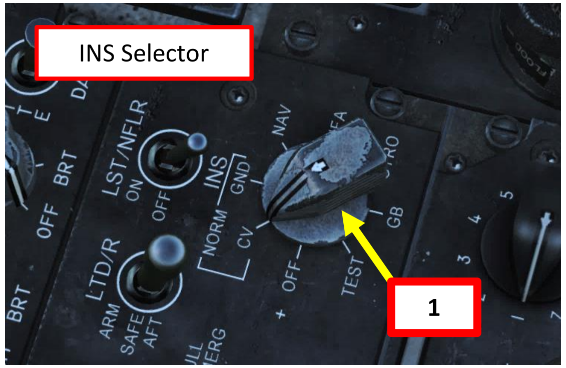


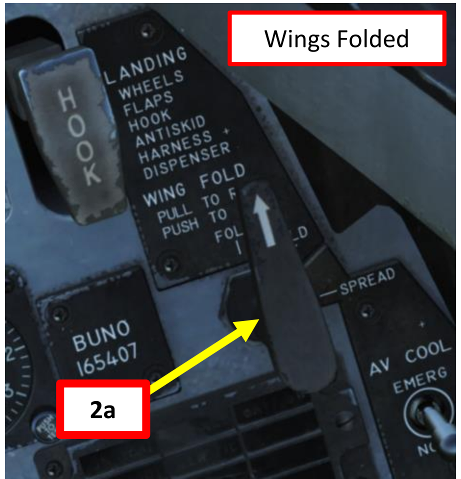


SHORE TAKEOFF

CARRIER TAKEOFF

1. Make sure the INS alignment was done with the INS Selector switch to CV. With CV mode, the alignment will take its positional data directly from the carrier. Once alignment is finished, remember to verify that the INS Selector switch is set back to NAV.
2. To save space on the carrier deck, aircraft wings are often folded after each flight. Make sure wings are SPREAD & LOCKED instead of FOLDED. To spread wings:
    a) Right click on the WING FOLD lever and set it to SPREAD
    b) Wait for the wings to deploy properly
    c) On your HUD Repeater, you should see WING UNLK. This means that wings are spread out but not locked.
    d) Push the WING FOLD lever forward (scroll mousewheel) to lock the wing actuators.
    e) Verify that the WING UNLK caution has disappeared and you should be good to go.





CARRIER TAKEOFF

3. Ensure Anti-Skid Switch is set to OFF (Down Position), and Flaps are HALF (MIDDLE position), chocks are removed, Launch Bar is RETRACTED, HOOK BYPASS is set to CARRIER and Parking Brake is released
4. Throttle up and start taxiing
5. Aircraft is steered using the nosewheel steering (NWS), controlled with rudder pedals.
    - The default **NWS LOW GAIN** Mode allows **+/- 16** deg and is displayed as **NWS** on the HUD.
    - The **NWS HIGH GAIN** Mode allows **+/- 75 deg** steering, which is useful on aircraft carriers or small spaces. You can activate it by pressing and holding the «Undesignate /Nosewheel Steer Switch» (key binding: « S ») button on your HOTAS. This steering mode is displayed as **NWS HI** on the HUD.
    - Note: If the Launch Bar is deployed, NWS is disengaged

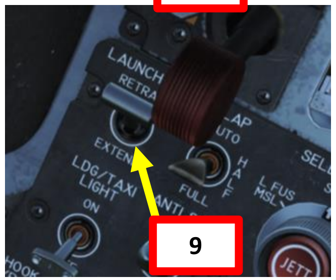
Nosewheel Steering LOW GAIN Mode (NWS)

Nosewheel Steering HIGH GAIN Mode (NWS HI)

CARRIER TAKEOFF

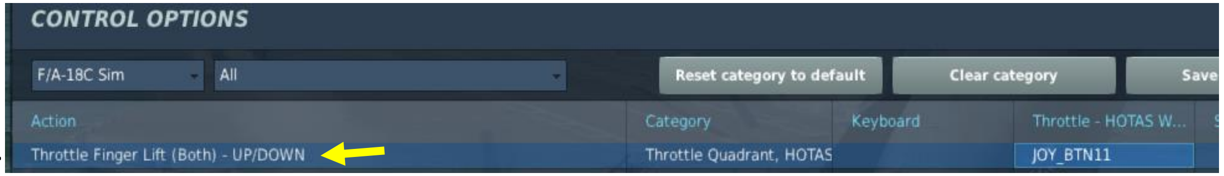
CARRIER TAKEOFF

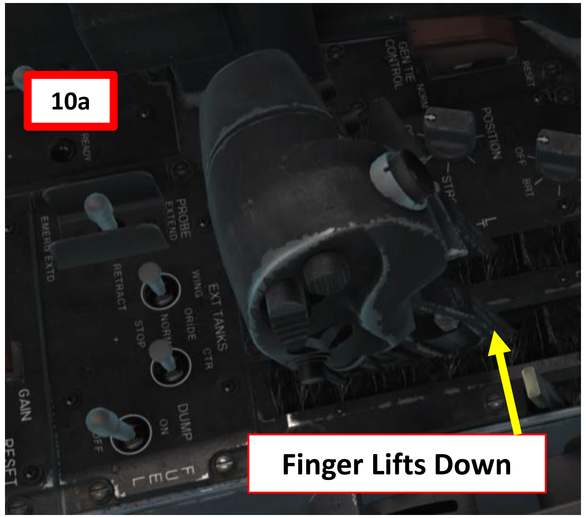
6. Line up with the Catapult Shuttle (as shown in picture). Typically, a ground crew would help us taxi to the right spot, but In our case we can cheat using the "F2" view or by using a wingman to guide us.
7. Set LAUNCH BAR switch to EXTEND
8. Once lined up with the shuttle, press "U" ("Catapult Hook Up" binding) to hook Launch Bar into the Catapult Shuttle.
9. Once launch bar is hooked up with the shuttle, set LAUNCH BAR switch to RETRACT.
   The hydraulic pressure sets the bar to stick the shuttle, and the shuttle holds it in place mechanically. A spring then allows the bar to flip as soon as the aircraft has left the shuttle and off the end of the deck.

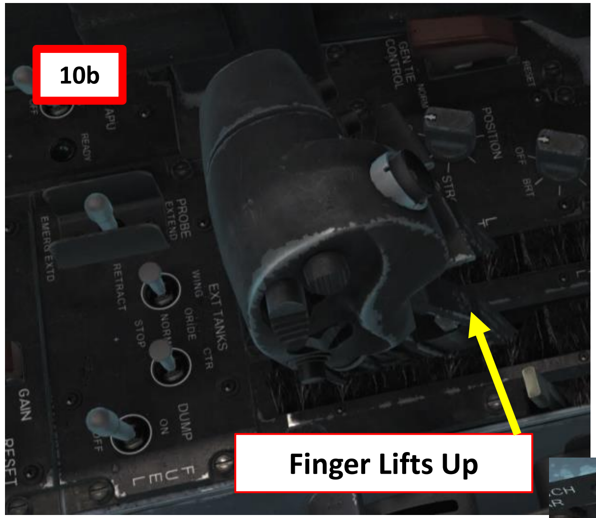


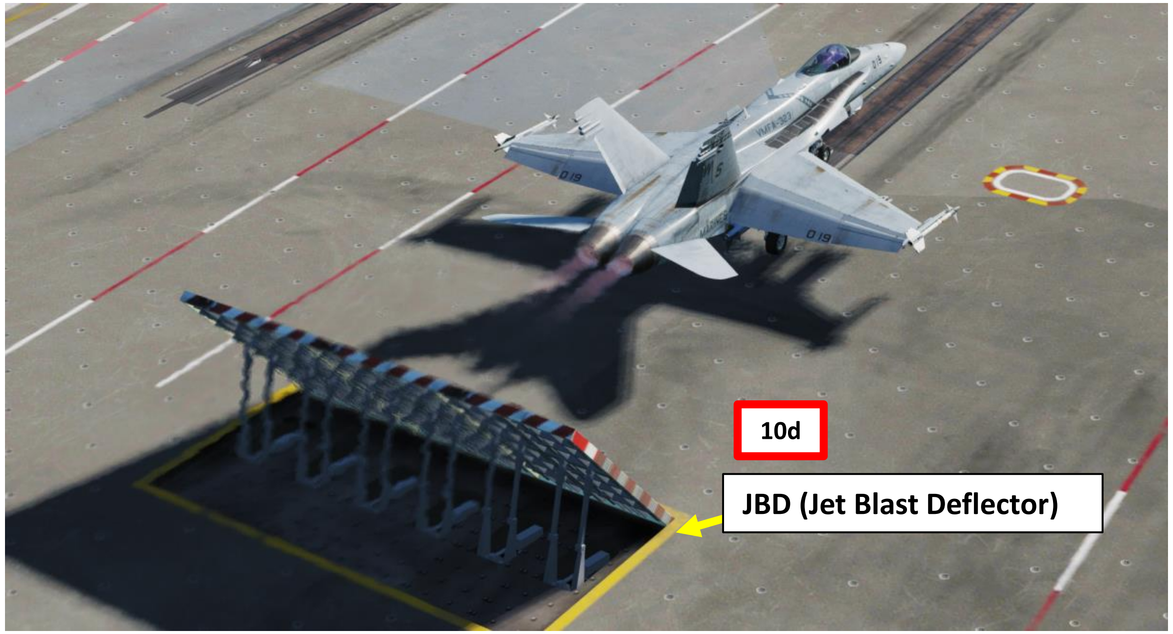
CARRIER TAKEOFF

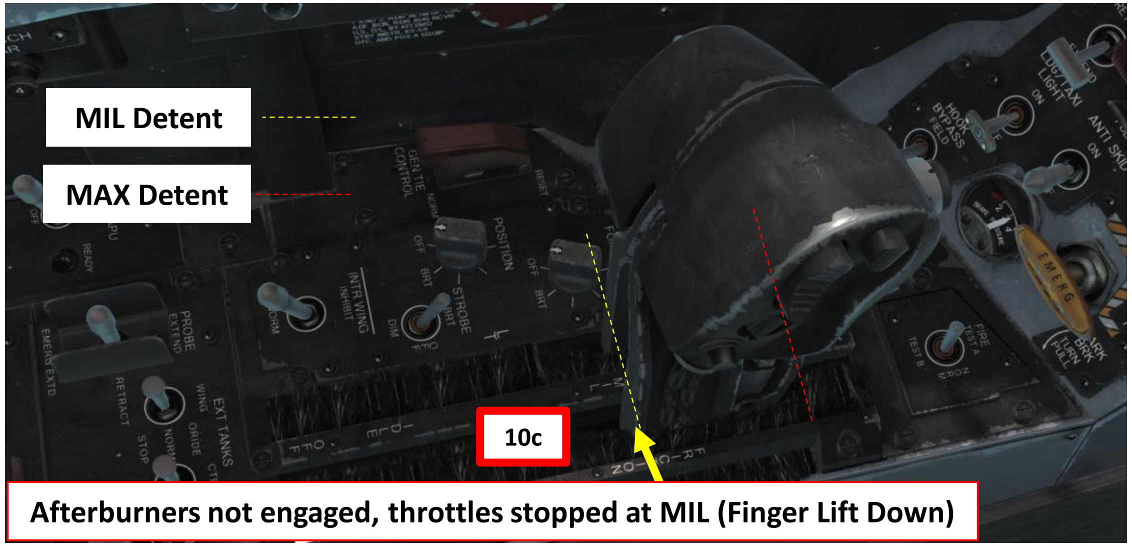
10. Throttle up fully forward to engage afterburners and let go of the flight stick.
*Take note that **if the arrestor hook or launch bar is down**, an afterburner lockout system helps guard against inadvertent afterburner selection. The way to engage afterburners in that case is to either **raise the finger lifts (press 0 & 9)** and throttle up to MAX **OR** apply a **force of approximately 32 pounds** (not simulated) before the throttles can be moved to MAX. If finger lifts are not raised, the throttle will be stopped at MIL instead of MAX.*

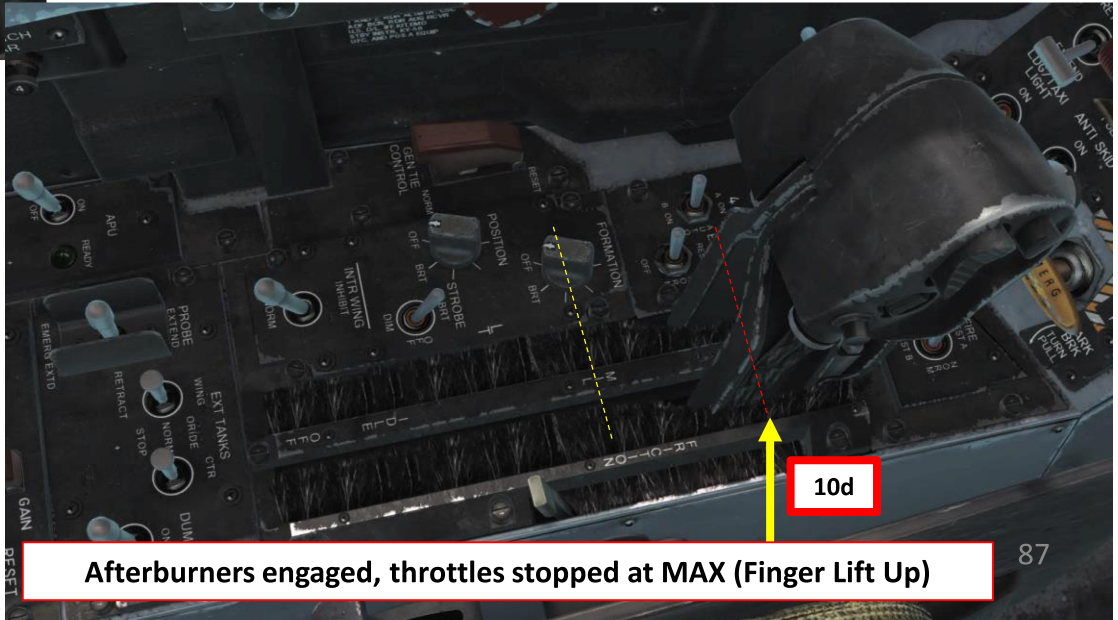






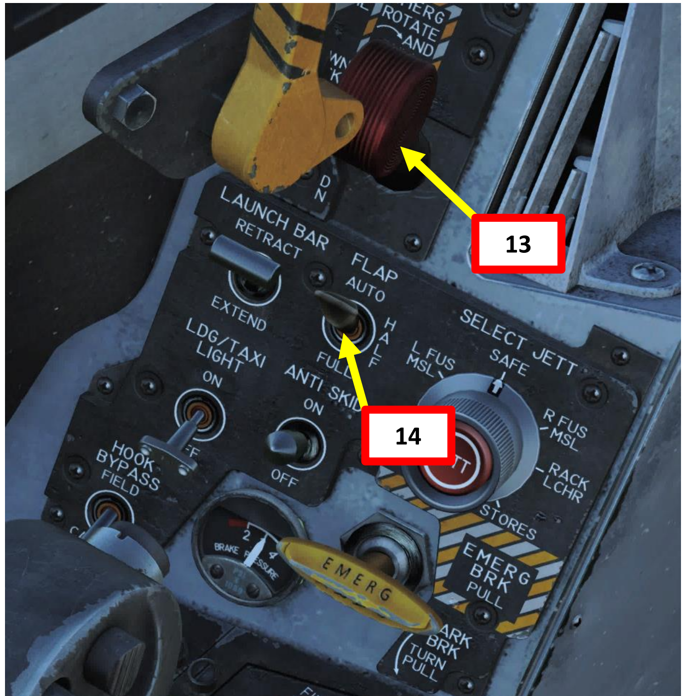






CARRIER TAKEOFF

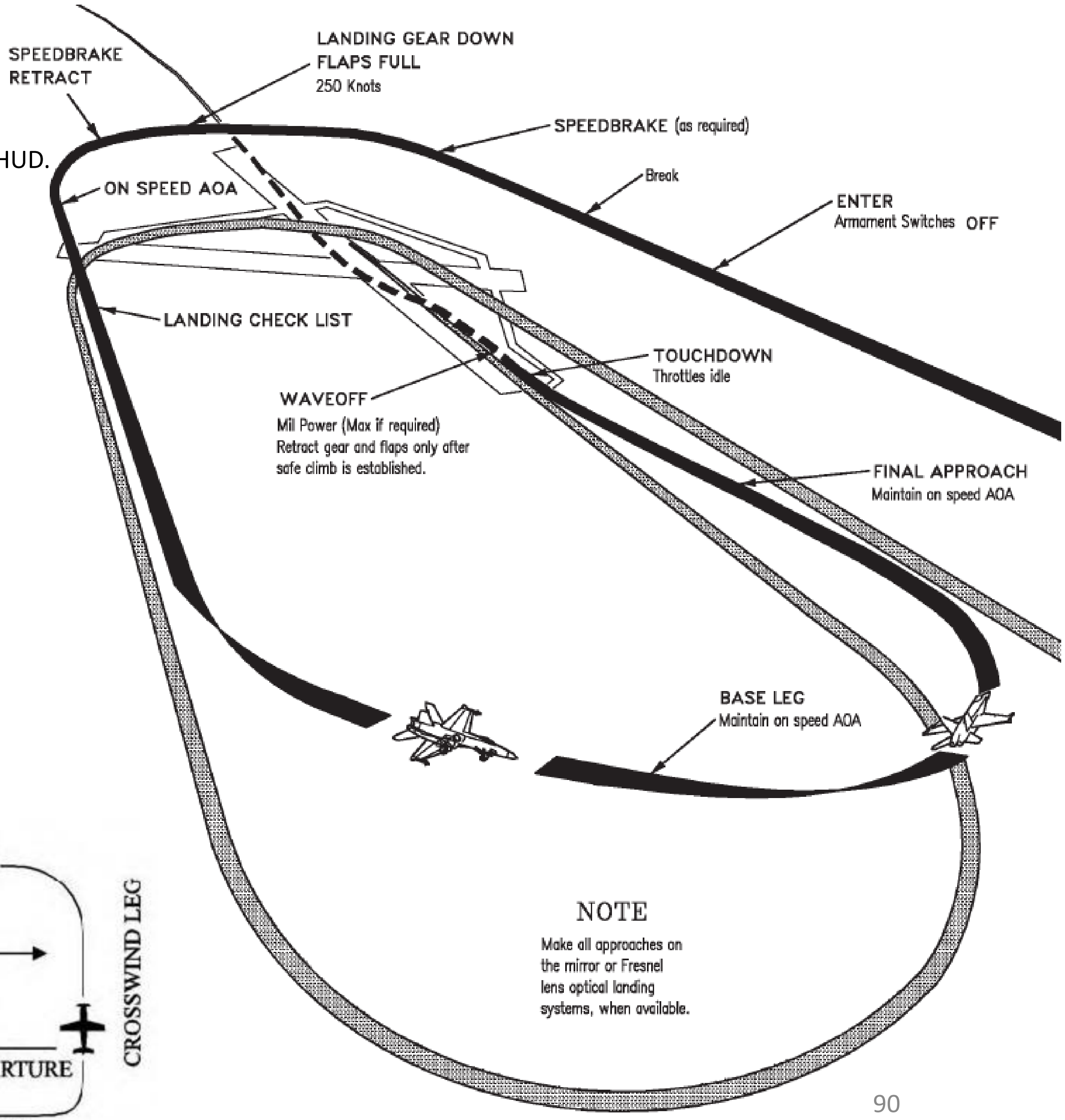
11. Once afterburners kick in, the catapult will launch you off the deck. The FCS (Flight Control System) will automatically set your flight control surfaces to the best climb attitude.
12. Once you have a positive climb, take back control of the flight stick.
13. Raise landing gear up before reaching 240 kts
14. Set Flaps lever – AUTO
15. Set ALTITUDE Switch to BARO once reaching an altitude of 3000 ft to use Barometric Altitude as a reference for your HUD.

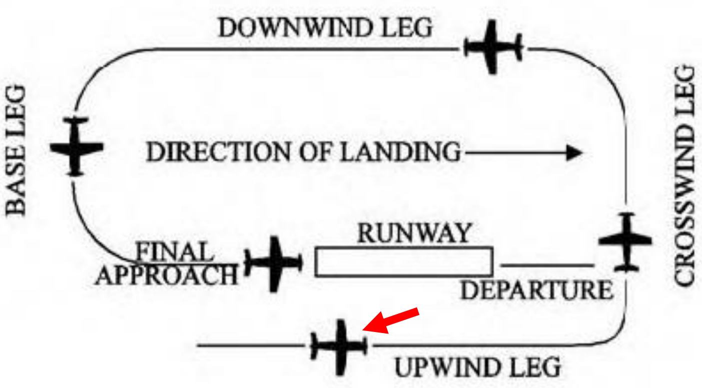


CARRIER TAKEOFF

SHORE LANDING
VFR

1. Set Anti-Skid Switch to ON (UP Position) & Landing Lights ON
2. Set ALTITUDE Switch to RDR to use your radar altimeter as a reference for your HUD.
3. Enter upwind leg at approx. 350 kts at about 1000 ft altitude

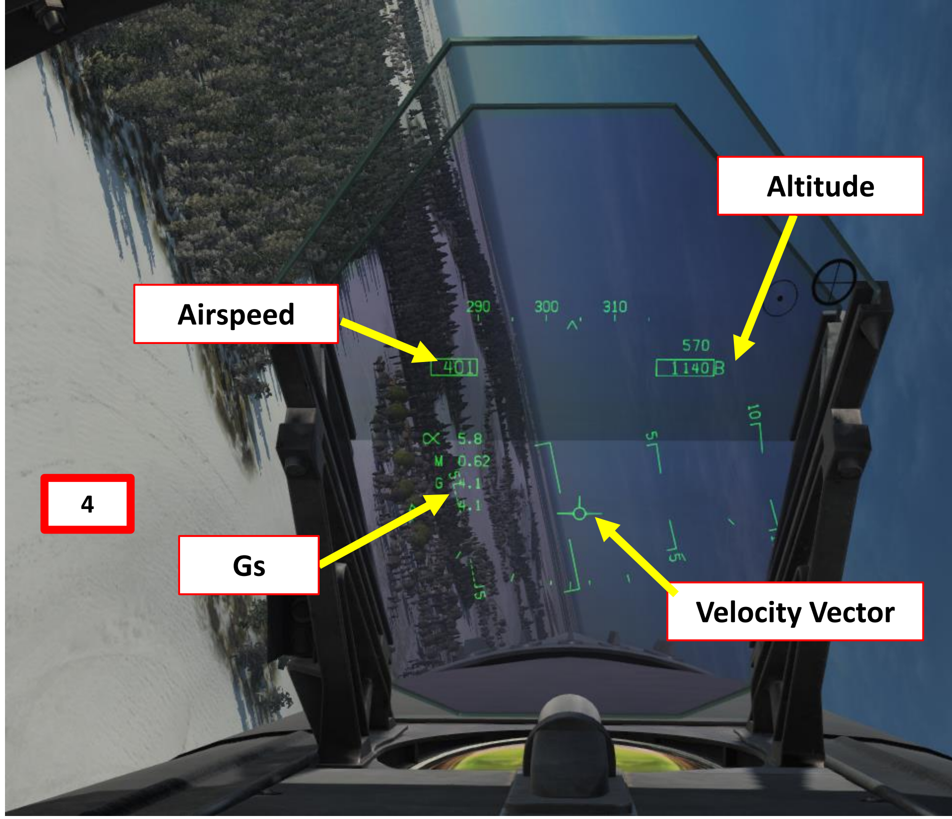


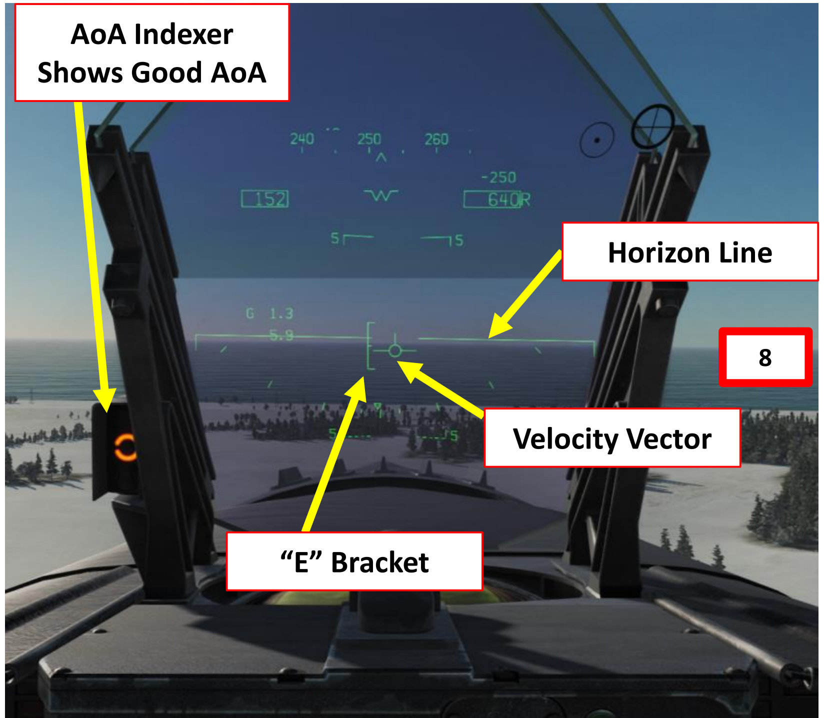


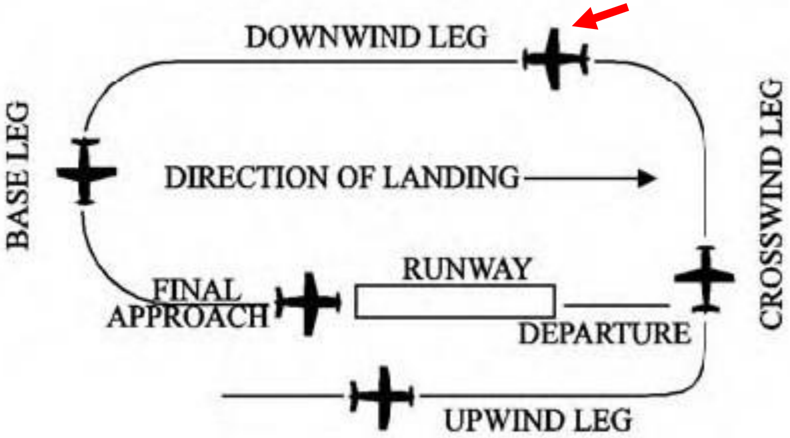
SHORE LANDING
VFR

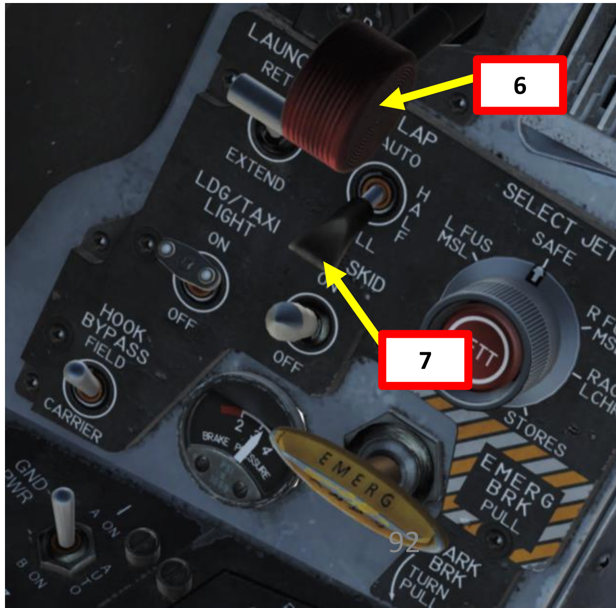
SHORE LANDING VFR

4. When turning left from the upwind leg to the crosswind leg, try to pull a number of Gs that is 1 % of your airspeed (i.e. 3.5 G turn if going at 350 kts) while maintaining your velocity vector on the horizon line. This should line up your downwind leg to about 1.2 nm away from the runway.
5. Slow down to 250 kts and fly at 600 ft
6. Set Landing Gear Lever - DOWN
7. Flaps Lever – FULL (DOWN)
8. As you enter downwind leg, slow down to ON SPEED AOA by setting the velocity vector in the middle of the "E" bracket on the HUD using elevator trim and throttle input. You should reach an airspeed of about 140-150 kts for an AoA (Angle of Attack) to 8.1 deg approx. Make sure to maintain your 600 ft altitude by keeping the velocity vector on the horizon line. The AoA Indexer will also give you a good reference if you have the correct Angle of Attack or not.









SHORE LANDING VFR

9. When turning to base leg, start a 30-degree bank while maintaining the Velocity Vector and the E bracket just below the horizon line. Maintaining the 600 ft altitude will require you to adjust the throttle constantly.
10. When lined up with the runway, set velocity vector on the runway and keep it there. Keep your velocity vector pointed on the runway with your flight stick, and control your glide slope and angle of attack with your throttle. That's called flying "pitch for speed, power for altitude".
11. Don't check your speed, if you have a good AoA and velocity vector, you'll be on speed.
12. Once AoA Indexer shows that you are ON SPEED (orange donut) and that your velocity vector is on the runway, just let yourself touchdown on the runway. It will feel like a controlled crash into the ground; that's normal.

SYMBOL	AIRSPEED	AOA
	Slow	9.3° to 90.00°
	Slightly slow	8.8° to 9.3°
	On speed	7.4° to 8.8°
	Slightly fast	6.9° to 7.4°
	Fast	0° to 6.9°

SHORE LANDING
VFR

CARRIER LANDING
CASE I RECOVERY

A “case 1 recovery” is simply a fancy term to qualify what kind of landing you perform.

<u>CASE I</u>: occurs when flights are anticipated to not encounter instrument conditions during daytime departure/recovery, and the ceiling and visibility around the carrier are no lower than 3000 ft and 5 nm.

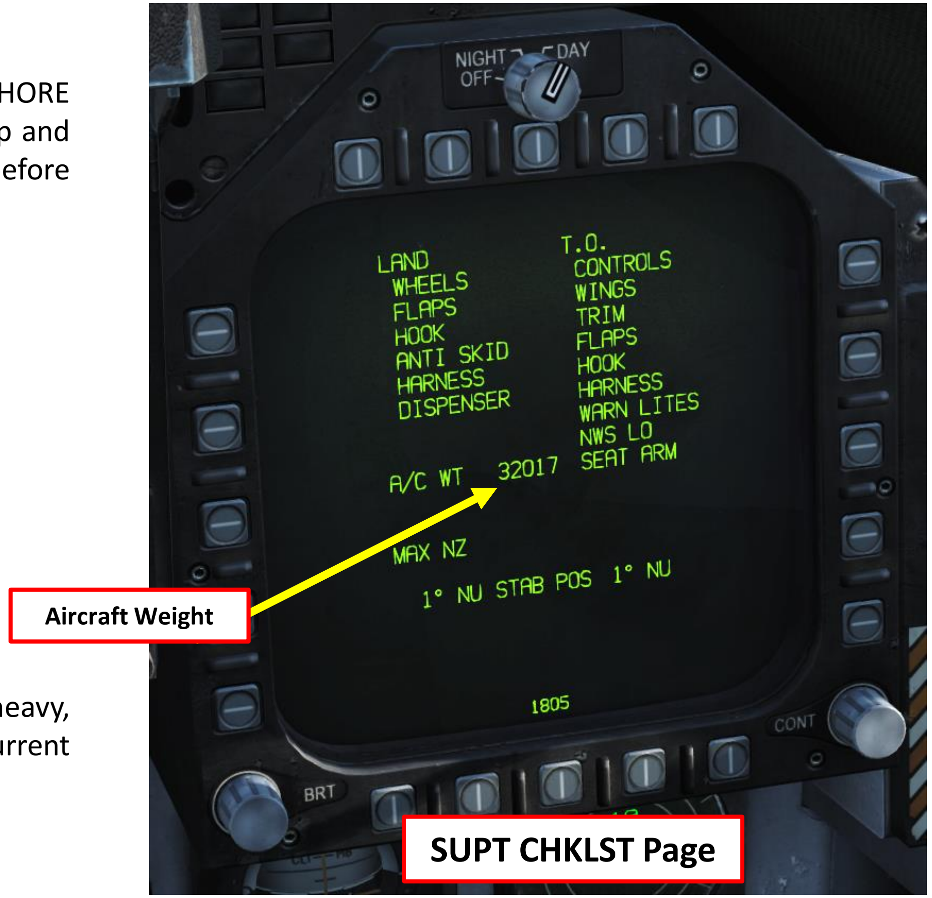
<u>CASE II</u>: occurs when flights may encounter instrument conditions during day time departure/recovery, and the ceiling and visibility in the carrier control zone are no lower than 1000 ft and 5 nm.

<u>CASE III</u>: occurs when flights are expected to encounter instrument conditions during a departure/recovery because the ceiling or visibility around the carrier is lower than 1000 ft and 5 nm, or for night departures/recoveries.

The procedure to land on a carrier is in fact quite similar to the procedure shown in the SHORE LANDING tutorial. The only things that change is that the runway is moving, may pitch up and down and is much smaller. Here is a couple of videos I recommend you watch before attempting a carrier landing:

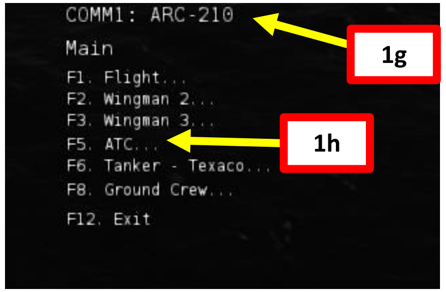
- **Carrier Landing Tutorial by Matt Wagner:**
  https://www.youtube.com/watch?v=TuigBLhtAH8
- **Carrier Landing Tutorial by Jabbers:**
  https://youtu.be/lm-M3VUy-_I
- **Carrier Landing Discussions by F/A-18 Pilot A.E.W.:**
  https://www.youtube.com/channel/UCNvV27UZkI8W-jvMA-iGqyQ
- **Carrier Ops Instructional by F/A-18 Pilot Lex Talionis:**
  https://youtu.be/bLOZJ0tpzRs
- **Carrier Operations by Redkite:**
  https://www.youtube.com/watch?v=LMJ1Y57qtjI

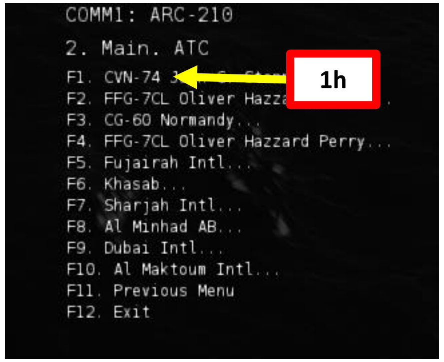
Note: The maximum weight allowable for a carrier landing is 33,000 lbs. If you are too heavy, you can either fly around to burn fuel, jettison fuel or jettison your ordnance. Your current weight is accessible through your Support CHKLST page.

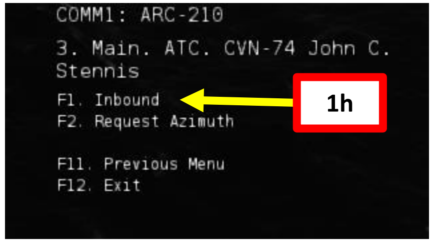


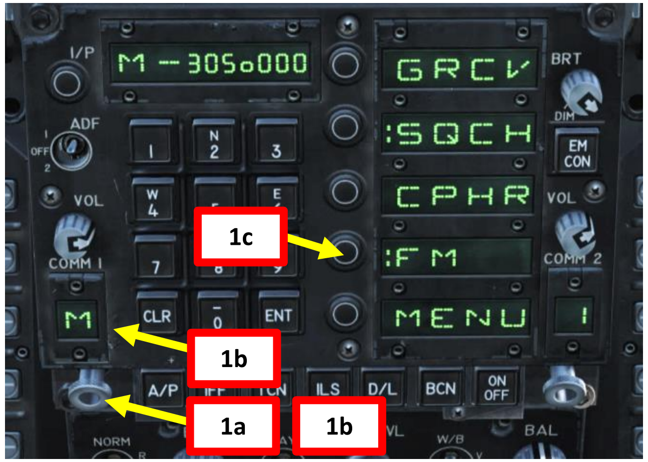
CARRIER LANDING CASE I RECOVERY

1. Contact Carrier to turn on the lights
    a. Left click on the COMM1 knob to pull it and select COMM1 Radio
    b. Scroll mousewheel on COMM1 Radio Channel Selector to M (Manual) Mode
    c. Press the OSB next to AM or FM to select the FM frequency (":FM" will appear when selected)
    d. Press CLR on the UFC to clear current frequency
    e. Type "127500" on the UFC to set carrier radio frequency 127.5 MHz
    f. Press ENT on the UFC to enter this frequency
    g. Press the COMM switch – COMM1 on your throttle to contact the carrier (RALT+\)
    h. Go in F5 – AT5 menu, then to the CVN-74 menu, then to the F1 – Inbound menu.
    i. And that's it, the carrier is now illuminated.



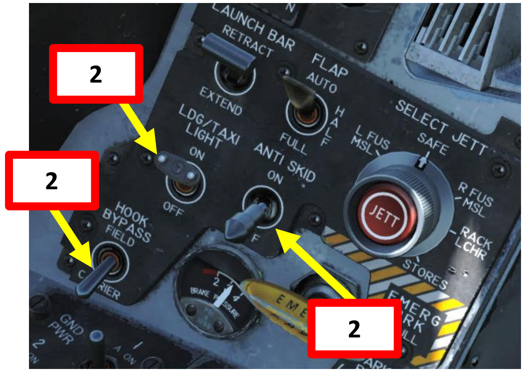


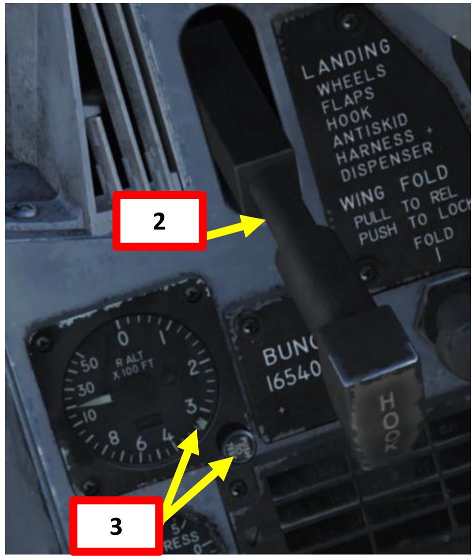


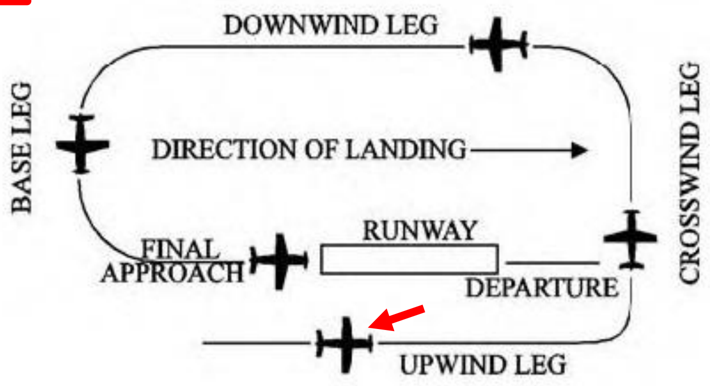


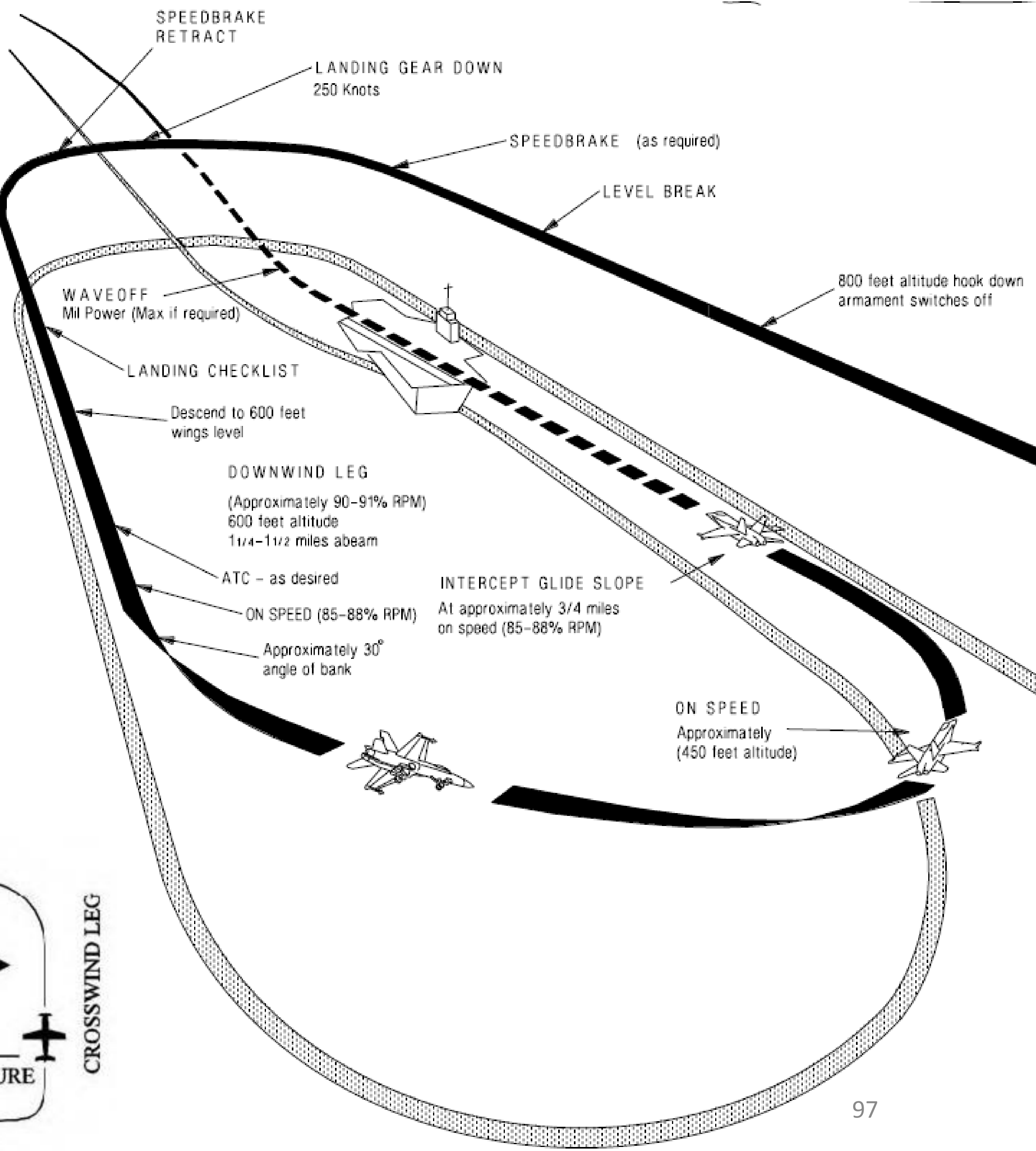
CARRIER LANDING
CASE I RECOVERY

2. Set Anti-Skid Switch to OFF (Down Position), Hook Lever DOWN, Hook Bypass Switch to CARRIER, and Landing Lights ON
3. Set ALTITUDE Switch to RDR to use your radar altimeter as a reference for your HUD and set radar altimeter index to 370 ft or 320 (as you prefer). You use 370 ft to remind you that you need to make the ball call or 320 ft to make sure you have the proper altitude when 3/4 nm from the carrier.
4. Enter upwind leg at approx. 350 kts and 800 ft altitude





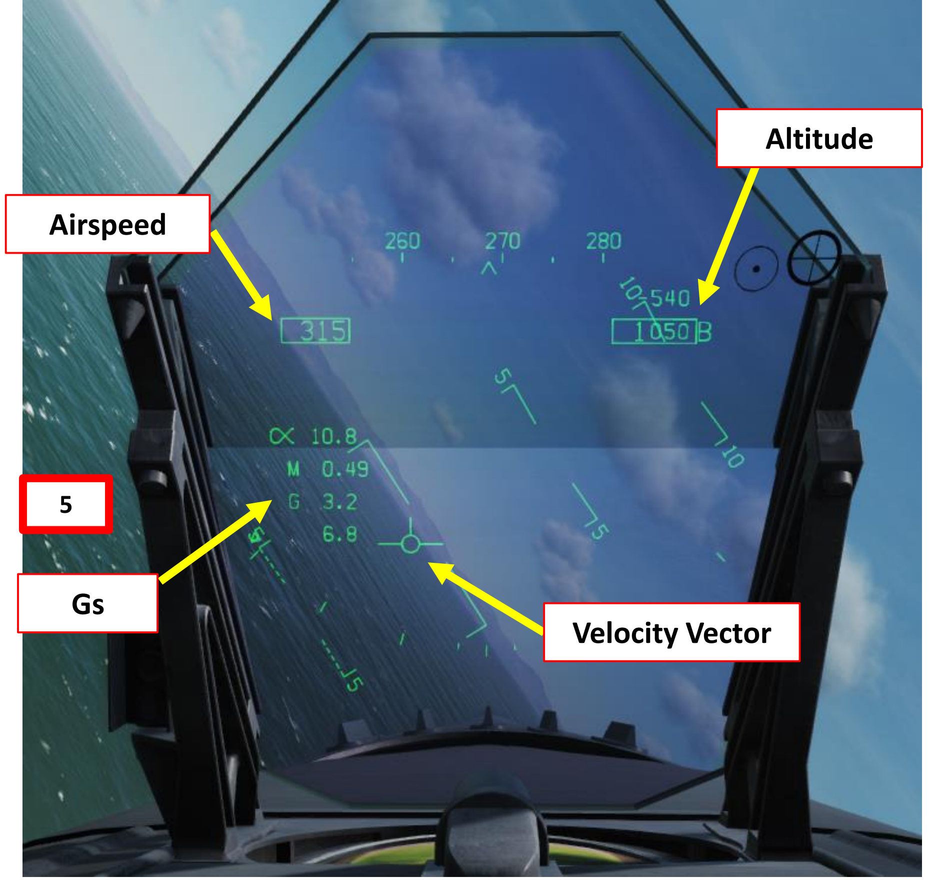


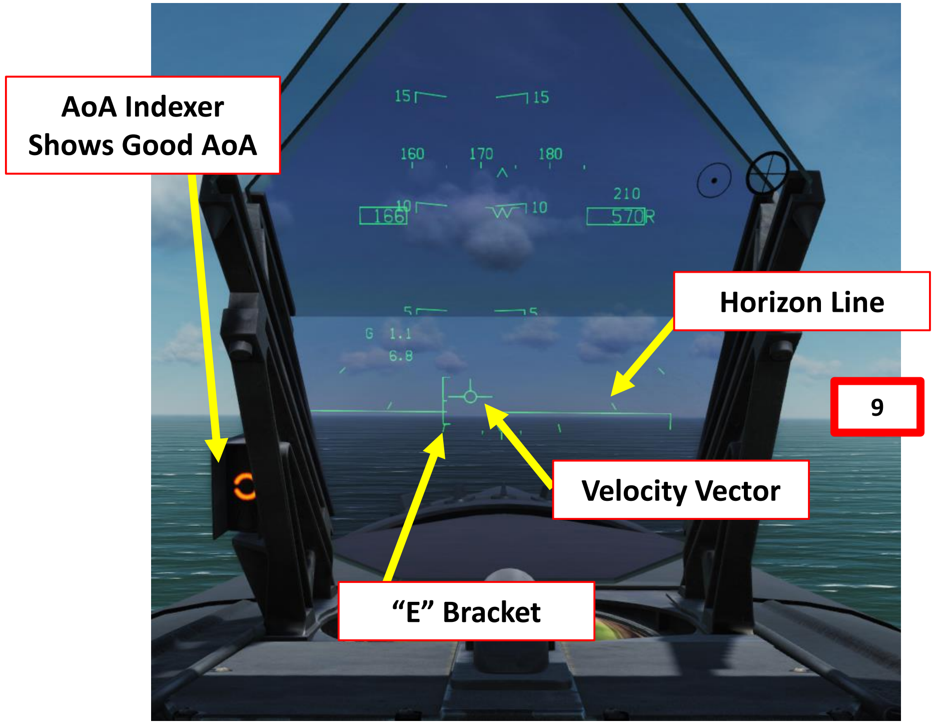


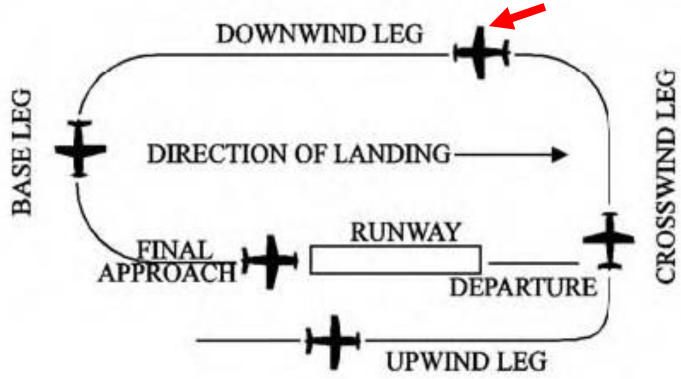
CARRIER LANDING CASE I RECOVERY

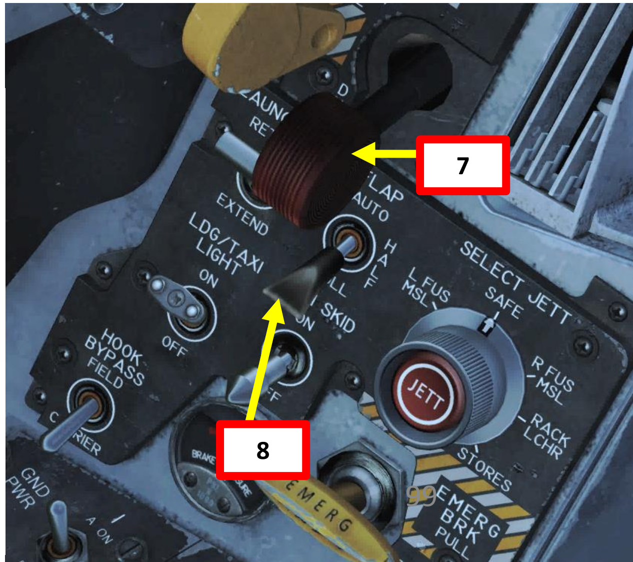
CARRIER LANDING CASE I RECOVERY

5. When turning left from the upwind leg to the crosswind leg, try to do pull a number of Gs that is 1 % of your airspeed (i.e. 3.5 G turn if going at 350 kts) while maintaining your velocity vector on the horizon line. This should line up your downwind leg to about 1.2 nm away from the runway.
6. Slow down to 250 kts at fly at 600 ft
7. Set Landing Gear Lever - DOWN
8. Flaps Lever – FULL (DOWN)
9. As you enter downwind leg, slow down to ON SPEED AOA by setting the velocity vector in the middle of the "E" bracket on the HUD using **elevator trim** (super important) and throttle input. I cannot stress it enough: make sure you are properly trimmed. You should reach an airspeed of about 140-150 kts for an AoA (Angle of Attack) to 8.1 deg approx. If you fail to trim to 8 degrees, your AoA will be off and you will be fighting the fly-by-wire system all the way to landing. Make sure to maintain your 600 ft altitude by keeping the velocity vector on the horizon line. The AoA Indexer will also give you a good reference if you have the correct Angle of Attack or not.







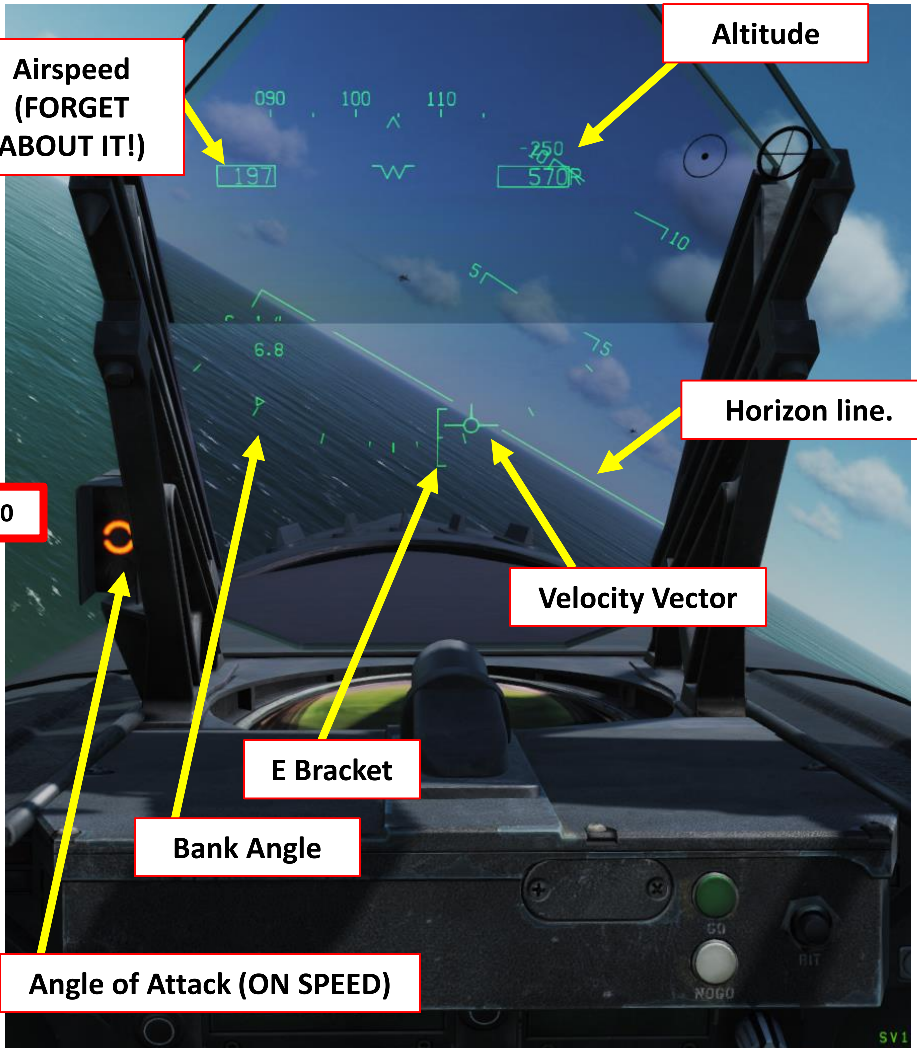


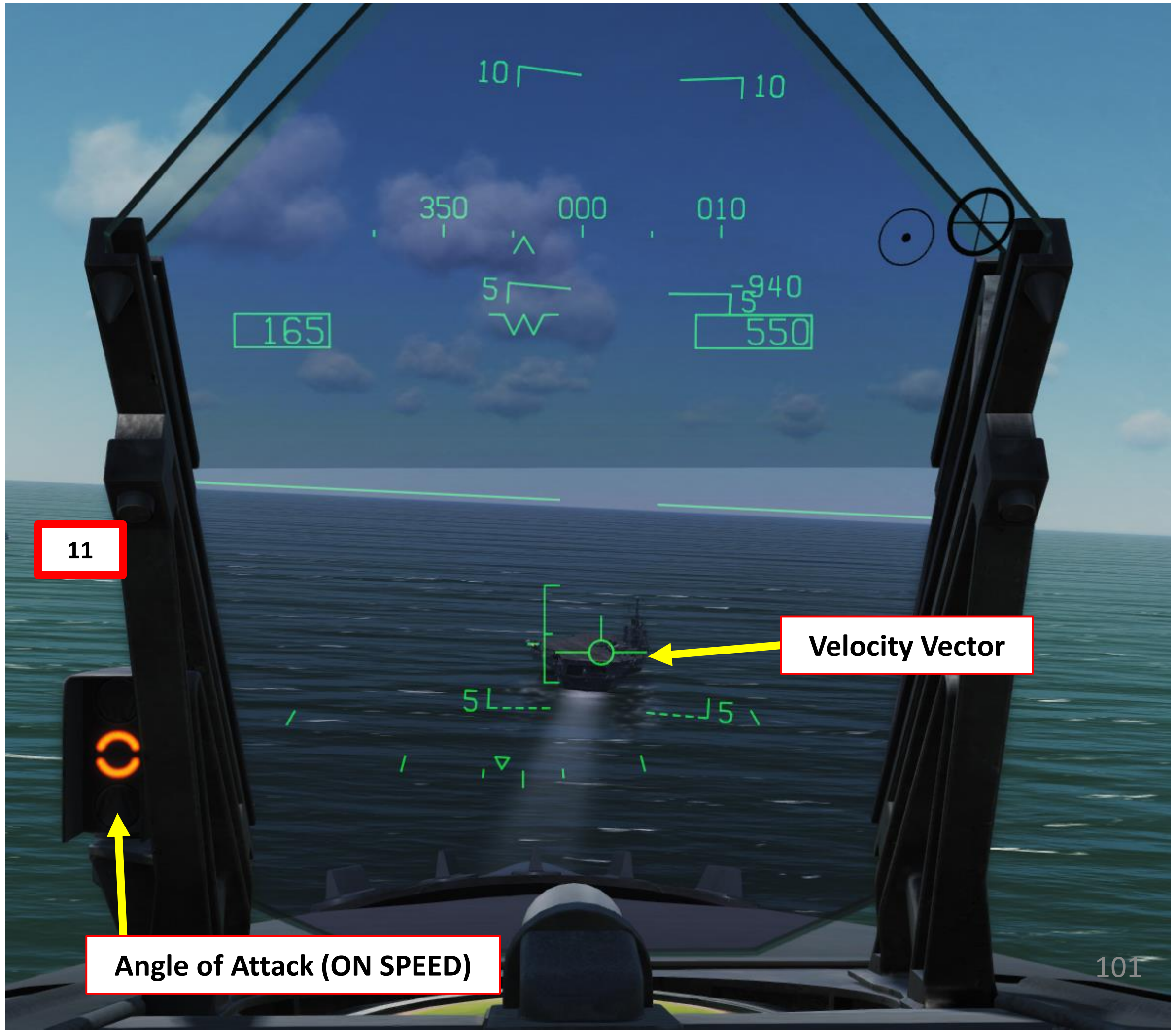
CARRIER LANDING
CASE I RECOVERY

Once flying abeam the ship on the downwind leg, start your approach turn when your wing meets the ship's Rounddown.

CARRIER LANDING
CASE I RECOVERY

10. When turning to base leg, start a 30-degree bank while maintaining the Velocity Vector and the E bracket just below the horizon line. Maintaining the 600 ft altitude will require you to adjust the throttle constantly. Forget about your airspeed: just focus on maintaining altitude and bank angle.
11. When lined up with the ship, you will be entering the "groove" (short final).
12. Once wings are level, you would normally "call the ball". Example: "403, Hornet Ball, 3.0". (Side number of your Hornet, Aircraft Type, "Ball", Fuel State/Remaining in thousands of pounds). The LSO (Landing Signal Officer) would then respond with "Roger Ball" and then give you corrections to land properly.

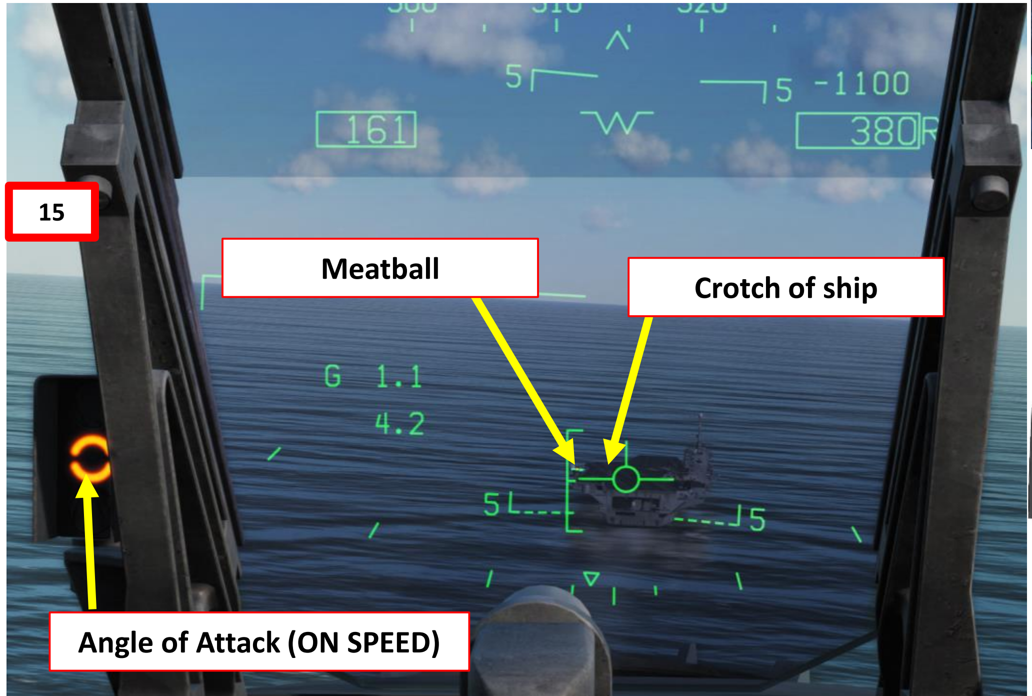


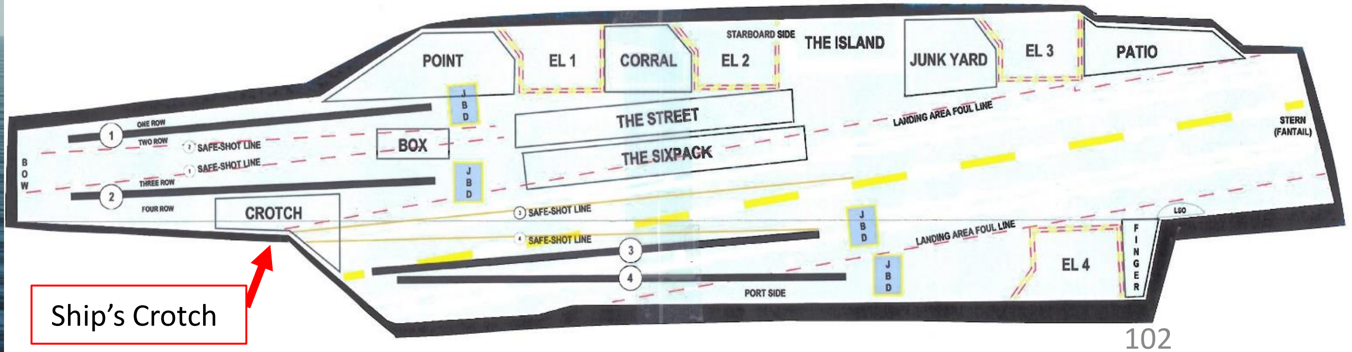


CARRIER LANDING CASE I RECOVERY

13. When entering the groove (final), if you set up your turn correctly the velocity vector should be lined up with the crotch of the ship. This is called “Spotting the Deck”, and you should **NOT** use this as a reference to land. **Use the meatball, E bracket and the AoA Indexer instead as a reference** (see next page), and control your glide slope and angle of attack with your throttle. That’s called flying “pitch for speed, power for altitude”.
14. Don’t check your speed, if you have a good AoA, you’ll be on speed.
15. Once AoA Indexer shows that you are ON SPEED (orange donut) and that your velocity vector is on the runway, just let yourself touchdown on the carrier. **DO NOT FLARE**. Ever. It will feel like a controlled crash into the deck; that’s normal. **Don’t use brakes either**.

SYMBOL	AIRSPEED	AOA
	Slow	9.3° to 90.00°
	Slightly slow	8.8° to 9.3°
	On speed	7.4° to 8.8°
	Slightly fast	6.9° to 7.4°
	Fast	0° to 6.9°

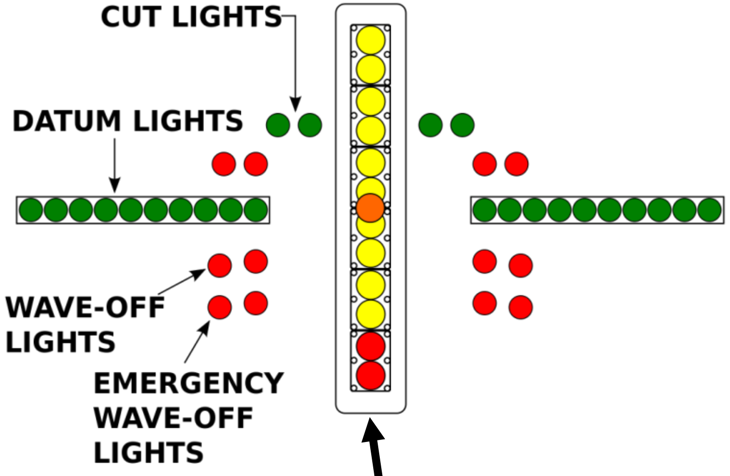




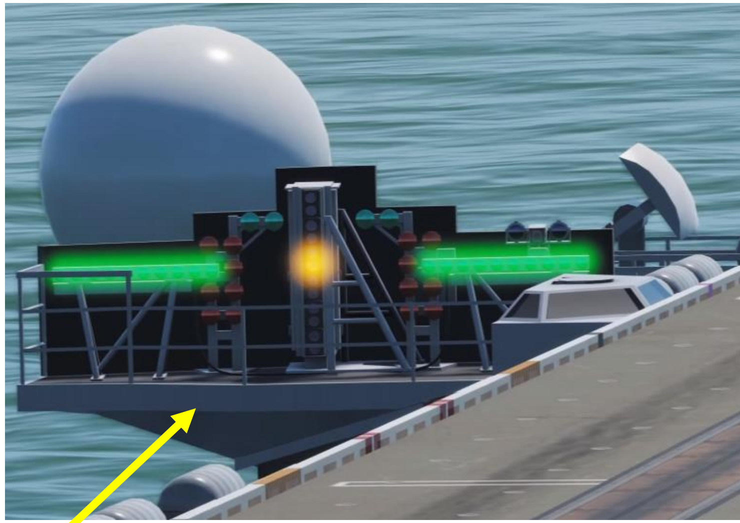
CARRIER LANDING CASE I RECOVERY

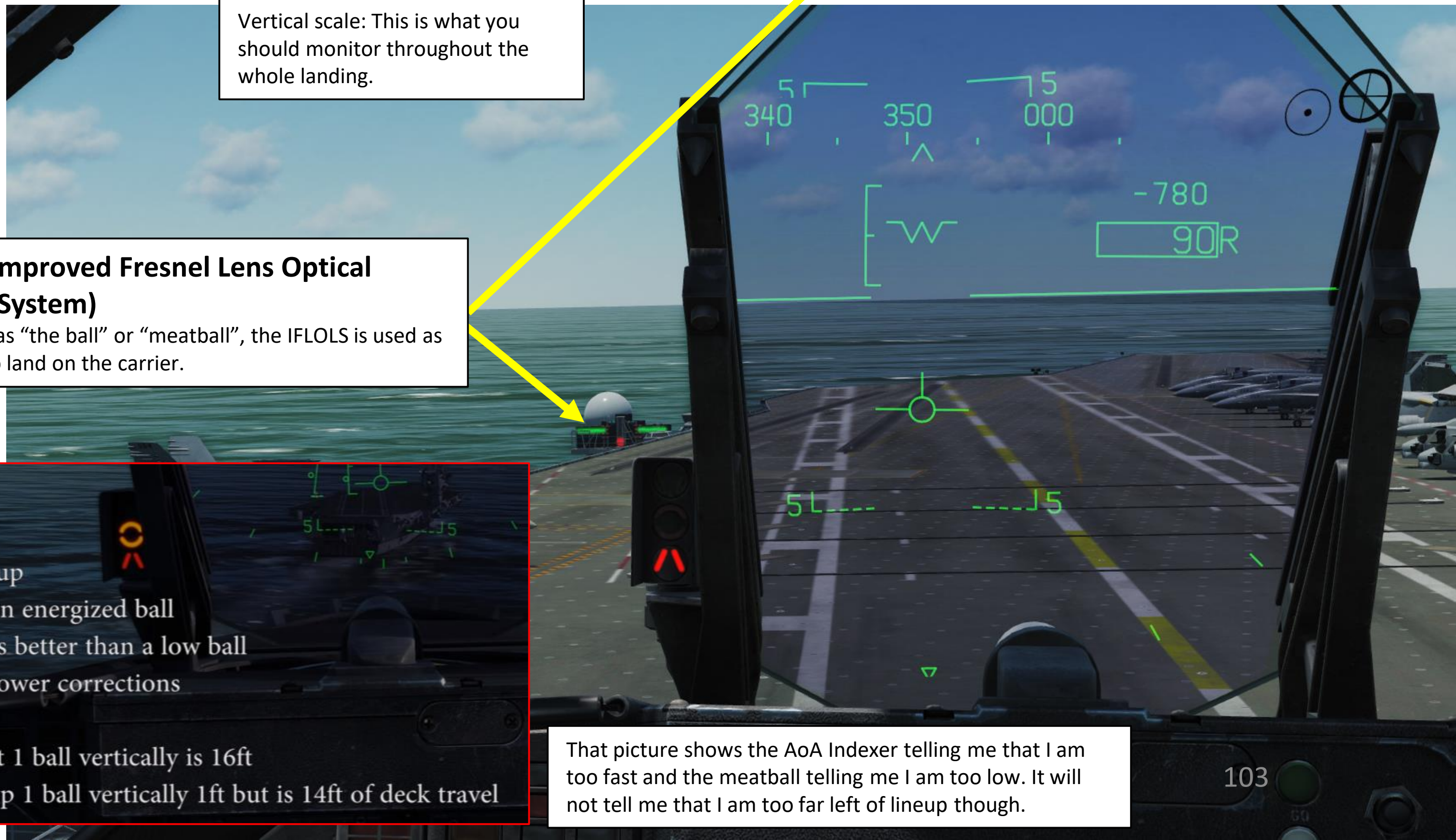
But what is "**the ball**" (or "meatball"), exactly? In fact, it's the IFLOLS (Improved Fresnel Lens Optical Landing System), which acts a bit like PAPI lights but for aircraft carriers. The color of the lights you see will depend on what your angle with the lights and will tell you your glide slope, or in other words "if you need to add or reduce power". The lights that will matter the most are the vertical center lights.

- If you see the bottom red lights ("Atomic Sunrise"), you're about to hit the back of the ship. Throttle up and go around!
- If you see a centered orange light, you're on the ball and should catch a wire.
- If the ball is high, this means you should reduce power very slightly.
- If the ball is low, you need to add power
- Avoid making large power corrections and stay lined up as much as possible.
- Overall, keep your eyes glued to your AoA Indexer and the "ball". It will tell you what to do.

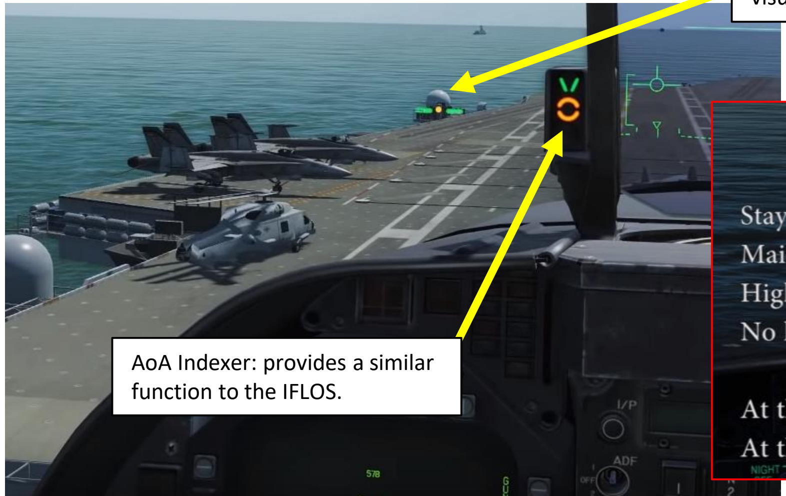


Vertical scale: This is what you should monitor throughout the whole landing.





IFLOLS (Improved Fresnel Lens Optical Landing System)
Also called as "the ball" or "meatball", the IFLOLS is used as visual aid to land on the carrier.



AoA Indexer: provides a similar function to the IFLOS.

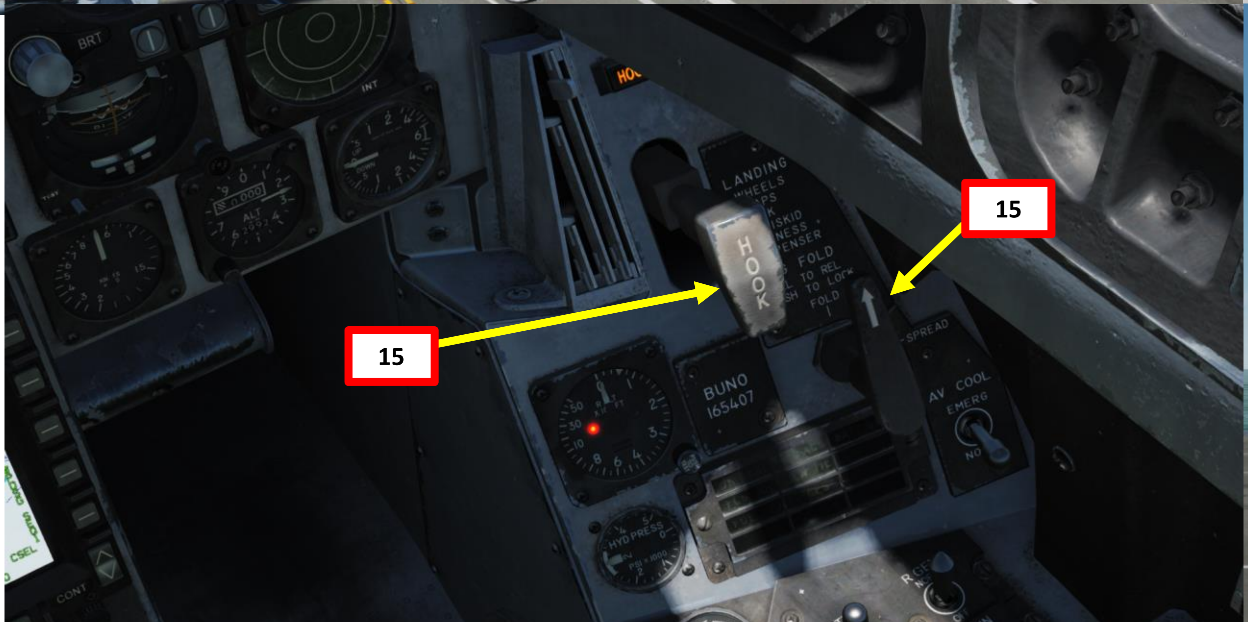
That picture shows the AoA Indexer telling me that I am too fast and the meatball telling me I am too low. It will not tell me that I am too far left of lineup though.

CARRIER LANDING
CASE I RECOVERY

CARRIER LANDING
CASE I RECOVERY

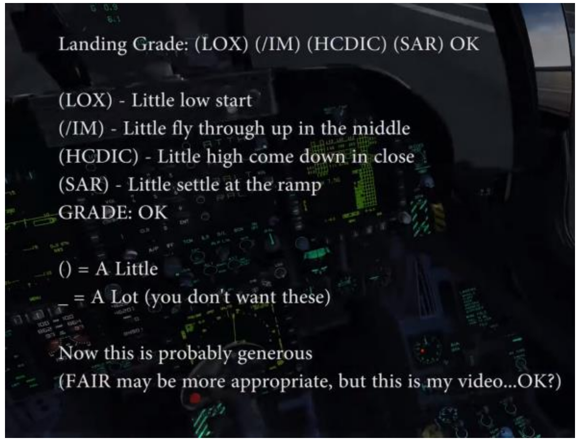
13. You should aim for the third arrestor wire. First and second wires indicate a short landing, while the fourth wire indicates a long landing.
14. Once you touch the deck, throttle up to MIL power (just before afterburner detent). This will make sure that you have enough power to go around if your hook misses an arrestor wire (this is what we call a “bolter”) or you catch a wire and it snaps.
15. Once the aircraft has come to a full stop, throttle down, raise arrestor hook, set flaps UP, fold wings and taxi to the nearest parking area. The WING FOLD lever needs to be pulled first (scroll mousewheel), then rotated left to FOLD (left click).

CARRIER LANDING
CASE I RECOVERY



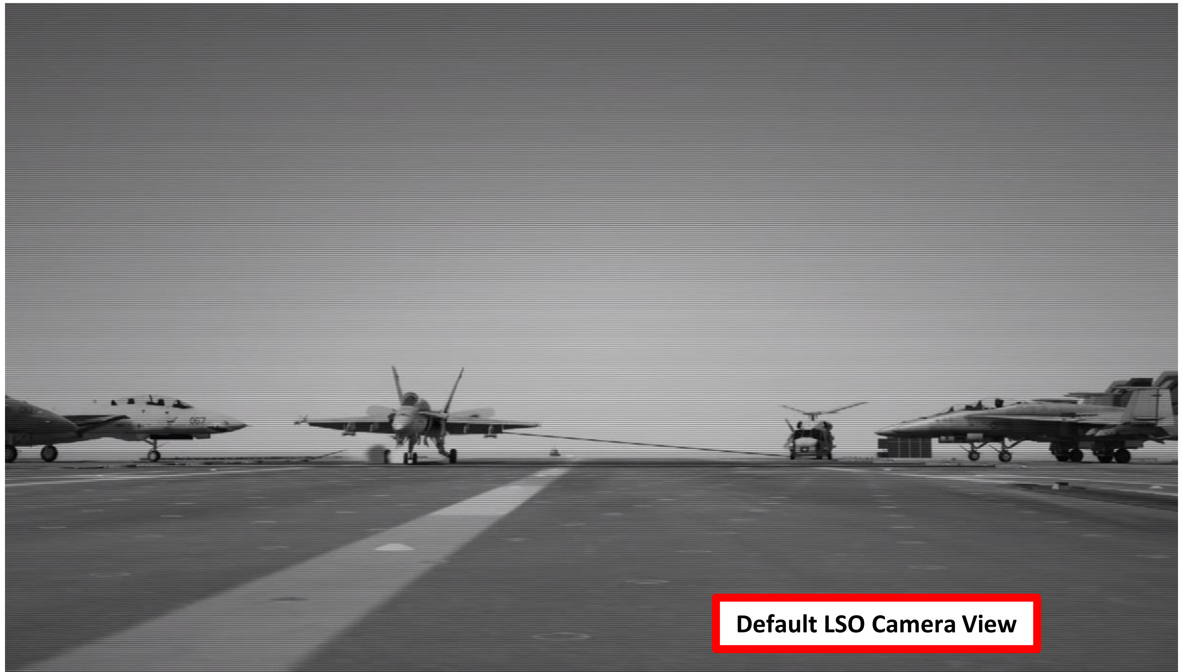
CARRIER LANDING
LSO (LANDING SIGNAL OFFICER)

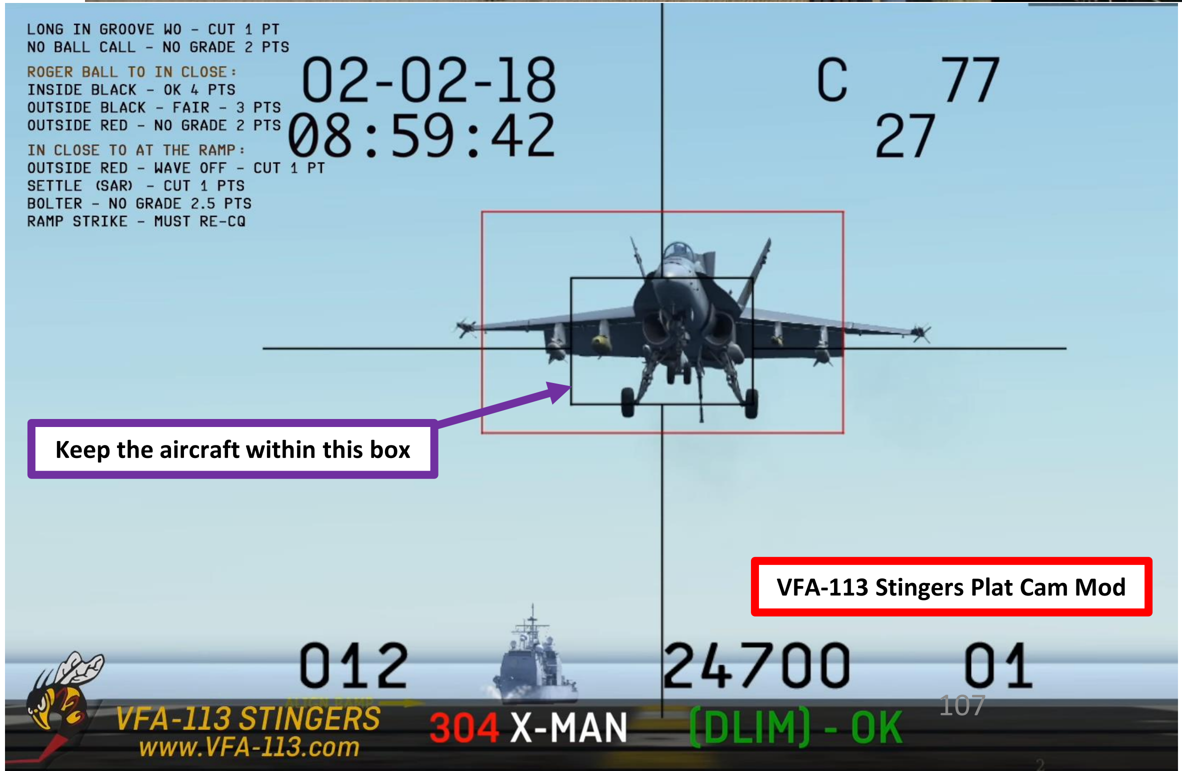
You can also roleplay in multiplayer as the "**LSO**" (Landing Signal Officer), you can! You can select the LSO camera by pressing "LALT+F9". The camera can be moved and zoomed in or out using LCTRL+[Numpad *] or LCTRL+[Numpad /]



You can help the pilot line up properly for landing by giving him corrective commands like "Come right for lineup, Come Left, You're high, (Add) Power". Once the pilot has landed, you can also give him a "grading" based on how he landed.

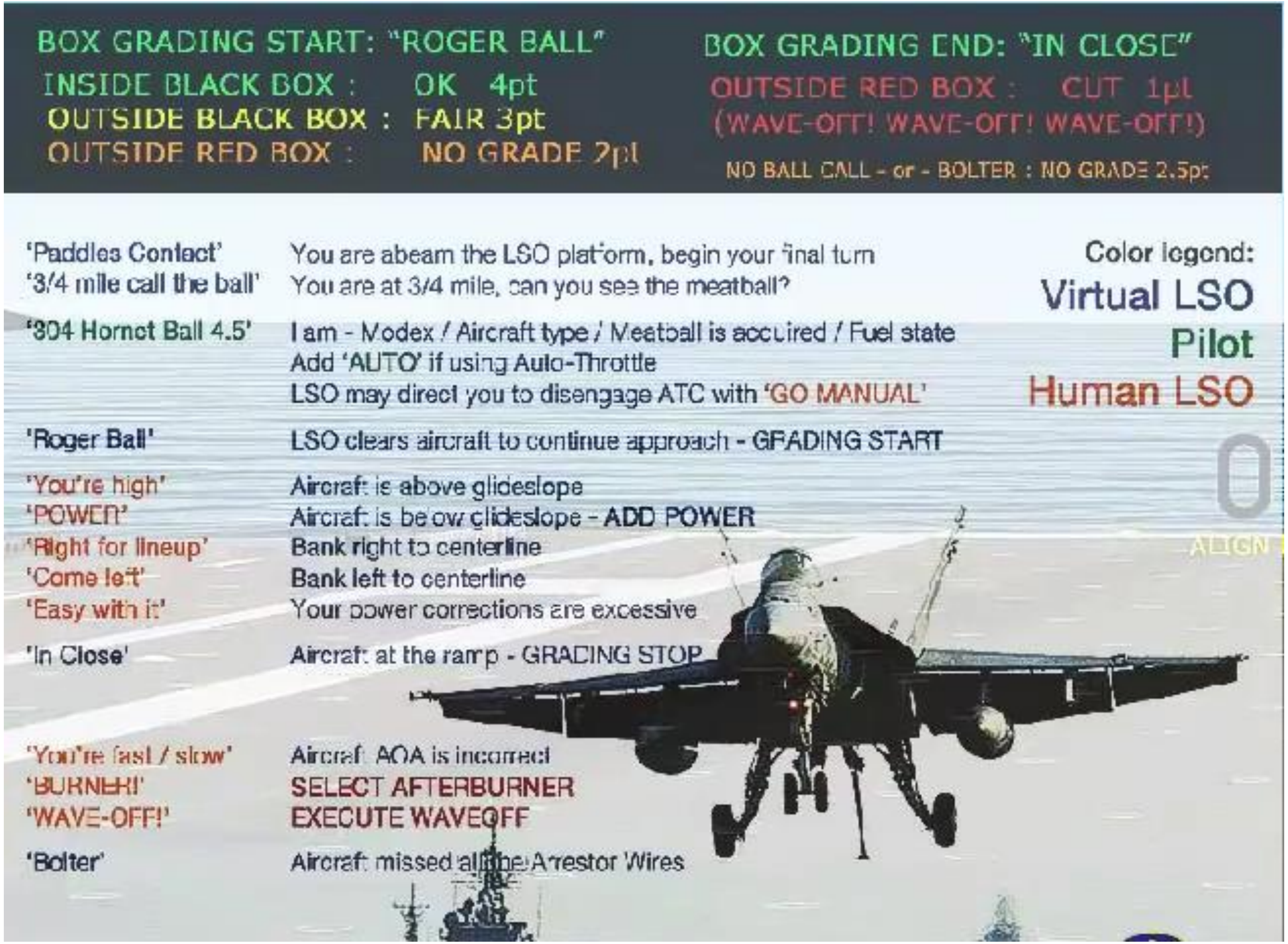
There is a cool LSO mod by the VFA-113 Stingers that gives you a slick overlay:
LSO Mod Link: www.VFA-113.com
LSO Mod Video: https://www.youtube.com/watch?v=vDG1_v1CJVI





CARRIER LANDING
LSO COMMUNICATIONS & GRADING

The VFA-113 Stingers have a short course on LSO & Carrier Landing Grading
LSO Training Course Link: https://youtu.be/BbMw4PcvMyY

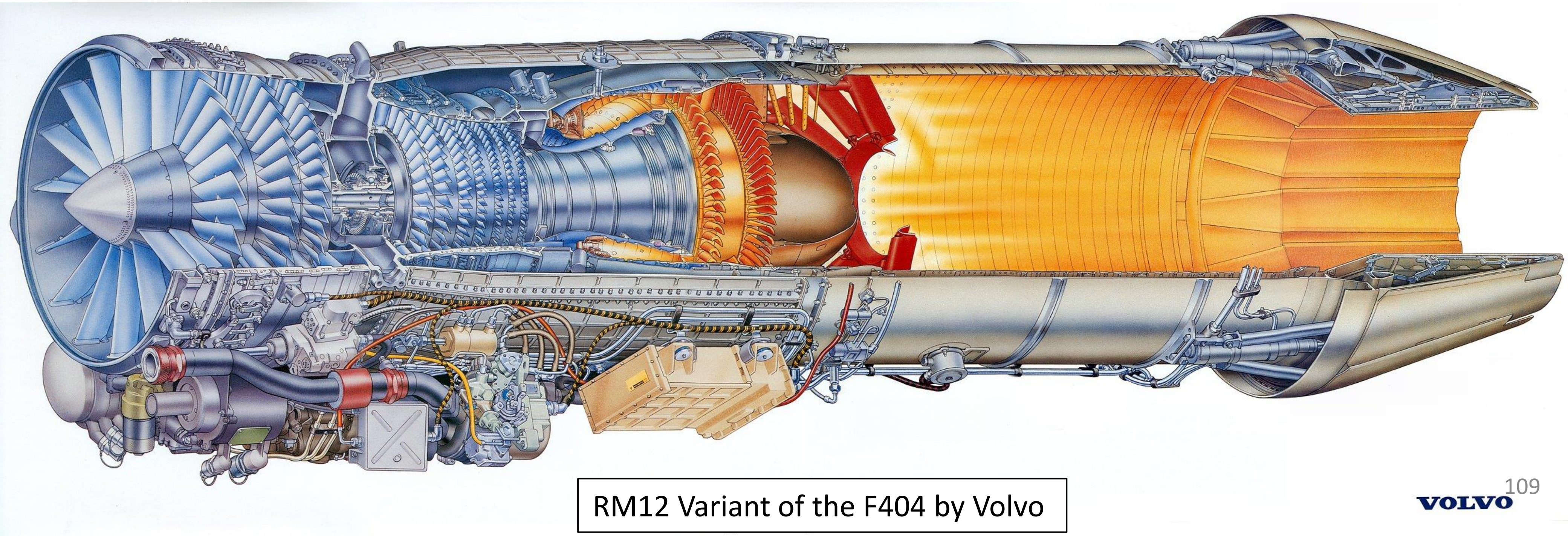


GENERAL ELECTRIC **F404**-GE-402 ENGINE

The Legacy “Charlie” Hornet is powered by two General Electric F404-GE-402 afterburning turbofan engines, which are able to provide 11,000 lbf (49 kN) of thrust each dry, 17,750 lbf (79.0 kN) with afterburner.

GE developed the F404 for the F/A-18 Hornet, shortly after losing the competition for the F-15 Eagle's engine to Pratt & Whitney, and losing the Lightweight Fighter (LWF) competition to the Pratt & Whitney F100 powered YF-16. For the F/A-18, GE based the F404 on the YJ101 engine they had developed for the Northrop YF-17, enlarging the bypass ratio from .20 to .34 to enable higher fuel economy. The engine was designed with a higher priority on reliability than performance. Cost was the main goal in the design of the engine.

GE also analyzed "throttle profiles" and found that pilots were changing throttle settings far more often than engineers previously expected; putting undue stress on the engines. GE also sought with the F404 a design that would avoid compressor stalls and other engine failures, and would respond quickly to control inputs; a common complaint of pilots converting from propeller planes to jets were that early turbojets were not responsive to changes in thrust input. Due to a fan designed to smooth airflow before it enters the compressor, the F404 has high resistance to compressor stalls, even at high angles of attack. It requires less than two shop visits per 1,000 flight hours and averages 6,500 hours between in-flight events. It also demonstrates high responsiveness to control inputs, spooling from idle to full afterburner in 4 seconds. The engine contains an in-flight engine condition monitoring system (IECMS) that monitors for critical malfunctions and keeps track of parts lifetimes.



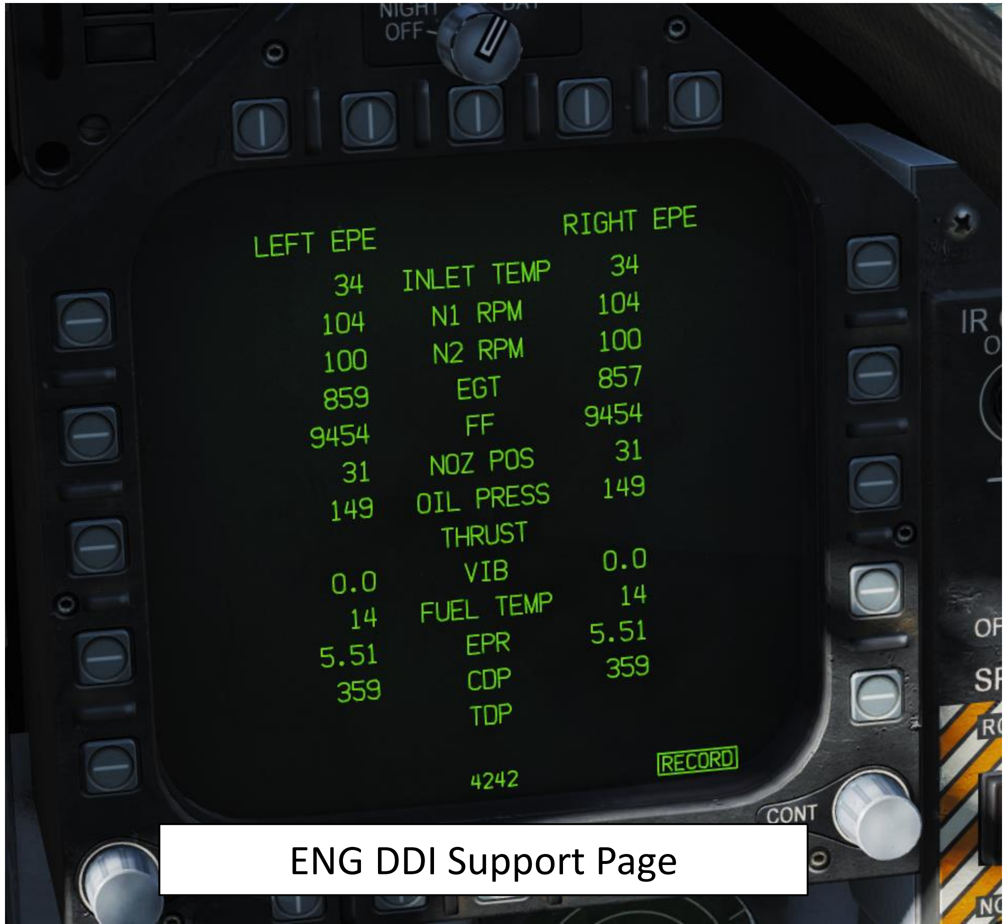
RM12 Variant of the F404 by Volvo

GENERAL ELECTRIC **F404**-GE-402 ENGINE

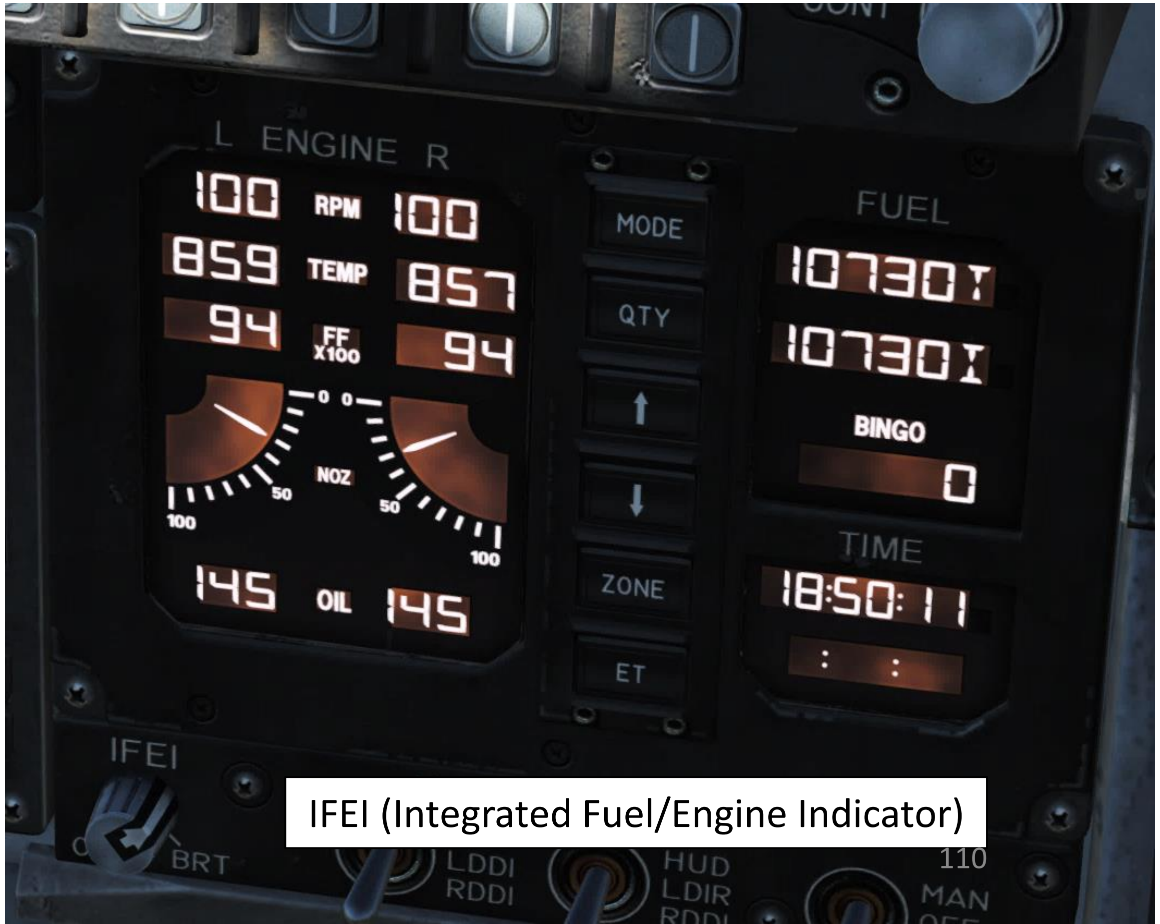
Keep in mind that even if the engine response is qualified as “quick” by modern standards, the engine spool time has a non-negligible lag time. This becomes apparent when landing on a carrier, where throttle input is critical in order to control your descent and glide slope.

Another peculiarity of the Hornet is that the reheaters (afterburners) can only be monitored with the nozzle angle and the afterburner sounds. The fuel flow indication does **not** give you the added fuel flow injected to the jet pipe downstream of (i.e. after) the turbine to the afterburner section. You can monitor engine parameters on the DDI ENG Support page and on the IFEI (Integrated Fuel/Engine Indicator) panel.

Additionally, the ATC (Automatic Throttle Control) system is a two-mode auto-throttle system that automatically maintains angle of attack (approach mode) or airspeed (cruise mode) by modulating engine thrust in the range of FLIGHT IDLE through MILITARY power. We will come back to the ATC in the « Autopilot » section of this guide.

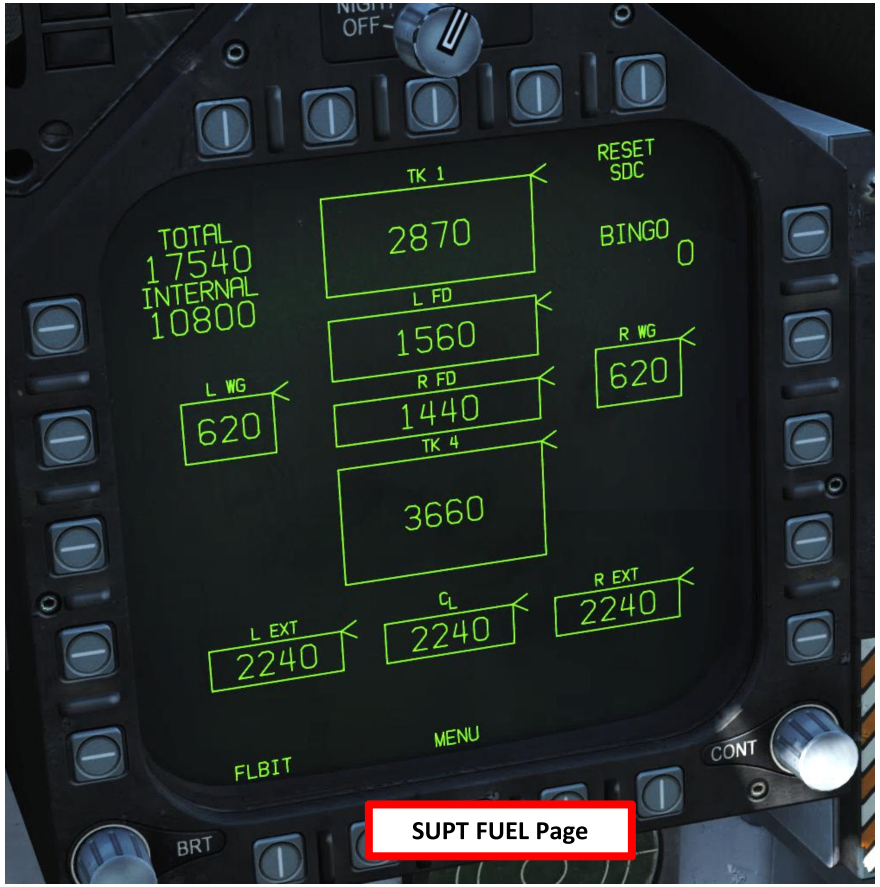


ENG DDI Support Page

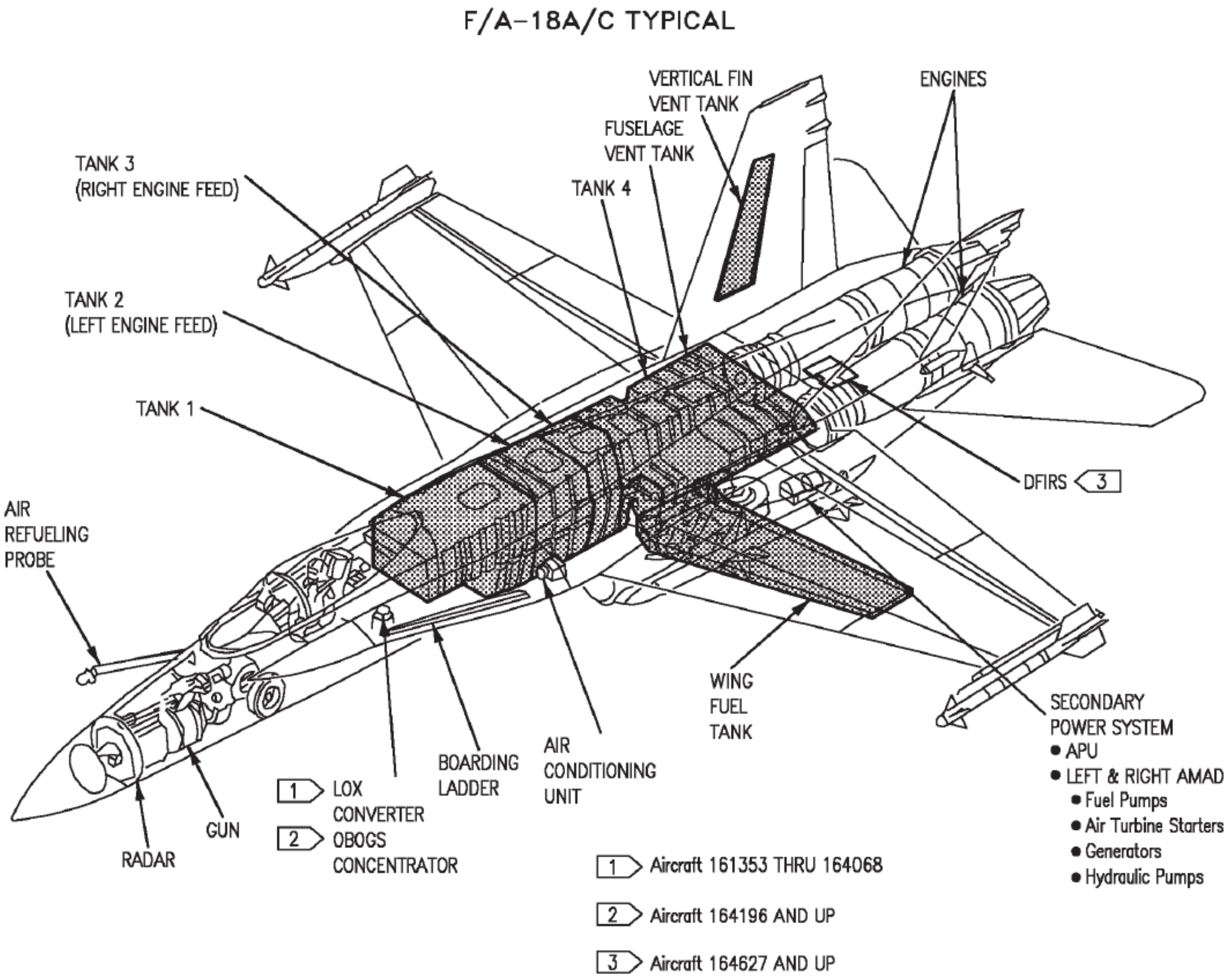


IFEI (Integrated Fuel/Engine Indicator)

FUEL SYSTEM OVERVIEW



FUEL TANK	DESCRIPTION
TK 1	Fuselage Fuel Tank (No. 1)
L/R FD	Left/Right Fuselage Engine Feed Tanks (No. 2 & 3)
TK 4	Fuselage Fuel Tank (No. 4)
L/R WG	Left/Right Wing (Wet) Fuel Tank
L/R EXT	Left/Right External Fuel Tanks
CL	Centerline External Fuel Tank



ENGINE RELIGHT PROCEDURE

If one of your engines happens to flame out during flight, you can restart it using a cross-bleed start. Bleed air is compressed air used for (among other things) engine start, and is normally provided for starting by the APU (Auxiliary Power Unit). Cross-bleed simply means air supplied across from one running engine to start the other.

1. Set flamed out engine throttle to IDLE or above.
2. Adjust aircraft airspeed to 350 kts or more. Maintaining a high airspeed will allow windmilling (air flow driving the engine compressor blades) to maintain an engine RPM between 12 % and 45 %, facilitating engine start. Windmill restart attempts made after RPM has degraded to 0 % may require up to 450 kts to obtain 12 % RPM for ignition.
3. Make sure that you are flying below 25000 ft.
4. Set ENG CRANK Switch to start flamed out engine
5. In case of a failed engine cross-bleed start, an engine restart with the APU as the bleed air source can be use as the last alternative.

FCS: Flight Control System

The primary flight controls are the ailerons, twin rudders, differential/collective leading edge flaps, differential/collective trailing edge flaps and differential/collective stabilators. position the control surfaces. Stick and rudder feel are provided by spring cartridges. Although there is no aerodynamic feedback to the stick and rudder pedals, the effect is simulated by flight control computer scheduling of control surface deflection versus pilot input as a function of flight conditions.

Normally, inputs to the hydraulic actuators are provided by the two flight control computers (FCC A and FCC B) through the full authority control augmentation system (CAS). A direct electrical link (DEL) automatically backs up the CAS. DEL is normally a digital system but has an analog mode for backup aileron and rudder control. If digital DEL fails, a mechanical link (MECH) automatically provides roll and pitch control through a direct mechanical input from the stick to the stabilator actuators. MECH bypasses both flight control computers and the stabilator actuator servo valves.

Flight control deflections can be monitored on the DDI FCS (Flight Control System) page. This page monitors all four FCS channels and "X"s means a sub-system channel failure, or when the control surfaces droop after the aircraft has been on the ground for a while. In that case, the FCS RESET button resets these faults.

G LIMITER

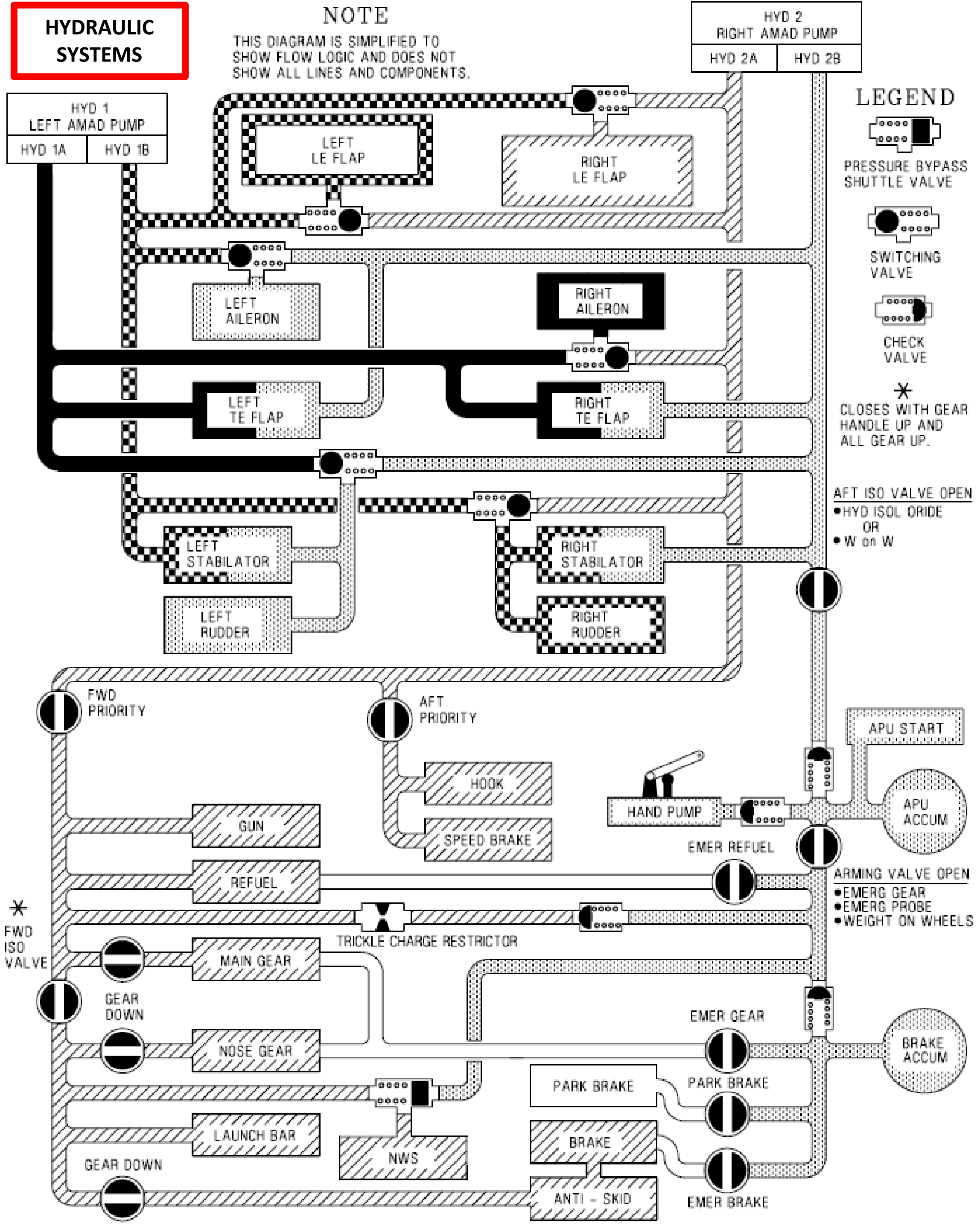
The F/A-18 has a "G Limiter", which can override flight controls to prevent the exceedance of any load limit.

- The aircraft design load limit is +7.5 g at 32,357 lbs gross weight
- Below 44,000 lbs gross weight, the positive symmetrical command limit is calculated based on fuel state and stores loading.
- Above 44,000 lbs gross weight, the positive symmetrical command limit is fixed at +5.5 g.
- Negative symmetrical command limit is fixed at -3.0 g at all gross weights and stores loading

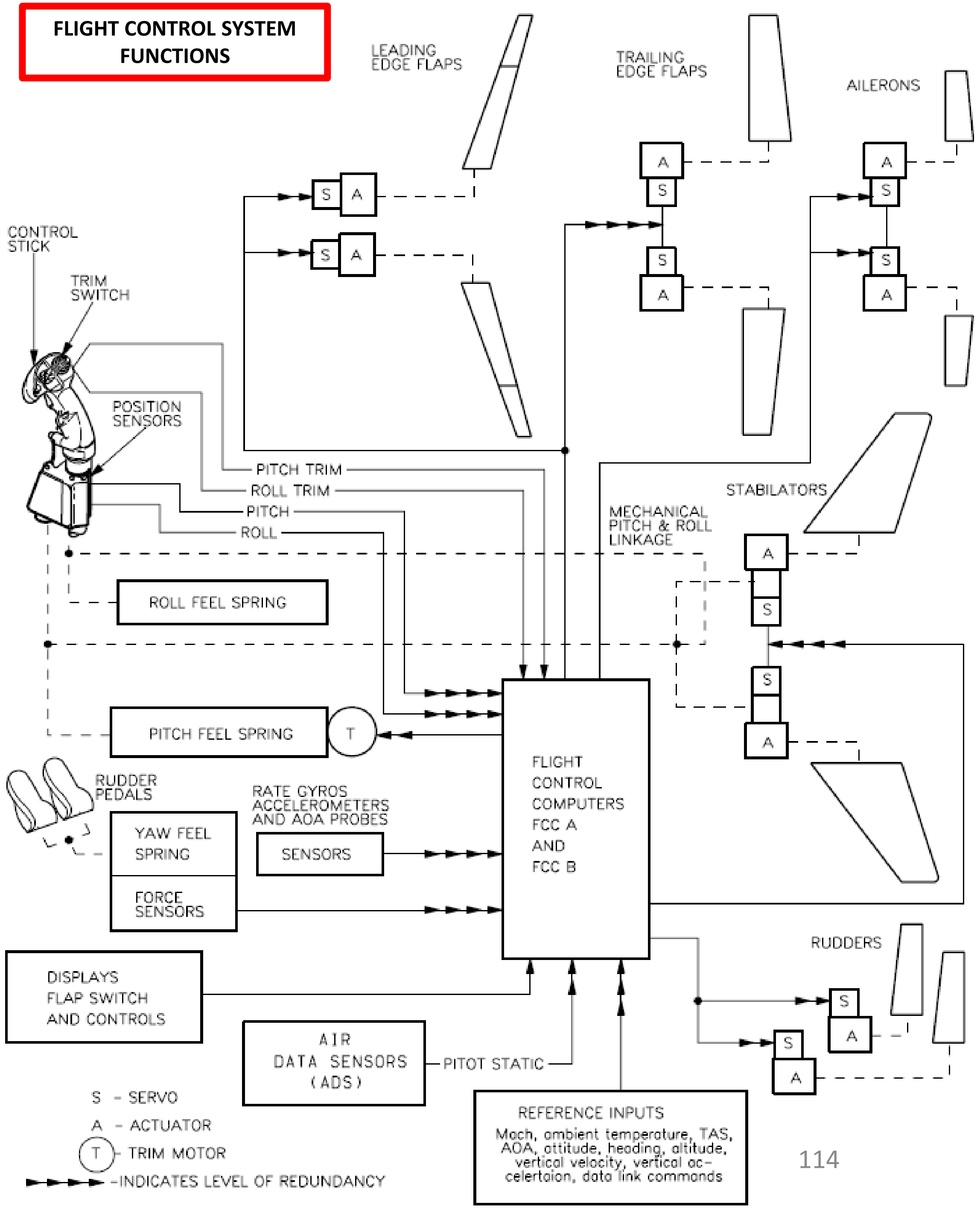
Note: the G Limiter can be overridden by momentarily pressing the paddle switch with the control stick near full aft. Command limit G is then increased by 33 %. A G-LIM OVRD caution is displayed and the MASTER CAUTION light and tone come on.

Paddle Switch
(Nosewheel steering disengage, Autopilot disengage & G-limiter override switch)

HYDRAULIC SYSTEMS



FLIGHT CONTROL SYSTEM FUNCTIONS



SRM (SPIN RECOVERY MODE)

The spin recovery system, when engaged, puts the flight controls in a spin recovery mode (SRM), which gives the pilot full aileron, rudder and stabilator authority without any control surface interconnects. The leading edge flaps are driven to 33 deg down and the trailing edge flaps are driven to 0 deg. The SRM will also give you a stick direction to recover from the spin.

If Spin Recovery Switch is in NORM, spin recovery mode is engaged when:

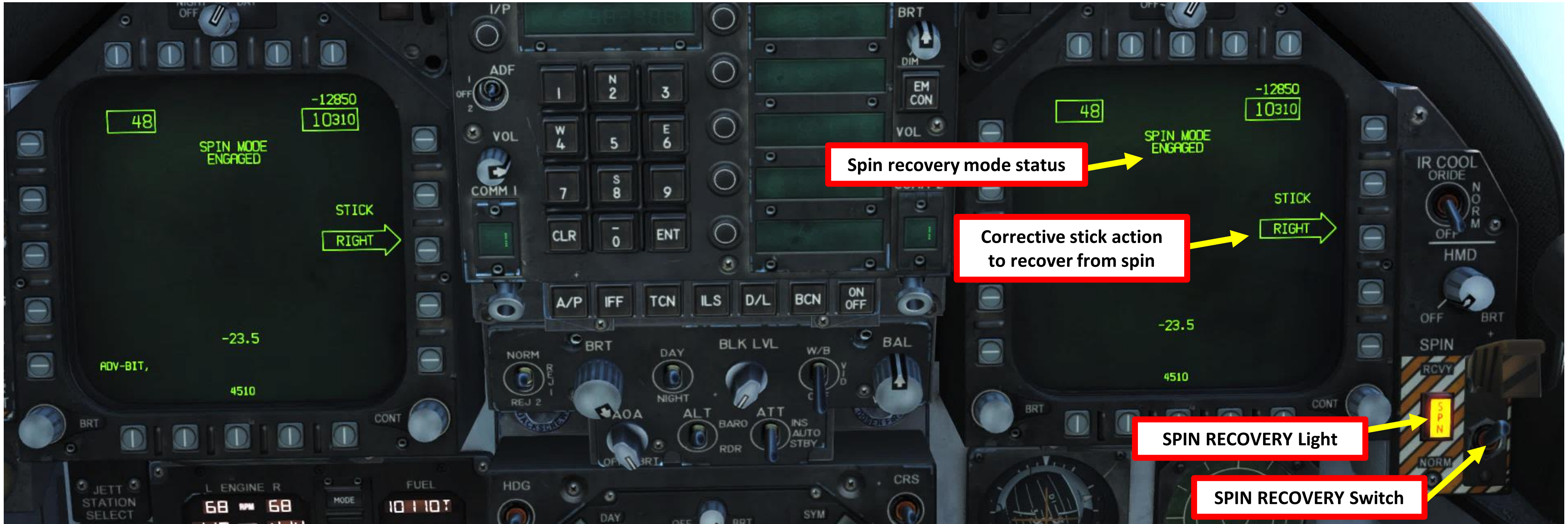
- Airspeed is at 120 +/- 15 kts
- Sustained, uncommanded yaw rate
- Stick is placed in the direction indicated on the DDI spin recovery display

Note: The flight controls revert to CAS (Control Augmentation System) any time the stick is placed in the wrong direction (i.e. prospin), the airspeed increases above 245 kts or the yaw rate decreases to less than 15 deg / sec.

If Spin Recovery Switch is in RCVY, spin recovery mode is engaged when:

- Airspeed is at 120 +/- 15 kts

Note: The flight controls revert to CAS when airspeed increases above 245 knots, but full authority prospin controls can be applied with the switch in RCVY and spin mode engaged.



FPAS (Flight Performance Advisory System)

The FPAS advises the pilot of the altitude and airspeed corresponding to maximum inflight fuel efficiency based on current operating conditions. The range and airspeed data provided by FPAS appears on the FPAS DDI page from the SUPT menu. The page is divided into five data areas and two select options.

Data Areas:

- ***Current Range***:
  - First Line: Current range of the aircraft until only 2,000 lbs. of fuel remains based on the current altitude and Mach.
  - Second Line: Best Mach to fly to extend range at the current altitude
  - Third Line: Calculated range if the aircraft is flown at the optimal Mach at the current altitude.
- ***Current Endurance***:
  - First Line: Time in hours:minutes the aircraft can fly at the current Mach and altitude.
  - Second Line: Optimal Mach to fly to maximize flight endurance time at the current altitude.
  - Third Line: Light endurance time if the aircraft is flown at best Mach at the current altitude.
- ***Optimal Range***:
  - Altitude and Mach at which to fly to achieve maximum range to 2,000 or 0 lbs. of fuel remaining.
- ***Optimal Endurance***:
  - Altitude and Mach to fly to achieve the maximum flight endurance time in hours:minutes to 2,000 or 0 lbs. of fuel remaining.
- ***TACAN and Waypoint Navigation To***:
  - Time to reach, fuel remaining in lbs, and fuel burn rate as lbs per nautical mile of a selected TACAN station or waypoint.

FPAS (Flight Performance Advisory System)

Note: To have data displayed in the NAV TO field, make sure you either have a valid WYPT (Waypoint) or a TCN (TACAN) selected (boxed).

FPAS (Flight Performance Advisory System)

Options:

- ***Optimal Climb Selection***:
    - When the CLIMB option is boxed by pressing the OSB (Option Select Button) next to it, the optimal climb airspeed is displayed above the airspeed box on the HUD.
- ***Home Fuel Selection***:
    - Using the up and down arrows on OSBs next to HOME arrows, you may designate any waypoint as the HOME location. Generally, you would want to set this as your landing waypoint. When it is calculated that 2,000 lbs. of fuel would remain upon reaching the location, the Master Caution will activate, and the HOME FUEL caution is displayed on the DDI.

SECTION STRUCTURE

- 1 - Sensors
  - Introduction to Sensors
  - Sensors Display Selection
  - HMD (Helmet-Mounted Display)
  - My Sensors Control Setup

- 2 - AN/APG-73 Radar
  - Air-to-Air Radar Display
  - Air-to-Air Radar Main Modes
  - Air-to-Air Radar RWS Mode
  - Air-to-Air Radar TWS Mode
  - Air-to-Air Radar LTWS Mode
  - Air-to-Air Radar ACM Mode
  - Radar Lingo and Terminology

- 3 - AN/AAQ-28(V) LITENING II Targeting Pod
  - Introduction
  - Displays
  - Controls
  - Start-Up & Lasing Procedure
  - Laser Spot Search Mode
  - Laser Marking
  - Targeting Pod Tips

- 4 - AGM-65F/G Maverick Air-to-Ground Missile (IR-MAVF)
  - Displays
  - Controls

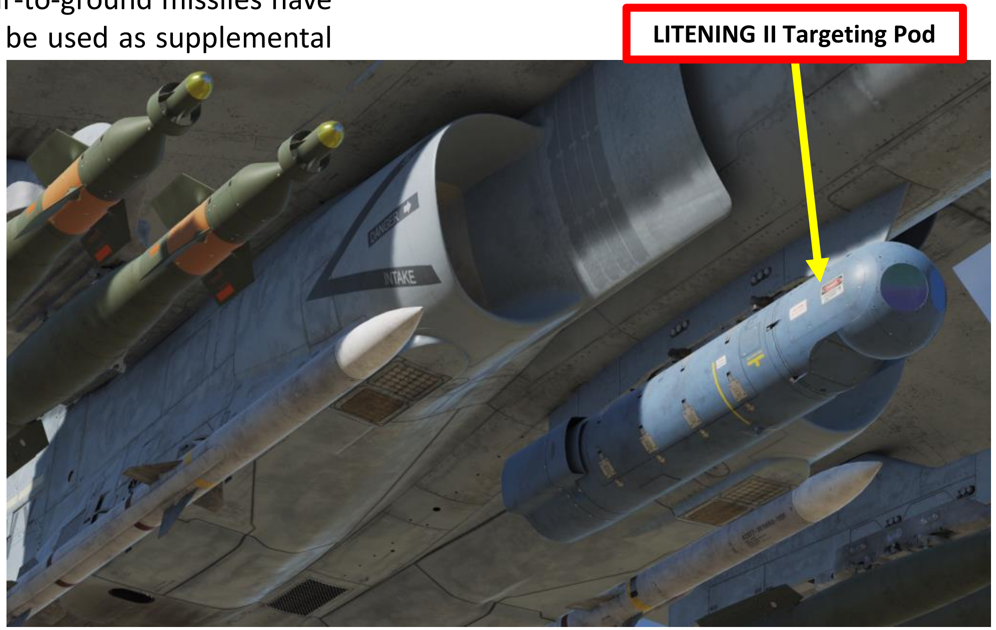
1 - INTRODUCTION TO SENSORS

The F/A-18C Hornet is by definition one of the most versatile aircraft when it comes to armament and sensors. Sensors will come gradually as Early Access goes on, so this section will be fleshed out as updates from Eagle Dynamics come. Here is an overview of how the Hornet can “see” the outside world.

- **AN/APG-73 Air-to-Air Radar**: pulse-Doppler, look-down/shoot-down radar with both BVR (Beyond Visual Range) and close in ACM (Air Combat Maneuvering) modes of operation.
    - Modes currently implemented are RWS (Range While Scan), STT (Single Target Track) and ACM (Air Combat Maneuvering).

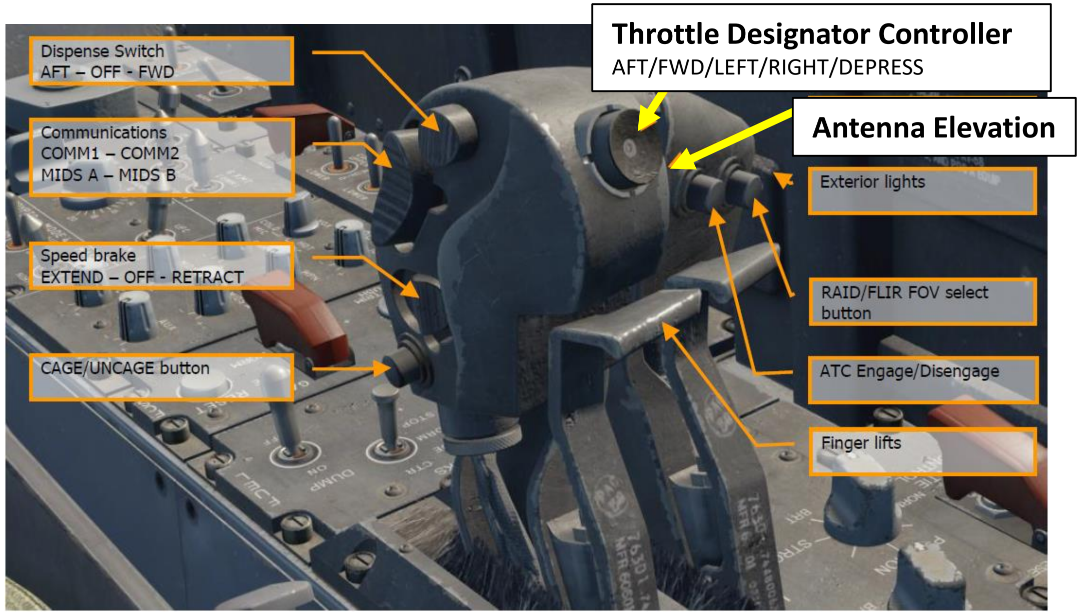
- **AN/ASQ-228 ATFLIR / AN/AAQ-28(V) LITENING II Targeting Pod**: Targeting system developed to provide precision strike capability. Target designation is achieved by using a laser designator/range finder or an infrared laser marker, which can be created by the pod itself. It is also capable of displaying a FLIR (Forward-Looking Infrared) thermal imagery.

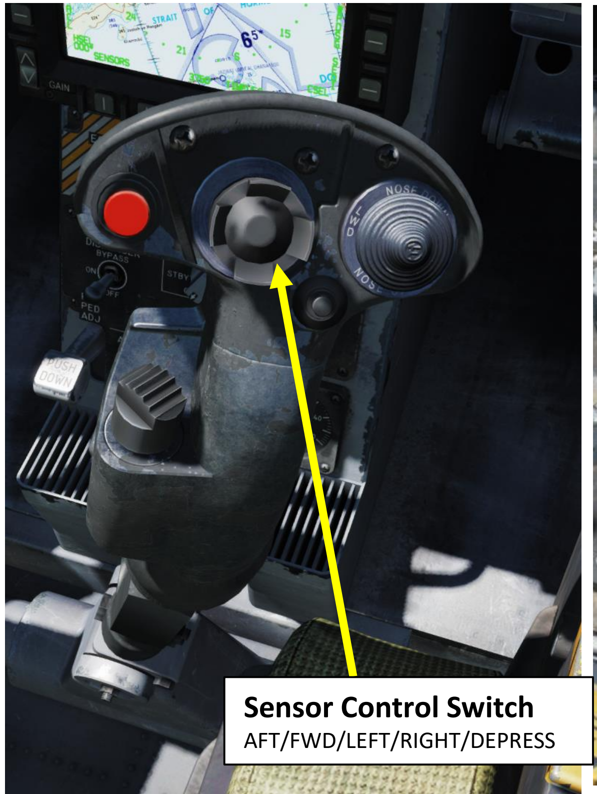
- **AMG-65F/G Maverick** Seeker Head feed: Maverick air-to-ground missiles have seeker heads that have video capability and that can be used as supplemental sensors.

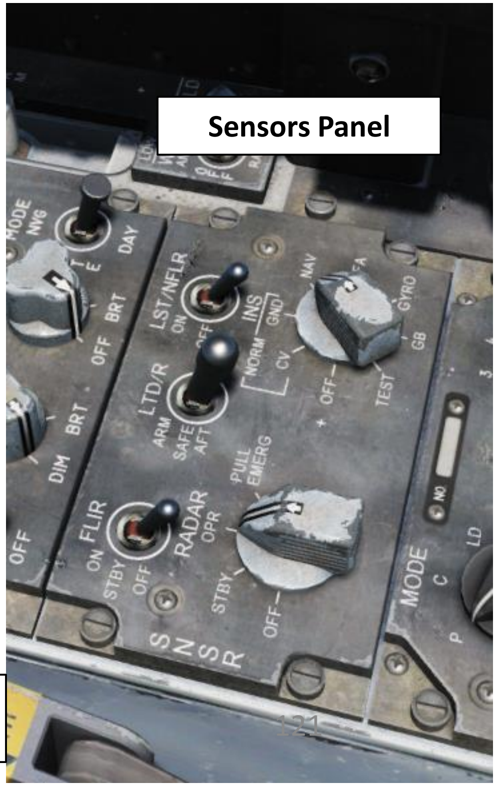


1 - INTRODUCTION TO SENSORS

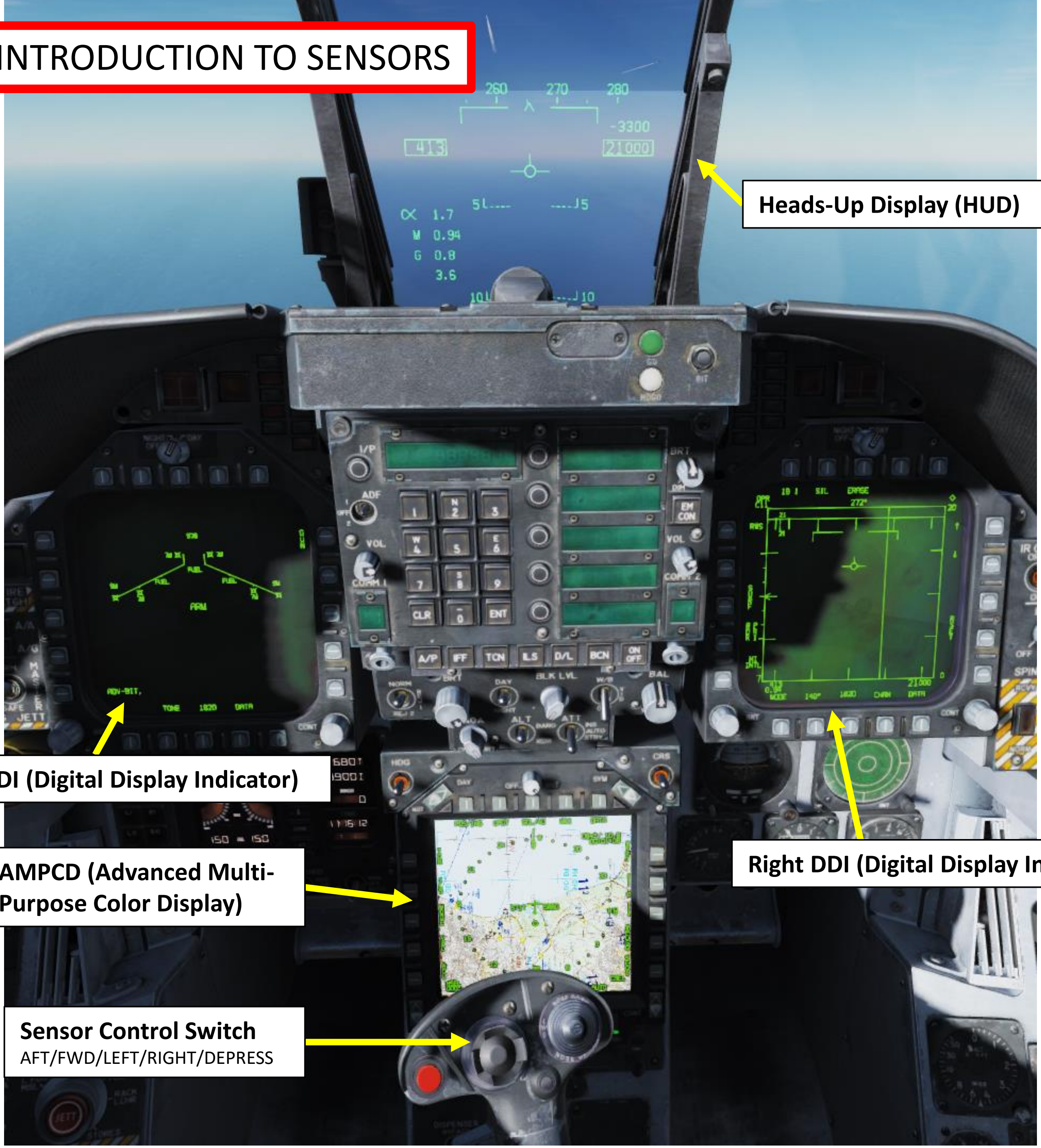
This section will introduce you to various sensors. You will get the « what », but the « how » will be demonstrated later in the Weapons section since the use and application of sensors will make more sense to you once you start using them for a specific purpose. Just keep in mind that your sensors can be monitored from the HUD (Heads-Up Display) and various displays, while they can be operated from the HOTAS stick and throttle.







1 - INTRODUCTION TO SENSORS



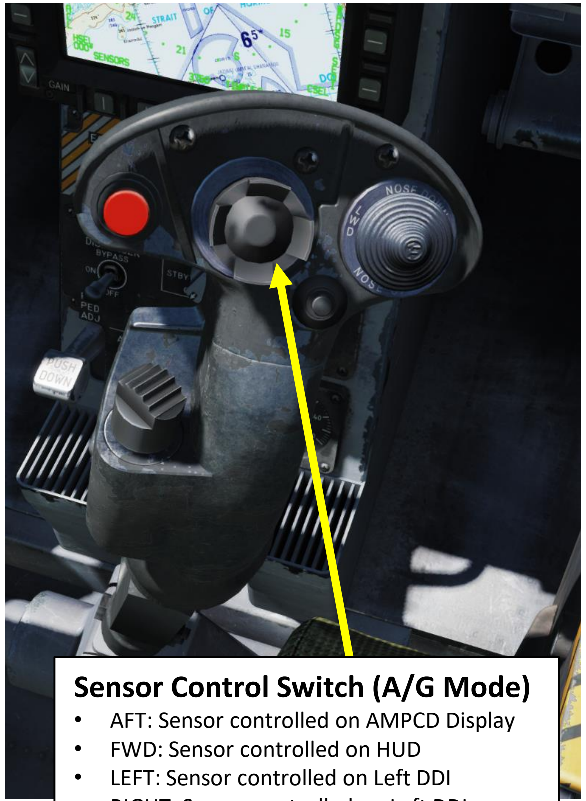
RDR ATTK (RADAR) TAC PAGE

1 - SENSOR DISPLAYS SELECTION

For those familiar with the A-10C Warthog, the Sensor Control Switch is similar to setting a SOI (Sensor of Interest).

- In A/G (Air-to-Ground) mode the switch selects your primary sensor on the displays.
- In A/A (Air-to-Air) Mode it selects your acquisition type.

Selecting a particular display allows you to us the TDC cursor and you can tell that sensor is active by the little diamond that displays in the upper right corner of the DDIs

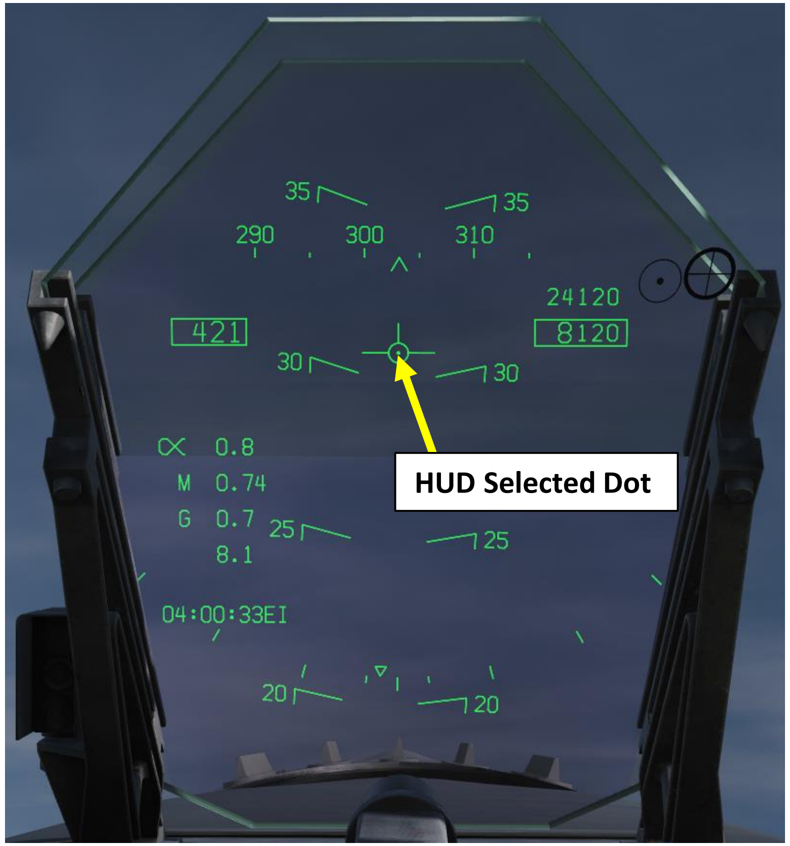


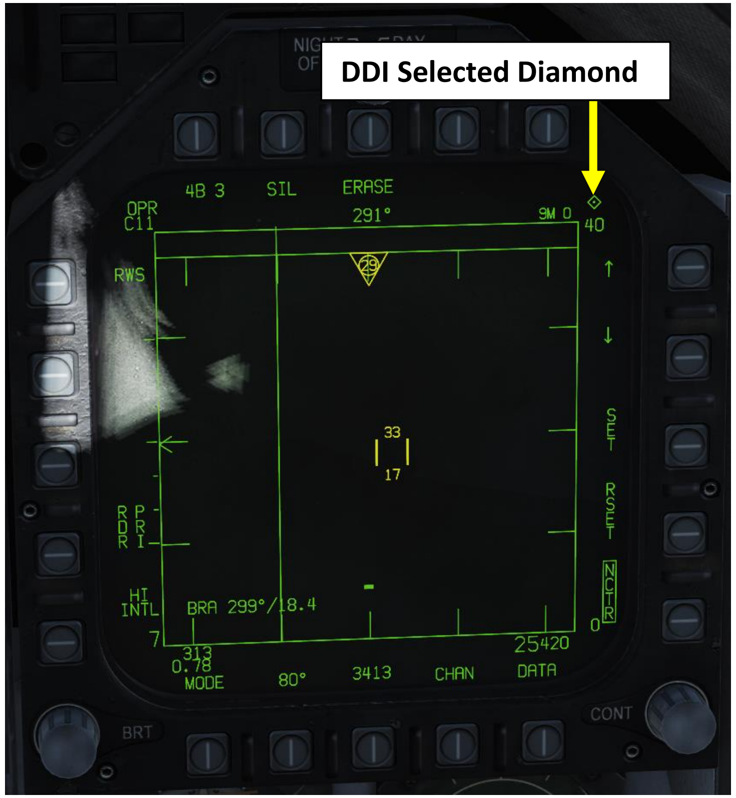
Sensor Control Switch (A/G Mode)

- AFT: Sensor controlled on AMPCD Display
- FWD: Sensor controlled on HUD
- LEFT: Sensor controlled on Left DDI
- RIGHT: Sensor controlled on Left DDI

Sensor Control Switch (A/A Mode)

- AFT: VACQ Mode
- FWD: Bore Sight Mode
- LEFT: WACQ Mode
- RIGHT: AACQ Mode



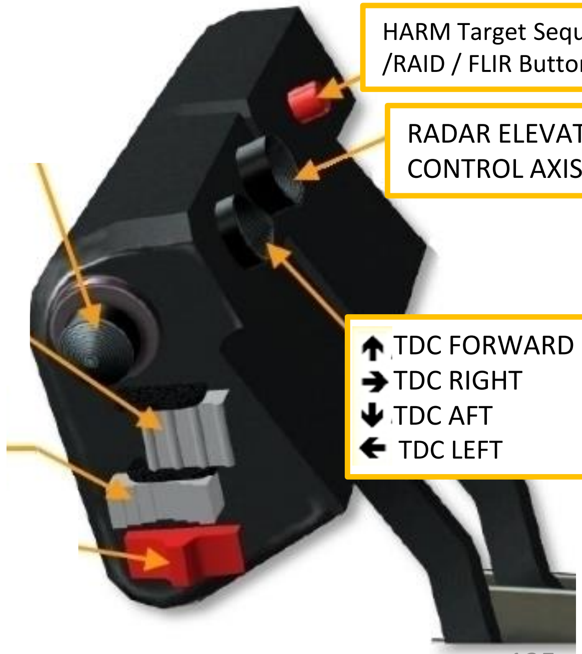


1 - HMD (HELMET-MOUNTED DISPLAY)

The HMD (Helmet-Mounted Display) can be used by turning the HMD Brightness Control Switch to BRT. The JHMCS (Joint Helmet-Mounted Cueing System) allows the pilot to project the Heads-Up Display in his field of vision at all times. It also allows the slaving of sensors and weapons to the helmet's line of sight.

In the Hornet, the JHMCS is very useful for using missiles like the AIM-9X, an upgraded version of the AIM-9 with TVC (Thrust Vectoring Control) allowing 80 deg off-boresight shots.

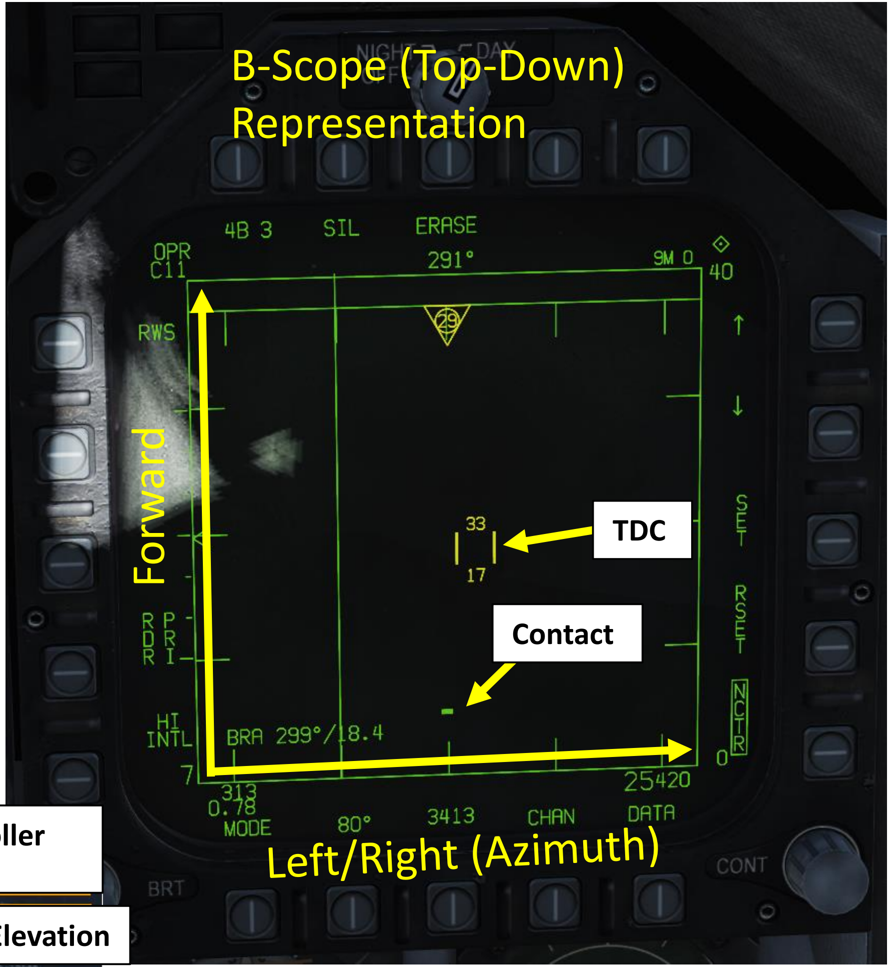
1 - MY SENSORS CONTROL SETUP

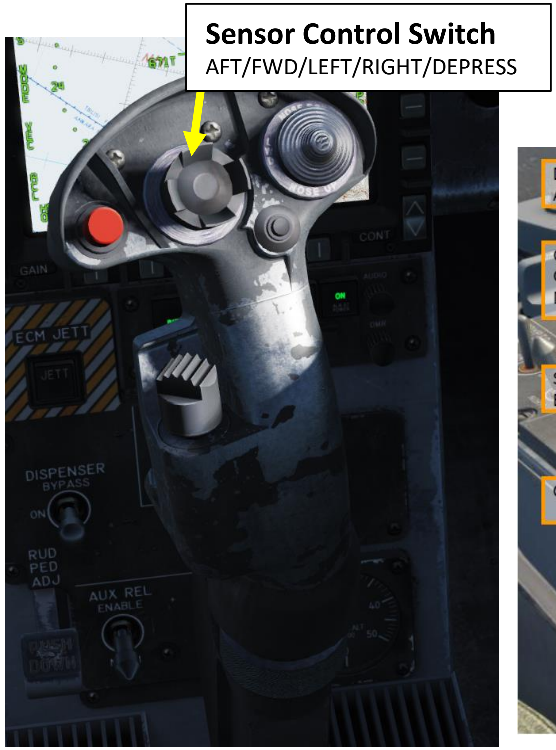


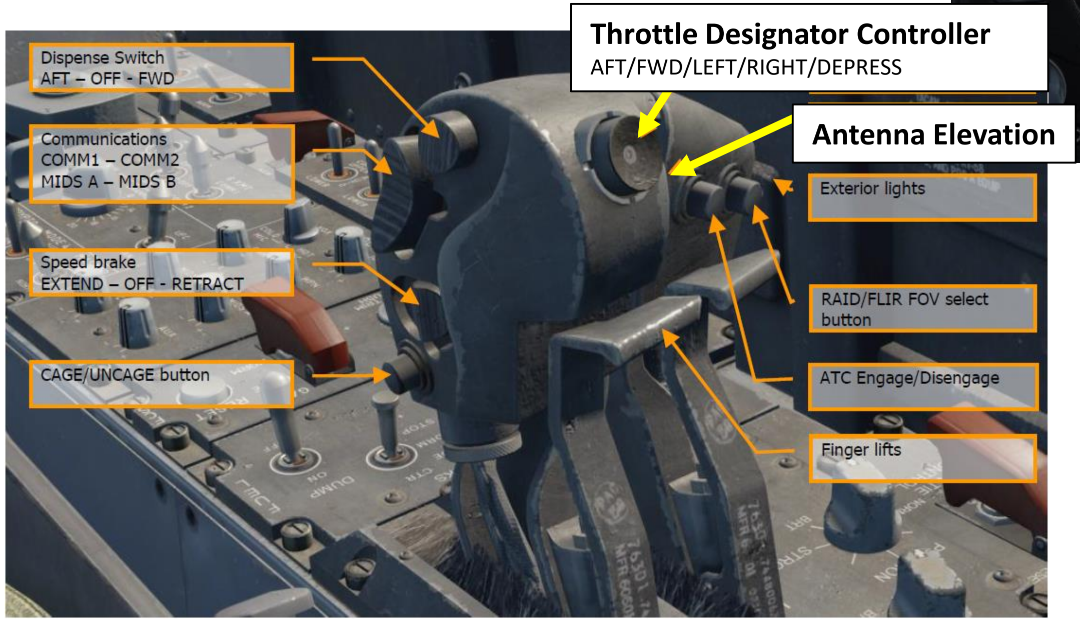
2 - AN/APG-73 AIR-TO-AIR RADAR

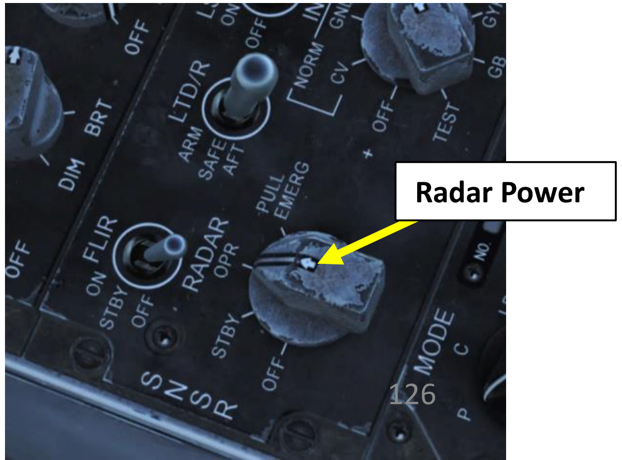
The air-to-air radar uses a B-Scope representation, which is a top-down view of what's in front of you.

- You can slew your radar and lock a target using the TDC, or Throttle Designator Controller.
- Radar Data can be shown on the RDR ATTK TAC page and on the HUD (Heads-Up Display).
- The Sensor Control Switch is used to set up which display is selected (left DDI, right DDI, lower AMPCD or HUD) or which radar mode you will be using.





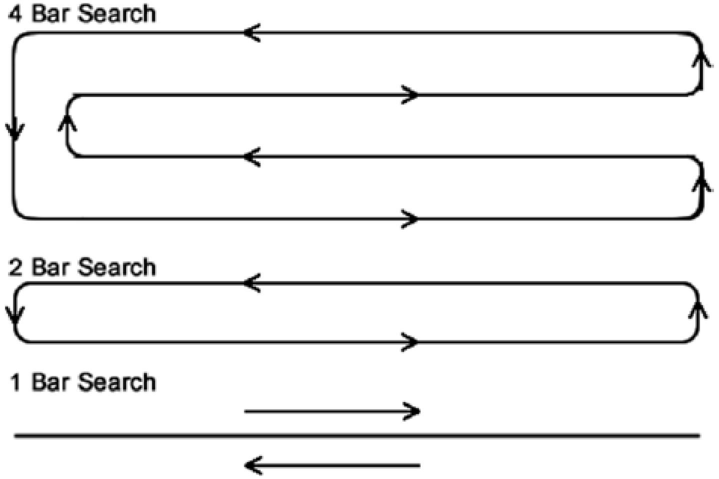


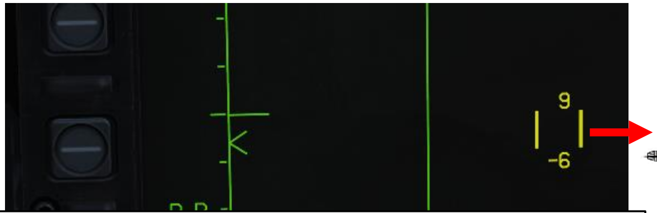


2 - AN/APG-73 AIR-TO-AIR RADAR

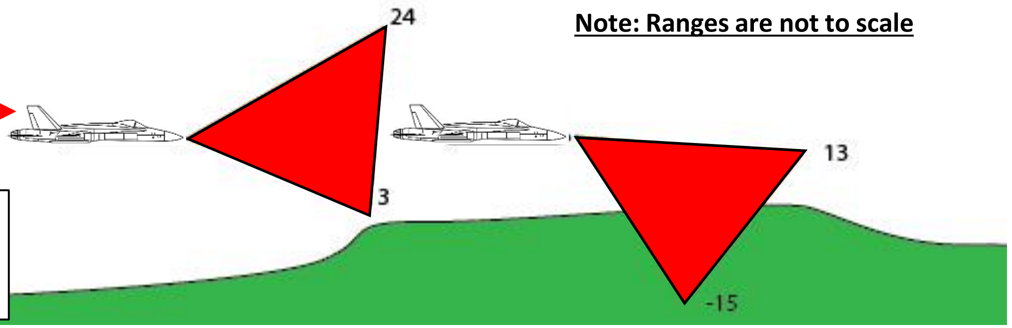
The Hornet's radar has a range of 160 nautical miles, a horizontal arc of 140 degrees and a variable vertical arc that is customizable. You can control the radar scan pattern (bars), which will give you a narrower or wider scanning area.

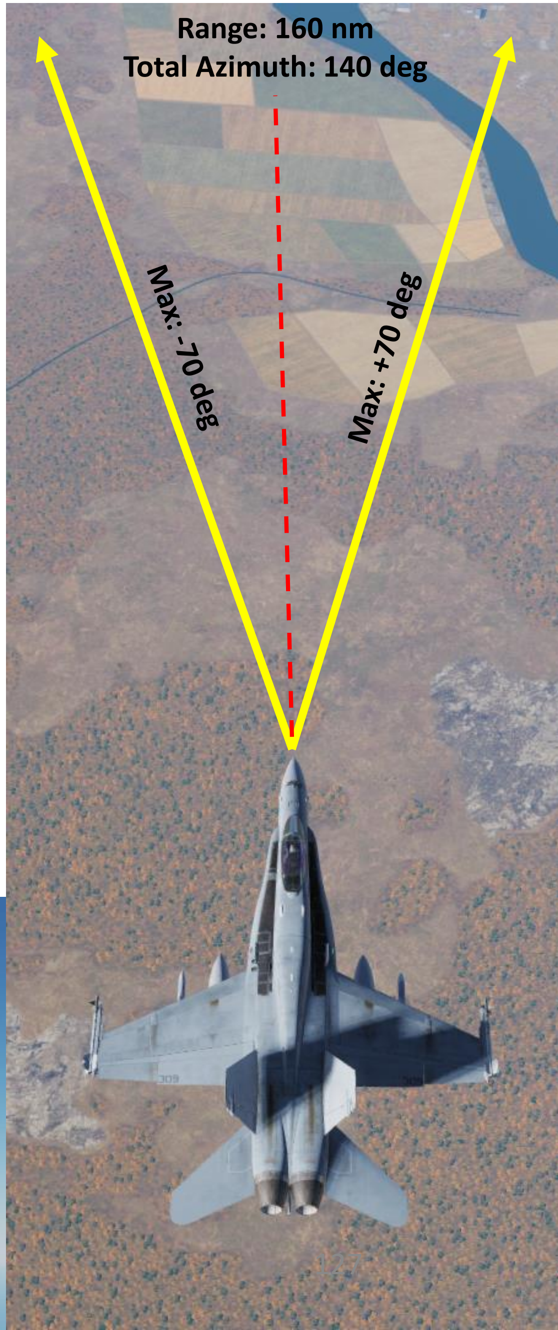
The numbers next to the TDC correspond to the altitudes (in thousands of feet) of the top and bottom of the radar beam at the distance of the target designator. As you move the target designator closer and further you will see the numbers change. The practical application is that the radar will not detect targets above or below these altitudes which is why you need to slew the radar antenna up and down to do a complete search.



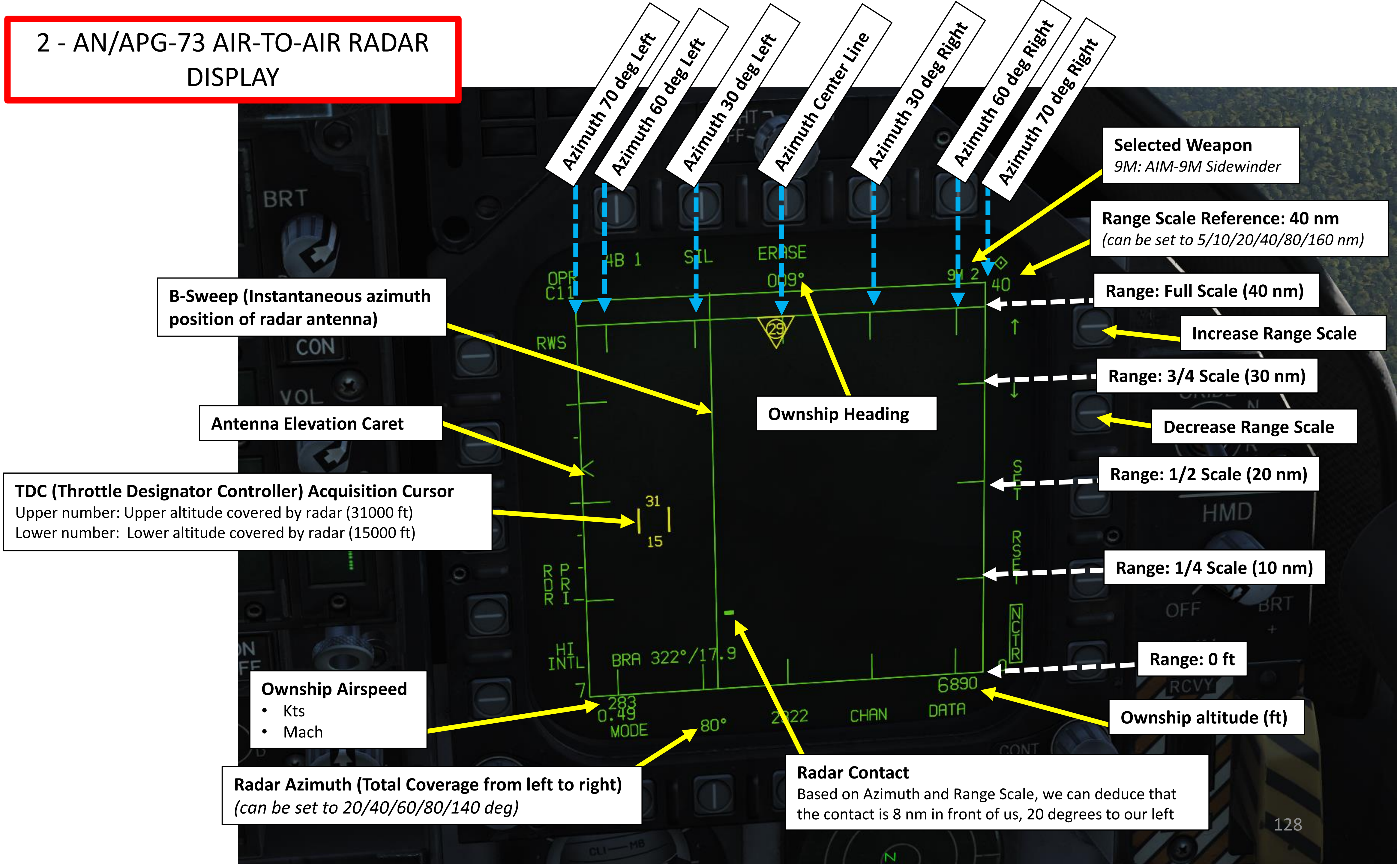


TDC (Throttle Designator Controller) Acquisition Cursor
Upper number: Upper altitude covered by radar (9000 ft)
Lower number: Lower altitude covered by radar (-6000 ft)





2 - AN/APG-73 AIR-TO-AIR RADAR DISPLAY



2 - AN/APG-73 AIR-TO-AIR RADAR DISPLAY

Silent (SIL) Mode: Radar ceases operation and placed in STANDBY mode.

Erase: all target history on radar display are removed.

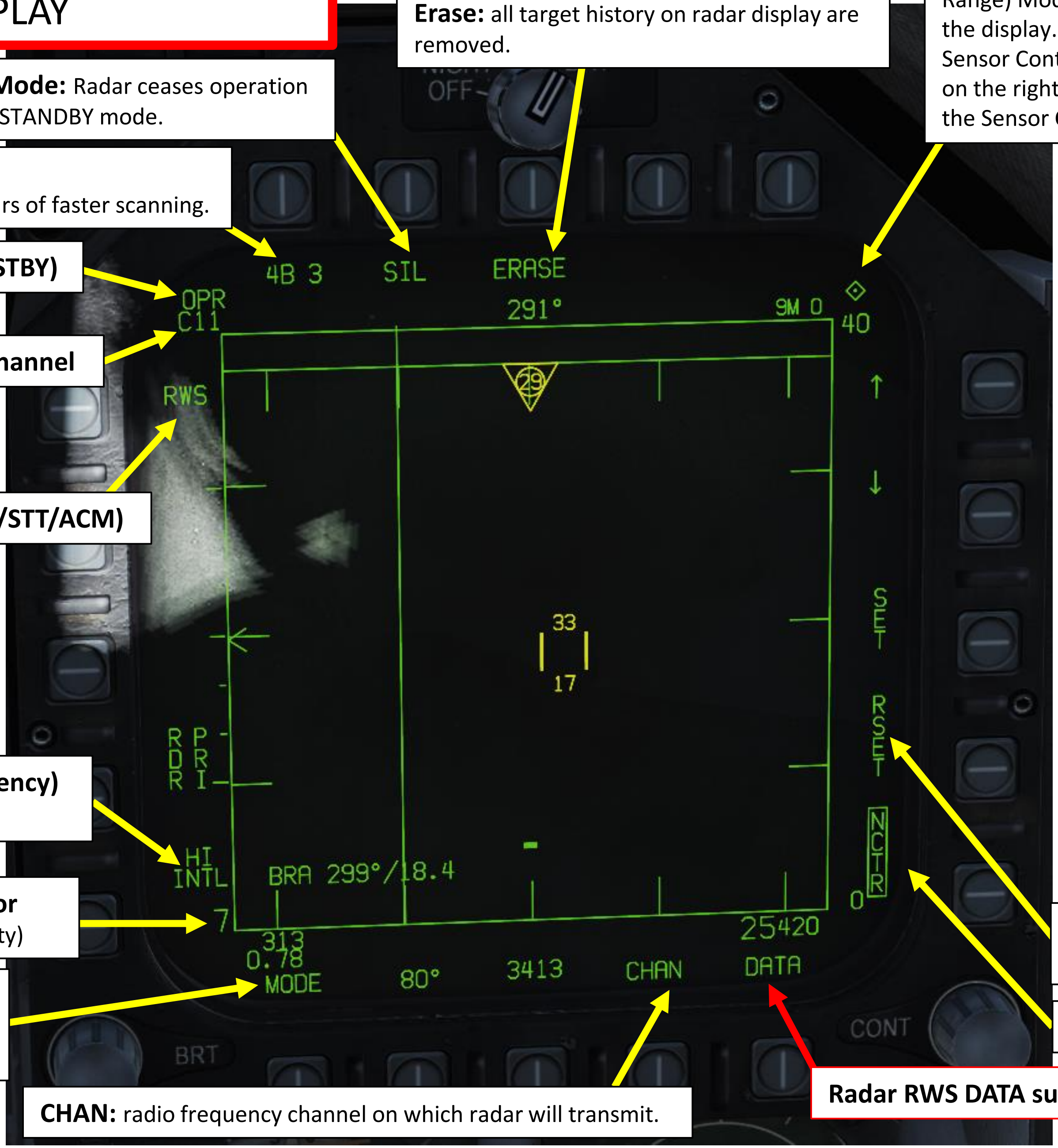
TDC Control Indication Diamond
When the RADAR display is selected for TDC control in a BVR (Beyond Visual Range) Mode, this diamond symbol is displayed in the top right corner of the display. Selecting the RADAR for TDC control is done by moving the Sensor Control Switch to the right. Note that the RADAR is normally placed on the right DDI. If your radar is placed on the left DDI, you'd need to set the Sensor Control Switch left to move TDC on the left DDI.

Elevation Bar Scan
Cycles between 1, 2, 4 and 6 bars of faster scanning.

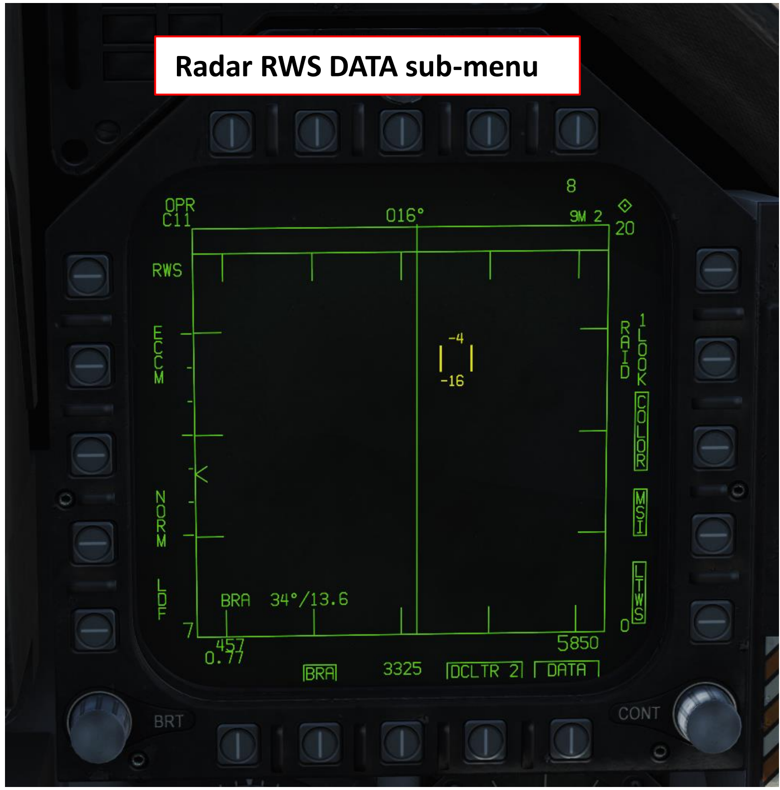
Operational Mode (OPR/STBY)

Radar's Radio Frequency Channel

Radar Mode Selected (RWS/STT/ACM)



Radar RWS DATA sub-menu



PRF (Pulse Repetition Frequency)
Medium/High/Interleaved

Radar Sensitivity Indicator
(high numbers, high sensitivity)

Radar Mode Selector
RWS: Range While Scan
TWS: Track While Scan

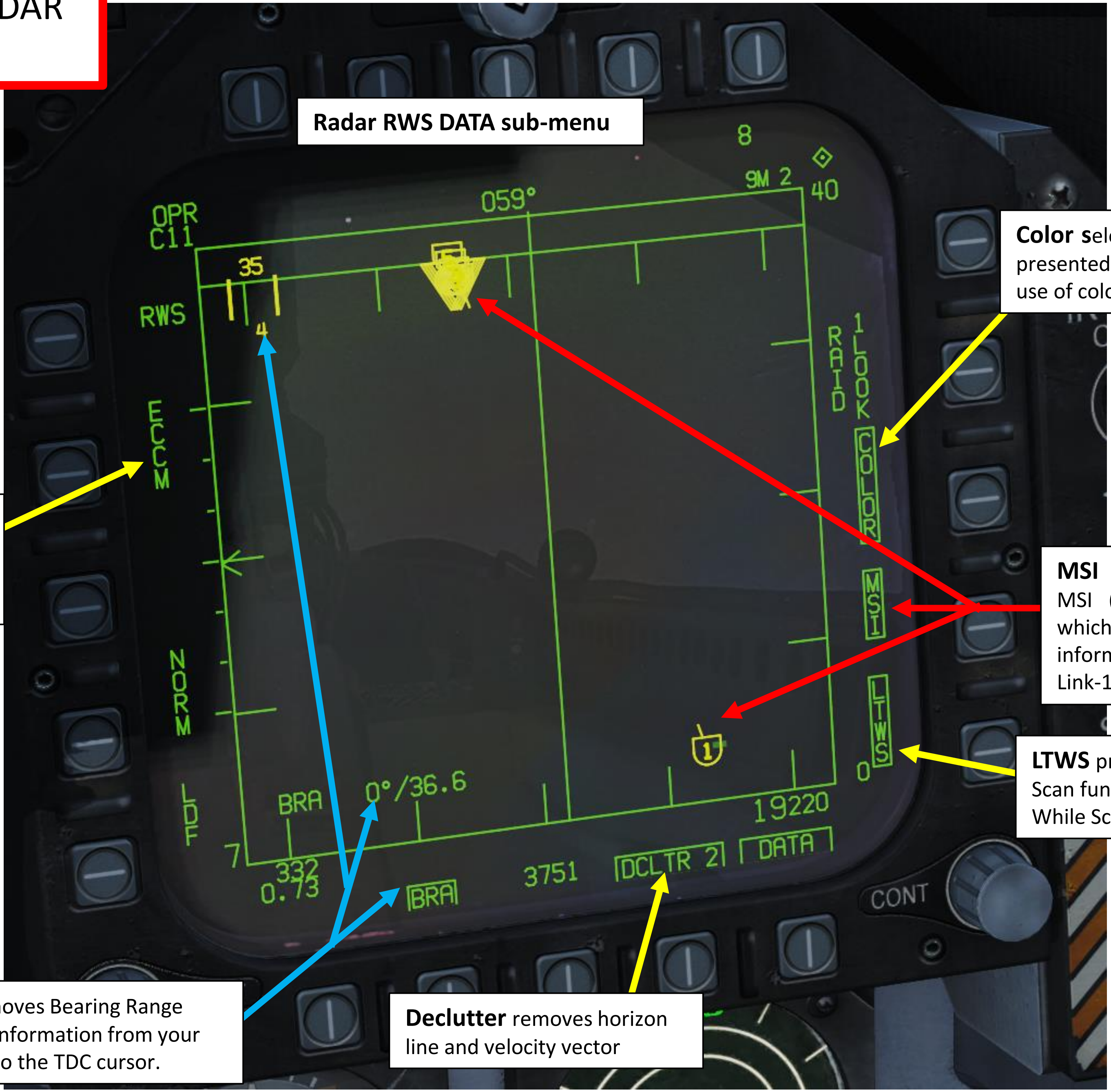
CHAN: radio frequency channel on which radar will transmit.

RESET: Radar settings are returned to default settings.

NCTR: Non-Cooperative Target Recognition

Radar RWS DATA sub-menu

2 - AN/APG-73 AIR-TO-AIR RADAR DISPLAY



Color selects the RADAR display to be presented in monochrome or limited use of colors of three colors

ECCM enables or disables Electronic Counter-Counter Measures. When enabled, the jamming effects of hostile aircraft are less pronounced, but the sensitivity of the RADAR is reduced

MSI removes information from MSI (Multi-Sensor Integration), which is basically contact/target information gathered from the Link-16 Datalink

LTWS provides Latent Track While Scan function while in RWS (Range While Scan) mode.

BRA removes Bearing Range Altitude information from your location to the TDC cursor.

Declutter removes horizon line and velocity vector

2 - AN/APG-73 AIR-TO-AIR RADAR MAIN MODES

The radar has the following main modes: **BVR** (Beyond Visual Range, used for long-distance engagements), and **ACM** (Air Combat Maneuvering, used for close air engagements), AACQ (Automatic Acquisition) and STT (Single Target Track).

BVR Search sub-modes include:

- **RWS** (Range While Scan): RWS radar mode allows for detection of contacts in a large volume. It is the default search mode for air-to-air or when an air-to-air missile is placed in priority. RWS mode provides all-aspect (nose-on, tail-on) and all altitude (look-up, look-down) target detection. The display shows range as the vertical axis and azimuth angle on the horizontal. While in RWS mode, the RADAR can maintain up to 10 trackfiles.

- **TWS** (Track While Scan): **Not Yet Implemented.**

- **LTWS** (Latent Track While Scan): LTWS provides a Track While Scan (TWS) function while in RWS mode. With LTWS enabled, placing the TDC over a target symbol will display Launch and Steer (L&S) track symbols. However, no “Shoot” cues are displayed. An LTWS target will have its’ airspeed in Mach displayed to the left and its altitude in thousands of feet to the right. Additionally, its range and closure information are displayed along the right tactical border. Note that weapons cannot, however, be launched and guided from RWS.

- **VS** (Velocity Search): **Not Yet Implemented.**

ACM sub-modes include:

- **GACQ** (Gun Acquisition): automatically enabled with air-to-air guns are selected

- **BST** (Boresight): searches targets out to 10 nm

- **VACQ** (Vertical Acquisition): vertical auto-acquisition search pattern covers from -13 deg to +46 deg, searches targets out to 5 nm

- **WACQ** (Wide Acquisition): space-stabilized mode that can be slewed using the TDC controller when uncaged, searches targets out to 10 nm

2 - AN/APG-73 AIR-TO-AIR RADAR MAIN MODES

The radar has the following main modes: **BVR** (Beyond Visual Range, used for long-distance engagements), and **ACM** (Air Combat Maneuvering, used for close air engagements), AACQ (Automatic Acquisition) and STT (Single Target Track).

AACQ:

AACQ (Automatic Acquisition): AACQ serves as a fast way of acquiring a track/contact into Single Target Track. It is entered by pressing the Sensor Control Switch right when the TDC is assigned to the RDR ATTK format, the A/A master mode is engaged, and the radar is not in an ACM mode. "AACQ" will be indicated on the RDR ATTK page and the HUD. If the TDC cursor is not over a contact/track, AACQ will place the closest presently detected contact/track in an STT. If the TDC cursor is over a contact/track, it will place it in STT.

STT

STT (Single Target Track): STT mode is a traditional radar "lock" where the radar continuously scans a single target, resulting in a very high update rate; this makes it the primary method of providing guidance to air-to-air weapons. STT maintains a trackfile for its target and automatically designates it as the L&S if it is not already. The radar is slaved to this trackfile; as such, manual antenna elevation control is inhibited and the B-sweep follows the trackfile. Only the trackfile that is placed in STT is visible and all onboard trackfiles are dropped. In STT, the RDR ATTK format is presented in azimuth along the horizontal axis and range along the vertical axis.

Single Target Track is obtained by:
- depressing the TDC while the cursor is over the Launch & Steering trackfile or while over any raw contact when in a mode where trackfiles are not displayed (e.g. RWS without LTWS)
- using Automatic Acquisition
- using an Air Combat Maneuvering mode

STT is exited by pressing the Undesignate button. The radar is returned to the last-entered search mode.

2 - AN/APG-73 AIR-TO-AIR RADAR RWS MODE

RWS is the default search mode for air-to-air or when an air-to-air missile is placed in priority.

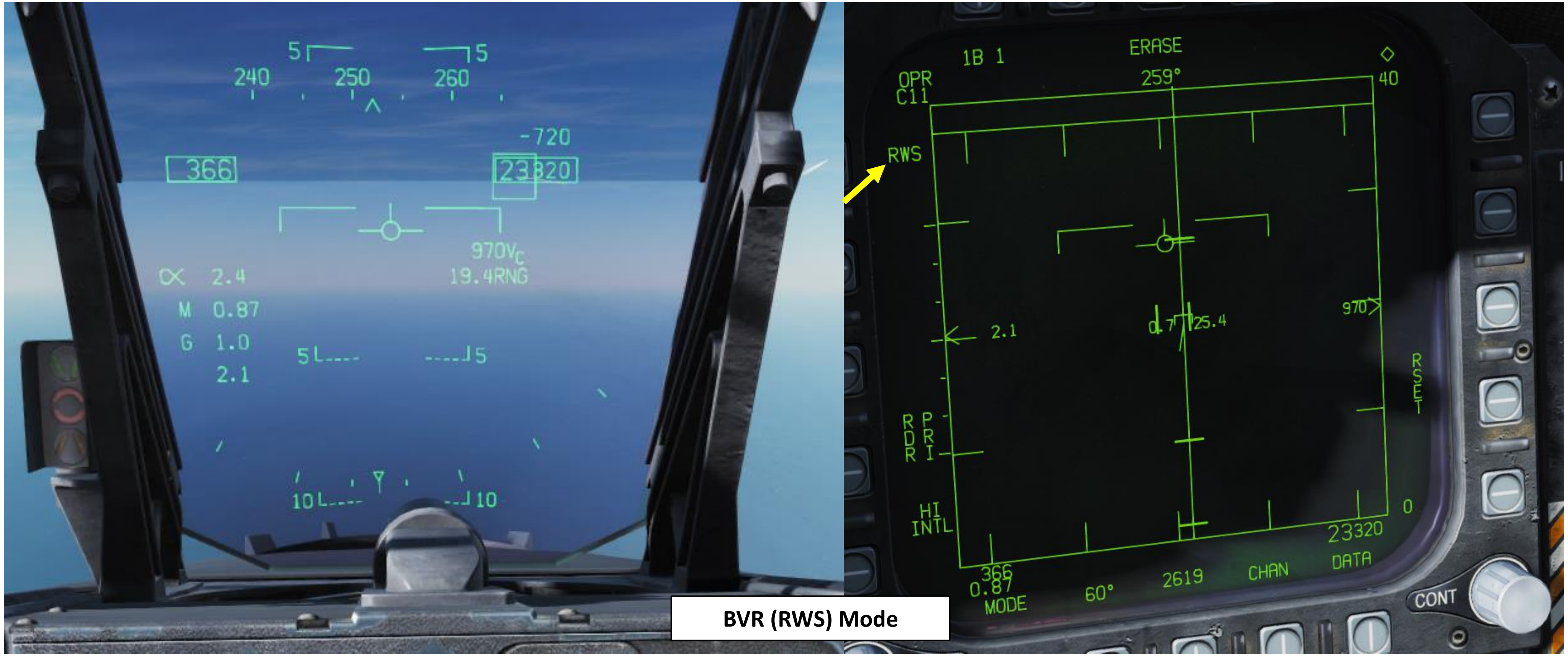
FOR LONG RANGE:

BVR Mode is also known as **RWS** (Range While Scan). The antenna follows the designated search pattern and informs you of all the tracks discovered in one sweep. You can then select a specific track and lock it.

In BVR mode, the Sensor Control Switch has the following functions:

- FWD: Switch to ACM (Air Combat Maneuvering) mode with Boresight selected by default
- AFT: Assigns TDC to center AMPCD
- LEFT: Assigns TDC to left DDI
- RIGHT: Assigns TDC to right DDI

Sensor Control Switch
AFT/FWD/LEFT/RIGHT/DEPRESS



BVR (RWS) Mode

2 - AN/APG-73 AIR-TO-AIR RADAR
TWS MODE

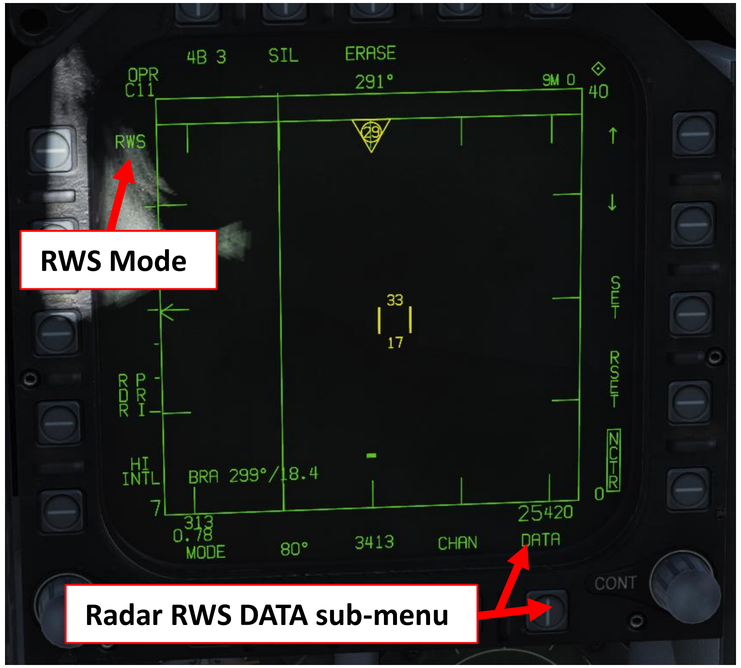
Not available yet.

2 - AN/APG-73 AIR-TO-AIR RADAR LTWS MODE

Latent Track While Scan (LTWS) is a RWS option (you need to go in the DATA sub-menu of the RDR ATTK page) allowing for raw contacts to be displayed as trackfiles with HAFU (Hostile, Ambiguous, Friendly, Unknown) symbology and other information; with the Multi-sensor Integration (MSI) function, offboard trackfile information can also be shown in LTWS. It also allows for the designation of a Launch & Steering (L&S) and Secondary Designated Target (DT2) trackfile. Using the TDC "Depress" and "Slew" commands, you can designate up to three targets.

An onboard-only track is not displayed unless the TDC cursor is over the associated raw contact bricks (aka "target under cursor" or "TUC") or it is designated as the L&S or DT2. In these cases, the brick(s) will be replaced by a HAFU symbol representing the track. Note that since multiple raw radar contacts may be correlated to be a single aircraft and therefore one trackfile, a HAFU may replace multiple bricks.

Offboard-only tracks and tracks that are both onboard and offboard are always displayed as HAFUs and never show their corresponding raw contacts. Note that MSI must be enabled to display offboard trackfile information. We will further explore the HAFU symbology in the Datalink section.

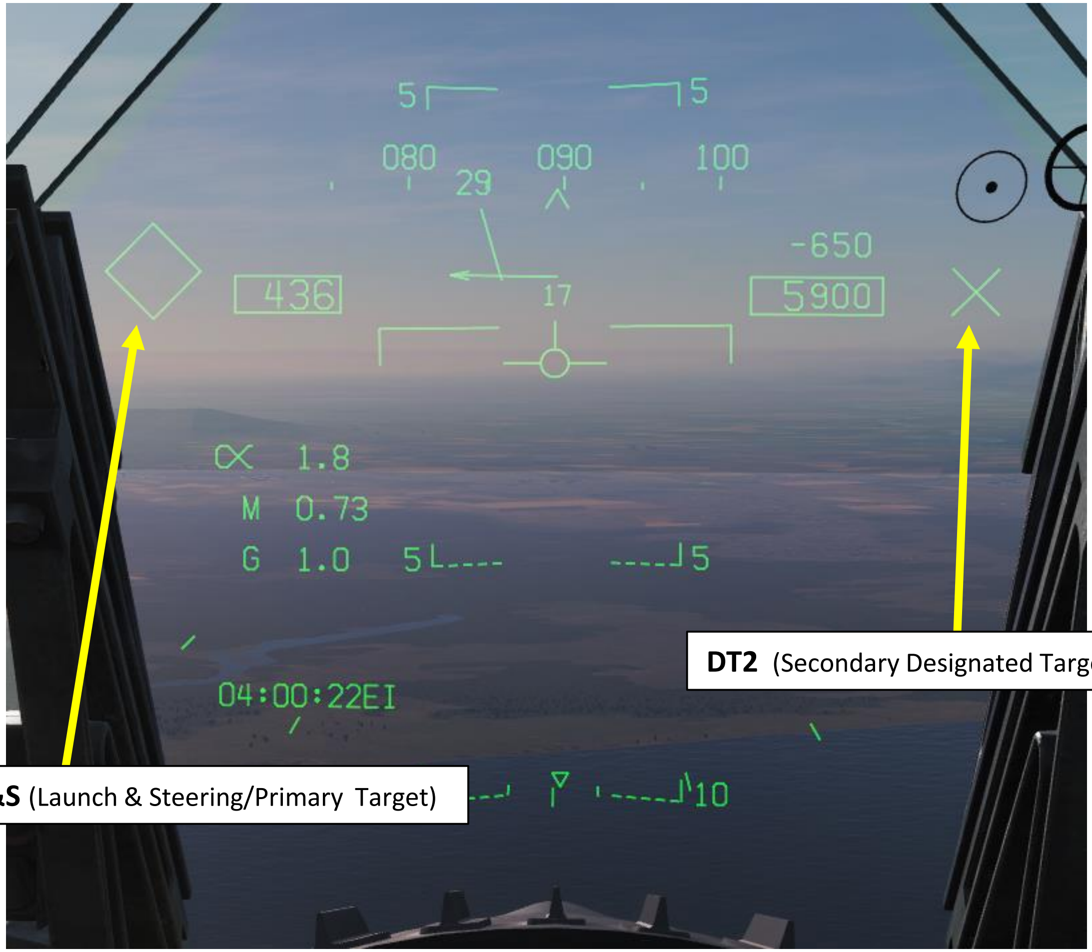


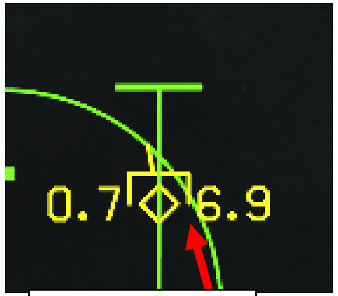
HAFU symbols in LTWS, whenever under the cursor or designated as the L&S or DT2, feature the track's Mach number on the left side and its altitude in thousands of feet on the right. A line also stems out to indicate a trackfile's horizontal velocity (this applies for all).

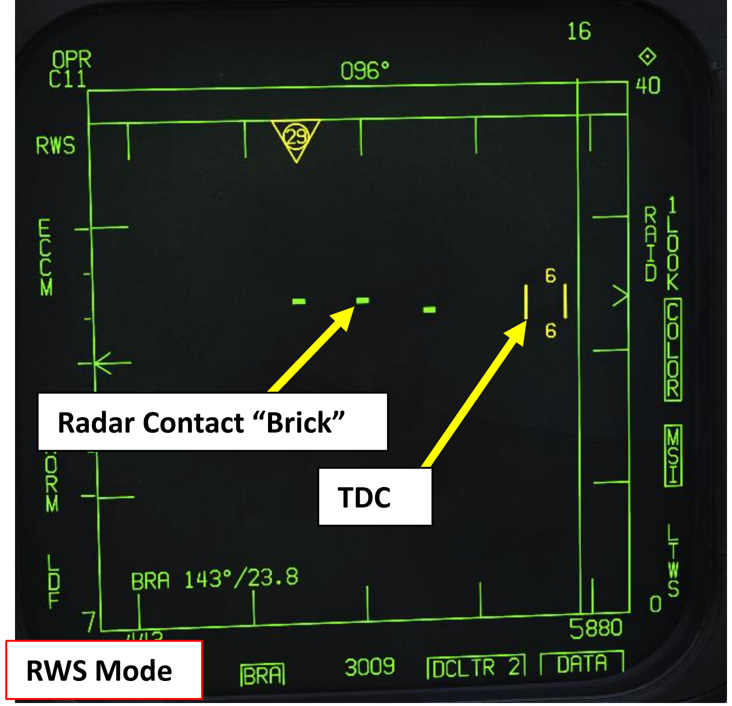
An IFF interrogation is automatically sent when a TUC is performed. Tracks in LTWS also have Launch Acceptable Region information displayed. Note that weapons cannot, however, be launched and guided from RWS.

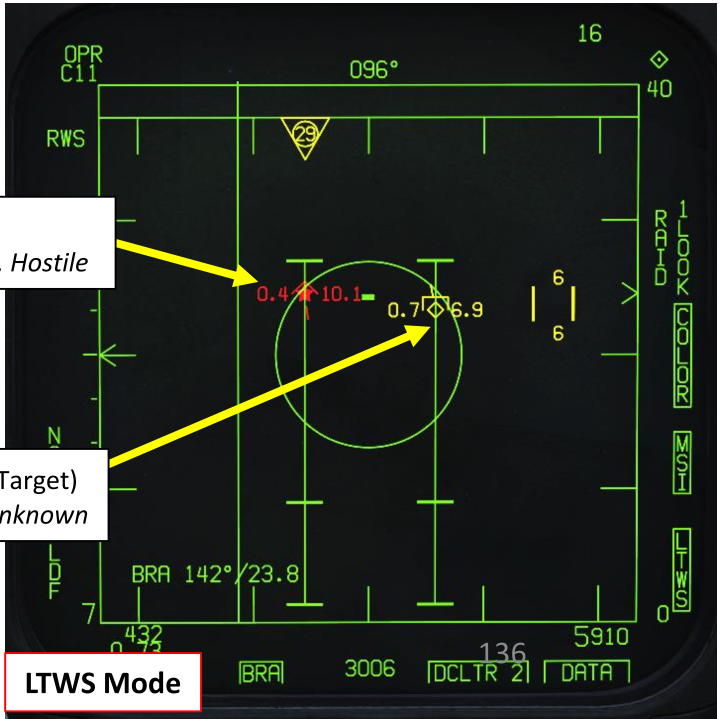
2 - AN/APG-73 AIR-TO-AIR RADAR LTWS MODE

As you hover your TDC over the radar contacts in LTWS, there are two designations: the Launch & Steering target (L&S), and the Secondary Designated Target (DT2). These are essentially the "primary" and "secondary" targets, as assigned by the pilot (there cannot be a DT2 without an L&S). The L&S is also pertinent to air-to-air weapons delivery; launch information is displayed and, depending on the radar mode and weapon, weapons may be guided onto the L&S. The L&S and DT2 have target designators (TDs) superimposed on the HUD so that their position can be better visualized. A star (L&S) and diamond (DT2) is placed in the center of the trackfile's HAFU symbol.



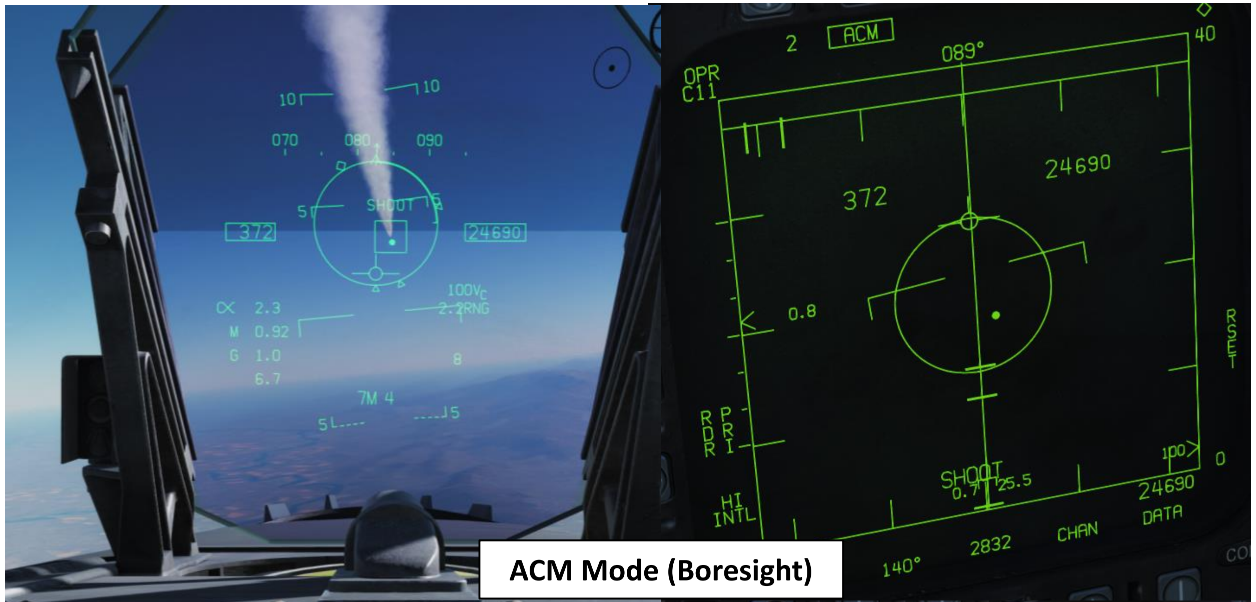




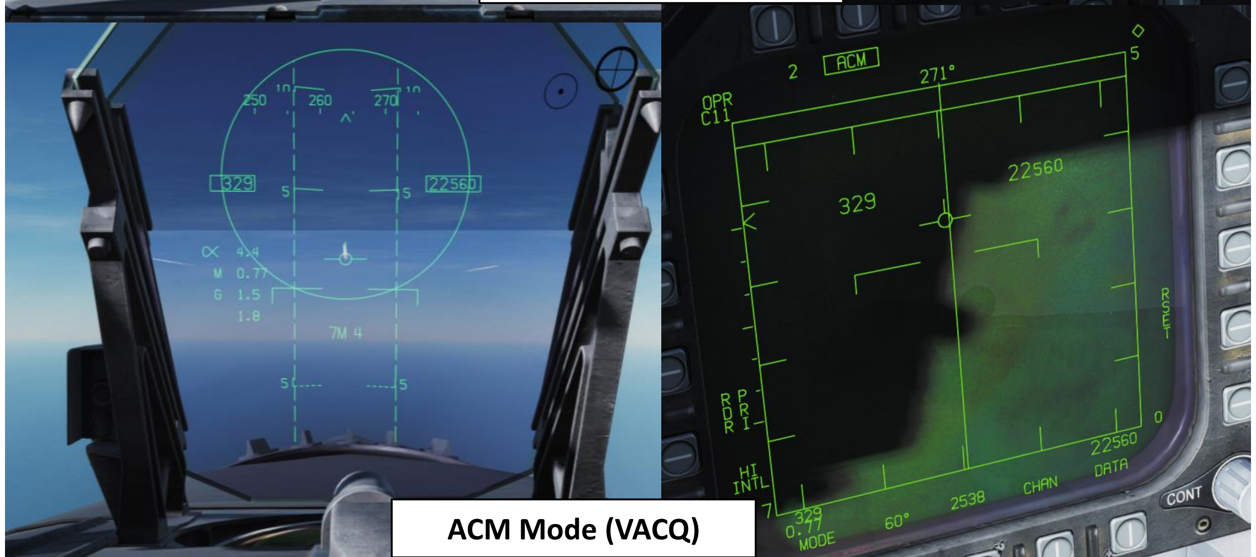


2 - AN/APG-73 AIR-TO-AIR RADAR ACM MODES

The ACM modes can be selected by either pressing forward on the Sensor Control Switch while in air-to-air BVR mode, or by pressing aft on the Weapon Select Switch to set A/A GUN as priority. Except for the Guns Acquisition mode, any air-to-air missile can be used for all ACM modes.



ACM Mode (Boresight)



ACM Mode (VACQ)

FOR CLOSE RANGE:

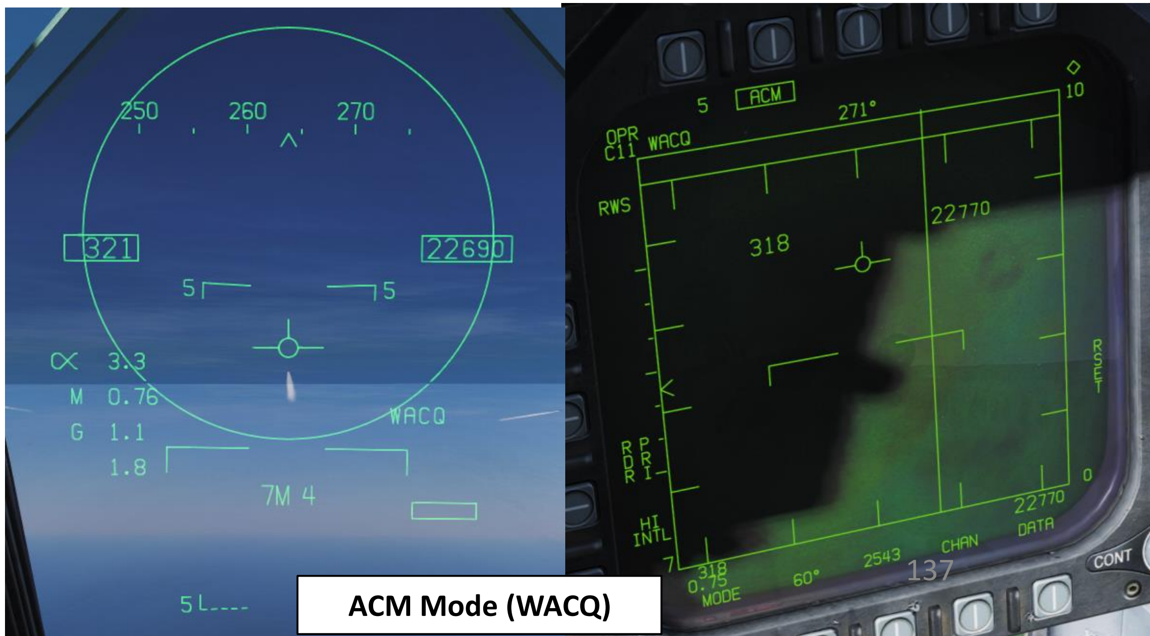
ACM (Air Combat Maneuvering) Mode has four sub-modes, which are all used for close combat:

- **GACQ** (Gun Acquisition): automatically enabled with air-to-air guns are selected
- **BST** (Boresight): searches targets out to 10 nm
- **VACQ** (Vertical Acquisition): vertical auto-acquisition search pattern covers from -13 deg to +46 deg, searches targets out to 5 nm
- **WACQ** (Wide Acquisition): space-stabilized mode that can be slewed using the TDC controller when uncaged, searches targets out to 10 nm

In ACM mode, the Sensor Control Switch has the following functions:

- FWD: selects Boresight ACM mode
- AFT: selects Vertical Acquisition ACM mode
- LEFT: selects Wide Acquisition ACM mode

Sensor Control Switch
AFT/FWD/LEFT/RIGHT/DEPRESS



ACM Mode (WACQ)

2 - RADAR LINGO AND TERMINOLOGY

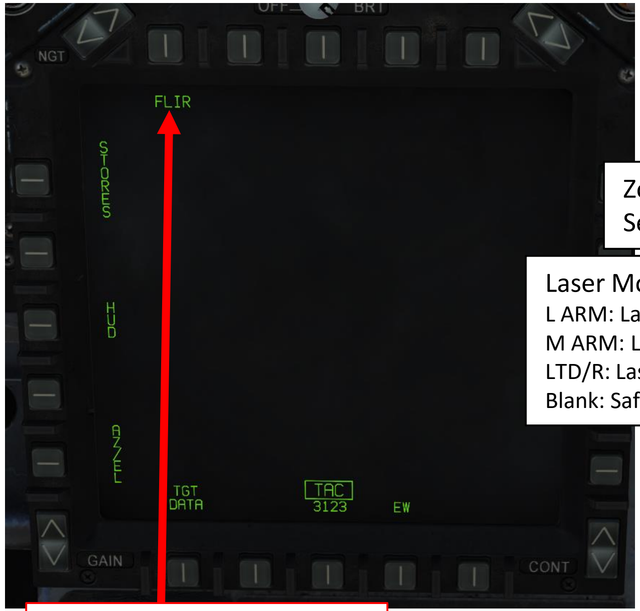
- BANDIT: Identified Enemy Aircraft
- BOGEY: Unidentified Aircraft
- SPIKE: Air-to-Air radar is locked on you
- BUDDY SPIKE: Friendly radar is locked on you
- NAILS: RWR contact, which emits radar waves but does not have a radar lock on you
- FOX 1: semi-active radar missile (27R/ER + AIM-7)
- FOX 2: heat-seeking infrared missile (27T/ET + AIM-9 + R-73/60)
- FOX 3: active radar missile, meaning the missile tracks to an aircraft’s radar up to a certain distance, then it's internal radar activates (pitbull) (AIM-120/R-77)
- RIFLE: AGM-65 Air-to-Ground missile
- RAYGUN: When locking a target with your radar, it is good practice to say “RAYGUN” so your teammates are aware that you are locking someone. It is often used to identify a contact as friend or foe. If a person yells “BUDDY SPIKE!”, it’s very likely that you are locking a friendly contact.
- IFF: meaning “Is he friendly or bandit (enemy)?”
- PITBULL: Any FOX 3 (active radar) missile that starts using its onboard radar for tracking

3 - AN/AAQ-28(V) LITENING II T-POD INTRODUCTION

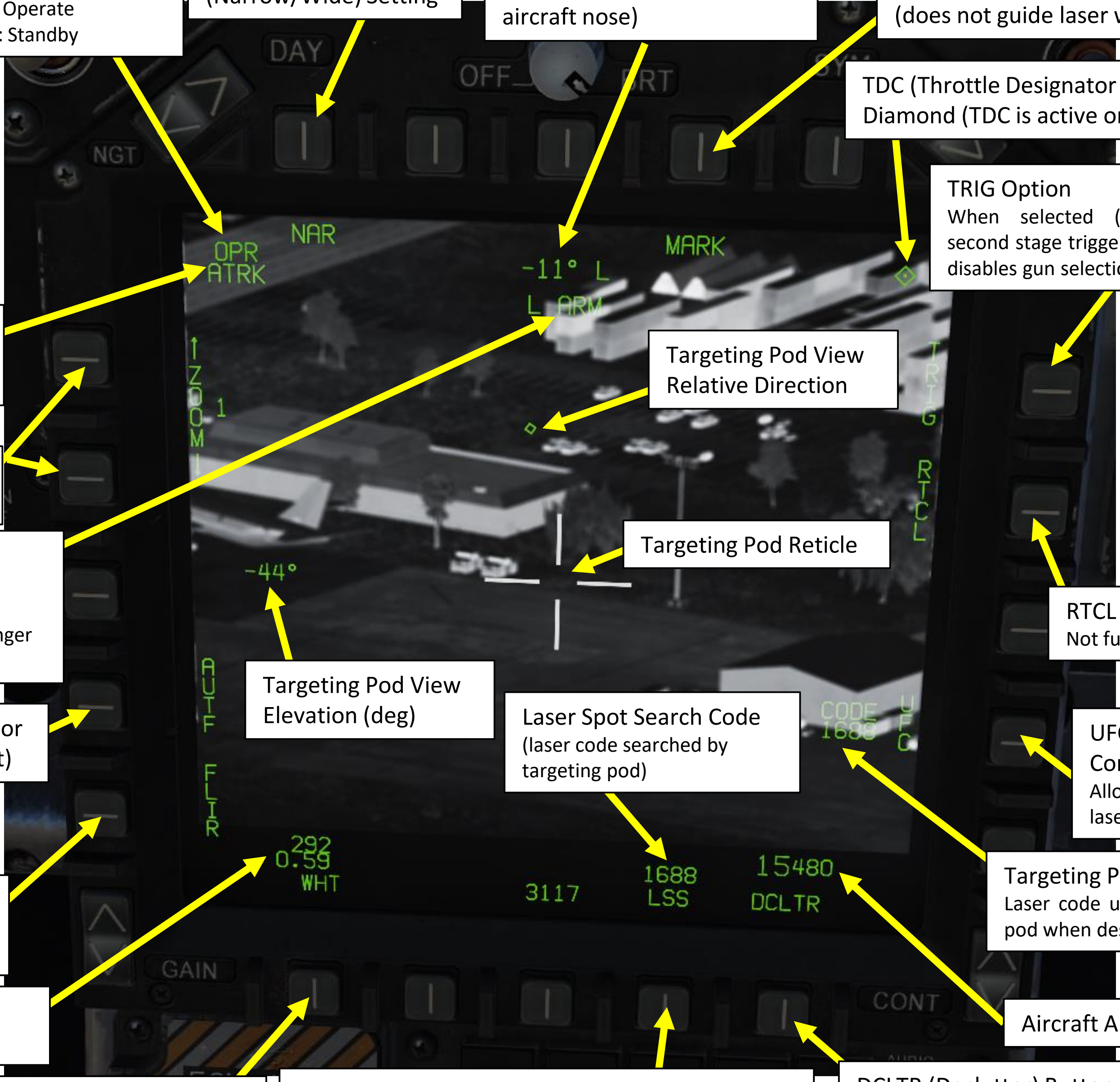
The AN/AAQ-28(V) LITENING system is a self-contained, multi-sensor targeting and surveillance system. The LITENING enables aircrews to detect, acquire, auto-track and identify targets at long ranges for weapon delivery or non-traditional intelligence, surveillance and reconnaissance missions. LITENING's FLIR, charged-coupled device (CCD), laser imaging sensors, advanced image processing and digital video output provide useful imagery of targets on the ground, allowing aircrews to identify and engage targets under a wide range of battlefield conditions.

3 - AN/AAQ-28(V) LITENING II T-POD DISPLAYS

The targeting pod feed can be displayed on either DDI (Digital Display Indicator) or on the AMPCD (Advanced Multi-Purpose Color Display). To display targeting pod feed, select TAC page, then click on the OSB next « FLIR ». Take note that the FLIR page on the AMPCD is displayed in white and black, while the FLIR page on the DDIs are in shades of black and green.



From the TAC page, you can access the targeting pod feed by pressing the OSB next to "FLIR".



Targeting Pod Mode
OPR: Operate
STBY: Standby

Field of View (Narrow/Wide) Setting

Targeting Pod View Direction (degrees Left/Right off of aircraft nose)

Laser Marker Mode Selector (does not guide laser weapons)

TDC (Throttle Designator Controller) Focus Diamond (TDC is active on this display)

TRIG Option
When selected (boxed), pressing the second stage trigger will fire the laser. Also disables gun selection while enabled.

Tracking Mode
ATRK: Area Track
PTRK: Point Track

Zoom Control and Setting (1 through 9)

Targeting Pod View Relative Direction

Laser Mode
L ARM: Laser Armed
M ARM: Laser Marker Armed
LTD/R: Laser Target Designator/Ranger
Blank: Safe/Off

Targeting Pod Reticle

RTCL (Reticle) Option
Not functional yet.

AUTF Mode Selector (Not functional yet)

Targeting Pod View Elevation (deg)

Laser Spot Search Code
(laser code searched by targeting pod)

UFC (Up-Front Controller) Button
Allows you to change the laser code from the UFC.

FLIR/CCD Camera Mode Selector
FLIR: Forward-Looking Infrared
CCD: Charged Coupled Device (TV)

Targeting Pod Laser Code
Laser code used by your targeting pod when designating a target.

Aircraft Airspeed (kts/Mach)

Aircraft Altitude (ft)

FLIR WHT/BLK (White-Hot/Black-Hot) Option Button

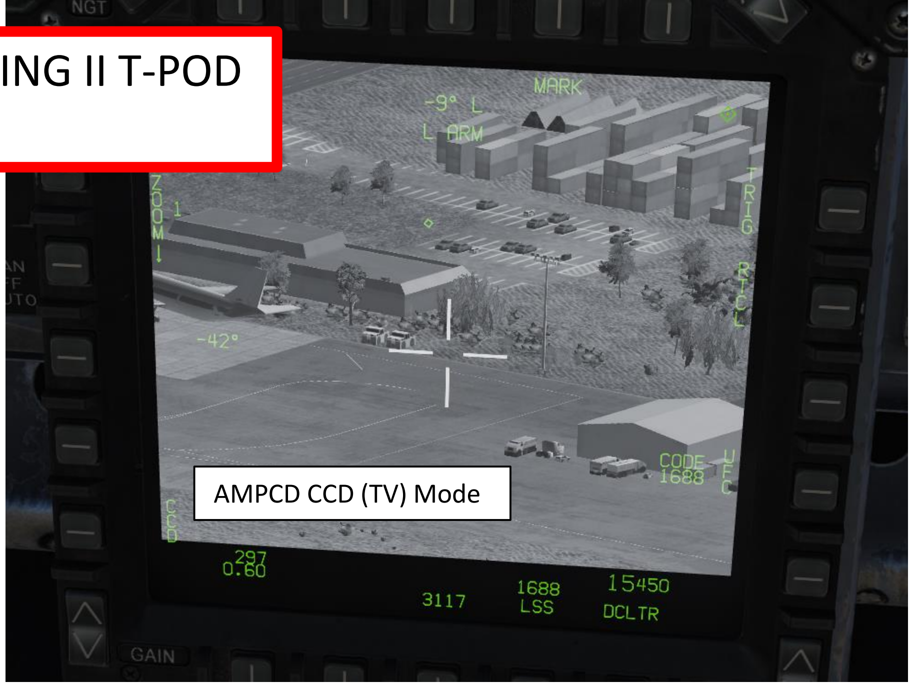
Laser Spot Search (LSS) Mode Selector Button
Targeting pod searches for a laser code of either a JTAC or someone else's targeting pod laser (buddy lasing).

DCLTR (Declutter) Button
Removes aircraft airspeed and altitude information.

3 - AN/AAQ-28(V) LITENING II T-POD DISPLAYS

The Targeting Pod View Relative Direction symbol on the FLIR display can give you a good idea of where the pod is pointing in relationship to your aircraft. This view direction is represented in a top-down view.

3 - AN/AAQ-28(V) LITENING II T-POD DISPLAYS



AMPCD CCD (TV) Mode

AMPCD FLIR Mode

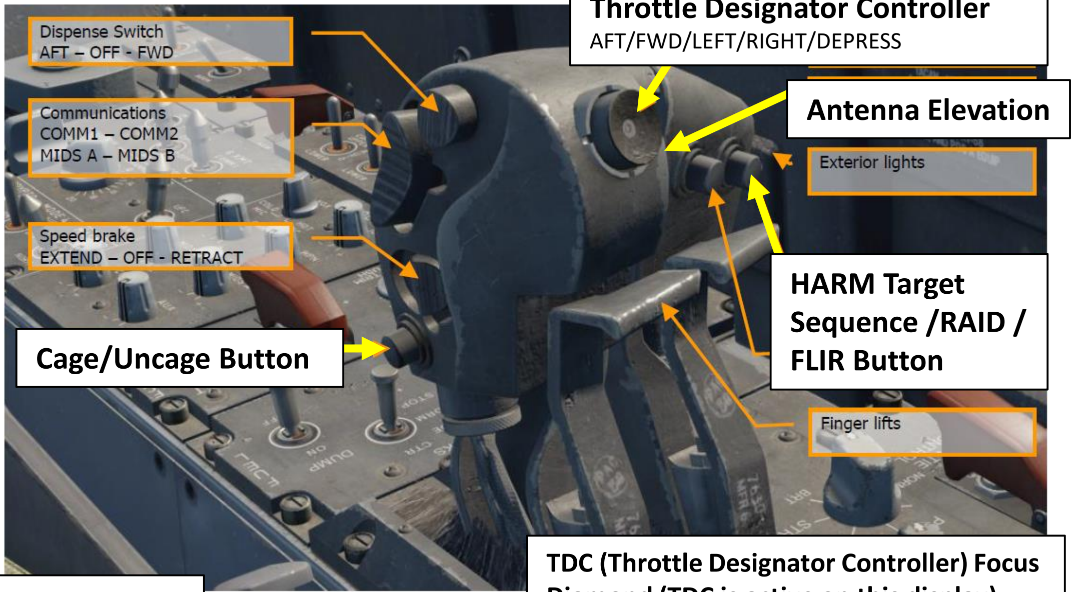
DDI CCD (TV) Mode

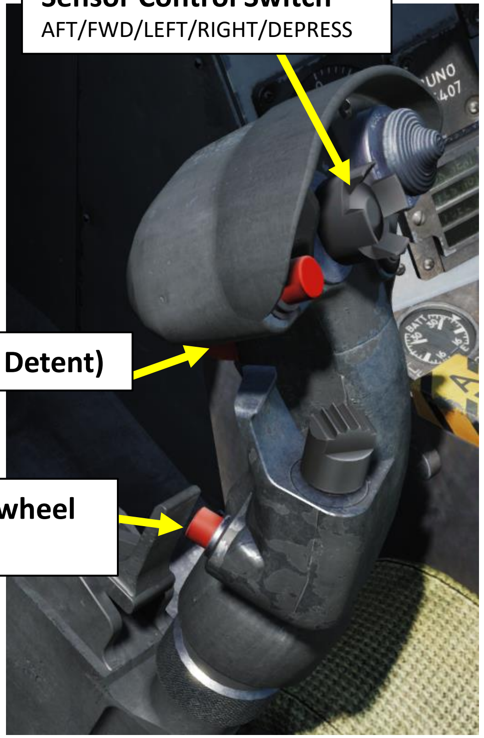
DDI FLIR Mode

3 - AN/AAQ-28(V) LITENING II T-POD CONTROLS

Some useful HOTAS functionalities when using the targeting pod:

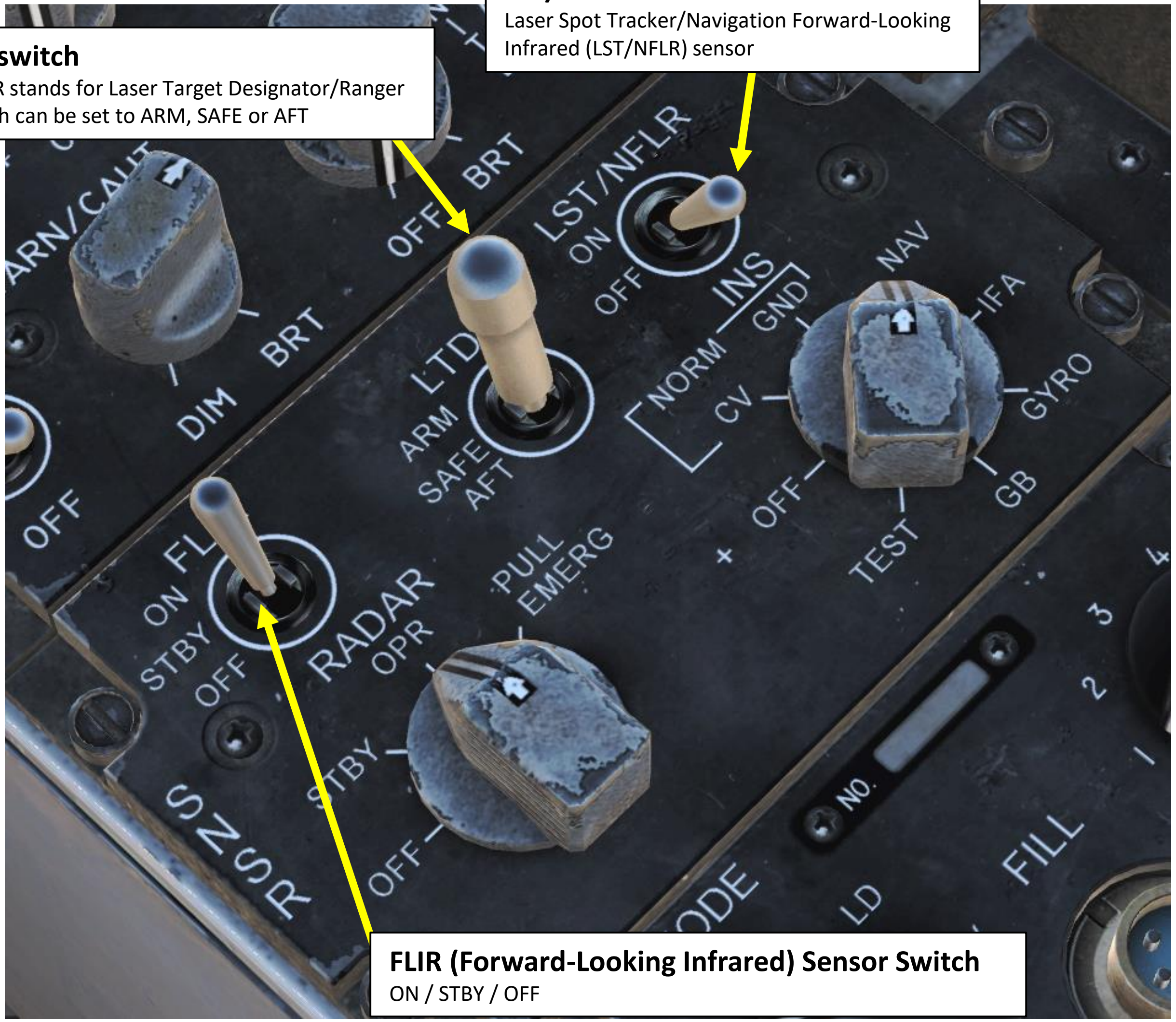
- **Sensor Control Switch Directions**: Selects which display is used to slew the targeting pod view with the TDC (Throttle Designator Controller). The Select Focus Diamond indicates what display is selected.
- **Sensor Control Switch Held Towards Selected Display**: Toggles between Point Track (PTRK, tracks an object like a high-contrast vehicle) and Area Track (ATRK).
- **Radar Elevation Control:** controls zoom (can also be controlled directly from the DDI/AMPCD FLIR page)
- **RAID/FLIR Field-of-View Select Button Short Hold**: Toggles Wide/Narrow field-of-view
- **RAID/FLIR Field-of-View Select Button Long Hold**: Toggles TV (CCD, Charged-coupled Device) and FLIR (Infrared) modes
- **Throttle Designator Controller (TDC) Up/Down/Left/Right**: Slews targeting pod reticle
- **Throttle Designator Controller (TDC) Depressed**: Designates the point under the targeting pod crosshairs as the target (used by weapons)
- **Nosewheel Steering Button**: Undesignates target
- **Cage/Uncage Button**: Cages the targeting pod in Boresight mode (looks straight ahead, five degrees down).
- **Gun Trigger (Second Stage)**: Fires laser if TRIG mode is boxed on the FLIR page.





3 - AN/AAQ-28(V) LITENING II T-POD CONTROLS

Targeting Pod Page
OSB (Option Select Buttons) can be used to select various options or settings



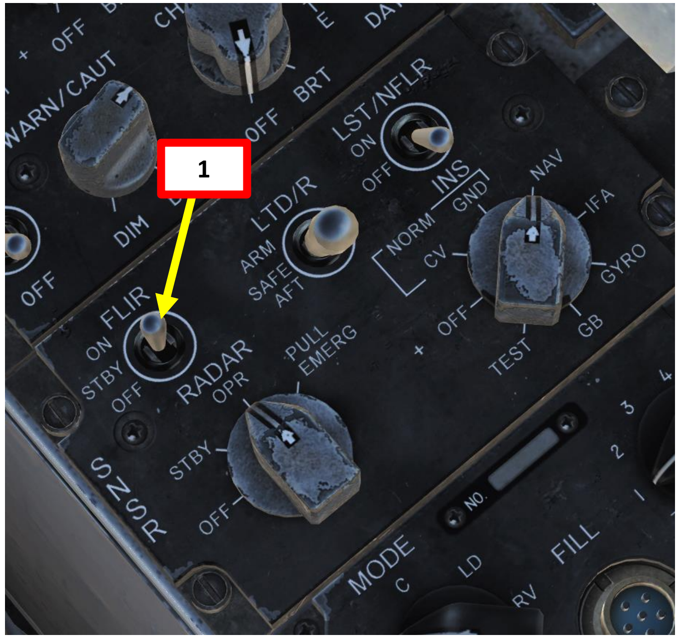
LTD/R switch
- LTD/R stands for Laser Target Designator/Ranger
- Switch can be set to ARM, SAFE or AFT

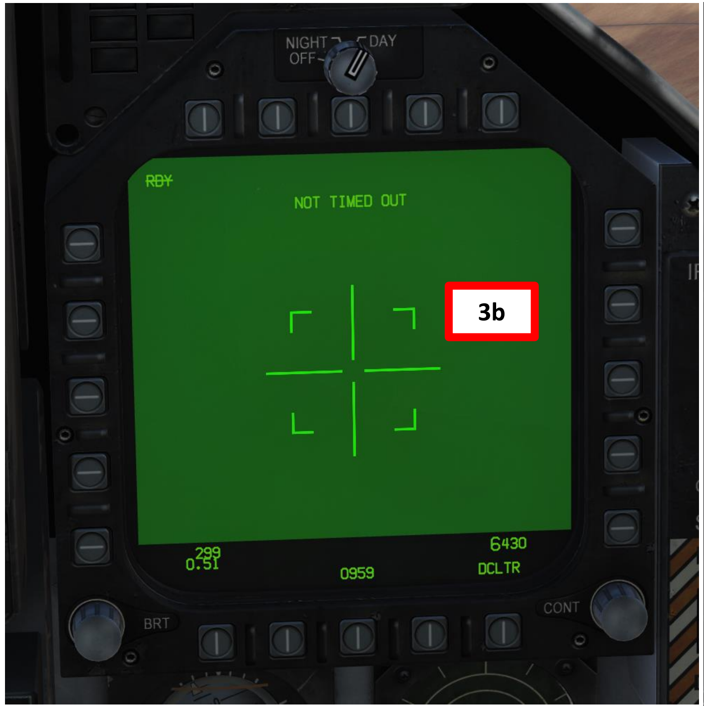
LST/NFLR switch
Laser Spot Tracker/Navigation Forward-Looking Infrared (LST/NFLR) sensor

FLIR (Forward-Looking Infrared) Sensor Switch
ON / STBY / OFF

3 - AN/AAQ-28(V) LITENING II T-POD START-UP & LASING PROCEDURE

1. To power up the targeting pod, set FLIR Sensor Switch to STBY.
2. From the TAC page on either DDI or the AMPCD, press the OSB (Option Select Button) next to “FLIR” (Forward-Looking Infrared) to select the Targeting Pod feed page.
3. Monitor the warm-up process. Targeting pod warm-up process will take about 2 minutes.
4. When targeting pod is ready to be used, the pod status will switch from ~~RDY~~ – NOT TIMED OUT to STBY.



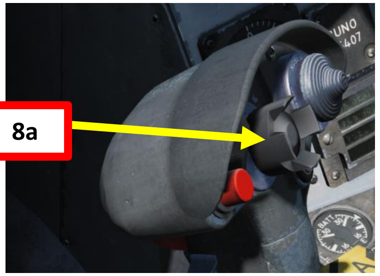


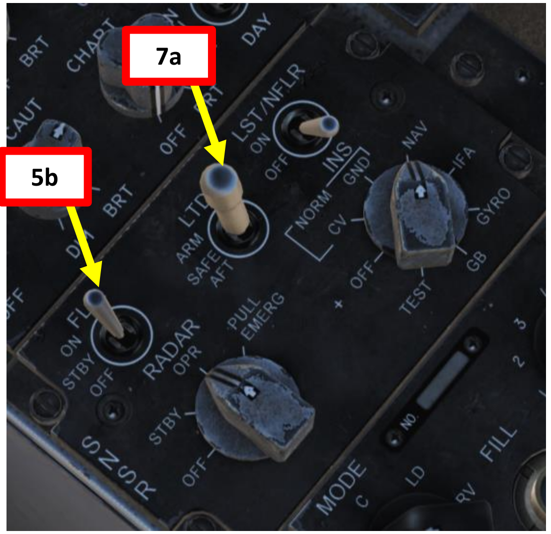
3 - AN/AAQ-28(V) LITENING II T-POD START-UP & LASING PROCEDURE

5. Set FLIR Sensor Switch to ON. This will un-stow the camera. Confirm that Targeting Pod mode switches from STBY to OPR (Operate).
6. Press A/G Master Mode. This will allow you to arm the laser designator.
7. Set LTD/R (Laser Target Designator/Ranger) switch to ARM. This will arm the laser. Confirm that L ARM indication is displayed on the FLIR page.
8. Press the Sensor Control Switch in the direction of the selected DDI (Right for the Right DDI as an example). The Select Focus Diamond indicates what display is selected.

TDC (Throttle Designator Controller) Focus Diamond (TDC is active on this display)

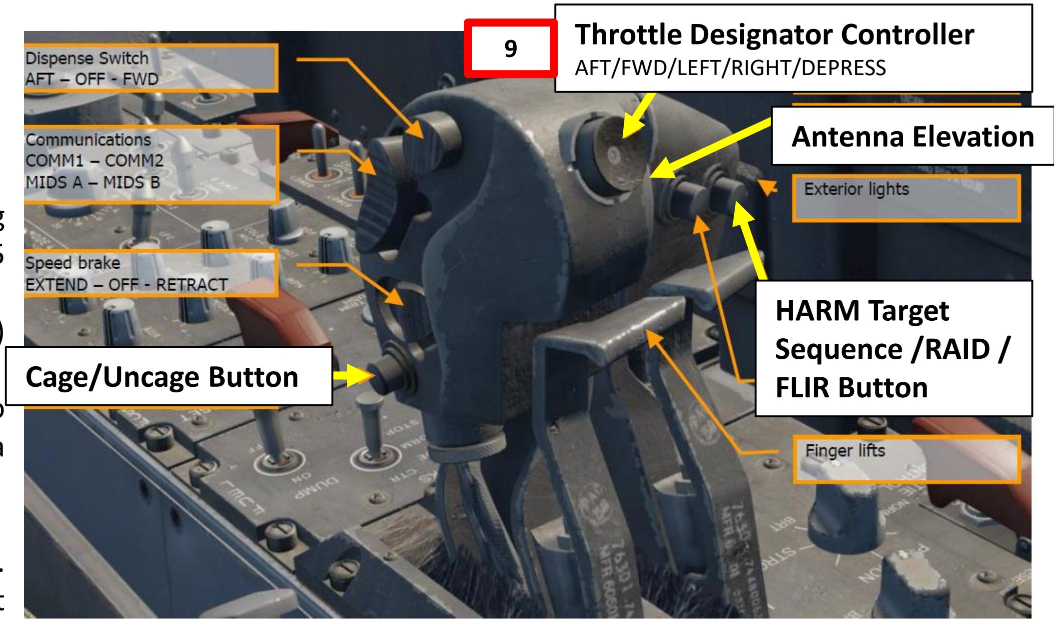
Sensor Control Switch
AFT/FWD/LEFT/RIGHT

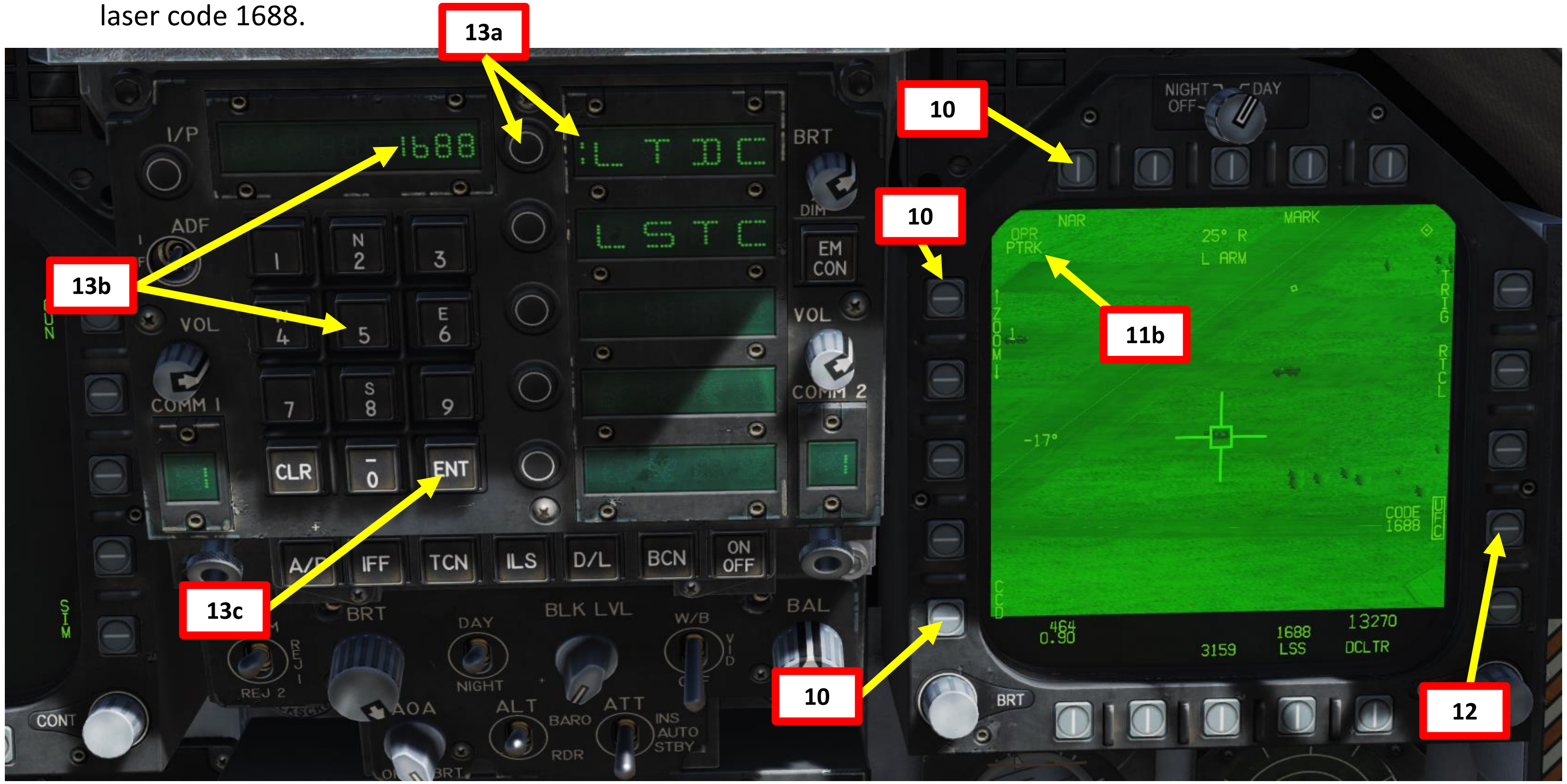




3 - AN/AAQ-28(V) LITENING II T-POD START-UP & LASING PROCEDURE

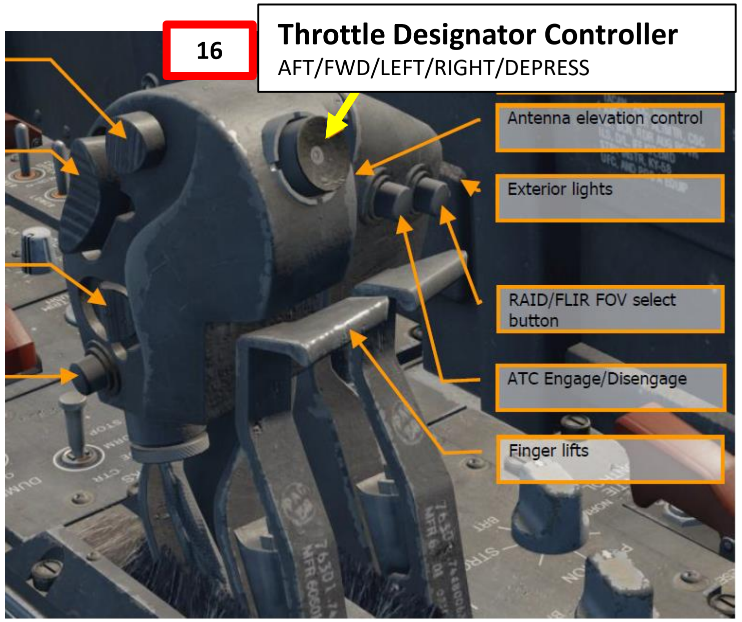
9. Using the TDC (Throttle Designator Controller) Aft/Fwd/Left/Right controls, slew the targeting pod reticle over the desired target. The targeting pod is boresighted by default to a forward, 5 deg down view.
10. Use appropriate zoom level, field of view (NARROW/WIDE) and camera mode (CCD/TV or FLIR) to identify the target.
11. Press the Sensor Control Switch Towards Selected Display (Right if our right DDI is selected) to toggle between Point Track (PTRK, tracks a moving object like a high-contrast vehicle) and Area Track (ATRK, used for a static target).
12. Press the OSB next to "UFC" to set the Targeting Pod laser code on the Up-Front Controller.
13. Press the button next to "LTDC" (Laser Target Designator Code). A ":" will indicate it is selected. Then, enter the desired laser code on the keypad and press "ENT". We will choose the default laser code 1688.

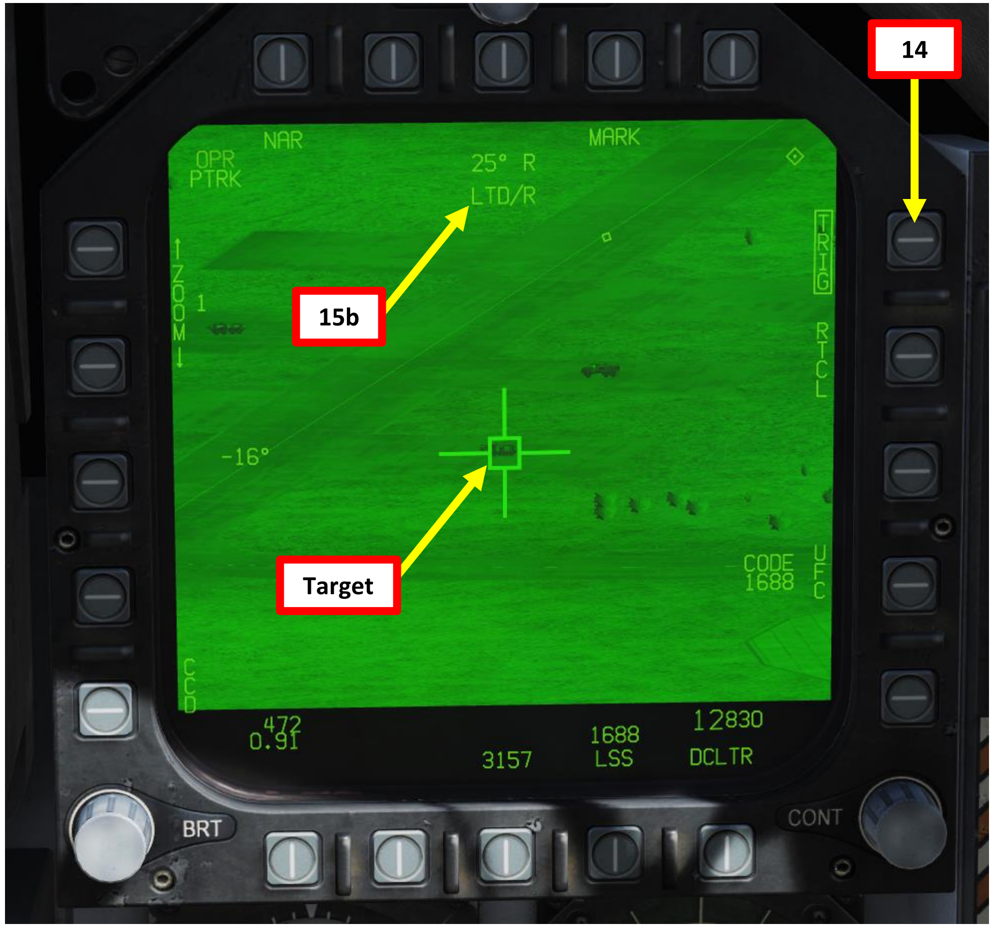


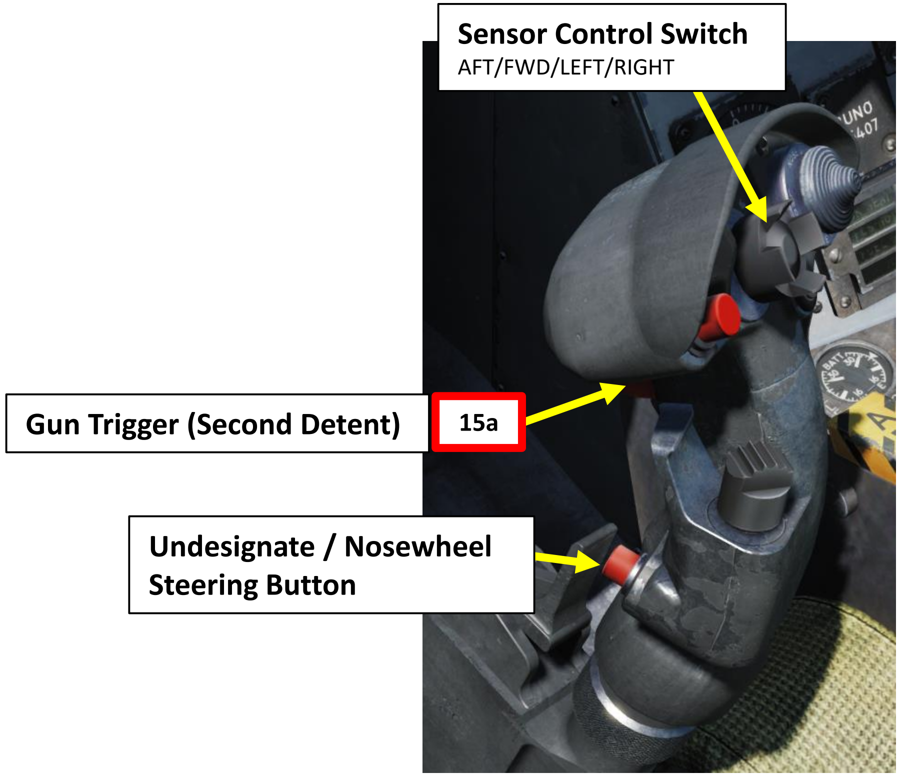


3 - AN/AAQ-28(V) LITENING II T-POD START-UP & LASING PROCEDURE

14. Press the OSB next to “TRIG”. The indication will become boxed once selected, which means that a gun trigger press will fire the laser.
15. Press the gun trigger to fire laser. Once laser is firing, the laser mode will switch from L ARM to LTD/R.
16. Use the TDC (Throttle Designator Controller) Depress button to designate the laser as the target point. This will slave selected air-to-ground weapons to where the laser is firing.
17. You may now launch laser-guided weapons as per their release procedure.
18. When desired, press the Gun Trigger a second time to stop firing the laser. You can use the Undesignate/Nosewheel Steering button to undesignate the target.





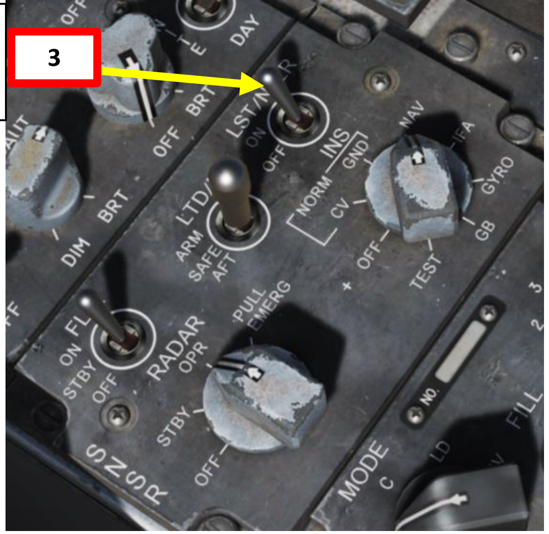


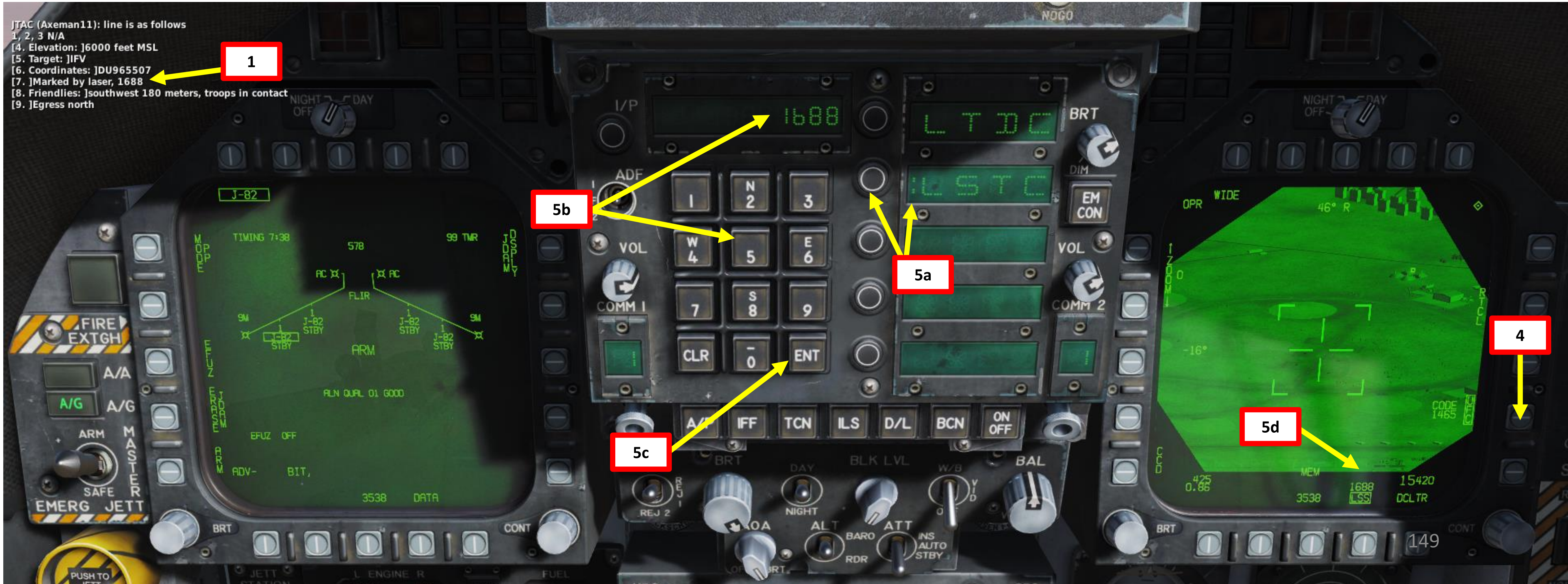
3 - AN/AAQ-28(V) LITENING II T-POD LASER SPOT SEARCH MODE

The targeting pod can also spot and track a laser from someone else (a friendly Hornet lasing his own target, or a JTAC, Joint Tactical Air Controller, calling an air strike). To track another laser:

1. Find out what the laser code used by the friendly is (in our case, the friendly JTAC uses code 1688). Make sure the friendly asset is lasing the target before attempting to track it.
2. Power up the Targeting Pod and set A/G Master Mode as per the previous Power-Up Procedure.
3. Set the LST/NFLR (Laser Spot Tracker) switch to ON.
4. Press the OSB next to "UFC" to set the LSS (Laser Spot Search) code on the Up-Front Controller.
5. Press the button next to "LSTC" (Laser Spot Track Code). A ":" will indicate it is selected. Then, enter the desired laser code on the keypad and press "ENT". We will choose the default code used by the JTAC, which is 1688.

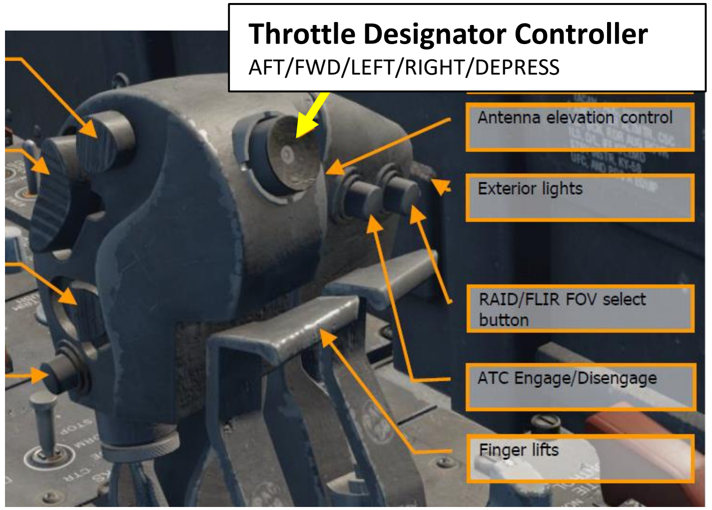
LST/NFLR switch
Laser Spot Tracker/Navigation Forward-Looking Infrared (LST/NFLR) sensor

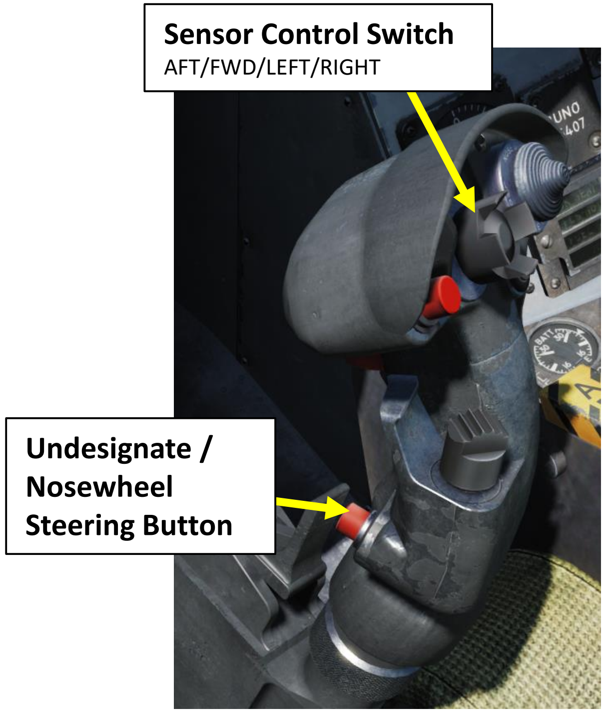


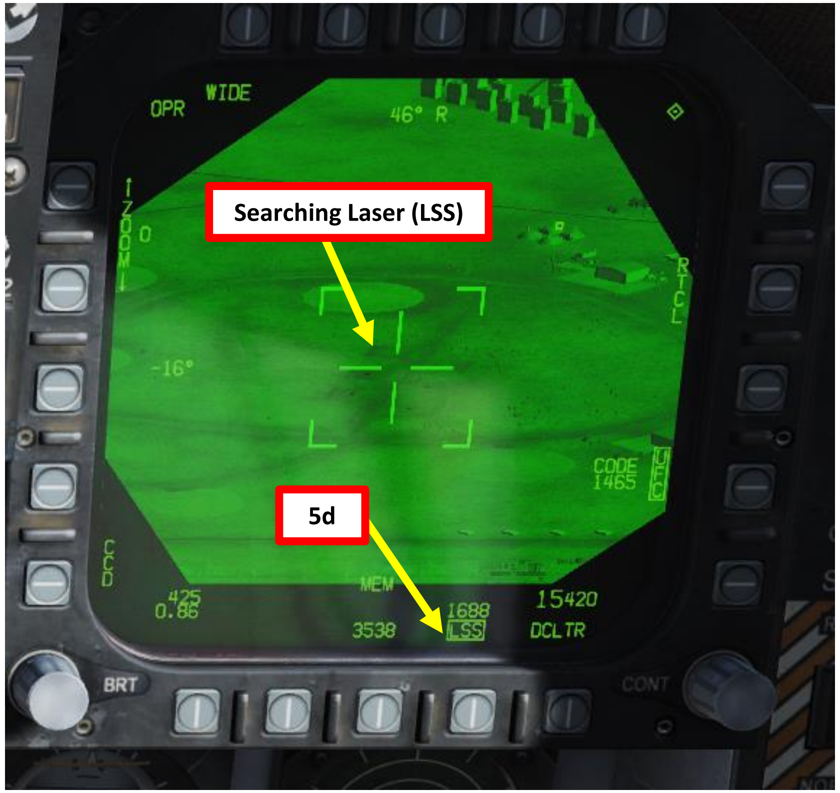


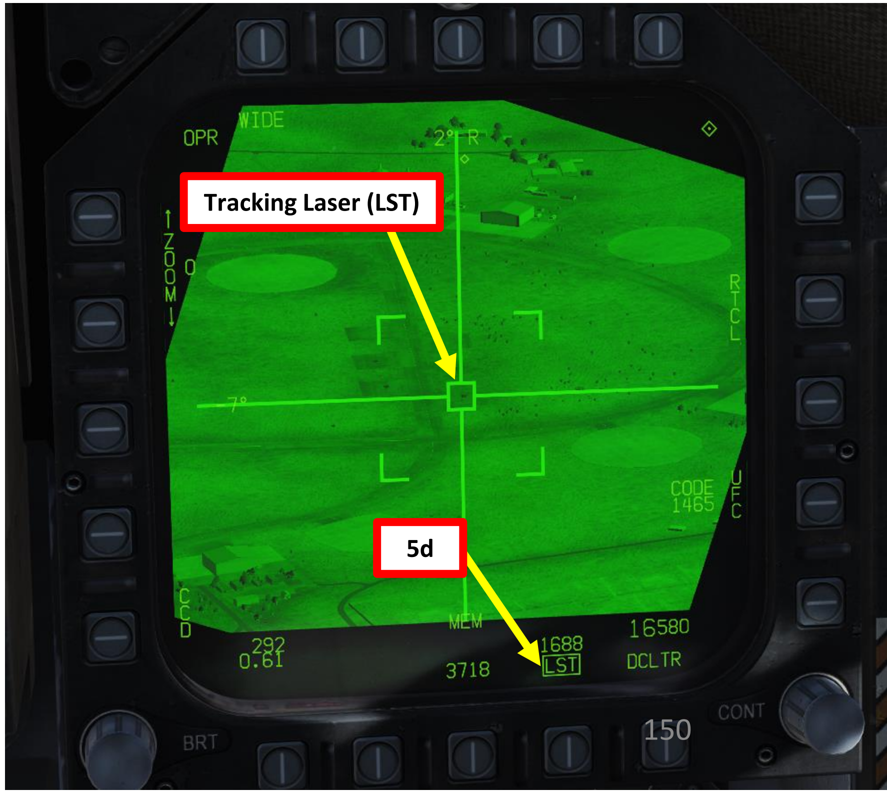
3 - AN/AAQ-28(V) LITENING II T-POD LASER SPOT SEARCH MODE

6. Slew the targeting pod using the Sensor Select Switch and TDC controls within the vicinity of the JTAC location. If the targeting pod is looking too far from the laser, it will not be able to find the laser.
7. Press the OSB next to “LSS” (Laser Spot Search). Once selected, the indication will be boxed.
8. While the targeting pod is searching for a laser, the FLIR image will remain frozen. Targeting pod will remain in LSS mode as long as it is in Search mode.
9. When targeting pod has found a friendly laser, targeting pod mode will switch from LSS (Laser Spot Search) to LST (Laser Spot Track). It will actively track the JTAC laser.
10. Use the TDC (Throttle Designator Controller) Depress button to designate the laser as the target point. This will slave selected air-to-ground weapons to where the laser is firing.
11. You may now launch laser-guided weapons as per their release procedure.
12. When desired, press the OSB next to LST to stop tracking the laser. You can use the Undesignate/Nosewheel Steering button to undesignate the target.





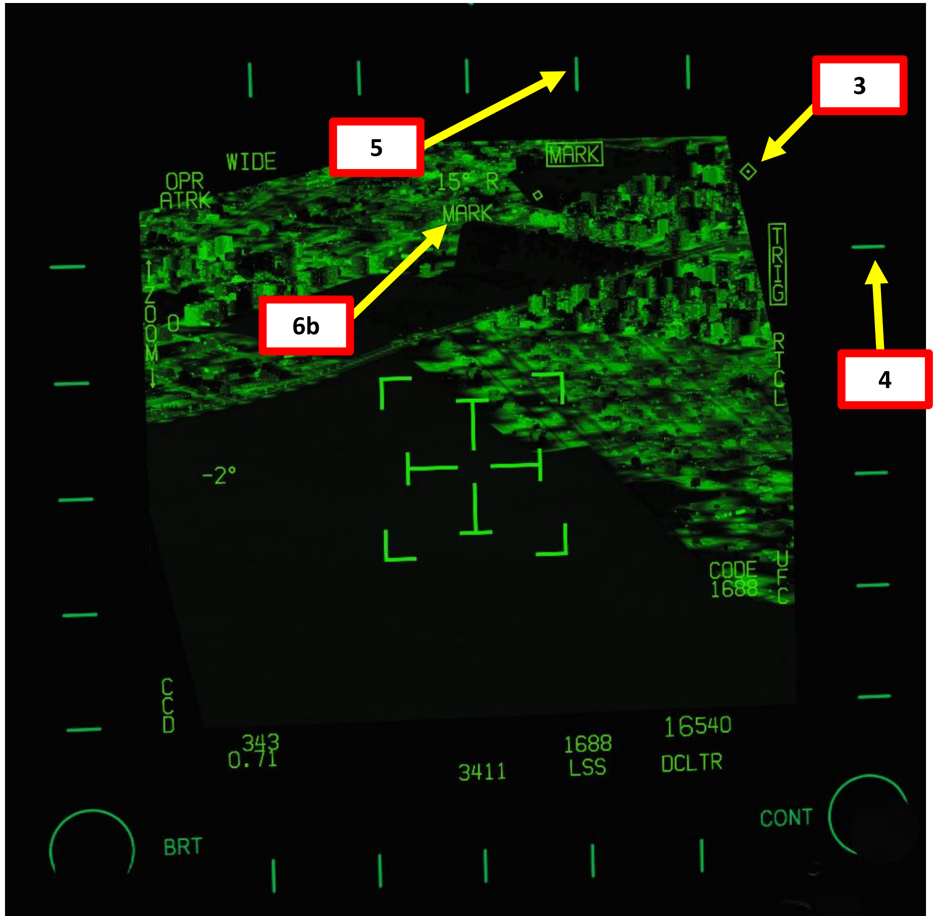


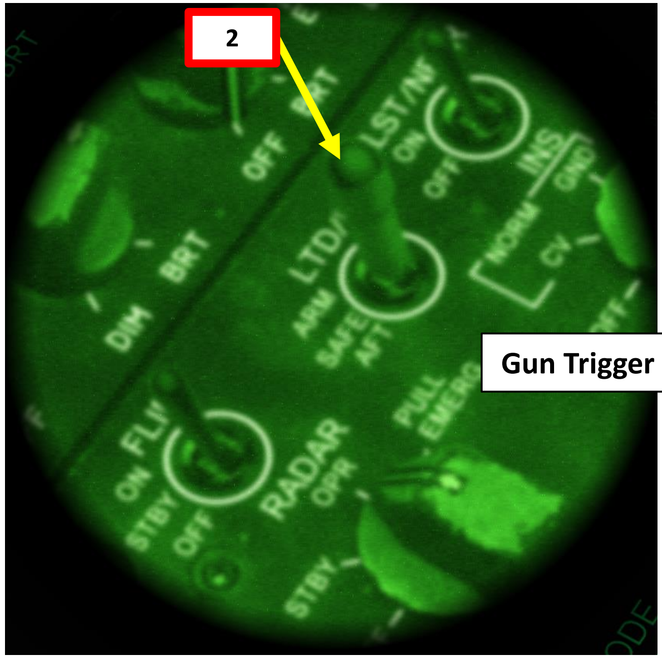


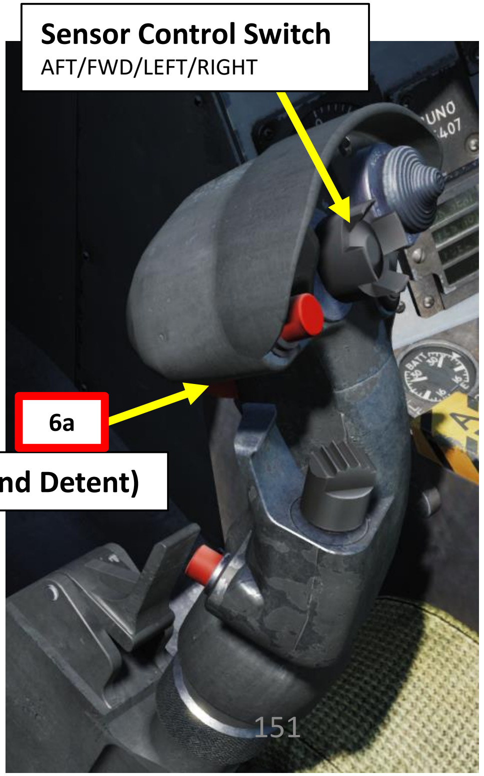
3 - AN/AAQ-28(V) LITENING II T-POD LASER MARKING

The targeting pod can also use a laser marker (the laser marker cannot be tracked by air-to-ground weapons), which is an infrared laser that can only be seen with night vision goggles (RSHIFT+H to toggle NVGs). This is used mainly to provide a visual reference to other aircraft on where a target is.

1. Power up the Targeting Pod and set A/G Master Mode as per the previous Power-Up Procedure.
2. Set LTD/R (Laser Target Designator/Ranger) switch to ARM. This will arm the laser. Confirm that L ARM indication is displayed on the FLIR page.
3. Press the Sensor Control Switch in the direction of the selected DDI (Right for the Right DDI as an example). The Select Focus Diamond indicates what display is selected.
4. Press the OSB next to “TRIG”. The indication will become boxed once selected, which means that a gun trigger press will fire the laser.
5. Press the OSB next to “MARK” to set the laser in “M Arm” (Marker Arm) mode. When selected, “Mark” indication will be boxed.
6. Press the gun trigger to fire laser. Once laser is firing, the laser mode will switch from M ARM to MARK.

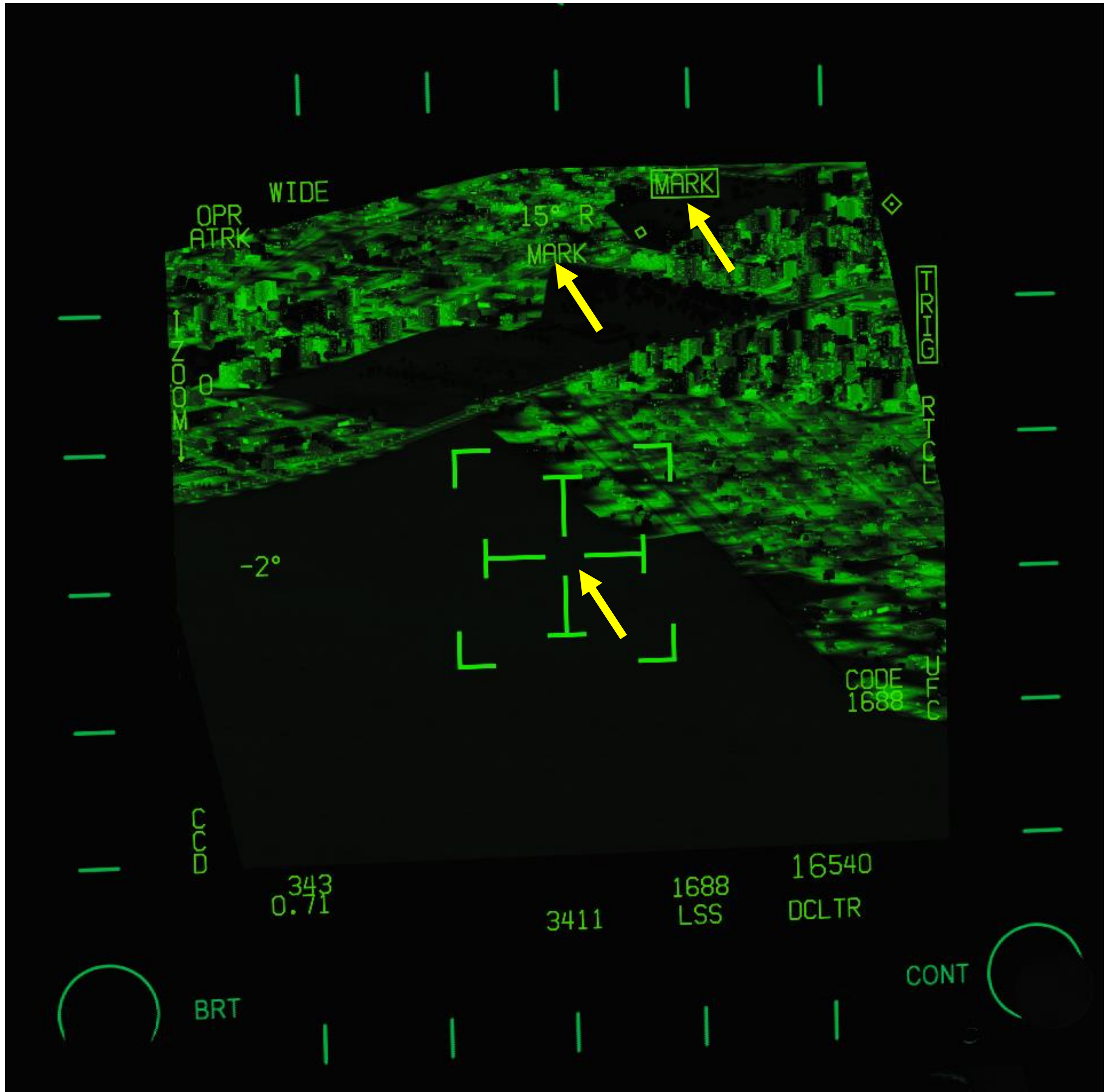




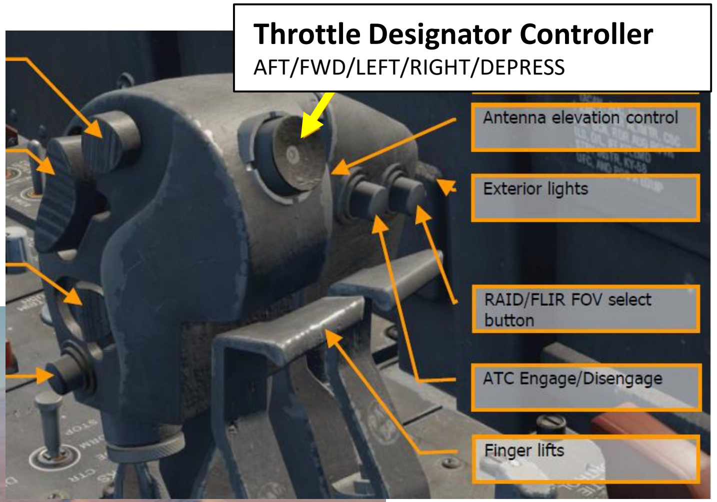


3 - AN/AAQ-28(V) LITENING II T-POD LASER MARKING

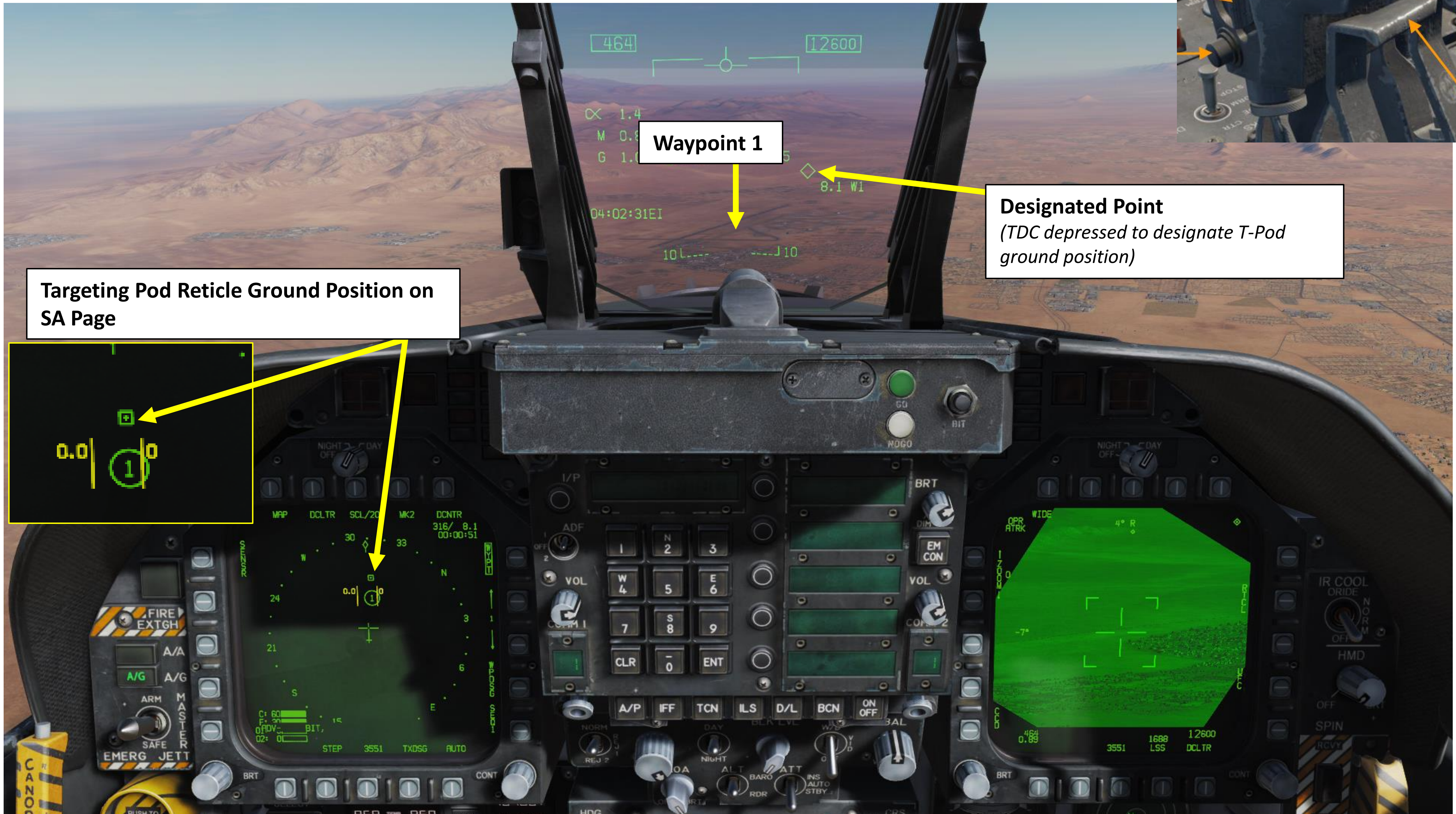
7. An infrared laser will be visible with your night vision goggles.



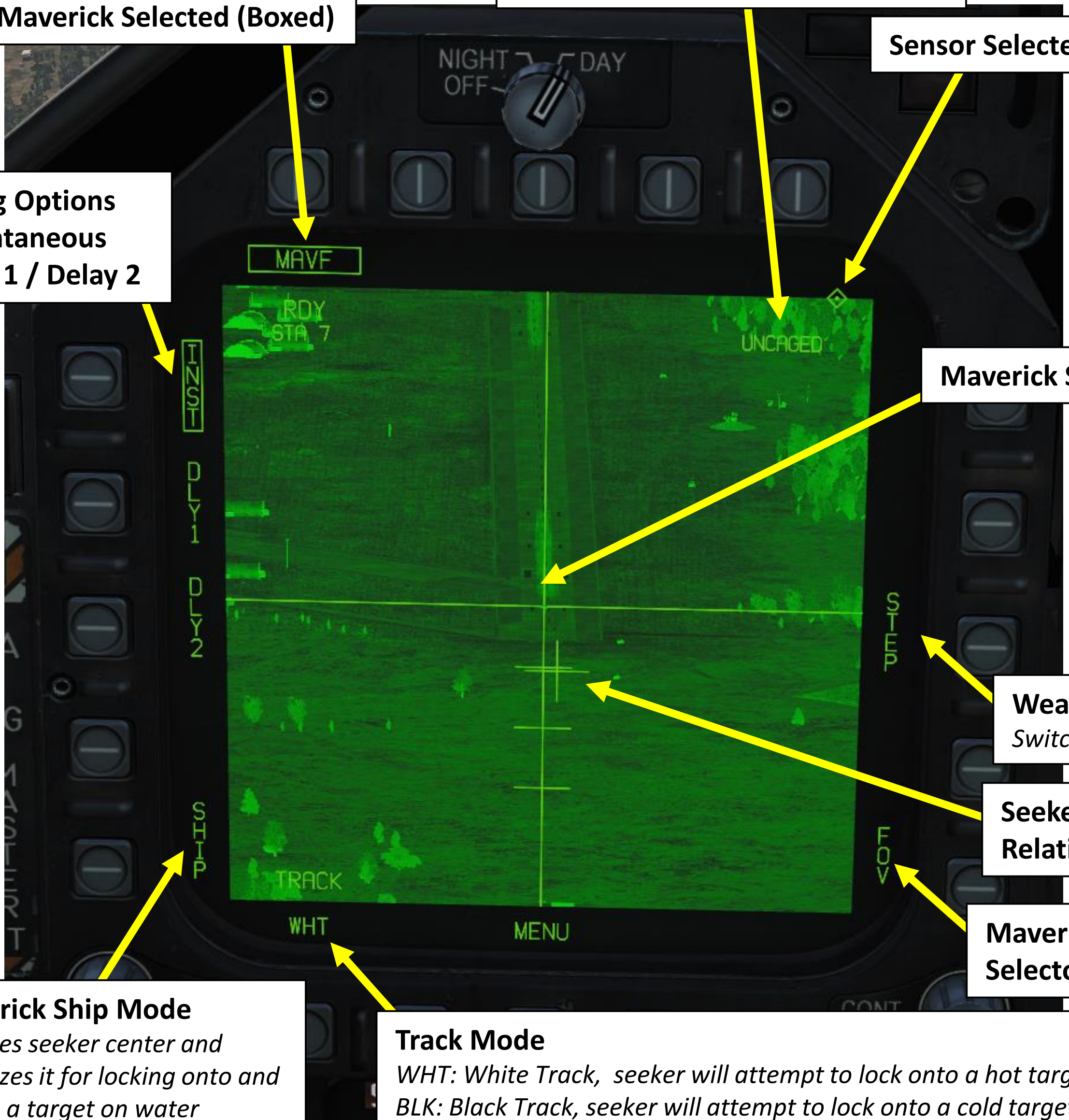
3 - AN/AAQ-28(V) LITENING II T-POD TARGETING POD TIPS



To get a visual reference of where the targeting pod is looking, consult the SA (Situational Awareness) page. A small square represents the T-Pod reticle position in a top-down view. You can also use the TDC Depress button to designate the targeting pod reticle, which will appear as a diamond on the Heads-Up Display.



4 – AGM-65F/G MAVERICK (IR-MAVF) DISPLAYS



Maverick Selected (Boxed)

Maverick Caged/Uncaged Status

Sensor Selected Diamond

Fuzing Options
Instantaneous
Delay 1 / Delay 2

Maverick Seeker Center

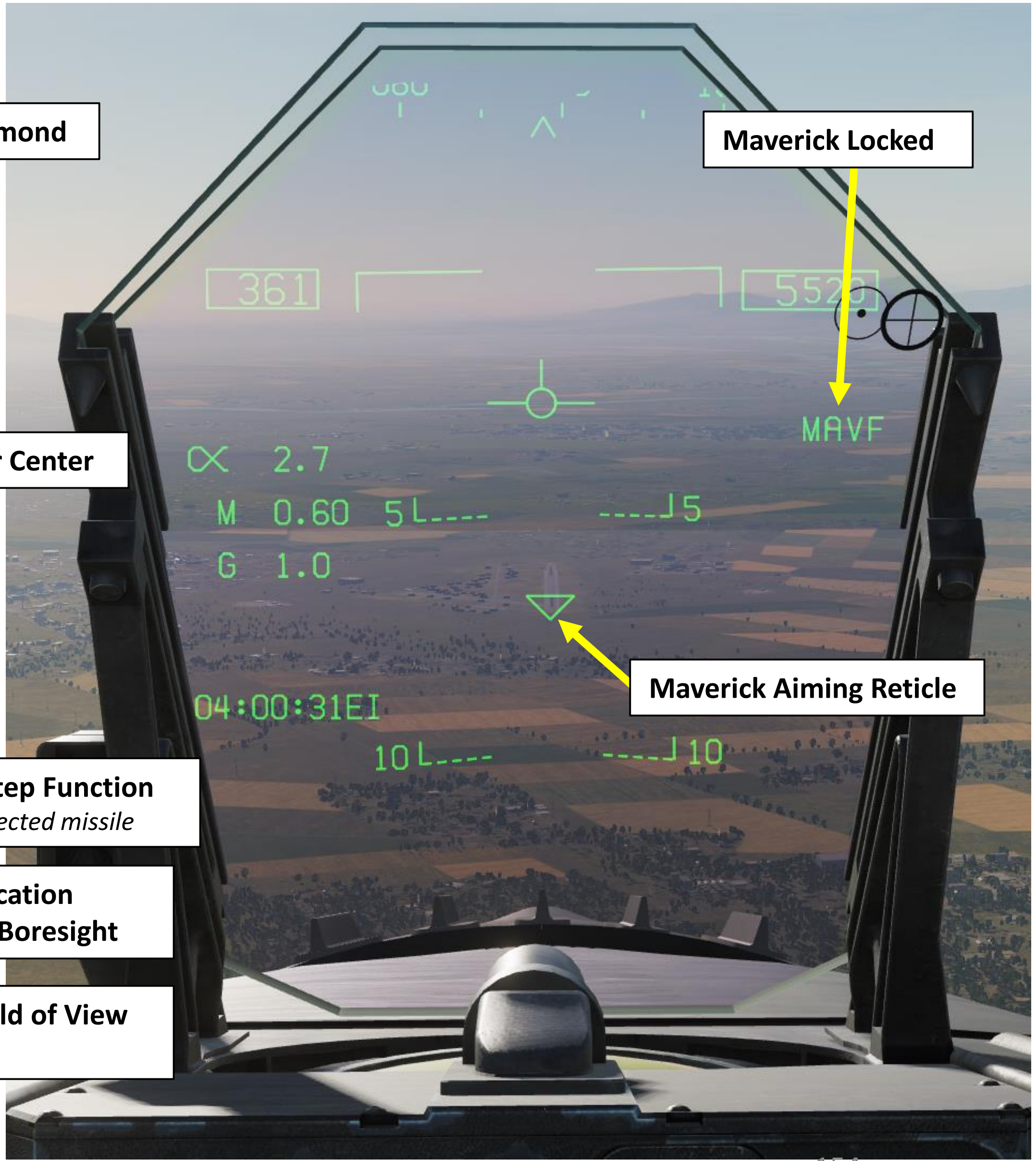
Weapon Step Function
Switches selected missile

Seeker Indication Relative to Boresight

Maverick Field of View Selector

Maverick Ship Mode
Enlarges seeker center and optimizes it for locking onto and hitting a target on water

Track Mode
WHT: White Track, seeker will attempt to lock onto a hot target
BLK: Black Track, seeker will attempt to lock onto a cold target

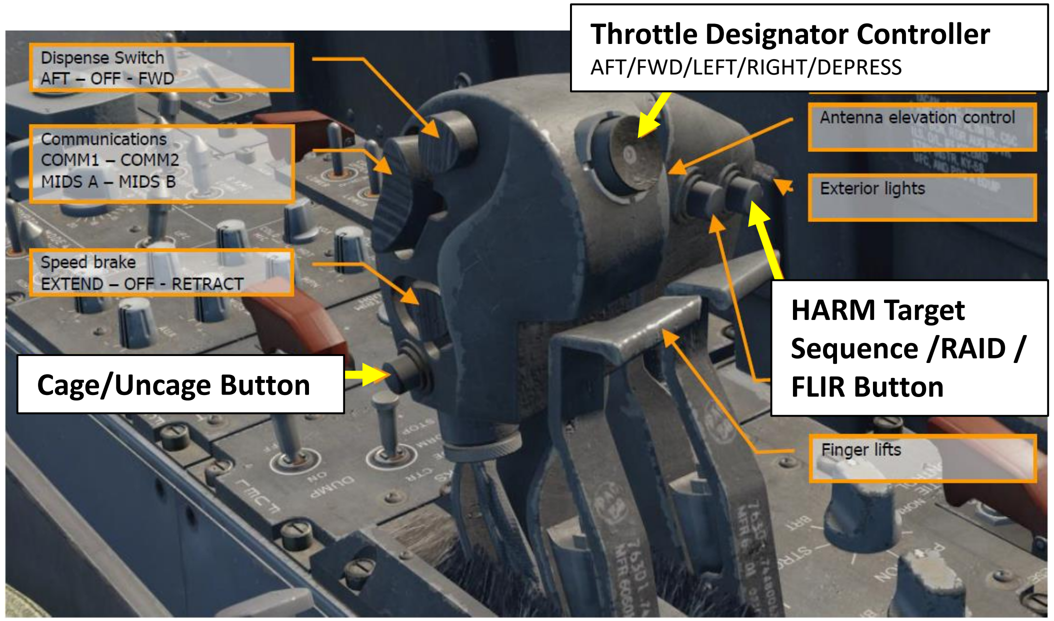


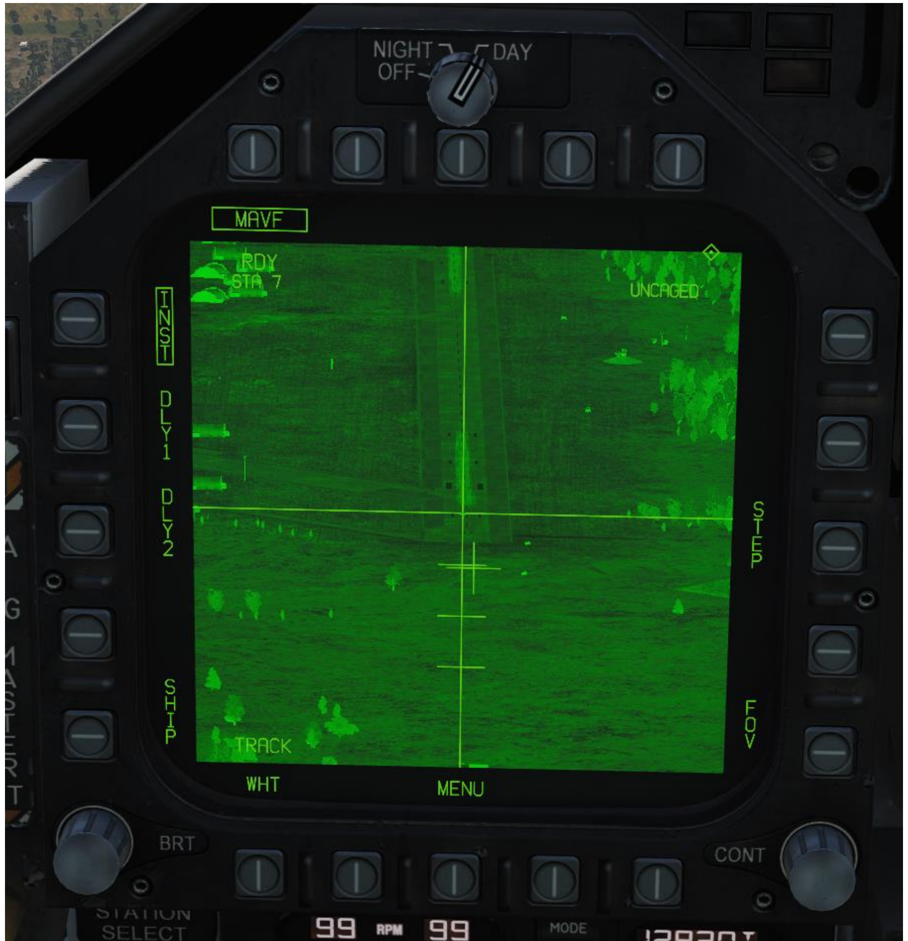
Maverick Locked

Maverick Aiming Reticle

4 – AGM-65F MAVERICK (IR-MAVF) CONTROLS

To operate the IR-Seeker Maverick, you need to first allow it to cooldown (will be shown in Weapons Section) by selecting it in the SMS (Stores Management System) page, setting Master Arm On and pressing the A/G Master Mode. Then, you can select the Maverick seeker head feed by going back to the TAC page and selecting IMAV DSPLY. Then, use the Sensor Control Switch to the Maverick Feed DDI, Uncage the Maverick, hold the TDC Depress button while slewing the Maverick to the target. When release the TDC Depress button, the missile will attempt to lock its target.





SECTION STRUCTURE

1 - INTRODUCTION

BOMBS

WEAPON	TYPE	WEAPON	TYPE
MK-82	500 lbs low-drag unguided bomb ***Fuze Needed: MFUZ NOSE***	CBU-99	500 lbs anti-tank cluster bomb ***Fuze Needed: MFUZ VT*** ***HT Function: Sets HOB (Height of Burst)***
MK-82SE (Snake Eye)	500 lbs unguided low-drag retarded bomb ***Fuze Needed: MFUZ NOSE***	MK-20 Rockeye	Unguided cluster bomb ***Fuze Needed: MFUZ VT*** ***HT Function: Sets HOB (Height of Burst)***
MK-83	1000 lbs low-drag unguided bomb ***Fuze Needed: MFUZ NOSE***	BDU-33	25 lbs unguided training bomb ***Fuze Needed: MFUZ NOSE***
MK-84	2000 lbs low-drag unguided bomb ***Fuze Needed: MFUZ NOSE***	AGM-154A/C JSOW	Global Positioning System (GPS)-guided Joint Standoff Weapon (JSOW) glide bombs ***HT Function (AGM-154A): Sets HOB (Height of Burst)***
		GBU-38 (J-82) JDAM	Global Positioning System (GPS)-guided Joint Direct Attack Munition (JDAM) bombs

SMS Designations

Type	SMS Designation
GBU-38	J-82
GBU-32	J-83
GBU-31	J-84
GBU-31(V)	J-109
AGM-154A	JSA
AGM-154C	JSC

GUN POD

WEAPON	TYPE
M61A2 Vulcan	Six-barrel 20 mm Gatling-type rotary cannon (578 rounds)

AIR-TO-AIR MISSILES

WEAPON	TYPE
AIM-9L/M/P Sidewinder	Infrared guided air-to-air missile
AIM-7F/M Sparrow	Semi-active radar-guided air-to-air missile
AIM-120 AMRAAM	Advanced Medium Range Air-to-Air Missile (AMRAAM), active radar homing air-to-air missile

ROCKETS

WEAPON	TYPE
ZUNI MK-71	130 mm (5 inches) unguided rockets
2.75 in	2.75 inches rocket, used for general purpose

1 - INTRODUCTION

AIR-TO-GROUND MISSILES

WEAPON	TYPE
AGM-65F/G Maverick – IR Seeker (MAVF)	Air-to-Ground missile guided by imaging infrared system (MAVF) and used at night and during bad weather.
AGM-65E Maverick – Laser Guided (MAV)	Air-to-Ground missile guided by laser designator guidance system (MAV) optimized for fortified installations and heavier penetrating blast-fragmentation warhead
AGM-88C HARM	Air-to-Surface High-Speed Anti-Radiation Missile (HARM) missile. Anti-radiation guidance homes in on radiowave emissions from a radar, allowing it to attack surface-to-air missile (SAM) sites.
AGM-84D Harpoon	All-weather, over-the-horizon, Anti-Ship missile system.

1 - ARMAMENT MATRIX BY TWISTED-BISCUIT

ver. 1.0.2
11 July 2018

F/A-18C Hornet | Stations

9	8	7	6	5	4	3	2	1
AIM-9 ONLY	LAU-115	LAU-115	AIM-7 ONLY	BRU-33	AIM-7 ONLY	LAU-115	LAU-115	AIM-9 ONLY
	BRU-33	BRU-33	LAU-115		LAU-115	BRU-33	BRU-33	
	BRU-41A	BRU-41A	LAU-115C		LAU-115C	BRU-41A	BRU-41A	

Common Terms	
Cluster	A bomb which releases hundreds of smaller explosives at a given height or time.
Fuse	Determines the detonation condition of the warhead. Impact or electronic fuse on the head / tail.
Unguided	Once the ordnance is released, it receives no further direction from the pilot.
Fin-Retarding	Deploys a set of fins to slow the ordnance in order to allow the aircraft escape the explosion.
Free-Fall	Does not guide itself to a target.
Semi-Active Radar	Missile relies on the aircraft on-board radar to keep lock of the target.
IR	Infra-red tracking. When launched, the missile locks onto a heat signature and attempts to follow it.

F/A-18C Hornet | Armament Matrix

STATION	NAME	AKA	PURPOSE	TARGETS	FRAG DISTANCE	WEIGHT	LENGTH	RANGE	SPEED	SUB-MUNITIONS	EMPLOYMENT	SUB-MUNITIONS DISPENSER	FUSE	STORES SETTINGS	NOTE	NOTE
BOMBS																
BRU-33	Mk20 Rockeye	CBU-100	Air-to-Ground Multipurpose Cluster Munition	Armoured Vehicle Requiring Penetration	Unknown	220kg / 490lbs	2.34m	N/A	N/A	247 x Mk118 Bomblets	Unguided, Free-Fall	MK7	Mk331 Mod 1 Timed Fuse OR FMU-140 Radio Proximity Fuse	SMS Page > MFUZ > VT > HOB (Height of Burst) Toggle to desired height	Almost identical to CBU-99 except for the dispenser and fuze.	Aiming corrected as of DCS 2.5.2.19157 Update 6
BRU-33	CBU-99		Air-to-Ground Multipurpose Cluster Munition	Armoured Vehicle	Unknown	220kg / 490lbs	2.34m	N/A	N/A	247 x Mk118 Bomblets	Unguided, Free-Fall	SUU-75	FMU-140 Radio Proximity Fuse (Version Dependant)	SMS Page > MFUZ > VT > HOB (Height of Burst) Toggle to desired height	Almost identical to Mk20 Rockeye except for the dispenser and fuze.	Aiming corrected as of DCS 2.5.2.19157 Update 6
BRU-33	Mk-82		Low-Drag, General Purpose Iron Bomb	Unarmoured or Lightly Armoured Targets	80m Across, 30m Long (Approx.)	241kg / 500lbs	2.21m	N/A	N/A	N/A	Unguided, Free-Fall	N/A	Nose Only	SMS Page > MFUZ > Nose	Nose fuse only in current version.	
BRU-33	Mk-82 SnakeEye		Fin-Retarding, General Purpose Iron Bomb	Unarmoured or Lightly Armoured Targets	80m Across, 30m Long (2.400m2) Approx.	258kg / 568lbs	2.27m	N/A	N/A	N/A	Unguided, Fin-Retarded	N/A	Nose Only	SMS Page > DRAG > RET to toggle fin-retarder.	No longer releases with retarder automatically deployed as of DCS 2.5.2.19157 Update 6	
BRU-33	Mk-83		Low-Drag, General Purpose Iron Bomb	Unarmoured or Lightly Armoured Targets	200m Across Approx.	447kg / 1000lbs	3.01m	N/A	N/A	N/A	Unguided, Free-Fall	N/A	Nose Only	SMS Page > MFUZ > Nose	Nose fuse only in current version.	
BRU-33	Mk-84		Low-Drag, General Purpose Iron Bomb	Armoured Targets	360m Across Approx.	894kg / 2000lbs	3.84m	N/A	N/A	N/A	Unguided, Free-Fall	N/A	Nose Only	SMS Page > MFUZ > Nose	Nose fuse only in current version.	
BRU-41A	BDU-33		Training, "Dumb Bomb"	N/A	Dispenses at force of a Shotgun Blast	10kg / 24lbs		N/A	N/A	Phosphorus	Unguided, Free-Fall	N/A	Nose Only		Designed to simulate Mk82	
ROCKETS																
BRU-33 [LAU-10]	ZUNI MK71		Unguided Rocket	Anti-Tank / Anti-Personnel		56.3kg / 124lbs	2.93m	4 km	2520 km/h	N/A	Unguided, Solid-Fuel Rocket Motor Propelled	N/A	Nose			
BRU-33 [LAU-61]	MK151HE	Hydra 70	Unguided Rocket	Anti-Material / Anti-Personnel	10m (can be lethal to soft targets up to 50m)	6.2kg / 13.6lbs	1.06m	8.8 km	4388 km/h	N/A	Unguided, Solid-Fuel Rocket Motor Propelled	N/A	Nose			
BRU-33 [LAU-68]	M151HE	Hydra 70	Unguided Rocket	Anti-Material / Anti-Personnel	10m (can be lethal to soft targets up to 50m)	6.2kg / 13.6lbs	1.06m	8.8 km	4388 km/h	N/A	Unguided, MK66 Solid-Fuel Rocket Motor Propelled	N/A	Nose	SMS > MTR > MK66 to set rocket motor.		
BRU-33 [LAU-68]	MK5 HE	Hydra 70	Unguided Rocket	Anti-Tank / Anti-Personnel	10m (can be lethal to soft targets up to 50m)	6.2kg / 13.6lbs	1.06m	8.8 km	4388 km/h	N/A	Unguided, MK66 Solid-Fuel Rocket Motor Propelled	N/A	Nose	SMS > MTR > MK66 to set rocket motor.		
MISSILES																
Wing	AIM-9L	Sidewinder	IR Fire-and-Forget, Air-to-Air Missile	Anti-Aircraft, Anti-Helo	Unknown	85.5kg / 188.5 lbs	2.83m	11 km	2.5 mach	N/A	IR Guided, MK36 Solid-Fuel Rocket Motor	N/A	Laser Proximity Fuse		Less advanced seeker than AIM-9M	
Wing	AIM-9M	Sidewinder	IR Fire-and-Forget, Air-to-Air Missile	Anti-Aircraft, Anti-Helo	Unknown	85.5kg / 188.5 lbs	2.83m	18 km	2.5 mach	N/A	IR Guided, Reduced Smoke Solid-Fuel Rocket Motor	N/A	Laser Proximity Fuse		IR Coolant Required	
Wing	CAP-9M	Sidewinder	IR Fire-and-Forget, Air-to-Air Missile	Training	Unknown	85.5kg / 188.5 lbs	2.83m	11 km	2.5 mach	N/A	IR Guided, Reduced Smoke Solid-Fuel Rocket Motor	N/A	N/A			
LAU-115	AIM-7M	Sparrow	Radar-Guided, Medium Range, Air-to-Air Missile	Anti-Aircraft, Anti-Helo	Unknown	230kg / 507lbs	3.66m	45 km	3.0 mach	N/A	Semi-Active Radar Guided, Hercules MK58 Dual Thrust Solid Fuel Motor	N/A	Active Radar Proximity Fuse	Select AIM7 (automatically places you in A/G mode) > SMS > HELO (when tracking helo)	Blast Frag Warhead	
LAU-115	AIM-7F	Sparrow	Radar-Guided, Medium Range, Air-to-Air Missile	Anti-Aircraft, Anti-Helo	Unknown	230kg / 507lbs	3.66m	45 km	3.0 mach	N/A	Semi-Active Radar Guided, Hercules MK58 Dual Thrust Solid Fuel Motor	N/A	Active Radar Proximity Fuse		Continuous Rod Warhead	Continuous Rod Warhead is designed to explode in a radial fashion to shear a target in two.

1 - MY WEAPONS CONTROLS SETUP

Note: this is the setup as per aircraft. Feel free to customize your own control mapping for the Weapon Select functions.

Forward: AIM-7 Sparrow (no function for this Early Access version)
Press Down: AIM-9 Sidewinder
Aft: M61A2 20mm Gun
Right: AIM-120 AMRAAM
Left: No Function

↑ Select Sidewinder
→ Select Amraam
↓ Select Sparrow
← Select Guns

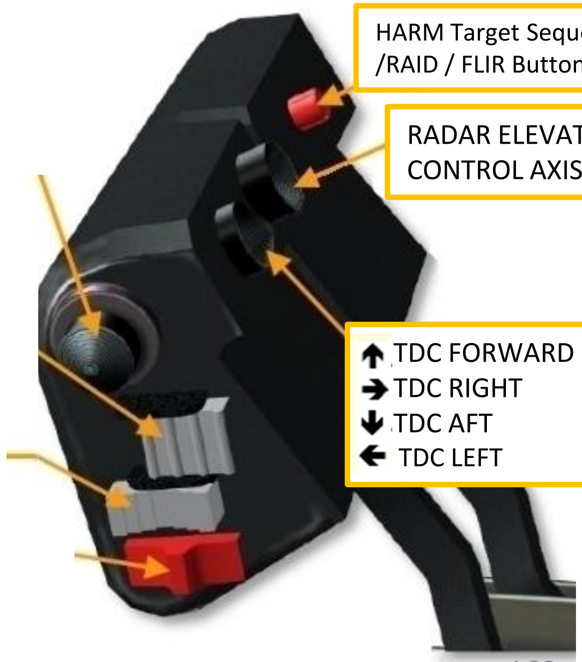
↑
→ TDC - DEPRESS
↓
← CAGE/UNCAGE BUTTON

Weapon Release

Gun Trigger: Second Detent

↑ Sensor Control Sw. FWD
→ Sensor Control Sw. RIGHT
↓ Sensor Control Sw. AFT
← Sensor Control Sw. LEFT
P Sensor Control Sw. DEPRESS

Undesignate / Nose Wheel Steer Switch



HARM Target Sequence /RAID / FLIR Button

RADAR ELEVATION CONTROL AXIS

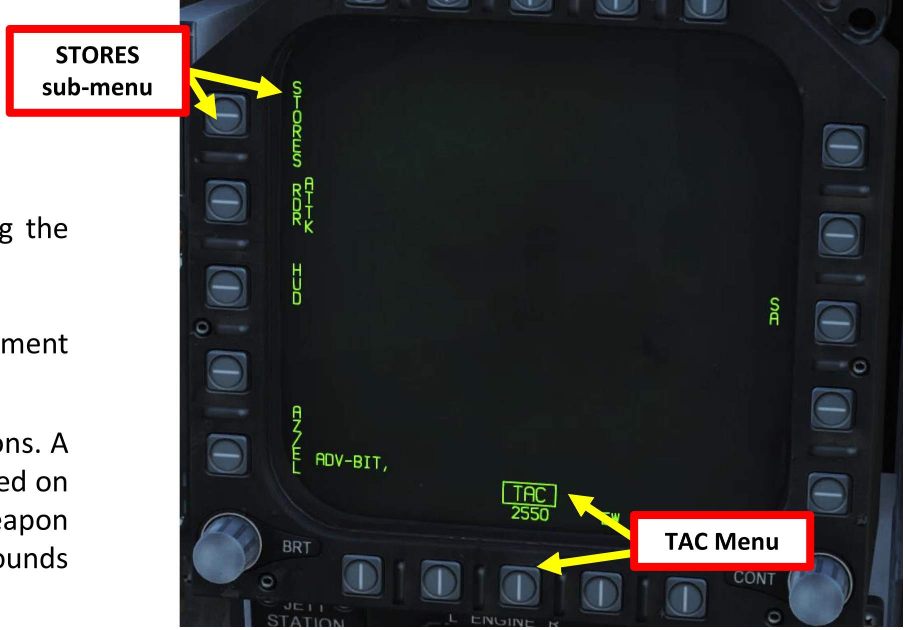
↑ TDC FORWARD
→ TDC RIGHT
↓ TDC AFT
← TDC LEFT

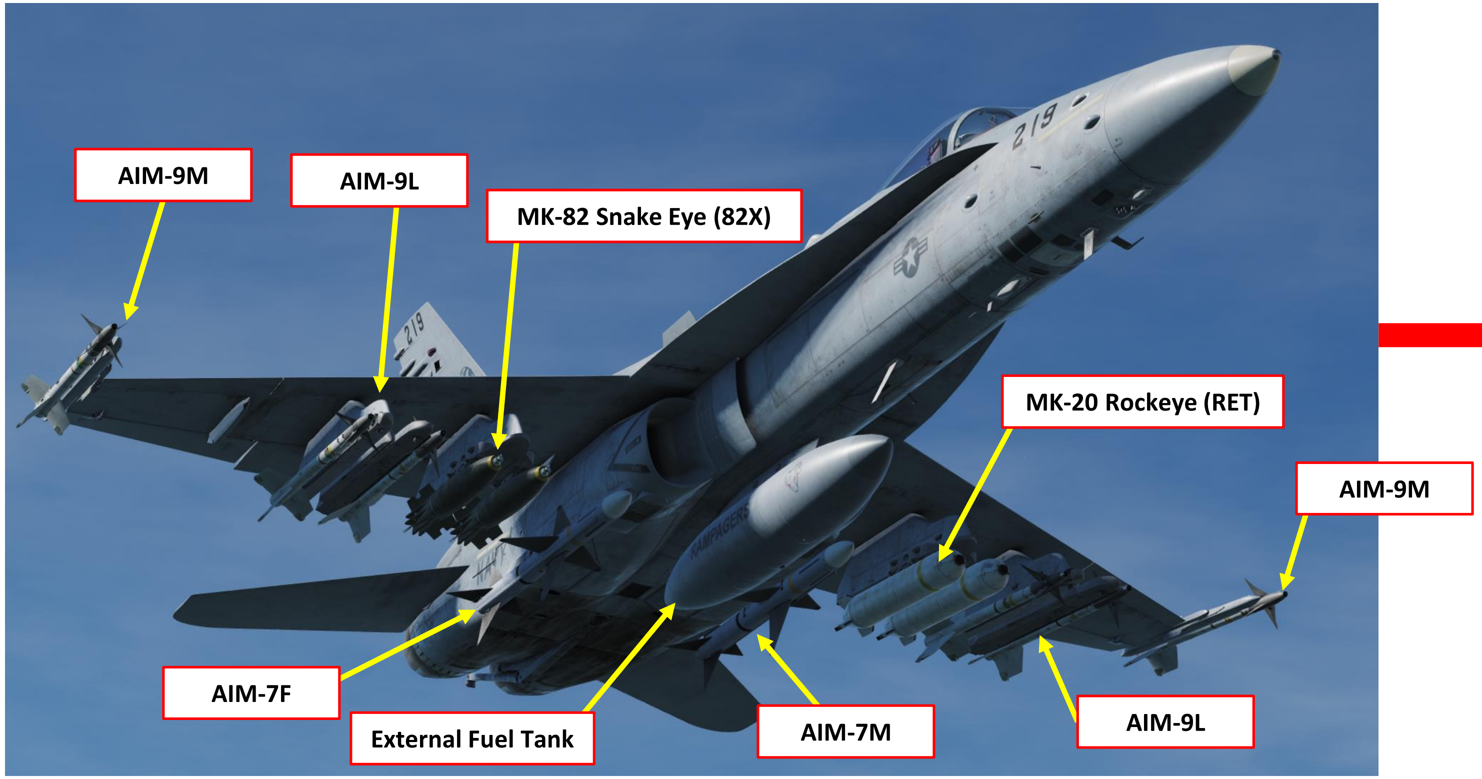
1 - SMS PAGE (STORES MANAGEMENT SYSTEM)

The SMS (Stores Management System) page can be accessed by clicking on the MENU OSB , then selecting the STORES sub-menu in the TAC (Tactical) menu.

This page acts like the A-10C's DSMS (Data & Stores Management Systems) page and allows you to select armament and program useful options like gun firing speed, bomb delivery mode or advanced air-to-air missile modes.

The wingform display provides the number, type, and status of all stores loaded on the aircraft's weapon stations. A weapons rack is indicated as a diamond symbol, and the number below indicates the number of weapons loaded on the rack or station. Various indications can be displayed below the number of weapons numeric to indicate weapon status such as RDY (ready, STBY (standby), SEL (selected), LKD (locked) and ULK (unlocked). The gun rounds remaining is indicated at the top of the wingform (578 being a full load and XXX when empty).





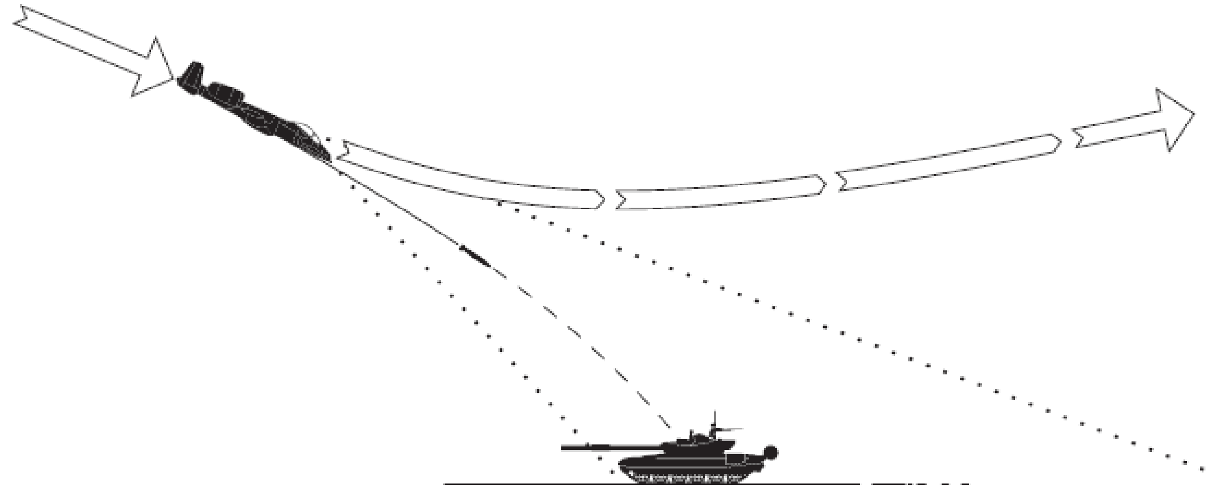
1 - BOMB DELIVERY MODES CCIP & CCRP (AUTO)

There are 2 ways to deliver a bomb: CCRP or CCIP modes.

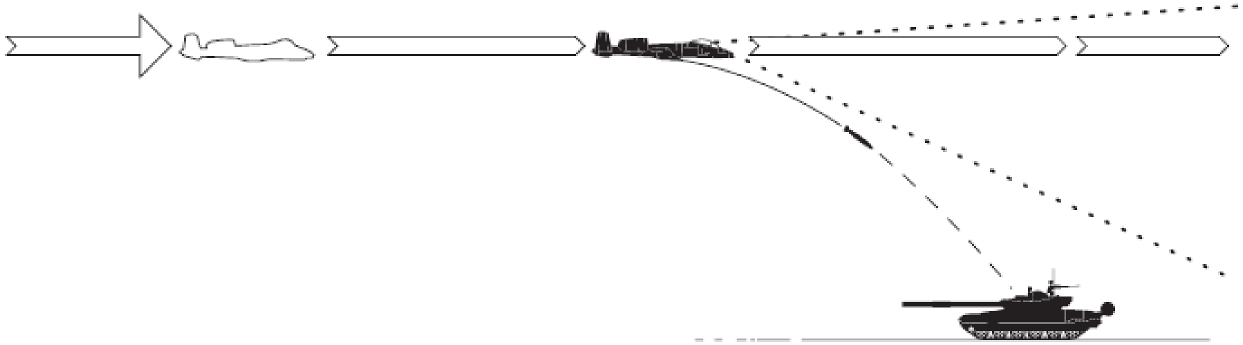
CCIP mode is the traditional dive bombing approach: you dive on target and the reticle will tell you where the bomb will impact.

However, dive bombing is a risky business, especially if anti-air defences are surrounding your target. The lower you go, the more vulnerable you are. This is why CCRP release mode was invented.

CCRP mode allows you to fly straight and level without having to dive down. The HUD will tell you when to release your bomb for the target you have designated with your radar. It is a much safer way to release a bomb, but as you may have guessed already, it is less precise. CCRP mode is also referred to the AUTO mode.



CCIP: Continuously Computed Impact Point



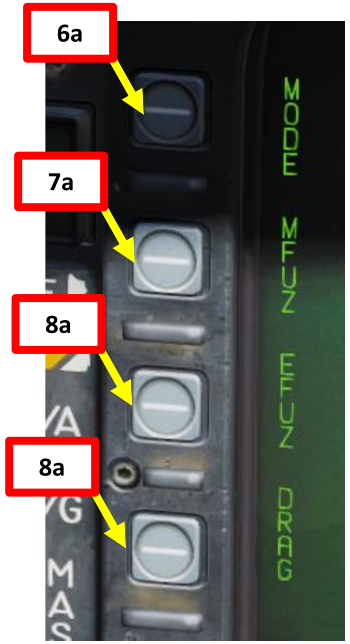
CCRP: Continuously Computed Release Point

2.1 - UNGUIDED BOMB (MK-82) CCIP RELEASE MODE

1. Master Arm switch – ARM (UP)
2. Master Mode – A/G
3. Go in SMS (Stores Management System) page
4. Click on the desired bomb to select it (82B)
5. We will create a weapon delivery program by selecting a preset program. Toggle programs with the OSB next to PROG. We will use PROG 1.

2.1 - UNGUIDED BOMB (MK-82) CCIP RELEASE MODE

6. Click on OSB next to MODE, then click on OSB to select CCIP Mode
7. Click on OSB next to MFUZ (Mechanical Fuze), then press on OSB next to NOSE.
8. Click on OSB next to EFUZ (Electronic Fuze), then press on OSB next to DLY1 for a delay if desired, otherwise set to INST.
9. Click on OSB next to DRAG, then press on OSB next to either FF (Free-Falling low-drag bomb) or RET (retarded fuze) based on your bomb type.



MFUZ (Mechanical Fuze)

- OFF
- NOSE (Nose Fuze Only)
- TAIL (Tail Fuze Only)
- NT (Nose and Tail)

EFUZ (Electronic Fuze)

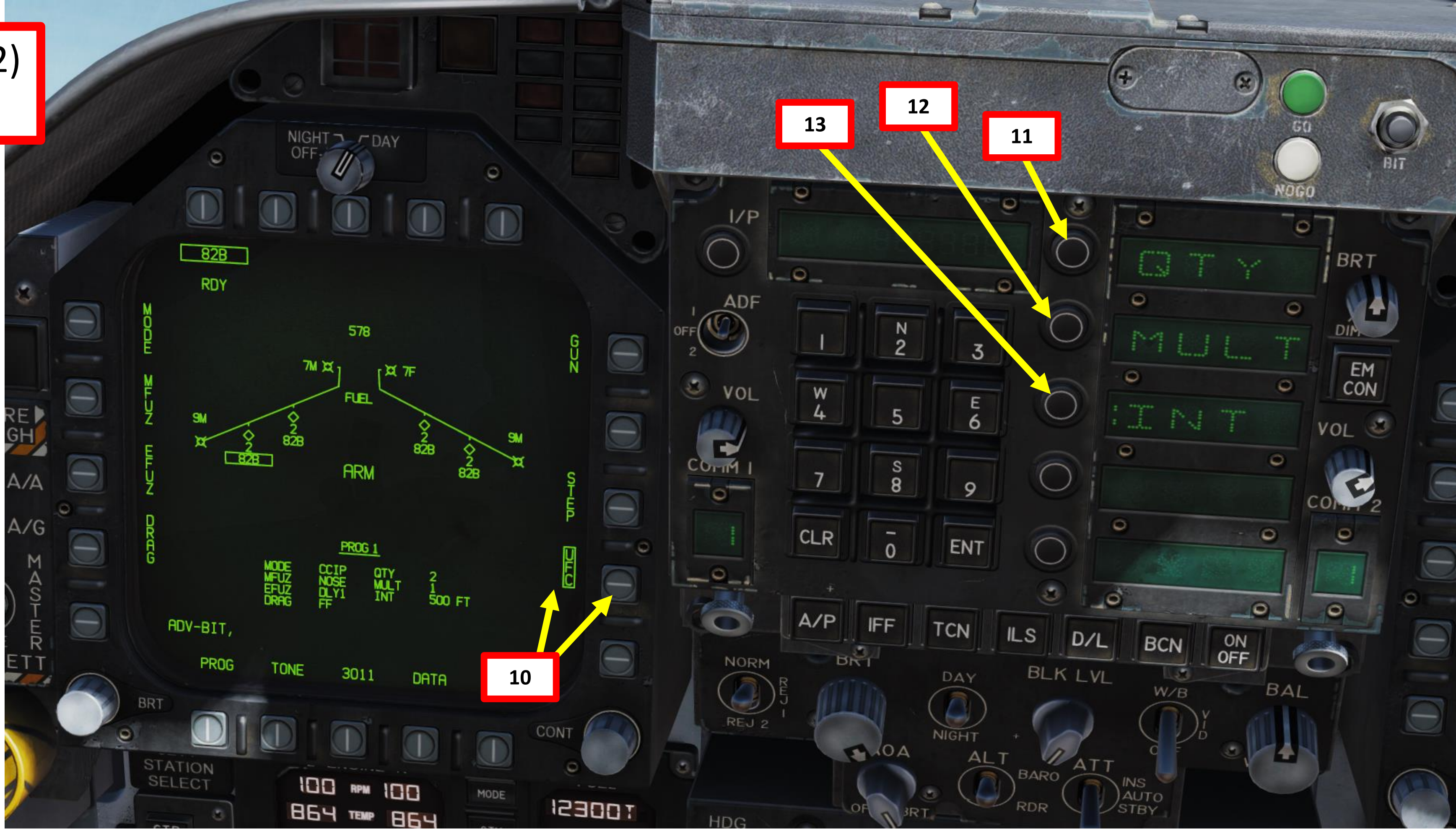
- OFF
- VT (Variable Time or Proximity)
- INST (Instantaneous)
- DLY1 (Delay 1)
- DLY2 (Delay 2)

DRAG

- FF (Free Fall)
- RET (Retarded)

2.1 - UNGUIDED BOMB (MK-82) CCIP RELEASE MODE

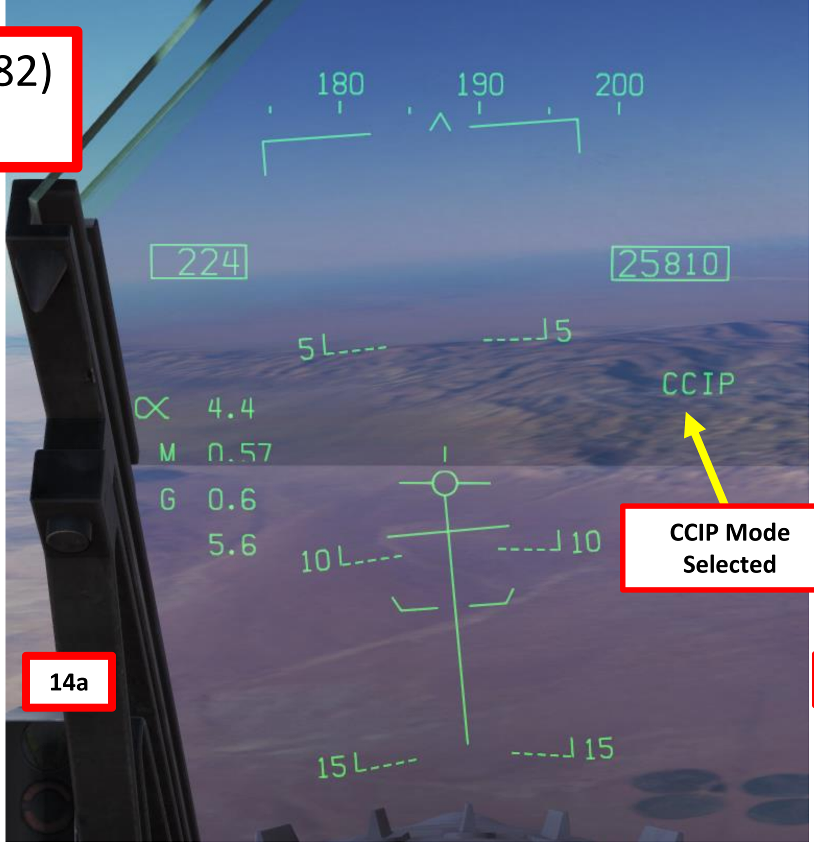
10. Click on OSB next to « UFC » to activate the UFC keypad for the STORES page
11. Click on the OSB next to QTY (« : » means option is selected), type « 2 » on the UFC keypad, then press « ENT » (« : » means option is selected) to set 2 bombs per release.
12. Click on the OSB next to MULT (« : » means option is selected), type « 1 » on the UFC keypad, then press « ENT » to set 1 bomb to be released simultaneously from weapon stations
13. Click on the OSB next to INT (« : » means option is selected), type « 500 » on the UFC keypad, then press « ENT » to set a 500 ft bomb impact spacing.

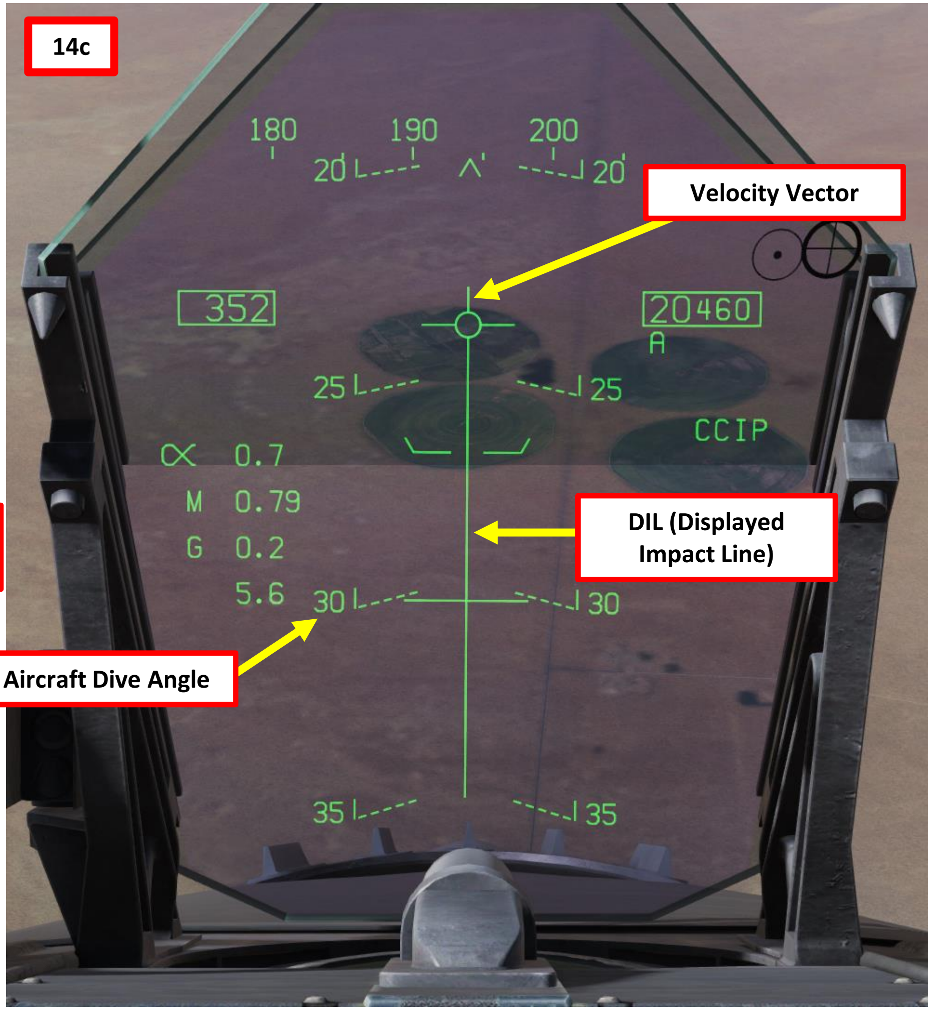


Quantity (QTY). Number of bombs to release, ranging from 1 to 30. When more than one bomb is selected, you must hold the Weapon Release Button down until all bombs in the salvo are released.
Multiples (MULT). Number of bombs to be released simultaneously from the weapon stations in each salvo
Interval (INT). The ground impact spacing in feet when in AUTO, FD, and CCIP modes, but milliseconds when on MAN mode.

2.1 - UNGUIDED BOMB (MK-82) CCIP RELEASE MODE

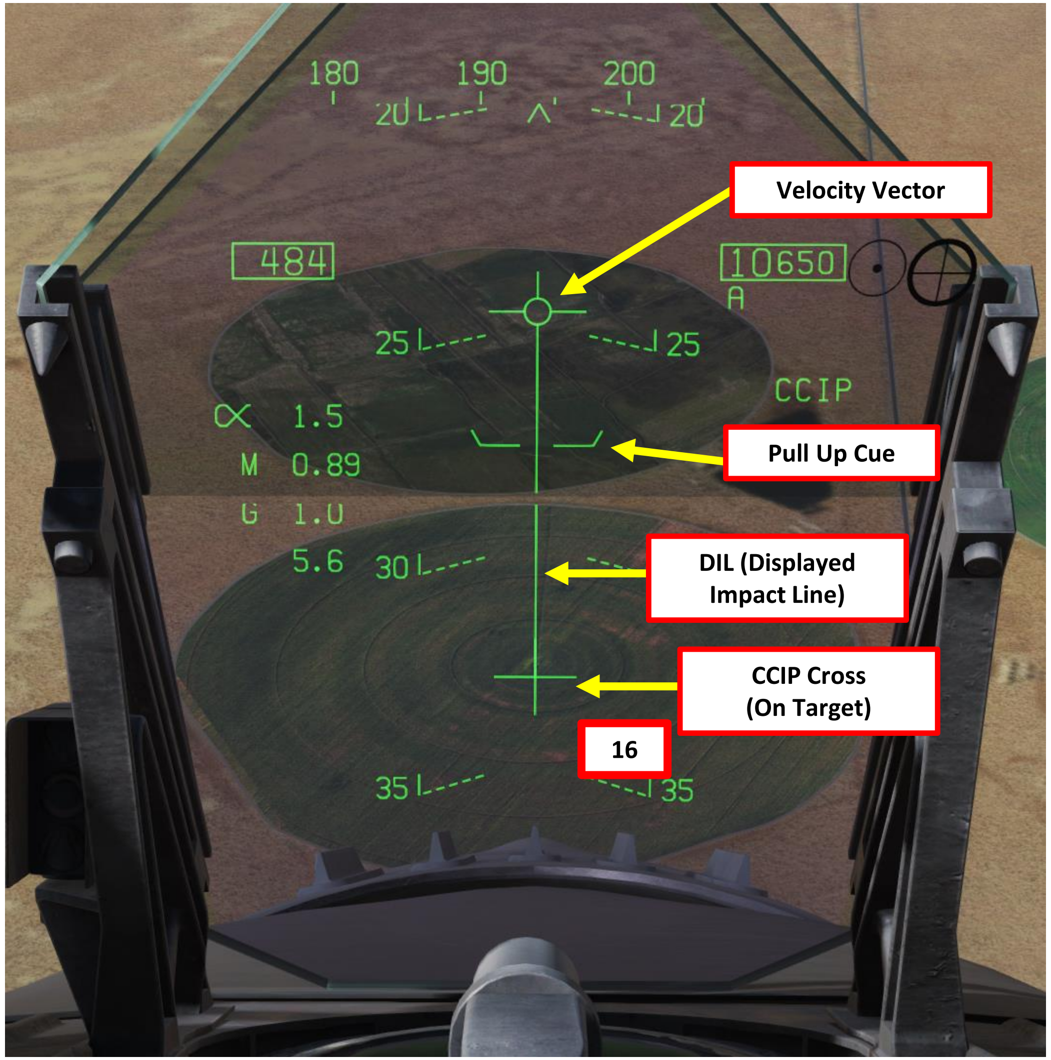
14. Start a 30-45 degree dive on your target
15. Align target vertically with DIL (Displayed Impact Line), also known as Bomb Fall Line.





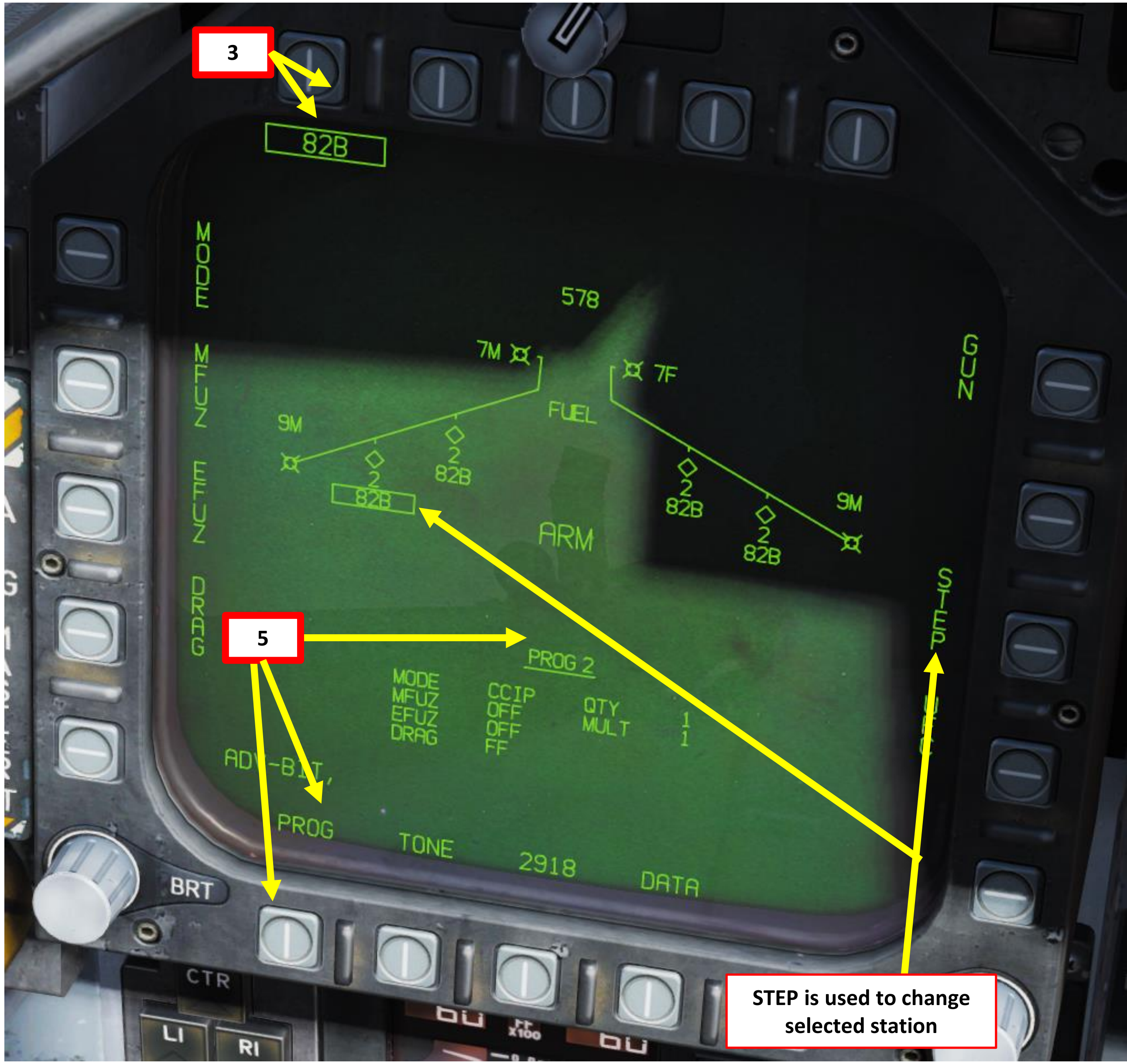
2.1 - UNGUIDED BOMB (MK-82) CCIP RELEASE MODE

16. The CCIP cross will appear once a bombing solution is computed.
17. Steer aircraft to keep the DIL vertical and the CCIP cross on the target.
18. Press and hold the Weapon Release button (« RALT+SPACE ») once CCIP cross is on target. Hold button until all programmed bombs are released.
19. Pull up before velocity vector reaches the PULL UP cue.



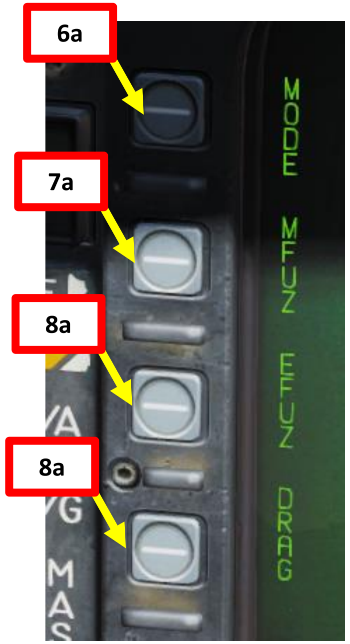
2.2 - UNGUIDED BOMB (MK-82) CCRP (AUTO) RELEASE MODE

1. Master Arm switch – ARM (UP)
2. Master Mode – A/G
3. Go in SMS (Stores Management System) page
4. Click on the desired bomb to select it (82B)
5. We will create a weapon delivery program by selecting a preset program. Toggle programs with the OSB next to PROG. We will use PROG 2.



2.2 - UNGUIDED BOMB (MK-82) CCRP (AUTO) RELEASE MODE

6. Click on OSB next to MODE, then click on OSB to select AUTO Mode
7. Click on OSB next to MFUZ (Mechanical Fuze), then press on OSB next to NOSE.
8. Click on EFUZ (Electronic Fuze), then press on OSB next to DLY1 for a delay if desired, otherwise set to INST.
9. Click on OSB next to DRAG, then press on OSB next to either FF (Free-Falling low-drag bomb) or RET (retarded fuze) based on your bomb type.



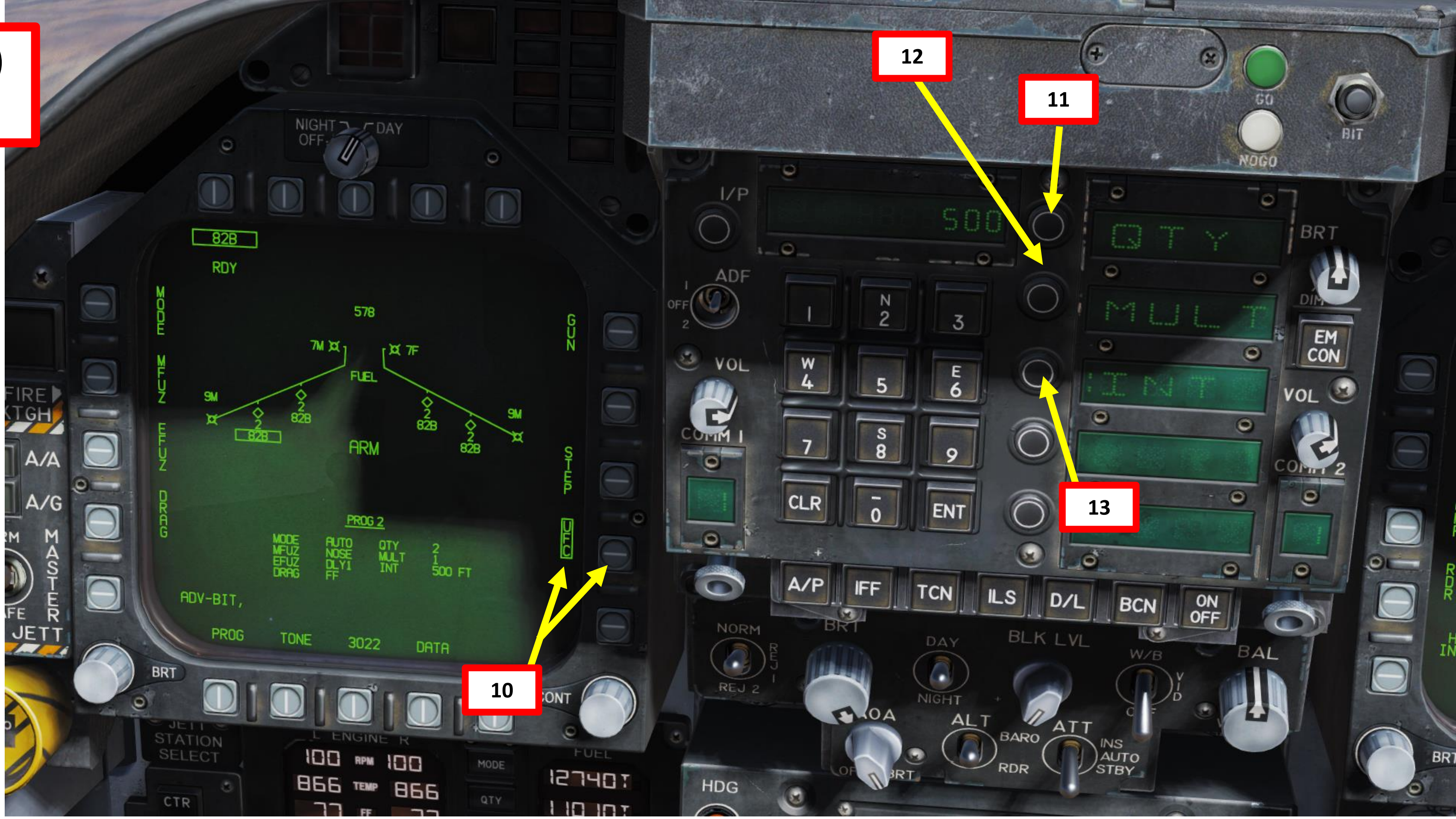
MFUZ (Mechanical Fuze)
- OFF
- NOSE (Nose Fuze Only)
- TAIL (Tail Fuze Only)
- NT (Nose and Tail)

EFUZ (Electronic Fuze)
- OFF
- VT (Variable Time or Proximity)
- INST (Instantaneous)
- DLY1 (Delay 1)
- DLY2 (Delay 2)

DRAG
- FF (Free Fall)
- RET (Retarded)

2.2 - UNGUIDED BOMB (MK-82) CCRP (AUTO) RELEASE MODE

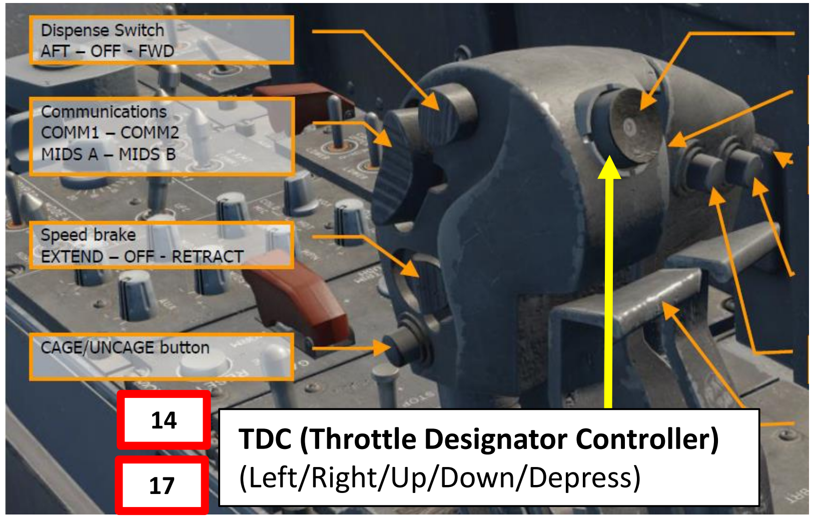
10. Click on OSB next to « UFC » to activate the UFC keypad for the STORES page
11. Click on the OSB next to QTY (« : » means option is selected), type « 2 » on the UFC keypad, then press « ENT » (« : » means option is selected) to set 2 bombs per release.
12. Click on the OSB next to MULT (« : » means option is selected), type « 1 » on the UFC keypad, then press « ENT » to set 1 bomb to be released simultaneously from weapon stations
13. Click on the OSB next to INT (« : » means option is selected), type « 500 » on the UFC keypad, then press « ENT » to set a 500 ft bomb impact spacing.

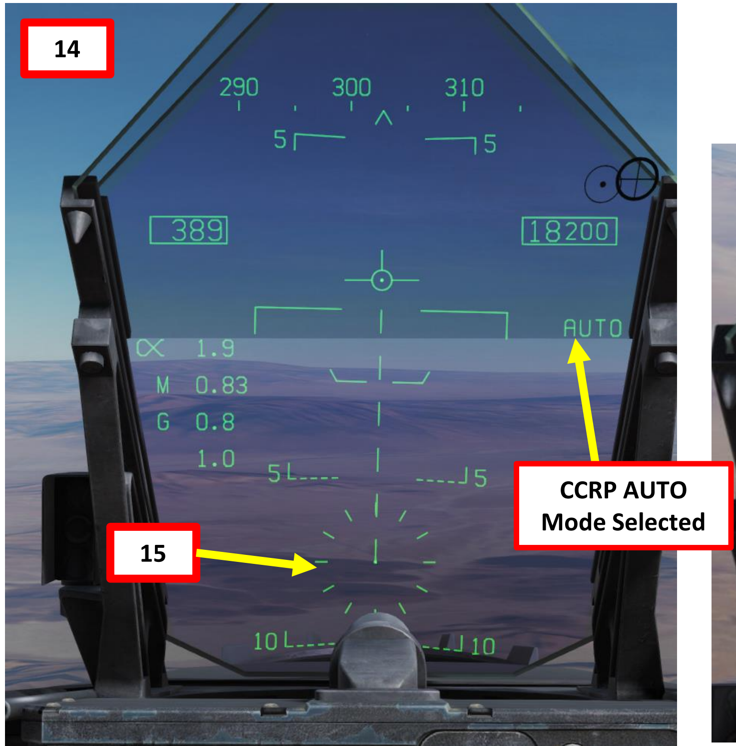


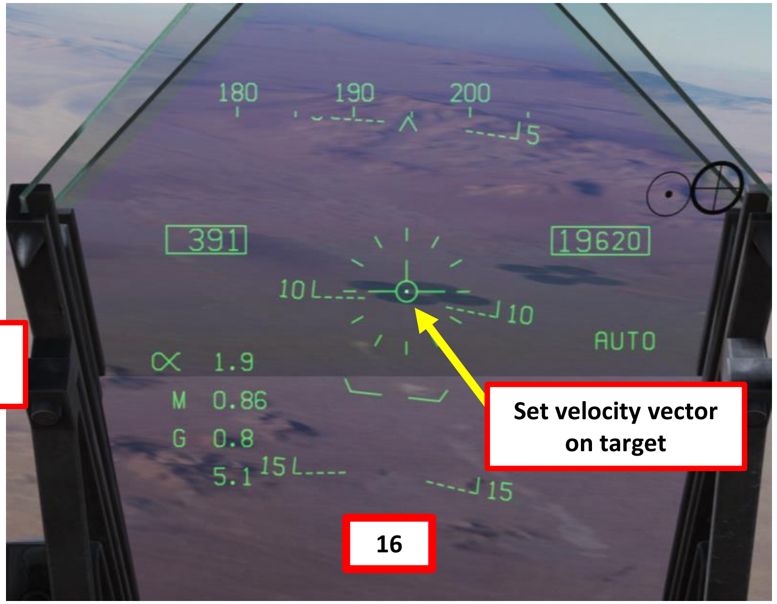
Quantity (QTY). Number of bombs to release, ranging from 1 to 30. When more than one bomb is selected, you must hold the Weapon Release Button down until all bombs in the salvo are released.
Multiples (MULT). Number of bombs to be released simultaneously from the weapon stations in each salvo
Interval (INT). The ground impact spacing in feet when in AUTO, FD, and CCIP modes, but milliseconds when on MAN mode.

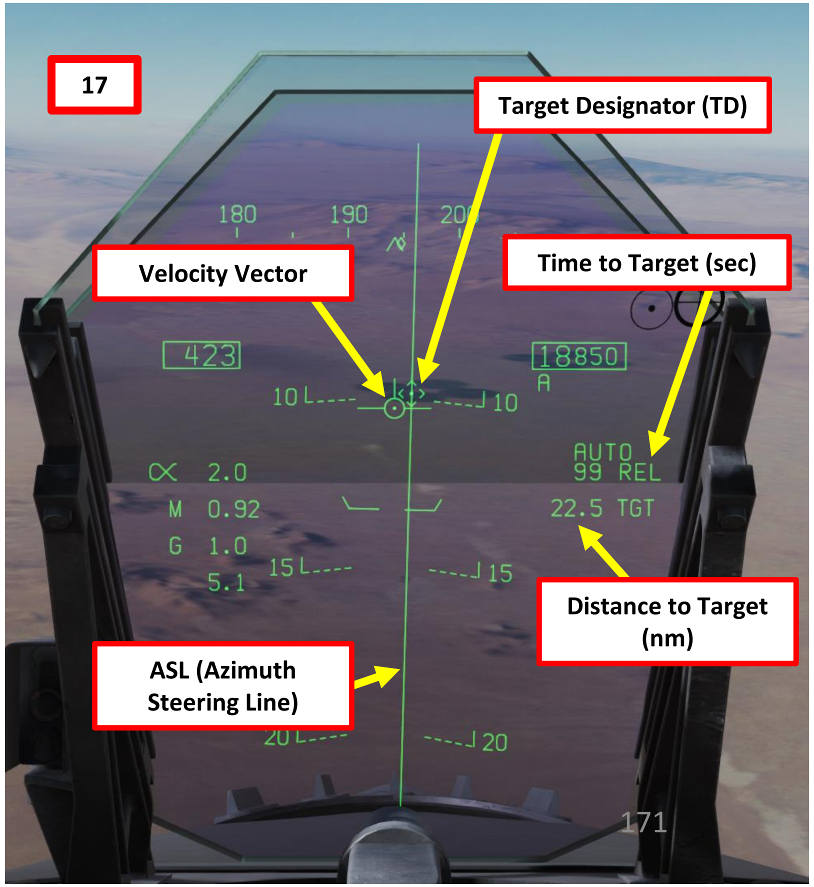
2.2 - UNGUIDED BOMB (MK-82) CCRP (AUTO) RELEASE MODE

14. To slave your TDC (Throttle Designator Controller) to your HUD, press the Sensor Control Switch FWD.
15. You will see the « ball and chain » appear. In order to create a reference point for the CCRP, we will have to designate a specific point in space with the TDC.
16. Enter a 25 deg dive to the target and set your velocity vector on the target.
17. Once velocity vector is on the target, press the TDC Depress (« Enter ») to designate your CCRP reference point.



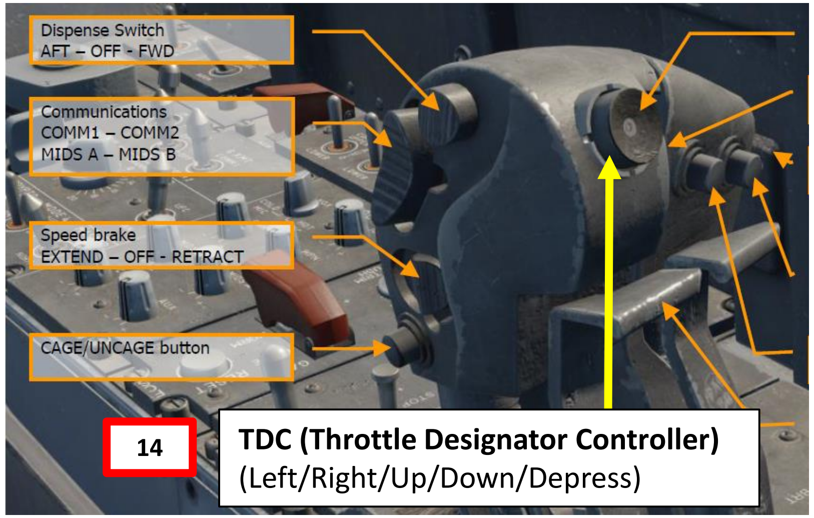


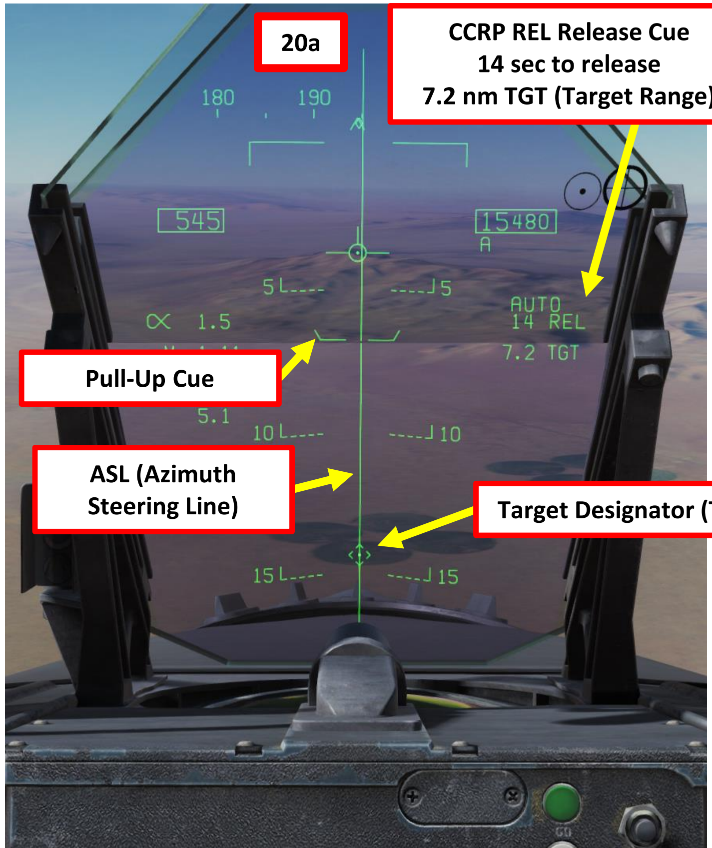


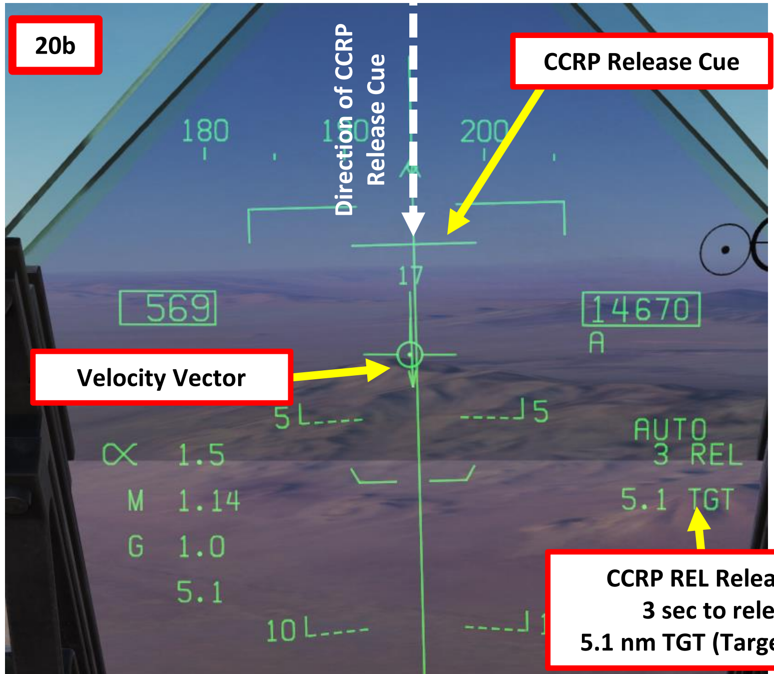


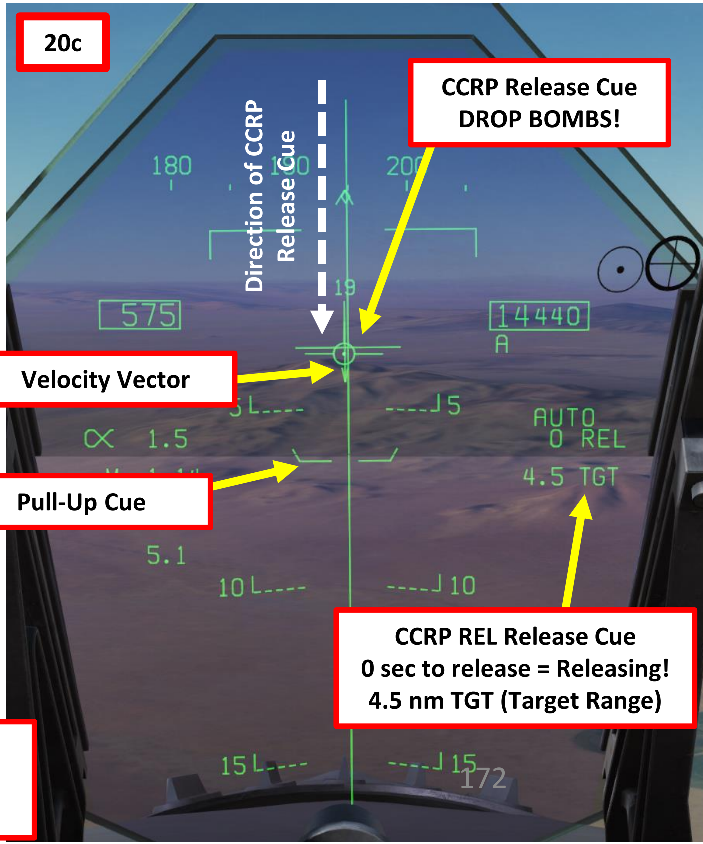
2.2 - UNGUIDED BOMB (MK-82) CCRP (AUTO) RELEASE MODE

18. Slew your TD (Target Designator) with the TDC controls to adjust your CCRP reference point properly.
19. Fly level and keep your velocity vector aligned with the ASL (Azimuth Steering Line) and above the Pull-Up cue.
20. When release cue appears, hold the Weapon Release Button (« RALT+SPACE ») until all bombs in the pass have been released.
21. Pull up before velocity vector reaches the PULL UP cue.





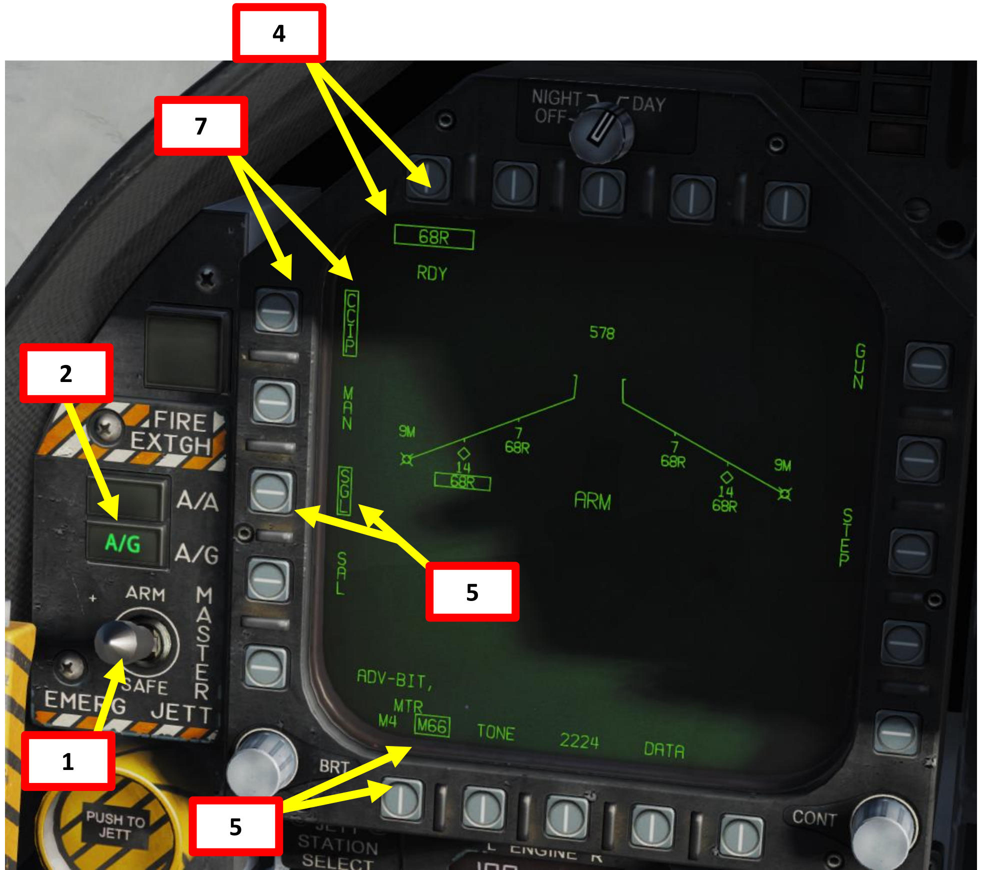


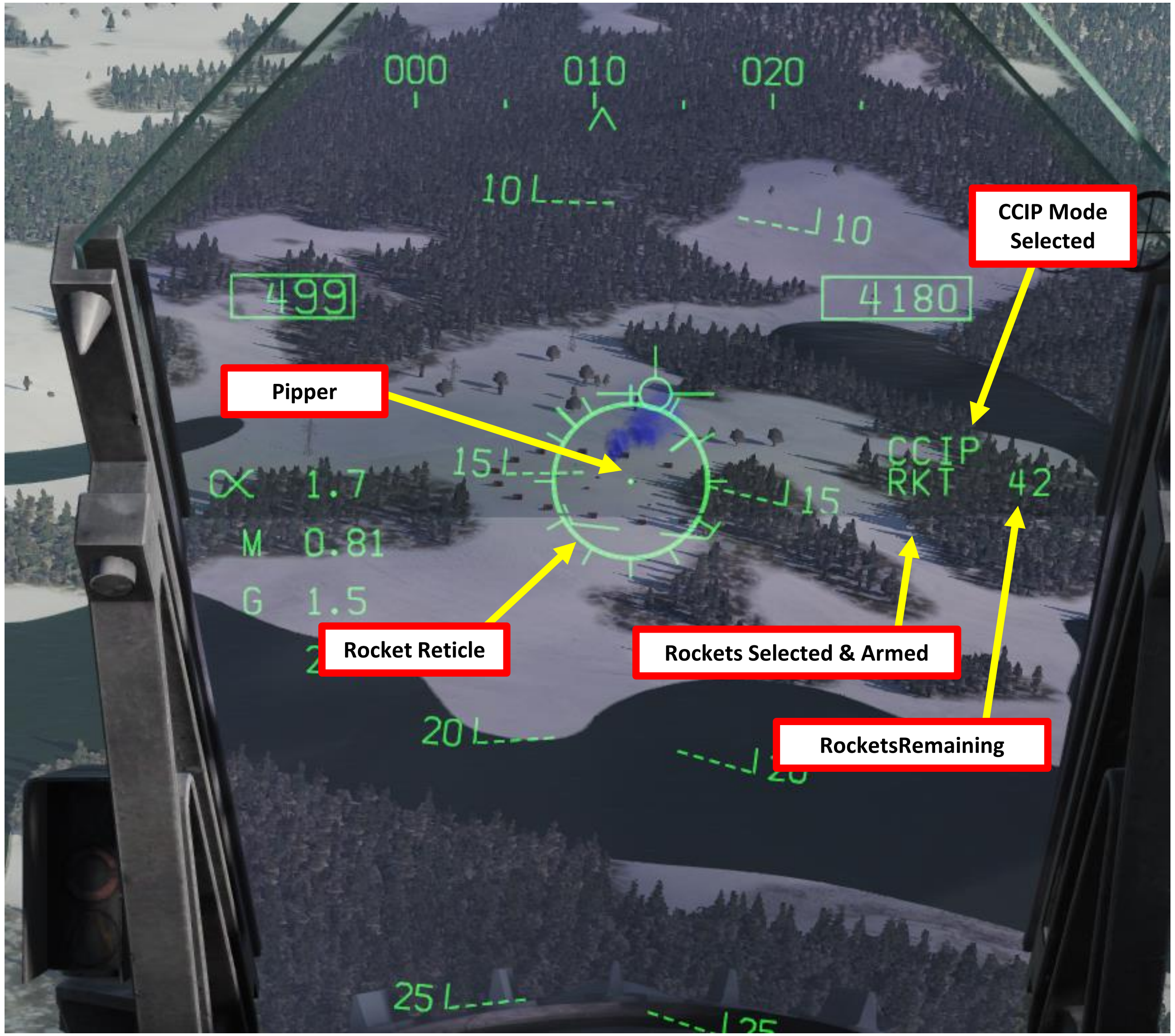


2.2 - UNGUIDED BOMB (MK-82) CCRP (AUTO) RELEASE MODE

2.3 - ROCKETS

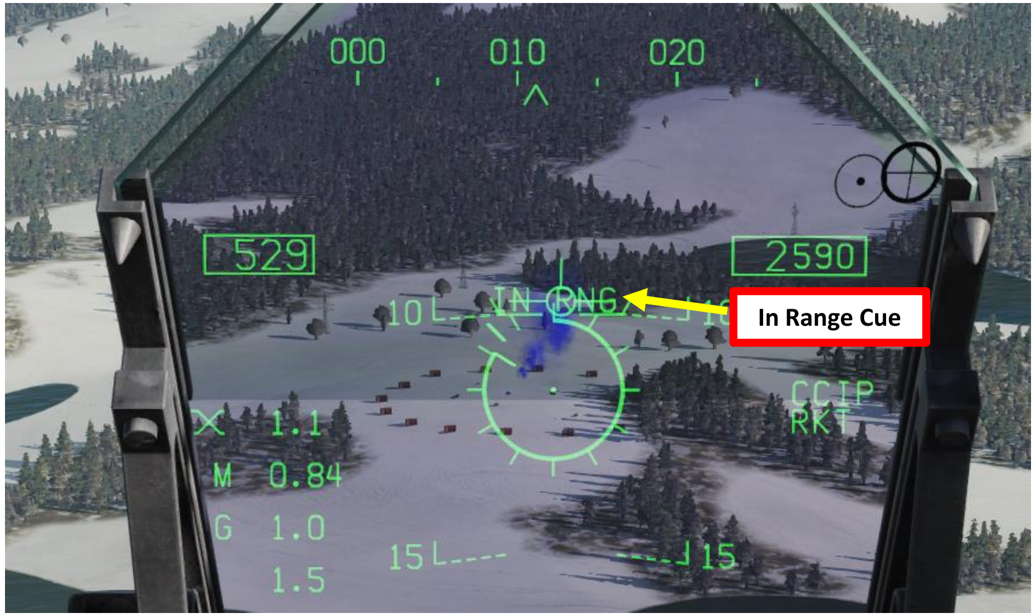
1. Master Arm switch – ARM (UP)
2. Master Mode – A/G
3. Go in SMS (Stores Management System) page
4. Select desired rocket pods (68R in our case, ttext should be boxed when selected)
5. Select desired Firing mode Option (SGL for Single, SAL for Salvo)
6. Set desired Rocket Motor (MTR) Type (M4 or M66)
7. Set Rocket Mode to CCIP (text should be boxed)





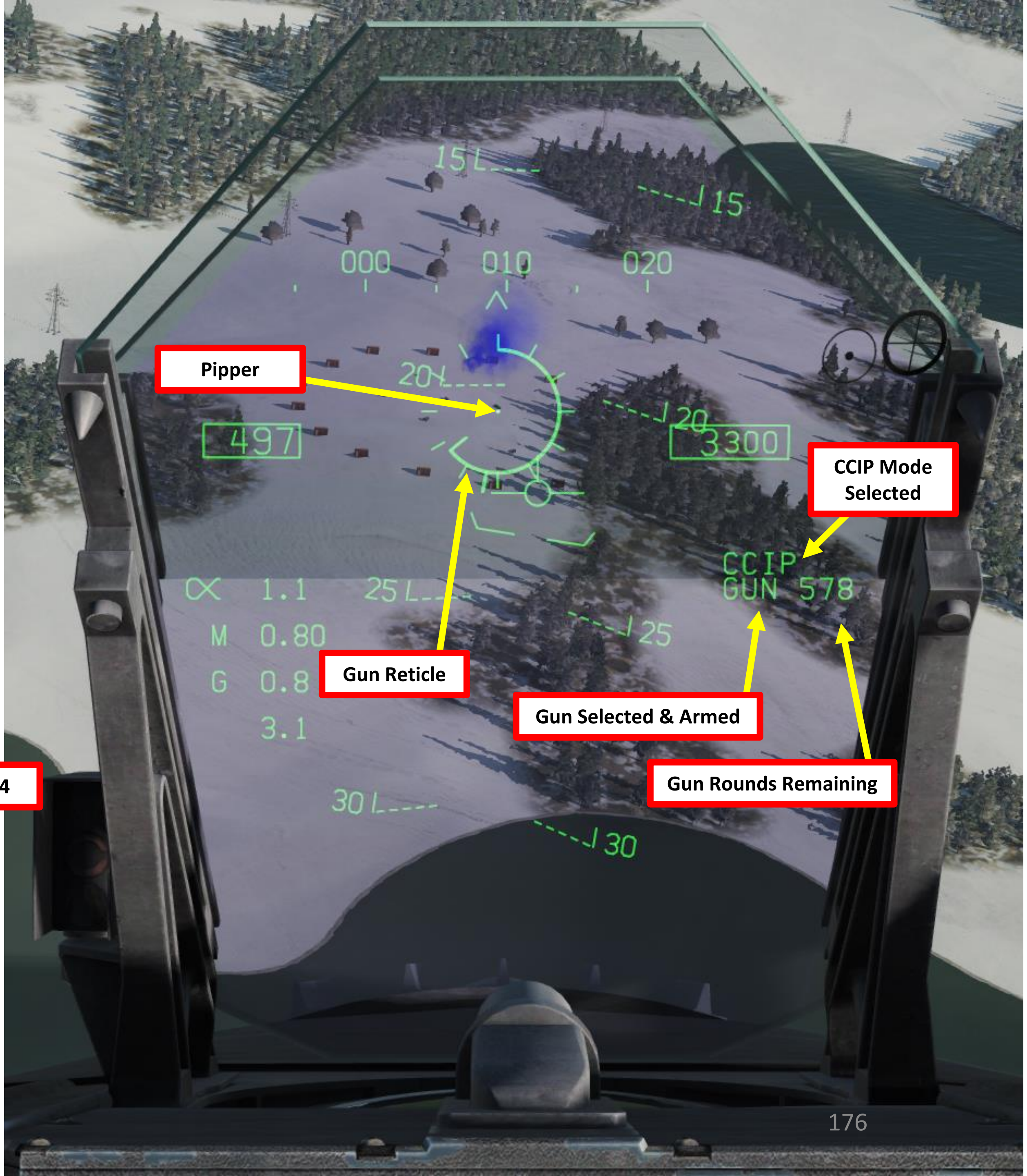
2.3 - ROCKETS

8. Set center of gun reticle on target and wait for the « IN RNG » (In Range) cue to appear.
9. Press the Weapon Release button (« RALT+ SPACE ») to fire rockets
10. Once you have done your run and the Breakaway X appears, break off the attack and wave off from target.



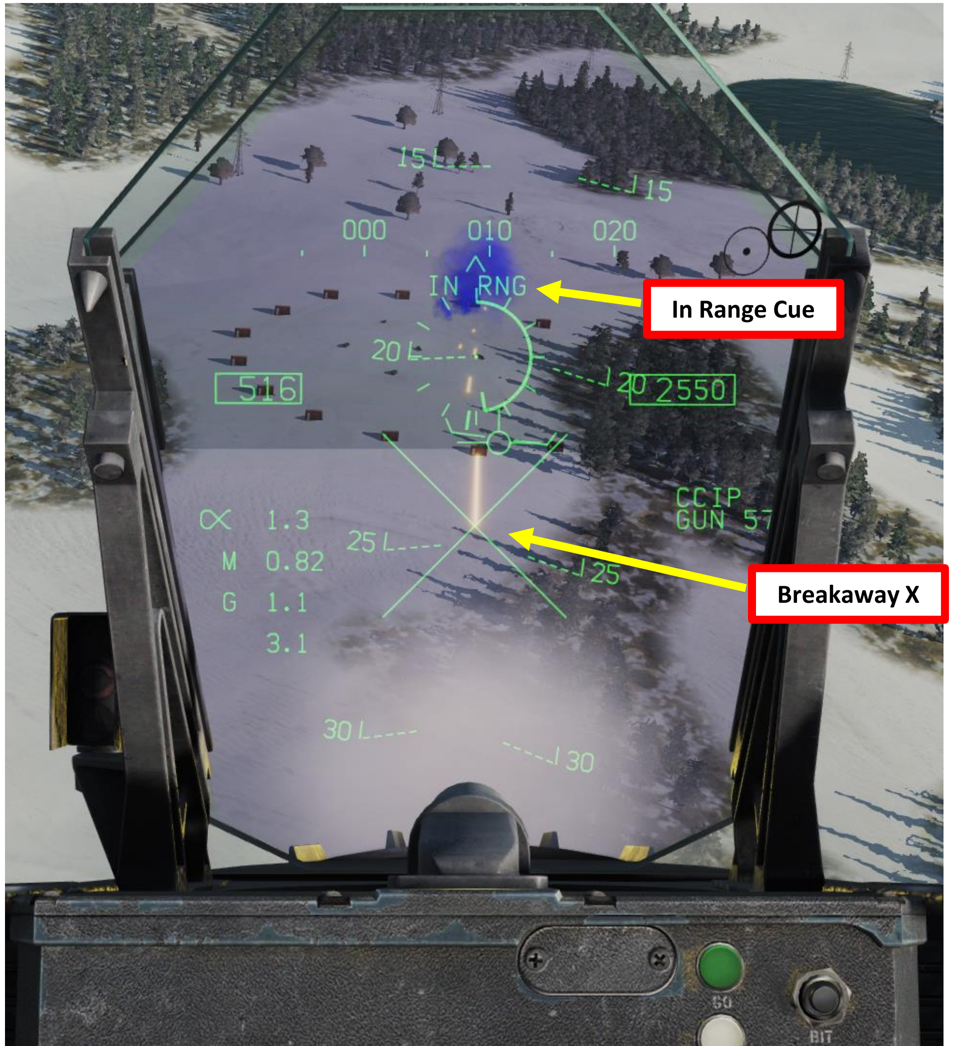
2.4 - M61A2 GUNS (AIR-TO-GROUND)

1. Master Arm switch – ARM (UP)
2. Master Mode – A/G
3. Go in SMS (Stores Management System) page
4. Select GUN (text should be boxed)
5. Select Gun Rounds Options (MK-50 or PGU-28 rounds)
6. Set Gun Firing Rate Option (HI = 6000 rounds per minute, LO = 4000 rounds per minute)
7. Set Gun Mode to CCIP (text should be boxed)



2.4 - M61A2 GUNS (AIR-TO-GROUND)

8. Set center of gun reticle on target and wait for the « IN RNG » (In Range) cue to appear.
9. Squeeze the gun trigger (« Spacebar »)
10. Once you have done your run and the Breakaway X appears, break off the attack and wave off from target.

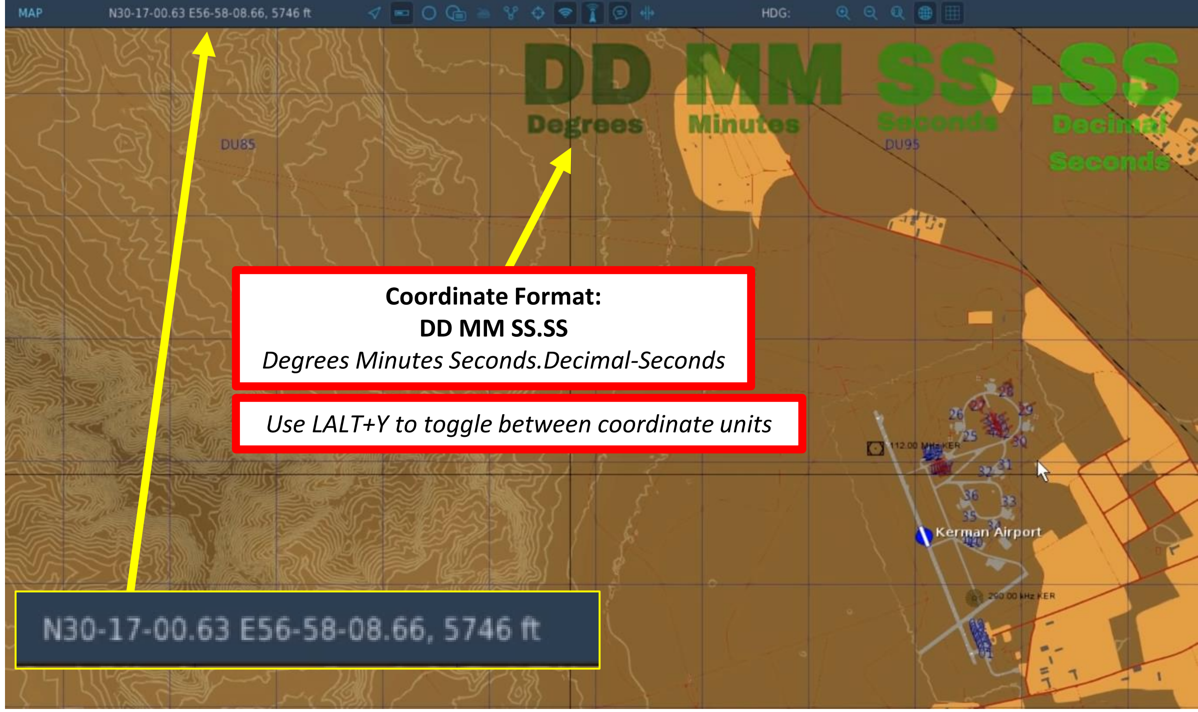


2.5 – GBU-38 JDAM INTRODUCTION

The F/A-18C is able to employ the Global Positioning System (GPS)-guided Joint Direct Attack Munition (JDAM) bombs and the Joint Standoff Weapon (JSOW) glide bombs. JDAMs are modified general purpose bombs, equipped with a GPS and inertial navigation system (INS) for guidance as well as flight controls. The JSOW has the same guidance and is a bomb with wings to provide lift and maneuvering flight controls. As such, it has a significantly longer range than JDAMs. The JDAMs/JSOWs have (at optimal INS alignment) a margin of error of approximately 16ft (5m). Independent programming of each individual bomb allows for simultaneous multi-target attacks.

Basically, the way to employ JDAMs is to first get your target coordinates from either the mission briefing or using the F10 map, input them to the weapons in either Pre-Planned Mode (coordinates need to be entered manually) or in TOO Mode (Target of Opportunity, weapons use the existing A/G (Air-to-Ground) designation, which is the Hornet (or Harrier) equivalent of the SPI (Sensor Point of Interest) in the A-10C. Currently, we can only make an A/G designation with WPDSG (Waypoint Designate) button or via the HUD, but in the future it will also be possible to designate with the JHMCS, TGP or A/G radar).

For the JDAM tutorial, we will use the Pre-Planned Mode while for the JSOW tutorial we will use TOO Mode. Once the setup is done and the weapon alignment has been performed, we will then be able to release them in Manual Mode.



Find Target Coordinates
(F10 Map, Mission Editor Waypoints, JTAC, etc.)

→ **Set Up Weapon** (Pre-Planned coordinates)

OR

→ **Set Up Weapon** (TOO, Waypoint Designate)

→ **Manual Release Mode**

2.5 – GBU-38 JDAM
PRE-PLANNED + MANUAL MODE

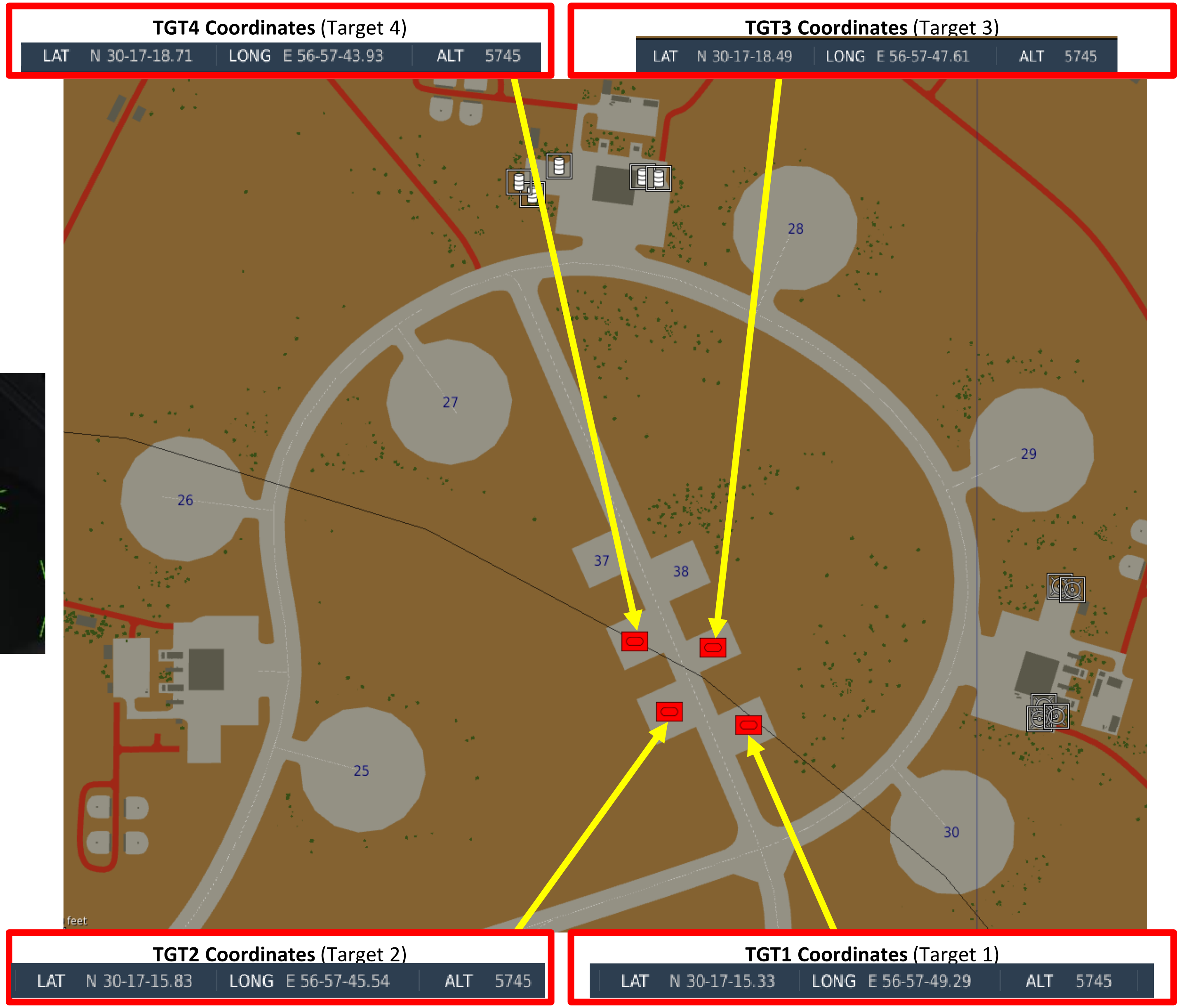
Find Coordinates

1. Find coordinates of targets in Degrees Minutes Seconds:Decimal-Seconds. Do not forget target elevation.

Note: Each JDAM station can have five individual Pre-Planned points per station (PP1 to PP5). This means 20 possible targets for four JDAMs. For simplicity's sake, we will use:

- PP1 for Station 2
- PP1 for Station 3
- PP1 for Station 8
- PP1 for Station 7.

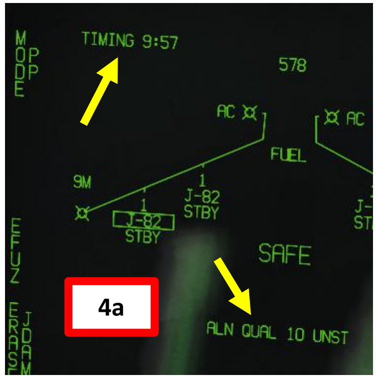
Pre-Planned Points (Deg Min Sec.Decimal-Seconds)			
Target Point	Latitude	Longitude	Elevation (ft)
TGT1 STA2 / PP1	30 17 15.33 N	56 57 49.29 E	5745
TGT2 STA3 / PP1	30 17 15.83 N	56 57 45.54 E	5745
TGT3 STA8 / PP1	30 17 18.49 N	56 57 47.61 E	5745
TGT4 STA7 / PP1	30 17 18.71 N	56 57 43.93 E	5745

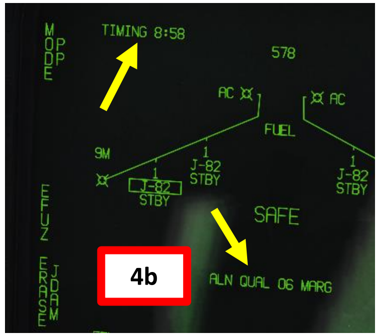


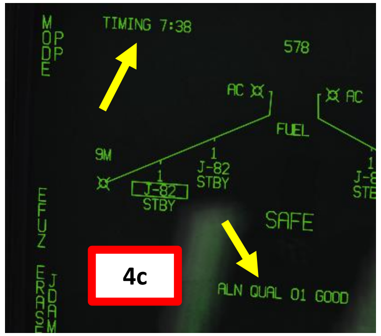
2.5 – GBU-38 JDAM
PRE-PLANNED + MANUAL MODE

Set Up Weapons

2. While on the ground, go in SMS (Stores Management System) page
3. Click on the desired JDAM bomb to select it (J-82)
4. Once selected, JDAMs need about 3 minutes for alignment. It will go from 10 UNSTABLE, to 06 MARGINAL and finally 01 GOOD. When alignment is complete, the TIMING indicator will disappear from the JDAM page.



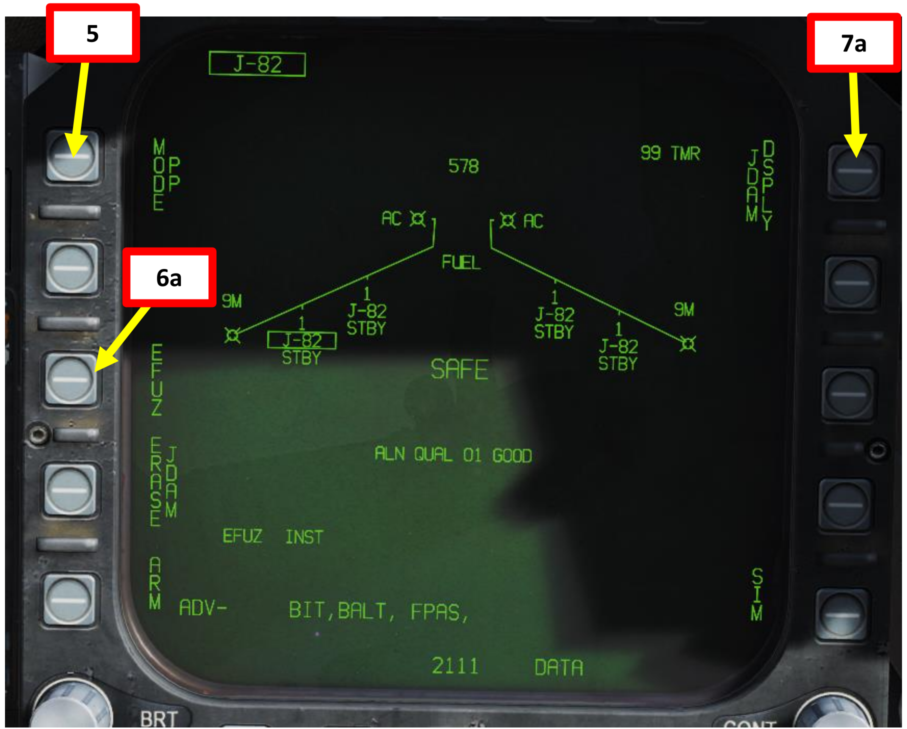


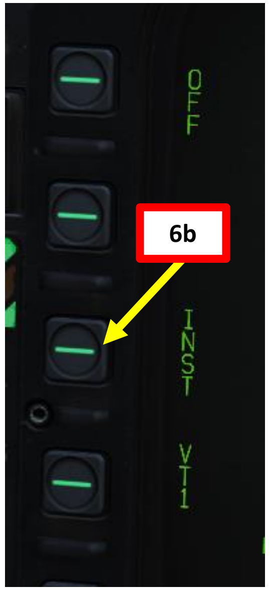


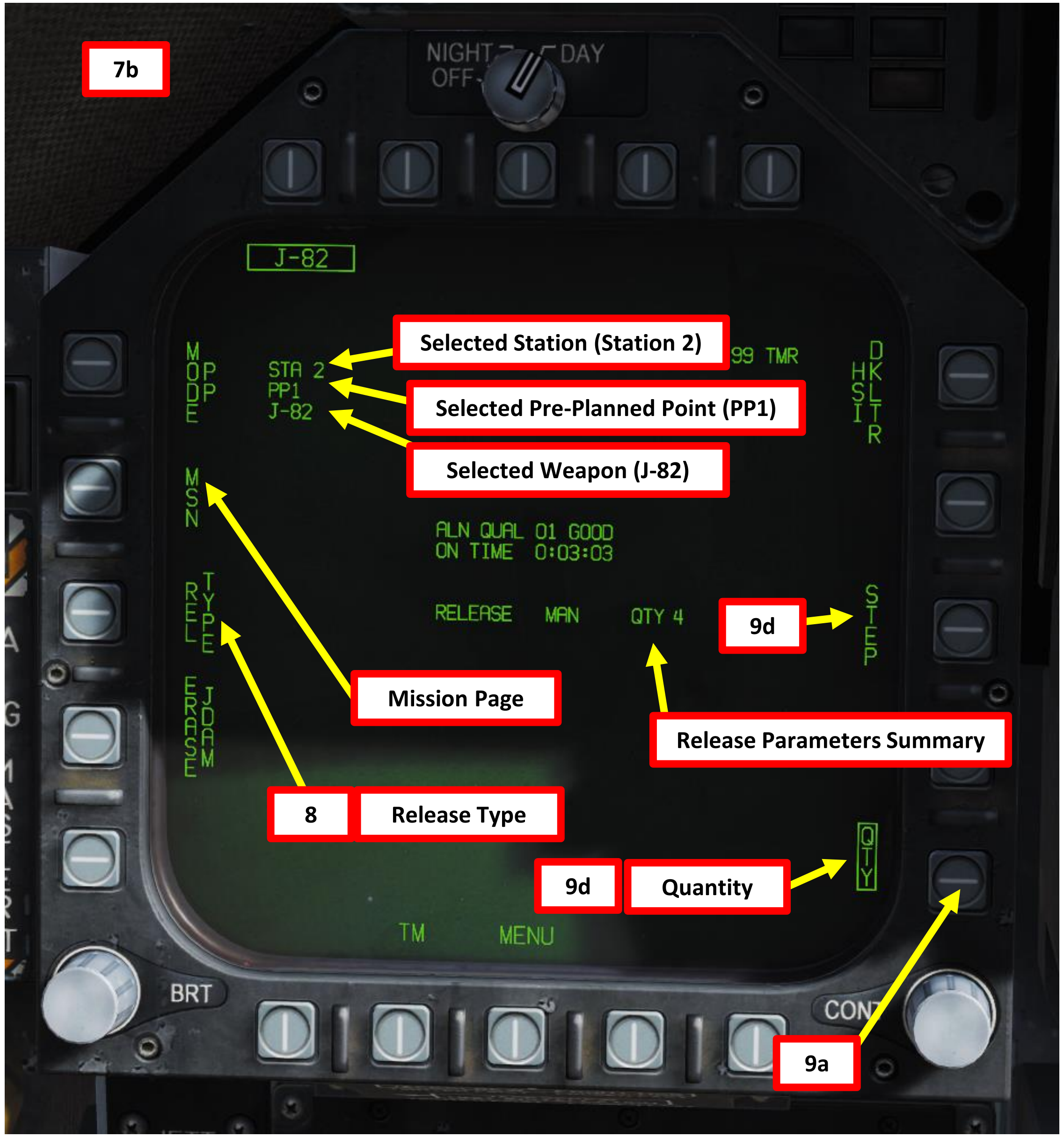
2.5 – GBU-38 JDAM
PRE-PLANNED + MANUAL MODE

Set Up Weapons

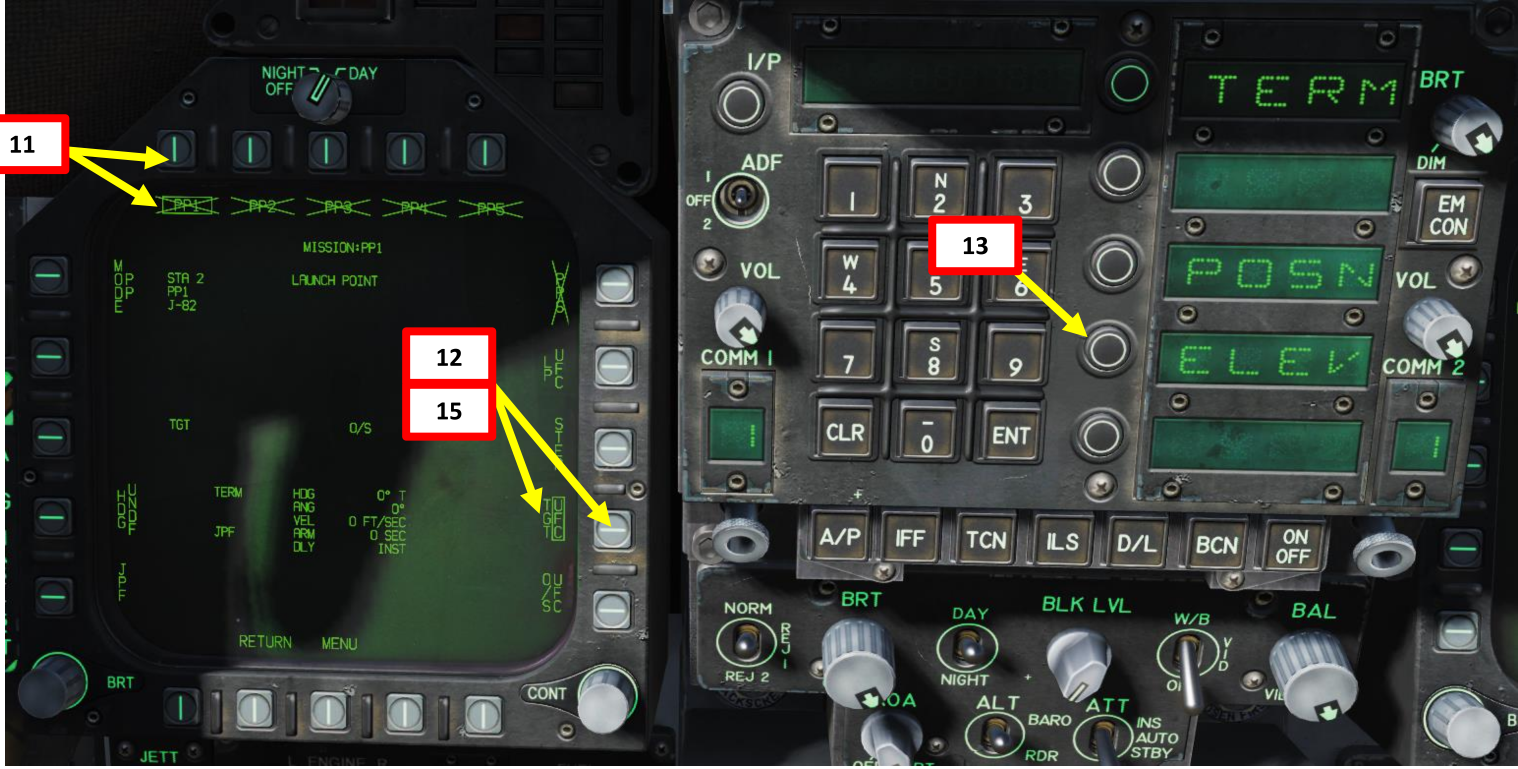
5. Select PP (Pre-Planned) Release Mode
6. Select Electronic Fuze to INST (Instantaneous).
7. Go in the JDAM Display page by pressing the JDAM DSPLY OSB
8. Select Manual Release Type
9. Select desired JDAM quantity to be used for this mission.
    a) Press the OSB next to QTY
    b) Select desired stations to be used for the mission (I suggest you select all of them). Selected stations will become boxed.
    c) Press the OSB next to RTN (Return).
    d) Once quantity is set, the STEP function will be available to select desired weapon station.







2.5 – GBU-38 JDAM
PRE-PLANNED + MANUAL MODE



Set Up Weapons

10. Enter MSN (Mission) page. Crossed-out PP Points mean no valid coordinates are entered yet.
11. Select PP1 to input Target 1 coordinates
12. Select TGT UFC
13. On the UFC, select ELEV (Elevation)
14. Select FT (« : » will appear when selected), then enter Target 1 altitude on the scratchpad (5745), then press the ENT (Enter) button.
15. Return to main UFC menu by pressing the TGT UFC button twice.

Pre-Planned Points (Deg Min Sec.Decimal-Seconds)			
Target Point	**Latitude**	**Longitude**	**Elevation (ft)**
TGT1 STA2 / PP1	30 17 15.33 N	56 57 49.29 E	5745
TGT2 STA3 / PP1	30 17 15.83 N	56 57 45.54 E	5745
TGT3 STA8 / PP1	30 17 18.49 N	56 57 47.61 E	5745
TGT4 STA7 / PP1	30 17 18.71 N	56 57 43.93 E	5745

2.5 – GBU-38 JDAM
PRE-PLANNED + MANUAL MODE

Set Up Weapons

16. On the UFC, select POSN (Position) « : » will appear once selected.
17. We will add the coordinates of Target 1 (PP1)

    30 °17'15.33'' North **56 °57'49.29'' East**

18. On the UFC, select LAT (Latitude). « : » will appear once selected.
19. Press « 2 » (N) to select North coordinates, type « 301715 », then « ENT » to enter Degrees Minutes Seconds.
20. Wait for the UFC screen to reset, then type « 33 », then « ENT » to enter remaining Decimal-Seconds.
21. On the UFC, select LON (Longitude). « : » will appear once selected.
22. On the UFC, press « 6 » (E) to select East coordinates, type « 565749 », then « ENT » to enter Degrees Minutes Seconds.
23. Wait for the UFC screen to reset, then type « 29 », then « ENT » to enter remaining Decimal-Seconds.
24. Return to main UFC menu by pressing the TGT UFC button twice.

Pre-Planned Points (Deg Min Sec.Decimal-Seconds)

Target Point	Latitude	Longitude	Elevation (ft)
TGT1 STA2 / PP1	30 17 15.33 N	56 57 49.29 E	5745
TGT2 STA3 / PP1	30 17 15.83 N	56 57 45.54 E	5745
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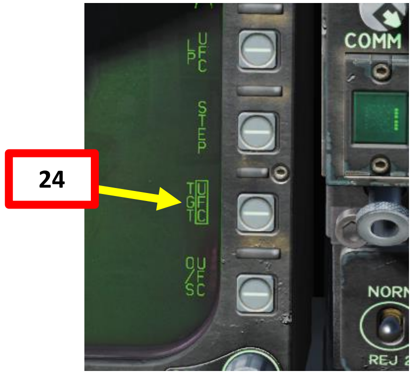
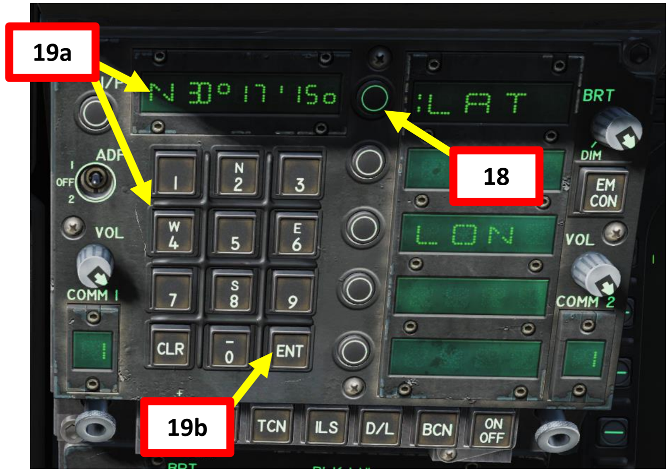
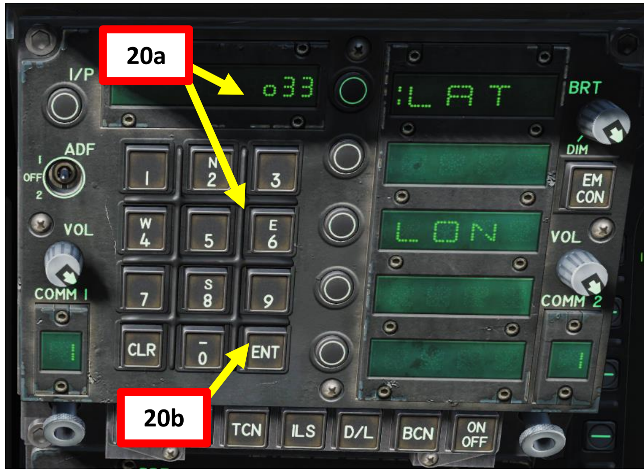






2.5 – GBU-38 JDAM
PRE-PLANNED + MANUAL MODE

Set Up Weapons

25. Once Longitude, Latitude and Elevation coordinates are entered for PP1, the PP1 icon will be boxed and no longer crossed out.
26. Press on STEP to select the next station (STATION 3).
27. Repeat process (Steps 11 through 24) for Station 3 PP1, Station 8 PP1, and Station 7 PP1.

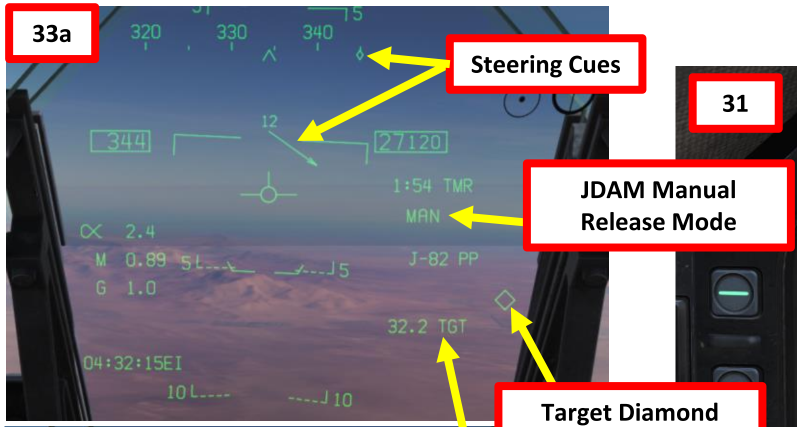
Pre-Planned Points (Deg Min Sec.Decimal-Seconds)

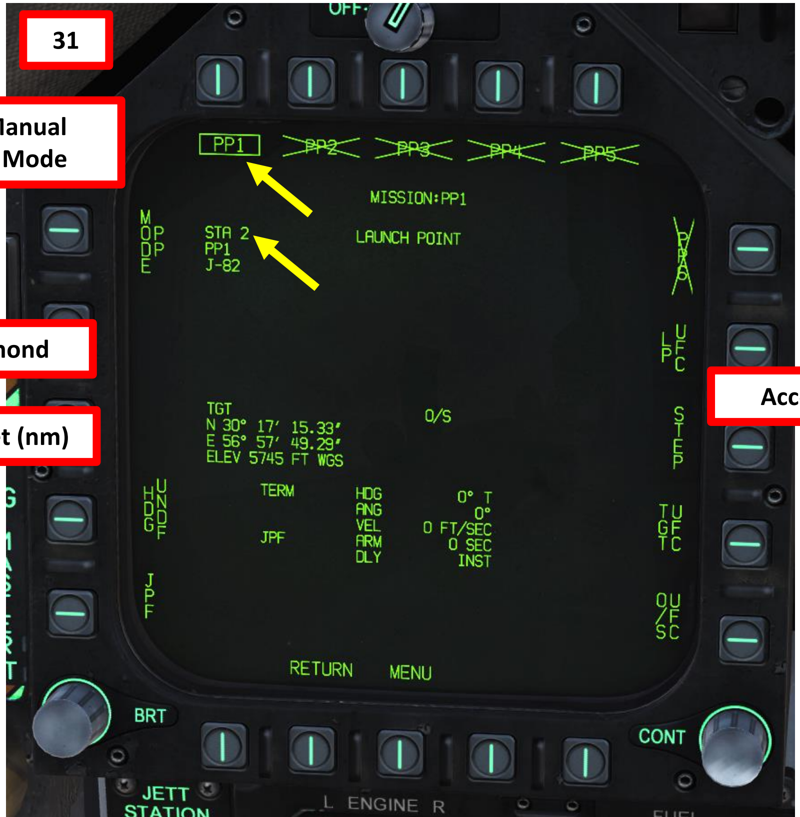
Target Point	Latitude	Longitude	Elevation (ft)
TGT1 STA2 / PP1	30 17 15.33 N	56 57 49.29 E	5745
TGT2 STA3 / PP1	30 17 15.83 N	56 57 45.54 E	5745
TGT3 STA8 / PP1	30 17 18.49 N	56 57 47.61 E	5745
TGT4 STA7 / PP1	30 17 18.71 N	56 57 43.93 E	5745

2.5 – GBU-38 JDAM
PRE-PLANNED + MANUAL MODE

Launch Weapons

28. Master Arm switch – ARM (UP)
29. Master Mode – A/G
30. On the SMS (Stores Management System) page, verify that J-82 is selected
31. Set HSI on the right DDI and the JDAM Display page on the left DDI (from SMS page, press the JDAM DSPLY OSB, then select MSN (Mission) page)
32. Verify that Manual Release PP Release Mode is selected and that the desired station and PP is selected.
33. Steer aircraft to the target (indicated by a diamond on the HUD)





2.5 – GBU-38 JDAM
PRE-PLANNED + MANUAL MODE

Launch Weapons

34. When you are within the acceptable release zone (between the minimum and maximum release limits identified on the HSI), the HUD will switch from displaying "TMR" (Time to reach acceptable release zone) to "IN RNG" (In Range). You may now release your weapons.
35. Hold the Weapon Release Button (« RALT+SPACE ») to drop your first bomb.
36. Once the bomb is released, the system will step to the next available JDAM. Verify that PP and station match as per our plan, then release weapon when ready.

2.5 – GBU-38 JDAM
PRE-PLANNED + MANUAL MODE

Launch Weapons

37. Repeat for remaining bombs.

2.6 – AGM-154A JSOW INTRODUCTION

The F/A-18C is able to employ the Global Positioning System (GPS)-guided Joint Direct Attack Munition (JDAM) bombs and the Joint Standoff Weapon (JSOW) glide bombs. JDAMs are modified general purpose bombs, equipped with a GPS and inertial navigation system (INS) for guidance as well as flight controls. The JSOW has the same guidance and is a bomb with wings to provide lift and maneuvering flight controls. As such, it has a significantly longer range than JDAMs. The JDAMs/JSOWs have (at optimal INS alignment) a margin of error of approximately 16ft (5m). Independent programming of each individual bomb allows for simultaneous multi-target attacks.

Basically, the way to employ JSOWs is to first get your target coordinates from either the mission briefing or using the F10 map, input them to the weapons in either Pre-Planned Mode (coordinates need to be entered manually) or in TOO Mode (Target of Opportunity, weapons use the existing A/G (Air-to-Ground) designation, which is the Hornet (or Harrier) equivalent of the SPI (Sensor Point of Interest) in the A-10C. Currently, we can only make an A/G designation with WPDSG (Waypoint Designate) button or via the HUD, but in the future it will also be possible to designate with the JHMCS, TGP or A/G radar).

For the JSOW tutorial, we will use TOO Mode, while for the JDAM tutorial we will use the Pre-Planned Mode. Once the setup is done and the weapon alignment has been performed, we will then be able to release them in Manual Mode.

The warhead of the **AGM-154A** consists of 145 BLU-97/B Combined Effects Bomb (CEB) submunitions. These bomblets have a shaped charge for armor defeating capability, a fragmenting case for material destruction, and a zirconium ring for incendiary effects.

The **AGM-154C**, on the other hand, uses an Imaging Infrared (IIR) terminal seeker with autonomous guidance. The AGM-154C carries the BROACH warhead, which is designed to attack hardened targets.

Find Target Coordinates
(F10 Map, Mission Editor Waypoints, JTAC, etc.)

→ **Set Up Weapon**
(Pre-Planned coordinates)

OR

→ **Set Up Weapon**
(TOO, Waypoint Designate)

→ **Manual Release Mode**

JSOW A-1 with the BLU-111 warhead

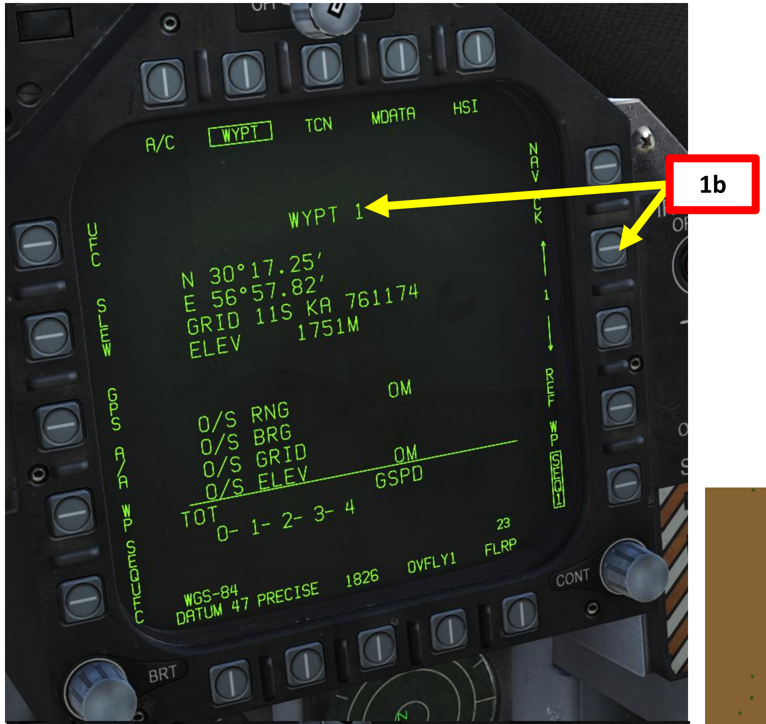
JSOW C with the BROACH warhead

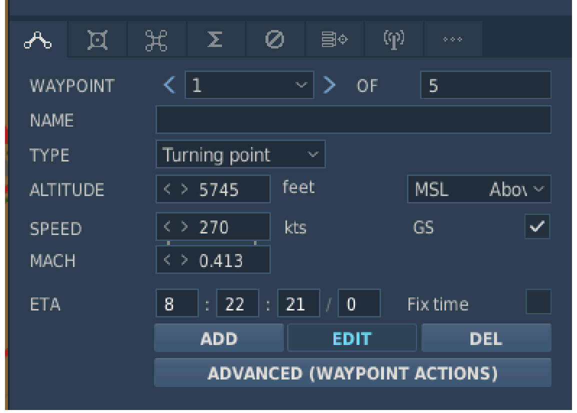
JSOW C-1 with the BROACH warhead and data link

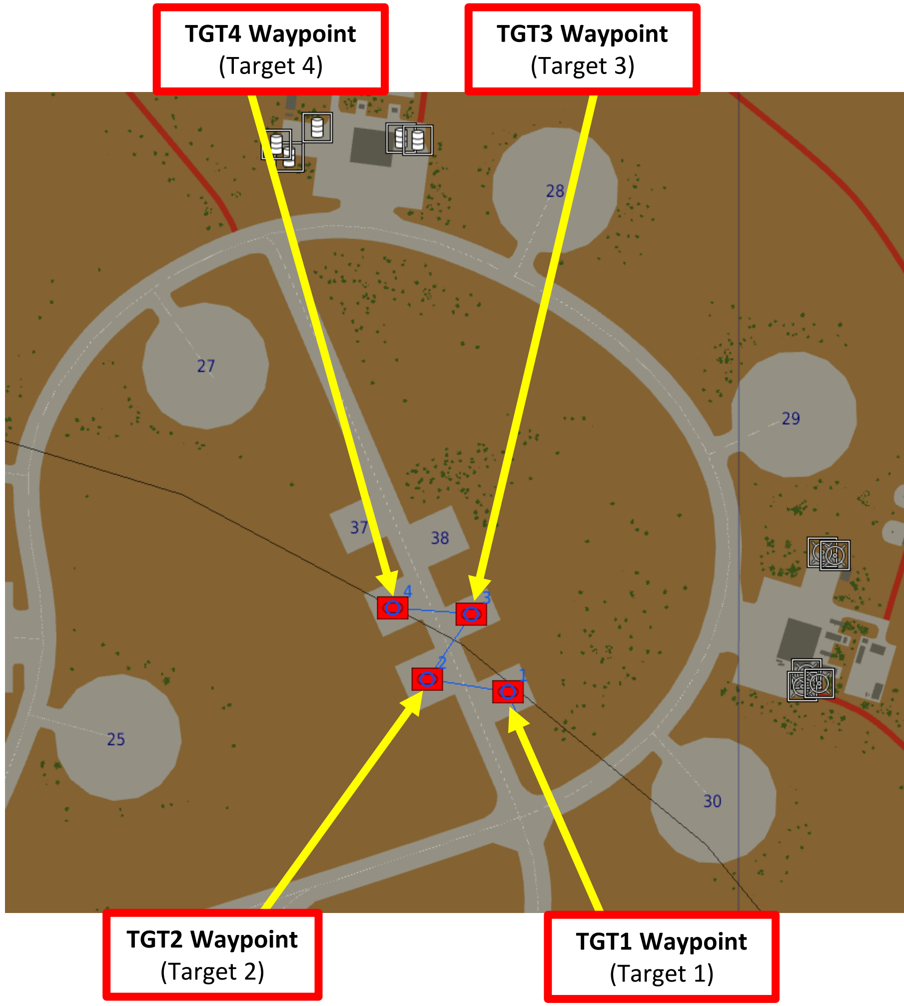
2.6 – AGM-154A JSOW
TOO + MANUAL MODE

Verify Waypoint Coordinates

1. Normally, JSOW strikes using TOO (Target of Opportunity) use waypoint already defined in the mission editor. However, you should always cross-check with the F10 map if the coordinates make sense in terms of **Longitude**, **Latitude** and **Elevation** and modify them if required.
   a) Open the SUPT HSI page, then press open the "DATA" sub-menu.
   b) Cycle through existing waypoints and verify their coordinates and elevation.
   c) You can convert each waypoint to PRECISE coordinates by clicking on the OSB next to PRECISE. It will add two digits to existing coordinates.



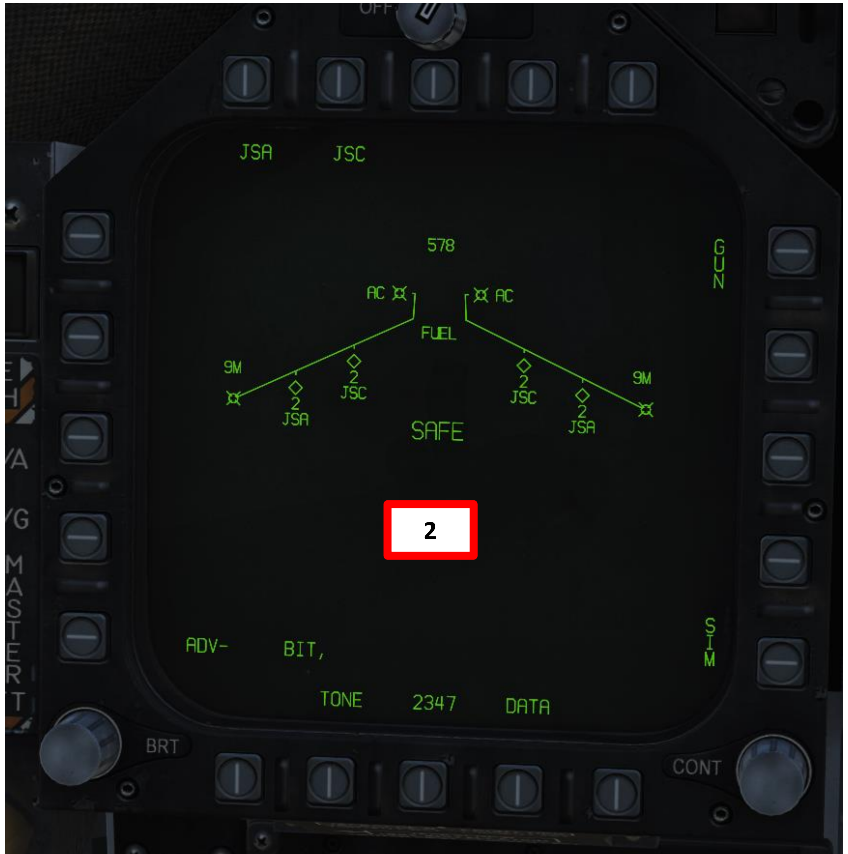




2.6 – AGM-154A JSOW
TOO + MANUAL MODE

Set Up Weapons

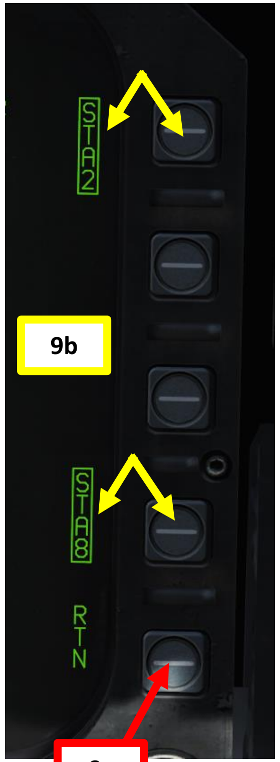
2. While on the ground, go in SMS (Stores Management System) page
3. Click on the desired JSOW to select it (JSA for AGM-154A and JSC for AGM-154C)
4. Once selected, JSOWs need about 3 minutes for alignment. It will go from 10 UNSTABLE, to 06 MARGINAL and finally 01 GOOD. When alignment is complete, the TIMING indicator will disappear from the JSOW page.

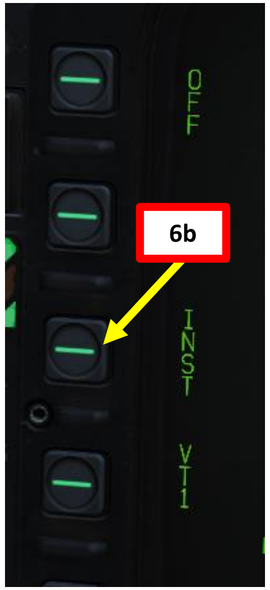


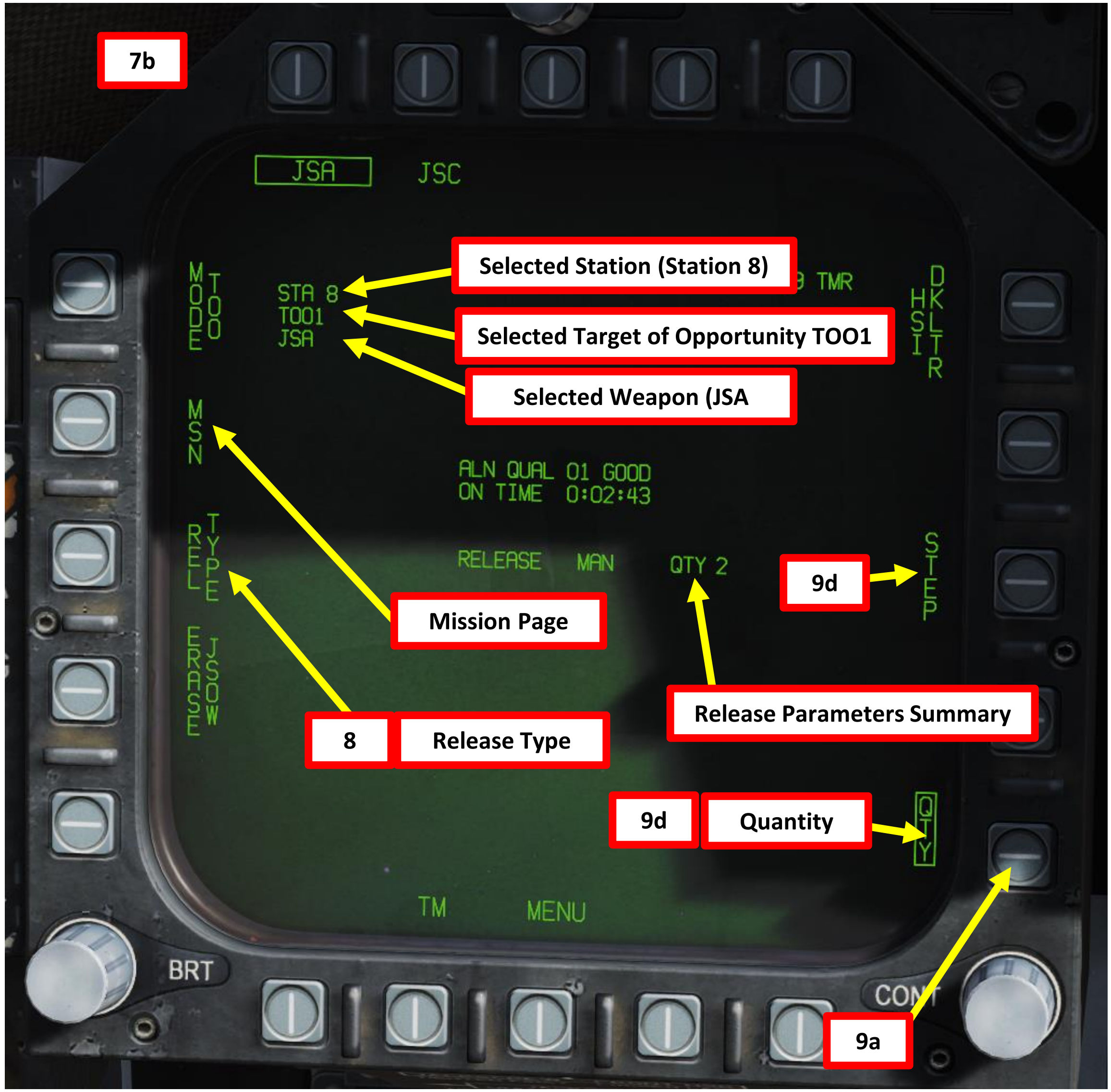
2.6 – AGM-154A JSOW
TOO + MANUAL MODE

Set Up Weapons

5. Select TOO (Target of Opportunity) Release Mode
6. Select Electronic Fuze to INST (Instantaneous).
7. Go in the JSOW Display page by pressing the JSOW DSPLY OSB
8. Select Manual Release Type
9. Select desired JSOW quantity to be used for this mission.
    a) Press the OSB next to QTY
    b) Select desired stations to be used for the mission (I suggest you select all of them). Selected stations will become boxed.
    c) Press the OSB next to RTN (Return).
    d) Once quantity is set, the STEP function will be available to select desired weapon station.







2.6 – AGM-154A JSOW
TOO + MANUAL MODE

Set Up Weapons

10. Enter MSN (Mission) page.
11. Select TOO1 to set Target 1 parameters
12. Select TOO UFC
13. On the UFC, Select HT (Height). « : » will appear when selected. Then, enter the Height above target in feet at which the JSOW cluster bomb will detonate. As an example, enter 100 on the scratchpad, then press the ENT (Enter) button. The greater the HT, the bigger radius the blast will have. **Note**: This step is only required for AGM-154A (cluster bombs). For the AGM154C, there is no HT setting.
14. Return to main UFC menu by pressing the TOO UFC button twice.

Waypoints Used for TOO

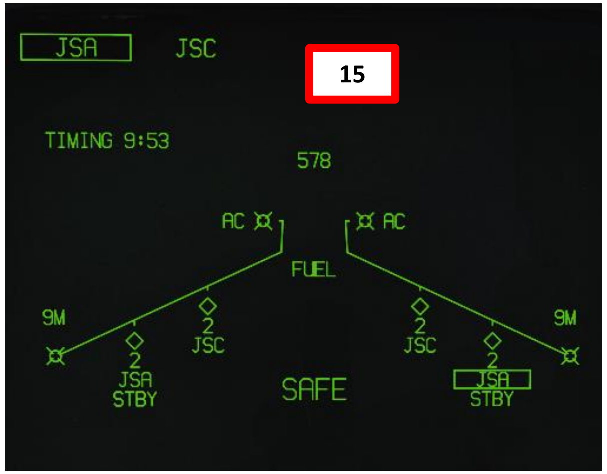
Target Point	Waypoint Used
TGT1	Waypoint WP1
TGT2	Waypoint WP1
TGT3	Waypoint WP1
TGT4	Waypoint WP1

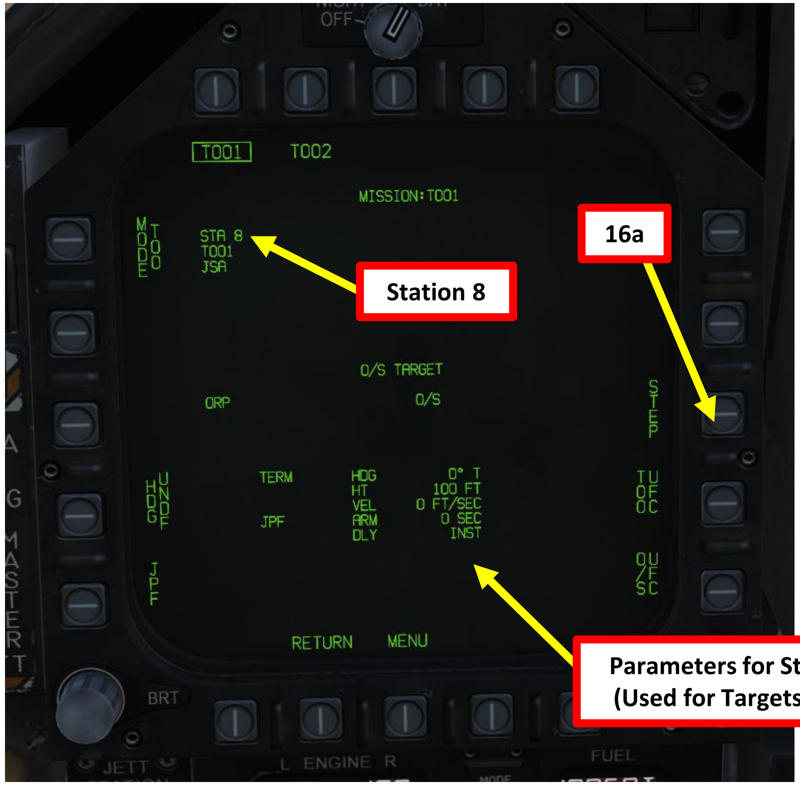
Note:
To access the burst height (HT) in pre-planned mode on MSN, you will need to press TGT UFC then press TERM , and select HT; one extra step vs TOO mode.

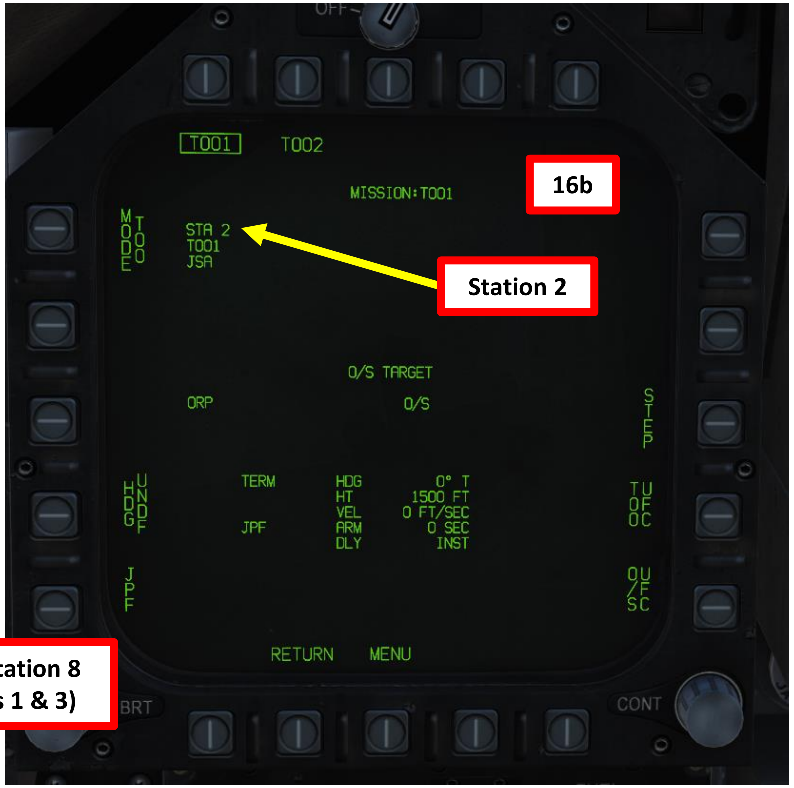
2.6 – AGM-154A JSOW
TOO + MANUAL MODE

Set Up Weapons

15. Our current configuration is 2 stations with 2 JSOW-As each. Therefore, the second JSOW on the rack has the same release parameters and we only need to set up release parameters for Station 2, where the other two JSOW-As are installed.
16. Press on STEP to select the next station (STATION 2).
17. Repeat process (Steps 11 through 14) for Station 2 TOO1.



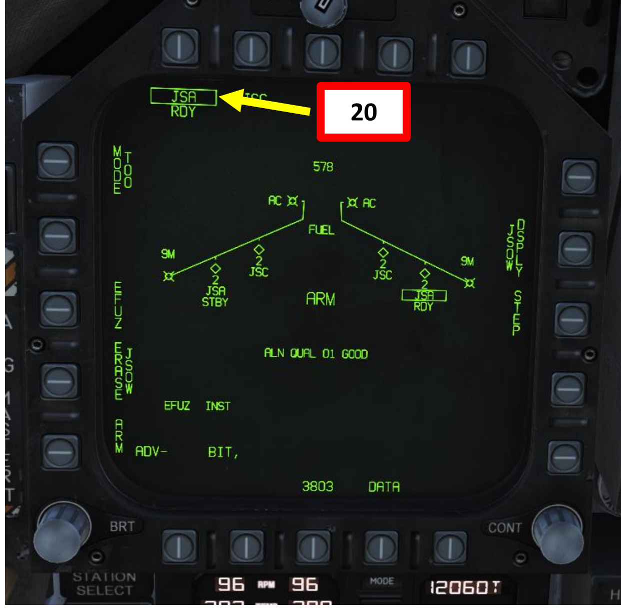


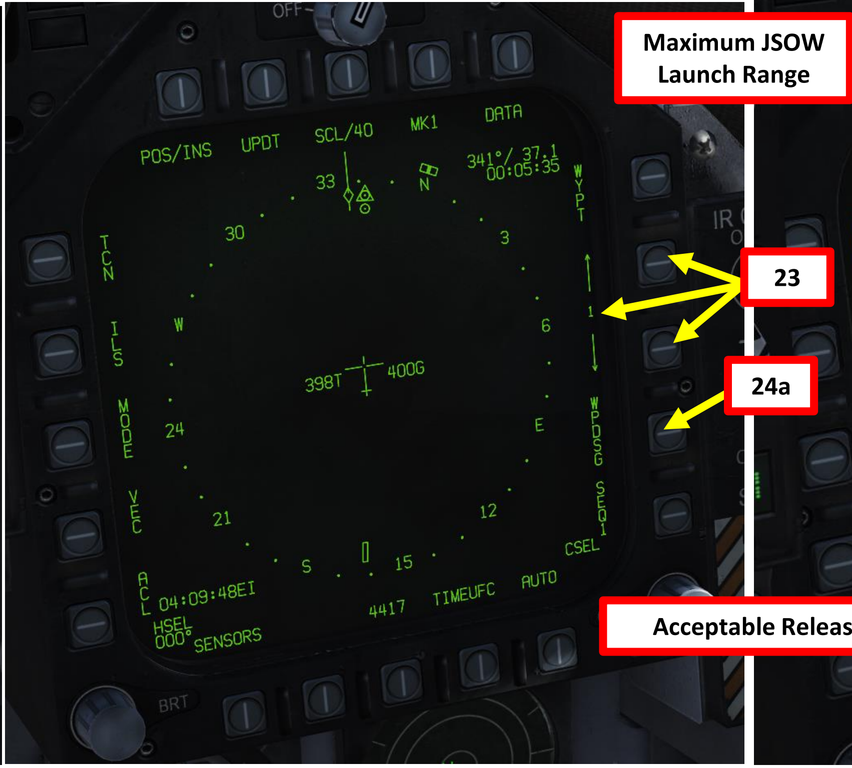


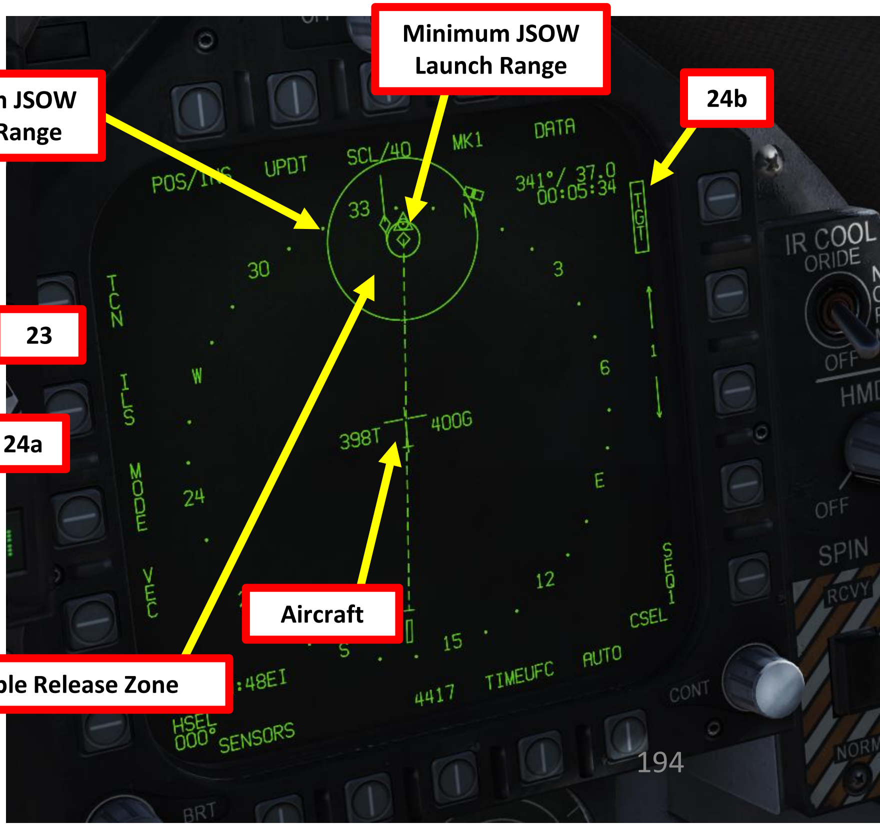
2.6 – AGM-154A JSOW
TOO + MANUAL MODE

Launch Weapons

18. Master Arm switch – ARM (UP)
19. Master Mode – A/G
20. On the SMS (Stores Management System) page, verify that JSA is selected
21. Set HSI on the right DDI and the JSOW Display page on the left DDI (from SMS page, press the JSOW DSPLY OSB, then select MSN (Mission) page)
22. Verify that Manual Release TOO Release Mode is selected and that the desired station and TOO is selected.
23. On the HSI, select Waypoint 1 using the OSBs next to the arrows.
24. Once the Waypoint 1 is selected, press the OSB next to WPSDG (Waypoint Designate) to designate Waypoint 1 as your TGT1 (Target Point 1). On the HSI, « WYPT » will switch to « TGT ».



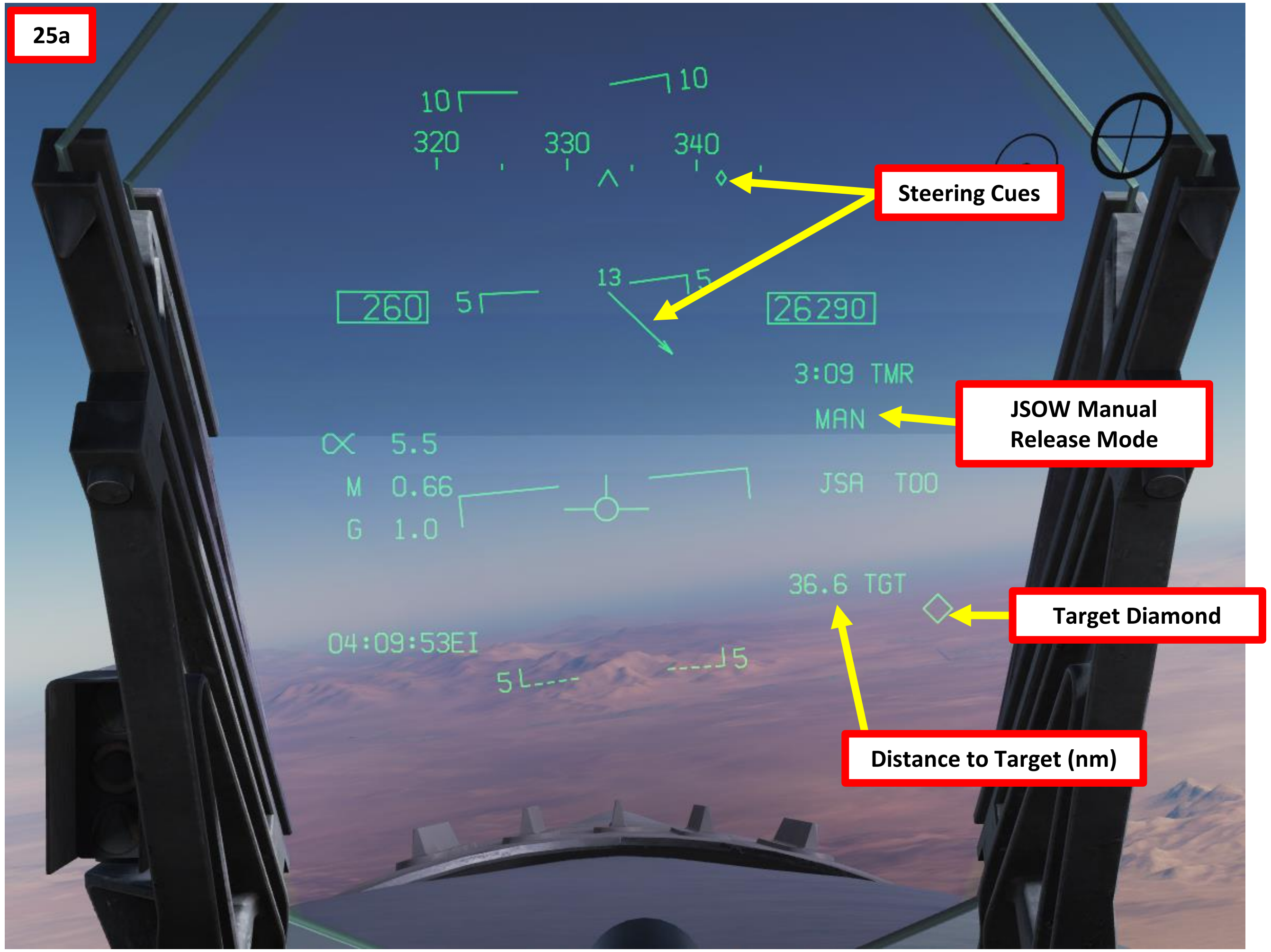


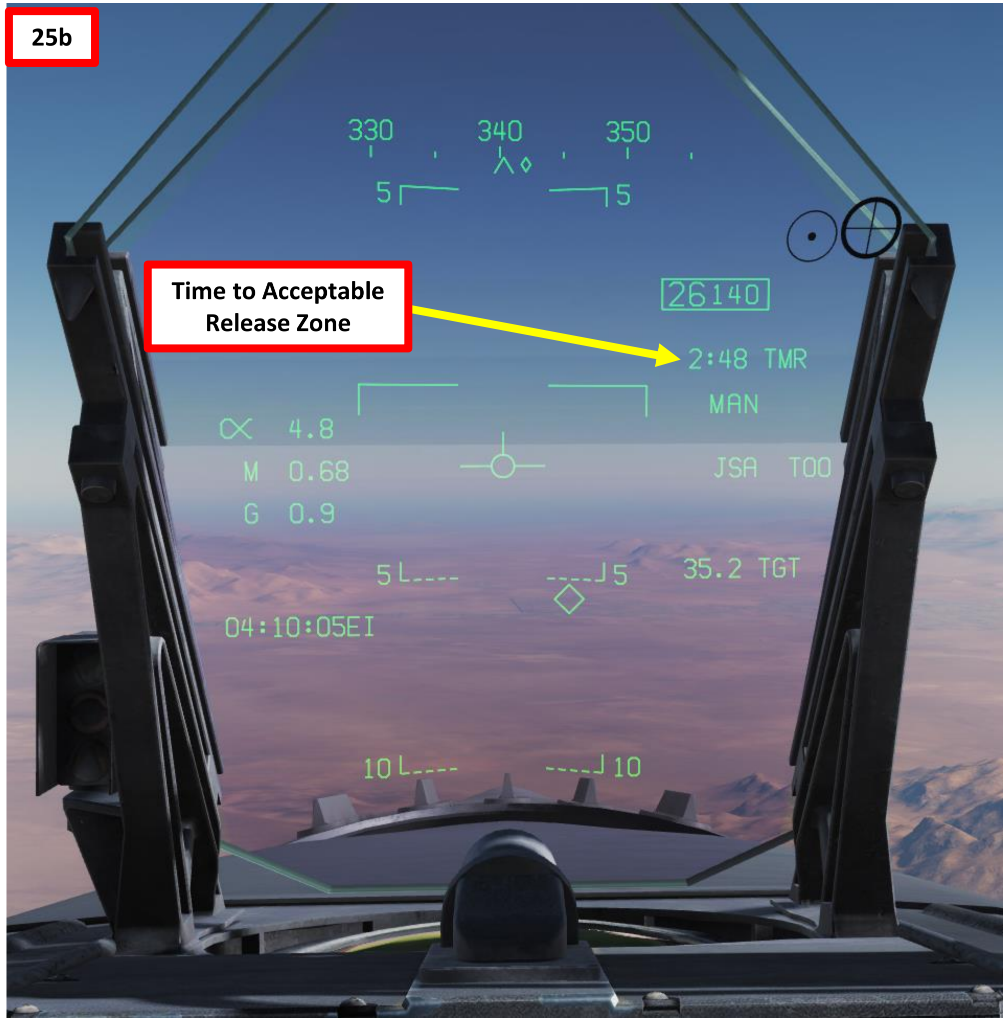


2.6 – AGM-154A JSOW
TOO + MANUAL MODE

Launch Weapons

25. Steer aircraft to the target (indicated by a diamond on the HUD)





2.6 – AGM-154A JSOW
TOO + MANUAL MODE

Launch Weapons

26. When you are within the acceptable release zone (between the minimum and maximum release limits identified on the HSI), the HUD will switch from displaying "TMR" (Time to reach acceptable release zone) to "IN RNG" (In Range). You may now release your weapons.
27. Hold the Weapon Release Button (« RALT+SPACE ») to drop your first JSOW.

2.6 – AGM-154A JSOW
TOO + MANUAL MODE

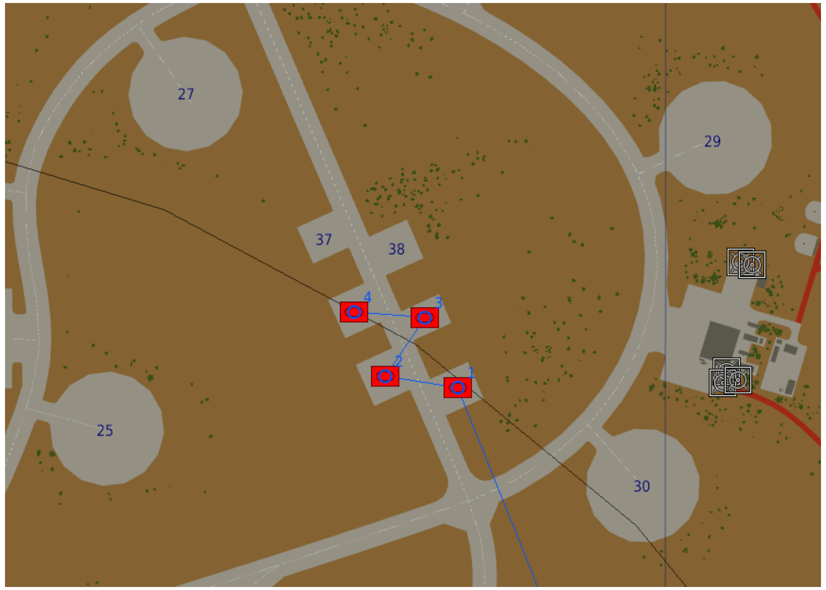
Launch Weapons

28. Once the JSOW is released, the system will step to the next available JSOW. However, keep in mind that your next JSOW will still be slaved to Waypoint 1. You need to designate Waypoint 2 as your Target Point.
29. On the HSI, select Waypoint 2 using the OSBs next to the arrows.
30. Once the Waypoint 2 is selected, press the OSB next to WPSDG (Waypoint Designate) to designate Waypoint 2 as your TGT2 (Target Point 2). On the HSI, « WYPT » will switch to « TGT ».
31. Verify that TOO and station match as per our plan, then release weapon when ready.

2.6 – AGM-154A JSOW
TOO + MANUAL MODE

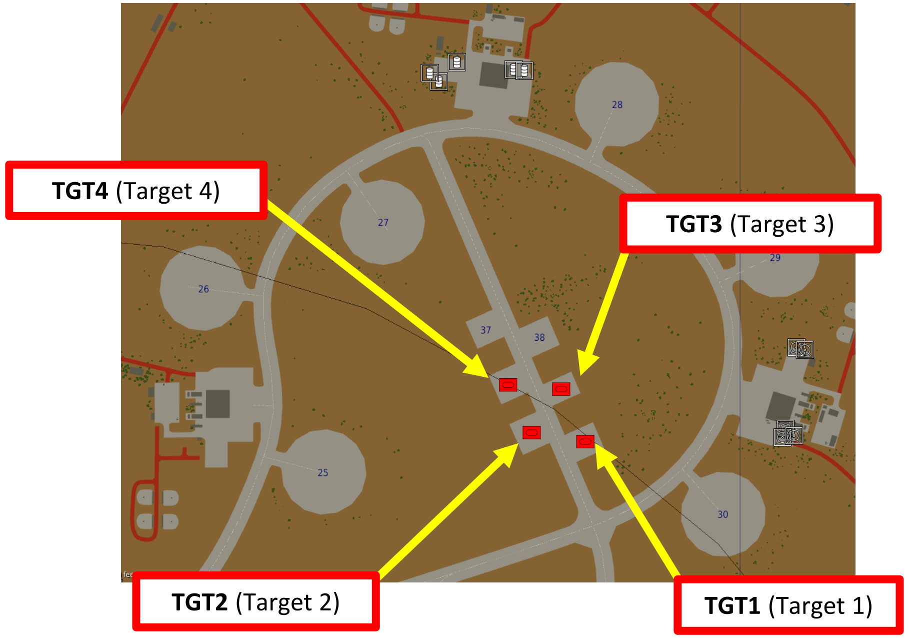
Launch Weapons

32. Repeat for remaining bombs.



2.7 – GPS-Guided Ordnance (JDAM/JSOW) (Targeting Pod, TOO + Pre-Planned)

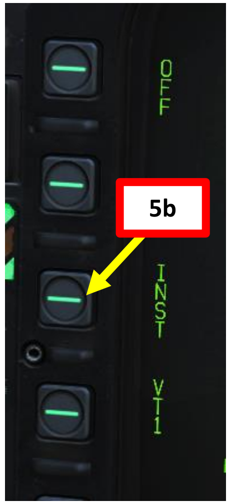
A neat feature of the targeting pod is that you can designate targets with it even without a laser. The laser is used for laser-guided weapons, so the GPS-guided units only need valid coordinates. These coordinates can be obtained by designating a target with the targeting pod while the JDAM/JSOW is in TOO (Target of Opportunity) Mode. The coordinates are then memorized, and simply switching to PP (Pre-Planned) mode will automatically transfer these coordinates to the selected JDAM/JSOW.

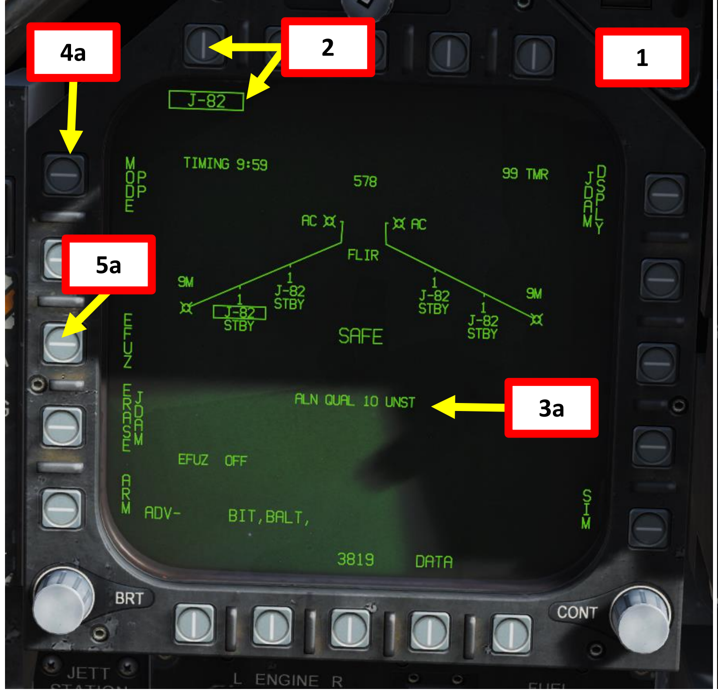


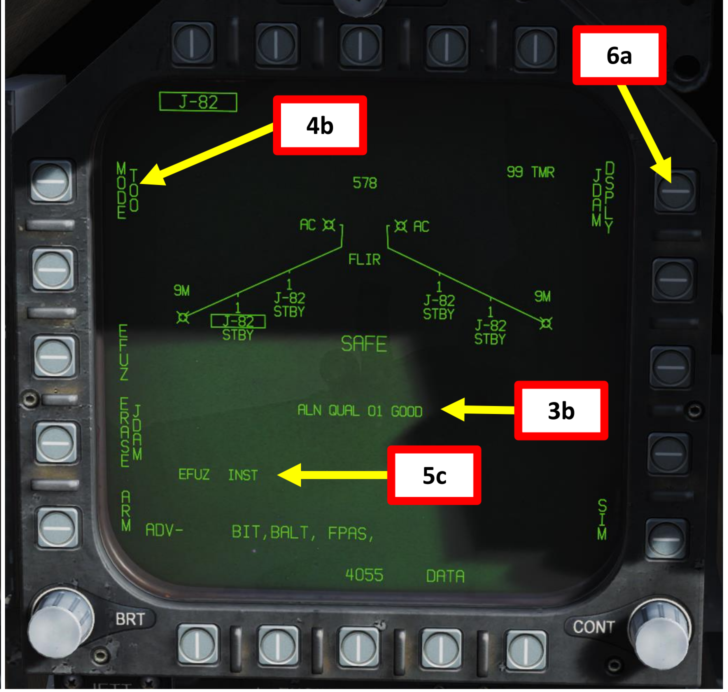
Find Target with Targeting Pod and Designate with TDC → **From Targeting Pod Designated Point, Obtain Coordinates** → **Set Up Weapon - TOO** (TOO, uses Designated Point) → **Transfer TOO Coordinates to PP Mode** (Pre-Planned coordinates) → **Manual Release Mode**

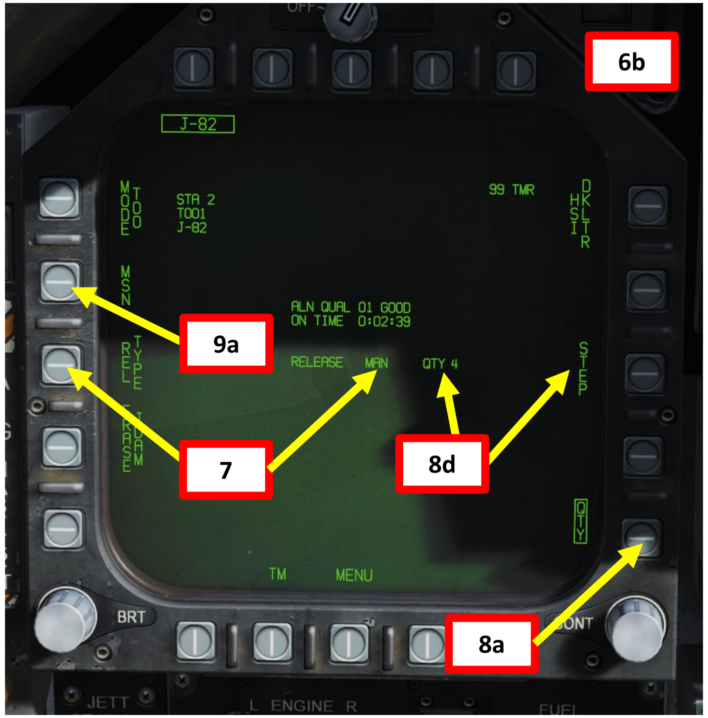
2.7 – GPS-Guided Ordnance (JDAM/JSOW) (Targeting Pod, TOO + Pre-Planned)

1. While on the ground, go in SMS (Stores Management System) page
2. Click on the desired JDAM or JSOW to select it (we will use the J-82 JDAM)
3. Once selected, JDAMs need about 3 minutes for alignment. It will go from 10 UNSTABLE, to 06 MARGINAL and finally 01 GOOD. When alignment is complete, the TIMING indicator will disappear from the JDAM page.
4. Select TOO (Target-of-Opportunity) Release Mode
5. Select Electronic Fuze to INST (Instantaneous).
6. Go in the JDAM Display page by pressing the JDAM DSPLY OSB
7. Select Manual Release Type
8. Select desired JDAM quantity to be used for this mission.
    a) Press the OSB next to QTY
    b) Select desired stations to be used for the mission (I suggest you select all of them). Selected stations will become boxed.
    c) Press the OSB next to RTN (Return).
    d) Once quantity is set, the STEP function will be available to select desired weapon station.
9. Enter MSN (Mission) page.
10. Select TOO1 to set Target 1 parameters. We will now have to designate Target 1 with the Targeting Pod to obtain the coordinates of this target.



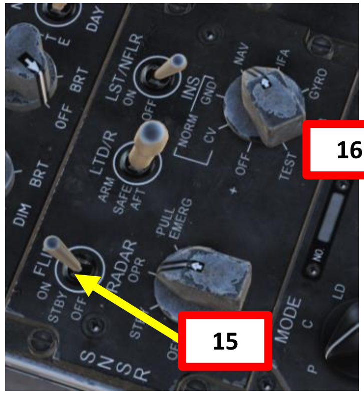


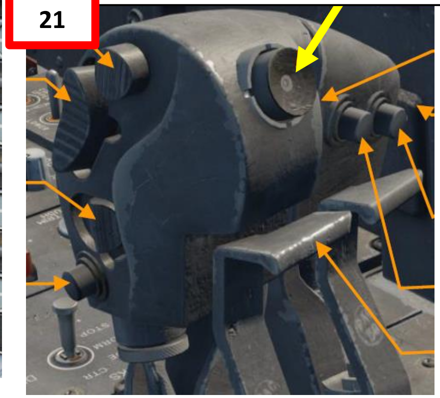




2.7 – GPS-Guided Ordnance (JDAM/JSOW) (Targeting Pod, TOO + Pre-Planned)

11. Power up the targeting pod by setting FLIR Sensor Switch to STBY.
12. From the TAC page on either DDI or the AMPCD, press the OSB (Option Select Button) next to “FLIR” (Forward-Looking Infrared) to select the Targeting Pod feed page.
13. Monitor the warm-up process. Targeting pod warm-up process will take about 2 minutes.
14. When targeting pod is ready to be used, the pod status will switch from ~~RDY~~ – NOT TIMED OUT to STBY.
15. Set FLIR Sensor Switch to ON. This will un-stow the camera. Confirm that Targeting Pod mode switches from STBY to OPR (Operate).
16. Press A/G Master Mode.
17. Press the Sensor Control Switch in the direction of the selected DDI (Right for the Right DDI as an example). The Select Focus Diamond indicates what display is selected.
18. Using the TDC (Throttle Designator Controller) Aft/Fwd/Left/Right controls, slew the targeting pod reticle over target 1. The targeting pod is boresighted by default to a forward, 5 deg down view.
19. Use appropriate zoom level, field of view (NARROW/WIDE) and camera mode (CCD/TV or FLIR) to identify the target.
20. Press the Sensor Control Switch Towards Selected Display (Right if our right DDI is selected) to toggle between Point Track (PTRK, tracks a moving object like a high-contrast vehicle) and Area Track (ATRK, used for a static target).
21. Use the TDC (Throttle Designator Controller) Depress button to designate the target. Since the JDAM is in TOO mode, the target coordinates will automatically be saved once the target is designated.



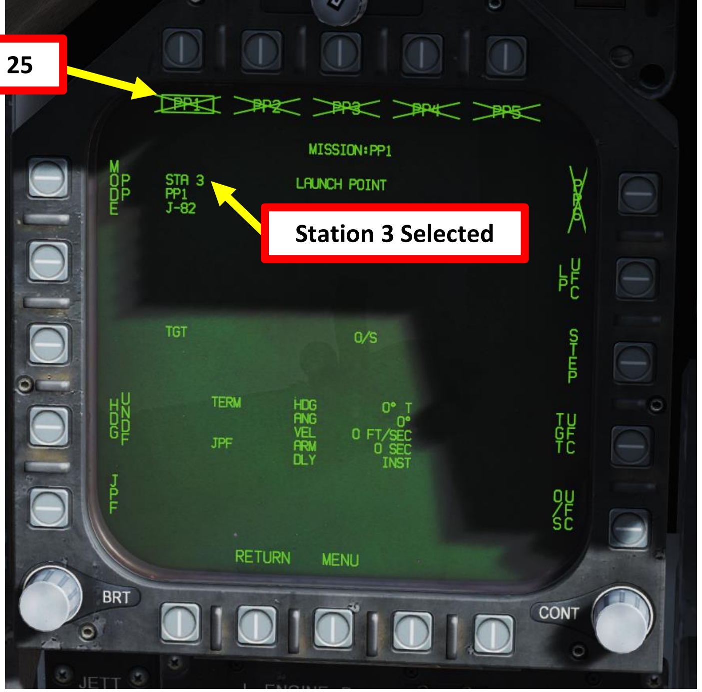


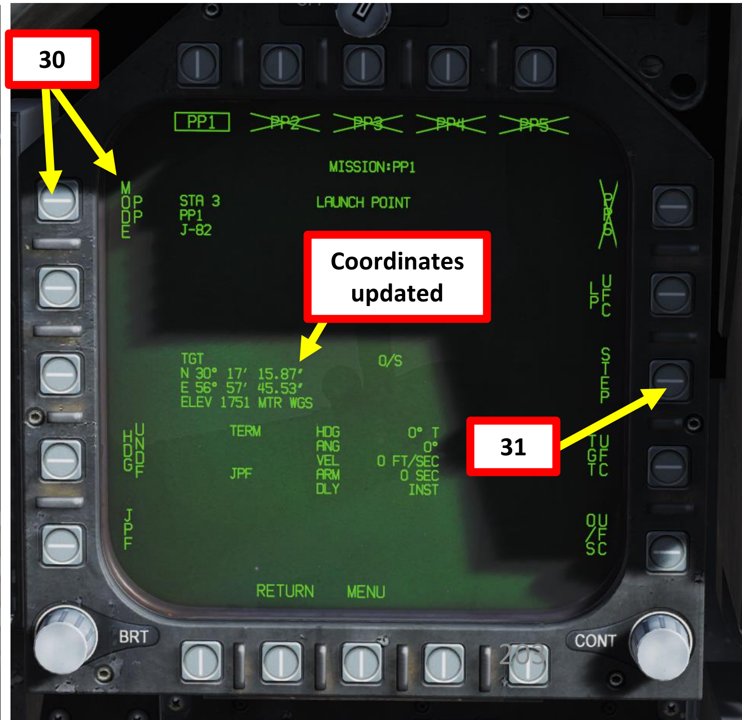
2.7 – GPS-Guided Ordnance (JDAM/JSOW)
(Targeting Pod, TOO + Pre-Planned)

22. Confirm on JDAM MSN (Mission) page that coordinates have updated properly once the TDC Depress button has been pressed.
23. Now, select PP (Pre-Planned) Release Mode. JDAM coordinates of the TOO mode for Target 1 will automatically be transferred to the Pre-Planned mode PP1 coordinates.

2.7 – GPS-Guided Ordnance (JDAM/JSOW) (Targeting Pod, TOO + Pre-Planned)

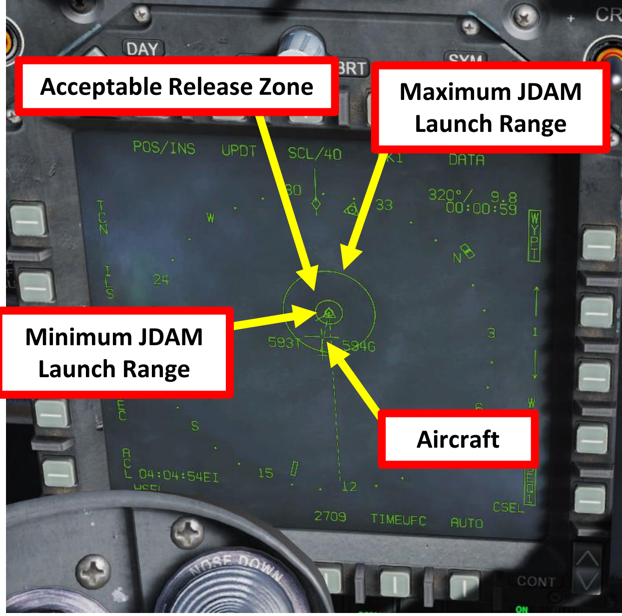
24. Now that target 1 coordinates are memorized by the JDAM, press the "STEP" button to switch to the next station (STA 3) for target 2.
25. You will see that there is a crossed-out PP1 Point, which means no valid coordinates are entered yet.
26. Select TOO (Target-of-Opportunity) Release Mode
27. The new station will memorize the previously designated target. We will have to designate another target (Target 2) with the pod.
28. Using the TDC (Throttle Designator Controller) Aft/Fwd/Left/Right controls, slew the targeting pod reticle over target 2.
29. Use the TDC (Throttle Designator Controller) Depress button to designate target 2. Once again, since the JDAM is in TOO mode, the target 2 coordinates will automatically be saved once the target is designated.
30. select PP (Pre-Planned) Release Mode. JDAM coordinates of the TOO mode for Target 1 will automatically be transferred to the Pre-Planned mode PP1 coordinates.
31. Repeat process for remaining two targets until each one of the four JDAMs selected has its own coordinates selected by the targeting pod.

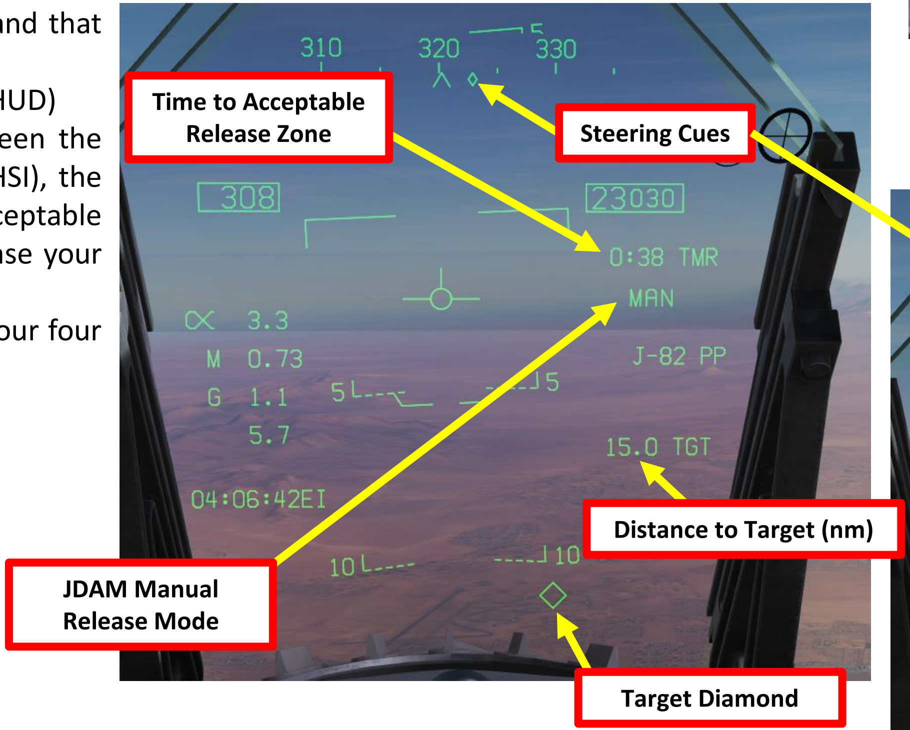


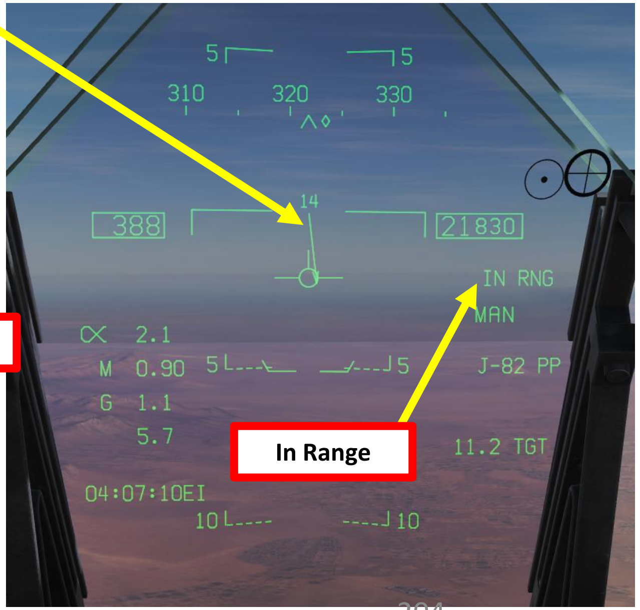


2.7 – GPS-Guided Ordnance (JDAM/JSOW) (Targeting Pod, TOO + Pre-Planned)

32. Once the four JDAMs selected have their own individual coordinates and are in PP mode, we can now start the attack run.
33. Master Arm switch – ARM (UP)
34. Verify that Master Mode is in A/G
35. On the SMS (Stores Management System) page, verify that J-82 is selected
36. Set HSI on the lower AMPCD (I suggest you remove the moving map), the targeting pod feed on the right DDI, and the JDAM Display page on the left DDI (from SMS page, press the JDAM DSPLY OSB, then select MSN (Mission) page)
37. Verify that Manual Release PP Release Mode is selected and that the desired station and PP is selected.
38. Steer aircraft to the target (indicated by a diamond on the HUD)
39. When you are within the acceptable release zone (between the minimum and maximum release limits identified on the HSI), the HUD will switch from displaying "TMR" (Time to reach acceptable release zone) to "IN RNG" (In Range). You may now release your weapons.
40. Hold the Weapon Release Button (« RALT+SPACE ») until your four bombs are dropped.



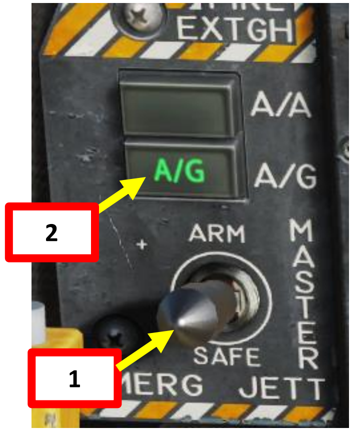


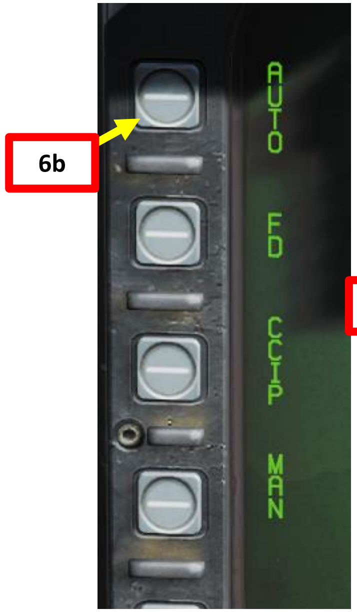


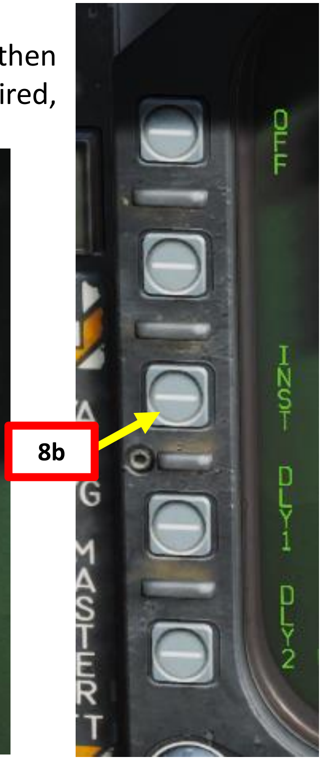
2.7 – GPS-Guided Ordnance (JDAM/JSOW)
(Targeting Pod, TOO + Pre-Planned)

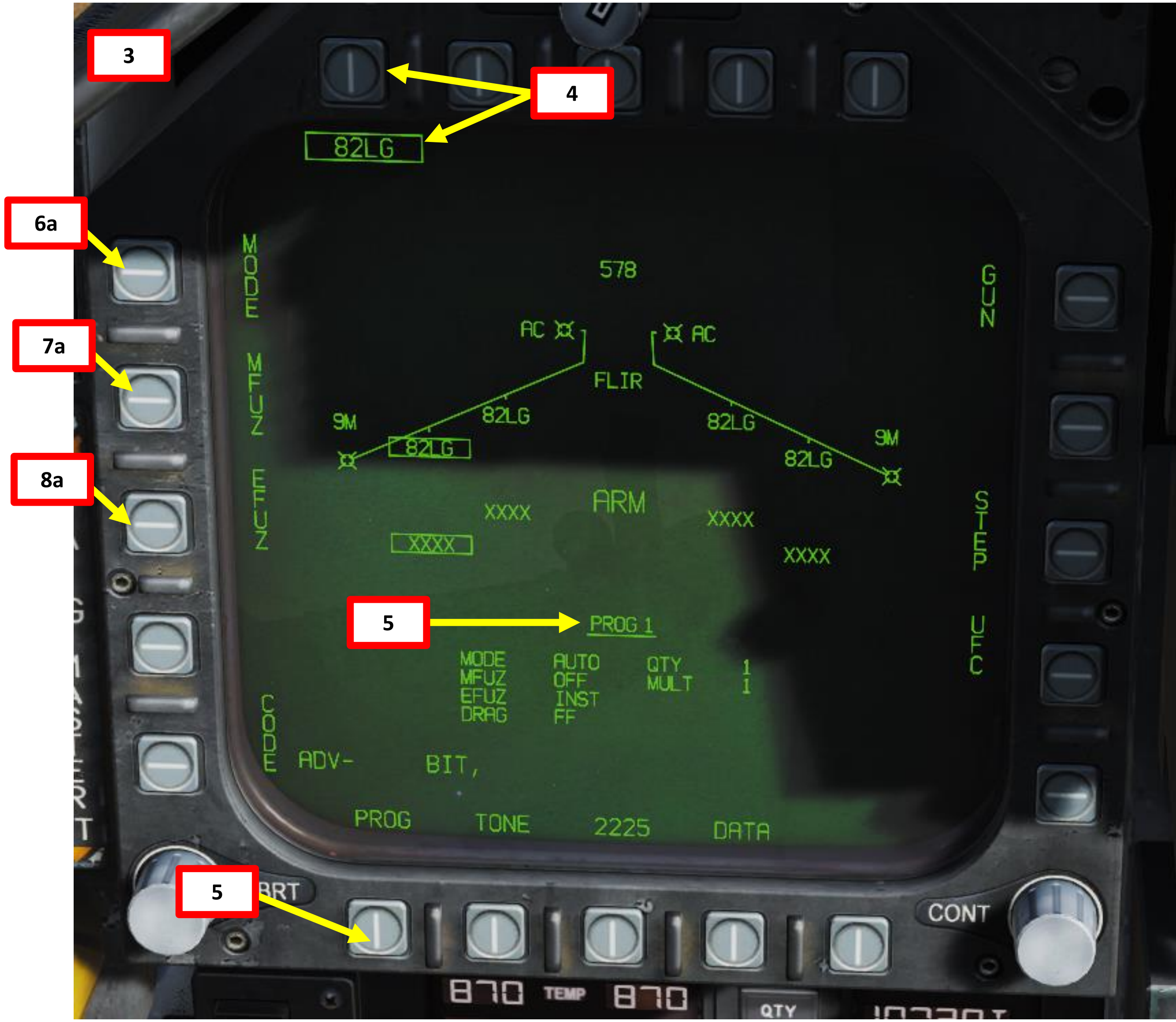
2.8 – GBU-12 Paveway II (Laser-Guided Mode)

1. Master Arm switch – ARM (UP)
2. Master Mode – A/G
3. Go in SMS (Stores Management System) page
4. Click on the desired bomb to select it (82LG, Laser-Guided)
5. We will create a weapon delivery program by selecting a preset program and modifying it. Toggle programs with the OSB next to PROG. We will use PROG 1 for simplicity.
6. The Release Mode can be set to either CCIP or CCRP (AUTO). In our case, we will choose CCRP (AUTO).
7. Leave MFUZ (Mechanical Fuze) to OFF.
8. Click on OSB next to EFUZ (Electronic Fuze), then press on OSB next to DLY1 for a delay if desired, otherwise set to INST.



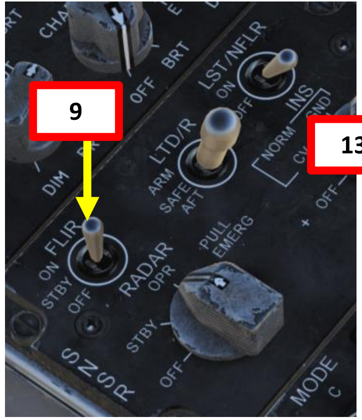


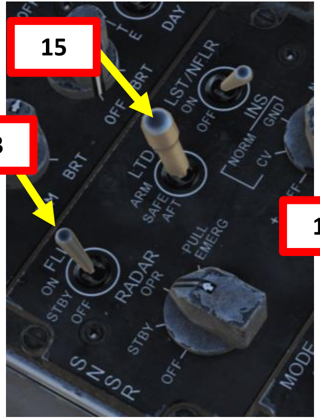


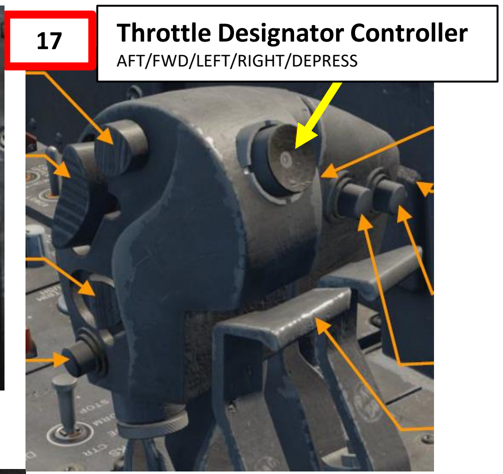


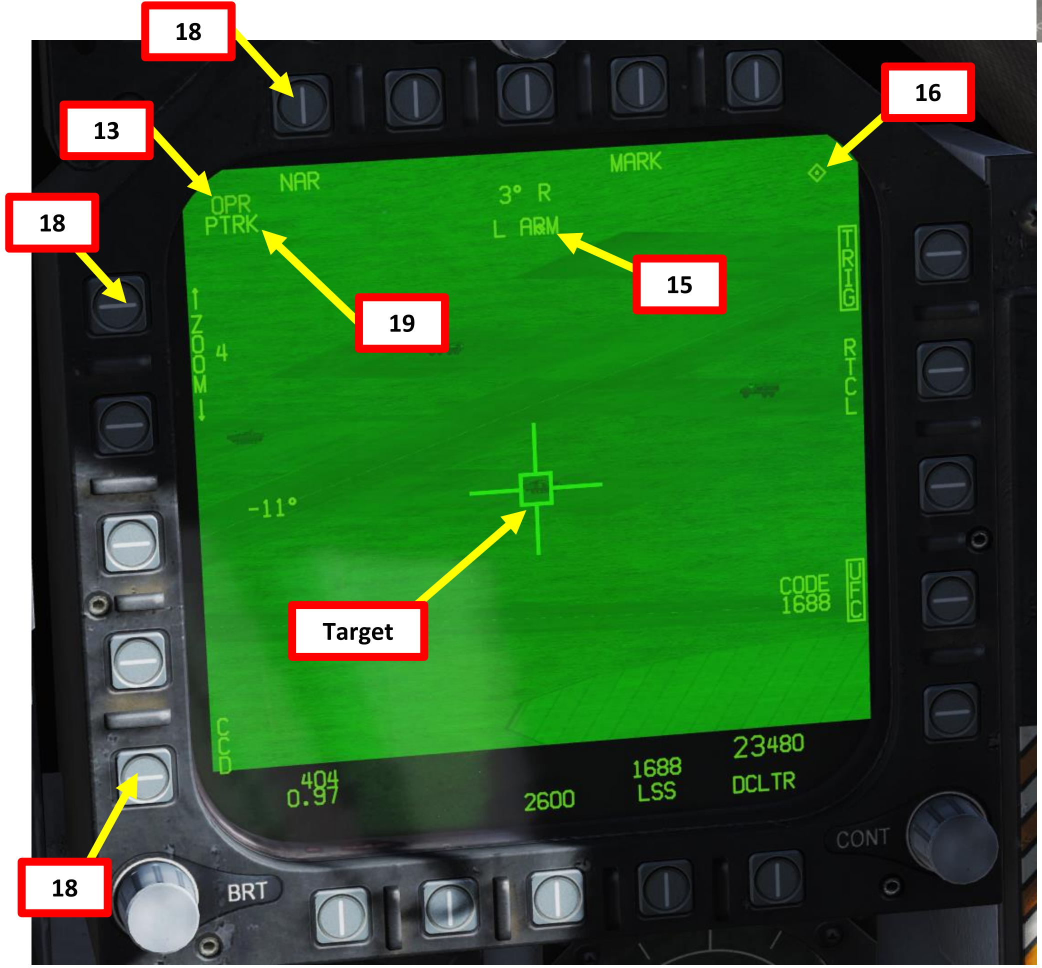
2.8 – GBU-12 Paveway II (Laser-Guided Mode)

9. Power up the targeting pod by setting FLIR Sensor Switch to STBY.
10. From the TAC page on either DDI or the AMPCD, press the OSB (Option Select Button) next to “FLIR” (Forward-Looking Infrared) to select the Targeting Pod feed page.
11. Monitor the warm-up process. Targeting pod warm-up process will take about 2 minutes.
12. When targeting pod is ready to be used, the pod status will switch from ~~RDY~~ – NOT TIMED OUT to STBY.
13. Set FLIR Sensor Switch to ON. This will un-stow the camera. Confirm that Targeting Pod mode switches from STBY to OPR (Operate).
14. Verify A/G Master Mode is selected. This will allow you to arm the laser designator.
15. Set LTD/R (Laser Target Designator/Ranger) switch to ARM. This will arm the laser. Confirm that L ARM indication is displayed on the FLIR page.
16. Press the Sensor Control Switch in the direction of the selected DDI (Right for the Right DDI as an example). The Select Focus Diamond indicates what display is selected.
17. Using the TDC (Throttle Designator Controller) Aft/Fwd/Left/Right controls, slew the targeting pod reticle over the desired target. The targeting pod is boresighted by default to a forward, 5 deg down view.
18. Use appropriate zoom level, field of view (NARROW/WIDE) and camera mode (CCD/TV or FLIR) to identify the target.
19. Press the Sensor Control Switch Towards Selected Display (Right if our right DDI is selected) to toggle between Point Track (PTRK, tracks a moving object like a high-contrast vehicle) and Area Track (ATRK, used for a static target).



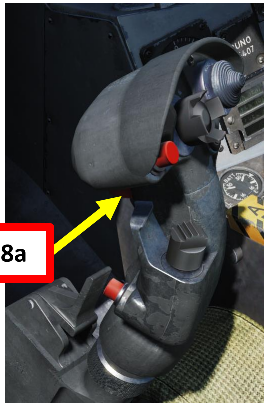


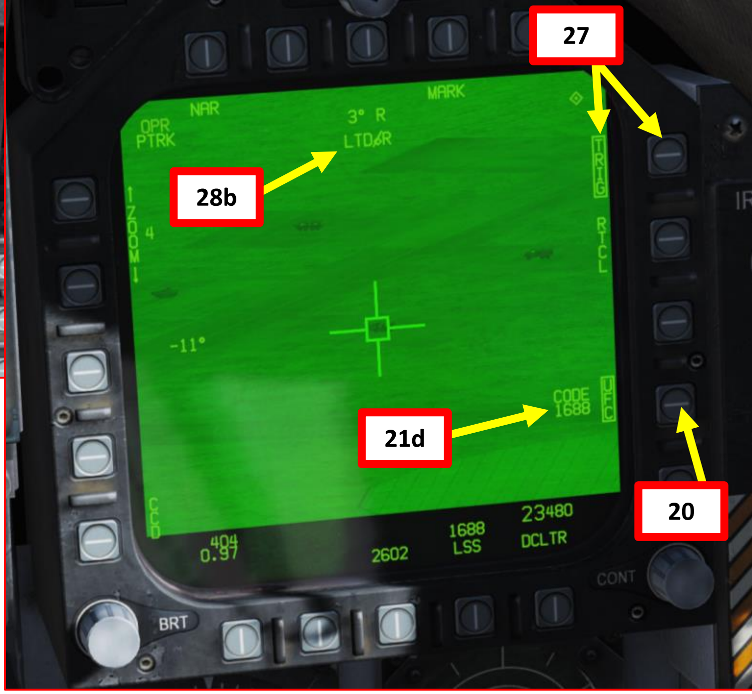




2.8 – GBU-12 Paveway II (Laser-Guided Mode)

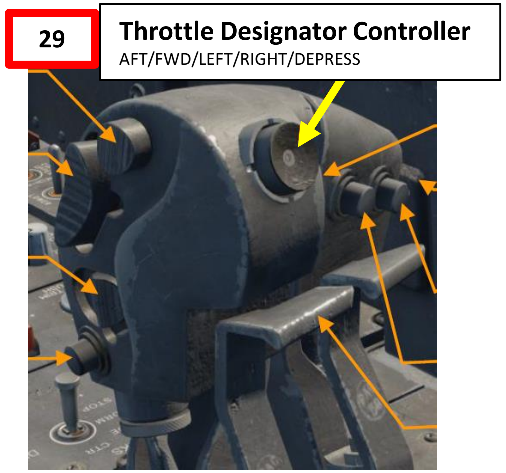
20. Press the OSB next to "UFC" to set the Targeting Pod laser code on the Up-Front Controller.
21. Press the button next to "LTDC" (Laser Target Designator Code). A ":" will indicate it is selected. Then, enter the desired laser code on the keypad and press "ENT". We will choose the default laser code 1688.
22. Now that the targeting pod has its laser code, we need to tell the GBU which laser code to track.
23. In SMS (Stores Management System) page, select GBUs (82LG, boxed when selected).
24. Press the OSB next to "CODE".
25. Press the button next to "CODE" (Guided Bomb Laser Code). A ":" will indicate it is selected. Then, enter the desired laser code on the keypad and press "ENT". We will choose targeting pod's laser code 1688 (which we already set in **step 21**).
26. The 82LG indication will then display "RDY" since it now has all the information it needs to launch, track a laser with a specific code, then home on the target.
27. On the FLIR page, press the OSB next to "TRIG". The indication will become boxed once selected, which means that a gun trigger press will fire the laser.
28. Press the gun trigger to fire laser. Once laser is firing, the laser mode will switch from L ARM to LTD/R.

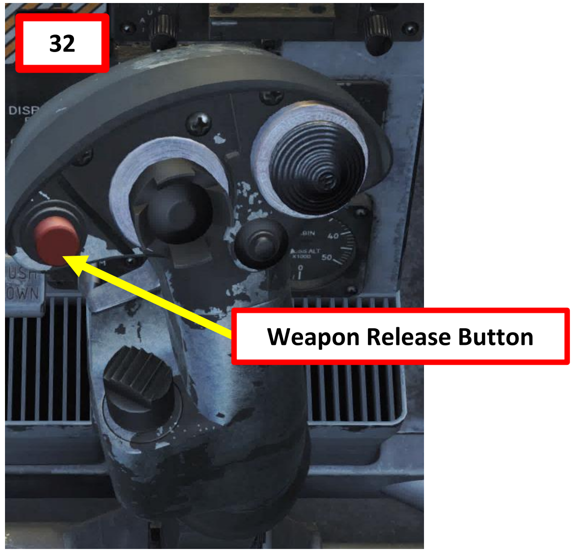


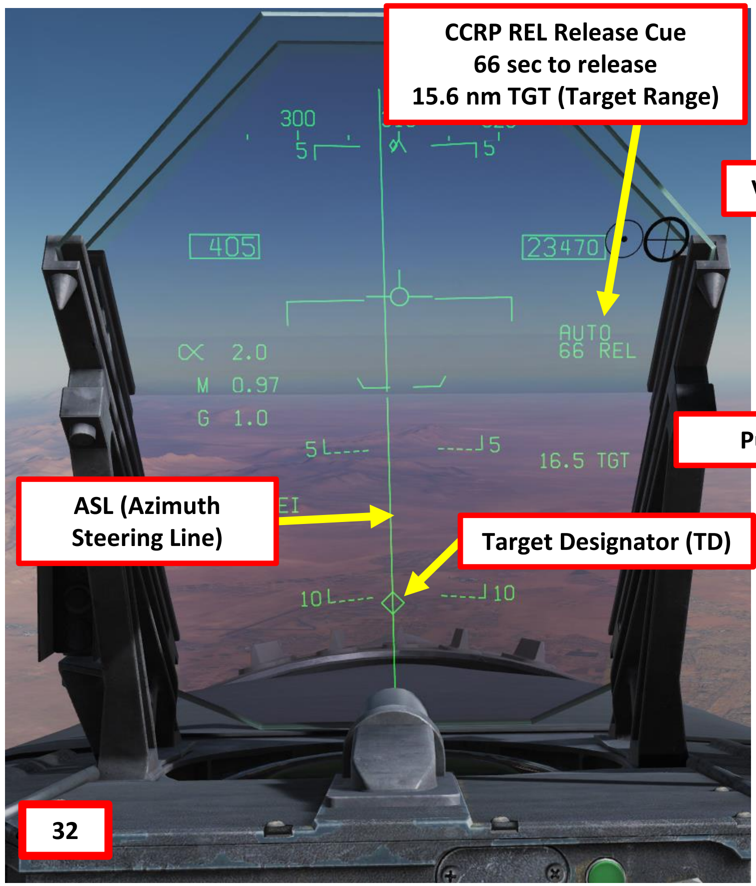


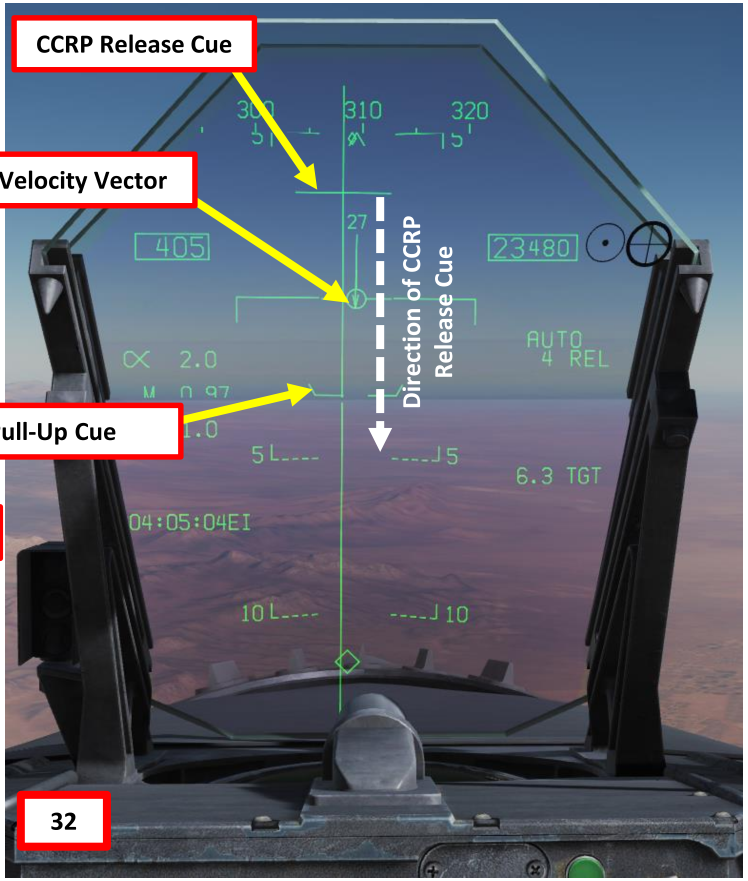
2.8 – GBU-12 Paveway II (Laser-Guided Mode)

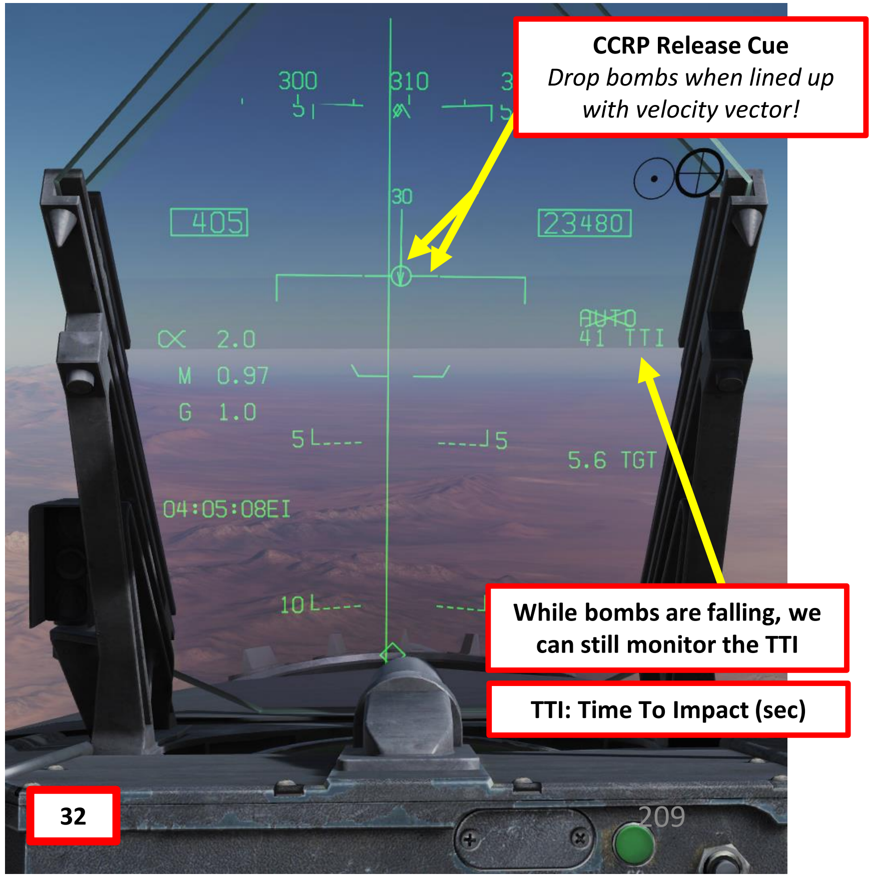
29. Use the TDC (Throttle Designator Controller) Depress button to designate the laser as the target point. This will slave selected air-to-ground weapons to where the laser is firing.
30. Fly level and keep your velocity vector aligned with the ASL (Azimuth Steering Line) and above the Pull-Up cue.
31. When release cue appears, hold the Weapon Release Button (« RALT+SPACE ») until bomb has been released.
32. If you want to drop other GBUs, you will have to re-enter a laser code for each bomb every time.



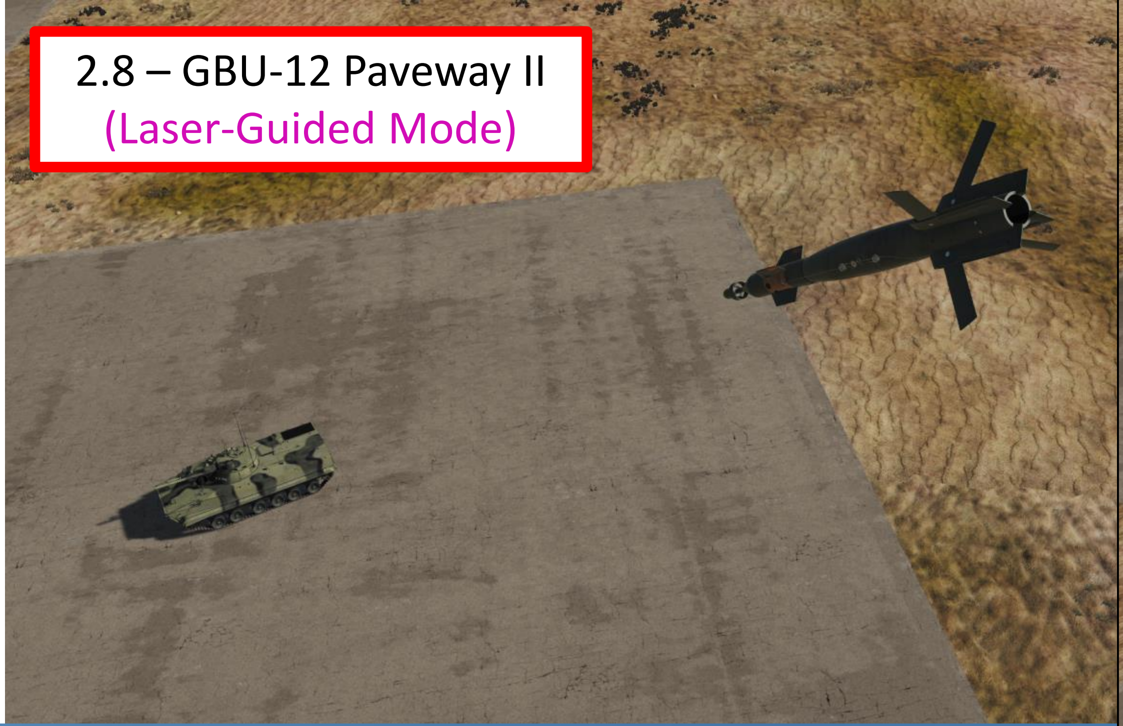






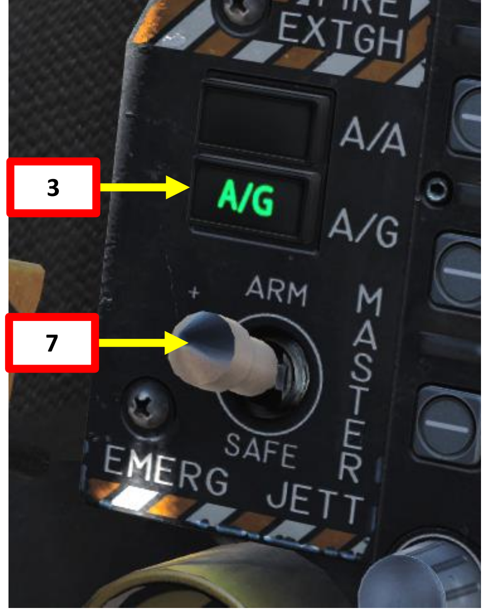


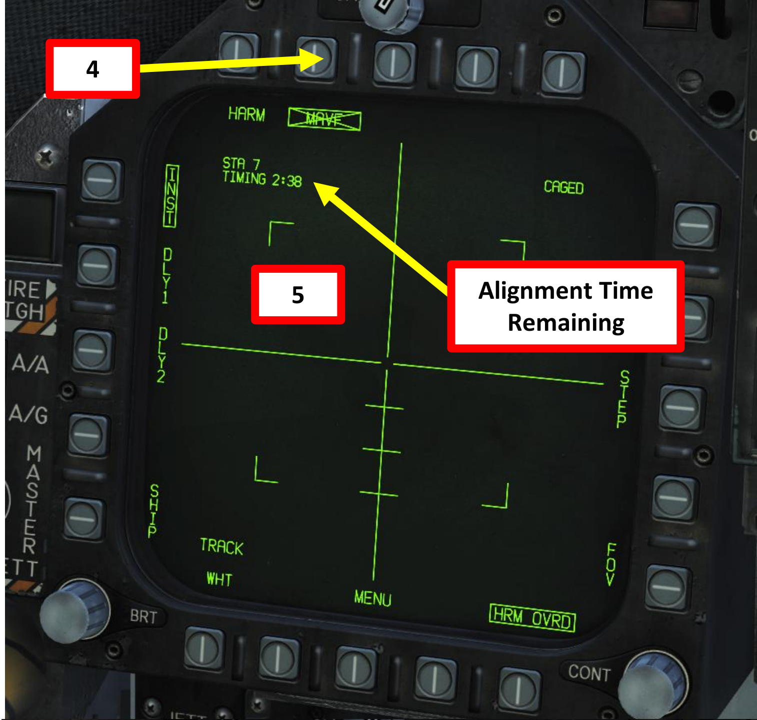
2.8 – GBU-12 Paveway II (Laser-Guided Mode)

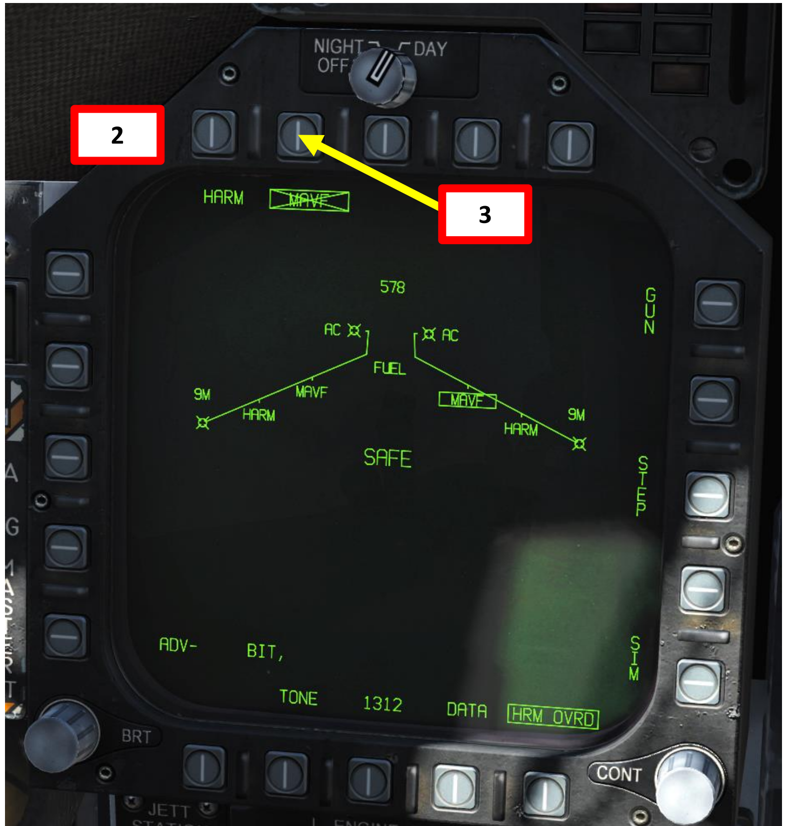


2.9 – AGM-65F/G MAVERICK (IR-MAVF)

1. The AGM-65F requires its seeker to be cooled by releasing a fluid stored inside onto it for it to be able to see properly and cannot be operated until it is cooled. Upon first selection of it on the STORES format, cooling will be initiated. A timer counting down to operating status can be seen on the IMAV DSPLY format, which takes approximately 3 minutes. **Note: The cooldown should be started while you are in the air and the missile is selected since the Weight On Wheels (WoW) signal inhibits missile cooldown initiation.**
2. Go in SMS (Stores Management System) page
3. Master Mode – A/G
4. Select MAVF (text should be boxed)
5. Maverick cooldown process will start and take about 3 minutes. Monitor cooldown progress by pressing the OSB next to the crossed-out « MAVF », which will show you the Maverick seeker head feed.
6. Once Maverick cooldown is complete, the timer will disappear and the MAVF Feed will go live.
7. Master Arm switch – ARM (UP)

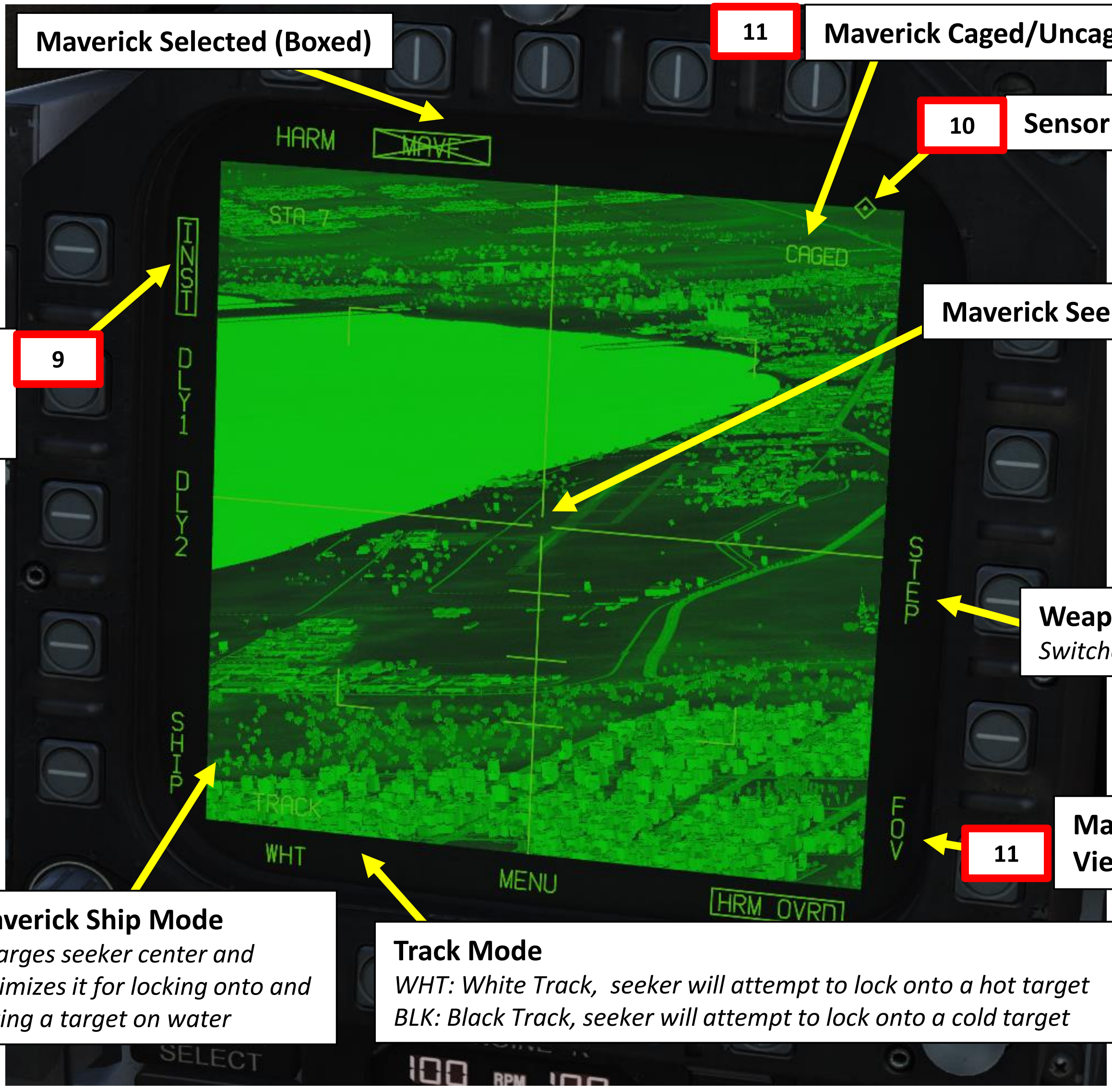


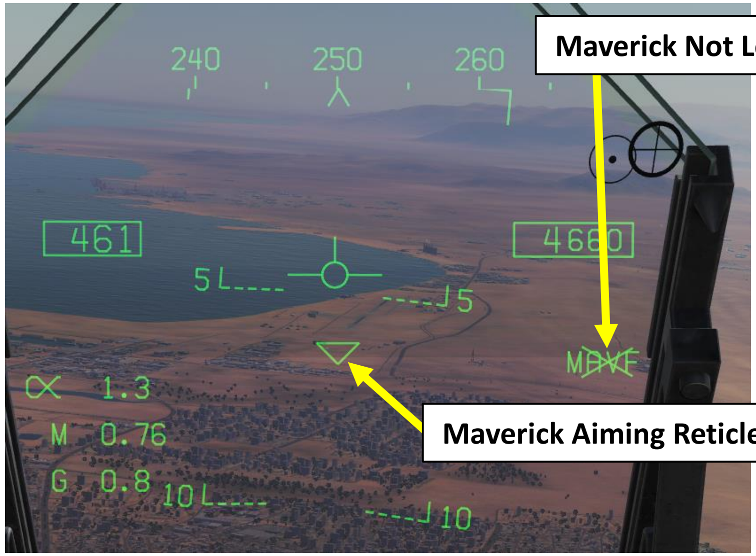




2.9 – AGM-65F/G MAVERICK (IR-MAVF)

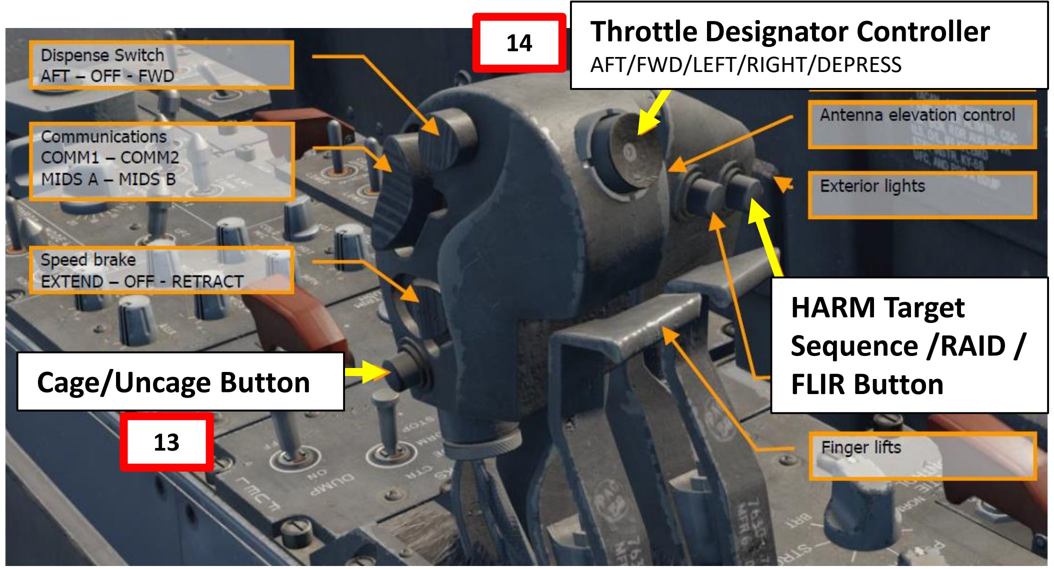
8. You can select the Maverick seeker head feed by going back to the TAC page and selecting IMAV DSPLY or by going in the STORES page and selecting MAVF twice as shown previously.
9. Set Fuzing to either INST (Instantaneous), DLY1 (Delayed Fuze) or DLY2.
10. Set Sensor Control Switch to the Maverick Feed DDI (Sensor Control Switch LEFT since we showed up the MAV feed on the left DDI). A diamond will appear to show the left DDI is selected.
11. Adjust FOV (Field of View) as required.
12. By default, the Maverick is Caged. When the seeker is caged, it will always point forward at its boresight.

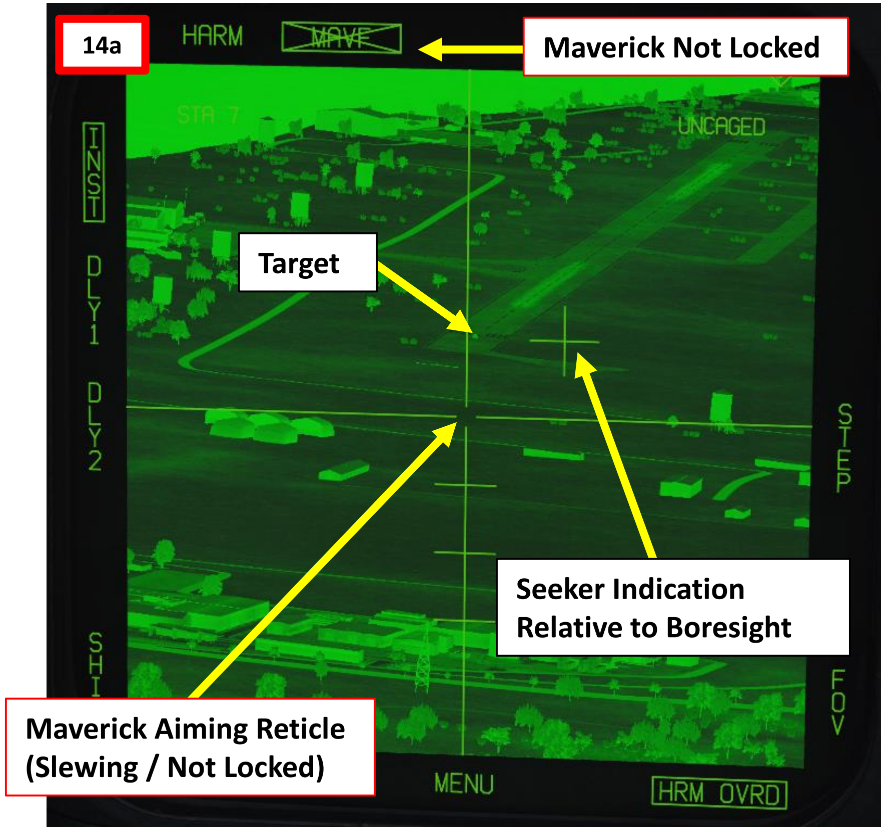


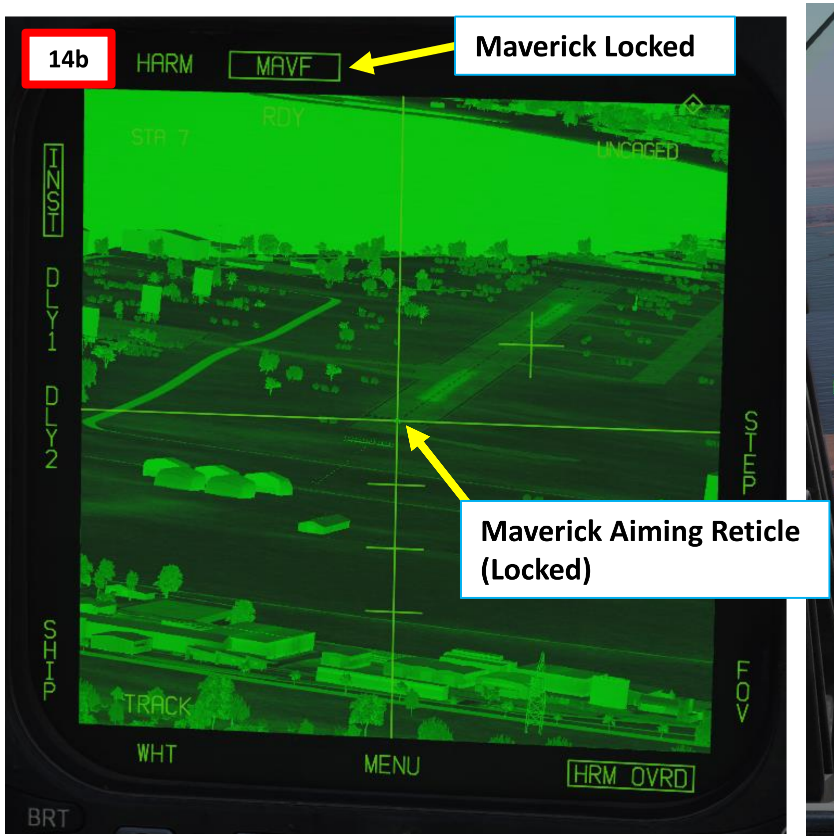


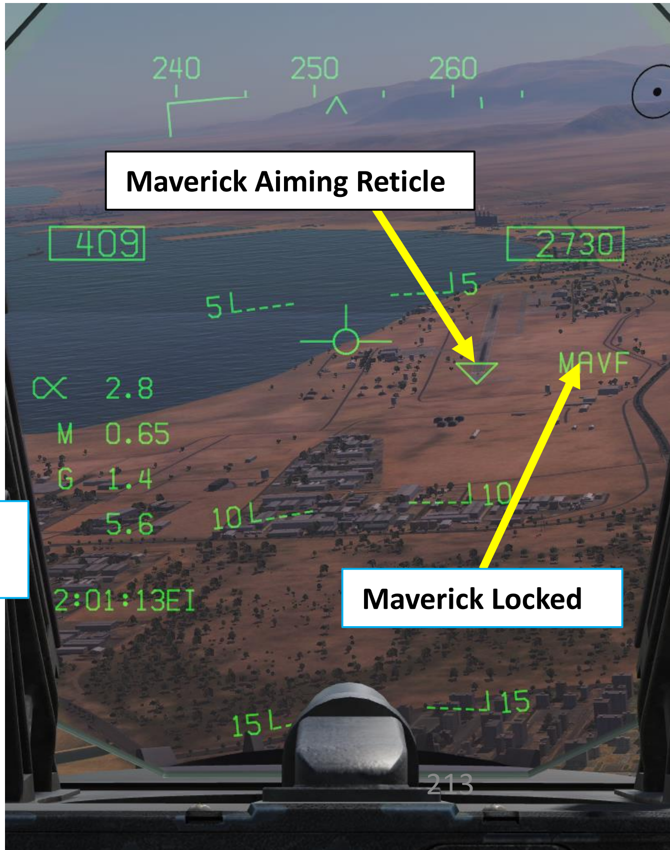
2.9 – AGM-65F/G MAVERICK (IR-MAVF)

13. Press the Cage/Uncage Button to uncage the Maverick. When uncaged, the missile will attempt to lock onto a contrasting target within the seeker center.
14. Hold the TDC Depress button **while** slewing the Maverick to the target. When release the TDC Depress button, the missile will attempt to lock its target. The Maverick is most likely going to acquire a good lock from a distance of 7.5 miles.
15. When lock is acquired by Maverick, the MAVF crossed-out indication will disappear. Hold the Weapon Release Button (« RALT+SPACE ») to fire missile.







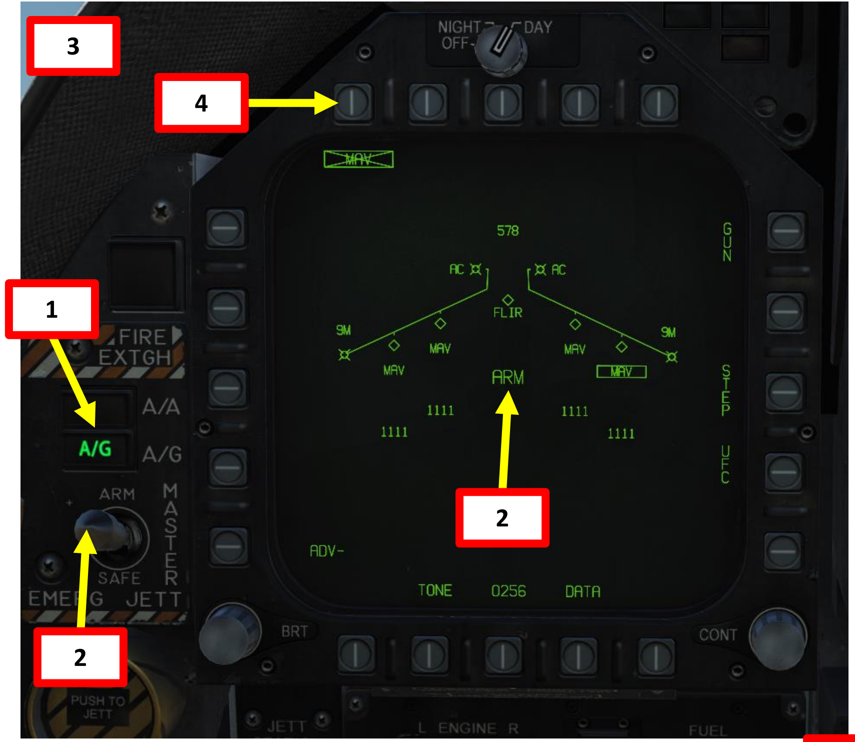


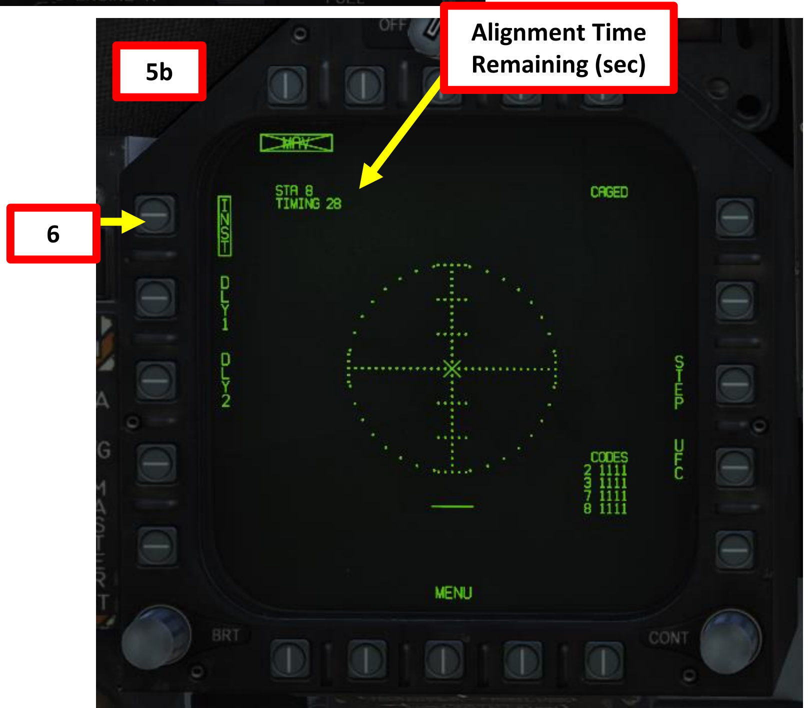
2.9 – AGM-65F/G MAVERICK (IR-MAVF)

Note: IR Mavericks have a Gimbal Limit warning. If the gimbal limits are reached, the missile's seeker will cage itself. You will have to uncage the missile again. If you attempt to uncage while the seeker is at gimbal limits, the warning will appear and the missile will cage itself again.

2.10 – AGM-65E MAVERICK (Laser-Guided MAV)

1. Master Mode – A/G (switch can only be activated when wheels are off the ground)
2. Master Arm switch – ARM (UP)
3. Go in SMS (Stores Management System) page
4. Select MAV (text should be boxed)
5. Laser Maverick will start a self-test that takes about 30 seconds. You can monitor cooldown progress in the MAV DSPLY page by either:
    - Selecting the MAV DSPLY (Maverick Display) page from the TAC menu, or:
    - Pressing the OSB next to the crossed-out « MAV » from the SMS (Stores Management System) page.
- **Note:** Once Maverick cooldown is complete, the timer will disappear.
6. Select INST (Instantaneous) Fuzing.

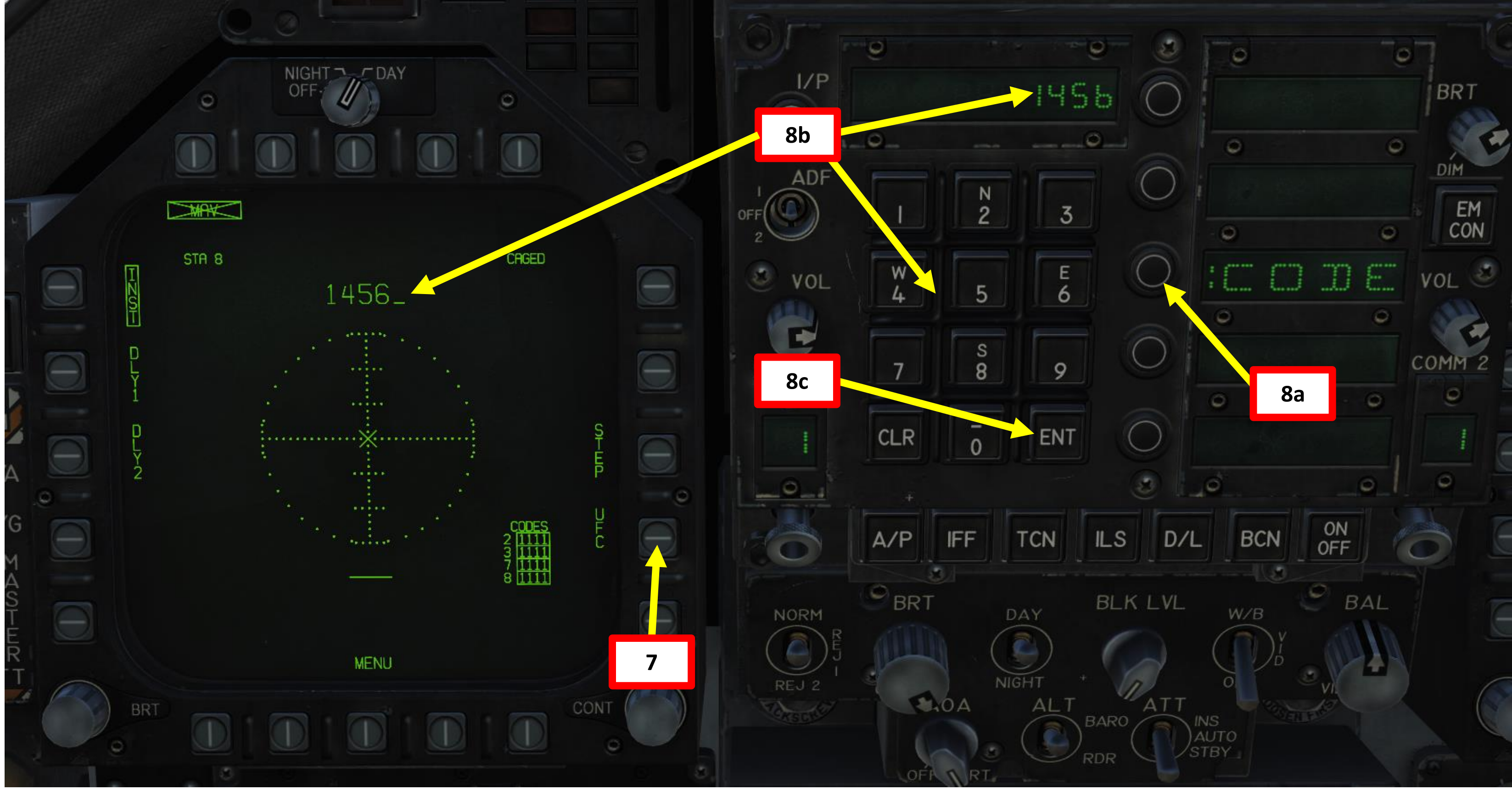




2.10 – AGM-65E MAVERICK (Laser-Guided MAV)

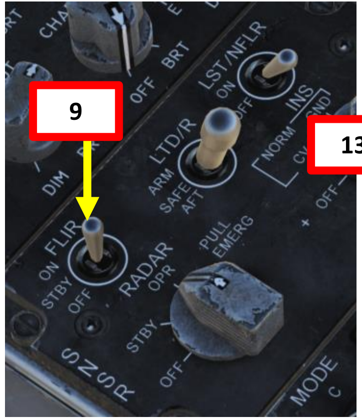
7. In the MAV DSPLY page, press the OSB next to UFC (Up-Front Controller). This will select all Laser-Maverick stations (boxed when selected) and allow us to edit their laser codes all at once. If you want to edit a specific Maverick's laser code, press UFC again to switch between stations.
8. Press the button next to "CODE" (Laser-Guided Maverick Laser Code). A ":" will indicate it is selected. Then, enter the desired laser code on the keypad and press "ENT". In our case, we will choose a laser code 1456, which we will set up for our targeting pod as well in later steps.

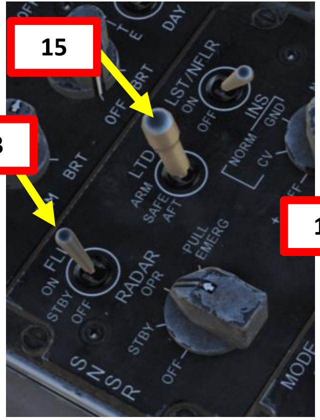
   Note: Keep in mind that if we were tracking someone else's laser, we would need to set the laser code to the one used by their own targeting pod.

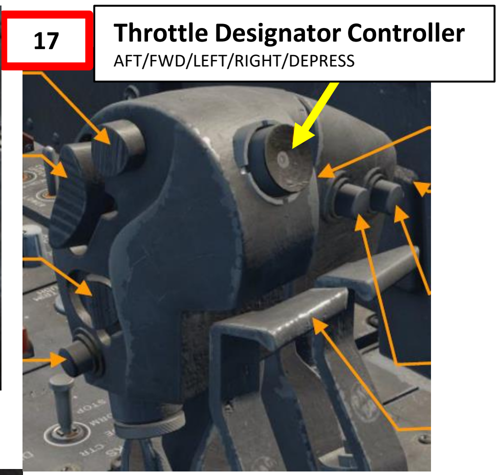


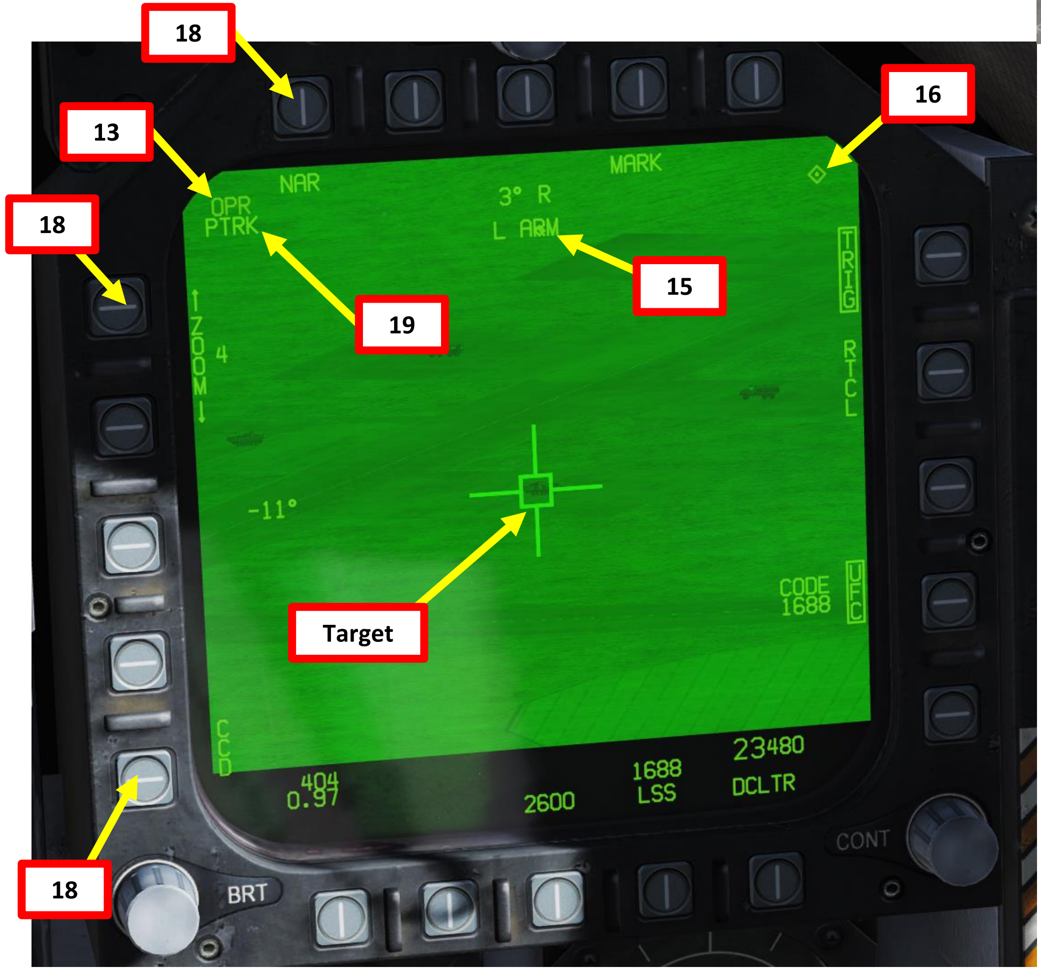
2.10 – AGM-65E MAVERICK (Laser-Guided MAV)

9. Power up the targeting pod by setting FLIR Sensor Switch to STBY.
10. From the TAC page on either DDI or the AMPCD, press the OSB (Option Select Button) next to “FLIR” (Forward-Looking Infrared) to select the Targeting Pod feed page.
11. Monitor the warm-up process. Targeting pod warm-up process will take about 2 minutes.
12. When targeting pod is ready to be used, the pod status will switch from ~~RDY~~ – NOT TIMED OUT to STBY.
13. Set FLIR Sensor Switch to ON. This will un-stow the camera. Confirm that Targeting Pod mode switches from STBY to OPR (Operate).
14. Verify A/G Master Mode is selected. This will allow you to arm the laser designator.
15. Set LTD/R (Laser Target Designator/Ranger) switch to ARM. This will arm the laser. Confirm that L ARM indication is displayed on the FLIR page.
16. Press the Sensor Control Switch in the direction of the selected DDI (Right for the Right DDI as an example). The Select Focus Diamond indicates what display is selected.
17. Using the TDC (Throttle Designator Controller) Aft/Fwd/Left/Right controls, slew the targeting pod reticle over the desired target. The targeting pod is boresighted by default to a forward, 5 deg down view.
18. Use appropriate zoom level, field of view (NARROW/WIDE) and camera mode (CCD/TV or FLIR) to identify the target.
19. Press the Sensor Control Switch Towards Selected Display (Right if our right DDI is selected) to toggle between Point Track (PTRK, tracks a moving object like a high-contrast vehicle) and Area Track (ATRK, used for a static target).





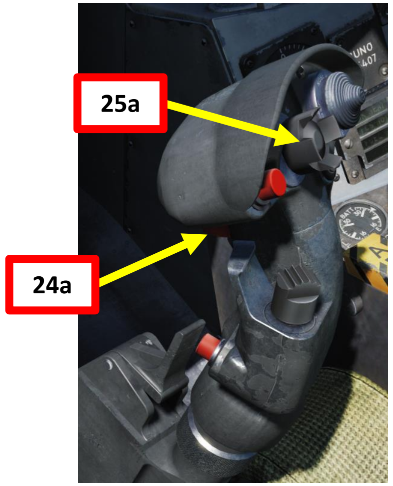


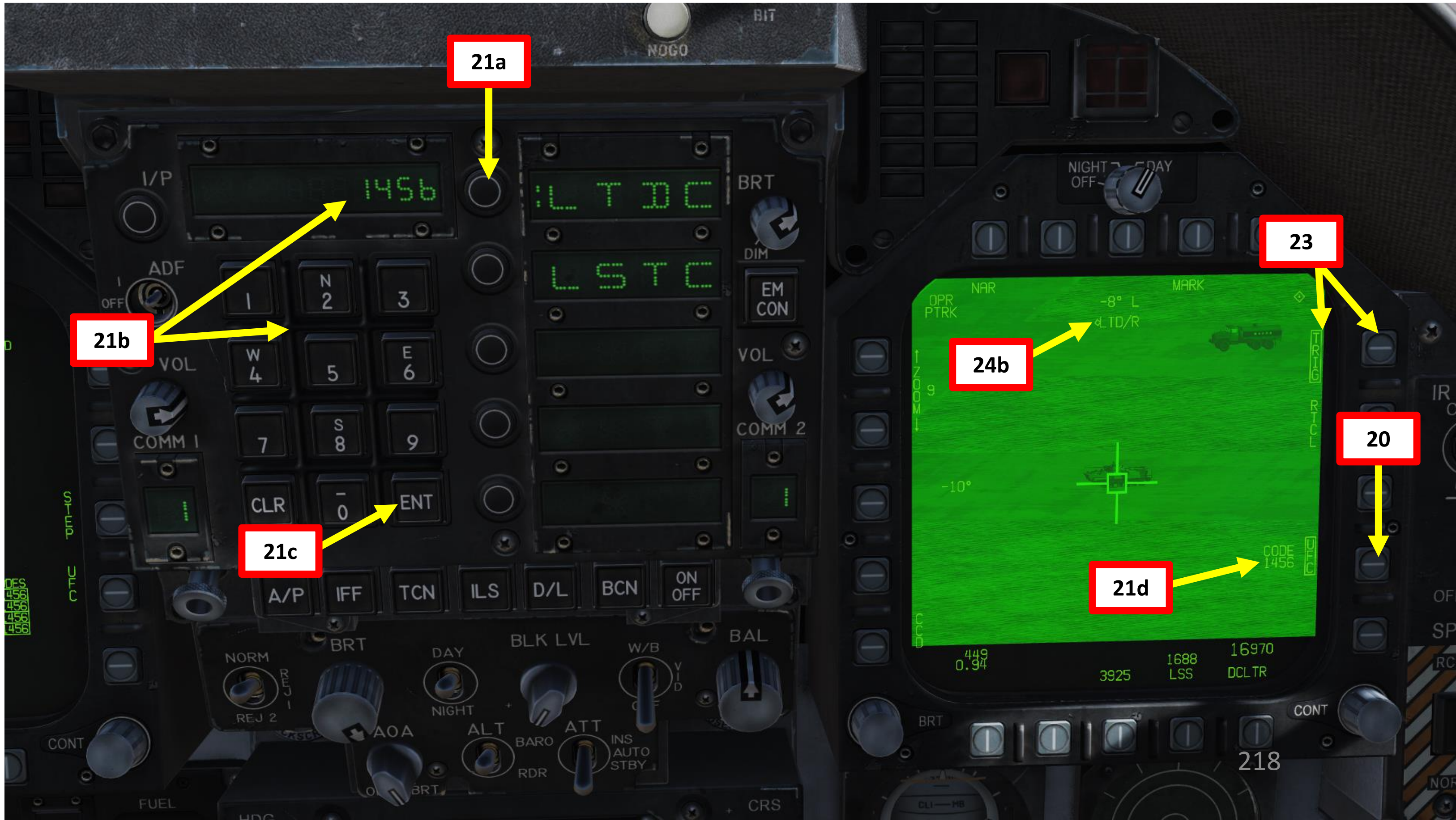


2.10 – AGM-65E MAVERICK (Laser-Guided MAV)

20. Press the OSB next to “UFC” to set the Targeting Pod laser code on the Up-Front Controller.
21. Press the button next to “LTDC” (Laser Target Designator Code). A “:” will indicate it is selected. Then, enter the desired laser code on the keypad and press “ENT”. We will choose laser code 1456, which we set previously in step **8** for the laser Mavericks themselves.
22. Now that the targeting pod has its laser code and it matches the laser code tracked by the Laser-Guided Maverick, we can now uncage the missile to make it track the laser.
23. On the FLIR page, press the OSB next to “TRIG”. The indication will become boxed once selected, which means that a gun trigger press will fire the laser.
24. Press the gun trigger to fire laser. Once laser is firing, the laser mode will switch from L ARM to LTD/R.
25. **Very important:** Set Sensor Control Switch to the Maverick Display page’s DDI (Sensor Control Switch LEFT since we showed up the MAV DSPLY feed on the left DDI). A focus diamond will appear to show the left DDI is selected.

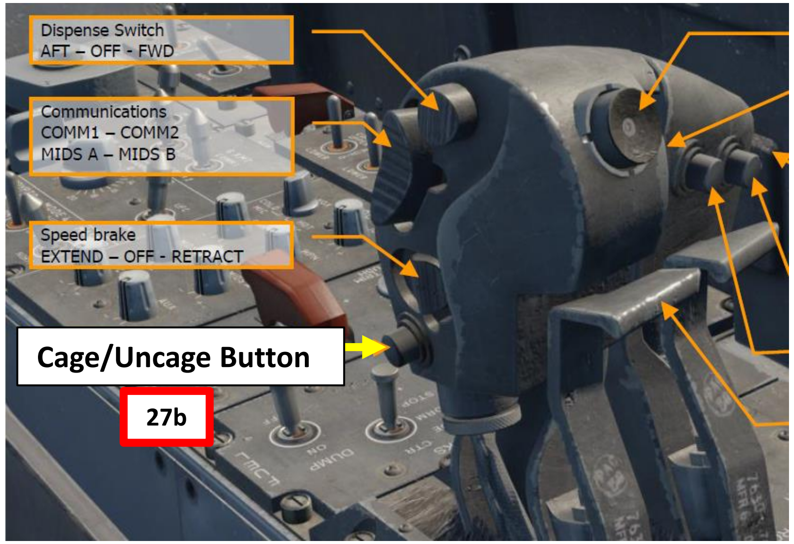
    Note: This step is important since using the Cage/Uncage button on the throttle without selecting the MAV DSPLY DDI will reset the targeting pod’s view to boresight, losing our precious target in the process.

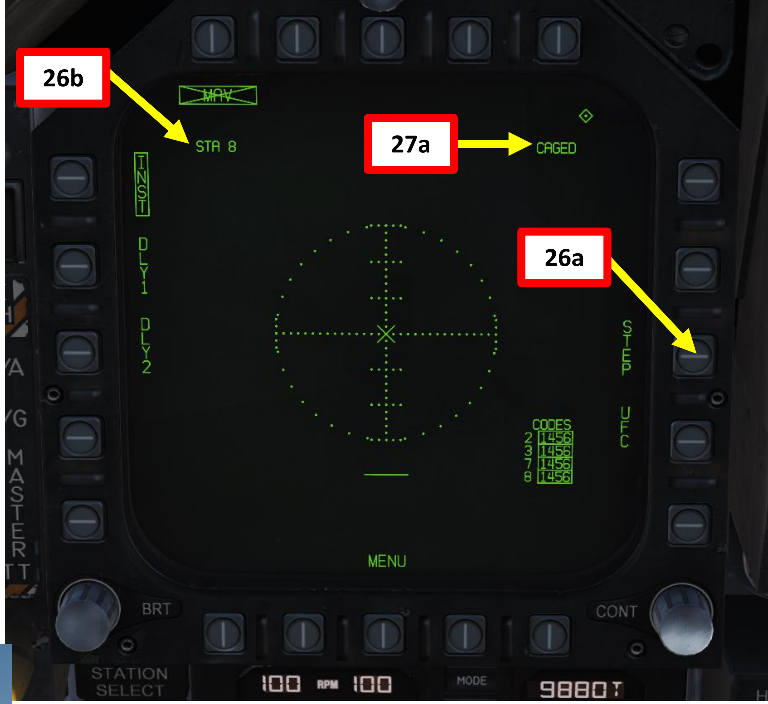


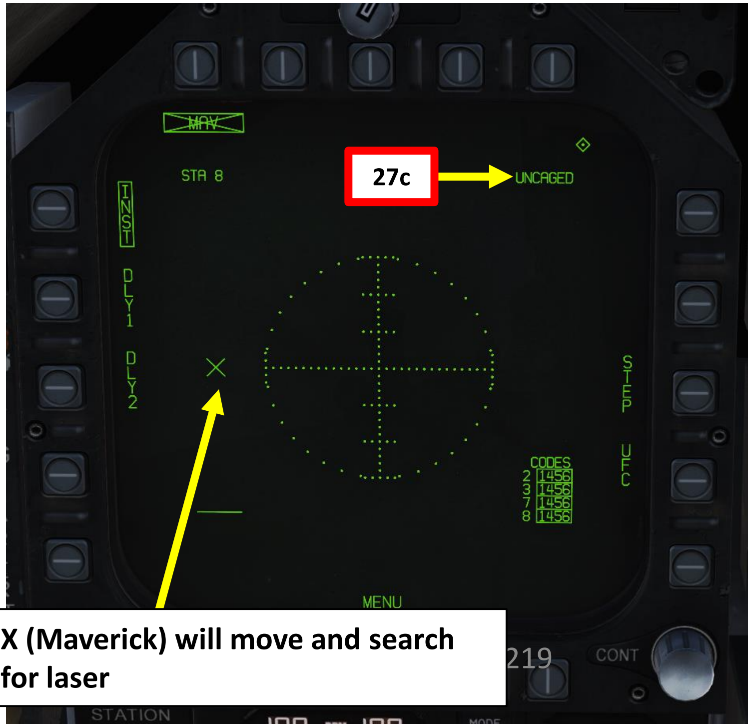


2.10 – AGM-65E MAVERICK (Laser-Guided MAV)

26. Select desired Maverick station using the OSB next to STEP. We will select Station 8.
27. Press the Cage/Uncage Button to uncage the Maverick. When uncaged, the missile will scan ahead in a pattern to search for the nearest laser with the code we entered earlier (1456).

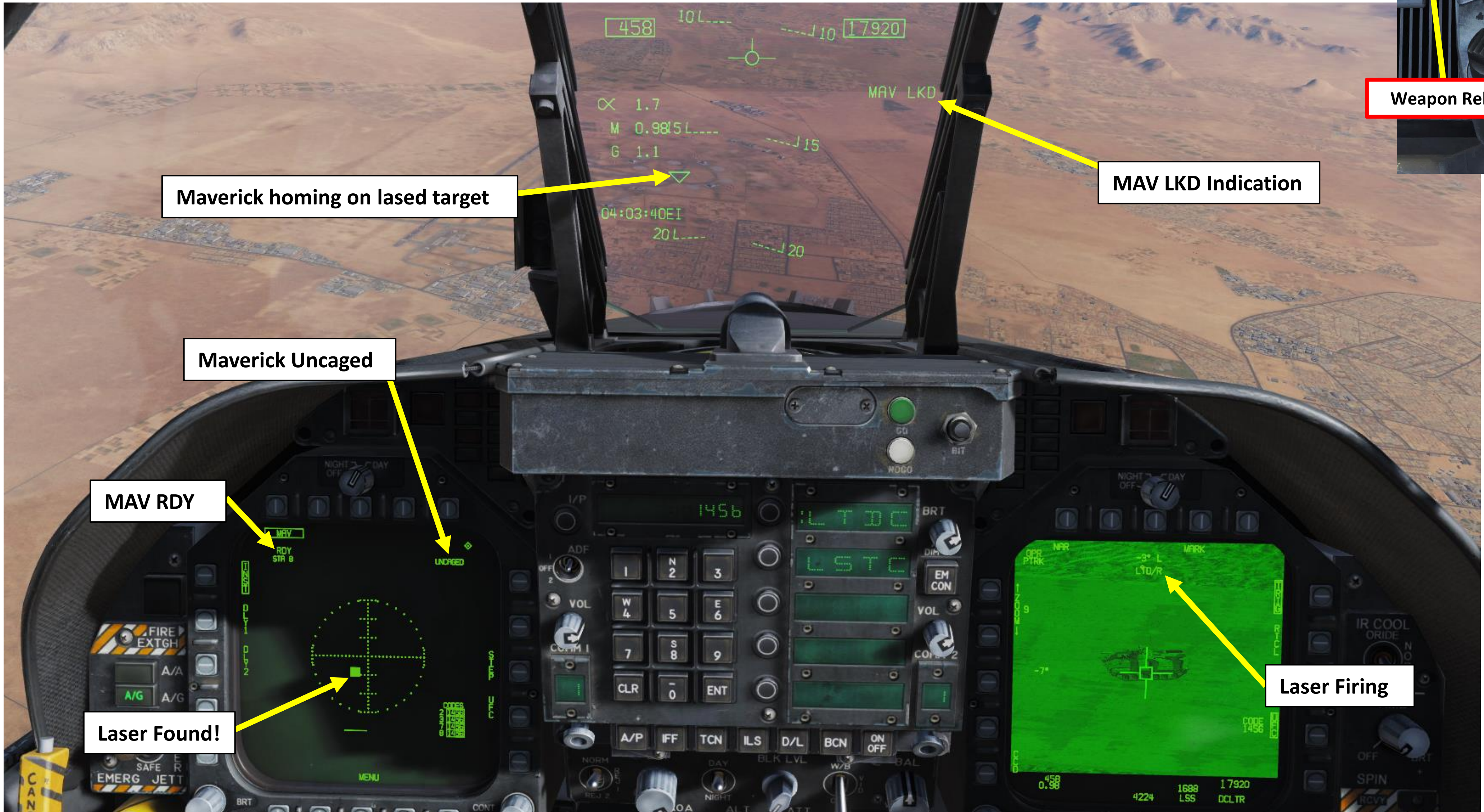




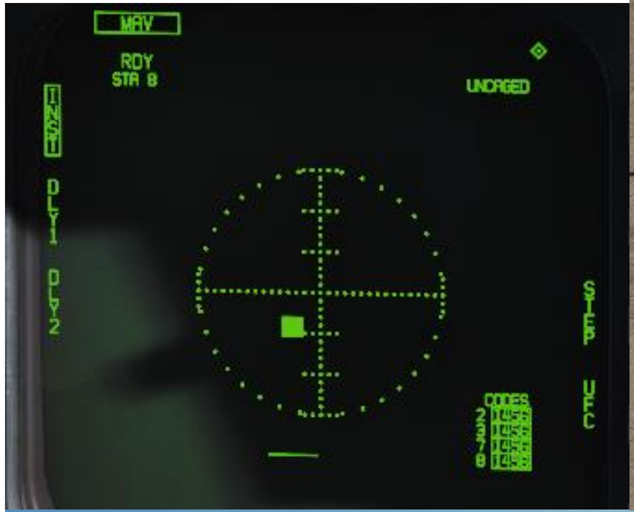


2.10 – AGM-65E MAVERICK (Laser-Guided MAV)

28. When lock is acquired by Maverick on the targeting pod's laser, the MAV crossed-out indication will disappear and be replaced by the RDY indication. The HUD will also display MAV LKD (Maverick Locked on Laser)
29. Hold the Weapon Release Button (« RALT+SPACE ») to launch missile. Make sure to maintain the targeting pod's laser on target.



2.10 – AGM-65E MAVERICK (Laser-Guided MAV)



2.11 – AGM-88C HARM INTRODUCTION

Suppression of Enemy Air Defenses (SEAD, also known in the United States as "Wild Weasel" and (initially) "Iron Hand" operations, are military actions to suppress enemy surface-based air defenses, including not only surface-to-air missiles (SAMs) and anti-aircraft artillery (AAA) but also interrelated systems such as early-warning radar and command, control and communication (C3) functions, while also marking other targets to be destroyed by an air strike. Suppression can be accomplished both by physically destroying the systems or by disrupting and deceiving them through electronic warfare.

The **AGM-88 HARM** (High-speed Anti-radiation Missile) is a tactical, air-to-surface anti-radiation missile designed to home in on electronic transmissions coming from surface-to-air radar systems. The AGM-88 can detect, attack and destroy a radar antenna or transmitter with minimal aircrew input. The proportional guidance system that homes in on enemy radar emissions has a fixed antenna and seeker head in the missile's nose.

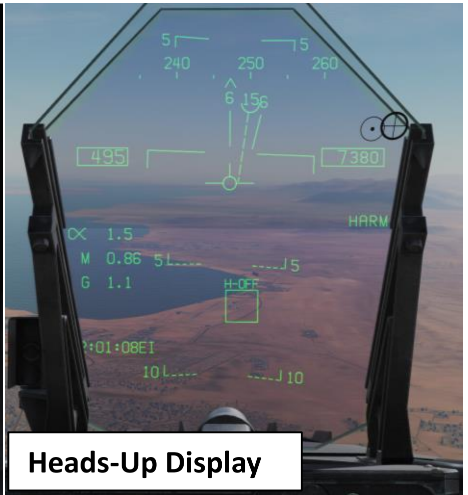
TLDR version? The HARM mainly homes on radar emitters. The best way to use the HARMs is to use the HARM Display page, the HUD and the EW (Early Warning) page with the RWR (Radar Warning Receiver) together to detect which radar emitters are actively tracking, which ones are locking you, what level of threat each emitter poses, and which one to target.


HARM

There are three main HARM modes: SP (Self-Protection), TOO (Target-of-Opportunity) and PB (Pre-Briefed).

- **SP** mode uses the radar warning receiver (RWR) to view and select emitters for the HARM to search for and then engage
- **TOO** uses the HARM seeker itself to view and engage emitters. Up to 15 emitters can be displayed.
- **PB** allows you to fire from maximum range to a preset waypoint without having to acquire a lock before firing.


HARM Display Page


Heads-Up Display


EW Page

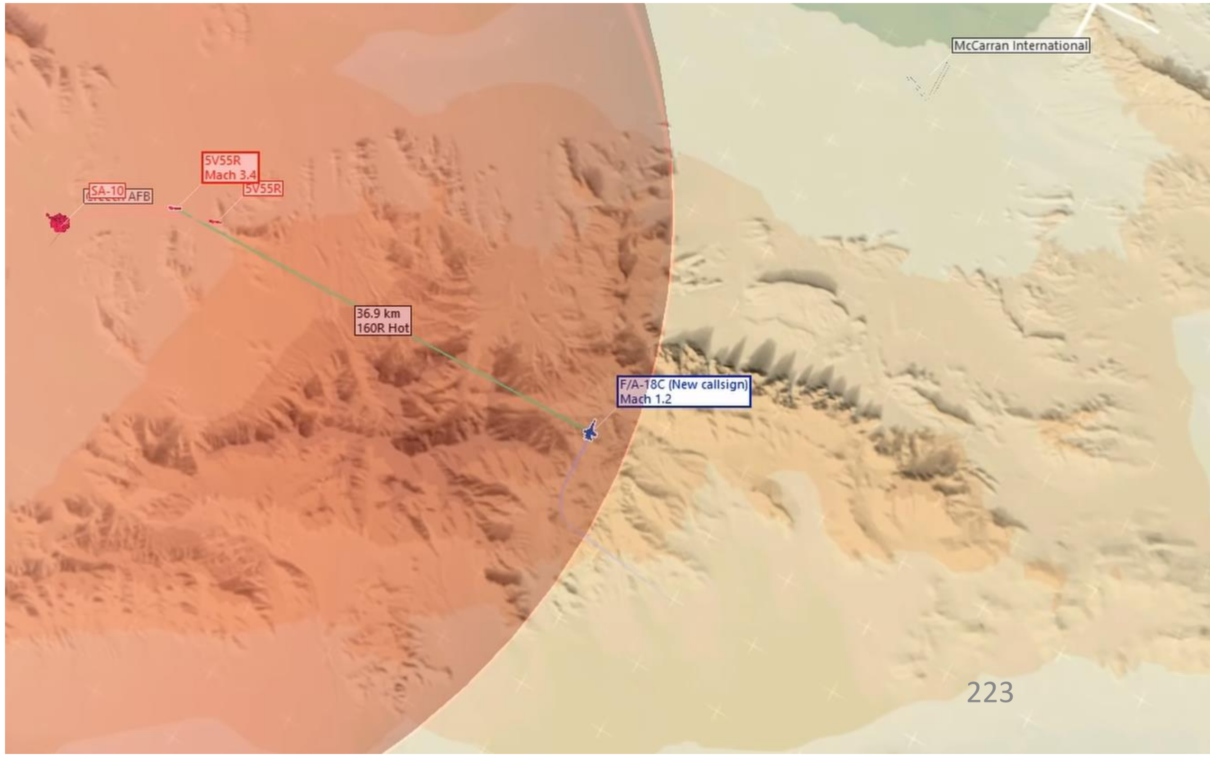

SA6 SAM Site

2.11 – AGM-88C HARM INTRODUCTION

Flying at high altitudes greatly enhances the HARM's range. However, the higher you are, the easier you are to find by enemy radars. Keep in mind that doing SEAD operations means that you will be locked by multiple radar stations and SAM sites can fire missiles on you or on your own HARM missiles. This means that your countermeasures programs must be ready at all times and you must often break away from the target once you have fired your weapon. A great way to do SEAD is to use terrain to mask your approach and fire your weapons at the last second before breaking off back your egress route.

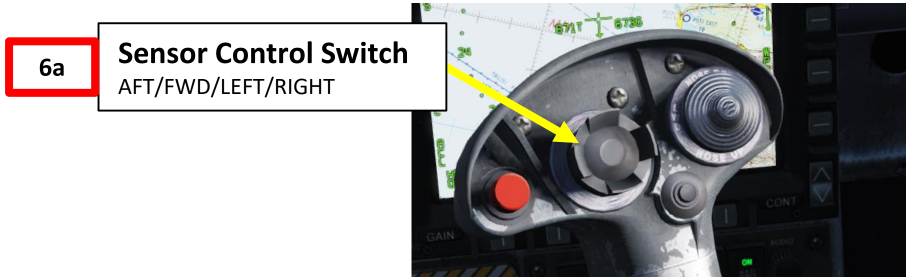
HARM Range Table (Ref: RedKite Tutorial)

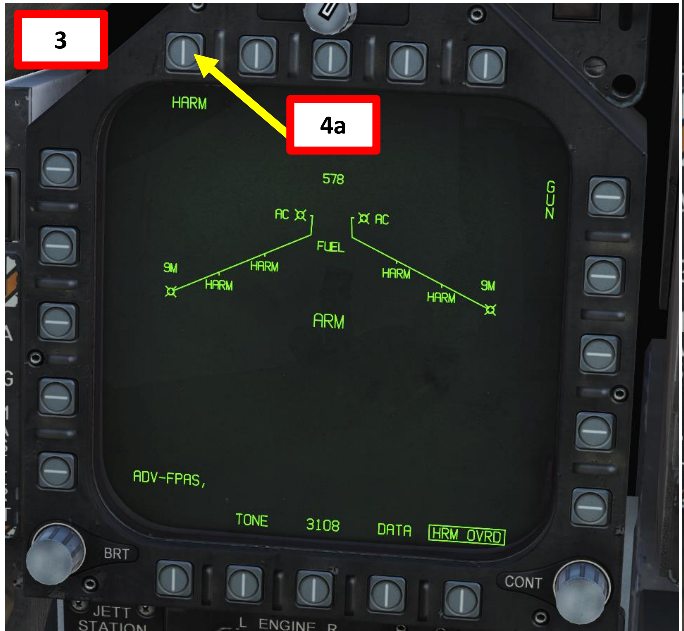
Range (nm)	Altitude (ft)	Airspeed (kts IAS)
70	40000	380
50	30000	400
35	20000	400
25	10000	400
15	1000	550

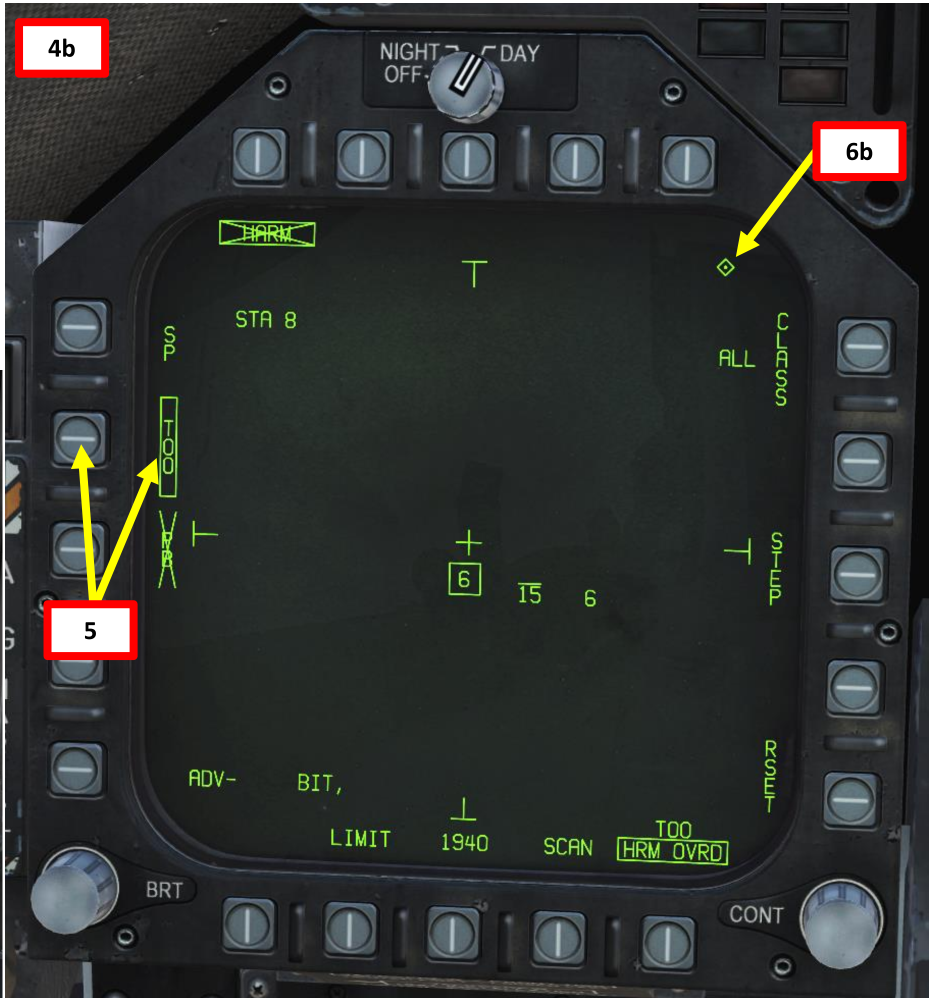


2.11 – AGM-88C HARM
(TOO, Target-of-Opportunity Mode)

1. Master Arm switch – ARM (UP)
2. Master Mode – A/G
3. Set the TAC EW (Early Warning) page on the right DDI and the SMS (Stores Management System) page on the left DDI.
4. In SMS (Stores Management System) page, click on the OSB next to HARM to select it
5. Select TOO (Target-of-Opportunity) Mode
6. Set Sensor Control Switch to the Maverick Feed DDI (Sensor Control Switch LEFT since we showed up the MAV feed on the left DDI). A diamond will appear to show the left DDI is selected.

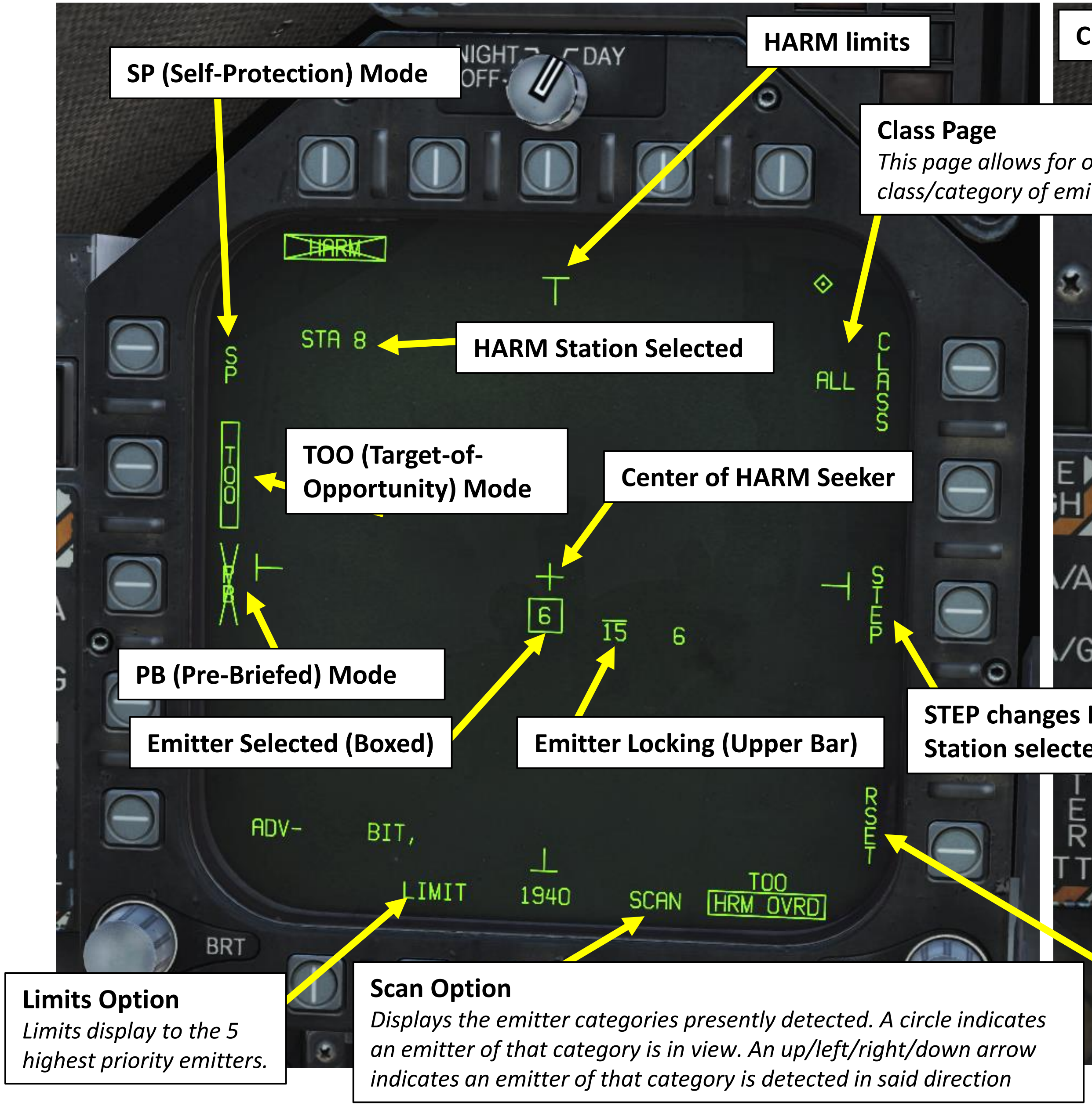


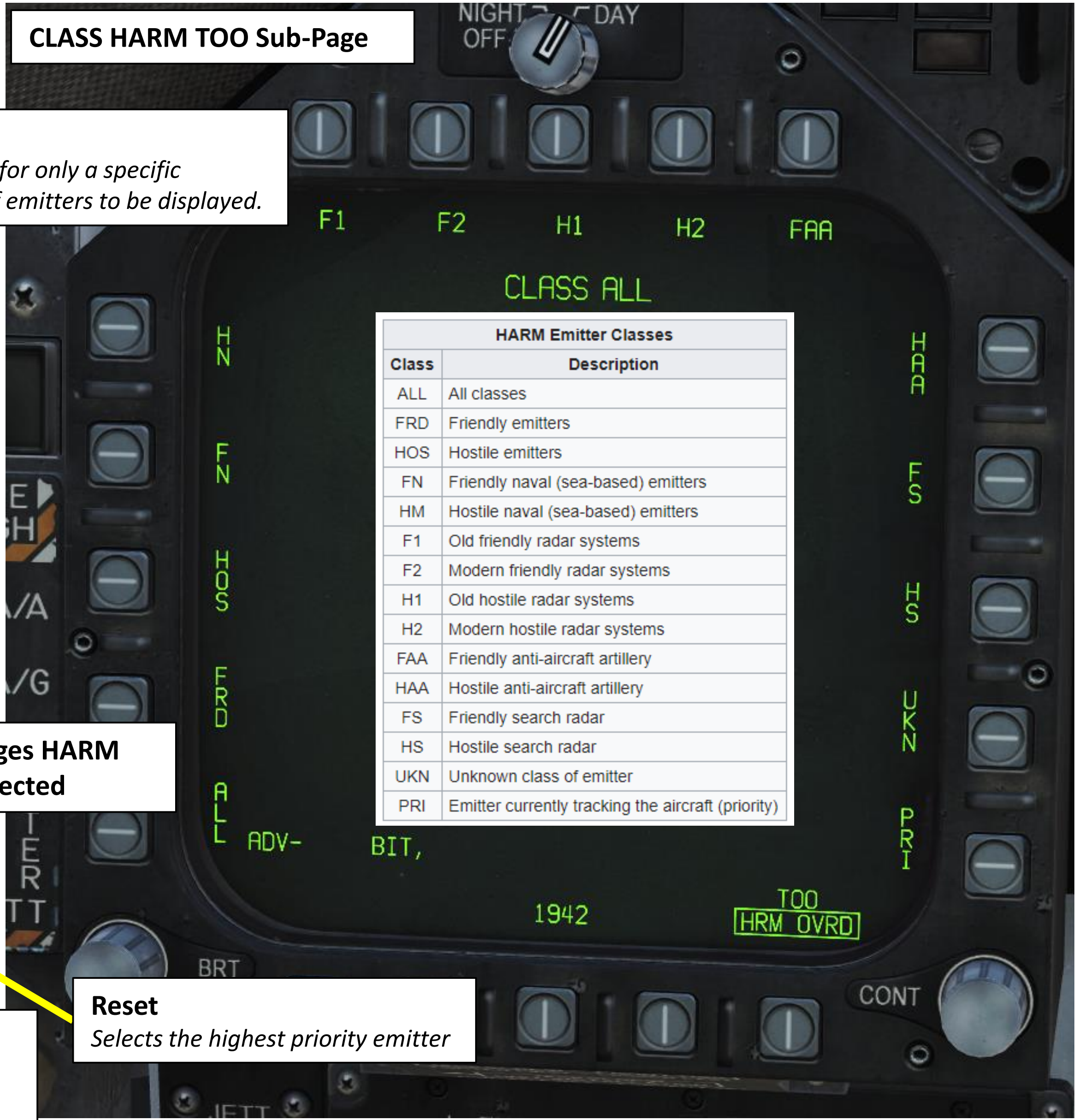




2.11 – AGM-88C HARM
(TOO, Target-of-Opportunity Mode)

HARM DISPLAY Notes
Friendly emitters have their code prefixed with an "F". The Upper Line on an emitter means the emitter is locking you. The Lower Line is used to denote a sea-based emitter.



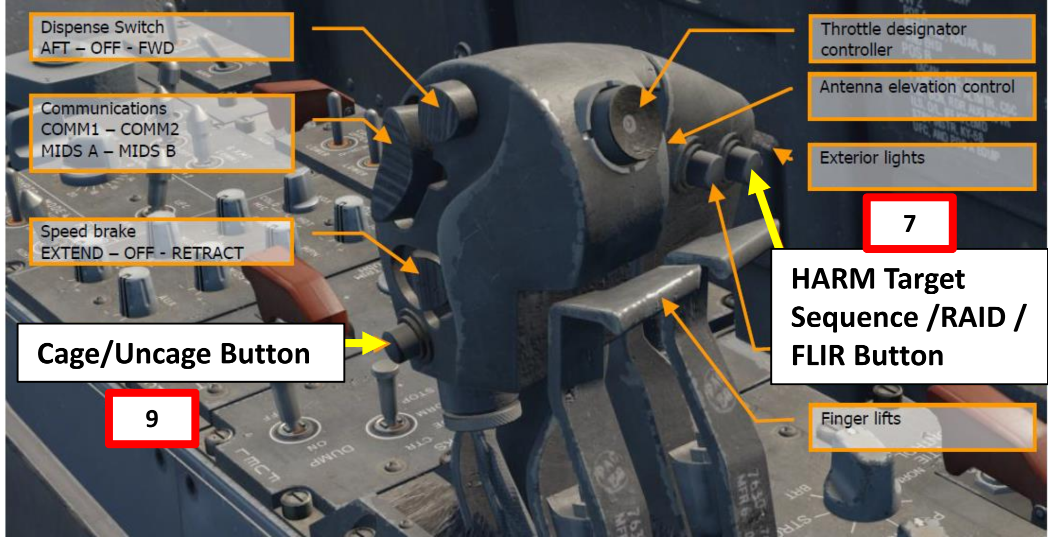


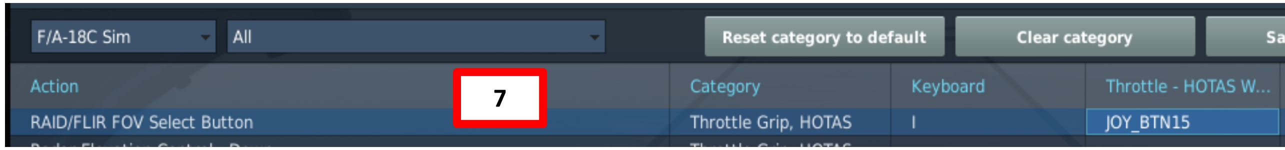
HARM Emitter Classes

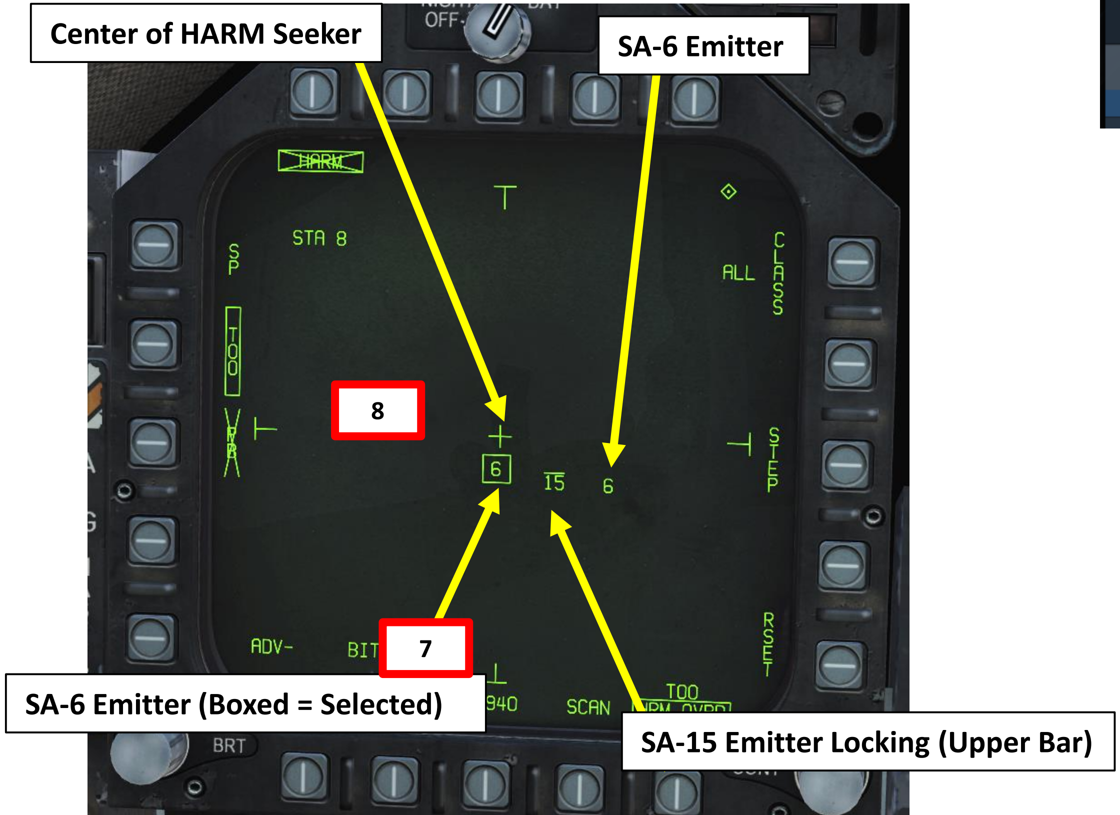
Class	Description
ALL	All classes
FRD	Friendly emitters
HOS	Hostile emitters
FN	Friendly naval (sea-based) emitters
HM	Hostile naval (sea-based) emitters
F1	Old friendly radar systems
F2	Modern friendly radar systems
H1	Old hostile radar systems
H2	Modern hostile radar systems
FAA	Friendly anti-aircraft artillery
HAA	Hostile anti-aircraft artillery
FS	Friendly search radar
HS	Hostile search radar
UKN	Unknown class of emitter
PRI	Emitter currently tracking the aircraft (priority)

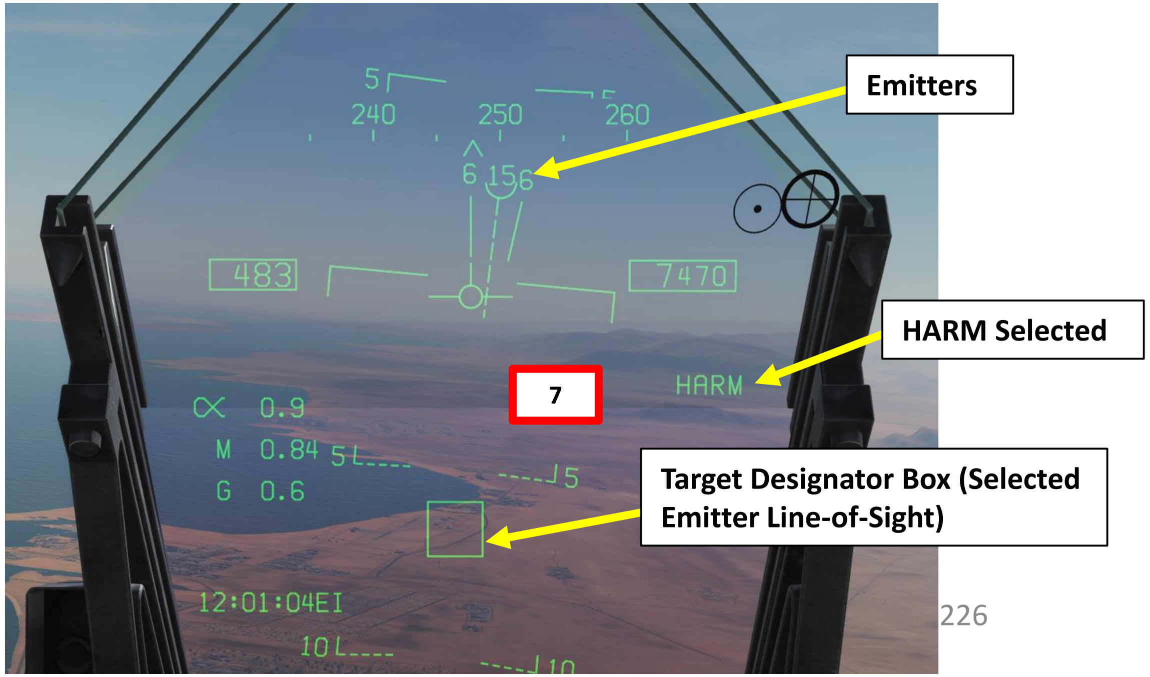
2.11 – AGM-88C HARM (TOO, Target-of-Opportunity Mode)

7. Select which emitter you want to track by pressing the HARM Target Sequence / RAID / FLIR Button ("I" binding). There is no range information available.
8. Fly to align the target icon with the center cross of the seeker head. **Note**: The HARM Display page is not a Top-Down view; it's a POV (Point-of-View) of the HARM seeker head with no ground stabilization. HARM DSPLY format provides a boresight view of the HARM seeker.
9. Press the Cage/Uncage Button to uncage the HARM and set it to HANDOFF (H-OFF) Mode. When uncaged, the missile will attempt to lock onto the selected target within the seeker center. The HARM has a range of up to 80 nm.
10. When lock is acquired by the HARM, the HARM crossed-out indication will disappear. Hold the Weapon Release Button (« RALT+SPACE ») to fire missile.





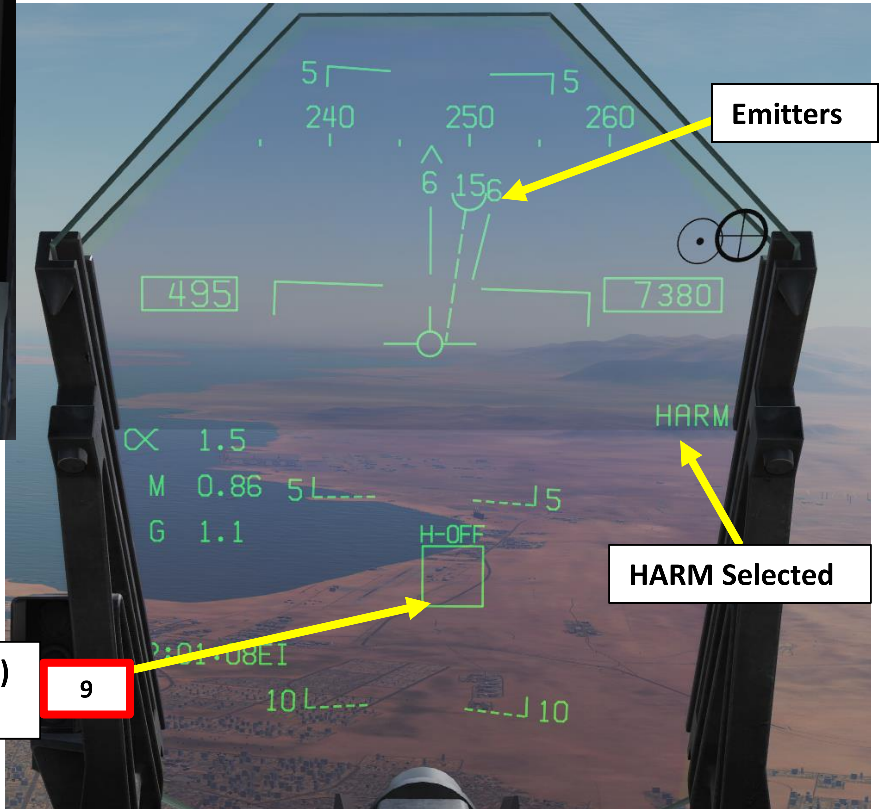




2.11 – AGM-88C HARM
(TOO, Target-of-Opportunity Mode)

HARM Locked (Handoff Mode)

9



Emitters

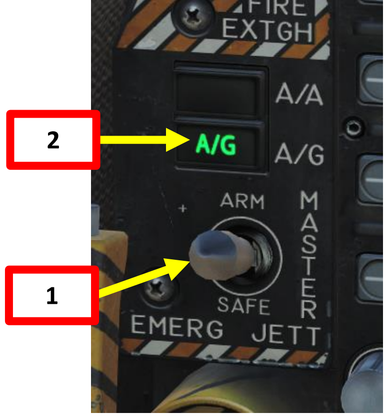
HARM Selected

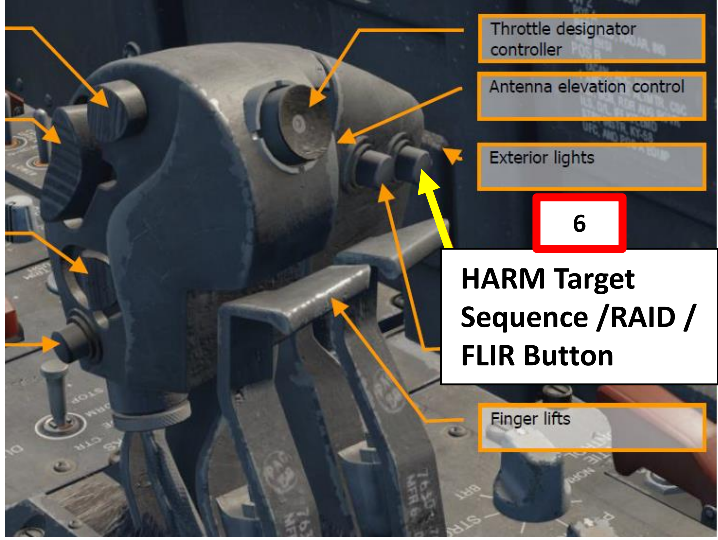
9

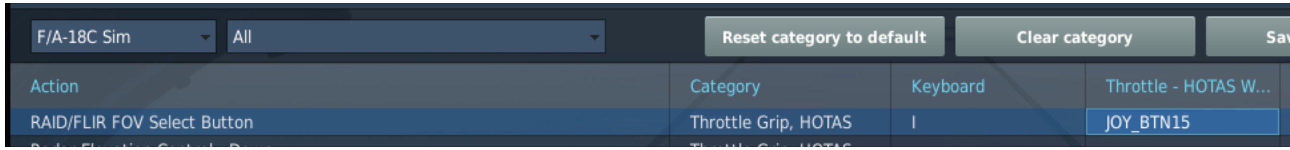
Target Designator Box (Selected Emitter Line-of-Sight) in HANDOFF (H-OFF) Mode

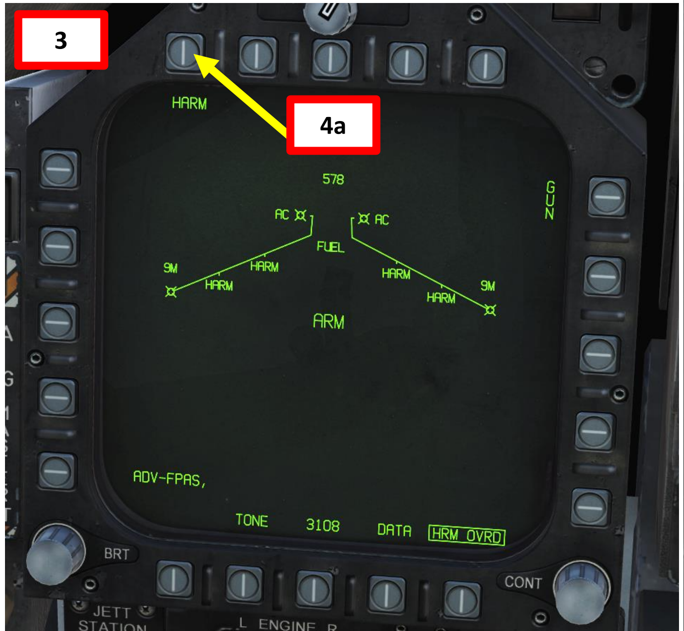
2.12 – AGM-88C HARM
(SP, Self-Protection Mode)

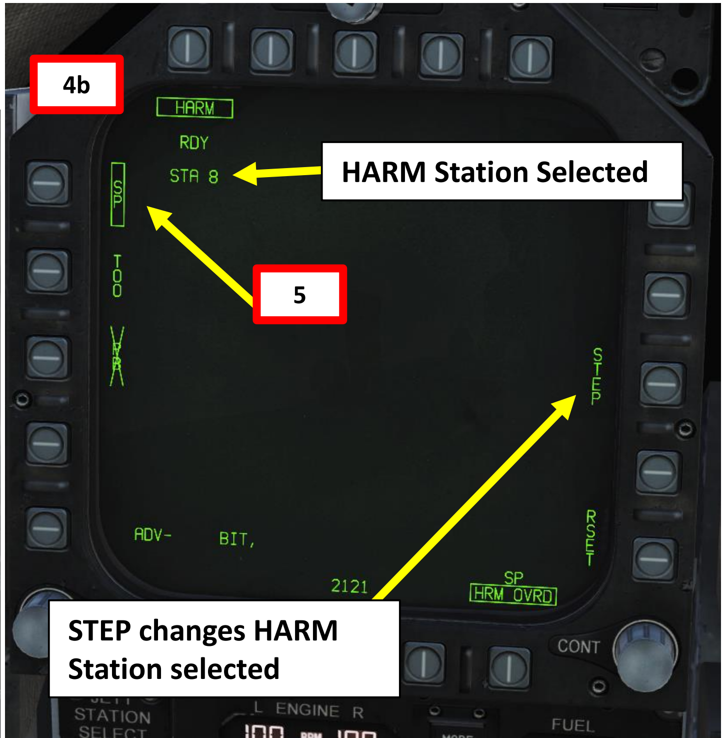
1. Master Arm switch – ARM (UP)
2. Master Mode – A/G
3. Set the TAC EW (Early Warning) page on the right DDI and the SMS (Stores Management System) page on the left DDI.
4. In SMS (Stores Management System) page, click on the OSB next to HARM to select it
5. Select SP (Self-Protection) Mode
6. Consult the HUD, RWR or EW page and select which emitter you want to track by pressing the HARM Target Sequence / RAID / FLIR Button (“I” binding). There is no range information available.

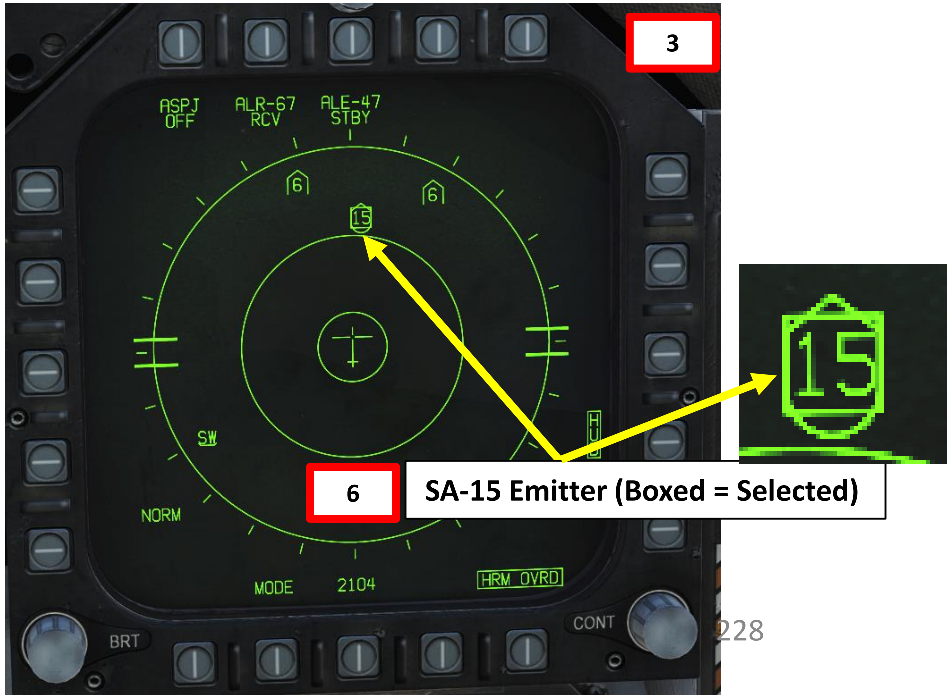








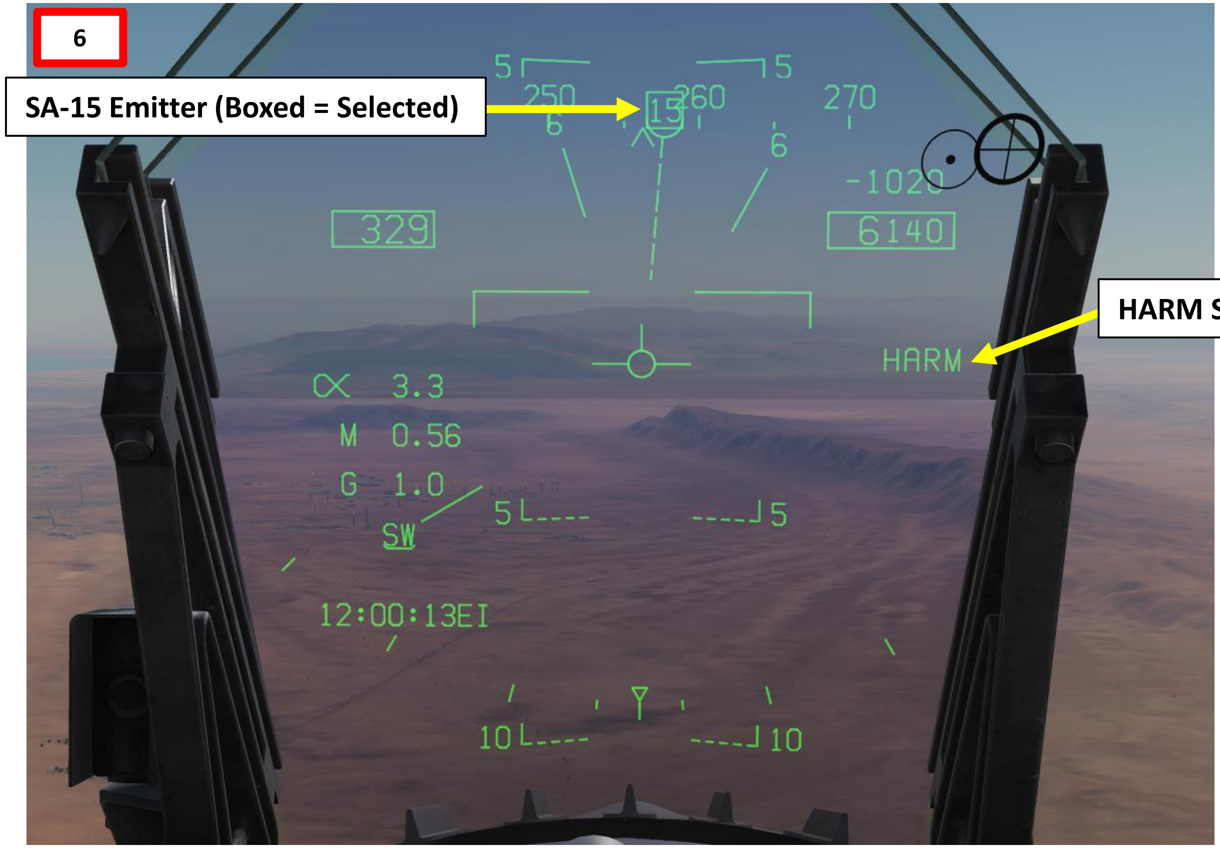


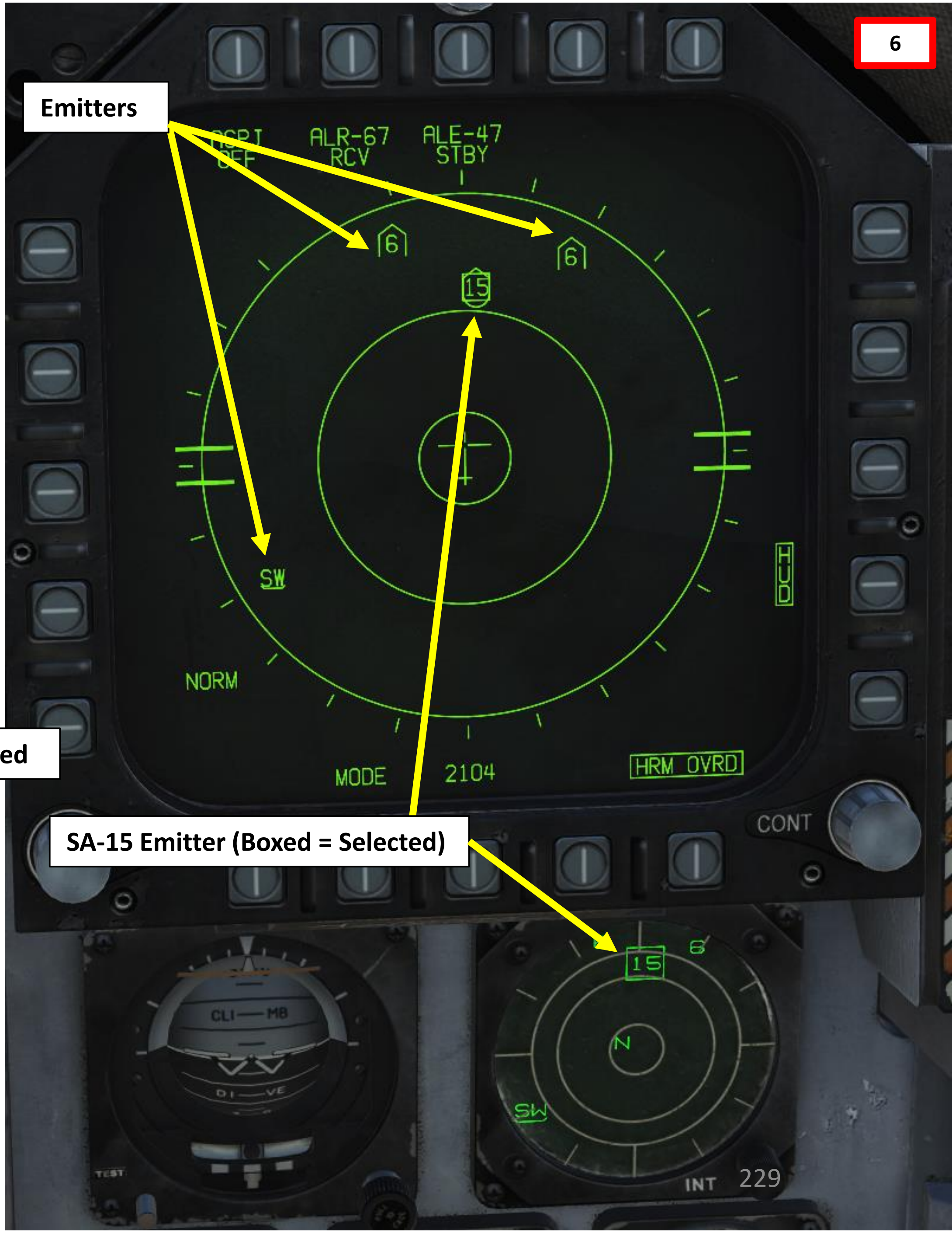


2.12 – AGM-88C HARM (SP, Self-Protection Mode)

7. Hold the Weapon Release Button (« RALT+SPACE ») to fire missile.

Note: SP Mode allows for 360° engagement; however, more kinetic energy is sacrificed to turn as the angle increases. Self-Protect is named as such because it is primarily designed for quick reaction to a threat. On these three RWR displays, whenever the HARM and SP mode is selected, a square is placed around the selected emitter; the highest priority emitter is selected automatically. Note that a maximum of 6 emitters are displayed on the HUD, but the HARM will always cycle all emitters. Once fired, the HARM will either have already acquired the selected emitter or, if it is outside the HARM seeker field of view, it will acquire it post-launch.



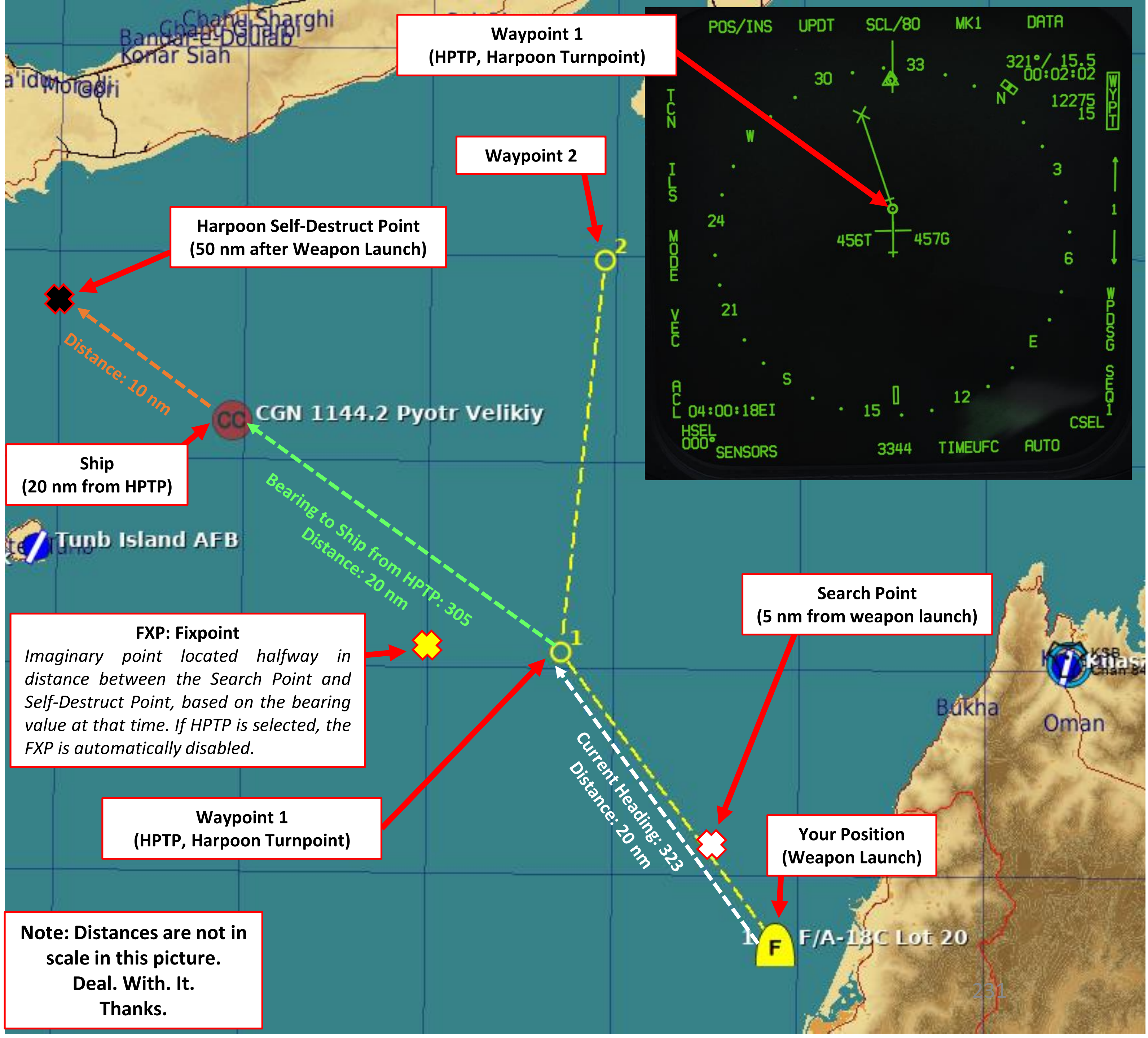


2.12 – AGM-88C HARM
(SP, Self-Protection Mode)

2.13 – AGM-84D Harpoon
(BOL, Bearing-Only Launch Mode)

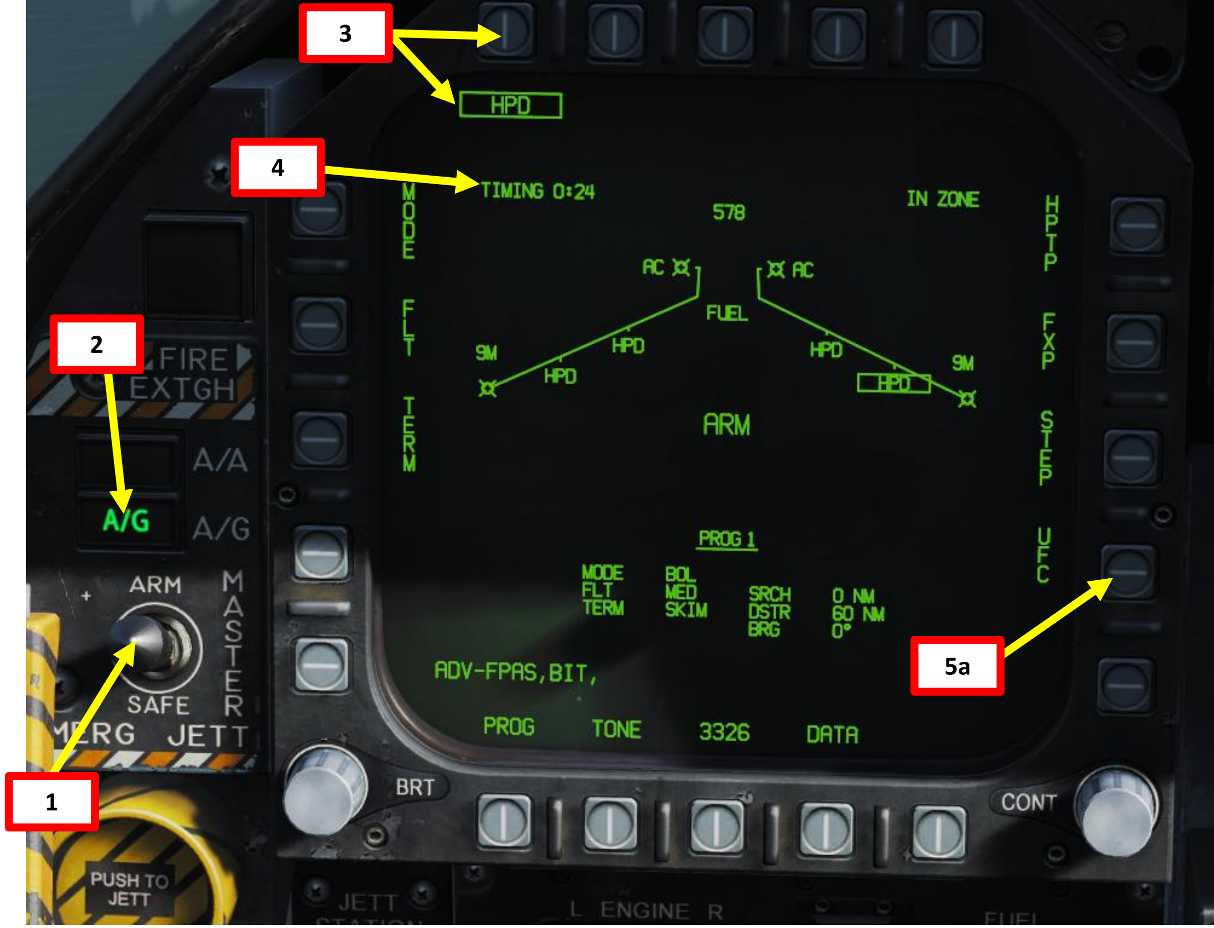
The Harpoon is a programmable anti-ship missile. In this tutorial, we will use the BOL (Bearing-Only Launch) mode, which requires us to enter the following parameters:

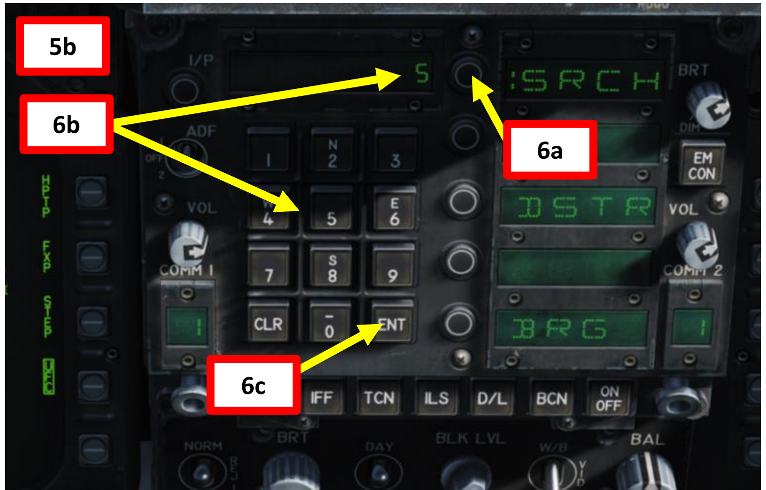
- **Search Point Distance**: distance from launch to when the Harpoon will begin searching for a target. Valid value is between 0–105 nm.
- **Self-Destruct Distance**: distance the Harpoon will travel after launch before self-destructing if it does not find a target.
- **Bearing to Target**: bearing (in degrees) the Harpoon will travel, if no Harpoon Turnpoint (HPTP) exists, at launch from the aircraft, or if a HPTP does exist, the bearing it will travel from the HPTP.
- **Fly-Out (FLT) Altitude** Option: toggle between HIGH, MED, and LOW. This is the altitude the missile will fly at during the ingress/searching phase of flight. LOW is 5,000 ft, MED is 15,000 ft, and HIGH is 35,000 ft.
- **Terminal (TERM) Altitude** Option: toggle between SKIM and POP. This is the altitude the missile will fly at in the terminal phase of flight to ultimately impact the target. SKIM performs a very low-level approach all the way to impact. POP performs a high-G "pop-up" maneuver to impact the target from above.

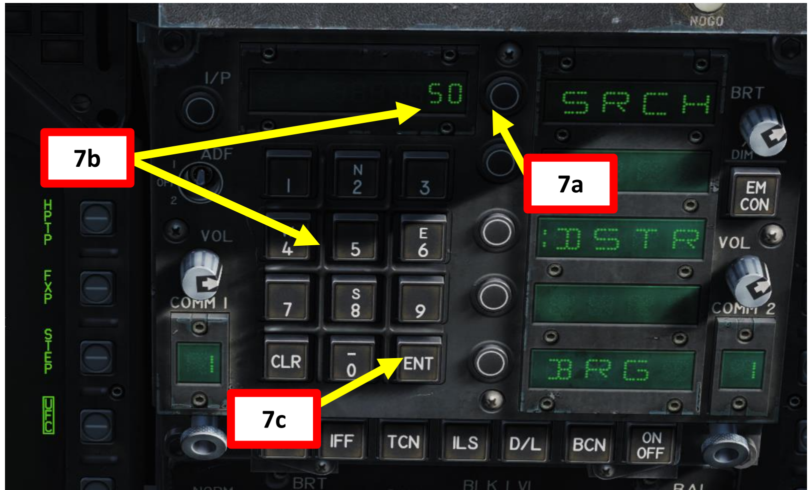


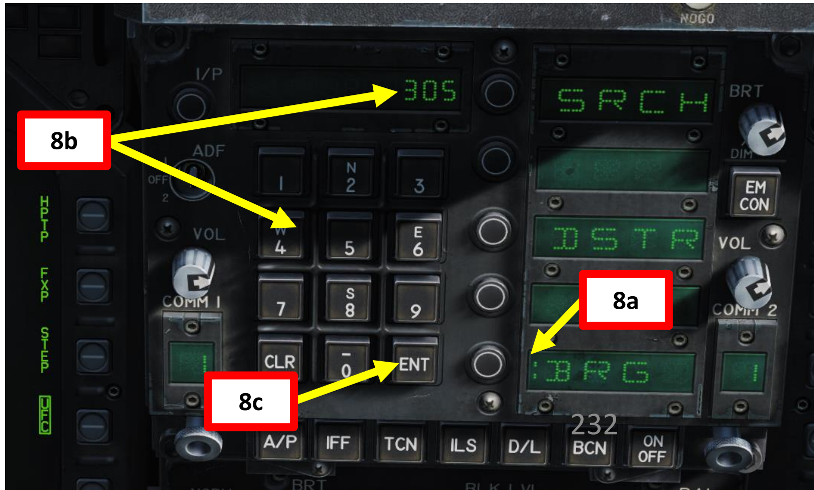
2.13 – AGM-84D Harpoon (BOL, Bearing-Only Launch Mode)

1. Master Arm switch – ARM (UP)
2. Master Mode – A/G
3. On the SMS (Stores) page, press OSB next to HPD (AGM-84D Harpoon)
4. Harpoon will start an inertial alignment that takes about 25 seconds. You can monitor gyro alignment process on the SMS (Stores Management System) page.
   - **Note:** Once Harpoon alignment is complete, the timer will disappear.
5. Press the OSB next to « UFC » (Up-Front Controller) to program Harpoon release parameters
6. On the UFC, press the button next to "SRCH" (Search Point). A ":" will indicate it is selected. Then, enter on the keypad the desired distance from launch to when the Harpoon will begin searching for a target. Press "ENT" afterwards. In our case, we will choose a Search Point distance of 5 nm.
7. On the UFC, press the button next to "DSTR" (Self-Destruct Distance). A ":" will indicate it is selected. Then, enter on the keypad the desired missile self-destruction distance, and press "ENT". In our case, we will choose a self-destruction distance of 50 nm.
8. On the UFC, press the button next to "BRG" (Bearing). A ":" will indicate it is selected. Then, enter on the keypad the desired bearing (in degrees) the Harpoon will travel, and press "ENT". In our case, we will choose a bearing of 305.





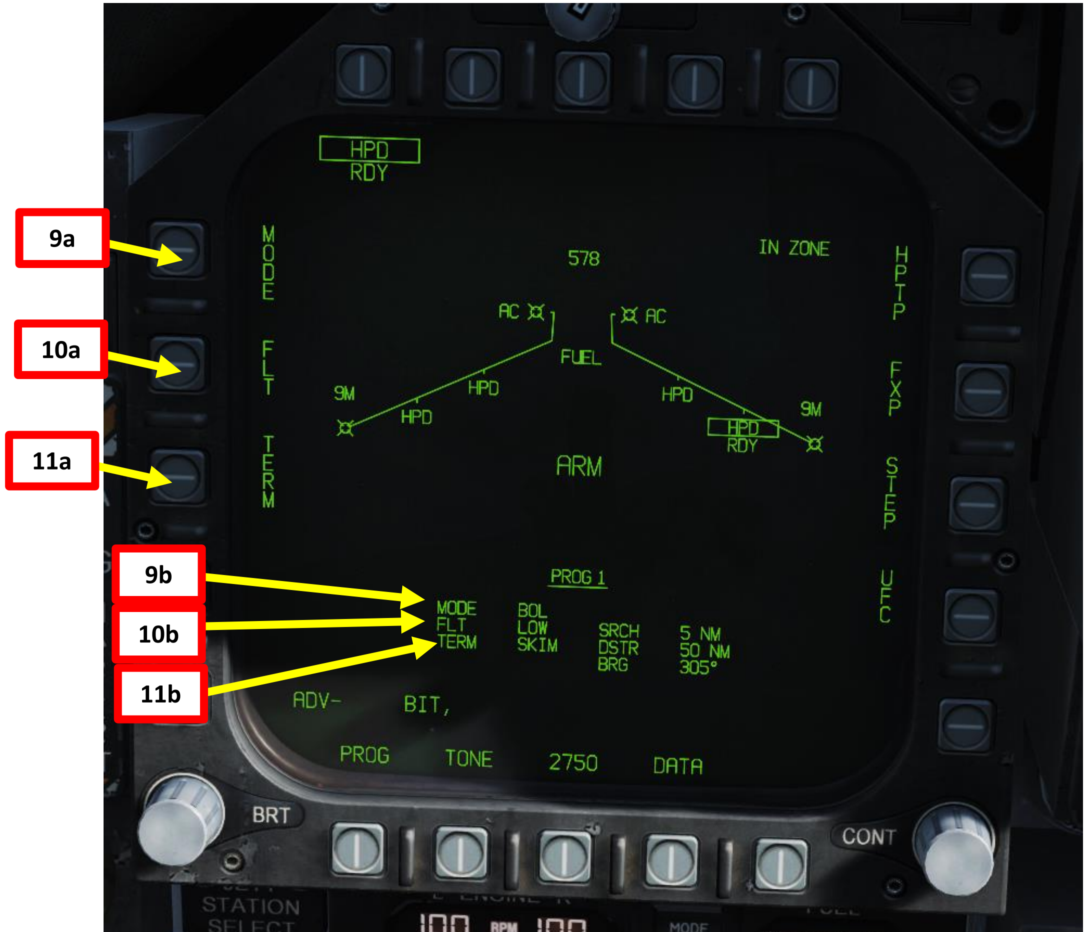


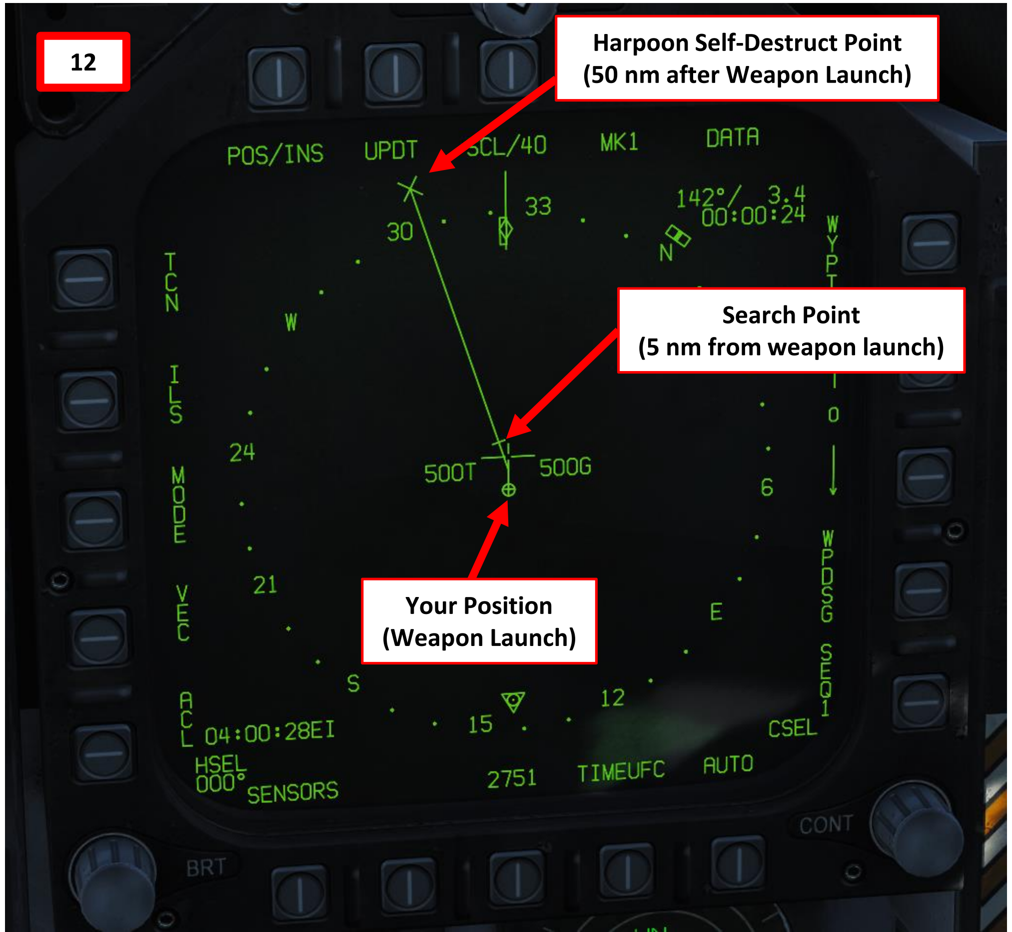


2.13 – AGM-84D Harpoon
(BOL, Bearing-Only Launch Mode)

9. Verify "BOL" release mode is selected (can be toggled to R/BL with the OSB next to "MODE" if a target is designated, which we will see in the R/BL tutorial).
10. Press OSB next to "FLT" (Fly-Out Altitude) to toggle between LOW, MED and HIGH. We will choose LOW.
11. Press OSB next to "TERM" (Terminal Altitude) to toggle between SKIM and POP attack profiles. SKIM performs a very low-level approach all the way to impact, while POP performs a high-G "pop-up" maneuver to impact the target from above. In our case, we will choose SKIM.
12. Set HSI (Horizontal Situation Indicator) on the other DDI from the SUPT menu. This will display the Harpoon profile without the use of a FXP (Fixpoint) or a HPTP (Harpoon Turnpoint). This basic profile will launch the missile and make it turn immediately to the bearing programmed earlier.

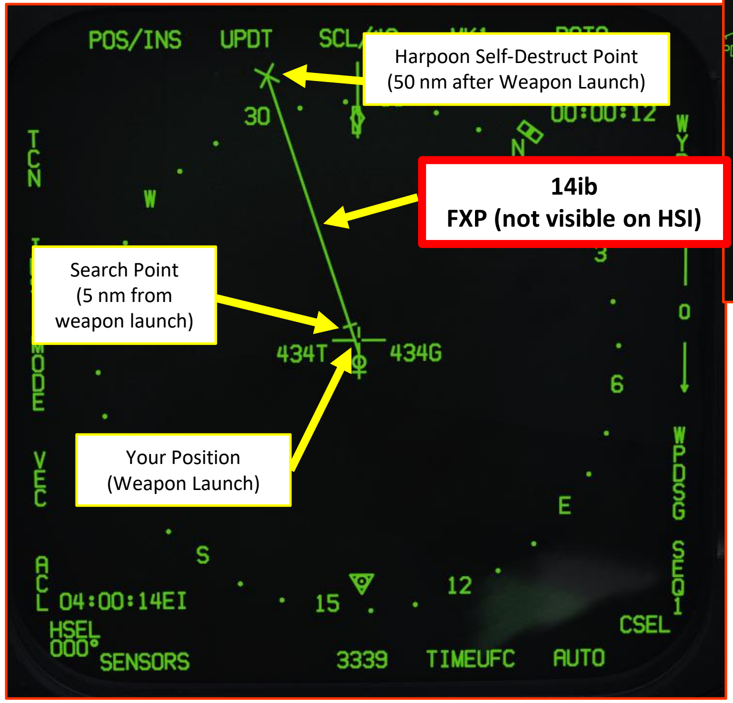
Note: Each Harpoon missile must be programmed individually since these programs are not shared between missiles.





2.13 – AGM-84D Harpoon
(BOL, Bearing-Only Launch Mode)

13. When launched in BOL mode, the Harpoon travels either directly in the direction of the set bearing from the aircraft, directly to a Harpoon Turnpoint (HPTP) and then to the set bearing, or directly to the Fixpoint (FXP).
14. Use Fixpoint or HPTP as required.
    i. If you want to use a **Fixpoint**, press the OSB next to FXP. This will create a Fixpoint, which is located halfway in distance between the search point and destruct point, based on the bearing value at that time. The course between the FXP and the aircraft then pivots around said FXP.
    ii. If you want to use a **Harpoon Turnpoint**, select a desired waypoint with the HSI, then press the OSB next to HPTP. This profile makes the missile travel directly to the Harpoon Turnpoint (HPTP) and then to the set bearing.

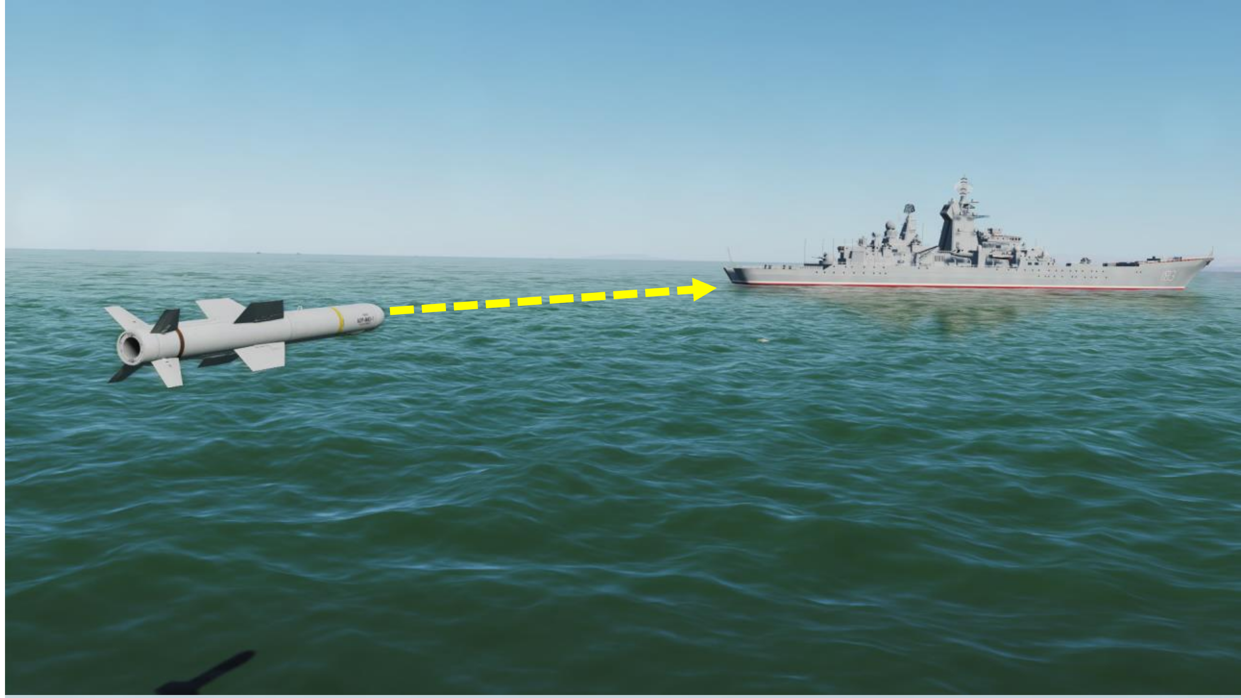


2.13 – AGM-84D Harpoon
(BOL, Bearing-Only Launch Mode)

15. Check the IN ZONE/IN RNG/TTMR/out of zone cue and confirm that “IN ZONE” is displayed. If you are not, steer the aircraft in the correct direction.
16. Make sure you are above the minimum launch altitude of 2500 ft and flying level. Launching the Harpoon during negative Gs can make the aircraft collide with the missile.
17. Press and hold the Weapon Release button (« RALT+SPACE ») to launch Harpoon.
18. Once launched, there can be a momentary radar altimeter warning; that is normal due to the free-falling missile being momentarily detected by the radar altimeter system.

2.13 – AGM-84D Harpoon (BOL, Bearing-Only Launch Mode)

19. The Harpoon, at an altitude corresponding to the FLT option (LOW, 5000 ft), travels either directly in the direction of the set bearing from the aircraft, directly to a Harpoon Turnpoint (HPTP) and then to the set bearing (305), or directly to the Fixpoint (FXP). At the defined search distance (5 nm after reaching the HPTP), the Harpoon will then initiate its search for a target. If it locates one, it will engage it based on the SKIM or POP terminal options (SKIM in our case). If it does not find a target before reaching the self-destruct point, it self-destructs (50 nm after launch).

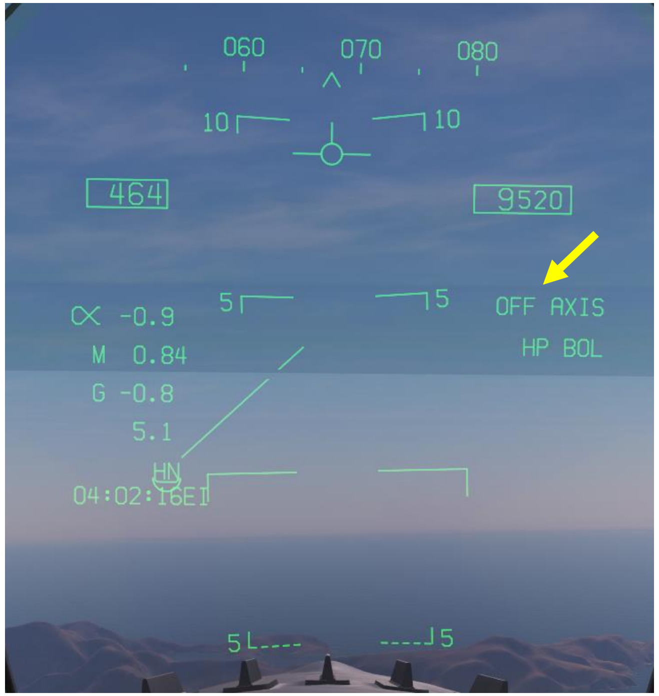


2.13 – AGM-84D Harpoon (BOL, Bearing-Only Launch Mode)

Note 1: if the aircraft is not lined up properly to launch the Harpoon, the IN ZONE/IN RNG/TTMR/out of zone cue will let you know.

- IN ZONE: displayed in BOL when no out of zone condition exists.
- IN RNG: displayed in RB/L mode when the aircraft is in range and no out of zone condition exists.
- TTMR: predicted time in seconds (to a maximum of 99) until the aircraft will reach maximum range in RB/L.
- Out of zone: one of various cues displayed in either BOL or RB/L if the aircraft meets one of these out of zone conditions:
  - SRCH/DSTR: distance between BOL search point and destruct point is too small.
  - DSTR RNG: BOL destruct range is greater than maximum range.
  - INV TGT: R/BL TGT distance from aircraft is considered invalid (>172nm).
  - ALT: aircraft altitude less than absolute minimum (generally 2,500ft above the ground).
  - OFF AXIS: bearing to R/BL TGT, BOL search area, or HPTP is >90°.
  - HPTP ANG: total angle at the HPTP is too large.
  - A/C HPTP: aircraft is too close to the HPTP.
  - TGT/HPTP: HPTP is too close to the R/BL TGT or BOL search area.

Note 2: A dashed line on the HSI will indicate that you are off axis as well.

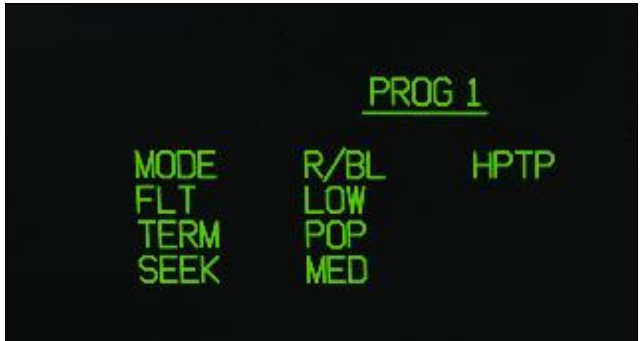


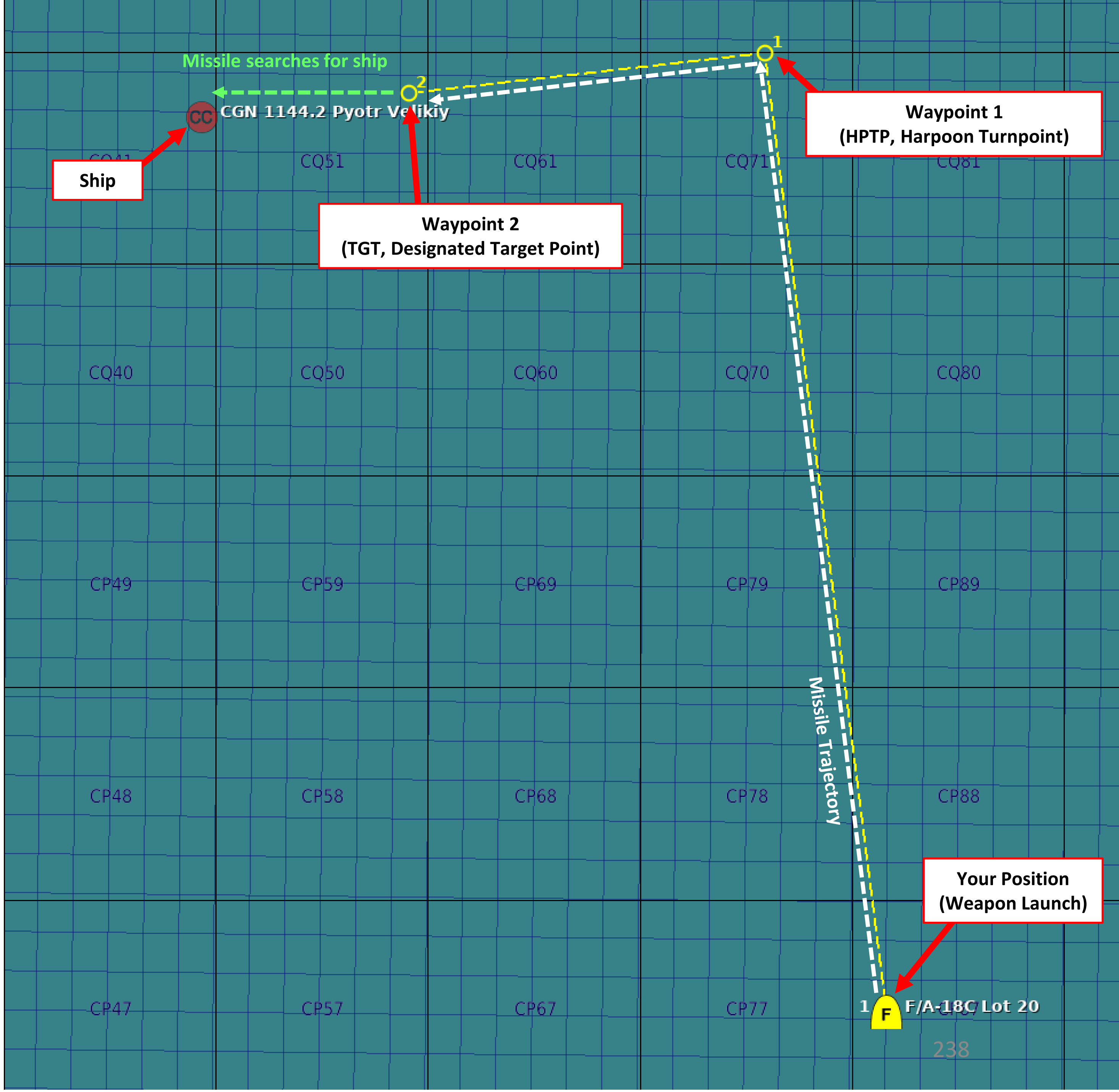
2.14 – AGM-84D Harpoon (R/BL, Range & Bearing Launch Mode)

The Harpoon is a programmable anti-ship missile. In this tutorial, we will use the R/BL (Range & Bearing Launch) mode. Range and Bearing Launch (R/BL) uses an Air-to-Ground Target (TGT) designation to provide both range and bearing information to the Harpoon. This mode does not command the Harpoon to detonate on the TGT, but rather to begin searching for a suitable target near the TGT designation and then engage it.

R/BL requires us to enter the following parameters:

- **Fly-Out (FLT) Altitude** Option: toggle between HIGH, MED, and LOW. This is the altitude the missile will fly at during the ingress/searching phase of flight. LOW is 5,000 ft, MED is 15,000 ft, and HIGH is 35,000 ft.
- **Terminal (TERM) Altitude** Option: toggle between SKIM and POP. This is the altitude the missile will fly at in the terminal phase of flight to ultimately impact the target. SKIM performs a very low-level approach all the way to impact. POP performs a high-G "pop-up" maneuver to impact the target from above.
- **Search Area (SEEK)** Option: toggle between SML (5.4 nm), MED (10.8 nm) and LRG (16.2 nm) search area distance. This is the distance before the TGT point the missile will begin searching.





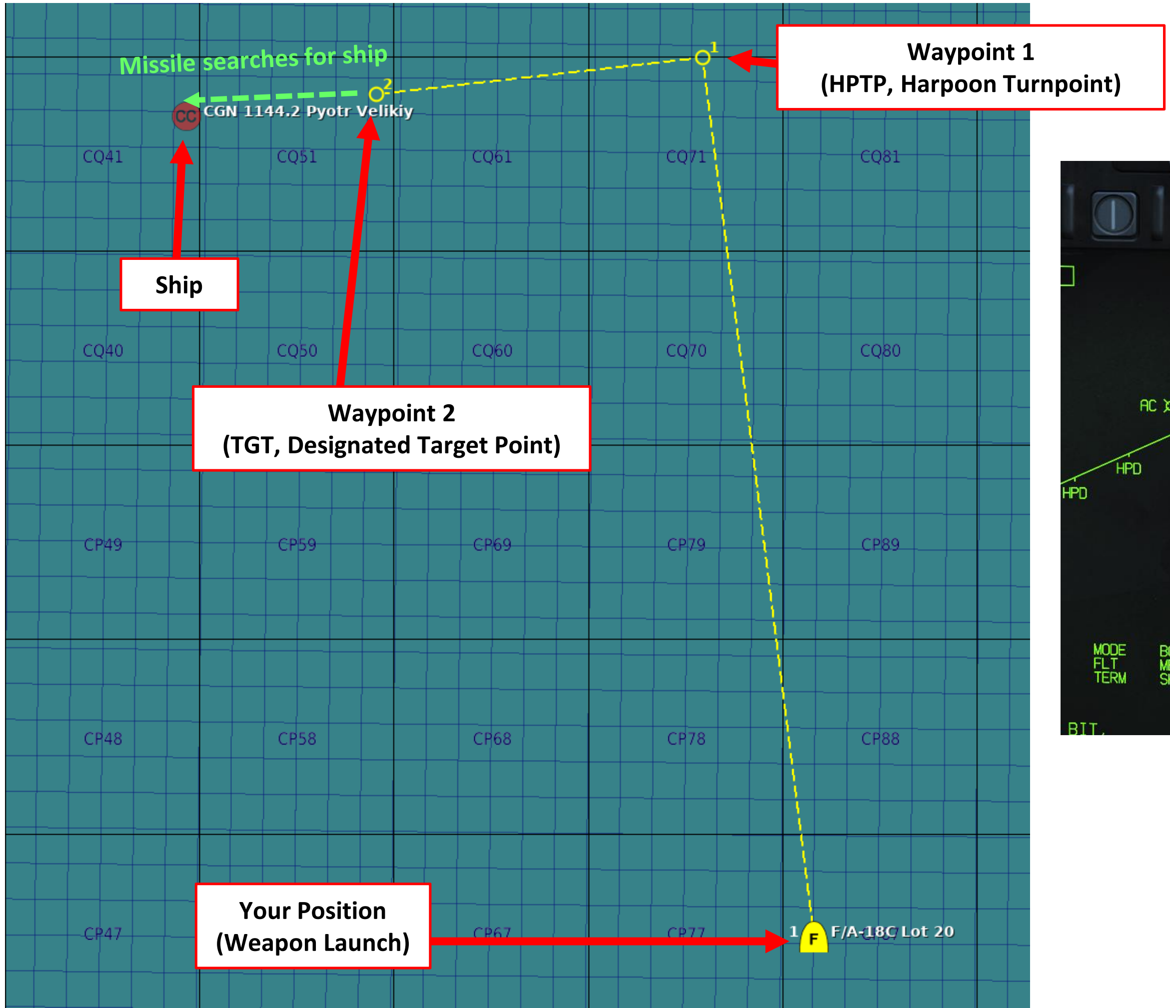
2.14 – AGM-84D Harpoon (R/BL, Range & Bearing Launch Mode)

1. Master Arm switch – ARM (UP)
2. Master Mode – A/G
3. On the SMS (Stores) page, press OSB next to HPD (AGM-84D Harpoon)
4. Harpoon will start an inertial alignment that takes about 25 seconds. You can monitor gyro alignment process on the SMS (Stores Management System) page.
   - **Note:** Once Harpoon alignment is complete, the timer will disappear.

2.14 – AGM-84D Harpoon (R/BL, Range & Bearing Launch Mode)

5. If you want to use a **Harpoon Turnpoint**, select a desired waypoint with the HSI, then press the OSB next to HPTP.

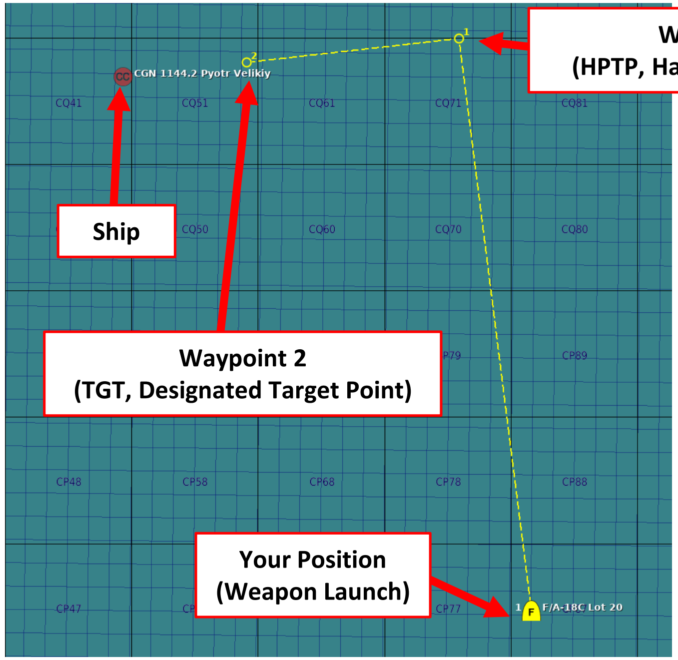
   This profile makes the missile travel directly to the Harpoon Turnpoint (HPTP) and then to the Designated TGT point (we will see how to set it up in the next steps).



2.14 – AGM-84D Harpoon
(R/BL, Range & Bearing Launch Mode)

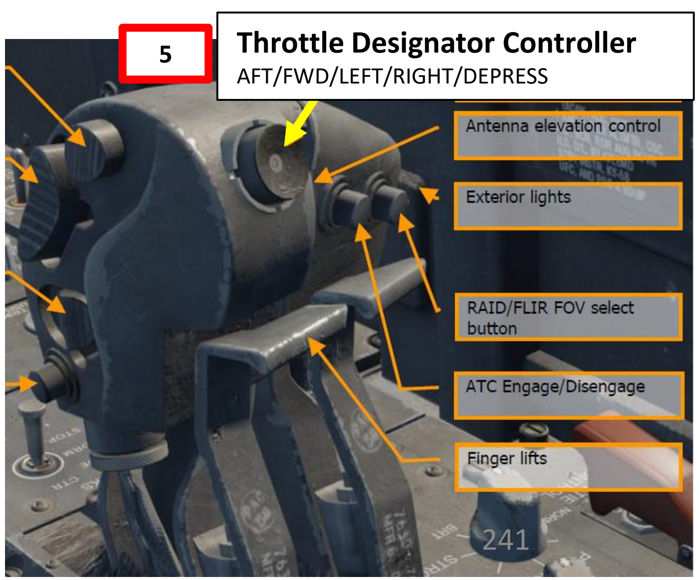
6. You will only be able to select the R/BL mode is a target is designated. This can be done by either performing a Waypoint Designate (WPDSG) action via the HSI or by using the Targeting Pod and designating the ship's location with the TDC (Throttle Designation Control) Depress button.

   As an example, we will set Waypoint 2 as the TGT point by selecting Waypoint 2 with the OSB selectors, then pressing the OSB next to WPDSG (Waypoint Designate). Waypoint 2 will then become the designated target point.



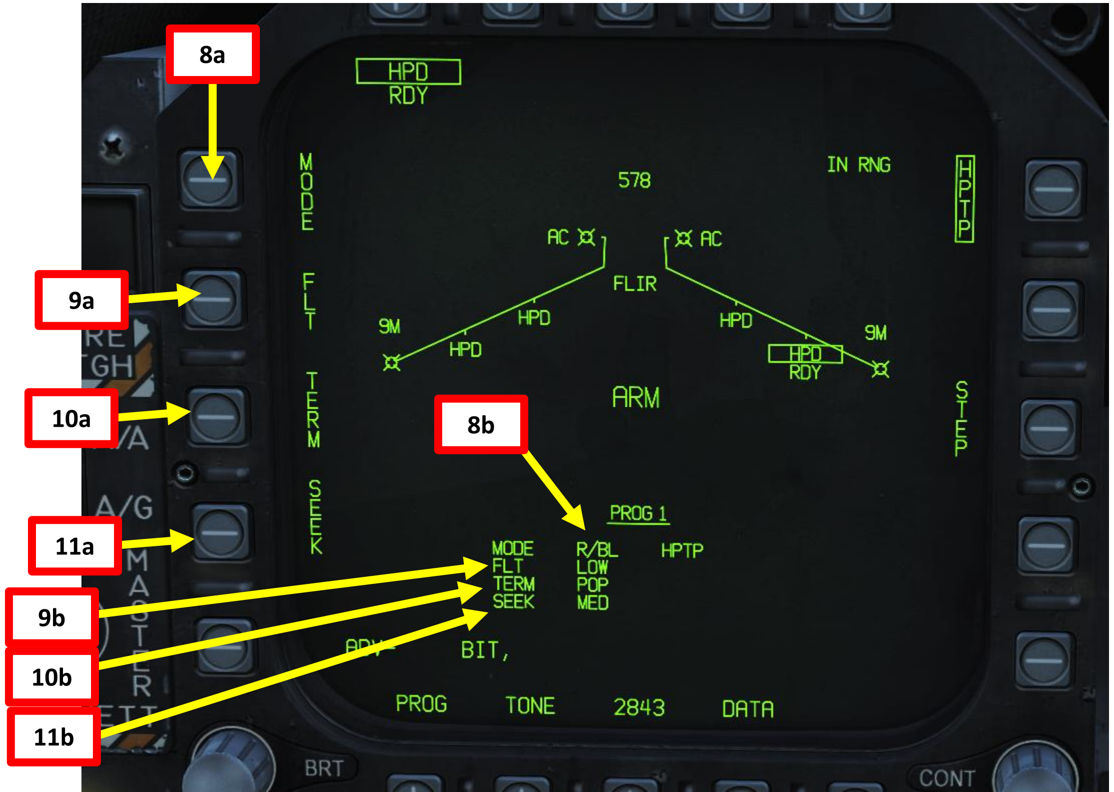
Targeting Pod (use at your own risk… some ship missiles have a longer range than your targeting pod's effective visibility)

Waypoint 2
(TGT, Designated Target Point)



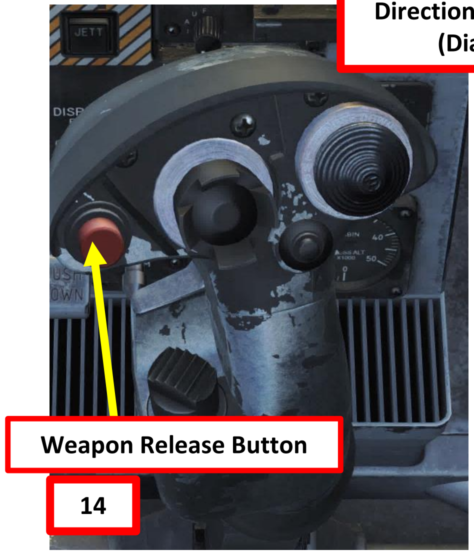
2.14 – AGM-84D Harpoon
(R/BL, Range & Bearing Launch Mode)

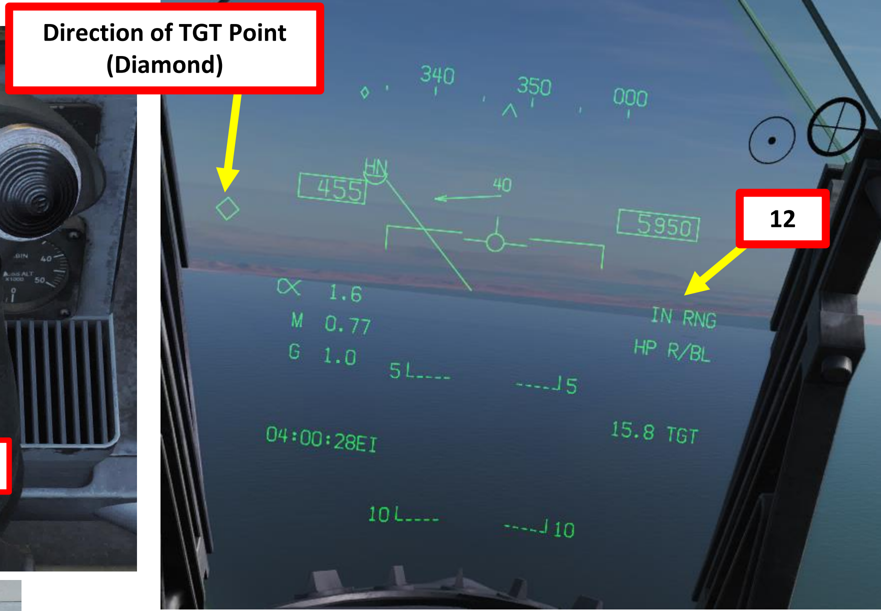
7. Once the TGT (Air-to-Ground Target Point) has been designated, the R/BL Mode will become available for selection.
8. Select "R/BL" release mode by pressing the OSB next to "MODE" if a target is designated properly, the mode will switch from BOL to R/BL.
9. Press OSB next to "FLT" (Fly-Out Altitude) to toggle between LOW, MED and HIGH. We will choose LOW.
10. Press OSB next to "TERM" (Terminal Altitude) to toggle between SKIM and POP attack profiles. SKIM performs a very low-level approach all the way to impact, while POP performs a high-G "pop-up" maneuver to impact the target from above. In our case, we will choose POP.
11. Press OSB next to "SEEK" (Search Area) to between SML (5.4 nm), MED (10.8 nm) and LRG (16.2 nm) search area distance. In our case, we will choose MED.

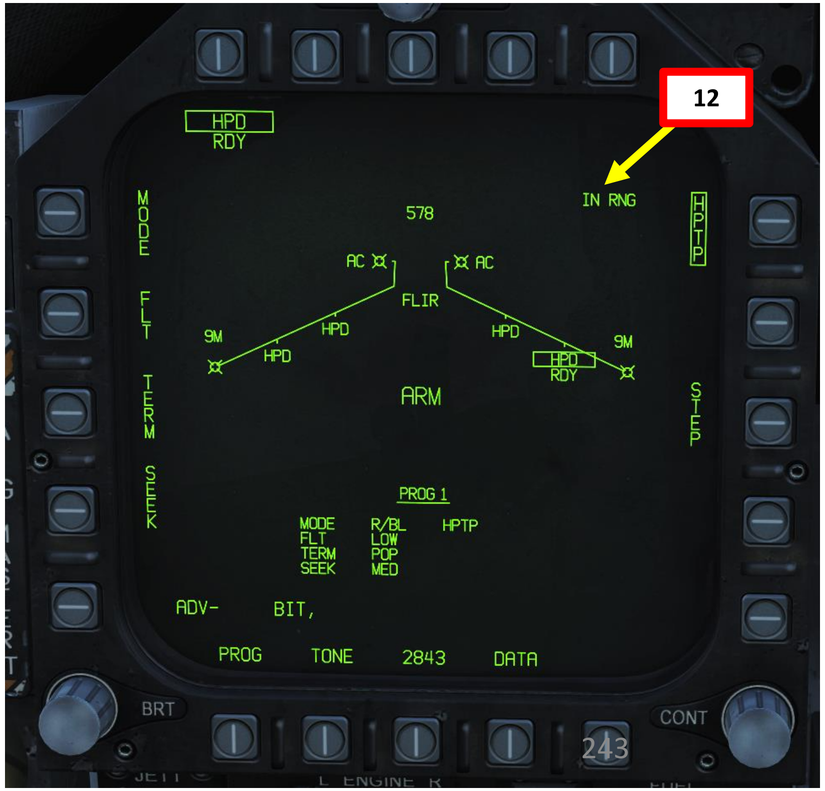


2.14 – AGM-84D Harpoon
(R/BL, Range & Bearing Launch Mode)

12. Check the IN ZONE/IN RNG/TTMR/out of zone cue and confirm that "IN RNG" is displayed. If you are not, steer the aircraft in the correct direction and .
13. Make sure you are above the minimum launch altitude of 2500 ft and flying level. Launching the Harpoon during negative Gs can make the aircraft collide with the missile.
14. Press and hold the Weapon Release button (« RALT+SPACE ») to launch Harpoon.
15. Once launched, there can be a momentary radar altimeter warning; that is normal due to the free-falling missile being momentarily detected by the radar altimeter system.

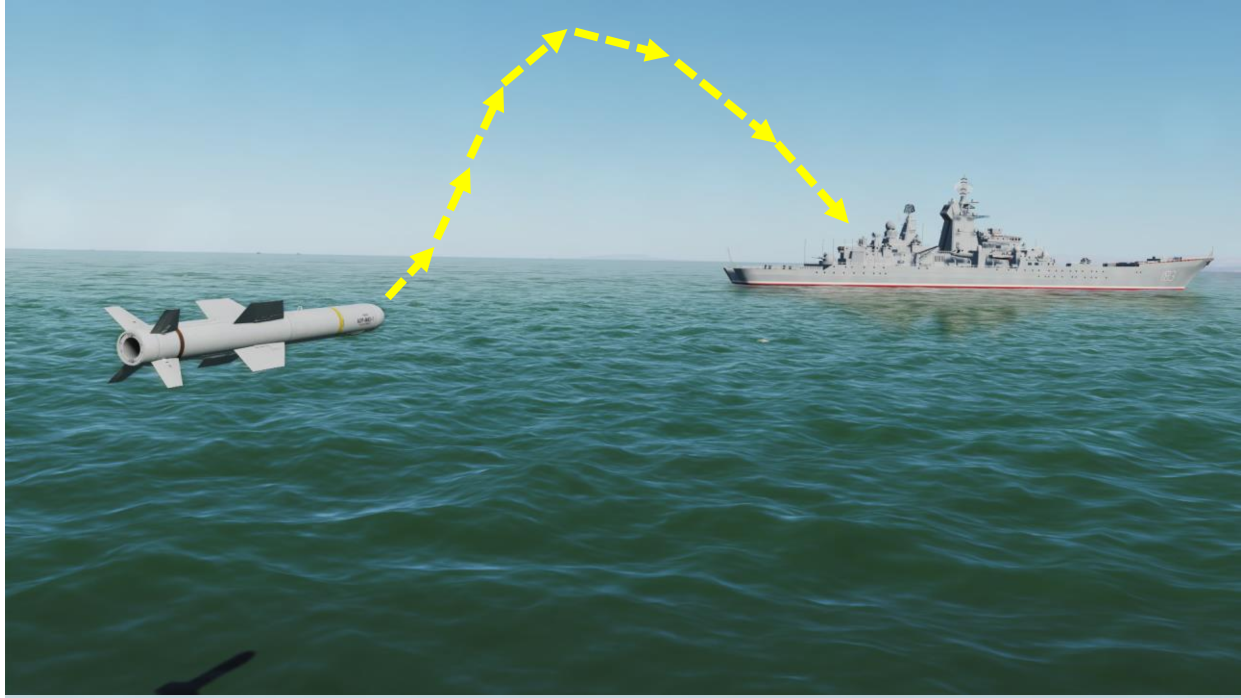






2.14 – AGM-84D Harpoon
(R/BL, Range & Bearing Launch Mode)

16. The Harpoon, at an altitude corresponding to the FLT option (LOW, 5000 ft), travels either directly in the direction of the set bearing from the aircraft, directly to a Harpoon Turnpoint (HPTP) and then directly to the designated TGT point (Waypoint 2). The missile then begins searching a set programmed distance before the TGT. If it locates a target, it will engage it based on the SKIM or POP terminal modes.



2.14 – AGM-84D Harpoon
(R/BL, Range & Bearing Launch Mode)

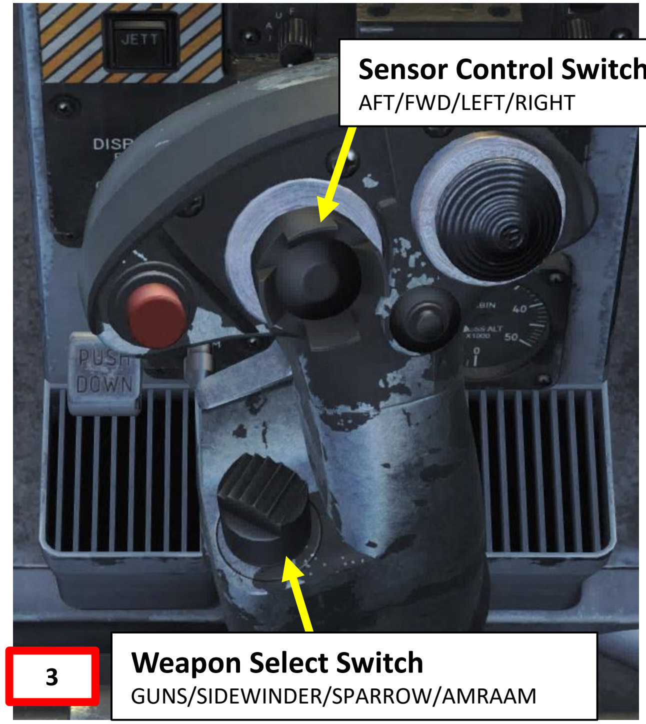
Note 1: if the aircraft is not lined up properly to launch the Harpoon, the IN ZONE/IN RNG/TTMR/out of zone cue will let you know.

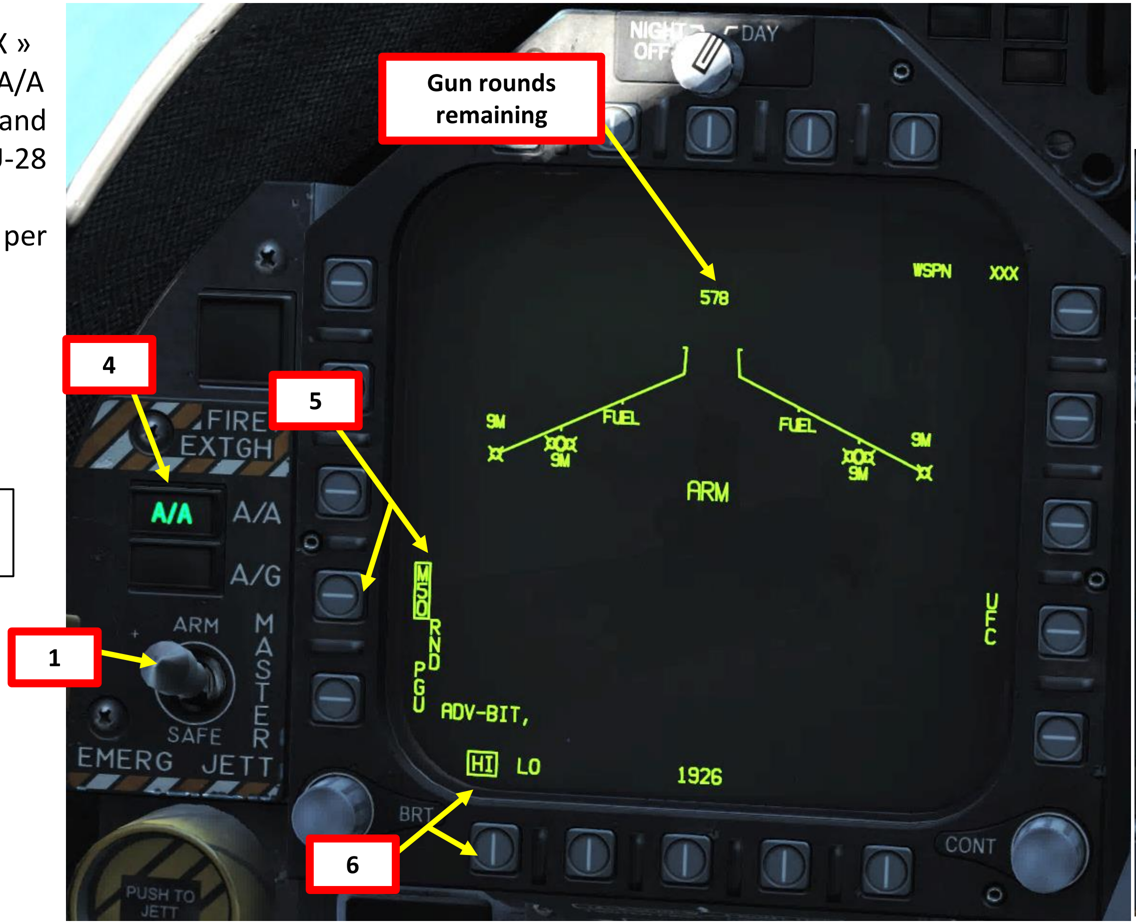
- IN ZONE: displayed in BOL when no out of zone condition exists.
- IN RNG: displayed in RB/L mode when the aircraft is in range and no out of zone condition exists.
- TTMR: predicted time in seconds (to a maximum of 99) until the aircraft will reach maximum range in RB/L.
- Out of zone: one of various cues displayed in either BOL or RB/L if the aircraft meets one of these out of zone conditions:
    - SRCH/DSTR: distance between BOL search point and destruct point is too small.
    - DSTR RNG: BOL destruct range is greater than maximum range.
    - INV TGT: R/BL TGT distance from aircraft is considered invalid (>172nm).
    - ALT: aircraft altitude less than absolute minimum (generally 2,500ft above the ground).
    - OFF AXIS: bearing to R/BL TGT, BOL search area, or HPTP is >90°.
    - HPTP ANG: total angle at the HPTP is too large.
    - A/C HPTP: aircraft is too close to the HPTP.
    - TGT/HPTP: HPTP is too close to the R/BL TGT or BOL search area.

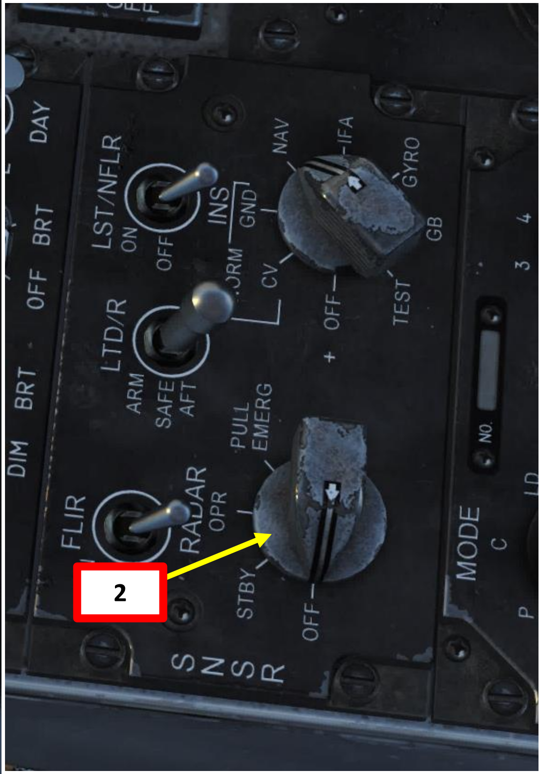
Note 2: A dashed line on the HSI will indicate that you are off axis as well.

3.1 - M61A2 GUNS (AIR-TO-AIR)
(FUNNEL / NO RADAR TRACKING)

1. Master Arm switch – ARM (UP)
2. Radar switch – OFF
3. Weapon Select Switch – A/A GUNS, or « LSHIFT+X »
4. Master Mode switch will be automatically set to A/A
5. Go in SMS (Stores Management System) page and select Gun Rounds Options (MK-50 or PGU-28 rounds)
6. Set Gun Firing Rate Option (HI = 6000 rounds per minute, LO = 4000 rounds per minute)

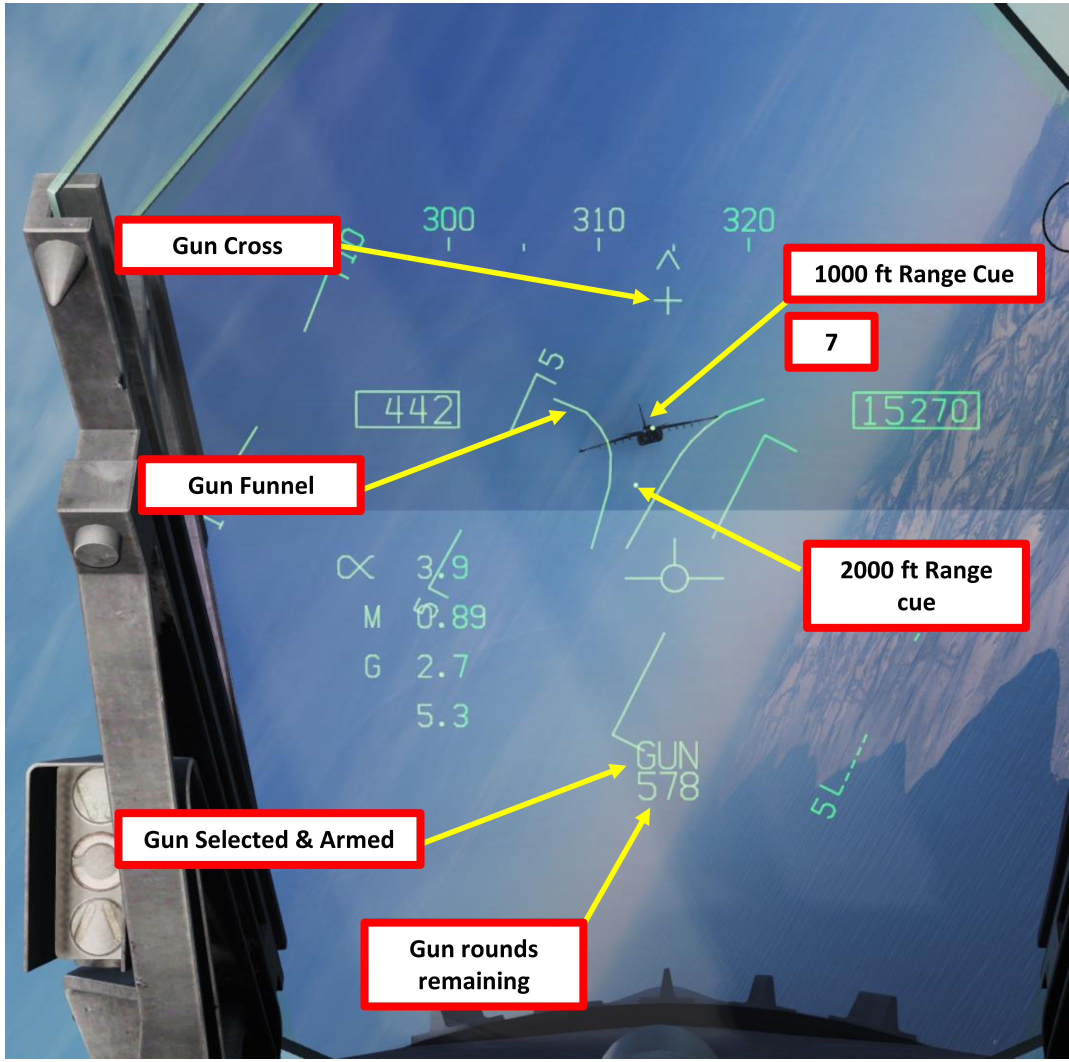






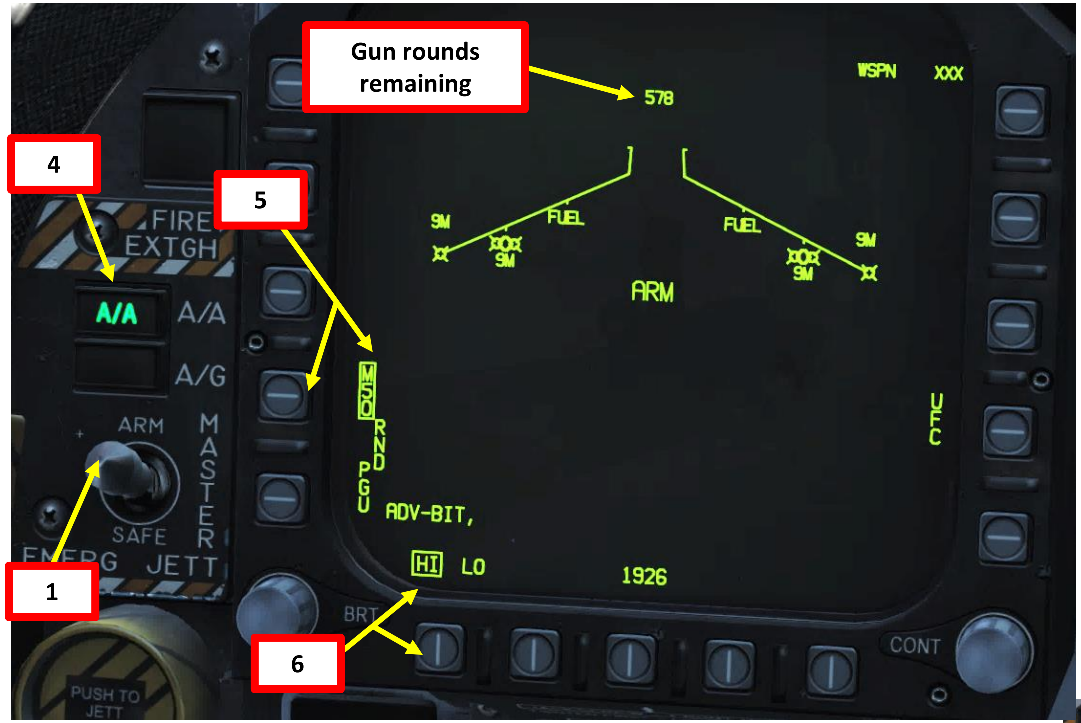
3.1 - M61A2 GUNS (AIR-TO-AIR) (FUNNEL / NO RADAR TRACKING)

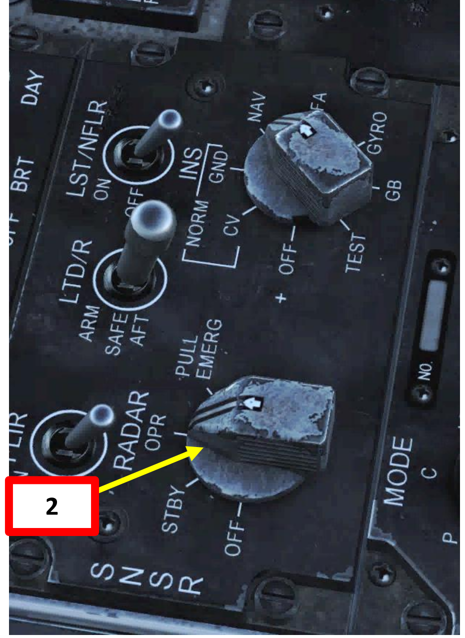
7. Fly to place either the 1000 ft Range Cue dot or the 2000 ft Range Cue dot over the target. Once the 1000 ft (or 2000 ft) Range Cue dot is on the aircraft and its wingspan fits inside the Gun Funnel, you are now in range.
8. Squeeze the gun trigger (« Spacebar »)

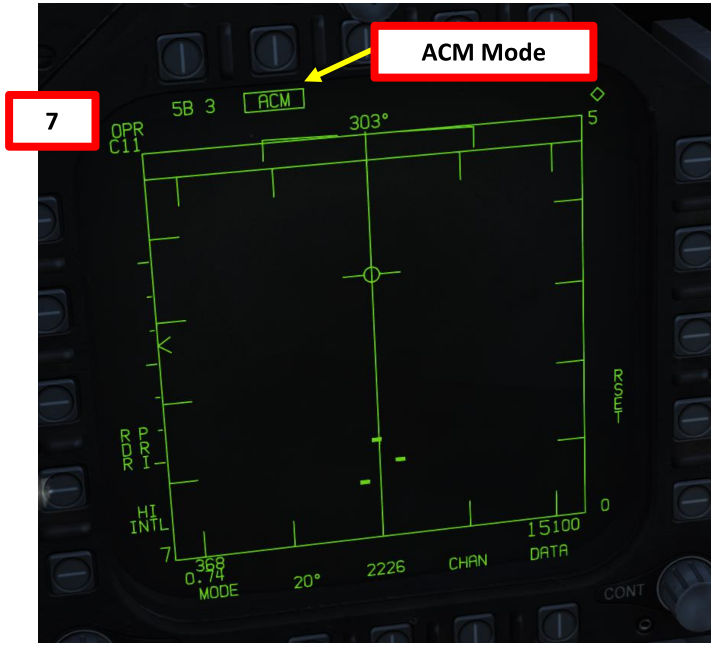


3.2 - M61A2 GUNS (AIR-TO-AIR) (RADAR TRACKING)

1. Radar Switch - OPERATE
2. Master Arm switch – ARM (UP)
3. Weapon Select Switch – A/A GUNS (AFT), or « LSHIFT+X »
4. Master Mode switch will be automatically set to A/A
5. Go in SMS (Stores Management System) page and select Gun Rounds Options (MK-50 or PGU-28 rounds)
6. Set Gun Firing Rate Option (HI = 6000 rounds per minute, LO = 4000 rounds per minute)
7. When A/A GUNS is selected and radar is operating, the radar automatically switches to the ACM (Air Combat Maneuvering) GACQ (Guns Auto Acquisition) mode

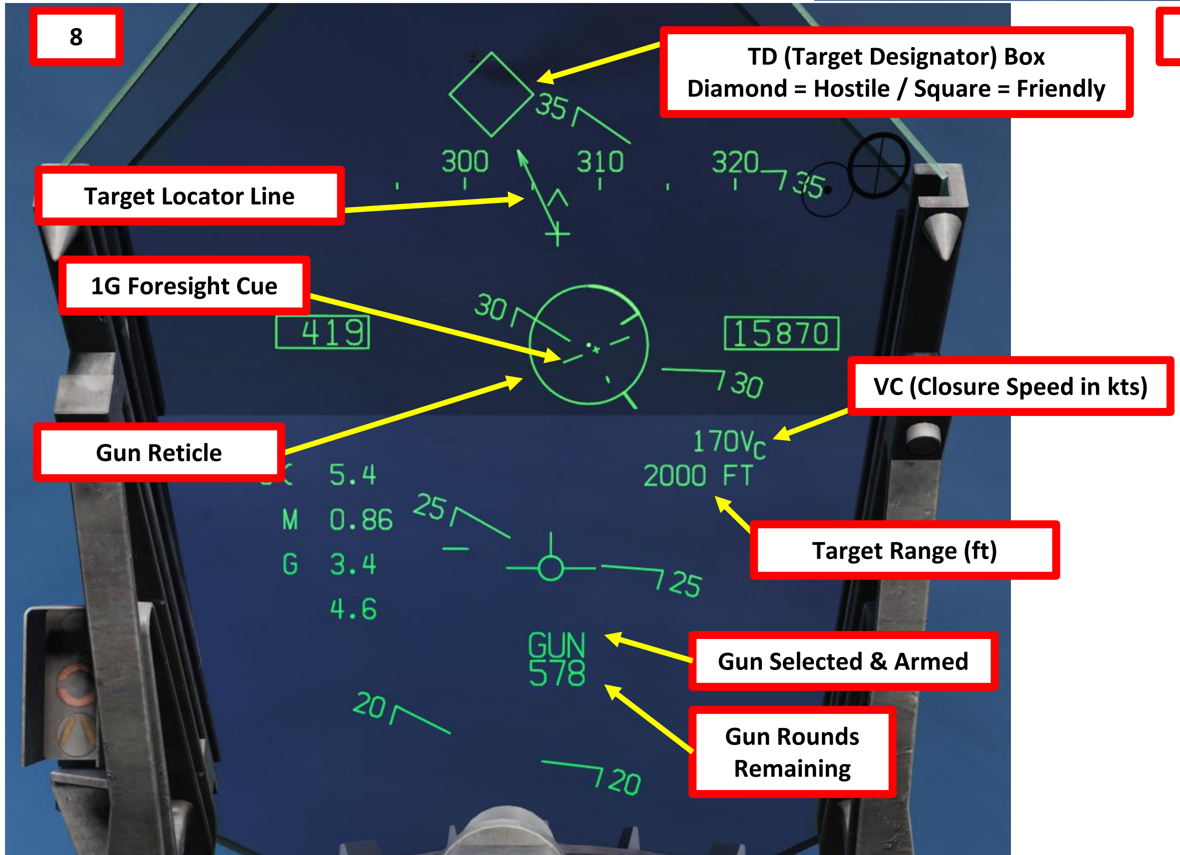






3.2 - M61A2 GUNS (AIR-TO-AIR) (RADAR TRACKING)

8. Fly to place target in dashed circle on the HUD to lock it on radar when at 5 nm or closer. When target is flying through this scan zone, it is automatically locked on to in STT (Single Target Track) mode
9. Fly to place the dot in the center of the gun reticle over the target and squeeze the gun trigger (« Spacebar ») when you see the SHOOT cue on the HUD.



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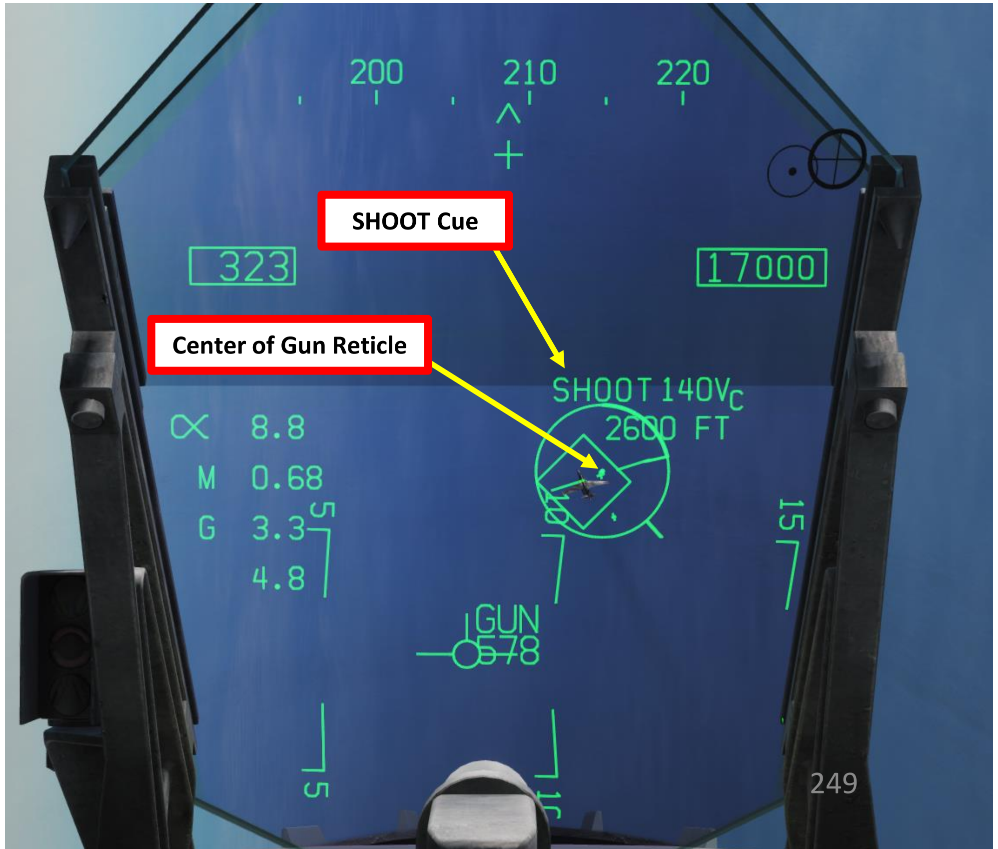
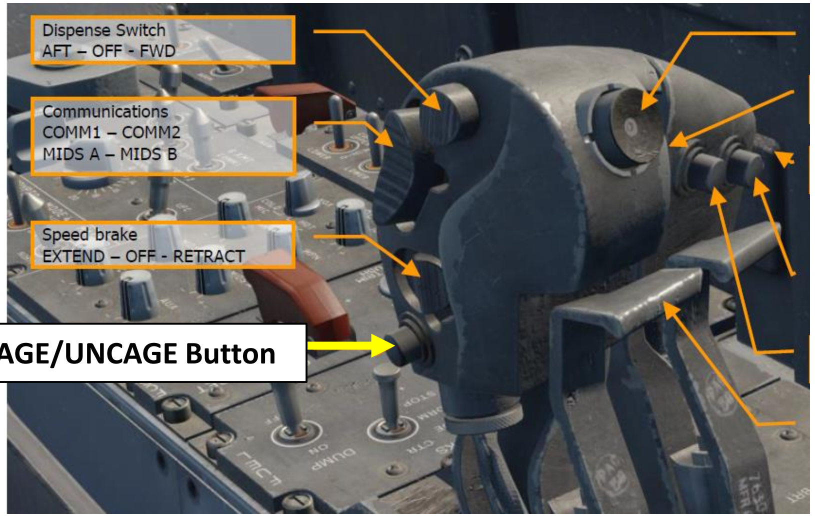
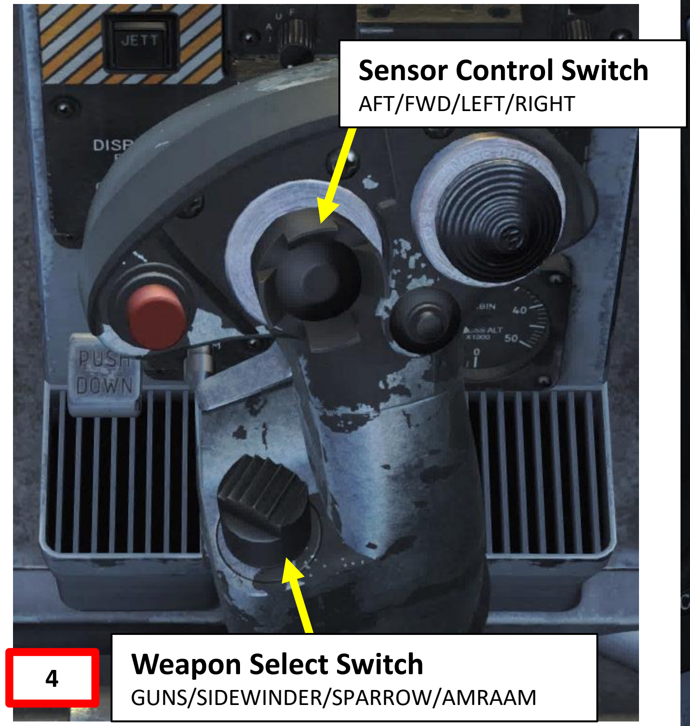
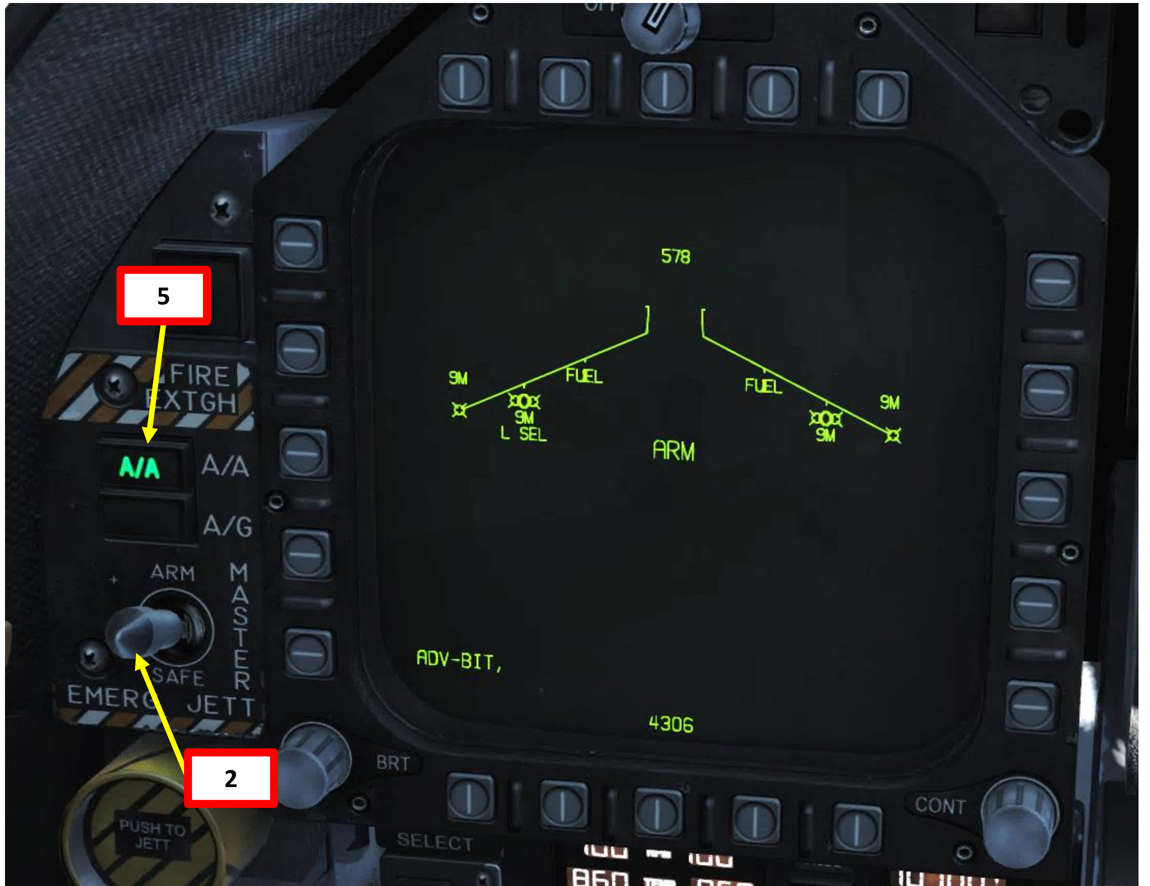


3.3 - AIM-9M SIDEWINDER AIR-TO-AIR IR MISSILE (NO RADAR)

1. Set IR COOL switch to NORM. Infrared seeker in the AIM-9 nose must be cooled down to increase sensitivity and reduce background noise. There is enough coolant for 3 hours.
2. Master Arm switch – ARM (UP)
3. Radar switch – OFF
4. Weapon Select Switch – SIDEWINDER, or « LSHIFT+S »
5. Master Mode switch will be automatically set to A/A
6. Press and hold the Cage/Uncage switch to uncage the Sidewinder (« C » by default). Once uncaged, the Sidewinder should be actively looking for a lock on the closest heat signature. As you uncage the Sidewinder, you should hear a low growl tone when the missile seeker is searching.

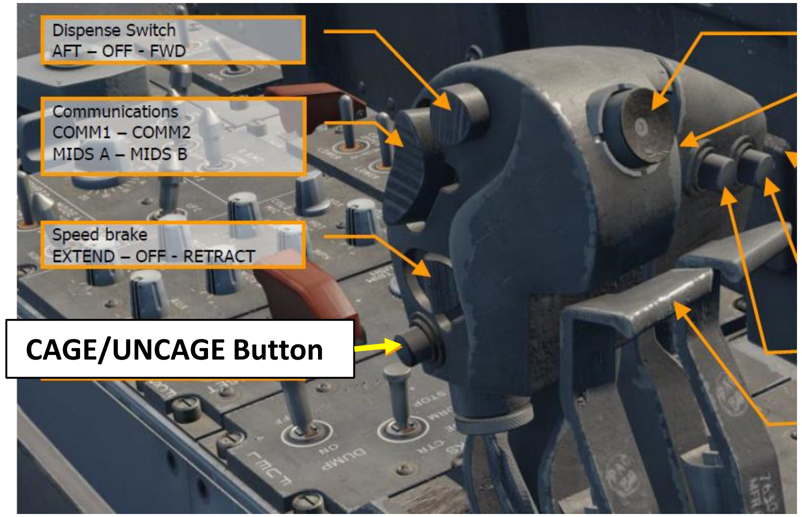


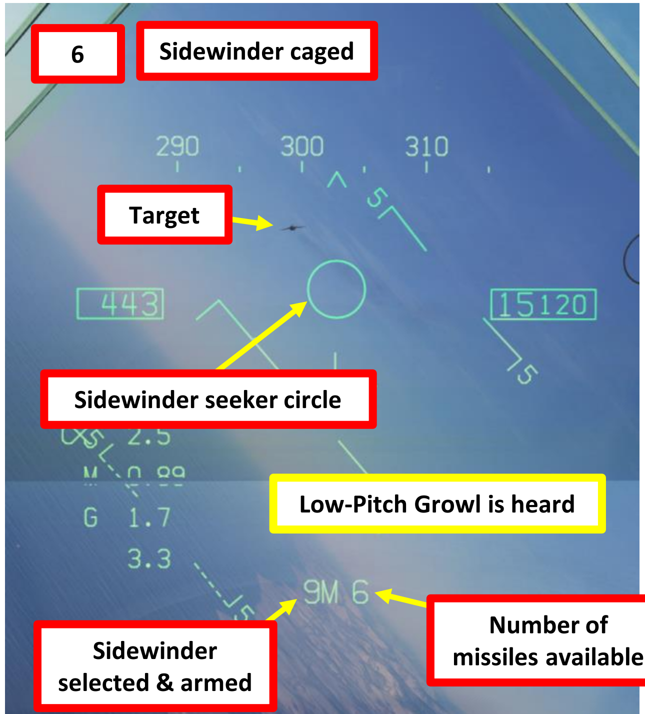




3.3 - AIM-9M SIDEWINDER AIR-TO-AIR IR MISSILE (NO RADAR)

7. Fly to place the target inside the Sidewinder seeker circle until a high-pitched audio sound confirms that the missile's seeker has acquired a solid lock.
8. Squeeze the gun trigger (« Spacebar ») to launch missile.



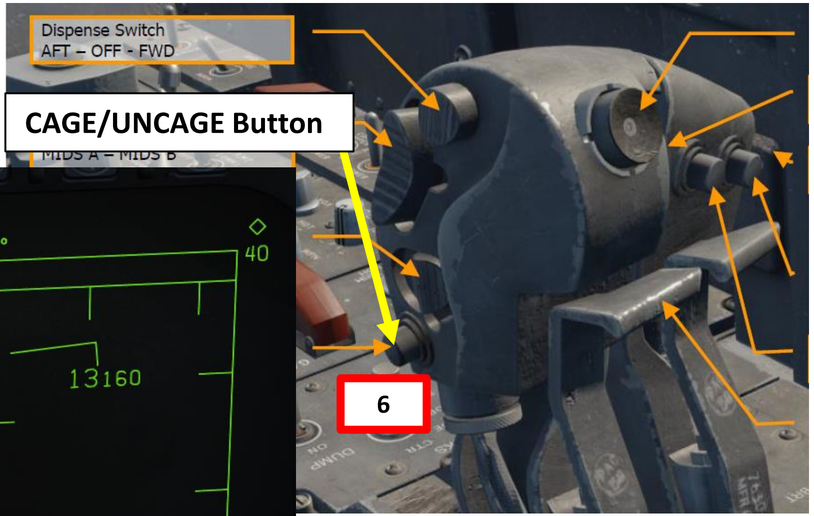


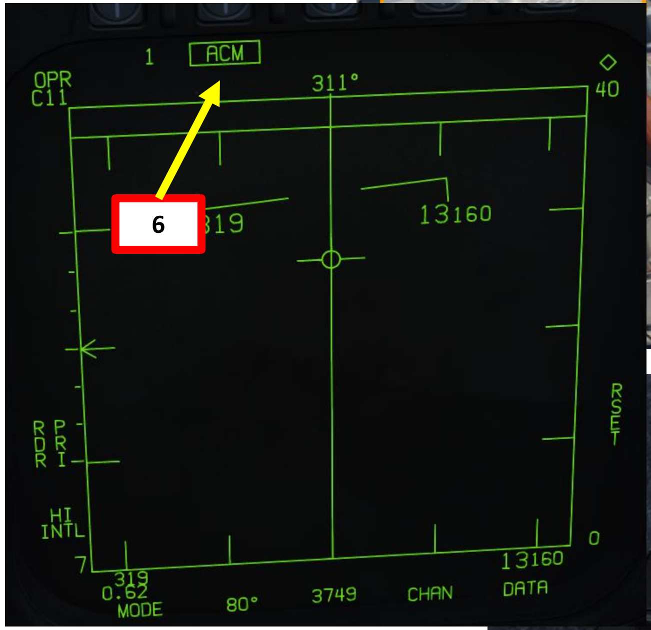
F/A-18C HORNET

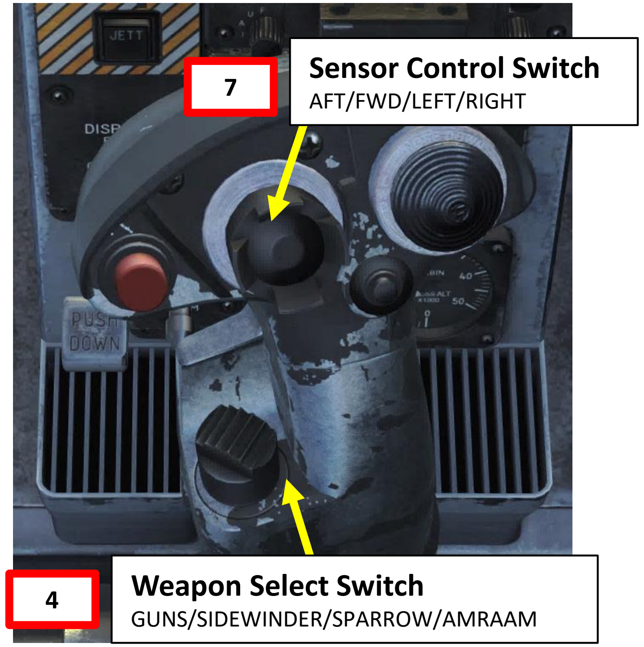
PART 10 – OFFENCE: WEAPONS & ARMAMENT

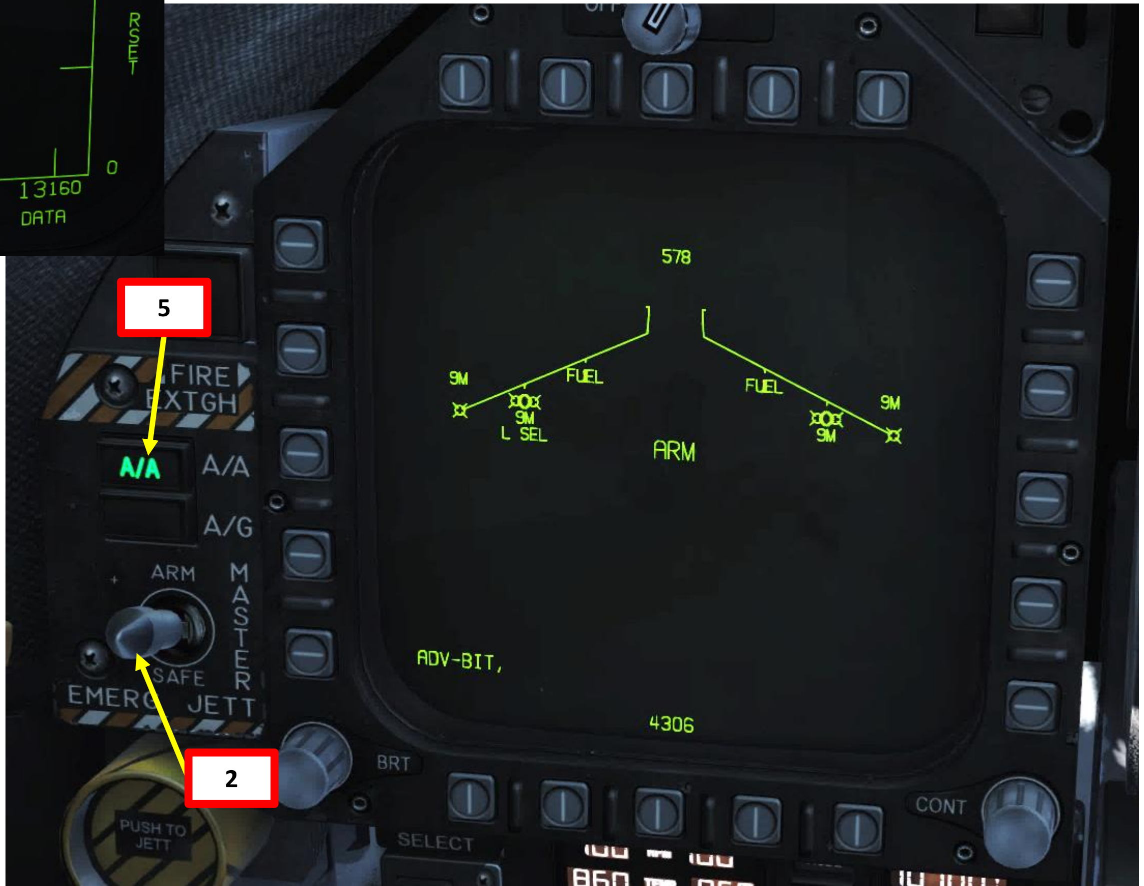
3.4 - AIM-9M SIDEWINDER AIR-TO-AIR IR MISSILE (RADAR)

1. Set IR COOL switch to NORM. Infrared seeker in the AIM-9 nose must be cooled down to increase sensitivity and reduce background noise. There is enough coolant for 3 hours.
2. Master Arm switch – ARM (UP)
3. Radar Switch - OPERATE
4. Weapon Select Switch – SIDEWINDER (DOWN), or « LSHIFT+S »
5. Master Mode switch will be automatically set to A/A
6. When SIDEWINDER is selected and radar is operating, press the Sensor Select Switch FWD to select ACM (Air Combat Maneuvering) radar mode





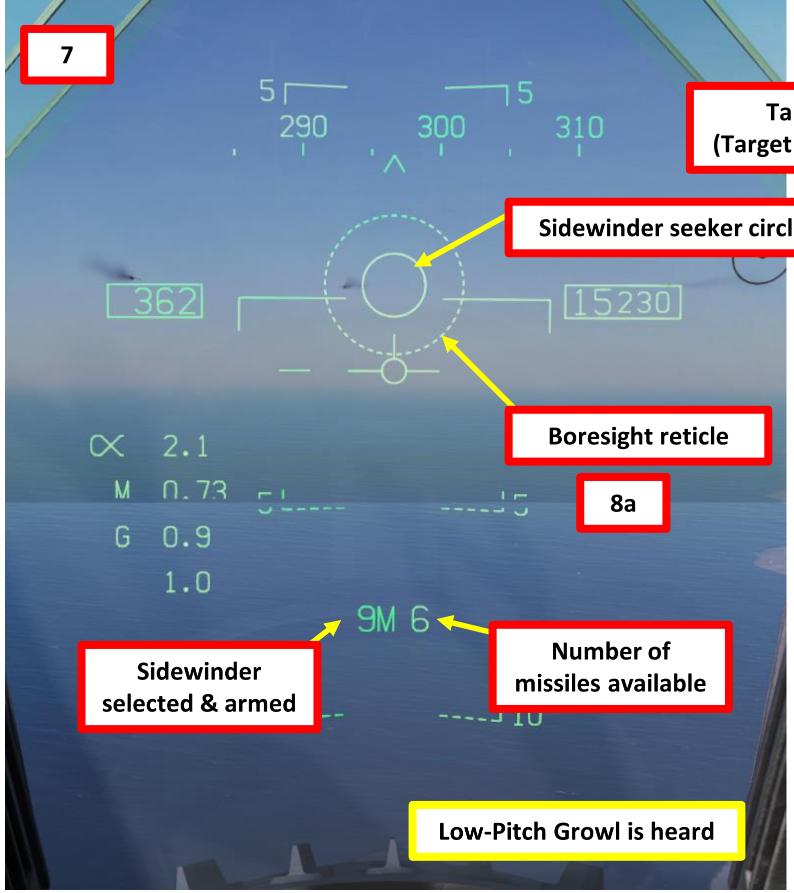


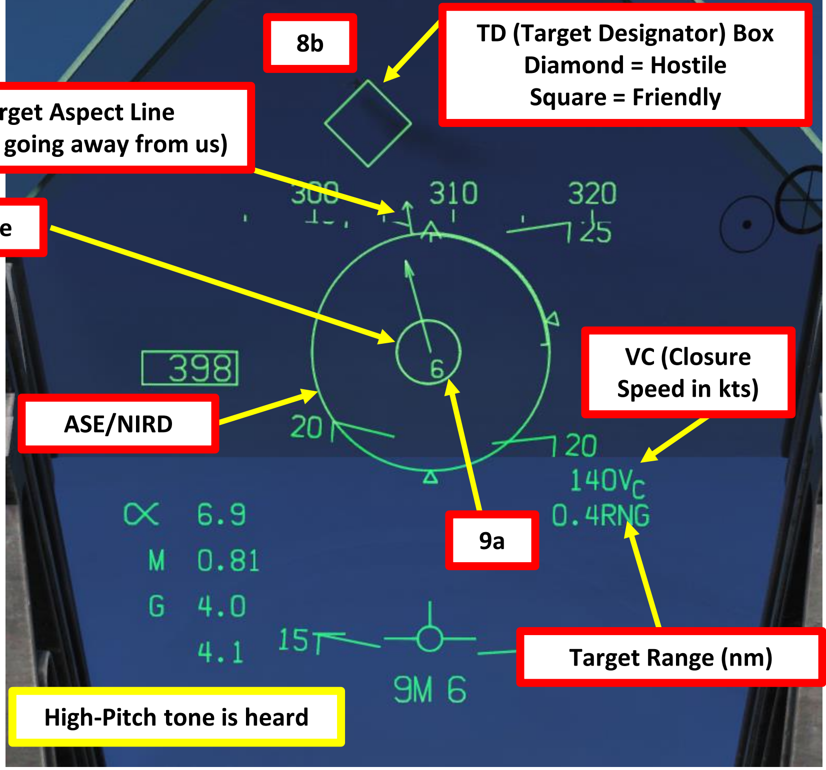


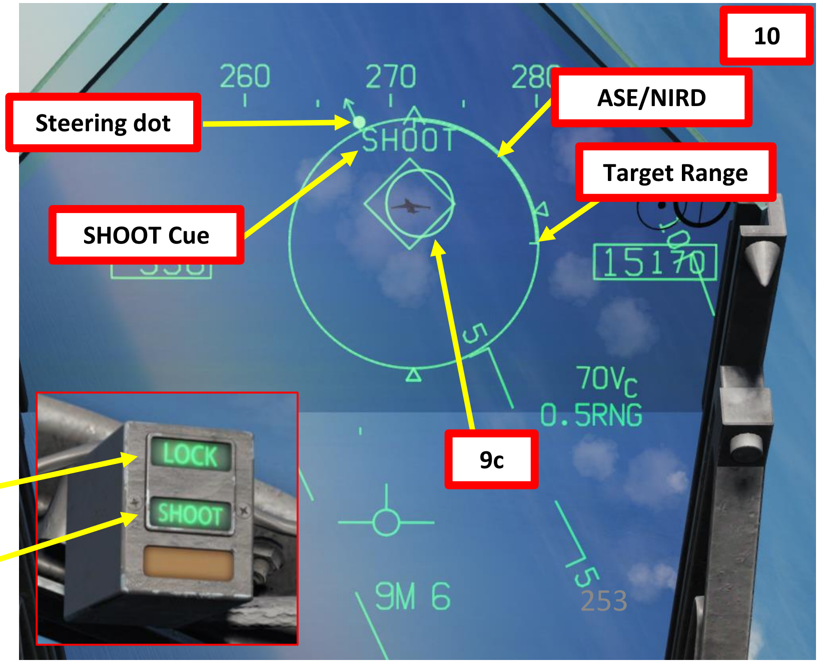
3.4 - AIM-9M SIDEWINDER AIR-TO-AIR IR MISSILE (RADAR)

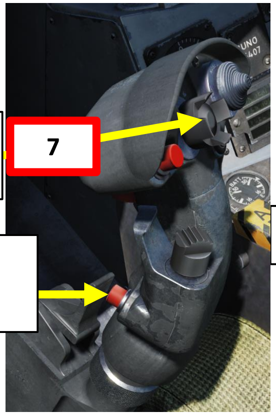
7. Select ACM sub-mode using the Sensor Select switch again. We will select BST sub-mode.
    a) BST (Boresight), Sensor Select FWD
    b) VACQ (Vertical Acquisition), Sensor Select AFT
    c) WACQ (Wide Acquisition), Sensor Select LEFT
8. Fly to place target in dashed circle on the HUD to lock it on radar when at 5 nm or closer. When target is flying through this scan zone, it is automatically locked on to in STT (Single Target Track) mode
9. Press and hold the Cage/Uncage switch (« C » by default) to uncage the Sidewinder.
10. Fly to place the Steering Dot inside the ASE/NIRD (Allowable Steering Error / Normalized In-Range Display) Circle and squeeze the gun trigger (« Spacebar ») when you see the SHOOT cue over the TD (Target Designation) box on the HUD to launch missile.

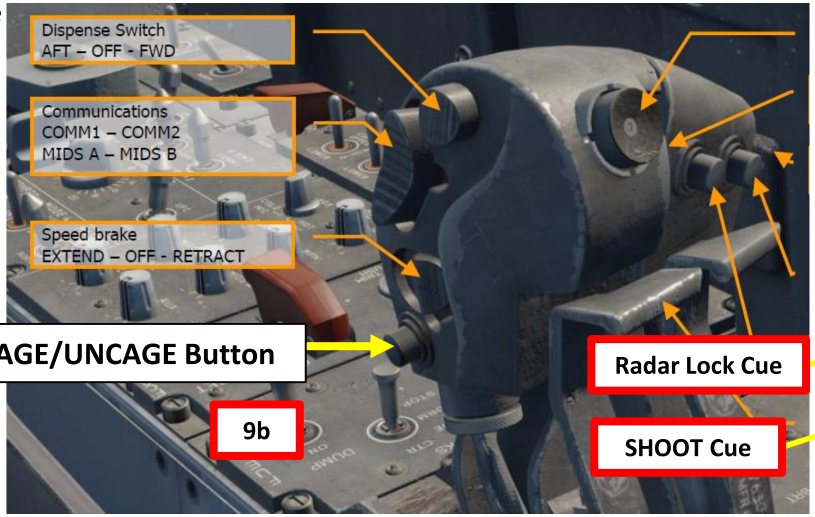
Note: You can unlock a target by pressing the Undesignate Button (« S »)



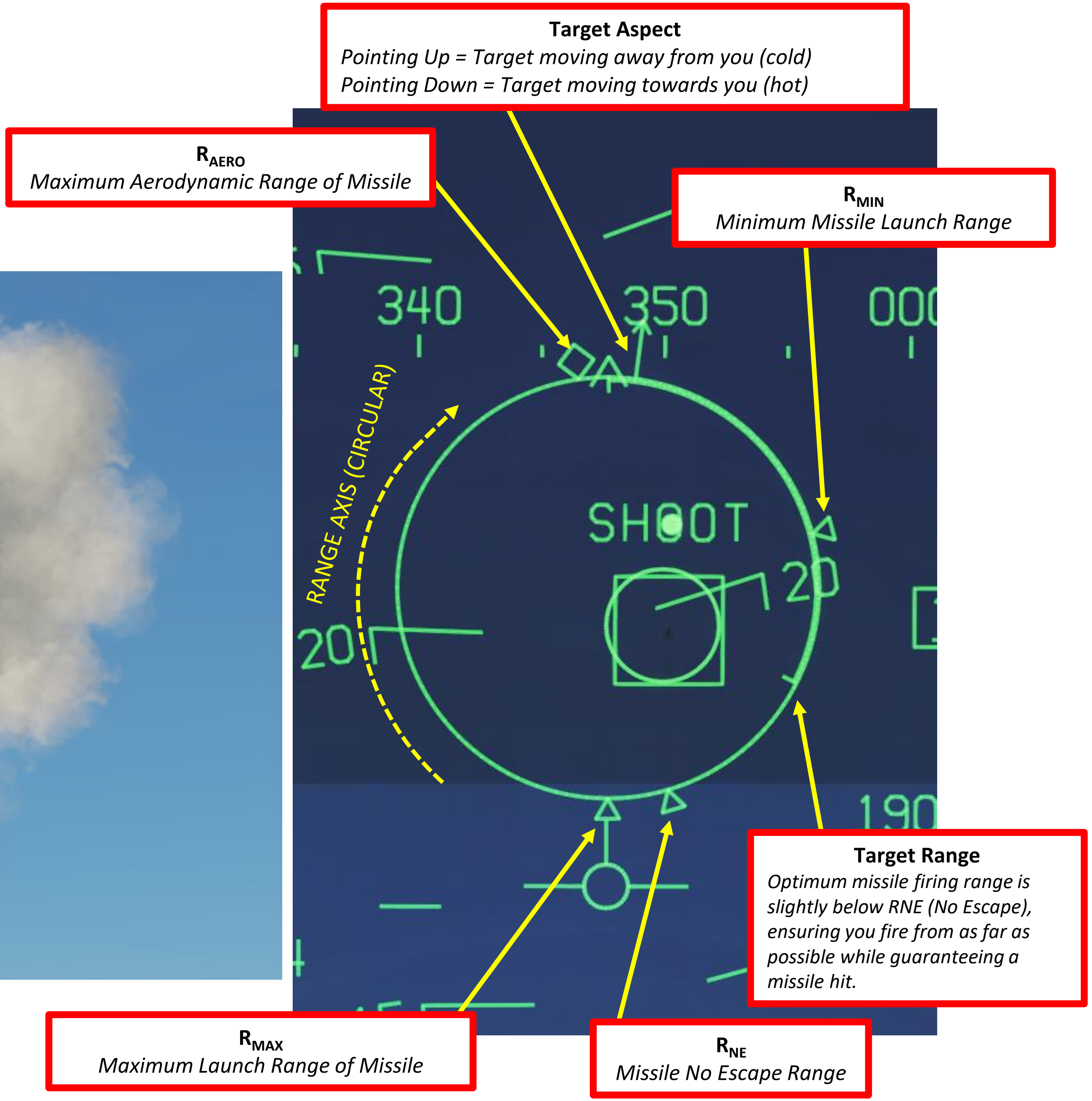








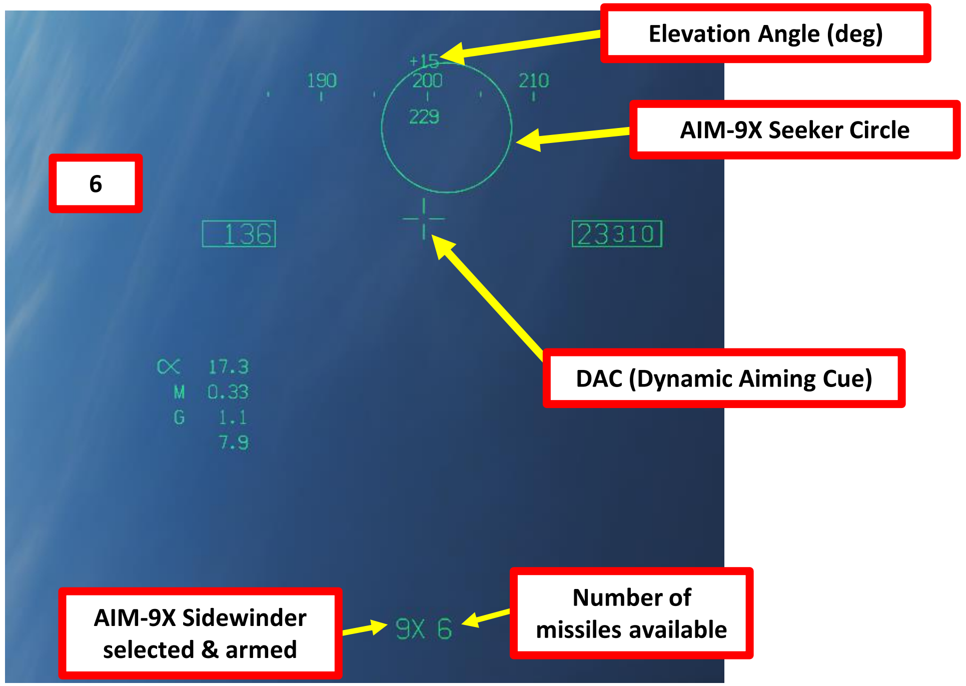
3.4 - AIM-9M SIDEWINDER AIR-TO-AIR IR MISSILE (RADAR)

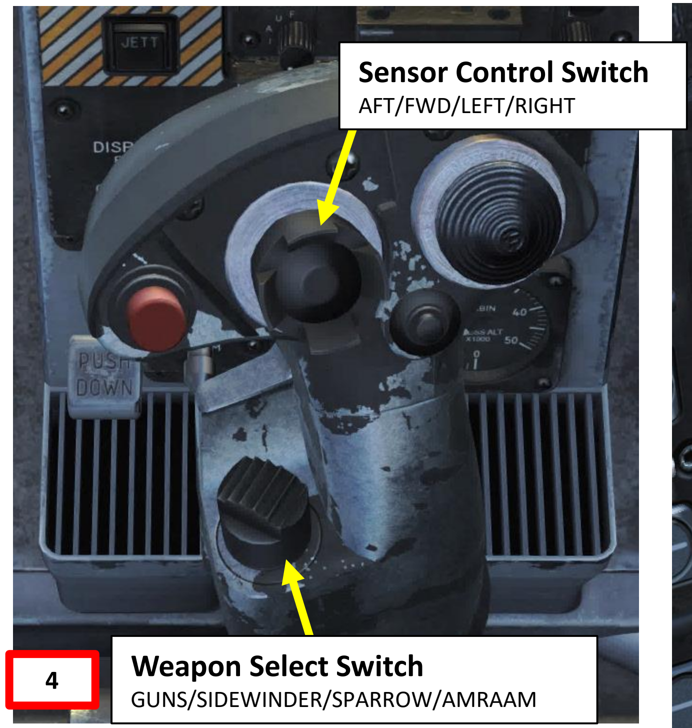


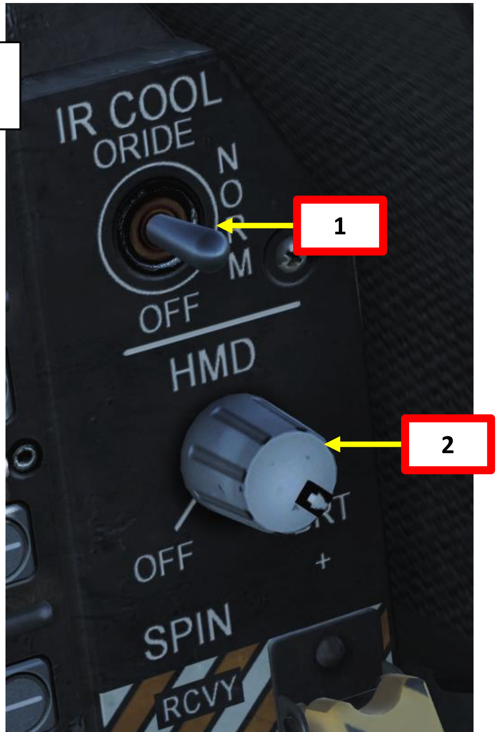
3.5 - AIM-9X SIDEWINDER AIR-TO-AIR IR MISSILE (JHMCS)

The HMD (Helmet-Mounted Display) and JHMCS (Joint Helmet-Mounted Cueing System) allow the pilot to project the Heads-Up Display in his field of vision at all times. It also allows the slaving of sensors and weapons to the helmet's line of sight. In the Hornet, the JHMCS is very useful for using missiles like the AIM-9X, an upgraded version of the AIM-9 with TVC (Thrust Vectoring Control) allowing 80 deg off-boresight shots.

1. Set IR COOL switch to NORM. Infrared seeker in the AIM-9 nose must be cooled down to increase sensitivity and reduce background noise. There is enough coolant for 3 hours.
2. Set HMD switch to BRT (Fully Right) to power up the JHMCS (Joint Helmet Cueing System)
3. Master Arm switch – ARM (UP)
4. Weapon Select Switch – SIDEWINDER, or « LSHIFT+S »
5. Master Mode switch will be automatically set to A/A
6. Move your head/helmet and try to place the DAC (Dynamic Aiming Cue) and AIM-9X Seeker Circle on the nearest target.

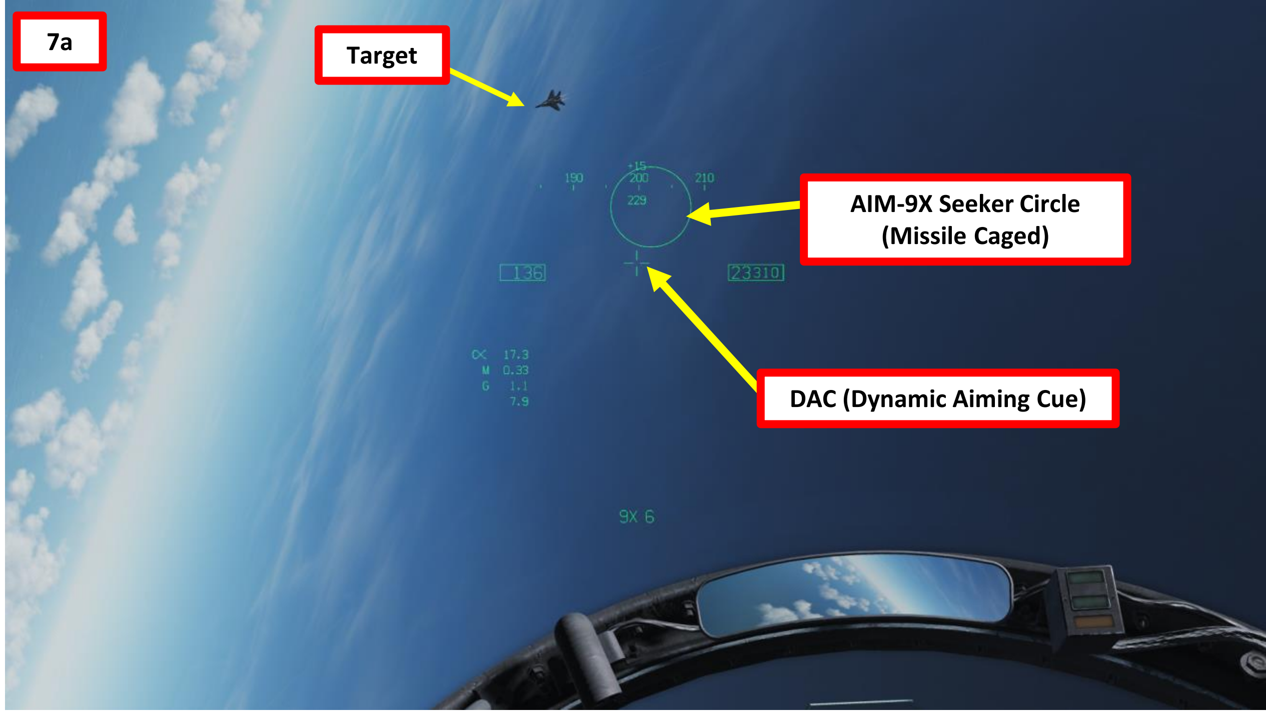


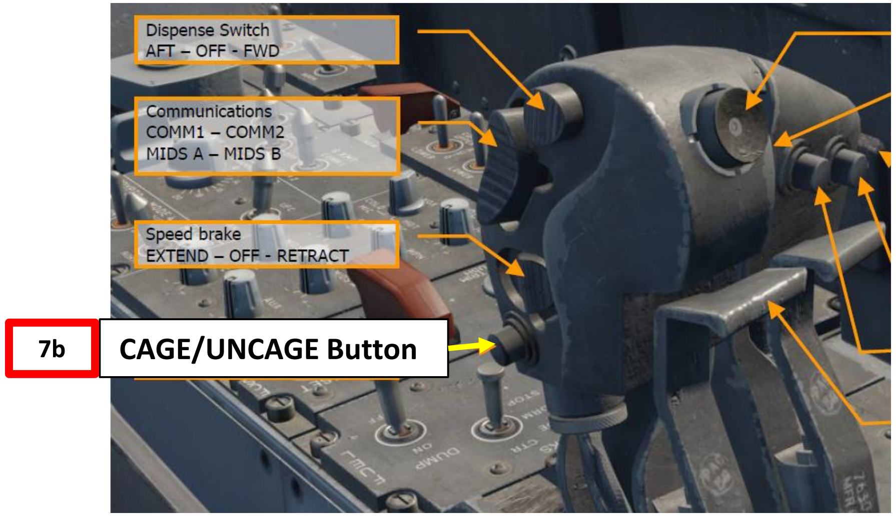


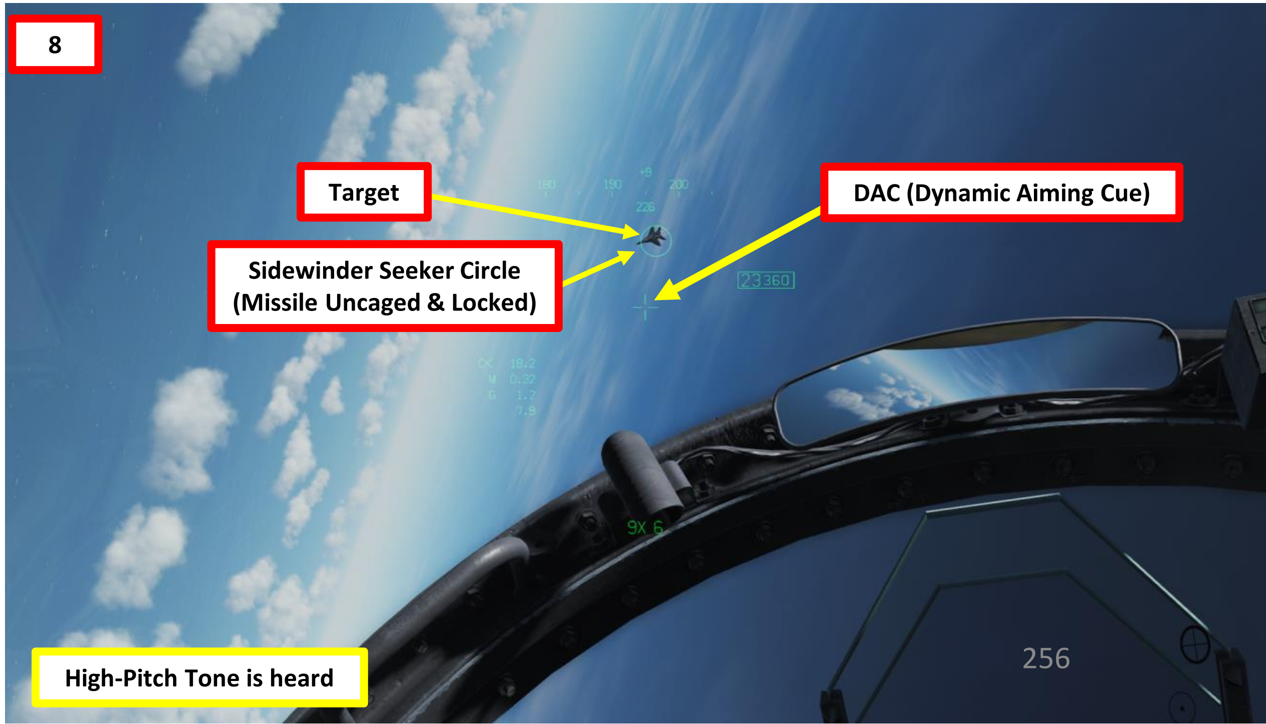


3.5 - AIM-9X SIDEWINDER AIR-TO-AIR IR MISSILE (JHMCS)

7. When DAC (Dynamic Aiming Cue) and Sidewinder Seeker Circle are placed on a target, press and hold the Cage/Uncage switch to uncage the Sidewinder (« C » by default). Once uncaged, the Sidewinder should be actively looking for a lock on the closest heat signature.
8. Once the Sidewinder is uncaged and has locked a heat signature, the Seeker Circle will become smaller and a high-pitched audio sound confirms that the missile's seeker has acquired a solid lock.
9. Squeeze the gun trigger (« Spacebar ») to launch missile.







3.5 - AIM-9X SIDEWINDER AIR-TO-AIR IR MISSILE (JHMCS)

3.5 - AIM-9X SIDEWINDER AIR-TO-AIR IR MISSILE (JHMCS)

AIM-9X Sounds:

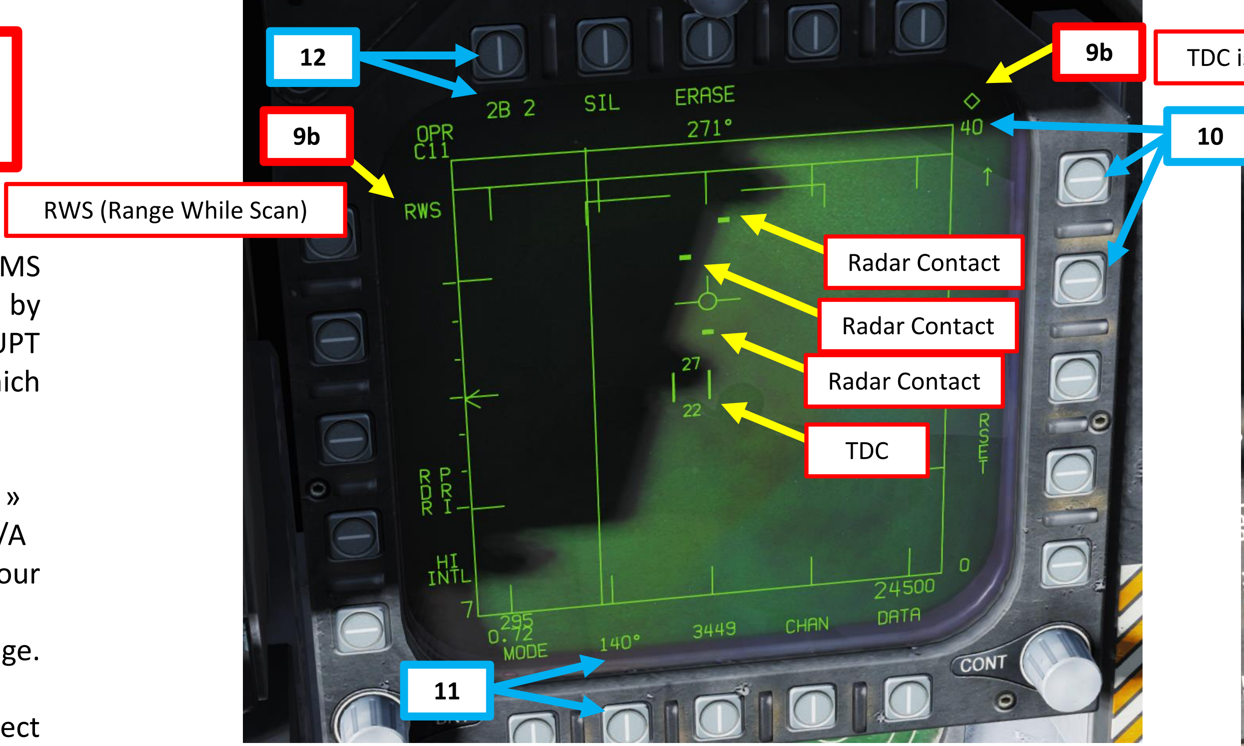
- Static: Seeker is searching.
- Double Beep: Seeker has been moved past 27.5° off boresight while searching.
- Repeating Beep: Seeker sees infrared contrast, but not enough to reliably track (i.e. the seeker is too far from the source).
- Steady Tone: Seeker sees an infrared contrasting target.
- Steady High Pitch Tone: Seeker is uncaged.
- Steady Higher Pitch Tone: Seeker is uncaged and is more than 27.5° off boresight.

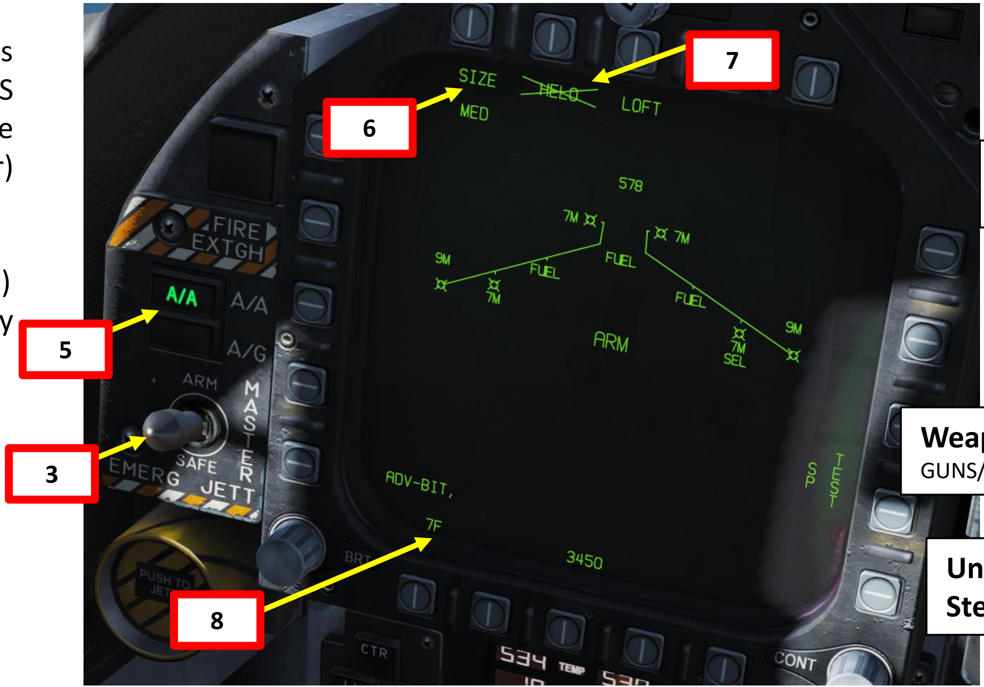
Wags' AIM-9X Tutorial: https://youtu.be/vLPkVOR5JY4

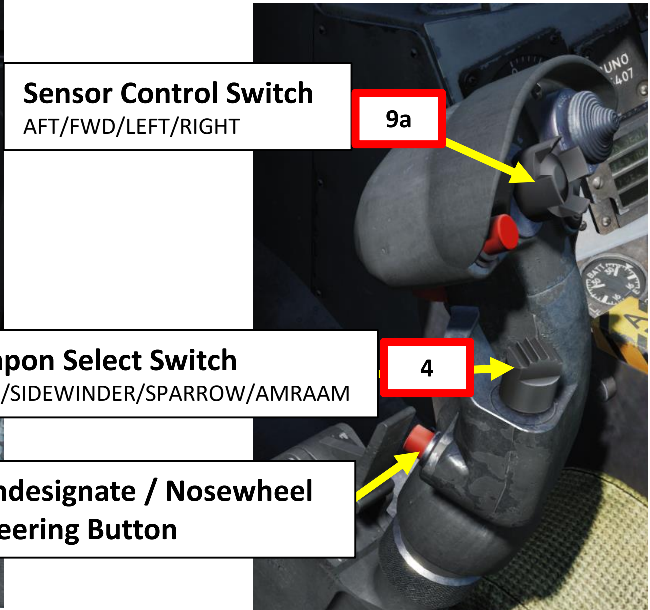
AIM-9X Tones: https://youtu.be/QV4GStRN5UU

3.6 - AIM-7F SPARROW AIR-TO-AIR SARH MISSILE (RADAR)

1. Radar Switch – OPERATE
2. Set RDR ATTK page on the right DDI and the SMS page on the left DDI (Digital Display Indicator) by pressing the MENU OSB, then selecting TAC or SUPT page, then choosing which menu to display on which DDI.
3. Master Arm switch – ARM (UP)
4. Weapon Select Switch – SPARROW, or « LSHIFT+W »
5. Master Mode switch will be automatically set to A/A
6. On SMS (Stores Management System) page, set your desired target size (SMALL/MEDIUM/LARGE).
7. If tracking helicopters, set HELO on the SMS page. Otherwise, leave HELO with an X on it.
8. If you have different types of Sparrows loaded, select desired Sparrow type on the SMS page.
9. When SPARROW is selected, radar is operating, press the Sensor Select Switch RIGHT to select BVR/RWS (Beyond Visual Range/Range While Scan) radar mode and slave the TDC (Throttle Designation Controller) to the radar screen.
10. Set desired radar range scale (40 nm in our case)
11. Set desired radar azimuth range (140 deg in our case)
12. Set desired radar bar mode (4 or 2 bars are generally used)



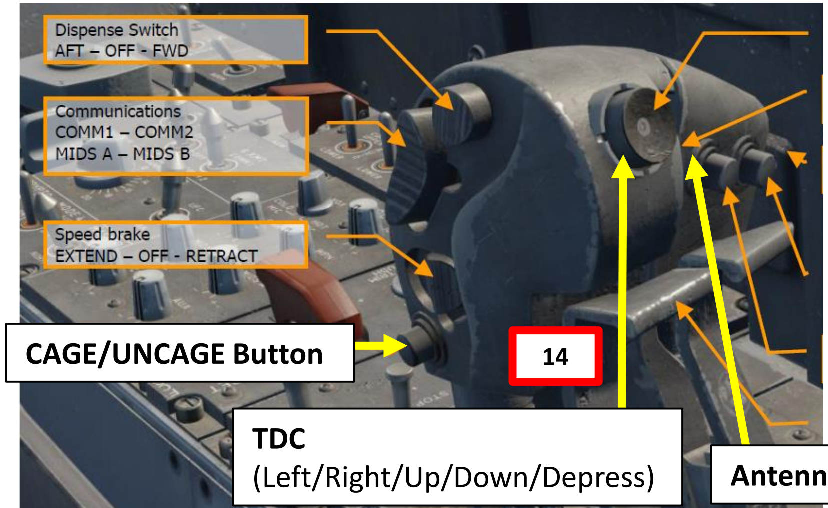


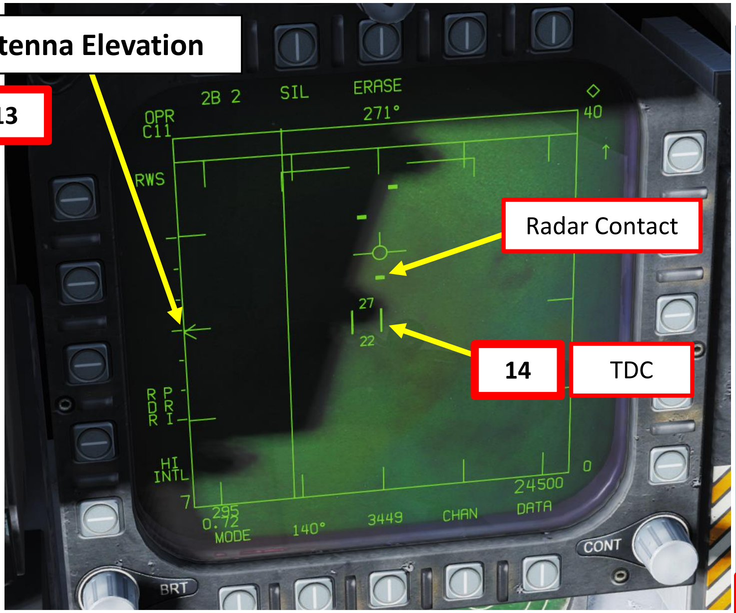


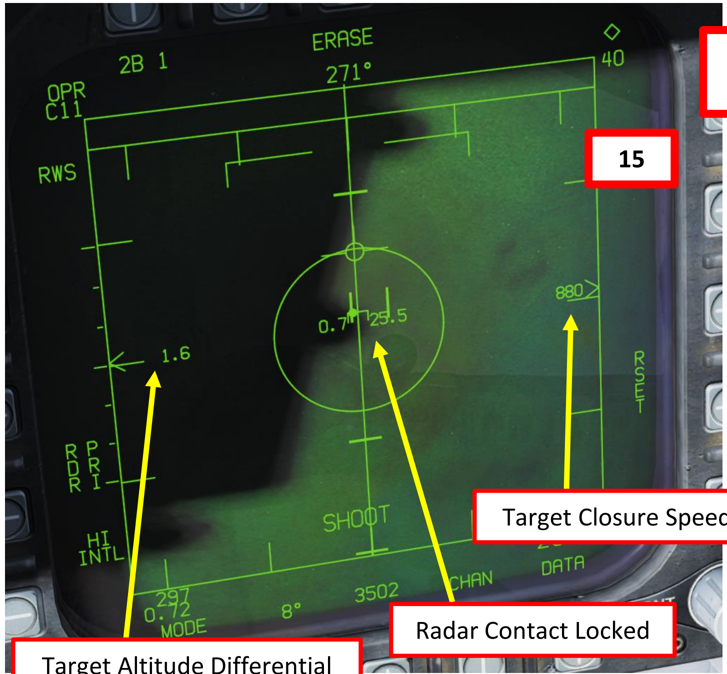
3.6 - AIM-7F SPARROW AIR-TO-AIR SARH MISSILE (RADAR)

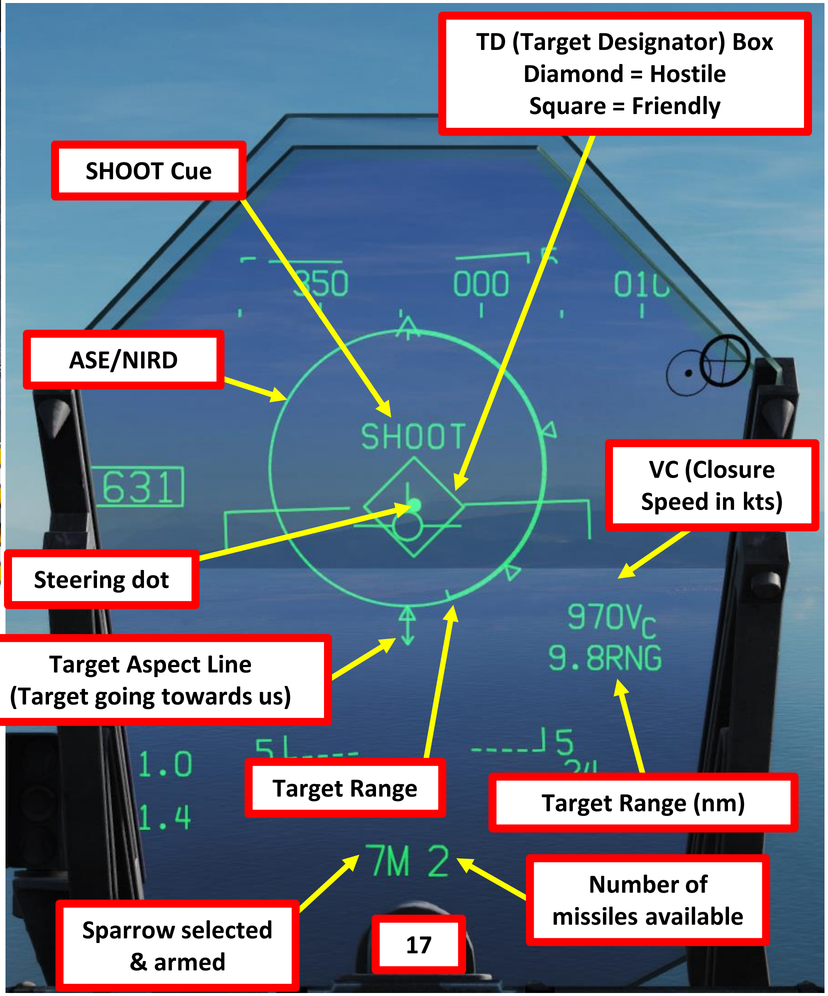
13. Control your antenna elevation to make sure the radar scans the desired area.
14. Move the TDC over the target using the TDC controls.
15. Lock target by using the TDC DEPRESS control (« ENTER »).
16. Fly to place target in ASE circle on the HUD to lock it on radar. When target is flying through this scan zone, it is automatically locked on to in STT (Single Target Track) mode
17. Fly to place the Steering Dot inside the ASE/NIRD (Allowable Steering Error / Normalized In-Range DIsplay) Circle and squeeze the gun trigger (« Spacebar ») when you see the SHOOT cue over the TD (Target Designation) box on the HUD to launch missile.

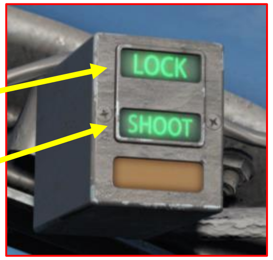
- Note 1: You can unlock a target by pressing the Undesignate Button
- Note 2: You can also use ACM (Air Combat Maneuvering) radar modes to lock a target, as shown in the AIM-9 Sidewinder tutorial.





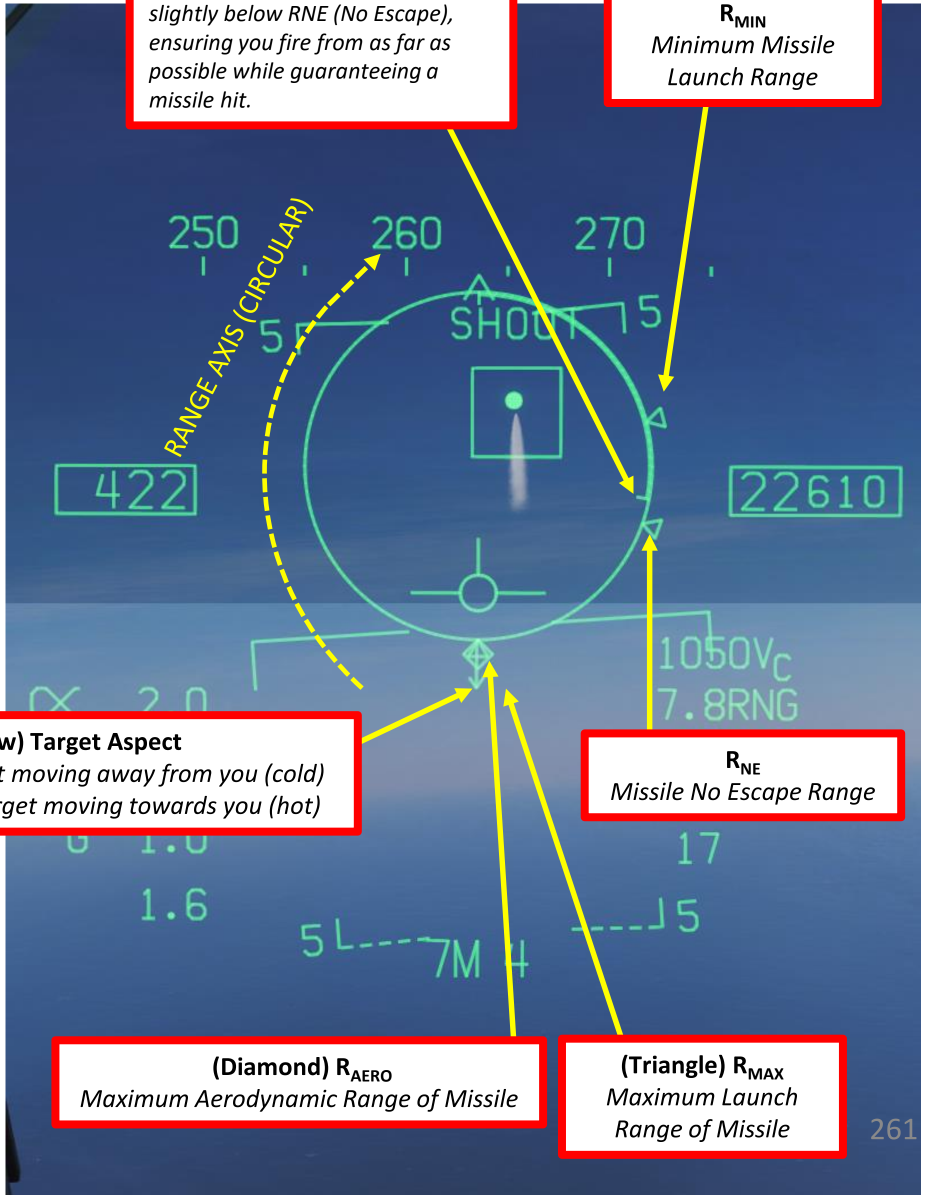






3.6 - AIM-7F SPARROW AIR-TO-AIR SARH MISSILE (RADAR)

TTG: Missile Time to Target (sec)



Target Range
Optimum missile firing range is slightly below RNE (No Escape), ensuring you fire from as far as possible while guaranteeing a missile hit.

R_{MIN}
Minimum Missile Launch Range

(Arrow) Target Aspect
Pointing Up = Target moving away from you (cold)
Pointing Down = Target moving towards you (hot)

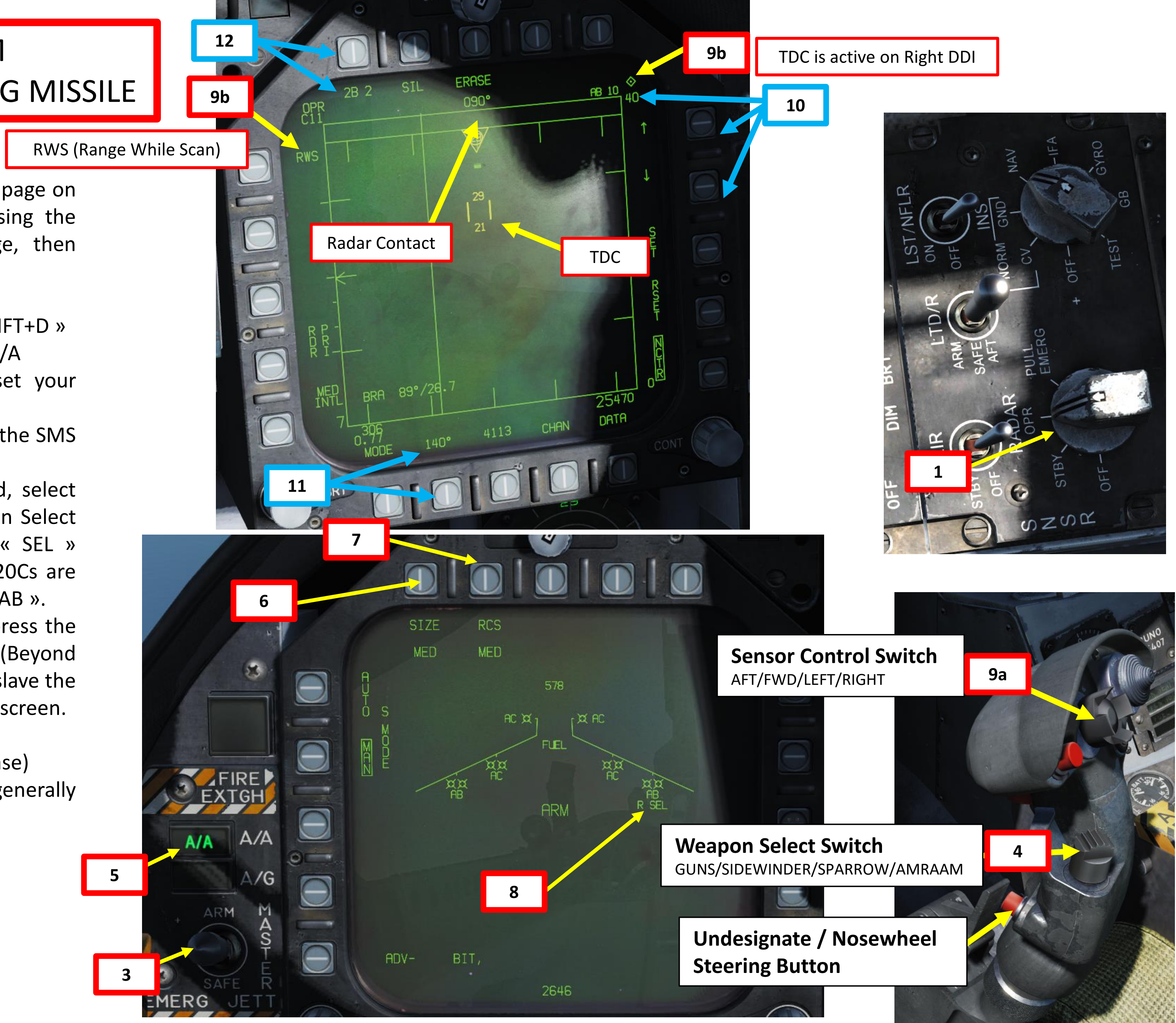
R_{NE}
Missile No Escape Range

(Diamond) R_{AERO}
Maximum Aerodynamic Range of Missile

(Triangle) R_{MAX}
Maximum Launch Range of Missile

3.7 - AIM-120B AMRAAM
AIR-TO-AIR ACTIVE RADAR HOMING MISSILE

1. Radar Switch – OPERATE
2. Set RDR ATTK page on the right DDI and the SMS page on the left DDI (Digital Display Indicator) by pressing the MENU OSB, then selecting TAC or SUPT page, then choosing which menu to display on which DDI.
3. Master Arm switch – ARM (UP)
4. Weapon Select Switch – Right/AMRAAM, or « LSHIFT+D »
5. Master Mode switch will be automatically set to A/A
6. On SMS (Stores Management System) page, set your expected target size (SMALL/MEDIUM/LARGE).
7. Set expected target RCS (Radar Cross-Section) on the SMS page (SMALL/MEDIUM/LARGE).
8. If you have different types of AMRAAMS loaded, select desired AMRAAM station by pressing the Weapon Select Switch – Right/AMRAAM, or « LSHIFT+D ». A « SEL » symbol will be near the selected station. AIM-120Cs are shown as « AC » while AIM-120Bs are shown as « AB ».
9. When AMRAAM is selected, radar is operating, press the Sensor Select Switch RIGHT to select BVR/RWS (Beyond Visual Range/Range While Scan) radar mode and slave the TDC (Throttle Designation Controller) to the radar screen.
10. Set desired radar range scale (40 nm in our case)
11. Set desired radar azimuth range (140 deg in our case)
12. Set desired radar bar mode (4 or 2 bars are generally used)



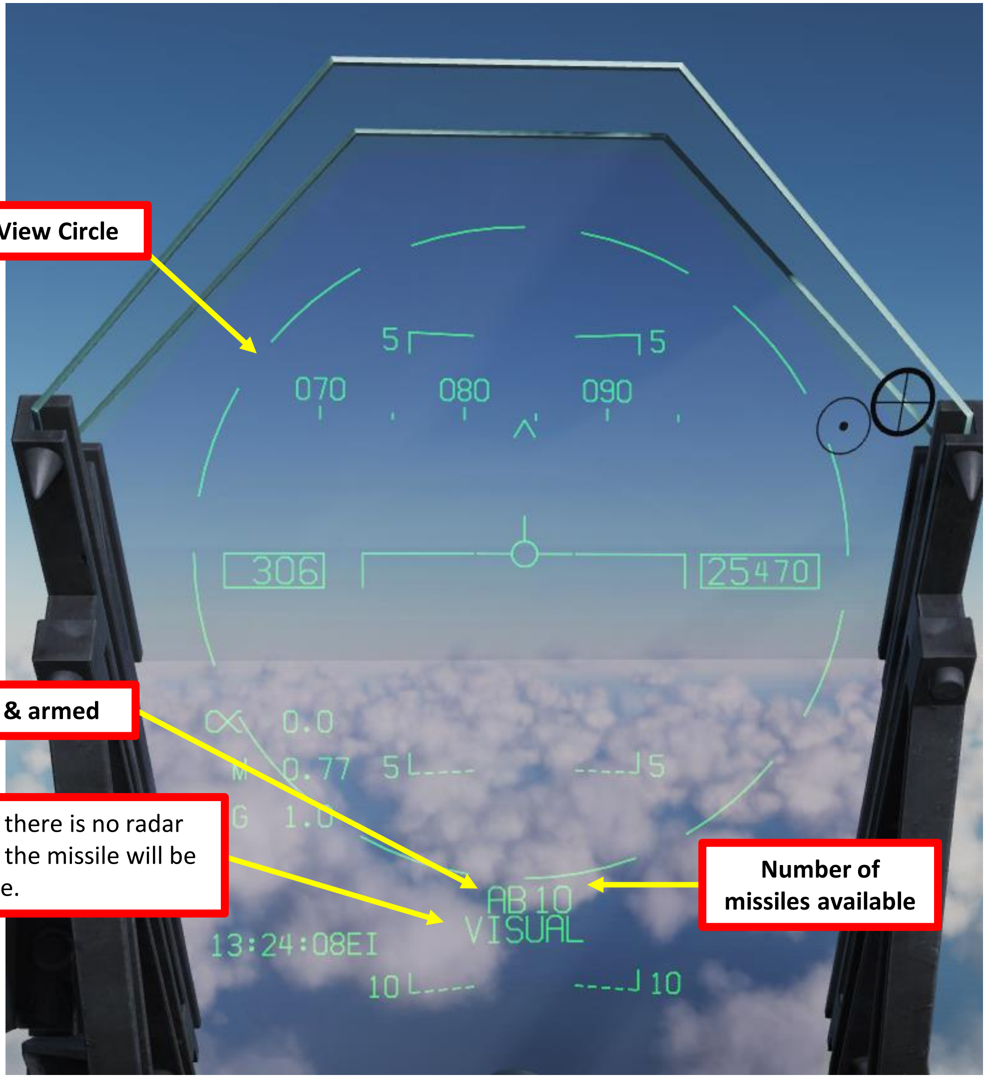
3.7 - AIM-120B AMRAAM
AIR-TO-AIR ACTIVE RADAR HOMING MISSILE

Note: When AMRAAM is selected and there is no radar lock yet, a large dashed circle will appear on the HUD. This circle is the seeker field of view if launched with no radar lock, which is termed a ***Mad Dog Launch***. A Mad Dog Launch will lock on to intercept the first target the missile seeker detects within the dashed circle area out to 10 miles.

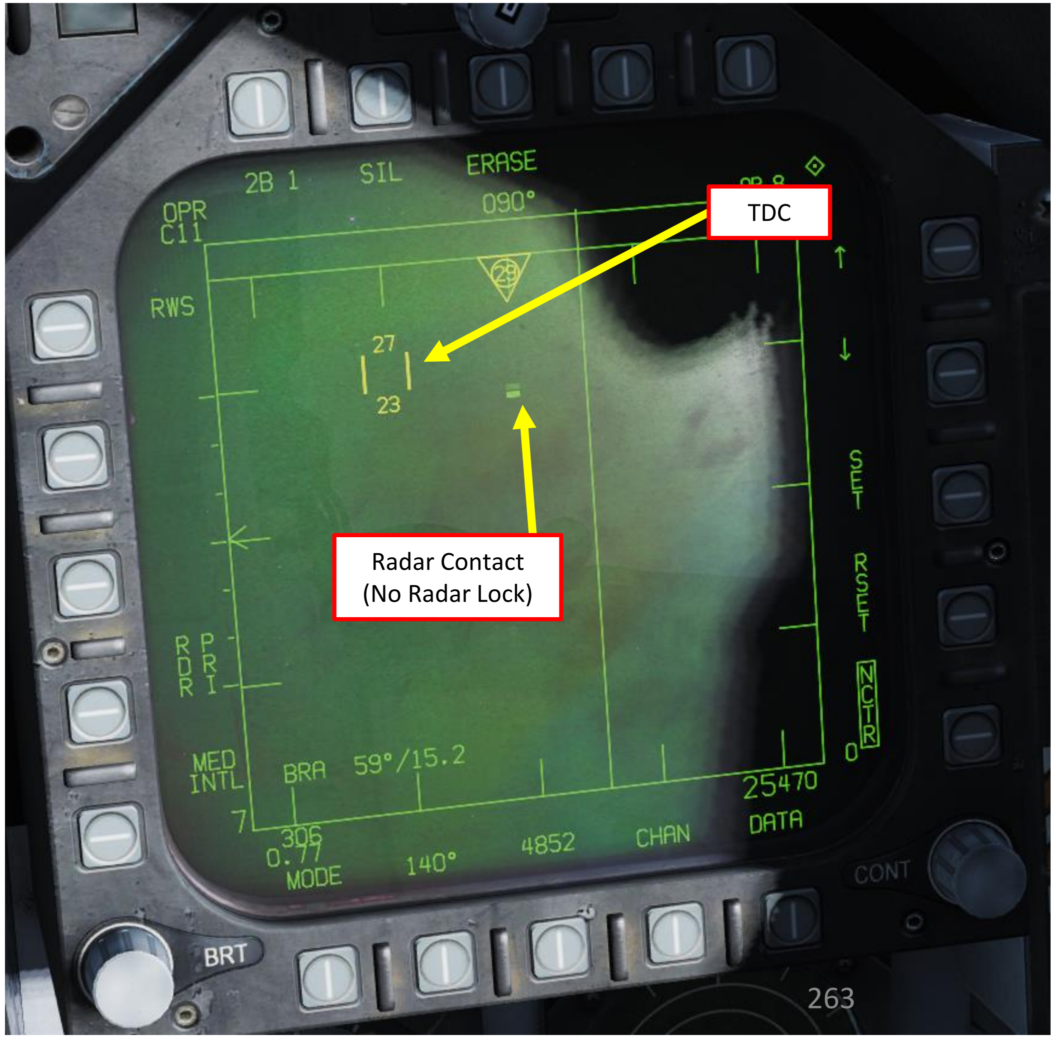
Mad Dog Launch Field-of-View Circle

AIM-120B selected & armed

VISUAL Indication means there is no radar lock and if launched now, the missile will be launched in Maddog mode.



Number of missiles available



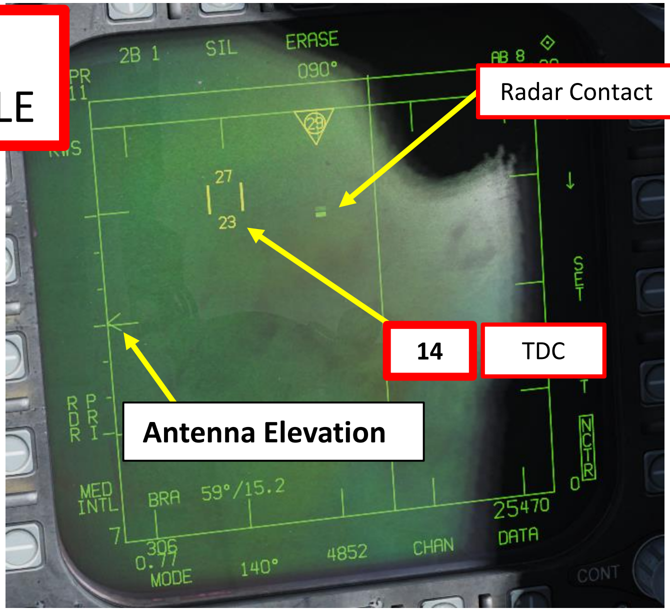
TDC

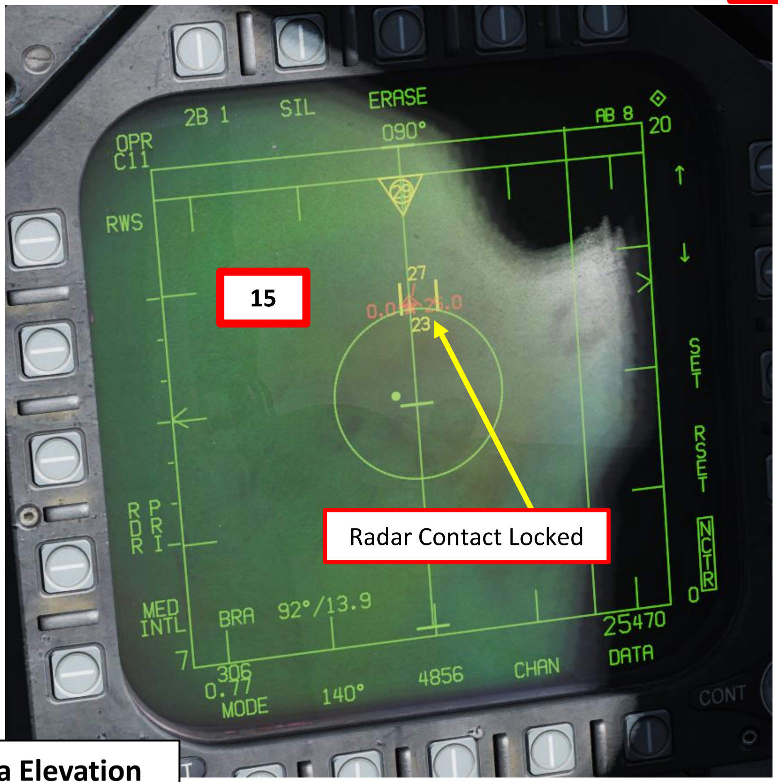
Radar Contact (No Radar Lock)

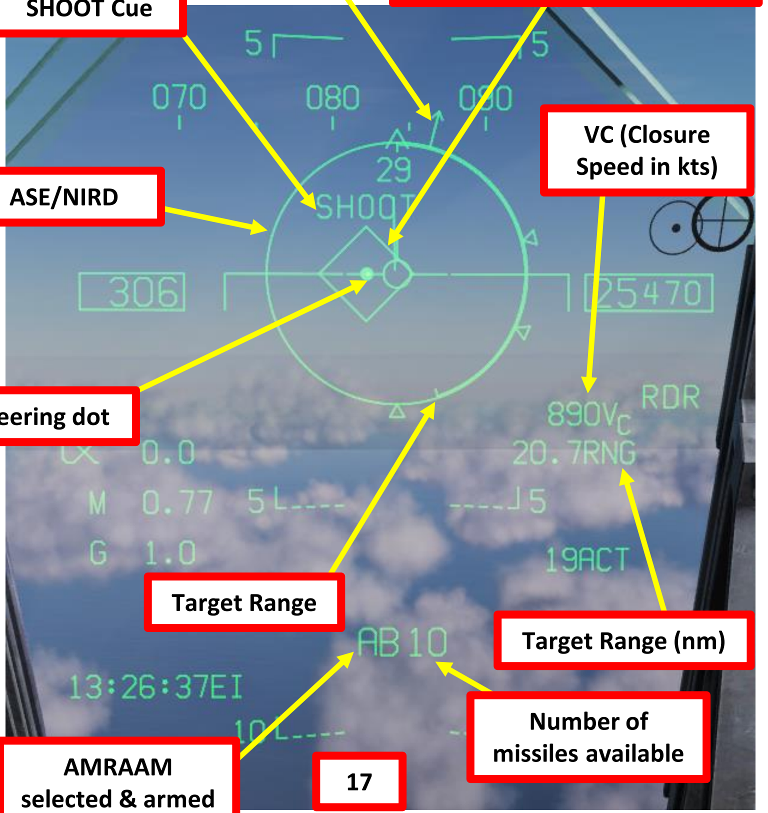
3.7 - AIM-120B AMRAAM
AIR-TO-AIR ACTIVE RADAR HOMING MISSILE

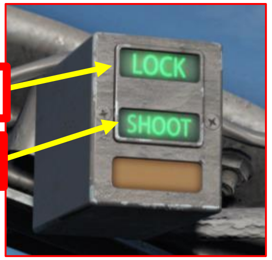
13. Control your antenna elevation to make sure the radar scans the desired area.
14. Move the TDC over the target using the TDC controls.
15. Lock target by using the TDC DEPRESS control (« ENTER »).
16. Fly to place target in ASE circle on the HUD to lock it on radar. When target is flying through this scan zone, it is automatically locked on to in STT (Single Target Track) mode
17. Fly to place the Steering Dot inside the ASE/NIRD (Allowable Steering Error / Normalized In-Range DIsplay) Circle and squeeze the gun trigger (« Spacebar ») when you see the SHOOT cue over the TD (Target Designation) box on the HUD to launch missile.

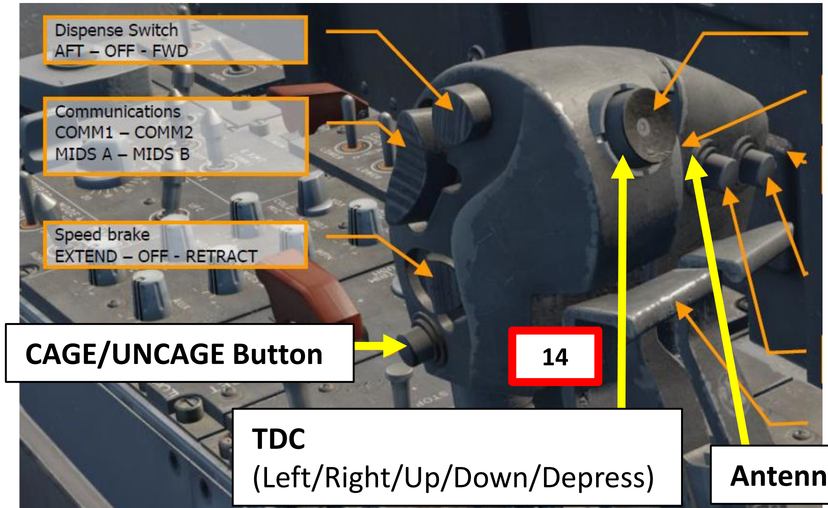
- Note 1: You can unlock a target by pressing the Undesignate Button
- Note 2: You can also use ACM (Air Combat Maneuvering) radar modes to lock a target, as shown in the AIM-9 Sidewinder tutorial.





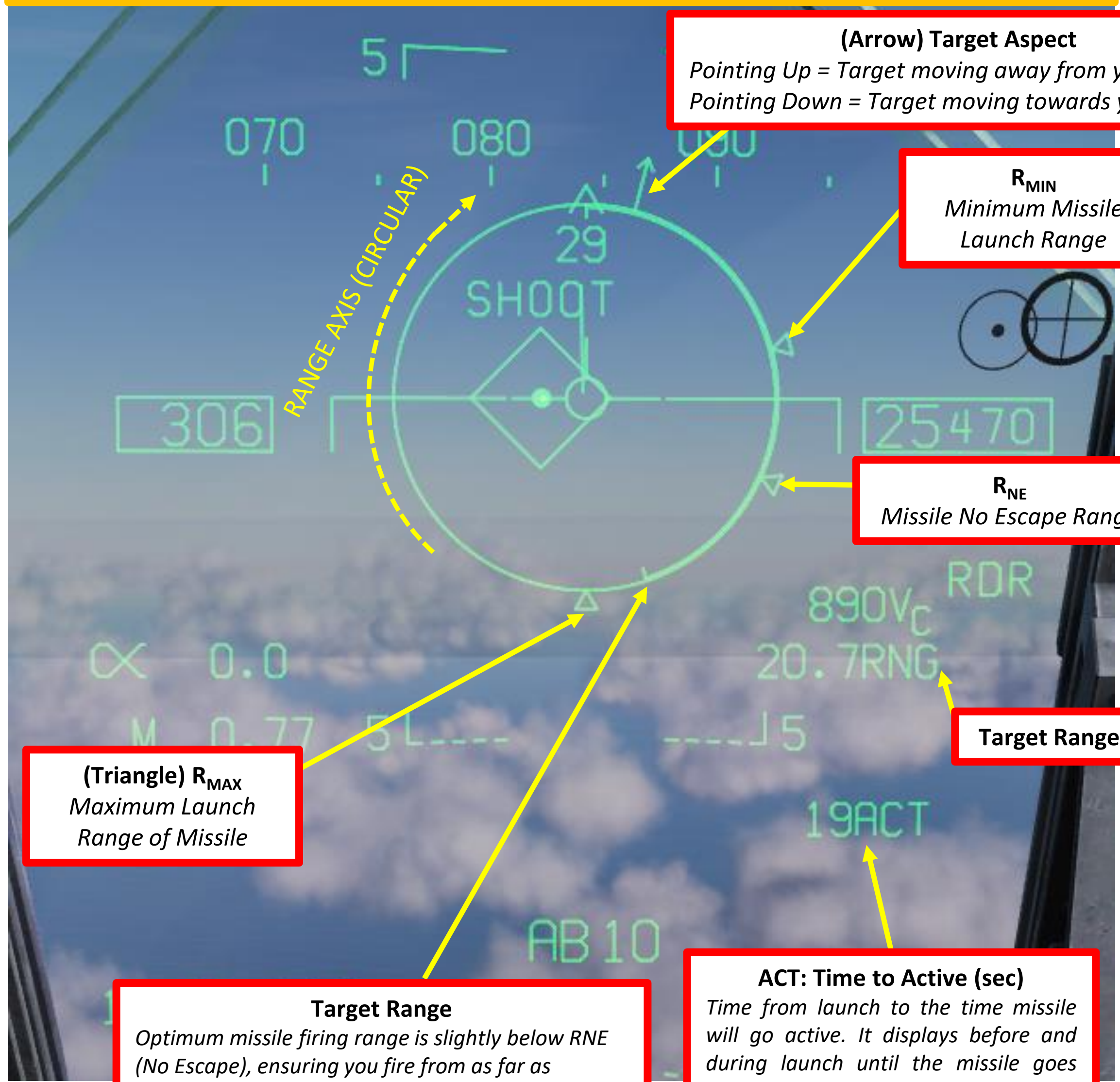






3.7 - AIM-120B AMRAAM
AIR-TO-AIR ACTIVE RADAR HOMING MISSILE

Missile has not been fired yet



(Arrow) Target Aspect
Pointing Up = Target moving away from you (cold)
Pointing Down = Target moving towards you (hot)

R_{MIN}
Minimum Missile Launch Range

R_{NE}
Missile No Escape Range

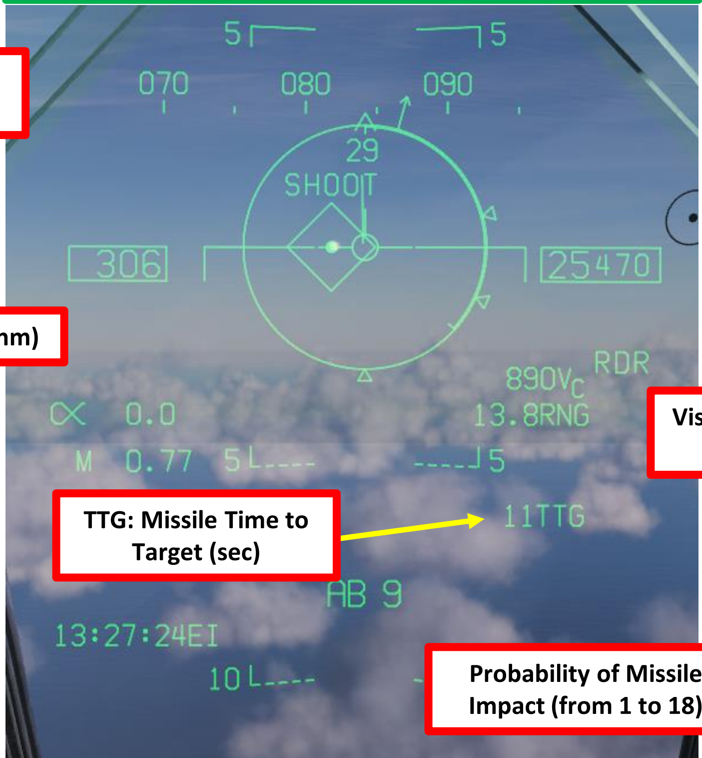
Target Range (nm)

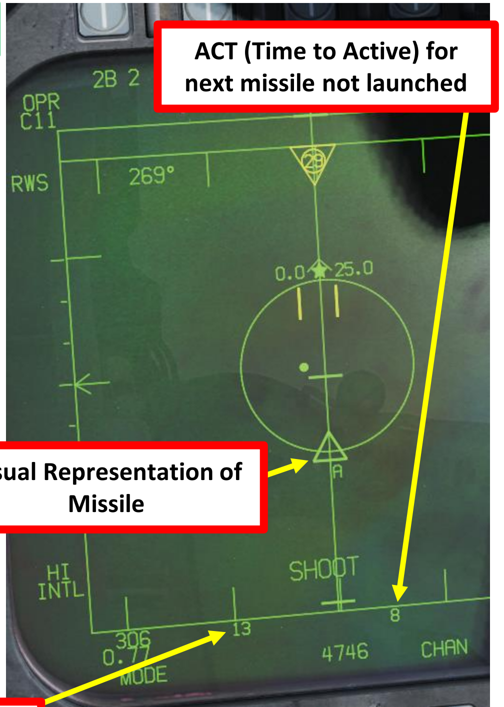
(Triangle) R_{MAX}
Maximum Launch Range of Missile

Target Range
Optimum missile firing range is slightly below RNE (No Escape), ensuring you fire from as far as possible while guaranteeing a missile hit.

ACT: Time to Active (sec)
Time from launch to the time missile will go active. It displays before and during launch until the missile goes active

Missile has been fired, Range of seeker is less than 10 nm





ACT (Time to Active) for next missile not launched

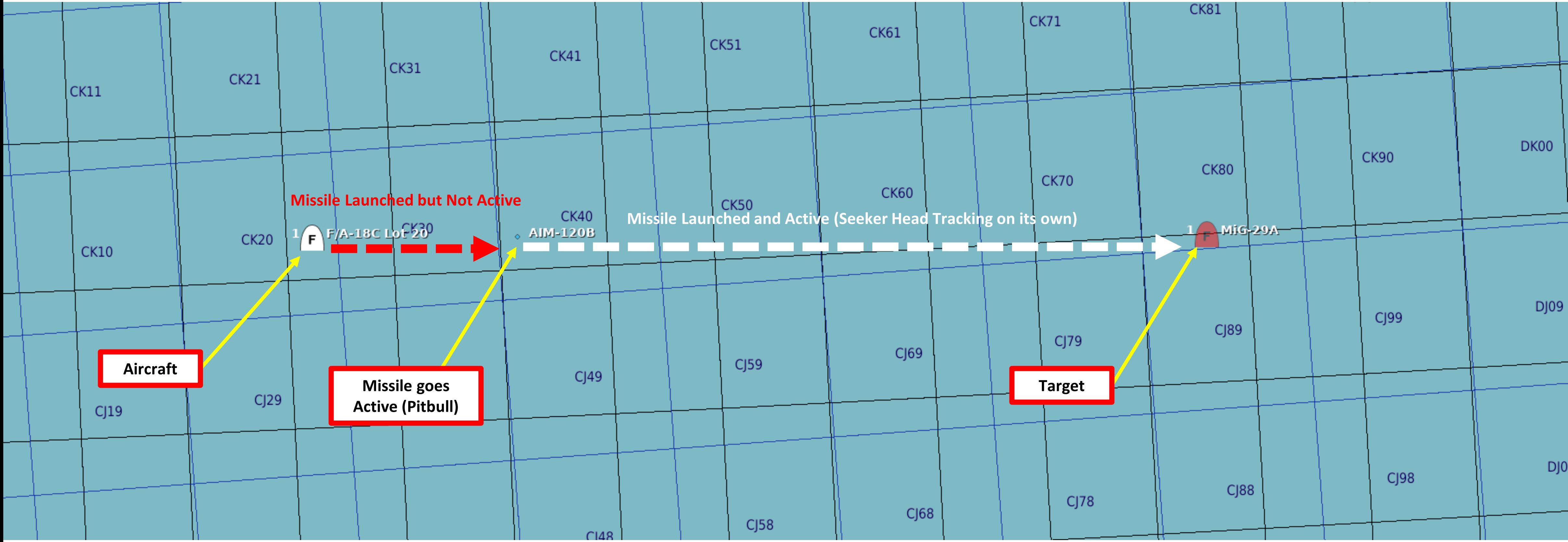
Visual Representation of Missile

TTG: Missile Time to Target (sec)

Probability of Missile Impact (from 1 to 18)

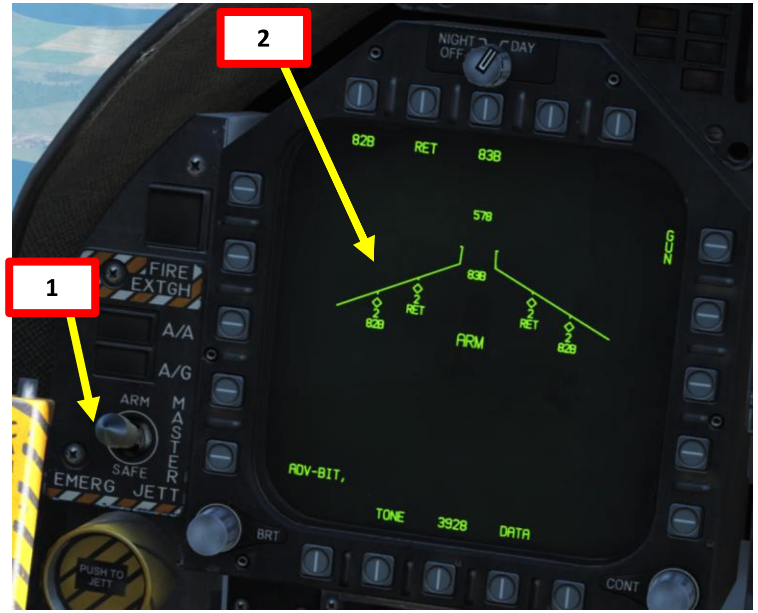
3.7 - AIM-120B AMRAAM
AIR-TO-AIR ACTIVE RADAR HOMING MISSILE

Note: When you first fire an AMRAAM missile, the missile is initially guided by your own radar. However, an « active radar homing missile » also has his own radar inside the seeker head. The moment the missile goes « active » (meaning it will start self-homing/tracking targets on his own instead of using your aircraft's radar) is called « Pitbull ». When the missile goes « Pitbull », the missile truly becomes fire-and-forget. NATO brevity word "Pitbull" would be called out on the radio to inform other pilots, just as "Fox Three" would be called out upon launch.



4 - SELECTIVE ORDNANCE JETTISON

1. Set Master Arm Switch – ON
2. Consult SMS (Stores Management System) page's wingform to see what is loaded on what pylon
3. Select store you want to jettison (Left Inner, Right Inner, Left Outer, Right Outer, Center) using the LI, RI, LO, RO, CTR pushbuttons
4. Rotate the Selective Jettison knob to desired release mode (we will use RACK/LCHR).
    - L FUS MSL and R FUS MSL are used to jettison AIM-7 or AIM-120 missiles attached to the fuselage
    - RACK/LCHR drops the weapon and its launcher rack
    - STORES drops the weapon but not its attachment rack
5. Press and hold the red JETT (Jettison) button to jettison ordnance.
6. Return Selective Jettison knob back to SAFE



5 – VIDEO TUTORIALS

2 – Air-to-Ground Weapons

2.1 – Unguided Bomb (MK-82 – CCIP)
https://youtu.be/JrMDXwaSHzE
2.2 – Unguided Bomb (MK-82 – CCRP/AUTO)
https://youtu.be/JrMDXwaSHzE
2.3 – Rockets
https://youtu.be/R1BTgGYij5o
2.4 – M61A2 Guns (Air-to-Ground)
https://youtu.be/R1BTgGYij5o
2.5 – GBU-38 JDAM (Pre-Planned)
https://youtu.be/UZ4uoT0sPK4
2.6 – AGM-154A JSOW (TOO)
https://youtu.be/YAhISGnrjtk
2.7 – GPS-Guided Ordnance - JDAM (Targeting Pod)
https://youtu.be/snpgsO-vwu8?t=615
2.8 – GBU-12 Paveway II (Laser-Guided)
https://youtu.be/urGAhuxmaEk
2.9 – AGM-65F/G Maverick (IR-MAVF)
https://youtu.be/cqIHsxfXsVM
2.10 – AGM-65E Maverick (Laser-Guided MAV)
https://youtu.be/uW7EO1VlGdw
2.11 – AGM-88C HARM (TOO)
https://youtu.be/2yS4eKuVjVw
2.12 – AGM-88C HARM (SP)
https://youtu.be/bf6EH9gRxlw
2.13 – AGM-84D Harpoon (BOL)
https://youtu.be/xoJLCxEzexk
2.14 – AGM-84D Harpoon (RB/L)
https://youtu.be/oDBPUkm2NYY

3 – Air-to-Air Weapons

3.1 – M61A2 Guns (Funnel / No Radar Tracking)
https://youtu.be/jPe4k_Zo0MM
3.2 – M61A2 Guns (Radar Tracking)
https://youtu.be/jPe4k_Zo0MM
3.3 – AIM-9M (No Radar)
https://youtu.be/em9Kr31nPJE
3.4 – AIM-9M (Radar)
https://youtu.be/em9Kr31nPJE
3.5 – AIM-9X (JHMCS)
https://youtu.be/ceUtluGFFLM
3.6 – AIM-7F (Radar)
https://youtu.be/3SKP0uFdI2M
3.7 – AIM-120B (Radar)
https://youtu.be/MJOQfylt6nE

INTRODUCTION

Countermeasures are very simple to use. You have three countermeasure types at your disposal: flares, chaff and an ECM (Electronic Countermeasure) jammer. We will explore together what is used against what, and how.

Missiles can generally track you using 2 things: radar signature (radar waves are sent on you and you reflect them, which is called a "radar signature") and heat signature (like the exhaust of your engines). Countermeasures will only be effective against the kind of weapon it was meant to counter; a heat-seeking missile will not care if you deploy electronic countermeasures against it since it tracks heat, not radar signatures. This is why it is important to know what is attacking you in order to counter it properly. This is what the **RWR** (Radar Warning Receiver) is for: to help you know what is firing at you so you can take the adequate action to counter it.

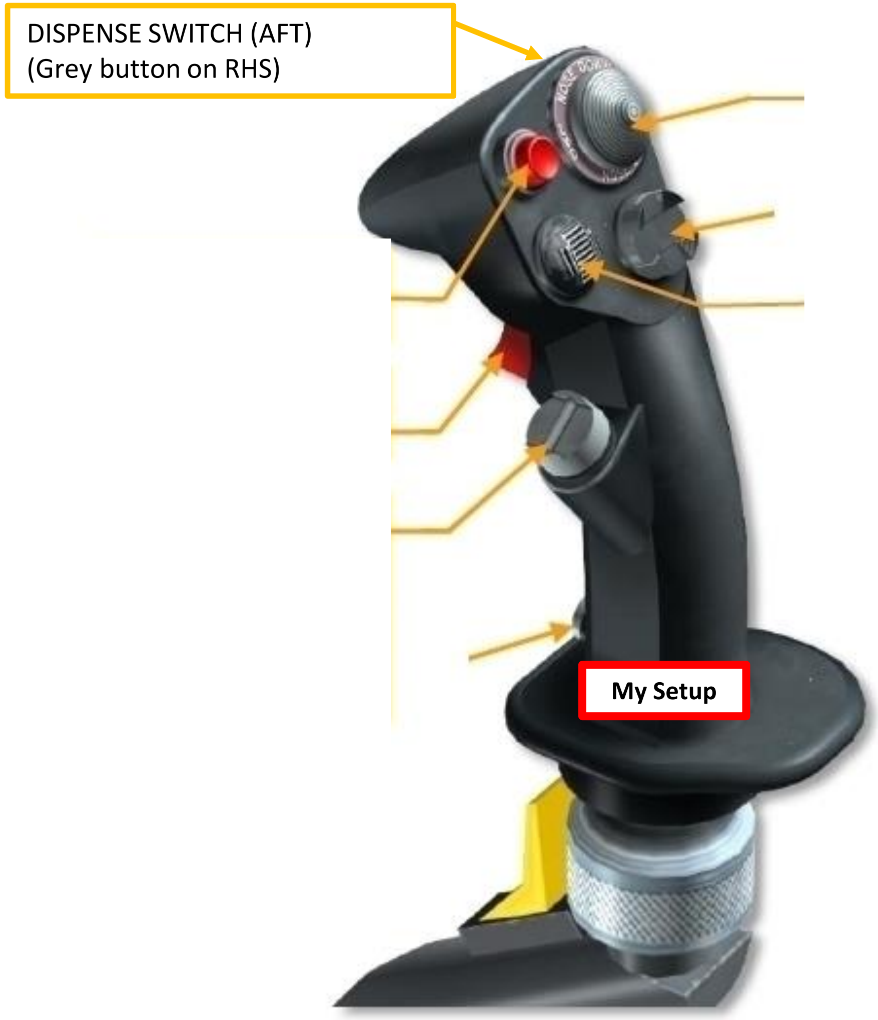
Flares are used against missiles that track heat (infrared or IR) signatures. Instead of going for the heat signature generated by your engines, a missile will go for a hotter heat source like flares.

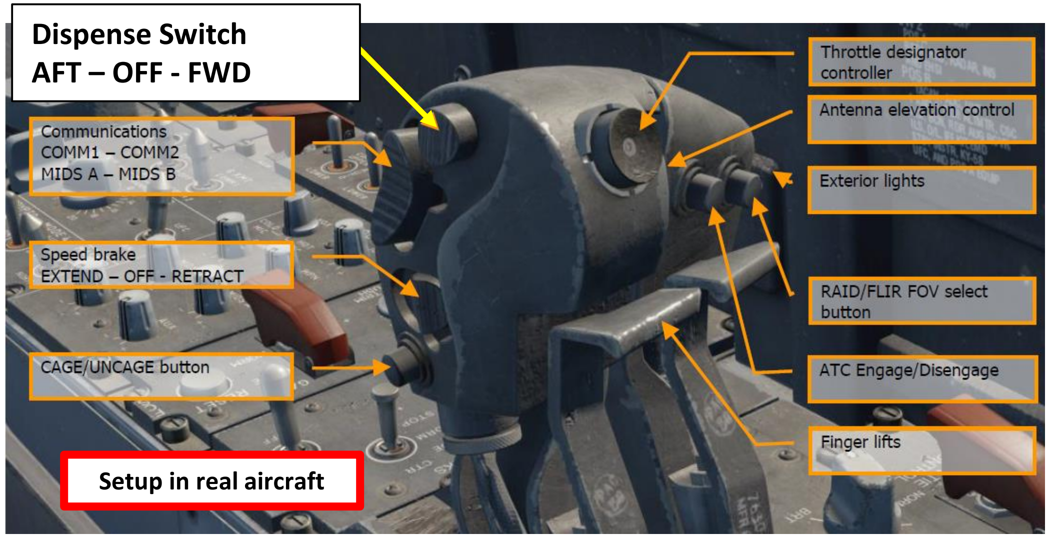
Chaff is a form of "passive" jamming. Passive (reflected) jamming is when a deceptive object or device reflects radar waves. Chaff is simply a bundle of small pieces of metal foil with reflective coating, which creates clusters of radar signatures that prevent a radar to get a solid lock on the aircraft itself.

The **AN/ALQ-165 Airborne Self Protection Jammer (ASPJ)** is the onboard Electronic Countermeasure (**ECM**) system. It is a form of "continuous" jamming, also called "active" or "transmitted" jamming. This device transmits its own synchronized radar waves back at your enemy's radar receiver to simulate erroneous radar wave returns. Simply put, active jamming will try to drown a radar in white noise.

In order to use these three forms of countermeasures, you can use "countermeasure programs", routines that will deploy a number of flares/chaff for a number of cycles at a given interval.

COUNTERMEASURES CONTROL SETUP





AN/ALR-67 RWR (RADAR WARNING RECEIVER)

The RWR (Radar Warning Receiver) will tell if you are being searched or locked by radar. Just press the RWR ON button below the AMPCD and set up your EW (Early Warning) page on either DDI and you will have a top-down view of your aircraft.

The annunciator threat lights will tell you which type of threat is locking you. CW is for continuous wave emissions, AI is for Air Intercept, SAM is for surface-to-air-missiles, and AAA is for anti-aircraft artillery radar. DISP is for when the ALE-47 countermeasure dispenser system has a program ready for the detected threat and is waiting for start consent. In addition, a DISPENSE cue will be displayed on the HUD.

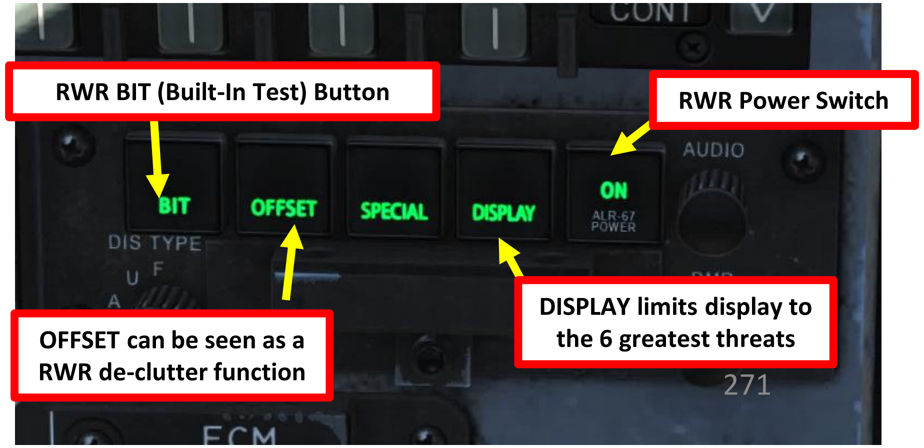
The EW (Early Warning) page and Azimuth Display will locate the radar emitters' heading but not their range. Instead, their spacing from the center of the RWR circle refers to the lethality of the threat. The inner band (critical) is generally missiles in flight. The middle band (lethal) is for radars actively tracking you. The outer band is classified as non-lethal since these are radars searching for you, not actively tracking you.

RWR EW Page

RWR Azimuth Display

If an indication is illuminated, it means the radar emitter has a solid lock on you. Tones also indicate what's happening (new contact, radar lock warning, missile launch, etc.) The faster the tone frequency, the greater the danger.

The RWR is still a work-in-progress at the moment and its current implementation is subject to change.



AN/ALR-67 RWR (RADAR WARNING RECEIVER)

If too many contacts start overlapping each other, you can use the “OFFSET” function, which will spread out enemy contacts. This can be quite useful when using HARMs in order to select a specific radar emitter. Keep in mind that when the OFFSET function is used, you will no longer have any directional information on the emitters, so you will need to set the OFFSET mode to OFF.

OFFSET can be seen as a RWR de-clutter function

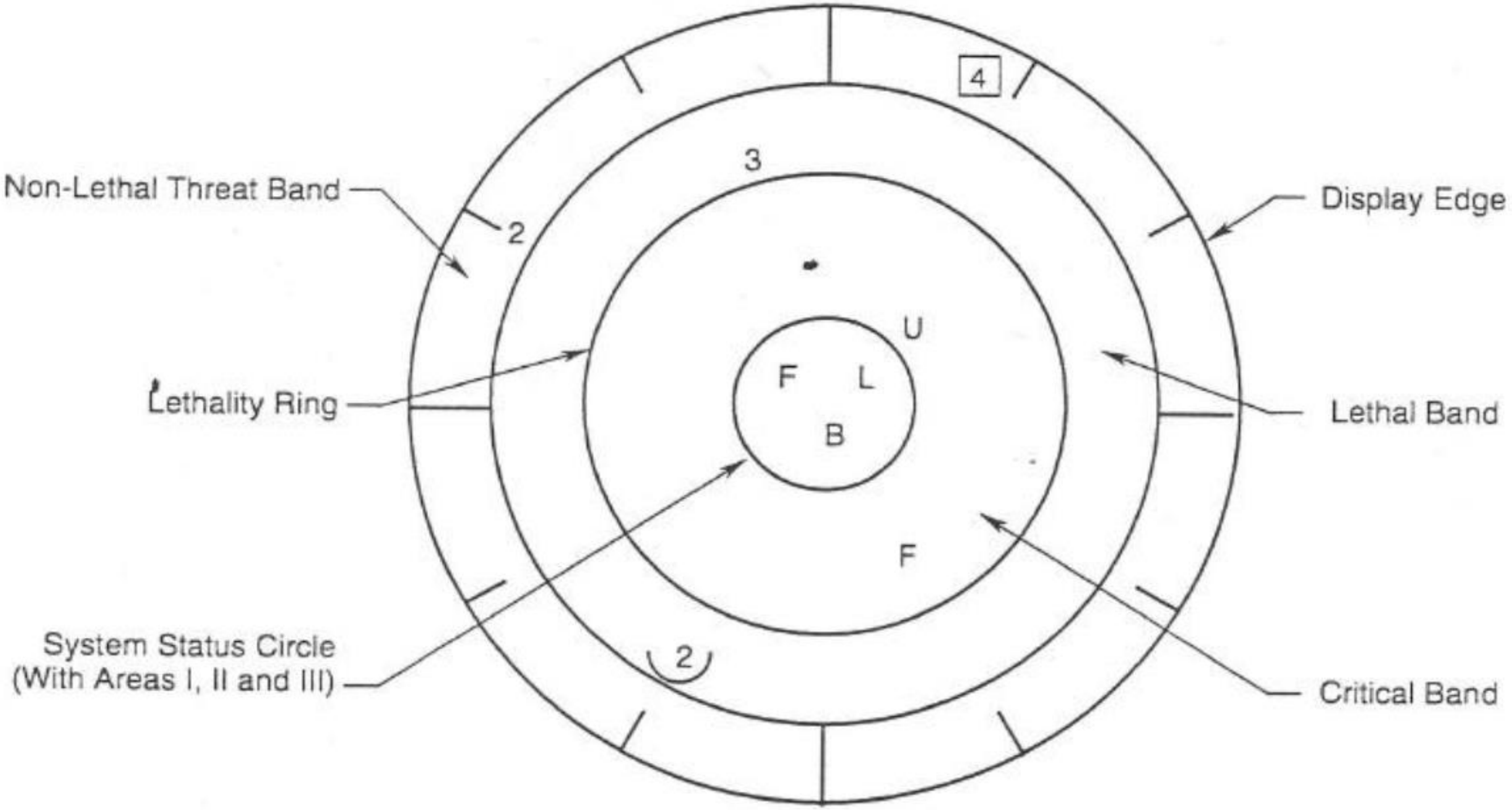
AN/ALR-67 RWR (RADAR WARNING RECEIVER)

Source: Eagle Dynamics Early Access Manual (as of 10/06/2018). Remember that the RWR is currently a work-in-progress and its logic may be subject to change. This guide will be updated accordingly if such changes are made.

The status circle is in the center of the azimuth indicator and displays ALR-67(V) system status. The status circle is divided into three areas of display:

Upper left quadrant of circle (area I)
Upper right quadrant of circle (area II)
Bottom half of circle (area III)

- Area I displays the priority setting of the EW Mode as set on the EW page (N, I, A, U or F).
- Area II is either blank when ALR-67(V) system is operating in the full display mode, or displays the character L when operating in the display limit mode.
- Area III displays current ALR-67(V) Built-In Test (BIT) status. Area III is blank when there are no ALR-67(V) system failures. The character B is displayed when a failure is detected. The character T is displayed when a thermal overload has been detected in Countermeasures Computer or RADAR Receiver.



AN/ALR-67 RWR (RADAR WARNING RECEIVER)

Note: “U” symbol stands for “Unknown”, which is sometimes attributed to ships.

List made by .408-X~RAY

RWR	Name
3	S125 TR SNR
6	Kub STR 9S91
8	Osa 9A33
10	RLS 5H63C
10	S300PS TR 30N6
11	BUK LL
11	Buk LN 9A310M1
11	F-111
12	RLS 9C32 1
12	S300V 9A82
12	S300V 9A83
13	C-130
13	Strela-9A35M3
14	F-14
15	F-15
15	Tor 9A331
16	F-16
17	C-17
18	FA-18
22	Tu-22M3
23	MIG-23
24	Su-24
25	MiG-25P
29	MIG-29
29	Su-27
29	Su-33
30	Su-30
31	MiG-31
34	Su-34
39	Su-39
40	Spruance
48	Vinson
49	Perry
50	A-50
52	B-52
76	IL-76
78	IL-78
95	Tu-95
A	Gepard
A	Vulcan M163
A	ZSU 23 4 Shilka
AE	Ticonderoga
AN	AN-26B
AN	AN-30M

RWR	Name
AV	AV-8B
B1	B-1
BB	S300PS SR 64H6E
BD	RLO 9C15MT
BJ	Tu-160
CD	Bobruisk
CD	Bora
CS	S300PS SR 5N66M
DE	Dog Ear
DT	Osa
E2	E-2C
E3	E-3
E6	EA-6B
F2	F-2
F4	F-4E
F5	F-5E
GR	Roland rdr
HA	Hawk SR ANMPQ 50
HK	Hawk TR ANMPQ 46
HN	Grozny
HN	Orel
HN	Skory
HP	Albatros
HS	RLO 9C19M2
KC	KC-10
KC	KC-135
M2	Mirage
PP	Veter
PS	Molniya
PT	Patriot STR ANMPQ 53
RO	Roland ADS
S	EWR 1L13
S	EWR 55G6
S	S125 SR P 19
S3	S-3
S6	Tunguska 2S6
SC	Ametyst
SD	Buk SR 9S18M1
SW	Kuznecow
T2	Moscow
TP	Neustrash
TP	Rezky
TS	Azov
Tu	Tu-142

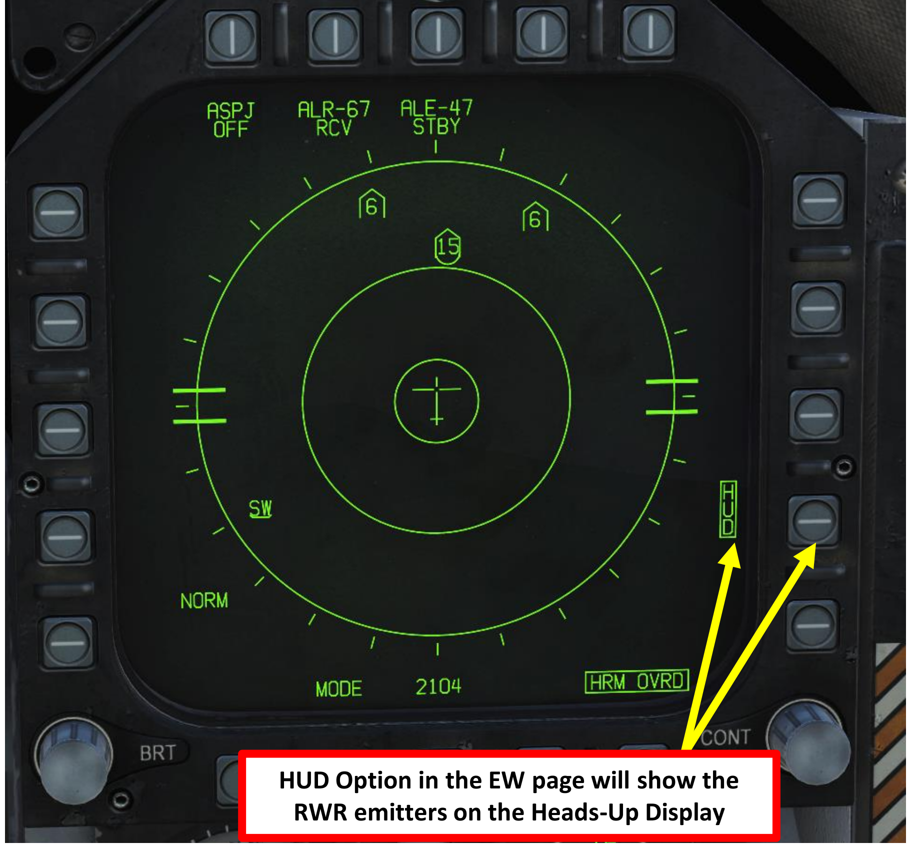
House Symbol means it is a Ground Emitter

Lower Bar means a Naval Emitter

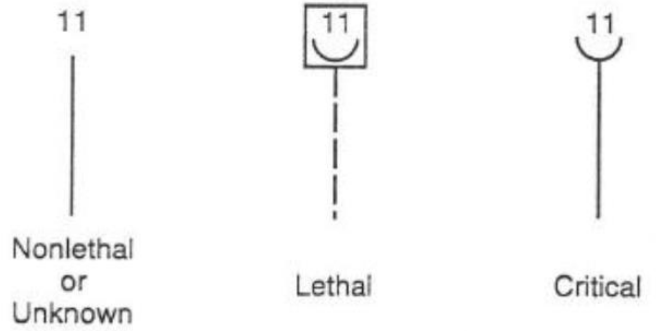
Lower Arc means an Emitter is locking you

AN/ALR-67 RWR HUD Display

The RWR (Radar Warning Receiver) can also be displayed on the Heads-Up Display.



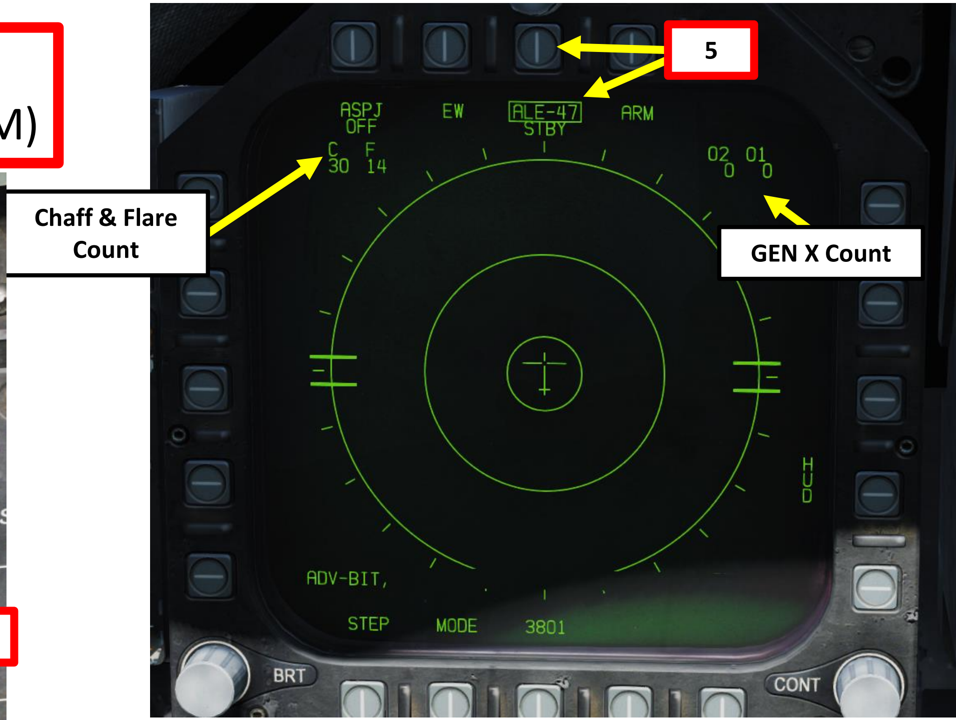
- Non-critical/lethal steams are solid and short
- Critical threat stems are solid and long
- Lethal threat stems are dashed and long



COUNTERMEASURES - CHAFF & FLARES
AN/ALE-47 ACMDS (AIRBORNE COUNTERMEASURES DISPENSER SYSTEM)

COUNTERMEASURE PROGRAM & USAGE TUTORIAL

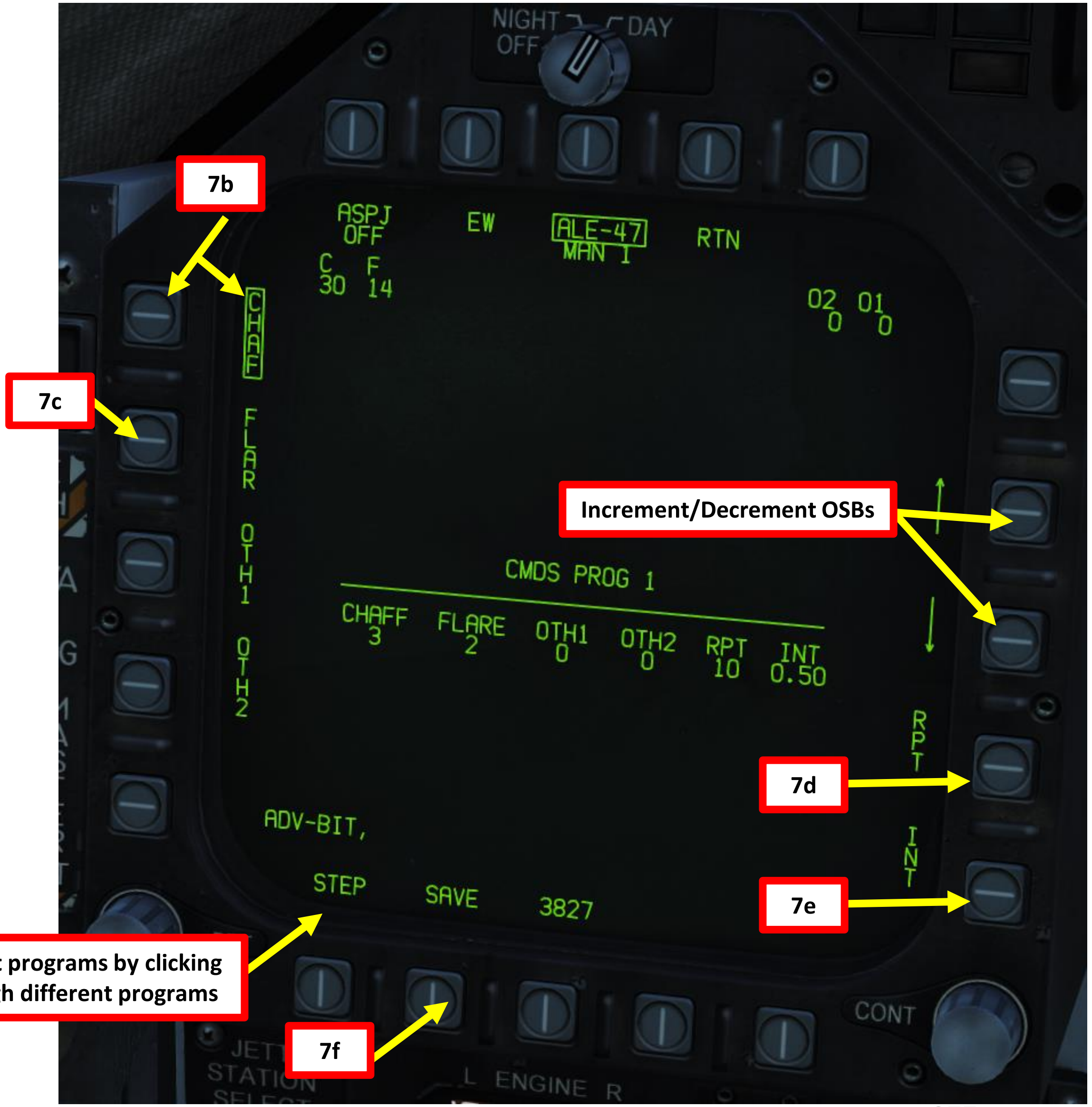
1. Set Master Arm Switch – ON
2. In the TAC menu, select the EW (Early Warning) page
3. Set DISPENSER switch – ON (MIDDLE)
4. ALE-47 status will perform a series of built-in tests by going to SF TEST (Self-Test), then PBIT GO, then to STBY.
5. Once ALE-47 status is set to STBY, click on the OSB above ALE-47 to select the countermeasure dispenser. ALE-47 will be boxed in green.
6. Click the OSB next to MODE to select desired dispenser mode (MAN1 (Manual), S/A (Semi-Automatic), AUTO, STBY). We will choose MAN1.



COUNTERMEASURES - CHAFF & FLARES
AN/ALE-47 ACMDS (AIRBORNE COUNTERMEASURES DISPENSER SYSTEM)

COUNTERMEASURE PROGRAM & USAGE TUTORIAL

7. To create a countermeasure program:
   a) Press the OSB next to ARM
   b) Configure Chaff by pressing the OSB next to CHAF, then use the Increment/Decrement OSBs to set the desired number
   c) Configure Flares by pressing the OSB next to FLAR, then use the Increment/Decrement OSBs to set the desired number
   d) Configure the number of repetitions by pressing the OSB next to RPT, then use the Increment/Decrement OSBs to set the desired number
   e) Configure the interval time (sec) by pressing the OSB next to INT, then use the Increment/Decrement OSBs to set the desired number
   f) Press the OSB next to SAVE to save countermeasure program 1

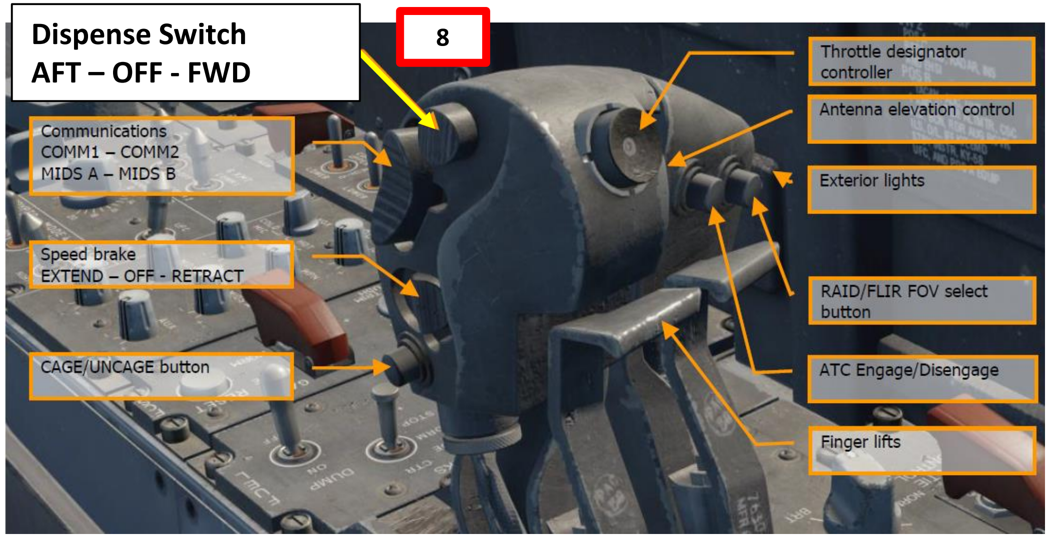


COUNTERMEASURES - CHAFF & FLARES
AN/ALE-47 ACMDS (AIRBORNE COUNTERMEASURES DISPENSER SYSTEM)

COUNTERMEASURE PROGRAM & USAGE TUTORIAL

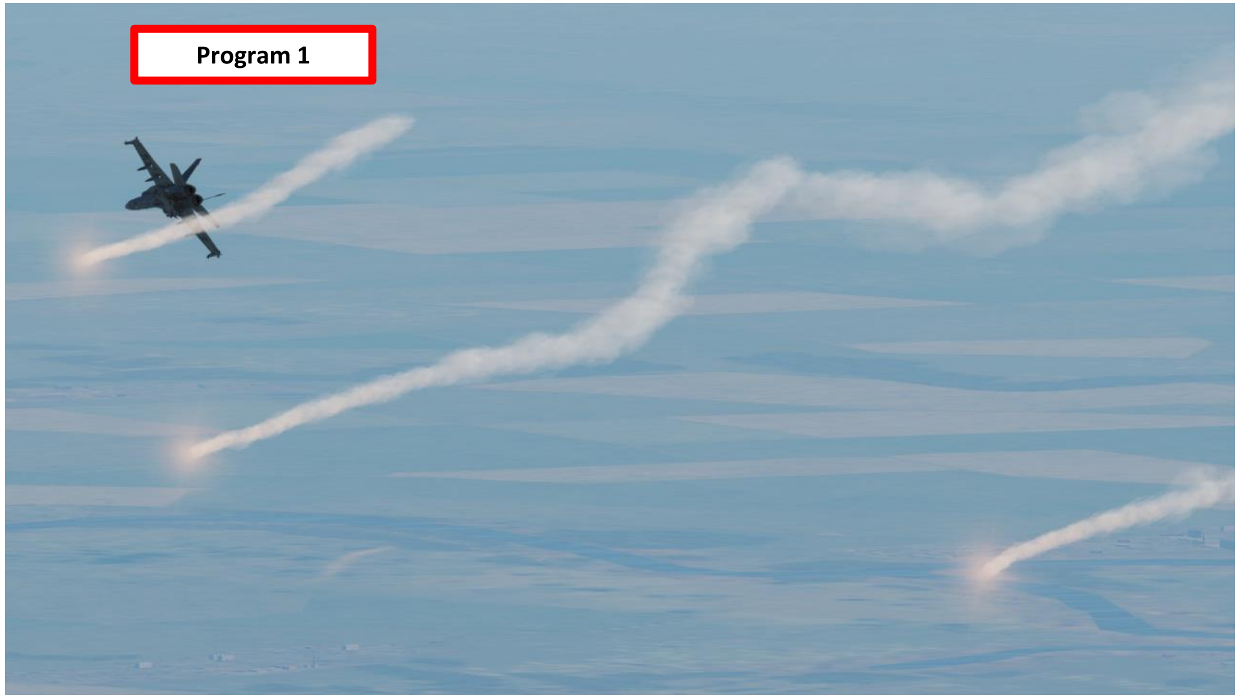
8. To dispense countermeasures using Program 1, press the Dispense Switch – AFT button (key binding: D).

Note: the Dispense Switch – FWD button will use Program 5 by default. You can modify which program is used by either AFT or FWD Dispense by clicking on the STEP OSB.



Countermeasure Modes

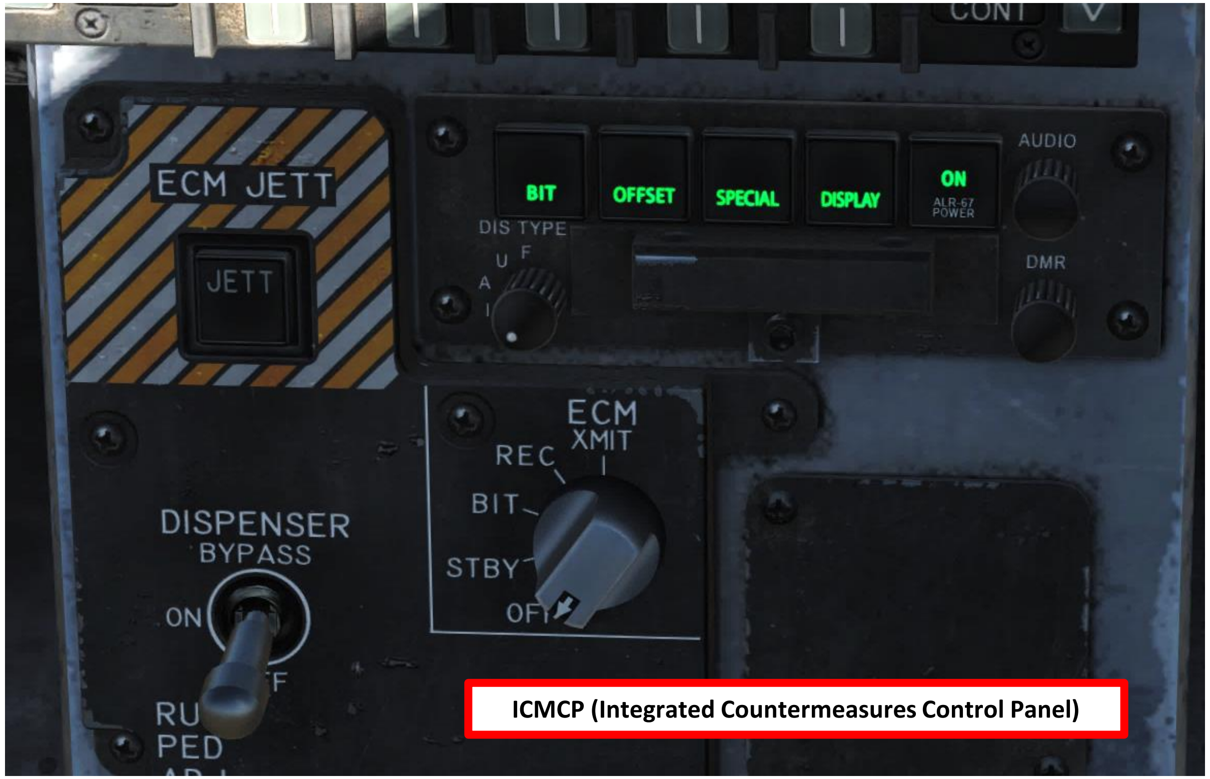
- **MAN**: manual program that can be stored and edited. You choose what the program is.
- **AUTO**: the ALE-47 chooses for you when to deploy countermeasures and what to use. Very wasteful mode, but reduces pilot workload.
- **S/A**: Semi-Automatic. ALE-47 will choose the best countermeasure program for you in response to the current threats, but you will have control on when the countermeasures are dispensed.
- **STBY**: Standby Mode



AN/ALQ-165 ASPJ (AIRBORNE SELF PROTECTION JAMMER)

The ALQ-165 Airborne Self Protection Jammer (ASPJ) is the onboard Electronic Countermeasure (ECM) system. The ALQ-165 detects and deceives threat pulse fire control and guidance RADARs and has four operating modes: standby, receive, transmit, and built in test. This ECM system detects, processes, and transmits a simulated target echo for deception when a RADAR signal is received. The simulated echoes are recognized by the enemy RADAR as true target returns. Tracking RADAR then tracks a false target and breaks lock from the true target. Threat RADAR indications are indicated as both indicators lights and the RADAR Warning Receiver.

Note: the ASPJ is not yet implemented in Early Access. This section will be updated once it is available.



ICMCP (Integrated Countermeasures Control Panel)

DATALINK & IFF INTRODUCTION

One of the biggest challenges of integrated modern warfare is the identification of contacts. As various information donors like friendly fighters, ground radar stations, AWACS (Airborne Warning and Control System, like an E-3 Sentry or an E-2 Hawkeye), and ships interrogate unknown contacts with IFF (Identify-Friend-or-Foe) systems, this information needs to be relayed to everyone within a given Network. This is where Datalink comes in; with Link 16 Datalink, military aircraft as well as ships and ground forces may exchange their tactical picture in near-real time. Link 16 also supports the exchange of text messages, imagery data and provides two channels of digital voice (2.4 kbit/s and/or 16 kbit/s in any combination).

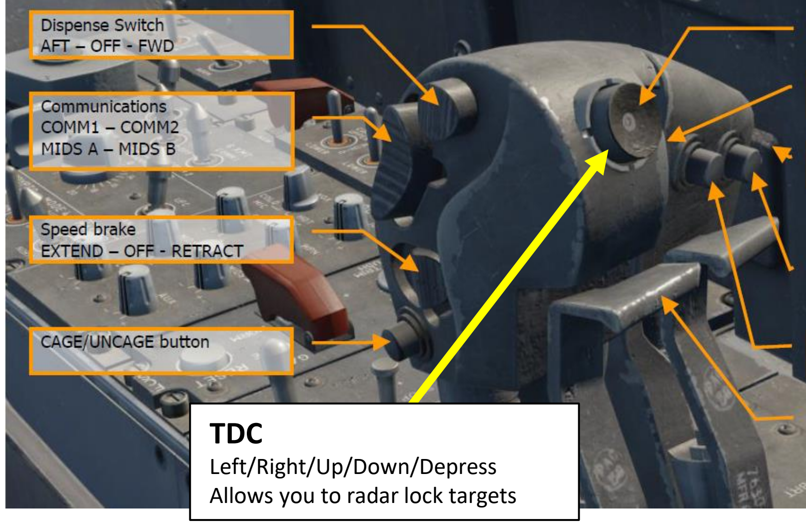
Multifunctional Information Distribution System (MIDS) is the NATO name for the communication component of Link-16. MID is an advanced command, control, communications, computing and intelligence (C4I) system incorporating high-capacity, jam-resistant, digital communication links for exchange of near real-time tactical information, including both data and voice, among air, ground, and sea elements. MIDS is intended to support key theater functions such as surveillance, identification, air control, weapons engagement coordination and direction for all Services.

TYPICAL IFF SETUP

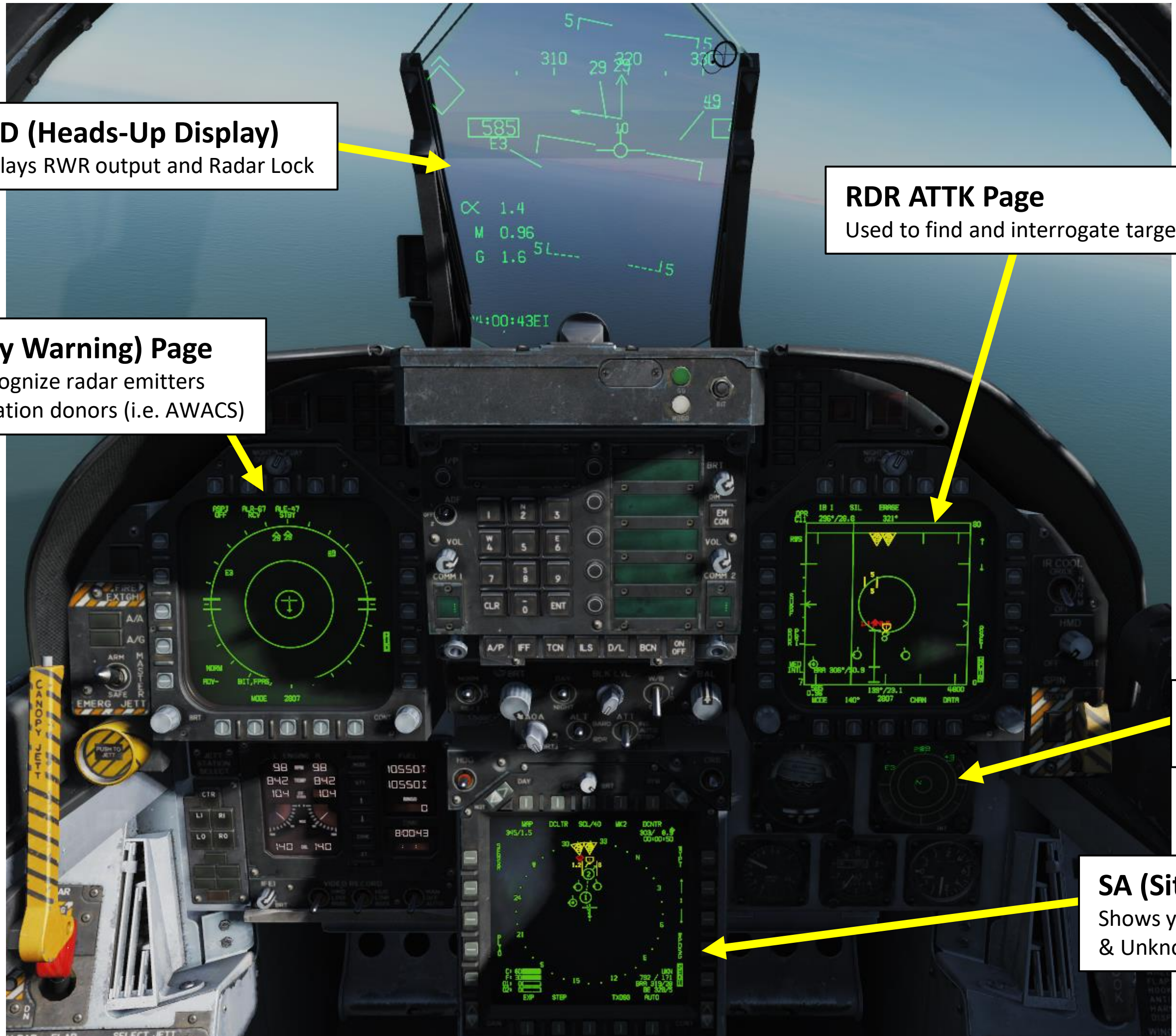
A typical setup that favors good situational awareness and ease of access to information is as follows:

- EW (Early Warning) Page on either DDI
- RDR ATTK (Radar Attack) Page on either DDI
- SA (Situational Awareness) Page on either DDI or on the AMPCD
- RWR (Radar Warning Receiver) output repeated on HUD

Operation of the IFF System is done with the TDC (Throttle Designator Controller) and the Sensor Control Switch.



TDC
Left/Right/Up/Down/Depress
Allows you to radar lock targets



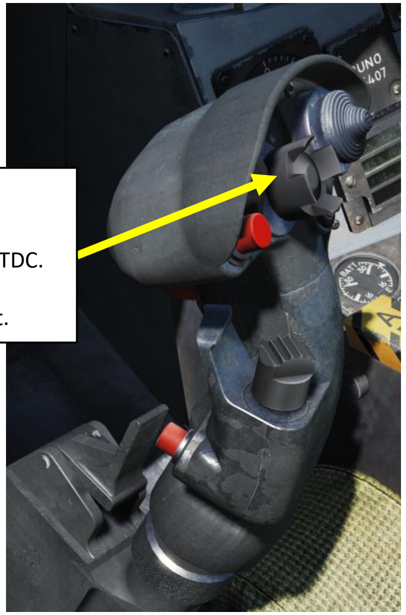
HUD (Heads-Up Display)
Displays RWR output and Radar Lock

RDR ATTK Page
Used to find and interrogate targets

EW (Early Warning) Page
Used to recognize radar emitters and information donors (i.e. AWACS)

RWR (Radar Warning Receiver)
Used to recognize radar emitters

SA (Situational Awareness) Page
Shows you HAFU (Hostile, Ambiguous, Friendly, & Unknown) symbology

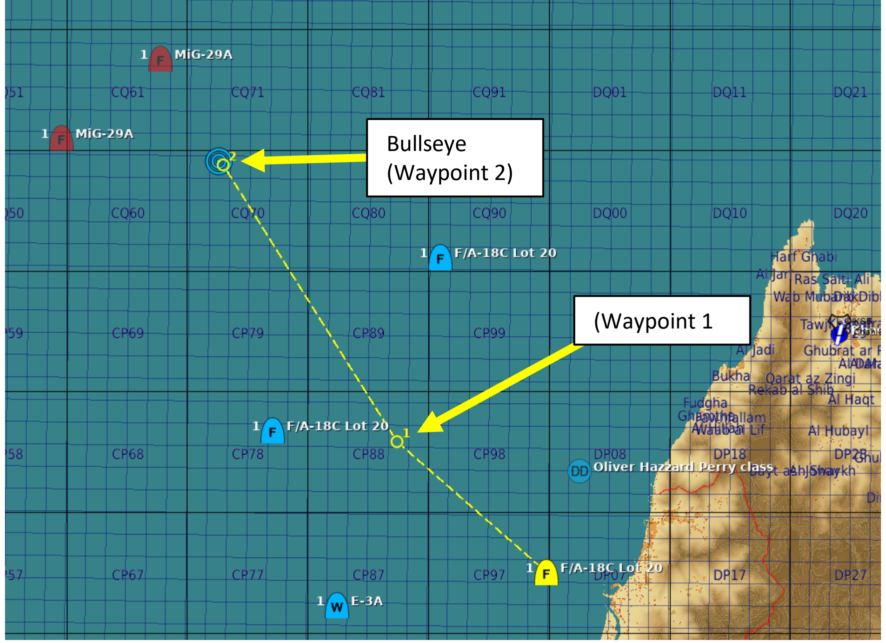


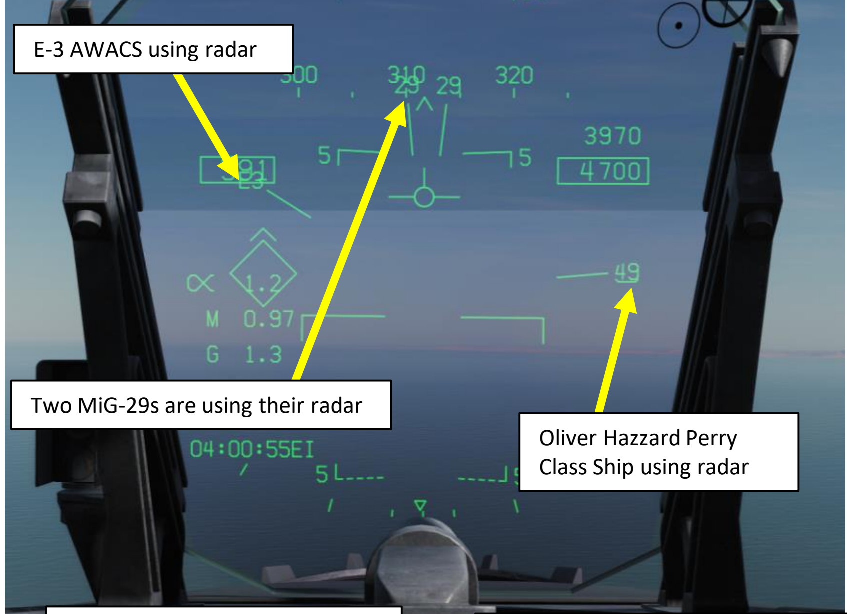
Sensor Control Switch
AFT/FWD/LEFT/RIGHT/DEPRESS
Allows you to select which display to use when using the TDC.

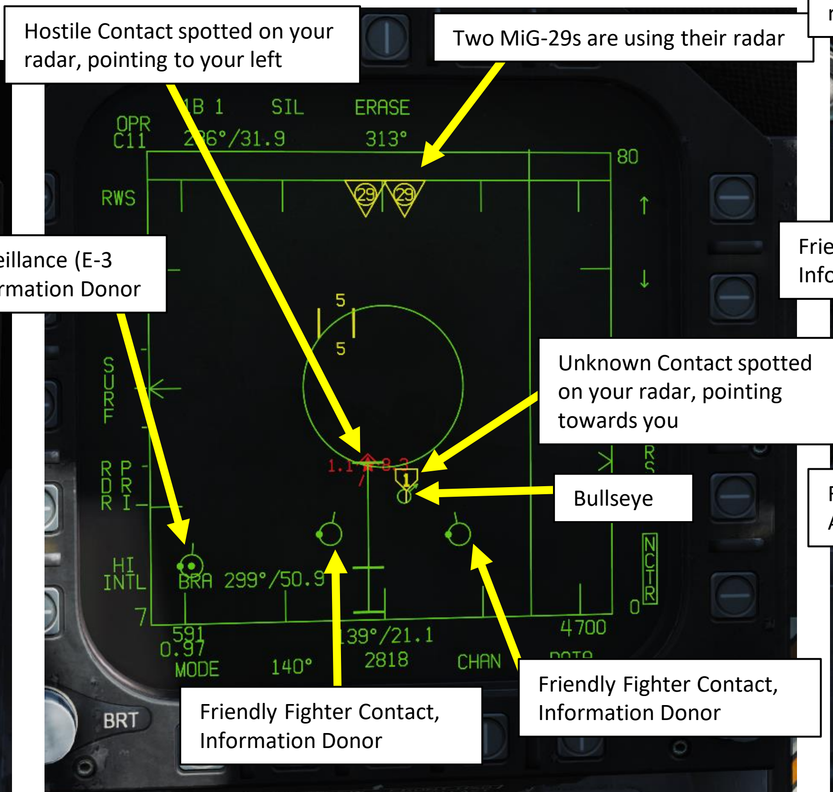
Sensor Control Switch DEPRESS will interrogate the target.

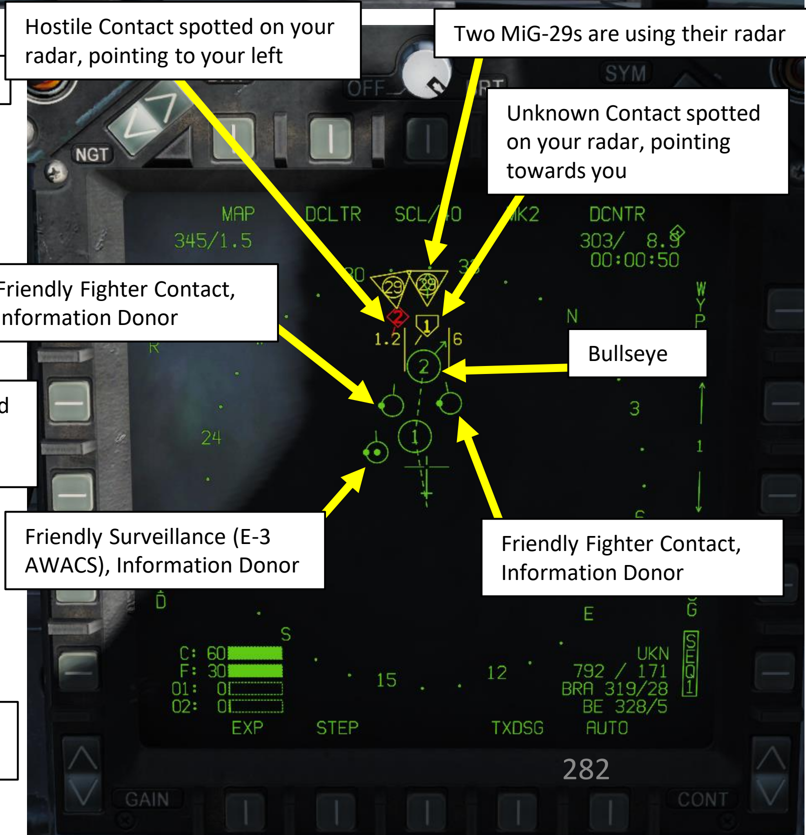
SENSORS INTEGRATED VIEW

The F/A-18's sensors are integrated wonderfully. Here is an example of all the information you can find by consulting the HUD, EW page, SA page and RDR ATTK page.







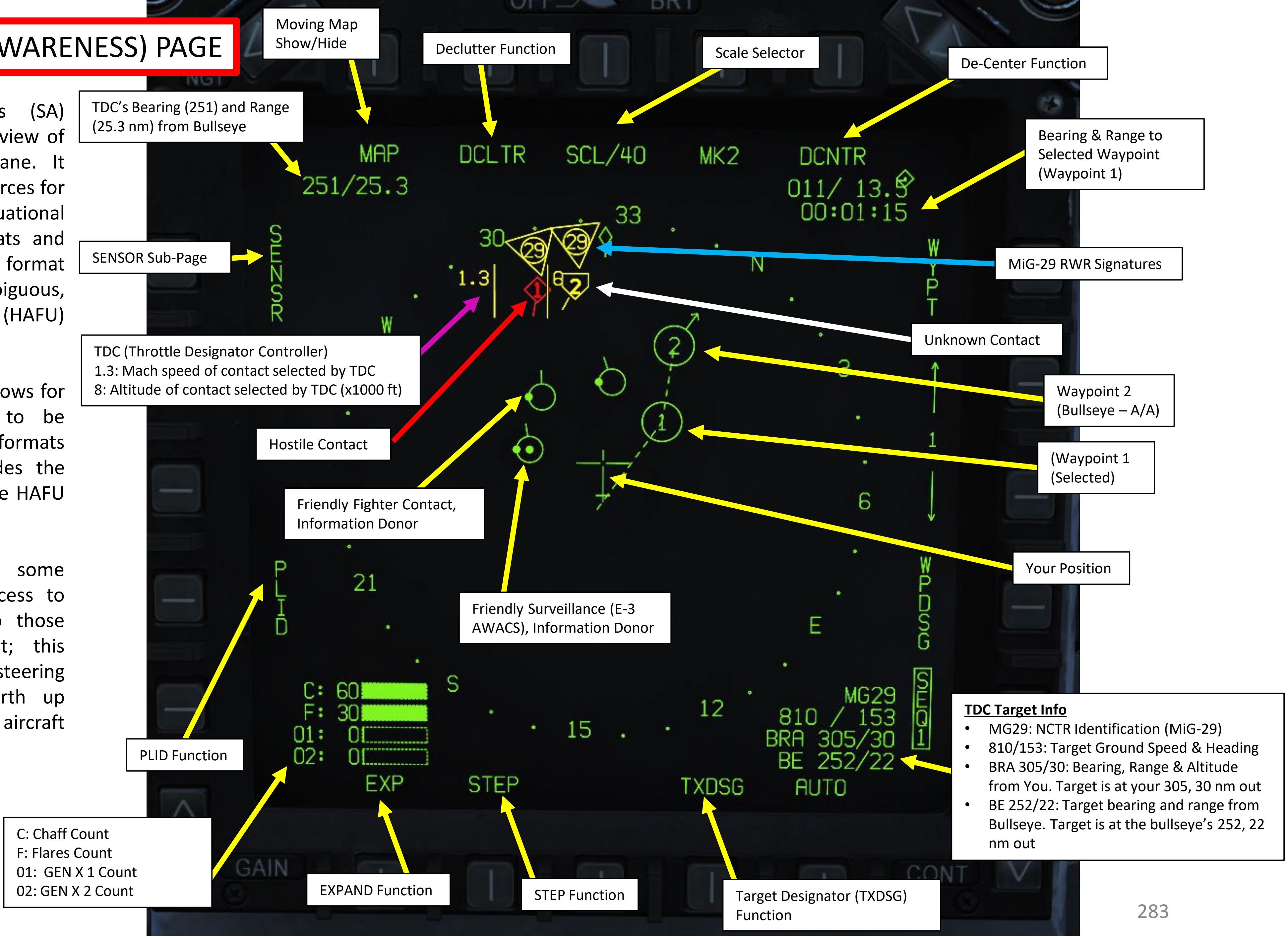


SA (SITUATIONAL AWARENESS) PAGE

The Situational Awareness (SA) format provides a top-down view of the area around the airplane. It displays trackfiles from all sources for the best possible situational awareness of airborne threats and allies. All trackfiles on the SA format are displayed as Hostile, Ambiguous, Friendly, or Unknown (HAFU) symbols.

The SA format additionally allows for offboard trackfile sources to be selectively filtered for all formats displaying tracks and provides the ability to manually classify the HAFU identification of trackfiles.

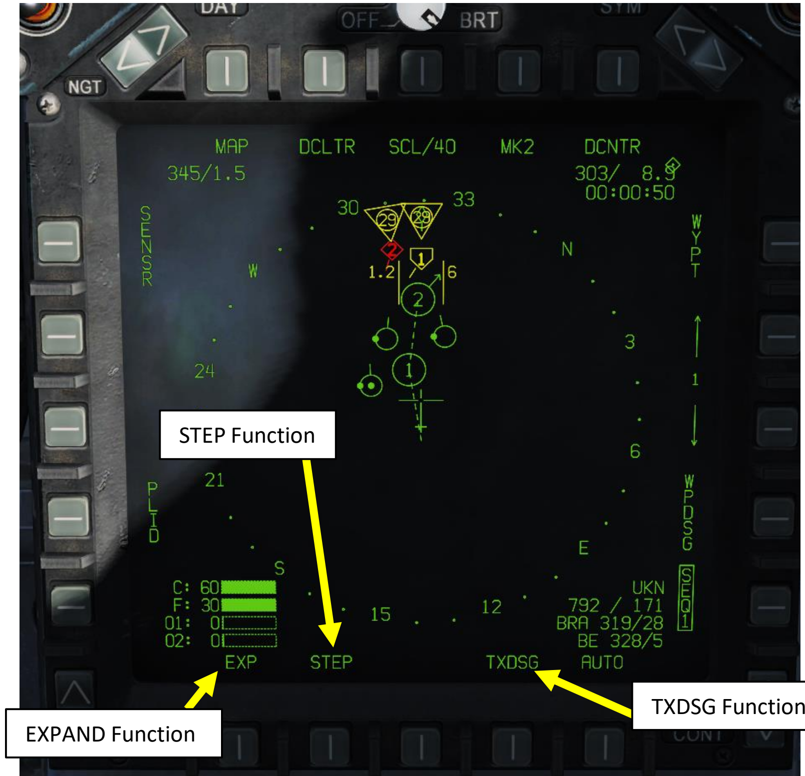
The page also shows some symbology and provides access to some functions identical to those found on the HSI format; this excludes non-waypoint steering options and cues, the north up display option, and the aircraft heading line.

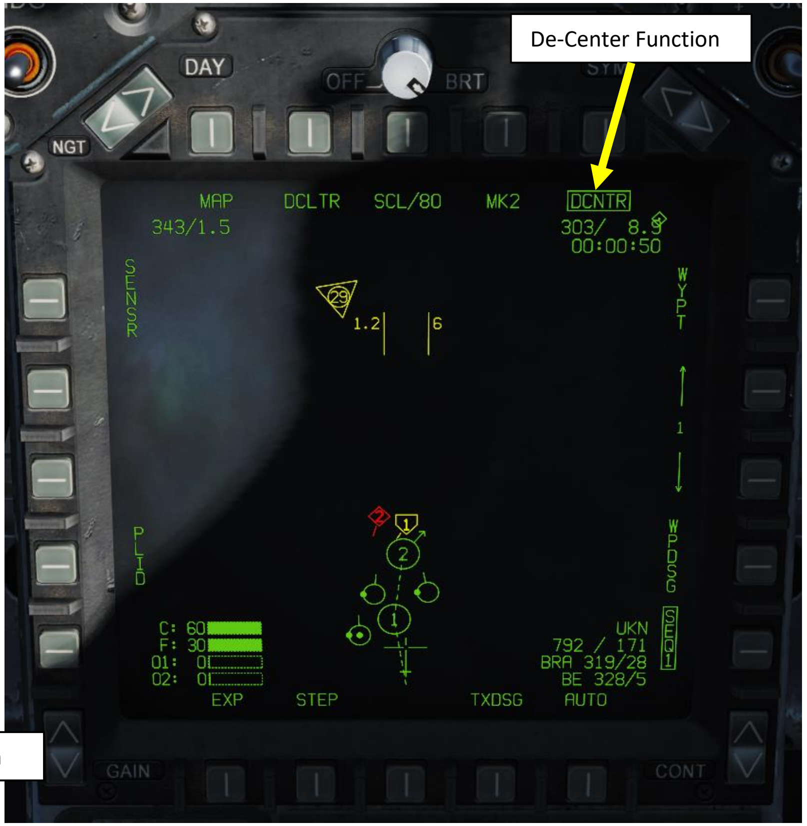


SA (SITUATIONAL AWARENESS) PAGE FUNCTIONS

- **MAP**: Toggles Moving Map
- **DCLTR**: De-Clutters SA page
- **DCNTR**: De-Centers SA page
- **EXP**: Expand Mode (Not Yet Implemented)
- **STEP**: "STEP" function replaces the TDC cursor with a rectangular box, always centered around a trackfile. Around the trackfile selected is its Mach number to the left and altitude in thousands of feet. The option "steps" the STEP box through all non-friendly trackfiles based on rank. If the TDC cursor is over a trackfile, the STEP box will first step to that track; if not, it will select the highest ranked trackfile. Moving the TDC will bring back the cursor, which will appear where the STEP box was last.
- **TXDSG**: (Not Yet Implemented)
- **PLID**: Pilot Identification option displays whenever the TDC cursor is over a trackfile or the STEP box exists. This allows for manual hostile, friendly, or unknown status designation of a trackfile which is not from a PPLI (Precise Participant Location and Identification) donor.

Declutter Function
REJ1: Removes compass rose, ground track diamond, and SAM range rings.
REJ2: Removes REJ1 items and the waypoint/TGT data block.
MREJ1: Hides all SAM indications.
MREJ2: Not yet implemented.

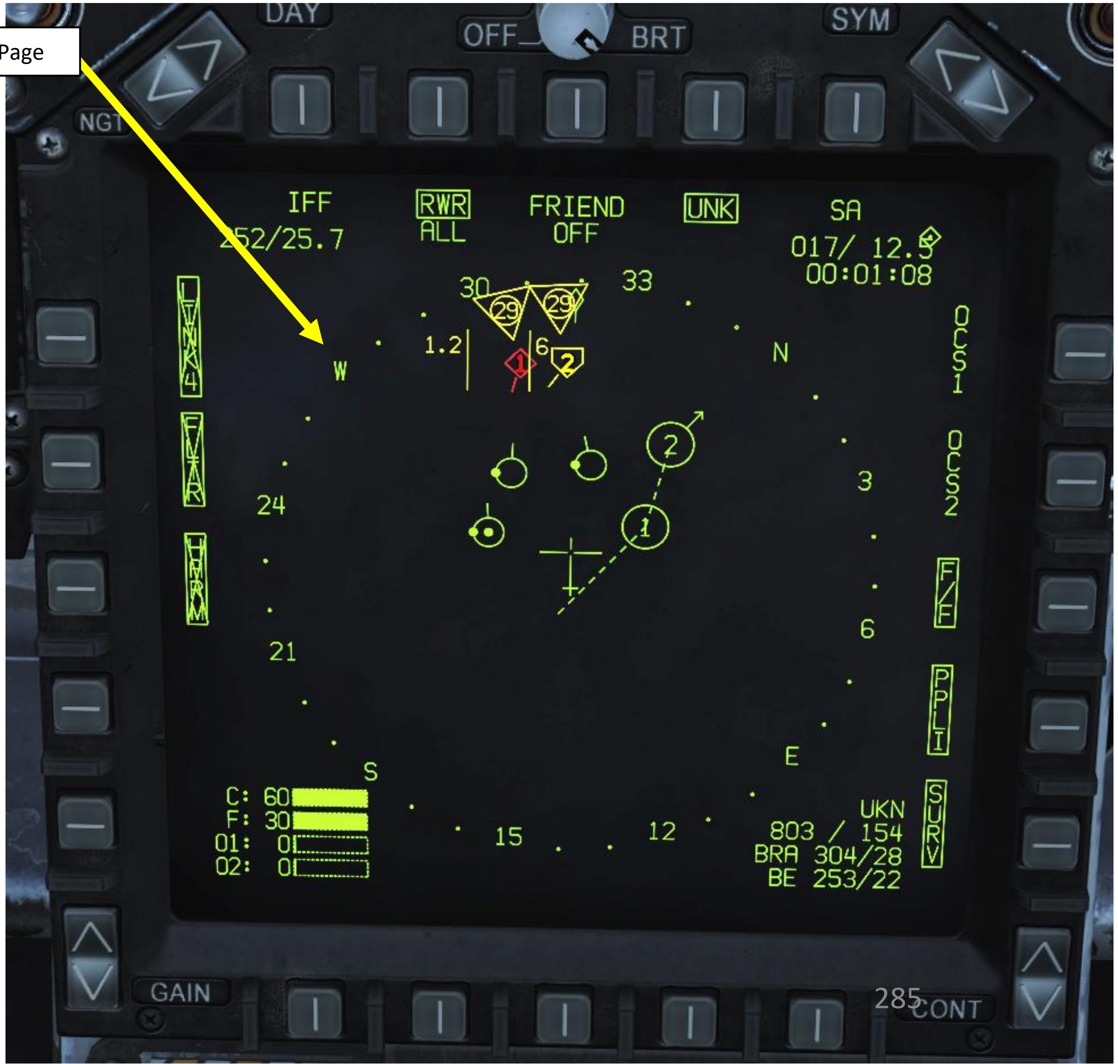




SA (SITUATIONAL AWARENESS) PAGE SENSORS SUB-PAGE

The SENSR (Sensor) SA Sub-Page controls what sensors contribute to the displays throughout the aircraft. Selecting SA returns to the main format.

SENSOR Sub-Page



- **LINK4**: Toggles trackfile information being displayed from LINK-4 Datalink
- **FLTR**: Not Yet Implemented
- **HARM**: Not Yet Implemented
- **IFF**: Not Yet Implemented
- **RWR**: Toggles display of the four most priority air-to-air RWR bearings, shown in yellow as a triangle with the emitter identifier. This affects the SA format itself and also the RDR ATTK with MSI enabled. This always displays hostiles and unknowns, but will also display friendly bearings based on the FRIEND setting. Unboxed will show no RWR bearings, "ALL" will show all, "CRIT LETH" will show only critical and lethal bearings, and "CRIT" will only show critical bearings.
- **FRIEND**: Toggles display of friendly air-to-air RWR bearings for the SA and RDR ATTK format. "OFF" shows none. "NO ID" shows friendly RWR bearings but without the emitter type in the triangle. "RWR ID" shows friendly RWR bearings with both the triangle and emitter type. Note that only the priority four emitters are displayed, so friendly emitters will not always be displayed even with the option enabled.
- **UNK**: Toggles display of unknown HAFU trackfiles.
- **OCS1/OCS2**: Not Yet Implemented
- **F/F**: Toggles trackfile information being displayed from fighter-fighter (F/F) donors.
- **PPLI**: Toggles trackfile information being displayed from Precise Participant Location and Identification (PPLI) donors.
- **SURV**: Toggles trackfile information being displayed from surveillance (SURV) donors.

HAFU SYMBOLOGY

Hostile, Ambiguous, Friendly or Unknown (HAFU) is a symbology system used by the F/A-18 to represent trackfiles; specifically, to show its status as a friendly or hostile. It is usually what trackfiles are displayed as across the software.

Here are four HAFU symbols:

- **Triangle:** Hostile (red when colored)
- **Thick Staple:** Ambiguous (yellow when colored)
- **Half-Circle:** Friendly (green when colored)
- **Thin Staple:** Unknown (yellow when colored)

A hostile HAFU will be assigned whenever:
A negative IFF response is returned, and

- An NCTR print returns with an aircraft type that is on the hostile coalition; or
- A SURV (surveillance, like an AWACS) source over datalink also marks it hostile; or
- A F/F (fighter-to-fighter, like another F/A-18) source over datalink also marks it hostile.

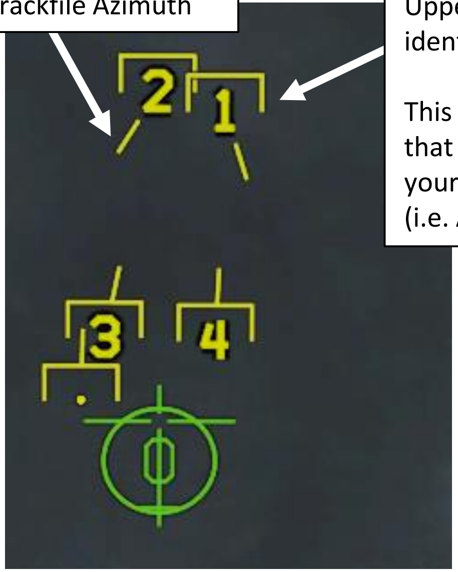
An ambiguous HAFU will be assigned when the aircraft and a donor have conflicting identifications (friendly and hostile).

A friendly HAFU will be assigned whenever an IFF interrogation returns as friendly or the track itself is contributed to by the Precise Participant Location and Identification (PPLI) system.

An unknown HAFU will be assigned by default until it is updated by meeting one of the requirements above.

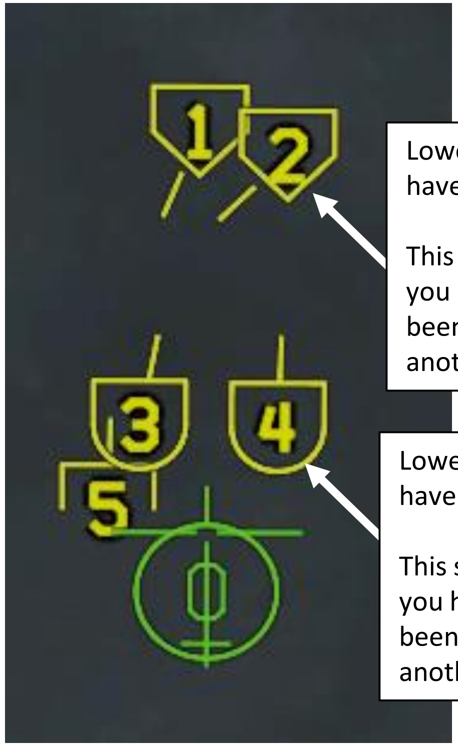
A number is assigned on the HAFU symbol to show the level of criticality (1 being the most critical).

Trackfile Azimuth



Upper Part: This is what you have identified.

This symbol shows an Unknown Target that has not been interrogated by either yourself or any other information donor (i.e. AWACS).



Lower Part: This is what information donors have identified.

This symbol shows an Unknown Target that you have not interrogated yet, but that has been interrogated and confirmed hostile by another information donor (i.e. AWACS).

Lower Part: This is what information donors have identified.

This symbol shows an Unknown Target that you have not interrogated yet, but that has been interrogated and confirmed friendly by another information donor (i.e. AWACS).

HAFU SYMBOLOGY

F/A-18C HORNET LINK 16 SA PAGE SYMBOLOGY & HAFU

The Precise Participant Location and Identification (PPLI) system broadcasts to other aircraft on datalink positional information about the PPLI donor itself. The dot on the side means it is a friendly fighter-to-fighter information donor.

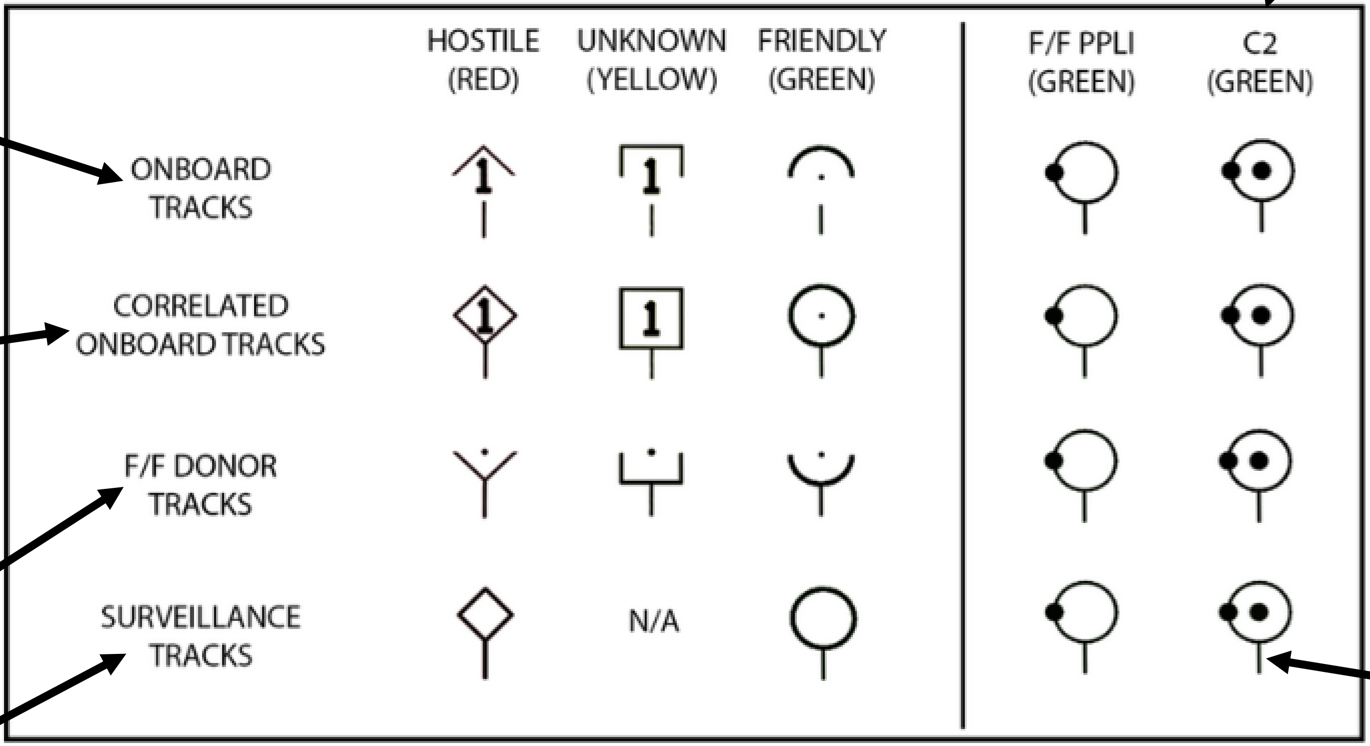
A C2 HAFU represents a Command and Control Aircraft (AWACS, E3A Senty, E2C Hawkeye, etc.), which is a friendly information donor.

You have acquired this track (**onboard trackfile**), but no other information donor has given you information about it.

You have acquired this track and another information donor has given you information (offboard trackfile) about it as well. This means this information is correlated/coherent between an onboard (you) and an offboard information source.

This information comes from a friendly fighter donor (F/F: Fighter-to-Fighter) on the same datalink network, however you have not acquired this track yourself. This is an **offboard trackfile**.

This information comes from a surveillance donor (like an AWACS or a ship) on the same datalink network. This is an **offboard trackfile**.



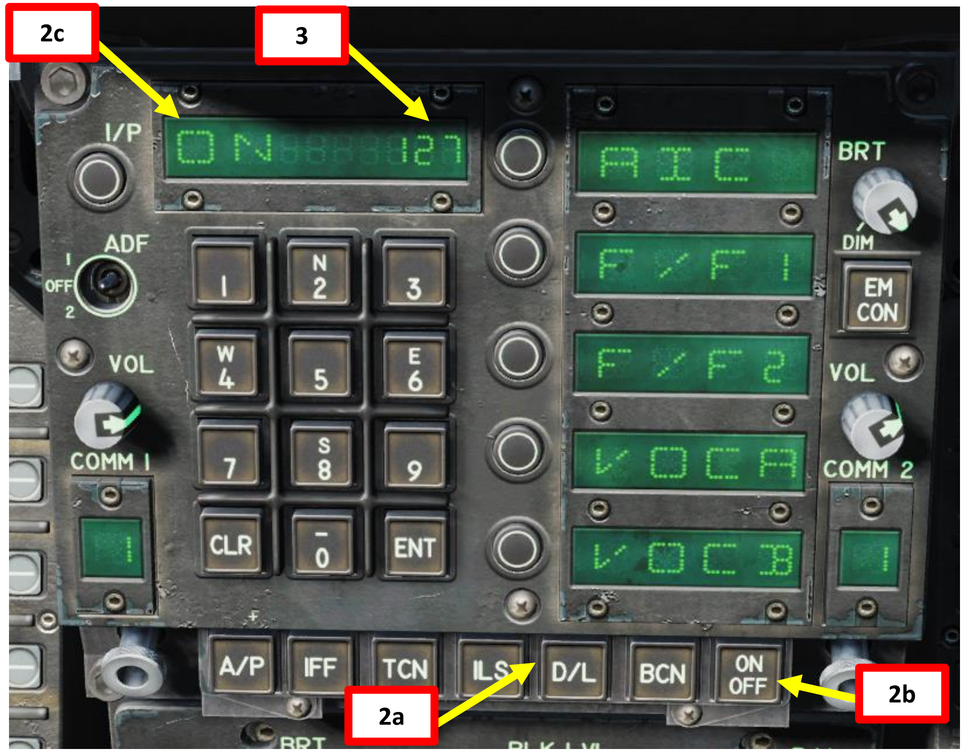
This vector line represents the direction of the trackfile/contact.

MANUAL IFF TUTORIAL

The IFF (Identify-Friend-or-Foe) and Datalink systems need to be ON when wanting to identify radar contacts. Remember:

- **NCTR**: Non-Cooperative Target Recognition is done from the RDR ATTK (Radar Attack) page. Mode 4 Transponder operation is done when interrogating a contact.

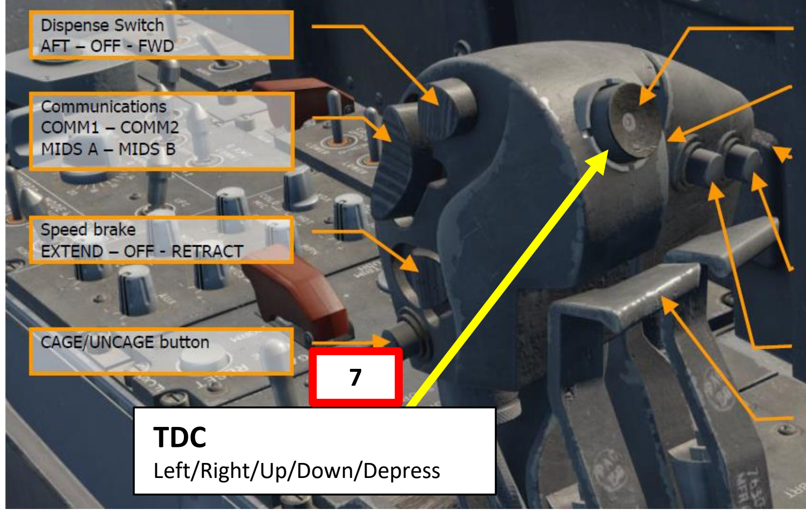
1. Power Up IFF (Identify-Friend-or-Foe) system by pressing the IFF Button, then holding the ON button on the UFC for a few seconds. When « ON » is displayed, the IFF has been powered up correctly.
2. Power Up Datalink system by pressing the D/L Button, then holding the ON button on the UFC for a few seconds. When « ON » is displayed, the IFF has been powered up correctly.
3. On UFC, set desired Datalink Frequency by entering it on the scratchpad, then pressing « ENT ». 127 is used by default, you can keep it.

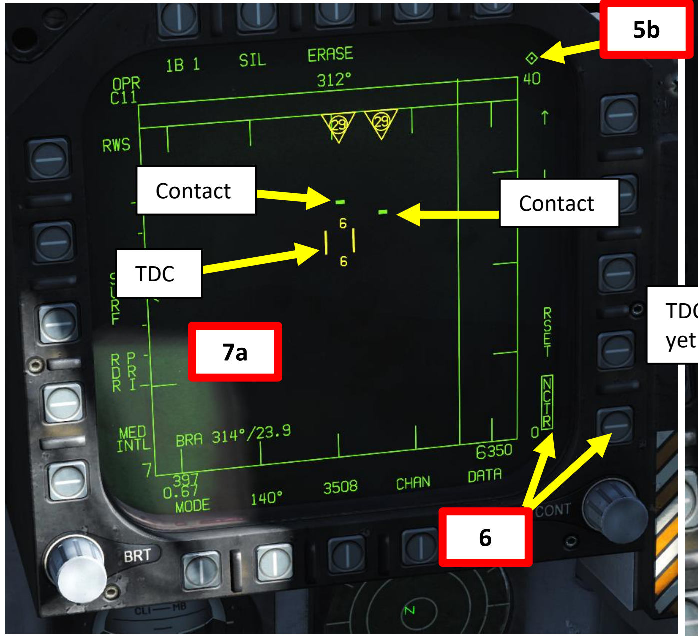


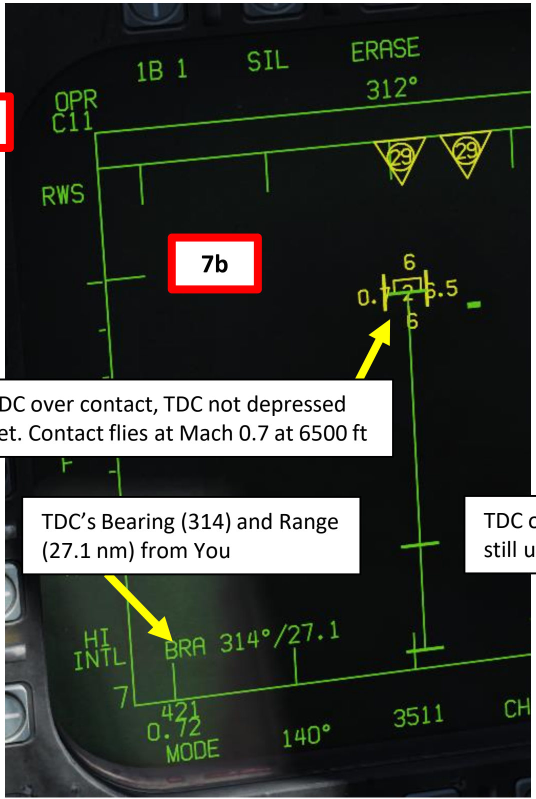
MANUAL IFF TUTORIAL – NCTR

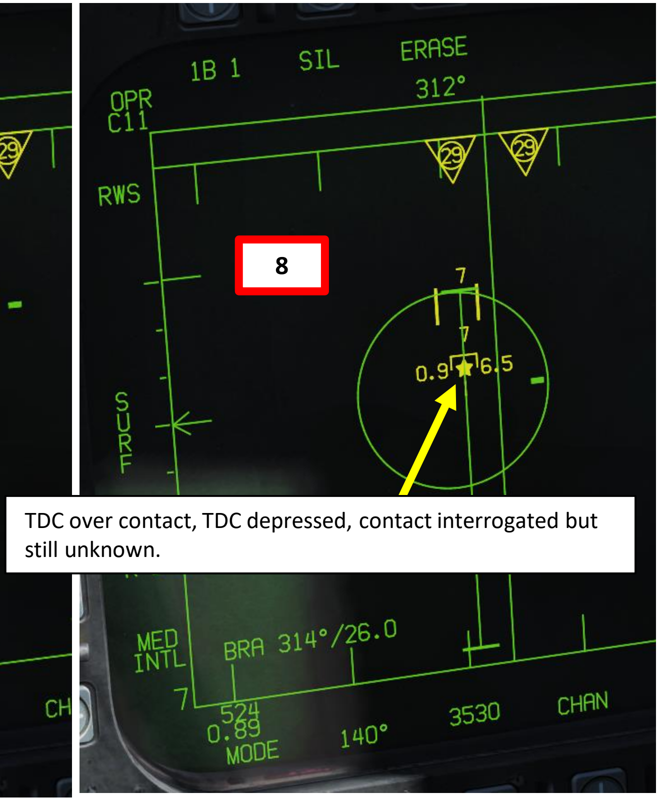
4. Make sure your Radar Power switch is set to OPR.
5. Set Sensor Control Switch to the RDR ATTK DDI (Sensor Control Switch Right since we showed up the RDR ATTK on the right DDI). A diamond will appear to show the right DDI is selected.
6. Press the OSB next to NCTR (Non-Cooperative Target Recognition) activate (boxed)
7. Move the TDC over the target using the TDC controls.
8. Interrogate target by using the Sensor Control Switch DEPRESS control. You can radar lock your target by pressing TDC DEPRESS.

Sensor Control Switch
AFT/FWD/LEFT/RIGHT/DEPRESS

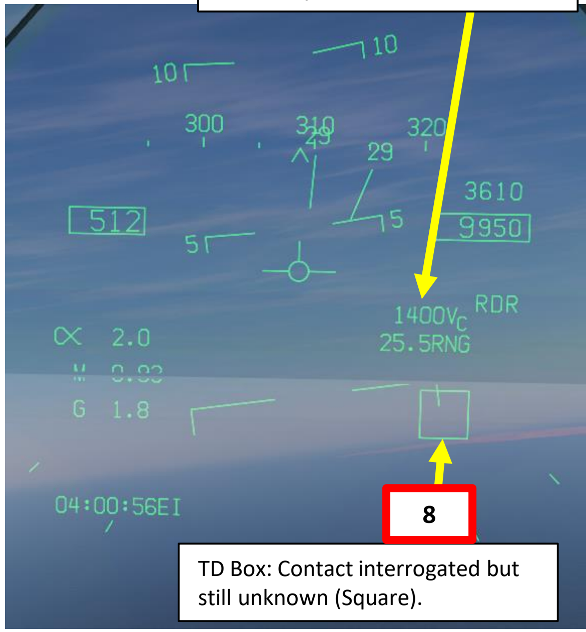






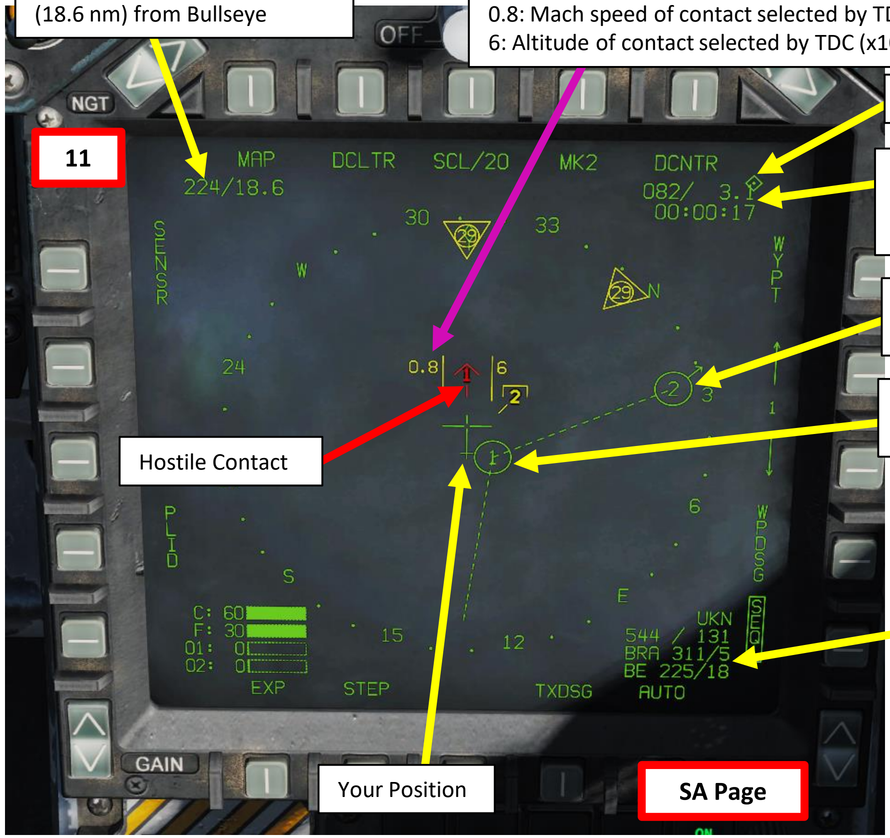


If you radar lock a target after having interrogated it, you will get additional information like closure speed (V_c) in kts and range (nm).



MANUAL IFF TUTORIAL – NCTR

9. In NCTR Mode, targets that are farther than 25 nm may remain UNKNOWN or AMBIGUOUS. To get a proper identification, make sure you are within 25 nm.
10. After a few seconds, the trackfile should turn to either HOSTILE, FRIENDLY or AMBIGUOUS HAFU symbols. See HAFU legend.
11. You can set your Sensor Control Switch to the SA Page (Sensor Control Switch Down since we showed up the SA Page on the Lower AMPCD). A diamond will appear to show the AMPCD is selected. Then, you can move the TDC over a contact and gain additional information from it.



11

TDC's Bearing (224) and Range (18.6 nm) from Bullseye

TDC (Throttle Designator Controller)
0.8: Mach speed of contact selected by TDC
6: Altitude of contact selected by TDC (x1000 ft)

AMPCD Sensor Selected

Bearing & Range to Selected Waypoint (Waypoint 1)

Waypoint 2 (Bullseye – A/A)

(Waypoint 1 (Selected)

Hostile Contact

Your Position

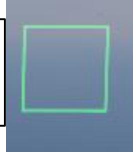
SA Page

TDC Target Info
- UKN: NCTR Identification (Unknown aircraft type)
- 544/131: Target Ground Speed & Heading
- BRA 311/5: Bearing, Range & Altitude from You. Target is at your 311, 5 nm out
- BE 225/18: Target bearing and range from Bullseye. Target is at the bullseye's 225, 18 nm out

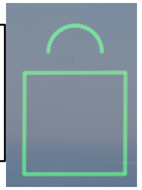
10

Contact interrogated and confirmed hostile

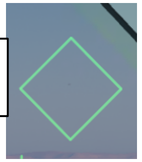
Square: Radar Locked Target, Identified as Friendly or Unknown by yourself alone



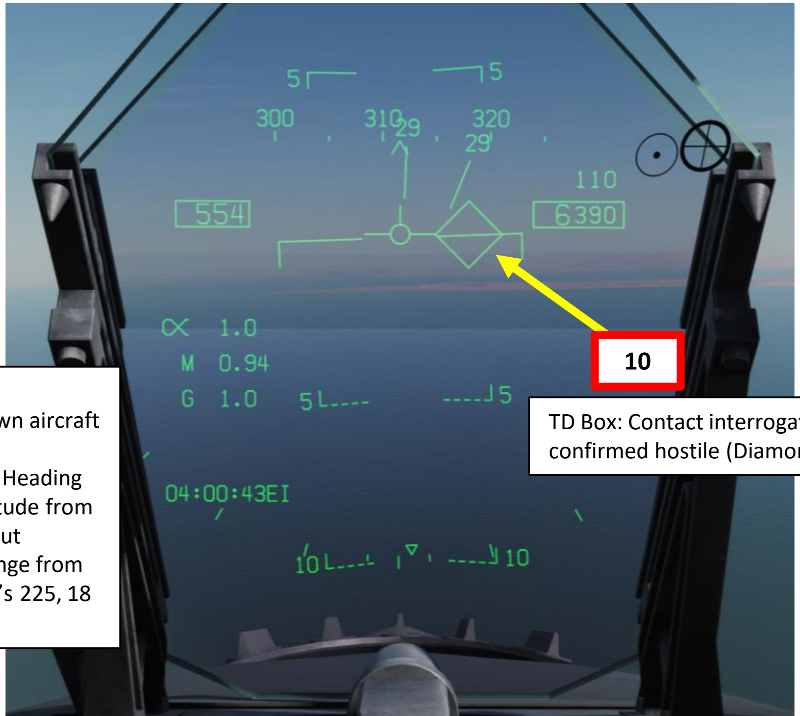
Square with Half Circle: Radar Locked Target, Identified as Friendly by yourself and another Link-16 Datalink Donor



Diamond: Radar Locked Target, Identified as Hostile by yourself alone



Diamond with Caret: Radar Locked Target, Identified as Hostile by yourself and another Link-16 Datalink Donor



10

TD Box: Contact interrogated and confirmed hostile (Diamond).

MANUAL IFF TUTORIAL – EXAMPLES

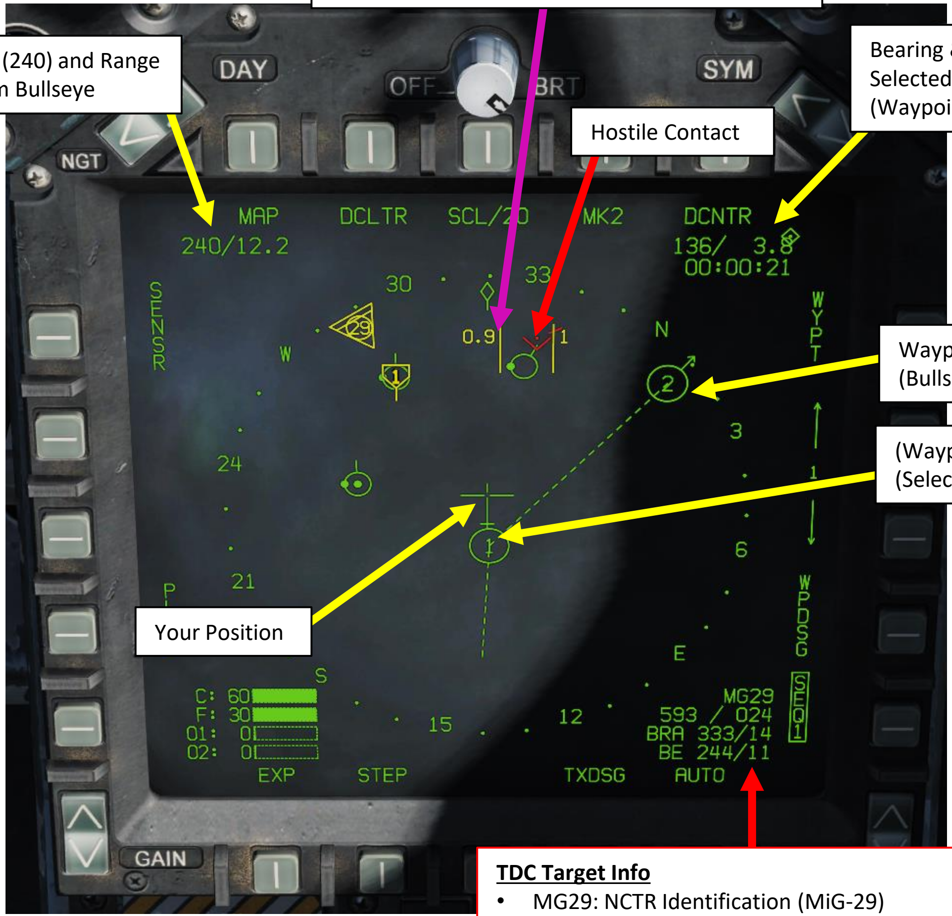
Note: When hovering the TDC on a friendly target, the TDC Target Info differs slightly. See notes in **red** and **green**.

TDC (Throttle Designator Controller)
0.9: Mach speed of contact selected by TDC
1: Altitude of contact selected by TDC (x1000 ft)

TDC's Bearing (240) and Range (12.2 nm) from Bullseye

Hostile Contact

Bearing & Range to Selected Waypoint (Waypoint 1)



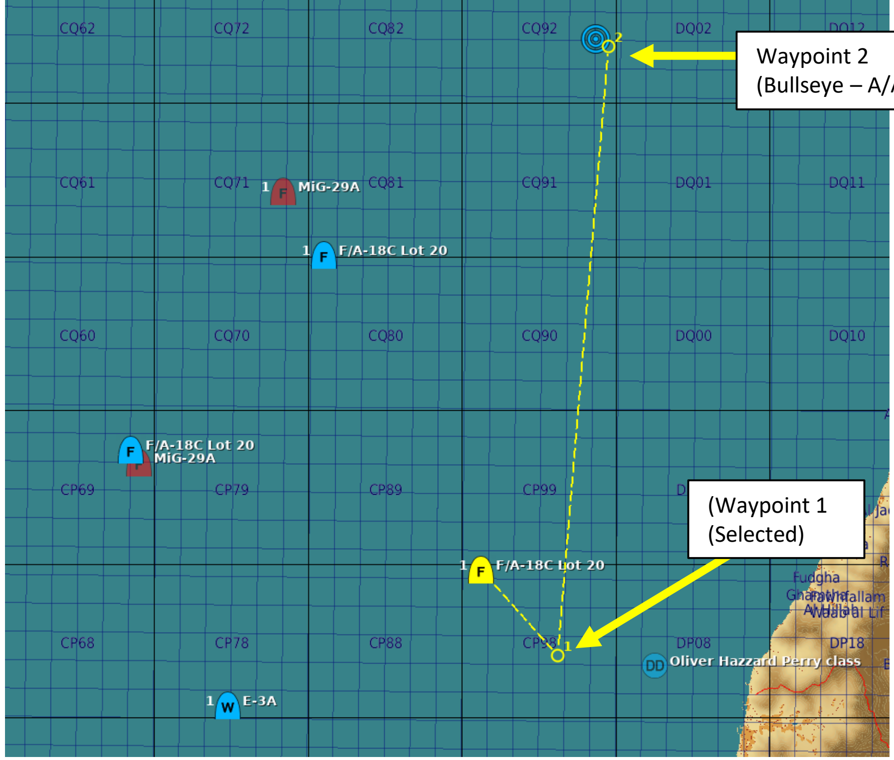
Waypoint 2 (Bullseye – A/A)

(Waypoint 1 (Selected)

Your Position

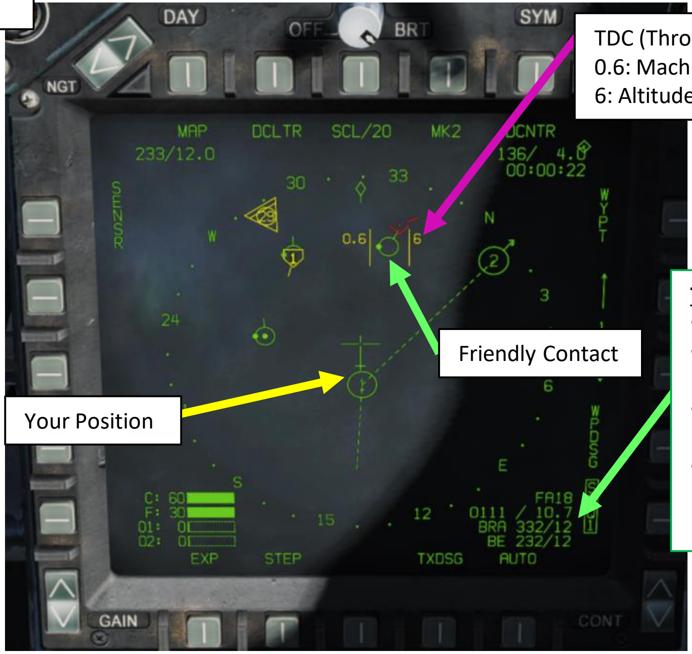
TDC Target Info

- MG29: NCTR Identification (MiG-29)
- 593/024: Target Ground Speed & Heading
- BRA 333/14: Bearing, Range & Altitude from You. Target is at your 333, 14 nm out
- BE 244/11: Target bearing and range from Bullseye. Target is at the bullseye's 244, 11 nm out



Waypoint 2 (Bullseye – A/A)

(Waypoint 1 (Selected)



TDC (Throttle Designator Controller)
0.6: Mach speed of contact selected by TDC
6: Altitude of contact selected by TDC (x1000 ft)

Friendly Contact

Your Position

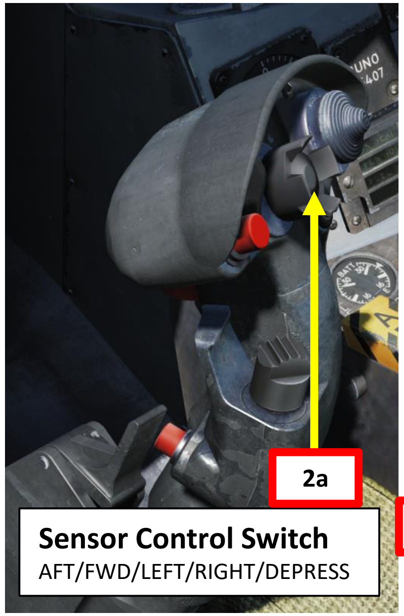
TDC Target Info

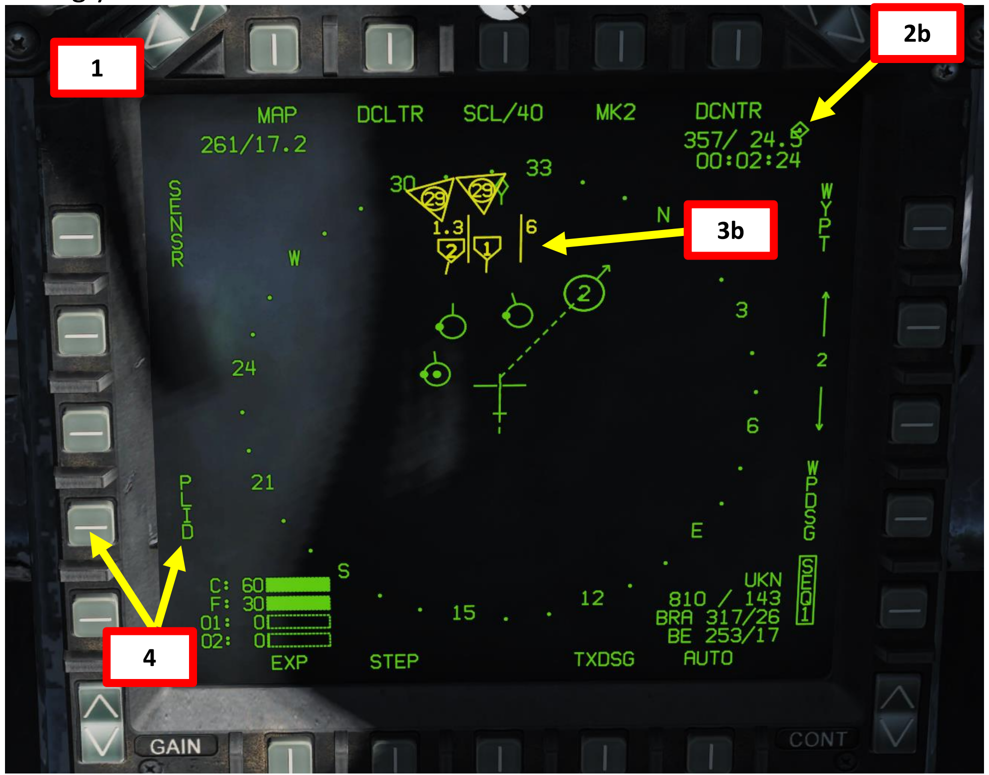
- FA18: NCTR Identification (F/A-18 Hornet)
- 0111/10.7: Friendly Contact Callsign & Range
- BRA 332/12: Bearing, Range & Altitude from You. Target is at your 332, 12 nm out
- BE 232/12: Target bearing and range from Bullseye. Target is at the bullseye's 232, 12 nm out

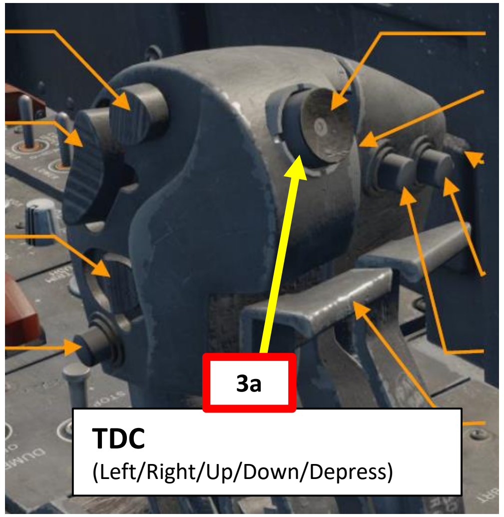
PLID (PILOT IDENTIFICATION)

The Pilot Identification (PLID) is a nice function to the Situational Awareness (SA) page that you can use if you want to manually set the top half of a HAFU (your identification) for a non-PPLI (Precise Participant Location and Identification) donors contact on the SA page. The top half of the HAFU can be manually set to friendly, hostile, or unknown.

1. Open SA page
2. Set your Sensor Control Switch to the SA Page (Sensor Control Switch Down since we showed up the SA Page on the Lower AMPCD). A diamond will appear to show the AMPCD is selected.
3. Move the TDC over a contact and gain additional information from it.
4. Press the OSB next to PLID
5. Select which HAFU type you want to set (i.e. HOS for HOSTILE).
6. The HAFU symbol will change accordingly.





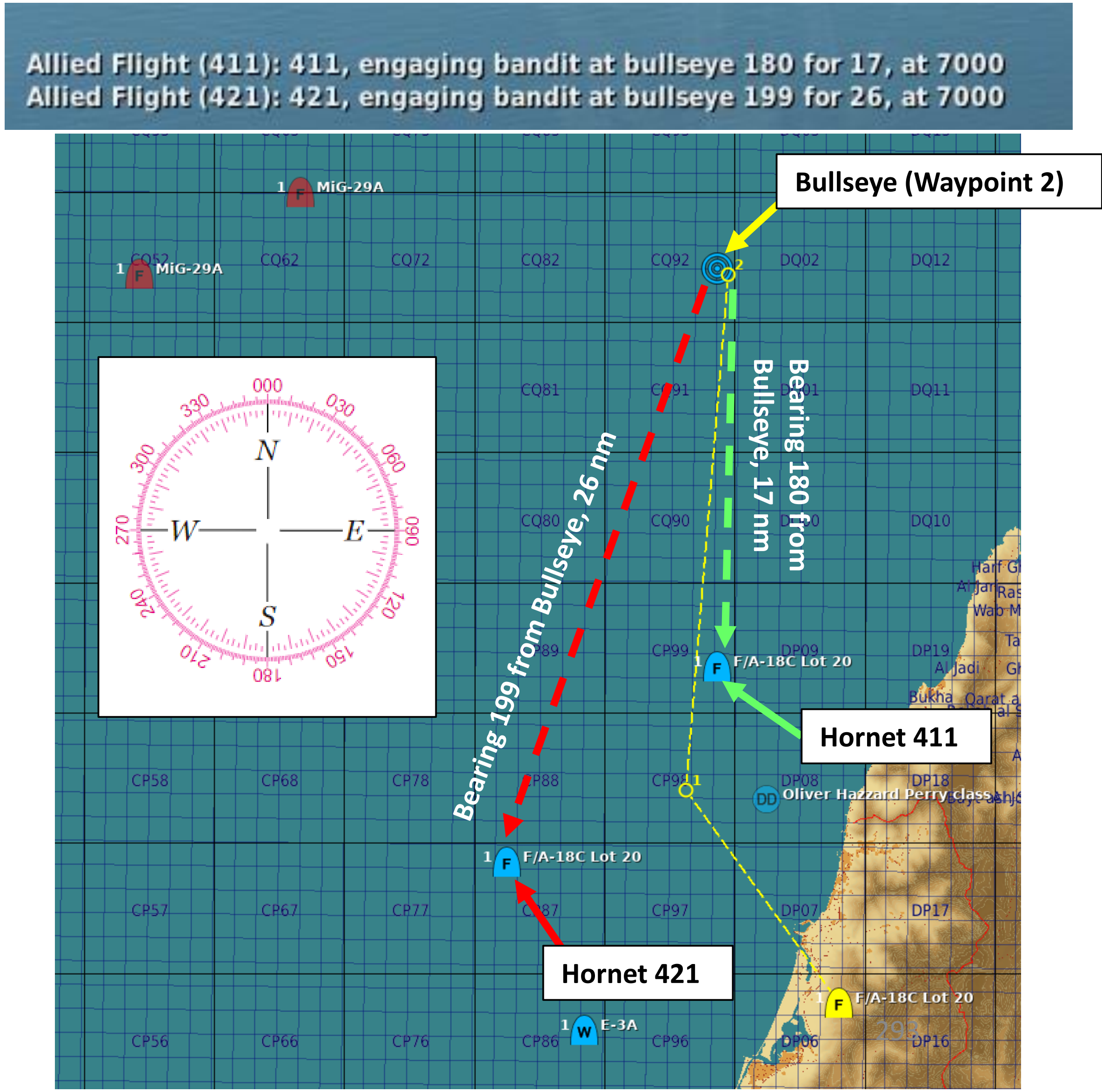


A/A WAYPOINTS & BULLSEYE

A “Bullseye” is a fictional point in space used as a reference to locate yourself, friendly contacts and enemy contacts. If you know where the bullseye is and the enemy doesn’t, it gives you a way to communicate positions without the enemy knowing where to look from. Your wingmen and AWACS will often refer to “bulls” or “bullseye” on the radio. A bullseye call, used to communicate your position, is done in the following format:

- Bearing from bullseye
- Range to bullseye
- Altitude

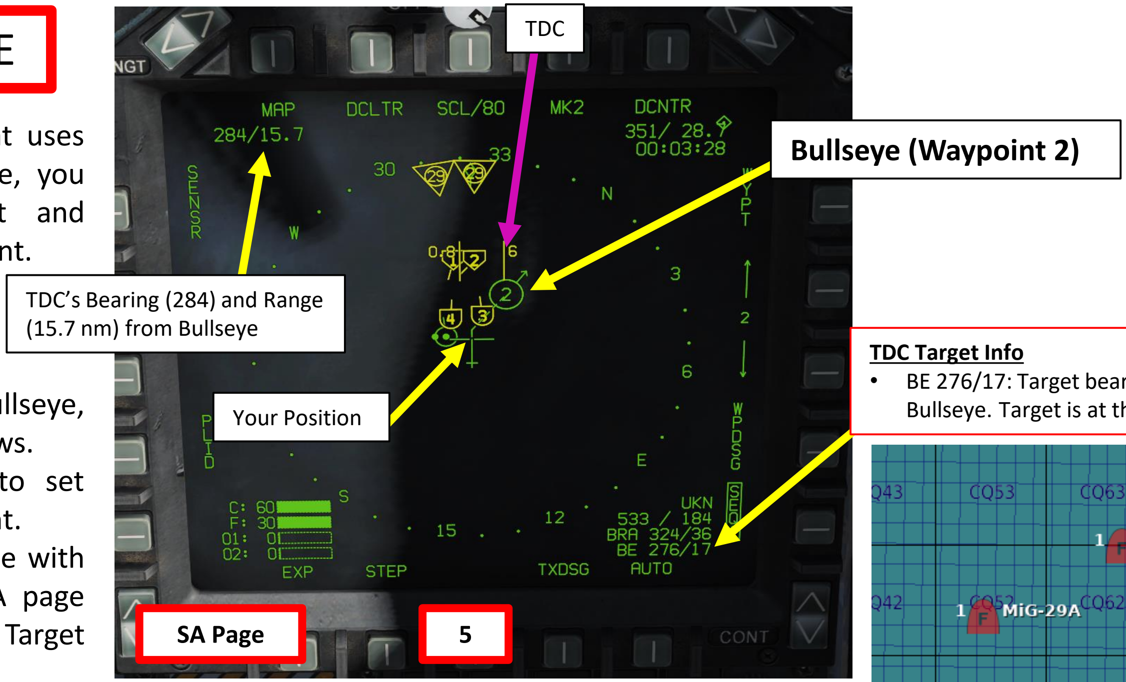
Bullseye Explanation by JediLinks: https://youtu.be/vgcXcfeGb2M



A/A WAYPOINTS & BULLSEYE

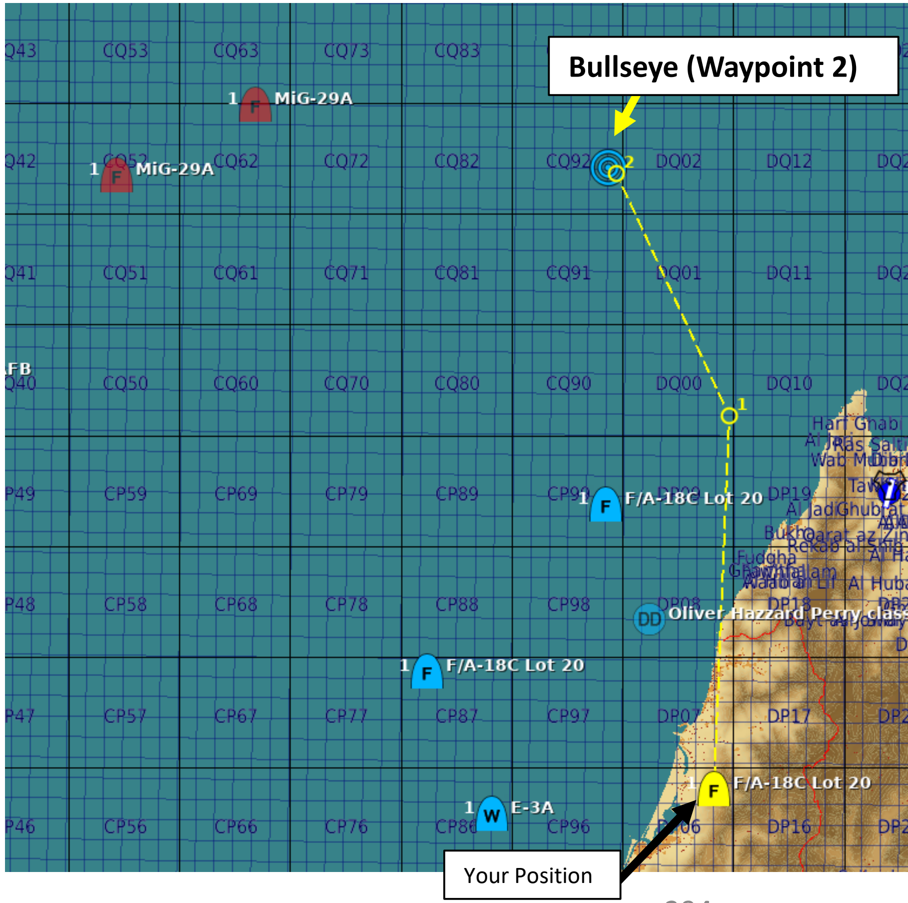
In order to gain trackfile information that uses Bullseye as a reference on your SA page, you need to select an existing waypoint and designate it as an “A/A” (Air-to-Air) Waypoint.

1. Open HSI page
2. Select DATA sub-menu
3. If we want to set Waypoint 2 as our Bullseye, select Waypoint 2 using the WYPT arrows.
4. Press the OSB next to “A/A WP” to set Waypoint 2 as an A/A Bullseye Waypoint.
5. You should now see the Bullseye (circle with an arrow pointing North) on your SA page and see a “BE” section in your TDC Target Info.



TDC Target Info

- BE 276/17: Target bearing and range from Bullseye. Target is at the bullseye’s 276, 17 nm out



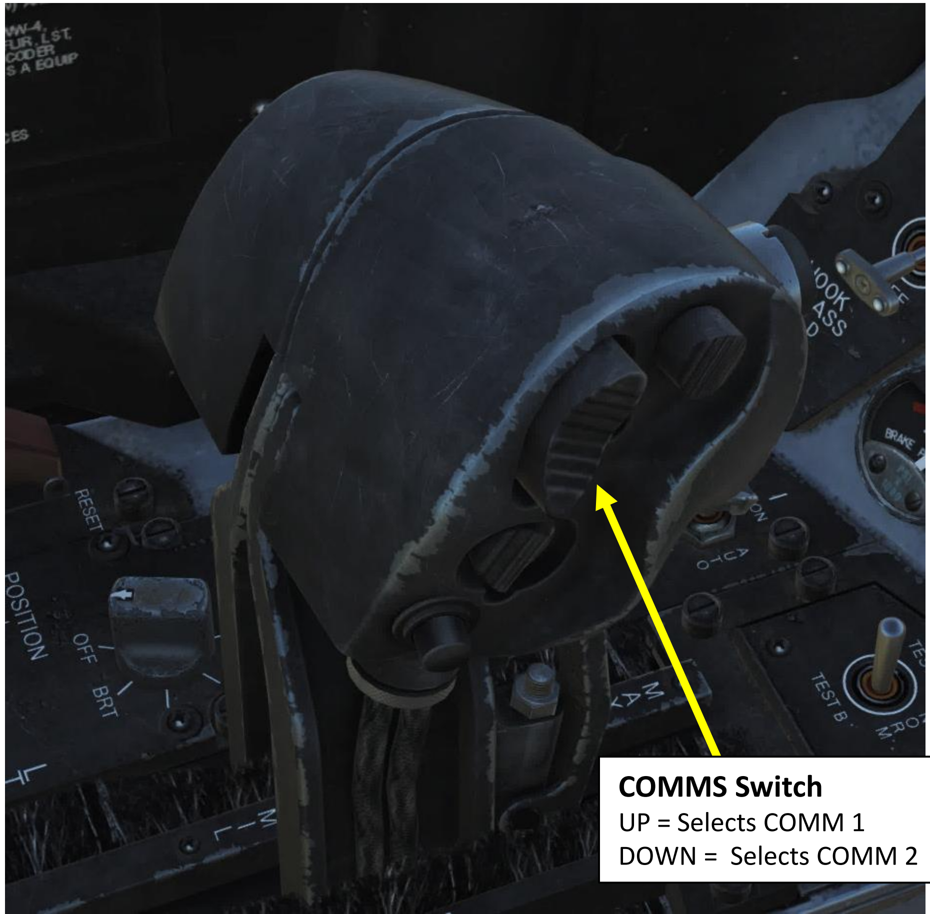
ARC-210 RADIO - INTRO

The ARC-210 radio provides transmission and reception of amplitude and frequency modulated (AM & FM) on frequencies ranging from 30 MHz to 399.975 MHz.

The Hornet has two radios installed: COMM1 and COMM2. They are independent and have 20 preset channels each. The preset frequencies are set in the mission editor.

You can control the radio through the Up-Front Control (UFC).

UFC: Up Front Control



COMMS Switch
UP = Selects COMM 1
DOWN = Selects COMM 2

ARC-210(RT-1556 and DCS)

Frequency Band (MHz)	Modulation	Guard Channel (MHz)
30 to 87.995	FM	
*108 to 135.995	AM	121.5
136 to 155.995	AM/FM	
156 to 173.995	FM	
225 to 399.975	AM/FM	243.0 (AM)

*Cannot transmit on 108 thru 117.995 MHz

ARC-210 RADIO - UFC

To turn on radios, rotate the VOL knobs of COMM1 and COMM 2.

To change preset frequency, rotate the COMM1 or COMM2 Channel selector knobs.

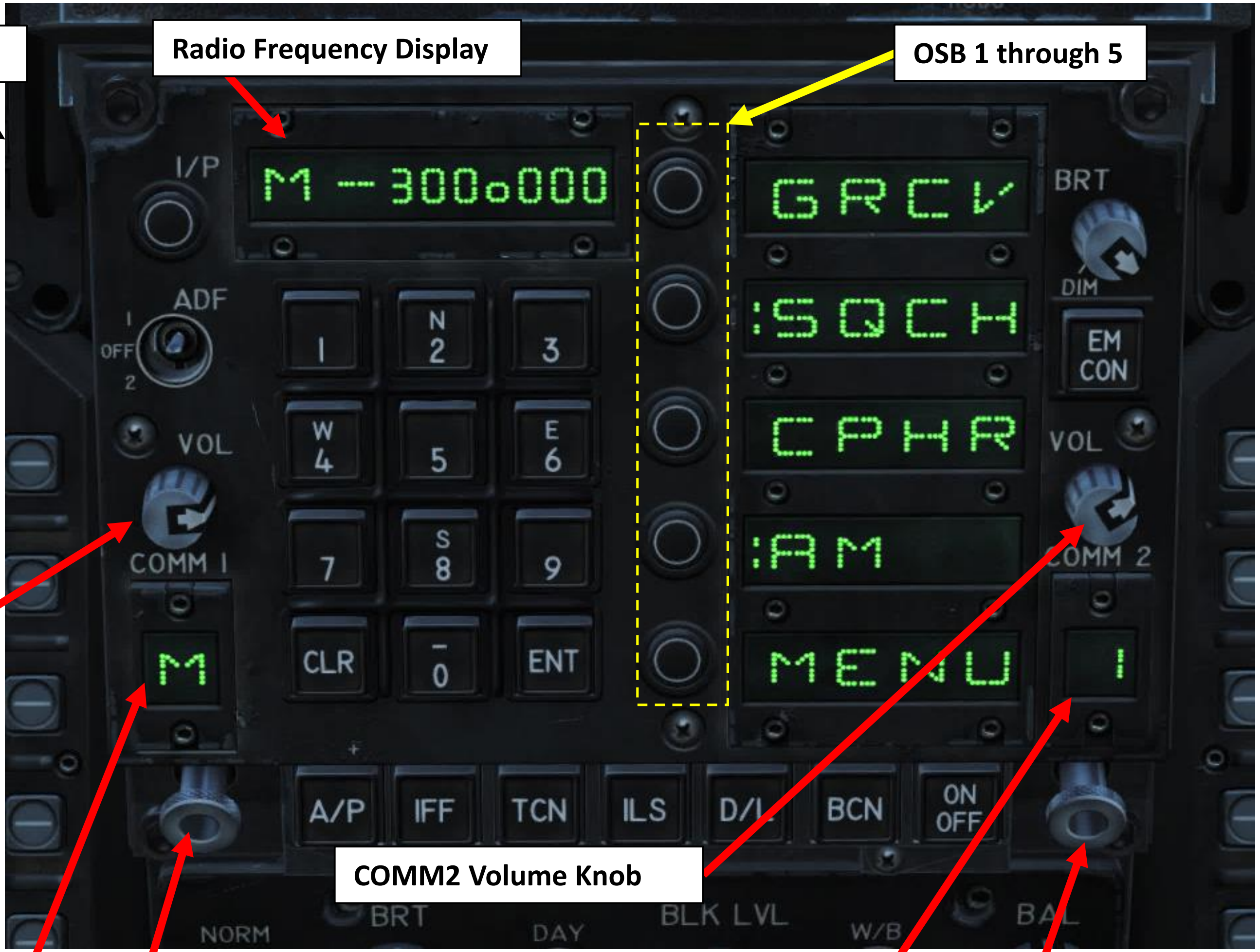
To set radio options, press the OSB (Option Select Buttons) to toggle parameters for each option.

To transmit to either COMM1 or COMM2, use the "COMM AFT: Select COMM2" and the "COMM FWD: Select COMM1" bindings.

UFC: Up Front Control

Radio Frequency Display

OSB 1 through 5



Option Select Button (OSB) 1
GRCV: Guard Receive

Option Select Button (OSB) 2
Toggles Squelch. ":" means Squelch is active.

Option Select Button (OSB) 3
Toggles cipher modes: PLN (plain), CIPH (cipher) and DLY (delay). Not simulated.

Option Select Button (OSB) 4
Selects AM or FM Frequency band. ":AM" means AM Frequency is selected, while ":FM" means FM Frequency is selected. This option is only visible when the frequency selected is within the FM/AM bands as shown on the previous page.

Option Select Button (OSB) 5
Menu Button

COMM1 Volume Knob

COMM2 Volume Knob

COMM1 Channel Selector

COMM2 Channel Selector

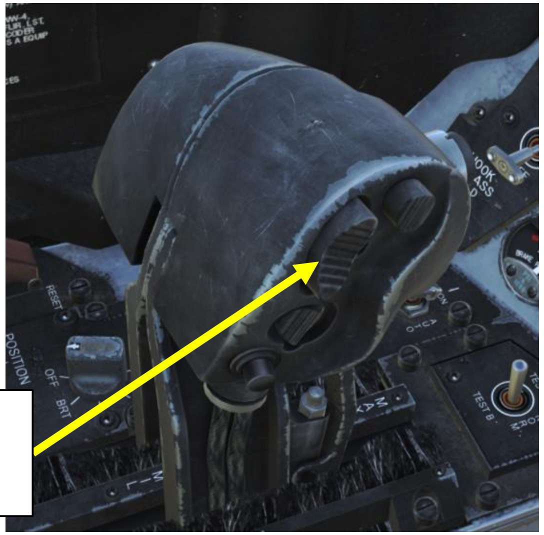
COMM1 Preset Channel Selected
- **M**: Manual
- **1 through 20**: Preset Channel
- **G**: Guard (243.000)
- **C**: Cue Channel for Single Channel Ground and Airborne Radio System (SINCGARS)
- **S**: Maritime (Sea)

COMM2 Preset Channel Selected
- **M**: Manual
- **1 through 20**: Preset Channel
- **G**: Guard (243.000)
- **C**: Cue Channel for Single Channel Ground and Airborne Radio System (SINCGARS)
- **S**: Maritime (Sea)

ARC-210 RADIO - UFC

To set a radio frequency manually on an existing preset frequency:

1. Left click on the COMM1 knob to pull it and select COMM1 Radio
2. Scroll mousewheel on COMM1 Radio Channel Selector to M (Manual) Mode
3. Press the OSB next to AM or FM to select the desired frequency band (if we choose FM, the ":FM" symbol will appear when selected)
4. Press CLR on the UFC to clear current frequency
5. Type "127500" on the UFC to set carrier radio frequency 127.5 MHz
6. Press ENT on the UFC to enter this frequency.
7. Press the COMM switch – COMM1 on your throttle to transmit.



7

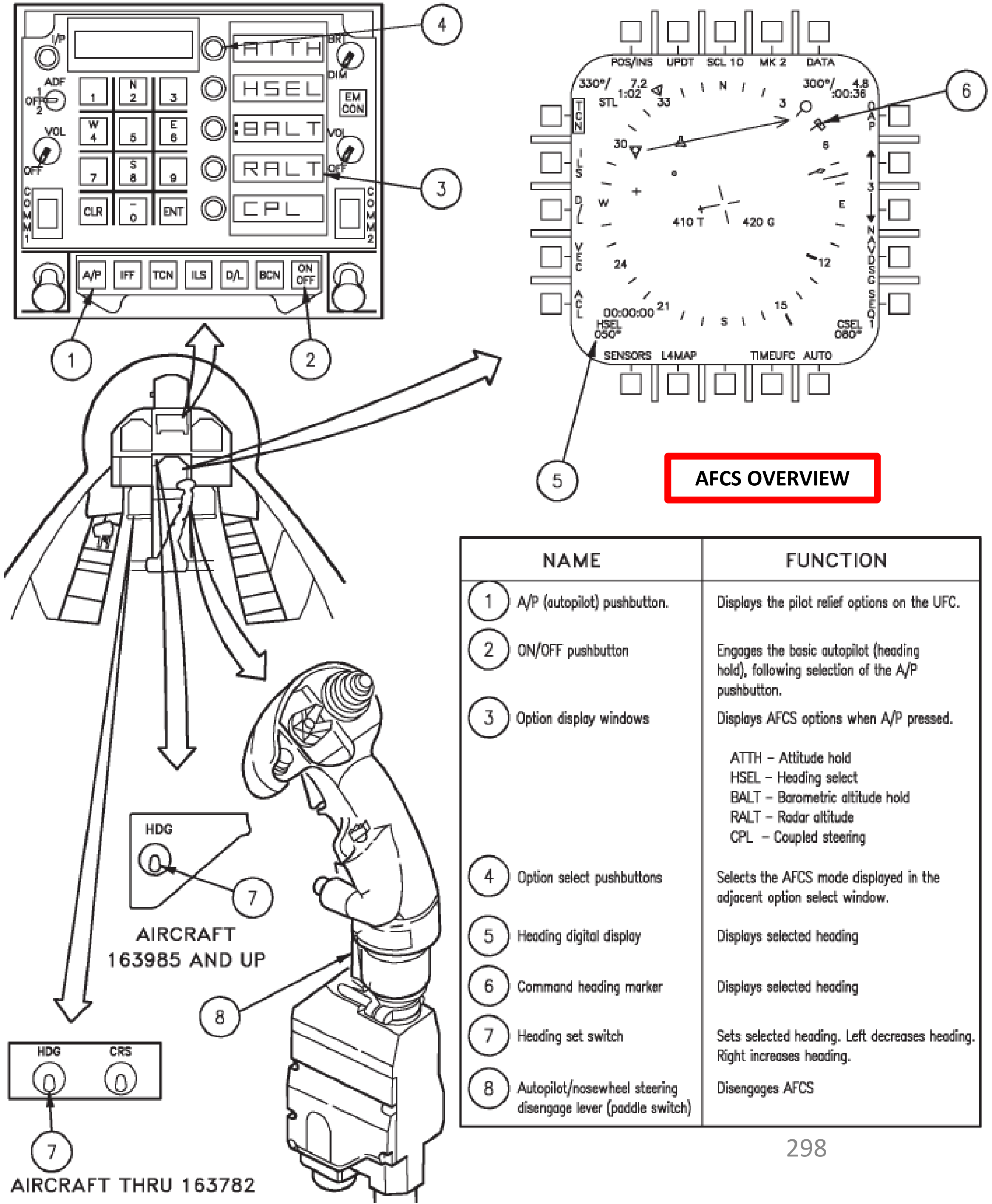
COMMS Switch
UP = Selects COMM 1
DOWN = Selects COMM 2

AFCS (AUTOMATIC FLIGHT CONTROL SYSTEM)

The Hornet has a number of autopilot "relief modes" that assist the pilot in flying the aircraft. You can combine multiple autopilot modes together, in conjunction with the ATC (Automatic Throttle Controller). If you want to steer the aircraft to a particular heading while maintaining a certain speed and altitude, you could for instance engage the AFCS "BALT" mode to maintain altitude, then set the "HSEL" mode to steer your aircraft to the desired heading, then set the ATC to CRUISE mode to maintain your current airspeed. Powerful stuff!

AUTOPILOT AFCS MODES

- **ATTH**: Attitude Hold. Aircraft will maintain the existing pitch and roll attitude between +/- degrees in pitch and +/- 70-degrees in roll
- **BALT**: Barometric Altitude Hold. When engaged, aircraft will maintain current heading and barometric altitude between 0 and 70000 ft
- **HSEL**: Heading Select. Aircraft will turn to and fly the heading as set on the HSI (Horizontal Situation Indicator).
- **RALT**: Radar Altitude Hold. Aircraft will maintain current heading and radar altitude between 0 and 5000 ft



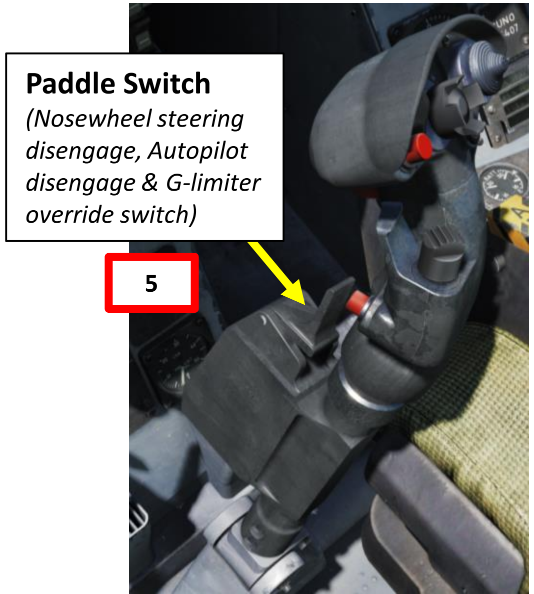
AFCS OVERVIEW

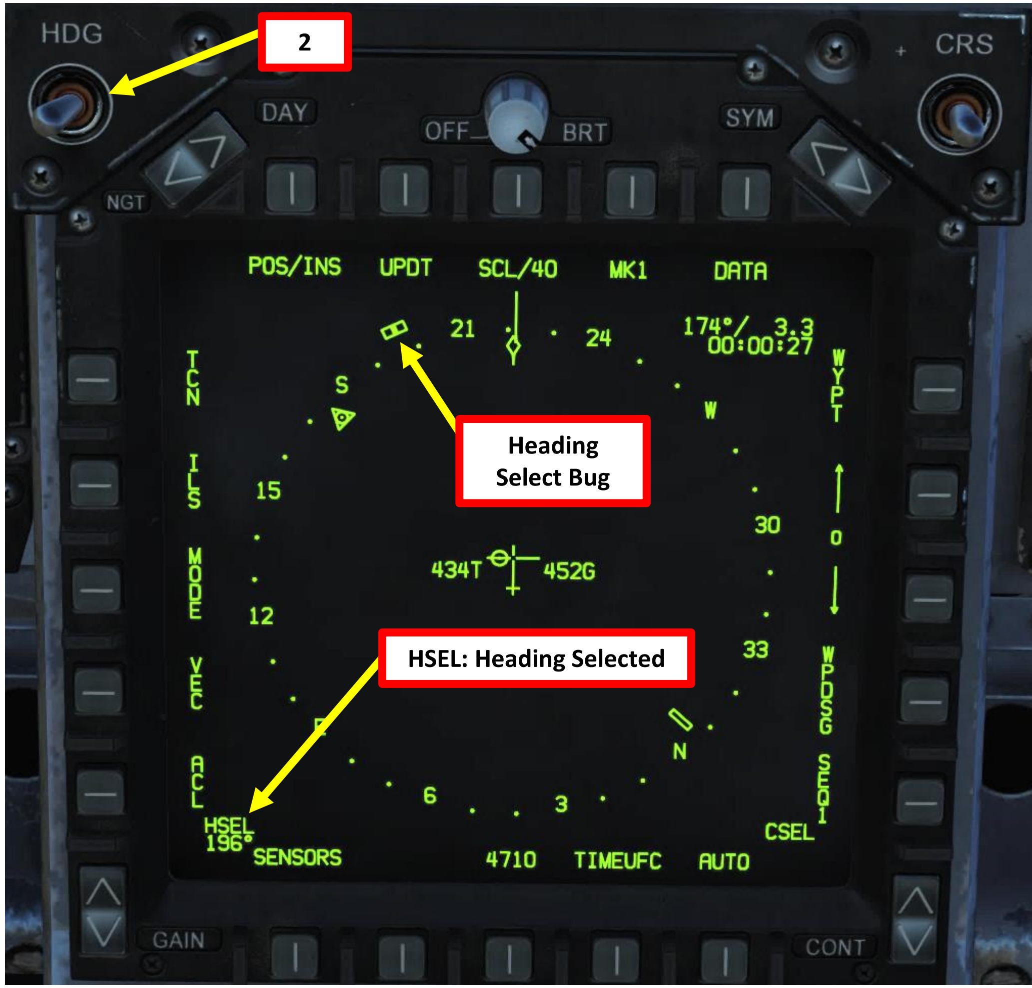
NAME	FUNCTION
1 A/P (autopilot) pushbutton.	Displays the pilot relief options on the UFC.
2 ON/OFF pushbutton	Engages the basic autopilot (heading hold), following selection of the A/P pushbutton.
3 Option display windows	Displays AFCS options when A/P pressed. ATTH – Attitude hold HSEL – Heading select BALT – Barometric altitude hold RALT – Radar altitude CPL – Coupled steering
4 Option select pushbuttons	Selects the AFCS mode displayed in the adjacent option select window.
5 Heading digital display	Displays selected heading
6 Command heading marker	Displays selected heading
7 Heading set switch	Sets selected heading. Left decreases heading. Right increases heading.
8 Autopilot/nosewheel steering disengage lever (paddle switch)	Disengages AFCS

AFCS (AUTOMATIC FLIGHT CONTROL SYSTEM)

PROCEDURE

1. Make sure your stick is centered, no force is applied on it and that you have an appropriate deadzone (see CONTROLS SETUP - WHAT YOU NEED MAPPED section). Stick movement automatically inhibits autopilot activation.
2. If you intend to use the HSEL (Heading Select) mode, set the desired heading with the HDG switch above the AMPCD screen. Otherwise, disregard this step.
3. Press the **A/P** button on the UFC (Up-Front Controller) to display autopilot modes
4. Press on the OSB (Option Select Button) next to the desired autopilot mode:
    - **ATTH**: Attitude Hold. Aircraft will maintain the existing pitch and roll attitude between +/- degrees in pitch and +/- 70-degrees in roll
    - **BALT**: Barometric Altitude Hold. When engaged, aircraft will maintain current heading and barometric altitude between 0 and 70000 ft
    - **HSEL**: Heading Select. Aircraft will turn to and fly the heading as set on the HSI (Horizontal Situation Indicator).
    - **RALT**: Radar Altitude Hold. Aircraft will maintain current heading and radar altitude between 0 and 5000 ft.
5. You can disengage autopilot by pressing the Paddle Switch on the control stick.



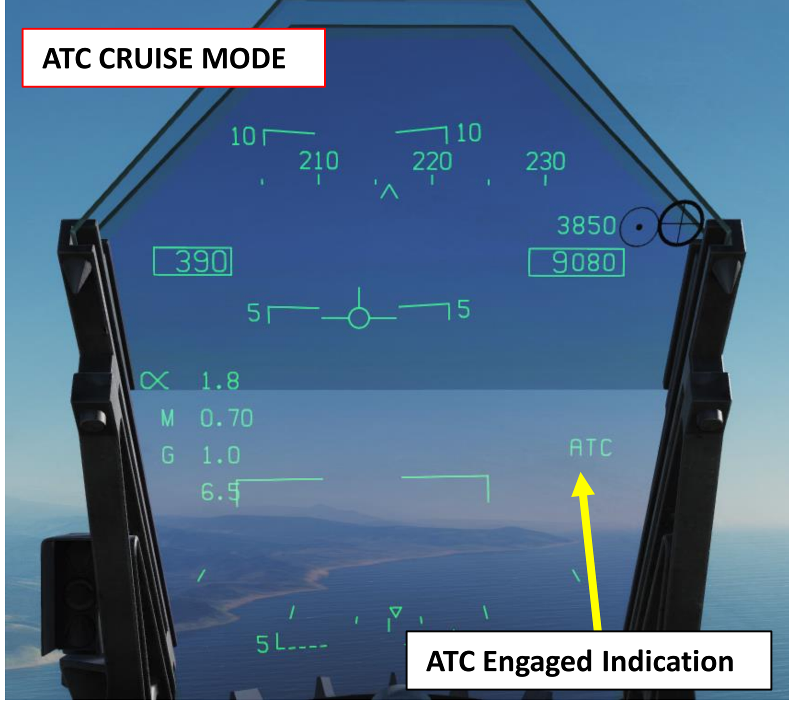


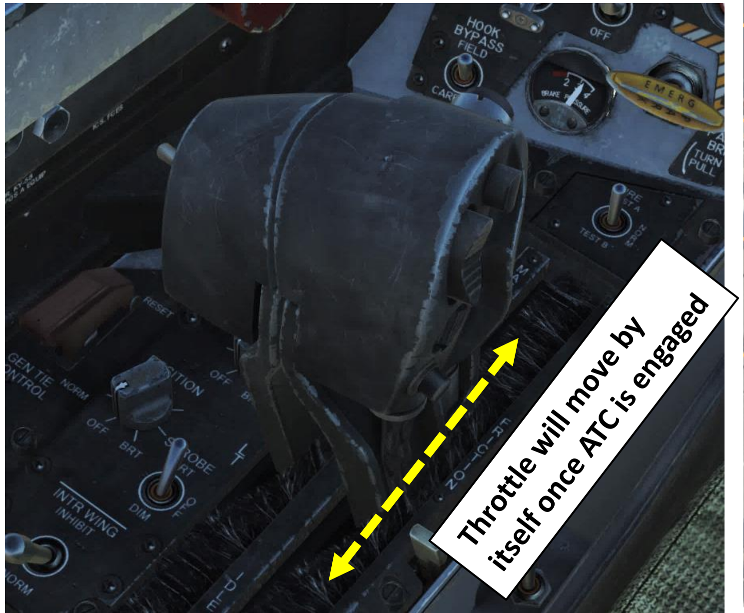
ATC (AUTOMATIC THROTTLE CONTROL)

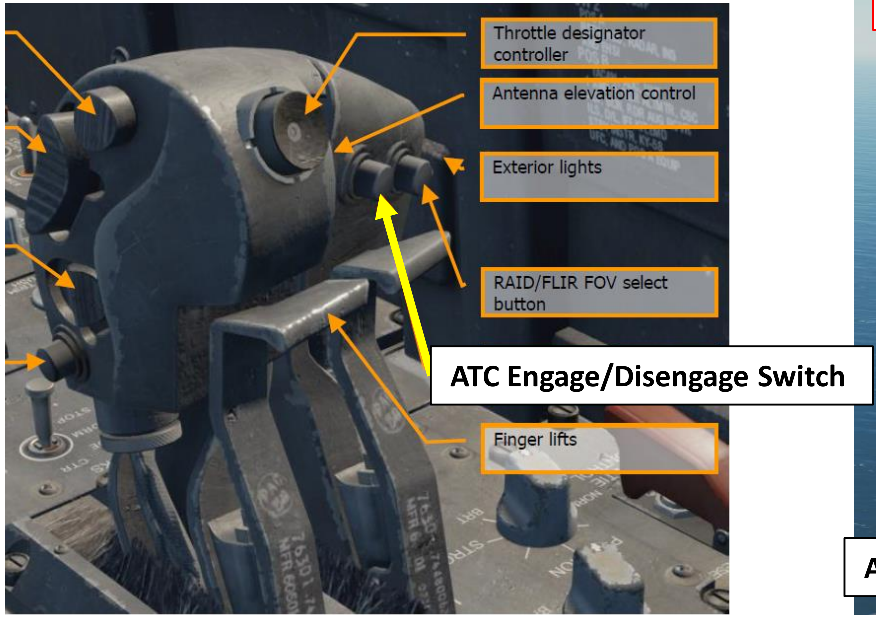
The ATC (Automatic Throttle Control) system is a two-mode auto-throttle system that automatically maintains angle of attack (approach mode) or airspeed (cruise mode) by modulating engine thrust in the range of FLIGHT IDLE through MILITARY power.

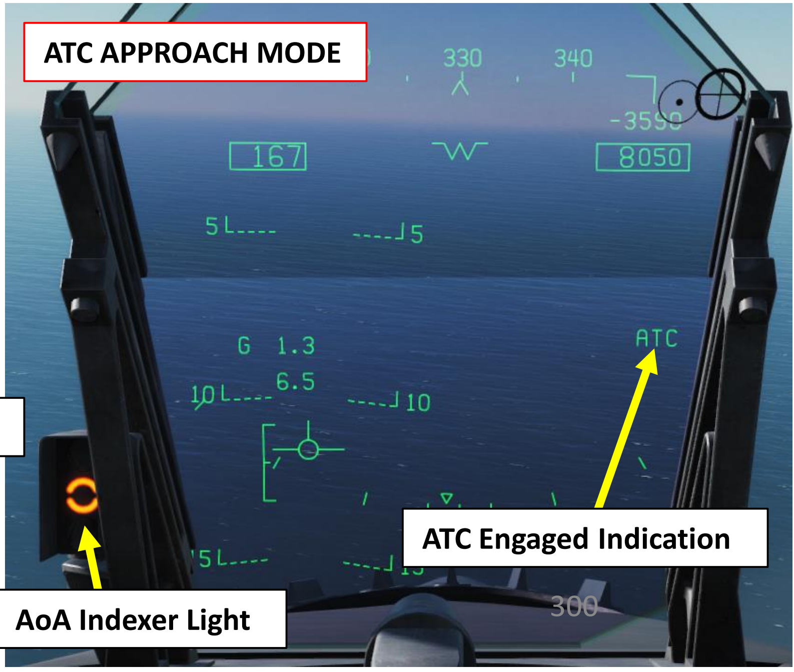
When either mode is engaged, the ECS (Environment Control System) air to the torque boosters is shut off, the throttles are initially backdriven, a stop is extended in the power lever control (PLC) to limit throttle travel from flight idle to MIL, and an ATC advisory is displayed on the HUD.

If either mode does not engage when selected, or automatically disengages after engagement, the ATC display flashes for 10 seconds and is then removed from the HUD. If a force of approximately 12 pounds (with friction off) is applied to either throttle the system automatically disengages. This force is sufficient to permit the hand to follow throttle movement without causing disengagement. Switching flap position also disengages the system.









ATC (AUTOMATIC THROTTLE CONTROL)

ATC APPROACH MODE:

HOW TO ENGAGE

Approach mode is engaged by pressing and releasing the **ATC button (T)** on the left throttle with the **FLAP switch in HALF or FULL** and **the trailing edge flaps extended at least 72 deg**.

WHAT IT DOES

When ATC is engaged in the approach mode, the flight control computer modulates engine thrust to maintain on-speed AoA (Angle of Attack). Computer uses inputs of AoA, normal load factor, stabilator position, pitch rate and angle of bank to generate command signals. These signals drive the throttle, which in turn commands engine fuel controls. Thrust will vary with pilot induced pitch changes and banking manoeuvers provide additional thrust to prevent the aircraft from falling out of the sky.

HOW TO DISENGAGE

Normal disengagement is accomplished by pressing the ATC button (T).

ATC Approach Mode Automatic Disengage Conditions

Flap AUTO up
AOA sensor failure
Two or more failures of either trailing edge flap
Trailing edge flap deflection less than 27°
ATC button fails
FCES channel 2 or 4 fails
WOW
FCS reversion to MECH or to DEL in any axis
Left and right throttle angles differ by more than 10° for more than 1 second
Bank angle exceeds 70°
Any internal system failure
Selection of GAIN ORIDE

ATC CRUISE MODE:

HOW TO ENGAGE

Cruise mode is engaged by pressing and releasing the **ATC button (T)** on the left throttle with the **FLAP switch in AUTO**.

WHAT IT DOES

When ATC is engaged in the cruise mode, existing airspeed is used by the flight control computer to module engine thrust to maintain this existing airspeed. Existing airspeed is the airspeed being sent from the ADC (Air Data Computer) to the flight control computers via the mission computers.

HOW TO DISENGAGE

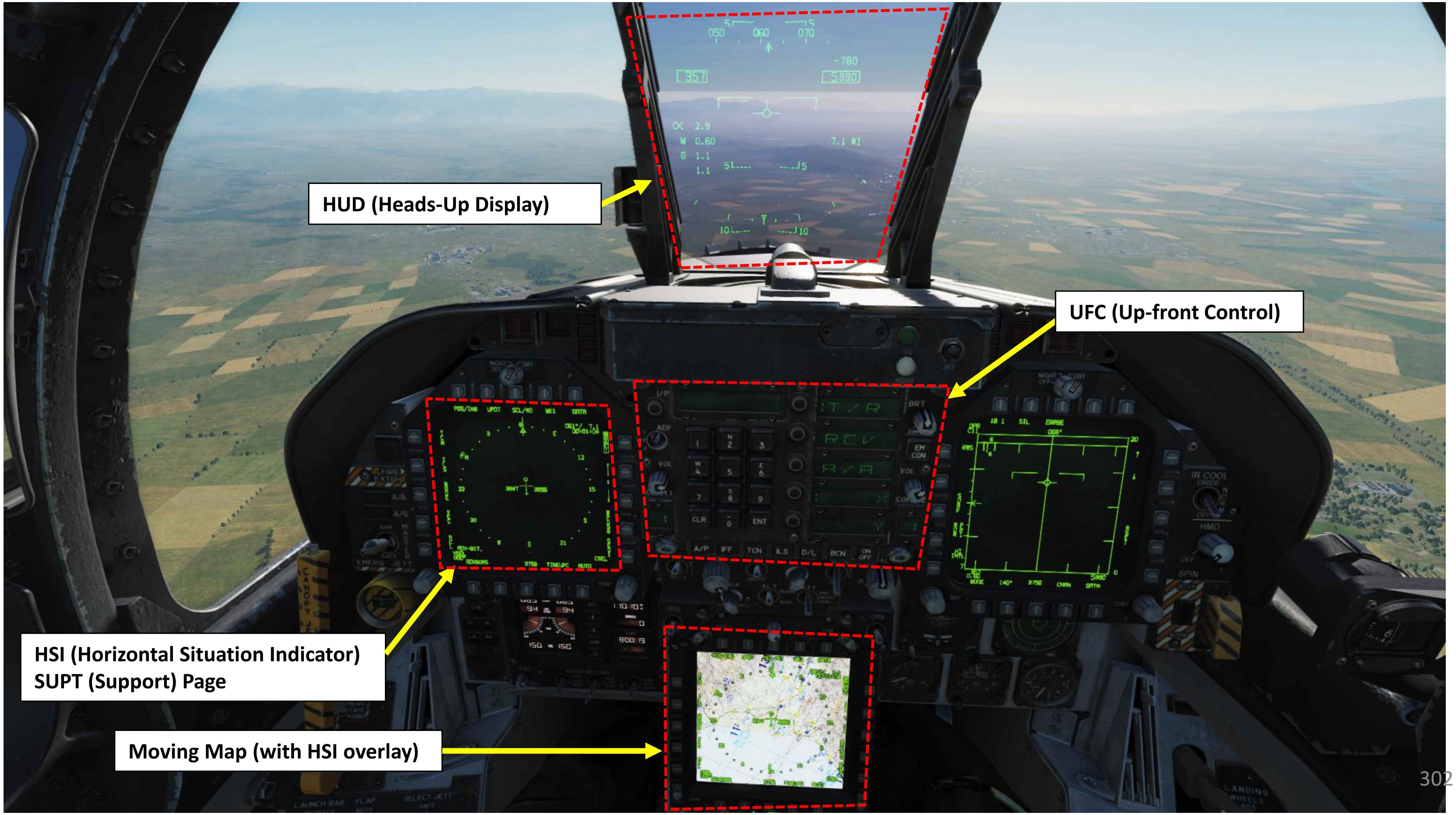
Normal disengagement is accomplished by pressing the ATC button (T).

ATC Cruise Mode Automatic Disengage Conditions

Flaps HALF or FULL
ATC button fails
FCES channel 2 or 4 fails
FCS reversion to MECH or to DEL in any axis
Left and right throttle angles differ by more than 10° for more than 1 second
ADC true airspeed failure
ADC degrade
Any internal system failure

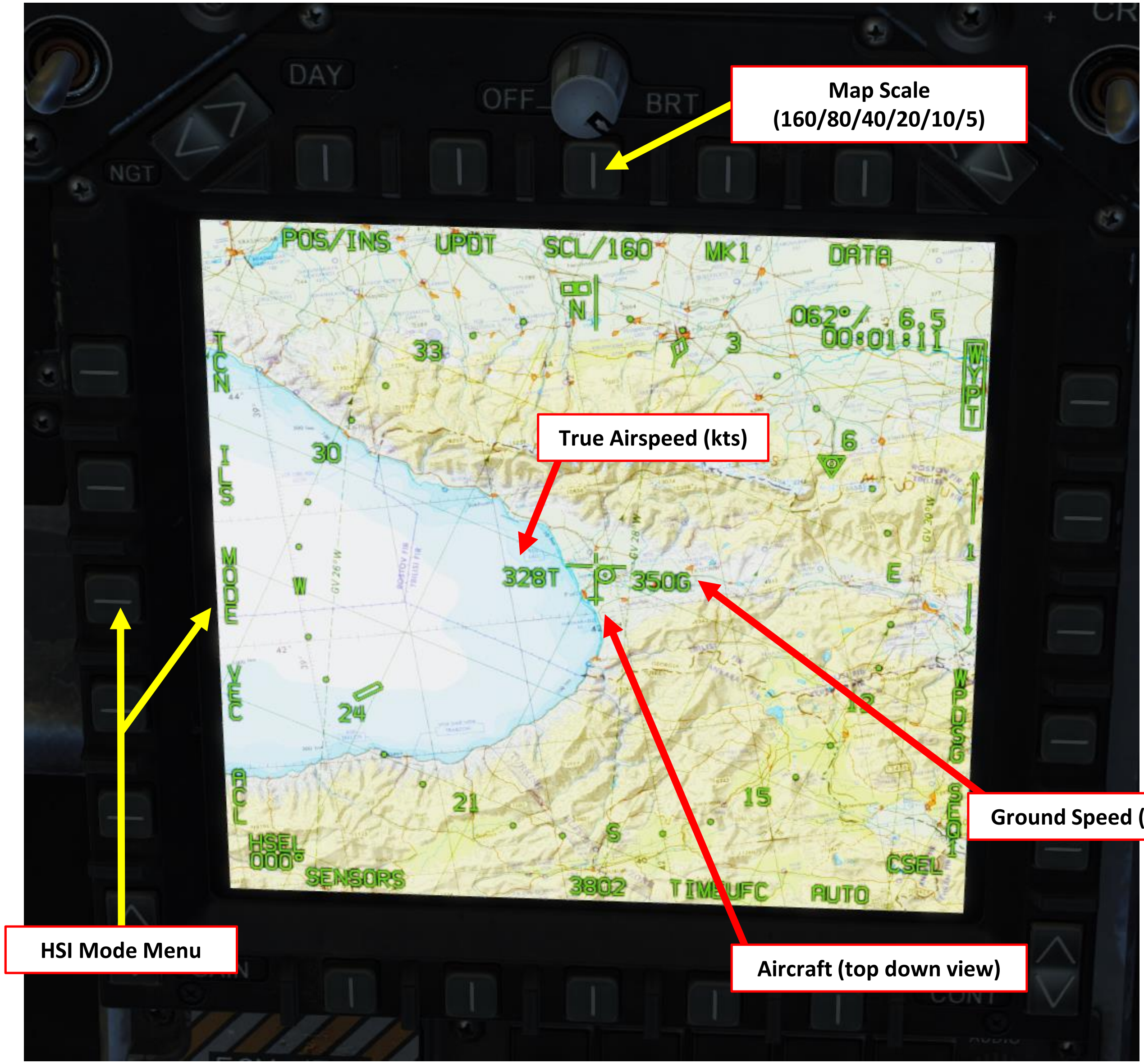
NAVIGATION INTRODUCTION

Navigation in the F/A-18 is mostly done through the HSI (Horizontal Situation Indicator), which is a top-down view that displays your heading and navigation aids such as TACAN (Tactical Air Navigation) beacons and waypoints entered before flight in the mission editor.

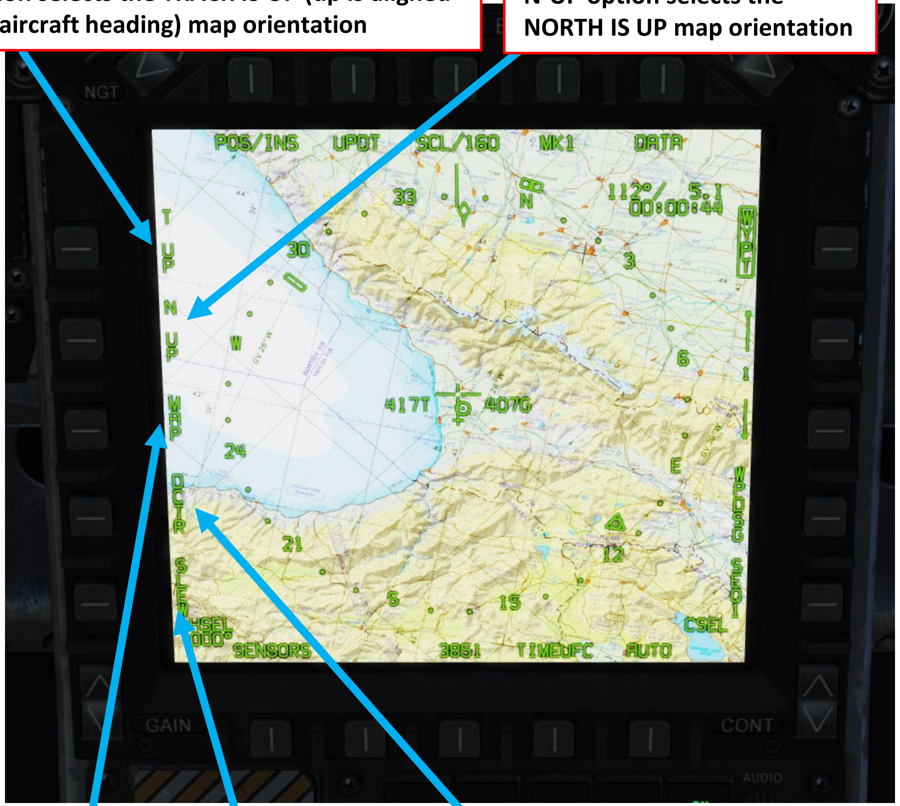


MOVING MAP – DMS (DIGITAL MAP SET)

The Moving Map can only be seen on the AMPCD (Advanced Multi-Purpose Color Display). However, most of its functions will be covered in the "HSI" section.

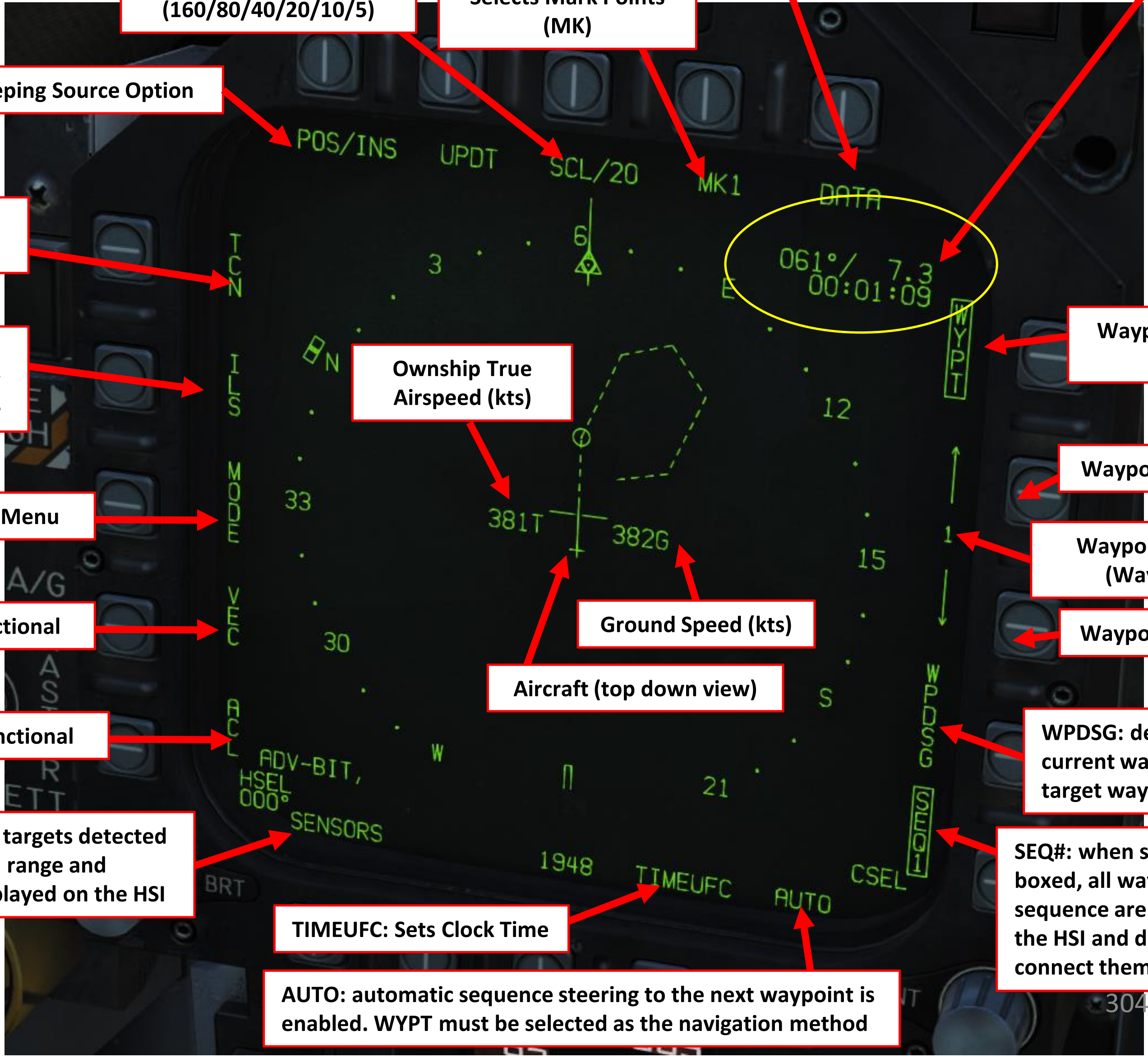


HSI Modes Sub-Menu



HSI (HORIZONTAL SITUATION INDICATOR)

The HSI page is pretty much the most important tool at your disposal for navigation. Basically, it is a top-down view of your aircraft, flight plan and navigation aids. You can select it by pressing twice on the MENU OSB (Option Select Button).



DATA selects the Data display mode (information about tracked aircraft/waypoint/TACAN)

Waypoint Data
Bearing (degrees) Distance (Nm)
Time-to-Go to Waypoint (minutes:seconds)

HSI Scale (160/80/40/20/10/5)

Selects Mark Points (MK)

Position Keeping Source Option

TCN selects the TACAN tracking mode

ICLS selects the Instrumented Landing System tracking mode

Ownship True Airspeed (kts)

Waypoint Selected (Boxed)

Waypoint Increment

Waypoint Selected (Waypoint 1)

Waypoint Decrement

HSI Mode Menu

VEC: Not Functional

Ground Speed (kts)

Aircraft (top down view)

ACL: Not Functional

WPDSG: designates the current waypoint as a target waypoint (TGT)

SENSORS: aerial targets detected by the RADAR in range and azimuth are displayed on the HSI

SEQ#: when selected and boxed, all waypoints of the sequence are displayed on the HSI and dashed lines connect them in sequence

TIMEUFC: Sets Clock Time

AUTO: automatic sequence steering to the next waypoint is enabled. WYPT must be selected as the navigation method

WAYPOINT INTRODUCTION

Your waypoints are usually already set up with the mission editor. They are generally set up as a “sequence” and numbered 1, 2, 3… for a maximum of 60 waypoints. You can have up to three different sequences of waypoints.

You will have a number of options that you can select like WYPT, SEQ, AUTO, etc. You can select them by clicking on the Option Select Buttons next to them. A boxed option means it is selected.

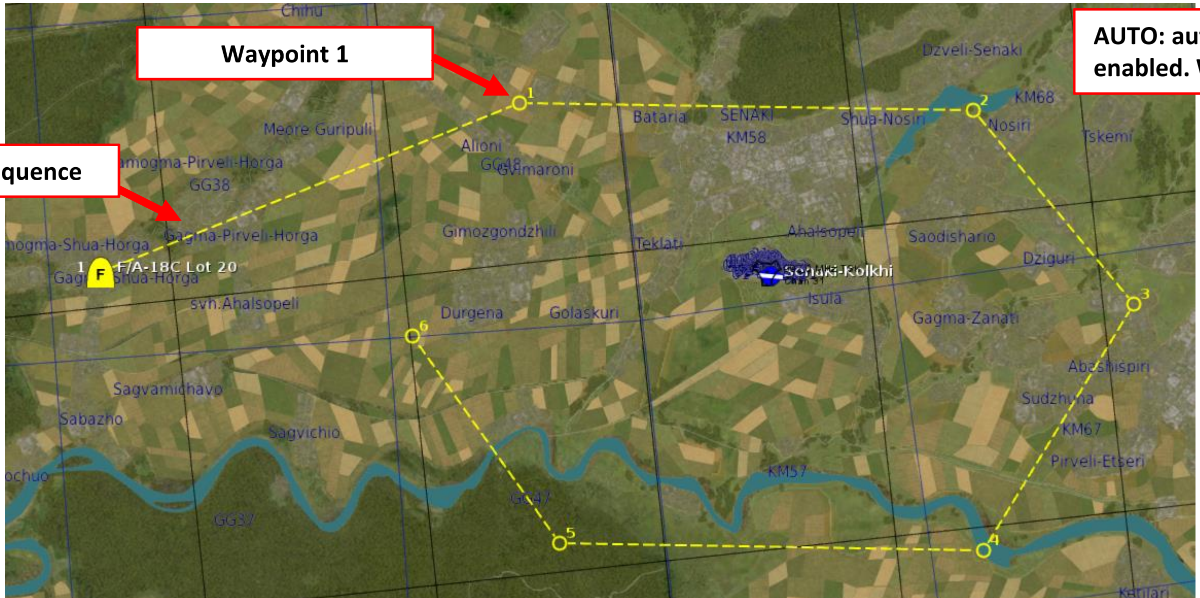
Waypoint 1 Tracked

AUTO: automatic sequence steering to the next waypoint is enabled. WYPT must be selected as the navigation method

SEQ#: when selected and boxed, all waypoints of the sequence are displayed on the HSI and dashed lines connect them in sequence

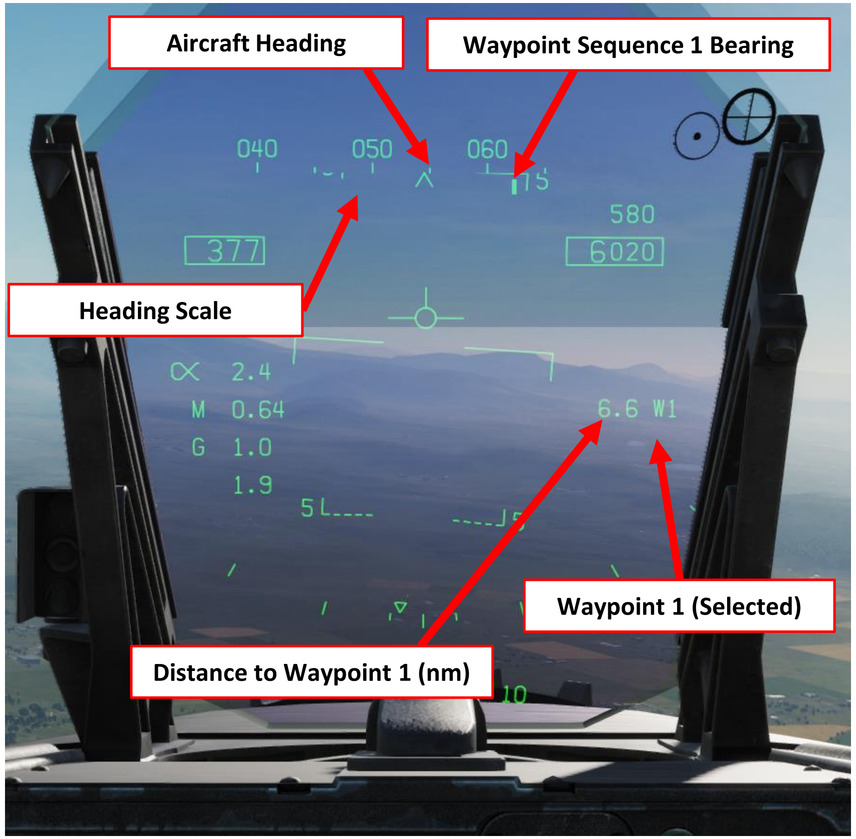
Waypoint 1

Waypoint Sequence



WAYPOINT NAVIGATION

1. Press the OSB (Option Select Button) next to WYPT to set tracking mode to WAYPOINT.
2. Select desired waypoint sequence by pressing the OSB next to SEQ#. We will pick Sequence 1. To display the sequence lines, press on the OSB again to make the SEQ1 text boxed.
3. To select a waypoint, press the OSBs to increment or decrement the waypoint number.
4. Use the HSI and HUD to navigate towards waypoint



HOW TO ADD/REMOVE WAYPOINTS

TO ADD WAYPOINTS:

1. In the HSI page, press the OSB next to DATA.
2. You will see the waypoint sequence. We want to insert a 7th waypoint after Waypoint 6, which we will call Waypoint 7.
3. Press the OSB next to SEQUFC (Sequence UFC)
4. On the UFC, press the OSB next to INS (Insert). « : » will appear once selected.
5. Press « 7 », then « ENT » to enter Waypoint 7.
6. Waypoint 7 will need coordinates, which we will add in the « HOW TO EDIT WAYPOINTS » tutorial.

TO REMOVE WAYPOINTS:

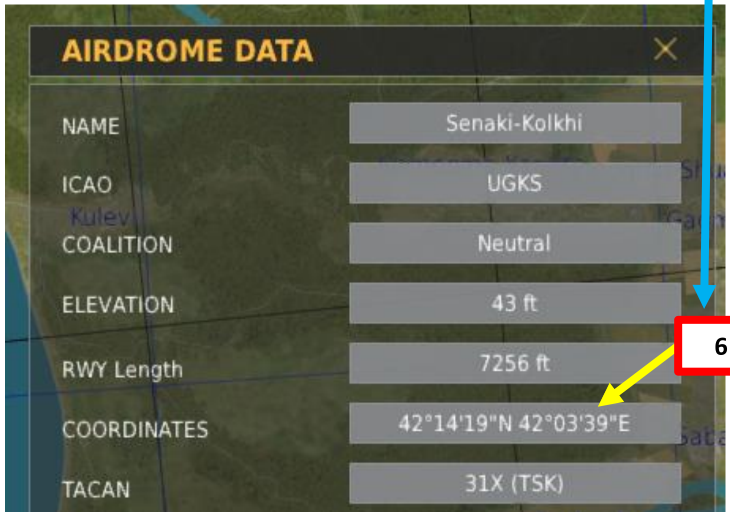
a) In the HSI page, press the OSB next to DATA.
b) You will see the waypoint sequence. Let's say we want to delete waypoint 2.
c) Press the OSB next to SEQUFC (Sequence UFC)
d) Press « CLR » to clear any displayed number on the UFC display
e) On the UFC, press the OSB next to DEL (Delete). « : » will appear once selected.
f) Press « 2 », then « ENT » to delete Waypoint 2
g) And that's it!

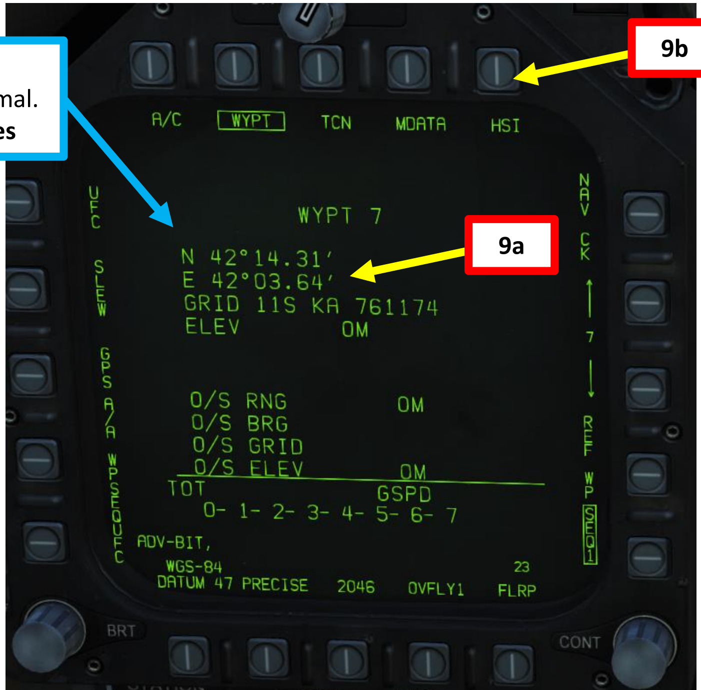
HOW TO EDIT WAYPOINTS

1. In the HSI page, press the OSB next to DATA.
2. You will see the waypoint sequence. We want to edit the coordinates of Waypoint 7 (which we created in the previous tutorial).
3. Press the Waypoint Increment/Decrement OSBs to select WYPT 7
4. Press the OSB next to UFC (Up-Front Controller)
5. On the UFC, press the OSB next to POSN (Position). « : » will appear once selected.
6. We will add the coordinates of the Senaki-Kolkhi Airdrome, which are in (deg, minutes, sec):

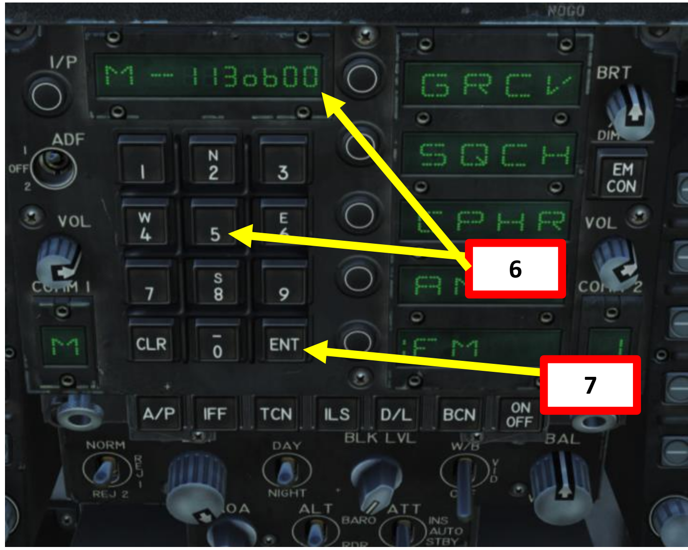
   42 °14’19’’ North 42 °03’39’’ East
7. On the UFC, press « 2 » (N) to select North coordinates, type « 421419 », then « ENT » to enter them.
8. On the UFC, press « 6 » (E) to select East coordinates, type « 420339 », then « ENT » to enter them.
9. And that’s it! You have edited Waypoint 7’s coordinates. If you click on the OSB next to HSI, you can see that Waypoint 7 is now visible in the sequence lines.

Coordinate format you input in the UFC is Degree, Minute, Seconds.
Coordinate format displayed on the DATA page is Degree, Minute, Decimal.
INPUT 42 deg 14 minutes 19 seconds = OUTPUT 42 deg 14.31 minutes





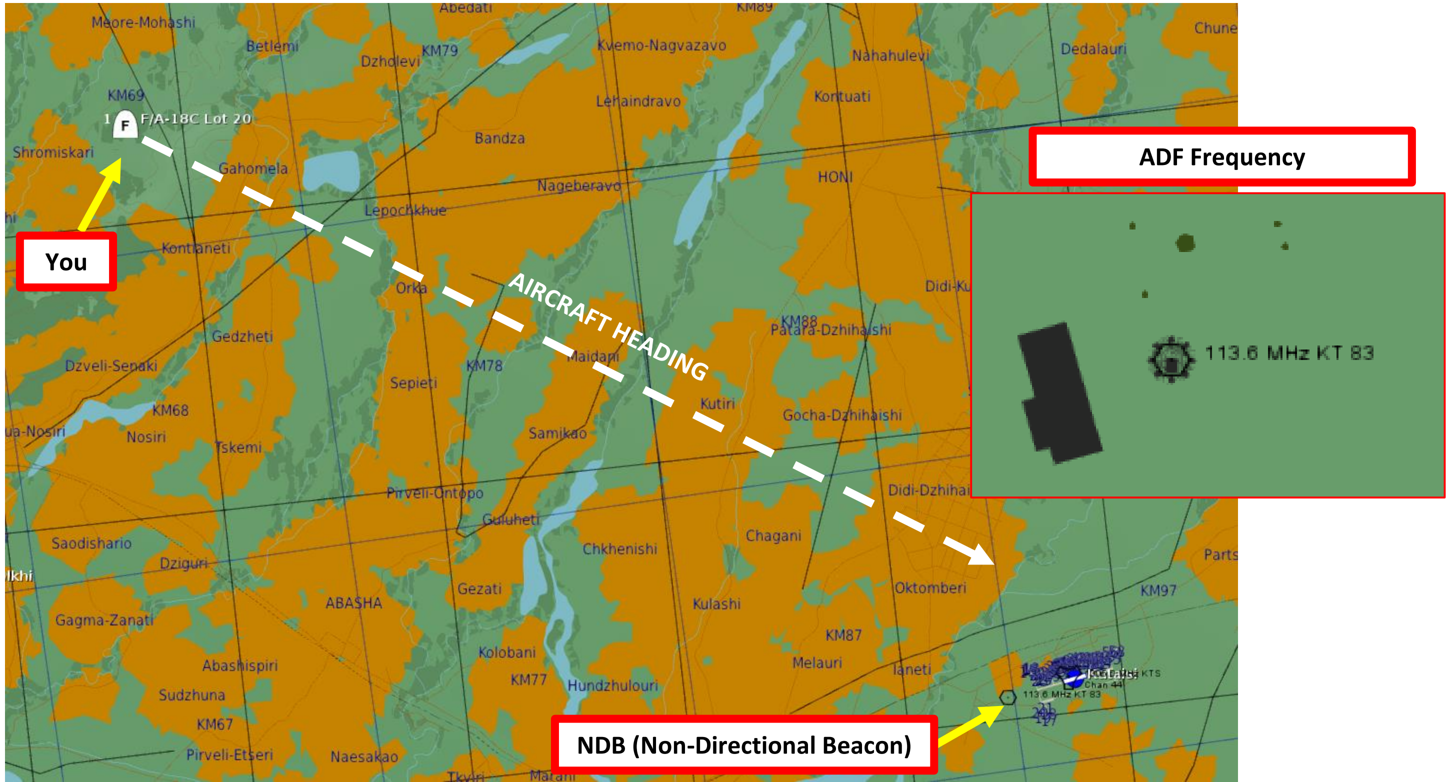
ADF NAVIGATION



To track an ADF (Automatic Direction Finder):

We want to track NDB (Non-Directional Beacon) 113.6.

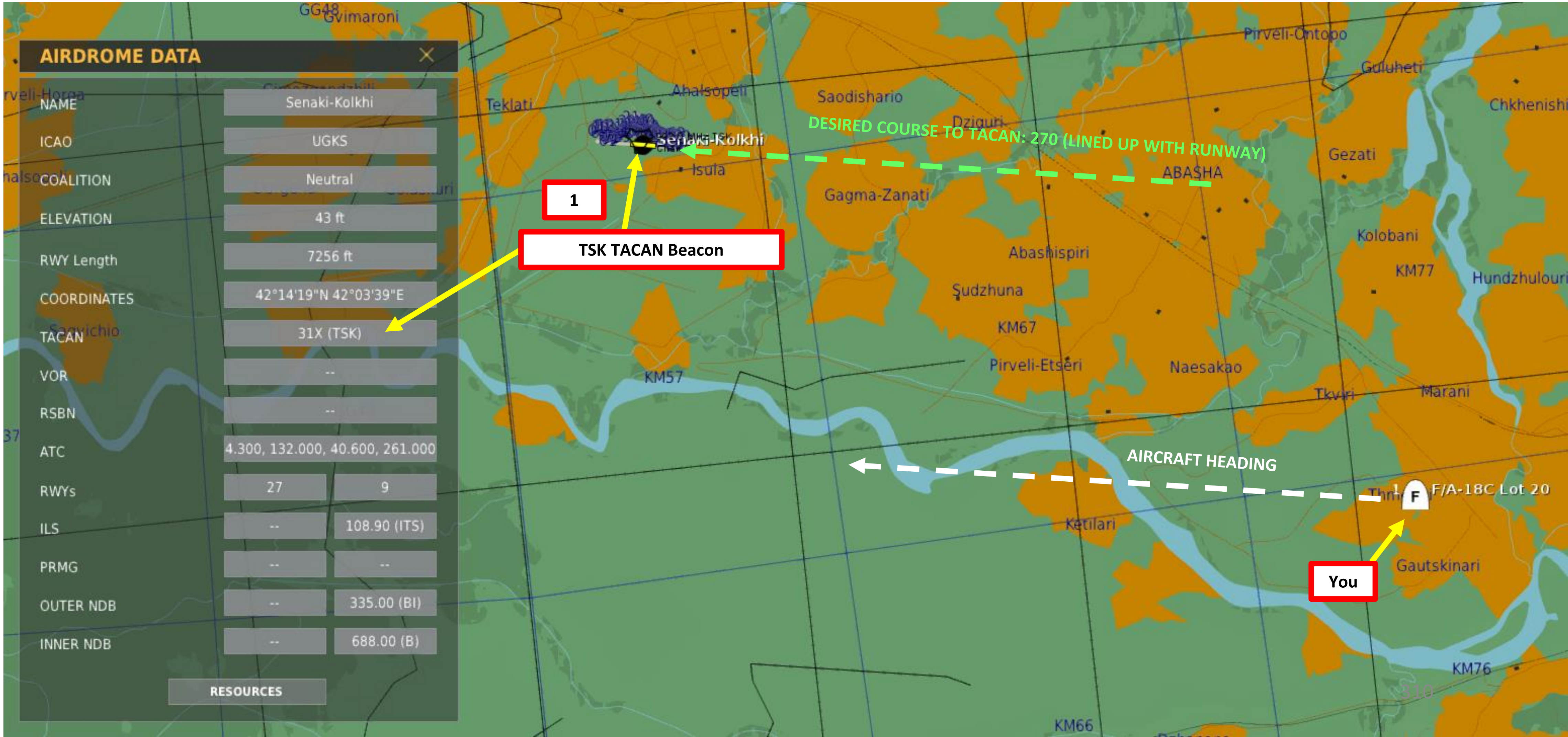
1. Set ADF switch to ADF1 (UP)
2. Left click on the COMM1 knob to pull it and select COMM1 Radio
3. Scroll mousewheel on COMM1 Radio Channel Selector to M (Manual) Mode
4. Press the OSB next to FM (":" will appear when selected)
5. Press CLR on the UFC to clear current frequency
6. Type "113600" on the UFC to set ADF frequency 113.6 MHz
7. Press ENT on the UFC to enter this frequency
8. You will now see a circle on the HSI compass rose. This is the heading towards the ADF beacon.



TACAN NAVIGATION

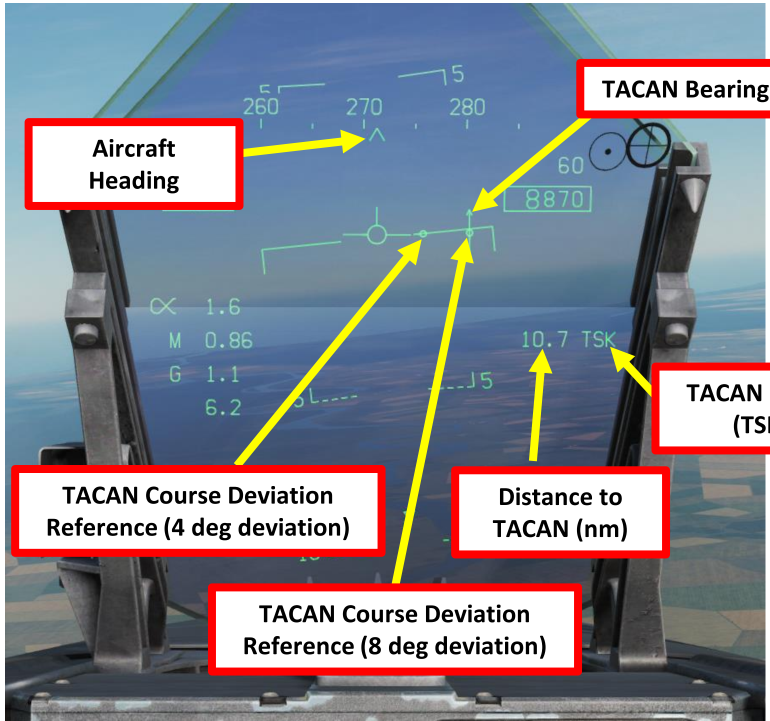
TACAN (Tactical Air Navigation) stations are navigation aids typically used by the military and provide you directional and distance guidance. They can be installed on airdromes, air refueling tankers or even aircraft carriers like the CVN-74 John Stennis (74-X frequency typically).

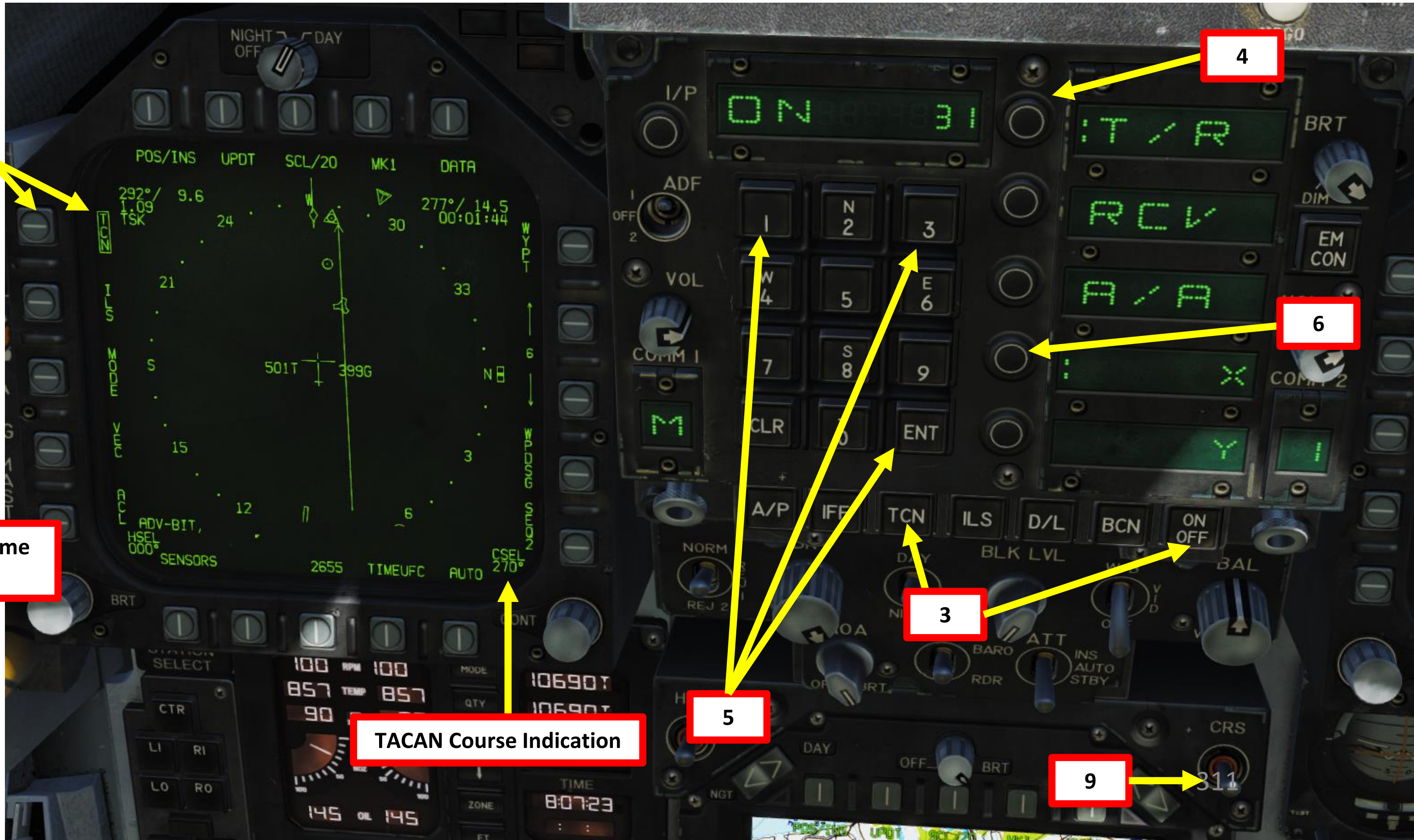
1. Determine the TACAN frequency you want to track by opening the map with F10 and by clicking on the airport you want to track. The frequency of the TACAN beacon for Senaki-Kolkhi is 31X (TSK).



TACAN NAVIGATION

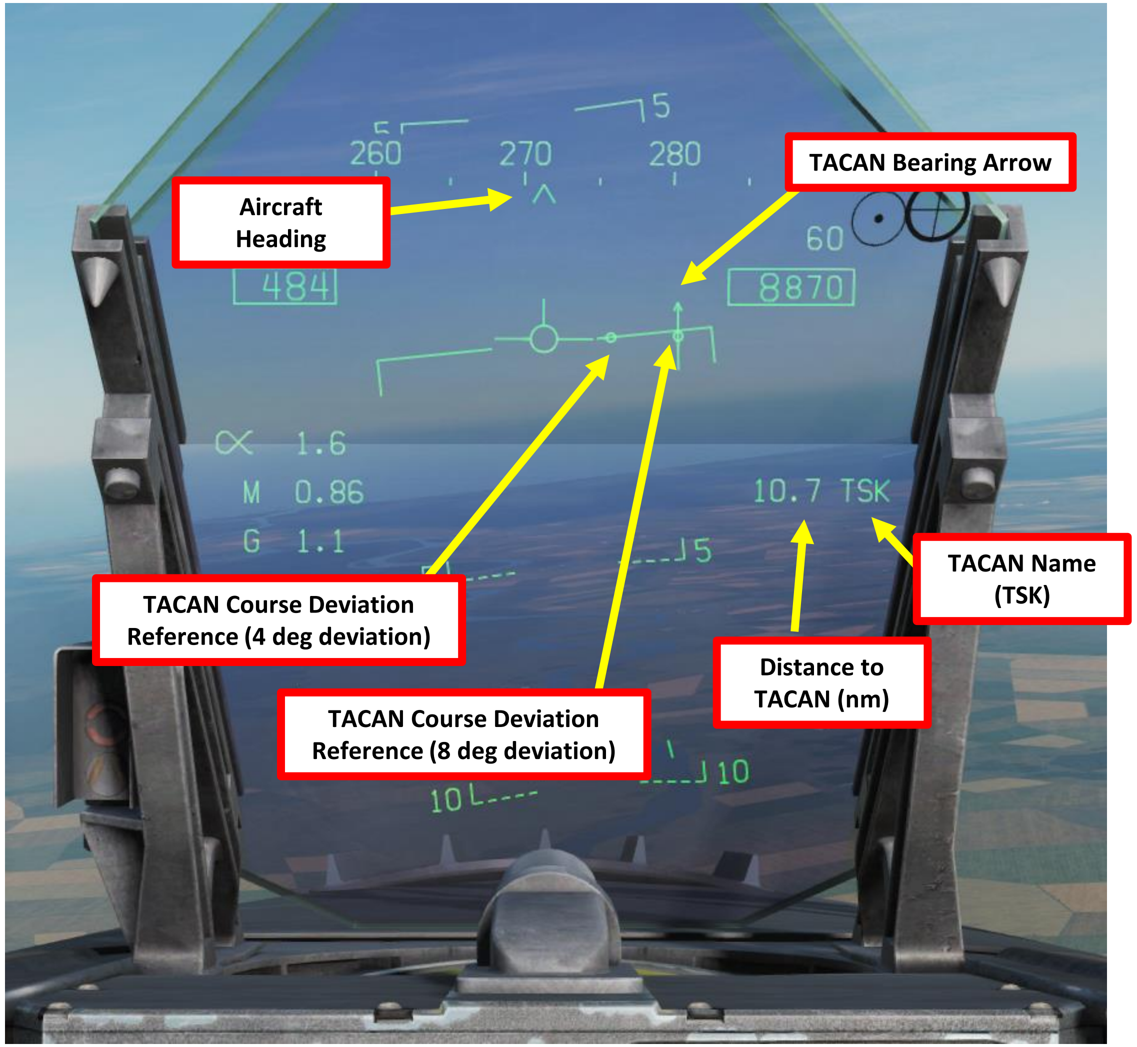
2. Select the HSI page on either DDI
3. On the UFC (Up-Front Control) Panel, press the TCN button and press the ON/OFF button if the ON indication is extinguished.
4. Press the T/R OSB button to set it to Transmit/Receive. The ":" symbol indicates that it is selected.
5. Press "31" on the scratchpad and press "ENT" to enter frequency.
6. Press the X or Y OSB to select the right letter of the TACAN frequency (31X in our case).
7. If you are tracking an aerial TACAN beacon (i.e. on a tanker), press the A/A OSB button to select air-to-air mode. The ":" symbol indicates that the mode is selected. Otherwise, make sure A/A is not selected (no ":" symbol).
8. Press the OSB next to TACAN to select tracking mode to TACAN. Once selected, TCN should be boxed.
9. Left/Right Click the CRS (Course Set) knob to set desired course for TACAN approach. This is useful when approaching a carrier or an airfield from a certain direction.
10. Once frequency is set and options are set, you can track the TACAN beacon via the HSI page and the HUD (Heads-Up Display).





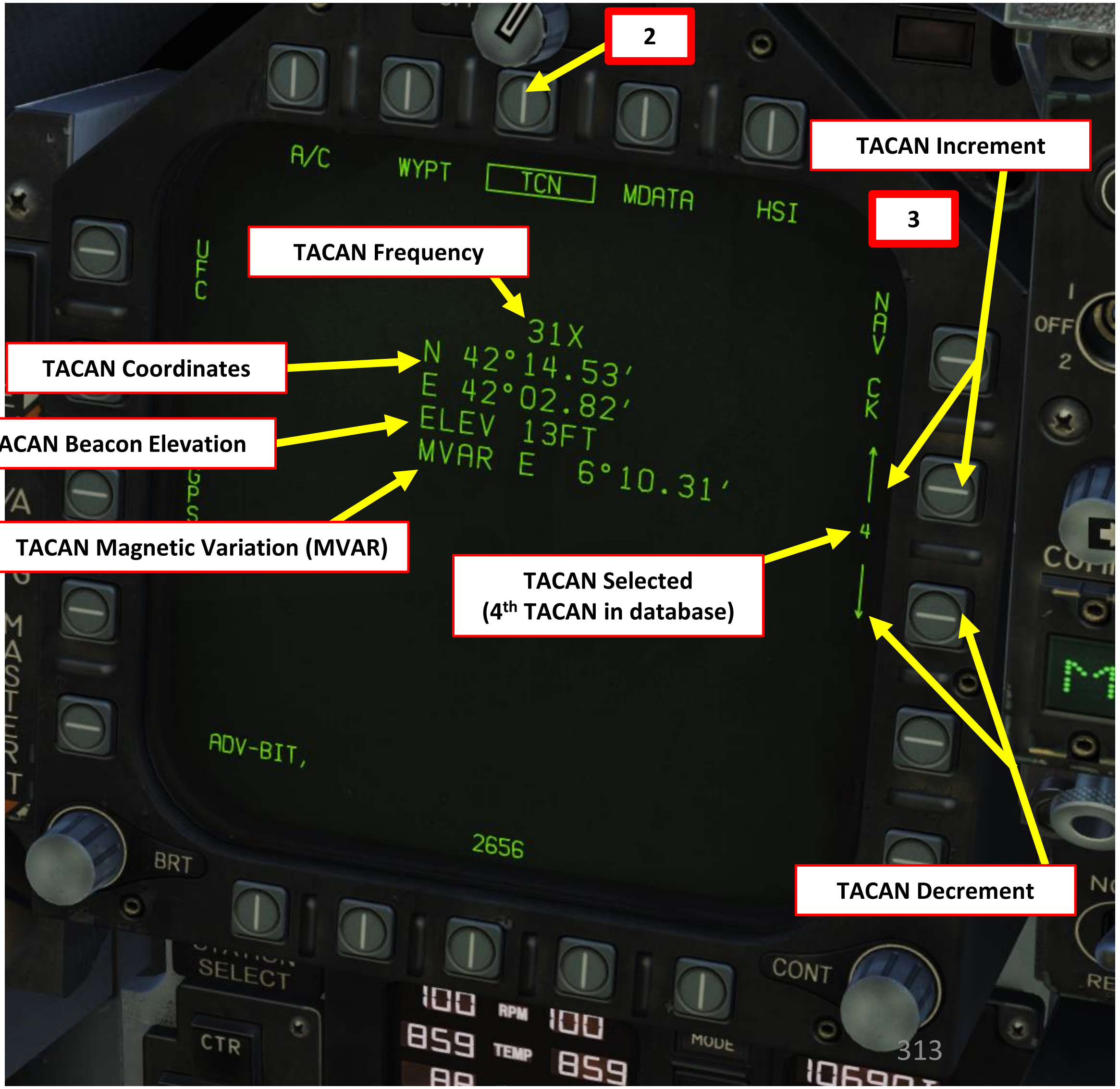
TACAN NAVIGATION

TSK TACAN Data
Bearing (degrees) Distance (Nm)
Time-to-Go to TACAN (minutes:seconds)
TACAN Name



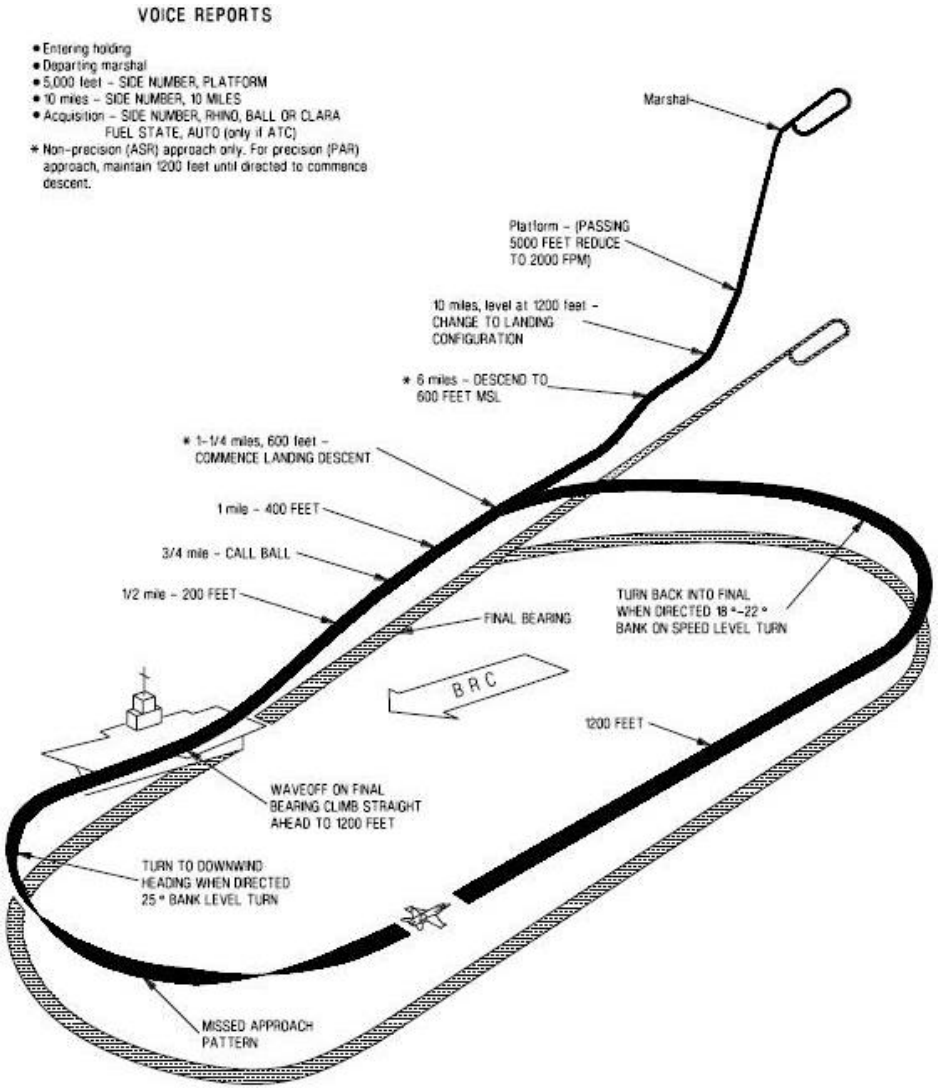
TACAN NAVIGATION

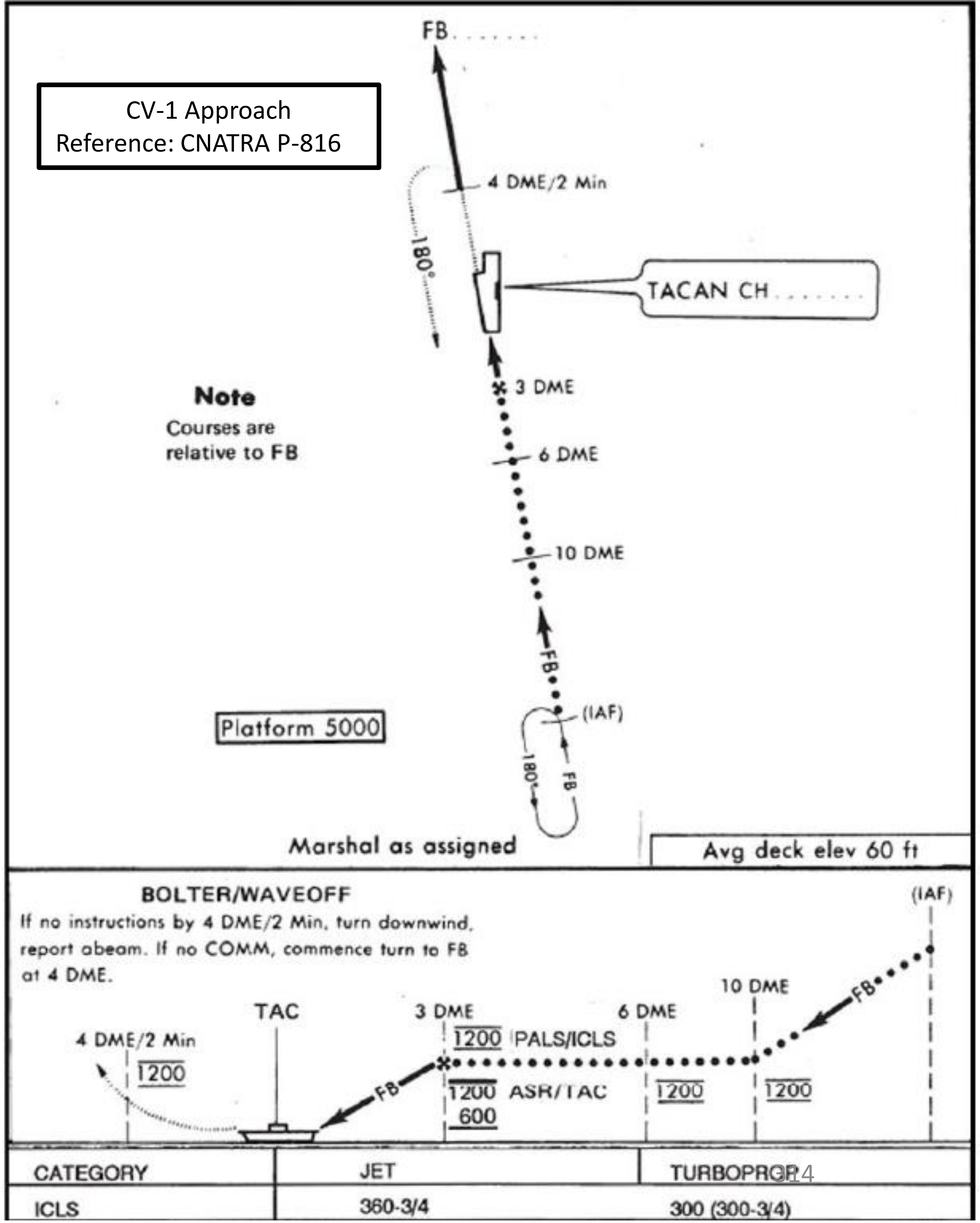
Here's a nice trick for you. If you click the OSB next to DATA while in the main HSI page, then click the OSB next to TCN, you can find the whole TACAN database. You can cycle through every TACAN station using the Increment/Decrement OSBs.



ICLS CARRIER LANDING TUTORIAL
CASE III RECOVERY

Case III recovery is used for all night operations, as well as during the day when the weather is below Case II minimums (less than 1,000-3). In other words, a Case III recovery is used for bad weather with low visibility conditions. The ICLS (Instrumented Carrier Landing System) will act sort of like an ILS (Instrumented Landing System) but for a carrier (d'uh).





ICLS CARRIER LANDING TUTORIAL
CASE III RECOVERY

The landing looks complicated, but it's not that bad once you figure out what you need to do. Don't worry, we'll go through it together.

- You will generally start a Case III recovery in the Marshal Zone. It's an airspace 25 nautical miles from the carrier where aircraft wait for landing clearances. We will use the carrier's TACAN beacon to orient ourselves and approach the carrier from a certain direction in reference to the beacon, which is what we call a radial. The Marshal Radial is usually 15 to 30 degrees off the Final Bearing. In our case, the final bearing is 360 deg, so the Marshal Radial is 030.

- We will follow the Marshal Radial (030) and descend from 10,000 ft to 5,000 ft at 250 kts with a descent rate of 4000 ft/min

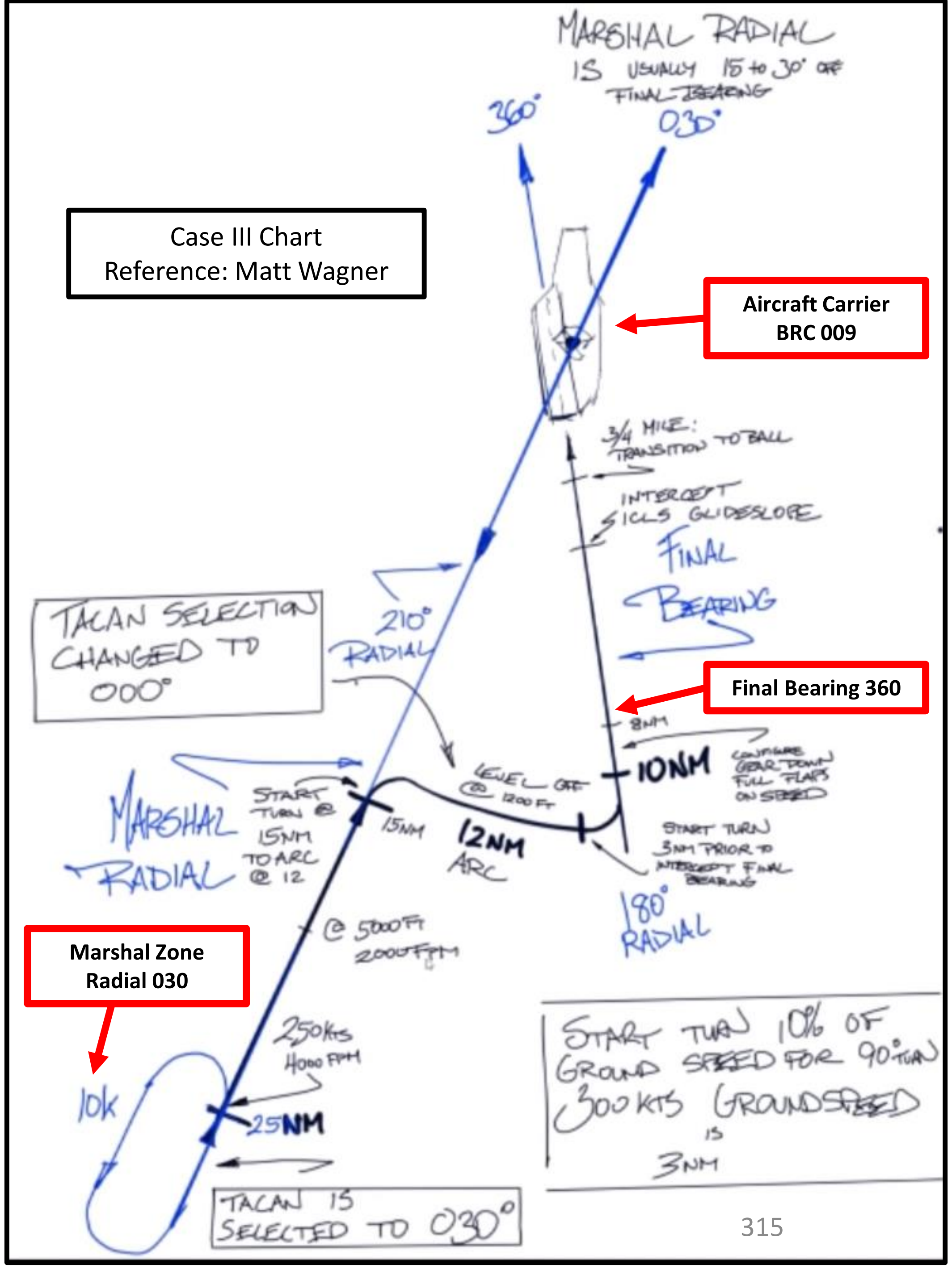
- Once we are 15 nm from the carrier on the Marshal Radial, we will turn 90 degrees right (030 + 90 degrees = 120 degrees) and maintain a 12 nm separation with the carrier.

- We will follow the "arc" until we reach the Final Bearing radial (360/000) approximately 10 nm from the carrier. We will then drop our gear down, set our flaps to full and set our angle of attack to ON SPEED AOA.

- Once we have turned to 360/000 and captured the carrier's localizer (indicates lateral deviation with runway centerline), we will then capture the glide slope (indicates vertical deviation with optimal path) using the ICLS (Instrumented Carrier Landing System).

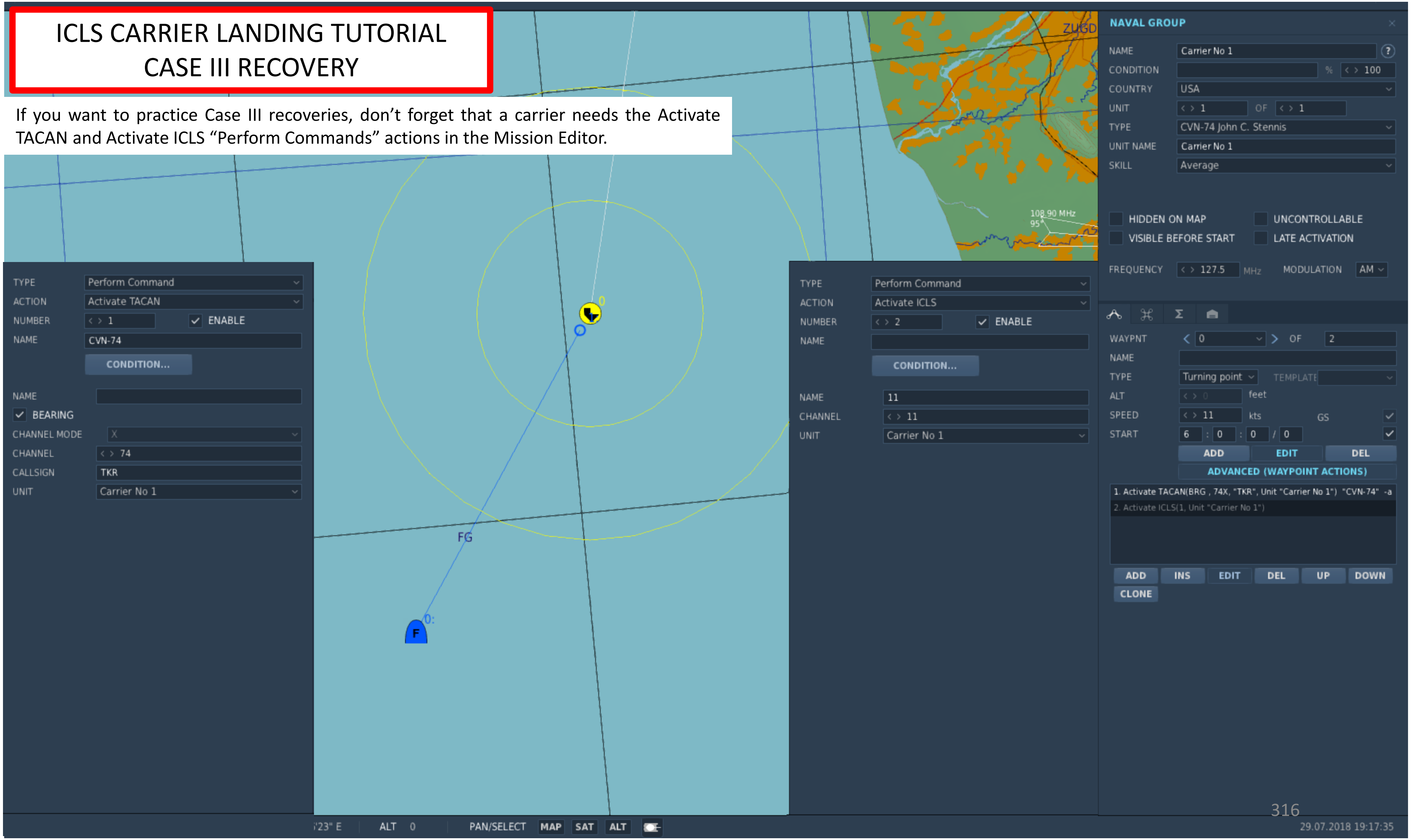
- Once we are 3/4 nm from the aircraft, we will track the meatball and use it as a reference to land.

- The TACAN is mostly used to help you track your radials and distance from the carrier during your approach. The ICLS, on the other hand, is used to give you a reference on where you should be during the final landing phase.



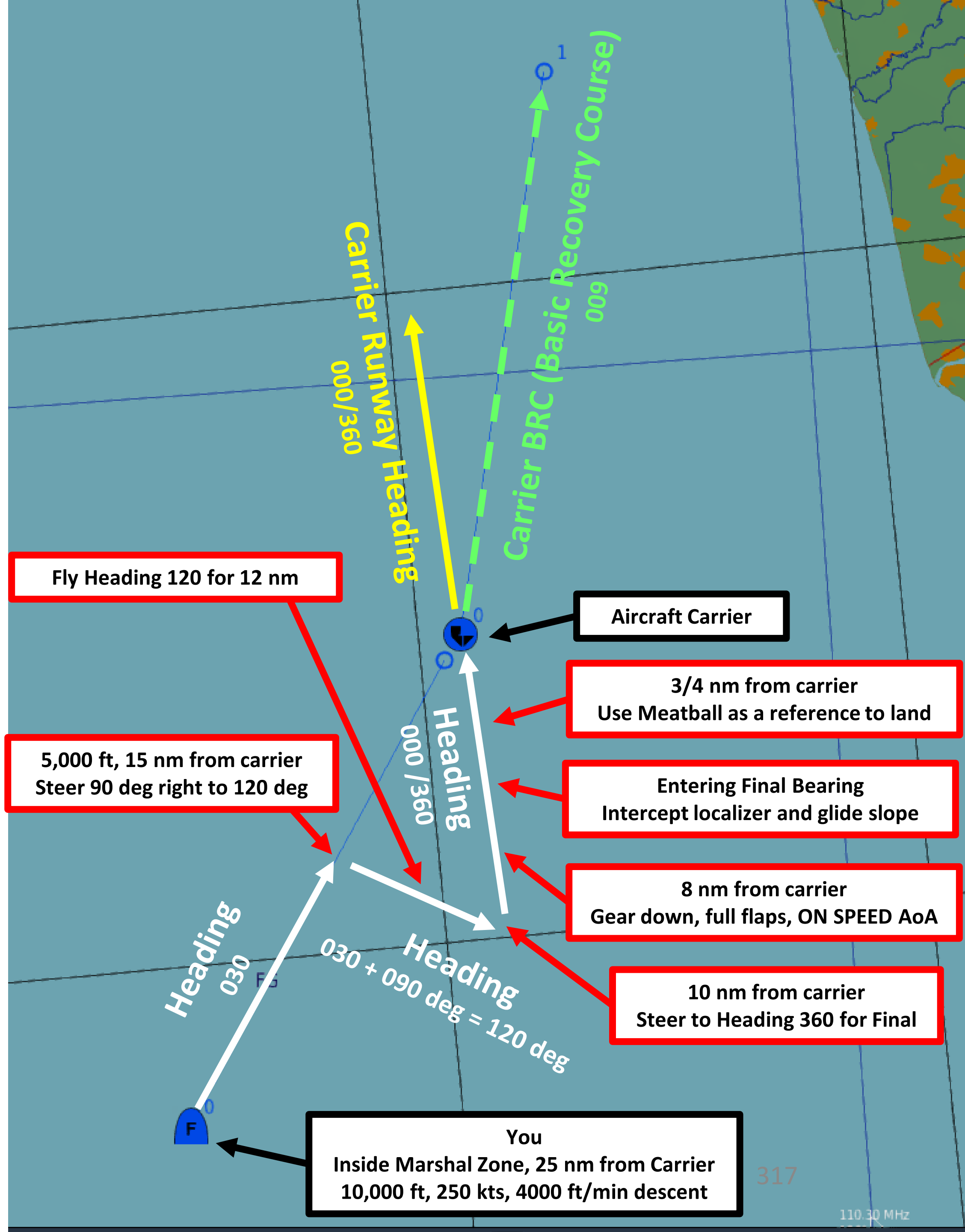
ICLS CARRIER LANDING TUTORIAL
CASE III RECOVERY

If you want to practice Case III recoveries, don't forget that a carrier needs the Activate TACAN and Activate ICLS "Perform Commands" actions in the Mission Editor.



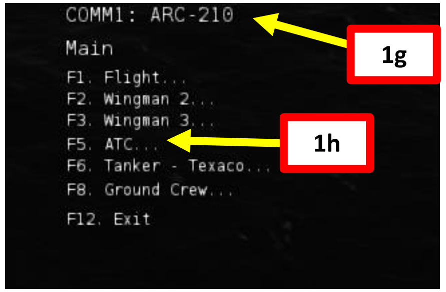
ICLS CARRIER LANDING TUTORIAL CASE III RECOVERY

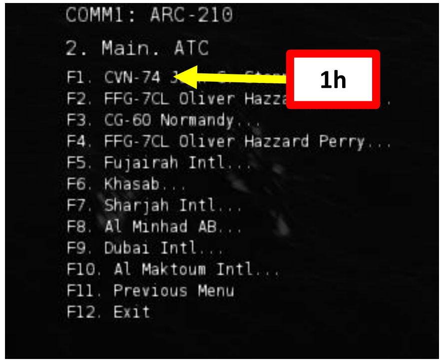
Here is a brief overview of what we'll do.

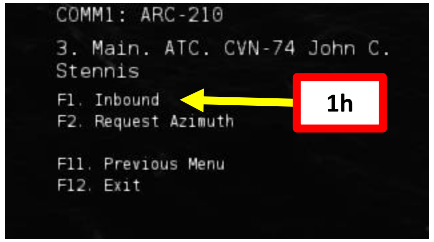


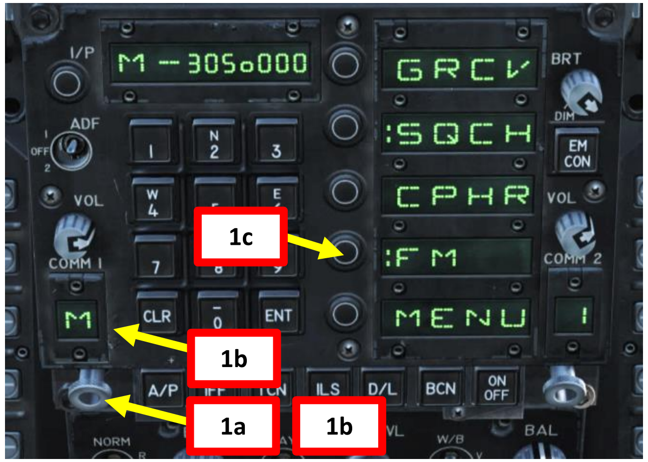
ICLS CARRIER LANDING TUTORIAL
CASE III RECOVERY

1. Contact Carrier to turn on the lights
    a. Left click on the COMM1 knob to pull it and select COMM1 Radio
    b. Scroll mousewheel on COMM1 Radio Channel Selector to M (Manual) Mode
    c. Press the OSB next to AM or FM to select the FM frequency (":FM" will appear when selected)
    d. Press CLR on the UFC to clear current frequency
    e. Type "127500" on the UFC to set carrier radio frequency 127.5 MHz
    f. Press ENT on the UFC to enter this frequency
    g. Press the COMM switch – COMM1 on your throttle to contact the carrier (RALT+\)
    h. Go in F5 – AT5 menu, then to the CVN-74 menu, then to the F1 – Inbound menu.
    i. And that's it, the carrier is now illuminated.



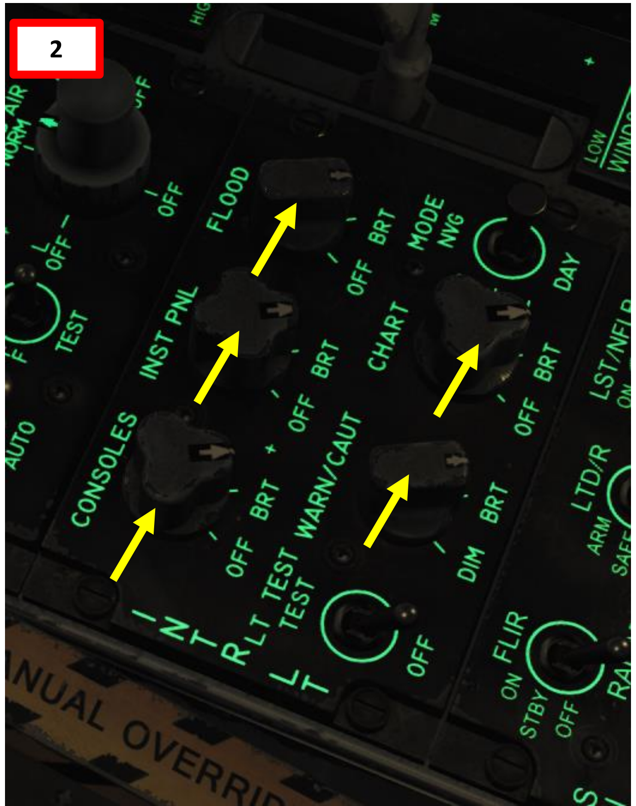


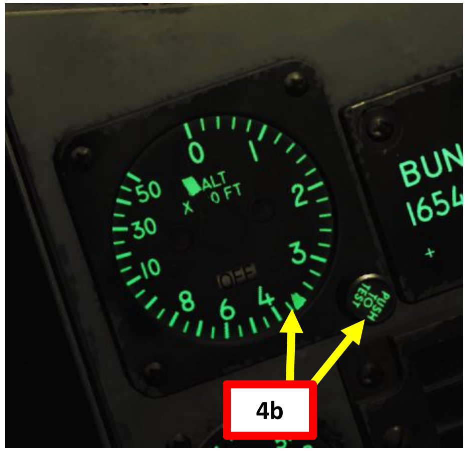




ICLS CARRIER LANDING TUTORIAL
CASE III RECOVERY

2. Adjust your interior cockpit lights as required
3. Set your HSI page on the left DDI, your FCS page on the right DDI, and the CHKLST page on the center AMPCD.
4. Set ALTITUDE Switch to RDR to use your radar altimeter as a reference for your HUD and set radar altimeter index to 370 ft or 320 (as you prefer). You use 370 ft to remind you that you need to make the ball call or 320 ft to make sure you have the proper altitude when 3/4 nm from the carrier.

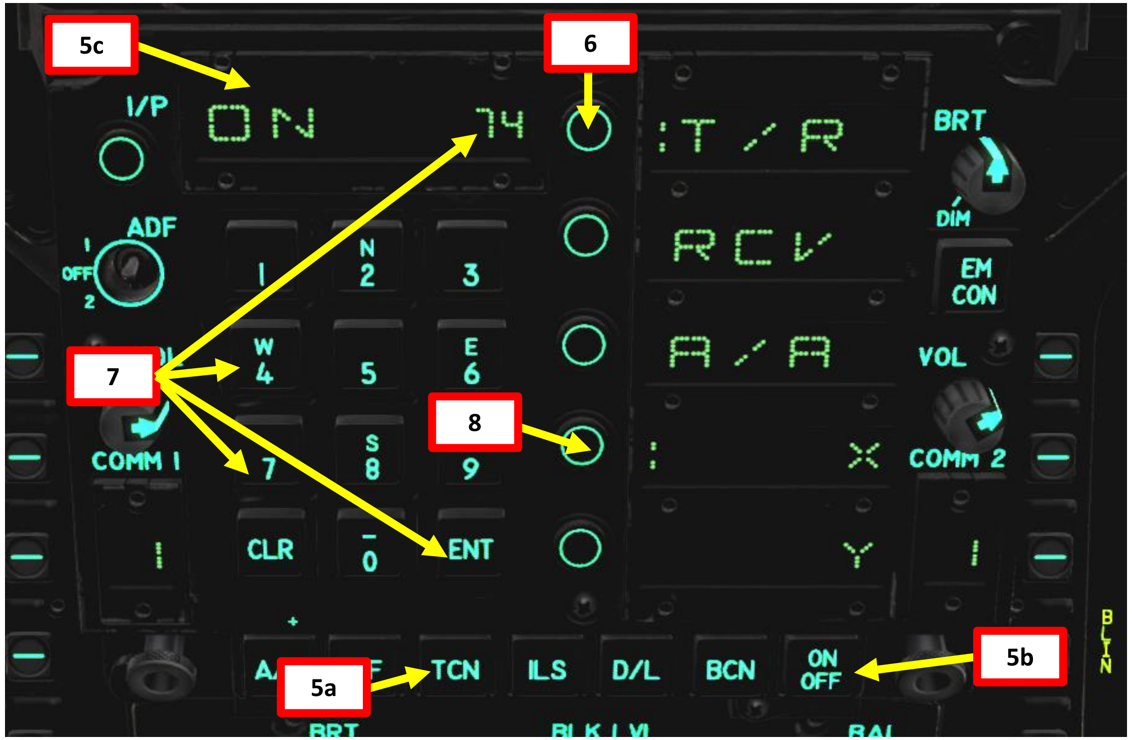


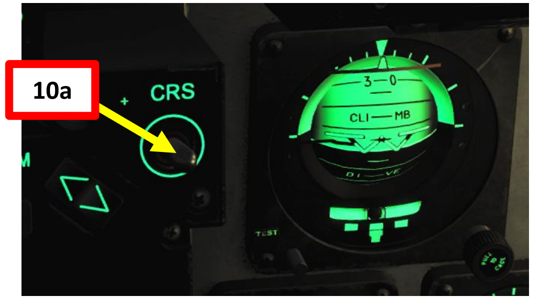


ICLS CARRIER LANDING TUTORIAL
CASE III RECOVERY

Note: we will assume the carrier's **TACAN frequency is 74X** and our **ICLS channel is 11**.

5. On the UFC (Up-Front Control) Panel, press the TCN button and press the ON/OFF button if the ON indication is extinguished.
6. Press the T/R OSB button to set it to Transmit/Receive. The ":" symbol indicates that it is selected.
7. Press "74" on the scratchpad and press "ENT" to enter frequency.
8. Press the X or Y OSB to select the right letter of the TACAN frequency (74X in our case).
9. Press the OSB next to TACAN to select tracking mode to TACAN. Once selected, TCN should be boxed.
10. Left/Right Click the CRS (Course Set) knob to set desired course for TACAN approach (030 for the Marshal Radial).





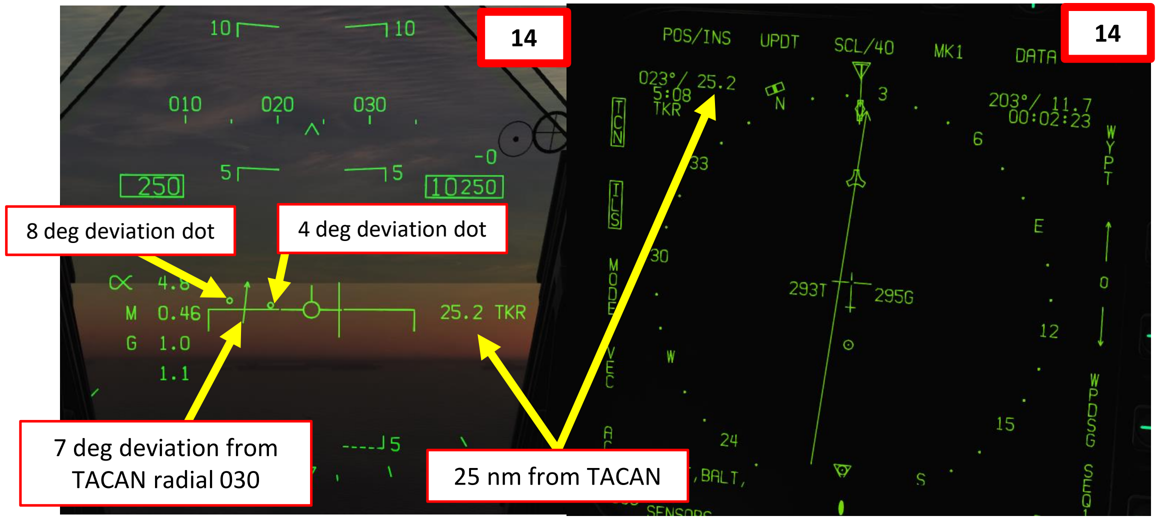
ICLS CARRIER LANDING TUTORIAL
CASE III RECOVERY

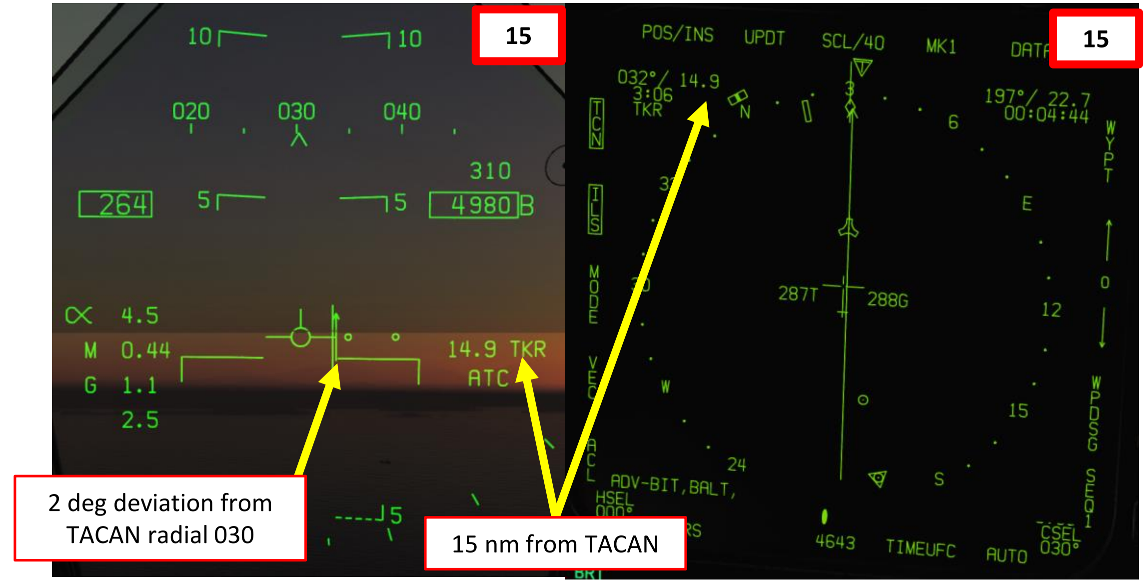
Note: we will assume the carrier's **TACAN frequency is 74X** and our **ICLS channel is 11**.

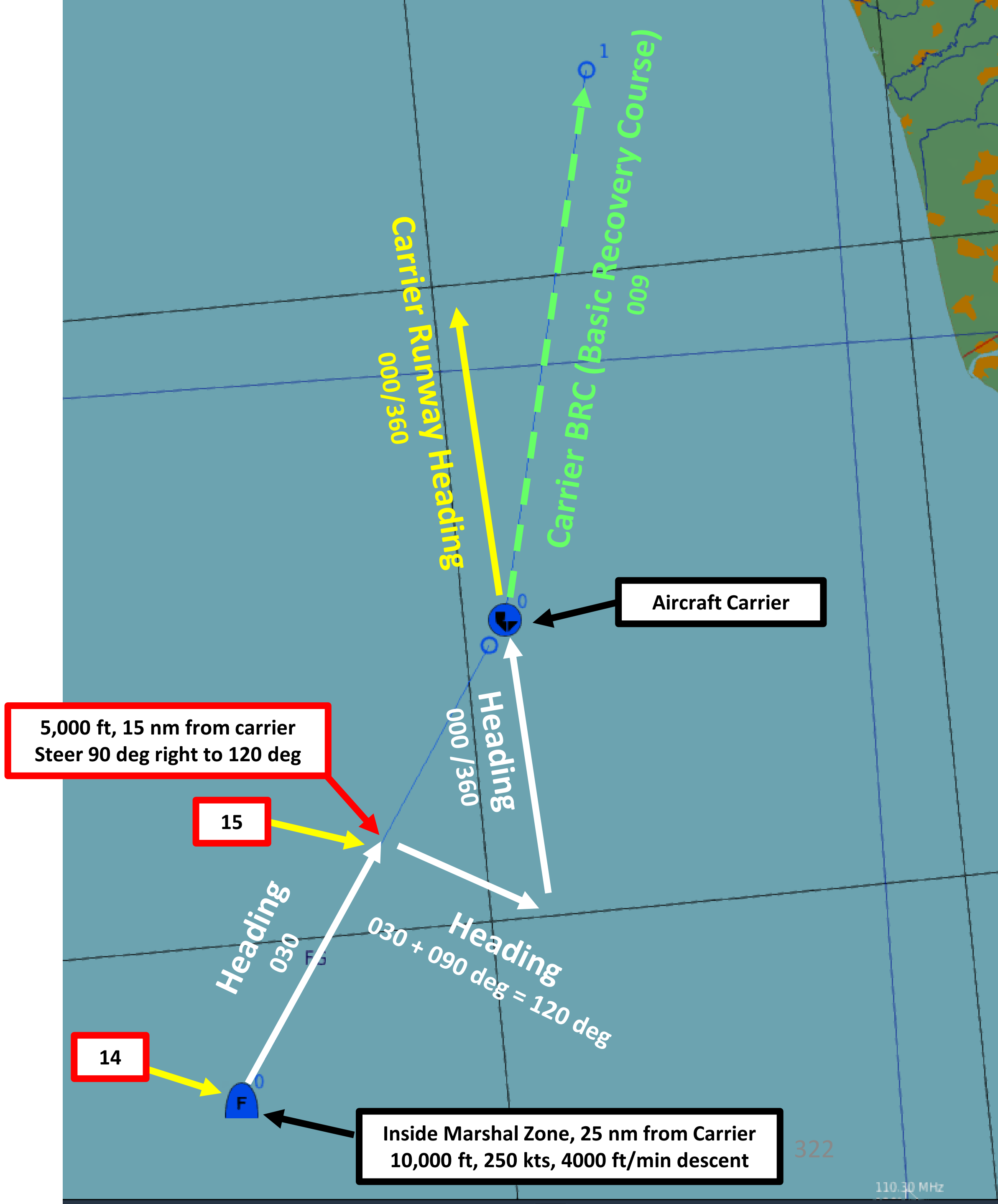
11. On the UFC (Up-Front Control) Panel, press the ILS button and press the ON/OFF button if the ON indication is extinguished.
12. Press "11" on the scratchpad and press "ENT" to enter ICLS frequency.
13. Press the OSB next to ILS to select tracking mode to ICLS. Once selected, ILS should be boxed.

ICLS CARRIER LANDING TUTORIAL CASE III RECOVERY

14. When you are 25 nm from carrier, follow the Marshal Radial (030) and descend from 10,000 ft to 5,000 ft at 250 kts.
15. Maintain 5,000 ft until being 15 nm from carrier

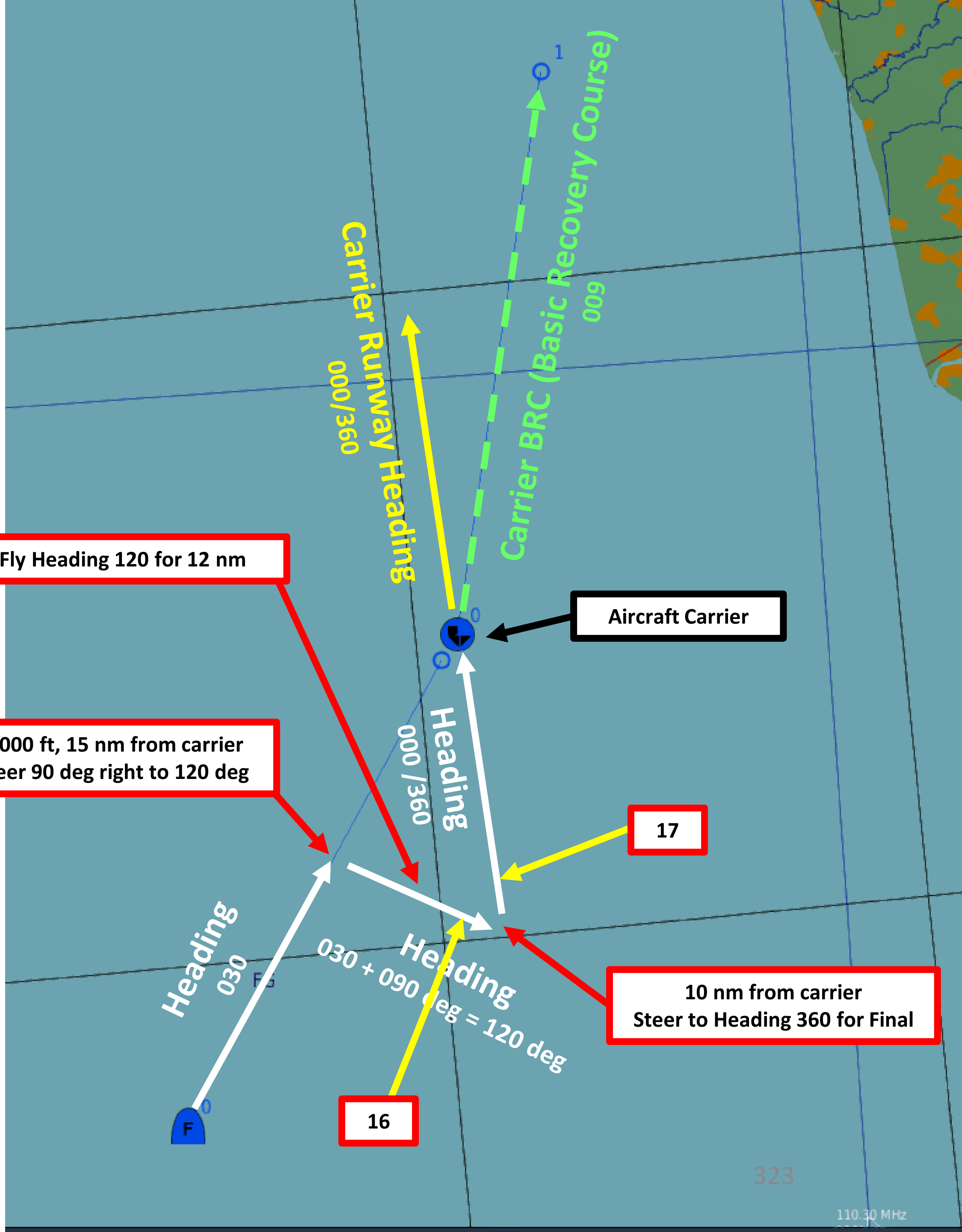






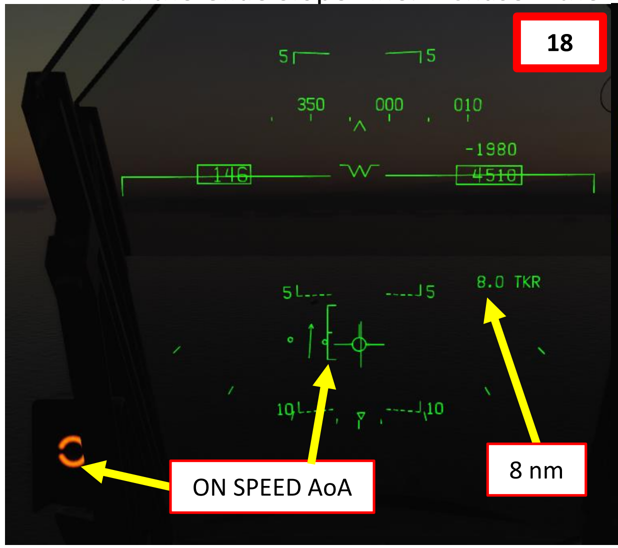
ICLS CARRIER LANDING TUTORIAL
CASE III RECOVERY

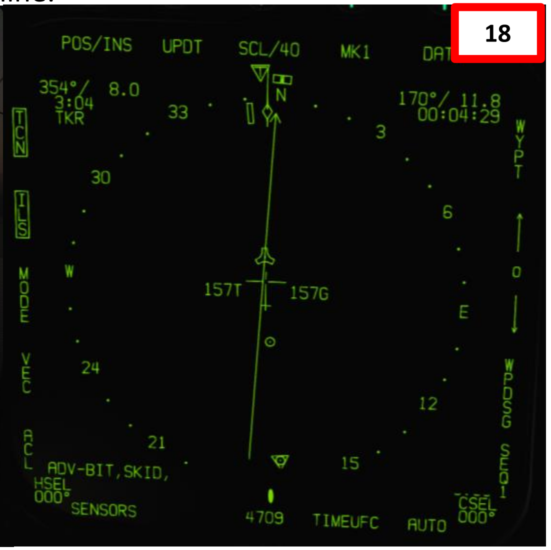
16. Steer 90 deg right to a heading of 120 and set TACAN course to the Carrier Runway Heading (000/360).
17. When crossing the carrier's runway heading radial of 360, steer aircraft to 360 for Final Approach.

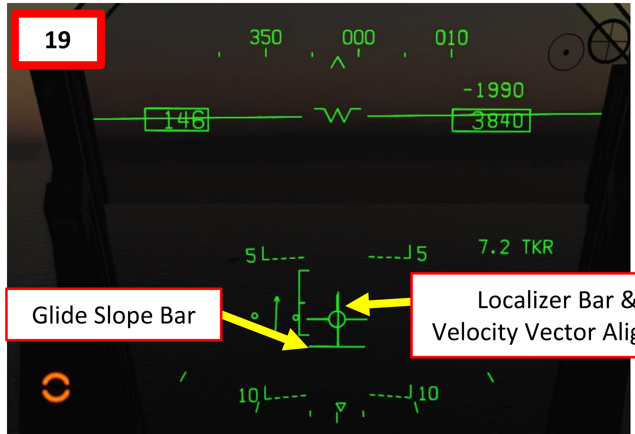


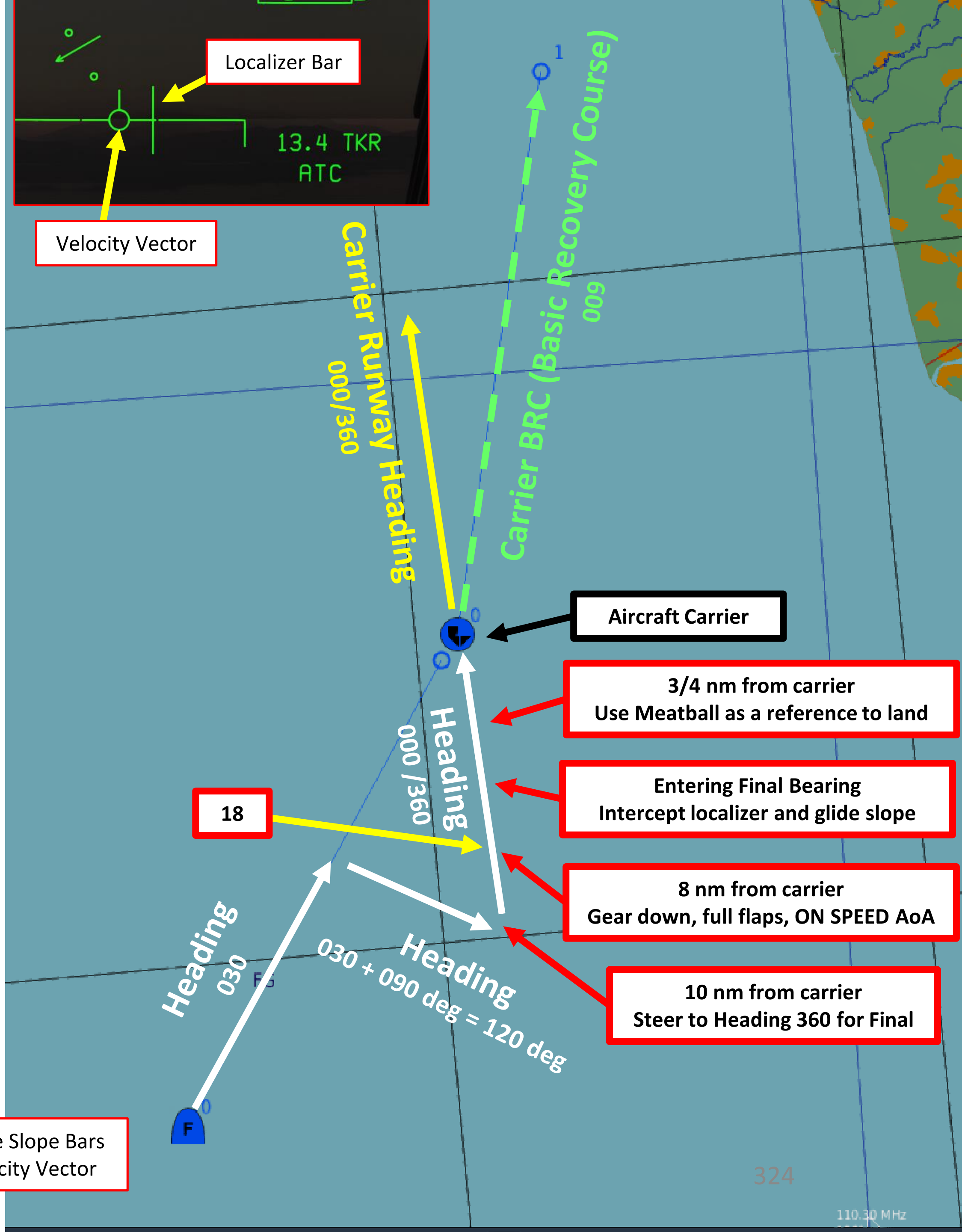
ICLS CARRIER LANDING TUTORIAL
CASE III RECOVERY

18. When reaching 8 nm from carrier, set landing gear down, full flaps, On Speed AoA, Anti-Skid Switch to OFF, Hook Lever DOWN, Hook Bypass Switch to CARRIER.
19. When entering final bearing, intercept **localizer** line to guide yourself **laterally** on the runway. Line up Velocity Vector with the Localizer Line. « Chase » the line.
20. When Reaching approx. 7 nm from the carrier, the **glide slope** line will appear. Intercept the glide slope line to guide yourself **vertically** on the glide path. Line up Velocity Vector with the Glide Slope Line. « Chase » the line.







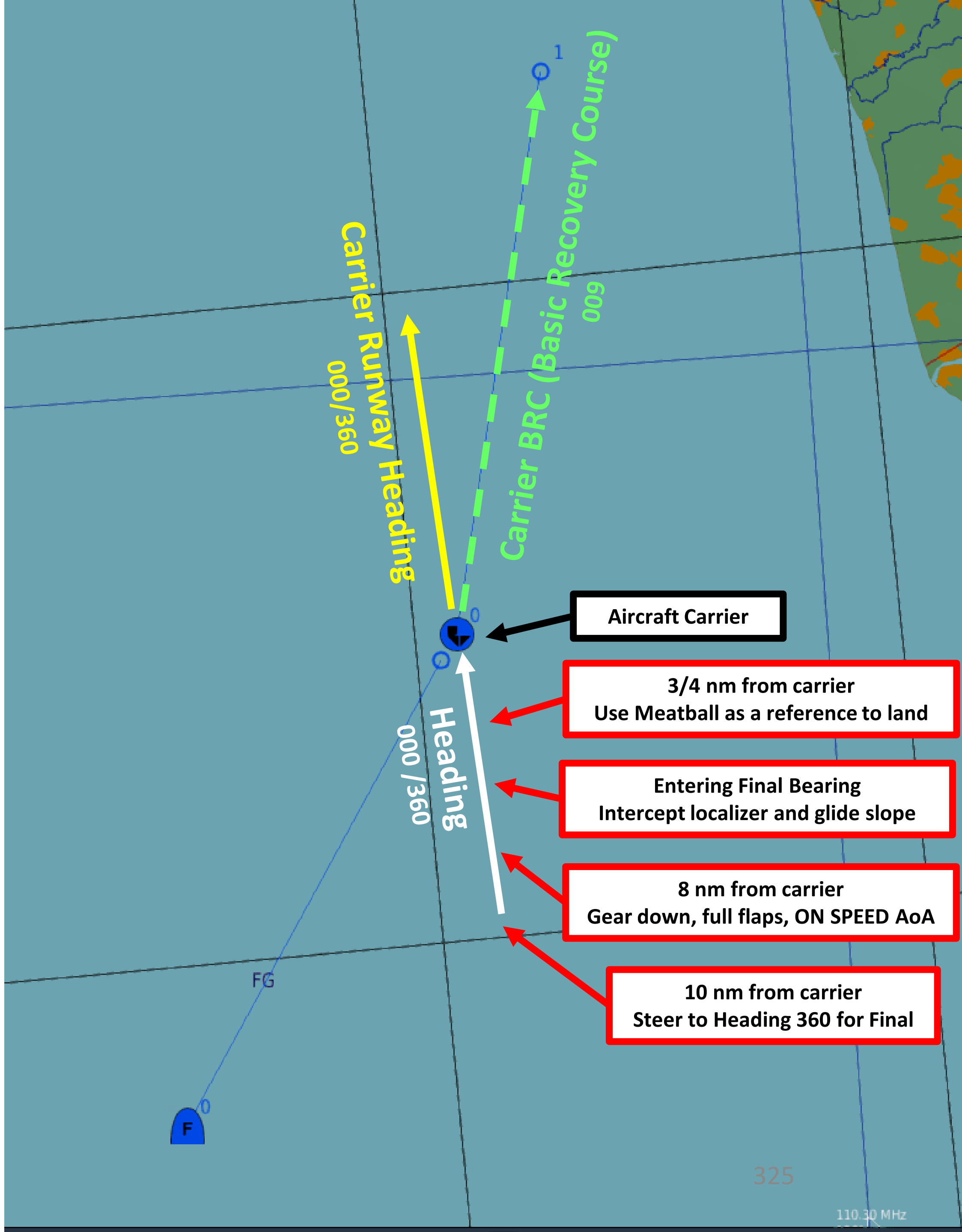


ICLS CARRIER LANDING TUTORIAL
CASE III RECOVERY

21. Keep your velocity vector lined up with the glide slope bar and the localizer bar. Perform gentle corrections until you reach 3/4 nm from the carrier.
22. Use Meatball as reference when at 3/4 nm and land.

21

22



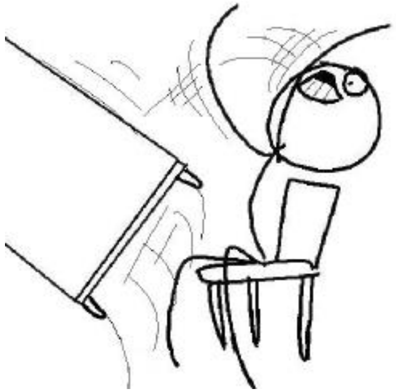
INTRODUCTION

AIR-TO-AIR REFUELING – WHY WE ALL HATE IT

Air-to-air refueling is one of the hardest, most hated, and most frustrating tasks in DCS. Ever. Of all time.

Why? Well, one of the main reasons for the difficulty behind refueling is the skill required to do formation flying. Flying in formation with another aircraft requires much more practice than you would initially think. Another reason is pure physics: there is this thing called “wake turbulence”. An aircraft flies through a fluid: air. Just like with any fluid, if you have something that displaces itself through it at a certain speed, the fluid will become disrupted (turbulence). Wingtip vortices and jetwash are both effects of this simple concept. Wake turbulence is the reason why airliners need to wait a minimum time between takeoffs: flying through disrupted air will destabilize the aircraft and it is unsafe, especially during critical phases of flight like takeoff and landing.

Unfortunately, wake turbulence is something a pilot **has** to deal with during air-to-air refueling. This is why the aircraft will fly just fine when approaching the tanker, but start wobbling around when flying in close proximity of the refueling basket/drogue and tanker engines.

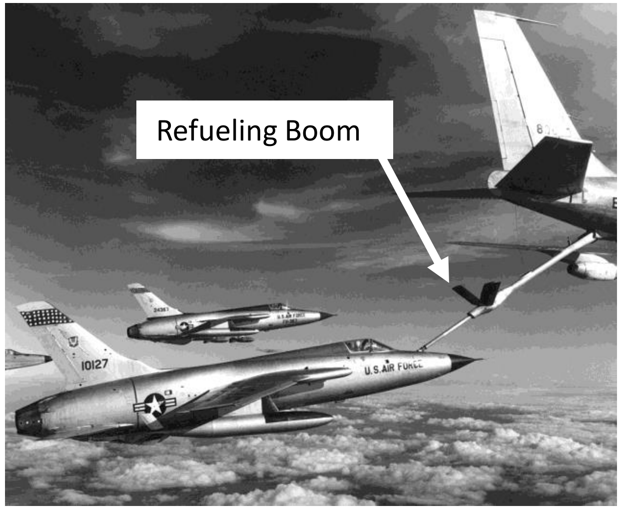


TYPES OF AIR-TO-AIR REFUELING

- There are four main air-to-air refueling techniques used in military aviation:
  - Probe-and-drogue (refueling probe must be inserted in the tanker’s drogue basket)
  - Flying Refueling Boom (guided by boom operator aboard the tanker)
  - Buddy Refueling (two fighters can refuel one another independently without a tanker)
  - Nose-Probe refueling

- The refueling aircraft available in DCS are:
  - The Ilyushin Il-78M “Midas”, a russian **probe-and-drogue** tanker, which was developed from the Il-76
  - The Boeing KC-135 “Stratotanker”, a US Air Force **flying boom** tanker, which was developed from the Boeing 367-80
  - The Lockheed S-3B “Viking”, a US Navy **probe-and-drogue** tanker
  - The Lockheed KC-130 “Hercules”, a USMC **probe-and-drogue** tanker, which was developed from the C-130.

The Hornet is equipped with a Probe-and-Drogue system, so air-to-air refueling will only be performed from either an Il-78M, a KC-130 or a S-3B tanker.



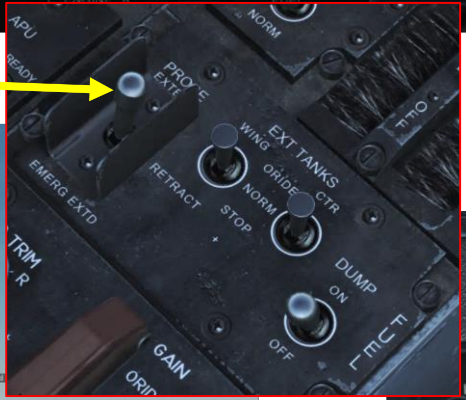
F-105 Thunderchiefs being refueled by a Boom system during the Vietnam War

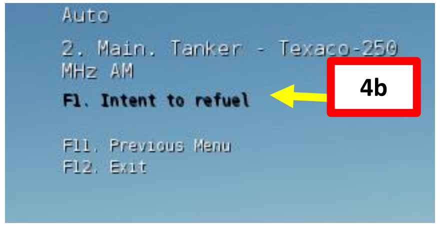
Tornado GR4 being refueling by a Probe-and-Drogue system

AIR-TO-AIR REFUELING DEMO

1. Consult mission briefing to know on which radio frequency you need to contact the tanker. In our case, we will use the frequency 251.000 AM on the COMM1 radio.
2. Find tanker using TACAN frequency as shown in the NAVIGATION - TACAN section.
3. Set your radio to 251 AM and turn radio VOL knobs ON, and press "/" to communicate with TEXACO (tanker callsign).
4. Select Tanker – Texaco (F6) communication menu, and then select "Intent to Refuel"
5. TEXACO should give you a pre-contact altitude (in our case 8,000 ft).
6. Set Master Arm Switch – OFF (DOWN)
7. Set Flaps to AUTO
8. Set PROBE switch to EXTEND (right click).

Note: Some tankers like the KC-130 are equipped with a TACAN beacon, which can give you a direction to find it easily. Just make sure you have the correct TACAN frequency set in the A/A (Air-to-Air) Mode. Set TACAN using the NAVIGATION TACAN tutorial.

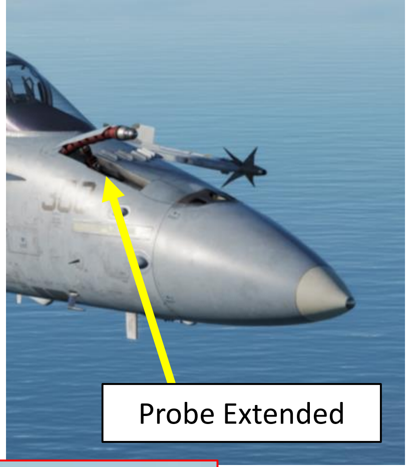


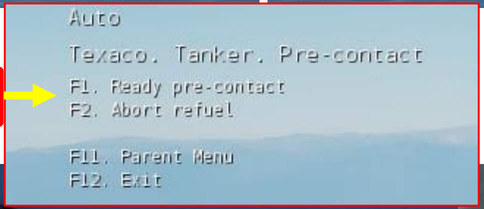


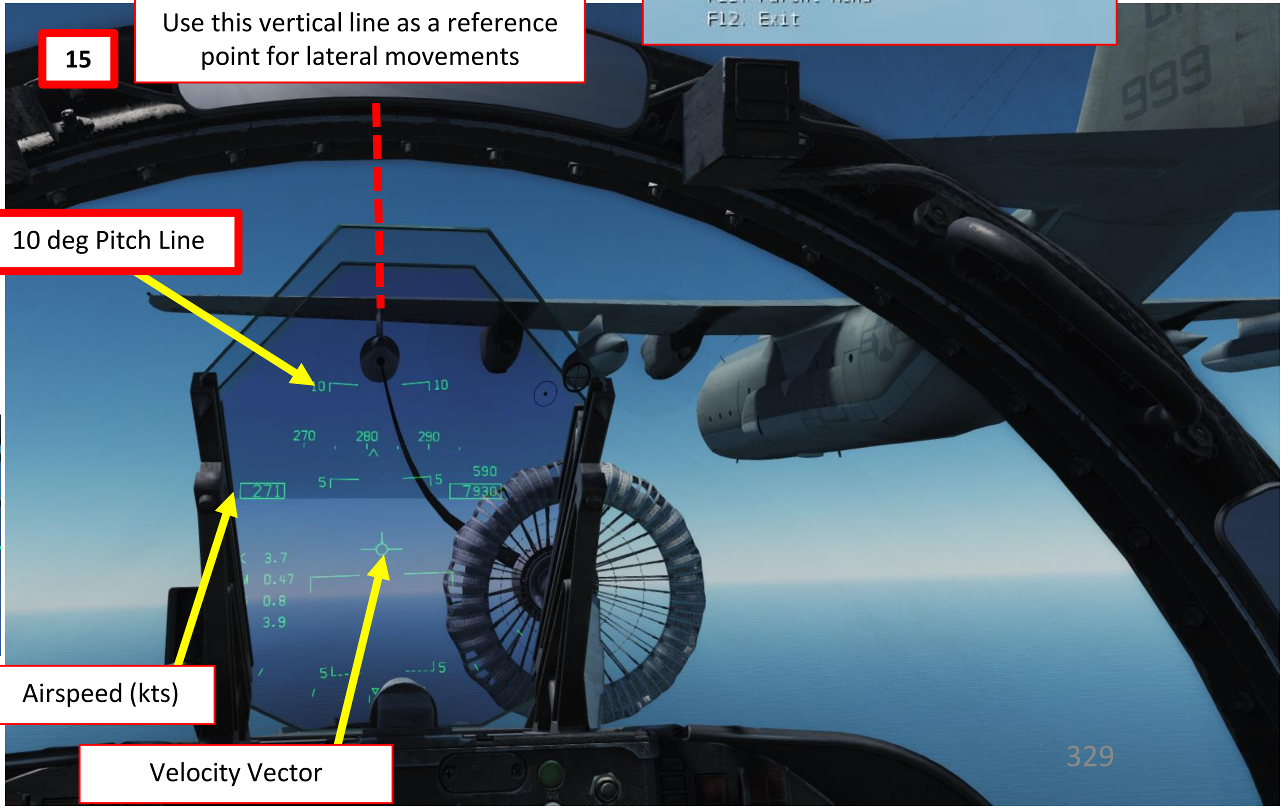
Pre-contact information:
rendez-vous at 8,000 ft

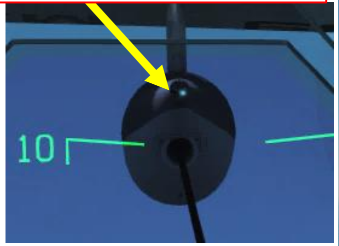
AIR-TO-AIR REFUELING DEMO

9. Make sure refueling probe has deployed correctly.
10. When you are less than 0.1 nm away from tanker, position yourself as shown on picture.
11. When in position, use your radio menu to select "Ready Pre-Contact" (F1).
12. The tanker's pilot should answer you with "Cleared Contact" and should deploy his drogue basket and start to accelerate to cruising speed.
13. Fly formation with the tanker and approach the drogue basket very slowly (make sure you remain about 2-3 kts faster than the tanker) with very gentle inputs. Use stick for big corrections, but keep trimming constantly for small corrections.
14. Keep the aircraft **trimmed at ALL TIMES**. Approaching untrimmed is living hell. Be careful with the throttle since it has a long response time. Use airbrake if you need to slow down quickly while maintaining altitude.
15. Insert your probe into the drogue basket by using your reference points. The **10 deg Pitch Line should be lined up vertically with the left-most engine**, and you should be **aligned with the engine pylon for lateral** movements
16. Additional drag should be generated by the drogue once you have contact with the drogue: your aircraft will slightly decelerate. Throttle up a little to keep the probe in. Once the probe is taking fuel, the tanker pilot should tell you "You're taking fuel" and a green light should illuminate on the tanker's engine.
17. Keep formation with the tanker until your refueling is complete. Don't aim for the probe, aim for the tanker's engine.
18. Detach your probe form the basket by throttling down and set PROBE switch to RETRACT.









AIR-TO-AIR REFUELING DEMO

Of course, all of this seems much easier said than done. You will very likely do following mistakes:

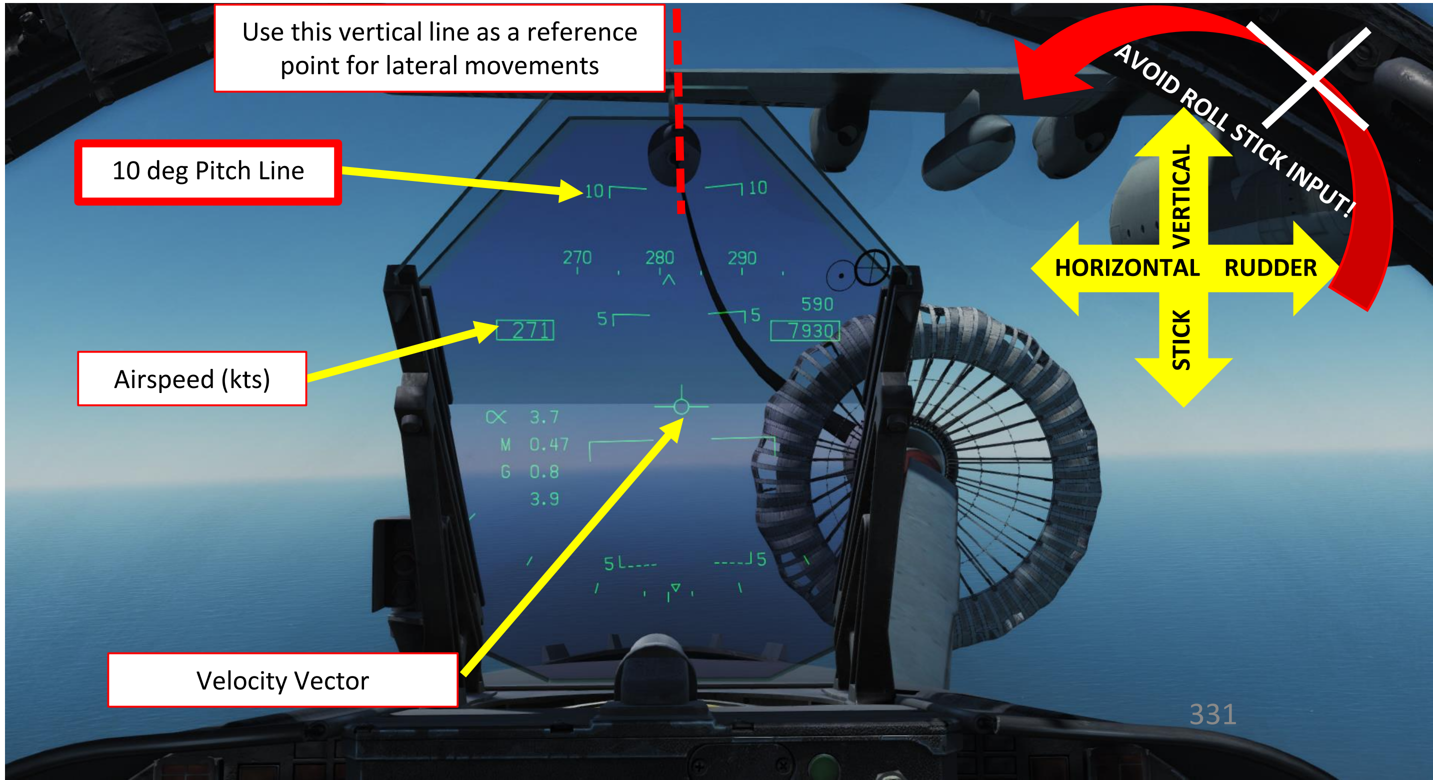
- Approach too fast and miss the basket
- Oscillate vertically without being able to line up with the basket
- Keep going either too fast or too slow
- Drift left or right
- Overcompensate control inputs
- Forget the airbrake on

Here are various demos of air-to-air refueling.
- https://www.youtube.com/watch?v=T5dOLIqGQ-I
- https://www.youtube.com/watch?v=k8gDUUYy8Io

The next slide will give you a couple of tips to help you catch that basket and slurp that delicious jet fuel like a crack addict.

TIPS AND TRICKS

- Remaining **CALM is key** for a successful refueling. If you lose your cool, take a break and try again once you are relaxed. Silk hands and a clear head are needed for that part.
- If you overshoot (or are about to fly past) the tanker, you can bleed speed very fast by deploying your airbrakes. You can go from 400 kts to 300 kts in a matter of seconds.
- **Avoid rolling** your aircraft when you are tracking the basket: you will change the orientation of your lift vector and it will make you drift vertically and horizontally, which doesn't help at all. Try to stay in the same horizontal plane as much as possible.
- It is easier if you try to "break down" your control inputs in **separate movements**. I try to avoid gunning my throttle, pitching up/down and using my rudder at the same time. The aircraft reacts in a way that makes it all very difficult for your brain to predict and process. I tend to make sure my plane is **straight and level at first** and that I am more or less lined up with the basket.
- Once I have a satisfying attitude and that the basket is placed as per the reference points (10 deg pitch line lined up with engine), **I gradually throttle up** and increase speed to **match the tanker's speed**. In this case, the tanker's speed is 270 kts. Make sure that you keep a constant speed.
- Avoid big throttle movements as the Hornet's engines respond very slowly.
- Once my speed matches the tanker's, I can gradually accelerate to a speed that is 2-3 kts faster (271 in our case), **approaching the basket very slowly**. At that part, the ONLY two things I am watching are my **AIRSPEED** and the **10 DEG PITCH LINE BEING LINED UP WITH THE TANKER'S ENGINE (NOT THE BASKET)**. Nothing else matters.
- Once I am approaching the basket, I make sure to avoid inducing rolling motions while displacing myself with the rudder and the vertical stick input ONLY. This way, your aircraft stays straight and delicately drifts left or right based on the **rudder input**, while you can **fine-tune your vertical attitude** with your stick.



USEFUL RESOURCES

A1-F18AC-NFM-000
NATOPS Flight Manual
https://info.publicintelligence.net/F18-ABCD-000.pdf

Eagle Dynamics (Official Developer) Work-In-Progress Early Access Guide
https://drive.google.com/file/d/1vJ94f1Z2RIz078bYUak-lPKJN8A0B1wB/view

Matt Wagner (Eagle Dynamics Producer) DCS F/A-18C Hornet Video Tutorials
https://www.youtube.com/user/wagmatt/videos

Hoggit Wiki
https://wiki.hoggitworld.com/view/F/A-18C

Redkite's Youtube Tutorials
https://www.youtube.com/watch?v=iKLrnJpc8I4&list=PLml_c09ciuctIreNtpLoPg1DByY5upg6v

Jabbers' Youtube Tutorials
https://youtu.be/lm-M3VUy-_I

A.E.W.'s Youtube Discussions on CASE I Recovery (Carrier Landing)
https://www.youtube.com/channel/UCNvV27UZkI8W-jvMA-iGqyQ/videos

Maverick's Air-to-Air Refueling Tutorial
https://youtu.be/T5dOLIqGQ-I

DCS
digital combat series
Chuck_Owl
DIGITAL COMBAT SIMULATOR
F/A-18C
HORNET
INSTANT ACTION
CREATE FAST MISSION
MISSION
CAMPAIGN
MULTIPLAYER
LOGBOOK
ENCYCLOPEDIA
TRAINING
REPLAY
MISSION EDITOR
CAMPAIGN BUILDER
EXIT
Nevada 2.5.0
A-10C 2.5.2
AJS37 2.5.2
AV8BNA Beta 2.5.2
Bf 109 K-4 2.5.2
C-101 2.5.2 Beta
CA 2.5.2
Caucasus 2.5.0
F-5E 2.5.2
F-86F 2.5.2
F/A-18C 2.5.2 WIP
FC3 2.5.2
Fw 190 D-9 2.5.2
Hawk 2.5.2 Beta
Ka-50 2.5.2
L-39 2.5.2
M-2000C 2.5.1
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