# DCS GUIDE
# UH-1H HUEY

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By Chuck

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

"**HELICOPTERS SUCK!**" is the first thing I said when I crashed my Huey for the first time. This is what many people among the flight sim community think as well. Choppers are slow, blocky, noisy, sluggish… who would want to be a glorified taxi driver when you could be Maverick and save the world at Mach 1.5?

Well, you should! Why? Simply because helicopter pilots have one of the most dangerous jobs in the world. You have to be one hell of a pilot to fly one of those. Or batshit insane. Or a bit of both. Flying a helicopter is challenging, and one of the most rewarding experiences I ever had in a flight sim. Have you ever seen "We Were Soldiers"? Have you read "Chickenhawk"? Both highlight the incredible courage of Huey pilots, and the skill needed to fly these machines. The Vietnam War was a brutal war, incredibly taxing on the men on the ground, but also the men in the air as well. Bruce "Snake Shit" Crandall, Robert Mason, Ed "Too Tall" Freeman… read about what these men did in battles like Ia Drang, and you will understand the importance of "slicks" and "gunships", even for the grunts on the ground. Helicopters revolutionized modern warfare, and I feel it is a privilege for us to have access to a module like the DCS Huey, especially since Belsimtek created it in partnership with Bell Helicopter.

Flying helicopters is difficult, much more difficult than flying an airplane. Helicopters are marvellous and totally insane creations. They seem unnatural, intricate and many pilots who come from the jet or prop plane world have difficulties to learn to fly helicopters since it requires a different way of thinking. I had the chance to meet a real life Huey pilot who was kind enough to show me the basics of how to "think" like a chopper pilot. I will attempt to share what I learned from him with you, and hopefully you will benefit from it like I did.

It took me many tries, many crashes, a lot of cursing… but in the end I realized that the DCS UH-1H Huey is one of the most fun and interesting modules I ever had the chance to fly. Real-life helicopter pilots agree with me on this: the Huey you are about to fly is one of the finest modules ever made flight model wise. If you think you learned to fly choppers from ARMA, Take On Helicopters, FSX or Battlefield, think again. You've seen nothing yet. The Vortex Ring State is one brutal wake up call. ☺

"Peter Pilot" is the nickname given to novice helicopter pilots. At the beginning, we all suck. Get used to it, and you won't feel as frustrated as I was in the beginning. The human brain is just not engineered to think like a helicopter… but with proper training and a bit of practice, you will get the hang of it in no time. Understanding is half the training, so put your thinking cap on.

Give the Huey a chance, and I promise you that you will not regret it.

During the Vietnam War, life expectancy for chopper pilots was right down there with that of an infantry ground pounder.

The facts are cold and stark: Approximately 12,000 US Helicopters flew in the Vietnam War. Approximately 5,000 were destroyed. That means 42% of the aircraft that spent time in the air crashed or were shot down... nearly 3 out of every 7 that flew. Approximately 40,000 US Helicopter pilots flew in the Vietnam War. Approximately 2,202 pilots were killed, along with 2,704 crewmen. For those with their hands on the joystick, that means 5.5% never made it back. Considering that the average pilot flew 4 times a week, he could expect that during his tour in Vietnam he was flying up against the Grim Reaper on 11.4 of his flights. That means that every 4.5 weeks he faced death. In soldier talk, his life expectancy was 4 and a half weeks... basically, a month.

This makes you think, doesn’t it?

What's often forgotten in this is that helicopters weren't built to fly around empty. They carried cargo... usually human cargo. Soldiers. One of the best helicopters for this task was the UH-1D Iroquois, unofficially nicknamed “Huey” due to its original designation letters “HU-1”.

The Bell (model 205) UH-1D (1963) had a longer fuselage than previous models, increased rotor diameter, increased range, and a powerful Lycoming T53-L-11, sporting 1,100 shp, with growth potential to 1,400 shp. A distinguishing characteristic of this ship was its larger cargo doors, as well as its twin cabin windows. The UH-1D was stretched so that it could carry up to 12 troops, with a crew of two. The first UH-1D reached Vietnam in 1963. With a range of 293 miles (467 km) and a speed of 127 mph (110 knots), it was a formidable troop carrier. With so many people on board, it was also a formidable death trap when it went down.

The UH-1H was an improved UH-1D, with the Lycoming T53-L-13 engine of 1,400 shp (1,000 kW) installed, plus the pitot tube relocated from the nose to the roof, to reduce ground damage to it. "Hotel" models were created by upgrading "Deltas" with the more powerful engine. The first YUH-1H flew in 1966 with deliveries of production models starting in September 1967. The "Hotel" model Huey was produced in larger numbers than any other model, with 4,850 delivered to the US Army alone. The "Hotel" model was widely exported and was also built under license in Germany, Italy, Japan and Taiwan.

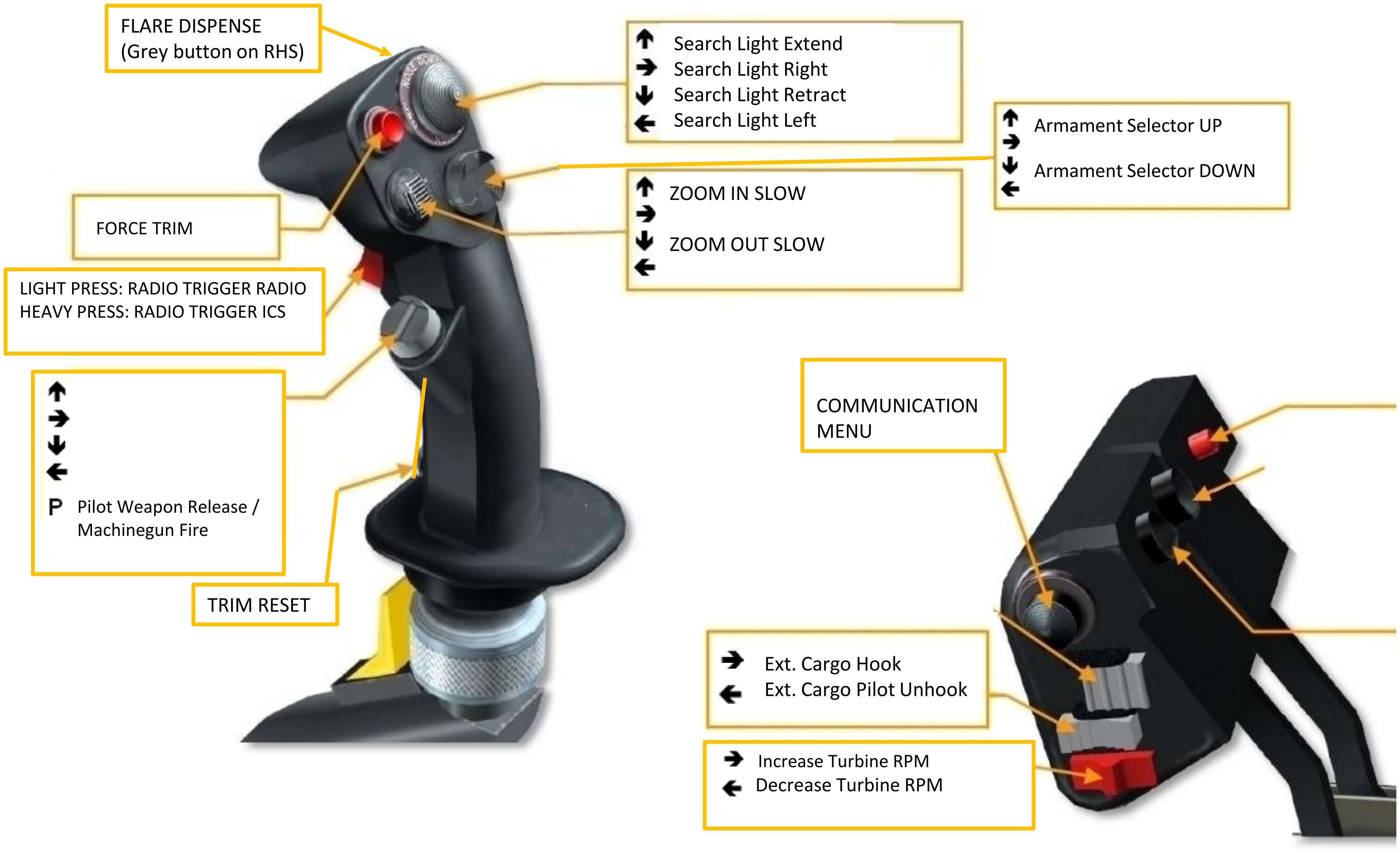
Overall, the Huey is one of the most renowned helicopters of its time.


UNITED STATES ARMY

# CONTROLS SETUP

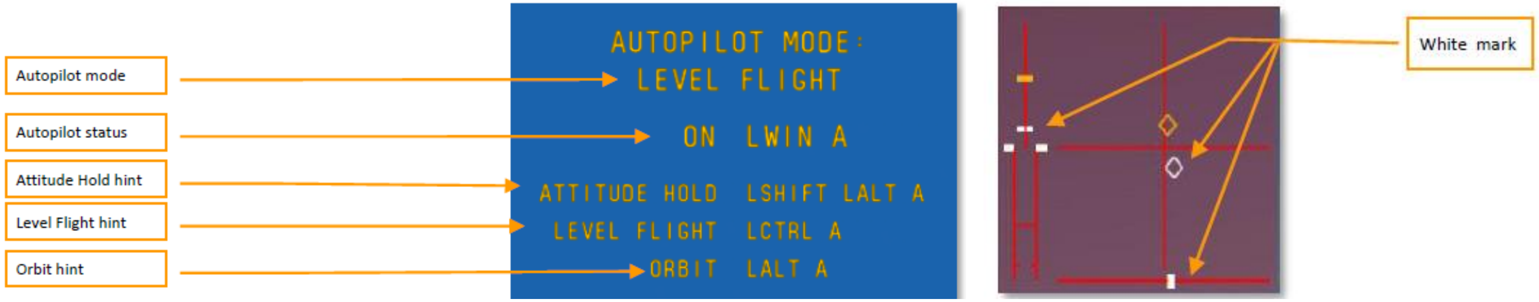
These controls should be mapped to your joystick and are essential. Names on the left column are what you should look for in the "ACTION" column of the Controls Setup menu in DCS. Description of action is on the right column.

| | |
|---|---|
| • COMMUNICATION MENU | ALLOWS YOU TO USE RADIO MENU WHILE FLYING |
| • ARMAMENT SELECTOR UP / DOWN | ALLOWS YOU TO QUICKLY SWITCH GUNS/ROCKETS |
| • PILOT TRIMMER | FORCE TRIM |
| • EXTERNAL CARGO HOOK | HOOK CARGO (SLING LOADS) |
| • EXTERNAL CARGO PILOT UNHOOK | UNHOOK CARGO (SLING LOADS) |
| • FLARE DISPENSE | DROPS FLARES |
| • FLEXIBLE SIGHT ON/OFF | DEPLOYS/RETRACTS COPILOT'S FLEXIBLE SIGHT |
| • NIGHT VISION GOGGLES | NIGHT VISION GOGGLES ON/OFF (RSHIFT+H) |
| • PILOT WEAPON RELEASE / GUN FIRE | FIRES GUNS AND/OR ROCKETS |
| • PILOT'S RADIO TRIGGER ICS (FACULTATIVE) | INTERCOMM SWITCH (USED TO TALK TO CREW) |
| • PILOT'S RADIO TRIGGER RADIO | MICROPHONE SWITCH (USED TO TALK ON RADIO) |
| • SEARCH LIGHT LEFT/RIGHT/RETRACT/EXTEND | ROTATE SEARCH LIGHT LEFT/RIGHT/AFT/FWD |
| • START-UP ENGINE | ENGINE STARTER |
| • TRIMMER RESET | TRIM RESET |
| • ZOOM IN SLOW | ALLOWS YOU TO ZOOM IN |
| • ZOOM OUT SLOW | ALLOWS YOU TO ZOOM OUT |


FLARE DISPENSE
(Grey button on RHS)
Search Light Extend
Search Light Right
Search Light Retract
Search Light Left
Armament Selector UP
Armament Selector DOWN
FORCE TRIM
ZOOM IN SLOW
ZOOM OUT SLOW
LIGHT PRESS: RADIO TRIGGER RADIO
HEAVY PRESS: RADIO TRIGGER ICS
P Pilot Weapon Release / Machinegun Fire
TRIM RESET
COMMUNICATION MENU
Ext. Cargo Hook
Ext. Cargo Pilot Unhook
Increase Turbine RPM
Decrease Turbine RPM

# CONTROLS FOR GUNNERS, CREW & INTERFACE MANAGEMENT

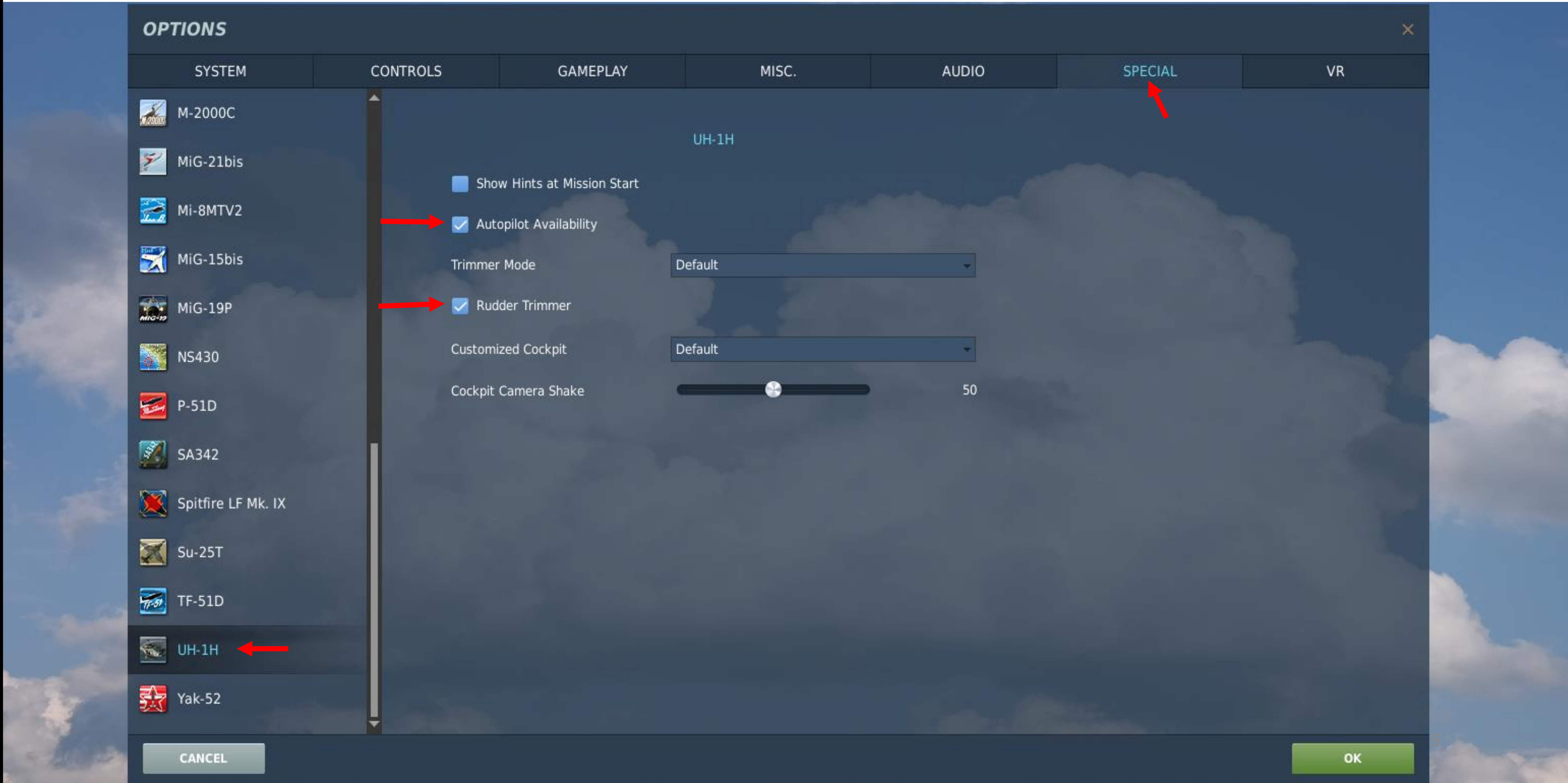
| | |
|---|---|
| • SET PILOT SEAT | SWITCHES TO PILOT SEAT (“1” BY DEFAULT) |
| • SET OPERATOR SEAT | SWITCHES TO COPILOT SEAT (“2” BY DEFAULT) |
| • SET LEFT GUNNER SEAT | SWITCHES TO LEFT GUNNER SEAT (“3” BY DEFAULT) |
| • SET RIGHT GUNNER SEAT | SWITCHES TO RIGHT GUNNER SEAT (“4” BY DEFAULT) |
| • AI OPERATOR/LEFT/RIGHT ROE ITERATE (L_CTRL+ 2/3/4) | ITERATES RULES OF ENGAGEMENT FOR COPILOT, LEFT & RIGHT GUNNERS<br>HOLD FIRE / RETURN FIRE / FREE FIRE (AT WILL) |
| • AI OPERATOR/LEFT/RIGHT BURST SWITCH (L_SHIFT+ 2/3/4) | ITERATES FIRING BURST LENGTH FOR COPILOT, LEFT & RIGHT GUNNERS<br>SHORT BURST / LONG BURST |
| • OPEN/CLOSE LEFT/RIGHT GUNNER SIDE DOOR (LALT+3/4) | OPENS UP SIDE DOORS FOR LEFT & RIGHT GUNNERS. |
| • AUTOPILOT | TURNS AI AUTOPILOT ON/OFF (LWIN+A) |
| • AUTOPILOT ATTITUDE HOLD/LEVEL FLIGHT/ORBIT | SELECTS AI AUTOPILOT MODE (LALT+LSHIFT+A/LCTRL+A/LALT+A) |
| • WEAPON HINTS ON/OFF | TOGGLE WEAPON INTERFACE (LCTRL+LSHIFT+H) |
| • SHOW CONTROLS INDICATOR | TOGGLE CONTROL INDICATOR INTERFACE (RCTRL+ENTER) |
| • TRACKIR AIMING ON/OFF | TOGGLE SIDE GUNNER AIMING WITH OR WITHOUT TRACKIR (RSHIFT+T) |

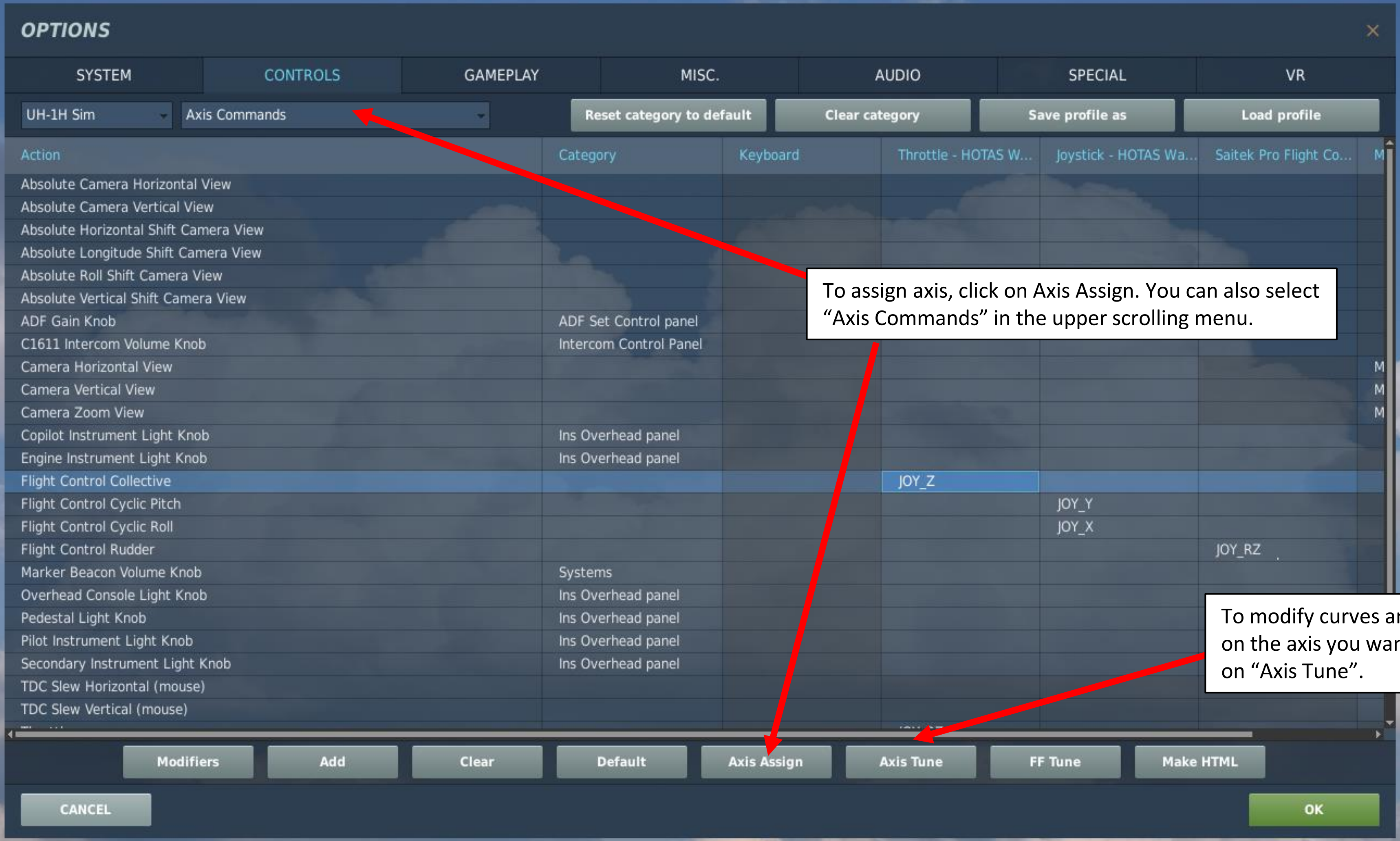




Note: these labels are only visible if you have the “Show Hints at Mission Start” and “Autopilot Availability” options ticked in the “Special – UH-1H” options tab.

# CONTROLS FOR GUNNERS, CREW & INTERFACE MANAGEMENT

- In the "Special" tab, make sure AUTOPILOT AVAILABILITY, and RUDDER TRIMMER checkboxes are ticked! Note that rudder trimmer is in fact use for anti-torque pedals, and is optional and up to your personal taste. The real life Huey has it (pedals remain in place once trimmed) but most anti-torque pedals we have use springs, which makes rudder trim impractical.






To assign axis, click on Axis Assign. You can also select "Axis Commands" in the upper scrolling menu.

To modify curves and sensitivities of axes, click on the axis you want to modify and then click on "Axis Tune".

# BIND THE FOLLOWING AXES:

- CYCLIC PITCH (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 85, CURVATURE AT 21)
- CYCLIC ROLL (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 85, CURVATURE AT 21)
- RUDDER/ANTI-TORQUE PEDAL (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 14)
- COLLECTIVE (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 11)
- THROTTLE – CONTROLS ENGINE RPM

# NOTES ABOUT CONTROLS

If you are more familiar with airplanes than with helicopters, you might not be quite familiar with a "collective" and a "cyclic". In a prop aircraft, you generally set your engine to a given RPM by changing the propeller's pitch, and you throttle up and down to change your thrust. Anti-torque pedals are used to change the orientation of your vertical stab.

In a helicopter, it's the opposite. You set your throttle to a given setting, and you change your thrust with your **collective**, which changes the pitch of your rotor/propeller's blades. Rudder pedals are used to modify your tail rotor's propeller pitch: the amount of lateral thrust generated by your rotor is in direct relationship with the horizontal/lateral orientation of your helicopter. The **cyclic**, on the other hand, is used just like a regular stick on a plane. The cyclic modifies the orientation of swashplates, to which are attached push rods that define the orientation of the rotor.

In very simple terms, you could say that the collective is used like a throttle on a plane, the throttle is used like a RPM setter on a plane, and the cyclic is used like a joystick on a plane.

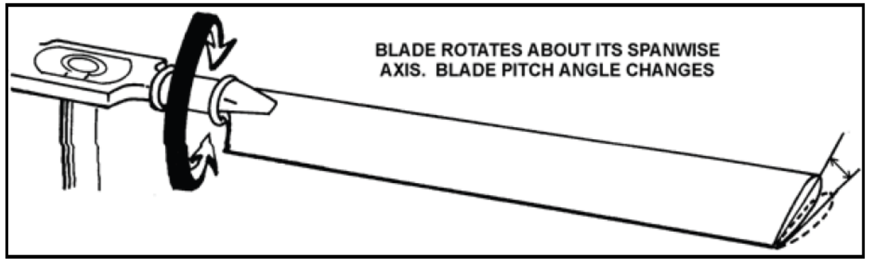
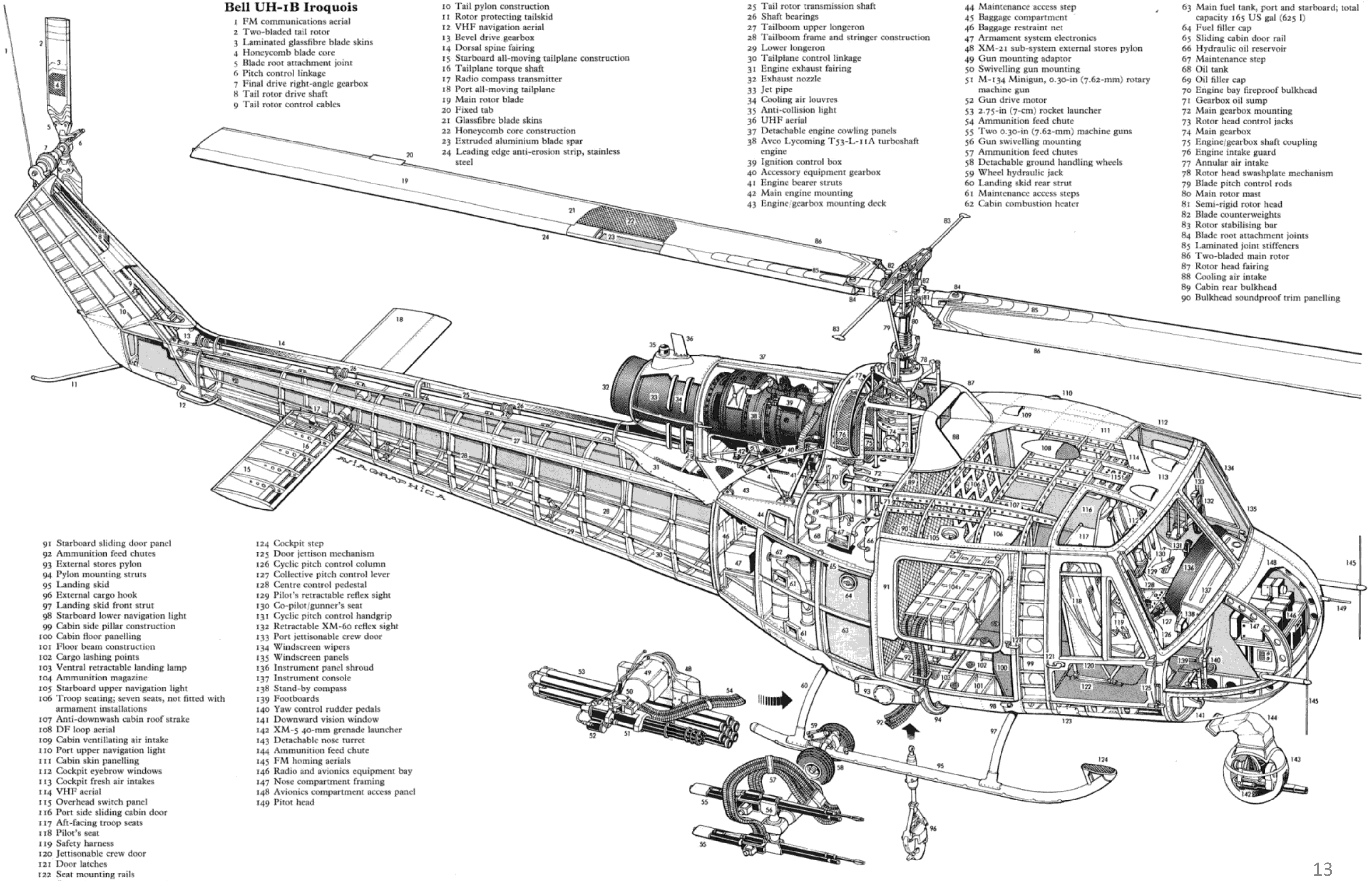



Figure 1-17. Feathering

**Bell UH-1B Iroquois**

1 FM communications aerial
2 Two-bladed tail rotor
3 Laminated glassfibre blade skins
4 Honeycomb blade core
5 Blade root attachment joint
6 Pitch control linkage
7 Final drive right-angle gearbox
8 Tail rotor drive shaft
9 Tail rotor control cables
10 Tail pylon construction
11 Rotor protecting tailskid
12 VHF navigation aerial
13 Bevel drive gearbox
14 Dorsal spine fairing
15 Starboard all-moving tailplane construction
16 Tailplane torque shaft
17 Radio compass transmitter
18 Port all-moving tailplane
19 Main rotor blade
20 Fixed tab
21 Glassfibre blade skins
22 Honeycomb core construction
23 Extruded aluminium blade spar
24 Leading edge anti-erosion strip, stainless steel
25 Tail rotor transmission shaft
26 Shaft bearings
27 Tailboom upper longeron
28 Tailboom frame and stringer construction
29 Lower longeron
30 Tailplane control linkage
31 Engine exhaust fairing
32 Exhaust nozzle
33 Jet pipe
34 Cooling air louvres
35 Anti-collision light
36 UHF aerial
37 Detachable engine cowling panels
38 Avco Lycoming T53-L-11A turboshaft engine
39 Ignition control box
40 Accessory equipment gearbox
41 Engine bearer struts
42 Main engine mounting
43 Engine/gearbox mounting deck
44 Maintenance access step
45 Baggage compartment
46 Baggage restraint net
47 Armament system electronics
48 XM-21 sub-system external stores pylon
49 Gun mounting adaptor
50 Swivelling gun mounting
51 M-134 Minigun, 0.30-in (7.62-mm) rotary machine gun
52 Gun drive motor
53 2.75-in (7-cm) rocket launcher
54 Ammunition feed chute
55 Two 0.30-in (7.62-mm) machine guns
56 Gun swivelling mounting
57 Ammunition feed chutes
58 Detachable ground handling wheels
59 Wheel hydraulic jack
60 Landing skid rear strut
61 Maintenance access steps
62 Cabin combustion heater
63 Main fuel tank, port and starboard; total capacity 165 US gal (625 l)
64 Fuel filler cap
65 Sliding cabin door rail
66 Hydraulic oil reservoir
67 Maintenance step
68 Oil tank
69 Oil filler cap
70 Engine bay fireproof bulkhead
71 Gearbox oil sump
72 Main gearbox mounting
73 Rotor head control jacks
74 Main gearbox
75 Engine/gearbox shaft coupling
76 Engine intake guard
77 Annular air intake
78 Rotor head swashplate mechanism
79 Blade pitch control rods
80 Main rotor mast
81 Semi-rigid rotor head
82 Blade counterweights
83 Rotor stabilising bar
84 Blade root attachment joints
85 Laminated joint stiffeners
86 Two-bladed main rotor
87 Rotor head fairing
88 Cooling air intake
89 Cabin rear bulkhead
90 Bulkhead soundproof trim panelling



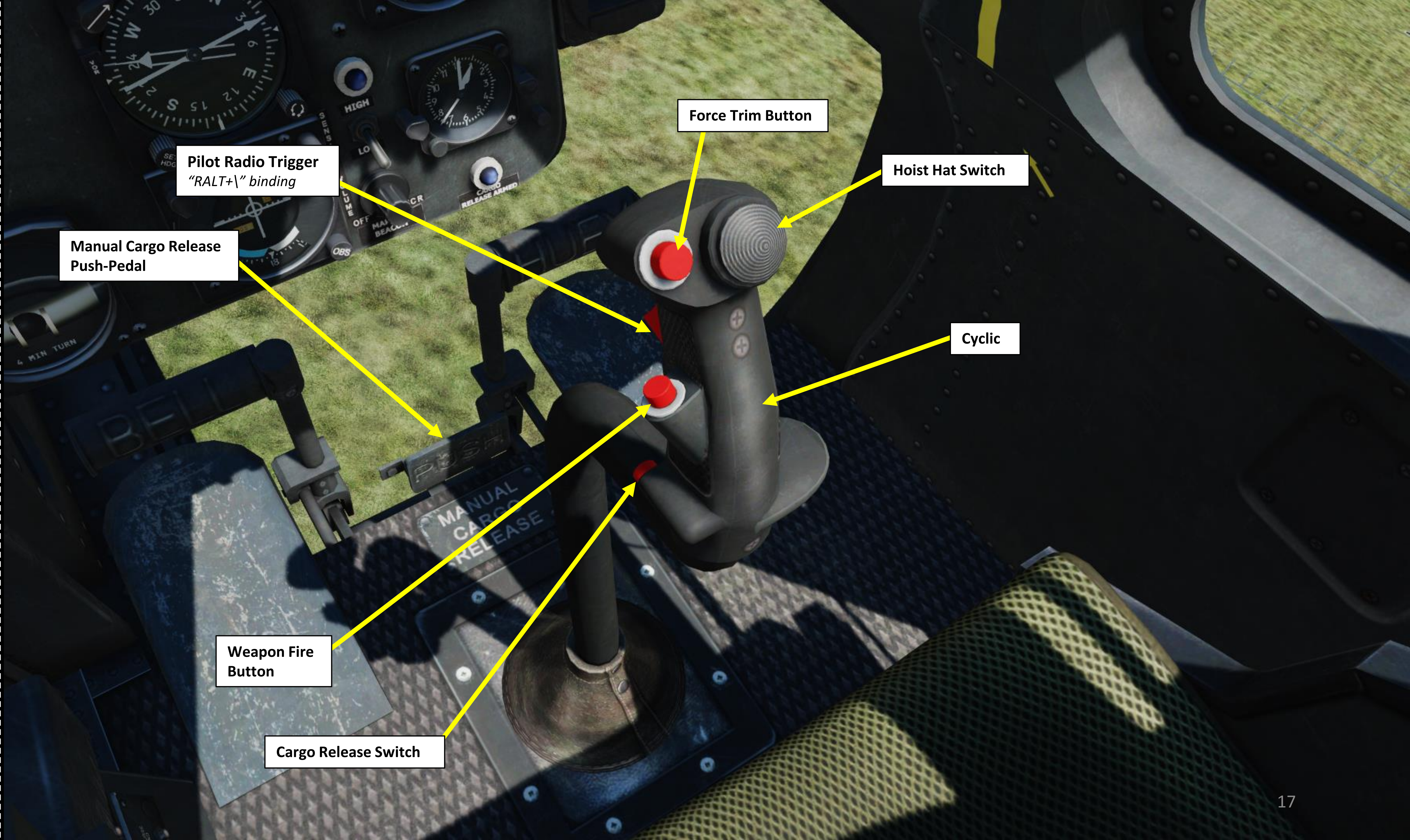
91 Starboard sliding door panel
92 Ammunition feed chutes
93 External stores pylon
94 Pylon mounting struts
95 Landing skid
96 External cargo hook
97 Landing skid front strut
98 Starboard lower navigation light
99 Cabin side pillar construction
100 Cabin floor panelling
101 Floor beam construction
102 Cargo lashing points
103 Ventral retractable landing lamp
104 Ammunition magazine
105 Starboard upper navigation light
106 Troop seating; seven seats, not fitted with armament installations
107 Anti-downwash cabin roof strake
108 DF loop aerial
109 Cabin ventillating air intake
110 Port upper navigation light
111 Cabin skin panelling
112 Cockpit eyebrow windows
113 Cockpit fresh air intakes
114 VHF aerial
115 Overhead switch panel
116 Port side sliding cabin door
117 Aft-facing troop seats
118 Pilot's seat
119 Safety harness
120 Jettisonable crew door
121 Door latches
122 Seat mounting rails
123 Control system access panel
124 Cockpit step
125 Door jettison mechanism
126 Cyclic pitch control column
127 Collective pitch control lever
128 Centre control pedestal
129 Pilot's retractable reflex sight
130 Co-pilot/gunner's seat
131 Cyclic pitch control handgrip
132 Retractable XM-60 reflex sight
133 Port jettisonable crew door
134 Windscreen wipers
135 Windscreen panels
136 Instrument panel shroud
137 Instrument console
138 Stand-by compass
139 Footboards
140 Yaw control rudder pedals
141 Downward vision window
142 XM-5 40-mm grenade launcher
143 Detachable nose turret
144 Ammunition feed chute
145 FM homing aerials
146 Radio and avionics equipment bay
147 Nose compartment framing
148 Avionics compartment access panel
149 Pitot head

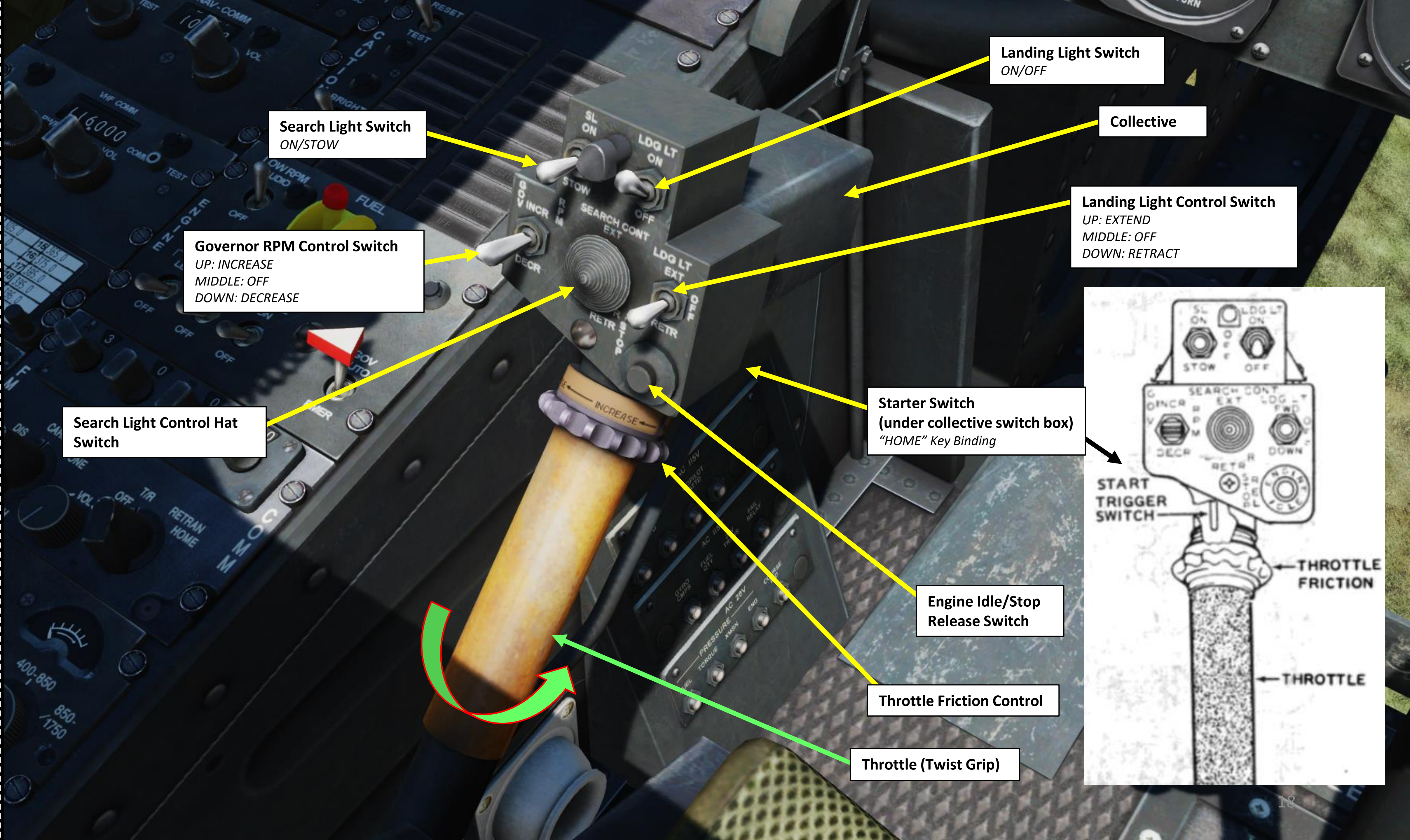

**SEAT SELECTION CONTROLS**

Pilot: 1
Copilot: 2
Left Gunner: 3
Right Gunner: 4

**Note: Use “RSHIFT+P” to turn pilot body ON or OFF.**


Collective
Anti-torque Pedals
Throttle (Twist Grip)
Cyclic


Force Trim Button
Hoist Hat Switch
Pilot Radio Trigger
"RALT+\" binding
Manual Cargo Release Push-Pedal
Cyclic
Weapon Fire Button
Cargo Release Switch
HIGH
LO
PUSH
MANUAL CARGO RELEASE
4 MIN TURN
CARGO RELEASE ARMED


Landing Light Switch
ON/OFF
Collective
Search Light Switch
ON/STOW
Landing Light Control Switch
UP: EXTEND
MIDDLE: OFF
DOWN: RETRACT
Governor RPM Control Switch
UP: INCREASE
MIDDLE: OFF
DOWN: DECREASE
Search Light Control Hat Switch
Starter Switch
(under collective switch box)
"HOME" Key Binding
Engine Idle/Stop Release Switch
Throttle Friction Control
Throttle (Twist Grip)
START TRIGGER SWITCH
THROTTLE FRICTION
THROTTLE

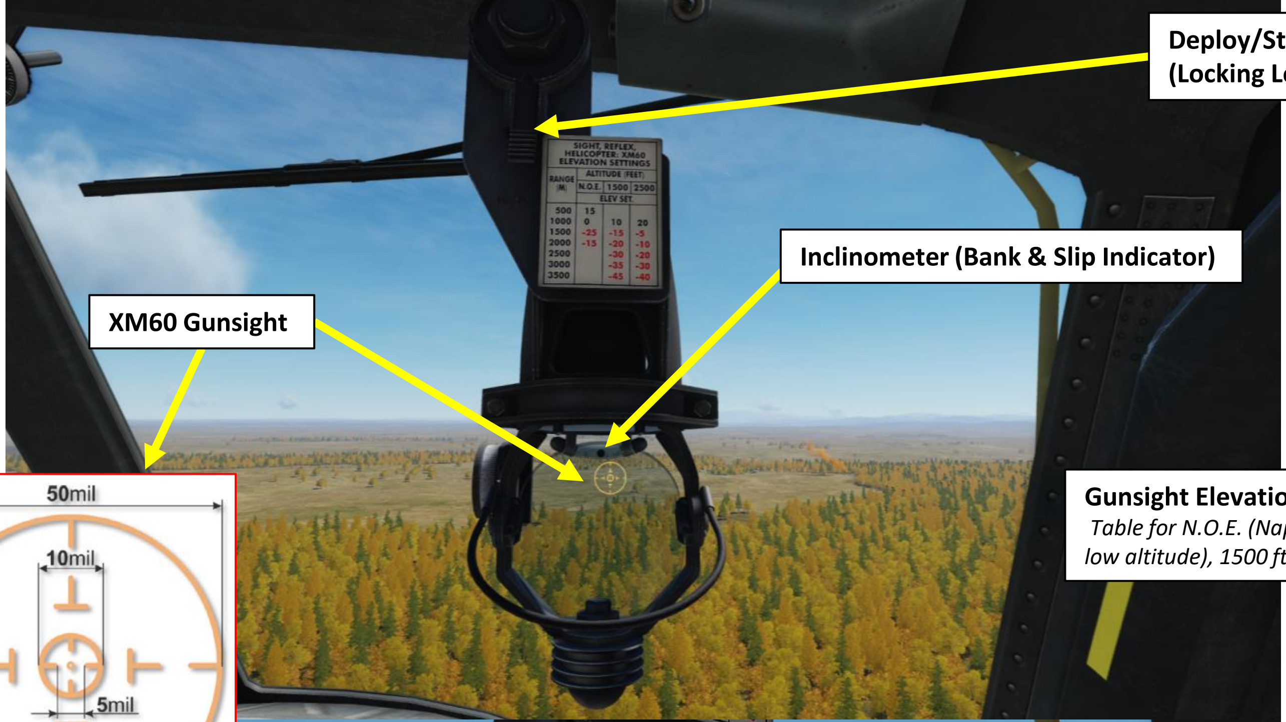

Door Handle
*Shortcut: RCTRL+R*


HAND HOLD
Armored Plate
Armored Plate
Armored Plate


Circuit Breaker Panel
AC 115 Volts Systems
AC 28 Volts Systems
AC 115V
PILOT ATTD
COPILOT ATTD
AC 115V
GYRO CMPS
FUEL QTY
28V TRANS
FAIL RELAY
AC 28V
PRESSURE
FUEL
TORQUE
XMSN
ENG
COURSE IND
INCREASE
GOV
AUTO
EMER
RETR


Gunsight Power Switch
*ON/OFF*
HAND HOLD
COPILOT'S VIEW

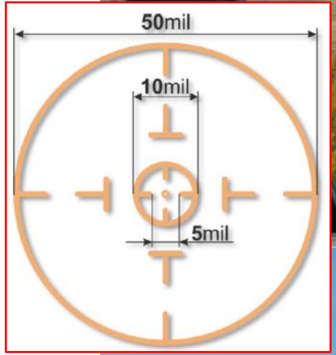

Gunsight Power Switch
*ON/OFF*
PILOT'S VIEW

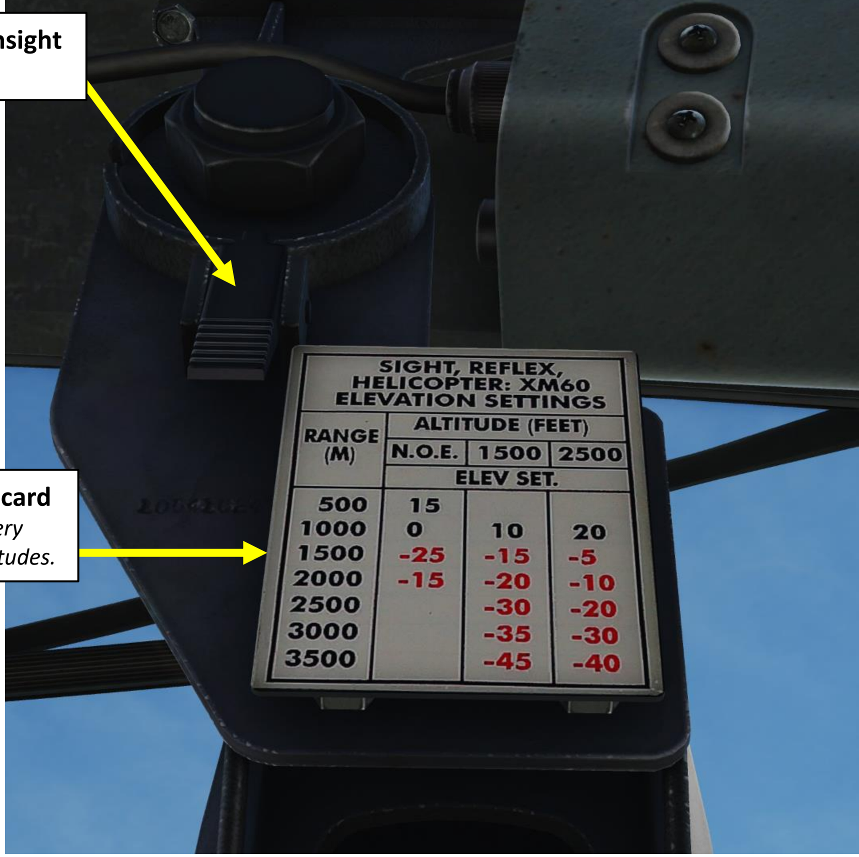



Deploy/Stow XM60 Gunsight (Locking Lever)

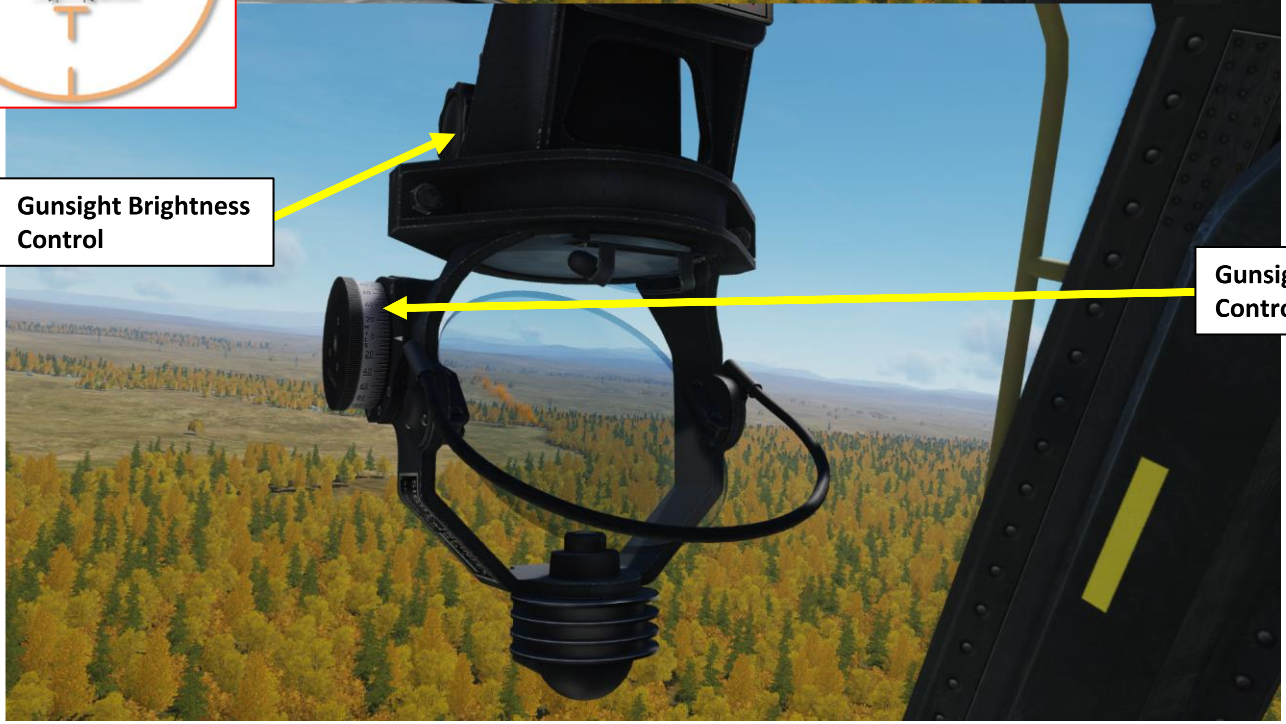
Inclinometer (Bank & Slip Indicator)

XM60 Gunsight



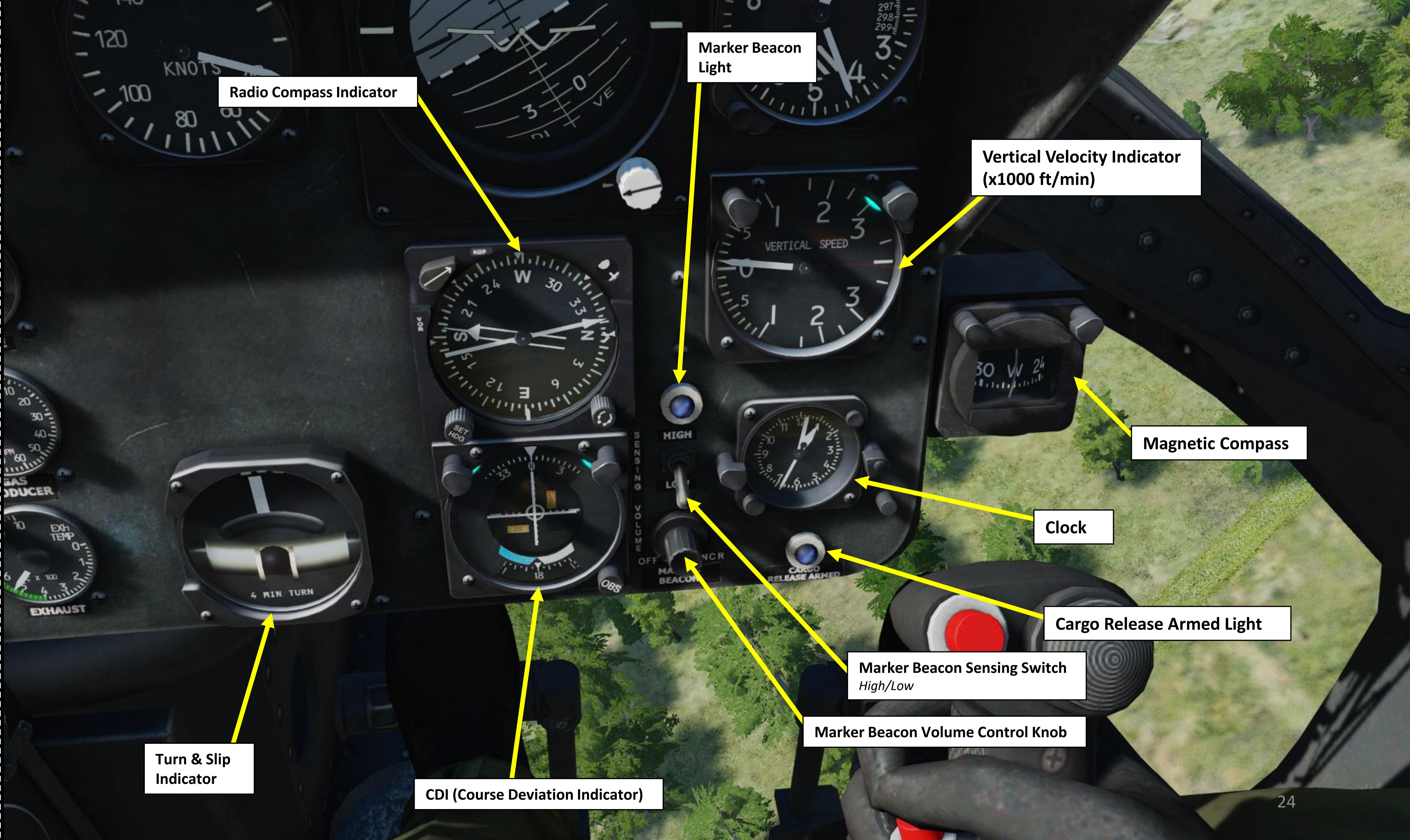



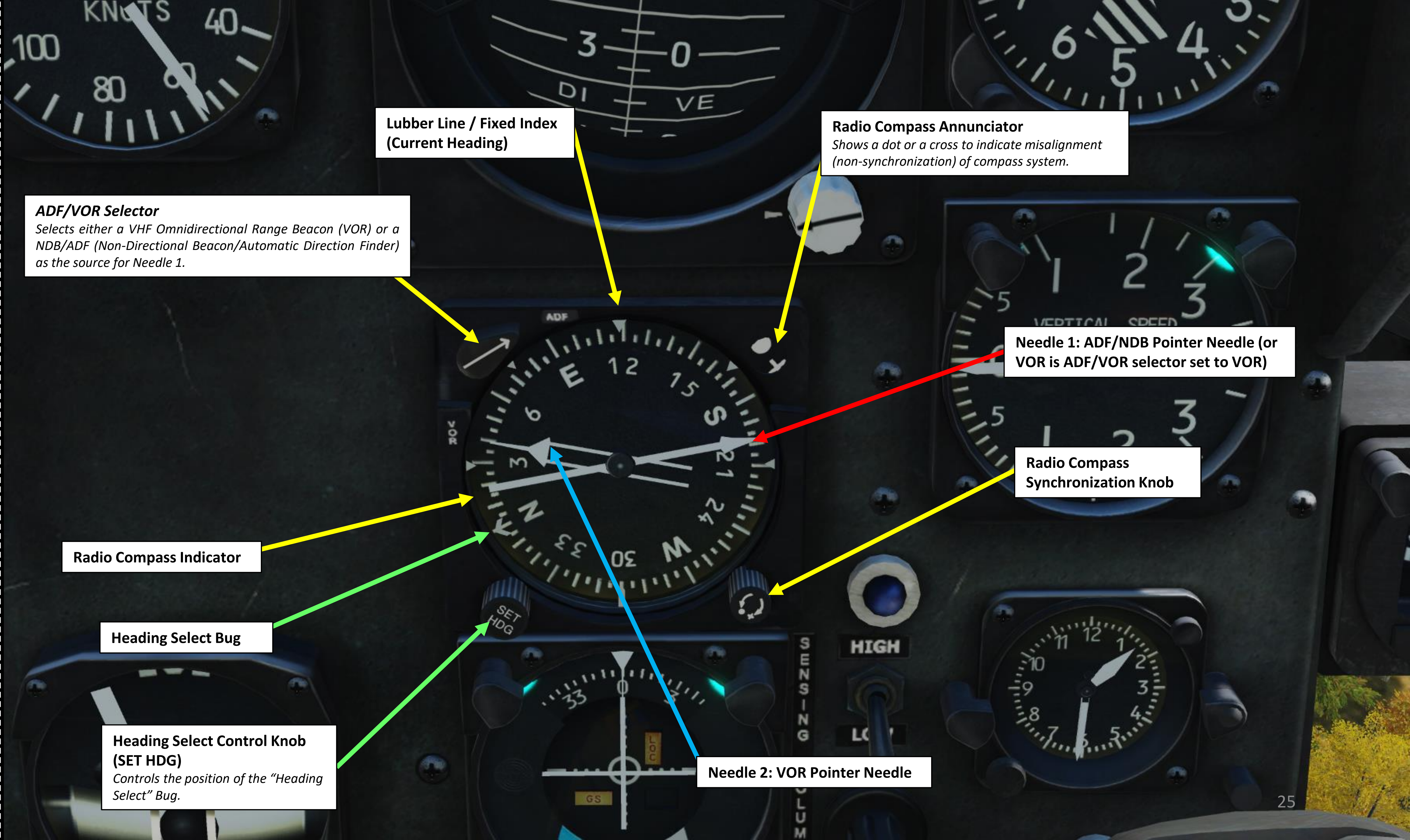

**Gunsight Elevation Settings Placard**
*Table for N.O.E. (Nap of the Earth, very low altitude), 1500 ft and 2500 ft altitudes.*

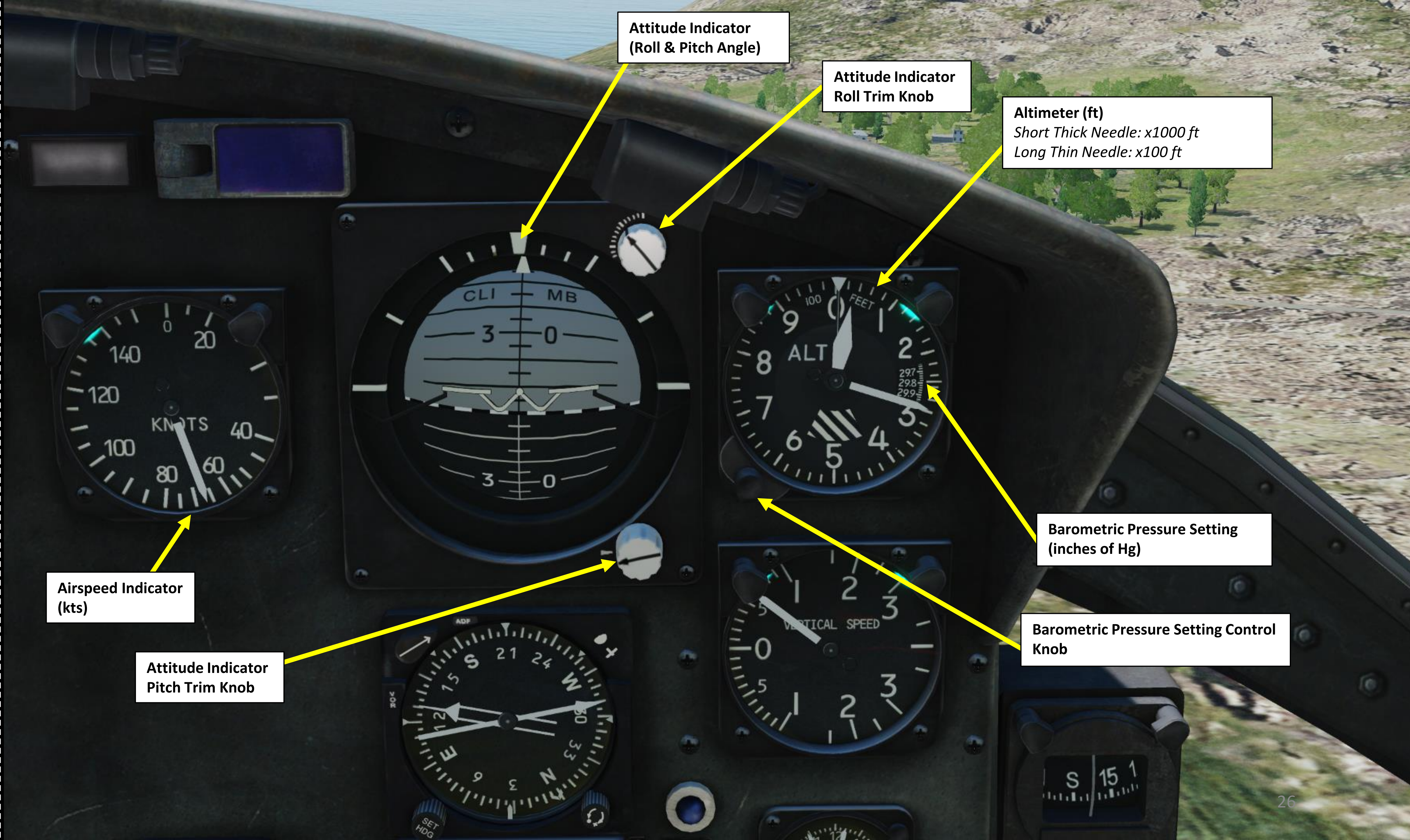


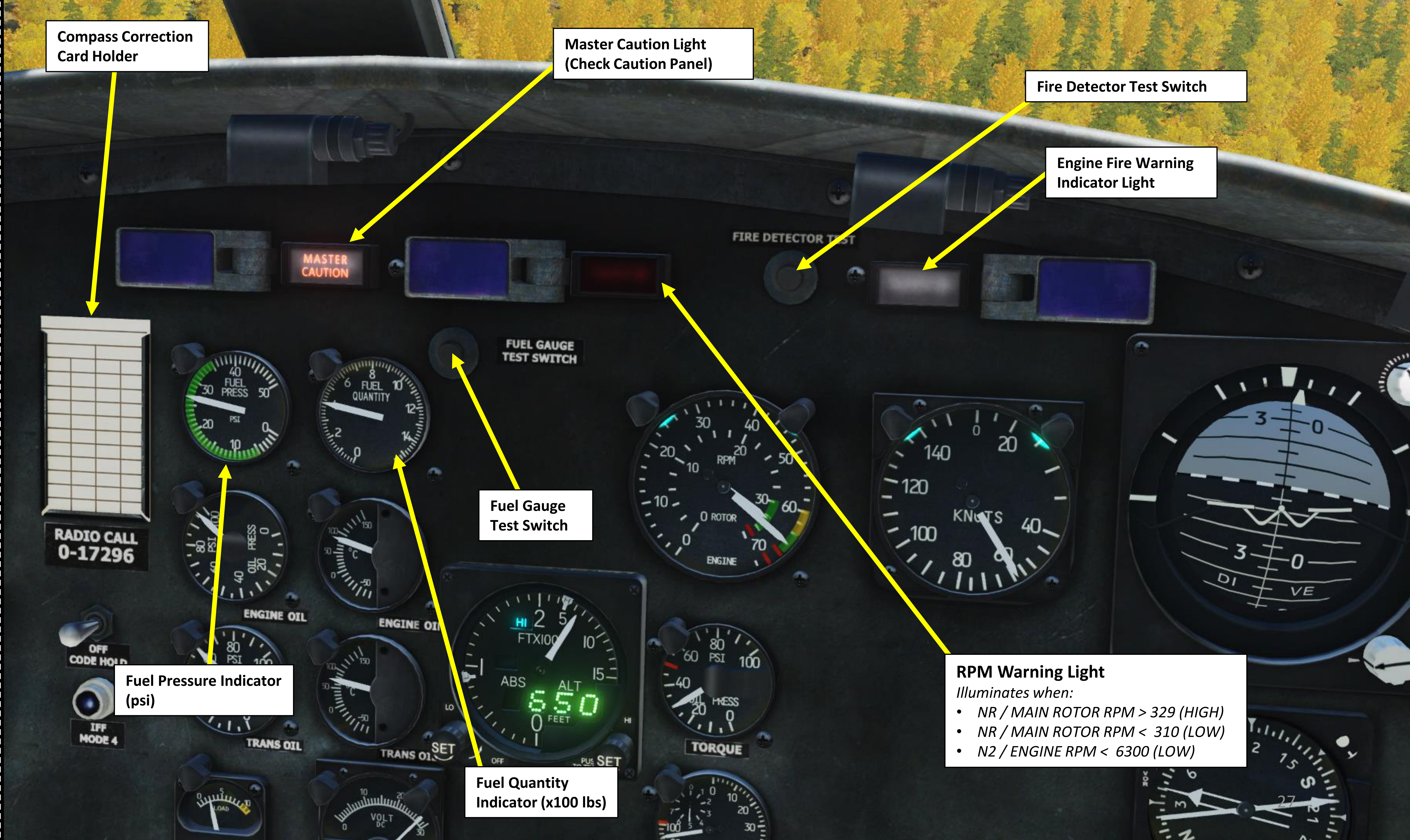
Gunsight Brightness Control

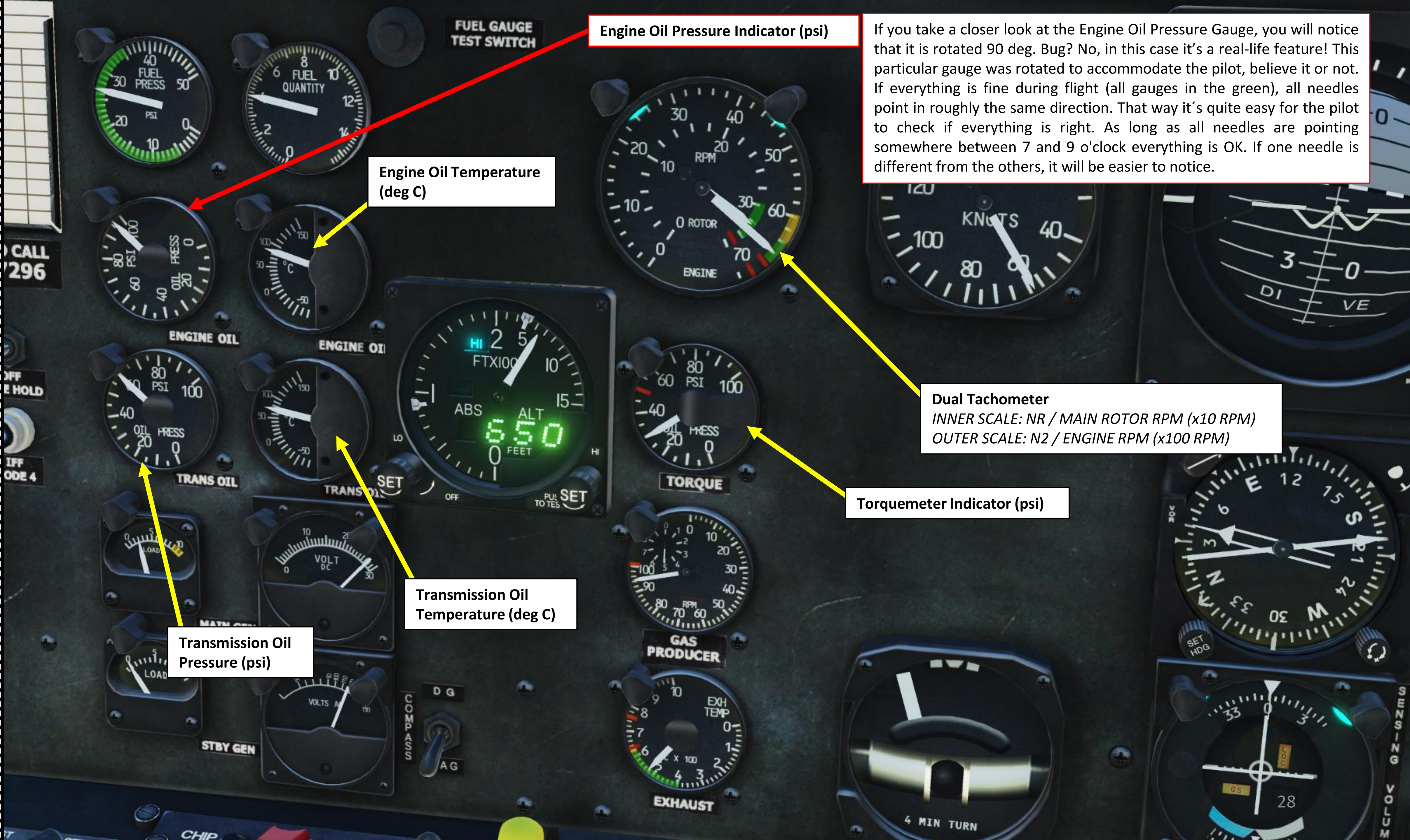
Gunsight Elevation Control (mils)


Radio Compass Indicator
Marker Beacon Light
Vertical Velocity Indicator (x1000 ft/min)
Magnetic Compass
Clock
Cargo Release Armed Light
Marker Beacon Sensing Switch
High/Low
Marker Beacon Volume Control Knob
Turn & Slip Indicator
CDI (Course Deviation Indicator)


Lubber Line / Fixed Index (Current Heading)
Radio Compass Annunciator
Shows a dot or a cross to indicate misalignment (non-synchronization) of compass system.
ADF/VOR Selector
Selects either a VHF Omnidirectional Range Beacon (VOR) or a NDB/ADF (Non-Directional Beacon/Automatic Direction Finder) as the source for Needle 1.
Needle 1: ADF/NDB Pointer Needle (or VOR is ADF/VOR selector set to VOR)
Radio Compass Synchronization Knob
Radio Compass Indicator
Heading Select Bug
Heading Select Control Knob (SET HDG)
Controls the position of the “Heading Select” Bug.
Needle 2: VOR Pointer Needle


Attitude Indicator (Roll & Pitch Angle)
Attitude Indicator Roll Trim Knob
Altimeter (ft)
Short Thick Needle: x1000 ft
Long Thin Needle: x100 ft
Barometric Pressure Setting (inches of Hg)
Barometric Pressure Setting Control Knob
Airspeed Indicator (kts)
Attitude Indicator Pitch Trim Knob
KNOTS
ALT
FEET
VERTICAL SPEED
CLIMB


Compass Correction Card Holder
Master Caution Light (Check Caution Panel)
Fire Detector Test Switch
Engine Fire Warning Indicator Light
MASTER CAUTION
FIRE DETECTOR TEST
FUEL GAUGE TEST SWITCH
RADIO CALL 0-17296
Fuel Gauge Test Switch
RPM Warning Light
Illuminates when:
• NR / MAIN ROTOR RPM > 329 (HIGH)
• NR / MAIN ROTOR RPM < 310 (LOW)
• N2 / ENGINE RPM < 6300 (LOW)
Fuel Pressure Indicator (psi)
Fuel Quantity Indicator (x100 lbs)
ENGINE OIL
TRANS OIL
TORQUE
OFF CODE HOLD
IFF MODE 4




**Engine Oil Pressure Indicator (psi)**

If you take a closer look at the Engine Oil Pressure Gauge, you will notice that it is rotated 90 deg. Bug? No, in this case it's a real-life feature! This particular gauge was rotated to accommodate the pilot, believe it or not. If everything is fine during flight (all gauges in the green), all needles point in roughly the same direction. That way it´s quite easy for the pilot to check if everything is right. As long as all needles are pointing somewhere between 7 and 9 o'clock everything is OK. If one needle is different from the others, it will be easier to notice.

**Engine Oil Temperature (deg C)**

**Dual Tachometer**
*INNER SCALE: NR / MAIN ROTOR RPM (x10 RPM)*
*OUTER SCALE: N2 / ENGINE RPM (x100 RPM)*

**Torquemeter Indicator (psi)**

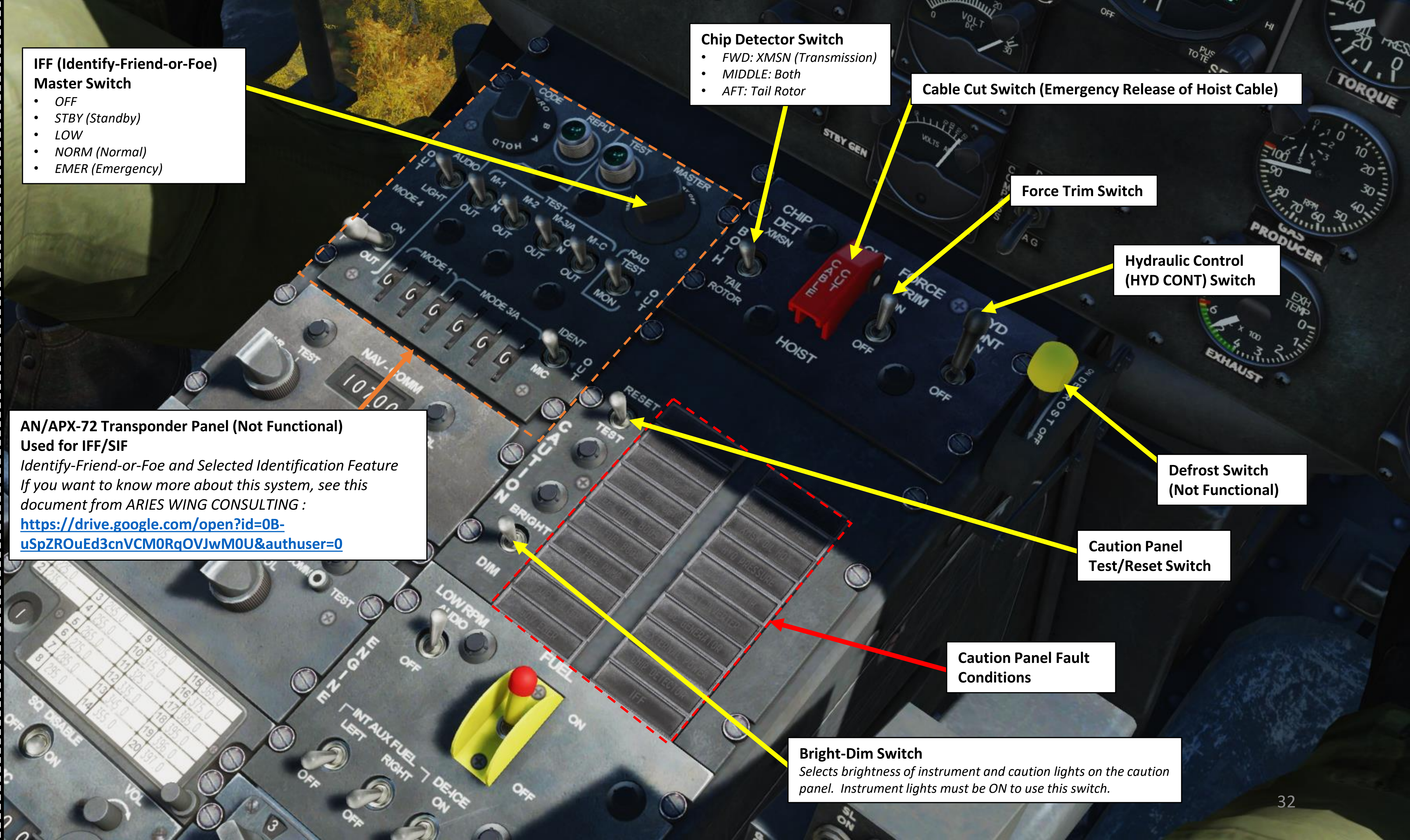
**Transmission Oil Temperature (deg C)**

**Transmission Oil Pressure (psi)**

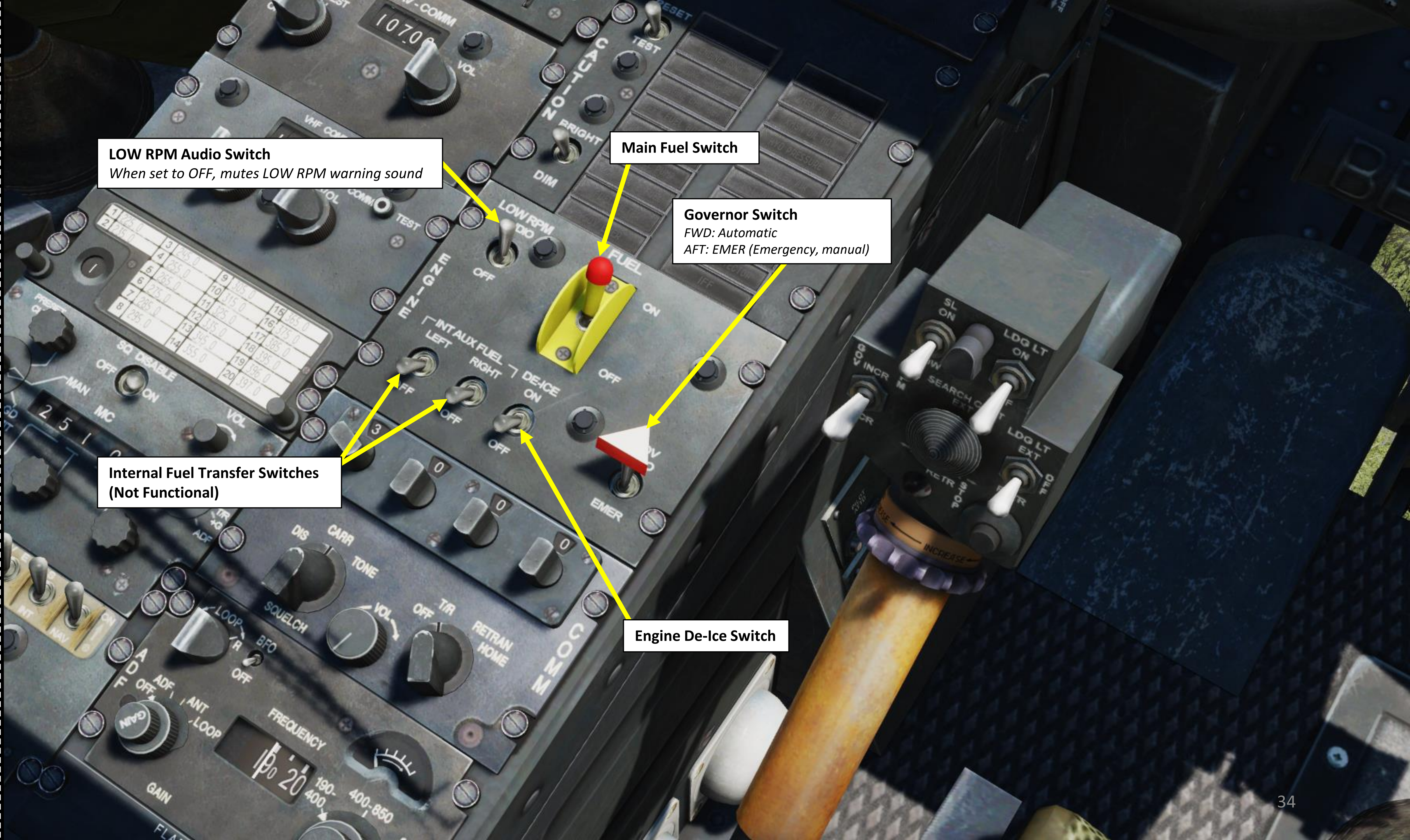

IFF (Identify-Friend-ot-Foe) Code Hold Switch
IFF (Identify-Friend-ot-Foe) Code Hold Light
Main Generator Loadmeter (%)
Standby Generator Loadmeter (%)
Radar Altimeter (x100 ft)
1. LO set bug
2. LO warning lamp
3. LO altitude bug
4. HI warning lamp
5. HI altitude bug
6. OFF flag
7. HI set bug
DC Voltmeter (Volts)
AC Voltmeter (Volts)
N1 / Gas Turbine (Producer) Tachometer (% RPM)
Exhaust Gas Temperature (EGT/EXH) (deg C)
Radio Compass Slaving Switch
DG (UP): Free Directional Gyro Mode
MAG (DOWN): Slaved Directional Gyro Mode
RADIO CALL 0-17296
ENGINE OIL
TRANS OIL
MAIN GEN
STBY GEN
TORQUE
GAS PRODUCER
EXHAUST
COMPASS
HOIST
4 MIN TURN

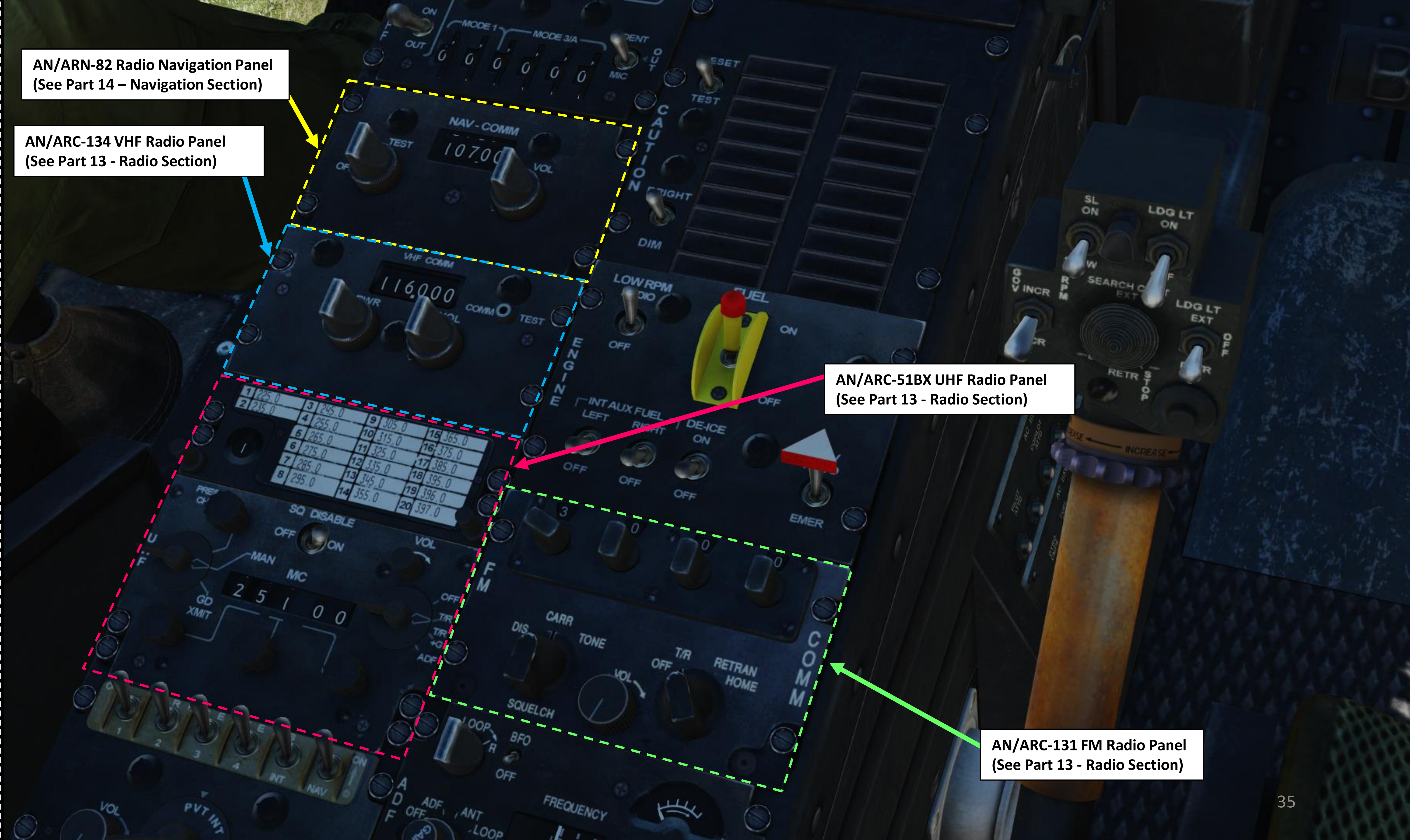

FIRE DETECTOR TEST
FUEL GAUGE TEST SWITCH
RADIO CALL
0-17296
OFF
CODE HOLD
IFF
MODE 4
ENGINE OIL
TRANS OIL
MAIN GEN
STBY GEN
TORQUE
GAS PRODUCER
FORCE TRIM
CHIP DET

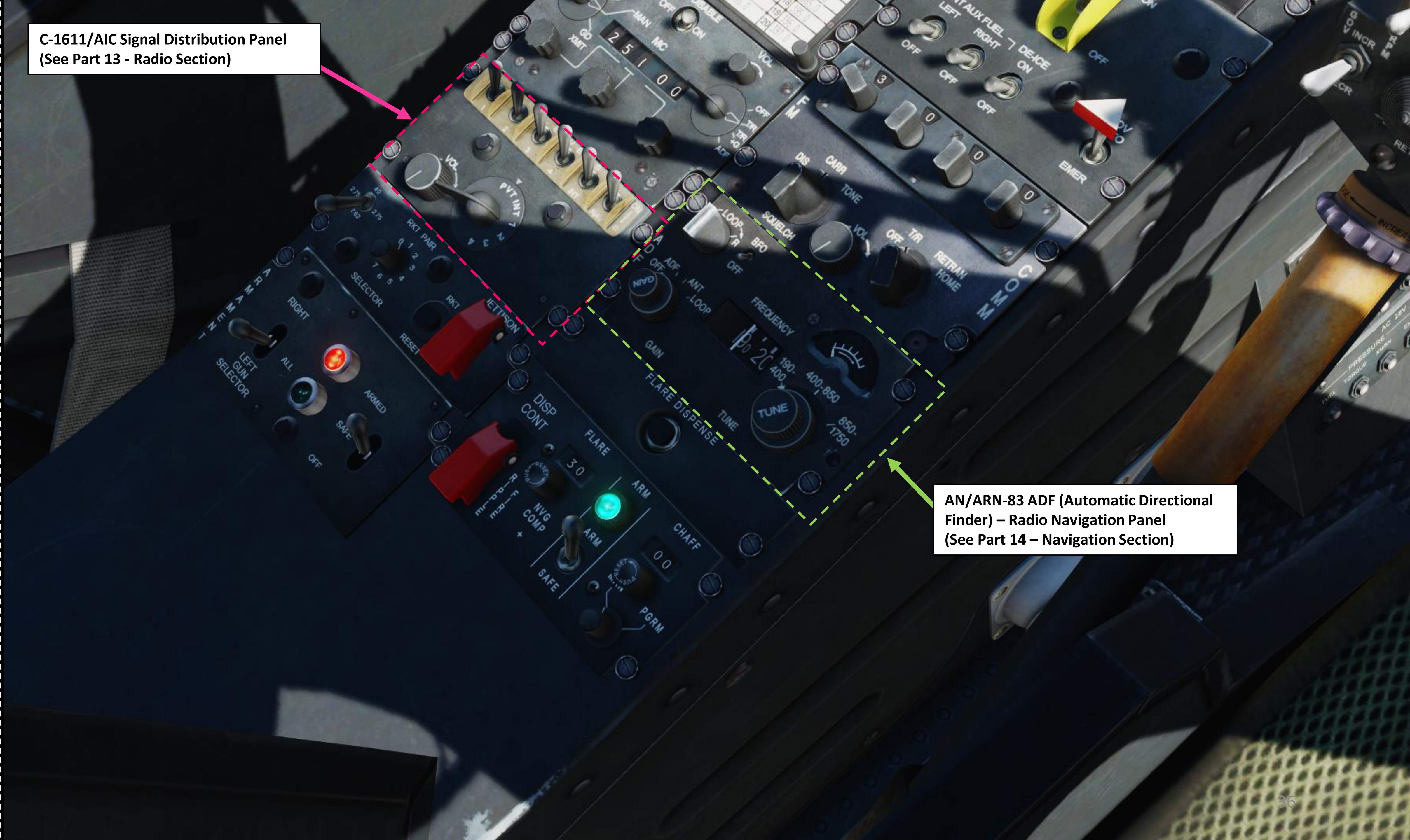

GAS PRODUCER
EXHAUST
MAIN GEN
STBY GEN
FORCE TRIM
HOIST
VHF COMM
NAV - COMM
LOW RPM
FUEL
DE-ICE
FREQUENCY
TUNE
FLARE DISPENSE
JETTISON
SELECTOR
ARMED
SAFE
CHAFF
FLARE
PGRM

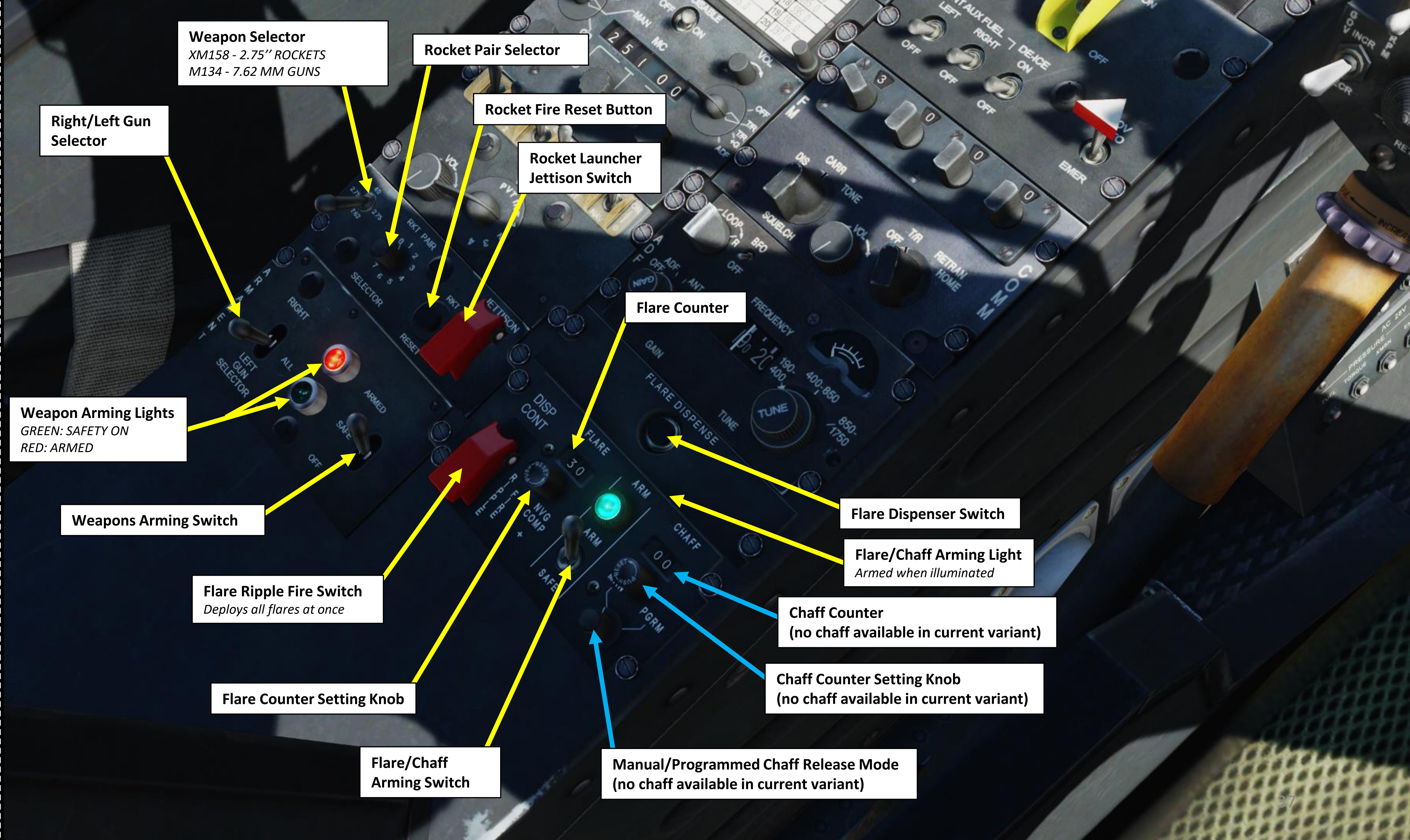

IFF (Identify-Friend-or-Foe) Master Switch
- OFF
- STBY (Standby)
- LOW
- NORM (Normal)
- EMER (Emergency)
Chip Detector Switch
- FWD: XMSN (Transmission)
- MIDDLE: Both
- AFT: Tail Rotor
Cable Cut Switch (Emergency Release of Hoist Cable)
Force Trim Switch
Hydraulic Control (HYD CONT) Switch
Defrost Switch (Not Functional)
Caution Panel Test/Reset Switch
Caution Panel Fault Conditions
AN/APX-72 Transponder Panel (Not Functional)
Used for IFF/SIF
Identify-Friend-or-Foe and Selected Identification Feature
If you want to know more about this system, see this document from ARIES WING CONSULTING :
https://drive.google.com/open?id=0B-uSpZROuEd3cnVCM0RqOVJwM0U&authuser=0
Bright-Dim Switch
Selects brightness of instrument and caution lights on the caution panel. Instrument lights must be ON to use this switch.


| CAUTION PANEL | |
|---|---|
| ENGINE OIL PRESS | Engine oil pressure below 25 psi |
| ENGINE ICING | Engine icing detected |
| ENGINE ICE DET | Not connected |
| ENGINE CHIP DET | Metal particle in engine oil |
| LEFT FUEL BOOST | Left fuel boost pump inoperative |
| RIGHT FUEL BOOST | Right fuel boost pump inoperative |
| ENG FUEL PUMP | Engine fuel pump inoperative |
| 20 MINUTE | Fuel quantity about 170 lbs (20 min remaining) |
| FUEL FILTER | Fuel filter impending bypass |
| GOV EMER | Governor switch in emergency position |
| AUX FUEL LOW | Auxiliary fuel tank empty |
| XMSN OIL PRESS | Transmission oil pressure below 30 psi |
| XMSN OIL HOT | Transmission oil temperature above 110 deg C |
| HYD PRESSURE | Hydraulic pressure LOW |
| ENGINE INLET AIR | Engine air filter clogged |
| INST INVERTER | Failure of inverter |
| DC GENERATOR | DC generator failure |
| EXTERNAL POWER | External power access door open |
| CHIP DETECTOR | Metal particles present in 42 deg (intermediate gearbox) or 90 deg (tail rotor gearbox) gearbox or main transmission |
| IFF | IFF (Identify-Friend-or-Foe) system inoperative |

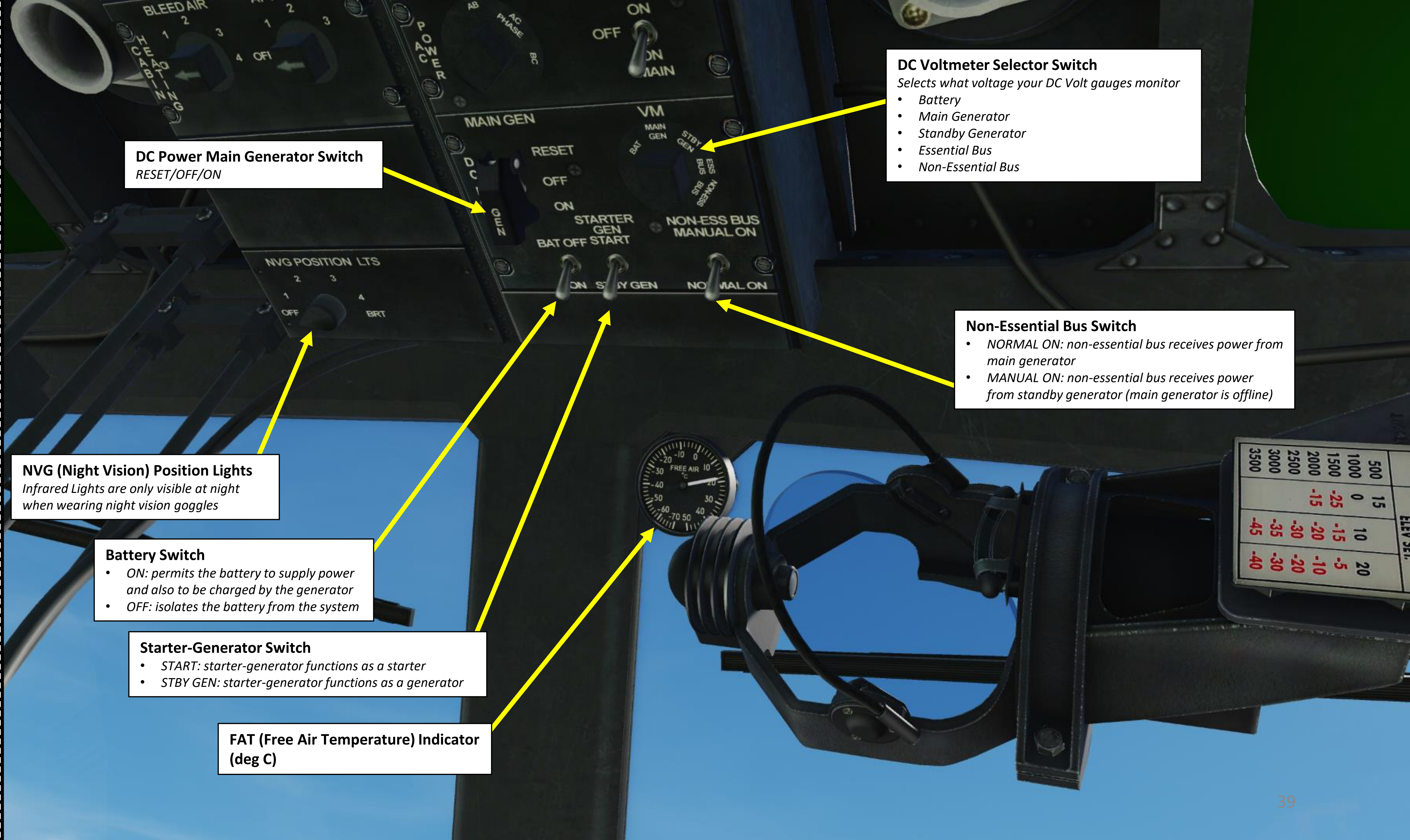

LOW RPM Audio Switch
When set to OFF, mutes LOW RPM warning sound
Main Fuel Switch
Governor Switch
FWD: Automatic
AFT: EMER (Emergency, manual)
Internal Fuel Transfer Switches
(Not Functional)
Engine De-Ice Switch


AN/ARN-82 Radio Navigation Panel
(See Part 14 – Navigation Section)
AN/ARC-134 VHF Radio Panel
(See Part 13 - Radio Section)
AN/ARC-51BX UHF Radio Panel
(See Part 13 - Radio Section)
AN/ARC-131 FM Radio Panel
(See Part 13 - Radio Section)


C-1611/AIC Signal Distribution Panel
(See Part 13 - Radio Section)
AN/ARN-83 ADF (Automatic Directional Finder) – Radio Navigation Panel
(See Part 14 – Navigation Section)


Weapon Selector
XM158 - 2.75'' ROCKETS
M134 - 7.62 MM GUNS
Rocket Pair Selector
Rocket Fire Reset Button
Rocket Launcher Jettison Switch
Right/Left Gun Selector
Flare Counter
Weapon Arming Lights
GREEN: SAFETY ON
RED: ARMED
Weapons Arming Switch
Flare Dispenser Switch
Flare/Chaff Arming Light
Armed when illuminated
Flare Ripple Fire Switch
Deploys all flares at once
Chaff Counter
(no chaff available in current variant)
Chaff Counter Setting Knob
(no chaff available in current variant)
Flare Counter Setting Knob
Flare/Chaff Arming Switch
Manual/Programmed Chaff Release Mode
(no chaff available in current variant)


HAND HOLD




**DC Power Main Generator Switch**
*RESET/OFF/ON*

**DC Voltmeter Selector Switch**
*Selects what voltage your DC Volt gauges monitor*
- *Battery*
- *Main Generator*
- *Standby Generator*
- *Essential Bus*
- *Non-Essential Bus*

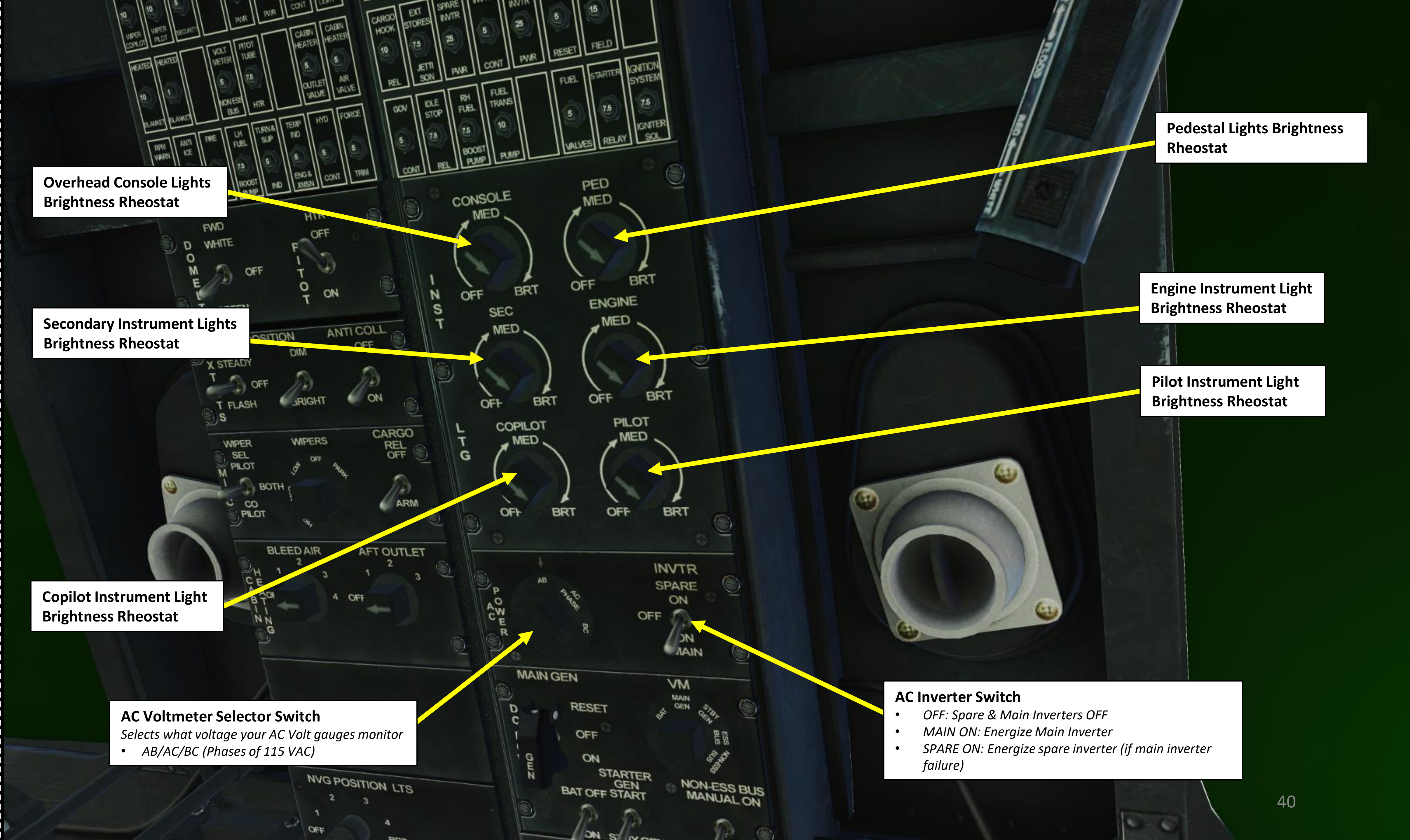
**Non-Essential Bus Switch**
- *NORMAL ON: non-essential bus receives power from main generator*
- *MANUAL ON: non-essential bus receives power from standby generator (main generator is offline)*

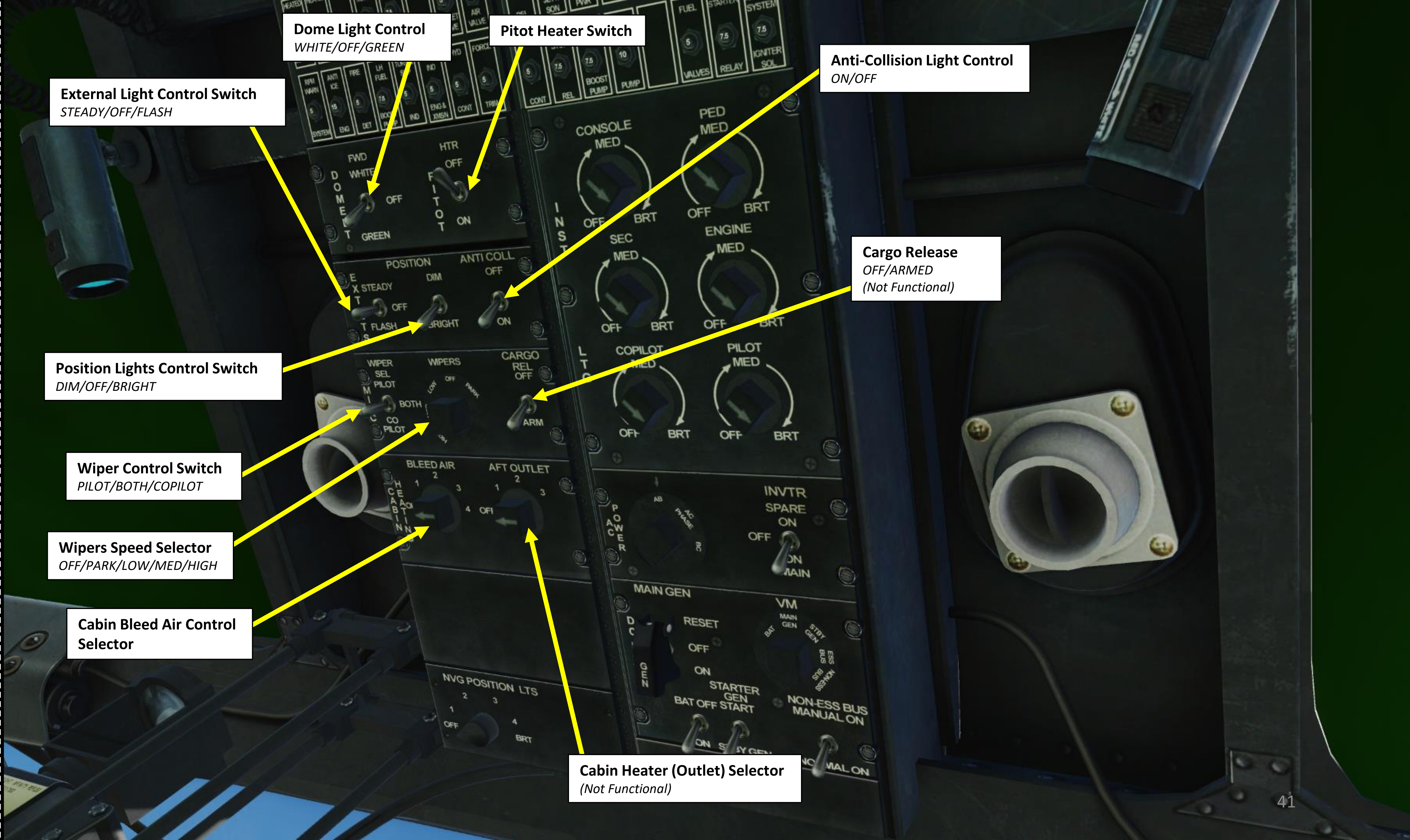
**NVG (Night Vision) Position Lights**
*Infrared Lights are only visible at night when wearing night vision goggles*

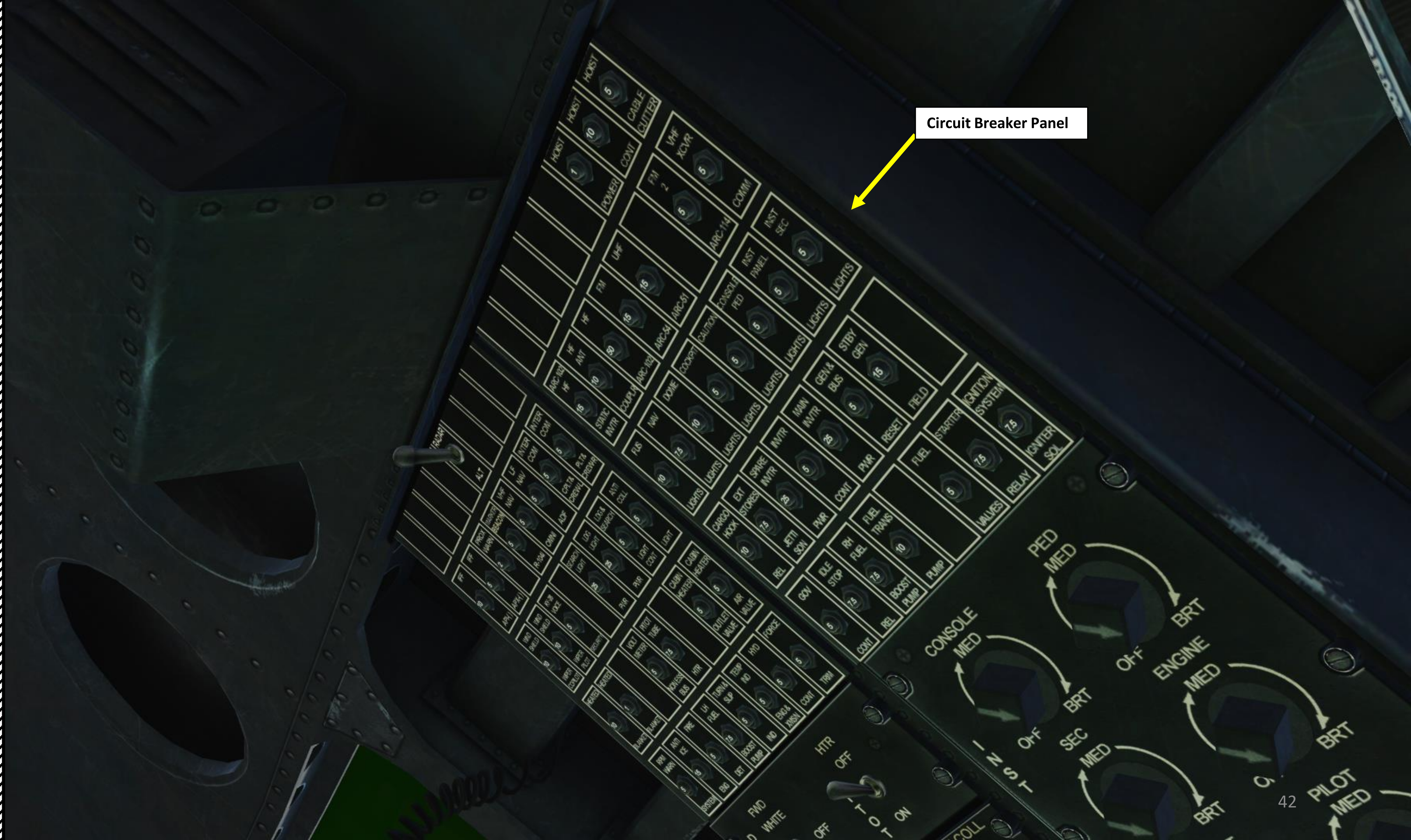
**Battery Switch**
- *ON: permits the battery to supply power and also to be charged by the generator*
- *OFF: isolates the battery from the system*

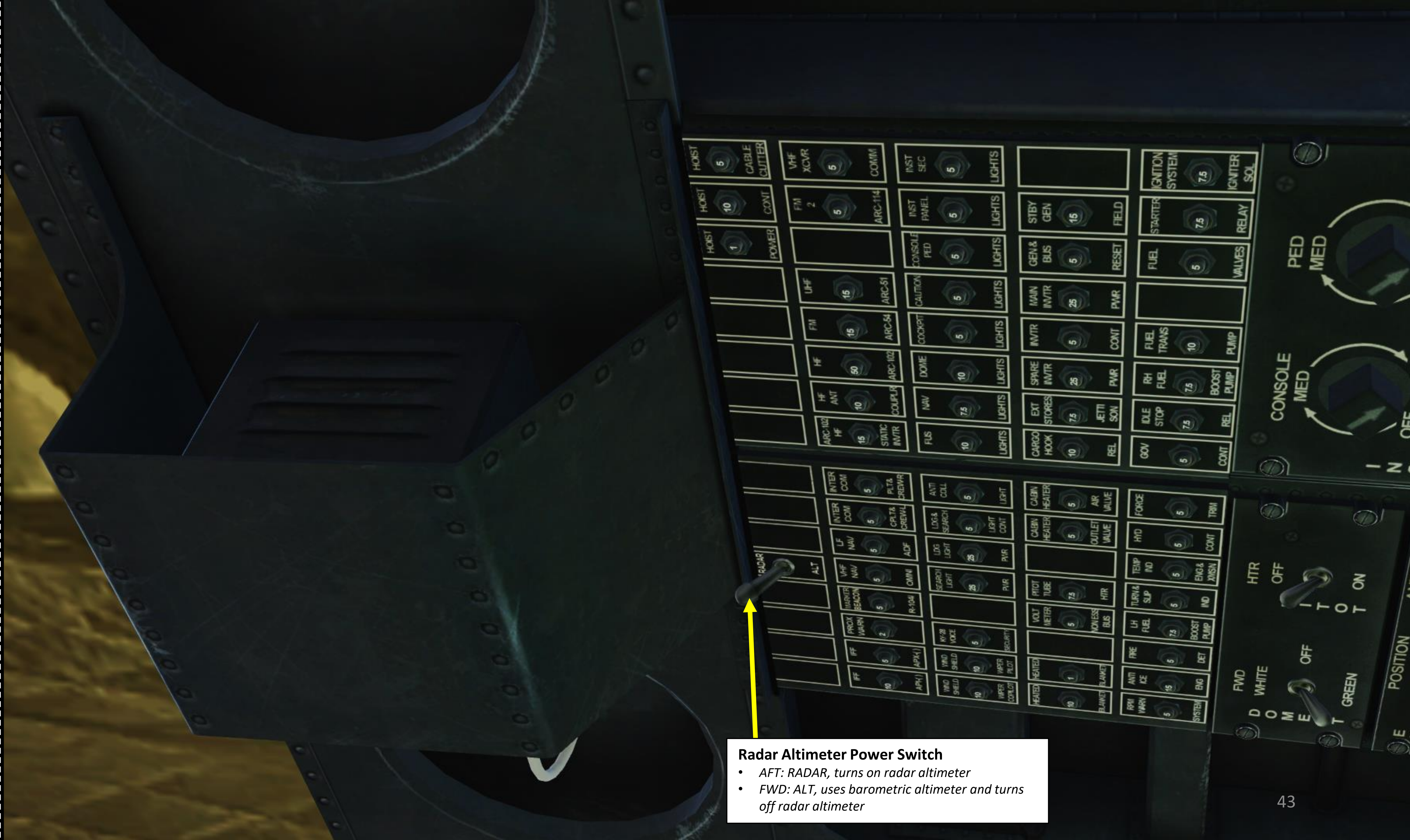
**Starter-Generator Switch**
- *START: starter-generator functions as a starter*
- *STBY GEN: starter-generator functions as a generator*

**FAT (Free Air Temperature) Indicator (deg C)**


Overhead Console Lights Brightness Rheostat
Pedestal Lights Brightness Rheostat
Secondary Instrument Lights Brightness Rheostat
Engine Instrument Light Brightness Rheostat
Pilot Instrument Light Brightness Rheostat
Copilot Instrument Light Brightness Rheostat
AC Voltmeter Selector Switch
*Selects what voltage your AC Volt gauges monitor*
• *AB/AC/BC (Phases of 115 VAC)*
AC Inverter Switch
• *OFF: Spare & Main Inverters OFF*
• *MAIN ON: Energize Main Inverter*
• *SPARE ON: Energize spare inverter (if main inverter failure)*


Dome Light Control
WHITE/OFF/GREEN
Pitot Heater Switch
Anti-Collision Light Control
ON/OFF
External Light Control Switch
STEADY/OFF/FLASH
Cargo Release
OFF/ARMED
(Not Functional)
Position Lights Control Switch
DIM/OFF/BRIGHT
Wiper Control Switch
PILOT/BOTH/COPILOT
Wipers Speed Selector
OFF/PARK/LOW/MED/HIGH
Cabin Bleed Air Control Selector
Cabin Heater (Outlet) Selector
(Not Functional)


Circuit Breaker Panel




**Radar Altimeter Power Switch**

- *AFT: RADAR, turns on radar altimeter*
- *FWD: ALT, uses barometric altimeter and turns off radar altimeter*

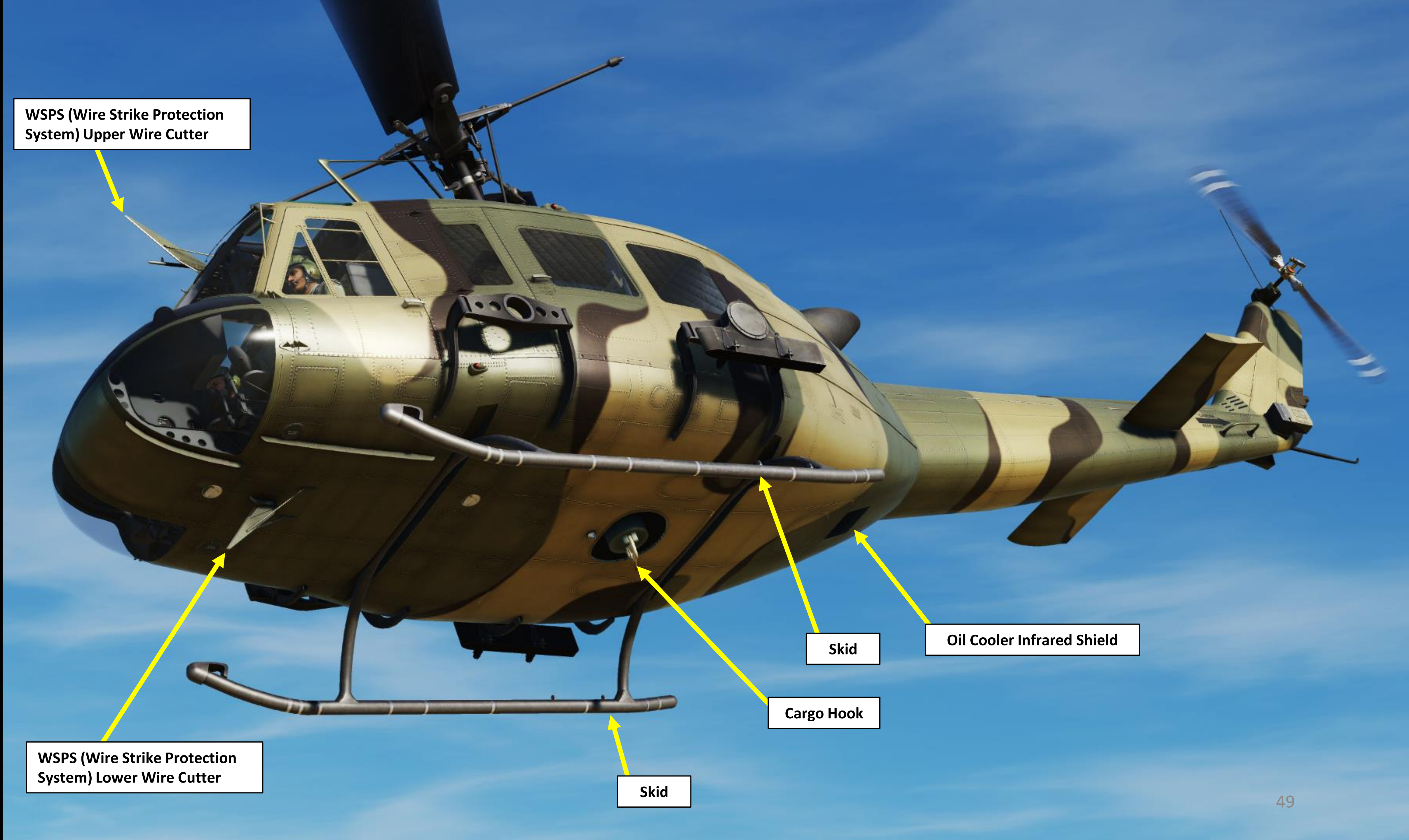
**NIGHT VISION GOGGLES CONTROLS**

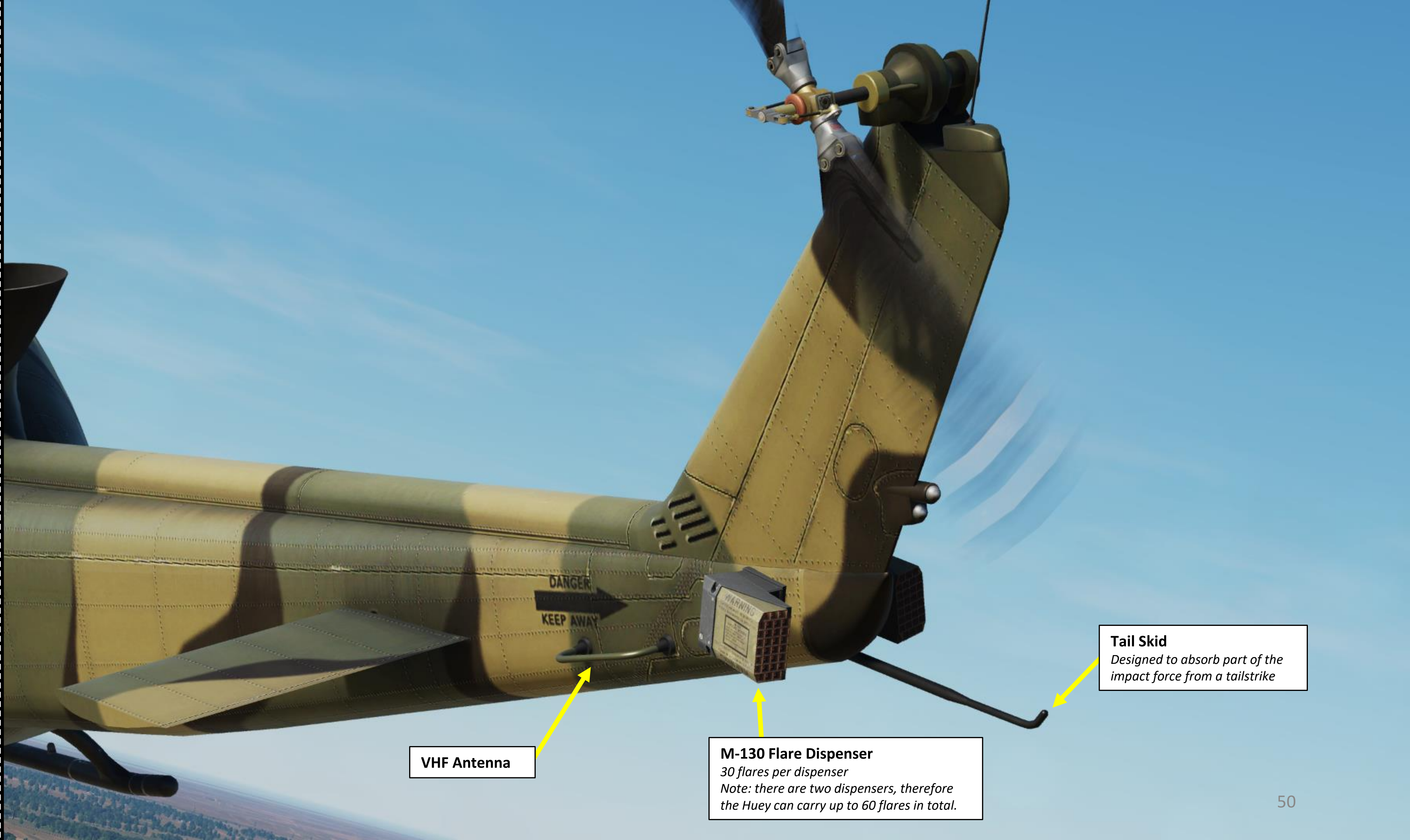
ON/OFF: RSHIFT + H
BRIGHTNESS + : RCTRL + RSHIFT + H
BRIGHTNESS - : RALT + RSHIFT + H

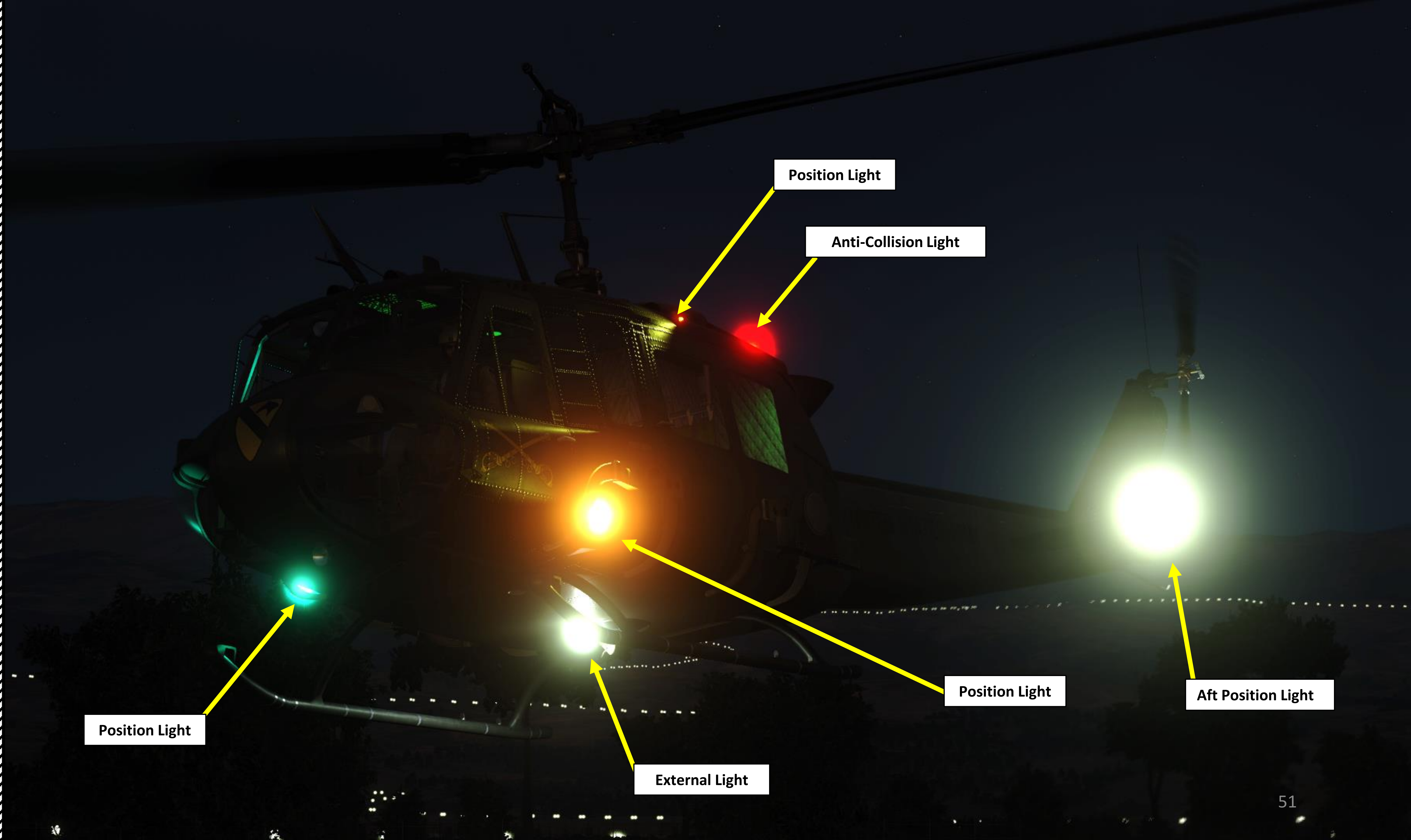

Main Rotor
Tail Rotor
Stabilizer Bar
The gyroscopic and inertial effect of the stabilizer bar will produce a damping force in the rotor rotating control system and thus the rotor. When an angular displacement of the helicopter/mast occurs, the bar tends to remain in its trim plane. The rate at which the bar rotational plane tends to return to a position perpendicular to the mast is controlled by the hydraulic dampers. By adjusting the dampers, positive dynamic stability can be achieved, and still allow the pilot complete responsive control of the helicopter.
All-Moving Tailplane (Synchronized Elevators)
The elevators are connected by control tubes and mechanical linkage to the fore-and-aft cyclic system. Fore-and-aft movement of the cyclic control stick will produce a change in the synchronized elevator attitude. This improves controllability within the center of gravity (CG) range

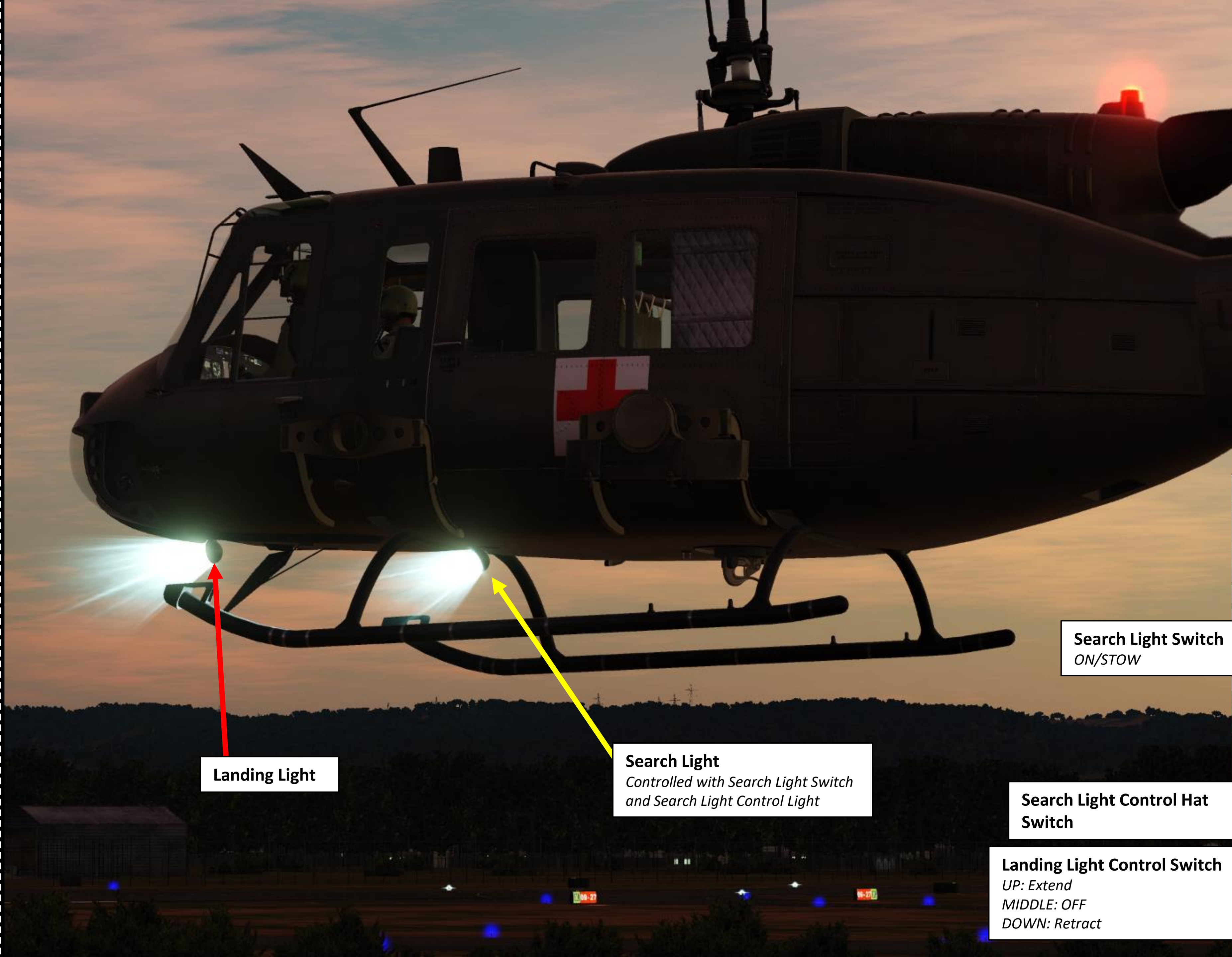

FM Communication Antenna #2
VHF/UHF Antenna
Pitot Tube
FM Communication Antenna #1
Infrared Exhaust Suppressor

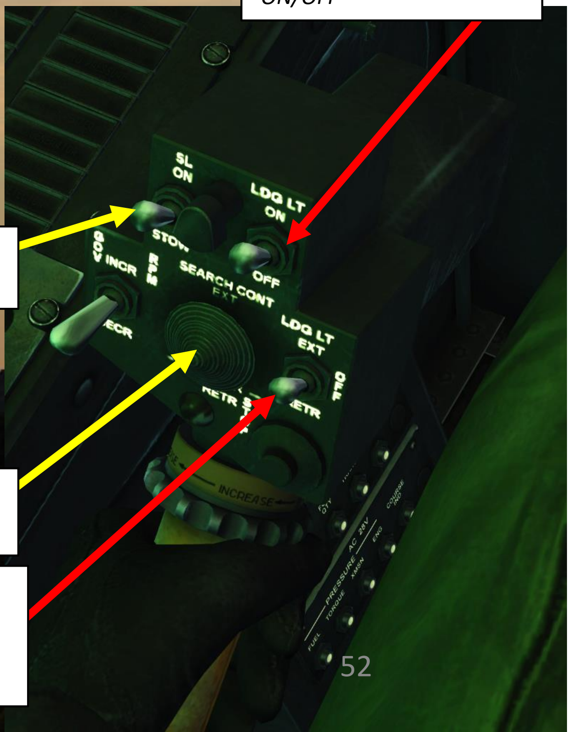

Radio Compartment and Forward Battery Location Access Door
Radar Warning Antenna
UNITED STATES ARMY


WSPS (Wire Strike Protection System) Upper Wire Cutter
Skid
Oil Cooler Infrared Shield
Cargo Hook
WSPS (Wire Strike Protection System) Lower Wire Cutter
Skid


DANGER
KEEP AWAY
Tail Skid
*Designed to absorb part of the impact force from a tailstrike*
VHF Antenna
M-130 Flare Dispenser
*30 flares per dispenser*
*Note: there are two dispensers, therefore the Huey can carry up to 60 flares in total.*


Position Light
Anti-Collision Light
Position Light
Aft Position Light
Position Light
External Light


Landing Light
Search Light
Controlled with Search Light Switch and Search Light Control Light


Landing Light Switch
ON/OFF
Search Light Switch
ON/STOW
Search Light Control Hat Switch
Landing Light Control Switch
UP: Extend
MIDDLE: OFF
DOWN: Retract

**Note:** *For copilot, you can only adjust gunsight brightness and lamp mode once the sight is stowed.*



M23 Armament System
M-60D 7.62 mm Machinegun


Hardpoint

XM93 Armament System
M-134 7.62 mm Machinegun


Hardpoint


M21 Armament System
M159: 19 x 2.75 inch rocket launcher

M21 Armament System
M-134 7.62 mm Machinegun


M21 Armament System
M158: 7 x 2.75 inch rocket launcher

# PRE-FLIGHT: WHAT IS IT, AND WHY SHOULD YOU CARE?

Flying helicopters is a risky business: statistics collected by the National Transport Safety Board revealed that the rate of accidents during instructional flights in 2009 was twice as high for helicopters as for airplanes: 12.69 accidents per 100,000 hours. Crash rate for helicopters: 9.84 per 100,000 hours. Helicopters crash about 35 percent more often per hour in the air than your average aircraft. Scary, isn't it?

You might wonder "why is that, Chuck?" One of the many reasons is that the standards of pilot training vary from flight school to flight school. Flying helicopters is an art form: learn it wrong and it will eventually bite you in the arse. For many years, the industry has failed many pilots in providing adequate training and knowledge of **helicopter performance** and **Aeronautical Decision Making** (ADM).

Decision-making should never be done by taking a wild guess: it's a recipe for disaster. Pilots should ALWAYS know their **max power producible by the engine** and their **reserve power** (which both vary with altitude/air density and temperature conditions). These two power settings are compared to the value read on the torquemeter in order to know safe power settings.

Still awake? Hang on, it's almost over. These power settings are directly affected by your environment. If you know your engine performance based on that, you will be able to operate safely. **Helicopter performance** is governed by three factors that influence your flight: **density altitude (air density), helicopter weight and wind**. **Humidity** (moisture) has an effect as well, but to a lesser extent (3-4 % performance reduction compared to dry air).

Now why on earth should you give a darn about that wall of text I just wrote? Because your (virtual) life is at stake, ye' muppet! Before you even think about taking off and tuning the radio for Wagner's Ride of the Valkyries, you need to do a PRE-FLIGHT check. Basically, you choose your loadout (fuel quantity & armament) for the type of mission you want to fly. Based on this loadout, you will obtain a gross weight. With this weight, you will be able to check very easily the power settings you need to know in order not to end up in a smoldering pile of ashes.

**Know your mission, your loadout, your environment… and from that, you can find your power settings and operational ceiling.**

And that's it! Did it hurt?

# PRE-FLIGHT: WHAT IS IT, AND WHY SHOULD YOU CARE? (KEEP READING, YOU KNOW YOU WANT TO)

Sorry, I lied: there's a little more to talk about! I am fair but firmly cruel: deal with it! Don't worry, we come to the fun part.

During the Vietnam War, the Huey operated in a hot and humid environment: definitely NOT a winning combination for engine performance. The problem was not with the airframe's max structural weight load: the fuselage could handle the payload just fine. The real problem was with the engine. In these environmental conditions, the UH-1's in Vietnam did not have sufficient power to come to a hover with what would be considered today a "light load". This is why you will have to be selective about what you bring on board. You can't carry 10 fully armed soldiers, 4 miniguns, 2 rocket pods, a full fuel load, a 500 lbs sling load, that weird guy who always says "Get some!" and your grandmother all at once.

Before takeoff, pilots and ground crews had to do a "Weight and Balance" calculation. The weight calculation will be shown in the following pages: it's pretty straightforward and easy to do. You find your weight, and find your **hover ceiling, max torque available and hover power required** with fancy charts. The balance calculation, on the other hand, is a little more laborious since you need to find if the CG resulting from the weight of cargo, armament & passengers is within a safe range. I am merciful though: this calculation will not be shown (you can still consult the -10 manual available in Part 17: Other Resources to learn if you are curious).

**So here are the steps for a successful PRE-FLIGHT check.**

1. Find out what your mission will be
    - Hoist Sling Loads / MEDIVAC
    - Troop movement (slick)
    - CSAR (Combat Search and Rescue) / CASEVAC
    - Gunship / Recon
    - ARA (Aerial Rocket Artillery)
2. Select appropriate loadout (fuel & armament) based on your mission
3. Find your weight resulting from the loadout selected (DCS loadout interface already gives you this value, you lucky dog)
4. Find the environmental conditions (temperature and atmospheric pressure)
5. Find your hover ceiling, max torque available and hover power required from your gross weight and environmental conditions
6. Perform PRE-FLIGHT checklist
7. Proceed to engine start-up.

WEIGHT AND BALANCE CALCULATION EXPLAINED:
https://www.faasafety.gov/gslac/ALC/course_content.aspx?cID=103&sID=438&preview=true

# 1 - MISSION TYPE

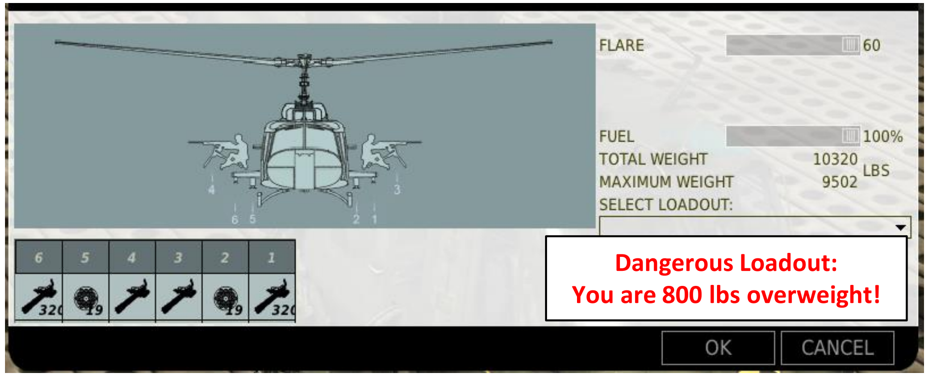
Find out what your mission will be

- Hoist Sling Loads / MEDIVAC
- Troop movement (slick)
- CSAR (Combat Search and Rescue) / CASEVAC
- Gunship / Recon
- ARA (Aerial Rocket Artillery)

# 2 - LOADOUT

| | RECOMMENDED LOADOUT PER MISSION TYPE | | | | | |
|---|---|---|---|---|---|---|
| | HOIST SLING LOADS / MEDIVACS | GUNSHIP (SIDE GUNS) | GUNSHIP (FWD GUNS) | TROOP MOVEMENT (SLICK) | CSAR CASEVAC | ARA |
| FWD M-134 MINIGUNS | | | X | | | |
| SIDE-MOUNTED M-134 MINIGUNS | | X | | | X | |
| SIDE-MOUNTED M-60D | | | X | X | | |
| M158 x 7 ROCKETS | | X | X | | | |
| M159 x 19 ROCKETS | | | | | | X |
| COUNTERMEASURES | | 60 FLARES | 60 FLARES | 60 FLARES | 60 FLARES | 60 FLARES |
| FUEL | 100 % | 100 % | 100 % | 100 % | 100 % | 100 % |

# 3 – RESULTING WEIGHT





## WEIGHT TABLE

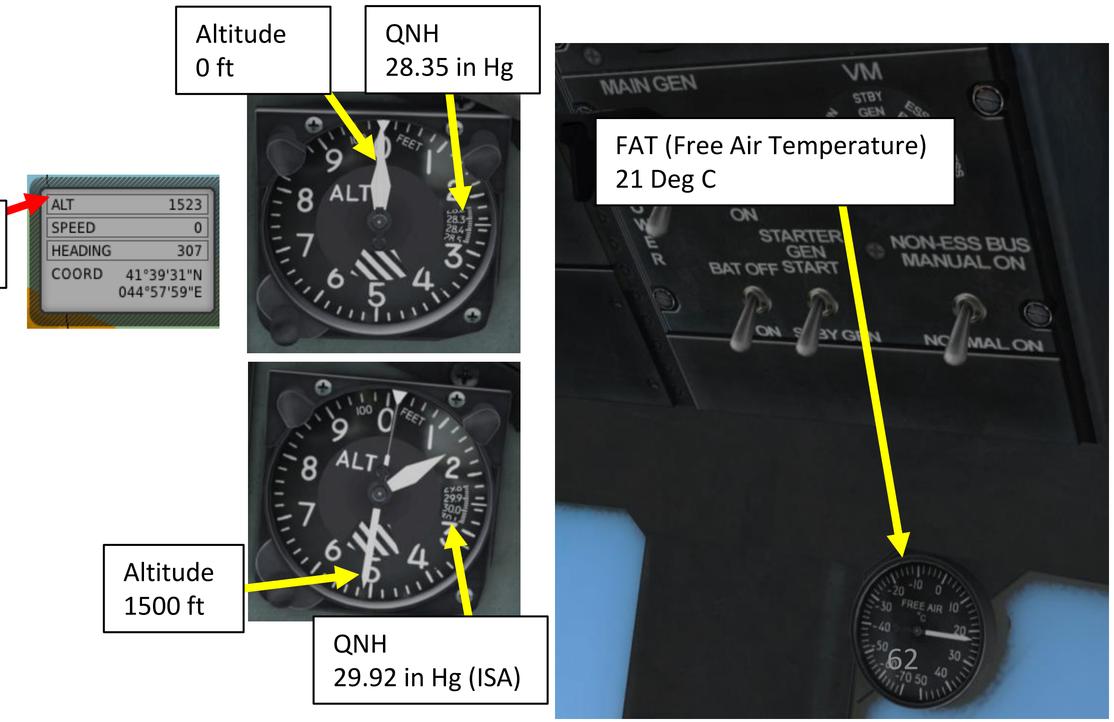
**MINIMUM WEIGHT: 6312 LBS**

**MAX GROSS WEIGHT: 9502 LBS**

| EQUIPMENT | WEIGHT (LBS) |
|---|---|
| 1 x M-134 FWD MINIGUN | 276 |
| 1 x M-134 SIDE MINIGUN + GUNNER | 517 |
| 1 x M60D SIDE MACHINEGUN + GUNNER | 264 |
| 7 x M158 ROCKETS | 247 |
| 19 x M159 ROCKETS | 516 |
| 10 X COMBAT TROOPS (240 LBS EACH) | 2400 |
| 100% FUEL | 1391 |

# 4 – ENVIRONMENTAL CONDITIONS

Airfield Elevation 1500 ft




- Consult your temperature gauge. In this case, we have a FAT (Free Air Temperature) of 21 deg C.
- For simplification purposes, we will assume that OAT (Outside Air Temperature) is equal to FAT.
- Your altimeter is already adjusted for atmospheric conditions
- You can find your pressure altitude (airfield elevation) by turning the altimeter setting knob and set the QNH to 29.92 inches of Hg.
- Your altimeter reading will change: the altitude you see for 29.92 in Hg is your airfield elevation. If you set your altimeter back to a pressure altitude of 0, you will notice that the QNH setting will be different. Your altimeter is generally zeroed when you spawn.
- To know more about altimeter settings, consult: http://en.wikipedia.org/wiki/Atmospheric_pressure

NOTE: Pressure Altitude (PA) = Height + 1000 x (29.92 - altimeter setting)

# 5 – OPERATIONAL LIMITS AND POWER SETTINGS

We will now find three values:

1. **Required power (torque) to maintain a hover state**
2. Hover ceiling
3. Max torque available

REQUIRED TORQUE FOR HOVER can be found from the chart on the right.

The max torque value your prop blades can take is about 50 psi.

This technique allows you to find required power to maintain a hover at any altitude. Therefore, you can plan your mission and take mental notes of power settings to apply during mission.


## WHAT WE WANT TO KNOW

TORQUE REQUIRED TO HOVER

## WHAT WE KNOW

PRESSURE ALTITUDE = 1500 FT
FAT = 20 DEG C
GROSS WEIGHT = 9000 LBS
DESIRED SKID HEIGHT = 5 FT

## METHOD:

1) ENTER PRESSURE ALTITUDE
2) MOVE RIGHT TO FAT
3) MOVE DOWN TO GROSS WEIGHT
4) MOVE LEFT TO SKID HEIGHT
5) MOVE DOWN, READ CALIBRATED TORQUE = 35 PSI
6) FIND TORQUE CORRECTION FROM TABLE BELOW FOR FAT AND CALIBRATED TORQUE SETTINGS (IF FAT IS AT 0 DEG OR BELOW). SINCE WE ARE AT 20 DEG C, NO CORRECTION IS NEEDED.
7) TORQUE REQUIRED TO HOVER IS CALIBRATED TORQUE + CORRECTION = 35 PSI
8) ADD +5 PSI SINCE THERE IS A SMALL DIFFERENCE BETWEEN DCS AND FLIGHT TEST DATA. THEREFORE, TORQUE REQUIRED = 40 PSI.

## NOTE

PRESSURE ALTITUDE = CURRENT ELEVATION + 1000 x (29.92 – ALTIMETER SETTING)

*EXAMPLE FOR TAKEOFF AT 0 FT AGL WITH ALT. SETTING of 28.42 in Hg:*
**PA** = 0 FT + 1000 x (29.92 in Hg – 28.42 in Hg) = 1500 ft

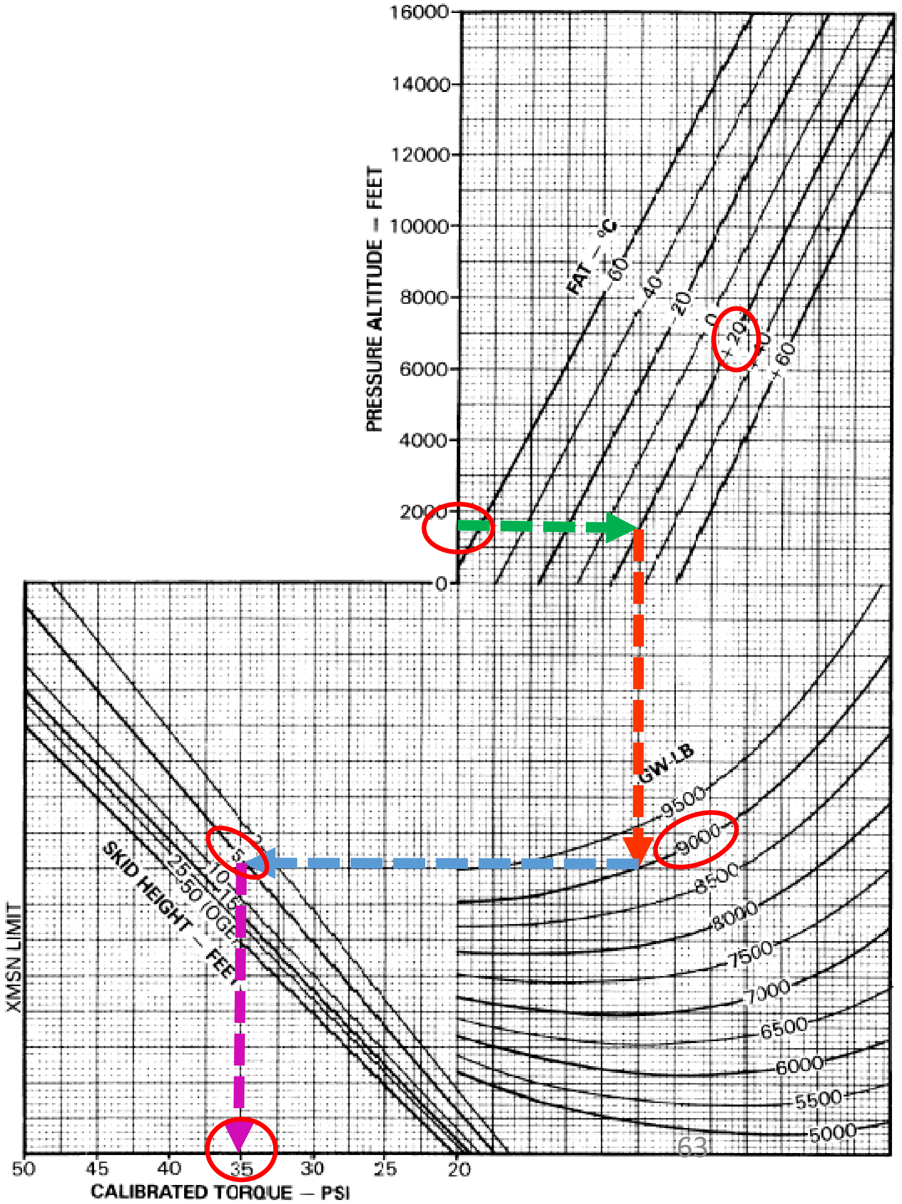
CORRECTION TABLE:

NOTE:
WHEN OPERATING BELOW 20°C
INCREASE TORQUE REQ'D BY:

| FAT \ PSI | 20 | 30 | 40 | 50 |
|---|---|---|---|---|
| 0°C | .2 | .3 | .4 | .5 |
| – 20°C | .4 | .6 | .8 | 1.0 |
| – 40°C | 1.4 | 2.1 | 2.8 | 3.5 |
| – 50°C | 2.4 | 3.6 | 4.8 | 6.0 |
| – 60°C | 4.0 | 6.0 | 8.0 | 10.0 |

## HOVER POWER REQUIRED

### LEVEL SURFACE – CALM WIND
### 324 ROTOR / 6600 ENGINE RPM



# 5 – OPERATIONAL LIMITS AND POWER SETTINGS

We will now find three values:

1. Required power (torque) to maintain a hover state
2. **Hover ceiling**
3. Max torque available

Finding your HOVER CEILING is very important since it allows you to figure out the maximal gross (loaded) weight of your helicopter for a given pressure altitude ceiling.

You can also use this chart the other way around: from a gross weight (determined by the requirements of your mission), you can determine a maximal pressure altitude you can reach for a given rotorcraft configuration.

IGE and OGE mean "In Ground Effect" and "Out of Ground Effect". Ground effect is the increased lift force and decreased aerodynamic drag that an aircraft/rotorcraft's wings or propeller blades generate when they are close to a fixed surface (like ground). The Huey is often operating very close to the ground, so ground effect is particularly noticeable.

A skilled pilot should remember that he will benefit from ground effect if he flies 50 ft from the ground or lower. If he flies higher, he will not benefit from this increased lift and decreased drag.

## WHAT WE WANT TO KNOW

GROSS WEIGHT TO HOVER AT A GIVEN PRESSURE ALTITUDE

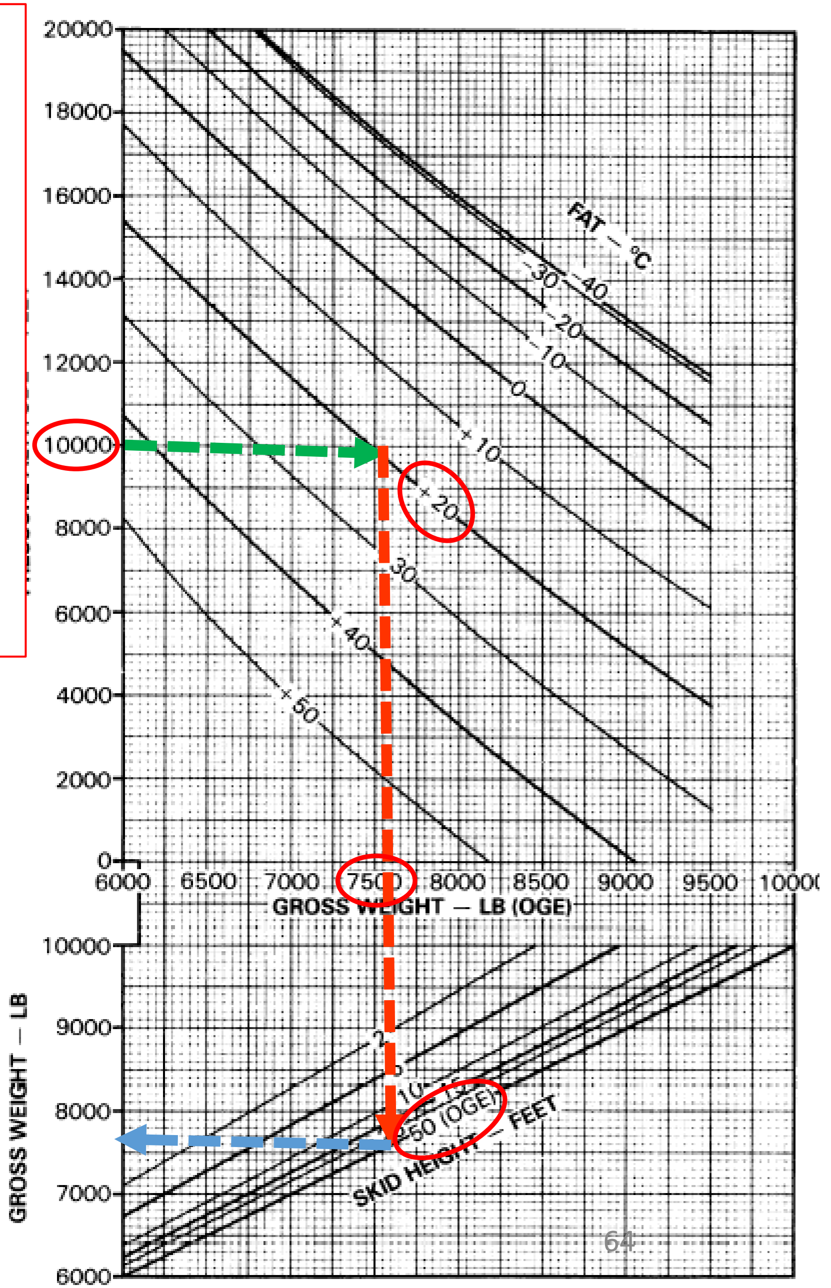
## WHAT WE KNOW

HIGHEST (PREDICTED) PRESSURE ALTITUDE REACHED DURING MISSION= 10,000 FT
FAT = 20 DEG C
SKID HEIGHT = 50 FT (OGE, OUT OF GROUND EFFECT)

## METHOD:

1) ENTER PRESSURE ALTITUDE
2) MOVE RIGHT TO FAT
3) MOVE DOWN TO SKID HEIGHT
4) MOVE LEFT, HEAD GROSS WEIGHT TO HOVER = 7550 LBS

**HOVER CEILING**
**MAX TORQUE AVAILABLE (30 MIN OPERATION)**
**324 ROTOR / 6600 ENGINE RPM**



# 5 – OPERATIONAL LIMITS AND POWER SETTINGS

We will now find three values:

1. Required power (torque) to maintain a hover state
2. Hover ceiling
3. **Max torque available**

The MAXIMUM TORQUE AVAILABLE for a given pressure altitude and temperature can be found from the chart on the right.

This is where the concepts of max producible power and reserve power come into play.

**Max Power Available – Current Power = Reserve Power**

Knowing your maximum available power is useful since it helps you have a good idea of much additional torque you can use when flying. You will tend to be more careful in situations where you have not a whole lot of reserve torque.

Monitoring your torquemeter gauge is critical since an excessive strain on your propeller blades will cause catastrophic structural damage. Unlike a plane, a helicopter cannot glide without his propeller blades.

**IN CONCLUSION:**

Performance planning charts are usually done by pilots for all phases of flight. Torque values should be known for hover (at different altitudes), takeoff, climb, cruise and landing.

## WHAT WE WANT TO KNOW

INDICATED & CALIBRATED TORQUE

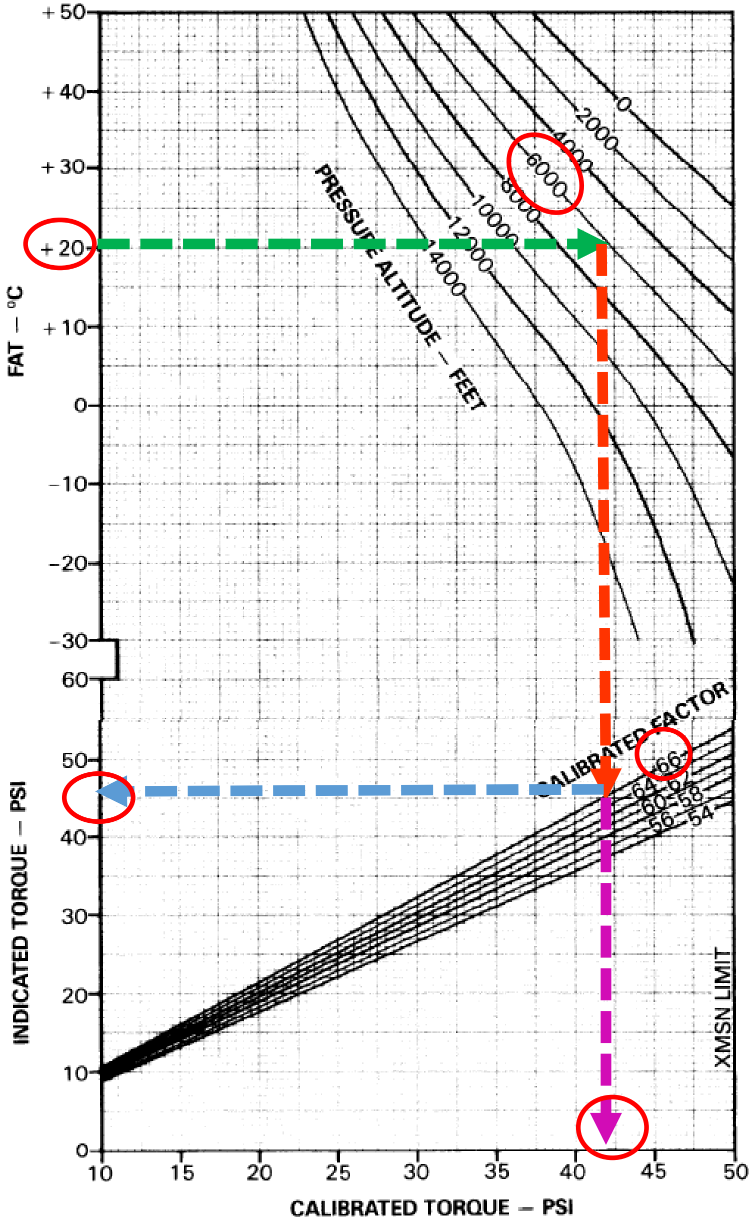
## WHAT WE KNOW

PRESSURE ALTITUDE = 6,000 FT
FAT = 20 DEG C
CALIBRATION FACTOR = 66.0

## METHOD:

1) ENTER FAT
2) MOVE RIGHT TO PRESSURE ALTITUDE
3) MOVE DOWN TO CALIBRATION FACTOR
4) FOR INDICATED TORQUE, MOVE LEFT (50 PSI)
5) FOR CALIBRATED TORQUE, MOVE DOWN (47 PSI)


**MAXIMUM TORQUE AVAILABLE (30 MIN OPERATION)**
**324 ROTOR / 6600 ENGINE RPM**



# 6 – PRE-FLIGHT CHECK

If you were flying a helicopter in real life, you would be obligated to perform pre-flight checks: your own safety and your passengers' is at stake and should be your number one priority. No effort should be spared to protect their life.

Life is imperfect, and mistakes from the ground crew or other pilots can cost you dearly if you do not take precautions to do these checks.

The table on the right is derived from the -10 UH-1H/V Operator's Manual.

| BEFORE STARTING | |
|---|---|
| DC circuit breaker | IN |
| DOME LT | As required |
| PITOT HTR | OFF |
| EXT LTS | |
| ANTI COLL | ON |
| POSITION lights | As required |
| CARGO REL | OFF |
| WIPERS-OFF | OFF |
| CABIN HEATING | OFF |
| CABIN LTG | As required |
| AC POWER | |
| PHASE | AC |
| INVRT | OFF |
| DC POWER | |
| MAIN GEN | ON and Cover |
| VM | ESS-BUS |
| NON-ESS BUS | As required |
| STARTER GEN | START |
| BATT | ON |
| GPU | |
| Smoke gauge | Check |
| FIRE wrng ind light | Test |
| Caution/warning lights | Test |
| System instruments | Check |
| Avionics | OFF |
| Ext Stores jett handle | Check |
| DISP CONTROL panel | Check |
| GOV | AUTO |
| DE-ICE | OFF |
| FUEL | |
| MAIN FUEL | ON |
| All other | OFF |
| CAUTION panel lights | Test and RESET |
| HYD CONT | ON |
| FORCE TRIM | ON |
| CHIP DET | BOTH |
| Flight controls | Check |
| Altimeters | Set field elev. |

*UH1-H check list, by Flyer and Stockfish*

| STARTING ENGINE | |
|---|---|
| Fire guard post | |
| Rotor blades | Clear ans un-tied |
| Ignition key | ON |
| Throttle | Start position |
| *Engine start* | |
| Start switch | Press and hold , DC>14V |
| N1 15% | Up to ddle, rotor turning |
| N1 40% | Release start switch, 1min |
| N1 68-72% | Throttle slowly to full |
| INVTR | MAIN ON |
| *Pressures* | |
| Eng Press | 80-100PSI |
| Eng Temp | 93°<30° |
| Trans Press | 40-60PSI |
| Trans Temp | 110° max |
| EGT | 400°-610° |
| GPU | Disconnect |

| ENGINE RUNUP | |
|---|---|
| Avionics | ON |
| UHF | Default |
| VHF | Default |
| FM | Default |
| STARTER GEN | STBY GEN |
| *Systems* | |
| FUEL | Check |
| Engine | In green |
| Transmission | In green |
| *Electrical* | |
| AC | 112-118V |
| DC | 27V>26°C, 28V<26°C |
| RPM | 6600 |
| Compass | Set RMI |
| Hit check | Perform |
| PITOT HTR | As required |

| HOVER/TAXI | |
|---|---|
| Engine and trans inst | Check green |
| Flight instruments | Check |
| Hover Power | 2PSI<power check |

| BEGORE TAKEOFF | |
|---|---|
| RPM | 6600 |
| Systems | Check |
| Avionics | As required |
| Passenger equipment | Check |

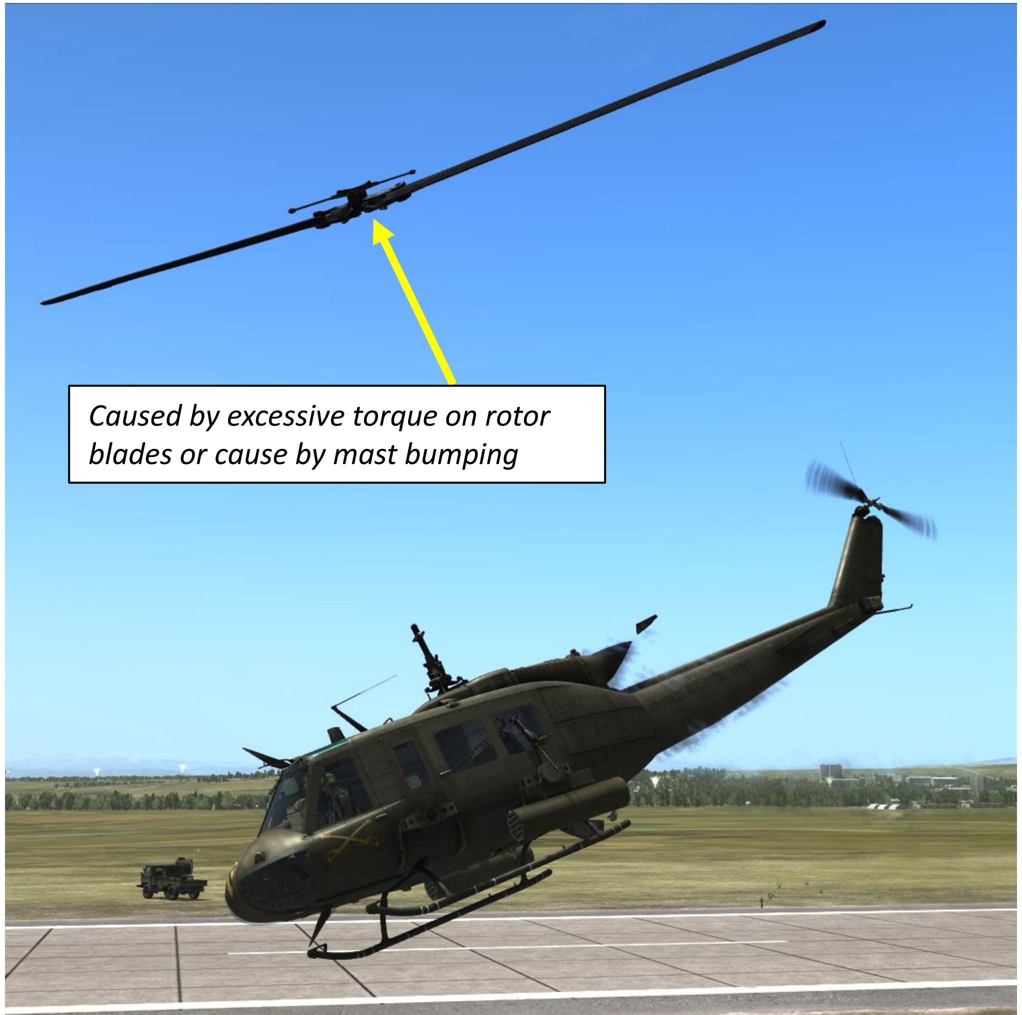
| BEFORE LANDING | |
|---|---|
| RPM | 6600 |
| Passenger equipment | Check |

| ENGINE SHUTDOW | |
|---|---|
| Throttle | Iddle 2min |
| FORCE TRIM | ON |
| PITOT HTR | Check |
| INVTR | OFF then SPARE |
| AC | Check |
| MAIN GEN | OFF check DC voltmeter |
| MAIN GEN | ON |
| STARTER GEN | START |
| Throttle | OFF |
| Pedestal switches | OFF |
| Overhead switches | OFF |
| Ignition key | As required |

| BEFORE LEAVING | |
|---|---|
| Walk around | Complete |
| Mission equipment | Secure |
| Complete DA forms | 2408-12, 2408-13 |
| Secure helicopter | |

# COMMON MISTAKES

There are good and bad ways to start the Huey. Both will get you up in the air, but only adequate start-up procedures will ensure that you remain so. There are a million ways to die in the Huey: please don't pick the easy or stupid ones. Common mistakes include using the engine starter with your throttle maxed out, raising collective too quickly and too violently, or using your cyclic in angles that generate too much strain/torque on your propeller blades.  Most of these acts are usually bad habits developed from playing Arma or Battlefield.



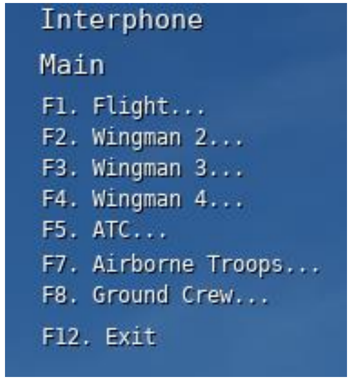


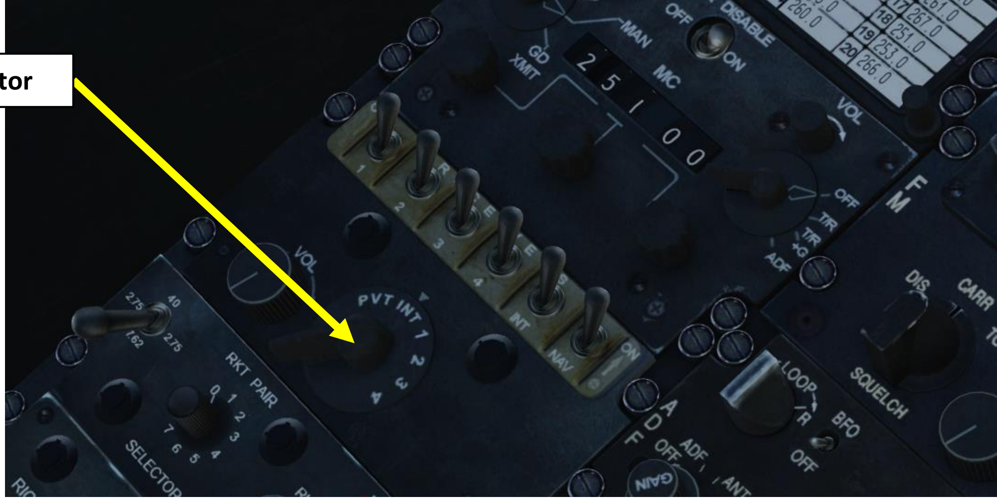
# REARMING

To contact the ground crew to rearm the UH-1 in DCS, you have to:

a) Set the Intercom Mode Selector to INT (Intercom) on Audio Panel
b) Press the Radio ICS (Intercom System) Trigger to communicate
c) Contact the ground crew with "F8"

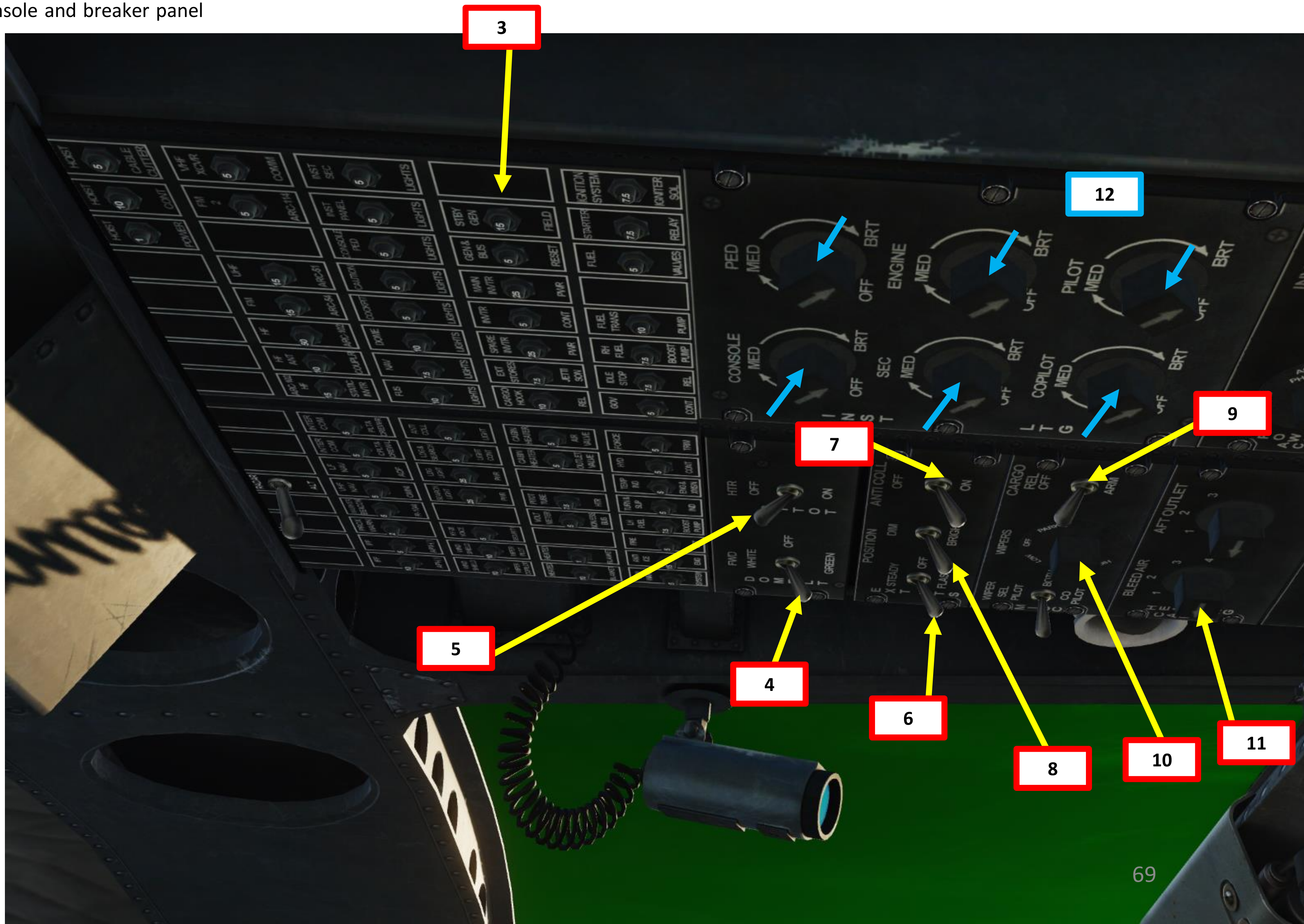
Note: Radio is powered by Battery power. Make sure it is available.



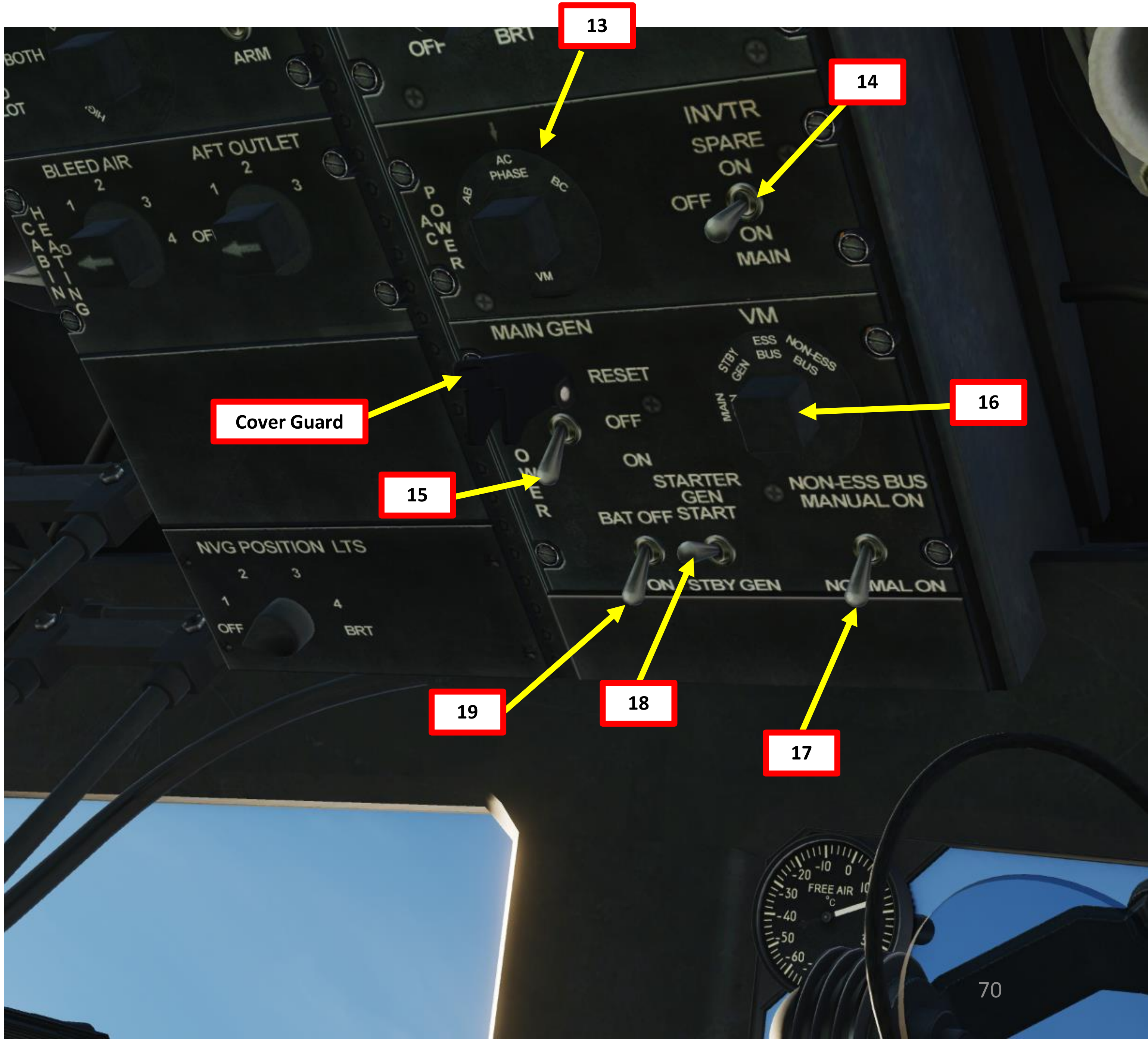

# PRE-START-UP

1. Perform Pre-Flight checks (define mission, loadout, power settings)
2. For night operations, put NVGs (night vision goggles) ON (RSHIFT + H)
3. Set all DC circuit breakers – IN (overhead console and breaker panel next to your left foot)
4. Set Dome Lights – As Required
5. Set Pitot Heat Switch – OFF
6. Set External Lights – ON (FLASH or STEADY)
7. Set Anti-Collision Lights – ON
8. Set Position Lights – As Required
9. Set Cargo Release – OFF (not functional)
10. Set Wipers – OFF
11. Set Cabin Heating – OFF
12. Set Cabin & Instrument Lighting – As Required

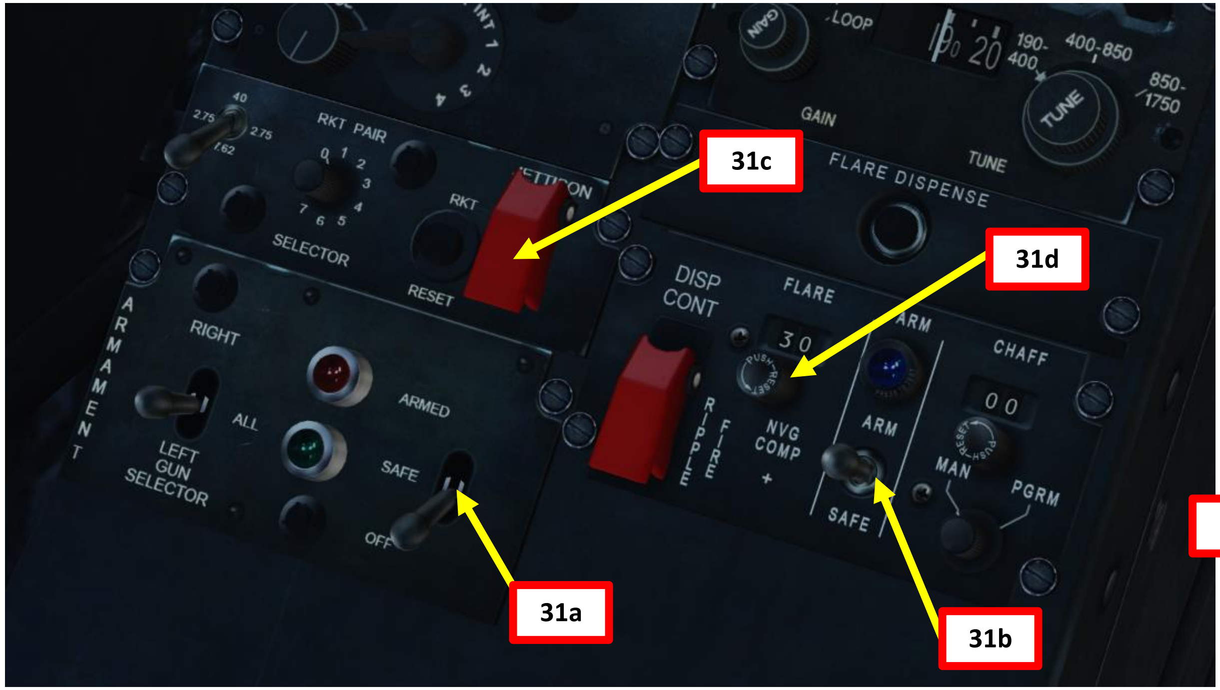
# PRE-START-UP

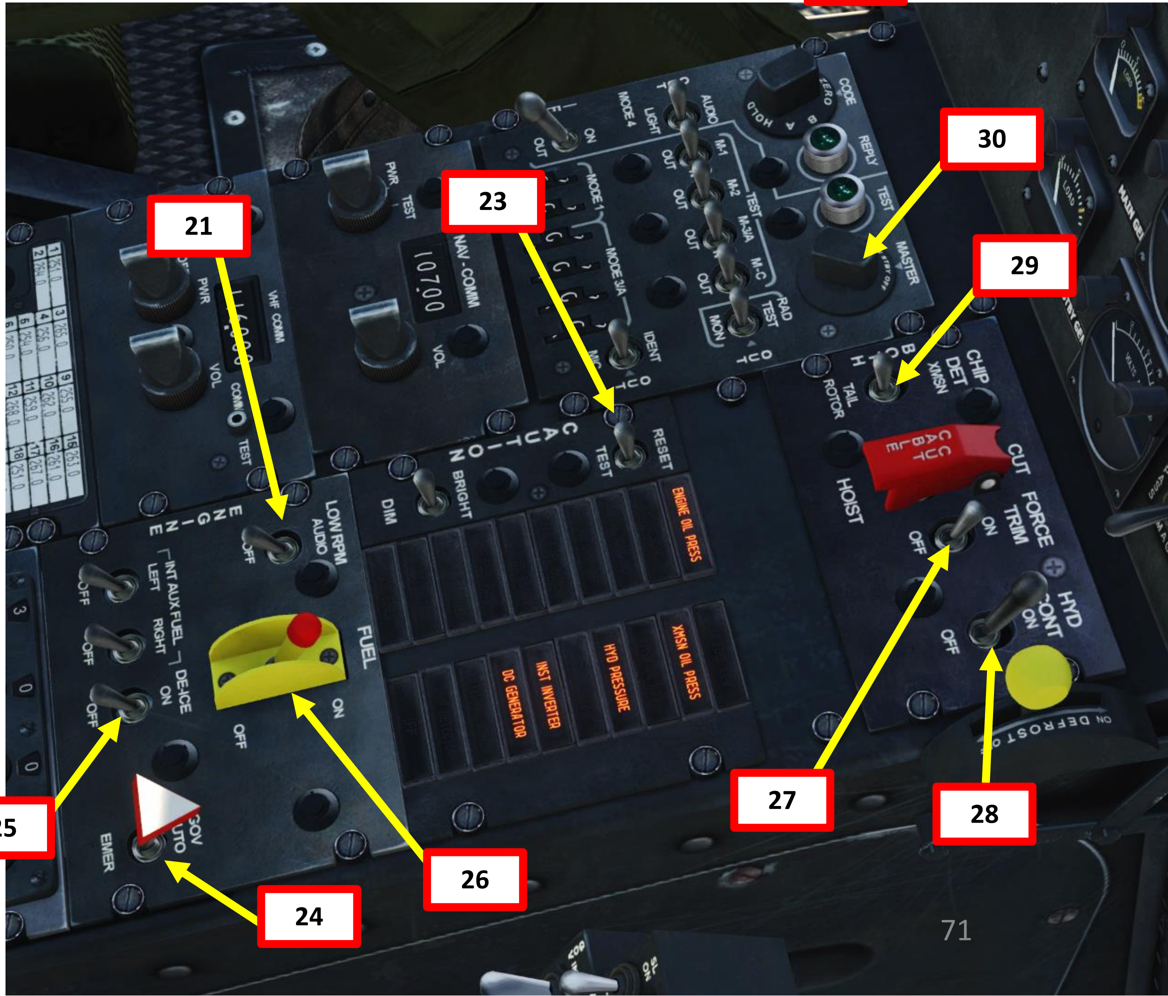
13. Set AC Power Selector – AC PHASE
14. Set Inverter Switch – OFF
15. Set DC Power MAIN GEN Selector – ON (Flip Cover)
16. Set VM (Voltmeter) Selector – ESS-BUS
17. Set NON-ESS BUS (Non-Essential Bus) Switch – NORMAL ON
18. Set Starter Generator Switch – GEN START
19. Set Battery Switch – ON
20. Optional: Set GPU (Ground Power Unit) ON via Ground Crew commands



# PRE-START-UP

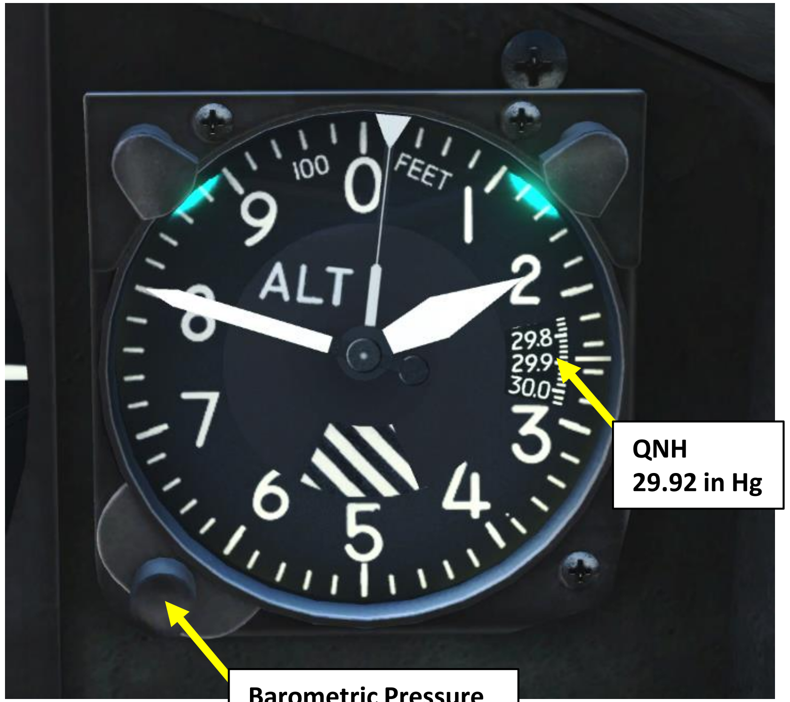
21. Set LOW RPM Switch – OFF/AFT (This will inhibit the LOW RPM aural cue)
22. Press and hold Fire Warning Indicator TEST button and confirm that FIRE caution light illuminates. Release button afterwards.
23. Set Caution/Warning Lights Switch to TEST, then back to RESET. On the glareshield, Master Caution light will extinguish, but LOW RPM light will remain illuminated.
24. Set Governor Switch – AUTO (FWD)
25. Set De-Ice Switch – OFF (AFT)
26. Set Main Fuel Switch – ON (FWD)
27. Set Force Trim Switch – ON (FWD)
28. Set HYD CONT (Hydraulic Control) Switch – ON (FWD)
29. Set Chip Detector Switch – BOTH (FWD)
30. Set IFF (Identify-Friend-or-Foe) Transponder Master Switch – STBY (Right Click)
31. Check Armament & Countermeasure (DISP) Panel
    a) Weapons Arming Switch – OFF
    b) Flare/Chaff Arming Switch – SAFE
    c) Rocket Launcher Jettison Switch – OFF & Covered
    d) Set FLARE quantity

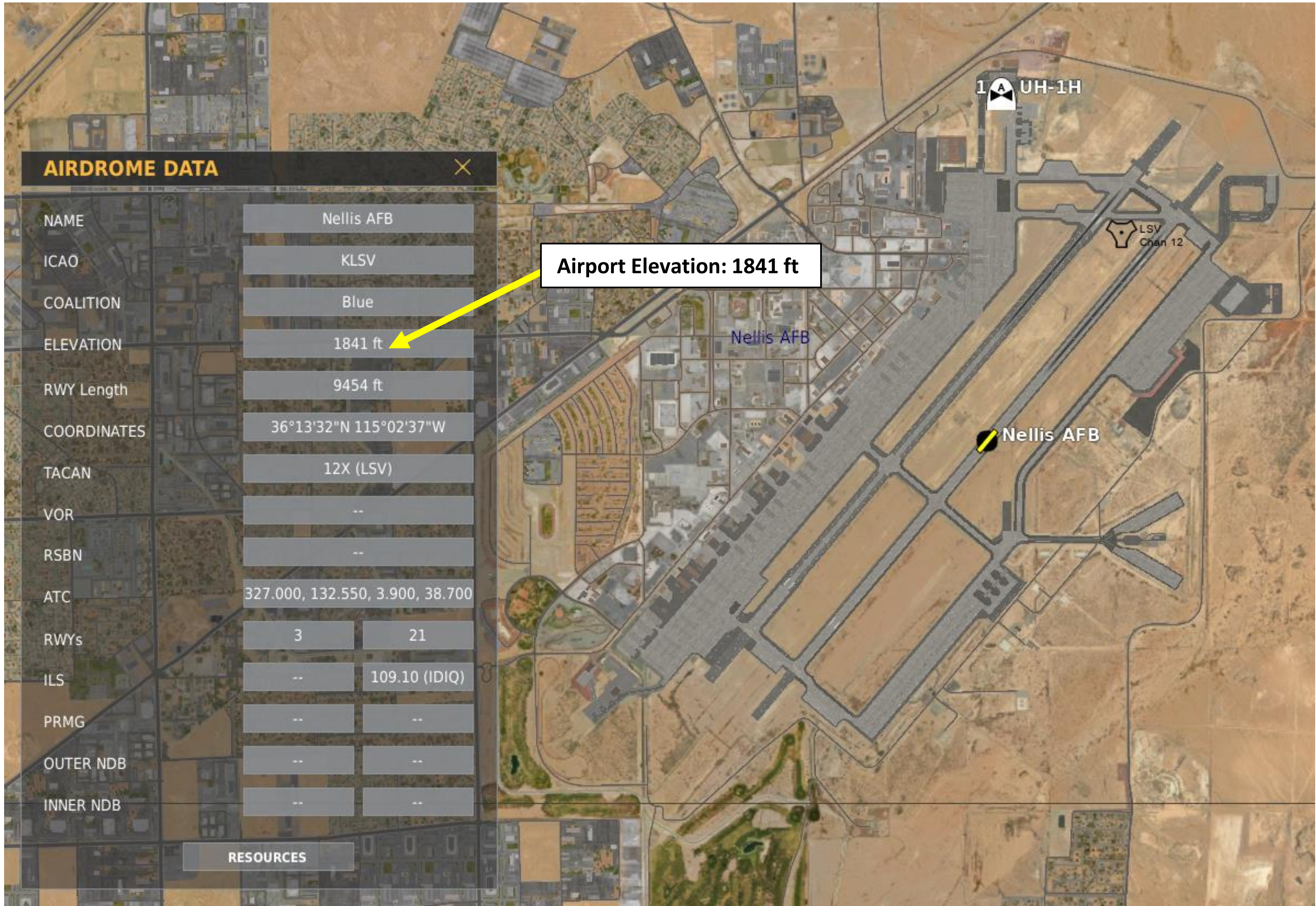



# PRE-START-UP

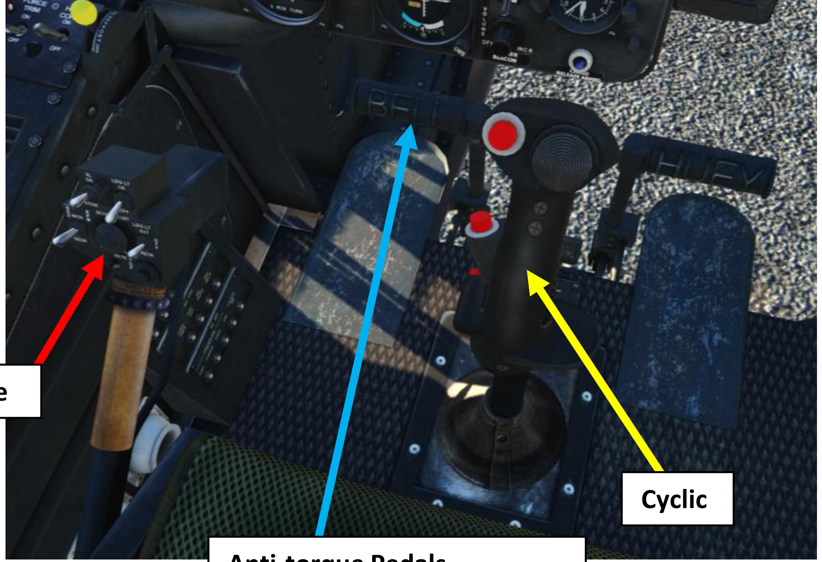
32. Adjust Altimeter Barometric Pressure Setting to airfield elevation (QNH).
See PART 4 – PRE-FLIGHT for more details.



# PRE-START-UP

33. Check Flight Control response to Cyclic, Collective and Anti-Torque Pedal input.



Collective

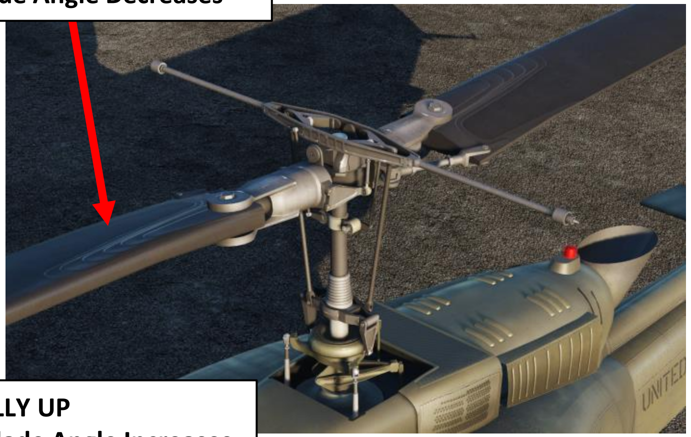
Cyclic

Anti-torque Pedals

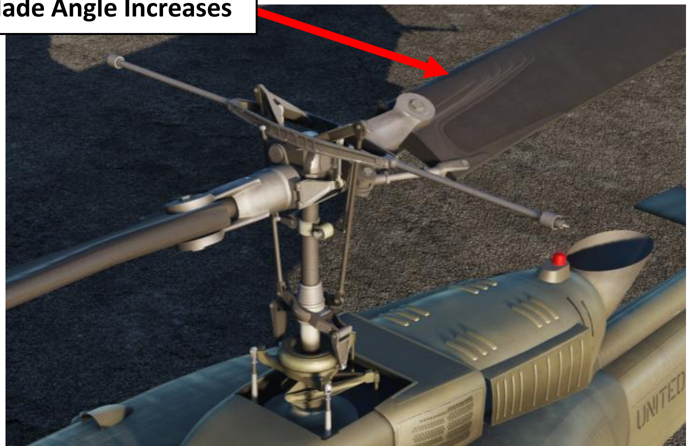
Tail Rotor
Anti-Torque Pedals CENTERED

Tail Rotor
Anti-Torque Pedals RIGHT

Collective FULLY DOWN
Main Rotor Blade Angle Decreases



Collective FULLY UP
Main Rotor Blade Angle Increases

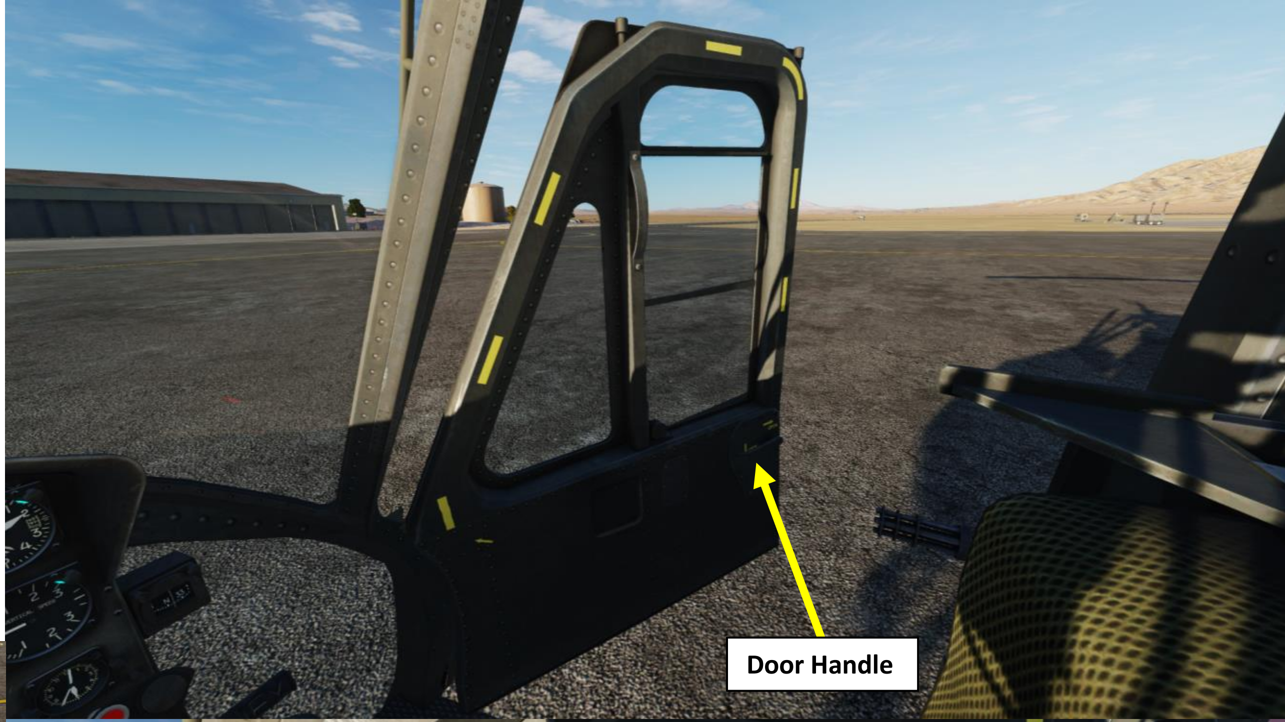


Collective FULLY DOWN
Main Rotor Blade Angle Decreases

Collective FULLY UP
Main Rotor Blade Angle Increases

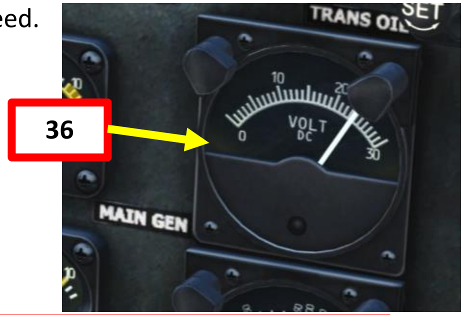
# PRE-START-UP

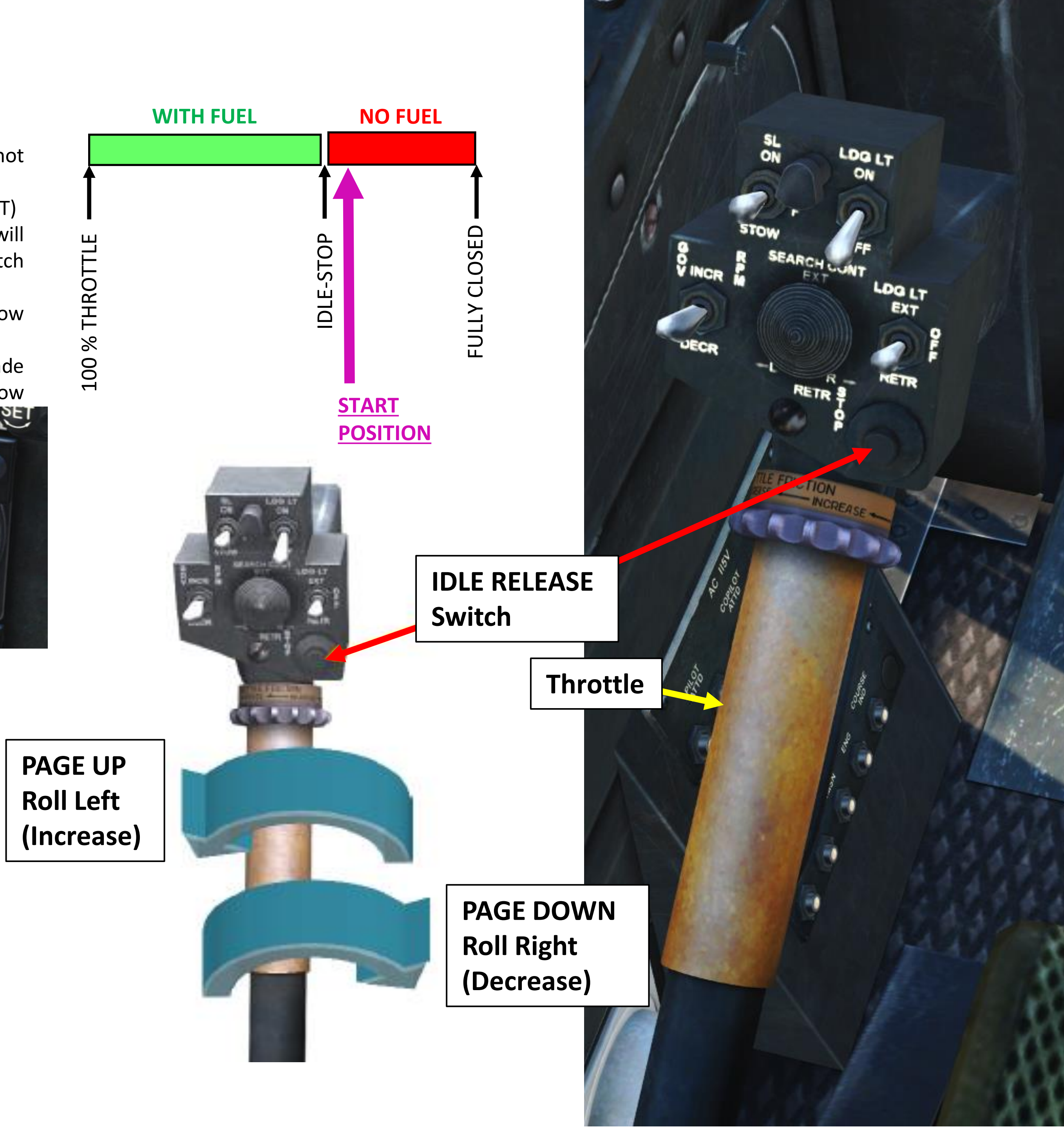
34. Close doors (RCTRL+C), check that rotors are cleared and un-tied, and then check that surrounding area is clear for engine start.




# ENGINE START-UP

35. Set Throttle to IDLE-START position
    a) Press “IDLE RELEASE” switch DOWN. Safety gate is off and you are not prevented from shutting down your engine.
    b) Use “PAGE UP” to throttle all the way to the FULLY OPEN position (LEFT)
    c) Use “PAGE DOWN” to throttle back to the “START” position. You will know you have reached this position when the “IDLE RELEASE” switch pops back up.
    d) “IDLE RELEASE” switch should be released (UP). Throttle safety gate now prevents you from shutting down your engine.
36. Monitor DC Voltmeter for sufficient battery voltage. Battery starts can be made when voltages less than 24 volts are indicated, provided the voltage is not below 14 volts when cranking through 10% N1 speed.




**FULLY CLOSED**: position of the throttle when you spawn (fully rotated to the right). If you try to move it using your throttle axis, nothing will happen: it is locked and fuel cannot physically be sent to the engine. You can see it like an OFF, or 0 % position. **Red throttle range** can only be accessed if IDLE RELEASE SWITCH is UP.

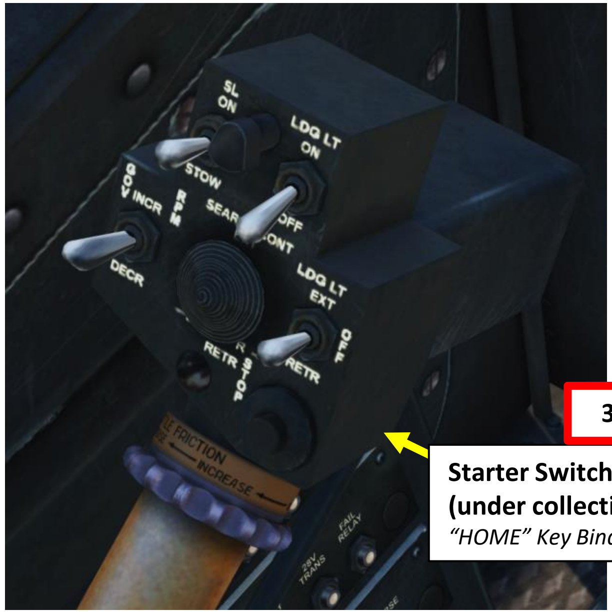
**IDLE-STOP**: position of the throttle that allows just enough fuel to start the engine in an IDLE setting. You can see it like an IDLE position (5-10 %).

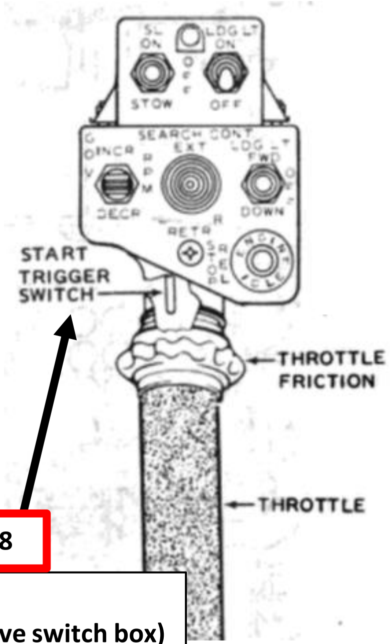
**START POSITION**: position of the throttle when you start holding your starter switch in order not to flood the engine with fuel.

**IDLE RELEASE SWITCH**: this switch is a safety barrier that prevents you from shutting down your engine while you’re flying. If the IDLE RELEASE is pressed (DOWN), the safety barrier is lifted and you are allowed to turn your throttle all the way down to the FULLY CLOSED position. If the IDLE RELEASE is “released” (UP), the safety barrier is locked and you will be prevented from turning your throttle to the FULLY CLOSED position.

# ENGINE START-UP

37. Lower collective – FULLY DOWN
38. Press and hold the starter switch ("HOME" key by default) to engage starter.
39. Wait until N1 (Gas Turbine Speed) RPM reaches 15 %. Check visually that the main rotor is turning as N1 reaches 15 percent. If the rotor is not turning, abort the start.
40. At 15 % N1 RPM, throttle up to IDLE-STOP (START) position.
41. Engine lightoff occurs. Monitor EGT (Exhaust Gas Temperature) for any sign of a hot start.
42. Wait until N1 RPM reaches 40 %. At 40 % N1 RPM, release start switch (do not hold it for more than 1 minute).
43. Wait until N1 RPM reaches 68-72 %. At 70 % N1 RPM, slowly throttle to FULLY OPEN.




Starter Switch
(under collective switch box)
*"HOME" Key Binding*

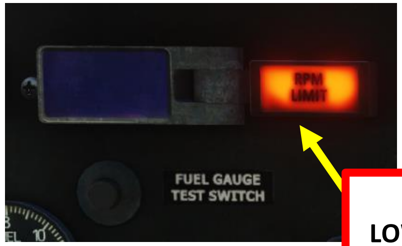

N1 (Gas Producer) at 15 %
EGT increases with lightoff

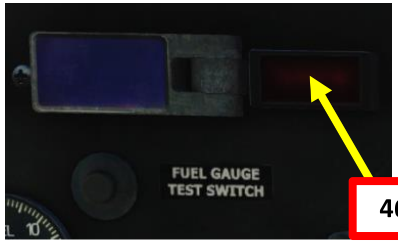

N1 (Gas Producer) at 70 %
Throttle at IDLE


N1 (Gas Producer) at 85+ %
Throttle FULLY OPEN

# ENGINE START-UP

44. Set Inverter Switch – MAIN ON
45. Set Starter Generator Switch – STBY GEN
46. Wait until engine parameters stabilize, then verify correct engine operation
    a) EXH/EGT (Exhaust Gas Temperature): 400 - 610 deg C
    b) Engine Oil Temperature: below 100 deg C
    c) Engine Oil Pressure: 80-100 psi
    d) Transmission Oil Temperature: below 110 deg C
    e) Transmission Oil Pressure: 40 - 60 psi
    f) Engine RPM: 6600 RPM
    g) LOW RPM indicator light – Extinguished
47. Disconnect GPU (Ground Power Unit) if used
48. Check for correct AC voltage (112-118 V)
49. Check for correct DC voltage (27-28.5 V)

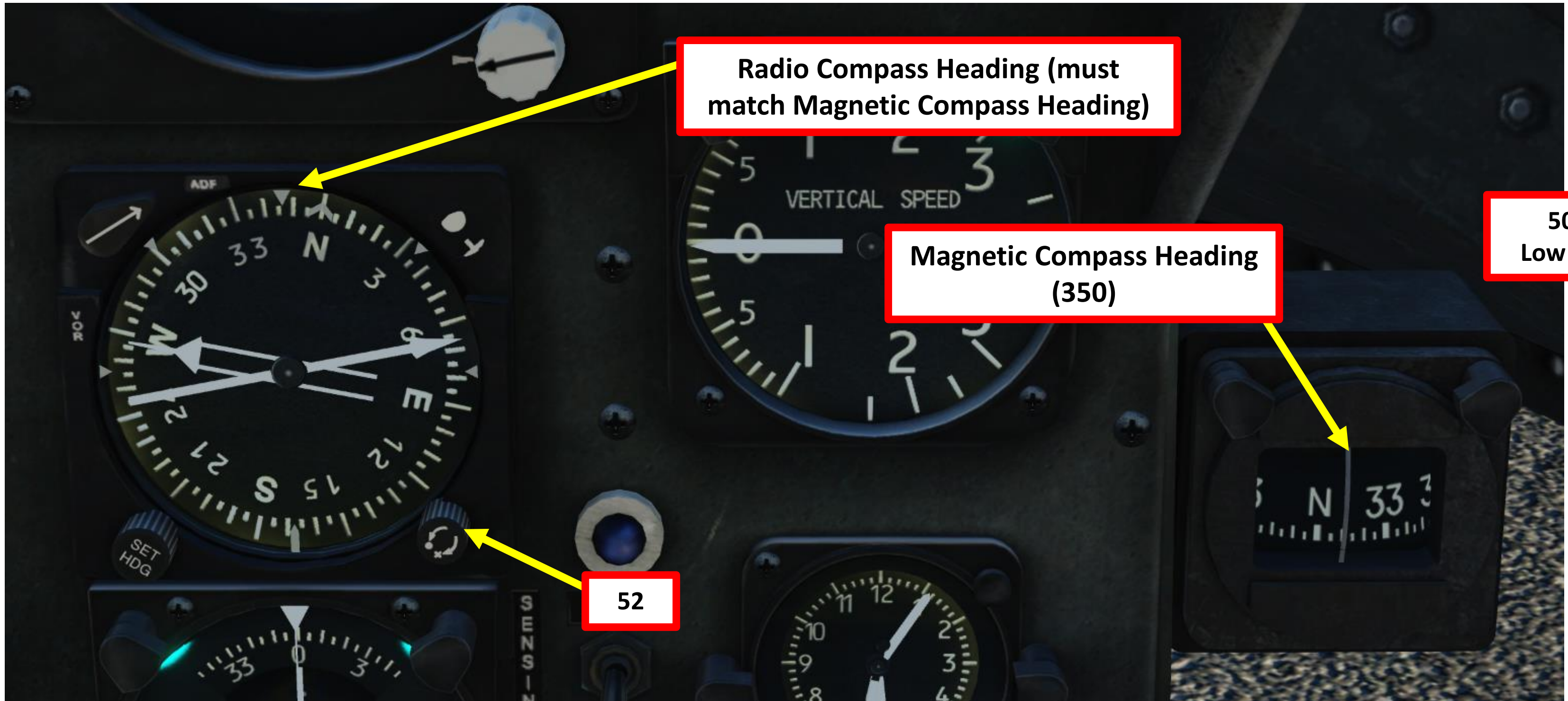




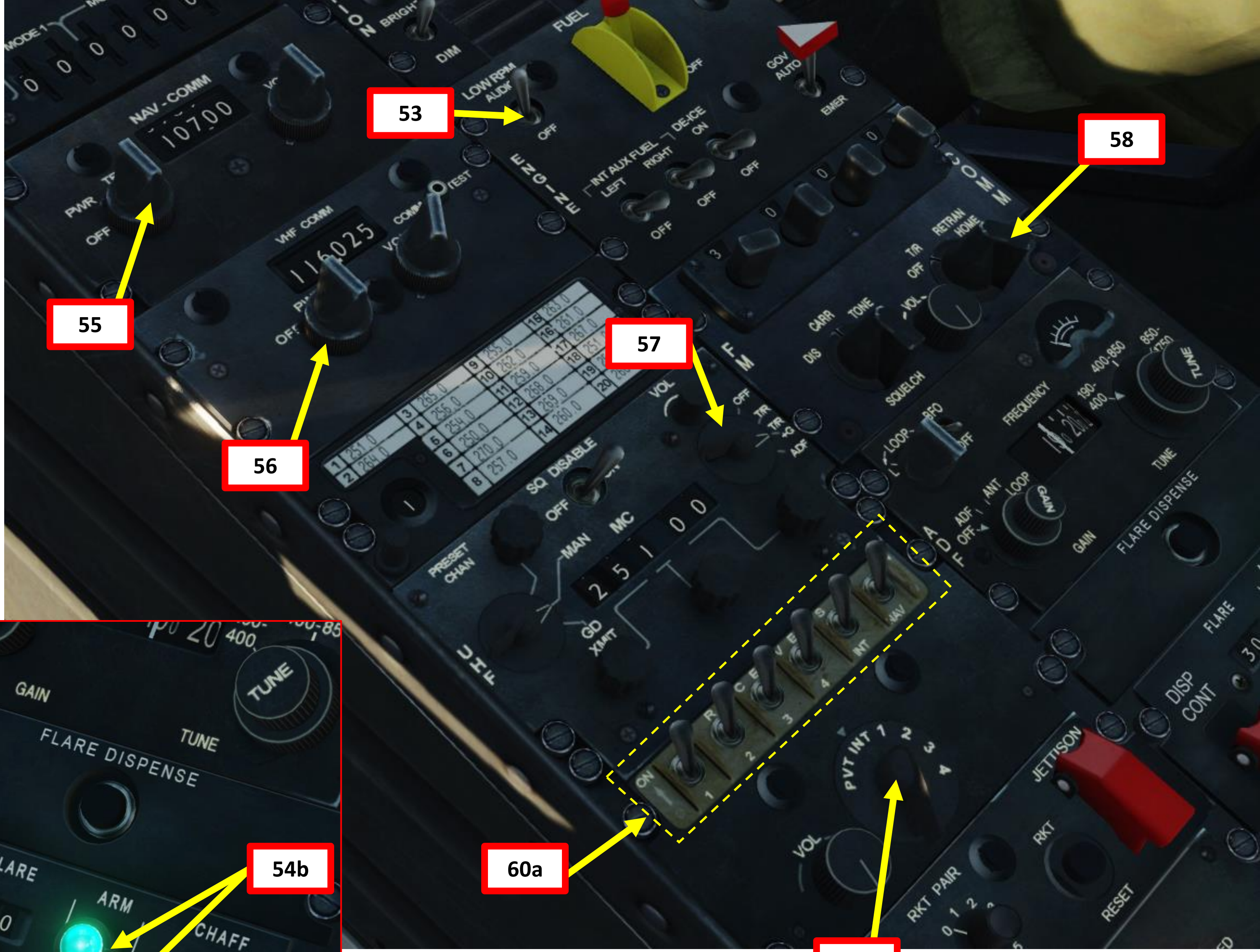
# POST-START / ENGINE RUNUP

50. Turn on Radar Altimeter on the Overhead Panel
    a) Turn on radar altimeter power switch
    b) Rotate left knob to activate radar altimeter
    c) Click right knob test switch
    d) Rotate left and right knobs to set the LOW and HIGH radar altimeter warnings with the flags.
51. Set Pitot Heat Switch – As Required (ON below 0 deg C)
52. Adjust compass synchronization knob to match the Radio Compass heading with the Magnetic Compass heading.


# POST-START / ENGINE RUNUP

53. Set LOW RPM Switch – AUDIO/AFT
54. Prepare Armament & Countermeasure (DISP) Panel
    a) Weapons Arming Switch – ARMED
    b) Flare/Chaff Arming Switch – ARM
55. Set NAV Radio Mode – PWR (Right Click)
56. Set VHF Radio Mode – PWR (Right Click)
57. Set UHF Radio Mode – T/R+G (Transmit/Receive + Guard)
58. Set FM Radio Mode – T/R (Transmit/Receive)
59. Set all radio frequencies as required for the mission.
60. On Signal Distribution Panel:
    a) Verify that all Receiver switches are ON (FWD)
    b) Set Transmit-Interphone Selector to INT (Intercom)




# POST-START / ENGINE RUNUP

61. You are now ready to taxi and takeoff.

# HOVER POWER CHECK – WHY IT ACTUALLY MATTERS

- The standard procedure for takeoff requires you to do a "5-ft hover power check".
- As we have seen before, engine performance will vary based on temperature, humidity and air density/pressure altitude (QNH).
- In this example, we have the exact same loadout, same weight. In a hot & humid setting, the helicopter cannot generate enough power to hover over the ground (LOW RPM warning). In normal temperature & humidity conditions though, we can hover without any problem.
- This is why you need to do a hover power check to confirm the torque settings you predicted.
- A hover power check is simple: maintain a 5 ft high hover and note the torque value required to maintain this attitude. If this value is greater than the torque value you predicted to maintain a hover state, this means that you are too heavy. If the torque value is within the predicted safe range, you're good to go!
- A pilot's ability to predict his engine performance will allow him to know if he can safely hover or not, what climb rates he takes and how he MUST operate his machine to its full potential.

FAT: 45 deg C
QNH: 29.25 in HG
High Temp, QNH & Humidity Levels
Max Torque: 35 PSI


FAT: 20 deg C
QNH: 28.30 in Hg
Normal Temp, QNH & Humidity Levels
Max Torque: 40 PSI

# HOW TO HOVER

1. Apply left anti-torque pedal to stay centered and avoid drifting.
2. Use cyclic to remain straight and level (left & aft input).
3. Raise collective very gently to initiate a hover.
4. Hovering is hard at first. Failure to predict the helicopter's reaction after cyclic input will often result in you dancing the French Cancan for a looong long time. Think of it like doing plate-spinning: you need to put yourself in a position of equilibrium, so you always need to think one step ahead.
5. Hold the "FORCE TRIM" button (on your cyclic) and your stick will remember that "hover" position. Keep in mind that trim works a bit differently from a plane's trimming.
6. Anticipate the rotorcraft's reaction when you trim.

# TAKING OFF

NOTE: There are many ways to takeoff in a Huey. The best way is generally a function of your loadout, weight and mission.

1. Check that all your engine and transmission gauges (pressure & temperature) are in the green.
2. Check to see if all your flight instruments all set up properly.
3. Open gunner doors (LALT + 3, LALT+4) and set gunners to RETURN FIRE (LCTRL+3, LCTRL+4) or FIRE AT WILL (PRESS 2 TIMES LCTRL+3, LCTRL+4). I generally recommend setting them to FIRE AT WILL (2 key presses) since you can assume that you will be sent into enemy territory anyway.
4. Once you have performed a hover check and are maintaining a 5 ft hover, you can taxi to the runway. Just push your nose down slightly to move forward.
5. When lined up, set RPM to 6600.
6. Push nose slightly forward to start gaining horizontal speed. No collective input should be required since you are already in a hover state. This is the normal takeoff and the safest procedure. You can also attempt a maximum performance takeoff, which will be more taxing on the rotor blades and can end in tragedy if you are too heavily loaded or the environmental conditions don't allow for it. I recommend using the normal takeoff since you are very unlikely to fly at empty weight. You're better off being safe than sorry.
7. NORMAL TAKEOFF: Keep accelerating and you will start generating more and more translational lift, naturally climbing. Try to maintain an airspeed of 60 kts when climbing.

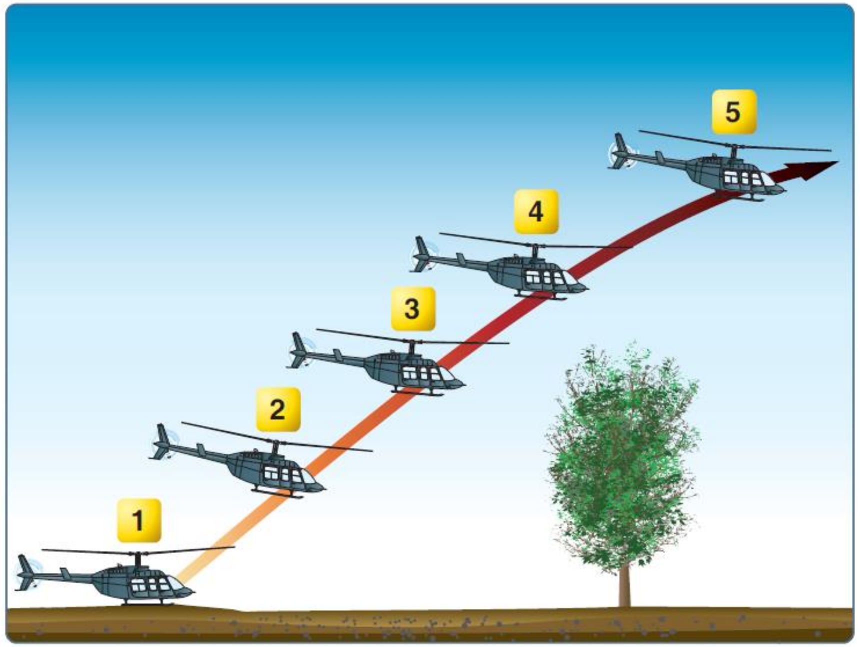



**Figure 10-1.** *Maximum performance takeoff.*


**Figure 9-7.** *The helicopter takes several positions during a normal takeoff from hover.*

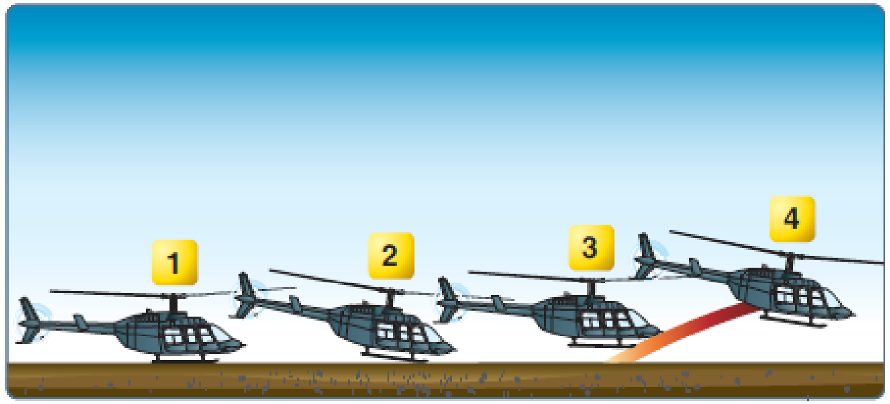



**Figure 10-2.** *Running/rolling takeoff.*

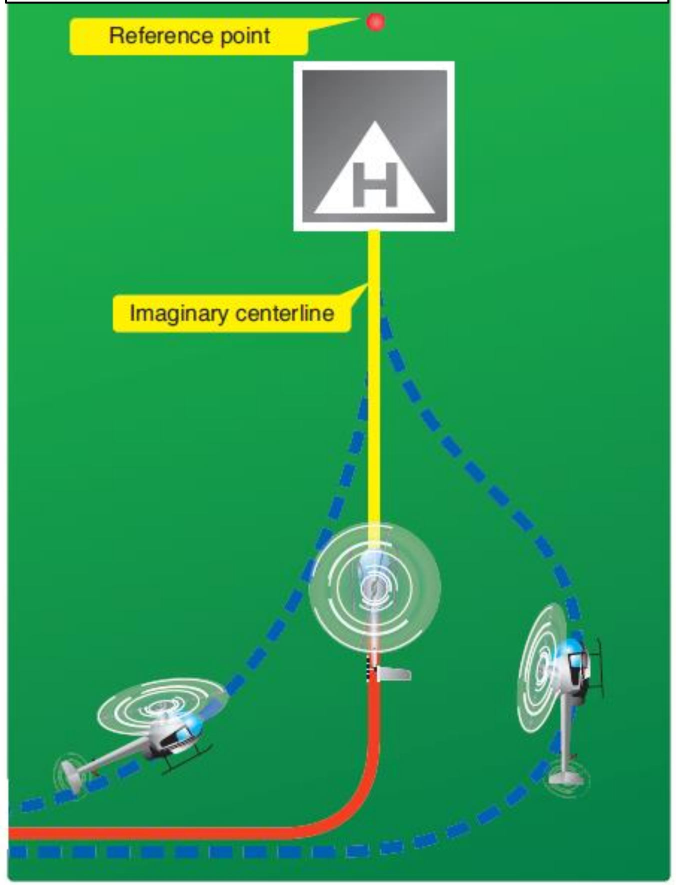
# VISUAL LANDING

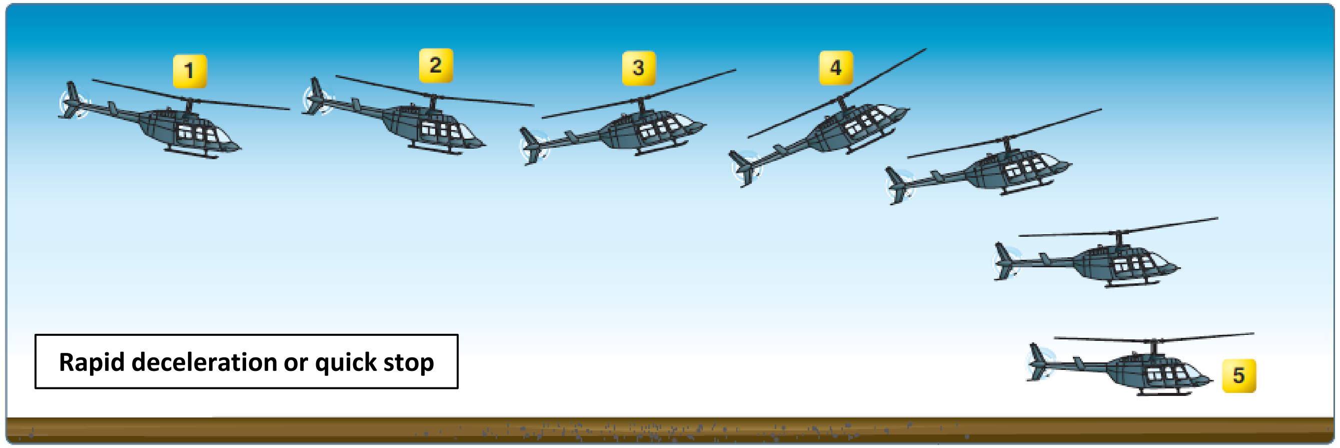
NOTE: When you think about it, a helicopter is usually landed like an aircraft: you maintain a descent rate, reach a touchdown point and pull back on your cyclic to bleed speed and come to a full stop. There are many different types of approaches. Your approach and landing type will depend on the type of LZ (landing zone) and the type of mission you are doing.

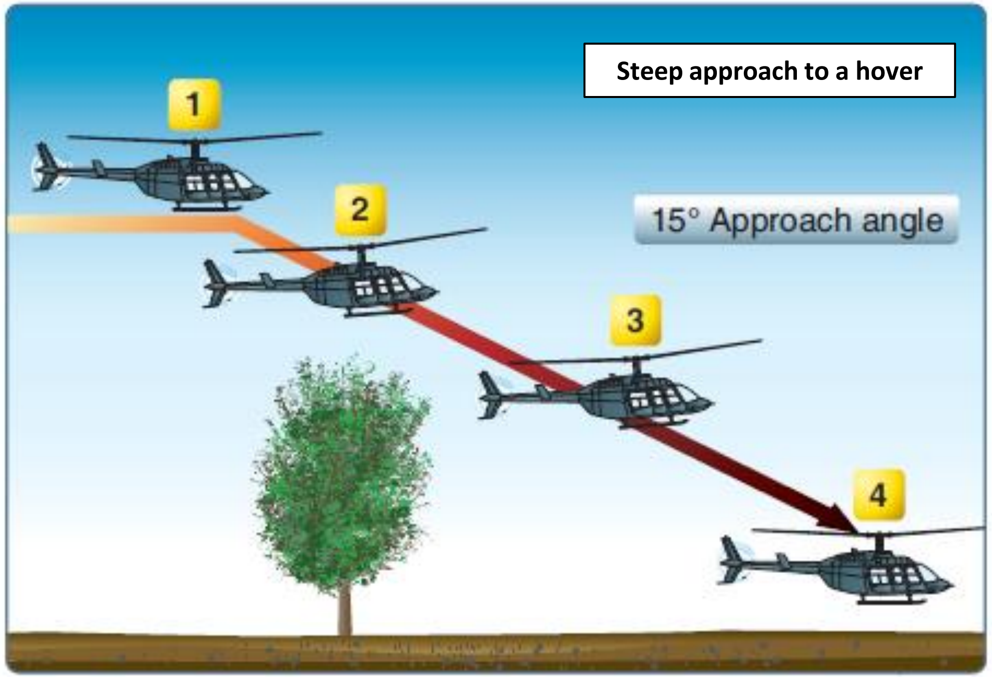
1. Start descent from 500 ft. Fly towards a reference point on the runway. Pay particular attention to the Vortex Ring State (state in which the helicopter is settling in its own downwash and gets sucked down, which is caused by a flight profile of forward flight less than ETL (Effective Translational Lift, helicopter is slower than 10-15 kts), rate of descent of 300ft/min or more and at least 20% power applied). VRS is further explained in Part 9: Principles of Helicopter Flight.
2. From 500 to 300 ft, use collective and cyclic input to maintain 80 kts for a descent rate between 300-500 ft/min
3. From 450 to 50 ft, use collective and cyclic input to maintain 60 kts for a descent rate between 300-500 ft/min
4. Reduce speed to 30 kts when you are 50 ft: you will start feeling excess lift being generated by ground effect. Adjust collective to keep a straight trajectory towards your reference point while reducing airspeed.
5. You should reach your reference point in a 5 ft hover. Use your cyclic to come to a full stop, and raise your collective to “cushion” the sudden drop caused by the loss of translational lift (which is caused by the loss of airspeed).
6. Once you have come to a full stop in a 5 ft hover, you can slowly reduce collective to safely land on the ground.

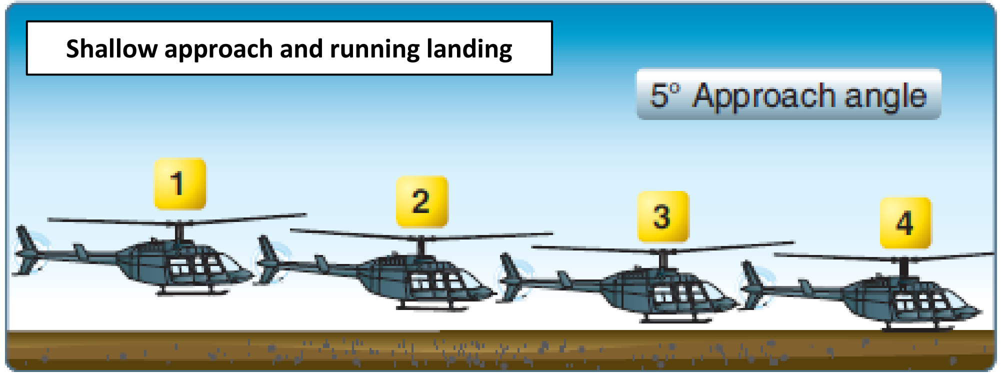
NOTE: It takes a lot of practice to be able to counter the different flight states you will go through when coming for an approach and landing. This is why performing hover power checks before takeoff is very useful: it helps you master the hover state.

*Plan the turn to final so the helicopter rolls out on an imaginary extension of the centerline for the final approach path. This path should neither angle to the landing area, as shown by the helicopter on the left, nor require an S-turn, as shown by the helicopter on the right.*



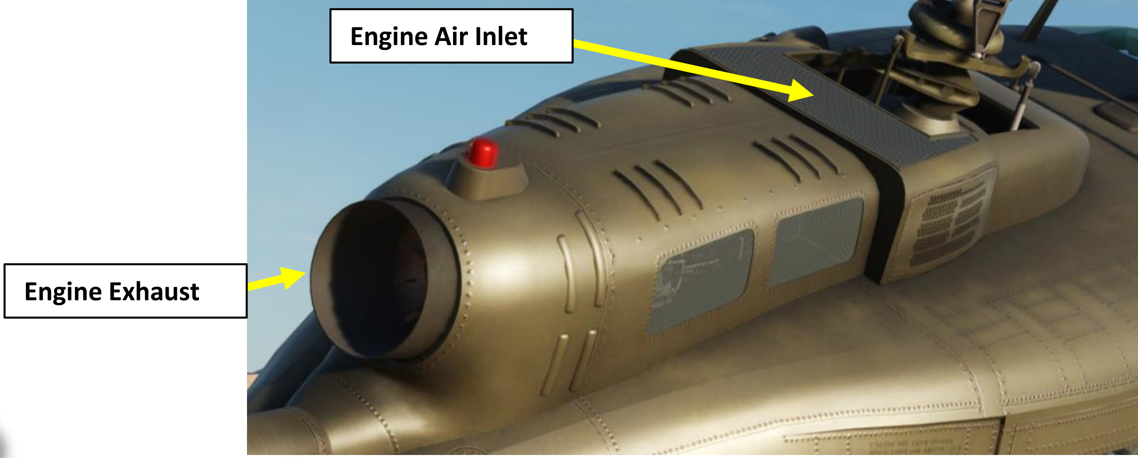
# SHUTDOWN

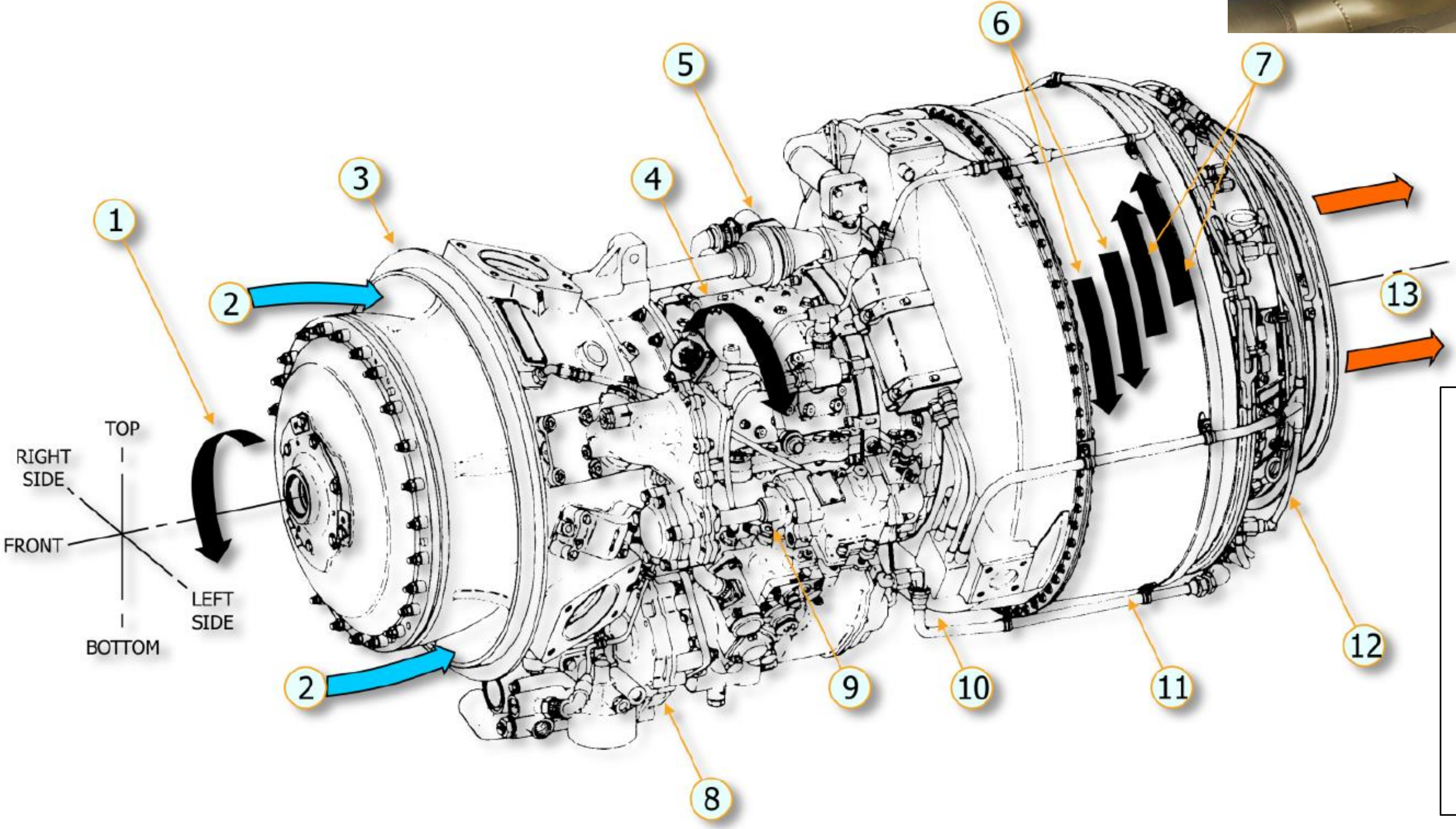
1. Set throttle to IDLE-STOP with PAGE-DOWN key, let engine spool down for 2 minutes
2. Force Trim – ON
3. Pitot Heater – OFF
4. INVERTER – OFF, then SPARE
5. AC – CHECK
6. Main GEN – OFF, Check DC voltmeter
7. Main GEN – ON
8. Starter GEN – START
9. Set throttle to OFF with PAGE-DOWN key (make sure IDLE RELEASE switch on collective is pressed ENGAGED/PUSHED)
10. Central Pedestal switches – OFF (Fuel switch, Hydro, Force Trim, Armament & Countermeasure Panel)
11. Overhead panel switches – OFF (Battery, Lights)

# SECTION STRUCTURE

# POWERPLANT – LYCOMING T53-L-13B INTRODUCTION

The powerplant system of the UH-1H consists of a single Lycoming T53-L-13B turboshaft engine with a maximum output power of 1100 kW/1400 hp. It was designed at the Lycoming Turbine Engine Division in Stratford, Connecticut, by a team headed by Anselm Franz, who was the chief designer of the Junkers Jumo 004 during World War II.

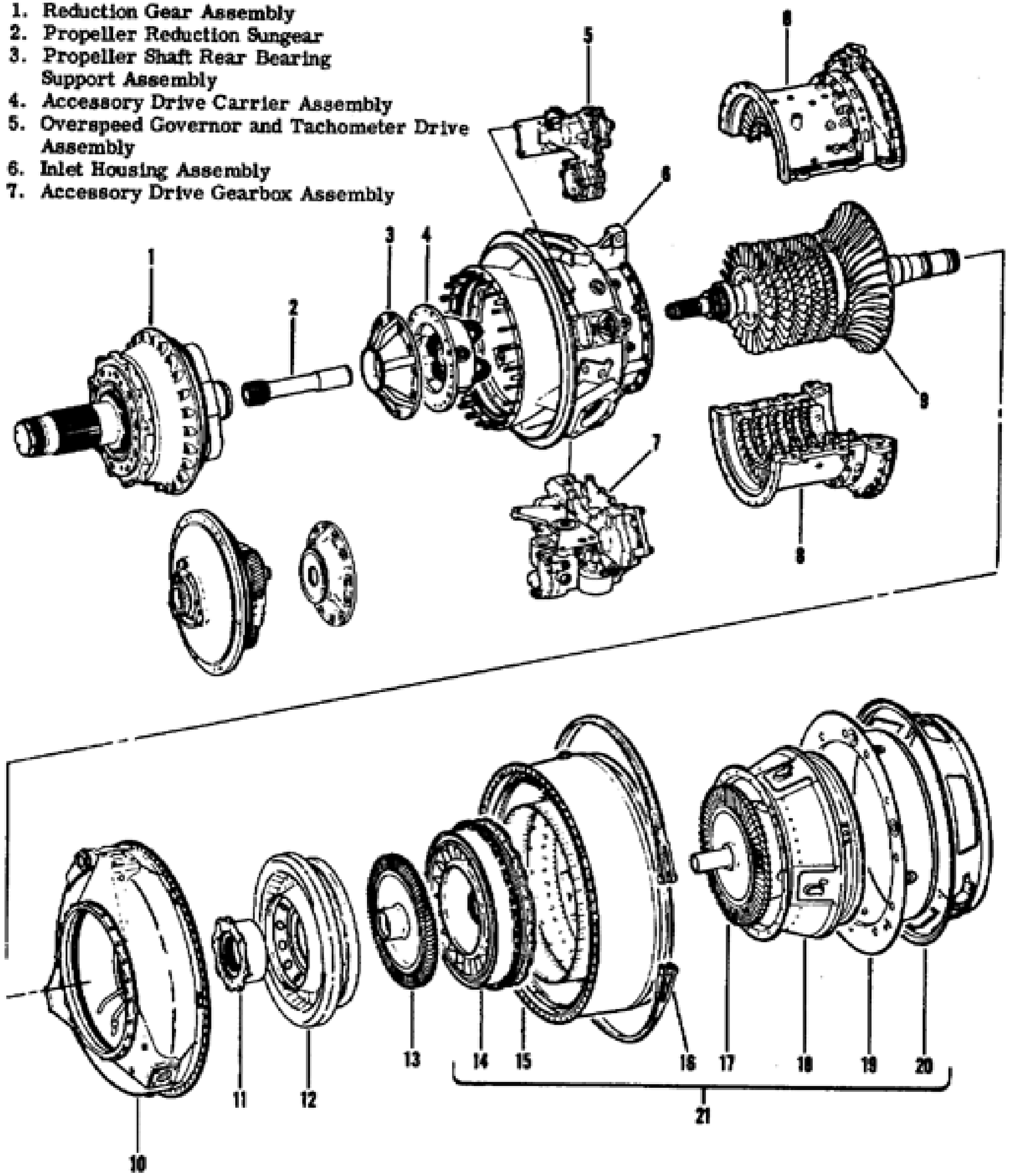



1. Rotation of Output Gearshaft
2. Air Inlet
3. Air Inlet Section
4. Rotation of Compressor Rotor
5. Hot Air Solenoid Valve
6. Rotation of Gas Producer Turbine Rotors
7. Rotation of Power Turbine Rotors
8. Accessory Drive Gearbox
9. Compressor Section
10. Diffuser Section
11. Combustion Section
12. Exhaust Section
13. Rear Exhaust

# POWERPLANT – LYCOMING T53-L-13B INTRODUCTION

1. Reduction Gear Assembly
2. Propeller Reduction Sungear
3. Propeller Shaft Rear Bearing Support Assembly
4. Accessory Drive Carrier Assembly
5. Overspeed Governor and Tachometer Drive Assembly
6. Inlet Housing Assembly
7. Accessory Drive Gearbox Assembly

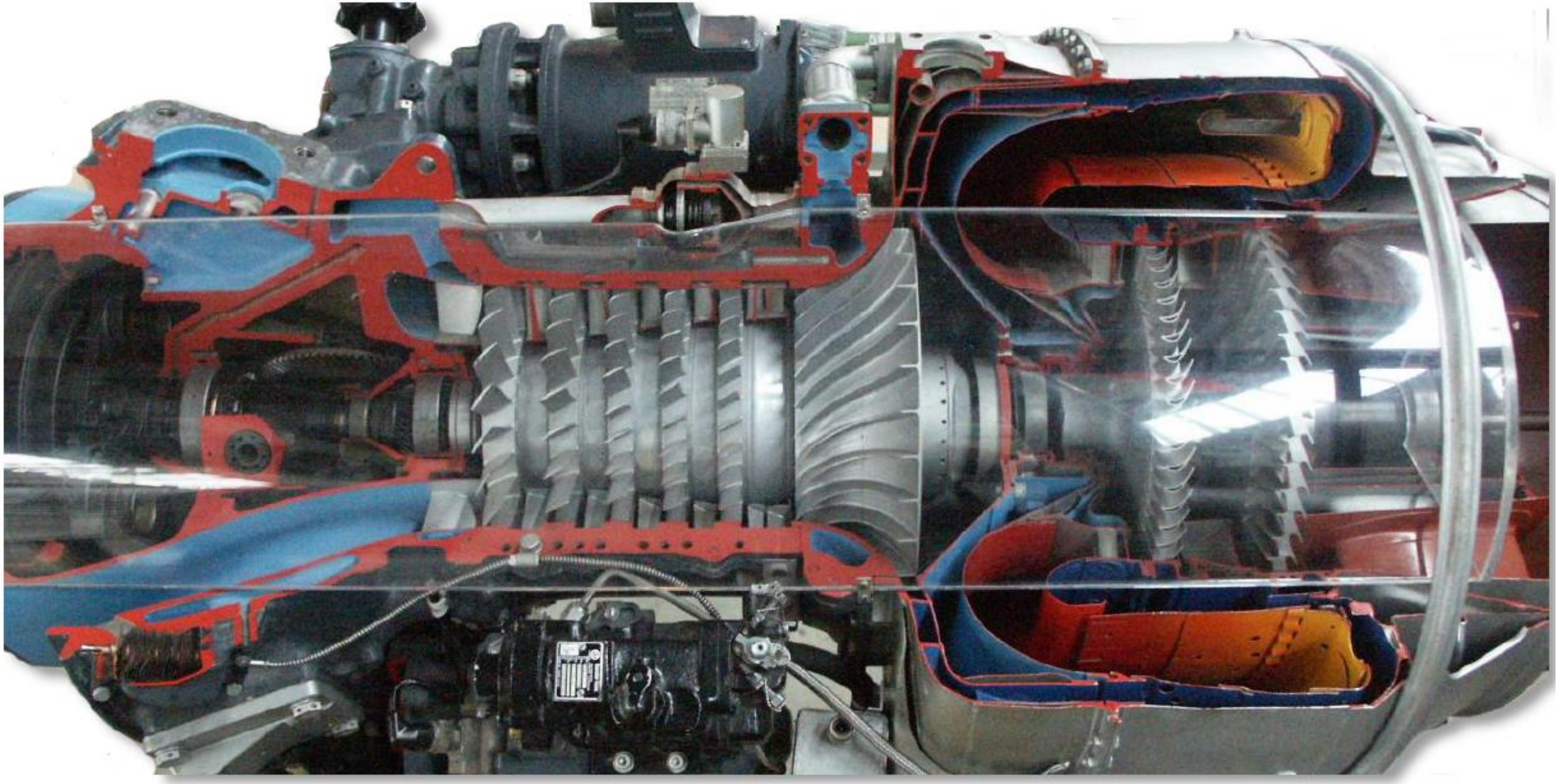


8. Compressor and Impeller Housing Assemblies
9. Compressor Rotor Assembly
10. Diffuser Housing
11. Rear Bearing Housing
12. First Stage Turbine Nozzle and Flange Assembly
13. First Stage Turbine Rotor
14. Power Turbine Nozzle and Cylinder Assembly
15. Combustion Chamber Assembly
16. V-Band Coupling
17. Second Stage Turbine Rotor Assembly
18. Exhaust Diffuser
19. Fireshield Assembly
20. Support Cone Assembly
21. Combustor Turbine Assembly

## Engine Specifications

| | |
|---|---|
| Power Rating, shp | 1400 |
| Air consumption,<br>lbs/s<br>kg/s | 13<br>6 |
| Compression Ratio | 7,2:1 @ 25,600 rpm |
| Specific Fuel Consumption, lbs/shp/h<br>kg/shp/h | 0.58<br>0,263 |
| Burner: reverse flow annular, fuel nozzles | 22 |
| Dimensions Engine, inch / mm | |
| diameter | 22.99 / 584 |
| length | 47.6 / 1209 |
| Weight lbs / kg | 549 / 249 |
| Rated revolutions power turbine, /min | 22.000 |
| Rated revolutions driveshaft, /min | 6600 |
| Rated Torque Output at full power | 1,200 lb/ft @ 6,640 rpm |
| Peak Torque Output | 1,700 lb/ft @ 1,800 rpm |
| Turbine entry temperature, °C | 938 |
| Compressor | |
| axial | 5 stage |
| centrifugal | 1 stage |

## POWERPLANT – LYCOMING T53-L-13B INTRODUCTION



# POWERPLANT – ENGINE CONTROLS

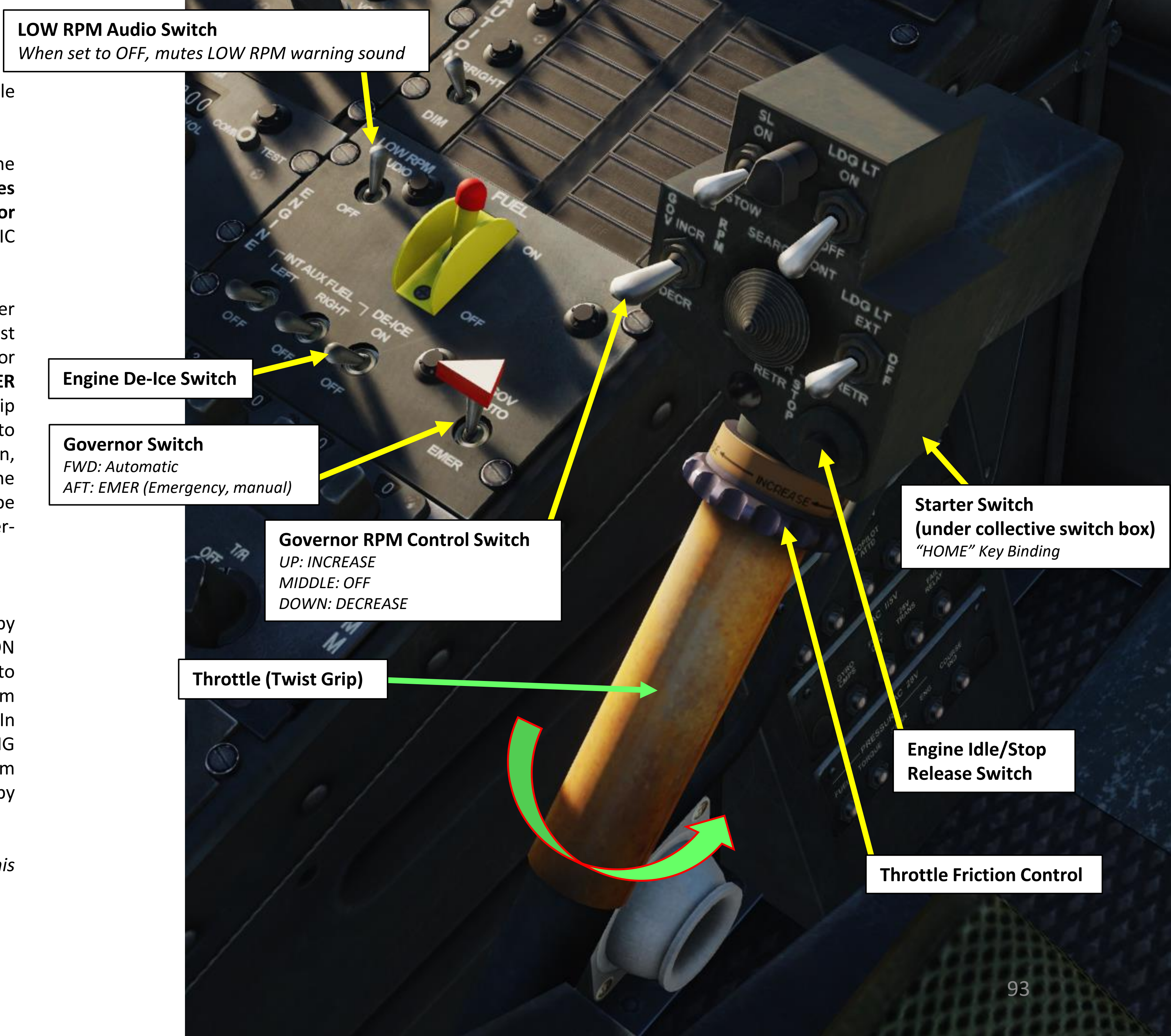
Engine operation is controlled using the twist grip throttle control on the pilot or copilot collective sticks.

During normal flight, the throttle is left fully open and the engine fuel control unit (FCU) system **automatically regulates fuel flow to maintain a nominal engine RPM and main rotor RPM**… provided the Governor switch is left to AUTOMATIC (FWD).

If the automatic fuel control system fails, the engine power setting can be controlled by manual adjustment of the twist grip throttle and the collective pitch to maintain the main rotor RPM. In that case, set the **Governor Switch to EMER** (Emergency) and control the fuel flow with the twist grip throttle. The EMER position permits the pilot or copilot to manually control the rpm. Because automatic acceleration, deceleration, and overspeed control are not provided with the GOV switch in the EMER position, control movements must be smooth to prevent compressor stall, overspeed, over-temperature, or engine failure.

The **Engine de-icing system** is a bleed air system activated by the **DE-ICE switch** on the ENGINE control panel. In the ON position bleed air is directed through the engine inlet to provide the protection. Power losses caused when the system is on (auto increase rpm gas producer at between 3 to 5%). In the event of DC electrical failure or when the DE-ICE ENG circuit breaker is out, de-ice is automatically ON. System power is provided by the DC essential bus and protected by the ANTI-ICE ENG circuit breaker.

*Note: the ice detection system is not connected in this helicopter variant.*

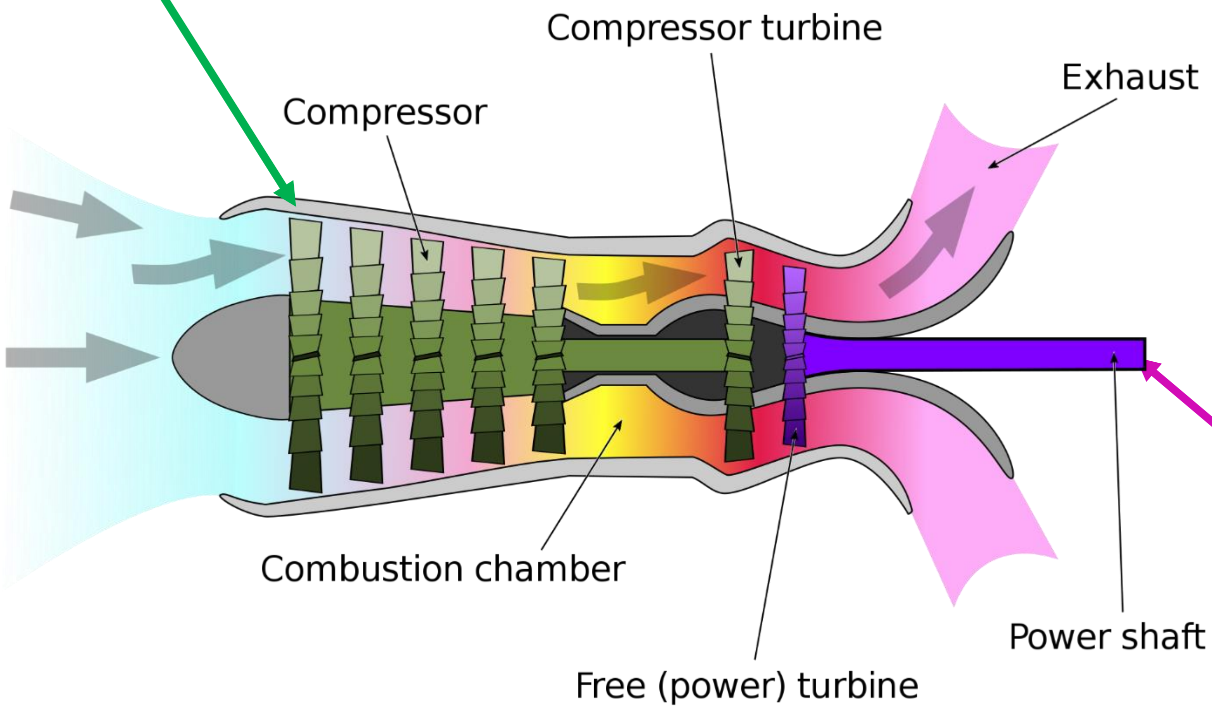


# POWERPLANT – ENGINE INDICATIONS

The four engine indications you should keep an eye on at all times are:

- **N1** (Gas Turbine Speed) – used to monitor health and power setting of the engine
- **N2** (Free Power Turbine Rotation Speed) / NR (Main Rotor Speed) – used to monitor rotor overspeed or underspeed
- **Torquemeter** – used to define reference power settings for different phases of flight
- **EGT/EXH** (Exhaust Gas Temperature) – must be monitored to prevent engine overheat

**N1** (Gas Turbine / Compressor Rotation Speed in %RPM)




**Dual Tachometer (RPM)**
- *INNER SCALE: **NR** / MAIN ROTOR RPM (x10 RPM)*
- *OUTER SCALE: **N2** / ENGINE RPM (x100 RPM)*

**Torquemeter Indicator (psi)**

**N1 / Gas Turbine (Producer) Tachometer (% RPM)**

**Exhaust Gas Temperature (EGT/EXH) (deg C)**


**N2** (Free Power Turbine Rotation Speed in RPM), typically set to 6600 RPM

Incidentally, since the Power Turbine drives the Main Rotor shaft, in normal operation N2 is equal to the Main Rotor Speed (**NR**) in relative RPM %. Do keep in mind that NR is in absolute RPM (typically 324).

# POWERPLANT – ENGINE INDICATIONS

Additionally, engine oil and various transmission gearbox oil indicators must be monitored once in a while to watch for oil leaks (which are often fatal issues if not found quickly, resulting in degraded transmission performance or even catastrophic transmission failure).


**RPM Warning Light**

*Illuminates when:*

- *NR / MAIN ROTOR RPM > 329 (HIGH)*
- *NR / MAIN ROTOR RPM < 310 (LOW)*
- *N2 / ENGINE RPM < 6300 (LOW)*

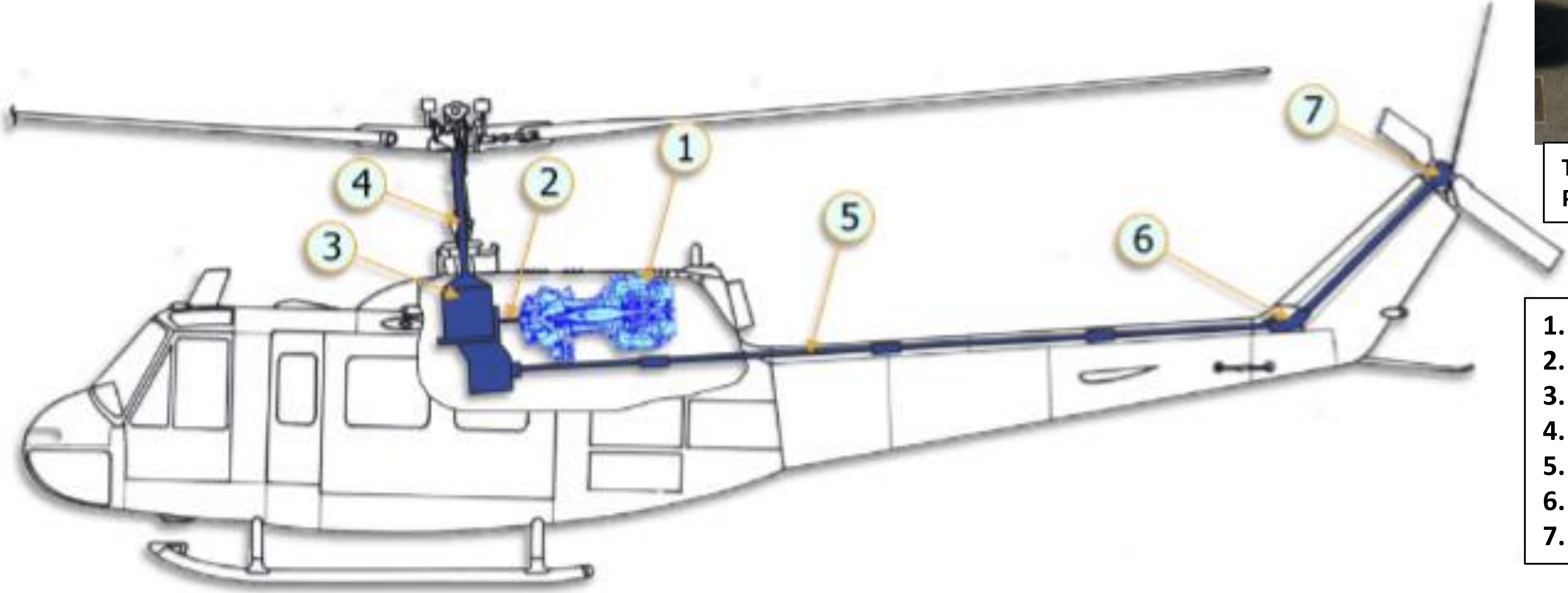

**Fuel Pressure Indicator (psi)**

**Engine Oil Temperature (deg C)**

**Engine Oil Pressure Indicator (psi)**

**Transmission Oil Pressure (psi)**

**Transmission Oil Temperature (deg C)**




1. **Engine**
2. **Main Driveshaft (6600 RPM)**
3. **Transmission**
4. **Mast (324 RPM)**
5. **Tail Rotor Driveshafts**
6. **Intermediate Gearbox (42 deg)**
7. **Tail Rotor Gearbox (90 deg, 1782 RPM)**

# POWERPLANT – ENGINE OPERATION LIMITS

If you are over EGT safe limits for a considerable amount of time, there will be a cumulative degradation effect which will depend on the time and EGT temperature in which you will be flying since that cumulative degradation effect started. Cumulative degradation effect will cause permanent engine performance degradation and percentage of that degradation will depend again on temperature and time. There are the three main points:

1. If you drop to safe numbers before cumulative degradation effects start, you will regain normal engine performance.
2. If you drop to safe numbers after cumulative degradation effect started, damage accumulation will stop and you will return to degraded engine performance. However, the accumulated cumulative degradation effect will not go anywhere. Next time you exceed EGT limits, damage accumulation will grow again and it will bring even more performance degradation.
3. After cumulative degradation effect reaches its limit and if you still operate engine above limits, it will cause even more engine performance degradation and can cause engine fire.

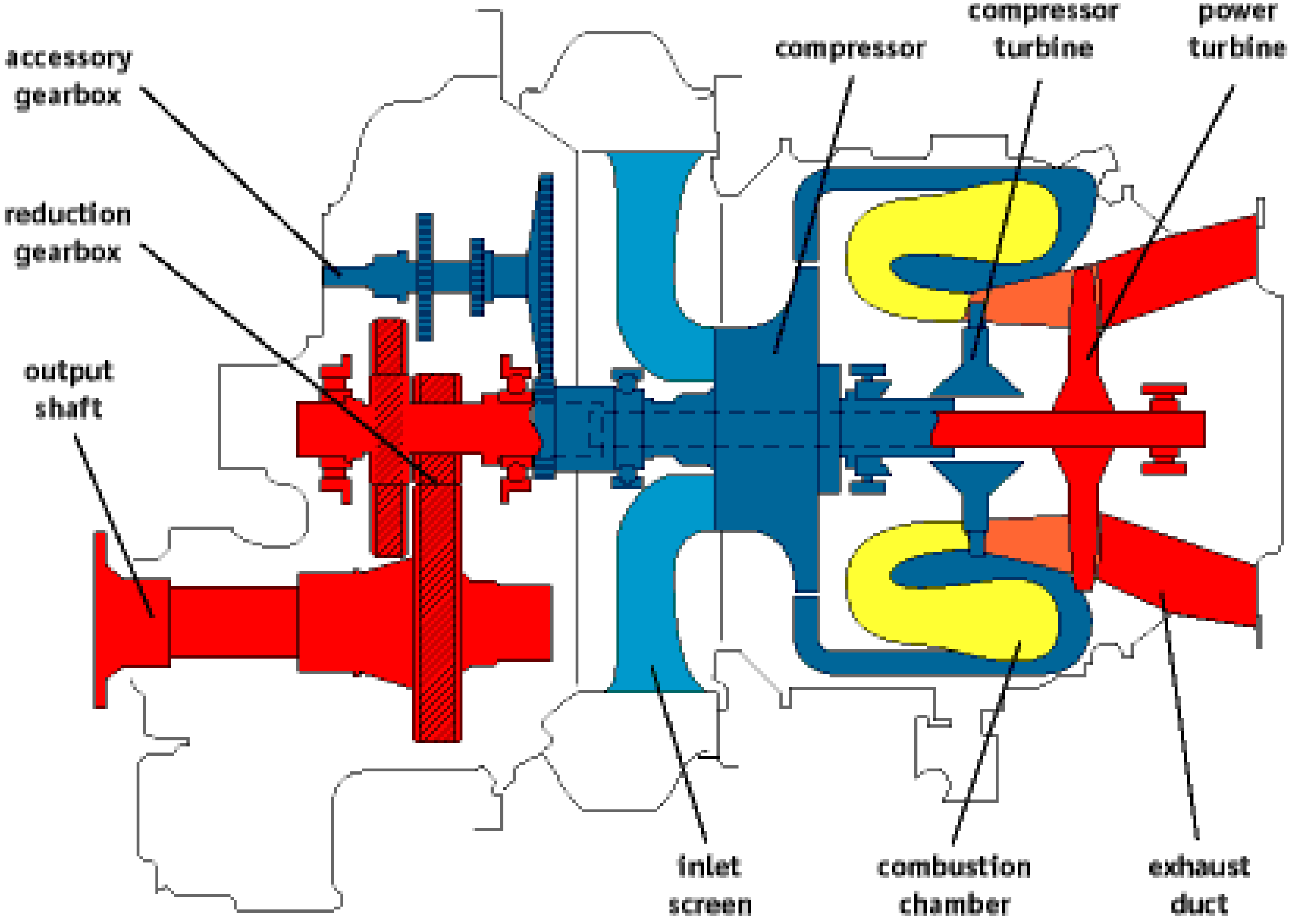

| Power Setting | EGT Limit |
|---|---|
| Max Continuous (green arc) | 400 to 610 deg C |
| Takeoff Power (max 30 min) | 610 to 625 deg C<br>Risk of engine fire after 30 min |
| 10-second power limit (max 10 sec)<br>(Engine Hot Start) | 625 to 675 deg C<br>Only for engine start and acceleration |
| 5-second power limit (max 5 sec)<br>(Engine Hot Start) | 675 to 760 deg C<br>Only for engine start and acceleration |
| EGT Redline (Maximum Allowable EGT) | 760 deg C<br>If exceeded in flight, high risk of engine fire |
| **Bottom Line**: Use 625 deg C as your maximum EGT during flight. Any exceedance of this parameter may lead to engine fire, engine damage or engine seizure. | |

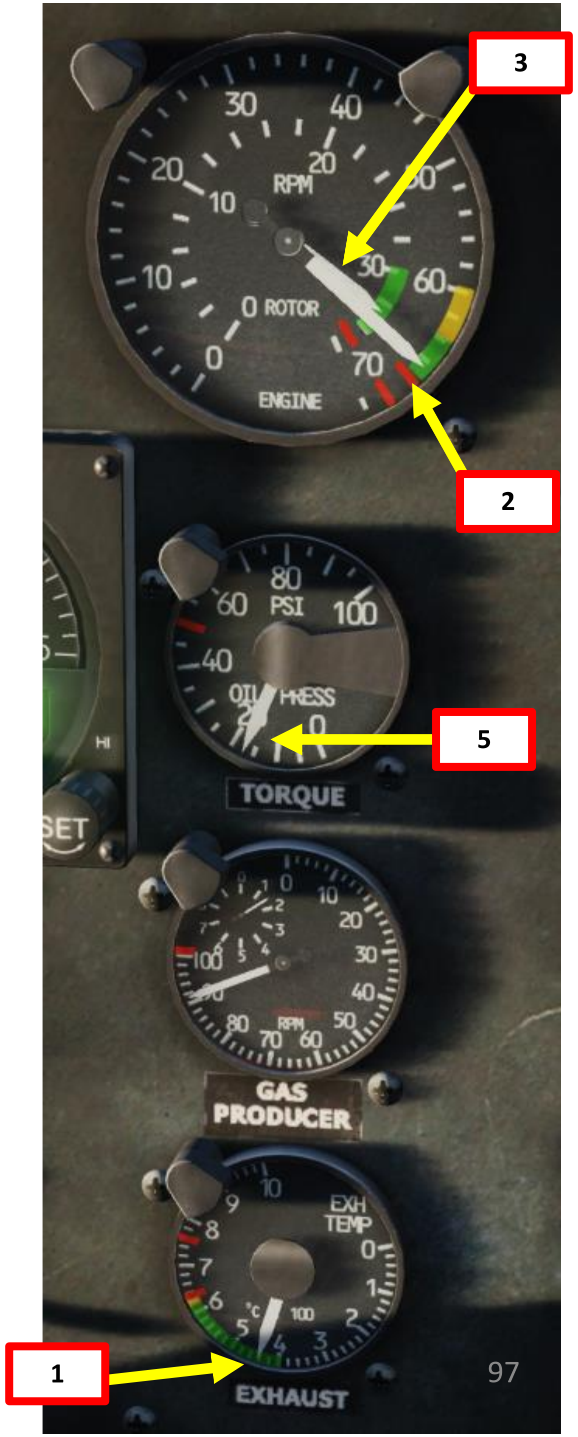
| Condition | Effect |
|---|---|
| EGT is **645** deg C | • 166 seconds (from start of over limits operation) before performance degradation (RPM will drop by ~200 in 5-10 sec)<br>• 209 seconds (from start of over limits operation) before your engine can catch fire |
| EGT is **680** deg C | • 83-88 seconds (from start of over limits operation) before performance degradation (RPM will drop by ~200 in 3-6 sec)<br>• 90-95 seconds (from start of over limits operation) before your engine can catch fire |

# POWERPLANT – ENGINE OPERATION LIMITS

Here are a few recommendations when operating the engine:

1. Make sure EGT (Exhaust Gas Temperature) is always in the green.
2. Make sure N2 RPM needle for the engine free power turbine is in the green, preferably at 6600 RPM.
3. Make sure N2 RPM for the main rotor is in the green and lined up on the power turbine RPM needle, preferably at 324 RPM.
4. Throttle should be fully open during engine operation.
5. Torquemeter should never exceed 50 psi.



# POWERPLANT – ENGINE FUEL CONTROL

The fuel control assembly is mounted on the engine. It consists of a metering section, a computer section and an overspeed governor.

### *Computer Section*

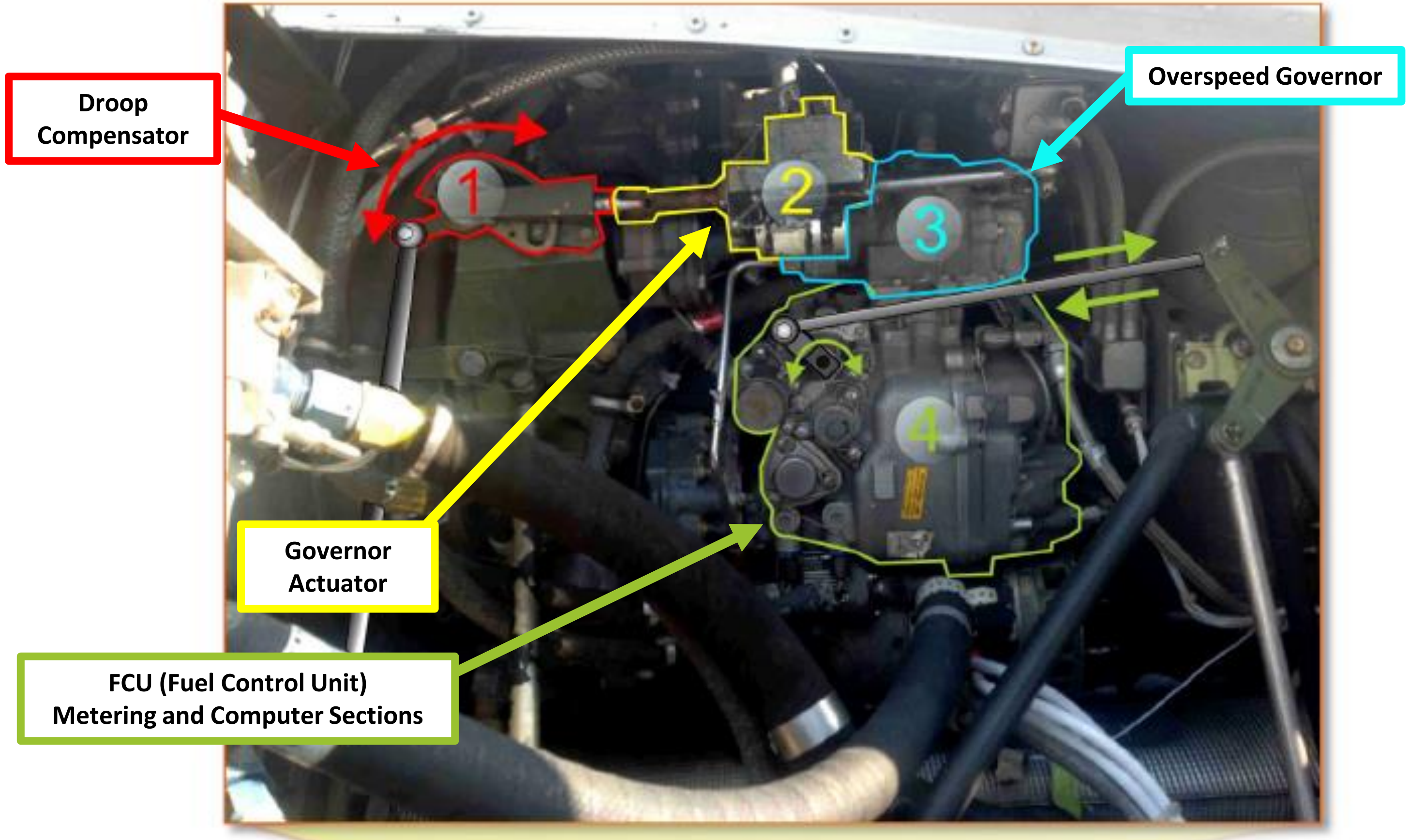
The FCU's computer (Fuel Control Unit) determines the rate of main fuel delivery by biasing the main fuel metering valve (FMV) opening for N1 (Gas Turbine Speed) RPM, inlet air temperature and pressure, and throttle position. It also controls the operation of the compressor air bleed and operation of the variable inlet guide vanes.

### *Metering Section*

The metering valve section is driven is driven at a speed proportional to N1 speed. It pumps fuel to the engine through the main fuel metering valve…. Or through the emergency fuel metering valve if the main system fails, which is positioned directly by the twist grip throttle.

### *Overspeed Governor*

The overspeed governor is driven at a speed proportional to N2 speed. It biases the main fuel metering valve opening to maintain a constant selected N2 (Free Power Turbine / Engine Speed) RPM.




# POWERPLANT – RPM GOVERNOR & DROOP COMPENSATOR

### *Governor RPM Switch*

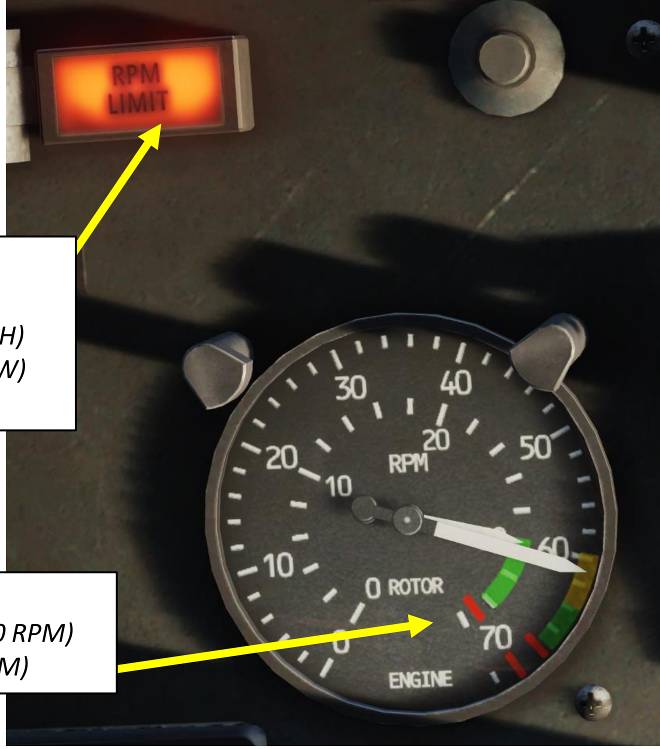
The pilot and copilot GOV RPM INCR/DECR switches are mounted on a switch box attached to the end of the collective pitch control lever.

The switches are a three-position momentary type and are held in INCR (up) position to increase the power turbine (N2) speed or DECR (down) position to decrease the power turbine (N2) speed.

### *Droop Compensator*

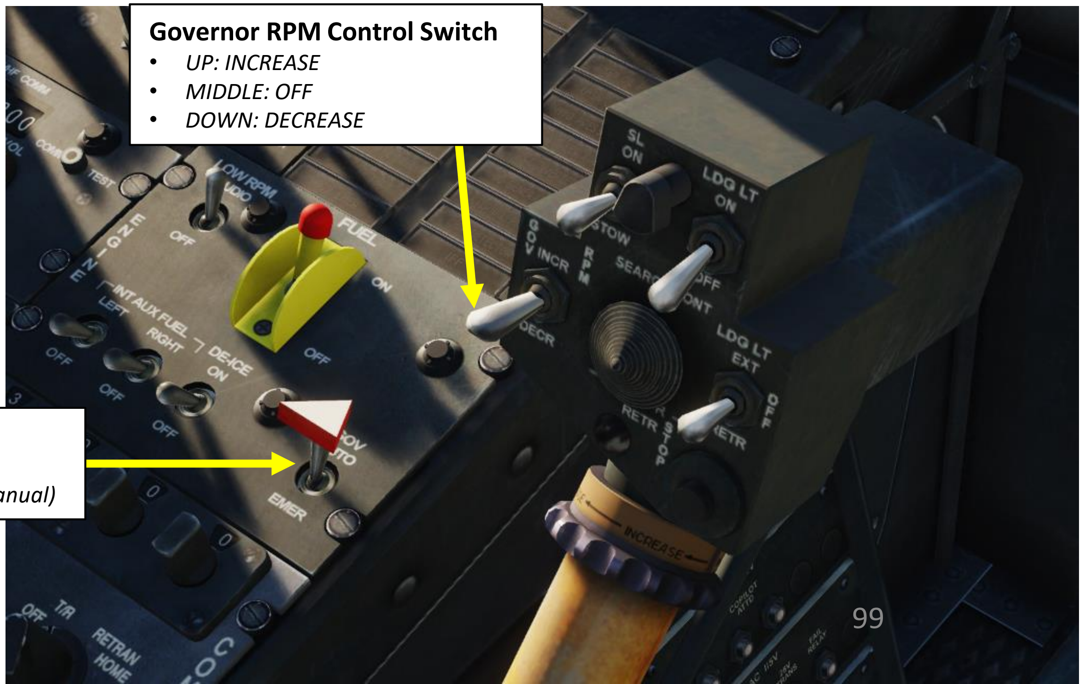
A droop compensator maintains engine rpm (N2) as power demand is increased by the pilot.

The compensator is a direct mechanical linkage between the collective stick and the speed selector lever on the N2 governor. No crew controls are provided or required. The compensator will hold N2 rpm to 6600 rpm when properly rigged. Droop is defined as the speed change in engine rpm (N2) as power is increased from a no-load condition. It is an inherent characteristic designed into the governor system. Without this characteristic instability would develop as engine output is increased resulting in N1 speed overshooting or hunting the value necessary to satisfy the new power condition.




**RPM Warning Light**
*Illuminates when:*
- *NR / MAIN ROTOR RPM > 329 (HIGH)*
- *NR / MAIN ROTOR RPM < 310 (LOW)*
- *N2 / ENGINE RPM < 6300 (LOW)*

**Dual Tachometer (RPM)**
- *INNER SCALE: **NR** / MAIN ROTOR RPM (x10 RPM)*
- *OUTER SCALE: **N2** / ENGINE RPM (x100 RPM)*



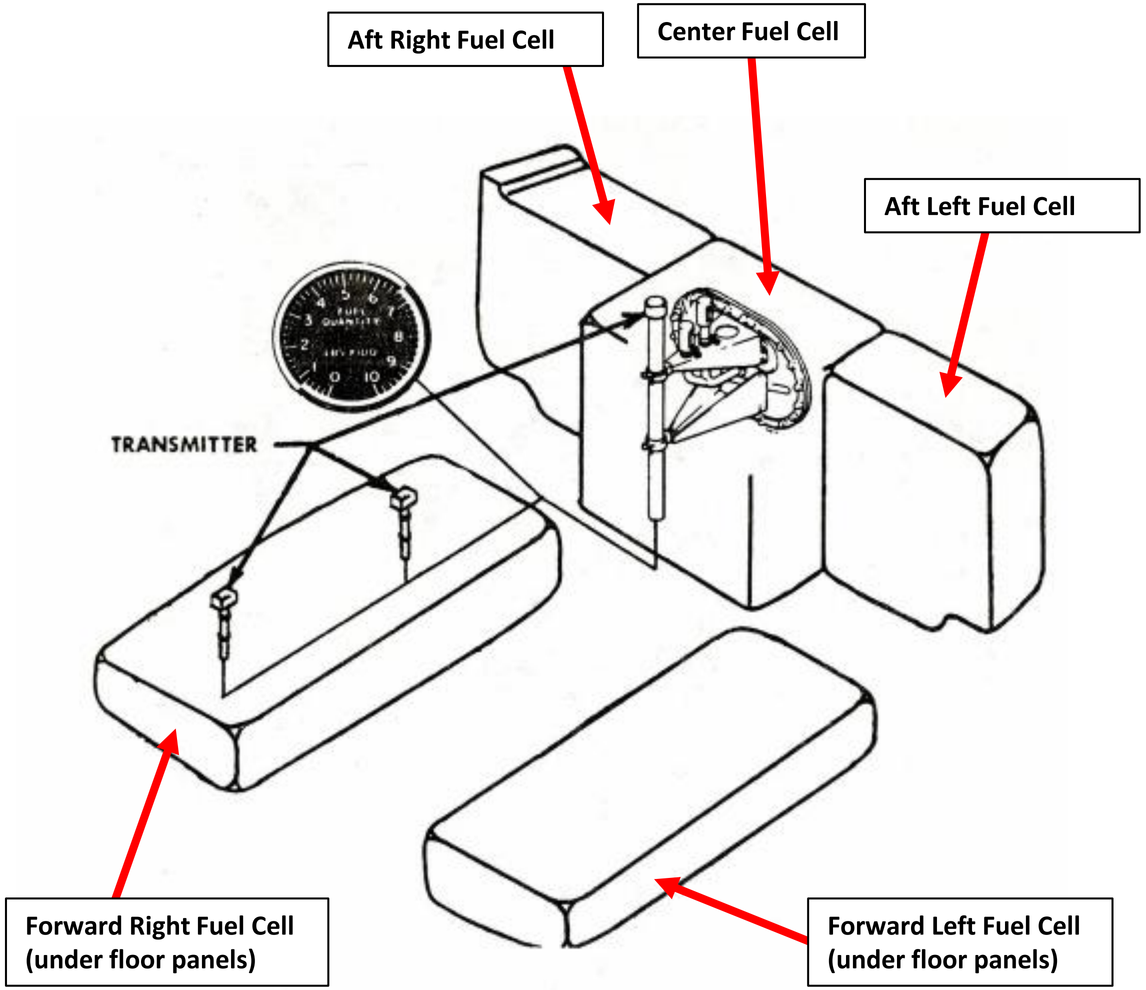
**Governor RPM Control Switch**
- *UP: INCREASE*
- *MIDDLE: OFF*
- *DOWN: DECREASE*

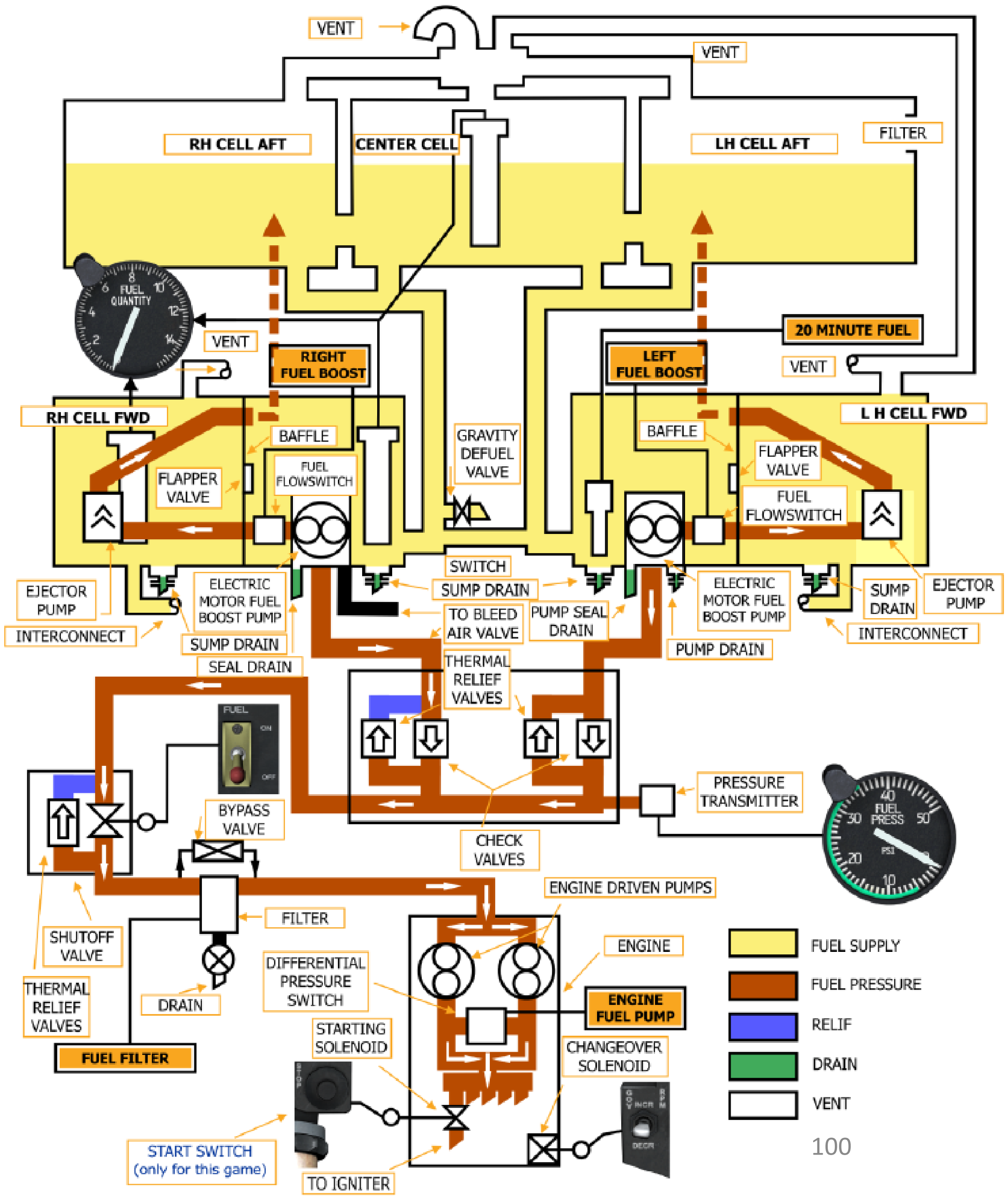
**Governor Switch**
- *FWD: Automatic*
- *AFT: EMER (Emergency, manual)*

# FUEL SYSTEM

The fuel system consists of five interconnected cells all filled from a single fitting on the right side of the helicopter, for a **total capacity of 1391 lbs** of fuel.

Complete provisions have been made for installing an auxiliary fuel equipment kit in the helicopter cargo passenger compartment. However, auxiliary fuel tanks are not available.

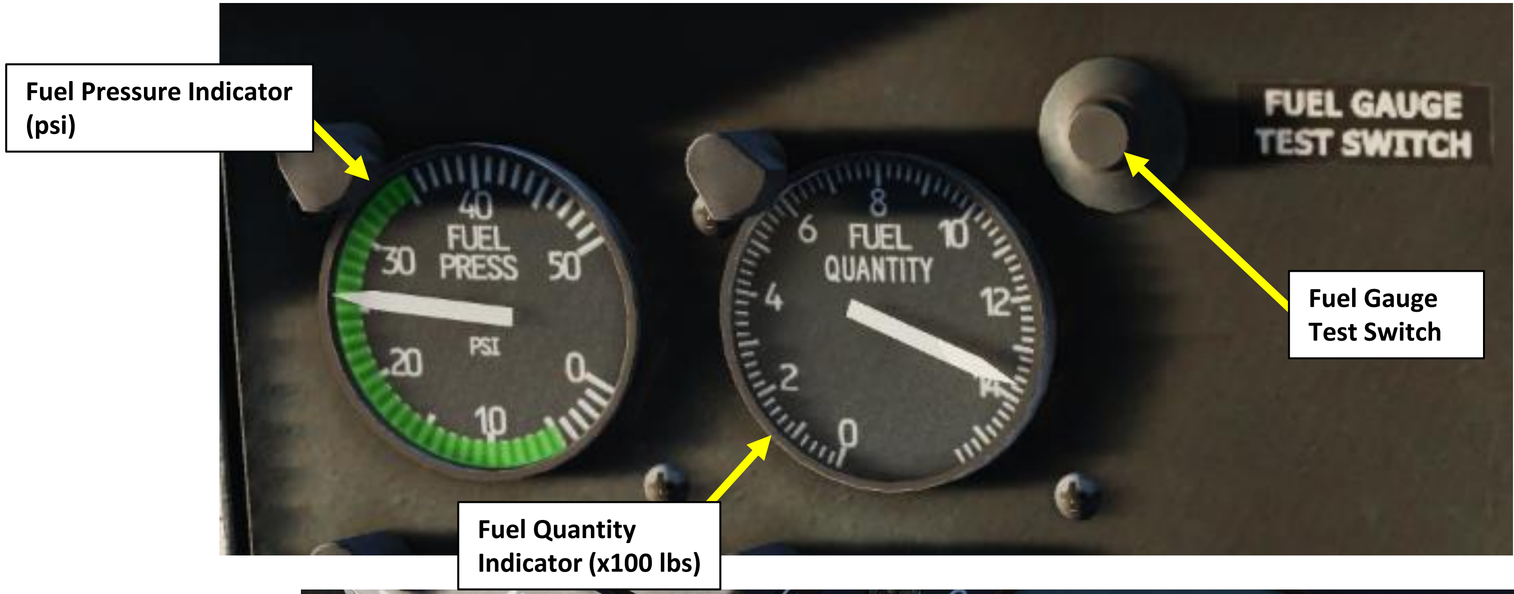


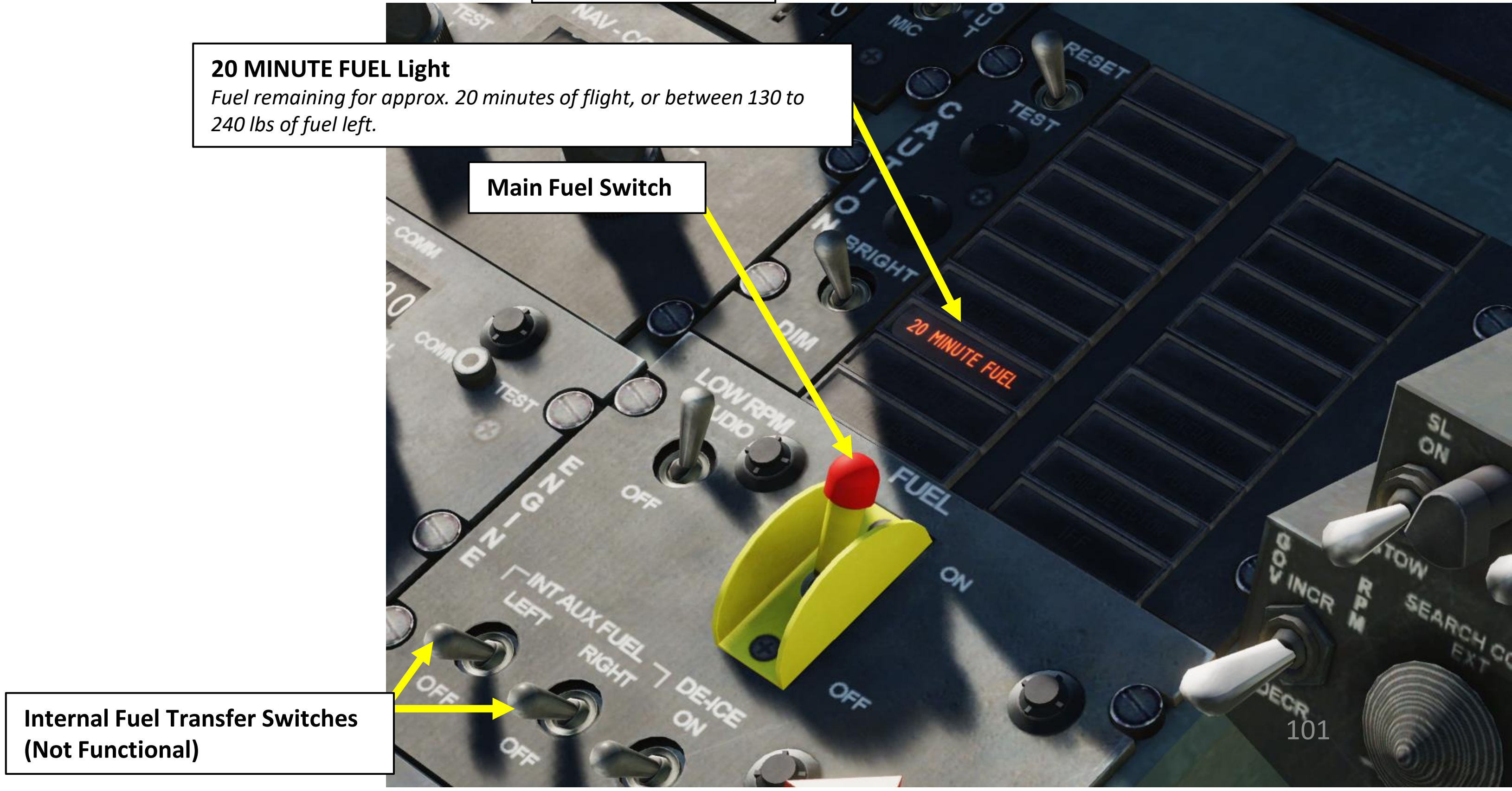



## FUEL SYSTEM

The **MAIN FUEL** ON/OFF switch is located on the pedestal-mounted ENGINE panel. The switch is protected from accidental operation by a spring-loaded toggle head that must be pulled up before switch movement can be accomplished. When the switch is in the ON position, the fuel valve opens, the electric boost pump(s) are energized and fuel flows to the engine. When the switch is in the OFF position, the fuel valve closes and the electric boost pump(s) are de-energized.

The **Fuel Quantity Indicator** is located in the upper center area of the instrument panel. This instrument is a transistorized electrical receiver which continuously indicates the quantity of fuel in pounds. The indicator is connected to three fuel transmitters mounted in the fuel cells. Two are mounted in the right forward cell and one in the center aft cell. Indicator readings shall be multiplied by 100 to obtain fuel quantity in pounds.



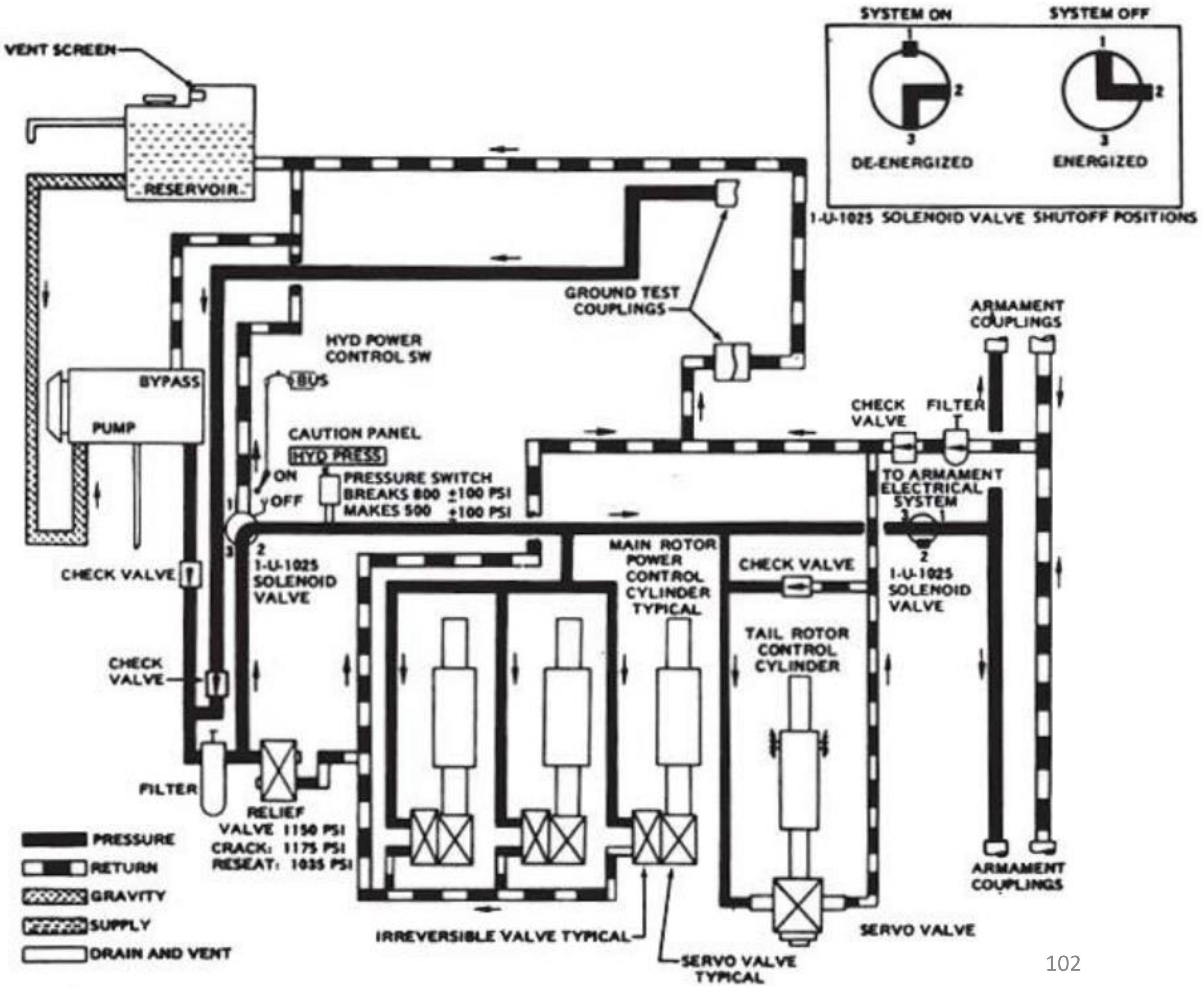
## HYDRAULIC SYSTEM

A hydraulic pump, mounted on and driven by the transmission supplies pressure to the hydraulic servos. The hydraulic servos are connected into the mechanical linkage of the helicopter flight control system. Movement of the controls in any direction causes a valve, in the appropriate system, to open and admit hydraulic pressure which actuates the cylinder, thereby reducing the force-load required for control movement.

The hydraulic control switch is located on the miscellaneous panel. The switch is a two-position toggle type labeled **HYD CONT ON/OFF**.

When the switch is in the ON position, pressure is supplied to the servo system. When the switch is in the OFF position, the solenoid valve is closed and no pressure is supplied to the system. The switch is a fail-safe type. Electrical power is required to turn the switch off.

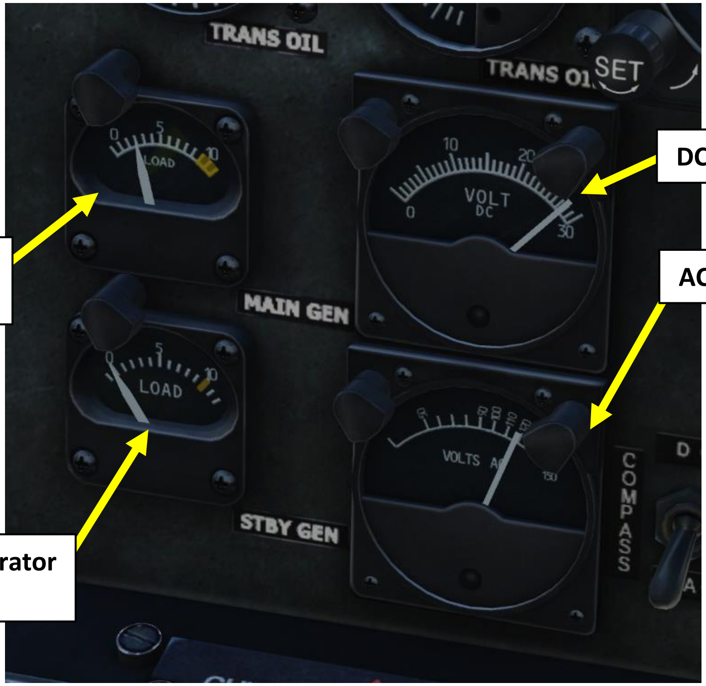

Hydraulic Control (HYD CONT) Switch

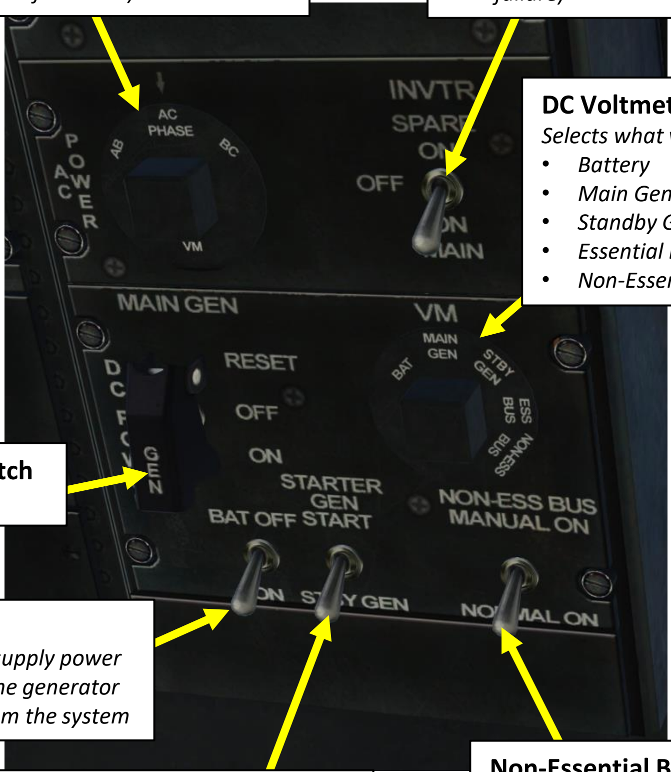


# ELECTRICAL SYSTEM

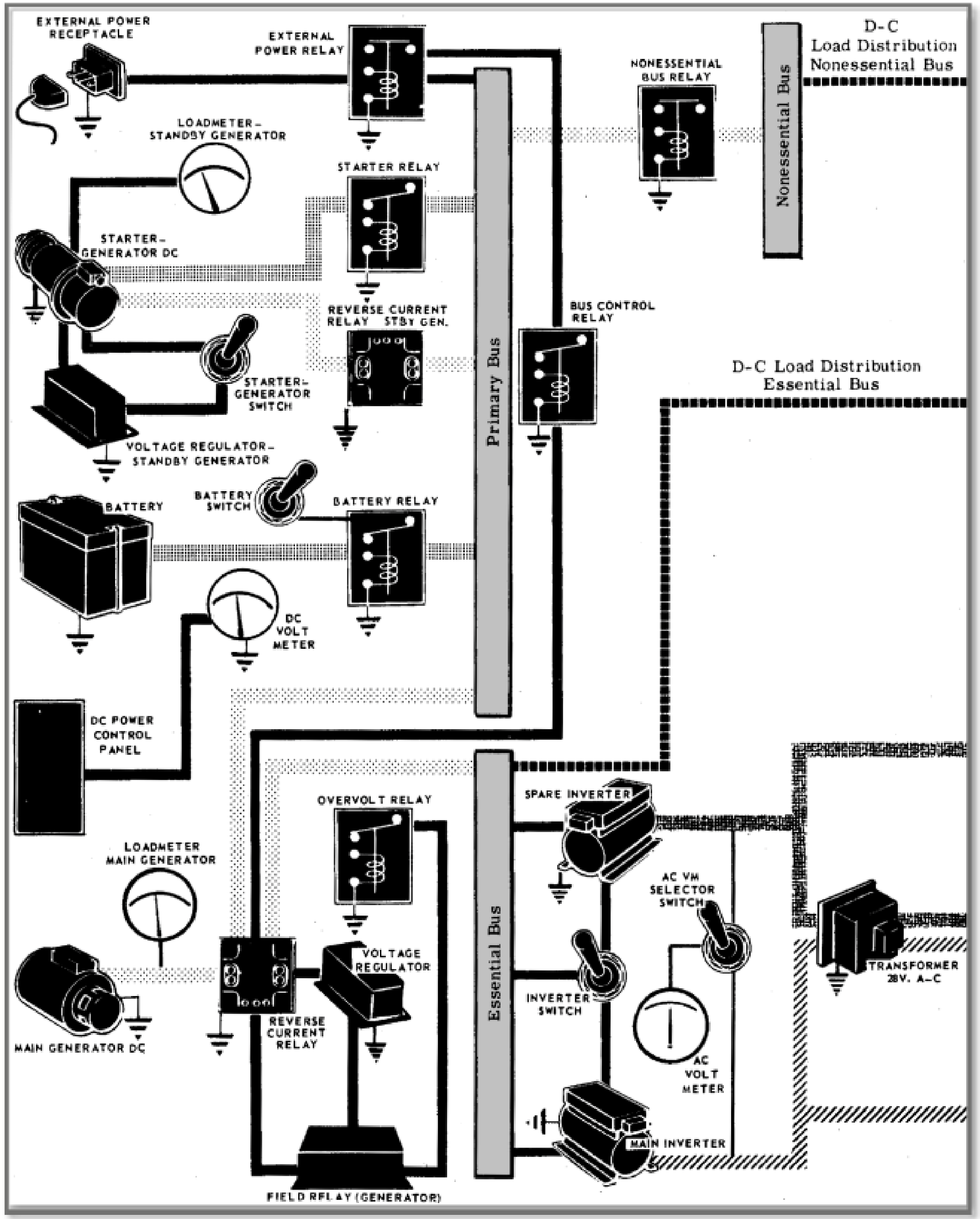
The Direct current (DC) power supply system is a single conductor system with the negative leads of the generator grounded in the helicopter fuselage structure. The main generator voltage will vary from 27 to 28.5 depending on the average ambient temperature. In the event of a generator failure the nonessential bus is automatically de-energized. The pilot may override the automatic action by positioning the NON-ESS BUS switch on the DC POWER control panel to MANUAL ON.

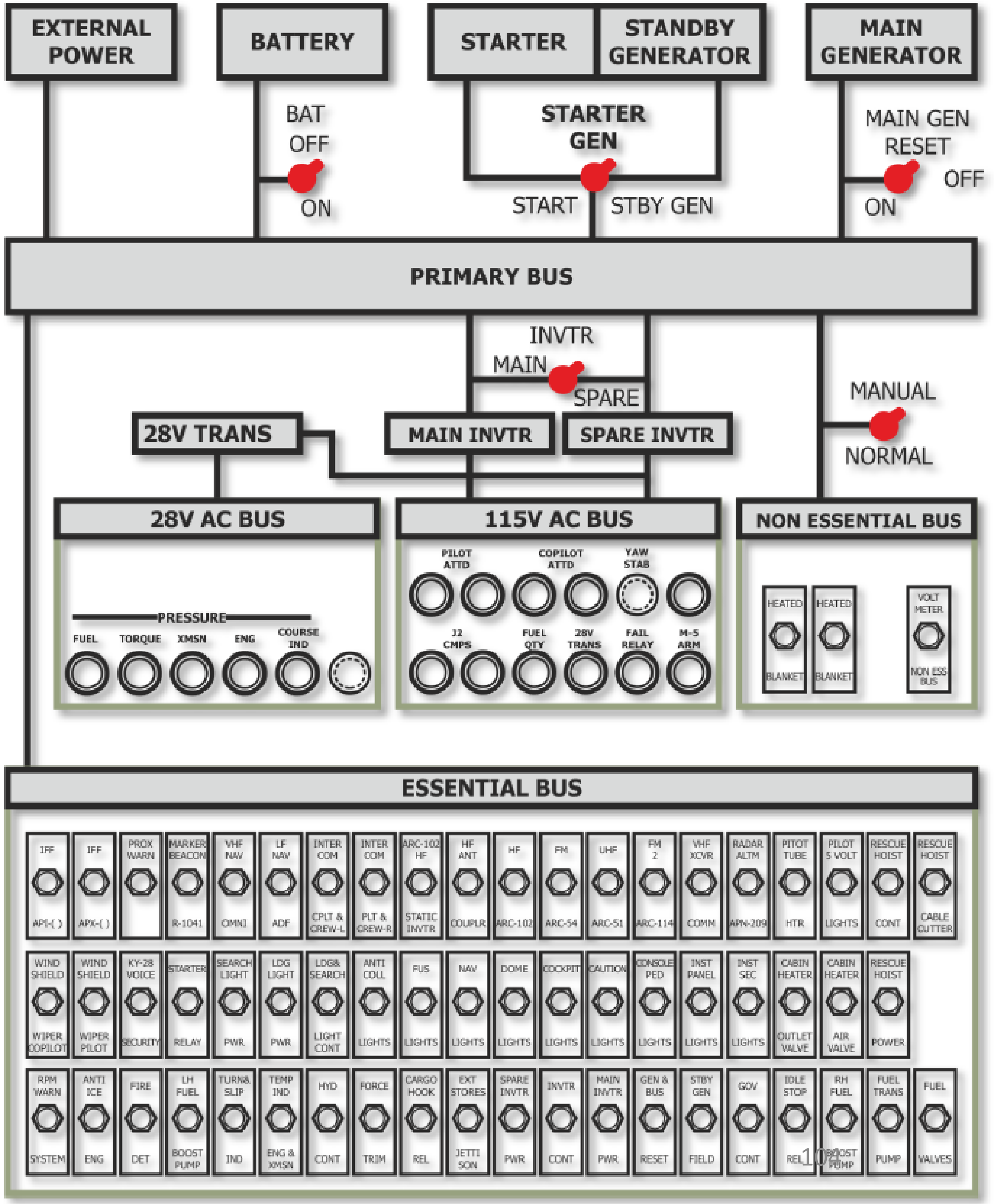
Alternating current (AC) is supplied by two inverters They receive power from the essential bus and are controlled from the AC POWER control panel. Either the main or spare inverter will supply the necessary 115 VAC to the distribution system. The inverters also supply 115 VAC to the 28 Volt AC transformer which in turn supplies 28 VAC to the necessary equipment. Circuit protection for the inverters is provided by the MAIN INVTR PWR and SPARE INVTR PWR circuit breakers.



# ELECTRICAL SYSTEM



## ELECTRICAL SYSTEM

## DC & AC Power Distribution Diagram

**28 VOLT DC ESSENTIAL BUS**
- Generator & Bus Reset
- Main Inverter Power
- Inverter Control
- Spare Inverter Power
- Starter Relay
- Ignition System & Ignition Solenoid
- Fuel & Oil Valves
- Left Fuel Boost Pump
- Right Fuel Boost Pump & Transfer Pump
- Idle Stop Release
- Governor Control
- Cargo Hook Release
- Fire Detection
- Windshield Wiper
- Engine Anti-Ice
- Utility Lights
- Dome Lights
- Force Trim
- Hydraulic Control
- Instrument Section Lights
- Turn & Slip Indicator
- Instrument Panel Lights
- Temperature Indicator - Engine & Transmission
- Console & Pedestal Lights
- Navigation Lights
- Caution Lights
- Anti-Collision Light
- Landing Light Power
- Search Light Power
- Landing & Search Light Control
- VHF Receiver AN/ARC-134
- VHF Transmitter AN/ARC-134
- UHF Transceiver AN/ARC-51BX
- FM Transceiver AN/ARC-131
- Intercom C-1611/AIC
- J-2 Compass
- Bleed Air
- Heater Control
- Heater Power
- Radio Compass Receiver AN/ARN-83
- Omni Receiver AN/ARN-82
- Marker Beacon Receiver R-1963/ARN
- Marker Beacon Receiver R-1963/ARN

**115 VOLT AC SPARE INVERTER**
- AC Failure Relay
- Fuel Quantity Indicator & Tank Unit
- Attitude Indicator - Pilot
- Attitude Indicator - Copilot
- J-2 Compass

**28 VOLT AC**
- Course Indicator
- Torque Pressure Instruments
- Transmission Oil Pressure Transmitter & Indicator
- Engine Oil Pressure Transmitter & Indicator

**115 VOLT AC MAIN INVERTER**
- AC Failure Relay
- Fuel Quantity Indicator & Tank Unit
- Attitude Indicator - Pilot
- Attitude Indicator - Copilot
- J-2 Compass

**28 VOLT DC NON ESSENTIAL BUS**
- Non Essential Bus Voltmeter
- Heated Blankets

## FIRE DETECTION SYSTEM

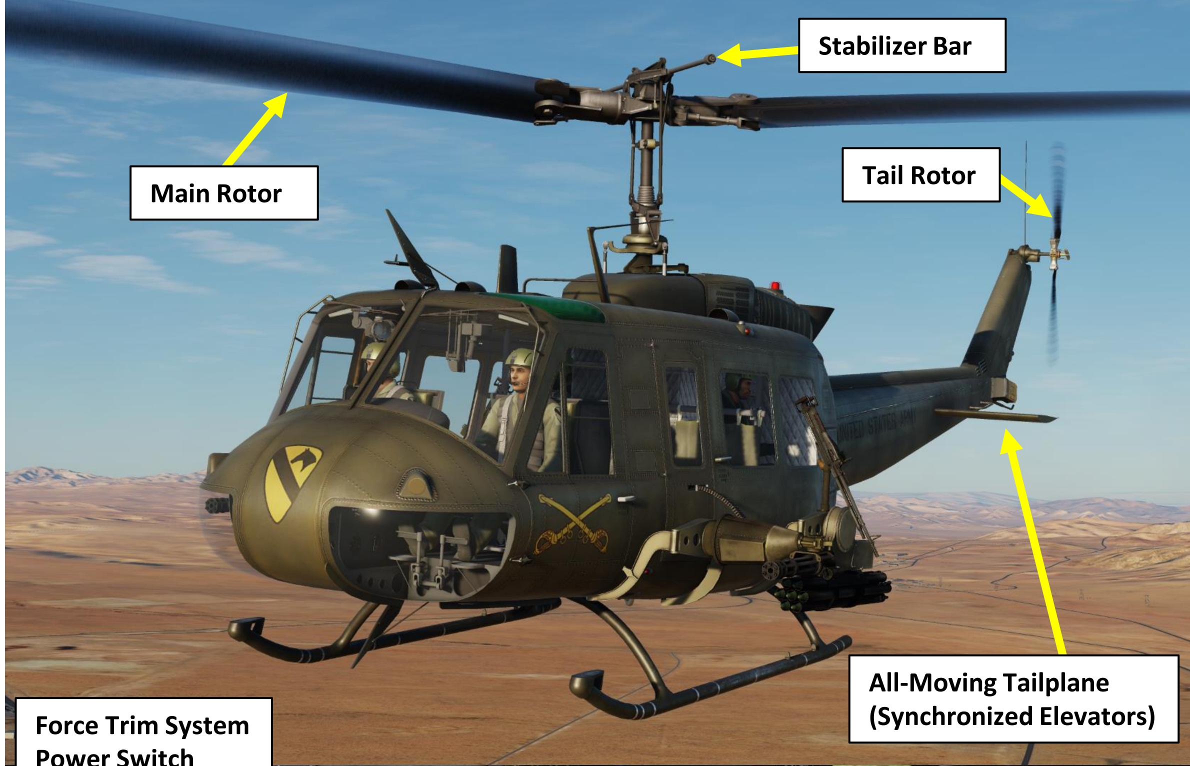
If the FIRE warning light illuminates and/or fire is observed during flight, there isn't much you can do since you only have one engine. There is no fire suppression system in the Huey, therefore the best you can do is land as soon as possible and run like hell to safety.

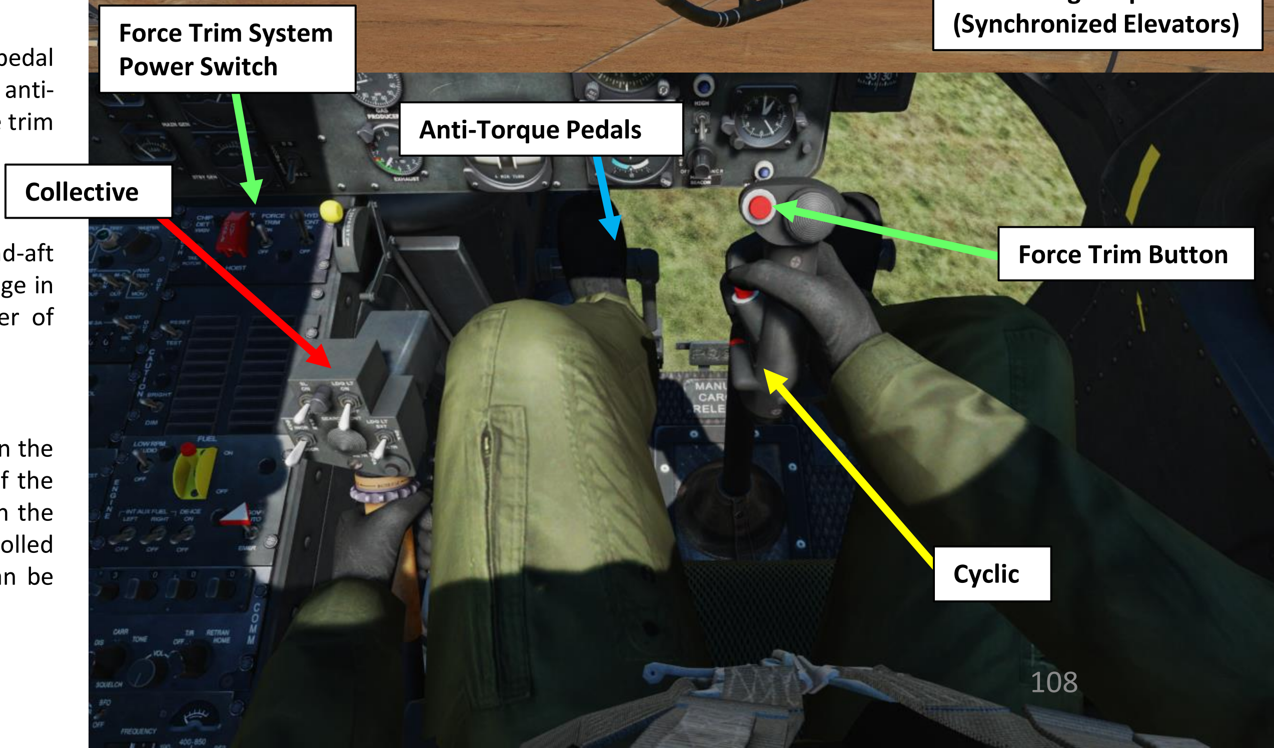

The Huey has one of the most interesting aerodynamic models in DCS. We will look at some aerodynamic concepts to help you understand why the helicopter behaves the way it does. Don't worry, I'll keep it short and simple. The following principles are simply what you MUST understand as a Huey pilot if you want to fly worth a darn.

# FLIGHT CONTROLS

The flight control system is a hydraulically-assisted positive mechanical type, actuated by conventional helicopter controls. Complete controls are provided for both pilot and copilot.
The system includes the following:

- **Cyclic system**:
  - Moving the cyclic (stick) in any direction will produce a corresponding movement of the helicopter which is a result of a change in the plane of rotation of the main rotor.
- **Collective control system**:
  - The amount of lever movement determines the angle of attack and lift developed by the main rotor, and results in ascent or descent of the helicopter: When the lever is in the full down position, the main rotor is at minimum pitch. When the lever is in the full up position, the main rotor is at maximum pitch.
- **Tail Rotor system**:
  - The tail rotor control system is operated by pilot/copilot anti-torque pedals. Pushing a pedal will change the pitch of the tail rotor blades, resulting in directional control.
- **Force Trim system**:
  - Force centering devices are incorporated in the cyclic controls and directional pedal controls. The devices furnish a force gradient or "feel" to the cyclic control stick and anti-torque pedals. These forces can be reduced to zero by pressing and holding the force trim push-button switch on the cyclic stick grip or moving the force trim switch to OFF.
- **Synchronized Elevator**:
  - The elevators are connected by control tubes and mechanical linkage to the fore-and-aft cyclic system. Fore-and-aft movement of the cyclic control stick will produce a change in the synchronized elevator attitude. This improves controllability within the center of gravity (CG) range
- **Stabilizer bar**:
  - The gyroscopic and inertial effect of the stabilizer bar will produce a damping force in the rotor rotating control system and thus the rotor. When an angular displacement of the helicopter/mast occurs, the bar tends to remain in its trim plane. The rate at which the bar rotational plane tends to return to a position perpendicular to the mast is controlled by the hydraulic dampers. By adjusting the dampers, positive dynamic stability can be achieved, and still allow the pilot complete responsive control of the helicopter.



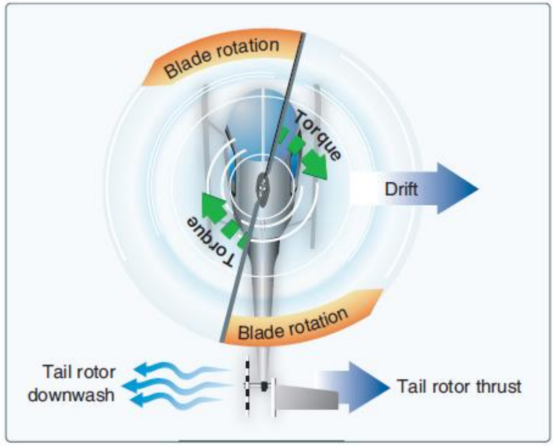
# FORCES: TORQUE, TRANSLATIONAL & VERTICAL LIFT

***IN A NUTSHELL…***

In a hover, you will most likely generate vertical lift only since the lift vector is pointing upwards. However, if you push your nose down and gain horizontal speed, you will notice that you will generate much more lift as you gain speed. This is called “**Translational Lift**”: your blades gain much more lift efficiency as you accelerate.

You might also wonder why you need to apply left pedal when you are hovering. This is simply to counter the **torque** created by the main rotor blades’ rotation in the yaw axis. In a prop airplane, the torque will force you to use pedal on takeoff to stay straight. The same principle applies for a helicopter, but in a different axis.

**Translating tendency** is a right lateral movement of the helicopter that is a combination of tail rotor thrust and main rotor torque; translating tendency is countered with left cyclic.




A tail rotor is designed to produce thrust in a direction opposite torque. The thrust produced by the tail rotor is sufficient to move the helicopter laterally.

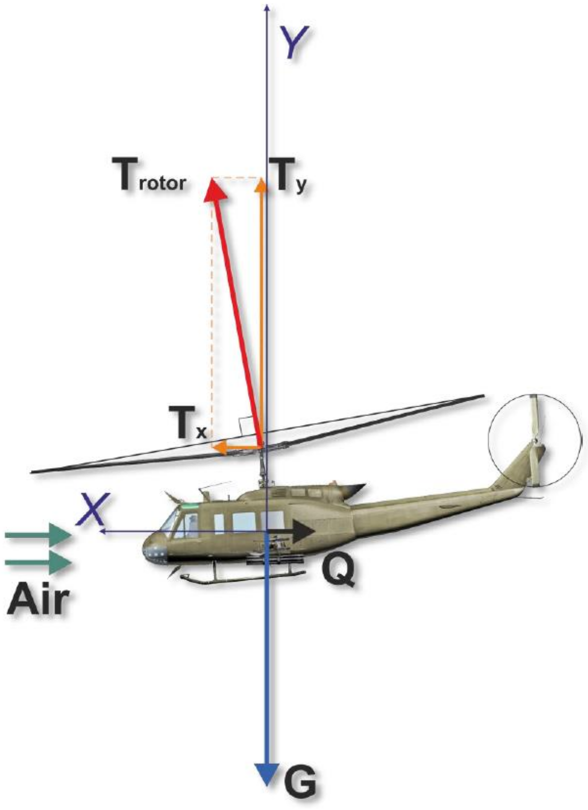
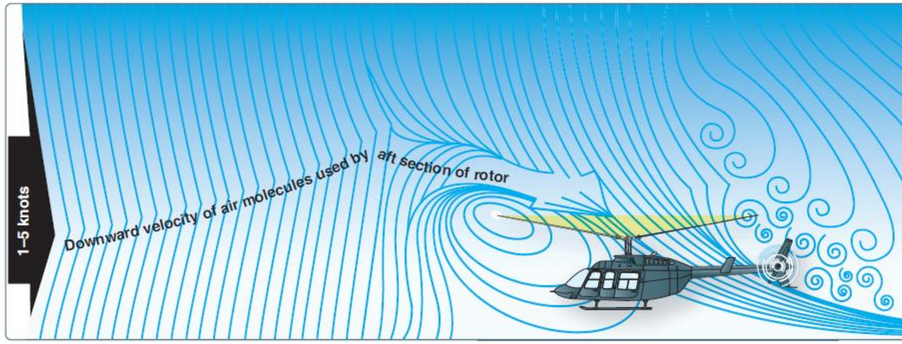
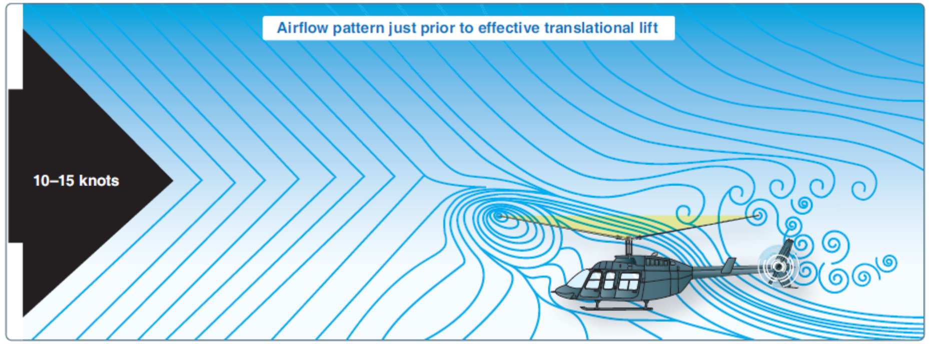



Figure 3.1. Forces Acting on a Helicopter




The airflow pattern for 1-5 knots of forward airspeed. Note how the downwind vortex is beginning to dissipate and induced flow down through the rear of the rotor system is more horizontal.




The airflow pattern for 10-15 knots. At this increased airspeed, the airflow continues to become more horizontal. The leading edge of the downwash pattern is being overrun and is well back under the nose of the helicopter.

# GYROSCOPIC PRECESSION

***IN A NUTSHELL…***

The spinning main rotor of a helicopter acts like a gyroscope. What we call "**gyroscopic precession**" is the resultant action or deflection of a spinning object when a force is applied to this object. This action occurs 90 degrees in the direction of rotation from the point where the force is applied, like on a rotating blade.

Now, what does this mean and why should you care about such mumbo jumbo? This means that if you want to push your nose down, you push your cyclic forward. What happens in reality is that pilot control input is mechanically offset 90 degrees "later", as shown on the pictures below.

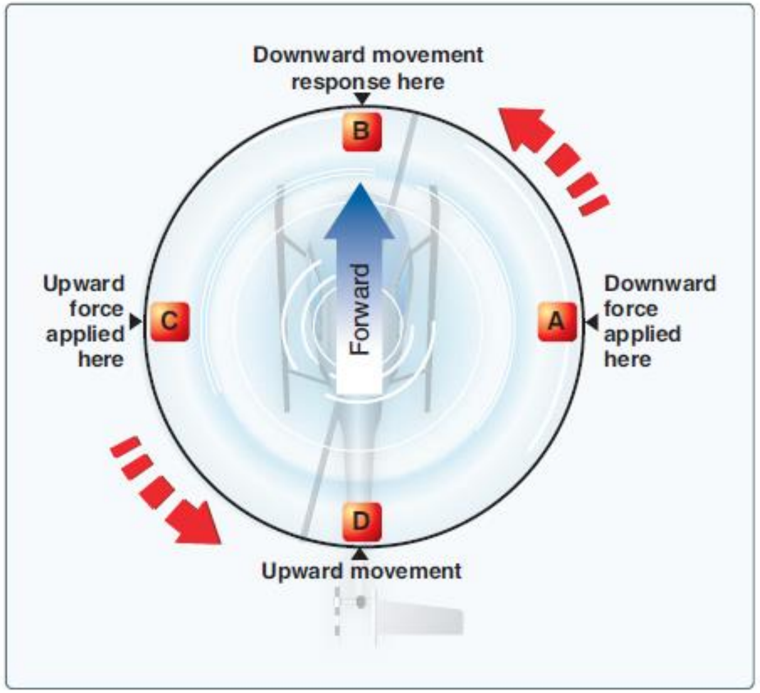



**Figure 2-28.** *Gyroscopic precession.*

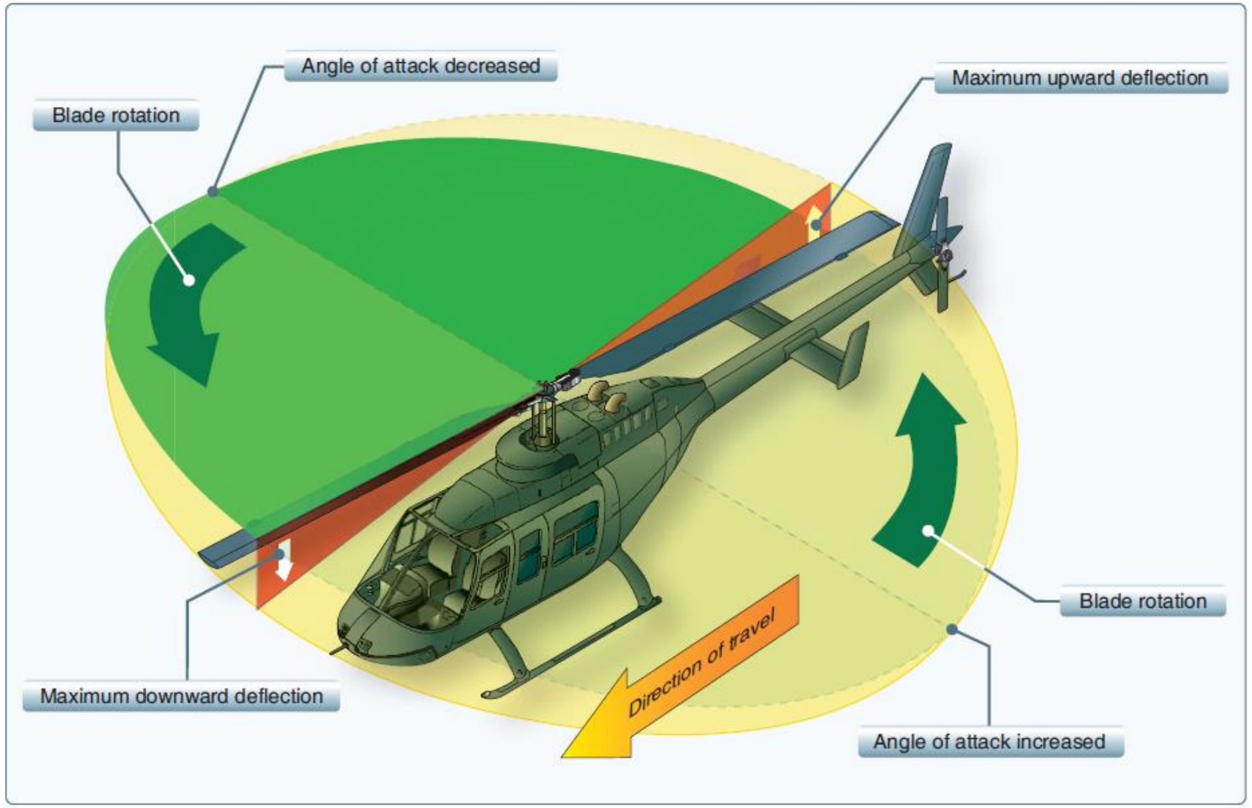



**Figure 2-29.** *As each blade passes the 90° position on the left in a counterclockwise main rotor blade rotation, the maximum increase in angle of incidence occurs. As each blade passes the 90° position to the right, the maximum decrease in angle of incidence occurs. Maximum deflection takes place 90° later—maximum upward deflection at the rear and maximum downward deflection at the front—and the tip-path plane tips forward.*

## RETREATING BLADE STALL & DISSYMMETRY OF LIFT

In forward flight, the relative airflow through the main rotor disk is different on the advancing and retreating side. The relative airflow over the advancing side is higher due to the forward speed of the helicopter, while the relative airflow on the retreating side is lower. This dissymmetry of lift increases as forward speed increases. To generate the same amount of lift across the rotor disk, the advancing blade flaps up while the retreating blade flaps down. This causes the AOA to decrease on the advancing blade, which reduces lift, and increase on the retreating blade, which increases lift.

At some point as the forward speed increases, the low blade speed on the retreating blade, and its high AOA cause a stall and loss of lift. Retreating blade stall is a major factor in limiting a helicopter’s never-exceed speed (VNE) and its development can be felt by a low frequency vibration, pitching up of the nose, and a roll in the direction of the retreating blade. High weight, low rotor rpm, high density altitude, turbulence and/or steep, abrupt turns are all conducive to retreating blade stall at high forward airspeeds. As altitude is increased, higher blade angles are required to maintain lift at a given airspeed.

Thus, retreating blade stall is encountered at a lower forward airspeed at altitude. Most manufacturers publish charts and graphs showing a VNE decrease with altitude.

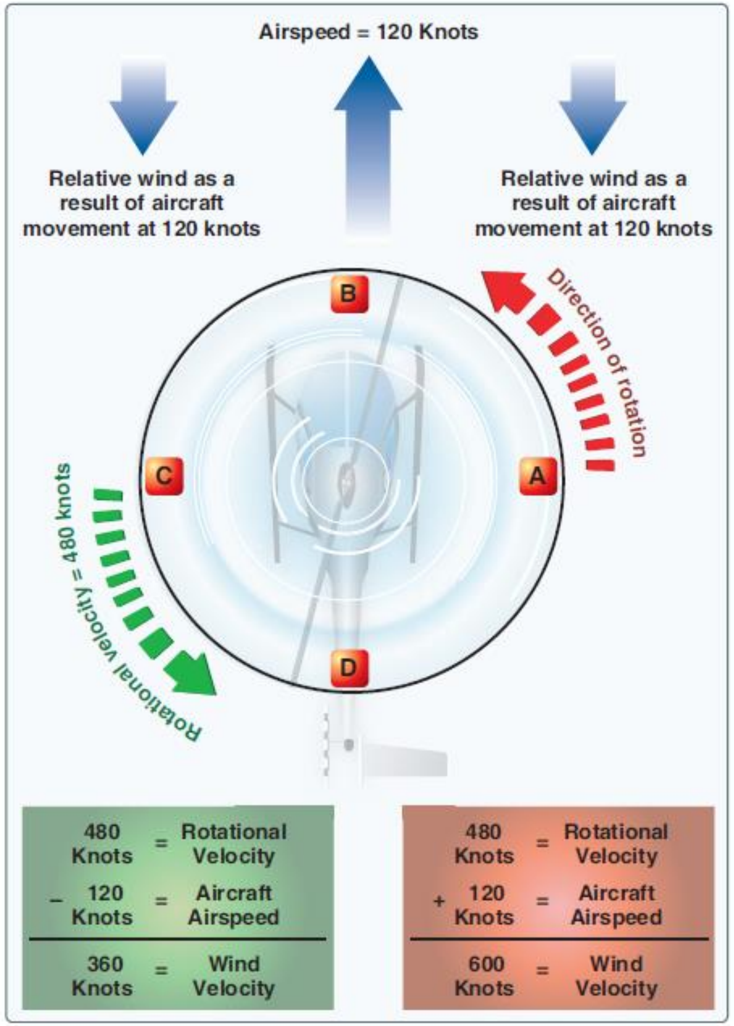



**Figure 2-33.** *Airflow in forward flight.*

**IN A NUTSHELL…**

Did you ever wonder why your helicopter can never stay straight when you center your cyclic stick? The reason why you always need to hold your stick to your left and towards you is because the lift generated by your rotor blade is not equal everywhere on your blades. Therefore, the lift profile is **not symmetric.** “Lift dissymmetry” is just other fancy ways to refer to this phenomenon.

“Retreating Blade Stall” is a major factor in limiting a helicopter's maximum forward airspeed. Just as the stall of a fixed wing aircraft wing limits the low-airspeed flight envelope, the stall of a rotor blade limits the high-speed potential of a helicopter.

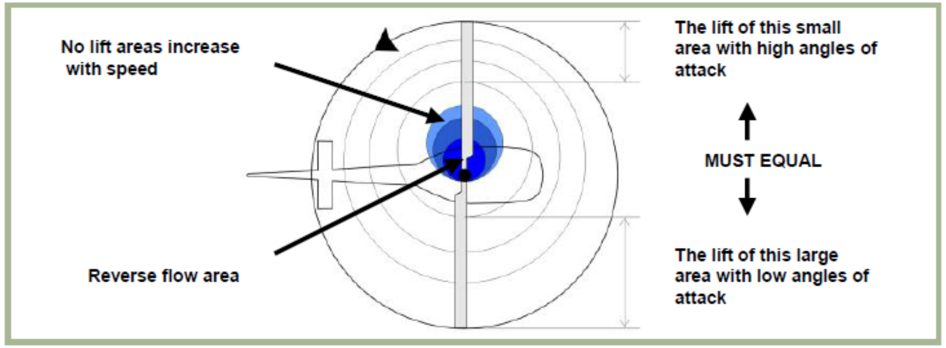



**Figure 3.8. Normal Cruise Lift Pattern**

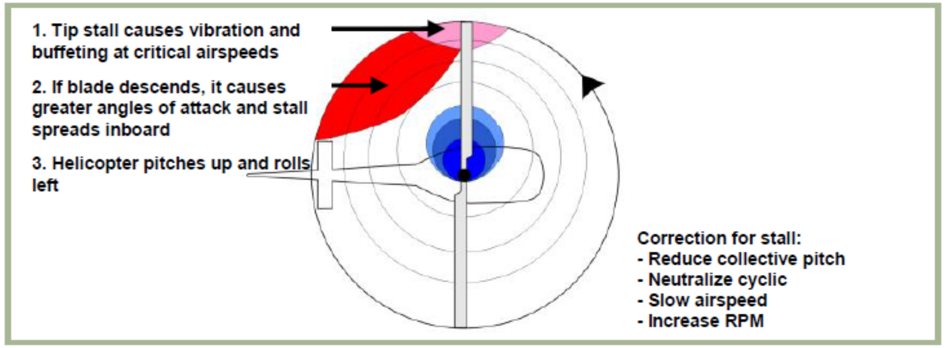



**Figure 3.9. Lift Pattern at Critical Airspeed**

## OGE VS IGE: UNDERSTANDING GROUND EFFECT

Ground effect is the increased efficiency of the rotor system caused by interference of the airflow when near the ground. The air pressure or density is increased, which acts to decrease the downward velocity of air. Ground effect permits relative wind to be more horizontal, lift vector to be more vertical, and induced drag to be reduced.

These conditions allow the rotor system to be more efficient. Maximum ground effect is achieved when hovering over smooth hard surfaces. When hovering over surfaces as tall grass, trees, bushes, rough terrain, and water, maximum ground effect is reduced. Rotor efficiency is increased by ground effect to a height of about one rotor diameter (measured from the ground to the rotor disk) for most helicopters. Since the induced flow velocities are decreased, the AOA is increased, which requires a reduced blade pitch angle and a reduction in induced drag. This reduces the power required to hover IGE.

The benefit of placing the helicopter near the ground is lost above IGE altitude, which is what we call OGE: Out of Ground Effect.

***IN A NUTSHELL…***

Ground Effect is what gives you additional lift when you are flying close to the ground. A hover, for instance, is much easier to maintain close to the ground torque-wise since ground effect is nullified at higher altitudes.

Ground effect is specially important on missions where you need to fly NOE (Nap-Of-Earth, where even lawnmowers dare not set foot).

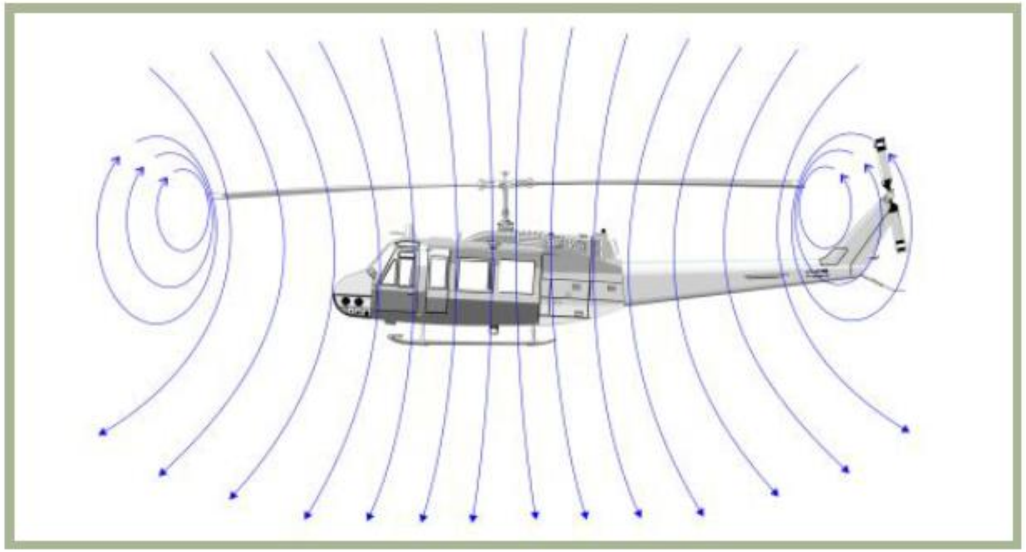


**Figure 3.13. Airflow When Out of Ground Effect**

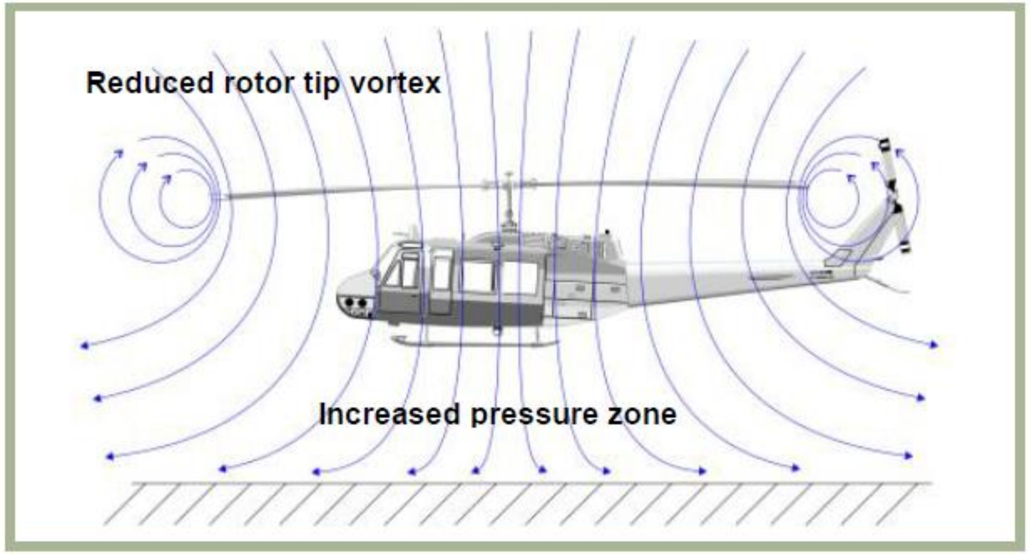



**Figure 3.14. Airflow When In Ground Effect**

# VORTEX RING STATE (VRS)

Vortex ring state describes an aerodynamic condition in which a helicopter may be in a vertical descent with 20 percent up to maximum power applied, and little or no climb performance. The term "settling with power" comes from the fact that the helicopter keeps settling even though full engine power is applied.

In a normal out-of-ground-effect (OGE) hover, the helicopter is able to remain stationary by propelling a large mass of air down through the main rotor. Some of the air is recirculated near the tips of the blades, curling up from the bottom of the rotor system and rejoining the air entering the rotor from the top. This phenomenon is common to all airfoils and is known as tip vortices. Tip vortices generate drag and degrade airfoil efficiency. As long as the tip vortices are small, their only effect is a small loss in rotor efficiency. However, when the helicopter begins to descend vertically, it settles into its own downwash, which greatly enlarges the tip vortices. In this vortex ring state, most of the power developed by the engine is wasted in circulating the air in a doughnut pattern around the rotor.

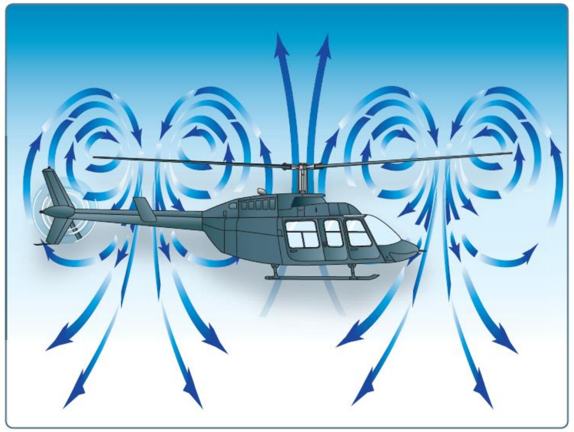


**Figure 11-5.** *Vortex ring state.*

A fully developed vortex ring state is characterized by an unstable condition in which the helicopter experiences uncommanded pitch and roll oscillations, has little or no collective authority, and achieves a descent rate that may approach 6,000 feet per minute (fpm) if allowed to develop.


# WHY SHOULD YOU CARE?

One of the biggest issues new pilots have is that they do not understand what VRS is, what it does, why it happens and how to counter it. In simple terms, if your airspeed is around 10-15 kts (which is the speed at which VRS usually occurs), you will experience a sudden loss of lift that will cause you to drop like a rock. VRS also occurs in situations where you have a descent rate of 500 ft/min or greater. More often than not, VRS happens when you are trapped in a column of disrupted air created by your own rotor blades, and this (unfortunately) often occurs at the most critical part of flight: on **LANDING.**

Oh, now I've got your attention? Good. One of the biggest problems Peter Pilots experience is to land their chopper. Even in real life, there are many pilots who do what we call a "hard landing" because they did not anticipate correctly the sudden loss of lift caused by VRS. A hard landing is when you impact the ground at a vertical speed that is too great, which causes structural damage to the skids, and possibly other structural components. The helicopter is not a total loss, but it will require extensive inspection and repairs, which costs time, money, and temporarily deprives the operator from one of its main sources of income.

Countering VRS is easy if you pay attention to your airspeed and descent rate. Once you enter VRS, raising the collective (which is instinctively what someone would do) will do nothing at best, or aggravate the situation at worst. To reduce the descent rate, you need to get out of that column of disrupted air. You counter VRS by pointing the nose down (or in any direction) to pick up some speed and get away from these nasty vortices.
Note: Many pilots confuse VRS with the inertia of your machine. If you come in too fast and raise your collective too slowly, it is to be expected that you will crash.

## MAST BUMPING

Mast bumping is generally a result of pilot induced over controlling of the cyclic leading to a negative G situation, however the negative G can also be caused by other factors without input by the pilot such as severe turbulence or a rapid lowering of the collective. It is a condition applicable to two bladed helicopters with a teetering rotor. Mast bumping is a result of the helicopters main rotor hub (head) making contact with the main rotor mast. The head literally 'bumps' the mast and can damage or snap it off. For this to happen excessive flapping of the disc must occur and this is impossible if the helicopter is flown within its designed tolerances.

### *Causes:*

Excessive flapping may be the result of

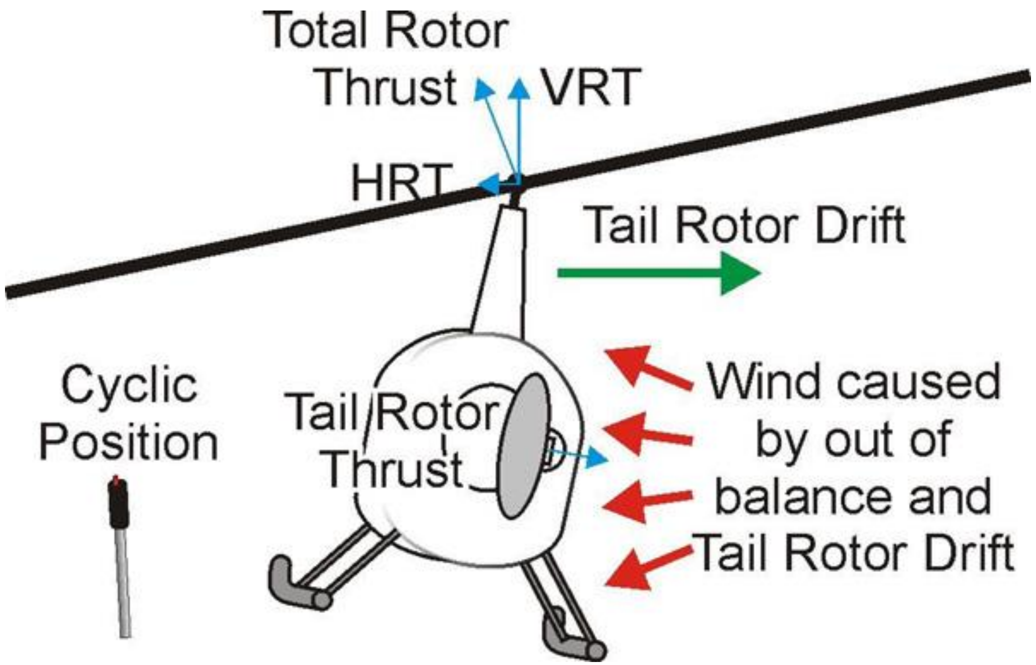
- Flight resulting in a negative or low G situation, this may be due to manoeuvring, turbulence or similar
- Sudden, abrupt and large changes made to the cyclic, especially in the fore/aft direction
- Sudden and unanticipated lowering (or dropping) of the collective
- Strong gusty winds (especially updraughts associated with hovering or landing on a cliff edge)
- Excessive sideways flight beyond the maximum allowable limits
- Landings on an excessive slope beyond the design limits of the helicopter

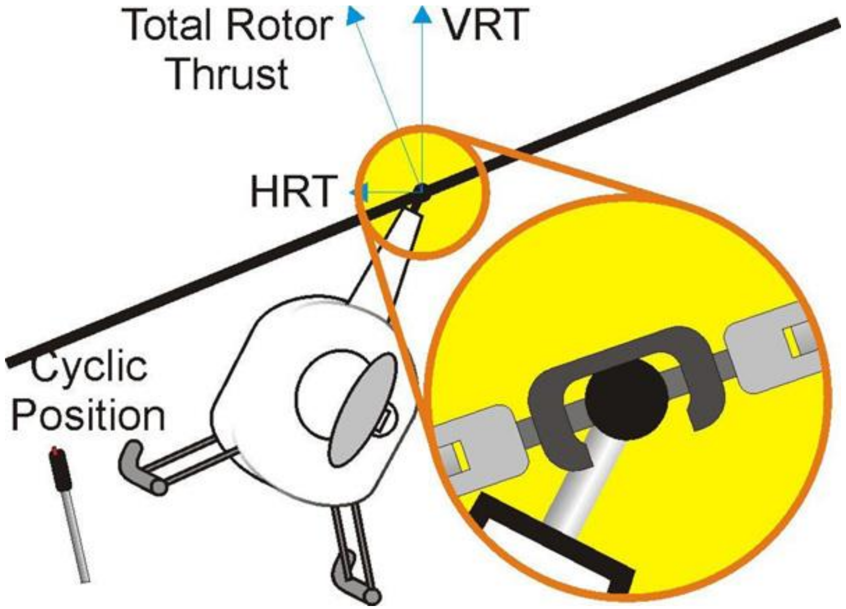
### *Corrective actions:*

Prevention is the best rule. Never get into a negative G situation in a two bladed helicopter system by intentionally using abrupt control inputs. If you do experience a negative G for any reason then the obvious solution is to reload the rotor disc so that you are experiencing positive G. This can be done by

- Using aft cyclic to increase the G force and use right cyclic to follow the roll
- Raise collective to increase the total rotor thrust and help increase the G force
- Once the G force has been restored then you can recover to straight and level flight.

A great video on mast bumping:
https://youtu.be/_QkOpH2e6tM



## AUTOROTATION

Autorotation is a flight state where your engine is disengaged from the rotor system and rotor blades are driven solely by the upward flow of air through the rotor. It can be caused by engine malfunction or engine failure, tail rotor failure or a sudden loss of tail rotor effectiveness.

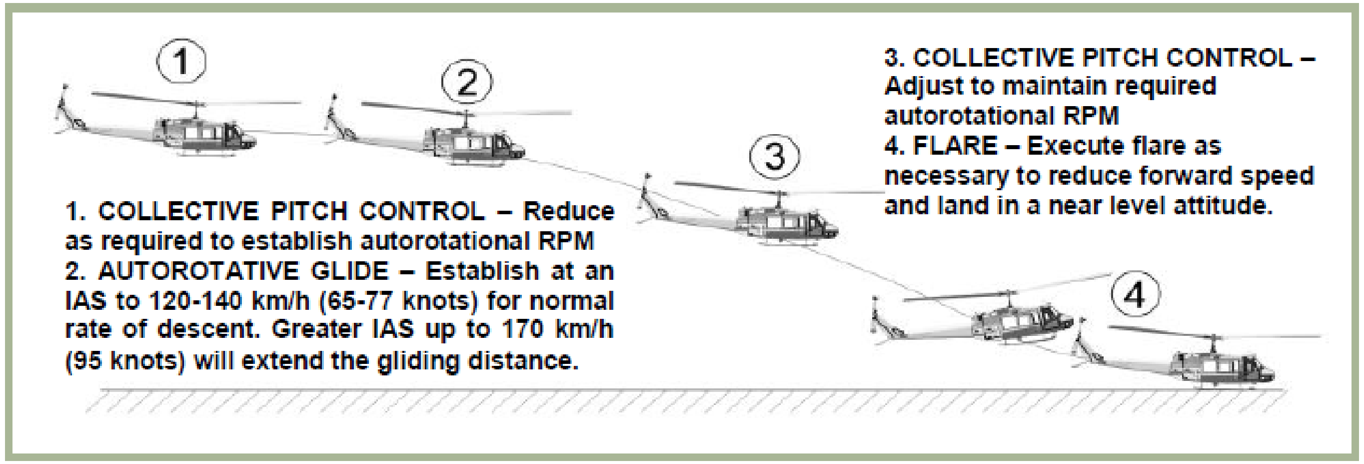



**Figure 3.16. Approach to Landing, Power Off**

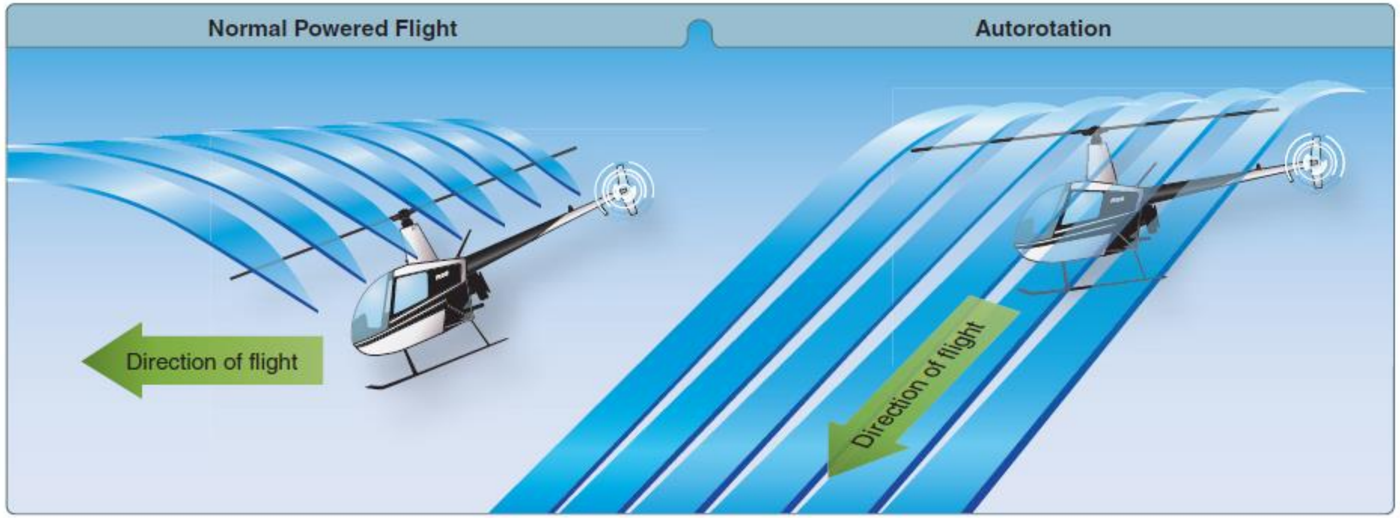



**Figure 11-1.** *During an autorotation, the upward flow of relative wind permits the main rotor blades to rotate at their normal speed. In effect, the blades are "gliding" in their rotational plane.*

# AUTOROTATION – CORRECTIVE ACTIONS

## WHY SHOULD YOU WANT TO SIMULATE AUTOROTATION?

Real life does not come with a "re-spawn" button. Life is imperfect: there is always a chance that you could lose engine power for a million reasons. In the world of DCS, odds are that you will be sent on dangerous (read: SUICIDAL) missions. Forget about milk runs: combat landings, close gunship support, CSAR… there are very high chances that you will be fired upon. With so much crap flying in the air, you are bound to get zinged by something. This is why if you enter in an autorotation state, you MUST know what you do.

## HOW TO SIMULATE AUTOROTATION

Autorotation can be simulated if you reduce your throttle to IDLE (hold PAGE DOWN until you get to IDLE position). Train yourself to deal with autorotation and you will be surprised to see how much better your flying will become.

## AUTOROTATION RECOVERY EXAMPLE:

1) Find a good place to land first and make sure you are at 1,500 ft or more.
2) Simulate engine loss of power by reducing throttle to IDLE-STOP (PAGE DOWN).
3) Push TRIM RESET switch
4) Immediately set the GOV (governor) switch to EMERGENCY, which will allow pilot to manually control engine RPM with the throttle (AUTO automatically controls engine RPM while in the FULL OPEN position).
5) Apply right rudder to center the slip ball, lower collective and pull up cyclic to compensate for sudden RPM loss: make sure the power turbine reaches 6600 RPM (green).
6) Adjust cyclic for a constant descent at 80 kts
7) Maintain 6600 RPM and 80 kts airspeed. You now have the choice between the three following recovery modes.

*8.1) RECOVERY MODE # 1: POWER RECOVERY* (throttle up, climb back up and resume flight)

   a) Once condition at step 7) is respected and you are high enough (400 ft or higher), throttle up to FULLY OPEN and raise collective to start climbing again.
   b) Set the GOV EMERGENCY switch to Auto.

*8.2) RECOVERY MODE # 2: TERMINATE WITH POWER* (throttle up, continue descent and land)

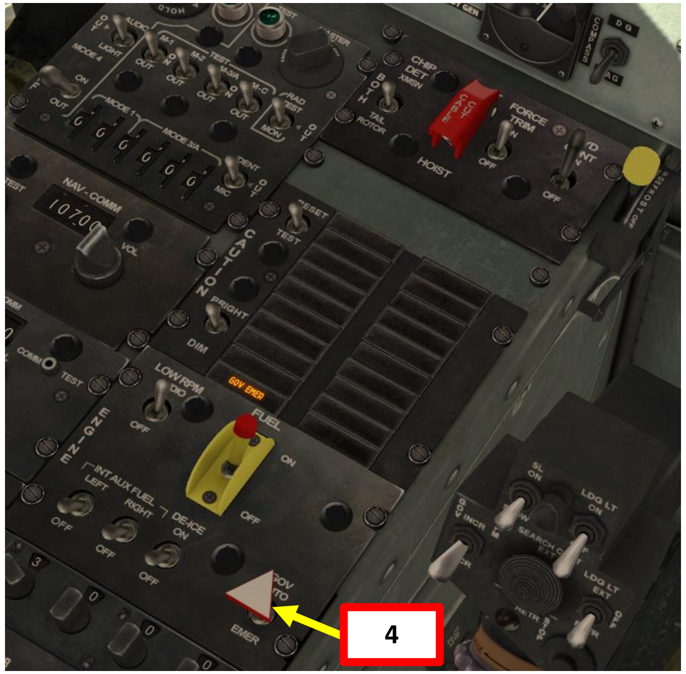
   a) Once condition at step 7) is respected , continue descent and throttle up to FULLY OPEN. Adjust collective to maintain 6600 RPM.
   b) At 100 ft AGL, apply aft cyclic to level out and decelerate. Descent rate should be around 500 ft/min.
   c) At 15 ft AGL, start flaring and raise collective with decision to cushion the landing: not too fast, not too slow.

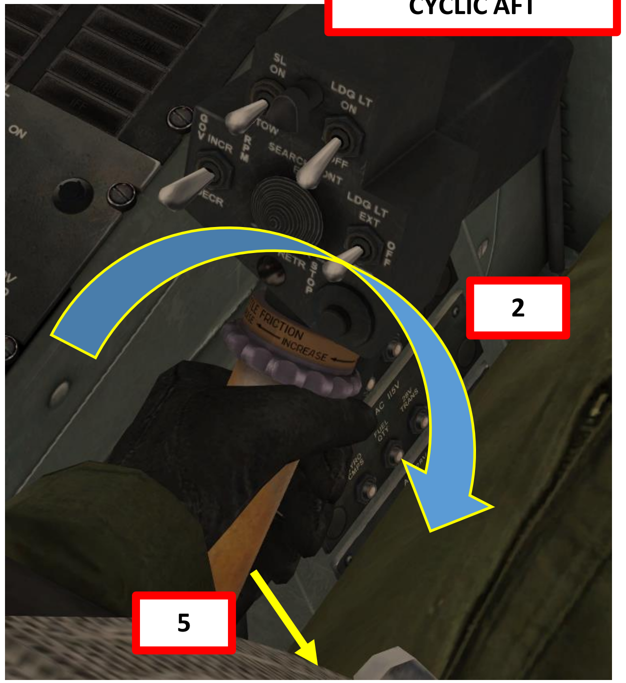
*8.3) RECOVERY MODE # 3: TOUCHDOWN* (no power, continue descent and land)

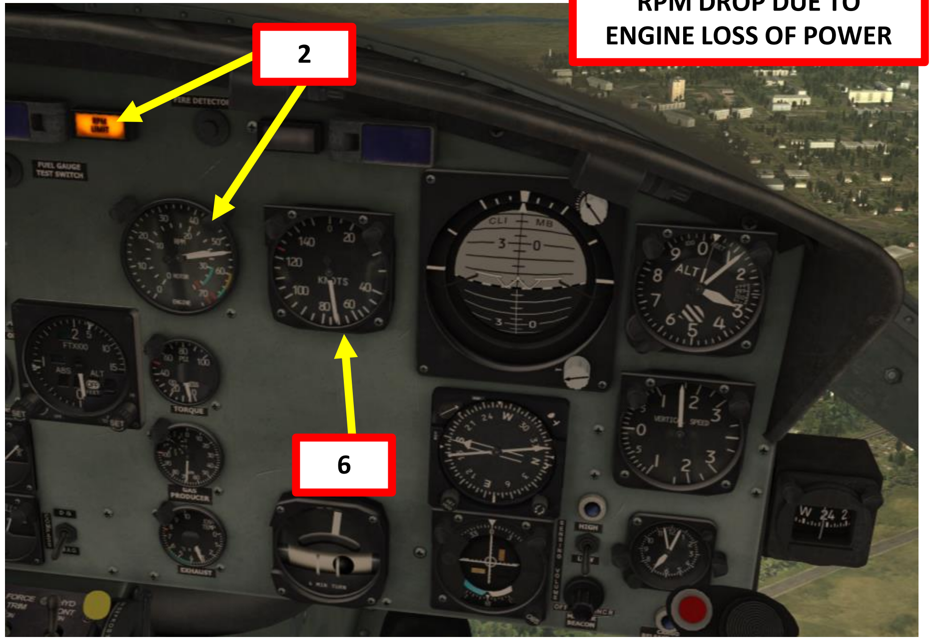
   a) Once condition at step 7) is respected , continue descent and do not touch throttle.
   b) At 100 ft AGL, apply aft cyclic to level out and decelerate. Descent rate should be around 500 ft/min.
   c) At 15 ft AGL, start flaring and raise collective with decision to cushion the landing: not too fast, not too slow.

Here is a video demonstration of a touchdown autorotation recovery by Furia, a real life helicopter pilot. The engine loss of power is simulated differently, but the recovery concepts are the same.
LINK: https://www.youtube.com/watch?v=u6UufhO2A9k

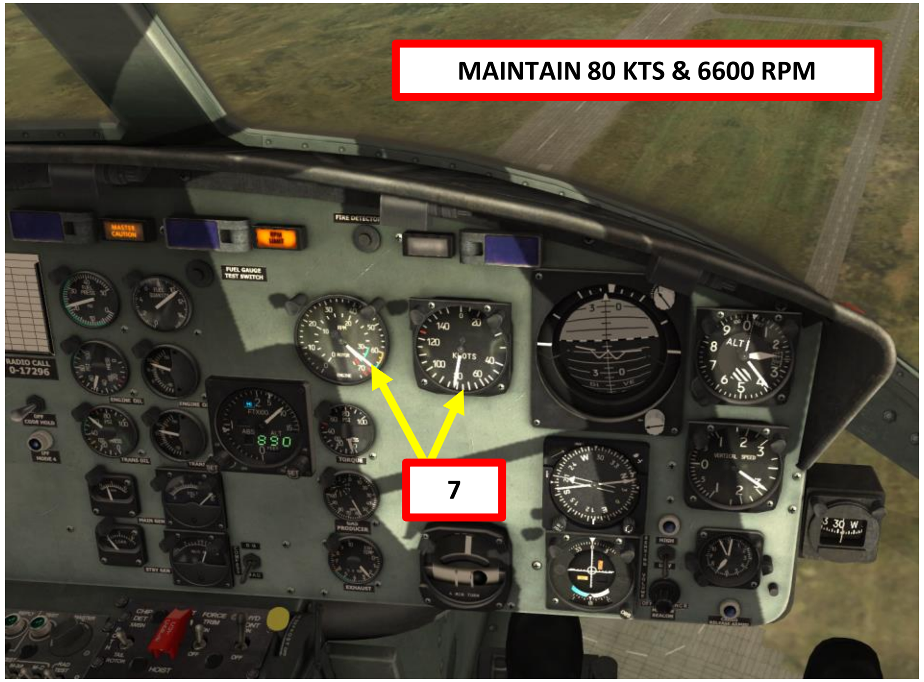
## AUTOROTATION – CORRECTIVE ACTIONS







## AIRCRAFT SPECIFICATIONS TABLE

| **A. AIRCRAFT** | **UNIT** | **UH-1H** |
|---|---|---|
| **B. NORMAL CREW** | per acft | 2 |
| **C. OPERATIONAL CHARACTERISTICS** | | |
| (1) Max allowable gross | lbs / kg | 9.500 / 4.309 |
| (2) Basic weight | lbs / kg | 5.914 / 2.683 |
| (3) Useful load | lbs / kg | 4.368 / 1.981 |
| (4) Payload/Normal mission | lbs / kg | 2.900 / 1.315 |
| (5) Fuel capacity internal | lbs/gal // kg/l | 1.358/204 // 616/770 |
| (6) Fuel consumption rate | lbs/gal/h // kg/l/h | 550/84 // 250/318 |
| (7) Normal cruise speed | kts / km/h | 90–120 / 160–220 |
| (8) Endurance at cruise (Plus 30 min reserve) | hrs+min | 2+15 |
| (9) Grade of fuel | octane | JP 4/5 |
| **D. PASSENGER CAPACITY** | | |
| (1) Troops seats | ea | 11 |
| (2) Total capacity with crew | ea | 13 |
| (3) Litters and ambulatory | ea | 13 |
| **E. EXTERNAL CARGO** | | |
| (1) Maximum recommended | lbs / kg | 4.000 / 1.814 |
| (2) Rescue hoist capacity | lbs / kg | 300 / 136 |

# A FEW RULES OF THUMB

a) One PSI torque equals about 200 pounds of weight lift capacity.

b) Approximately ¾ PSI of torque is lost for every 1000 foot gain in altitude.

c) For every 3 degree C rise in OAT, about 1 to 1.5 PSI torque is lost.

d) Approximately 5 PSI more torque is required for OGE hovering as compared to IGE hovering.

e) About 17.5 pounds per hour, per PSI of torque is normal cruise power fuel consumption.

f) Do not attempt a battery start if the static voltage is 21 VDC or lower.

g) At a given power there is about 1000 pound load difference in OGE versus IGE hovering ability.

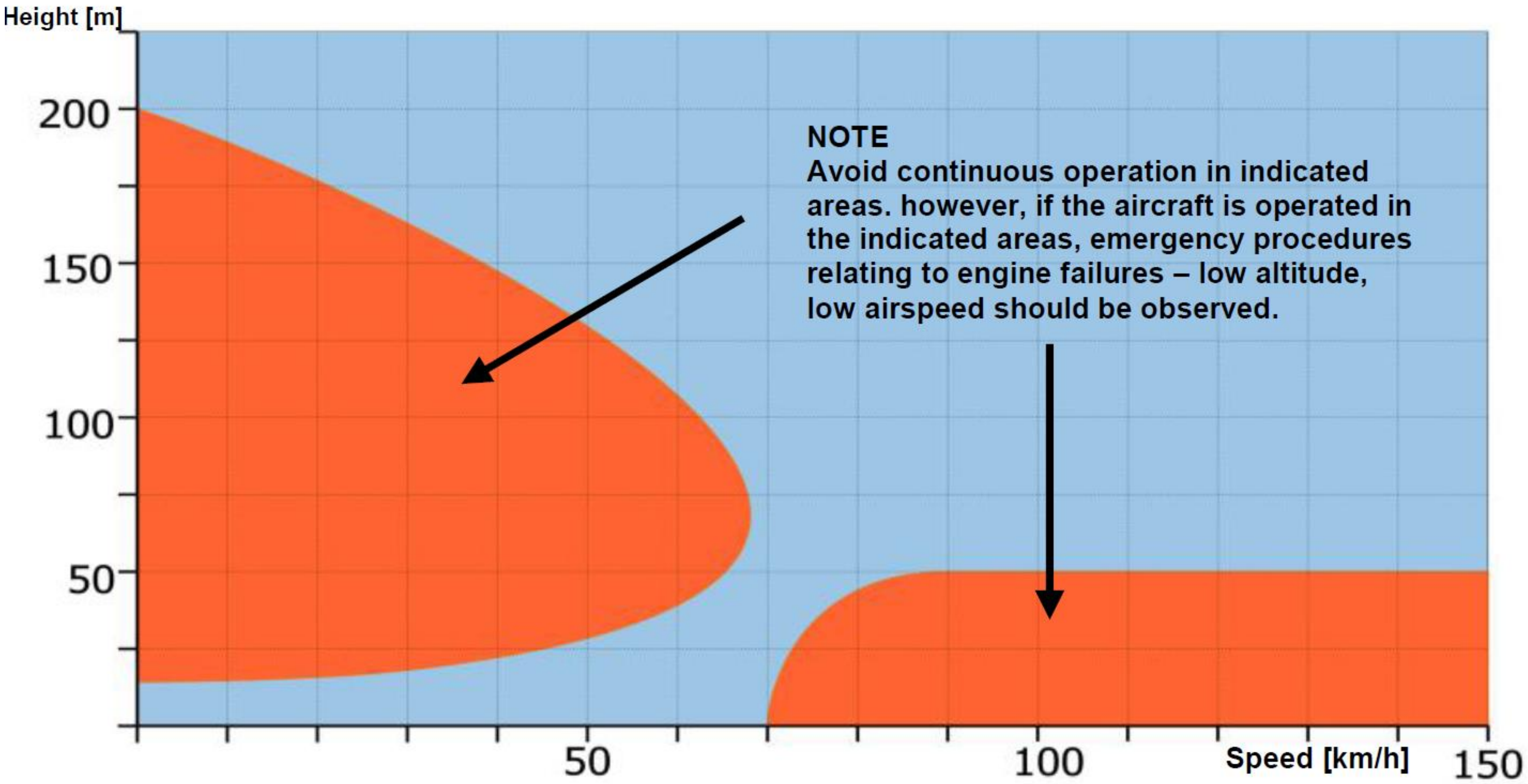
h) With about a 15 degree decrease in Oat, the following will happen:
   - Auto revs will decrease about 1 turn (10 rpm)
   - Flight idle can decrease about 1 – 1.5 % N1
   - The beep range will lower on both ends
   - The RPM warning box settings can change
   - DC voltage will change slightly
   - Maximum N1 available changes
   - The bleed band range can change

In high wind conditions, land with the right side of the helicopter into wind to keep the low flapping blade away from the tail boom at low rotor RPM.

## FLIGHT ENVELOPE: HEIGHT VS SPEED & "DEAD MAN'S CURVE"

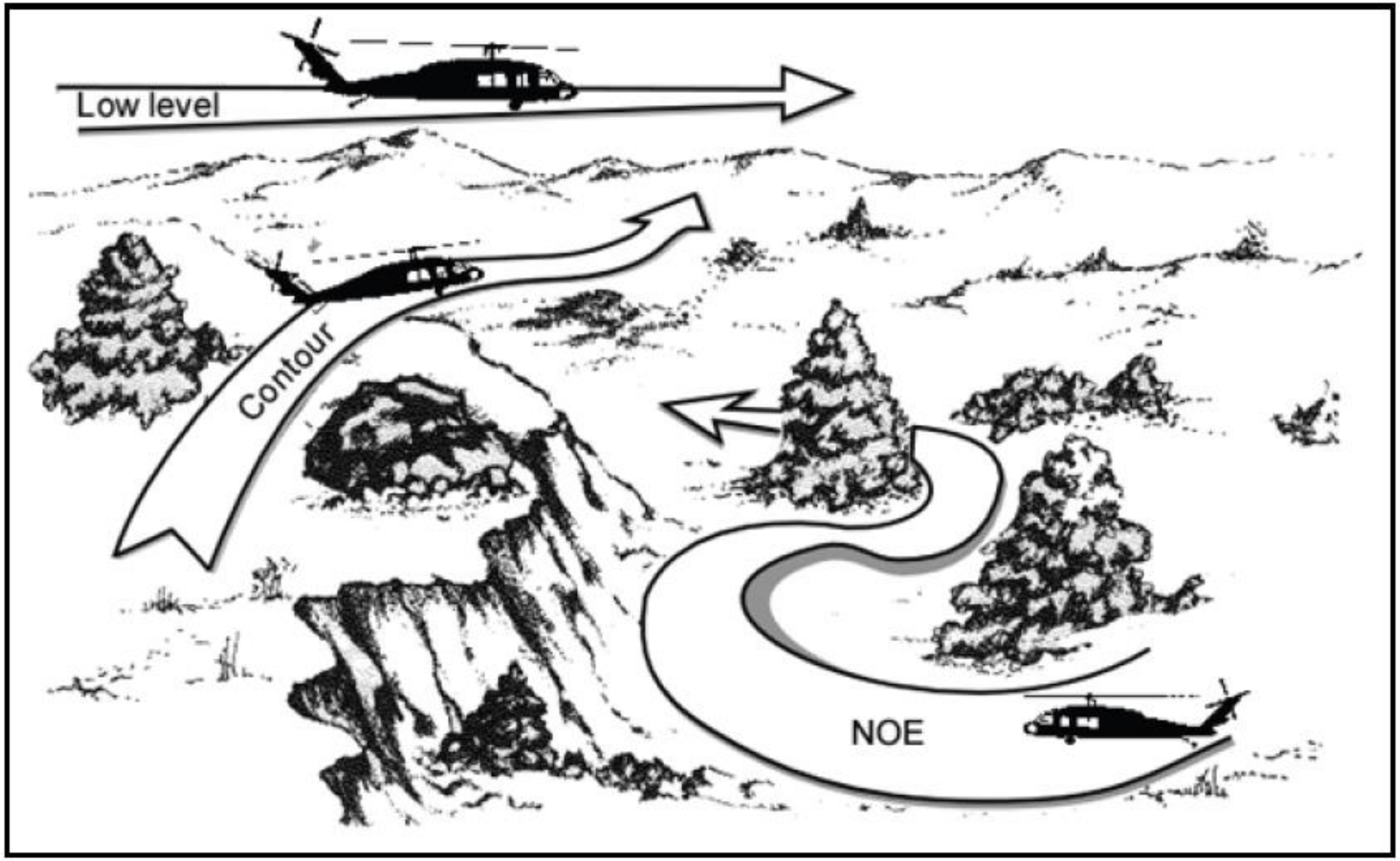
All helicopters carry an operator's manual that has an airspeed versus altitude chart similar to this one. The shaded area on this chart must be avoided. It is often referred to as the "dead man's curve" and "avoid curve". Proper manoeuvres for a safe landing during engine failure cannot be accomplished in these areas.

## RECOMMENDED SPEEDS: 90 kts for cruise, 70 kts for climbing

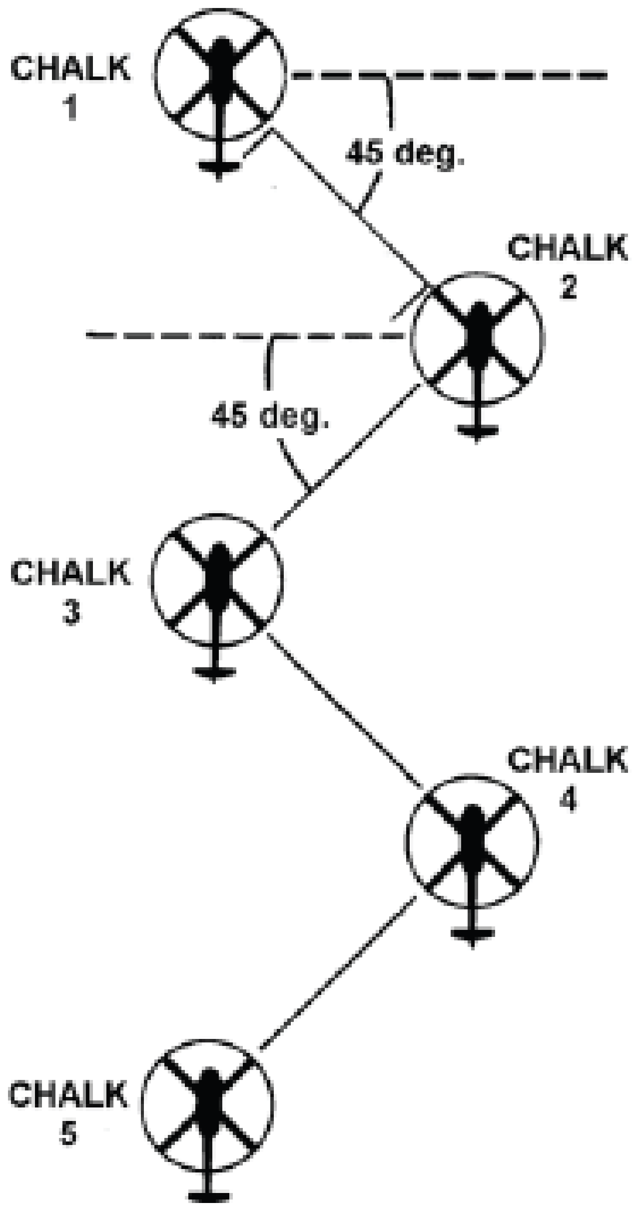


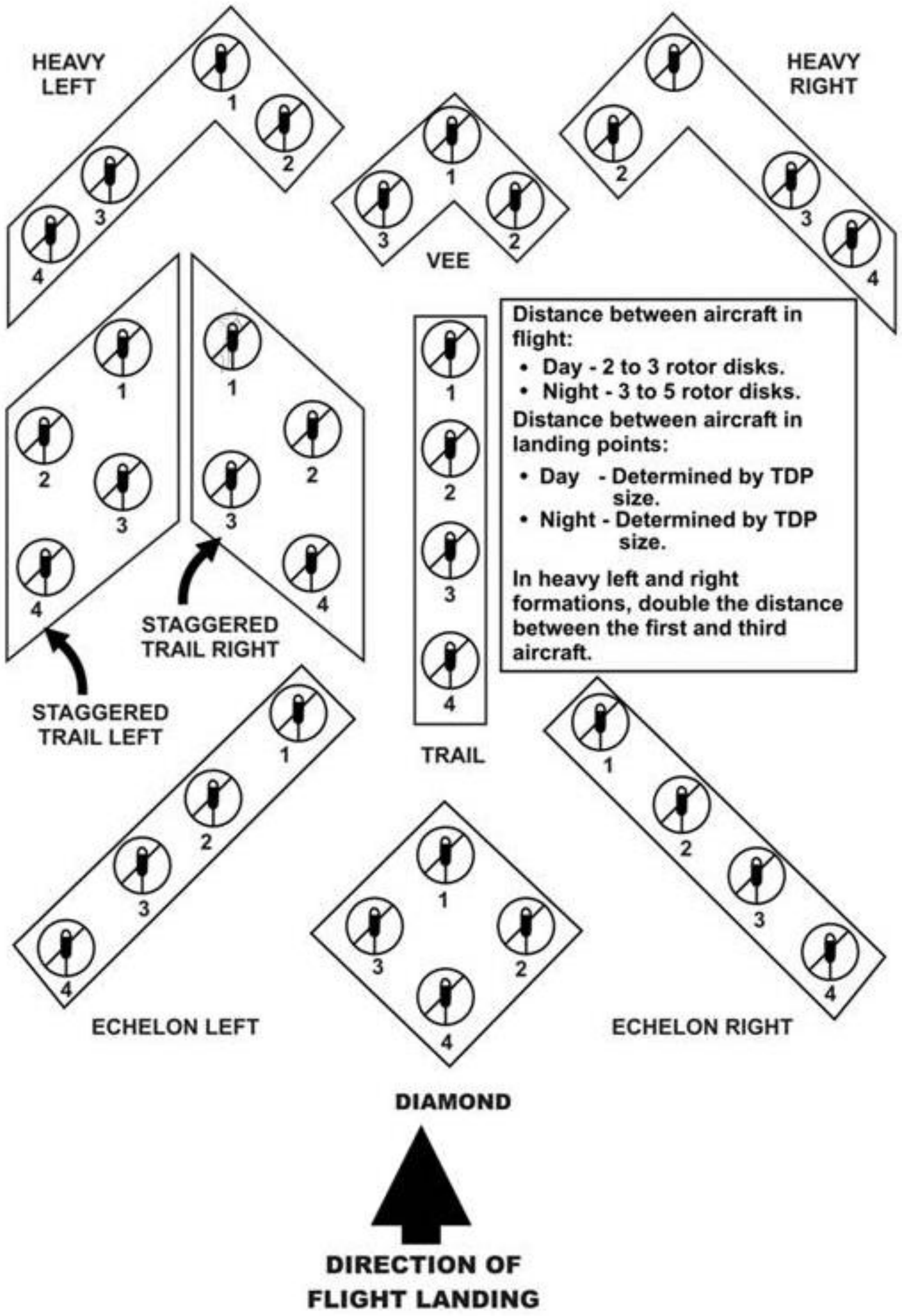
# FLIGHT MODES

Mission planning is a crucial part of flying helicopters. Airmobile operations will often require you to drop troops at a designated LZ (landing zone). The flight path to reach this LZ should be as safe as possible. The Huey can neither fly fast nor high, therefore his safest routes will often be as close to the ground as possible in order to avoid detection and use terrain to mask his approach. “NOE” is what pilots call “Nap-of-the-Earth”, a very low altitude flight mode done in a high-threat environment. NOE flying minimizes detection and vulnerability to enemy radar.



## FORMATIONS


CHALK
1
45 deg.
CHALK
2
45 deg.
CHALK
3
CHALK
4
CHALK
5


HEAVY
LEFT
VEE
HEAVY
RIGHT
STAGGERED
TRAIL LEFT
STAGGERED
TRAIL RIGHT
TRAIL
Distance between aircraft in flight:
• Day - 2 to 3 rotor disks.
• Night - 3 to 5 rotor disks.
Distance between aircraft in landing points:
• Day - Determined by TDP size.
• Night - Determined by TDP size.
In heavy left and right formations, double the distance between the first and third aircraft.
ECHELON LEFT
DIAMOND
ECHELON RIGHT
DIRECTION OF
FLIGHT LANDING

# TROOP DEPLOYMENT

Transport helicopters are called "**slicks**". Since slicks carry troops and are not heavily armed, they are often escorted by gunships.

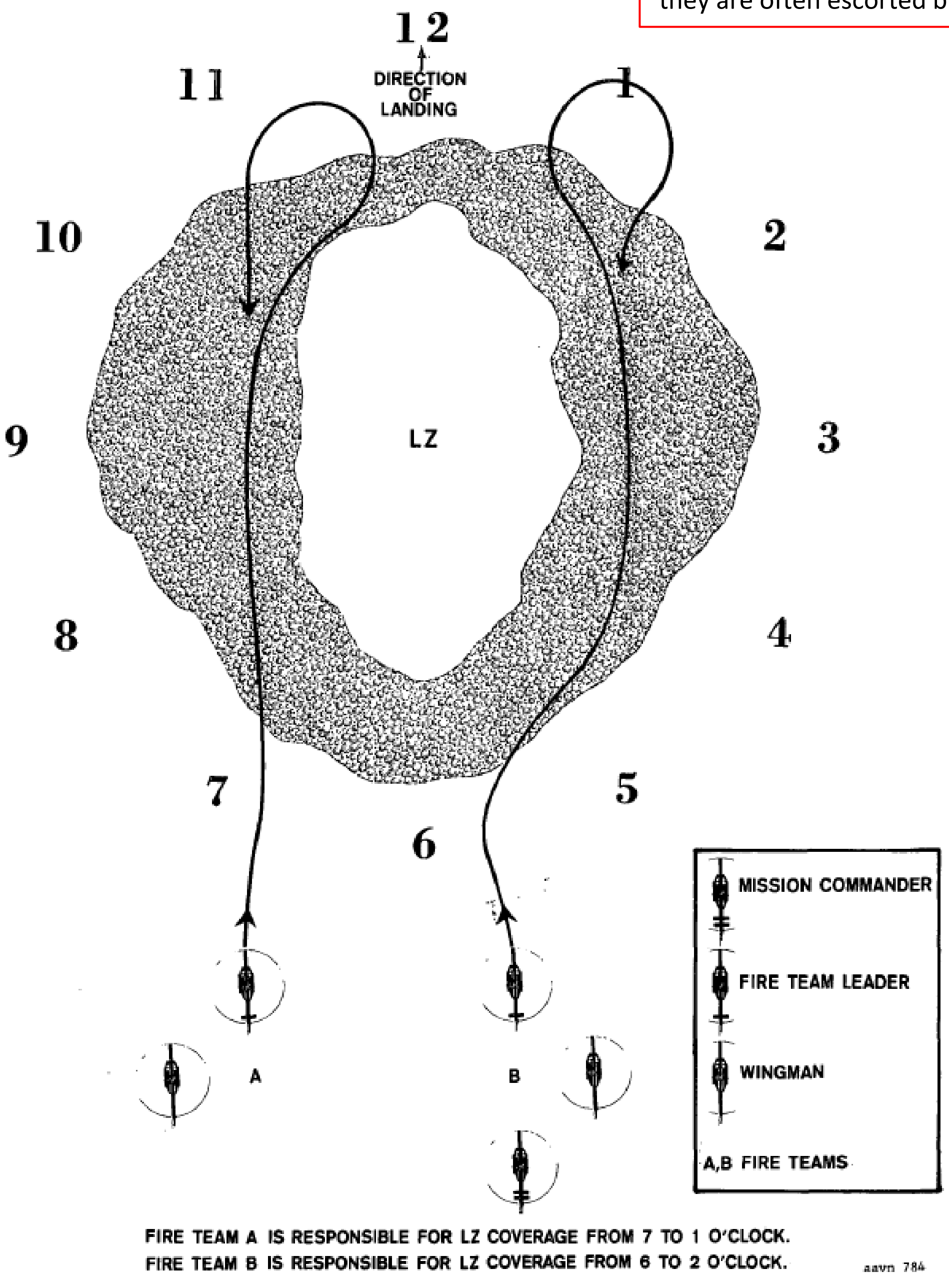



*Figure 26. Double orbit of the landing zone.*

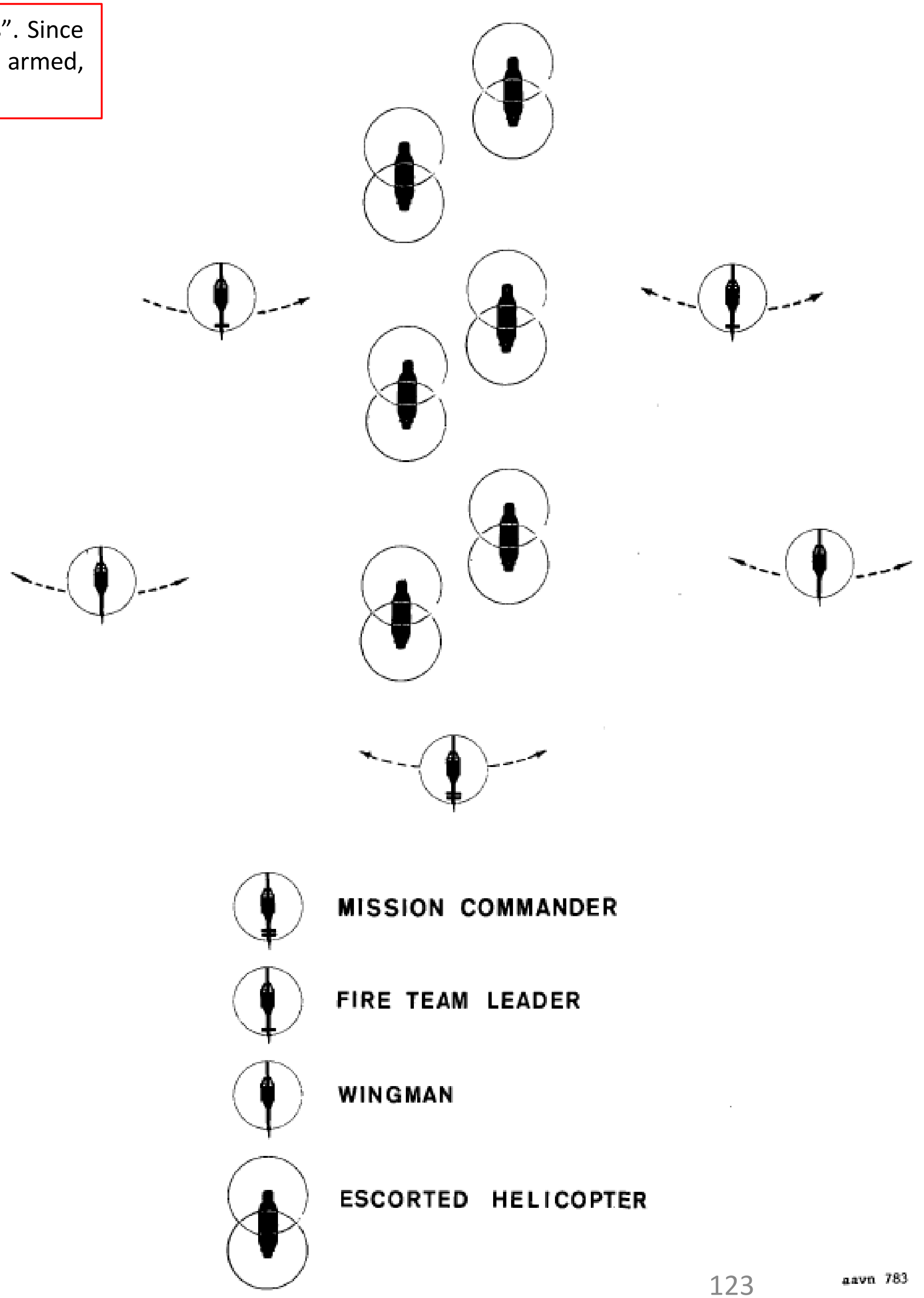
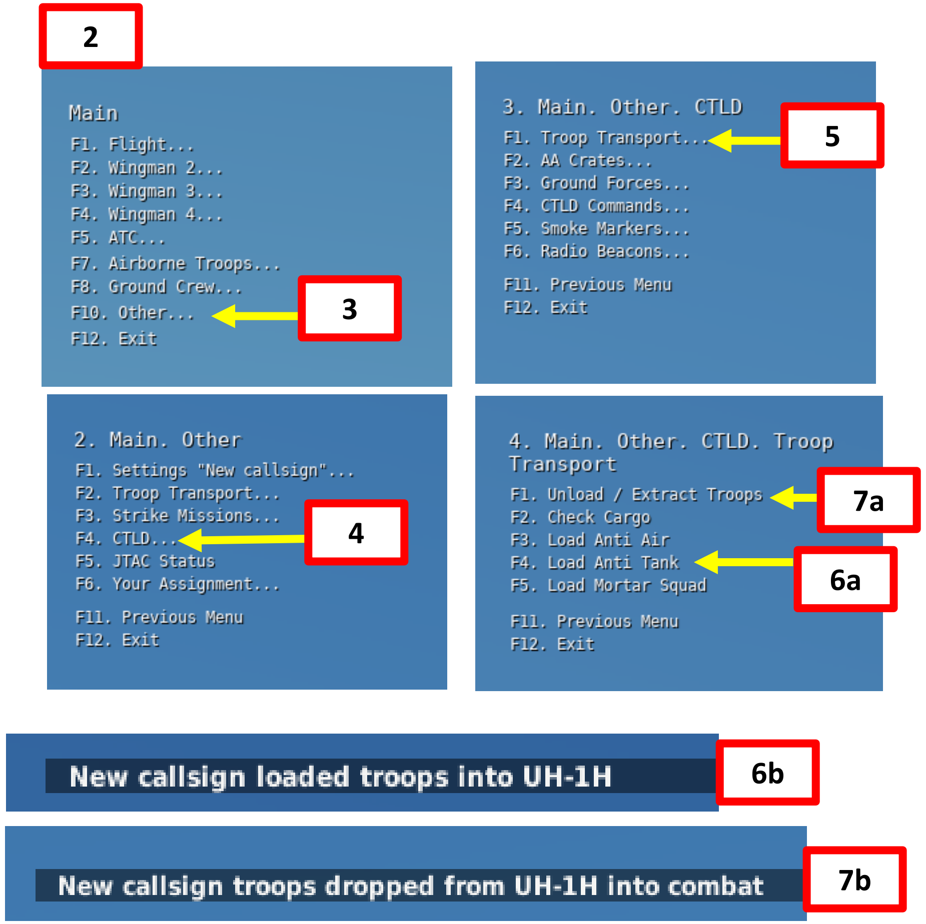



*Figure 25. Escort formation at tree-top level or nap-of-the-earth.*

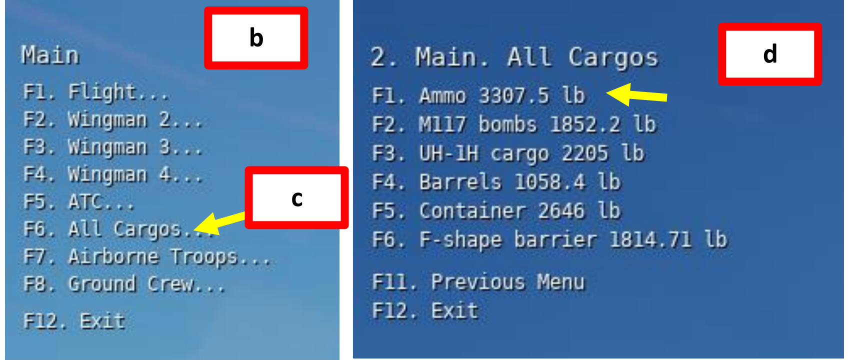
# HOW TO LOAD AND DROP TROOPS (CTLD SCRIPT)

1) Land next to ground troops
2) Press "\" to open the main menu
3) Press "F10" to select Other
4) Press "F3" to select CTLD
5) Press "F1" to select Troop Transport
6) Select troops you want to load by pressing either "F3", "F4", "F5" or "F6".
7) To Unload / Extract Troops, repeats steps 2) through 5), then press "F1"

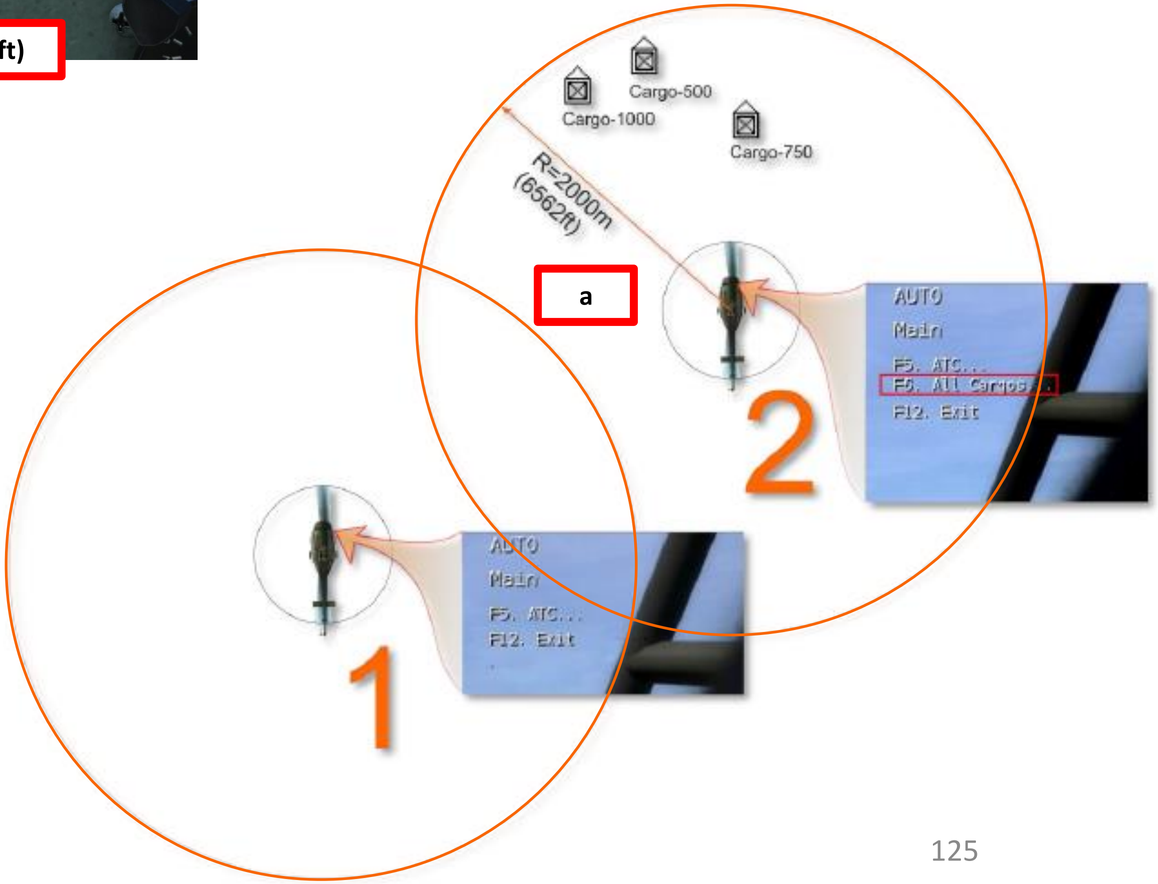



## SLING LOADS

a) Land next to cargo crates
b) Press “\” to open the main menu
c) Press “F6” to select ALL CARGOS
d) Press the key specified to choose the cargo you will pick. Its location will be identified by a red smoke.
e) Hover about 10 ft above the target. The copilot will give you corrections (i.e. “Forward, Left.”). Use the Radar altimeter as an altitude reference.


Cargo selection menu appearance depends on distance to cargo



# SLING LOADS

f) Press **External Cargo Hook** key binding (RCtrl+Rshift+L) to request a ground crew to attach cargo to the hoist cable.

g) When the Copilot tells you "Take Tension", raise collective to gain altitude and create tension on the hoist cable. You will then be able to fly away with the sling load.


| Action | Category | Keyboard | Throttle - HOTAS... |
| --- | --- | --- | --- |
| External Cargo Autounhook | External Cargo | RCtrl + RShift + K | |
| External Cargo CoPilot Unhook | External Cargo | | |
| External Cargo Hook | External Cargo | RCtrl + RShift + L | JOY_BTN7 |
| External Cargo Indicator | External Cargo | RCtrl + RShift + P | |
| External Cargo Pilot Unhook | External Cargo | | JOY_BTN8 |
| External Cargo Safety | External Cargo | | |
| External Cargo Unhook | External Cargo | RCtrl + RShift + ; | |



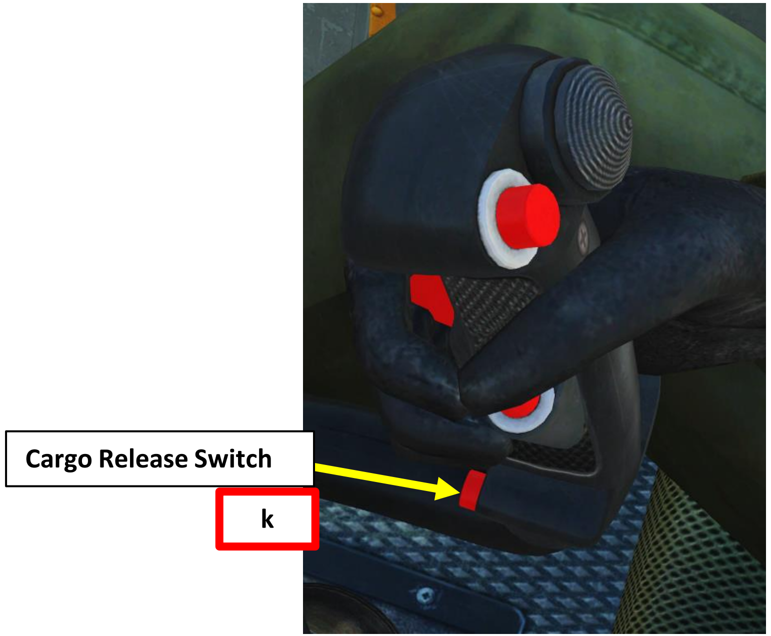
## SLING LOADS

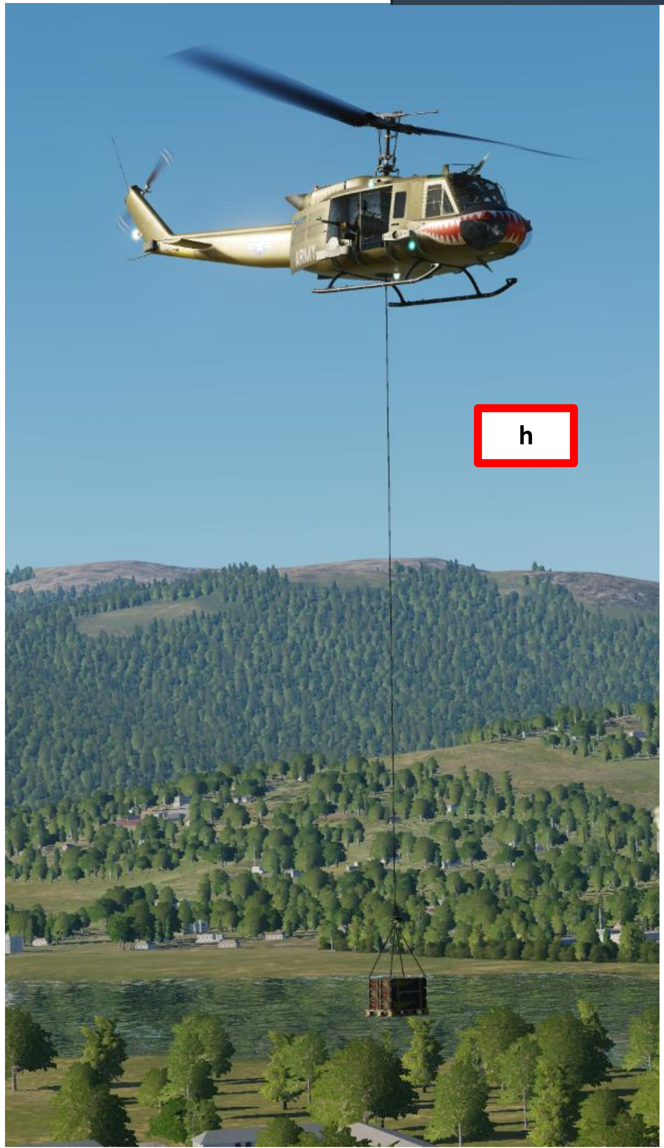
h) When you fly, be mindful of the pendulum effect the cargo will have. Do not make hard turns or the hoist cable will snap.

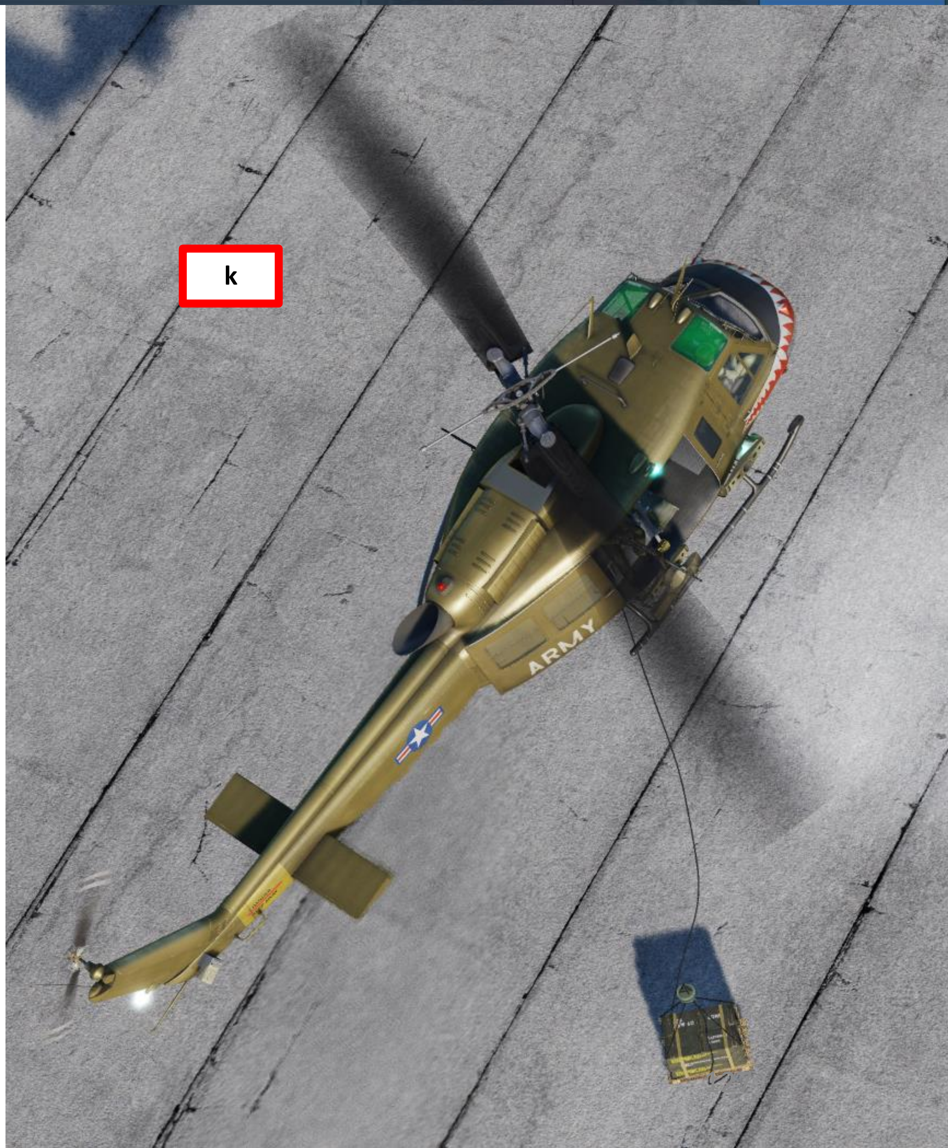
i) To drop cargo, maintain a hover above drop zone (DZ)

j) Set Cargo Release Switch to ARM

k) On the collective, unhook the cargo by pressing the **External Cargo Pilot Unhook** key (RCtrl+Rshift+;) binding to detach cargo.

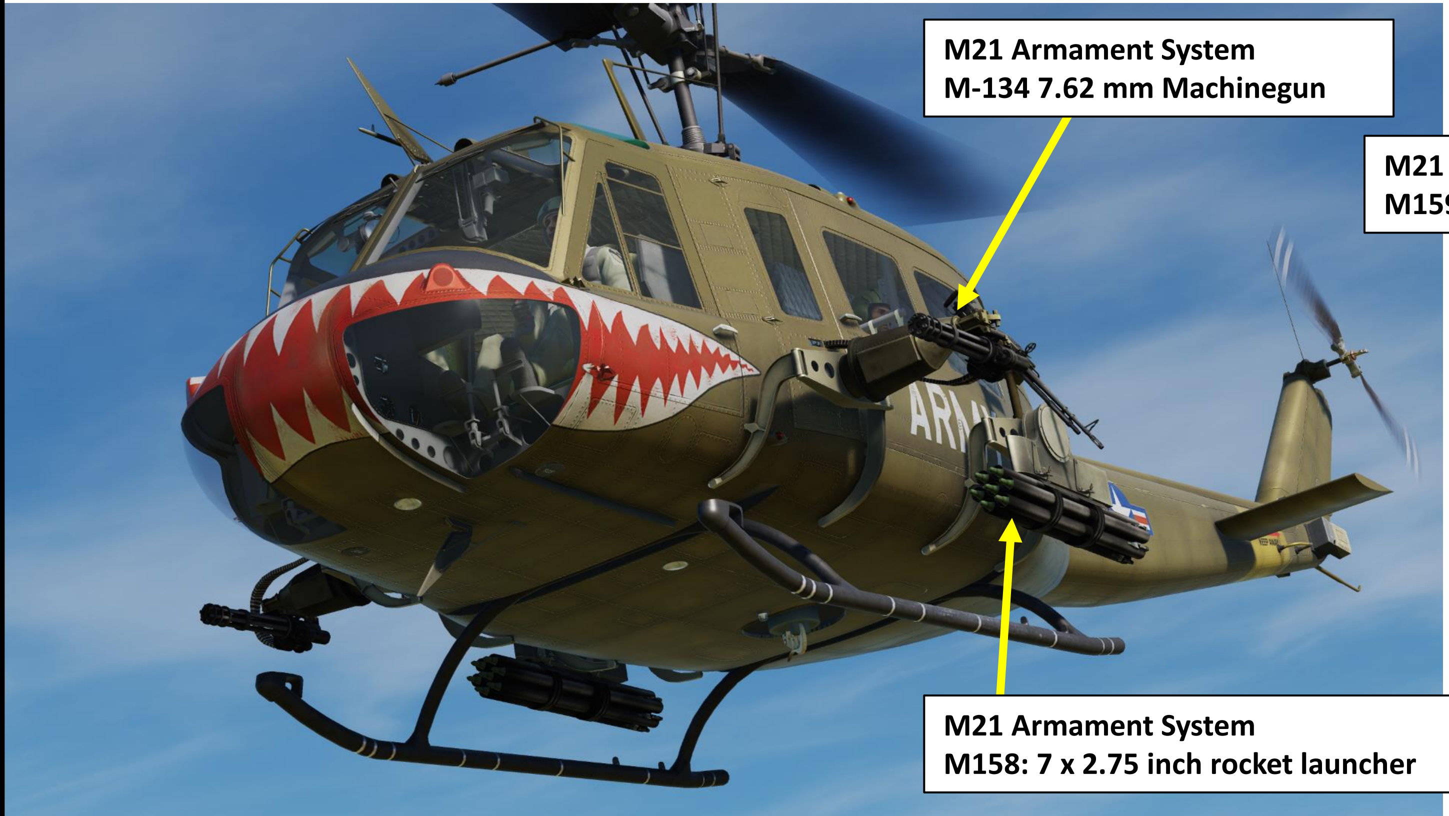



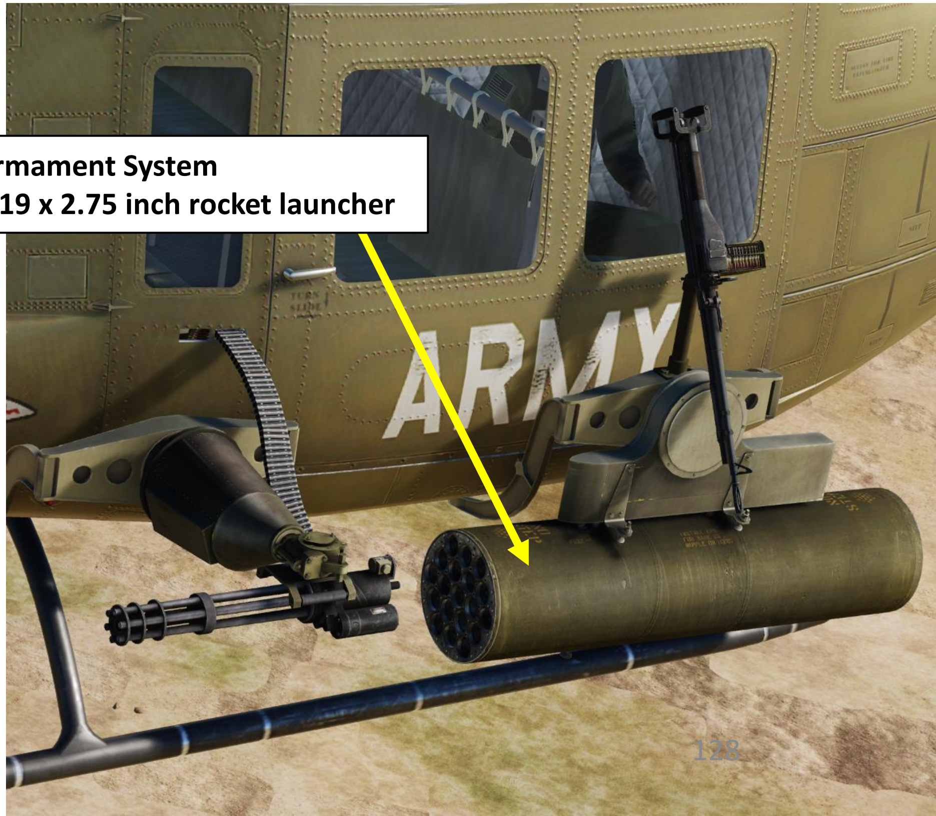
# ARMAMENT OVERVIEW

The Huey can equip the following weapons:

- 2 x M-134 Frontal Miniguns (5400 rounds total, 7.62 mm), useable by both pilot (XM60 Reflex fixed sight) or copilot (flexible sight)
- 2 x Side Door Guns
    - M-134 Miniguns (2 x 3200 rounds, 7.62 mm)
    - M-60D Machineguns (2 x 750 rounds, 7.62 mm)
- 2 x FFAR (Folding Fin Aerial Rocket) Pods
    - M158 Rockets (7 per pod, 2.75 in)
    - M159 Rockets (19 per pod, 2.75 in)

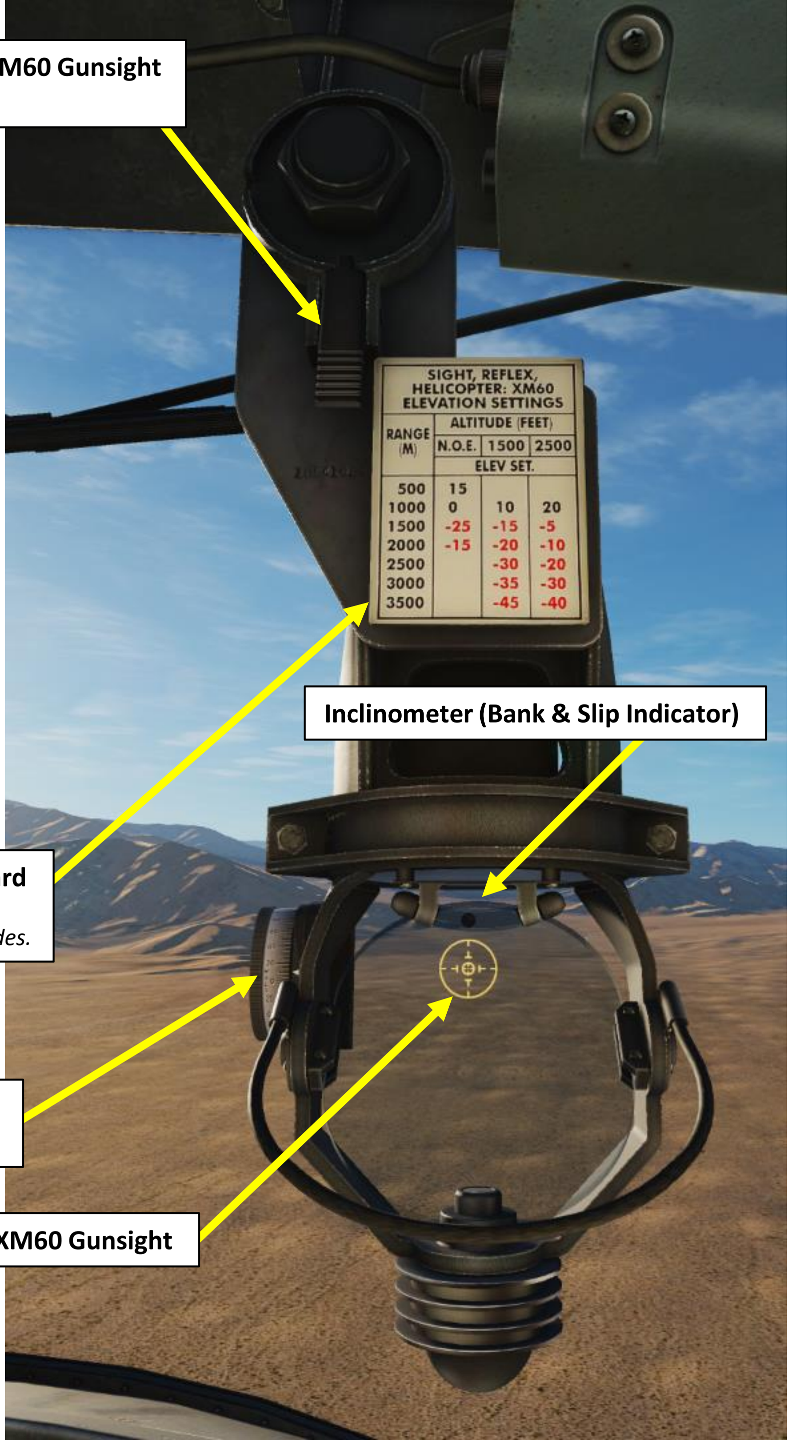


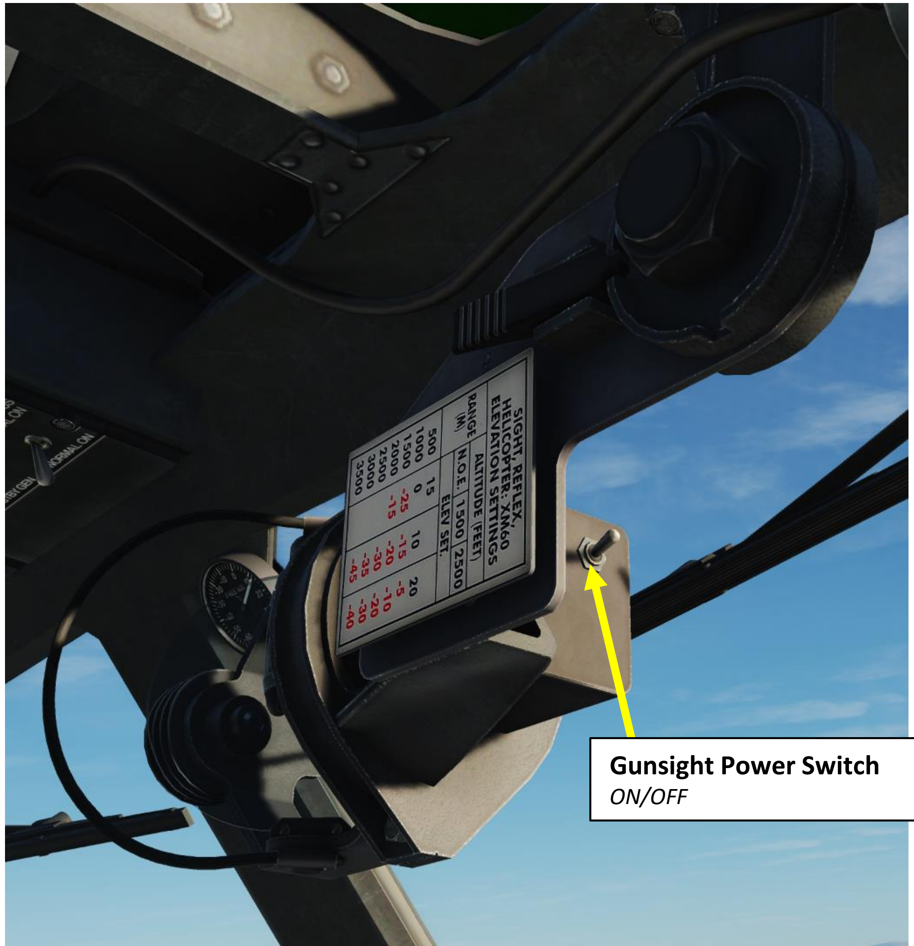


# XM60 REFLEX (FIXED) SIGHT

The XM60 Reflex Sight is fixed and can be used for frontal miniguns and rockets.

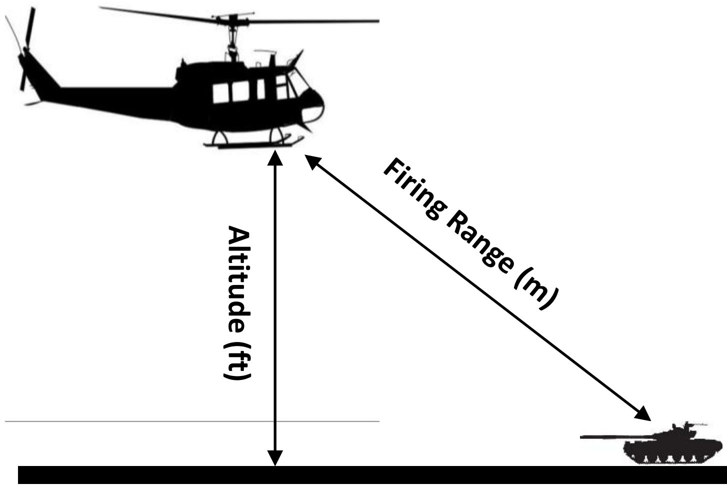



# XM60 REFLEX (FIXED) SIGHT

In order to use the sight effectively, there are three important aspects to consider:

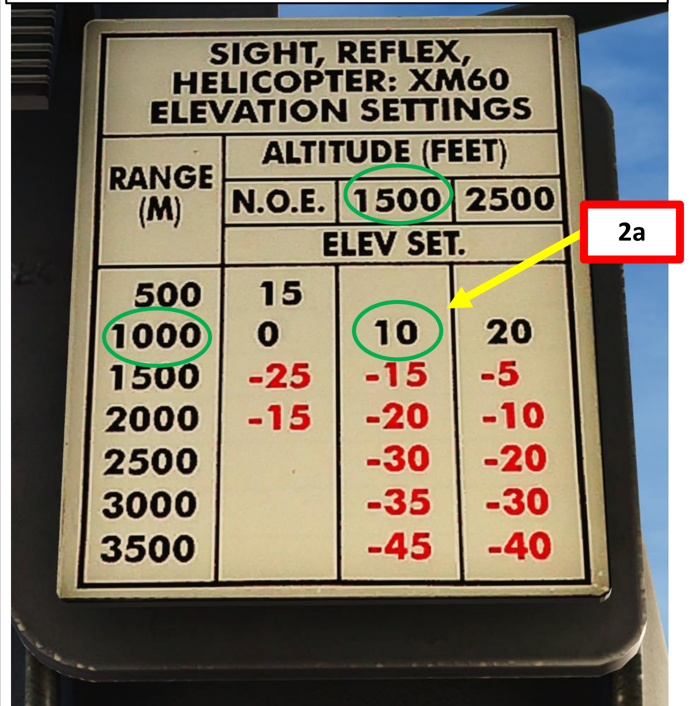
1. Determine what firing range you want to use for your weapons (i.e. 1500 meters)
2. Set the depression angle of the sight based on the ELEVATION SETTINGS table, which is a function of firing range/distance (slant range) and altitude.
3. Calculate the size of the target (a T-72 tank is 7 meters long and about 5 mil (milliradians) wide on the fixed sight for a range of 1500 meters).




**Gunsight Elevation Settings Placard**

*Table for N.O.E. (Nap of the Earth, very low altitude), 1500 ft and 2500 ft altitudes.*

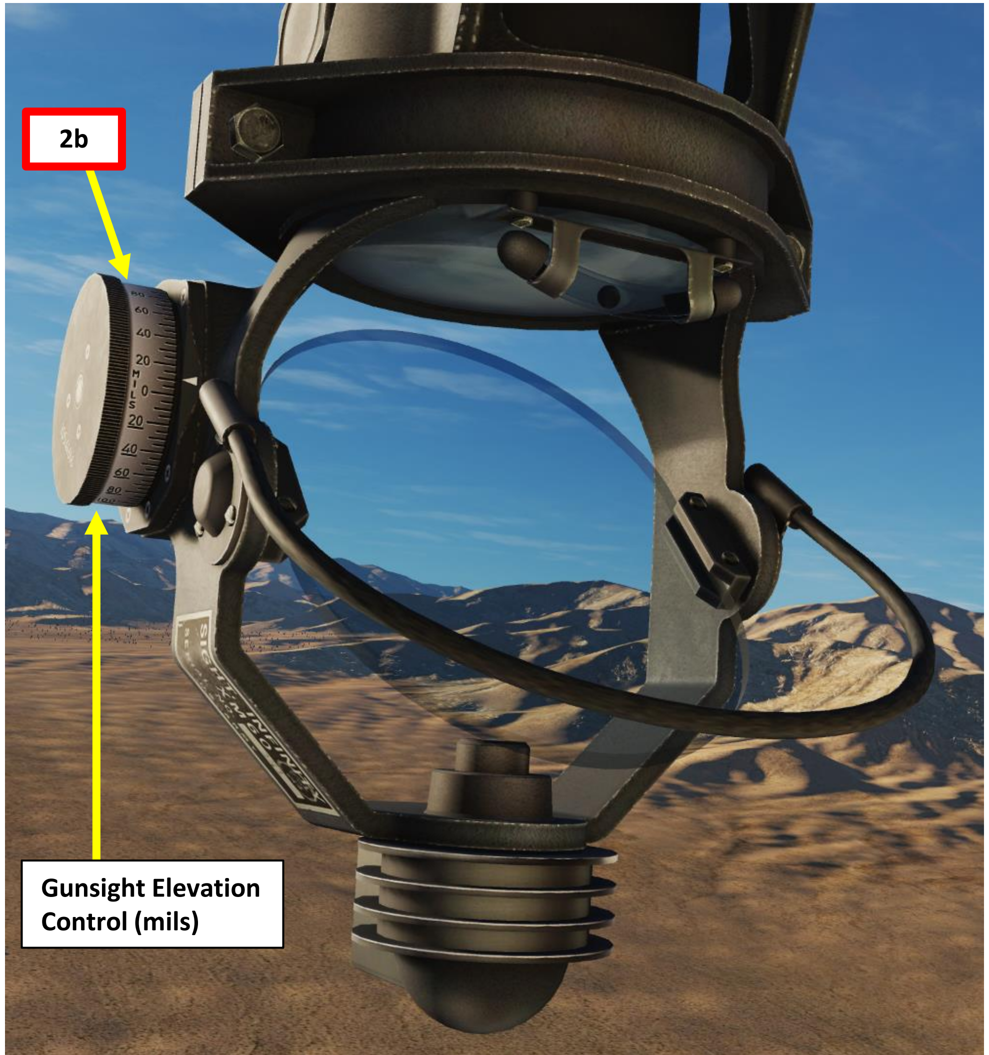
*Example: with altitude of 1500 ft and a slant range of 1000 meters, a Gunsight Elevation needs to be set to +10 mils.*

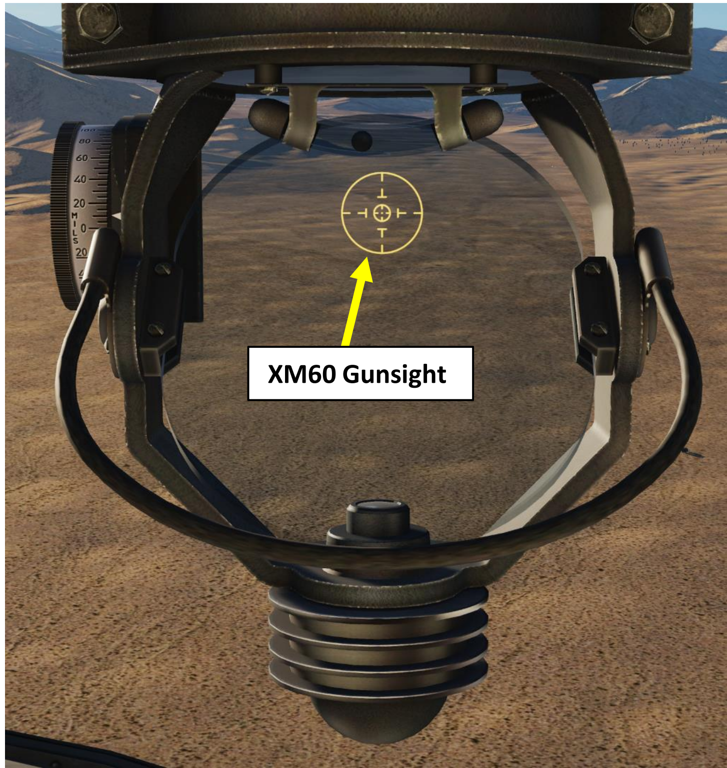


SIGHT, REFLEX, HELICOPTER: XM60 ELEVATION SETTINGS

| RANGE (M) | ALTITUDE (FEET) N.O.E. | 1500 | 2500 |
|---|---|---|---|
| | ELEV SET. | | |
| 500 | 15 | | |
| 1000 | 0 | 10 | 20 |
| 1500 | -25 | -15 | -5 |
| 2000 | -15 | -20 | -10 |
| 2500 | | -30 | -20 |
| 3000 | | -35 | -30 |
| 3500 | | -45 | -40 |





# XM60 REFLEX (FIXED) SIGHT

Now… how do we know when the target is in range to fire? Typically, you choose a firing range/distance first (as an example, 1500 meters), then place the fixed sight on the target and approach until it fits reference marks in “mils” (milliradians, which is an angle) for the desired firing distance.

As an example, let’s take a T-72 tank, which has a length of 7 meters.

There is a rule in trigonometry that states that “in a right triangle, the tangent (tan) of an angle is the length of the opposite side divided by the length of the adjacent side”. For very small angles, simplifications can be made. I’ll spare you the math, but the bottom line is:

$$\frac{\theta}{2} = \arctan\left(\frac{L/2}{D}\right)$$

$$\text{For small angles, arctan}\left(\frac{L/2}{D}\right)\ \textit{can be approximated to}\ \frac{L/2}{D}$$

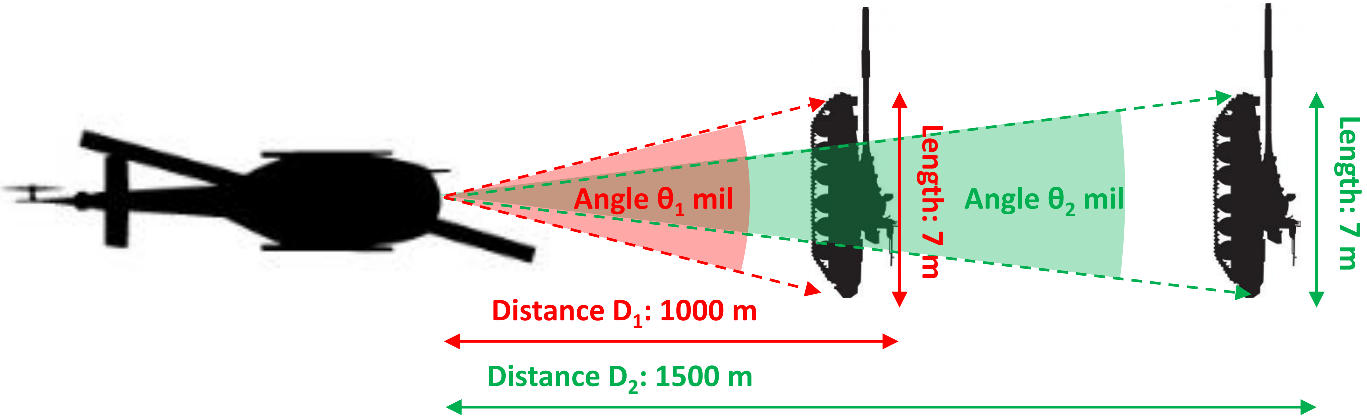
$$\text{Therefore: } \theta = \frac{L}{D}$$

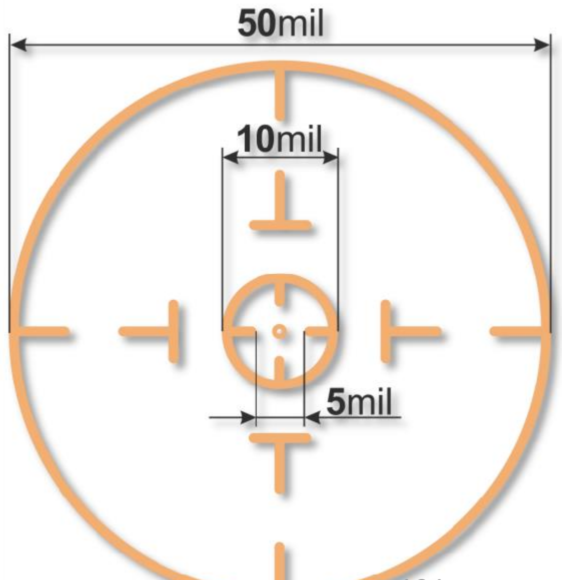
For a target with a length $L_1$ = 7 m at a distance $D_1$ of 1000 m:

$$\theta_1 = \frac{L_1}{D_1} = \frac{7\ m}{1000\ m} = 0.007\ rad = 7\ mil\ (milliradians)$$

For a target with a length $L_2$ = 7 m at a distance $D_2$ of 1500 m:

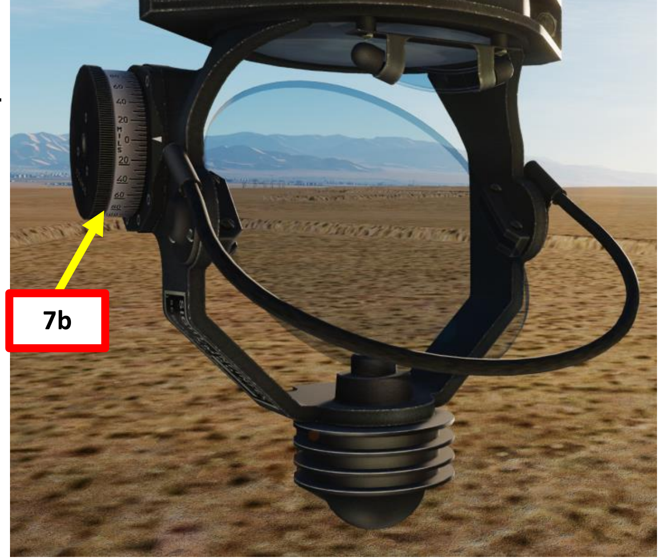
$$\theta_2 = \frac{L_2}{D_2} = \frac{7\ m}{1500\ m} = 0.0047\ rad \approx 5\ mil\ (milliradians)$$

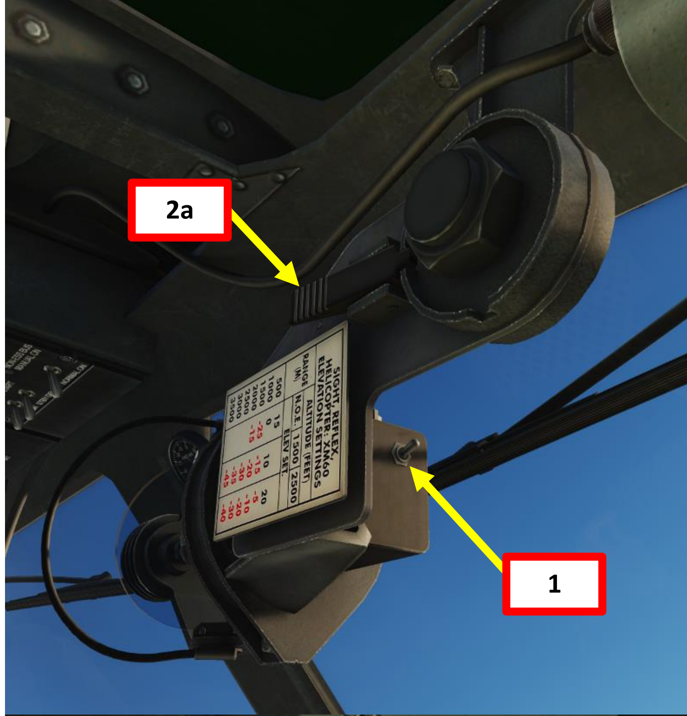



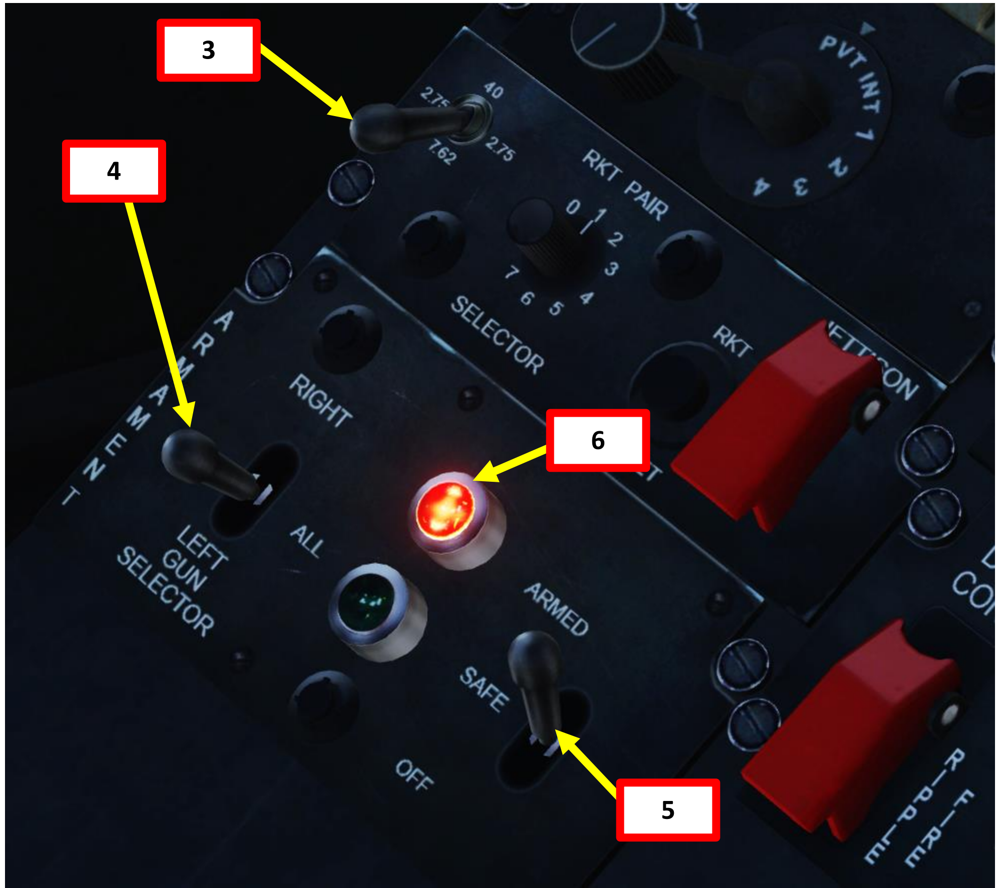



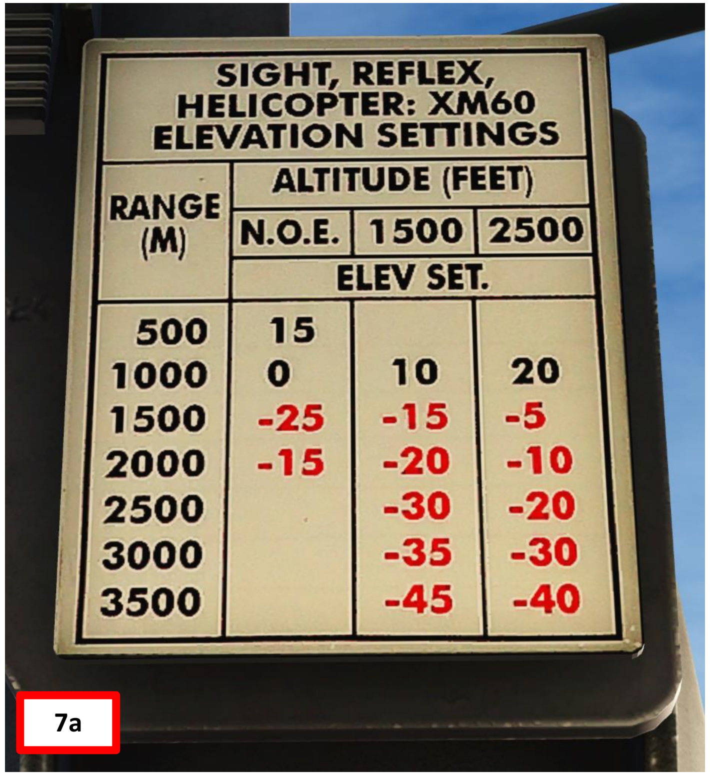
# FRONTAL MINIGUNS (XM60 REFLEX FIXED SIGHT)

1. Click on Gunsight Power switch
2. Click on Gunsight handle to un-stow the XM60 Fixed Sight
3. Set Weapon Selector to "7.62" (7.62 mm guns)
4. Set Right/Left Gun selector as required. I suggest setting the switch to ALL in order to use both guns at once.
5. Set Weapon Arming Switch – FWD (ARMED)
6. Confirm Weapon Arming Light is RED (ARMED).
7. Adjust Gunsight elevation as required (see XM60 Flex Sight tutorial).



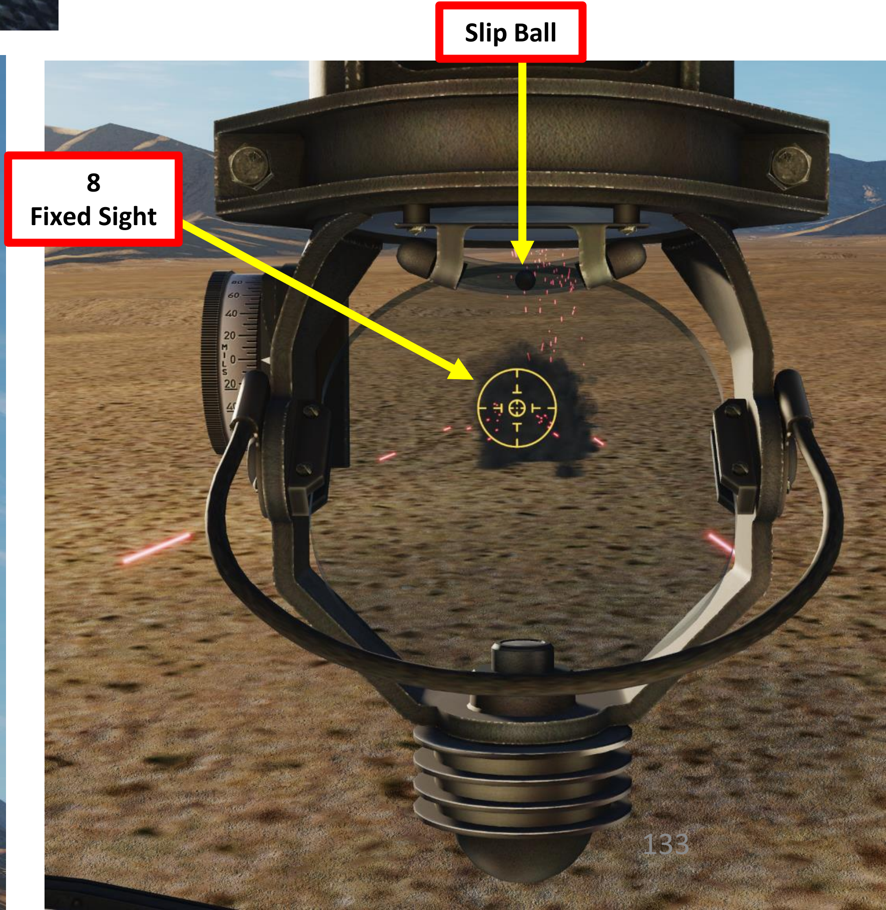

SIGHT, REFLEX,
HELICOPTER: XM60
ELEVATION SETTINGS

| RANGE (M) | ALTITUDE (FEET) N.O.E. | 1500 | 2500 |
|---|---|---|---|
| | ELEV SET. | | |
| 500 | 15 | | |
| 1000 | 0 | 10 | 20 |
| 1500 | -25 | -15 | -5 |
| 2000 | -15 | -20 | -10 |
| 2500 | | -30 | -20 |
| 3000 | | -35 | -30 |
| 3500 | | -45 | -40 |

# FRONTAL MINIGUNS (XM60 REFLEX FIXED SIGHT)

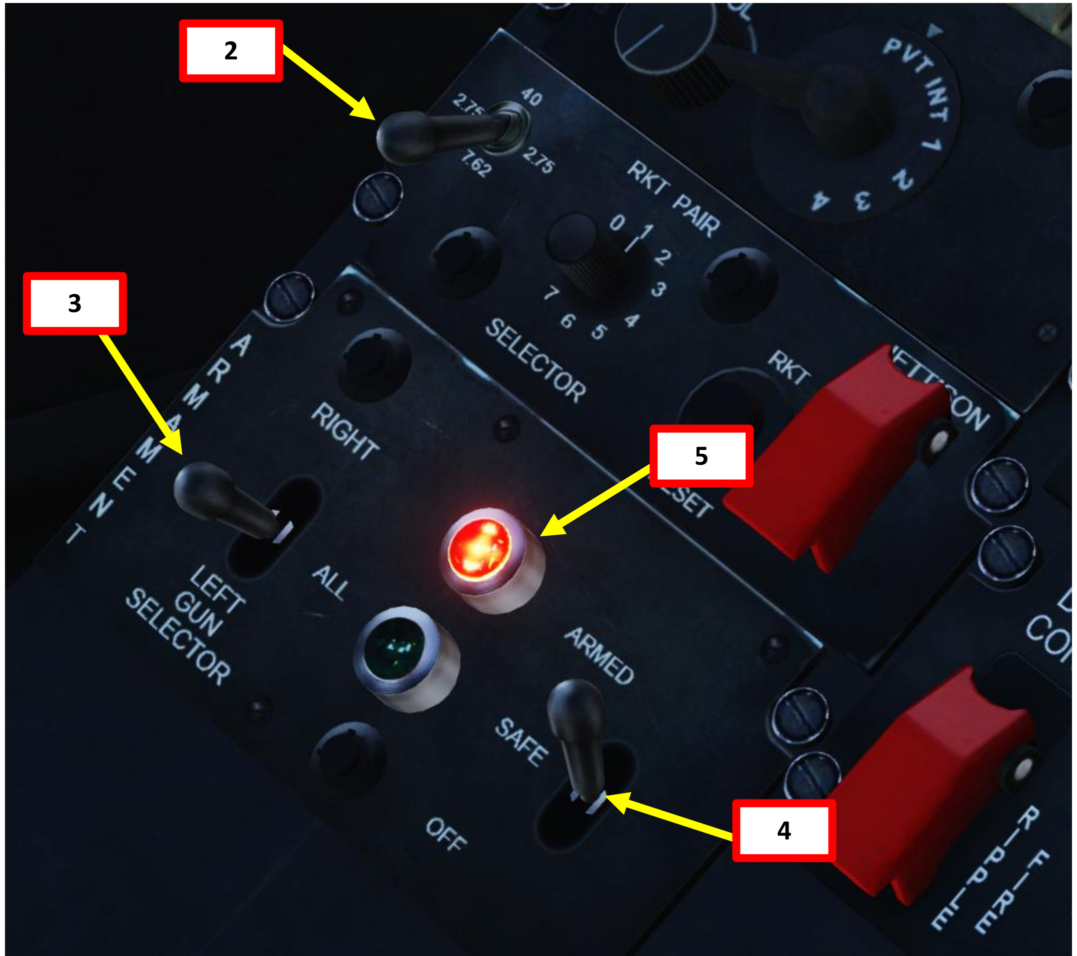
8. Place the fixed sight on the target and center the slip ball using the anti-torque pedals.
9. When you are in range, press the Weapon Fire Button (Spacebar) to fire miniguns.

- Note: If the copilot's Flexible Sight is un-stowed, the pilot will not be able to use the frontal miniguns. The copilot's control of the guns will take precedence over the pilot's.

# FRONTAL MINIGUNS (FLEXIBLE SIGHT)

1. (For DCS versions older than 2.5) Don't forget to have your "TRACKIR AIMING" option ticked in the SPECIAL option panels.
2. Set Weapon Selector to "7.62" (7.62 mm guns)
3. Set Right/Left Gun selector as required. I suggest setting the switch to ALL in order to use both guns at once.
4. Set Weapon Arming Switch – FWD (ARMED)
5. Confirm Weapon Arming Light is RED (ARMED).
6. Select desired AI autopilot mode.
7. Select co-pilot (operator) by pressing "2".

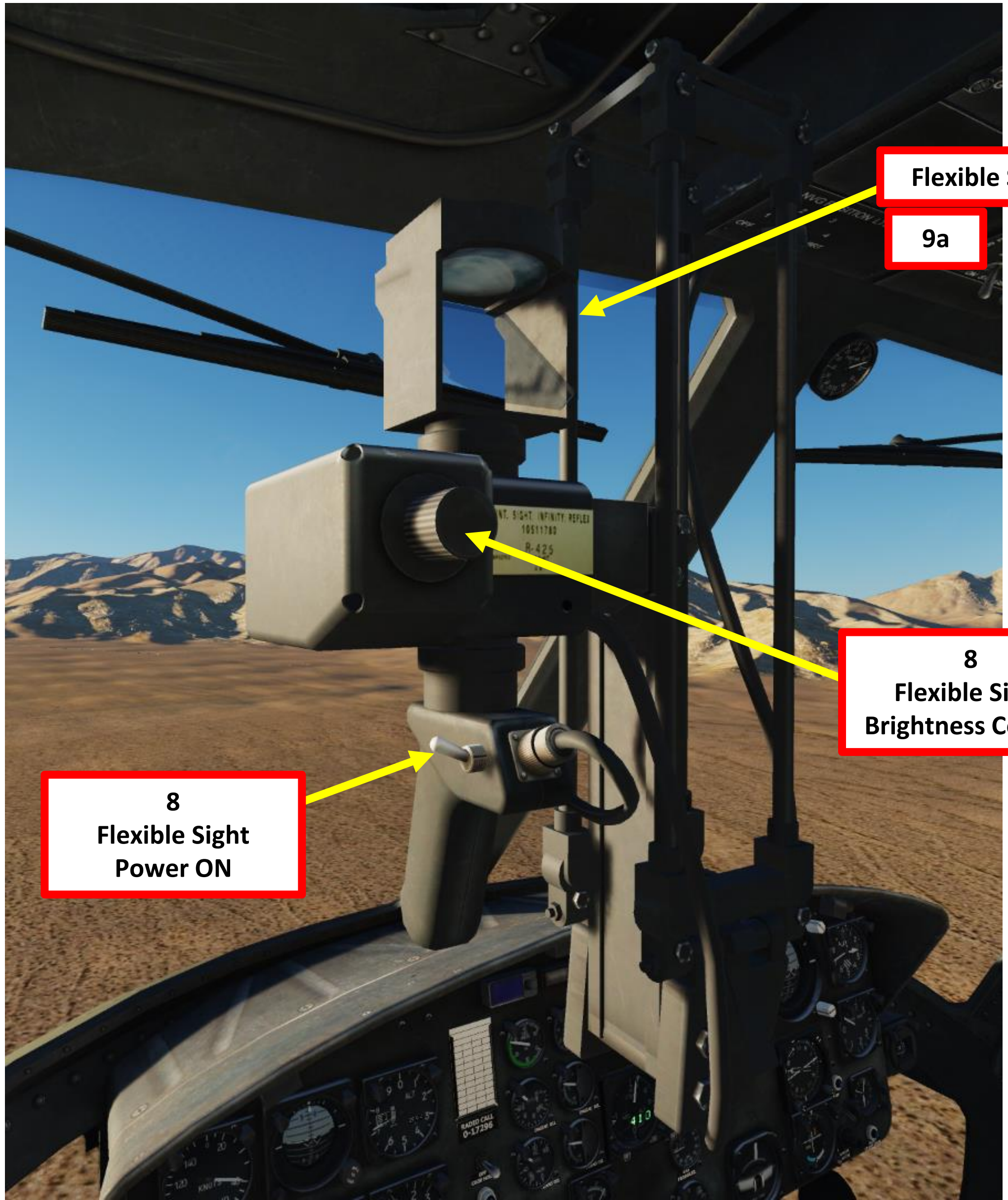



## COPILOT (OPERATOR) CONTROLS

TAKE COPILOT POSITION: 2
SET AI ROE (RULE OF ENGAGEMENT): L_CTRL+2
SET AI FIRING BURST LENGTH: L_SHIFT+2
AUTOPILOT ON/OFF: LWIN+A
AUTOPILOT ATTITUDE HOLD MODE: LALT+LSHIFT+A
AUTOPILOT LEVEL FLIGHT MODE: LCTRL+A
AUTOPILOT ORBIT MODE: LALT+A
SHOW WEAPON HINTS: LCTRL+LSHIFT+H
FLEXIBLE SIGHT ON/OFF: M
MOUSE CURSOR CLICK MODE ON/OFF: LALT+C
ZOOM: MOUSEWHEEL

# FRONTAL MINIGUNS (FLEXIBLE SIGHT)

8. While the sight is stowed, turn your flexible switch UP and adjust brightness.
9. Press “M” to deploy flexible sight.




# FRONTAL MINIGUNS (FLEXIBLE SIGHT)

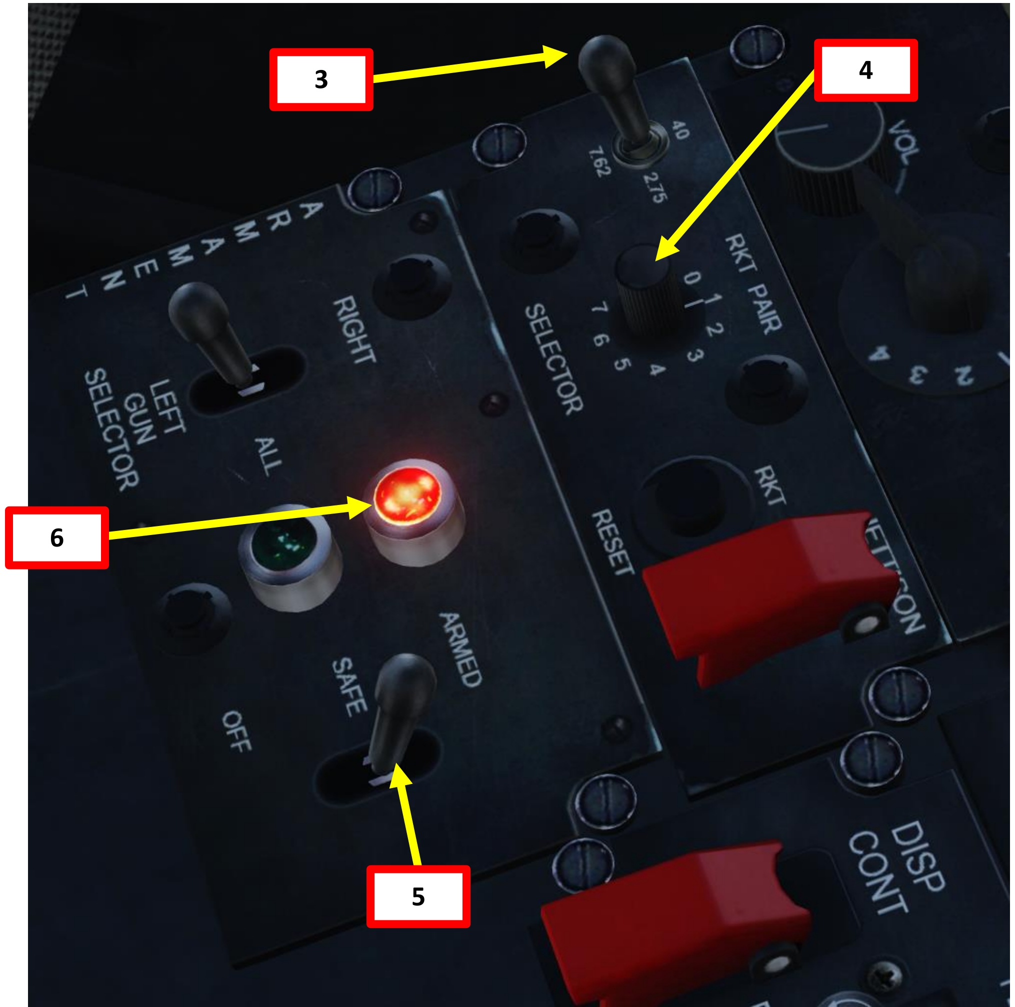
10. By default, the miniguns will aim where you look in trackIR. If you prefer to aim with the mouse (recommended), you just have to pause your trackIR and the mouse will take over.
11. As you move the flexible sight with the mouse (in real life it would be done with your hands), the frontal miniguns will swivel and aim towards the reticle of the flexible sight.
12. Place the flexible sight on the target.
13. When you are in range, press the Weapon Fire Button (Spacebar) to fire miniguns. Scroll mousewheel to zoom in/out.

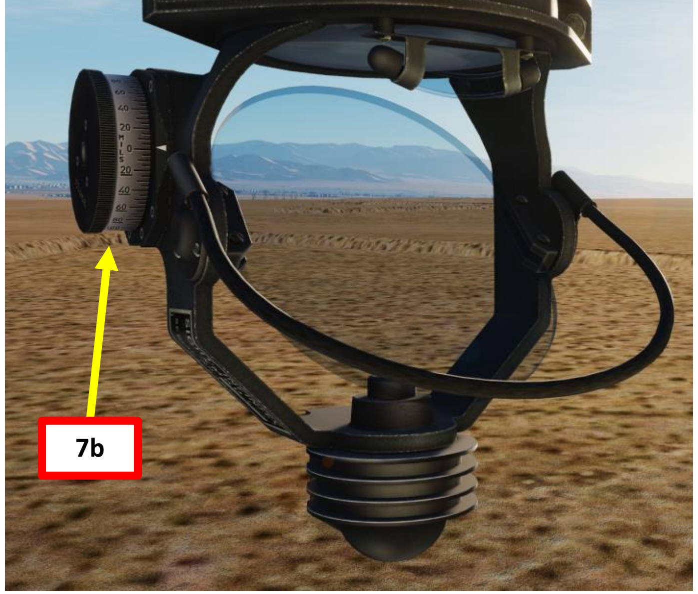
- Note: While the copilot's Flexible Sight is un-stowed, the pilot will not be able to use the frontal miniguns. The copilot's control of the guns will take precedence over the pilot's.

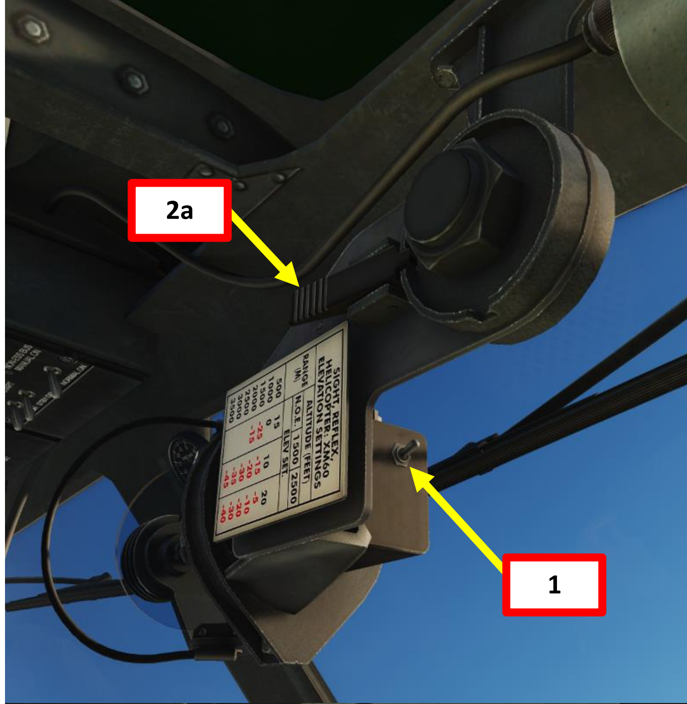


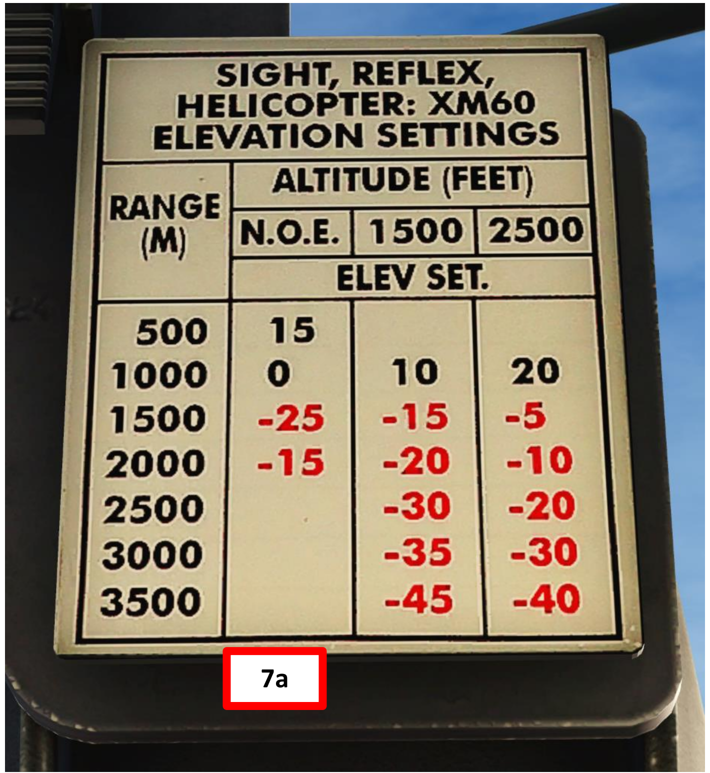
# ROCKETS

1. Click on Gunsight Power switch
2. Click on Gunsight handle to un-stow the XM60 Fixed Sight
3. Set Weapon Selector to “2.75” (2.75 inch rockets)
4. Set Rocket Pair Selector to desired quantity of rockets to fire per salvo. I suggest you choose “1”, as it gives you more flexibility.
5. Set Weapon Arming Switch – FWD (ARMED)
6. Confirm Weapon Arming Light is RED (ARMED).
7. Adjust Gunsight elevation as required (see XM60 Flex Sight tutorial).



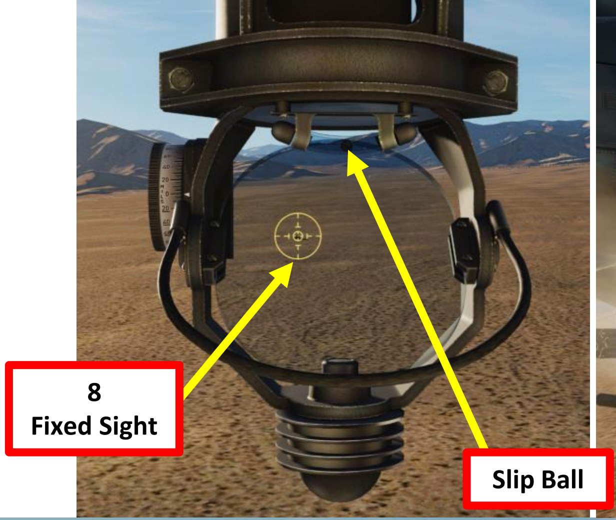




SIGHT, REFLEX, HELICOPTER: XM60 ELEVATION SETTINGS

| RANGE (M) | ALTITUDE (FEET) N.O.E. | 1500 | 2500 |
|---|---|---|---|
| | ELEV SET. | | |
| 500 | 15 | | |
| 1000 | 0 | 10 | 20 |
| 1500 | -25 | -15 | -5 |
| 2000 | -15 | -20 | -10 |
| 2500 | | -30 | -20 |
| 3000 | | -35 | -30 |
| 3500 | | -45 | -40 |

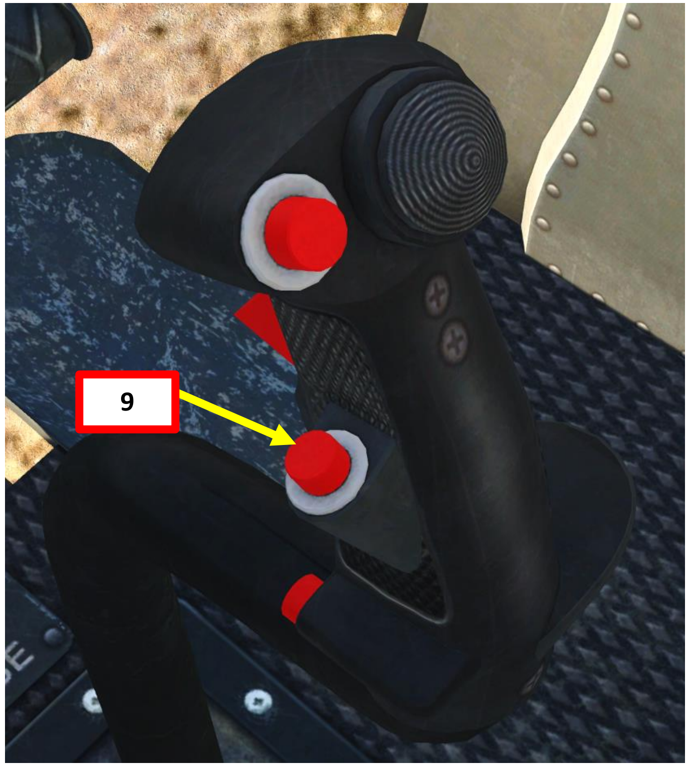
# ROCKETS

8. Place the fixed sight on the target and center the slip ball using the anti-torque pedals.
9. When you are in range, press the Weapon Fire Button (Spacebar) to fire rockets. Take note that you will send two rockets at a time (one per pod).




**Rocket Types**

- MK5 High explosive anti-tank warhead
- MK61 Inert warhead practice rocket
- M151 Anti-personnel fragmentation warhead
- M156 White phosphorus smoke warhead
- M274 Training smoke marker
- M257 Parachute-retarded illumination flare




# USING SIDE DOOR GUNNER

1. (For DCS versions older than 2.5) Don't forget to have your "TRACKIR AIMING" option ticked in the SPECIAL option panels.
2. Select desired AI autopilot mode.
3. You can toggle the CREW STATUS window (AI Panel) by pressing "**LWIN+H**"
4. Select desired gunner (press "3" or "4").
5. By default, the gun will follow where you look in trackIR. If you prefer to aim with the mouse (recommended), press "**RSHIFT+T**" (TrackIR Aiming ON/OFF binding). The mouse will then take over.
6. Fire using the WEAPON RELEASE button (binding: SPACEBAR) or your left mouse button. Scroll mousewheel to zoom.


## RIGHT GUNNER CONTROLS

TAKE RIGHT GUNNER POSITION: 3
SET AI ROE (RULE OF ENGAGEMENT): L_CTRL+4
SET AI FIRING BURST LENGTH: L_SHIFT+4
OPEN/CLOSE RIGHT GUNNER DOOR: L_ALT+4
AUTOPILOT ON/OFF: LWIN+A
AUTOPILOT ATTITUDE HOLD MODE: LALT+LSHIFT+A
AUTOPILOT LEVEL FLIGHT MODE: LCTRL+A
AUTOPILOT ORBIT MODE: LALT+A
SHOW WEAPON HINTS: LCTRL+LSHIFT+H
MOUSE CURSOR CLICK MODE ON/OFF: LALT+C
ZOOM: MOUSEWHEEL

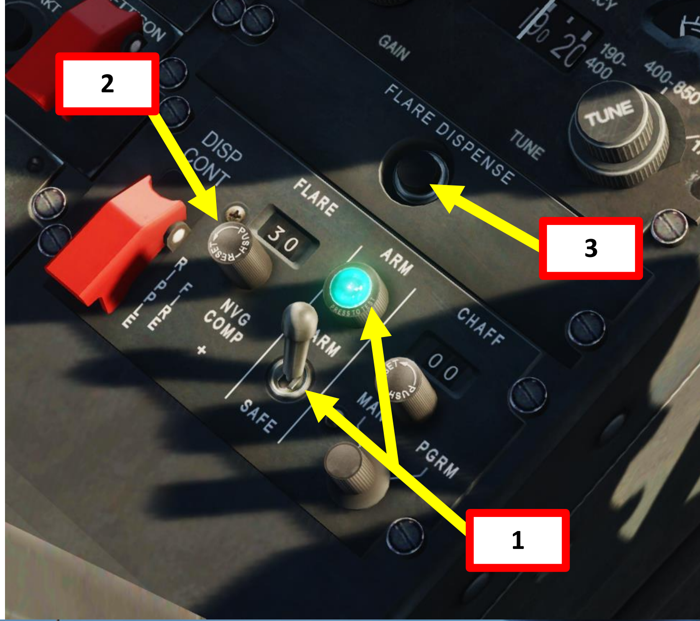
## LEFT GUNNER CONTROLS

TAKE LEFT GUNNER POSITION: 3
SET AI ROE (RULE OF ENGAGEMENT): L_CTRL+3
SET AI FIRING BURST LENGTH: L_SHIFT+3
OPEN/CLOSE RIGHT GUNNER DOOR: L_ALT+3
AUTOPILOT ON/OFF: LWIN+A
AUTOPILOT ATTITUDE HOLD MODE: LALT+LSHIFT+A
AUTOPILOT LEVEL FLIGHT MODE: LCTRL+A
AUTOPILOT ORBIT MODE: LALT+A
SHOW WEAPON HINTS: LCTRL+LSHIFT+H
MOUSE CURSOR CLICK MODE ON/OFF: LALT+C
ZOOM: MOUSEWHEEL

# DEPLOYING FLARES

1. Arm flare dispensers ("ARM" light is blue)
2. Turn the FLARE counter knob manually to set it to 30 flares (for one dispenser). You have 60 flares in total since your tailboom is equipped with 2 dispensers that deploy one flare each simultaneously each time you pop flares)
3. Press the "flare dispense" button to pop a pair of flares.

*NOTE: There is no chaff available for the version of the Huey simulated in DCS.*





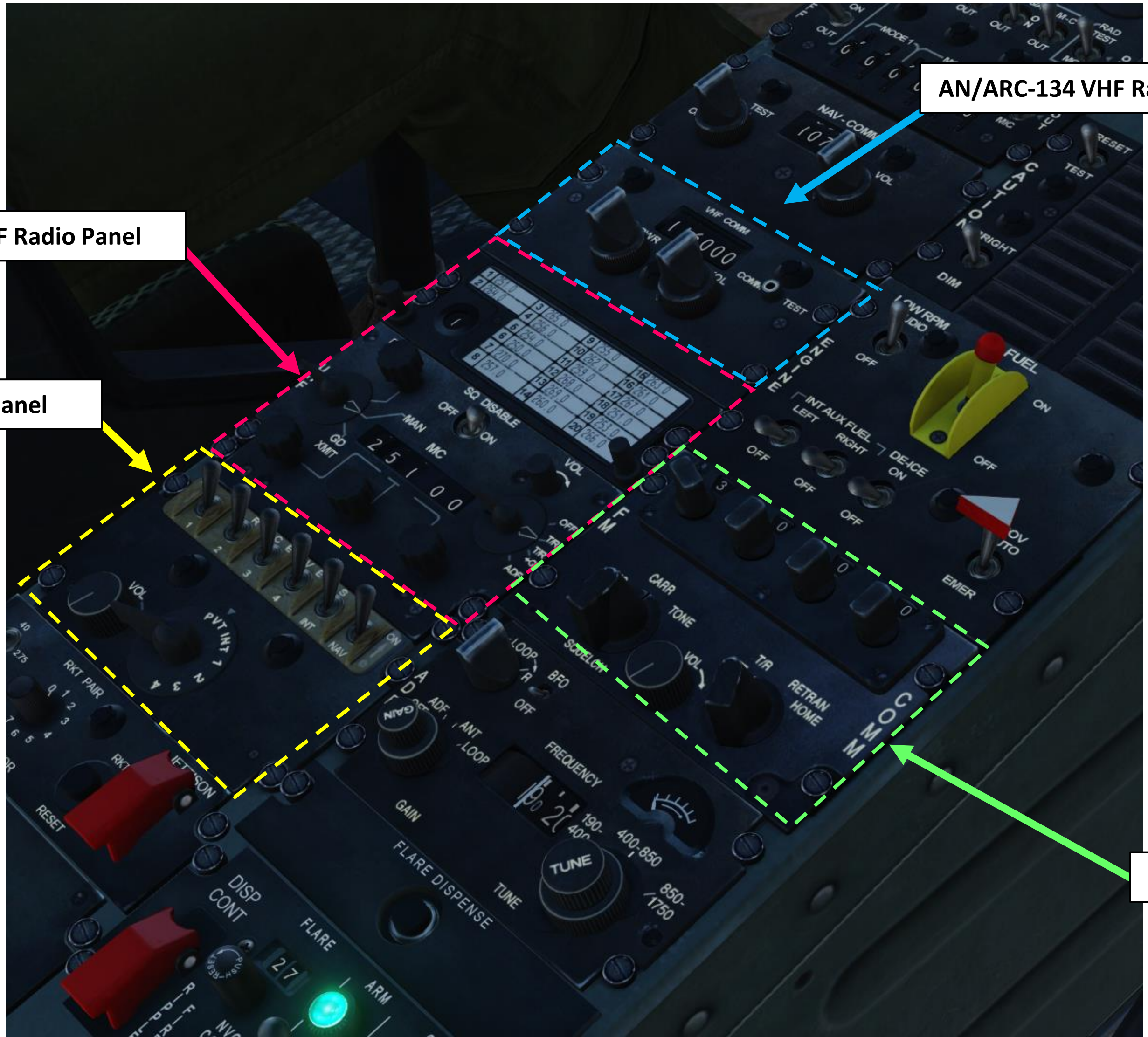
**M-130 Flare Dispensers**
*30 flares per dispenser*
*Note: there are two dispensers, therefore the Huey can carry up to 60 flares in total.*

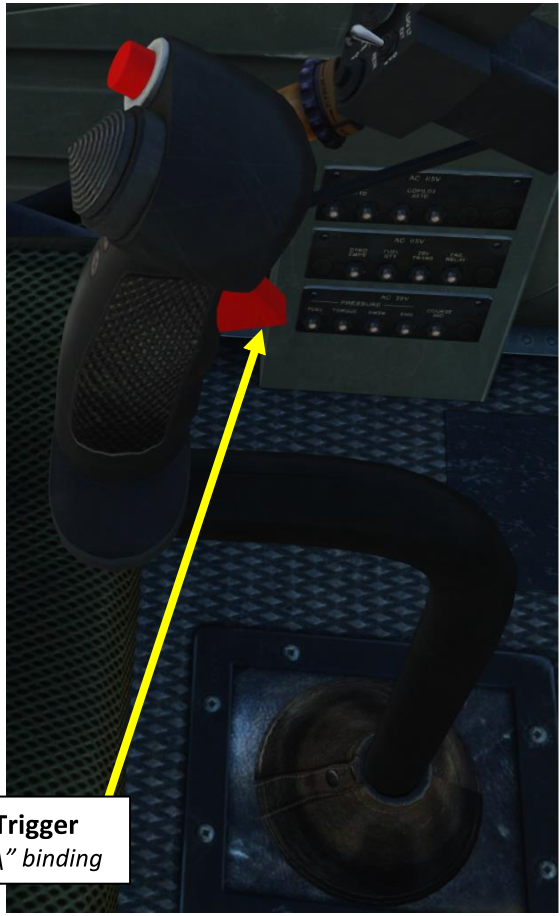
# RADIO SYSTEM OVERVIEW

You have three radios on your central console.

- The UHF AN/ARC-51BX radio set is used for Air-to-Air primary communications.
- The VHF AN/ARC-134 radio set is used for Air-to-Air alternate communications (and tower).
- The FM AN/ARC-131 radio set is used for internal flight communications between crew members.
- The C-1611/ARC Signal Distribution Panel allows you to choose which radio set you communicate on.

Most of the time, you will only be using the ARC-51BX UHF radio since in DCS you don't really need to communicate with crew members.



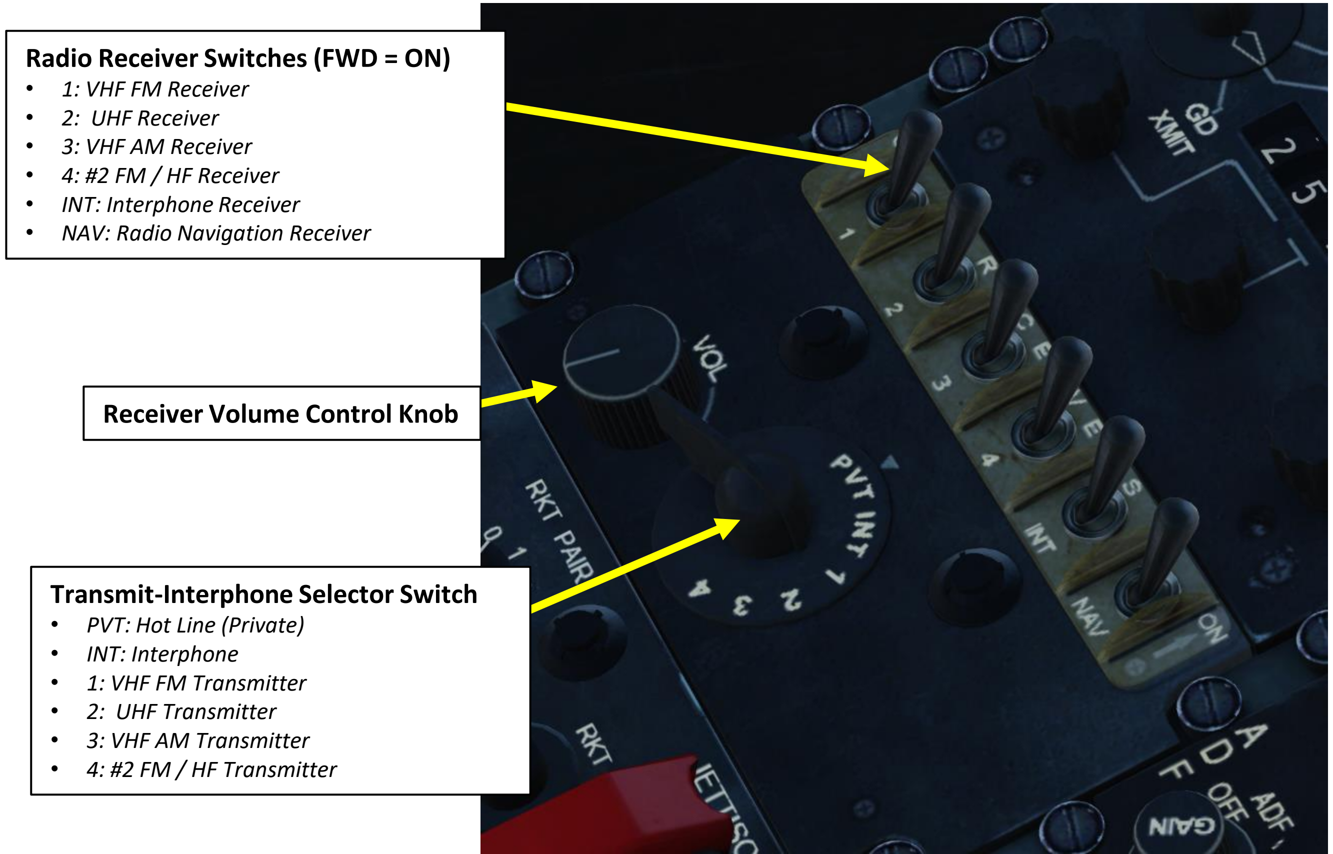
# INTERCOM SYSTEM (ICS)

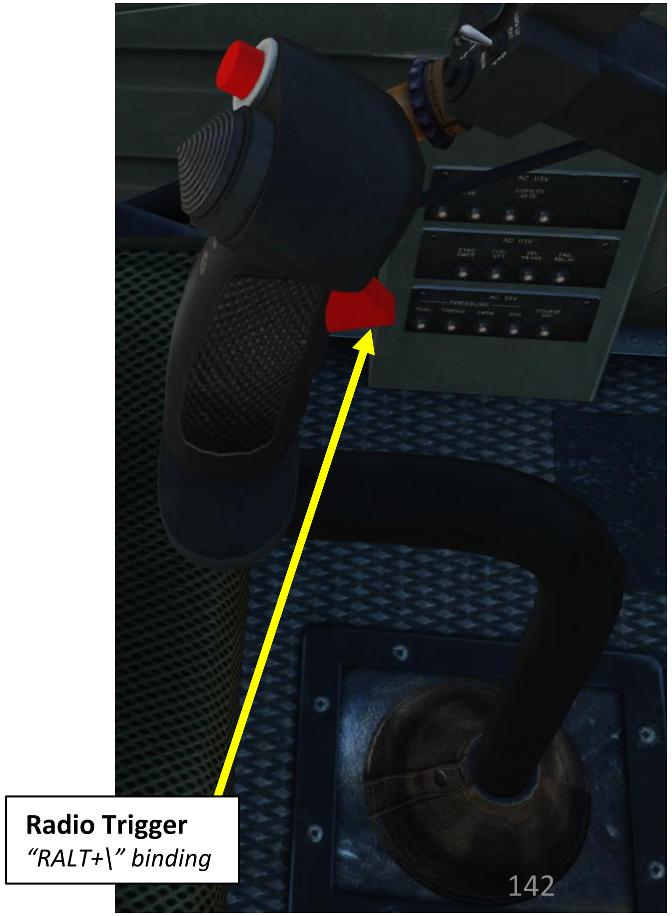
The intercom system allows the whole crew to communicate with each other. The **Signal Distribution Panel** amplifies and controls the distribution of audio signals applied to or from each headset-microphone, to or from communication receivers and transmitters, from navigation receivers, intercommunication between crewmembers, and for monitoring the communication and navigation receivers singly or in combination. In addition the C-1611/AIC panel permits the operator to control four receiver-transmitters. A private interphone line is also provided. A HOT MIC switch is provided on the C-1611/AIC control panel at the medical attendant's station to permit hand-free intercommunications with Transmit-Interphone Selector in any position. Up to four C-1611/AIC units may be installed. One each of the units are installed for the pilot and copilot, and two are installed in the crew/passenger compartment of the crew. All four of the C-1611/AIC units are wired to provide interphone operations for the crew, and full transmit and receive facilities for all communication and navigation equipment.

There are two ways to use the intercom:

1. When the **Transmit-Interphone Selector** switch is in the **PVT** (private) position, it provides a hot line (no external switch is used) to any station in the helicopter which also has PVT selected.
2. When the **Transmit-Interphone Selector** switch is in the **INT** (Interphone) position, you have to press the **Radio Trigger** on the cyclic **(RALT+\)** to communicate on the interphone.

Note: In order to hear incoming transmissions on the radio, make sure the **Radio Receiver Switches are set to ON** (FWD).

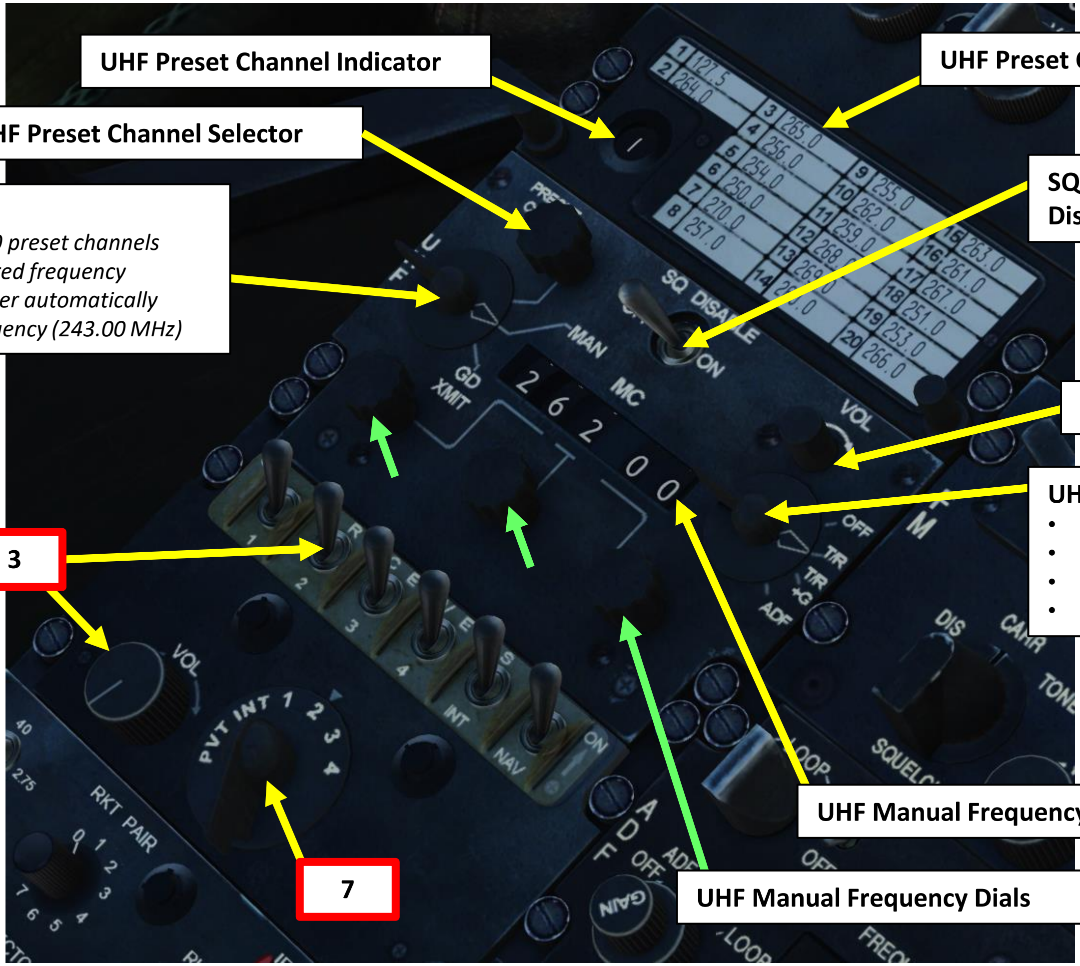


# AN/ARC-51BX UHF RADIO – MANUAL FREQUENCY TUTORIAL

The AN/ARC-51BX UHF Radio Set provides two way communications in the UHF (**225.0 to 399.9 MHz**) band. To transmit on UHF radio:

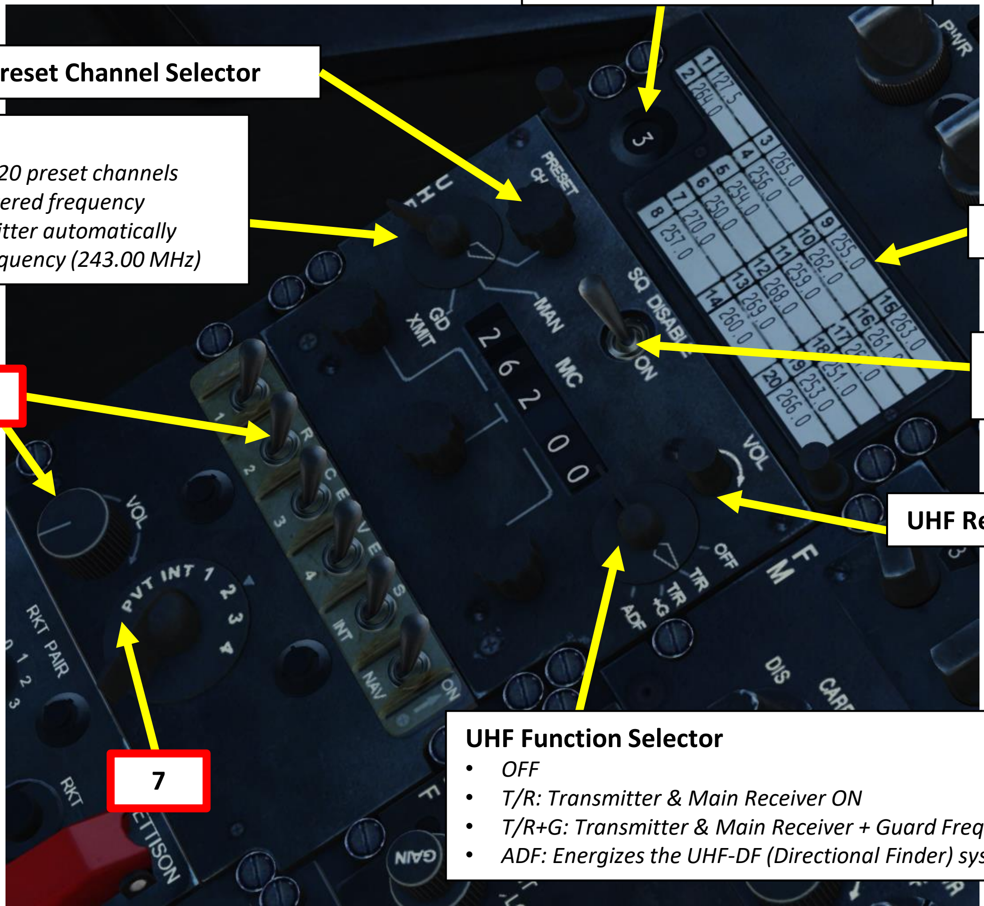
1. Set UHF function select switch – T/R or T/R+G (as desired).
2. Set UHF mode selector switch – MAN (Manual)
3. Set Radio Receiver No. 2 Switch – ON (FWD). Adjust volume as required.
4. Set manual radio frequency using the manual frequency knobs
5. Set SQ DISABLE (Squelch Disable) Switch – OFF
    - **As of DCS version 2.5, the switch logic is reversed (bug).**
6. Adjust volume as required
7. Set Transmit-Interphone Selector switch – No. 2 position
8. Press the Radio Trigger on the cyclic (RALT+\) to transmit




# AN/ARC-51BX UHF RADIO – PRESET FREQUENCY TUTORIAL

The AN/ARC-51BX UHF Radio Set provides two way communications in the UHF (**225.0 to 399.9 MHz**) band. To transmit on UHF radio:

1. Set UHF function select switch – T/R or T/R+G (as desired).
2. Set UHF mode selector switch – PRESET CHAN
3. Set Radio Receiver No. 2 Switch – ON (FWD). Adjust volume as required.
4. Set preset radio frequency using the preset channel selector. Frequencies associated to a preset channel are listed on the UHF placard.
5. Set SQ DISABLE (Squelch Disable) Switch – OFF
    - **As of DCS version 2.5, the switch logic is reversed (bug).**
6. Adjust volume as required
7. Set Transmit-Interphone Selector switch – No. 2 position
8. Press the Radio Trigger on the cyclic (RALT+\) to transmit




**UHF Preset Channel Indicator**

**4** **UHF Preset Channel Selector**

**UHF Mode Selector**
- *PRESET: selects one of the 20 preset channels*
- *MAN: selects manually entered frequency*
- *GD XMIT: Receiver-transmitter automatically tunes to guard channel frequency (243.00 MHz)*

**2**

**3**

**UHF Preset Channel Placard**

**SQ DISABLE (Squelch Disable) Switch** **5**

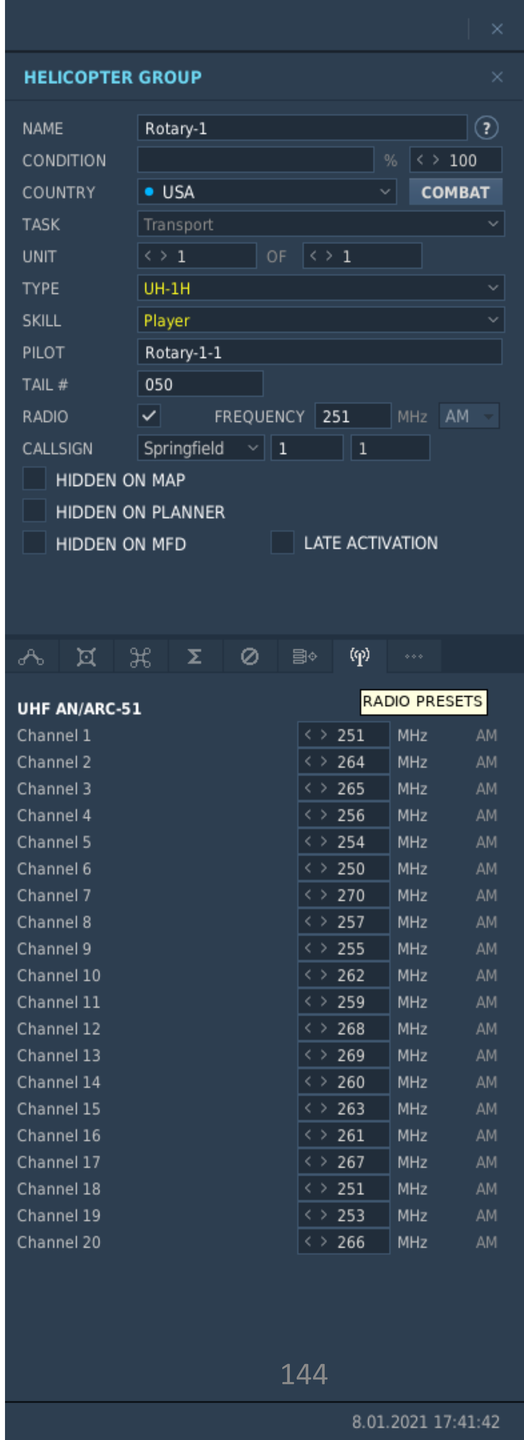
**UHF Receiver Volume** **6**

**7**

**UHF Function Selector** **1**
- *OFF*
- *T/R: Transmitter & Main Receiver ON*
- *T/R+G: Transmitter & Main Receiver + Guard Frequency Receiver ON*
- *ADF: Energizes the UHF-DF (Directional Finder) system when installed*

**8**

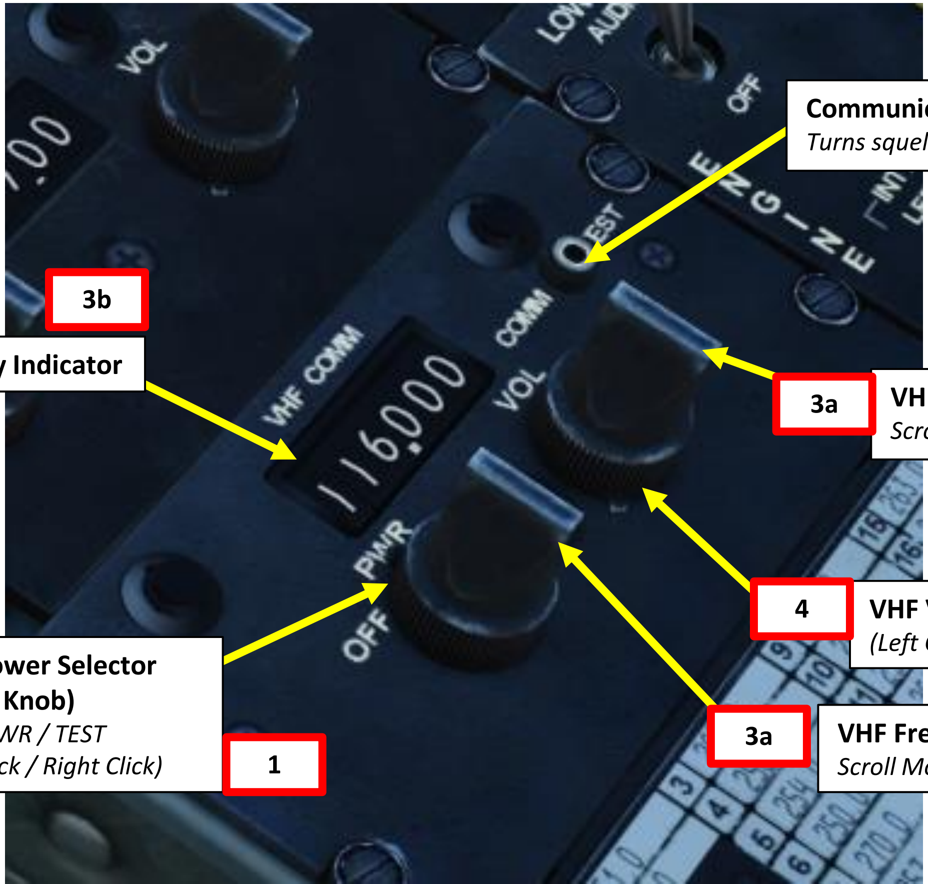
**Radio Trigger**
*"RALT+\" binding*

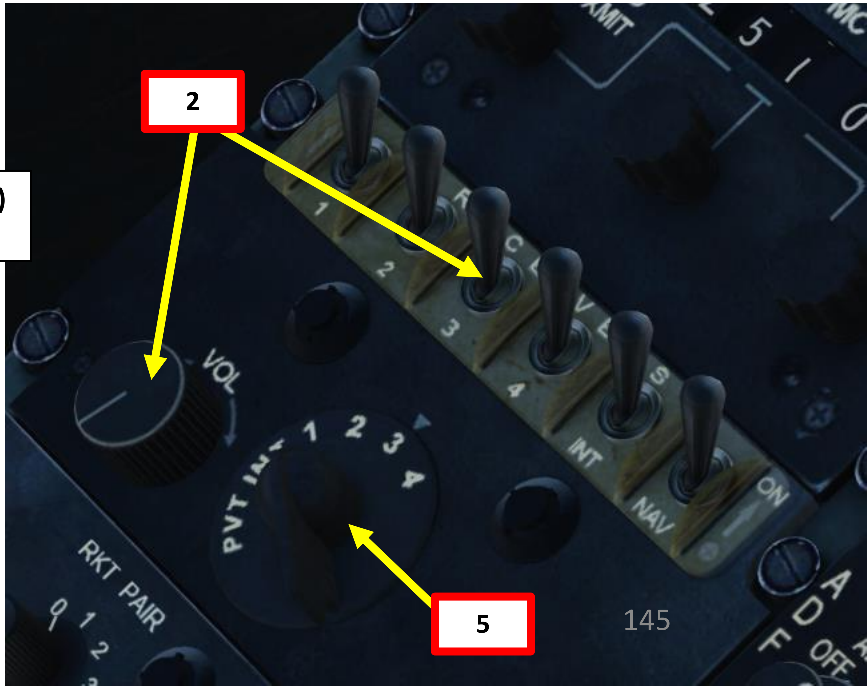


# AN/ARC-134 VHF RADIO TUTORIAL

The AN/ARC-134 VHF Radio Set provides voice communications in the VHF range (**116.000 to 149.975 MHz**).
To transmit on VHF radio:

1. Set VHF Power Selector switch – PWR (Right Click to toggle position).
2. Set Radio Receiver No. 3 Switch – ON (FWD). Adjust volume as required.
3. Set radio frequency using the frequency knobs (scroll mousewheel)
4. Adjust volume as required
5. Set Transmit-Interphone Selector switch – No. 3 position
6. Press the Radio Trigger on the cyclic (RALT+\) to transmit

# AN/ARC-131 FM RADIO TUTORIAL

The AN/ARC-131 FM Radio Set provides voice communications in the frequency range **30.00 to 75.95 MHz**. It can be used either in communication mode or in homing home, which allows you to track troops on the ground equipped with a transmitter.

To transmit on FM radio:

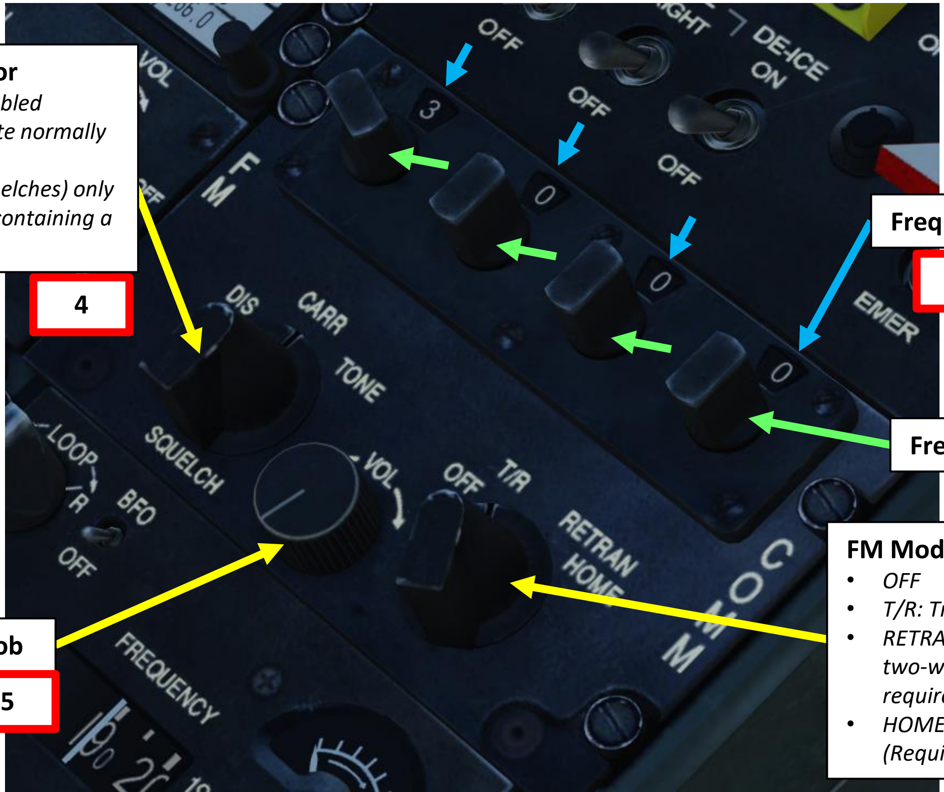
1. Set FM mode control switch – T/R (Transmit/Receive).
2. Set Radio Receiver No. 1 Switch – ON (FWD). Adjust volume as required.
3. Set radio frequency using the frequency selector dials.
4. Set FM Squelch Control Selector to CARR (Carrier).
5. Adjust volume as required
6. Set Transmit-Interphone Selector switch – No. 1 position
7. Press the Radio Trigger on the cyclic (RALT+\) to transmit

7 **Radio Trigger**
*“RALT+\” binding*

**FM Squelch Control Selector**

- *DIS: Squelch circuits are disabled*
- *CARR:Squelch circuits operate normally in presence of any carrier*
- *TONE: Squelch opens (unsquelches) only on selected signals (signals containing a 150-cps tone modulation)*

4



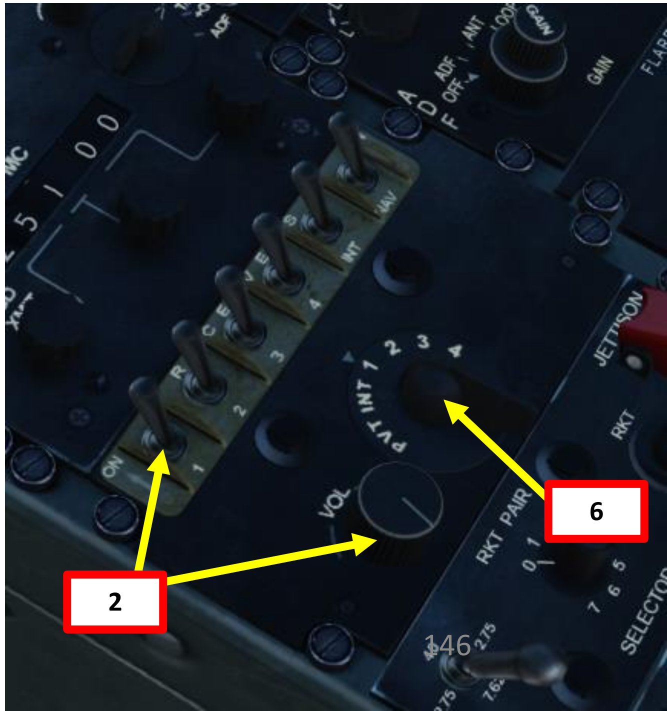

**Frequency Indicators** 3b

**Frequency Selector Dials** 3a

**FM Volume Control Knob** 5

**FM Mode Selector** 1

- *OFF*
- *T/R: Transmitter & Main Receiver ON*
- *RETRAN (Retransmit): Radio set operates as a two-way relay station. (Two radio sets are required set at least 3 MHz apart)*
- *HOME: Radio set operates as a homing facility. (Requires a homing antenna and indicator)*



2

6

# RADIO FREQUENCIES – AIRFIELDS

| LOCATION | FREQUENCY |
|---|---|
| Anapa | 121.0 |
| Batumi | 131.0 |
| Beslan | 141.0 |
| Gelendzhik | 126.0 |
| Gudauta | 130.0 |
| Kobuleti | 133.0 |
| Kutaisi | 134.0 |
| Krasnodar Center | 122.0 |
| Krasnodar Pashkovsky | 128.0 |
| Krymsk | 124.0 |
| Maykop | 125.0 |
| Mineral’nye Vody | 135.0 |
| Mozdok | 137.0 |
| Nalchik | 136.0 |
| Novorossiysk | 123.0 |
| Senaki | 132.0 |
| Sochi | 127.0 |
| Soganlug | 139.0 |
| Sukhumi | 129.0 |
| Tblisi | 138.0 |
| Vaziani | 140.0 |

# UNDERSTANDING ADF, NDB, VOR, ILS

Navigation is an extensive subject. You can check chapter 15 of FAA manual for more details on navigation.
**LINK:** http://www.faa.gov/regulations_policies/handbooks_manuals/aviation/pilot_handbook/media/PHAK%20-%20Chapter%2015.pdf

- “NDB” is what we call a non-directional beacon. It transmits radio waves on a certain frequency on long distances. These waves are read by an ADF (automatic direction finder). NDBs are typically used for radio navigation.

- “VOR” is what we call a VHF Omnidirectional Range system. It transmits radio waves on a certain frequency. These waves are read by a VOR receiver. VOR systems, just like NDBs, can be used for radio navigation.

- NDB and VOR are used just like lighthouses were used to guide ships. This way, air corridors and airways are created to help control an increasingly crowded sky.

- ILS (Instrument Landing System) allows an aircraft find their way to an airstrip (provided it is equipped with a VOR or NDB) despite bad visibility conditions.

- The UH-1H Huey can navigate using the following equipment:
    - **AN/ARC-131 FM radio set (FM-COMM panel):** you can communicate with your on-board crew OR you can track FM signals being broadcast by units on the ground using its HOMING mode, which works just like an ADF (automatic direction finder) and is very useful for CSAR (Combat Search & Rescue) missions

    - **AN/ARN-83 ADF radio set (ADF panel):** you can track NDB (non-directional beacons), which are scattered throughout the map. The ADF will give you a direction to follow, but not a range.

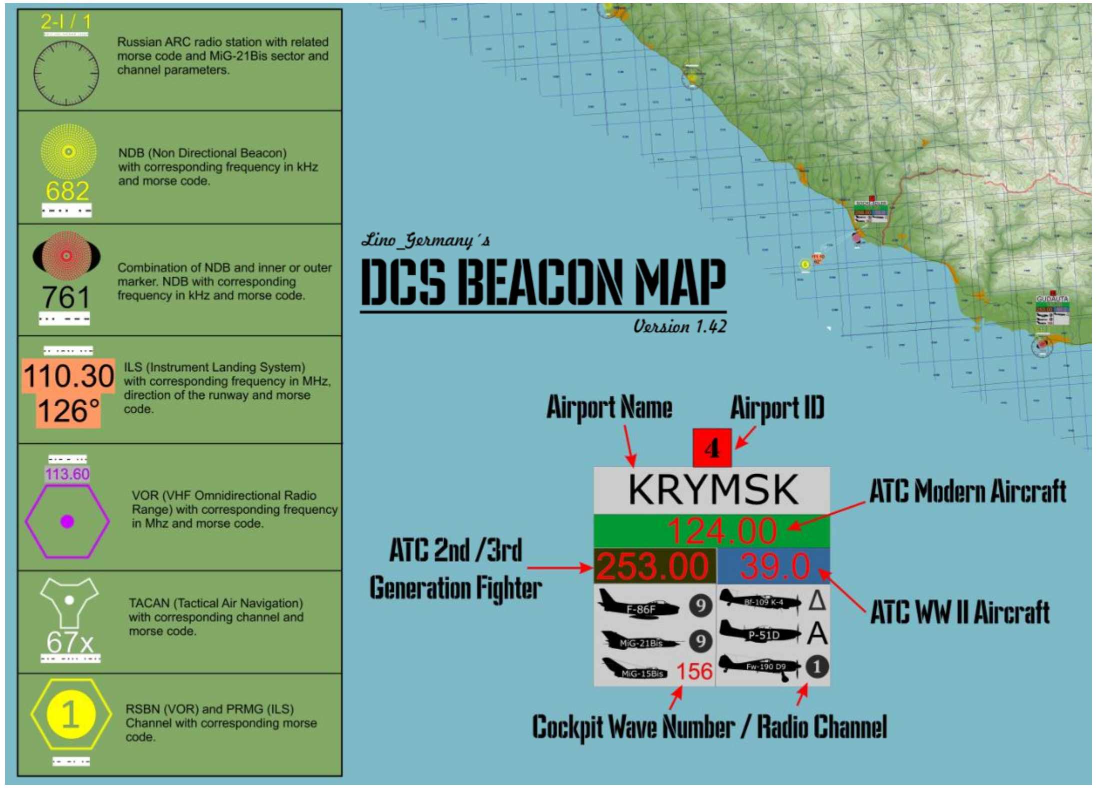
    - **AN/ARN-82 VHF navigation set (NAV-COMM panel):** you can track VOR signals, which are used by airfields for ILS (Instrument Landing System) approaches.

| FREQUENCY RANGES | |
|---|---|
| FM-COMM<br>**AN/ARC-131 FM radio** | 30.00 MHz<br>75.95 MHz |
| ADF<br>**AN/ARN-83 ADF radio** | 190 kHz<br>1750 kHz |
| VHF NAV-COMM<br>**AN/ARN-82 VHF** | 108.0 MHz<br>126.95 MHz |

# NDB, VOR & ILS STATIONS – HOW TO FIND THEM?

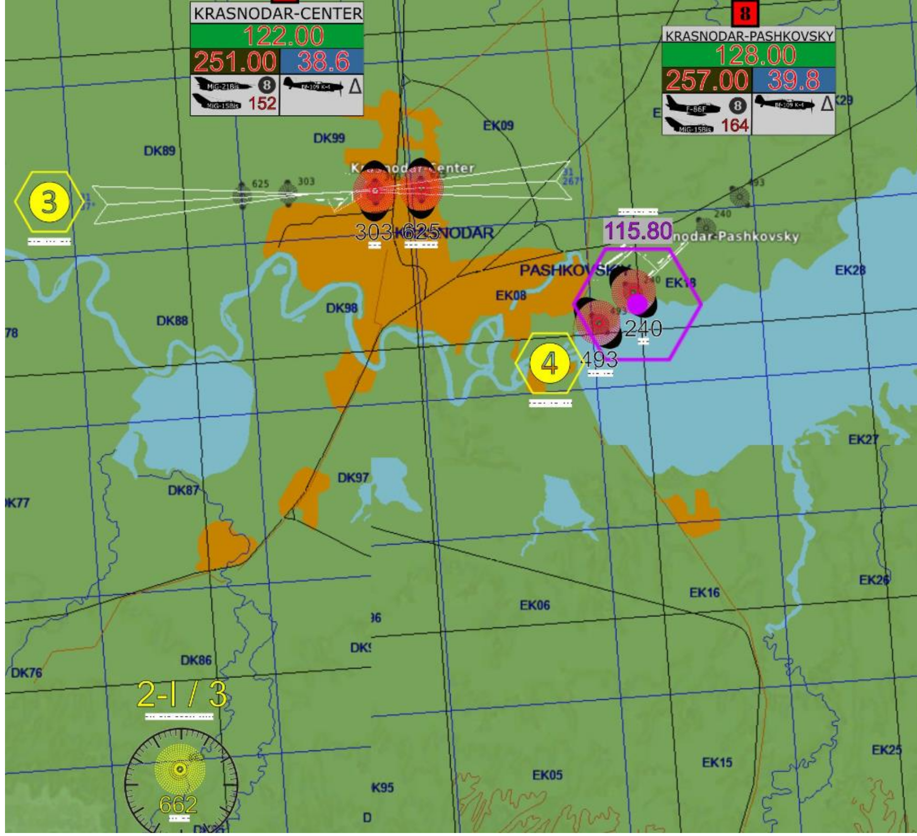
Lino_Germany created a **wonderful** HD map containing all NDB stations and VOR/ILS stations scattered throughout the map.  Use this to know the NDB and VOR channel frequencies you need to set.

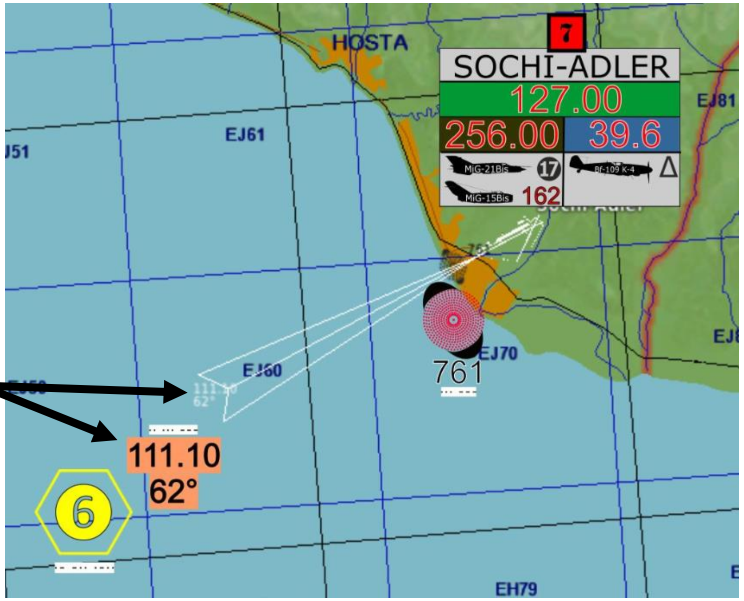
LINK: https://drive.google.com/open?id=0B-uSpZROuEd3YWJBUmZTazBGajQ&authuser=0





NDB



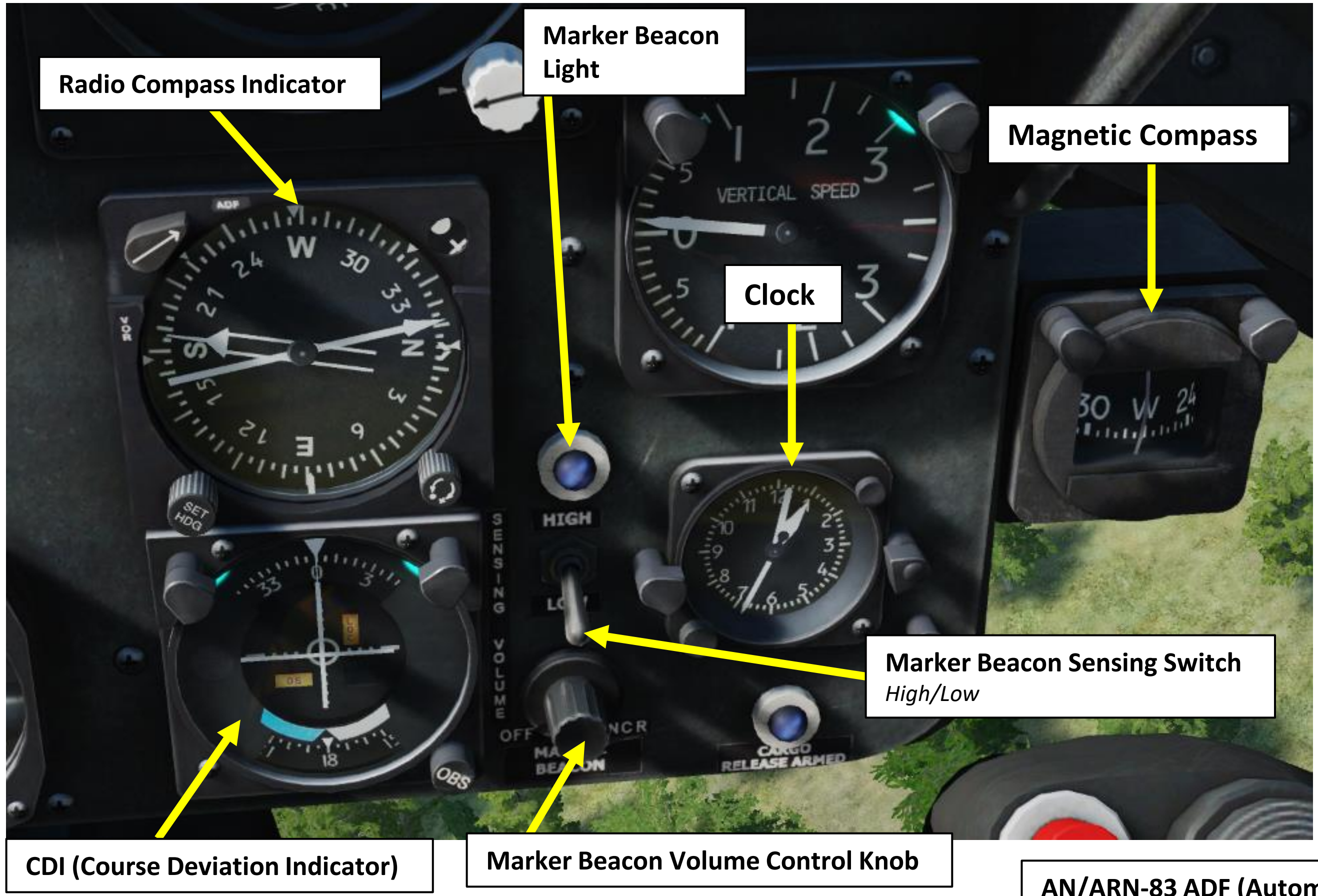

ILS/VOR

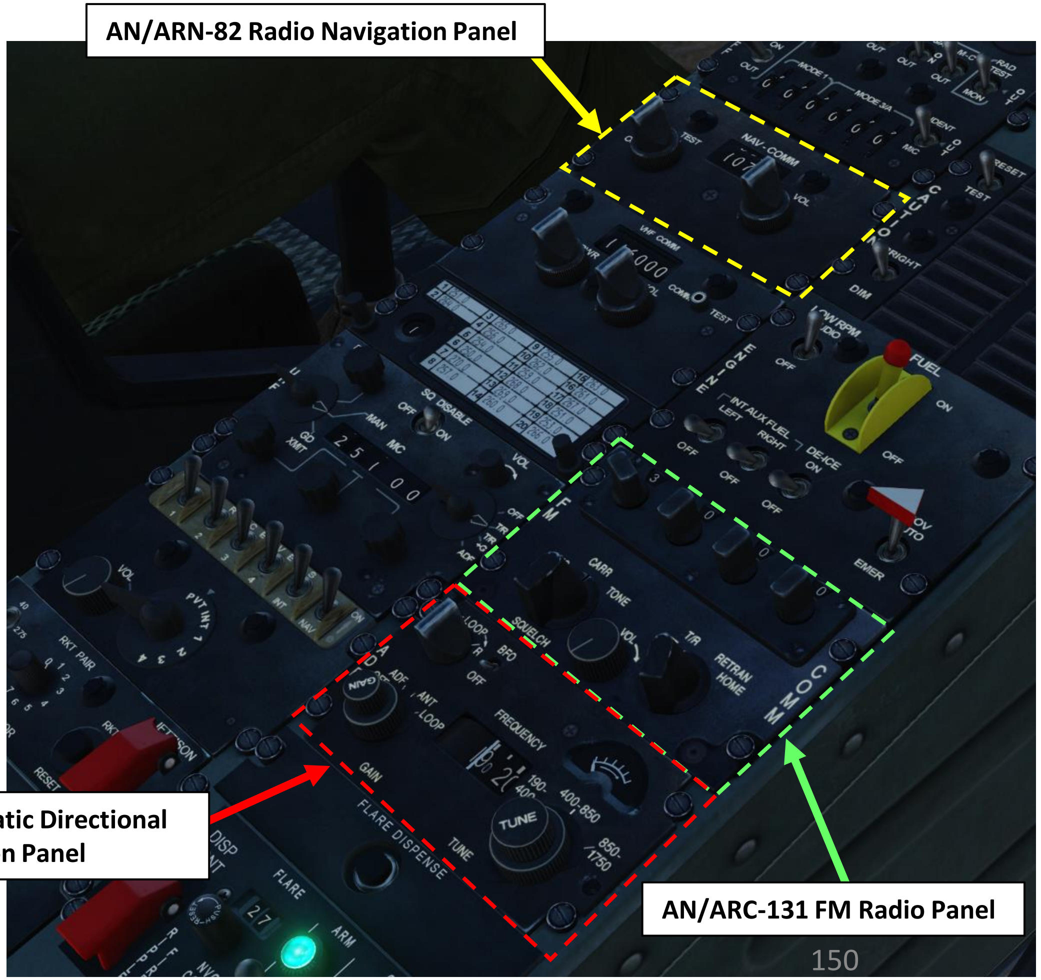
ADF & FM demo: https://www.youtube.com/watch?v=SNT0A2Pgxh8
VOR/ILS demo: https://www.youtube.com/watch?v=SkpvrbqeFDk

# NAVIGATION EQUIPMENT

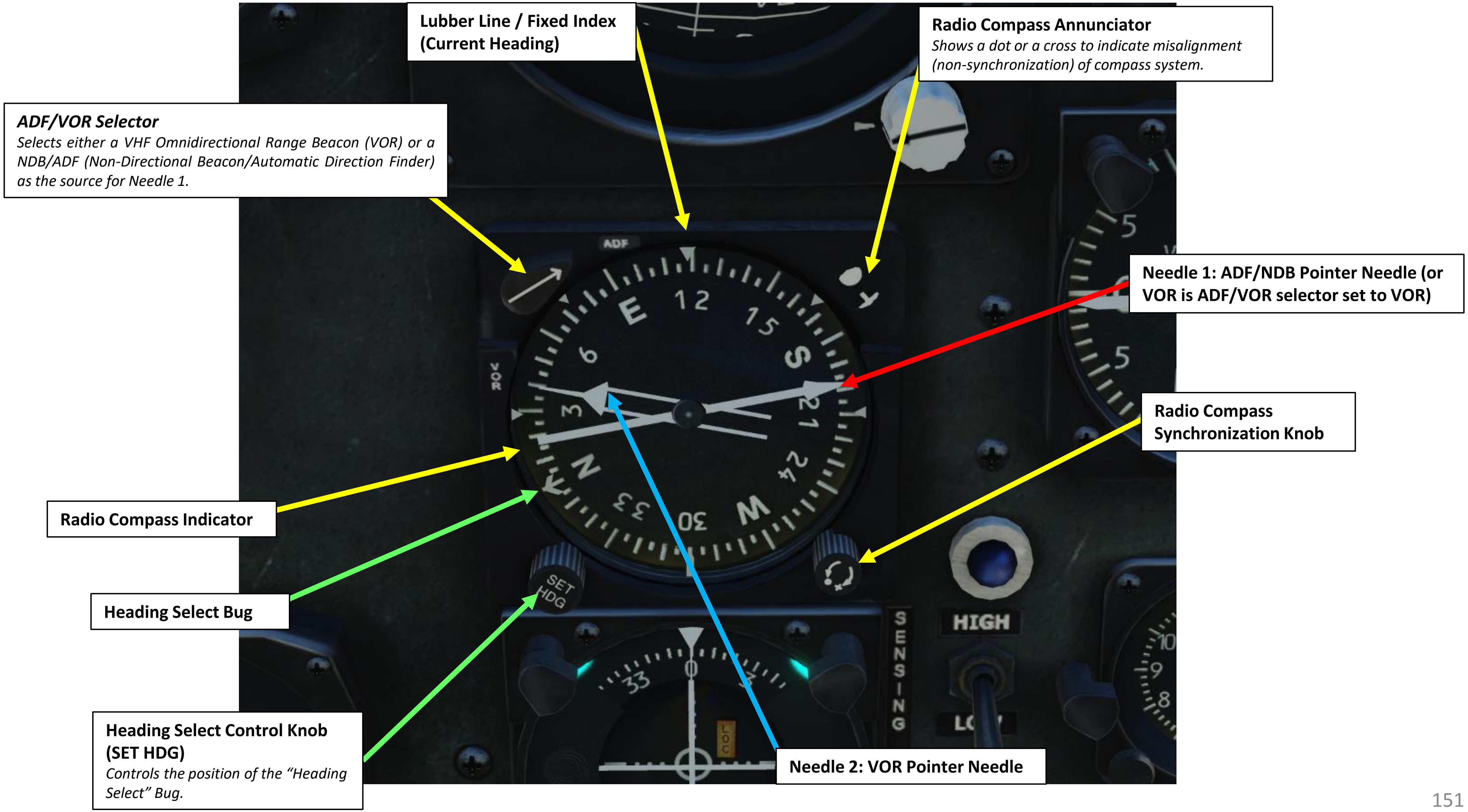
The **Radio Compass Indicator** is used as a primary navigation instrument. The **Magnetic Compass** is used as a standby instrument (or to re-align the Radio Compass).

The Navigation Receiver set provides reception from 108.0 to 126.95 MHz. This permits reception of the VHF omnidirectional range (VOR) between 108.0 and 117.95 MHz. The Localizers are received between 108.0 and 112.0 MHz. Both VOR and Localizer are received aurally through the interphone system. The VOR is presented visually by the course indicator and the number 2 pointer on the bearing indicator and the localizer is presented visually by the vertical needle on the **Course Deviation Indicator (CDI)**.

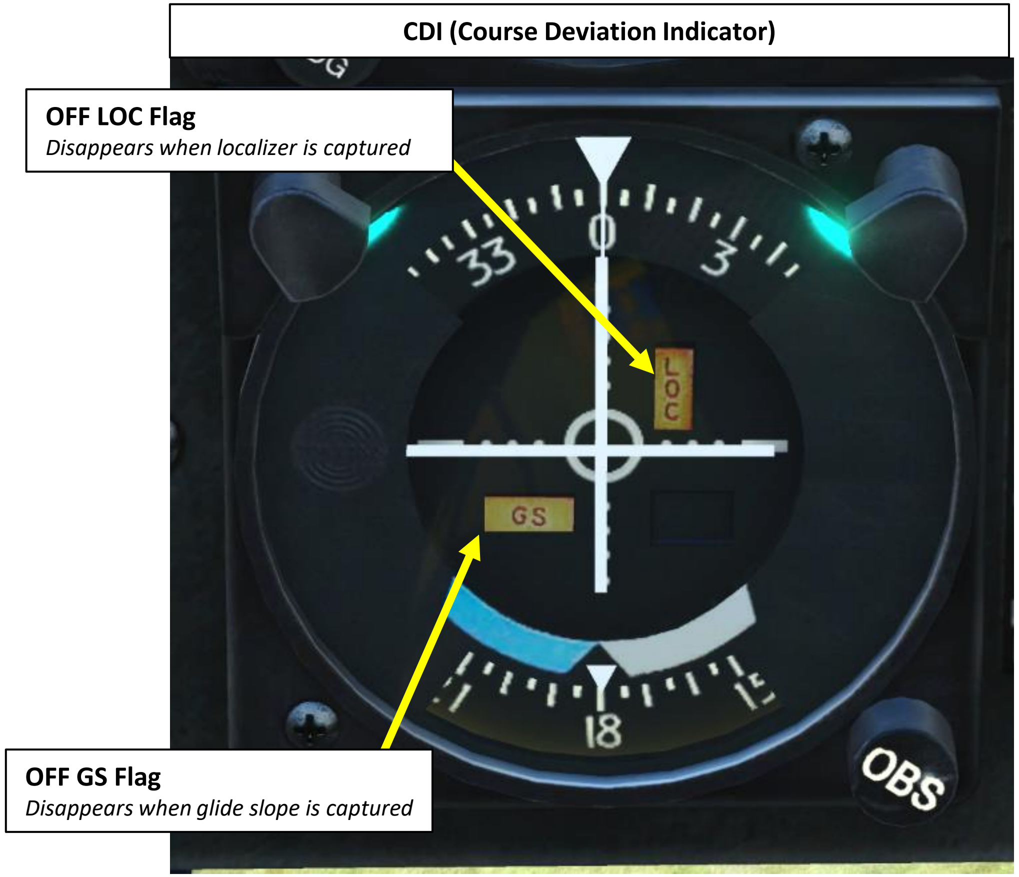


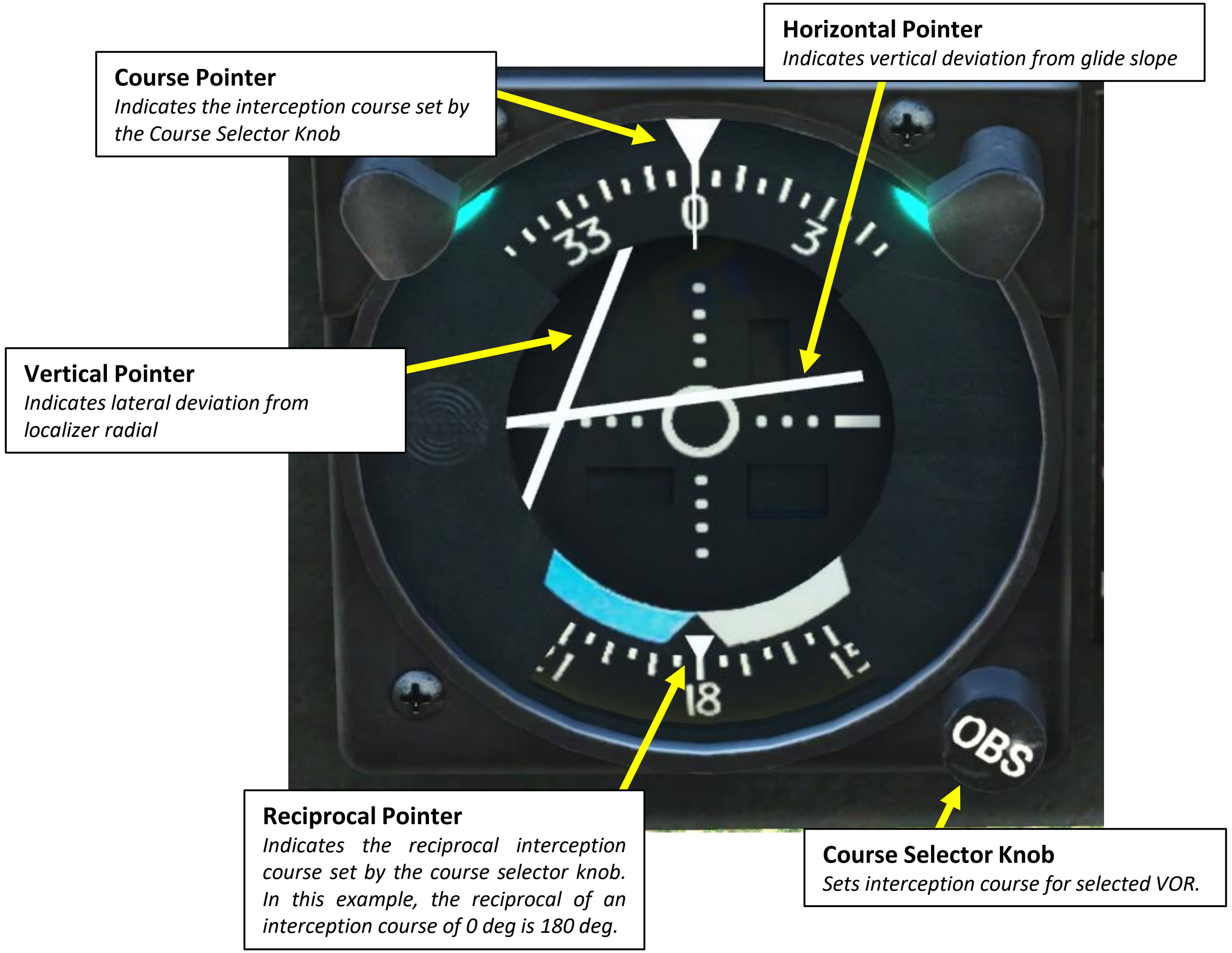



# NAVIGATION EQUIPMENT



# NAVIGATION EQUIPMENT



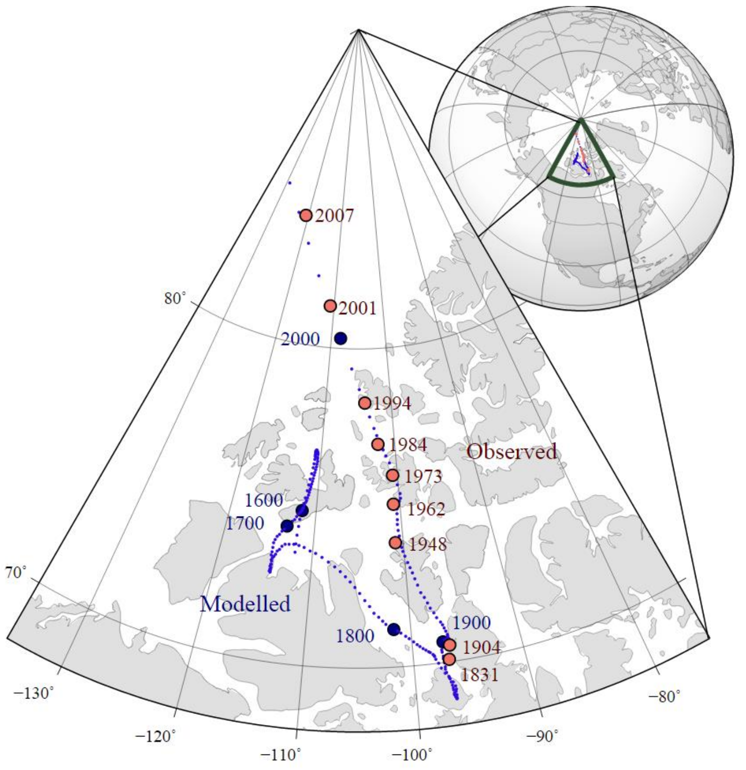
# NAVIGATION – MAGNETIC VARIATION

The direction in which a compass needle points is known as magnetic north. In general, this is not exactly the direction of the North Magnetic Pole (or of any other consistent location). Instead, the compass aligns itself to the local geomagnetic field, which varies in a complex manner over the Earth's surface, as well as over time. The local angular difference between magnetic north and true north is called the magnetic variation. Most **map coordinate** systems are based on **true north**, and magnetic variation is often shown on map legends so that the direction of true north can be determined from north as indicated by a compass. This is the reason why in DCS the course to a runway needs to be “adjusted” to take into account this magnetic variation of the magnetic North pole (actually modelled in the sim, which is pretty neat).

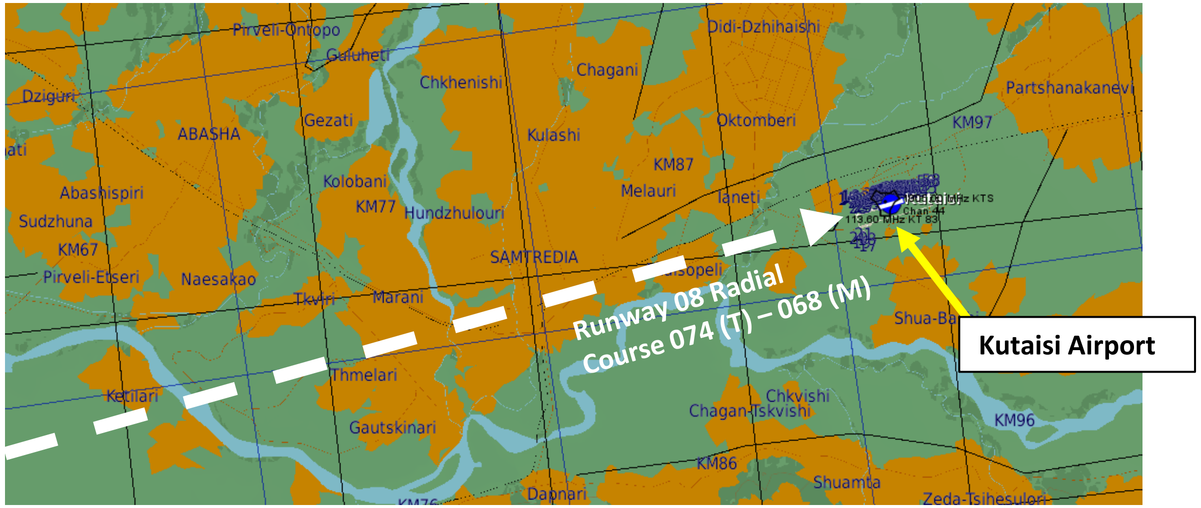
**True Heading = Magnetic Heading + Magnetic Variation**

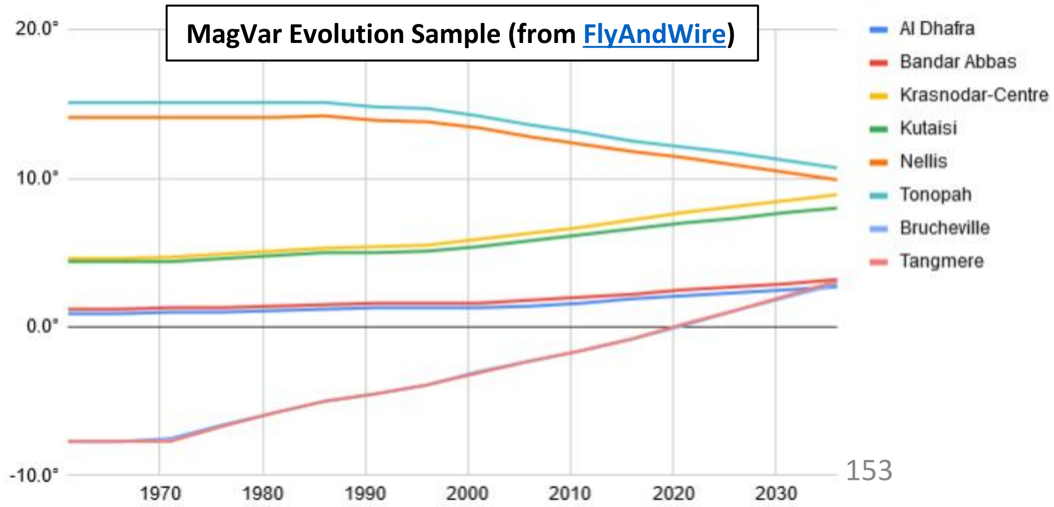
As an example, if the runway heading that you read on the F10 map in Kutaisi is 074 (True Heading), then the input to your magnetic compass course should be 074 subtracted with the Magnetic Variation (+6 degrees), or 068. You would need to enter a course of 068 (M) on the Radio-Compass.

Magnetic variation varies from place to place, but it also changes with time. This means this value will be highly dependent on the mission time and map.




The movement of Earth's north magnetic pole across the Canadian arctic, 1831–2007.



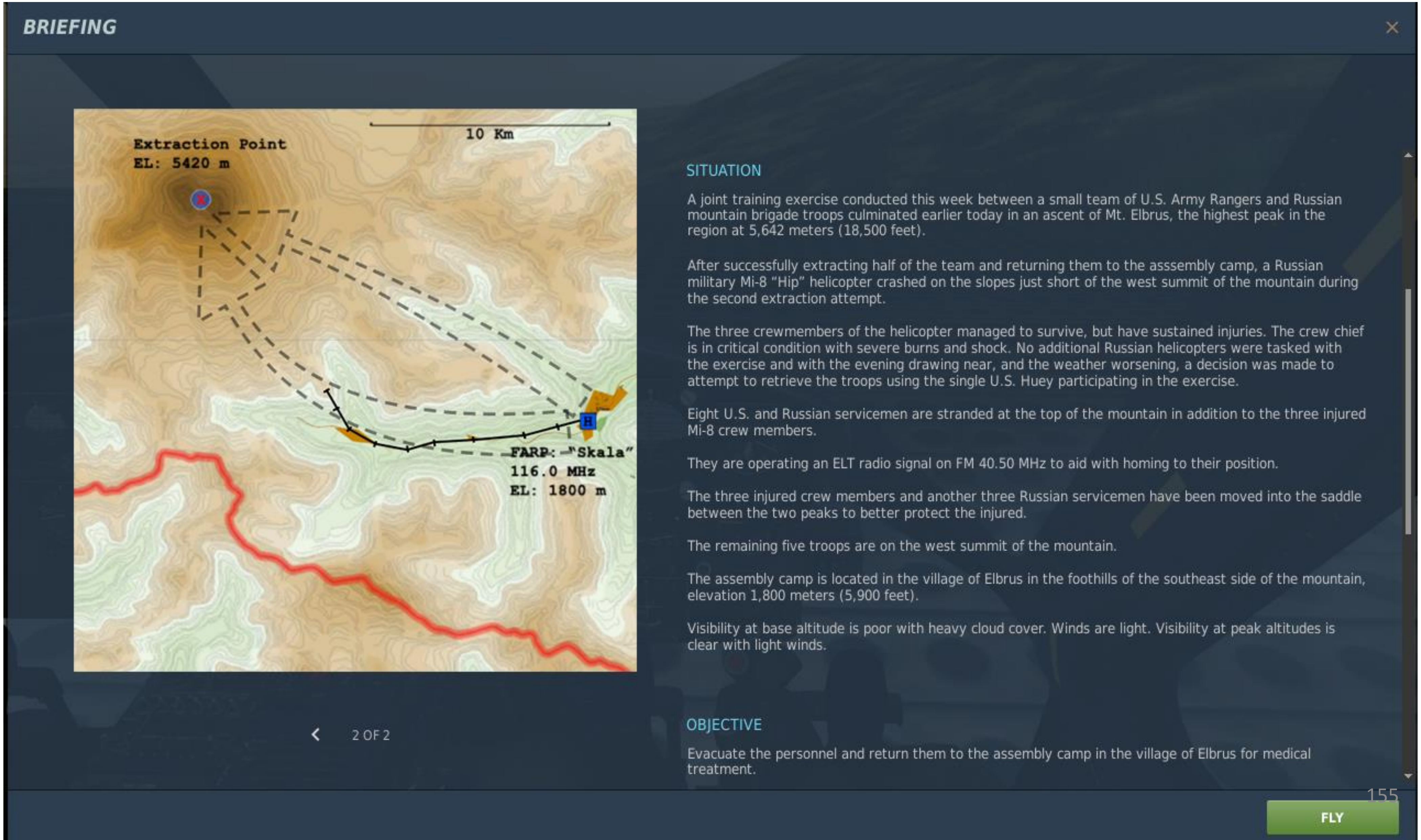



# NAVIGATION – MAGNETIC VARIATION

Checking the magnetic variation is now very easy: you can access it directly from the F10 map, shown with the Compass Rose.

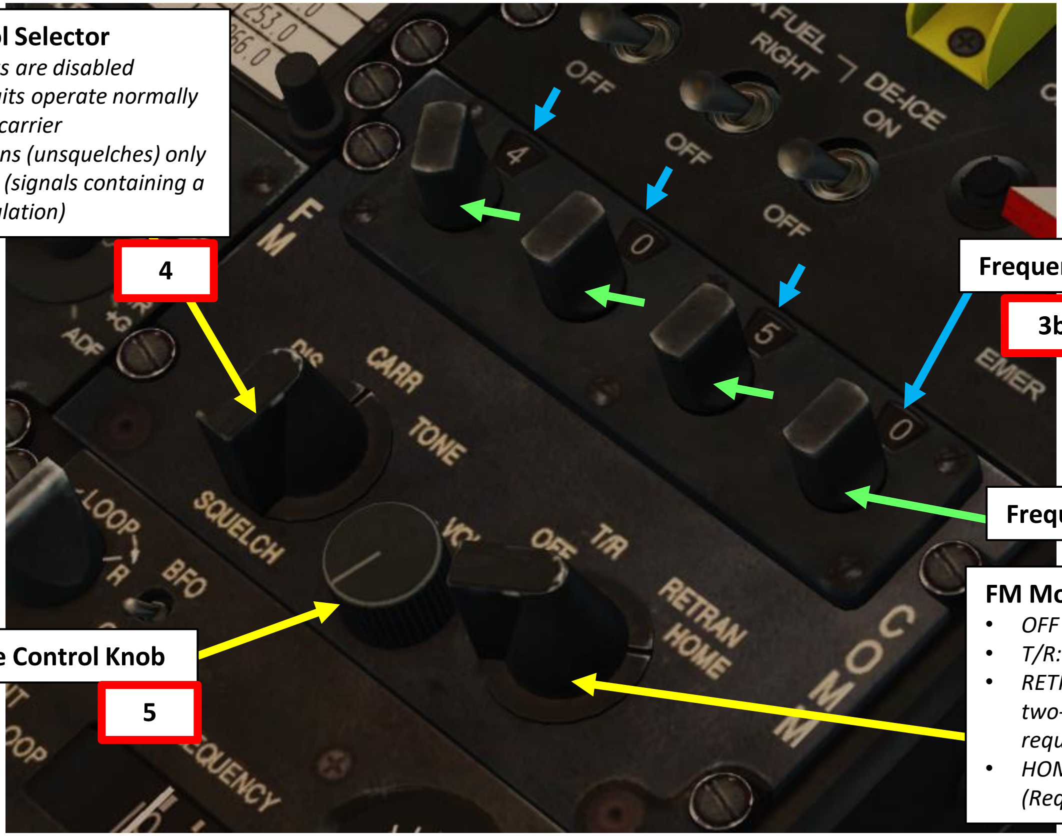
# FM RADIO HOMING NAVIGATION EXAMPLE

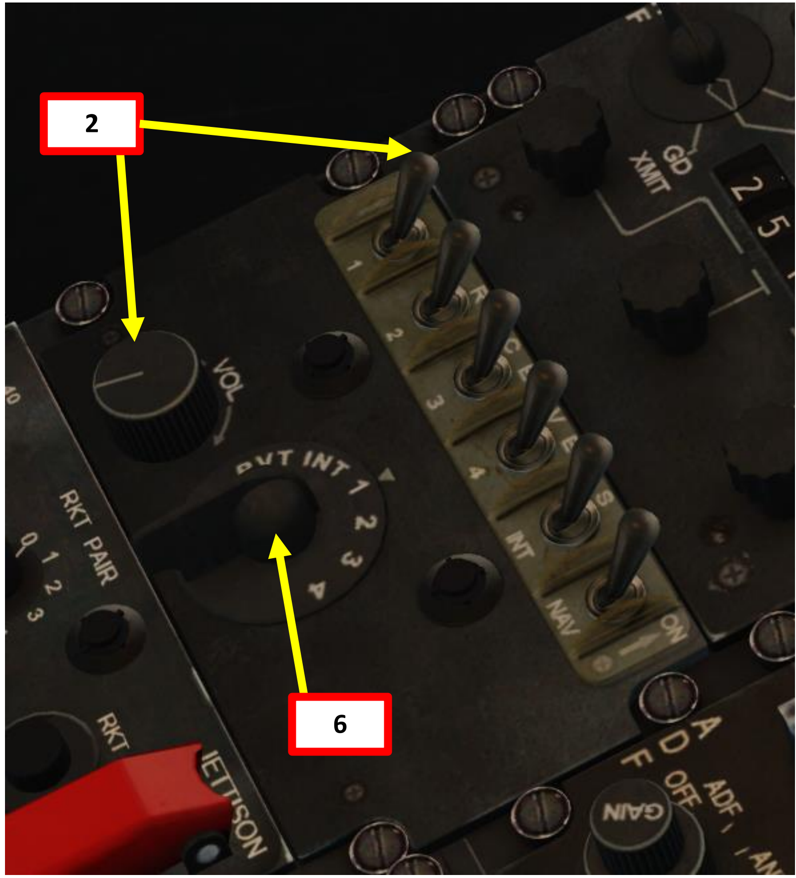
As an example, we will take a rescue mission to Mount Elbrus. Try it, it’s a lot of fun and flying a rescue mission really feels great! A Mi-8 crew crashed in the mountains and its ELT (Emergency Locator Transmitter) started broadcasting an emergency signal on a 40.50 MHz FM frequency.



# FM RADIO HOMING NAVIGATION EXAMPLE

1. Set FM mode control switch – HOME (Homing).
2. Set Radio Receiver No. 1 Switch – ON (FWD). Adjust volume as required.
3. Set radio frequency using the frequency selector dials. We will set frequency 40.50 MHz.
4. Set FM Squelch Control Selector to CARR (Carrier) or TONE. The carrier squelch is automatically selected by an internal contact arrangement on HOME position.
5. Adjust volume as required
6. This step is not required, but it is good practice to set Transmit-Interphone Selector switch – No. 1 position. This is in case you want to communicate on the FM frequency.



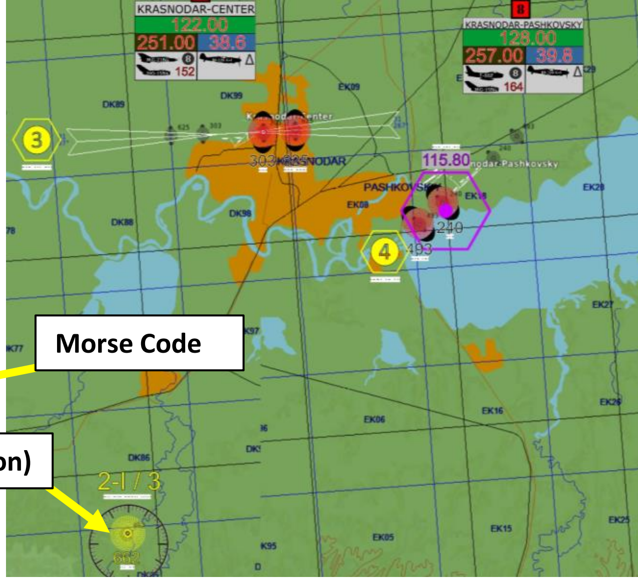
# FM RADIO HOMING NAVIGATION EXAMPLE

7. Fly helicopter toward the homing station by heading in direction that causes homing Course Deviation Indicator (CDI) right-left vertical pointer to position itself in the center of the indicator scale. To ensure that the helicopter is not heading away from the homing station, change the heading slightly and note that the course deviation indicator vertical pointer deflects in direction opposite that of the turn.

# ADF (AUTOMATIC DIRECTION FINDER) NAVIGATION EXAMPLE

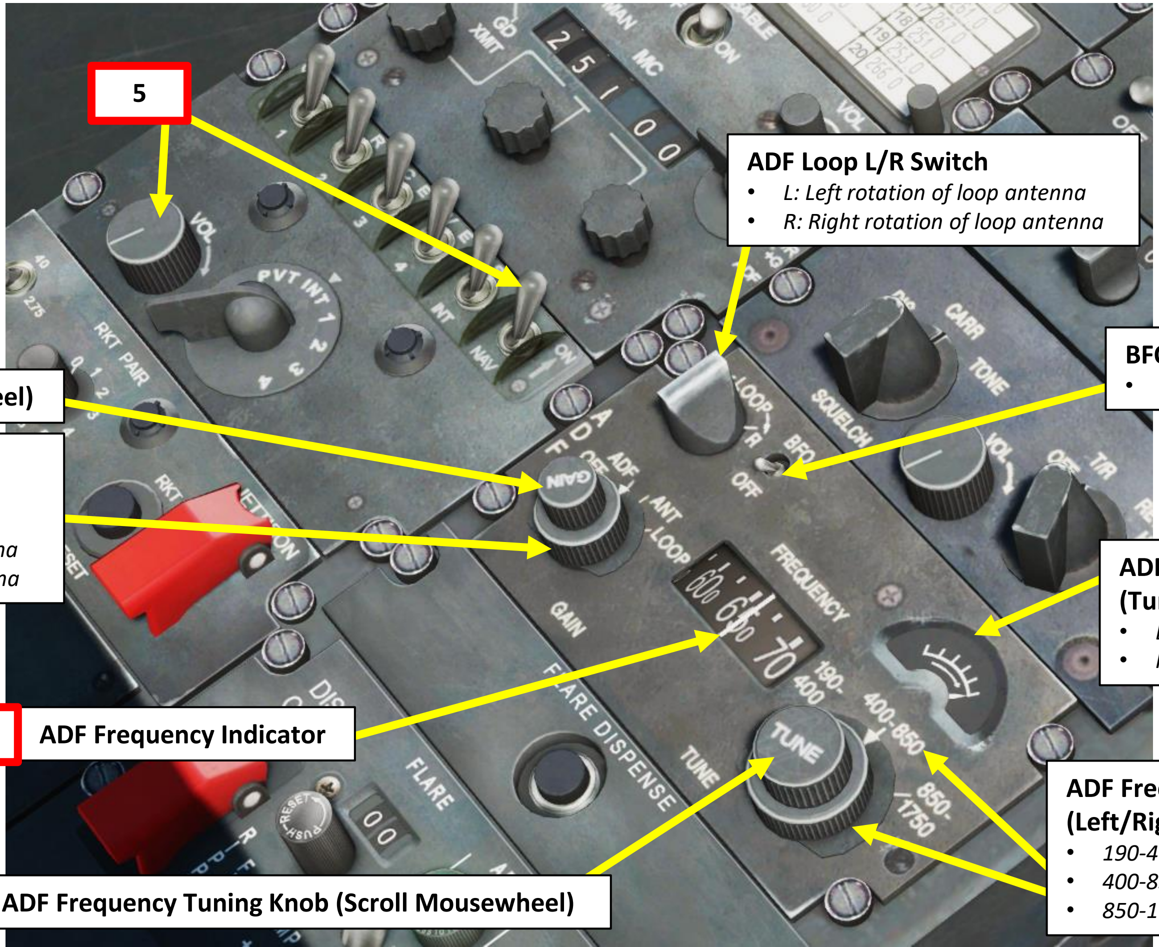
By consulting Lino_Germany's map, we can find NDB locations and frequencies. In this example, we will use NDB (Non-Directional Beacon) 662 (ADF frequency = 662 kHz).

1. Right click on ADF mode selector to set it to "ADF" (Automatic Direction Finder)
2. Right click on Frequency tuner to pick adequate band range (in our case 400-850 kHz).
3. Scroll mousewheel on the frequency tuner and set frequency to 662 kHz.
4. Check signal strength to know when you are receiving a signal. Be careful: it is very sensitive. You can check if you are on the good frequency by cross-checking the signal you are hearing and the morse code associated with the NDB.
5. Set Radio Receiver NAV Switch – ON (FWD). Adjust volume as required.


Morse Code

NDB (Non-Directional Beacon)



5

ADF Loop L/R Switch
- *L: Left rotation of loop antenna*
- *R: Right rotation of loop antenna*

BFO (Beat Frequency Oscillator) Switch
- *ON/OFF*

ADF Gain Control Knob (Scroll Mousewheel)

1 ADF Mode Selector (Left/Right Click)
- *OFF*
- *ADF: Automatic Direction Finding*
- *ANT: Receiver operates with sense antenna*
- *LOOP: Receiver operates with loop antenna*

4 ADF Signal Strength Indicator (Tuning Meter)
- *Left: Weak Signal*
- *Right: Strong Signal*

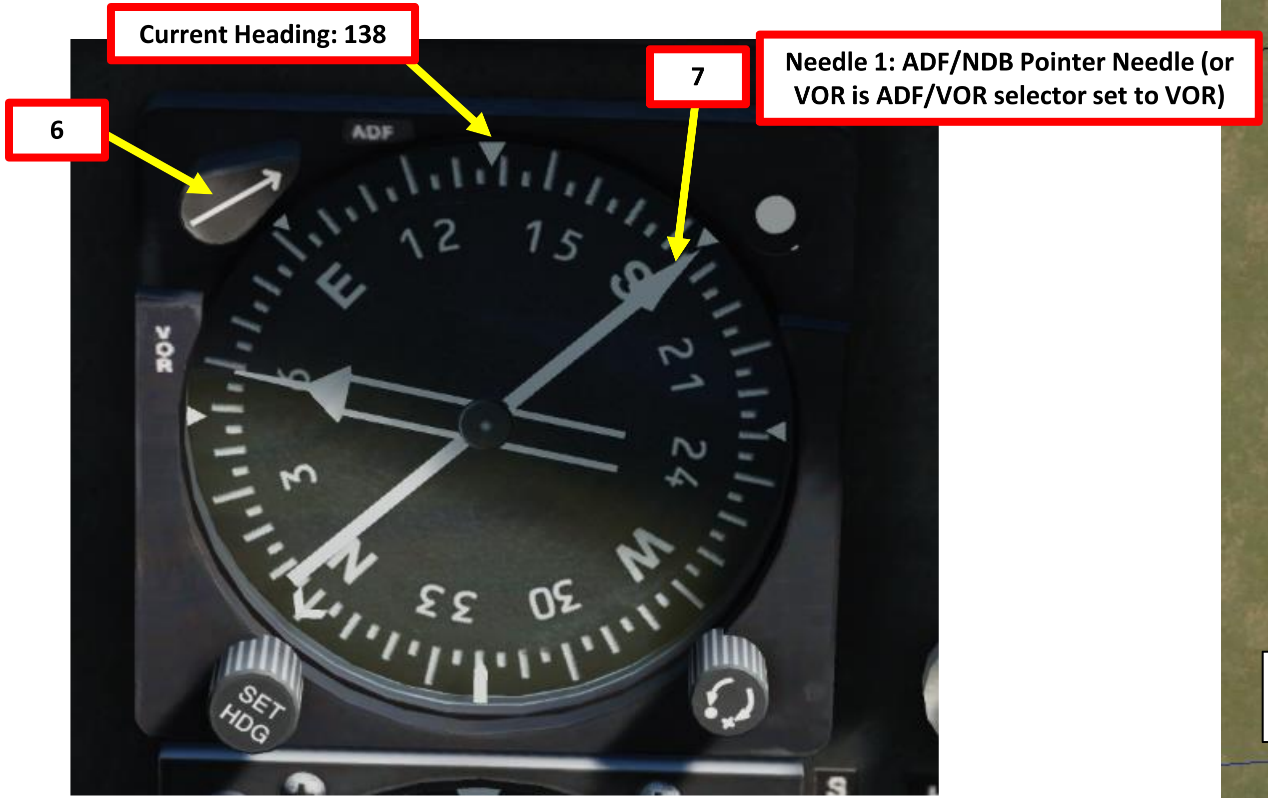
3b ADF Frequency Indicator

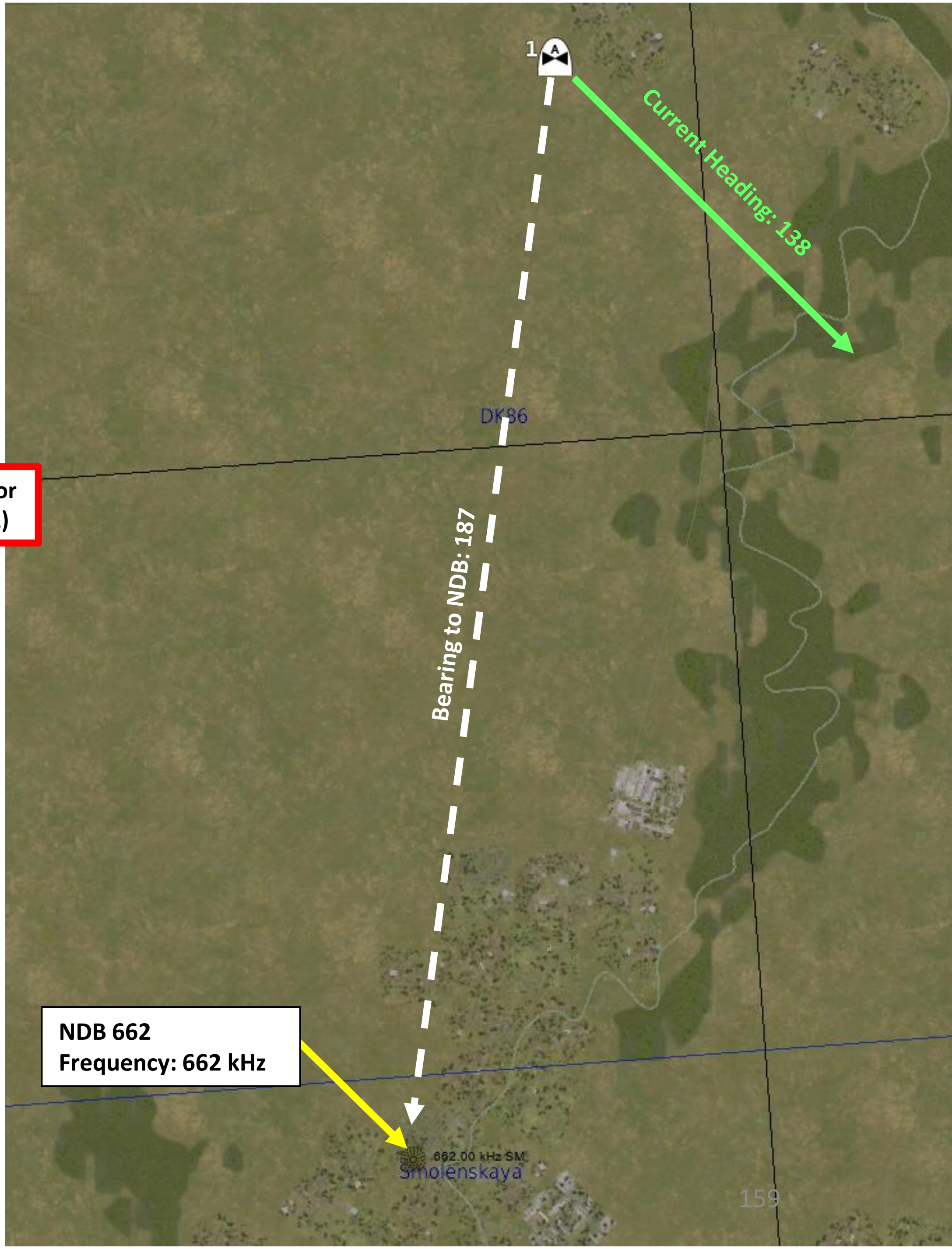
2 ADF Frequency Band Selector (Left/Right Click)
- *190-400 kHz*
- *400-850 kHz*
- *850-1750 kHz*

3a ADF Frequency Tuning Knob (Scroll Mousewheel)

# ADF (AUTOMATIC DIRECTION FINDER) NAVIGATION EXAMPLE

6. Set VOR/ADF selector to ADF on the Radio-Compass.
7. Consult the Radio Compass Indicator and find where the signal is coming from by following the pointy end of Needle 1.
8. Fly towards the signal: you will be on course when Needle 1 is aligned with your current heading on the Radio Compass.

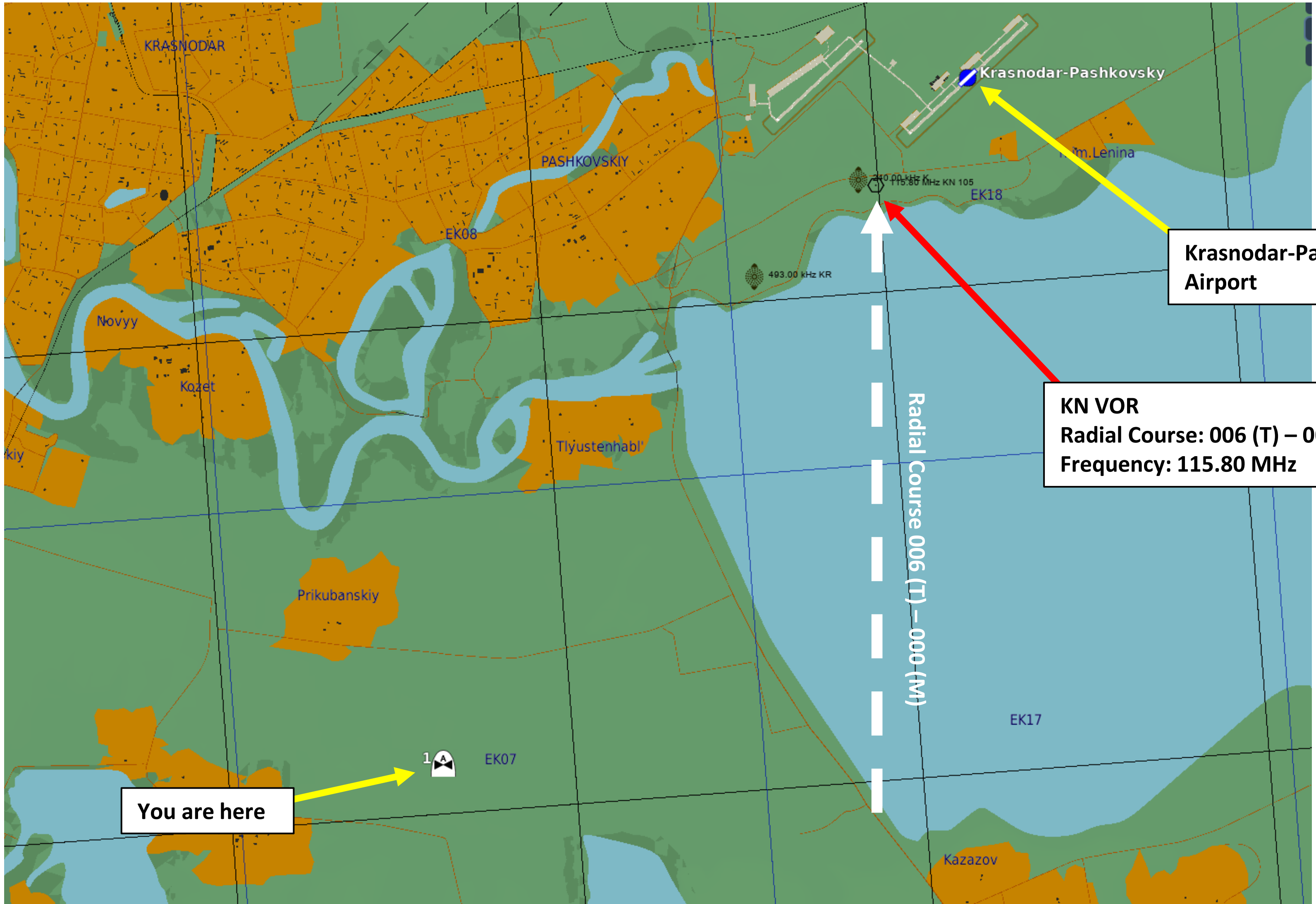


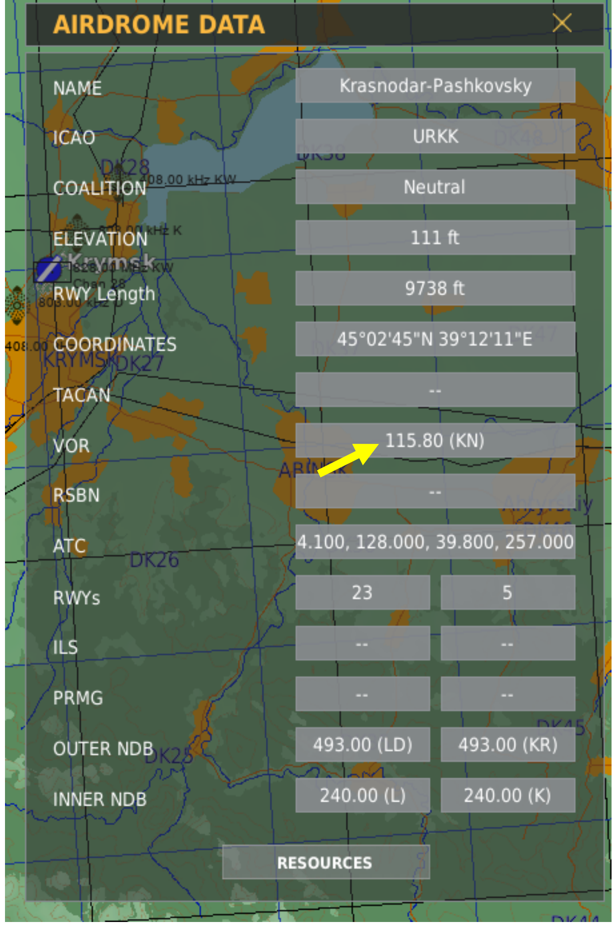



# VOR (VHF OMNIDIRECTIONAL RANGE) NAVIGATION EXAMPLE

Using a VOR will give you lateral guidance only, while ILS will give you both lateral and vertical guidance based on the localizer (lateral component) and the glide slope (vertical component). As an example, we will use the VOR station “KN” near Krasnodar-Pashkovsky airport. By consulting Lino_Germany’s map, we can find the VOR station location, morse signal and frequency.

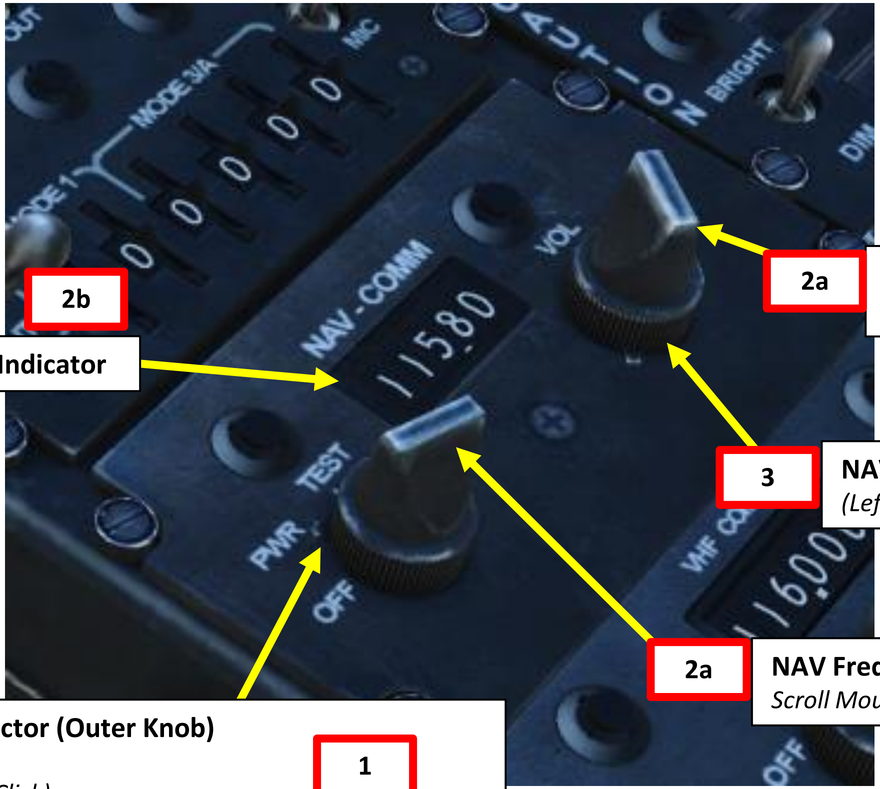
In this example, we will use a VOR frequency of 115.80 MHz for a radial of 000 deg magnetic (006 deg true heading).



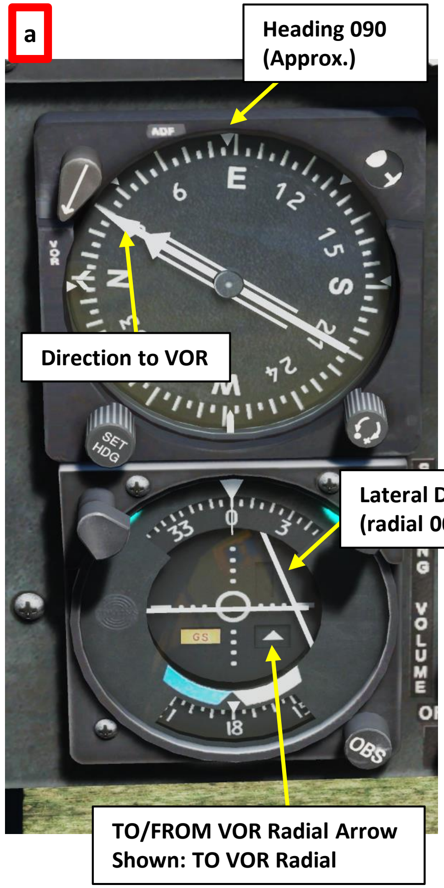

# VOR (VHF OMNIDIRECTIONAL RANGE) NAVIGATION EXAMPLE

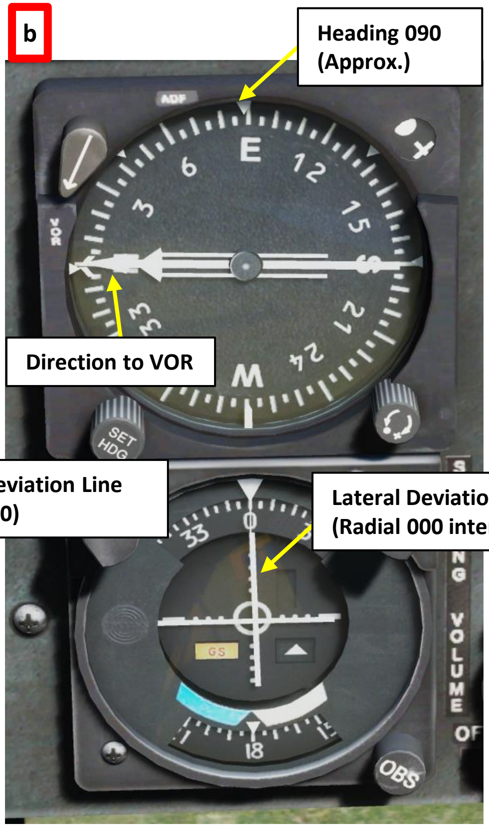
1. Set NAV-COMM radio to PWR (right click).
2. Scroll mousewheel on both frequency tuners and set frequency to 108.90 MHz. You can check if you are on the good frequency by cross-checking the signal you are hearing and the morse code associated with the ILS.
3. Adjust NAV radio volume as required.
4. Set VOR/ADF selector to VOR on the Radio-Compass.
5. Set Course Deviation Adjustment knob to the radial interception heading of 000 (Magnetic Heading).
6. Consult the Course Deviation Indicator (CDI) and find where the signal is coming from.



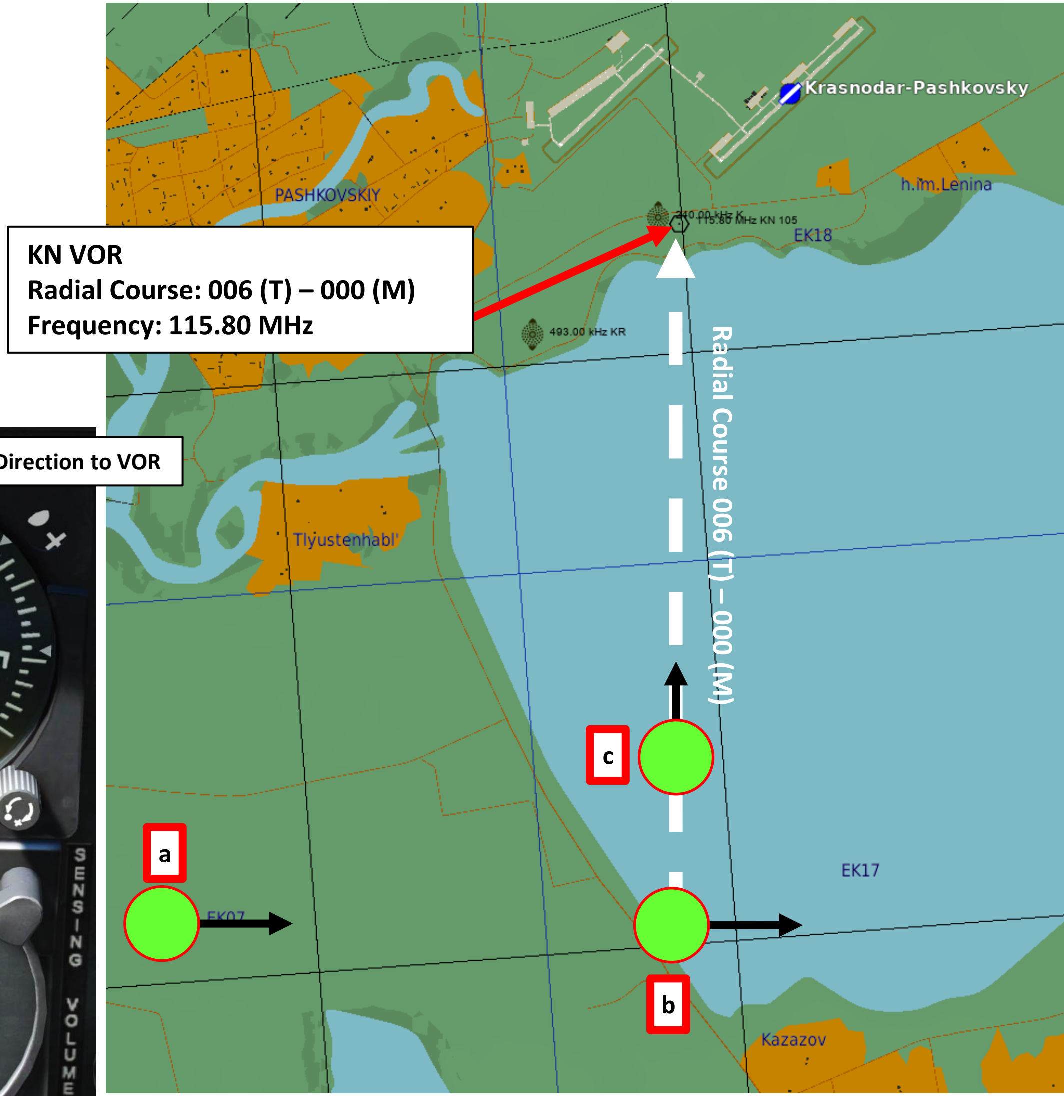

# VOR (VHF OMNIDIRECTIONAL RANGE) NAVIGATION EXAMPLE

7. Steer the helicopter until the vertical bar on the CDI (Course Deviation Indicator) is lined up with the vertical centerline. This will align you with the radial you are trying to intercept.
8. Once radial is intercepted, the Lateral Deviation line should be lined up vertically with the CDI centerline.



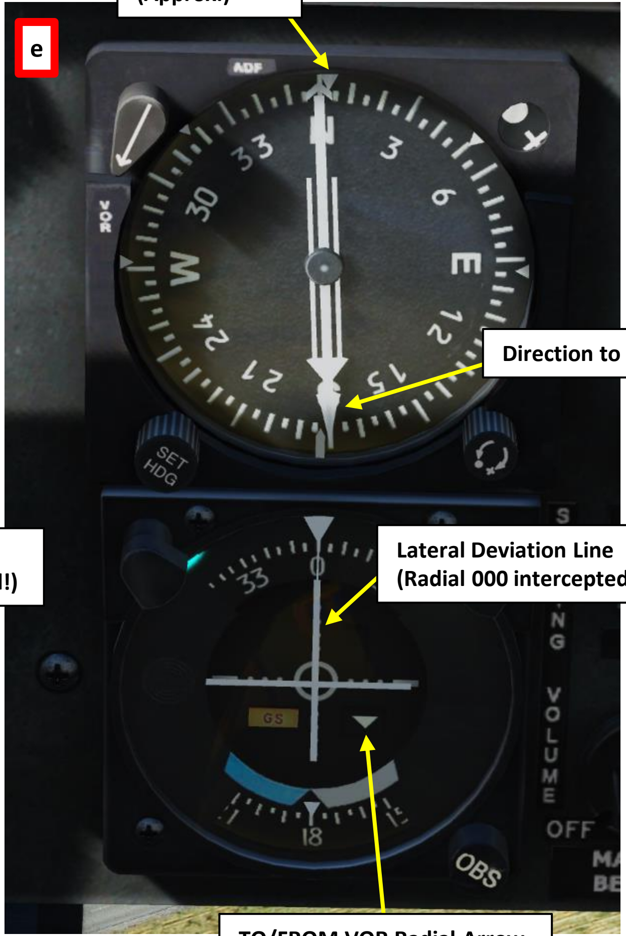



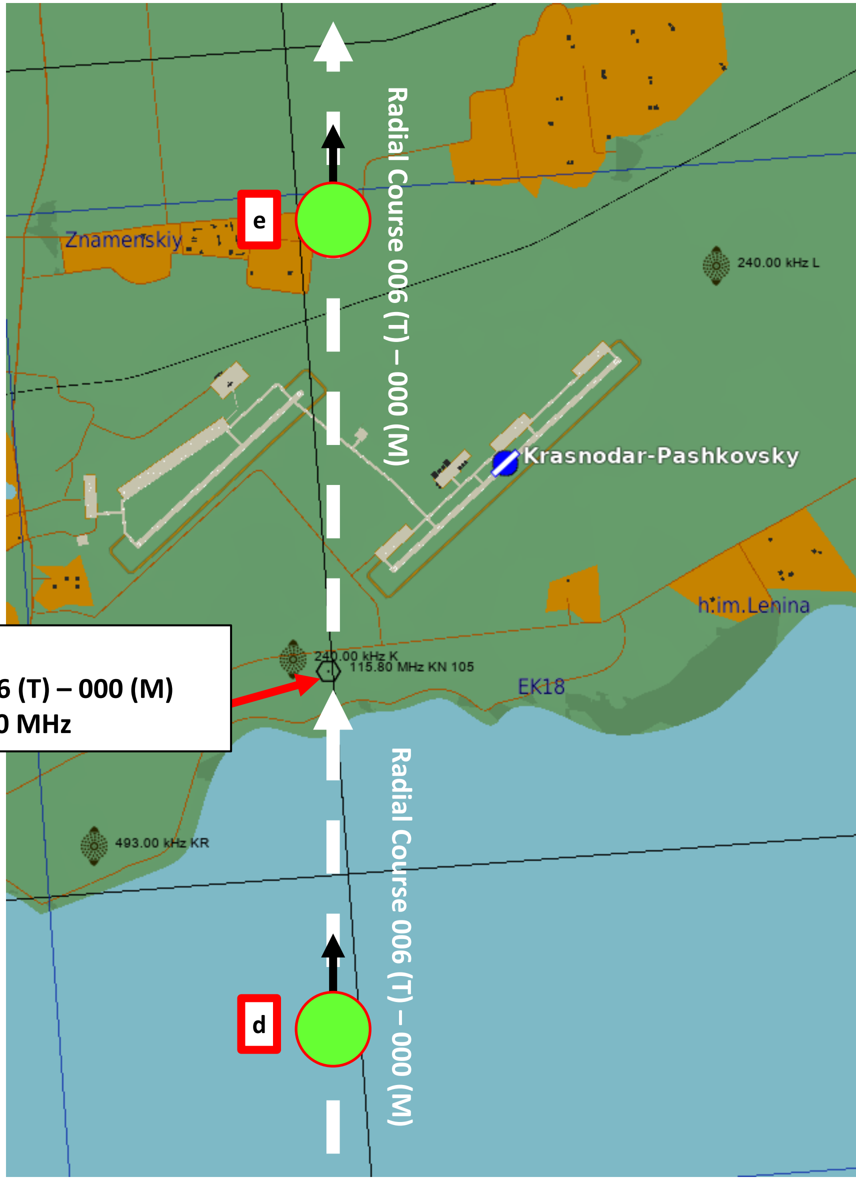




# VOR (VHF OMNIDIRECTIONAL RANGE) NAVIGATION EXAMPLE

9. As you fly over the VOR station, the TO/FROM indicator will switch to FROM.

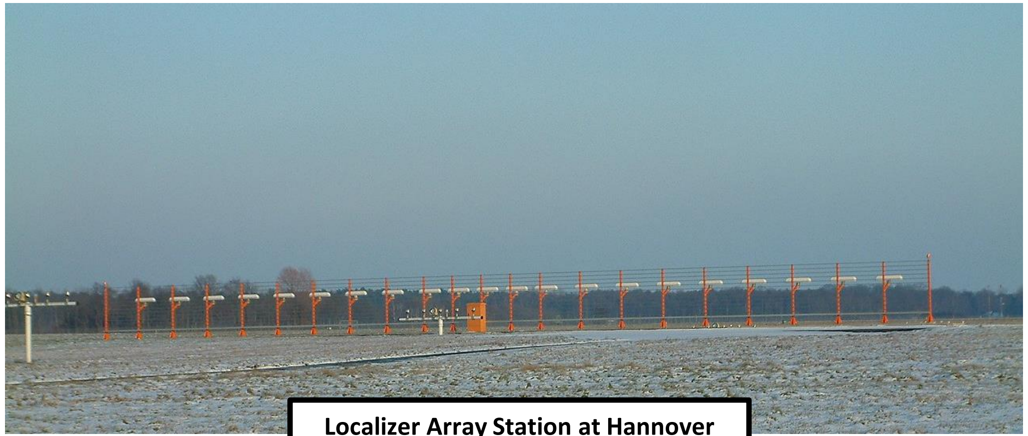

**KN VOR**
**Radial Course: 006 (T) – 000 (M)**
**Frequency: 115.80 MHz**

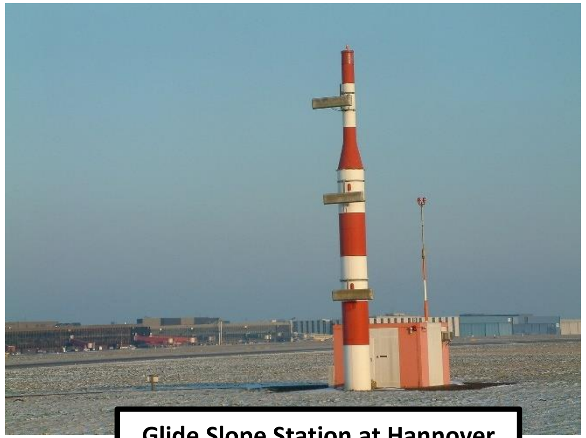
# ILS APPROACH EXAMPLE

The ILS (Instrument Landing System) exists to guide you during your approach.

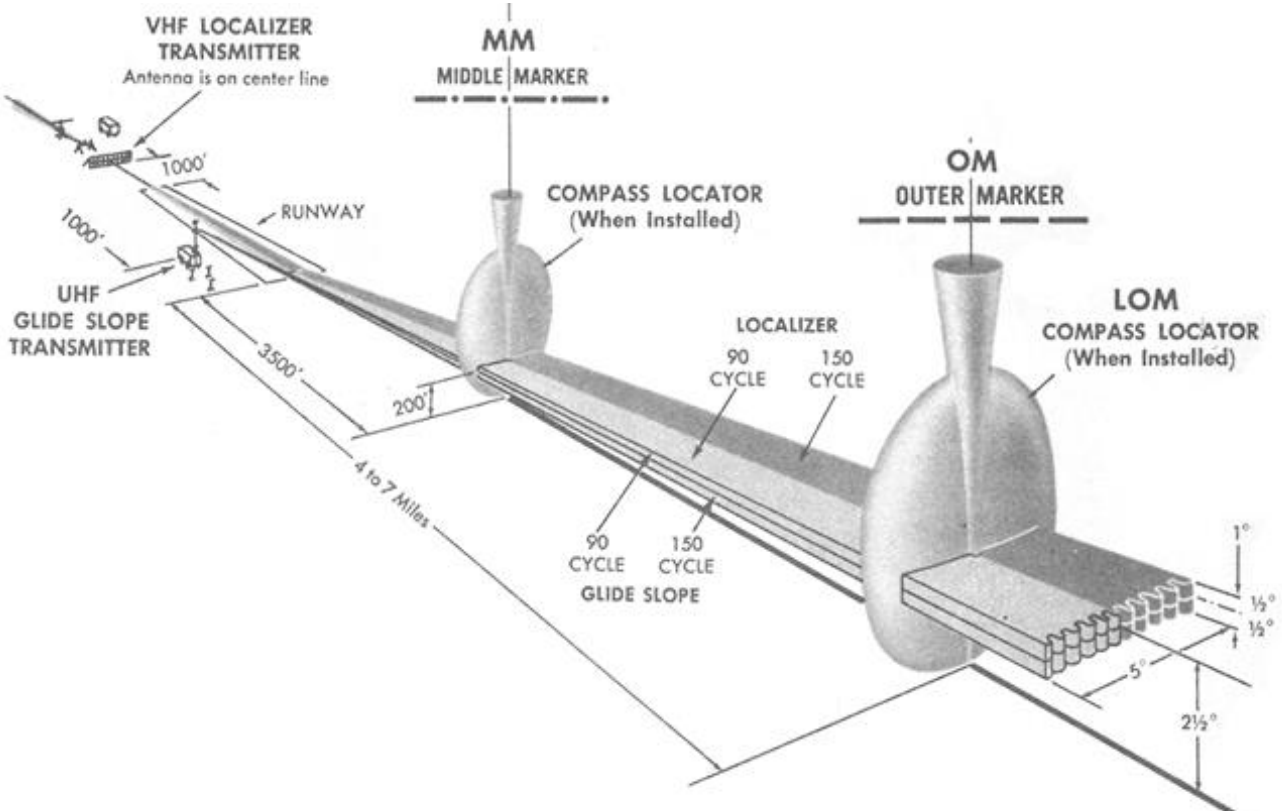
The Localizer is generally an array of antennas that will give you a lateral reference to the center of the runway.

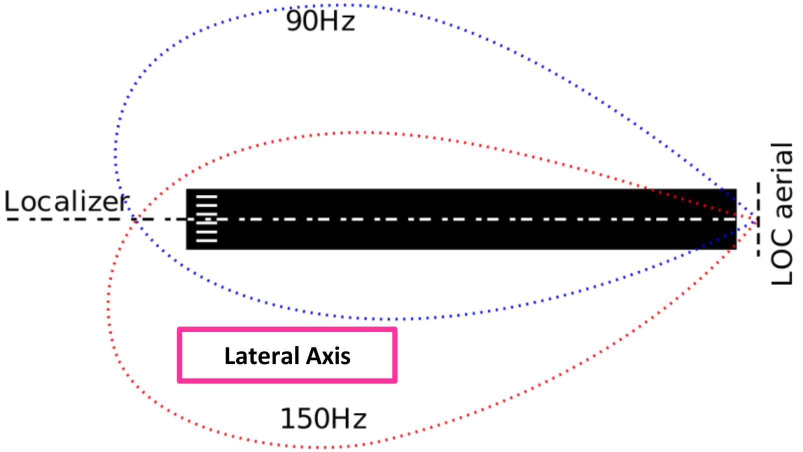
The Glide Slope station will help you determine the descent speed you need in order to not smack the runway in a smoldering ball of fire.


Localizer Array Station at Hannover

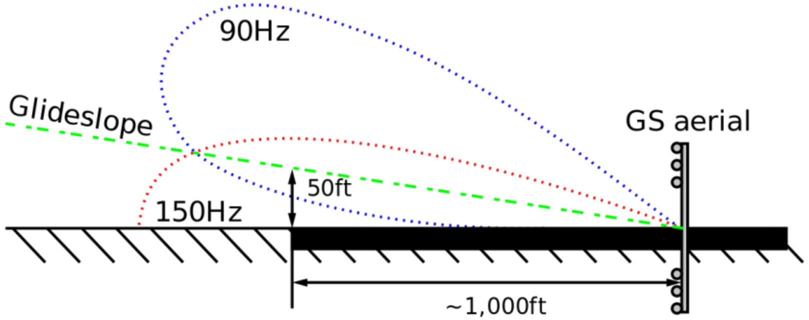

Glide Slope Station at Hannover

Great video explanation of ILS
[https://www.youtube.com/watch?v=KVtEfDcNMO8](https://www.youtube.com/watch?v=KVtEfDcNMO8)




Lateral Axis

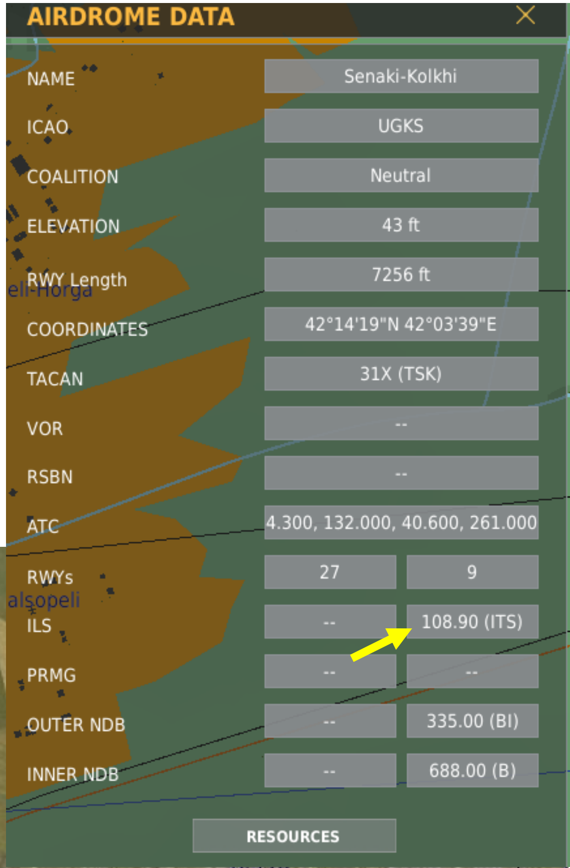


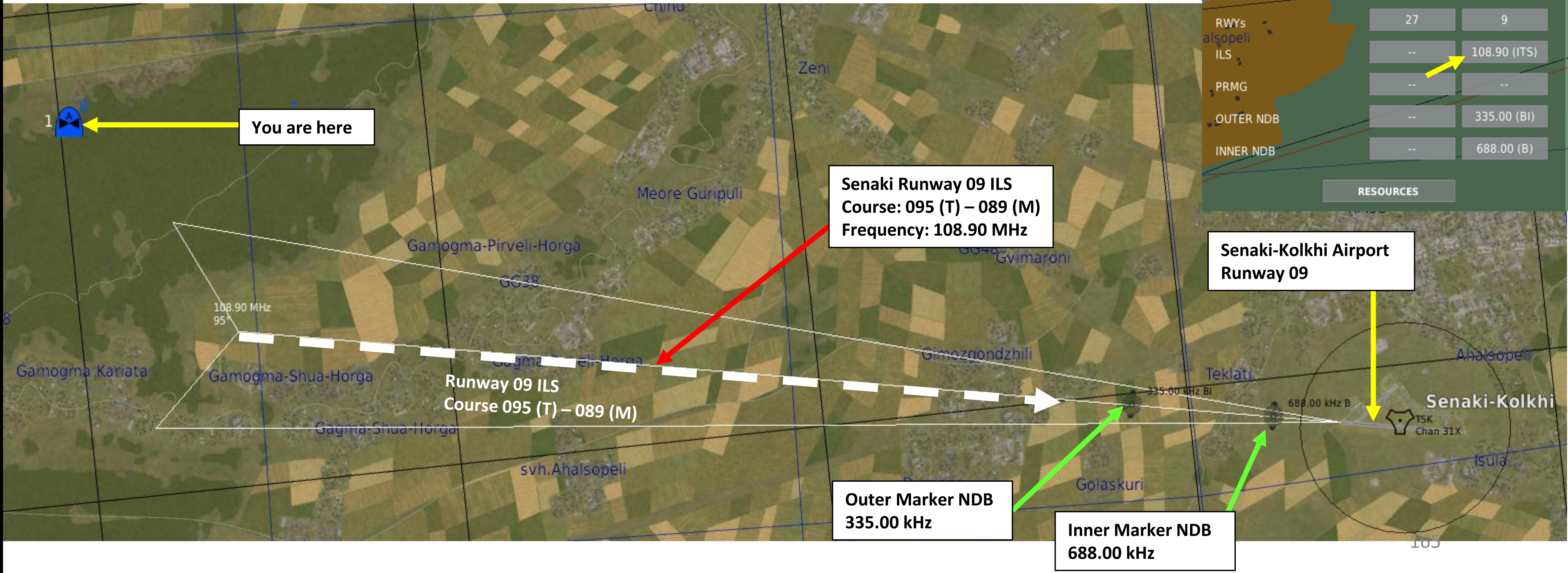

Vertical Axis

# ILS APPROACH EXAMPLE

You can use the NAV-COMM radio for both VOR and ILS approaches. VOR will give you lateral guidance only, while ILS will give you both lateral and vertical guidance based on the localizer (lateral component) and the glide slope (vertical component). As an example, we will use the ILS beacon at Senaki-Kolkhi. By consulting Lino_Germany's map, we can find the ILS station location, runway heading, morse signal and frequency.

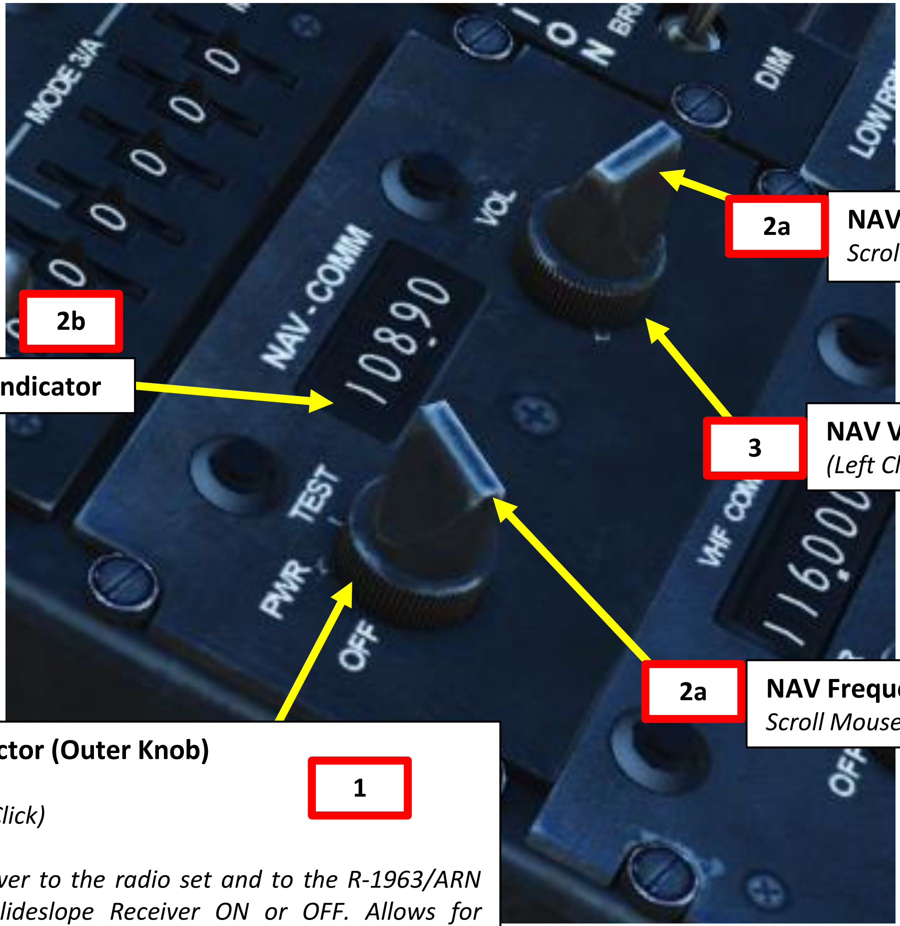
In this example, we will use a ILS frequency of 108.90 MHz for a runway heading of 089 deg magnetic (095 deg true heading).



# ILS APPROACH EXAMPLE

1. Set NAV-COMM radio to PWR (right click).
2. Scroll mousewheel on both frequency tuners and set frequency to 108.90 MHz. You can check if you are on the good frequency by cross-checking the signal you are hearing and the morse code associated with the ILS.
3. Adjust NAV radio volume as required.
4. Switch marker sensitivity switch to HIGH.
5. Set Course Deviation Adjustment knob to the runway heading of 089 (Magnetic Heading).
6. Consult the Course Deviation Indicator (CDI) and find where the signal is coming from.


**2a** **NAV Frequency Selecter (Inner Knob)**
*Scroll Mousewheel*

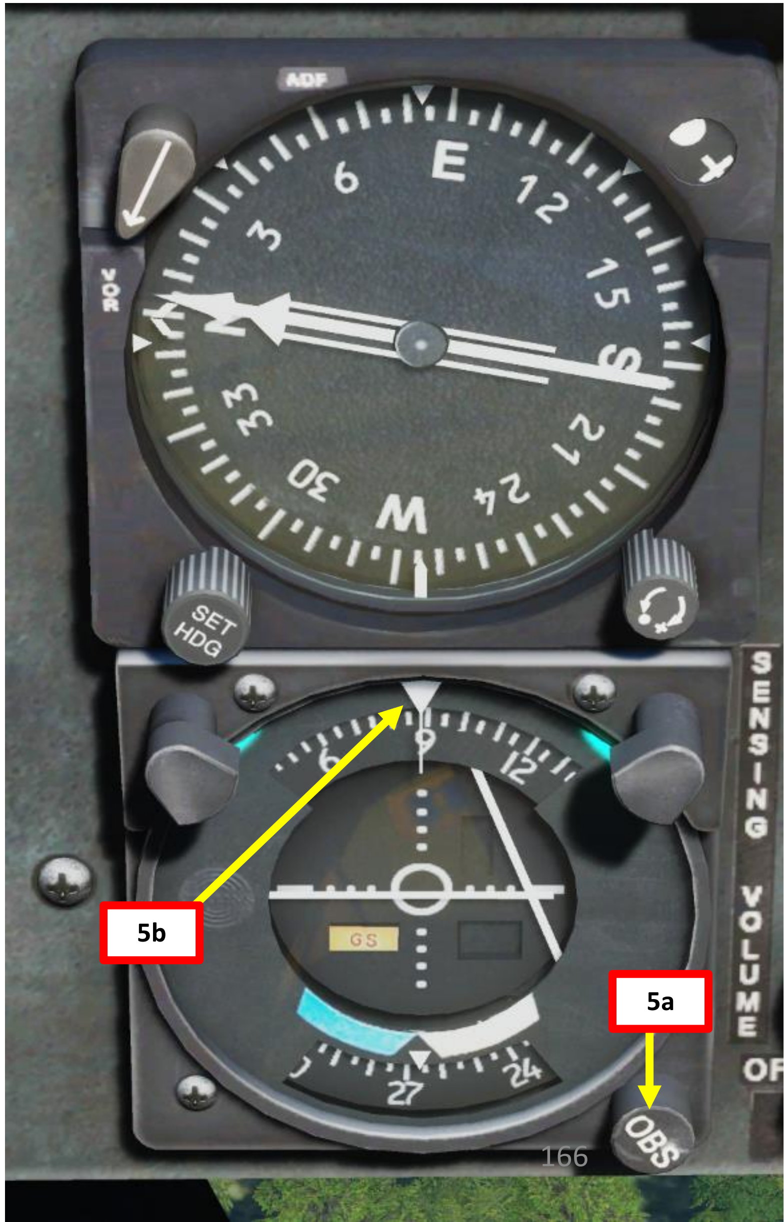
**2b** **NAV Frequency Indicator**

**3** **NAV Volume Selector (Outer Knob)**
*(Left Click / Right Click)*

**2a** **NAV Frequency Selecter (Inner Knob)**
*Scroll Mousewheel*

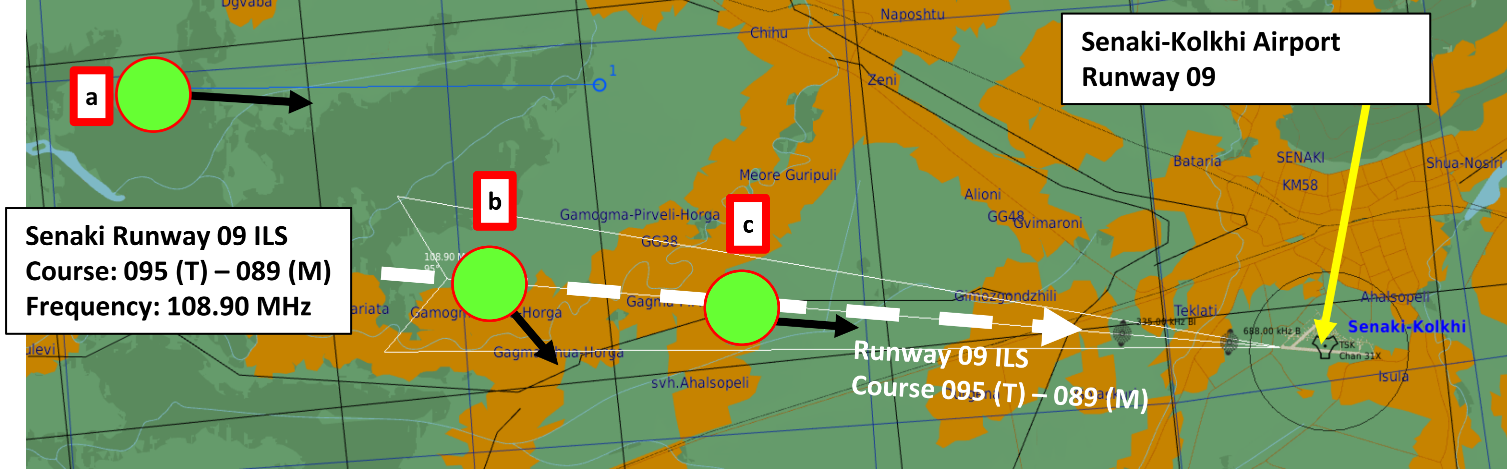
**1** **NAV Power Selector (Outer Knob)**
*OFF / PWR / TEST*
*(Left Click / Right Click)*

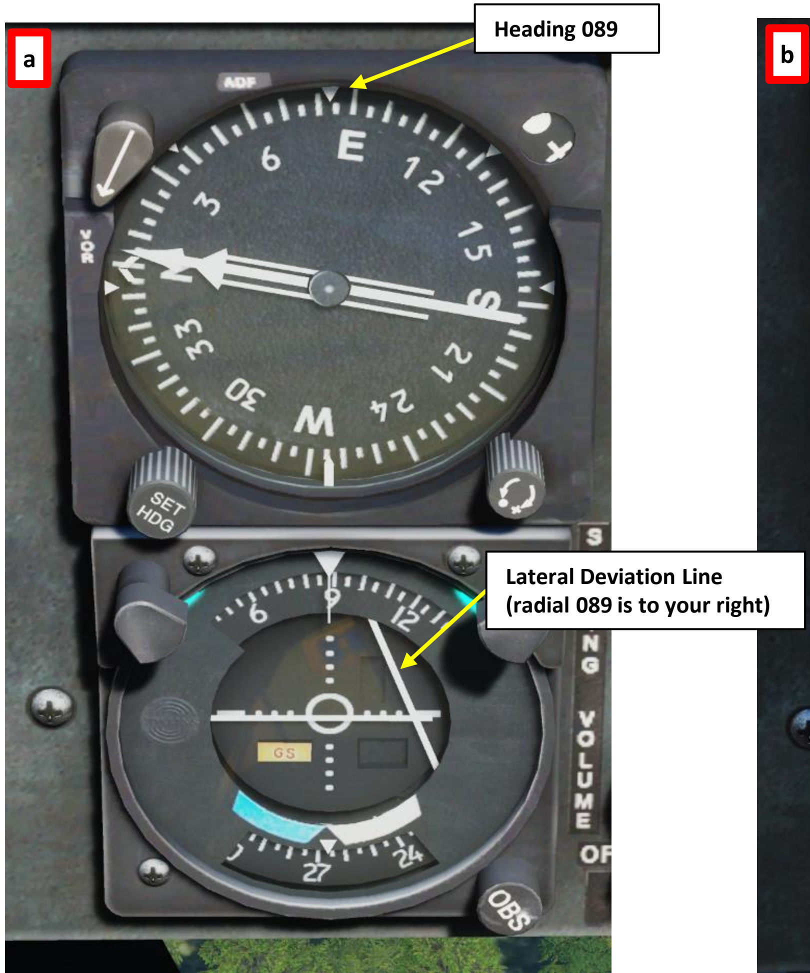
*Turns primary power to the radio set and to the R-1963/ARN Marker Beacon/Glideslope Receiver ON or OFF. Allows for accuracy of Course Deviation Indicators and Marker Beacon Indicator lamp in the TEST position.*

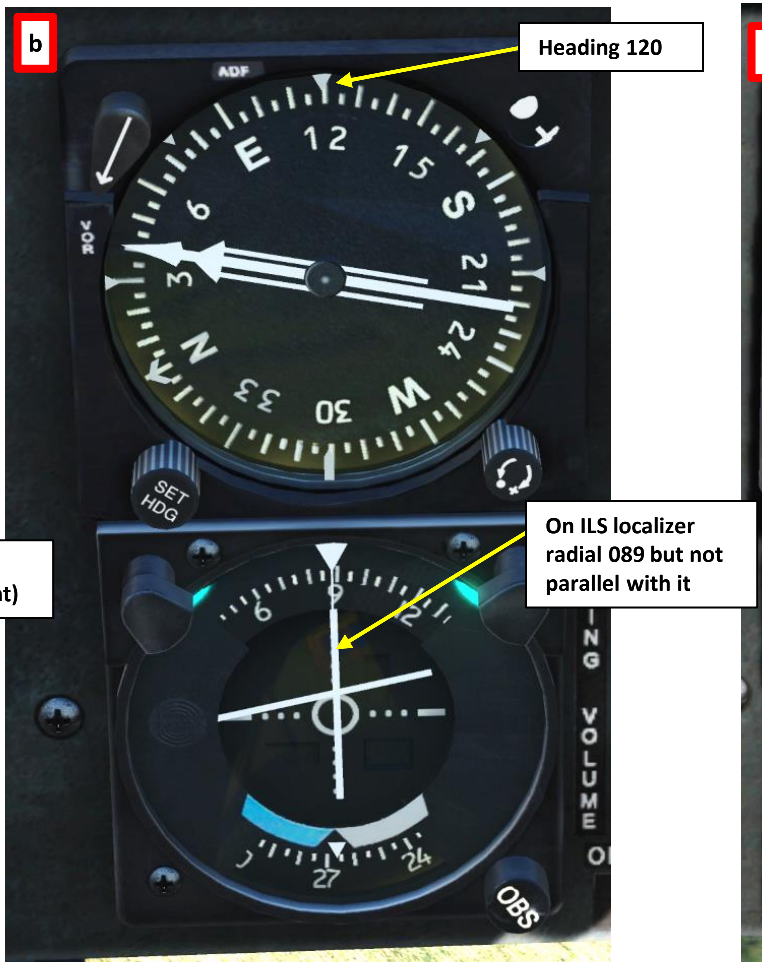


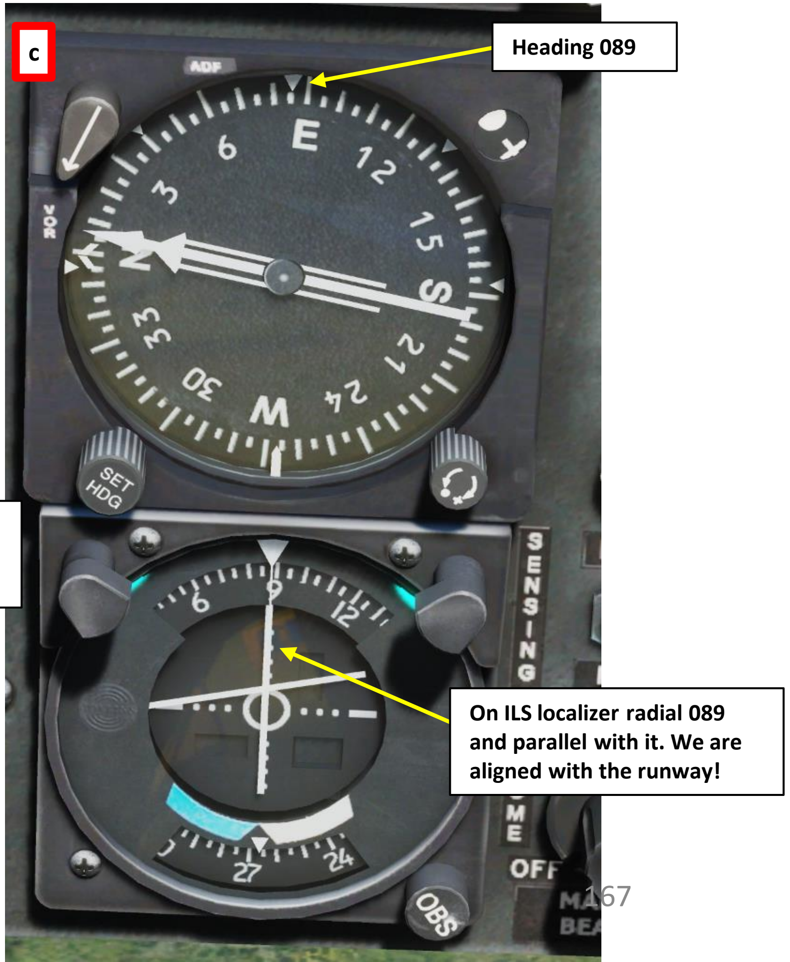
# ILS APPROACH EXAMPLE

7. Steer the helicopter until the vertical bar on the CDI (Course Deviation Indicator) is lined up with the vertical centerline. This will align you with the runway's localizer.
8. Once localizer is captured, the Lateral Deviation line should be lined up vertically with the CDI centerline.



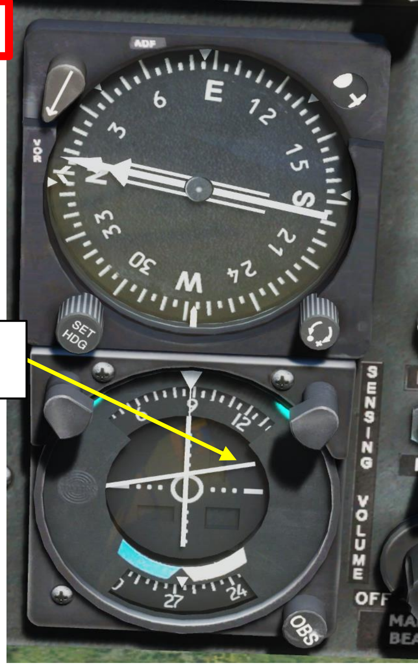



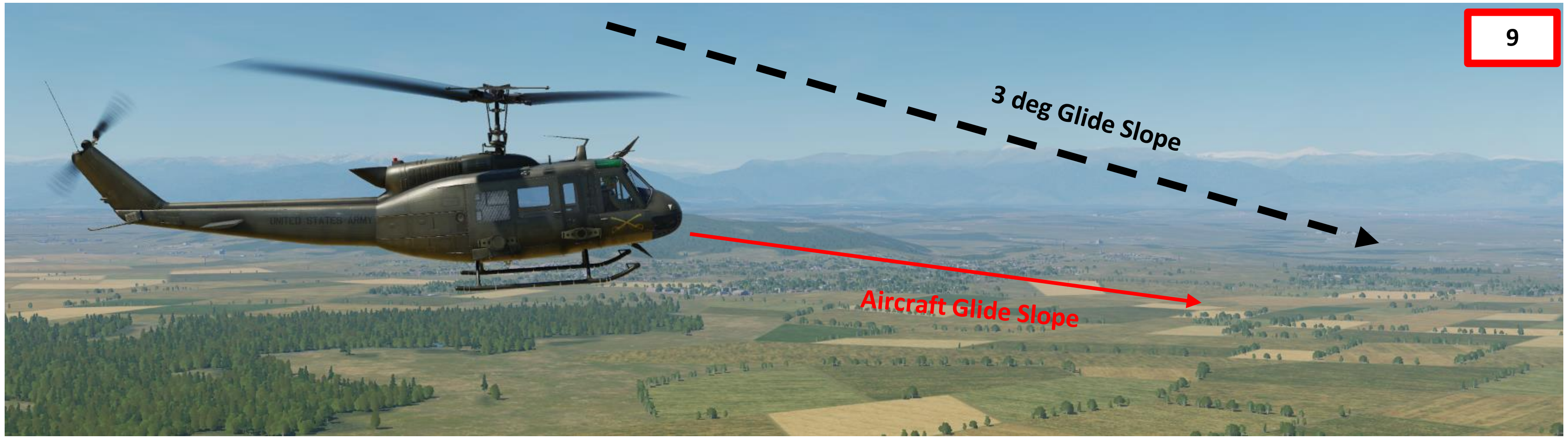



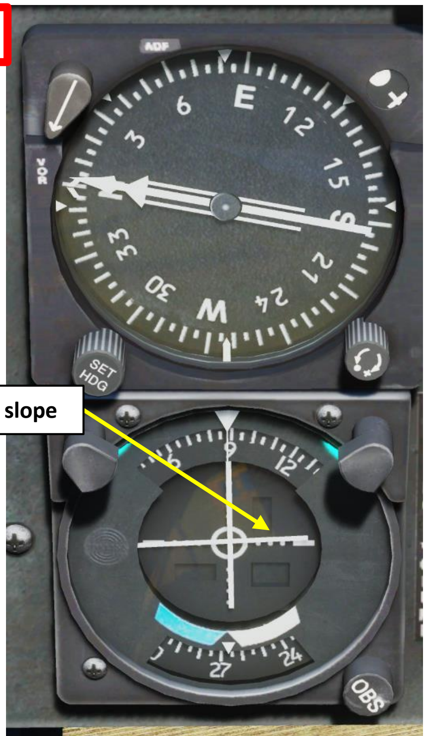



# ILS APPROACH EXAMPLE

9. Fly the helicopter until the horizontal bar on the CDI (Course Deviation Indicator) is lined up with the horizontal centerline. This will allow you to capture a 3-degree glide slope for a standard ILS approach.
10. Once glide slope is captured, the Vertical Deviation line should be lined up horizontally with the CDI centerline.

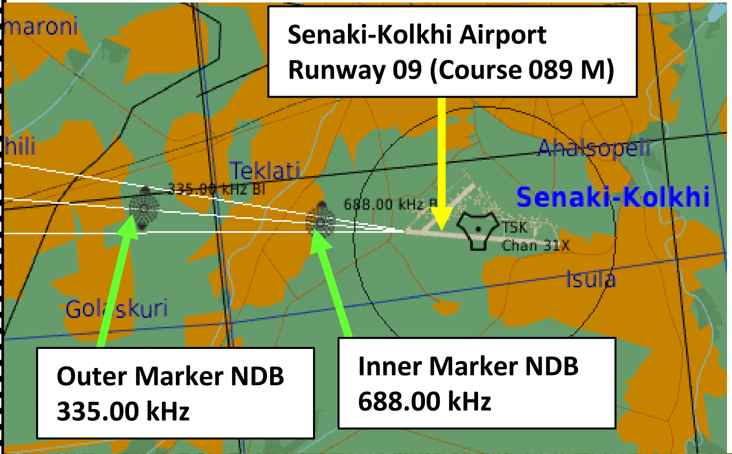



# ILS APPROACH EXAMPLE

11. Once you are lined up with the runway and on glide slope, follow the cues to the runway.
12. When you overfly the outer and inner markers (NDBs, or Non-Directional Beacons), the Marker light should illuminate with an aural warning.

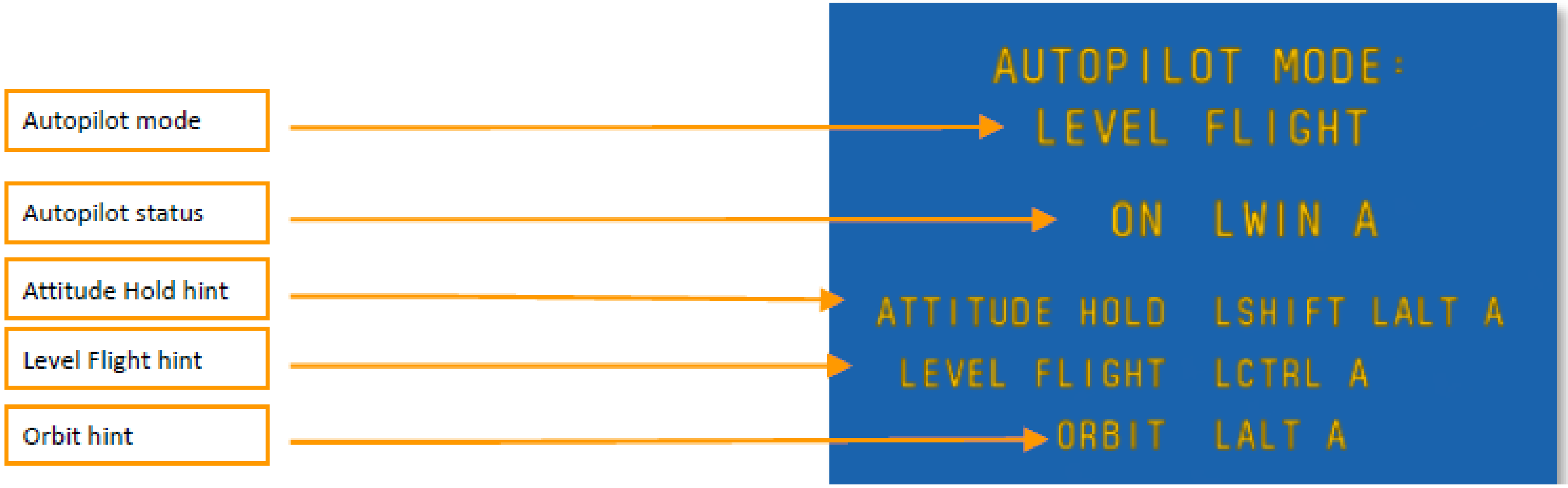





# CONTROLS FOR AI AUTOPILOT

The autopilot is not a real autopilot in the case of the Huey. Belsimtek simply allowed an AI pilot to take over controls when you switch to the co-pilot, left gunner or right gunner.

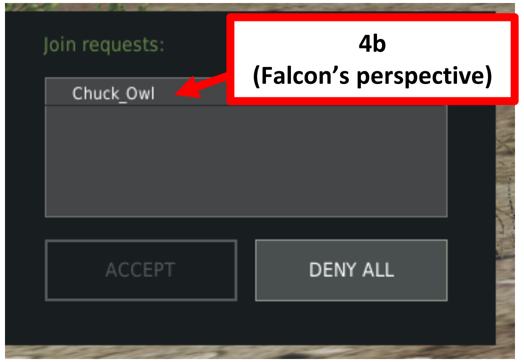
| | |
|---|---|
| **AI OPERATOR/LEFT/RIGHT ROE ITERATE (LCTRL+ 2/3/4)** | **ITERATES RULES OF ENGAGEMENT FOR COPILOT, LEFT & RIGHT GUNNERS<br>HOLD FIRE / RETURN FIRE / FREE FIRE (AT WILL)** |
| **AI OPERATOR/LEFT/RIGHT BURST SWITCH (LSHIFT+ 2/3/4)** | **ITERATES FIRING BURST LENGTH FOR COPILOT, LEFT & RIGHT GUNNERS<br>SHORT BURST / LONG BURST** |
| **AUTOPILOT** | **TURNS AI AUTOPILOT ON/OFF (LWIN+A)** |
| **AUTOPILOT ATTITUDE HOLD/LEVEL FLIGHT/ORBIT** | **SELECTS AI AUTOPILOT MODE (LALT+LSHIFT+A/LCTRL+A/LALT+A)** |
| **WEAPON HINTS ON/OFF** | **TOGGLE WEAPON INTERFACE (LCTRL+LSHIFT+H))** |

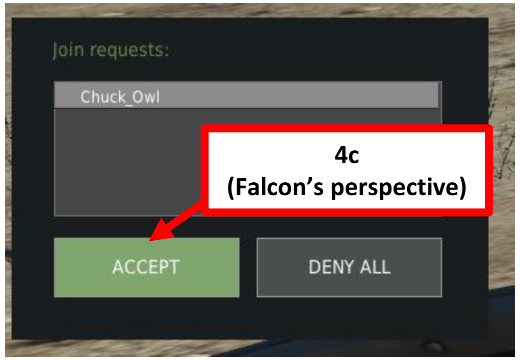


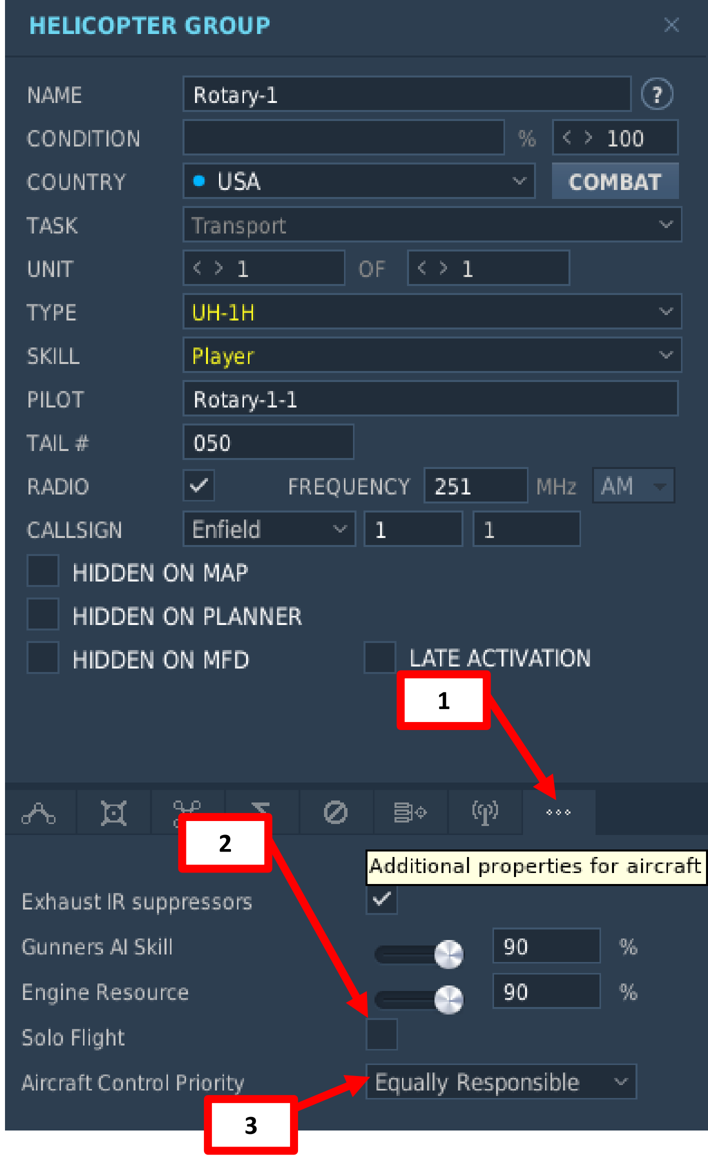
# MULTICREW

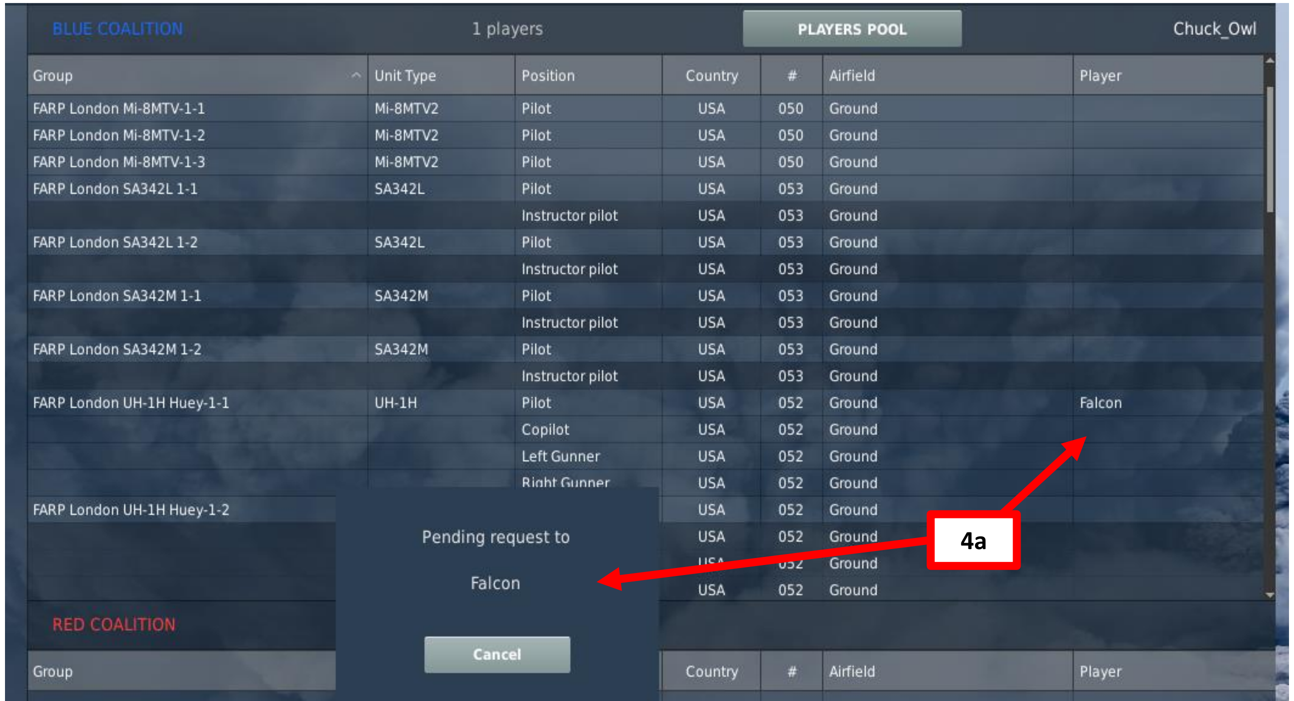
The Huey can be flown by two players in multiplayer. You can also take two additional players as gunners. However, you need to go in the Mission Editor and make sure the Huey is set up in the following manner:

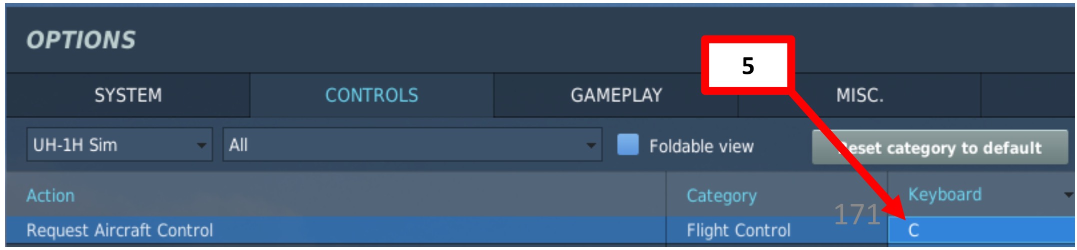
1. Select UH-1 Unit and go in “Additional Properties for Aircraft” menu
2. Make sure “Solo Flight” option is not ticked
3. Set “Aircraft Control Priority” to “Equally Responsible”
4. When spawning in multiplayer in any seat, the pilot will receive a request to let you take control of the other seat.
5. Once you are spawned, you can take control of the aircraft by pressing the “Request Aircraft Control” binding (“C” key). The other crew member you are taking controls from must accept.

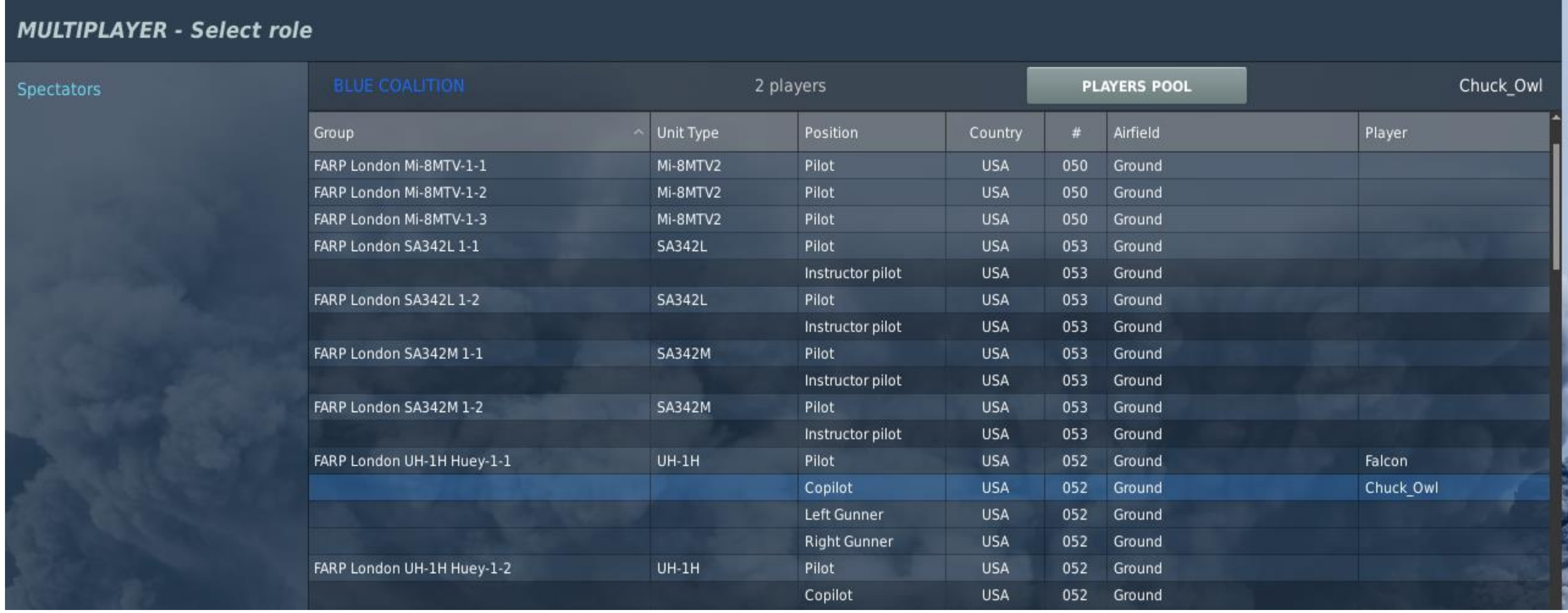



## MULTICREW

Note: you can press "LWIN+H" to display other players in the crew.

- PLAYER is displayed next to your position
- NET is displayed next to another player's position





# STANDARD COMMUNICATIONS

**Abort**--terminate a preplanned aircraft maneuver.
**Affirmative**--yes.
**Bandit**--an identified enemy aircraft.
**Braking**--announcement made by the crew member who intends to apply brake pressure.
**Break**--immediate action command to perform an emergency maneuver to deviate from the present ground track; will be followed by the word "right," "left," "up," or "down."
**Call out**--command by the pilot on the controls for a specified procedure to be read from the checklist by the other crew member.
**Cease fire**--command to stop firing but continue to track.
**Clear**--no obstacle present to impede aircraft movement along the intended ground track. Will be preceded by the word "nose," "tail," or "aircraft" and followed by the direction; for example, "left," "right," "slide left," or "slide right." Also indicates that ground personnel are authorized to approach the aircraft.
**Come up/down**--command to change altitude up or down; normally used to control masking and unmasking operations.
**Contact**--establish communication with... (followed by the name of the element).
**Controls**--refers to aircraft flight controls.
**Drifting**--an alert of the unintentional or undirected movement of the aircraft; will be followed by the word "right," "left," "backward," or "forward."
**Egress**--command to make an emergency exit from the aircraft; will be repeated three times in a row.
**Execute**--initiate an action.
**Expect**--anticipate further instructions or guidance.
**Firing**--announcement that a specific weapon is to be fired.

**Figure 6-4. Examples of standard words and phrases**

**Fly heading**--command to fly an assigned compass heading. (This term generally used in low-level or contour flight operations.)
**Go ahead**--proceed with your message.
**Go AJ**--directive to activate antijam communications.
**Go plain**--directive to discontinue secure operations.
**Go secure**--directive to activate secure communications.
**Go red**--directive to discontinue secure operations.
**Hold**--command to maintain present position.
**Hover**--horizontal movement of aircraft perpendicular to its heading; will be followed by the word "left" or "right."
**Inside**--primary focus of attention is inside the cockpit for longer than two to three seconds.
**Jettison**--command for the emergency or unexpected release of an external load or stores; when followed by the word "door," will indicate the requirement to perform emergency door removal.
**Maintain**--command to continue or keep the same.
**Mask/unmask**--to conceal aircraft by using available terrain features and to position the aircraft above terrain features.
**Mickey**--a Have Quick time-synchronized signal.
**Monitor**--command to maintain constant watch or observation.
**Move aft**--command to hover aft, followed by distance in feet.
**Move forward**-- command to hover forward, followed by distance in feet.
**Negative**--incorrect or permission not granted.
**Negative contact**--unable to establish communication with. . . (followed by name of element).
**No joy**--target, traffic, or obstruction not positively seen or identified.
**Now**--indicates that an immediate action is required.
**Outside**--primary focus of attention is outside the aircraft.
**Put me up**--command to place the P* radio transmit selector switch to a designated position; will be followed by radio position numbers on the intercommunication panels (1, 2, 3). Tells the other crew member to place a frequency in a specific radio.
**Release**--command for the planned or expected release of an external load.

**Figure 6-4. Examples of standard words and phrases (continued)**

**Report**--command to notify.
**Roger**--message received and understood.
**Say again**--repeat your transmission.
**Slide**--intentional horizontal movement of an aircraft perpendicular to it's heading; will be followed by the word "right" or "left."
**Slow down**--command to reduce ground speed.
**Speed up**--command to increase ground speed.
**Stand by**--wait; duties of a higher priority are being performed and request cannot be complied with at this time.
**Stop**--command to go no further; halt present action.
**Strobe**--indicates that the aircraft AN/APR-39 has detected a radar threat; will be followed by a clock direction.
**Tally**--target, traffic, or obstruction positively seen or identified; will be followed by a repeat of the word "target," "traffic," or "observation" and the clock position.
**Target**--an alert that a ground threat has been spotted.
**Traffic**--refers to friendly aircraft that present a potential hazard to the current route of flight; will be followed by an approximate clock position and the distance from your aircraft with a reference to altitude (high or low).
**Transfer of controls**--positive three-way transfer of the flight controls between the rated crew members; for example, "I have the controls," "You have the controls," and "I have the controls."
**Troops on/out**--command to have troops enter or exit the aircraft.
**Turn**--command to deviate from present ground track; will be followed by words "right" or "left," specific heading in degrees, a bearing ("Turn right 30 degrees"), or instructions to follow a well-defined contour ("Follow the draw at 2 o'clock").
**Unable**--indicates the inability to comply with a specific instruction or request.
**Up on**--indicates primary radio selected; will be followed by radio position numbers on the intercommunication panels ("Up on 1, up on 3").
**Weapons hot/cold/off**--weapon switches are in the ARMED, SAFE, or OFF position.
**Wilco**--I have received your message, I understand, and I will comply.

**Figure 6-4. Examples of standard words and phrases (continued)**

# OTHER INTERESTING RESOURCES AND USEFUL STUFF

**DCS HUEY MANUAL**
https://drive.google.com/open?id=0B-uSpZROuEd3VkREci05UnVnd1U&authuser=0

# OTHER INTERESTING RESOURCES AND USEFUL STUFF

**LINO_GERMANY'S NAVIGATION MAP**
http://www.digitalcombatsimulator.com/en/files/588673/

**FAA HELICOPTER FLYING HANDBOOK**
http://www.faa.gov/regulations_policies/handbooks_manuals/aviation/helicopter_flying_handbook/

**FAA MANUAL CHAPTER 15: NAVIGATION**
http://www.faa.gov/regulations_policies/handbooks_manuals/aviation/pilot_handbook/media/PHAK%20-%20Chapter%2015.pdf

**CHICKENHAWK – ROBERT MASON**
In my opinion, this is one of the best (if not THE best) book on chopper pilots. Robert Mason's writing is thrilling and is a must-read for any reader interested in the Vietnam War, helicopters, and the dangers of being a Huey pilot.

**TO THE LIMIT: AN AIR CAV HUEY PILOT IN VIETNAM – TOM A. JOHNSON**
This is also one of my favourite books on the experiences of Huey pilots during the Vietnam War. Highly recommended.

**AUTOROTATION TUTORIAL**
https://www.youtube.com/watch?v=u6UufhO2A9k

**AIR FORCE HELICOPTER - UH-1 TACTICAL OPERATIONS (1970)**
https://www.youtube.com/watch?v=gNJ1-RUIVuQ

**BUNYAP'S YOUTUBE CHANNEL – HUEY TEST FLIGHT SERIES**
https://www.youtube.com/watch?v=S2KQQSxVK9w&list=PLoiMNu5jyFzQyf1DMZ4y4lkGGbD0buiOV

**DSLYECXI'S FLYING & LANDING THE HUEY IN DCS**
https://www.youtube.com/watch?v=hZYMkG63cJU

**MAST BUMPING (CHEESY MUSIC INCLUDED!)**
https://www.youtube.com/watch?v=nm8iV_uiBsI

# HOVER POWER REQUIRED

**LEVEL SURFACE – CALM WIND**
**324 ROTOR / 6600 ENGINE RPM**

**EXAMPLE**

**WANTED**

TORQUE REQUIRED TO HOVER

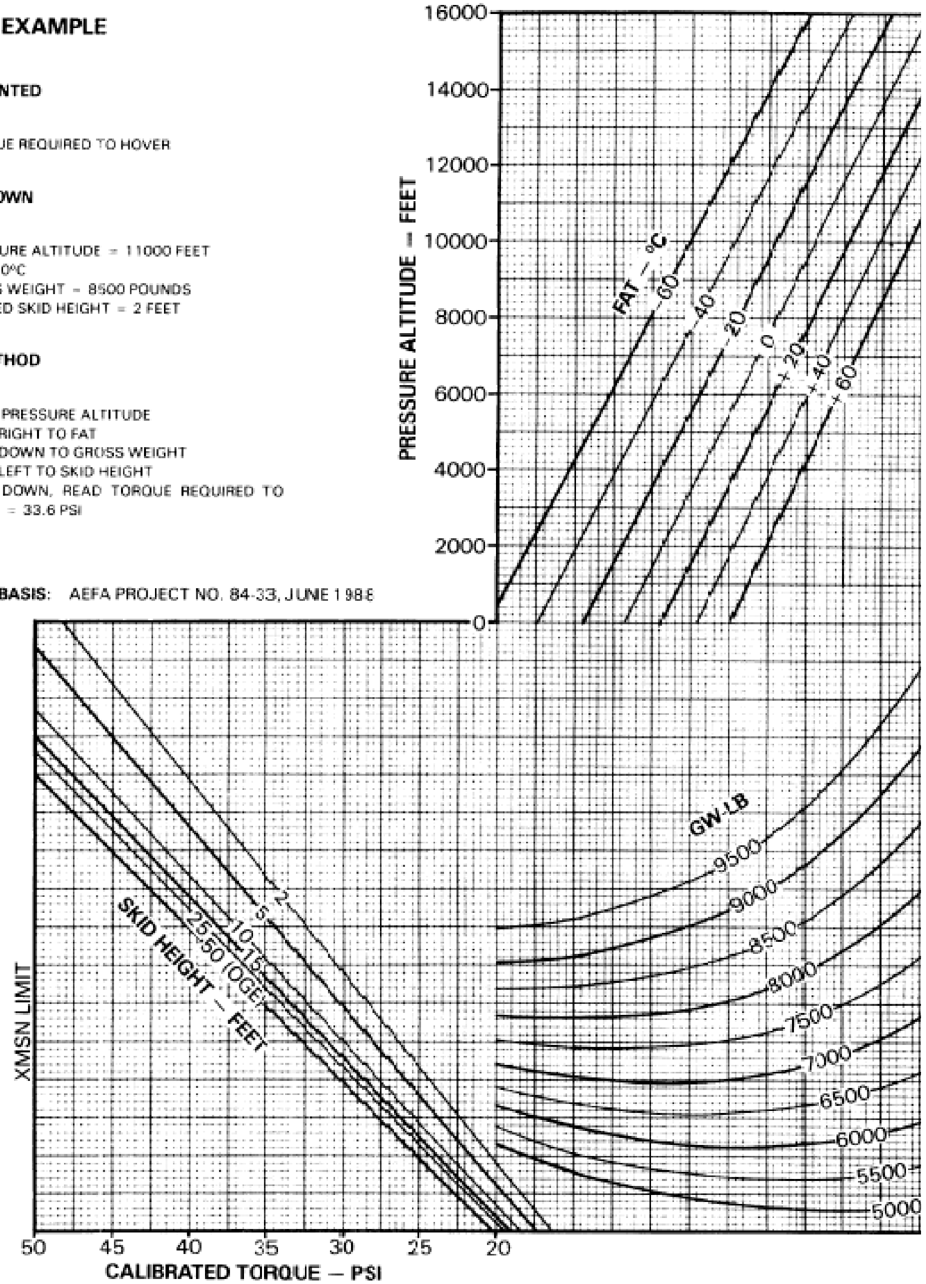
**KNOWN**

PRESSURE ALTITUDE = 11000 FEET
FAT = 0°C
GROSS WEIGHT = 8500 POUNDS
DESIRED SKID HEIGHT = 2 FEET

**METHOD**

ENTER PRESSURE ALTITUDE
MOVE RIGHT TO FAT
MOVE DOWN TO GROSS WEIGHT
MOVE LEFT TO SKID HEIGHT
MOVE DOWN, READ TORQUE REQUIRED TO HOVER = 33.6 PSI

**DATA BASIS:** AEFA PROJECT NO. 84-33, JUNE 1988




# HOVER CEILING

**MAX TORQUE AVAILABLE (30 MIN OPERATION)**
**324 ROTOR / 6600 ENGINE RPM**

**EXAMPLE**

**WANTED**

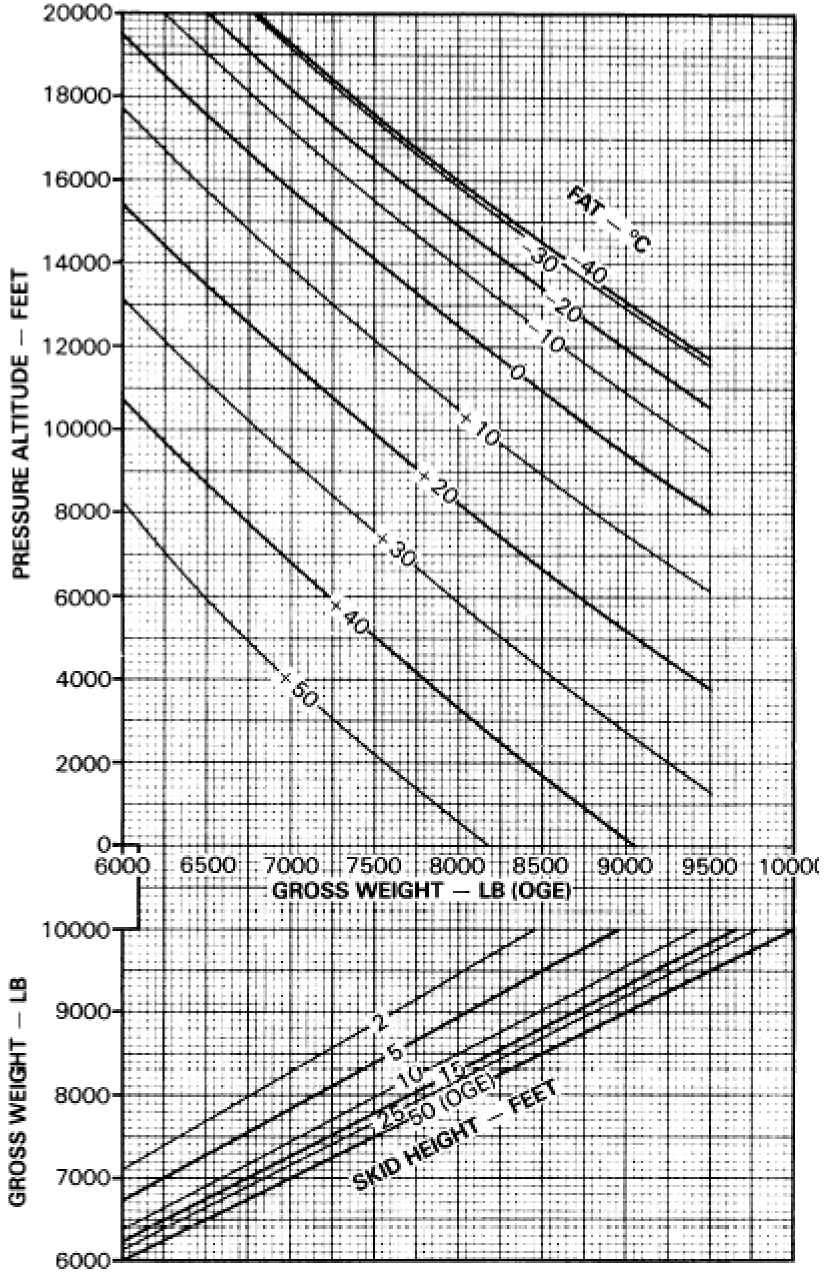
GROSS WEIGHT TO HOVER

**KNOWN**

PRESSURE ALTITUDE = 12000 FEET
FAT = 10°C
SKID HEIGHT = 2 FEET

**METHOD**

ENTER PRESSURE ALTITUDE
MOVE RIGHT TO FAT
MOVE DOWN TO SKID HEIGHT
MOVE LEFT, READ GROSS WEIGHT TO HOVER = 8900 POUNDS



# MAXIMUM TORQUE AVAILABLE (30 MIN OPERATION)

**324 ROTOR / 6600 ENGINE RPM**

## EXAMPLE

### WANTED

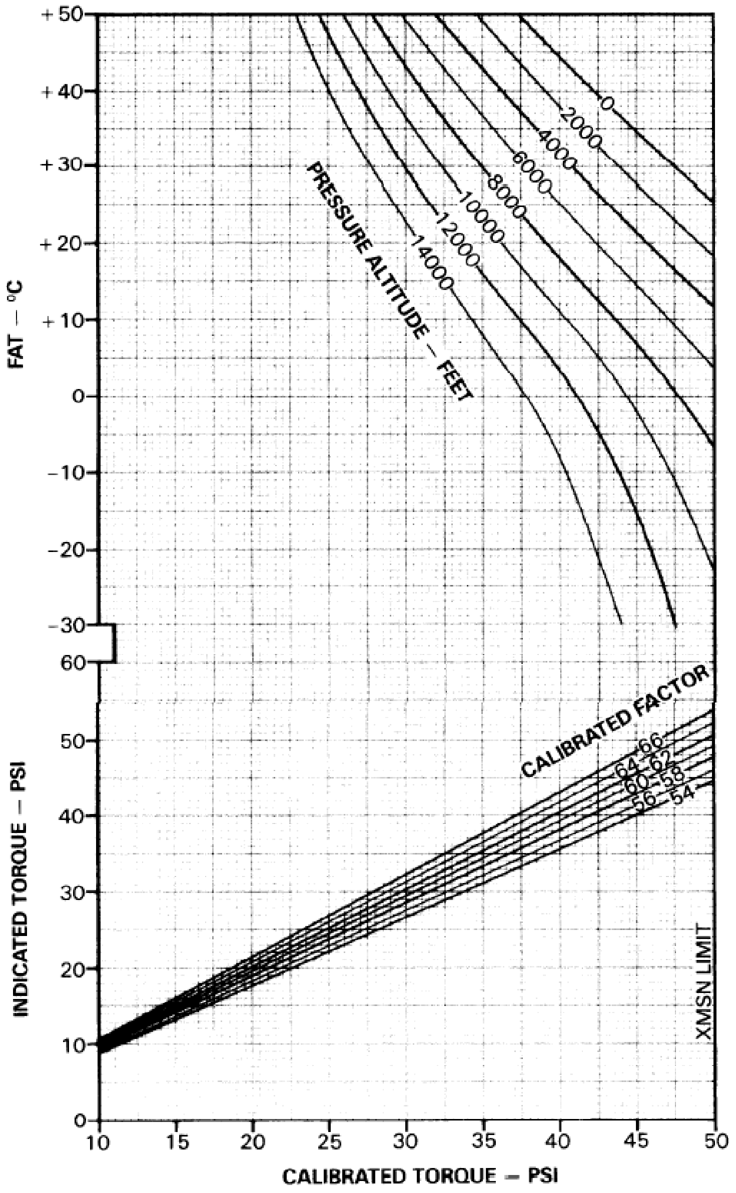
INDICATED TORQUE
CALIBRATED TORQUE

### KNOWN

PRESSURE ALTITUDE = 10,000 FEET
FAT = 15°C
CALIBRATION FACTOR = 66

### METHOD

ENTER FAT
MOVE RIGHT TO PRESSURE ALTITUDE
MOVE DOWN TO CALIBRATION FACTOR
MOVE LEFT, READ INDICATED TORQUE = 41.2 PSI
FOR CALIBRATED TORQUE CONTINUE DOWN THRU CALIBRATION FACTOR
READ CALIBRATED TORQUE = 38.3 PSI



# Special Thanks to

Virtual 229th Battalion, 1st Cavalry Division
http://1stcavdiv.conceptbb.com/

Flyer
GunfighterSIX
Samri
Skullz

And all Huey pilots and air crews who risked their lives to fly these wonderful machines.

# THANK YOU TO ALL MY PATRONS

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- ChazFlyz


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L-39
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MiG-15bis
MiG-19P
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