DCS GUIDE
SA-342M/L GAZELLE

By Chuck

LAST UPDATED: 26/12/2016

TABLE OF CONTENTS

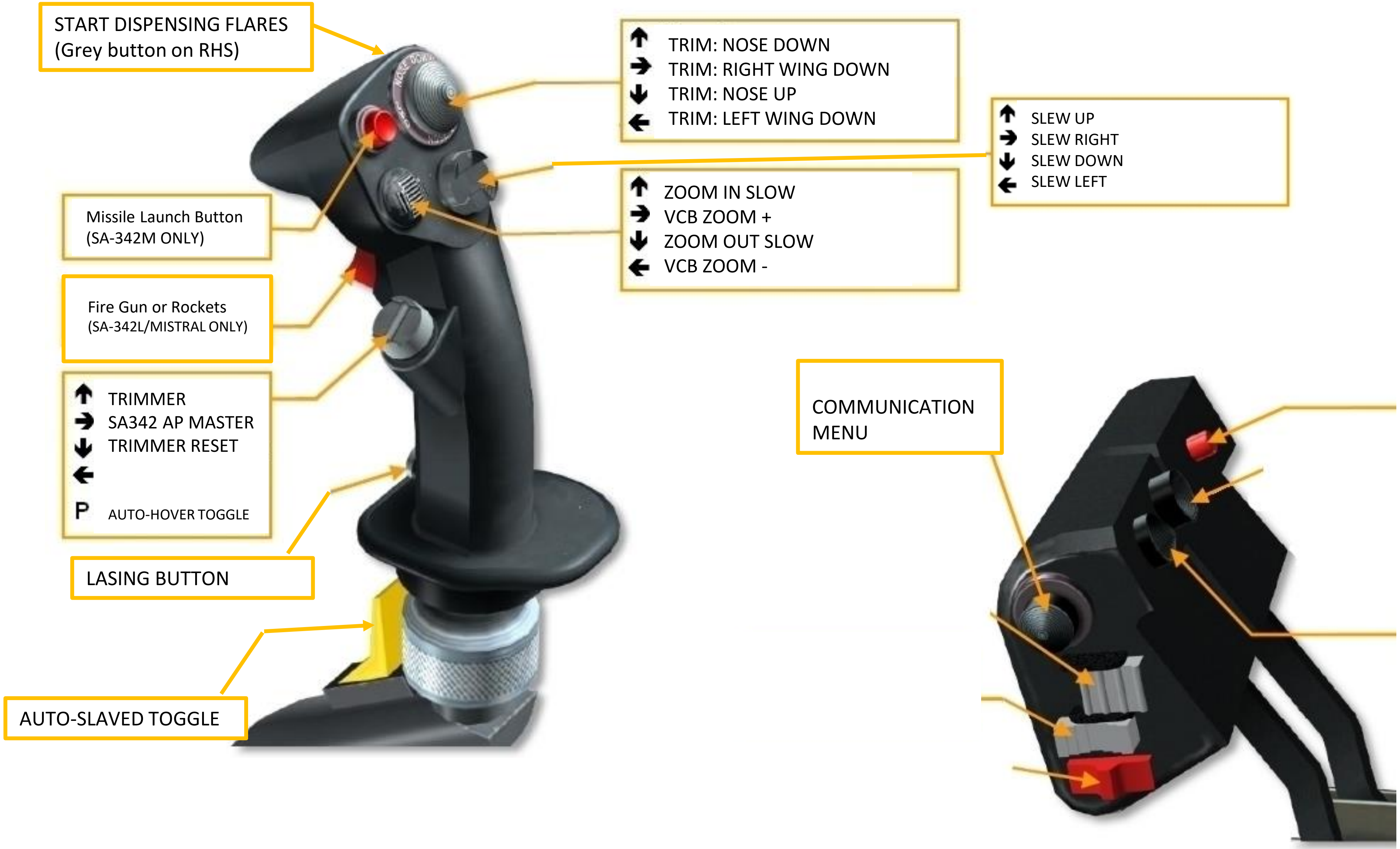
Special thanks to Paul "Goldwolf" Whittingham for creating the guide icons.

The *Aérospatiale Gazelle* is a French five-seat helicopter, commonly used for light transport, scouting and light attack duties. The SA-342M variant offered to us by Polychop Simulations is an anti-armor version of this nimble helicopter. First designed in 1967 by Sud Aviation (which later became Aérospatiale, then Eurocopter, and now Airbus Helicopters as of 2014), the Gazelle was manufactured in France and in the United Kingdom through a joint production agreement with Westland Aircraft.

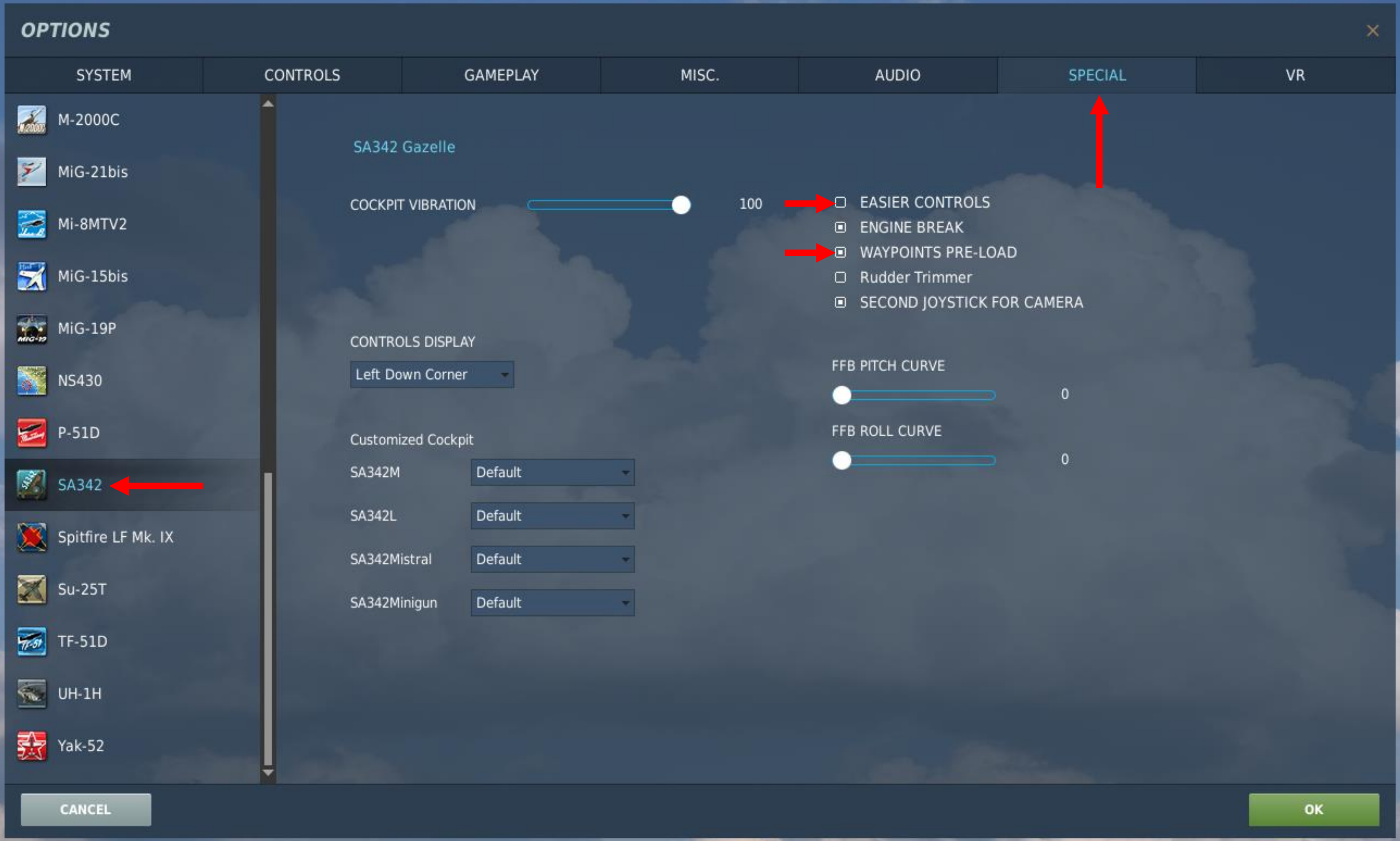
Introduced to service in 1973, the Gazelle participated in numerous conflicts around the world including the Lebanon War in 1982, the Rwandan Civil War in the 1990s, and in the Gulf War in 1991. It was operated by France, the United Kingdom, China, Iraq, Syria, Kuwait, Ecuador, Yugoslavia, Lebanon, Morocco, Rwanda and Egypt. In French service, the SA-342 was supplemented as an attack helicopter by the larger Eurocopter Tigre, but remained primarily used for scouting missions. Operating in desert theatres required the installation of additional equipment like sand filters.

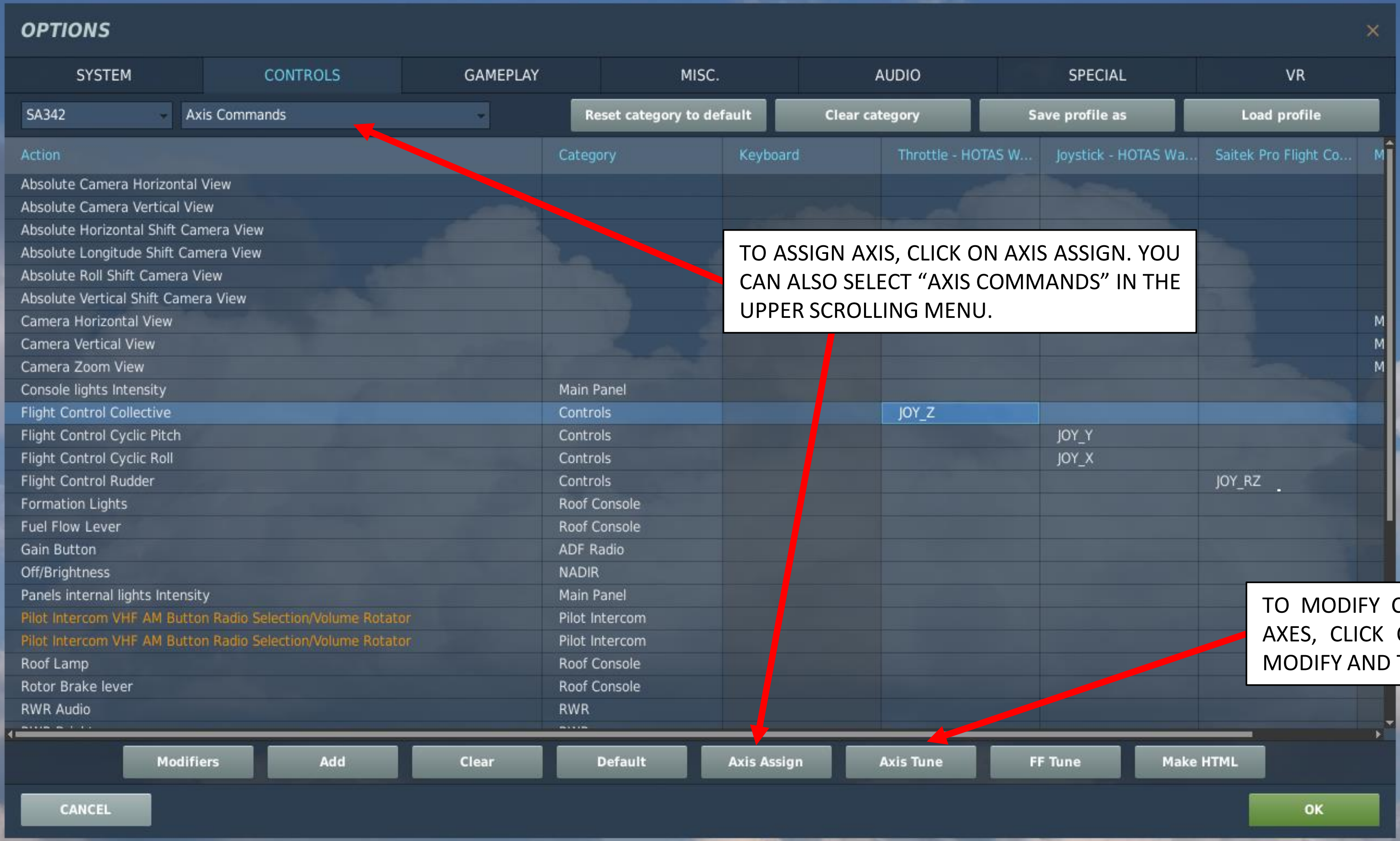
This agile chopper is challenging to fly since it requires very delicate inputs. The slightest wrong move can have dramatic consequences. Polychop simulated the SAS (Stability Augmentation System) and its effects on flight, meaning that you will often have the impression of “fighting” against the helicopter during flight. This is to be expected and makes precision flying quite challenging for the uninitiated. Make no mistake: the Gazelle might seem like a simple machine at first sight, but mastering it is a daunting task that is overall very rewarding in the end.

Before you think of trying to fly this helicopter, ask yourself the following question: are you ready to go on some of the most dangerous missions with limited means? The SA-342 will test you to your limits and beyond. Give it a shot and find out for yourself.


START DISPENSING FLARES
(Grey button on RHS)
TRIM: NOSE DOWN
TRIM: RIGHT WING DOWN
TRIM: NOSE UP
TRIM: LEFT WING DOWN
SLEW UP
SLEW RIGHT
SLEW DOWN
SLEW LEFT
Missile Launch Button
(SA-342M ONLY)
ZOOM IN SLOW
VCB ZOOM +
ZOOM OUT SLOW
VCB ZOOM -
Fire Gun or Rockets
(SA-342L/MISTRAL ONLY)
COMMUNICATION MENU
TRIMMER
SA342 AP MASTER
TRIMMER RESET
P
AUTO-HOVER TOGGLE
LASING BUTTON
AUTO-SLAVED TOGGLE

Note: Make sure you have "WAYPOINTS PRE-LOAD" ticked and "EASIER CONTROLS" unticked in your SPECIAL tab in the options. Waypoint pre-load means that you will not have to enter manually the coordinates of each waypoint each time you fly (which without doubt a real pain to do).





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 AXIS TUNE

CONTROLS SETUP

BIND THE FOLLOWING AXES:

- CYCLIC PITCH (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 40, CURVATURE AT 0)
- CYCLIC ROLL (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 25, CURVATURE AT 0)
- RUDDER/ANTI-TORQUE (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 60, CURVATURE AT 15)
- COLLECTIVE (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT -15)

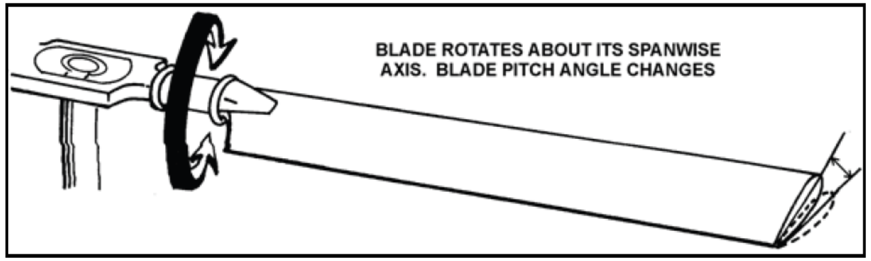


Figure 1-17. Feathering

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.

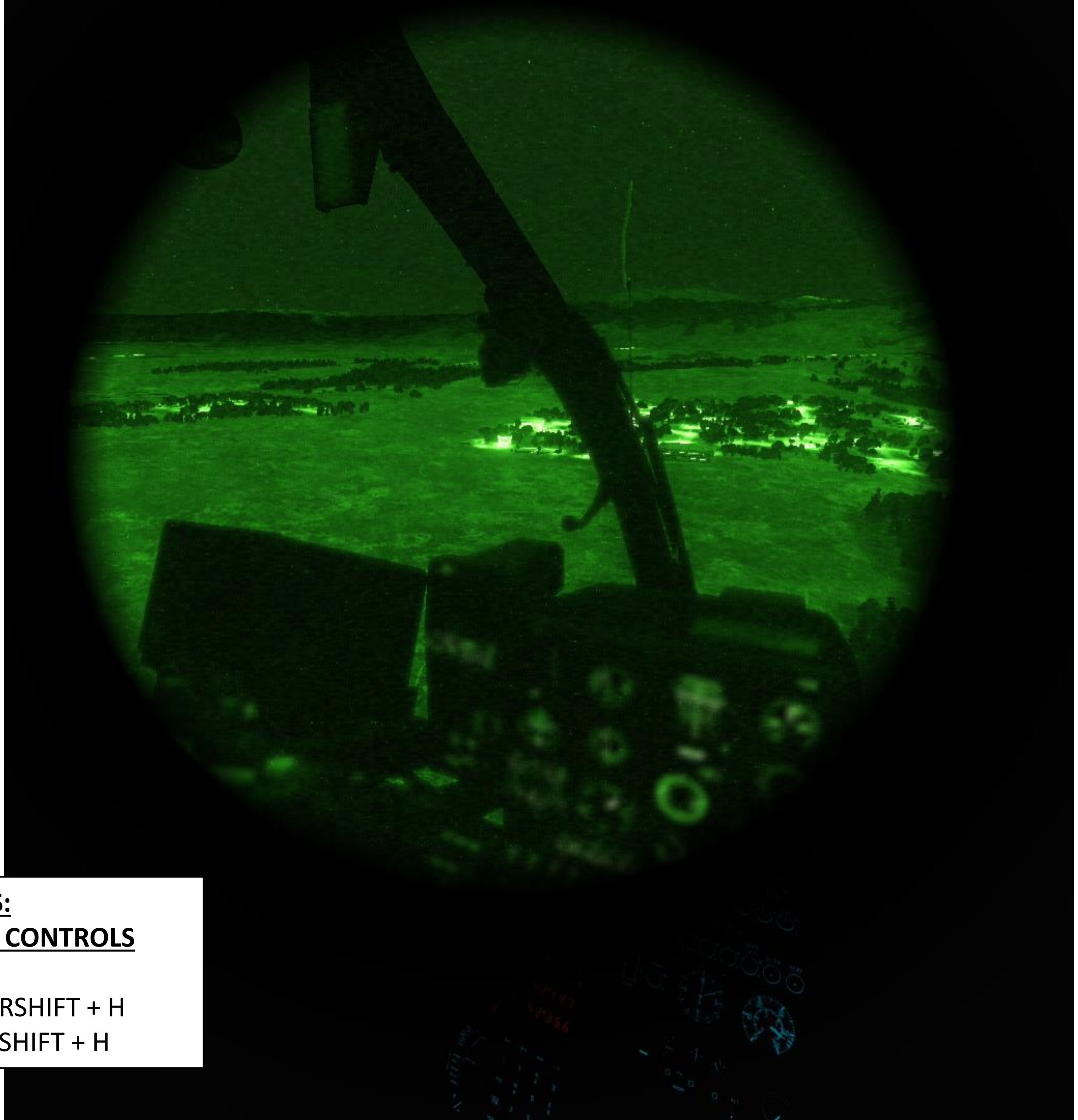
In a helicopter, it's the opposite. You set your throttle to a given setting, and you change your thrust with your **collective**, which changes the pitch of your rotor/propeller's blades. Anti-torque pedals are used to modify your tail rotor's propeller pitch: the amount of lateral thrust generated 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.


Infrared Deflector
(Suppresses IR signature)
Sand Filter
Viviane Camera System
Copilot
(Commander)
Press 2 to Select
Pilot
Press 1 to Select
HOT3 Missile
Matra Flare Dispenser System


PILOT SEAT
NOTE: USE "RSHIFT+P" TO TURN PILOT BODY ON OR OFF.
Anti-Torque Pedals
Cyclic
Collective

PILOT SEAT



FOR NIGHT OPERATIONS:
NIGHT VISION GOGGLES CONTROLS

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


PILOT SEAT
DOOR
OPEN/CLOSE = RCTRL+C

PILOT SEAT

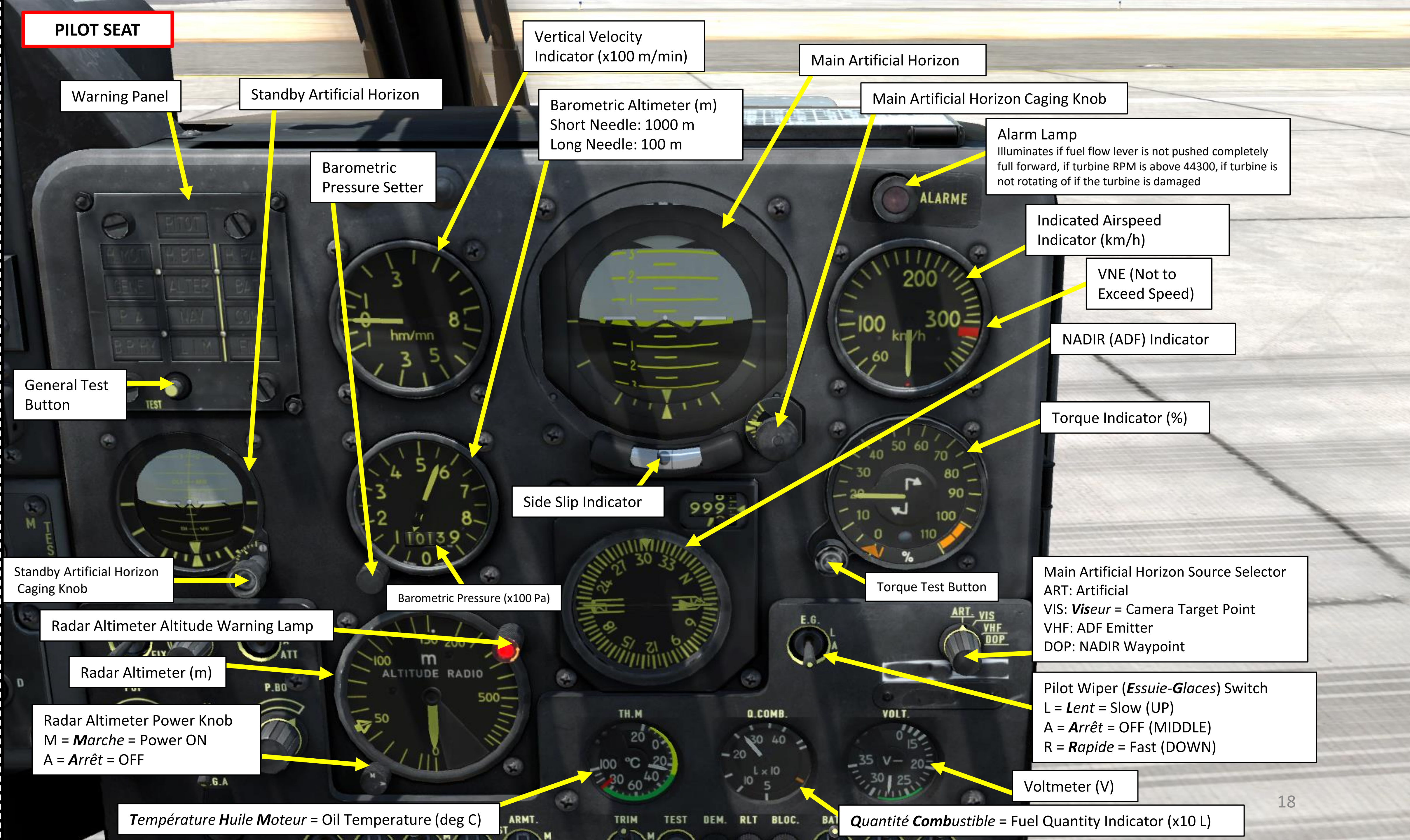
VNE Chart ("Not to exceed" Airspeed in function of altitude)

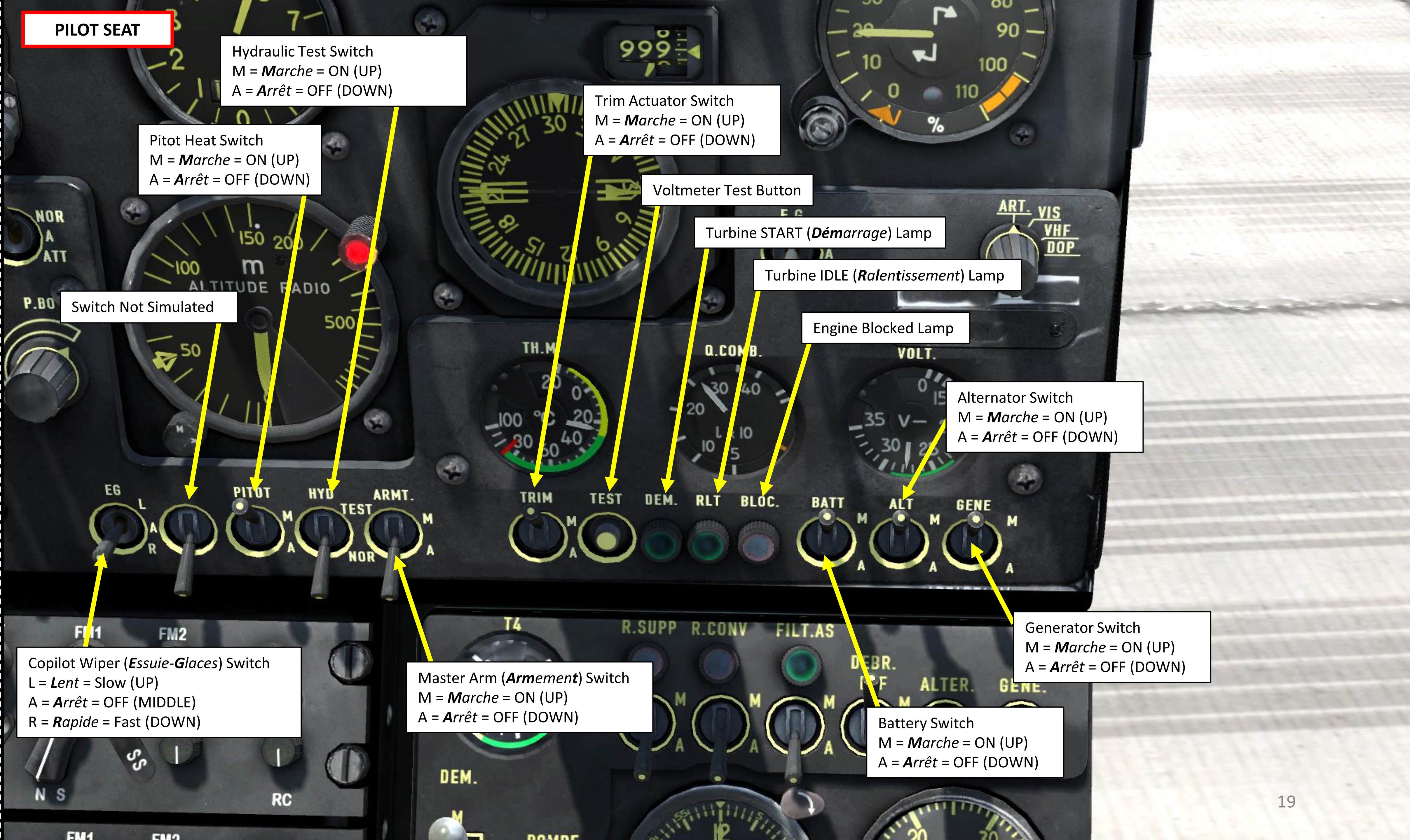
ft \ deg C	-50	-40	-30	-20	-10	0	10	20	30	40	45
	MAXIMUM ALLOWABLE TORQUE (%)										
-1500	100	100	100	100	100	100	100	100	100	95	91
0	100	100	100	100	100	100	100	100	100	90	85
3000	100	100	100	100	100	100	100	98	90	80	X
6000	100	100	100	100	100	100	94	87	80	X	X
9000	100	100	100	100	95	90	84	77	X	X	X
12000	100	98	94	90	85	80	75	X	X	X	X
15000	92	88	84	80	76	71	X	X	X	X	X
18000	81	77	74	71	67	X	X	X	X	X	X
20000	74	71	68	65	X	X	X	X	X	X	X

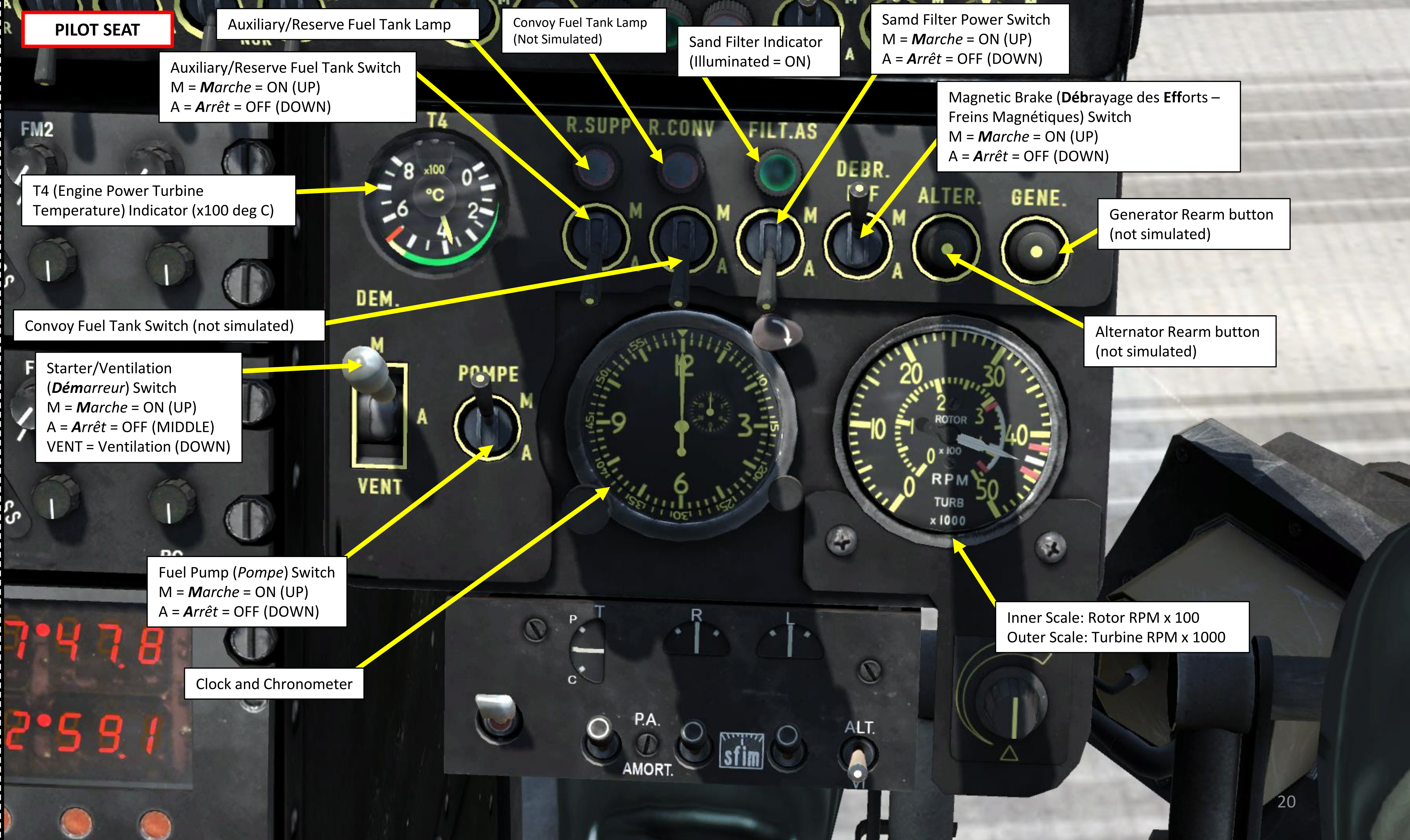
PILOT SEAT

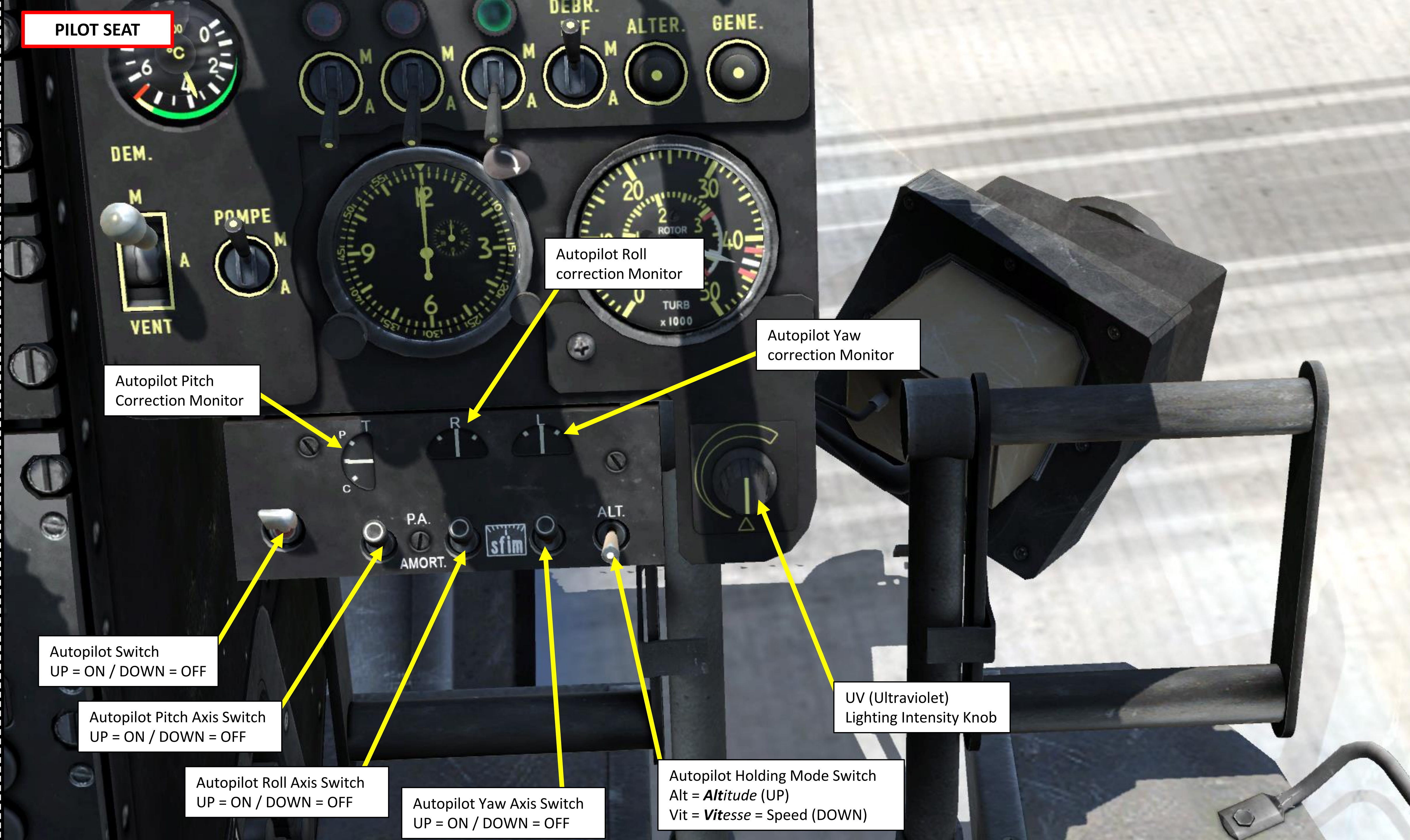

Engine Specifications chart
FLUKE
TOURS THEORIQUES
25500 +/- 400
43000 +/- 200
RALENTI
REGIMES

PILOT SEAT


PILOT SEAT
Warning Panel
Standby Artificial Horizon
Vertical Velocity Indicator (x100 m/min)
Barometric Altimeter (m)
Short Needle: 1000 m
Long Needle: 100 m
Barometric Pressure Setter
Main Artificial Horizon
Main Artificial Horizon Caging Knob
Alarm Lamp
Illuminates if fuel flow lever is not pushed completely full forward, if turbine RPM is above 44300, if turbine is not rotating of if the turbine is damaged
Indicated Airspeed Indicator (km/h)
VNE (Not to Exceed Speed)
NADIR (ADF) Indicator
Torque Indicator (%)
General Test Button
Side Slip Indicator
Standby Artificial Horizon Caging Knob
Barometric Pressure (x100 Pa)
Torque Test Button
Main Artificial Horizon Source Selector
ART: Artificial
VIS: *Viseur* = Camera Target Point
VHF: ADF Emitter
DOP: NADIR Waypoint
Radar Altimeter Altitude Warning Lamp
Radar Altimeter (m)
Pilot Wiper (***E**ssuie-**G**laces*) Switch
L = ***L**ent* = Slow (UP)
A = ***A**rrêt* = OFF (MIDDLE)
R = ***R**apide* = Fast (DOWN)
Radar Altimeter Power Knob
M = ***M**arche* = Power ON
A = ***A**rrêt* = OFF
Voltmeter (V)
***T**empérature **H**uile **M**oteur* = Oil Temperature (deg C)
***Q**uantité **Comb**ustible* = Fuel Quantity Indicator (x10 L)


PILOT SEAT
Hydraulic Test Switch
M = *Marche* = ON (UP)
A = *Arrêt* = OFF (DOWN)
Pitot Heat Switch
M = *Marche* = ON (UP)
A = *Arrêt* = OFF (DOWN)
Trim Actuator Switch
M = *Marche* = ON (UP)
A = *Arrêt* = OFF (DOWN)
Voltmeter Test Button
Turbine START (*Démarrage*) Lamp
Turbine IDLE (*Ralentissement*) Lamp
Engine Blocked Lamp
Switch Not Simulated
Alternator Switch
M = *Marche* = ON (UP)
A = *Arrêt* = OFF (DOWN)
Generator Switch
M = *Marche* = ON (UP)
A = *Arrêt* = OFF (DOWN)
Copilot Wiper (*Essuie-Glaces*) Switch
L = *Lent* = Slow (UP)
A = *Arrêt* = OFF (MIDDLE)
R = *Rapide* = Fast (DOWN)
Master Arm (*Armement*) Switch
M = *Marche* = ON (UP)
A = *Arrêt* = OFF (DOWN)
Battery Switch
M = *Marche* = ON (UP)
A = *Arrêt* = OFF (DOWN)

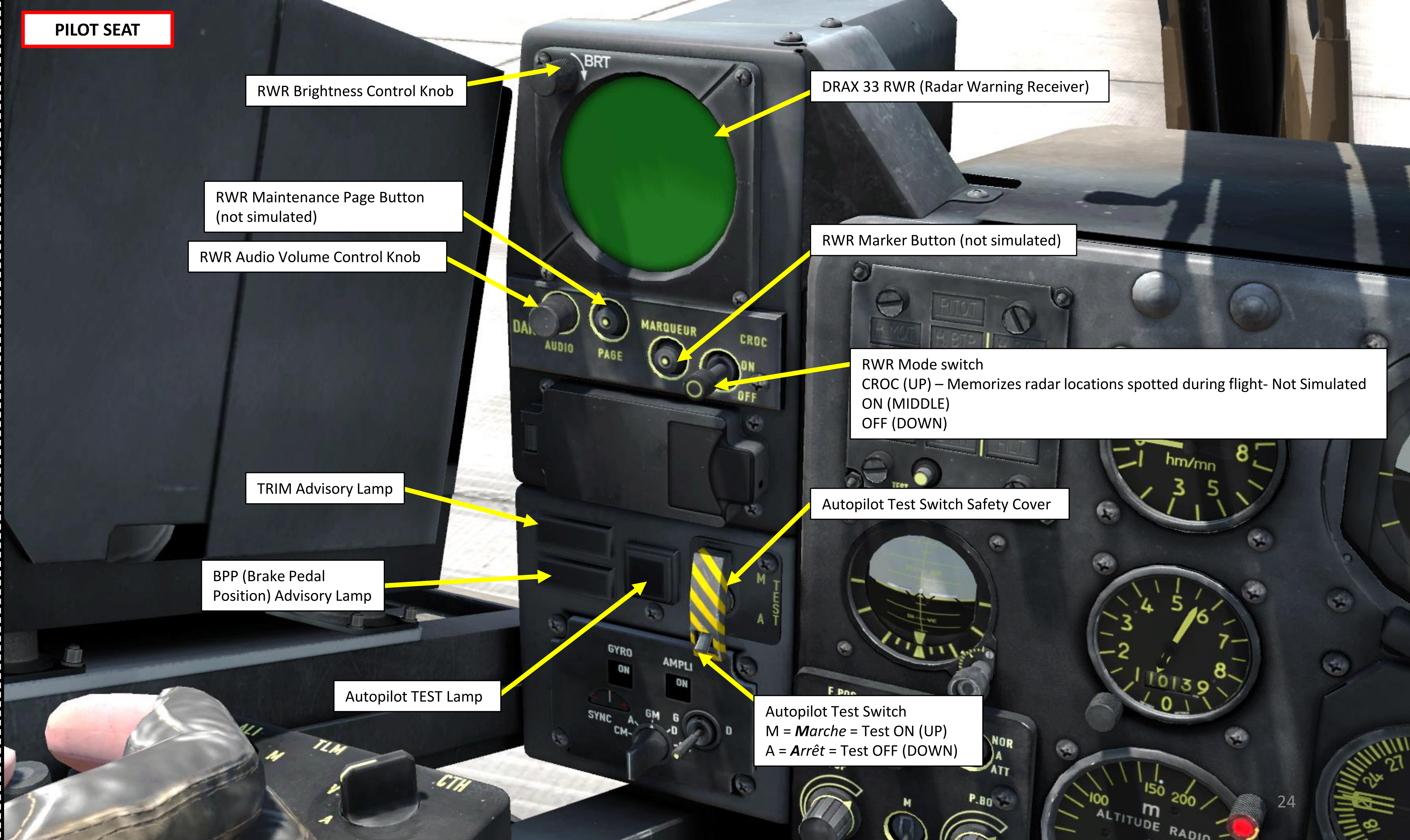

PILOT SEAT
Auxiliary/Reserve Fuel Tank Lamp
Convoy Fuel Tank Lamp (Not Simulated)
Sand Filter Indicator (Illuminated = ON)
Samd Filter Power Switch
M = *Marche* = ON (UP)
A = *Arrêt* = OFF (DOWN)
Auxiliary/Reserve Fuel Tank Switch
M = *Marche* = ON (UP)
A = *Arrêt* = OFF (DOWN)
Magnetic Brake (**Déb**rayage des **Eff**orts – Freins Magnétiques) Switch
M = *Marche* = ON (UP)
A = *Arrêt* = OFF (DOWN)
T4 (Engine Power Turbine Temperature) Indicator (x100 deg C)
Generator Rearm button (not simulated)
Convoy Fuel Tank Switch (not simulated)
Alternator Rearm button (not simulated)
Starter/Ventilation (*Démarreur*) Switch
M = *Marche* = ON (UP)
A = *Arrêt* = OFF (MIDDLE)
VENT = Ventilation (DOWN)
Fuel Pump (*Pompe*) Switch
M = *Marche* = ON (UP)
A = *Arrêt* = OFF (DOWN)
Inner Scale: Rotor RPM x 100
Outer Scale: Turbine RPM x 1000
Clock and Chronometer
FM2
T4
R.SUPP
R.CONV
FILT.AS
DEBR.
ALTER.
GENE.
DEM.
POMPE
VENT
ROTOR
RPM
TURB
x 1000
P.A.
AMORT.
ALT.
sfim

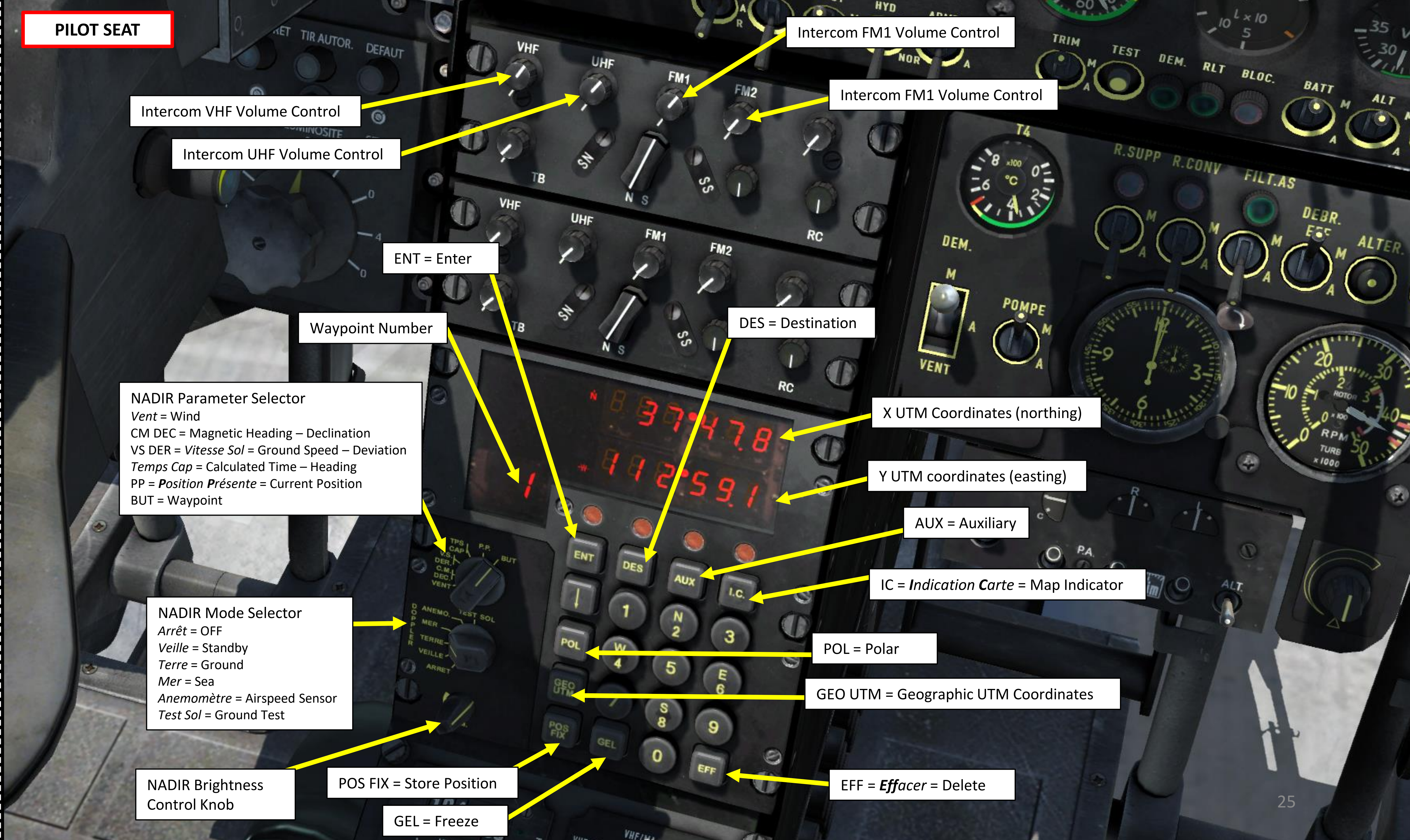

PILOT SEAT
Autopilot Roll correction Monitor
Autopilot Yaw correction Monitor
Autopilot Pitch Correction Monitor
Autopilot Switch
UP = ON / DOWN = OFF
Autopilot Pitch Axis Switch
UP = ON / DOWN = OFF
Autopilot Roll Axis Switch
UP = ON / DOWN = OFF
Autopilot Yaw Axis Switch
UP = ON / DOWN = OFF
Autopilot Holding Mode Switch
Alt = ***Alt****itude* (UP)
Vit = ***Vit****esse* = Speed (DOWN)
UV (Ultraviolet)
Lighting Intensity Knob

PILOT SEAT

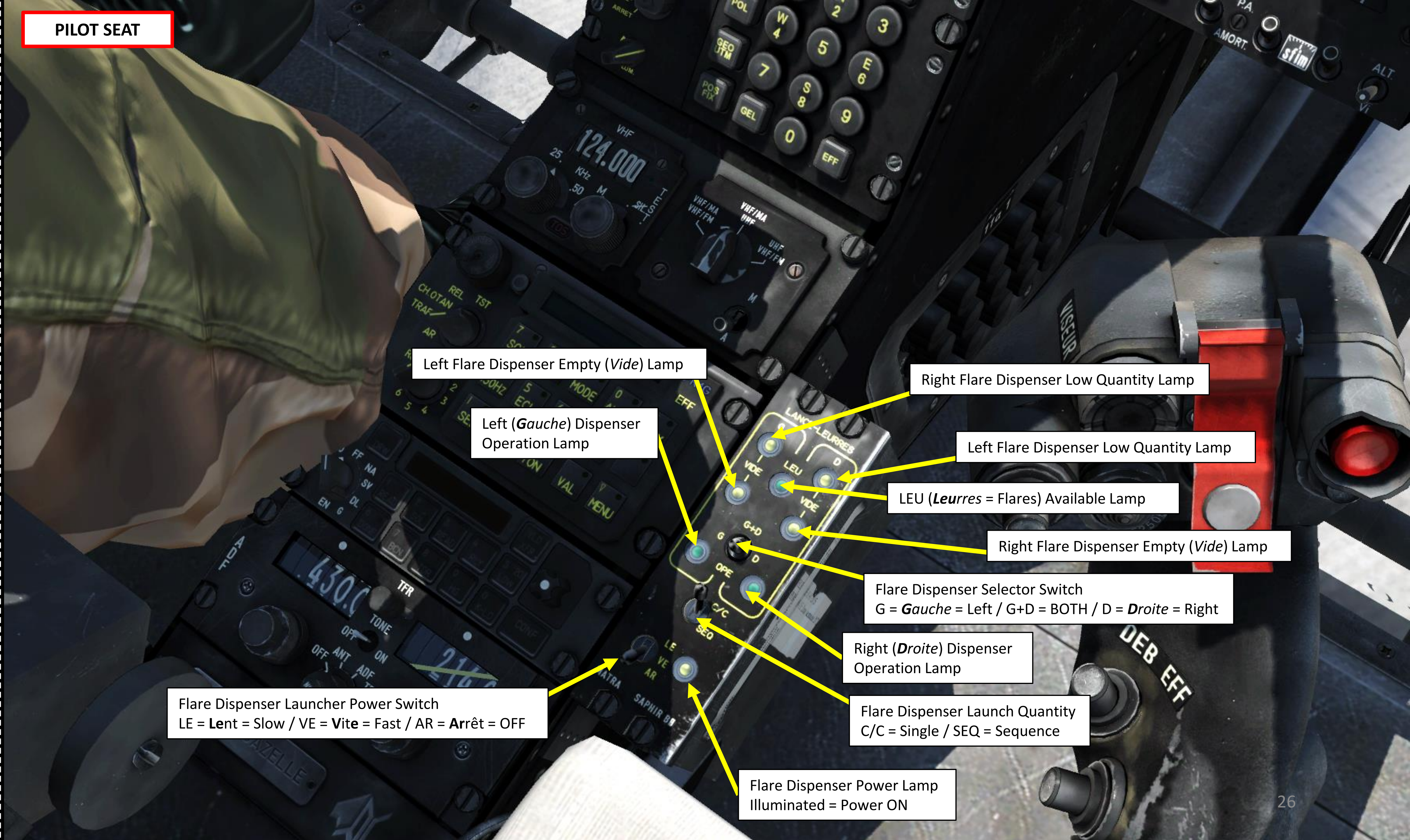
PILOT SEAT

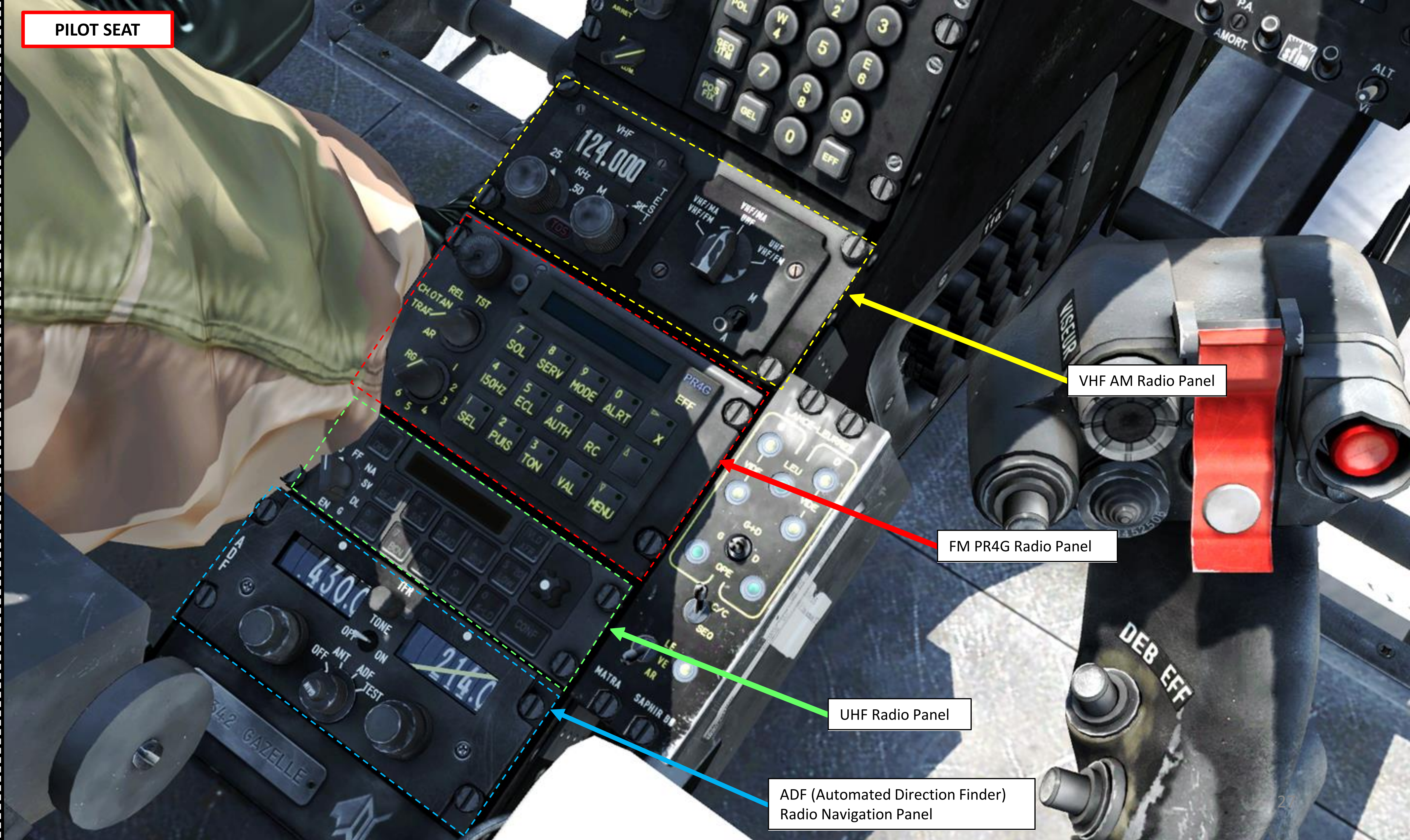

Gyro Mode Switch
CM = *Compas Magnétique* = Magnetic Compass Mode
A = *Arrêt* = OFF
GM = Gyro-Magnetic Mode
D = *Droite* = Right Mode (not simulated)
G = *Gauche* = Left Mode (not simulated)
Gyro Flag
Ampli Flag
Gyro Synchronization Monitor
Left / Right Gyro Switch (not simulated)
Center Console (*Pupitre*) Lighting Intensity Control Knob
Navigation Lights Mode (*Feux de Position)* Switch
CLI = Clignotant = Blinking (UP)
OFF (MIDDLE)
FIX = *Fixe* = Steady (DOWN)
Anti-collision Lights Intensity Control Knob
Anti-collision Lights Mode Switch
NOR = Normal (UP)
A = *Arrêt* = OFF (MIDDLE)
ATT = *Atténué* = Attenuated (DOWN)
Main Dashboard (*Planche de Bord*) Lighting Intensity Control Knob
Panels Lighting Switch
M = *Marche* = ON (UP)
A = *Arrêt* = OFF (DOWN)


PILOT SEAT
RWR Brightness Control Knob
DRAX 33 RWR (Radar Warning Receiver)
RWR Maintenance Page Button (not simulated)
RWR Audio Volume Control Knob
RWR Marker Button (not simulated)
RWR Mode switch
CROC (UP) – Memorizes radar locations spotted during flight- Not Simulated
ON (MIDDLE)
OFF (DOWN)
TRIM Advisory Lamp
Autopilot Test Switch Safety Cover
BPP (Brake Pedal Position) Advisory Lamp
Autopilot TEST Lamp
Autopilot Test Switch
M = ***Marche*** = Test ON (UP)
A = ***Arrêt*** = Test OFF (DOWN)
BRT
AUDIO
PAGE
MARQUEUR
CROC
ON
OFF
GYRO
AMPLI
SYNC
hm/mn
ALTITUDE RADIO


PILOT SEAT
Intercom VHF Volume Control
Intercom UHF Volume Control
Intercom FM1 Volume Control
Intercom FM1 Volume Control
ENT = Enter
Waypoint Number
DES = Destination
NADIR Parameter Selector
Vent = Wind
CM DEC = Magnetic Heading – Declination
VS DER = *Vitesse Sol* = Ground Speed – Deviation
Temps Cap = Calculated Time – Heading
PP = ***Position Présente*** = Current Position
BUT = Waypoint
X UTM Coordinates (northing)
Y UTM coordinates (easting)
AUX = Auxiliary
IC = ***Indication Carte*** = Map Indicator
NADIR Mode Selector
Arrêt = OFF
Veille = Standby
Terre = Ground
Mer = Sea
Anemomètre = Airspeed Sensor
Test Sol = Ground Test
POL = Polar
GEO UTM = Geographic UTM Coordinates
NADIR Brightness Control Knob
POS FIX = Store Position
GEL = Freeze
EFF = ***Effacer*** = Delete

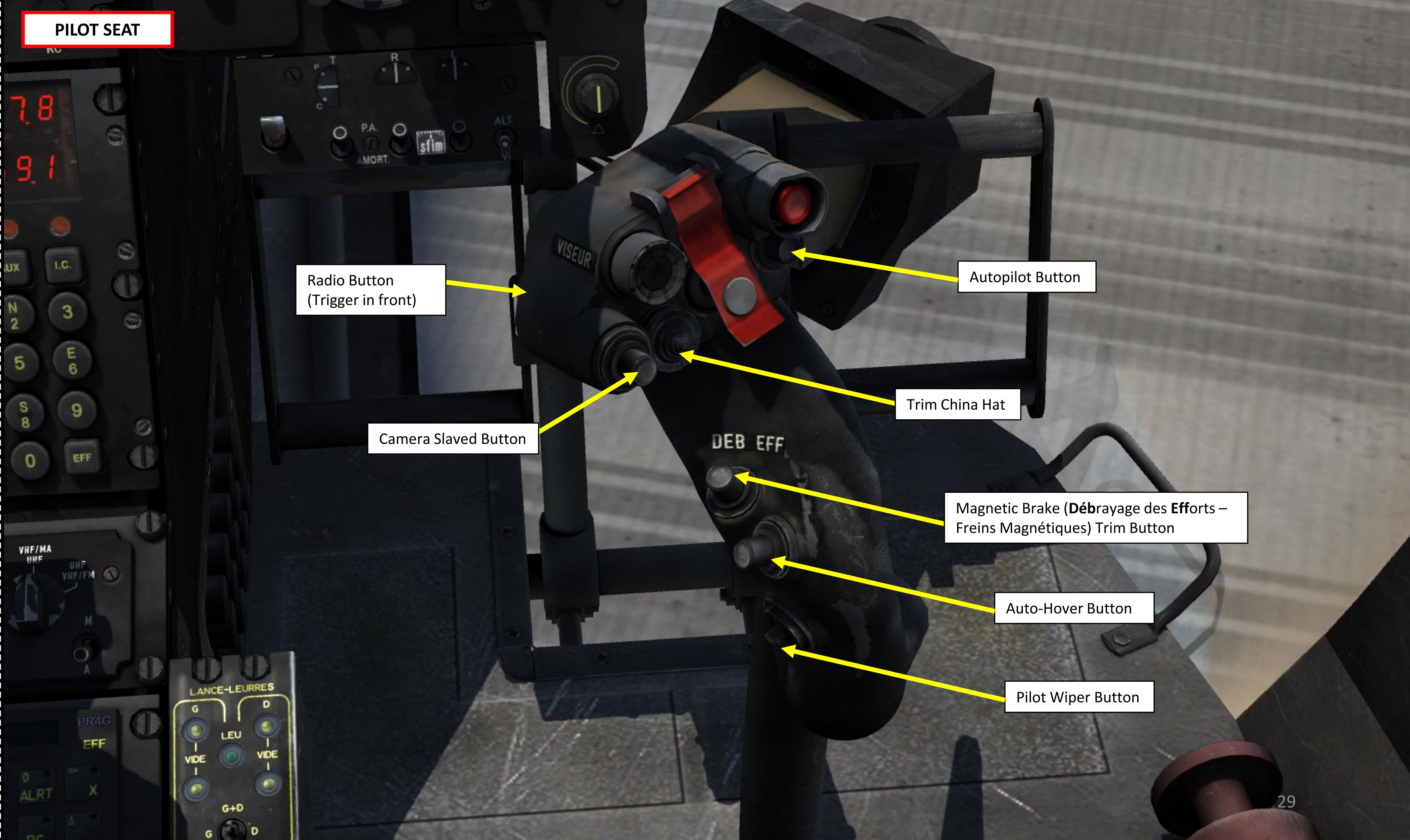
PILOT SEAT


Left Flare Dispenser Empty (*Vide*) Lamp
Left (***Gauche***) Dispenser Operation Lamp
Right Flare Dispenser Low Quantity Lamp
Left Flare Dispenser Low Quantity Lamp
LEU (***Leurres*** = Flares) Available Lamp
Right Flare Dispenser Empty (*Vide*) Lamp
Flare Dispenser Selector Switch
G = ***Gauche*** = Left / G+D = BOTH / D = ***Droite*** = Right
Right (***Droite***) Dispenser Operation Lamp
Flare Dispenser Launch Quantity
C/C = Single / SEQ = Sequence
Flare Dispenser Launcher Power Switch
LE = **Le**nt = Slow / VE = **Vi**te = Fast / AR = **Ar**rêt = OFF
Flare Dispenser Power Lamp
Illuminated = Power ON

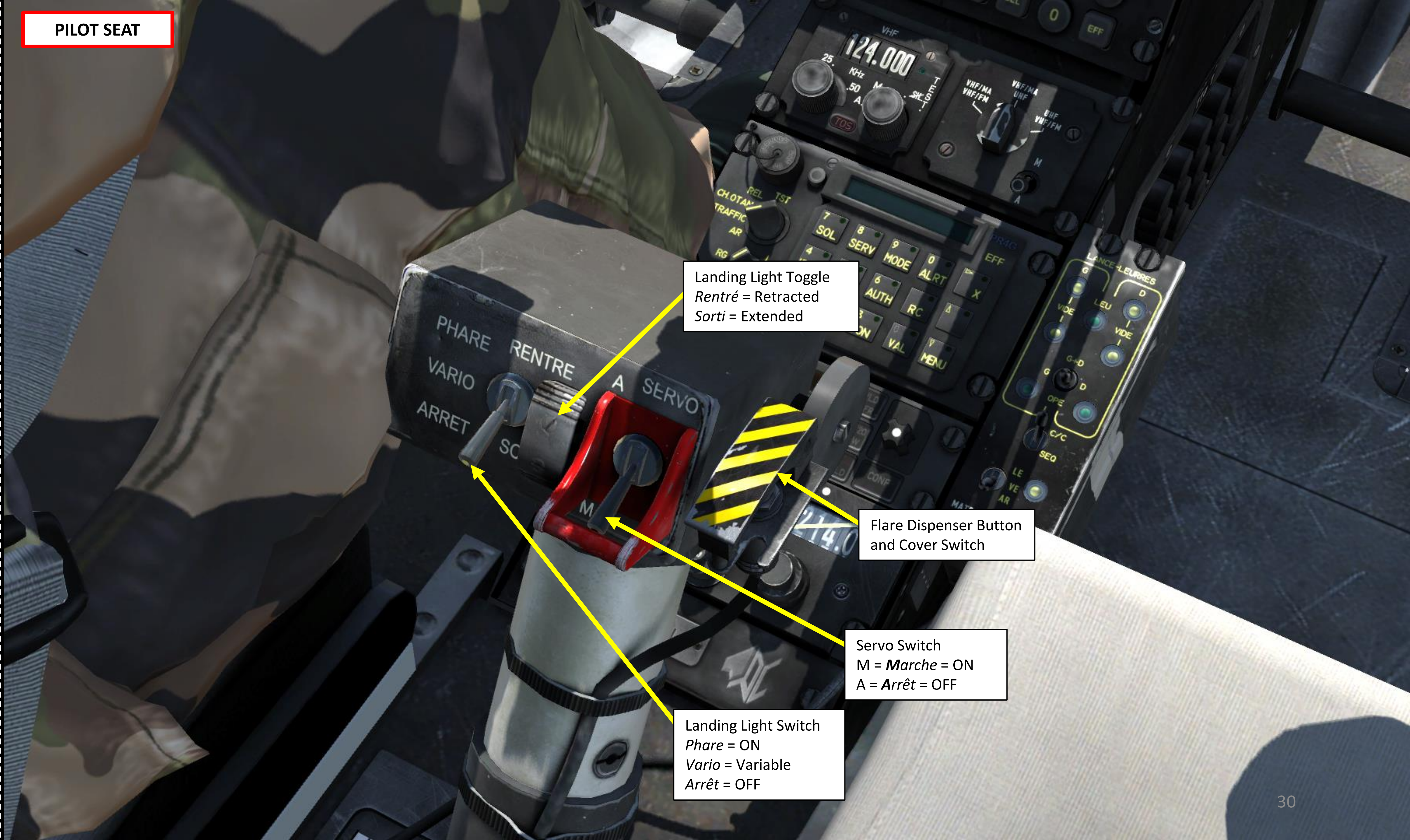

PILOT SEAT
VHF AM Radio Panel
FM PR4G Radio Panel
UHF Radio Panel
ADF (Automated Direction Finder)
Radio Navigation Panel

PILOT SEAT

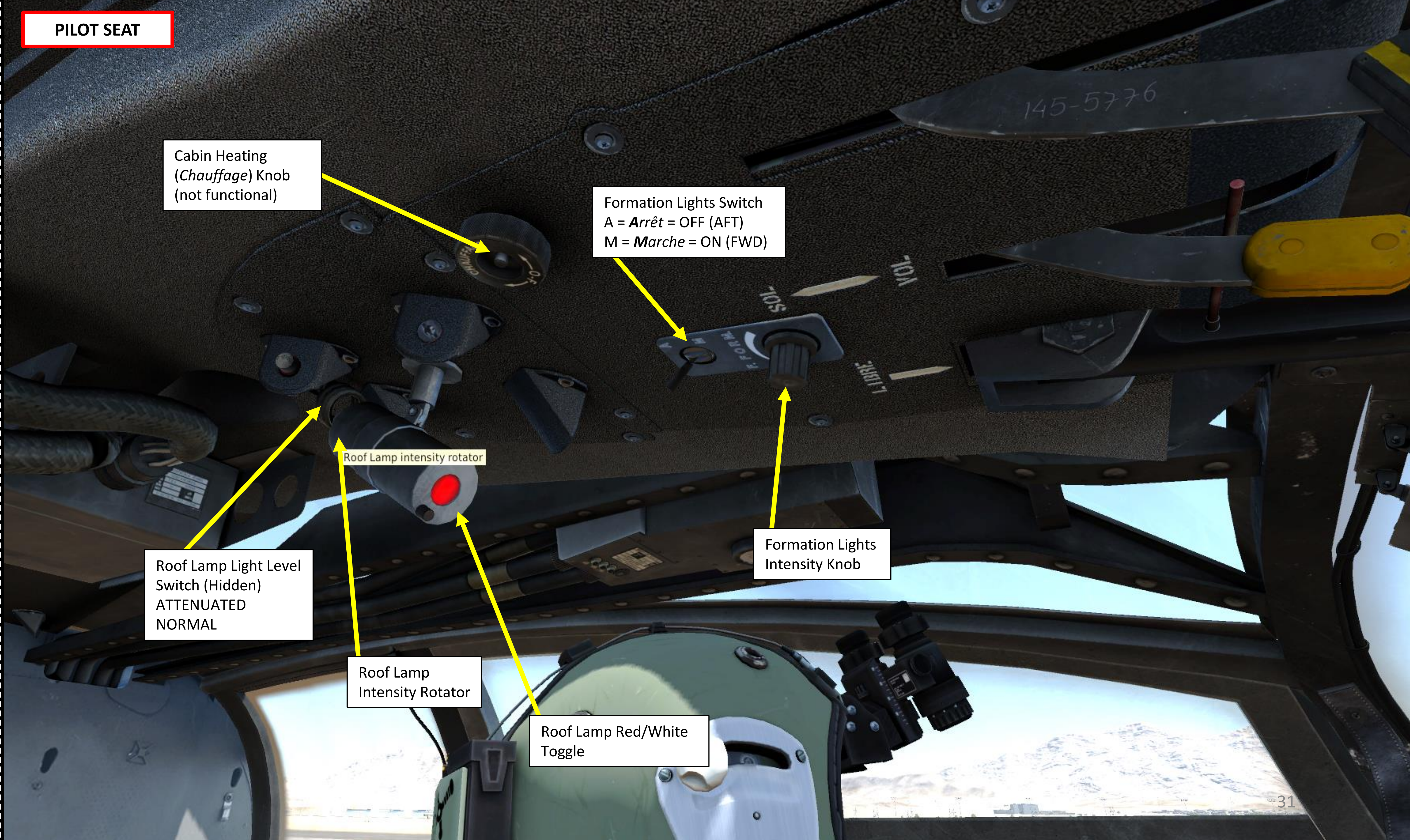
PILOT SEAT


Radio Button (Trigger in front)
Autopilot Button
Trim China Hat
Camera Slaved Button
Magnetic Brake (**Déb**rayage des **Eff**orts – Freins Magnétiques) Trim Button
Auto-Hover Button
Pilot Wiper Button
VISEUR
DEB EFF
LANCE-LEURRES
VHF/MA
UHF
VHF/FM
P.A.
AMORT.
ALT
sfim
EFF
I.C.

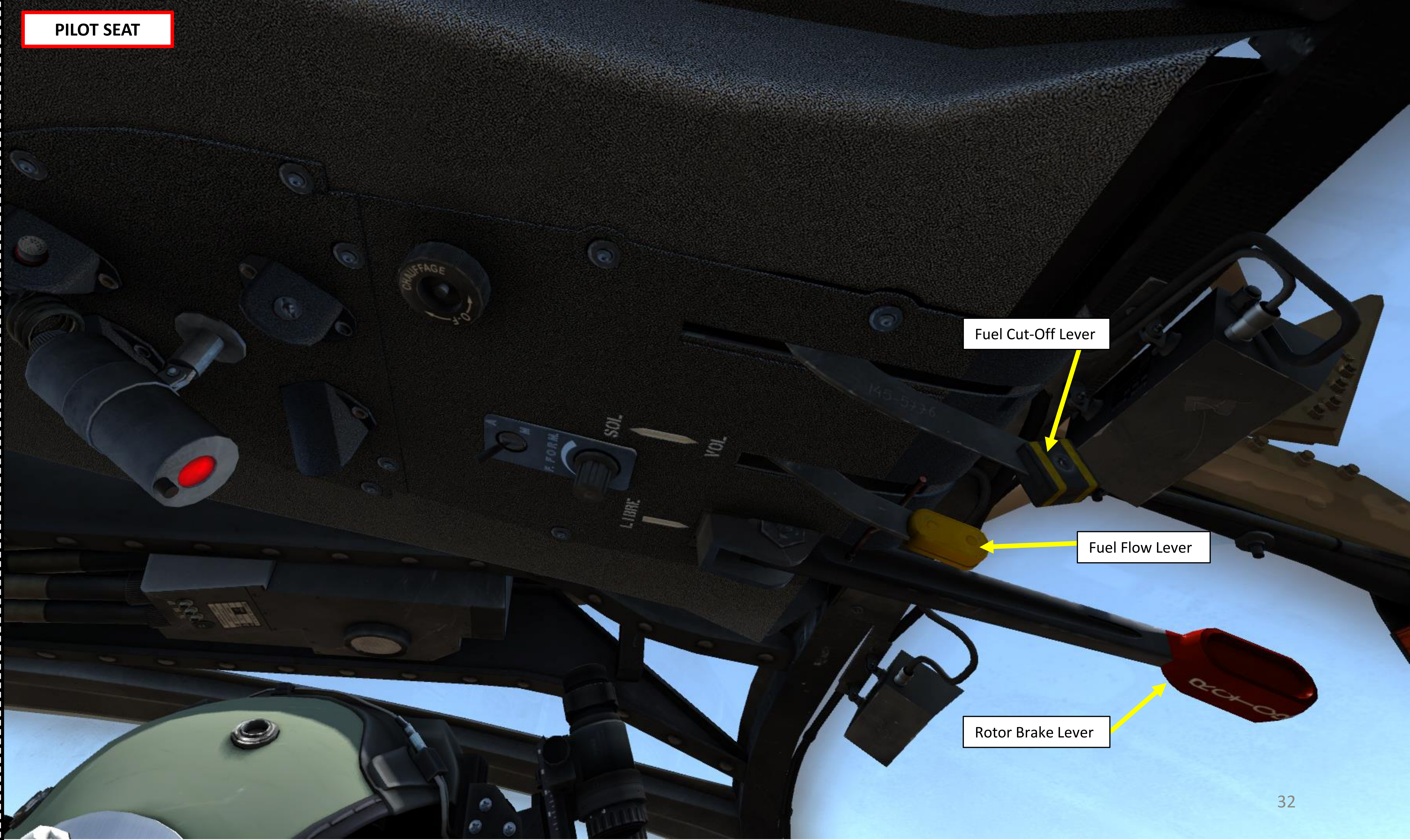
PILOT SEAT


Landing Light Toggle
Rentré = Retracted
Sorti = Extended
Flare Dispenser Button and Cover Switch
Servo Switch
M = ***Marche*** = ON
A = ***Arrêt*** = OFF
Landing Light Switch
Phare = ON
Vario = Variable
Arrêt = OFF
PHARE
RENTRE
VARIO
ARRET
SERVO
VHF
124.000

PILOT SEAT


Cabin Heating (*Chauffage*) Knob (not functional)
Formation Lights Switch
A = ***Arrêt*** = OFF (AFT)
M = ***Marche*** = ON (FWD)
145-5776
SOL
VOL
LIBRE
Roof Lamp intensity rotator
Roof Lamp Light Level Switch (Hidden)
ATTENUATED
NORMAL
Roof Lamp Intensity Rotator
Roof Lamp Red/White Toggle
Formation Lights Intensity Knob

PILOT SEAT


Fuel Cut-Off Lever
Fuel Flow Lever
Rotor Brake Lever
CHAUFFAGE
SOL
VOL
LIBRE


PILOT SEAT
Yaw String (or Slip String) Indicates a slip or skid during flight
Standby Magnetic Compass

PILOT SEAT

Compass Heading Correction Sheet	
CM = Cap Magnétique Magnetic Heading	CC = Cap Compas Compass Heading
0	0
045	+1
090	0
135	-3
180	-2
225	-1
270	0
315	-3

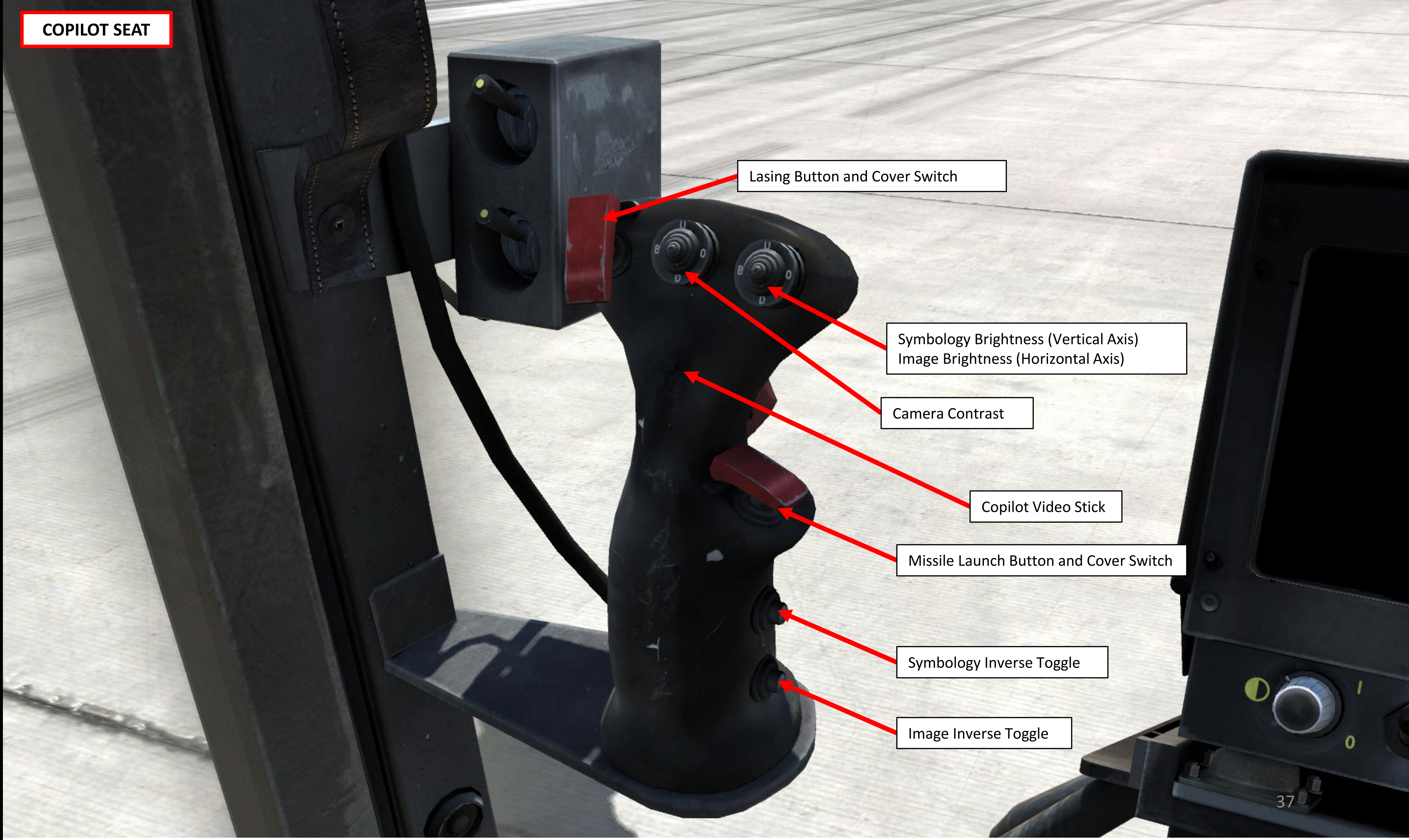
Compass Heading Correction Sheet
CM = ***Cap Magnétique*** = Magnetic Heading
CC = ***Cap Compas*** = Compass Heading

PILOT SEAT

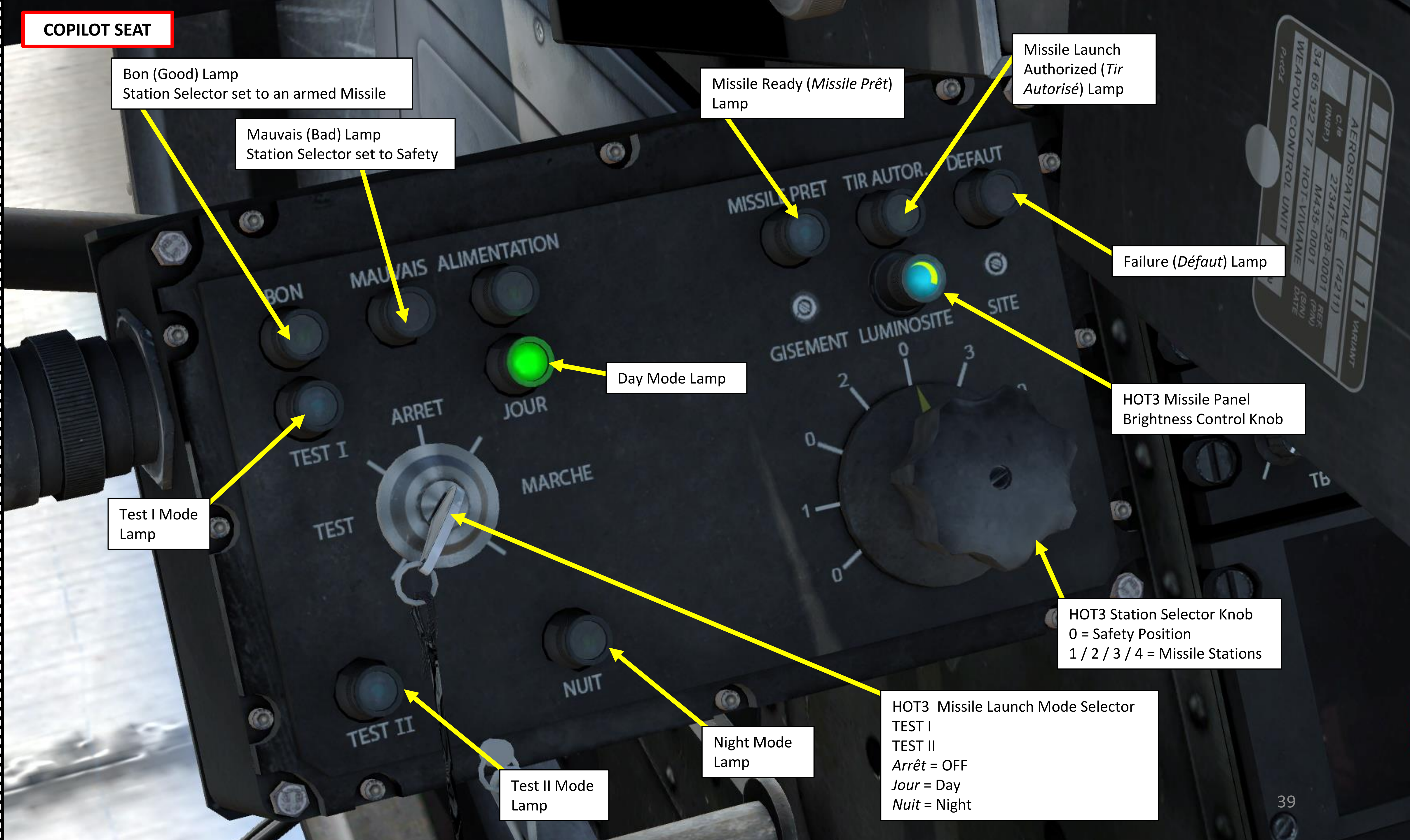

SUPPLEMENT
CARBURANT - FUEL
90 L - 70 Kg - 150 lbs
24 US Gal - 20 Imp Gal
1/2 1/1
Additional Fuel Quantity Indicator (70 kg)

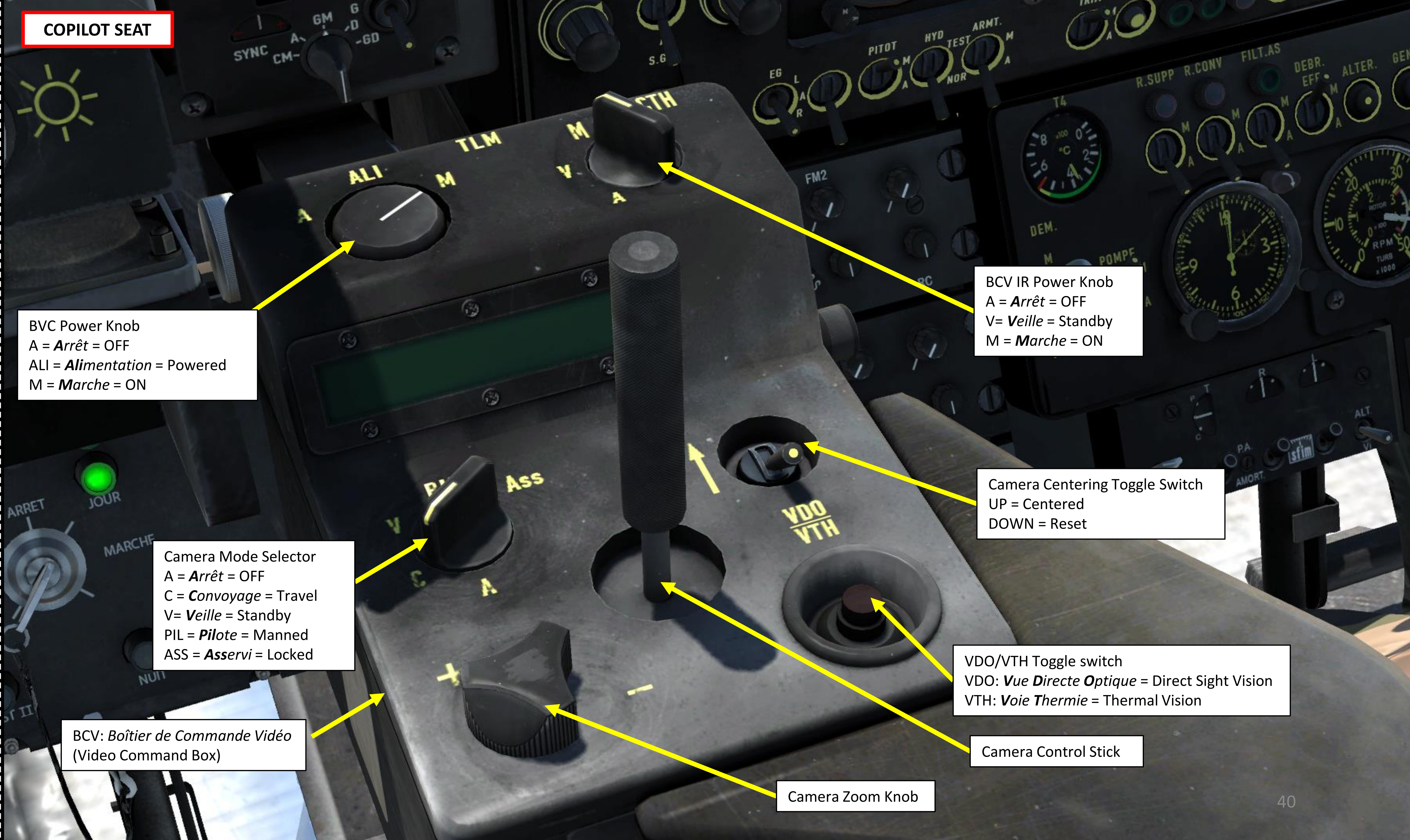
COPILOT SEAT

COPILOT SEAT




COPILOT SEAT
TV Display
TV Power Switch
UP = ON
DOWN = OFF
TV Contrast Knob
TV Power Lamp
Illuminated = ON
TV Brightness Knob
SAGEM

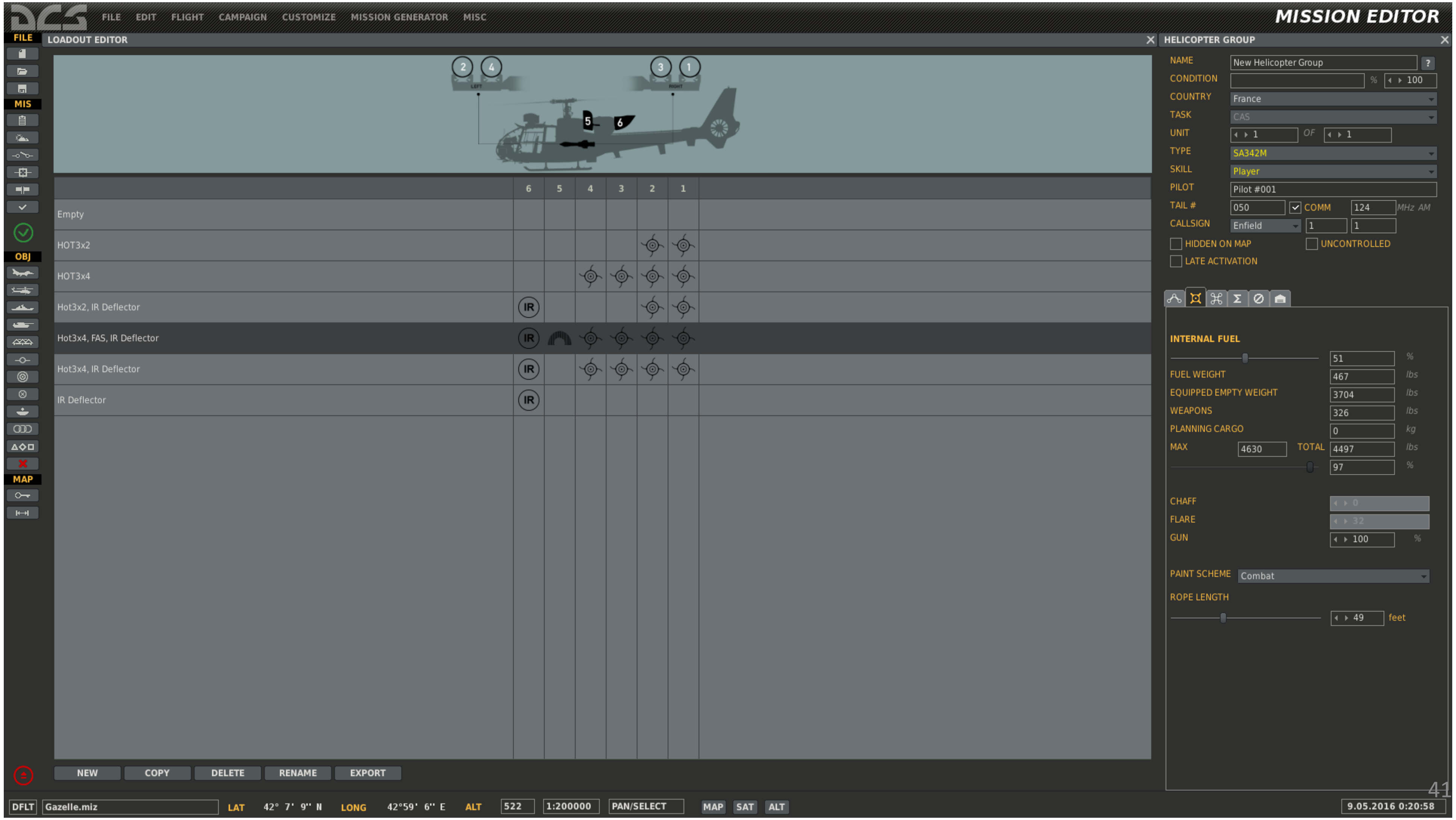

COPILOT SEAT
Bon (Good) Lamp
Station Selector set to an armed Missile
Mauvais (Bad) Lamp
Station Selector set to Safety
Missile Ready (*Missile Prêt*) Lamp
Missile Launch Authorized (*Tir Autorisé*) Lamp
Failure (*Défaut*) Lamp
Day Mode Lamp
HOT3 Missile Panel Brightness Control Knob
Test I Mode Lamp
HOT3 Station Selector Knob
0 = Safety Position
1 / 2 / 3 / 4 = Missile Stations
HOT3 Missile Launch Mode Selector
TEST I
TEST II
Arrêt = OFF
Jour = Day
Nuit = Night
Night Mode Lamp
Test II Mode Lamp
BON
MAUVAIS
ALIMENTATION
MISSILE PRET
TIR AUTOR.
DEFAUT
JOUR
ARRET
MARCHE
TEST I
TEST
TEST II
NUIT
GISEMENT
LUMINOSITE
SITE


COPILOT SEAT
BVC Power Knob
A = *Arrêt* = OFF
ALI = *Alimentation* = Powered
M = *Marche* = ON
BCV IR Power Knob
A = *Arrêt* = OFF
V= *Veille* = Standby
M = *Marche* = ON
Camera Centering Toggle Switch
UP = Centered
DOWN = Reset
Camera Mode Selector
A = *Arrêt* = OFF
C = *Convoyage* = Travel
V= *Veille* = Standby
PIL = *Pilote* = Manned
ASS = *Asservi* = Locked
VDO/VTH Toggle switch
VDO: *Vue Directe Optique* = Direct Sight Vision
VTH: *Voie Thermie* = Thermal Vision
BCV: *Boîtier de Commande Vidéo*
(Video Command Box)
Camera Control Stick
Camera Zoom Knob

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

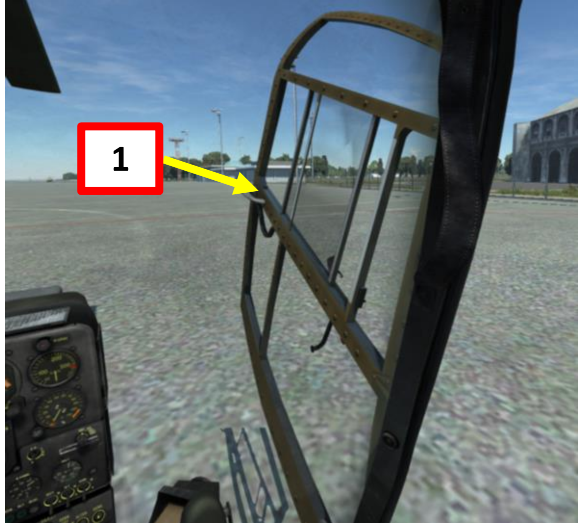
Choosing your payload carefully is a critical task for all Gazelle crews. If you takeoff with a full fuel load and a full set of four HOT3 missiles, you will be overweight and are quite likely to damage your engine and/or exceed torque safety limits during flight. Make sure you check if your fuel load + your weapon load does not exceed your maximum takeoff weight, as shown in the picture below.

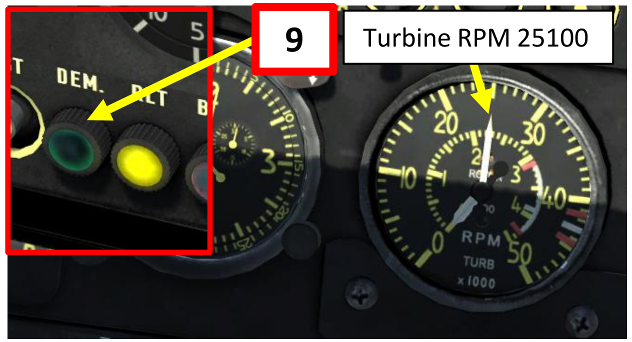
As a general rule of thumb, I suggest that you take 50 % fuel if you intend to carry 4 TOW missiles.

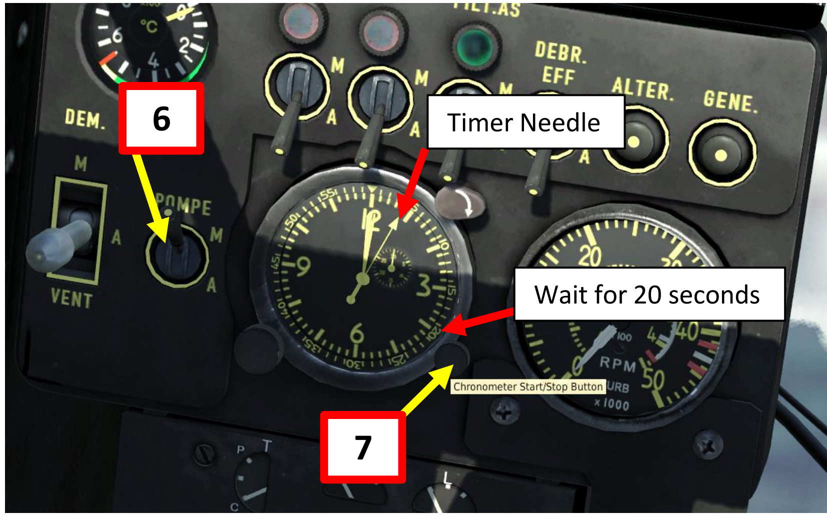


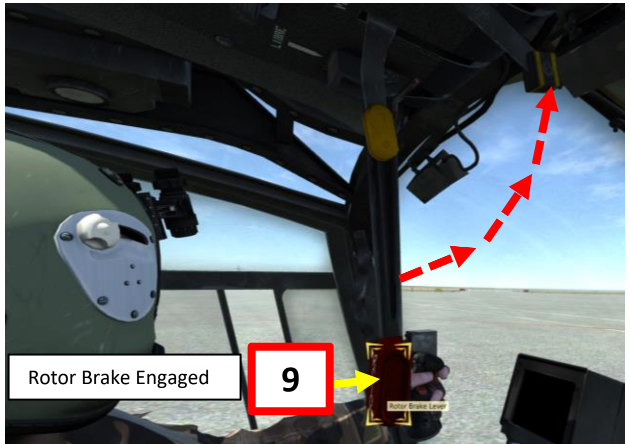
START-UP PROCEDURE

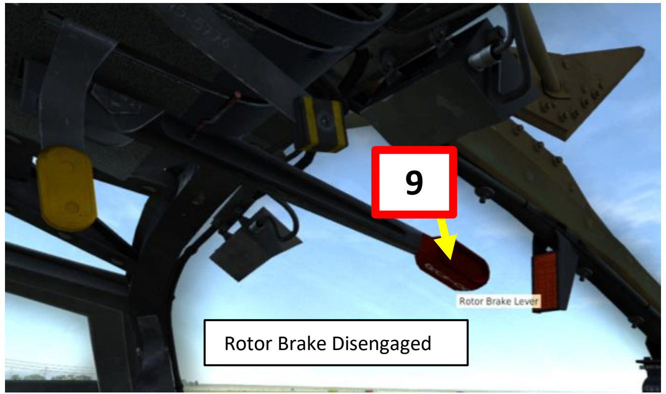
1) Press RCtrl+C to close doors
2) Set UV Lighting as required
3) Set Battery switch ON by turning it UP to ***MARCHE***.
4) Set Alternator switch ON by turning it UP to ***MARCHE***.
5) Set Generator switch ON by turning it UP to ***MARCHE***.
6) Set Fuel Pump (*Pompe*) switch ON by turning it UP to **MARCHE**.
7) Start stop-watch timer on the clock and wait for 20 seconds to allow the fuel pumps enough time to prime the fuel lines.
8) After 20 seconds, set the starter (***Démarreur***) switch ON by turning it up to ***MARCHE***. Ensure starter (DEM) lamp illuminates. Remember to reset the Stop-Watch.
9) Once Turbine RPM reaches IDLE (25100), release rotor brake by pushing it forward (click and drag). DEM lamp should extinguish once turbine reaches IDLE RPM.





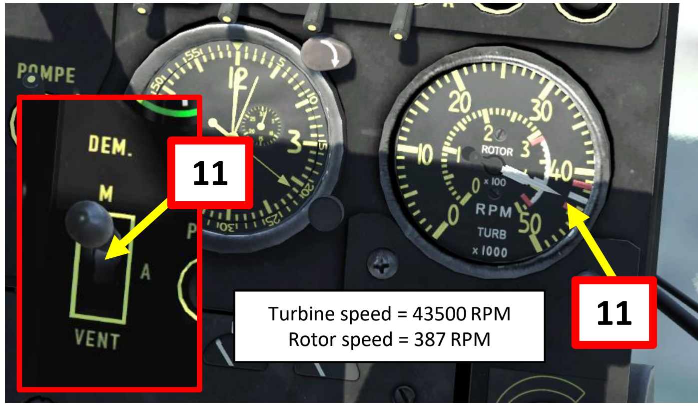


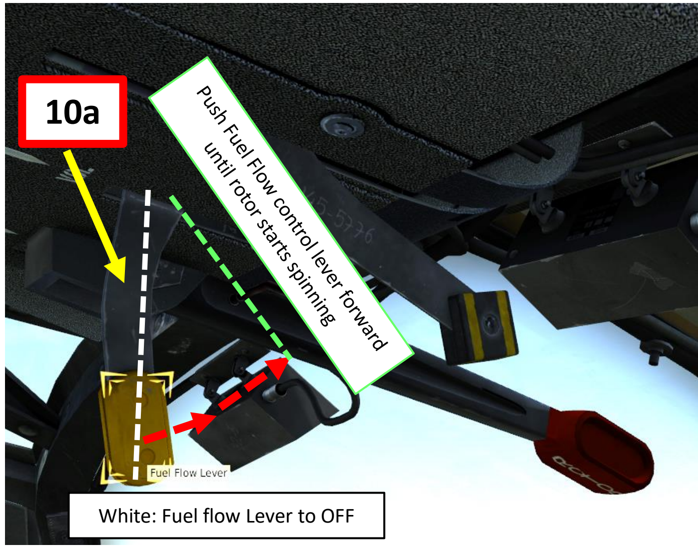


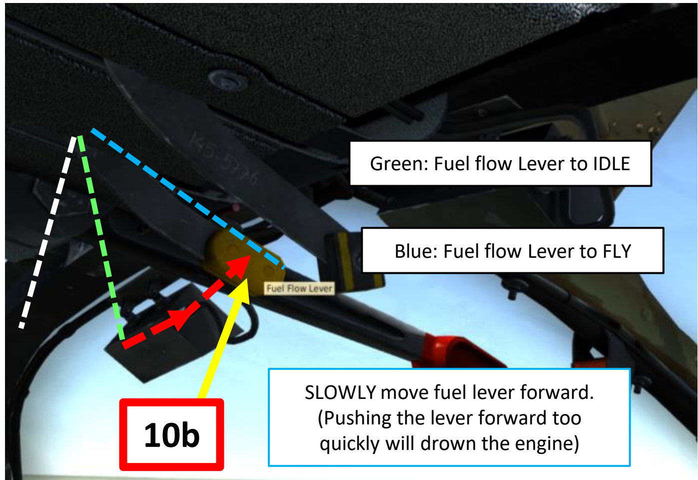


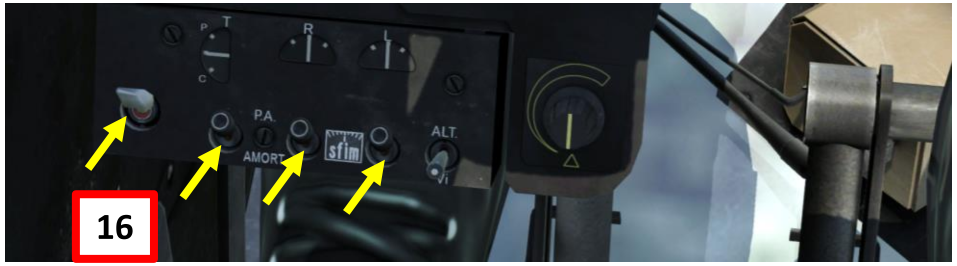
START-UP PROCEDURE

10) a) Push Fuel Flow control lever forward until rotor starts spinning.
b) Wait for turbine and rotor to sync, then SLOWLY move fuel lever forward. (Pushing the lever forward too quickly will drown the engine)
11) Wait until Turbine RPM reaches 43500 and Rotor RPM reaches 387. After, leave the starter (***Démarreur***) switch ON to ***MARCHE***.
12) Set Pitot Heat switch ON by turning it UP to ***MARCHE***.
13) Set Trimmer Heat switch ON by turning it UP to ***MARCHE***.
14) Set Magnetic Brake (***Débrayage des Efforts***) switch ON by turning it UP to ***MARCHE***.
15) Set gyro mode to GM (Gyro-Magnetic mode). Wait for alignment.
16) Set Autopilot Power and Main Axes switches ON by turning them UP.



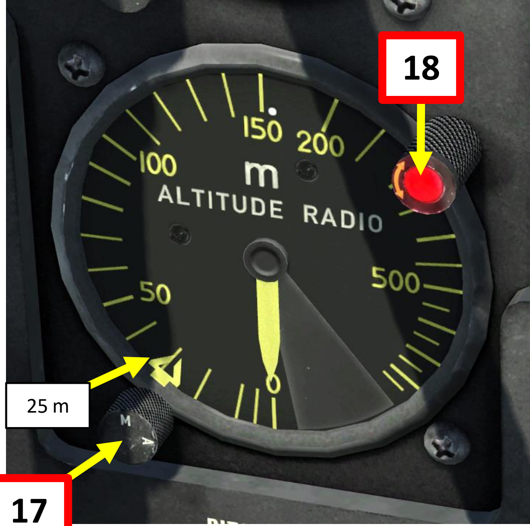


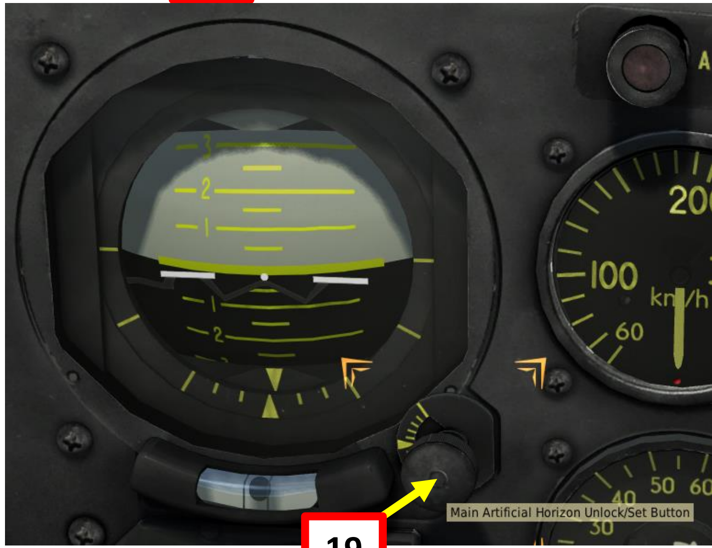




START-UP PROCEDURE

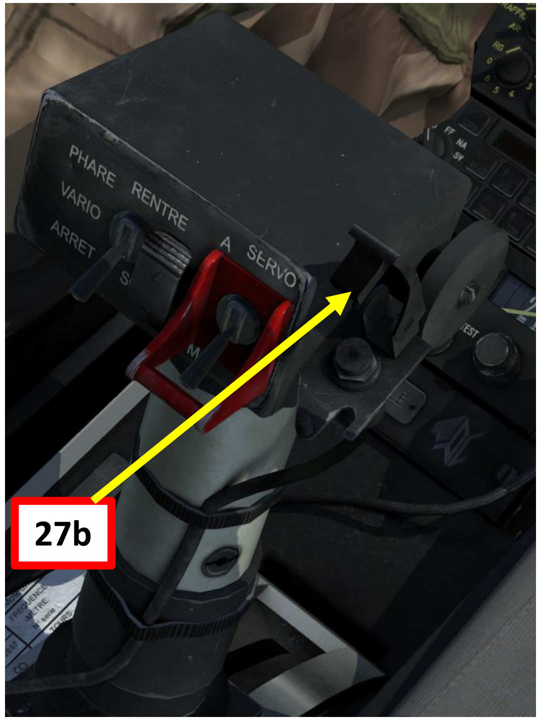
17) Set Radar Altimeter switch ON/**M**ARCHE (scroll mousewheel)
18) Set manually the “Danger Altitude” using the bug rotator. Typically, I set it to 25 m.
19) Uncage Main ADI (Attitude Director Indicator) by left-clicking on the Caging knob.
20) Uncage Standby ADI (Attitude Director Indicator) by left-clicking on the Caging knob, holding it and scrolling your mousewheel to remove the flag.
21) Set DRAX33 RWR (Radar Warning Receiver) switch to ON (MIDDLE).
22) Set NADIR parameter to BUT to select waypoints.
23) Set NADIR mode to VEILLE (Standby) and wait for completion of alignment phase, which should take approximately 70 seconds. (ERR, AIR and NAV cautions will extinguish)
24) Set NADIR mode to “*Terre*” (Ground). If the WAYPOINT PRELOAD option has been selected in the mission editor, all your waypoints will be entered already in the waypoint database. If not, you will have to enter each waypoint manually (see NAVIGATION section).

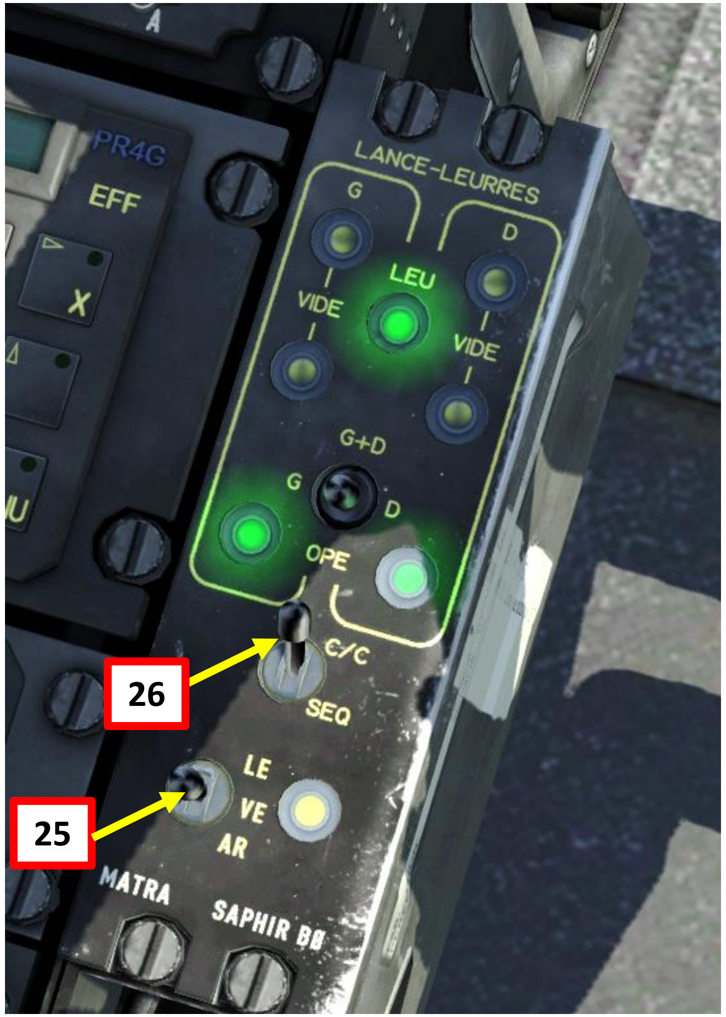




START-UP PROCEDURE

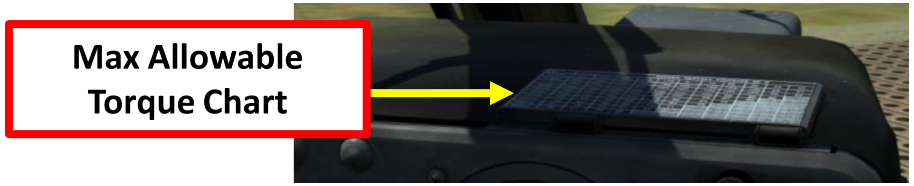
25) Set your Flare Dispenser (*Lance-Leurres*) power switch to either LE (**Le**nt = Slow) or VE (**Vite** = Fast)
26) Set your Flare Dispenser Launch Quantity to either C/C (Single) or SEQ (Sequence).
27) Flare Dispenser Cover Switch - UP





HOVER POWER CHECK – WHY IT ACTUALLY MATTERS

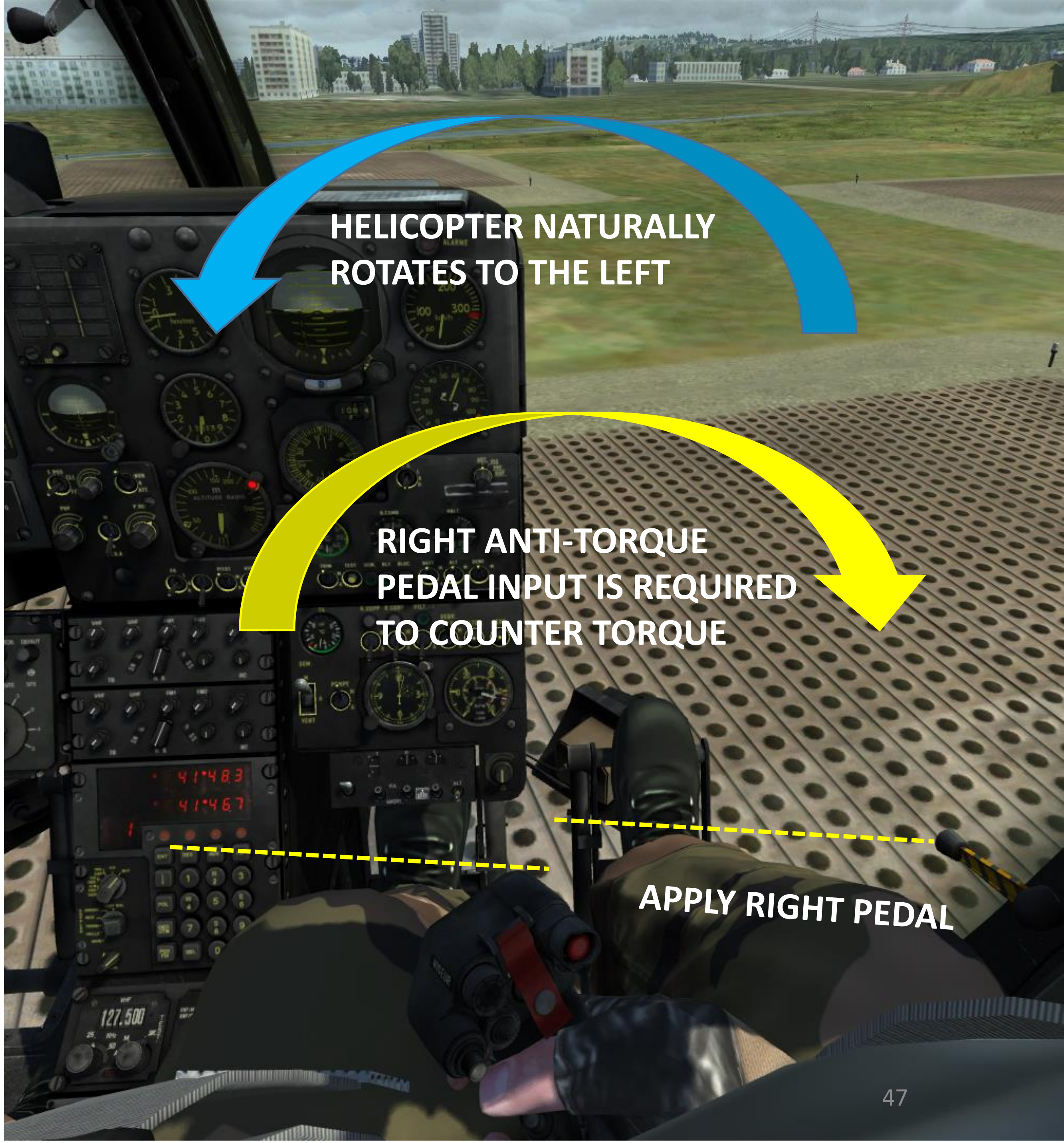
- The standard procedure for takeoff requires you to do a "5-ft (1.5 m) hover power check".
- Engine performance will vary based on temperature, humidity and air density/pressure altitude (QNH).
- For the exact same loadout and same weight, two identical helicopter configurations can perform differently based on temperature and atmospheric pressure. In a hot & humid setting, the helicopter cannot generate enough power to hover over the ground. 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 that the torque you need to hover does not exceed maximum allowable torque requirements.
- 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 maximum allowable torque value to maintain a hover state specified in the chart, this means that you are too heavy. If the torque value Is within the safe range, you're good to go! If it's not, you should probably carry less fuel or reduce your payload.
- 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.



ft \ deg C	MAXIMUM ALLOWABLE TORQUE (%)									
	-50	-40	-30	-20	-10	0	10	20	30	40	45
-1500	100	100	100	100	100	100	100	100	100	95	91
0	100	100	100	100	100	100	100	100	100	90	85
3000	100	100	100	100	100	100	100	98	90	80	X
6000	100	100	100	100	100	100	94	87	80	X	X
9000	100	100	100	100	95	90	84	77	X	X	X
12000	100	98	94	90	85	80	75	X	X	X	X
15000	92	88	84	80	76	71	X	X	X	X	X
18000	81	77	74	71	67	X	X	X	X	X	X
20000	74	71	68	65	X	X	X	X	X	X	X

HOW TO HOVER

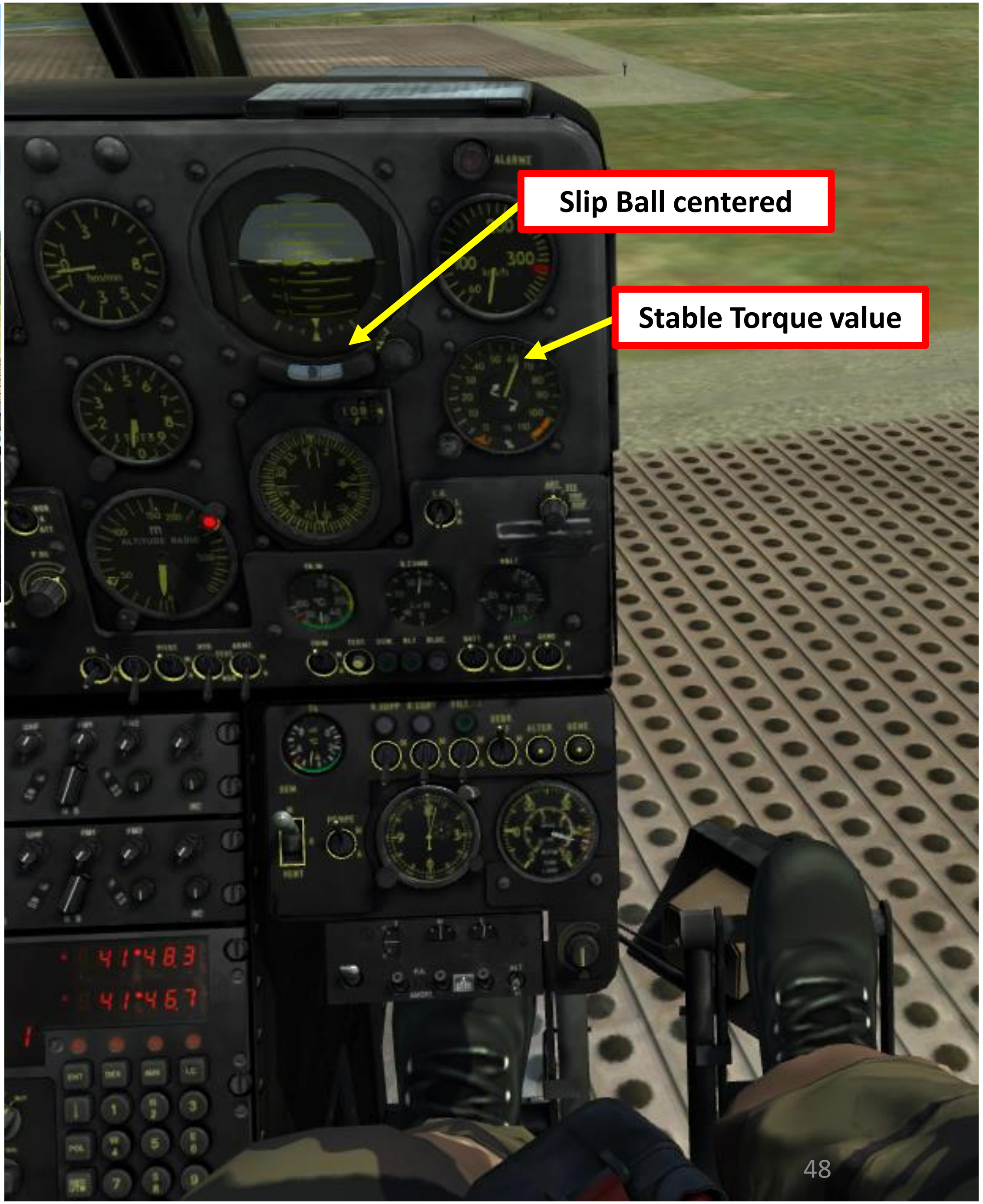
1. Apply right pedal to stay centered and avoid drifting.
2. Use cyclic to remain straight and level.
3. Raise collective very gently to initiate a hover.
4. Hovering is hard at first. Failure to predict the helicopter's reaction after cyclic input will often result in you dancing the French Cancan for 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. Use VERY gentle cyclic and collective inputs and try to maintain a stable torque value.
6. As you reach a stable hover state, the SAS (Stability Augmentation System) yaw, roll and pitch channels will help the helicopter to stabilize itself.



HOW TO HOVER

There are things you need to pay attention to when hovering:

1. Make sure that your torque value is stable for a 5 ft (1.5 m) hover.
2. Torque will vary based on collective and anti-torque pedal input.
3. A good indication of drifting is your slip ball and yaw string.
4. Once you can maintain a hover state, try not touch the collective unless you are about to smack the ground.
5. Do not pull on the cyclic too hard or your tail will hit the ground.
6. The cyclic is extremely sensitive to violent inputs. Use smooth, gentle cyclic inputs.



TAKING OFF

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

1. Check that all your engine (pressure & temperature) are within safe parameters.
2. Ensure that maximum torque is not exceeded.
3. Check to see if all your flight instruments all set up properly.
4. Once you have performed a hover check and are maintaining a 5 ft (1.5 m) hover, you can taxi to the runway. Just push your nose down slightly to move forward.
5. When lined up, 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.
6. NORMAL TAKEOFF: Keep accelerating and you will start generating more and more translational lift, naturally climbing. Try to maintain an airspeed of 120 km/h when climbing.

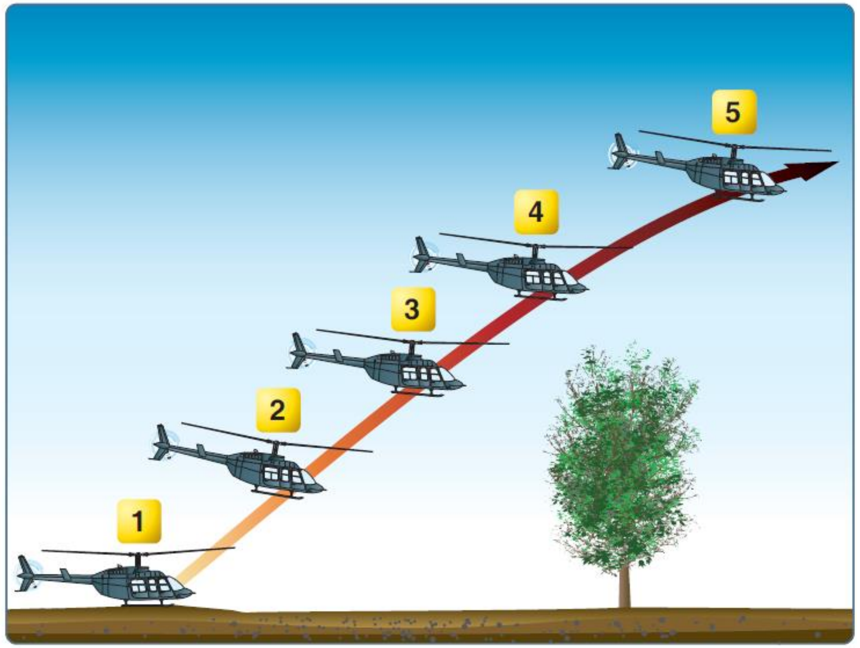


Figure 10-1. *Maximum performance takeoff.*

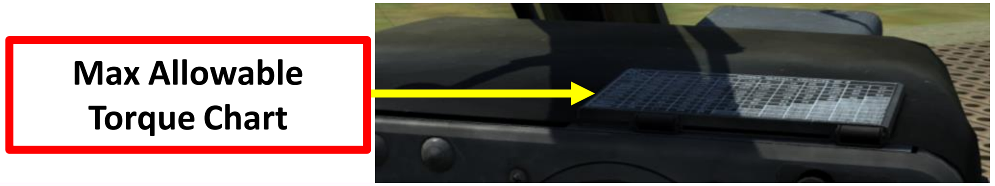


Figure 9-7. *The helicopter takes several positions during a normal takeoff from hover.*

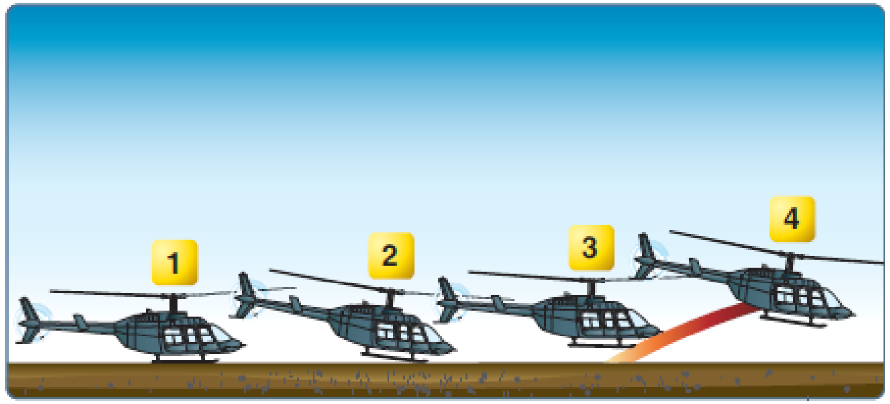


Figure 10-2. *Running/rolling takeoff.*

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 150 m. 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 20-25 km/h), 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 150 to 50 m, use collective and cyclic input to maintain 120 km/h for a descent rate of 100 m/min or less
3) Reduce speed to 70 km/h when you are 50 m: you will start feeling excess lift being generated by ground effect. You will also feel the SAS (stability augmentation system) channels being automatically disengaged around 80-90 km/h, so prepare to counter incoming torque with your anti-torque pedals. Adjust collective to keep a straight trajectory towards your reference point while reducing airspeed.
4) You should reach your reference point in a 5 ft (1.5 m) 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).
5) Once you have come to a full stop in a 5 ft (1.5 m) 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.

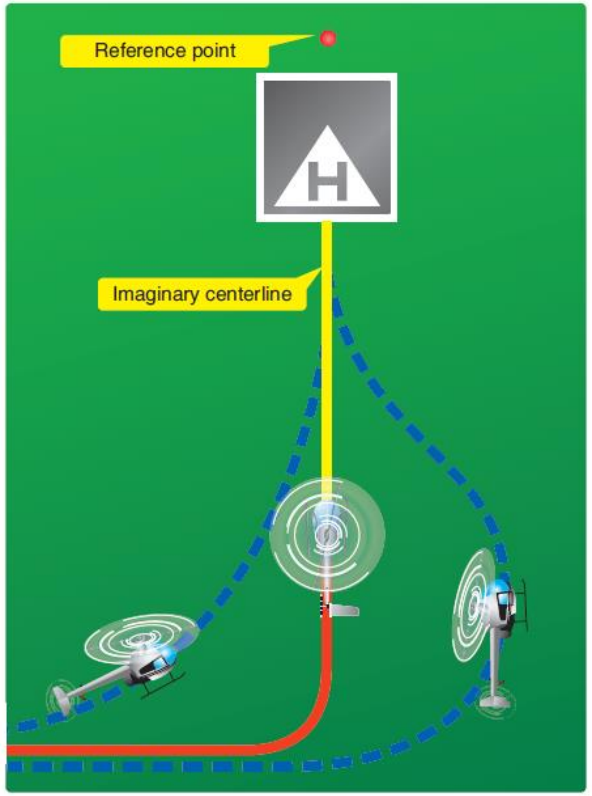


Figure 9-20. *Plan the turn to final so the helicopter rolls out on an imaginary extension of the centerline for the final approach path. This path should neither angle to the landing area, as shown by the helicopter on the left, nor require an S-turn, as shown by the helicopter on the right.*

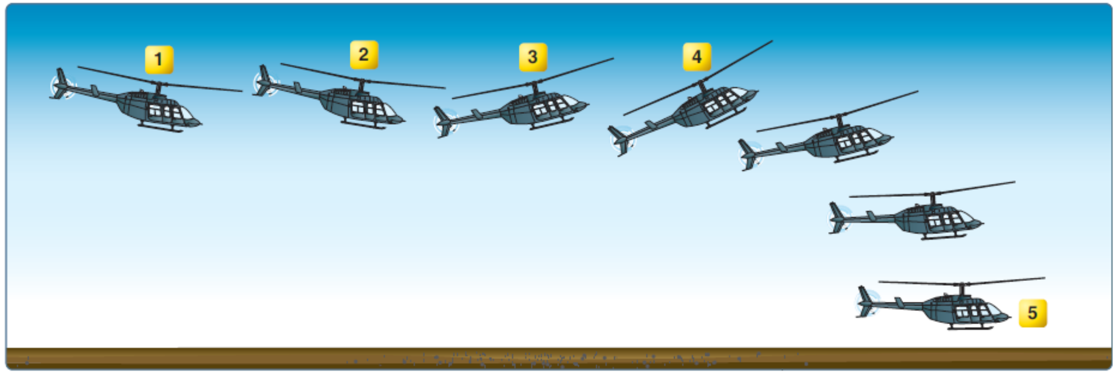


Figure 10-3. *Rapid deceleration or quick stop.*

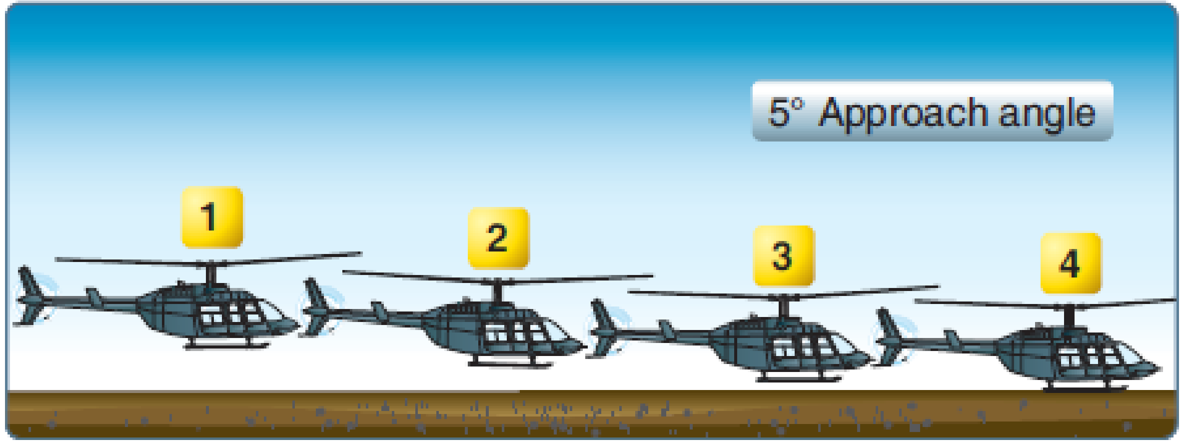


Figure 10-5. *Shallow approach and running landing.*

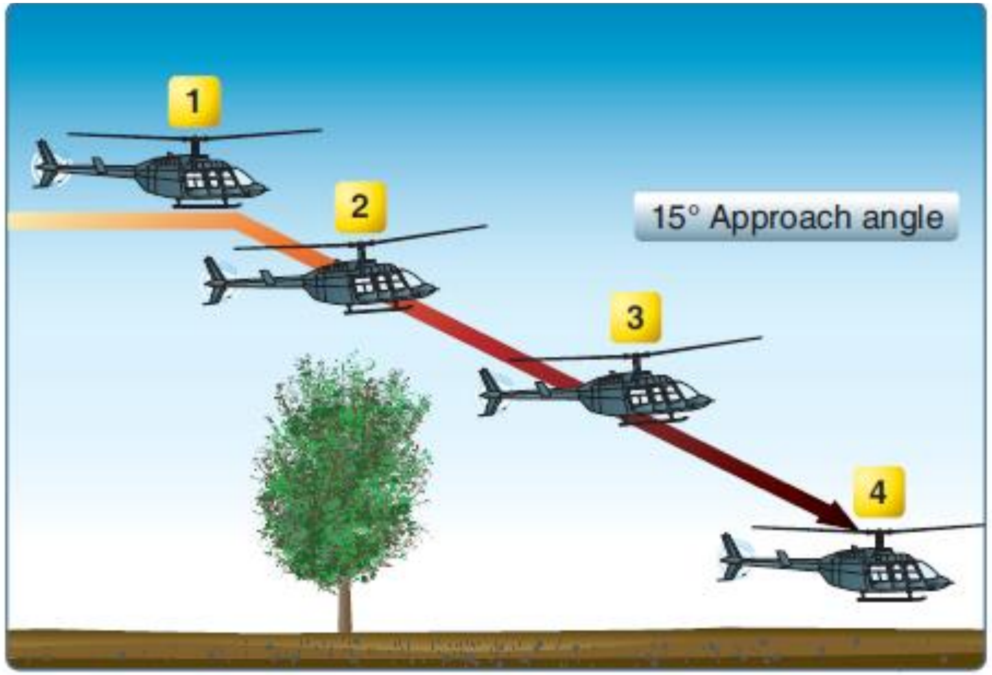
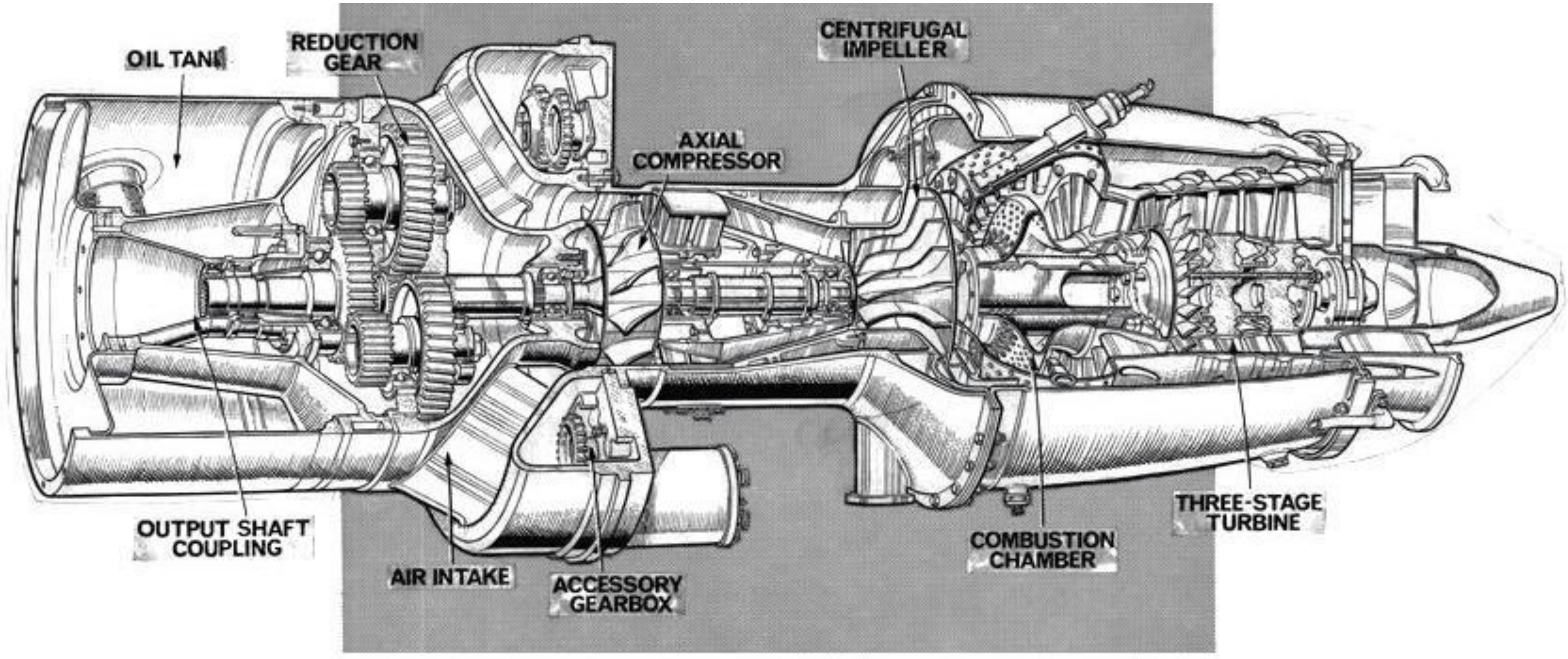


Figure 10-4. *Steep approach to a hover.*

Named after two summits of the Pyrenees, the Astazou XIV engine (649 kW or 870 shp) powers the SA-342M Gazelle. The Astazou XIV is the descendant of the Astazou II engine, used on the Aerospatiale Alouette. With a pressure ratio of 8:1, it has a two-stage axial plus a single-stage centrifugal compressor, an annular combustor, and a three-stage turbine. What makes this engine different is that it's what's commonly referred to as a fixed shaft, or fixed turbine engine, as opposed the free turbine engine which is what most modern helicopters use.

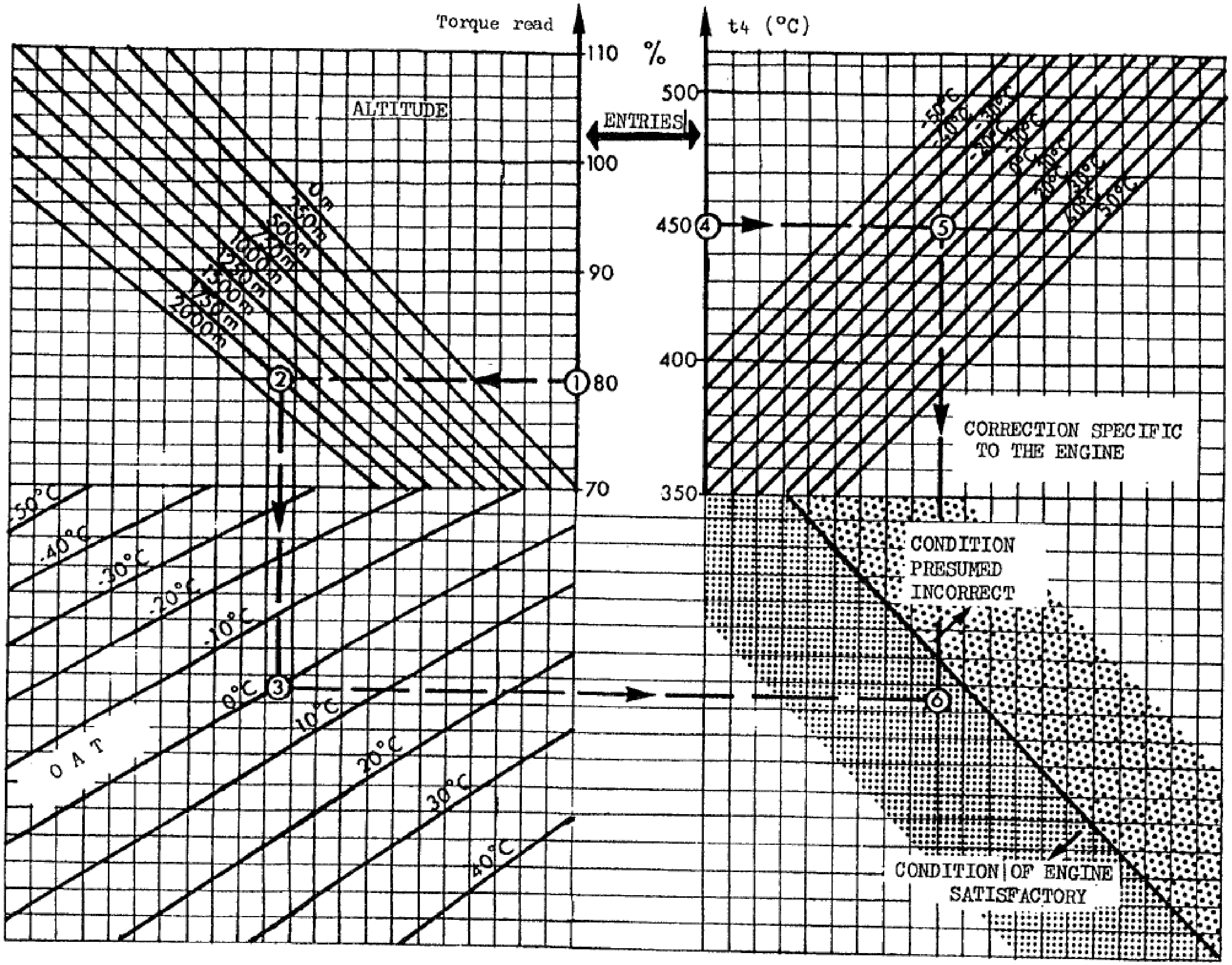
The internal mechanics of this is mostly transparent to the operator, but what stands out is the simplified engine start, which the Turbomeca Astazou had long before the invention of the modern FADEC (Full Authority Digital Engine Controller). Also, the ability to have the engine at idle without the rotors moving is different than what you might have on the Huey or the Mi-8. When you start a free turbine engine, like those equipped on most modern helicopters (without a rotor brake) you will notice that the rotor system slowly starts to move and as soon as NG or N1 (the engines compressor speed) gets up to speed before fuel is even introduced. This isn't always so on a fixed turbine, in which the clutch doesn't engage until the drive shaft RPM is somewhere above idle.



Turbomeca Astazou Gas Turbine Engine


Torquemeter (%)
Overtorque Lamp
Engine Oil Temperature (deg C)
Inner Scale: Rotor RPM x 100
Outer Scale: Turbine RPM x 1000

ENGINE CONDITION CHECK CHART



The Fenestron

A **Fenestron** (or fantail, sometimes called "fan-in-fin") is a protected tail rotor of a helicopter operating like a ducted fan. Placing the fan within a duct reduces tip vortex losses, shields the tail rotor from damage, is much quieter than a conventional tail rotor, and shields ground crews from the hazard of a spinning rotor. The housing is integral with the tail skin and, like the conventional tail rotor it replaces, is intended to counteract the torque of the main rotor. It was first developed by the French company Sud Aviation (now part of Airbus Helicopters) and is installed on many of their helicopters including the Gazelle.

Advantages:

- Increased safety for people on the ground because the enclosure provides peripheral protection
- Greatly reduced noise and vibration due to the enclosure of the blade tips, the greater number of blades, and variation in the angular spacing of the blades
- A lower susceptibility to foreign object damage because the enclosure makes it less likely to suck in loose objects such as small rocks
- Enhanced anti-torque control efficiency
- A computational simulation suggested that maximum achievable thrust is twice as high and at identical power, thrust was slightly greater than for a conventional rotor of the same diameter

The Gazelle has one of the most interesting aerodynamic models in DCS. We will look at some aerodynamic concepts to help you understand why this agile light 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 Gazelle pilot if you want to fly worth a darn.

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 right pedal and right cyclic when you are hovering. This is simply because of the torque created by the propeller blades' rotation: we call this "**Translating Tendency**", or simply "drift". In a prop airplane, the torque will force you to use anti-torque pedal on takeoff to stay straight. The same principle applies for a helicopter, but in a different axis.

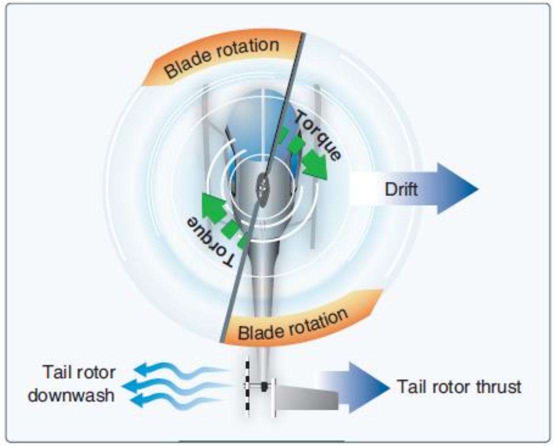


Figure 2-25. *A tail rotor is designed to produce thrust in a direction opposite torque. The thrust produced by the tail rotor is sufficient to move the helicopter laterally.*

NOTE: THESE PICTURES SHOW THE ROTOR DIRECTION OF THE HUEY. THE GAZELLE'S ROTOR DIRECTION IS INVERTED.

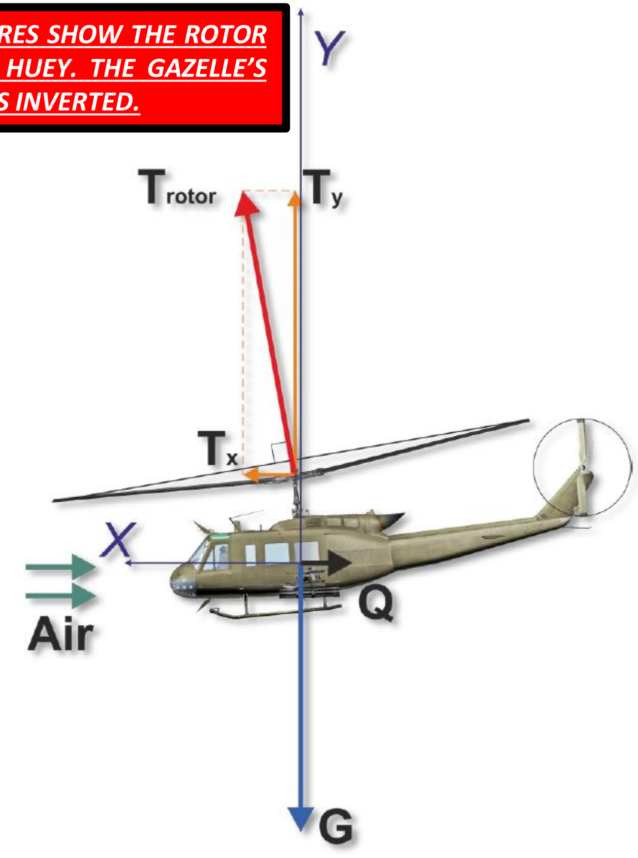


Figure 3.1. Forces Acting on a Helicopter

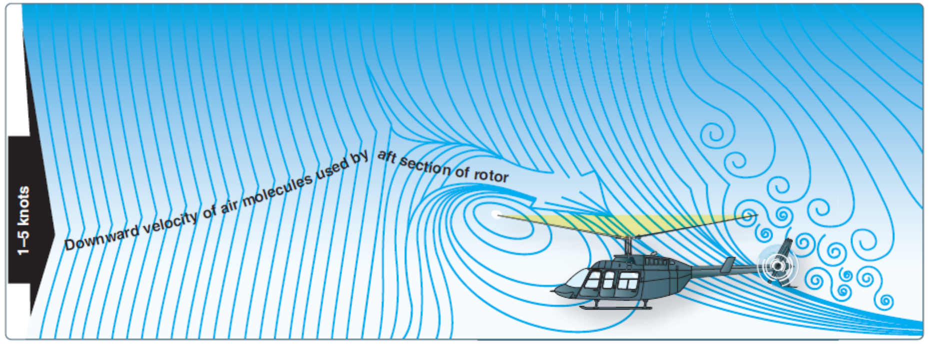


Figure 2-37. *The airflow pattern for 1–5 knots of forward airspeed. Note how the downwind vortex is beginning to dissipate and induced flow down through the rear of the rotor system is more horizontal.*

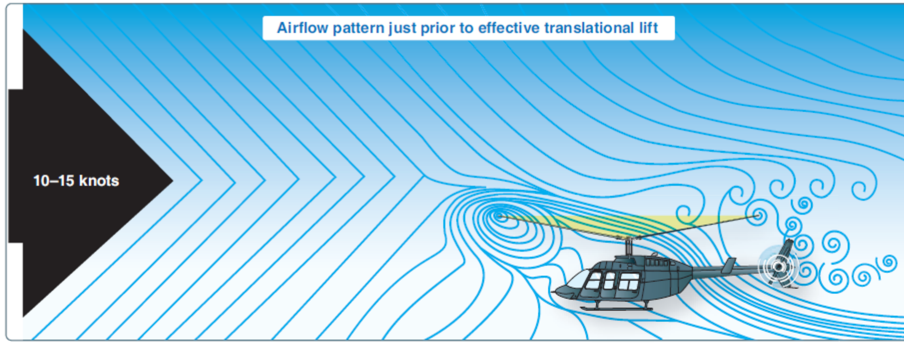


Figure 2-38. *An airflow pattern at a speed of 10–15 knots. At this increased airspeed, the airflow continues to become more horizontal. The leading edge of the downwash pattern is being overrun and is well back under the nose of the helicopter.*

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 "before".

NOTE: THESE PICTURES SHOW THE ROTOR DIRECTION OF THE HUEY. THE GAZELLE'S ROTOR DIRECTION IS THE OPPOSITE.

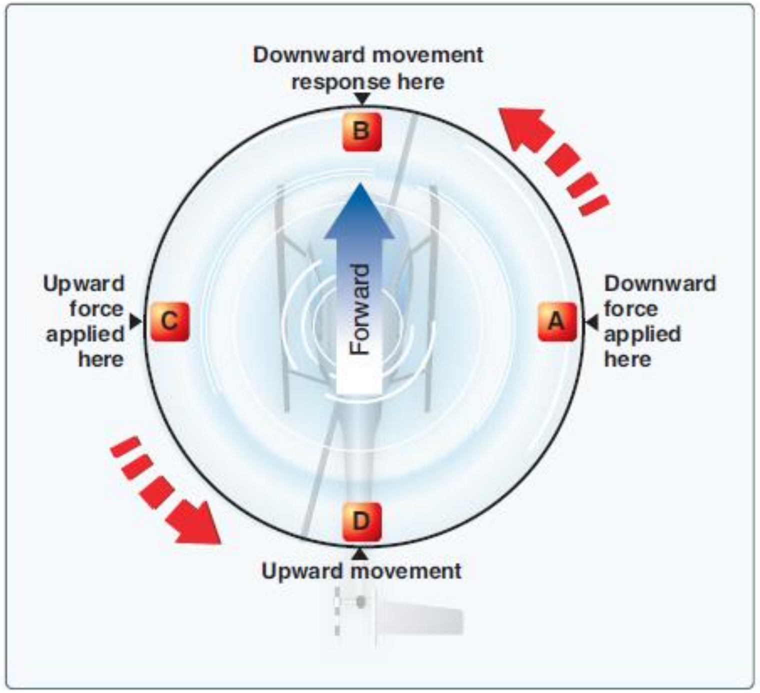


Figure 2-28. *Gyroscopic precession.*

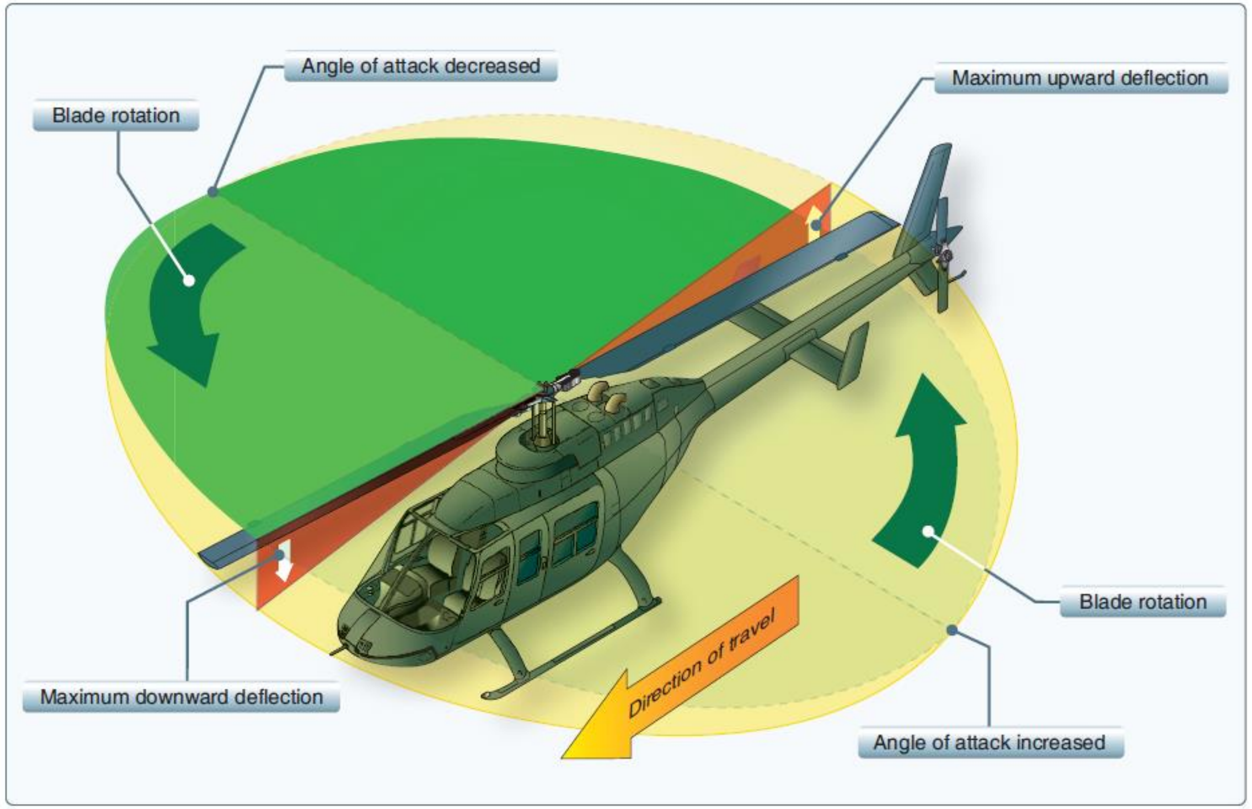


Figure 2-29. *As each blade passes the 90° position on the left in a counterclockwise main rotor blade rotation, the maximum increase in angle of incidence occurs. As each blade passes the 90° position to the right, the maximum decrease in angle of incidence occurs. Maximum deflection takes place 90° 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.

NOTE: THESE PICTURES SHOW THE ROTOR DIRECTION OF THE HUEY. THE GAZELLE'S ROTOR DIRECTION IS THE OPPOSITE.

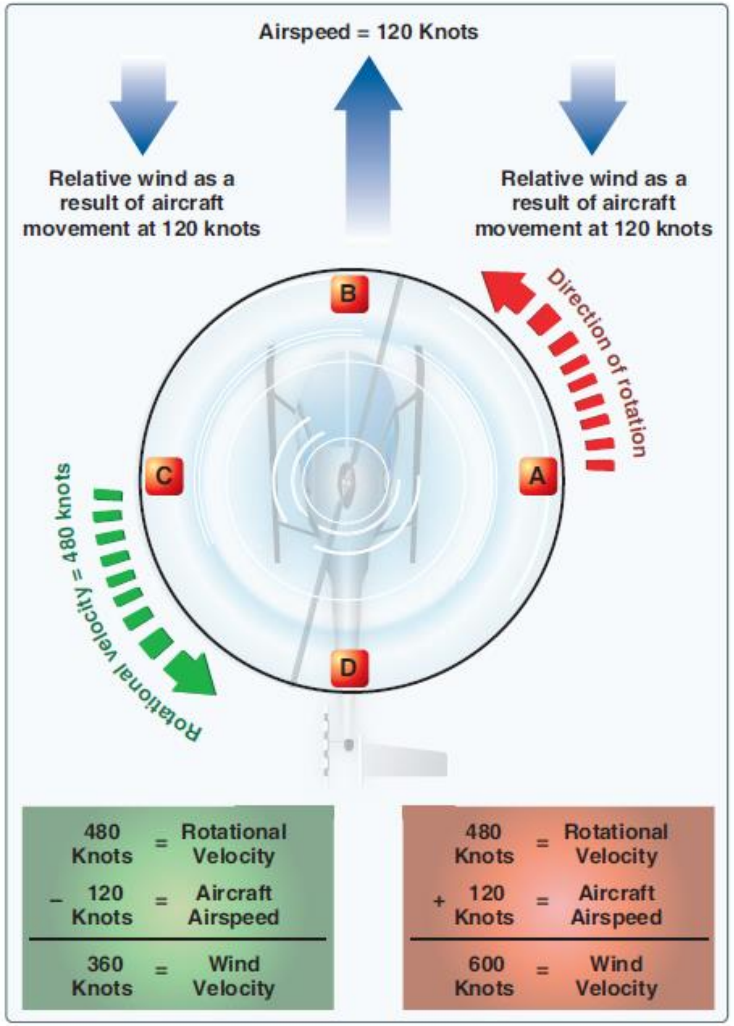


Figure 2-33. *Airflow in forward flight.*

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 right and forward is because the lift generated by your rotor blade is not equal everywhere on your blades due to the blowback effect (pitch up moment caused by blade flapping and transverse flow during the transition from a hover to forward flight). 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.

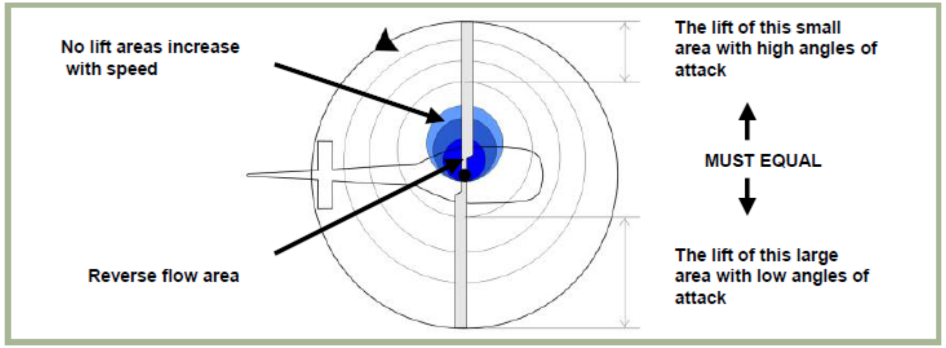


Figure 3.8. Normal Cruise Lift Pattern

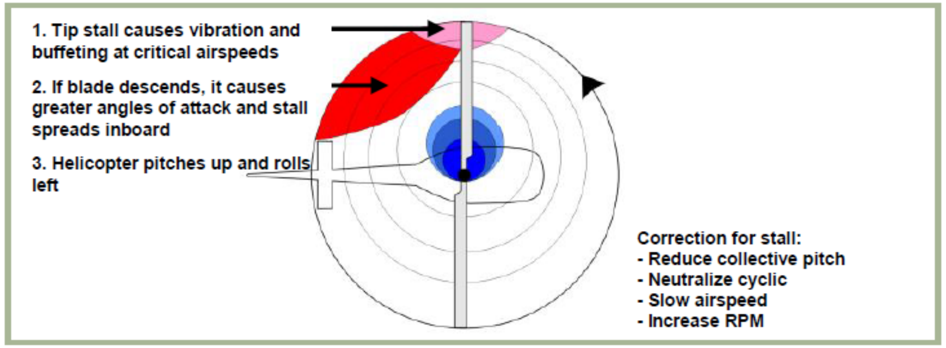


Figure 3.9. Lift Pattern at Critical Airspeed

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).

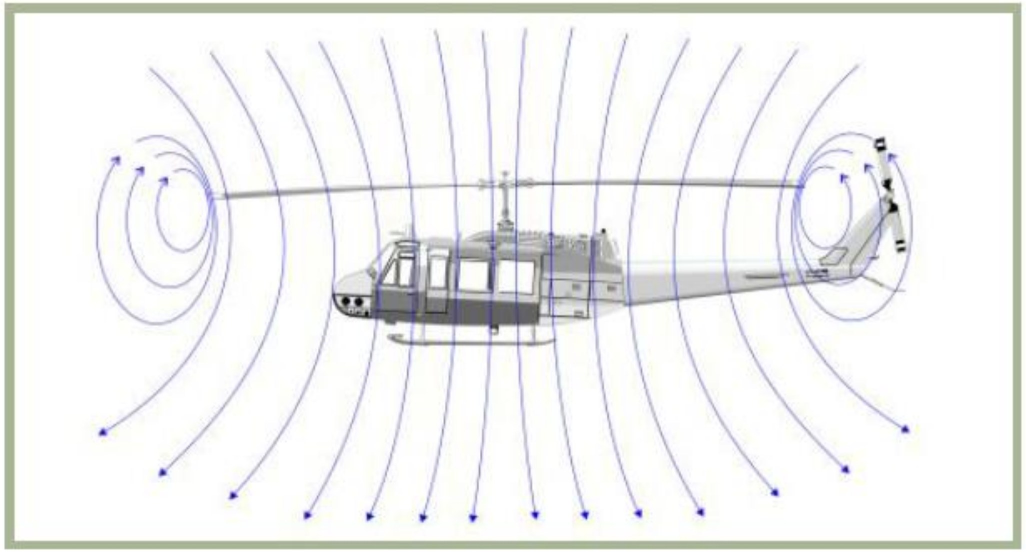


Figure 3.13. Airflow When Out of Ground Effect

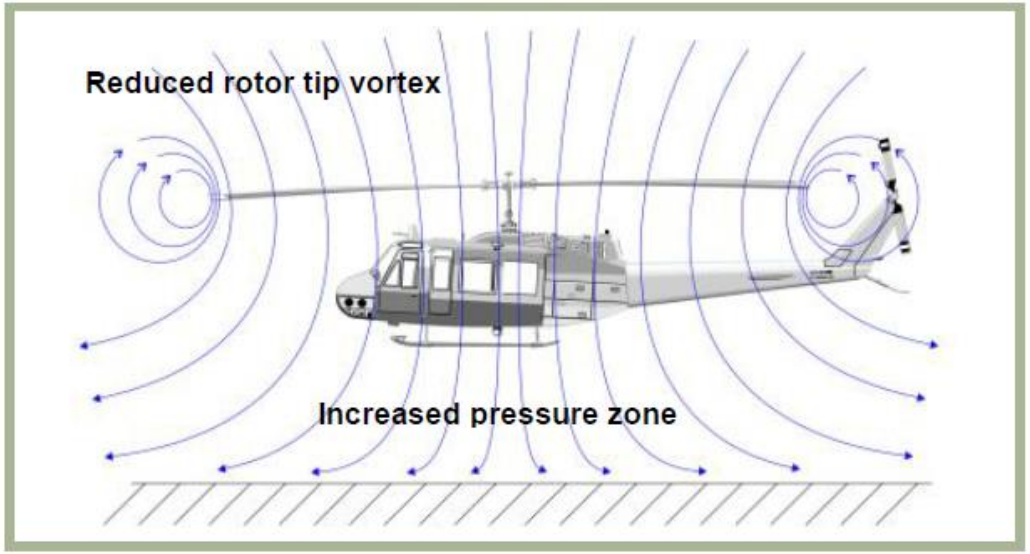


Figure 3.14. Airflow When In Ground Effect

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.

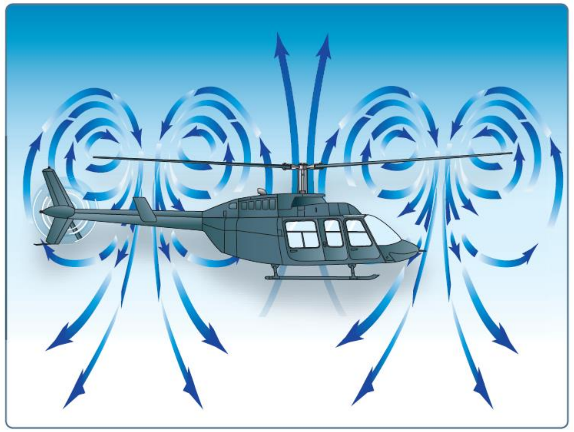


Figure 11-5. *Vortex ring state.*

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 20-30 km/h (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 150 m/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.

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.

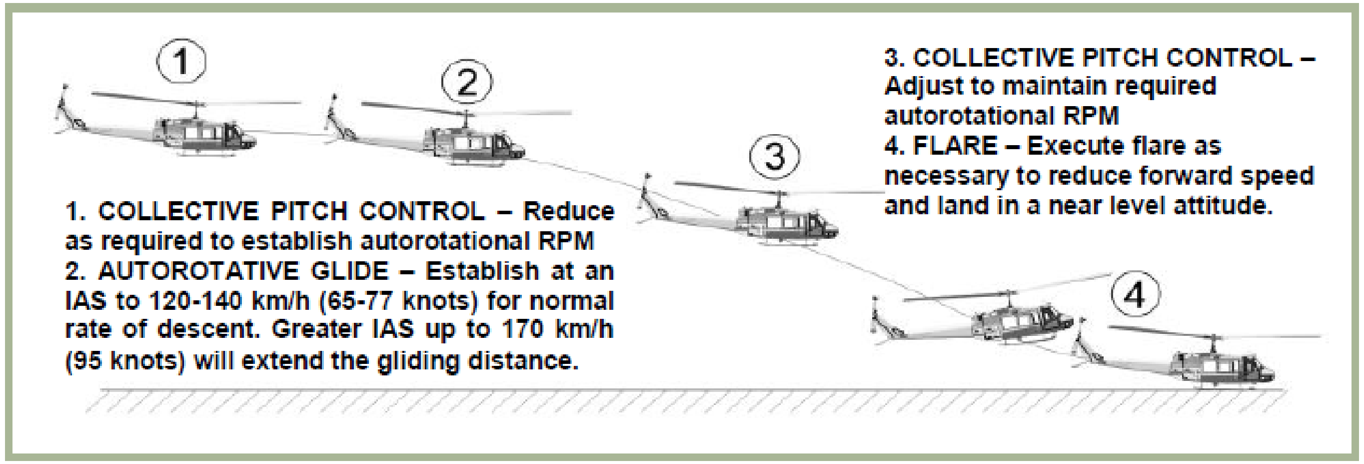


Figure 3.16. Approach to Landing, Power Off

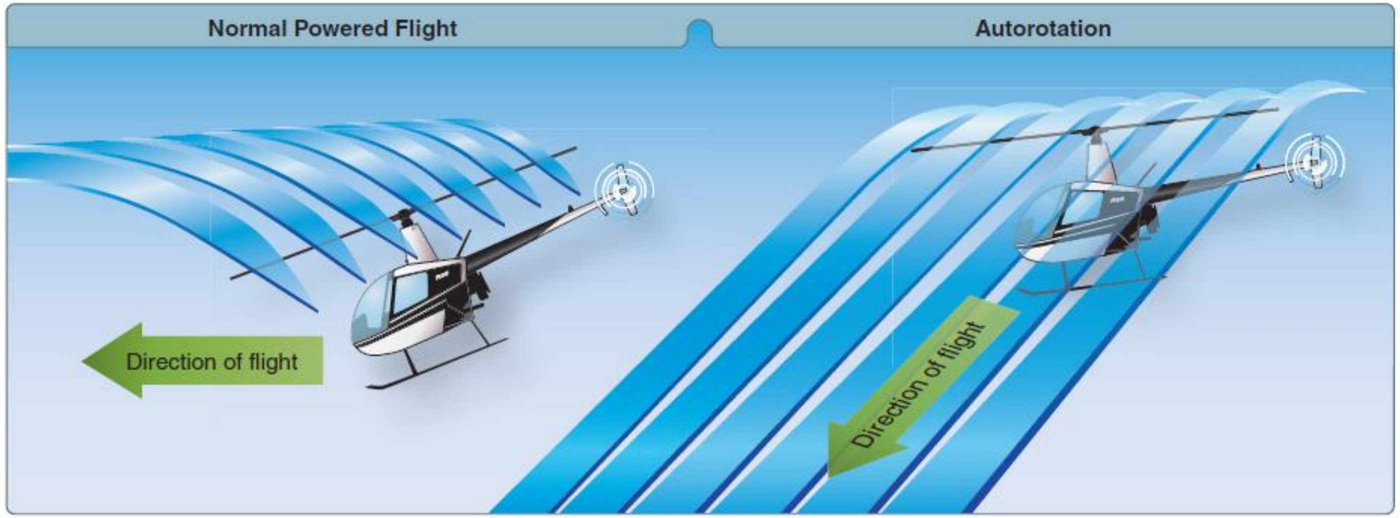


Figure 11-1. *During an autorotation, the upward flow of relative wind permits the main rotor blades to rotate at their normal speed. In effect, the blades are "gliding" in their rotational plane.*

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 air 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

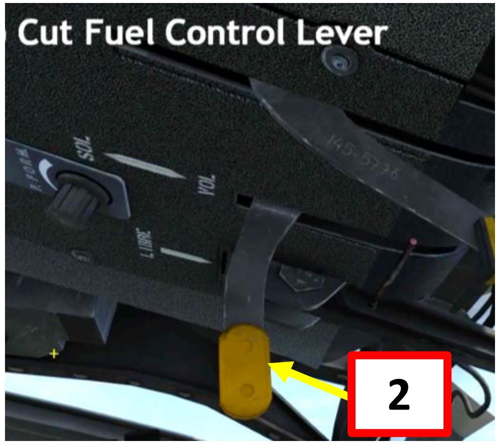
Autorotation can be simulated if you reduce your throttle to IDLE. Train yourself to deal with autorotation and you will be surprised to see how much better your flying will become.

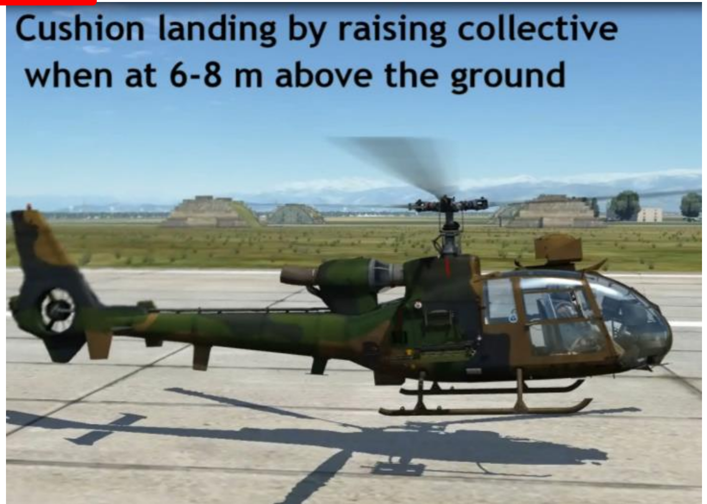
AUTOROTATION RECOVERY EXAMPLE:

1) Find a good place to land first and make sure you are at 1000 m more.
2) Simulate engine loss of power by reducing throttle by setting it all the way aft.
3) Push TRIM RESET switch
4) Apply anti-torque pedal to center the slip ball, lower collective and pull up cyclic to compensate for sudden RPM loss.
5) Adjust cyclic for a constant descent between 120-140 km/h,
6) *RECOVERY MODE: TOUCHDOWN* (no power, continue descent and land)
    a) Once condition at step 5) is respected , continue descent and do not touch collective.
    b) At 20 m AGL, perform a moderate flare (watch your vertical velocity indicator).
    c) At 6-8 m AGL, raise (increase) collective to cushion your landing.
    d) Let the helicopter “gently” touch the ground.

Here is a video tutorial showcasing a Gazelle autorotation recovery by yours truly.

https://www.youtube.com/watch?v=F_a9q_B-TRE





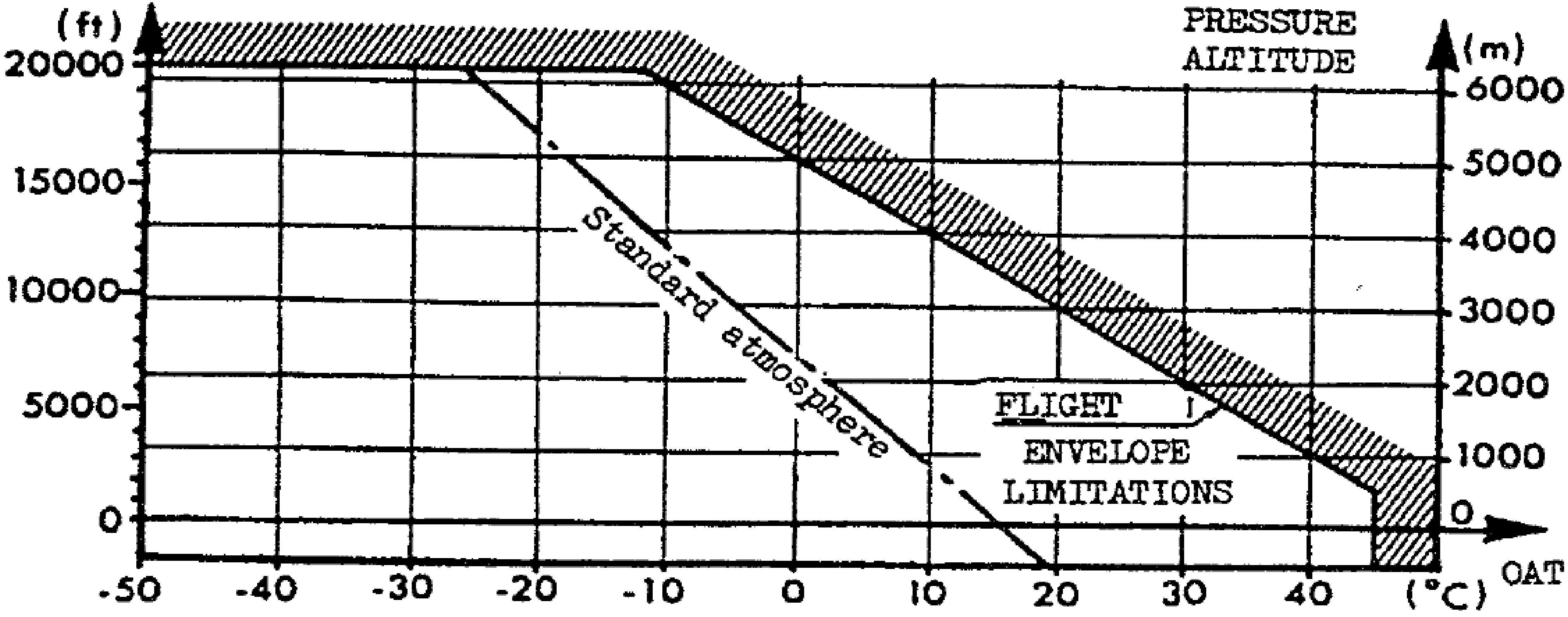
LOSS OF AIRSPEED

VERTICAL SPEED CLOSE TO 0

CAUTION PANEL – WHAT DOES IT MEAN?

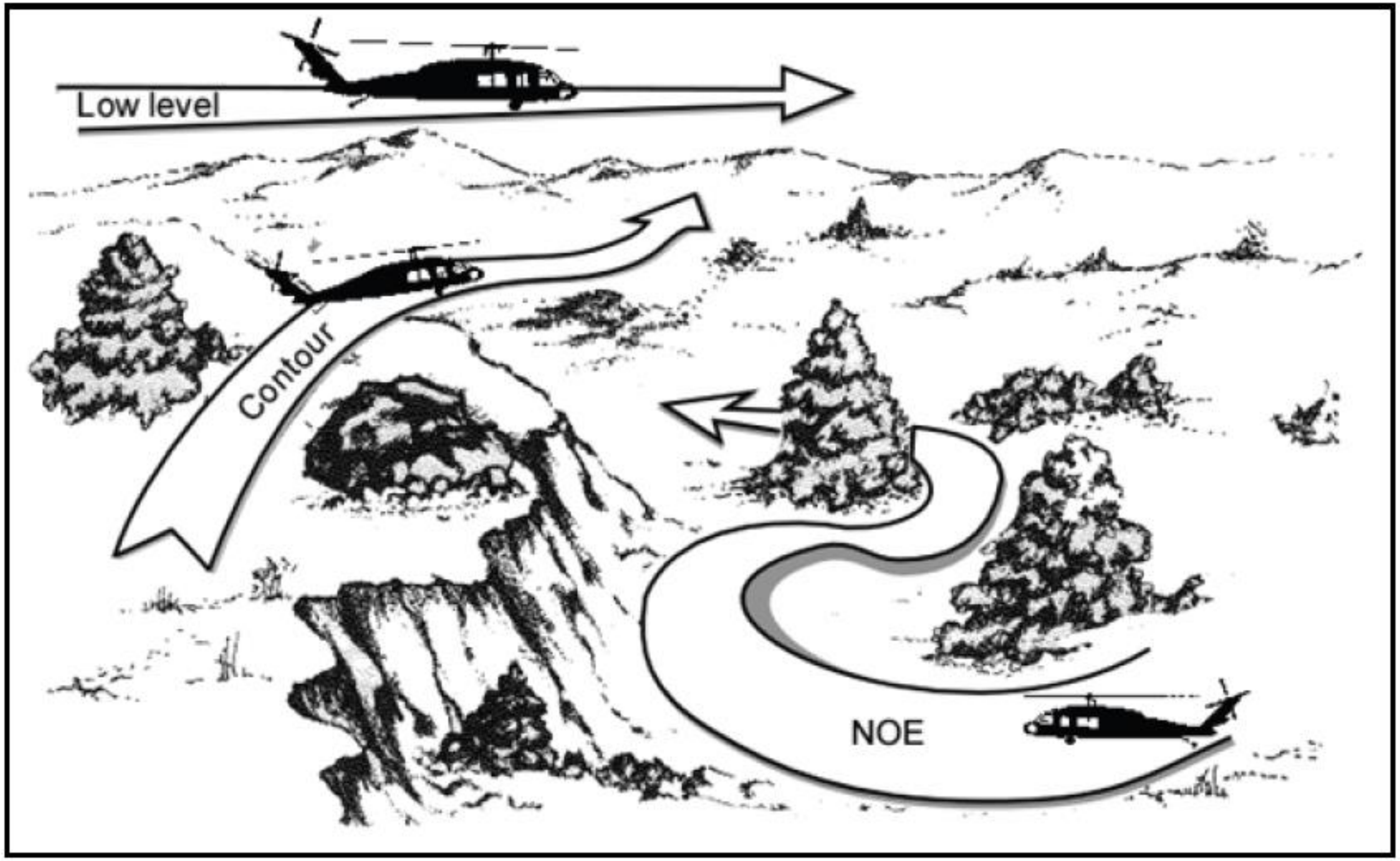
CAUTION PANEL	
H.MOT.	Turbine oil pressure drop
GENE	DD power supply system defective
PA	Main Autopilot (Pilote Automatique) switch OFF or Autopilot is in ALTITUDE mode and IAS is below 120 km/h
BPHY	Rotor RPM below 170
PITOT	Pitot Heat switch is OFF
H.BTP.	Main gear box oil pressure drop
ALTER.	AC power supply system defective
NAV	Failure of the AC power supply system – ADF is inoperative
LIM	When oil is dirty
H.RAL	Turbine RPM is below 15000
BAT.	Battery is isolated from DC network and is no longer charging
COMB	Usable fuel level below 50 litres
FILT.	Fuel filter beginning to be clogged

FLIGHT ENVELOPE LIMITATIONS

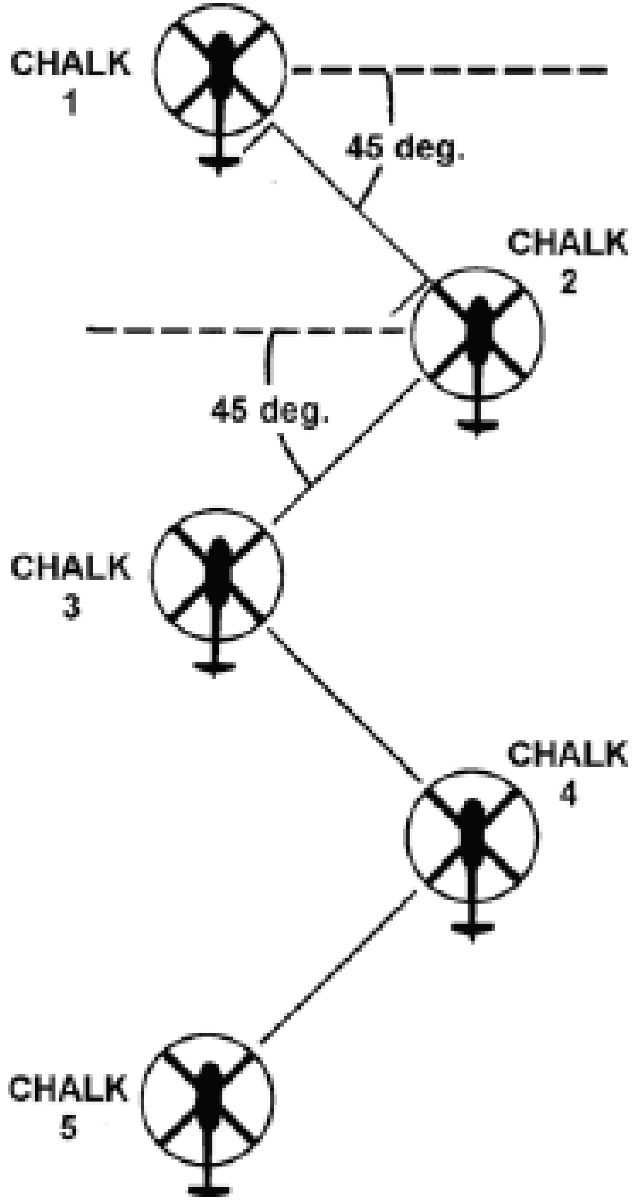


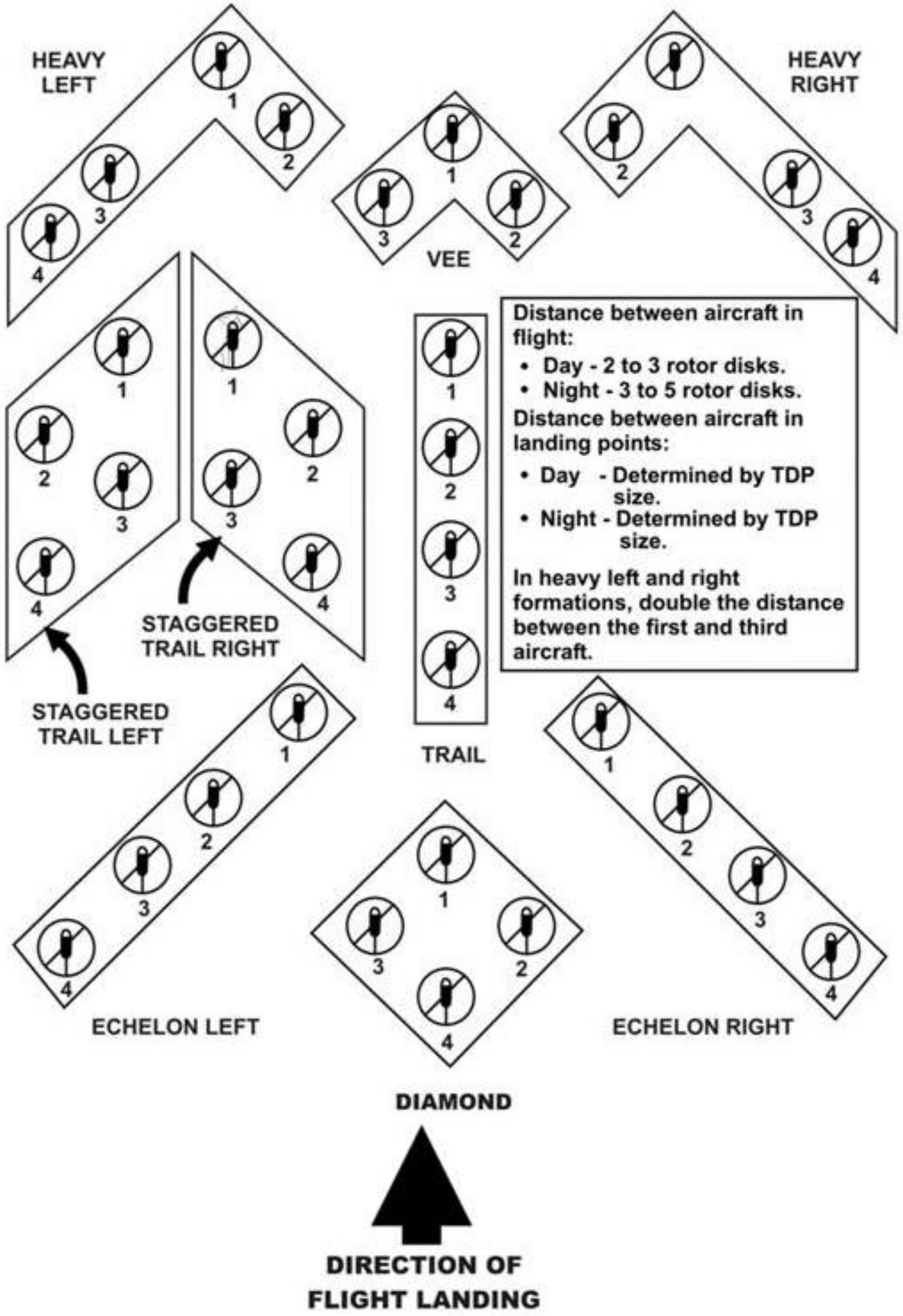
FLIGHT MODES

Mission planning is a crucial part of flying helicopters. Airmobile operations will often require you to drop troops at a designated LZ (landing zone) or to do ambush attacks on incoming tank columns. The flight path to reach this area of operations should be as safe as possible. The Gazelle 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
HEAVY RIGHT
VEE
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.
STAGGERED TRAIL RIGHT
STAGGERED TRAIL LEFT
TRAIL
ECHELON LEFT
ECHELON RIGHT
DIAMOND
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 or scout helicopters like the Gazelle.

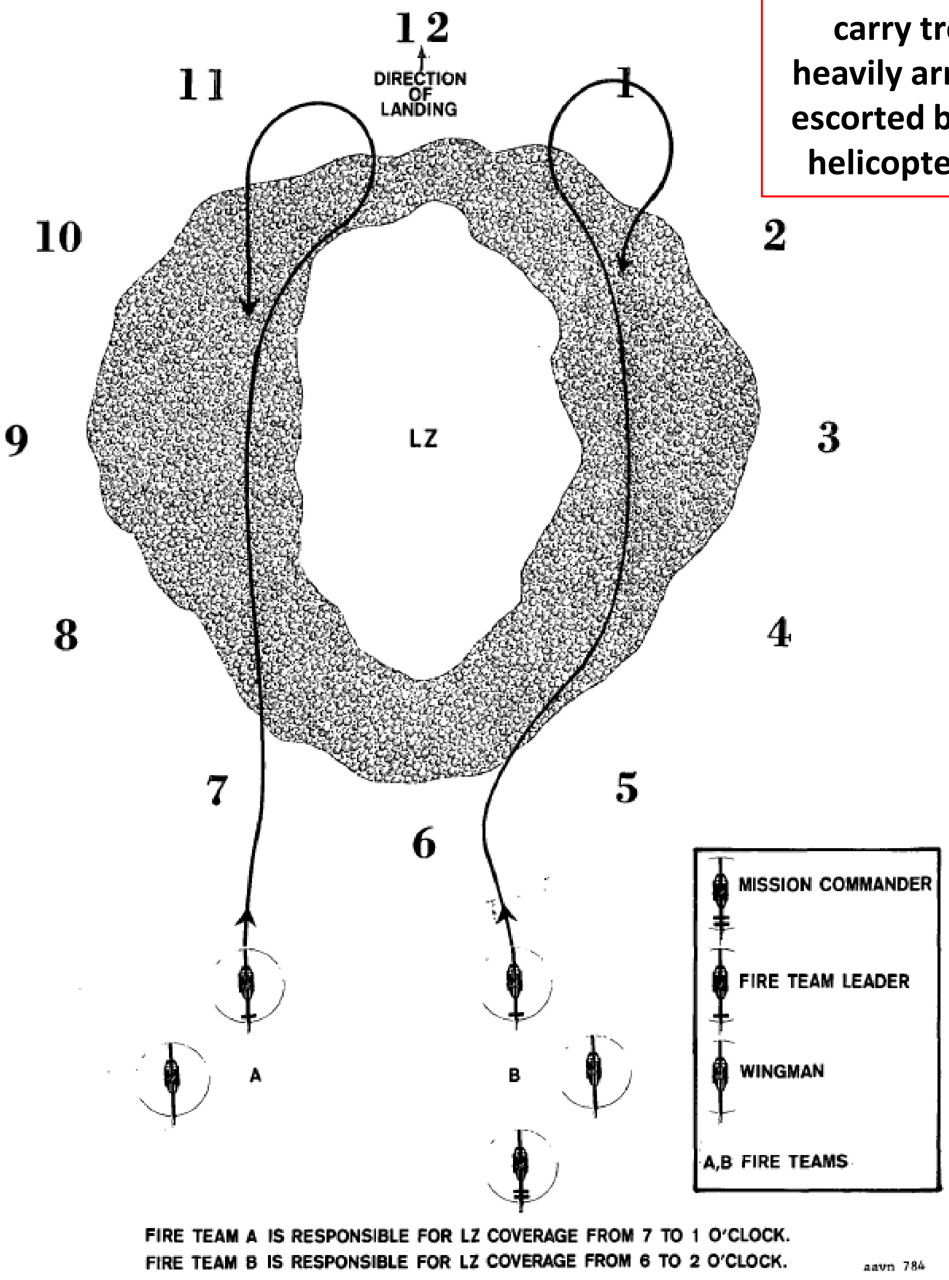


Figure 26. Double orbit of the landing zone.

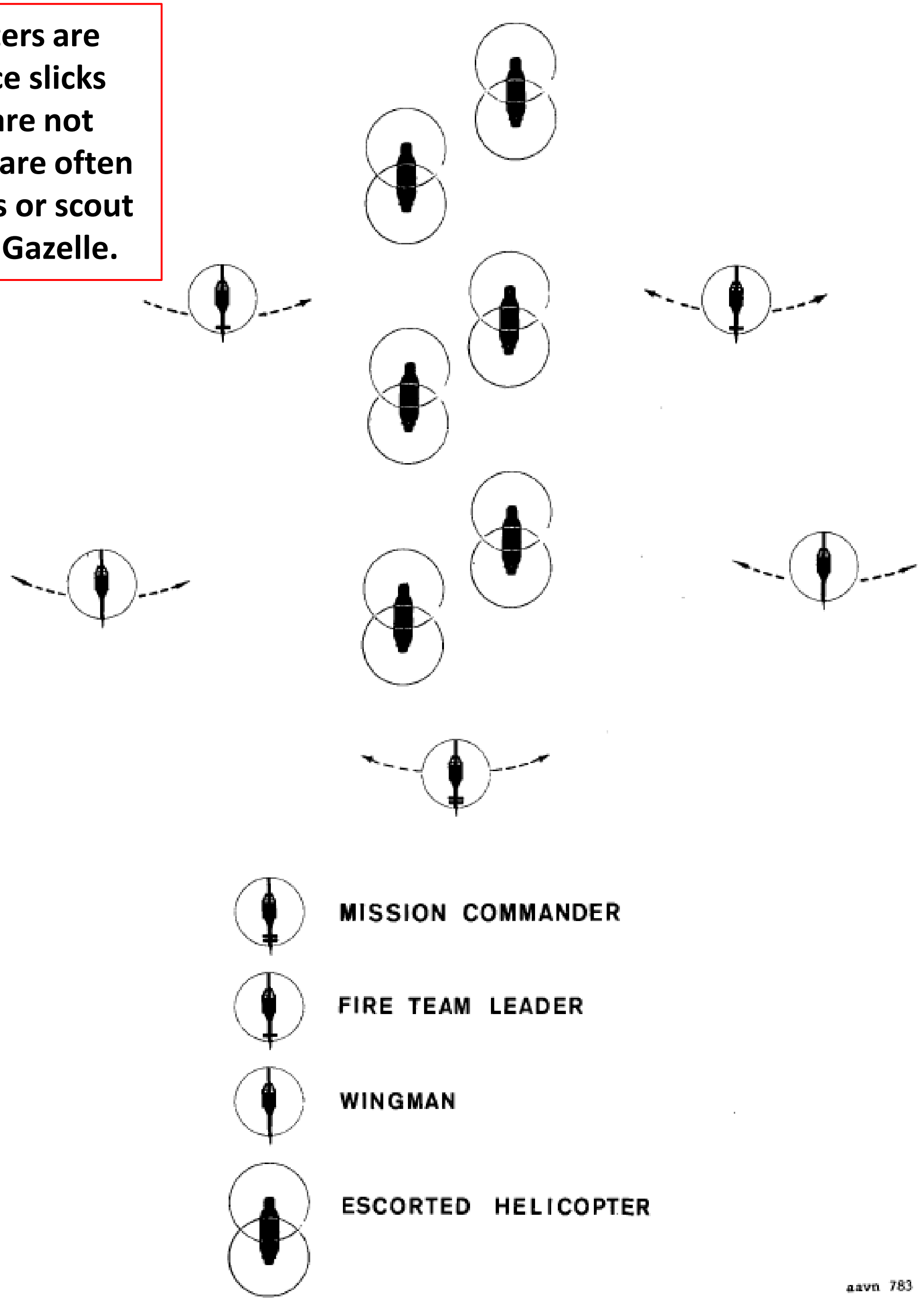


Figure 25. Escort formation at tree-top level or nap-of-the-earth.

ALWAYS PLAN YOUR APPROACH ROUTE CAREFULLY!

Use hills, buildings, trees… ANYTHING to avoid being detected.

GAZELLE MODEL VARIANTS: SA-342M VS SA-342L

There are a number of Gazelle variants. At the moment, the two main versions available are the SA-342M and L variants.

The **M** is equipped with an Astazou XIV M turboshaft engine and was intended mostly for the French ALAT (*Aviation Légère de l'Armée de Terre*, or Land Army Light Aviation). This variant is equipped with up to four HOT anti-tank missiles. Its Viviane camera allowed both day and night operations.

The **L** is a militarized version of the civilian SA-342J and is equipped with an Astazou XIV H turboshaft engine. It was built under license by the Yugoslavian aircraft manufacturer SOKO and the Arab British Helicopter Company (ABHCo). This variant is equipped with a 20 mm gun and a rocket pod. Its older Athos camera only allowed day operations.

The **MISTRAL** is a SA 342 L1 that was converted into an anti-air scout helicopter armed with four infrared AATCP (*Air-Air Très Courte Portée*, Air-to-Air Very Short Range) Mistral missiles build by MDBA. It is equipped with the same Athos camera used in the **L** variant.

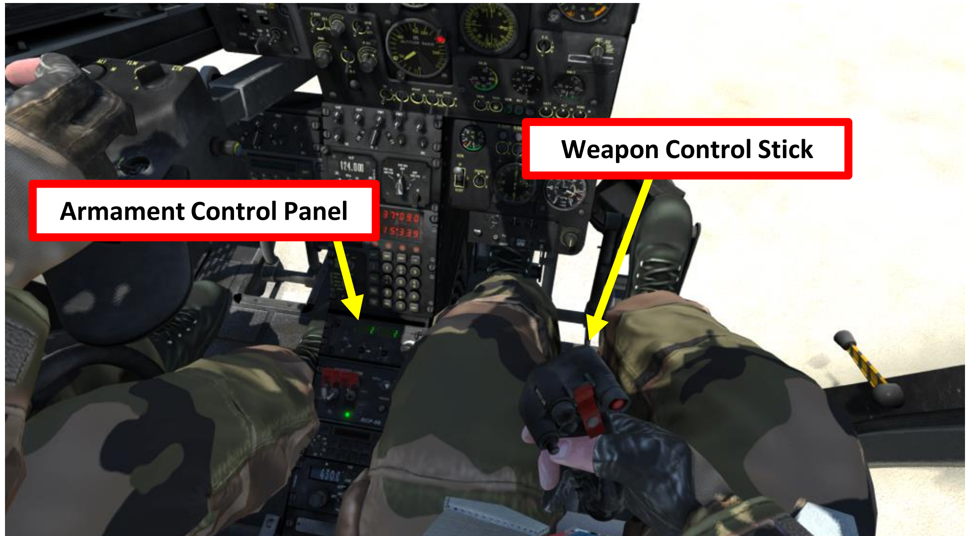
WEAPON CONTROLS

ARMAMENT OVERVIEW (SA-342L)

- The SA-342L Gazelle is equipped with a GIAT M621 20 mm gun (240 rounds) and a SNEB68 EAP Rocket pod, which are controlled by the pilot.
- Aiming is done manually.
- The Athos Sighting Camera is only used for reconnaissance. The Co-Pilot (Commander) has control over this TV and has a VCB (Video Control Box) at his disposal to find the target. The Weapon Control handle on the co-pilot's side is not functional in the SA-342L.

ARMAMENT OVERVIEW (SA-342 MISTRAL)

- The SA-342 MISTRAL Gazelle is equipped with four MBDA Mistral anti-air short-range heat-seeking missiles, which are controlled by the pilot only.
- Aiming is done manually.
- The Athos Sighting Camera is only used for reconnaissance. The Co-Pilot (Commander) has control over this TV and has a VCB (Video Control Box) at his disposal to find the target. The Weapon Control handle on the co-pilot’s side is not functional in the SA-342 MISTRAL.



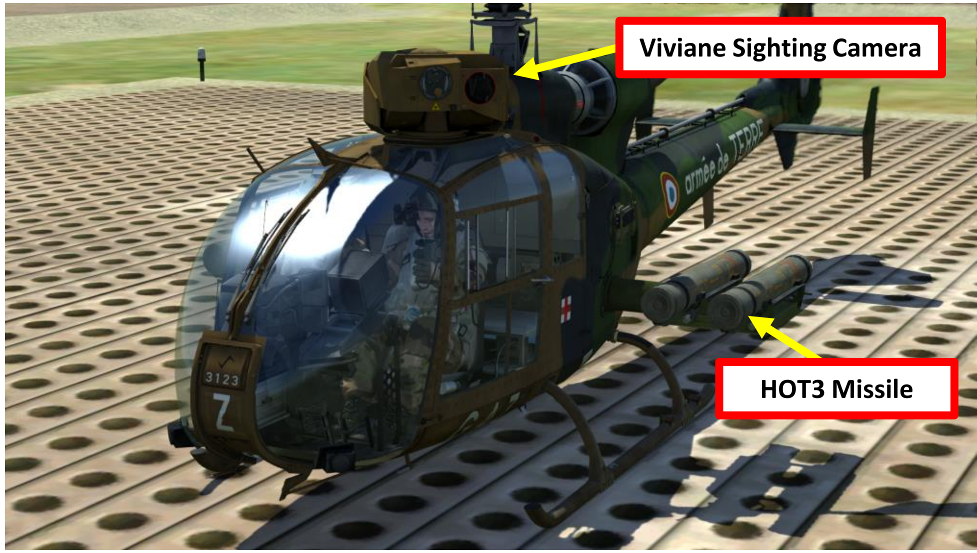
Athos Sighting Camera

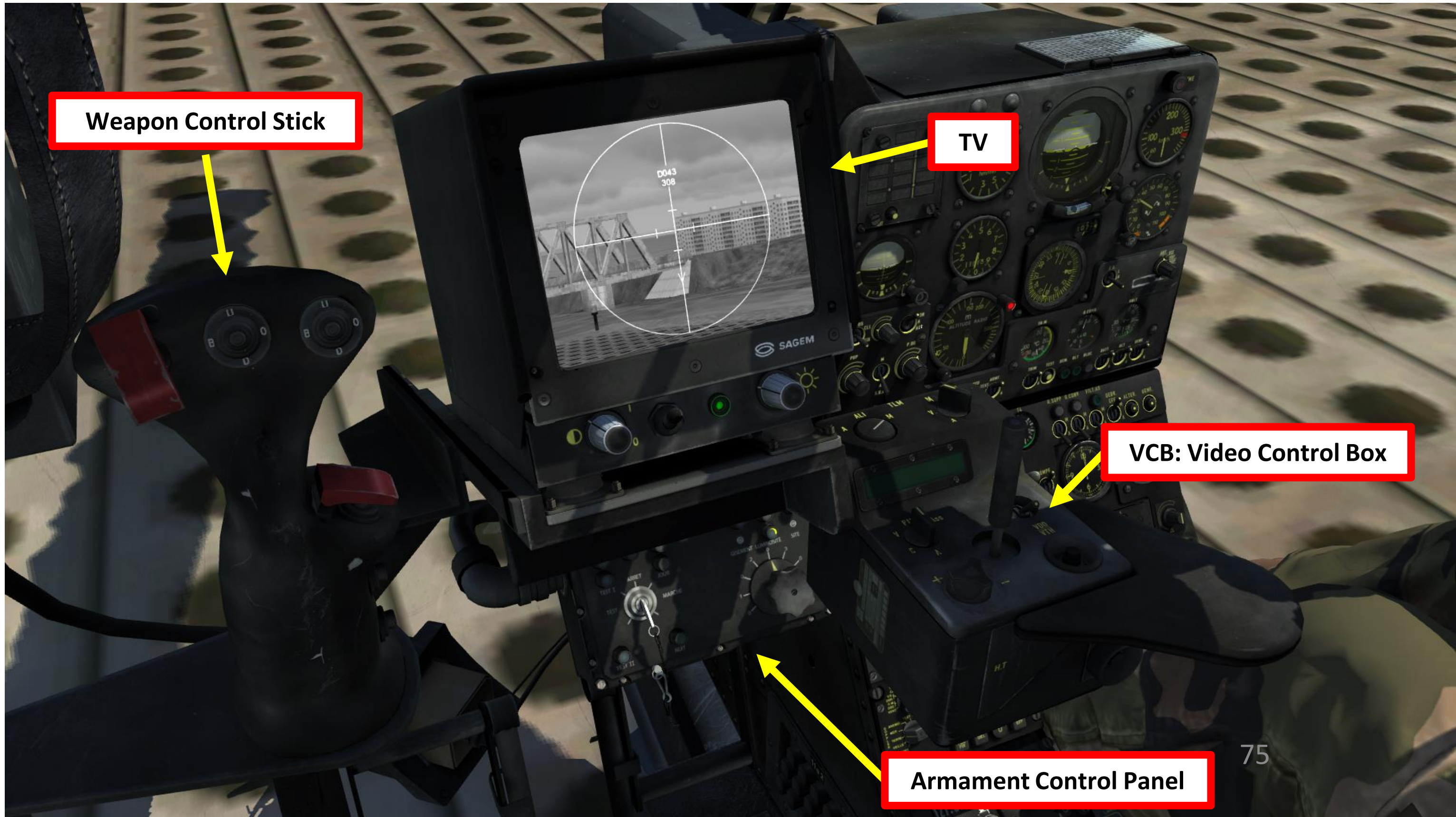
ARMAMENT OVERVIEW (SA-342M)

- The SA-342M Gazelle can be equipped with up to four HOT3 anti-tank missiles.
- These missiles are guided by the Viviane Sighting Camera.
- The Co-Pilot (Commander) has a TV, a weapon control stick and a VCB (Video Control Box) at his disposal to find the target, range it, lase it and launch a missile in its face.
- The following pages summarize how to prepare the Viviane system, how to operate it and how to use your missiles as efficiently as possible.

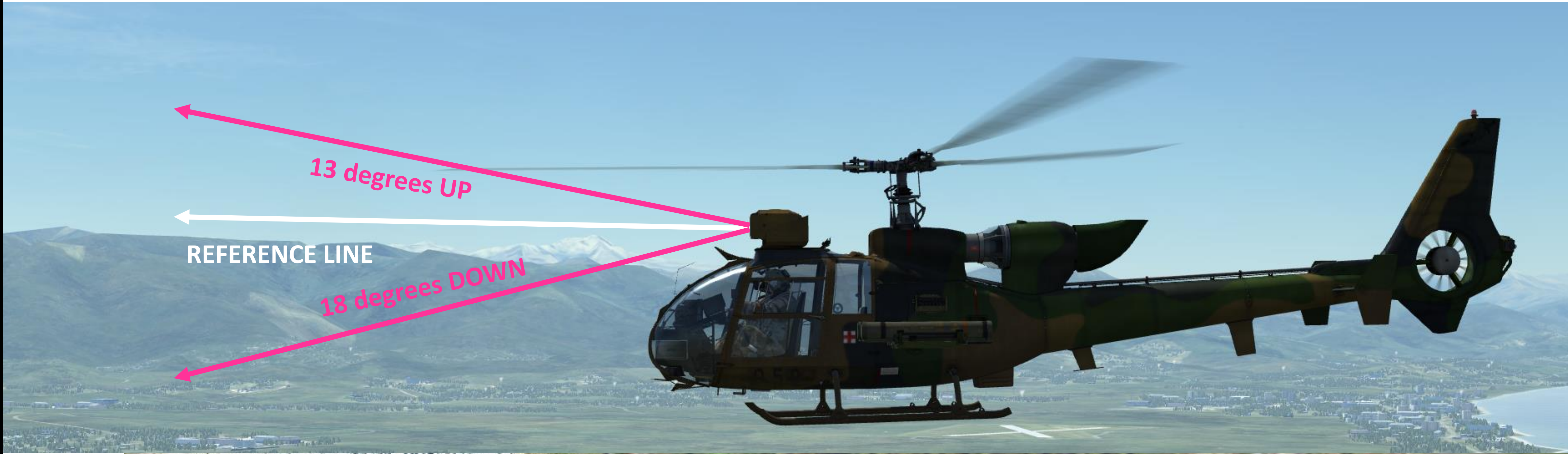
An missile launch procedure will generally go as follows:

1) Prepare TV equipment on the ground
2) Prepare missile equipment on the ground
3) Fly in the vicinity of target
4) Find a safe spot and engage auto-hover
5) Switch to co-pilot and find target using Viviane camera sight
6) Arm missile
7) Lase target (max range: 15 km)
8) Lock missile to laser designator
9) Launch missile (max range: 4.3 km)
10) Enjoy the fireworks

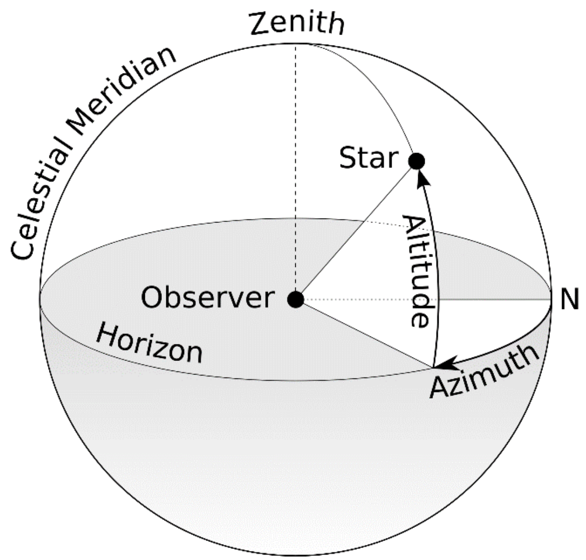


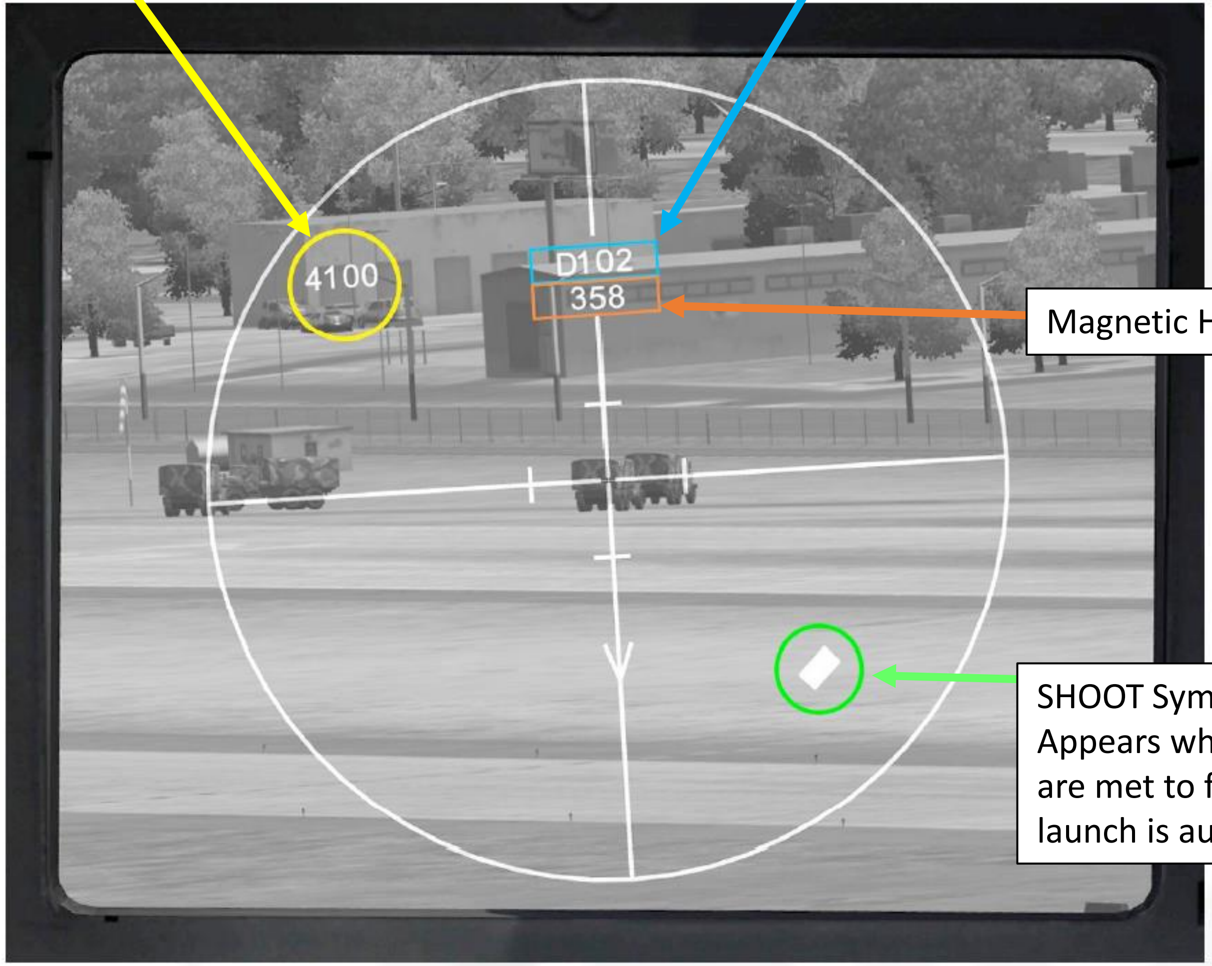


VIVIANE TV RANGE



VIVIANE TV SCREEN

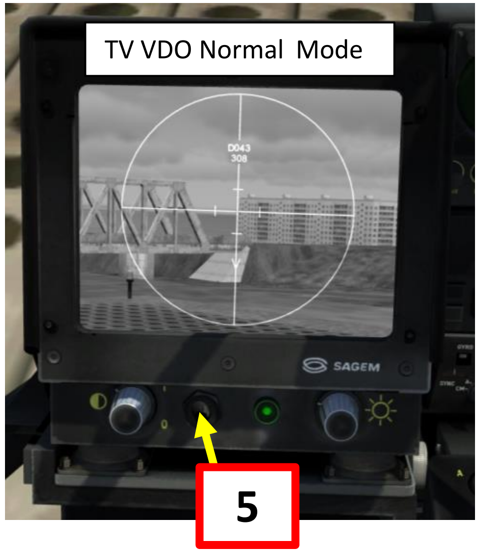


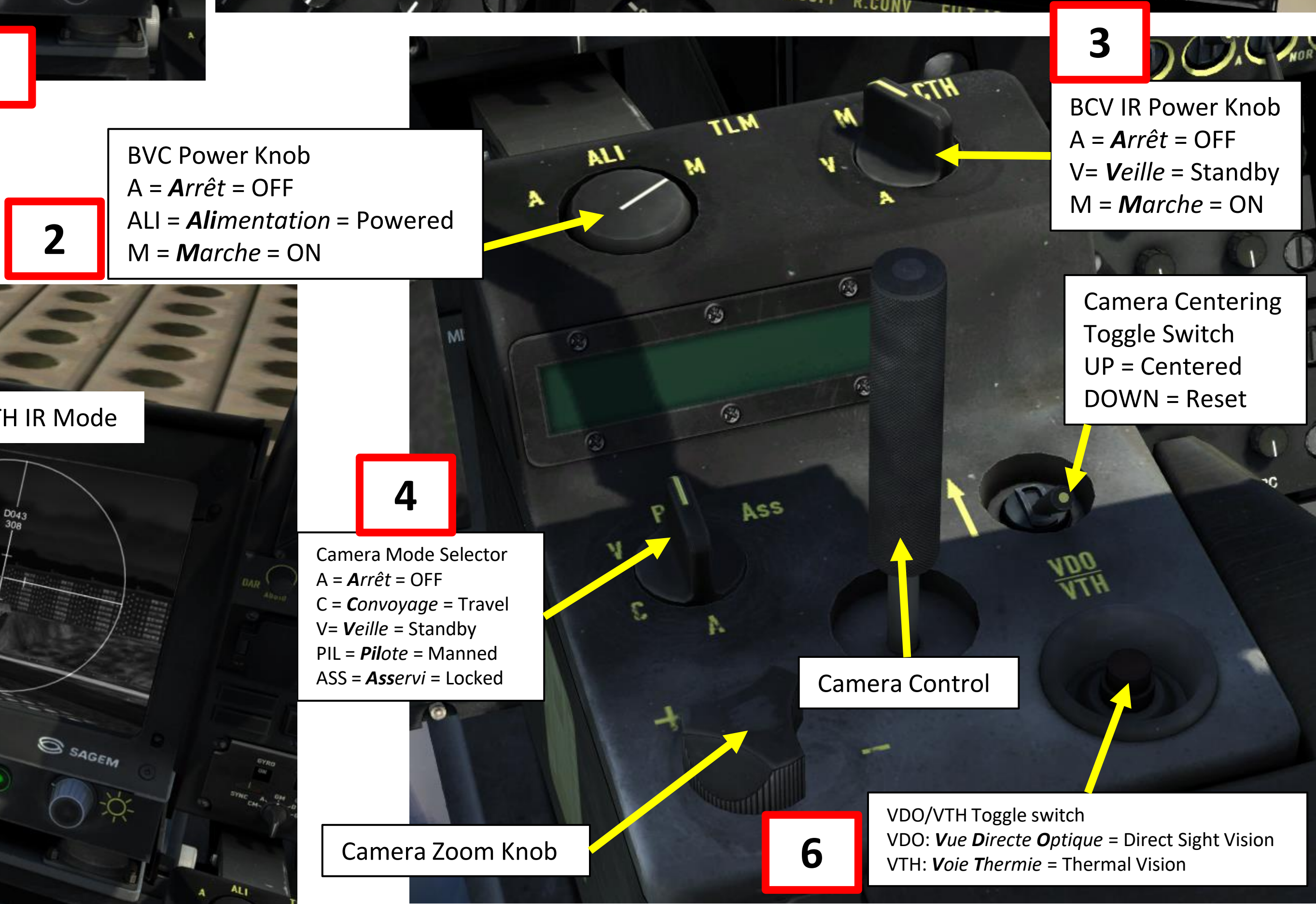


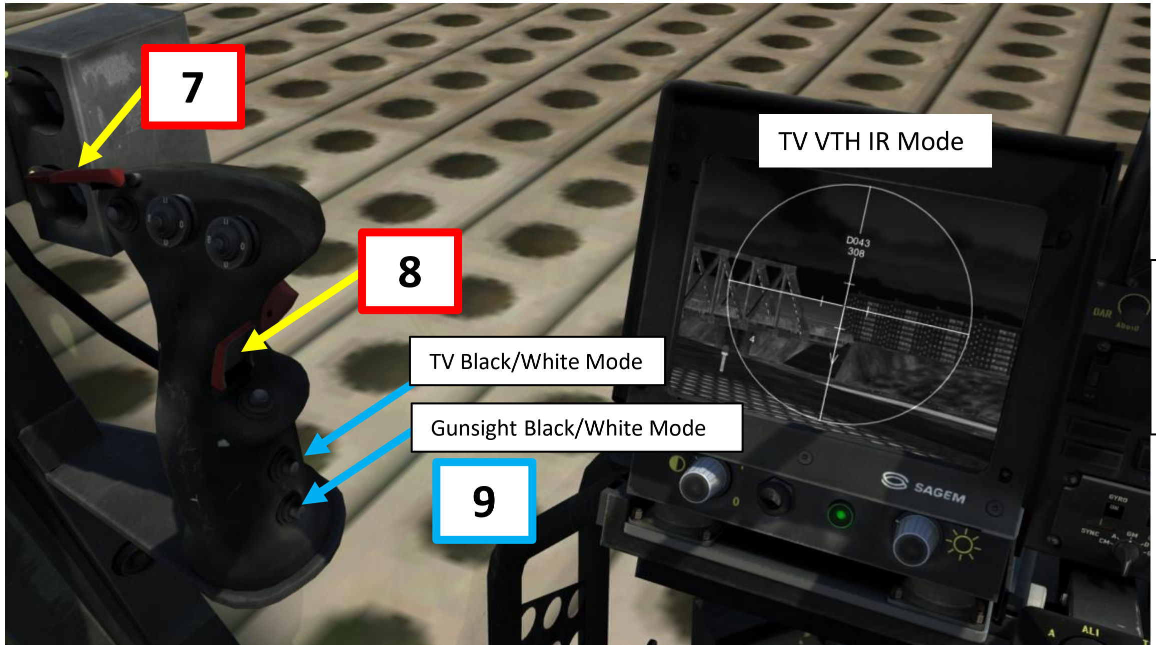
PREPARING ON THE GROUND

1) Set Weapon Arming Switch (***Armement***) to *MARCHE* (UP)
2) Set VDO (Vue Directe Optique) normal camera Power to *MARCHE*.
3) Set VTH (Voie Thermie) IR camera Power to *MARCHE.*

   Note: IR camera will take 3 minutes to cool down, which is why it is more practical to do it on the ground and be ready as soon as possible.
4) Set Camera Mode to PILOTE (manual control mode)
5) Turn ON (UP) TV power switch.
6) Select VDO or VTH mode as required.
7) Flip up cover switch of laser designator button
8) Flip up cover switch of missile launch button
9) Select appropriate Black/White TV and Gunsight Modes.

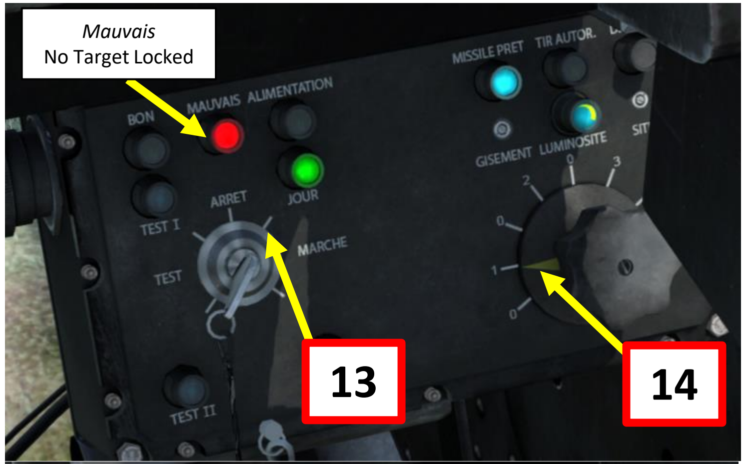


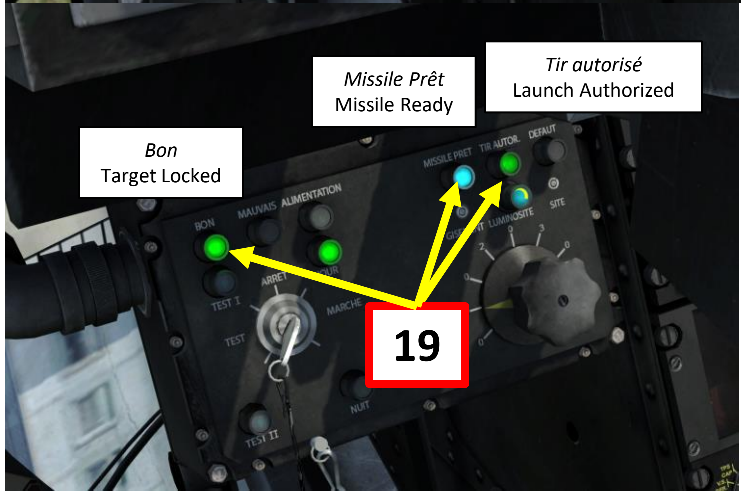


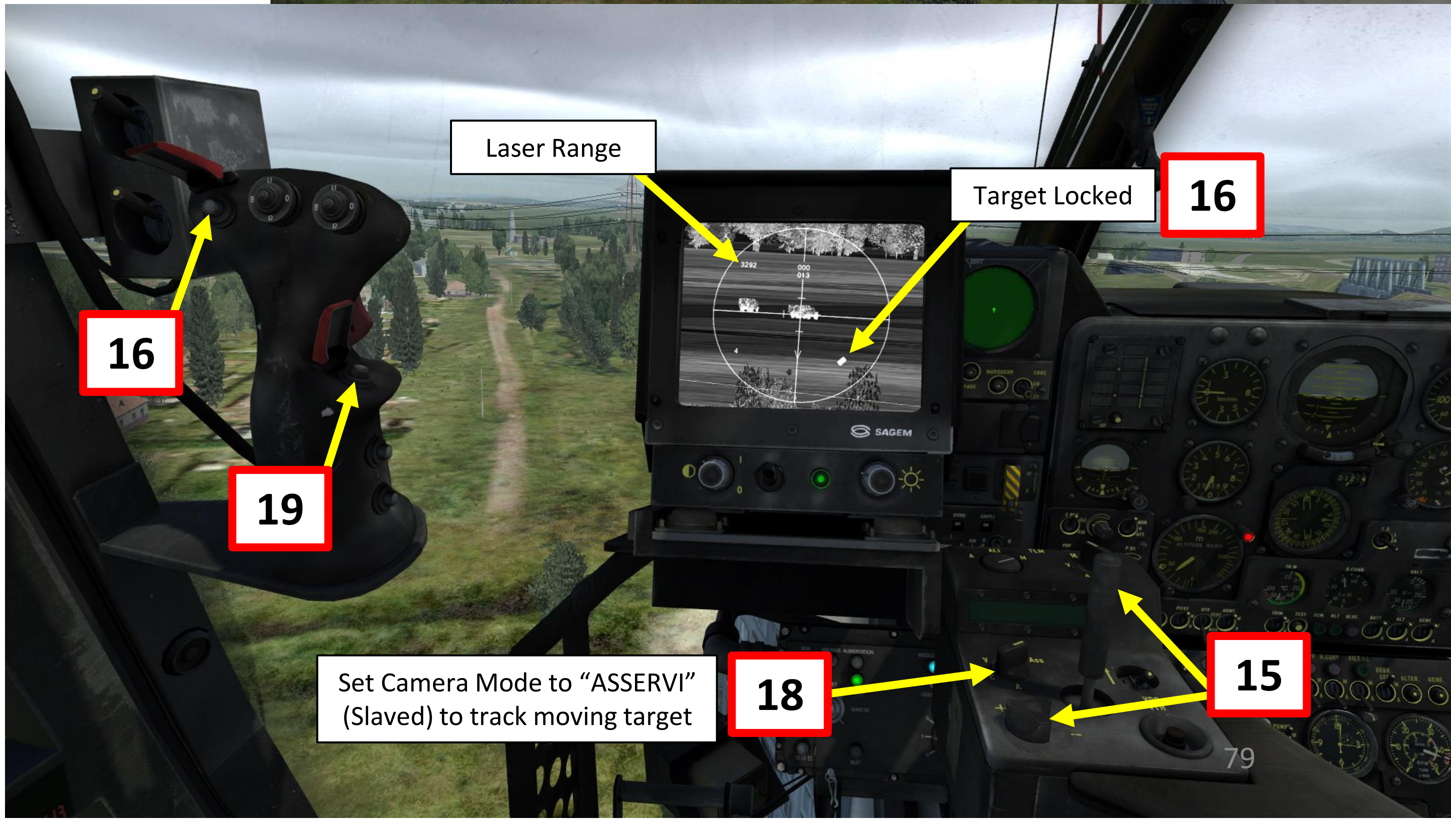


HOW TO USE HOT3 MISSILES (SA-342M)

10) Ensure all preparations on previous page are done.
11) Fly towards target and come to a hover from a concealed and safe position.
12) Engage auto-hover as explained in the AUTOPILOT & TRIM section.
13) Turn weapon key to either JOUR (Day) or NUIT (Night).
14) Select desired HOT3 station (1/2/3/4 = stations, 0 = safety)
15) Use TV slew controls (**; , . /**) and Zoom knob (**= -**) to find desired target.
16) Lase target to lock it and range it. A white rectangle will appear.
17) Press "Auto-Slave Toggle" ("E") on pilot's stick to automatically steer the helicopter to the slaved target you just lased.
18) Optional: set Camera to "ASS" (***Asservi*** = Slaved) to track target with camera.
19) If all launch parameters are met (range under 4300 m + target lased), missile launch is authorized (BON/OK lamp illuminated). Press "Missile Launch" button (Space).







HOW TO USE HOT3 MISSILES (SA-342M)

Tips & Tricks:

- Your missiles are very heavy. If you fire one and disengage auto-hover immediately, the helicopter will be increasingly difficult to stabilize since it will be unbalanced. I suggest that you fire two missiles (1 from each side) before disengaging auto-hover so you remain balanced.
- Tanks are quite deadly, even at your maximum missile range. Proceed with extreme caution.
- Concealment and surprise are key if you are to survive your missile launch. Use them to your advantage.
- Make sure you study the terrain carefully before going into position. Flying low at tree-top level is a must if you want to avoid detection.

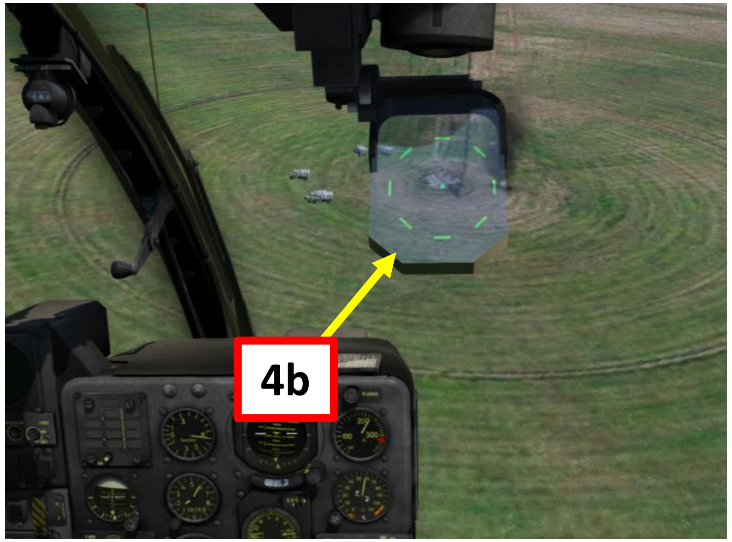
The following conditions need to be met to have a valid HOT3 firing solution:

- One missile must be selected
- The relative angle between the camera and the aircraft nose must be between G003 and D003 (3 degrees left or right)
- Master Arm switch must be ON
- Weapon Key must be on « MARCHE » (ON) position

HOW TO USE THE MACHINEGUN (SA-342L)

1) Set Weapon Arming Switch (***Armement***) to *MARCHE* (UP)
2) Set Armament Panel Power switch to *MARCHE* (MIDDLE position)
3) Flip up safety cover and set right pylon MASTER ARM switch to ARM (FWD)
4) Click on gunsight to deploy it.
5) Press the "FIRE GUNS OR ROCKETS" button on your cyclic to fire guns.

Note: If both right and left pylon switches are armed simultaneously, the guns will take precedence (meaning that the FIRE GUNS button will fire guns only).



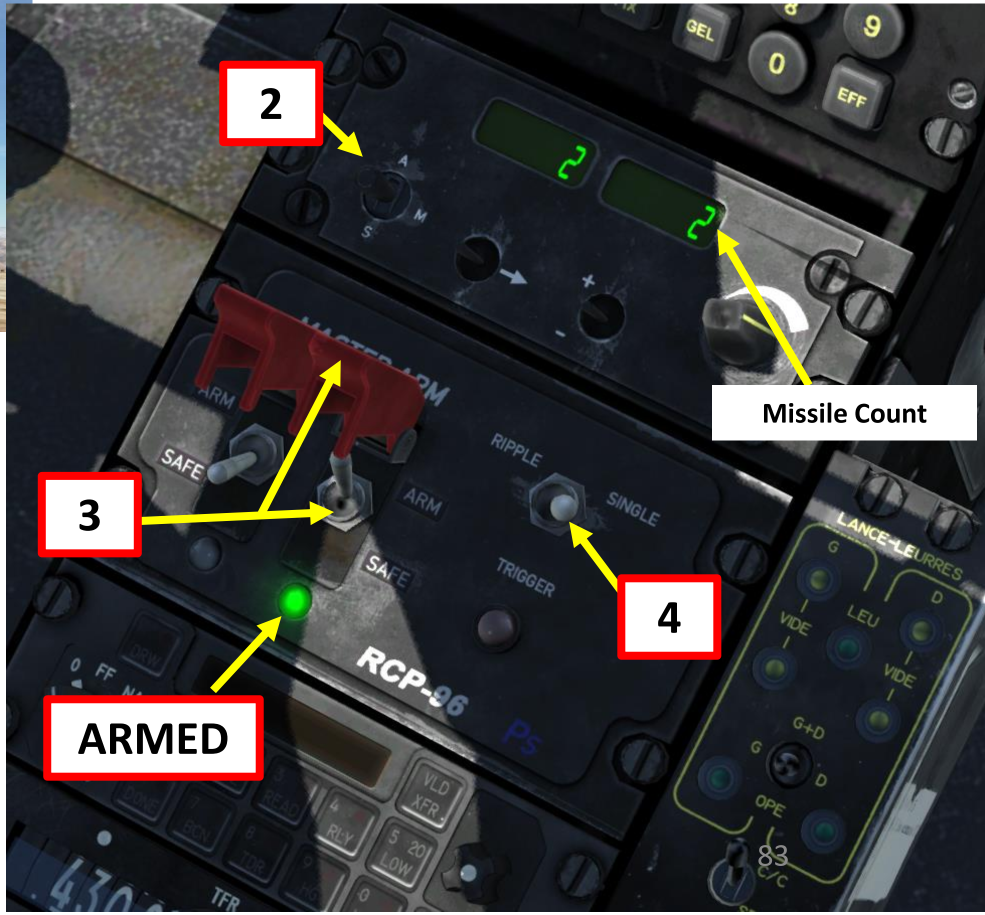
HOW TO USE ROCKETS (SA-342L)

1) Set Weapon Arming Switch (***Armement***) to ***MARCHE*** (UP)
2) Set Armament Panel Power switch to ***MARCHE*** (MIDDLE position)
3) Flip up safety cover and set left pylon MASTER ARM switch to ARM (FWD)
4) Select RIPPLE or SINGLE rocket firing mode
5) Click on gunsight to deploy it.
6) Press the "FIRE GUNS OR ROCKETS" button on your cyclic to fire guns.

Note: If both right and left pylon switches are armed simultaneously, the guns will take precedence (meaning that the FIRE GUNS button will fire guns only).

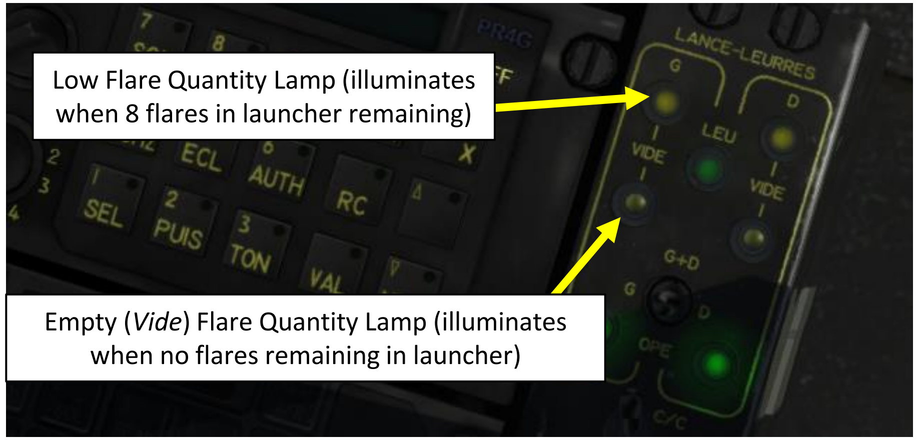
HOW TO USE MISTRAL AIR-TO-AIR MISSILES (SA-342 MISTRAL)

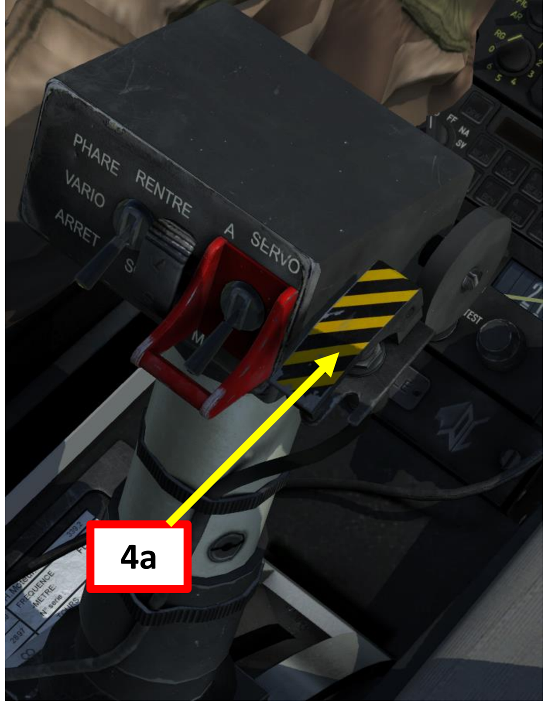
1) Set Weapon Arming Switch (***Armement***) to ***MARCHE*** (UP)
2) Set Armament Panel Power switch to ***MARCHE*** (MIDDLE position)
3) Flip up safety cover and set left pylon MASTER ARM switch to ARM (FWD)
4) Select SINGLE missile firing mode
5) Click on gunsight to deploy it.
6) Once you hear a high-pitched missile lock tone, press the “FIRE GUNS OR ROCKETS” button on your cyclic to fire guns once . Typical firing ranges are at about 0.5 nm.

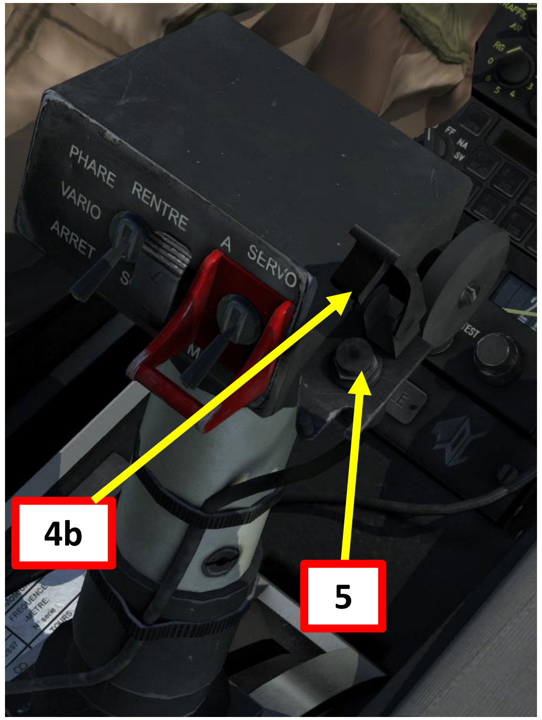


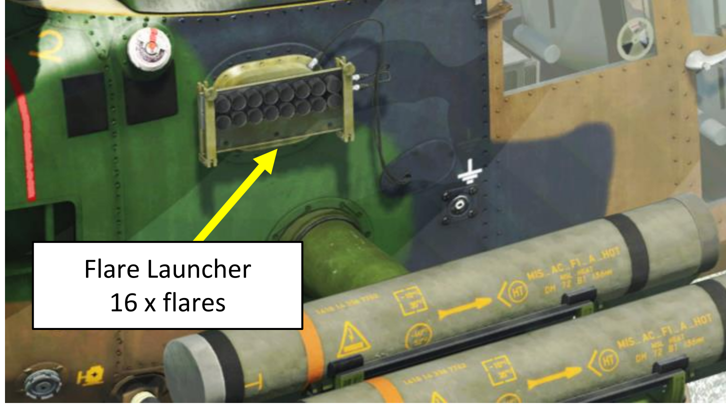
HOW TO DEPLOY FLARES

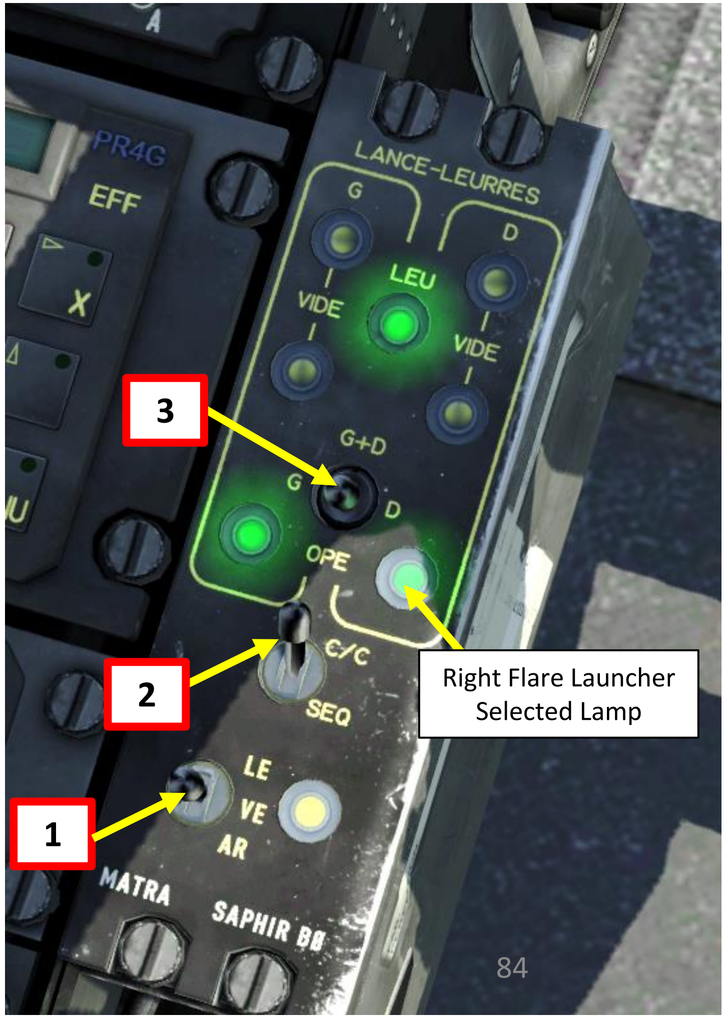
1) Set your Flare Dispenser (*Lance-Leurres*) power switch to either LE (**Le**nt = Slow) or VE (**Vi**te = Fast)
2) Set your Flare Dispenser Launch Quantity to either C/C (Single) or SEQ (Sequence).
3) Select Flare Dispenser (G = Gauche = Left, D = Droite = Right, G+D = BOTH)
4) Flare Dispenser Cover Switch - UP
5) Press the “Start Dispensing” button (“Insert” key) to launch flares.











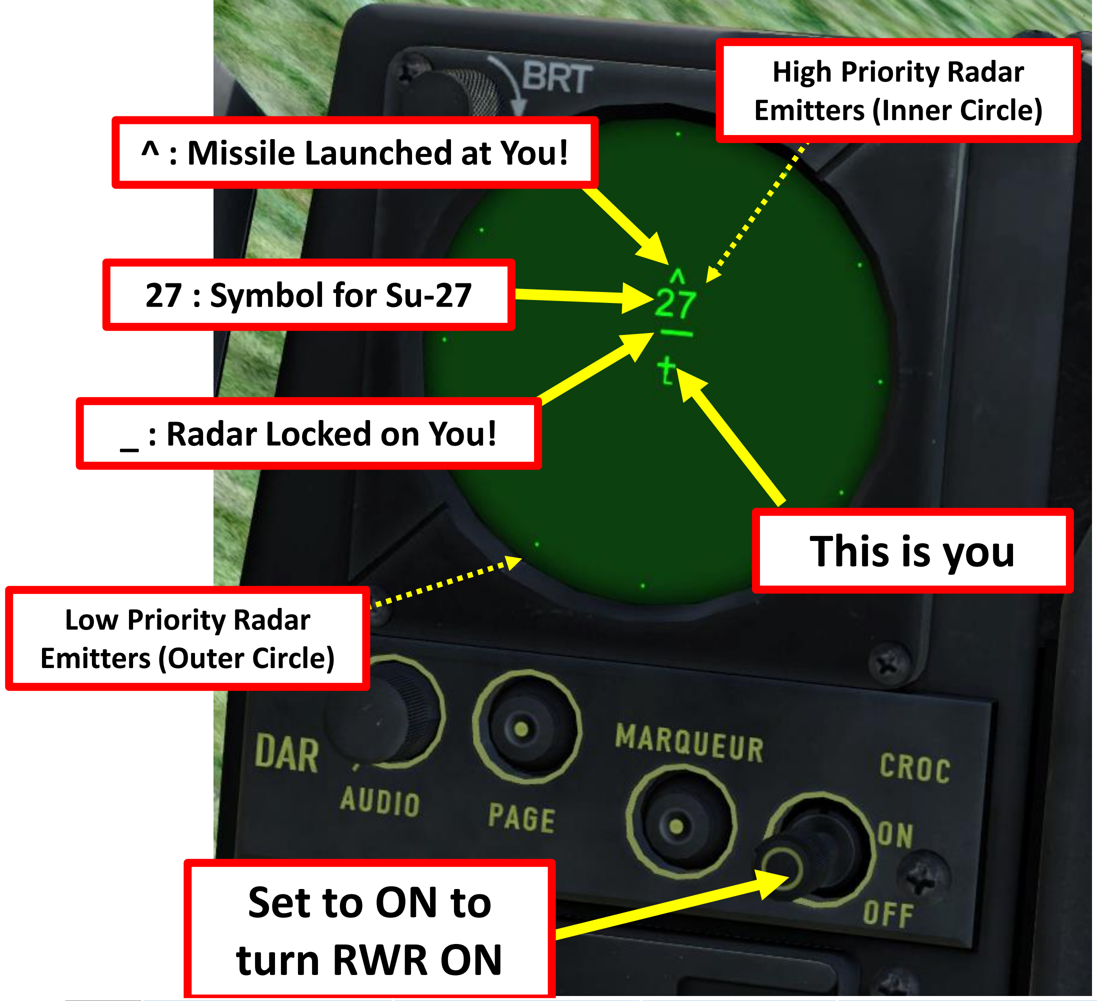
DRAX33 RWR – RADAR WARNING RECEIVER

AIR UNITS

Symbol	Meaning	Symbol	Meaning
14	F-14	21	MiG-21
15	F-15	23	MiG-23
16	F-16	25	MiG-25
18	F-18	27	Su-27
F2	Tornado	29	MiG-29
F5	F-5	30	Su-30
M2	Mirage 2000	31	MiG-31
C1	C-101	33	Su-33
86	F-86	34	Su-34
E2	E-2	50	A-50
E3	E-3		

GROUND UNITS

Symbol	Meaning	Symbol	Meaning
S	EWR, KP, SA	DE	Dog Ear
BB	S-300PS	RO	Roland
SD	BUK	PT	Patriot
06	KUB	HK/HA	Hawk
R-15	Tor	S6	Tunguska
A	Shilka, Gepard, Vulcan		



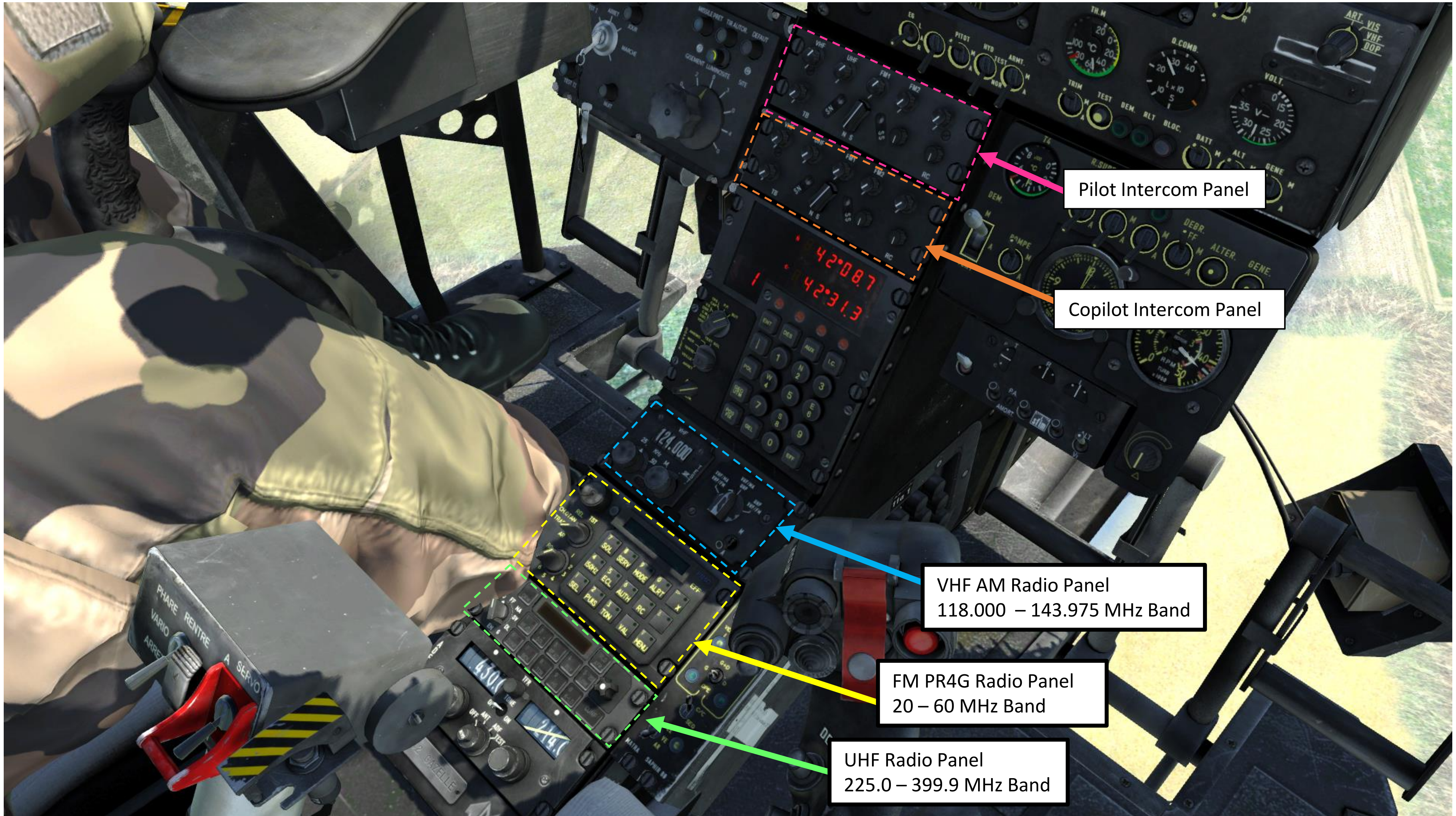
SHIPS

Symbol	Meaning	Symbol	Meaning
SW	Kuznetsov	HP	Albatros
48	Vinson	TP	Rezky, Neutrashimy
T2	Moscow	PS	Molniya
49	Perry	HN	Skory
AE	Ticonteroga	U	Unknown

You have three radios on your central console.

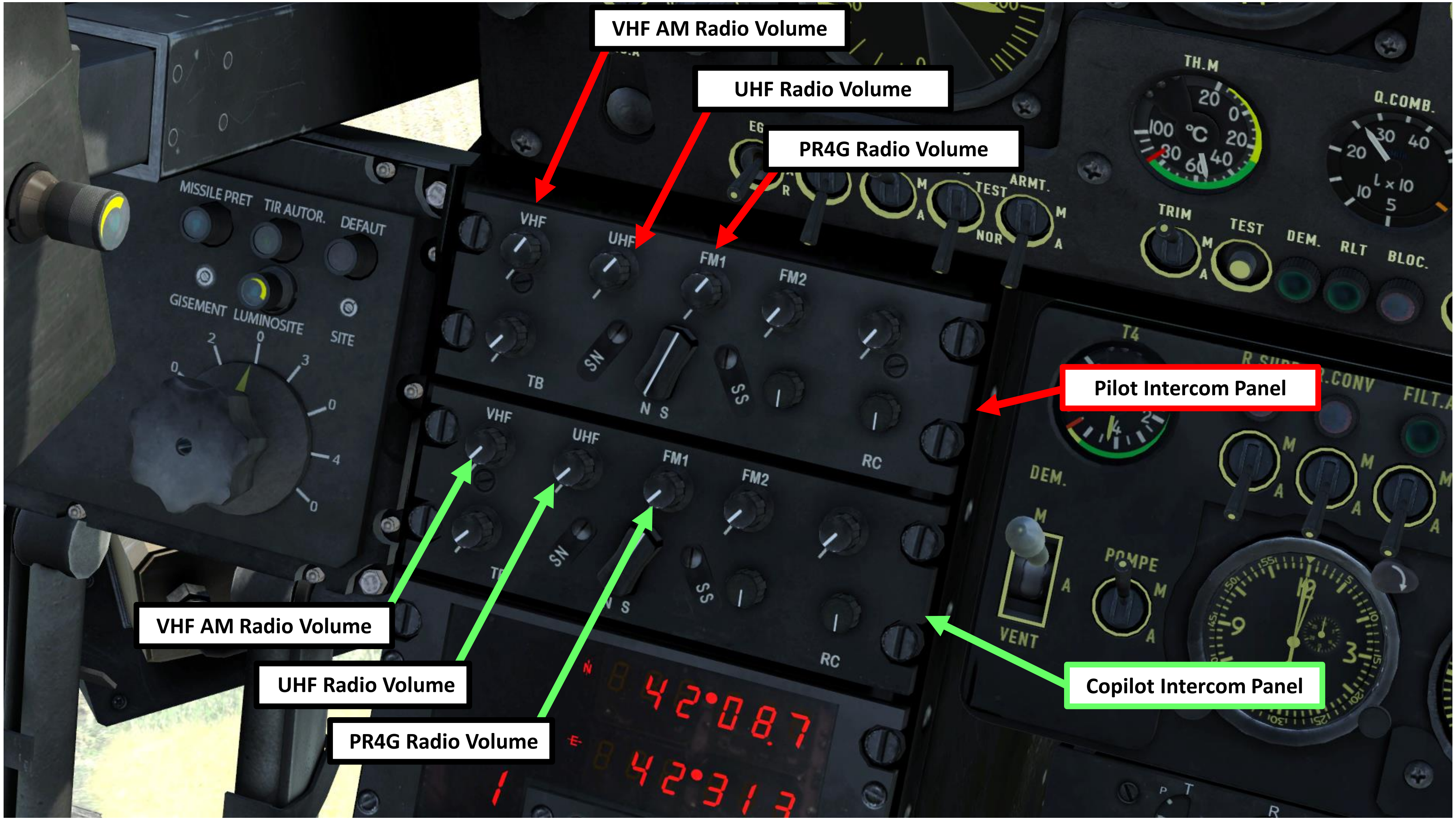
- The UHF radio set is used for Air-to-Air primary communications.
- The VHF AM radio set is used for Air-to-Air alternate communications (and tower).
- The FM radio set is used for internal flight communications between crew members.
- The Pilot and Copilot Intercom Panels allow you to control the volume of various radio sets.

Most of the time, you will only be using the UHF radio since in DCS you don't really need to communicate with your other crew member.



Intercom Panel

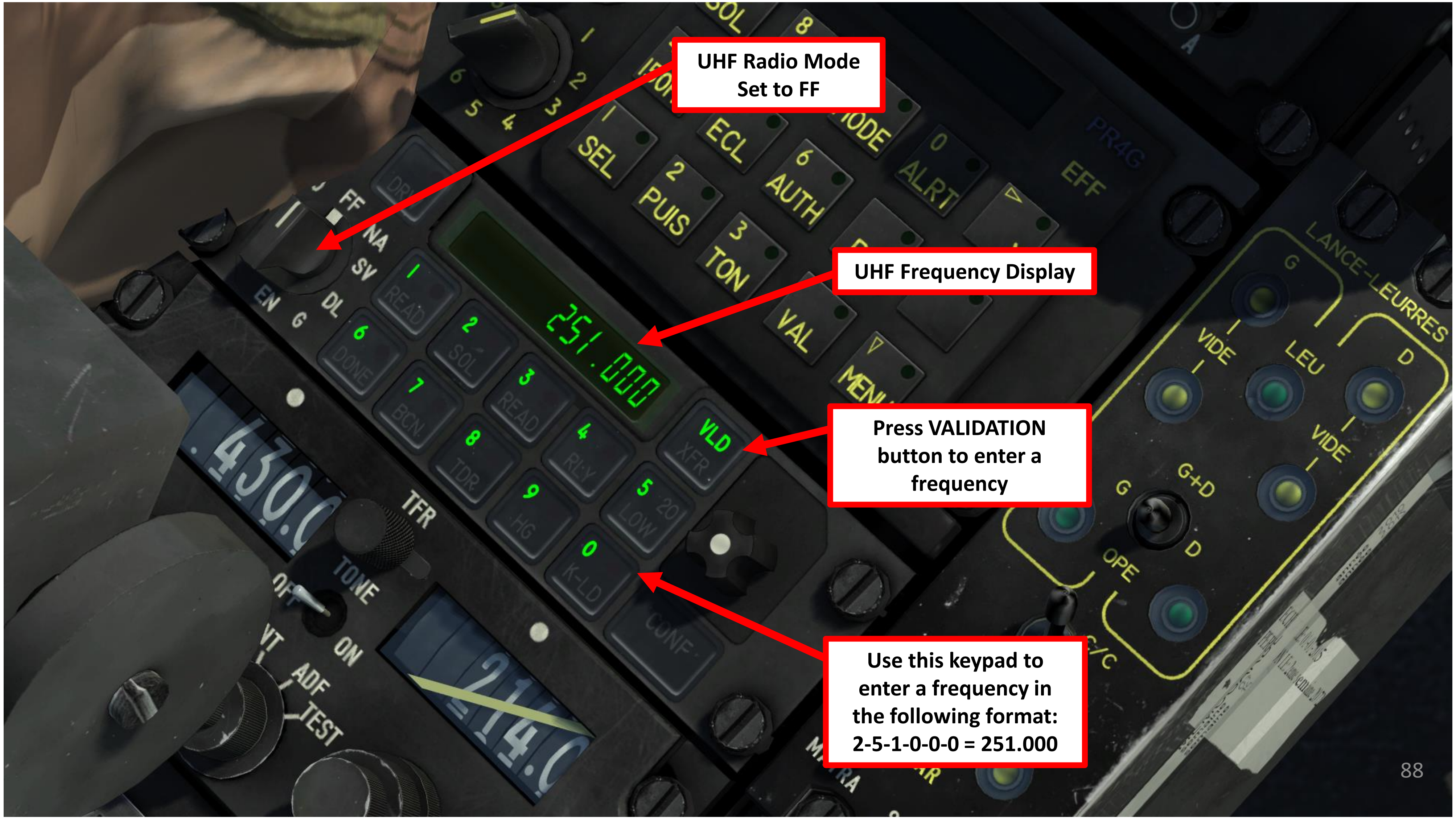
The intercom panel allows you to set the volume for each radio.



UHF Radio Set Panel

UHF Radio Panel
225.0 – 399.9 MHz Band

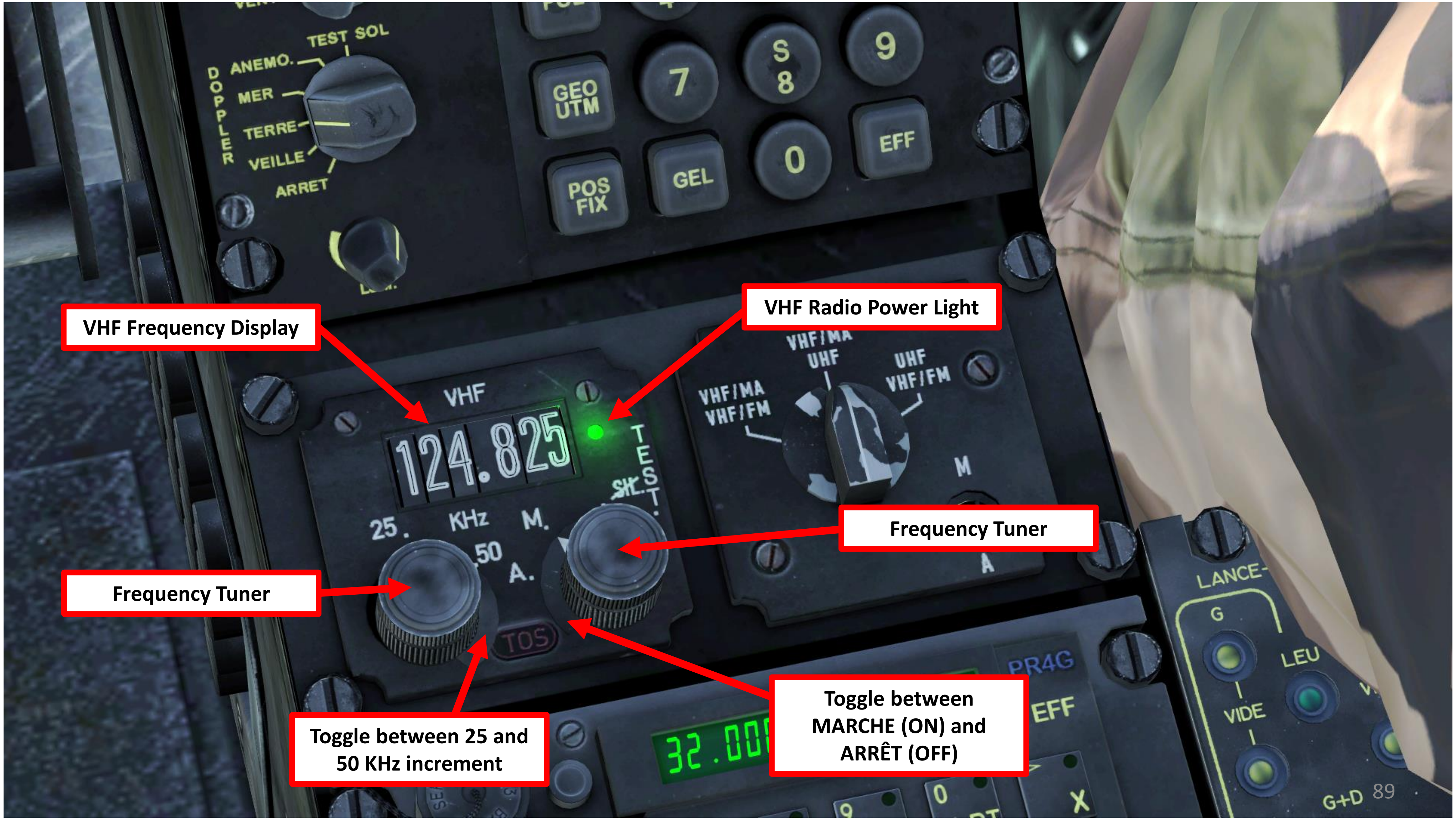
- Turn ON UHF radio set by setting the Power knob to FF.
- Change Frequency by setting the frequency in the format described below and by pressing VLD (Validation) button.
- Transmit by pressing “/”



VHF AM Radio Set Panel

VHF AM Radio Panel
118.000 – 143.975 MHz Band

- Turn ON VHF AM radio set by setting the Power knob to *MARCHE* (ON).
- Transmit by pressing "/"

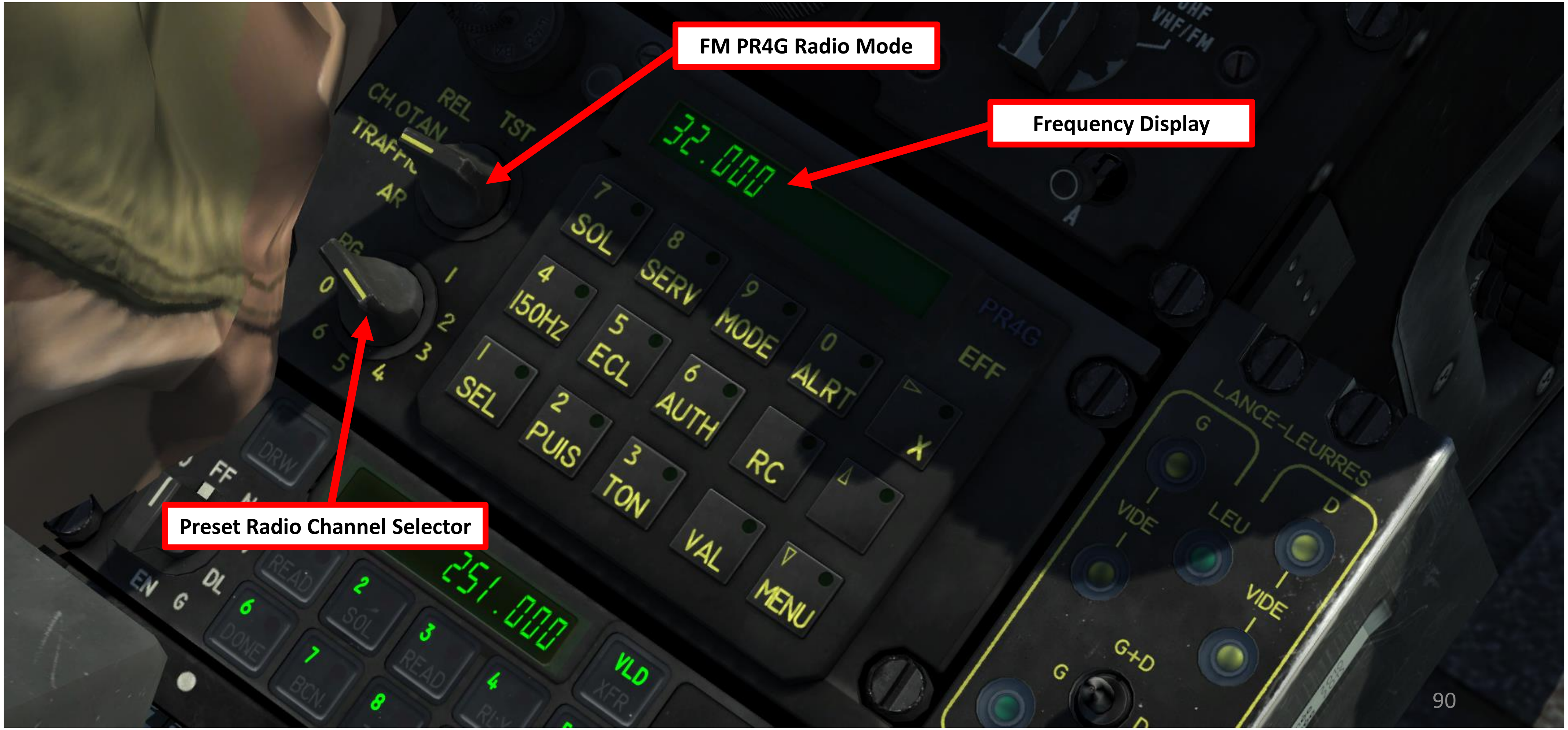


FM PR4G Radio Set Panel

FM PR4G Radio Panel
20 – 60 MHz Band

At the moment, the PR4G radio functionalities are classified and simplified in DCS. At the moment, the only frequencies you can use are the PRESET frequencies defined throughout the mission editor. At the moment, frequencies cannot be entered manually.

- Set the FM radio mode to TRAFFIC.
- Select which preset channel you want to transmit on.
- Transmit by pressing "/"



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

NAVIGATION TUTORIAL STRUCTURE

The navigation tutorial chapter will be divided in the two following sub-sections:

I – INTRODUCTION TO NAVIGATION

II – NADIR INTRODUCTION

III – NADIR NAVIGATION TUTORIAL

IV – NDB AND VOR STATIONS – HOW TO FIND THEM?

V – ADF SYSTEM TUTORIAL

NADIR Tutorials by John

Part 0 - Overview: https://www.youtube.com/watch?v=6HDRPoeppWY
Part 1 - Introduction: https://www.youtube.com/watch?v=SZuJg_M82uE
Part 2 –Navigation: https://www.youtube.com/watch?v=Tz4Y4qJTxvk
Part 3 - Handling Waypoints: https://www.youtube.com/watch?v=tcZTqb-gCoE
Part 4 –Other Functionalities: https://www.youtube.com/watch?v=AtdARMcRuqE

ADF Tutorial by Bunyap

Tutorial - https://www.youtube.com/watch?v=0gz26R9Qg0Y

I - INTRODUCTION TO RADIO NAVIGATION

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.

- The Gazelle can navigate using the following equipment:
  - **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.
  - **NADIR navigation set (NADIR panel):** you can track (manually entered) waypoints with the NADIR, which will give you a direction AND a range to follow. The NADIR system is an integrated navigation system that provides information coming from a Doppler sensor, gyros, airspeed sensors, etc. The NADIR can stock a total of 9 waypoints. However, you can modify them as you please.

II - INTRODUCTION TO THE NADIR SYSTEM

Note: If a mission editor has an ounce of common sense and feels merciful, your waypoints will already be "preloaded" in your NADIR if this option is ticked in your SPECIAL OPTIONS tab.

To start the NADIR:

1) Set the NADIR Mode to VEILLE (Standby) and the NADIR Parameter to BUT (Waypoint). An automated test will run.
2) AIR will disappear after 40 s, PANNE and ERR NAV will disappear after 70 s.
3) Set NADIR Mode to TERRE (Ground).
4) Once NADIR is started, we can select what we want to monitor.

1

Set Parameter to BUT (Waypoint)

Set Mode to VEILLE (STANDBY)

NADIR NOT READY

NADIR Parameter Selector
Vent = Wind
CM DEC = Magnetic Heading – Declination
VS DER = *Vitesse Sol* = Ground Speed – Deviation
Temps Cap = Calculated Time – Heading
PP = ***Position Présente*** = Current Position
BUT = Waypoint

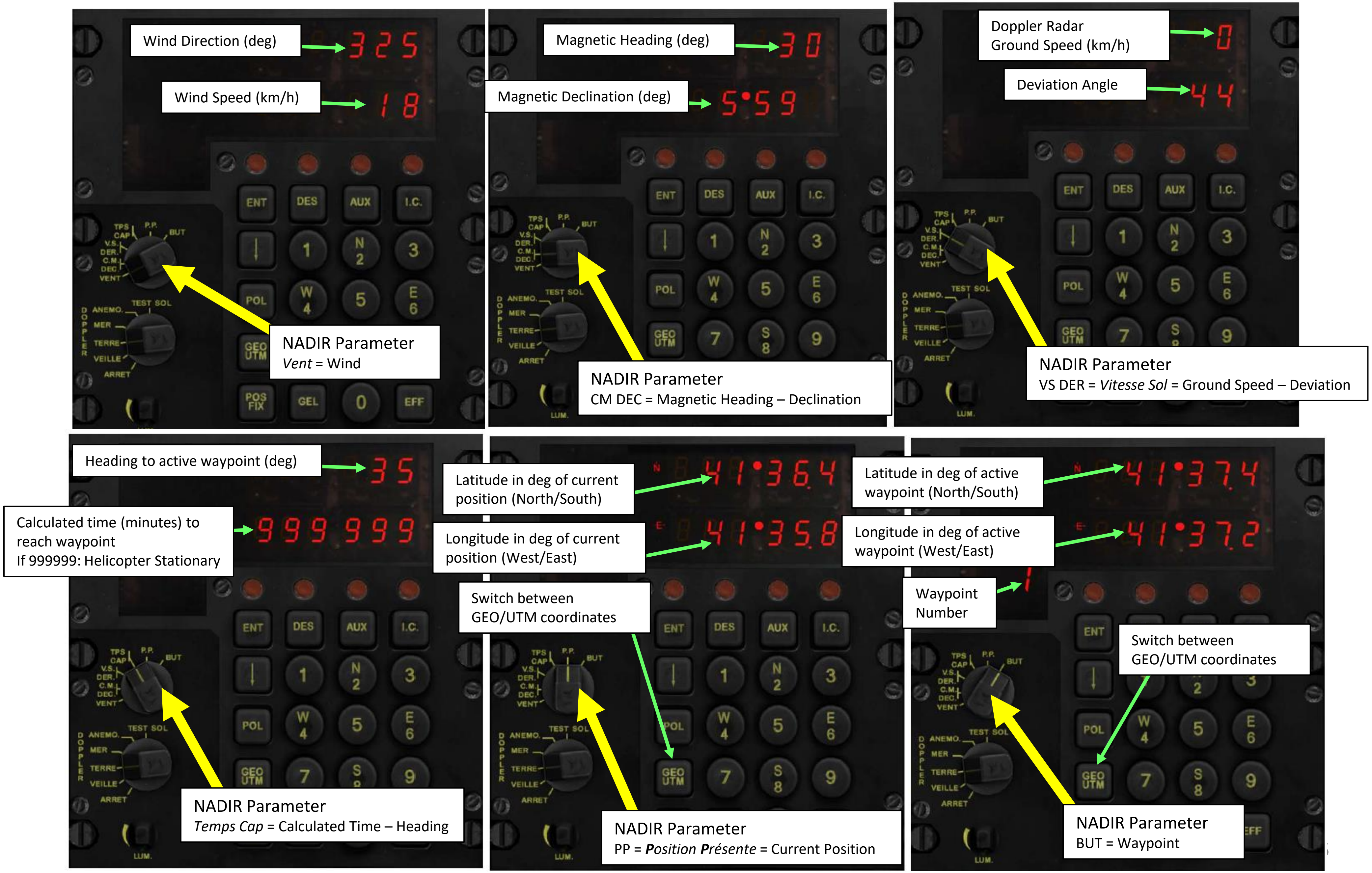
2

NADIR READY

NADIR Mode Selector
Arrêt = OFF
Veille = Standby
Terre = Ground
Mer = Sea
Anemomètre = Airspeed Sensor
Test Sol = Ground Test

3

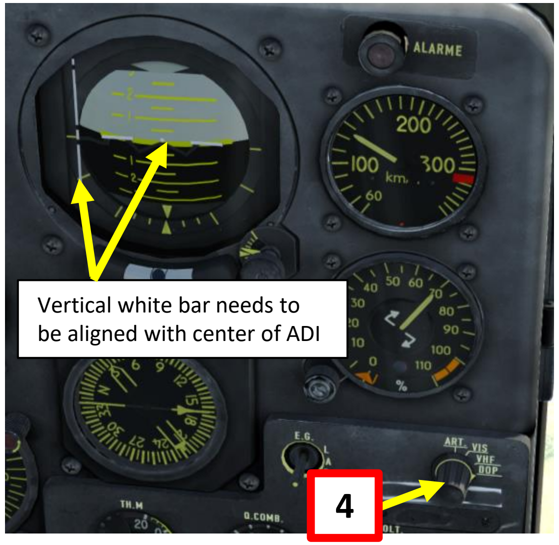
II - INTRODUCTION TO THE NADIR SYSTEM



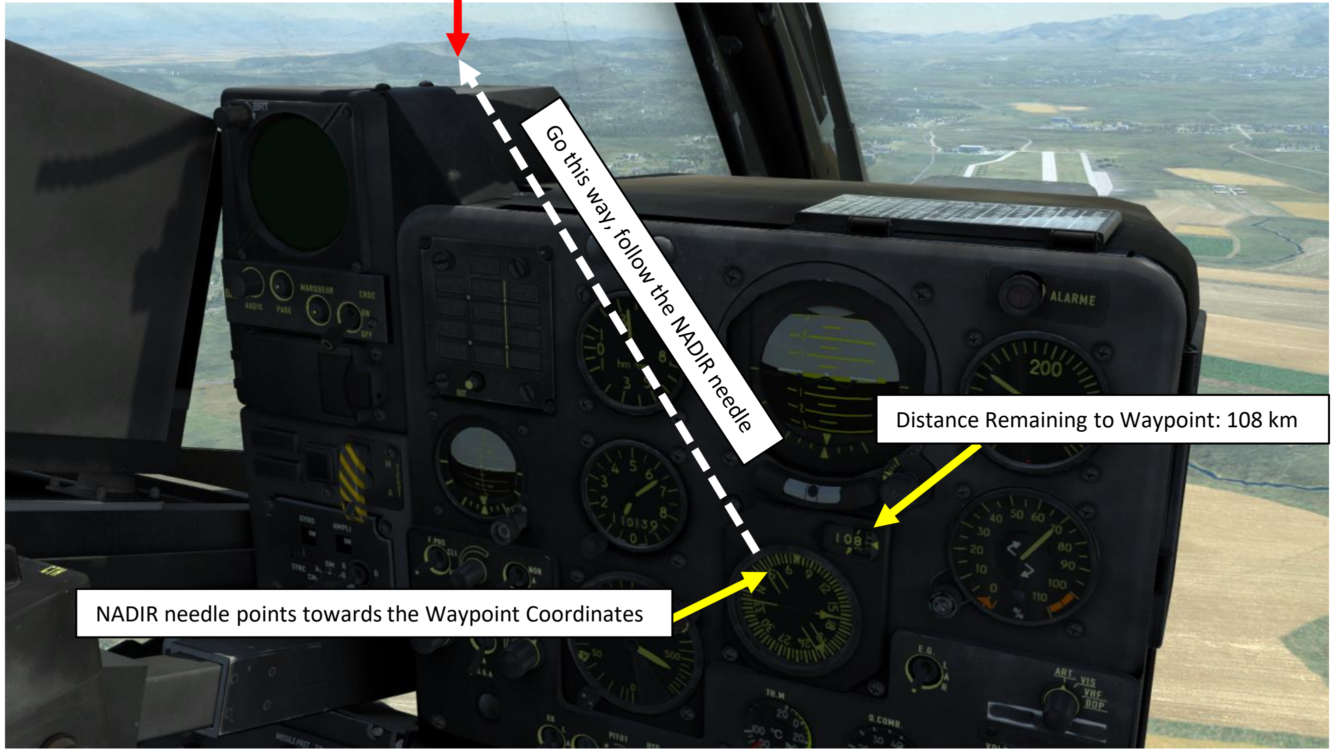
III – NADIR SYSTEM TUTORIAL

TUTORIAL 1 – HOW TO SELECT AND TRACK A BUT (WAYPOINT)

1) Select TERRE (Ground) NADIR Mode.
2) Select BUT (Waypoint) NADIR Parameter.
3) Select Waypoint Number on the keyboard.
4) Follow pointy end of NADIR needle on NADIR indicator.
5) Optional: Set ADI (Attitude Director Indicator) mode to “DOPPLER” to track the signal on the ADI as well.



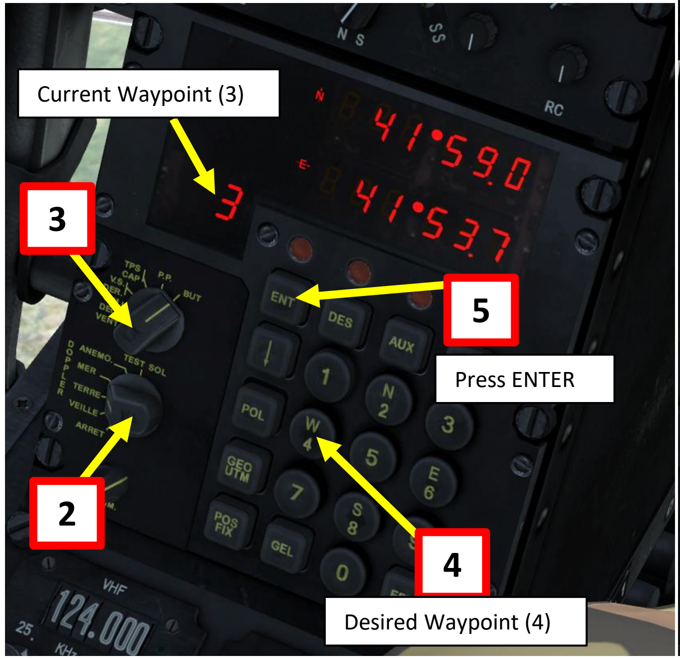
WAYPOINT #3 IS HERE

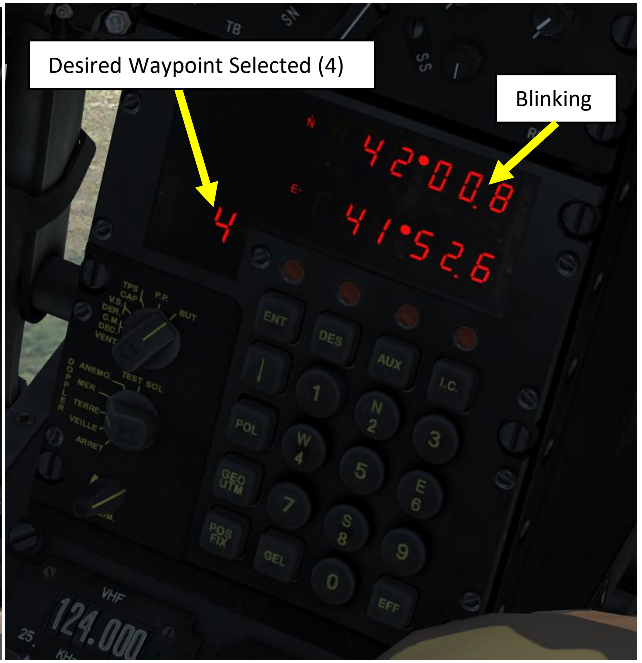


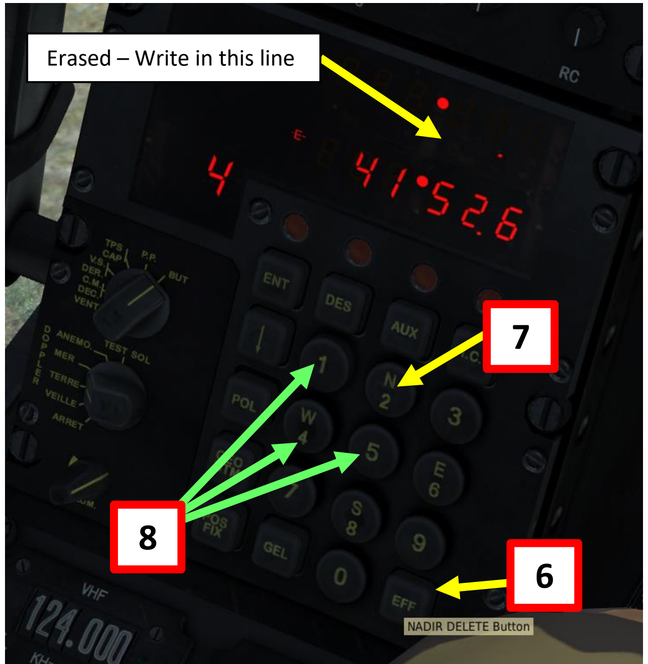
III – NADIR SYSTEM TUTORIAL

TUTORIAL 2 – HOW TO CREATE AND TRACK A BUT (WAYPOINT)

1) Note the coordinates of the desired new Waypoint (example: Kobuleti Airfield coordinates when pressing F10 are **41°55’4**5’’ North / **41°51’4**7’’ East)
2) Select TERRE (Ground) NADIR Mode.
3) Select BUT (Waypoint) NADIR Parameter.
4) Select desired Waypoint Number to edit/add on the keyboard.
5) Press ENTER
6) Press EFF (ERASE) repeatedly to delete all digits of the selected line.
7) Add N (for North Hemisphere) by pressing “N” or “2”.
8) Enter North coordinates via the keypad (41 55 45)
9) Press the DOWN ARROW button on the keypad to select second display line
10) Press EFF (ERASE) repeatedly to delete all digits of the selected line.
11) Add E (for East Hemisphere) by pressing “E” or “6”.
12) Enter East Coordinates via the keypad (41°51’47)
13) Press ENTER. New Waypoint 4 with proper coordinates is now tracked.
14) Follow pointy end of NADIR needle on NADIR indicator.



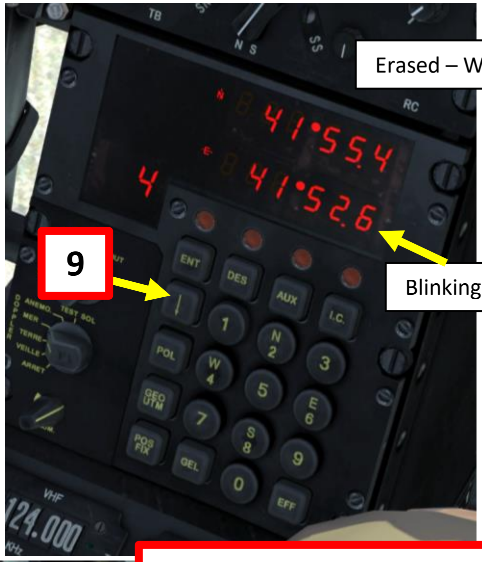


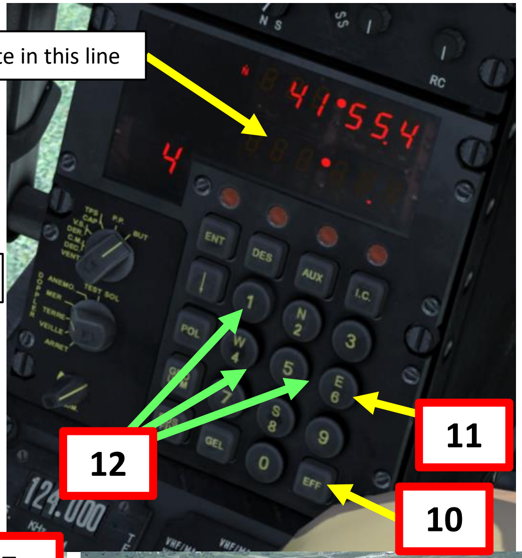


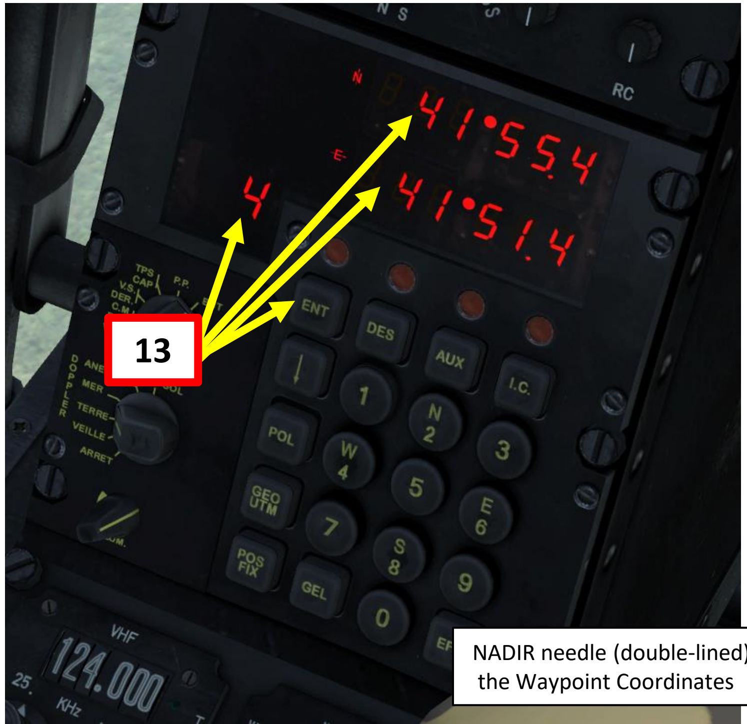
III – NADIR SYSTEM TUTORIAL

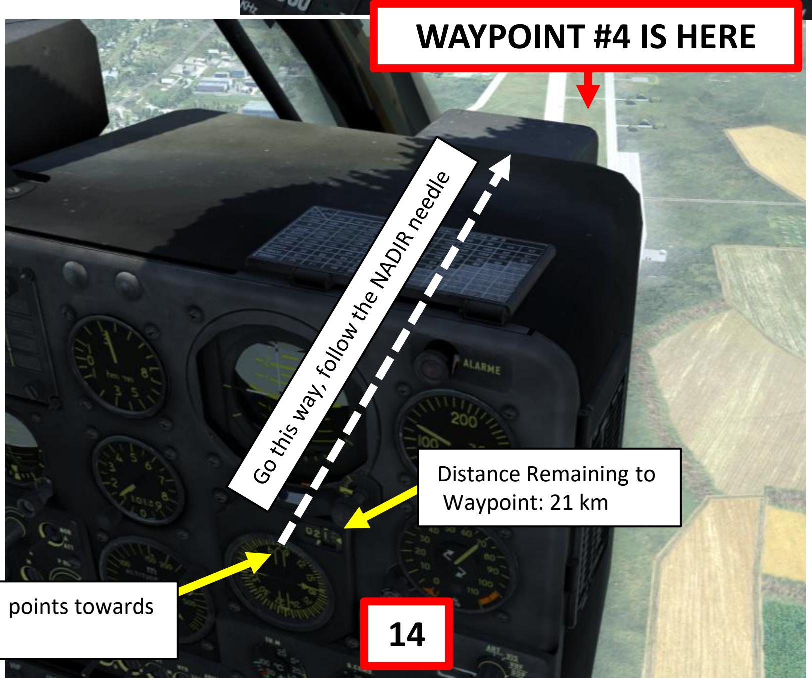
TUTORIAL 2 – HOW TO CREATE AND TRACK A BUT (WAYPOINT)

1) Note the coordinates of the desired new Waypoint (example: Kobuleti Airfield coordinates when pressing F10 are **41°55’4**5’’ North / **41°51’4**7’’ East)
2) Select TERRE (Ground) NADIR Mode.
3) Select BUT (Waypoint) NADIR Parameter.
4) Select desired Waypoint Number to edit/add on the keyboard.
5) Press ENTER
6) Press EFF (ERASE) repeatedly to delete all digits of the selected line.
7) Add N (for North Hemisphere) by pressing “N” or “2”.
8) Enter North coordinates via the keypad (41 55 4)
9) Press the DOWN ARROW button on the keypad to select second display line
10) Press EFF (ERASE) repeatedly to delete all digits of the selected line.
11) Add E (for East Hemisphere) by pressing “E” or “6”.
12) Enter East Coordinates via the keypad (41°51’4)
13) Press ENTER. New Waypoint 4 with proper coordinates is now tracked.
14) Follow pointy end of NADIR needle on NADIR indicator.



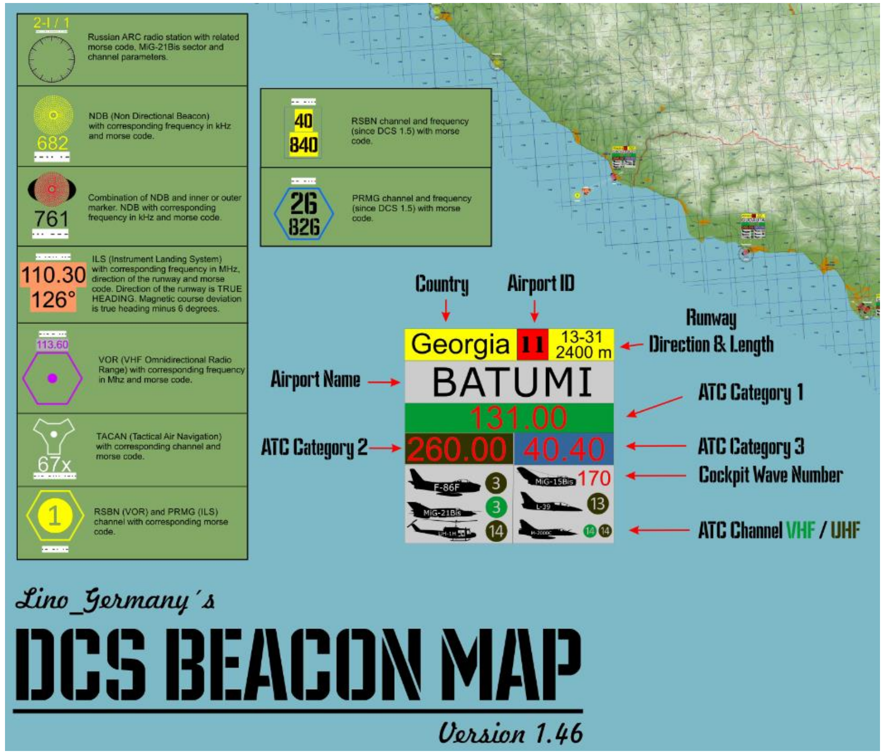


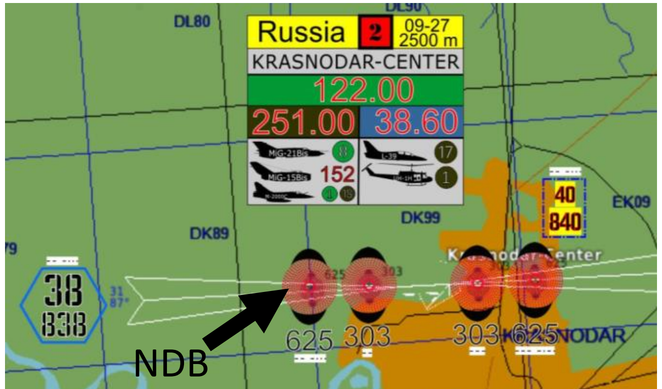


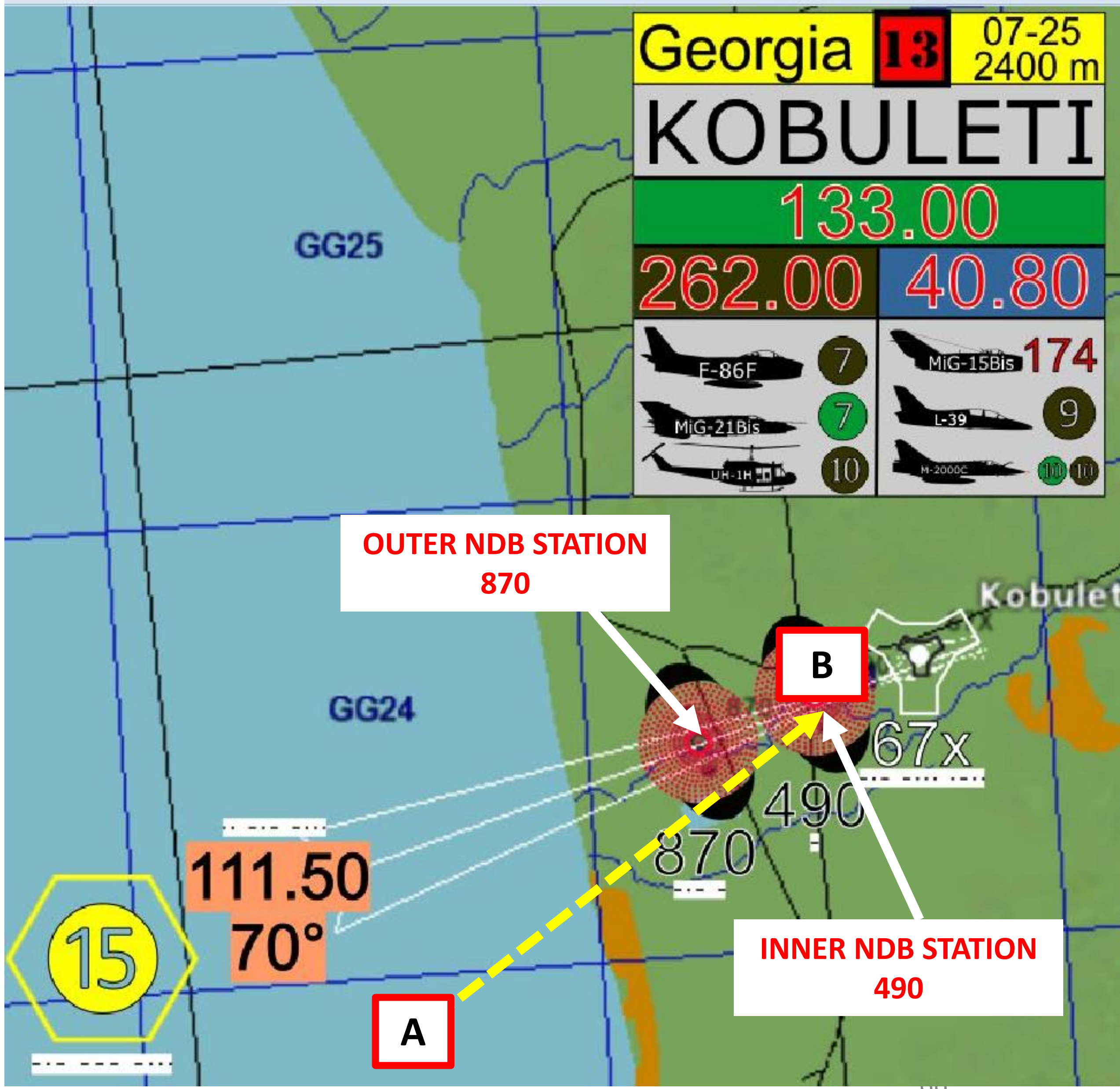


IV – NDB & VOR STATIONS – HOW TO FIND THEM?

Lino_Germany created a **wonderful** HD map containing all NDB stations scattered throughout the map. Use this to know the NDB stations you need to use.
LINK: https://drive.google.com/file/d/0B-uSpZROuEd3LVRDS3hyaElkUEk/view?usp=sharing







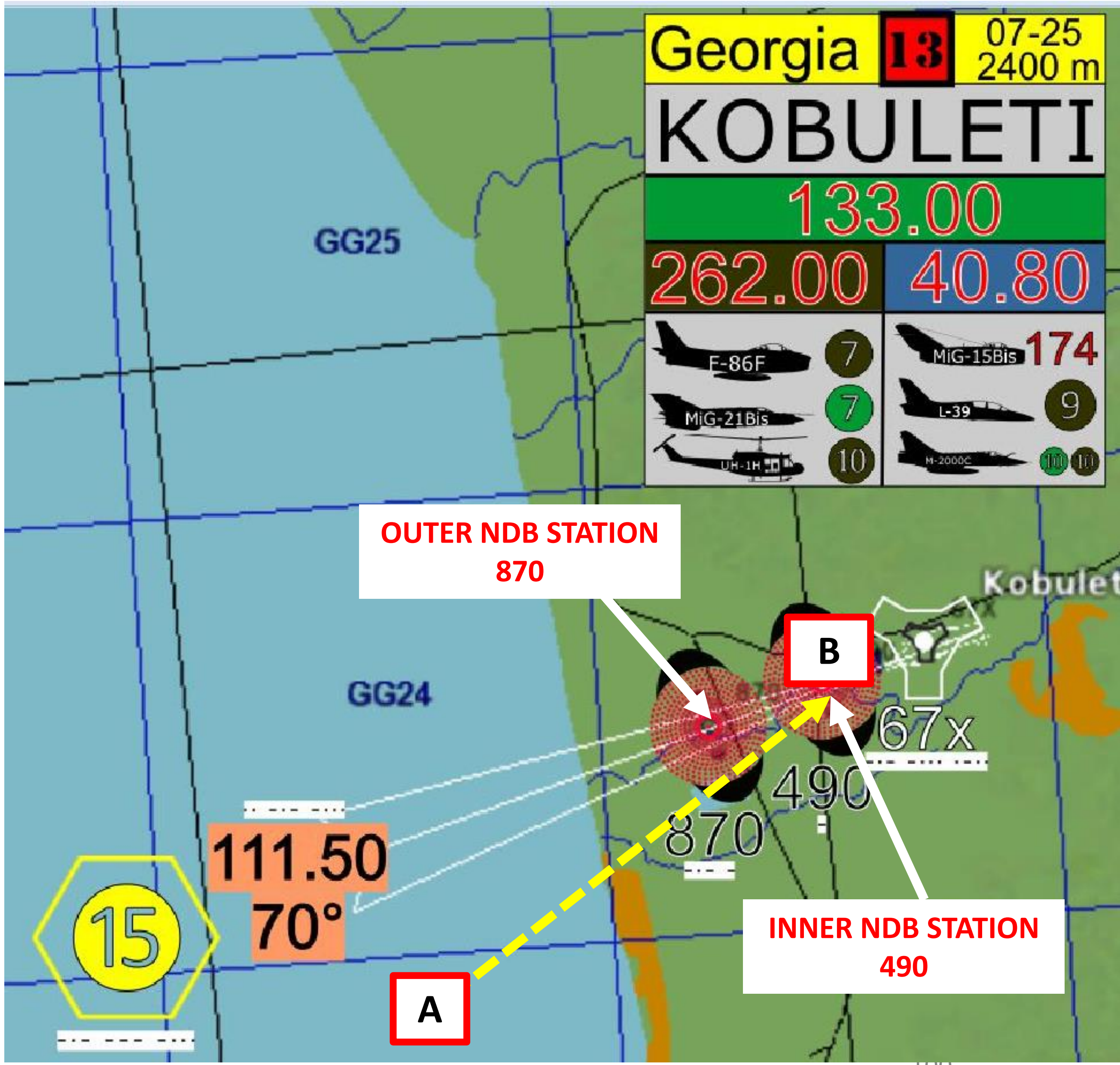
V – ADF SYSTEM TUTORIAL

In this example, we will fly over the inner NDB beacon placed in the vicinity of Kobuleti using the ADF (Automatic Direction Finder). We will do the following:

A. Fly towards **Kobuleti**.
B. Use the ADF1 system to track **Kobuleti's Inner NDB Beacon**, **ADF frequency 490** (obtained through Lino Germany's map).
C. Set the ADF2 system to **Kobuleti's Outer NDB Beacon**, **ADF frequency 870** (obtained through Lino Germany's map).
D. Navigate towards Kobuleti's Inner NDB Beacon.

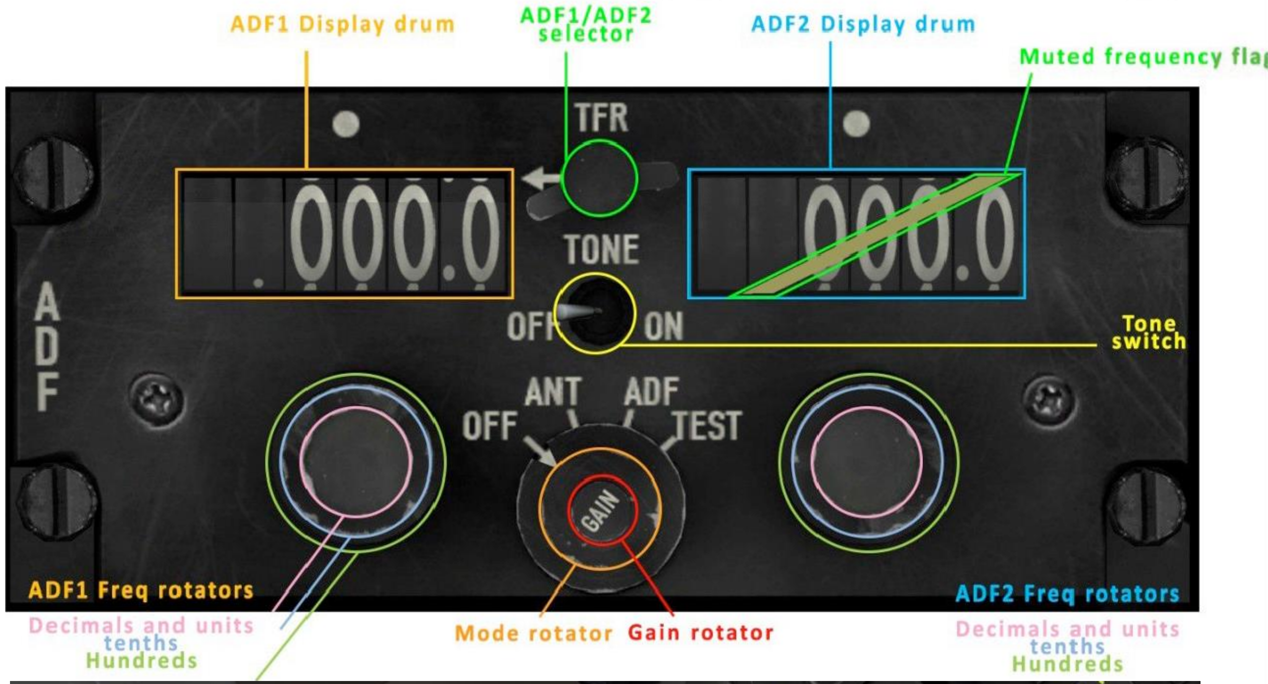
Note: The ADF system in the Gazelle can memorize two NDB frequencies at the same time but can only track one at a time. We will have to choose which one we want to track.

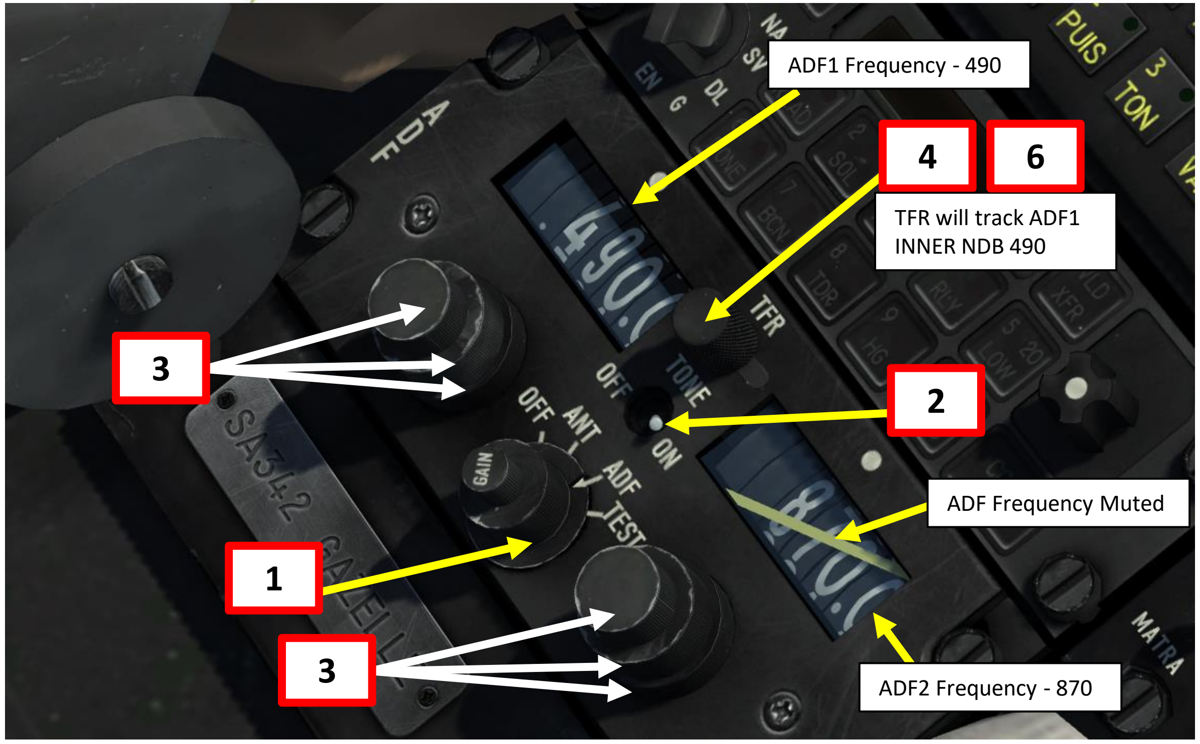
In our case, we will track the INNER NDB STATION (490), which is set on our ADF1.



V – ADF SYSTEM TUTORIAL

1) Set ADF mode rotator to ADF
2) Set ADF Tone switch to ON
3) Set your frequencies for a) the Inner NDB (490) on ADF1 and for b) the Outer NDB (870) for ADF2.
4) Select the ADF frequency you want to track using the TFR selector toggle. We will track ADF1 (Inner NDB 490) as an example. A "Mute" yellow line will appear over muted ADF freq.
5) Follow the pointy end of the ADF needle on the NADIR indicator towards the Inner NDB (490).
6) At any time, you can choose to switch the ADF system to the Outer NDB instead (870) by using the TFR selector toggle.





OVERVIEW OF TRIM AND AUTOPILOT SYSTEMS ON THE GAZELLE

The SA-342 can be trimmed in two ways independently:

- **Magnetic Brake Trim** (*Débrayage des Efforts – Freins Magnétiques*), which works like a Force Trim usually used in helicopters that leaves your cyclic in its current position and releases forces felt in the cyclic (very apparent with a force-feedback joystick).
- **China Hat Trim**, which works like a trim in a normal aircraft (pitch up/down, roll left/right).

The SA-342 is equipped with a **Stability Augmentation System** (SAS), which helps to stabilize the helicopter during flight. The SAS is split into three channels:

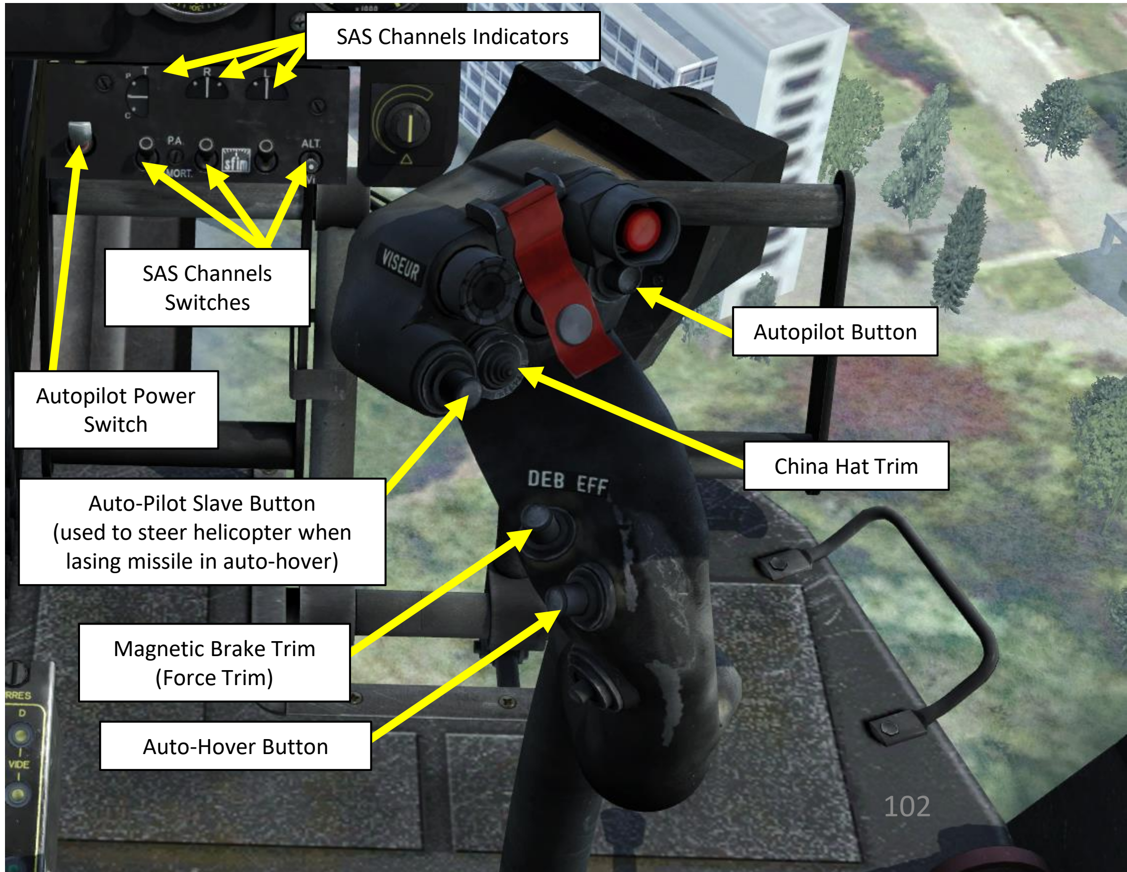
- Pitch channel
- Roll channel
- Yaw channel

Watch xxJohnxx's youtube tutorial explaining trim and the autopilot here:
https://www.youtube.com/watch?v=inT-fGgpmOM

The SAS is used by the **Autopilot**, which relies on the SAS. The SAS autopilot is automatically engaged at 120 km/h or faster. When reducing speed under 120 km/h, you may notice a sudden yaw motion of the aircraft; this means that the SAS autopilot has been disengaged. The Autopilot has three modes:

- **Normal Operation** Mode – Normal SAS behaviour
- **Hold Altitude** Mode – Maintain current altitude
- **Hold Speed** Mode – Maintain current airspeed

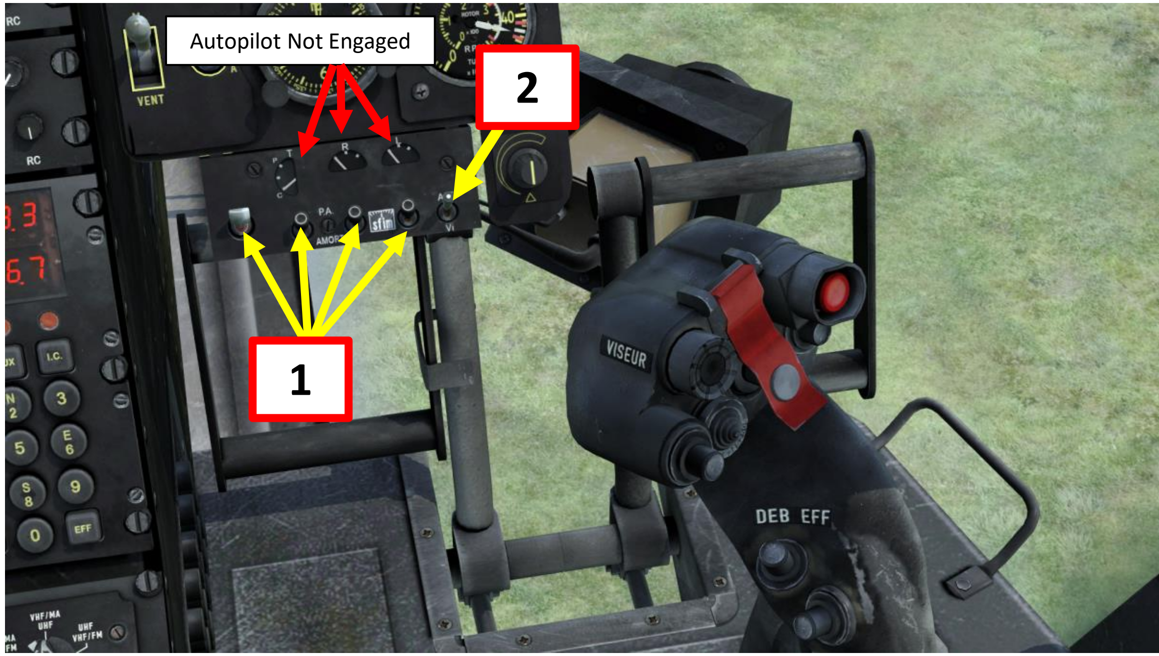
Finally, you can use the autopilot's **Auto-Hover** Mode, which can be used with the **Auto-Pilot Slave** button used to automatically steer the helicopter towards a designated lased target.

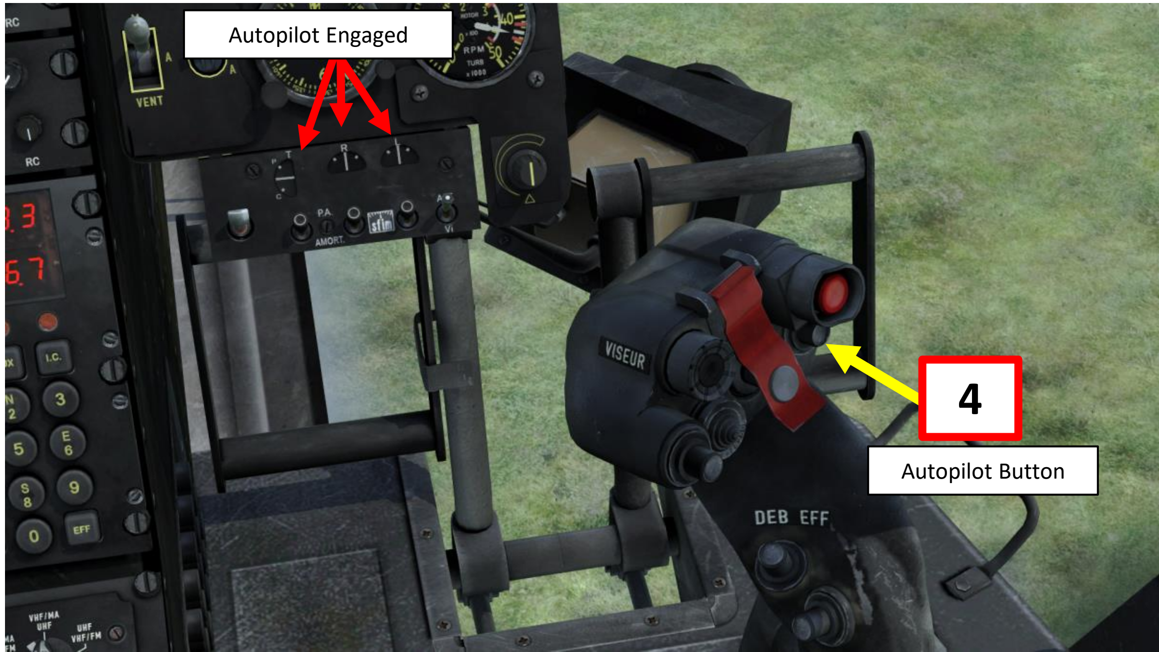


AUTOPILOT TUTORIAL – HOLD ALTITUDE

1) Ensure all SAS channel switches are ON (UP) and Autopilot power switch is ON (UP).
2) Set Autopilot Mode to ALTITUDE (UP).
3) Ensure that your current airspeed is greater than 120 km/h.
4) Engage Autopilot using the AP button on the cyclic.
5) Helicopter will maintain current altitude.

NOTE: Autopilot will disengage if you go slower than 120 km/h.





AUTO-HOVER TUTORIAL

To maintain a auto-hover, you need to respect the following conditions:

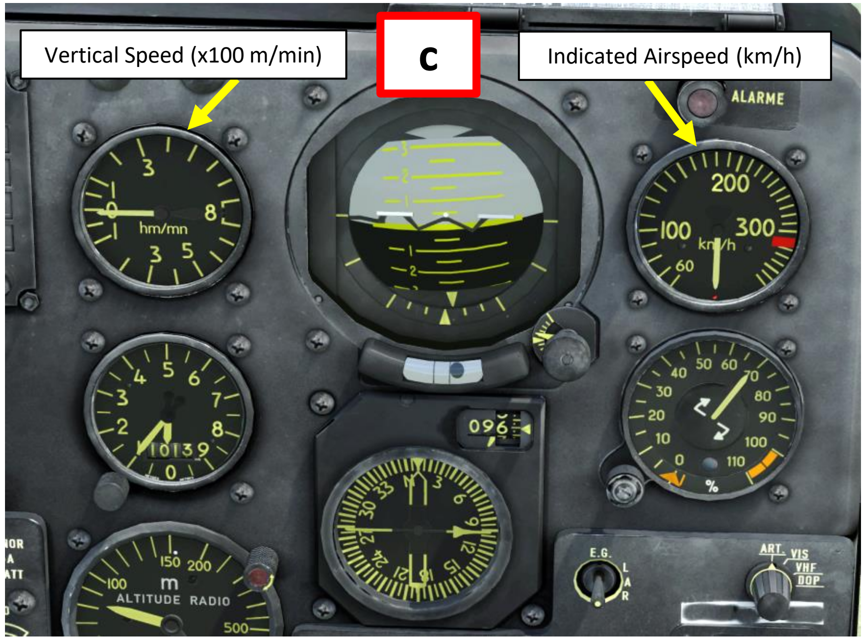
1) Ground Speed is less than 18 km/h
2) Roll and pitch angle less than 30 deg
3) Vertical Speed is less than 60 m/min

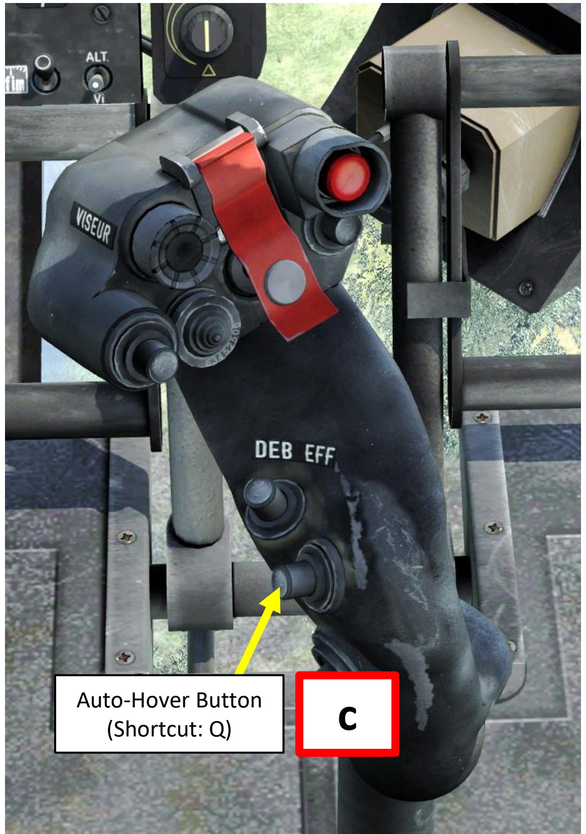
To monitor ground speed, we will use the Doppler radar of the NADIR system.

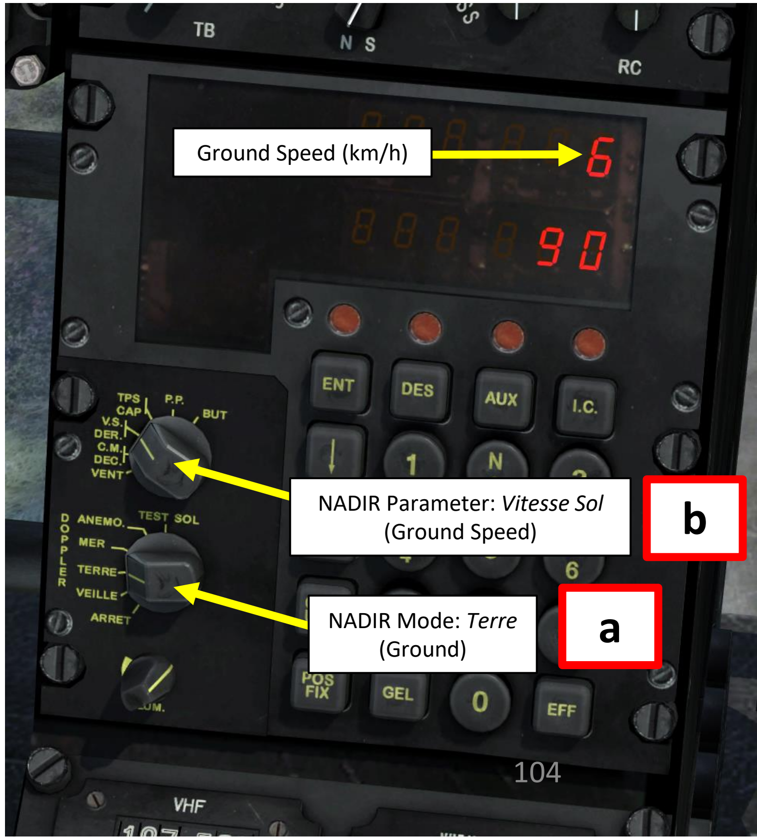
a) Set your NADIR mode to "Terre" (ground)

b) Set your NADIR parameter to "VS" (*Vitesse Sol* = Ground Speed)

c) Once all conditions 1, 2 and 3 are met, **engage auto-hover**. If auto-hover is engaged, you can let go of the controls and you will remain in a controlled hover. You will also notice that you cannot move the collective unless you disengage Auto-Hover Mode.







AUTO-HOVER TUTORIAL

Once in auto-hover, the SA-342 will keep hovering in a 10m x 10m zone.

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

POLYCHOP'S DCS GAZELLE MANUAL
https://drive.google.com/open?id=0B-uSpZROuEd3aURVaDJuRTZKQjQ

POLYCHOP'S DCS GAZELLE: NADIR MANUAL
https://drive.google.com/open?id=0B-uSpZROuEd3aldIRjN0M2wxb1E

AUTOROTATION TUTORIAL
https://www.youtube.com/watch?v=F_a9q_B-TRE

BUNYAP'S YOUTUBE CHANNEL – GAZELLE TEST FLIGHT SERIES
https://www.youtube.com/playlist?list=PLoiMNu5jyFzQTjEIhGFPWZ2qFfCIVf0l9

XXJOHNXX'S YOUTUBE CHANNEL – GAZELLE TUTORIALS
https://www.youtube.com/playlist?list=PLs4yzB9MM2SxhUARTzldiME7-nTNI-QX-

LINO_GERMANY'S NAVIGATION MAP
https://drive.google.com/file/d/0B-uSpZROuEd3LVRDS3hyaElkUEk/view?usp=sharing

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

THANK YOU TO ALL MY PATRONS

Creating these guides is no easy task, and I would like to take the time to properly thank every single one of my Patreon supporters. The following people have donated a very generous amount to help me keep supporting existing guides and work on new projects as well:

- ChazFlyz


DCS digital combat series
Chuck_Owl
SA342
GAZELLE
by: POLYCHOP-SIMULATIONS
INSTANT ACTION
CREATE FAST MISSION
MISSION
CAMPAIGN
MULTIPLAYER
LOGBOOK
ENCYCLOPEDIA
TRAINING
REPLAY
MISSION EDITOR
CAMPAIGN BUILDER
EXIT
F-86F
F/A-18C EA
FC3
Fw 190 D-9
I-16 beta
Ka-50
L-39
M-2000C
Mi-8MTV2
MiG-15bis
MiG-19P
MiG-21bis trunk
Normandy
P-51D
Persian Gulf
SA342
Spitfire IX
Disclaimer: The manufacturers and intellectual property right owners of the vehicles, weapons, sensors and other systems represented in DCS World in no way endorse, sponsor or are otherwise involved in the development of DCS World and its modules
Version: 2.5.4.30386