DCS GUIDE
SA-342 GAZELLE

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TABLE OF CONTENTS

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

PART 1 – INTRODUCTION

The **Aérospatiale Gazelle** is a French five-seat helicopter, commonly used for light transport, scouting and light attack duties. The SA-342M variant initially 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.

The SA-342 Gazelle originated in a French Army requirement for a lightweight observation helicopter intended to replace the Aérospatiale Alouette III; early on in the aircraft's development, the decision was taken to enlarge the helicopter to enable greater versatility and make it more attractive for the export market. In 1966, Sud Aviation began working on a light observation helicopter to replace its Alouette II with seating for five people.

Early on, the Gazelle attracted British interest, which resulted in a major joint development and production work share agreement between Sud Aviation and Westland. The deal, signed in February 1967, allowed the production in Britain of 292 Gazelles and 48 Sud Aviation SA-330 Puma medium transport helicopters ordered by the British armed forces; in return Sud Aviation was given a work share in the manufacturing programme for the 40 Westland Lynx naval helicopters for the French Navy.

Additionally, Westland would have a 65% work share in the manufacturing, and be a joint partner to Sud Aviation on further refinements and upgrades to the Gazelle. Westland would produce a total of 262 Gazelles of various models, mainly for various branches of the British armed forces, Gazelles for the civil market were also produced.

The first prototype SA-340 flew for the first time on 7 April 1967, it initially flew with a conventional tail rotor taken from the Alouette II. The tail was replaced in early 1968 with the distinctive fenestron tail on the second prototype. Four SA 341 prototypes were flown, including one for British firm Westland Helicopters. On 6 August 1971, the first production Gazelle conducted its first flight. On 13 May 1967, a Gazelle demonstrated its speed capabilities when two separate world speed records were broken on a closed course, achieving speeds of 307 km/h over 3 km and 292 km/h over 100 km.

PART 1 – INTRODUCTION

The Gazelle was the first helicopter to be adapted for single-pilot operations under instrument flight rules. An advanced duplex autopilot system was developed by Honeywell in order to allow the pilot to not be overworked during solo flights; the Gazelle was chosen as the platform to develop this capability as it was one of the faster and more stable helicopters in service at that point and had a reputation for being easy to fly.

The docile flying abilities of the Gazelle are such that it has been reported as being capable of comfortably flying without its main hydraulic system operation at speeds of up to 100 knots. The flight controls are highly responsive; unusually, the Gazelle lacks a throttle or a trimming system. Hydraulic servo boosters are present on all flight control circuits to mitigate control difficulties in the event of equipment failure.

The Gazelle was designed to be easy to maintain, all bearings were life-rated without need for continuous application of lubrication and most fluid reservoirs to be rapidly inspected The emphasis in the design stage of achieving minimal maintenance requirements contributed towards the helicopter's low running costs; many of the components were designed to have a service life in excess of 700 flying hours, and in some cases 1,200 flight hours, before requiring replacement. Due to the performance of many of the Gazelle's subsystems, features pioneered upon the Gazelle such as the fenestron would appear upon later Aerospatiale designs.

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.

PART 1 – INTRODUCTION

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.

The SA-342 isn't meant to be flown like an attack helicopter such as the AH-64 Apache or the Mi-24 Hind. You will be very lightly armored and the strength of the Gazelle lies in being nimble and discrete for scouting and intelligence gathering rather than direct confrontation with armored columns. You still have some weapons at your disposal, but their range is limited and attack runs will make you very vulnerable. Good decision-making is part of the toolkit of any Gazelle pilot, and flying in multiplayer servers will teach you the value of discretion over reckless exposure to gunfire and missiles. You will be a tremendous asset for other attack helicopters and fighter jets by finding targets and relaying their location to other better-equipped assets in the area of operations.

Another often overlooked aspect of flying a helicopter like the Gazelle is that teamwork is mandatory. The pilot and co-pilot have to coordinate and communicate with each other for sensor operation and workload management. A good crew is able to constantly adjust to shifting priorities and changes in mission conditions. You have at your disposal a very capable chopper with great sensors that will allow you to sneak anywhere at any time. A flight of Gazelles can wreak havoc on enemy supply lines if left unchecked.

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.

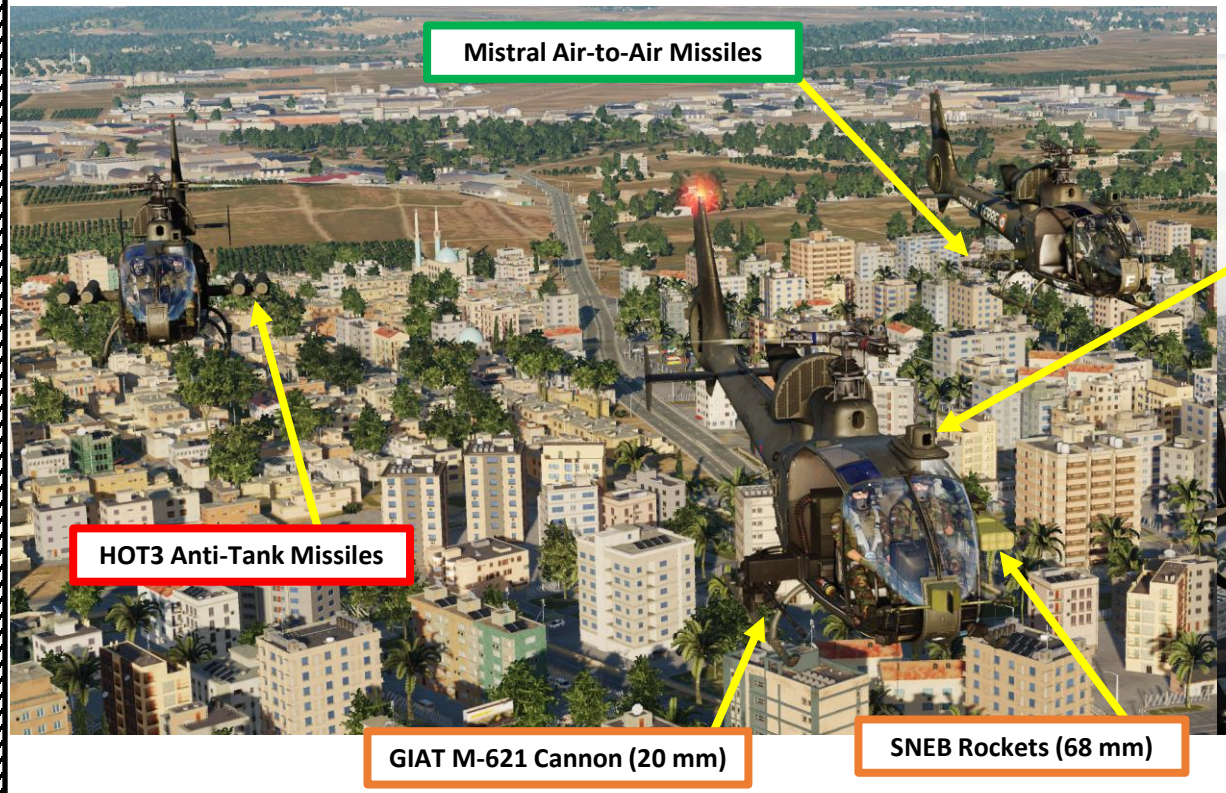
GAZELLE VARIANTS
SA-342M

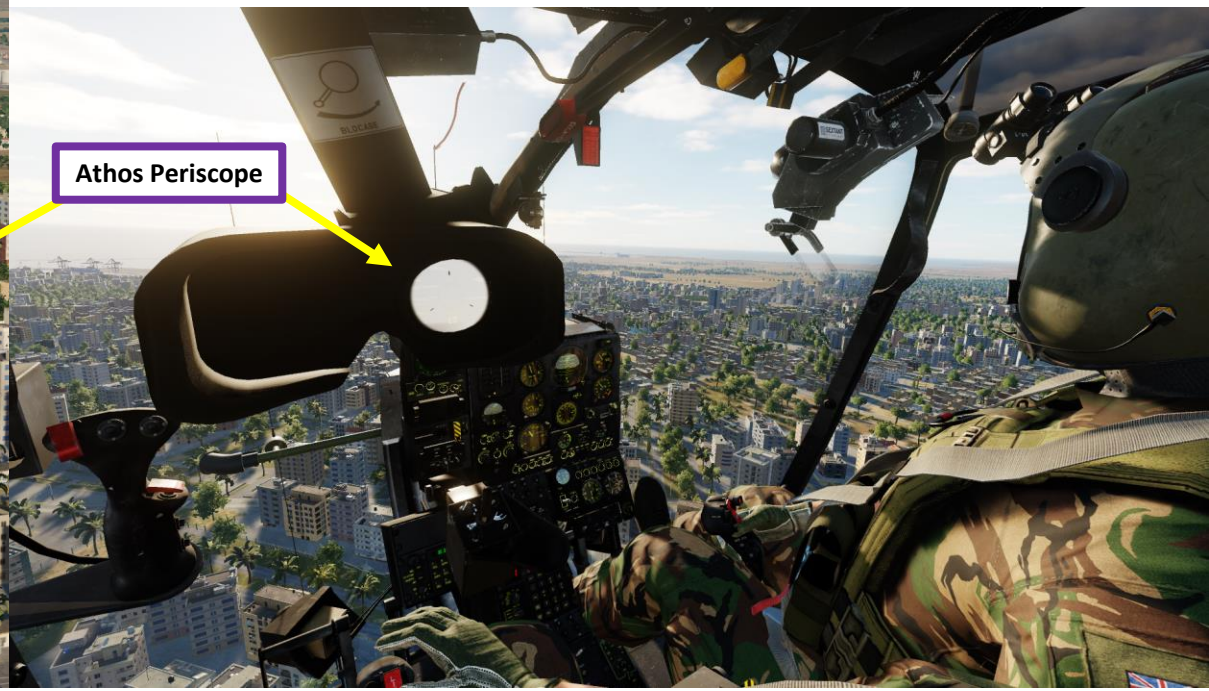
The “**M”** variant is equipped with an Astazou XIV M turboshaft engine and was intended mostly for the French ALAT (*Aviation Légère de l’Armée de Terre*, or Land Army Light Aviation). This variant is equipped with up to four HOT3 anti-tank missiles. Its Viviane camera allowed both day and night operations.

GAZELLE VARIANTS
SA-342L

The "**L"** variant 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 has an older Athos periscope, which only allowed for day operations. In DCS, the SA-342L comes in three sub-variants:

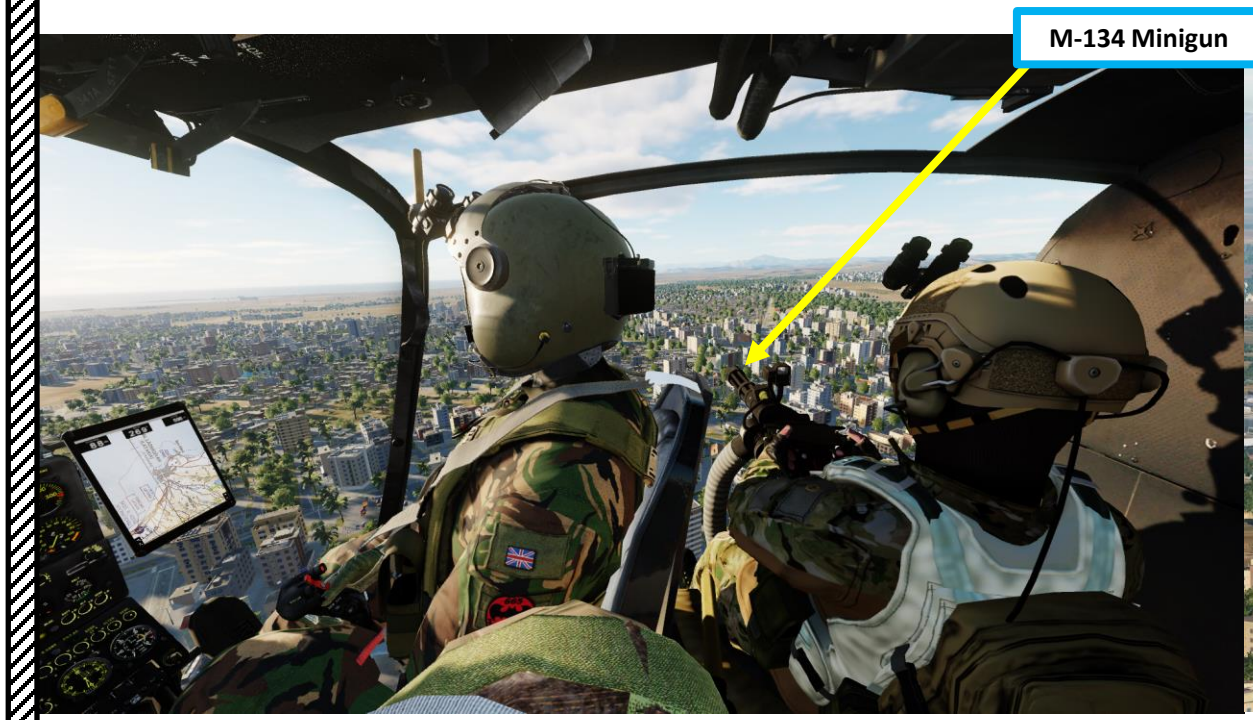
- Sub-Variant 1 – **HOT3**: Equipped with up to four HOT3 anti-tank missiles operating with the Athos periscope, which is limited to Day operations. This configuration is similar in terms of capability to the SA-342M variant.
- Sub-Variant 2 – **Gun/Rocket**: Equipped with SNEB 68 mm Rockets and a GIAT M-621 20 mm Cannon, or FN HMP-400 12.7 mm Gunpods. This configuration is used for close-range fire support.
- Sub-Variant 3 – **Mistral**: This 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 built by MDBA.





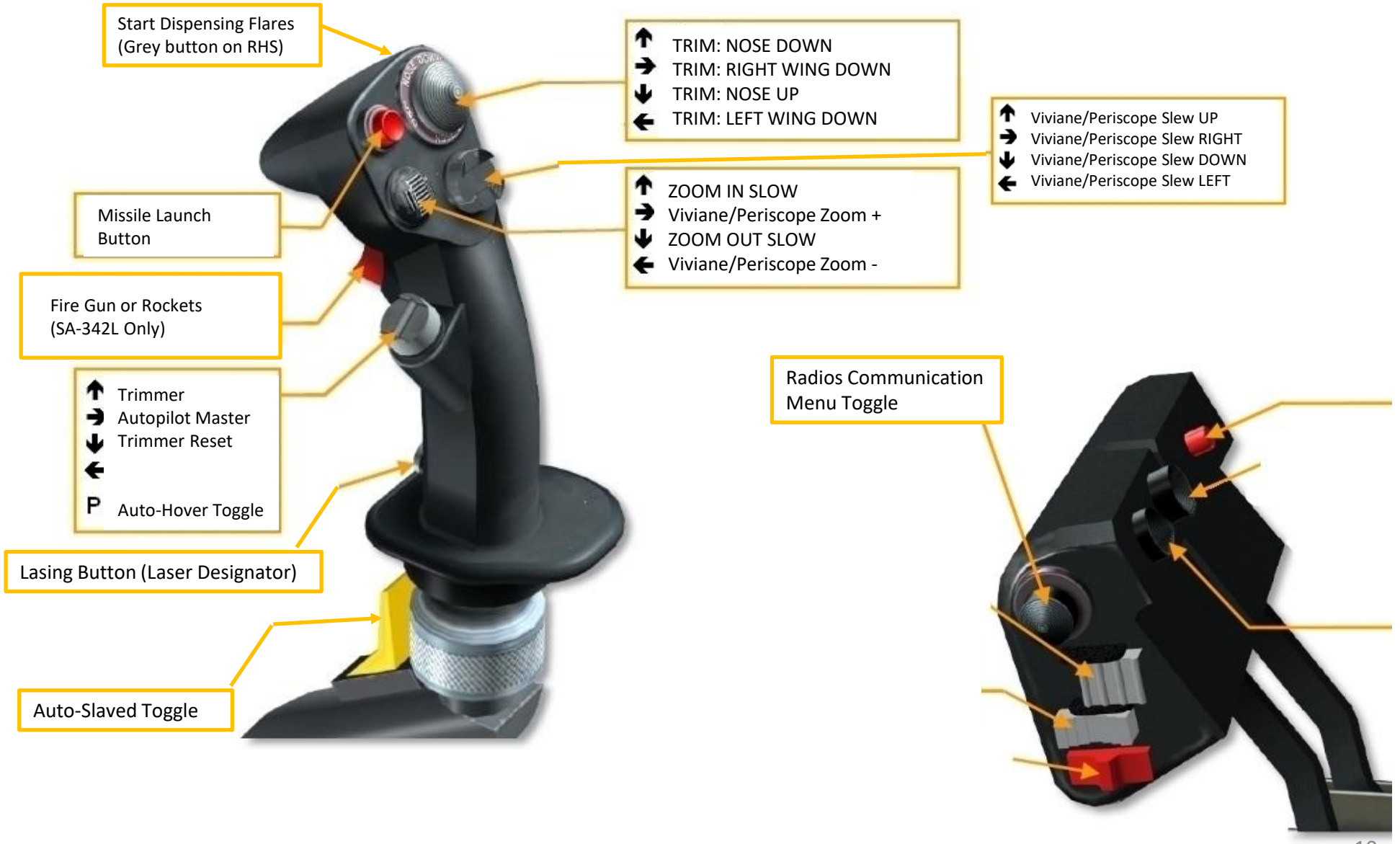
GAZELLE VARIANTS
SA-342 “MINIGUN”

The “**Minigun**” variant of the Gazelle comes equipped with a side gunner and a M-134 Minigun with 7.62 mm ammunition. It does not have the Viviane TV Camera nor the Athos periscope. It cannot carry any other weapons from the SA-342M or SA-342L variants.

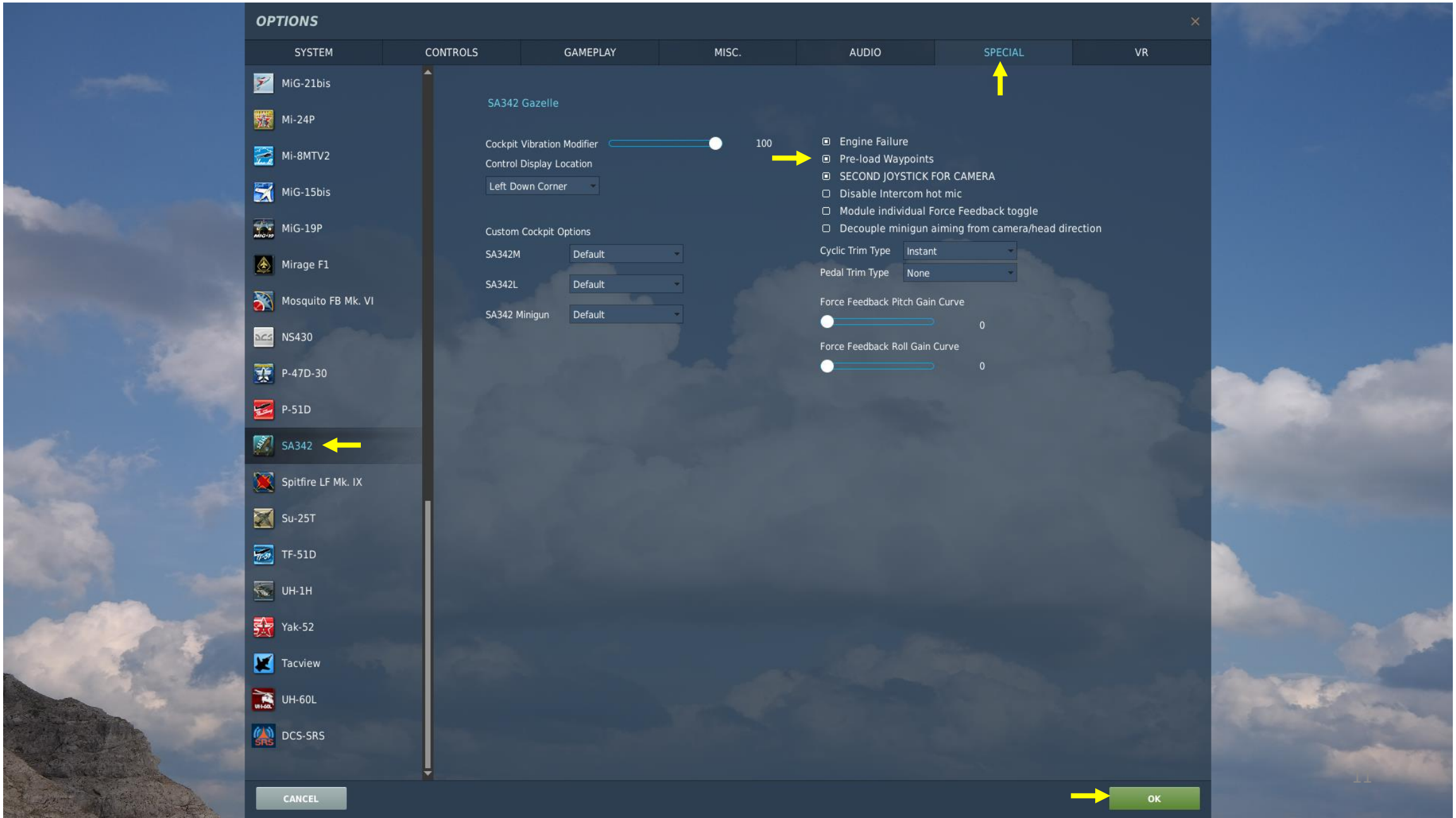


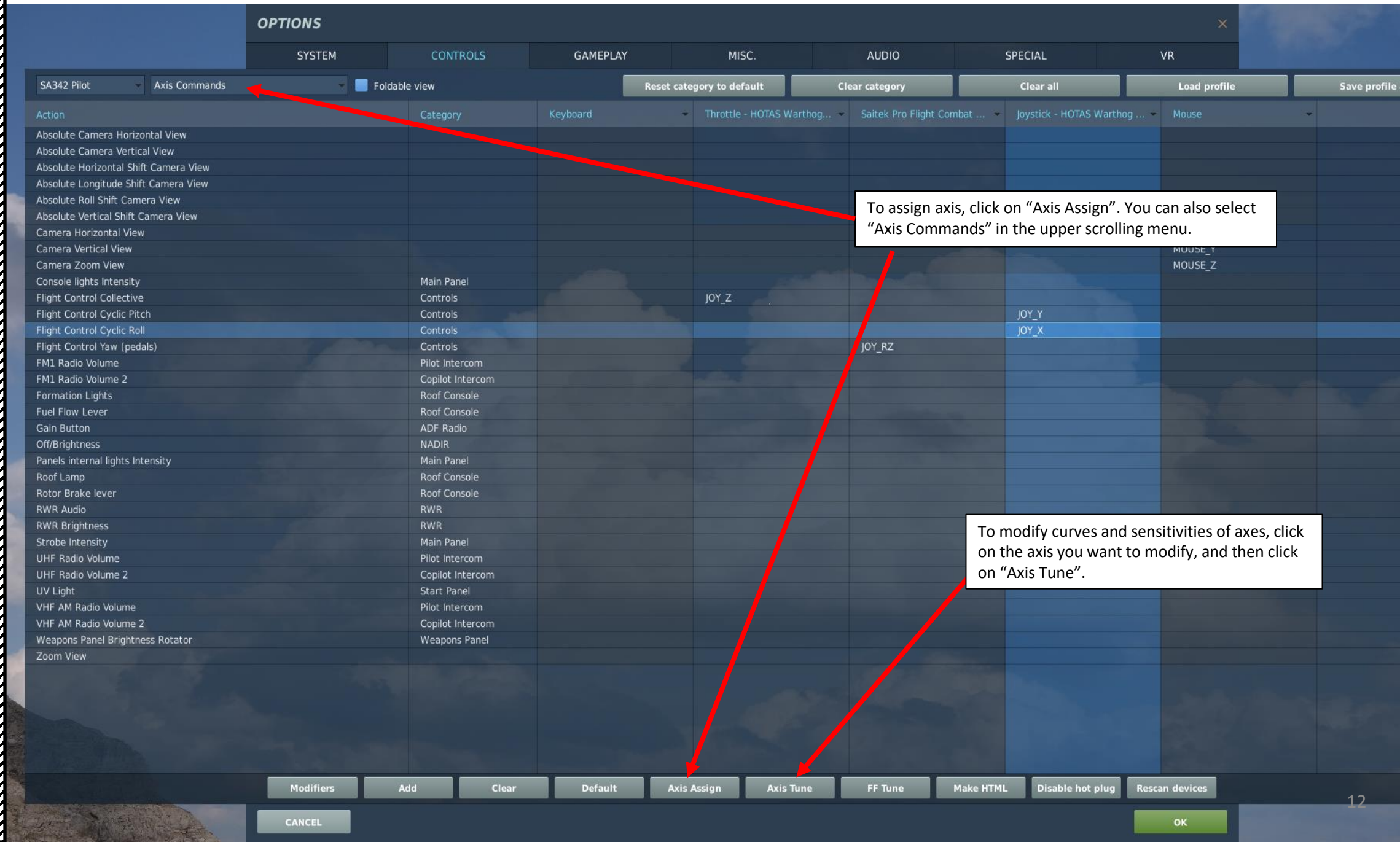
PART 1 – INTRODUCTION

WHAT YOU NEED MAPPED



Note: Make sure you have “PRE-LOAD WAYPOINTS” ticked in your SPECIAL tab in the options. This setting 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).




OPTIONS
SYSTEM
CONTROLS
GAMEPLAY
MISC.
AUDIO
SPECIAL
VR
SA342 Pilot
Axis Commands
Foldable view
Reset category to default
Clear category
Clear all
Load profile
Save profile as
Action
Category
Keyboard
Throttle - HOTAS Warthog...
Saitek Pro Flight Combat ...
Joystick - HOTAS Warthog ...
Mouse
Absolute Camera Horizontal View
Absolute Camera Vertical View
Absolute Horizontal Shift Camera View
Absolute Longitude Shift Camera View
Absolute Roll Shift Camera View
Absolute Vertical Shift Camera View
Camera Horizontal View
Camera Vertical View
Camera Zoom View
Console lights Intensity
Flight Control Collective
Flight Control Cyclic Pitch
Flight Control Cyclic Roll
Flight Control Yaw (pedals)
FM1 Radio Volume
FM1 Radio Volume 2
Formation Lights
Fuel Flow Lever
Gain Button
Off/Brightness
Panels internal lights Intensity
Roof Lamp
Rotor Brake lever
RWR Audio
RWR Brightness
Strobe Intensity
UHF Radio Volume
UHF Radio Volume 2
UV Light
VHF AM Radio Volume
VHF AM Radio Volume 2
Weapons Panel Brightness Rotator
Zoom View
Main Panel
Controls
Pilot Intercom
Copilot Intercom
Roof Console
ADF Radio
NADIR
RWR
Start Panel
Weapons Panel
JOY_Z
JOY_Y
JOY_X
JOY_RZ
MOUSE_Y
MOUSE_Z
To assign axis, click on “Axis Assign”. You can also select “Axis Commands” in the upper scrolling menu.
To modify curves and sensitivities of axes, click on the axis you want to modify, and then click on “Axis Tune”.
Modifiers
Add
Clear
Default
Axis Assign
Axis Tune
FF Tune
Make HTML
Disable hot plug
Rescan devices
CANCEL
OK

BIND THE FOLLOWING AXES:

- FLIGHT CONTROL CYCLIC PITCH (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 15)
- FLIGHT CONTROL CYCLIC ROLL (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 15)
- FLIGHT CONTROL (ANTI-TORQUE) YAW PEDALS (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 15)
- FLIGHT CONTROL COLLECTIVE (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 15)

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.

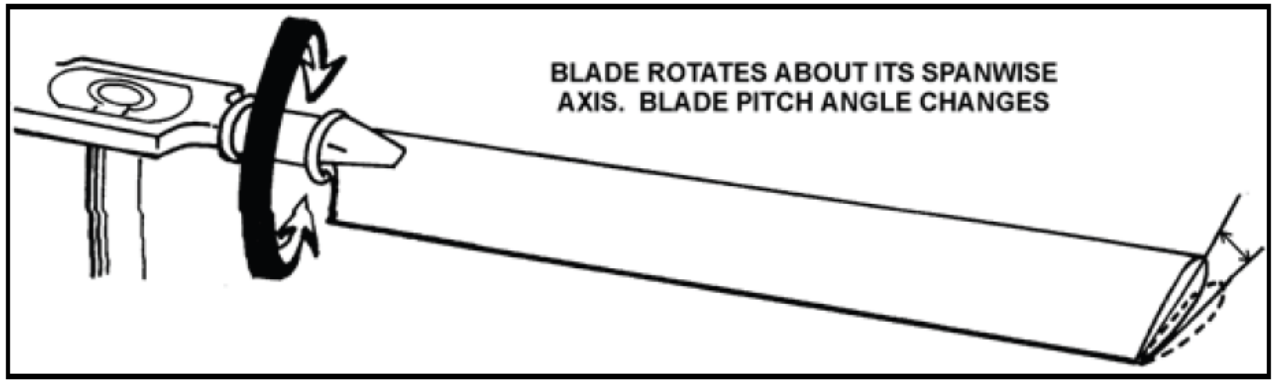
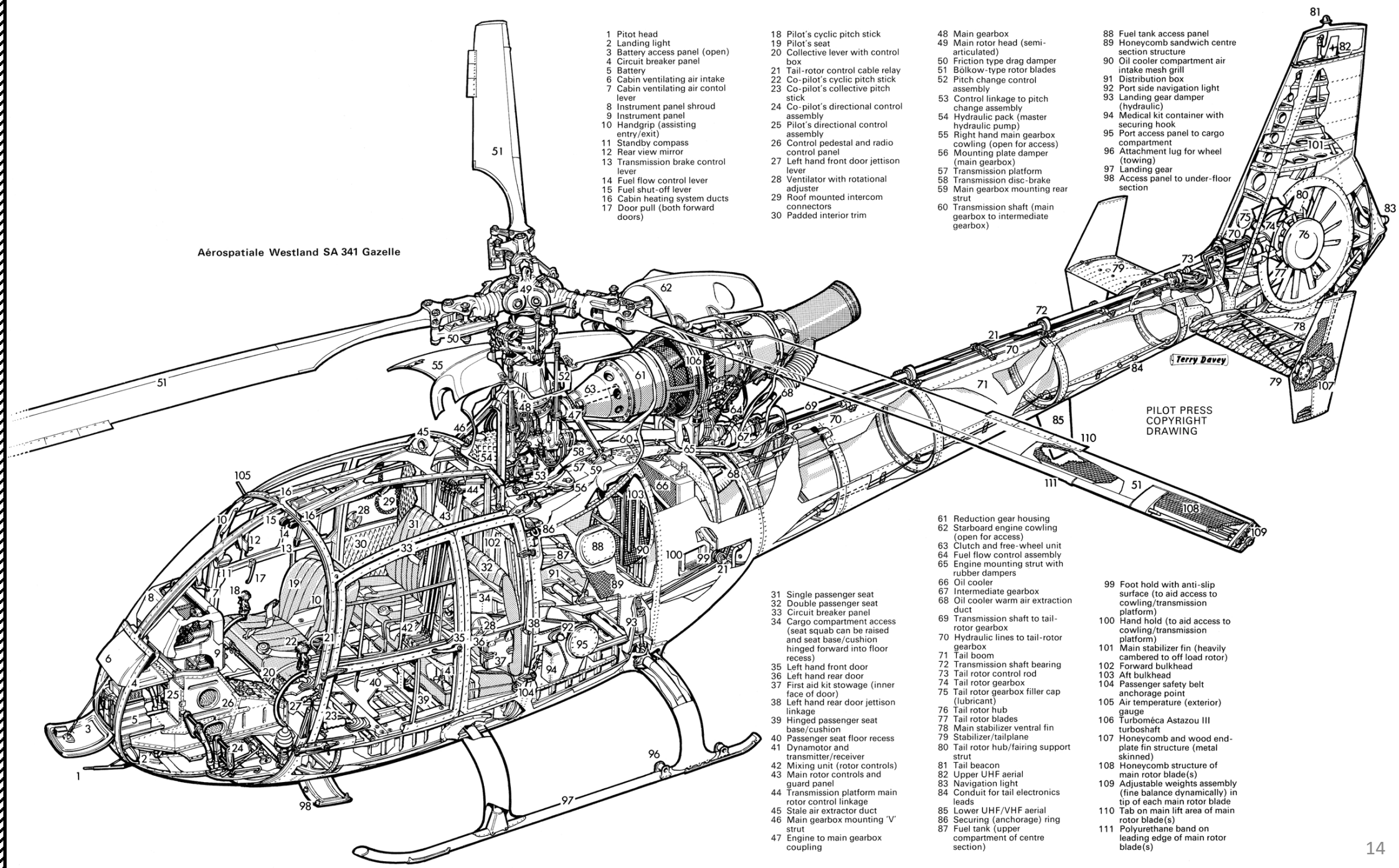


Figure 1-17. Feathering



1 Pitot head
2 Landing light
3 Battery access panel (open)
4 Circuit breaker panel
5 Battery
6 Cabin ventilating air intake
7 Cabin ventilating air contol lever
8 Instrument panel shroud
9 Instrument panel
10 Handgrip (assisting entry/exit)
11 Standby compass
12 Rear view mirror
13 Transmission brake control lever
14 Fuel flow control lever
15 Fuel shut-off lever
16 Cabin heating system ducts
17 Door pull (both forward doors)

18 Pilot's cyclic pitch stick
19 Pilot's seat
20 Collective lever with control box
21 Tail-rotor control cable relay
22 Co-pilot's cyclic pitch stick
23 Co-pilot's collective pitch stick
24 Co-pilot's directional control assembly
25 Pilot's directional control assembly
26 Control pedestal and radio control panel
27 Left hand front door jettison lever
28 Ventilator with rotational adjuster
29 Roof mounted intercom connectors
30 Padded interior trim

31 Single passenger seat
32 Double passenger seat
33 Circuit breaker panel
34 Cargo compartment access (seat squab can be raised and seat base/cushion hinged forward into floor recess)
35 Left hand front door
36 Left hand rear door
37 First aid kit stowage (inner face of door)
38 Left hand rear door jettison linkage
39 Hinged passenger seat base/cushion
40 Passenger seat floor recess
41 Dynamotor and transmitter/receiver
42 Mixing unit (rotor controls)
43 Main rotor controls and guard panel
44 Transmission platform main rotor control linkage
45 Stale air extractor duct
46 Main gearbox mounting 'V' strut
47 Engine to main gearbox coupling

48 Main gearbox
49 Main rotor head (semi-articulated)
50 Friction type drag damper
51 Bölkow-type rotor blades
52 Pitch change control assembly
53 Control linkage to pitch change assembly
54 Hydraulic pack (master hydraulic pump)
55 Right hand main gearbox cowling (open for access)
56 Mounting plate damper (main gearbox)
57 Transmission platform
58 Transmission disc-brake
59 Main gearbox mounting rear strut
60 Transmission shaft (main gearbox to intermediate gearbox)

61 Reduction gear housing
62 Starboard engine cowling (open for access)
63 Clutch and free-wheel unit
64 Fuel flow control assembly
65 Engine mounting strut with rubber dampers
66 Oil cooler
67 Intermediate gearbox
68 Oil cooler warm air extraction duct
69 Transmission shaft to tail-rotor gearbox
70 Hydraulic lines to tail-rotor gearbox
71 Tail boom
72 Transmission shaft bearing
73 Tail rotor control rod
74 Tail rotor gearbox
75 Tail rotor gearbox filler cap (lubricant)
76 Tail rotor hub
77 Tail rotor blades
78 Main stabilizer ventral fin
79 Stabilizer/tailplane
80 Tail rotor hub/fairing support strut
81 Tail beacon
82 Upper UHF aerial
83 Navigation light
84 Conduit for tail electronics leads
85 Lower UHF/VHF aerial
86 Securing (anchorage) ring
87 Fuel tank (upper compartment of centre section)

88 Fuel tank access panel
89 Honeycomb sandwich centre section structure
90 Oil cooler compartment air intake mesh grill
91 Distribution box
92 Port side navigation light
93 Landing gear damper (hydraulic)
94 Medical kit container with securing hook
95 Port access panel to cargo compartment
96 Attachment lug for wheel (towing)
97 Landing gear
98 Access panel to under-floor section

99 Foot hold with anti-slip surface (to aid access to cowling/transmission platform)
100 Hand hold (to aid access to cowling/transmission platform)
101 Main stabilizer fin (heavily cambered to off load rotor)
102 Forward bulkhead
103 Aft bulkhead
104 Passenger safety belt anchorage point
105 Air temperature (exterior) gauge
106 Turboméca Astazou III turboshaft
107 Honeycomb and wood end-plate fin structure (metal skinned)
108 Honeycomb structure of main rotor blade(s)
109 Adjustable weights assembly (fine balance dynamically) in tip of each main rotor blade
110 Tab on main lift area of main rotor blade(s)
111 Polyurethane band on leading edge of main rotor blade(s)

PART 3 – COCKPIT & EQUIPMENT

SA-342M Only

PART 3 – COCKPIT & EQUIPMENT

SA-342M Only

SA-342M GAZELLE

PART 3 – COCKPIT & EQUIPMENT

SA-342M Only

SEAT SELECTION CONTROLS

- Pilot: 1
- Co-Pilot: 2

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

SA-342M Only

PART 3 – COCKPIT & EQUIPMENT

SA-342M Only

SA-342M Only


SA-342M Only
Anti-Torque Pedals
Cyclic
Collective

SA-342M Only

SA-342M Only

VNE Chart

- *"Not to exceed" Airspeed in function of altitude*

SA-342M Only

Couple Maximal Autorisé **(Max Allowable Torque) Chart**

Altitude in 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

SA-342M Only

Tablet Deploy/Stow Hinge

- *Click this spot to deploy or stow EFB Tablet.*

SA-342M Only

EFB (Electronic Flight Bag) Tablet

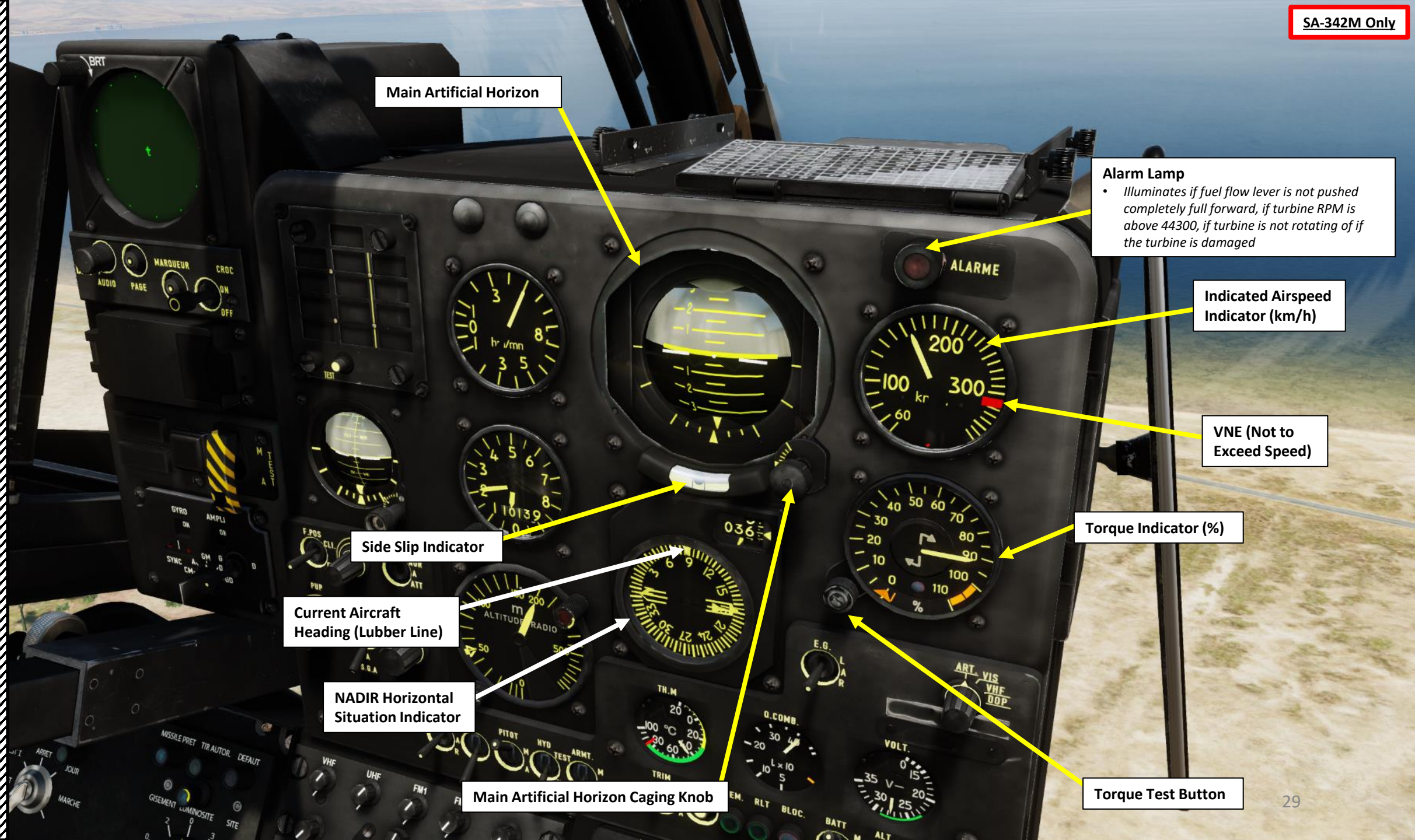
- *This tablet displays aircraft position, ground speed, bearing and altitude.*

SA-342M Only


Ground Speed
111 kts
Bearing
001 °
Altitude
380 ft
22:32
Aircraft Altitude (ft)
Aircraft Bearing
Aircraft Ground Speed (kts)
Tablet Zoom In Button
Tablet Zoom Out Button
Tablet Brightness Increase Button
Tablet Brightness Decrease Button
EFB Tablet Power ON/OFF Button
ALARME
AKROTIRI S B A (UK)
AKROTIRI CHAN 107X
EPISKOPI BAY
AKROTIRI BAY
LIMASSOL
Cape Zevgari
Cape Gata
masts 370 (370)
mast 690 (250)
315 (315)
1253
AKROTIRI 76


SA-342M Only
Additional Fuel Quantity Indicator (70 kg)
Yaw String (Slip String)
• Indicates a slip or skid during flight
FAT (Free Air Temperature) Indicator (deg C)

SA-342M Only


Main Artificial Horizon
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)
Torque Indicator (%)
Side Slip Indicator
Current Aircraft Heading (Lubber Line)
NADIR Horizontal Situation Indicator
Main Artificial Horizon Caging Knob
Torque Test Button
ALARME
MARQUEUR
CROC
AUDIO
PAGE
ON
OFF
BRT
TEST
GYRO
AMPLI
SYNC
F.POS
PUP
ATT
ALTITUDE RADIO
TH.M
TRIM
PITOT
HYD
ARMT.
TEST
E.G.
D.COMB.
VOLT.
BATT
ART.
VIS
VHF
DOP
MISSILE PRET
TIR AUTOR.
DEFAUT
ABRET
JOUR
MARCHE
GISEMENT
LUMINOSITE
SITE
VHF
UHF
FM1
RLT
BLOC.

SA-342M Only

Pilot Wiper (*Essuie-Glaces*) Switch
- *L = Lent = Slow (UP)*
- *A = Arrêt = OFF (MIDDLE)*
- *R = Rapide = Fast (DOWN)*

Main Artificial Horizon Source Selector
- *ART: Artificial*
- *VIS: Viseur = Camera Target Point*
- *VHF: ADF Emitter*
- *DOP: NADIR Waypoint*

Voltmeter (V)

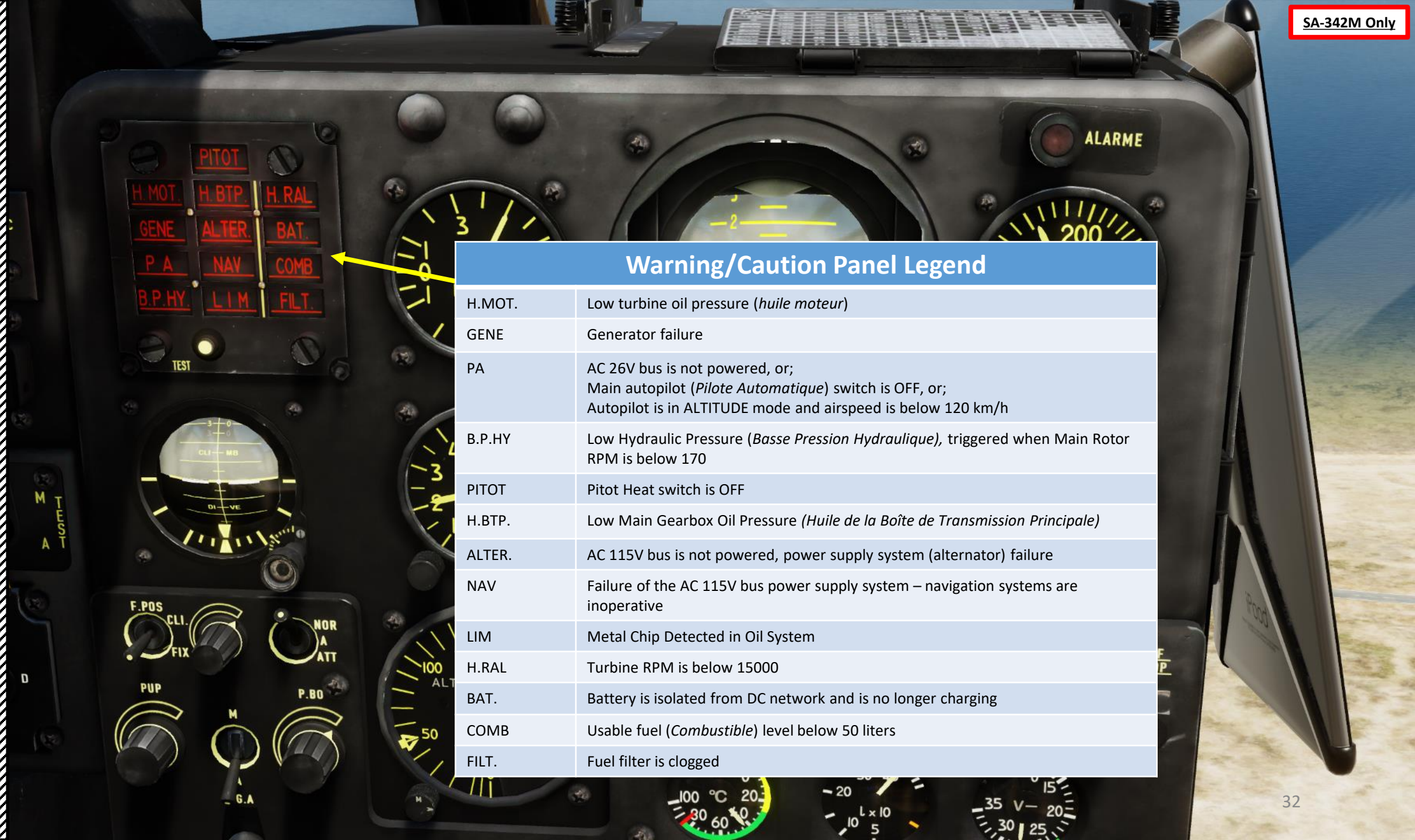
***Quantité Combustible* / Fuel Quantity Indicator (x10 L)**

***Température Huile Moteur (THM)* / Oil Temperature (deg C)**

SA-342M Only


Standby Artificial Horizon
Vertical Velocity Indicator (x100 m/min)
Barometric Altimeter (m)
• Short Needle: 1000 m
• Long Needle: 100 m
Light Test Button
Standby Artificial Horizon Caging Knob
Barometric Pressure Setting Control Knob
Barometric Pressure (x100 Pa)
BRT
MARQUEUR
CROC
AUDIO
PAGE
ON
OFF
ALARME
GYRO
AMPLI
F.POS
NOR
ATT
PUP
ALTITUDE RADIO
E.G.
ART.
VIS
VHF
DOP

SA-342M Only

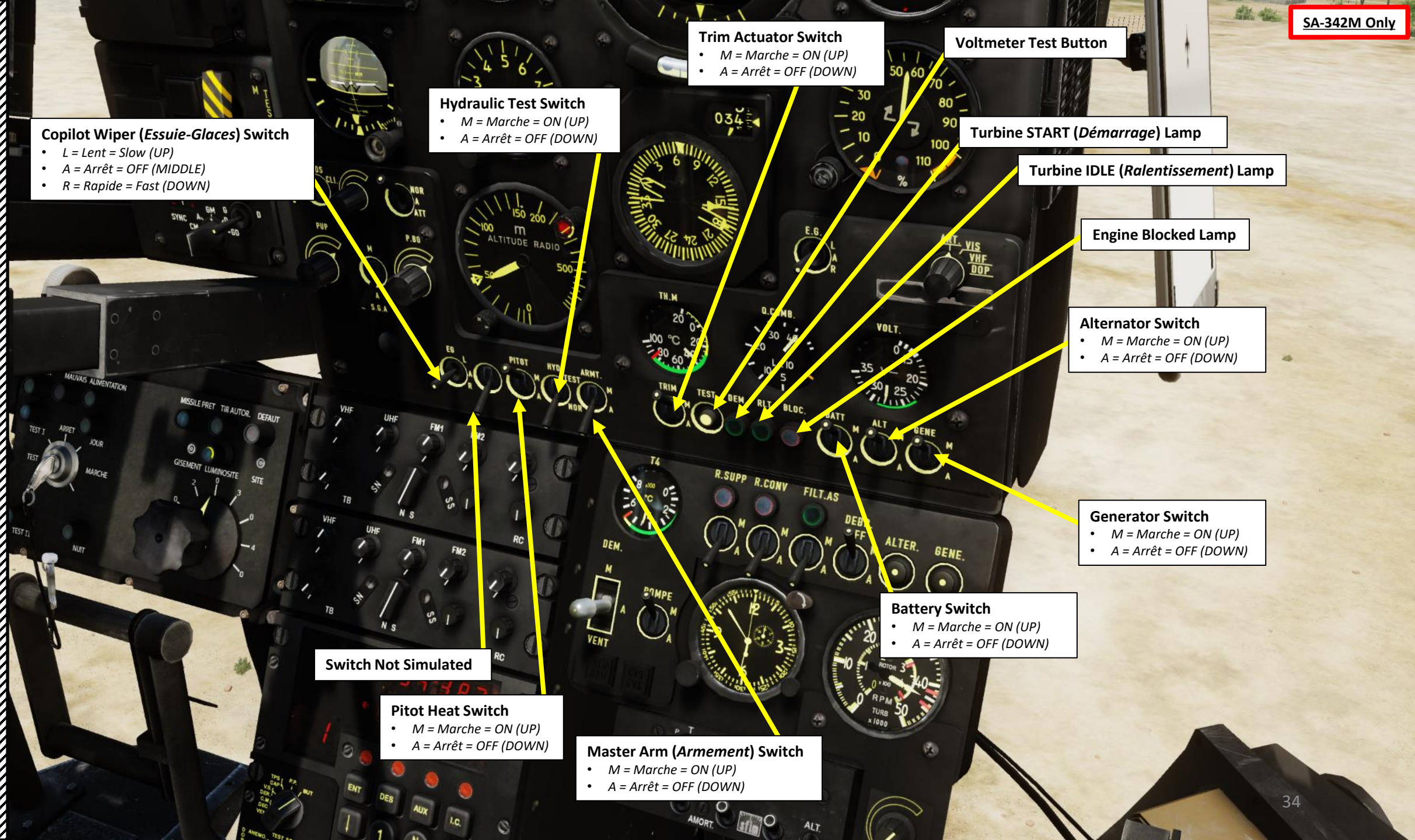


Warning/Caution Panel Legend

H.MOT.	Low turbine oil pressure (*huile moteur*)
GENE	Generator failure
PA	AC 26V bus is not powered, or; Main autopilot (*Pilote Automatique*) switch is OFF, or; Autopilot is in ALTITUDE mode and airspeed is below 120 km/h
B.P.HY	Low Hydraulic Pressure (*Basse Pression Hydraulique),* triggered when Main Rotor RPM is below 170
PITOT	Pitot Heat switch is OFF
H.BTP.	Low Main Gearbox Oil Pressure *(Huile de la Boîte de Transmission Principale)*
ALTER.	AC 115V bus is not powered, power supply system (alternator) failure
NAV	Failure of the AC 115V bus power supply system – navigation systems are inoperative
LIM	Metal Chip Detected in Oil System
H.RAL	Turbine RPM is below 15000
BAT.	Battery is isolated from DC network and is no longer charging
COMB	Usable fuel (*Combustible*) level below 50 liters
FILT.	Fuel filter is clogged

SA-342M Only


Radar Altimeter (m)
Radar Altimeter Altitude Warning Lamp
Radar Altimeter Power Knob
• M = Marche = Power ON
• A = Arrêt = OFF



SA-342M Only

Trim Actuator Switch
- *M = Marche = ON (UP)*
- *A = Arrêt = OFF (DOWN)*

Voltmeter Test Button

Hydraulic Test 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)*

Turbine START (*Démarrage*) Lamp

Turbine IDLE (*Ralentissement*) Lamp

Engine Blocked Lamp

Alternator Switch
- *M = Marche = ON (UP)*
- *A = Arrêt = OFF (DOWN)*

Generator Switch
- *M = Marche = ON (UP)*
- *A = Arrêt = OFF (DOWN)*

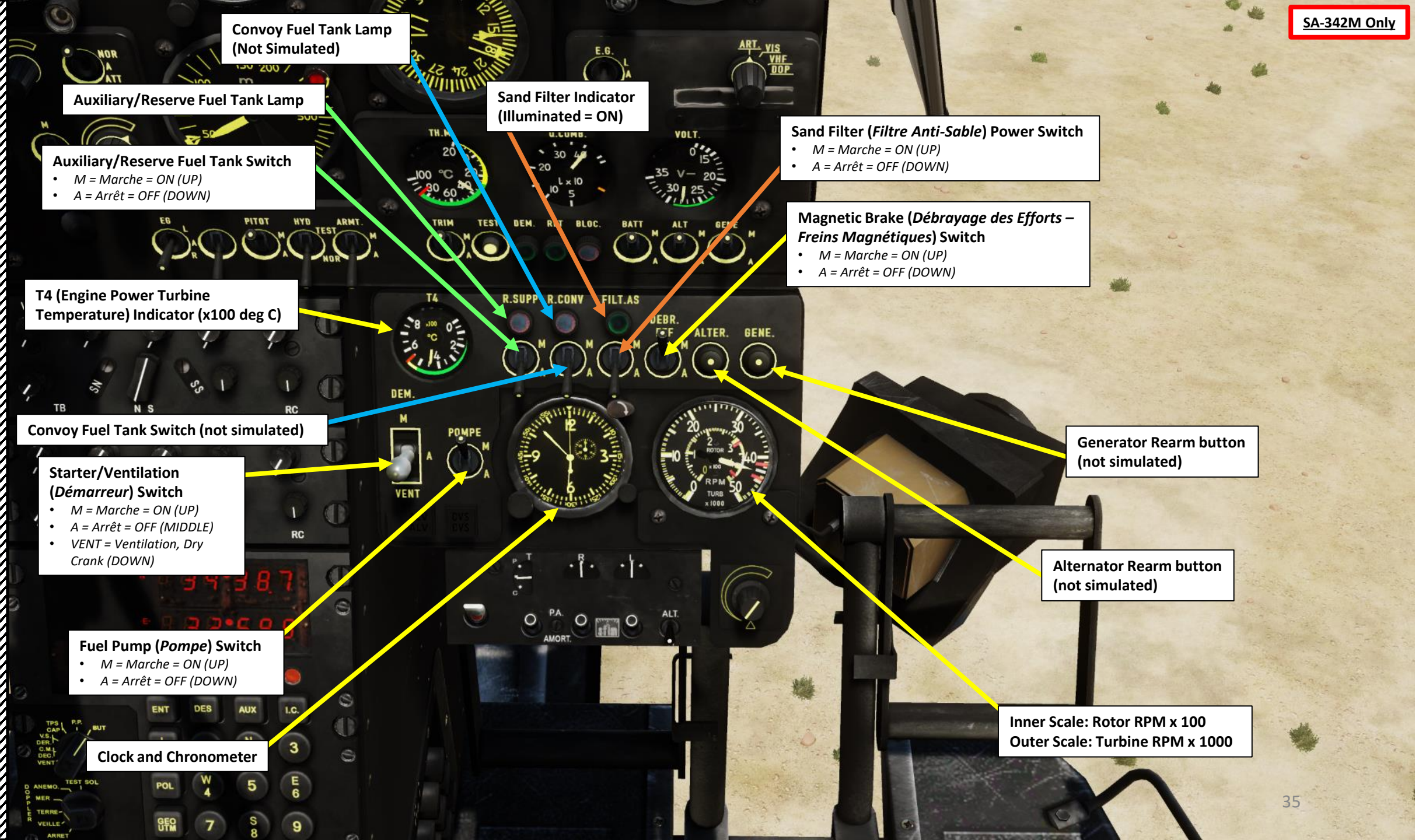
Battery Switch
- *M = Marche = ON (UP)*
- *A = Arrêt = OFF (DOWN)*

Switch Not Simulated

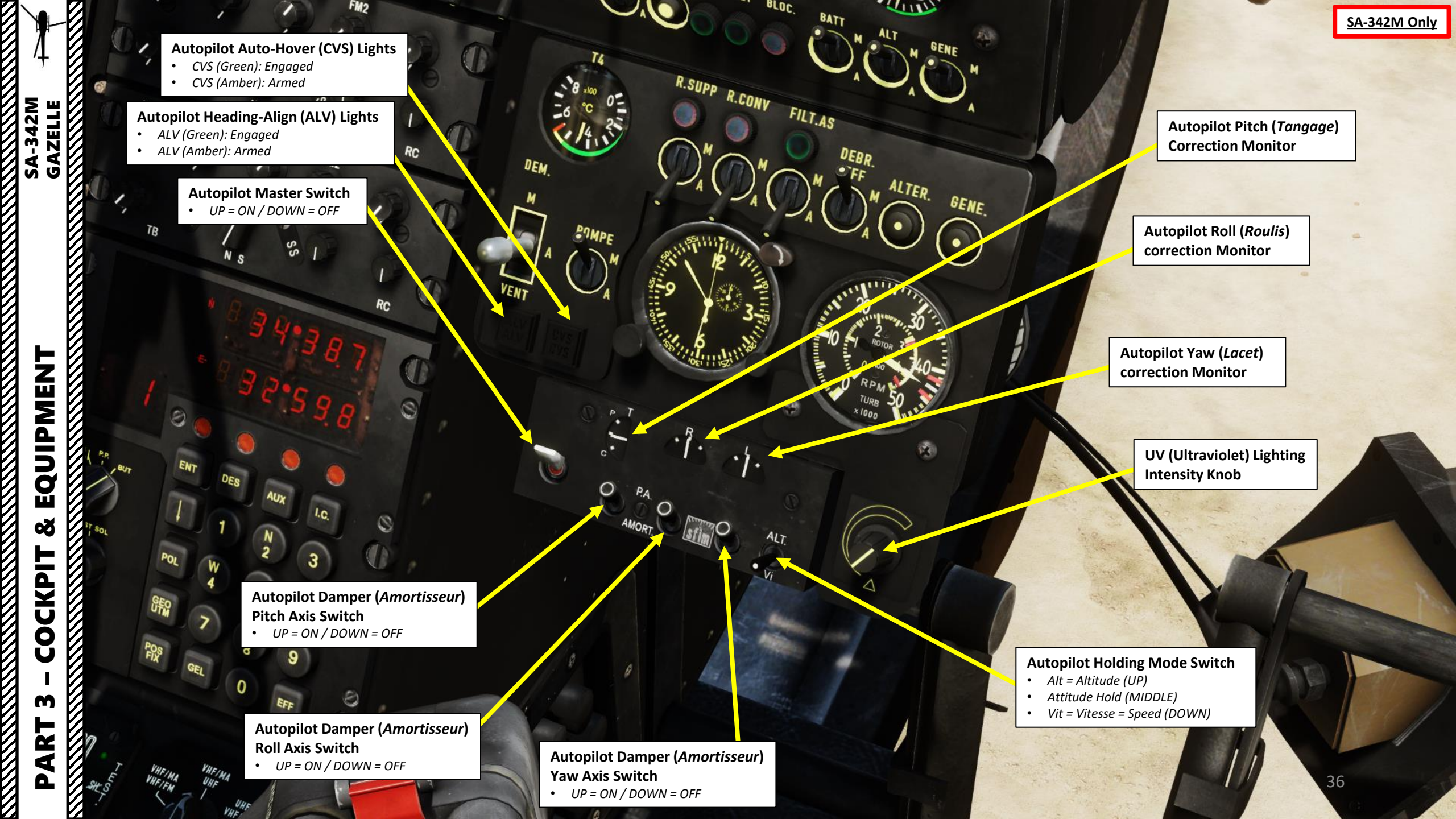
Pitot Heat Switch
- *M = Marche = ON (UP)*
- *A = Arrêt = OFF (DOWN)*

Master Arm (*Armement*) Switch
- *M = Marche = ON (UP)*
- *A = Arrêt = OFF (DOWN)*

SA-342M Only

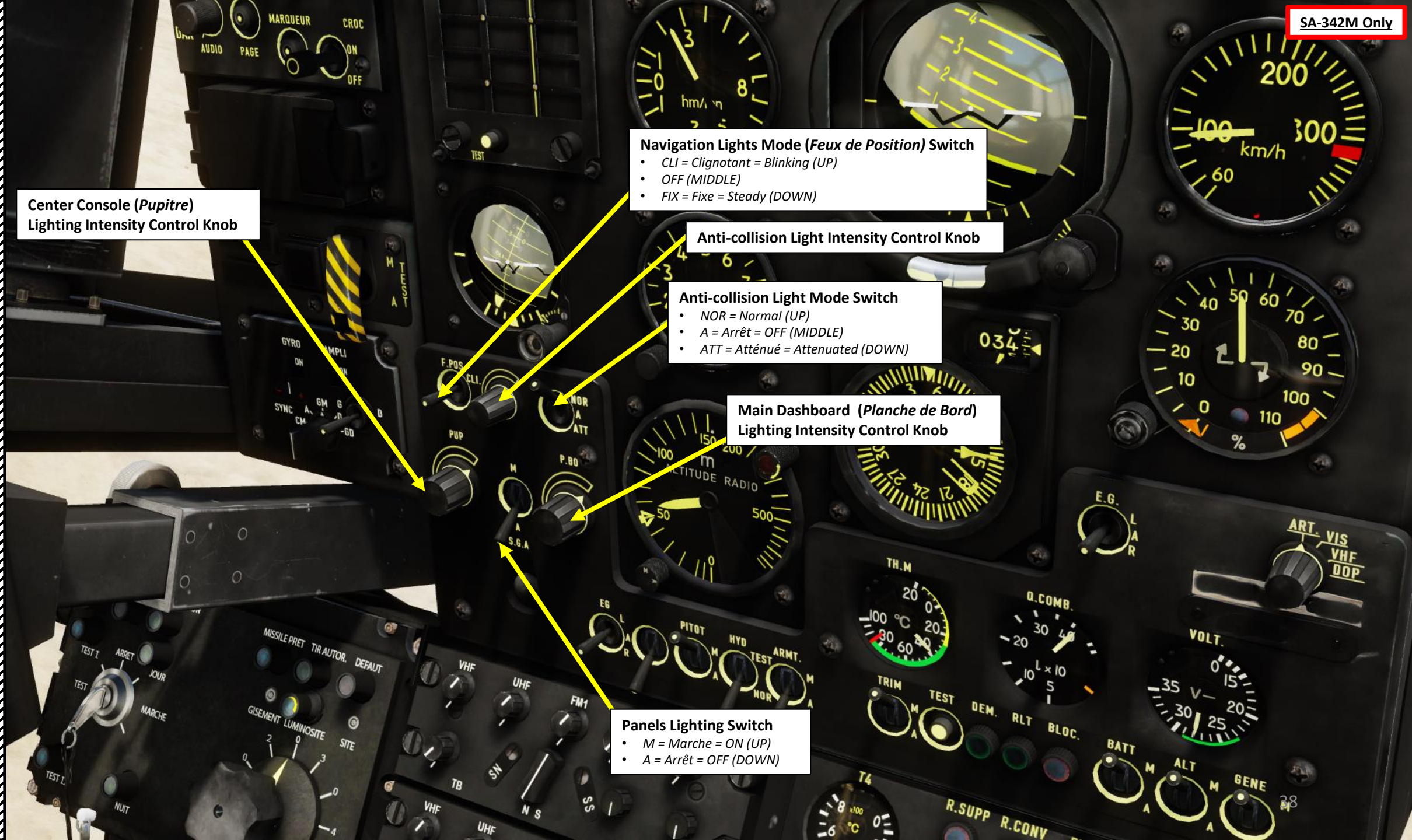

Convoy Fuel Tank Lamp (Not Simulated)
Auxiliary/Reserve Fuel Tank Lamp
Sand Filter Indicator (Illuminated = ON)
Auxiliary/Reserve Fuel Tank Switch
• M = Marche = ON (UP)
• A = Arrêt = OFF (DOWN)
Sand Filter (Filtre Anti-Sable) Power Switch
• M = Marche = ON (UP)
• A = Arrêt = OFF (DOWN)
Magnetic Brake (Débrayage des Efforts – Freins Magnétiques) Switch
• M = Marche = ON (UP)
• A = Arrêt = OFF (DOWN)
T4 (Engine Power Turbine Temperature) Indicator (x100 deg C)
Convoy Fuel Tank Switch (not simulated)
Starter/Ventilation (Démarreur) Switch
• M = Marche = ON (UP)
• A = Arrêt = OFF (MIDDLE)
• VENT = Ventilation, Dry Crank (DOWN)
Fuel Pump (Pompe) Switch
• M = Marche = ON (UP)
• A = Arrêt = OFF (DOWN)
Clock and Chronometer
Generator Rearm button (not simulated)
Alternator Rearm button (not simulated)
Inner Scale: Rotor RPM x 100
Outer Scale: Turbine RPM x 1000

SA-342M Only

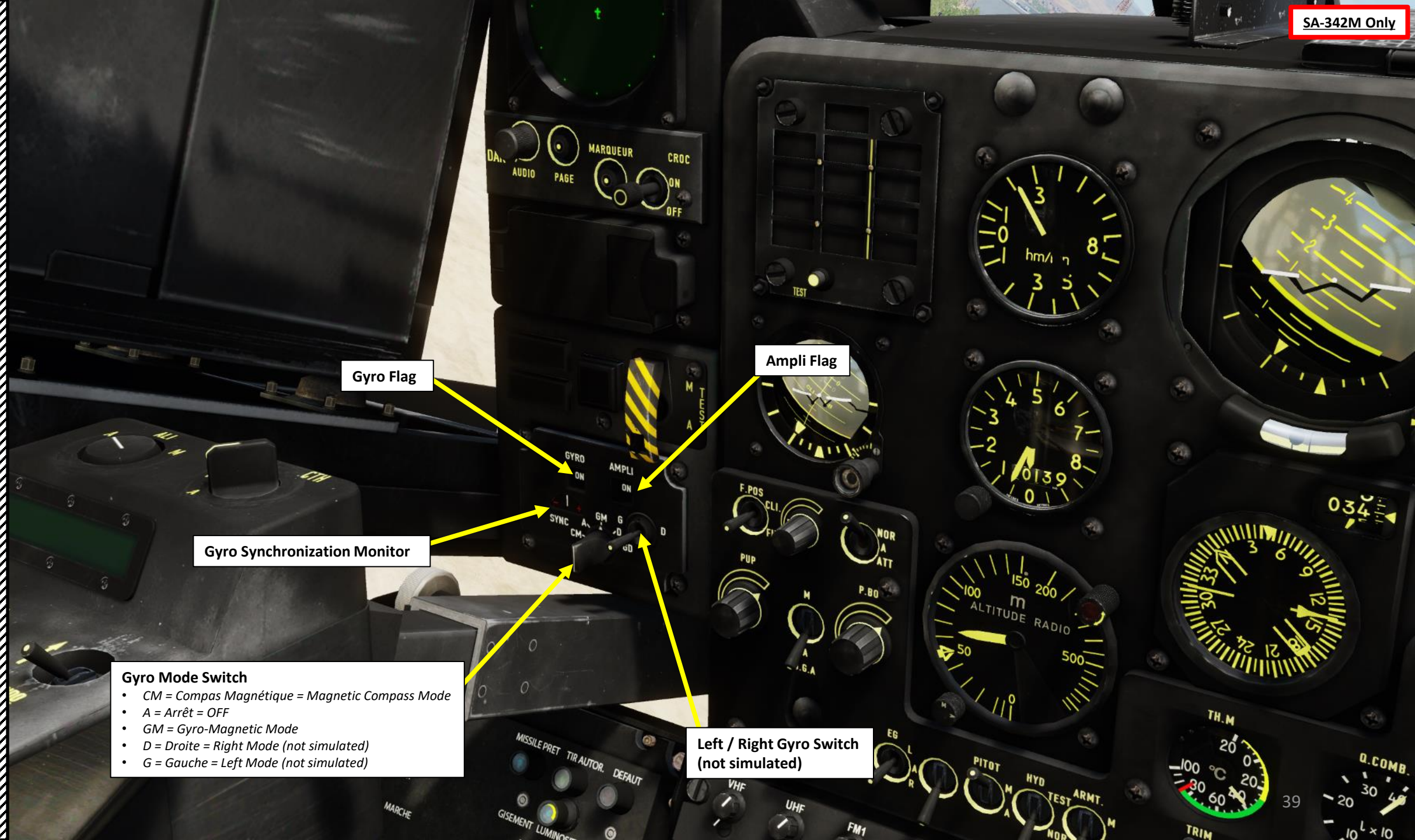

Autopilot Auto-Hover (CVS) Lights
• CVS (Green): Engaged
• CVS (Amber): Armed
Autopilot Heading-Align (ALV) Lights
• ALV (Green): Engaged
• ALV (Amber): Armed
Autopilot Master Switch
• UP = ON / DOWN = OFF
Autopilot Pitch (Tangage) Correction Monitor
Autopilot Roll (Roulis) correction Monitor
Autopilot Yaw (Lacet) correction Monitor
UV (Ultraviolet) Lighting Intensity Knob
Autopilot Damper (Amortisseur) Pitch Axis Switch
• UP = ON / DOWN = OFF
Autopilot Damper (Amortisseur) Roll Axis Switch
• UP = ON / DOWN = OFF
Autopilot Damper (Amortisseur) Yaw Axis Switch
• UP = ON / DOWN = OFF
Autopilot Holding Mode Switch
• Alt = Altitude (UP)
• Attitude Hold (MIDDLE)
• Vit = Vitesse = Speed (DOWN)

SA-342M Only

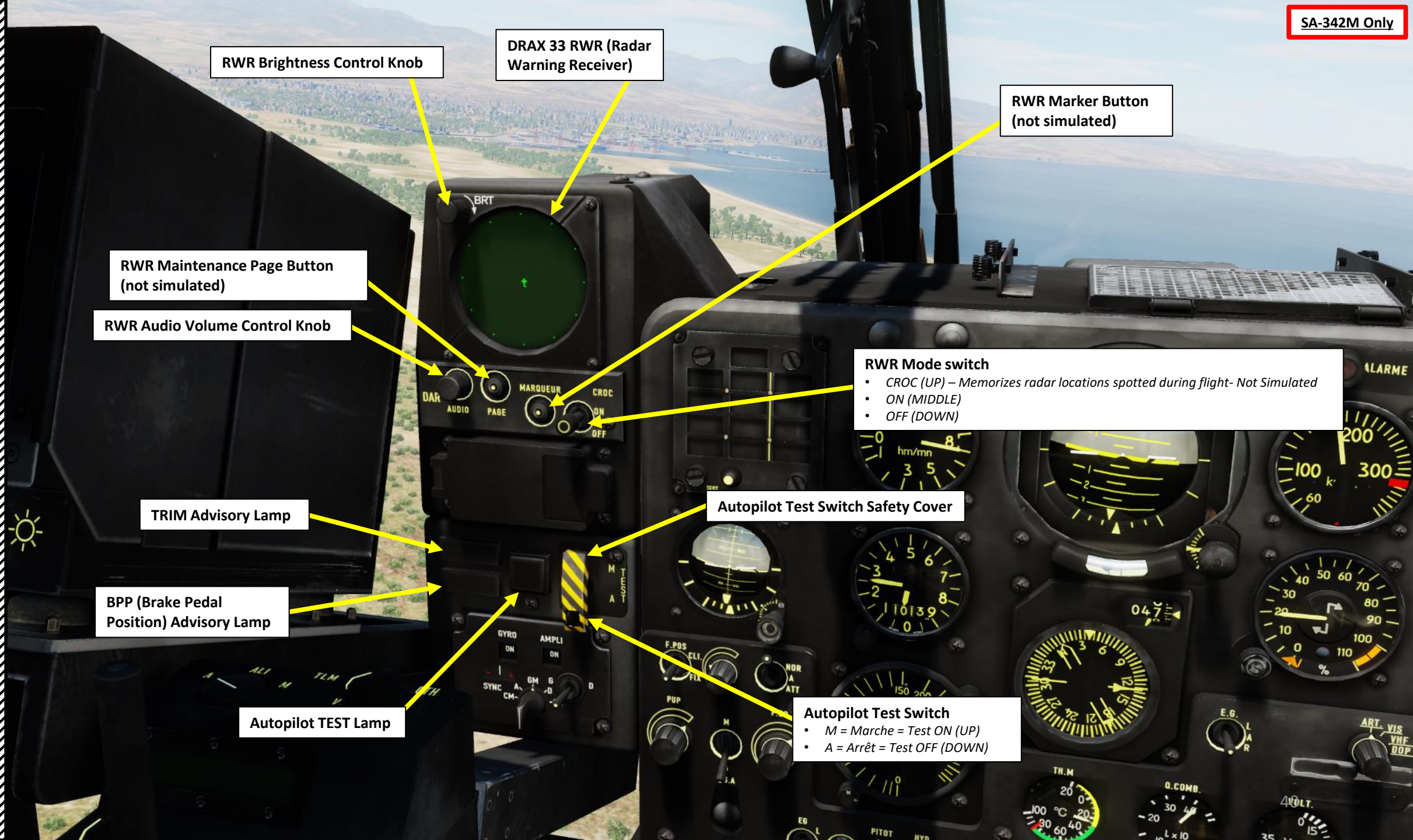
SA-342M Only


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 Light Intensity Control Knob
Anti-collision Light 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)*

SA-342M Only


Gyro Flag
Ampli Flag
Gyro Synchronization Monitor
Left / Right Gyro Switch (not simulated)
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)
MARQUEUR
CROC
AUDIO
PAGE
ON
OFF
GYRO
AMPLI
SYNC
ALTITUDE RADIO
PITOT
HYD
TEST
ARMT.
MISSILE PRET
TIR AUTOR.
DEFAUT
VHF
UHF
FM1
TH.M
TRIM
Q.COMB.

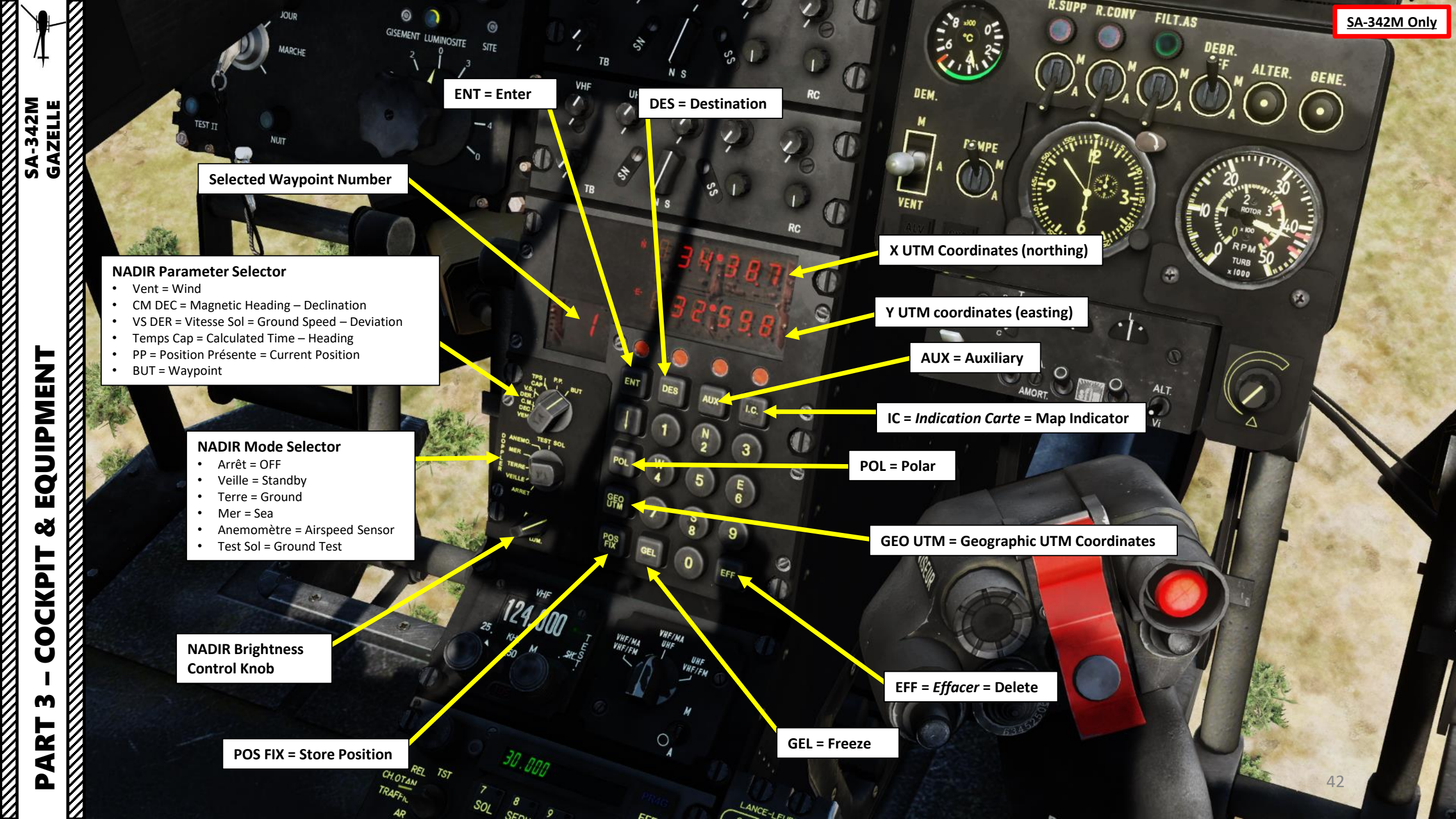
SA-342M Only


RWR Brightness Control Knob
DRAX 33 RWR (Radar Warning Receiver)
RWR Marker Button (not simulated)
RWR Maintenance Page Button (not simulated)
RWR Audio Volume Control Knob
RWR Mode switch
• CROC (UP) – Memorizes radar locations spotted during flight- Not Simulated
• ON (MIDDLE)
• OFF (DOWN)
Autopilot Test Switch Safety Cover
TRIM Advisory Lamp
BPP (Brake Pedal Position) Advisory Lamp
Autopilot TEST Lamp
Autopilot Test Switch
• M = Marche = Test ON (UP)
• A = Arrêt = Test OFF (DOWN)
BRT
DAR
AUDIO
PAGE
MARQUEUR
CROC
ON
OFF
TEST
GYRO
AMPLI
F.POS
PUP
ALARME
hm/mn
E.G.
TH.M
Q.COMB.
VOLT.
ART.
VIS
VHF
DOP

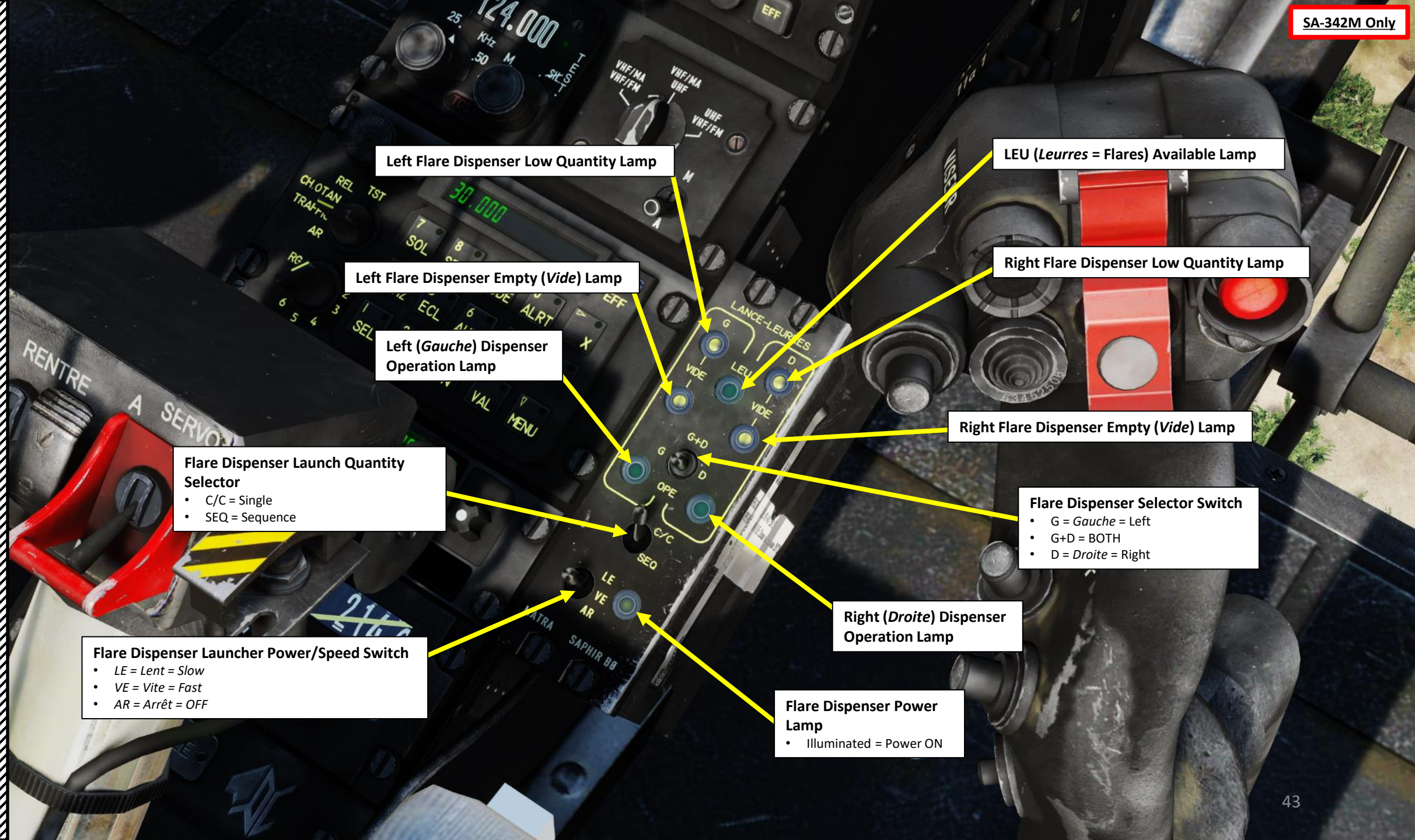
SA-342M Only


Pilot Audio Control Panel
Intercom FM1 Volume Control
Intercom FM2 Volume Control
Intercom VHF Volume Control
Intercom UHF Volume Control
Copilot Audio Control Panel
VHF
UHF
FM1
FM2
TB
SN
N S
SS
RC
ENT
DES
AUX
I.C.
ALTITUDE
VOLT.
TRIM
TEST
DEM.
RLT
BLOC.
BATT
ALT
GENE
R.SUPP
R.CONV
FILT.AS
DEBR.
ALTER.
GENE.
VENT
POMPE
RPM
ROTOR
TURB
P.A.
AMORT.
ALT.

SA-342M Only


ENT = Enter
DES = Destination
Selected Waypoint Number
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
POL = Polar
GEO UTM = Geographic UTM Coordinates
NADIR Mode Selector
• Arrêt = OFF
• Veille = Standby
• Terre = Ground
• Mer = Sea
• Anemomètre = Airspeed Sensor
• Test Sol = Ground Test
NADIR Brightness Control Knob
EFF = *Effacer* = Delete
GEL = Freeze
POS FIX = Store Position

SA-342M Only

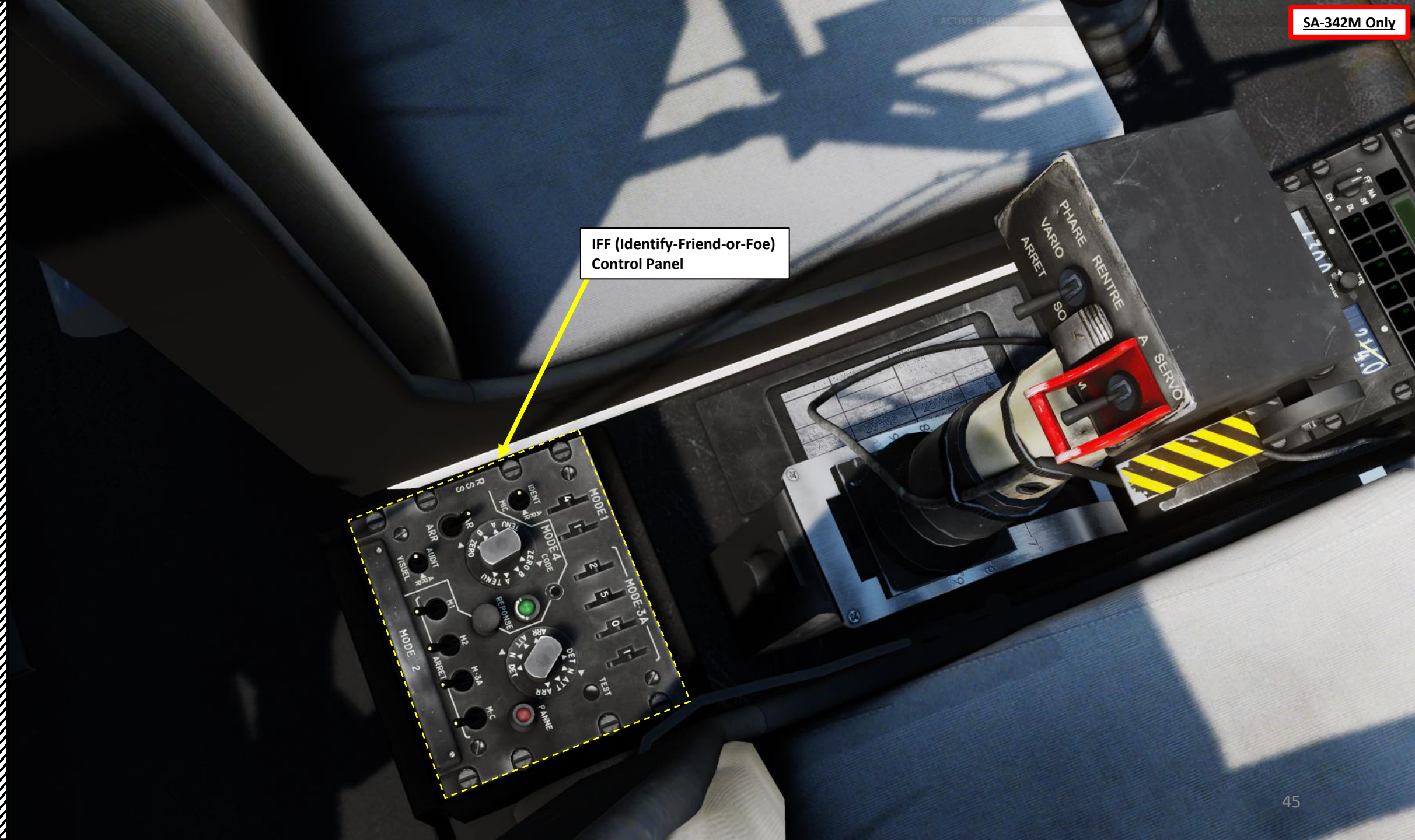

Left Flare Dispenser Low Quantity Lamp
LEU (*Leurres* = Flares) Available Lamp
Left Flare Dispenser Empty (*Vide*) Lamp
Right Flare Dispenser Low Quantity Lamp
Left (*Gauche*) Dispenser Operation Lamp
Right Flare Dispenser Empty (*Vide*) Lamp
Flare Dispenser Launch Quantity Selector
• C/C = Single
• SEQ = Sequence
Flare Dispenser Selector Switch
• G = *Gauche* = Left
• G+D = BOTH
• D = *Droite* = Right
Right (*Droite*) Dispenser Operation Lamp
Flare Dispenser Launcher Power/Speed Switch
• *LE = Lent = Slow*
• *VE = Vite = Fast*
• *AR = Arrêt = OFF*
Flare Dispenser Power Lamp
• Illuminated = Power ON

SA-342M Only


VHF AM Radio Panel
FM PR4G Radio Panel
UHF Radio Panel
ADF (Automatic Direction Finder)
Radio Navigation Panel

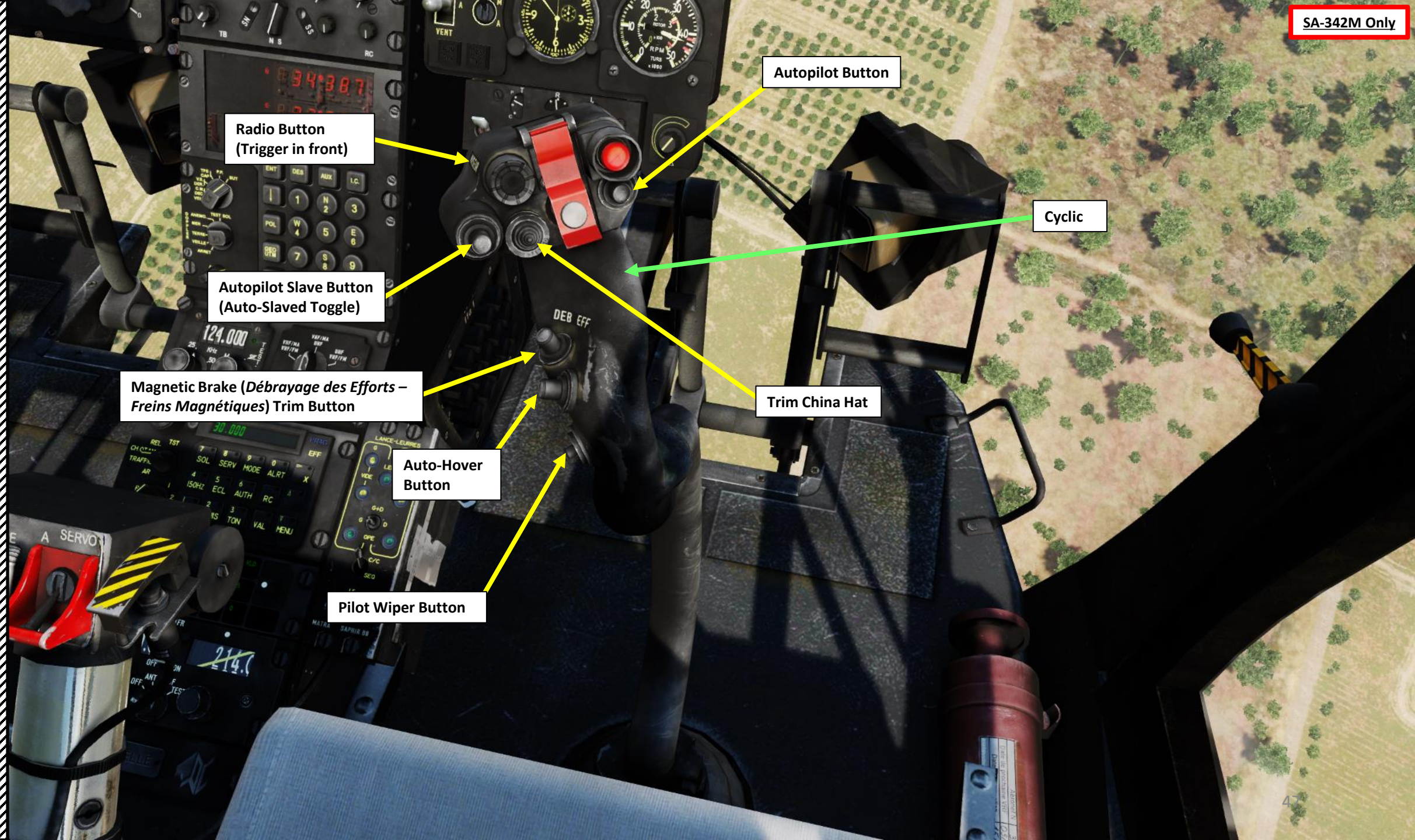
PART 3 – COCKPIT & EQUIPMENT

SA-342M Only

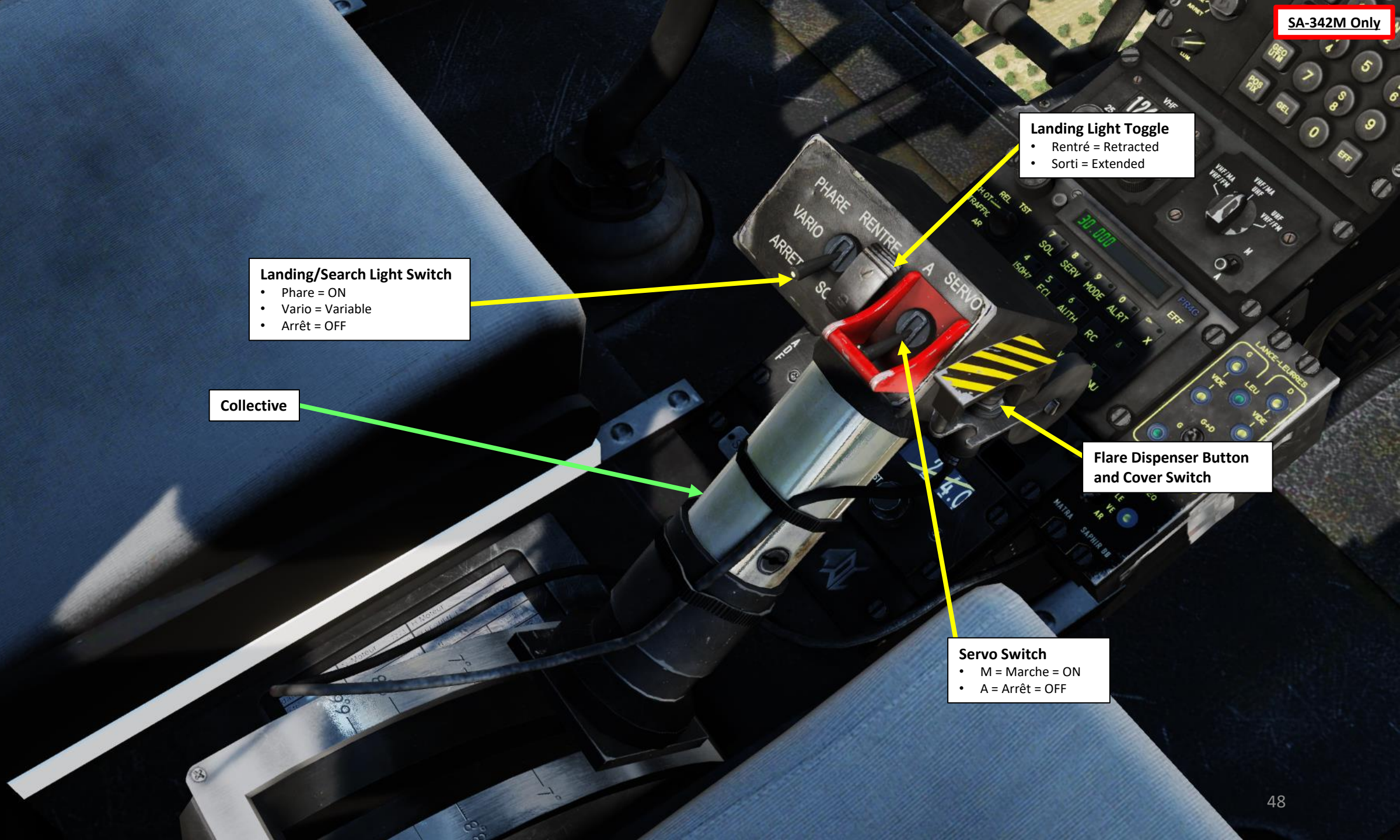


PART 3 – COCKPIT & EQUIPMENT

SA-342M Only


Autopilot Button
Radio Button (Trigger in front)
Cyclic
Autopilot Slave Button (Auto-Slaved Toggle)
Magnetic Brake (*Débrayage des Efforts – Freins Magnétiques*) Trim Button
Trim China Hat
Auto-Hover Button
Pilot Wiper Button

SA-342M Only



Landing Light Toggle
- Rentré = Retracted
- Sorti = Extended

Landing/Search Light Switch
- Phare = ON
- Vario = Variable
- Arrêt = OFF

Collective

Flare Dispenser Button and Cover Switch

Servo Switch
- M = Marche = ON
- A = Arrêt = OFF

SA-342M Only

SA-342M Only

Compass Heading Correction Sheet

- *CM = Cap Magnétique = Magnetic Heading*
- *CC = Cap Compas = Compass Heading*

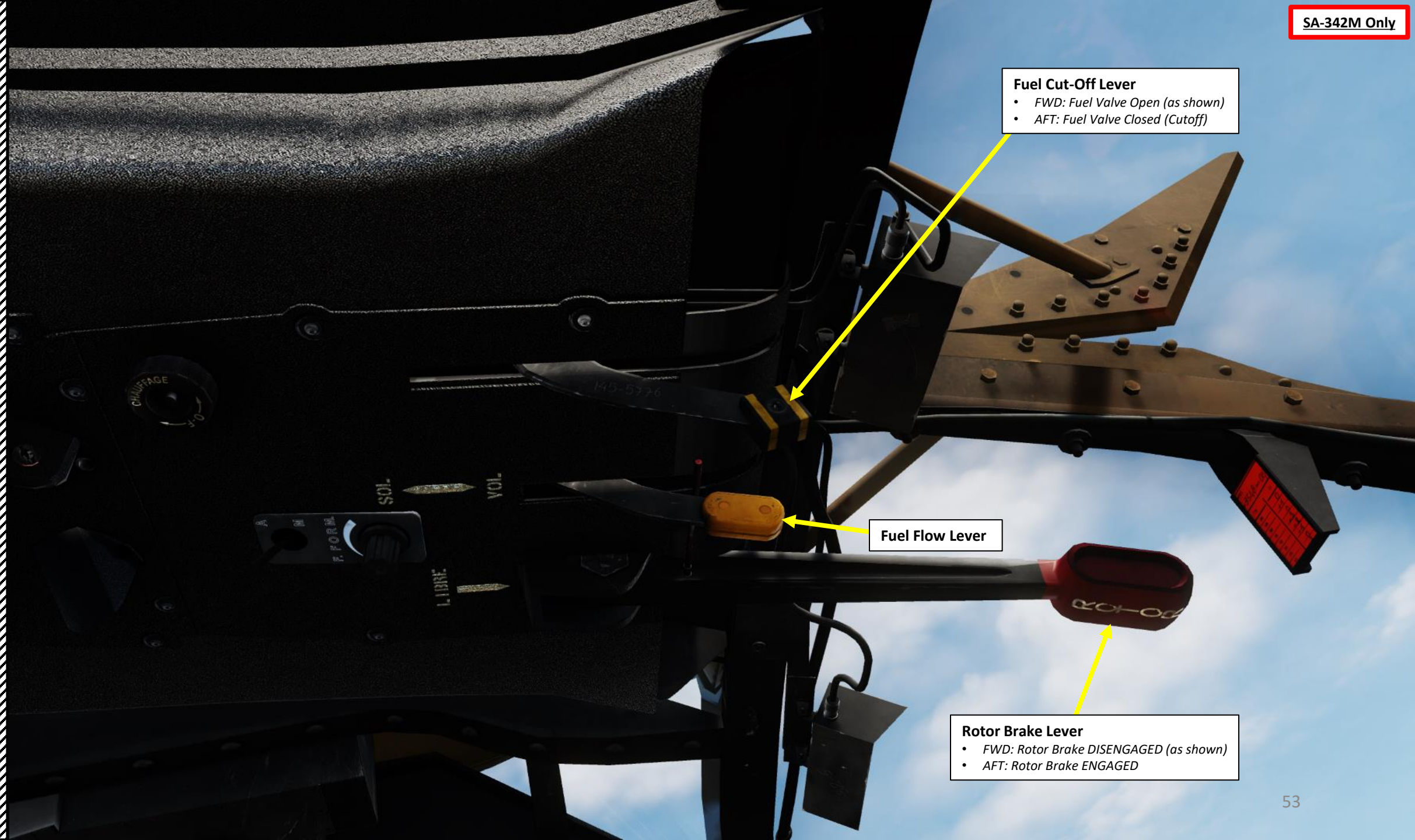
Standby Magnetic Compass

SA-342M Only

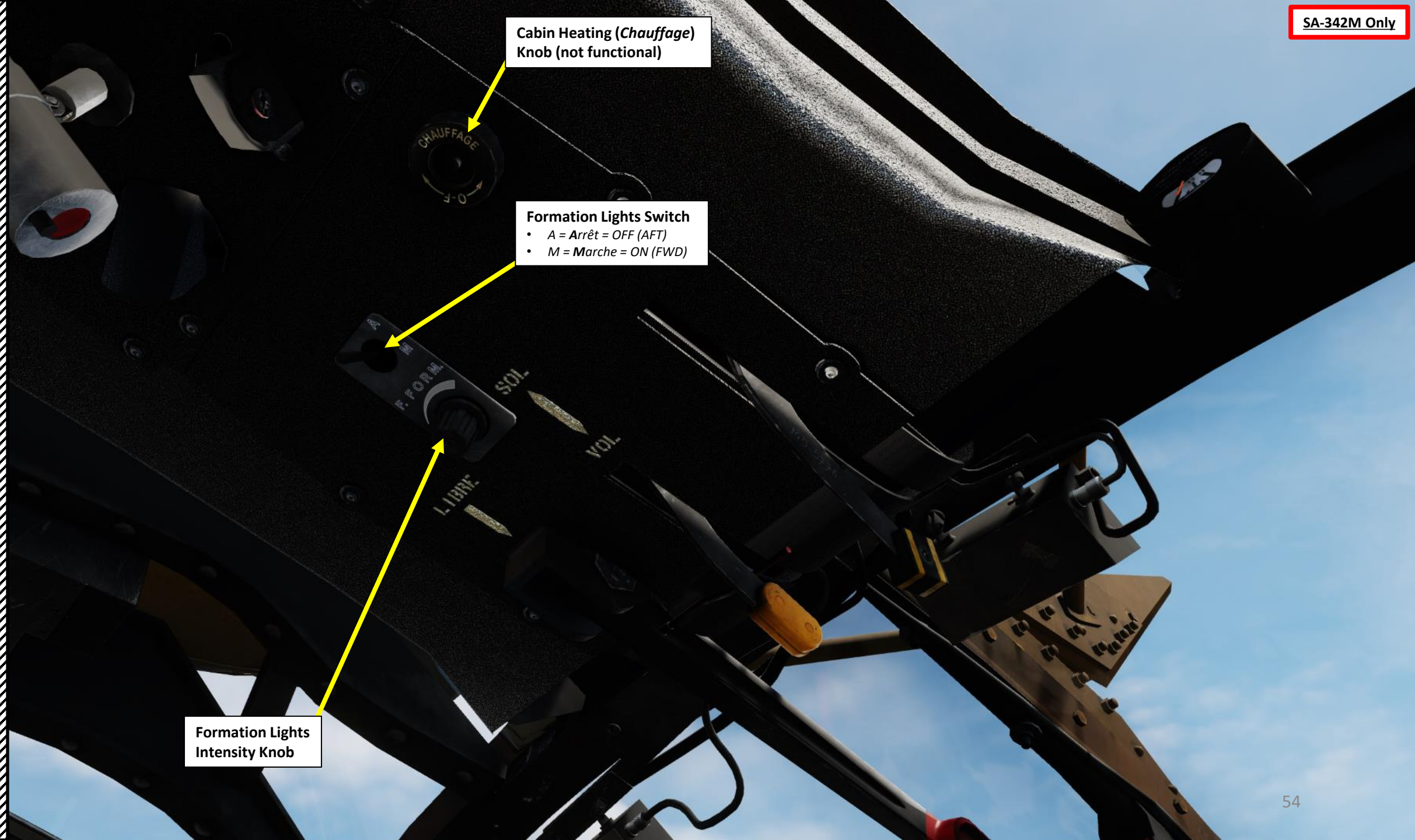
Compass Heading Correction Sheet	
CM = Cap Magnétique Magnetic Heading	CC = Cap Compas Compass Heading
0	0
045	+1
090	0
135	-3
180	-2
225	-1
270	0
315	-3

SA-342M Only

SA-342M Only


Fuel Cut-Off Lever
• FWD: Fuel Valve Open (as shown)
• AFT: Fuel Valve Closed (Cutoff)
Fuel Flow Lever
Rotor Brake Lever
• FWD: Rotor Brake DISENGAGED (as shown)
• AFT: Rotor Brake ENGAGED

SA-342M Only

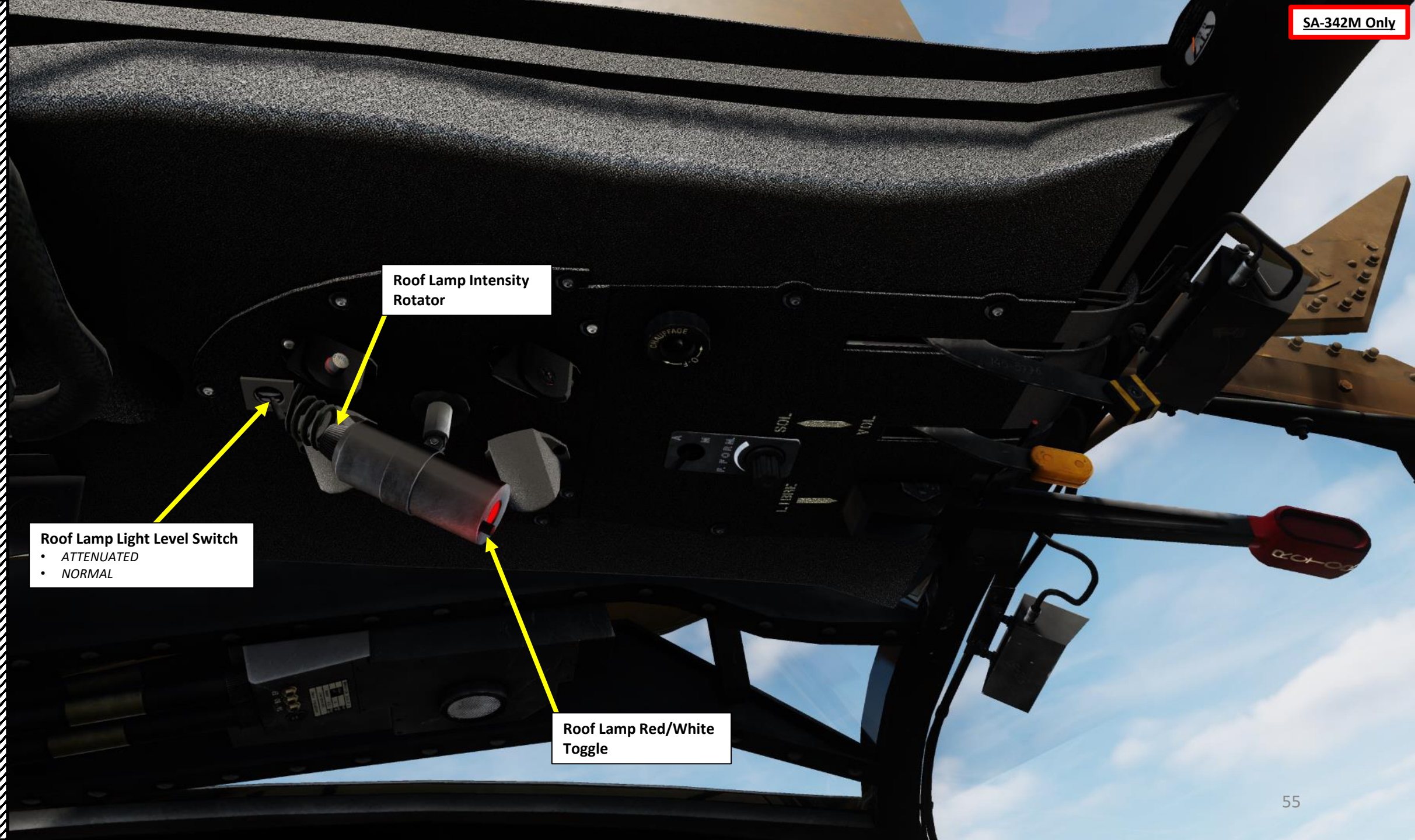


Cabin Heating (*Chauffage*) Knob (not functional)

Formation Lights Switch
- *A = **A**rrêt = OFF (AFT)*
- *M = **M**arche = ON (FWD)*

Formation Lights Intensity Knob

SA-342M Only

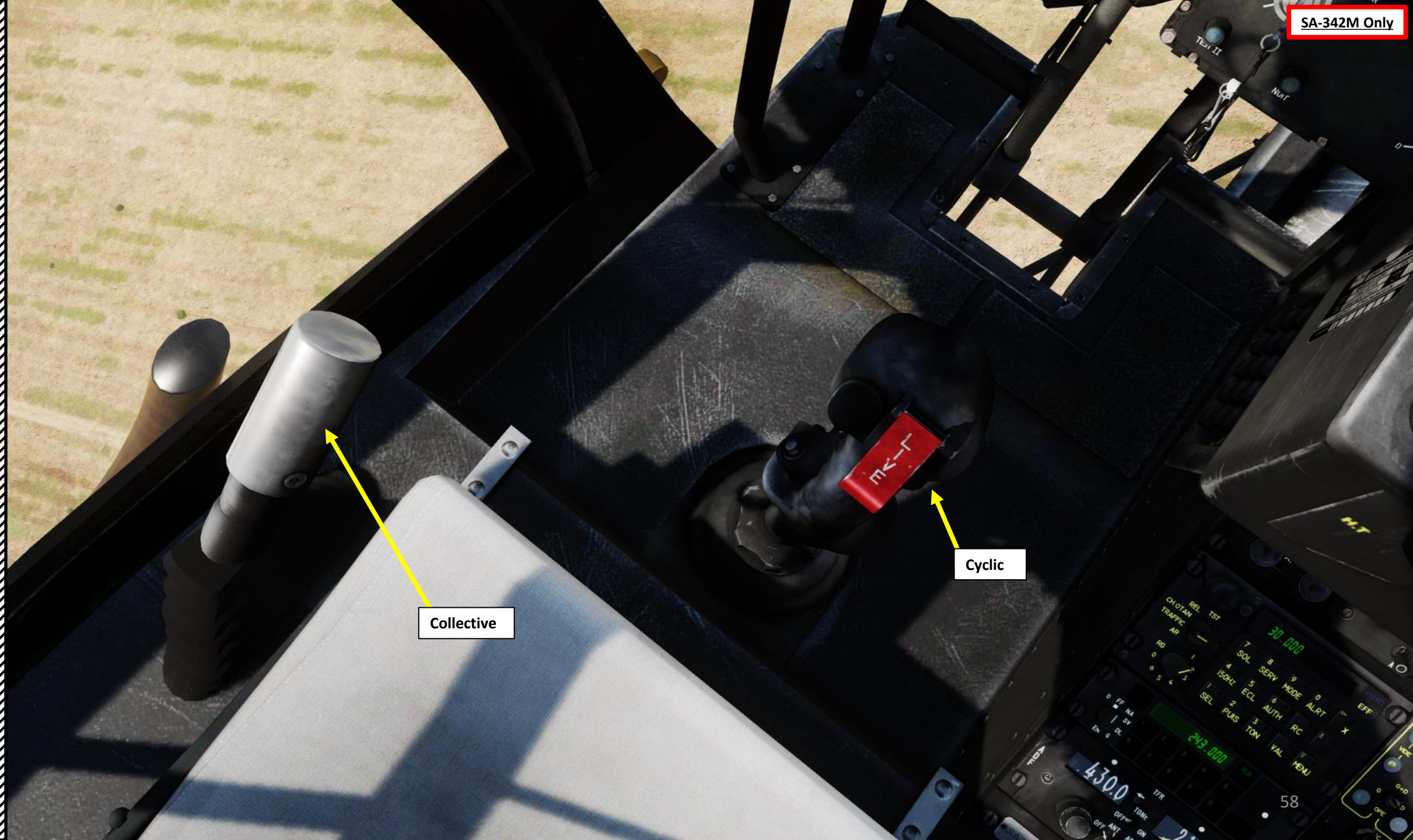

Roof Lamp Intensity Rotator
Roof Lamp Light Level Switch
• ATTENUATED
• NORMAL
Roof Lamp Red/White Toggle

PART 3 – COCKPIT & EQUIPMENT

SA-342M Only

SA-342M Only

SA-342M Only



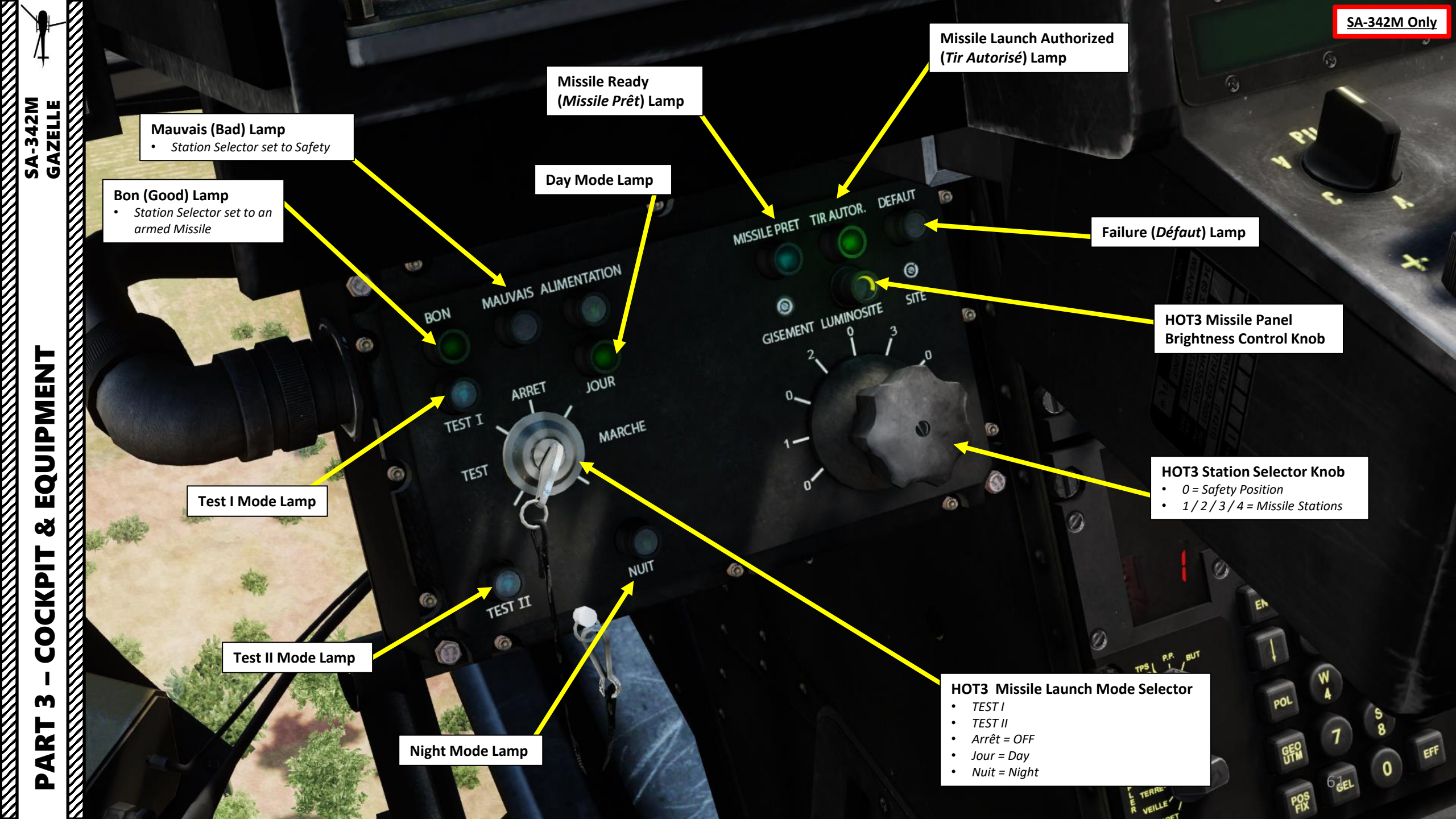
SA-342M Only

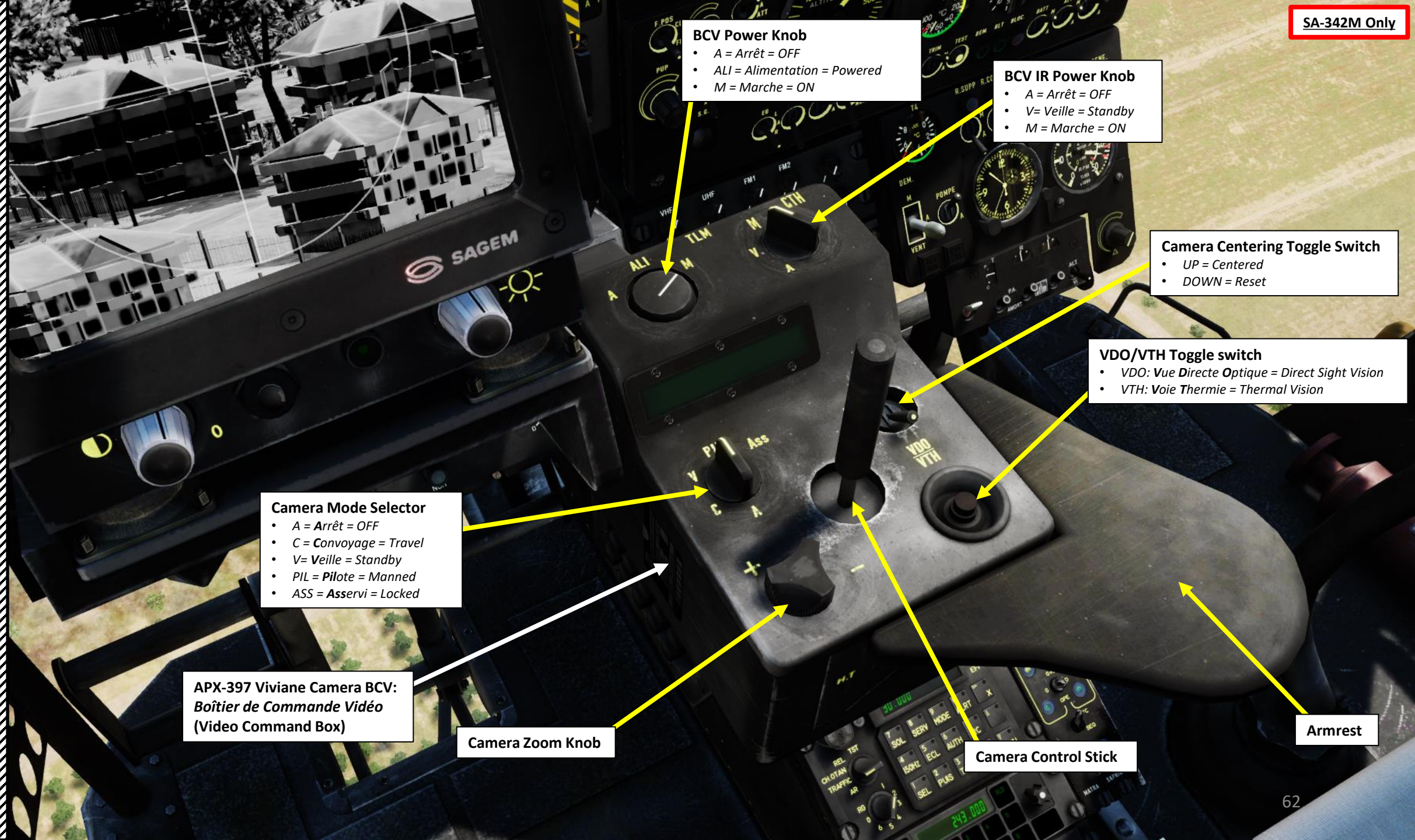

Lasing Button and Cover Switch
Image Focus (Vertical Axis)
Image Gain (Horizontal Axis)
Symbology Brightness (Vertical Axis)
Image Brightness (Horizontal Axis)
Copilot Video Stick
Missile Launch Button and Cover Switch
Symbology Inverse Toggle
Image Inverse Toggle

SA-342M Only


TV Display
TV Contrast Knob
TV Power Switch
• UP = ON
• DOWN = OFF
TV Power Lamp
• Illuminated = ON
TV Brightness Knob
SAGEM
BRT
DAR
AUDIO
PAGE
MARQUE
GYRO
ON

SA-342M Only


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


SA-342M Only
BCV 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
VDO/VTH Toggle switch
• VDO: Vue Directe Optique = Direct Sight Vision
• VTH: Voie Thermie = Thermal Vision
Camera Mode Selector
• A = Arrêt = OFF
• C = Convoyage = Travel
• V= Veille = Standby
• PIL = Pilote = Manned
• ASS = Asservi = Locked
APX-397 Viviane Camera BCV:
Boîtier de Commande Vidéo
(Video Command Box)
Camera Zoom Knob
Camera Control Stick
Armrest

PART 3 – COCKPIT & EQUIPMENT

SA-342M Only

SA-342M Only

SA-342M Only

Night Vision Goggles (NVG) Controls:

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

SA-342M Only


SA-342M Only
Wire Cutter
GAM

PART 3 – COCKPIT & EQUIPMENT

SA-342M Only

SA-342M Only

Landing/Search Light Switch
- Phare = ON
- Vario = Variable
- Arrêt = OFF

Landing Light Toggle
- Rentré = Retracted
- Sorti = Extended

Landing/Search Light

SA-342M Only

Navigation Lights Mode (*Feux de Position)* Switch
- *CLI = Clignotant = Blinking (UP)*
- *OFF (MIDDLE)*
- *FIX = Fixe = Steady (DOWN)*

Navigation/Position Red Light (*Feu de Position*)

Navigation/Position White Light (*Feu de Position*)

Navigation/Position Green Light (*Feu de Position*)

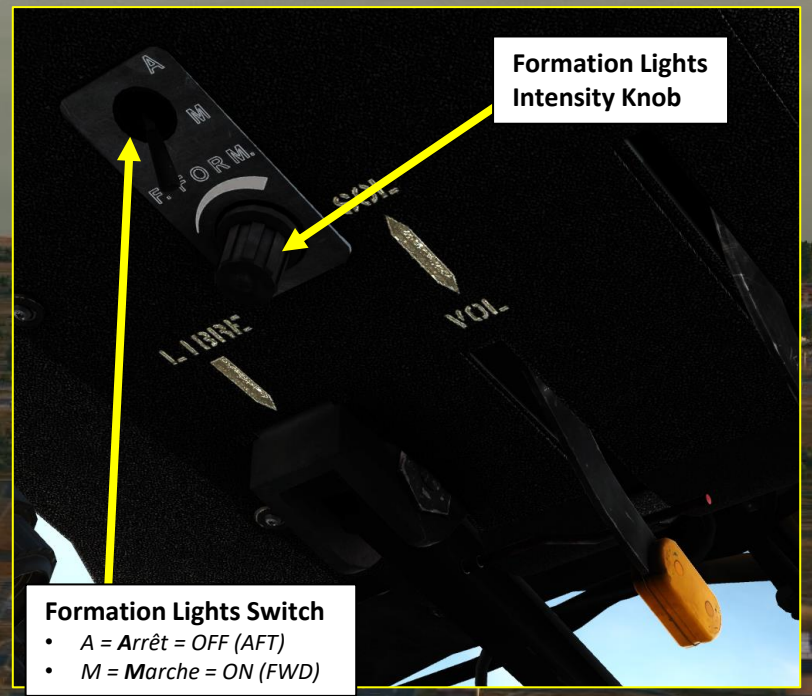
SA-342M Only

Anti-collision Light Mode Switch
- *NOR = Normal (UP)*
- *A = Arrêt = OFF (MIDDLE)*
- *ATT = Atténué = Attenuated (DOWN)*

Anti-collision Light Intensity Control Knob

Strobe/Anti-Collision Light

SA-342M Only



Formation Lights Intensity Knob

Formation Lights Switch
- *A = **A**rrêt = OFF (AFT)*
- *M = **M**arche = ON (FWD)*

Formation Light

Formation Light

Formation Light

armée de TERRE

SA-342M Only


Sand Filter
Infrared Deflector
(Suppresses IR signature)
ée de TERRE

SA-342M Only


SA-342M Only
APX-397 Viviane Camera System
HOT3 Anti-Tank Missile
armée de TERRE
3863

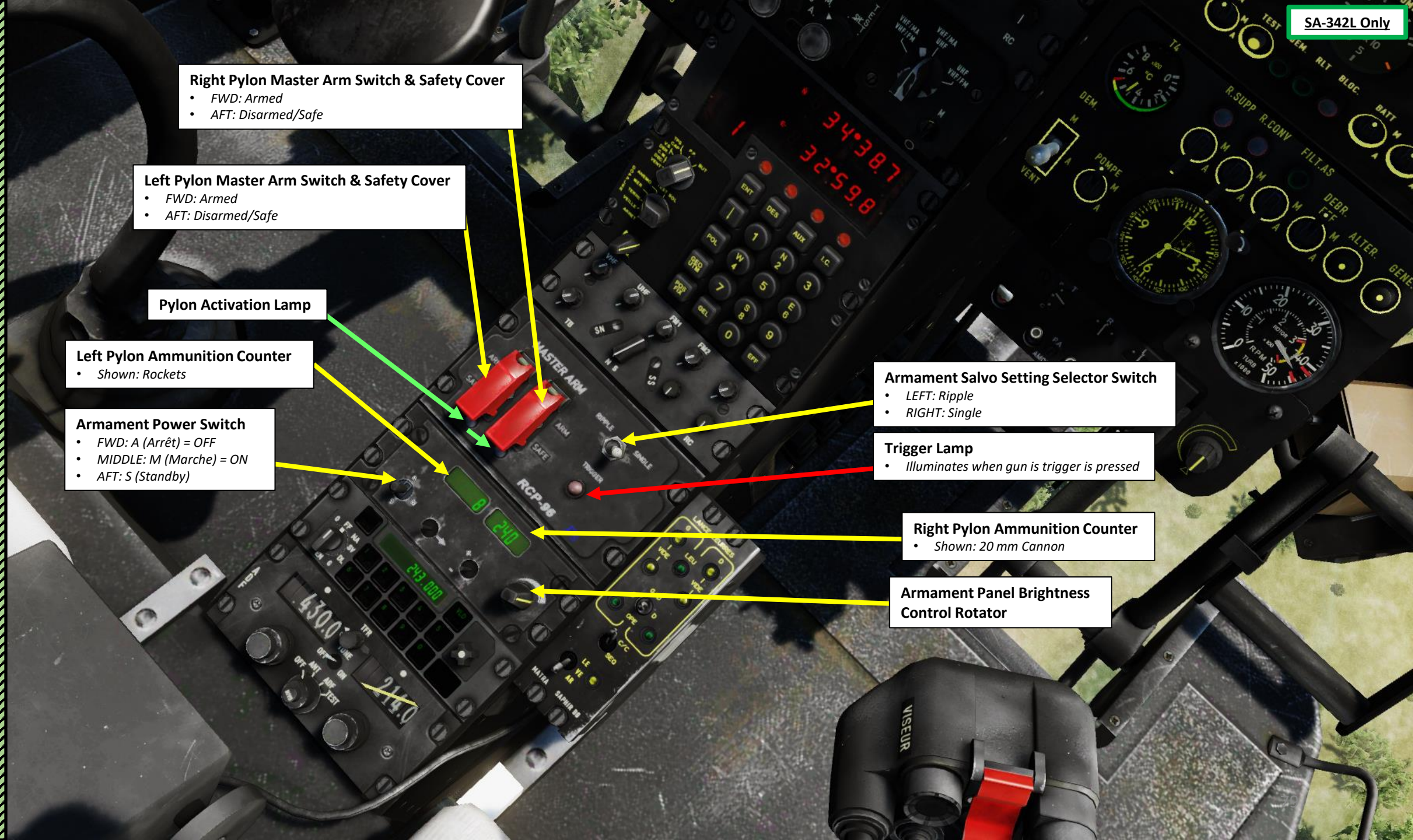
PART 3 – COCKPIT & EQUIPMENT

SA-342L Only

SA-342L Only

PART 3 – COCKPIT & EQUIPMENT

SA-342L Only


Right Pylon Master Arm Switch & Safety Cover
• FWD: Armed
• AFT: Disarmed/Safe
Left Pylon Master Arm Switch & Safety Cover
• FWD: Armed
• AFT: Disarmed/Safe
Pylon Activation Lamp
Left Pylon Ammunition Counter
• Shown: Rockets
Armament Power Switch
• FWD: A (Arrêt) = OFF
• MIDDLE: M (Marche) = ON
• AFT: S (Standby)
Armament Salvo Setting Selector Switch
• LEFT: Ripple
• RIGHT: Single
Trigger Lamp
• Illuminates when gun is trigger is pressed
Right Pylon Ammunition Counter
• Shown: 20 mm Cannon
Armament Panel Brightness Control Rotator

PART 3 – COCKPIT & EQUIPMENT

SA-342L Only

SA-342L Only

PART 3 – COCKPIT & EQUIPMENT

PART 3 – COCKPIT & EQUIPMENT

SA-342L Only

SA-342L Only

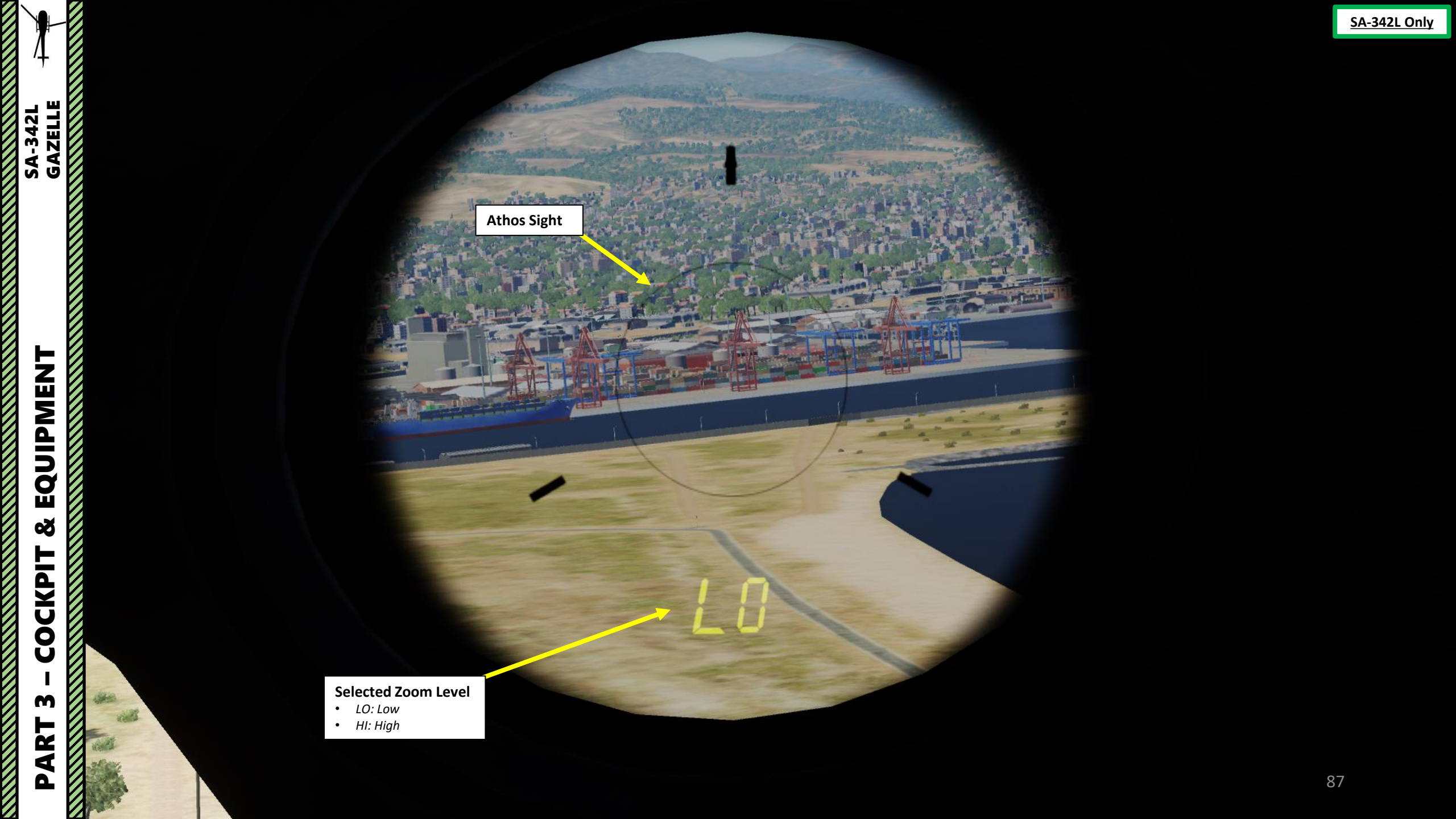
SA-342L Only


Athos Sight
• Shown: Stowed
• Click to Deploy
Copilot Video Stick

SA-342L Only

Athos Sight
- *Shown: Deployed*
- *Click to stow*

SA-342L Only

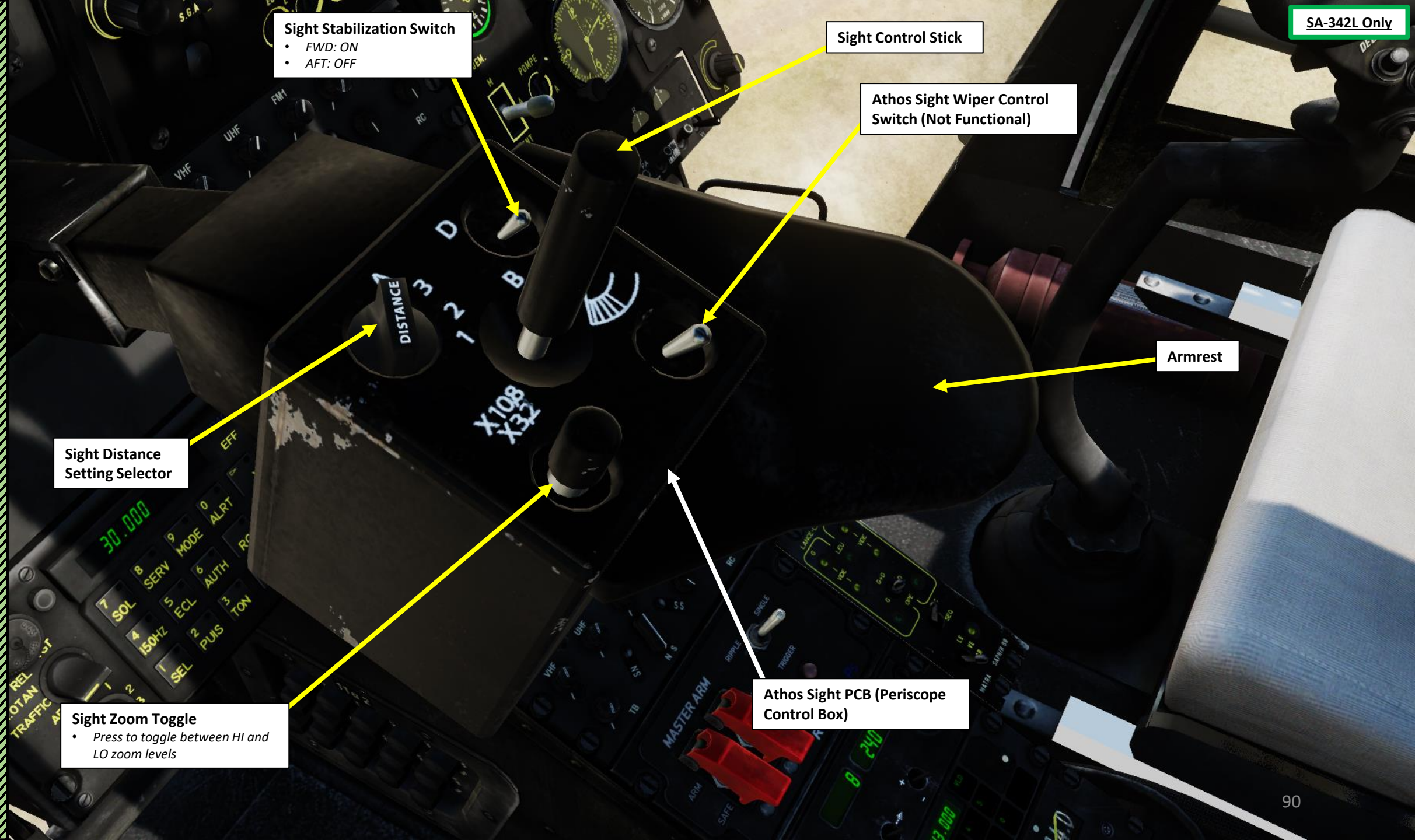


PART 3 – COCKPIT & EQUIPMENT

SA-342L Only

PART 3 – COCKPIT & EQUIPMENT

SA-342L Only


Sight Stabilization Switch
• FWD: ON
• AFT: OFF
Sight Control Stick
Athos Sight Wiper Control Switch (Not Functional)
SA-342L Only
Armrest
Sight Distance Setting Selector
Athos Sight PCB (Periscope Control Box)
Sight Zoom Toggle
• Press to toggle between HI and LO zoom levels

SA-342L Only

PART 3 – COCKPIT & EQUIPMENT

SA-342L Only

PART 3 – COCKPIT & EQUIPMENT

SA-342L Only


SA-342L Only
Mistral Air-to-Air IR (Infrared) Missile

SA-342L Only

PART 3 – COCKPIT & EQUIPMENT

SA-342L Only

HMP-400 Gunpod (400 rounds)

- *Caliber: 0.50 in, 12.7 mm*

SA-342L Only


HELICOPTER GROUP
GROUP NAME Rotary-1
CONDITION % 100
COUNTRY France COMBAT
TASK CAS
UNIT 1 OF 1
TYPE SA342L
SKILL Player
PILOT Rotary-1-1
TAIL # GAM3863
RADIO FREQUENCY 124 MHz AM
CALLSIGN Enfield 1 1
HIDDEN ON MAP
HIDDEN ON PLANNER
HIDDEN ON MFD
LATE ACTIVATION
PASSWORD
NS430 Allow
Remove Doors
Remove Tablet
armée de TERRE
3863
Removable Side Doors (Mission Editor Setting)

PART 3 – COCKPIT & EQUIPMENT

SA-342 Minigun Only

PART 3 – COCKPIT & EQUIPMENT

SA-342 Minigun Only

SEAT SELECTION CONTROLS

- Pilot: 1
- Co-Pilot: 2
- Gunner: 3

PART 3 – COCKPIT & EQUIPMENT

SA-342 Minigun Only

SA-342 Minigun Only

PART 3 – COCKPIT & EQUIPMENT

SA-342 Minigun Only

PART 3 – COCKPIT & EQUIPMENT

SA-342 Minigun Only

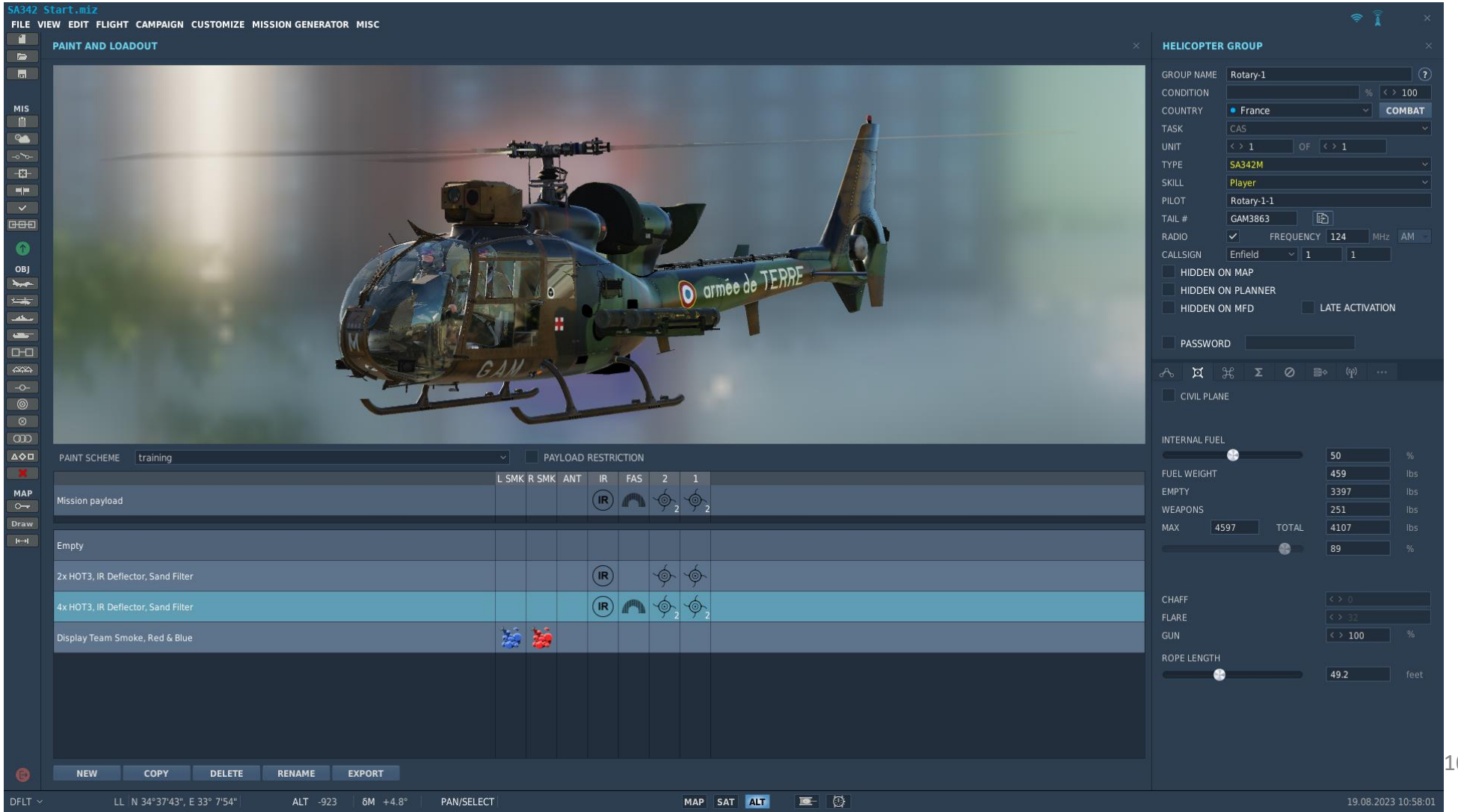
PART 3 – COCKPIT & EQUIPMENT

SA-342 Minigun Only

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 (263 L) if you intend to carry 4 TOW missiles, which provides roughly 1h08 of flight time.
If equipped with 2 TOW missiles and an infrared deflector, the Gazelle's maximal amount of fuel will be around 350 L (66 %), which provides roughly 1h30 of flight time.



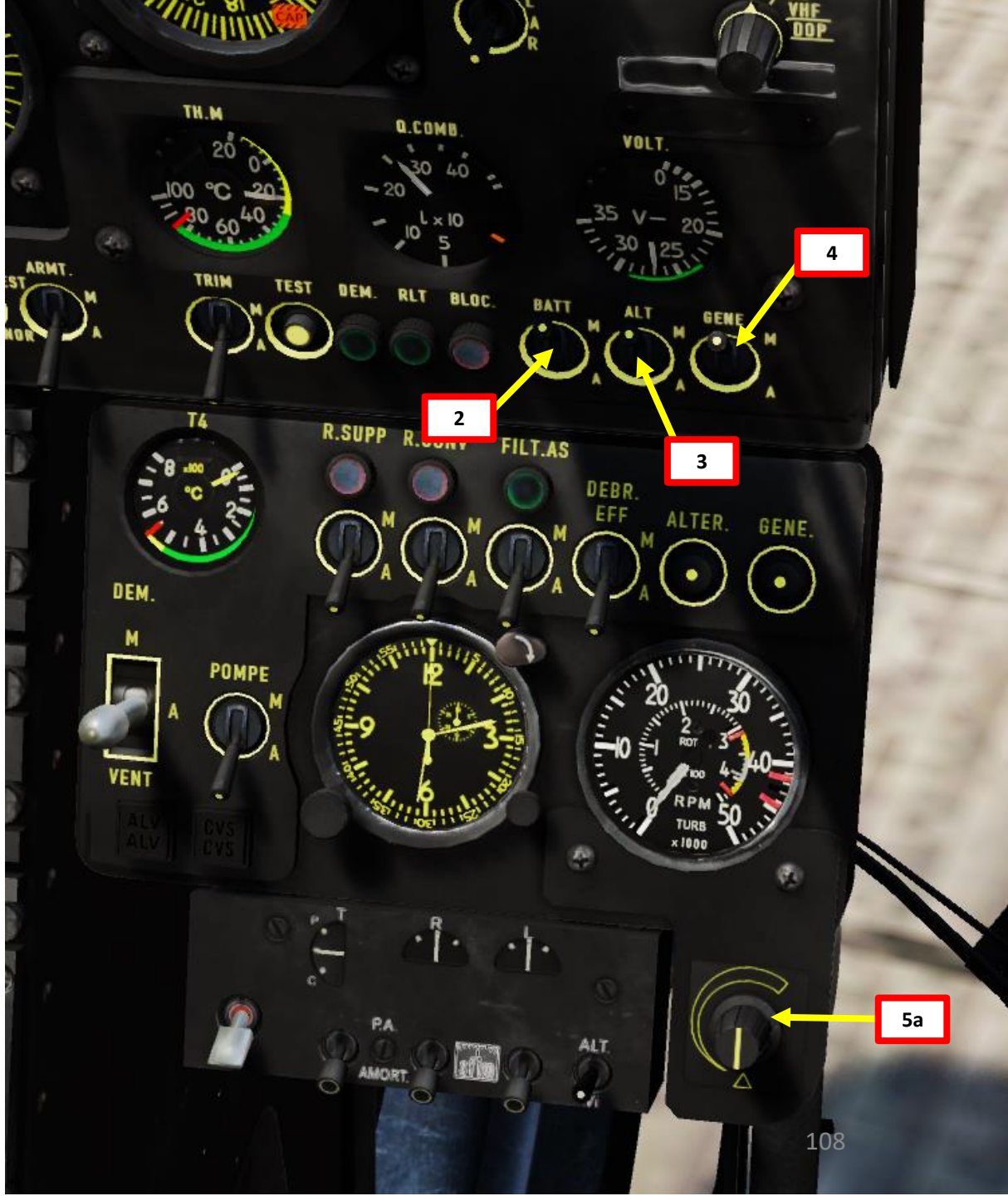

armée de TERRE
GAM

A - BEFORE START-UP

1. Close doors by pressing “RCtrl+C ”.

A - BEFORE START-UP

2. Set Battery Switch – ON/***M**ARCHE (UP)*.
3. Set Alternator Switch – ON/***M**ARCHE (UP)*.
4. Set Generator Switch – ON/***M**ARCHE (UP)*.
5. Set Interior Cockpit Lighting
    a) Set UV (Ultraviolet) Cockpit Lighting – As Required.
    b) Set Center Console (*Pupitre*) Lighting Intensity Control Knob – As Required.
    c) Set Panels Lighting Switch – As Required (ON/***M**ARCHE = UP)*.
    d) Set Main Dashboard (*Planche de Bord*) Lighting Intensity Control Knob – As Required

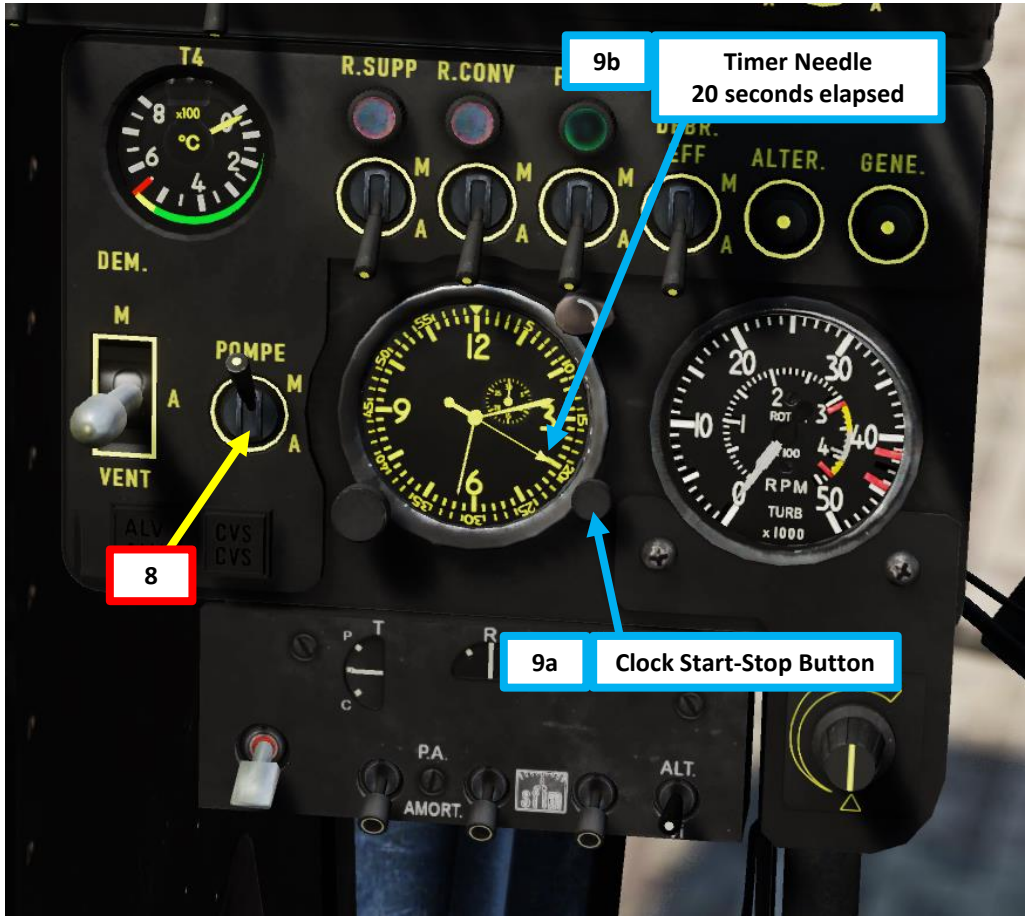


A - BEFORE START-UP

6. Set Exterior Lights
   a) Set Navigation Lights Mode (*Feux de Position*) Switch – *Clignotant*/Blinking (UP)
   b) Set Anti-collision Light Mode Switch – Normal (UP)
   c) Set Anti-collision Light Intensity Control Knob – As Required
   d) Set Formation Lights Switch - ON/***M****ARCHE* (FWD).
   e) Set Formation Lights Intensity Knob – As Required

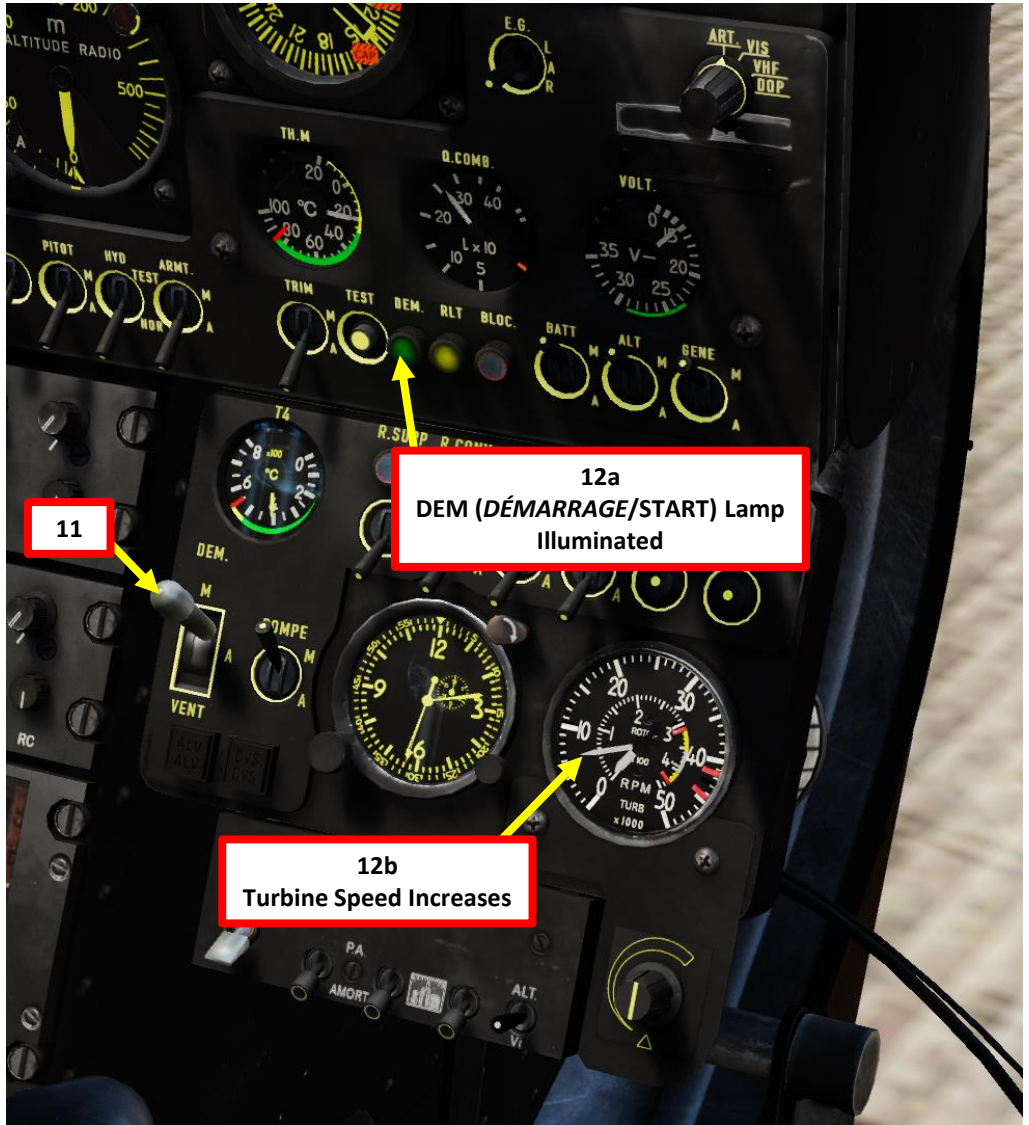
B - ENGINE START

7. Disengage/release rotor brake by pushing it forward (click and drag). Check that collective is FULLY DOWN.
8. Set Fuel Pump (*Pompe*) Switch – ON/***M****ARCHE (UP)*.
9. Start stop-watch timer on the clock and wait for 20 seconds to allow the fuel pump enough time to prime the fuel lines.
10. Once the fuel lines are primed after the 20-sec waiting period, you can start the engine.



B - ENGINE START

11. Set the starter (***Dém**arreur*) switch ON by turning it up to ***M**ARCHE* (UP).
12. Ensure starter (DEM) lamp illuminates and turbine speed increases.
    - Note: Remember to reset the Stop-Watch.
13. Confirm DEM lamp extinguishes once turbine reaches IDLE RPM (25100).



B - ENGINE START

14. Now that turbine speed has increased to IDLE, push Fuel Flow control lever forward until rotor starts spinning.
15. Wait for turbine and main rotor RPM to "sync", then **slowly** move fuel lever forward.
    - Note: Pushing the lever forward too quickly will flood the engine with fuel and render it inoperable.
16. Wait until turbine RPM reaches 43500 and main rotor RPM reaches 387. After, leave the starter (***Dém**arreur*) switch ON to ***M**ARCHE*.

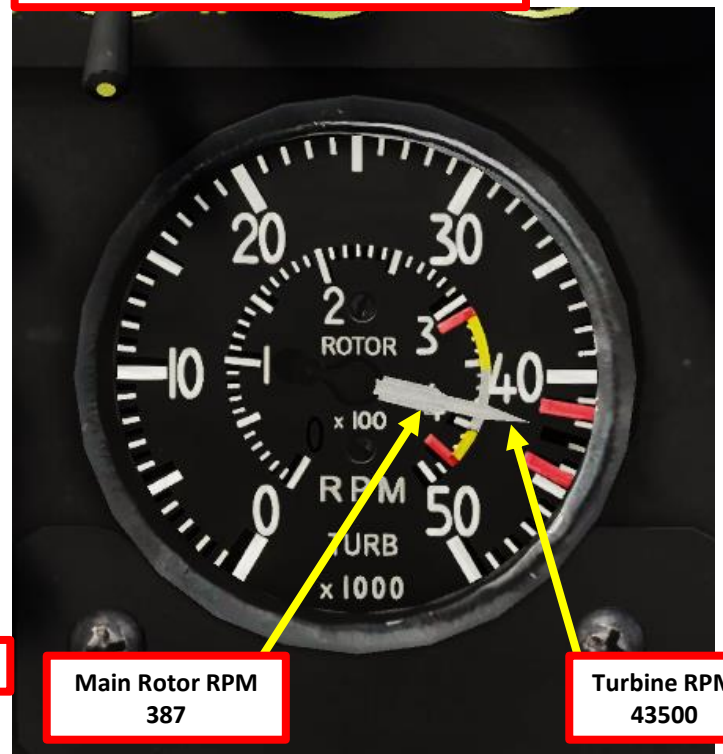
16c
Starter (*Démarreur*) Switch ON/*MARCHE*

16a
Turbine & Main Rotor RPM not Synchronized

Main Rotor RPM

Turbine RPM

16b
Turbine & Main Rotor RPM Synchronized

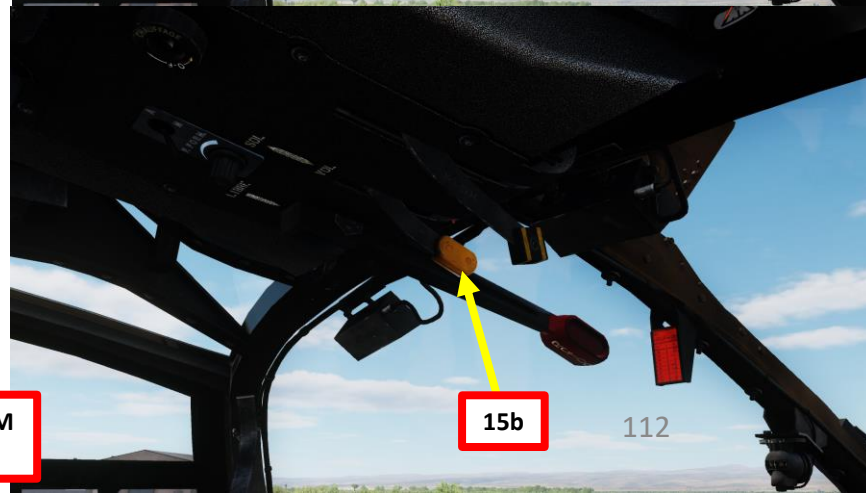


Main Rotor RPM
387

Turbine RPM
43500

14a

14b **15a**



15b

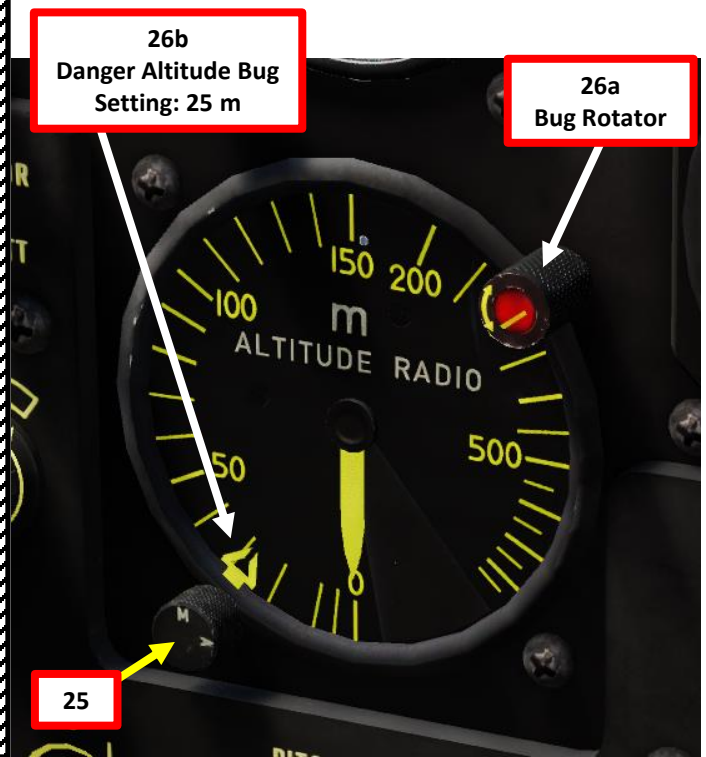
B - ENGINE START

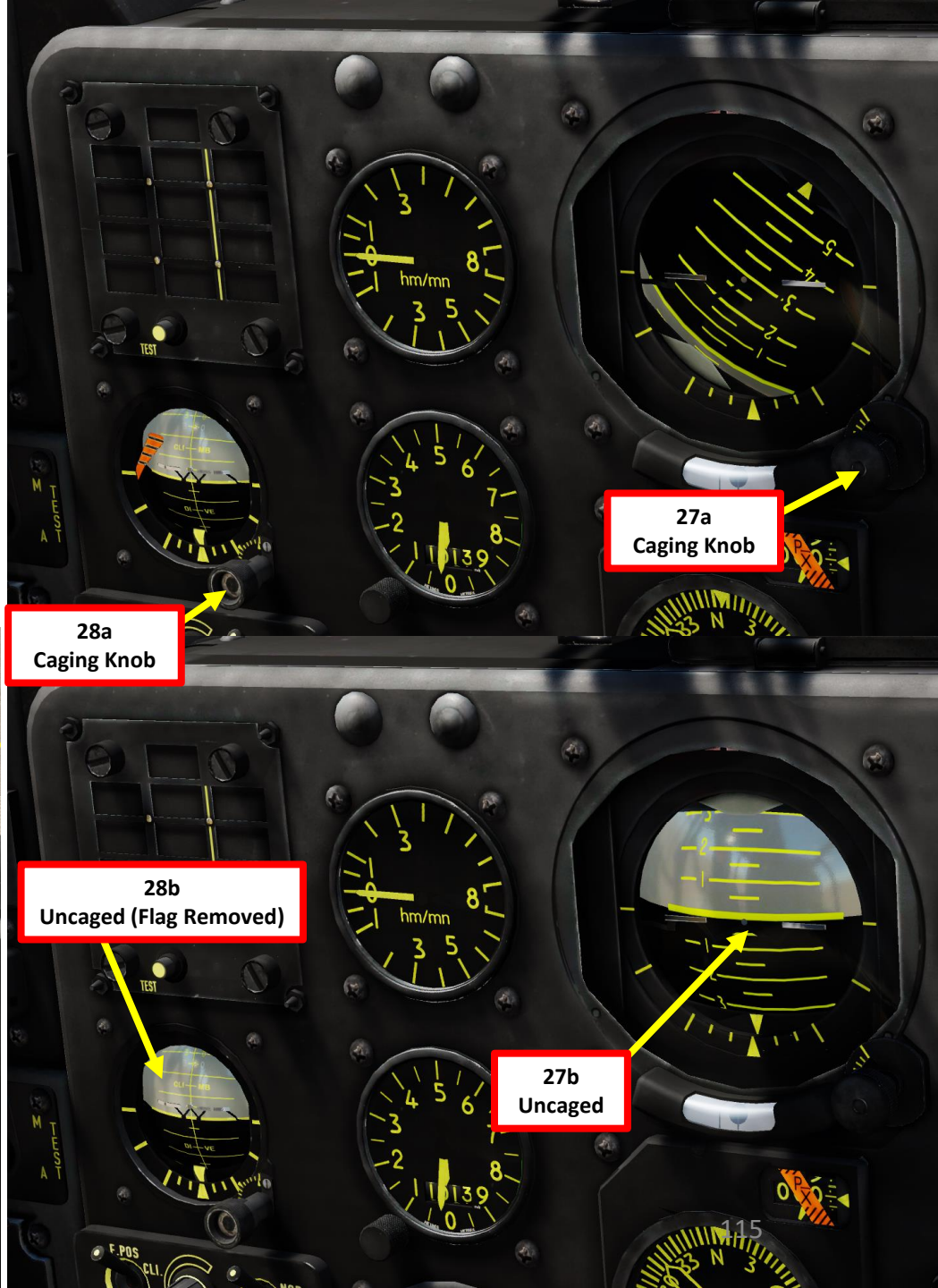
C - POST-START

17. Set Pitot Heat Switch – ON/***M**ARCHE (UP)*.
18. Set Trimmer Heat Switch – ON/***M**ARCHE (UP)*.
19. Set Auxiliary/Reserve Fuel Tank Switch – ARRÊT/OFF (DOWN).
    - The auxiliary tank is turned OFF at first since the main fuel tank level (capacity: 437 liters) must be lower than 347 liters in order to be able to transfer fuel from the auxiliary tank (capacity: 90 liters).
20. If sand filter is equipped, set Sand Filter (*Filtre Anti-Sable*) Power Switch – ON/***M**ARCHE (UP)*.
21. Set Magnetic Brake (***Débr**ayage des **Eff**orts*) Switch – ON/***M**ARCHE (UP)*.
22. Set Gyro Mode Selector – GM (Gyro-Magnetic Mode). Wait for alignment, which should take approximately 2 minutes.
23. Set Autopilot Power – ON/***M**ARCHE (UP)*.
24. Set Autopilot Damper (*Amortisseur*) Roll, Pitch and Yaw Axis Switches – ON/***M**ARCHE (UP)*.

C - POST-START

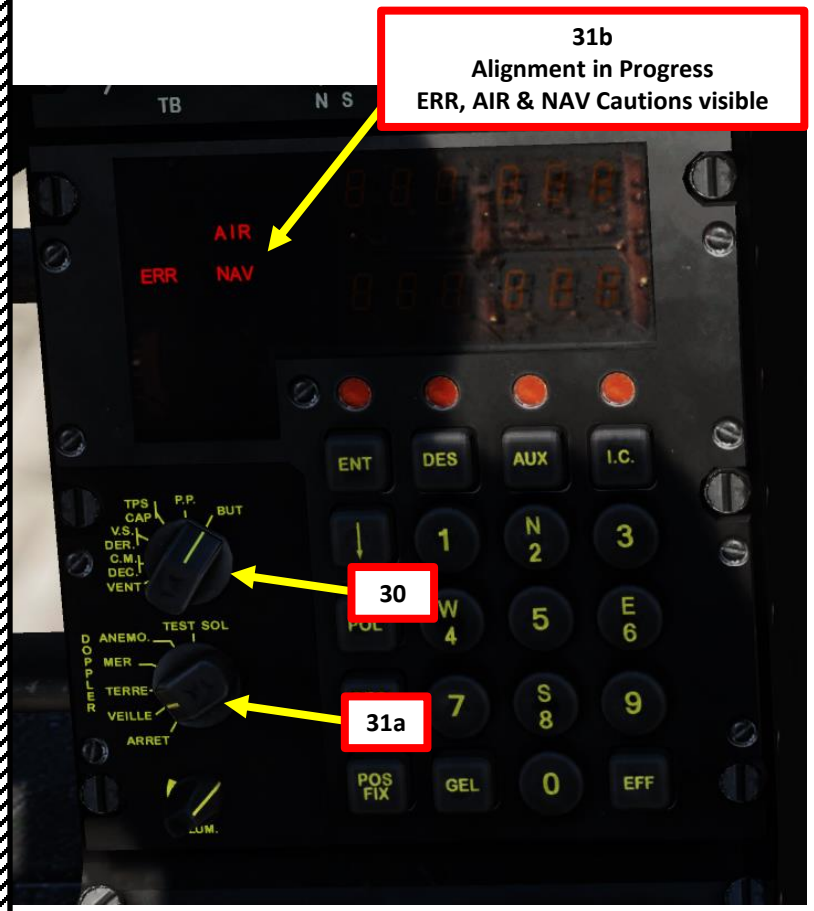
25. Rotate Radar Altimeter switch ON/**M**ARCHE (scroll mousewheel). The “M” symbol should be pointing upwards.
26. Set manually the “Danger Altitude” using the bug rotator. Typically, I set it to 25 m.
27. Uncage Main ADI (Attitude Director Indicator) by left-clicking on the Caging knob.
28. Uncage Standby ADI (Attitude Director Indicator) by left-clicking on the Caging knob, holding it and scrolling your mousewheel to remove the flag.
29. Set DRAX33 RWR (Radar Warning Receiver) Switch – ON (MIDDLE).

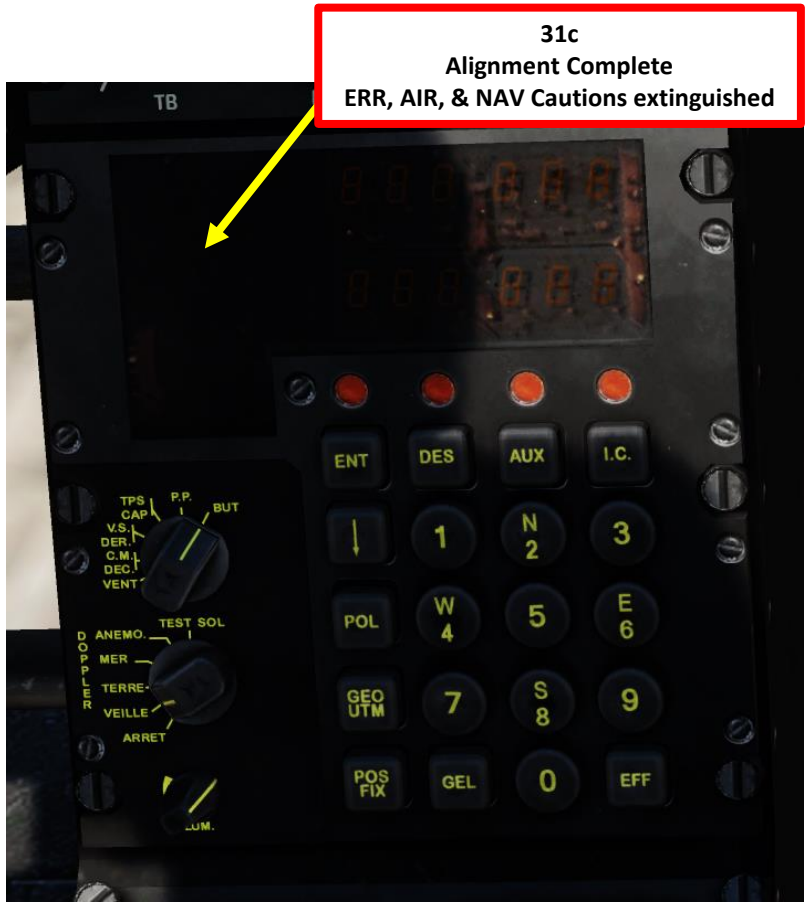


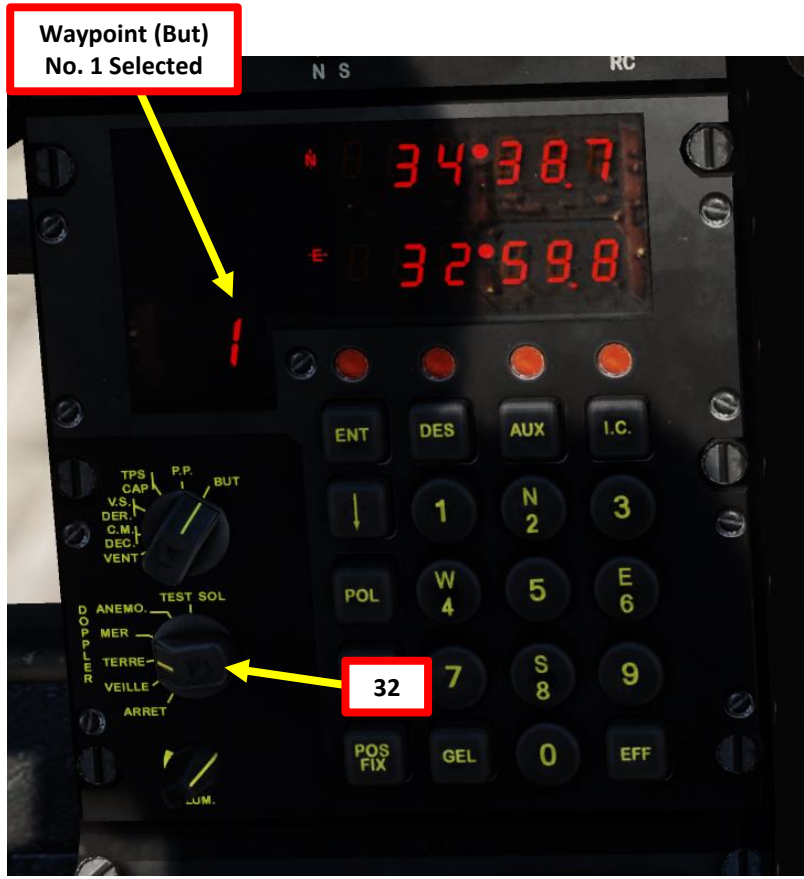


C - POST-START

30. Set NADIR parameter to BUT to select waypoints.
31. 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)
32. 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).

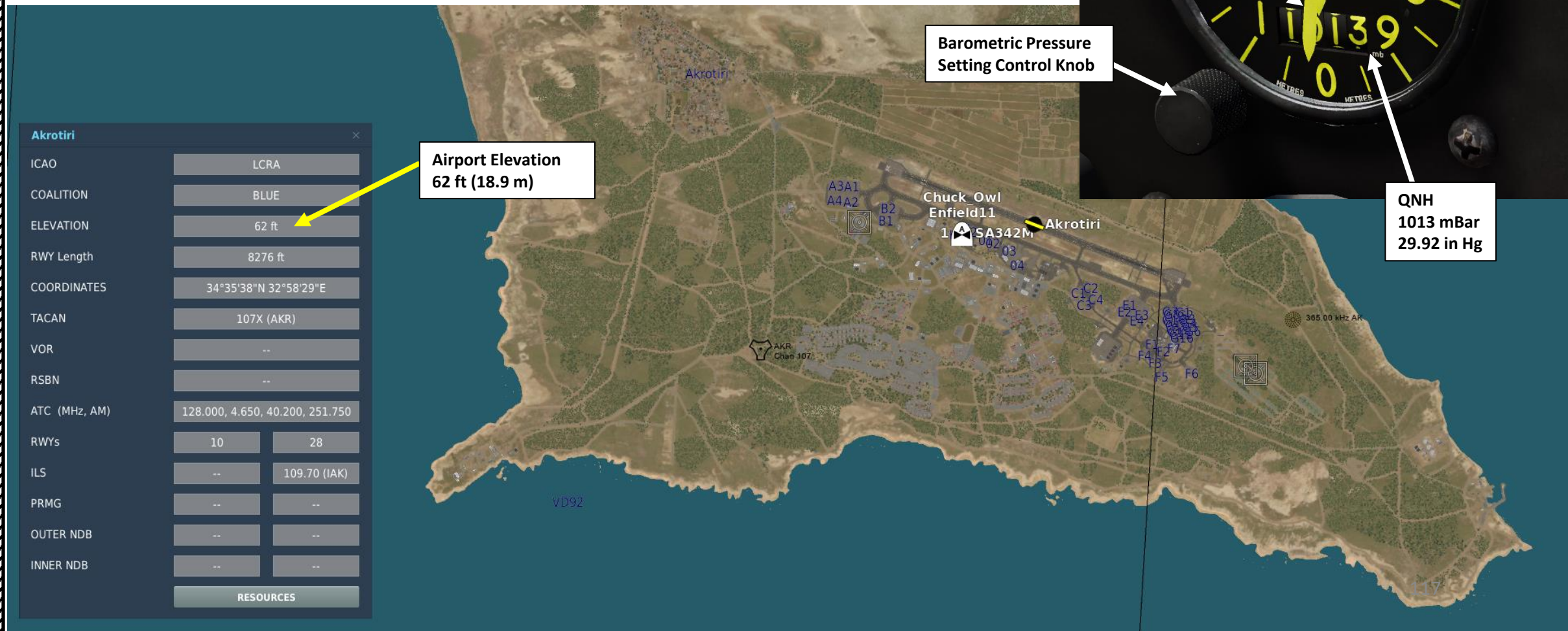






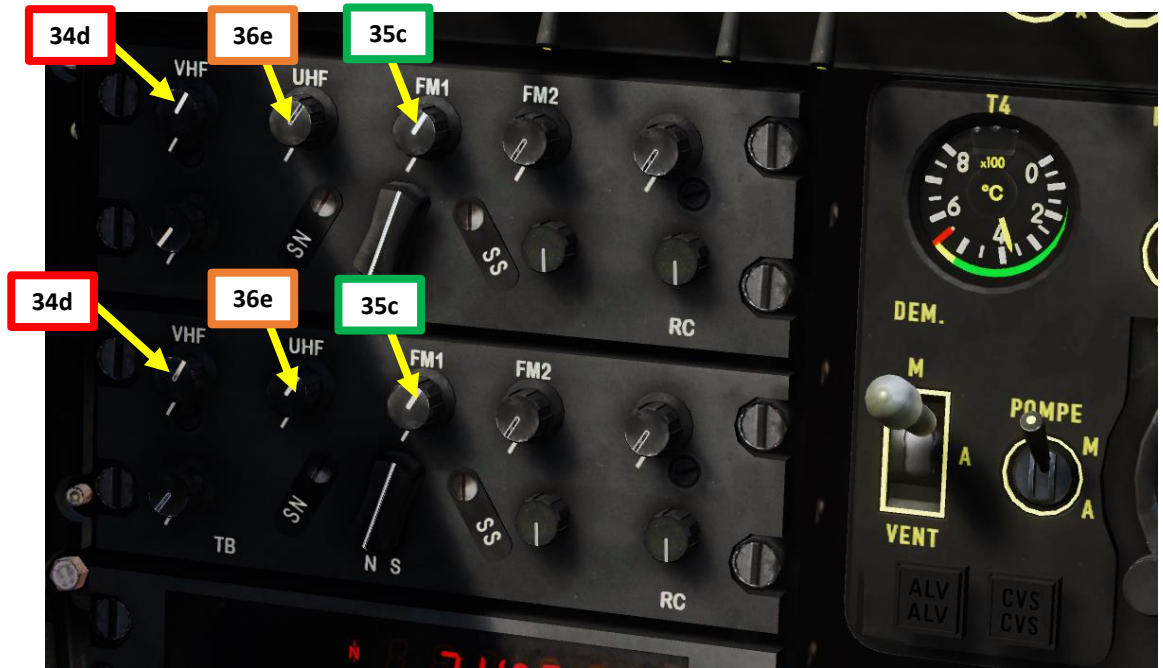
C - POST-START

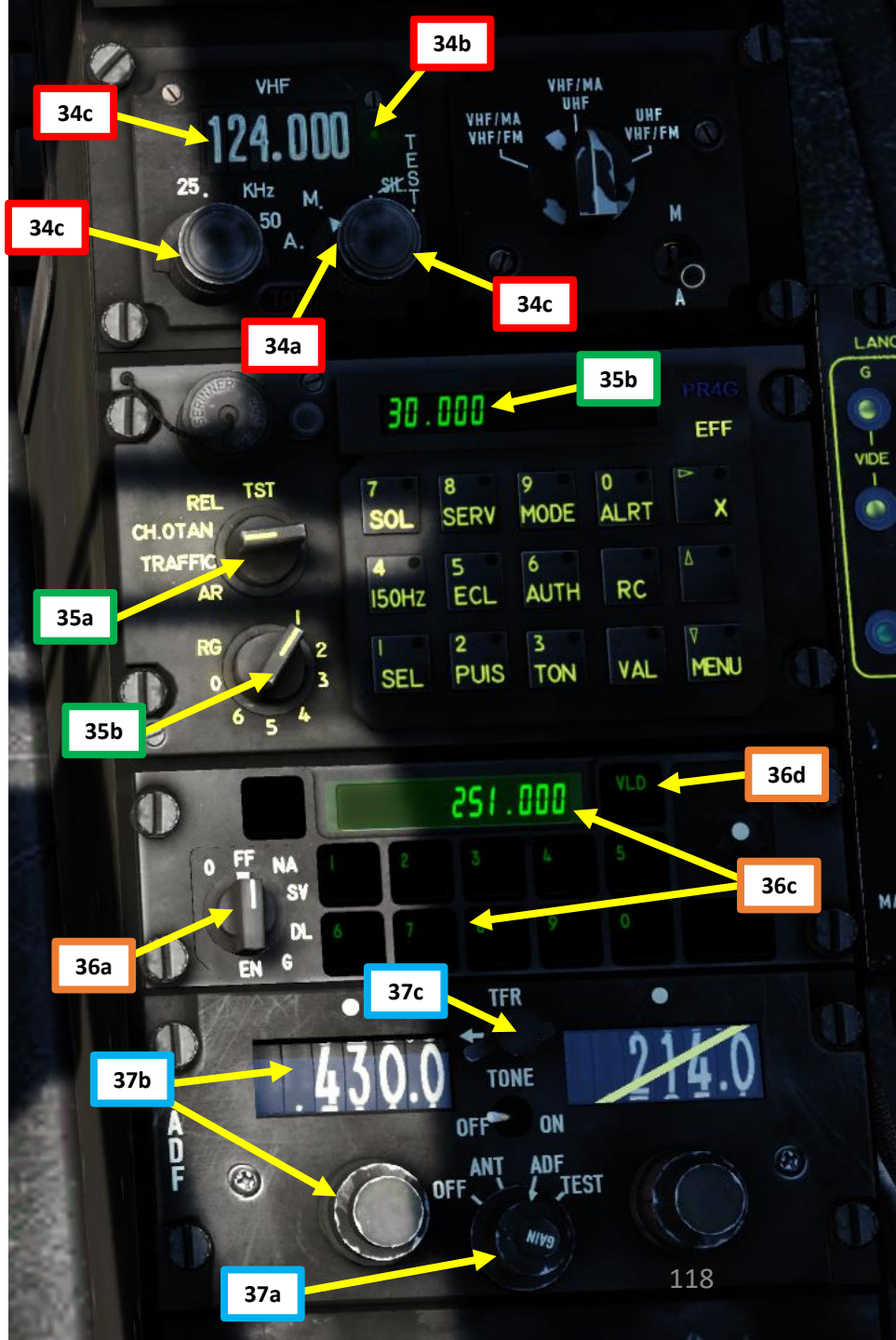
33. Set Altimeter Barometric Pressure Setting to Airfield Elevation (QNH).



C - POST-START

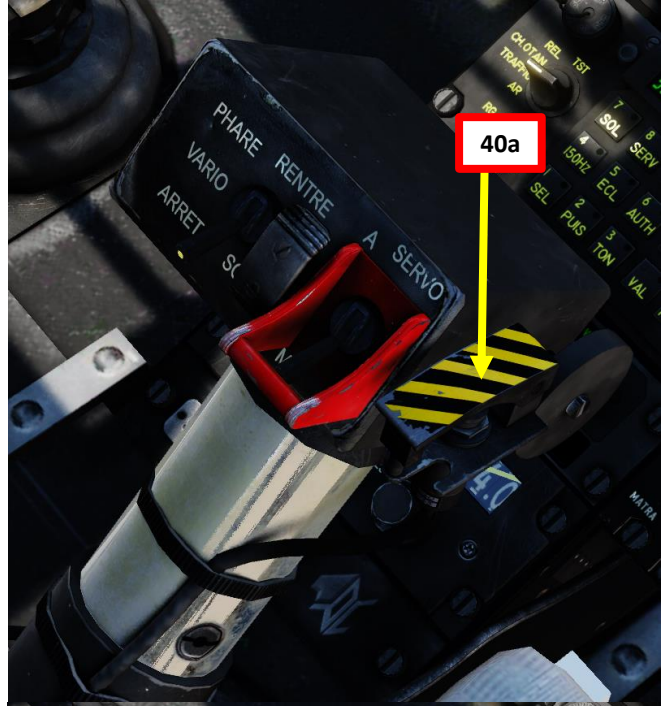
34. Set up VHF AM Radio – As required for mission.
    a) Set VHF AM radio set Power knob – ***M****ARCHE/*ON (Click outer knob).
    b) Confirm that VHF Radio Power Light is illuminated
    c) Tune VHF AM radio frequency using tuning knobs
    d) Adjust VHF Radio Volume on Pilot and Copilot Intercom Panel
35. Set up FM PR4G Radio – As required for mission.
    a) Set the FM radio mode to TRAFFIC.
    b) Select which preset channel you want to transmit on.
    c) Adjust FM1 Radio Volume on Pilot and Copilot Intercom Panel.
36. Set up UHF Radio – As required for mission.
    a) Set UHF Power knob – FF (Fixed Frequency).
    b) A BIT (Built-In Test) will be performed for about 15 sec; frequency digits will flash during the BIT.
    c) Set UHF Frequency by entering “251000” for a frequency of 251.000 MHz
    d) Press VLD (Validation) button.
    e) Adjust UHF Radio Volume on Pilot and Copilot Intercom Panel.
37. Set up NAV Radio Panel – As required for mission.
    a) Set NAV mode rotator – ADF (Automatic Direction Finder).
    b) Tune ADF frequency – As required by mission.
    c) Set ADF Frequency Selector – As required (in this case, selector is set to the LEFT to use left frequency).

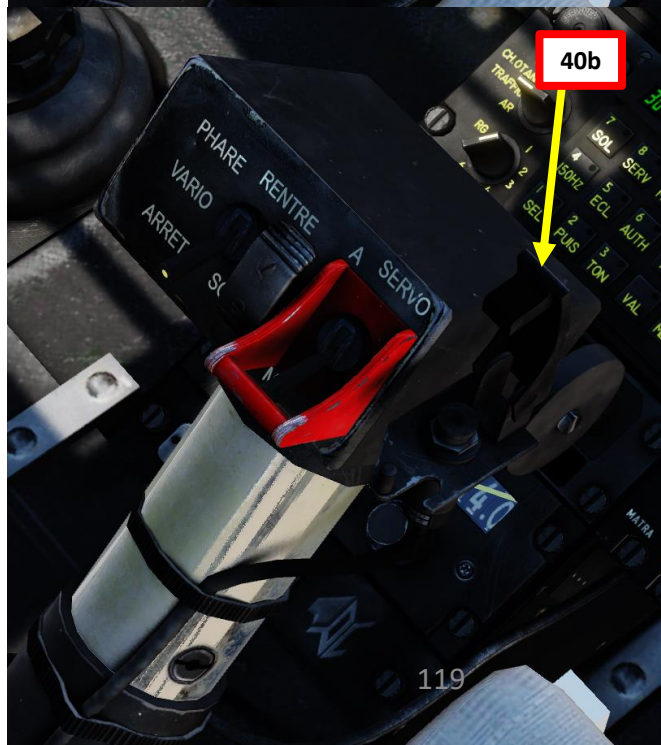




C - POST-START

38. Set your Flare Dispenser (*Lance-Leurres*) power switch to the desired setting.
    - FWD position: LE (**Le**nt = Slow)
    - MIDDLE position: VE (**V**it**e** = Fast)
39. Set your Flare Dispenser Launch Quantity to either C/C (Single) or SEQ (Sequence).
40. Set Flare Dispenser Cover Switch - UP



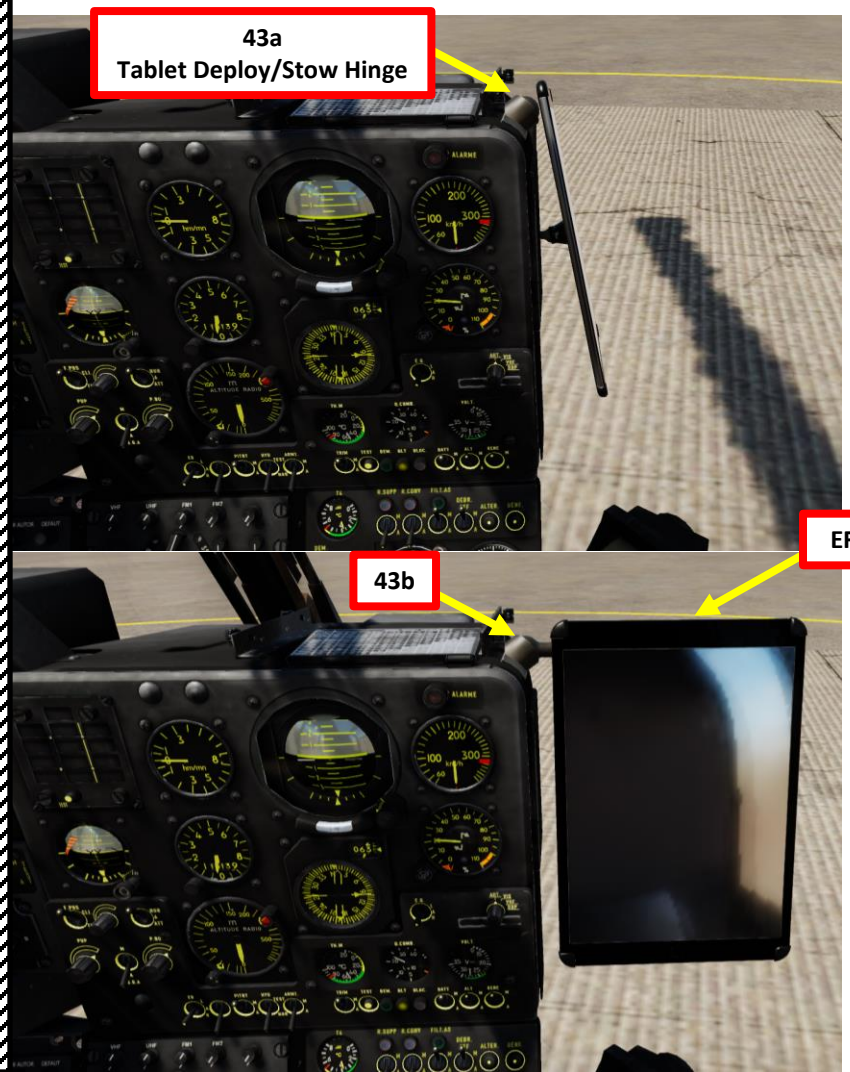


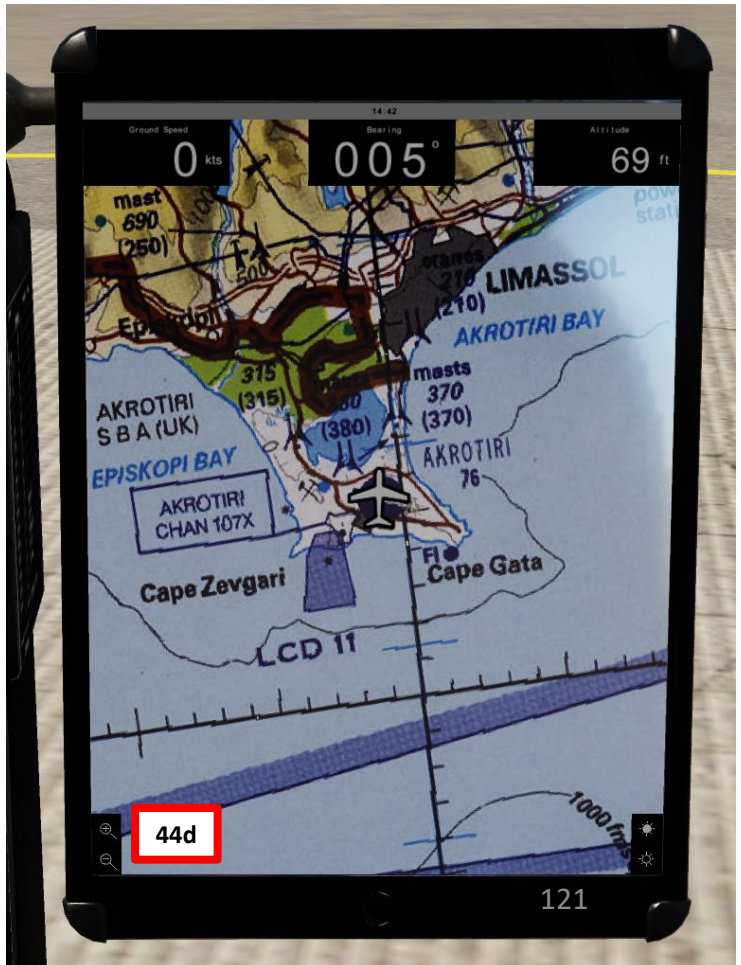
C - POST-START

41. Set IFF (Identify-Friend-or-Foe) Master Mode – Normal (N)
42. If specific IFF codes are required in the Mission Briefing, set them with the relevant Mode and Code Selectors. As an example, we will set Mode 3A to a Code of 2501.

C - POST-START

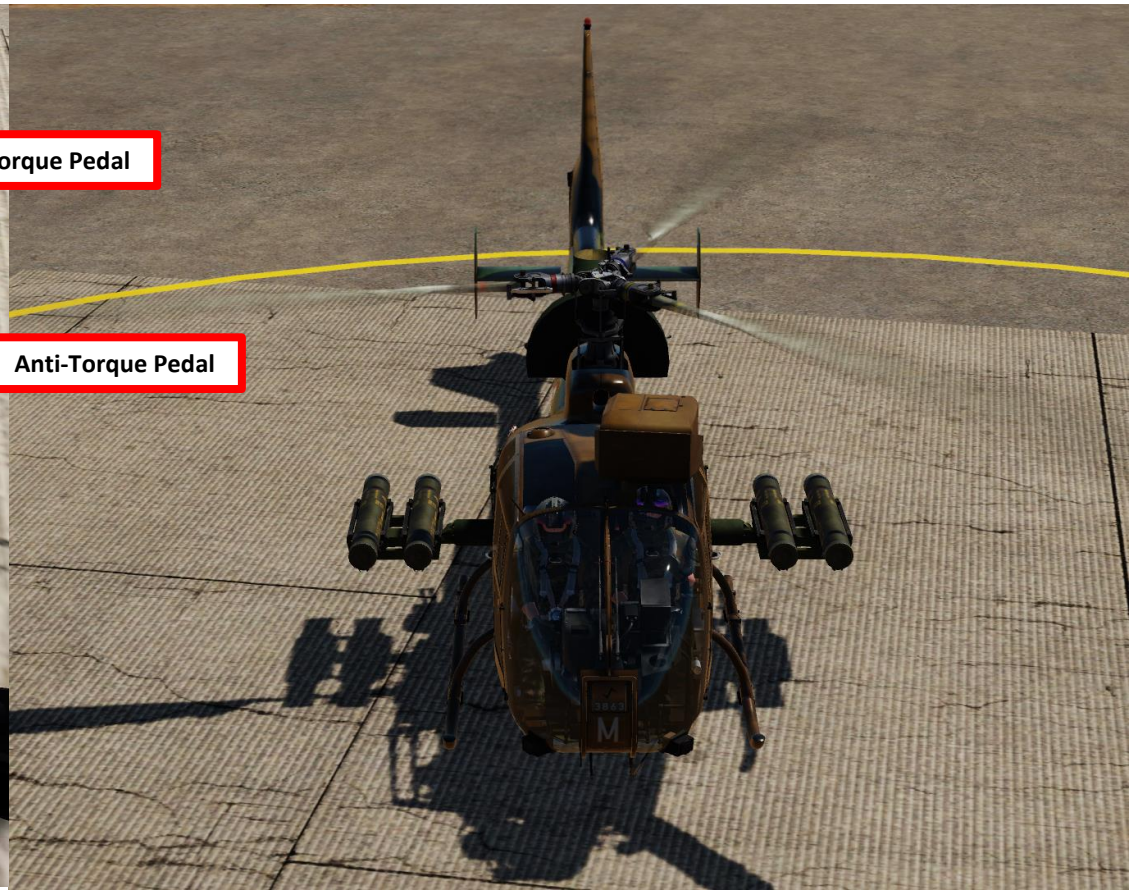
43. If an EFB (Electronic Flight Bag) tablet is installed, you can deploy it by clicking on the Tablet Deploy/Stow Hinge.
44. Turn on the EFB Tablet by pressing on the EFB Tablet Power ON/OFF Button.
45. If desired, you can stow the tablet for better cockpit visibility by clicking on the Tablet Deploy/Stow Hinge.





C - POST-START

46. Check flight control response to cyclic, collective and anti-torque pedal input.



C - POST-START

47. You are now ready to taxi and takeoff.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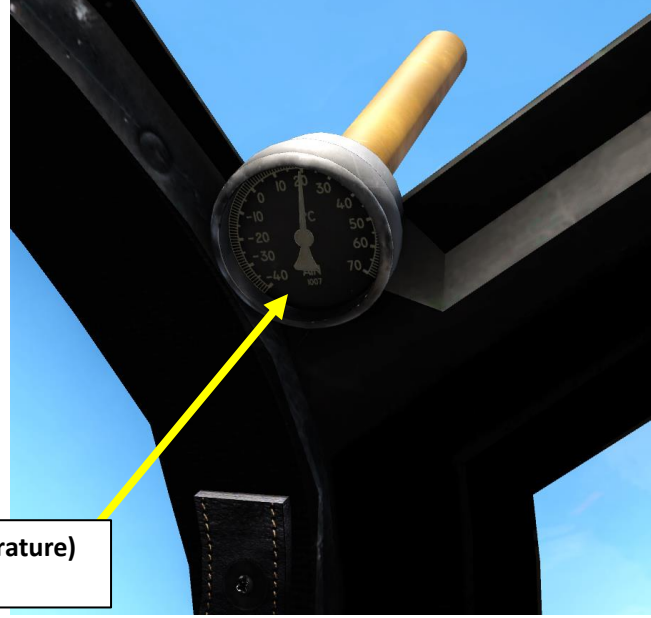
M

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.

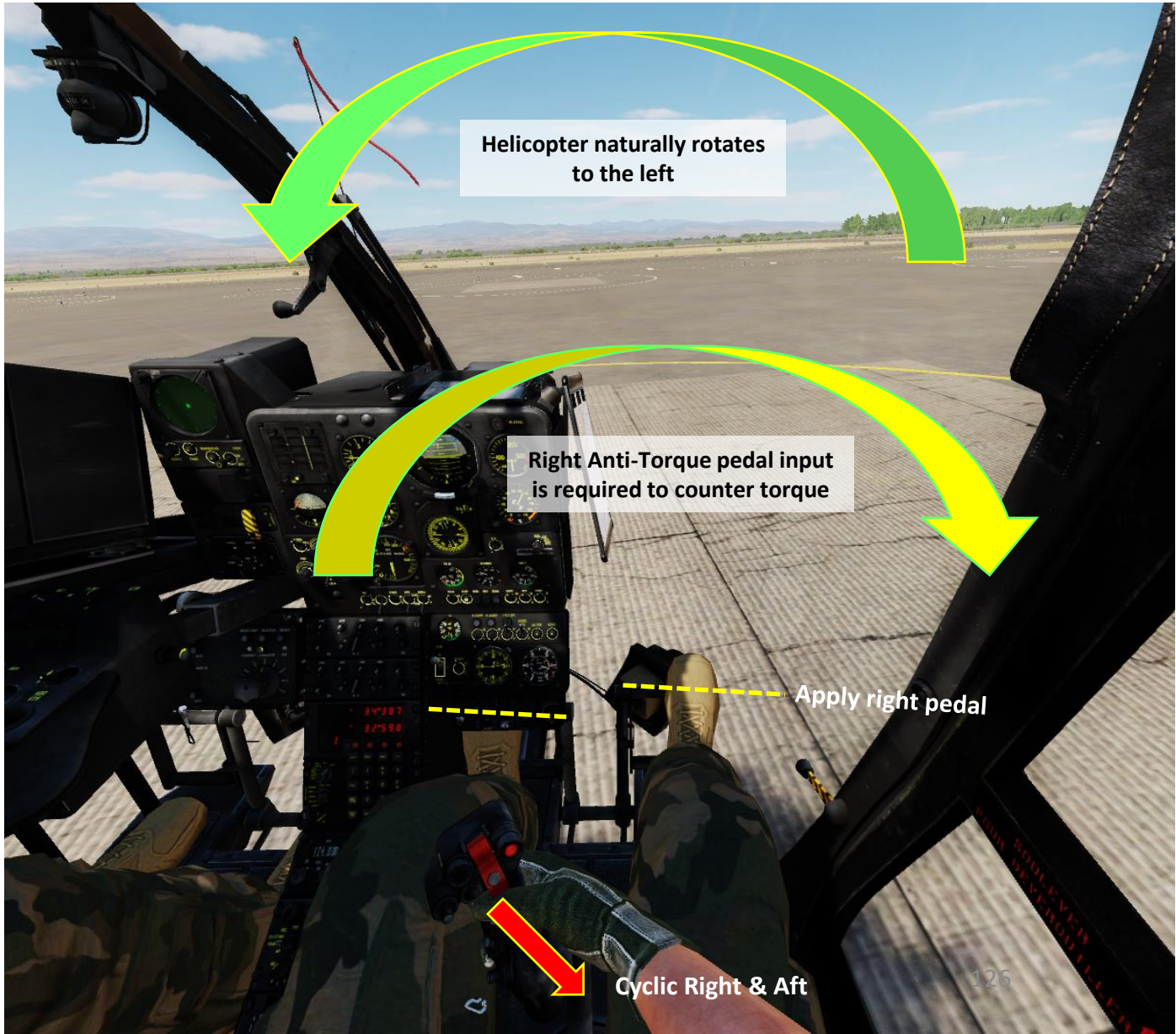


***Couple Maximal Autorisé* (Max Allowable Torque) Chart**

Altitude in 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

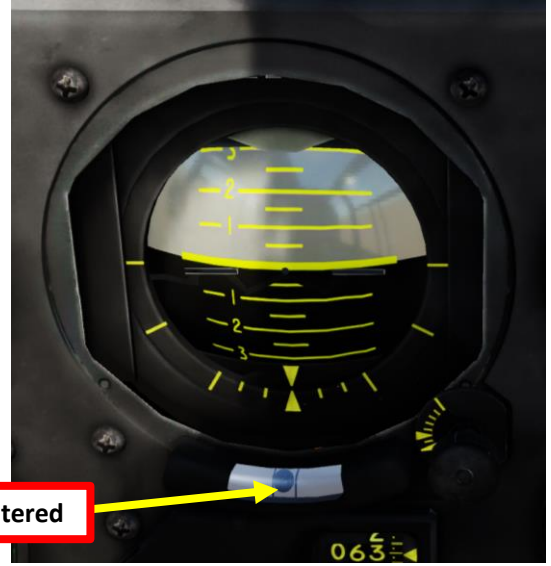
1. Apply right pedal to stay centered and avoid drifting.
2. Use cyclic to remain straight and level.
3. Raise collective very gently to initiate a hover.
4. Hovering is hard at first. Failure to predict the helicopter's reaction after cyclic input will often result in you dancing the French Cancan for a 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.

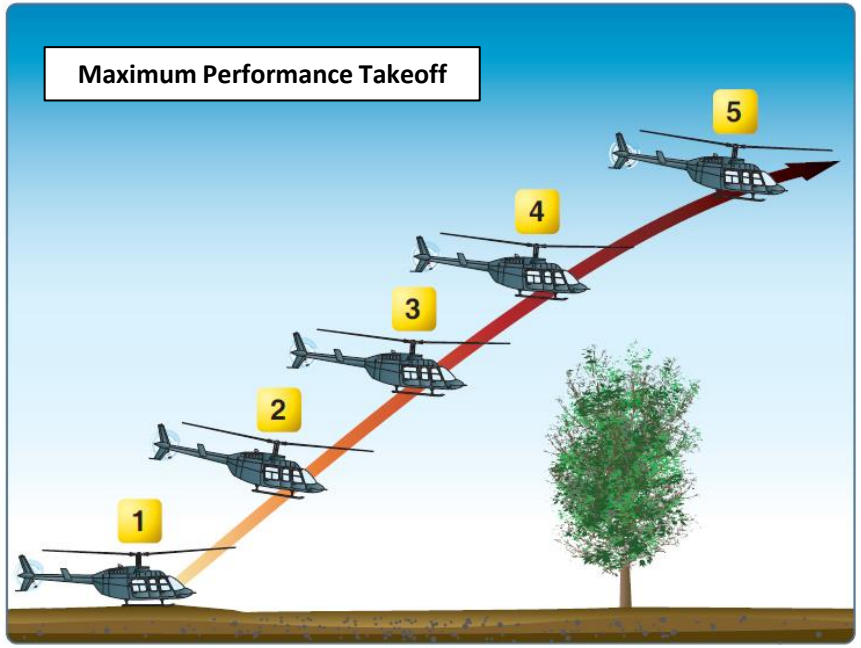


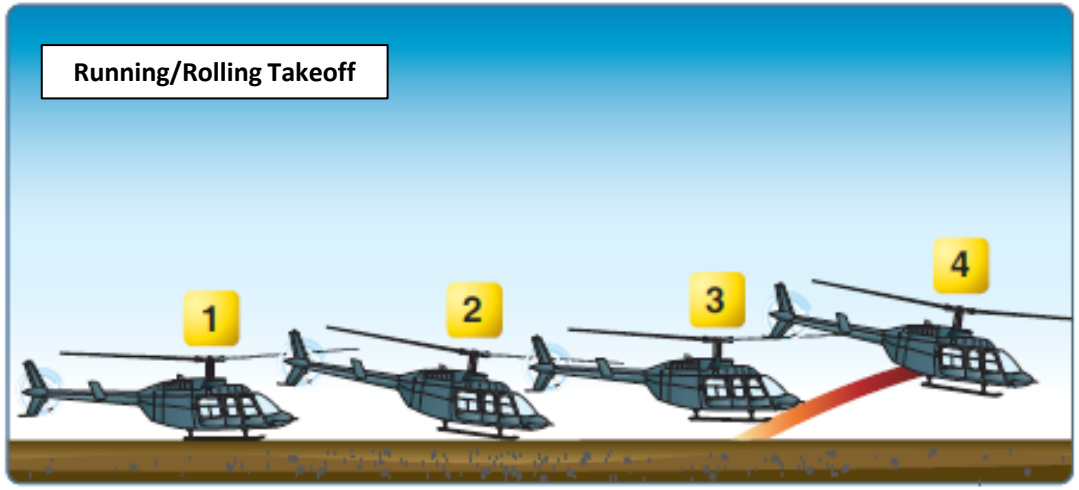
HOW TO HOVER

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.



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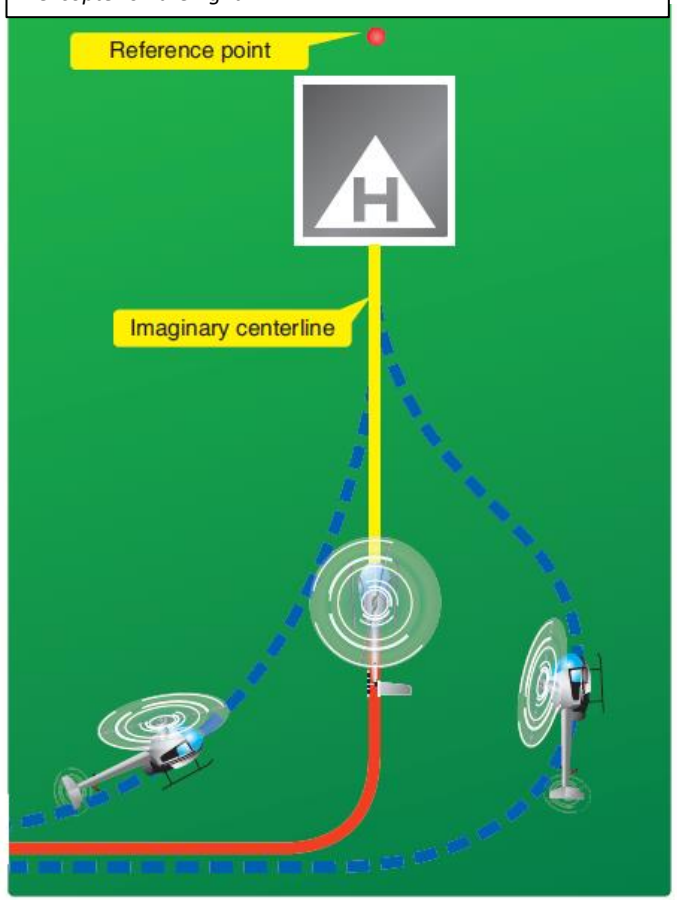
VISUAL LANDING

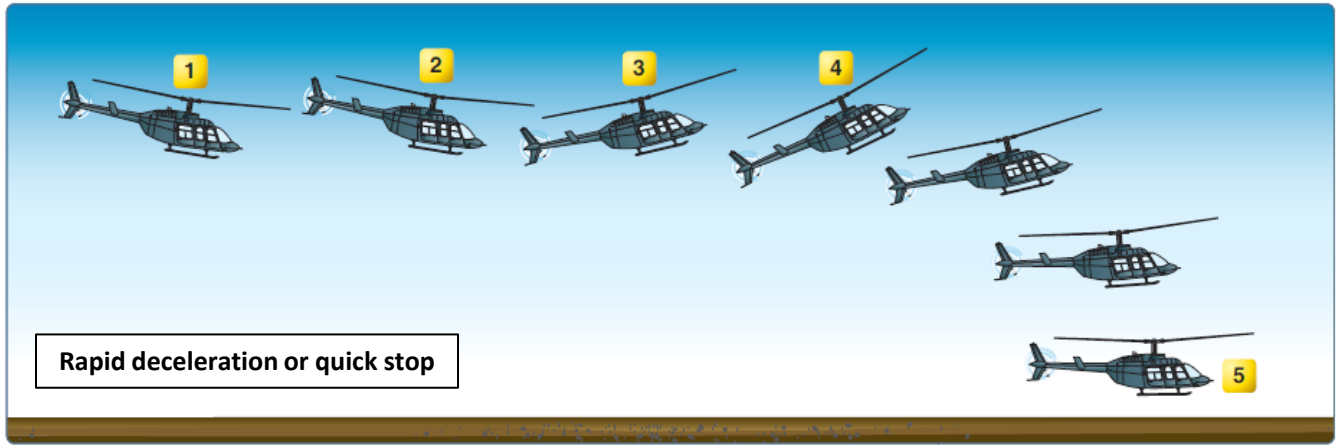
When you think about it, a helicopter is usually landed like an aircraft: you maintain a descent rate, reach a touchdown point and pull back on your cyclic to bleed speed and come to a full stop. There are many different types of approaches. Your approach and landing type will depend on the type of LZ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

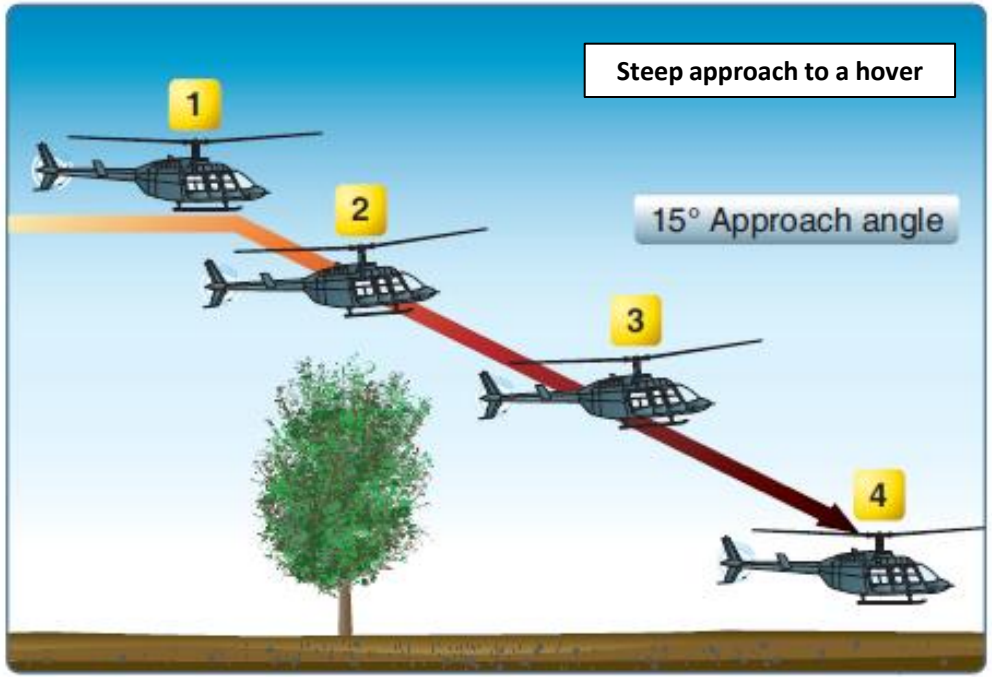
1. Start descent from 150 m. Fly towards a reference point on the runway. Pay particular attention to the Vortex Ring State (state in which the helicopter is settling in its own downwash and gets sucked down, which is caused by a flight profile of forward flight less than ETL (Effective Translational 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.

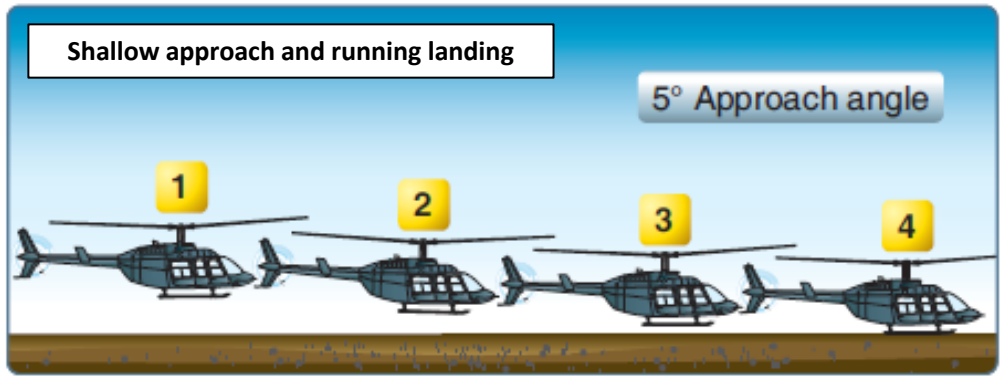
NOTE: It takes a lot of practice to be able to counter the different flight states you will go through when coming for an approach and landing. This is why performing hover power checks before takeoff is very useful: it helps you master the hover state.

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.









SECTION SUMMARY

- 1 – Powerplant
  - 1.1 – Turbomeca Astazou XIV Engine
  - 1.2 – Engine Controls
  - 1.3 – Engine Indications
  - 1.4 – Engine Operation Limits
  - 1.5 – Engine Fire
  - 1.6 – Sand Filter & Infrared Deflector

- 2 – Fuel System
  - 2.1 – Overview
  - 2.2 – Fuel Indications
  - 2.3 – Fuel Controls
  - 2.4 – Fuel Planning

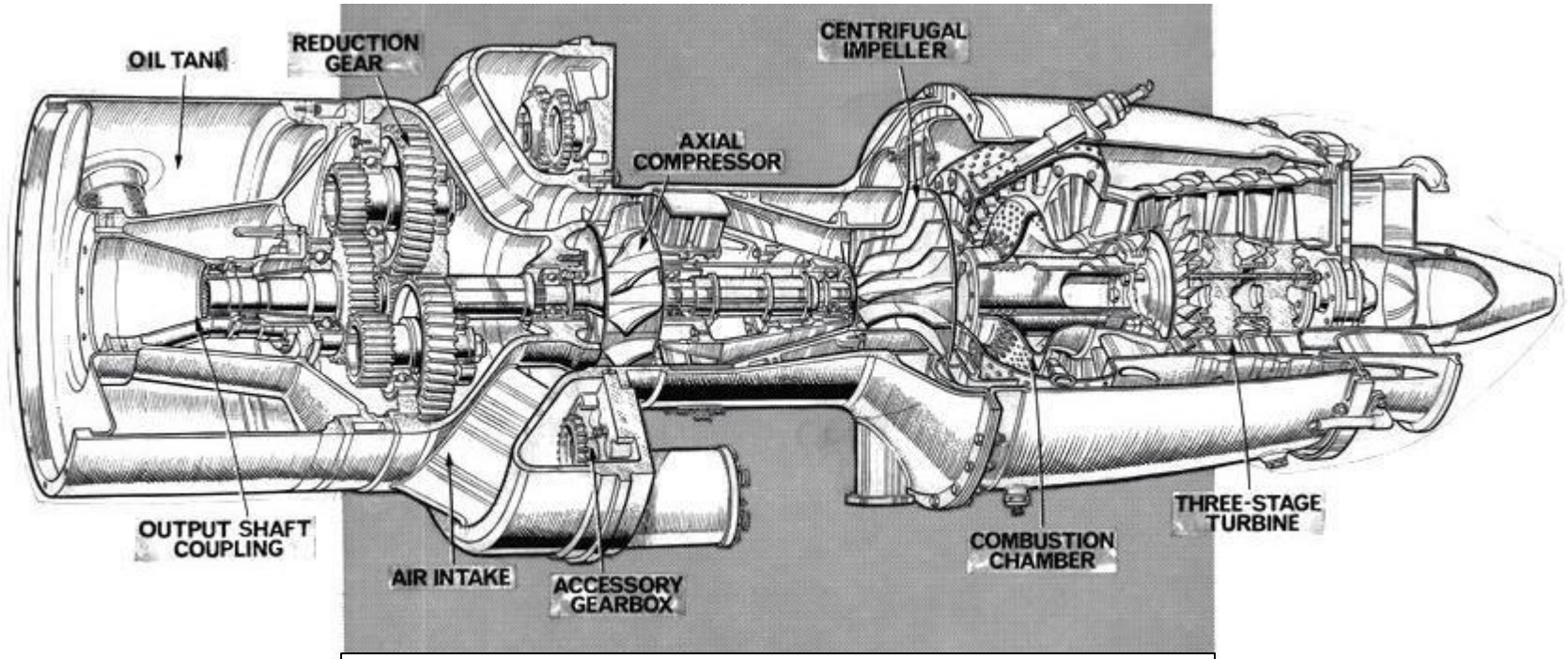
- 3 – Main Rotor & Fenestron Systems

1 – Powerplant

1.1 – Turbomeca Astazou XIV Engine

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.

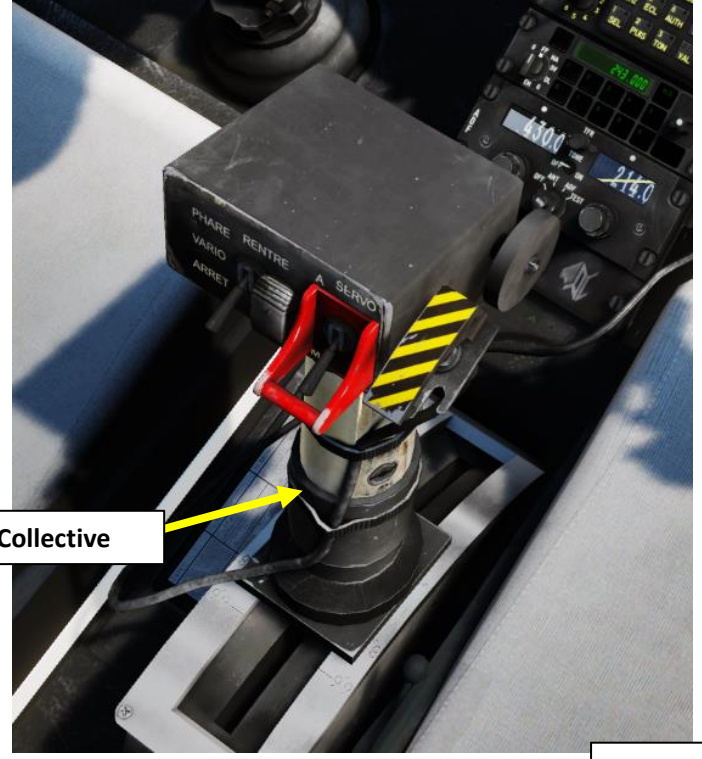


Turbomeca Astazou Gas Turbine Engine

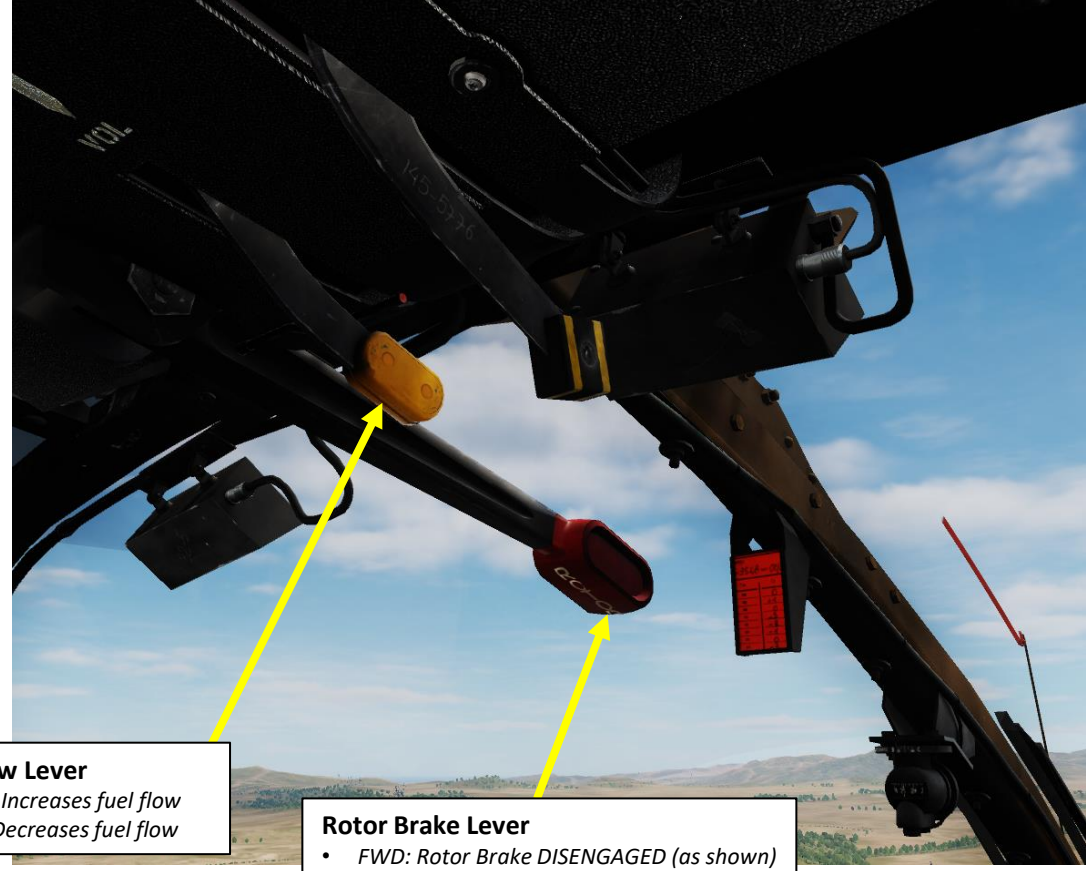
1 – Powerplant
1.2 – Engine Controls

Engine operation is controlled using the Fuel Flow Lever. During normal flight, the fuel flow lever is left fully open (FWD).

The collective controls the main rotor blade angles, not the engine RPM per se. The engine controls turbine RPM in order to maintain a constant rotor RPM.



Collective



Fuel Flow Lever
- *FWD: Increases fuel flow*
- *AFT: Decreases fuel flow*

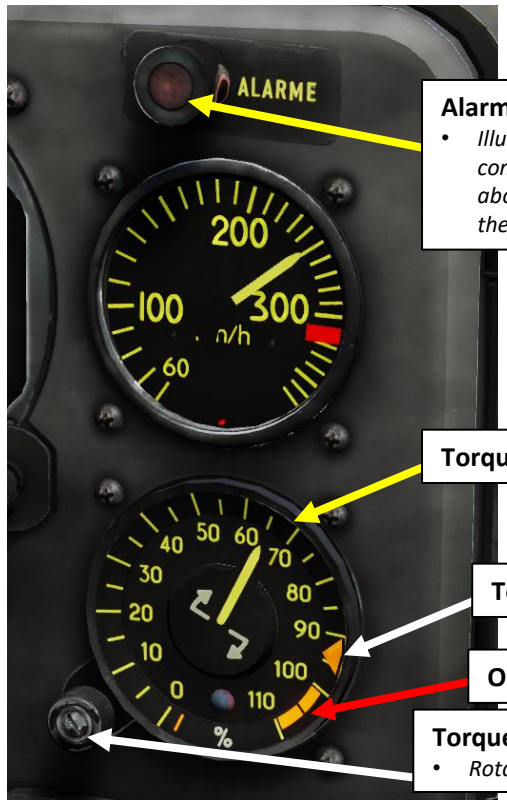
Rotor Brake Lever
- *FWD: Rotor Brake DISENGAGED (as shown)*
- *AFT: Rotor Brake ENGAGED*

Starter/Ventilation (*Démarreur*) Switch
- *M = Marche = ON (UP)*
- *A = Arrêt = OFF (MIDDLE)*
- *VENT = Ventilation, Dry Crank (DOWN)*

1 – Powerplant
1.3 – Engine Indications

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

- **NG (Turbine Speed)** – used to monitor health and power setting of the engine (gas turbine)
- **NR (Main Rotor Speed)** – used to monitor rotor overspeed or underspeed
- **Torque Indicator** – used to define reference power settings for different phases of flight
- **T4** (Engine Power Turbine Temperature) – must be monitored to prevent engine overheat
- **THM** (Engine Oil Temperature) – must be monitored to prevent loss of engine oil pressure



Température Huile Moteur (THM) / **Oil Temperature (deg C)**

Turbine START (*Démarrage*) Lamp

Turbine IDLE (*Ralentissement*) Lamp

Engine Blocked Lamp

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*

T4 (Engine Power Turbine Temperature) Indicator (x100 deg C)

Torque Indicator (%)

Torque Reference Bug

Overtorque Range Arc

Torque Test Button
- *Rotate knob to set torque reference bug*

Inner Scale: NR, Main Rotor RPM x 100
Outer Scale: NG, Turbine RPM x 1000

1 – Powerplant
1.3 – Engine Indications

The Warning/Caution Panel also provides important information about the engine and other engine-driven systems (hydraulic and electrical, for instance):

- **H.MOT**.: Low turbine oil pressure (*huile moteur*)
- **GENE**: Generator failure
- **B.P.HY**: Low Hydraulic Pressure (*Basse Pression Hydraulique),* triggered when Main Rotor RPM is below 170
- **H.BTP**.: Low Main Gearbox Oil Pressure *(Huile de la Boîte de Transmission Principale)*
- **ALTER**.: AC 115V bus is not powered, power supply system (alternator) failure
- **LIM**: Metal Chip Detected in Oil System
- **H.RAL**: Turbine RPM is below 15000
- **BAT**.: Battery is isolated from DC network and is no longer charging
- **FILT**.: Fuel filter is clogged

1 – Powerplant
1.4 – Engine Operation Limits

Engine RPM Settings
- IDLE Turbine RPM: 25100
- Rotor Clutch RPM: 29000
- Nominal Turbine RPM: 43500

Color Code for Instrument Gauges
- Red line: Minimum and Maximum Safety Limits
- Yellow Arc: Caution Range
- Green Arc: Normal operating range

NG (Turbine Speed) Limits
- Normal Operation: 43500 RPM
- Minimum: 42000 RPM
- Maximum: 45000 RPM

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*

NR (Main Rotor Speed) Limits
- Normal Operation (Green): 378 RPM (360-400 RPM green range)
- Low Caution Range (Yellow): 310-360 RPM
- High Caution Range (Yellow): 400-430 RPM
- Minimum (Red): 310 RPM
- Maximum (Red): 430 RPM

1 – Powerplant
1.4 – Engine Operation Limits

Torque Indicator Limits

- Overspeed Range: 100-110 %

Couple Maximal Autorisé **(Max Allowable Torque) Chart**

Altitude in 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

1 – Powerplant
1.4 – Engine Operation Limits

T4 (Engine Power Turbine Temperature) Limits
- Normal Operation (Green): 150 to 550 deg C
- Maximum (Red): 550 deg C

THM (Engine Oil Temperature) Limits
- Normal Operation (Green): 30 to 85 deg C
- Caution Range (Yellow): -15 to 30 deg C
- Maximum (Red): 85 deg C

Rotor Brake Limit:
- The rotor brake must not be applied at a rotor speed above 170 RPM.

1 – Powerplant
1.5 – Engine Fire

In the Gazelle, there is no fire warning light in the cockpit and there is no fire suppression system either. If an engine fire is observed during flight, there isn't much you can do since you only have one engine. Therefore, the best you can do is land as soon as possible and run like hell to safety.

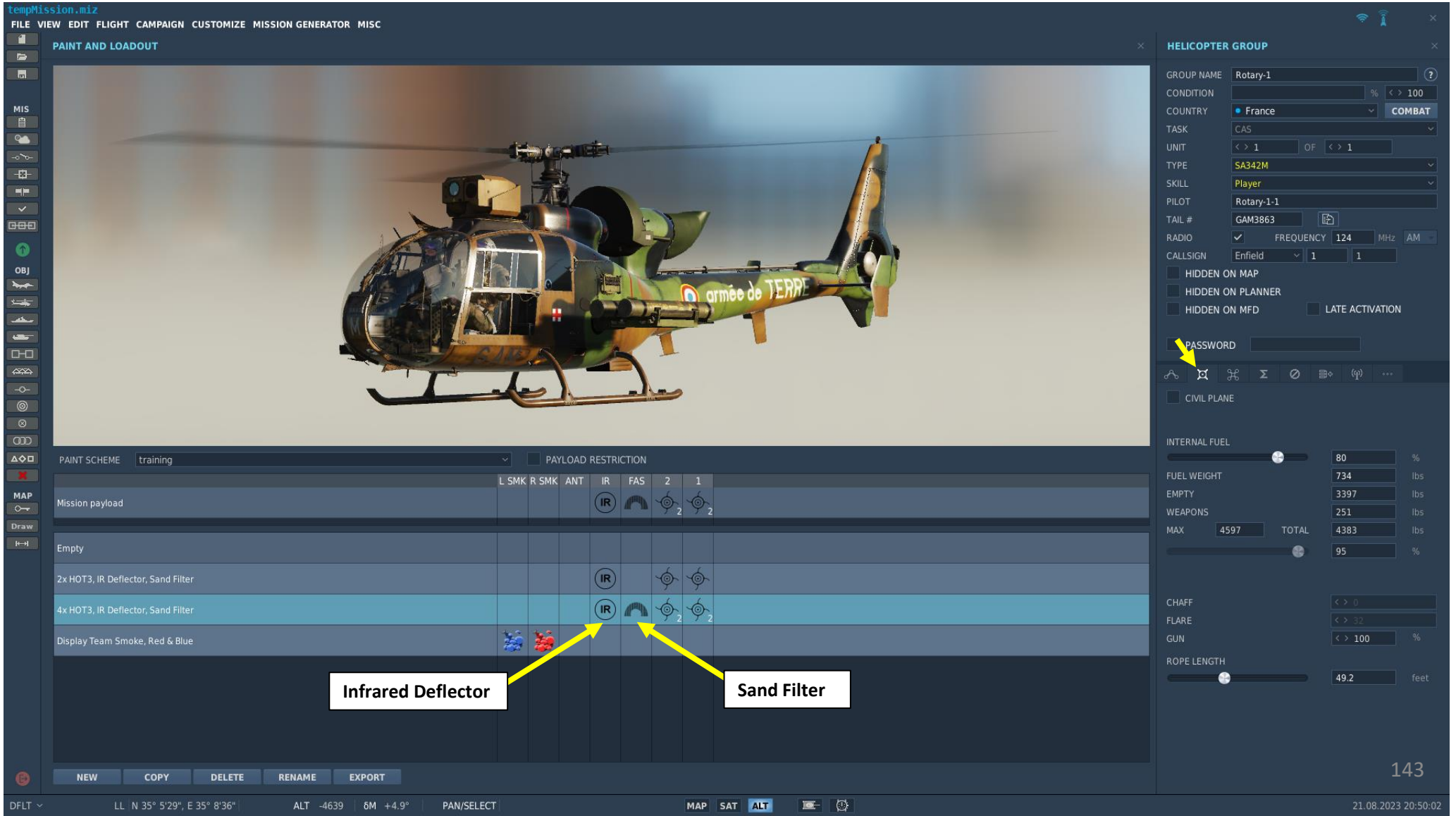
1 – Powerplant
1.6 – Sand Filter & Infrared Deflector

The sand filter (*Filtre Anti-Sable*) protects the engine during taxi, takeoff, and landing at unprepared airstrips and in sandy/dusty environments. The anti-sand filter can be armed by setting the Sand Filter Power Switch ON (UP). Keep in mind that the sand filter reduces available engine power.

The Infrared Deflector, on the other hand, is another piece of equipment mounted on the engine's exhaust. Its role is to reduce the heat signature of the engine in order to increase its survivability against heat-seeking missiles.

1 – Powerplant
1.6 – Sand Filter & Infrared Deflector

The sand filter and infrared deflector can be equipped via the Mission Editor or the Ground Crew.



2 – Fuel System
2.1 – Overview

The SA-342 Gazelle has two fuel tanks: a Main Fuel Tank (437 L) and a Auxiliary Fuel Tank (90 L).

Fuel is first consumed from the Main Tank; the auxiliary tank is turned OFF at first since the main fuel tank level must be lower than 347 liters in order to be able to transfer fuel from the auxiliary tank.

2 – Fuel System
2.2 – Fuel Indications

Fuel quantity is monitored with the ***Quantité Combustible* / Fuel Quantity Indicator** for the **Main Fuel Tank**.

The **Auxiliary Fuel Tank quantity** is monitored with the **Additional Fuel Quantity Indicator**.

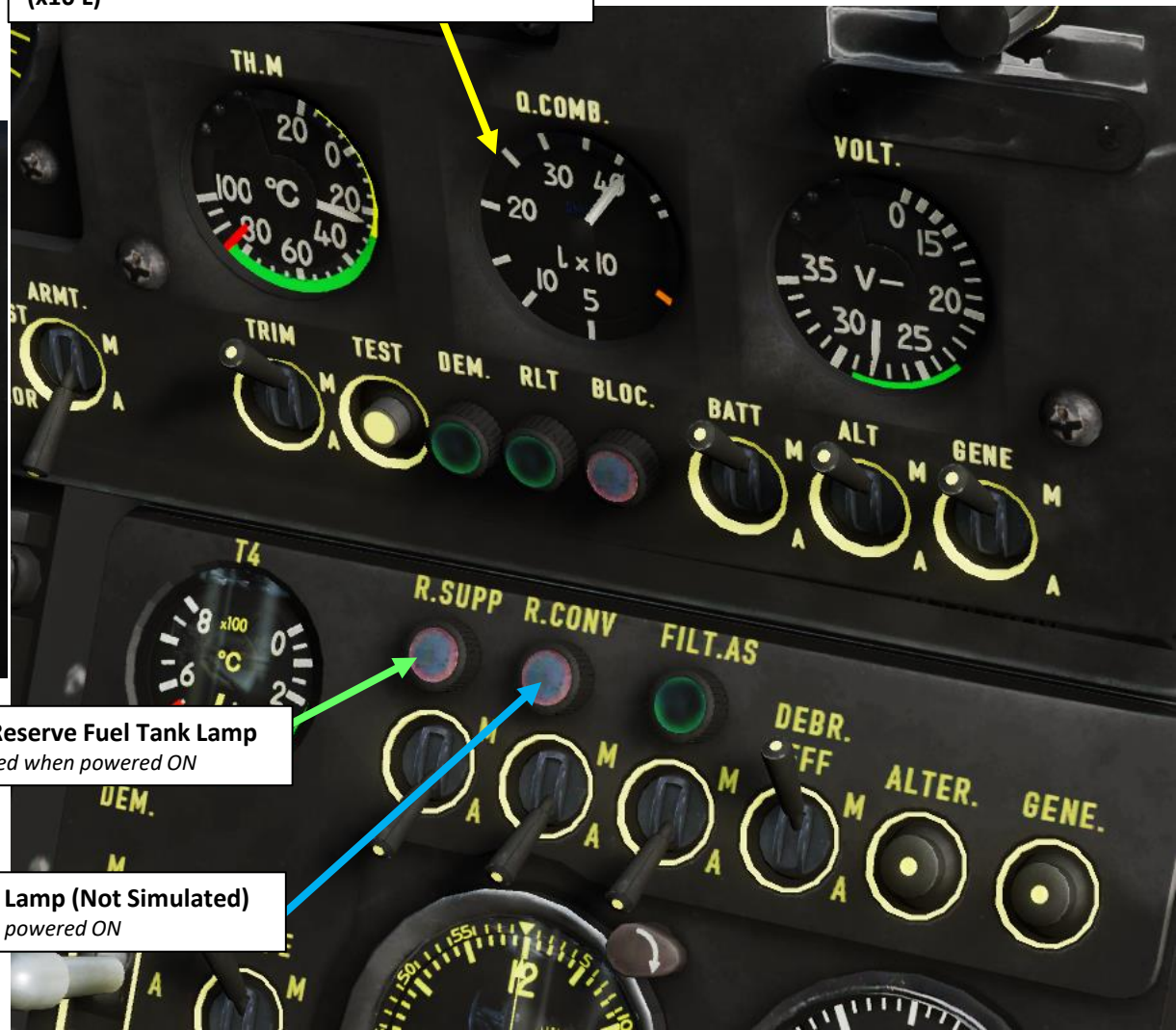
The **COMB Caution Light** will illuminate when fuel level is below 50 liters.

The **Auxiliary/Reserve Fuel Tank Lamp** is used when the Auxiliary Fuel Tank is in use.

COMB Caution Light
- Usable fuel (*Combustible*) level below 50 liters

Additional Fuel Quantity Indicator (70 kg)

***Quantité Combustible* / Fuel Quantity Indicator (x10 L)**



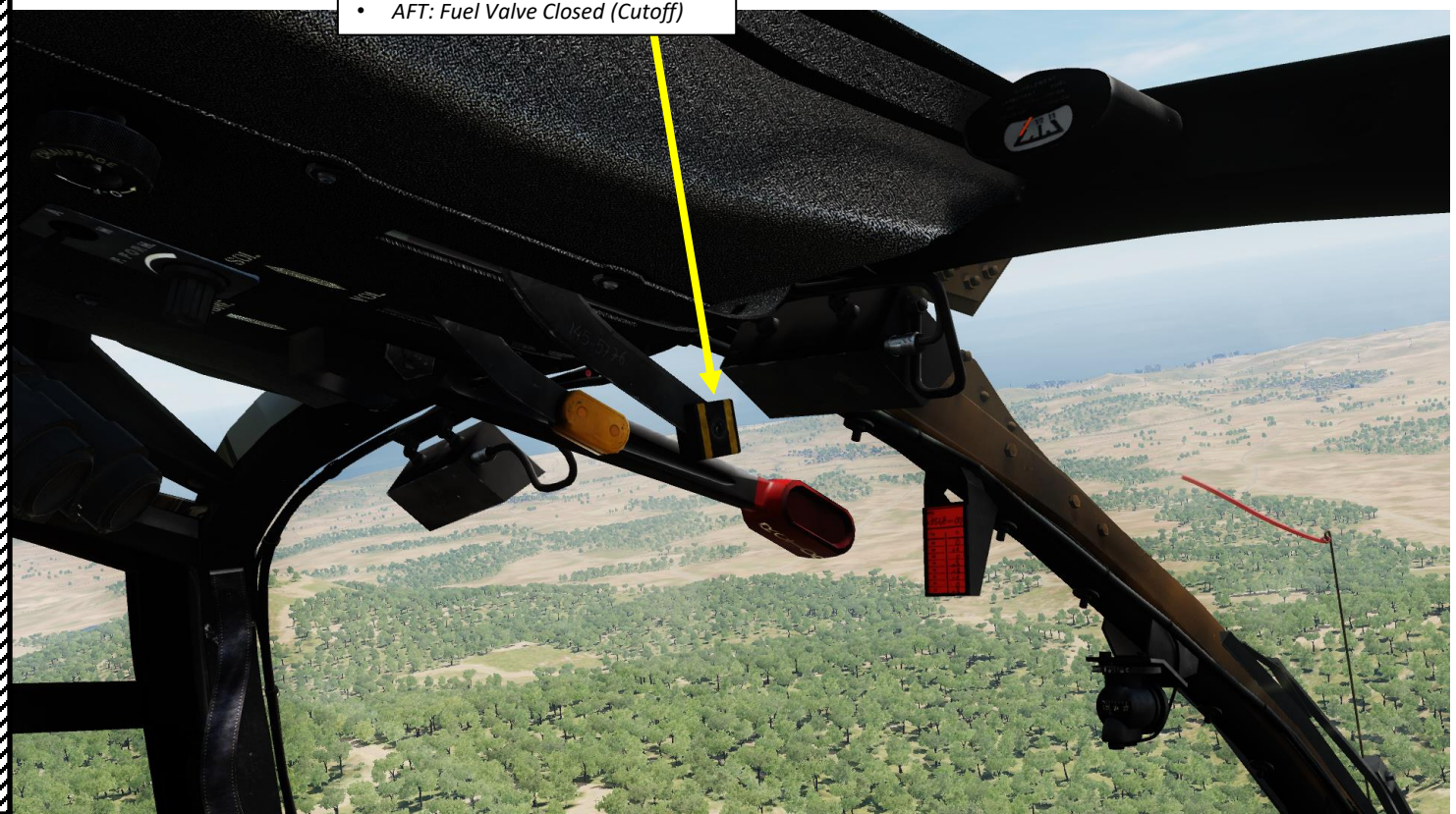
Auxiliary/Reserve Fuel Tank Lamp
- *Illuminated when powered ON*

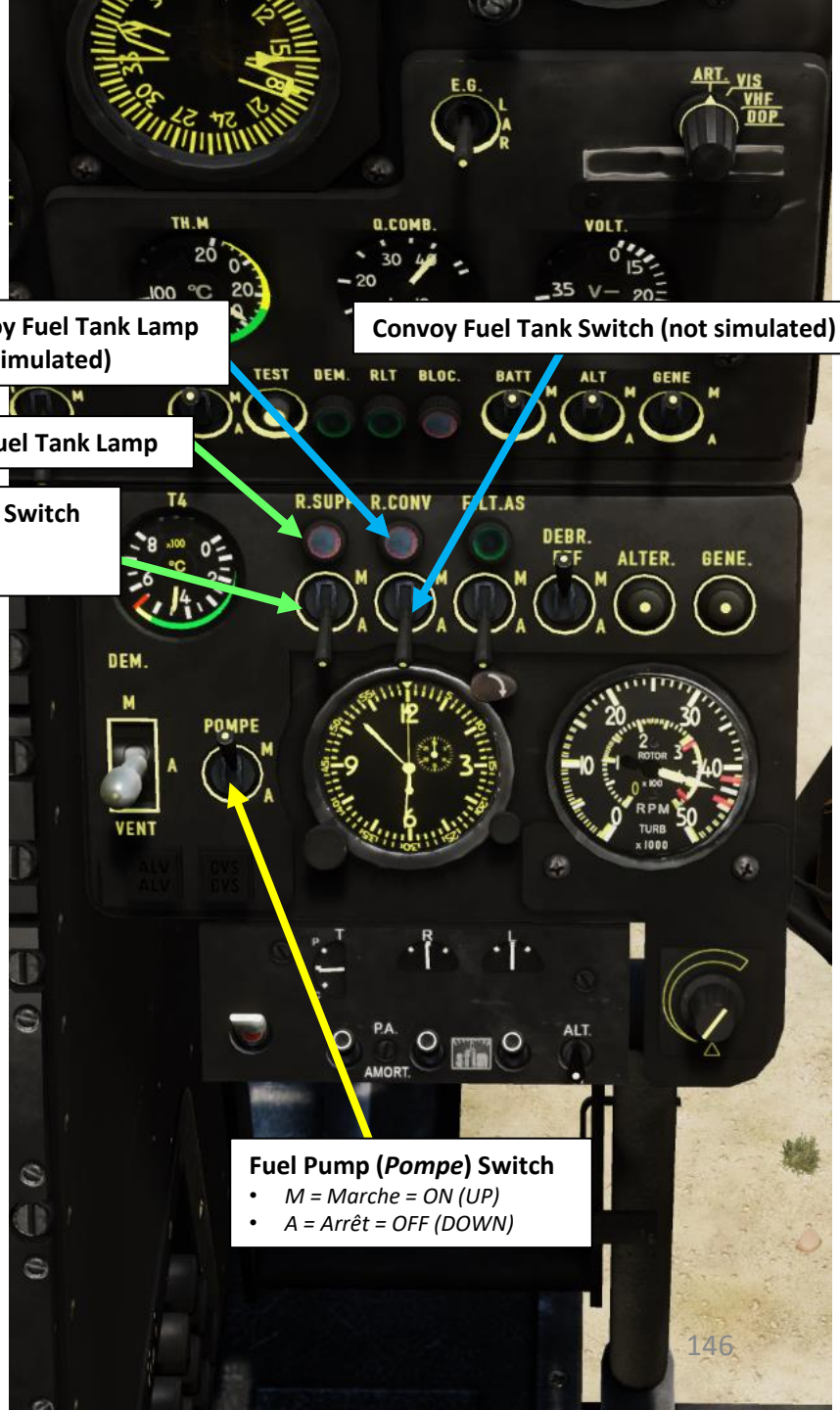
Convoy Fuel Tank Lamp (Not Simulated)
- *Illuminated when powered ON*

2 – Fuel System
2.3 – Fuel Controls

The **Fuel Pump Switch** is used to send the fuel from the fuel tanks to the engine. The **Fuel Cut-Off Lever** is used in emergencies to shut down the engine.

The auxiliary tank is turned OFF at first since the main fuel tank level must be lower than 347 liters in order to be able to transfer fuel from the auxiliary tank. Once the main fuel tank has less than 347 liters, you can set the **Auxiliary/Reserve Fuel Tank Switch** to ON.





2 – Fuel System
2.4 – Fuel Planning

A classic payload for a SA-342M consists of 2 x HOT3 Missiles, an IR deflector, and 350 L of fuel (66 %). This should provide the aircraft with a flight time of 1h55 for a cruising flight at 150 km/h, or 1h30 in combat scenarios with higher power requirements. As a general rule of thumb, I suggest that you take 50 % fuel (263 L) if you intend to carry 4 TOW missiles, which provides roughly 1h08 of flight time.

Fuel Load Reminders

- 100% Fuel: 437 Liters (Main Tank Full) + 90 Liters (Auxiliary Tank Full)
    - Total Fuel Mass: 416.33 kg
- 83 % Fuel: 437 Liters (Main Tank Full), Auxiliary Tank Empty
    - Total Fuel Mass: 345.23 kg

3 – Main Rotor & Fenestron Systems

The main rotor consists of a 3-blade assembly rotating clockwise when seen from above. The regulated main rotor RPM is 387 RPM. Due to the design of the transmission, the rotor and engine RPM are mechanically linked (unless the pilot gives a hard push on the collective).

A **Fenestron** (or fantail, sometimes called "fan-in-fin") is a protected tail rotor of a helicopter operating like a ducted fan. The tail rotor features 13 blades rotating at 5919 RPM. 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

INTRODUCTION

Let's 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.

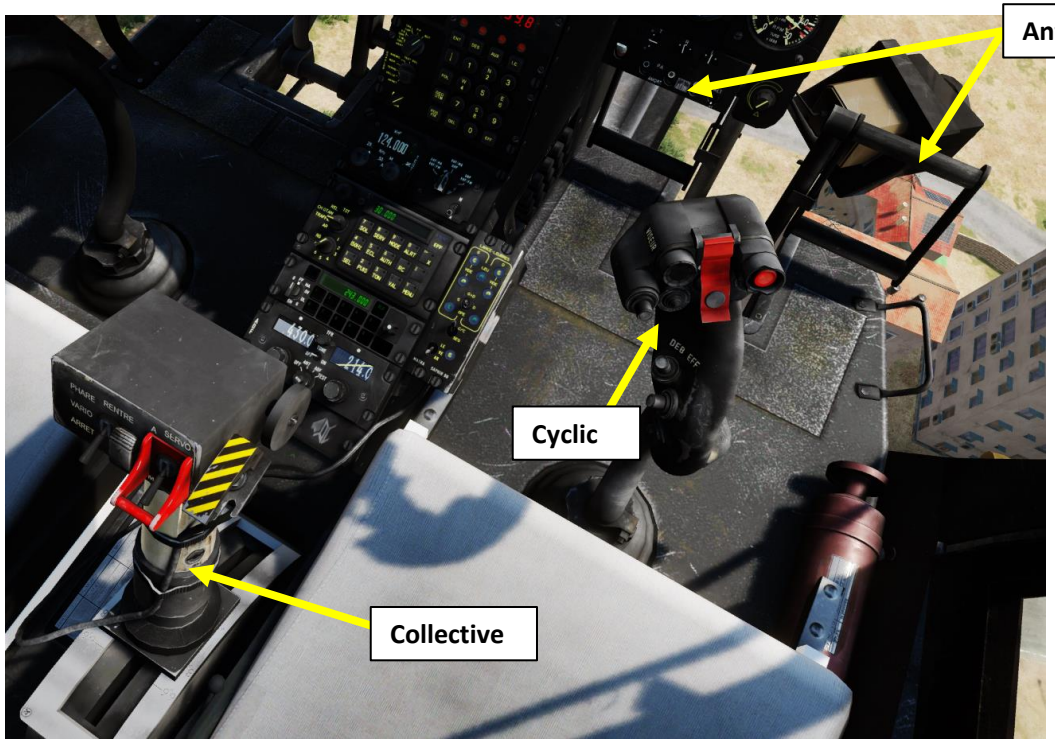
FLIGHT CONTROLS

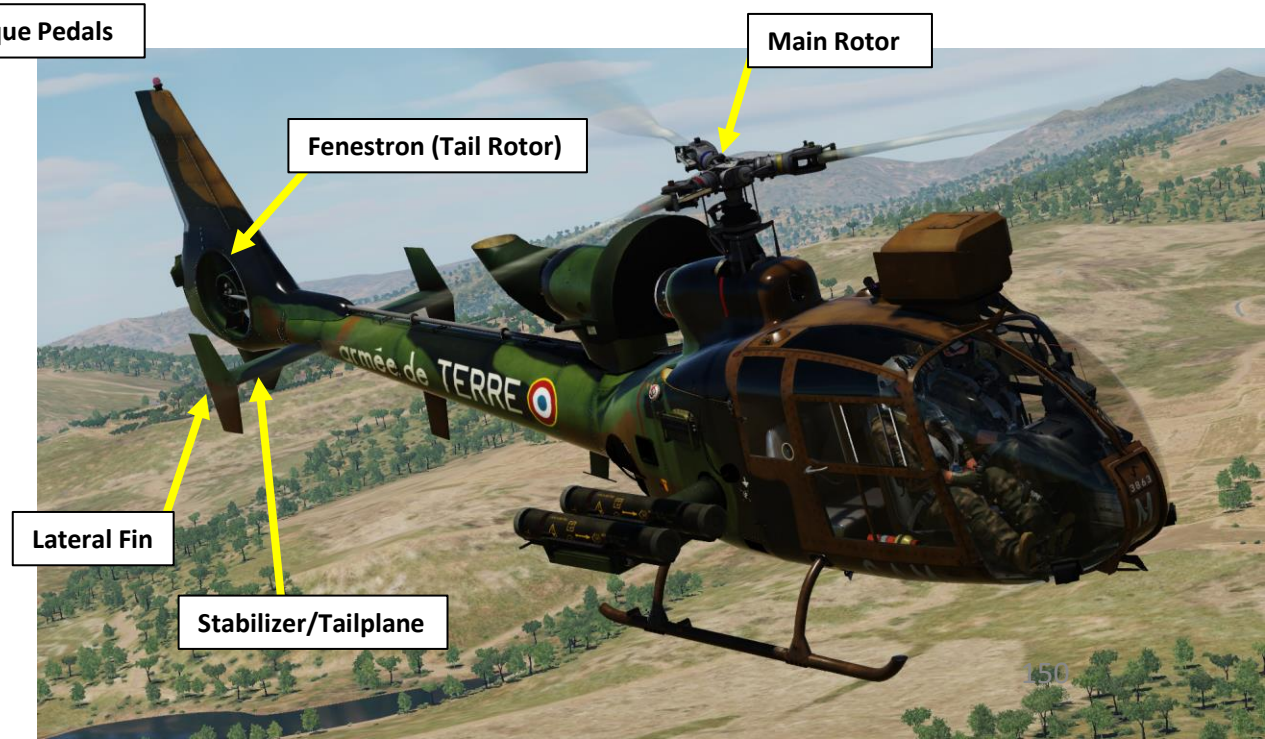
The flight control system is a hydraulically-assisted positive mechanical type, actuated by conventional helicopter controls.
Complete controls are provided for both pilot and copilot.
The system includes the following:

- **Cyclic system**:
  - Moving the cyclic (stick) in any direction will produce a corresponding movement of the helicopter which is a result of a change in the plane of rotation of the main rotor.

- **Collective control system**:
  - The amount of lever movement determines the angle of attack and lift developed by the main rotor, and results in ascent or descent of the helicopter: When the lever is in the full down position, the main rotor is at minimum pitch. When the lever is in the full up position, the main rotor is at maximum pitch.

- **Tail Rotor "Fenestron" system**:
  - The tail rotor control system is operated by pilot/copilot anti-torque pedals. Pushing a pedal will change the pitch of the tail rotor blades, resulting in directional control.





FLIGHT CONTROLS

- **Magnetic Brake (*Débrayage des Efforts – Freins Magnétiques*) System**:
  - The magnetic brake maintains the cyclic in a defined reference position. Pressing the magnetic brake button on the pilot cyclic will define a new reference position to hold.

- **Trim Actuator system**:
  - The trim actuator allows fine trimming, which can be set with the Trim China Hat on the cyclic. It allows the pilot to perform small adjustments in aircraft attitude and airspeed. The trim actuator system is used in conjunction with the magnetic brake system.

Trim China Hat

Magnetic Brake (*Débrayage des Efforts – Freins Magnétiques*) Trim Button

Trim Actuator Switch
- *M = Marche = ON (UP)*
- *A = Arrêt = OFF (DOWN)*

Magnetic Brake (*Débrayage des Efforts – Freins Magnétiques*) Switch
- *M = Marche = ON (UP)*
- *A = Arrêt = OFF (DOWN)*

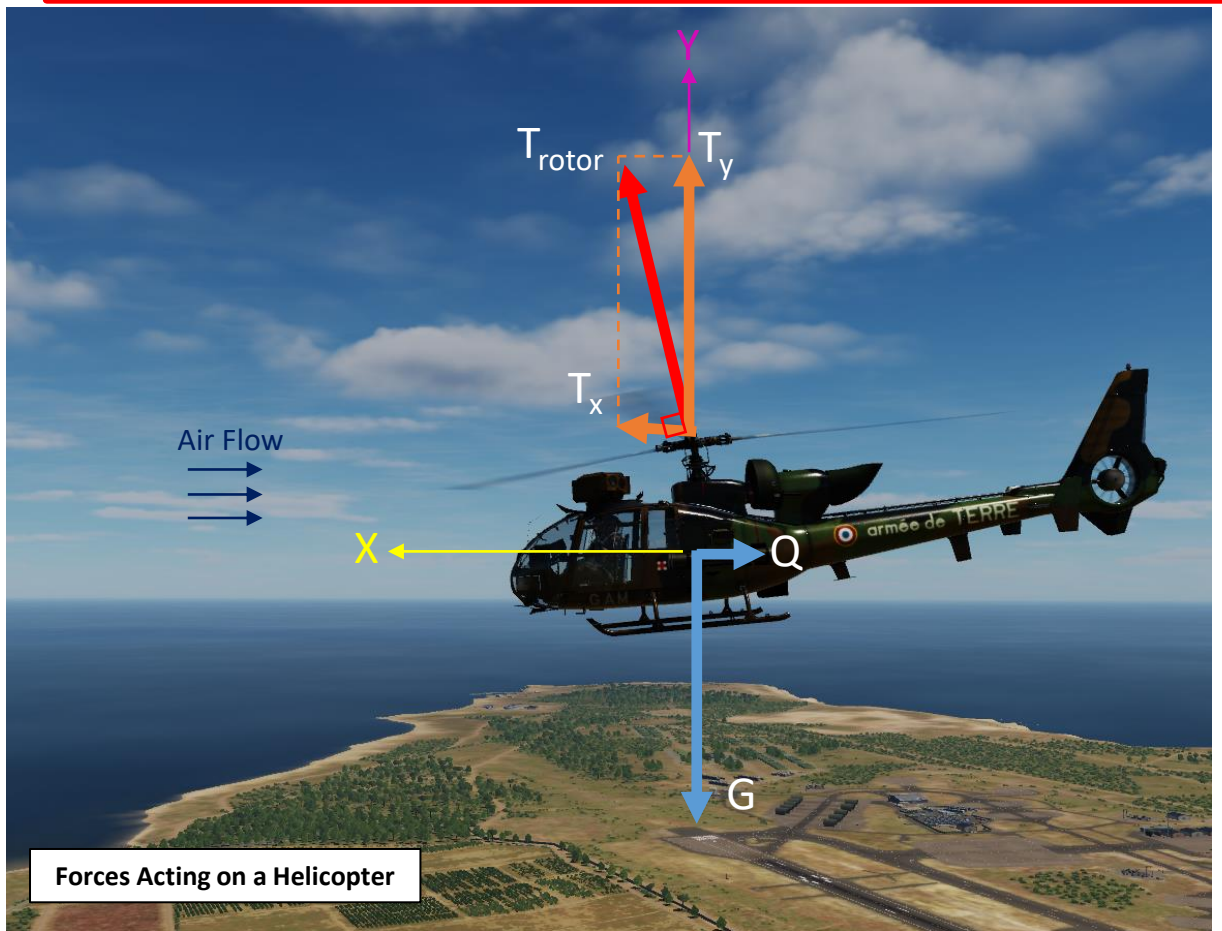
FORCES: TORQUE, TRANSLATIONAL & VERTICAL LIFT

IN A NUTSHELL…

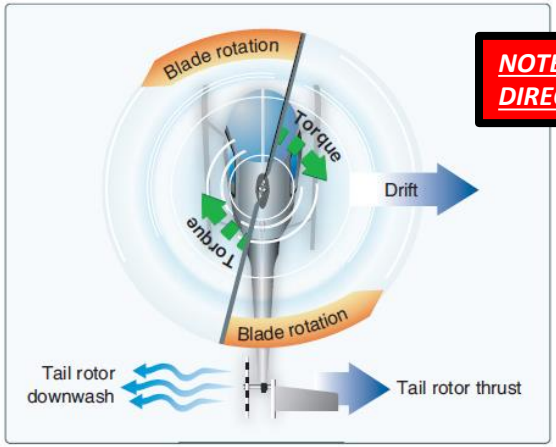
In a hover, you will most likely generate vertical lift only since the lift vector is pointing upwards. However, if you push your nose down and gain horizontal speed, you will notice that you will generate much more lift as you gain speed. This is called "**Translational Lift**": your blades gain much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

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

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

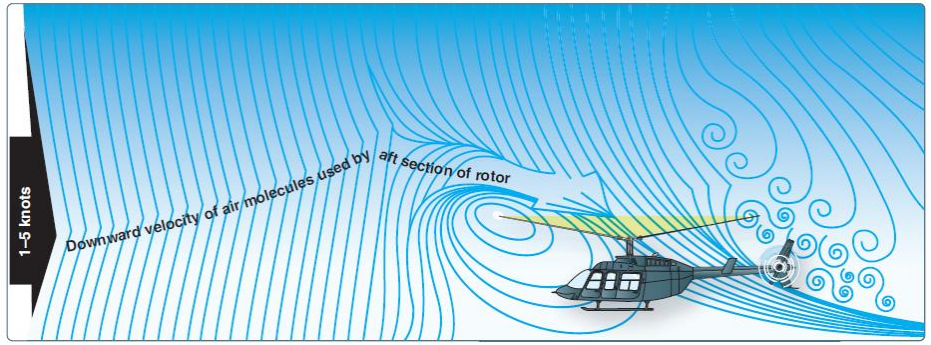


Forces Acting on a Helicopter

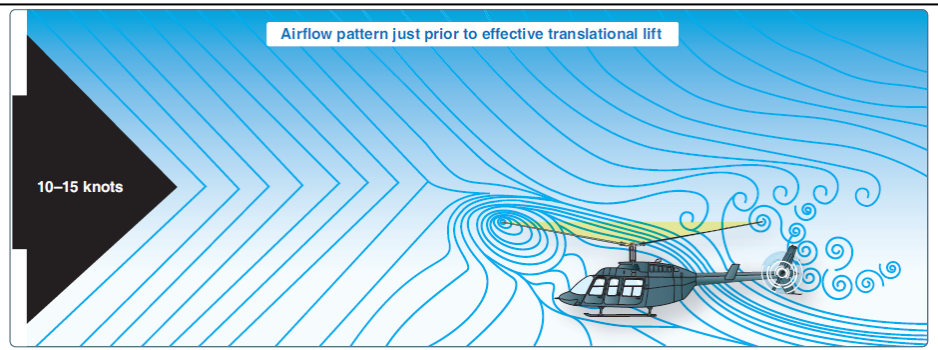


NOTE: THE GAZELLE'S ROTOR DIRECTION IS THE OPPOSITE.

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.



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



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

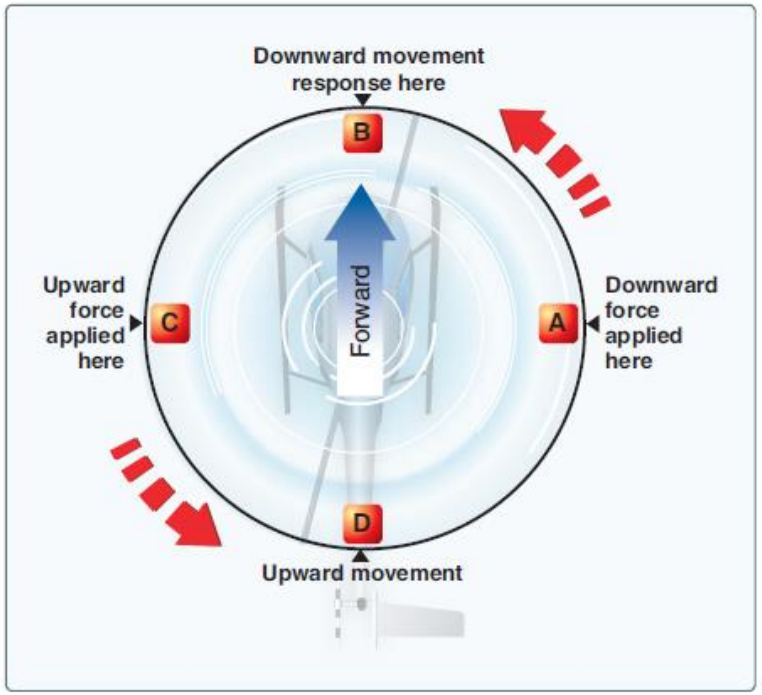
GYROSCOPIC PRECESSION

IN A NUTSHELL…

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

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

NOTE: THE GAZELLE'S ROTOR DIRECTION IS THE OPPOSITE.



Gyroscopic Precession

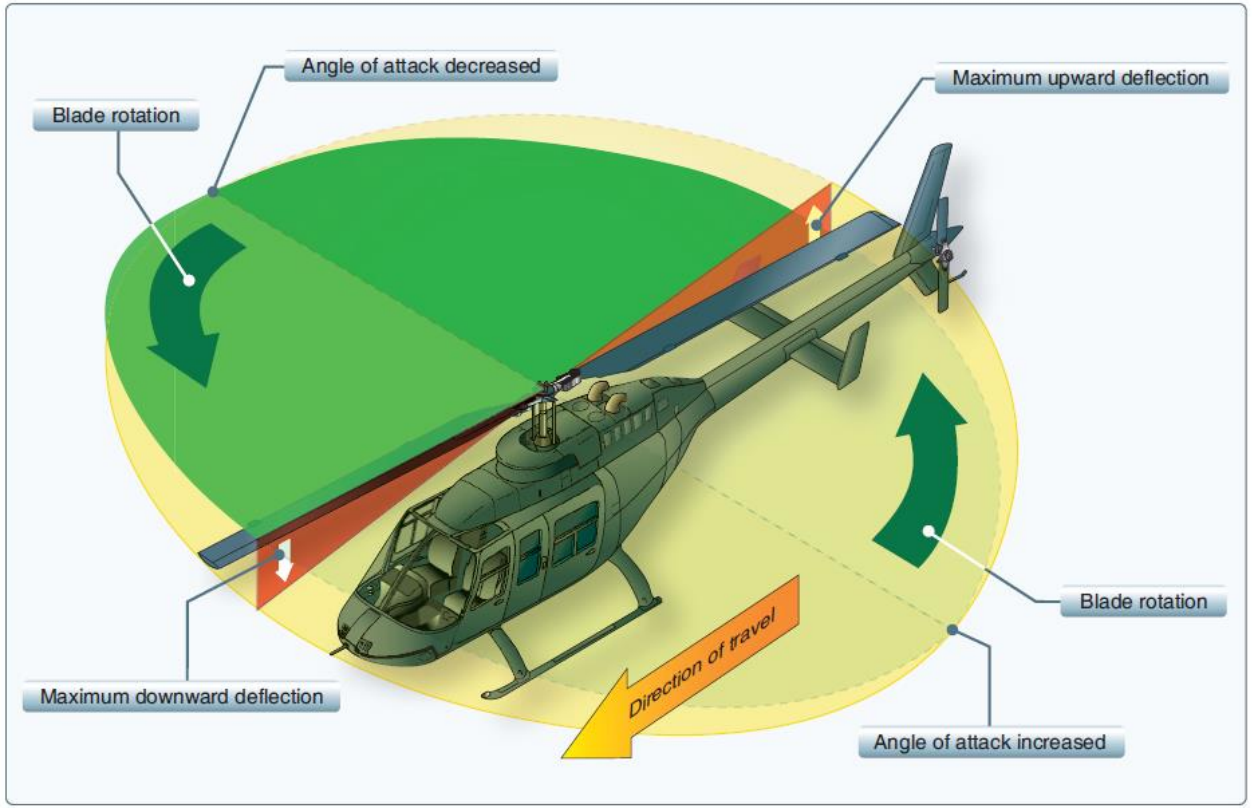


Figure 2-29. *As each blade passes the 90° position on the left in a counterclockwise main rotor blade rotation, the maximum increase in angle of incidence occurs. As each blade passes the 90° position to the right, the maximum decrease in angle of incidence occurs. Maximum deflection takes place 90°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

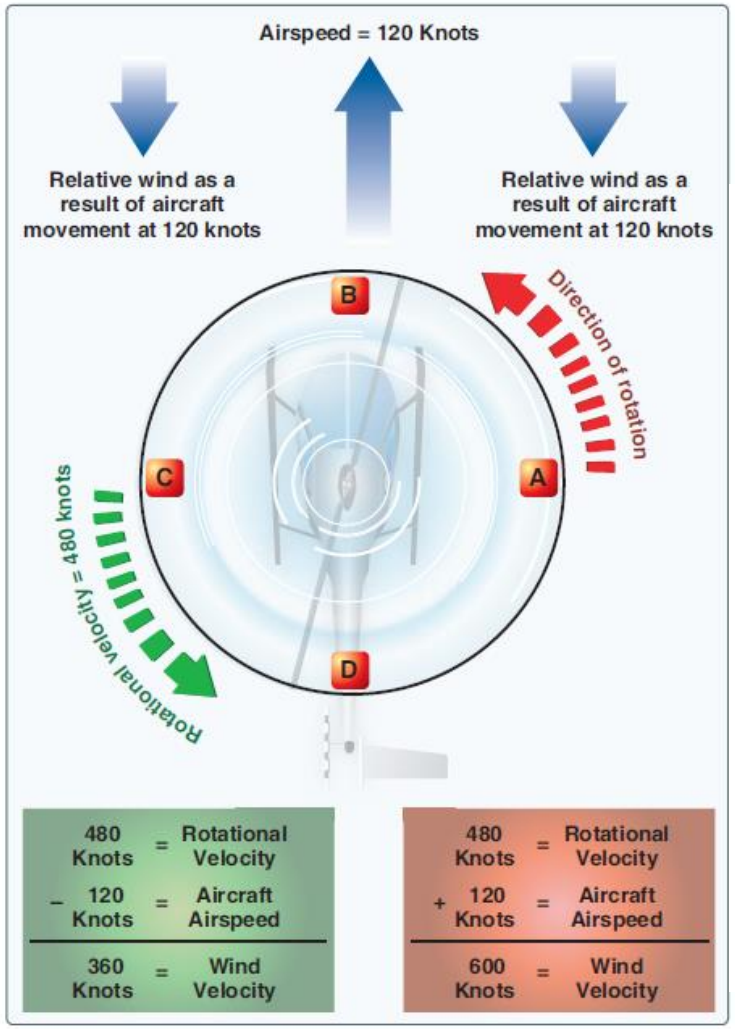
RETREATING BLADE STALL & DISSYMMETRY OF LIFT

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: THE GAZELLE'S ROTOR DIRECTION IS THE OPPOSITE.

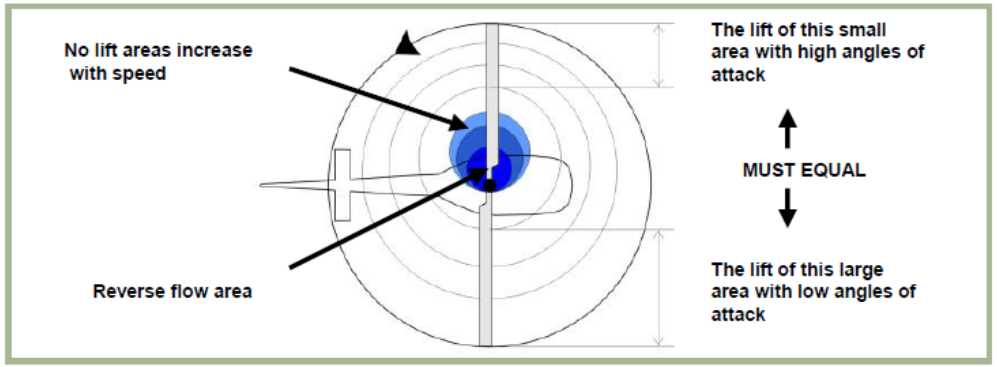


Airflow in forward flight

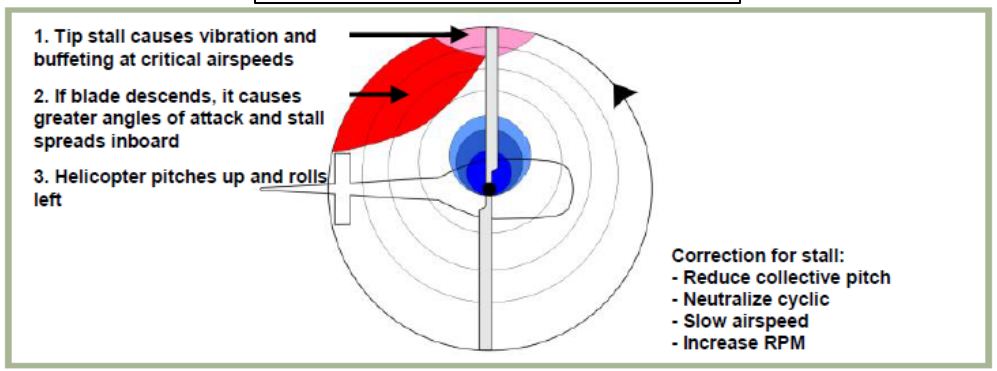
IN A NUTSHELL…

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.



Normal Cruise Lift Pattern



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.

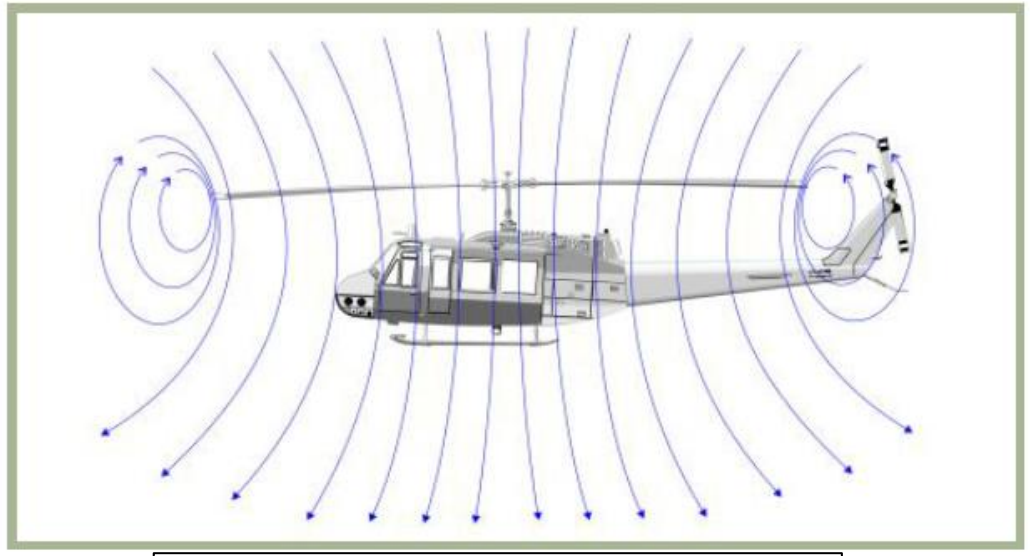
These conditions allow the rotor system to be more efficient. Maximum ground effect is achieved when hovering over smooth hard surfaces. When hovering over surfaces as tall grass, trees, bushes, rough terrain, and water, maximum ground effect is reduced. Rotor efficiency is increased by ground effect 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.

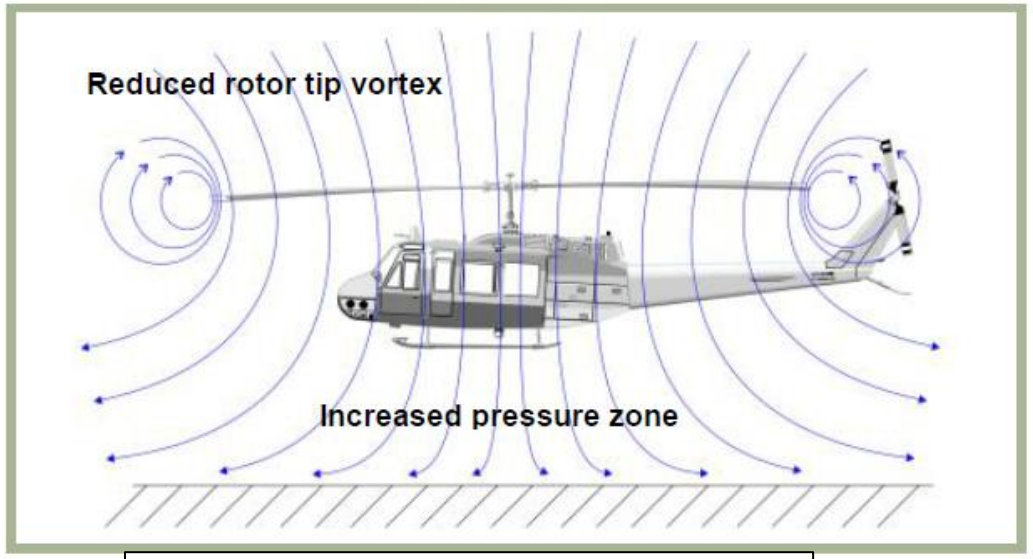
IN A NUTSHELL…

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).



Airflow when Out of Ground Effect (OGE) (UH-1H)



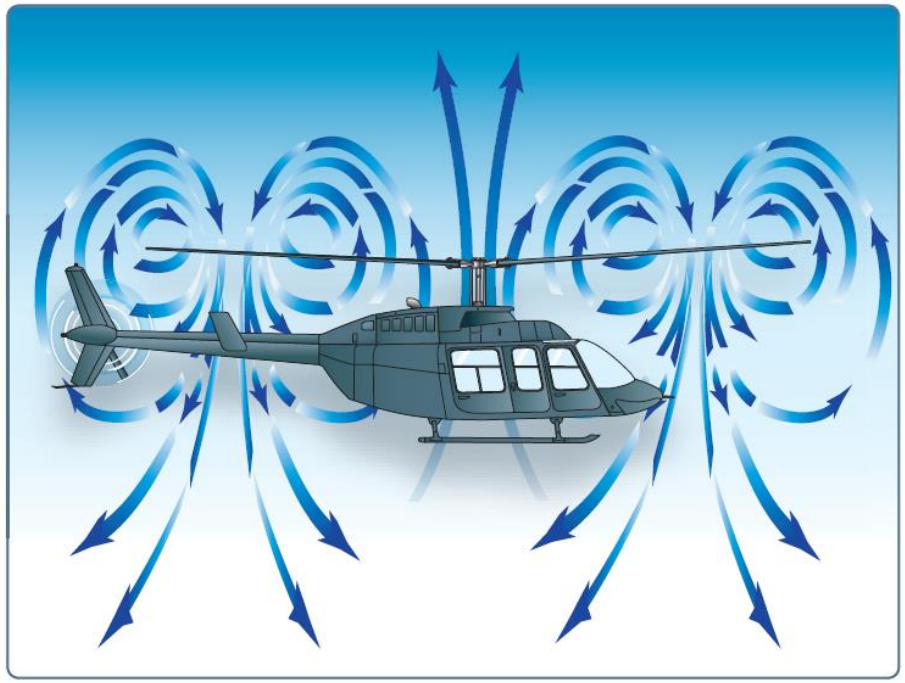
Airflow when In Ground Effect (IGE) (UH-1H)

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.

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.



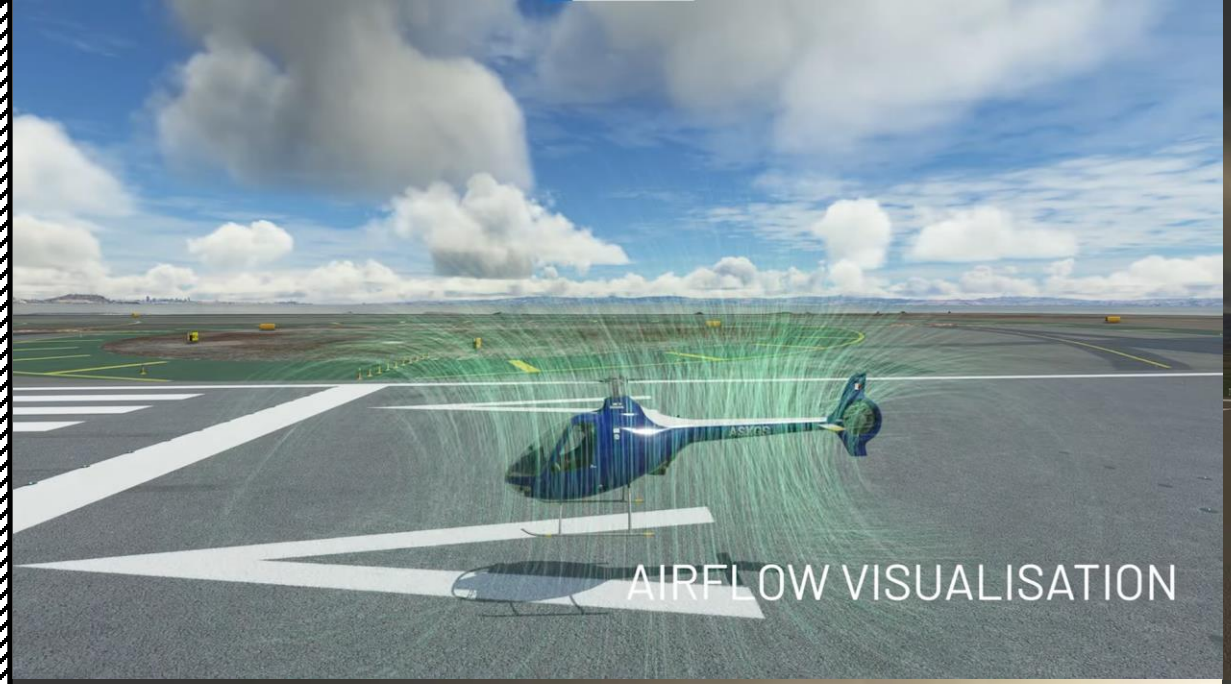
Vortex Ring State (VRS)

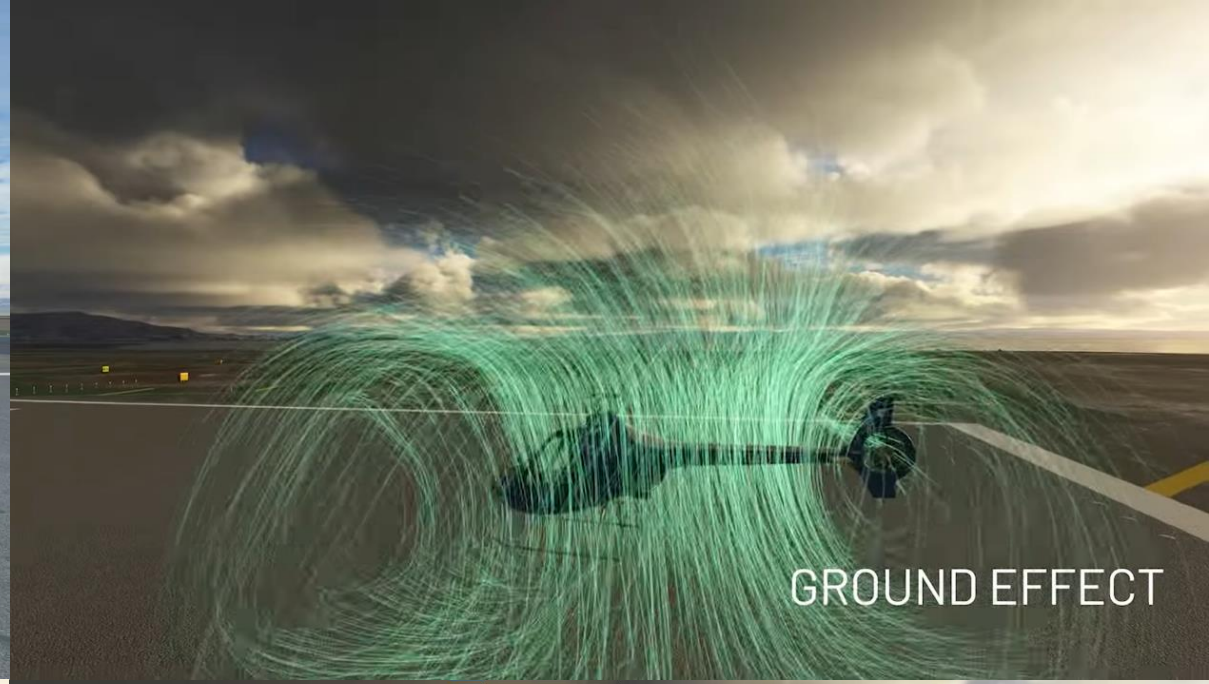
WHY SHOULD YOU CARE?

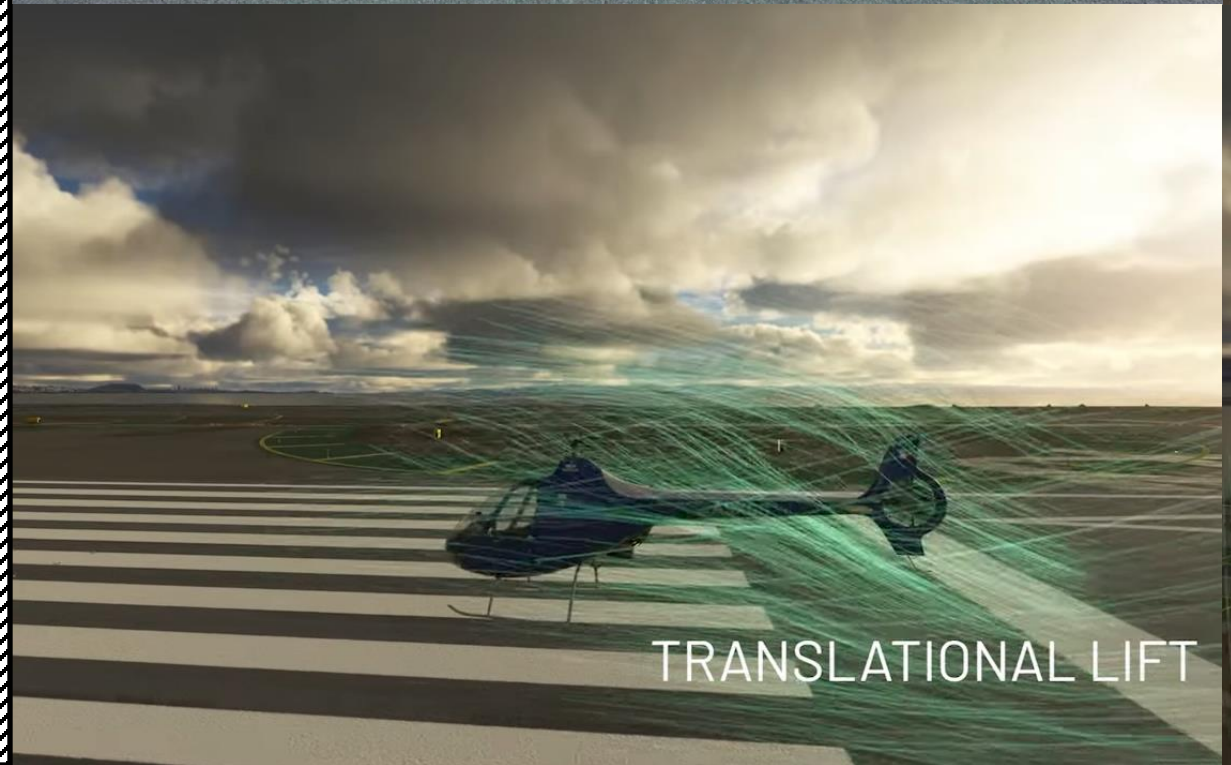
One of the biggest issues new pilots have is that they do not understand what VRS is, what it does, why it happens and how to counter it. In simple terms, if your airspeed is around 20-30 km/h (which is the speed at which VRS usually occurs), you will experience a sudden loss of lift that will cause 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.**

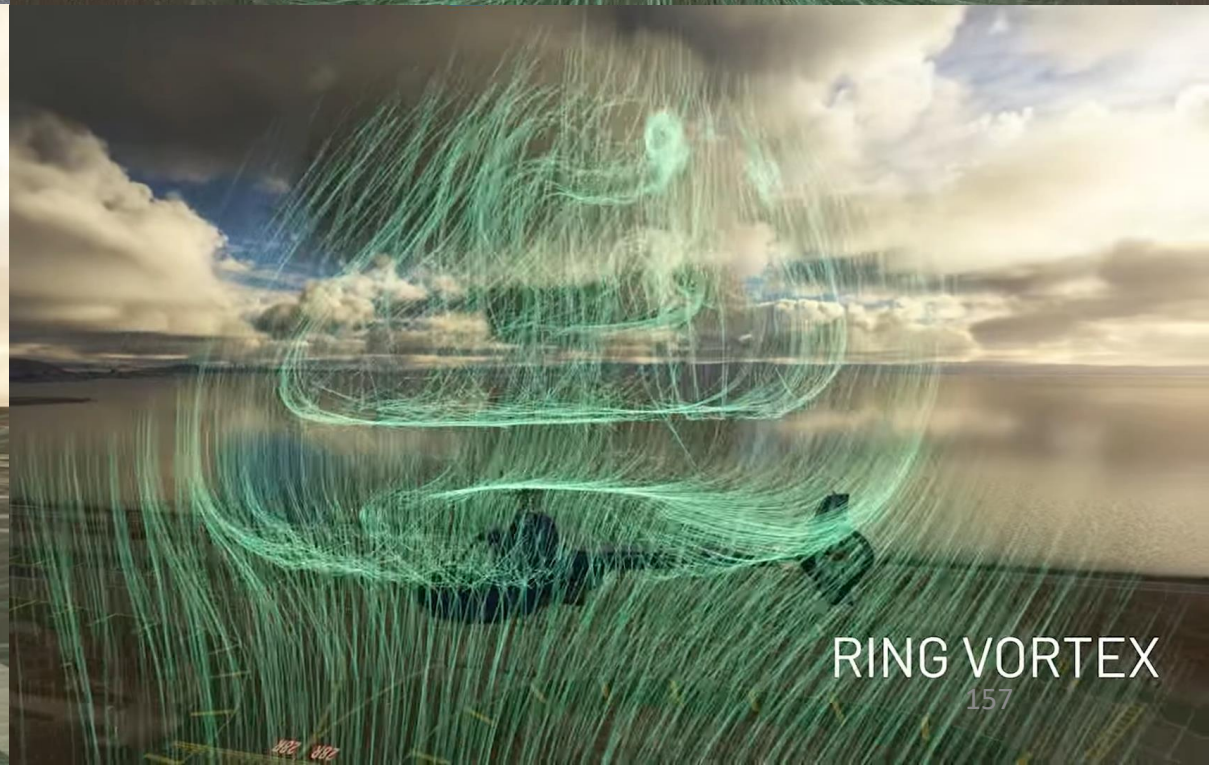
Oh, now I’ve got your attention? Good. One of the biggest problems Peter Pilots experience is to land their chopper. Even in real life, there are many pilots who do what we call a “hard landing” because they did not anticipate correctly the sudden loss of lift caused by VRS. A hard landing is when you 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.


AIRFLOW VISUALISATION

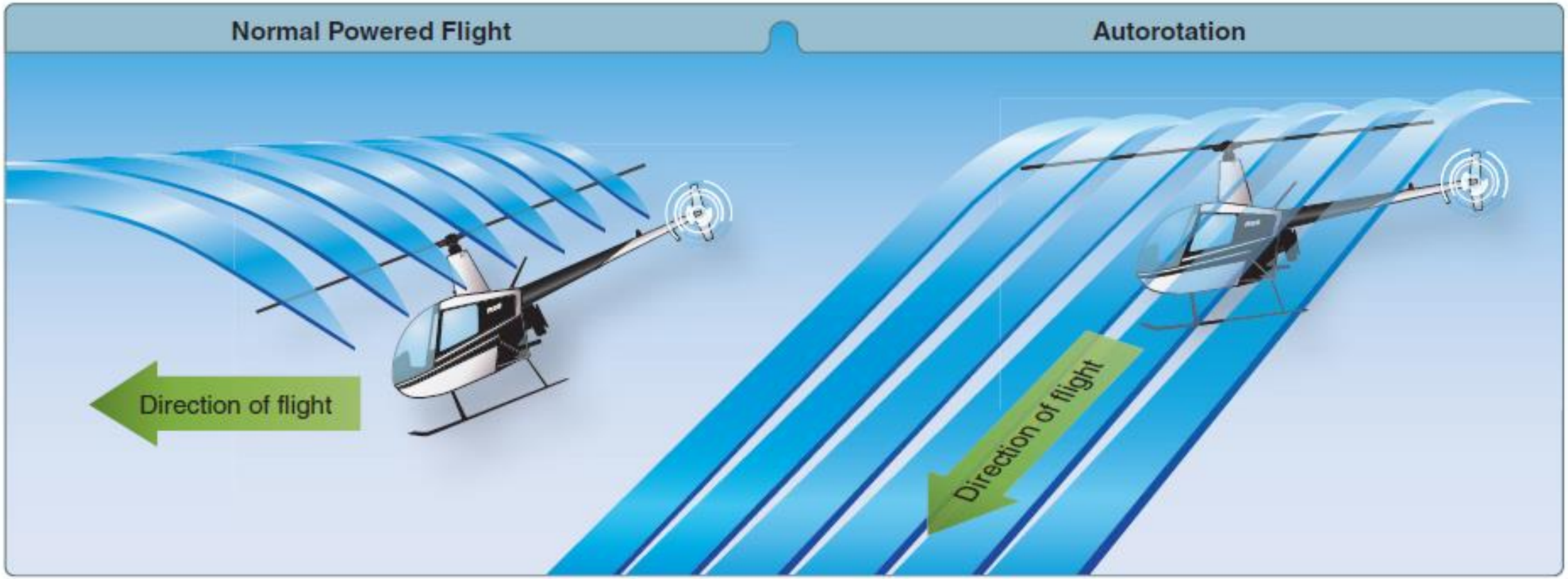

GROUND EFFECT


TRANSLATIONAL LIFT


RING VORTEX

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.



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.

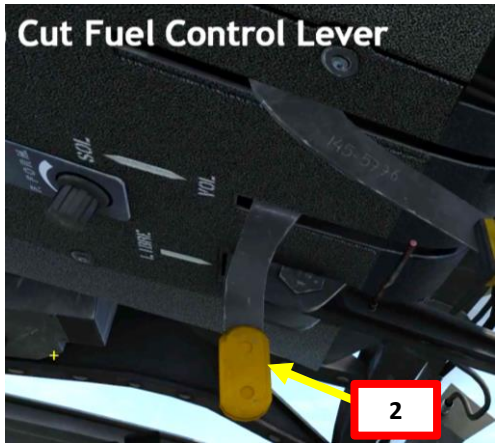
HOW TO SIMULATE AUTOROTATION

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:

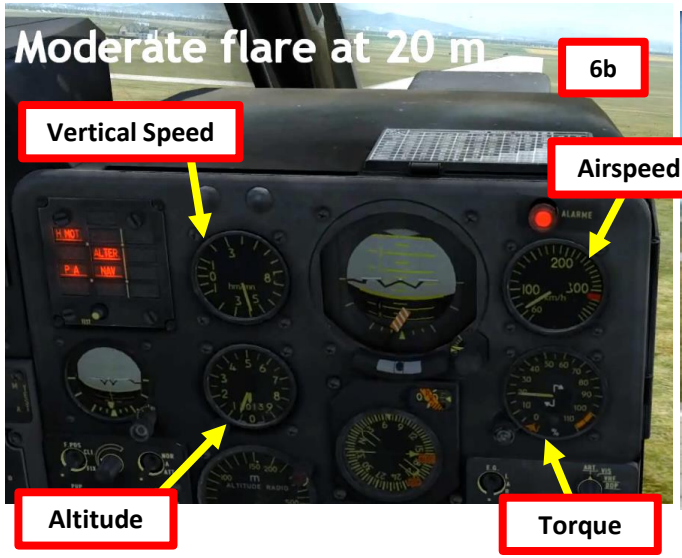
1. Find a good place to land first and make sure you are at 1000 m more.
2. Simulate engine loss of power by reducing throttle by setting it all the way aft.
3. Push TRIM RESET switch
4. Apply anti-torque pedal to center the slip ball, lower collective and pull up cyclic to compensate for sudden RPM 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.
https://www.youtube.com/watch?v=F_a9q_B-TRE


Cut Fuel Control Lever
2


Lower Collective (FULLY DOWN)
4


Maintain approach speed between 120-140 km/h
5


Moderate flare at 20 m
6b
Vertical Speed
Airspeed
Altitude
Torque

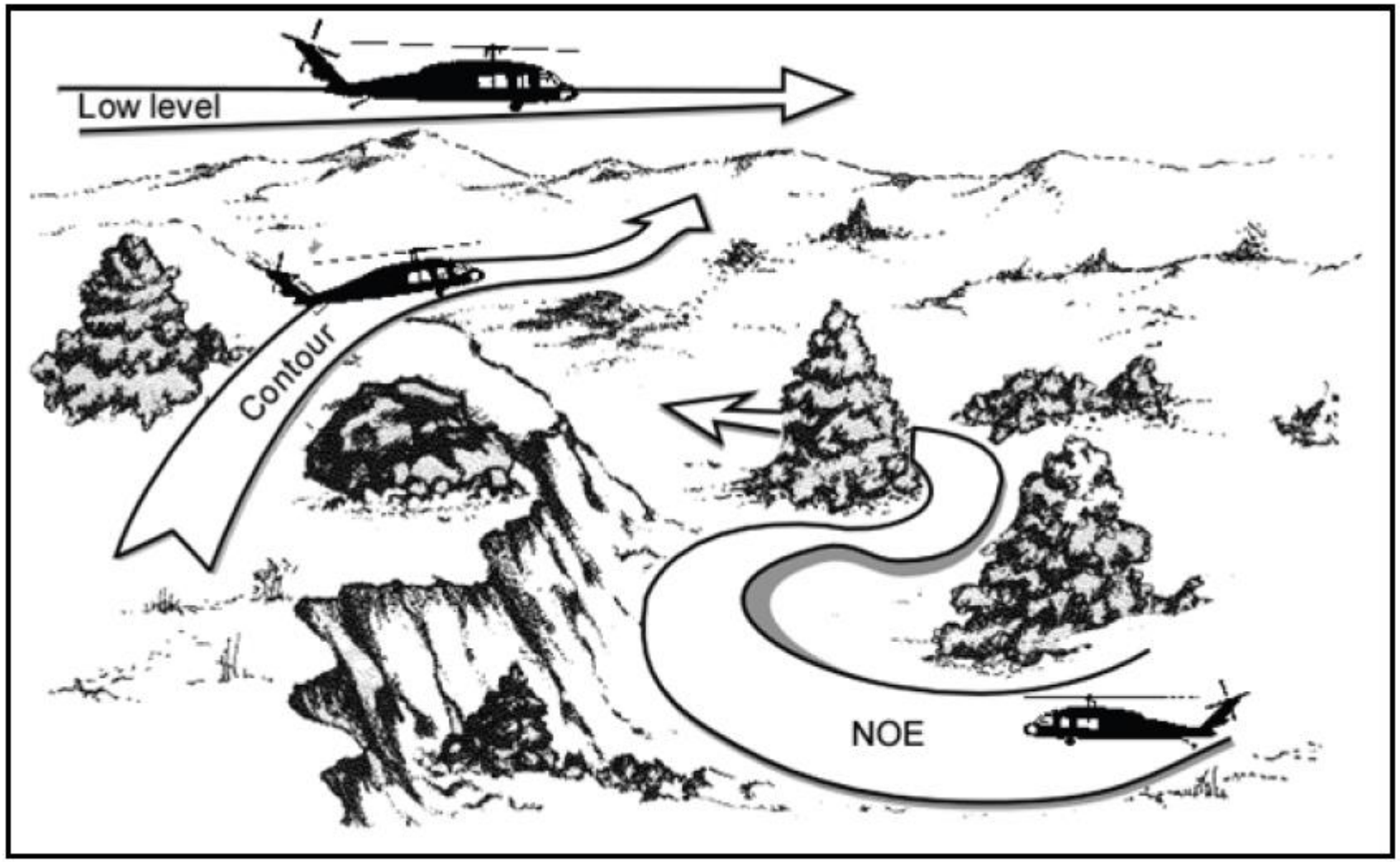

Moderate flare at 20 m
Loss of airspeed
Vertical Speed close to 0


Cushion landing by raising collective when at 6-8 m above the ground
6c
Airspeed
Torque
Vertical Speed

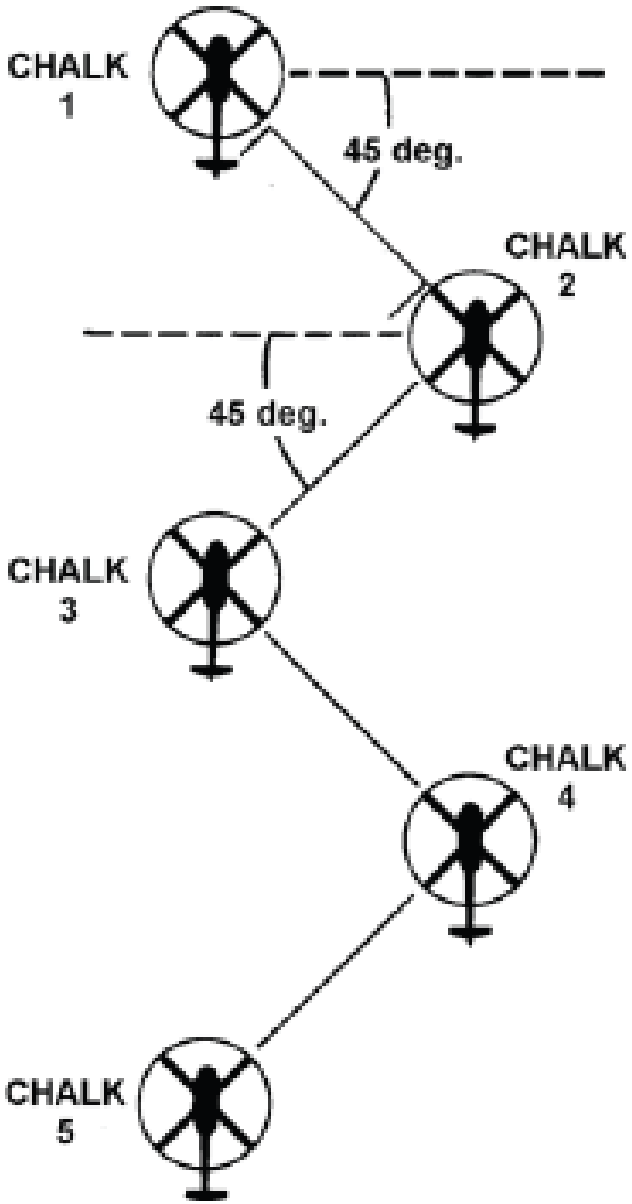

Cushion landing by raising collective when at 6-8 m above the ground

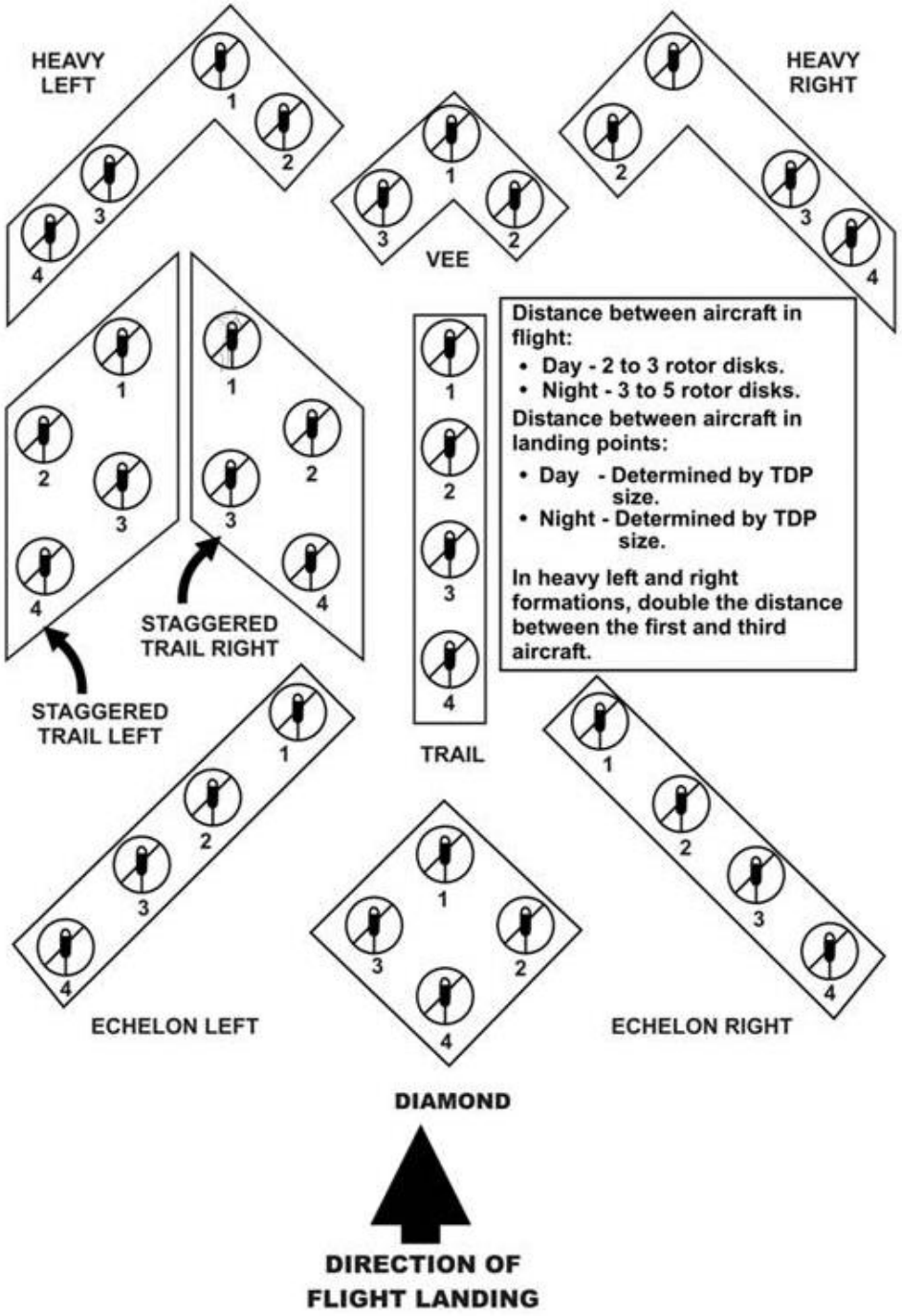
FLIGHT MODES

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

TROOPS 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.

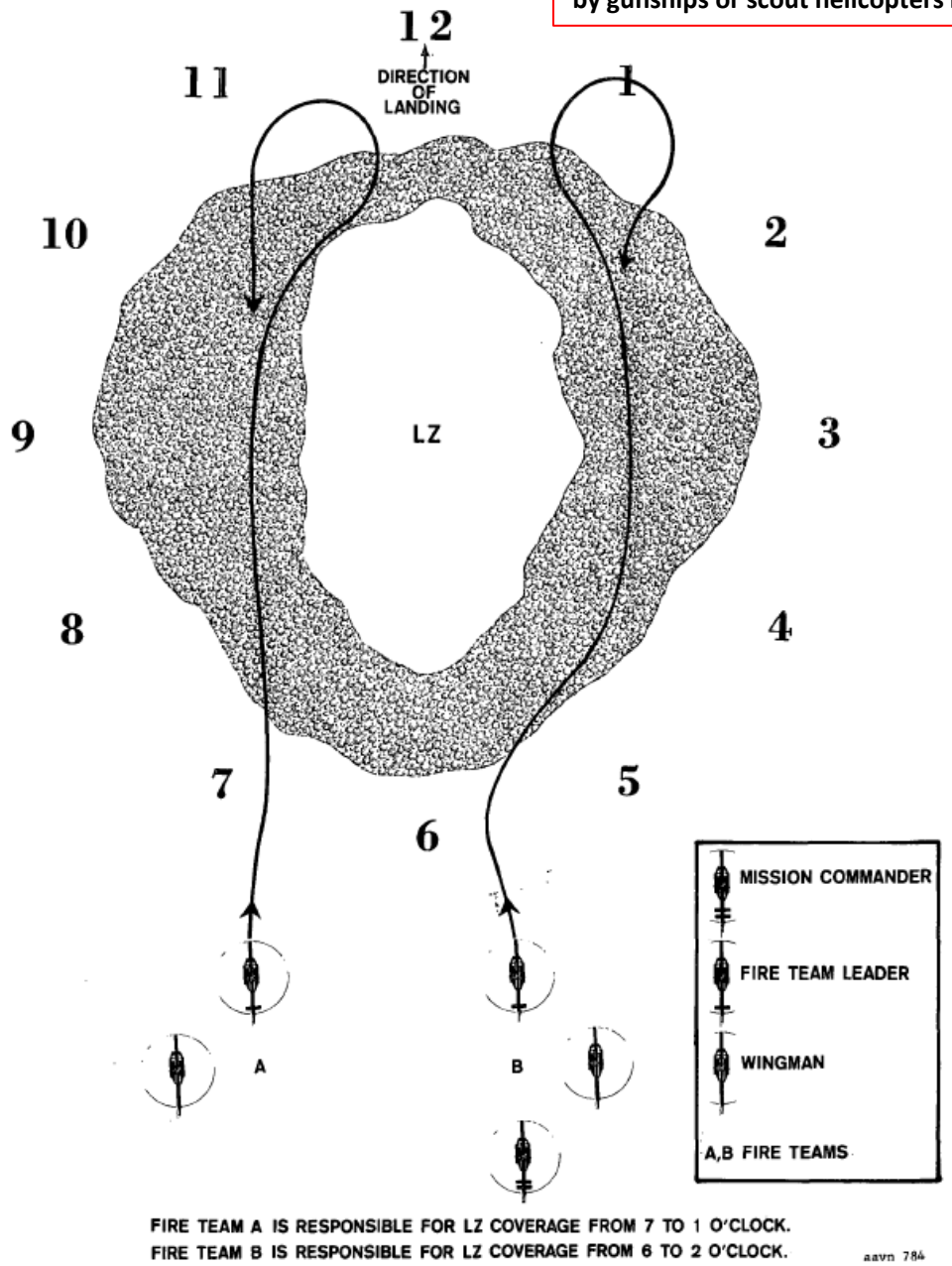


Figure 26. Double orbit of the landing zone.

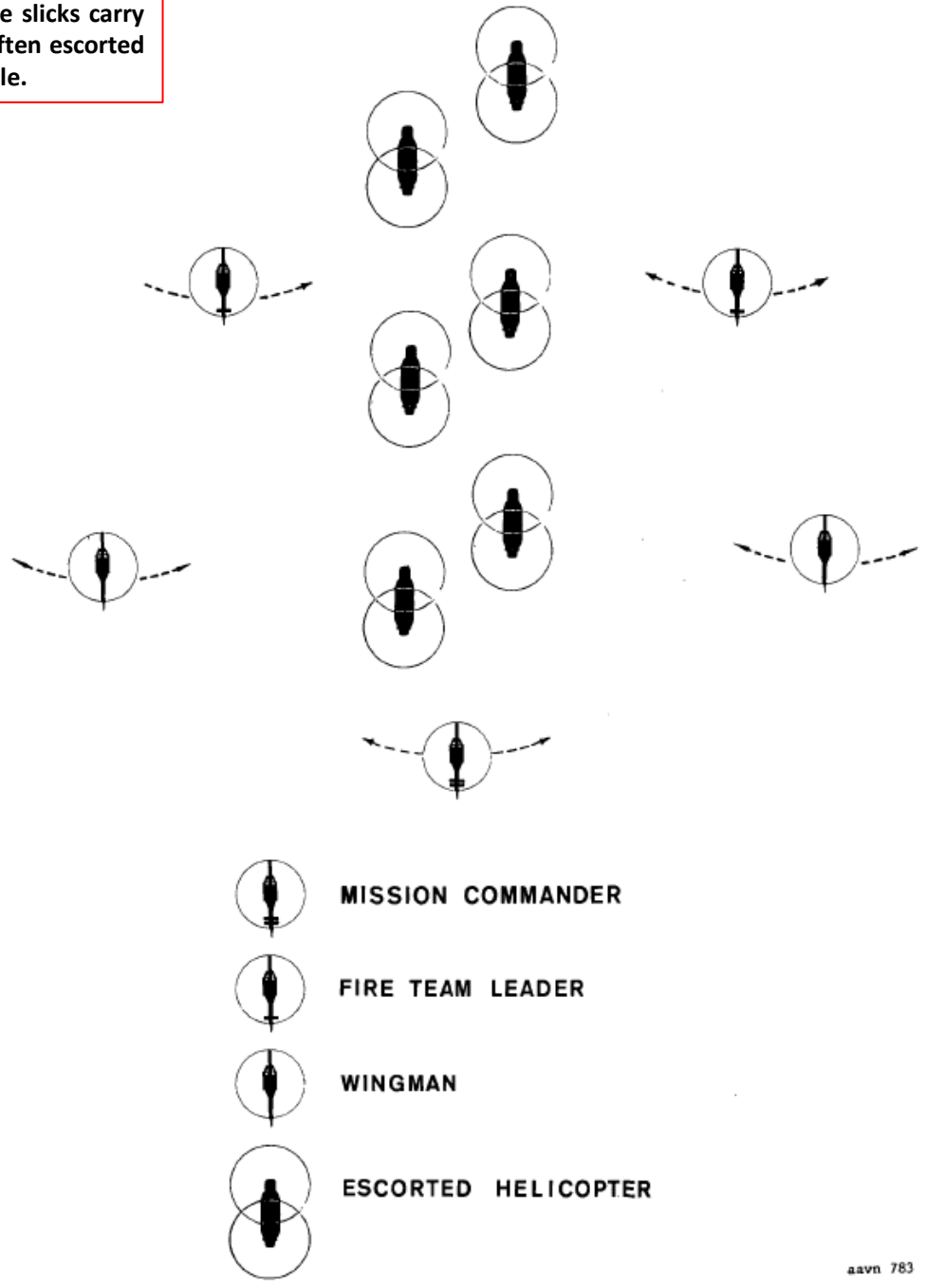
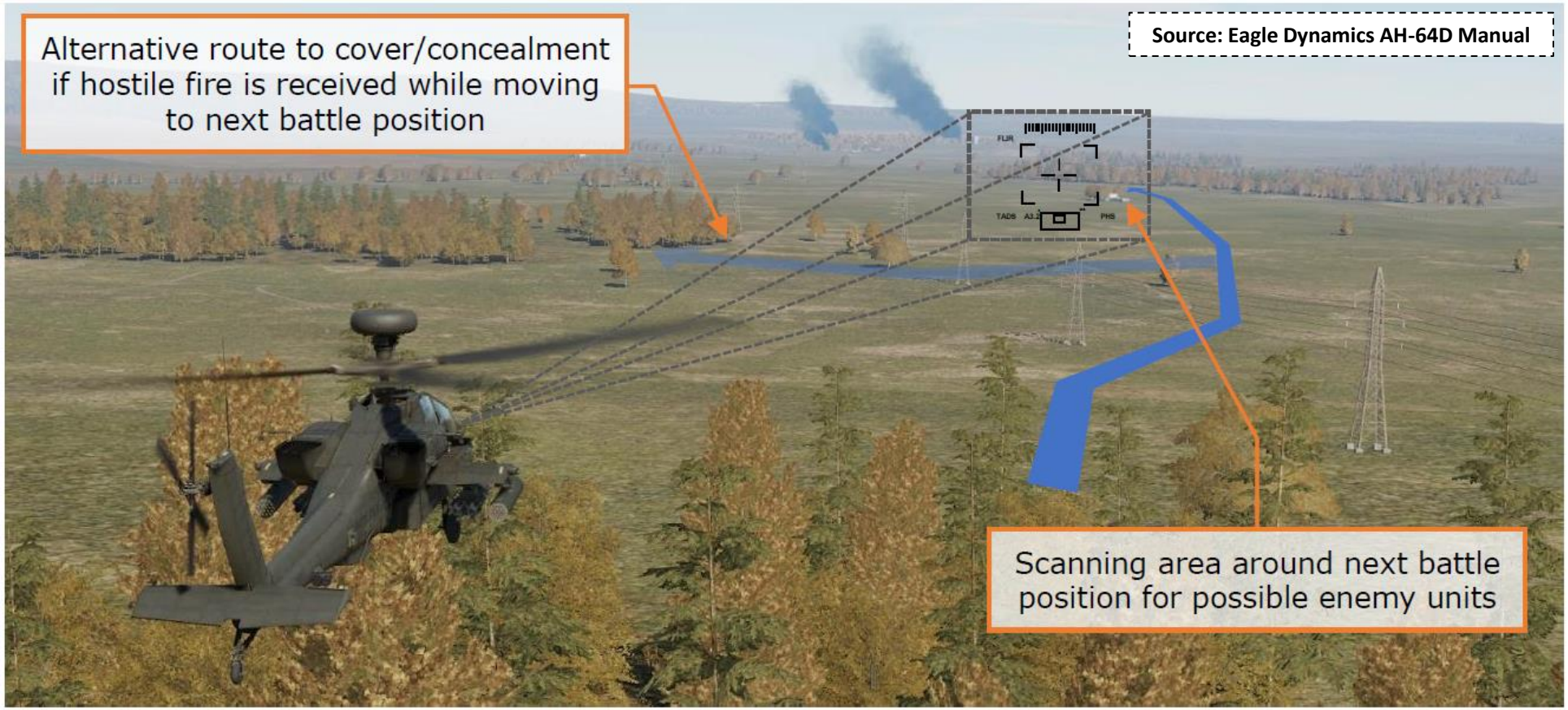


Figure 25. Escort formation at tree-top level or nap-of-the-earth.

COMBAT EMPLOYMENT

Planning is an essential aspect of flying the Gazelle. Even before climbing into the cockpit, air routes, terrain, suspected/known enemy positions, enemy weapon systems, and even the weather, should all be evaluated to understand how each factor will affect the aircrew's ability to operate. Terrain allows you to mask your position and movements from the enemy. Blindly bounding from one position to the next without performing reconnaissance of the route to that next position, and any potential fields of observation or fire, is a good way to catch lead in the face.

Whenever possible, an attack helicopter aircrew should always choose a **Battle Position** (BP, a defensive location oriented on a likely enemy avenue of approach) that places the enemy within the maximum effective range of their weapons, while remaining outside the maximum effective range of the enemy's range (standoff). When standoff cannot be maintained due to changes on the battlefield, the aircrew can utilize its mobility to rapidly re-position the attack helicopter to regain and maintain that standoff for as long as possible. This maximizes the helicopter's effectiveness against the enemy, while minimizing the enemy's ability to engage it.



Reconnaissance next to BP (Battle Position) with alternative sources of cover

COMBAT EMPLOYMENT

Scout helicopters should use cover and concealment whenever possible (known as “masking”), bounding from one battle position to the next to minimize exposure to enemy fire. The best practice is to remain undetected for as long as possible until ready to attack. To perform sensor scans of the battlefield or engage enemy targets with their weapon systems, attack helicopters must “un-mask” from behind cover/concealment.

Depending on the nature of the cover/concealment and the tactical situation, attack helicopters can un-mask vertically or laterally (from the side) to expose their sensors or weapon systems while keeping an escape route available if things go pear-shaped.

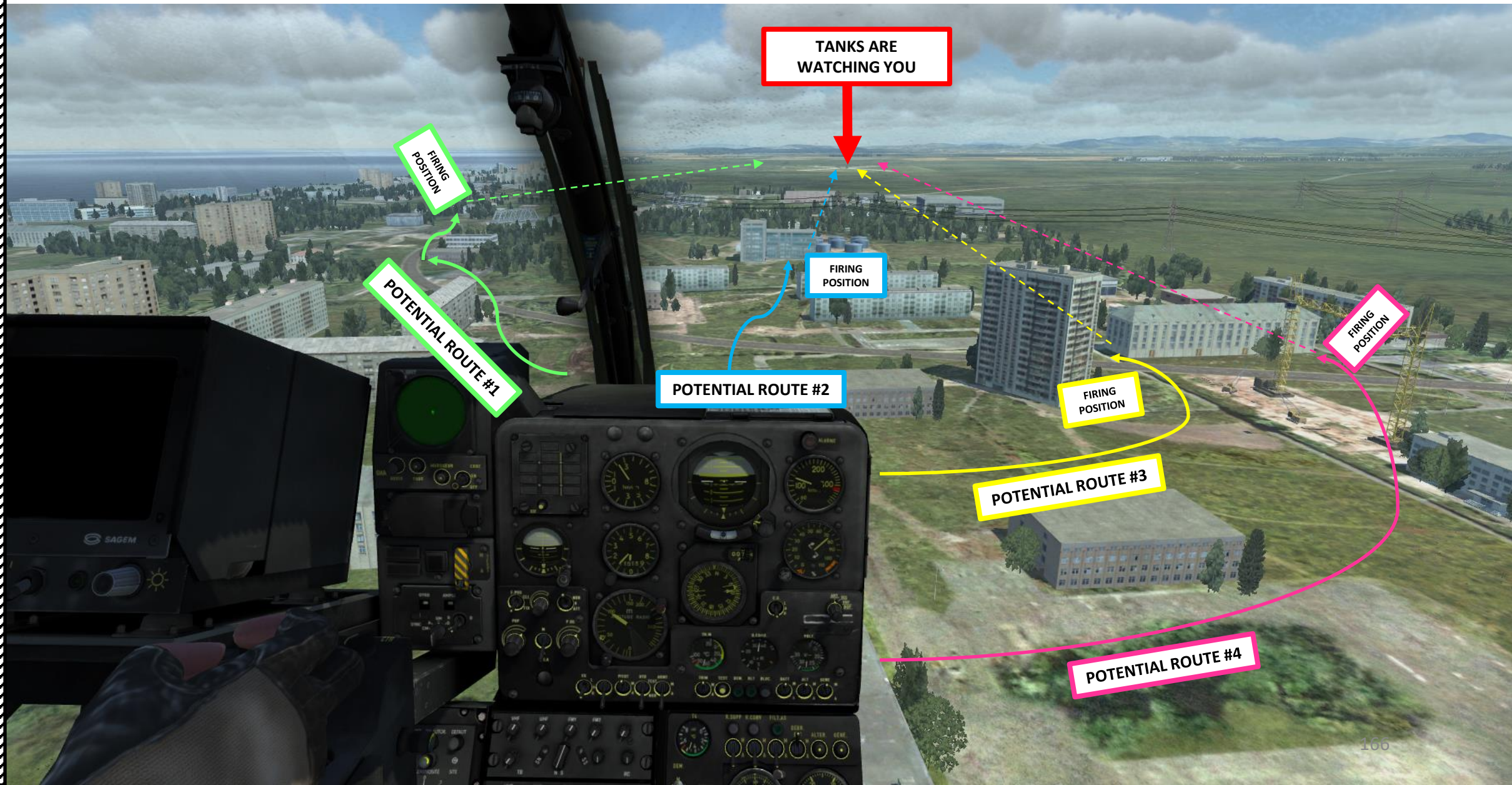
When an attack is initiated, the enemy should be engaged within the shortest amount of time possible before re-masking and relocating to a different battle position.

Weapon fire reveals your presence to the enemy, just as a sniper reveals his position by firing on the enemy. This is why constantly relocating is crucial to ensure your survival.

Un-masking from behind cover

COMBAT EMPLOYMENT

Always plan your approach route carefully. Use hills, buildings, trees… ANYTHING to avoid being detected.



QUICK TIPS

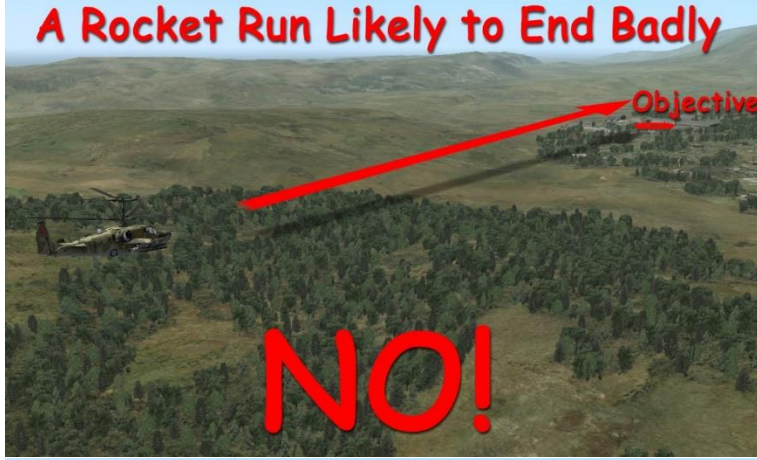
I recommend the "10 RULES TO LIVE BY: **DCS Black Shark Tactics Primer"** by Realandsimulatedwars. It's an oldie but a goldie; these concepts are explained for the Ka-50 Black Shark, but most of them are also very much applicable to the Gazelle as well.

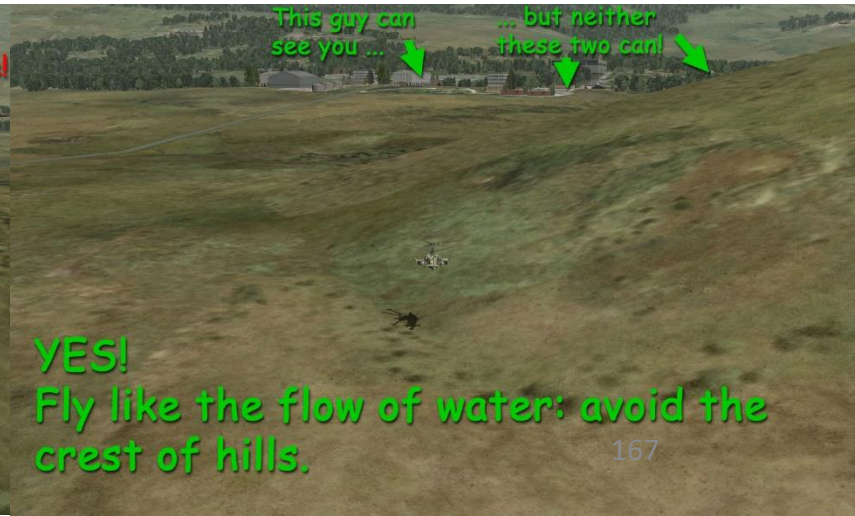
Link: http://realandsimulatedwars.yolasite.com/dcs-black-shark-tactics-primer.php

- **Rule #1: Never fly over the objective**
- **Rule #2: Fire munitions from their maximum range**
- **Rule #3: Avoid the "Dead Man's Zone"**
- **Rule #4: New Area = DANGER ZONE!**
- **Rule #5: There is no such thing as too much reconnaissance**
- **Rule #6: Identify your targets**
- **Rule #7: Preserve ammunition**
- **Rule #8: Know the operational situation**
- **Rule #9: Attack the enemy from your maximum munition range and on its flanks**
- **Rule #10: Lack of patience will kill you**

There are other great resources such as **KriegSimulation's "Nap-of-the-Earth" article**
http://kriegsimulation.blogspot.ca/2009/10/dcs-black-shark-nap-of-earth-noe-flying.html

Robdcamp's forum thread on SIMHQ is also enlightening to help you survive AAA threats:
http://simhq.com/forum/ubbthreads.php/topics/2915432/Guide_to_Surving_MANPADS_AAA_a.html#Post2915432





SECTION SUMMARY

- 1 – SA-342M APX-397 Viviane Sighting Camera
  - 1.1 – Introduction
  - 1.2 – Display & Symbology
  - 1.3 – Controls
  - 1.4 – Power-Up & Designation Procedure
  - 1.5 – Range & Field-of-View Limits

- 2 – SA-342L Athos Sight
  - 2.1 – Introduction
  - 2.2 – Display & Symbology
  - 2.3 – Controls
  - 2.4 – Power-Up & Designation Procedure
  - 2.5 – Range & Field-of-View Limits

SA-342M Only

1 – SA-342M APX-397 Viviane Sighting Camera

1.1 – Introduction

The APX-397 “Viviane” sighting camera is a gyro-stabilized sighting device. It features a VDO (*Vue Directe Optique*, TV) and a VTH (*Voie Thermie*, Infrared) mode. A laser ranging device provides the distance to a target point, and the maximum distance for stabilization and targeting is 15 km. Remote guidance to HOT3 missiles is also provided by the Viviane.

The camera has 5 preset zoom levels, and the camera requires a 3-minute delay to cool down when first powered on.

SA-342M Only

1 – SA-342M APX-397 Viviane Sighting Camera

1.1 – Introduction

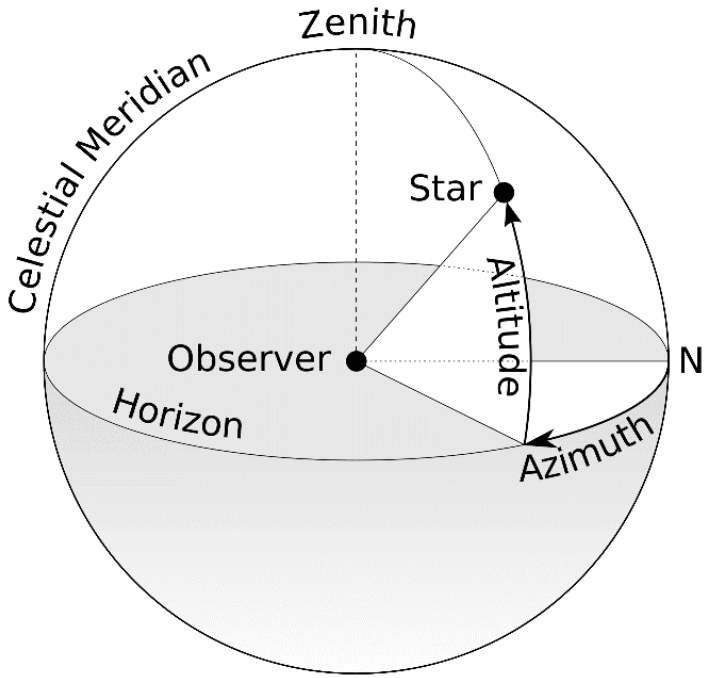
The Viviane is controlled by the Copilot using the Copilot Video Stick, TV display and Video Command Box.

- Note: A sight-coupled autopilot mode can also be used from the pilot cyclic.

SA-342M Only

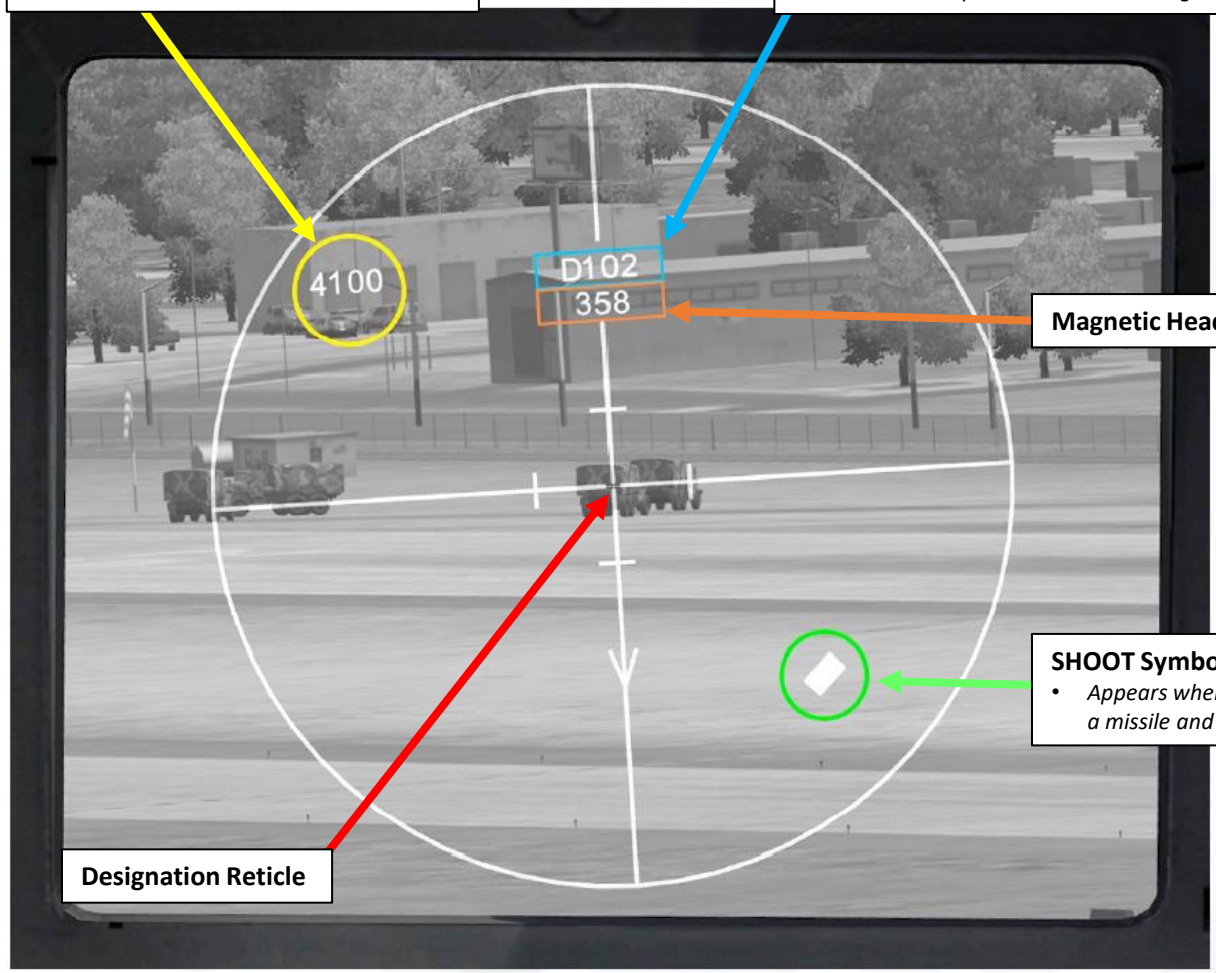
1 – SA-342M APX-397 Viviane Sighting Camera

1.2 – Display & Symbology



Distance lased from Viviane Camera
- *4100 = 4100 m*

Helicopter Azimuth from the Camera
- *D102 = Helicopter Azimuth is 102 degrees Right (Droite)*
- *G102 = Helicopter Azimuth is 102 degrees Left (Gauche)*



Magnetic Heading of Target

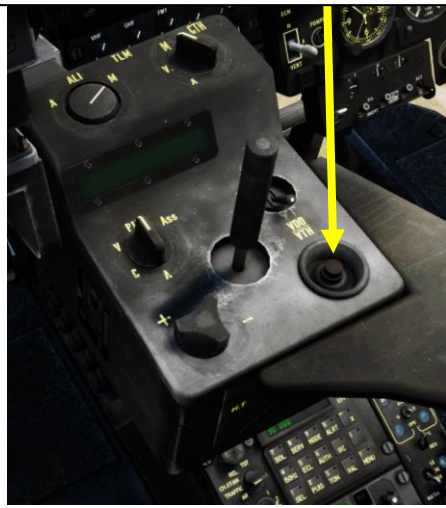
SHOOT Symbol
- *Appears when all conditions are met to fire a missile and launch is authorized*

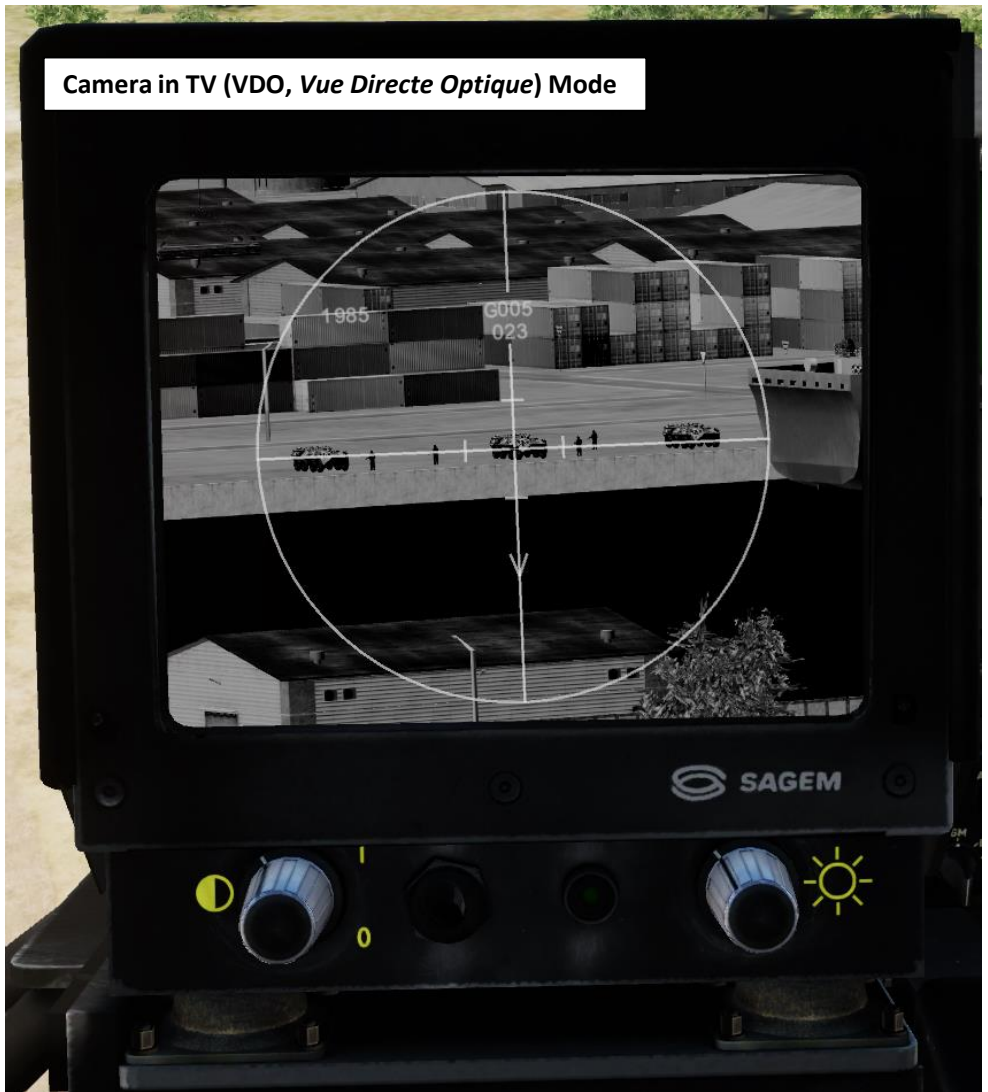
Designation Reticle

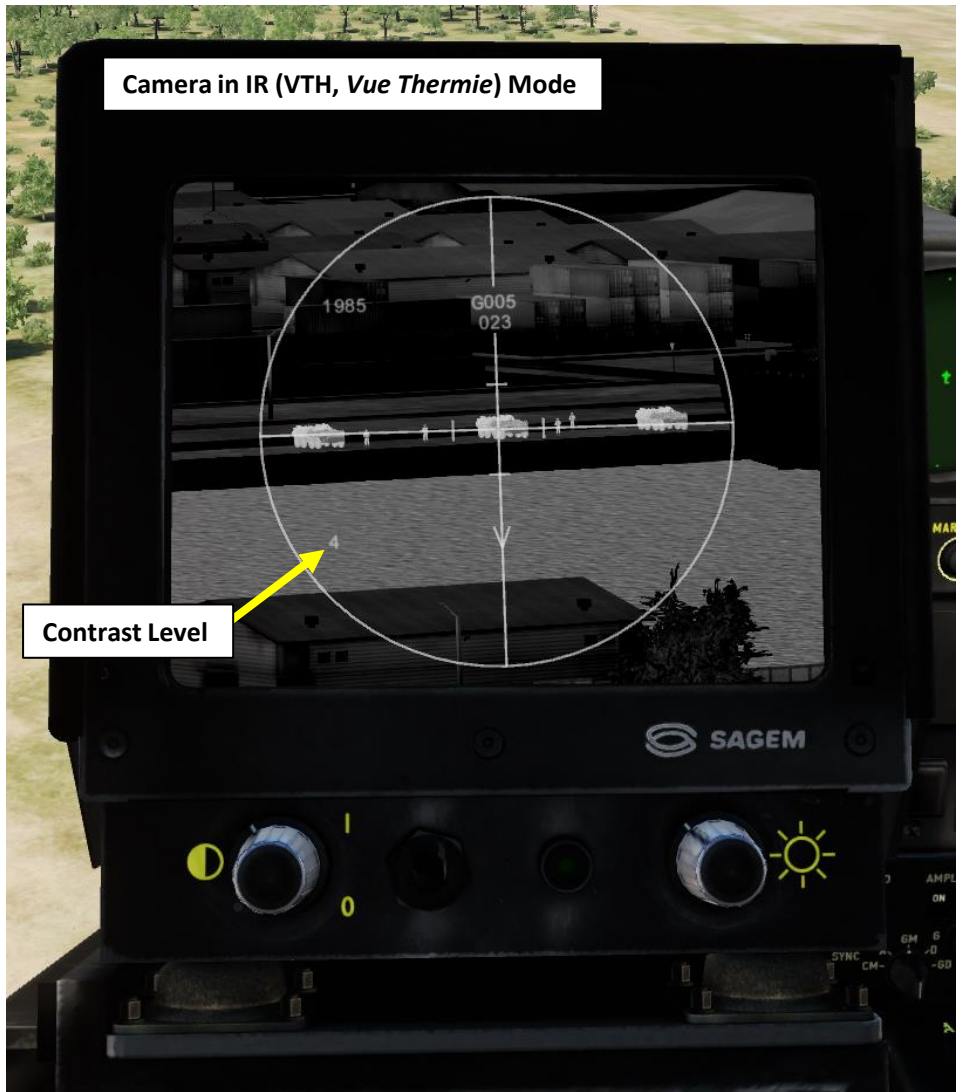
1 – SA-342M APX-397 Viviane Sighting Camera
1.2 – Display & Symbology

SA-342M Only

VDO/VTH Toggle switch
- *VDO: **V**ue **D**irecte **O**ptique = Direct Sight Vision*
- *VTH: **V**oie **T**hermie = Thermal Vision*







SA-342M Only

1 – SA-342M APX-397 Viviane Sighting Camera

1.3 – Controls

Cyclic

Autopilot Slave Button (Auto-Slaved Toggle)

BCV 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*

VDO/VTH Toggle switch
- *VDO: **V**ue **D**irecte **O**ptique = Direct Sight Vision*
- *VTH: **V**oie **T**hermie = Thermal Vision*

Camera Mode Selector
- *A = **A**rrêt = OFF*
- *C = **C**onvoyage = Travel*
- *V= **V**eille = Standby*
- *PIL = **Pil**ote = Manned*
- *ASS = **Ass**ervi = Locked*

APX-397 Viviane Camera BCV:
Boîtier de Commande Vidéo
(Video Command Box)

Camera Zoom Knob

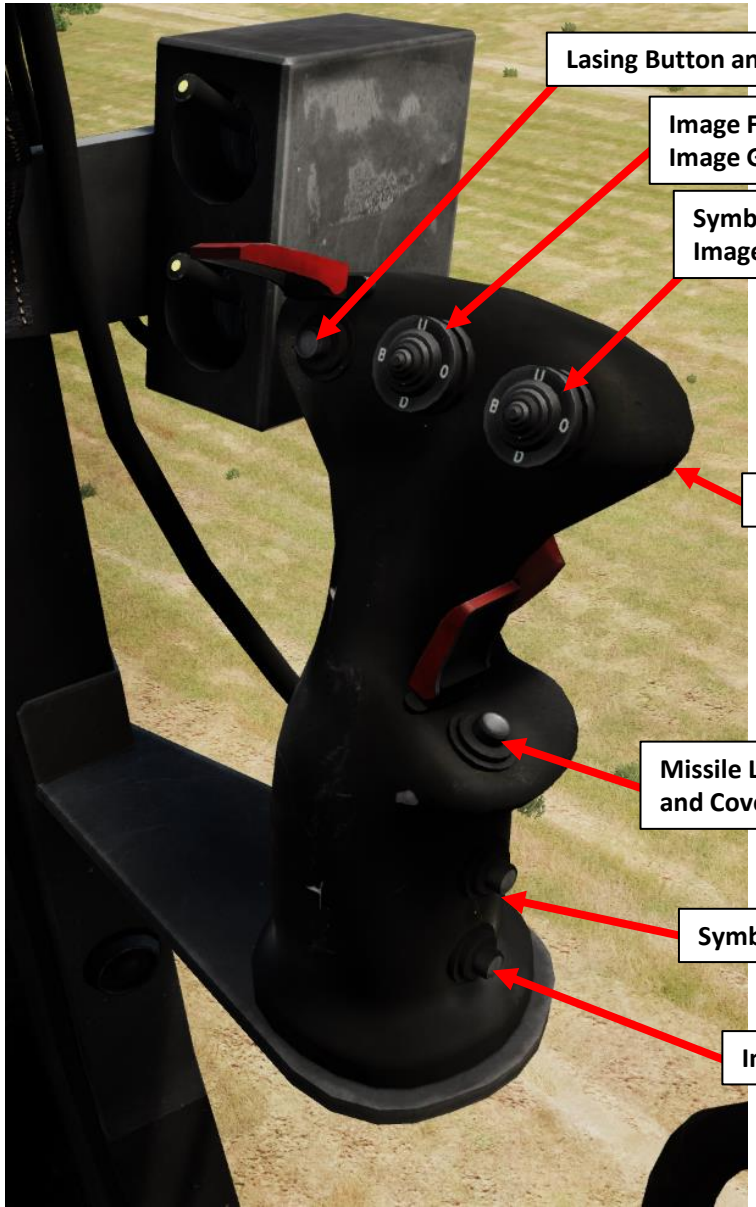
Camera Control Stick

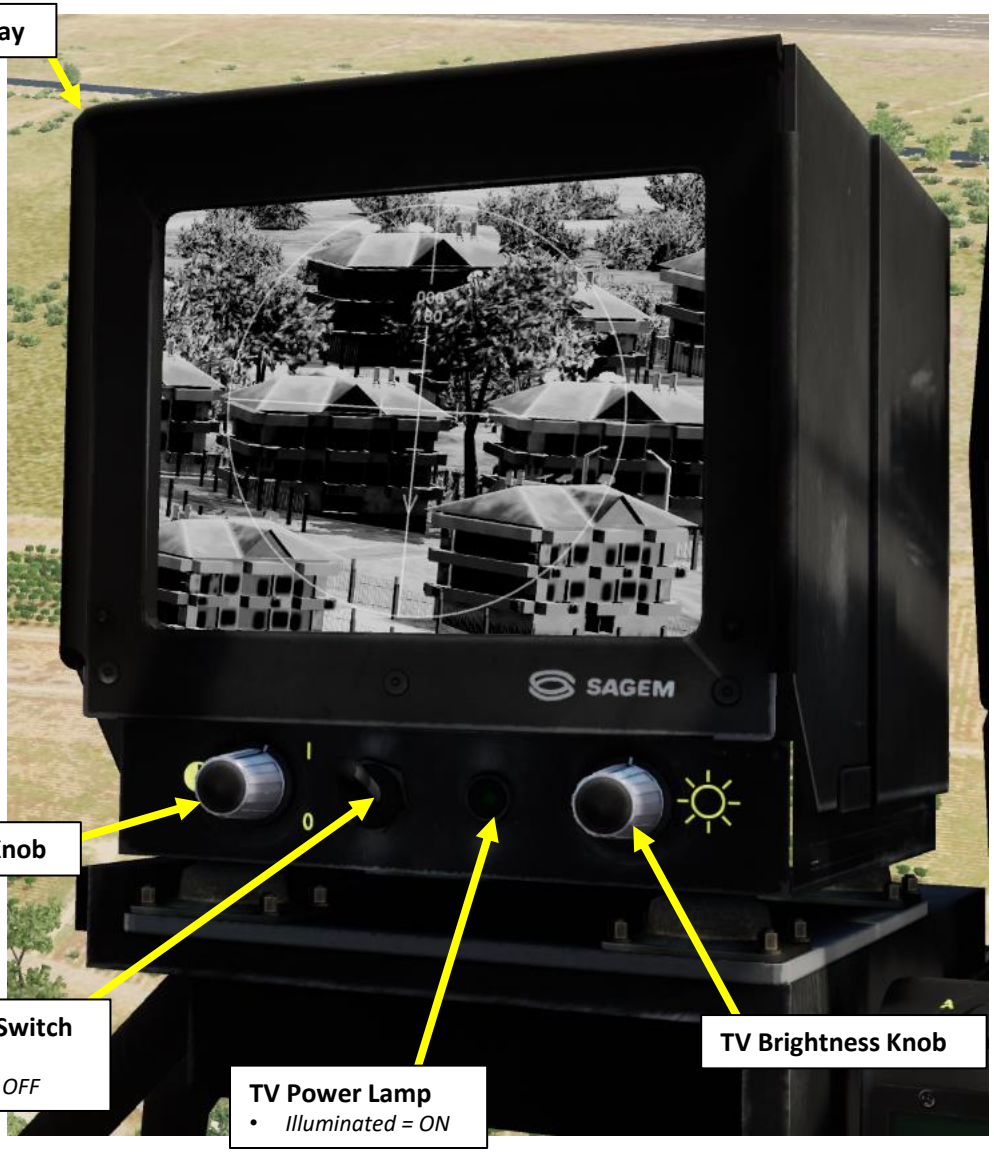
Armrest

SA-342M Only

1 – SA-342M APX-397 Viviane Sighting Camera

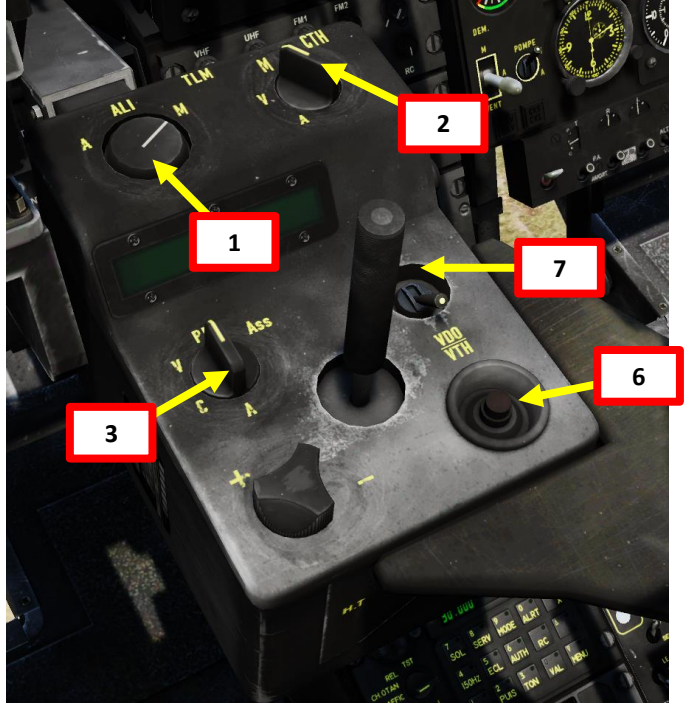
1.3 – Controls

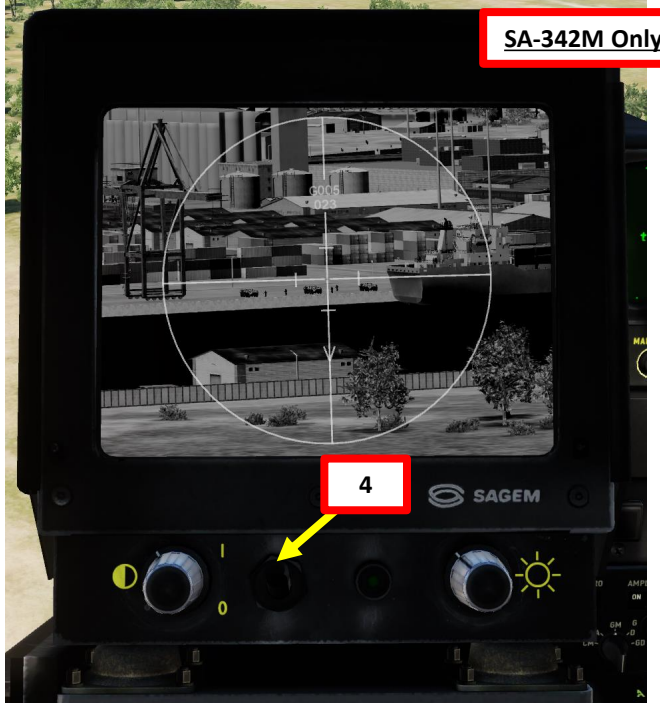




1 – SA-342M APX-397 Viviane Sighting Camera
1.4 – Power-Up & Designation Procedure

1. Set BCV (*Boîtier de Commande Vidéo*, Video Command Box) Power Selector – ***M**ARCHE*
2. Set BCV IR Power Selector – ***M**ARCHE*
    - The 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.
3. Set Camera Mode Selector – PILOTE (manual control mode)
4. Set TV Power Switch – ON (UP)
5. Once camera is ready, it will go from a stowed to an un-stowed position.
6. Press VDO/VTH Toggle switch to select VDO (TV) or VTH (Infrared) mode as required.
    - VDO: ***V**ue **D**irecte **O**ptique* = Direct Sight Vision
    - VTH: ***V**oie **T**hermie* = Thermal Vision
7. Use Camera Centering Toggle Switch if required
    - FWD: Centered
    - AFT: Reset

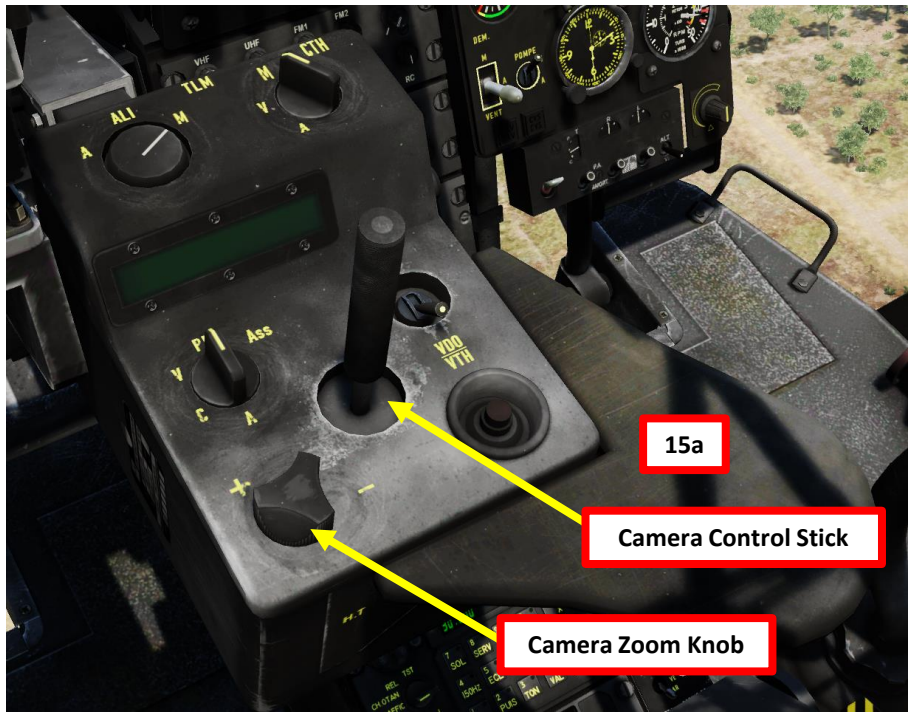


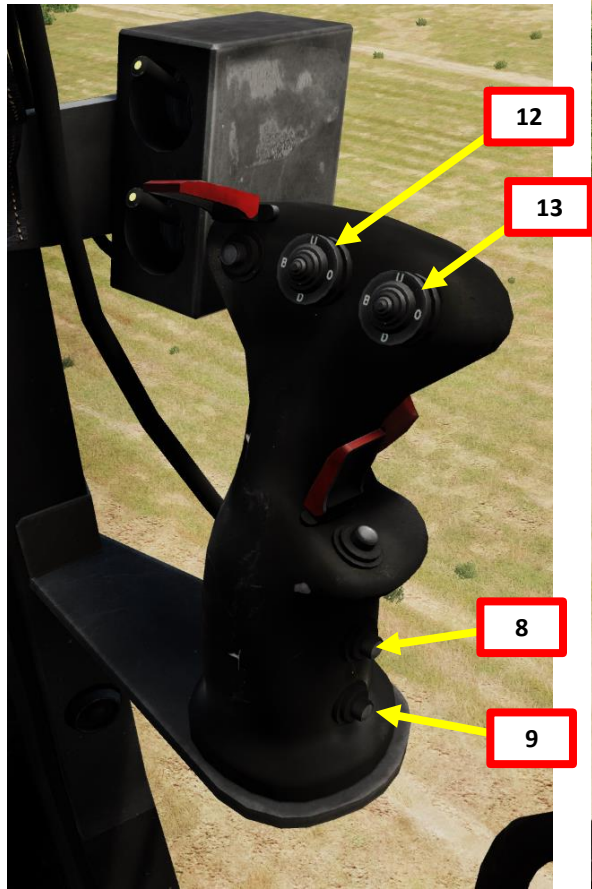


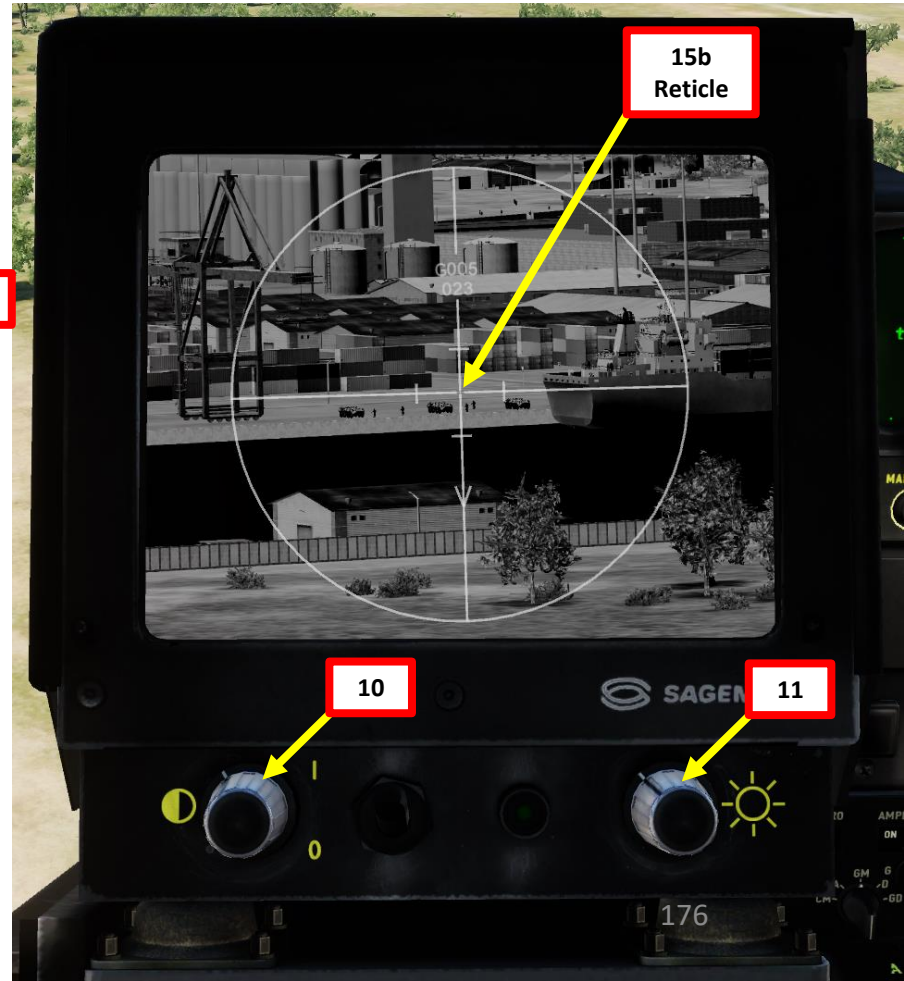
SA-342M Only

1 – SA-342M APX-397 Viviane Sighting Camera
1.4 – Power-Up & Designation Procedure

8. Press Symbology Inverse Toggle if needed.
9. Press Image Inverse Toggle if needed.
10. Adjust TV Contrast – As required
11. Adjust TV Brightness – As required
12. Adjust Image Focus (UP/DOWN) & Gain (LEFT/RIGHT) – As required
13. Adjust Symbology Brightness (UP/DOWN) & Image Brightness (LEFT/RIGHT) – As required
14. Fly towards target and come to a hover from a concealed and safe position.
15. Use Camera Control Stick TV slew controls (; , . / bindings) and Zoom knob (= - bindings) to find desired target.





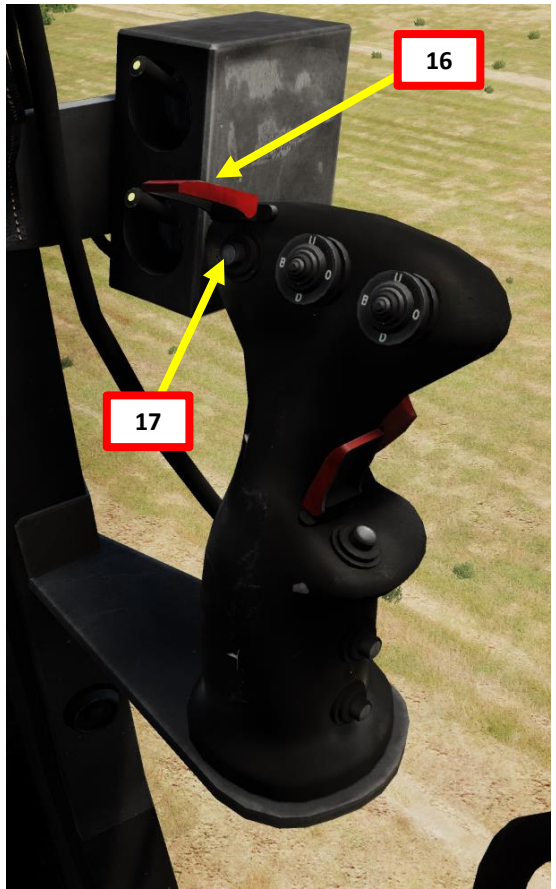


SA-342M Only

1 – SA-342M APX-397 Viviane Sighting Camera

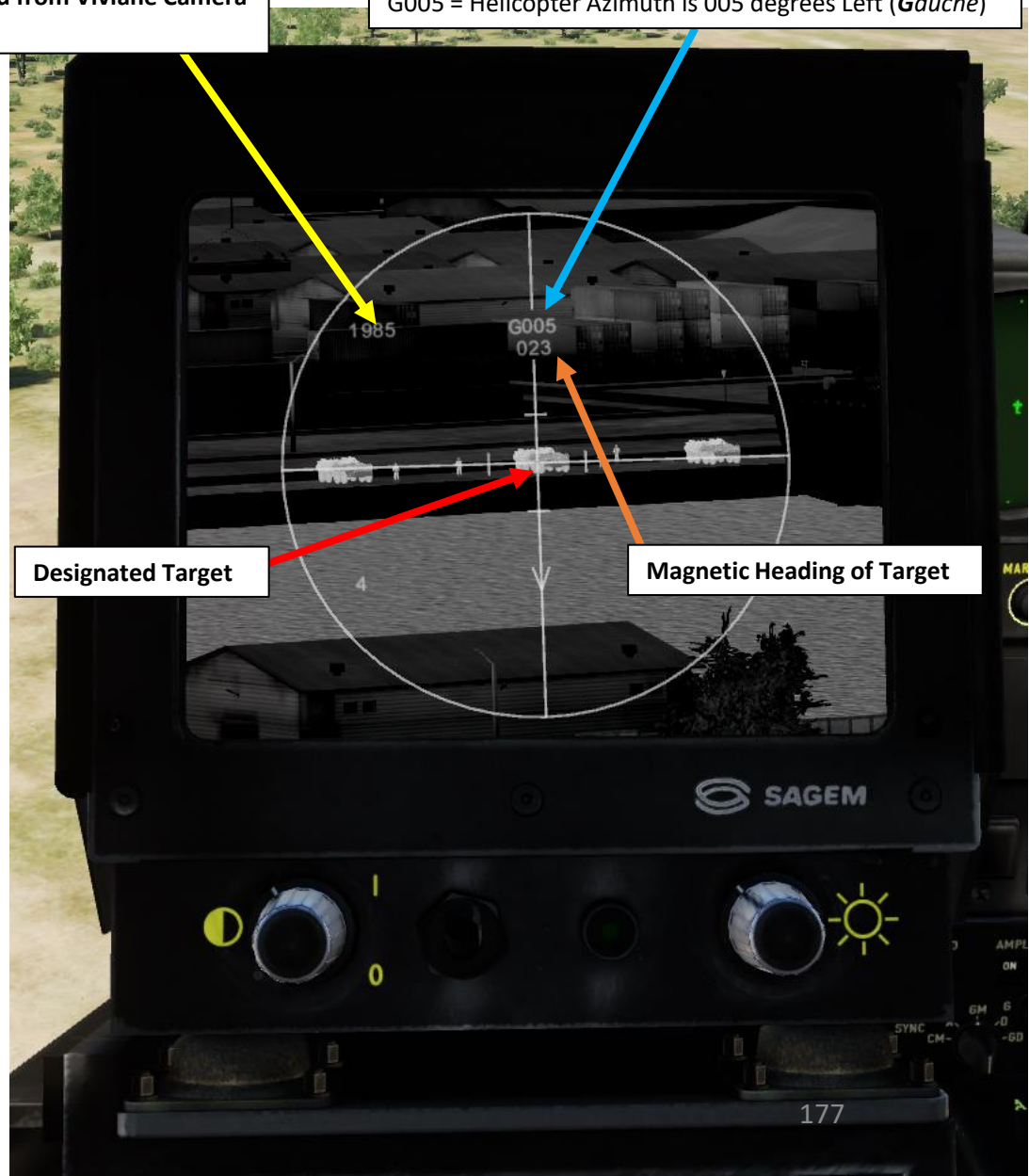
1.4 – Power-Up & Designation Procedure

16. Flip up cover switch of laser designator button.
17. Press Laser Designator Button to lase, designate and range the target.
18. If target is moving, set Camera Mode Selector to "ASS" (***Asservi*** = Slaved) to track target with camera.
19. *Optional:* Press "Auto-Slave Toggle" ("E" binding) on pilot's stick to automatically steer the helicopter to the slaved target you just lased.



Distance lased from Viviane Camera
1985 m

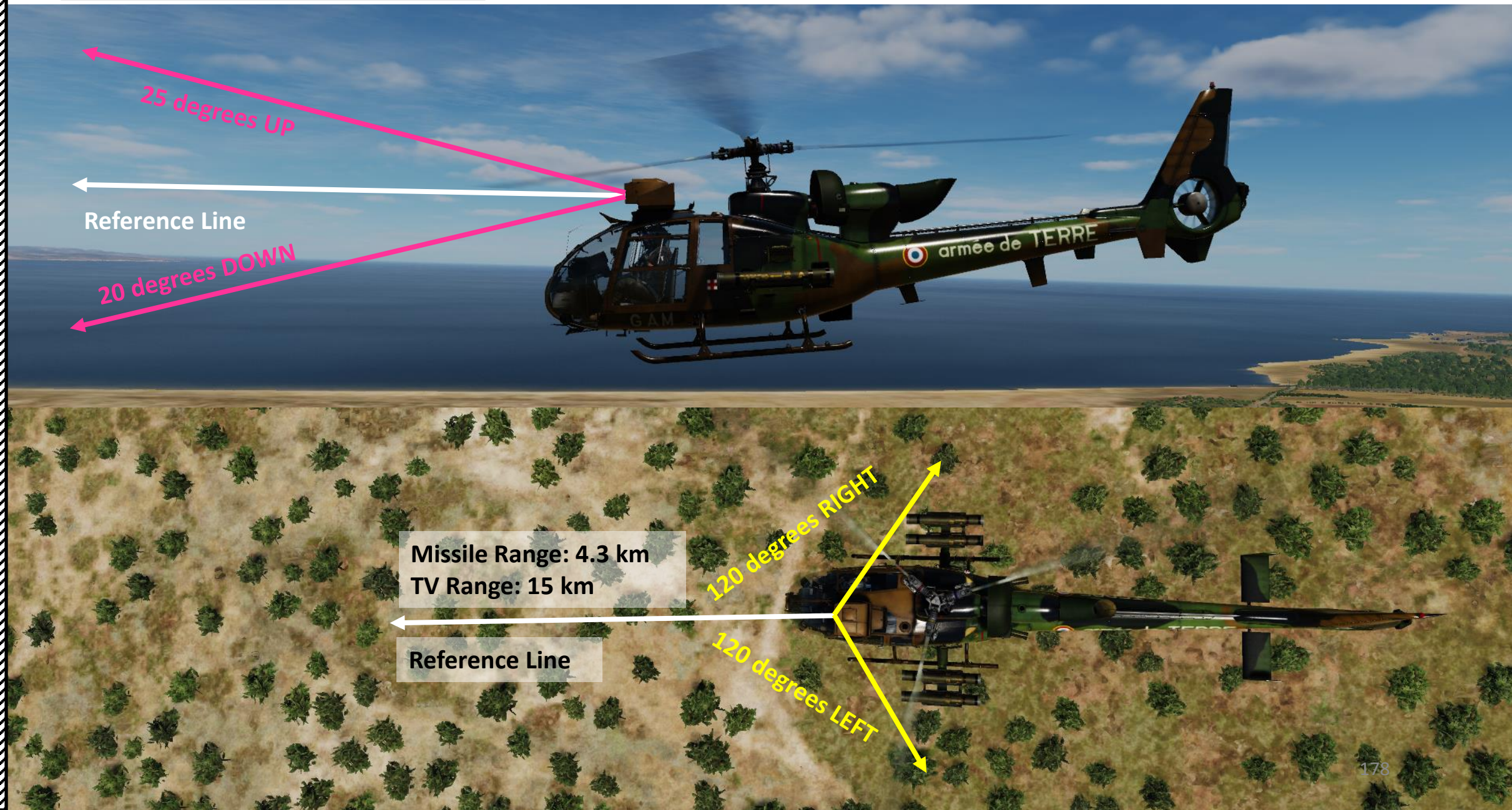
Helicopter Azimuth from the Camera
D005 = Helicopter Azimuth is 005 degrees Right (***Droite***)
G005 = Helicopter Azimuth is 005 degrees Left (***Gauche***)



1 – SA-342M APX-397 Viviane Sighting Camera

1.5 – Range & Field-of-View Limits

SA-342M Only



SA-342L Only

2 – SA-342L Athos Sight

2.1 – Introduction

The “Athos” is a gyro-stabilized optical sighting device. The periscope is used for daytime operations but unlike the Viviane, it has no infrared capability. A laser ranging device provides the distance to a target point, and the maximum distance for stabilization and targeting is 15 km. Remote guidance to HOT3 missiles is also provided by the Athos. The sight has 2 preset zoom levels.

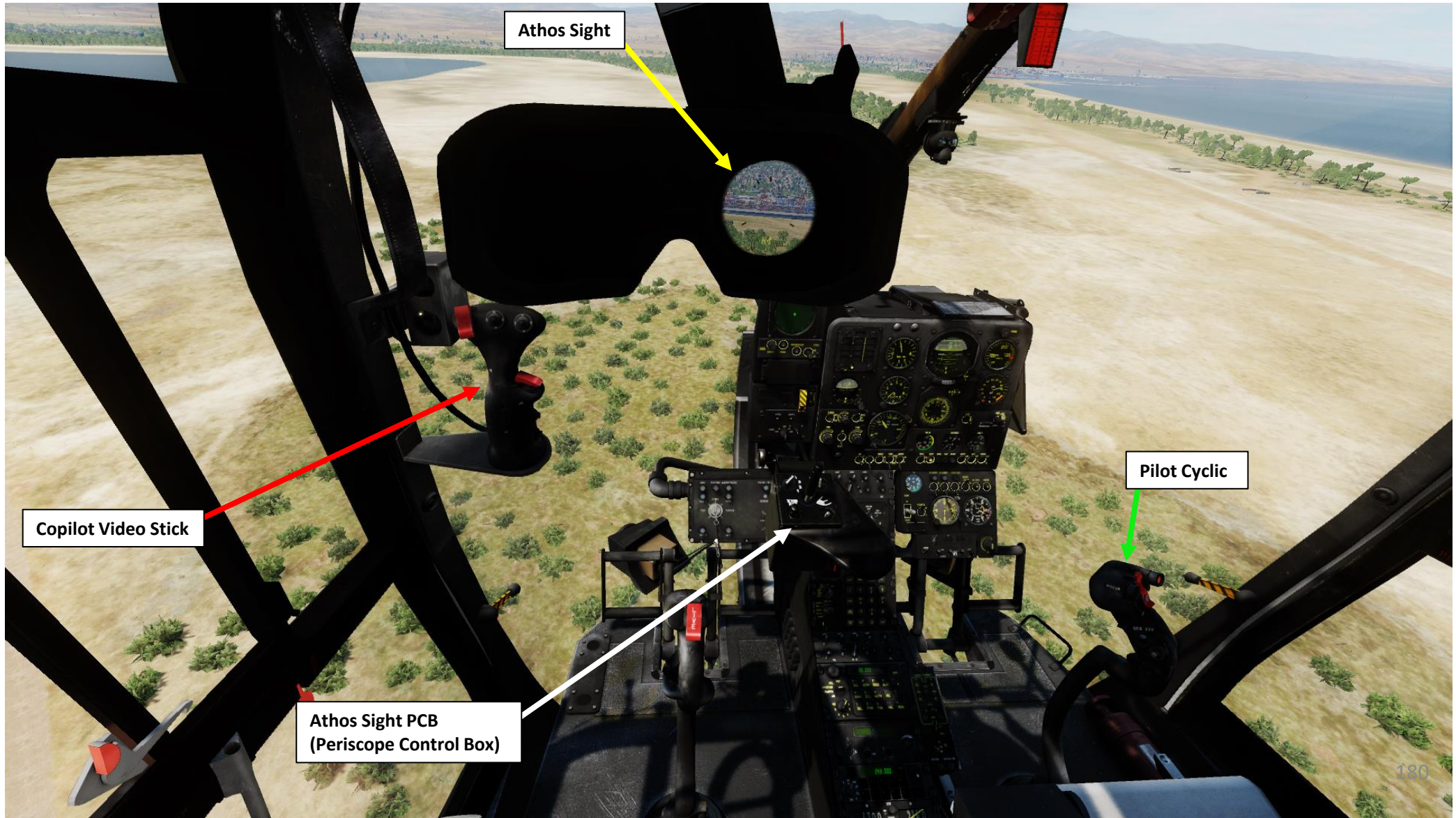
SA-342L Only

2 – SA-342L Athos Sight

2.1 – Introduction

The Athos is controlled by the Copilot using the Copilot Video Stick, and PCB (Periscope Control Box).

- Note: A sight-coupled autopilot mode can also be used from the pilot cyclic.

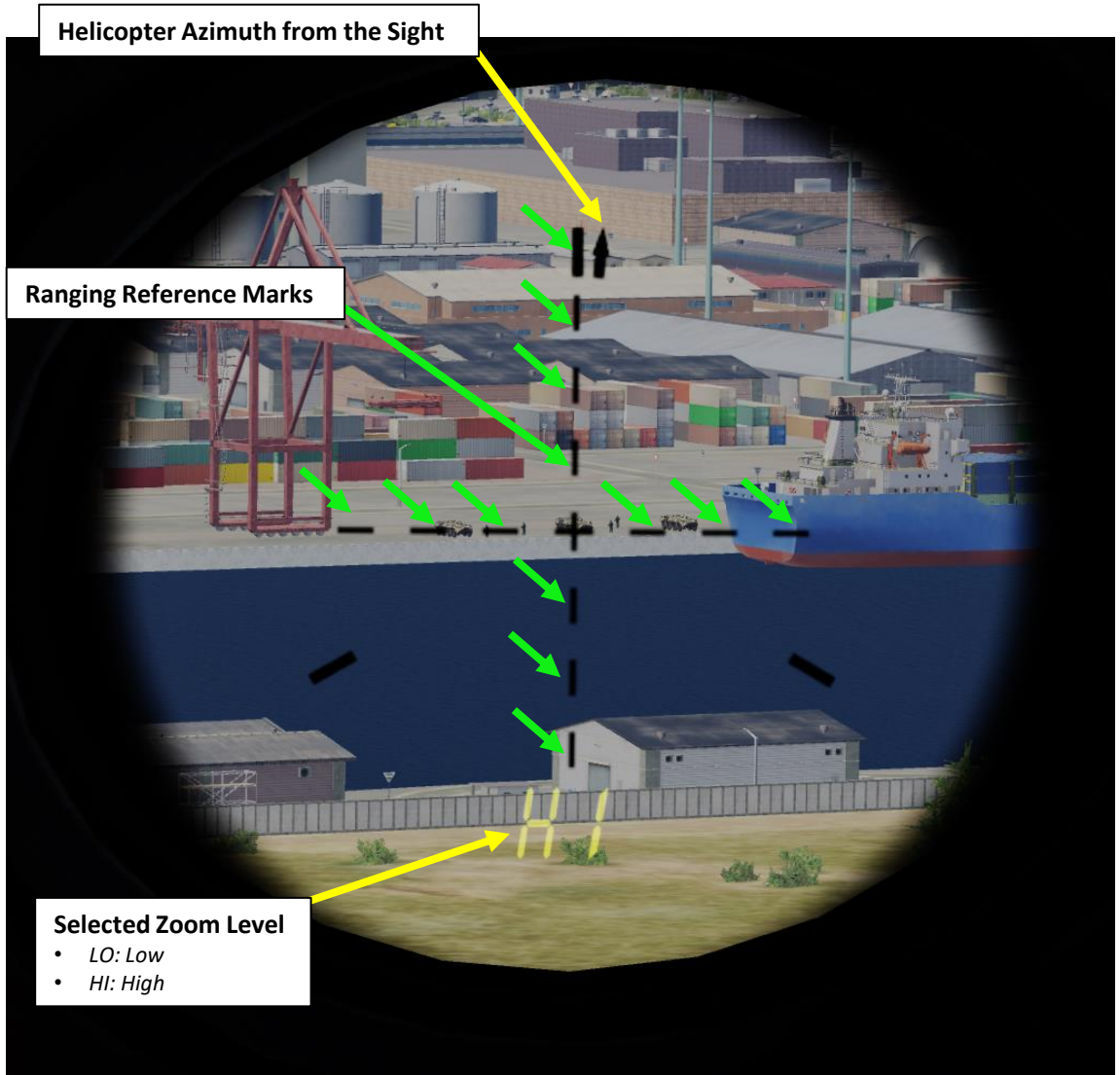


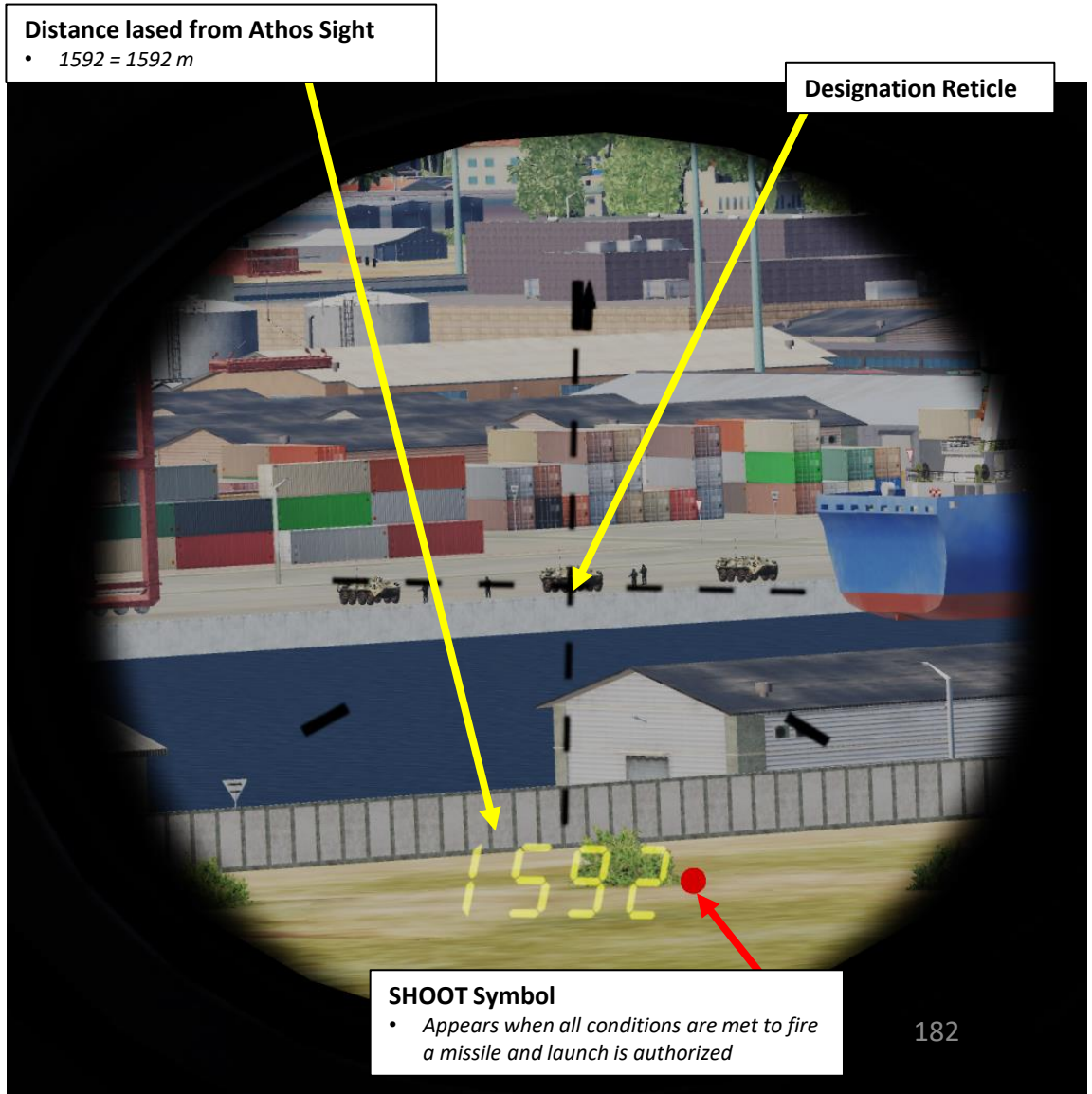
SA-342L Only

2 – SA-342L Athos Sight
2.2 – Display & Symbology

2 – SA-342L Athos Sight
2.2 – Display & Symbology

SA-342L Only





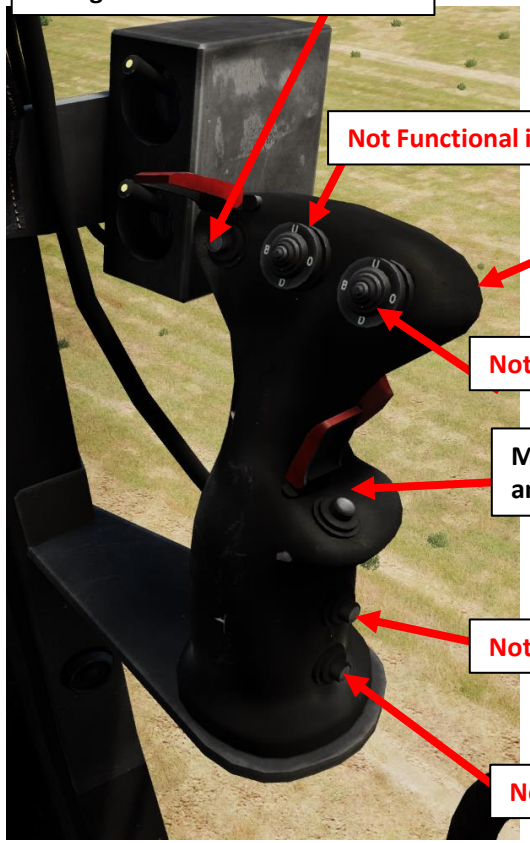
2 – SA-342L Athos Sight

2.3 – Controls

SA-342L Only

Autopilot Slave Button (Auto-Slaved Toggle)

Cyclic



Lasing Button and Cover Switch

Not Functional in the SA-342L

Copilot Video Stick

Not Functional in the SA-342L

Missile Launch Button and Cover Switch

Not Functional in the SA-342L

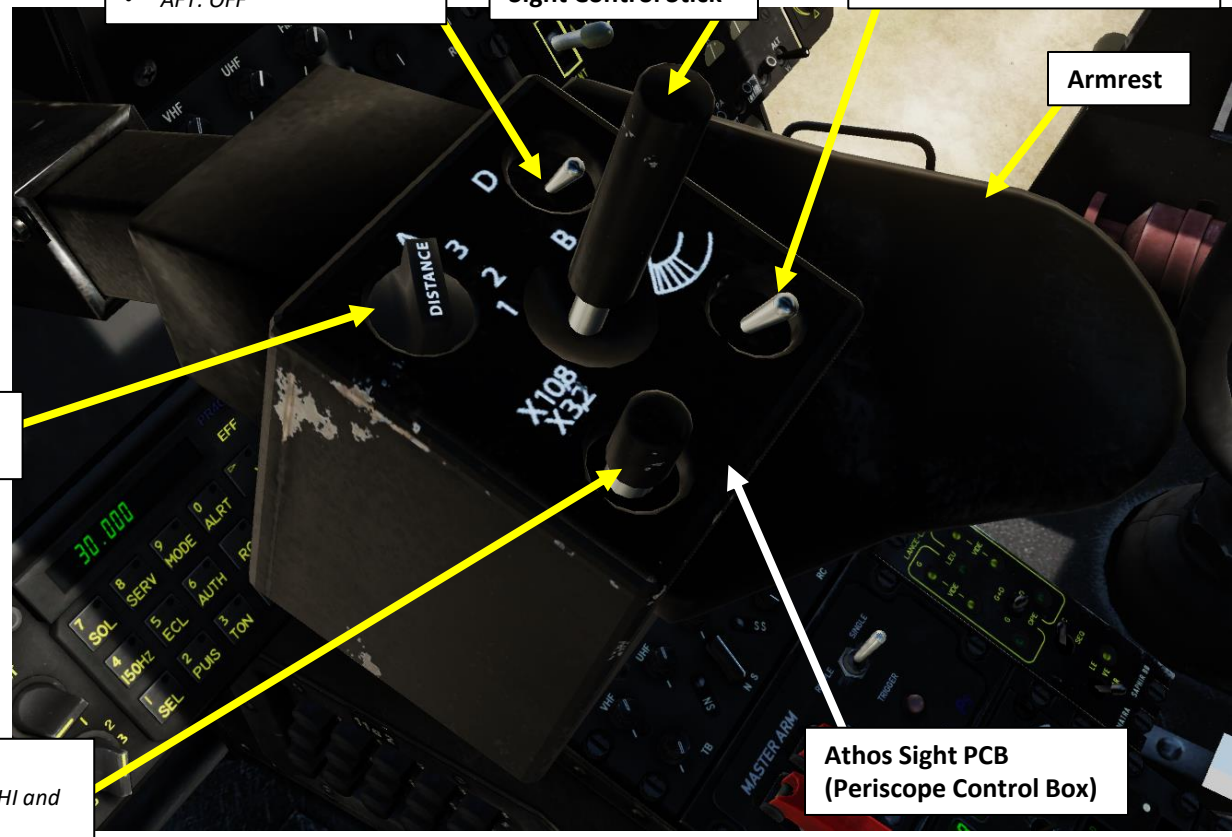
Not Functional in the SA-342L

Sight Stabilization Switch
- *FWD: ON*
- *AFT: OFF*

Sight Control Stick

Athos Sight Wiper Control Switch (Not Functional)

Armrest



Sight Distance Setting Selector

Sight Zoom Toggle
- *Press to toggle between HI and LO zoom levels*

Athos Sight PCB (Periscope Control Box)

2 – SA-342L Athos Sight

2.4 – Power-Up & Designation Procedure

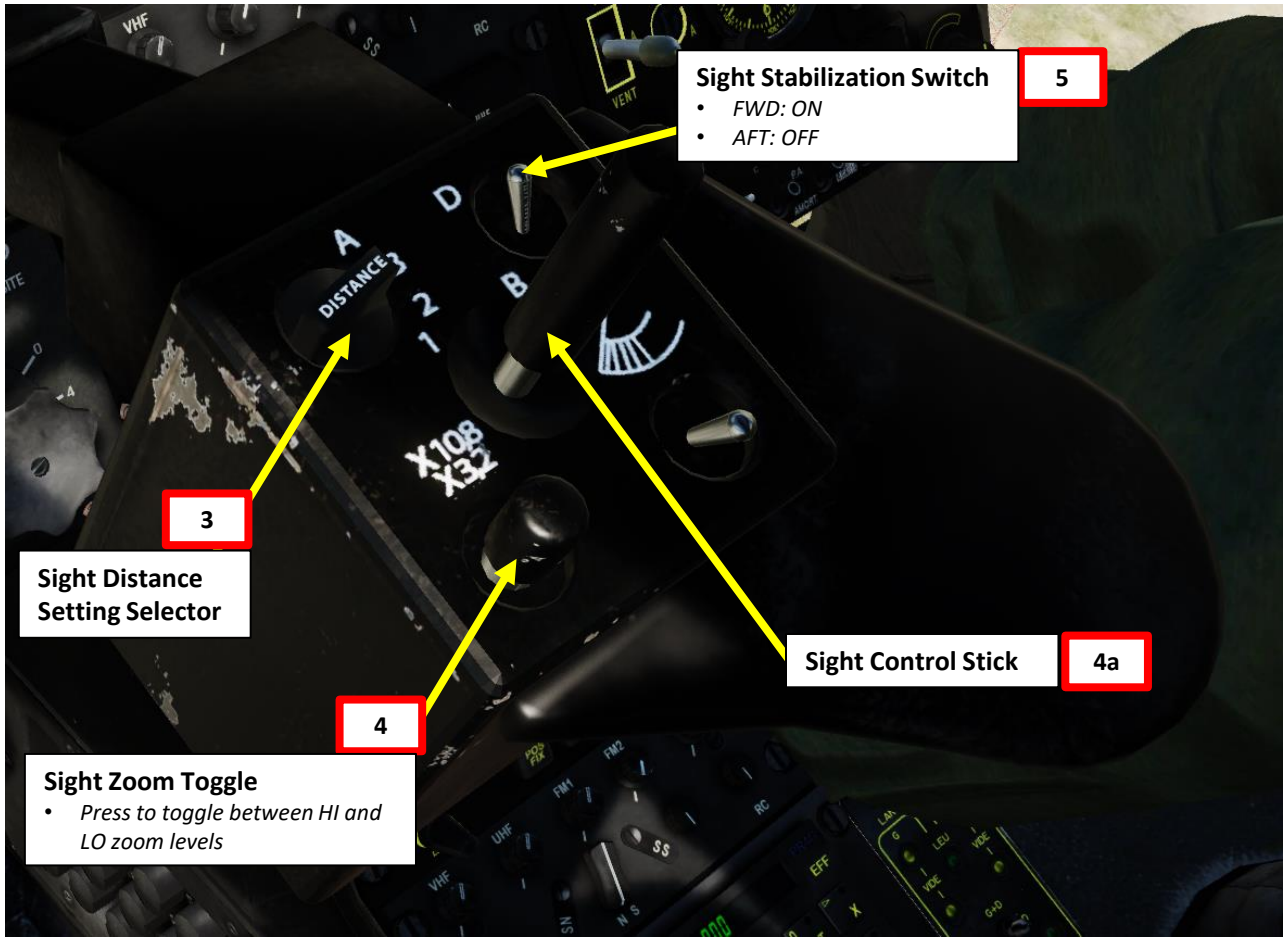
1. Click on the Athos Periscope to un-stow it.
2. Fly towards target and come to a hover from a concealed and safe position.

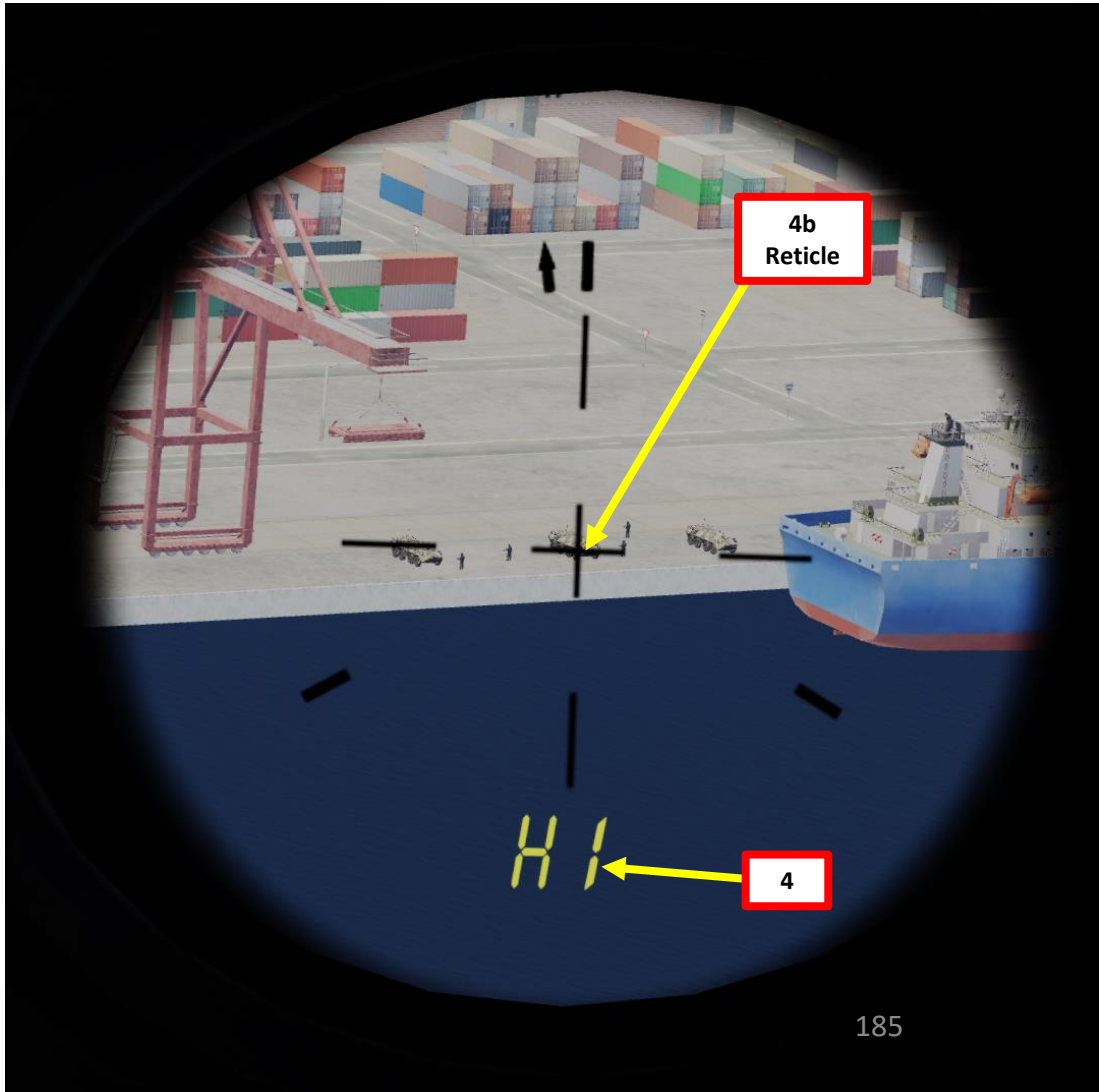
SA-342L Only

2 – SA-342L Athos Sight

2.4 – Power-Up & Designation Procedure

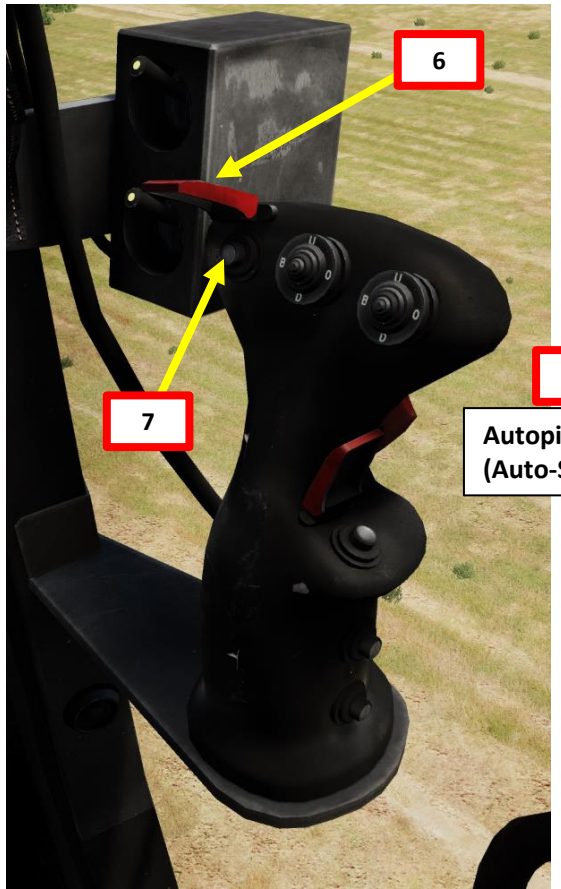
3. Set Sight Distance Setting Selector – As desired.
4. Use sight control stick slew controls (; , . / bindings) and Sight Zoom toggle (= - bindings) to find desired target.
5. Set Sight Stabilization Switch – ON (FWD).



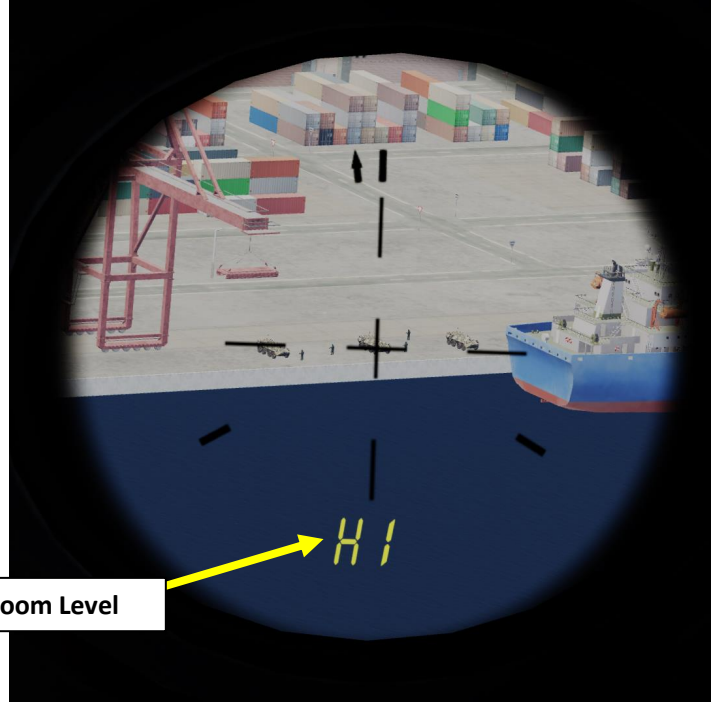


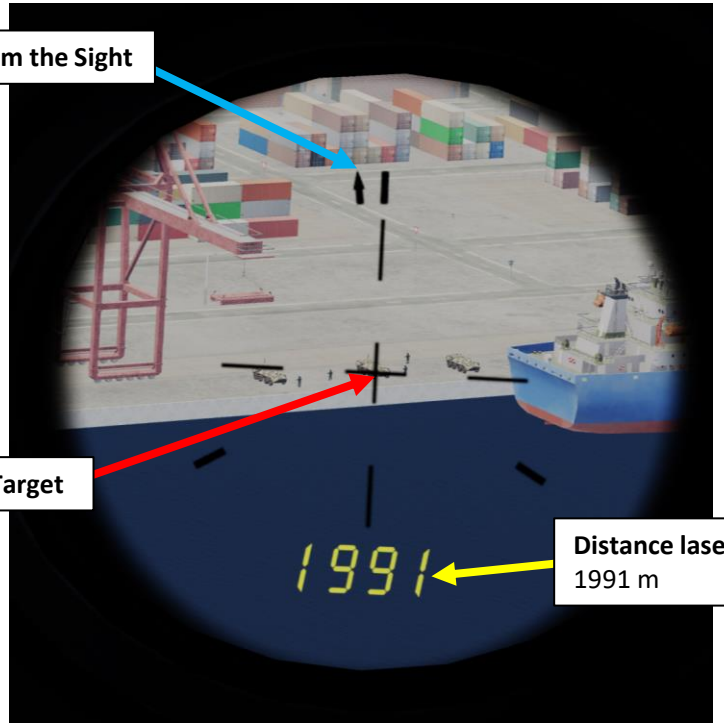
2 – SA-342L Athos Sight
2.4 – Power-Up & Designation Procedure

6. Flip up cover switch of laser designator button.
7. Press Laser Designator Button to lase, designate and range the target.
8. *Optional:* Press "Auto-Slave Toggle" ("E" binding) on pilot's stick to automatically steer the helicopter to the slaved target you just lased.



SA-342L Only





2 – SA-342L Athos Sight
2.5 – Range & Field-of-View Limits

SA-342L Only

SECTION SUMMARY

- 1 – Introduction
  - 1.1 – Armament Overview
  - 1.2 – Weapon Interface
  - 1.3 – My Weapon Controls

- 2 – SA-342M Weapon Employment
  - 2.1 – HOT3 Air-to-Ground Missile (APX-397 Viviane Sight)

- 3 – SA-342L Weapon Employment
  - 3.1 – HOT3 Air-to-Ground Missile (Athos Sight)
  - 3.2 – SNEB Rockets (68 mm)
  - 3.3 – GIAT M-621 Cannon (20 mm)
  - 3.4 – FN HMP-400 Gunpods (12.7 mm)
  - 3.5 – Mistral Air-to-Air IR (Infrared) Seeker Missile

- 4 – SA-342 MINIGUN Weapon Employment
  - 4.1 – M-134 Minigun (7.62 mm)

1 – Introduction
1.1 – Armament Overview

SA-342M Variant Armament

- **HOT3 Air-to-Ground Missile**: The Franco-German HOT (*Haut subsonique Optiquement Téléguidé Tiré d'un Tube*, or High Subsonic, Optical, Remote-Guided, Tube-Launched) missile was initially designed in collaboration between the German firm Bölkow and the French firm Nord. The HOT is wire-guided by the Viviane sight and can be used against tanks.
    - Max Range: 4.3 km
    - Ammunition: 4

****

SA-342L Variant Armament

- **HOT3 Air-to-Ground Missile**: The HOT missile is wire-guided by the Athos sight and can be used against tanks.
    - Max Range: 4.3 km
    - Ammunition: 4

- **SNEB 68 mm Rockets**: These unguided rockets are used against infantry, soft targets or lightly armored vehicles. "SNEB" stands for the French "*Société Nouvelle des Établissements Edgar Brandt*" company.
    - Ammunition: 1 x launcher, 8 rockets per launcher

- **GIAT M-621 20 mm Cannon**: This autocannon by the French "*Groupement des Industries de l'Armée de Terre*" (Army Industries Group) is used against infantry, soft targets or lightly armored vehicles
    - Ammunition: 1 x cannon, 240 rounds

- **HMP-400 12.7 mm Gunpods**: These Heavy-Machinegun-Pod (HMP), or "gunpods", were designed by the Belgian society "FN Herstal" and are used against infantry or unarmored vehicles.
    - Ammunition: 2 x gunpods, 400 rounds per pod

- **Mistral Air-to-Air Infrared Seeker Missile**: Anti-air short-range heat-seeking missile use against helicopters.
    - Ammunition: 4

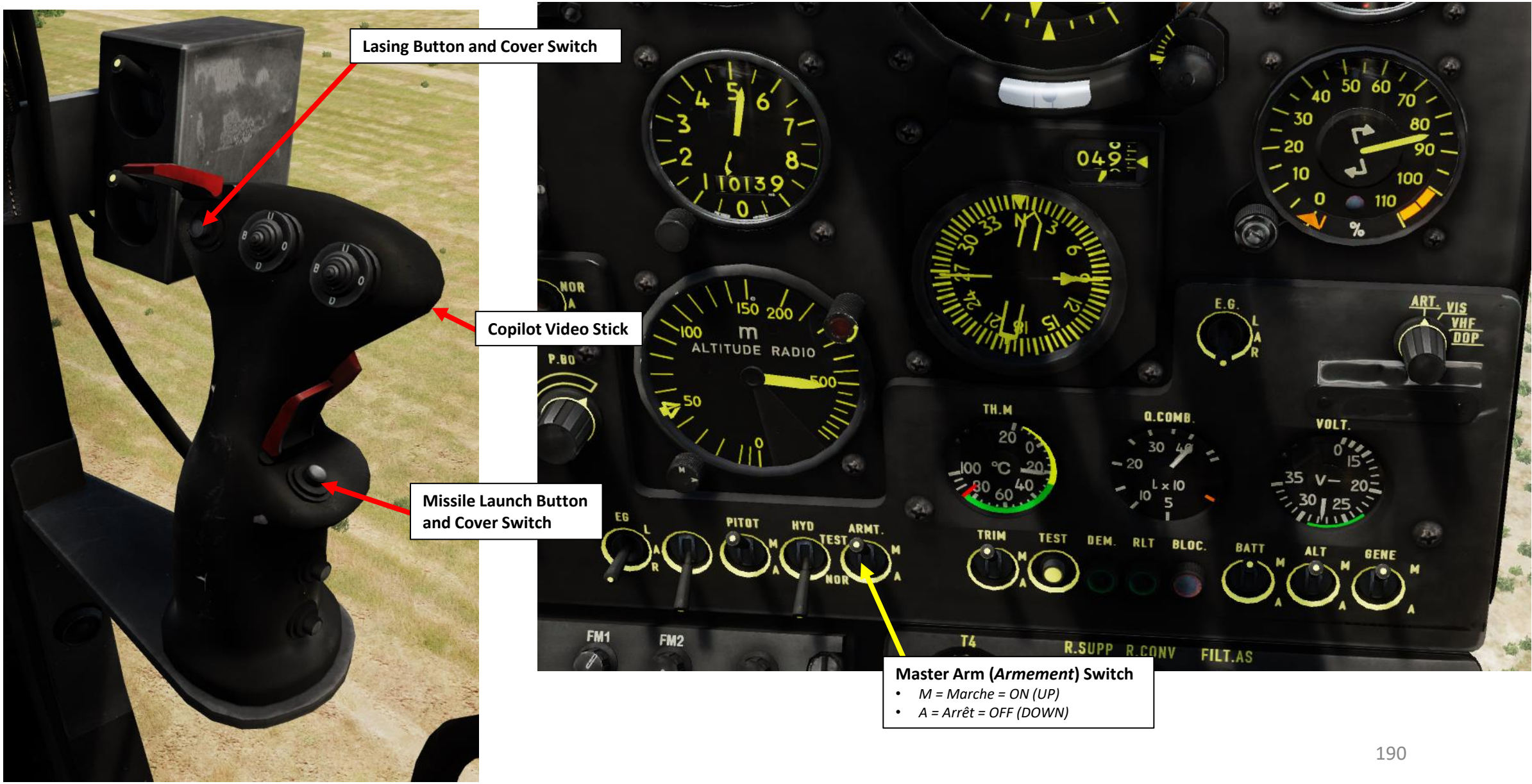
****

SA-342 "Minigun" Variant Armament

- **M-134 7.62 mm Minigun (Side)**: Gatling-style six-barrel rotary machine gun operated by a side gunner. The minigun is best used against infantry or unarmored vehicles.
    - Ammunition: 4000 rounds

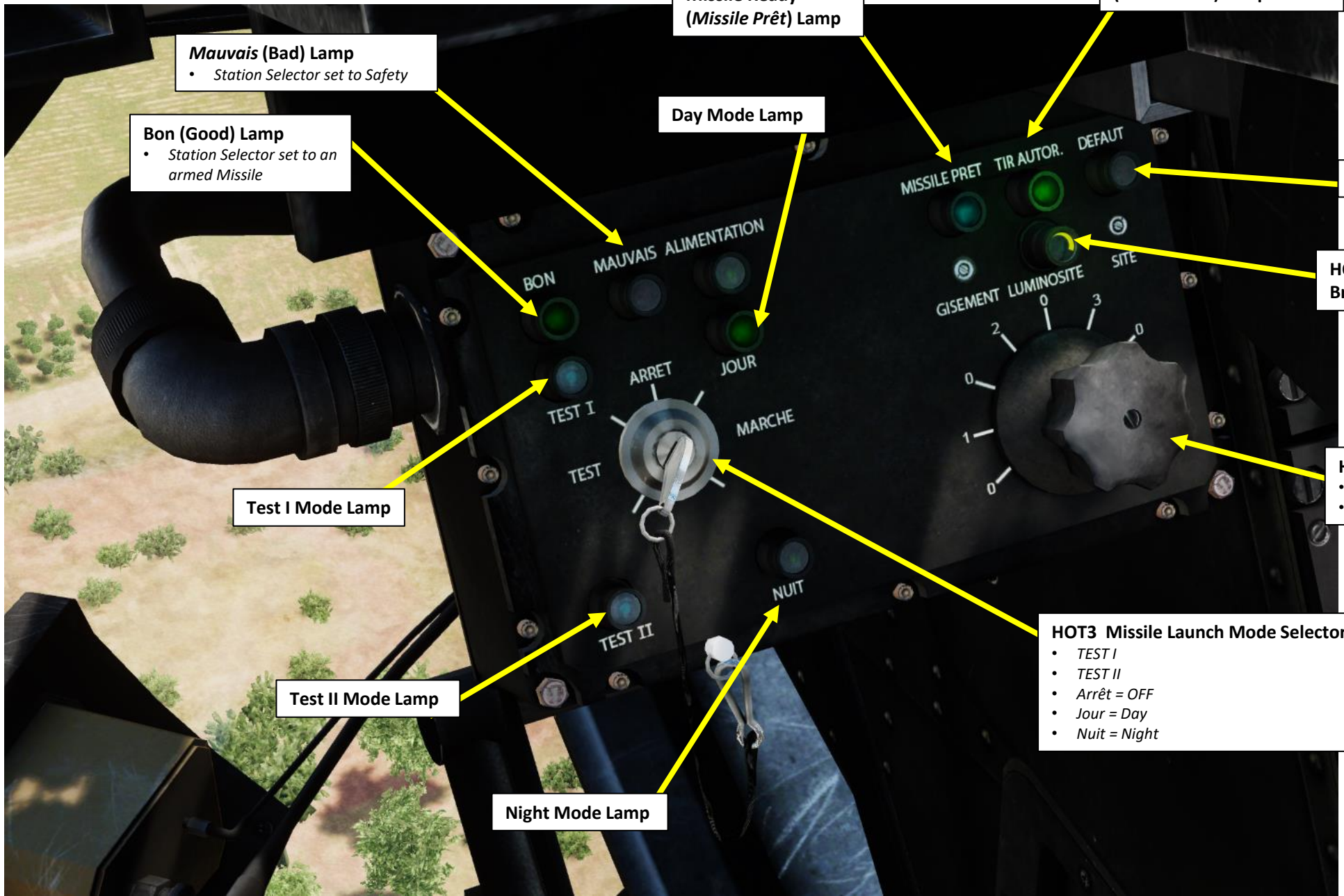
1 – Introduction
1.2 – Weapon Interface (SA-342M)

SA-342M Only



1 – Introduction
1.2 – Weapon Interface (SA-342M)

SA-342M Only



Missile Ready (*Missile Prêt*) Lamp

Missile Launch Authorized (*Tir Autorisé*) Lamp

***Mauvais* (Bad) Lamp**
- *Station Selector set to Safety*

Day Mode Lamp

Bon (Good) Lamp
- *Station Selector set to an armed Missile*

Failure (*Défaut*) Lamp

HOT3 Missile Panel Brightness Control Knob

HOT3 Station Selector Knob
- *0 = Safety Position*
- *1 / 2 / 3 / 4 = Missile Stations*

Test I Mode Lamp

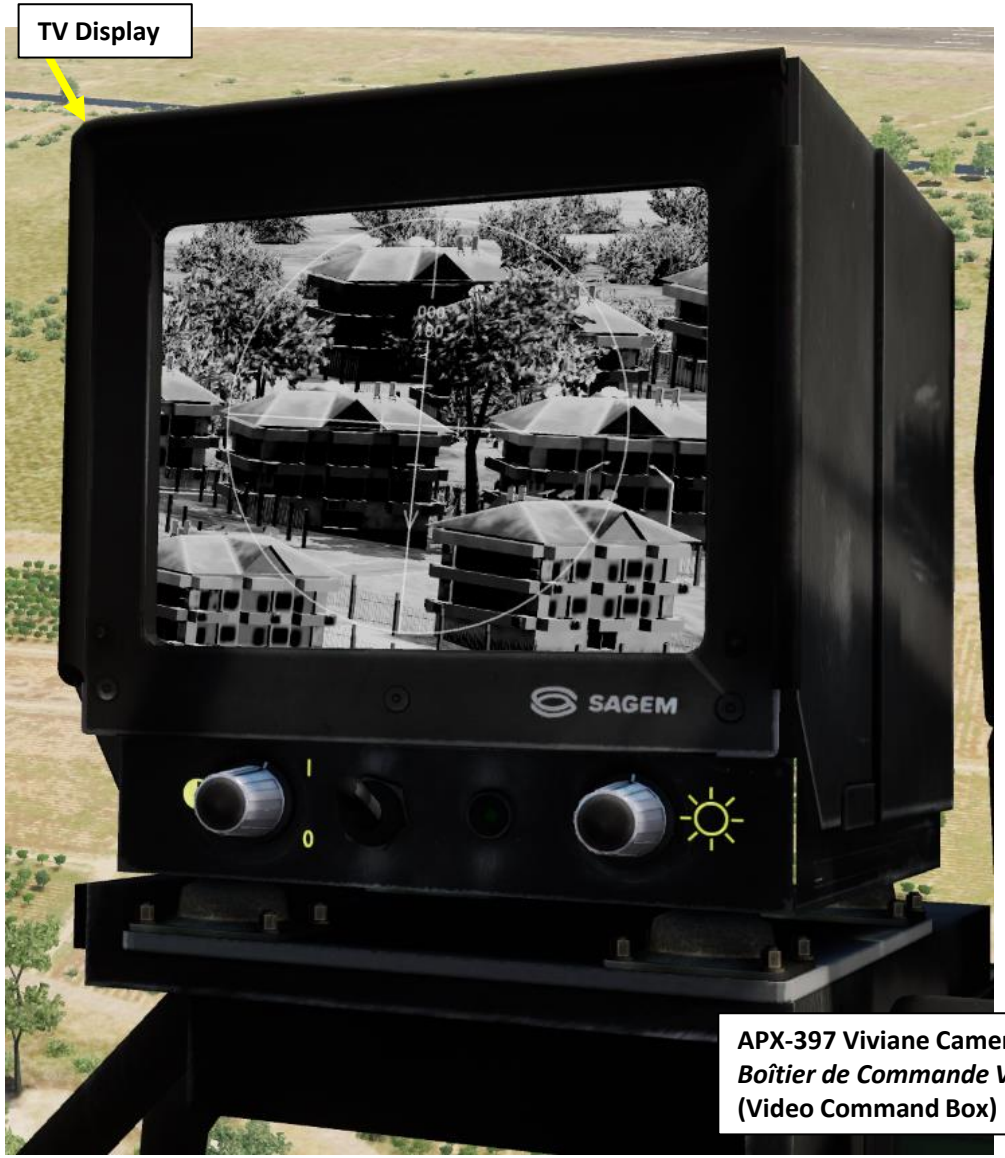
HOT3 Missile Launch Mode Selector
- *TEST I*
- *TEST II*
- *Arrêt = OFF*
- *Jour = Day*
- *Nuit = Night*

Test II Mode Lamp

Night Mode Lamp

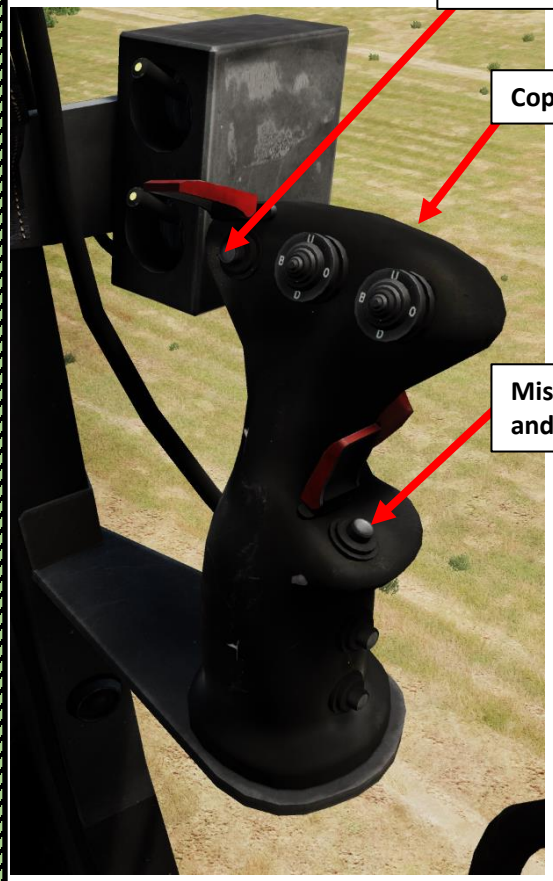
SA-342M Only

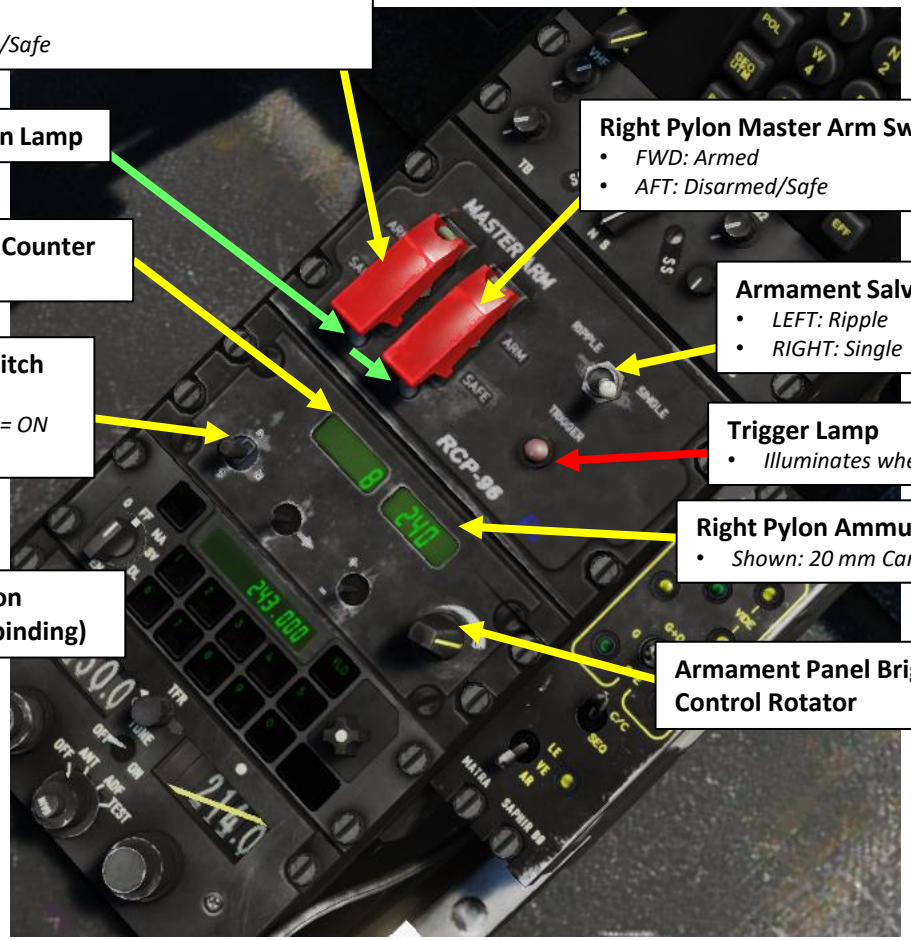
1 – Introduction
1.2 – Weapon Interface (SA-342M)



1 – Introduction
1.2 – Weapon Interface (SA-342L)

SA-342L Only



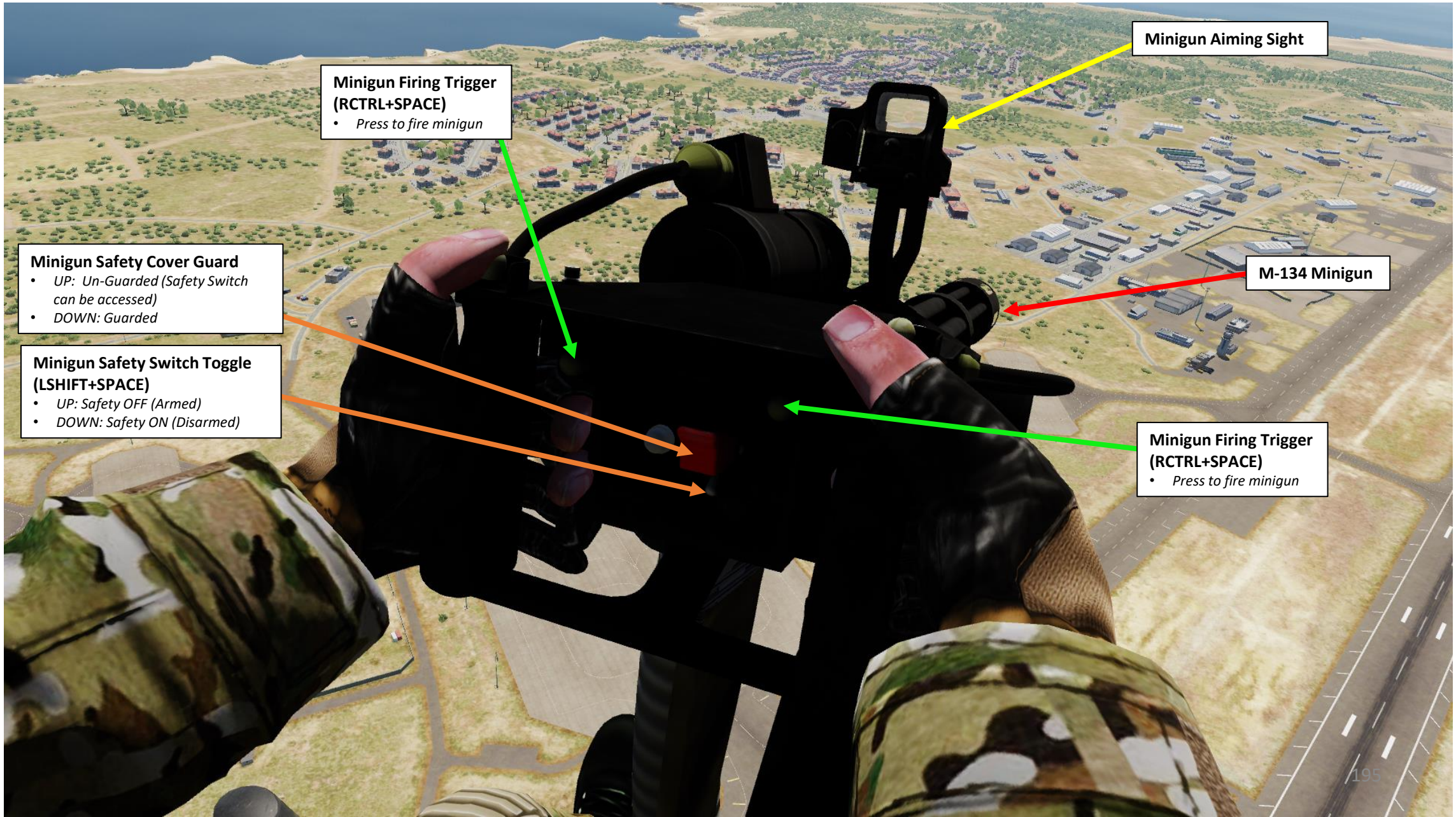


1 – Introduction
1.2 – Weapon Interface (SA-342L)

SA-342L Only

1 – Introduction
1.2 – Weapon Interface (SA-342 MINIGUN)

SA-342 Minigun Only



1 – Introduction
1.3 – My Weapon Controls

2 – SA-342M Weapon Employment

2.1 – HOT3 Air-to-Ground Missile (APX-397 Viviane Sight)

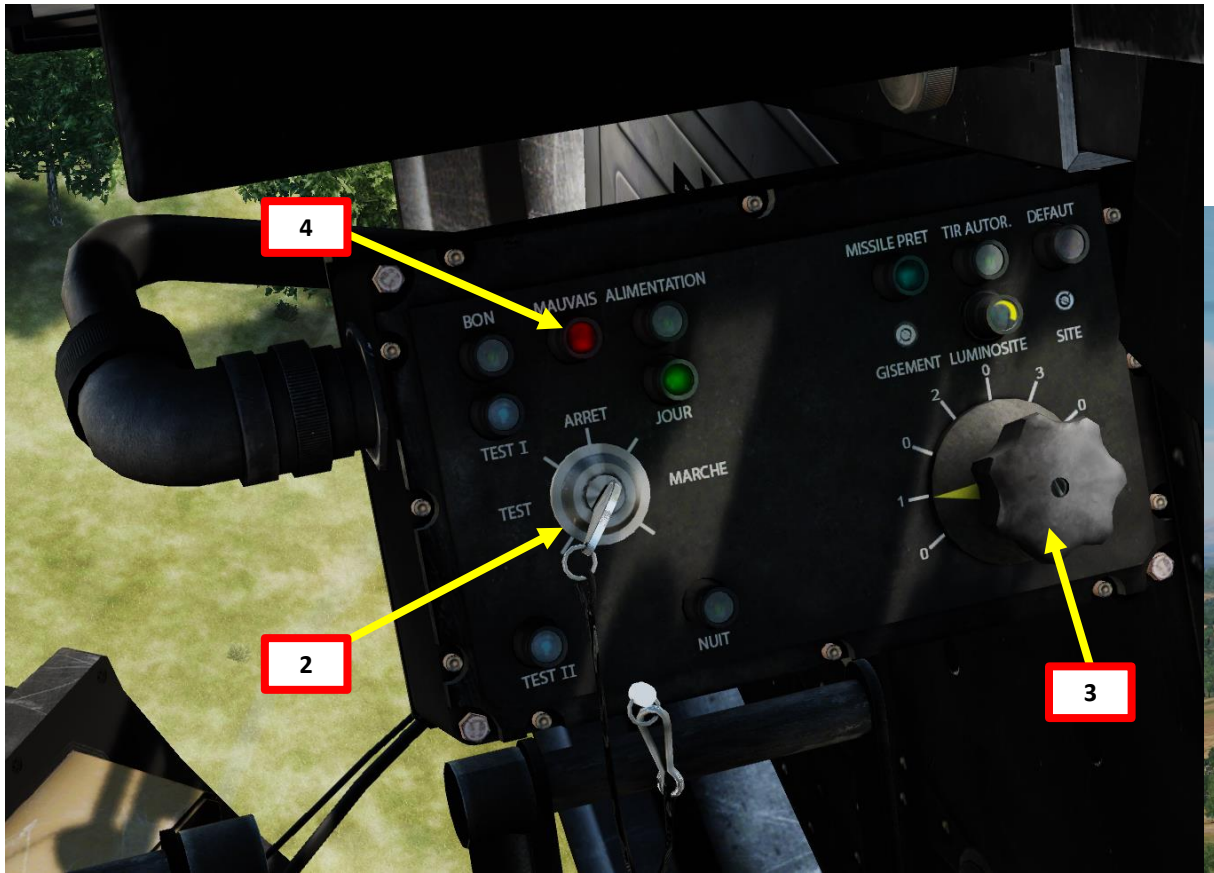
SA-342M Only

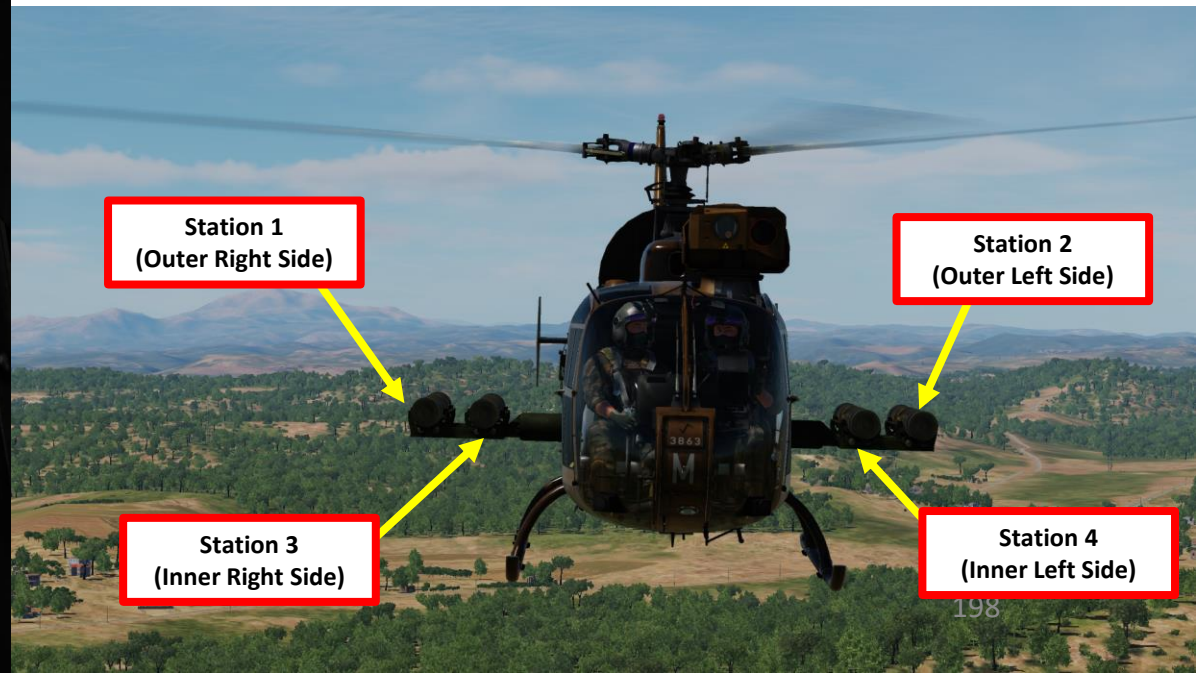
2 – SA-342M Weapon Employment

2.1 – HOT3 Air-to-Ground Missile (APX-397 Viviane Sight)

- *Steps preceded by [P] are performed by the Pilot.*
- *Steps preceded by [CPLT] are performed by the Copilot.*

1. *[P]* Set Weapon Arming Switch (***Arm****ement*) – ***M****ARCHE/ON* (UP)
2. *[CPLT]* Turn Weapon Key to either JOUR (Day) or NUIT (Night).
3. *[CPLT]* Select desired HOT3 station using the HOT3 Station Selector Knob
    - 1/2/3/4 = Stations
    - 0 = Safety
4. *[CPLT]* The *Mauvais*/Bad light indicates that the missile has not locked any target yet.

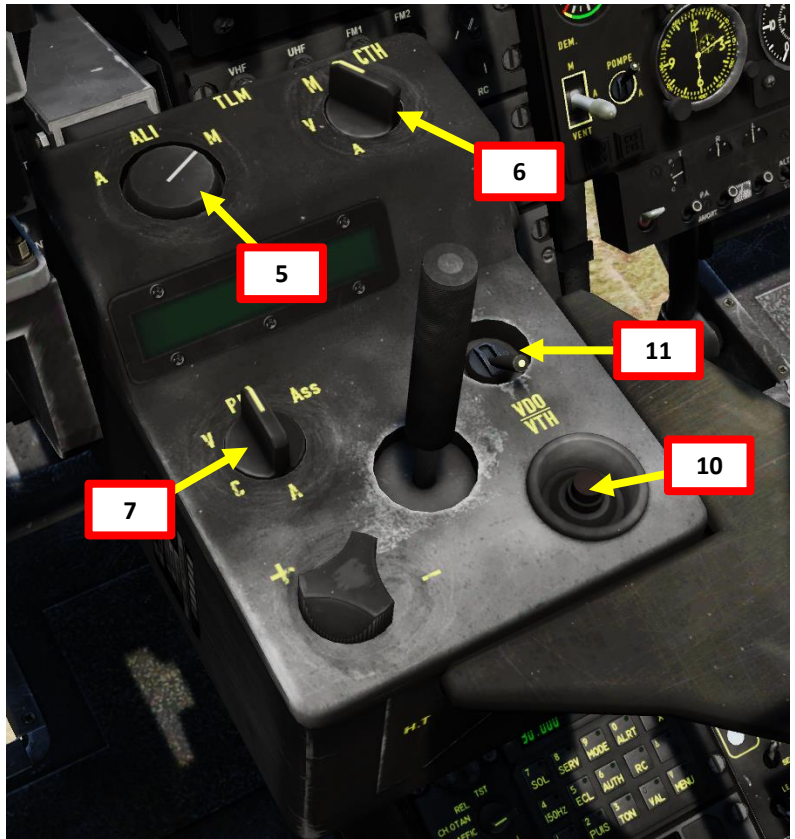


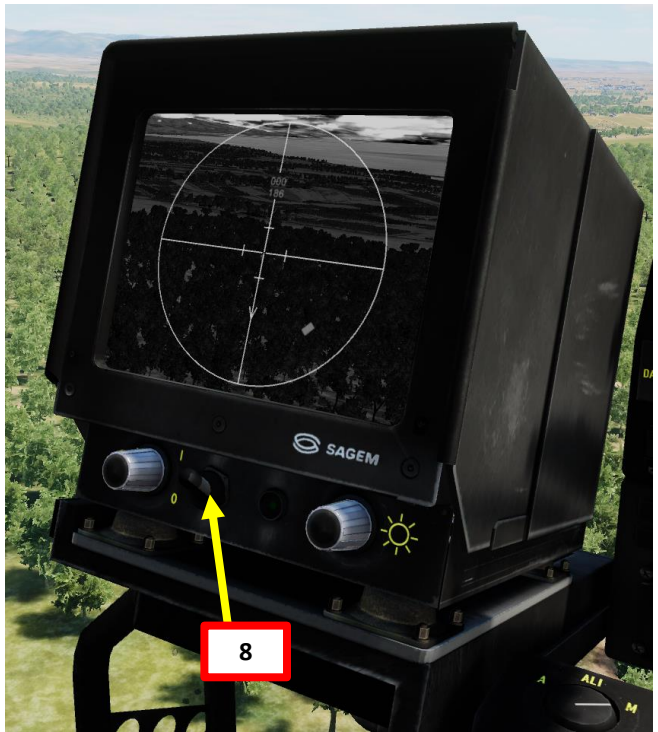


2 – SA-342M Weapon Employment

2.1 – HOT3 Air-to-Ground Missile (APX-397 Viviane Sight)

5. *[CPLT]* Set BCV (*Boîtier de Commande Vidéo*, Video Command Box) Power Selector – ***M****ARCHE*
6. *[CPLT]* Set BCV IR Power Selector – ***M****ARCHE*
    - The 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.
7. *[CPLT]* Set Camera Mode Selector – PILOTE (manual control mode)
8. *[CPLT]* Set TV Power Switch – ON (UP)
9. *[CPLT]* Once camera is ready, it will go from a stowed to an un-stowed position.
10. *[CPLT]* Press VDO/VTH Toggle switch to select VDO (TV) or VTH (Infrared) mode as required.
    - VDO: ***V****ue* ***D****irecte* ***O****ptique* = Direct Sight Vision
    - VTH: ***V****oie* ***T****hermie* = Thermal Vision
11. *[CPLT]* Use Camera Centering Toggle Switch if required
    - FWD: Centered
    - AFT: Reset



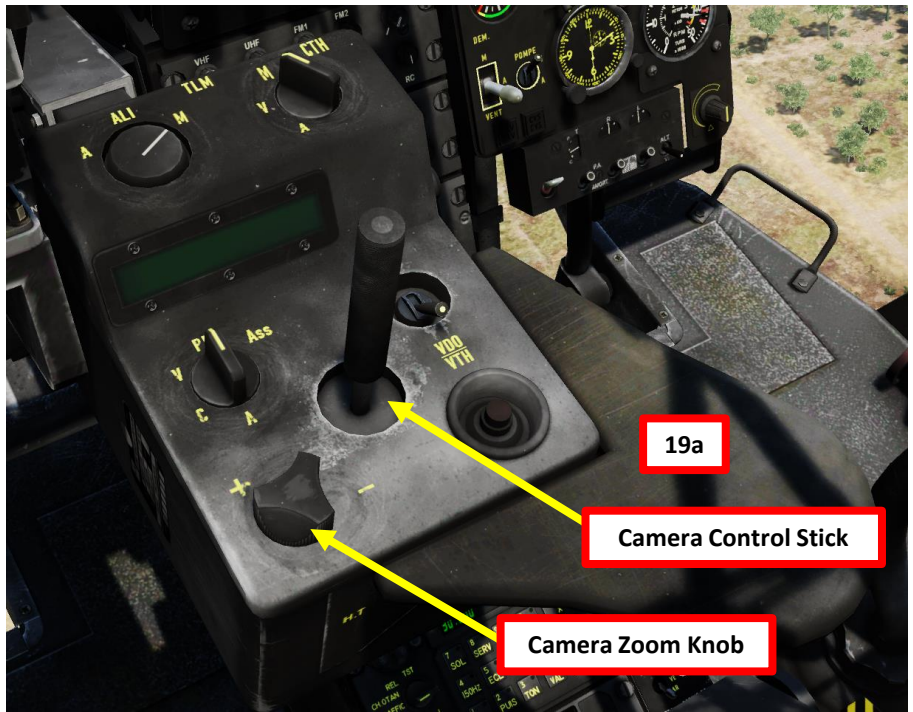


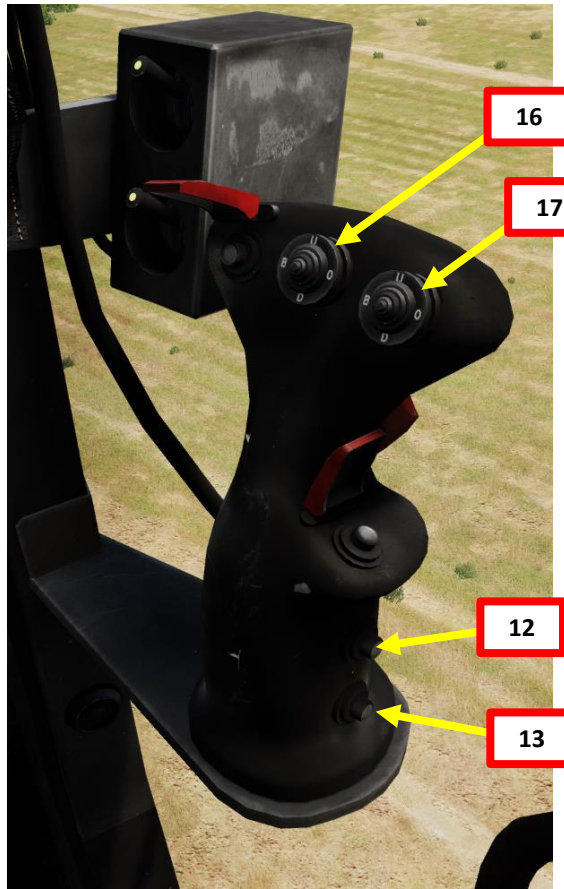
SA-342M Only

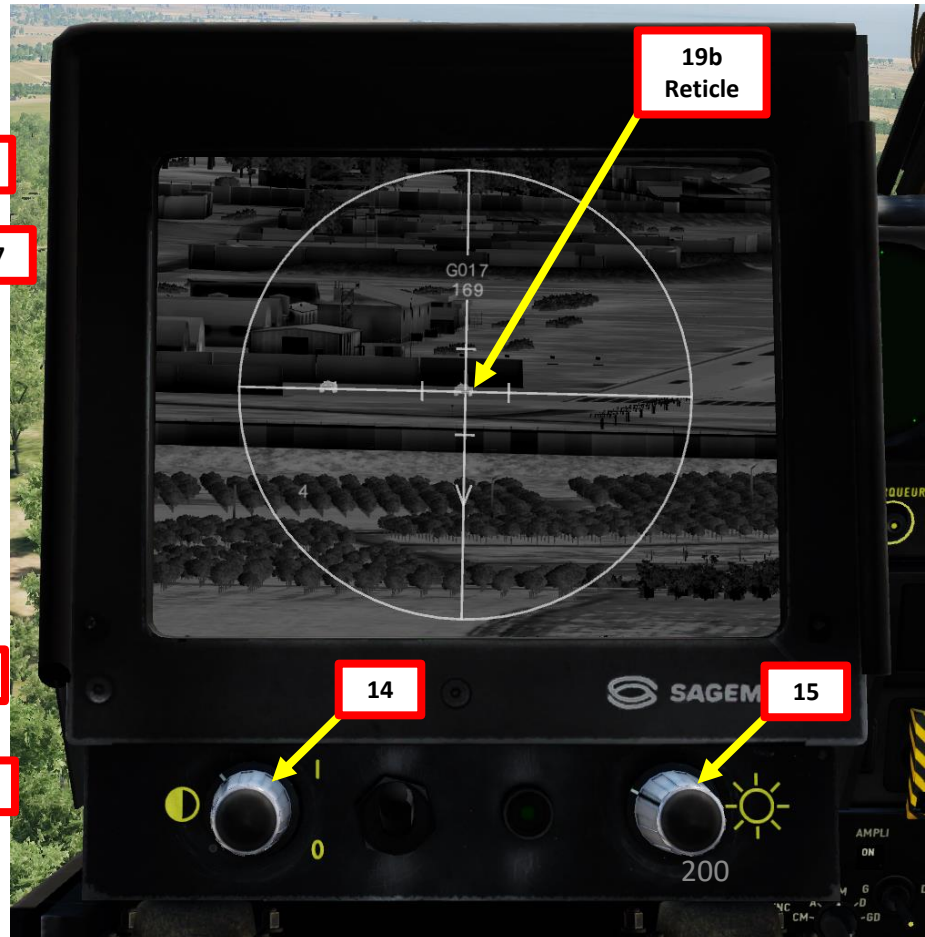
2 – SA-342M Weapon Employment

2.1 – HOT3 Air-to-Ground Missile (APX-397 Viviane Sight)

12. *[CPLT]* Press Symbology Inverse Toggle if needed.
13. *[CPLT]* Press Image Inverse Toggle if needed.
14. *[CPLT]* Adjust TV Contrast – As required
15. *[CPLT]* Adjust TV Brightness – As required
16. *[CPLT]* Adjust Image Focus (UP/DOWN) & Gain (LEFT/RIGHT) – As required
17. *[CPLT]* Adjust Symbology Brightness (UP/DOWN) & Image Brightness (LEFT/RIGHT) – As required
18. *[P]* Fly towards target and come to a hover from a concealed and safe position.
19. *[CPLT]* Use Camera Control Stick TV slew controls (; , . / bindings) and Zoom knob (= - bindings) to find desired target.





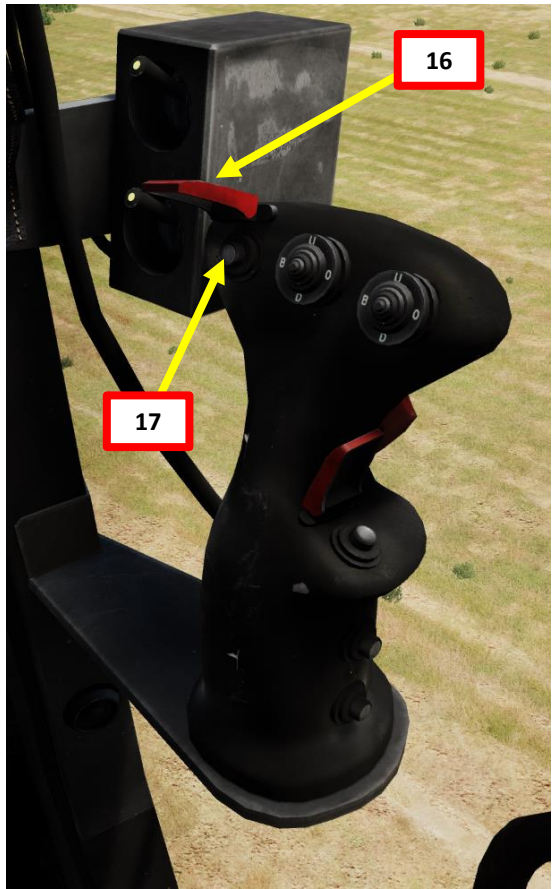


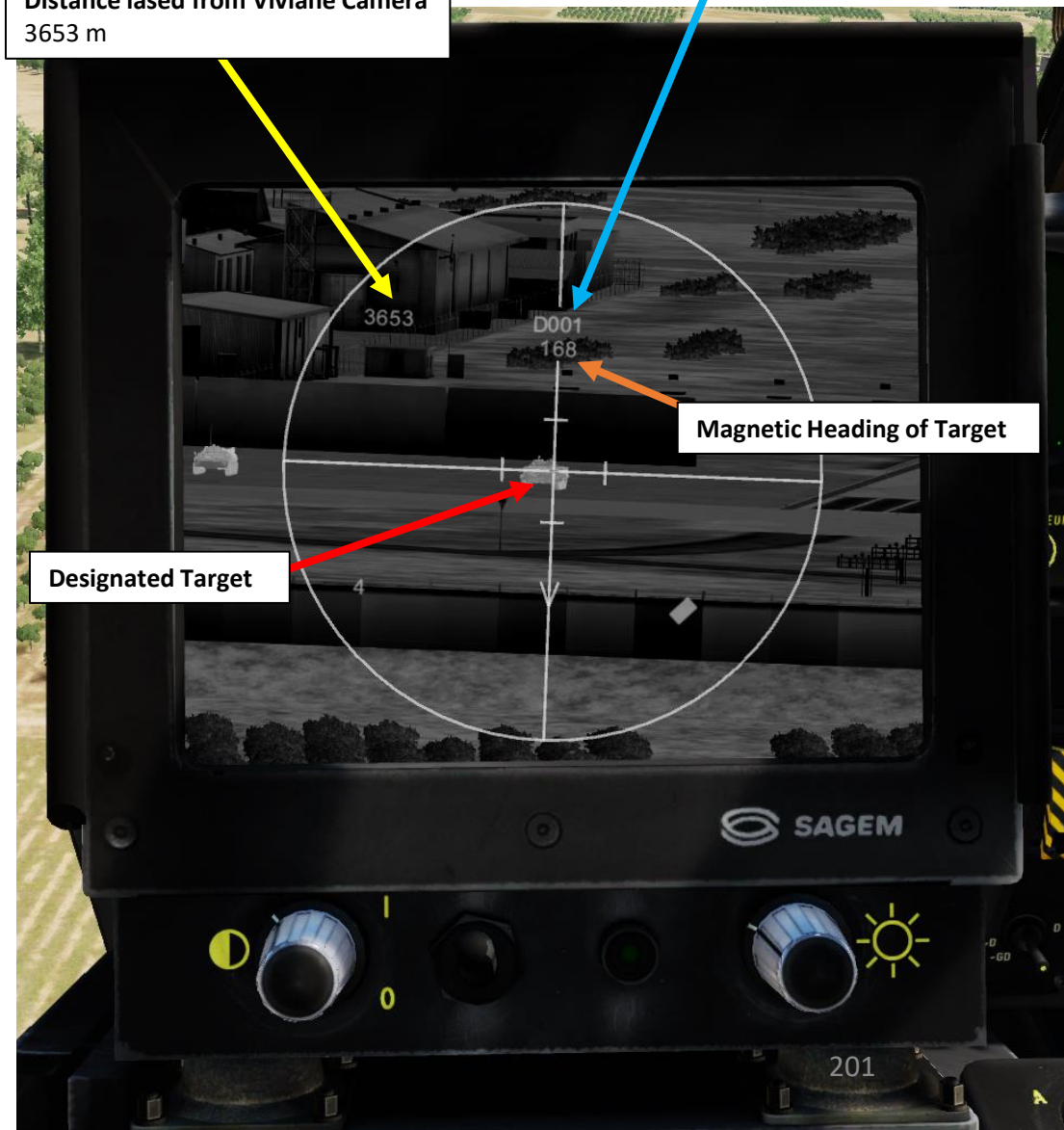
SA-342M Only

2 – SA-342M Weapon Employment

2.1 – HOT3 Air-to-Ground Missile (APX-397 Viviane Sight)

20. *[CPLT]* Flip up cover switch of laser designator button.
21. *[CPLT]* Press Laser Designator Button to lase, designate and range the target.
    - Note: maximum lasing range is 15 km.
22. *[CPLT]* If target is moving, set Camera Mode Selector to "ASS" (***Ass**ervi* = Slaved) to track target with camera.
23. *[P] Optional:* Press "Auto-Slave Toggle" ("E" binding) on pilot's stick to automatically steer the helicopter to the slaved target you just lased.





2 – SA-342M Weapon Employment

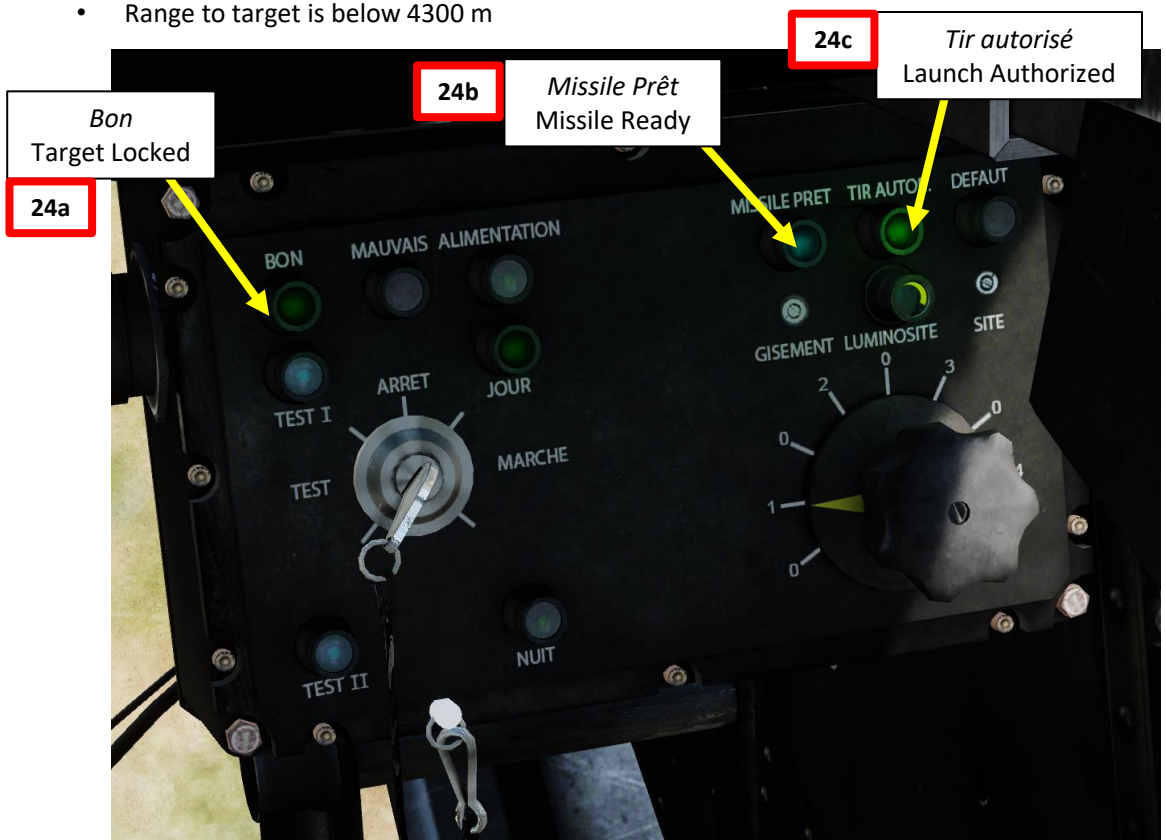
2.1 – HOT3 Air-to-Ground Missile (APX-397 Viviane Sight)

24. [CPLT] If all missile launch parameters are met, this indicates that missile launch is authorized :

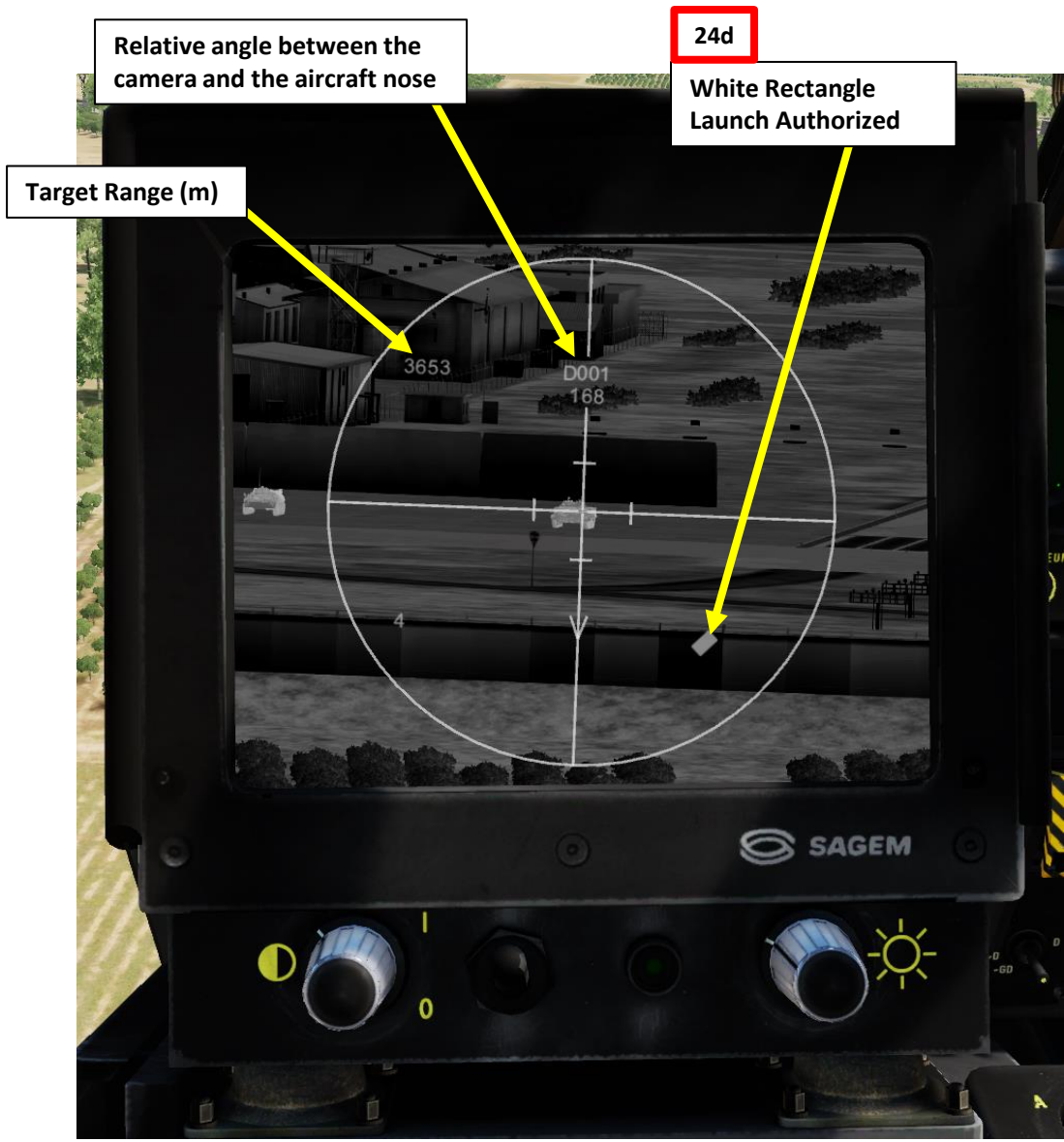
a) *BON*/OK lamp illuminates
b) *Missile Prêt*/Missile Ready lamp illuminates
c) *Tir Autorisé*/Launch Authorized lamp illuminates
d) A white rectangle appears on the TV display.

25. [CPLT] Missile Launch Parameters:

- Missile is selected
- Master arm switch must be ON
- Weapon Key must be on a ON/MARCHE position.
- Relative angle between the camera and the aircraft nose must be between G003 (3 deg left) and D003 (3 deg right)
- Target is lased and ranged
- Range to target is below 4300 m



SA-342M Only

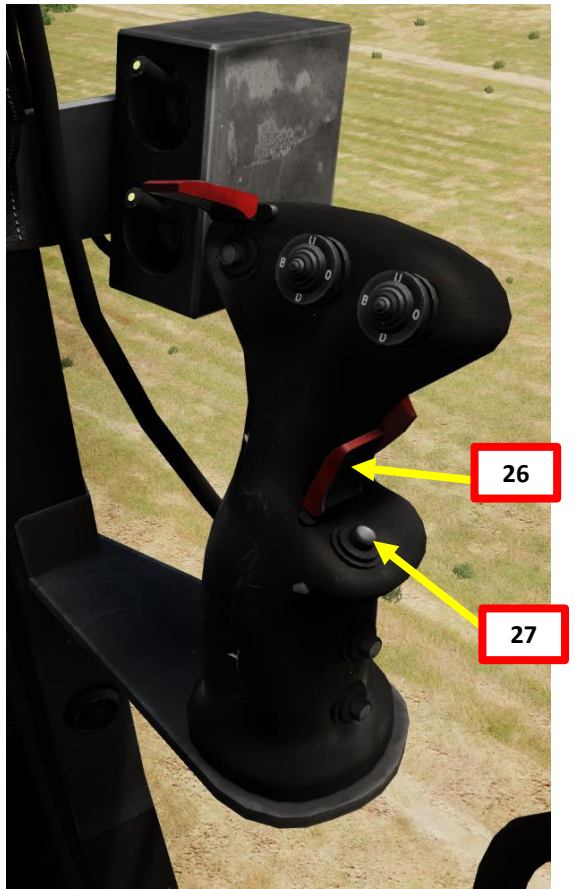


SA-342M Only

2 – SA-342M Weapon Employment

2.1 – HOT3 Air-to-Ground Missile (APX-397 Viviane Sight)

26. *[CPLT]* Flip up cover switch of missile launch button
27. *[CPLT]* Press “Missile Launch” button (Space).
28. *[CPLT]* Note: after a missile has been launched, swapping the HOT3 Station Selector Knob to a different position will cut the flying missile’s wire. You will lose control of the missile.



2 – SA-342M Weapon Employment

2.1 – HOT3 Air-to-Ground Missile (APX-397 Viviane Sight)

SA-342M Only

SA-342M Only

2 – SA-342M Weapon Employment

2.1 – HOT3 Air-to-Ground Missile (APX-397 Viviane Sight)

Tips & Tricks:

- HOT3 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.

3 – SA-342L Weapon Employment

3.1 – HOT3 Air-to-Ground Missile (Athos Sight)

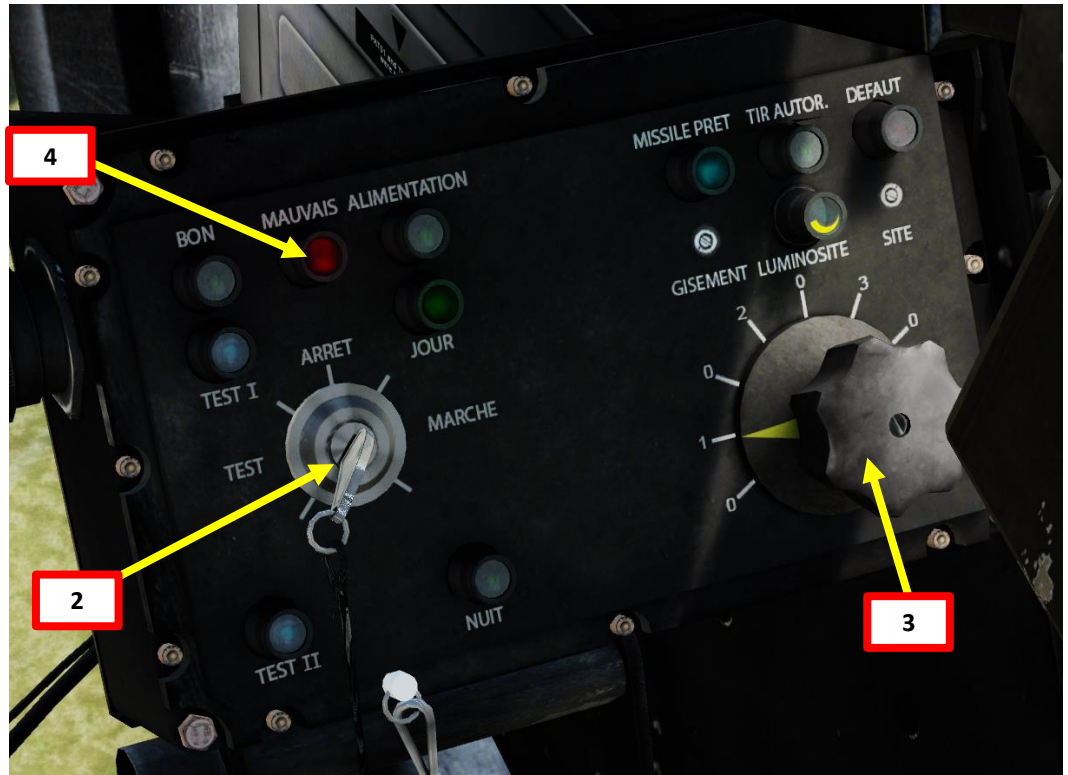
SA-342L Only

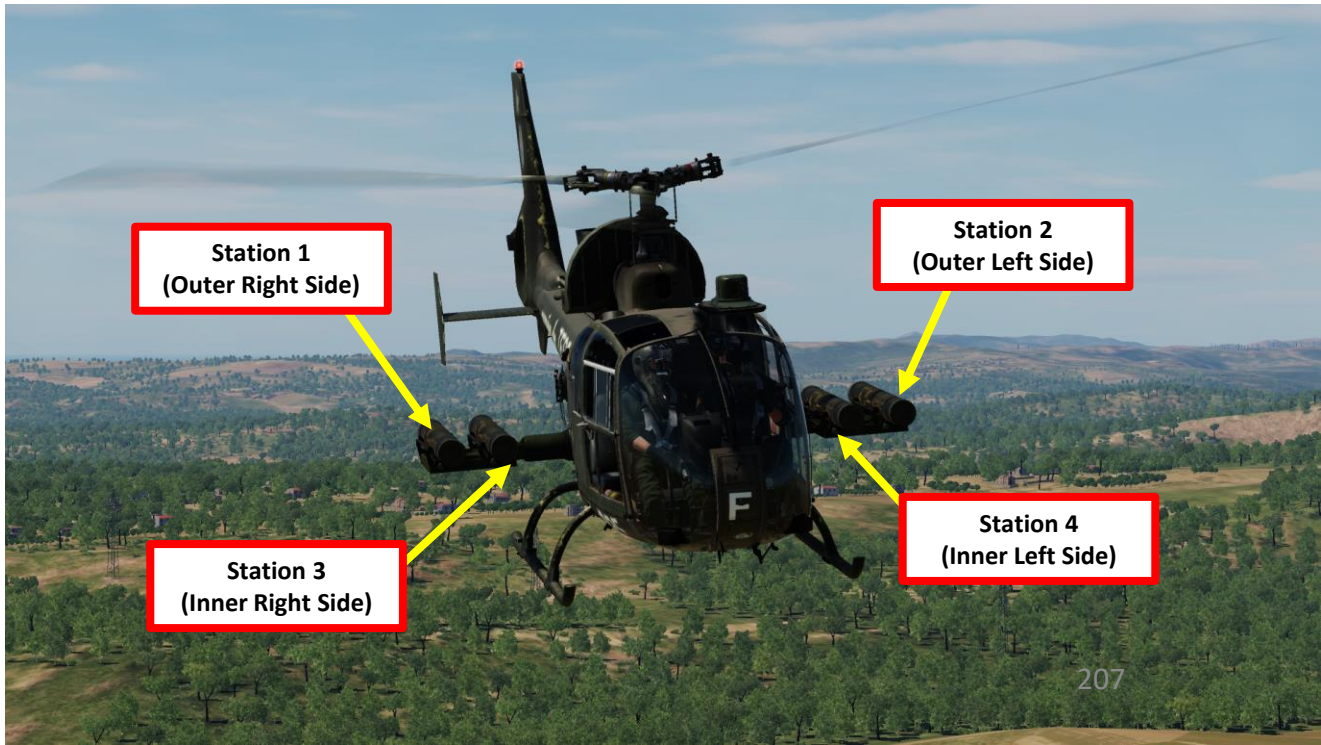
3 – SA-342L Weapon Employment

3.1 – HOT3 Air-to-Ground Missile (Athos Sight)

- *Steps preceded by [P] are performed by the Pilot.*
- *Steps preceded by [CPLT] are performed by the Copilot.*

1. *[P]* Set Weapon Arming Switch (***Arm****ement*) – ***M****ARCHE/ON* (UP)
2. *[CPLT]* Turn Weapon Key to either JOUR (Day) or NUIT (Night).
3. *[CPLT]* Select desired HOT3 station using the HOT3 Station Selector Knob
    - 1/2/3/4 = Stations
    - 0 = Safety
4. *[CPLT]* The *Mauvais*/Bad light indicates that the missile has not locked any target yet.





3 – SA-342L Weapon Employment

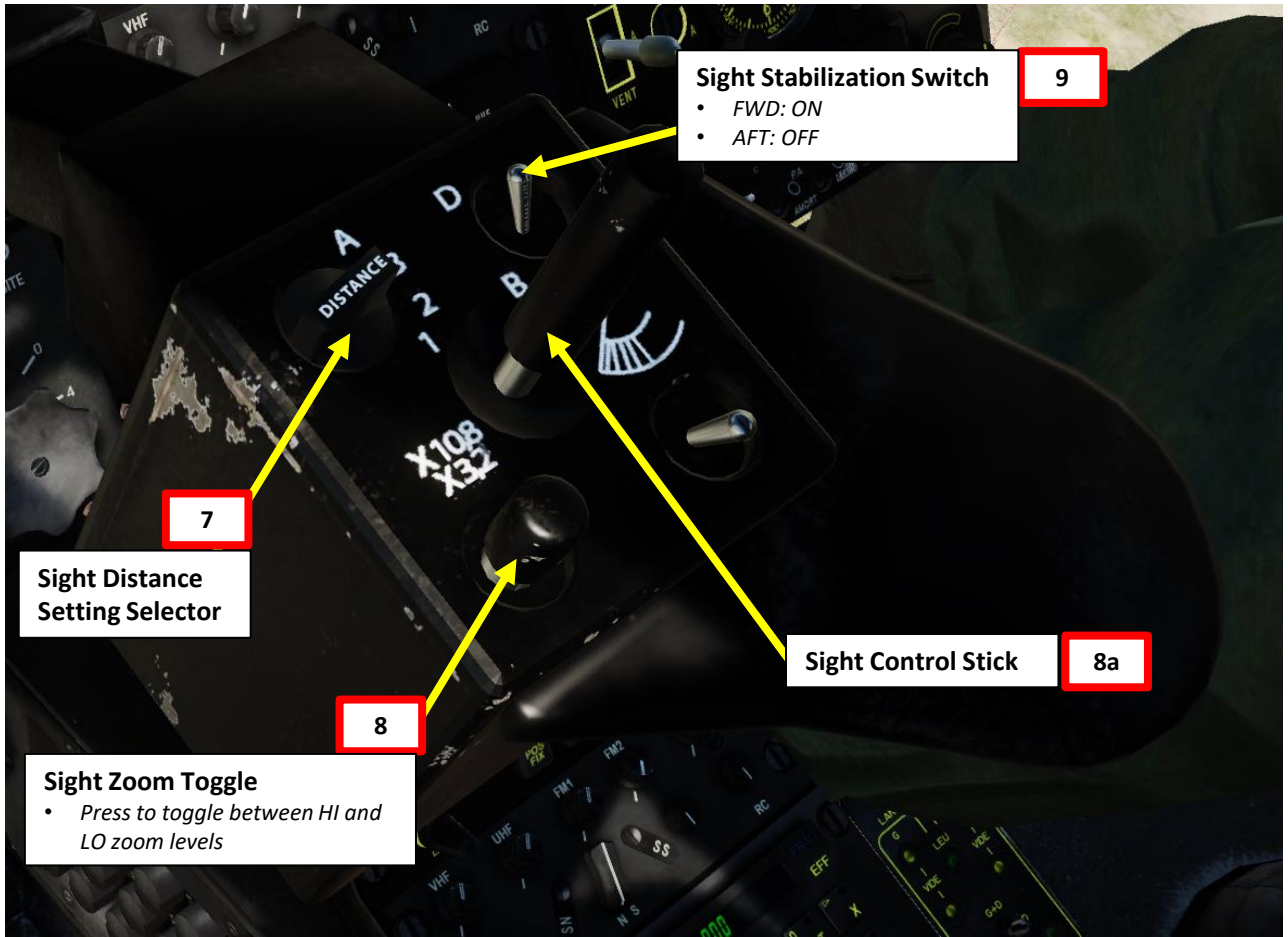
3.1 – HOT3 Air-to-Ground Missile (Athos Sight)

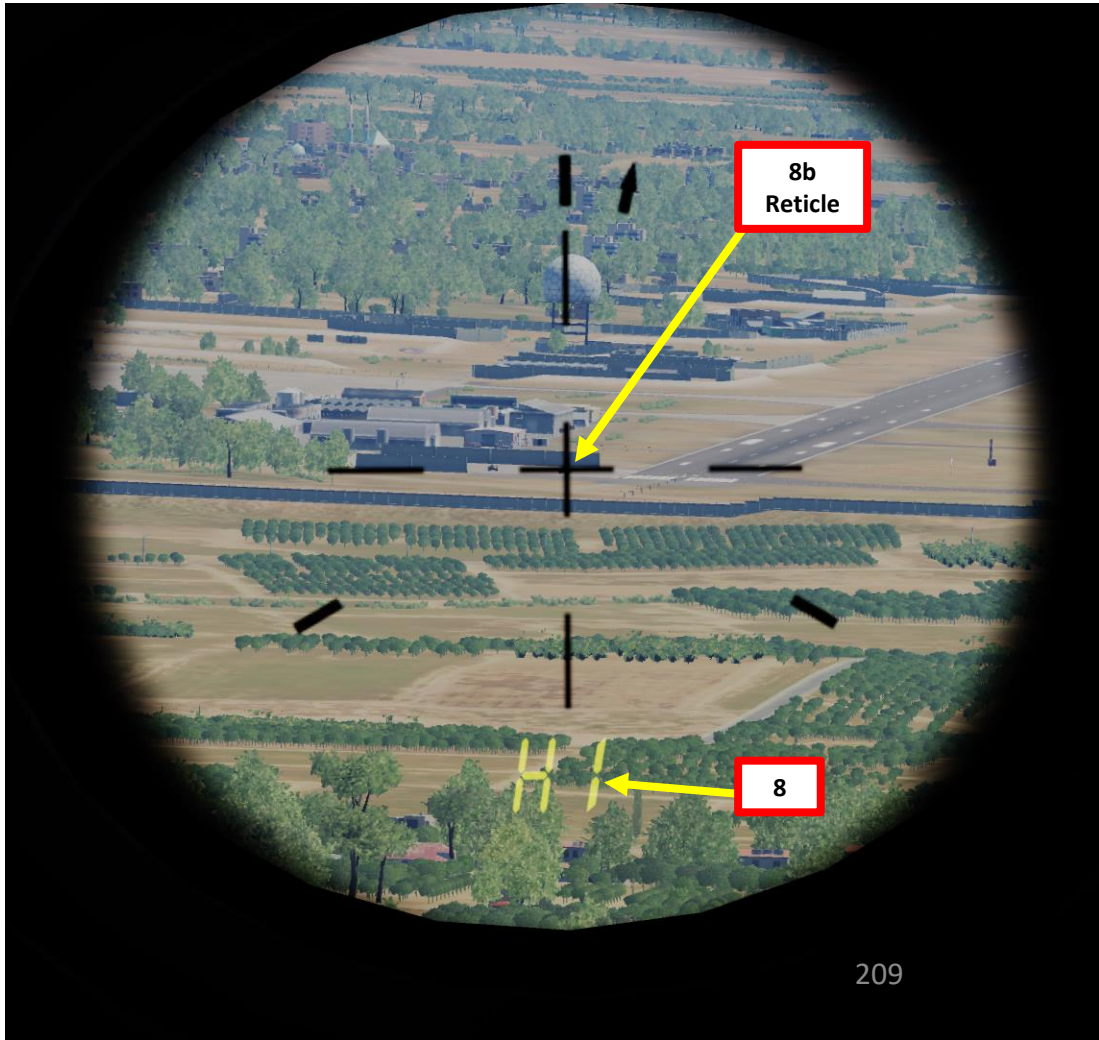
5. *[CPLT]* Click on the Athos Periscope to un-stow it.
6. *[P]* Fly towards target and come to a hover from a concealed and safe position.

SA-342L Only

3 – SA-342L Weapon Employment
3.1 – HOT3 Air-to-Ground Missile (Athos Sight)

7. *[CPLT]* Set Sight Distance Setting Selector – As desired.
8. *[CPLT]* Use sight control stick slew controls (; , . / bindings) and Sight Zoom toggle (= - bindings) to find desired target.
9. *[CPLT]* Set Sight Stabilization Switch – ON (FWD).

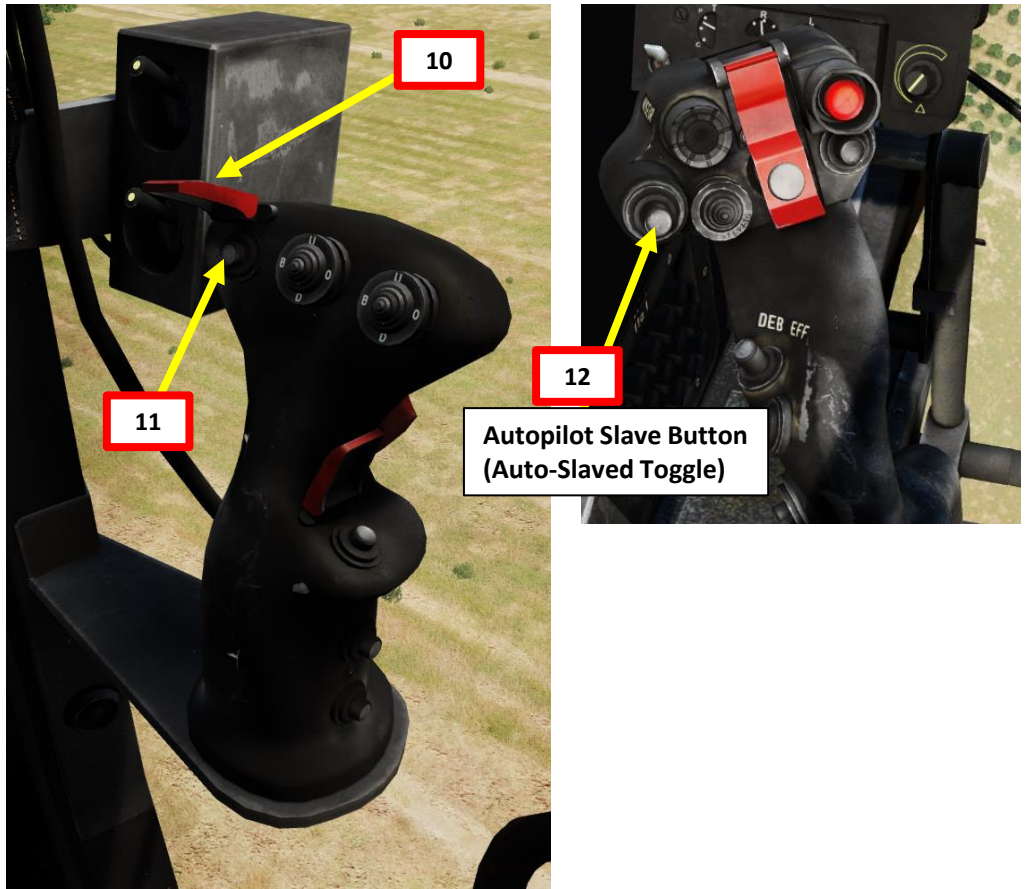




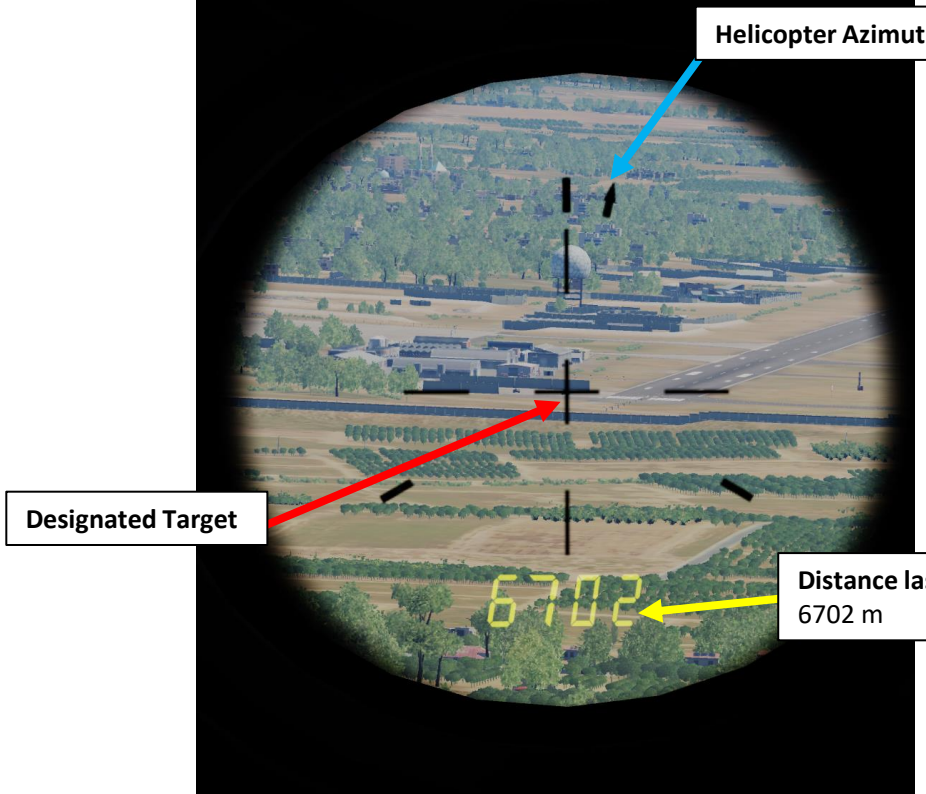
3 – SA-342L Weapon Employment

3.1 – HOT3 Air-to-Ground Missile (Athos Sight)

10. *[CPLT]* Flip up cover switch of laser designator button.
11. *[CPLT]* Press Laser Designator Button to lase, designate and range the target.
12. *[P] Optional:* Press "Auto-Slave Toggle" ("E" binding) on pilot's stick to automatically steer the helicopter to the slaved target you just lased.



SA-342L Only



SA-342L Only

3 – SA-342L Weapon Employment

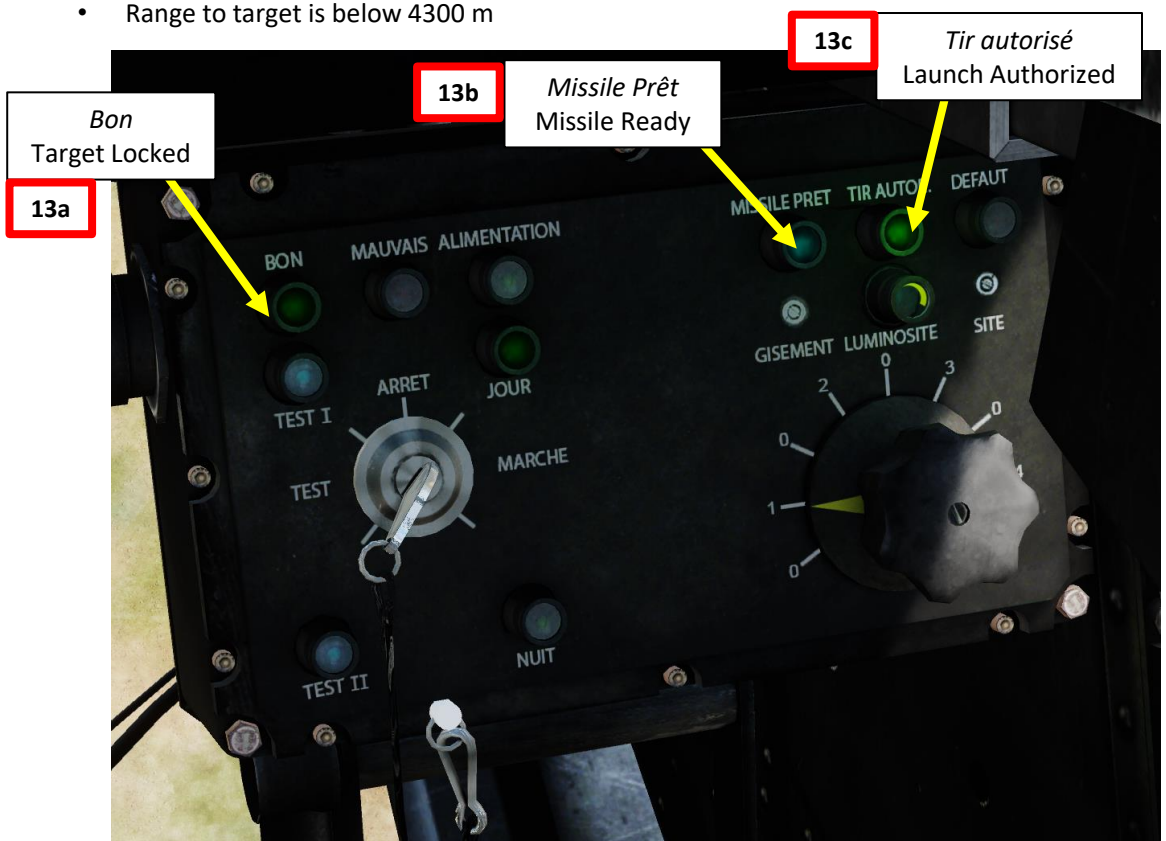
3.1 – HOT3 Air-to-Ground Missile (Athos Sight)

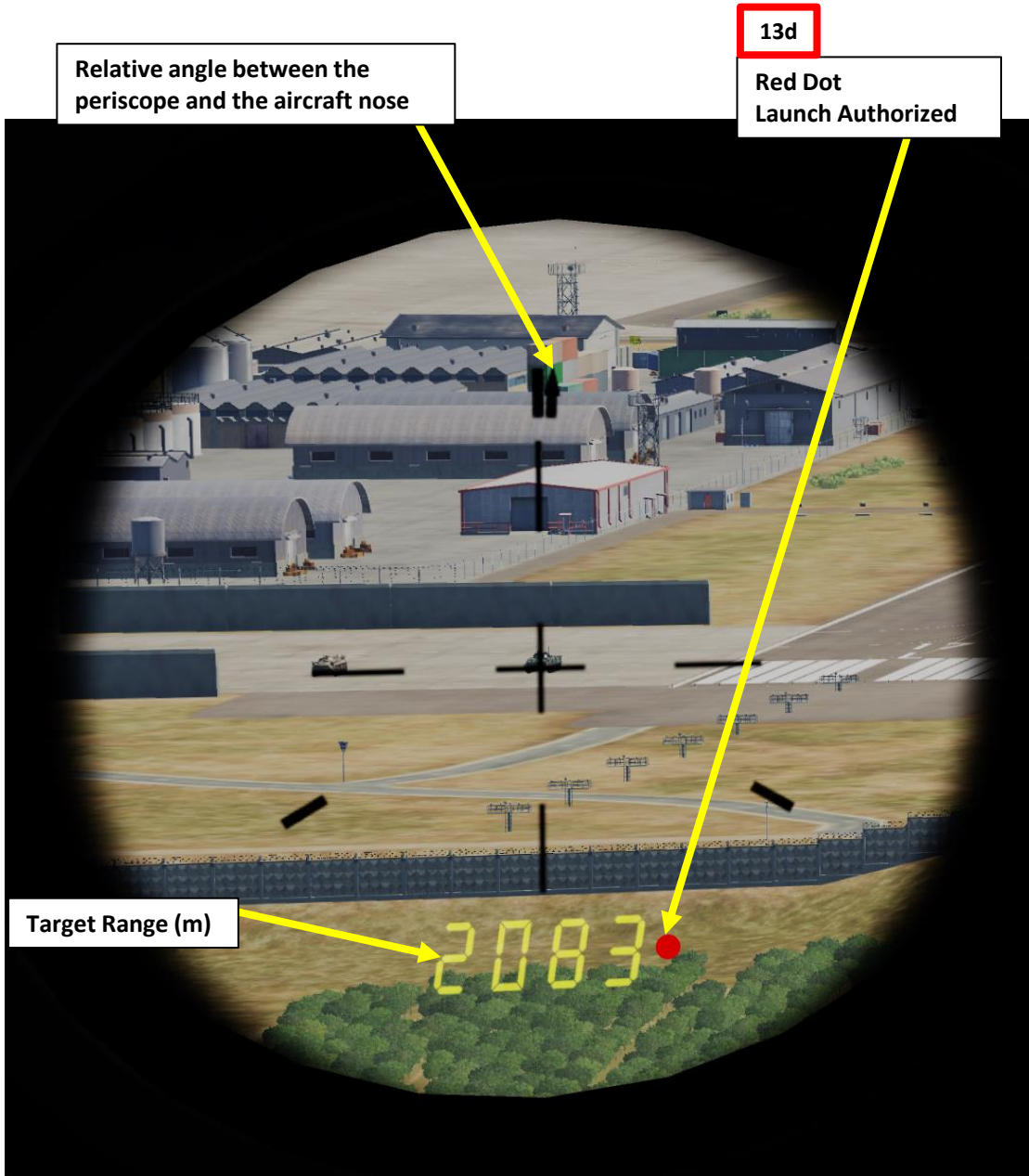
13. [CPLT] If all missile launch parameters are met, this indicates that missile launch is authorized :

a) *BON*/OK lamp illuminates
b) *Missile Prêt*/Missile Ready lamp illuminates
c) *Tir Autorisé*/Launch Authorized lamp illuminates
d) A red dot appears on the periscope sight.

14. [CPLT] Missile Launch Parameters:

- Missile is selected
- Master arm switch must be ON
- Weapon Key must be on a ON/MARCHE position.
- Relative angle between the periscope and the aircraft nose must be between 3 deg left and 3 deg right
- Target is lased and ranged
- Range to target is below 4300 m



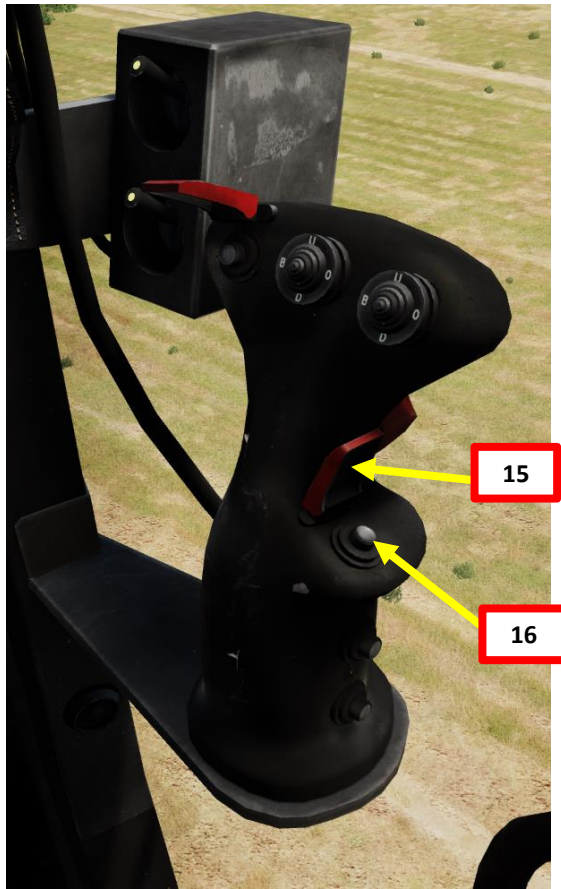


SA-342L Only

3 – SA-342L Weapon Employment

3.1 – HOT3 Air-to-Ground Missile (Athos Sight)

15. *[CPLT]* Flip up cover switch of missile launch button
16. *[CPLT]* Press “Missile Launch” button (Space).
17. *[CPLT]* Note: after a missile has been launched, swapping the HOT3 Station Selector Knob to a different position will cut the flying missile’s wire. You will lose control of the missile



3 – SA-342L Weapon Employment

3.1 – HOT3 Air-to-Ground Missile (Athos Sight)

SA-342L Only

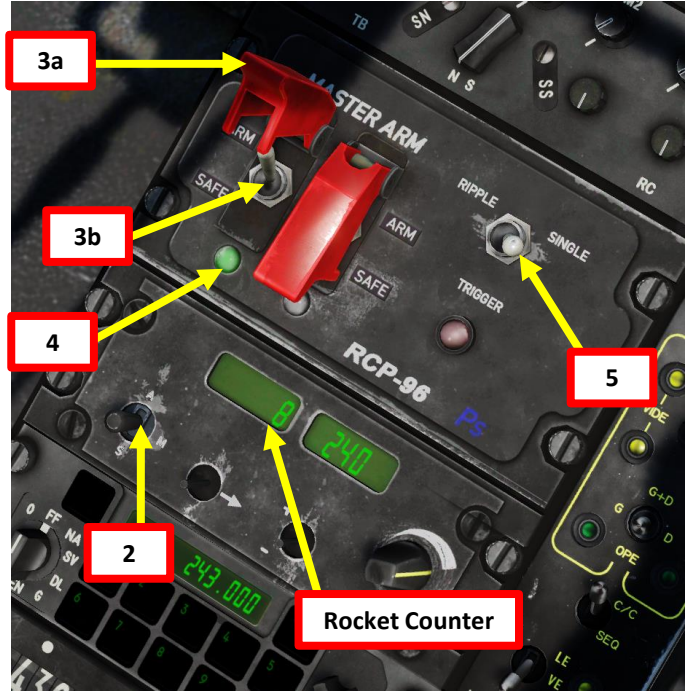
3 – SA-342L Weapon Employment
3.2 – SNEB Rockets (68 mm)

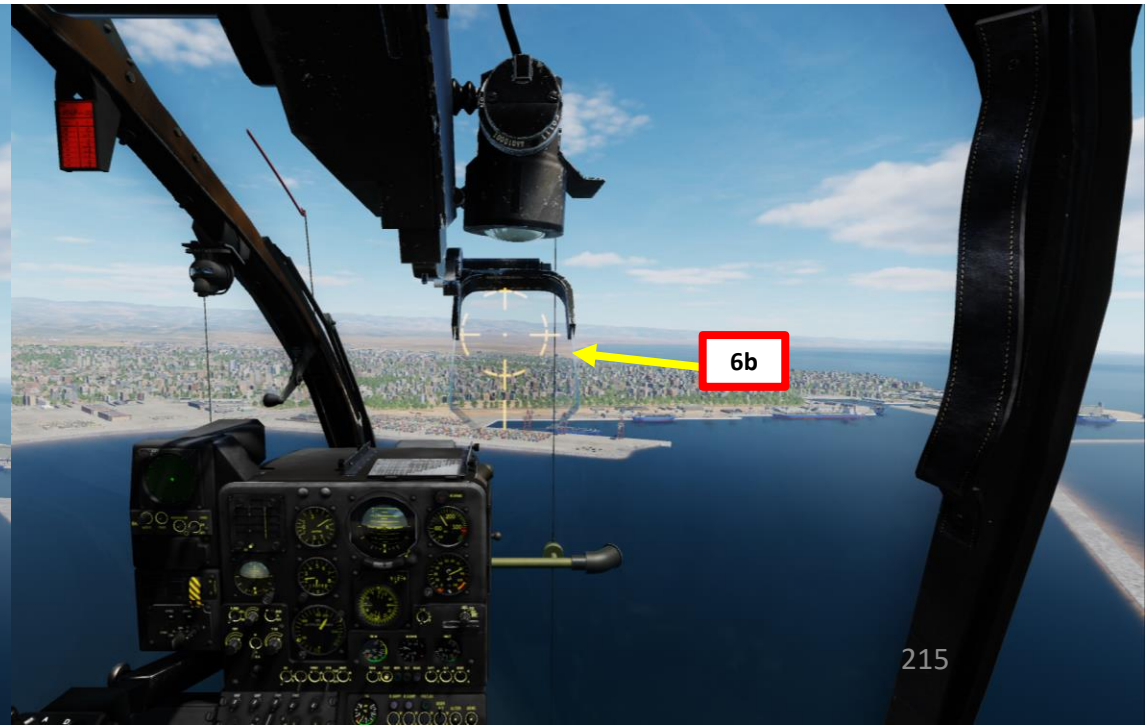
SA-342L Only

3 – SA-342L Weapon Employment
3.2 – SNEB Rockets (68 mm)

Note: the rocket pod can only be equipped on the left station.

1. Set Weapon Arming Switch (***Arm****ement*) – ***M****ARCHE/ON* (UP)
2. Set Armament Panel Power switch – ***M****ARCHE* (MIDDLE position)
3. Flip up safety cover and set left pylon MASTER ARM switch – ARM (FWD).
4. Confirm that green arming lamp is illuminated.
5. Select RIPPLE or SINGLE rocket firing mode
6. Click on gunsight to deploy it.





SA-342L Only

3 – SA-342L Weapon Employment
3.2 – SNEB Rockets (68 mm)

7. Steer the helicopter to align the center of the pilot's sight with the target.
8. Press the "FIRE GUNS OR ROCKETS" button on your cyclic to fire rockets.
9. As rockets are being fired, the Trigger Red Lamp illuminates.

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

3 – SA-342L Weapon Employment
3.2 – SNEB Rockets (68 mm)

SA-342L Only

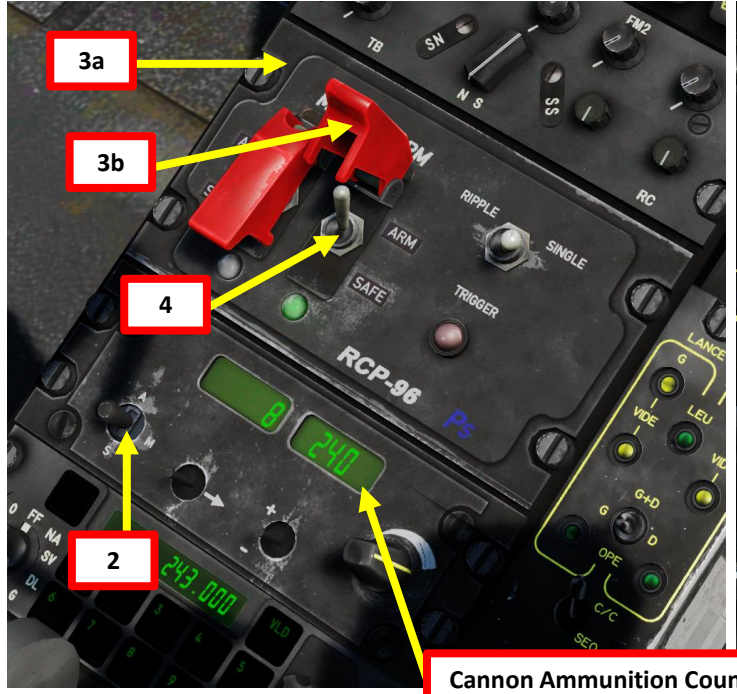
3 – SA-342L Weapon Employment
3.3 – GIAT M-621 Cannon (20 mm)

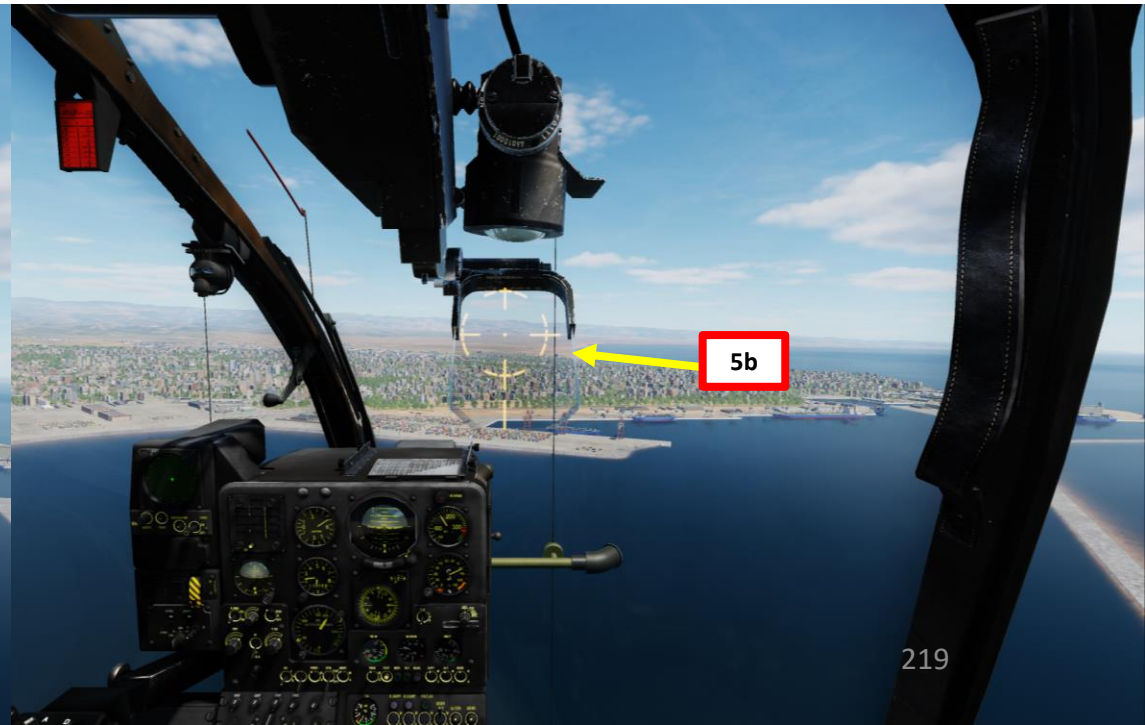
SA-342L Only

3 – SA-342L Weapon Employment
3.3 – GIAT M-621 Cannon (20 mm)

Note: the GIAT M-621 cannon can only be equipped on the right station.

1. Set Weapon Arming Switch (***Arm****ement*) – ***M****ARCHE/ON* (UP)
2. Set Armament Panel Power switch – ***M****ARCHE* (MIDDLE position)
3. Flip up safety cover and set right pylon MASTER ARM switch to ARM (FWD)
4. Confirm that green arming lamp is illuminated.
5. Click on gunsight to deploy it.



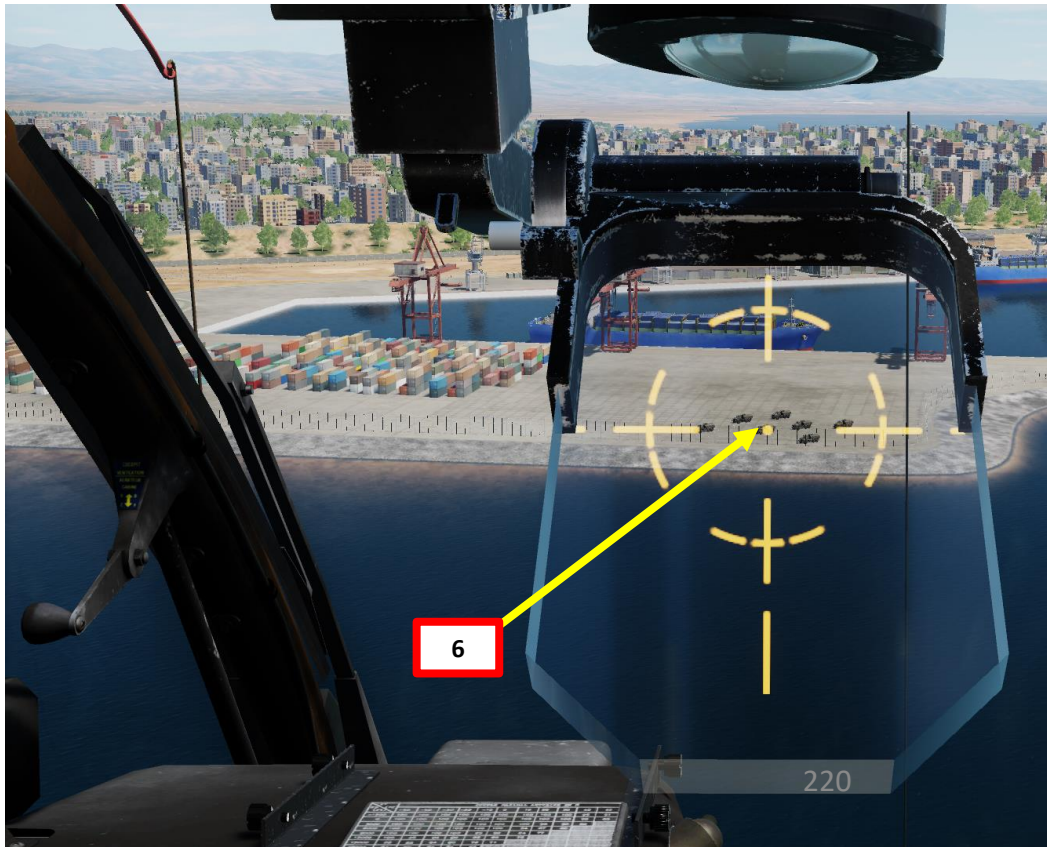


SA-342L Only

3 – SA-342L Weapon Employment
3.3 – GIAT M-621 Cannon (20 mm)

6. Steer the helicopter to align the center of the pilot's sight with the target.
7. Press the "FIRE GUNS/ROCKETS" button on your cyclic to fire the cannon.
8. As the cannon is being fired, the Trigger Red Lamp illuminates.

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



3 – SA-342L Weapon Employment
3.3 – GIAT M-621 Cannon (20 mm)

SA-342L Only

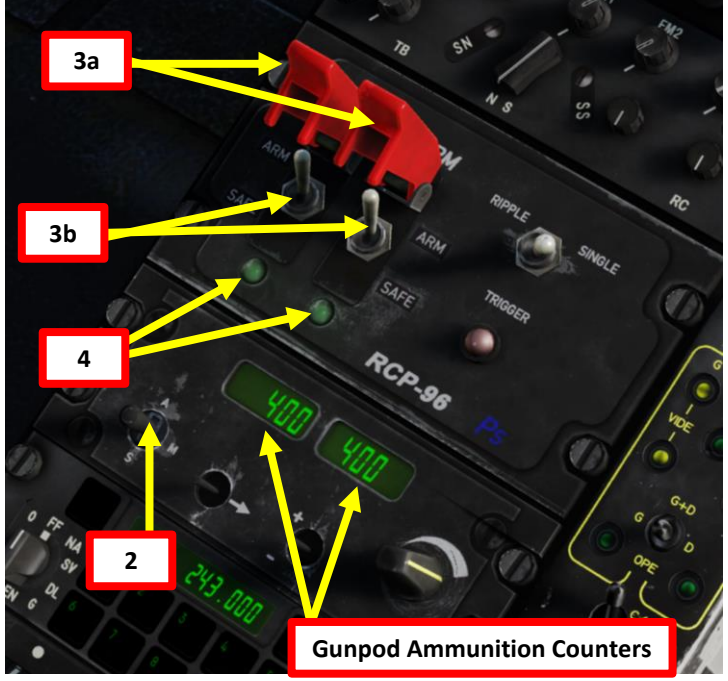
3 – SA-342L Weapon Employment
3.4 – FN HMP-400 Gunpods (12.7 mm)

SA-342L Only

3 – SA-342L Weapon Employment
3.4 – FN HMP-400 Gunpods (12.7 mm)

Note: the HMP-400 gunpod can be equipped on both left and right stations.

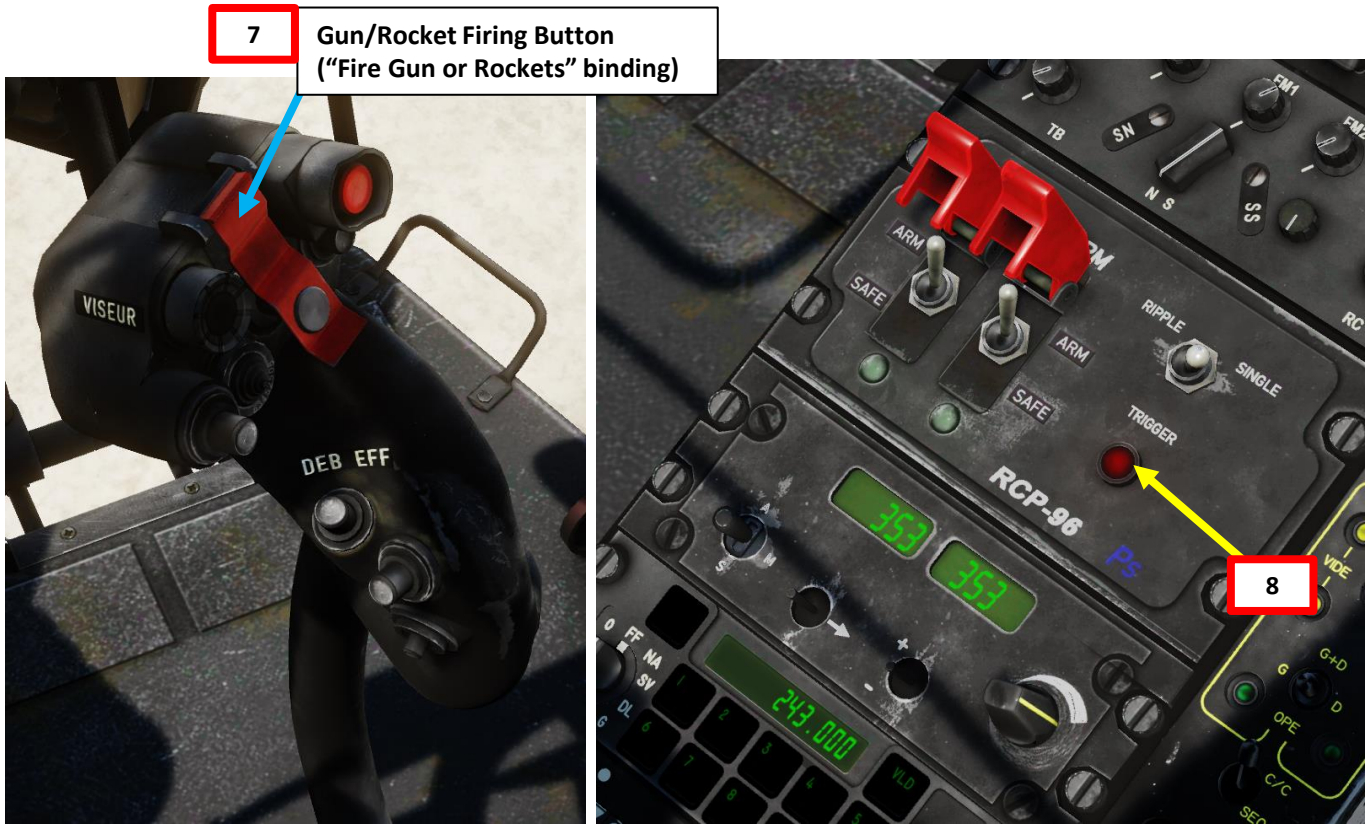
1. Set Weapon Arming Switch (***Arm****ement*) – ***M****ARCHE/ON* (UP)
2. Set Armament Panel Power switch – ***M****ARCHE* (MIDDLE position)
3. Flip up safety covers and set left and right pylon MASTER ARM switches to ARM (FWD)
4. Confirm that green arming lamps are illuminated.
5. Click on gunsight to deploy it.



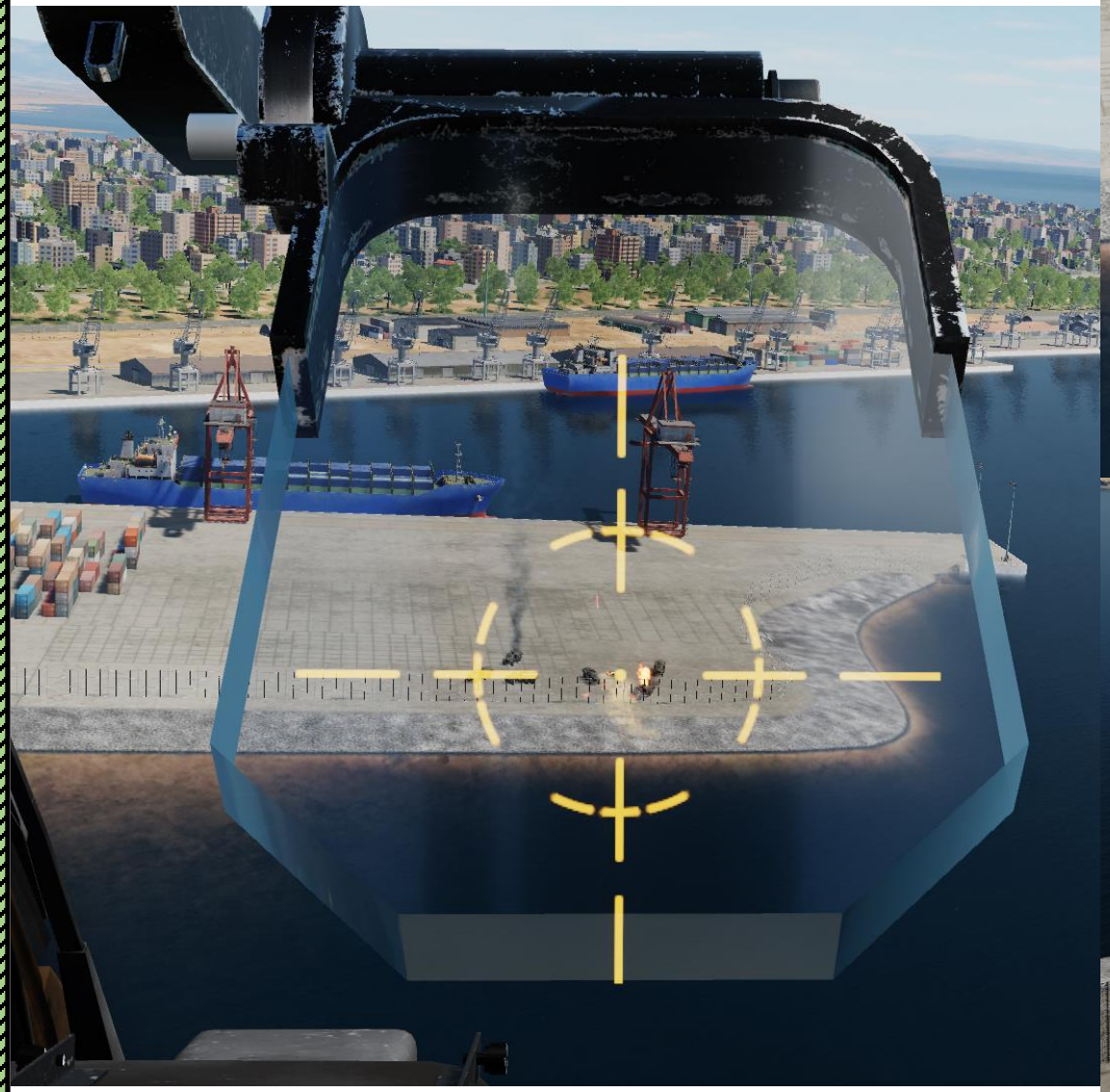
SA-342L Only

3 – SA-342L Weapon Employment
3.4 – FN HMP-400 Gunpods (12.7 mm)

6. Steer the helicopter to align the center of the pilot's sight with the target.
7. Press the "FIRE GUNS/ROCKETS" button on your cyclic to fire gunpods.
8. As the gunpods are being fired, the Trigger Red Lamp illuminates.



3 – SA-342L Weapon Employment
3.4 – FN HMP-400 Gunpods (12.7 mm)



SA-342L Only

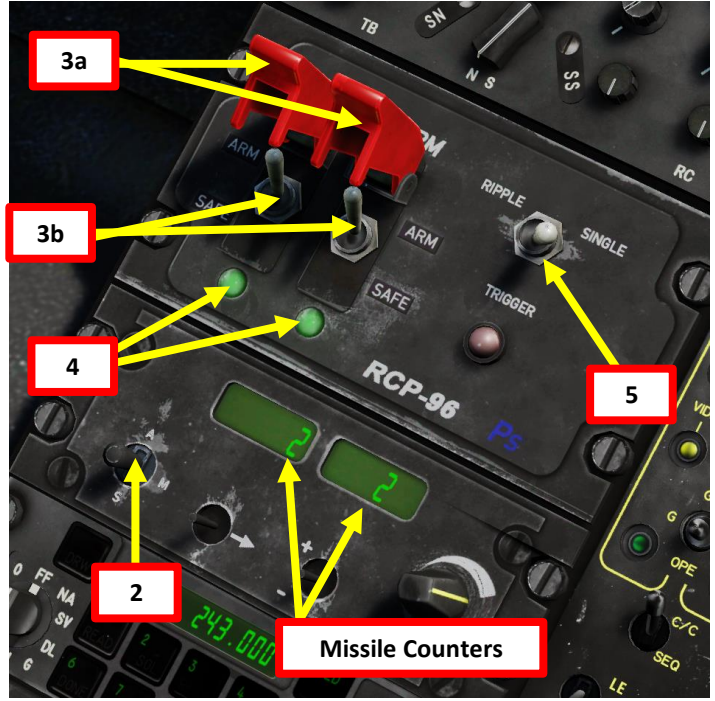
3 – SA-342L Weapon Employment
3.5 – Mistral Air-to-Air IR (Infrared) Seeker Missile

SA-342L Only

3 – SA-342L Weapon Employment
3.5 – Mistral Air-to-Air IR (Infrared) Seeker Missile

Note: the Mistral missiles can be equipped on both left and right stations.

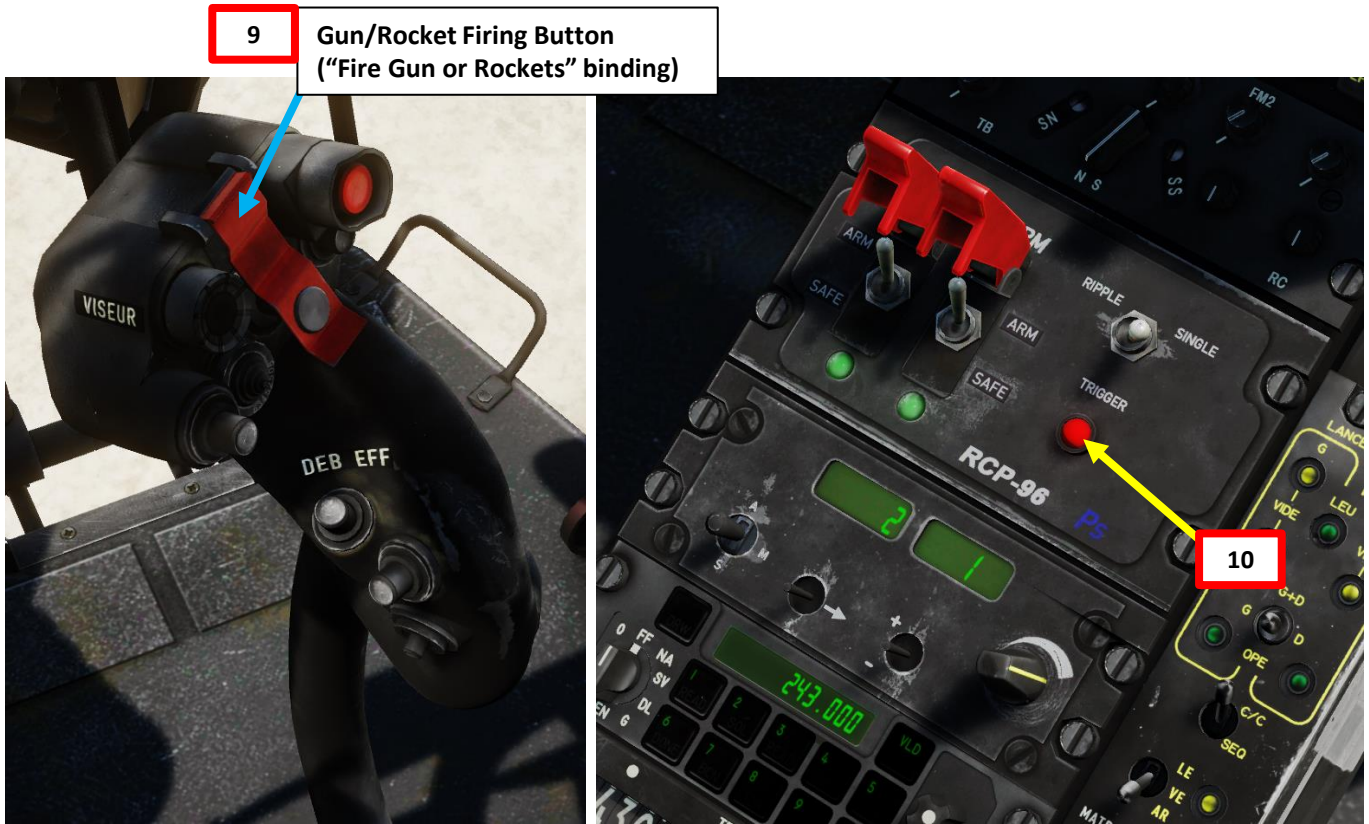
1. Set Weapon Arming Switch (***Arm****ement*) – ***M****ARCHE/ON* (UP)
2. Set Armament Panel Power switch – ***M****ARCHE* (MIDDLE position)
3. Flip up safety covers and set left and right pylon MASTER ARM switches to ARM (FWD)
4. Confirm that green arming lamps are illuminated.
5. Select SINGLE missile firing mode
6. Click on gunsight to deploy it.

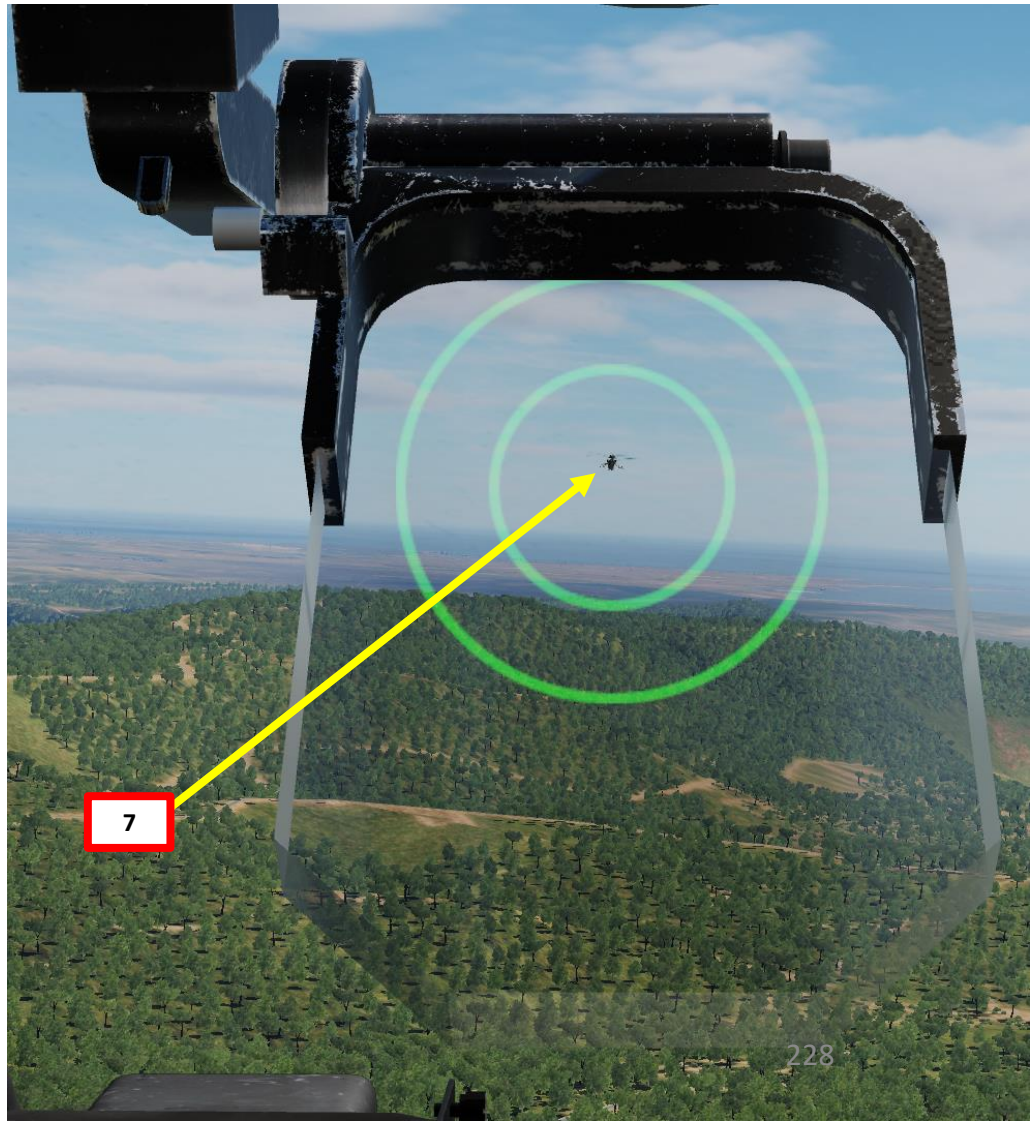


SA-342L Only

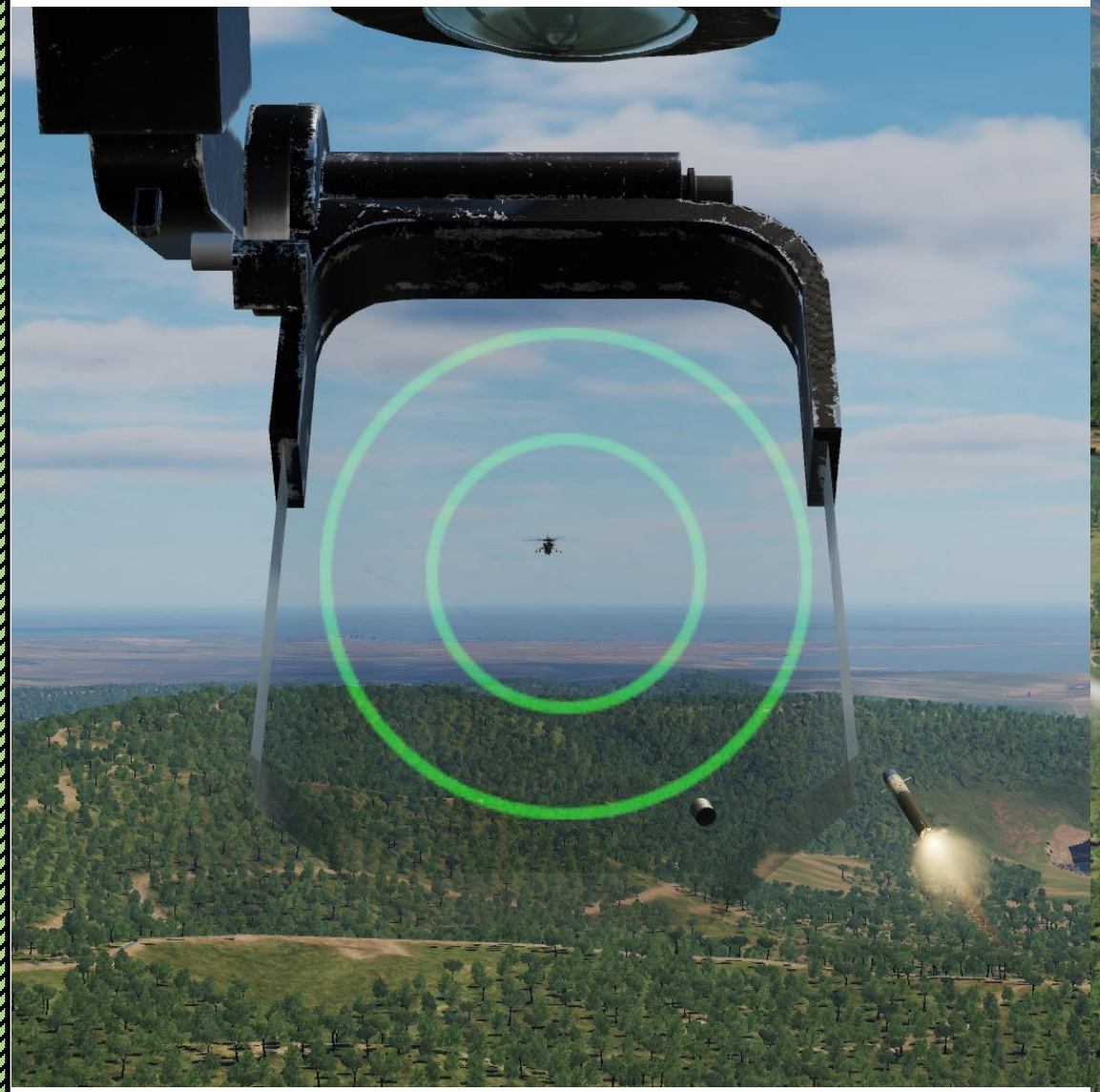
3 – SA-342L Weapon Employment
3.5 – Mistral Air-to-Air IR (Infrared) Seeker Missile

7. Steer the helicopter to align the center of the pilot's sight with the target.
8. Once you hear a high-pitched missile lock tone, the Mistral missile has detected a heat signature and is tracking it. You may fire the missile once you are within firing range (typically about 0.5 nm).
9. Press the "FIRE GUNS/ROCKETS" button on your cyclic to fire the missile.
10. As the missile is being fired, the Trigger Red Lamp illuminates.





3 – SA-342L Weapon Employment
3.5 – Mistral Air-to-Air IR (Infrared) Seeker Missile



SA-342L Only

4 – SA-342 MINIGUN Weapon Employment

4.1 – M-134 Minigun (7.62 mm)

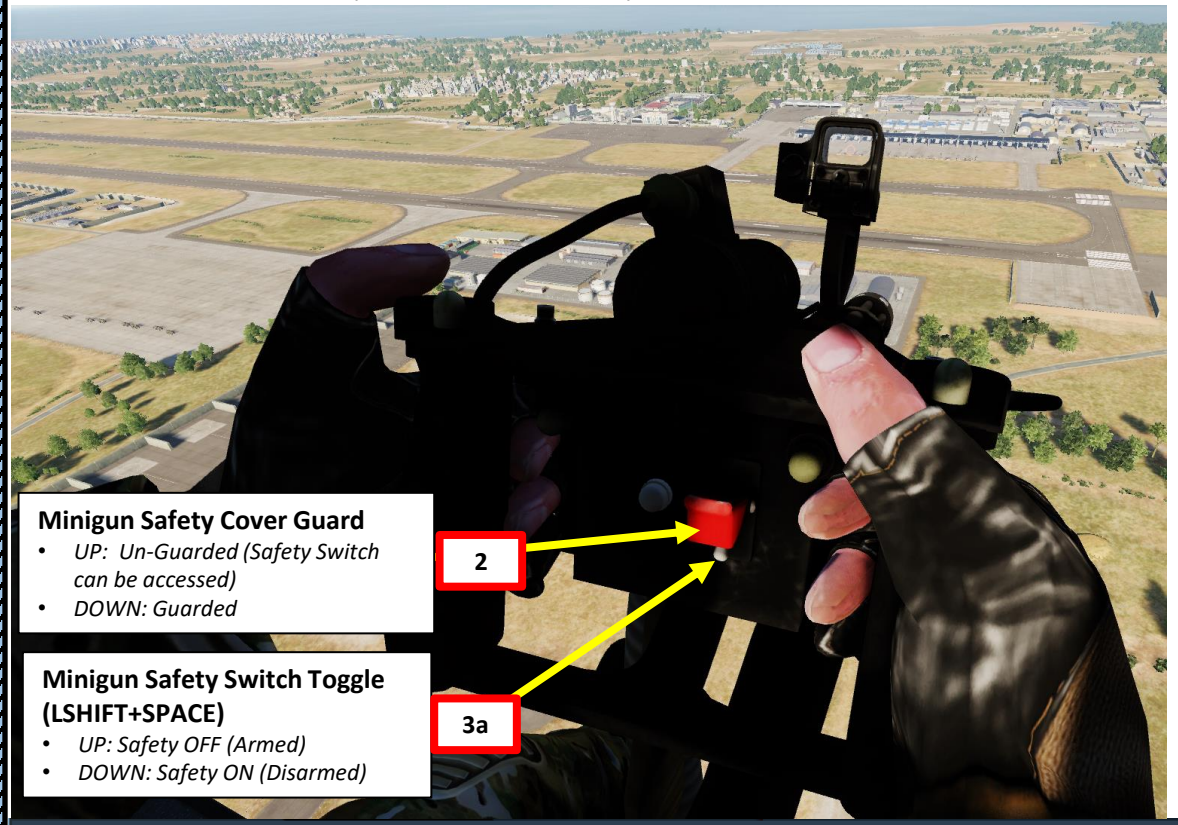
SA-342 Minigun Only

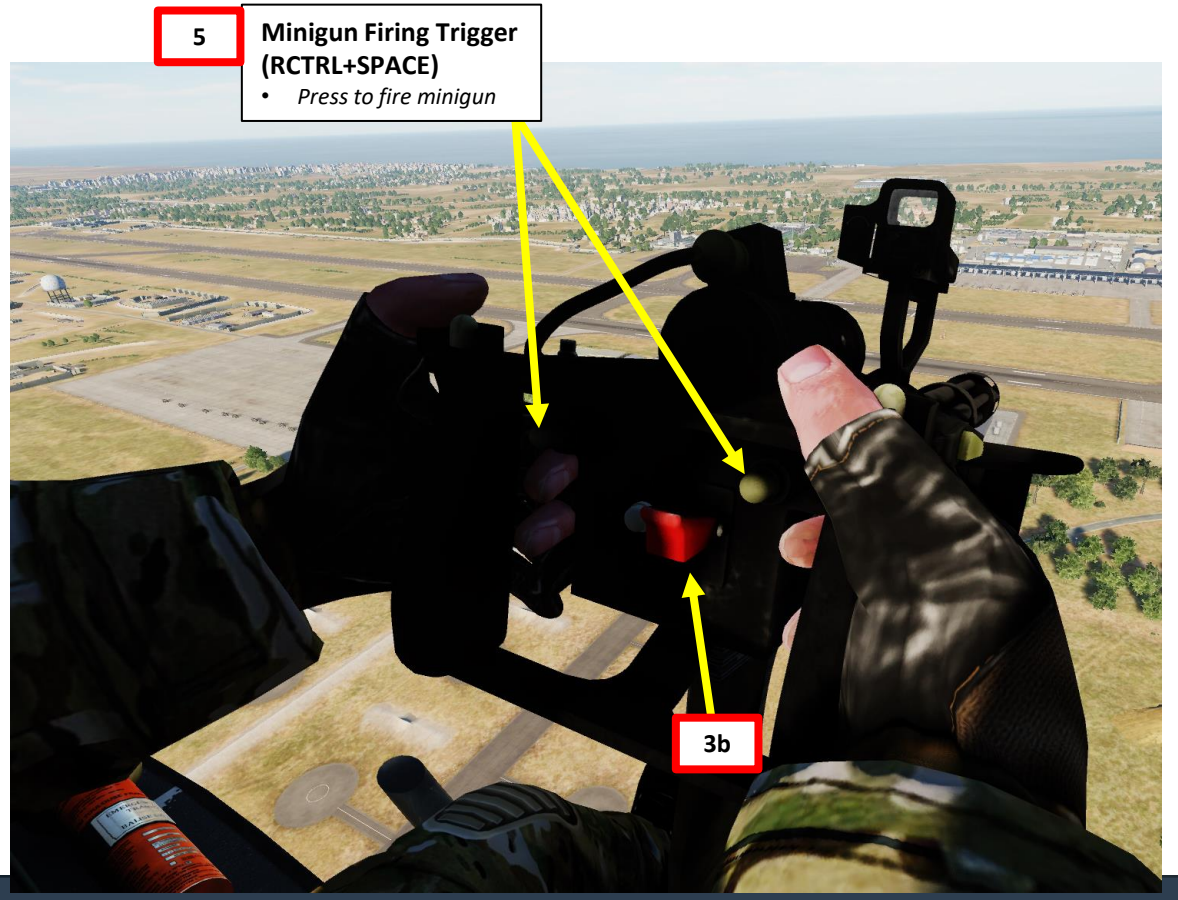
SA-342 Minigun Only

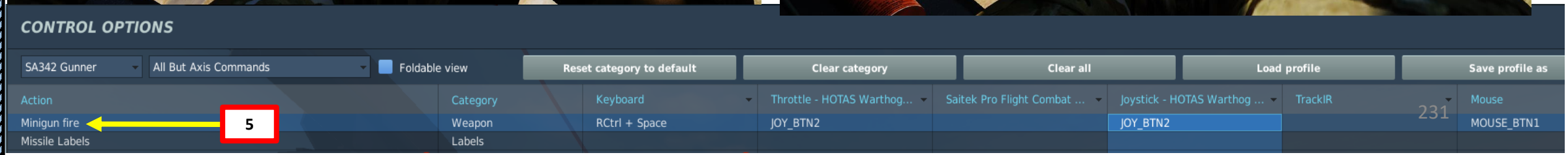
4 – SA-342 MINIGUN Weapon Employment

4.1 – M-134 Minigun (7.62 mm)

1. Select Gunner by pressing "3"
2. Flip Minigun Safety Cover Guard – UP
3. Set Minigun Safety Switch Toggle – UP (ARMED) (LSHIFT+SPACE)
4. By default, the gun will follow where you look in trackIR.
5. Fire minigun using the Minigun Firing Trigger ("RCTRL+SPACE" binding available in the SA-342 GUNNER Options Control menu or your left mouse button.







4 – SA-342 MINIGUN Weapon Employment

4.1 – M-134 Minigun (7.62 mm)

SA-342 Minigun Only


armée de TERRE

1 – Countermeasures
1.1 – Introduction

Countermeasures are very simple to use in the Gazelle. In most military aircraft, you have two countermeasure types at your disposal: flares and chaff. We will explore together what is used against what, and how.

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

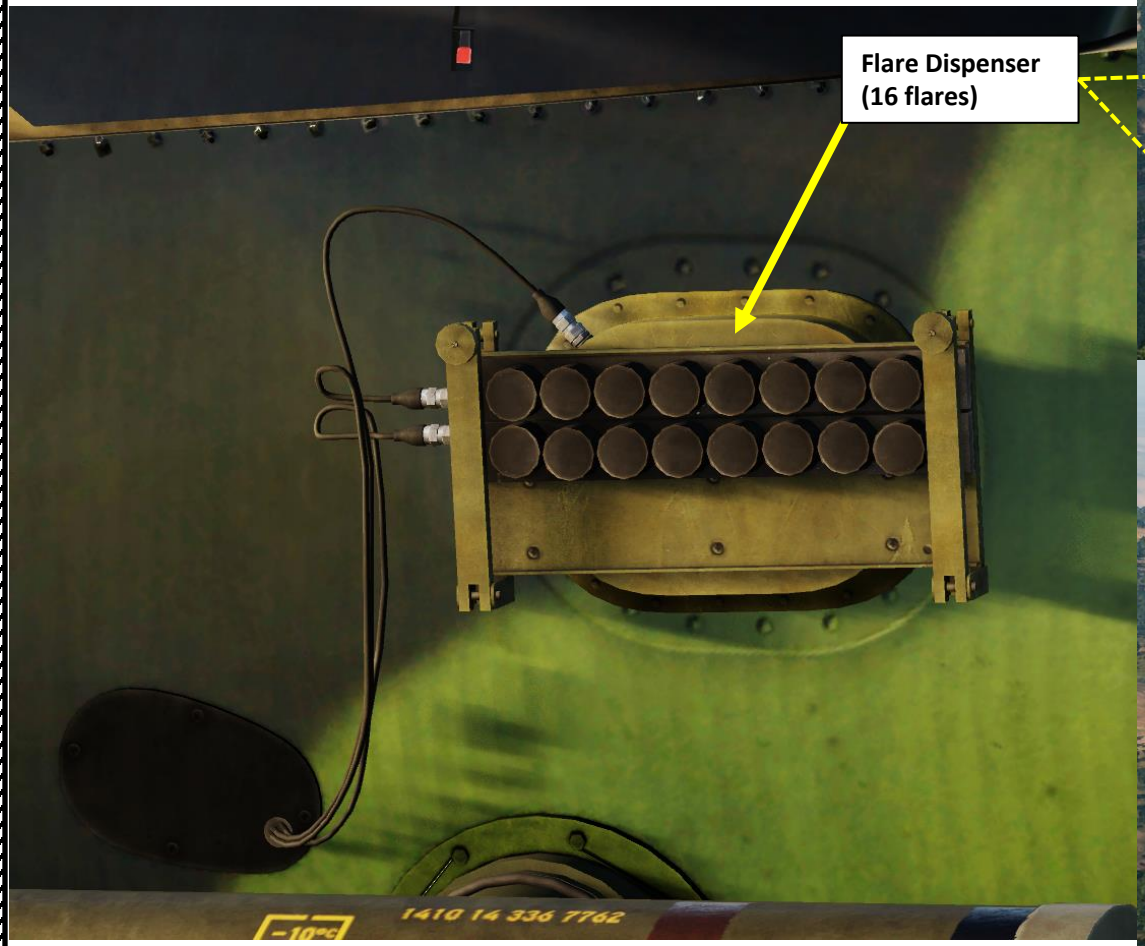
- **Flares** are used against missiles that track heat (infrared/IR) signatures. Instead of going for the heat signature generated by your engines, a missile will go for a hotter heat source like flares.

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

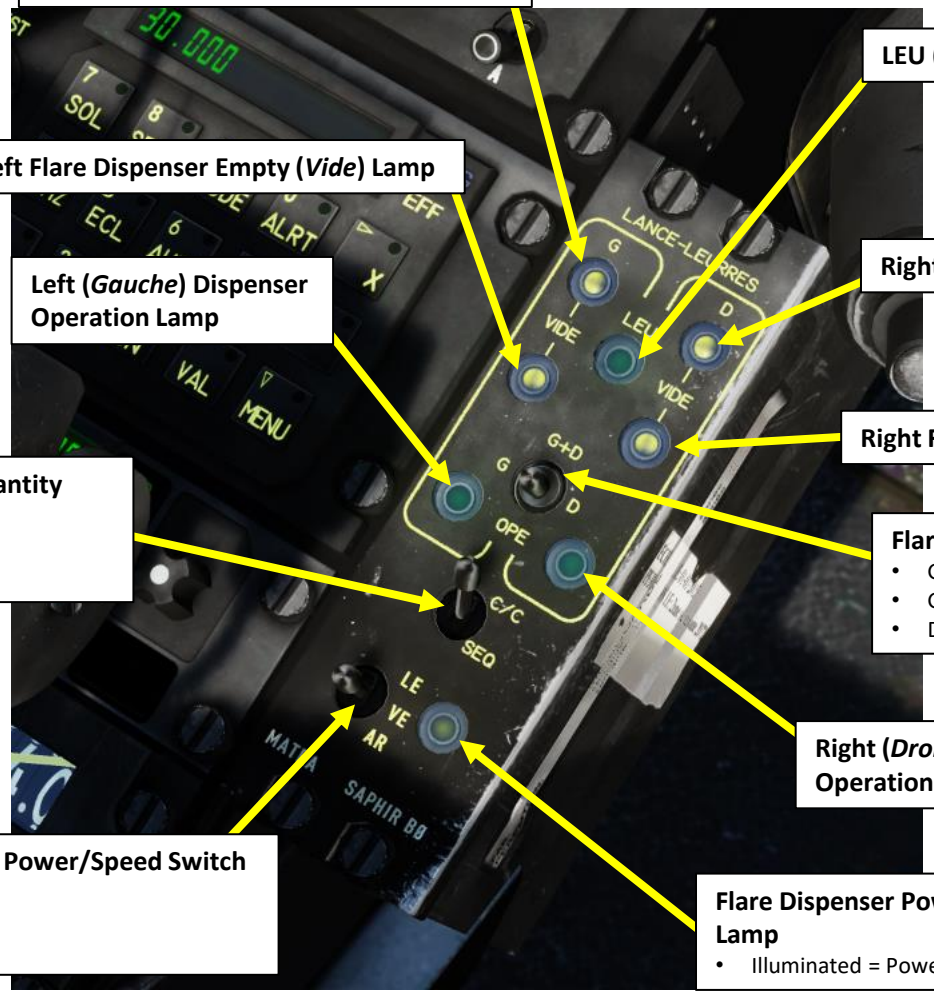
The SA-342 Gazelle only carries flares.

1 – Countermeasures
1.1 – Introduction

The Gazelle is equipped with two flare dispensers of 16 flares each, for a total of 32 flares.



1 – Countermeasures
1.2 – Controls



Left Flare Dispenser Low Quantity Lamp

LEU (*Leurres* = Flares) Available Lamp

Left Flare Dispenser Empty (*Vide*) Lamp

Right Flare Dispenser Low Quantity Lamp

Left (*Gauche*) Dispenser Operation Lamp

Flare Dispenser Launch Quantity Selector
- C/C = Single
- SEQ = Sequence

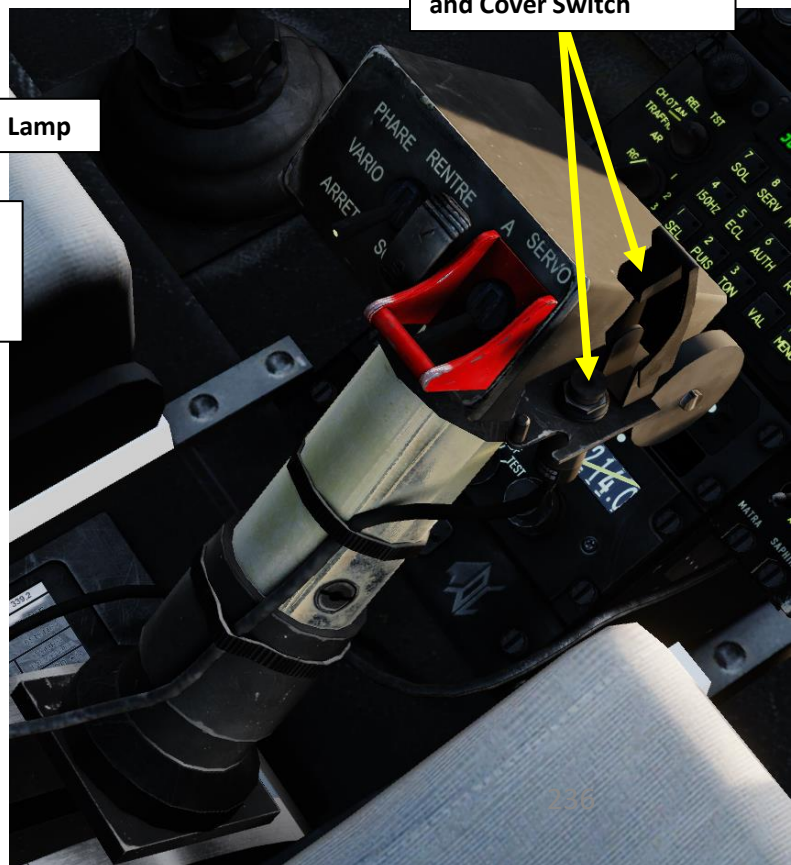
Right Flare Dispenser Empty (*Vide*) Lamp

Flare Dispenser Selector Switch
- G = *Gauche* = Left
- G+D = BOTH
- D = *Droite* = Right

Right (*Droite*) Dispenser Operation Lamp

Flare Dispenser Launcher Power/Speed Switch
- *LE = Lent = Slow*
- *VE = Vite = Fast*
- *AR = Arrêt = OFF*

Flare Dispenser Power Lamp
- Illuminated = Power ON

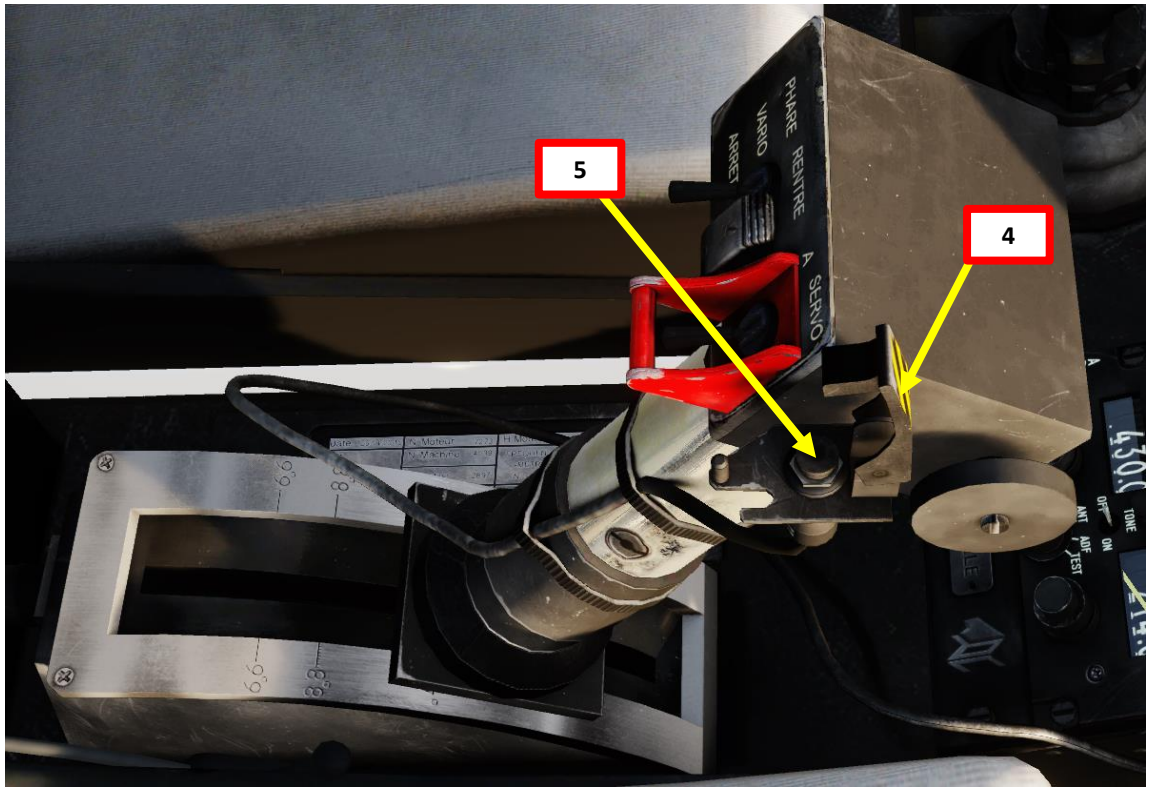


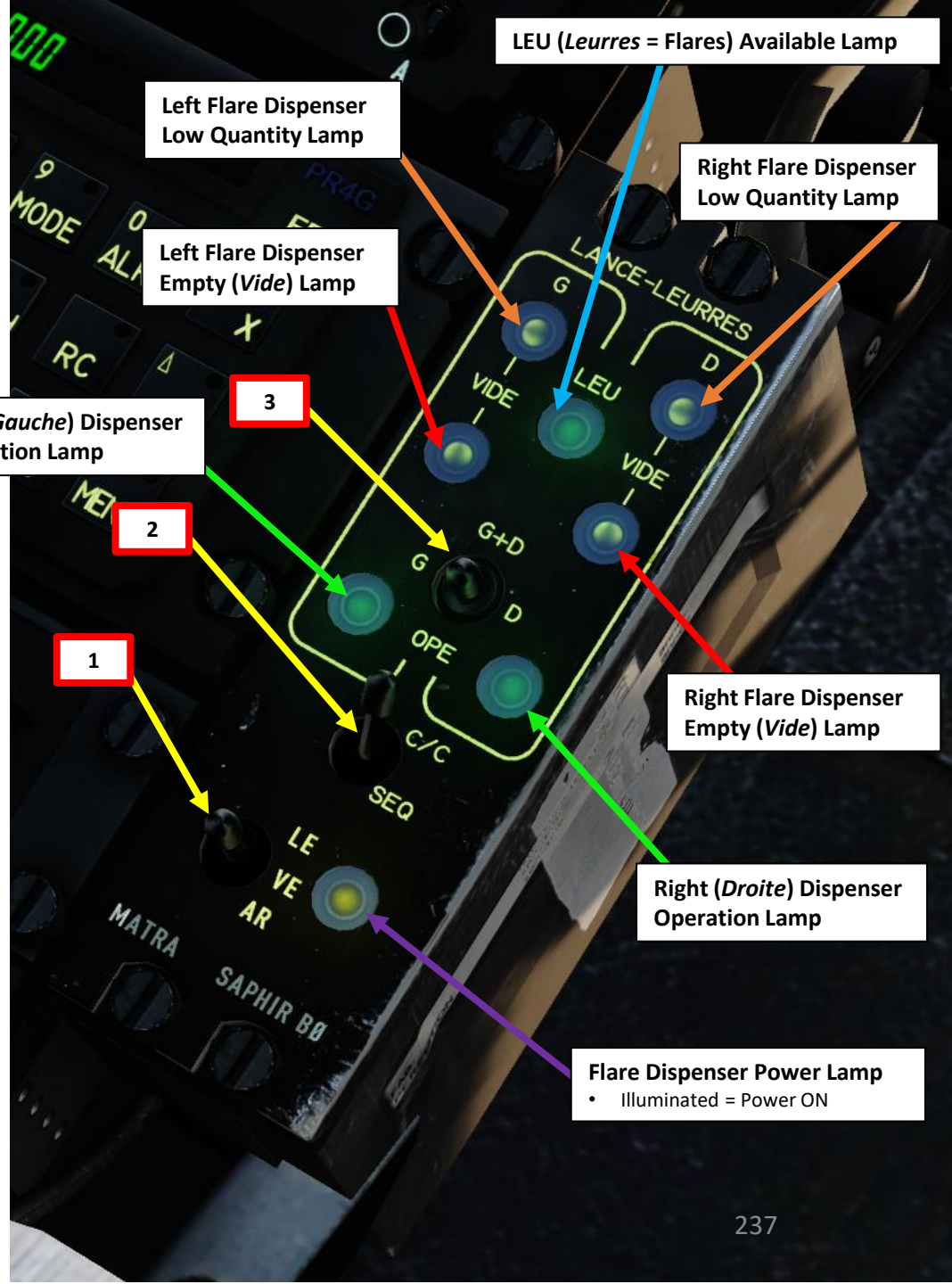
Flare Dispenser Button and Cover Switch

1 – Countermeasures
1.3 – Deploying Flares

1. Set your Flare Dispenser (*Lance-Leurres*) power switch to either LE (**Le**nt = Slow) or VE (**V**it**e** = 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. Set Flare Dispenser Cover Switch – UP
5. Press the "Start Dispensing" button ("Insert" binding) to launch flares.

It is good practice to launch countermeasures pre-emptively when performing attack runs. However, keep in mind that the Gazelle carries few countermeasures.

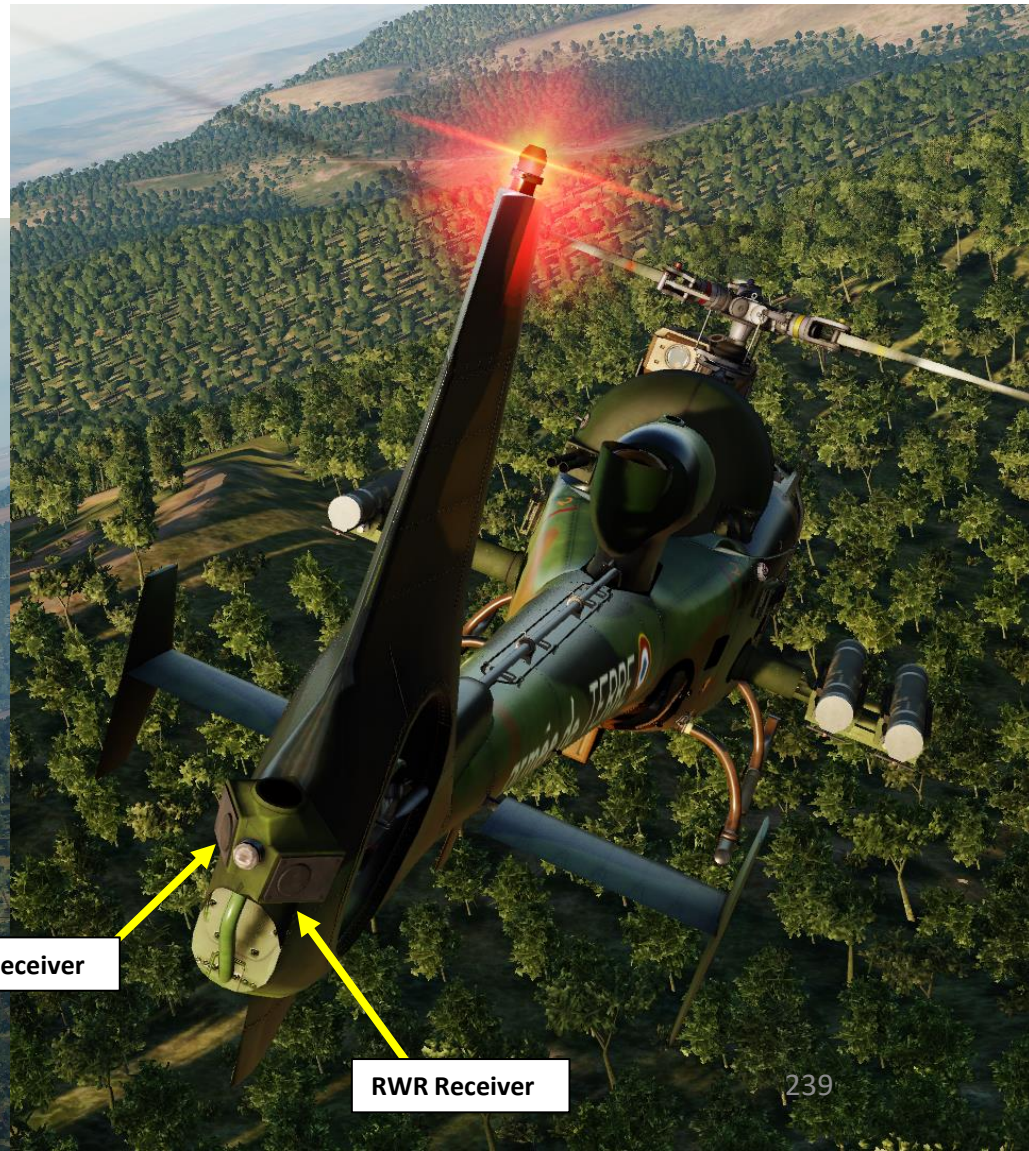




1 – Countermeasures
1.3 – Deploying Flares

2 – DRAX 33 RWR (Radar Warning Receiver)

The DRAX 33 Radar Warning Receiver (RWR) system is used to detect radar emitters. The system has four detectors installed behind the fenestron and on each side of the canopy.



2 – DRAX 33 RWR (Radar Warning Receiver)

To power on RWR, set DRAX33 RWR (Radar Warning Receiver) Mode Switch – ON (MIDDLE).

DRAX 33 RWR (Radar Warning Receiver) Display

RWR Brightness Control Knob

RWR Maintenance Page Button (not simulated)

RWR Audio Volume Control Knob

RWR Marker Button (not simulated)

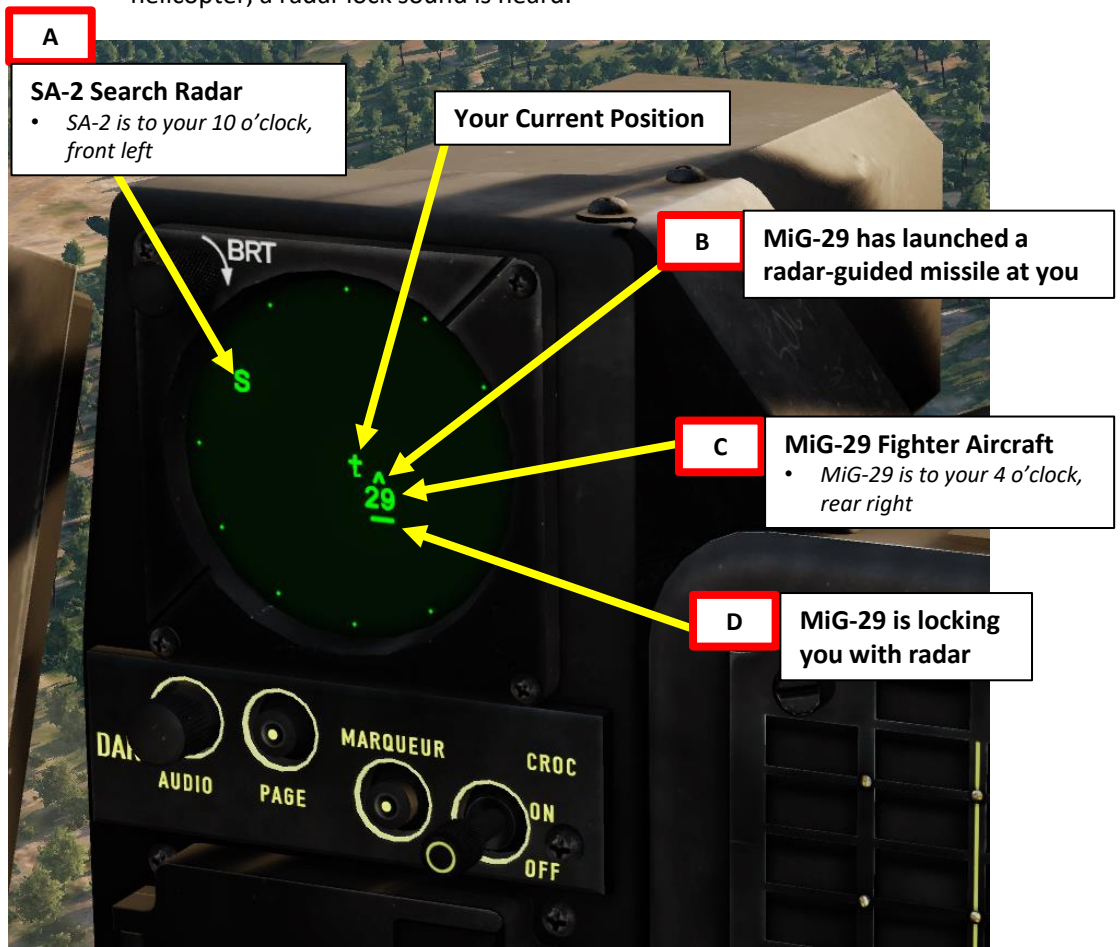
RWR Mode switch

- *CROC (UP) – Memorizes radar locations spotted during flight- Not Simulated*
- *ON (MIDDLE)*
- *OFF (DOWN)*

2 – DRAX 33 RWR (Radar Warning Receiver)

The RWR is able to detect a wide spectrum of radar threats.

A. **Low Priority Emitter Symbols**: Each time a new emitter is detected, a search sound is heard. Emitters with low priority are located away from the center of the display screen.
B. **"^" Missile Launch Symbol**: When displayed, this symbol is accompanied by a continuous missile launch warning sound.
C. **High Priority Emitter Symbols**: Emitters with high priority are displayed near the center of the display screen.
D. **"_" Radar Lock Symbol**: The first time a radar emitter has a radar lock on the helicopter, a radar lock sound is heard.



Airborne Radars:

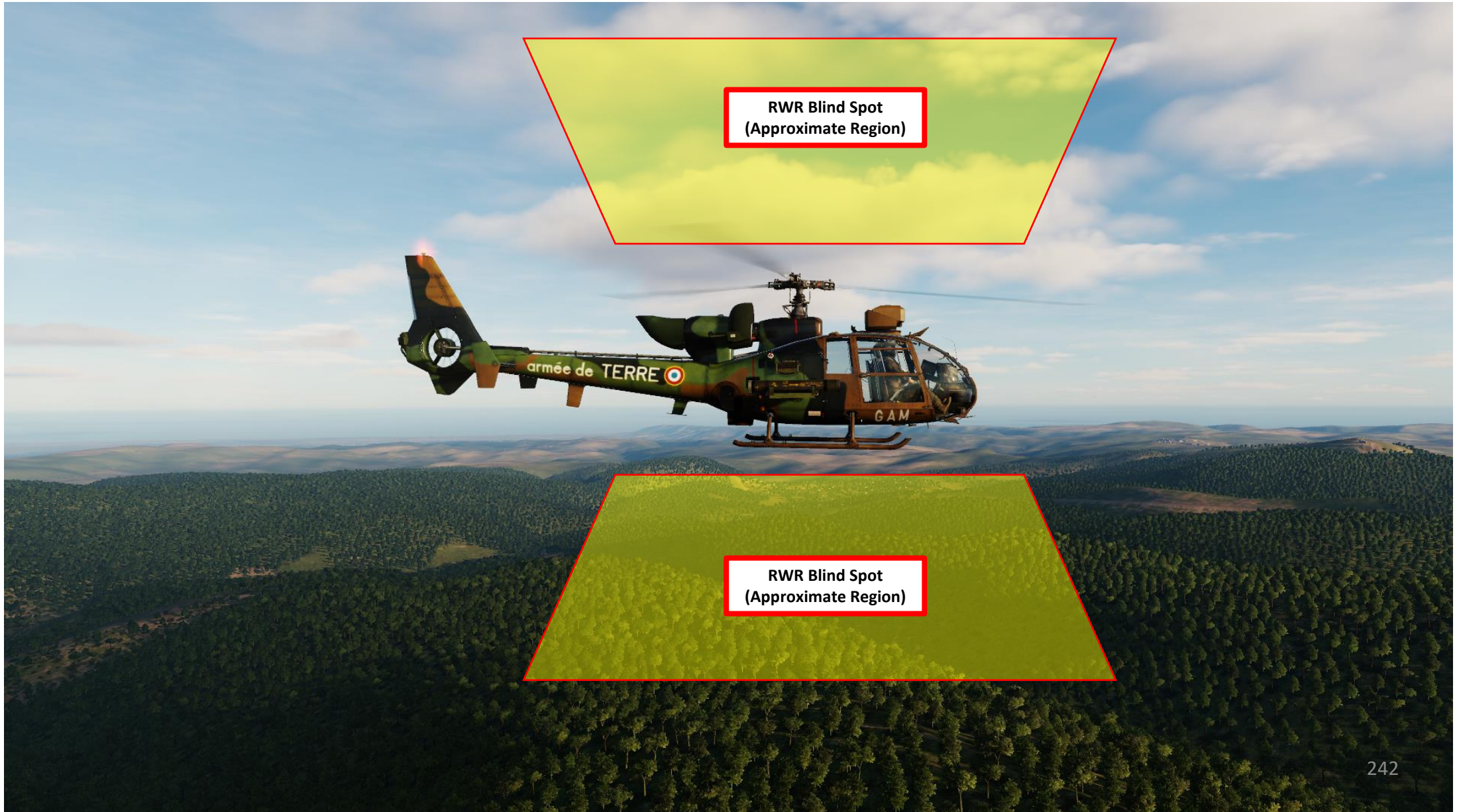
E3	E-3A AWACS
E2	E-2C AWACS
50	A-50/KJ-2000 AWACS
19	MiG-19
21	MiG-21
23	MiG-23
25	MiG-25
29	MiG-29, Su-27, Su-33
30	Su-30
31	MiG-31
34	Su-34
M2	Mirage 2000
F2	Tornado ('U' in SA342)
F4	F-4
F5	F-5
14	F-14
15	F-15
16	F-16
18	F/A-18
JF	JF-17 ('U' in SA342)
U	Unknown
L	Laser illumination
M	Missile detected by Missile Warning System (MWS)

Ground Radars:

A	Gepard, ZSU-23-4, M163 Self Propelled Anti-Aircraft guns
2	SA-2 (S-75)
3	SA-3 (S-125)
6	SA-6 (Kub)
S6	2S6 "Tunguska"
7	HQ-7_LN
8	SA-8 Osa
10	SA-10 "Flap Lid" tracking radar
11	SA-11/17 tracking radar (Buk)
13	SA-13 (Strela-10)
15	SA-15 Tor
40	LHA_Tarawa
CS	SA-10 "Clam Shell" low altitude search radar
BB	SA-10 "Big Bird" search radar
SD	SA-11/17 "Snow Drift" search radar
DE	"Dog Ear" search radar
RO	Roland
P	Patriot
HA	I-HAWK
HQ	HQ-7_ST
SW	CV_1143
S	Early Warning or Ground Control Intercept Radar

2 – DRAX 33 RWR (Radar Warning Receiver)

The Gazelle's RWR suffers from blind spots above and below the helicopter.



Radio Systems – Overview

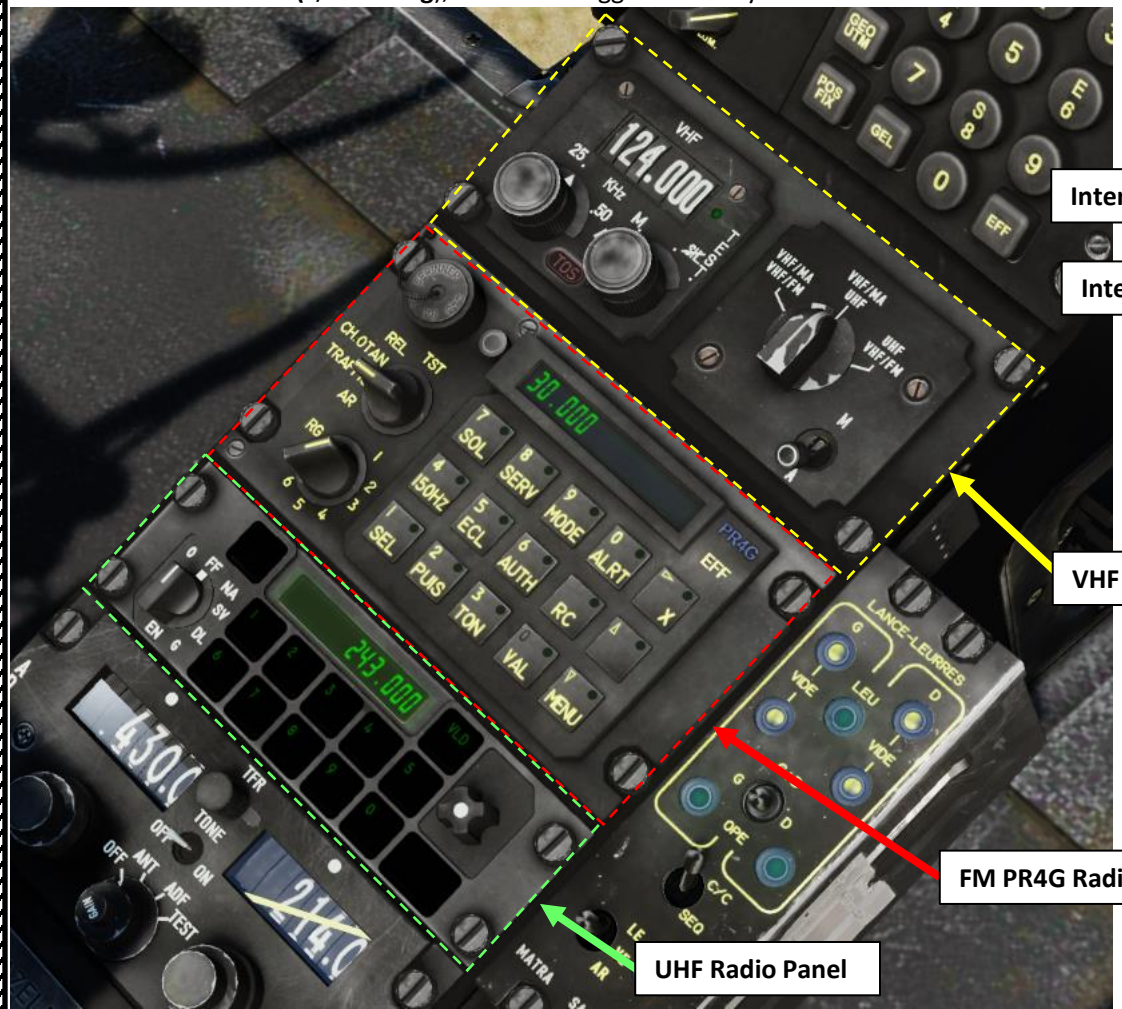
You have three radios on your central console.

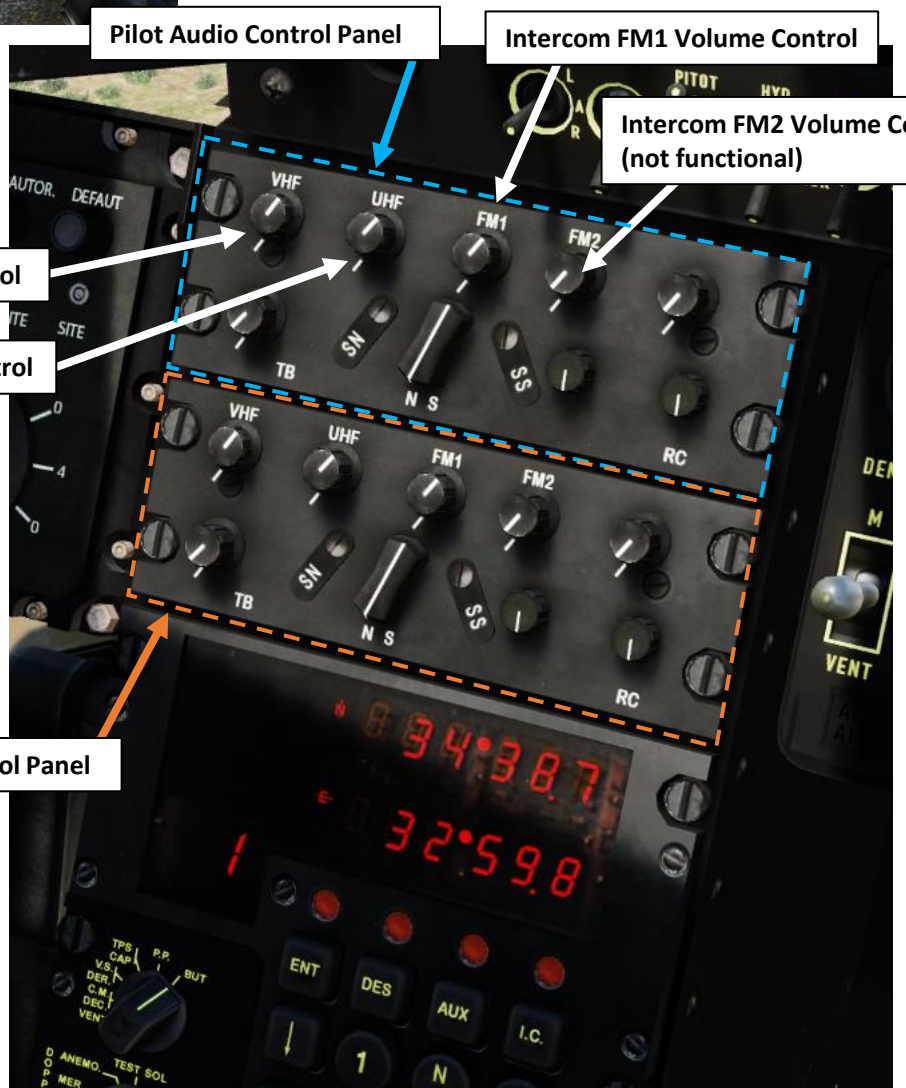
- The **UHF radio** set is used for Air-to-Air primary communications.
- The **VHF AM radio** set is used for Air-to-Air alternate communications (and tower).
- The FM **PR4G radio** set is used for internal flight communications between crew members.

The Pilot and Copilot Audio Control Panels allow you to control the volume of various radio sets.

Radio transmission is performed by pressing IN the desired radio's **Intercom Volume Control**, then using the **Radio Button ("/" binding)**, which is a trigger on the cyclic.

UHF Radio Frequencies: 225.0 – 399.9 MHz Band
VHF AM Radio Frequencies: 118.000 – 143.975 MHz Band
FM PR4G Radio Frequencies (8 Preset Channels): 20 – 60 MHz Band

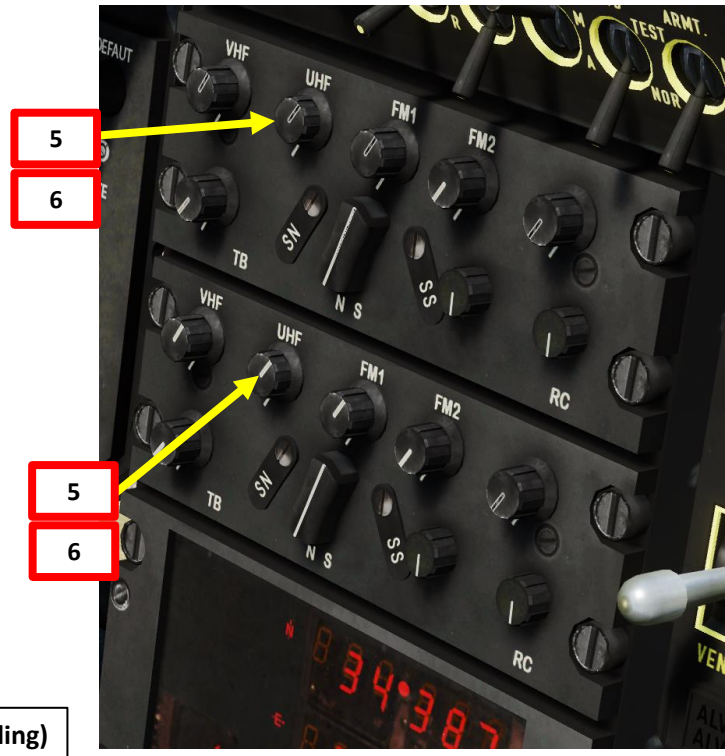




UHF Radio Tutorial

UHF Radio Frequencies: 225.0 – 399.9 MHz Band

1. Set UHF Power knob – FF (Fixed Frequency).
2. A BIT (Built-In Test) will be performed for about 15 sec; frequency digits will flash during the BIT.
3. Set UHF Frequency by entering “251000” for a frequency of 251.000 MHz
4. Press VLD (Validation) button.
5. Adjust UHF Radio Volume on Pilot and Copilot Intercom Panel.
6. Press Pilot’s and Co-Pilot’s Intercom UHF Volume Control – IN. This will select the UHF Radio for transmission.
7. Use the Radio Button (“/” binding) to transmit.



Radio Button (“/” binding)
(Trigger in front)

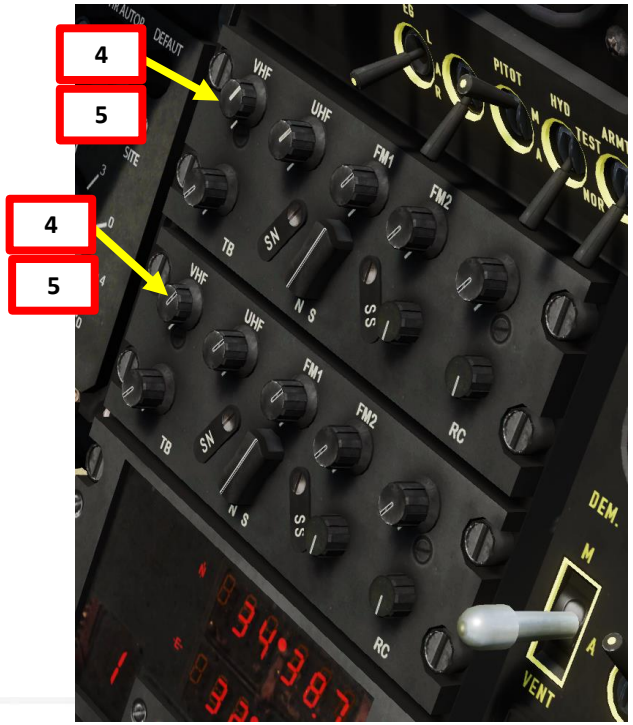
VHF AM Radio Tutorial

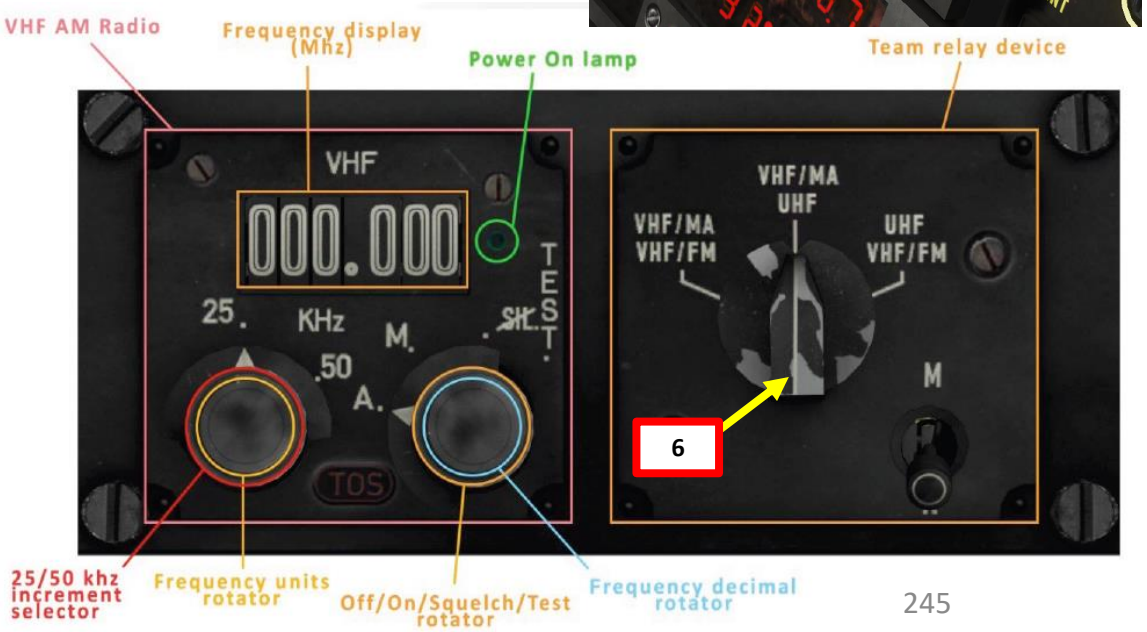
VHF AM Radio Frequencies: 118.000 – 143.975 MHz Band

1. Set VHF AM radio set Power knob – ***M****ARCHE/*ON (Click outer knob).
2. Confirm that VHF Radio Power Light is illuminated
3. Tune VHF AM radio frequency using tuning knobs
4. Adjust VHF Radio Volume on Pilot and Copilot Intercom Panel by turning the VHF Volume knobs.
5. Press Pilot's and Co-Pilot's Intercom VHF Volume Control – IN. This will select the VHF AM Radio for transmission.
6. *Note: The Team Relay Device is not simulated.*
7. Use the Radio Button ("/" binding) to transmit.

7

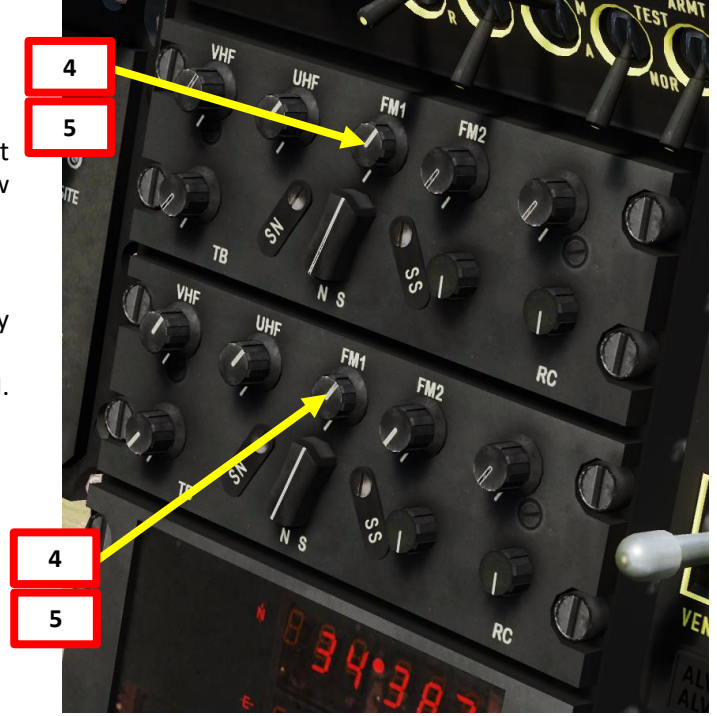
Radio Button ("/" binding)
(Trigger in front)



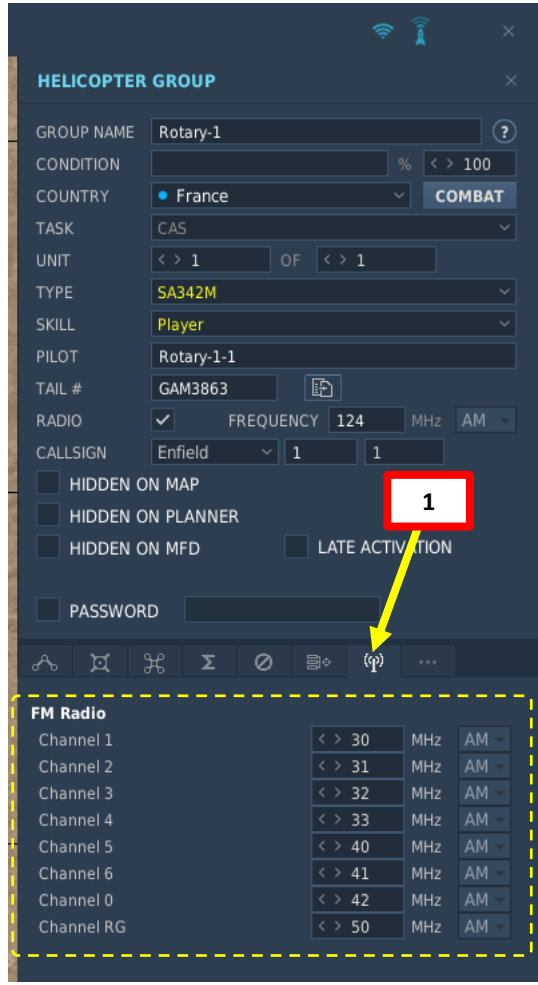


FM PR4G Radio Tutorial

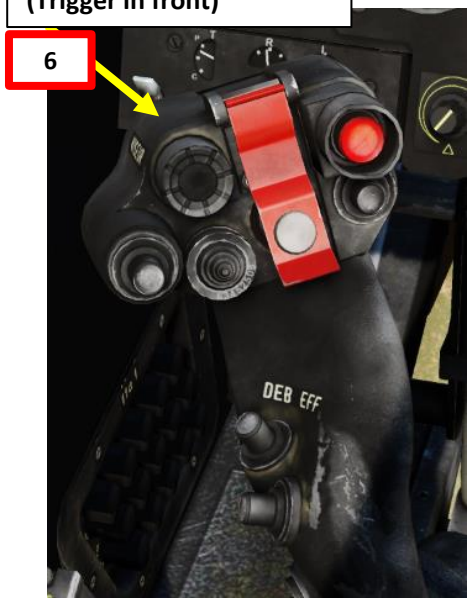
1. The FM PR4G Radio has 8 preset channels which are set through the Mission Editor. Consult Mission Briefing to know these frequencies.
2. Set the FM radio mode to TRAFFIC.
3. Select which preset channel you want to transmit on.
4. Adjust FM Radio Volume on Pilot and Copilot Intercom Panel by turning the FM1 Volume knobs.
5. Press Pilot's and Co-Pilot's Intercom FM1 Volume Control – IN. This will select the FM Radio for transmission.
6. Use the Radio Button ("/" binding) to transmit.



FM PR4G Radio Frequencies (8 Preset Channels): 20 – 60 MHz Band



Radio Button ("/" binding) (Trigger in front)



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

SECTION SUMMARY

- 1 – Introduction
  - 1.1 – Navigation Basics
  - 1.2 – Navigation Equipment Overview
  - 1.3 – Magnetic Variation

- 2 – NADIR System
  - 2.1 – Introduction
  - 2.2 – Power-Up Sequence
  - 2.3 – Navigation Tutorial 1: How to Select & Track a *But* (Waypoint)
  - 2.4 – Navigation Tutorial 2: How to Create & Track a *But* (Waypoint)
  - 2.5 – Waypoint Creation Methods

- 3 – ADF (Automatic Direction Finder) Tutorial

- 4 – EFB (Electronic Flight Bag) Tablet

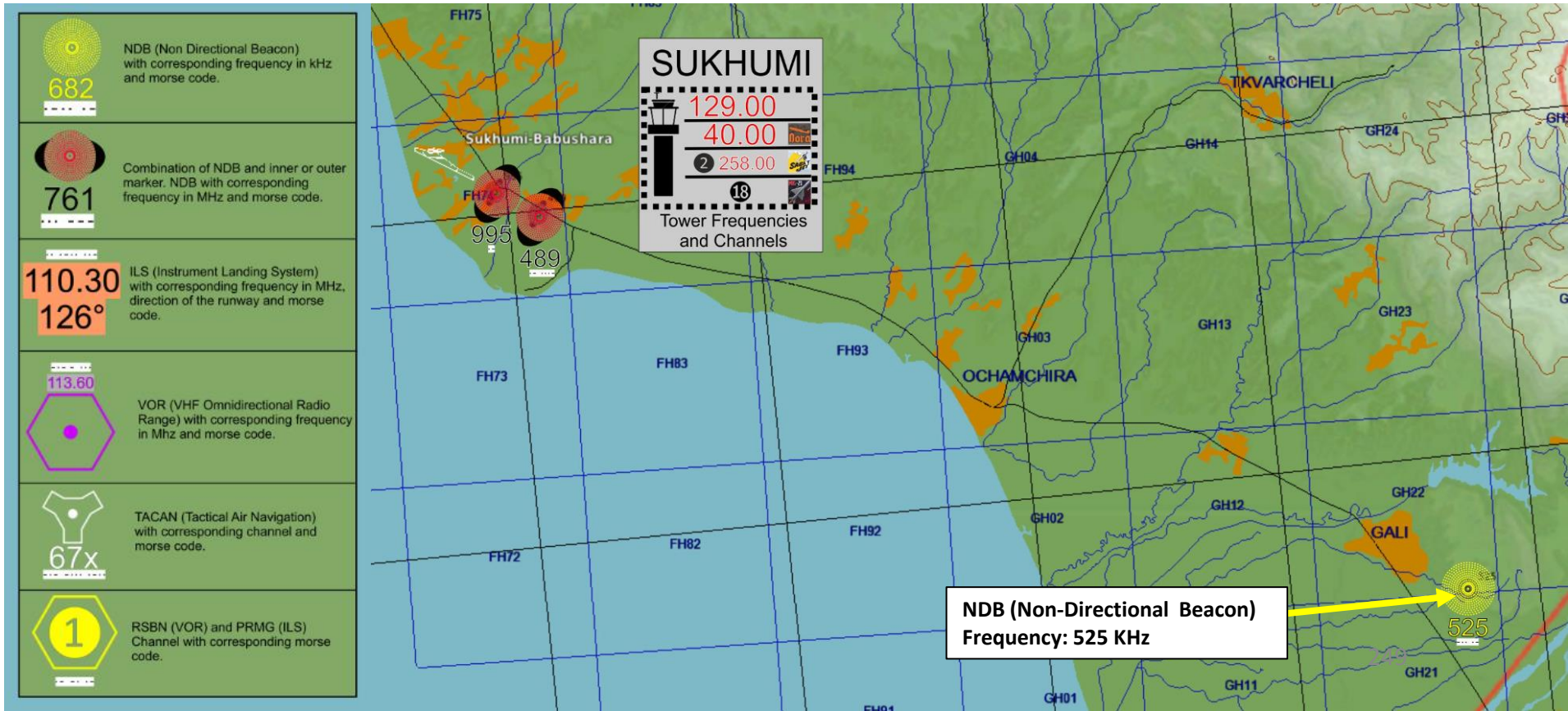
1 – Introduction

1.1 – Navigation Basics

Navigation is an extensive subject. You can check chapter 16 of FAA manual for more details on navigation.
LINK: https://www.faa.gov/sites/faa.gov/files/18_phak_ch16.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.

Lino_Germany created a **wonderful** HD map containing all NDB stations and VOR/ILS stations scattered throughout the map. Use this to know the NDB and VOR channel frequencies you need to set.
LINK: https://drive.google.com/open?id=0B-uSpZROuEd3YWJBUmZTazBGajQ&authuser=0



1 – Introduction
1.2 – Navigation Equipment Overview

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.
- A **Standby Magnetic Compass**: used in case of NADIR failure
- **EFB (Electronic Flight Bag) Tablet**: this device uses GPS information to provide the pilot with position, ground speed, heading and altitude information.

1 – Introduction
1.2 – Navigation Equipment Overview

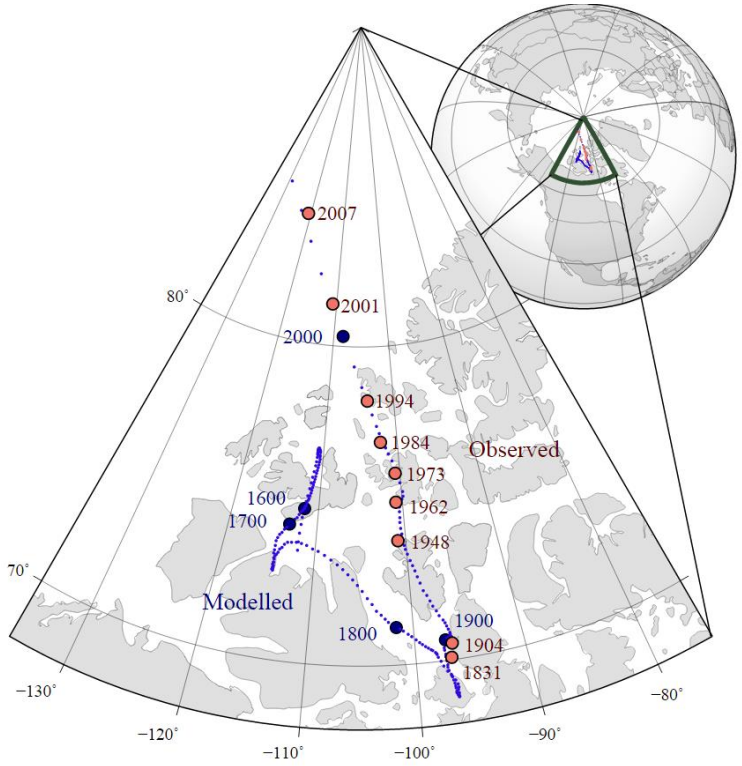
1 – Introduction
1.3 – Magnetic Variation

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

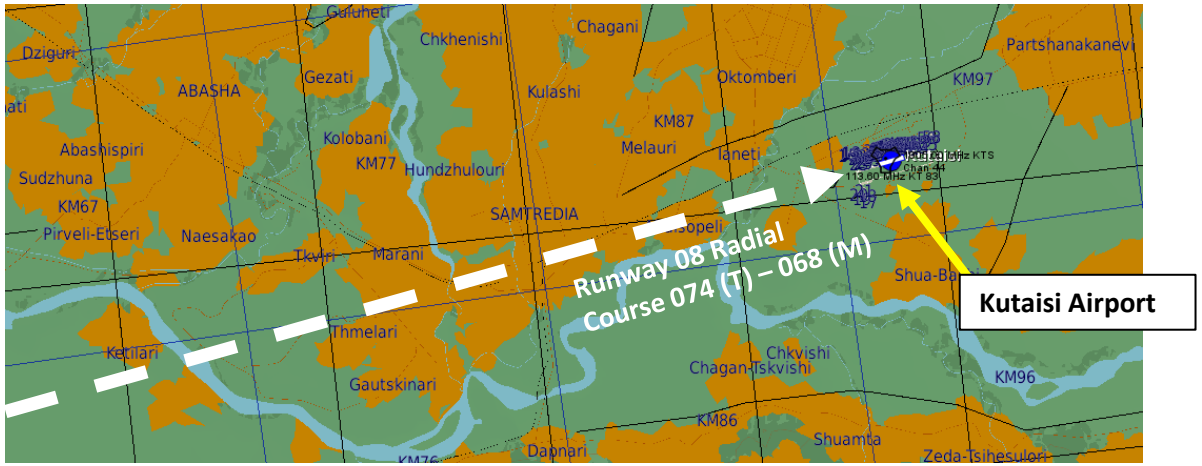
True Heading = Magnetic Heading + Magnetic Variation

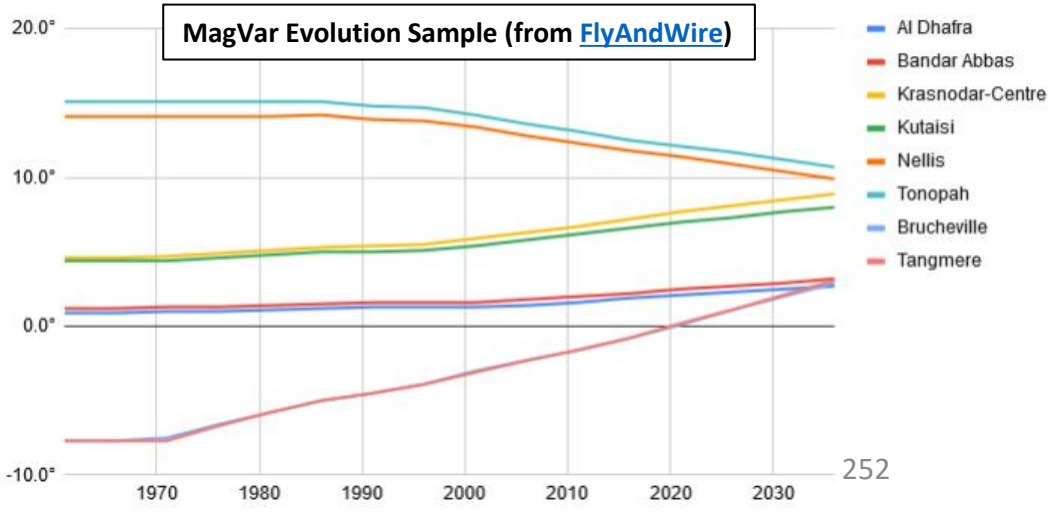
As an example, if the runway heading that you read on the F10 map in Kutaisi is 074 (True Heading), then the input to your magnetic compass course should be 074 subtracted with the Magnetic Variation (+6 degrees), or 068. You would need to enter a course of 068 (M) on the Radio-Compass.

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



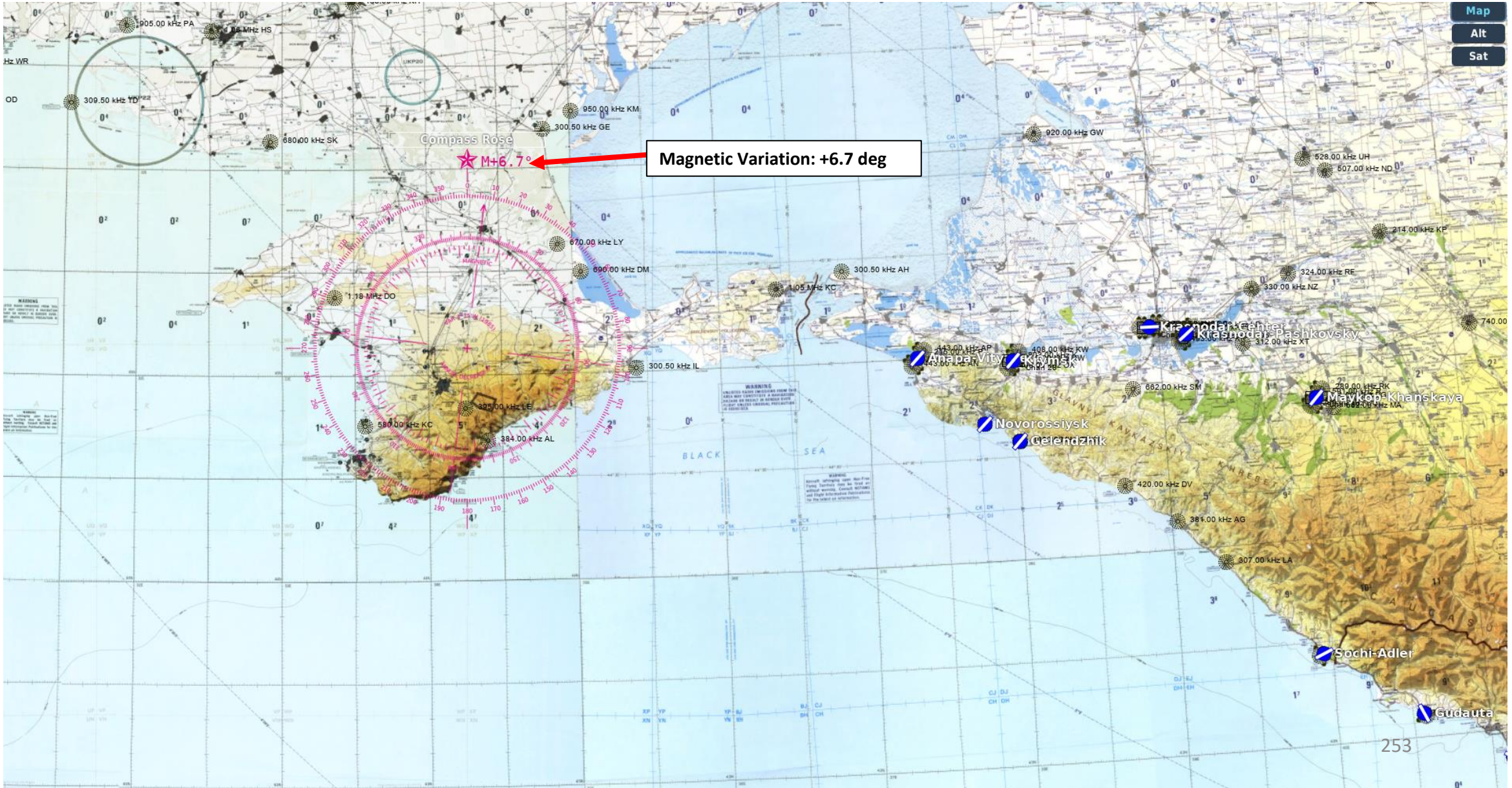
The movement of Earth's north magnetic pole across the Canadian arctic, 1831–2007.





1 – Introduction
1.3 – Magnetic Variation

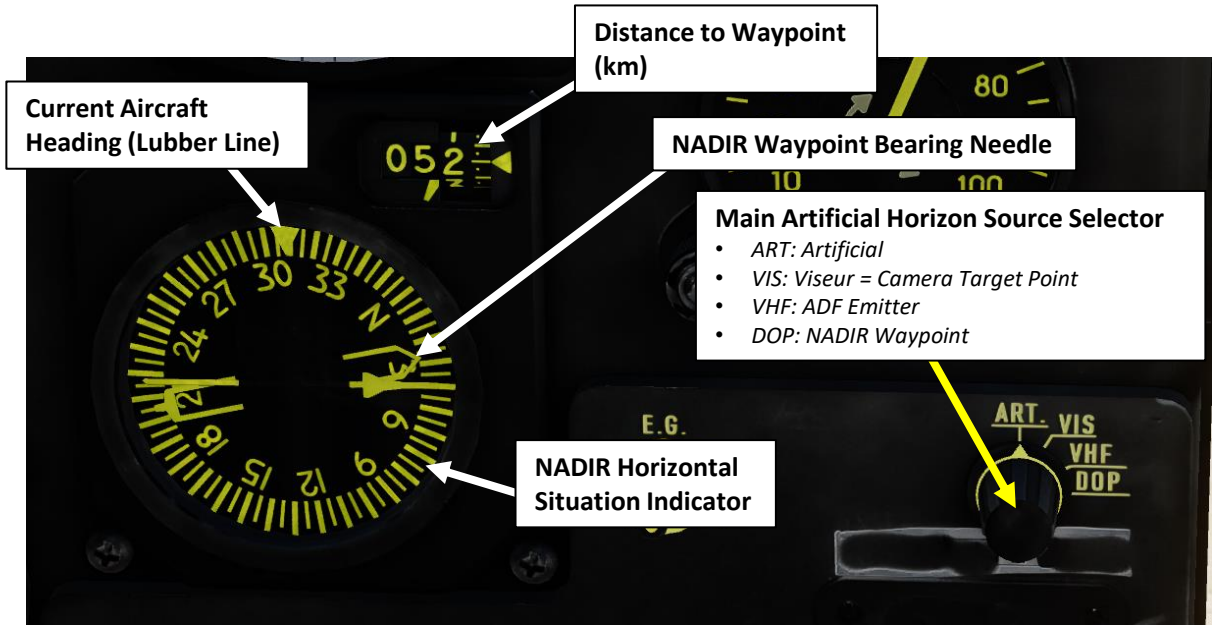
Checking the magnetic variation is now very easy: you can access it directly from the F10 map, shown with the Compass Rose.



2 – NADIR System
2.1 – Introduction

The NADIR system provides information derived from Doppler, gyrocompass, vertical gyro, airspeed sensor and navigation aid system data.

The NADIR database can store a **flight plan with up to 9 route points**, also called "*Buts*" or Waypoints. The active (selected) waypoint distance and direction are displayed on the NADIR Horizontal Situation Indicator.

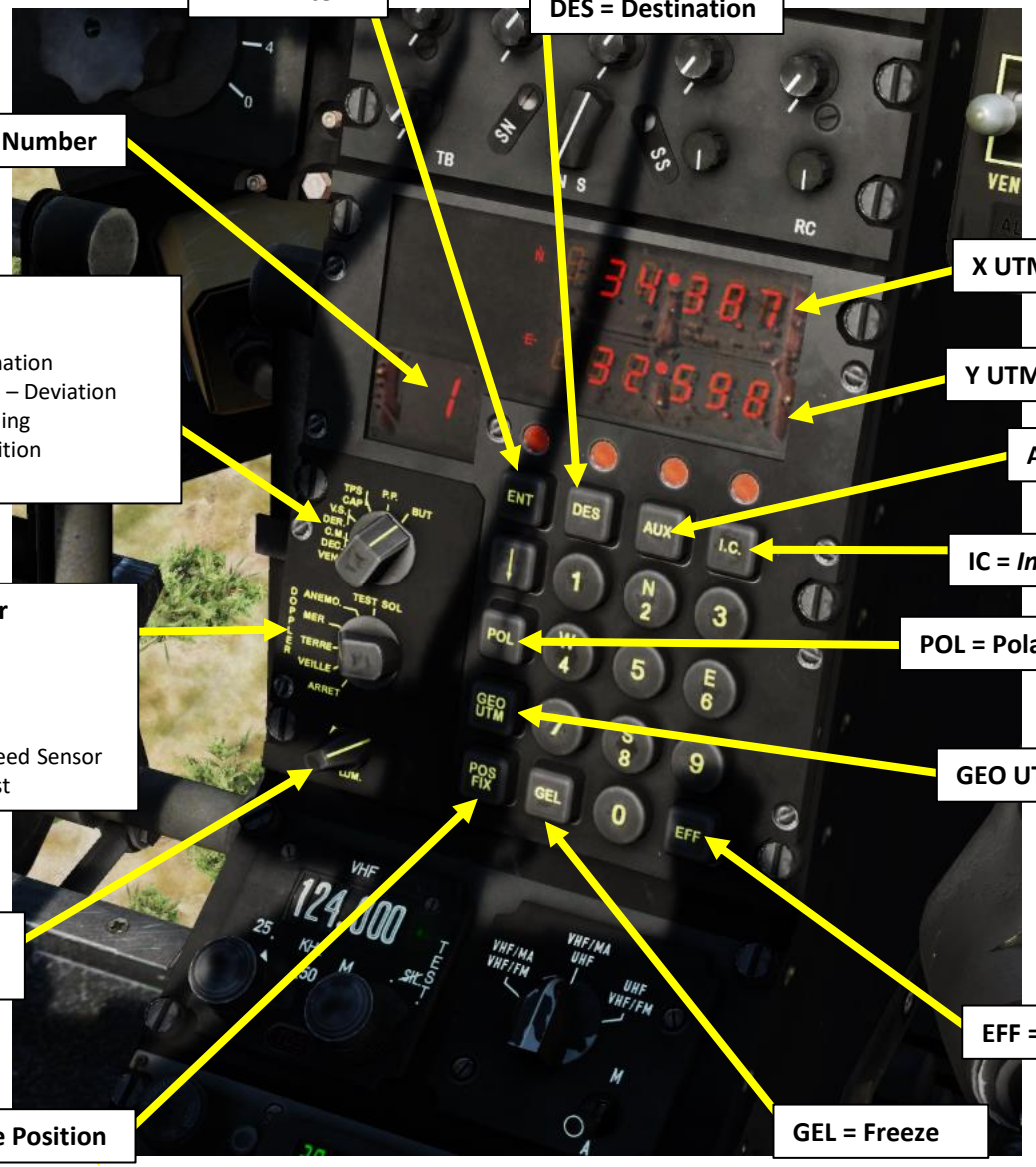


NADIR Tutorials by xxJohnxx

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

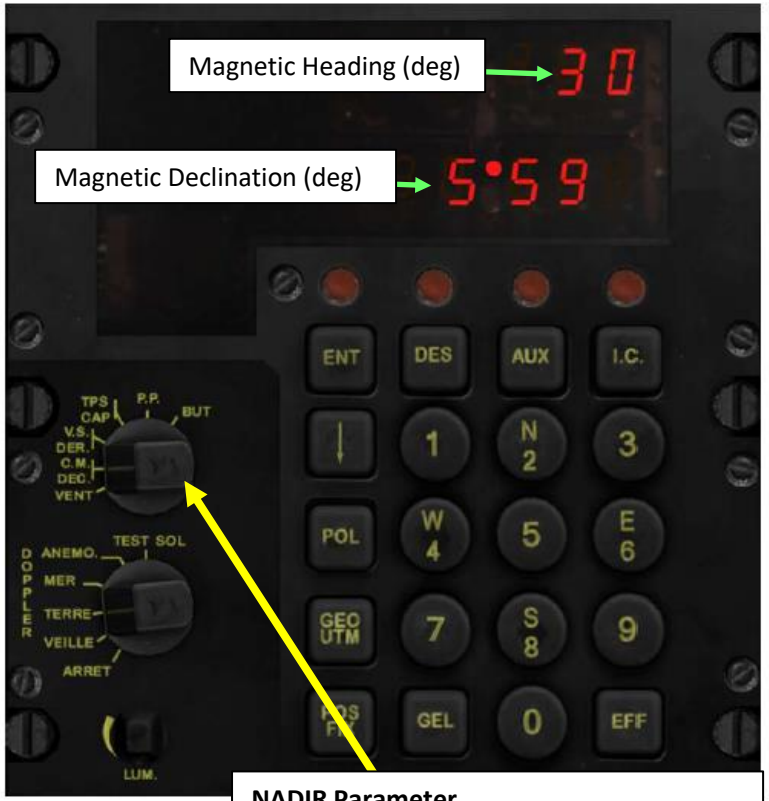
2 – NADIR System
2.1 – Introduction

Here is a breakdown of the NADIR Control Panel functions.



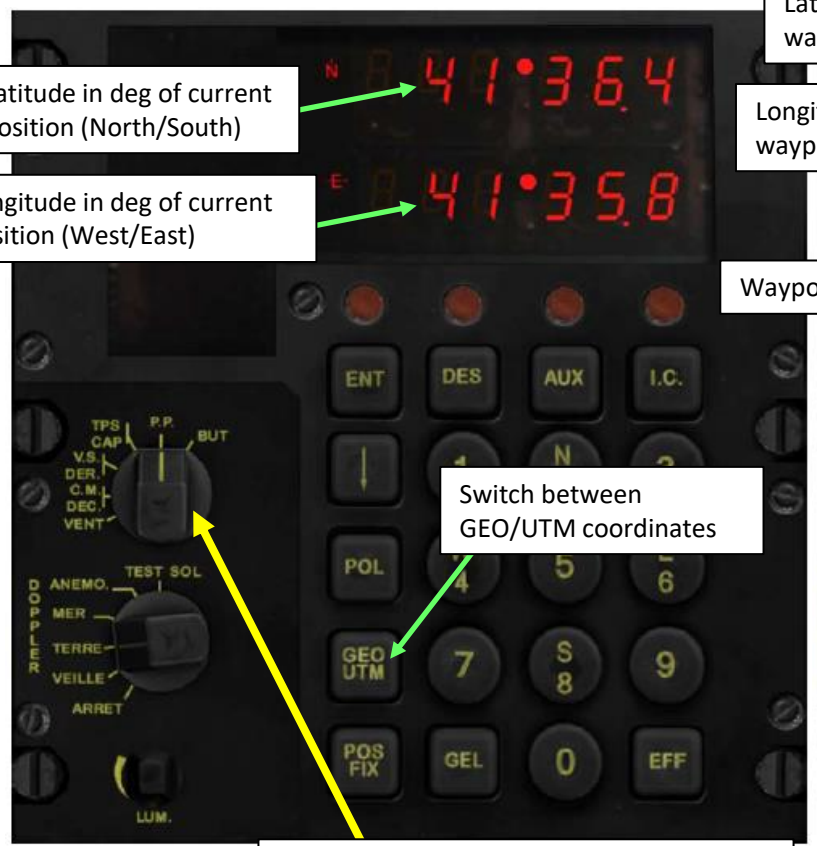
2 – NADIR System
2.1 – Introduction

Here is a breakdown of the NADIR parameters.



2 – NADIR System
2.1 – Introduction

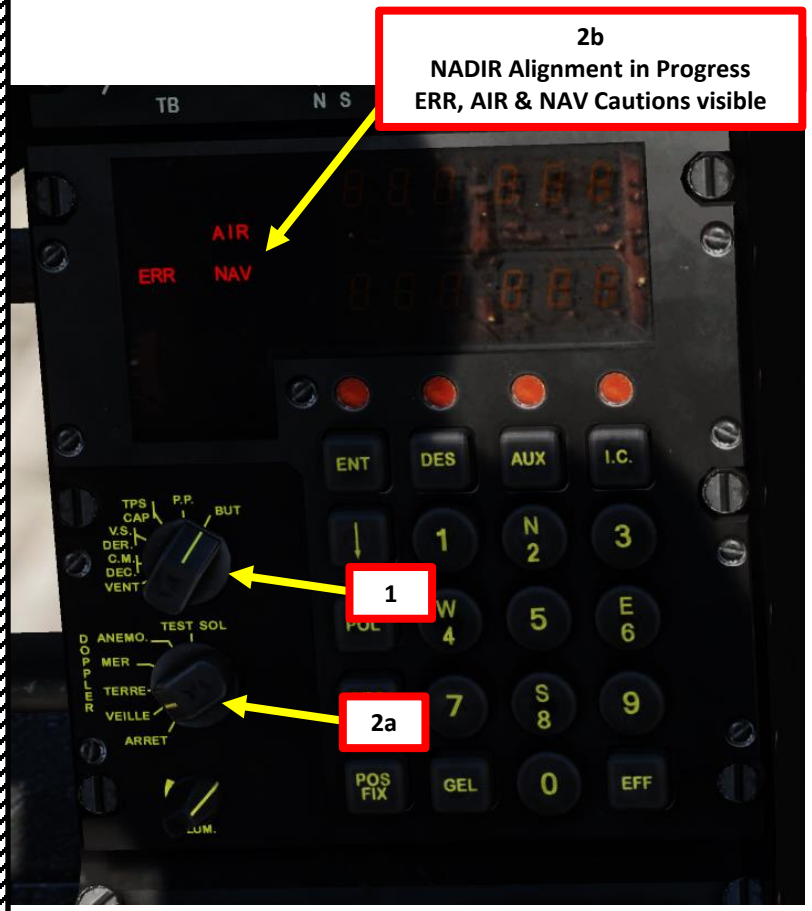
Here is a breakdown of the NADIR parameters.

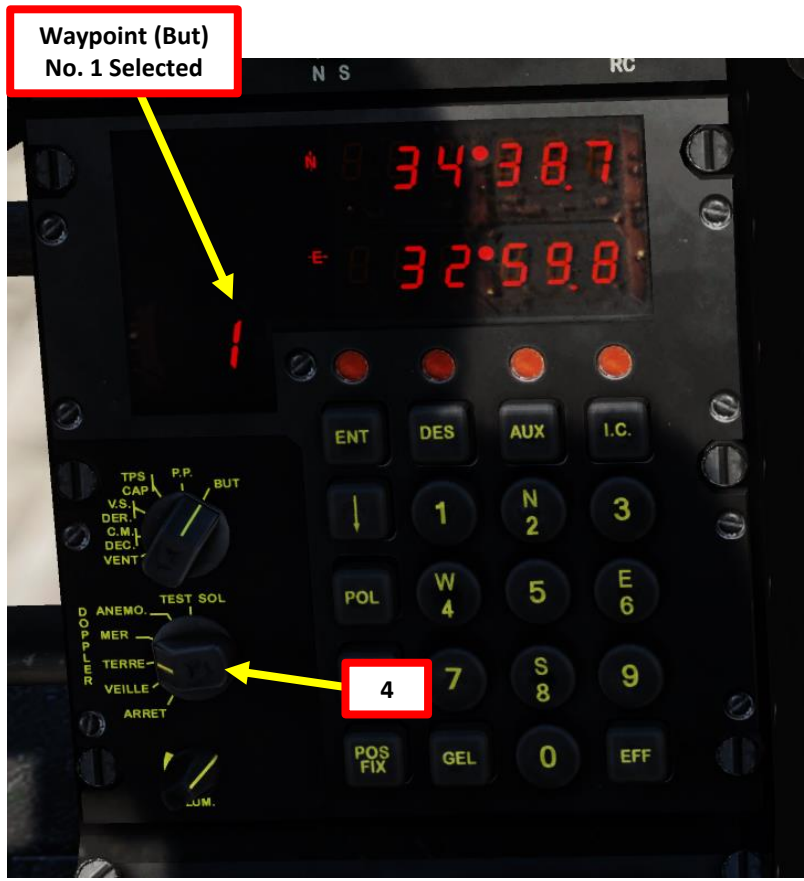


2 – NADIR System
2.2 – Power-Up Sequence

Note: If a mission creator 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.

1. Set NADIR parameter to BUT to select waypoints.
2. Set NADIR mode to VEILLE (Standby) and wait for completion of alignment phase.
3. AIR caution will disappear after 40 s, PANNE and ERR NAV cautions will disappear after 70 s.
4. Set NADIR Mode to TERRE (Ground).
5. Once NADIR is started, we can select what we want to monitor.

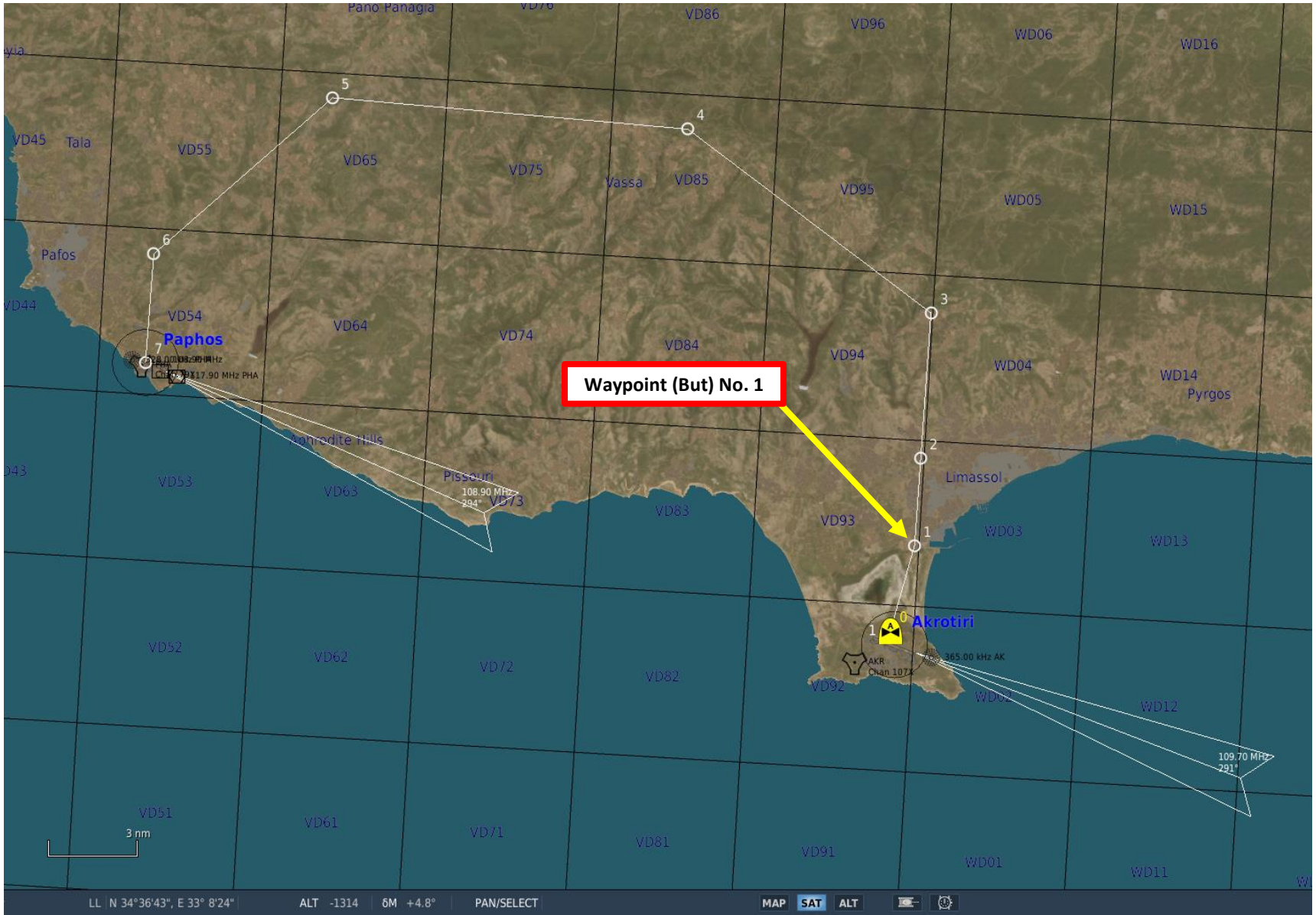




2 – NADIR System

2.3 – Navigation Tutorial 1: How to Select & Track a *But* (Waypoint)

In this tutorial, we want to track Waypoint (But) No. 1. Its coordinates are already entered in the NADIR database.



2 – NADIR System

2.3 – Navigation Tutorial 1: How to Select & Track a *But* (Waypoint)

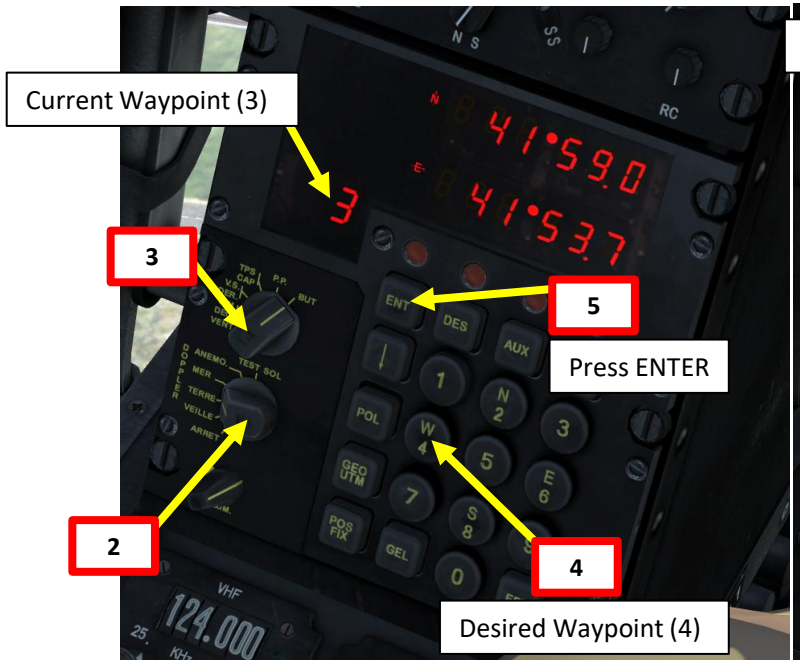
1. Select TERRE (Ground) NADIR Mode.
2. Select BUT (Waypoint) NADIR Parameter.
3. Select the Waypoint Number we want to track with the NADIR keyboard (1).
4. Set Main Artificial Horizon Source Selector – DOPPLER.
5. You can track the Waypoint/But using:
    a) The pointy end of NADIR needle on NADIR Horizontal Situation Indicator.
    b) The ADI (Attitude Director Indicator) course steering bar

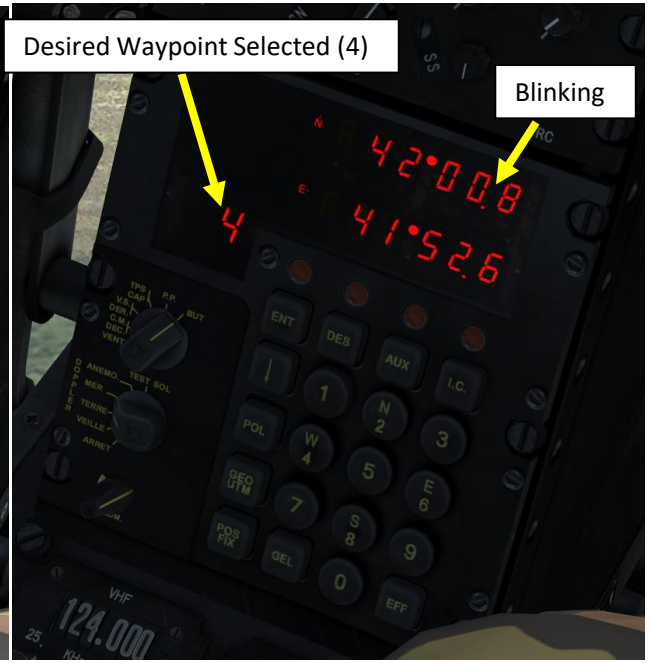
2 – NADIR System

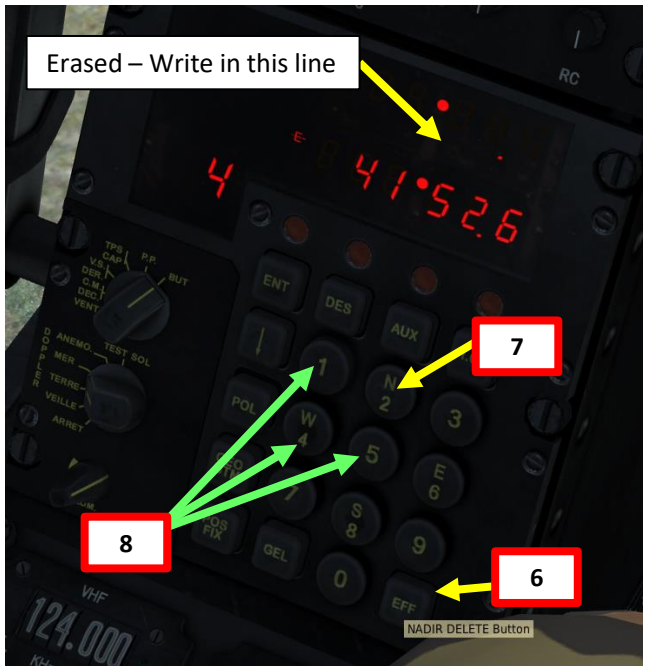
2.4 – Navigation Tutorial 2: How to Create & Track a *But* (Waypoint)

In this tutorial, we want to create a new waypoint/But No. 4 with the following coordinates of Kobuleti Airfield: **41°55’45**’’ North / **41°51’47**’’ East.

1. Note the coordinates of the desired new Waypoint (example: Kobuleti Airfield coordinates when pressing F10 are **41°55’45**’’ North / **41°51’47**’’ 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)



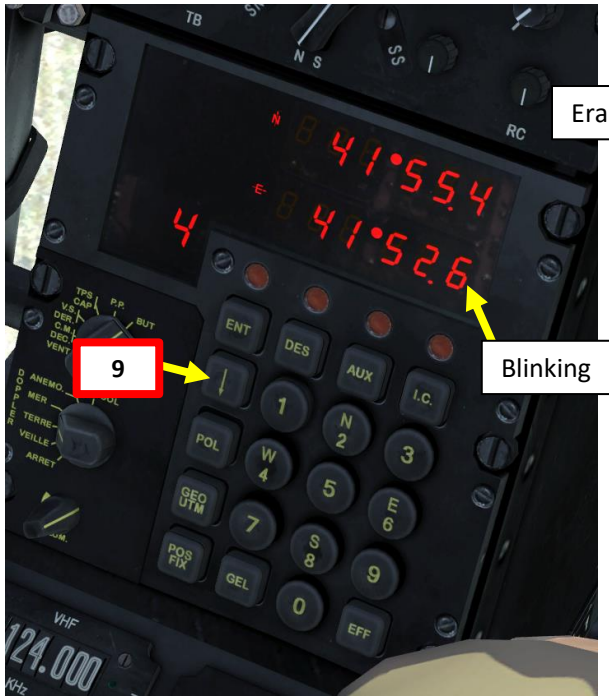


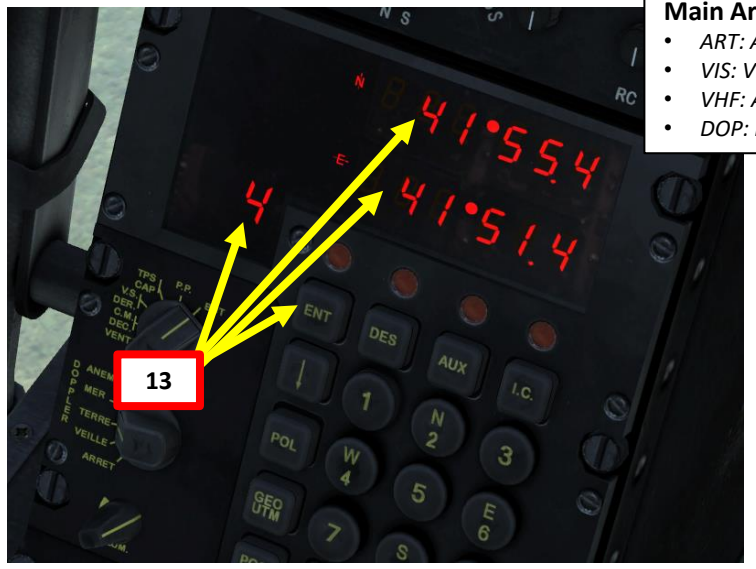


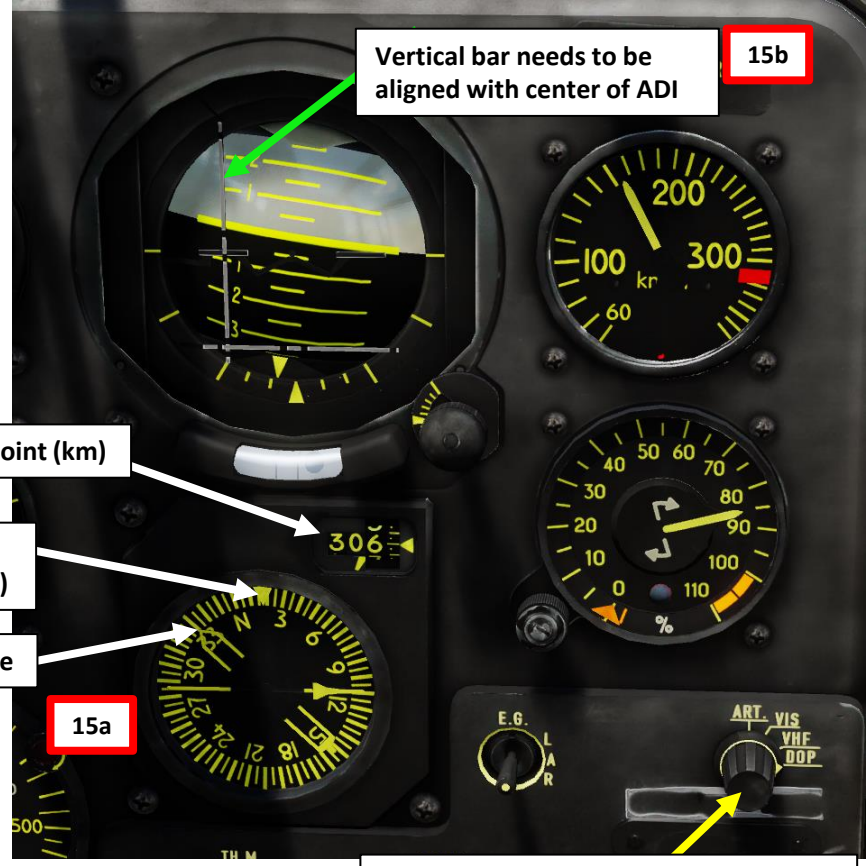
2 – NADIR System

2.4 – Navigation Tutorial 2: How to Create & Track a *But* (Waypoint)

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. Set Main Artificial Horizon Source Selector – DOPPLER.
15. You can track the Waypoint/But using:
    a) The pointy end of NADIR needle on NADIR Horizontal Situation Indicator.
    b) The ADI (Attitude Director Indicator) course steering bar







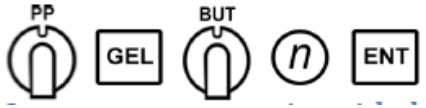
Main Artificial Horizon Source Selector

- *ART: Artificial*
- *VIS: Viseur = Camera Target Point*
- *VHF: ADF Emitter*
- *DOP: NADIR Waypoint*

14

2 – NADIR System
2.5 – Waypoint Creation Methods

From Current Position to a Point



- This sequence creates a new waypoint with the current position data
- Note: “n” refers to the waypoint number being entered via the NADIR keyboard

From the Stored Position to a Point

- This sequence creates a new waypoint with the stored position data

From a Point to another Point

- This sequence creates a new waypoint with an existing points’ data (Copy)

From a Point to another Point (Polar Coordinates)

- This sequence creates a new waypoint with an existing points’ data (Copy)

2 – NADIR System
2.5 – Waypoint Creation Methods

Point Coordinates (GEO or UTM)

BUT → GEO UTM → n → ENT → LAT X → ↓ → LON Y → ↓ → Zone (UTM) → ENT

Geographic coordinates

Latitude

First key pressed has to be N 2 or S 8 and will be considered as N or S for latitude

Then you can enter five digits which will stand for nn ° nn.n ‘

Longitude

First key pressed has to be W 4 or E 6 and will be considered as W or E for longitude

Then you can enter six digits which will stand for nnn ° nn.n ‘

UTM Coordinates

X and Y will be six digits numbers max and will mean tenth of meters

Zone is a number from 1 to 60.

3 – ADF (Automatic Direction Finder) 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:

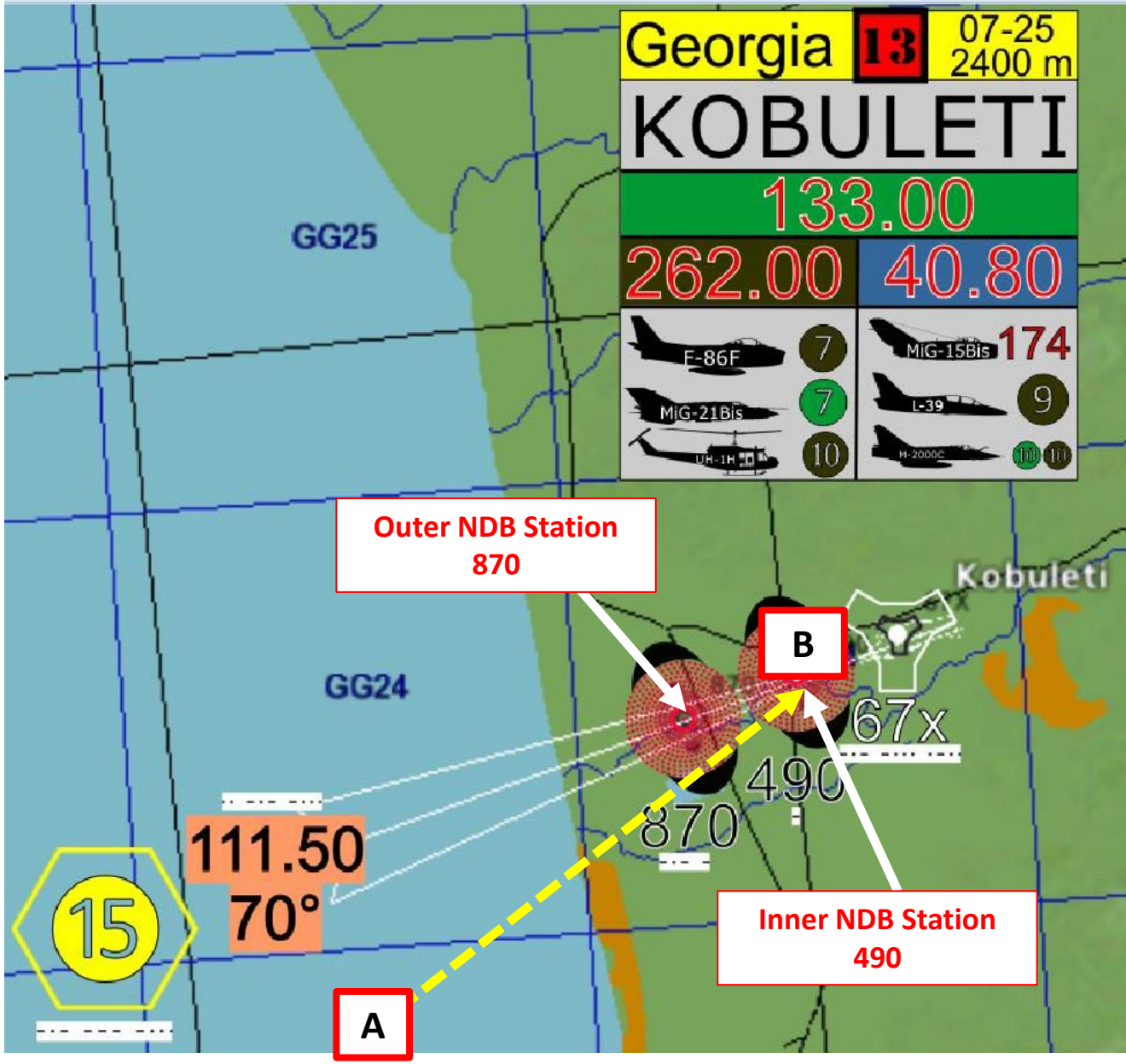
A. Fly towards **Kobuleti**.
B. Use the ADF1 system to track **Kobuleti's Inner NDB Beacon**, **ADF frequency 490** (obtained through Lino Germany's map).
C. Set the ADF2 system to **Kobuleti's Outer NDB Beacon**, **ADF frequency 870** (obtained through Lino Germany's map).
D. Navigate towards Kobuleti's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

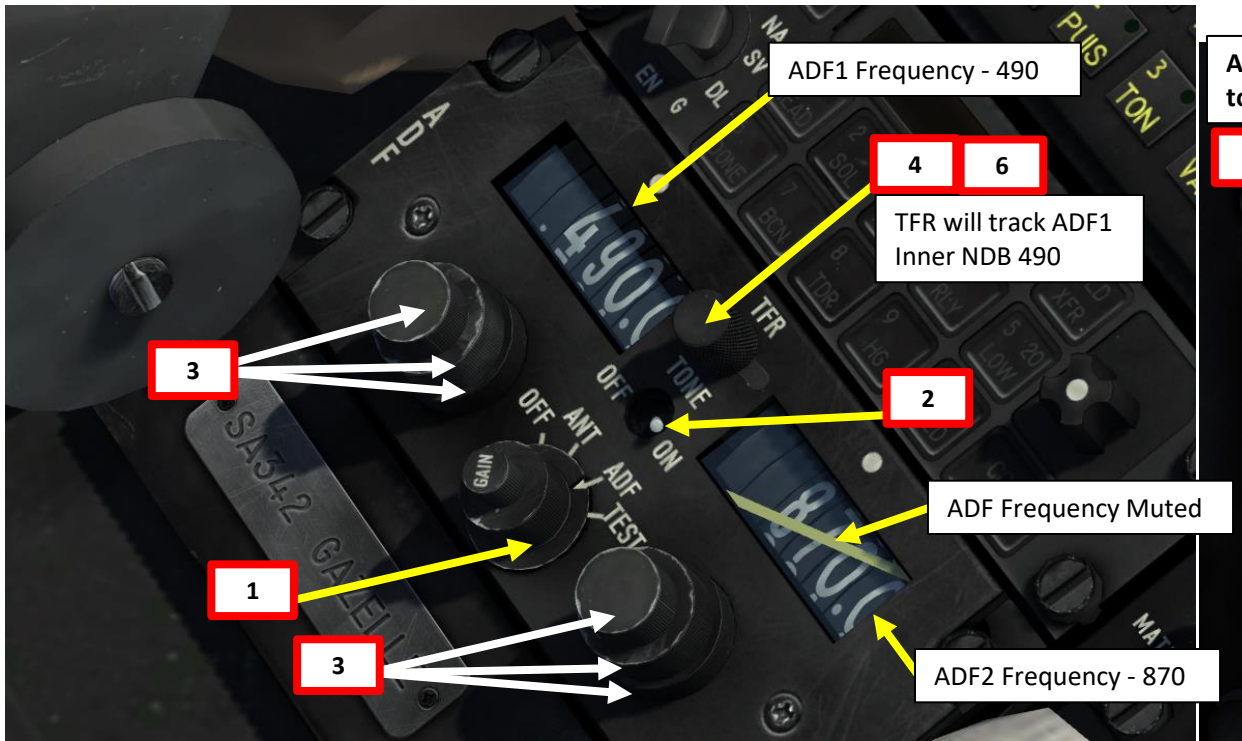
ADF Tutorial by Bunyap

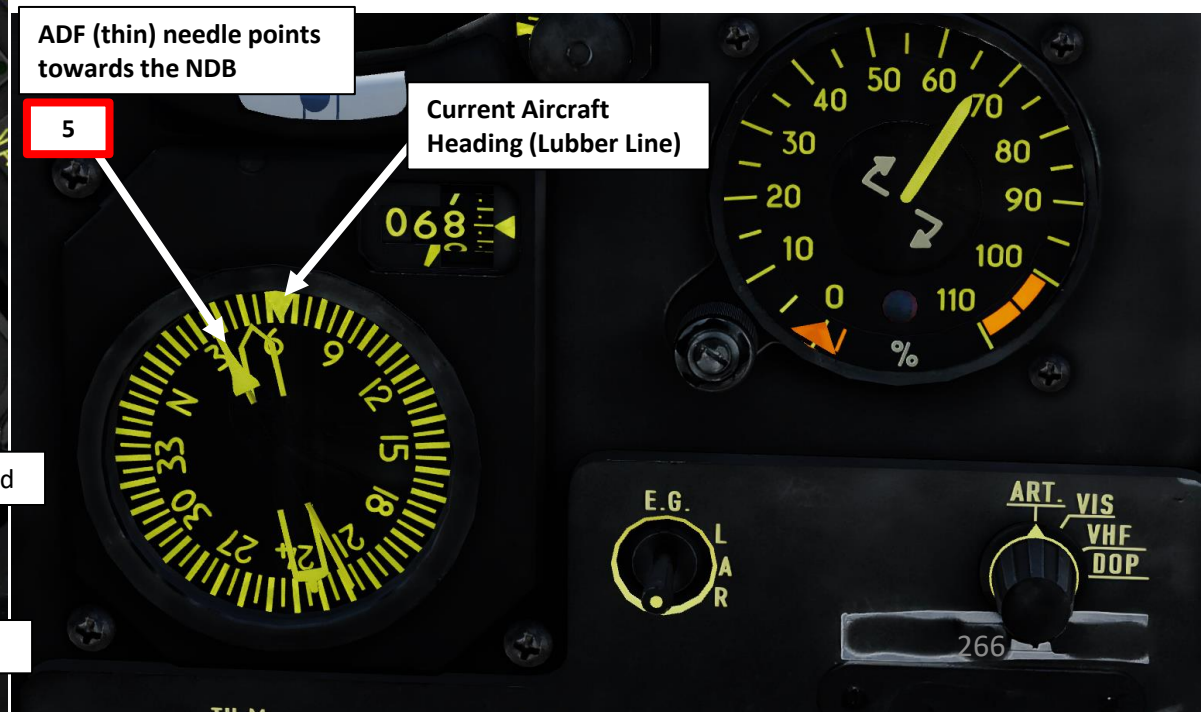
Tutorial - https://www.youtube.com/watch?v=0gz26R9Qg0Y



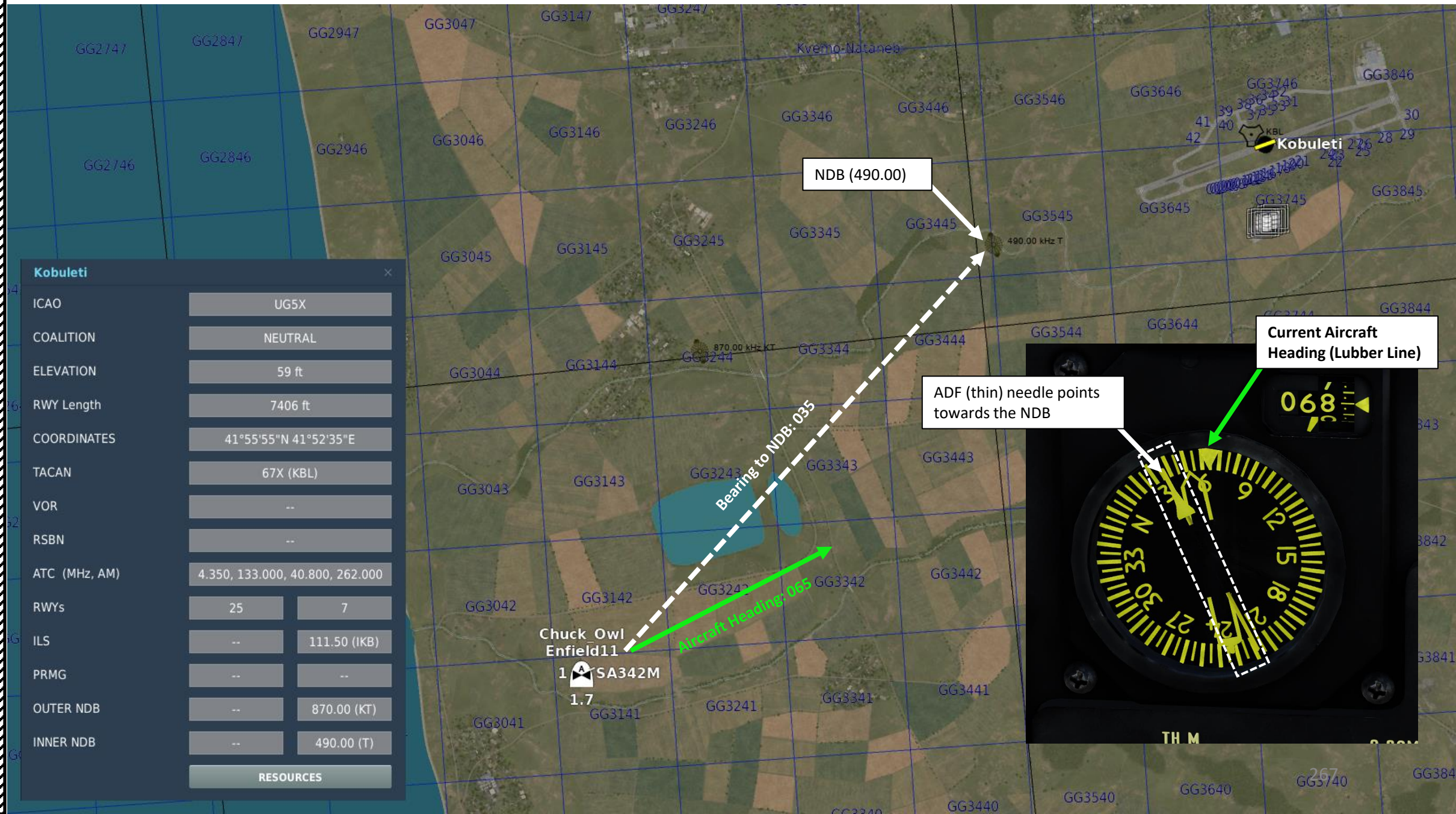
3 – ADF (Automatic Direction Finder) Tutorial

1. Set NAV 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 (Transfer) 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 (thin) needle on the NADIR indicator towards the Inner NDB (490). No distance information to the NDB is available.
6. At any time, you can choose to switch the ADF system to the Outer NDB instead (870) by using the TFR selector toggle.





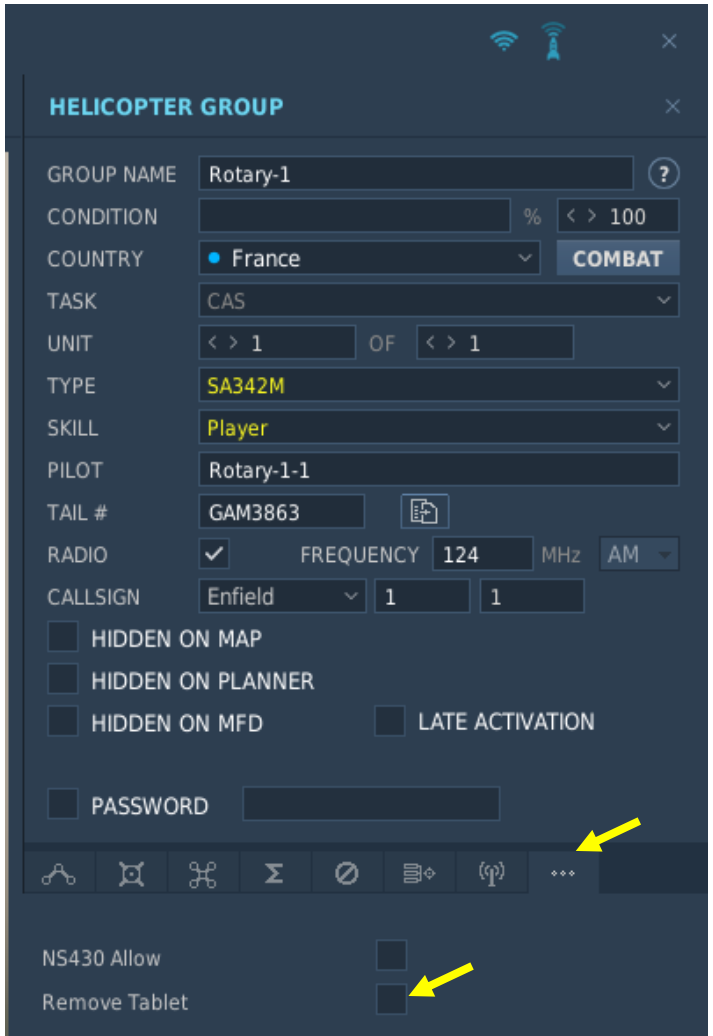
3 – ADF (Automatic Direction Finder) Tutorial



4 – EFB (Electronic Flight Bag) Tablet

An additional feature to the DCS Gazelle is an EFB (Electronic Flight Bag) tablet. This tablet provides a moving map, aircraft heading, airspeed and ground speed derived from GPS (Global Positioning System) information.

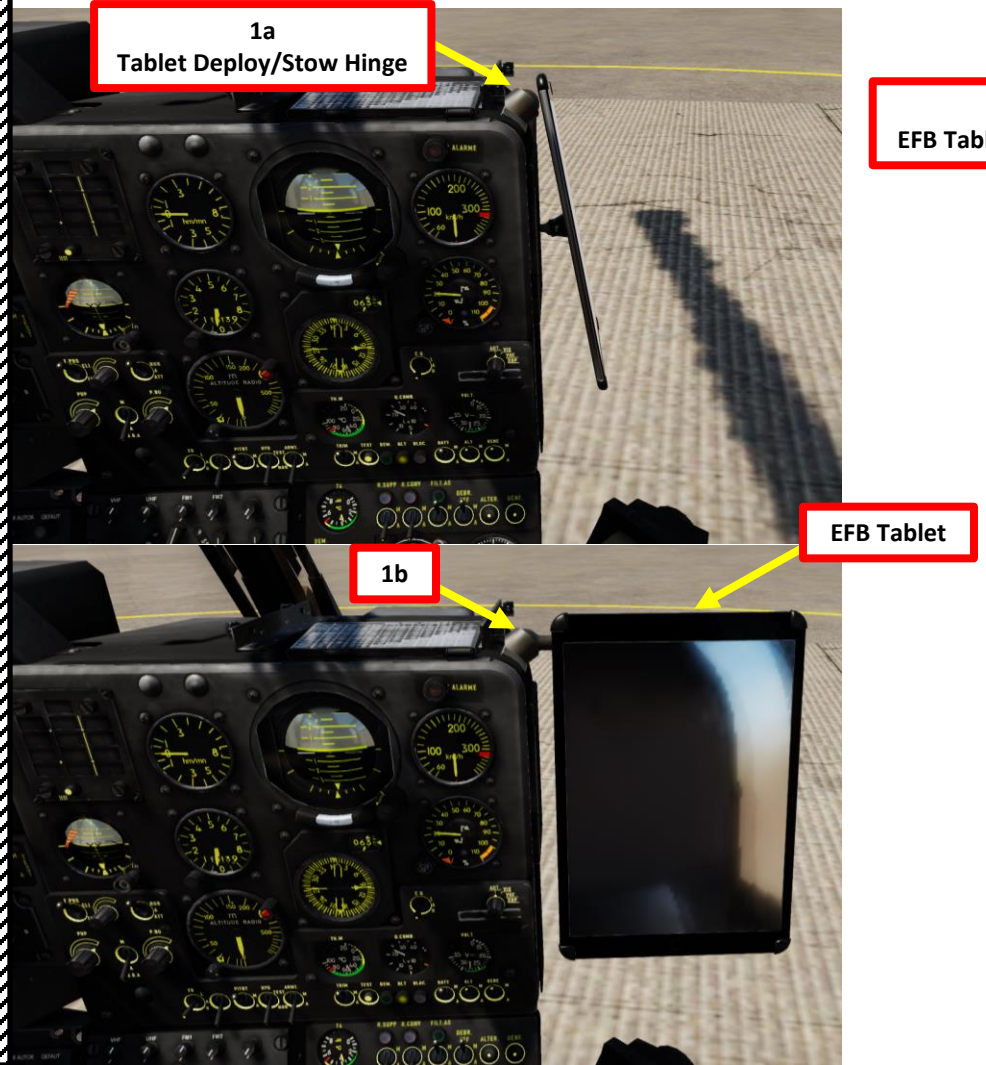
The tablet uses GPS, therefore it is only available in missions dated after march 1994. The Mission Editor has a setting that allows mission makers to make the tablet available or not.

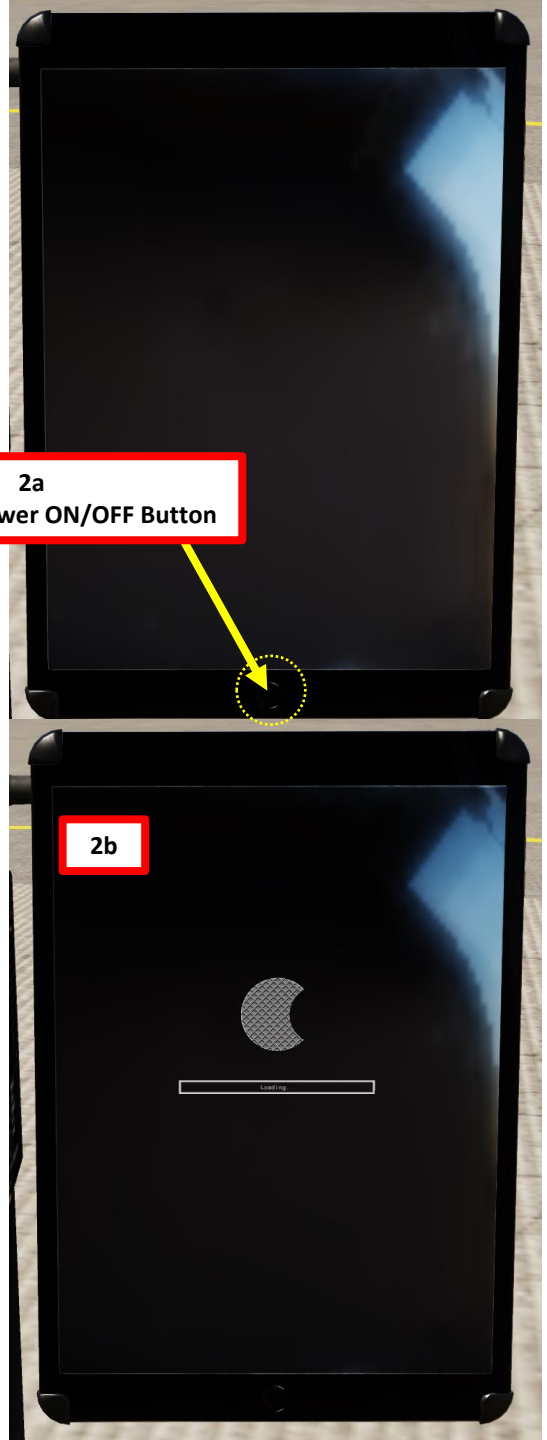


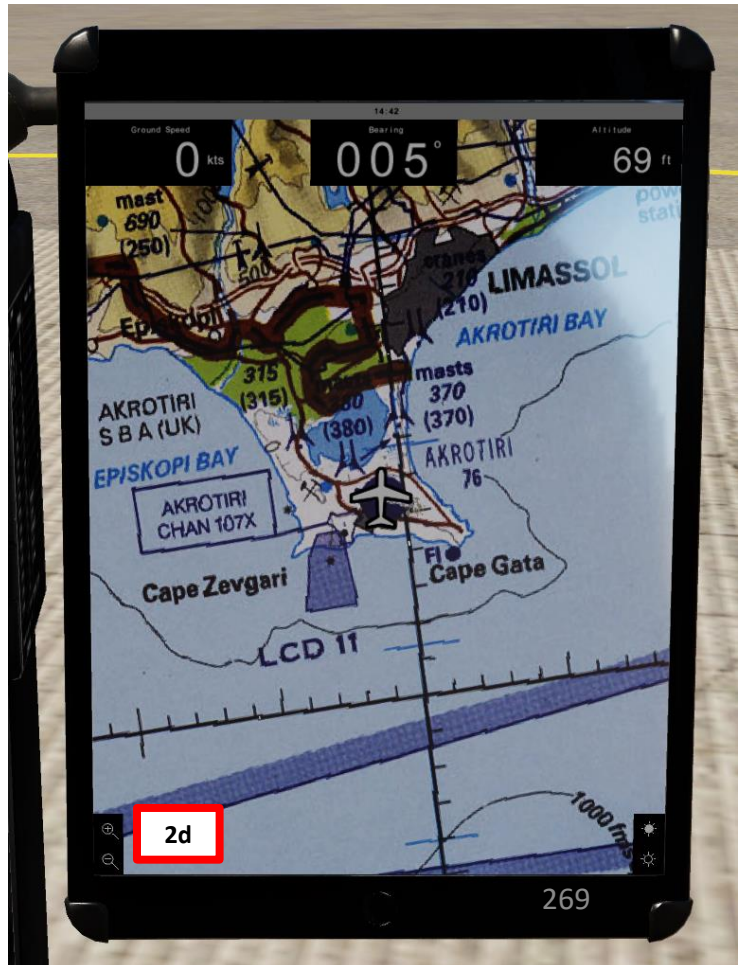
4 – EFB (Electronic Flight Bag) Tablet

To use the EFB Tablet:

1. If an EFB (Electronic Flight Bag) tablet is installed, deploy it by clicking on the Tablet Deploy/Stow Hinge.
2. Turn on the EFB Tablet by pressing on the EFB Tablet Power ON/OFF Button.







Overview of Trim and Autopilot Systems

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:

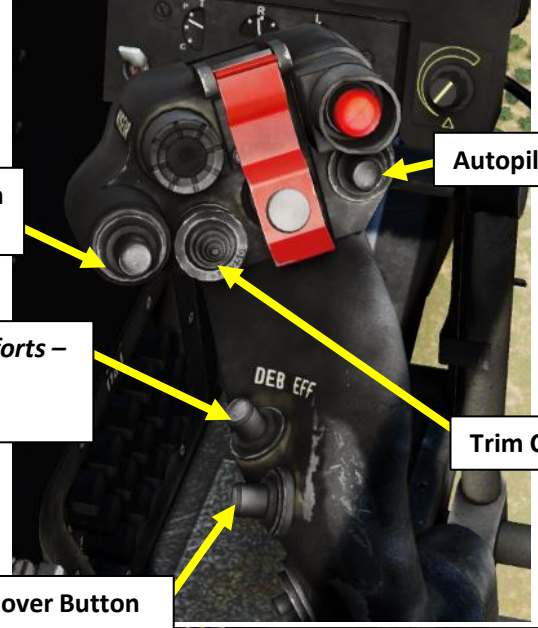
- Pitch channel
- Roll channel
- Yaw channel

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
- **Altitude Hold** Mode – Maintains current altitude
- **Speed Hold** Mode – Maintains current airspeed

Finally, you can use the autopilot's **Auto-Hover (CVS) Mode**, which can be used in conjunction with the **Auto-Pilot Slave** button in order to automatically steer the helicopter towards a designated lased target. This combined mode is called **Heading-Align (ALV) Mode**.

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



Autopilot Button

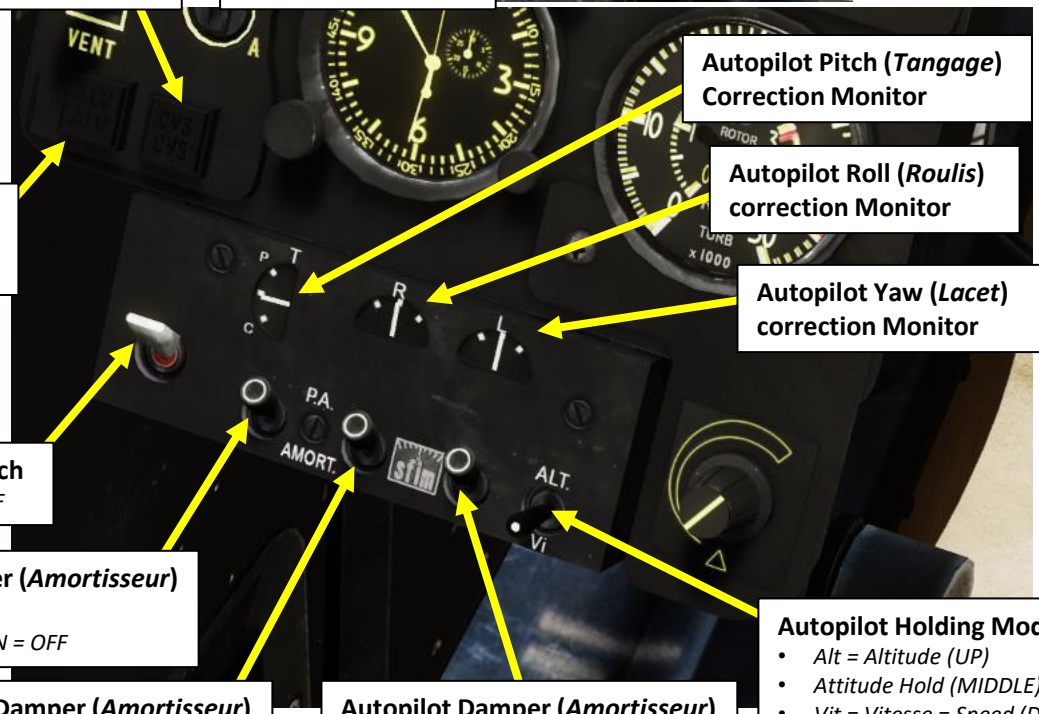
Autopilot Slave Button (Auto-Slaved Toggle)

Magnetic Brake (*Débrayage des Efforts – Freins Magnétiques*) Trim Button (Force Trim)

Trim China Hat

Autopilot Auto-Hover (CVS) Lights
- *CVS (Green): Engaged*
- *CVS (Amber): Armed*

Auto-Hover Button



Autopilot Pitch (*Tangage*) Correction Monitor

Autopilot Roll (*Roulis*) correction Monitor

Autopilot Yaw (*Lacet*) correction Monitor

Autopilot Heading-Align (ALV) Lights
- *ALV (Green): Engaged*
- *ALV (Amber): Armed*

Autopilot Master Switch
- *UP = ON / DOWN = OFF*

Autopilot Damper (*Amortisseur*) Pitch Axis Switch
- *UP = ON / DOWN = OFF*

Autopilot Damper (*Amortisseur*) Roll Axis Switch
- *UP = ON / DOWN = OFF*

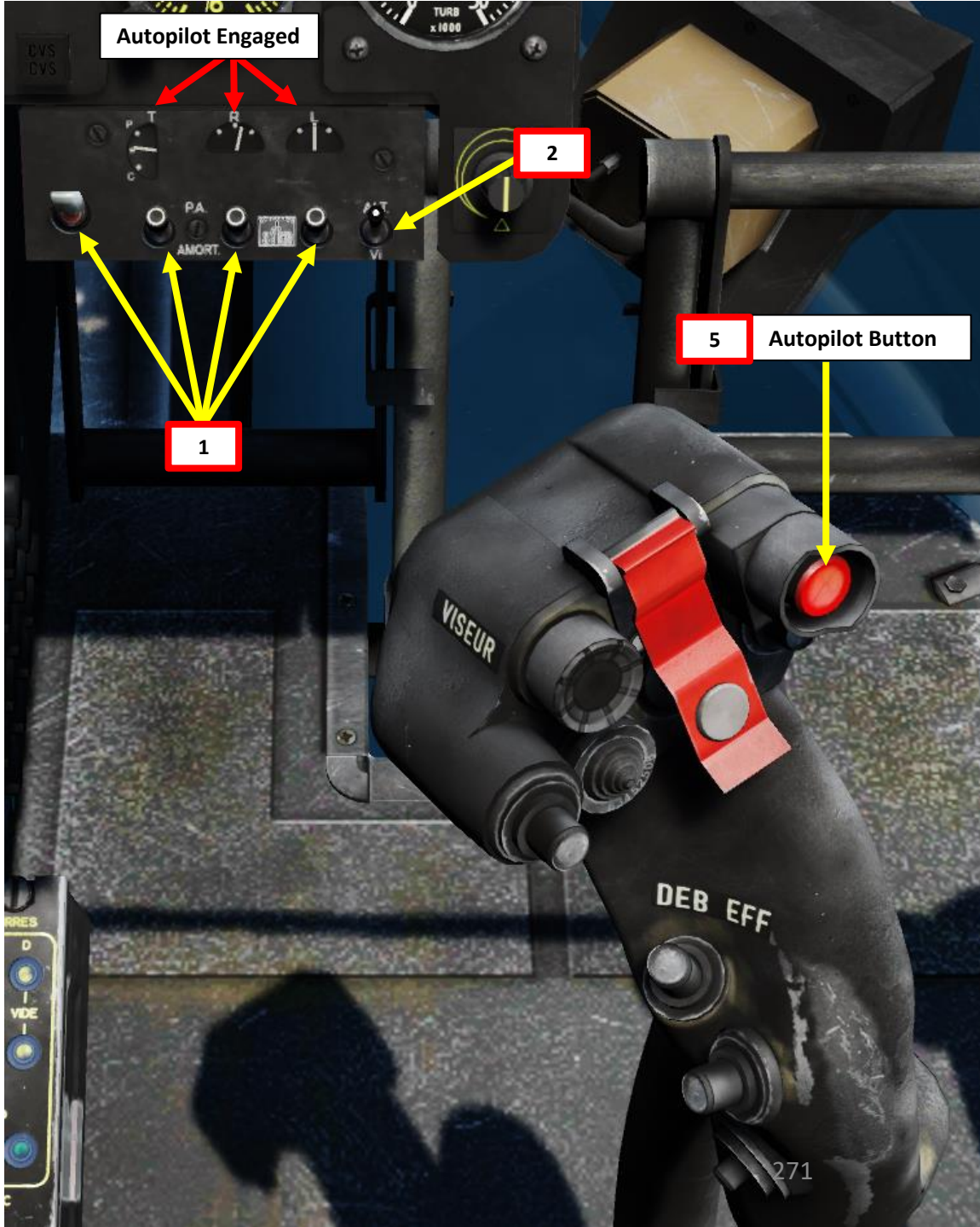
Autopilot Damper (*Amortisseur*) Yaw Axis Switch
- *UP = ON / DOWN = OFF*

Autopilot Holding Mode Switch
- *Alt = Altitude (UP)*
- *Attitude Hold (MIDDLE)*
- *Vit = Vitesse = Speed (DOWN)*

Autopilot Tutorial
Altitude Hold Mode

1. Ensure all SAS (Stability Augmentation System) 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.

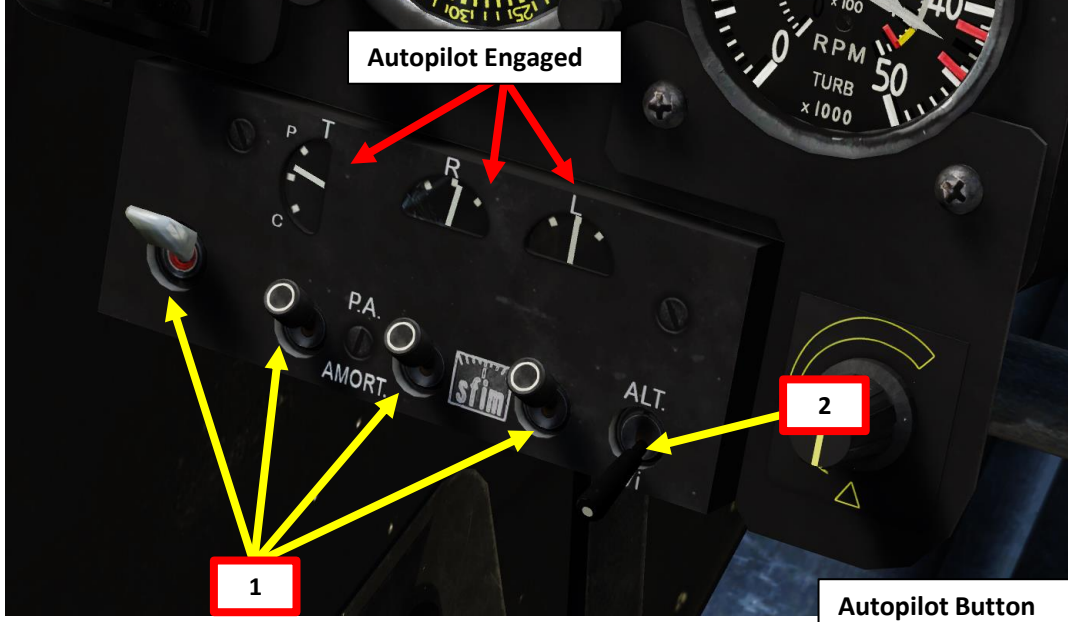
Note: Autopilot will disengage if you go slower than 120 km/h.

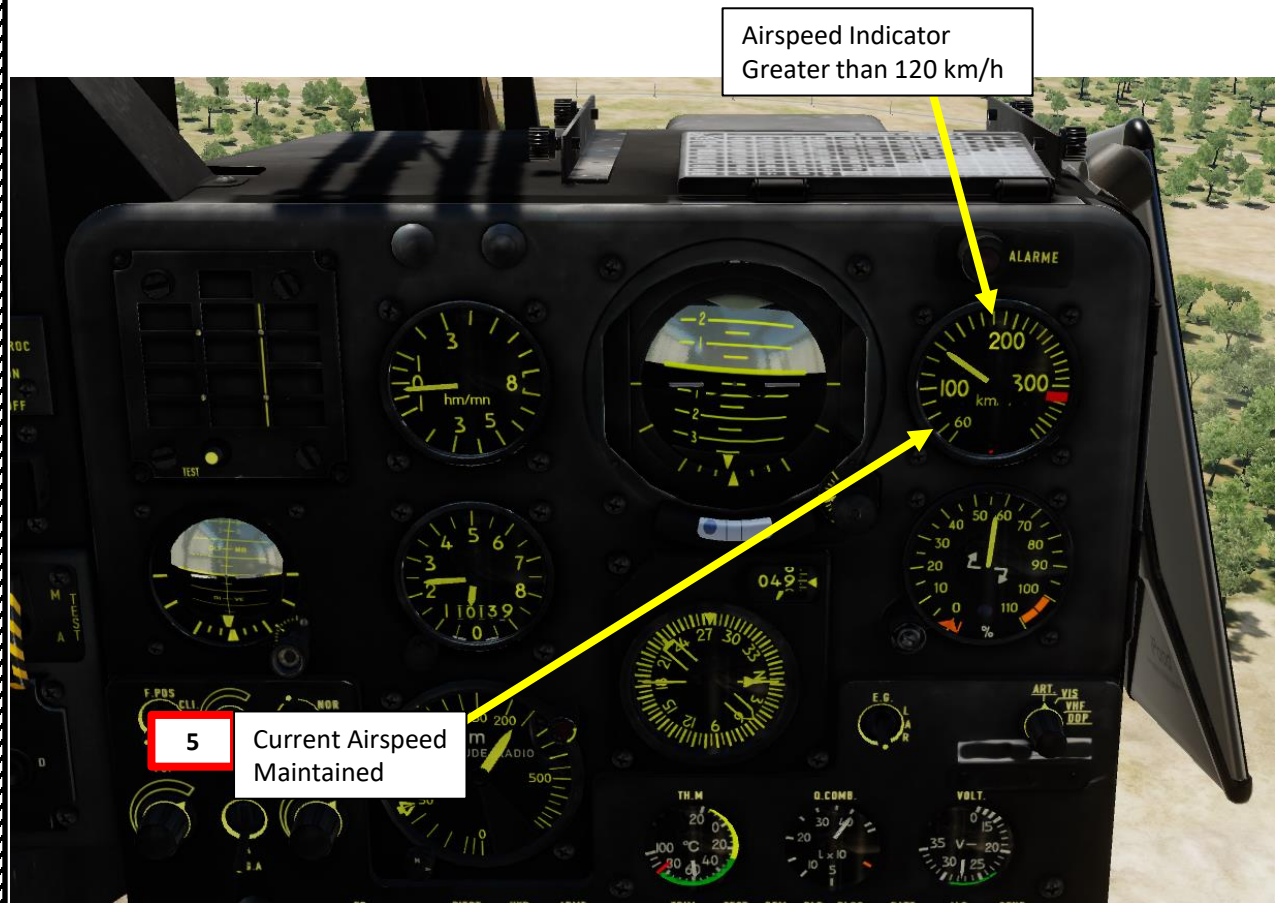


Autopilot Tutorial
Speed Hold Mode

1. Ensure all SAS (Stability Augmentation System) channel switches are ON (UP) and Autopilot power switch is ON (UP).
2. Set Autopilot Mode to VITESSE/Speed (DOWN).
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 airspeed as long as it is 120 km/h or faster.

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





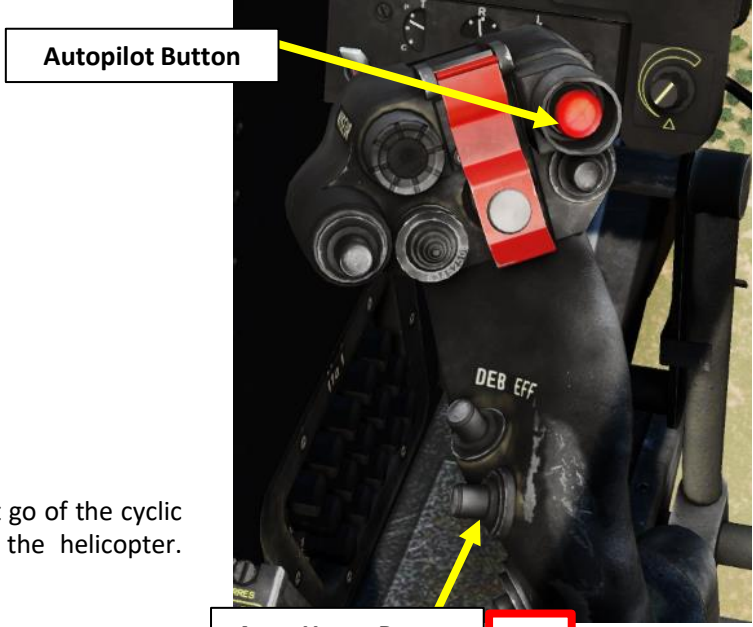
Autopilot Tutorial
Auto-Hover (CVS) Mode

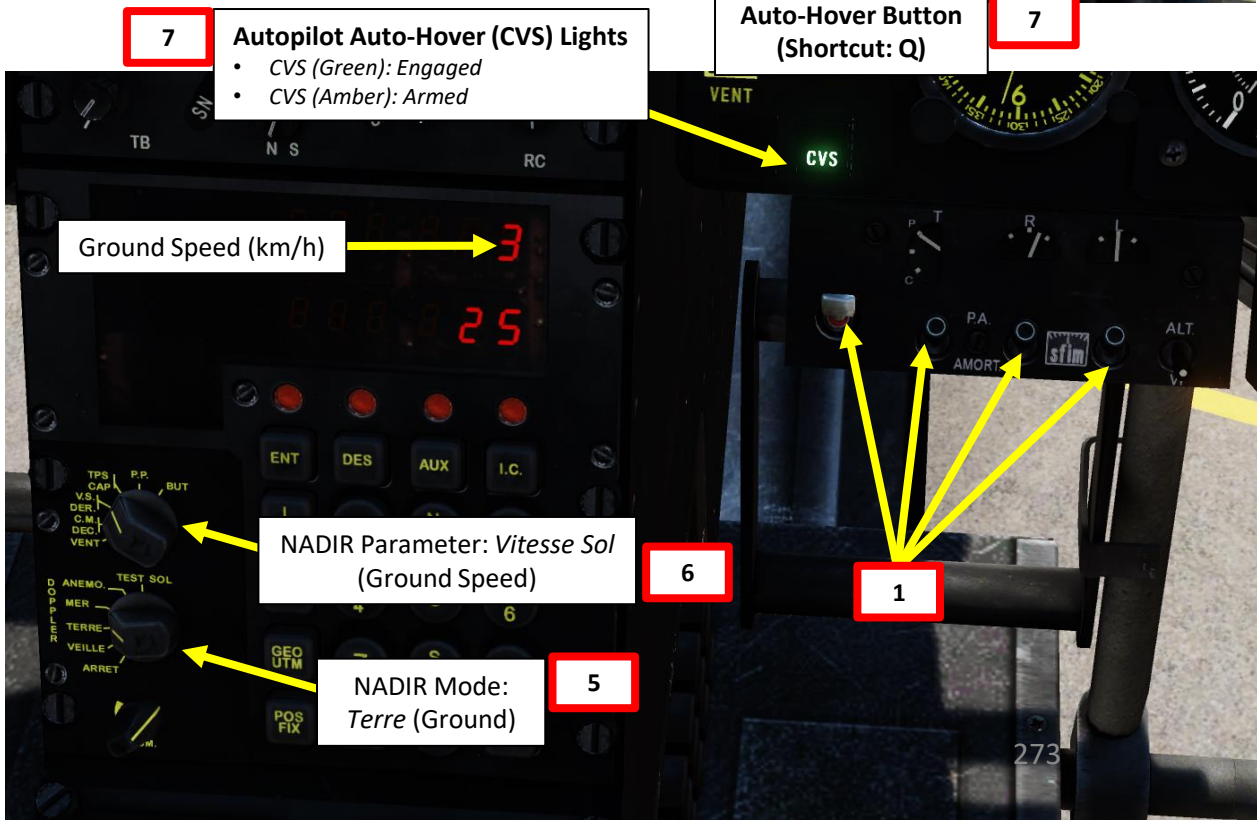
To maintain a auto-hover, you need to respect the following conditions:

1. Ensure all SAS (Stability Augmentation System) channel switches are ON (UP) and Autopilot power switch is ON (UP).
2. Ground Speed is less than 18 km/h
3. Roll and pitch angle less than 30 deg
4. Vertical Speed is less than 60 m/min

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

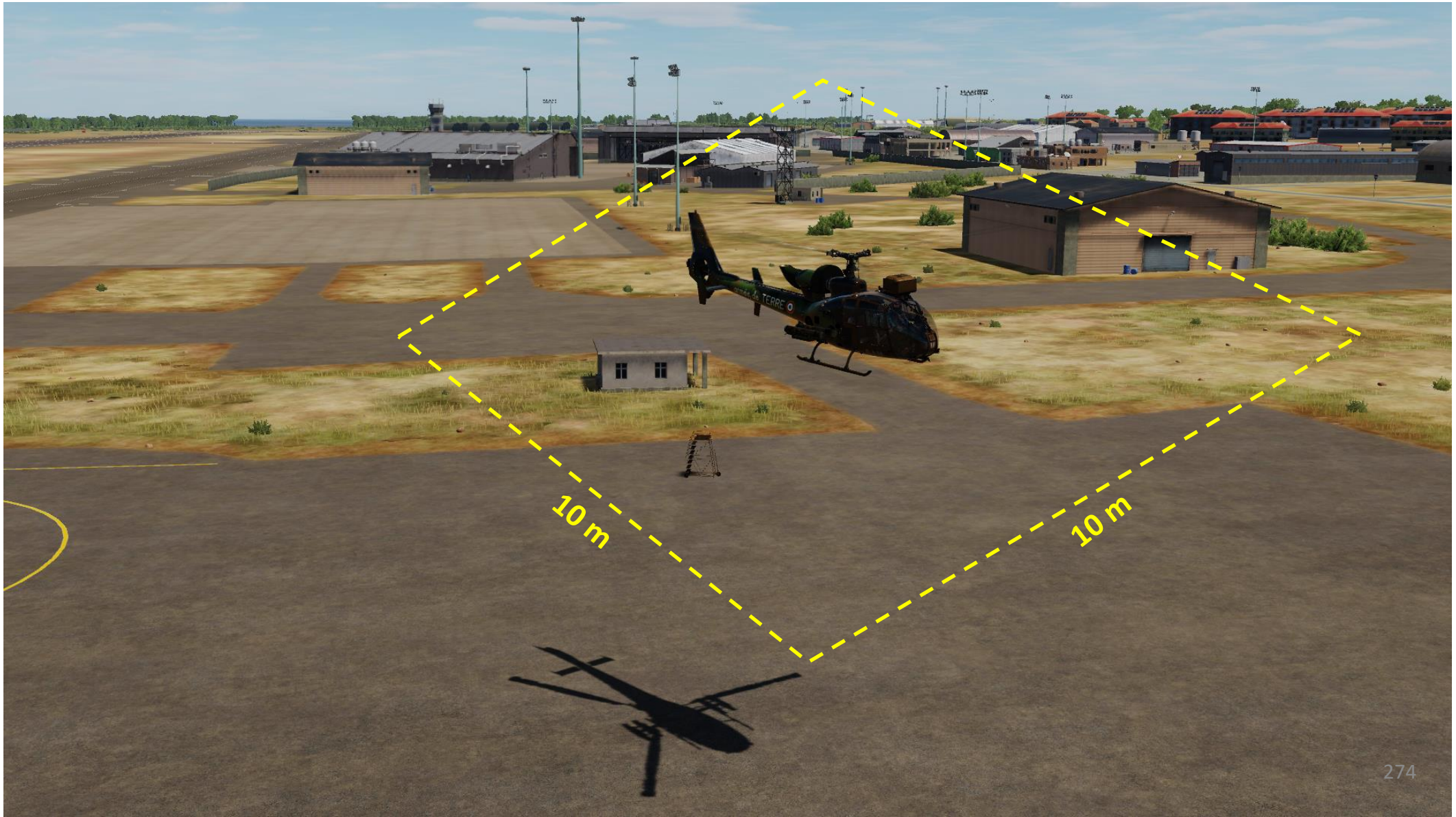
5. Set your NADIR mode to “Terre” (ground)
6. Set your NADIR parameter to “VS” (*Vitesse Sol* = Ground Speed)
7. Once all conditions 2, 3 and 4 are met, **engage auto-hover by pressing the Auto-Hover Button**. If auto-hover is engaged, you can let go of the cyclic and you will remain in a controlled hover. The **CVS Light** will illuminate. Collective and anti-torque pedal input still affect the helicopter. Note: You can disengage Auto-Hover Mode by pressing the **Autopilot Button**.





Autopilot Tutorial
Auto-Hover (CVS) Mode

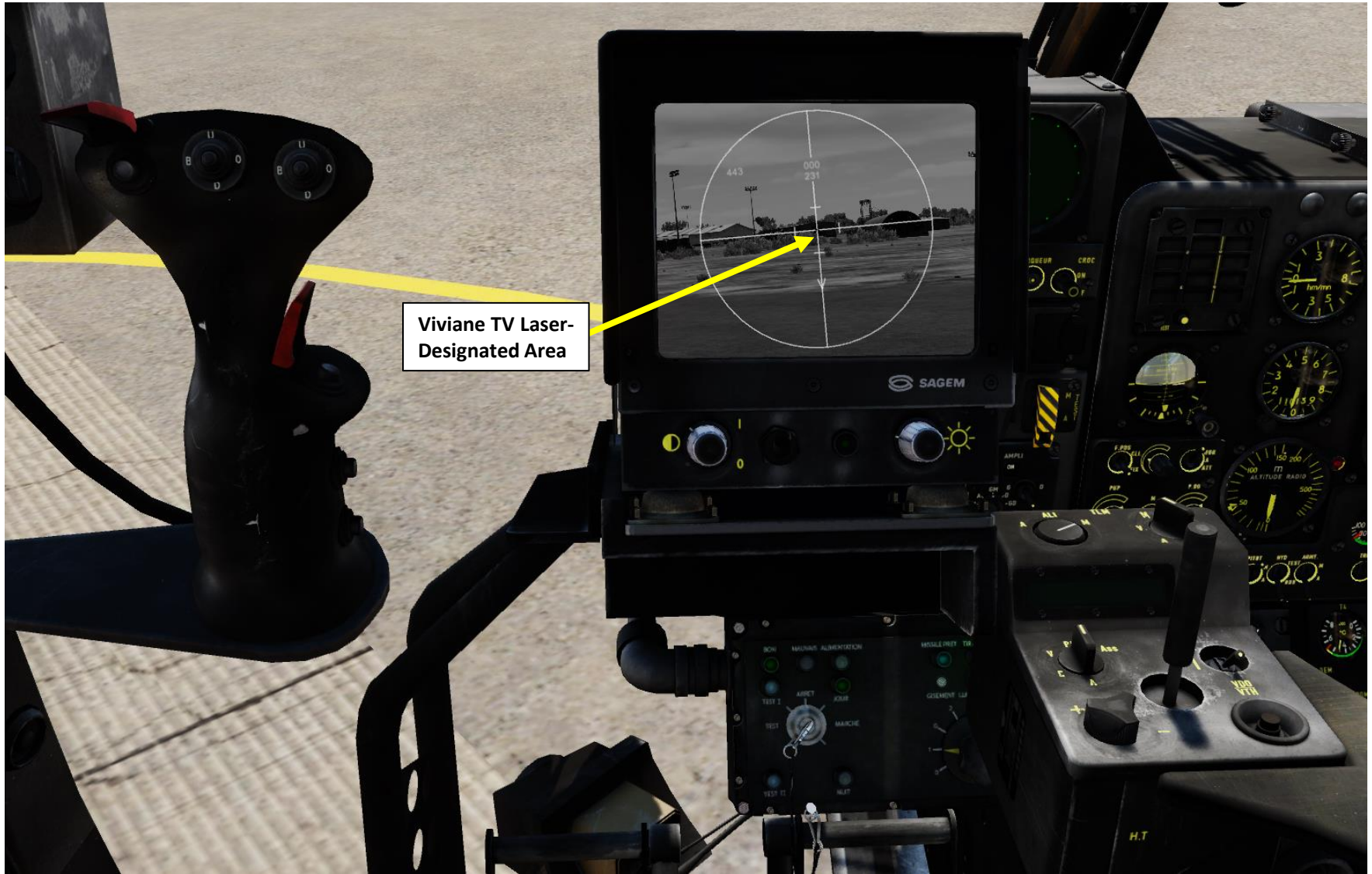
8. Once in auto-hover, the helicopter will keep hovering in a 10 m x 10 m zone.



Autopilot Tutorial
Heading-Align (ALV) Mode

The Heading-Align (ALV) is combined with the Autopilot Auto-Hover Mode (CVS), which means that the Heading-Align mode allows the helicopter to maintain a 10 m x 10 m hover while steering the helicopter in the direction where the TV camera is looking. Using this mode requires good teamwork from both the pilot and copilot.

1. The Copilot must first perform a laser designation with the Viviane Camera (or Athos Sight). The pilot then has to align the helicopter roughly in the same direction.



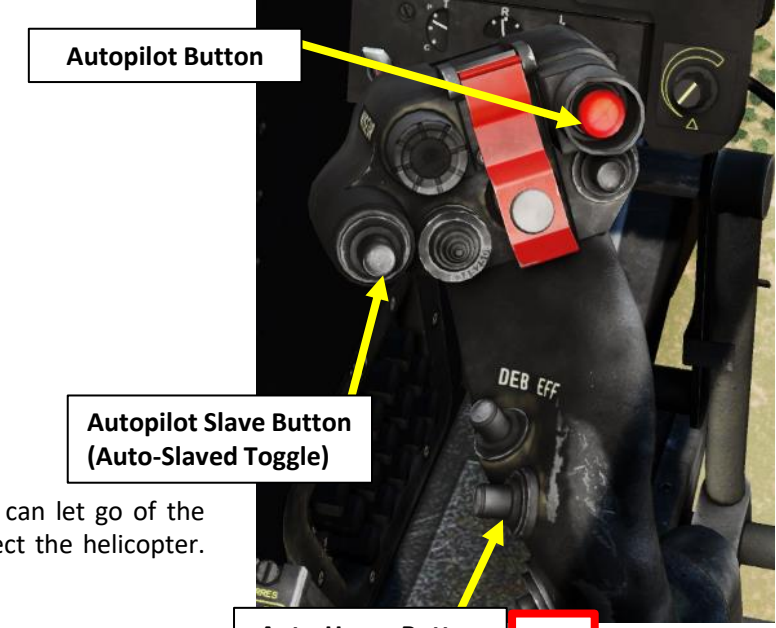
Autopilot Tutorial
Heading-Align (ALV) Mode

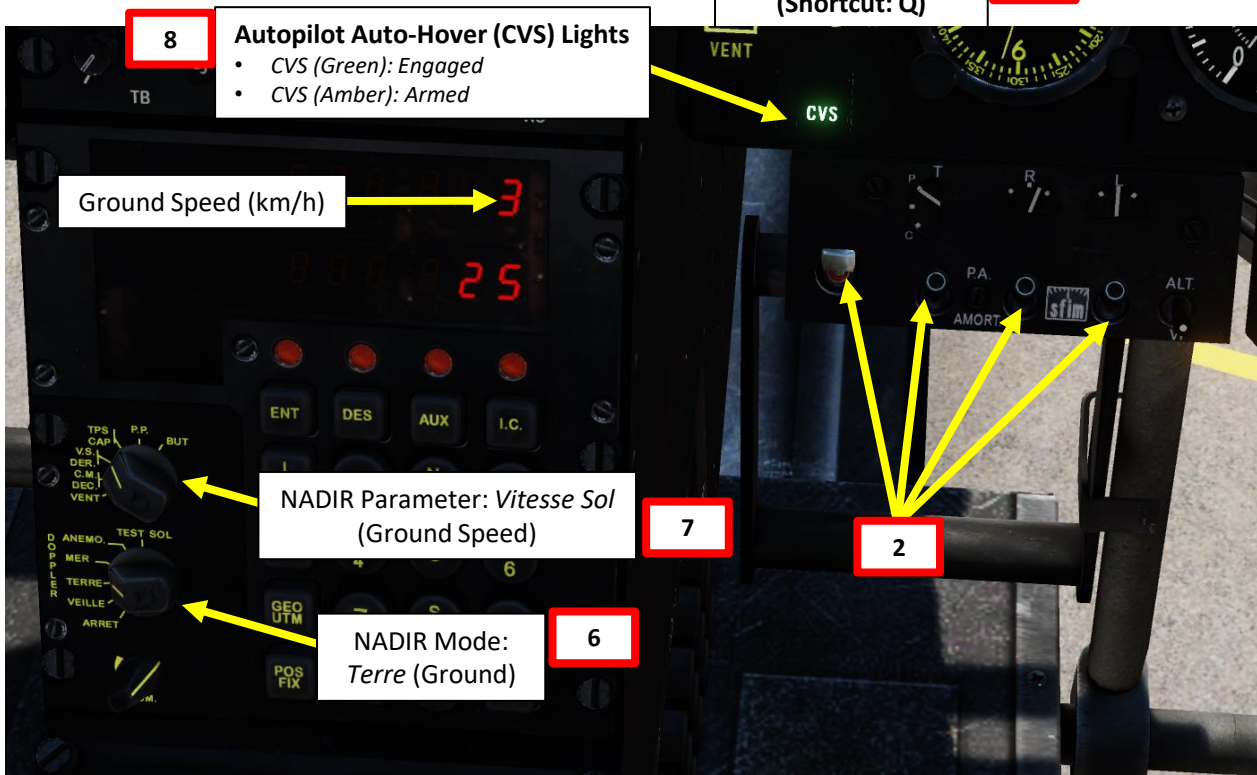
Then the pilot must set the helicopter in auto-hover mode. In order to do so, you need to respect the following conditions:

2. Ensure all SAS (Stability Augmentation System) channel switches are ON (UP) and Autopilot power switch is ON (UP).
3. Ground Speed is less than 18 km/h
4. Roll and pitch angle less than 30 deg
5. Vertical Speed is less than 60 m/min

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

6. Set your NADIR mode to “Terre” (ground)
7. Set your NADIR parameter to “VS” (*Vitesse Sol* = Ground Speed)
8. Once all conditions 3, 4 and 5 are met, **engage auto-hover by pressing the Auto-Hover Button**. If auto-hover is engaged, you can let go of the controls and you will remain in a controlled hover. The **CVS Light** will illuminate. Collective and anti-torque pedal input still affect the helicopter. Note: You can disengage Auto-Hover Mode by pressing the **Autopilot Button**.

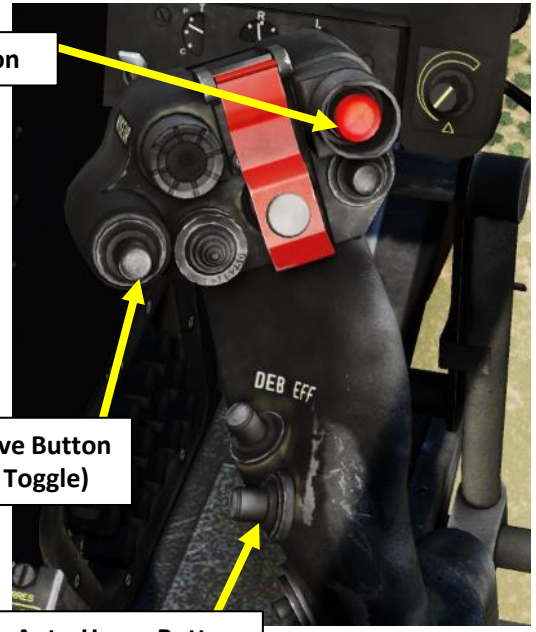




Autopilot Tutorial
Heading-Align (ALV) Mode

9. Press the **Autopilot Slave Button (Auto-Slaved Toggle)** to engage H**eading-Align (ALV) Mode**. The **ALV Light** will illuminate and the helicopter will steer towards the point designated by the TV camera while maintaining a hover.

Autopilot Auto-Hover (CVS) Lights
- *CVS (Green): Engaged*
- *CVS (Amber): Armed*



Autopilot Button

9 **Autopilot Slave Button (Auto-Slaved Toggle)**

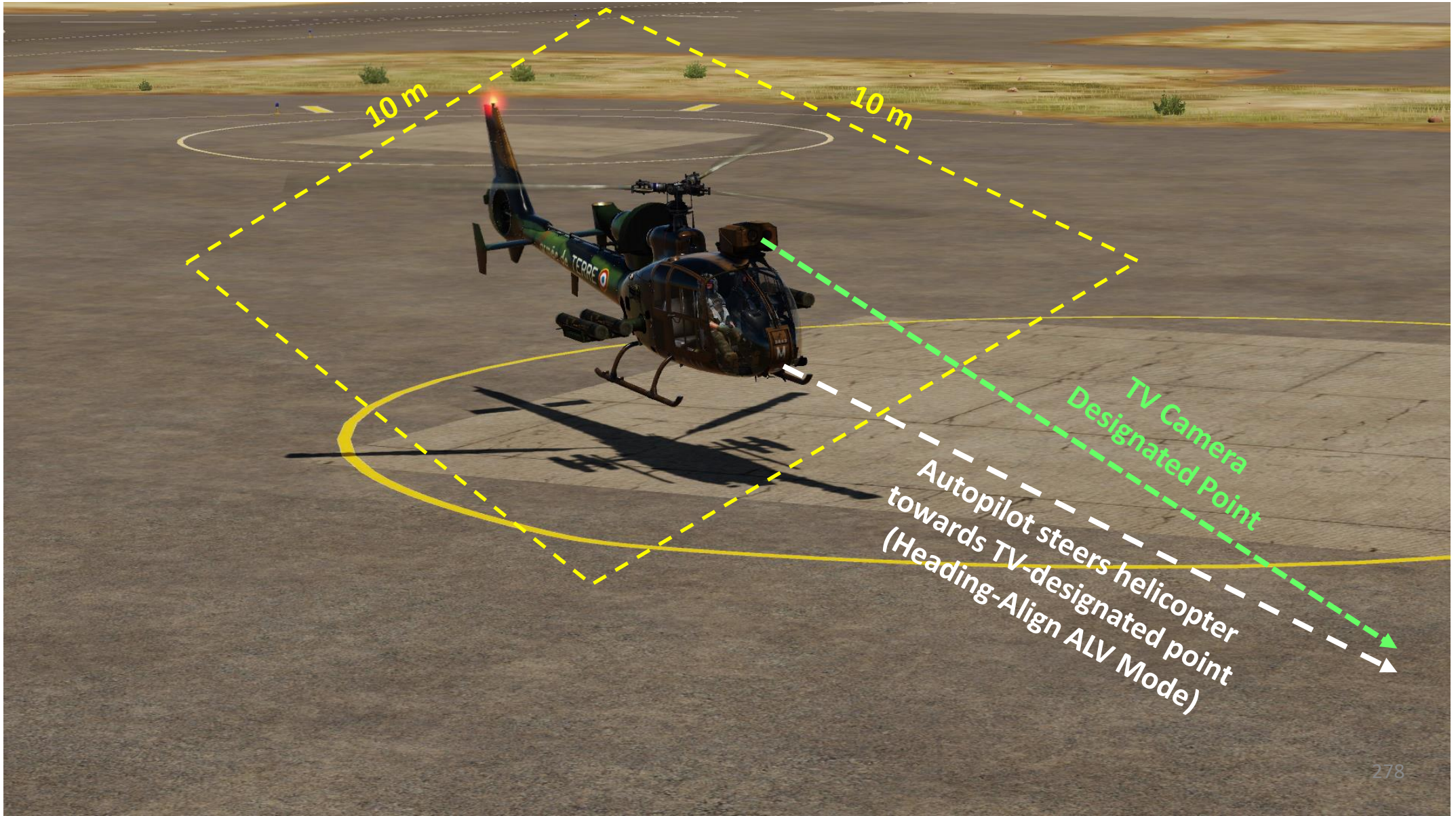
Auto-Hover Button (Shortcut: Q)

Autopilot Heading-Align (ALV) Lights
- *ALV (Green): Engaged*
- *ALV (Amber): Armed*

9

Autopilot Tutorial
Heading-Align (ALV) Mode

10. Auto-hover (CVS) mode will make the helicopter keep hovering in a 10 m x 10 m zone, while Heading-Align (ALV) mode will make it steer towards the point designated by the TV camera.



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 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 16: NAVIGATION
https://www.faa.gov/sites/faa.gov/files/18_phak_ch16.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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Mi-24P
EA
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MiG-15bis
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