DCS GUIDE
SPITFIRE LF MK IX

By Chuck

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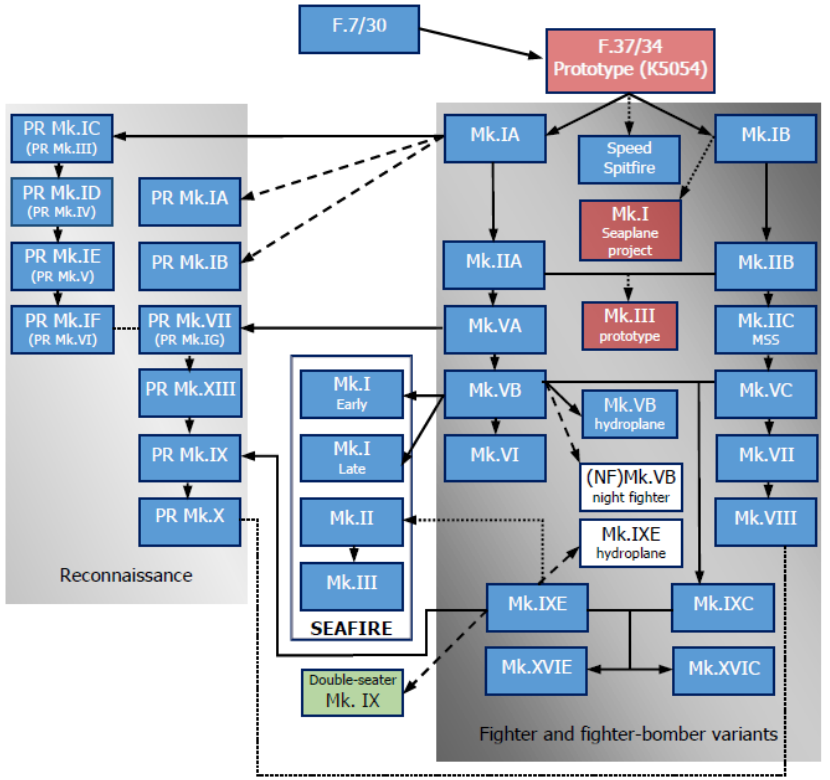
Special thanks to Paul "Goldwolf" Whittingham for creating the guide icons.

The **Supermarine Spitfire** is one of the most iconic aircraft of the Second World War. The Spitfire was built in many variants, using several wing configurations, and was produced in greater numbers than any other British aircraft. It was also the only British fighter to be in continuous production throughout the war. The Spitfire was designed as a short-range, high-performance interceptor aircraft by R. J. Mitchell, chief designer at Supermarine Aviation Works, which operated as a subsidiary of Vickers-Armstrong from 1928.

In accordance with its role as an interceptor, Mitchell supported the development of the Spitfire's distinctive elliptical wing (designed by B. Shenstone) to have the thinnest possible cross-section; this enabled the Spitfire to have a higher top speed than several contemporary fighters, including the Hawker Hurricane. Mitchell continued to refine the design until his death in 1937, whereupon his colleague Joseph Smith took over as chief designer, overseeing the development of the Spitfire through its multitude of variants. Joe Smith is often forgotten, yet he has worked on no fewer than twenty-four Marks of the Spitfire.

I could write about the Spitfire for days, but I prefer to let you read on it yourself. There have been dozens of books written on the men who flew it, tested it, built it, researched it and the mark it left in the bloody pages of History. Needless to say, it remains one of the most interesting masterpieces of british engineering ever built. The Spitfire's name was ironically hated by Mitchell himself since his boss decided to name the plane after his daughter, his "little spitfire".

The Mark (variant) modelled by Eagle Dynamics and The Fighter Collection is the Spitfire LF Mk IXc, powered by a Rolls-Royce Merlin 66 V-12 engine.



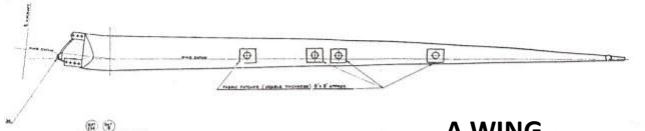
Reginald J. Mitchell
(1895-1937)

Joseph Smith
(1897-1956)

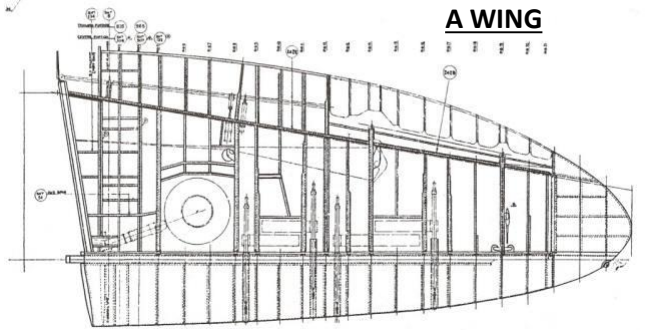
The Mark nomenclature can be summed up as follows:

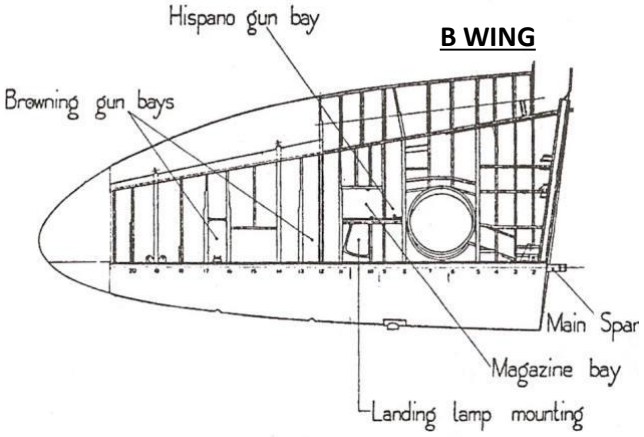
- **F, LF or HF** refer to the **engine rating**
  - **F** refers to the early Spitfire IX model with a Merlin 61 engine in it
  - **LF** refers to the slightly later Spitfire IX model with a Merlin 66 engine that was tuned to switch to the second supercharger stage (the Merlin 60 series introduced a two-stage supercharger) at higher altitudes. In the cockpit on the lower right side of the main panel there is a switch and a light that indicate which stage the supercharger is at (its automatically engaging). The red light will appear above 16,000 ft or so. The reason for the LF modification was to match the Spitfire IX's top speed to be better than the FW190A at all altitudes.
  - **HF r**efers to a very rare Spitfire IX model using a Merlin 70 engine. It is the exact opposite of the Merlin 66, meaning that its supercharger stage kicks in at a much higher altitude. The HF is slower than the LF model until about 24,000 ft where it outperforms it significantly. Most Spitfires employed in high altitude operations were used against high flying German reconnaissance aircraft and thus were not really meant for fighter combat but instead for interceptor operations at higher altitudes.

- **A, B, C, D or E** refer to the **wing type**
  - **A** refers to the original wing design, the basic structure of which was unchanged until the arrival of C type wing in 1942. The only armament able to be carried was eight .303-calibre Browning machine guns with 300 rounds per gun. *Armament: 4x .303 machineguns per wing.*
  - **B** refers to the A type wing modified to carry a 20mm Hispano cannon. One type of armament could be fitted, comprising two 20 mm-calibre Hispano Mk II cannon, fed from drum magazines with the capacity of 60 rounds/gun, and four .303 Browning machine guns with 350 rounds per gun. *Armament: 2x .303 machineguns and 1x 20mm cannon per wing.*
  - **C** refers to the "universal wing". This wing was structurally modified to reduce labour and manufacturing time and allow mixed armament options; A or B type armament or a new, yet heavier combination of four 20 mm Hispano cannon. *Armament: 2x .303 machineguns and 1x 20mm cannon per wing OR 2x 20mm cannon per wing.*
  - **D** refers to the unarmed long-range wing for reconnaissance versions. Space for substantial amount of additional fuel was provided in the space ahead of the wing spar, which together with the reinforced skin of the wing's leading edge formed a rigid torsion box. *Armament: None.*
  - **E** refers to a structurally unchanged form of the C wing, but the outer machine gun ports were eliminated. Although the outer machine gun bays were retained, their access doors were devoid of empty shell case ports and shell deflectors. The inner gun bays allowed for two weapon fits two 20 mm Hispano Mk II cannon with 120 rounds/gun in the outer bays and two American .50 calibre M2 Browning machine guns, with 250 rounds per gun in the inner bays. Alternatively, four 20 mm Hispano cannon with 120 rounds per gun could be carried as per original C-wing production standard. *Armament: 2 x 20mm cannons OR 1 x 20mm cannon and 2x .50 cal machineguns.*

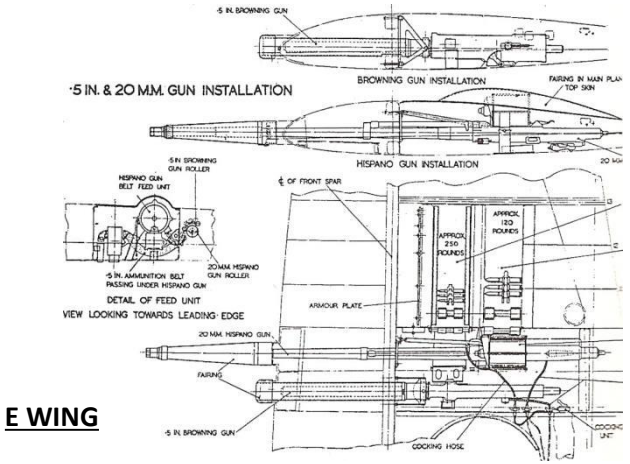


A WING



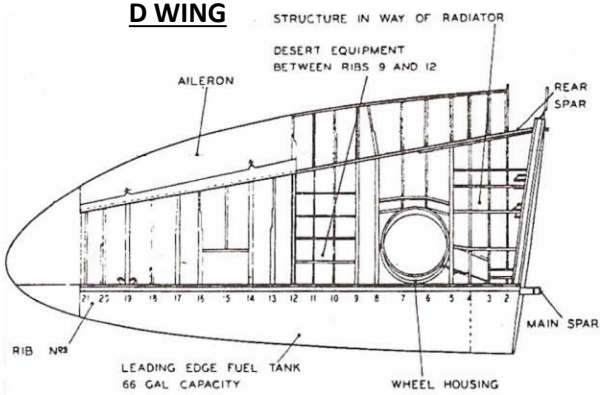


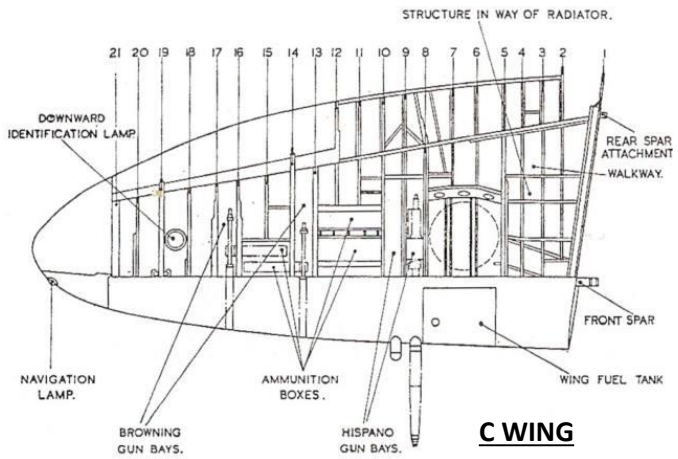
B WING



E WING

D WING





C WING

Spitfire Wing Types Available

The Spitfire was the result of many design iterations by trial and error. A “clipped wings” version was also designed by Supermarine and is available in DCS.

Clipped Wings Advantages:
- small increase in the rate of roll
- slight increase in speed bellow about 20000 ft

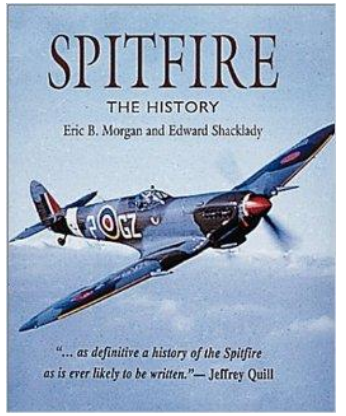
Clipped Wings Disadvantages:
- inability to turn as fast of tight as an aircraft with normal wings due to an increased stalling speed in the turn
- small increase in take-off run
- loss in maximum rate of climb at any height of 160 – 200 ft/min
- lowering of the service ceiling by 1800ft
- slight decrease in speed above 20000 ft

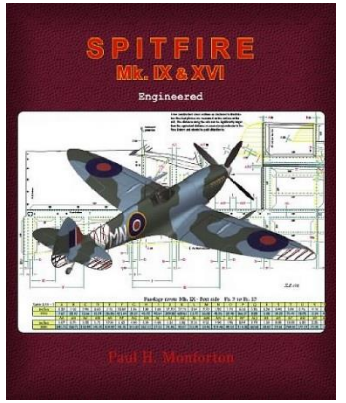
Pilots came from the four corners of the world to fly the Spitfire and fight the Luftwaffe. Famous aces include James “Johnnie” Johnson, Douglas Bader, Robert Stanford Tuck, Paddy Finucane, George Beurling, Adolph “Sailor” Malan, Alan Deere, Colin Falkland Cray and Pierre Clostermann.

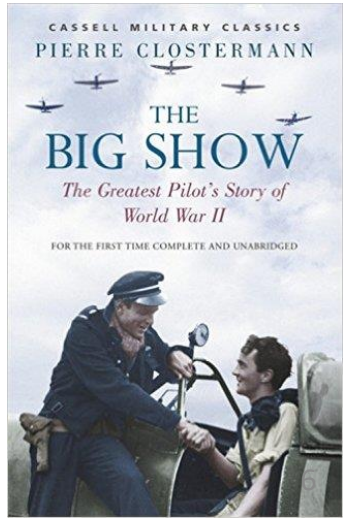
After the Battle of Britain, the Spitfire superseded the Hurricane to become the backbone of RAF Fighter Command, and saw action in the European, Mediterranean, Pacific and the South-East Asian theatres. Much loved by its pilots, the Spitfire served in several roles, including interceptor, photo-reconnaissance, fighter-bomber and trainer, and it continued to serve in these roles until the 1950s.

There are three books that I particularly recommend reading if you are a fan of the Spitfire:

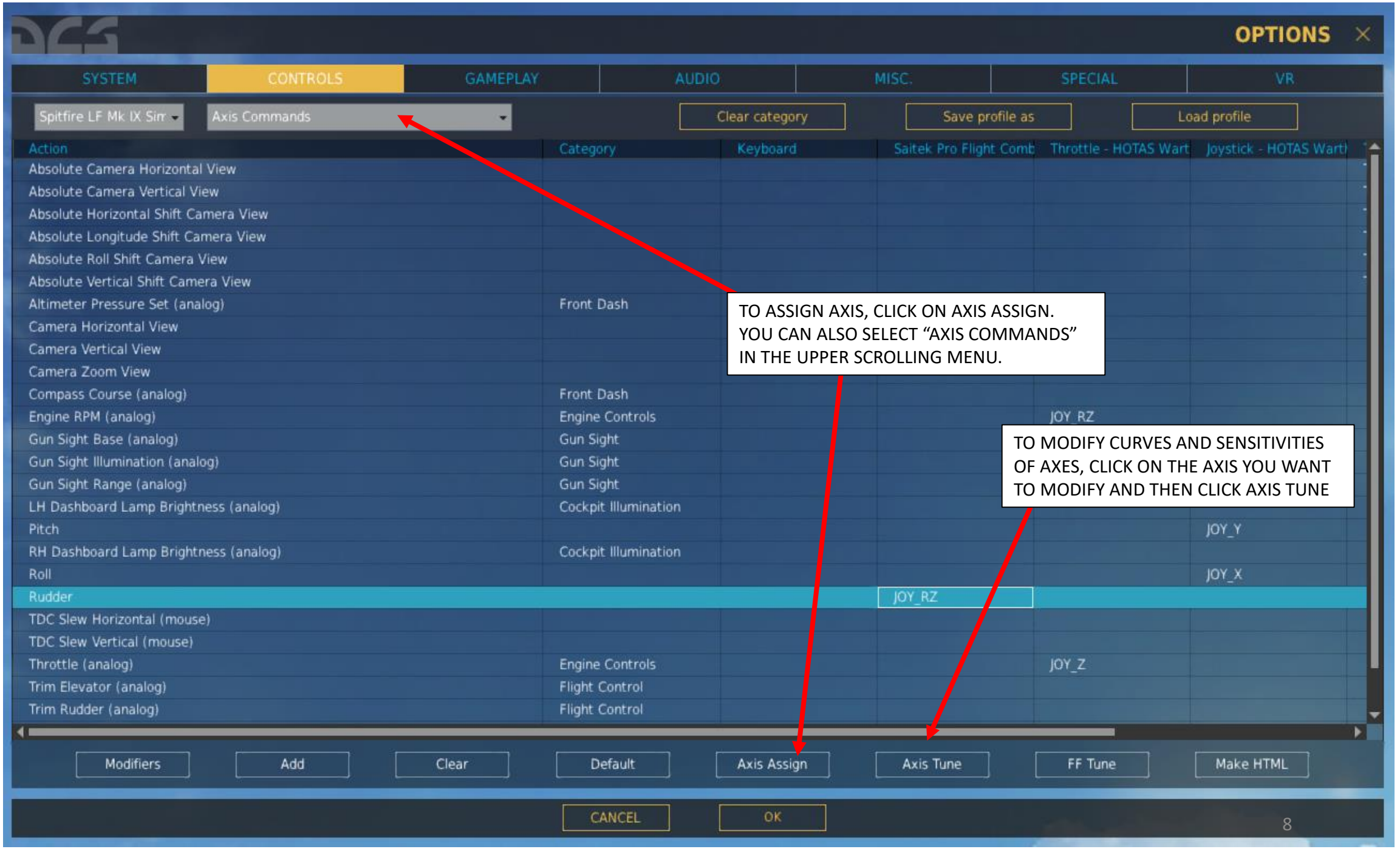
- *Spitfire: The History* by Eric B. Morgan and Edward Shacklady
- *The Big Show* by Pierre Clostermann
- *Spitfire Mk. IX & XVI Engineered* by Paul H. Monforton







CONTROL	FUNCTION
COMM – Push to Talk	Used to communicate on the radio
Drop Bombs	Use to drop bombs
Fire Machineguns and Cannons	Use to fire guns and cannons
Flaps (Toggle)	Used to extend/retract flaps
Gun Safety Lever (Toggle)	Toggles the gun safety
Show Fuel Contents	Hold this button to display fuel quantity on the Lower Fuel Tank Quantity Indicator
Trim Elevator NOSE UP / NOSE DOWN	Elevator Trim control
Trim Rudder LEFT / RIGHT	Rudder Trim Control
Undercarriage (Toggle)	Used to extend/retract landing gear
Wheel Brakes	Hold this lever to use pneumatic brakes (both wheels will brake)
Zoom In Slow	Used to zoom in pilot view
Zoom Out Slow	Used to zoom out pilot view
Booster Coil	Used for engine start (mapping to “DELETE” key is recommended to memorize key position in relationship to the “STARTER” button)
Starter	Used for engine start (mapping to “END” key is recommended to memorize key position in relationship to the “BOOSTER COIL” button)
Side Door (Toggle)	Used to open/close the side door. “RShift+C” binding is recommended.

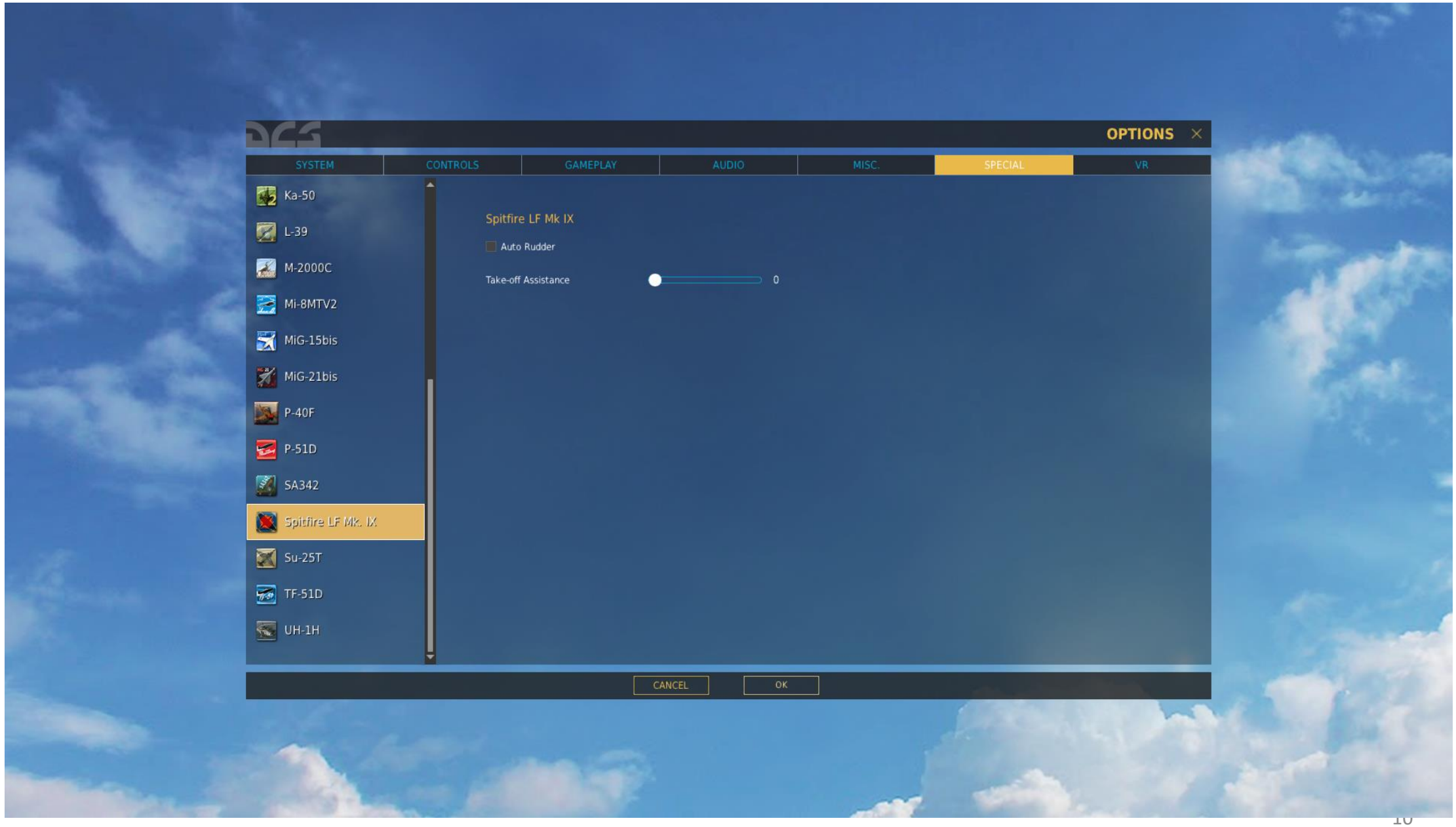

OPTIONS
SYSTEM
CONTROLS
GAMEPLAY
AUDIO
MISC.
SPECIAL
VR
Spitfire LF Mk IX Sim
Axis Commands
Clear category
Save profile as
Load profile
Action
Category
Keyboard
Saitek Pro Flight Comb
Throttle - HOTAS Wart
Joystick - HOTAS Wart
Absolute Camera Horizontal View
Absolute Camera Vertical View
Absolute Horizontal Shift Camera View
Absolute Longitude Shift Camera View
Absolute Roll Shift Camera View
Absolute Vertical Shift Camera View
Altimeter Pressure Set (analog) Front Dash
Camera Horizontal View
Camera Vertical View
Camera Zoom View
Compass Course (analog) Front Dash
Engine RPM (analog) Engine Controls JOY_RZ
Gun Sight Base (analog) Gun Sight
Gun Sight Illumination (analog) Gun Sight
Gun Sight Range (analog) Gun Sight
LH Dashboard Lamp Brightness (analog) Cockpit Illumination
Pitch JOY_Y
RH Dashboard Lamp Brightness (analog) Cockpit Illumination
Roll JOY_X
Rudder JOY_RZ
TDC Slew Horizontal (mouse)
TDC Slew Vertical (mouse)
Throttle (analog) Engine Controls JOY_Z
Trim Elevator (analog) Flight Control
Trim Rudder (analog) Flight Control
TO ASSIGN AXIS, CLICK ON AXIS ASSIGN.
YOU CAN ALSO SELECT “AXIS COMMANDS”
IN THE UPPER SCROLLING MENU.
TO MODIFY CURVES AND SENSITIVITIES
OF AXES, CLICK ON THE AXIS YOU WANT
TO MODIFY AND THEN CLICK AXIS TUNE
Modifiers
Add
Clear
Default
Axis Assign
Axis Tune
FF Tune
Make HTML
CANCEL
OK

Bind the following axes:

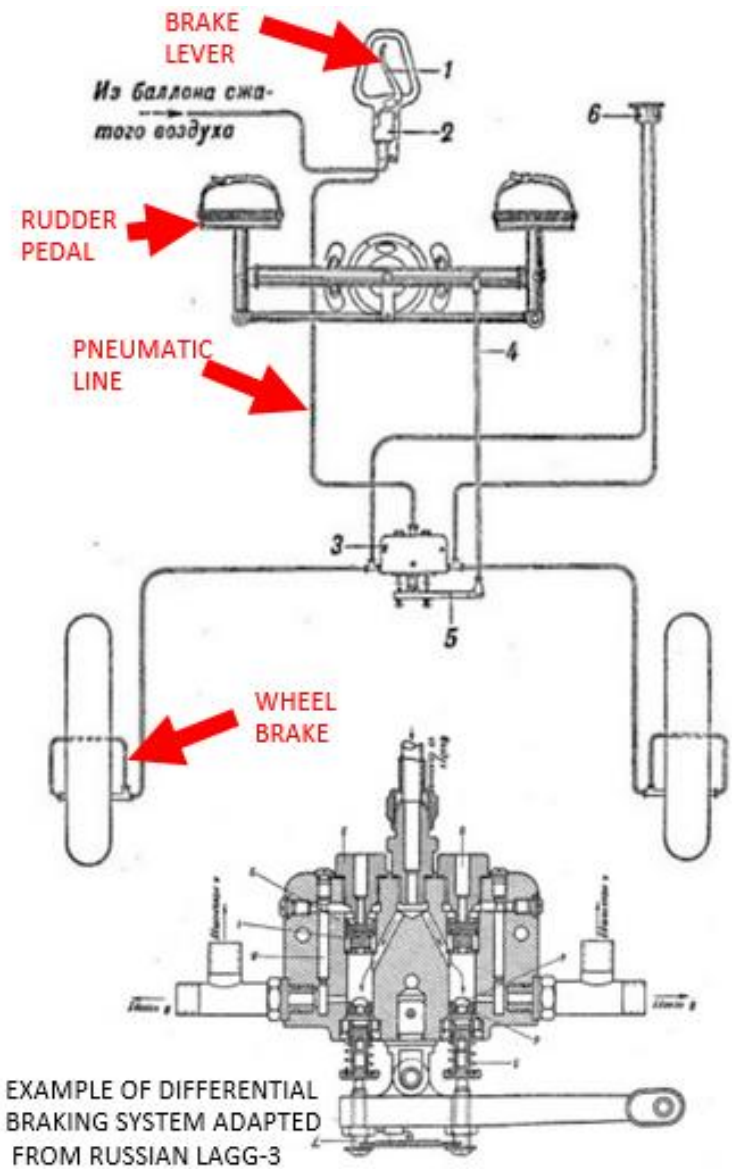
- ENGINE RPM (ANALOG) – CONTROLS RPM
- PITCH, ROLL, RUDDER (DEADZONE AT 5, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 15)
- THROTTLE (ANALOG) – CONTROLS MANIFOLD PRESSURE / BOOST

Engine RPM (analog)	Engine Controls			JOY_RZ	
Gun Sight Base (analog)	Gun Sight				
Gun Sight Illumination (analog)	Gun Sight				
Gun Sight Range (analog)	Gun Sight				
LH Dashboard Lamp Brightness (analog)	Cockpit Illumination				
Pitch					JOY_Y
RH Dashboard Lamp Brightness (analog)	Cockpit Illumination				
Roll					JOY_X
Rudder			JOY_RZ		
TDC Slew Horizontal (mouse)					
TDC Slew Vertical (mouse)					
Throttle (analog)	Engine Controls			JOY_Z	

In the “SPECIAL” tab, make sure that Take-Off Assistance is set to 0 and that Auto Rudder is unchecked.

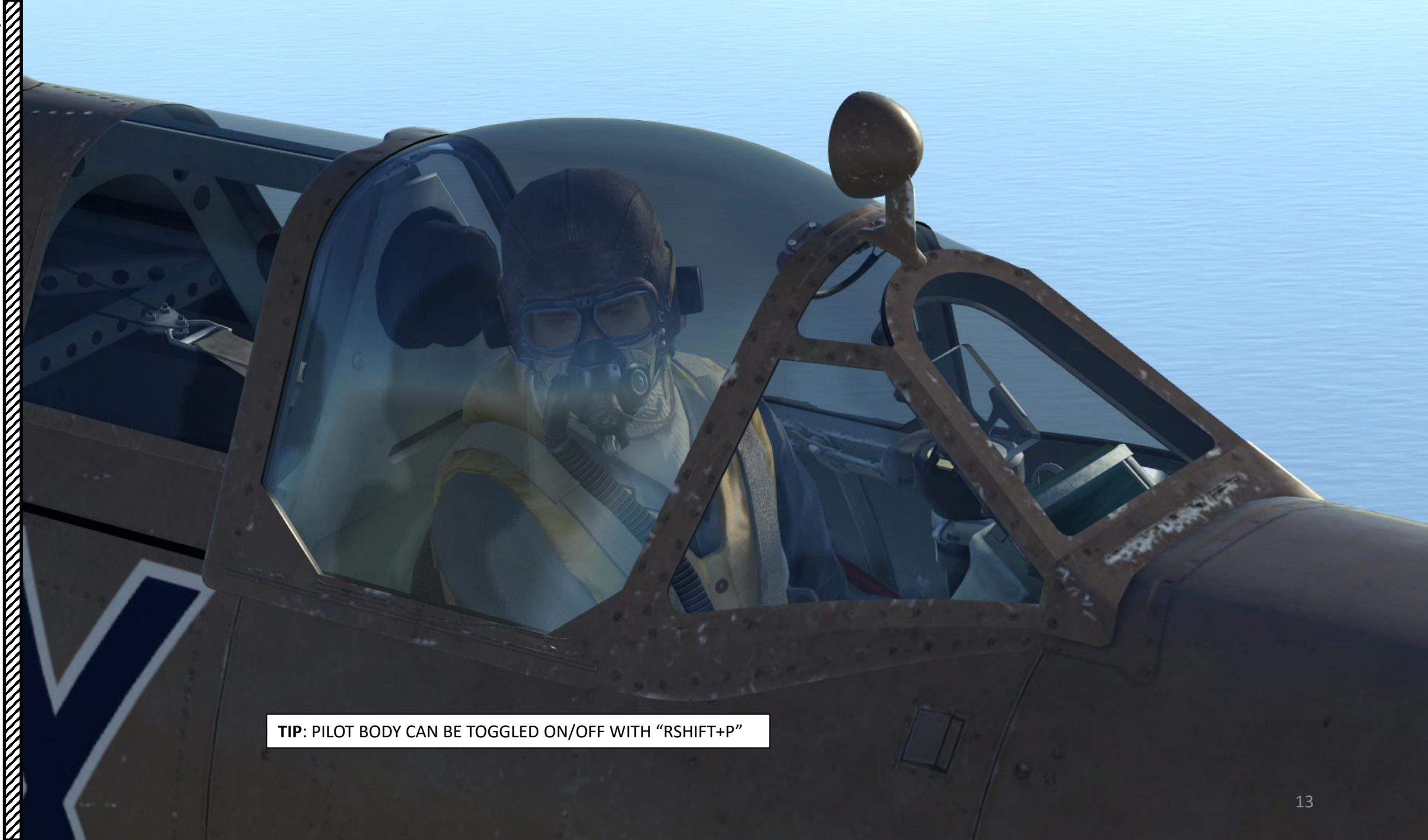


Braking is done by holding the braking lever while giving rudder input to steer the aircraft in the direction you want to turn. Make sure you have adequate RPM and Manifold Pressure settings or your turn radius will suffer. The Spitfire is a very tricky aircraft to taxi on the ground because of the narrow landing gear, the high power of the engine and poor cockpit visibility when taxiing. The best way to move safely on the tarmac is to give very gentle throttle input to ensure you maintain control of the aircraft while steering left and right once in a while to check for obstacles.



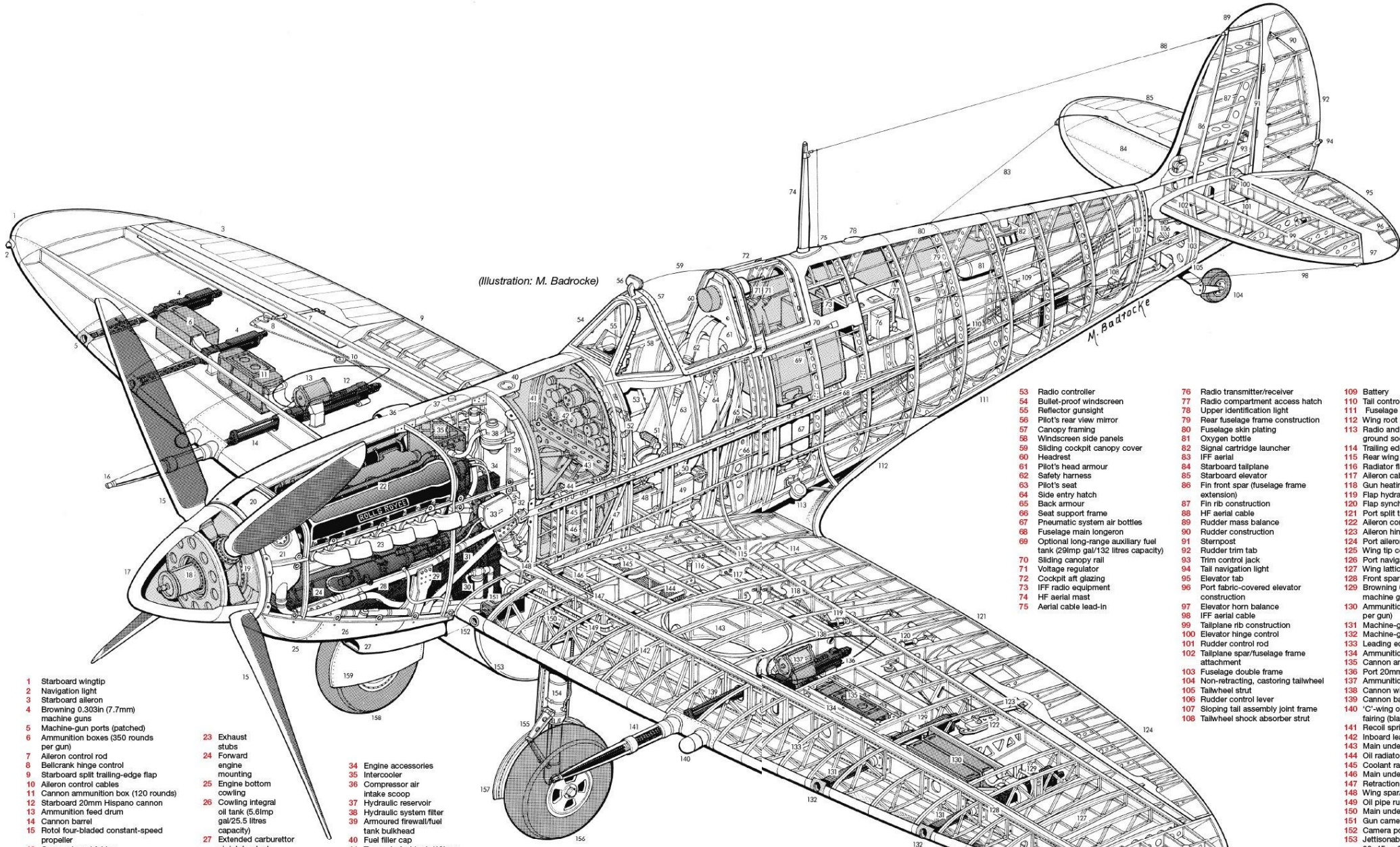
EXAMPLE OF DIFFERENTIAL BRAKING SYSTEM ADAPTED FROM RUSSIAN LAGG-3

PART 3 – COCKPIT & GAUGES

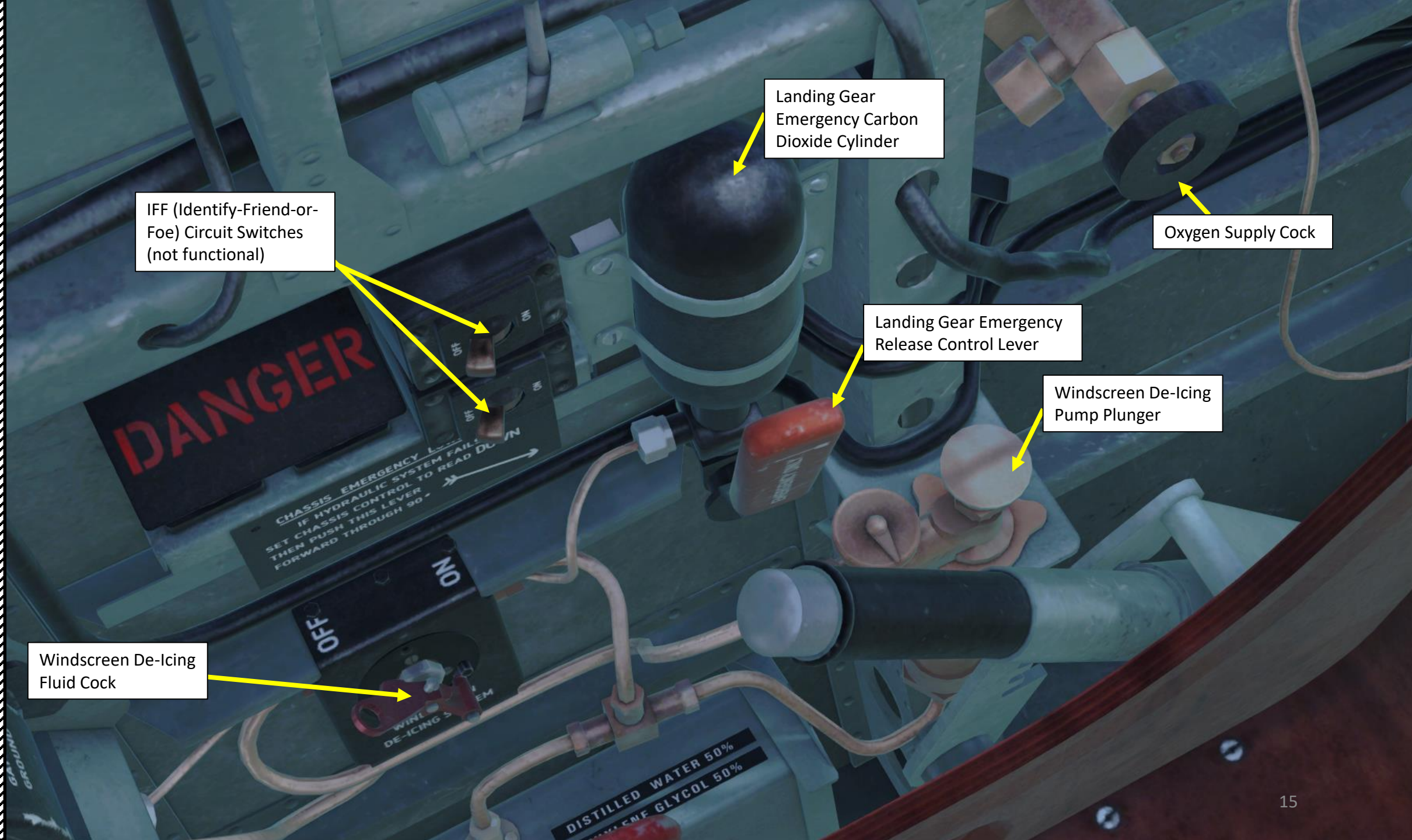


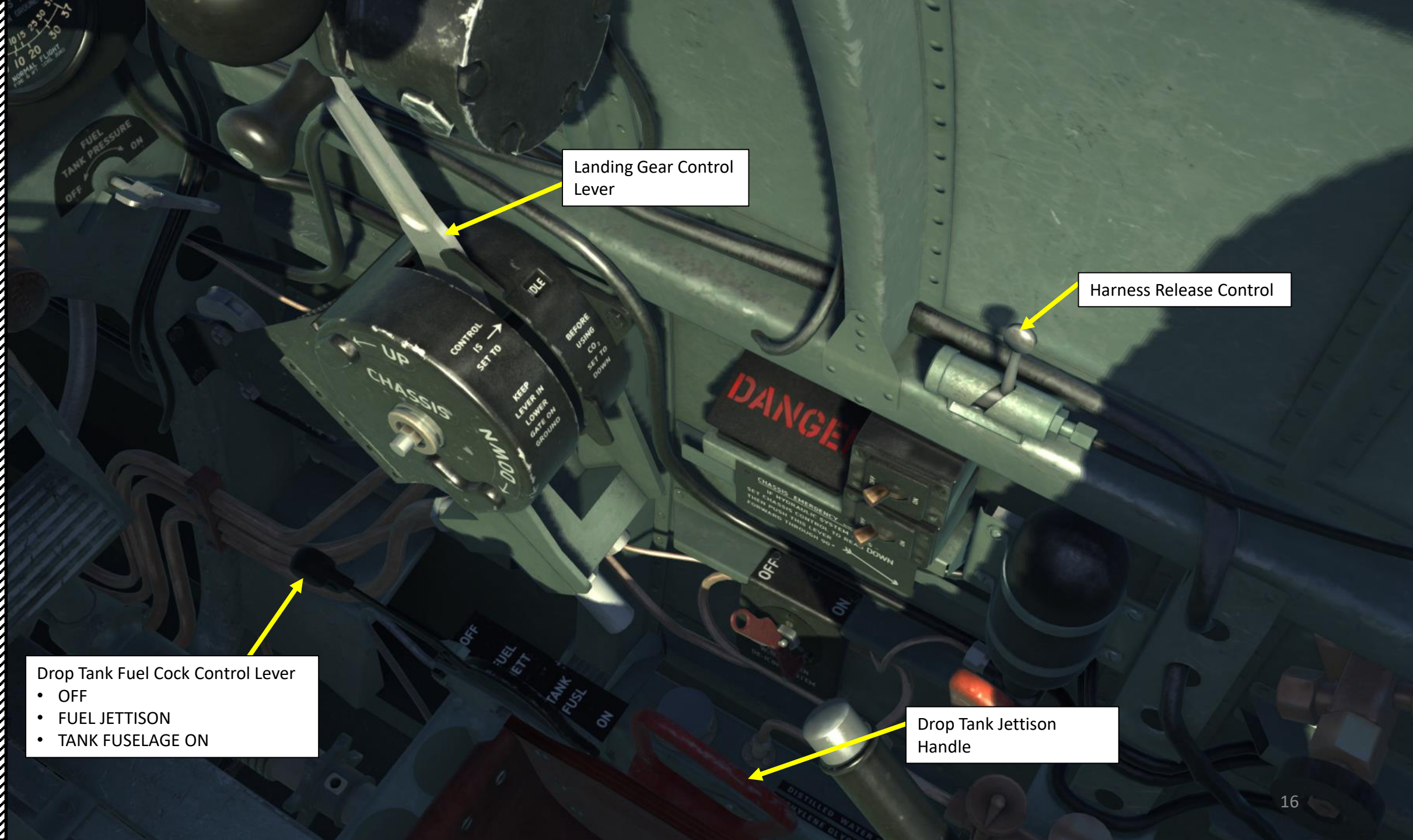
TIP: PILOT BODY CAN BE TOGGLED ON/OFF WITH “RSHIFT+P”

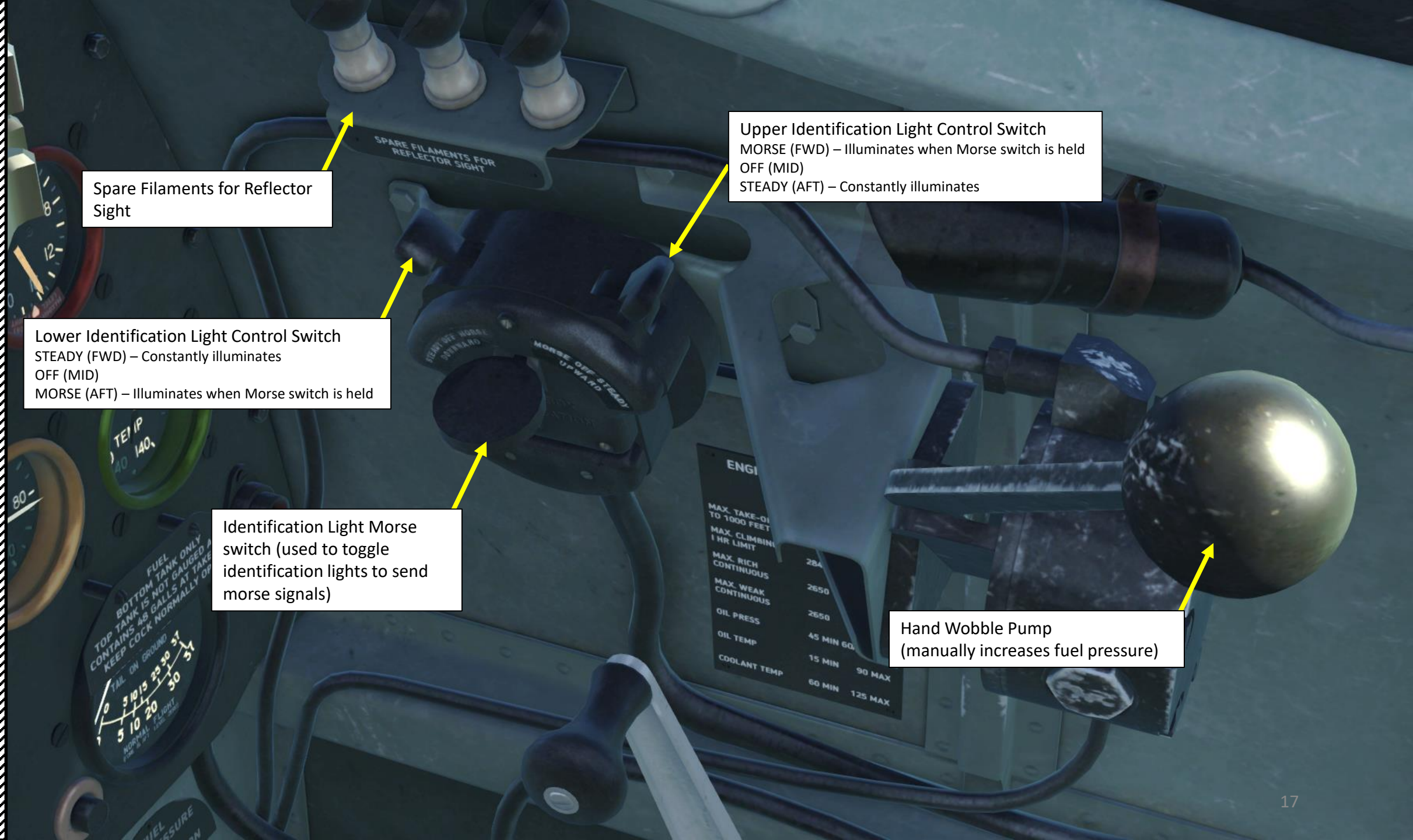
PART 3 – COCKPIT & GAUGES



1 Starboard wingtip
2 Navigation light
3 Starboard aileron
4 Browning 0.303in (7.7mm) machine guns
5 Machine-gun ports (patched)
6 Ammunition boxes (350 rounds per gun)
7 Aileron control rod
8 Bellcrank hinge control
9 Starboard split trailing-edge flap
10 Aileron control cables
11 Cannon ammunition box (120 rounds)
12 Starboard 20mm Hispano cannon
13 Ammunition feed drum
14 Cannon barrel
15 Rotol four-bladed constant-speed propeller
16 Cannon barrel fairing
17 Spinner
18 Propeller hub pitch control mechanism
19 Armoured spinner
20 Cooling system header tank
21 Coolant filler cap
22 Rolls-Royce Merlin 61 liquid-cooled 12-cylinder Vee piston engine
23 Exhaust stubs
24 Forward engine mounting
25 Engine bottom cowling
26 Cowling integral oil tank (5.6Imp gal/25.5 litres capacity)
27 Extended carburettor air intake duct
28 Engine bearer struts
29 Main engine mounting member
30 Oil filter
31 Two-stage supercharger
32 Engine bearer attachment
33 Suppressor
34 Engine accessories
35 Intercooler
36 Compressor air intake scoop
37 Hydraulic reservoir
38 Hydraulic system filter
39 Armoured firewall/fuel tank bulkhead
40 Fuel filler cap
41 Top main fuel tank (48Imp gal/218 litres capacity)
42 Back of instrument panel
43 Compass mounting
44 Fuel tank/longeron attachment fitting
45 Bottom main fuel tank (37Imp gal/168 litres capacity)
46 Rudder pedal bar
47 Sloping fuel tank bulkhead
48 Fuel cock control
49 Chart case
50 Trim control handwheel
51 Engine throttle and propeller controls
52 Control column handgrip
53 Radio controller
54 Bullet-proof windscreen
55 Reflector gunsight
56 Pilot's rear view mirror
57 Canopy framing
58 Windscreen side panels
59 Sliding cockpit canopy cover
60 Headrest
61 Pilot's head armour
62 Safety harness
63 Pilot's seat
64 Side entry hatch
65 Back armour
66 Seat support frame
67 Pneumatic system air bottles
68 Fuselage main longeron
69 Optional long-range auxiliary fuel tank (29Imp gal/132 litres capacity)
70 Sliding canopy rail
71 Voltage regulator
72 Cockpit aft glazing
73 IFF radio equipment
74 HF aerial mast
75 Aerial cable lead-in
76 Radio transmitter/receiver
77 Radio compartment access hatch
78 Upper identification light
79 Rear fuselage frame construction
80 Fuselage skin plating
81 Oxygen bottle
82 Signal cartridge launcher
83 IFF aerial
84 Starboard tailplane
85 Starboard elevator
86 Fin front spar (fuselage frame extension)
87 Fin rib construction
88 HF aerial cable
89 Rudder mass balance
90 Rudder construction
91 Sternpost
92 Rudder trim tab
93 Trim control jack
94 Tail navigation light
95 Elevator tab
96 Port fabric-covered elevator construction
97 Elevator horn balance
98 IFF aerial cable
99 Tailplane rib construction
100 Elevator hinge control
101 Rudder control rod
102 Tailplane spar/fuselage frame attachment
103 Fuselage double frame
104 Non-retracting, castoring tailwheel
105 Tailwheel strut
106 Rudder control lever
107 Sloping tail assembly joint frame
108 Tailwheel shock absorber strut
109 Battery
110 Tail control cable runs
111 Fuselage bottom longeron
112 Wing root trailing edge fillet
113 Radio and electrical system ground socket
114 Trailing edge flap shroud ribs
115 Rear wing spar
116 Radiator flap jack
117 Aileron cable runs
118 Gun heating air duct
119 Flap hydraulic jack
120 Flap synchronising jack
121 Port split trailing-edge flap
122 Aileron control bellcrank
123 Aileron hinge control rod
124 Port aileron construction
125 Wing tip construction
126 Port navigation light
127 Wing lattice rib construction
128 Front spar
129 Browning 0.303in (7.7mm) machine guns
130 Ammunition boxes (350 rounds per gun)
131 Machine-gun muzzle blast tubes
132 Machine-gun ports (patched)
133 Leading edge nose ribs
134 Ammunition box armour protection
135 Cannon ammunition box (120 rounds)
136 Port 20mm Hispano cannon
137 Ammunition feed drum
138 Cannon wing fairing
139 Cannon barrel
140 'C'-wing outboard cannon muzzle fairing (blanked-off)
141 Recoil spring
142 Inboard leading edge lattice ribs
143 Main undercarriage wheel well
144 Oil radiator
145 Coolant radiator
146 Main undercarriage retraction jack
147 Retraction link
148 Wing spar/fuselage attachment joint
149 Oil pipe runs to radiator
150 Main undercarriage leg pintle
151 Gun camera
152 Camera port
153 Jettisonable slipper tank, capacity 30, 45 or 90 Imp gal (136, 205 or 409 litres)
154 Mainwheel oleo damper
155 Undercarriage torque links
156 Port mainwheel
157 Mainwheel fairing door
158 Starboard mainwheel
159 Starboard wheel fairing door


Landing Gear Emergency Carbon Dioxide Cylinder
IFF (Identify-Friend-or-Foe) Circuit Switches (not functional)
Oxygen Supply Cock
Landing Gear Emergency Release Control Lever
Windscreen De-Icing Pump Plunger
Windscreen De-Icing Fluid Cock
DANGER
OFF
ON
DISTILLED WATER 50%


Landing Gear Control Lever
Harness Release Control
Drop Tank Fuel Cock Control Lever
• OFF
• FUEL JETTISON
• TANK FUSELAGE ON
Drop Tank Jettison Handle
UP
CHASSIS
DOWN
CONTROL IS SET TO
KEEP LEVER IN LOWER GATE ON GROUND
BEFORE USING CO2 SET TO DOWN
IDLE
FUEL TANK PRESSURE
OFF
ON
DANGE
OFF
ON
TANK FUSL
ON



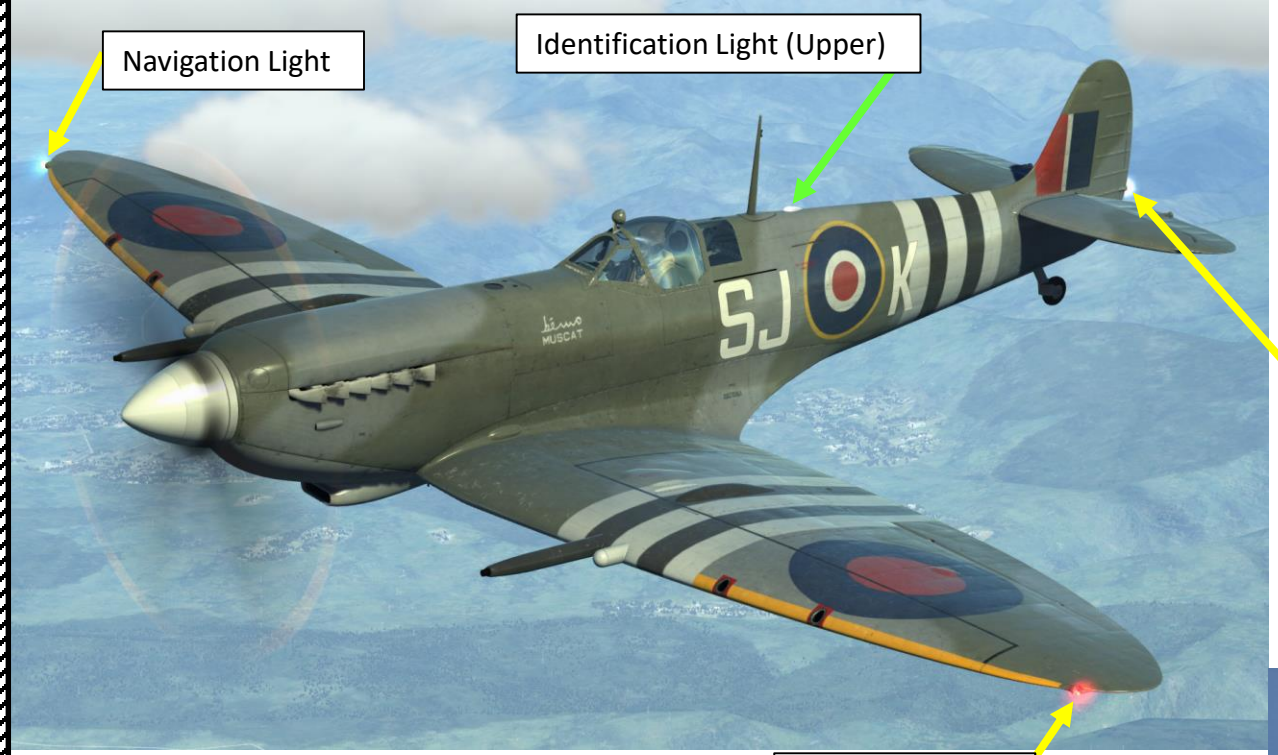
Spare Filaments for Reflector Sight

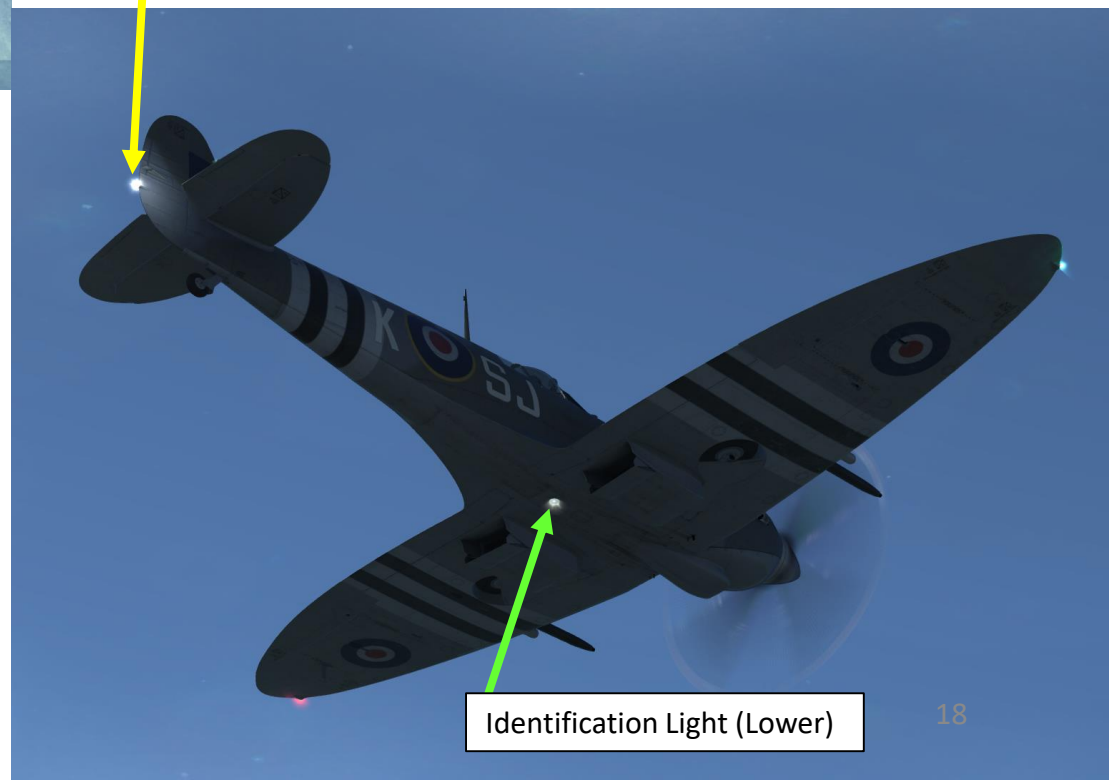
Upper Identification Light Control Switch
MORSE (FWD) – Illuminates when Morse switch is held
OFF (MID)
STEADY (AFT) – Constantly illuminates

Lower Identification Light Control Switch
STEADY (FWD) – Constantly illuminates
OFF (MID)
MORSE (AFT) – Illuminates when Morse switch is held

Identification Light Morse switch (used to toggle identification lights to send morse signals)

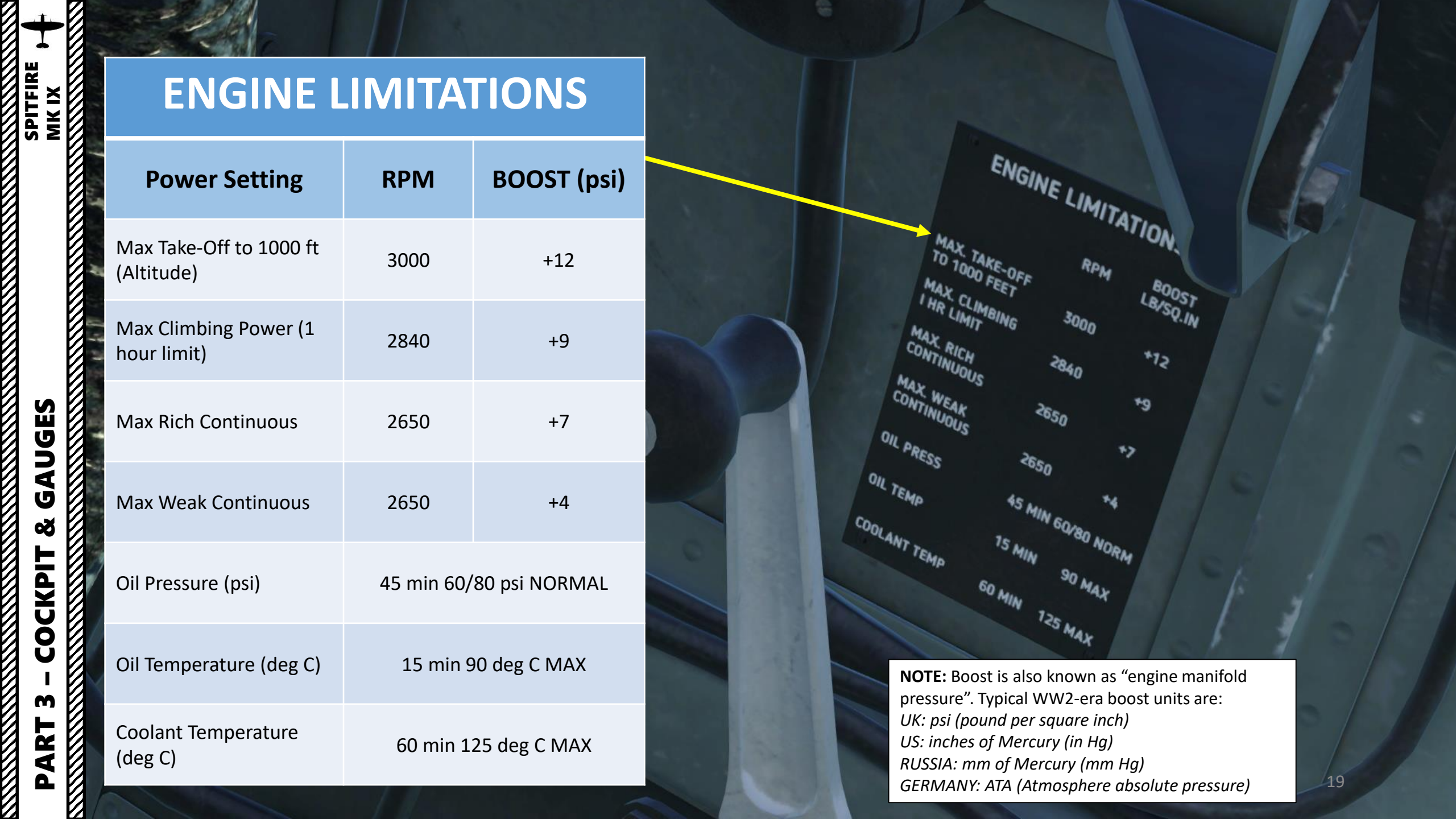
Hand Wobble Pump
(manually increases fuel pressure)


Navigation Light
Identification Light (Upper)
Navigation Light

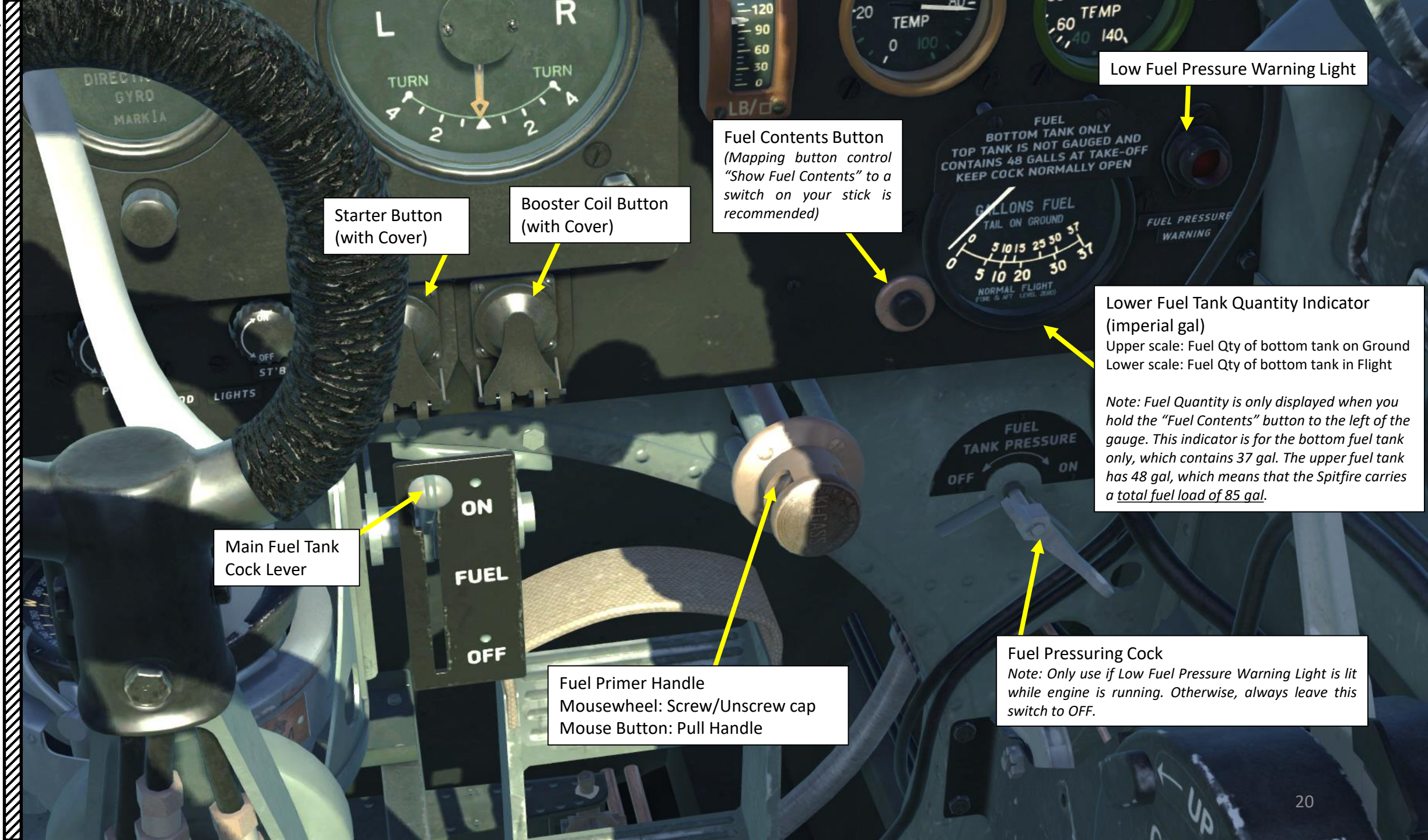

Navigation Light
Identification Light (Lower)

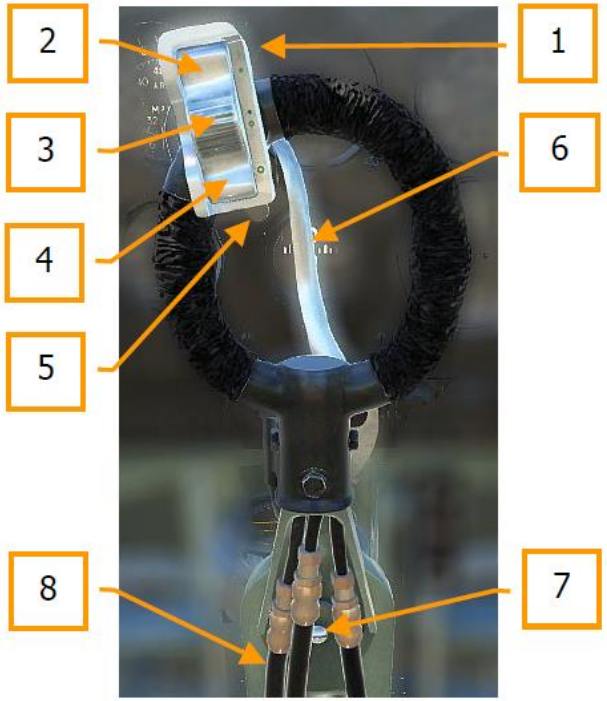
ENGINE LIMITATIONS

Power Setting	RPM	BOOST (psi)
Max Take-Off to 1000 ft (Altitude)	3000	+12
Max Climbing Power (1 hour limit)	2840	+9
Max Rich Continuous	2650	+7
Max Weak Continuous	2650	+4
Oil Pressure (psi)	45 min 60/80 psi NORMAL	
Oil Temperature (deg C)	15 min 90 deg C MAX	
Coolant Temperature (deg C)	60 min 125 deg C MAX	



NOTE: Boost is also known as “engine manifold pressure”. Typical WW2-era boost units are:
UK: psi (pound per square inch)
US: inches of Mercury (in Hg)
RUSSIA: mm of Mercury (mm Hg)
GERMANY: ATA (Atmosphere absolute pressure)


Low Fuel Pressure Warning Light
Fuel Contents Button
(Mapping button control "Show Fuel Contents" to a switch on your stick is recommended)
Starter Button (with Cover)
Booster Coil Button (with Cover)
Lower Fuel Tank Quantity Indicator (imperial gal)
Upper scale: Fuel Qty of bottom tank on Ground
Lower scale: Fuel Qty of bottom tank in Flight
Note: Fuel Quantity is only displayed when you hold the "Fuel Contents" button to the left of the gauge. This indicator is for the bottom fuel tank only, which contains 37 gal. The upper fuel tank has 48 gal, which means that the Spitfire carries a total fuel load of 85 gal.
Main Fuel Tank Cock Lever
Fuel Primer Handle
Mousewheel: Screw/Unscrew cap
Mouse Button: Pull Handle
Fuel Pressuring Cock
Note: Only use if Low Fuel Pressure Warning Light is lit while engine is running. Otherwise, always leave this switch to OFF.
ON
FUEL
OFF
FUEL TANK PRESSURE
FUEL PRESSURE WARNING
FUEL
BOTTOM TANK ONLY
TOP TANK IS NOT GAUGED AND CONTAINS 48 GALLS AT TAKE-OFF
KEEP COCK NORMALLY OPEN
GALLONS FUEL
TAIL ON GROUND
NORMAL FLIGHT
TURN
TEMP

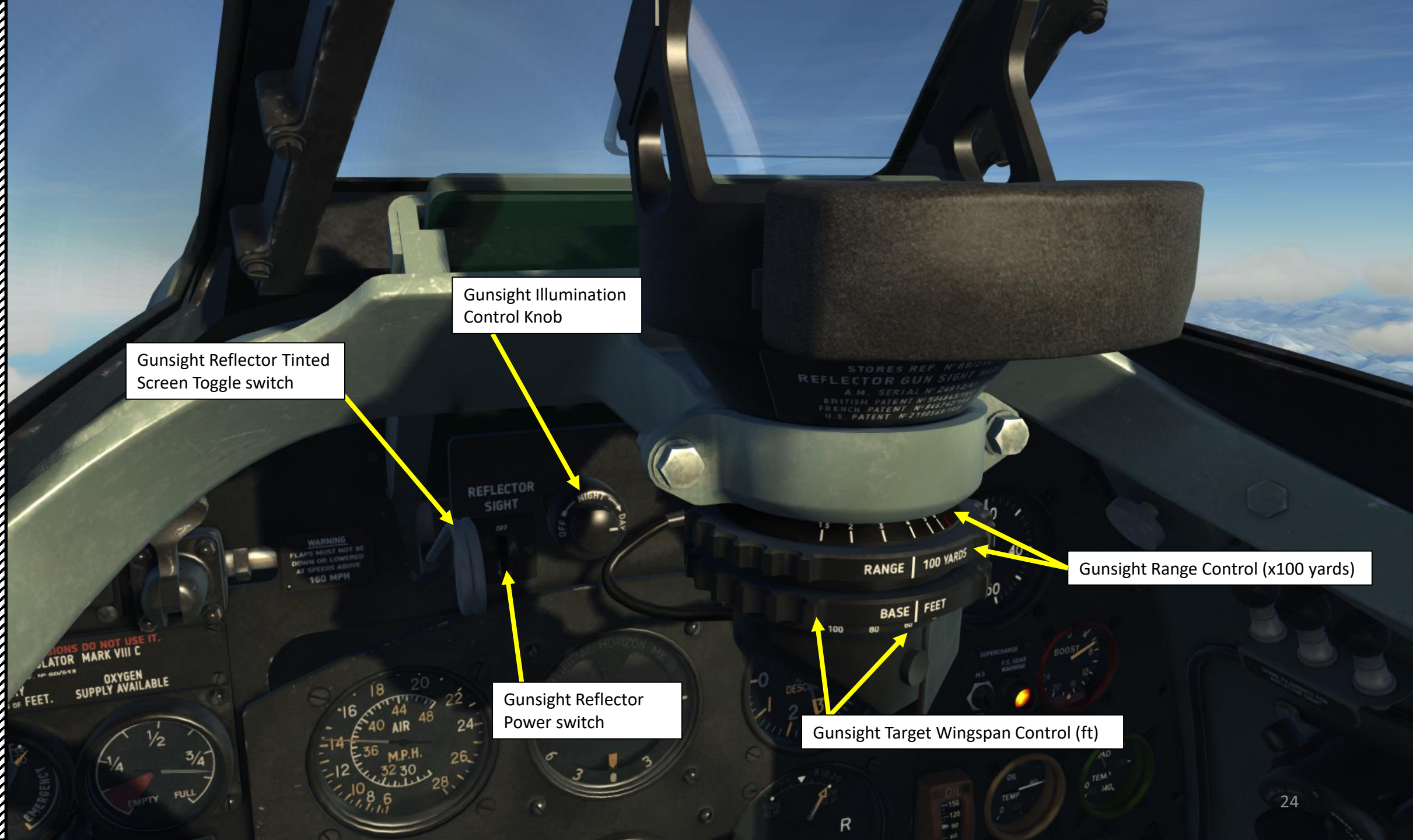


1. 3-Stage trigger
2. MG-trigger
3. Fire all weapons trigger
4. Guns trigger
5. Gun safety switch
6. Brake lever
7. Joint to the upper stick part
8. Pneumatic connection to the guns

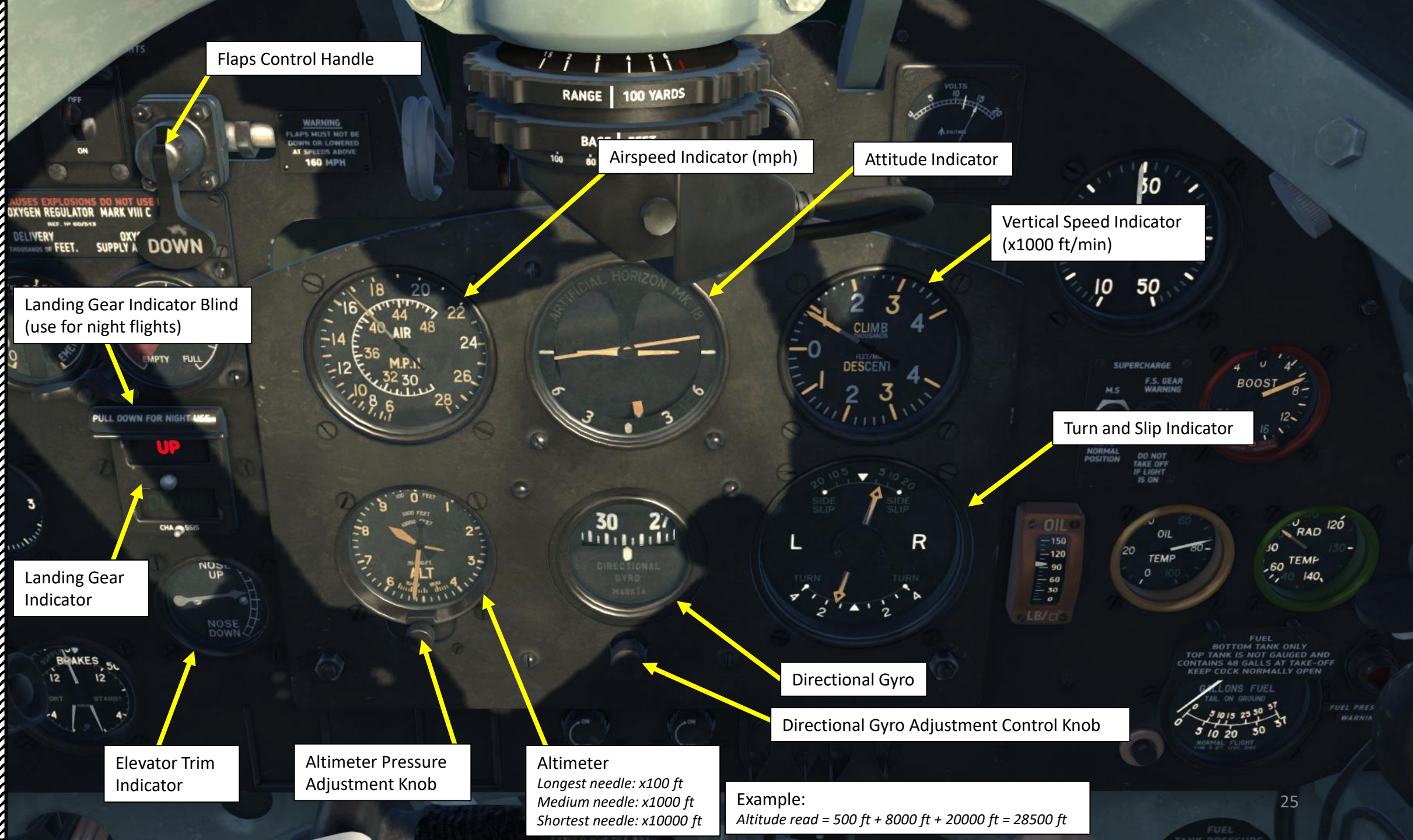
Figure 25: Control grip

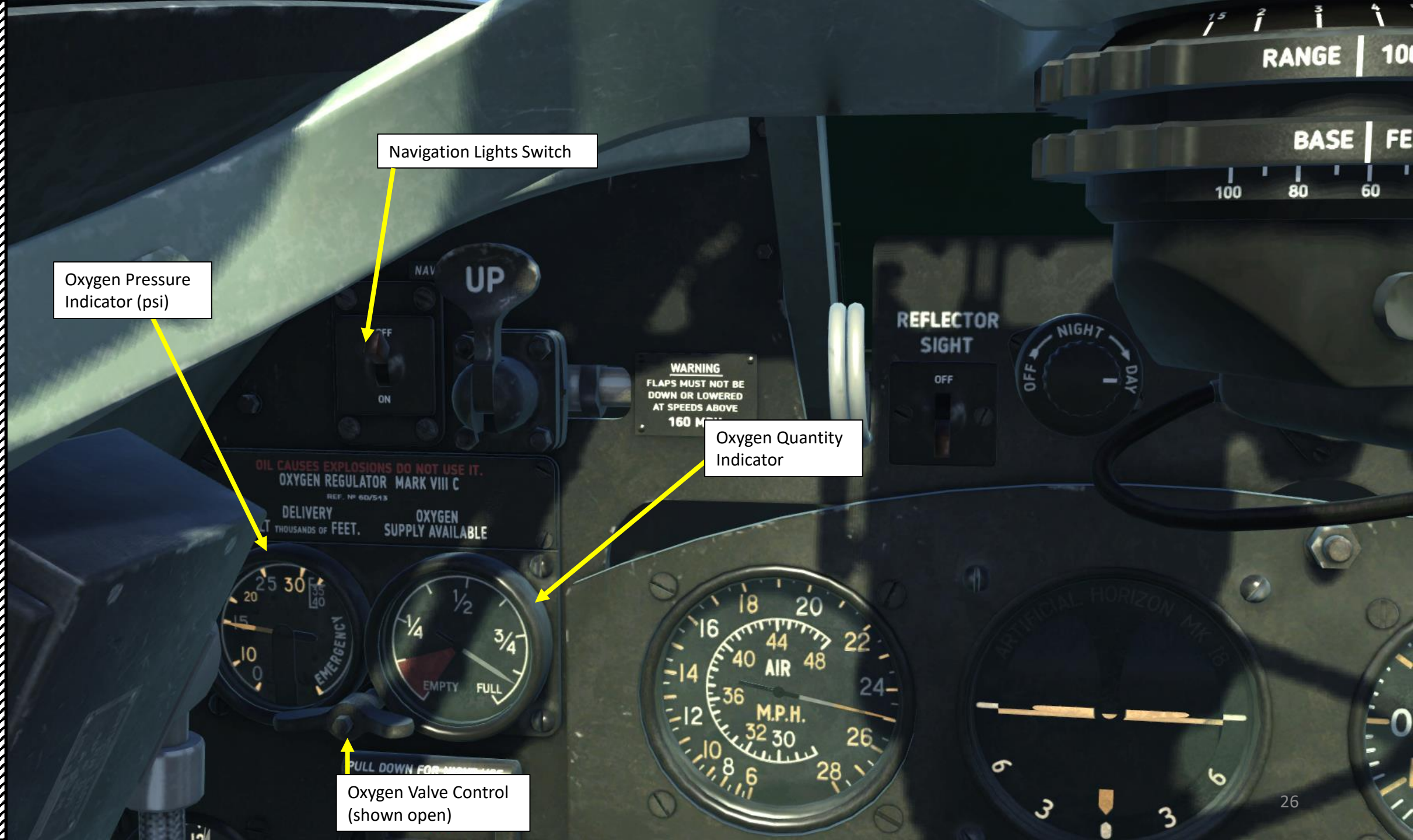

Voltmeter (Volts)
Tachometer (x100 RPM)
Supercharger Second Gear Warning Light
Boost Indicator (psi)
Water Radiator Temperature Indicator (deg C)
Supercharger Mode Selector
MS: Forced Manual Shift to First Gear
AUTO: Automatic Gear Shifting
Oil Pressure Indicator (psi)
Oil Radiator Temperature Indicator (deg C)
VOLTS
RPM
SUPERCHARGE
M.S
F.S. GEAR WARNING
AUTO NORMAL POSITION
DO NOT TAKE OFF IF LIGHT IS ON
BOOST
OIL
TEMP
SIDE SLIP
TURN


Gunsight

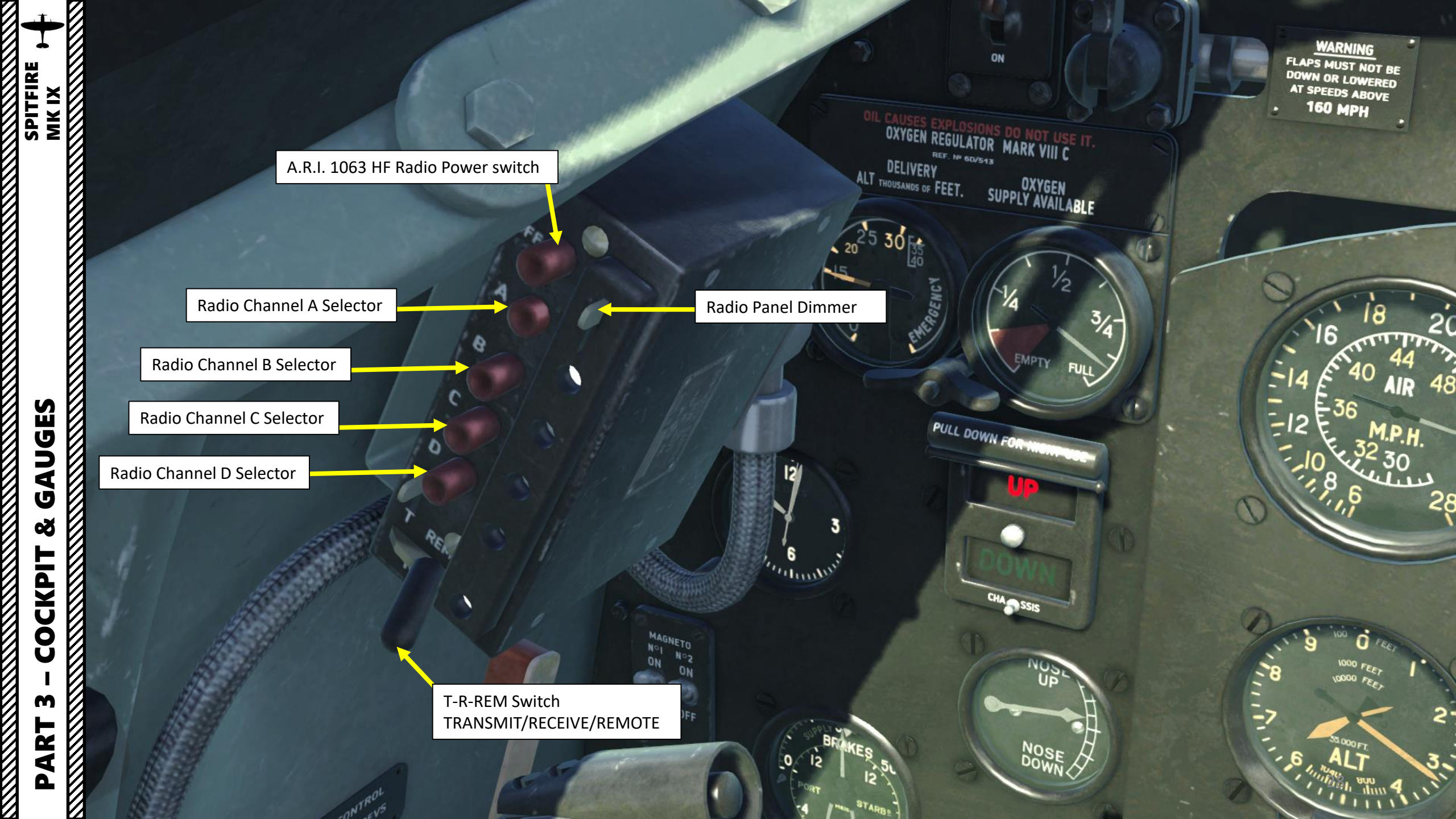

Gunsight Illumination Control Knob
Gunsight Reflector Tinted Screen Toggle switch
Gunsight Range Control (x100 yards)
Gunsight Reflector Power switch
Gunsight Target Wingspan Control (ft)
REFLECTOR SIGHT
RANGE | 100 YARDS
BASE | FEET
REFLECTOR GUN SIGHT
WARNING
FLAPS MUST NOT BE DOWN OR LOWERED AT SPEEDS ABOVE 160 MPH
OXYGEN SUPPLY AVAILABLE
M.P.H.
AIR

PART 3 – COCKPIT & GAUGES

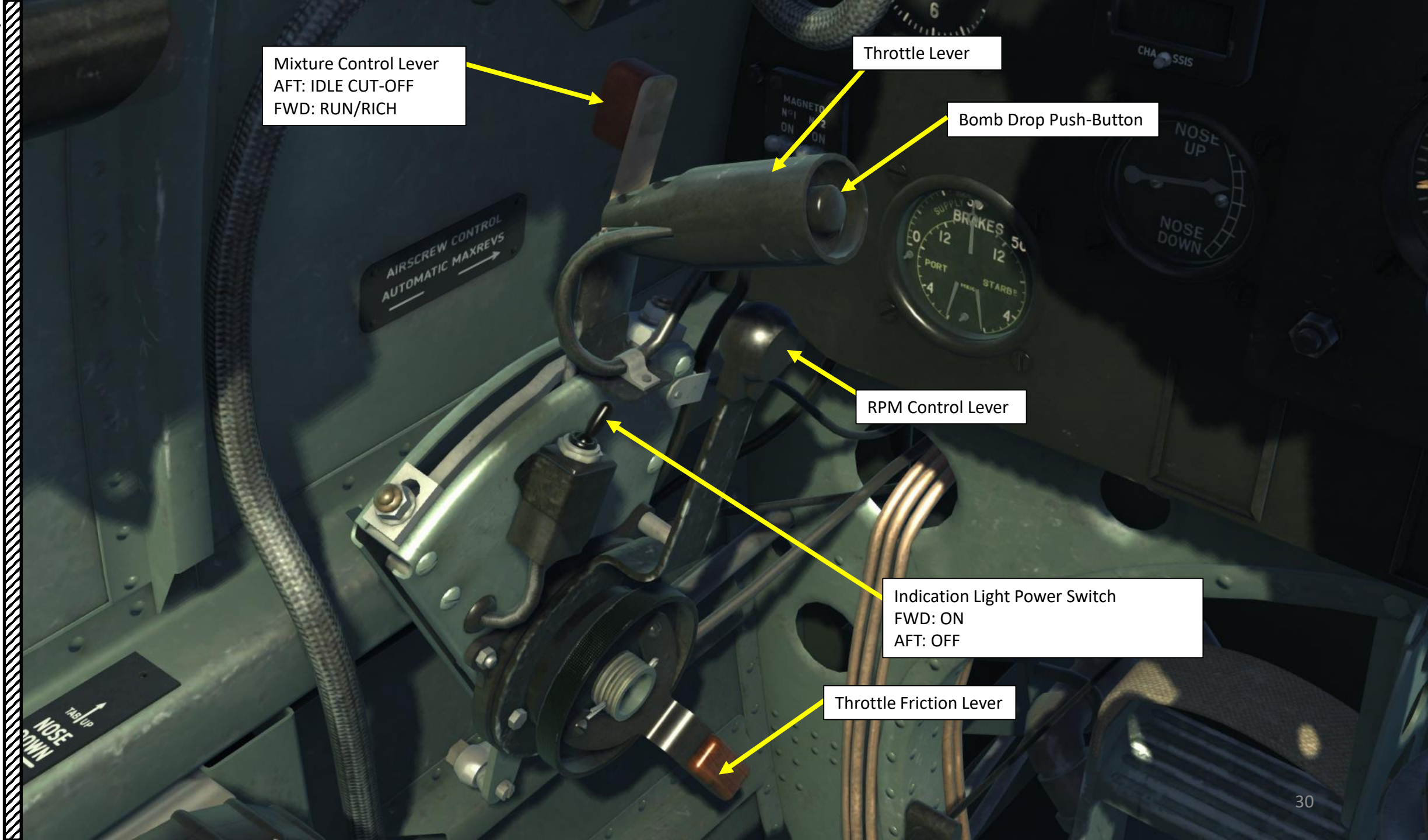


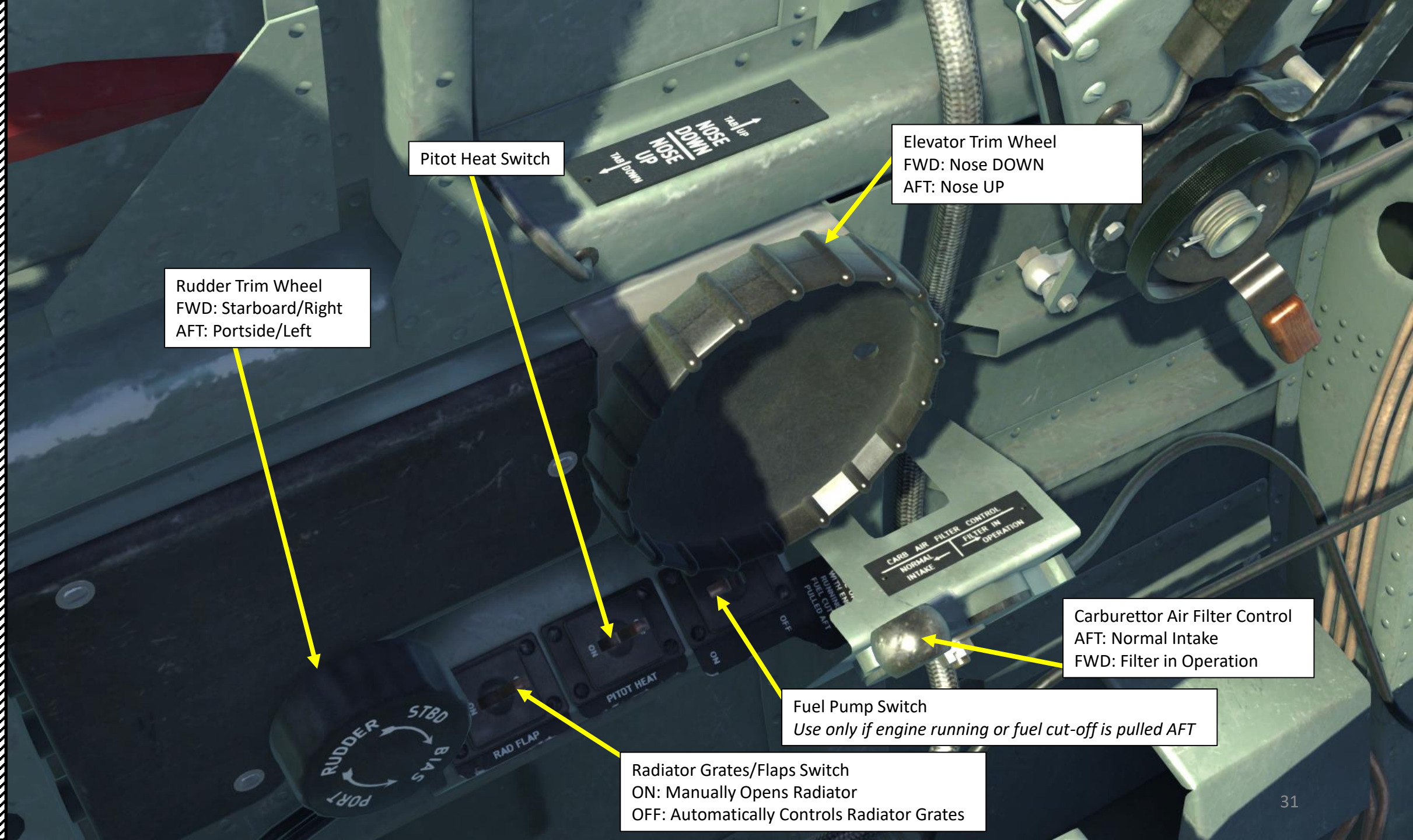

Navigation Lights Switch
Oxygen Pressure Indicator (psi)
Oxygen Quantity Indicator
Oxygen Valve Control (shown open)
NAV
UP
OFF
ON
WARNING
FLAPS MUST NOT BE DOWN OR LOWERED AT SPEEDS ABOVE
160
REFLECTOR SIGHT
OFF
NIGHT
DAY
OIL CAUSES EXPLOSIONS DO NOT USE IT.
OXYGEN REGULATOR MARK VIII C
DELIVERY
THOUSANDS OF FEET.
OXYGEN SUPPLY AVAILABLE
EMERGENCY
EMPTY
FULL
AIR
M.P.H.
RANGE
BASE


Clock
Brake Pneumatic Pressure Indicator (psi)
Magneto 1 and 2
UP
DOWN
AIR
M.P.H.
ALT
NOSE DOWN
BRAKES
DIRECTIONAL GYRO
OUT FIRE
IN SAFE


A.R.I. 1063 HF Radio Power switch
Radio Channel A Selector
Radio Panel Dimmer
Radio Channel B Selector
Radio Channel C Selector
Radio Channel D Selector
T-R-REM Switch
TRANSMIT/RECEIVE/REMOTE
WARNING
FLAPS MUST NOT BE DOWN OR LOWERED AT SPEEDS ABOVE 160 MPH
OIL CAUSES EXPLOSIONS DO NOT USE IT.
OXYGEN REGULATOR MARK VIII C
DELIVERY
OXYGEN SUPPLY AVAILABLE
EMERGENCY
EMPTY
FULL
PULL DOWN FOR
UP
DOWN
CHASSIS
AIR
M.P.H.
ALT
NOSE UP
NOSE DOWN
MAGNETO
BRAKES

PART 3 – COCKPIT & GAUGES


Mixture Control Lever
AFT: IDLE CUT-OFF
FWD: RUN/RICH
Throttle Lever
Bomb Drop Push-Button
RPM Control Lever
Indication Light Power Switch
FWD: ON
AFT: OFF
Throttle Friction Lever
AIRSCREW CONTROL
AUTOMATIC MAXREVS
BRAKES
PORT
NOSE UP
NOSE DOWN



Pitot Heat Switch

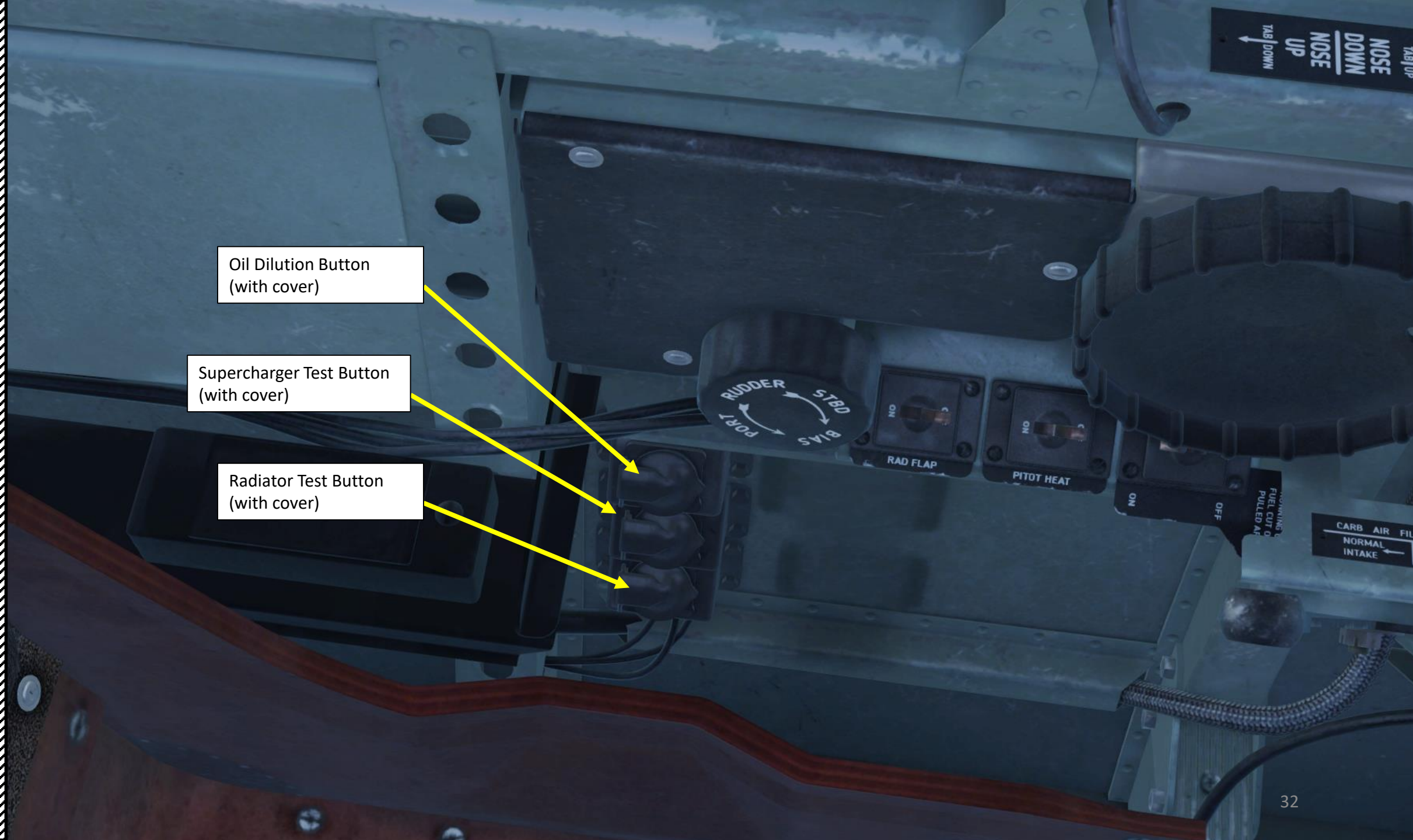
Elevator Trim Wheel
FWD: Nose DOWN
AFT: Nose UP

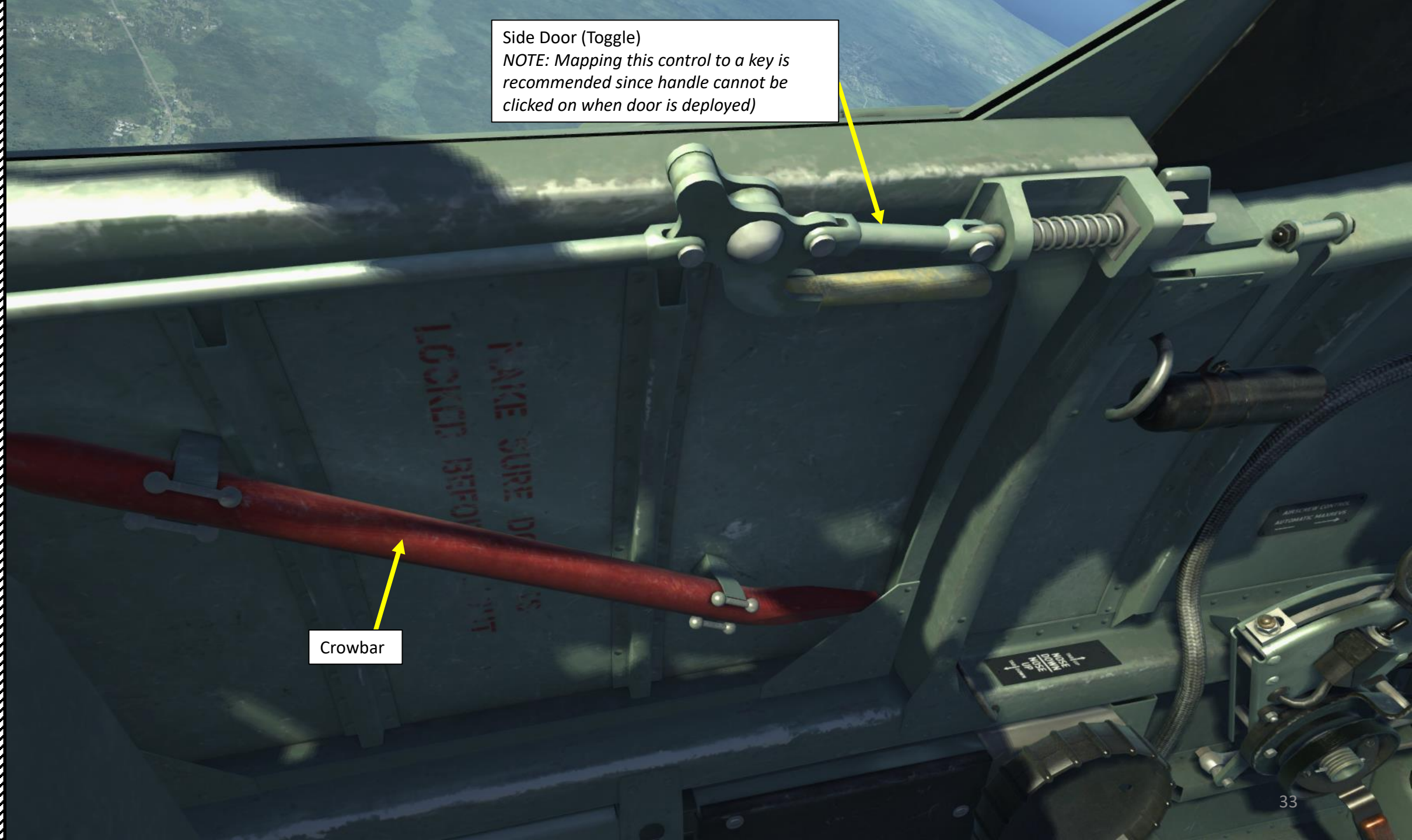
Rudder Trim Wheel
FWD: Starboard/Right
AFT: Portside/Left

Carburettor Air Filter Control
AFT: Normal Intake
FWD: Filter in Operation

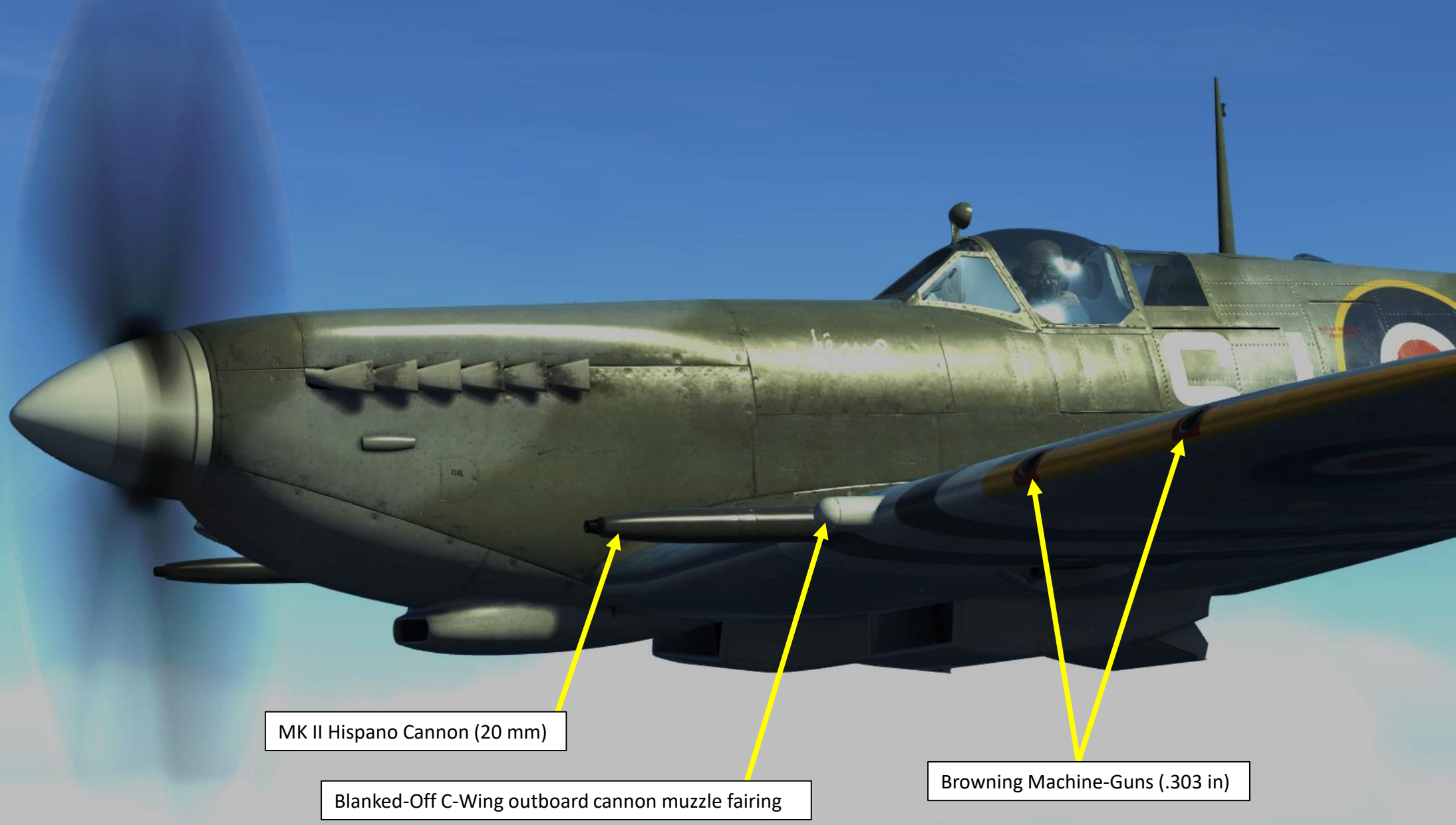
Fuel Pump Switch
Use only if engine running or fuel cut-off is pulled AFT

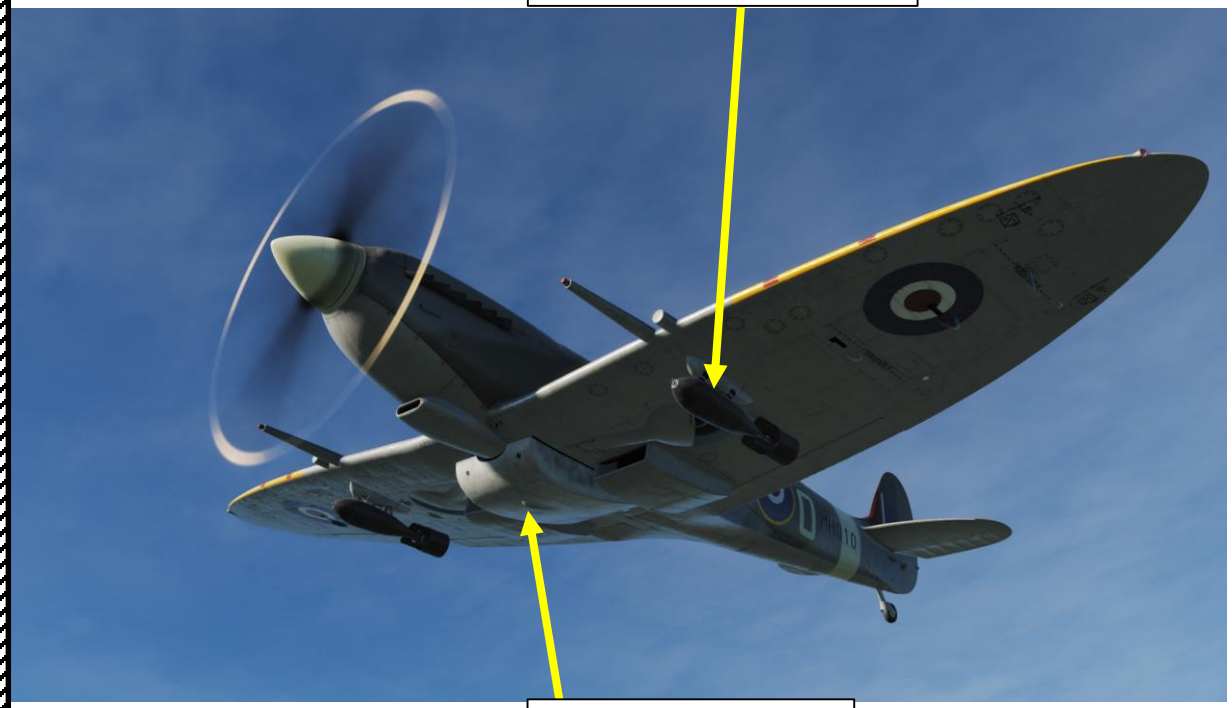
Radiator Grates/Flaps Switch
ON: Manually Opens Radiator
OFF: Automatically Controls Radiator Grates


Oil Dilution Button (with cover)
Supercharger Test Button (with cover)
Radiator Test Button (with cover)
RUDDER
PORT
STBD
BIAS
RAD FLAP
PITOT HEAT
ON
OFF
NOSE DOWN
NOSE UP
TAB DOWN
CARB AIR
NORMAL INTAKE

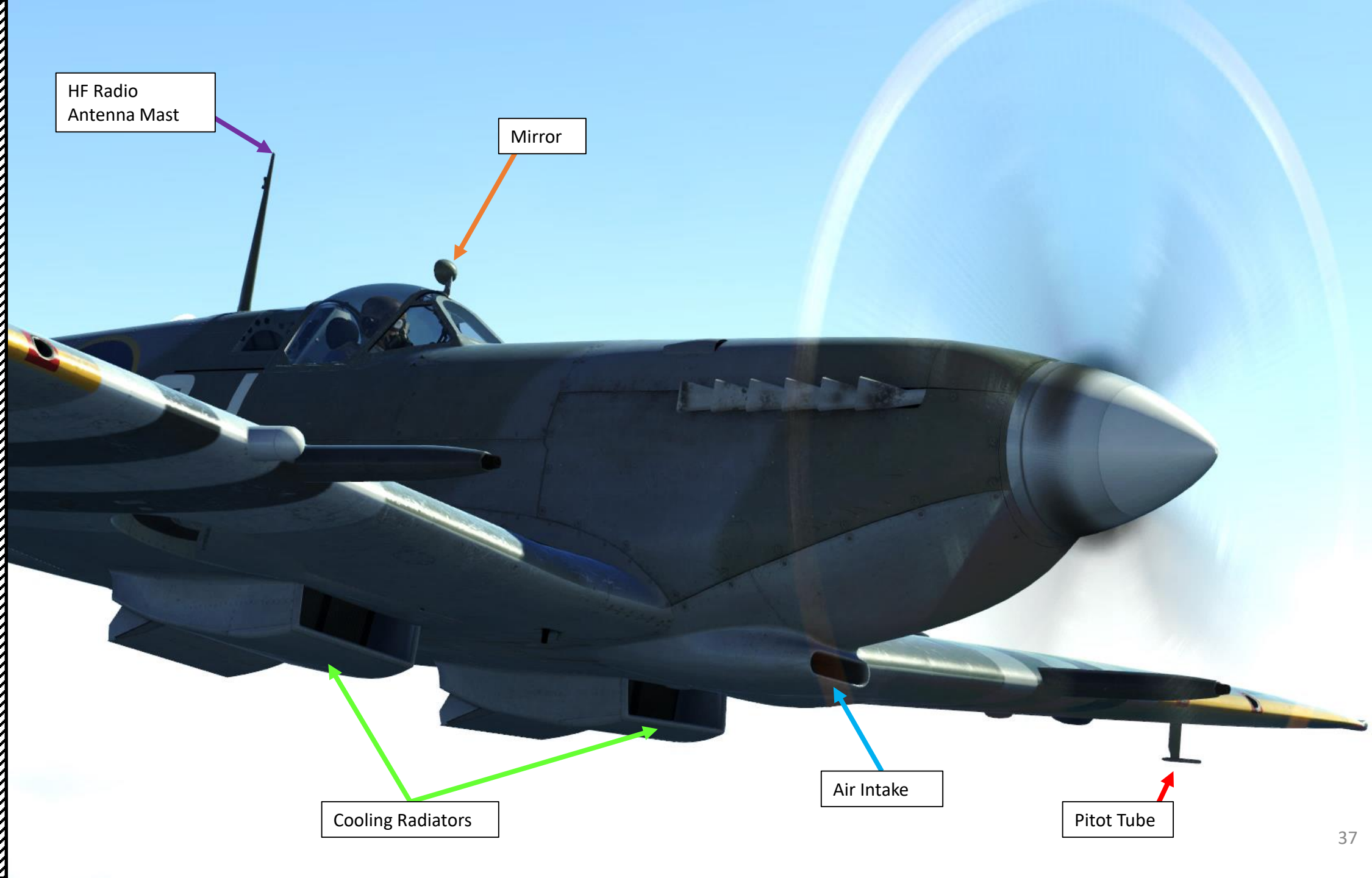

Side Door (Toggle)
NOTE: Mapping this control to a key is recommended since handle cannot be clicked on when door is deployed)
Crowbar

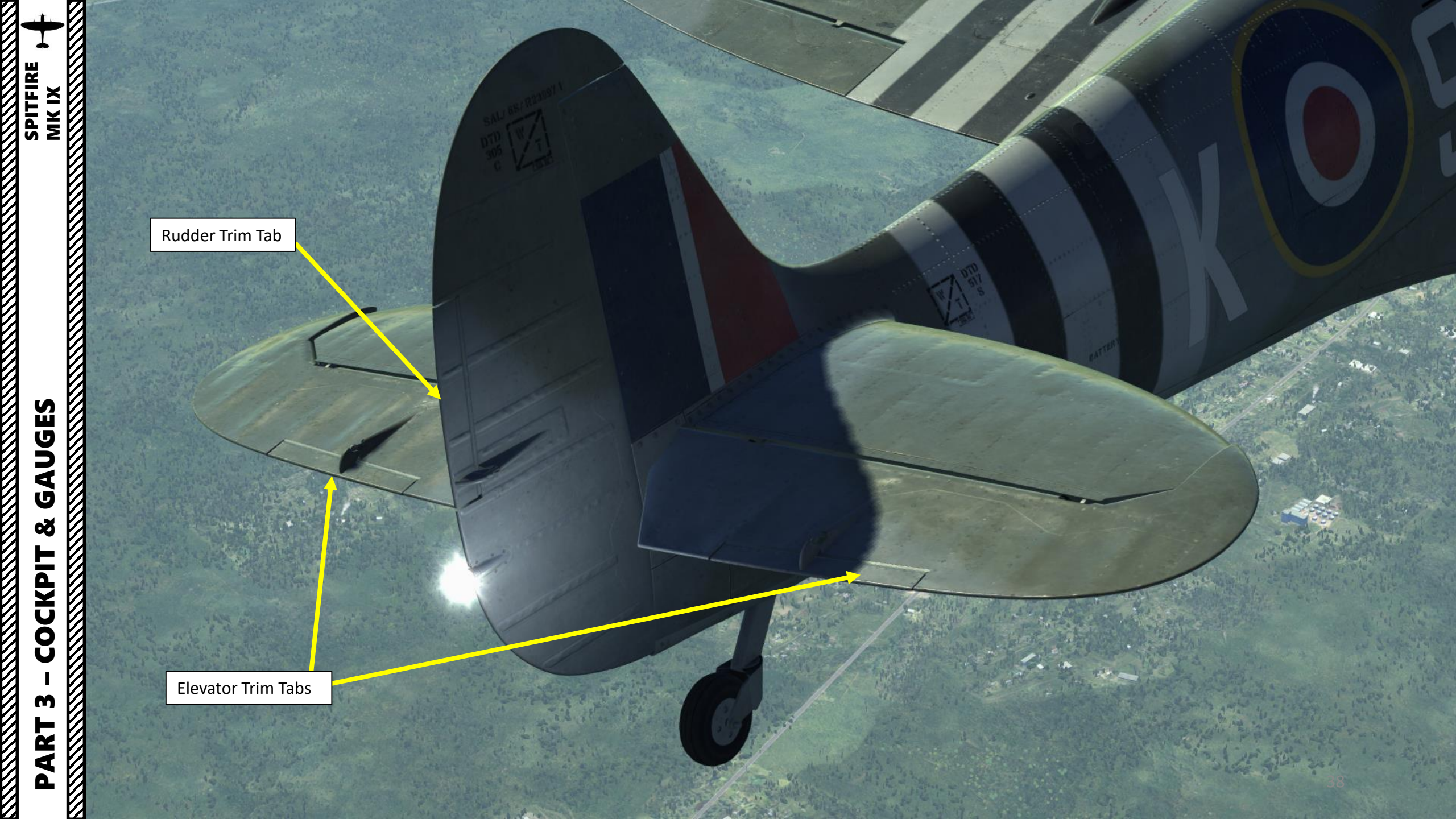

Mirror
Canopy Jettison Handle
Canopy Handle

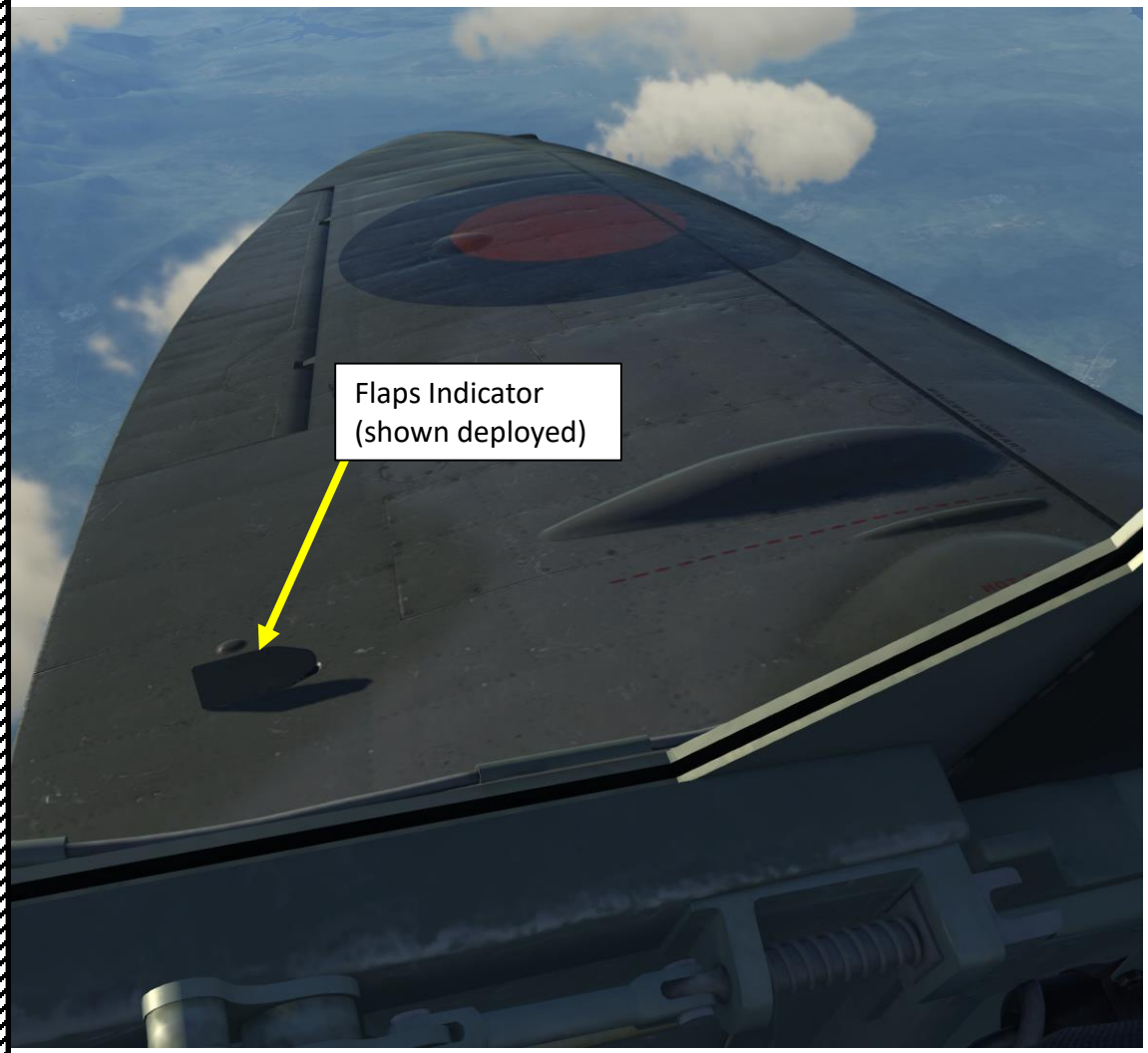

MK II Hispano Cannon (20 mm)
Blanked-Off C-Wing outboard cannon muzzle fairing
Browning Machine-Guns (.303 in)

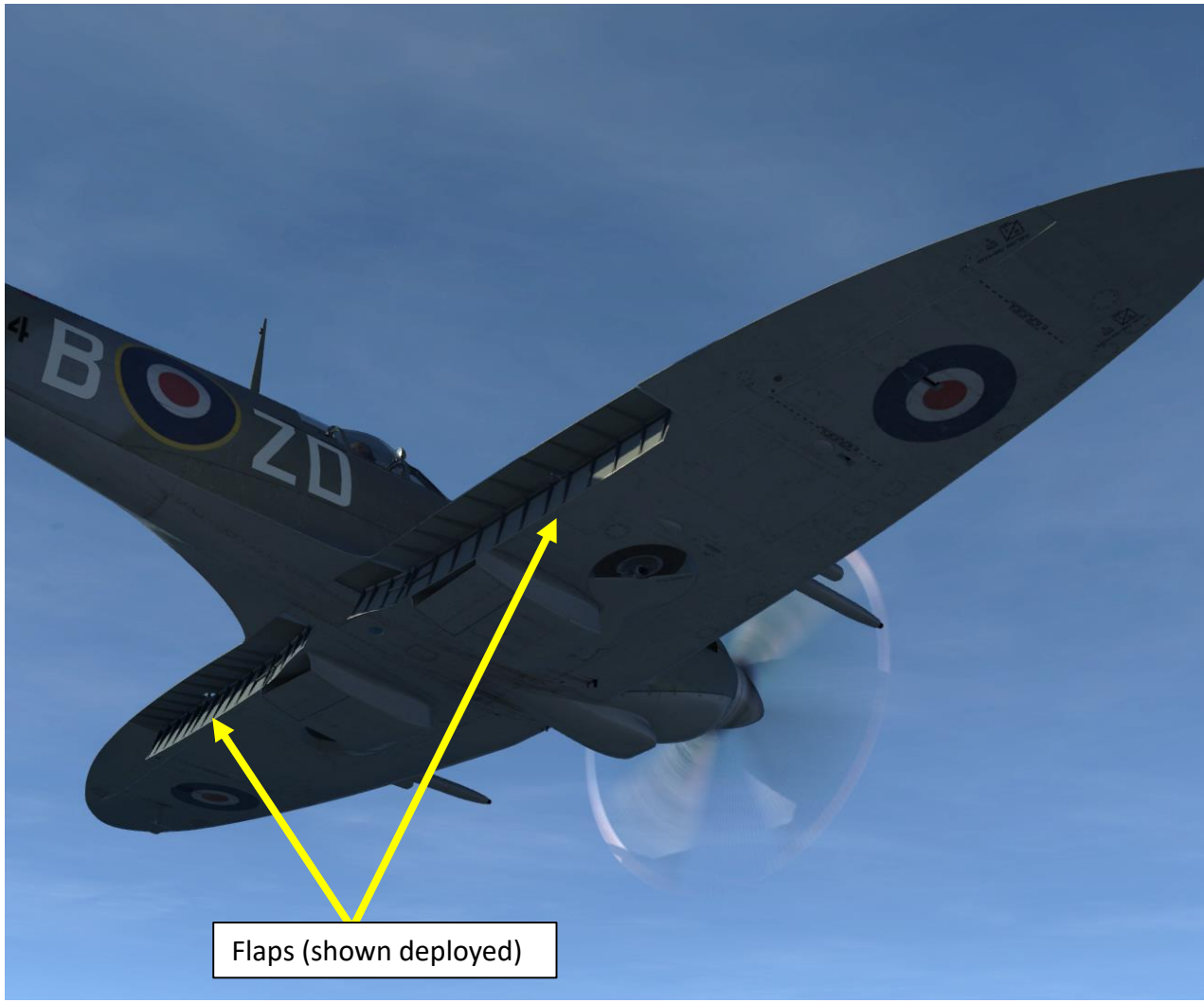

GB-GP 250 Lbs MK4 Bomb
45 gallons “Slipper” External Fuel Tank


45 gallons “Torpedo” External Fuel Tank

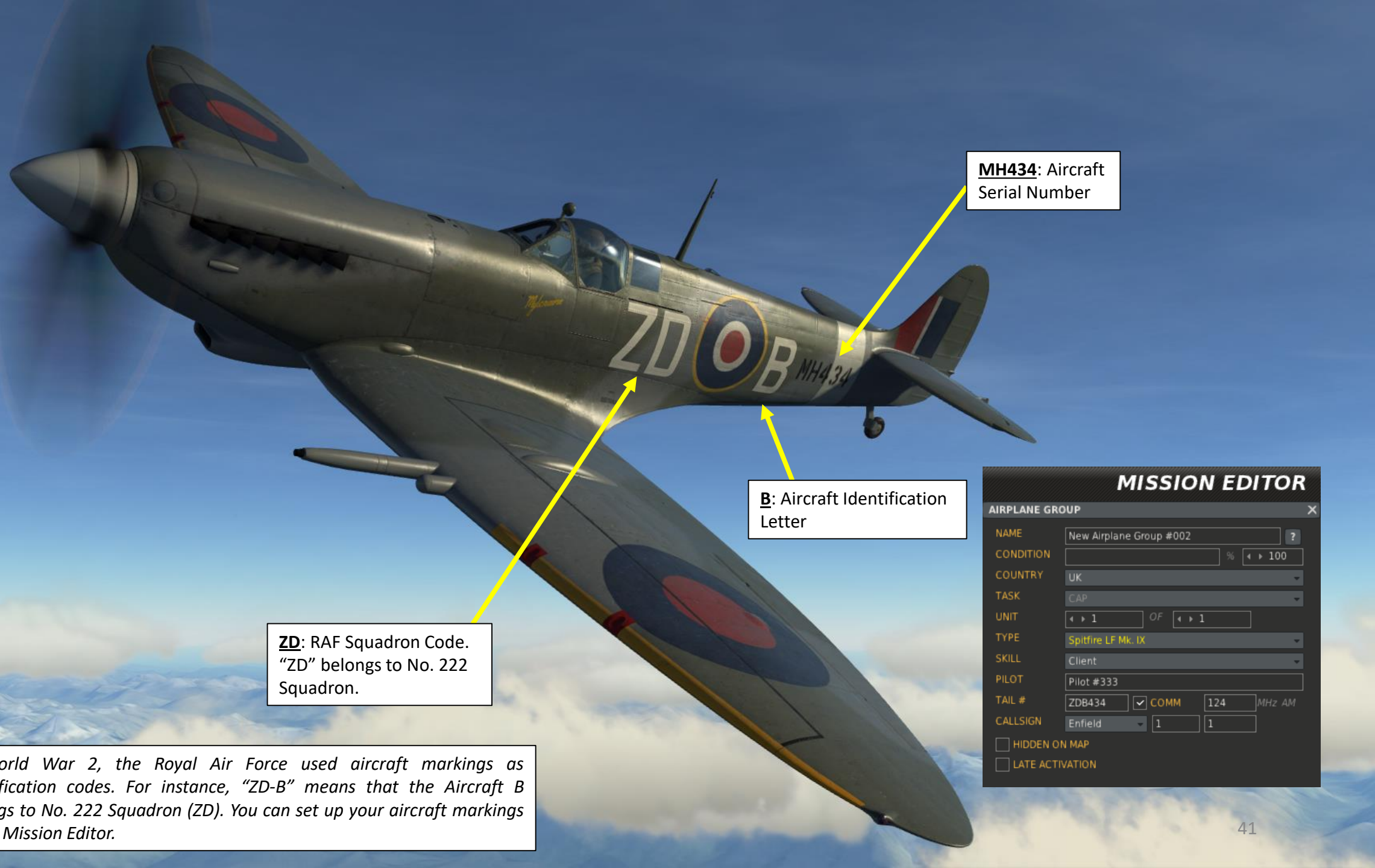

HF Radio Antenna Mast
Mirror
Cooling Radiators
Air Intake
Pitot Tube


Rudder Trim Tab
Elevator Trim Tabs


Flaps Indicator
(shown deployed)


Flaps (shown deployed)

In real life, the Spitfire's battery (called "Accumulator") switch is actually accessible by an external panel and is turned on or off by the ground crew. By default, the battery is always left on.



MH434: Aircraft Serial Number

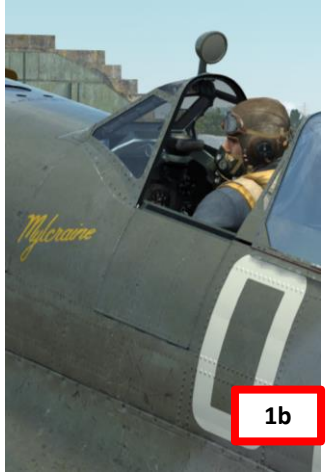
B: Aircraft Identification Letter

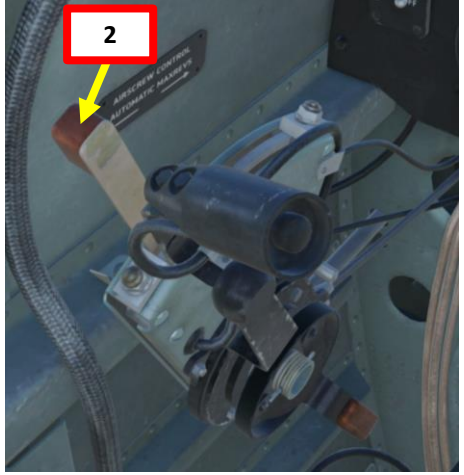
ZD: RAF Squadron Code. "ZD" belongs to No. 222 Squadron.

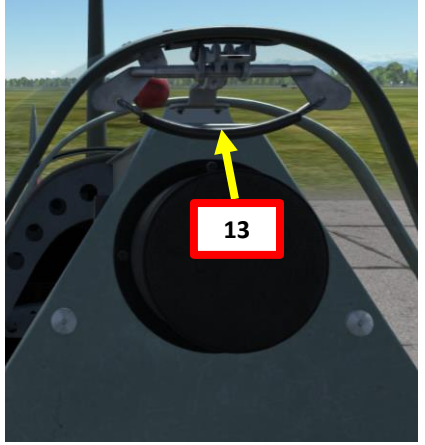
In World War 2, the Royal Air Force used aircraft markings as identification codes. For instance, "ZD-B" means that the Aircraft B belongs to No. 222 Squadron (ZD). You can set up your aircraft markings in the Mission Editor.

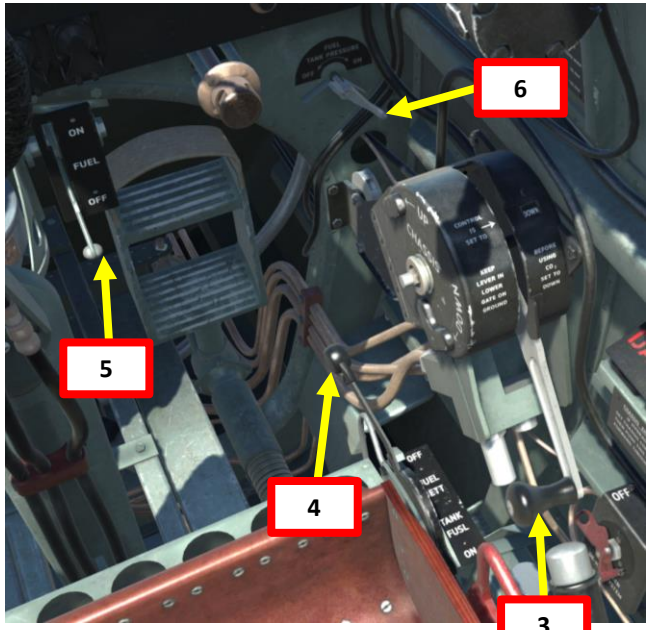
PRE-FLIGHT

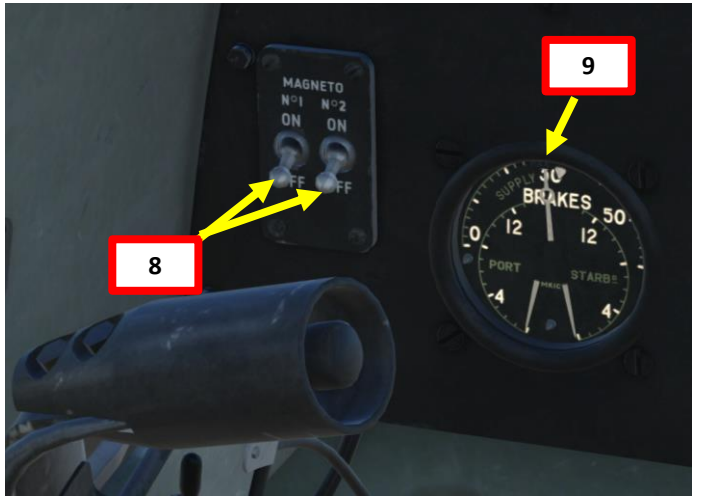
1. Close Side Door by pressing the “SIDE DOOR (TOGGLE)” key (*recommended binding: RShift+C*).
2. Mixture Control Lever – CUT-OFF (FULLY AFT)
3. Landing Gear Lever – DOWN
4. Drop Tank Fuel Cock Lever – OFF
5. Main Fuel Tank Cock Lever – OFF
6. Fuel Tank Pressure Cock – OFF
7. Ensure elevator, aileron and rudder controls are working by moving stick and rudder pedals
8. Magneto Ignition Switches – BOTH OFF
9. Pneumatic Supply Pressure – CHECK NO LESS THAN 220 PSI *(central needle is displays 300 PSI)*
10. Scroll mousewheel on the “Airfield Altitude Setting” knob to adjust the altimeter needle to 0.
11. Set Flaps Control Lever DOWN and check that mechanical flaps indicator are deployed
12. Set Flaps Control Lever UP and check that mechanical flaps indicator are retracted
13. Close Canopy by clicking on sliding hood handle
14. Advance throttle forward until you physically trigger the indication light power switch. Landing Gear and Low Fuel Pressure Warning lights should illuminate.
15. Retract throttle fully AFT. The indication light power switch should remain on.
16. Push the “Show Fuel Contents” button to display fuel quantity in the lower fuel tank.
17. Scroll mousewheel on brake lever to stick it in the PARKING position (fully to the right).

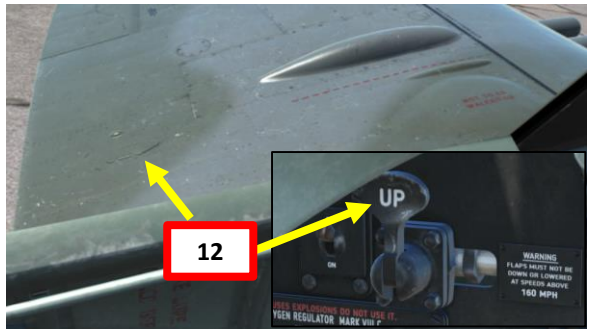












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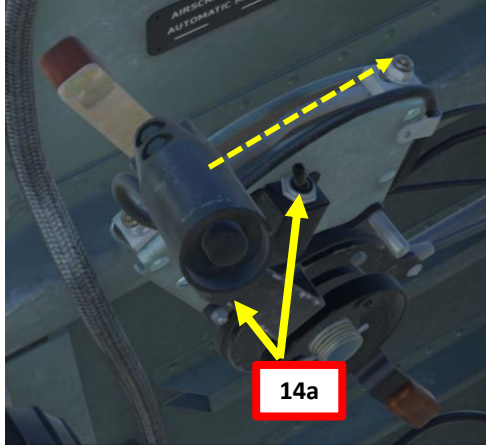
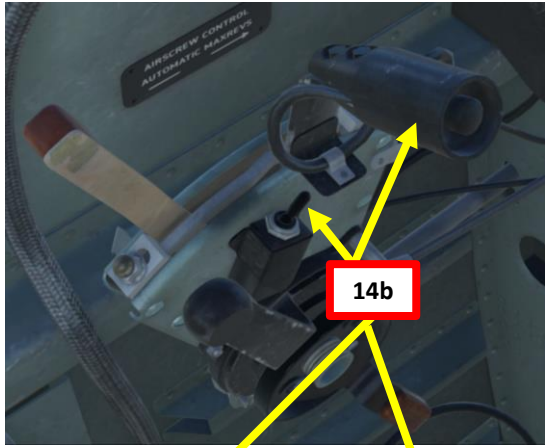
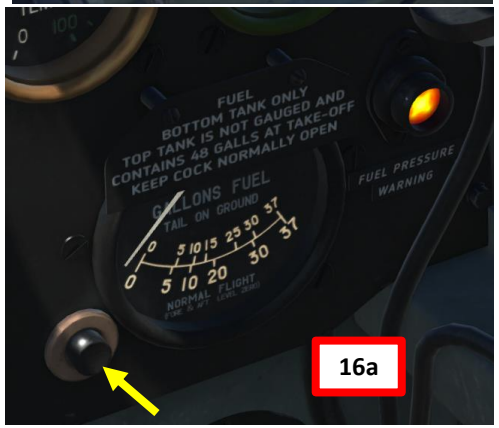
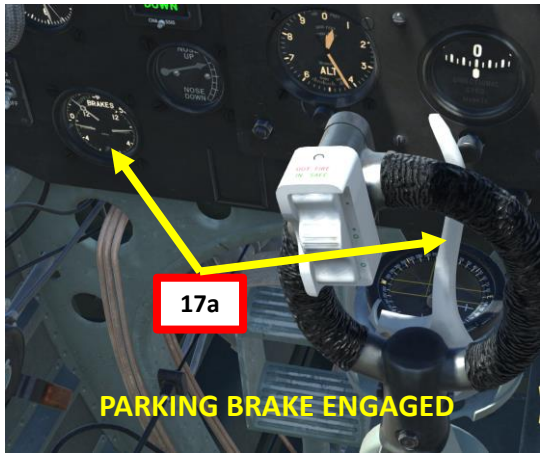


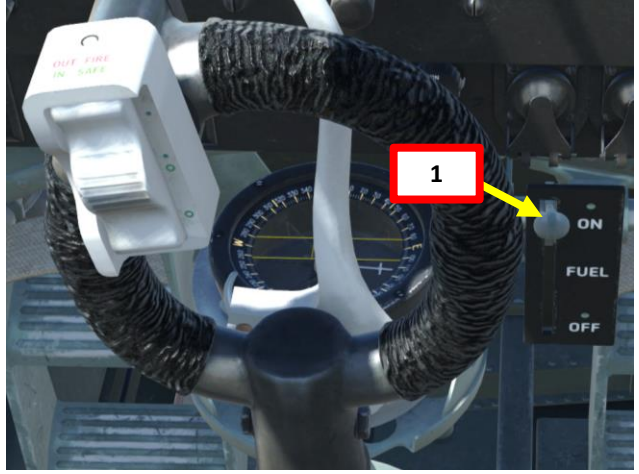


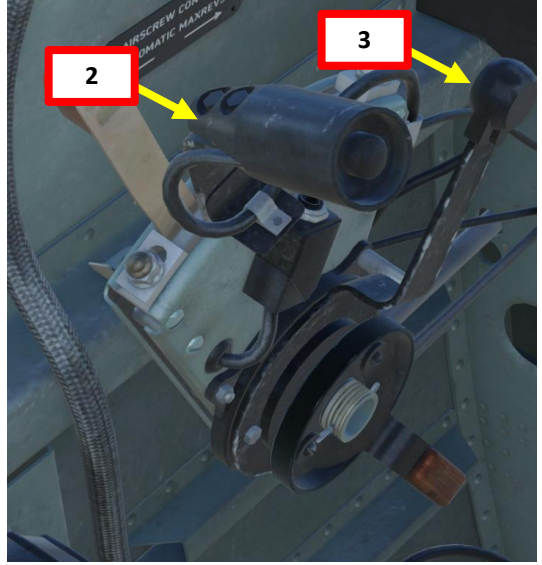


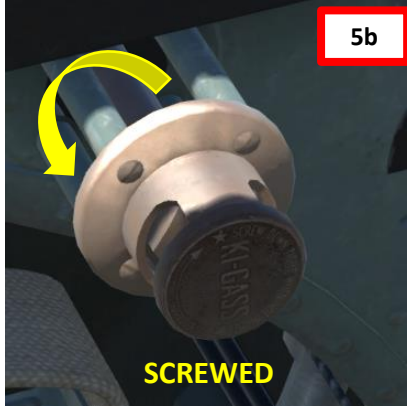


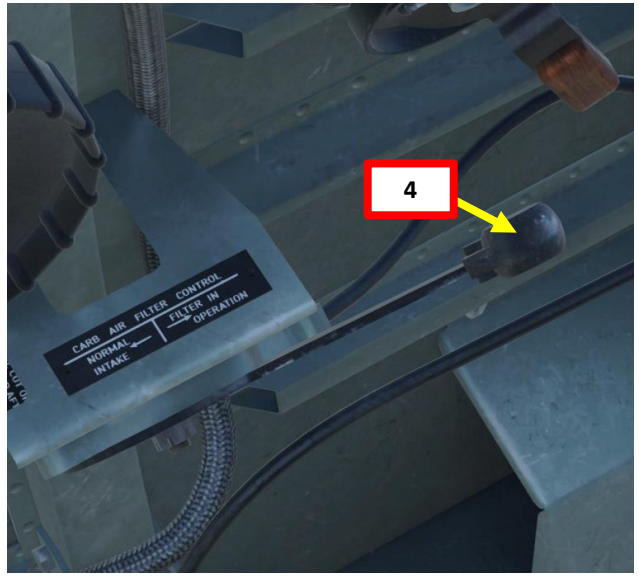
ENGINE START

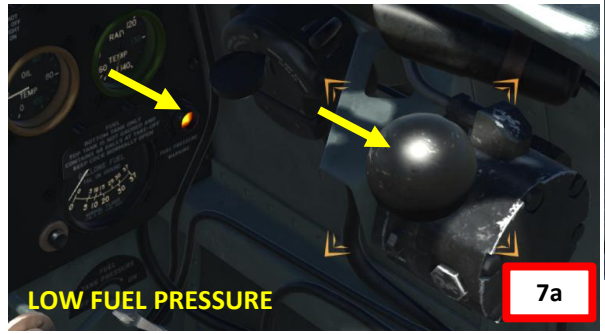
1. Main Fuel Tank Cock Lever – ON
2. Throttle Lever – 1 INCH FORWARD
3. RPM Control Lever – FULLY FORWARD
4. Carburettor Air Intake Control Lever – FORWARD (FILTER IN OPERATION)
5. Unscrew Primer Pump Handle Cap by scrolling mousewheel
6. Click and hold primer pump handle and give 5 full strokes (consult table for required number of strokes based on OAT).
7. Increase fuel pressure by operating the manual wobble pump handle (10 strokes). Low Fuel Pressure light will extinguish when required fuel pressure is high enough.
8. Set both Magneto Ignition switches to ON
9. Open Booster Coil and Starter covers.
10. Press and Hold Starter and Booster Coil buttons simultaneously. (Key bindings recommended: DELETE for Booster Coil button and END for Starter button).
11. While holding the Booster Coil and Starter buttons with your left hand, use your right hand to use the mouse to set the Mixture Control Lever to RUN (FULLY FORWARD) when the engine motor first sparks (you will hear an audible cough once the propeller catches up).
12. Throttle back to avoid a prop strike (often happens if too much power is applied).
13. Close the Booster Coil and Starter button covers.
14. Fuel Pump switch – ON (AFT)
15. Pitot Heat – ON
16. Screw the Primer Pump Handle Cap by scrolling mousewheel.
17. Oxygen Valve – OPEN

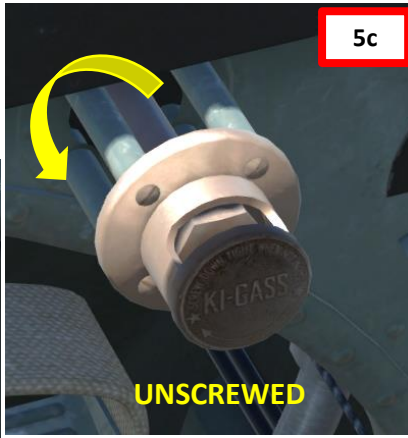


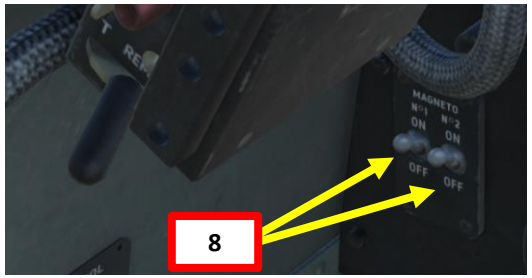












5a

Outside air temperature, °C	+30°	+20°	+10	0°	-10° ~ - 20°
Number of complete movements	2 - 3	4	5	5 - 6	Up to 15

ENGINE START

1. Main Fuel Tank Cock Lever – ON
2. Throttle Lever – 1 INCH FORWARD
3. RPM Control Lever – FULLY FORWARD
4. Carburettor Air Intake Control Lever – FORWARD (FILTER IN OPERATION)
5. Unscrew Primer Pump Handle Cap by scrolling mousewheel
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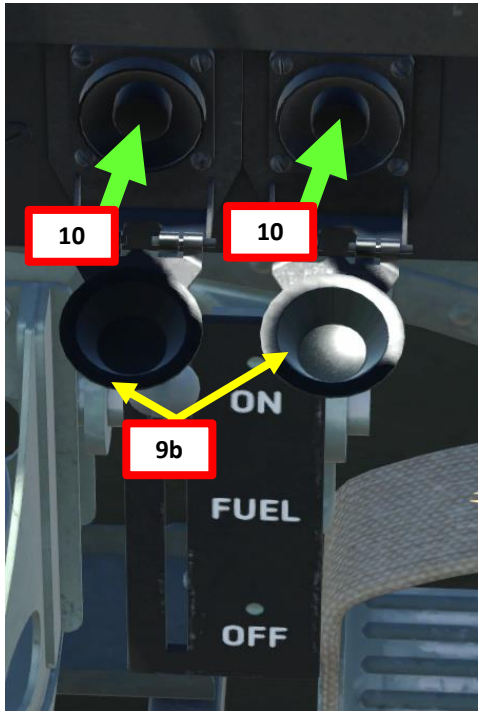
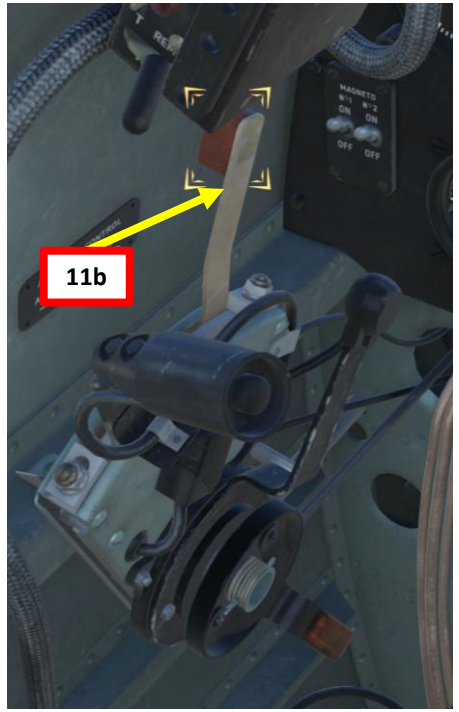
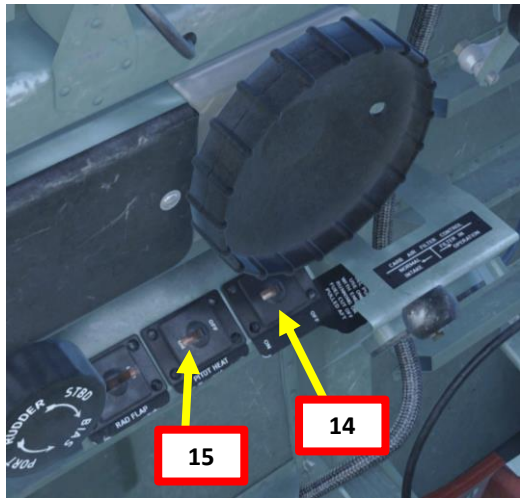






ENGINE WARM-UP

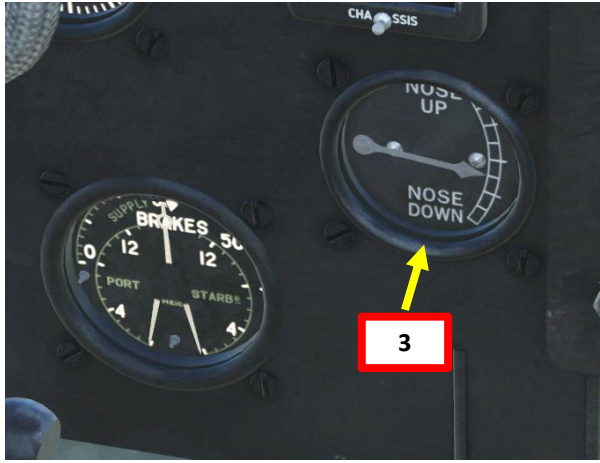
1. Ensure oil pressure is in the 60-120 psi range.
2. Adjust throttle to reach a RPM between 1000 and 1200 (IDLE range).
3. Wait until engine oil warms up to at least 20 deg C and coolant temperature is at least 60 deg C.
4. Start taxiing when engine is warmed up by releasing the Parking Brake (press on the Brake Lever to unlatch the brakes).

Note: *Attempting a takeoff with low oil or coolant temperature can lead to dire consequences. Waiting for proper engine warm-up is often overlooked by virtual pilots and the Merlin engine leaves no room for error when engine temperatures are concerned.*

TAXI PROCEDURE

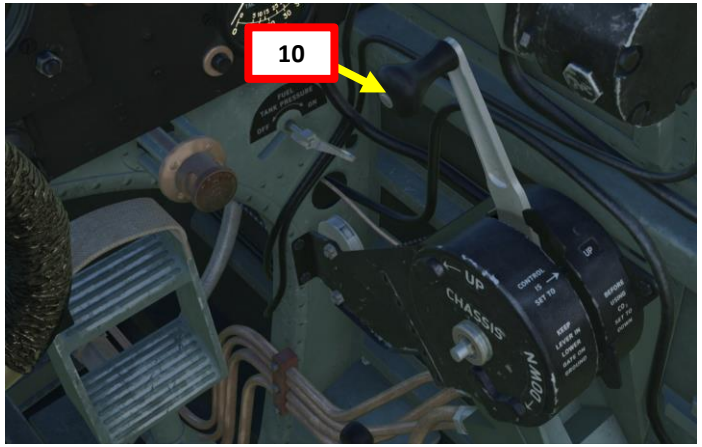
a) Ensure engine oil temperature is between 20 and 80 deg C and coolant temperature is between 60 and 120 deg C.
b) Ensure pneumatic pressure is no less than 220 psi.
c) Set throttle to 1800 RPM and check brake effectiveness.
d) Set throttle to 1500 RPM, open canopy and start taxiing. Reduce throttle as required to maintain a safe taxi speed.
e) To execute a turn, press and hold the wheel brake lever while simultaneously giving rudder input in the desired direction.
f) When lined up on the runway, close canopy.

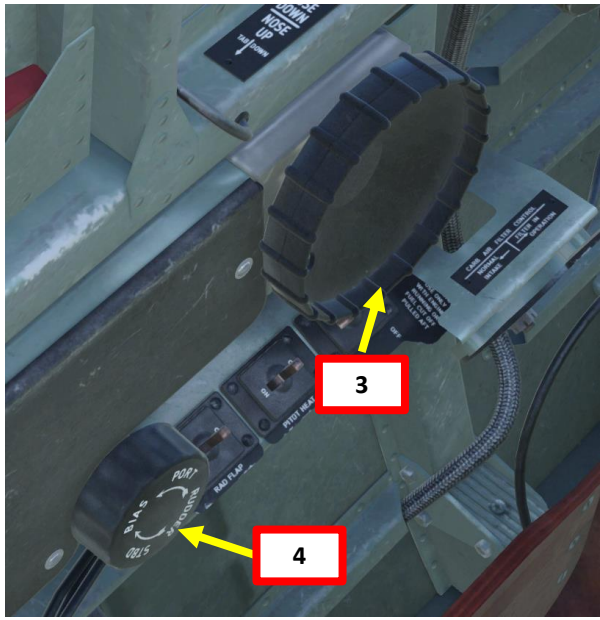
Note: *During taxi, keep the control stick pulled completely AFT to ensure that the tailwheel remains straight.*

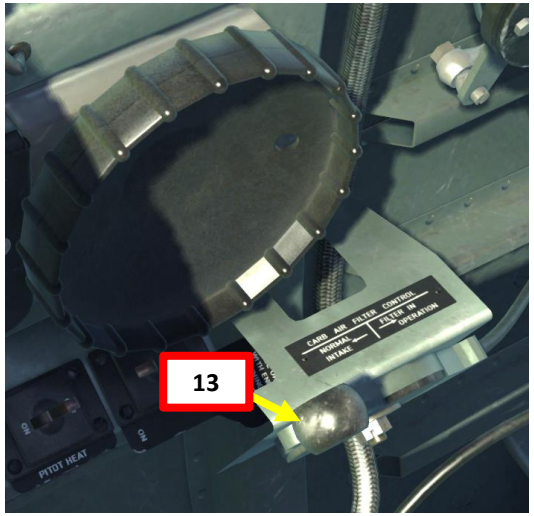


TAKEOFF PROCEDURE

1) Ensure RPM Control lever is fully forward
2) Flaps – UP
3) Set Elevator Trim 1 deg NOSE DOWN (indicator on front dash)
4) Set Rudder Trim FULL RIGHT (no indicator)
5) Ensure Supercharger Control Switch is set to AUTO-NORMAL position.
6) Pull stick fully back to ensure that tailwheel remains straight.
7) Gradually throttle up to +8 psi. Compensate engine torque with rudder input. The slower your increase the throttle, the better control you will have over the acceleration and engine torque of the aircraft.
8) Slowly release control stick to center position as aircraft gains speed and tailwheel leaves the ground.
9) Rotate when reaching 90 mph.
10) Once in the air, press the wheel brake lever to stop the wheels from spinning before retracting the landing gear.
11) Raise Landing Gear when reaching 140 mph.
12) Start climbing at +12 boost and 2850 RPM.
13) As you reach 1,000 ft or higher, set Carburettor lever to NORMAL INTAKE (AFT).







VIDEO DEMO:
https://www.youtube.com/watch?v=0iEMZb-dk_E

THROTTLE, STICK AND RUDDER INPUT DURING TAKEOFF

Here is an example of takeoffs at different engine power settings.

LINK: https://www.youtube.com/watch?v=Iqo7juJD3fU&feature=youtu.be

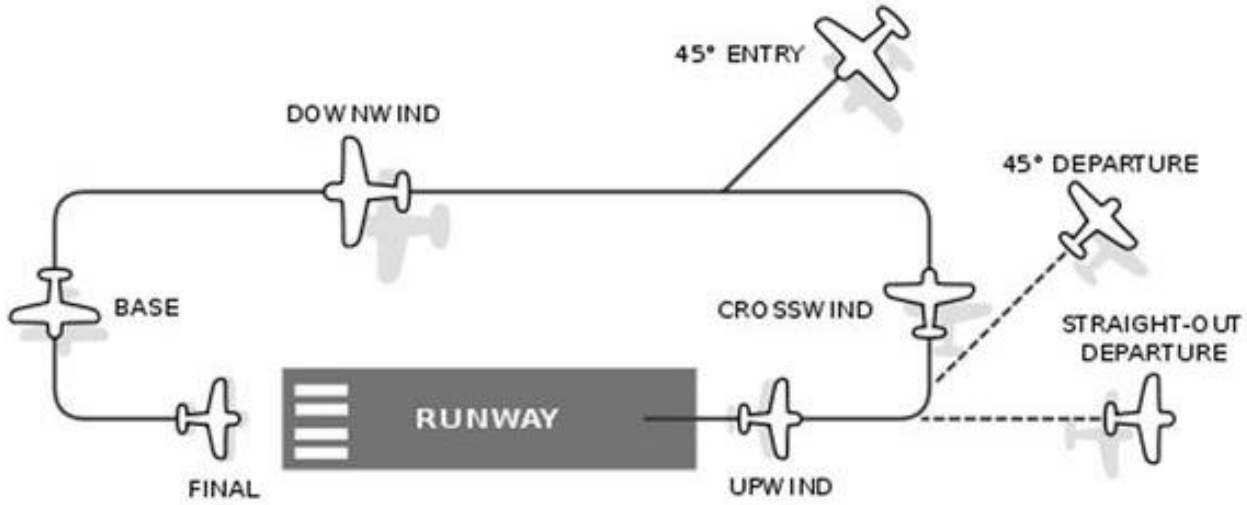

MH434 B ZD

LANDING PROCEDURE

1) Enter approach at 2600 RPM and +6 Boost.
2) Reduce throttle to -2 (Minus 2, yep!) Boost as you enter downwind leg.
3) Enter downwind leg at 1000 ft altitude.
4) Set Carburettor control lever to FILTER IN OPERATION (FWD).
5) Deploy landing gear as you slow down to 150 mph.
6) Once your wingtip is abeam the runway threshold, deploy flaps (at 150 mph or less) and enter base leg with a descending turn.
7) Maintain eyesight of the runway threshold as your turn and enter final at 500 ft altitude.
8) Fly over runway threshold at 90 mph.
9) Gently flare for a three-point landing and maintain attitude until your touchdown at 60-70 mph.
10) Use rudder pedals to stay straight on the runway as you decelerate.
11) Start using the wheel brake lever in short bursts when rudder movement becomes ineffective.
    WARNING: Excessive braking may cause the aircraft to nose over.
12) Raise flaps and taxi back to hangar.

Note: *During landing, the aircraft will feel extremely floaty when flaps are deployed. The narrow landing gear of the Spitfire also makes it even more difficult. Controlling the speed at which you touch the ground is essential in order to avoid nasty bounces. Avoid pulling aft on the stick when going for a three-point landing.*

VIDEO DEMO:
https://www.youtube.com/watch?v=0iEMZb-dk_E&t=116s

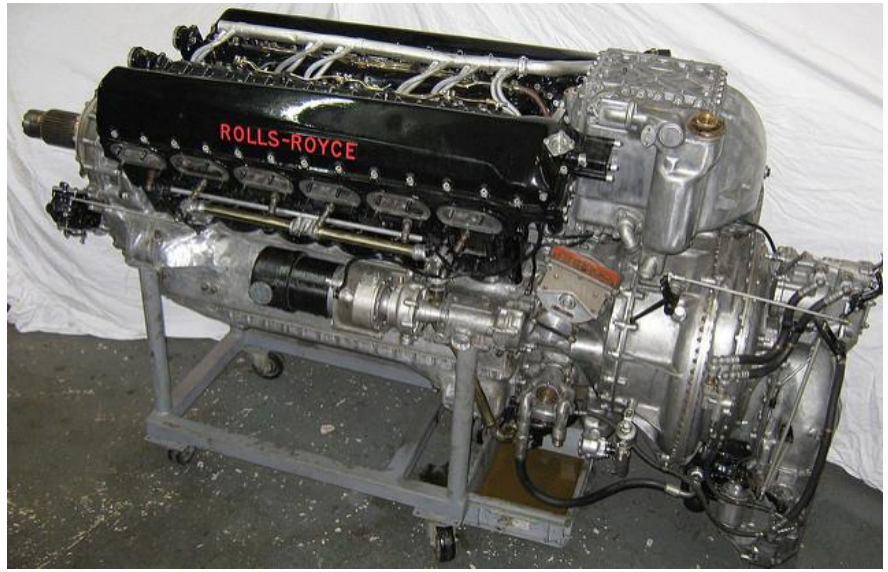


LANDING PROCEDURE

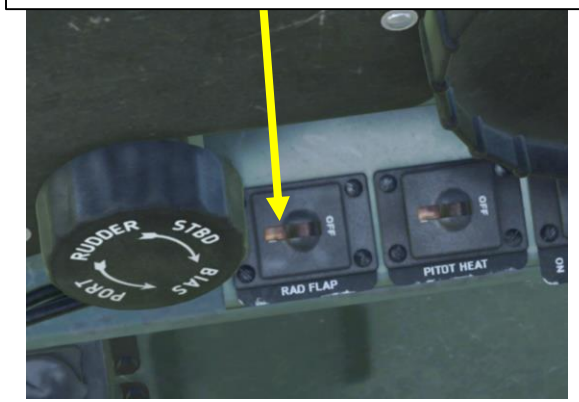
AVOIDING SCRAPING YOUR WING

Your first landings in the Spitfire may often result in the following scenario: you touch the ground, think you've finally made it home and then feel your wing dip down and strike the ground. The reason this happens is that many pilots will come in slightly crabbed and reduce their throttle suddenly once they touch the ground, which causes a destabilizing yaw motion to the aircraft because of the changing torque generated by the change in engine power.

The best way to avoid this is to use your **rudder trim** to make sure that you come in as straight as possible. The turn and slip indicator will help you judge whether you are coming in straight or side-slipping. **Minimize your side slip** on touchdown with your rudder trim wheel and you will finally nail those landings.



Radiator Grates/Flaps Switch
ON: Manually Opens Radiator
OFF: Automatically Controls Radiator Grates



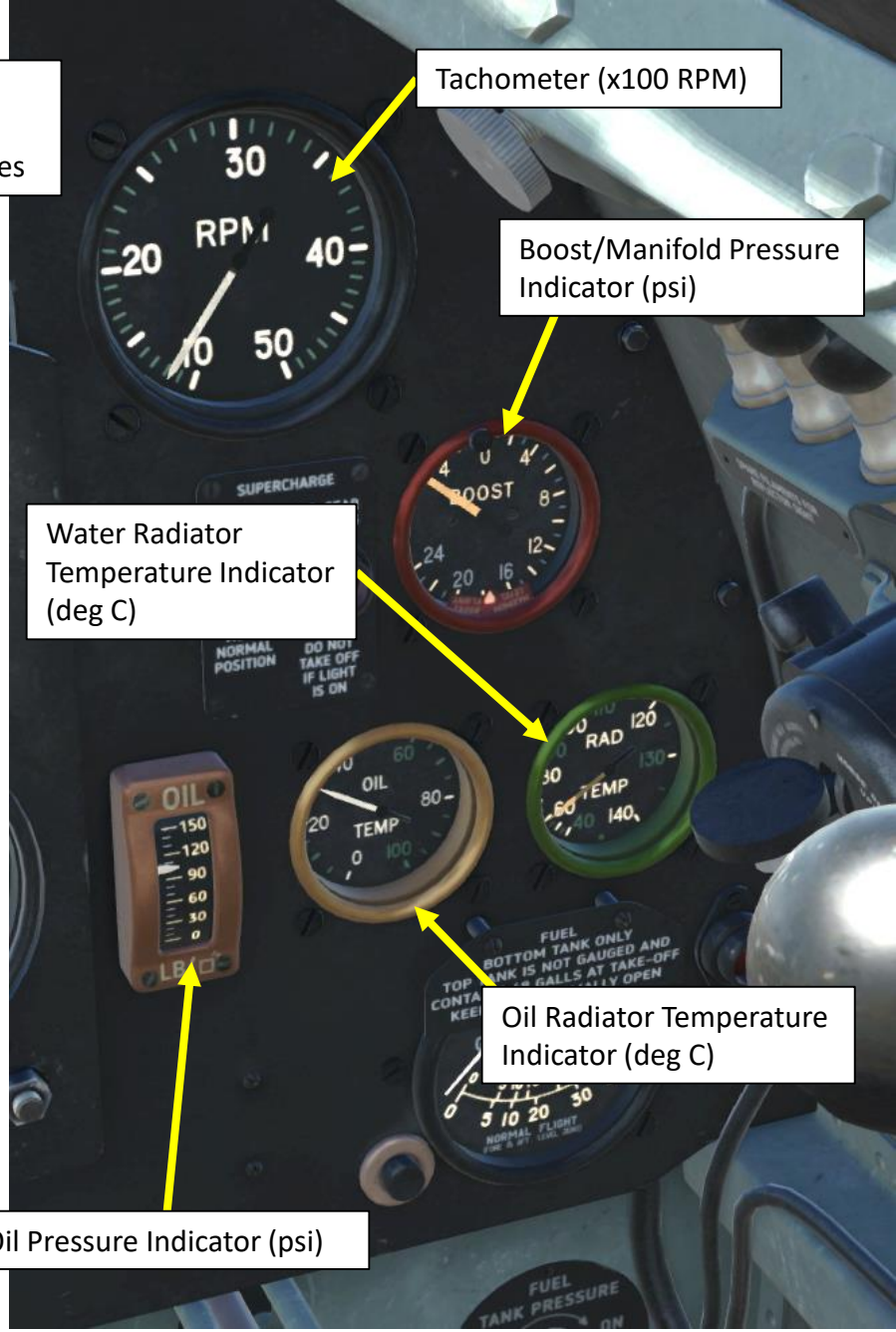
MERLIN 66 ENGINE

Earlier Spitfire Marks had manual radiator controls that the pilot would use to maximize his airspeed while maintaining oil and coolant temperatures within safety limits. The Mk IX variant reduced pilot workload by implementing an automatic radiator system. The pilot can still monitor engine RPM, boost pressure, oil pressure, oil temperature and coolant temperature. Each parameter has specific limitations that you should be aware of **AT ALL TIMES**. The engine limitations are listed in the table on the next page.

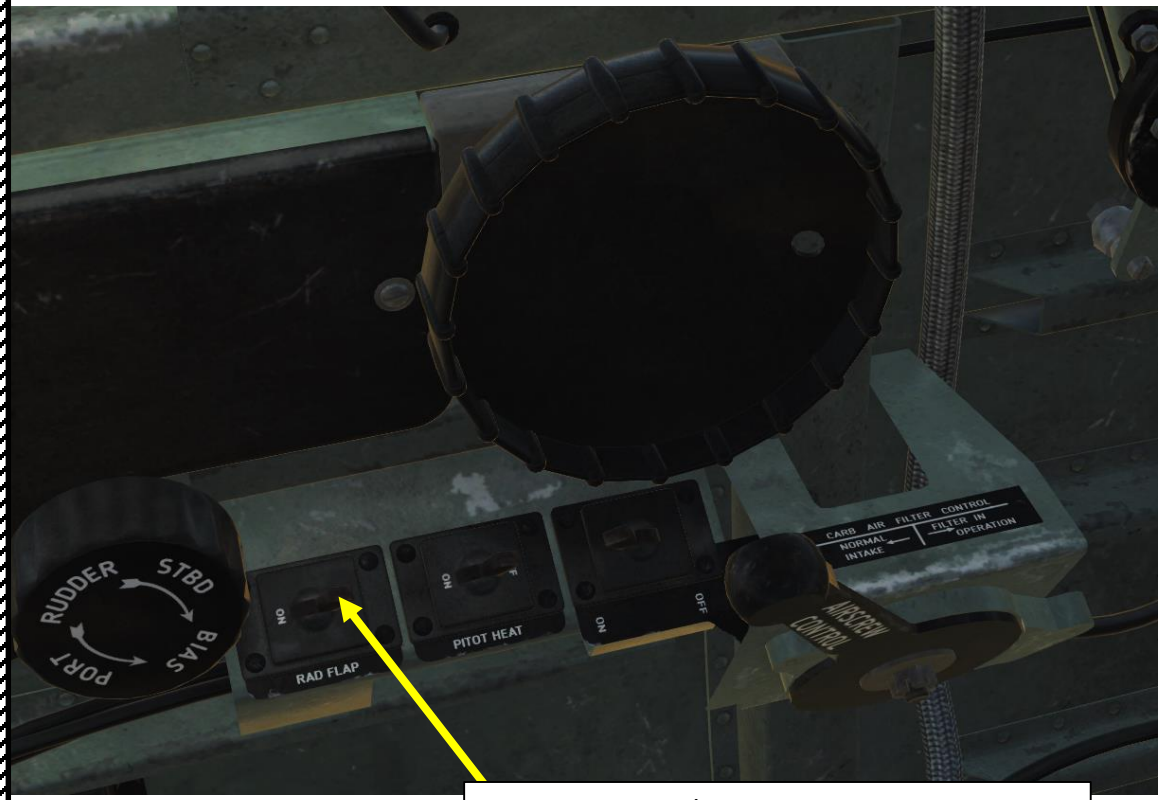
If engine overheats, you can:

1. Enter a dive to increase airspeed and airflow to the engine intake.
2. Reduce throttle and RPM
3. Decrease rate of climb
4. Set the RADIATOR TESTING switch to ON (will force the radiator flap to open manually)

CHECK YOUR ENGINE TEMPERATURES EVERY 30 SECONDS OR SO. IT WILL SAVE YOUR LIFE.



ENGINE CONTROLS



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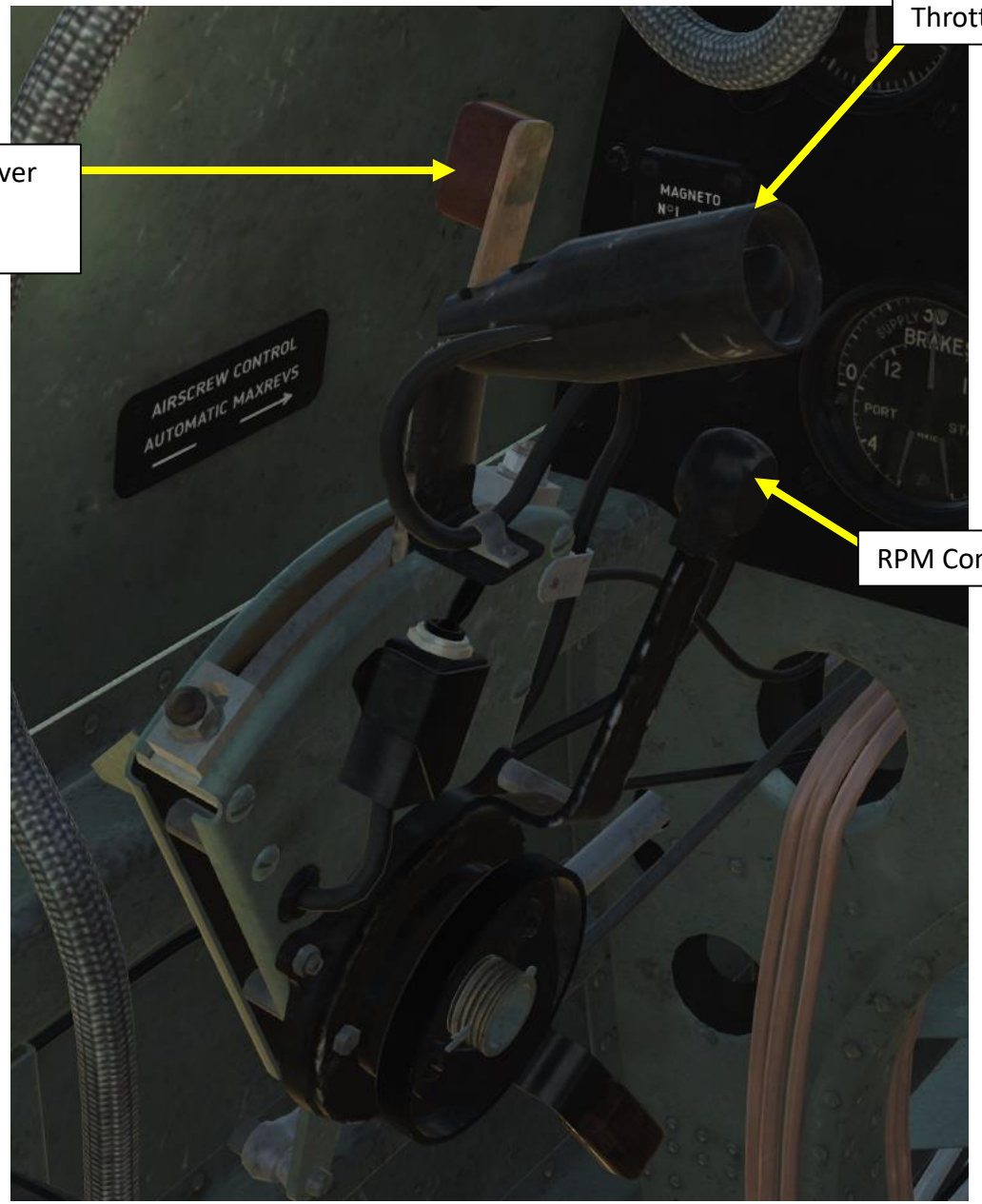


Throttle Lever

Mixture Control Lever
AFT: IDLE CUT-OFF
FWD: RUN/RICH

RPM Control Lever

ENGINE LIMITATIONS

Power Setting	RPM	BOOST (psi)
Max Take-Off to 1000 ft (Altitude)	3000	+12
Max Climbing Power (1 hour limit)	2840	+9
Max Rich Continuous	2650	+7
Max Weak Continuous	2650	+4
Oil Pressure (psi)	45 min 60/80 psi NORMAL	
Oil Temperature (deg C)	15 min 90 deg C MAX	
Coolant Temperature (deg C)	60 min 125 deg C MAX	

Basic modes of operation of the Merlin 66 engine, with 100 octane fuel

Basic data \ Mode		Takeoff		Combat		Nominal		Cruising	
		I spd.	II spd.	I spd.	II spd.	I spd.	II spd.	I spd.	II spd.
Horsepower		1325	-	1680*	1440	1310	1135	985	865
				1750**	1630	1410	1315	1095	1030
RPM		3000	-	3000	3000	2850	2850	2650	2650
Boost	lb/in²	+12	-	+18	+18	+12	+12	+7	+7
	mm Mercury	1350		1690	1690	1380	1380	1120	1120
Altitude limits in m. (w/o ram air flow)		305	-	1680	4960	2750	5800	3660	6330
Time for uninterrupted operation, in minutes		5	-	5	5	60	60	Unltd	unltd

*- Data for sea level
** - Data on approximate altitudes.

SUPERCHARGER BASICS

A **supercharger is an engine-driven air pump or compressor that provides compressed air to the engine to provide additional pressure to the induction air so the engine can produce additional power.** It increases manifold pressure and forces the fuel/air mixture into the cylinders. The higher the manifold pressure, the more dense the fuel/air mixture, and the more power an engine can produce.

With a normally aspirated engine, it is not possible to have manifold pressure higher than the existing atmospheric pressure. A supercharger is capable of boosting manifold pressure above 30 "Hg. For example, at 8,000 feet a typical engine may be able to produce 75 percent of the power it could produce at mean sea level (MSL) because **the air is less dense at the higher altitude**. The supercharger compresses the air to a higher density allowing a supercharged engine to produce the same manifold pressure at higher altitudes as it could produce at sea level.

Thus, an engine at 8,000 feet MSL could still produce 25” Hg of manifold pressure whereas without a supercharger it could produce only 22 "Hg. Superchargers are especially valuable at high altitudes (such as 18,000 feet) where the air density is 50 percent that of sea level. The use of a supercharger in many cases will supply air to the engine at the same density it did at sea level. With a normally aspirated engine, it is not possible to have manifold pressure higher than the existing atmospheric pressure.

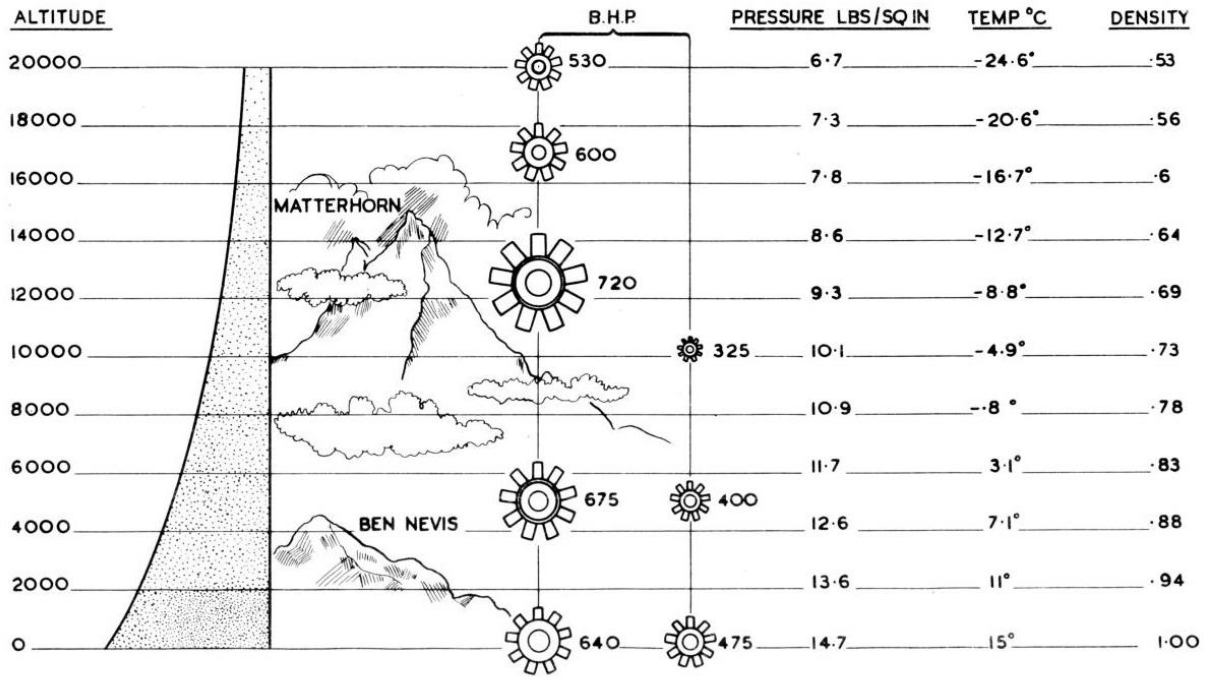
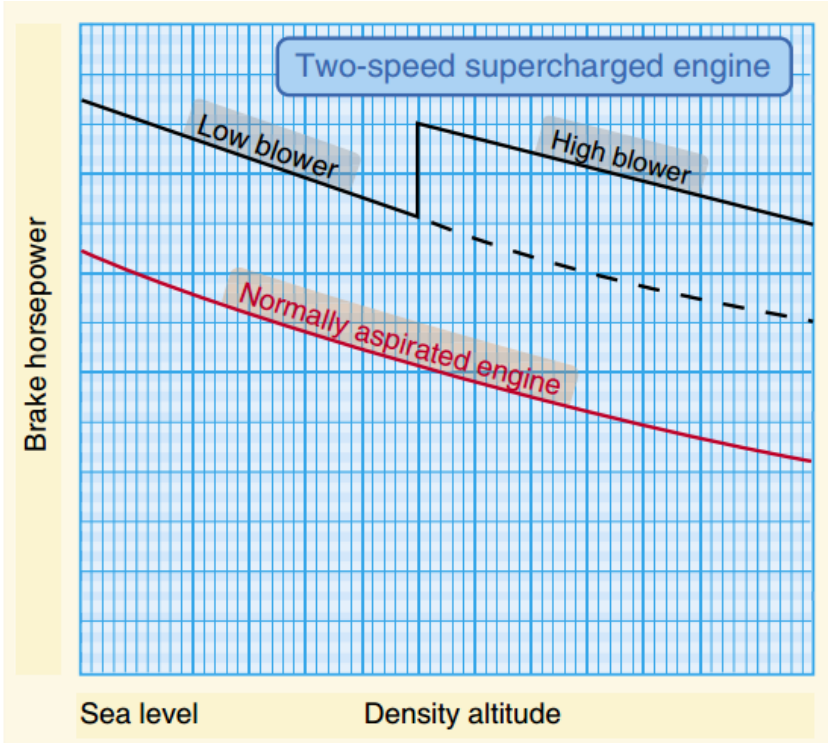


DIAGRAM SHOWING ATMOSPHERIC AND POWER VARIATIONS

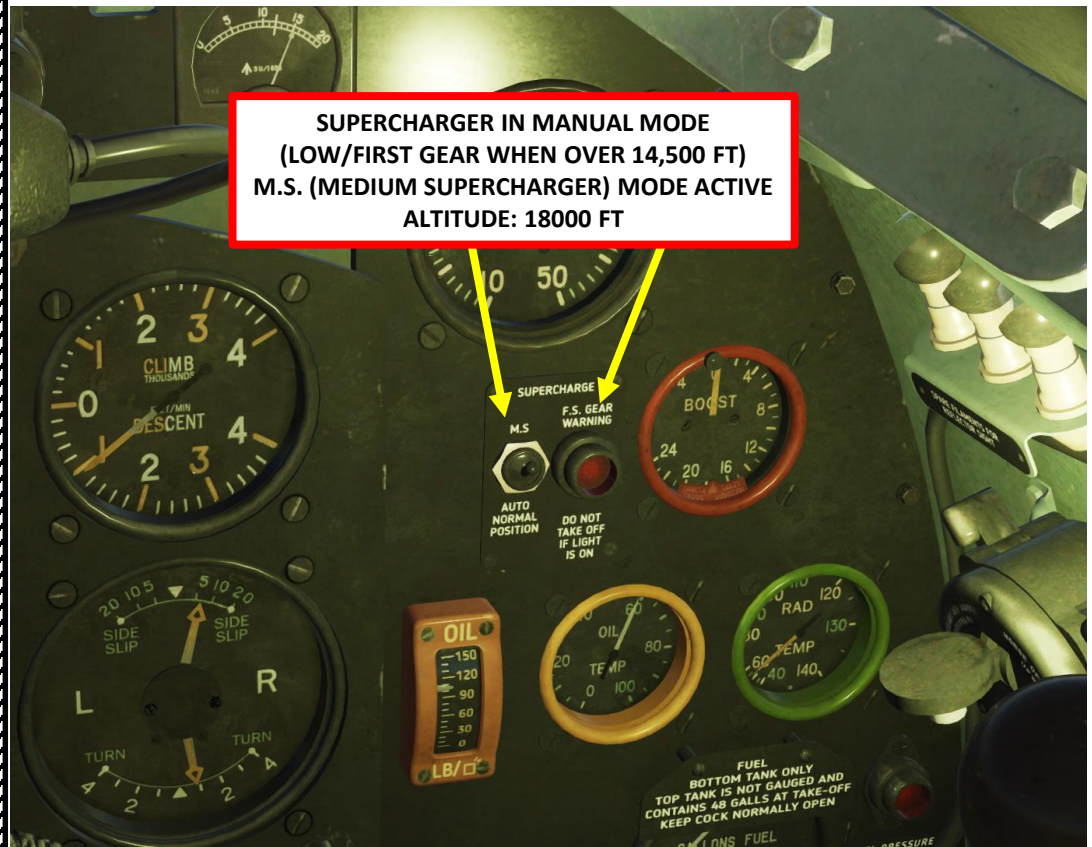


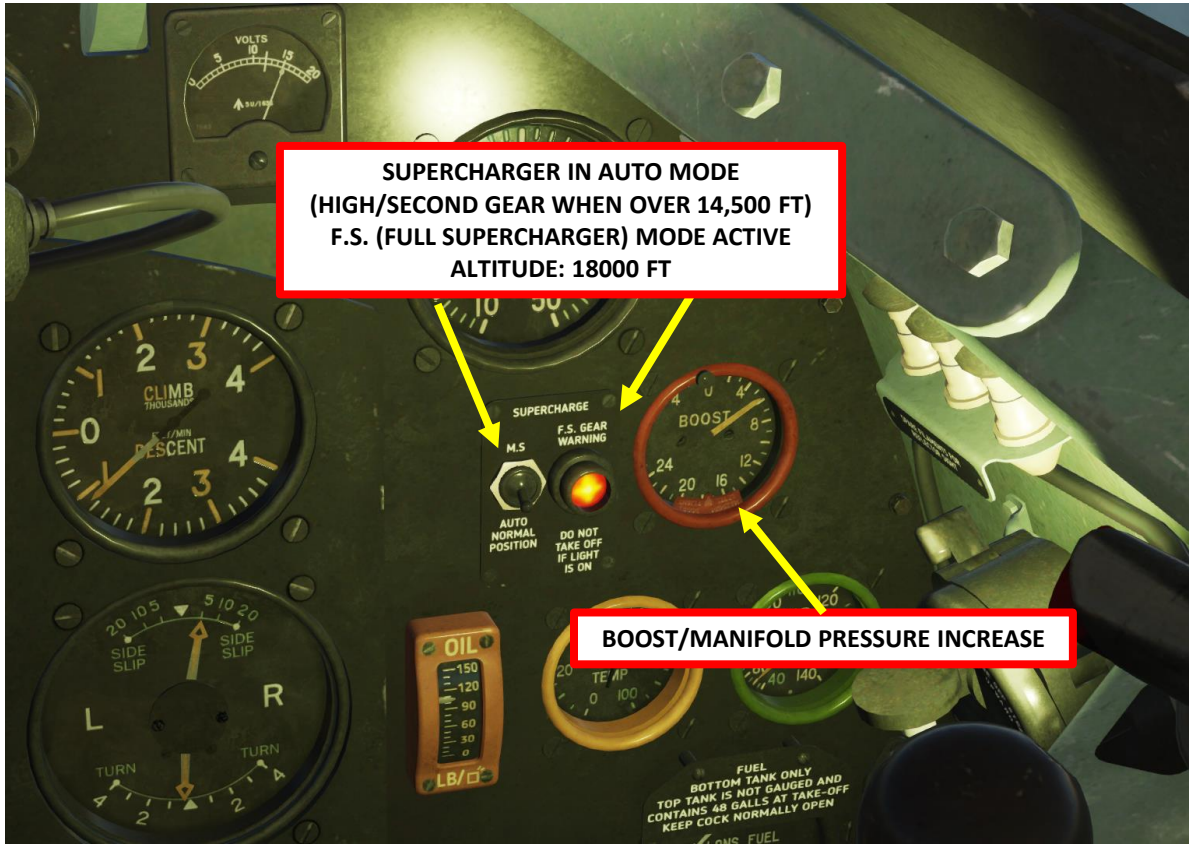
SUPERCHARGER OPERATION

- **FIRST GEAR = LOW BLOWER = LOW MANIFOLD PRESSURE = USED BETWEEN 0 AND 14500 FT.**
- **SECOND GEAR = HIGH BLOWER = HIGH MANIFOLD PRESSURE = USED AT 14500 FT OR HIGHER.**

- The gear-driven centrifugal-type supercharger mounted on the Merlin engine has a two-stage compressor that raises air pressure at the entrance to the engine cylinders in order to increase both the coefficient of admission and engine power, as well as to maintain a constant air pressure at the entrance to the cylinders during increases in altitude. The supercharger works in either low or high blower mode, selection of which can be automatic or manually set by the pilot. In normal operations, high blower mode starts automatically from 14,500 to 19,500 feet, depending on the amount of ram air being delivered through the carburetor. The supercharger increases the blower-to-engine compression ratio from a low of 5.8 to 1 to a high of 7.35 to 1.

- Shifting between the first gear “M.S” (medium supercharger) and second gear “F.S” (full supercharger) speeds may be performed automatically if the 2-stage switch in the cockpit is left in the AUTO (DOWN) position, or manually if set to M.S., forcing the supercharger in first gear.

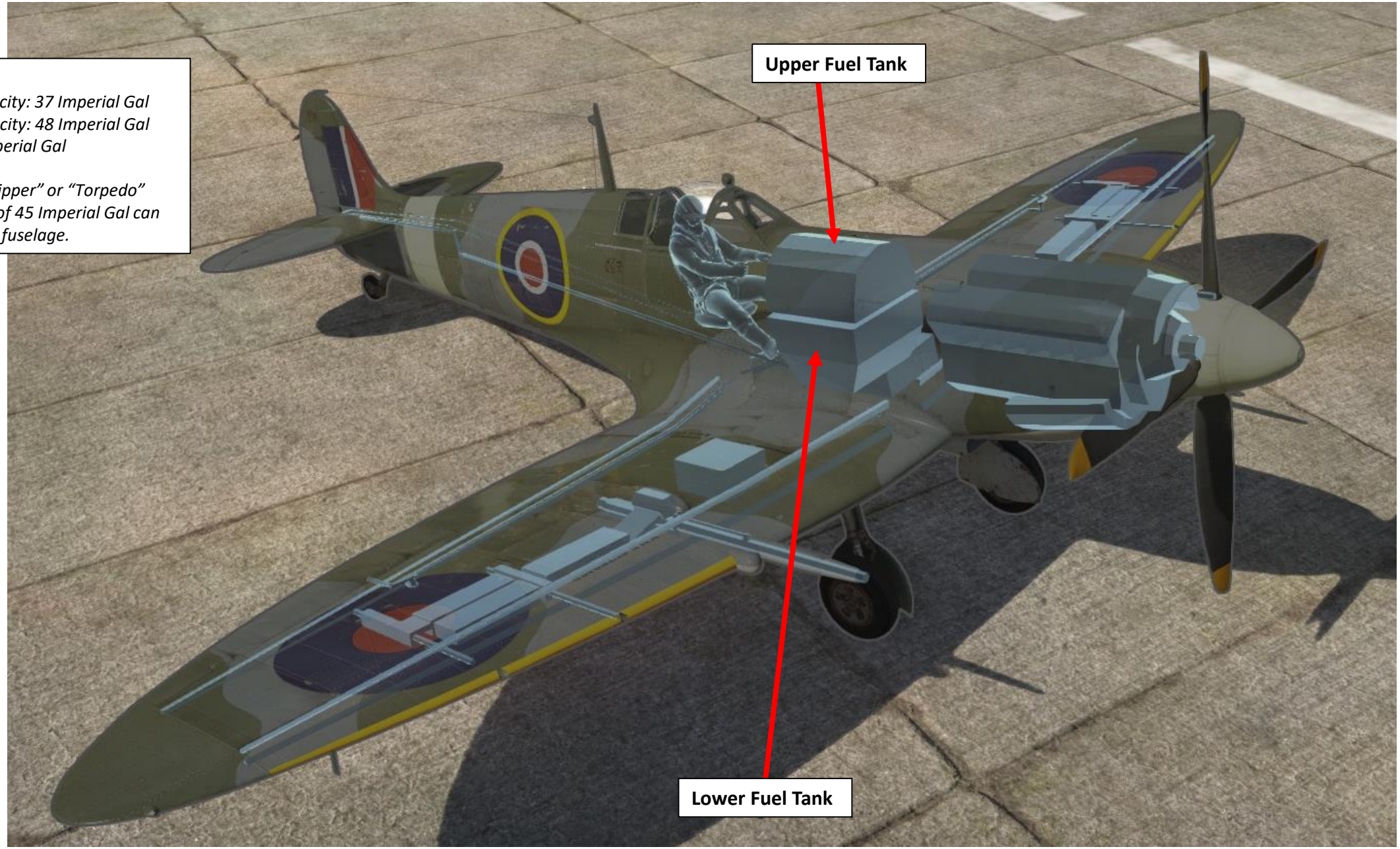




FUEL TANKS

Fuel Capacity
Lower Fuel Tank Capacity: 37 Imperial Gal
Upper Fuel Tank Capacity: 48 Imperial Gal
Total Capacity: 85 Imperial Gal

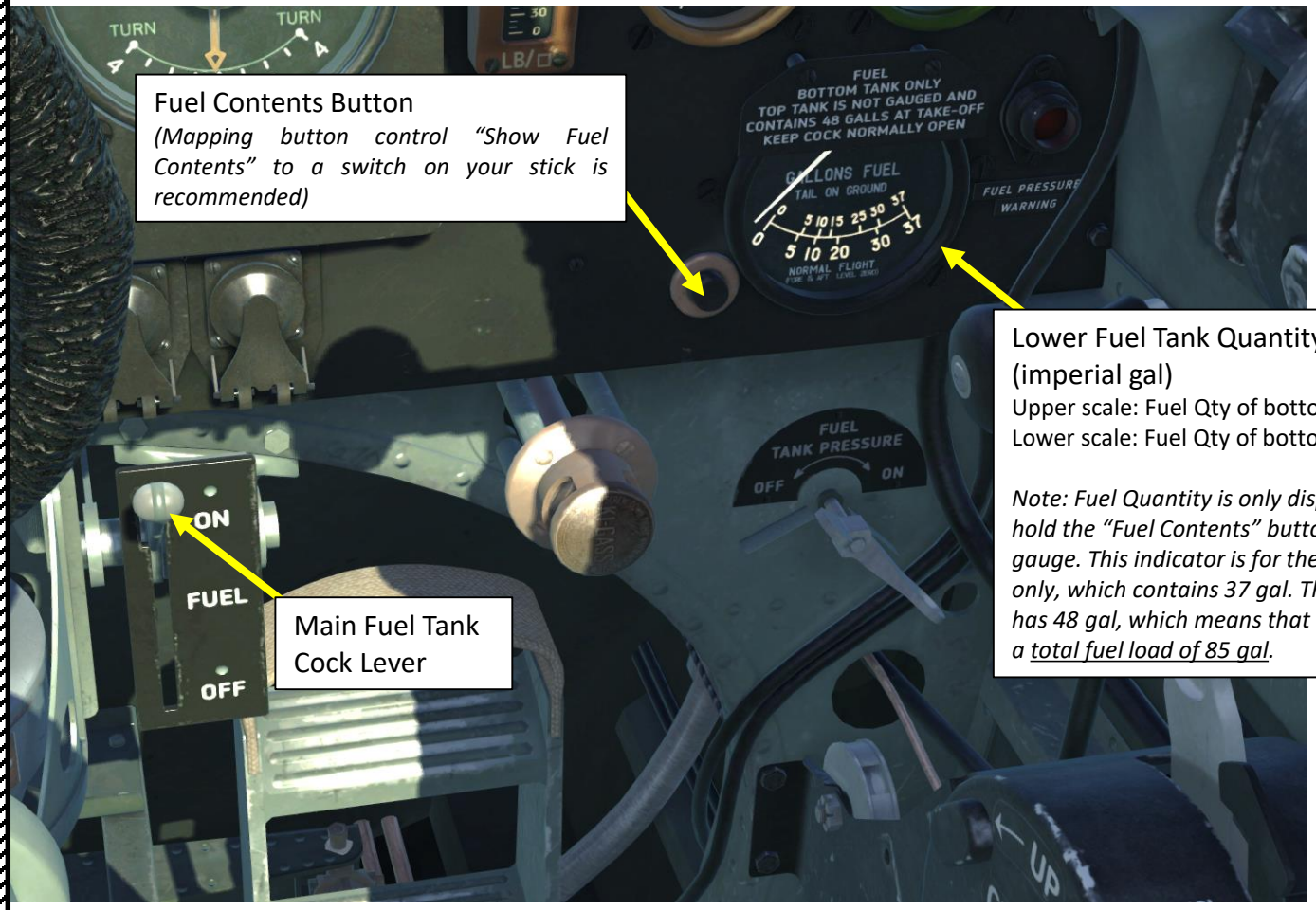
Note: a drop tank ("Slipper" or "Torpedo" type) with a capacity of 45 Imperial Gal can be installed under the fuselage.



FUEL MANAGEMENT

The fuel system uses 100-octane fuel and obtains its supply from two banks mounted in the fuselage behind the fireproof bulkhead. One tank, of 37 gallons capacity, is mounted on the bottom of fuselage frames 6 and 7. The other, of 48 gallons capacity, is mounted above the lower tank on four brackets on the top longerons, and is protected by a sheet of armour covering the tank from behind the fireproof bulkhead. Fuel from the upper tank flows on its own into the lower tank. From the cock on the lower tank, a pipe leads forward to an A.G.S. type filter on the forward side of the bulkhead.

When feeding fuel from external tanks, access to the air separator is shut off by a special valve in order to prevent the upper tank from overflowing. This valve is connected to the fuel intake valve of the external tanks.

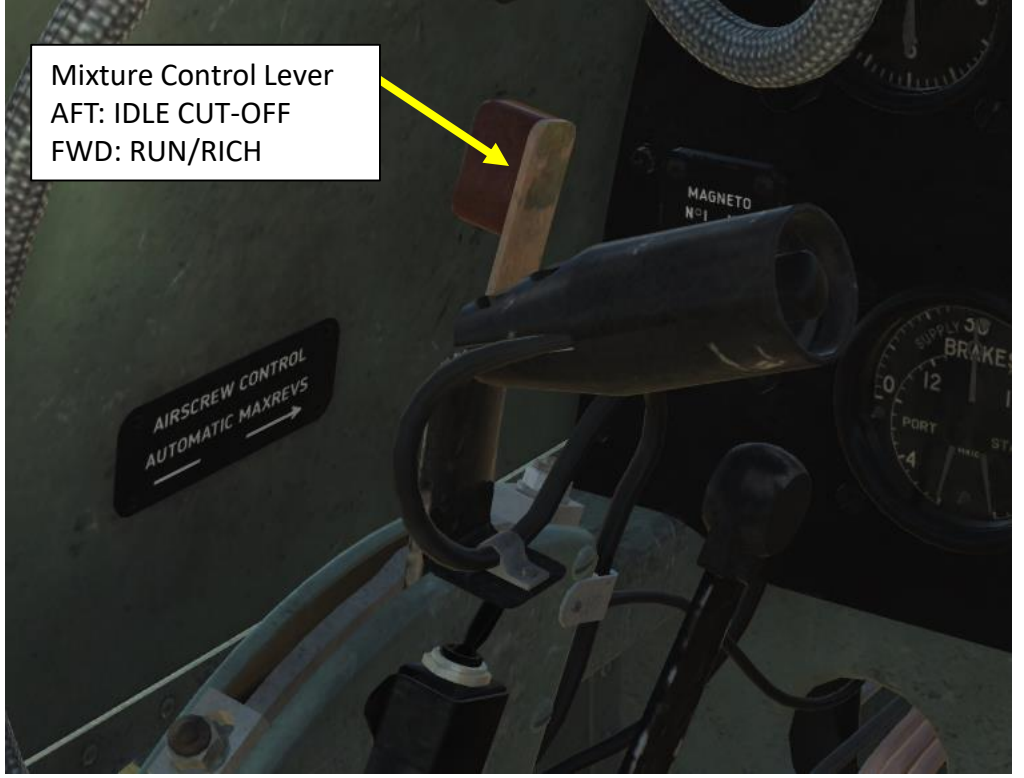


Fuel Contents Button
(Mapping button control "Show Fuel Contents" to a switch on your stick is recommended)

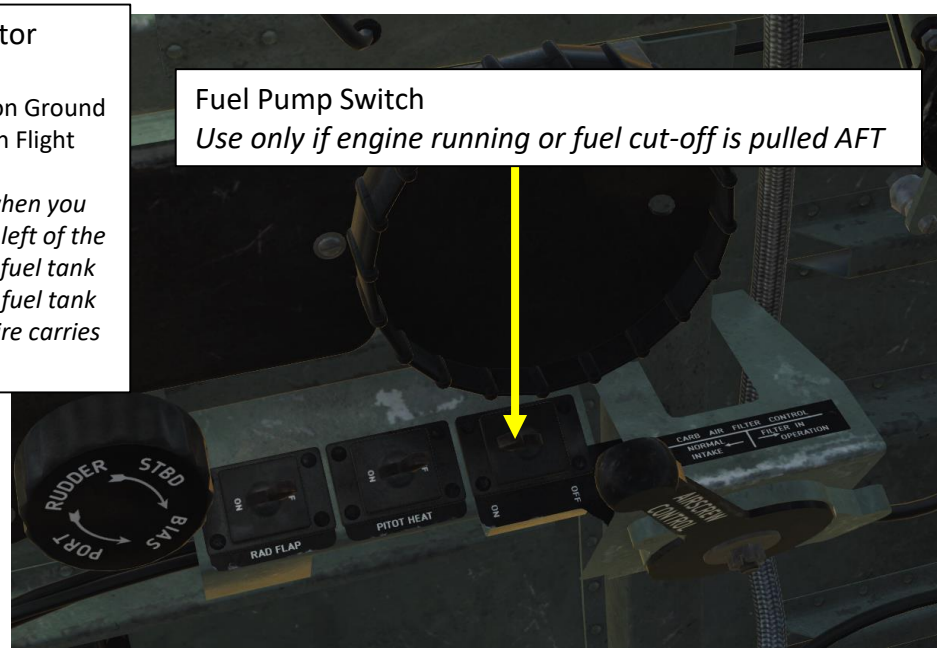
Lower Fuel Tank Quantity Indicator (imperial gal)
Upper scale: Fuel Qty of bottom tank on Ground
Lower scale: Fuel Qty of bottom tank in Flight

Note: Fuel Quantity is only displayed when you hold the "Fuel Contents" button to the left of the gauge. This indicator is for the bottom fuel tank only, which contains 37 gal. The upper fuel tank has 48 gal, which means that the Spitfire carries a <u>total fuel load of 85 gal</u>.

Main Fuel Tank Cock Lever



Mixture Control Lever
AFT: IDLE CUT-OFF
FWD: RUN/RICH



Fuel Pump Switch
Use only if engine running or fuel cut-off is pulled AFT

FUEL MANAGEMENT

In order to prevent fuel boiling at high altitudes in warm weather conditions, the fuel system is equipped with a fuel tank pressurizer system that switches on automatically at altitudes above 20000 feet. An aneroid valve feeds air, pressurized by a vacuum pump, into the fuel tanks. Pressurizing, however, impairs the self-sealing of the tanks and should be turned on only when the fuel pressure warning lamp lights up. In very warm weather at very high altitudes a rich cut may occur with the tanks pressurized, and pressure must then be turned off. The pressurizing cock is on the starboard side of the cockpit immediately below the instrument panel.

The default position of the pressurizer system is OFF, and must be turned ON only when a red warning light signalizes that the fuel pressure has dropped below 10lb/in².

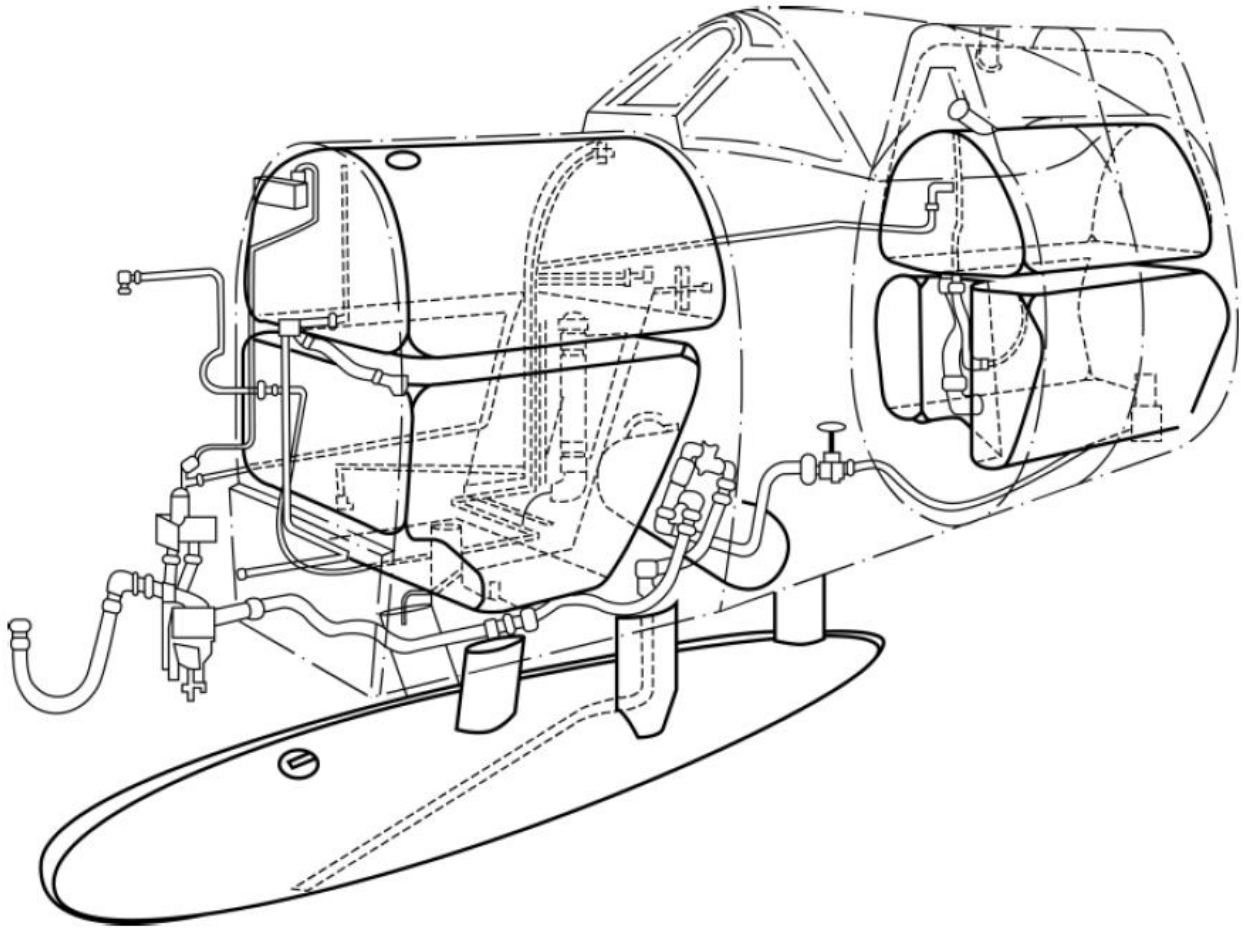
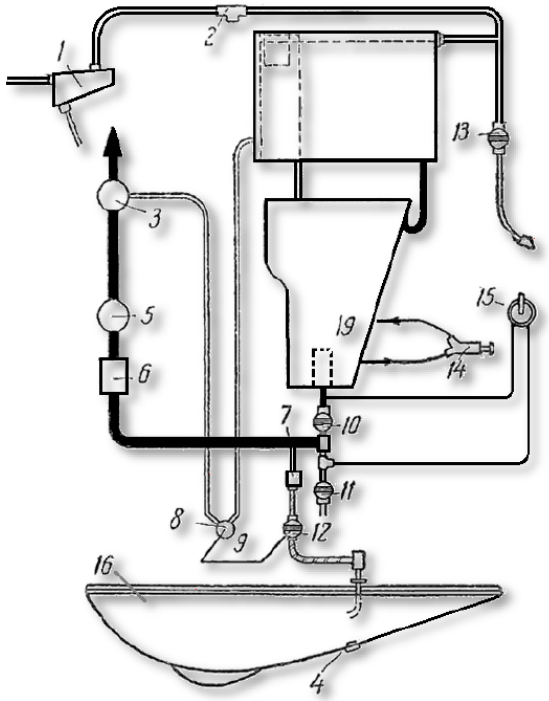
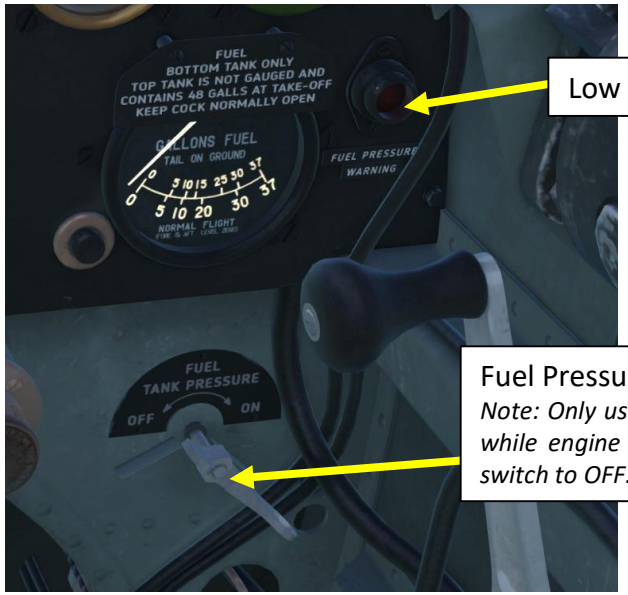


Figure 40: Fuel System Components on the Aircraft



1. Vacuul system oil separator
2. Pressure control valve and vent
3. De-aerator on carburettor
4. Drain
5. Fuel pump
6. Filter
7. Non-return valves
8. Separator valve
9. Valve junction
10. Main fuel cock
11. Drain cock
12. Auxiliary fuel cock
13. Drain system valve
14. Priming pump
15. Hand wobble pump
16. 30 or 90 gallons drop tank
17. 47-gallon upper fuel tank
18. 38-gallon lower fuel tank

Figure 41: Fuel feed system



Low Fuel Pressure Warning Light

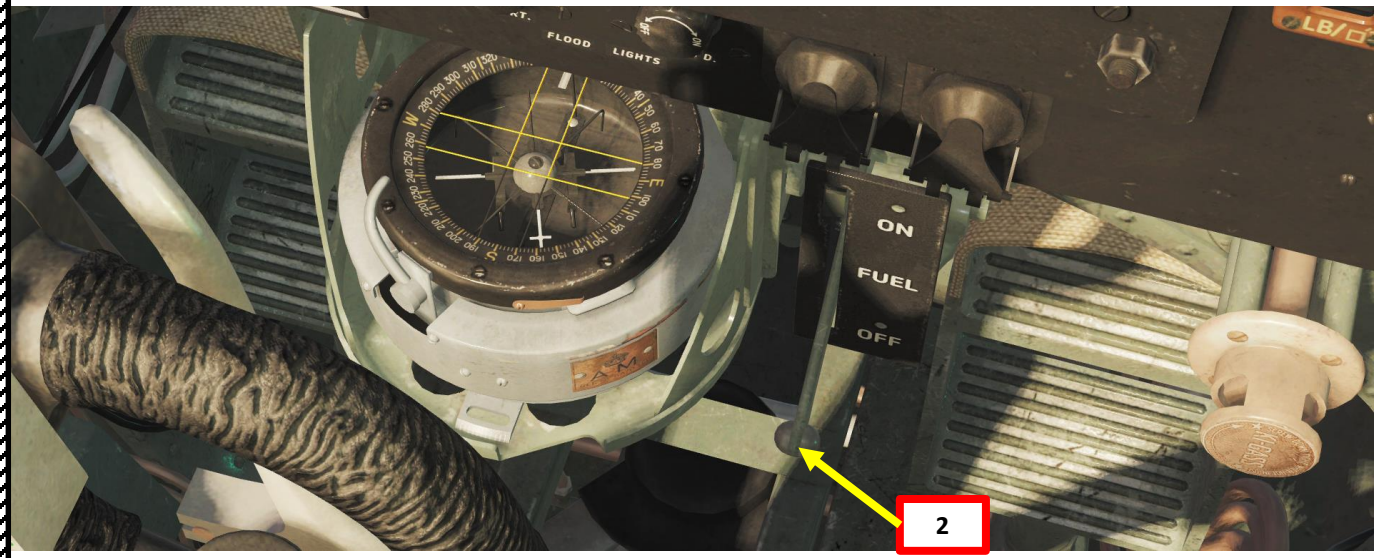
Fuel Pressuring Cock

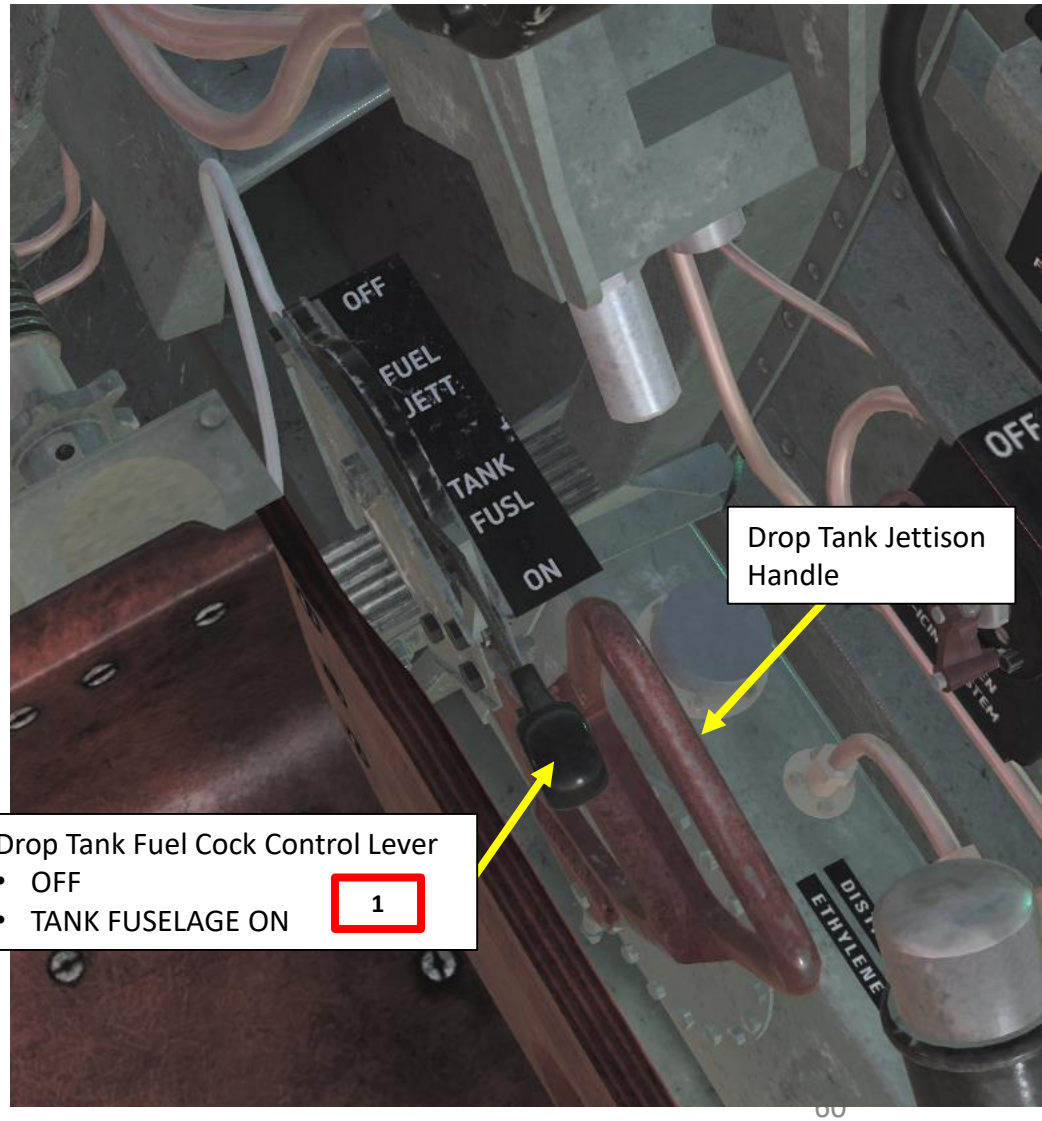
Note: Only use if Low Fuel Pressure Warning Light is lit while engine is running. Otherwise, always leave this switch to OFF.

FUEL MANAGEMENT - FLYING WITH AN EXTERNAL FUEL TANK

When flying with an external tank, make sure to do the following:

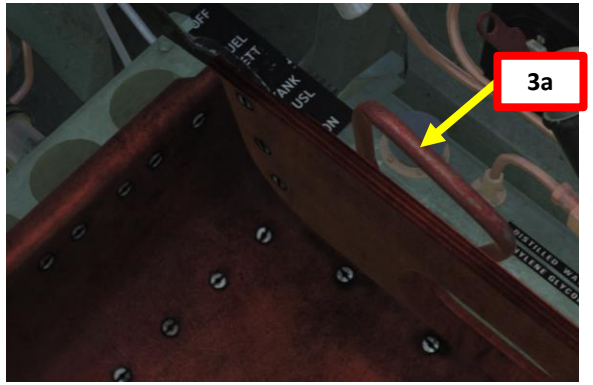
1. Set the Drop Tank Fuel Cock ON
2. Set the Main Fuel Tank Cock to OFF to allow the engine to take fuel directly from the external tank.

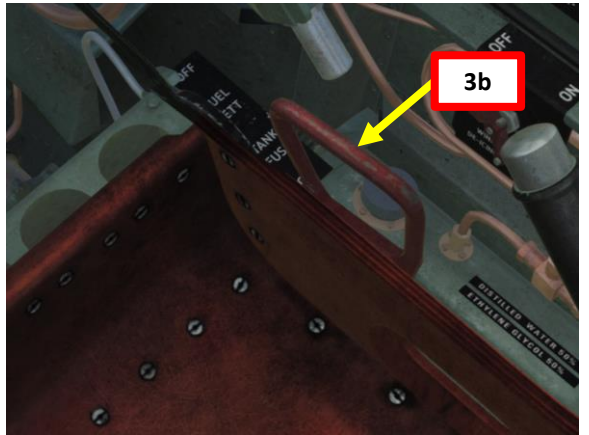


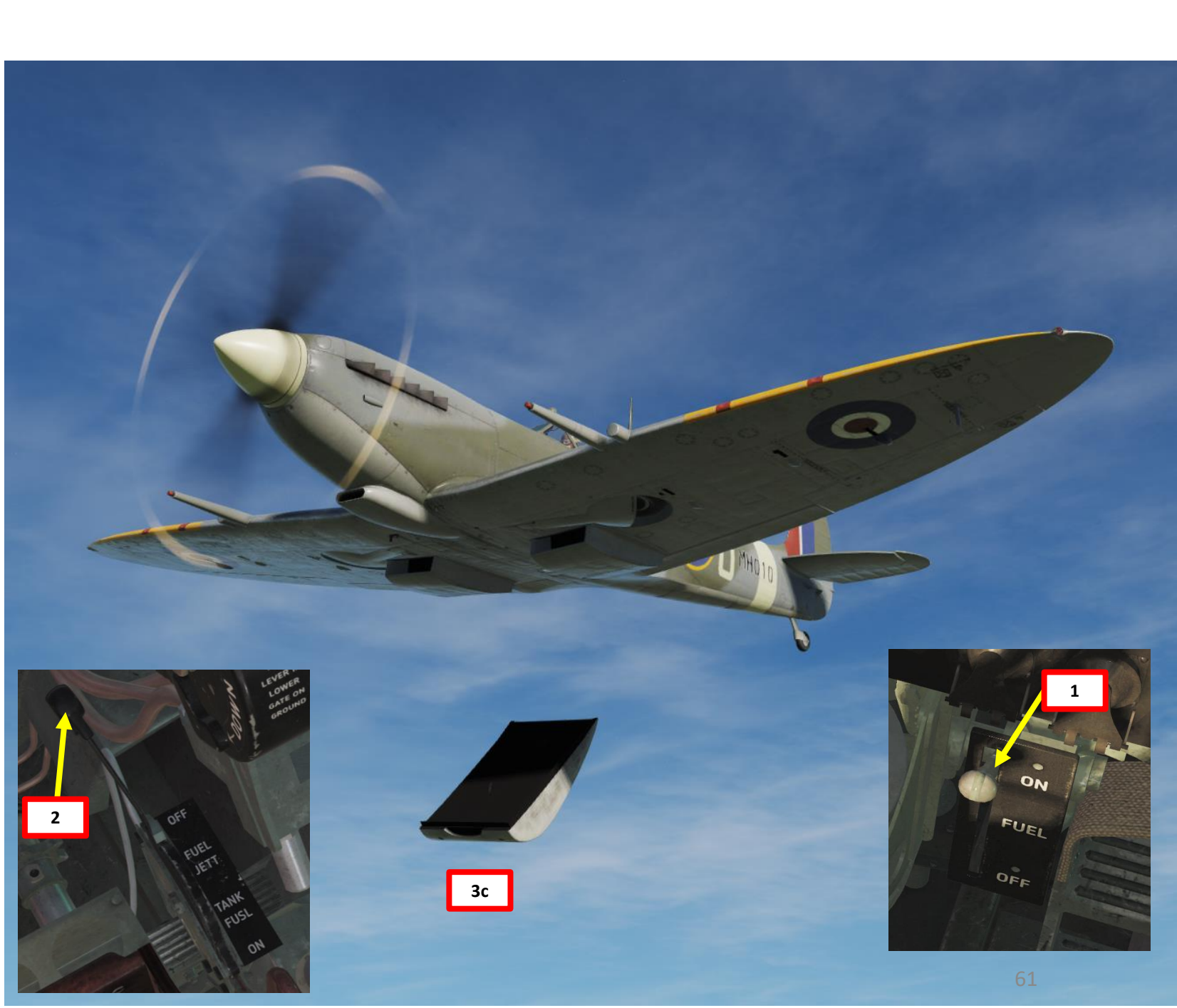


EXTERNAL FUEL TANK JETTISON

1. Set Main Fuel Tank Cock lever to ON
2. Set Drop Tank Fuel Cock Control Lever – OFF / FUEL JETT.
3. There is no indication to see the remaining external tank fuel. Just keep in mind that both “slipper” and “torpedo” tanks contain 45 gal.
4. You can jettison external fuel tanks by raising and pushing the “drop tank” handle forward.







Distance and duration of flight under different modes
(without external tanks) G_n=3392 KG, V_{rop}=392 L.

Flight mode	Altitude ft / m	IAS mph / kph	RPM	Fuel consumption L/km	Fuel consumption L/hr	Until tanks are emptied: Distance of horizontal flight, km	Until tanks are emptied: Duration of horizontal flight, H:MIN
Distance, maximum speed	21600 / 6600	256 / 410	2570	0.52	295	595	1:03
Distance, relative maximum speed	16400 / 5000	245 / 394	2360	0.475	237	685	1:22
Maximum distance	3280 / 1000	187 / 300	1800	0.395	125	880	2:46

Optimal Climb Speeds

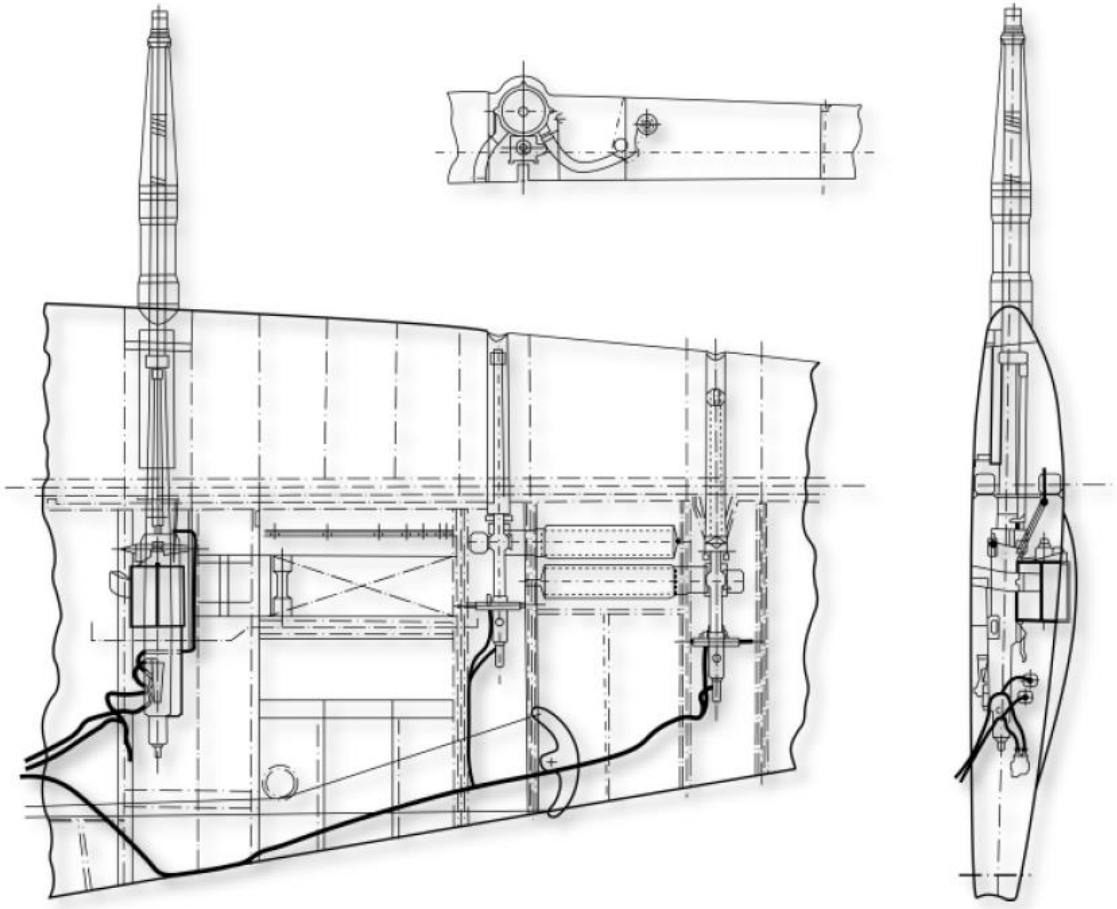
Altitude		Speed
From (ft)	To (ft)	mph
0	12000	185
12000	15000	180
15000	20000	170
20000	25000	160
25000	30000	150
30000	33000	140
33000	37000	130
37000	40000	120
40000	-	110

Maximum Diving Speed for Mach 0.85 (without external stores)	
Between SL and 20,000 ft	450 mph
Between 20,000 and 25,000 ft	430 mph
Between 25,000 and 30,000 ft	390 mph
Between 30,000 and 35,000 ft	340 mph
Above 35,000 ft	310 mph
Undercarriage down	160 mph
Flaps Down	160 mph

Maximum Weight	
For take-off and gentle manoeuvres only	8,700 lbs
For landing (except in emergency)	7,450 lbs
For take-off, all forms of flying and landing	7,800 lbs
*Note: At this weight, take-off must be made only from a smooth hard runway.	

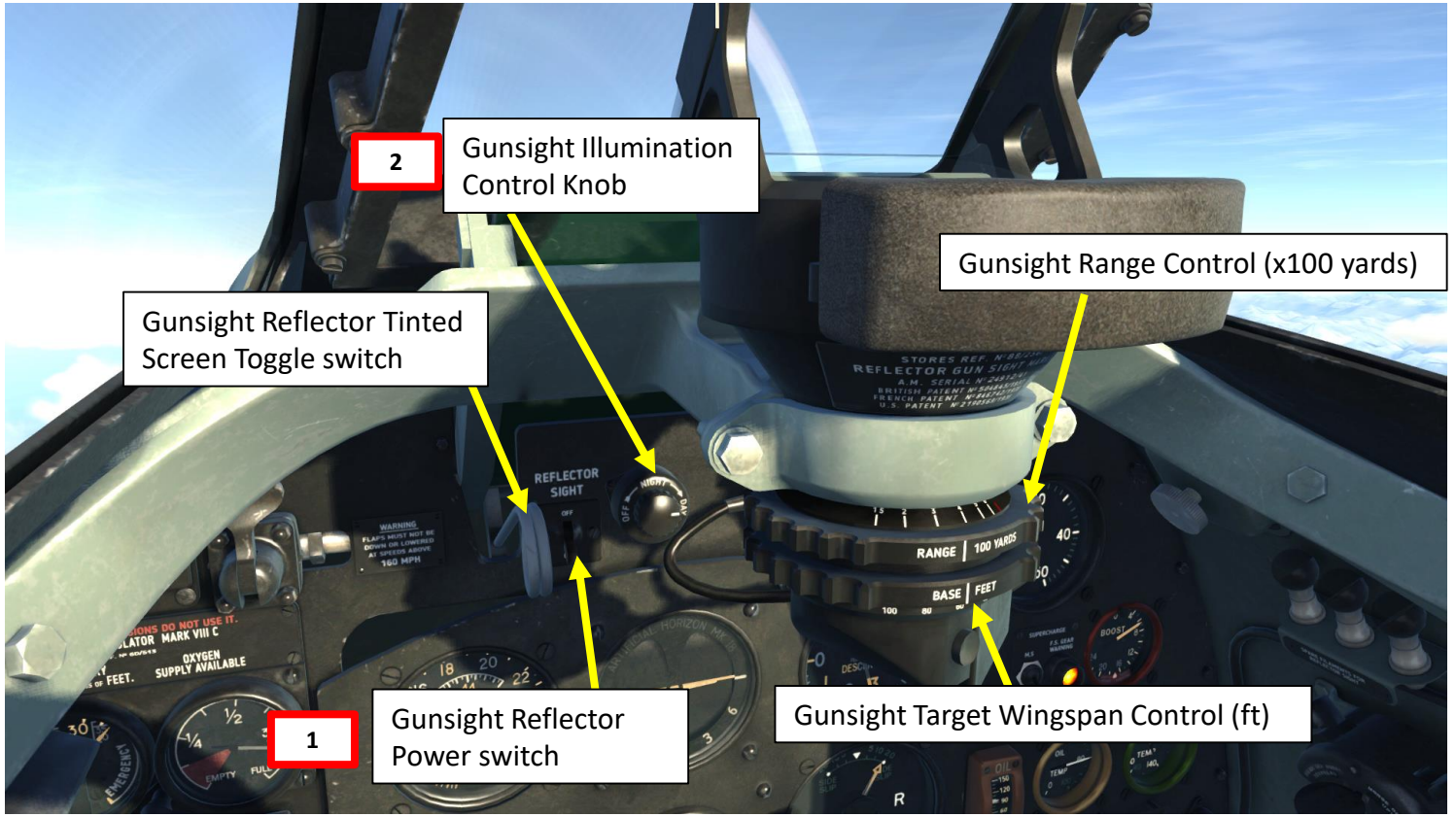
ARMAMENT OVERVIEW

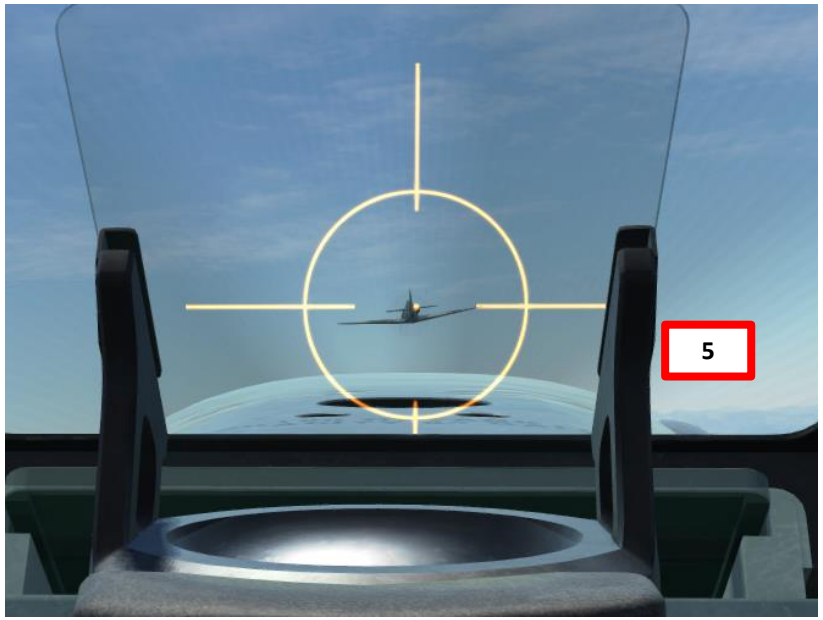
- 4 x Colt Browning .303 Machineguns (350 rounds per gun)
- 2 x Hispano Mk. II 20 mm Cannons (120 rounds per cannon)
- 2 x 250 lbs bombs + 1 x 500 lbs bomb

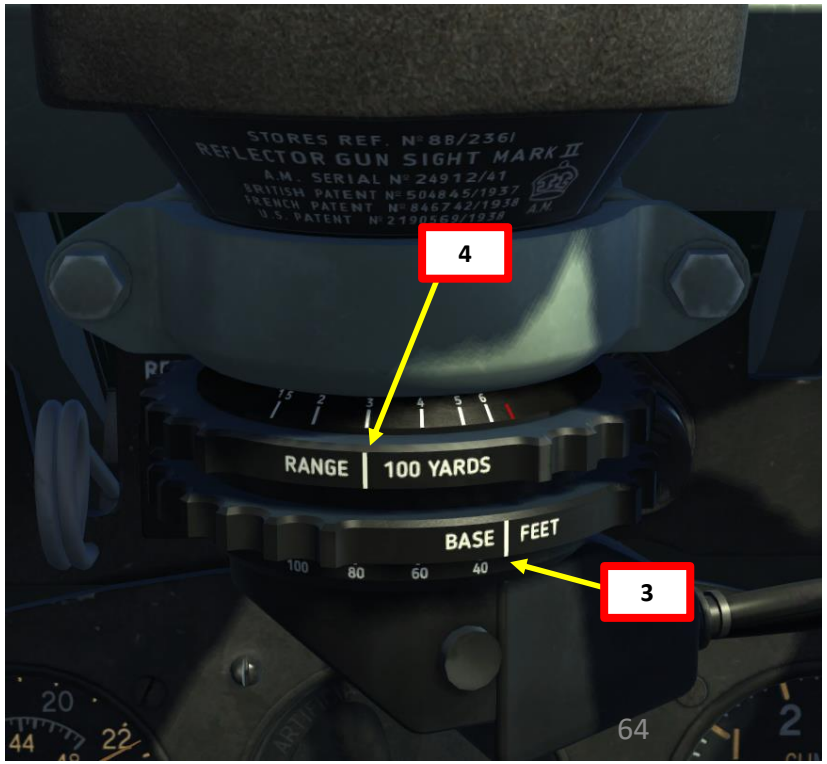


GUNSIGHT

1. Set Reflector Power switch to ON
2. Adjust Gunsight brightness as required
3. Set Gunsight Wingspan to 35 ft (typical FW190 and Bf.109 wingspan)
4. Set Gunsight Range to 300 yards (Typical Spitfire gun convergence was set to this value after the Battle of Britain).
5. When the wing of the target fits in your gunsight, you are now in the range set in step 4).

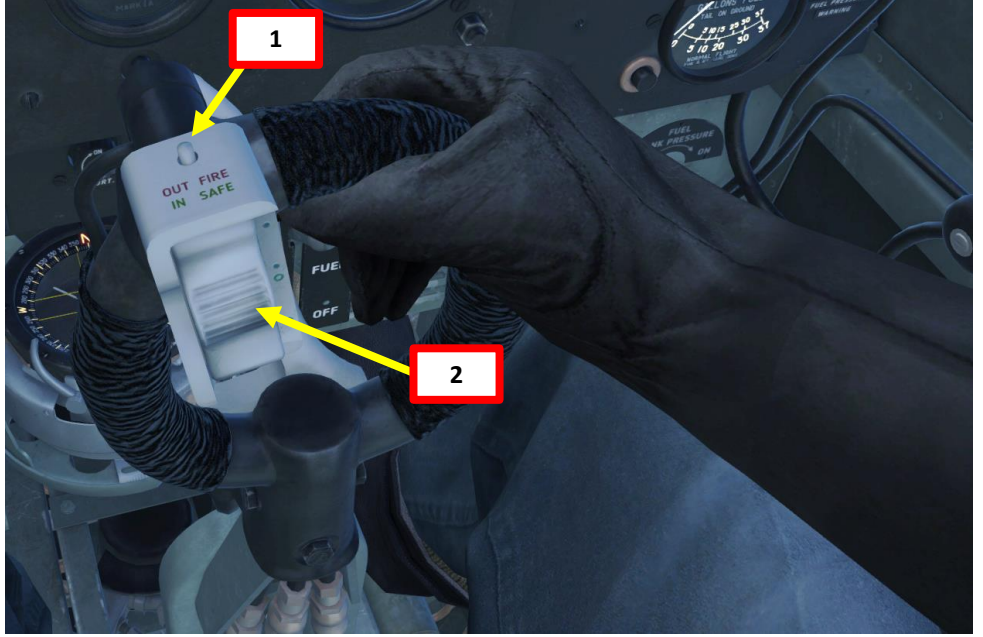






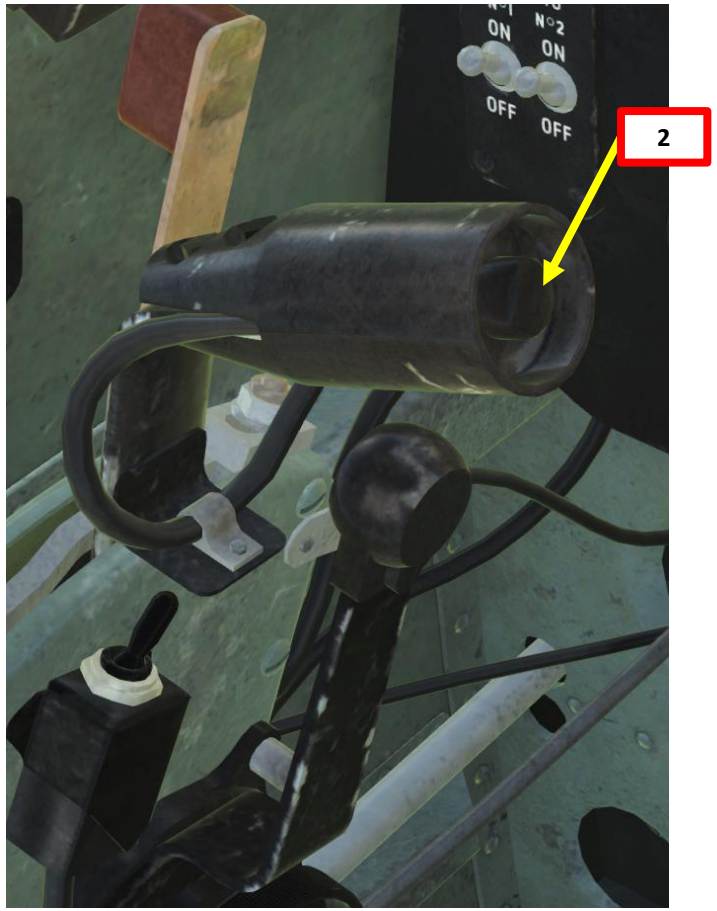
WEAPON EMPLOYMENT (CANNONS + MACHINEGUNS)

1. Remove gun safety by setting the Gun Safety Lever to OUT FIRE (LSHIFT+SPACEBAR)
2. Fire by using the “FIRE MACHINEGUNS AND CANNONS” button (SPACEBAR key)



WEAPON EMPLOYMENT (BOMBS)

1. Throttle back and perform a 45-degree dive at idle power
2. Use the Bomb Drop button on the throttle (RSHIFT+SPACEBAR key). All bombs equipped will drop simultaneously.



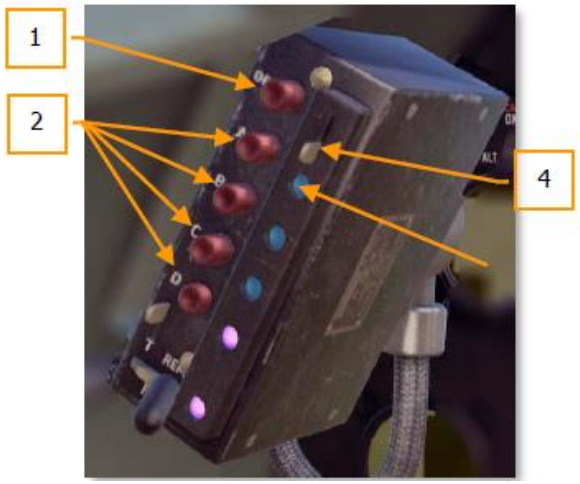
The Spitfire Mk IX is equipped with an A.R.I. 1063 type HF radio. Radio frequencies are preset in the mission editor in 4 different channels and cannot be tuned manually during flight; you have to use these 4 preset frequencies.

a) Set the radio transmit-receive switch to REM (Remote Operation)
b) Select desired channel (A, B, C OR D)
c) Press the "COMM – Push to Talk" key "RALT+ /" to transmit.

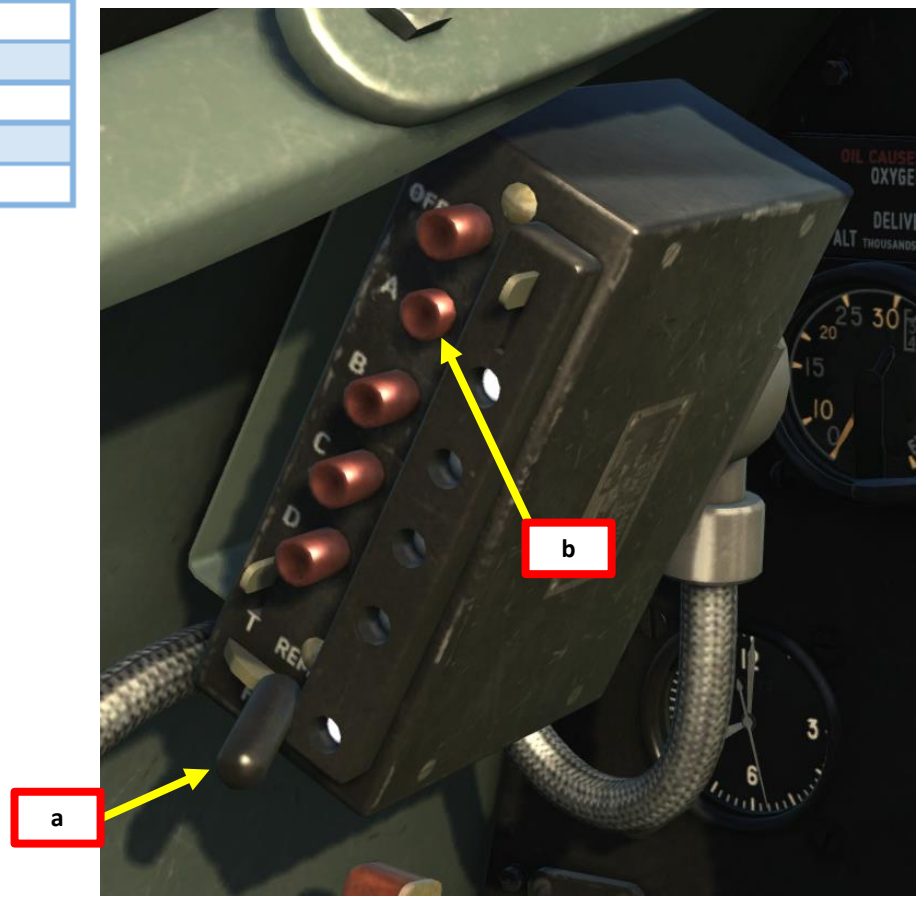
Maximum Radio Range

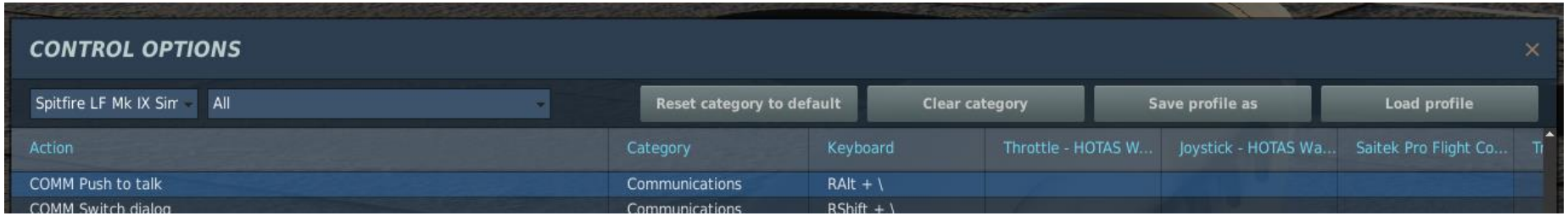
Altitude, Feet	Range, Miles
1000	30
3000	70
5000	80
10000	120
15000	150
20000	180

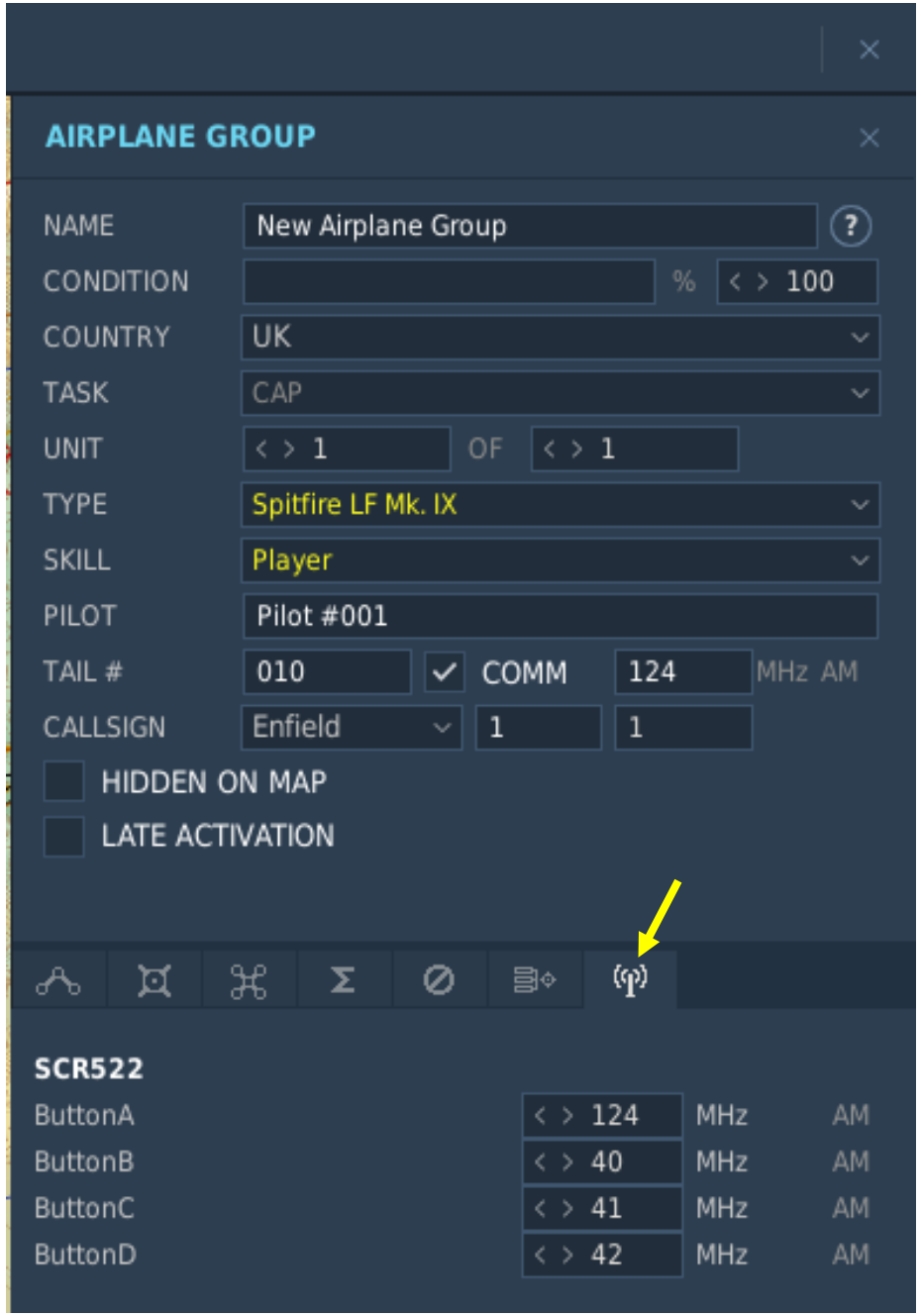
RADIO FREQUENCY RANGE: 100 - 156 MHz



1. Radio system power switch
2. Channel selector switches
3. Selected station light
4. Light filter slider
5. Mode toggle switch
6. Mode toggle switch locking pin.







RADIO FREQUENCIES – AIRFIELDS

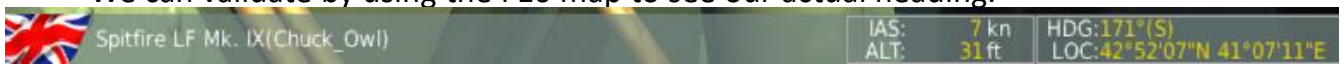
LOCATION	FREQUENCY (MHz)
Anapa	121.0
Batumi	131.0
Beslan	141.0
Gelendzhik	126.0
Gudauta	130.0
Kobuleti	133.0
Kutaisi	134.0
Krasnodar Center	122.0
Krasnodar Pashkovsky	128.0
Krymsk	124.0
Maykop	125.0
Mineral'nye Vody	135.0
Mozdok	137.0
Nalchik	136.0
Novorossiysk	123.0
Senaki	132.0
Sochi	127.0
Soganlug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

The P8 compass is a magnetic compass. You need to use it as a reference to set the Directional Gyro manually. Here is a quick tutorial:

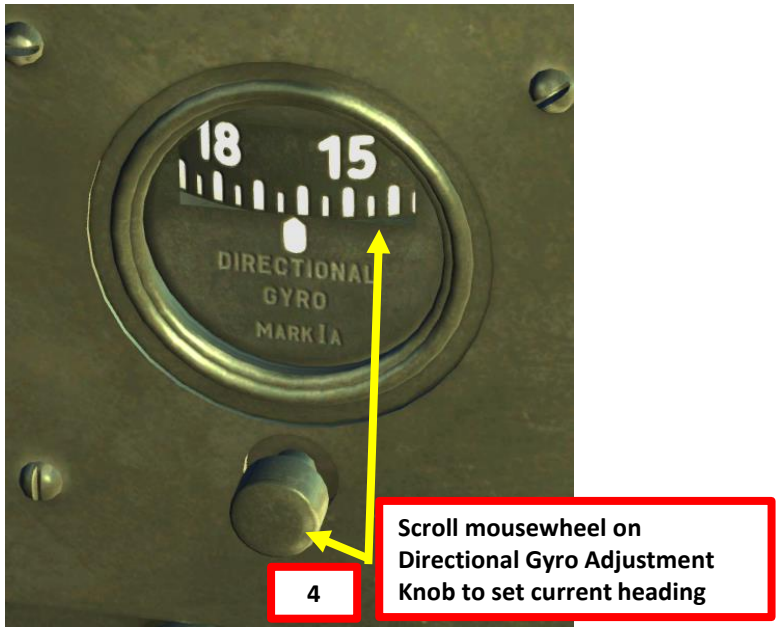
1) Turn up starboard flood lamp brightness to better illuminate P8 compass.

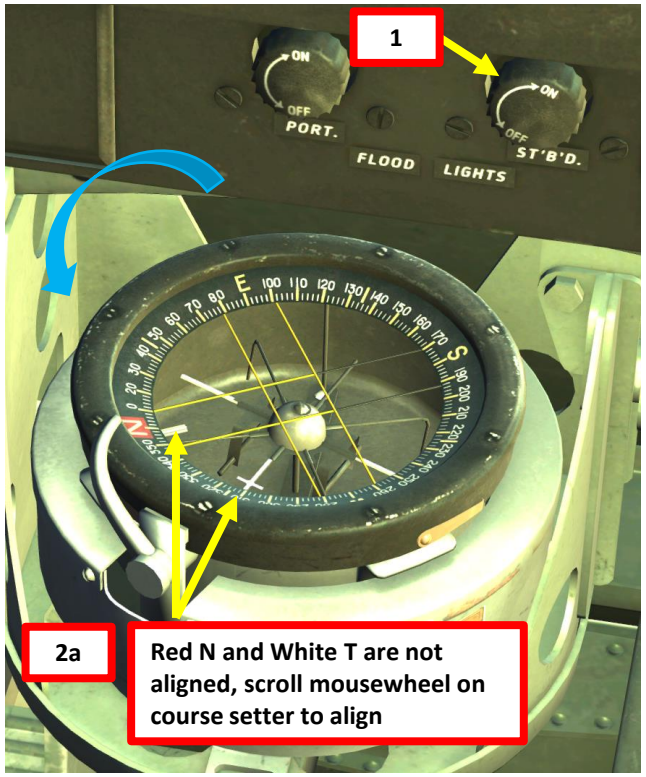
2) Align red **N** on compass on the white **T** by scrolling mousewheel on the course setter.

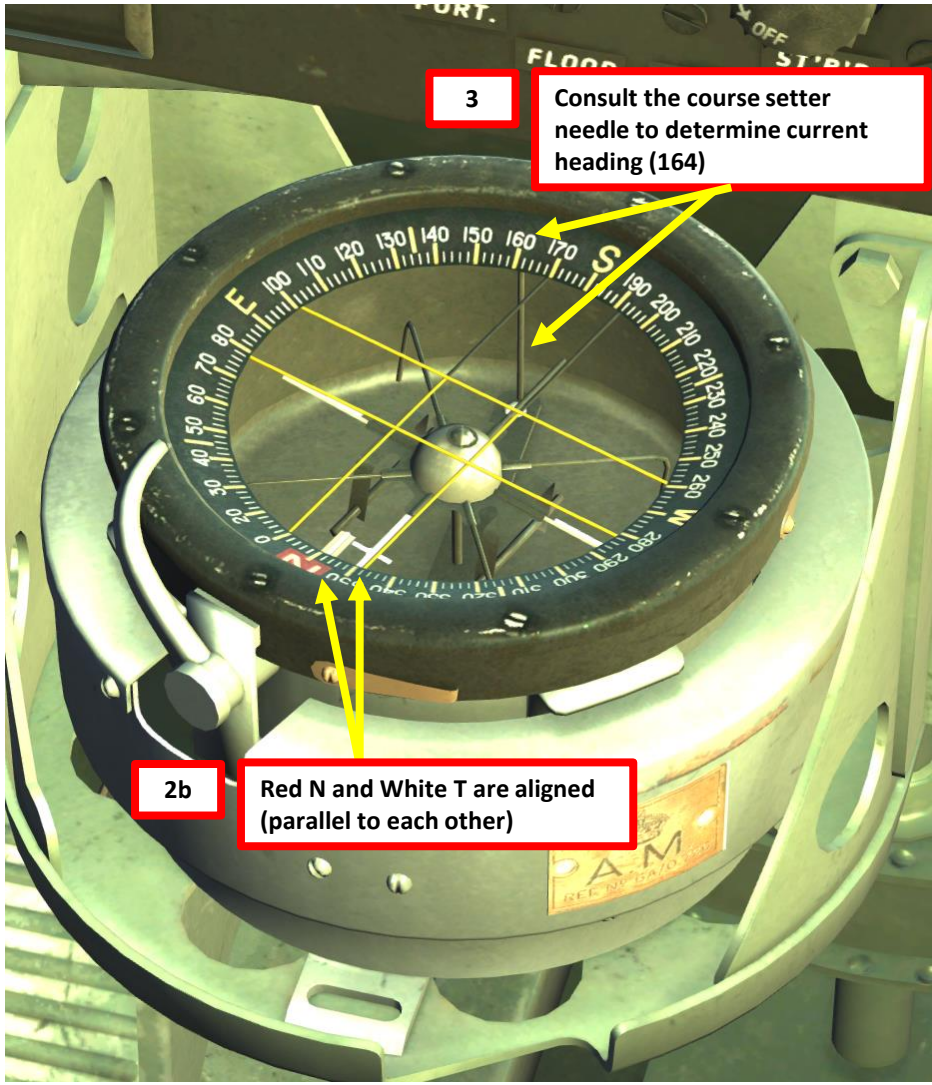
3) Consult course setter needle to determine current heading and add magnetic declination (approx. 7 degrees in Georgia, approx. -10 deg in Normandy 1944).
   - EXAMPLE: After N and T alignment in step 2), course Setter needle points to a course of 164. Adding 7 degrees will give us a **true heading** of 164+7 = **171 degrees**.
   - We can validate by using the F10 map to see our actual heading.



4) Set Directional Gyro to 171 degrees. This should be your true heading. You can now use the Directional Gyro as a reference.







Note: High-G manoeuvers can decalibrate your gyro and give you a wrong reading. Be aware that once you start a dogfight, your gyro can give you readings that don't make sense. It's normal: it is one of the real-life drawbacks of this navigation system. The same issue is also recurrent in today's civilian acrobatic prop planes.

Dogfighting in the Spitfire is an art that is difficult against a pilot who knows what he is doing.

You may have read countless articles on the Spitfire stating how much of a "turn and burn" fighter it is. The Spitfire's incredible turn rate is useful for defensive fights but tight turns often come at the price of losing valuable energy (airspeed). "Turning and burning" energy may be useful circumstantially, but accepting a defensive fight means that you lose the initiative and needlessly puts you in a vulnerable position. The design philosophy between the Mk I and the Mk IX radically changed: the Mk I was meant to be a superb turner, while the Mk IX was a stopgap measure to counter the FW.190A's vastly superior climb rate. Aircraft design is always a matter of trade-offs: gaining a better climb rate will often come at a cost in terms of turning performance. The Mk IX was such a compromise, meaning that while it could better keep up with the 190s in terms of airspeed and climb rate, it was slowly losing that turning advantage. Most pilots preferred this kind of compromise over the shortcomings of the Mk V that had become obsolete by late 1943.

The best Spitfire pilots used their aircraft offensively by using the combat tactics pioneered by the German *experten* throughout the war. Using "Boom and Zoom" techniques ensure a much higher survivability and offensive capabilities, therefore I recommend that you use your Spitfire as an energy fighter. The Spitfire is best used at altitudes of 25,000 ft and higher. This is where it will have the greatest performance advantage over the Bf.109 and the FW190. However, most dogfights occurring in multiplayer servers happen at lower altitudes between 5,000 and 15,000 ft, which is where the Messerschmitts and Focke-Wulfs will dominate in terms of climb rate and diving speed. Turning tightly will be of no use if you can't catch an opponent that dictates when, where and how fights will occur. If you happen to be forced to fight on the 109's terms down low, you are at a serious disadvantage from the very beginning. Try to avoid that.

During dogfights, I would advise you to keep your energy state (airspeed and altitude) high at all times. These principles apply to every single aircraft, but particularly to the Spitfire. The Spitfire's flaps can be used as an airbrake but are more or less impractical during a dogfight since they are used to slow the Spitfire down to a crawl for landing, which is closer to a death sentence than a proper dogfighting technique.

If you want to survive against experienced Bf.109 or FW.190 pilots, you must:

- Always fly with a wingman
- Always fly with a high energy state (high airspeed and altitude)
- Do not attempt to outclimb or outdive a 109 or 190 unless you have a serious energy advantage
- Bring the fight to high altitudes if you can to fly your plane in the combat environment it was designed for
- Master your aircraft: know your engine limits and airspeed limits by heart and practice manoeuvers to avoid stalls and spins.


ZX
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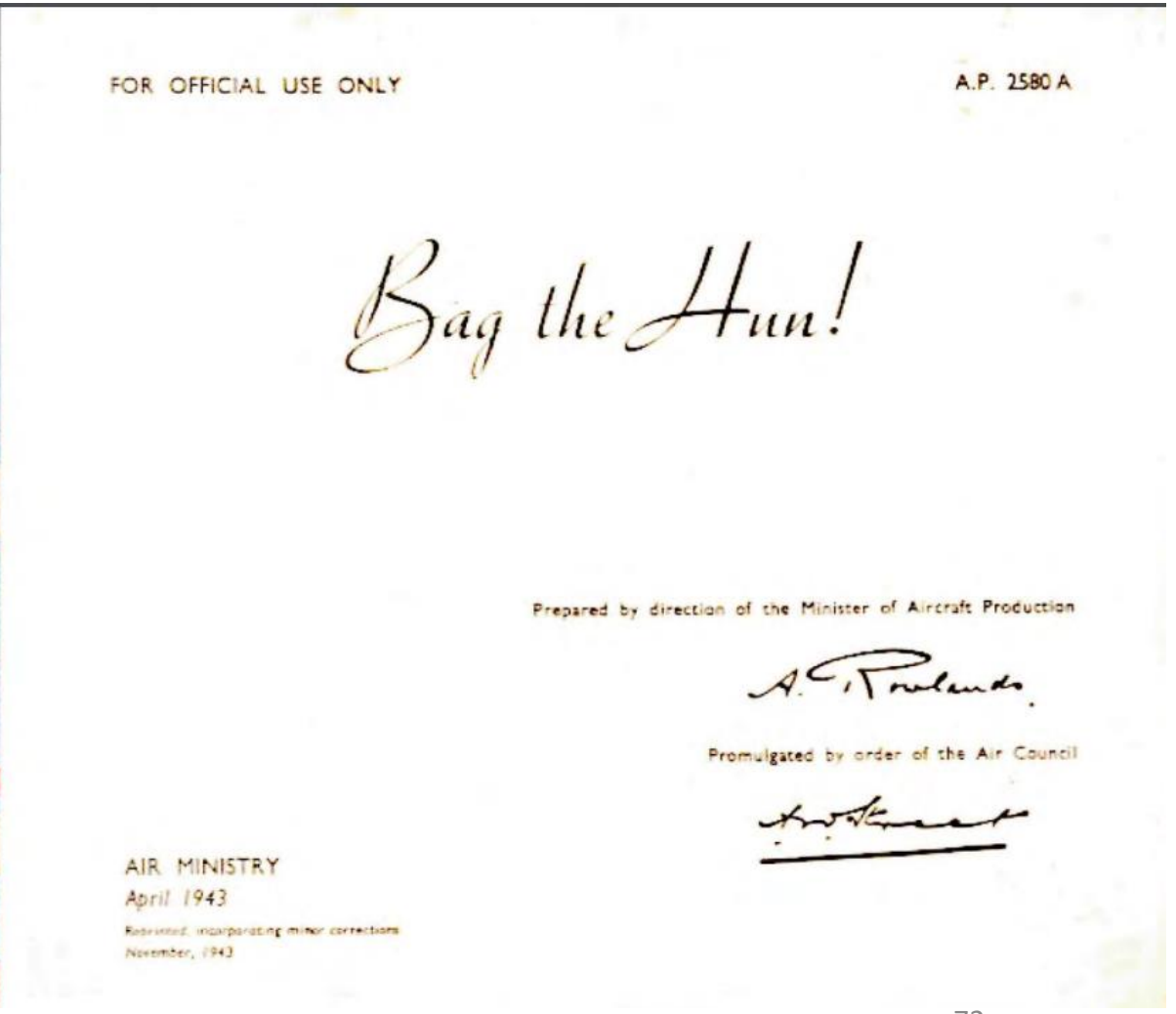
BAG THE HUN

One of the best resources for “bagging those huns” is actually a document of the same name.

Here is a link to a pdf scan of this manual: https://drive.google.com/open?id=0B-uSpZROuEd3V25mRlE2TDMzcXc



Taming taildraggers is much more difficult than meets the eye, especially during the takeoff and landing phase. Here is a useful and insightful essay on the art of flying taildraggers wonderfully written by *Chief Instructor*. I highly recommend you give it a read.

Link: https://drive.google.com/open?id=0B-uSpZROuEd3V3Jkd2pfa0xRRW8

TAMING TAILDRAGGERS

Essay by Chief Instructor (CFI)

PART 1

Why taildraggers are tricky and how to overcome it

What do I know about it? Well, I have spent a significant proportion of my professional flying career teaching both experienced and novice pilots how to fly and handle tail-dragging aircraft. This amounts to several thousand hours of tailwheel training alone, though who's counting! These aircraft include among them modern high performance aerobatic aircraft and a variety of more vintage types from DH Tiger Moths, to Harvards. I can't recall off the top of my head exactly how many students I've worked with over the years, but it's well over 200! Best of all, they have all gone on to fly extensive tailwheel ops in a variety of types and to the best of my knowledge, only 2 of them have crashed anything since!

As a significant number of pilots here are expressing difficulties with tailwheel handling,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Fw 190 D-9 1.5.5
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Ka-50 1.5.5
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