DCS GUIDE
P-51D MUSTANG

By Chuck

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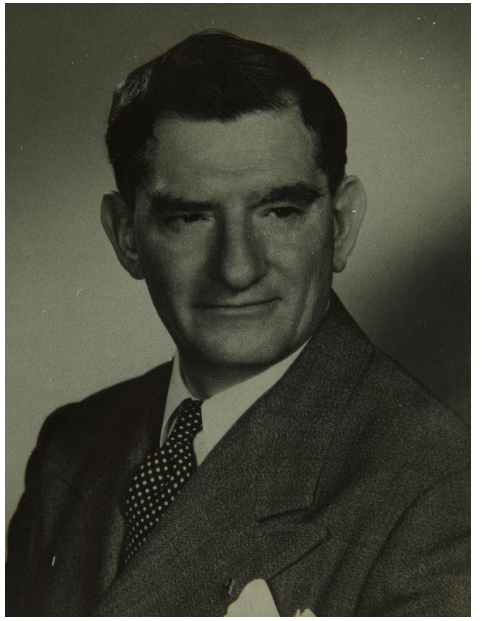
Special thanks to Paul "Goldwolf" Whittingham for creating the guide icons.

PART 1 – INTRODUCTION

The **North American Mustang** is is an American long-range, single-seat fighter and fighter-bomber used during World War II, the Korean War and other conflicts. The Mustang was designed in 1940 by North American Aviation (NAA) in response to a requirement of the British Purchasing Commission. The Purchasing Commission approached North American Aviation to build Curtiss P-40 fighters under license for the Royal Air Force (RAF). Rather than build an old design from another company, North American Aviation proposed the design and production of a more modern fighter. The P-51 Mustang was a solution to the need for an effective bomber escort. It used a common, reliable engine and had internal space for a huge fuel load. With external fuel tanks, it could accompany the bombers from England to Germany and back.

The Mustang, which was designed by a team led by lead engineer Edgar Schmued, followed the best conventional practice of the era, but included several new features. One was a wing designed using laminar flow airfoils which were developed co-operatively by North American Aviation and the National Advisory Committee for Aeronautics (NACA). These airfoils generated very low drag at high speeds. During the development of the NA-73X, a wind tunnel test of two wings, one using NACA 5-digit airfoils and the other using the new NAA/NACA 45–100 airfoils, was performed in the University of Washington Kirsten Wind Tunnel. The results of this test showed the superiority of the wing designed with the NAA/NACA 45–100 airfoils.



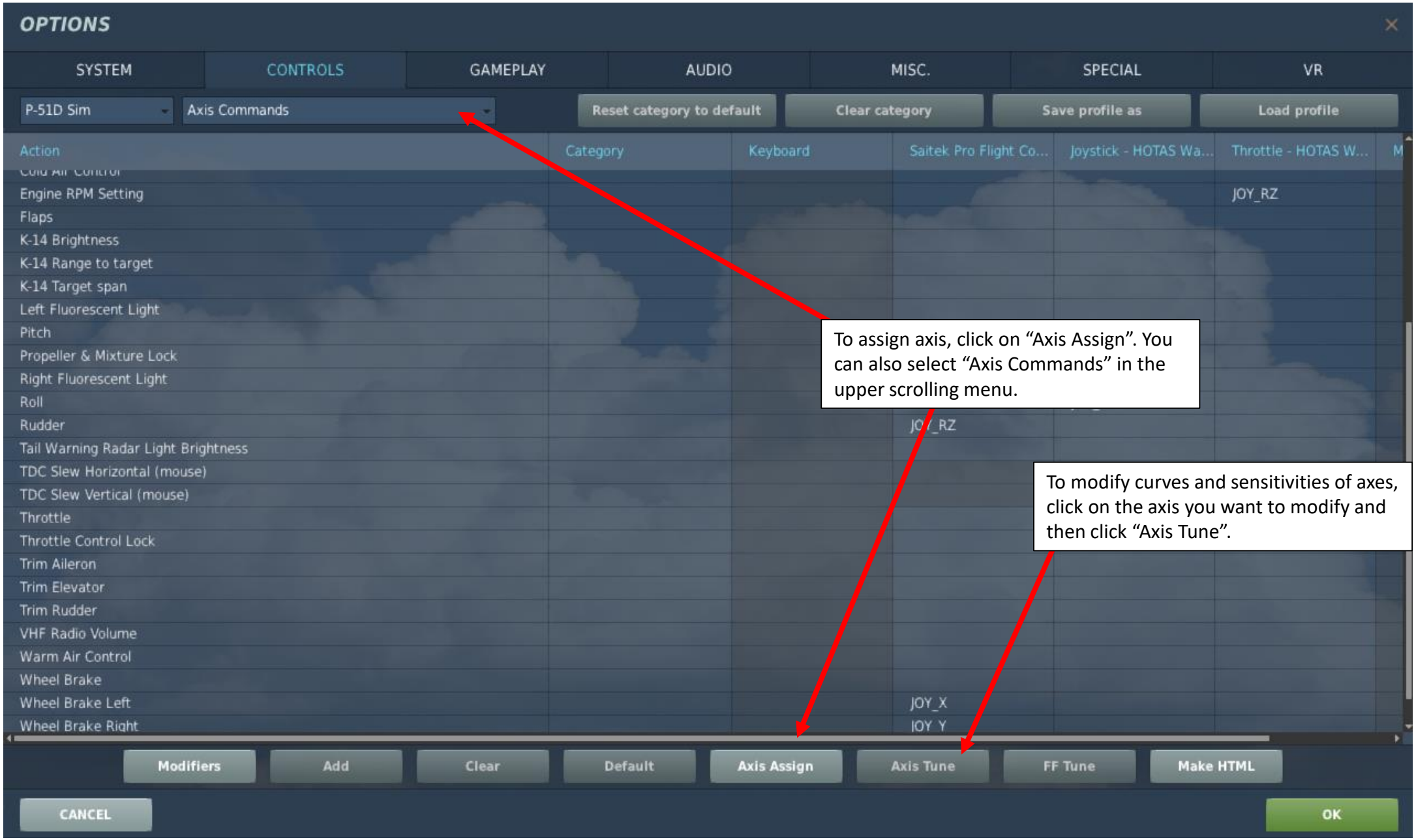
Edgar O. Schmued
(1899-1985)

The Mustang was originally designed to use the Allison V-1710 engine, which, in its earlier variants, had limited high-altitude performance. It was first flown operationally by the RAF as a tactical-reconnaissance aircraft and fighter-bomber (Mustang Mk I). The addition of the Rolls-Royce Merlin to the P-51B/C model transformed the Mustang's performance at altitudes above 15,000 ft, allowing the aircraft to compete with Luftwaffe's fighters. The definitive version, the P-51D, was powered by the Packard V-1650-7, a license-built version of the Rolls-Royce Merlin 66 two-stage two-speed supercharged engine, and was armed with six .50 caliber (12.7 mm) M2/AN Browning machine guns.

For me, flying the DCS Mustang was love at first sight. I crashed it so many times, seized countless engines, entered too many nasty spins… yet the Mustang truly is the Cadillac of the skies. Its cockpit is well laid out, and proper training will make it a real joy to fly. I learned so much about taildraggers with the Mustang, I cannot recommend this aircraft enough if you are interested in the second world war in the slightest.

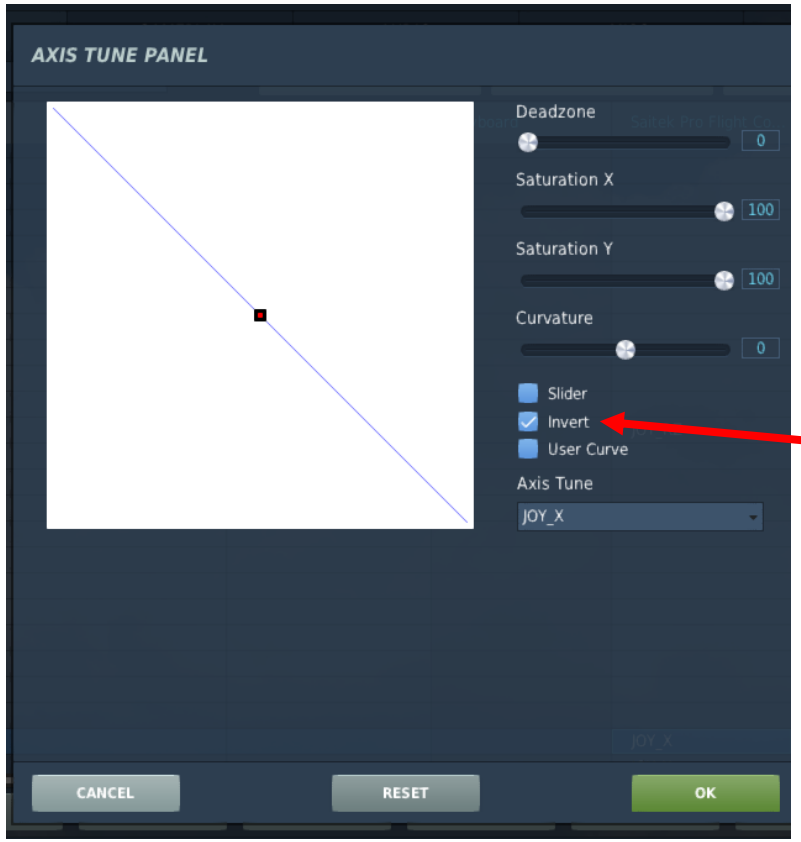
The versatility of the P-51 will bring you hundreds of hours of different kinds of missions. Hopefully, you will enjoy it as much as I did since 2012.

CONTROL	FUNCTION
COMM PUSH TO TALK	ALLOWS YOU TO USE RADIO MENU WHILE FLYING
FLAPS DOWN	DEPLOYS UP YOUR FLAPS 10 DEGREES (FLAP SETTINGS ARE 0, 10, 20, 30, 40 & 50 deg)
FLAPS UP	RETRACTS YOUR FLAPS 10 DEGREES (FLAP SETTINGS ARE 0, 10, 20, 30, 40 & 50 deg)
GUN FIRE	FIRES YOUR .50 CAL GUNS
LANDING GEAR UP/DOWN	RAISES OR DEPLOYS YOUR LANDING GEAR
RADIATOR COOLANT OPEN	THESE RADIATOR CONTROLS ARE USEFUL IN SITUATIONS WHERE YOU NEED TO COOL YOUR ENGINE QUICKLY. OTHERWISE, YOU CAN FLY USING THE AUTO MODE FOR RADIATORS. SEE ENGINE MANAGEMENT SECTION.
RADIATOR COOLANT CLOSE	
RADIATOR OIL OPEN	
RADIATOR OIL CLOSE	
STARTER	STARTER SWITCH. MAP IT TO SOMETHING YOU CAN HOLD OR TOGGLE.
TRIM ELEVATOR DOWN/UP	ELEVATOR TRIM CONTROL
TRIM RUDDER LEFT/RIGHT	RUDDER TRIM CONTROL
WAR EMERGENCY POWER	WEP (WAR EMERGENCY POWER). USE WITH CAUTION.
WEAPON RELEASE	ALLOWS YOU TO RELEASE YOUR BOMBS, ROCKETS AND DROP TANKS.
ZOOM IN SLOW	ALLOWS YOU TO ZOOM IN
ZOOM OUT SLOW	ALLOWS YOU TO ZOOM OUT


OPTIONS
SYSTEM
CONTROLS
GAMEPLAY
AUDIO
MISC.
SPECIAL
VR
P-51D Sim
Axis Commands
Reset category to default
Clear category
Save profile as
Load profile
Action
Category
Keyboard
Saitek Pro Flight Co...
Joystick - HOTAS Wa...
Throttle - HOTAS W...
Engine RPM Setting
JOY_RZ
Flaps
K-14 Brightness
K-14 Range to target
K-14 Target span
Left Fluorescent Light
Pitch
Propeller & Mixture Lock
Right Fluorescent Light
Roll
Rudder
Tail Warning Radar Light Brightness
TDC Slew Horizontal (mouse)
TDC Slew Vertical (mouse)
Throttle
Throttle Control Lock
Trim Aileron
Trim Elevator
Trim Rudder
VHF Radio Volume
Warm Air Control
Wheel Brake
Wheel Brake Left
JOY_X
Wheel Brake Right
JOY_Y
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:

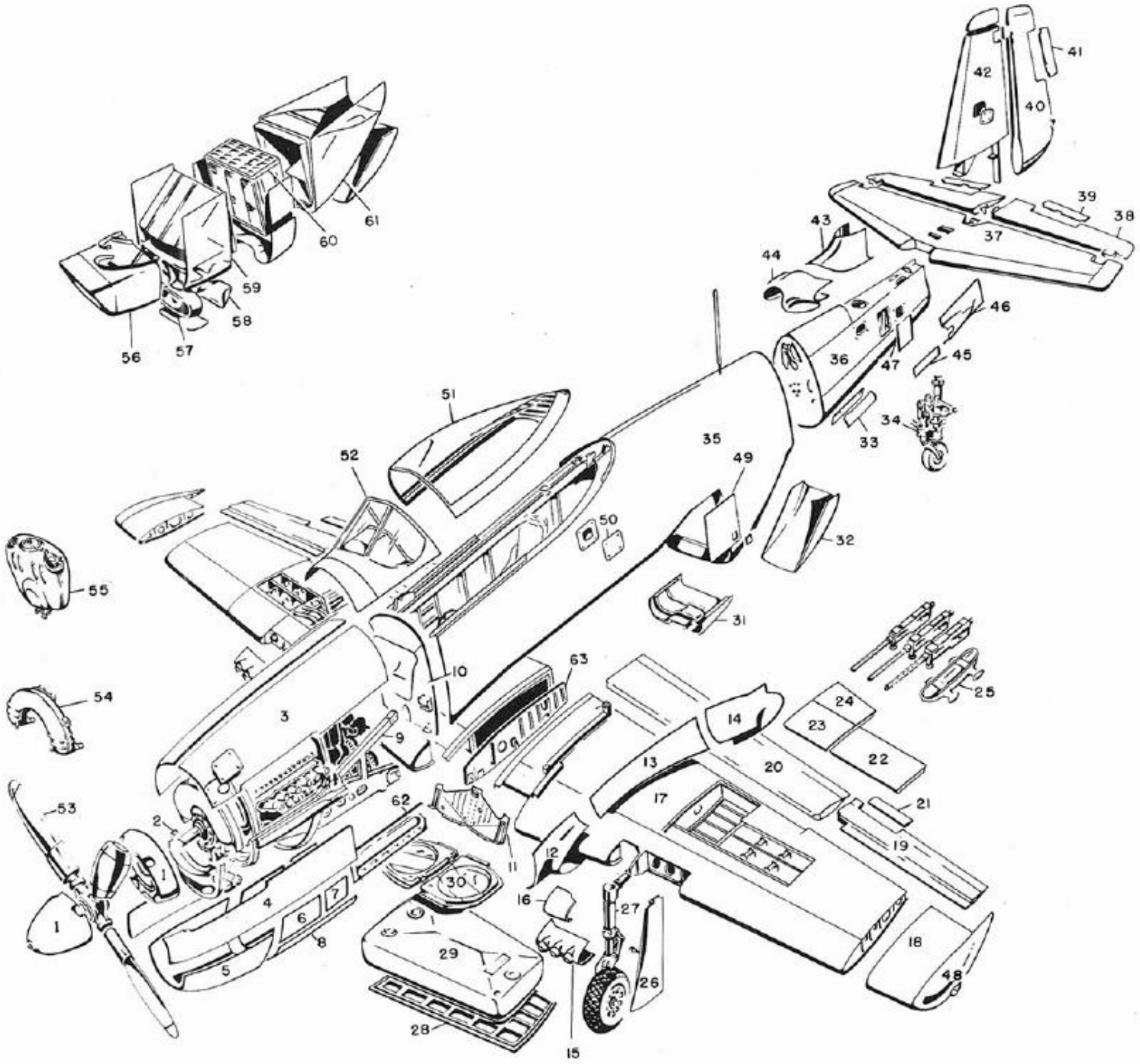
- ENGINE RPM SETTING – CONTROLS RPM
- PITCH, ROLL, RUDDER (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 0)
- THROTTLE – CONTROLS MANIFOLD PRESSURE / BOOST
- WHEEL BRAKE LEFT
- WHEEL BRAKE RIGHT



When setting wheel brake axis, they are not set to “INVERT” by default. You need to click on INVERT in the Axis Tune menu for each wheel brake.


NO
HAND HOLD

PART 3 – COCKPIT & GAUGES



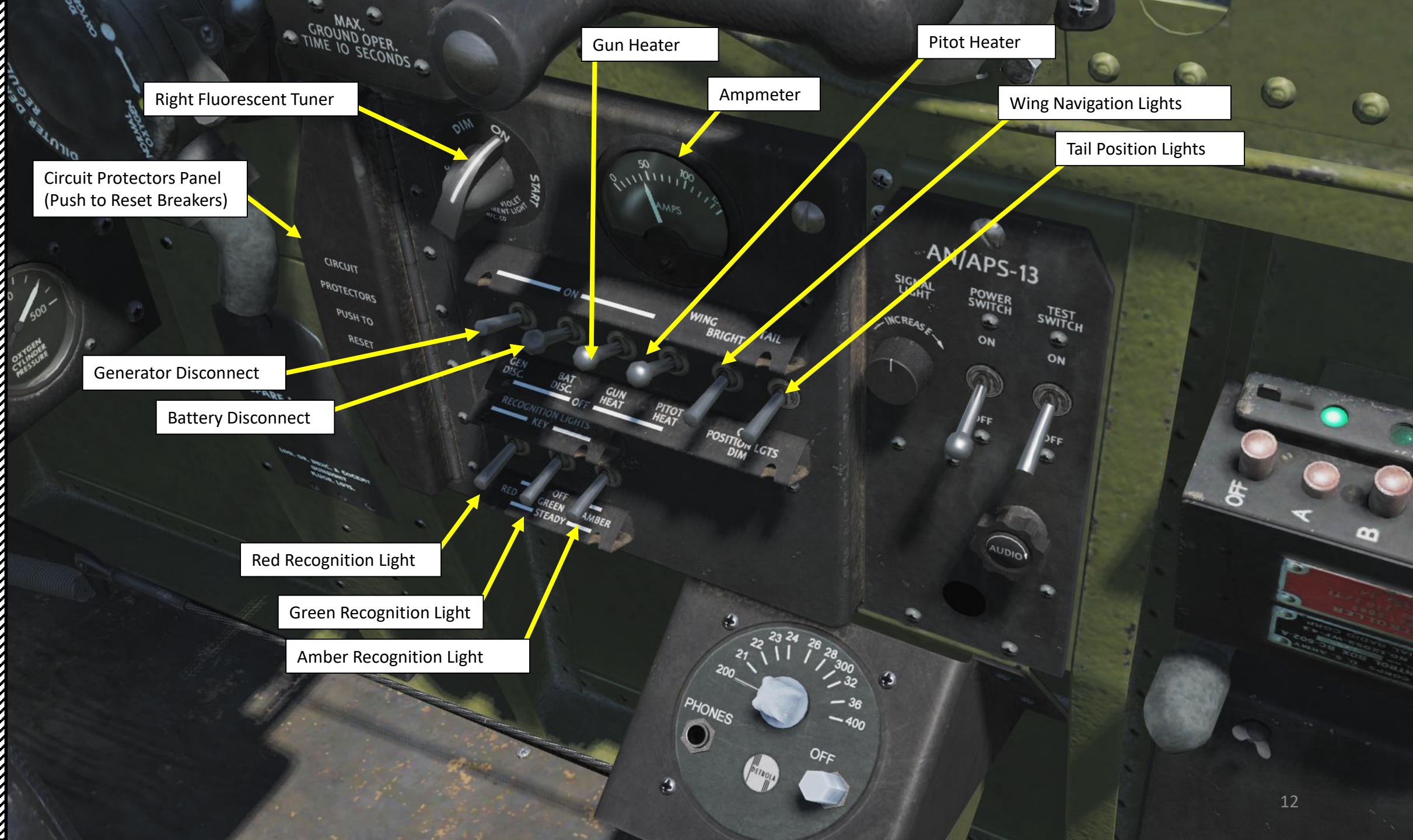
1. Propeller Spinner
2. Engine Mount Front Flame
3. Engine Top Cowling
4. Engine Intermediate Cowling
5. Engine Bottom Cowl Forward
6. Engine Bottom Cowl Center
7. Engine Bottom Cowl Rear
8. Engine Bottom Cowl Aft
9. Engine Mount Assembly
10. Firewall Assembly
11. Wing Center Bulkhead
12. Wing Fillet Forward
13. Wing Fillet Intermediate
14. Wing Fillet Rear
15. Gun Nose Assembly
16. Landing Gear Access Door
17. Outer Wing Panel
18. Wing Tip Assembly Inner
19. Aileron Assembly
20. Flap Assembly
21. Aileron Trim Tab Assembly
22. Ammunition Bay Door
23. Gun Bay Door Forward
24. Gun Bay Door Rear
25. Wing Bomb Rack
26. Strut Fairing
27. Landing Gear Strut
28. Fuel Tank Door
29. Fuel Cell
30. Wheel Fairing Door
31. Coolant Radiator Access Cover
32. Radiator Air Scoop Rear
33. Tail Wheel Doors
34. Tail Wheel Assembly
35. Fuselage Assembly Front Covered
36. Fuselage Assembly Rear Covered
37. Horizontal Stabilizer
38. Elevator
39. Elevator Trim Tab
40. Rudder
41. Rudder Trim Tab
42. Fin
43. Fin Fillet Forward
44. Empennage Fillet, Forward
45. Empennage Fillet, Lower
46. Stabilizer Fillet Rear
47. Cover Assembly
48. Wing Tip Assembly Outer
49. Cover Assembly
50. Cover Assembly
51. Canopy
52. Windshield Assembly
53. Propeller Blade
54. Cool. Header Tank Complete
55. Oil Tank
56. Radiator Air Scoop Forward
57. Oil Cooler
58. Oil Cooler Outlet Door
59. Radiator Air Duct Forward
60. Radiator Assembly
61. Air Duct Aft
62. Stack Fairing
63. Rib, Wing Center

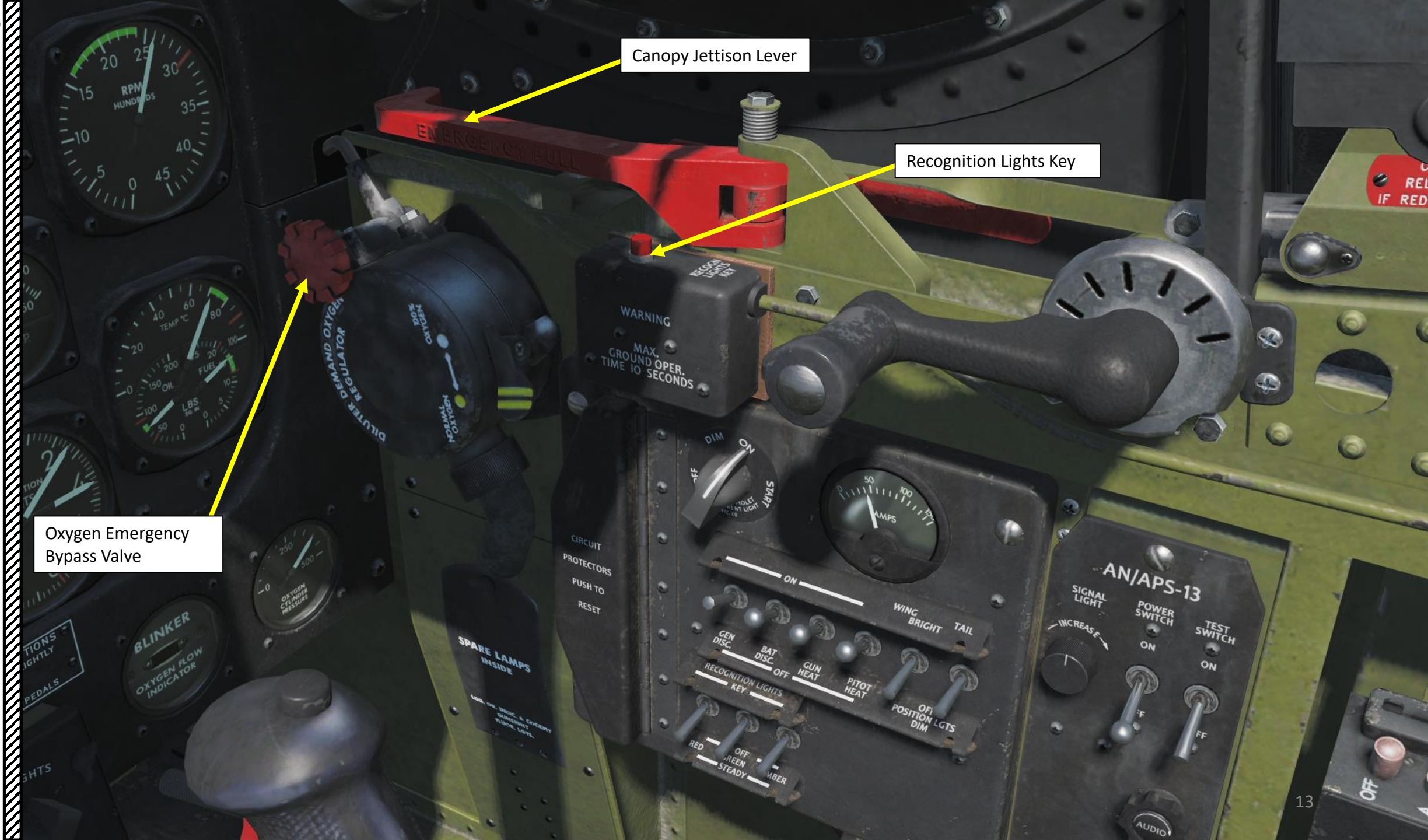
PART 3 – COCKPIT & GAUGES

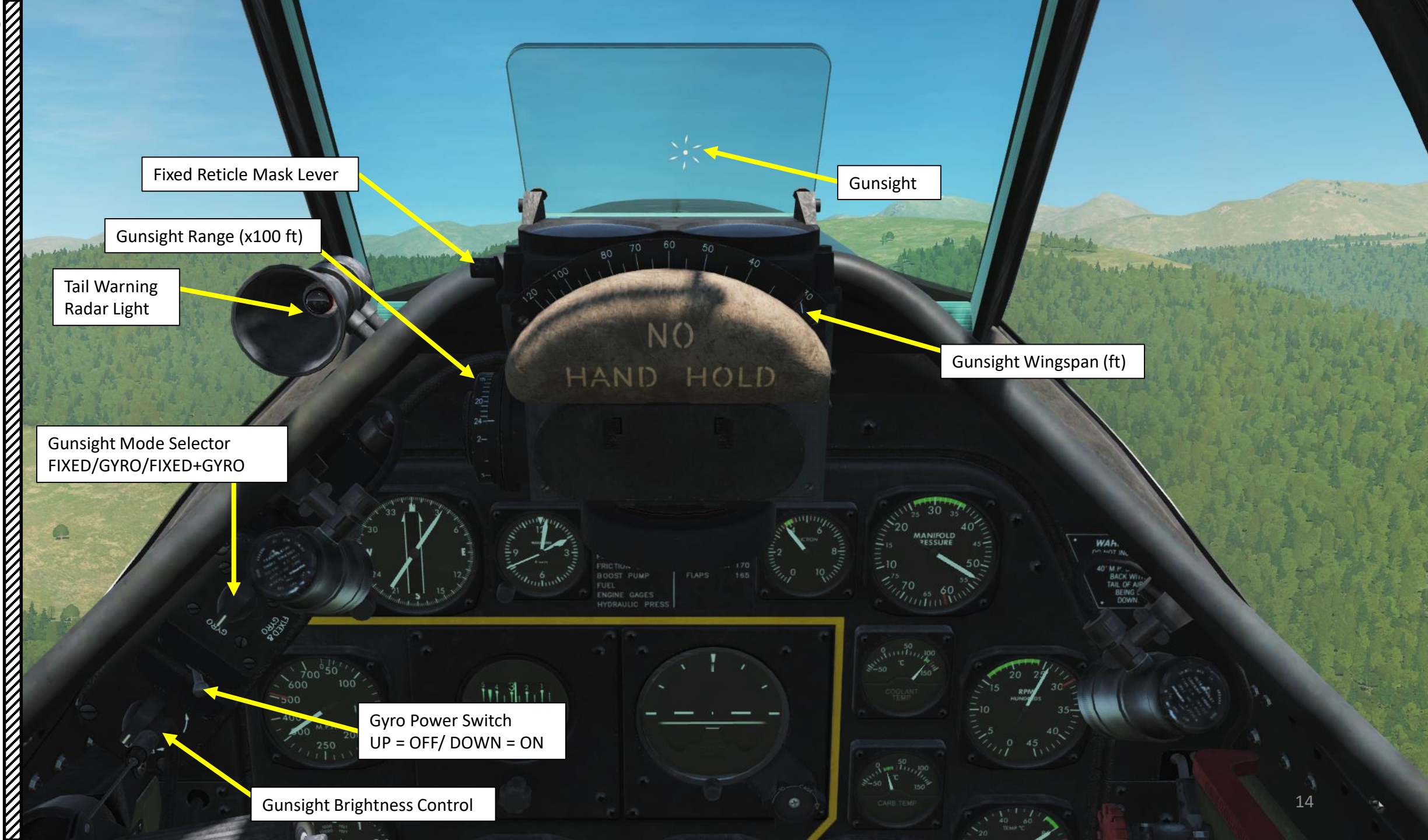
Tip: Pilot body can be toggled ON/OFF with “RSHIFT+P”

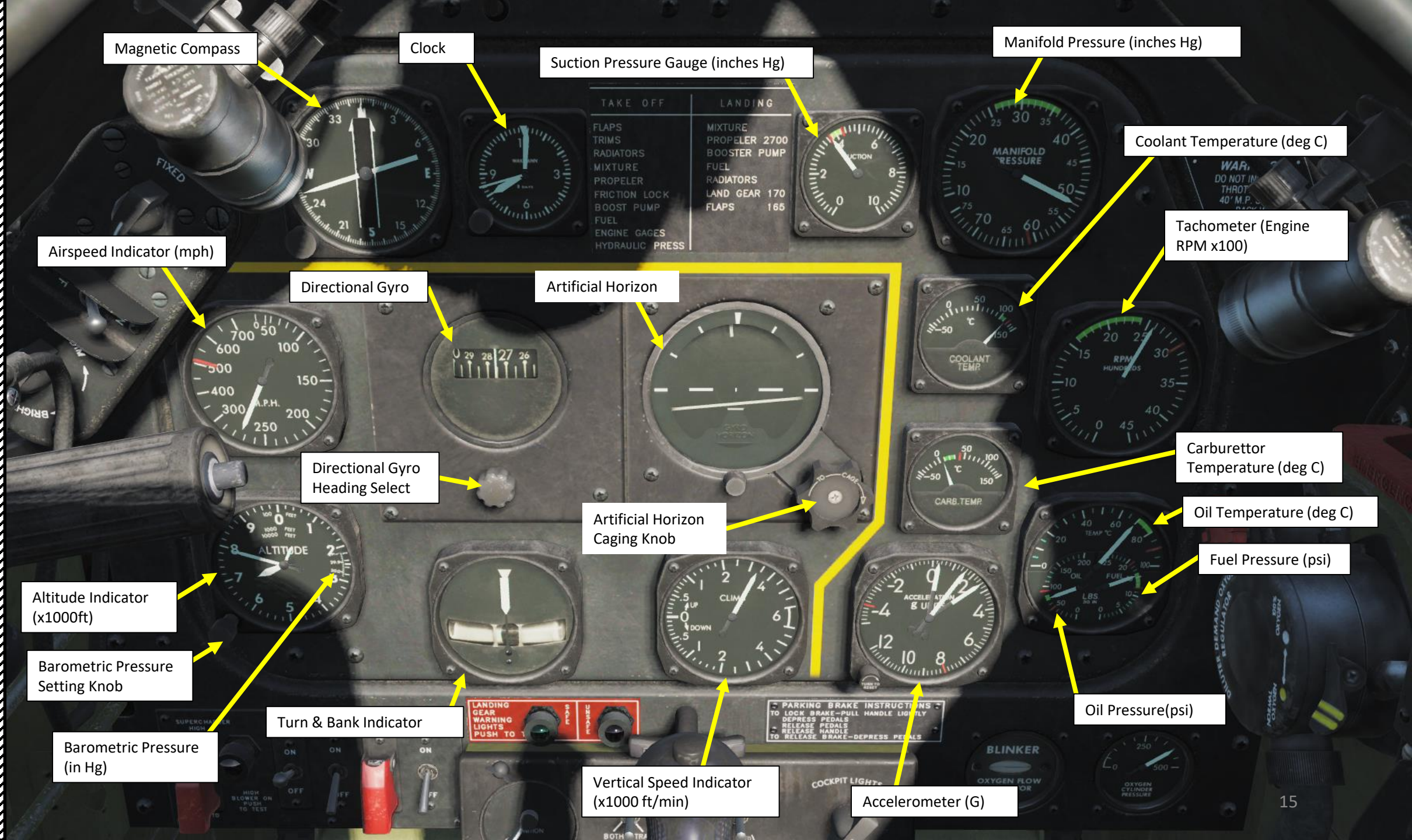

THIS IS A MILITARY TYPE AIRCRAFT AND UNDER THE CIVIL AIR REGULATIONS SHALL NOT BE USED FOR THE CARRIAGE OF PASSENGERS OR CARGO FOR COMPENSATION OR HIRE
ENGINE LIMITATIONS
TAKE OFF CONDITIONS
U.S.ARMY AIR CORPS
SERIAL NO
ORDER NO
DATE ACCEPTED
AN/APS-13
I.F.F.
DANGER
HOMING ADAPTER AN/ARA-8

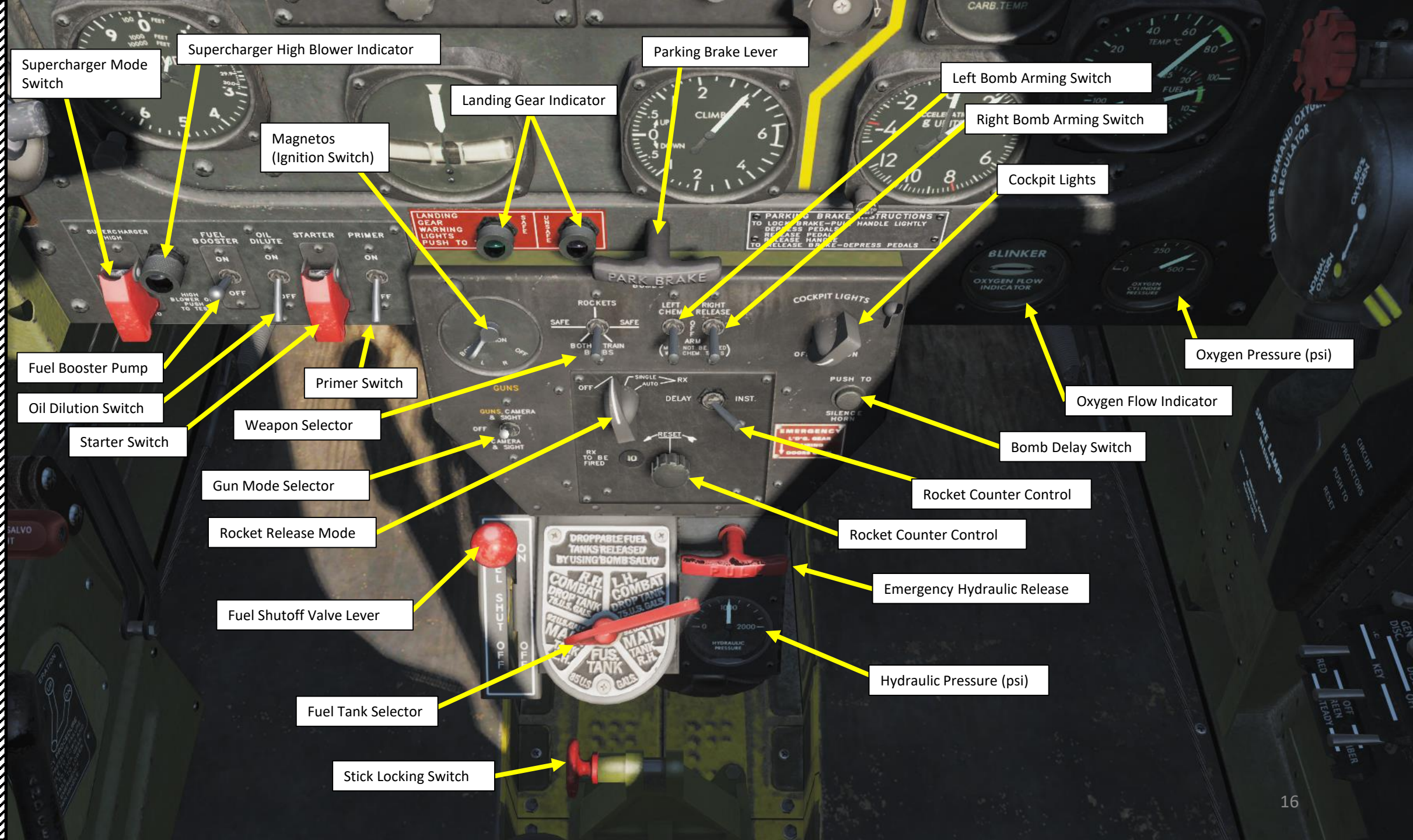

Canopy Handle
Tail Radar Warning Power
Tail Radar Warning Test
Radio System
IFF (Identify-Friend-or-Foe) System
(Not Functional)
Homing Adapter System
(Not Functional)
Detrola Radio Range Receiver
(Not Functional)
RELEASE UNLOCKED
IF RED INDICATOR SHOWS
THIS IS A MILITARY TYPE AIRCRAFT AND UNDER THE CIVIL AIR REGULATIONS SHALL NOT BE USED FOR THE CARRIAGE OF PASSENGERS OR CARGO FOR COMPENSATION OR HIRE
ENGINE LIMITATIONS
PACKARD V 1650-7
FUEL: 100 OCT.
TAKE OFF ONLY
WAR EMERG. 5 MIN
MILITARY 15 MIN
MAX. CONTINUOUS
CRUISE — MAX.
RPM MP
3000 61
3000 67
3000 61
2700 46
2400 36
COOLANT
OIL TEMP.
OIL PRESSURE
OIL PRES. MIN. CR.
FUEL PRESSURE
MAX
121
90
50
19
DESIRED
100–110
70– 80
70– 80
16– 18
TAKE OFF CONDITIONS
OIL TEMP. 15° C. MIN. OIL PRES. 60# MIN: COOLANT 60 °C. MIN.
AN/APS-13
I.F.F.
HOMING ADAPTER AN/ARA-8
DANGER

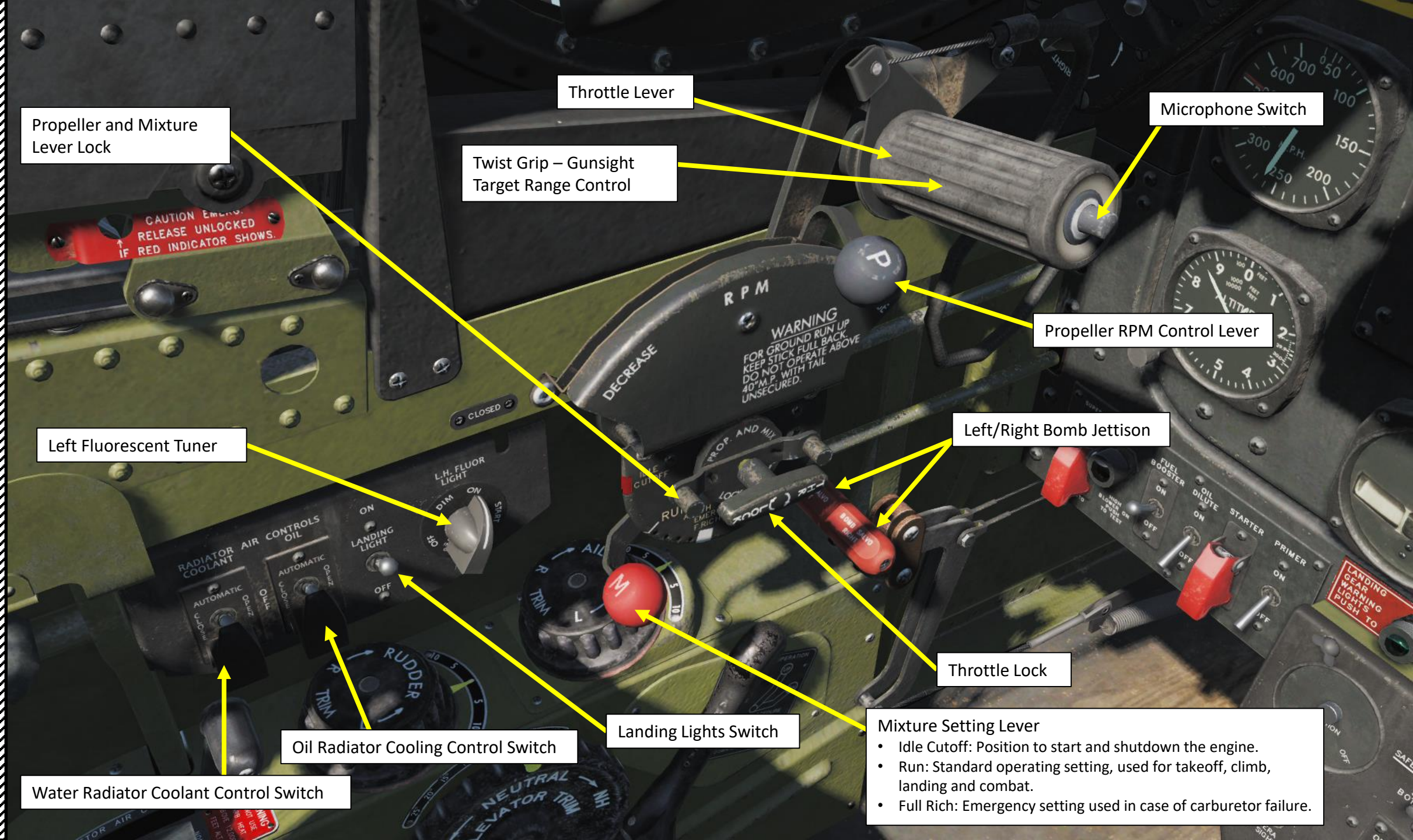

Gun Heater
Pitot Heater
Ampmeter
Right Fluorescent Tuner
Wing Navigation Lights
Tail Position Lights
Circuit Protectors Panel
(Push to Reset Breakers)
Generator Disconnect
Battery Disconnect
Red Recognition Light
Green Recognition Light
Amber Recognition Light
MAX. GROUND OPER. TIME 10 SECONDS
DIM
ON
START
AMPS
CIRCUIT PROTECTORS PUSH TO RESET
GEN DISC.
BAT DISC.
GUN HEAT
PITOT HEAT
WING
TAIL
POSITION LGTS
DIM
RECOGNITION LIGHTS
KEY
RED
OFF
GREEN
STEADY
AMBER
AN/APS-13
SIGNAL LIGHT
INCREASE
POWER SWITCH
TEST SWITCH
AUDIO
PHONES
OFF
PETROL
OXYGEN CYLINDER PRESSURE

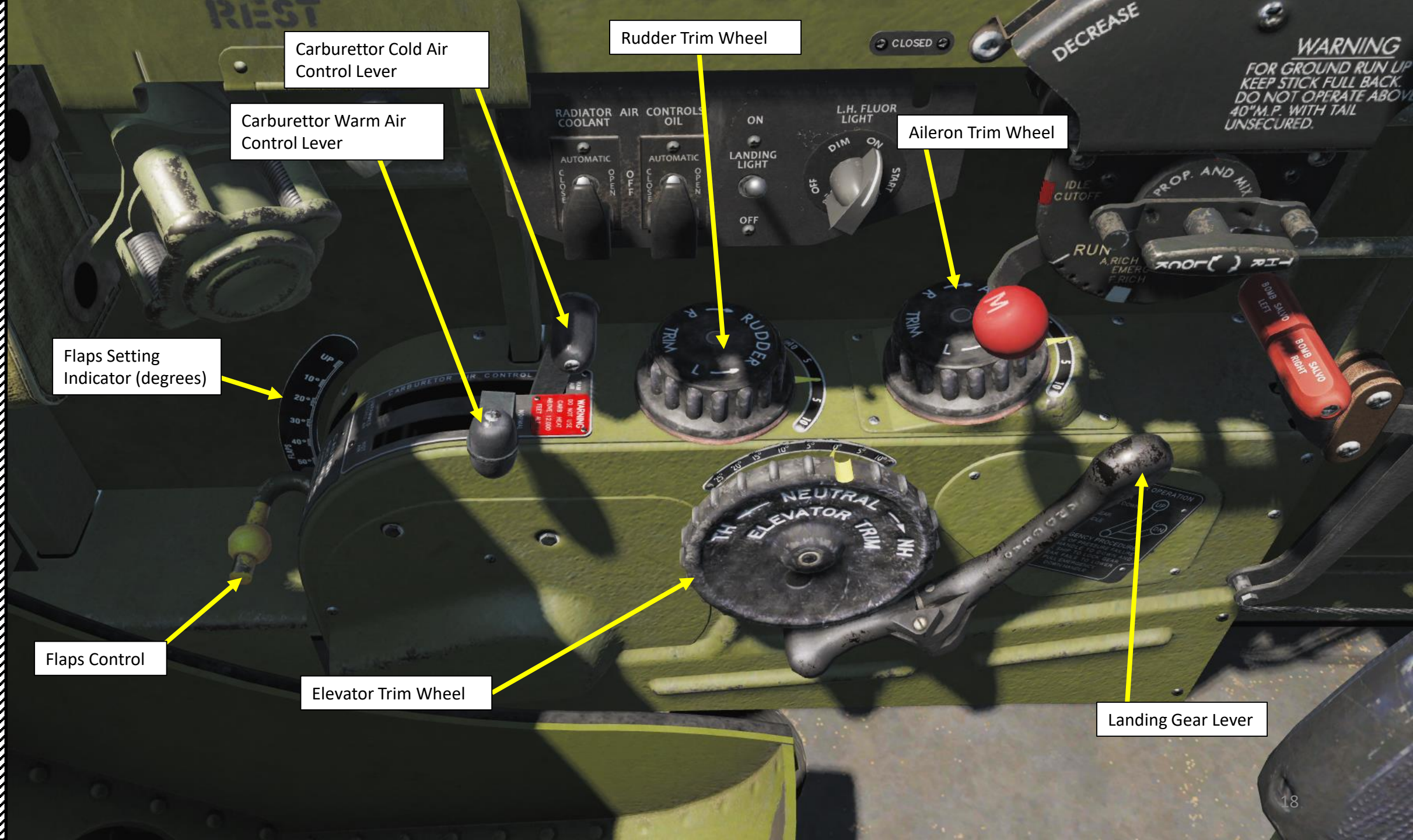

Canopy Jettison Lever
Recognition Lights Key
Oxygen Emergency Bypass Valve
EMERGENCY PULL
WARNING
MAX. GROUND OPER. TIME 10 SECONDS
RECOGN. LIGHTS KEY
DILUTER DEMAND OXYGEN REGULATOR
100% OXYGEN
NORMAL OXYGEN
DIM
ON
OFF
START
AMPS
CIRCUIT PROTECTORS PUSH TO RESET
ON
WING BRIGHT TAIL
GEN DISC.
BAT DISC.
OFF
GUN HEAT
PITOT HEAT
OFF POSITION LGTS DIM
RECOGNITION LIGHTS KEY
RED
OFF
GREEN
STEADY
AMBER
AN/APS-13
SIGNAL LIGHT
INCREASE
POWER SWITCH
ON
TEST SWITCH
ON
AUDIO
SPARE LAMPS INSIDE
BLINKER
OXYGEN FLOW INDICATOR
OXYGEN CYLINDER PRESSURE
RPM HUNDREDS
TEMP °C
FUEL
OIL
LBS
PEDALS
OFF


Fixed Reticle Mask Lever
Gunsight
Gunsight Range (x100 ft)
Tail Warning Radar Light
Gunsight Wingspan (ft)
Gunsight Mode Selector FIXED/GYRO/FIXED+GYRO
Gyro Power Switch UP = OFF/ DOWN = ON
Gunsight Brightness Control
NO HAND HOLD
MANIFOLD PRESSURE


Magnetic Compass
Clock
Suction Pressure Gauge (inches Hg)
Manifold Pressure (inches Hg)
Coolant Temperature (deg C)
Tachometer (Engine RPM x100)
Airspeed Indicator (mph)
Directional Gyro
Artificial Horizon
Directional Gyro Heading Select
Artificial Horizon Caging Knob
Carburettor Temperature (deg C)
Oil Temperature (deg C)
Fuel Pressure (psi)
Altitude Indicator (x1000ft)
Barometric Pressure Setting Knob
Barometric Pressure (in Hg)
Turn & Bank Indicator
Vertical Speed Indicator (x1000 ft/min)
Accelerometer (G)
Oil Pressure(psi)
TAKE OFF
LANDING
FLAPS
TRIMS
RADIATORS
MIXTURE
PROPELER
FRICTION LOCK
BOOST PUMP
FUEL
ENGINE GAGES
HYDRAULIC PRESS
MIXTURE
PROPELER 2700
BOOSTER PUMP
FUEL
RADIATORS
LAND GEAR 170
FLAPS 165
MANIFOLD PRESSURE
COOLANT TEMP
RPM
CARB.TEMP
ALTITUDE
CLIMB
ACCELERATION
LANDING GEAR WARNING LIGHTS PUSH TO
PARKING BRAKE INSTRUCTIONS
BLINKER


Supercharger Mode Switch
Supercharger High Blower Indicator
Parking Brake Lever
Left Bomb Arming Switch
Landing Gear Indicator
Right Bomb Arming Switch
Magnetos (Ignition Switch)
Cockpit Lights
Oxygen Pressure (psi)
Oxygen Flow Indicator
Fuel Booster Pump
Primer Switch
Oil Dilution Switch
Weapon Selector
Starter Switch
Bomb Delay Switch
Gun Mode Selector
Rocket Counter Control
Rocket Release Mode
Rocket Counter Control
Emergency Hydraulic Release
Fuel Shutoff Valve Lever
Hydraulic Pressure (psi)
Fuel Tank Selector
Stick Locking Switch


Throttle Lever
Microphone Switch
Propeller and Mixture Lever Lock
Twist Grip – Gunsight Target Range Control
Propeller RPM Control Lever
Left Fluorescent Tuner
Left/Right Bomb Jettison
Throttle Lock
Landing Lights Switch
Oil Radiator Cooling Control Switch
Water Radiator Coolant Control Switch
Mixture Setting Lever
• Idle Cutoff: Position to start and shutdown the engine.
• Run: Standard operating setting, used for takeoff, climb, landing and combat.
• Full Rich: Emergency setting used in case of carburetor failure.


Carburettor Cold Air Control Lever
Rudder Trim Wheel
Carburettor Warm Air Control Lever
Aileron Trim Wheel
Flaps Setting Indicator (degrees)
Flaps Control
Elevator Trim Wheel
Landing Gear Lever
RADIATOR COOLANT
AIR CONTROLS OIL
AUTOMATIC
LANDING LIGHT
L.H. FLUOR LIGHT
RUDDER TRIM
ELEVATOR TRIM
NEUTRAL
PROP. AND MIX
WARNING
DECREASE
CLOSED

PART 3 – COCKPIT & GAUGES


Defroster Control
Hot Air Control
DEFROSTER
HOT AIR
NEUTRAL
ELEVATOR TRIM
NH
BOMB SALVO
RIGHT
PHONES
OFF

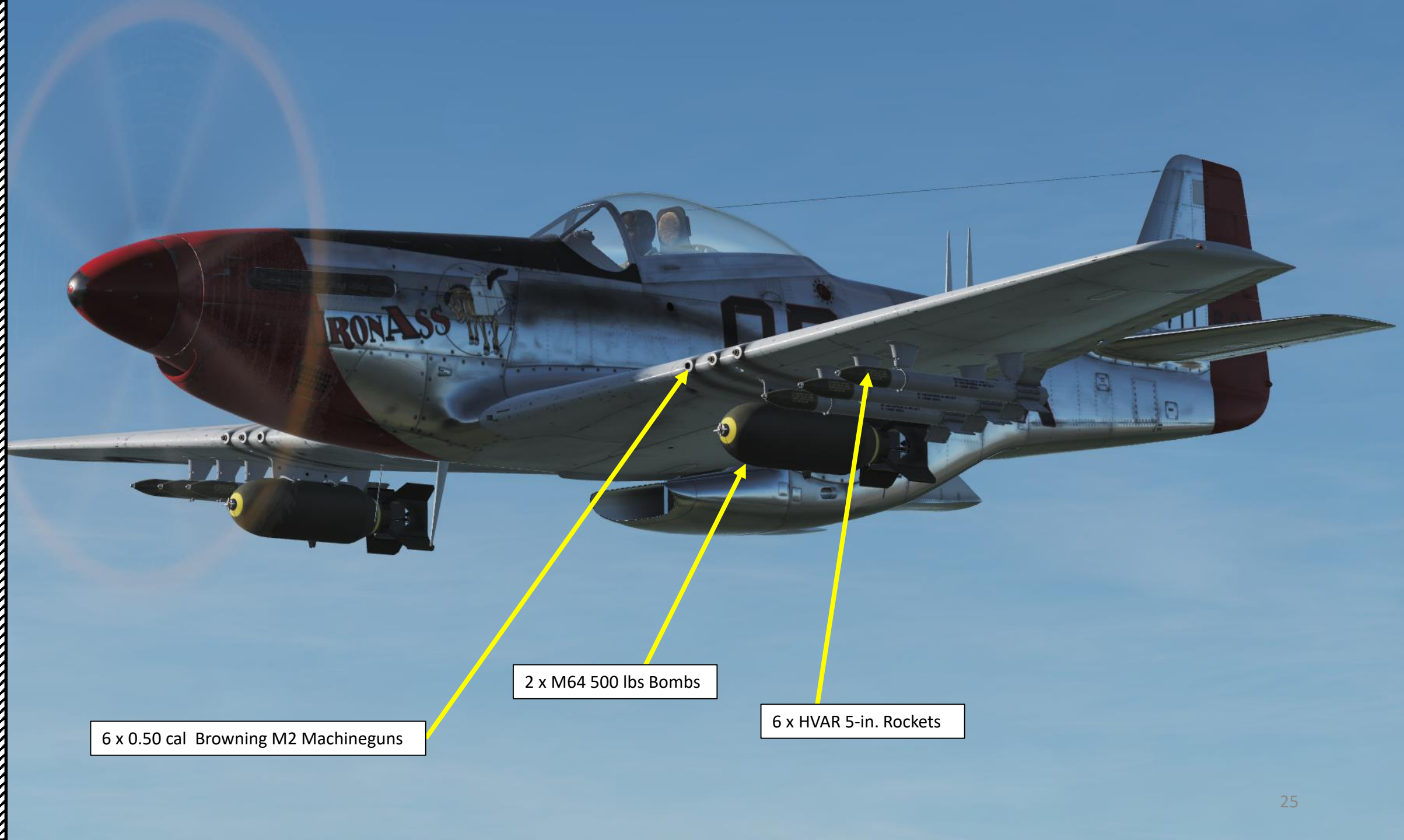
PART 3 – COCKPIT & GAUGES

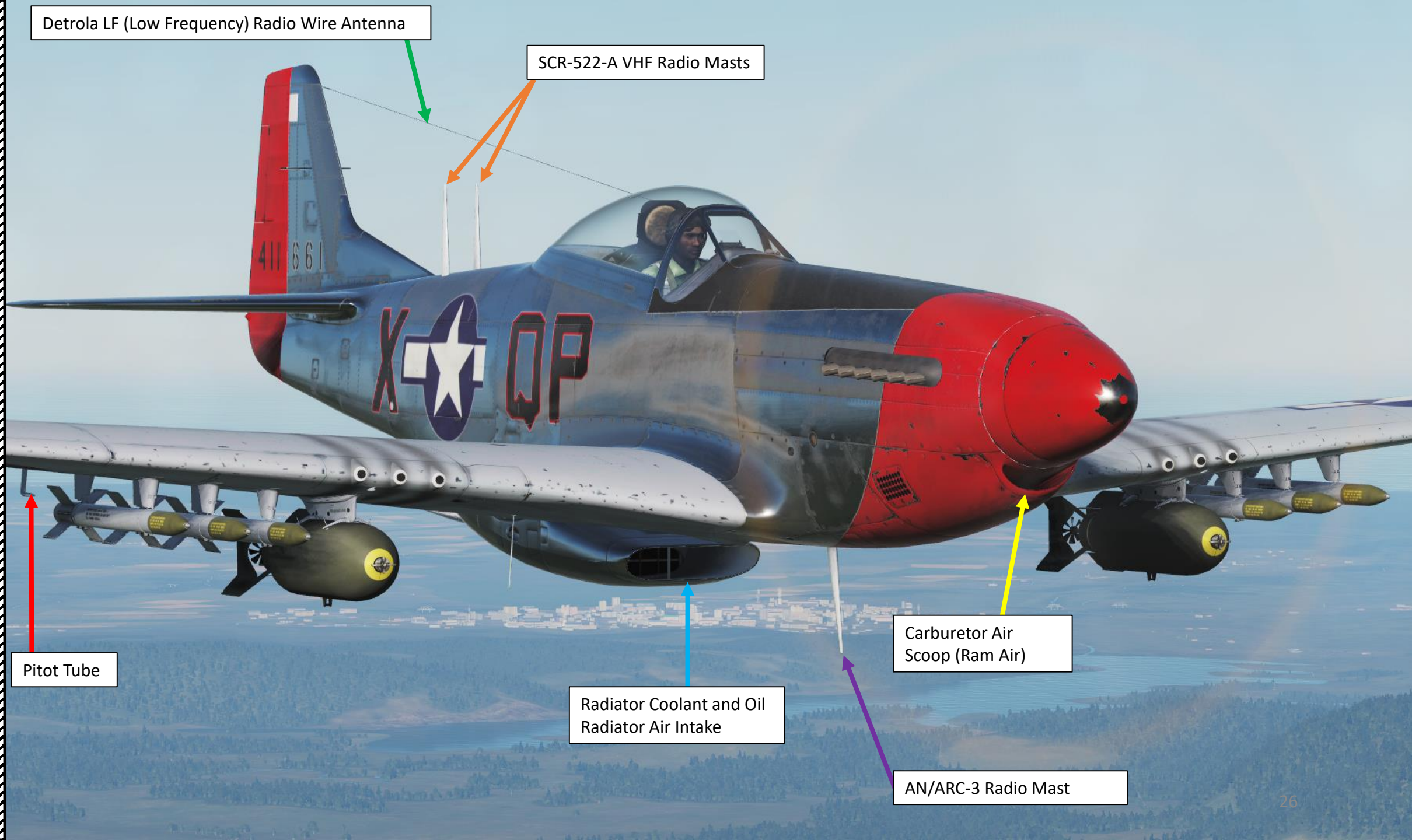

Left Wing Tank Fuel Gauge
(92 US GAL)


Right Wing Tank Fuel Gauge
(92 US GAL)
OFF
A
B
C
D
T
R


TOTAL FUEL QUANTITY: 489 US GAL
(with 2 x 110 gal drop tanks installed)
Rear Fuselage Tank Fuel
Gauge (85 US GAL)


Mirror
NO
HAND HOLD


RONASS
6 x 0.50 cal Browning M2 Machineguns
2 x M64 500 lbs Bombs
6 x HVAR 5-in. Rockets


Detrola LF (Low Frequency) Radio Wire Antenna
SCR-522-A VHF Radio Masts
Pitot Tube
Radiator Coolant and Oil Radiator Air Intake
Carburetor Air Scoop (Ram Air)
AN/ARC-3 Radio Mast


Aftercooler & Engine Coolant Radiator Outlet
Oil Radiator Outlet


AN/APS-13 Rear Warning Radar Antenna
Rudder Trim Tab
Elevator Trim Tabs

W: Aircraft Identification Letter

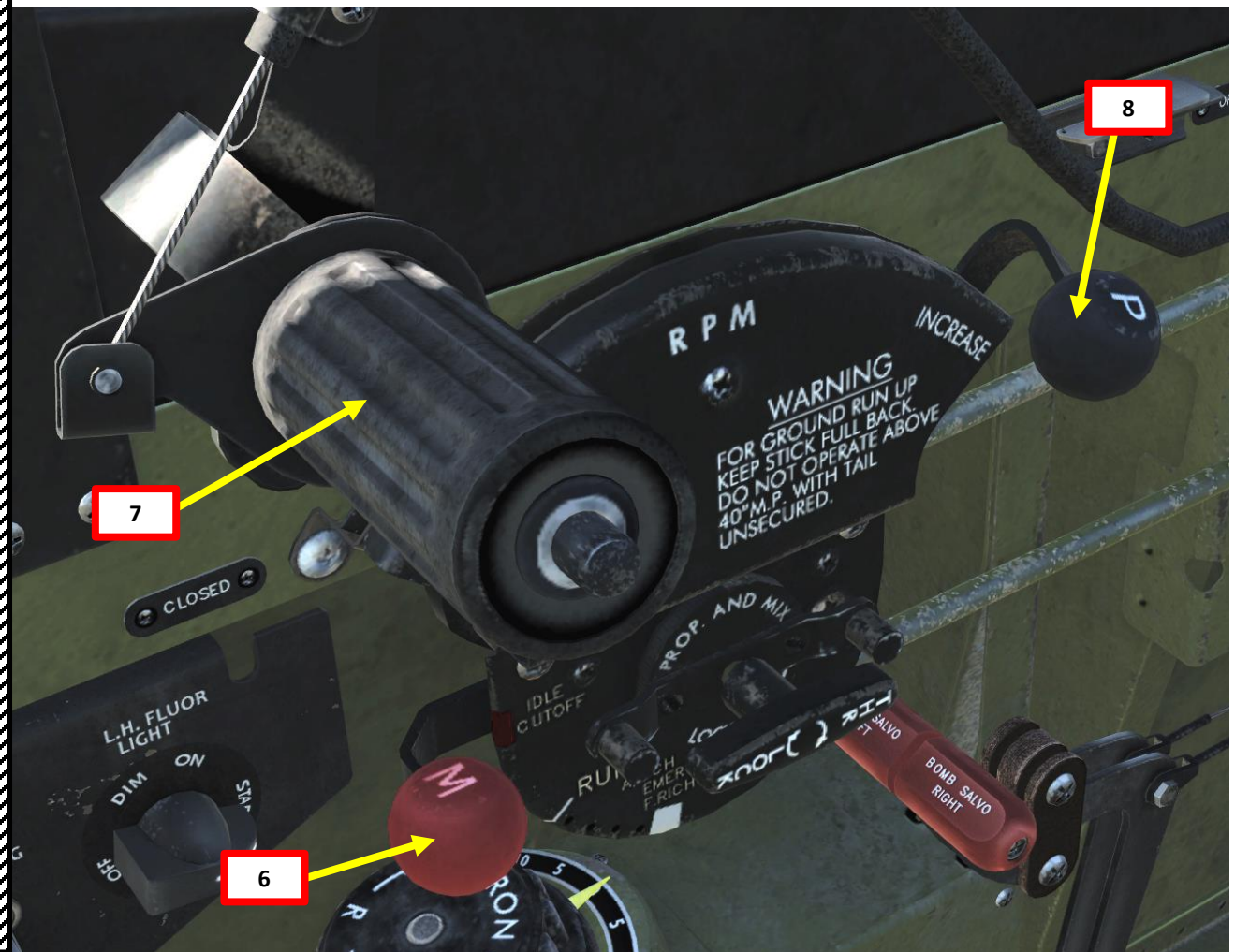
HO: USAAF Squadron Code. "HO" belongs to 485th Fighter Squadron.

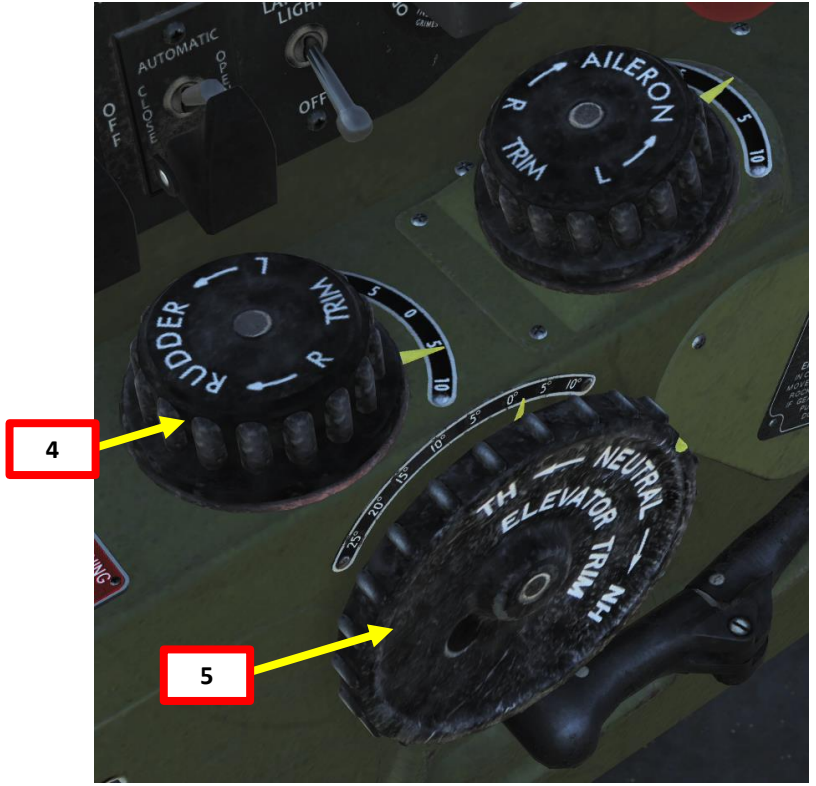
414999: Aircraft Serial Number

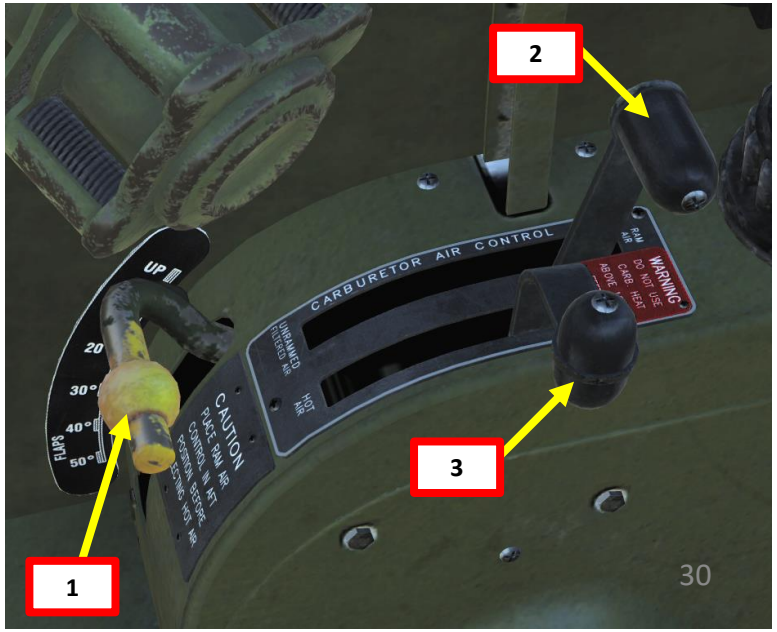
In World War 2, the United States Army Air Forces used aircraft markings as identification codes. For instance, "HO-W" means that the Aircraft W belongs to the 485th Fighter Squadron (HO). You can set up your aircraft markings in the Mission Editor.

PRE-FLIGHT

1. Flaps – UP
2. Carburettor Ram Air Control Lever – FORWARD (RAM AIR POSITION)
3. Carburettor Hot Air Control Lever – FORWARD (NORMAL POSITION)
4. Rudder Trim: 6 deg right
5. Elevator Trim: 2 deg nose heavy with no drop tanks, 4 deg nose heavy with drop tanks
6. Mixture Control Lever – IDLE CUT-OFF
7. Propeller Control Lever – FULLY FORWARD
8. Crack Throttle Open (1 inch)

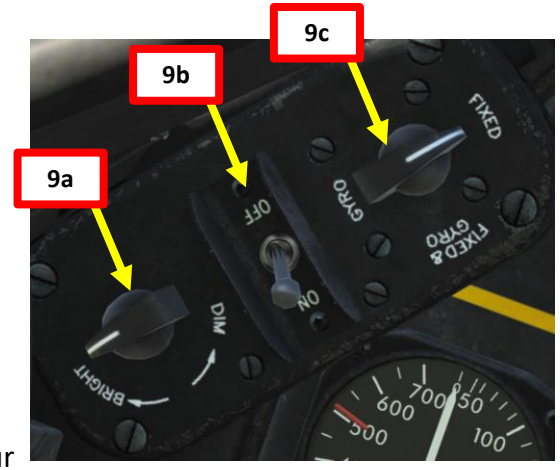


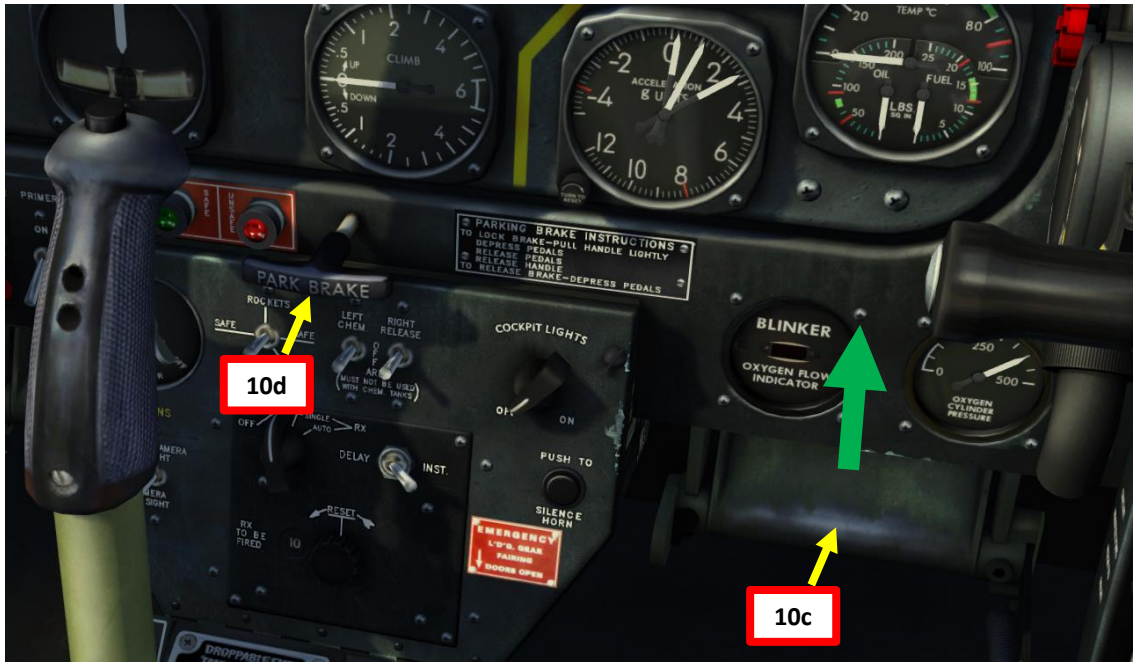




PRE-FLIGHT

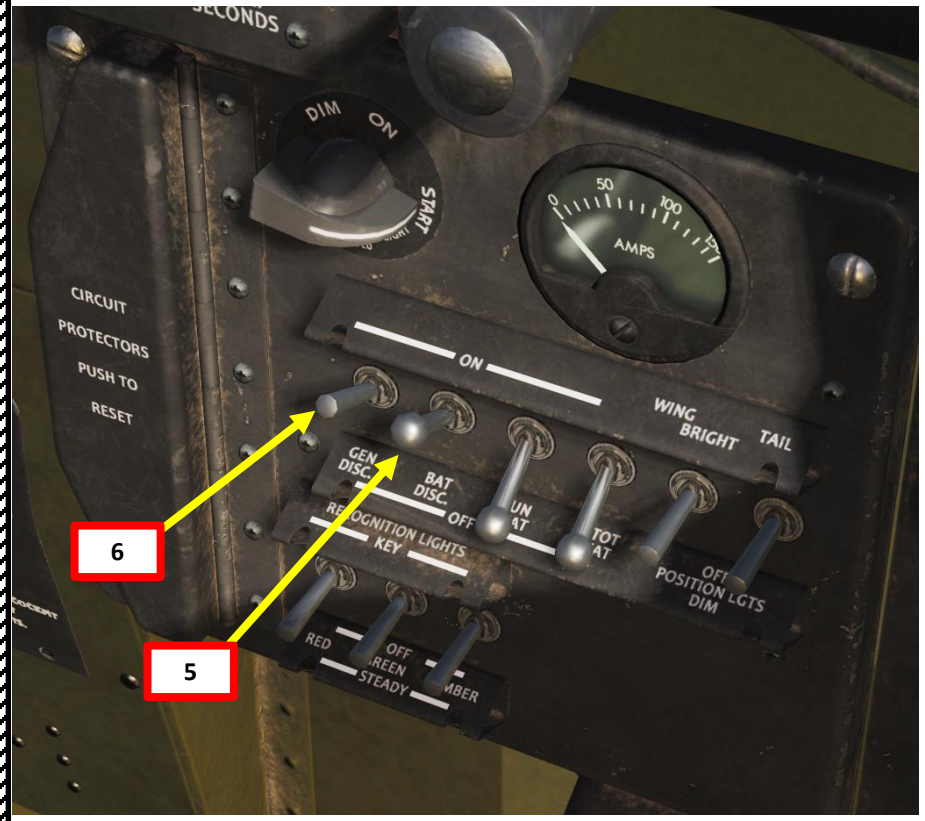
9. Set Gunsight Selector-Dimmer Panel
   a) Brightness – BRIGHT
   b) Gyro Power – ON
   c) Gunsight Mode - FIXED
10. Set Parking Brake
   a) Click and Hold Parking Brake Handle (hold left mouse button)
   b) Press wheel brake pedals
   c) Release Wheel brake pedals
   d) Release Parking Brake Handle (release left mouse button)
   e) To release parking brake, tap your wheel brake pedals

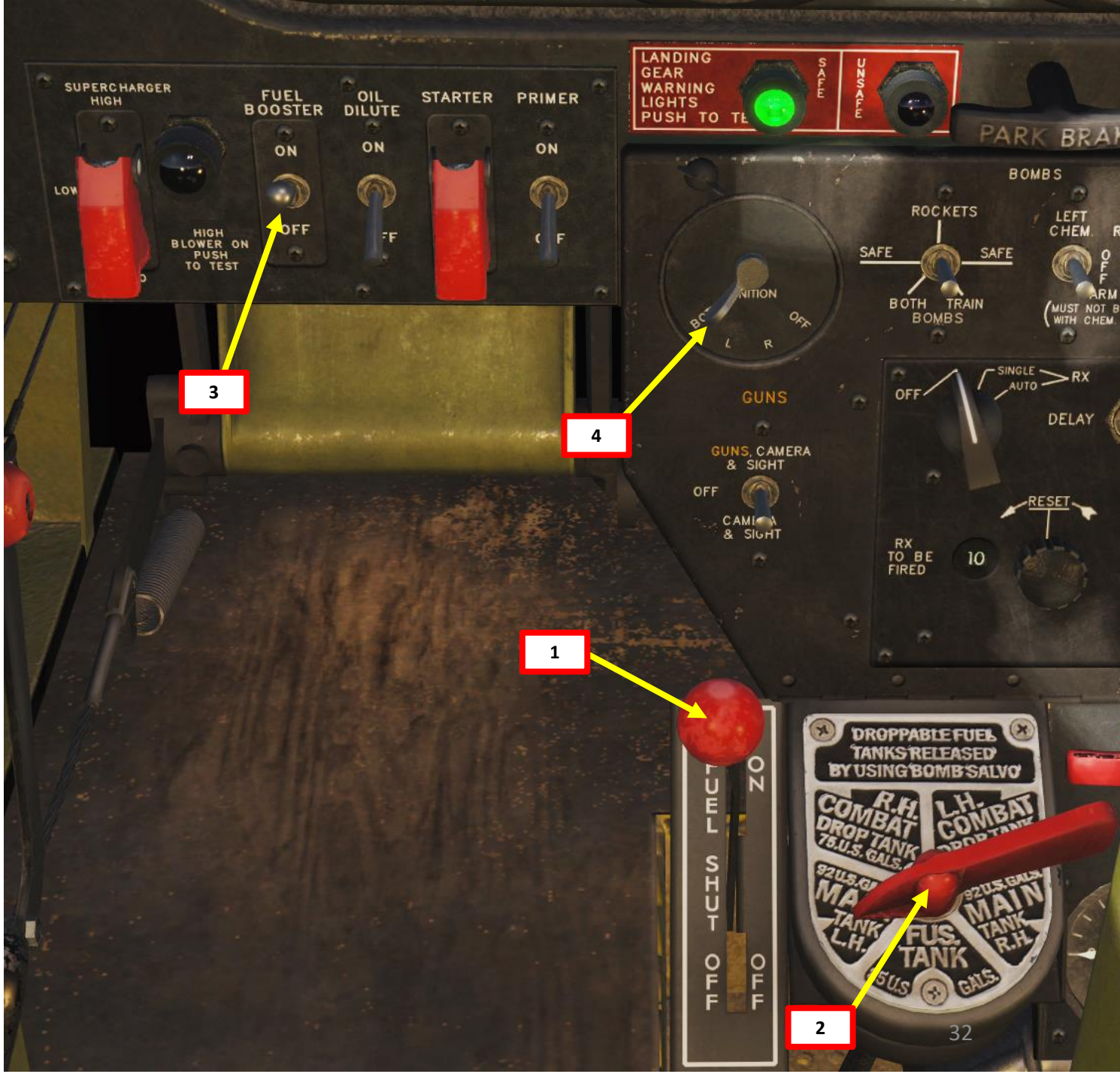




ENGINE START

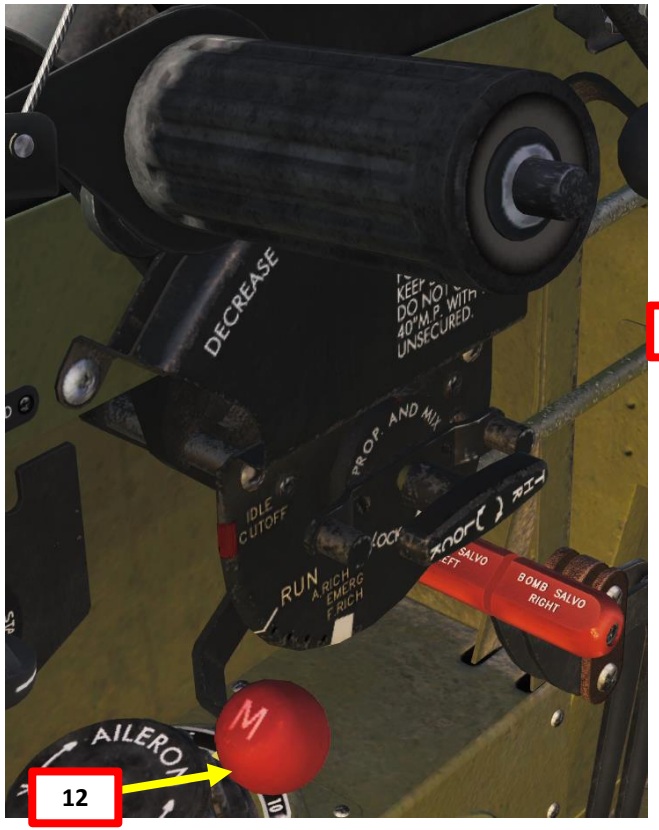
1. Fuel Shut-Off Valve – ON
2. Fuel Selector Valve – Set to MAIN TANK LEFT HAND SIDE
3. Fuel Booster – ON
4. Ignition (Magnetos) Switch – BOTH
5. Battery Switch – ON (UP)
6. Generator Switch – ON (UP)

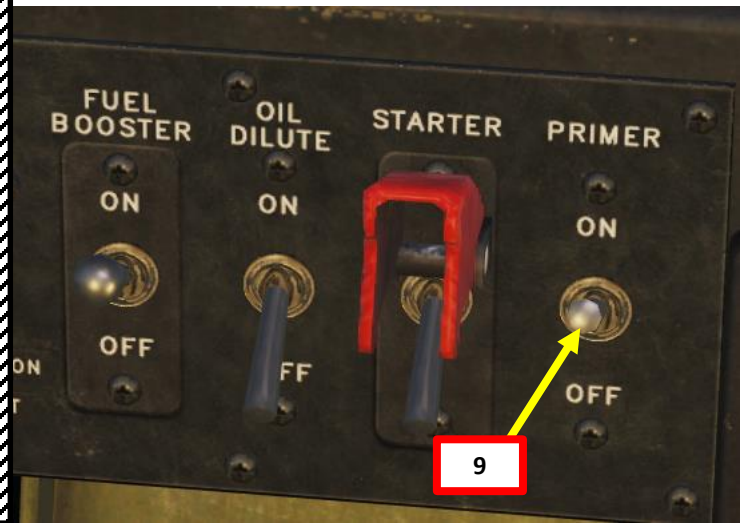


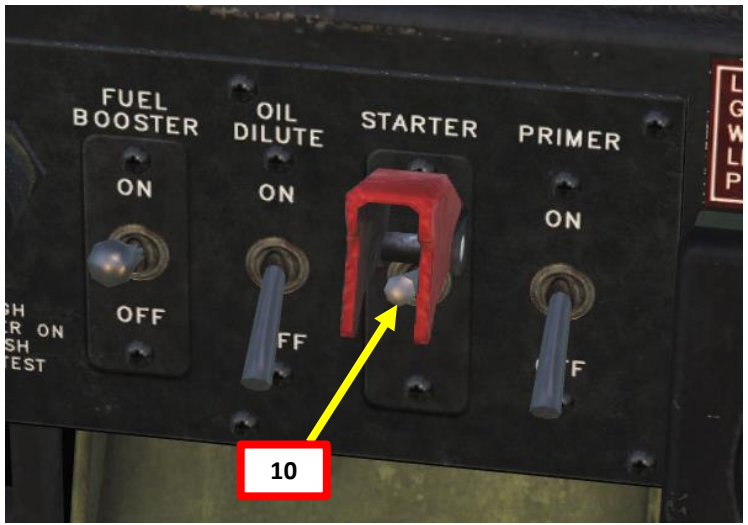


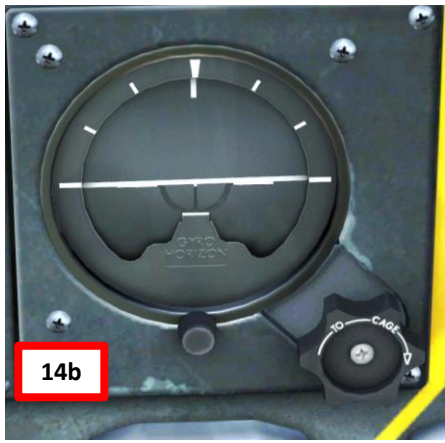
ENGINE START

7. Oil Radiator Flap Control Switch – AUTO (UP)
8. Coolant Radiator Flap Control Switch – AUTO (UP)
9. Hold Primer Switch for 3-4 seconds
10. Flip the Starter Switch cover and hold the Starter Switch
11. Wait for the propeller to start spooling up (keep holding the starter switch) and hold the primer switch for 2-3 seconds again to prime the engine again to trigger the engine ignition.
12. When propeller spins and engine “coughs”, set mixture to RUN by right-clicking on the red Mixture Lever.
13. After Engine Start, release starter switch and throttle back to IDLE. As engine power increases, the hydraulics will kick in automatically, raising your flaps up gradually as hydraulic pressure increases.
14. Uncage Attitude Indicator by scrolling mousewheel on caging knob
15. Taxi to the runway using your toe brakes. Be careful not to overheat your engine on the ground.









ENGINE START

ENGINE WARM-UP

1. Ensure oil pressure is at least 60 psi.
2. Adjust throttle to reach a RPM between 1000 and 1200 (IDLE range).
3. Wait until engine oil warms up to at least 15 deg C and coolant temperature is at least 60 deg C.
4. Start taxiing when engine is warmed up by releasing the Parking Brake (tap wheel 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 this engine leaves no room for error when engine temperatures are concerned.*

TAKEOFF PROCEDURE

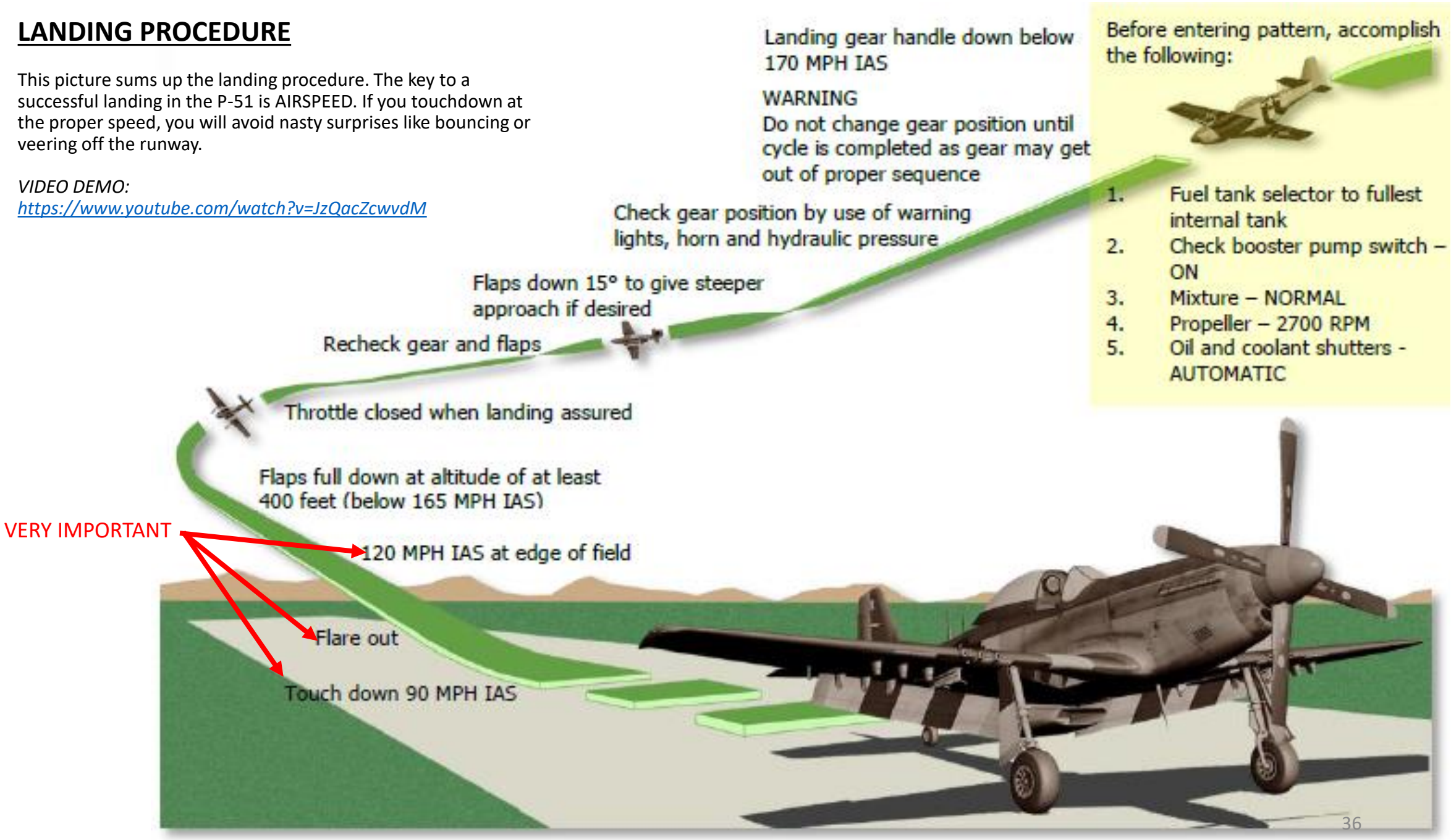
1) Line up on the runway
2) Flaps – UP
3) Increase RPM to 3000
4) Pull your stick back to lock your tailwheel
5) Brakes – ON
6) Slowly increase throttle to 35 in of Manifold Pressure
7) When you reach 35 in of Manifold Pressure, release brakes and gradually throttle up to 46 in (Military Power)
8) Do not use your brakes to steer your aircraft
9) Use your rudder to make small adjustments
10) At 100 mph, center your control stick to allow you to pick up airspeed
11) At 120 mph, rotate and retract your landing gear

VIDEO DEMO:
https://www.youtube.com/watch?v=xdx8kVWL70M

LANDING PROCEDURE

This picture sums up the landing procedure. The key to a successful landing in the P-51 is AIRSPEED. If you touchdown at the proper speed, you will avoid nasty surprises like bouncing or veering off the runway.

VIDEO DEMO:
https://www.youtube.com/watch?v=JzQacZcwvdM

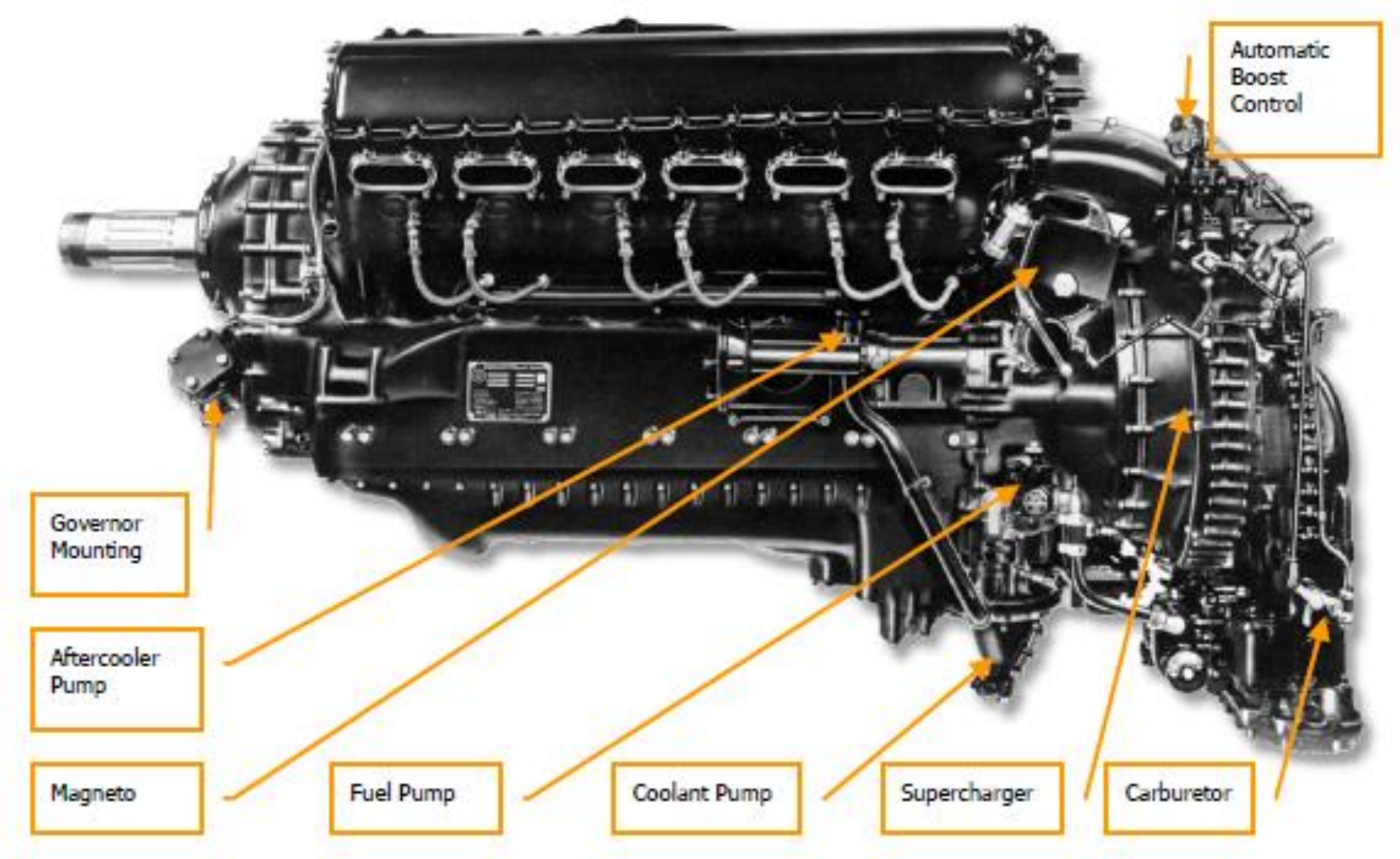


LANDING PROCEDURE

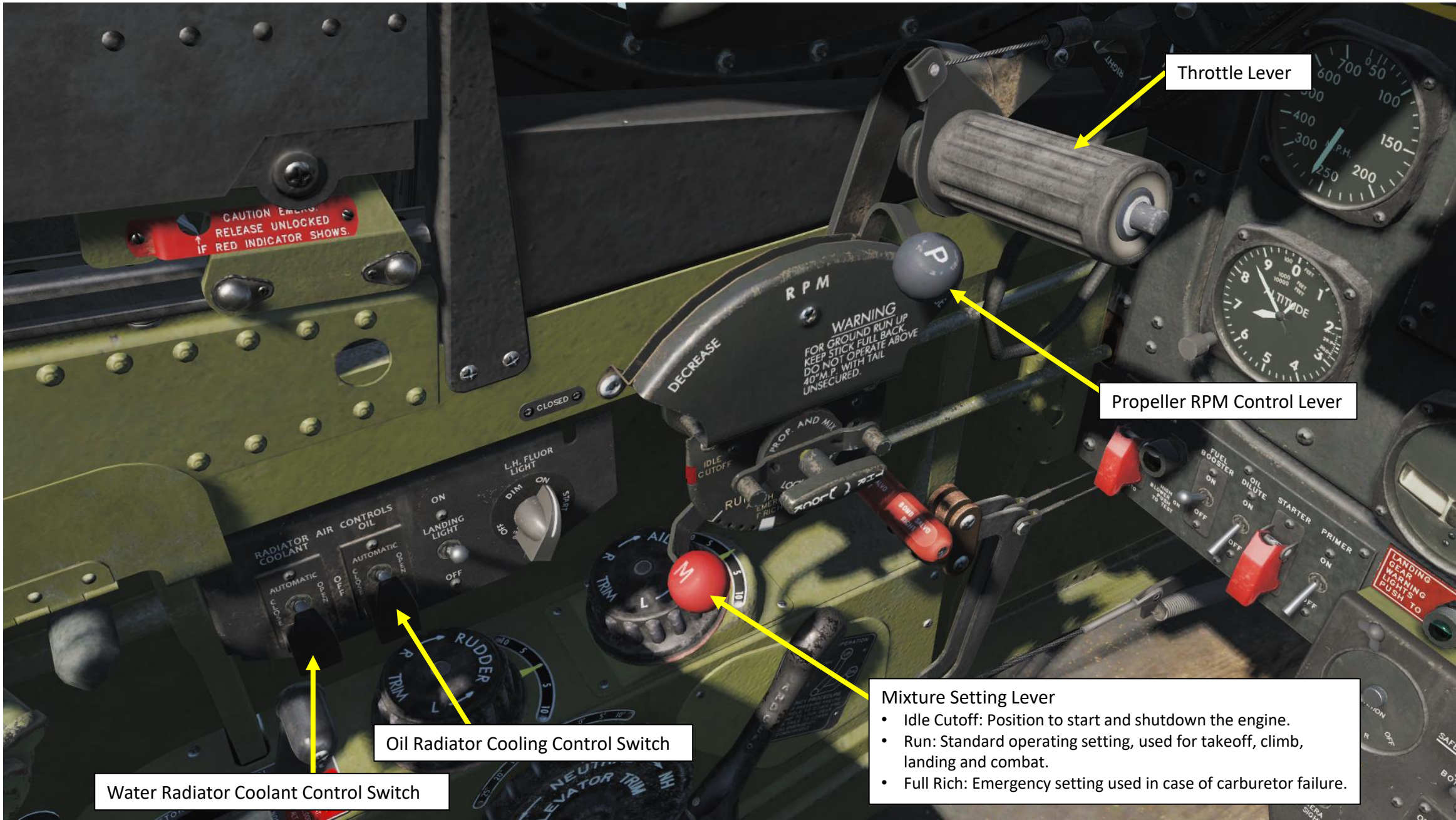
PACKARD V-1650 MERLIN ENGINE

The power plant of the P-51D is a liquid-cooled, 12-cylinder Rolls-Royce Merlin V-1650-7, built in the U.S. by the Packard Motor Car Company. It is equipped with an injection-type carburetor, a two-speed, two-stage supercharger, and develops over 1400 hp on takeoff.

The P-51D has automatic radiator coolant and oil radiator controls, which can be overridden manually. The pilot can monitor engine RPM, manifold pressure, oil pressure, oil temperature, fuel pressure, carburetor temperature and coolant temperature. Each parameter has specific limitations that you should be aware of **AT ALL TIMES**. The engine limitations are listed in this section.



ENGINE CONTROLS



ENGINE CONTROLS

An outlet door on the bottom of the air scoop controls the oil temperature. Under ordinary conditions this door is operated automatically. However, it can be operated manually when running the engine on the ground or in case the automatic regulator fails in the air. This can be done by means of the Oil Radiator Air Control switch, located on the Radiator Air Control panel on the left side of the cockpit. The switch has three positions: AUTOMATIC, OPEN, and CLOSE. The door can be set in any position by holding the toggle switch in the OPEN or CLOSE position for the necessary length of time (approximately 20 seconds), then returning the switch to neutral.

The oil system uses standard Air Force oil dilution equipment. This allows the oil to be thinned with gasoline to make the engine easier to start in ambient temperatures below 40°F. Thinning the oil requires allowing the engine to idle with the coolant flap open until the oil temperature drops to 50°C or less. Then, before stopping the engine, oil is diluted using the Dilution switch on the Engine Control panel of the front dash. This will dilute the oil until the engine is ready to be started again. Once the engine warms up, the gasoline in the oil is quickly evaporated.

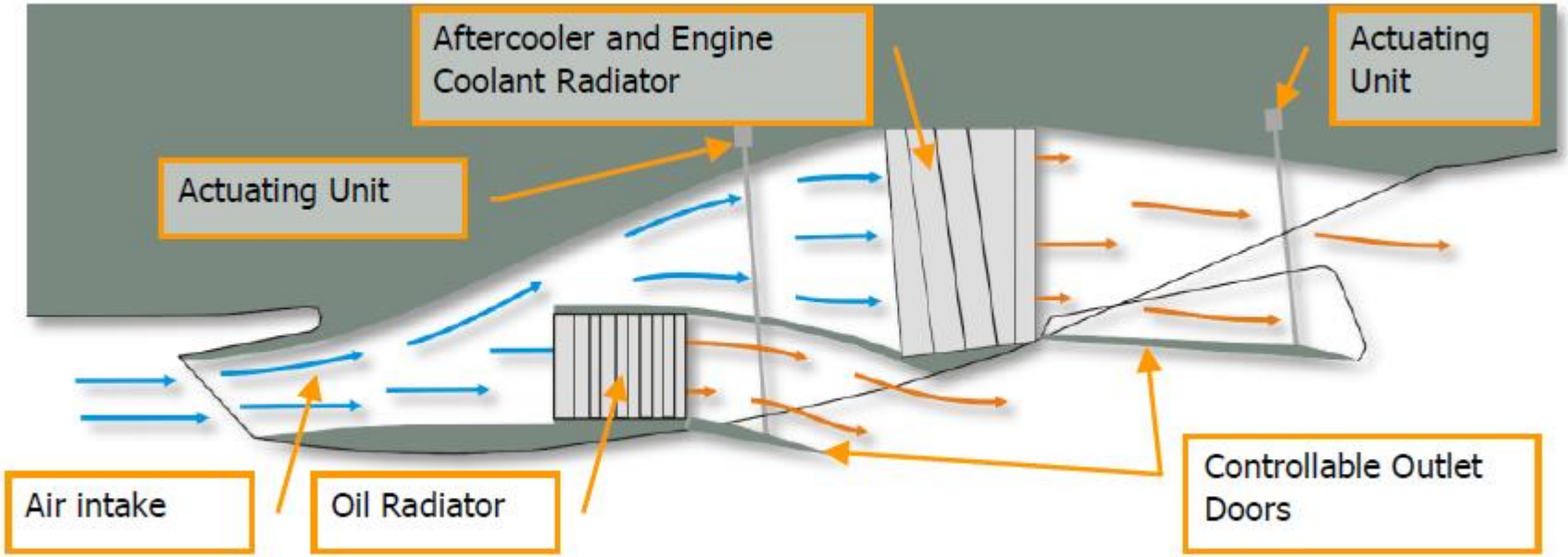
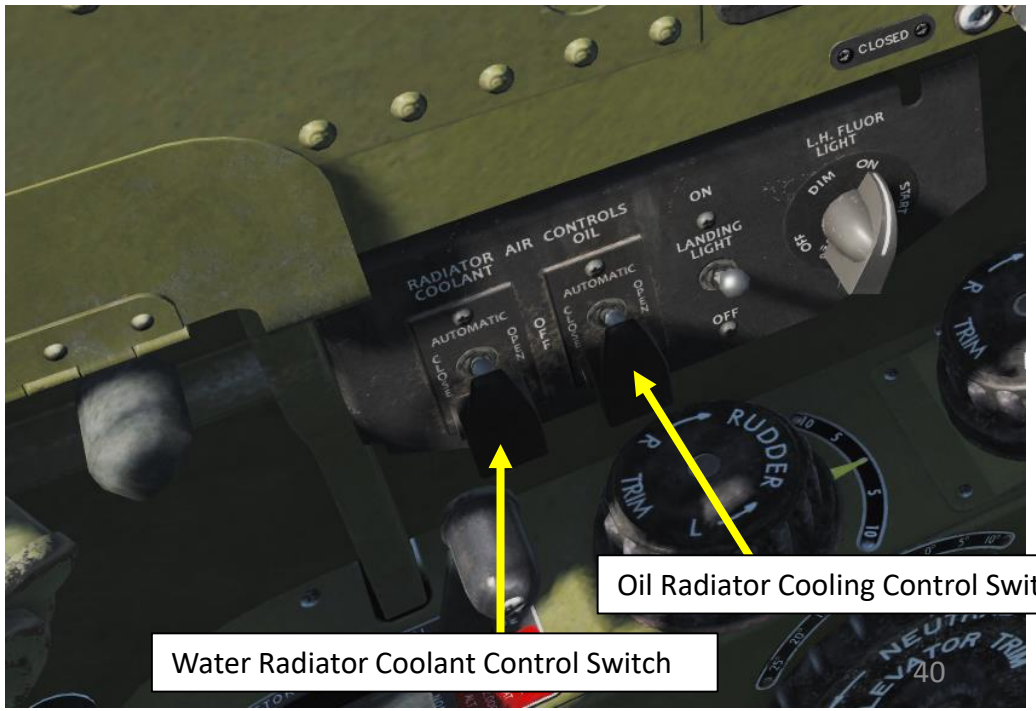


Figure 23: P-51D Radiators



RECOMMENDED ENGINE SETTINGS:

TAKEOFF: Full Throttle, 3000 RPM

LANDING: Throttle at IDLE, 2700 RPM

NORMAL OPERATION: 46 Inches of Hg Manifold Pressure (Max Continuous Power) and 2700 RPM

GENERAL RULE FOR OIL AND COOLANT TEMPERATURE: Keep them in the "green" scale.

IF **ENGINE OVERHEATS**:

1. Set oil and coolant radiator switches to "MANUAL" mode and set them to the Maximal Open position
2. Gain Airspeed to cool down the engine by diving
3. Reduce Throttle (Manifold Pressure) and RPM (RPM Control Lever)

Check your engine temperatures every 30 seconds or so. It will save your life!

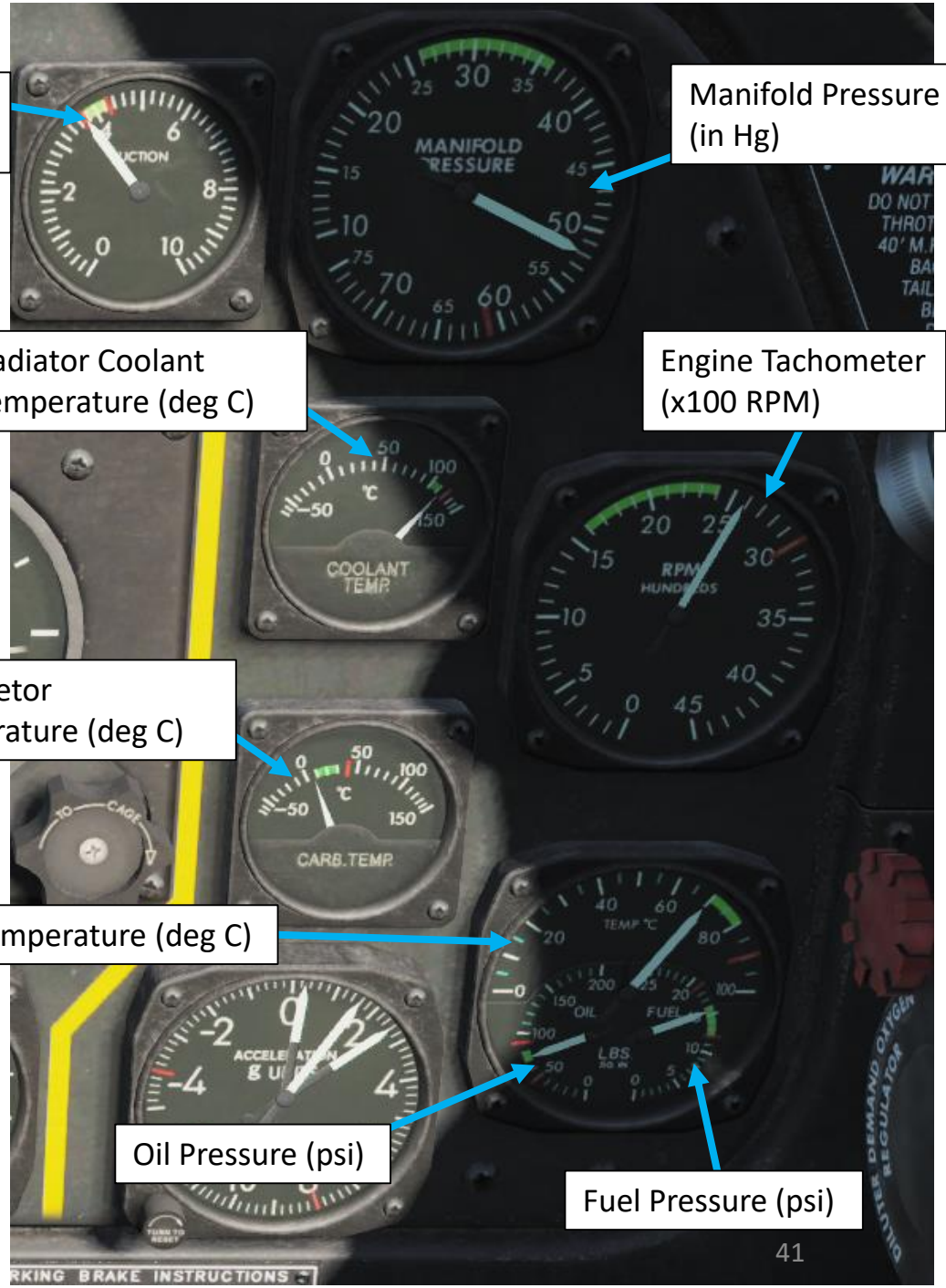


Table of Manifold Pressure and RPM Limits for Flight

	Maximum Cruise	Maximum Continuous	Takeoff Maximum	Military Power	War Emergency
Manifold Pressure [in.]	42	46	61	61	67
RPM	2400	2700	3000	3000	3000

Table of Engine Instrument Limits

	Coolant Temperature	Oil Temperature	Oil Pressure	Fuel Pressure
Minimum	-	-	50 PSI	14 PSI
Desired	100°-110°C	70°-80°C	70-80 PSI	16-18 PSI
Maximum	121°C	105°C	-	19 PSI

Engine Ratings Table

Engine Ratings:									
Operating Condition	**RPM**	**MP**	**HP**	**Critical Altitude With Ram**	**Critical Altitude No Ram**	**Blower**	**Mixture Control Position**	**Fuel Flow (Gal/Hr/Eng.) U.S.**	**Maximum Duration (Minutes)**
Take-Off	3000	61	1400	S.L.	S.L.	Low	Run/AR	150	5
War Emergency	3000	67	1595 1295	17,000 28,800	11,700 23,200	Low High	Run/AR Run/AR	166 160	5
Military	3000	61	1450 1190	19,800 31,200	13,700 25,600	Low High	Run/AR Run/AR	158 144	15
Maximum Continuous	2700	46	1120 940	20,500 34,400	17,500 29,500	Low High	Run/AR Run/AR	111 106	Cont.
Maximum Cruise	2400 2400	36 35	790 640	19,500 30,200	17,000 28,200	Low High	Run/AL Run/AL	70 70	Cont.

WAR EMERGENCY POWER (WEP)

In order to provide an extra boost to the engine in extreme situations, the throttle can be moved past the gate stop by the quadrant to break the safety wire. The engine will then be opened up to its absolute limit and will give approximately 6 in. of additional manifold pressure in excess of the normal full throttle setting of 61 in. (with mixture control set to RUN or AUTO RICH and prop set for 3000 RPM.) This throttle reserve is called War Emergency Power (WEP) and should be used only in extreme situations. If used for more than 5 minutes at a time, vital parts of the engine may be damaged.

WEP provides no benefit at altitudes below 5,000 feet. The throttle alone provides more than enough power to exceed the operating limits of the engine at these altitudes.

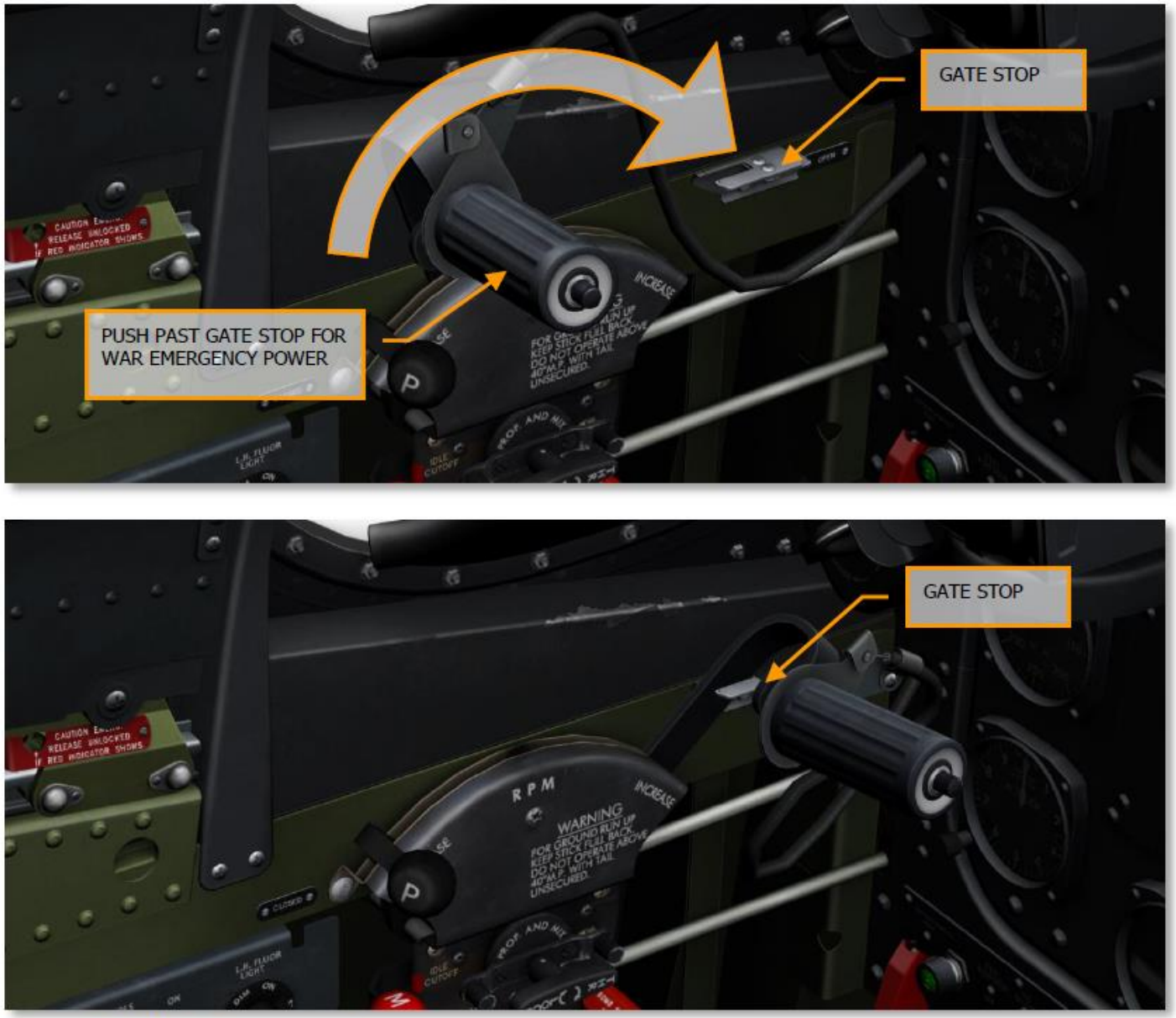


Figure 18: War Emergency Power

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.

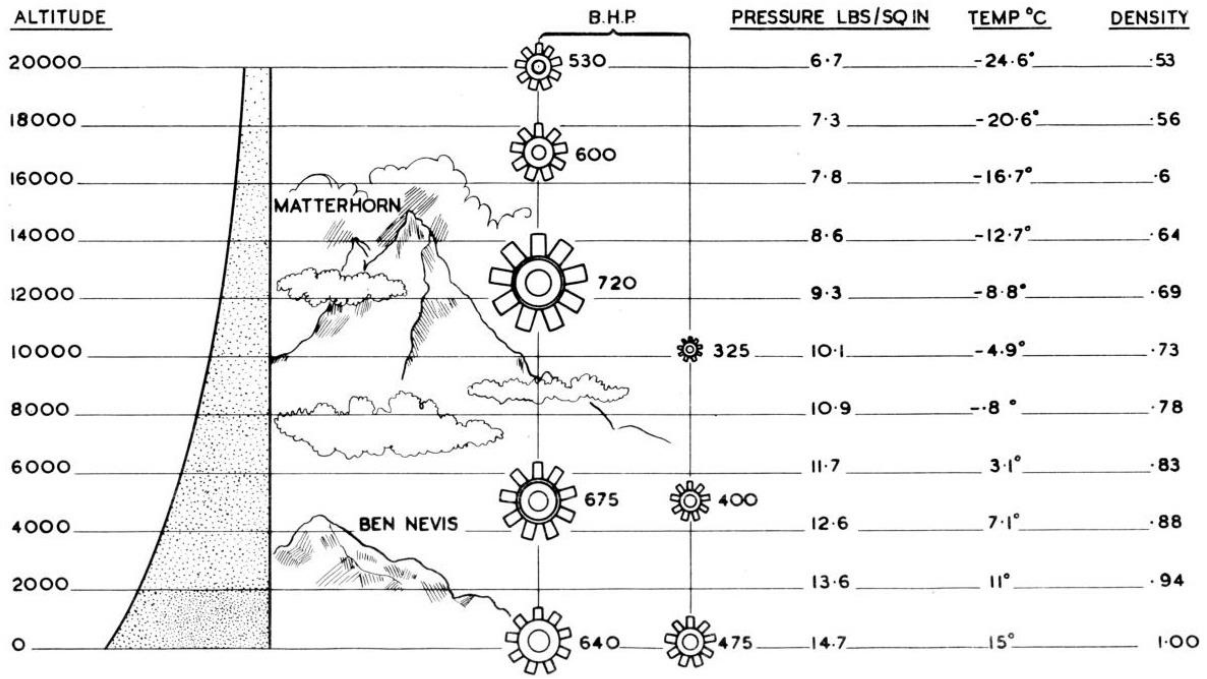
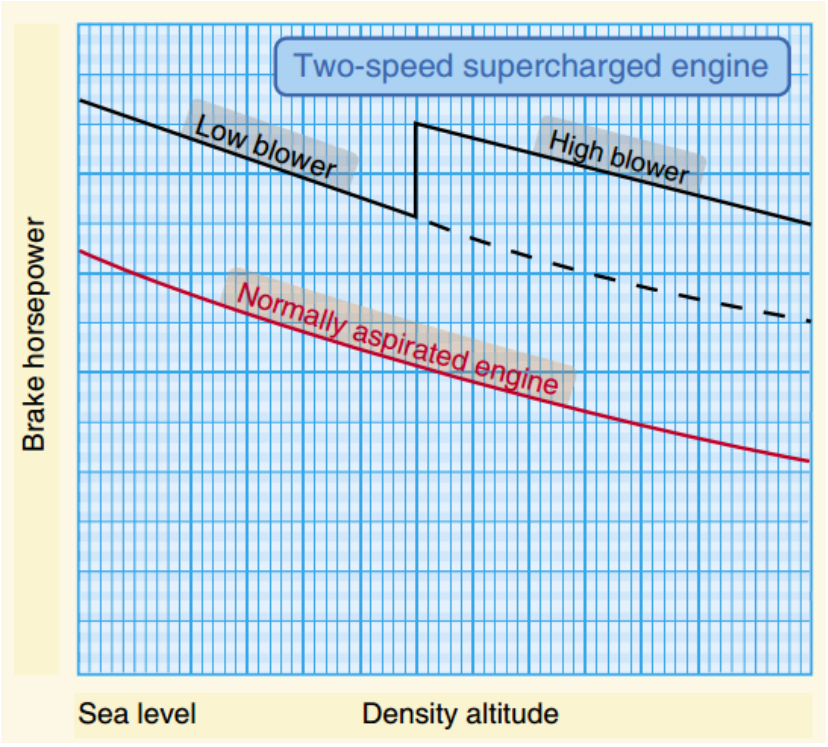


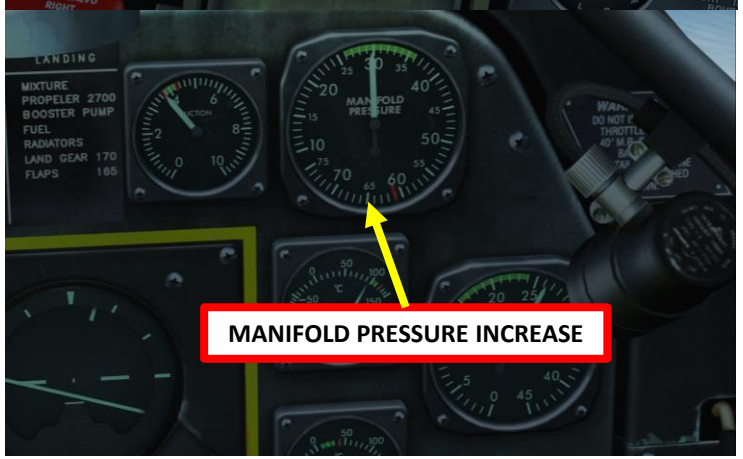
DIAGRAM SHOWING ATMOSPHERIC AND POWER VARIATIONS



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 supercharger installed on the Packard Merlin engine includes two compressor stages that deliver air from the carburetor intake to the pistons under much greater pressure than would be possible through direct aspiration, allowing a greater fuel-air mixture to be burned and increasing power output.
- 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.
- The supercharger can be controlled manually by a switch on the instrument panel. The switch has three positions – AUTOMATIC, LOW, and HIGH. Usually, I would recommend that you set it to AUTO to avoid having to manage the supercharger.

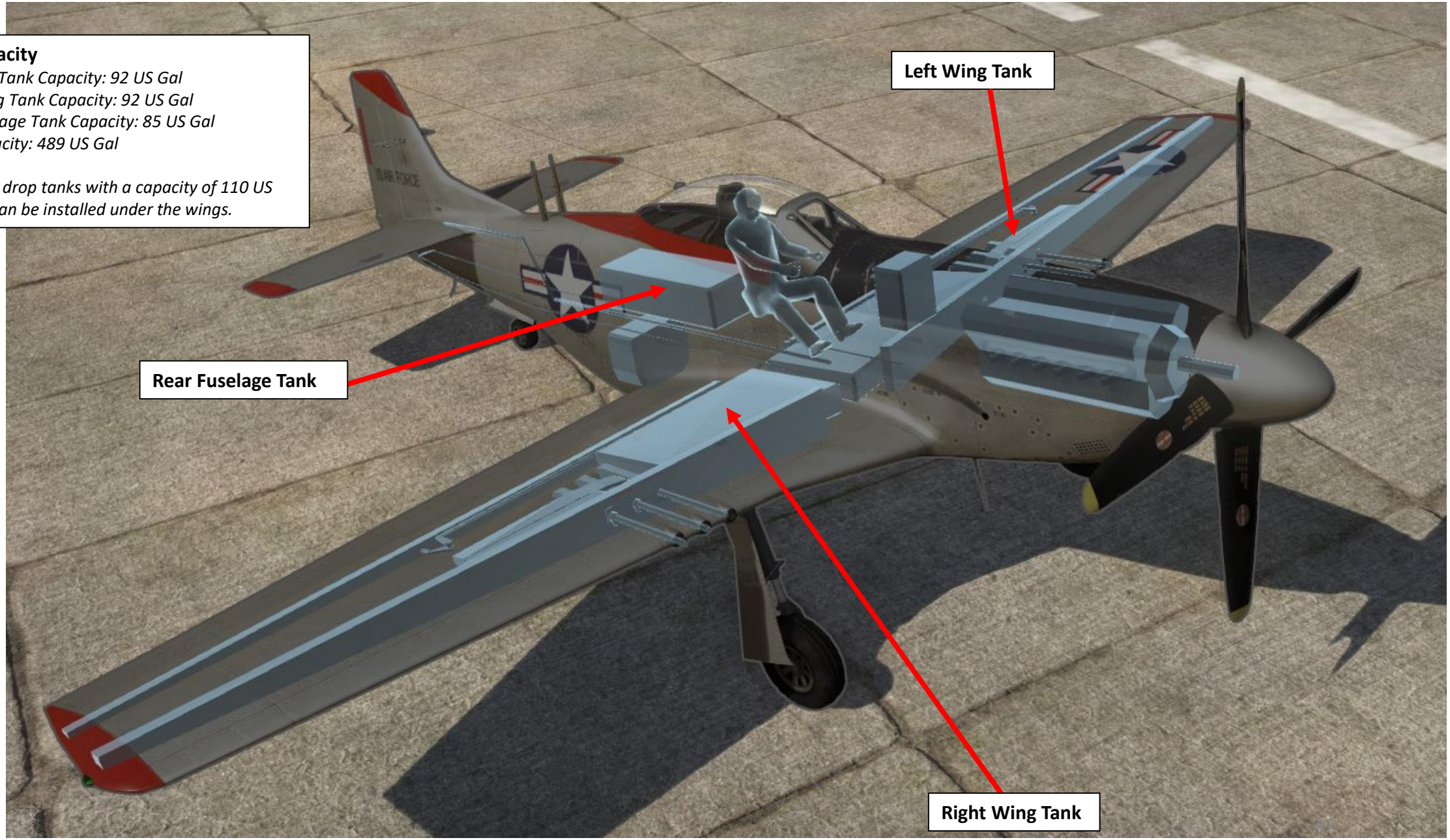


SUPERCHARGER IN AUTOMATIC MODE

FUEL TANKS

Fuel Capacity
Left Wing Tank Capacity: 92 US Gal
Right Wing Tank Capacity: 92 US Gal
Rear Fuselage Tank Capacity: 85 US Gal
Total Capacity: 489 US Gal

Note: Two drop tanks with a capacity of 110 US Gal each can be installed under the wings.



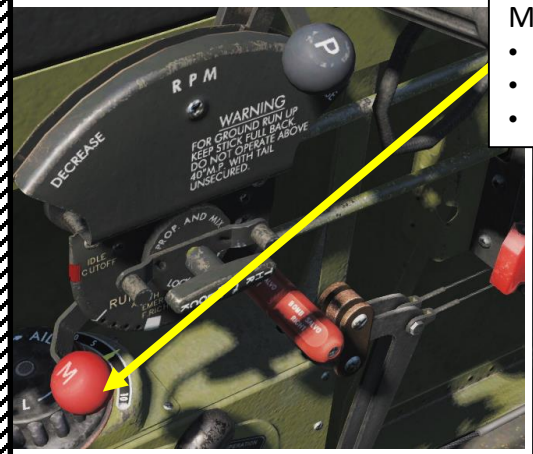
FUEL MANAGEMENT

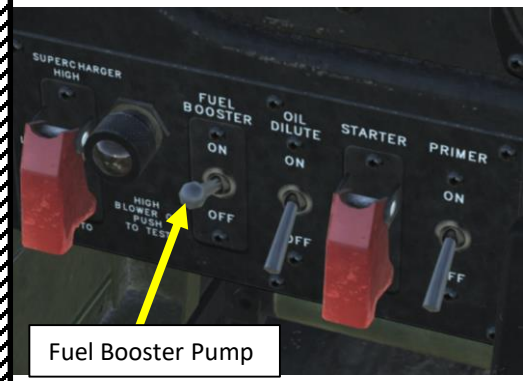
The tanks are not interconnected and it is necessary to switch from one tank to the other to maintain balance. The three booster pumps are controlled by a single switch on the front switch panel. Selection between the tanks is performed by turning the booster pump switch to ON, then turning the fuel selector valve to the desired tank.

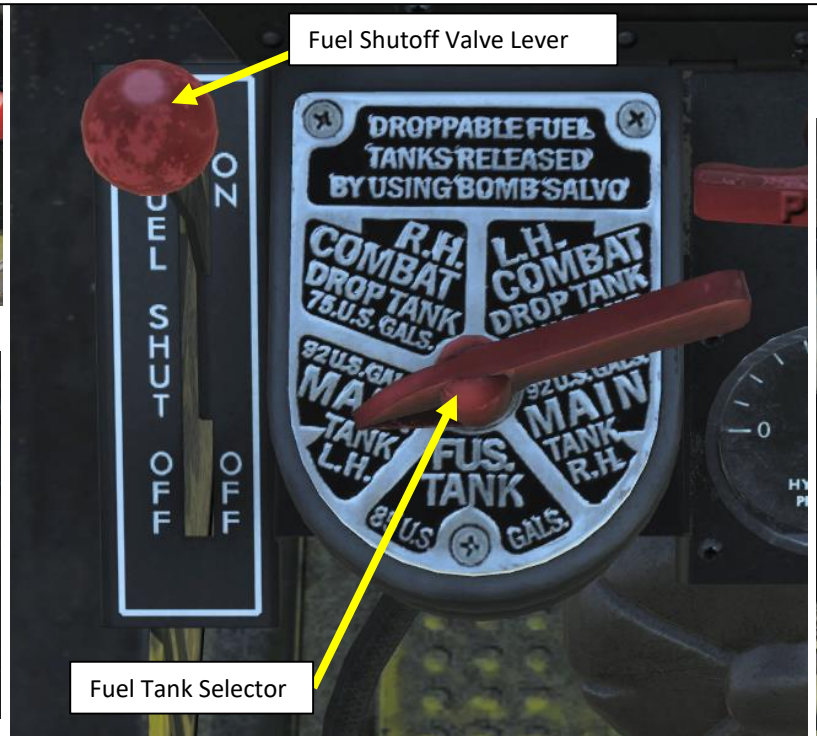
Fuel capacity is monitored using the Fuel Gauges for the main and fuselage tanks. No gauges for drop tanks are available.

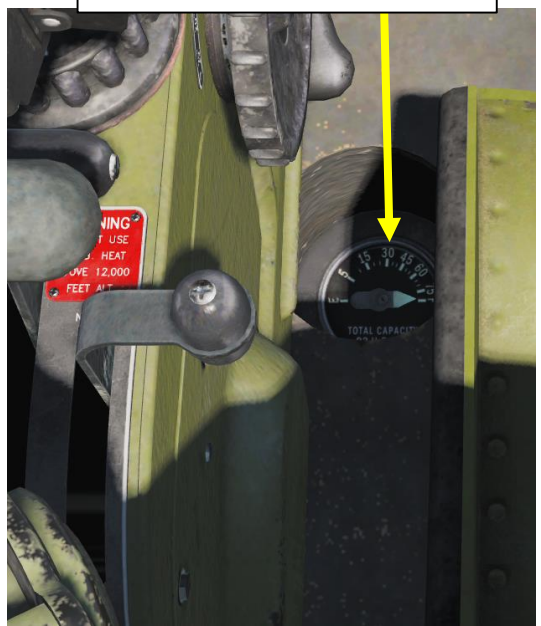
When changing tanks, don't stop the selector valve at an empty tank position, or at a droppable tank position if no droppable tanks are equipped. Starving the engine of fuel will result in engine failure. In such a case, perform the following steps immediately:

1. Turn the fuel selector to a loaded tank
2. Make sure that the booster pump switch is ON
3. As the engine takes hold, adjust the throttle setting as required.









FUEL MANAGEMENT

The fuel tanks are self-sealing and so are the fuel lines. The auxiliary drop tanks are not self-sealing. Fuel is forced to the carburetor by an engine-driven pump. In addition, there is an electrically powered booster pump in each internal tank. The booster pumps prevent vapor lock at high altitudes, assure sufficient fuel supply under all flight conditions and, in case of engine-driven pump failure, provide enough fuel to the carburetor for normal engine operation. The droppable tanks do not have a booster pump. However, a constant and controlled pressure is maintained within the combat tanks by pressure obtained from a vacuum pump. This is in addition to the pressure obtained from the main engine fuel pump.

The carburetor is of the fuel injection type with a separate idle cut-off device and is equipped with a vapor return line that extends to the left fuel tank. The vapor vent line may become a fuel return line if the needle valve in the vapor eliminator sticks in the open position. The left fuel tank should always be used first to ensure availability of space for any returning fuel.

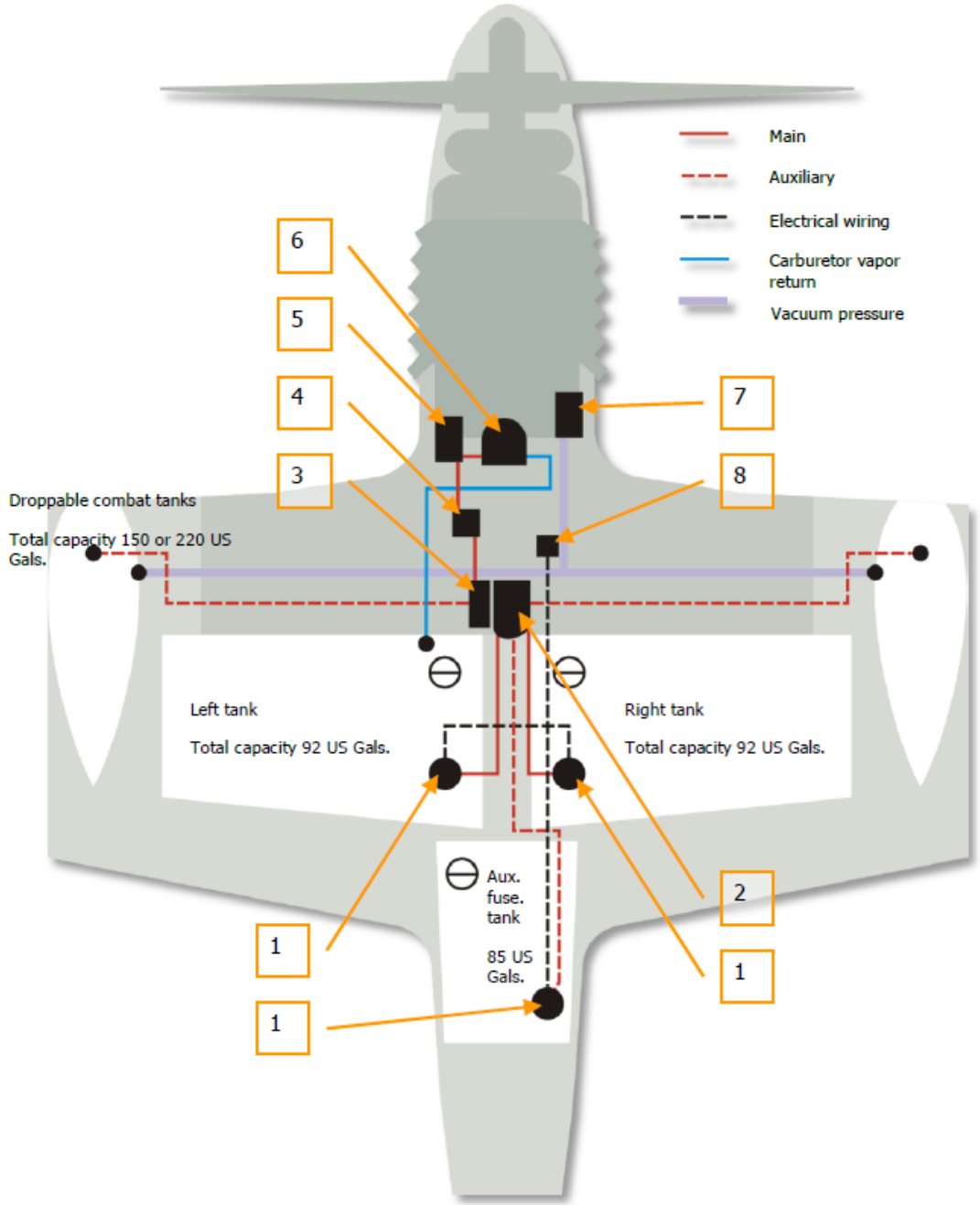
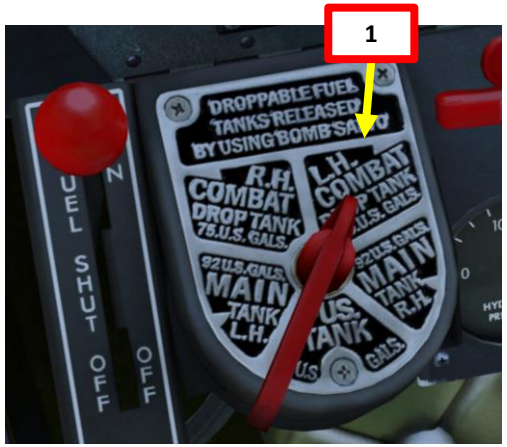
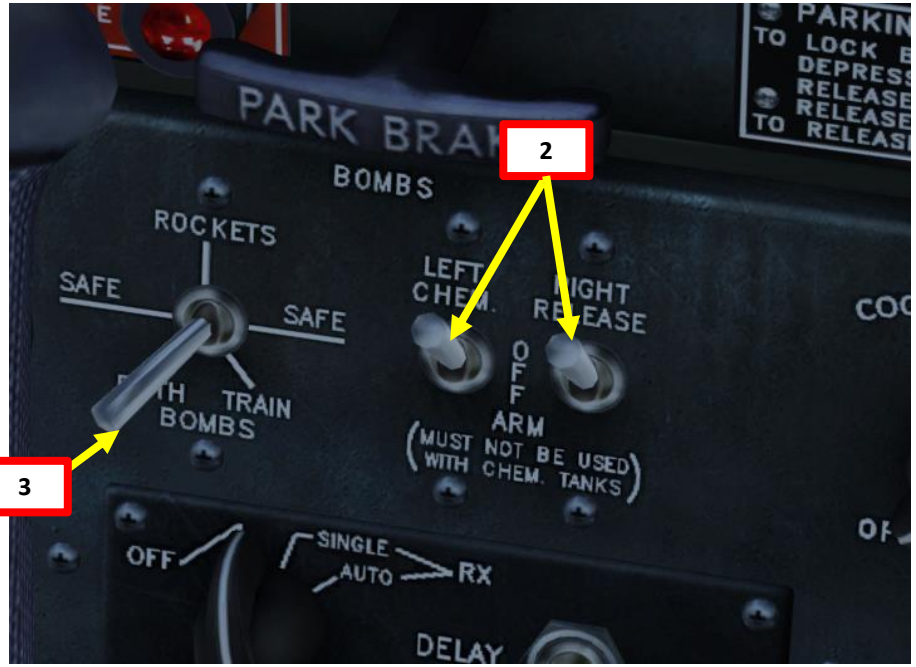


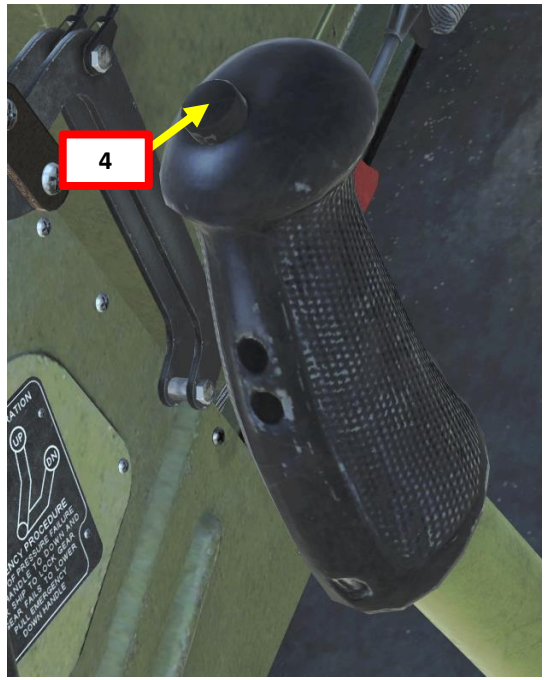
Figure 20: P-51 Fuel System

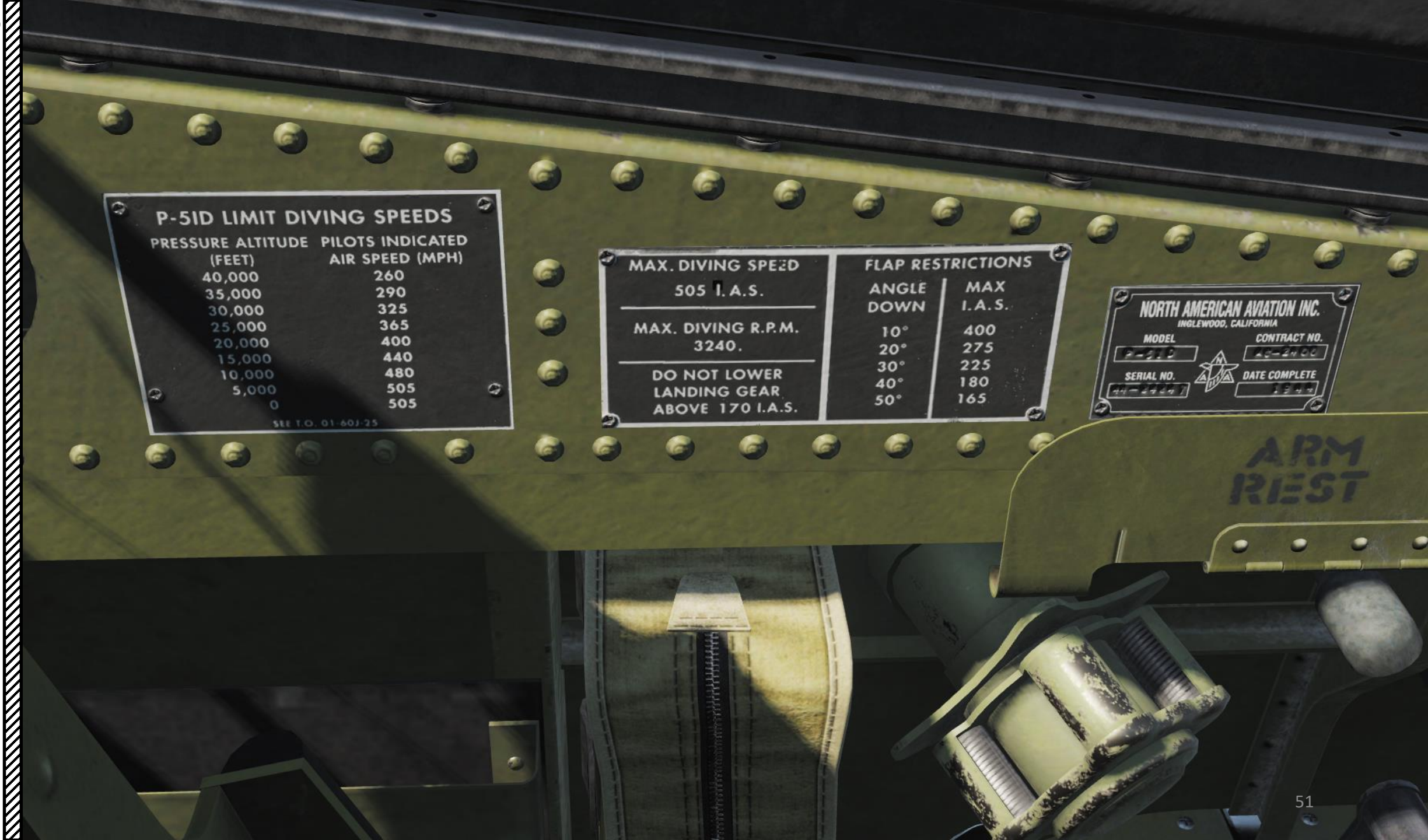
FUEL DROP TANK OPERATION

1. To consume fuel from your drop tanks, set Fuel Selector to either LH or RH COMBAT DROP TANKS
2. Set arming switch in CHEM RELEASE position (UP)
3. Select drop tank release mode
   a) BOTH = 2 tank at the same time
   b) TRAIN = 1 tank at a time
4. Release drop tanks by pressing “Weapons Release” button (RALT+SPACE).







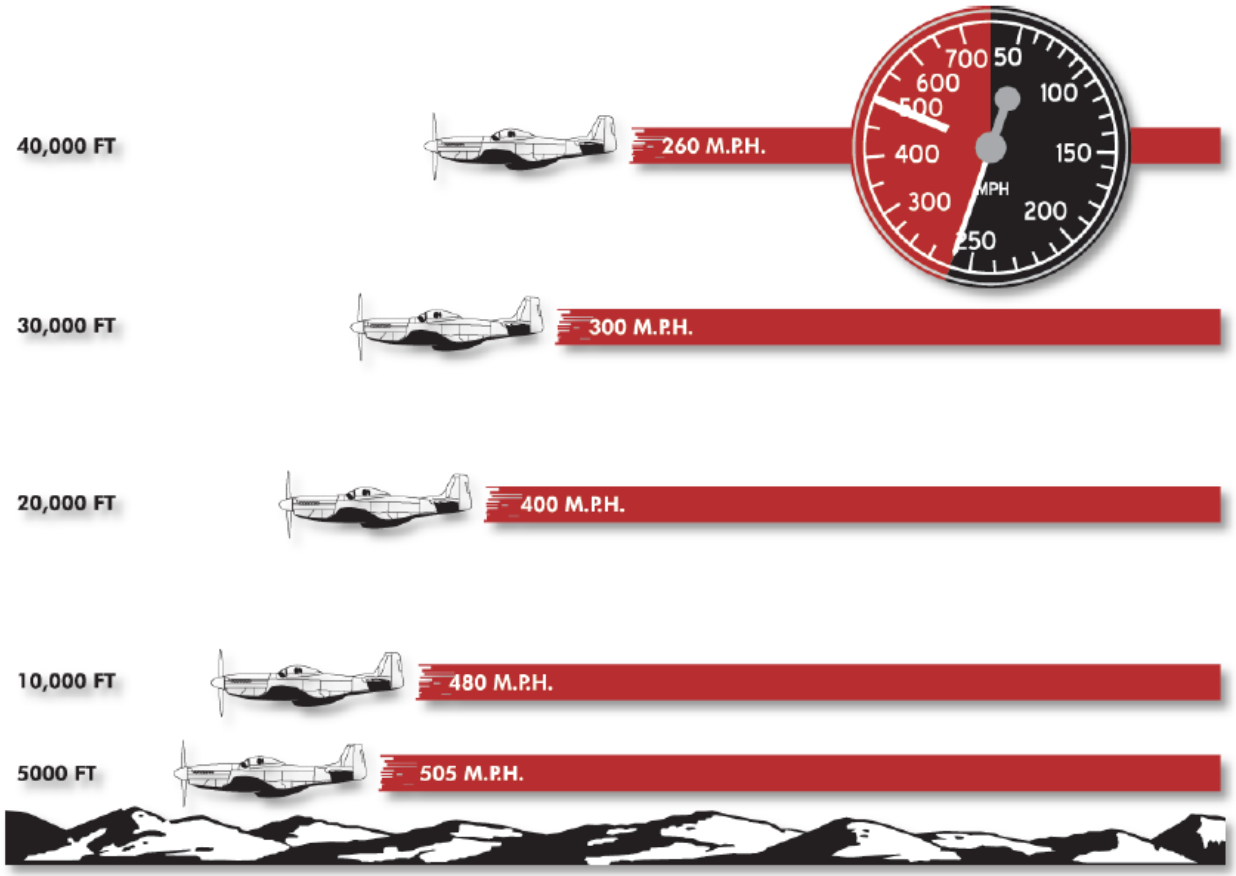

P-51D LIMIT DIVING SPEEDS
PRESSURE ALTITUDE (FEET) PILOTS INDICATED AIR SPEED (MPH)
40,000 260
35,000 290
30,000 325
25,000 365
20,000 400
15,000 440
10,000 480
5,000 505
0 505
SEE T.O. 01-60J-25
MAX. DIVING SPEED
505 I.A.S.
MAX. DIVING R.P.M.
3240.
DO NOT LOWER LANDING GEAR ABOVE 170 I.A.S.
FLAP RESTRICTIONS
ANGLE DOWN
MAX I.A.S.
10° 400
20° 275
30° 225
40° 180
50° 165
NORTH AMERICAN AVIATION INC.
INGLEWOOD, CALIFORNIA
MODEL
CONTRACT NO.
SERIAL NO.
DATE COMPLETE
ARM REST

Stall Speeds Table (in mph)

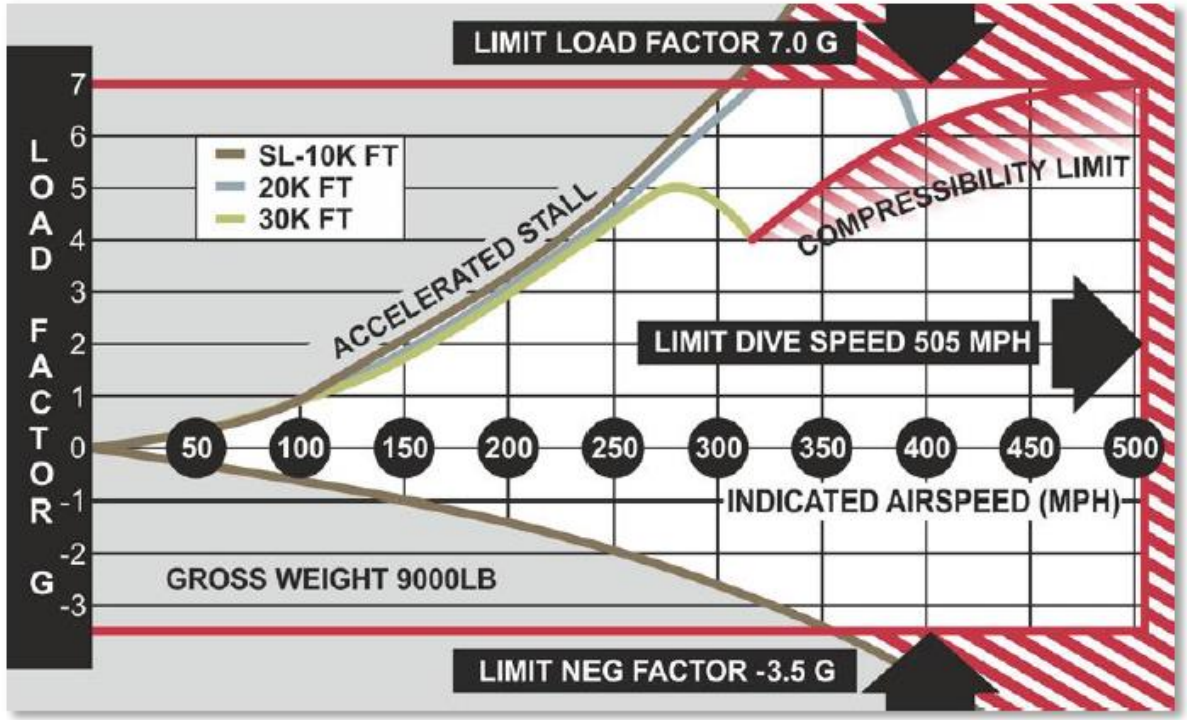
	Gross weight (lbs)	Gear up Flaps up			Gear down Flaps 45° down		
		Level	30° bank	45° bank	Level	30° bank	45° bank
With Wing Racks Only	10,000	106	115	128	101	110	123
	9,000	101	109	121	94	103	116
	8,000	94	102	114	87	98	108
With Bombs, Drop Tanks, or Rockets	12,000	119	128	143	113	123	136
	11,000	113	122	137	107	117	131
	10,000	108	116	130	102	111	124
	9,000	102	110	123	95	105	117

Flaps Down Angle [degrees]	Maximum IAS [mph]
10	400
20	275
30	225
40	180
50	165

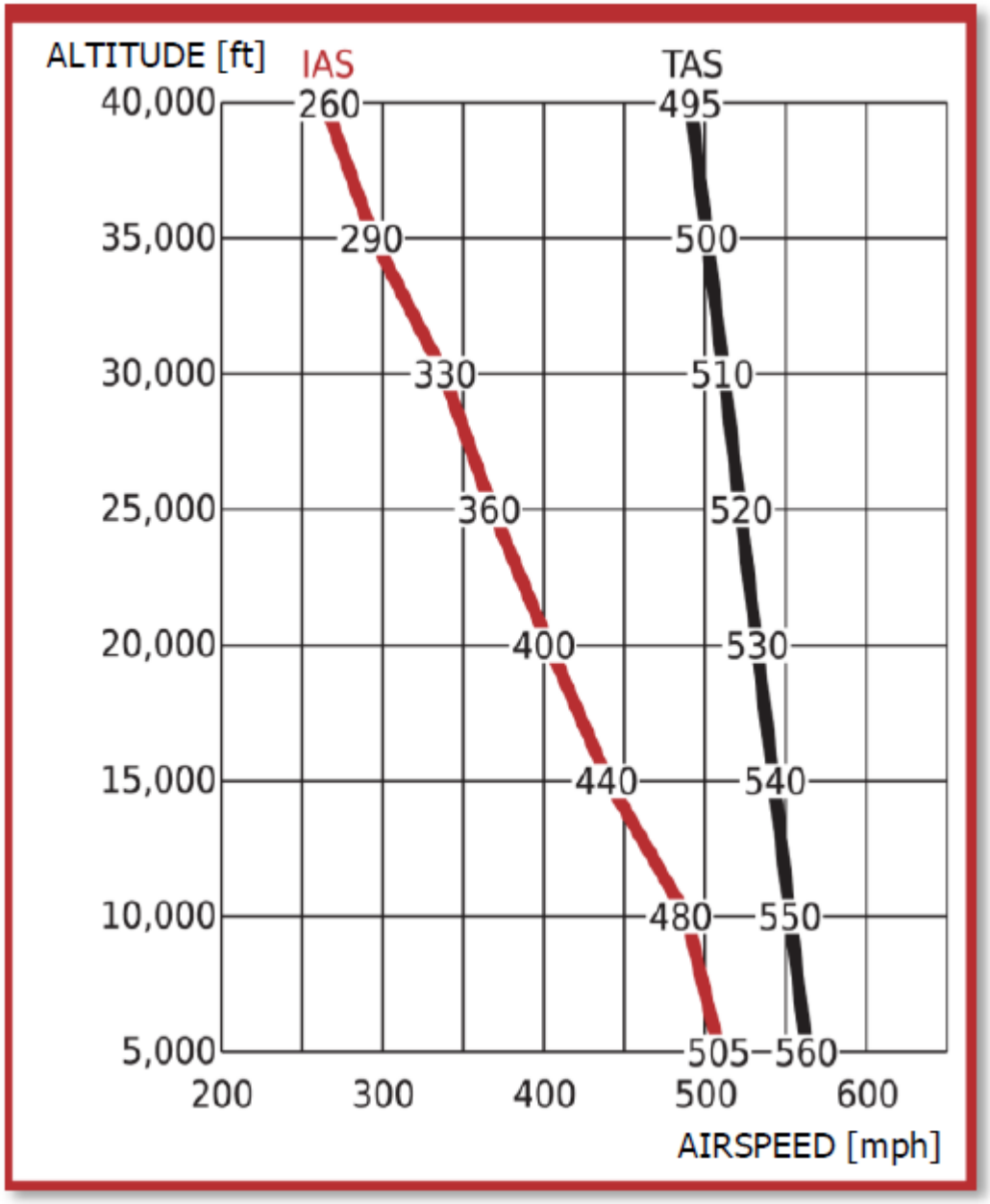
Maximum Indicated Airspeed



Load Factor Limitations

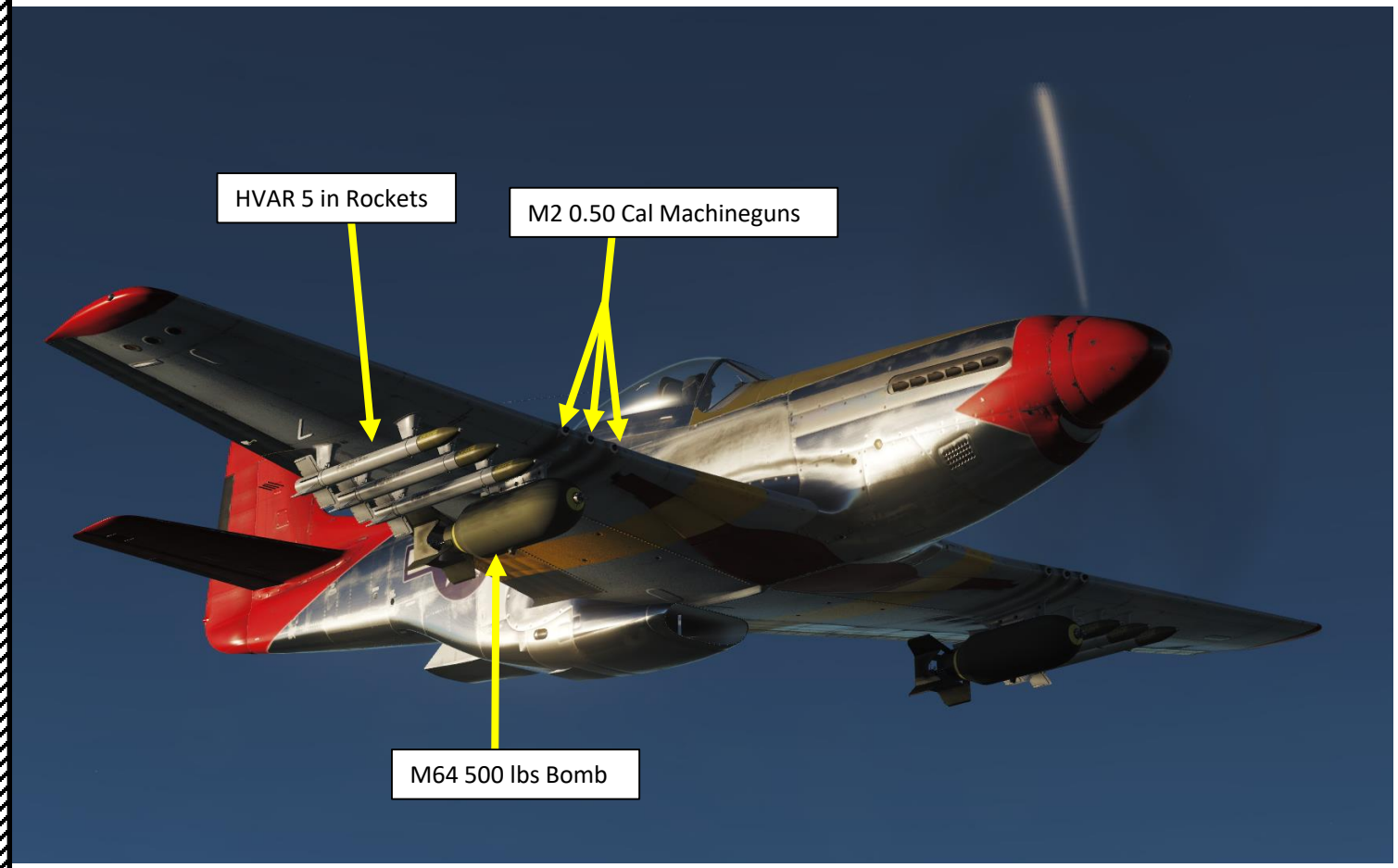


Maximum Allowable Dive Speeds



ARMAMENT OVERVIEW

- 6 x 0.50 cal M2 machineguns (1880 rounds total)
  - 400 rounds for inboard guns
  - 270 rounds for center guns
  - 270 rounds for outboard guns
- 2 x M64 500 lbs Bombs
- 8 x HVAR 5-in. Rockets



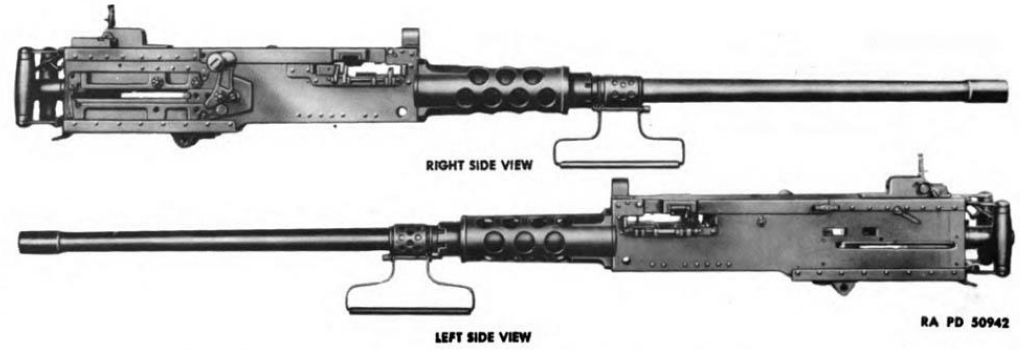
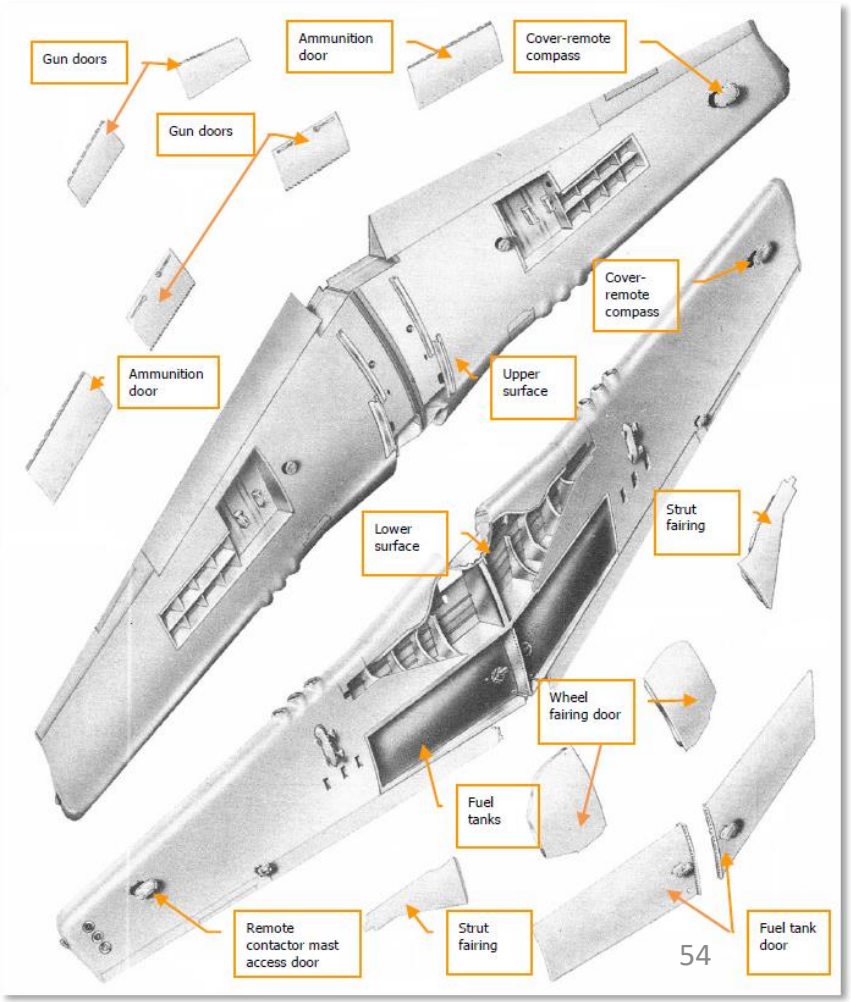


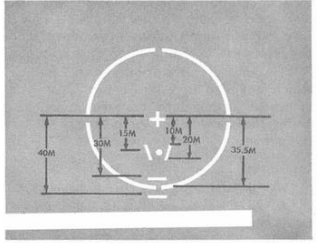
Figure 7—Browning Machine Gun, Cal. .50, M2, Heavy Barrel, Flexible

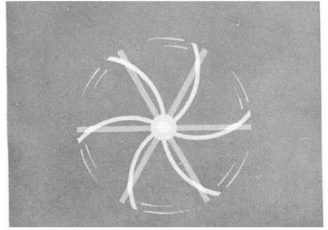


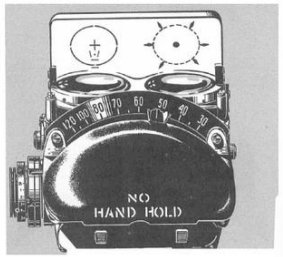
GUNSIGHT

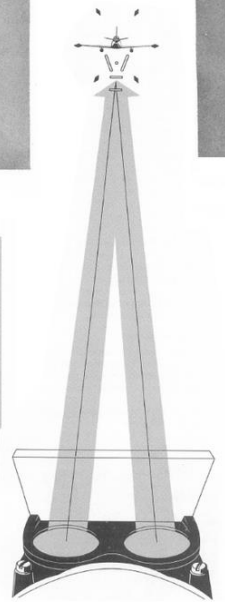
Your gunsight will show you where to shoot and when to shoot a target.

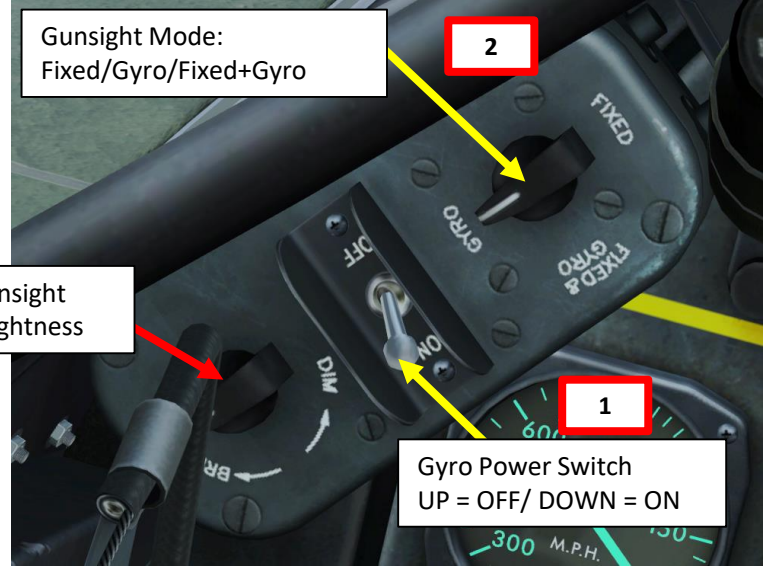
1. Gyro Power switch – ON (DOWN)
2. Select Gunsight Mode (FIXED/GYRO/FIXED + GYRO)
3. Set gunsight range scale (recommended: 1100 ft) by using your twist-grip throttle ("Gunsight Range to Target Decrease/Increase" controls)
4. Set gunsight wingspan scale (recommended: 32 ft for a Bf.109 or a FW190) by using the wingspan setter
5. Fire guns when the wings of the target fit within your gunsight reticle



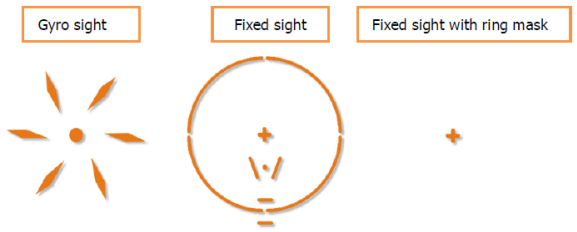


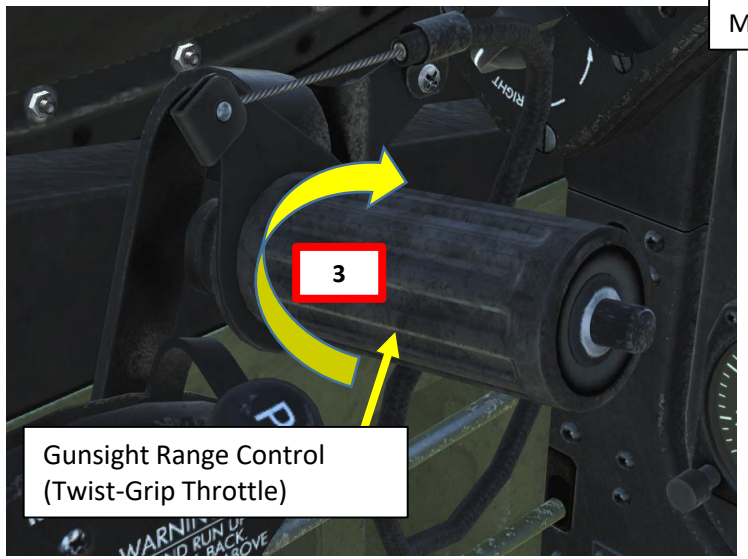


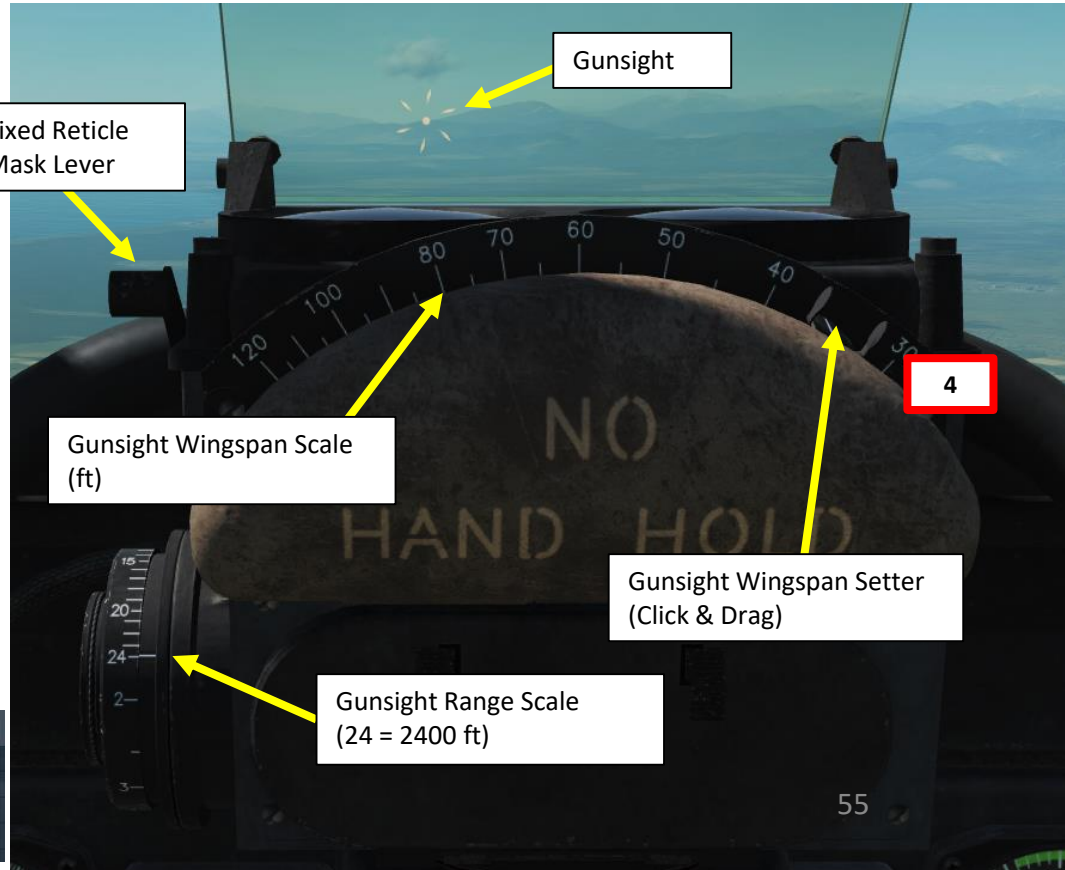




Consult this tutorial about using the gunsight:
https://www.youtube.com/watch?v=vCCuwzKV5wo





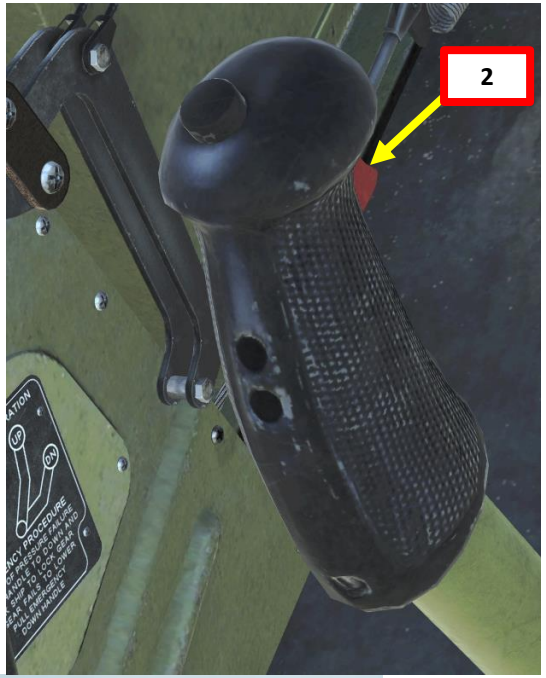


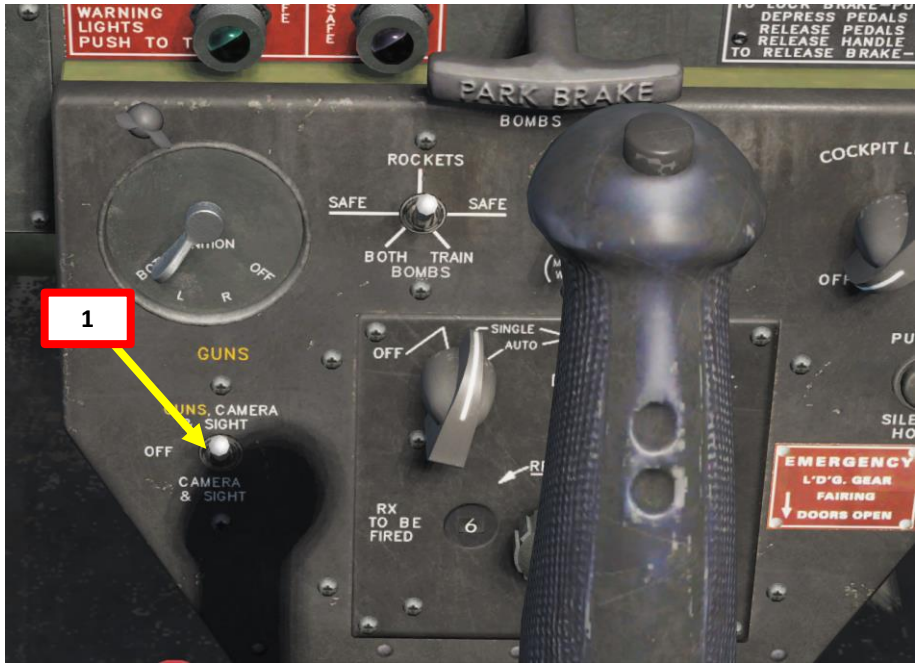
Gunsight Controls

Action	Category	Keyboard	Throttle - HOTAS W...	Joystick - HOTAS Wa...
Gunsight range to target Decrease	K-14 gunsight	.		JOY_BTN11
Gunsight range to target Increase	K-14 gunsight	;		JOY_BTN13
Gunsight target span Decrease	K-14 gunsight	/		JOY_BTN12
Gunsight target span Increase	K-14 gunsight	,		JOY_BTN14

WEAPON EMPLOYMENT (MACHINEGUNS)

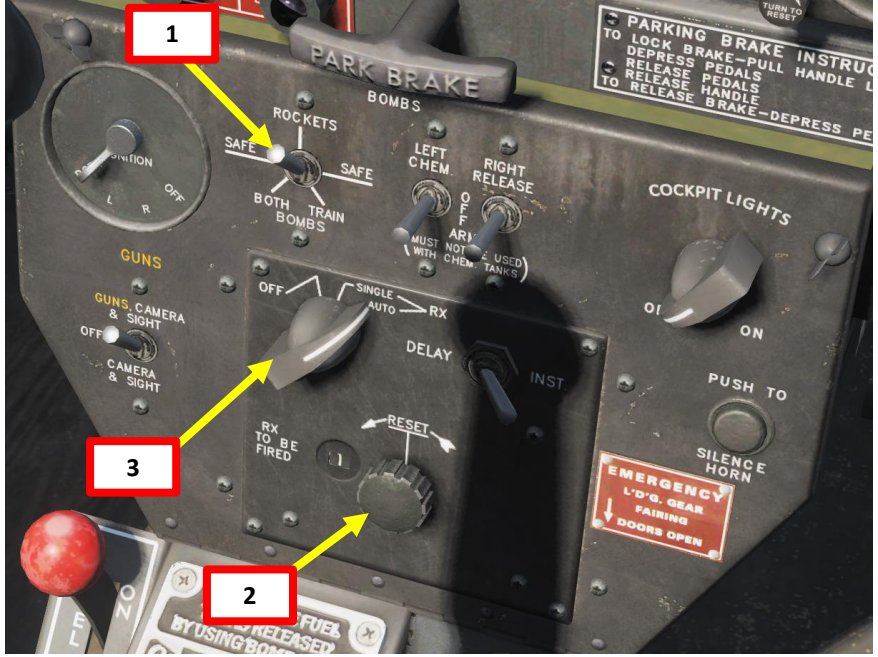
1. Set your guns safety OFF by setting safety switch to GUNS (UP)
2. Press the “GUN FIRE” button (Spacebar) to fire.

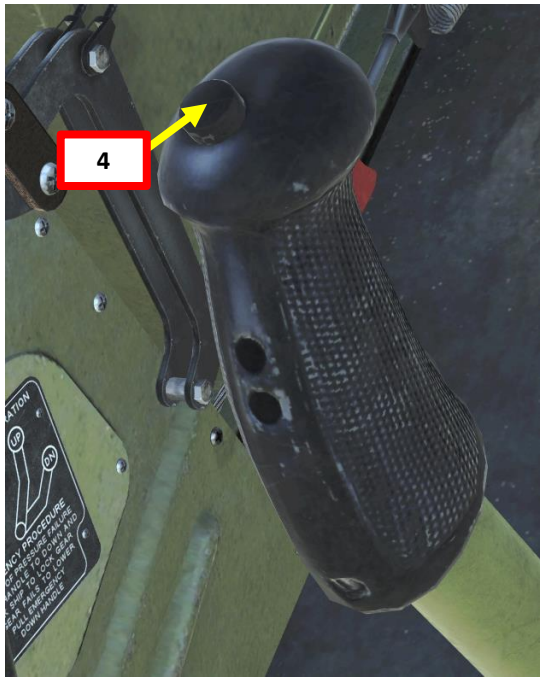




WEAPON EMPLOYMENT (ROCKETS)

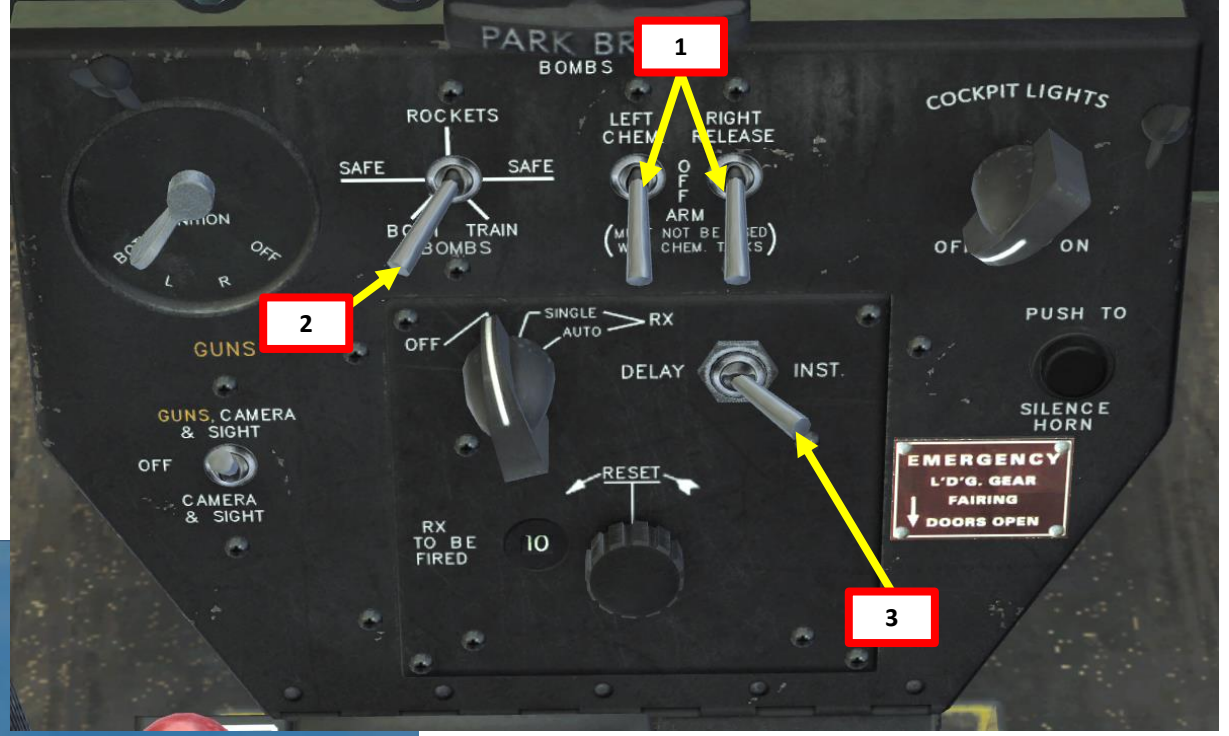
1. Select “ROCKETS” weapon mode (UP)
2. Select desired rocket firing mode
   a) Single = Fires 1 Rocket
   b) Auto = Fires Multiple Rockets
3. Select how any rockets you want to fire if Auto Firing Mode is selected
4. Fire rockets by pressing “Weapons Release” button (RALT+SPACE).

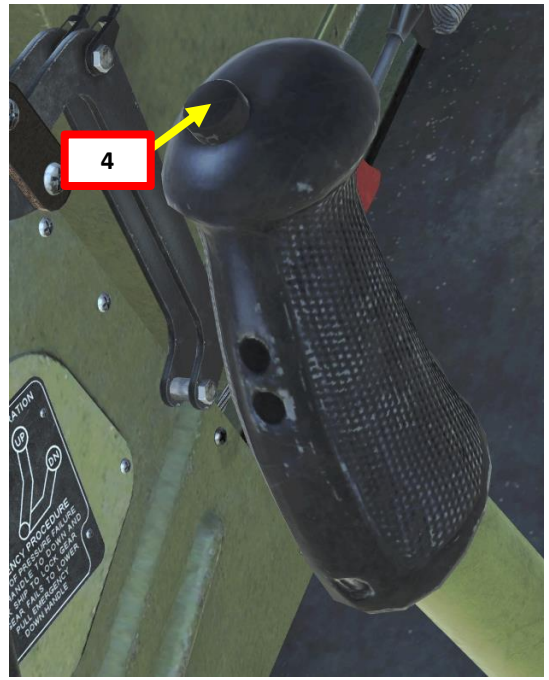




WEAPON EMPLOYMENT (BOMBS)

1. Arm bombs by setting bomb arming switch to the ARM position (DOWN)
2. Select bomb release mode
   a) BOTH = 2 bombs at the same time
   b) TRAIN = 1 bomb at a time
3. Select bomb fuse delay (Delay or Instantaneous)
4. Release bombs by pressing “Weapons Release” button (RALT+SPACE).

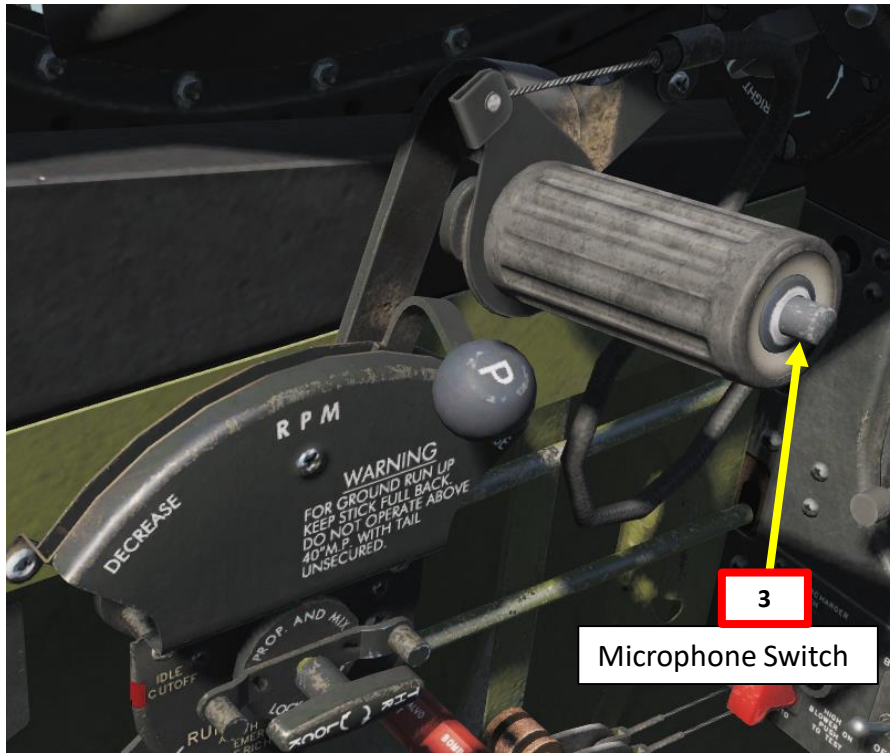


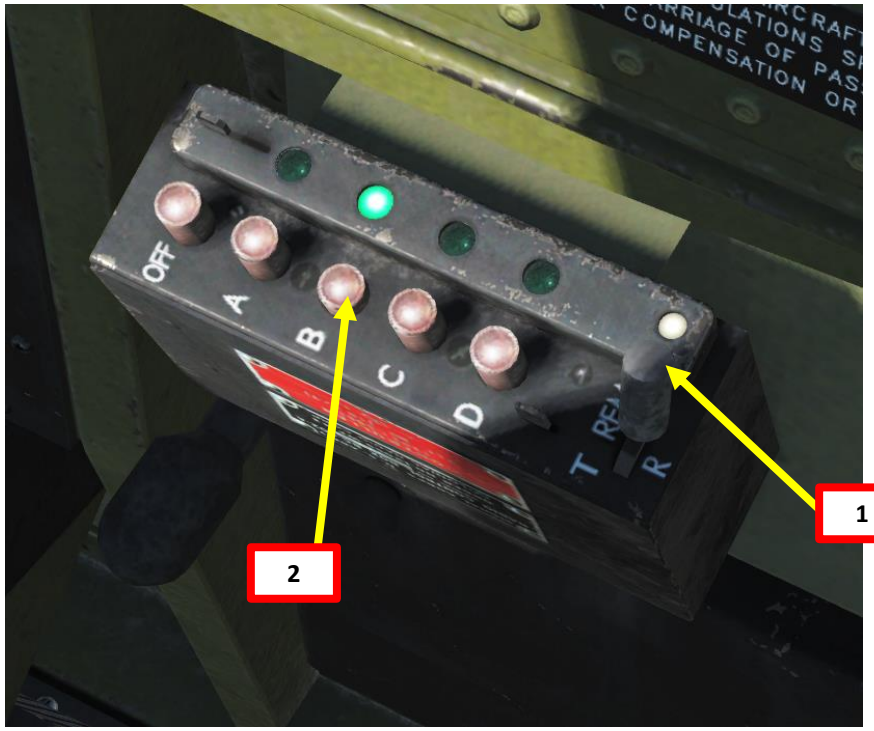


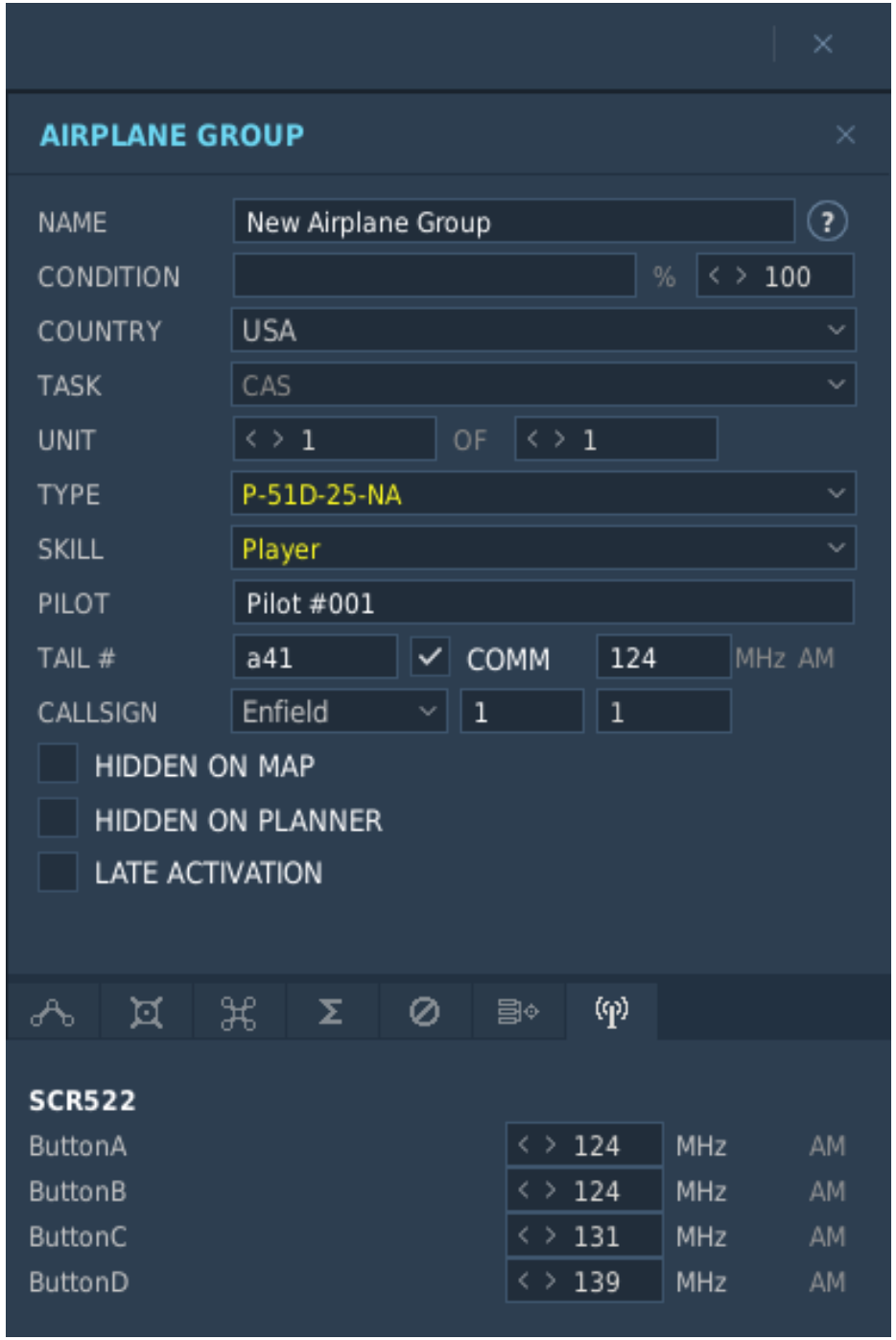
The P-51D is equipped with a SCR-522 VHF (Very High Frequency) radio system. Radio frequencies are preset in the mission editor for 4 different channels and cannot be changed manually during flight.

1. Set the radio Transmit-Receive switch to “REM” (Remote Operation)
2. Select desired channel (A, B, C OR D)
3. Press the Push-to-Talk switch on your throttle to transmit (“COMM PUSH TO TALK” control, or “RALT+\”)

RADIO FREQUENCY RANGE: 100 - 156 MHz



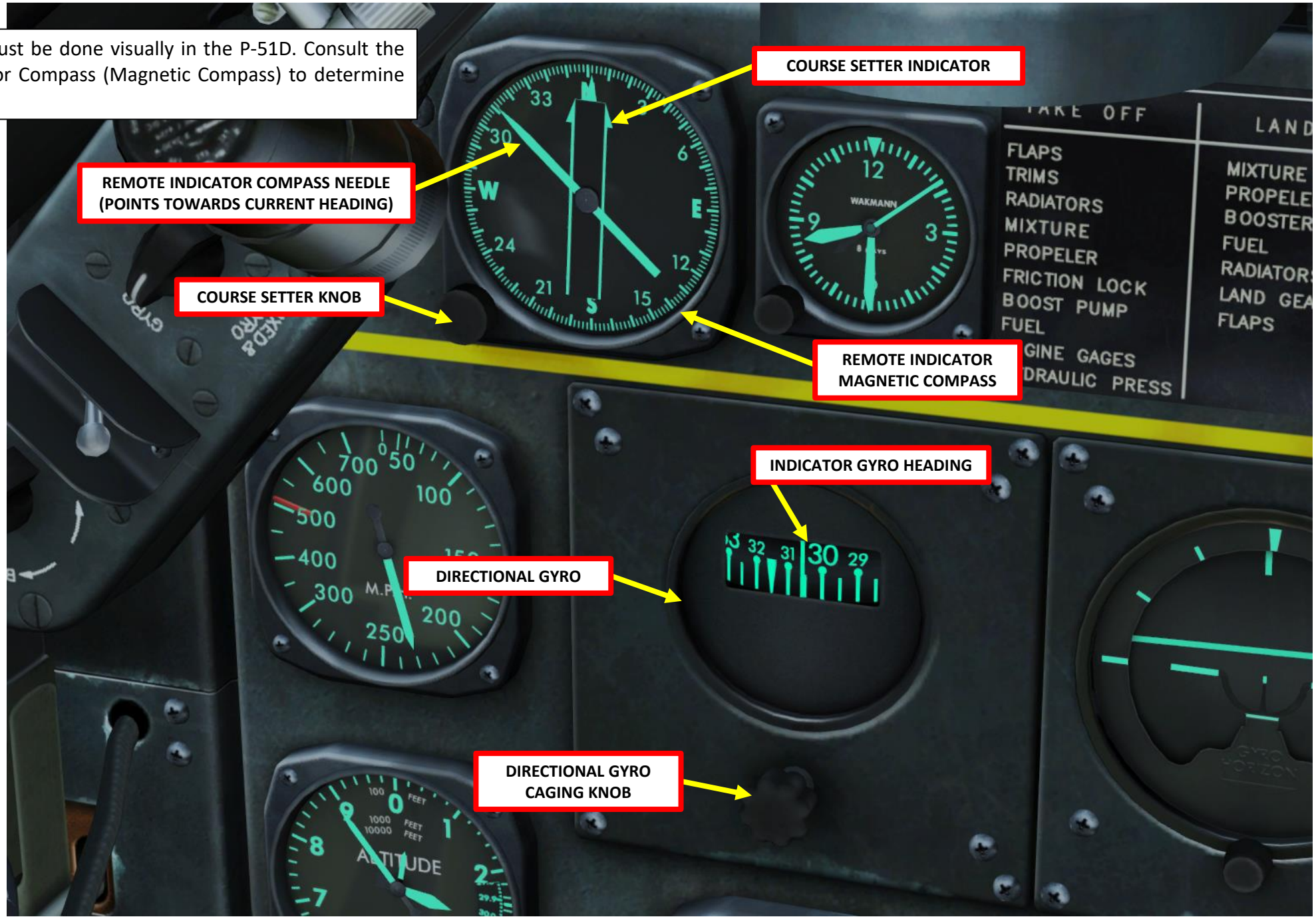




RADIO FREQUENCIES – AIRFIELDS

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

Most of the navigation must be done visually in the P-51D. Consult the Gyro and Remote Indicator Compass (Magnetic Compass) to determine your current heading.



Dogfighting in the P-51D Mustang is an art that is easy to learn, but very difficult to master. On various forums, you will read a thousand different theories about "how to dogfight" or "why it sucks monkey balls" or "why it's the most overpowered aircraft ever". Everyone has an opinion on the Mustang, but few people have a truly "informed" opinion about it. I will try to give you some tips that are intended to be as unbiased and factual as possible.

First, the P-51D Mustang was built to be a high-speed, long-range escort fighter. While the majority of allied fighters like the Spitfire had a range of about 430 miles, a P-51 equipped with external fuel tanks had a range of about 1,650 miles. The distance between London and Berlin being approximately 600 miles, the Mustang became the aircraft of choice to escort the bombers during the bombing campaign over Germany.

Therefore, the Mustang 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. This partially explains why the Mustang can sometimes seem "worst" in most aspects than other fighters at low altitude: it was meant to be a high-altitude fighter. 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.

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 Mustang too. If you have to make a quick turn, you will notice that the Mustang's wing configuration has an airfoil of a laminar-flow design, which provides low drag at high speeds but has the inconvenient of inducing violent accelerated stalls and spins if you pull too hard on the stick when turning and banking. A good trick is to deploy 10 to 20 degrees (1 to 2 notches) of flaps before beginning a turn and to retract your flaps immediately afterwards to gain back airspeed. The Mustang can have a surprisingly good turn rate when your flaps are deployed; this can be used to your advantage when you need to evade an enemy that is bouncing you.

It is also important for you to realize that the P-51D modelled in DCS is an early 1944 variant , while the Bf.109K-4 and FW.190D-9 entered service in late 1944. Therefore, the P-51D of early will underperform in comparison to the P-51D of late 1944 since the maximum allowable manifold pressure went from 67 inches of Hg to 75 inches of Hg, partly due to a change of fuel grade. There have been extensive and heated debates on "what fuel grade should be used" on the Eagle Dynamics forums.

While we could argue day and night about what the P-51D should or should not be, the conclusion remains the same. The P-51D must be used in the following way if you want to survive against experienced Bf.109 or FW.190 pilots.

- 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
- 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.


A4
K

The P-51D is equipped with the AN/APS-13 Rear Warning Radar System, which will trigger an alarm sound and light when a contact is behind you. This is very useful for situational awareness. Keep in mind that this radar is somewhat primitive and will not distinguish friend from foe.

To turn on the Rear Radar Warning switch, simply turn the Rear Radar Warning Power Switch ON (UP). An audible alarm sound and light will be triggered when an aircraft is behind you.

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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P-51D MUSTANG
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LOGBOOK
ENCYCLOPEDIA
TRAINING
REPLAY
MISSION EDITOR
CAMPAIGN BUILDER
EXIT
Hurry Home Honey
C5
413586
Bf 109 K-4 1.5.3 beta
C-101 1.5.3 Beta
CA 1.5.3
F-86F 1.5.3
FC3 1.5.3
Fw 190 D-9 1.5.3
Hawk 1.5.3 Beta EFM
Ka-50 1.5.3
L-39 1.5.3
M-2000C 1.5.3 Beta
Mi-8MTV2 1.5.3 beta
MiG-15bis 1.5.3
MiG-21bis 1.5.3
P-51D 1.5.3
SA342 1.5.3 beta
Su-25T 1.5.3
TF-51D 1.5.3
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