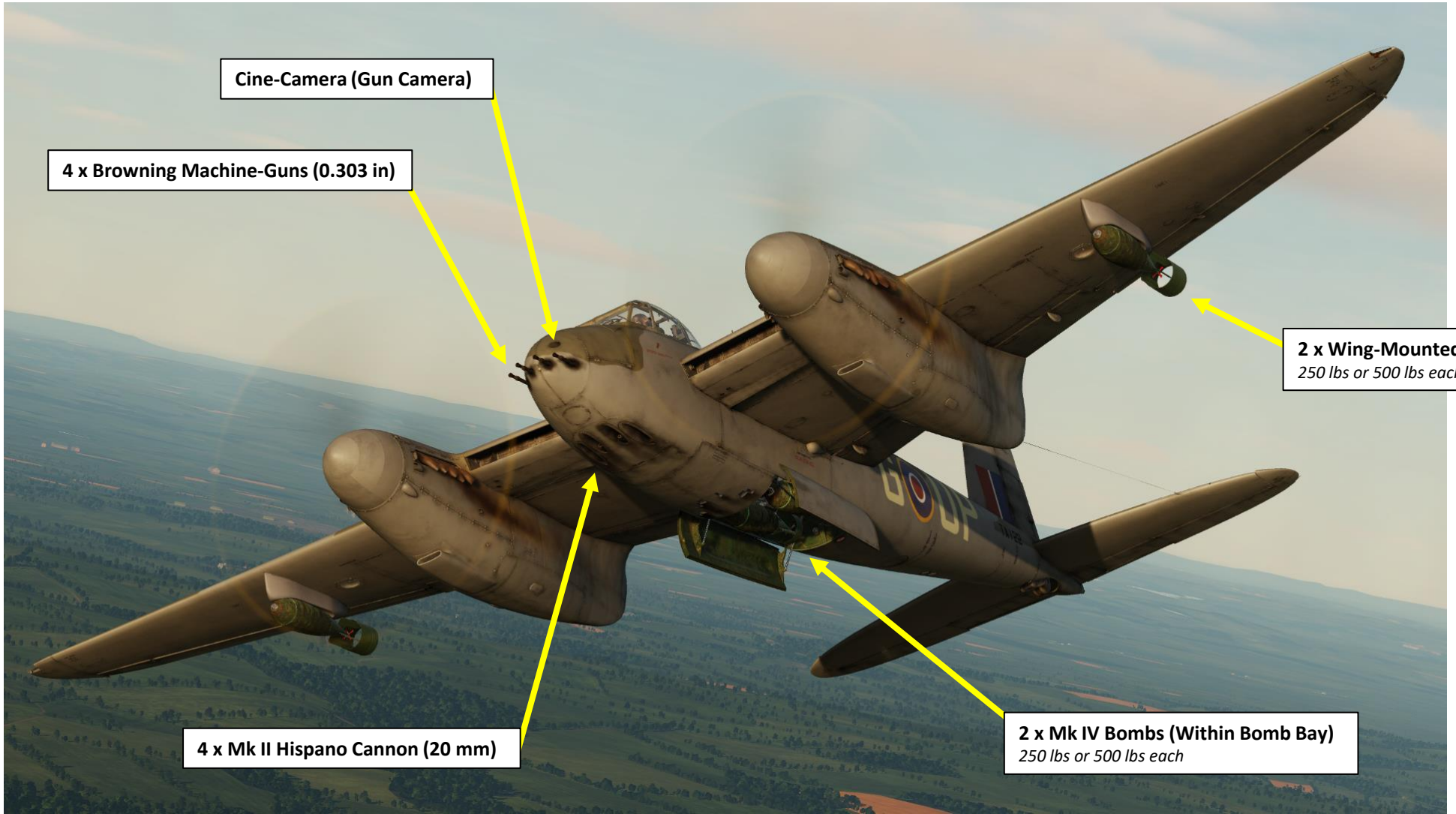
PART 10 – WEAPONS

ARMAMENT OVERVIEW

- 4 x Colt Browning .303 Machineguns (500 rounds per gun)
- 4 x Hispano Mk. II 20 mm Cannons (150 rounds per cannon)
- 4 x 250 lbs bombs (or 4 x 500 lbs bombs)
  - 2 in bomb bay
  - 2 under wings
- 8 x RP-3 Rocket Projectiles (3 in)

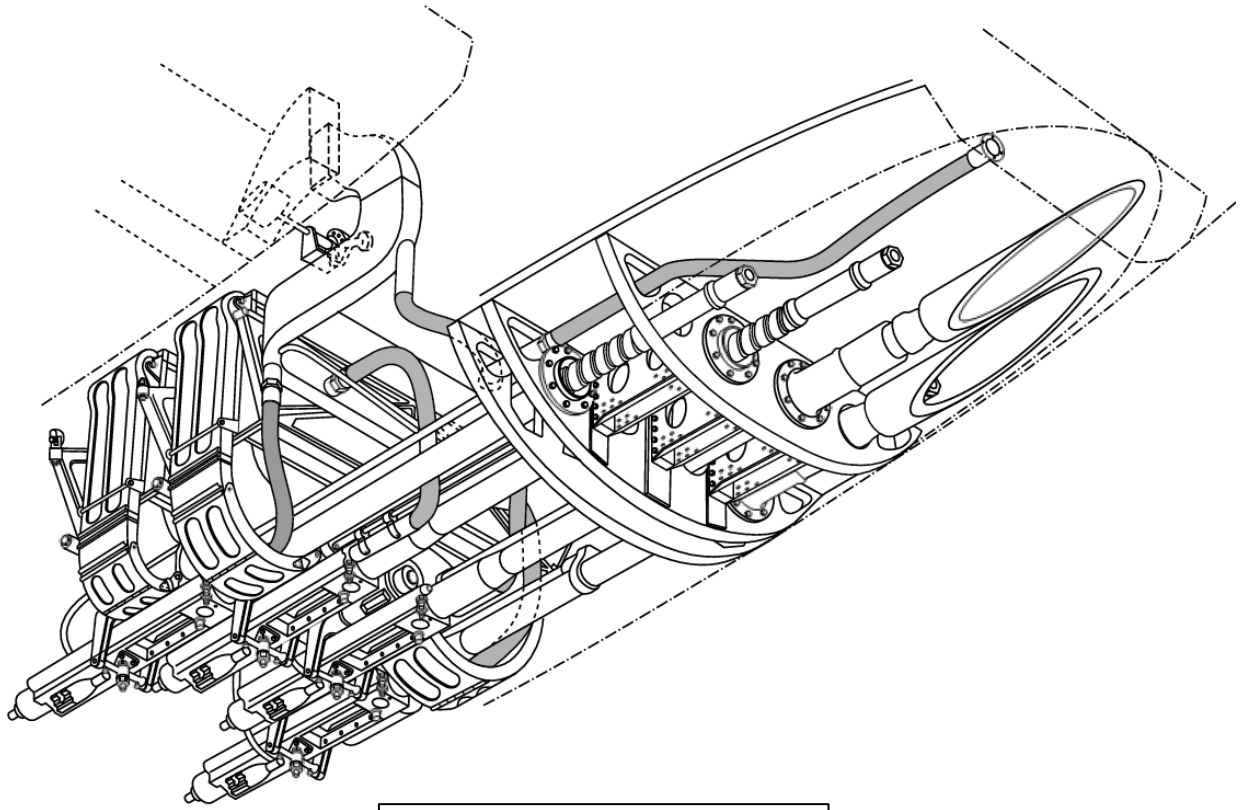


ARMAMENT OVERVIEW

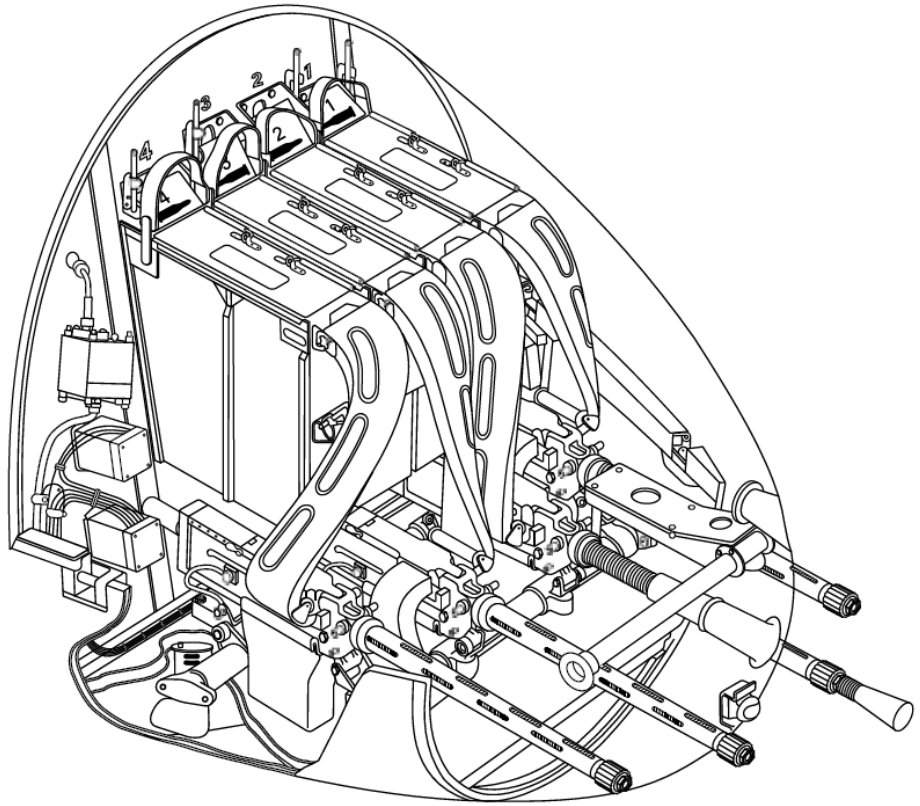
ARMAMENT MECHANISMS

The armament consists of four 20 mm. guns in the underside of the fuselage, and four .303 in guns and a camera gun in the nose. All guns are fired electro-pneumatically. The heat supply to the guns is controllable from the cockpit

The 20 mm guns are operated by a trigger, and the .303 in. guns by a push-switch on the control column. The gun master switch is located on the starboard instrument panel.



4 x Mk II Hispano Cannon (20 mm)



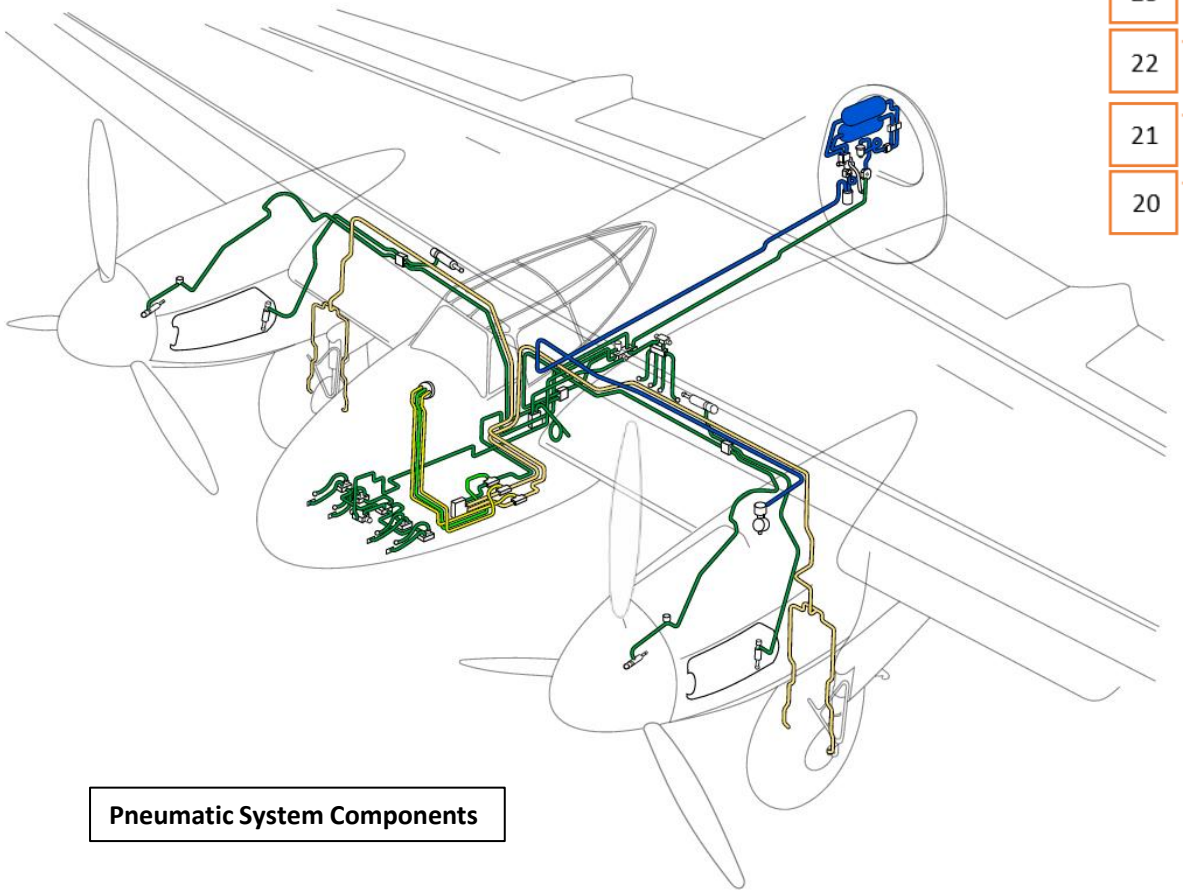
4 x Browning Machine-Guns (0.303 in)

ARMAMENT MECHANISMS

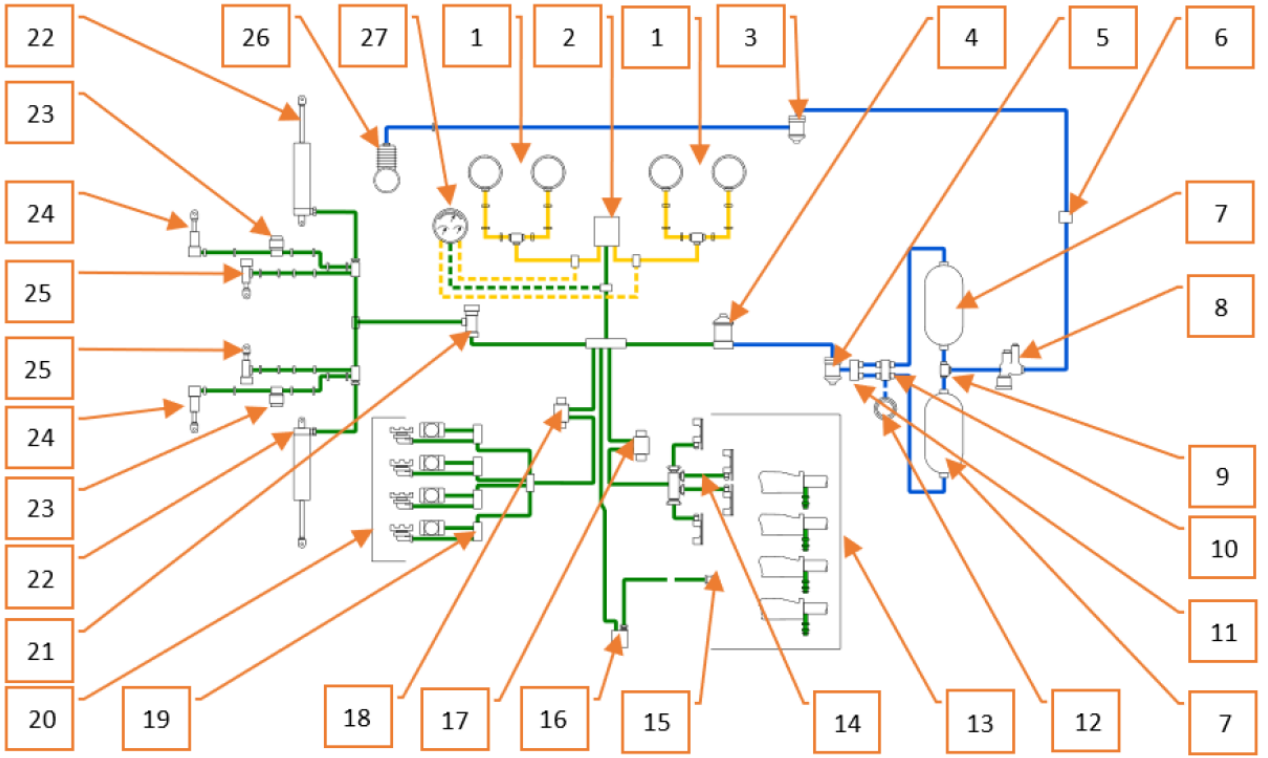
The pneumatic system operates the wheel brakes, the Browning guns, Hispano cannons, cine-camera, and flaps. Storage cylinders are kept charged by an engine-driven compressor and from them the supply is led to the various units in the system.

For the armament systems, pneumatic pressure controls the following components:

- Hispano cannons reload & firing mechanism
- Browning machineguns' firing, reloading & safety mechanism
- Camera gun
- Weapon fire buttons (on the control stick)



Pneumatic System Components



Pneumatic System

1. Wheel Brakes
2. Differential Unit
3. Oil Trap
4. Pressure Reducing Valve
5. Air Filter
6. Charging Connection
7. Dunlop air container
8. Pressure regulator Heywood type A.R.5
9. Non-Return Valves
10. Junction Block and Test Point
11. Non-Return Valves
12. Ground Check Pressure Valve
13. 20 mm Cannon Reload Mechanism
14. 20 mm Cannon Firing Control Mechanism
15. Dunlop Hose
16. Cocking Valve
17. Electro-Pneumatic Firing Valve
18. Electro-Pneumatic Firing Valve
19. Lag Valve
20. Browning .030 Block
21. Pressure Maintaining Valve
22. Pneumatic Cylinder
23. Magnetic Valve
24. Air Intake Control Ram
25. Supercharger Control Ram
26. Heywood Engine-Driven Compressor
27. Brake Pressure Gauge

BARR & STROUD MARK II GUNSIGHT - OVERVIEW

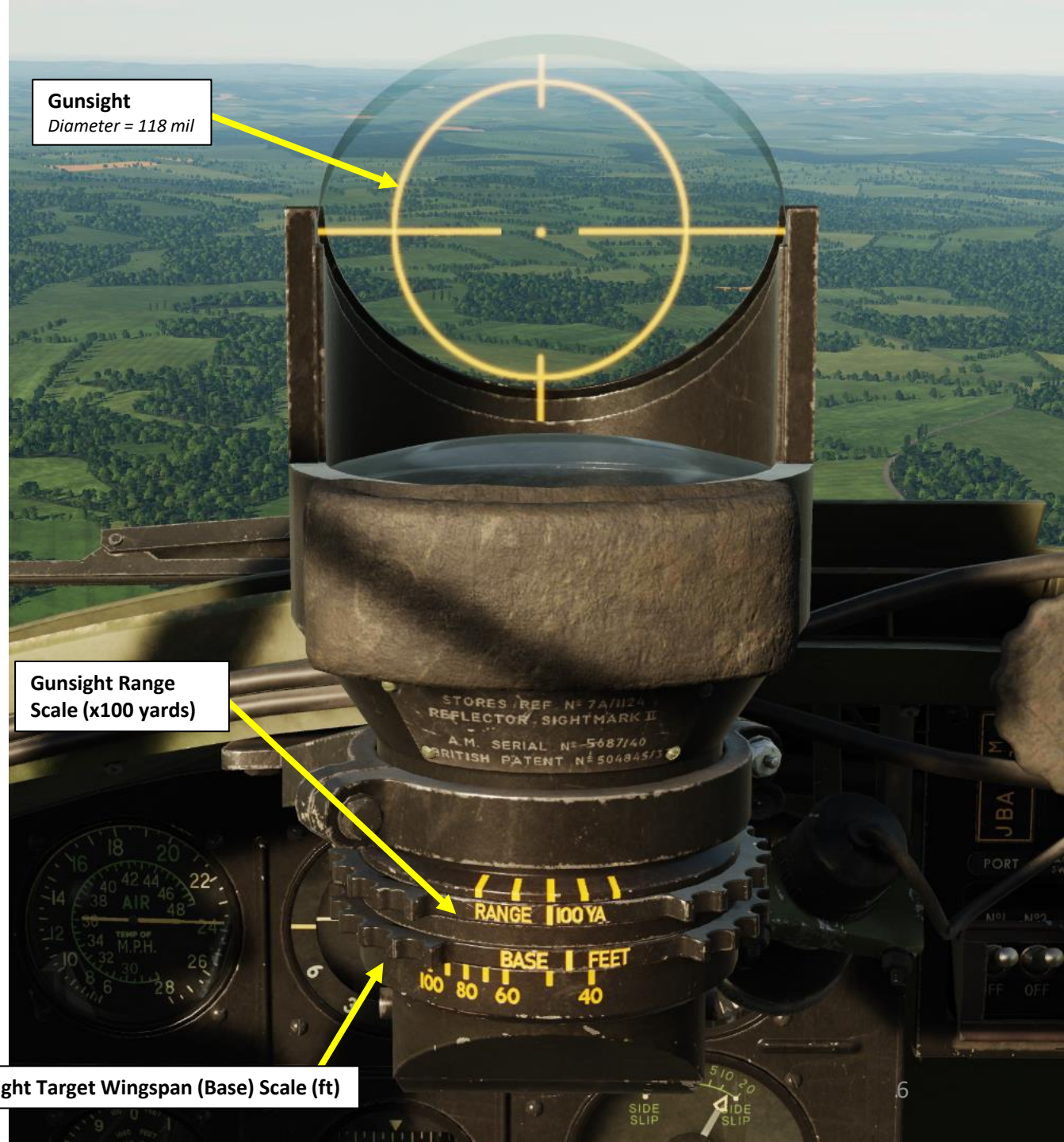
Your gunsight will show you where to shoot and when to shoot a target.

Gunsight Specifications:

1. Reticle ring diameter – angular values:
   - In degrees: 6° 44’
   - In thousandths (milliradians): 118
2. Reticle rings radius - angular values:
   - In degrees: 3° 22’
   - In thousandths (milliradians): 59
3. When shooting, this ring corresponds for allowance at an aspect of 2/4 and target speed of 200 mph (322 km/h).
4. At target aspect of 1/4, target speed should be 400 mph (644 km/h) .

Range scale						
In hundreds of yards	1	2	3	4	5	6
Yards	100	200	300	400	500	600
Meters	91,4	182,8	274,2	365,6	457	548,4

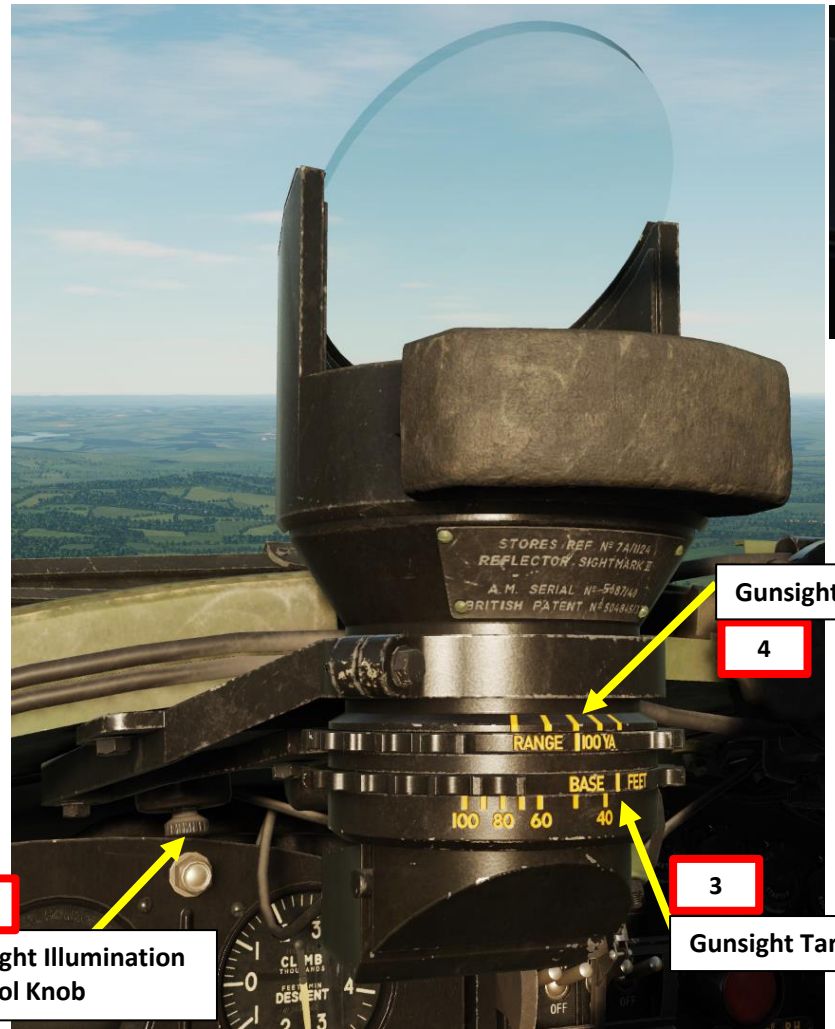
Base scale							
Feet	40	50	60	70	80	90	100
Meters	12,2	15,2	18,3	21,3	24,4	27,4	30,5



MARK II GUNSIGHT - TUTORIAL

To use the gunsight properly:

1. Set Reflector Gunsight Power switch to ON (DOWN)
2. Adjust Gunsight brightness as required
3. Set Gunsight Wingspan to 32 ft (typical FW190 and Bf.109 wingspan)
4. Set Gunsight Range to the distance you want to fire at. 300 yards is an adequate distance.
    - *Take note that in practice, it is usually the other way around. You spot a target, identify its type, then set the target wingspan and estimate its range by adjusting the Gunsight Range Control wheel.*

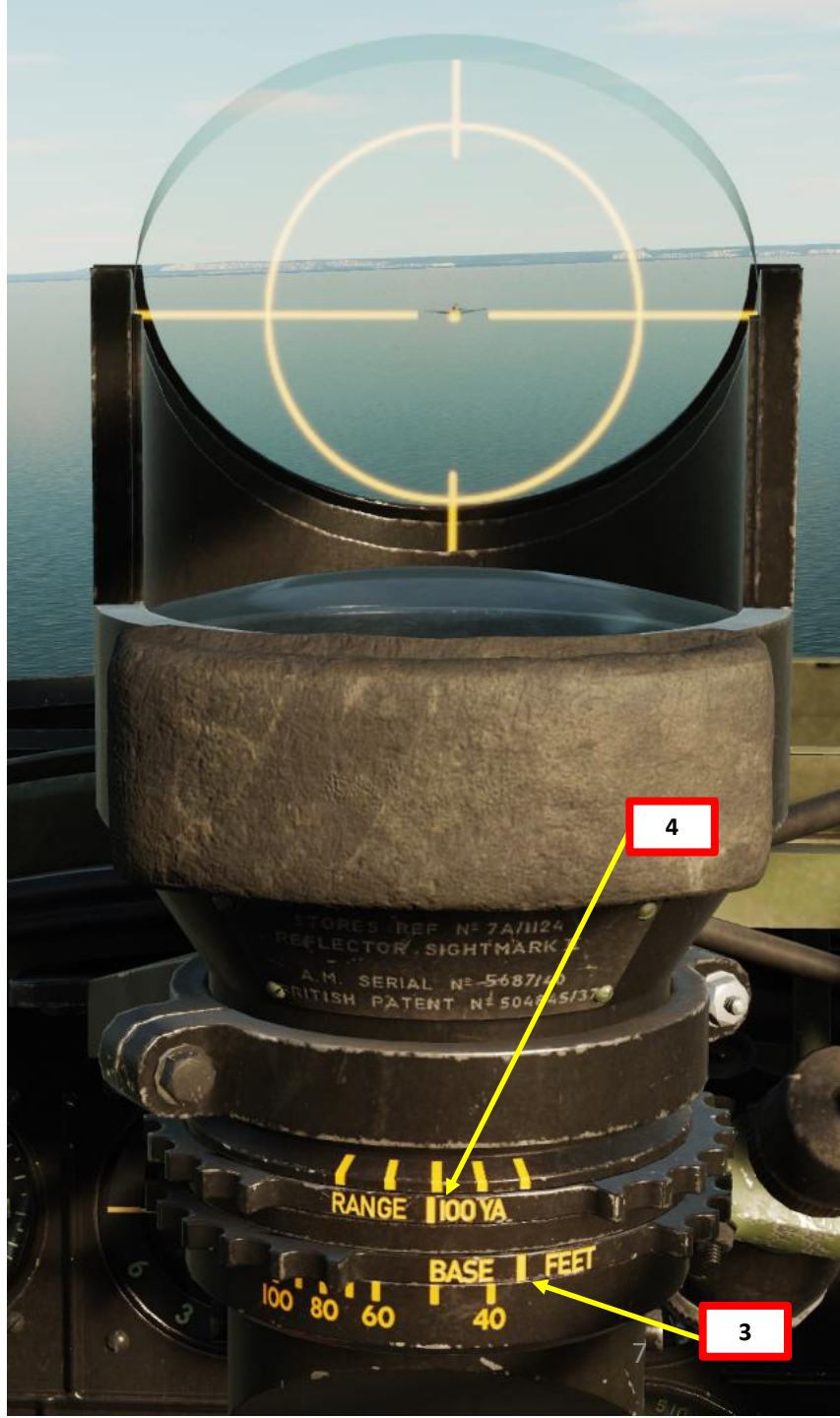


1 **Reflector Gunsight Power Switch**
- *DOWN: ON*
- *UP: OFF*

Gunsight Range Control (x100 yards) **4**

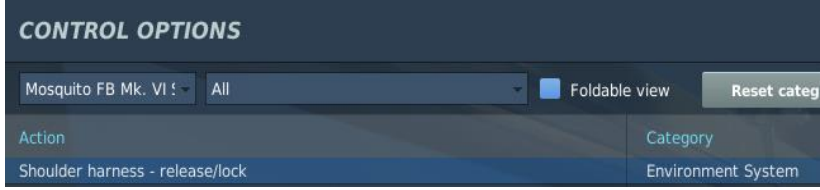
2 **Gunsight Illumination Control Knob**

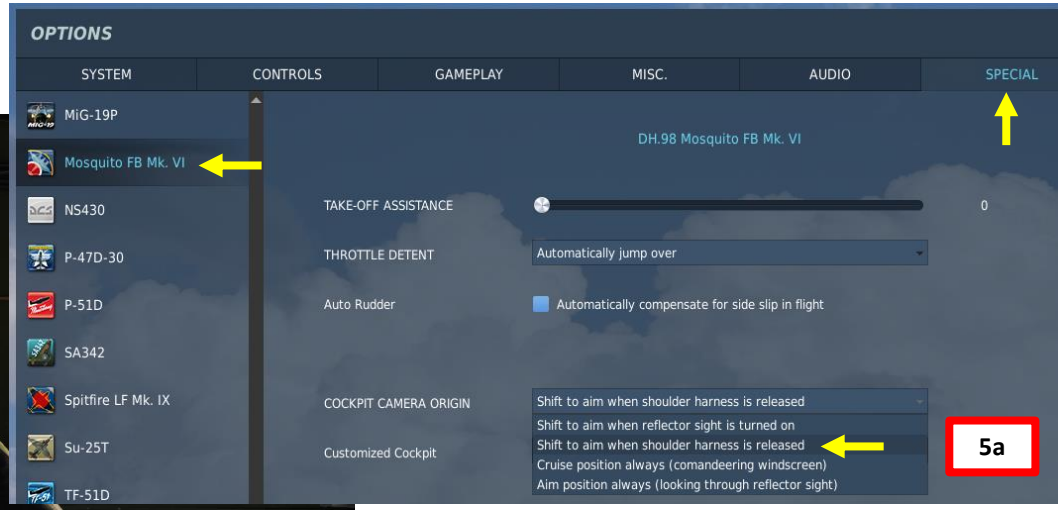
3 **Gunsight Target Wingspan Control (ft)**

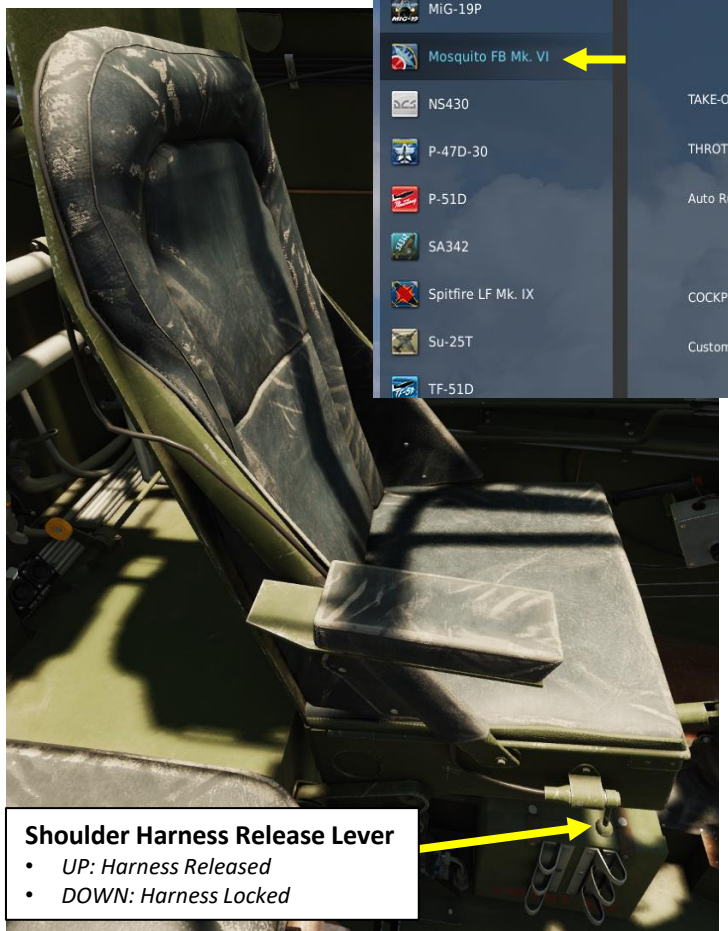


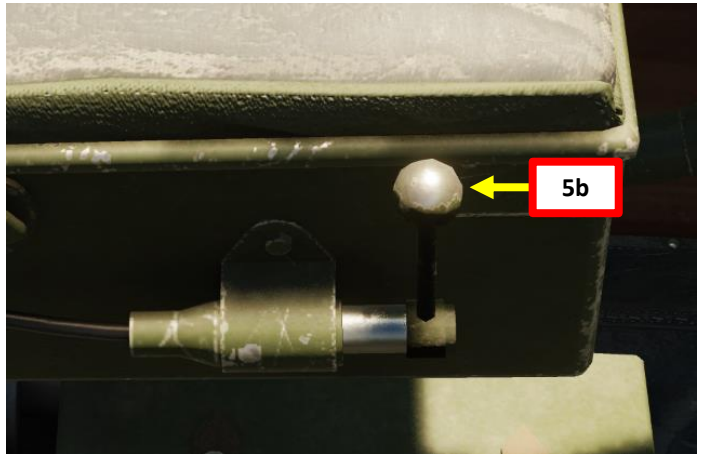
MARK II GUNSIGHT - TUTORIAL

5. The gunsight is aligned with the guns, which makes it difficult to see when sitting on the pilot seat (which isn't aligned with the gunsight). Lean on the gunsight and fit the target wings within your gunsight.
    a) Leaning on the gunsight can be done in numerous ways (as per the Special Options tab), but my recommended method is the "*Shift to aim when shoulder harness is released*" option.
    b) With this method, set a binding to "Shoulder Harness – Release/Lock". When you release the shoulder harness (lever UP), the pilot will automatically lean on the gunsight.
6. When the wing of the target fits in your gunsight, you are now in the range previously set.









MARK II GUNSIGHT - RANGE ESTIMATION

Now… how do we know when the target is in range to fire? Typically, you choose a firing range/distance first (as an example, 300 yards / 275 meters), then place the fixed sight on the target and approach until it fits reference marks in "mils" (milliradians, which is an angle) for the desired firing distance.

As an example, let's take a Bf.109, which has a wingspan (length) of about 32 ft (10 meters).

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

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

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

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

We know the reticle diameter represents an angle of 118 milliradians (118 thousandths of a radian, or 6° 44' in degrees). From the equation above, we can determine what distance D_1 the target is from us when its wingspan (L_1) fits within the reticle diameter.

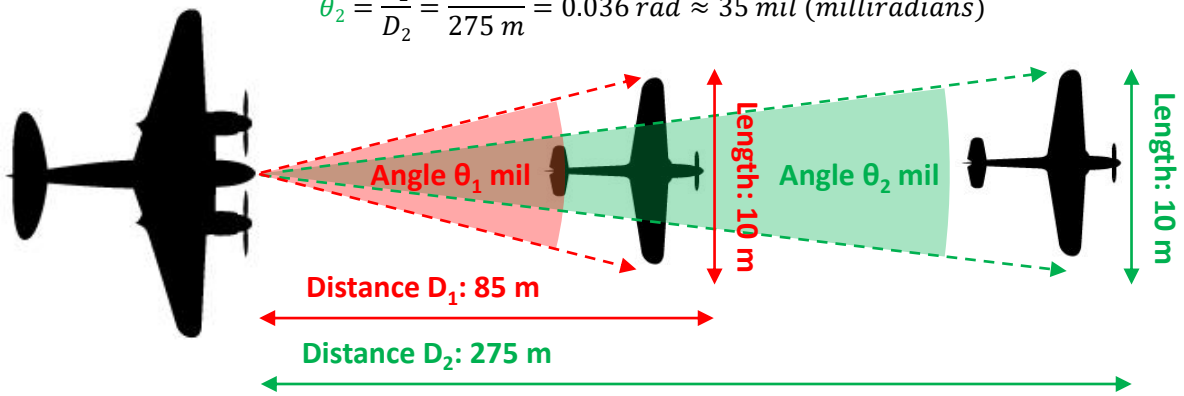
For a target with a length L_1 = 10 m that fits within the reticle angle θ_1 of 118 milliradians:

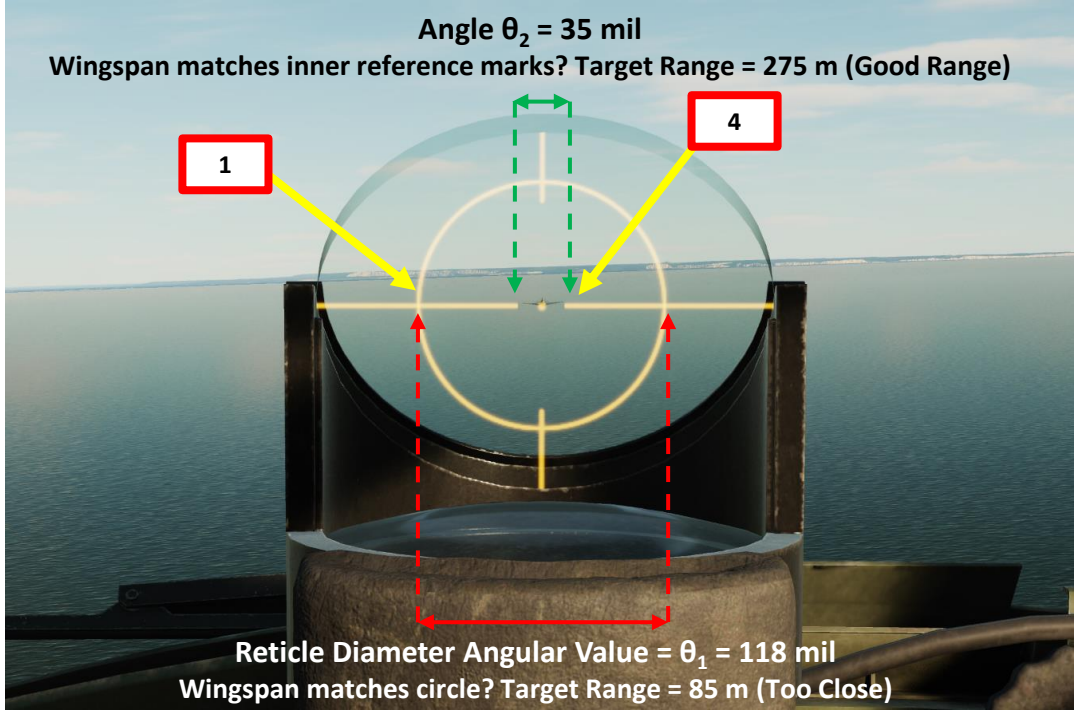
$$\theta_1 = 118\ mil = \frac{L_1}{D_1}$$

$$D_1 = \frac{L_1}{\theta_1} = \frac{10\ m}{0{,}118\ rad} = 85\ meters$$

For a target with a length L_2 = 10 m at a distance D_2 of 275 m (the range we actually want to fire at):

$$\theta_2 = \frac{L_2}{D_2} = \frac{10\ m}{275\ m} = 0.036\ rad \approx 35\ mil\ (milliradians)$$



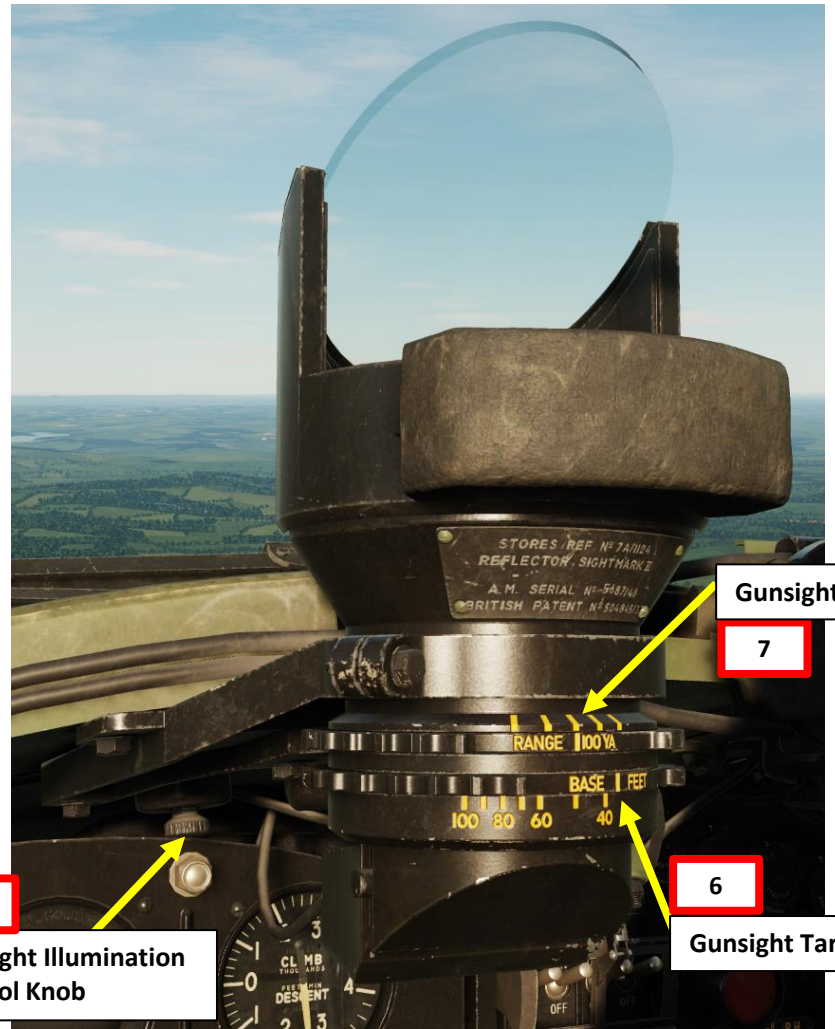


Now… how do we interpret the gunsight to estimate the range of a target?

1. We know the **reticle diameter** is 118 mil (118 thousandths of a radian, or 6° 44' in degrees).
2. We calculated that when the wingspan of a target fits within the diameter of the reticle, we are at a range of approx. 85 meters, which is way too close.
3. Using the **RANGE** and **BASE** gunsight settings, we can set the **inner reference marks** of the gunsight to a distance of 300 yards / 275 m (optimal firing range) adjusted for a wingspan of 10 m (32 ft).
4. When target wings fit within the **reticle inner reference marks**, we know we are at the optimal firing range of 300 yards. You may fire.

HISPANO 20 MM CANNONS & BROWNING 0.303 IN MACHINEGUNS

1. Ammunition belt types are customizable via the mission editor.
2. Ensure pneumatic pressure is no less than 200 psi. Insufficient pneumatic pressure may prevent the machinegun and cannon firing mechanisms from firing properly.
3. Set Reflector Gunsight Power switch to ON (DOWN)
4. Set Cine-Camera (Gun Camera) Master Switch – ON (DOWN)
5. Adjust Gunsight brightness as required
6. Set Gunsight Wingspan to 32 ft (typical FW190 and Bf.109 wingspan)
7. Set Gunsight Range to the distance you want to fire at. 300 yards is an adequate distance.



Cine-Camera (Gun Camera) Master Switch
- *DOWN: ON*
- *UP: OFF*

4

3

Reflector Gunsight Power Switch
- *DOWN: ON*
- *UP: OFF*

Gunsight Range Control (x100 yards)

7

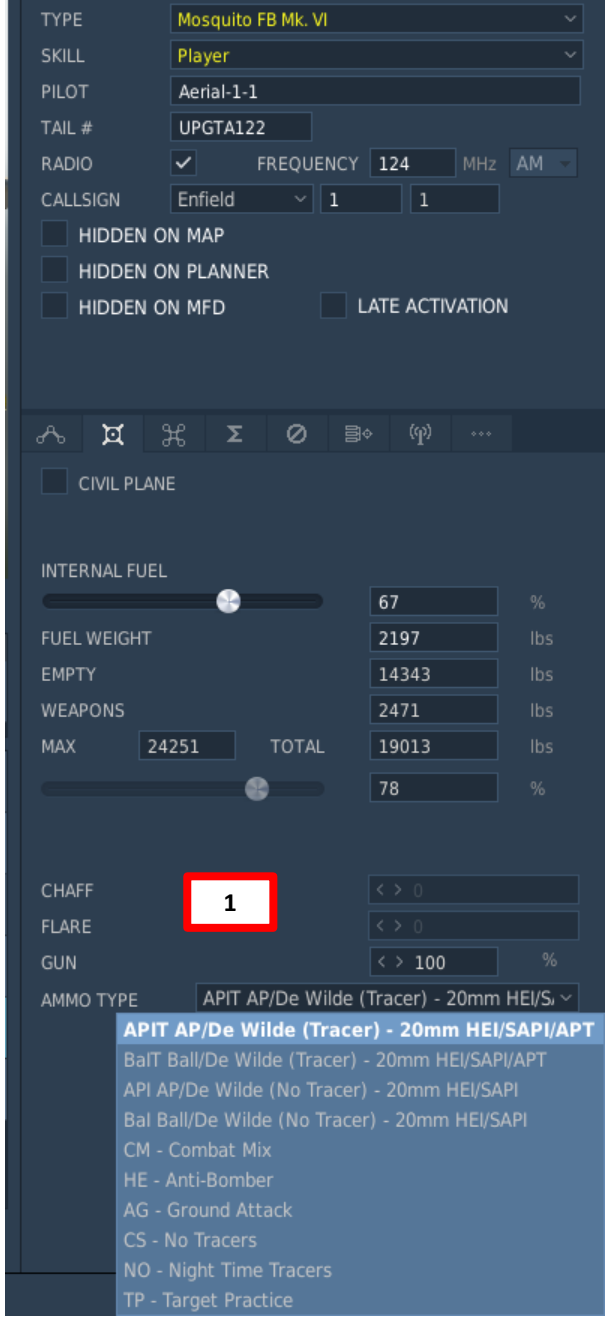
6

Gunsight Target Wingspan Control (ft)

5

Gunsight Illumination Control Knob

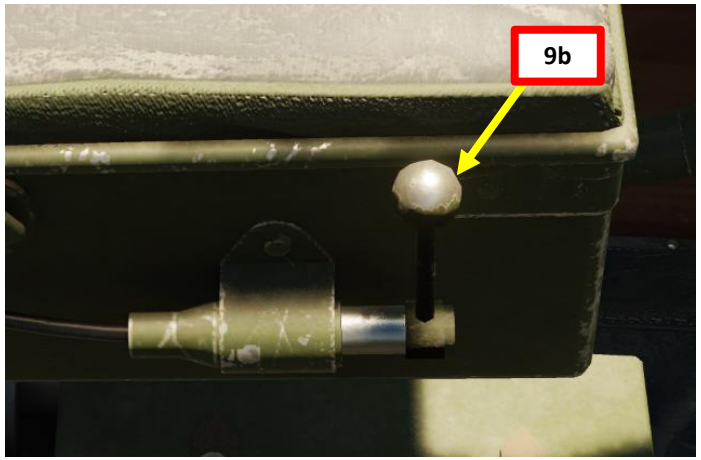
2



1

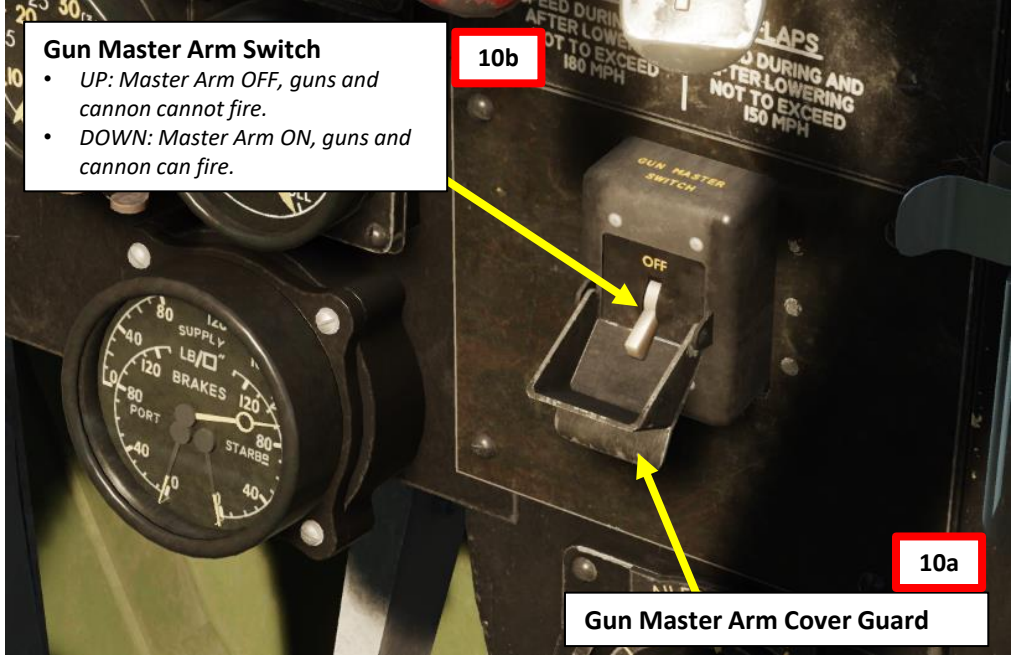
HISPANO 20 MM CANNONS & BROWNING 0.303 IN MACHINEGUNS

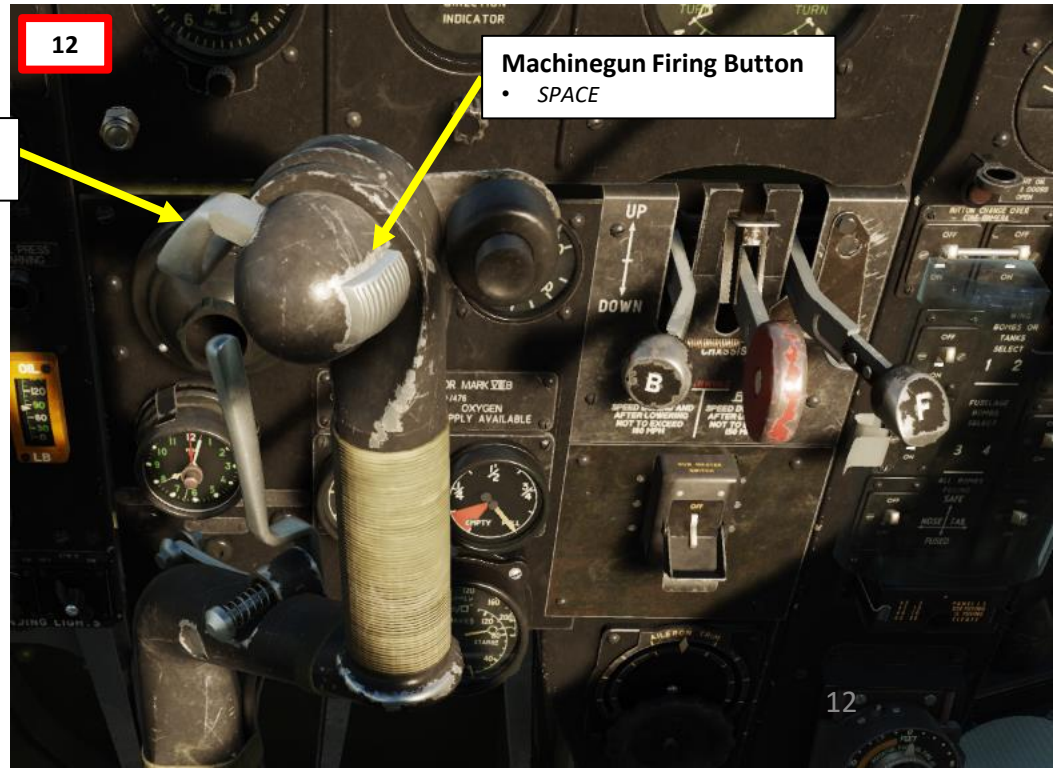
8. If required, set Gun Heating Lever ON (FWD).
9. The gunsight is aligned with the guns, which makes it difficult to see when sitting on the pilot seat (which isn't aligned with the gunsight). Lean on the gunsight and fit the target wings within your gunsight.
    a) Leaning on the gunsight can be done in numerous ways (as per the Special Options tab), but my recommended method is the "*Shift to aim when shoulder harness is released*" option.
    b) With this method, set a binding to "Shoulder Harness – Release/Lock". When you release the shoulder harness (lever UP), the pilot will automatically lean on the gunsight.



HISPANO 20 MM CANNONS & BROWNING 0.303 IN MACHINEGUNS

10. Remove gun safety by flipping the Master Arm Safety Cover DOWN and setting the Gun Master Arm Switch ON (DOWN).
11. When the wing of the target fits in your gunsight, you are now in the range previously set.
12. Fire by pressing and holding the Cannon Firing Button (RALT+SPACE binding) and the Machinegun Firing Button (SPACE binding) .





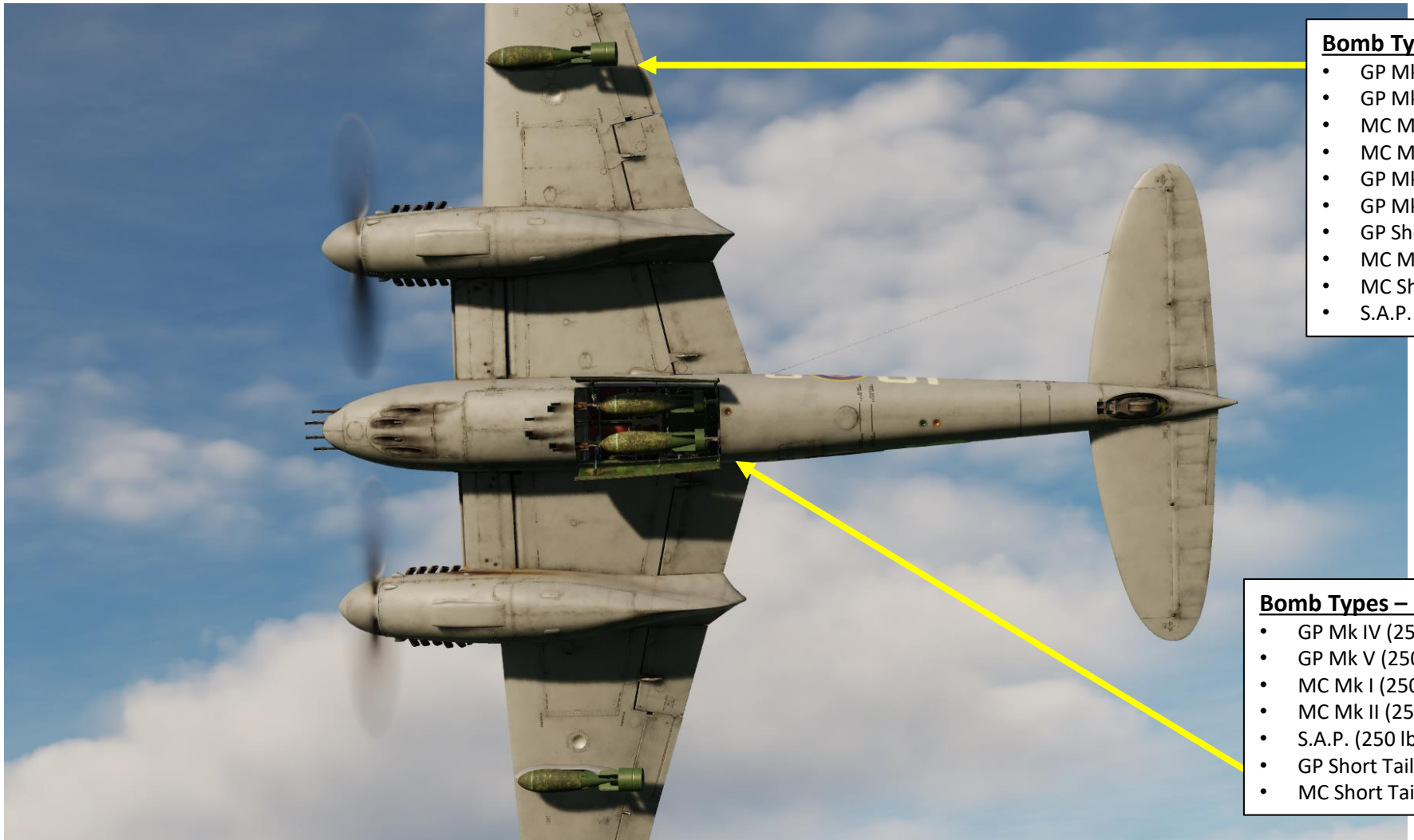
HISPANO 20 MM CANNONS & BROWNING 0.303 IN MACHINEGUNS

BOMBS – OVERVIEW

The Mosquito could be equipped with a variety of bombs. Here is an overview of the different bomb types:

- **GP**: General Purpose Bomb, with a thick-walled metal casing. GP bombs have less explosive filler than Medium Capacity bombs, but more shrapnel due to the thicker case.
- **MC**: Medium Capacity Bomb, with a thin-walled metal casing. MC bombs have more explosive filler than General Purpose bombs, at the expense of less shrapnel due to the thinner case.
- **SAP**: Semi-Armor Piercing Bomb
- **Short Tail**: Some bombs had their tail shortened in order to fit within the internal bomb bay of the Mosquito.

Note: Delayed fuze bombs are not yet available.



Bomb Types – Wing-Mounted

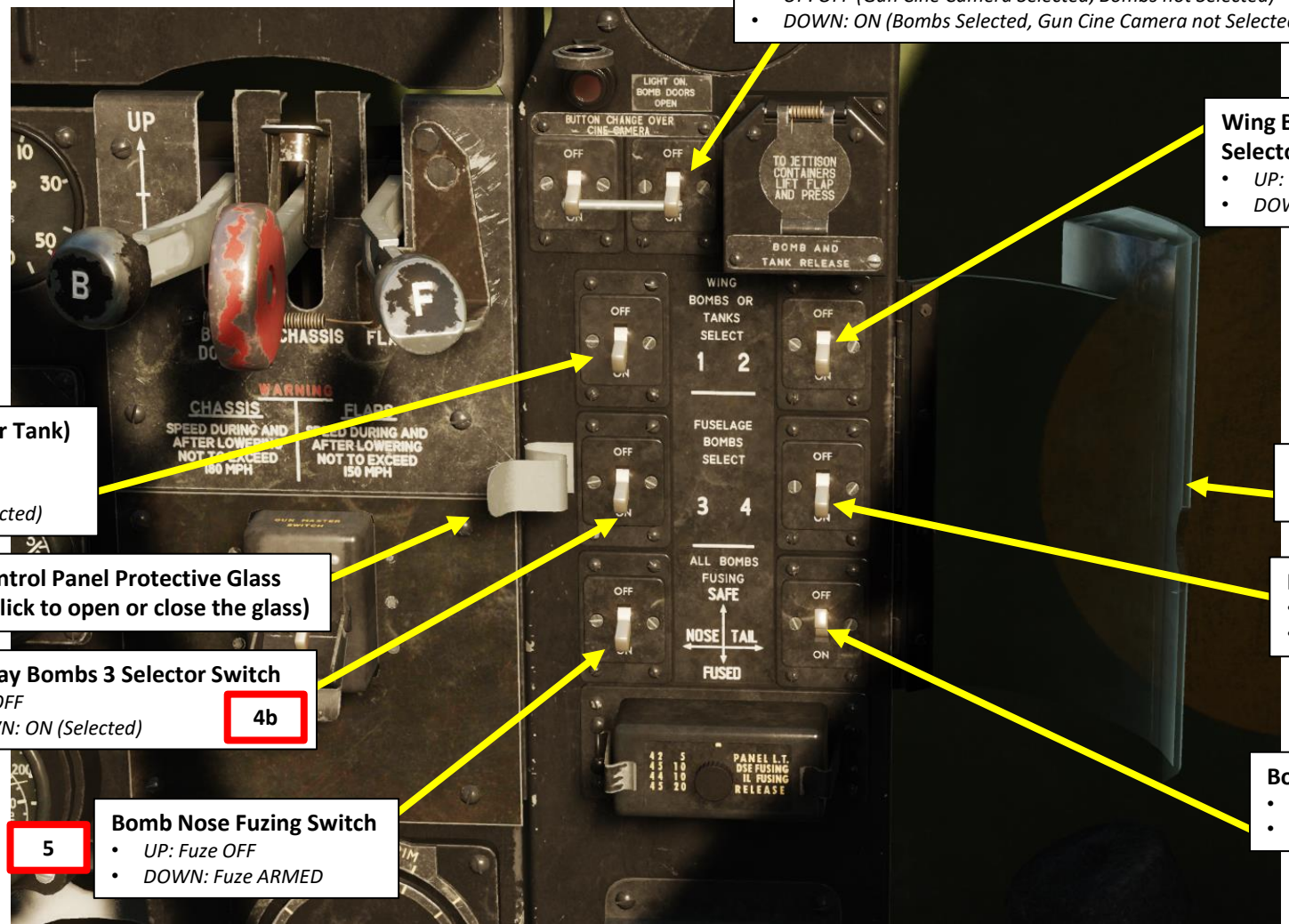
- GP Mk IV (250 lbs)
- GP Mk V (250 lbs)
- MC Mk I (250 lbs)
- MC Mk II (250 lbs)
- GP Mk IV (500 lbs)
- GP Mk V (500 lbs)
- GP Short Tail (500 lbs)
- MC Mk II (500 lbs)
- MC Short Tail (500 lbs)
- S.A.P. (500 lbs)

Bomb Types – Fuselage Bomb Bay

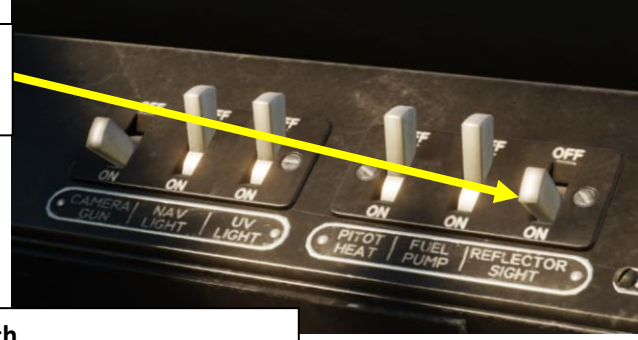
- GP Mk IV (250 lbs)
- GP Mk V (250 lbs)
- MC Mk I (250 lbs)
- MC Mk II (250 lbs)
- S.A.P. (250 lbs)
- GP Short Tail (500 lbs)
- MC Short Tail (500 lbs)

BOMBS – DIVE BOMBING TUTORIAL

1. Set Reflector Gunsight Power switch to ON (DOWN)
2. Open Bomb Bay Perspex Cover (depress release catch)
3. Set Bombs/Camera Changeover Switch – DOWN (ON)
4. Select desired Bombs with Selector Switches DOWN (SELECTED/ON)
    a) Wing-Mounted Bombs – Switch 1 for Left/Port Bomb, Switch 2 for Right/Starboard Bomb
    b) Fuselage Inner Bay Bombs – Switch 3 for Left/Port Bomb, Switch 4 for Right/Starboard Bomb
5. Set Nose Fuzing Switch – DOWN (Fuze ARMED). Most of the bombs used in this tutorial are nose-fuzed.
6. Set Tail Fuzing Switch – DOWN (Fuze ARMED). ***Step not applicable since no tail-fuzed bombs are available.***



1 **Reflector Gunsight Power Switch**
- *DOWN: ON*
- *UP: OFF*



Bombs or Camera Changeover Switch
Sets the function of the Bomb Release & Gun Camera (Guncam) Button
- *UP: OFF (Gun Cine Camera Selected, Bombs not Selected)*
- *DOWN: ON (Bombs Selected, Gun Cine Camera not Selected)*

3

Wing Bombs 2 (or Tank) Selector Switch **4a**
- *UP: OFF*
- *DOWN: ON (Selected)*

4a **Wing Bombs 1 (or Tank) Selector Switch**
- *UP: OFF*
- *DOWN: ON (Selected)*

Bomb Control Panel Protective Glass **2b**

2a **Bomb Control Panel Protective Glass Handle (click to open or close the glass)**

Inner Bay Bombs 4 Selector Switch **4b**
- *UP: OFF*
- *DOWN: ON (Selected)*

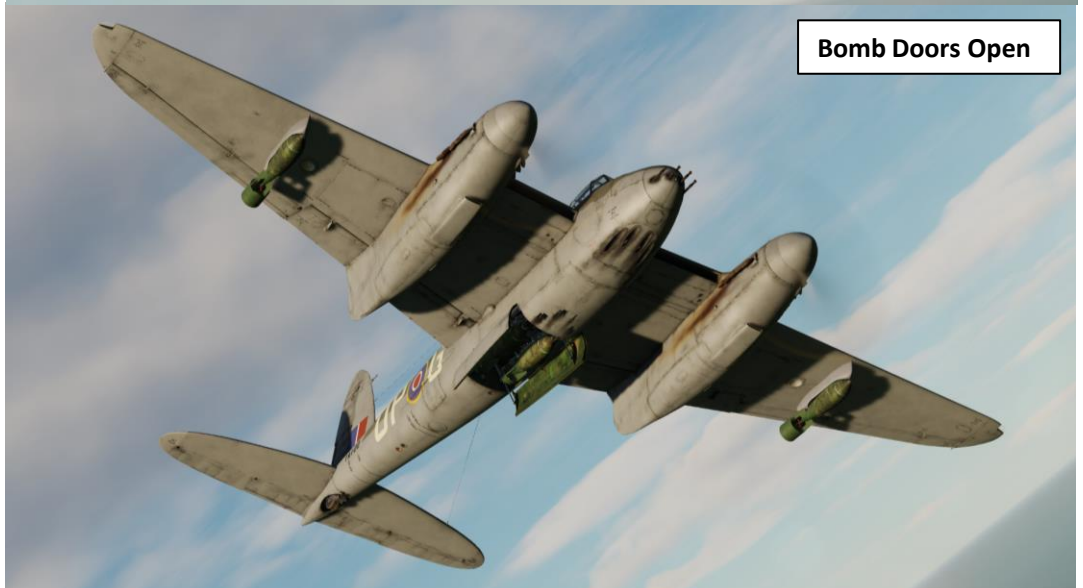
Inner Bay Bombs 3 Selector Switch **4b**
- *UP: OFF*
- *DOWN: ON (Selected)*

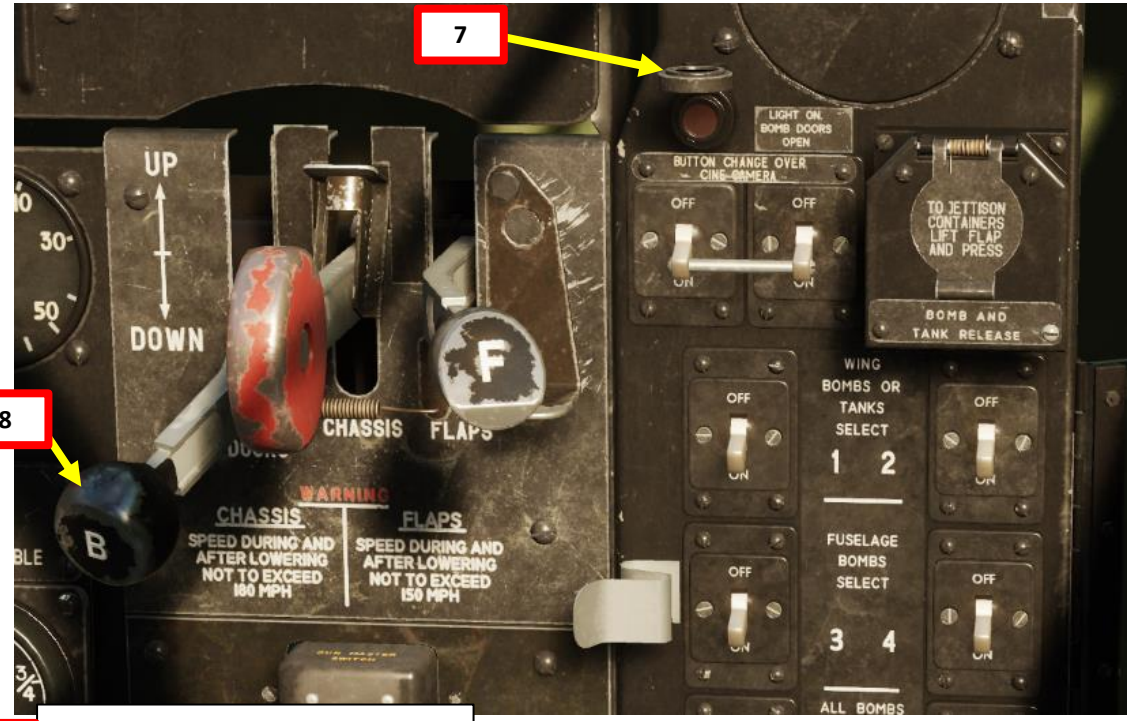
Bomb Tail Fuzing Switch **6**
- *UP: Fuze OFF*
- *DOWN: Fuze ARMED*

5 **Bomb Nose Fuzing Switch**
- *UP: Fuze OFF*
- *DOWN: Fuze ARMED*

BOMBS – DIVE BOMBING TUTORIAL

7. Flip Bomb Doors Warning Light Cover – UP
8. Hold Bomb Door Lever DOWN to open bomb bay doors. Max Bomb Extension Safety Speed is 350 mph.
9. When bomb bay doors are open, the Bomb Doors Warning Light should illuminate and the Bomb Door Lever should return to the NEUTRAL (Middle) Position.

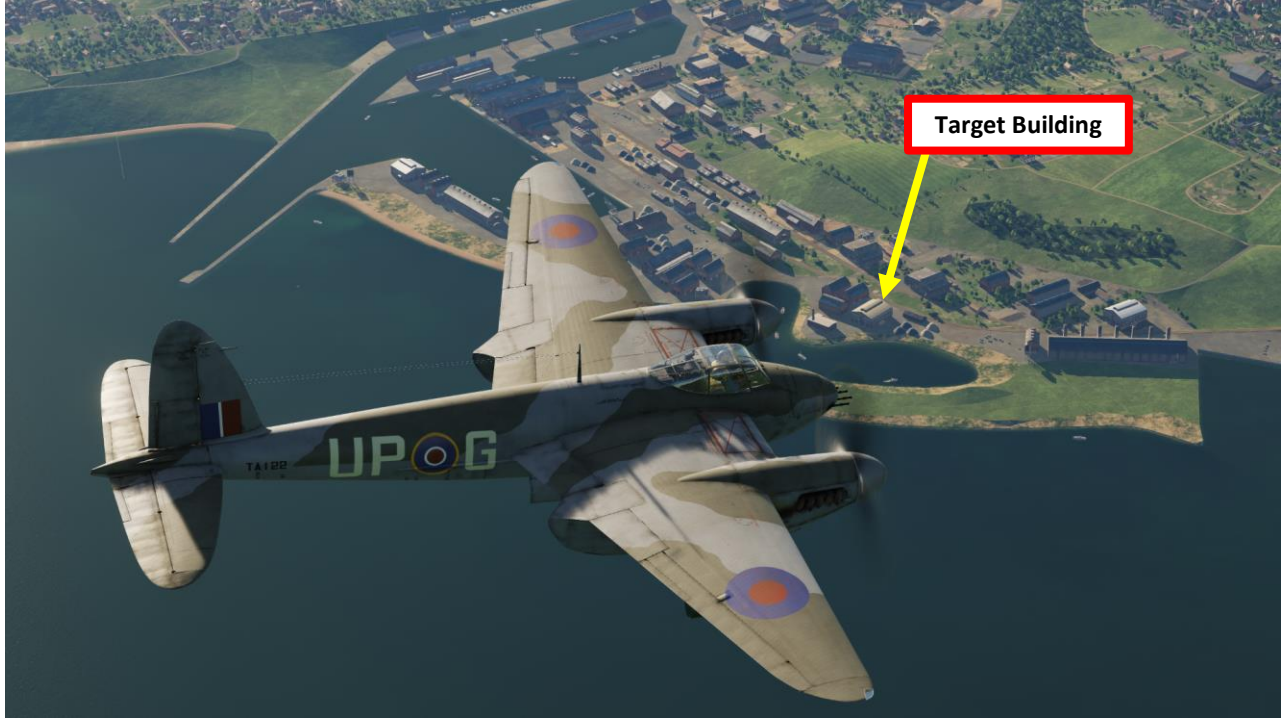




9 **Bomb Doors Warning Light**
Illuminates when bomb doors are OPEN

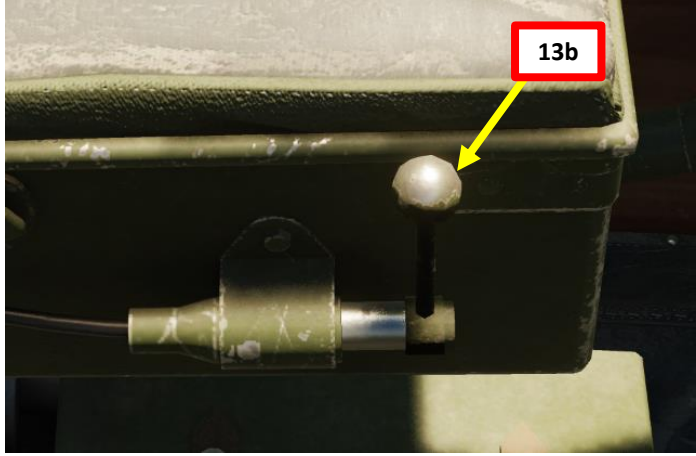
BOMBS – DIVE BOMBING TUTORIAL

10. Approach the target by flying level at an altitude between 5000 and 6000 ft, with an airspeed between 220 and 230 mph.
11. When the target disappears under the engine, perform a gentle turn under the horizon in the direction of the target.
12. While turning, regulate speed so that the target remains visible. This turn has to be very steady and made without excessive use of the rudder.



BOMBS – DIVE BOMBING TUTORIAL

13. The gunsight is aligned with the guns, which makes it difficult to see when sitting on the pilot seat (which isn't aligned with the gunsight). Lean on the gunsight and fit the target wings within your gunsight.
    a) Leaning on the gunsight can be done in numerous ways (as per the Special Options tab), but my recommended method is the "*Shift to aim when shoulder harness is released*" option.
    b) With this method, set a binding to "Shoulder Harness – Release/Lock". When you release the shoulder harness (lever UP), the pilot will automatically lean on the gunsight.
14. Throttle back at idle power and perform a dive between 30 and 40 degrees.
15. Line up the target with the center of the gunsight reticle. Make sure the aircraft is not slipping or the bombs may collide after bomb drop and detonate in the air.
16. Pull lead to bring the target slightly so that the target will cross the bottom arc of the reflector sight.
17. When target is lined up under the bottom arc of the reflector sight and aircraft is at an altitude of 1500 ft, release bombs by pressing the Bomb Release button on the stick ("RSHIFT+SPACEBAR" binding). All bombs selected will drop simultaneously.



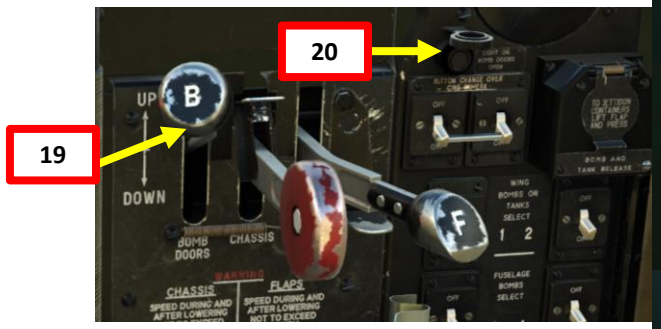
Bomb Release & Gun Camera (Guncam) Button

- *RSHIFT+SPACE*

The function of the button depends of the position of the Bombs or Camera Changeover Switch

BOMBS – DIVE BOMBING TUTORIAL

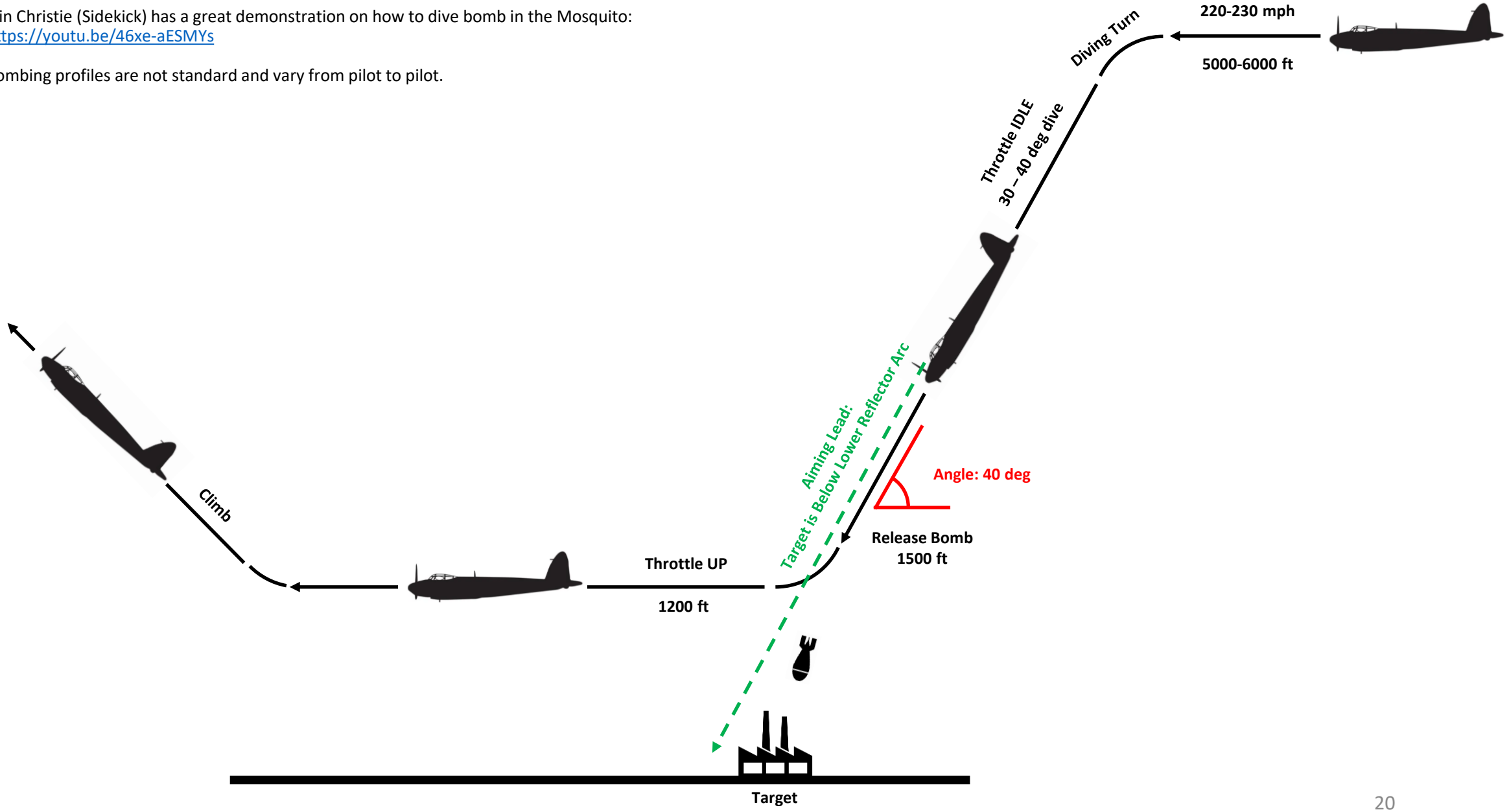
18. Apply full power and pull away from the blast while maintaining level flight. This will allow you to get out as quickly as possible from the orbit of enemy flak.
19. Close the bomb bay doors by holding the Bomb Door Lever UP.
20. When bomb bay doors are closed, the Bomb Doors Warning Light should extinguish and the Bomb Door Lever should return to the NEUTRAL (Middle) Position.
21. After having travelled enough distance, start climbing. Climbing immediately after the release of bombs was one of the most common mistakes and resulted in:
    - Unnecessary danger to the pilot from the enemy flak
    - Black-out
    - Wing wrinkling



BOMBS – DIVE BOMBING TUTORIAL

Iain Christie (Sidekick) has a great demonstration on how to dive bomb in the Mosquito:
https://youtu.be/46xe-aESMYs

Bombing profiles are not standard and vary from pilot to pilot.



BOMBS – LOW LEVEL BOMBING TUTORIAL

- Delayed fuzes for low level bombing are not yet available.

BOMBS – SKIP BOMBING TUTORIAL

- Delayed fuzes for skip bombing are not yet available.

RP-3 ROCKET PROJECTILES (3 IN)

- Rockets are not yet available.