FIAT BR.20M CICOGNA

GUIDE BY CHUCK

PERFORMANCE SHEET

	(Unit)	SPITFIRE Mk Ia 100 oct	HURRICANE Mk IA Rotol 100oct	BLENHEIM Mk IV	TIGER MOTH DH.82	BF.109 E-4	BF.110 C-7	JU-87B-2 STUKA	JU-88 A-1	HE-111 H-2	G.50 SERIE II	BR.20M
TEMPERATURES												
Water Rad Min Max	Deg C	60 115	60 115	-	-	40 100	60 90	38 95	40 90	38 95	-	-
Oil Rad (OUTBOUND) Min Max	Deg C	40 95	40 95	40 85	-	40 105	40 85	30 95	40 80	35 95	50 90	50 90
Cylinder Head Temp Min Max	Deg C	-	-	100 235	-	-	-	-	-	-	140 240	140 240
ENGINE SETTINGS												
Takeoff RPM	RPM	3000	3000	2600 FINE	2350	2400	2400	2300	2400	2400	2520	2200
Takeoff Manifold Pressure	UK: PSI GER: ATA ITA: mm HG	+6	+6	+9 BCO ON	See RPM Gauge	1.3	1.3	1.35	1.35	1.35	890	820 BCO ON
Climb RPM	RPM	2700	2700	2400 COARSE	2100	2300 30 min MAX	2300 30 min MAX	2300 30 min MAX	2300 30 min MAX	2300 30 min MAX	2400 30 min MAX	2100 30 min MAX
Climb Manifold Pressure	UK: PSI GER: ATA ITA: mm HG	+6	+6	+5	See RPM Gauge	1.23	1.2	1.15	1.15	1.15	700	740
Normal Operation/Cruise RPM	RPM	2700	2600	2400 COARSE	2000	2200	2200	2200	2100	2200	2100	2100
Normal Operation/Cruise Manifold Pressure	UK: PSI GER: ATA ITA: mm HG	+3	+4	+3.5	See RPM Gauge	1.15	1.15	1.1	1.1	1.10	590	670
Combat RPM	RPM	2800	2800	2400 COARSE	2100	2400	2400	2300	2300	2300	2400	2100
Combat Manifold Pressure	UK: PSI GER: ATA ITA: mm HG	+6	+6	+5	See RPM Gauge	1.3 5 min MAX	1.3 5 min MAX	1.15	1.15	1.15	700	740
Emergency Power/ Boost RPM @ km	RPM	2850 5 min MAX	2850 5 min MAX	2600 COARSE 5 min MAX	2350	2500 1 min MAX	2400 5 min MAX	2300 1 min MAX	2400 1 min MAX	2400 1 min MAX	2520 3 min MAX	2200 5 min MAX
Emergency Power / Boost Manifold Pressure @ Sea Level	UK: PSI GER: ATA ITA: mm HG	+12 BCO ON	+12 BCO ON	+9 BCO ON	See RPM Gauge	1.40 1 min MAX	1.3 5 min MAX	1.35 1 min max	1.35 1 min max	1.35 1 min max	890 3 min max	820 BCO ON 5 min MAX
Supercharger Stage 1 Operation Altitude	UK: ft GER: M	-	-	-	-	-	-	0 1500	0 1220	0 1220	-	-
Supercharger Stage 2 Operation Altitude	UK: ft GER: M ITA: M	-	-	-	-	-	-	1500+ (AUTO/MAN MODES)	1220+	1220+	-	-
Landing Approach RPM	RPM	3000	3000	2400	As required	2300	2300	2000	2100	2300	2400	2200
Landing Approach Manifold Pressure	UK: PSI GER: ATA ITA: mm HG	As required	As required	As required	See RPM Gauge	As required	As required	As required	As required	As required	As required	As required
Notes		Use "Rich" mixture for normal operation. Use "Lean" mixture for fuel conservation for RPM under 2600 & boost @ +1 or lower.		Boost Cut-Out Override (BCO) during takeoff often required	**Min Oil Press: 35 psi** **Max Oil Press: 45 psi**			No Abrupt Throttling	Eng. very sensitive to ata/rpm	Eng. very sensitive to ata/rpm		Boost Cut-Out Override (BCO) during takeoff often required
AIRSPEEDS												
Takeoff – Rotation	UK: mph GER/ITA: km/h	120	120	110	55	180	190	170	185	150	170	175
Max Dive Speed		420	390	260	160	750	620	720	675	600	410	600
Optimal Climb Speed		165	175	135	66	240	270	215	250	240	240	210
Landing – Approach		160	160	140	55	200	220	170	200	200	175	175
Landing – Touchdown		90	90	85	50	160	180	150	180	140	160	160

TABLE OF CONTENT – BR.20M

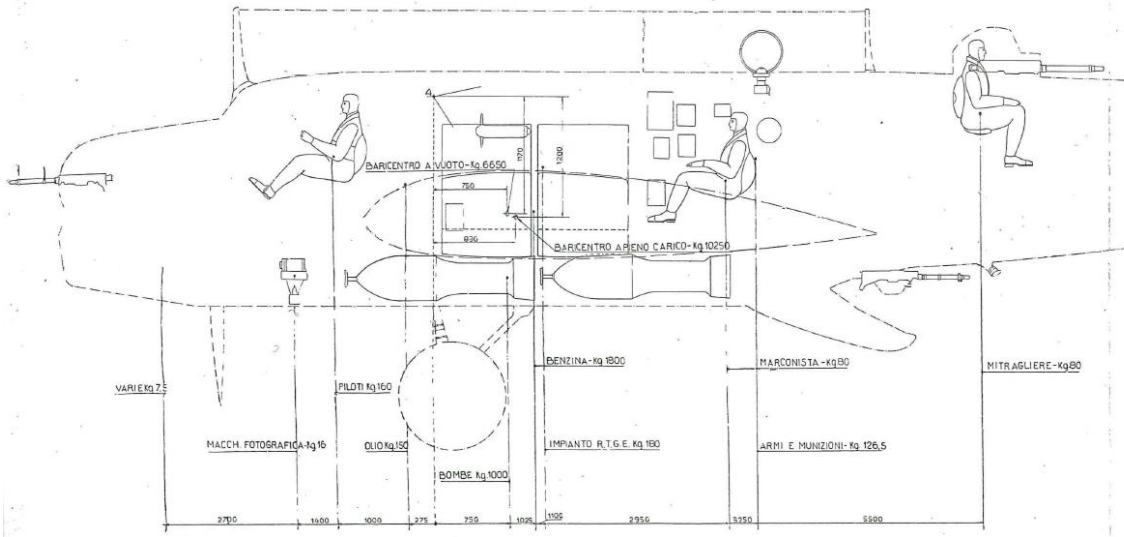
PART 1: AIRCRAFT HISTORY

Designed by Celestino Rosatelli, thus gaining the prefix BR for *"Bombardiere Rosatelli“,* the **Fiat BR.20 *Cicogna*** ("stork") was a low-wing twin-engine medium bomber produced from the mid-1930s until the end of World War II by the Turin firm. When it entered service in 1936 it was the first all-metal Italian bomber and it was regarded as one of the most modern medium bomber of the world. It had its baptism of fire in summer 1937, with *Aviazione Legionaria*, during the Spanish Civil War, when it formed the backbone of Nationalist bombing operations along with the Heinkel He 111. It was then used successfully by the Japanese during the Second Sino-Japanese War.

PART 1: AIRCRAFT HISTORY

The “M” in “BR.20M” stands for *Modificato*, or modified. This version was an improved version of the BR.20. It featured a strengthened center fuselage, protective armor for the crew, longer nose, revised tailwheel, another dorsal turret with same gun (more aerodynamic), and other aerodynamic improvements.

PART 1: AIRCRAFT HISTORY



In 1934, *Regia Aeronautica* requested Italian aviation manufacturers to submit proposals for a new medium bomber. Despite the BR.20 being the winner of the bomber competition, the Savoia Marchetti SM.79 *Sparviero*, a non-competitor which was developed at practically the same time, gained a reputation that overshadowed the *Cicogna*, partly because of its performance in air-racing. The reasons for the *Sparviero*'s success lay in its flying characteristics. The *Sparviero*'s three engines gave more power than the two of the BR.20. The *Sparviero*, weighing around the same, had a reserve of power and was capable of performing acrobatic manoeuvers, even rolls. Its engines were more reliable than those of the BR.20 and had enough power to return to base even with one shut down. The *Sparviero*'s superior agility enabled it to perform as a torpedo-bomber, while the *Cicogna* was never even considered for that role.

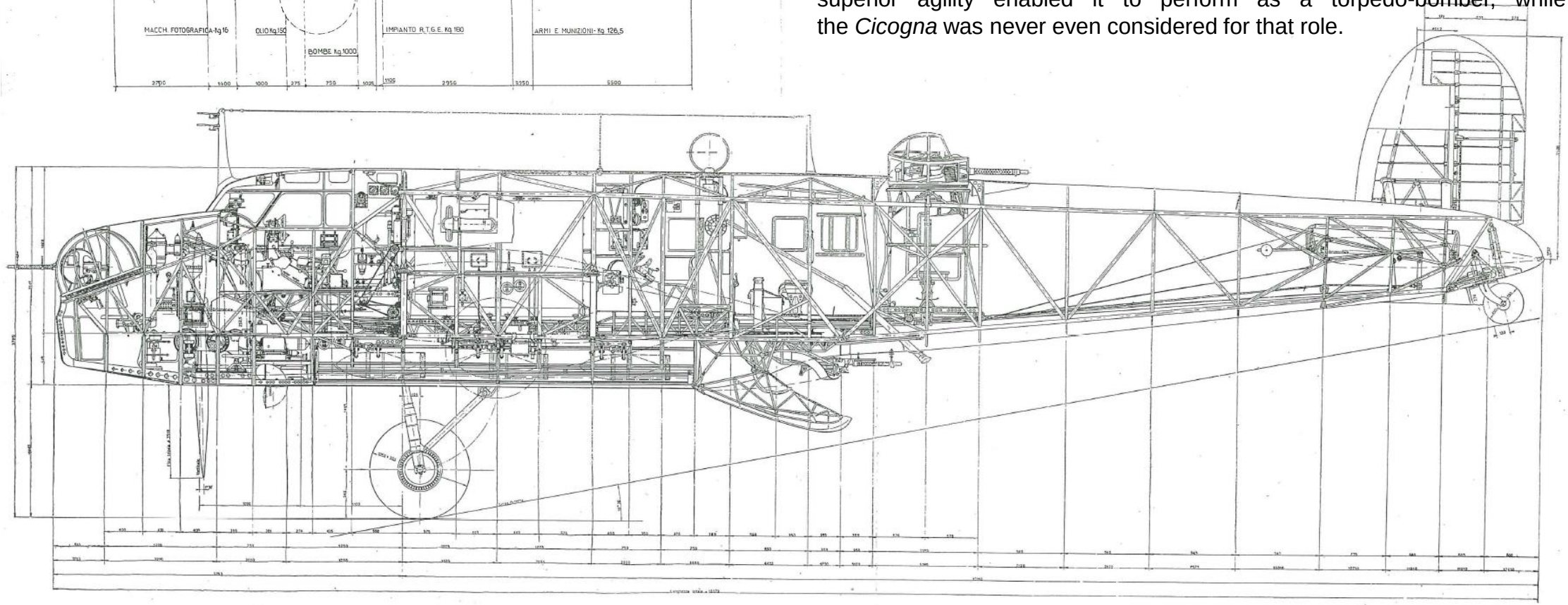
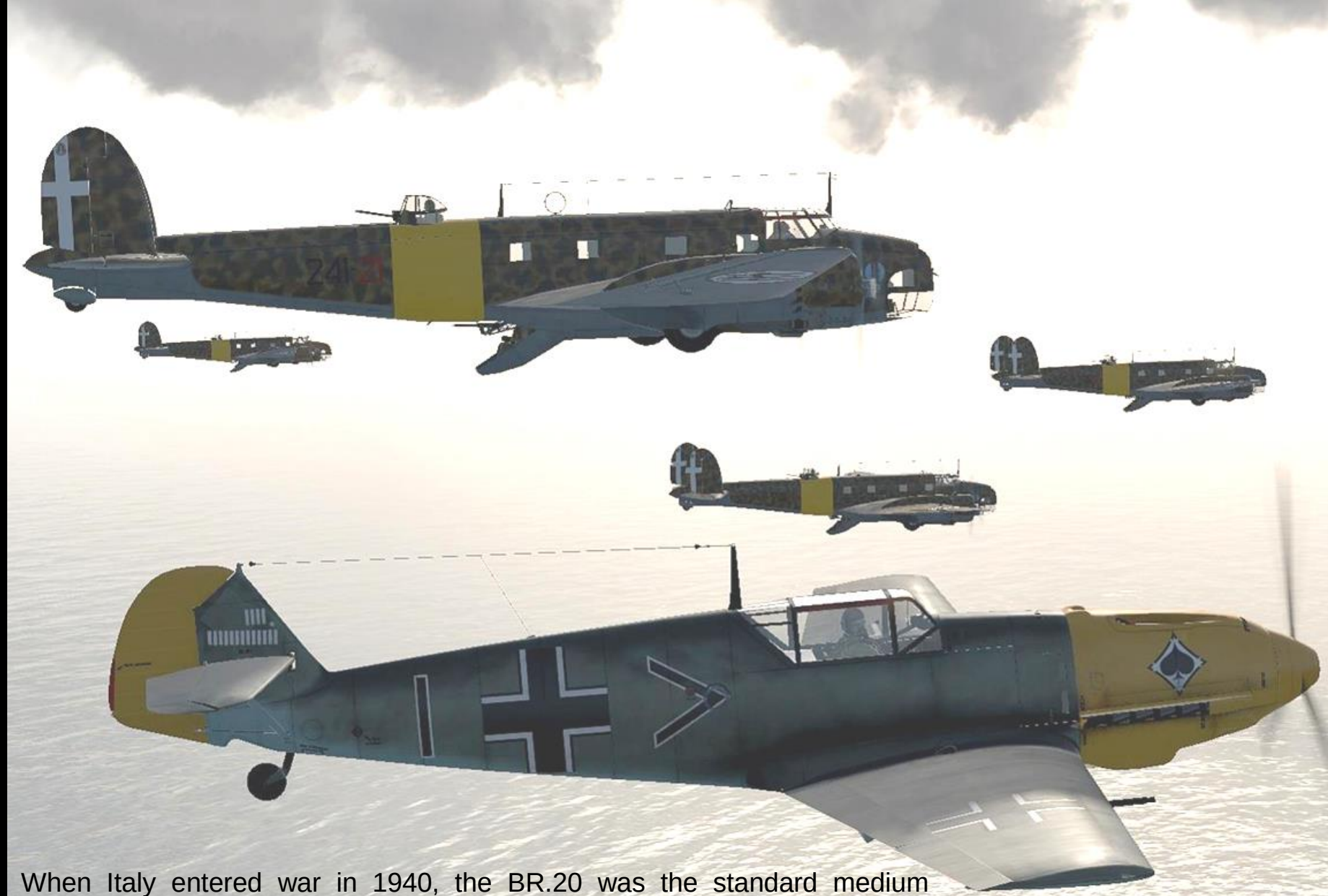


Fig. 96. — Sezione longitudinale apparecchio.

Aeroplano B. R. 20.

PART 1: AIRCRAFT HISTORY



When Italy entered war in 1940, the BR.20 was the standard medium bomber of *Regia Aeronautica* (Italian Air Force) but it was already showing its age. By 1942, it was mostly used for maritime patrol and operational training for bomber crews. More than 500 were produced by the end of the war.

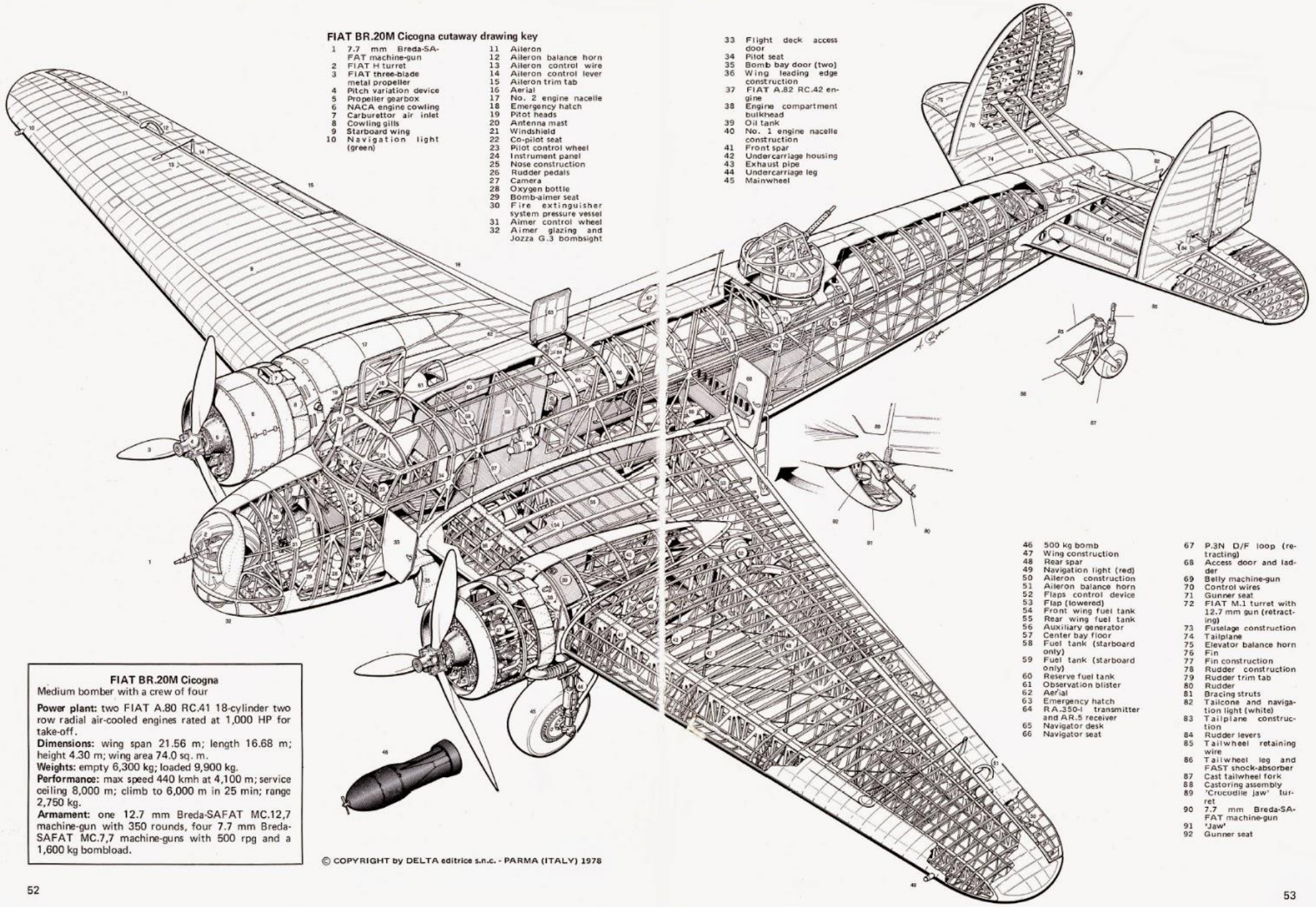
PART 1: AIRCRAFT HISTORY

It was against the British on the Channel that for the very first time the BR.20 showed its limitations. On 10 September 1940, was formed the Corpo Aereo Italiano, with 13° and 43° Stormi equipped with 80 brand-new BR.20Ms, to fight in the Battle of Britain. During the ferry operation from Italy to their bases in Belgium, five aircraft crash-landed for technical failures and a further 17 were forced to land en route due to poor visibility. On 10 January 1941, the 43° Stormo flew back to Italy, followed by the 13° before the end of the month. During 12 days of bombing missions, the “Cicognas” dropped 54,320 kg of bombs.

PART 2: AIRCRAFT VARIANTS

	(Unit)	BR.20M
TEMPERATURES		
Oil Rad (OUTBOUND) Min **Max**	Deg C	50 90
Cylinder Head Temp Min **Max**	Deg C	140 240
ENGINE SETTINGS & PROPERTIES		
Engine & Fuel grade		FIAT A.80 / R.C.41 87 octane fuel
Takeoff RPM	RPM	2200
Takeoff Manifold Pressure	UK: PSI GER: ATA ITA: mm HG	820 BCO ON
Climb RPM	RPM	2100 30 min MAX
Climb Manifold Pressure	UK: PSI GER: ATA ITA: mm HG	740
Normal Operation/Cruise RPM	RPM	2100
Normal Operation/Cruise Manifold Pressure	UK: PSI GER: ATA ITA: mm HG	670
Combat RPM	RPM	2100
Combat Manifold Pressure	UK: PSI GER: ATA ITA: mm HG	740
Emergency Power/ Boost RPM @ km	RPM	2200 5 min MAX
Emergency Power / Boost Manifold Pressure @ Sea Level	UK: PSI GER: ATA ITA: mm HG	820 BCO ON 5 min MAX
Landing Approach RPM	RPM	2200
Landing Approach Manifold Pressure	UK: PSI GER: ATA ITA: mm HG	As required
Notes & Peculiarities		**Boost Cut-Out Override (BCO) ON during takeoff often required**

PART 2: AIRCRAFT VARIANTS



FIAT BR.20M Cicogna cutaway drawing key

1 7.7 mm Breda-SAFAT machine-gun
2 FIAT H turret
3 FIAT three-blade metal propeller
4 Pitch variation device
5 Propeller gearbox
6 NACA engine cowling
7 Carburettor air inlet
8 Cowling gills
9 Starboard wing
10 Navigation light (green)
11 Aileron
12 Aileron balance horn
13 Aileron control wire
14 Aileron control lever
15 Aileron trim tab
16 Aerial
17 No. 2 engine nacelle
18 Emergency hatch
19 Pitot heads
20 Antenna mast
21 Windshield
22 Co-pilot seat
23 Pilot control wheel
24 Instrument panel
25 Nose construction
26 Rudder pedals
27 Camera
28 Oxygen bottle
29 Bomb-aimer seat
30 Fire extinguisher system pressure vessel
31 Aimer control wheel
32 Aimer glazing and Jozza G.3 bombsight
33 Flight deck access door
34 Pilot seat
35 Bomb bay door (two)
36 Wing leading edge construction
37 FIAT A.82 RC.42 engine
38 Engine compartment bulkhead
39 Oil tank
40 No. 1 engine nacelle construction
41 Front spar
42 Undercarriage housing
43 Exhaust pipe
44 Undercarriage leg
45 Mainwheel
46 500 kg bomb
47 Wing construction
48 Rear spar
49 Navigation light (red)
50 Aileron construction
51 Aileron balance horn
52 Flaps control device
53 Flap (lowered)
54 Front wing fuel tank
55 Rear wing fuel tank
56 Auxiliary generator
57 Center bay floor
58 Fuel tank (starboard only)
59 Fuel tank (starboard only)
60 Reserve fuel tank
61 Observation blister
62 Aerial
63 Emergency hatch
64 R.A.350-I transmitter and AR.5 receiver
65 Navigator desk
66 Navigator seat
67 P.3N D/F loop (retracting)
68 Access door and ladder
69 Belly machine-gun
70 Control wires
71 Gunner seat
72 FIAT M.1 turret with 12.7 mm gun (retracting)
73 Fuselage construction
74 Tailplane
75 Elevator balance horn
76 Fin
77 Fin construction
78 Rudder construction
79 Rudder trim tab
80 Rudder
81 Bracing struts
82 Tailcone and navigation light (white)
83 Tailplane construction
84 Rudder levers
85 Tailwheel retaining wire
86 Tailwheel leg and FAST shock-absorber
87 Cast tailwheel fork
88 Castoring assembly
89 'Crocodile jaw' turret
90 7.7 mm Breda-SAFAT machine-gun
91 'Jaw'
92 Gunner seat

FIAT BR.20M Cicogna

Medium bomber with a crew of four

Power plant: two FIAT A.80 RC.41 18-cylinder two row radial air-cooled engines rated at 1,000 HP for take-off.
Dimensions: wing span 21.56 m; length 16.68 m; height 4.30 m; wing area 74.0 sq. m.
Weights: empty 6,300 kg; loaded 9,900 kg.
Performance: max speed 440 kmh at 4,100 m; service ceiling 8,000 m; climb to 6,000 m in 25 min; range 2,750 kg.
Armament: one 12.7 mm Breda-SAFAT MC.12,7 machine-gun with 350 rounds, four 7.7 mm Breda-SAFAT MC.7,7 machine-guns with 500 rpg and a 1,600 kg bombload.

PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

CREW MEMBERS

PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

PILOT

PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

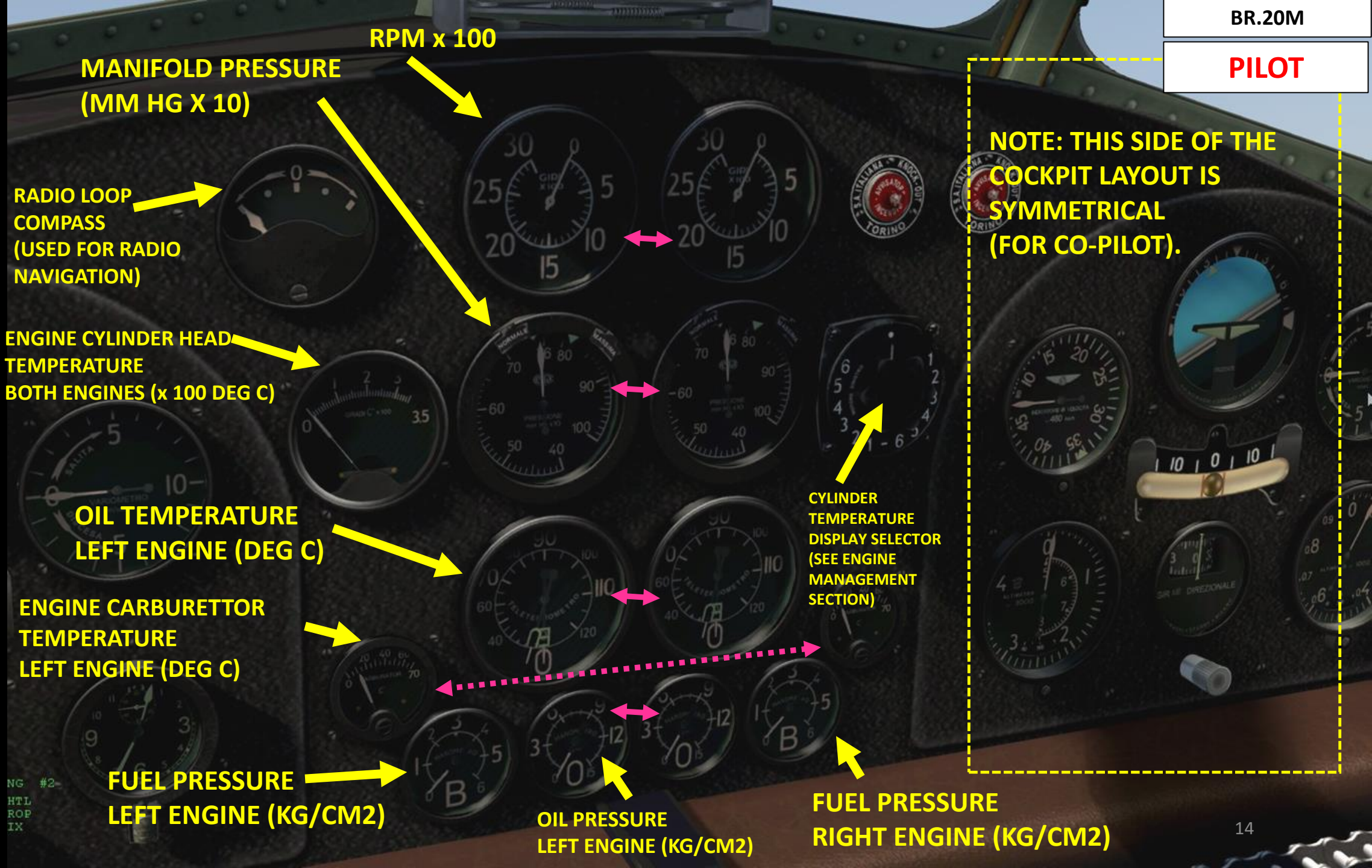
BR.20M

PILOT

PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

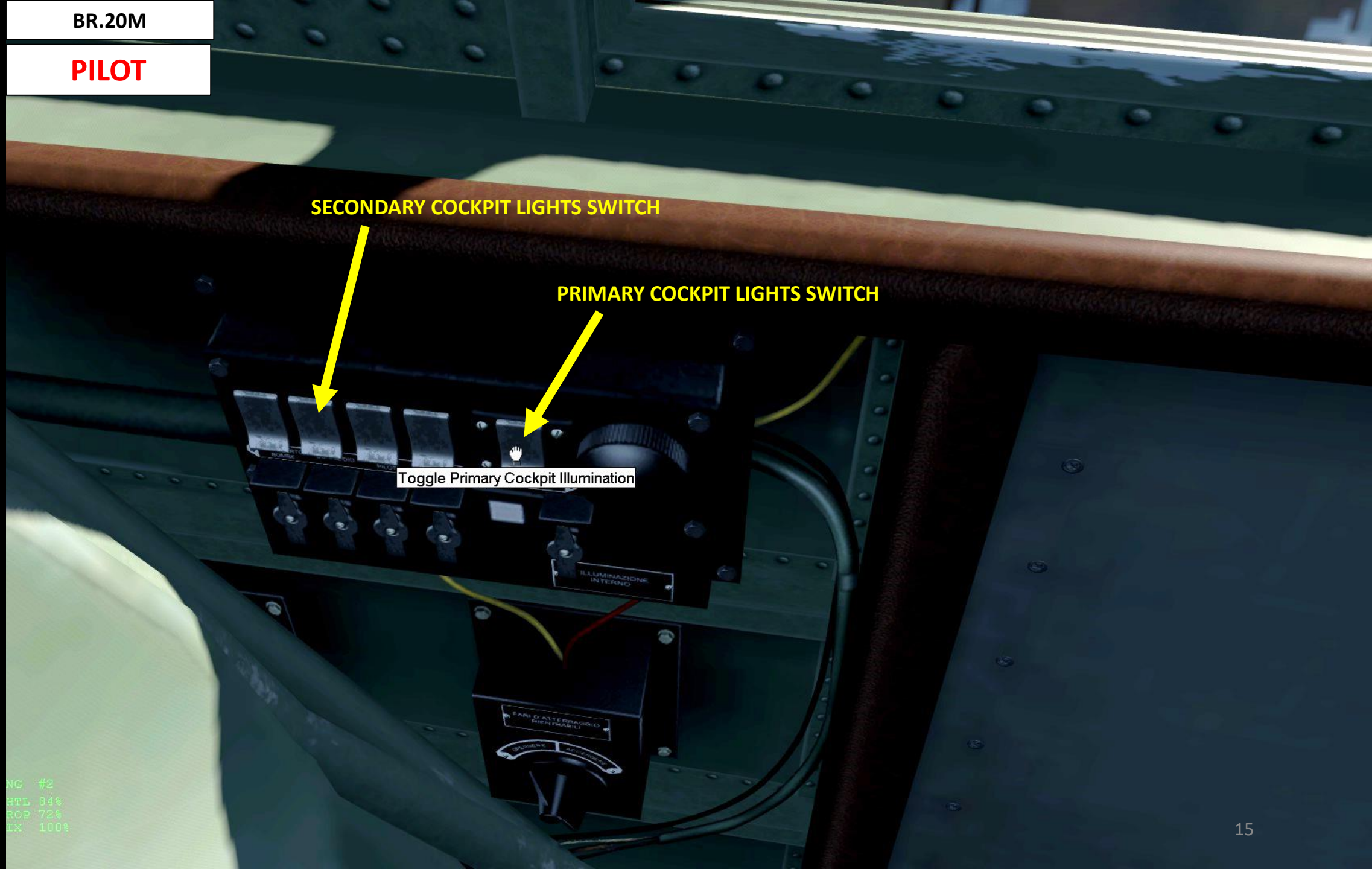
PILOT



PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

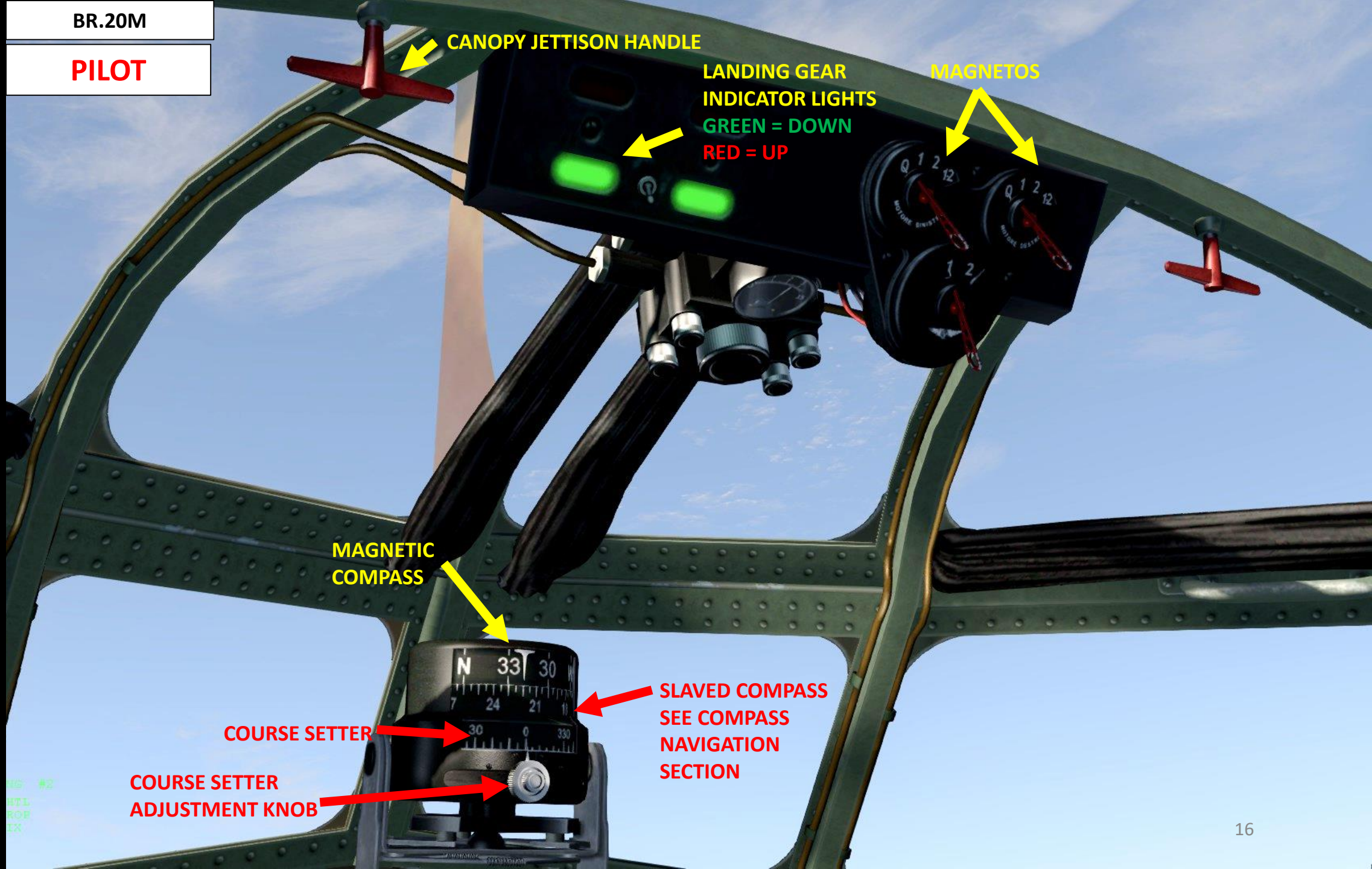
PILOT



PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

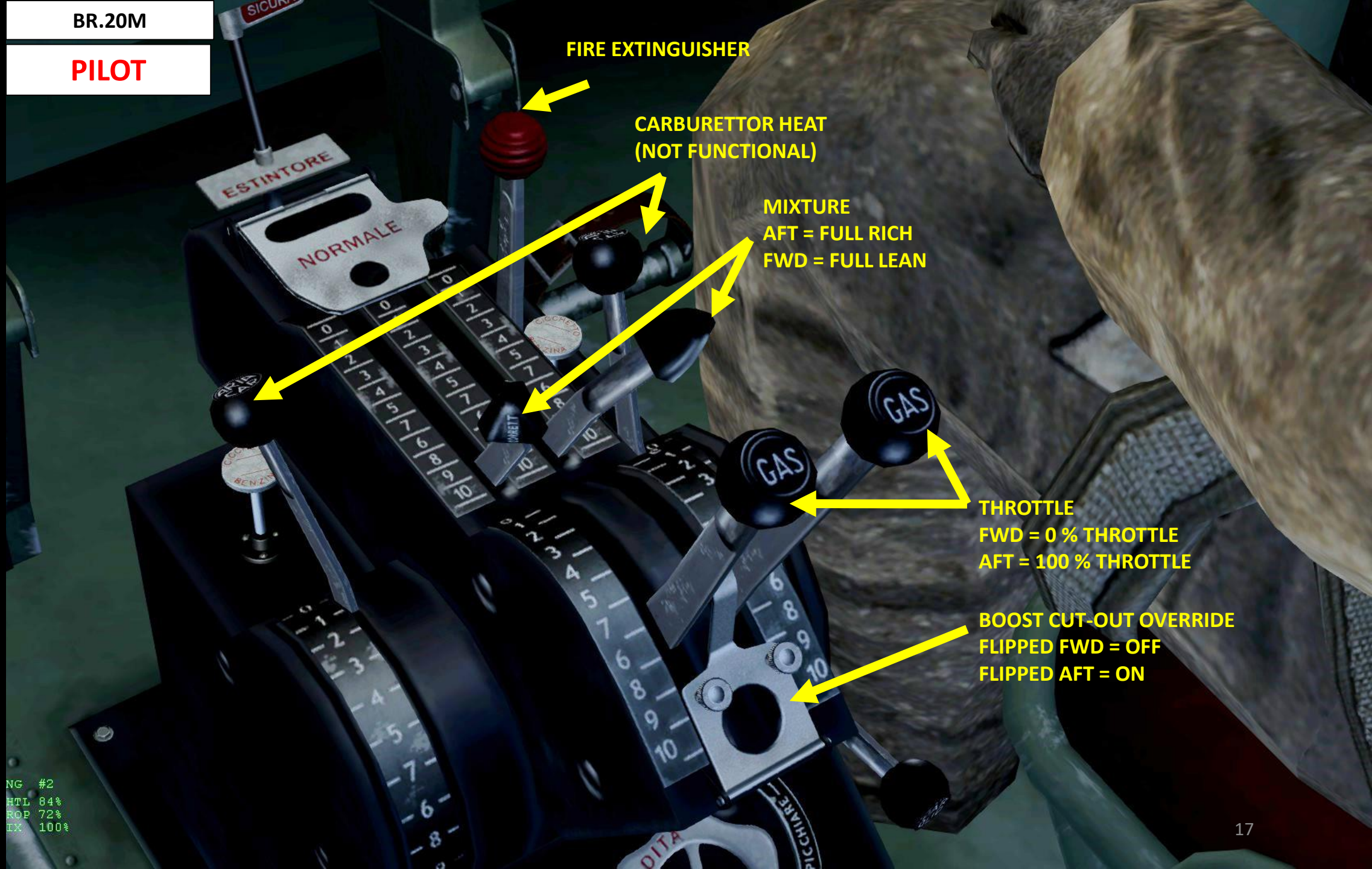
PILOT



PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

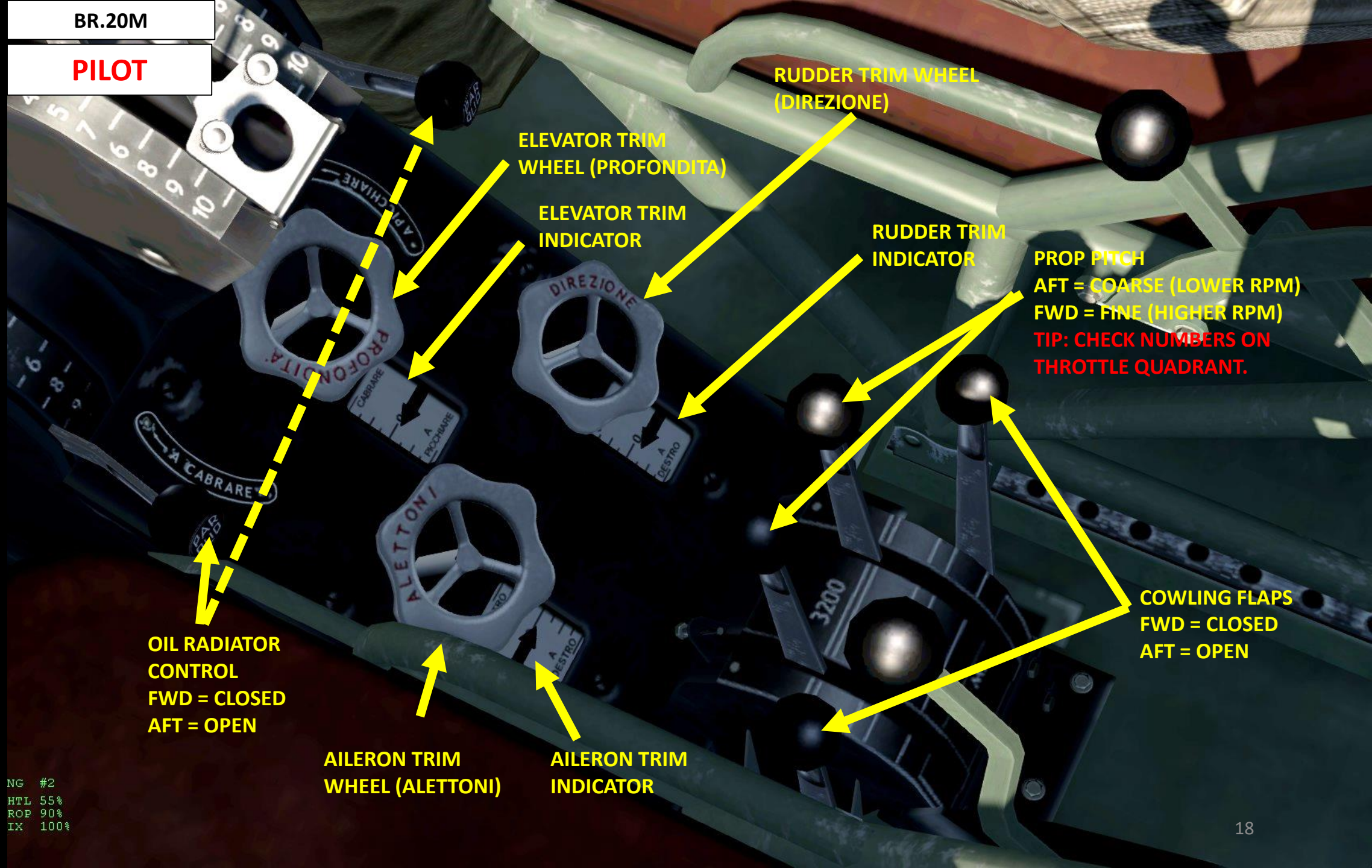
PILOT



PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

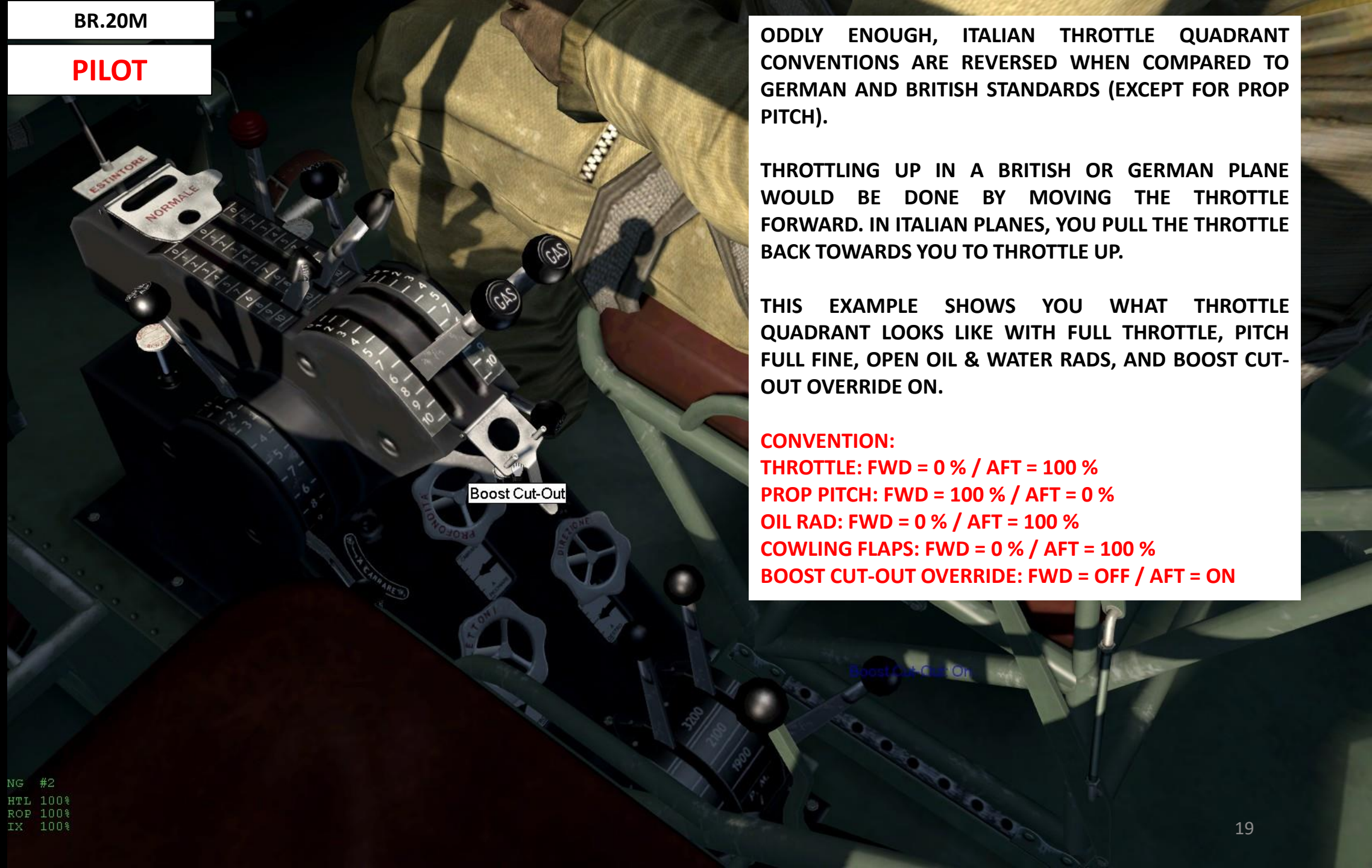
PILOT



PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

PILOT



ODDLY ENOUGH, ITALIAN THROTTLE QUADRANT CONVENTIONS ARE REVERSED WHEN COMPARED TO GERMAN AND BRITISH STANDARDS (EXCEPT FOR PROP PITCH).

THROTTLING UP IN A BRITISH OR GERMAN PLANE WOULD BE DONE BY MOVING THE THROTTLE FORWARD. IN ITALIAN PLANES, YOU PULL THE THROTTLE BACK TOWARDS YOU TO THROTTLE UP.

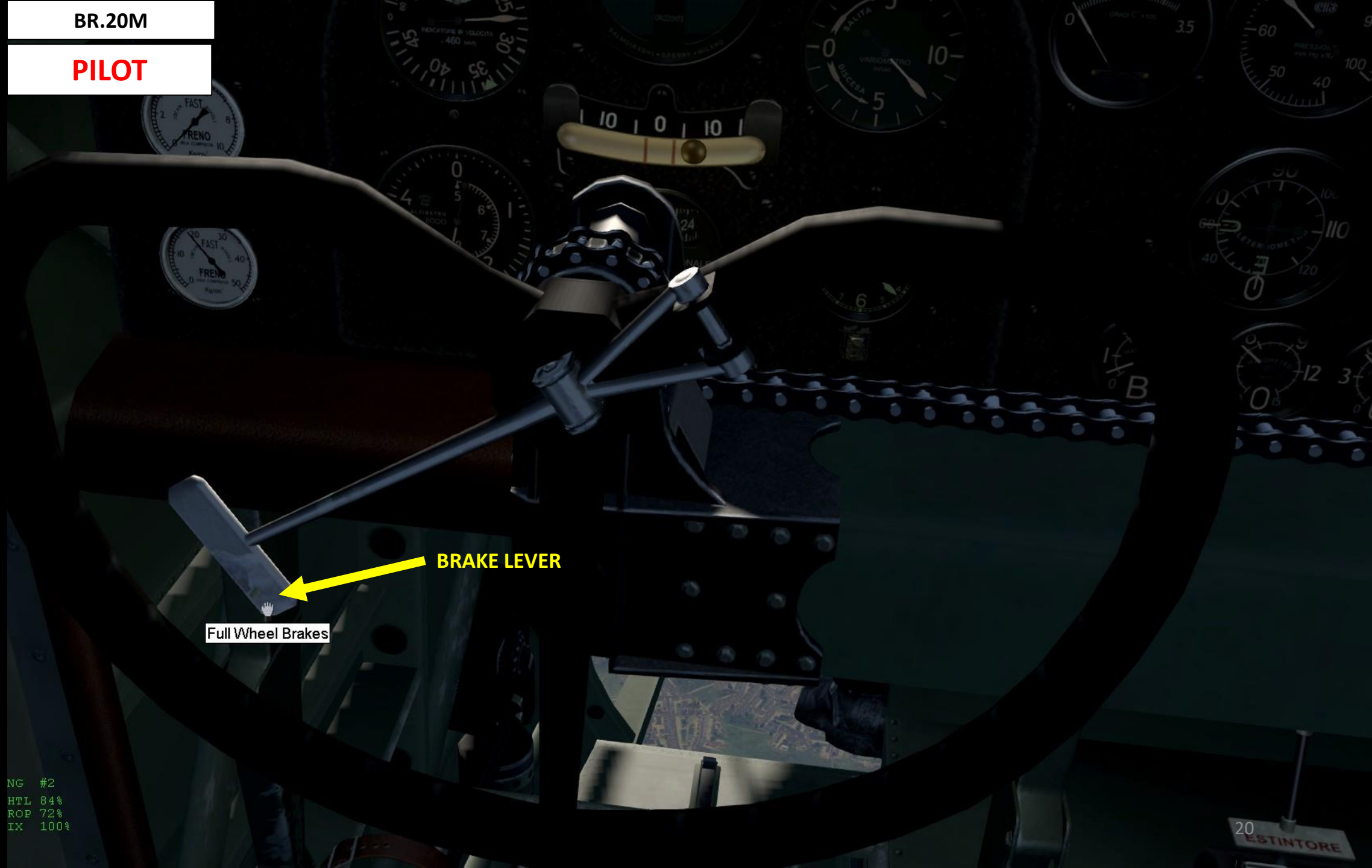
THIS EXAMPLE SHOWS YOU WHAT THROTTLE QUADRANT LOOKS LIKE WITH FULL THROTTLE, PITCH FULL FINE, OPEN OIL & WATER RADS, AND BOOST CUT-OUT OVERRIDE ON.

CONVENTION:
THROTTLE: FWD = 0 % / AFT = 100 %
PROP PITCH: FWD = 100 % / AFT = 0 %
OIL RAD: FWD = 0 % / AFT = 100 %
COWLING FLAPS: FWD = 0 % / AFT = 100 %
BOOST CUT-OUT OVERRIDE: FWD = OFF / AFT = ON

PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

PILOT



PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

PILOT

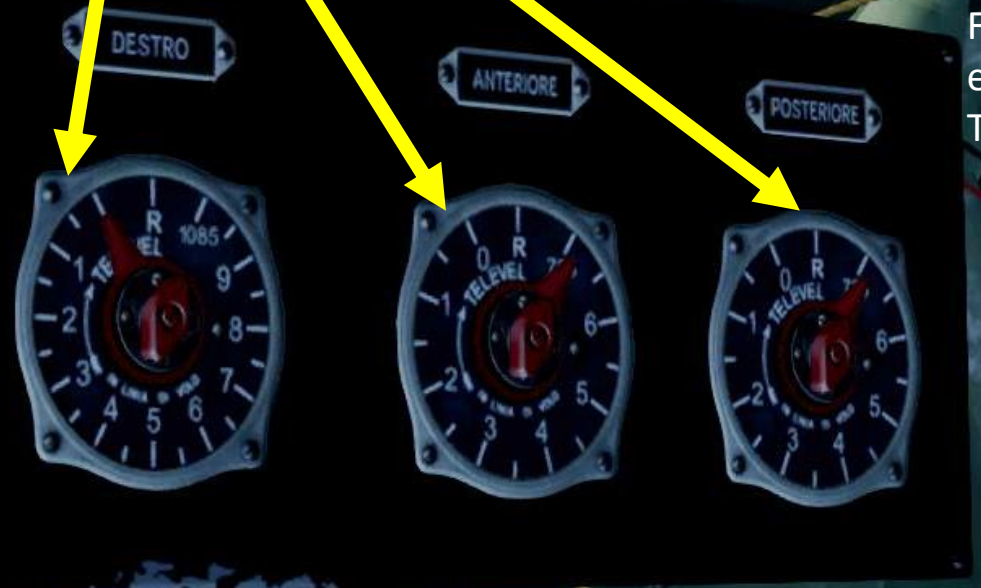
FUEL GAUGES (TOTAL: 3620 L)

FORWARD CENTER FUSELAGE (ANTERIORE): 725 L

AFT CENTER FUSELAGE (POSTERIORE): 725 L

RIGHT WING TANKS (DESTRO): 545 + 540L = 1085 L

HYDRAULIC PRESSURE (KG/CM2)



LANDING GEAR LEVER

FWD = RAISED / AFT = LOWERED

EACH WING TANK FUEL GAUGE MEASURES THE COMBINED FUEL QUANTITY IN EACH WING (WHICH HAS 2 TANKS EACH).

FUEL PUMPS TAKE FUEL FROM ALL TANKS SIMULTANEOUSLY.

The BR.20M has 6 self-sealing fuel tanks: 2 in the center fuselage (which are filled first) and 4 fuel tanks in the wings.

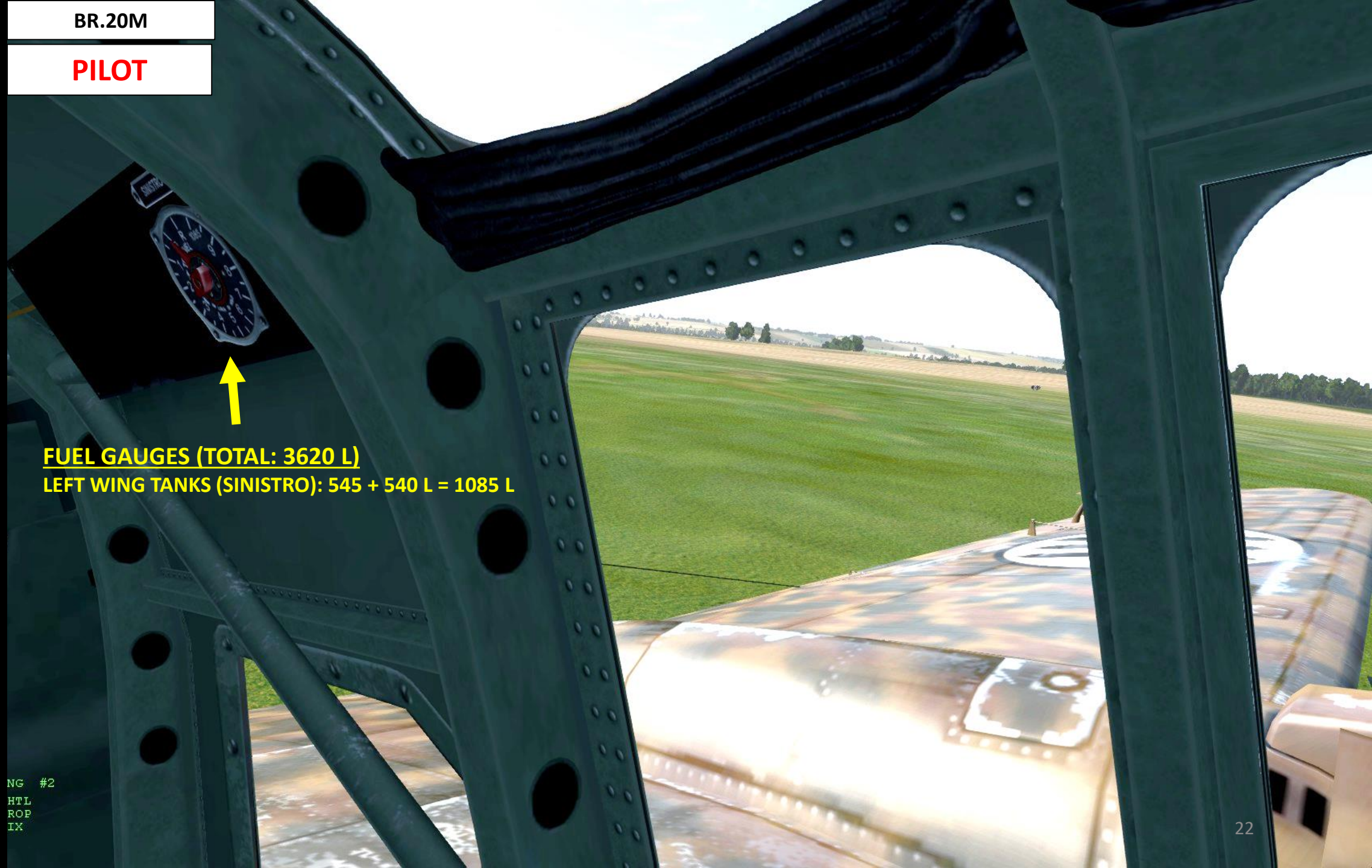
With a full bomb load (2 X 800 kg), the maximum fuel load you can carry is about 50% (approx. 1810 L).

Fuel planning will be further elaborated in the “BOMBING TUTORIAL” section.

PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

PILOT



FUEL GAUGES (TOTAL: 3620 L)

LEFT WING TANKS (SINISTRO): 545 + 540 L = 1085 L

PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

CO-PILOT (AI)

PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

IMPELLER

THE IMPELLER IS A SLIPSTREAM-DRIVEN GENERATOR FOR EMERGENCY ELECTRICAL POWER.

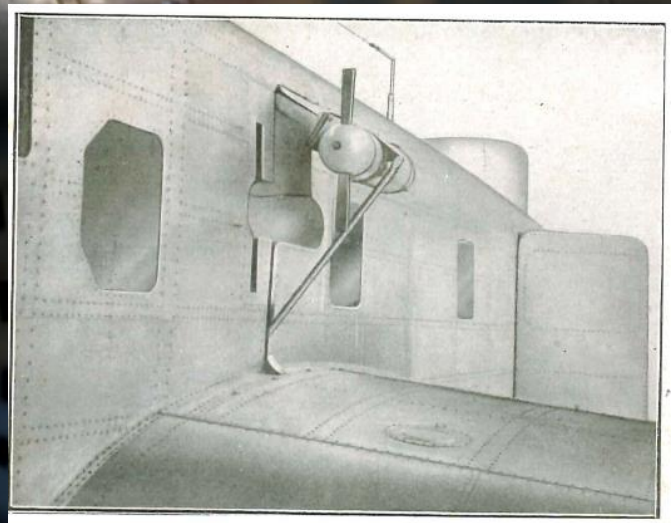


Fig. 64. — Generatore sollevato.

PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

BOMBARDIER NOSE GUN

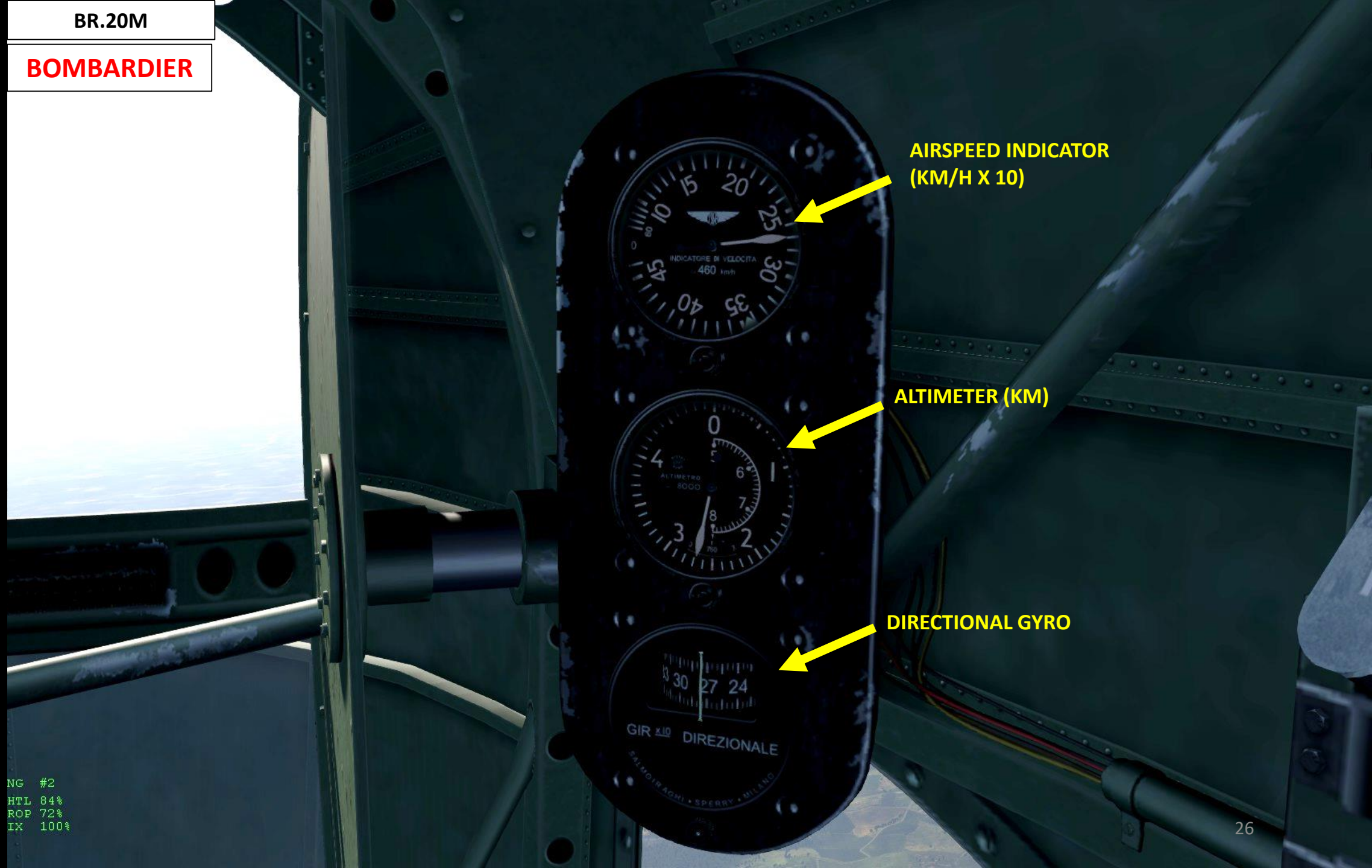
NOSE GUNNER CONTROLS

-LEAN TO GUNSIGHT: **CUSTOM KEY**
-FIRE WEAPON: **LEFT MOUSE BUTTON**
-SWITCH GUNNER/BOMBARDIER POSITION: **C**
-CHANGE MANNED POSITION: **L_SHIFT_C**
-GIVE GUNNER CONTROL TO AI: **L_ALT+F2**
-TAKE CONTROL OF GUN (TOGGLE INDEPENDENT MODE): **F10**

PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

BOMBARDIER



PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

BOMBARDIER

PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

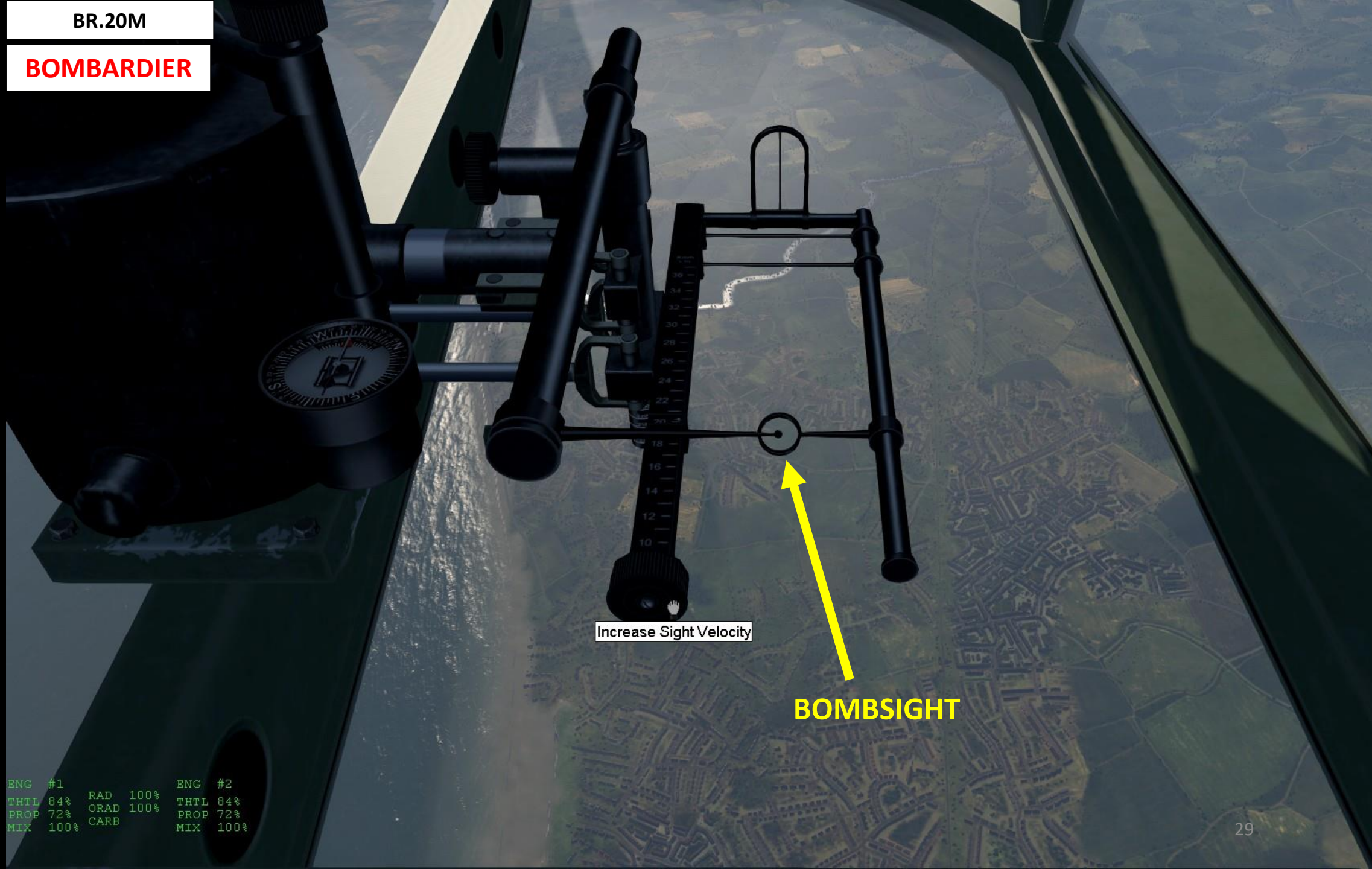
BR.20M

BOMBARDIER

PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

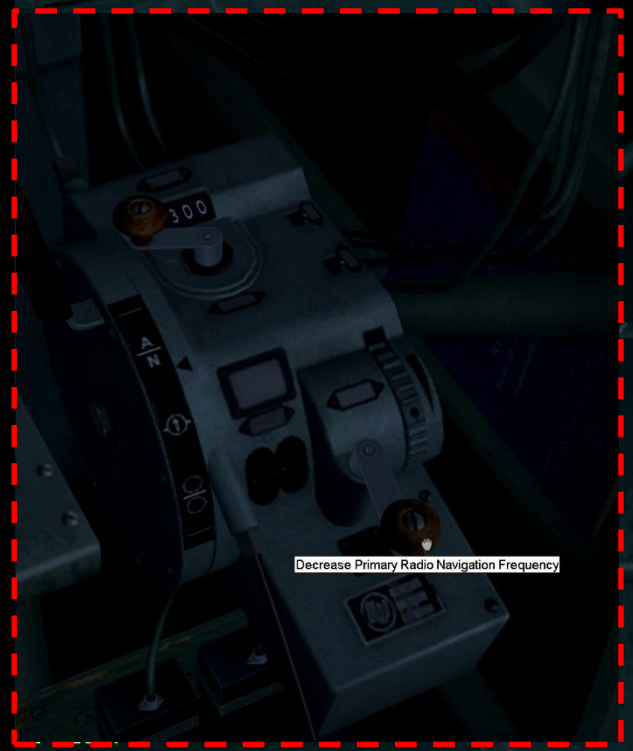
BOMBARDIER



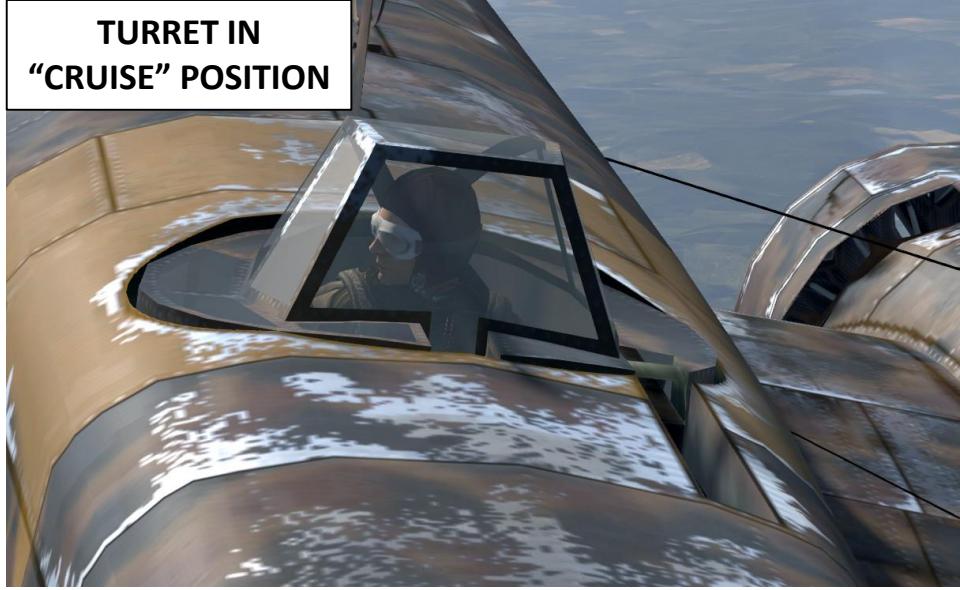
PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

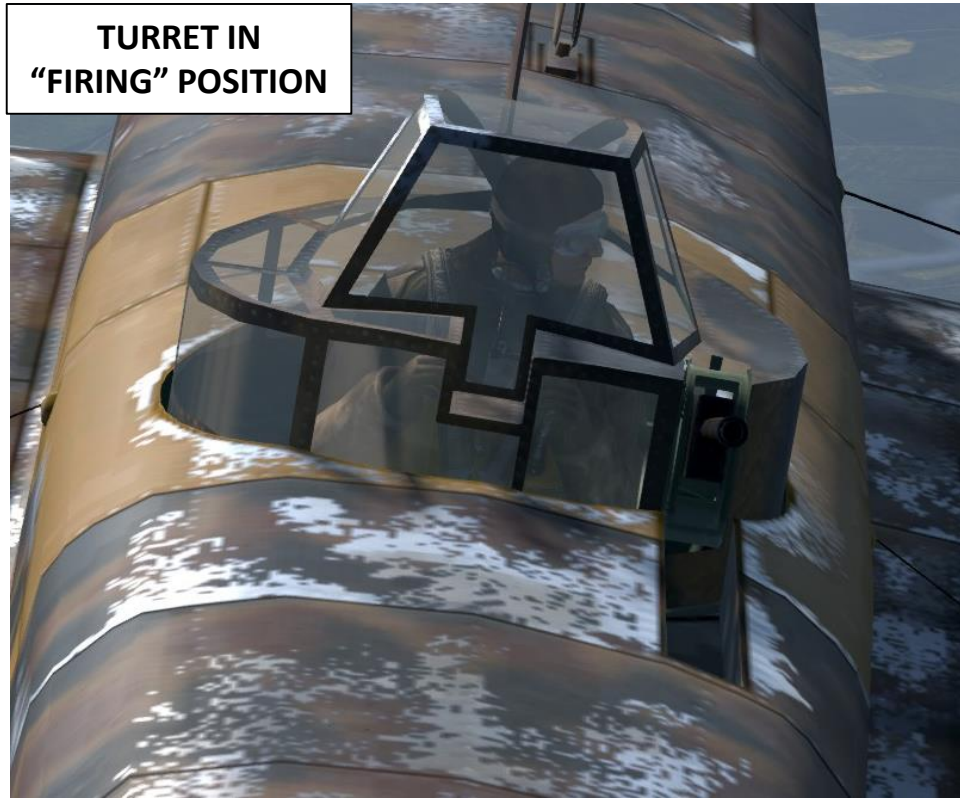
BR.20M

OBSERVER RADIO OPERATOR



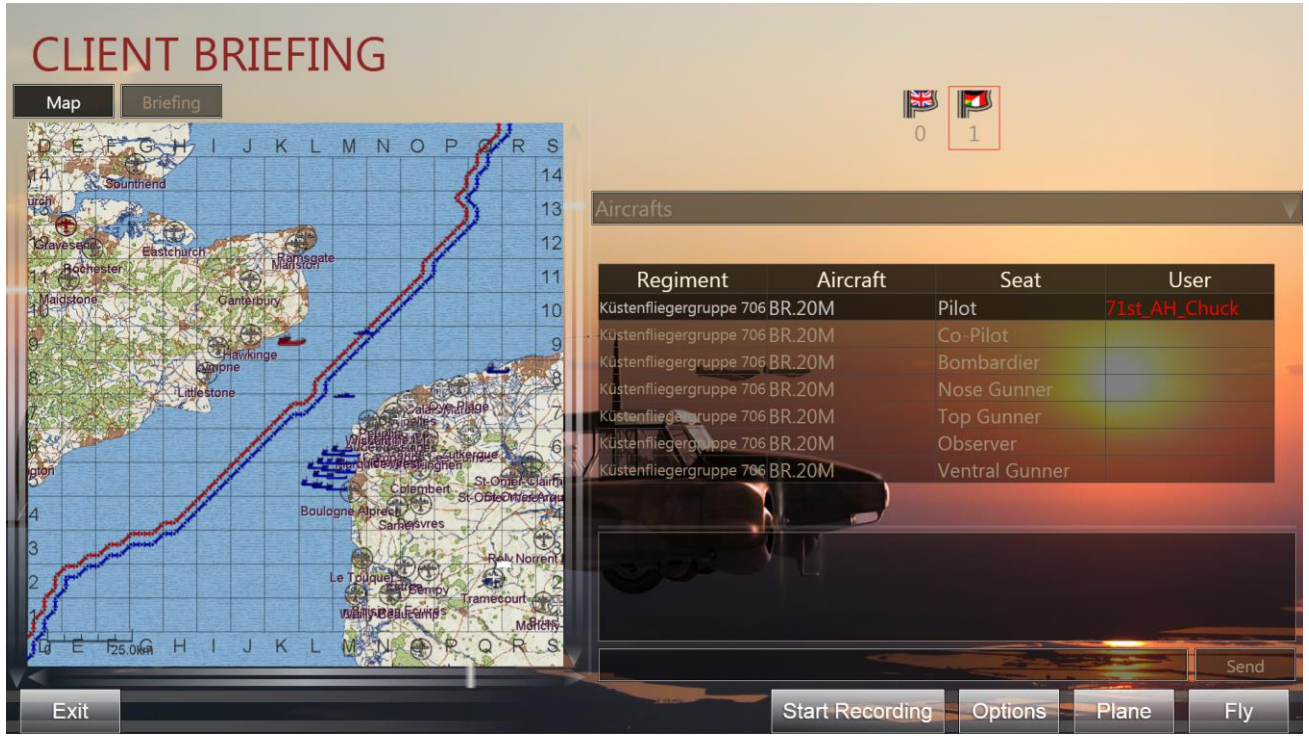
PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION





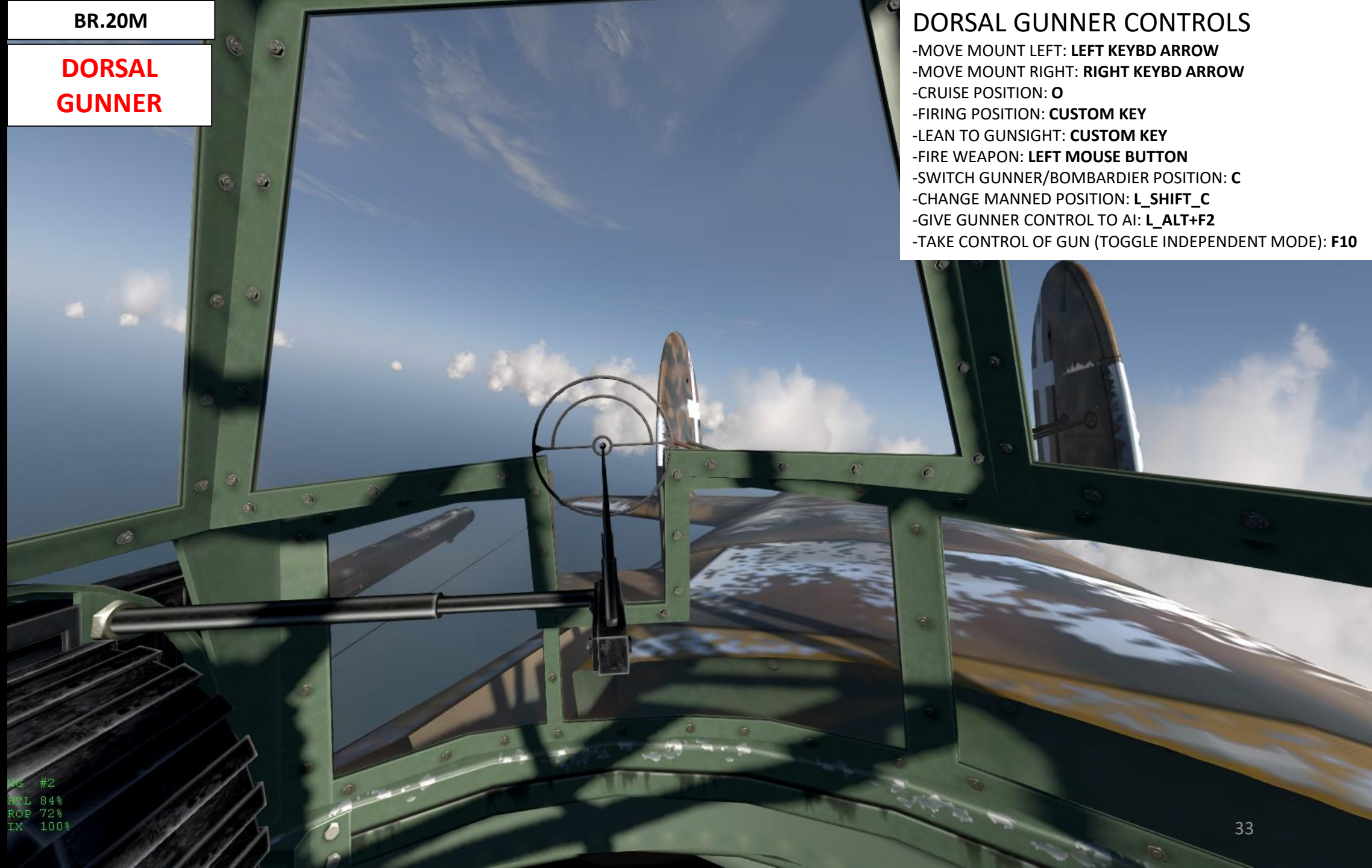
NOTES

- Your gunners can call out fighters if you have your in-game chat info window enabled. However, if you switcher to your gunner position and switched back to your pilot seat, it is possible that the AI gunner will not take control of the gun. In other words, your gunner will not fire unless the AI takes control of it. To give back the AI control of your turret, you should use the "L_ALT+F2".
- Your ventral and dorsal turrets have 2 positions: CRUISE and FIRING. During aircraft cold start, you start in "CRUISE/PARKED" position. In this mode, the gunner cannot fire his gun nor move his turret. This mode is primarily used to generate less drag and consume less power. "FIRING" position, on the other hand, is powered by the left engine. This mode allows you to use your gun and rotate your turret to get a better view angle. It is useful to track targets or examine damage on the wings or upper forward fuselage. Your gunner will only fire when the turret is in "FIRING" position.
- Any turret or other air crew position (like the bombardier) can be manned by other players in multiplayer. They just need to **double-click on the available slot in multiplayer** once they clicked on the "flag".



BR.20M

DORSAL GUNNER



DORSAL GUNNER CONTROLS

-MOVE MOUNT LEFT: **LEFT KEYBD ARROW**
-MOVE MOUNT RIGHT: **RIGHT KEYBD ARROW**
-CRUISE POSITION: **O**
-FIRING POSITION: **CUSTOM KEY**
-LEAN TO GUNSIGHT: **CUSTOM KEY**
-FIRE WEAPON: **LEFT MOUSE BUTTON**
-SWITCH GUNNER/BOMBARDIER POSITION: **C**
-CHANGE MANNED POSITION: **L_SHIFT_C**
-GIVE GUNNER CONTROL TO AI: **L_ALT+F2**
-TAKE CONTROL OF GUN (TOGGLE INDEPENDENT MODE): **F10**

PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

BR.20M

VENTRAL GUNNER

VENTRAL GUNNER CONTROLS

-CRUISE POSITION: **O**
-FIRING POSITION: **CUSTOM KEY**
-LEAN TO GUNSIGHT: **CUSTOM KEY**
-FIRE WEAPON: **LEFT MOUSE BUTTON**
-SWITCH GUNNER/BOMBARDIER POSITION: **C**
-CHANGE MANNED POSITION: **L_SHIFT_C**
-GIVE GUNNER CONTROL TO AI: **L_ALT+F2**
-TAKE CONTROL OF GUN (TOGGLE INDEPENDENT MODE): **F10**

PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

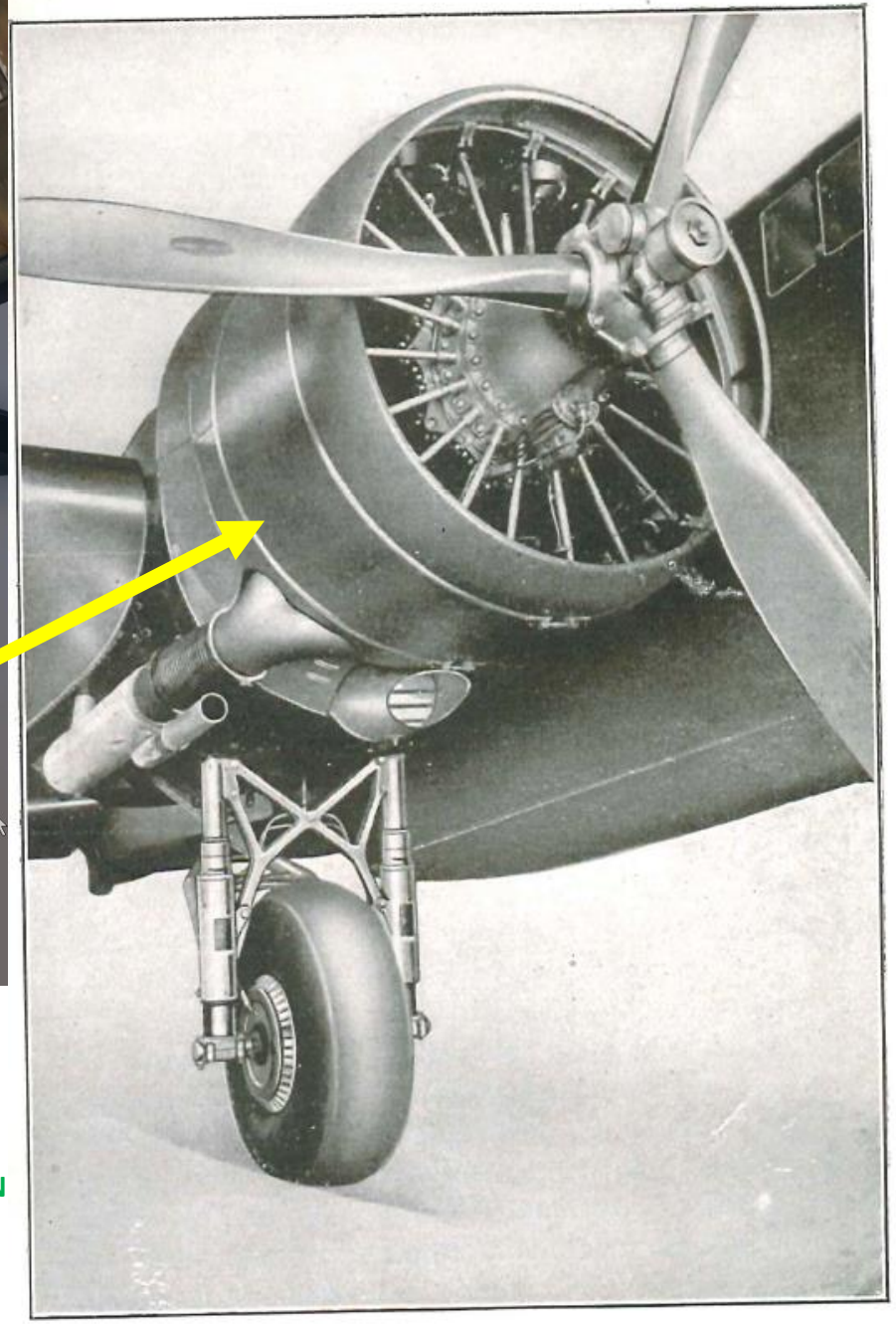


Fig. 14. — Carrello con ammortizzatori oleo-pneumatici.

ENGINE COWLING FLAPS (ALSO CALLED “LOUVRES”)

NOT ANIMATED IN GAME (BUG)

WHEN FLAPS ARE OPEN:

GOOD = LESS DRAG, MORE SPEED

BAD = LESS AIRFLOW TO COOL THE ENGINE, HIGH RISK OF ENGIN OVERHEAT

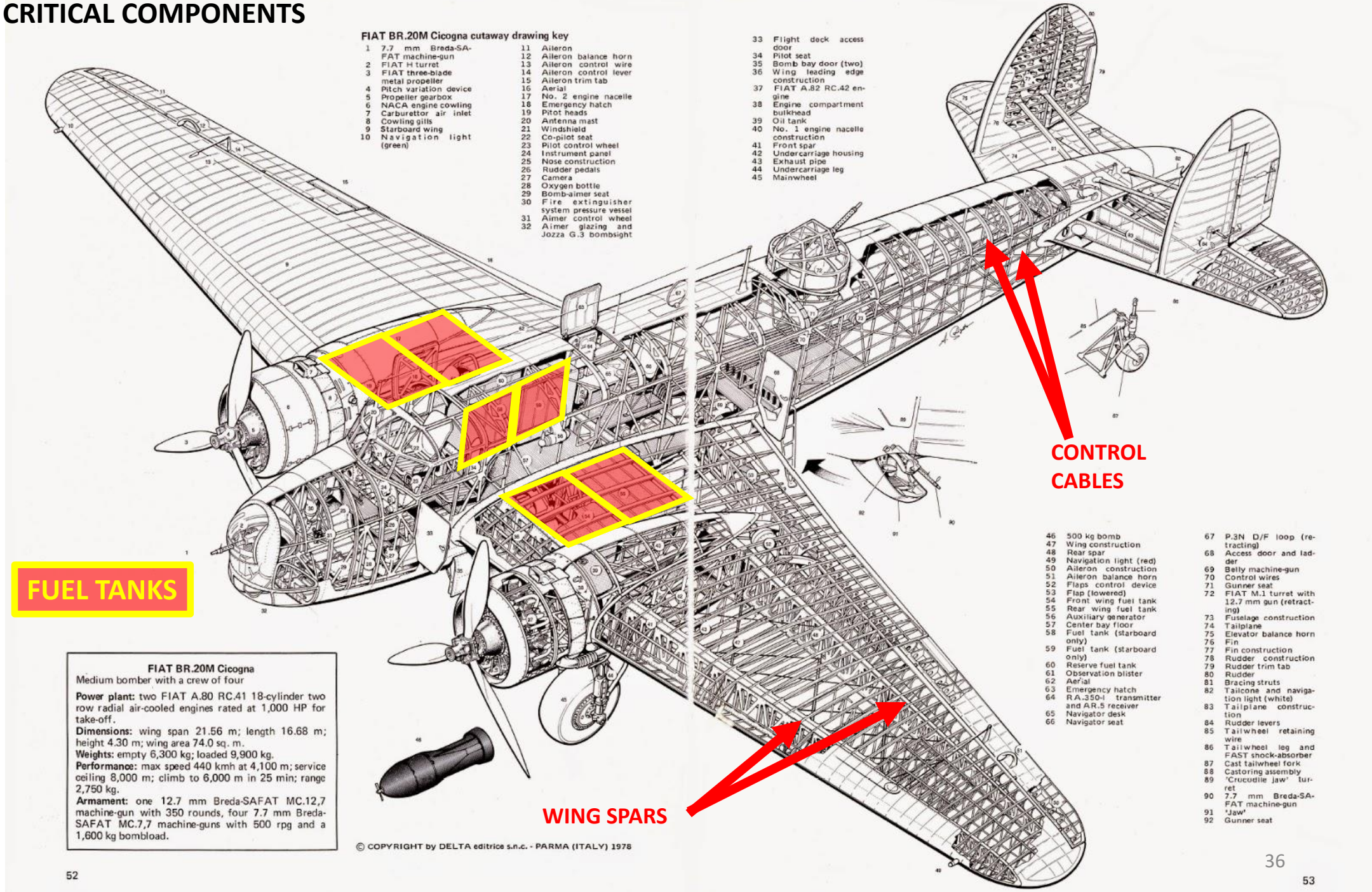
WHEN FLAPS ARE CLOSED:

GOOD = MORE AIRFLOW TO COOL THE ENGINE

BAD = MORE DRAG, LESS SPEED

PART 3: AIRCRAFT & COCKPIT FAMILIARIZATION

CRITICAL COMPONENTS



HOW TO RECOGNIZE A TAIL NUMBER

Italy

The system used for most aircraft flying in the Battle of Britain was rather uniform regardless of plane type or squadron.

Tail Number. Usually a one- or two-digit number for any regiment type, preceded by a two- or three-character number designating the squadron. The squadron number is added onto the plane automatically.

Serial Number.

Fighters: usually a six-character string starting with MM and followed by four numbers.

Bombers: a seven-character string starting with MM and followed by five numbers.

Some Examples (symbols in **bold** can be set by the player, symbols in *italics* are automatically set by Cliffs of Dover)

Plane	Squadron	Tactical #	Serial #
CR.42	83a Squadriglia	*83*-**1**(?)	*MM***5694**
CR.42	95a Squadriglia	*95*-**14**	*MM***5703**
G.50	20 Gruppo	*20*	*MM***5372**
G.50	352a Squadriglia	*352*-**7**	(none)
BR.20M	242a Squadriglia	*242*-**4**	*MM***22626**
BR.20M	243a Squadriglia	*243*-**9**	*MM***21879**

PART 4: CONTROLS

BR.20M		
DESCRIPTION	MAPPED TO	ESSENTIAL / NON-ESSENTIAL
Wheel Chocks		ESSENTIAL
toggle primary cockpit illumination		CLICKABLE IN COCKPIT
toggle secondary cockpit illumination		CLICKABLE IN COCKPIT
View-Position #1, # 2, #3, #4, # 5, #6	L_ALT+1, L_ALT+2…	ESSENTIAL
Next Manned Position (Cycles through air crew)	C	ESSENTIAL
Course autopilot – Previous Mode	A	ESSENTIAL
Course autopilot – Next Mode	S	ESSENTIAL
course setter - increase	NUMPAD + (CUSTOM)	CLICKABLE IN COCKPIT
course setter - decrease	NUMPAD - (CUSTOM)	CLICKABLE IN COCKPIT
directional gyro - increase	NUMPAD / (CUSTOM)	ESSENTIAL
directional gyro - decrease	NUMPAD * (CUSTOM)	ESSENTIAL
toggle selected engine (ignition)	“I” by default	ESSENTIAL
directional controls (ailerons, elevators, and rudder)	Joystick & Rudder Pedal axes	ESSENTIAL
Trim controls (elevator and rudder)	Joystick hat switch	ESSENTIAL
Field of View + (allows you to zoom out)		ESSENTIAL
Field of View – (allows you to zoom in)		ESSENTIAL
Cylinder Head Temperature Next/Previous Sender		CLICKABLE IN COCKPIT
Impeller (Emergency Power Generator) Toggle	Custom Key	NON-ESSENTIAL

PART 4: CONTROLS

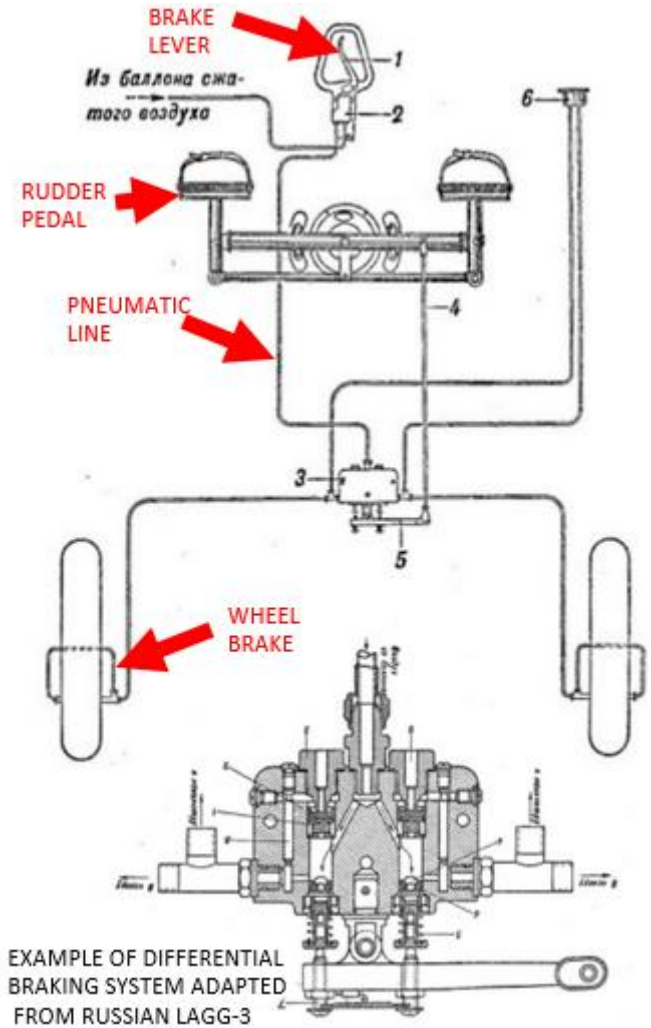
BR.20M		
DESCRIPTION	MAPPED TO	ESSENTIAL / NON-ESSENTIAL
lean to gunsight		ESSENTIAL
drop ordnance (bomb)	B	ESSENTIAL
throttle	Throttle axis	ESSENTIAL
boost cut-off (boost cut-out override)		ESSENTIAL
toggle canopy/hatch		ESSENTIAL
increase mixture	+	NON-ESSENTIAL (NOT FUNCTIONAL)
decrease mixture	-	NON-ESSENTIAL (NOT FUNCTIONAL)
open radiator (engine cowlings)	Up Arrow keyboard	ESSENTIAL
close radiator (engine cowlings)	Down Arrow keyboard	ESSENTIAL
open oil radiator	Right Arrow keyboard	ESSENTIAL
close oil radiator	Left Arrow keyboard	ESSENTIAL
increase propeller pitch	Usually set to Axis for second throttle. Set to keyboard otherwise.	ESSENTIAL
decrease propeller pitch		ESSENTIAL
Toggle undercarriage (landing gear)		ESSENTIAL
Wheel brakes		ESSENTIAL
bail out		ESSENTIAL
Toggle Independent Mode (allows you to use/hide mouse cursor and take control of your gun)	F10	ESSENTIAL

PART 4: CONTROLS

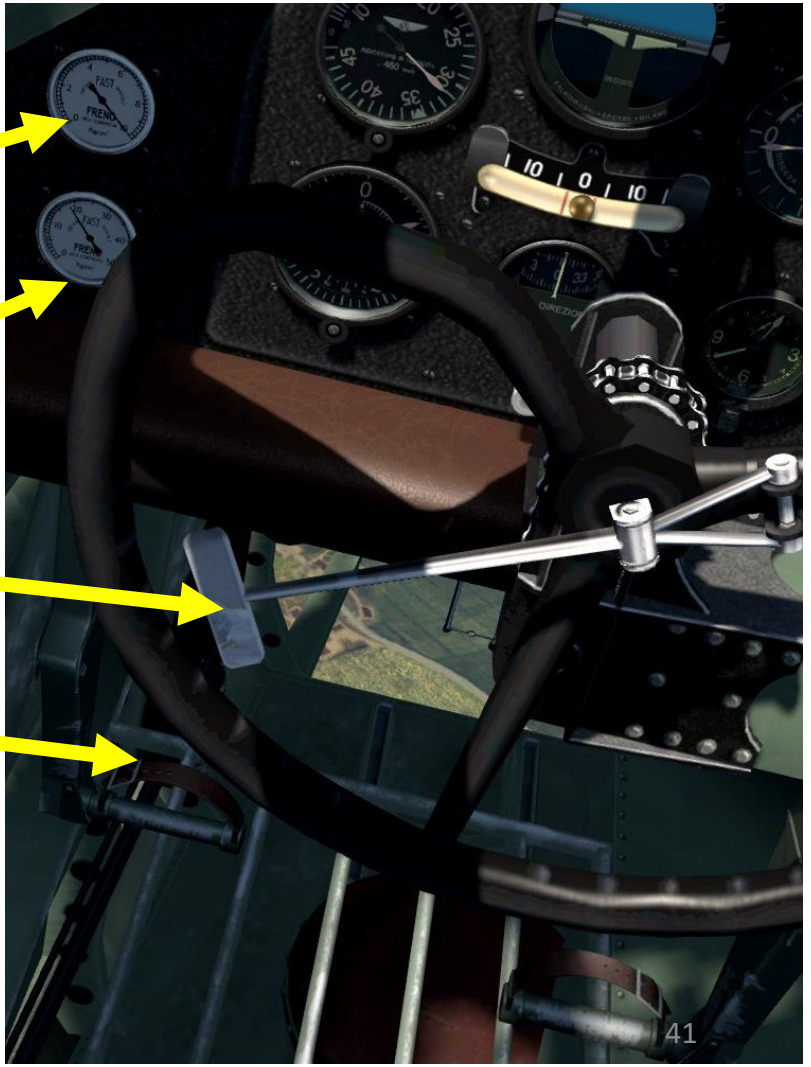
BR.20M		
DESCRIPTION	MAPPED TO	ESSENTIAL / NON-ESSENTIAL
Bombsight altitude + / -		CLICKABLE IN COCKPIT
Bombsight velocity + / -		CLICKABLE IN COCKPIT
Adjust Bombsight left / right (adjusts bombsight for crosswind)		NON-ESSENTIAL
engine #1 select	L_SHIFT+1	ESSENTIAL
engine #2 select	L_SHIFT+2	ESSENTIAL
all engines select	L_SHIFT+3 (CUSTOM)	ESSENTIAL
Turret – Move Mount Left	Left Arrow keyboard	ESSENTIAL
Turret – Move Mount Right	Right Arrow keyboard	ESSENTIAL
Turret – Cruise Position	O	ESSENTIAL
Turret – Firing Position	L_SHIFT+O (CUSTOM)	ESSENTIAL
External View (Give Turret Gunner Control to AI)	L_ALT+F2	ESSENTIAL
Open Bomb Bay Doors	N (CUSTOM)	ESSENTIAL
Close Bomb Bay Doors	L_CTRL+N (CUSTOM)	ESSENTIAL
bomb mode selector – next / previous (salvo/series/single)	SEE BOMBER NUMPAD	ESSENTIAL
Increase/decrease bomb distributor salvo quantity	SEE BOMBER NUMPAD	ESSENTIAL
previous bomb distributor mode (Salvo/Single)	SEE BOMBER NUMPAD	ESSENTIAL
next bomb distributor mode (Salvo/Single)	SEE BOMBER NUMPAD	ESSENTIAL
toggle bombs armed	SEE BOMBER NUMPAD	ESSENTIAL
Autopilot left (aircraft turns left while in autopilot)	L_CTRL + A (CUSTOM)	ESSENTIAL
Autopilot right (aircraft turns right while in autopilot)	L_CTRL + S (CUSTOM)	ESSENTIAL

PART 4: CONTROLS

- Unlike the German bombers, the BR.20M uses differential braking instead of toe brakes.
- In order to brake, you need to hold your “Full Wheel Brakes” key (which is physically mapped as a lever on your control column) while you give rudder input to steer your aircraft. Make sure you have adequate mixture, RPM and Manifold Pressure settings or your turn radius will suffer. Keep in mind that that for British and Italian aircraft, you use this braking system (Full Wheel Brakes key), while for the German aircraft you use toe brakes (“Full Left/Right Wheel Brakes” keys or “Left/Right Wheel Brakes” axes in your controls).



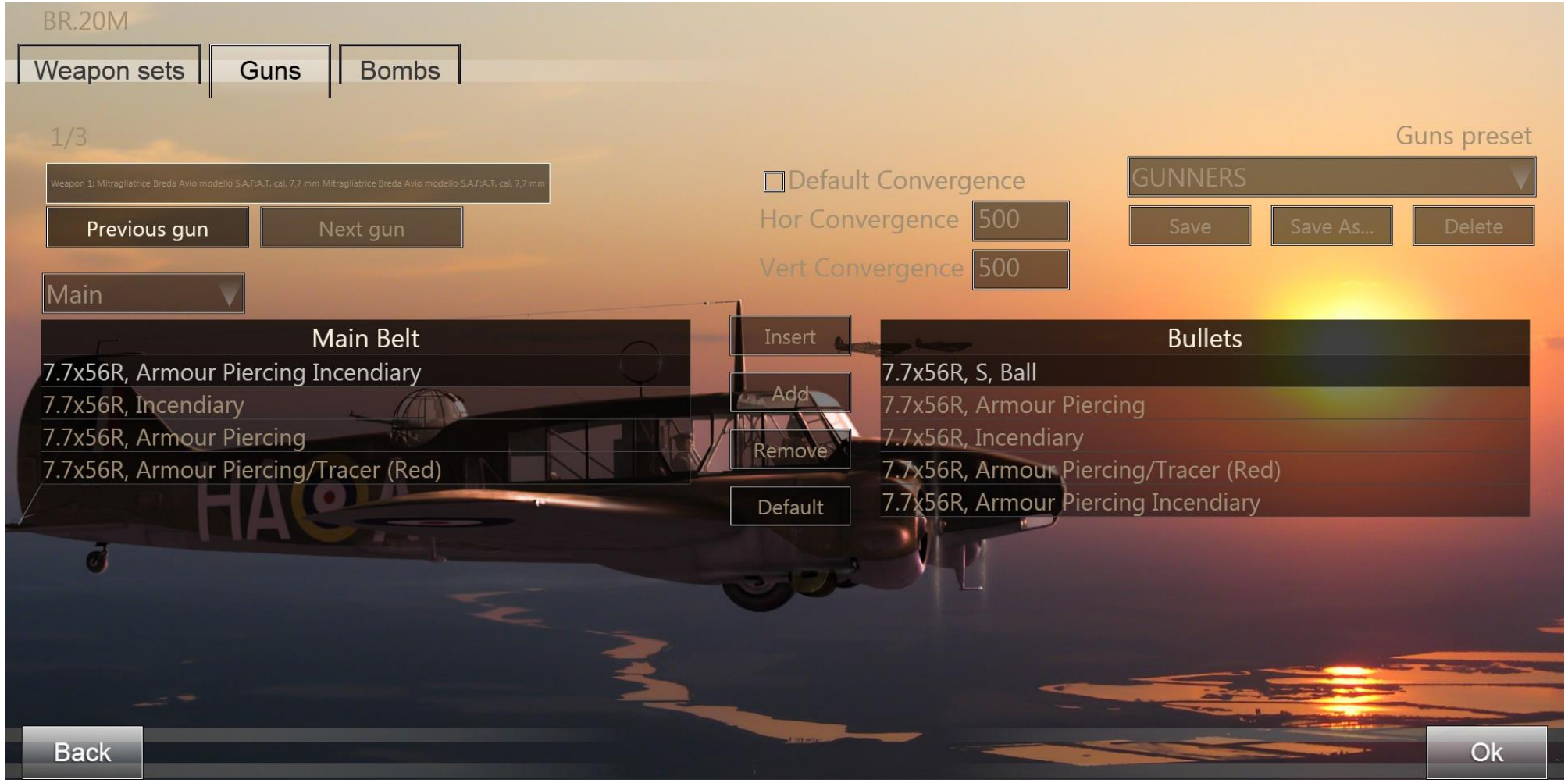
EXAMPLE OF DIFFERENTIAL BRAKING SYSTEM ADAPTED FROM RUSSIAN LAGG-3



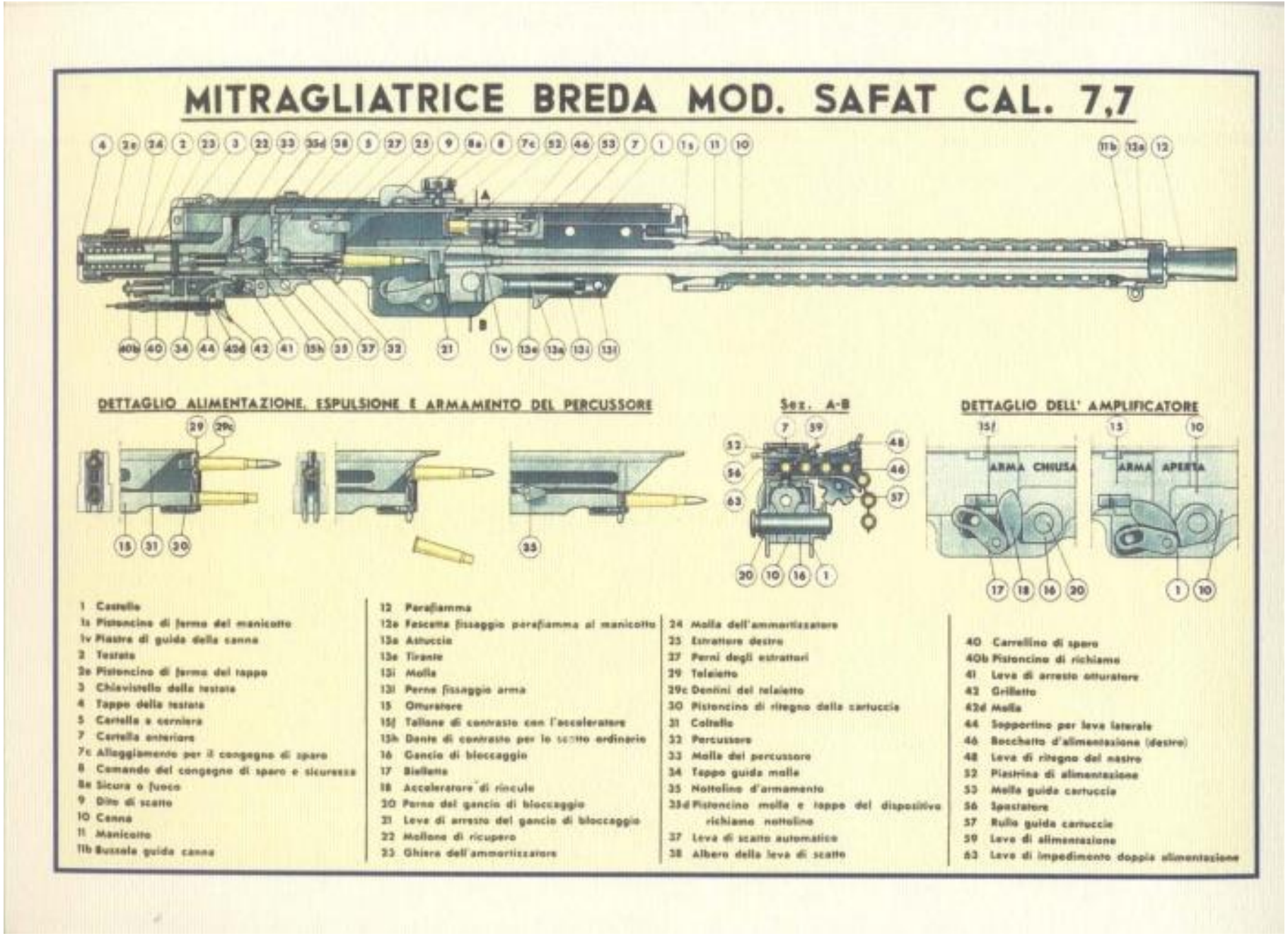
Recommended Gunner Machine-Gun Belt Loadouts

Mitragliatrice Breda Avio model S.A.F.A.T. (7.7 mm) – FOR NOSE & VENTRAL GUNNERS

1. 12.7x81SR, Armour Piercing/Tracer (Red)
2. 12.7x81SR, High Explosive Incendiary/Tracer (Red)
3. 12.7x81SR, Armour Piercing
4. 12.7x81SR, Incendiary



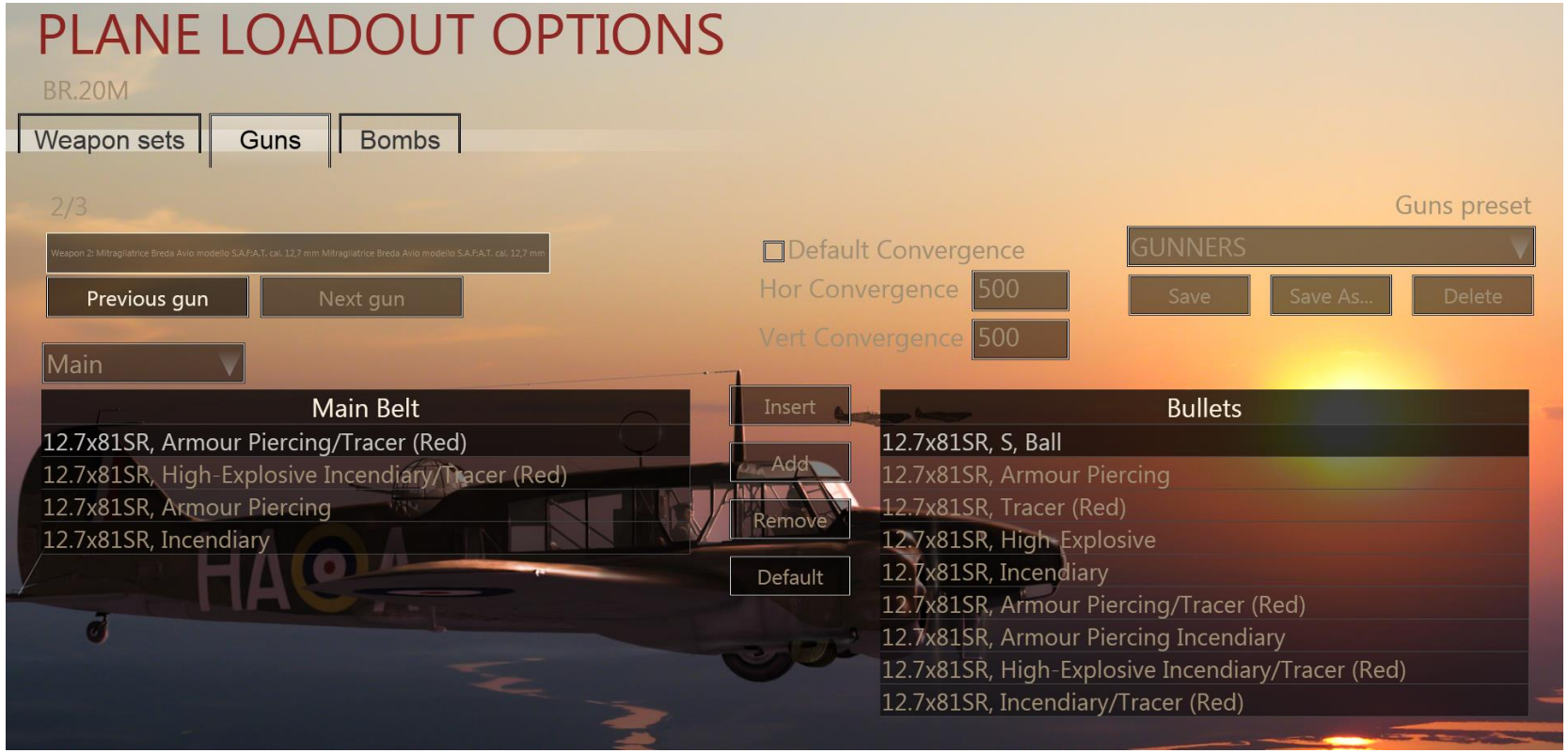
PART 5: WEAPONS AND ARMAMENT

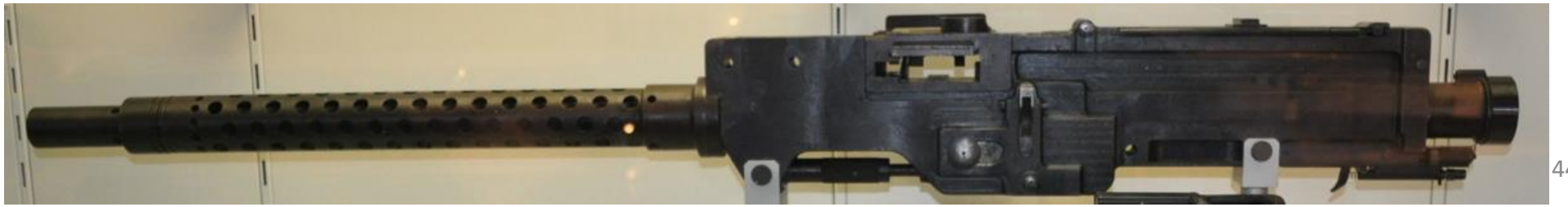


Recommended Gunner Machine-Gun Belt Loadouts

Mitragliatrice Breda Avio model S.A.F.A.T. (12.7 mm / 0.50 in) – FOR DORSAL GUNNER

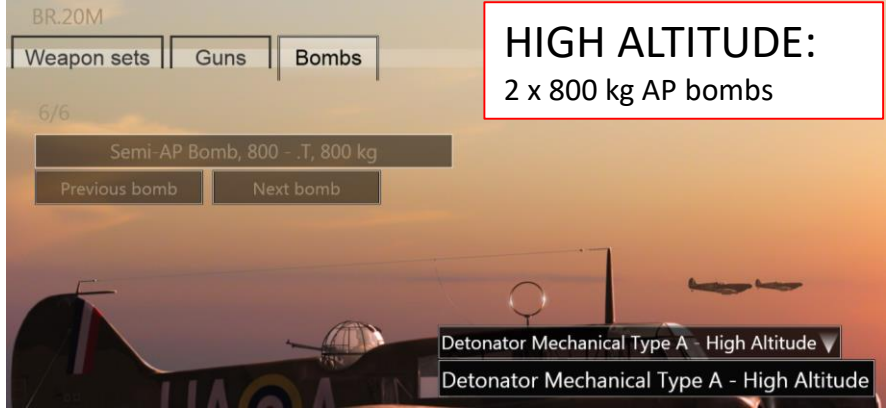
1. 12.7x81SR, Armour Piercing/Tracer (Red)
2. 12.7x81SR, High Explosive Incendiary/Tracer (Red)
3. 12.7x81SR, Armour Piercing
4. 12.7x81SR, Incendiary





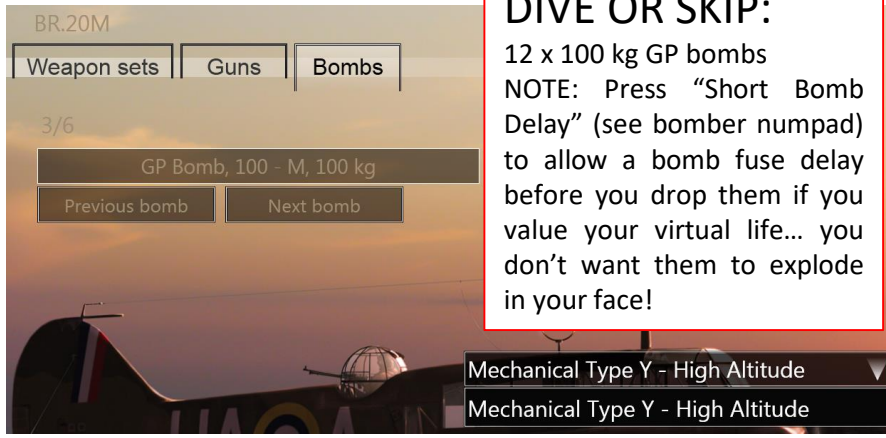
Recommended Bomb Loadout

- **2 x Semi AP 800 kg bombs** are best used for high altitude bombing (more explosive tonnage than every other loadout). Make sure you do not carry 100 % fuel, as you will be overweight.
- **12 x GP 100 kg bombs** are best used for area bombing and skip bombing.



HIGH ALTITUDE:

2 x 800 kg AP bombs



DIVE OR SKIP:

12 x 100 kg GP bombs

NOTE: Press “Short Bomb Delay” (see bomber numpad) to allow a bomb fuse delay before you drop them if you value your virtual life… you don’t want them to explode in your face!

PART 5: WEAPONS AND ARMAMENT

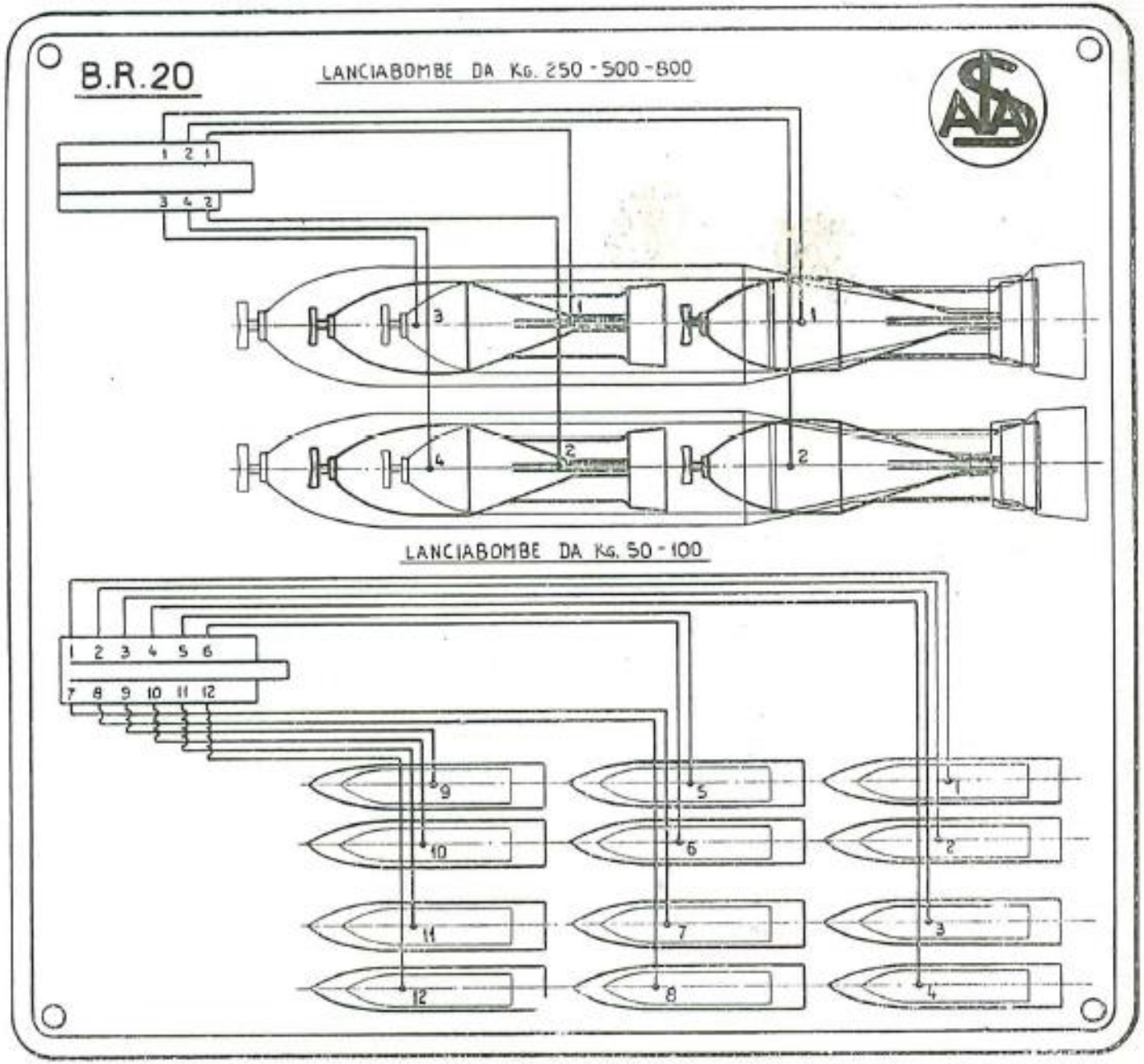


Fig. 51. — Schema sganciо bombe.

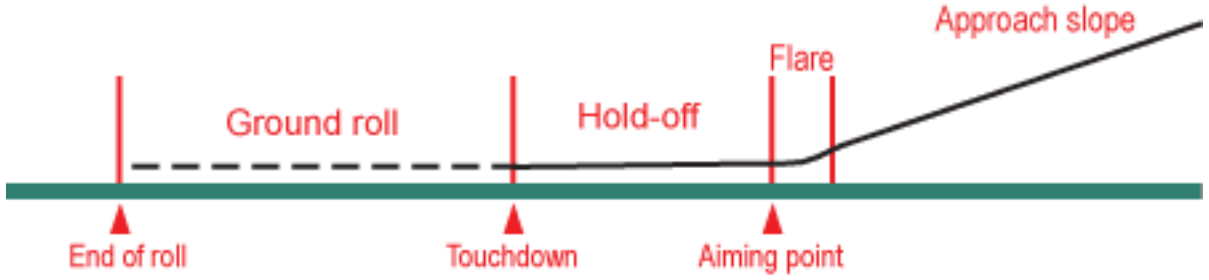
PART 6: TAKEOFF

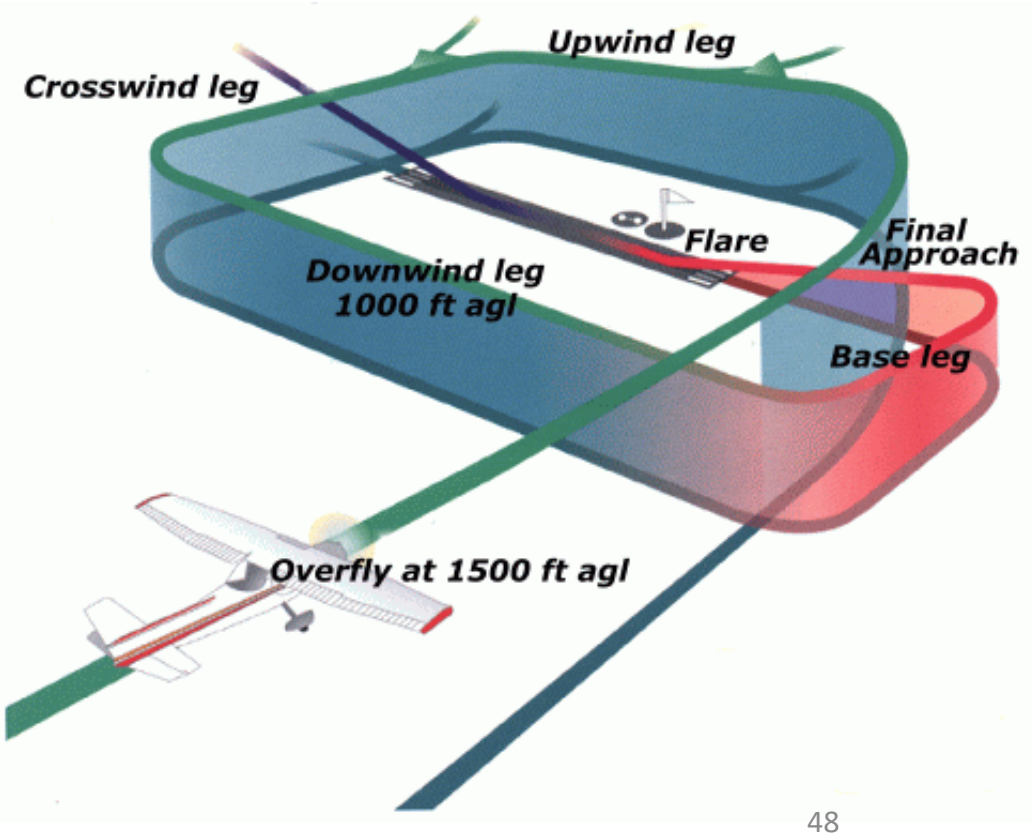
NOTE: This procedure is NOT the real-life start-up procedure, it has been simplified in the sim.

1. Make sure you have the proper fuel load by checking the fuel gauges.
2. Ensure that mixture is set to fully rich (by default it is).
3. Select Engine # 1 (L_Shift + 1).
4. Set your prop pitch to full fine (100 %).
5. Crack throttle about 10 %.
6. Engine cowling flap and oil radiator flaps fully closed.
7. Turn both magnetos for engine # 1 ON.
8. Make sure your propeller is clear (“Clear prop!”)
9. Engine ignition! (press “I” by default)
10. Select Engine # 2 (L_Shift + 2).
11. Repeat steps 3 to 9 but for engine # 2.
12. Select BOTH engines (I have it custom mapped to L_Shift + 3).
13. Open cowling flaps 100 %, oil radiator flaps 50 % and prop pitch is fully FINE (100 %).
14. Click on the Cylinder Head Temperature Gauge Selector (Sender) and set to any cylinder.
15. Wait for oil temperature to reach at least 50 deg C and the cylinder head temperature to reach at least 140 deg C.
16. Taxi to the runway. You can taxi with low oil temps without any problem. Make sure you are facing yellow panels on the runway. This means you are facing the right direction for takeoff.
17. Deploy flaps to approx. 10 degrees (first notch on flaps indicator). When flaps are set, set flaps to “Neutral” to lock them into position.
    - Note: With the BR20M, you need to cycle through 3 modes for flaps and landing gear. “Up”, “Neutral” and “Down”. Up and Down are straightforward, but since the flaps in the BR20 have a variable setting. “Neutral” means that the flaps stop moving. This way, you can have your flaps deployed to the angle you desire.
18. Perform last takeoff checks: Canopy Closed, Flaps at 10 deg, cowlings fully open, oil rad 50 %, Full Fine prop pitch, good oil & cylinder head temperatures.
19. Set Boost Cut-Out Override ON.
20. Gradually throttle up. Compensate for engine torque and wind using right aileron and rudder pedals to keep the aircraft straight. Slightly push the yoke forward to lift the tail.
21. Rotation is at 175 km/h.
22. Raise landing gear and flaps UP and adjust engine settings to 2100 RPM and 740 mm HG max for climb. Set Boost Cut-Out Override OFF.

PART 7: LANDING

1. Start your approach at 175 km/h @ approx. 800 m (1500 ft AGL).
2. Cowling flaps and oil rads fully open (100 %) and set prop pitch to full fine (100 %).
3. Deploy flaps (fully down) and landing gear.
4. Cut throttle and try to keep your nose pointed to the end of the runway.
5. Touchdown at 160 km/h in a 3-point landing.
6. Yoke fully back.
7. Tap your brakes until you come to a full stop. Be careful not to overheat your brakes or force your aircraft to nose over into a prop strike.





PART 8: ENGINE MANAGEMENT

Fiat A.80 / R.C.41 Engine

Pratt & Whitney R-1690 Hornet Engine (A.80 design derived from it)

The **Fiat A.80 / R.C.41** is a 18-cylinder, twin-row, air-cooled radial engine with reduction gear and supercharger, rated altitude 4,100 m. Rated at 1,000 hp (745 kW), it was a more powerful development of the Fiat A.74. At the time it was designed, the BR.20 was a good overall design, but it rapidly became obsolete, and the lack of improved versions condemned it to be only a second-line machine, underpowered and lacking in defensive firepower.

PART 8: ENGINE MANAGEMENT

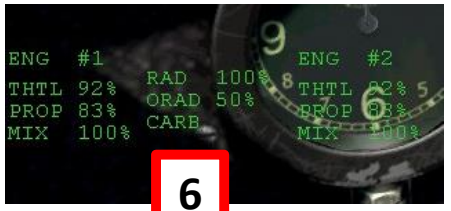
The engine was designed in 1935 by Tranquillo Zerbi and Antonio Fessia, simultaneously with the Fiat A.74. Both were conceptually derived from US models (Pratt & Whitney R-1690 Hornet for the A.80 and R-1830 Twin Wasp with 14 cylinders for the A.74). Fiat acquired a building license, but implemented numerous design differences such as engine bore and stroke. These decisions were made by the need to simplify production and to use the materials at hand. The A.80 was intended for bombers and civilian transport aircraft, while the A.74 with a smaller diameter was intended for fighter aircraft.

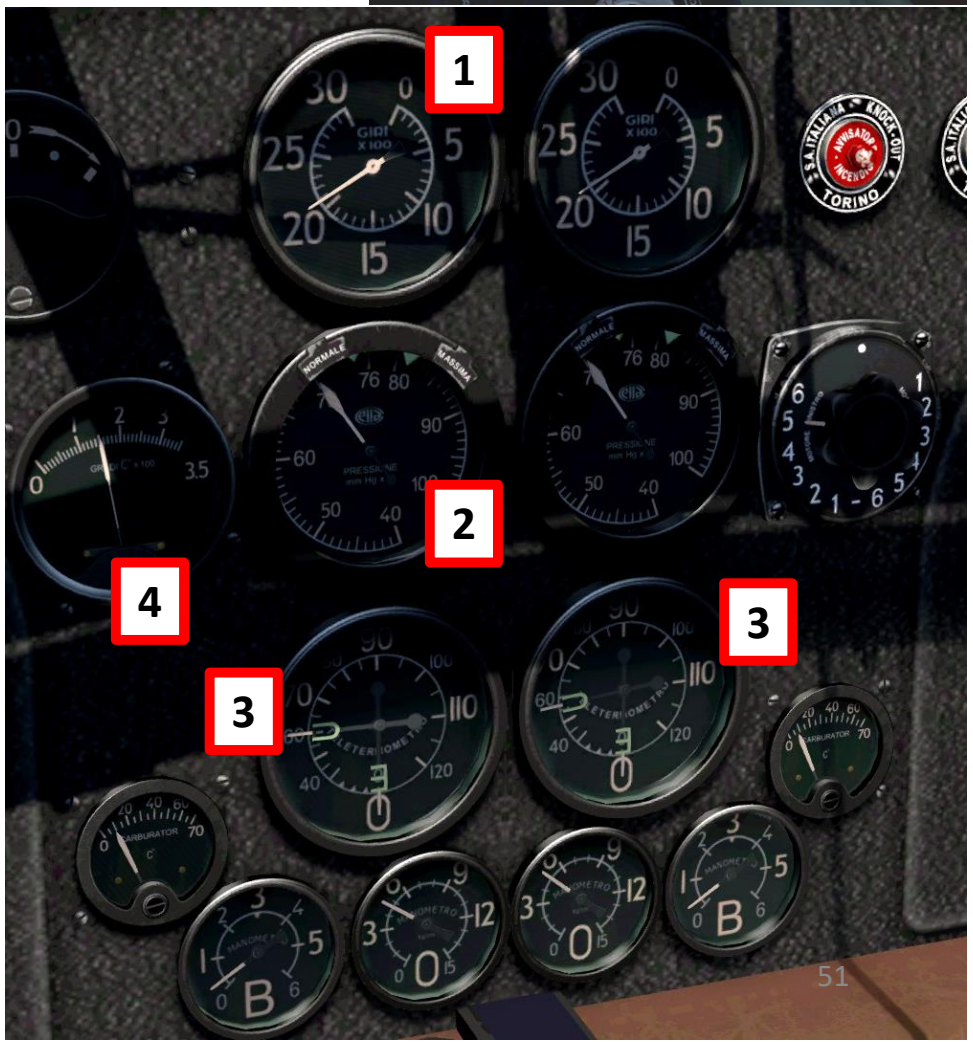
The engine was approved on November 10, 1937, after passing the usual test run for a cycle of 150 consecutive hours. The sad reality was that the A.80's operational capability was seriously reduced due to a number of factors. For instance, Italy only had access to poor qualify wartime fuel. The A.80 was far less popular than its little brother the A.74 as it ran into important reliability issues despite attempts in production to fix these issues. These problems earned the A.80 a bad reputation among Italian pilots.

On the other hand, it is interesting to note that the Japanese (which also used licensed BR.20s during the second Sino-Japanese War) did not complain about such engine reliability issues.

PART 8: ENGINE MANAGEMENT

- During a mission, the flight lead usually calls out his engine settings once in a while for the pilots to know what settings they should use.
- Always remember that this is a twin-engine: you must select “ALL ENGINES” in order to throttle up and change your cowling flap settings.
- You can read your engine settings from the gauges in the cockpit or from an info window.
  - The RPM indicator (1) shows 2100 RPM. The manifold pressure (2) reads 700 mm HG.
  - The oil radiators (3) can be approximated by looking at the oil rad lever or read from the info window in %. The control for cowling flaps is the same as the one used for water radiators. (100 % = fully open). Cowling flaps influence the cylinder head temperatures. (4)
  - Mixture lever is present in cockpit (5) but not functional.
  - Boost Cut-Out override (7) can be turned on as long as you do not exceed safety manifold pressure.
  - The resulting RPM is affected by manifold pressure (2), prop pitch (6)
  - Cowling flaps settings:
    - 0 % during engine warm-up
    - 100 % during normal operation
  - Oil radiator settings:
    - 0 % during engine warm-up
    - 50 % during normal operation





		(Unit)	BR.20M
TEMPERATURES			
Oil Rad	**Min**	Deg C	50
	Max		90
Cylinder Head Temp	**Min**	Deg C	140
	Max		240

PART 8: ENGINE MANAGEMENT

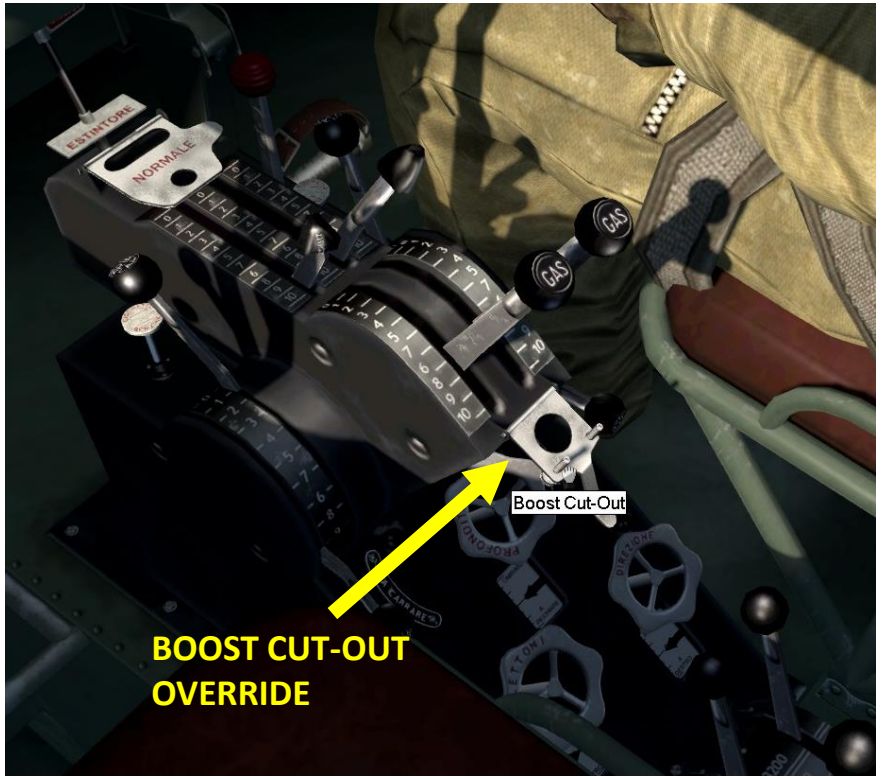
CYLINDER HEAD TEMPERATURES

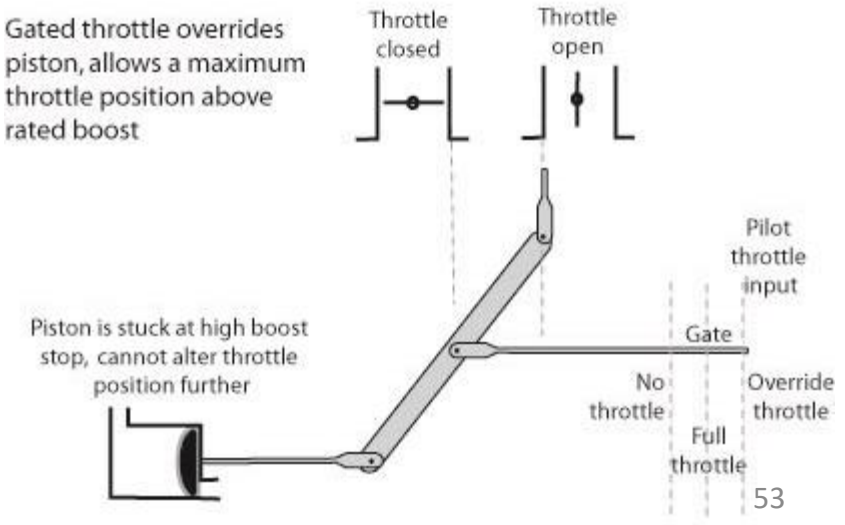
- In order to monitor cylinder head temperatures, you only have one gauge to do so.
- The Fiat A.80 R.C.41 is a 18-cylinder air-cooled radial engine.
- Click on the “Cylinder Head Temperature Next Sender” selector to choose which individual pair of cylinders will have its temperature displayed on the temperature gauge.
- In theory, all cylinders should have approximately the same temperature, which is why in-game you can only click once on the selector, monitor a single cylinder, and have a good idea how the temperature state of your whole engine.
- A diligent pilot (or co-pilot) would probably check each pair of cylinders periodically to make sure all cylinders are operating within safety parameters. Fortunately, we don’t really have to do that in CloD…
- If your engine is damaged by flak or enemy fire, using the Cylinder Head Temp Selector switch is a good way to know how many cylinders of each engine are still functioning. The loss of a single cylinder does not mean that the engine stops running… That’s the beauty of radial engines: they will keep running even when they are falling apart!

Boost cut-out override (BCO)

The Boost control override did not originate as an emergency power setting, but was adapted to be so. In original form, it was just a way of disabling the boost controller in case of malfunction, thus making the system directly link the pilot handle to the throttle valve and giving him the ability to set any boost the supercharger was capable of (but without control, boost would change with altitude).

Although it is hard to find references on this, it is easy to see how the BCO could become an unofficial emergency power switch. A pilot could pull it and try for a bit more boost than the rated 740 mm HG, and hopefully get a bit more power without damaging the engine.





PART 9: AIRCRAFT PERFORMANCE

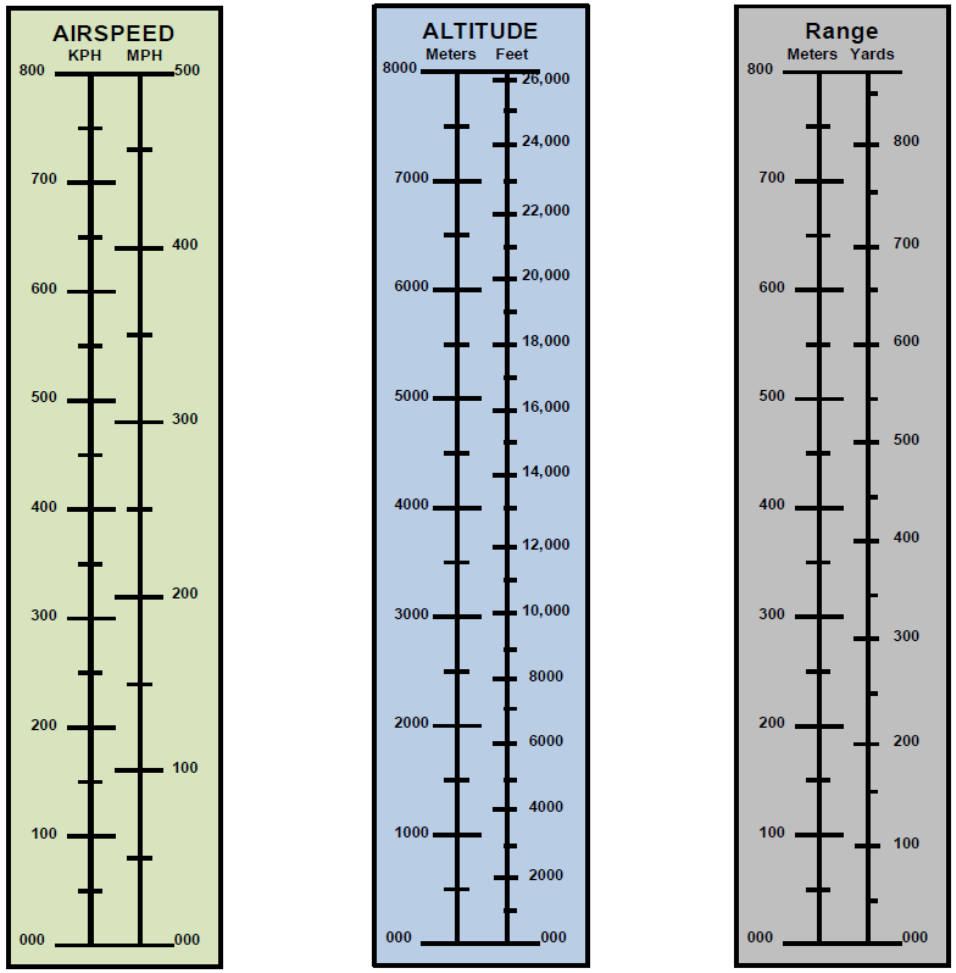
AIRSPEEDS		
Takeoff – Rotation	UK: mph GER/ITA: km/h	175
Max Dive Speed		600
Optimal Climb Speed		210
Landing – Approach		175
Landing – Touchdown		160

- A climb speed of 210 km/h is recommended.
- When diving, pilots should partially close their Air Louvres (cowling flaps) and Oil Radiators to prevent the Cylinder Heads and oil from cooling too much otherwise misfiring and rough running may result.
- Unfortunately, there is not a whole lot of information on the BR.20's performance.

SPECIFICATIONS	
CREW	4-5
ENGINE	2 x FIAT A.80 R.C.41, 735kW
WEIGHTS	
Take-off weight	10100 kg
Empty weight	6400 kg
SPEED LIMITS	
Stall Speed	150 km/h
Max Diving Speed	410 km/h

PART 9: AIRCRAFT PERFORMANCE

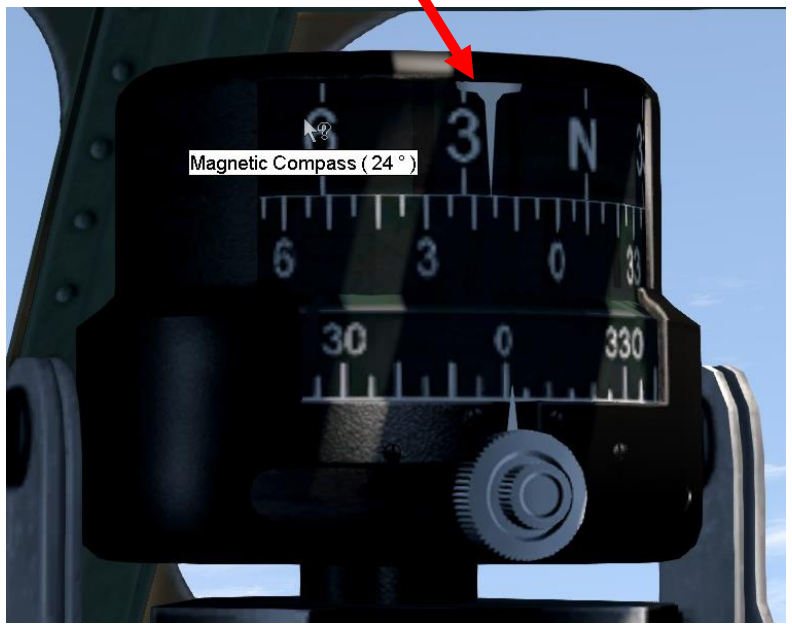
ONE **CONVERSION DATA** ONE

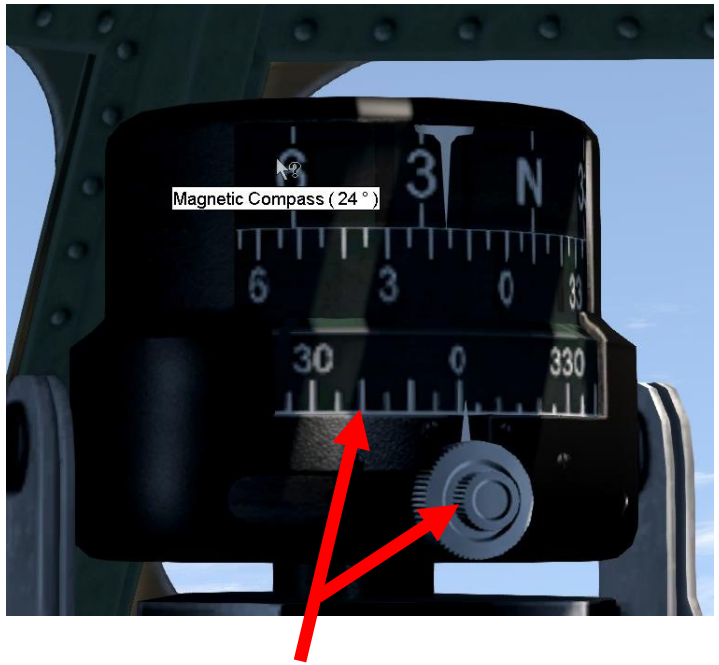


International Civil Aviation Organization International Standard Atmosphere							
Temperature		Altitude Above Sea Level		Atmospheric Pressure			Mach 1
°F	°C	feet	meters	inches Hg	mm Hg	psia	mph
59	15	SL	0	29.92	760	14.70	761
55	13	1000	305	28.86	733	14.17	758
52	11	2000	610	27.82	706	13.67	755
48	9	3000	914	26.82	681	13.17	752
45	7	4000	1219	25.84	656	12.69	750
41	5	5000	1524	24.90	632	12.23	748
38	3	6000	1829	23.98	609	11.78	745
34	1	7000	2134	23.09	586	11.34	742
31	-1	8000	2438	22.22	564	10.92	740
27	-3	9000	2743	21.39	543	10.51	736
23	-5	10000	3048	20.58	523	10.10	734
5	-15	15000	4572	16.89	429	8.29	720
-13	-25	20000	6096	13.75	349	6.75	706
-31	-35	25000	7620	11.10	282	5.45	693
ONE							ONE

PART 10: COMPASS TUTORIAL

YOUR MAGNETIC HEADING





MAGNETIC COMPASS (UPPER BAND)

GIVES YOU YOUR MAGNETIC HEADING. THE WHITE INDICATOR IS YOUR COURSE SETTER AND THE WHITE NEEDLE IS YOUR ACTUAL HEADING.

WHEN YOU SET A COURSE WITH THE COURSE SETTER AND THE RED TRIANGLE AND THE WHITE INDICATOR ARE ALIGNED, IT MEANS THAT YOU ARE ON COURSE.

AS YOU CAN SEE IN THE PICTURE ABOVE, WE ARE ABOUT 8 DEGREES OFF-COURSE.

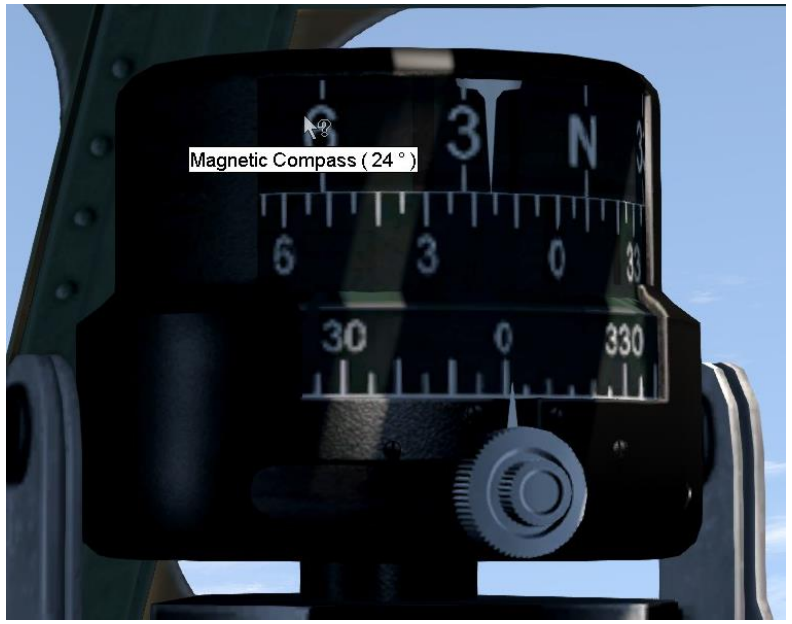
COURSE SETTER (LOWER BAND)

THE COURSE SETTER ALLOWS YOU TO CREATE A REFERENCE MARK ON THE COMPASS TO A HEADING OF YOUR CHOICE. THIS WAY, YOU JUST NEED TO STEER THE AIRCRAFT TOWARDS THE “COURSE” SET ON THE COURSE SETTER.

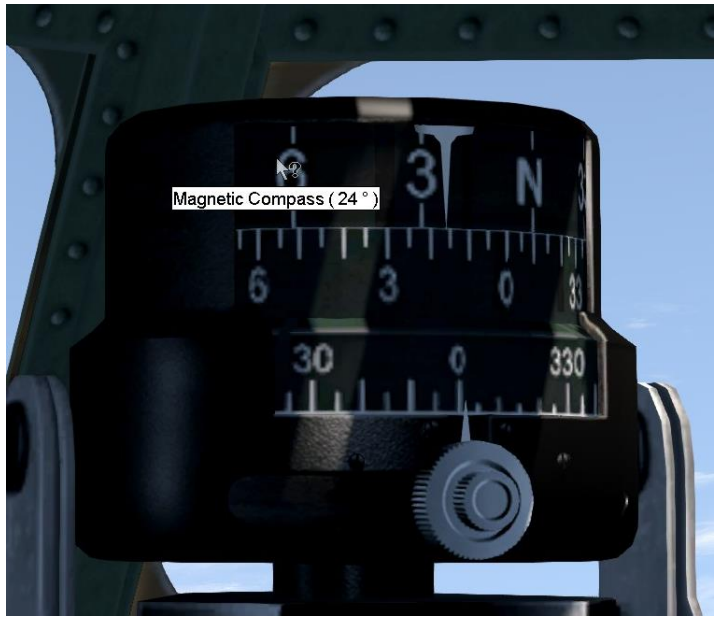
DIRECTIONAL GYRO

DIRECTIONAL GYRO (DG) CAN BE SET TO ANY HEADING YOU WANT. IT IS RECOMMENDED FOR THE DG TO BE SET TO YOUR CURRENT HEADING SHOWN BY THE MAGNETIC COMPASS. THIS WAY, YOUR MAGNETIC COMPASS AND DIRECTIONAL GYRO ALL SHOW THE SAME MAGNETIC HEADING.

PART 10: COMPASS TUTORIAL



MAGNETIC COMPASS (UPPER BAND)



COURSE SETTER (LOWER BAND)

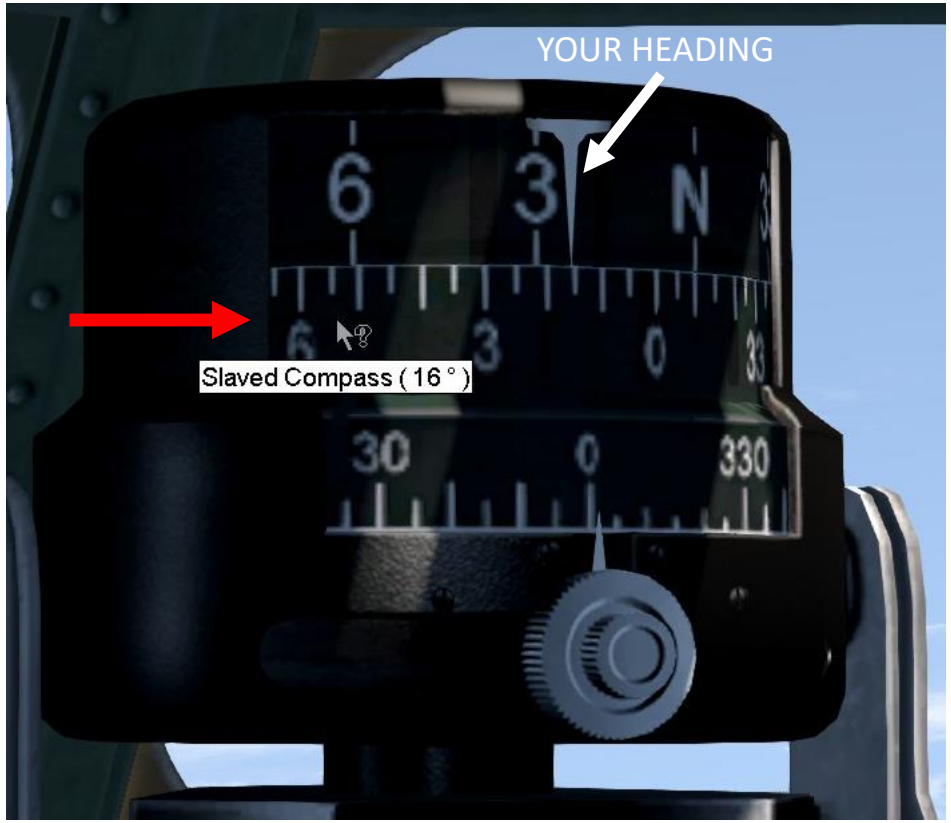
DIRECTIONAL GYRO

There is no mechanical/electrical relationship between the directional gyro and the compasses. The autopilot could be set without any reference to the magnetic compass. However, it is good practice to align the compasses with the directional gyro. In practice, only the lead aircraft has the option of engaging the autopilot. The other planes in the formation fly manually due to the demands of formation flying. Having the magnetic compass setup gives the pilot a visual reference to the current course. In some cases the leader may prefer to fly using the magnetic compass rather than setting up the auto-pilot. The complexity of the mission plan (course), length of leg (etc.) will usually dictate the practicality of employing the auto-pilot.

PART 10: COMPASS TUTORIAL

SLAVED COMPASS (MIDDLE BAND)

- Historically, the function of the slaved compass was to be a gyroscopically stabilized compass that would read correctly in turns while a magnetic compass would only read true when you are flying straight and level for a while. The magnetic compass has a much slower response than gyroscopes.
- In the earlier versions of the game, the slaved compass was powered by a separate “motor compressor”, which would require to be started too. However, in the latest versions of the game the slaved compass is simply powered by the left engine (# 1). Therefore, you don’t need to start anything.
- When you spawn, your slaved compass will not work. It’s normal: your # 1 engine is not running yet. Your slaved compass will only work once your engine reaches RPM high enough to get the gyros fired up.
- **However:** the slaved compass is often off by a couple of degrees. It is not very reliable since you always need to check your magnetic compass to make sure it is align. Therefore, **I recommend to just disregard the slaved compass**. It’s a nice, expensive toy… but not much else.



PART 10: COMPASS TUTORIAL

HOW TO SET UP YOUR GYRO & COMPASS

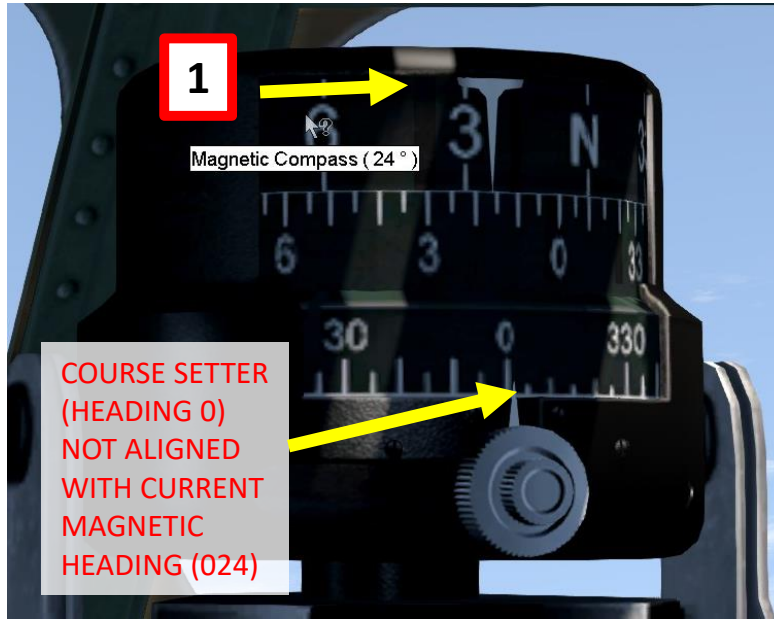
1. Check your magnetic compass and read your current heading. Our heading of 024. This heading is in reference to the magnetic north, NOT the geographic north.

2. Set your directional **directional gyro compass** by clicking on the rotary knob to reflect the magnetic heading obtained on your magnetic compass. In our case, set the gyro to 024. This way, the directional gyro will give us a magnetic heading that is correct. You will see the blue numbers pop again. You can use them as a way to fine tune your gyro.

3. And that's it! You will now be able to use your directional gyro to orient yourself. If your gyro accumulates error after high-G manoeuvers, you can try to re-set it using steps 1 to 2.

4. You could also set your directional gyro to 014 (024 minus 10 deg of magnetic declination) instead if you wanted to, which would give you your geographical heading instead of your magnetic one. But for simplicity's sake, we will use the DG and MC all synchronized.

NOTE: To navigate from point A to point B, open the map, find a geographical heading to follow, add 10 degrees to this heading and it will give you the magnetic heading to follow on your MG and DG (if they are all synchronized, of course).



Directional Gyro set to approx. 024 (magneticl heading). We are now havigating in relationship to the magnetic north,

PART 10: COMPASS TUTORIAL

COMPASS NAVIGATION TUTORIAL

- Using the magnetic compass and the directional gyro is quite useful to know where you are going.
- The directional gyro indicator itself does not indicate your heading. You need to set it manually in order to translate what the magnetic compass compass is telling you.
- Typically, you set your compass and gyro on the ground. It is not the kind of stuff you want to do when you are flying 2,700 m over England.
- 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.
- There is a difference between a **magnetic heading** and a **geographical heading**. If you follow a magnetic heading of 0 (which is what you read on your magnetic and repeater compasses), you will be following the magnetic North Pole, not the geographical one. Keep that in mind when you are navigating.
- If you consult your in-game map and want to go North, in fact you will have to take into account **magnetic declination**, which means that you will have to navigate to a magnetic heading of 0 + 10 deg = 010 deg.
- In other words, if you want to follow a specific heading, take that heading and add 10 degrees. This value is what you will have to follow on your magnetic compass.
- You can also look at it the other way: if you want to go North and you decide to follow your compass to "0" (magnetic North), you will in fact be 10 degrees off course. The next slide will explain why.

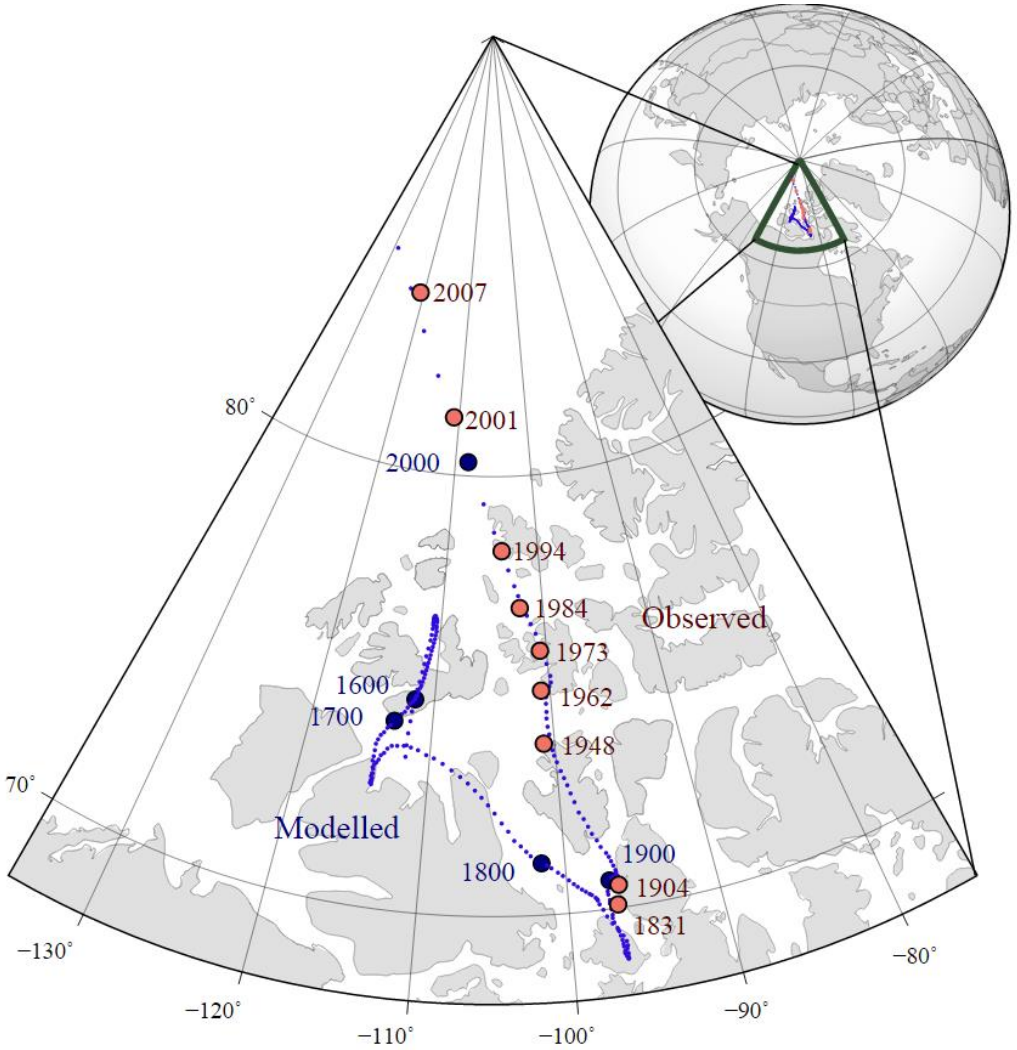
PART 10: COMPASS TUTORIAL

About Magnetic Declination

The direction in which a compass needle points is known as magnetic north. In general, this is not exactly the direction of the North Magnetic Pole (or of any other consistent location). Instead, the compass aligns itself to the local geomagnetic field, which varies in a complex manner over the Earth's surface, as well as over time. The local angular difference between magnetic north and true north is called the magnetic declination. Most map coordinate systems are based on true north, and magnetic declination is often shown on map legends so that the direction of true north can be determined from north as indicated by a compass.

This is the reason why in Cliffs of Dover, the magnetic compass needs to be “adjusted” to take into account this magnetic declination of the magnetic North pole (which is actually modelled in the sim, which is pretty neat).

In 1940, the magnetic declination required an adjustment of 10 degrees and 8 minutes. We round that to 10 deg.



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

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL - INTRO

- Bombing is one of the most complex and rewarding features of flight simulators. The bomber pilot has a thankless job, yet bombing is an art form in itself.
- This tutorial will be for high-altitude bombing as it encompasses all aspects of bombing and navigation.
- Bombers should work as a team. Not only with other bombers, but with fighter escorts as well to keep them alive.
- The mind of a bomber pilot is a patient and organized one. If you fail to plan your mission properly, you certainly plan to fail and end up in a smoldering pile of ashes.

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL - INTRO

- A bombing operation can be separated in 6 phases:
  1. Planning the mission
  2. Takeoff and assembly of bomber force
  3. Rendezvous with fighter escorts
  4. Fly to target
  5. Bombing run
  6. Return to Base
- We will explore phases 1, 4 and 5 together.

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL – PHASE 1: PLANNING THE MISSION

- Before you even take off, you need to make sure you know the following:
  1. Where am I?
  2. Where am I going?
  3. How much fuel do I need?
  4. What am I doing?
  5. How am I doing it?
  6. What can help me?
  7. What can kill me?
  8. How do I get home?
- Once you have all that stuff figured out, THEN you can takeoff.
- The following example will show you a typical mission planning.

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL – PHASE 1: PLANNING THE MISSION
WHERE AM I? WHERE AM I GOING?

- Reading the bomber objectives always helps to find a high-priority target.
- You can look at the bombing objectives in the mission briefing (can be accessed via aircraft selection menu or by right-clicking, opening the map, right-clicking on the map and choosing “Briefing”).
- **Hawkinge will be our target for today.**

Winds from the W @ 2 m/s.

4 Days ago England and her allies launched a raid into the city of Boulogne. Our ground forces have the city surrounded and the enemy shall soon suffer a total collapse. The Luftwaffe is supporting this effort, and plays a key role in throwing these "raiders' back to the sea. Aside from our regular duties with the bombing campaign against England, we will assist our army by taking out key bridges and artillery locations, as well as destroying the enemy re-supply ships in the channel.

Bombing orders:

=== 5 Enemy supply/troop ships inbound west of Boulogne
=== 2 Bridges in Boulogne centre (1 rail, 1 regular)
=== BA 19.1 Enemy artillery base east of Boulogne
=== AU 25.6 Faversham Railyard
=== AS 21.1 Battle Artillery Factory

Destroy the following RAF Airfeilds: (We believe Hawkinge and Littlestone are home to Spitfire IIa squadrons)

=== RAF Hawkinge
=== RAF Lympne
=== RAF Littlestone

JG. orders:

-Escort, patrol, and protect our troop staging area near Estree, and the railyard in Samer.
-Valuable fuel distribution and a munitions factory in the northern sectors must also be patrolled.
-Our frontline airfeilds are under threat! Cover them carefully, especially Campagne Les Guines, which is homebase to our E-1 Jabos and the 109 E-4N!
-Our troop trains may need air cover when called upon. One travelling from St Omer west to Samer, another travelling from Estree, to the coast, then north to Boulogne.

Grounded? Volunteer for the Army! Tank drivers and gunners are needed for the fight south of Boulogne. Fight your way in and destroy any artillery positions and even bridges (if you make it that far...)

(Please report any bugs/errors/suggestions on the ATAG Forums or PM ATAG_Freya)

Read bomber objectives and pick your targets.
For instance: the Faversham Railyard is located in grid AU25.6, which means it is located in the middle-right corner of the Alpha-Uniform 25 grid square. .6 is the location in the square based on the referential of a numpad for the designated grid square (1 is lower left, 5 is center, 6 is middle right, 9 is upper right, etc…)

However, Hawkinge seems like a juicier target. We’ll choose this one instead.

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL – PHASE 1: PLANNING THE MISSION
WHERE AM I? WHERE AM I GOING?

- Good! We now have a target (Hawkinge airfield), and we decided that we would spawn at Calais-Marck.
- Now, it is time to figure out how we get there and drop them cabbage crates. We need a heading and a distance.
- Open your map and select (left click) your Protractor tool to obtain your heading to target.

While map is selected, open up your "Tools" menu (right click) and use your protractor to find the correct heading.

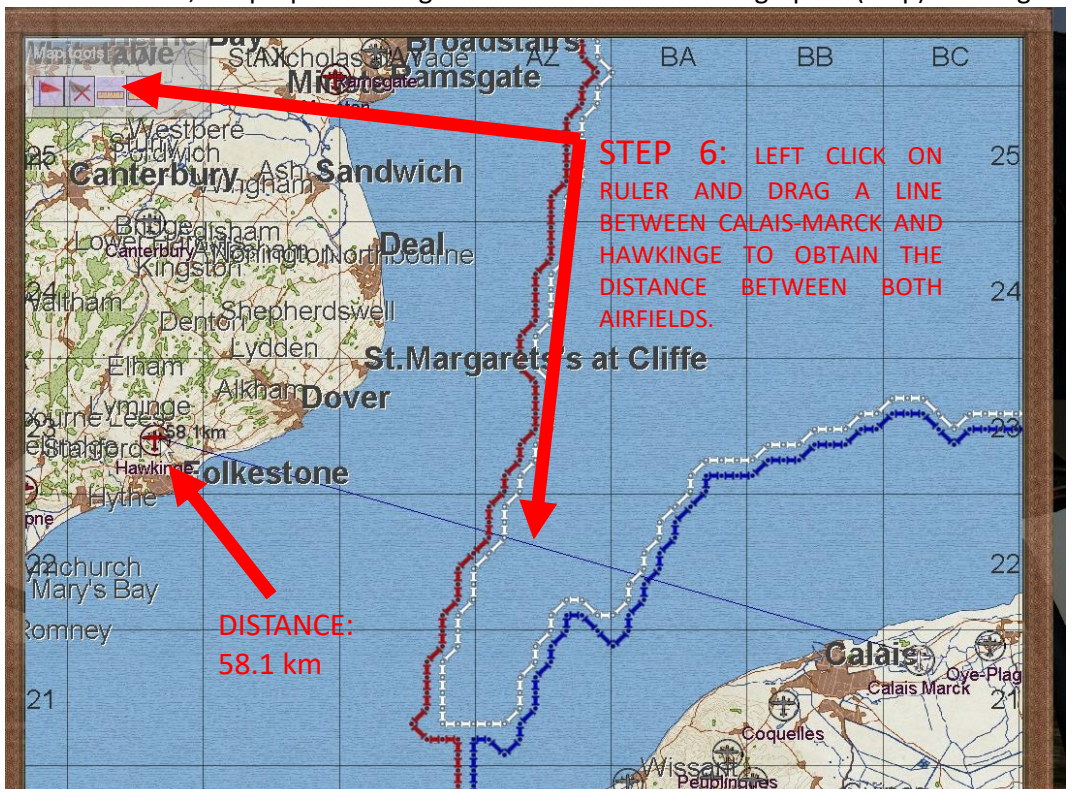
Left-Click on the protractor icon.

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL – PHASE 1: PLANNING THE MISSION
WHERE AM I? WHERE AM I GOING?

1) Click and hold left mouse button on Calais-Marck and drag a vertical line. Once line is parallel with the North, release mouse button.
2) Click and hold left mouse button on Calais and drag a line to Hawkinge Airfield. Once line is crossing the center of the airfield icon, release mouse button.

3) A heading number should pop next to Calais. Remember this number. In our case, we get 074 degrees.
4) In case your target is West (to the left) to your home base, the number that pops up will not be your heading. The proper heading will be <u>360 minus the number that popped up</u>. In our case, the proper heading will be 360 – 74 = 286 Geographic (map) Heading.



5) Since the heading we obtained on the map is geographic and not magnetic, the **magnetic course** we will need to follow on our compasses is **286 + 10 = 296 deg**. This is the heading we will follow on our compass, course setter, DG and repeater compass. We added 10 degrees to take into account magnetic declination as shown in previous compass navigation tutorial.
6) Obtain distance to target by clicking on the ruler and dragging a line from Calais to Hawkinge. In our case, we get a **distance of approx. 58 km**.

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL – PHASE 1: PLANNING THE MISSION WHERE AM I? WHERE AM I GOING?

- We now know our target: Hawkinge. We must know how high it is to take into account target elevation when we will be bombing.
- You can use the LOFTE tool available on ATAG: theairtacticalassaultgroup.com/utils/lotfe7.html
- A tutorial on how to use this tool is available in Chuck's Blenheim High Altitude Bomber Guide 2.0 available here: https://drive.google.com/open?id=0B-uSpZROuEd3MDEwaDZXdmNSdnM&authuser=0
- One quicker way to do it is to get the airfield's altitude directly from the list on the next page made by Ivank.
- LOFTE's values tend to vary from point to point: values you get from this tool are an approximation that must sometimes be taken with a grain of salt.
- Hawkinge's altitude in the table is 158 m (518 ft).

PART 11: BOMBING TUTORIAL

IL2 STURMOVIK CLIFFS OF DOVER AIRFIELD ELEVATIONS

UK AIRFIELDS

Bembridge	13m	43ft	Manston	44m	14ft
Biggin Hill	179m	587ft	Netheravon	119m	390ft
Boscombe Down	127m	417ft	North Weald	80m	262ft
Canterbury	51m	167ft	Northolt	37m	121ft
Croydon	101m	331ft	Old Sarum	79m	259ft
Eastchurch	7m	23ft	Portsmouth	1m	3ft
Farnborough	77m	253ft	Ramsgate	47m	154ft
Ford	1m	3ft	Reading	46m	151ft
Gatwick	60m	197ft	Redhill	24m	79ft
Gosport	1m	3ft	Rochester	130m	426ft
Gravesend	63m	207ft	Rochford	10m	33ft
Hamble	20m	66ft	Ryde	52m	171ft
Harewell	120m	394ft	Salisbury	131m	430ft
Hawkinge	158m	518ft	Sandown	21m	69ft
Heathrow	23m	75ft	Southhampton	9m	30ft
Hendon	50m	163ft	Tangmere	12m	40ft
Heston	30m	98ft	Thorney Island	1m	3ft
Hornchurch	10m	33ft	Upavon	147m	482ft
Kenley	174m	571ft	Watchfield	100m	328ft
Larkhill	114m	374ft	West Hampnett	21m	69ft
Lee On Solent	10m	33ft	White Waltham	36m	118ft
Littlestone	22m	72ft	Willimington	22m	72ft
Lympne	100m	328ft	Yatesbury	170m	558ft
Maidstone	84m	275ft			

IL2 STURMOVIK CLIFFS OF DOVER AIRFIELD ELEVATIONS

FRENCH AIRFIELDS

Abbeville	61m	200ft	Guines	46m	151ft
Achiet Grevillers	127m	417ft	Haute Fontaine	180m	590ft
Amiens Allonville	89m	292ft	Horm Elingen	161m	528ft
Amiens Glisy	59m	194ft	Hydrequent	78m	256ft
Aras St Liger	109m	358ft	Le Havre Octeville	96m	314ft
Arras	98m	321ft	Le Touquet	1m	3ft
Audembert	42m	138ft	Licescourt	70m	230ft
Barly	122m	400ft	Marquise West	24m	79ft
Barly	112m	367ft	Merville calonne	9m	30ft
Beamont Le Roger	139m	456ft	Monchy Briton	150m	492ft
Beauvais Nivllers	120m	394ft	Montdidier	108m	354ft
Beauvais Tille	99m	325ft	Oye- Plage	2m	7ft
Berk	1m	3ft	Persan Beaumont	42m	138ft
Bernay St Martin	161m	528ft	Peuplinguess	101m	331ft
Bolsjean Ecuires	57m	187ft	Pihen	96m	315ft
Brias	150m	492ft	Plumetot	40m	131ft
Brombos	191m	627ft	Poiy Nord	171m	561ft
Bulougne Alperch	69m	226ft	Querqueville	1m	3ft
Caen Carpiquet	61m	200ft	Rezy Norrent fontes	94m	308ft
Caffiers	112m	367ft	Rosieres En Santifer	82m	269ft
Calais Marck	2m	7ft	Rouen Boos	140m	459ft
Carquebut	20m	197ft	Roye Amy	83m	272ft
Champ Les Guines	75m	246ft	Samer	61m	200ft
Colembert	198m	649ft	Sempy	120m	394ft
Coquelles	13m	43ft	St Inglewert	129m	423ft
Cramont Yurtench	121m	397ft	St Omer Arques	29m	95ft
Crecy	141m	462ft	St Omer Clairmarrias	9m	29ft
Creil	101m	331ft	St Omer Wizennes	78m	256ft
Crepon	59m	194ft	Theville	135m	443ft
Deanville St Gatien	140m	459ft	Tramecourt	126m	413ft
Desures	200m	656ft	Wailly Beauchamp	51m	167ft
Dieppe	101m	331ft	Wissant	21m	69ft
Estree	80m	262ft	Yvrench	110m	361ft
Grandvilliers	180m	590ft	Zuterque	36m	118ft

NOTES

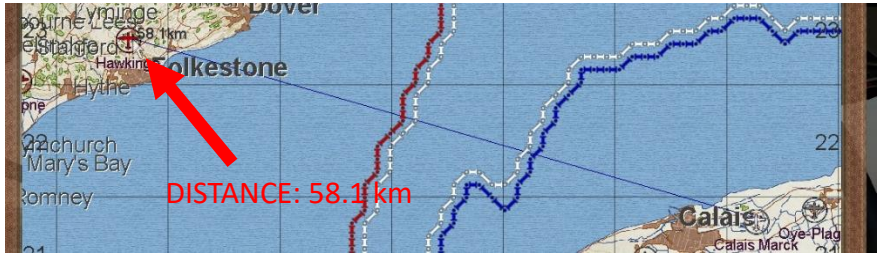
To determine Map QNH. Park on the airfield. Set Altimeter to read the values above. Pressure sub scale is now set to correct QNH for the map.

SC/JG_Ivank Oct 2012

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL – PHASE 1: PLANNING THE MISSION
HOW MUCH FUEL DO I NEED?

- The heavier you are, the slower you are and the more vulnerable you are.
- Calculating your required fuel is easy.
- With a full bomb load (2 X 800 kg), the maximum fuel load you can carry is about 50% (approx. 1810 L).
- Based on in-game tests I performed, the BR.20M consumes approximately 680 Liters of fuel per hour if we stay at engine settings for a max climb rate.
- If we fly at 300 km/h, based on fuel capacity, we can deduce that @ 50 % fuel we can fly around for 2.6 hours of flight time, which gives us a max flying distance of 780 km (which is 2 times the max range).
- Use the "Map Tool Ruler" to get our target's range. Hawkinge is about 60 km away from Calais. Since we plan to return to base, we add another 60 km. We can add about 40 km for loitering time, assembly and rendezvous with fighters and another 40 km for reserve fuel in case we need to find a secondary airfield. We have a grand total of 200 km.
- To fly for 200 km at 2100 RPM at 300 km/h, we simply multiply our max takeoff fuel load (50 %) by the ratio of the distance we need to fly on the maximum distance @ max takeoff weight (780 km):
- 50 % * 200 km / 780 km = 13 % fuel approx. That is what we need.
- We can round that up to 20 % to be very conservative. So there we go, we need roughly 20 % fuel.
- Note: you could also takeoff with a full fuel load and full bomb load if you wanted to. The BR.20M can still fly. This practice is simply to teach you how to plan your fuel for a real mission intelligently.



Left click and drag from point A to point B to get a distance.

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL – PHASE 1: PLANNING THE MISSION WHAT AM I DOING?

- Now that we know where we are and where we are going and how much fuel we need, we need to know what we will be doing.
- We will load up **2 X 800 kg Semi-AP bombs with a Type A Mechanical Detonator (high altitude)**. See the Weapons and Armament section to know more.
- Our bombing altitude will be 2,700 m. We could go as high as 7,000 m if we wanted to… but with our bombsight's max altitude setting of 2,700, our precision will greatly suffer.
- Why do we ask ourselves this question? Simply because the challenge of a bomber pilot is the sheer workload behind it. You are doing by yourself the task that took two dedicated guys or more to do. Therefore, our goal is to reduce the workload as much as possible by doing as much as we can on the ground so we can concentrate on what's going on during the flight rather than prepare our instruments in a hurry.
- In a bomber flight, generally half the guys do not know how to use a bomb sight: they simply drop their bombs on the bomber lead's command. Keep in mind that having a bomber lead is not enough to have a proper mission: fighter interceptors always go for the bomber lead because odds are that he is the most experienced bomber pilot. Good bomber operations generally have a second or a third leader to take No. 1's place in case he gets shot down or runs into engine trouble.
- If you have 9 guys flying for an hour to get to a target that are waiting on your command to drop their bombs, you better make sure that you know where you're aiming…
- Therefore, it is important to know at what speed and what altitude you plan to do your bomb run so you can set up your bombsight in advance. I usually set my bombsight when I am on the ground. This way, you just need to make small adjustments when you get to target rather than set everything up in a hurry.
- You will need your target elevation to set up your bombsight properly.

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL – PHASE 1: PLANNING THE MISSION
HOW AM I DOING?

- Here is why you need to take into account target elevation in your bombsight:
- Pressure altitude and Height are related to one another, but keep in mind that they are two completely different things.
- Height is the vertical physical distance between your aircraft and the ground. Pilots often refer to height as “AGL” (Above Ground Level).
- Pressure altitude is the altitude measured using a pressure datum reference. Pilots often refer to altitude as “AMSL” (Above Mean Sea Level). Pressure Altitude reading can vary based on meteorological conditions.
- Bombsight height setting can be determined by simply reading the altimeter and substracting the target elevation (assuming the altimeter pressure altitude was set correctly for the pressure conditions in Home Base).
- The bombsight height, in our case will be our altimeter altitude (2,700 m) minus the target elevation (158 m). The bombsight height will have to be set at more or less 2,542 m. Keep in mind that the altitude can change due to many factors and that your bombsight height is AGL, and will always require you to substract target elevation to be accurate.

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL – PHASE 1: PLANNING THE MISSION
HOW AM I DOING IT?

ALTITUDE: 2,700 M AMSL
ABOVE SEA LEVEL

BOMBSIGHT HEIGHT
2,542 m AGL

The bombsight height, in our case will be our altimeter altitude (2,700 m) minus the target elevation (150 m). The bombsight height will have to be set at more or less 2,700 m. Keep in mind that the altitude can change due to many factors and that your bombsight height is AGL (above ground level), and will always require you to substract target elevation to be accurate.

NOTE: the max bombsight altitude for the BR.20M is 2,700 m.

TARGET ELEVATION: 158 m

HAWKINGE
ALTITUDE: 158 m AMSL

ENGLISH CHANNEL
ALTITUDE: 0 m AMSL

CALAIS MARCK
ALTITUDE: 2 m AMSL

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL – PHASE 1: PLANNING THE MISSION
HOW AM I DOING?

- Caution: our altitude and speed set on the bombsight will **not** be the values read on the altimeter and airspeed indicators.
- We have already seen why the bombsight height must be the altitude value read on the altimeter minus the target elevation.
- **Indicated Airspeed** (IAS) is the speed you read on your airspeed indicator. It is driven by your Pitot tube and a barometric static port. Air pressure varies with altitude (the higher you go, the less air there is). IAS is corrected for the surrounding air pressure but **not** for air density.
- **True Airspeed** (TAS) is indicated airspeed corrected to take into account air density (which, like we said, depends on your current altitude).
- The bombsight requires a True Airspeed input, **not** an indicated airspeed.
- Fortunately, there is an interpolation table available in the Cliffs of Dover manual to help you get an approximation of TAS. We will see how to use this table in the next page.

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL – PHASE 1: PLANNING THE MISSION
HOW AM I DOING?

We will aim for an indicated airspeed (IAS) of 300 km/h (read on the airspeed gauge) at an altitude of 5,840 m.

1. Pick the appropriate row for IAS (300 km/h).
2. Pick the appropriate columns for nearest altitudes (2,000 and 3,000 m)
3. Take note of the TAS values in the table 331 km/h and 348 km/h)
4. Because the TAS values are close enough and that bombsight airspeed only goes into increments of 10, we can approximate the resulting TAS value to approx. an average value of **340 km/h**. It is not the exact value, but in our case, since we are too lazy to take a calculator and do the interpolation manually, it should be precise enough.

Metric (speed in km/h, altitude in metres)

Metres / Km/h	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
200	210	220	232	244	257	271	286	301	317	334
250	262	276	290	305	322	339	357	376	396	418
300	315	331	348	366	386	407	428	451	476	501
325	341	358	377	397	418	440	464	489	515	543
350	367	385	404	425	448	471	496	521	549	577
375	393	413	433	456	480	505	531	559	588	618
400	419	440	462	486	512	538	566	596	627	660
425	446	468	491	516	544	572	602	633	666	701
450	472	495	520	547	576	605	637	670	705	742
500	524	549	575	604	634	666	699	734	771	810
550	576	604	633	664	698	733	769	808	848	891
600	628	658	690	725	761	799	839	881	925	972
650	681	713	748	785	825	866	909	955	1003	1053

PART 11: BOMBING TUTORIAL

PRESUME ONE FACTOR, ALTITUDE OR TAS, IS CORRECT AND THE OTHER INCORRECT. BOMB TRAJECTORY WILL BE AFFECTED.

ALL BOMBSIGHTS IN THE SIM USE TRUE AIRSPEED (TAS). DO NOT CONFUSE TAS WITH IAS – INDICATED AIRSPEED, WHICH IS WHAT YOU READ ON YOUR INSTRUMENTS.

1. **INPUT TAS TOO LOW, PLANE IF FLYING FASTER THAN INPUT AIRSPEED**
2. **INPUT ALTITUDE TOO LOW, PLANE IS FLYING HIGHER THAN INPUT ALTITUDE**

BOMBS OVERSHOOT TARGET

CORRECT ALTITUDE AND TAS INPUT

BOMBS FALL SHORT OF TARGET

1. **INPUT TAS TOO HIGH, PLANE IF FLYING SLOWER THAN INPUT AIRSPEED**
2. **INPUT ALTITUDE TOO HIGH, PLANE IS FLYING LOWER THAN INPUT ALTITUDE**

TARGET

PART 11: BOMBING TUTORIAL

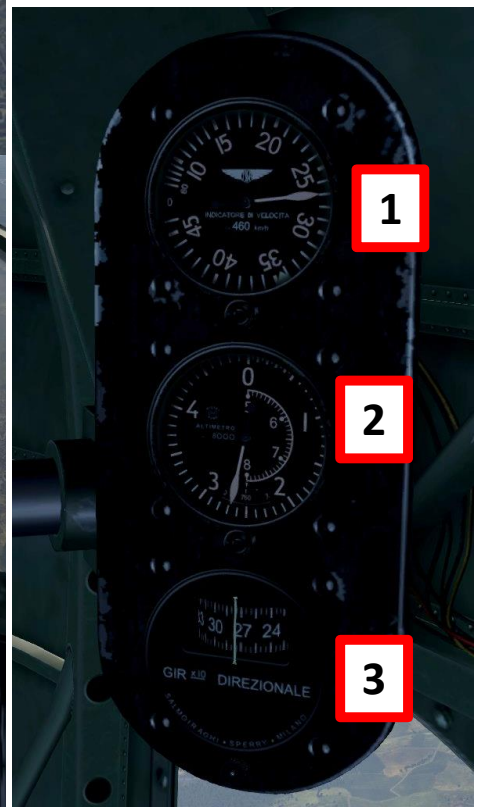
BOMBING TUTORIAL – PHASE 1: PLANNING THE MISSION

HOW AM I DOING?

Be smart: set up your bombsight in advance (set airspeed and altitude at which you want to bomb) while you are still on the ground. This will save you time and trouble. In our case, we will enter a bombsight airspeed of 340 km/h and an altitude of 2,542 m.

FIRE WEAPON HANDLE DOES NOT WORK (BUG). USE "DROP ORDNANCE" KEY INSTEAD TO DROP BOMBS.

1. AIRSPEED INDICATOR (IAS)
2. ALTIMETER (AMSL)
3. DIRECTIONAL GYRO
4. BOMBSIGHT WIND DRIFT ADJUSTMENT
5. BOMBSIGHT AIRSPEED INPUT (TAS)
6. BOMBSIGHT ALTITUDE INPUT (AGL)



PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL – PHASE 1: PLANNING THE MISSION WHAT CAN HELP ME OR KILL ME? HOW DO I GET HOME?

- WHAT CAN HELP ME OR KILL ME?
  - Know where your enemy patrol routes are, where battles usually take place and avoid these places when you are doing your flight plan.
  - Give fighter escorts a rendezvous point so they can link up with you and protect you.

- HOW DO I GET HOME?
  - In our case, we will simply do a 180 once we dropped our bombs and head back home.

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL
PHASE 4: FLYING TO TARGET

- Once we have taken off, we will follow a magnetic heading of 296 to Hawkinge.
- You can use the compass traditionally to fly there manually, but you can also use the auto-pilot.
- In order to use the auto-pilot and know where you are going, you will need to set up your magnetic compass and directional gyro differently than shown in the compass navigation section.
- **Course Mode** is a mode where auto-pilot takes over rudder control to make your aircraft travel following a given heading. You still have control over ailerons and elevator. Course mode is generally used when climbing or descending. In this mode, climb rate is better controlled through elevator trim rather than pure elevator input.
- **Mode 22 (Straight n' Level)** is a mode where auto-pilot takes over rudder, elevator and aileron controls to make your aircraft travel following a given heading. You will have no control over any of your control surfaces. Mode 22 is used when cruising or when level-bombing as this mode will want to make you stay level at a given heading.

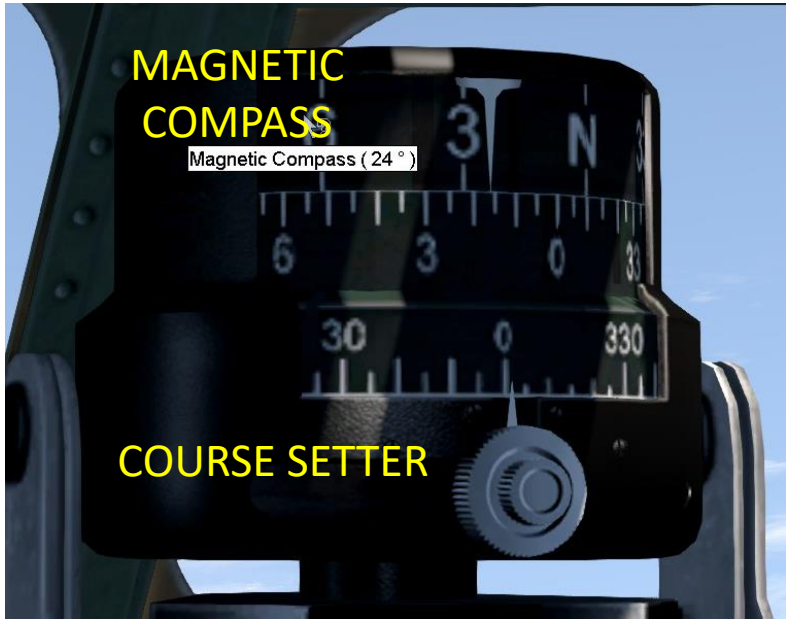
  Note: Mode 22 will often make your aircraft go into a dive (- 5 m/s approx) for approximately one minute. It is normal: the aircraft will try to gain speed in the process. You should lose from 500 to 800 m after Mode 22 is engaged. The climb rate will eventually stabilize to "0". If you intend on bombing the target from 2,700 m, make sure you are 500-800 m higher before you engage Mode 22.

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL
PHASE 4: FLYING TO TARGET

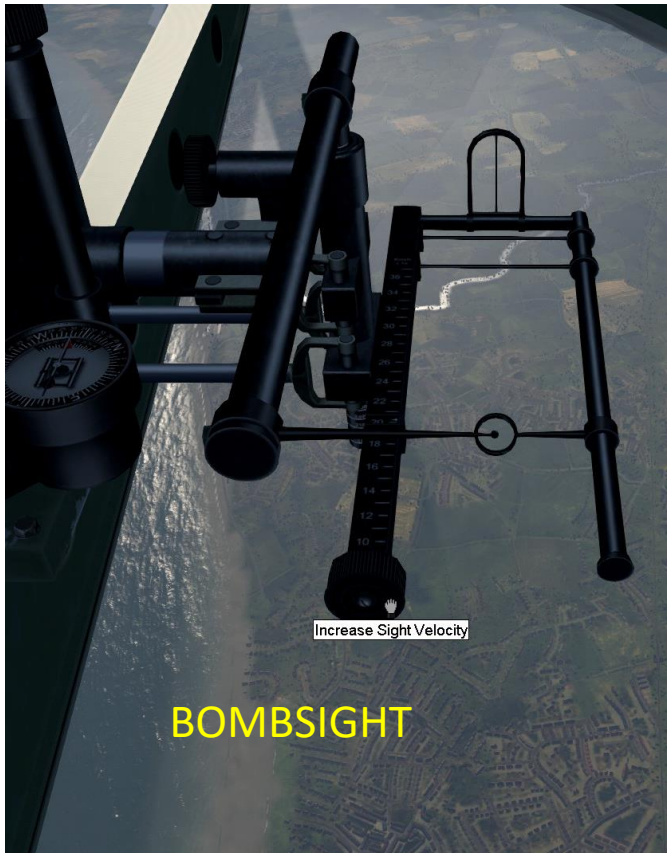
BR.20M AUTOPILOT OPERATION TABLE

STEP	ACTION
1	SET A COURSE TO DESIRED HEADING USING THE COURSE SETTER
2	ALIGN AIRCRAFT WITH COURSE SETTER BY CONSULTING THE MAGNETIC COMPASS.
3	WHEN AIRCRAFT IS ALIGNED WITH COURSE SETTER, SET DIRECTIONAL GYRO TO “0” USING THE BOTTOM KNOB.
4	ENGAGE DESIRED AUTOPILOT MODE (COURSE MODE OR MODE 22)
5	WHEN AUTOPILOT IS ENGAGED, STEER AIRCRAFT USING THE “AUTOPILOT RIGHT” OR “AUTOPILOT LEFT” CONTROLS FOR BIG CORRECTIONS. STEER AIRCRAFT USING THE “DIRECTIONAL GYRO INCREASE/DECREASE” CONTROLS FOR SMALL COURSE CORRECTIONS. USING THE DIRECTIONAL GYRO IS USUALLY A BETTER WAY TO USE THE AUTOPILOT AS THE PILOT HAS BETTER CONTROL OVER HIS SHIP.



PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL
PHASE 5: BOMBING RUN



BR.20M BOMBSIGHT OPERATION TABLE
HIGH ALTITUDE LEVEL BOMBING

STEP	ACTION
1	ENGAGE AUTO-PILOT IN MODE 22 WHEN YOU HAVE SIGHT ON TARGET AND YOU ARE ALIGNED WITH IT. (SEE AUTOPILOT TABLE)
2	TIP: SWITCH BACK AND FORTH TO NOSE GUNNER SEAT TO GET BETTER FRONTAL VIEW IF YOU WANT TO HAVE AN EASIER TIME SPOTTING YOUR TARGET.
3	OPEN BOMB BAY DOORS AND ARM YOUR BOMBS IF NOT DONE ALREADY ON THE GROUND.
4	SELECT BOMB DISTRIBUTION MODE (SINGLE/SERIES/SALVO). FOR HIGH ALTITUDE, SALVO IS RECOMMENDED.
5	SELECT BOMB DISTRIBUTOR DELAY (“0” IS RECOMMENDED FOR HIGH ALTITUDE PRECISION BOMBING)
6	SELECT BOMB SALVO QTY (“MAX” IS RECOMMENDED IF YOU WANT TO DROP ALL YOUR PAYLOAD).
7	CHECK AIRSPEED AND ALTITUDE IN THE BOMBARDIER SEAT.
8	CONVERT READ INDICATED AIRSPEED INTO TRUE AIRSPEED AND USE THIS VALUE FOR BOMBSIGHT AIRSPEED INPUT.
9	CONVERT ALTITUDE INTO HEIGHT (READ ALTITUDE MINUS TARGET ELEVATION) AND USE THIS VALUE FOR BOMBSIGHT ALTITUDE INPUT.
10	STEER THE AIRCRAFT USING THE “AUTOPILOT RIGHT” OR “AUTOPILOT LEFT” CONTROLS (SEE AUTOPILOT TABLE) AND LINE UP BOMBSIGHT RETICLE ON THE TARGET. YOU CAN FINE-TUNE COURSE CORRECTIONS WITH THE DIRECTIONAL GYRO INCREASE/DECREASE CONTROLS (RECOMMENDED).
11	DROP ORDNANCE (USE YOUR KEYBOARD SHORTCUT, NOT THE BOMB LEVER… IT DOES NOT WORK).

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL
PHASE 5: BOMBING RUN

OTHER USEFUL COMMANDS (APPLICABLE TO BR.20M)	
DROP BOMBS	B
OPEN BOMB BAY DOOR	N
CLOSE BOMB BAY DOOR	L_CTRL+N
ARM BOMBS (AXIS BOMBERS ONLY)	L_CTRL+W
SWITCH CREW POSITION (BOMBARDIER/PILOT)	C
LEAN TO GUNSIGHT	JOYSTICK BTN (CUSTOM KEY)
COURSE AUTO-PILOT MODE - PREVIOUS	A
COURSE AUTO-PILOT MODE – NEXT	S
COURSE AUTO-PILOT ADJUST COURSE LEFT	L_CTRL+A
COURSE AUTO-PILOT ADJUST COURSE RIGHT	L_CTRL+S

This layout is created with ease of access in mind. Bombsight altitude, velocity and wind correction are already clickable on the sight itself. This layout should allow the user to go through everything he needs set up instinctively following the numpad from 0 to 9.

CAUTION: MAKE SURE THERE ARE NO CONFLICTS BETWEEN THESE KEYS AND OTHER CONTROLS. YOU WILL HEAR A "PING" WHEN YOU MAP A CONTROL IF THERE IS SUCH A CONFLICT.

CHUCK'S BOMBER NUMPAD (APPLICABLE TO BR.20M)			
NUM	/ INCREASE DIRECTIONAL GYRO	* DECREASE DIRECTIONAL GYRO	- DECREASE COURSE SETTER
7 BOMB DISTRIBUTOR MODE PREVIOUS	8 BOMB DISTRIBUTOR MODE NEXT	9 TOGGLE BOMB DISTRIBUTOR SHORT DELAY	+ INCREASE COURSE SETTER
4 DECREASE BOMB DISTRIBUTOR DELAY	5 INCREASE BOMB DISTRIBUTOR DELAY	6 INCREASE SIGHT DISTANCE	
1 DECREASE BOMB SALVO QUANTITY	2 INCREASE BOMB SALVO QUANTITY	3 DECREASE SIGHT DISTANCE	ENTER TOGGLE BOMBSIGHT AUTOMATION
0 SELECT BOMB BAY PREVIOUS		. SELECT BOMB BAY NEXT	

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL
PHASE 5: BOMBING RUN

So here is a quick reminder:

- ON THE GROUND

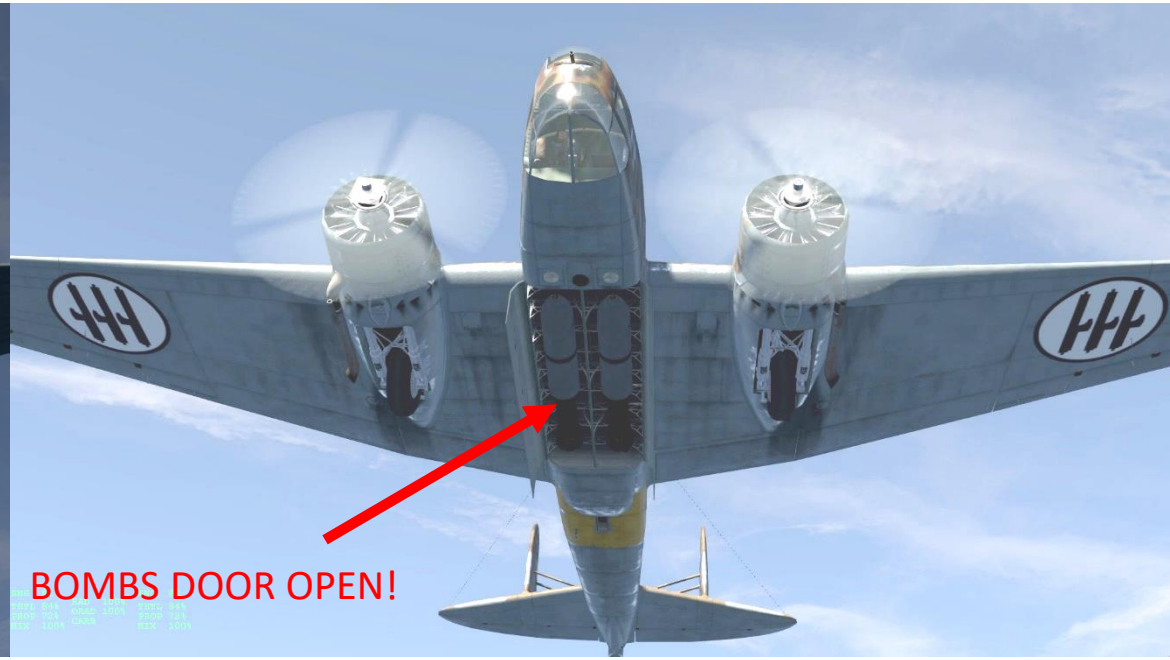
1. Set your predicted bomb run altitude and airspeed in your bombsight while on the ground.
2. Select desired salvo quantity, release delay (only applicable if you are skip bombing or dive bombing), distributor release mode (Salvo? Single?).
3. ARM bombs and fly to target.

- IN THE AIR

5. Find target and reach targeted altitude and airspeed
6. Open bomb bay doors
7. Follow steps detailed in the BOMBSIGHT OPERATION TABLE.
8. Thanks to all the work you did on the ground, you will see that there is not a whole lot to do in previous step apart from putting your bombsight cursor on the target, adjust slightly bombsight airspeed & altitude and drop your bombs when your bombsight reticle is on target!.
9. Jump into your ventral gunner to see hits on target (don’t forget to put him in “Firing Position” or you will not see anything because the ventral door will be shut).
10. Close bomb bay doors.
11. Go home for cookies and spaghetti.

PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL
PHASE 5: BOMBING RUN



PART 11: BOMBING TUTORIAL

BOMBING TUTORIAL
PHASE 5: BOMBING RUN

- You can switch between your bombardier and nose gunner seats to get a better frontal view to spot the target.

- Switch to ventral gunner position to get a view of the damage!