Microsoft Flight Simulator

SA315B LAMA

FLIGHT MANUAL

SA315B Lama Addon Manual for Microsoft Flight Simulator

Table of Contents

1. Aircraft History and information

1.1. Introduction

The Aerospatiale SA315B Lama is a remarkable helicopter known for its exceptional high-altitude performance and versatility. Developed from the Alouette II, the Lama has found applications in various challenging environments, particularly in mountainous regions.

1.2. Origins and Development:

The SA315B Lama is a derivative of the Alouette II helicopter, designed and manufactured by the French aerospace company Aerospatiale. Development began in response to a request from the Indian Air Force in the 1960s for a helicopter capable of operating effectively in high-altitude conditions, especially in the Himalayan region.

1.3. First Flight and Certification:

The prototype SA315B Lama took its first flight on March 17, 1969. The helicopter was characterized by its longer rotor blades, increased fuel capacity, and a modified powerplant to enhance its high-altitude capabilities. It received certification in 1970.

1.4. High-Altitude Performance:

The SA315B Lama's design modifications were specifically aimed at addressing the challenges posed by high-altitude environments. With its ability to operate at altitudes exceeding 20,000 feet (6,100 meters), the Lama became a go-to helicopter for missions such as search and rescue, medical evacuation, and utility transport in mountainous terrains. The SA315B is the current world record owner of the highest altitude reached with an rotating wing aircraft at an astonishing 12954m or 42500 ft.

1.5. Versatility in Operations:

The helicopter's versatility extended beyond its high-altitude capabilities. The SA315B Lama proved adaptable to a range of roles, including crop spraying, firefighting, and aerial construction. Its ability to perform delicate maneuvers and operate in confined spaces made it well-suited for various civilian and military applications.

Here are some of its main characteristics:

- A design comprised of three main parts: the cabin, the center frame, and the tail boom.
- The cabin offers an unrestricted view for the pilot and passengers, with adjustable front seats and overhead sunshades for comfort.
- The instrument panel console is centrally located, with a rigid box-type floor construction for cargo tie-downs.
- It includes a "trip computer" for calculating maximum permissible mass hovering, although it is less used by civilian pilots in practice.
- The center structure houses a large capacity fuel tank and supports a higher landing gear compared to the Alouette 2, with shock-absorbing struts.
- The tail boom supports the stabilizer, tail rotor gearbox, and rotor, with a safety feature for detecting cracks through a color-changing video-pi indicator.
- It has a three-blade fully articulated main rotor and a three-blade tail rotor, with rotor speed maintained at 353 rpm in flight, with acceptable autorotation variations.

1.6. Global Deployment:

The SA315B Lama gained popularity globally, with several countries adopting it for its unique capabilities. It became a valuable asset for operators requiring a helicopter capable of handling demanding terrains and altitudes.

Some of the current and former operators of the Lama are:
1. Argentine Army Aviation
2. Argentine Air Force
3. Argentine Gendarmerie
4. Bolivian Air Force
5. Helibras (Brazil)
6. Air Glaciers SA (Switzerland)
7. Air Zermatt AG (Switzerland)
8. Heli Bernina AG (Switzerland)
9. HELOG (Switzerland)
10. Chilean Army
11. Chilean Air Force
12. Ecuadorian Army
13. Helicopter Services Organization (Iran)
14. Pellissier Helicopter (Italy)
15. Akagi Helicopter (Japan)
16. Mexican Government
17. Airlift AS (Norway)
18. Pakistan Army Aviation
19. Evergreen Helicopters (USA)

1.7. Legacy and Continued Service:

The SA315B Lama has left a lasting legacy in the world of rotorcraft, particularly in high-altitude operations. While production of new Lamas ceased, many remain in service globally, with operators appreciating their reliability, adaptability, and performance in challenging conditions.
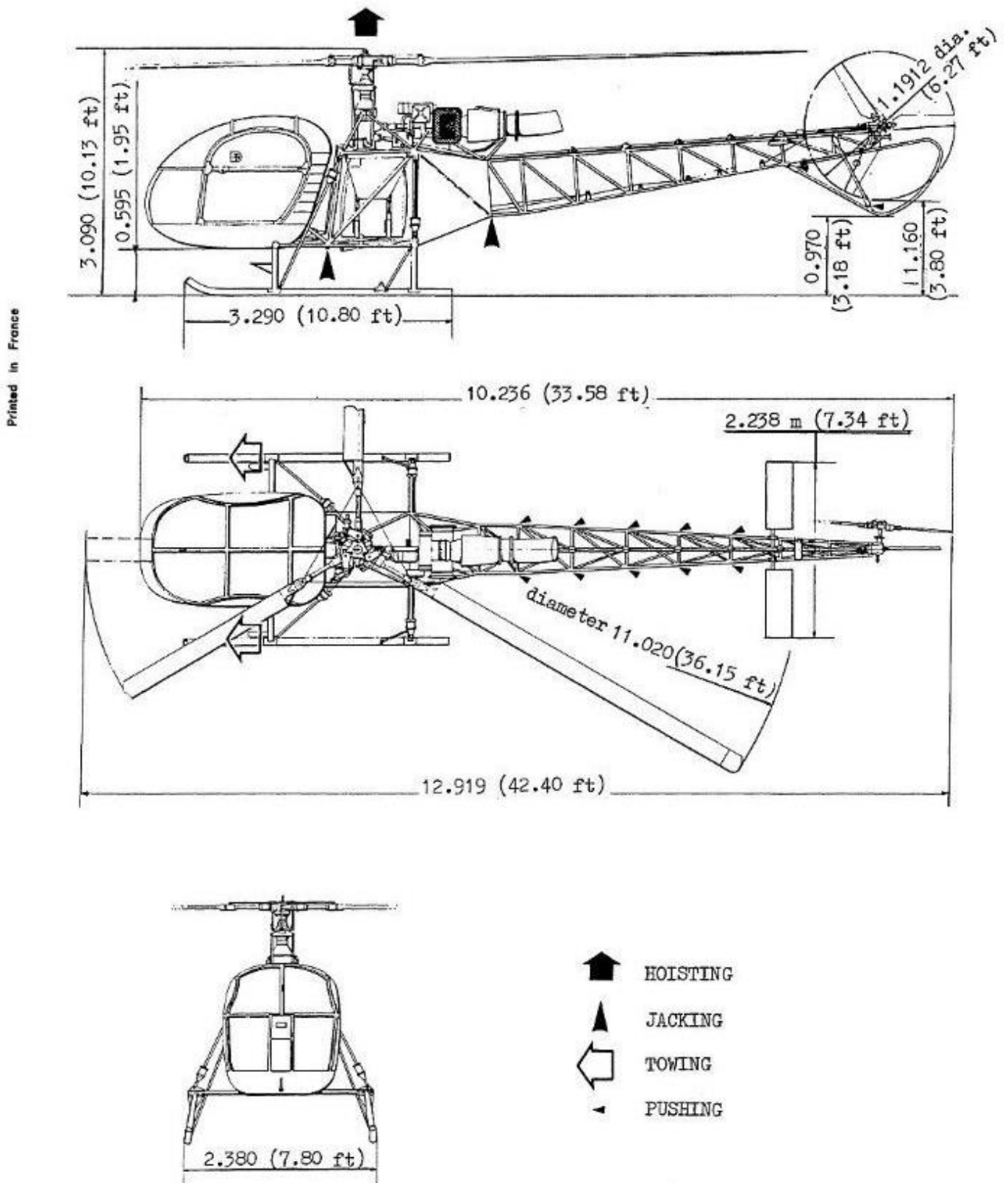
The Aerospatiale SA315B Lama stands out as a helicopter designed to conquer high-altitude challenges. Its legacy lives on through its continued service in various roles, showcasing the enduring impact of its innovative design and engineering.

2. Aircraft Specifications

Specification	Value
Crew Capacity	1-4 (depending on configuration)
Length	12.19 meters (40 feet)
Main Rotor Diameter	11.02 meters (36 feet 2 inches)
Height	3.09 meters (10 feet 2 inches)
Empty Weight	Approximately 970 kilograms (2,139 lbs)
Maximum Takeoff Weight	2,300 kilograms (5,070 lbs)
Engine	Turbomeca Artouste IIIB
Powerplant Output	870 shaft horsepower
Fuel Capacity	565 liters (149.2 gallons)
Maximum Speed	Approximately 120 knots (222 km/h)
Cruising Speed	90 knots (167 km/h)
Service Ceiling	5,700 meters (18,700 feet)
Range	Approximately 360 nautical miles (667 km)

3. Aircraft Characteristics

3.1. Aircraft diagram

Printed in France

3.090 (10.13 ft)
0.595 (1.95 ft)
11.1912 dia. (6.27 ft)
0.970 (3.18 ft)
11.160 (3.80 ft)
3.290 (10.80 ft)

10.236 (33.58 ft)
2.238 m (7.34 ft)
diameter 11.020 (36.15 ft)
12.919 (42.40 ft)

2.380 (7.80 ft)

HOISTING
JACKING
TOWING
PUSHING

High skid type landing gear

3.2. Engine

The Lama SA315B is powered by a generation of turbomotors of the type "turbine linked to the compressor" requiring the use of a clutch. In this case the Artouste IIIB turbine.
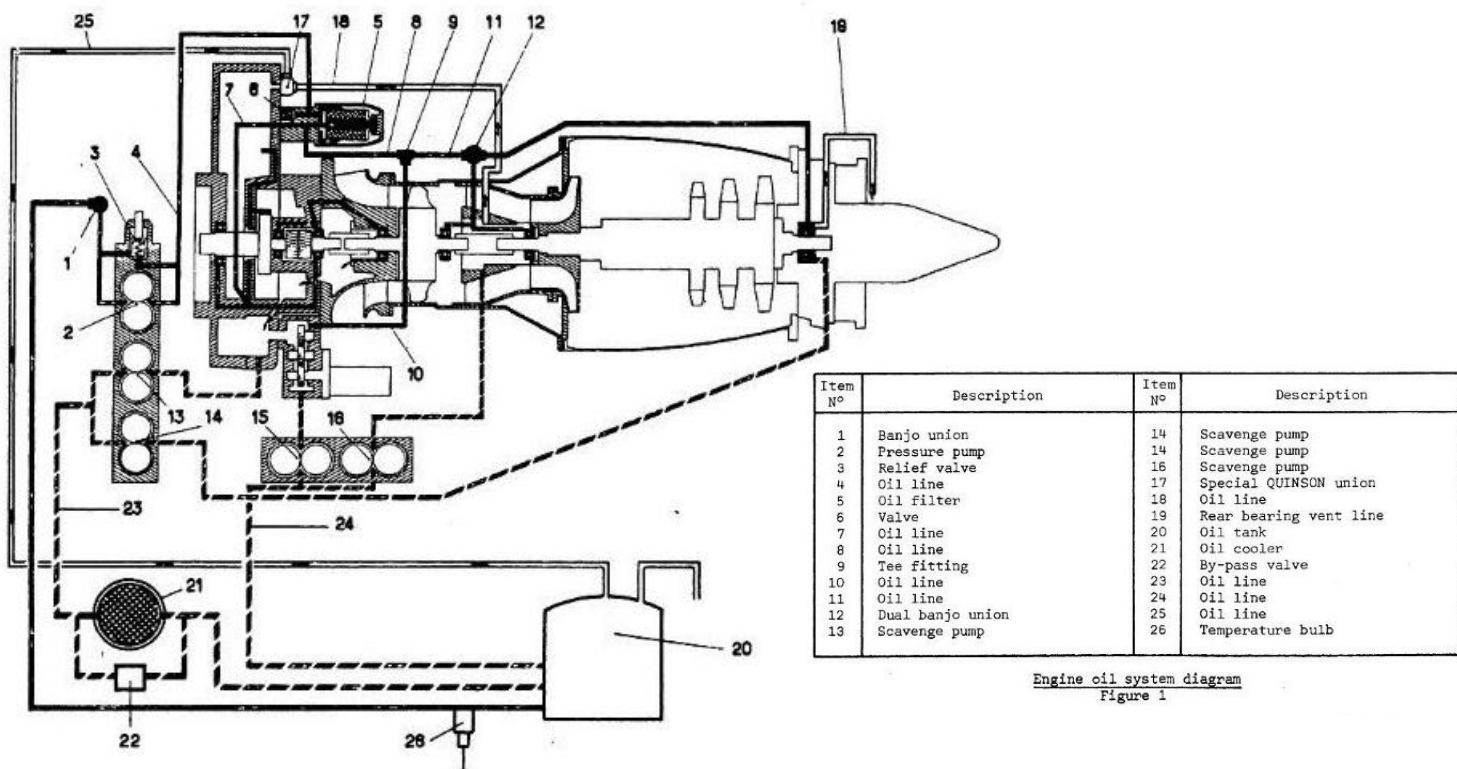
Operation of a linked or solidary wheel turbine:

The turbine is composed of the following main elements:

• a centrifugal compressor with stages.

• an annular combustion chamber with injection of a combustible gas mixture.

• an axial turbine with two stages providing energy to a drive.

The main characteristic of this type of engine compared to so-called "free" turbines is the presence of a single horizontal shaft connecting these different elements. The rotation of only one of these elements necessarily drives the others. Therefore, as soon as the turbine starts, the take-off unit located at the front of the engine is also set in rotation. The clutch protects the turbine from excessive torque at the beginning of the rotor drive.
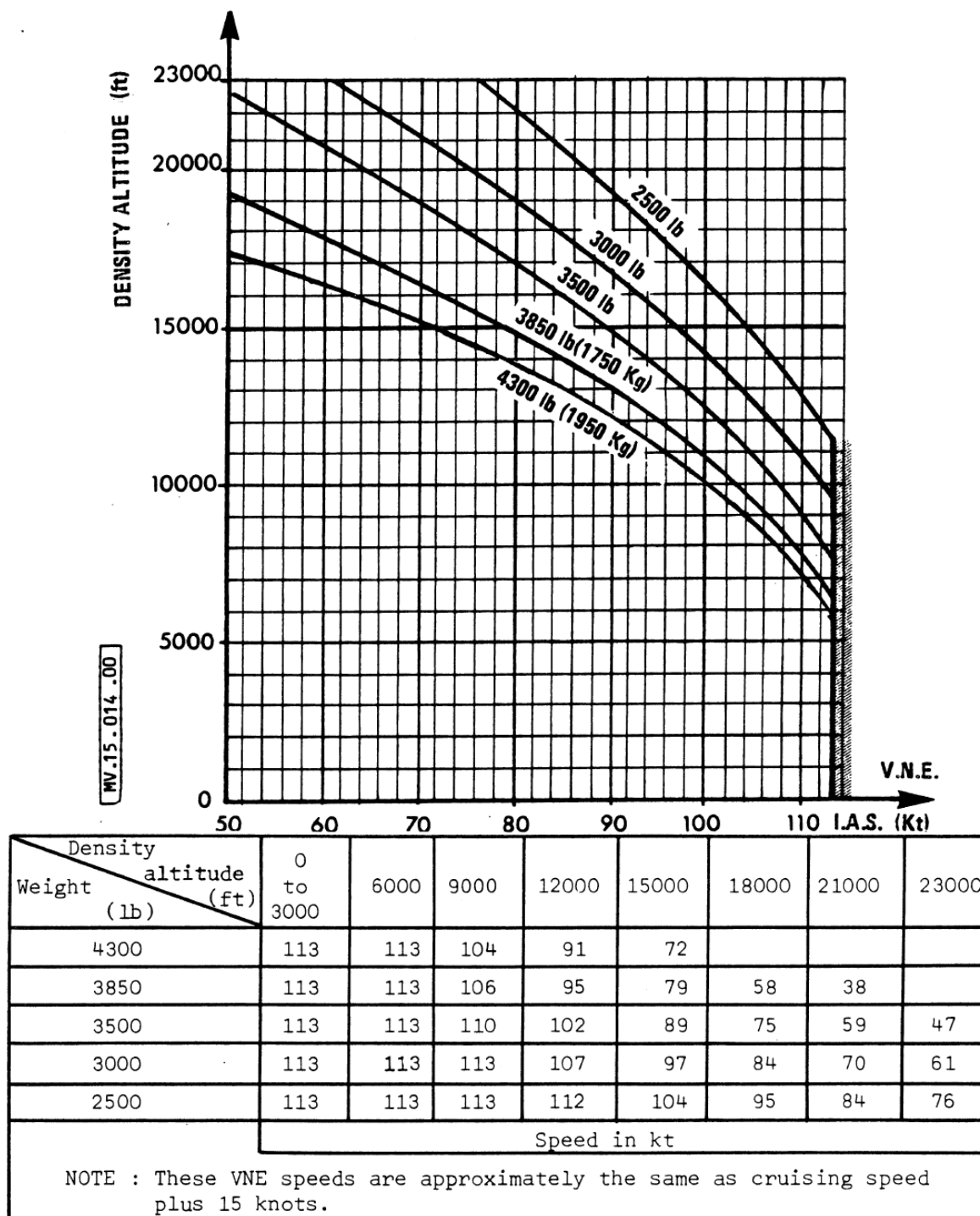
The take-off unit located at the front is set in motion by means of a reducer which reduces the GTM speed from 43,000 rpm to 6,334 rpm.

The Artouste IIIB engines are certified for a maximum thermal power of 870 hp. However, the GTMs are de-rated (load reduction) for mechanical stress reasons on the transmission elements.

Item N°	Description	Item N°	Description
1	Banjo union	14	Scavenge pump
2	Pressure pump	14	Scavenge pump
3	Relief valve	16	Scavenge pump
4	Oil line	17	Special QUINSON union
5	Oil filter	18	Oil line
6	Valve	19	Rear bearing vent line
7	Oil line	20	Oil tank
8	Oil line	21	Oil cooler
9	Tee fitting	22	By-pass valve
10	Oil line	23	Oil line
11	Oil line	24	Oil line
12	Dual banjo union	25	Oil line
13	Scavenge pump	26	Temperature bulb

Engine oil system diagram
Figure 1

4. Flight Characteristics

4.1. Airspeed Limitations

Weight (lb) \ Density altitude (ft)	0 to 3000	6000	9000	12000	15000	18000	21000	23000
4300	113	113	104	91	72			
3850	113	113	106	95	79	58	38	
3500	113	113	110	102	89	75	59	47
3000	113	113	113	107	97	84	70	61
2500	113	113	113	112	104	95	84	76
Speed in kt								

NOTE : These VNE speeds are approximately the same as cruising speed plus 15 knots.

4.2. Flight Envelope

- Maximum operating altitudes:
- Flight: 7000 m (23000 ft)
- Engine starting: 5800 m (19000 ft)
- Engine relight in flight: 5800 m (19000 ft)
- Temperature range: -40° C to +55° C

4.3. Minimum Crew

- One pilot (on R.H. side)

4.4. Restrictions

The following are prohibited:

- Engine starting with a main rotor blade over the tail pipe.
- Aerobatics (in particular, never exceed a 30° nose-up attitude).
- I.F.R. (I.M.C.) flight.
- Flying in icing conditions.
- Prolonged rearward flight, (due to the return of exhaust gases toward the cabin).
- Starting or stopping the rotor to leeward of any building, edifice or other obstruction when wind is in excess of 45 knots.
- Starting the rotor in all cases where wind is in excess of 60 knots.
- On the ground, decreasing rotor r.p.m. by increasing collective pitch to more than 0.20.
- Rapid yaw movements in hovering and vertical climb conditions.
- Deliberate autorotative landing (on ground), for helicopters equipped with floats.
- Harsh maneuvers such as sharp turns and rapid maneuvers

5. Cockpit Familiarization

5.1. Main Panel

Variometer   Artificial horizon

Altitude in feet

Airspeed in Knots

Radar Altitude

Pitch Computer

Warning lights

Rotor Brake

Voltmeter

Fuel gauge

Turbine temp

Turbine RPM

Oil temp and pressure

Rotor RPM

Fuel booster switch

Starter Switch

5.2. Overhead Panel

Lights potentiometers

Gyro Breaker

Circuit breakers

Battery switch
Generator switch
Engine heat. switch

Cabin heating switch
Cabin blower switch
Ermer. Floats switch

Landing light breaker/ switch

anti-col. lights breaker/ switch

Pitot heater switch
Exterior lights switch

INST. PANEL INSTRUM.   DISTRIBUTION PEDESTALS

LIGHTING

FM   XPDR   BLOWER   WAASE   GYRO   MIRROR HEAT

V.H.F   LAND.LT.   STARTER   EMERG.   FUEL   LIGHT.2

I.C.S   PIT.HEAT   POS.LTS.   MISSION   INSTRUM.   LIGHT.1

MIRROR   PIT.HEAT   EXT. LTS.   GENE.   BATT.

EMER. FLOATS   BLOWER   CABIN HEAT

6. Procedures

7. Use of the Computer

The computer surrounding the collective-pitch indicator is used to determine various parameters, as follows:

7.1. Density-Altitude

- By means of the rotating ring, line up:
  - The O.A.T. value (scale B) transferred from the O.A.T. indicator.
  - The pressure altitude (scale A) transferred from the altimeter set at 1013 mbars.
- Read the corresponding density altitude value on scale I opposite arrow C.
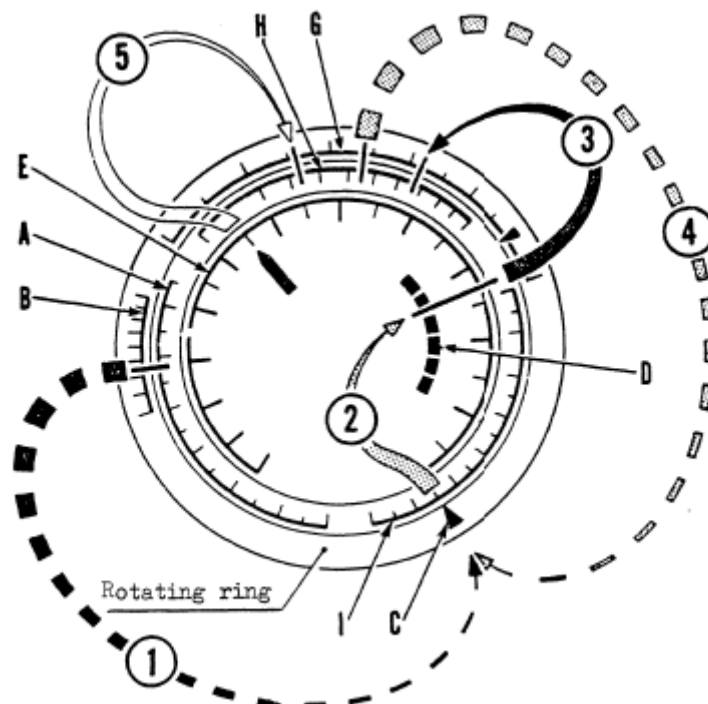
7.2. Maximum permissible collective pitch for hovering

- Determine density altitude as specified in para. (1) above.
- Convert the density altitude figure into km (or thousands of feet), transfer the result to scale D, then read opposite, on scale E, the maximum permissible collective pitch for this density altitude.

7.3. Maximum hovering take-off weight out of ground effect

- Determine maximum permissible collective pitch as specified in para. (7.2.) above.
- Transfer the maximum permissible collective pitch figure to scale G and read opposite, on scale H, the approximate maximum permissible weight.

7.4. Approximate gross weight during hover

- Indicate your weight

8. User Options

8.1. Clipboard List for Attachments

The SA315B Lama addon for MSFS comes with a multitude of different attachment options.

In order to activate those options, the player will have to use the clipboard tablet present on left bottom of the center console. Be aware that some attachments are mutually exclusive and will disappear if another conflicting attachment is added.
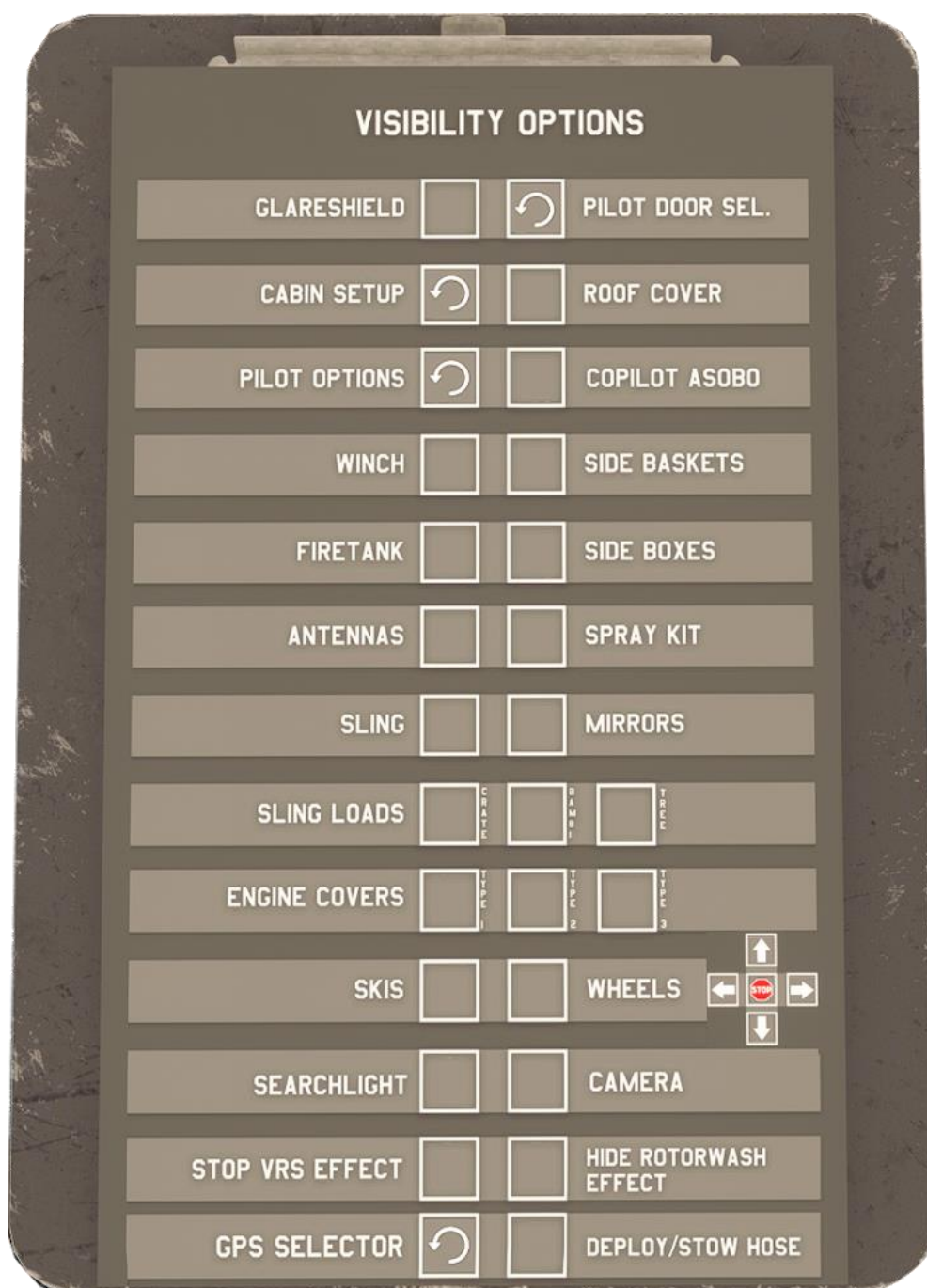
8.2. Weight and Visibility

Whenever you choose a visibility option on the clipboard, the corresponding weight will be added and subtracted automatically at the respective position in the helicopter.

Therefore, the MSFS weight and balance dialogue is not working as you might be used to:

PILOT	→	181 lb
COPILOT	→	181 lb
SKIS		0 lb
STRETCHER		0 lb
WINCH		0 lb
FIRETANK		0 lb
SIDE BASKETS		0 lb
SIDE BOXES		0 lb
SPRAY KIT		0 lb
WHEELS		0 lb
BAMBI		0 lb
CRATE		0 lb
SEARCHLIGHT		0 lb
TREE		0 lb
PAX REAR RIGHT		0 lb
PAX REAR LEFT		0 lb
CARGO	→	0 lb

The only items that can be adjusted manually and won't be overridden by our code are:

- FUEL
- PILOT
- COPILOT
- CARGO

9. Damage Model

When collective pitch limits are not satisfied, the main gear box (MGB) will be damaged caused by too high torque forces. This will result in an abrasion of fine metal chips which then will be detected in the transmission oil by the MGB chip detector.

When operating the SA315B Lama, use the inbuild computer (Chapter 7) to determine the respective collective pitch limit

In this add-on, we simulate that the main gear box will get damaged when you:

-   exceed the **white mark** at the top of the pitch scale (yellow arrow) by **more than 30 seconds accumulated** during one flight or

-   exceed the **red mark** at the top of the pitch scale (red arrow) by **more than 3 seconds**

As a consequence, metal chips in the transmission oil will be detected and the **MGB CHIP DETECTOR** warning light on the main instrument panel illuminates.

In real life, this is an emergency which requires a landing AS SOON AS POSSIBLE and a repair of the MGB before further flying is allowed.

If you ignore this warning and don't repair the damage immediately, the damage of the MGB will even worsen over time.

Next, you'll get a **XMSN oil temperature** warning as the oil gets hot due to the increased friction in the transmission. Finally, the MGB gets destroyed completely and the **XMSN oil pressure** drops.

This will result in a complete loss of power on the main rotor and you have to initiate an autorotation landing.

You can simulate the repair by pressing the **ENG CHIP** warning light on the main instrument panel. All damage will be instantly repaired and the **MGB CHIP DETECTOR** warning light goes out.

10. PMS50 GTN750 Integration

If you want to use the **PMS50 GTN750** (fully integrated), you need to follow these steps:

A) Download the **GTN750 Free** from the PMS50 homepage: https://pms50.com/msfs/

B) To use the full functionality, you can additionally purchase the **GTN750 Premium** license.

C) Unzip the file into your **community folder**

D) Select the corresponding **GPS option** on the clipboard (Chapter 8)

11. TDS GTNXi750 Integration

If you want to use the **TDS GTNXi750** (fully integrated), you need to follow these steps:

A) Purchase the **GTNXi Pro** from the TDS Sim Software homepage: https://www.tdssim.com/tdsgtnxi

B) Download the "**TDSGPSManager.exe**" and follow the installation instructions

C) Select the corresponding **GPS option** on the clipboard (Chapter 8)

12.Change Log

Version 1.2

3D model:

- **modified**: hose for watertank deployed
- **added**: emission of various warning lights
- **added**: servo control cock
- **added:** two GTN750 GPS options
- **added:** low on fuel warning lights
- **added:** MGB chip detector warning light

Flight model:

- **tuned**: performance according 'flight manual performance charts'
- **tuned**: crosswind and tailwind limits as per 'flight manual'
- **added**: skid flex and light on skids behaviour

Behaviour:

- **added**: functionality of watertank
- **added**: functionality of spraying kit
- **modified**: starter selector switch (now START/ON – OFF – VENT)
- **added**: functionality of starter position VENT
- **added**: functionality of external load power switch (as per real life flight manual)
- **added**: functionality including function test of all warning lights (as per real life flight manual)
- **modified:** functionality of POS lights/ANTICOL Lights switch (as per real life flight manual)
- **modified:** needle behaviour of NR/N2 tacho
- **modified:** needle behaviour of EGT gauge
- **modified:** needle behaviour of Voltmeter
- **added**: functionality of stop watch
- **added**: search light key bindings
- **modified**: fuel flow lever now bindable via helicopter throttle axis
- **modified:** timings for turbine start-up, idle to flight etc.
- **modified:** weight and balance options synchronized with visibility options
- **added**: damage model for MGB gear box (chip detection)
- **fixed:** fuel pump no longer audible when battery is off

13. Thanking

Dear Sérgio, Léo, Stuart, Daniel, Michael, Simon and HB-XDG,

I want to extend my heartfelt thanks to each one of you for your great contribution to the development of the Lama. Your expertise, dedication, and hard work have been crucial in bringing this project to life.

Together, you have not only helped create a product that transpire love for helicopters but have also been an inspiring group of people to work with. I am truly grateful for your support.

I also would like to thank all the members of my Discord server who got involved in the development and for the motivation they gave me to try to create a great product for MSFS.

Thank you all again,

Taog

14. Most Important Keybindings

MSFS CONTROL BINDING
PITOT HEAT ON/OFF TOGGLE PITOT HEAT
MASTER BATTERY ON/OFF TOGGLE MASTER BATTERY
SET CYCLIC LATERAL AXIS
SET CYCLIC LONGITUDINAL AXIS
TAIL ROTOR AXIS
SET HELICOPTER THROTTLE 1 AXIS
INCREASE/DECREASE ALTIMETER SET ALTIMETER
SET CYCLIC LATERAL AXIS
SET CYCLIC LONGITUDINAL AXIS
TAIL ROTOR AXIS
SET HELICOPTER THROTTLE 1 AXIS
INCREASE/DECREASE ALTIMETER SET ALTIMETER
HELICOPTER ENGINES BEEP TRIM INCREASE/DECREASE

MSFS CONTROL BINDING
LANDING LIGHTS ON/OFF TOGGLE LANDING LIGHTS
DECREASE ROTOR LONGITUDINAL TRIM
INCREASE ROTOR LONGITUDINAL TRIM
DECREASE ROTOR LATERAL TRIM
INCREASE ROTOR LATERAL TRIM
ROTOR TRIM RESET

	MSFS CONTROL BINDING
Search light 'left'	DECREASE FLAPS
Search light 'right'	INCREASE FLAPS
Search light 'up'	INCREMENT SPOILERS
Search light 'down'	DECREMENT SPOILERS

15.ANNEX

15.1.Checklist BEFORE STARTING ENGINE

15.2.Checklist STARTING ENGINE

15.3.Checklist ENGINE SHUTDOWN

15.4.Checklist and Instruction SLING LOAD CRATE/TREE

15.5.Checklist and Instruction BAMBI BUCKET
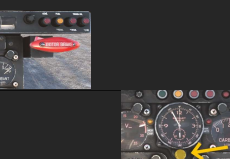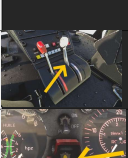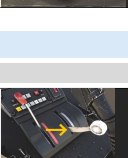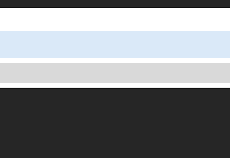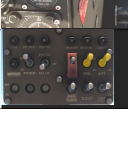
15.6.Checklist and Instruction WATER TANK

15.7.Checklist and Instruction SPRAY KIT

Before Starting Engine
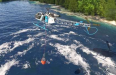
No.	Checklist Item	Action	Where To Find	Illustration	Explanation
1	Tail Rotor Control Pedals	- adjusted - check free travel			
2	Cyclic Pitch Stick	- check free travel - CENTER the control stick - HOLD the stick, using the friction lock [*not simulated*]			
3	Doors	closed			
4	Fuel Flow Control Lever	check **CLOSED** (against rear stop)	Center Pedestal		
5	Servo System Control Cock	check MARCHE (**ENGAGED**)	between Center Pedestal and the copilot's seat		
6	Fuel Shut-off Control Lever	check lockwired in **FORWARD POSITION**	Center Pedestal		
7	Circuit Breakers	Engaged except for: - landing light - cabin lighting system - position light (engaged for night flying only) 24-volt power supply	OH Panel		
8	Battery and Generator	switch **ON**	OH Panel		
9	Engine Selector Switch	check **OFF**	Center Pedestal		
10	- Rotor Brake - One main rotor blade	check **RELEASED** check **FORWARD**	Center Pedestal		
11	- Voltmeter - Electric Instruments (fuel content gauge, etc...)	chek **24-volt minimum**	Center Pedestal		
12	Warning Lights	check function (**press and hold**)	Center Pedestal		
13	- Altimeter - Compass	set check and adjust			
14	In the event of night flying: **Interior** and **Exterior Lighting**	check			

Starting Engine

1	Booster Pump	switch **ON** and wait for 20 seconds	Center Pedestal		- the fuel low pressure warning light goes out - NOTE: if the engine has been stopped less than 5 minutes before, crank the engine for 5 seconds
2	- Starter Selector Switch - Stop Watch	switch MARCHE (**ON**) switch on simultaneously	Center Pedestal		- the green "START" (DEM) indicator light comes on - a few seconds later, the yellow "MICRO PUMP" (INJ) indicator light comes on **Abort the start (Starter Selector Switch "OFF"), if** - the "START" (DEM) indicator remains out - the "MICRO PUMP" (INJ) light remains out - the "MICRO PUMP" (INJ) light has not gone out within 15 seconds - the "STOP" (BLOC.) red warning light comes on - 8 seconds after the "MICRO PUMP" (INJ) indicator light has come on, the temperature t4 has not yet risen - the EGT exceeds 630°C - the "START" (DEM) green indicator light has not gone out within 60 seconds - the oil pressure does not rise **NOTES:** - within 5 to 15 sec. (approx. N2 6000) the "MICRO PUMP" (INJ) light should go out and engine speed continue to rise - the engine stablizes at idling speed (between N2 16000 and 19000)
3	NR (rotor RPM)	Gradually move the **fuel flow control lever** forward until the main rotor just begins to turn and **start the stop watch. increase NR** by increasing N2 to maintain a constant rotor acceleration rate of 5-10 r.p.m. per second (monitor N2 by means of the fuel flow control lever)	Center Pedestal		- start of clutch engagement will be at around N2 20000 - the oil pressure warning light should be out above a rotor speed (NR) of 250 - Synchronization should be obtained in 34-45 seconds **NOTE:** This acceleration corresponds to an engine speed of 1000 - 2000 r.p.m. above the initial r.p.m. (this figure is given purely as a rough guide).
4	Fuel Flow Control Lever	Gradually move the fuel flow control lever forward to the travel limit stop.	Center Pedestal		- EGT temperature should not rise by more than 50°C during acceleration - Fuel flow control lever indicator light is out - Engine speed is 33500 ± 200 r.p.m
5	Starter Selector Switch	- switch **OFF** - the engine should not stop - switch **ON** again			

Engine Shutdown

1	Fuel Flow Control Lever	fully retard			
2	Starter Selector Switch	switch **OFF**			Wait until the "**STOP**" warning light goes out before switching off the radio, booster pump, battery and generator **STOPPING THE ROTOR WITH ENGINE RUNNING** The rotor can be stopped without stopping the engine. provided that there is no clutch drag; proceed as follows: 1) Set the fuel flow control lever in fully closed position and wait for rotor speed to fall below engine speed 2) Apply the rotor brake at 175 r.p.m.; partially release the brake just before the rotor stops. in such a way that one of the rotor blades comes to rest forward. 3) Release the brake completely and check that the clutch has no tendency to drag. If the rotor starts to rotate or creep. either : - switch the engine off - or, accelerate the engine to ensure full clutch engagement.
3	Rotor Brake	apply at NR 175			**RE-STARTING** If immediate re-starting, just following shutdown is disired, do not switch on the booster pump but first carry out a ventilation in order to reduce the residual tail pipe temperature down to no more than 150°C. Switch on the booster pump immediately after engine start up.
4	Battery and Generator	switch **OFF**	OH Panel		
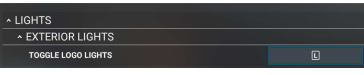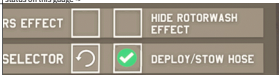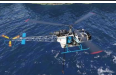
Sling Load Crate / Tree

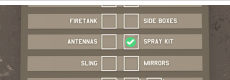| No.	Checklist Item	Action	Where To Find	Illustration	Explanation
1	Sling	- First select "**SLING**" on the **Attachment Options Tablet**. This will equip your Lama with a cargo hook - next, select either "**CRATE**" or "**TREE**"	left side of the Center Pedestal		
2	Map key for "RELEASE SLING LOAD"	bind **TAXI LIGHTS ON [on PRESS]** and **TAXI LIGHTS OFF [on RELEASE]** to the joystick button of your choice, e.g. the trigger or any other button or switch	MSFS Control Options		
3	External Load Power Switch	select "**ELING.**" (Long Line)			the External Load Power Switch gives you two options: - power supply for the **winch** (TREUIL) [*working winch is not simulated*] or - power supply for the **long line** (ELING.) **NOTE**: if the cargo hook is not powered, the electrical release mechanism won't work and you will be unable to release the cargo with the button you set up at no. 2!
3	Lift Cargo	- get into a stable hover - slowly increase collective pitch - when you reach a RADAR height of 20 ft (50 ft for the tree), the long line will be tight and you'll feel the additional weight			when the cargo hook release mechanism is powered and a load on the hook is detected, the **SLING warning light** will light up
5	Release Cargo	you have **two optios to release** the cargo: - land and let your ground crew detach the cargo (de-select "CRATE" or "TREE") or - **press the button** you have mapped to TAXI LIGHTS to **release the external cargo**			the **SLING warning light** will extinguish when the load is relieved from the hook by either landing or releasing the load

Bambi Bucket

No.	Checklist Item	Action	Where To Find	Illustration	Explanation
1	Sling	select on on **Attachment Options Tablet**	left side of the Center Pedestal		
2	Adjust Weight (FUEL)	reduce **FUEL** to **max 90 %** in order not to exceed max take off weight (MTOW) of 5070 lbs, when Bambi bucket is full. At higher altitudes this fuel value is less due to degrading performance!			
3	Map key for "WATER RELEASE"	bind **TAXI LIGHTS ON [on PRESS]** and **TAXI LIGHTS OFF [on RELEASE]** to the joystick button of your choice, e.g. the trigger or any other button or switch	MSFS Control Options		
4	External Load Power Switch	select "**ELING.**" (Long Line)			the External Load Power Switch gives you two options: - power supply for the **winch** (TREUIL) [*working winch is not simulated*] or - power supply for the **long line** (ELING.) **NOTE**: if the cargo hook is not powered, the electrical release mechanism won't work and you will be unable to release the water with the button you set up at no. 3!
5	Fill Bambi Bucket	- hover over water and below 20 ft RADAR height to fill the bucket - when you reach a RADAR height of 25 ft afterwards, the Bambi bucket is completely out of the water and you'll feel the additional weight			when the cargo hook release mechanism is powered and a load on the hook is detected, the **SLING warning light** will light up
6	Release water	when above the target area, **press the button** you have mapped to TAXI LIGHTS **to release the water**			the **SLING warning light** will extinguish when the load is relieved from the hook by either dipping into water again or dropping the water

Water tank

No.	Checklist Item	Action	Where To Find	Illustration	Explanation
1	Water tank	select on on **Attachment Options Tablet**	left side of the Center Pedestal		
2	Adjust Weight (FUEL)	reduce **FUEL** to **max 45 %** in order not to exceed max take off weight (MTOW) of 5070 lbs, when the water tank is full. If you want to fly with more fuel, you have to stop pumping water early enough.			The empty water tank weighs 285 lbs and has a capacity of 1755 lbs (796 ltrs). The pump is able to pump 17 ltrs (38 lbs) per second, so it takes about 46 seconds to fully load the water tank. You can always monitor the activation of the pump (green LED) and the fill status on this gauge ->
3	Map key for "DEPLOY HOSE"	bind **TOGGLE LOGO LIGHTS** to the joystick button or switch of your choice (**deploy only**). Alternatively, you can deploy **or** stow the hose on the **Attachment Options Tablet**	MSFS Control Options		
3	Map key for "WATER RELEASE"	bind **TAXI LIGHTS ON [on PRESS]** and **TAXI LIGHTS OFF [on RELEASE]** to the joystick button of your choice, e.g. the trigger or any other button or switch	MSFS Control Options		
5	Fill Water tank	**deploy the hose** (see 3), then hover over water and below 15 FT RADAR height to activate the pump			In this example, the pump is active (green LED illuminates, when the pump is dipped into the water and activates itself automatically). The tank is filled 75% here. You'll feel the additional weight constantly increasing. When you've pumped the desired amount of water, just climb and pull the pump out of the water to stop pumping.
6	Release water	when above the target area, **press and hold the button** you have mapped to TAXI LIGHTS ON **to release the water.** You can interrupt the drop by releasing the button (partial drop)			You have to fill the water tank at **least 25%** to be able to drop water. The time necessary for emptying the tank depends on the amount of the loaded water, max 4 seconds, when the tank is 100% full. **Note**: the water FX is limited to one relatively thin gush of water to not impact performance on lower end PC systems.

Spraying kit

No.	Checklist Item	Action	Where To Find	Illustration	Explanation
1	Spraying Kit	select on on **Attachment Options Tablet**	left side of the Center Pedestal		
2	Map key for "SPRAY/REFILL SPRAYTANK"	bind **TAXI LIGHTS ON [on PRESS]** and **TAXI LIGHTS OFF [on RELEASE]** to the joystick button of your choice, e.g. the trigger or any other button or switch	MSFS Control Options		
3	Fill Spray tank	when on ground, **press and hold the button** you have mapped to TAXI LIGHTS ON to fill the spray tank. You can interrupt the (re-)filling by releasing the button			In this example, the pump is active (green LED illuminates, when the button is pressed for filling). The tank is filled 50% here. You'll feel the additional weight when taking off. When you've pumped the desired amount of spraying liquids, just release the button and the pump will stop. It will automatically stop, when the spray tank is full. The spray tank weighs 210 lbs and has a capacity of 990 lbs (450 ltrs). It takes about 45 seconds to fully load the spray tank. You can always monitor the activation of the pump (green LED) and the fill status on the gauge.
6	Spraying	when above the target area, **press and hold the button** you have mapped to TAXI LIGHTS ON **to release the spraying liquid.** You can interrupt spraying by releasing the button			The time necessary for emptying the tank depends on the amount of the loaded spraying liquid, max 141 seconds (2:35 min), when the tank is 100% full.