Airvan GA-8

Microsoft Flight Simulator

SWS

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REVISIONS

REVISIONS

MAY 5, 2025
First version

JUNE 5, 2025
Added failures section

INTRODUCTION

1

1.1 ABOUT THE PRODUCT

The SWS GA-8 Airvan has a long development history that traces back to 2021. We started work on the Airvan as a companion aircraft to our Okavango Delta scenery, as the plane was used a lot to commute between airstrips in the area.

1.2 DEVELOPMENT TEAM

- Kevin Miller: Exterior & interior model, base exterior textures.
- Matt Wynn: Exterior & interior textures.
- Evripidis Efthymiou: Tablet back-end, FS450 and Voltammeter.
- Martyn Cook (TwoCats): Tablet prototyping and UI programming.
- Akis Karagiorgos: Tablet graphics.
- Eric Van der Veen: Flight dynamics and engine.
- Alex Vletsas: 3D animation, wear effects, systems programming, failures, propeller calibration, manual.
- Kostas Pilios: Lights, conversion to Flight Simulator 2024.
- Filippos Ninos: XML coding.
- SimAcoustics: Sounds

1.3 FEATURES

The SWS GA-8 Airvan was initially created with Flight Simulator 2020 in mind, but certain features that we developed for 2020 are now default in FS2024. As a result, some features like the walk-around will feel more intuitive in FS2024, regardless of what version of the aircraft you use.

When browsing through the manual you will come across the following icons, which should help you understand what version each feature is available for. Any unmarked feature is considered common across all versions.

FS2024	Feature is FS2024-exclusive.
FS2020+	Feature is available in both FS2020 and FS2024, but experience may be different across platforms.
FAILURES	Feature is available only with the Failure Module, which is a separate purchase.

Exterior model

- High detail 3D model, featuring accurate animations.
- Multiple LODs to maximise performance and quality.
- High resolution stencils, placards and rivet decals.
- 6 liveries, including white template for repainters
- Weathering, dirt and mud splat effects. FS2020+
- Preflight-clickable chocks, engine and pitot covers, oil cap and dipstick, ground power receptacle. FS2020+
- Preflight checks on flight controls. FS2024
- Cargo pod and non cargopod-equipped variants.
- Deforming tyres.
- Heating and glowing brake pads.

INTERIOR MODEL

- Analogue panel with highly detailed instrument textures and animations.
- Multiple LODs and smart configuration to maximise performance.
- GNS, GTN and GTNXi options with hot-swap capability.

- Cargo configuration: different cargo types selectable through tablet FS2020+
- Passenger configuration - passengers only modelled in FS2024.
- Automatic baggage loading based on passenger count.
- Working exits, sun visors and vibrating cockpit parts.
- Custom cockpit and cabin lighting.

Handling and systems

- Authentic flight handling and engine characteristics, verified by three GA-8 pilots providing by-the-book performance and correct feel of the aircraft.
- Accurate electrical system modelling, including functional circuit breakers.
- Exacting fuel system modelling using MSFS' modern fuel system and air bubble detection that will blink the warning lights when fuel levels are low.
- Simulated oil system, including oil consumption, oil filter, pump and plumbing FAILURES
- Custom Volt/Ammeter and FS450 instrument.
- Persistent state saving: next time you visit the aircraft it will be exactly as you left it.

Failures FAILURES

While included in this manual and described in the supplement, failures require the ***GA-8 Failures expansion module***, which is ***available as a separate purchase***.The module delivers increased systems depth and more than 70 realistic failures that can be triggered on-command or randomly as the aircraft accumulates flight time. The aircraft includes:

- 48 electrical failures: circuit failures, alternator and battery failures
- 24 engine failures and conditions: pistons, spark plugs, fouling, propeller governor, propeller blades, vapor lock, cold starts, engine fire
- 3 oil system failures: pump, filter, leakage
- Brake failures

Failures can be isolated, or cascade from one system to the next. As an example, let's assume that we have a clogged oil filter. In this situation, the oil cannot pass through the filter and is routed through the bypass pipe. If a metal chip or other contaminant is present in the oil, it can find its way to the engine parts.

1. If the chip ends up in one of the pistons, said piston could fail.
2. If the chip ends up in the propeller governor, the governor could fail and either flatten the propeller, or be stuck.
3. If the chip ends up in the accessory gearbox (AGB), the gears could break, stopping its operation. That will cause the following:
   - Loss of oil pressure: as the gearbox powers the oil pump, upon failure the pump will stop working. This will degrade engine lubrication and can lead to overheating and increased engine wear.
   - Loss of alternator power: the alternator will stop working, meaning that you are flying on battery power.

Tablet

The Airvan releases with the first iteration of the SWS tablet, designed to for ease-of-use without looking away from the cockpit. We have developed the tablet as a tool to manage certain aspects of the aircraft easily, while removing features we thought were not useful or that would bloat the application. The current feature set includes:

- Aircraft manual
- Checklists
- Aircraft fuel and cargo loading.
- Avionics configuration
- Aircraft servicing & failures FAILURES
- Aircraft settings

The SWS tablet will be updated over time to contain more features depending on installed modules and feedback from the community.

1.4 SUPPORT

In the event you encounter any issue with the aircraft we recommend that you
contact us on our support venues with the following information:

1. **Proof-of-purchase:** the store and order number, payment receipt or screenshot of the MSFS Marketplace page with the product showing as OWNED and your gamertag clearly visible.
2. **What is the problem?** Please be as detailed as possible in your description.
3. **What were you doing before the problem happened?** I.e. I was going through the tablet's manual. When I clicked on Section 2 on the side bar, the tablet went black.
4. **Did you try running the plane alone in the community folder, with all other mods removed?**
5. **If you did #4, did you encounter the problem again?**
6. **Did you try bringing back any of the mods you removed in the previous step? If yes, what was the offending mod?**
7. **What is the reproduction rate?** - I.e. 2 out of 10 times it happens.

Please contact us with the above information at:

- SWS Support page - Read the known issues or Contact Support
- SWS Discord server - Open a ticket at #official_support

AIRCRAFT DESCRIPTION

2

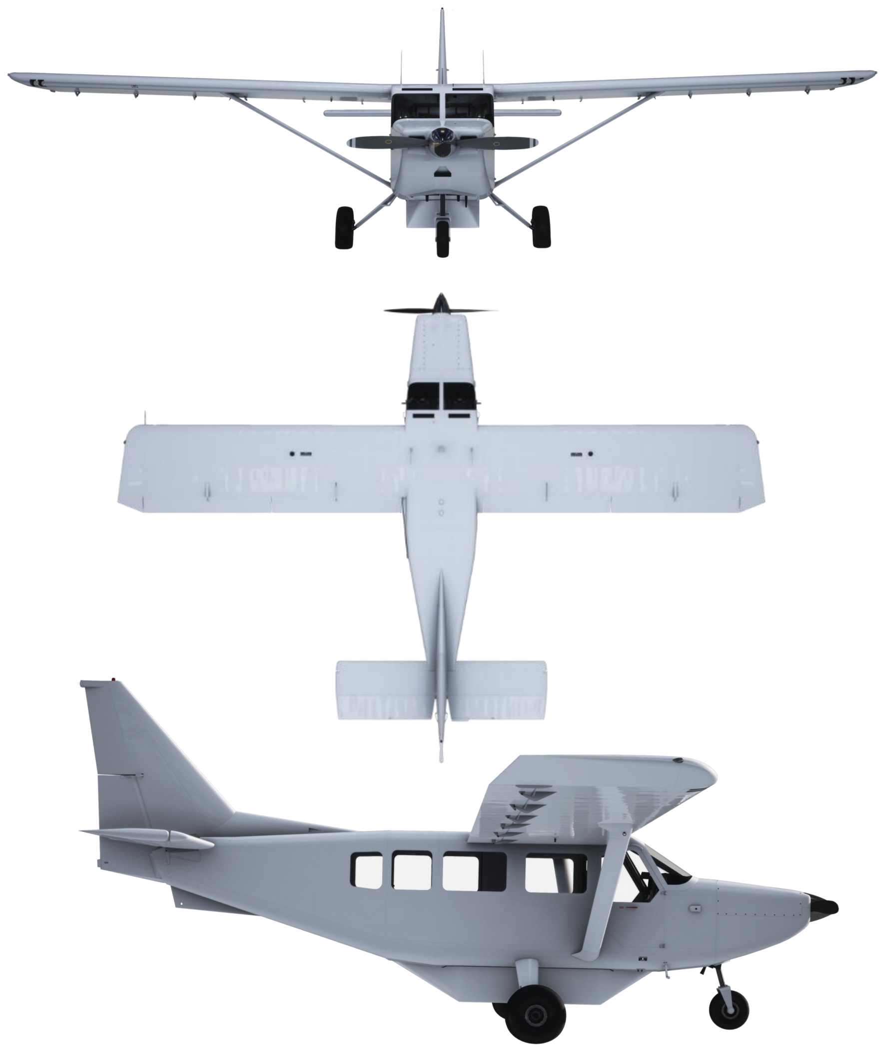
2.1 BASIC INFORMATION

The GA-8 Airvan is a single-engine utility aircraft, featuring a high-wing monoplane design. The GA-8's versatility allows it operate from remote, austere aistrips and perform a multitude of tasks such as passenger transport, cargo transport, sightseeing, skydiving, search and rescue and intelligence, surveillance and reconnaissance (ISR) tasks.

The aircraft is powered by the Lycoming IO540-K1A5 engine, outputting 300 horsepower and a 2-bladed, constant speed propeller rated for 2700RPM. Except for take-off, normal full-throttle operations are conducted using 2500RPM.

The basic dimensions and operating data for the aircraft can be seen in table 1.1.

Table 1.1 - GA-8 Airvan general characteristics			
Length	8.95m (29'4")	**Fuel capacity**	349L (92.2 US Gal)
Wingspan	12.28m (40'3")	**Usable fuel**	332L (87.6 US Gal)
Height	3.89m (12'9")	**Max maneuvering speed (V_A)**	121KIAS
Empty weight	2160lbs (981kg)	**Never exceed speed (V_{NE})**	185KIAS
Max weight	4000lbs (1814kg)	**Max structural cruising speed (V_{NO})**	143KIAS
Forward CG limit	10% MAC	**Aft CG limit**	64"36% MAC
Baggage shelf weight limit	250lbs (113kg)	**Luggage bin Weight limit**	50lbs (22kg)
		Cargo area max weight limit	1500lbs (680kg)



2.2 EXTERIOR FEATURES

Skipping preflight

This section mostly covers the preflight features of the SWS Airvan. As many users are not interested in pre-flighting the aircraft, they can use the "Skip preflight" option in the tablet and the aircraft will be brought in a ready-to-start state. The sim will remember this setting.

Dirt

The SWS Airvan allows for dirt to build up on the aircraft surfaces dynamically. Depending on the environment and weather, dirt will accumulate and landing on wet soil can create mud splats under the aircraft. You can clean the aircraft through the tablet's Wear and Failures page. Dirt can also be washed off by rain or when ditching.

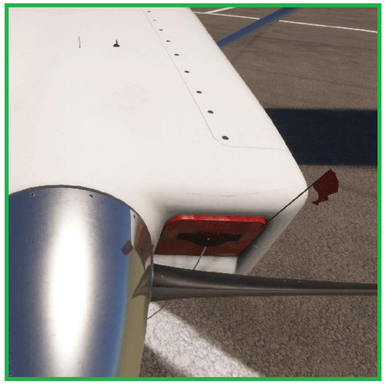
Propeller wear

The propeller will accumulate wear and tear with use, which you can see during the preflight walkaround. The rate at which the propeller wears will vary depending on the RPM and ambient conditions. Flying at low altitude means that you are flying through ground or water particles, which will increase the rate of wear. Different types of ground mean different types of wear also. A plane operating in the desert will wear down much faster than oneD operating from grass strips, as the sand wears down the propeller much faster.

Without the failure module installed, propeller wear will be a visual-only feature.

Engine cover

The engine cover can be placed or removed by clicking on either intake when the aircraft is stationary and the propeller is not spinning. The engine cover needs to be removed during preflight, or the engine will not be able to start.



AIRCRAFT DESCRIPTION 2

Oil cap

The oil cap is located atop the engine cowling and to the left of the centreline. By clicking the oil cap you can inspect the engine oil level using the cutouts on the dipstick.

While openable in all versions, without the failure module installed the oil level will always be normal.

Chocks

Chocks can be placed and removed when the aircraft is stationary on the ground. The chocks will stop the aircraft from moving even when the parking brake is released.

Unlike FS2024 where clicking on one wheel chock removes them from both main wheels, in the SWS Airvan you will need to remove the chocks from each side separately.

Pitot cover

The pitot cover can be removed while the aircraft is stationary and on the ground. If the pitot cover is not removed, the tube will be blocked and your airspeed will read zero.

Ground power

The ground power door is located under the pilot's door and allows you to use an external source to power the aircraft's electrical system. The SWS Airvan always carries a portable external battery that you can use when operating from remote areas.

To attach the battery, the aircraft must be on the ground and stationary. First, open the ground power door by clicking on it. Then, click on the receptacle hole to attach or detach the battery. Closing the door will also automatically remove the battery.

Cargo pod

The cargo pod doors can be opened and closed when on the ground by clicking on each door. Cargo pod baggage is generated randomly when loading passengers on the aircraft using the SWS tablet. If you wish, you can manually load the cargopod by setting the respective station weights using MSFS' default loading method.

2.2 INTERIOR FEATURES

Cabin layout

The SWS Airvan cabin comes with two layouts, commuter and empty. The commuter cabin can seat up to eight people, two in the cockpit and six in the cabin. In this configuration, the baggage shelf and luggage bin can be used to load baggage. The empty cabin configuration is used for cargo operations and skydiving.

In the commuter version you can load the passenger stations by clicking on the seat icons on the SWS tablet, or by manually loading weights using the default MSFS loading page.

At the request of many customers and to improve FS2024 compatibility, we have decided not to include our own passengers in the cabin.

WARNING
When loading the aircraft, it is the pilot's responsibility to ensure that the center of gravity is within the limits.

The empty cabin features a new loading system through the tablet. The user can select what type of cargo they want to load -i.e. crates, barrels- and click where they want to load them. Once the load is applied, the cargo weights are automatically applied to the aircraft.

Unlike our previous aircraft, loading weights using the MSFS weight and balance menu will no longer show cargo in the cabin. This allows us and 3rd party modders to extend the available cargo types for the cabin, as well as more variety in the weight loading of the cabin. Furthermore, it allows the aircraft to be future-proofed for career mode without our cargo popping on top of the career items.

Cockpit

Our rendition of the Airvan features an analogue panel, equipped with GPS. For the GPS you are provided with three options, the default GNS530/430 the TDS GTN750/650Xi and the PMS50 GTN750/650. For ease of navigation, we will split the panel in five large groups: the main panel, radio stack, copilot panel, pedestal and overhead panel.

2.3 MAIN PANEL

Basic flight instruments

Attitude indicator

There are two attitude indicators installed in the cockpit. The primary one is located top and center on the basic flight instruments area. The backup attitude is located right of the vertical speed indicator. The instrument features pitch markings in 5 degree increments, up to ±15 degrees of pitch The bank scale has major markers at 0, 30, 60 and 90 degrees. Smaller markers in 10 degree increments are drawn between 0 and 30 degrees of bank. The knob at the bottom right can be pulled to "cage" the attitude indicator.

Gyrocompass

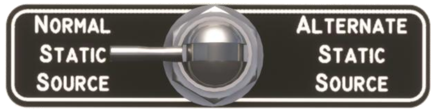
The gyrocompass is located below the attitude indicator. A knob at the 7 o' clock position can be used to adjust the instrument for gyro drift. If the aircraft is equipped with an autopilot, a knob at the 5 o' clock position is used to set the yellow heading bug to the desired autopilot heading.

Airspeed indicator

The airspeed indicator is situated left of the attitude indicator and has an indicating range from 0 to 200 knots. The instrument features three coloured bands indicating the flap speed range (white), normal operating range (green) and caution range (yellow). A red line indicates V_{NE} at 185kts.

Altimeter

The altimeter is located right of the attitude indicator and indicates pressure altitude in feet. A knob at the 7 o' clock position is used to set the reference barometric pressure, which is displayed in a cutout at the 3 o' clock position in inches of Mercury, and another cutout at the 9 o' clock position in millibars. Three needles indicate the current altitude in 100ft (long needle), 1000ft (short needle) and 10000ft (thin needle with triangle pointer at the perimeter).



In the event of a static port blockage, the pilot can open a port to the aircraft's cabin which serves as the alternate static source. This is done by using the static source switch, located at the bottom of the main panel and pulling the "ALTERNATE AIR" lever at the back of the pedestal. A yellow "Alternate Air" warning light will illuminate to indicate this condition.

Vertical speed indicator (VSI)

The VSI indicates the aircraft's vertical speed in 100s of feet per minute (fpm). The instrument is marked for vertical speeds up to 2000fpm. When the needle is in the upper half of the instrument it indicates a climb, while the bottom half indicates a descent.

<u>Turn coordinator</u>

The turn coordinator is located at the bottom left of the basic flight instruments' area and consists of an aircraft figure and a ball. The aircraft figure rotates about its centre and will indicate whether the aircraft is in a left or right turn. The ball indicates whether the aircraft is in a slip or skid.

When the aircraft is in a slip, the ball will be off-centre in the direction of the turn. In practical turns this means that the plane is turning but the nose is pointing "outside the turn".

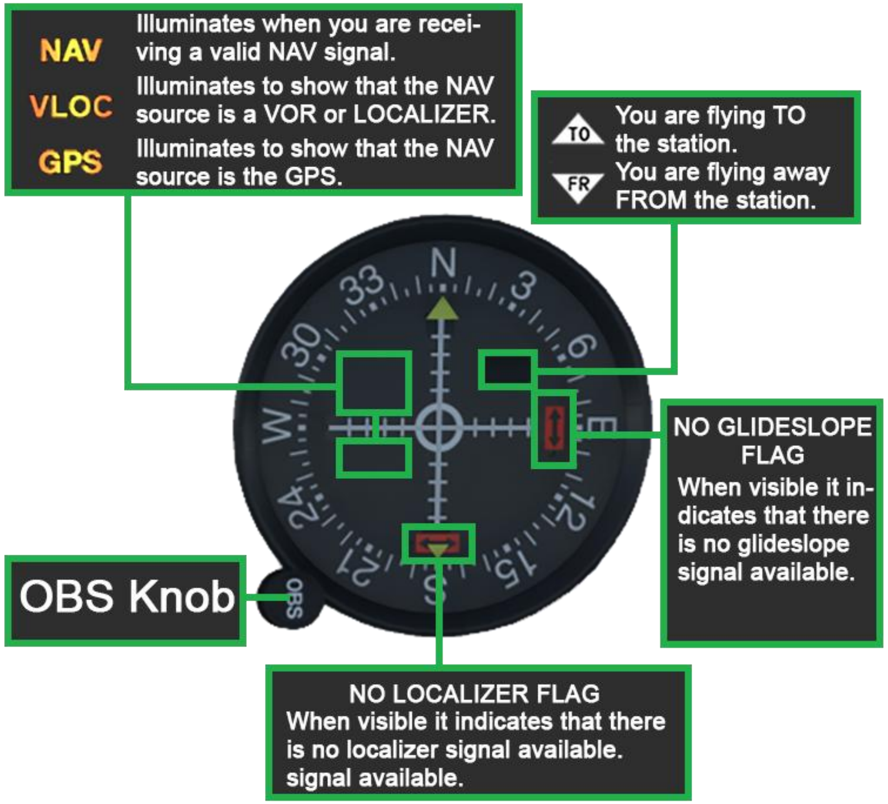
When the aircraft is skidding, the ball will be off-centre opposite to the direction of the turn, meaning that the plane's nose is pointing "inside the turn", similar to a car that is drifting sideways during a turn.

To co-ordinate the turn, the pilot must "step on the ball". This means stepping on the rudder pedal that is in the direction of the ball and keep working on the pedal to keep it centered.

Omni bearing selectors (OBS)

The GA-8 is equipped with two OBS, labelled NAV1 and NAV2. NAV1 OBS will tune to the frequency of Navigation Radio 1 or GPS, depending on what the source is set to from the primary GPS. NAV2 obs will tune to the NAV2 frequency.

A knob at the 7 o' clock position will allow the pilot to rotate the course drum to the desired course, which will be at the top of the circle. The horizontal and vertical bars indicate glideslope and localizer deviation respectively. The instrument contains additional indications which are illustrated on the image below.



Engine Instruments

Engine manifold & fuel pressure indicator

This dual-pressure gauge is situated under NAV2 OBS. The needle labelled “M” on the left side indicates engine manifold pressure (MAP) in inches of Mercury. The needle labelled “F” on the right side indicates fuel pressure in psi.

The green bands indicate the normal operating ranges. The yellow band on the fuel pressure scale indicates a low pressure warning range, while the red lines indicate the minimum and maximum operating limits of fuel pressure.

Engine tachometer

The tachometer is located under the engine Manifold & fuel pressure indicator. It indicates engine speed in hundreds of revolutions per minute (RPM). The instrument is powered by the accessory gearbox so if the accessory power is removed or the gearbox fails it will stop working.

The instrument is graded for speeds from 300 to 3500rpm, indicating 3 to 35. The green band is the normal operating range for the engine (600-2500RPM). The engine should be flown in that range, except for take-off where the engine is limited to 2700RPM for two minutes. A hobbs metre in the window below the needle keeps track of engine operating time.

Oil temperature indicator

The oil temperature indicator is located immediately right of the volt/amp meter and indicates oil temperature in °C. The green-coloured band indicates normal operating temperature limits of 60 to 118°C.The red line is placed at the maximum oil temperature limit.

Oil pressure indicator

The oil pressure indicator is graduated from 0 to 110psi. The green band indicates normal system operating pressure, from 55-95psi. The cautionary range is from 25-55psi and from 95-115psi.

When the oil pressure is outside the green band, a red warning light labelled “OIL” will illuminate.

Cylinder head temperature indicator

The cylinder head temperature (CHT) indicator is graduated in °C and indicates temperatures from 50 to 300°C. The green band indicates the normal operating range, from 75 to 260°C.

Exhaust Gas Temperature (EGT) indicator

The EGT indicator is located at the bottom right of the panel, next to the engine tachometer. The indicated temperature is from 0 to 500°F. The small lines indicate 25°F steps and big lines indicate 100°F increments. The settable yellow needle can be used as a reference bug and can be set by rotating the knob on the face of the instrument.

Fuel Scan 450

The single-engine variant of the FS540 is used to monitor fuel flow and fuel remaining. The top indication on the screen indicates fuel flow in US Gallons per hour. The lower indication switches between different indicating modes, which is done by pressing the "STEP" button. The active mode is indicated by a red light above the text label. The available modes are:

- **USD:** Fuel used since the last reset of the instrument. Holding the AUTO button for 5 seconds will reset the value to 0.0.
- **REM:** Fuel remaining.
- **HM:** Indicates the remaining endurance time in Hours and Minutes.
- **REQ:** Fuel required to Waypoint/Destination.
- **RES:** Fuel reserve when you arrive at your next waypoint.

The AUTO button operation is currently limited to resetting used fuel.

Fuel gauges and warning lights

Fuel gauges

Two fuel gauges are located at the top left of the panel labelled "LEFT TANK" and "RIGHT TANK". The gauges provide the pilot with an indication of how much fuel is loaded on each wing fuel tank.

Each gauge is accompanied with a "CHECK FUEL" light above it. The light will illuminate when the fuel level is low. The system works by detecting air bubbles in the wing tank to sump tank supply lines Blinking lights will indicate that the fuel level is low. As the fuel level keeps dropping, the lights will blink faster until illuminating constantly, at which point the tank is empty.

Fuel low light

The red light labelled "FUEL" will illuminate when the total fuel level drops to less than five gallons.

Sump tank low fuel light

The red lightbulb labelled "SUMP TANK LOW FUEL" will illuminate when fuel transfer from the main tanks to the sump tank has ceased, either because of a fuel filter blockage or because the main tanks are empty.

Volt/amp meter

<u>Volt/amp meter indicator</u>

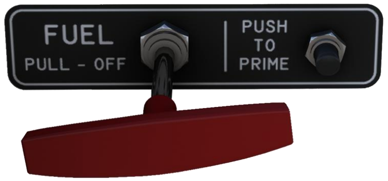
The Volt/amp meter indicator is situated in the lower left corner of the pilot's instrument panel. A screen will indicate Volts or Amps for the selected bus, which can be toggled using the VOLTS/AMPS switch under the screen. Above the screen are two lights: the "HIGH VOLTS" light will illuminate in the event that the voltage in the selected bus exceeds 16V. The "DISCHARGE" light will illuminate if the voltage in the selected bus drops below 12V.

<u>Volt/amp meter bus selector</u>

Located under the face of the volt/amp meter, the bus selector switch will change the voltage/amperage source to either BUS 1 (left) or BUS 2 (right).

Main panel - Fuel shutoff valve handle and primer switch

<u>Fuel Shutoff valve handle</u>



When pulled, the red coloured handle will immediately cut fuel feed to the engine.

<u>Primer switch</u>

When the primer switch is pressed, fuel will be sprayed into the combustion chamber to prime the engine for starting.

Warning lights

Warning light test switch and dimmer

The switch labelled "TEST" will make all warning and caution lights illuminate when held depressed. The switch labelled "DIM" controls the brightness of the warning lights.

Vacuum pressure caution light

Illuminates to indicate that the vacuum system pressure is low.

Oil pressure warning light

Illuminates to indicate that the oil system pressure is above or below the normal operating range.

Alternator warning light

Illuminates to indicate that the alternator is offline or producing less than 12.5V of voltage.

Alternate Air warning light

Illuminates to indicate that the static source has been switched to the alternate air source.

Pitot Heat warning light

Illuminates to indicate that the pitot heater is inactive, or that it is active and not receiving power.

Fuel boost pump light

Illuminates to indicate that the electrical fuel boost pump is in operation.

2.4 RADIO STACK

The SWS Airvan comes with three radio stack configurations, selectable through the Tablet:

- GNS stack
- GTN stack
- GTNXi stack

The KFC225 autopilot is an optional item on the real Airvan, so it is also optional here. Its installation can be toggled through the tablet's "OTHER SETTINGS" page. The avionics backlighting can be controlled using the "RADIO LIGHTS" knob on the Copilot panel.

GNS stack

The GNS stack features the following avionics:

- **GNS530:** Tied to GPS circuit #1, this is the primary GPS navigator and also controls COM1 and NAV1 radios.
- **GNS430:** Tied to GPS circuit #2, this is the secondary GPS navigator and also controls COM2 and NAV2 radios.
- **GTX330:** The GTX330 is equipped as the aircraft's transponder

GTN stack

The GTN stack features the PMS50 GTN, which is available as a separate download and comes in free and paid versions. The GTN stack features the following avionics.

- **GTN750:** Tied to GPS circuit #1, this is the primary GPS navigator, transponder and COM1/NAV1 radios.
- **GTN650:** Tied to GPS circuit #2, this is the secondary GPS navigator, transponder and also controls COM2 and NAV2 radios.

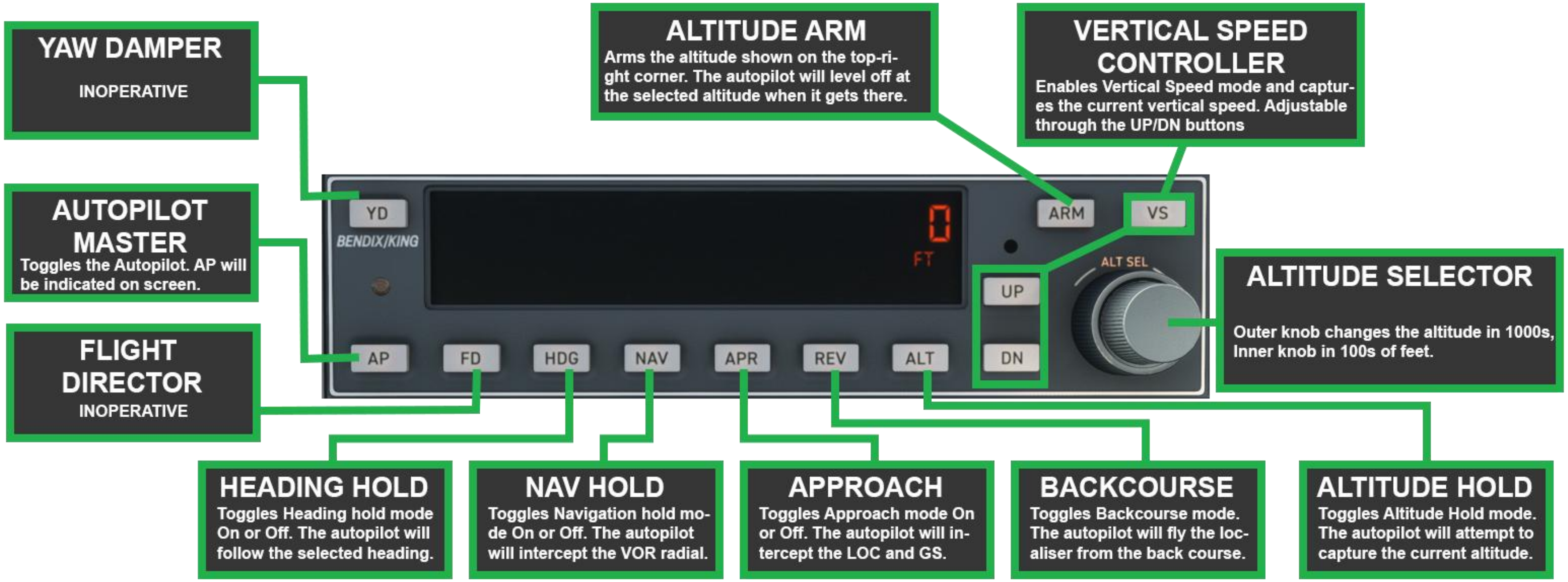
GTNXi stack

The GTNXi stack features the TDS Simulations GTNXi, which is a payware add-on that can be purchased from TDS Simulations' website. The GTNXi stack features the following avionics.

- **GTN750:** Tied to GPS circuit #1, this is the primary GPS navigator, transponder and COM1/NAV1 radios.
- **GTN650:** Tied to GPS circuit #2, this is the secondary GPS navigator, transponder and also controls COM2 and NAV2 radios.

KFC225 Autopilot (Option)

The Airvan comes with an optional KFC225 Autopilot which can be toggled through the tablet's "OTHER SETTINGS" page. The available autopilot modes are shown in the following picture.



2.5 CO-PILOT PANEL

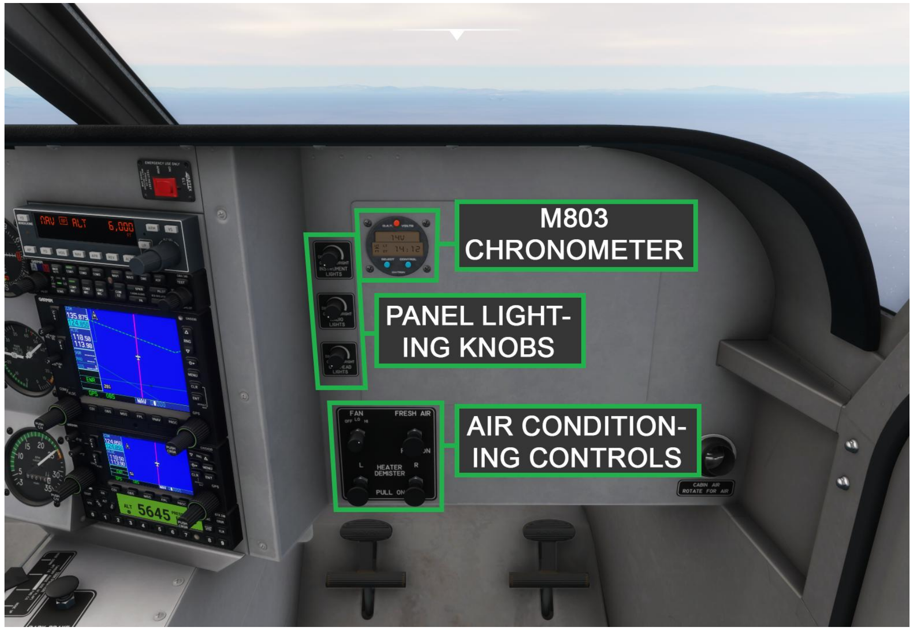
The co-pilot panel contains the M803 chronometer, lighting knobs and airconditioning control levers.

M803 chronometer

The M803 is a panel-mounted LCD chronometer that cycles through UTC, local, and flight-time displays, plus count-up/count-down elapsed-time modes. An integral sensor port lets it show outside-air temperature, while a voltmeter page monitors the battery bus voltage. Two push-buttons drive all functions, and the sunlight-readable display features clear UT/LT/FT/ET annunciators and built-in night illumination.

Panel lighting knobs

Three knobs mounted on the top left of the co-pilot's panel are used to control cockpit lighting. The first knob, labelled "INSTRUMENT LIGHTS", controls the lighting of the pilot's instrumentation. The middle knob, labelled "RADIO LIGHTS" controls the backlighting of the avionics stack (GPS, Audio panel, Autopilot). The bottom knob, labelled "OVERHEAD LIGHTS", controls the intensity of the overhead panel lighting.



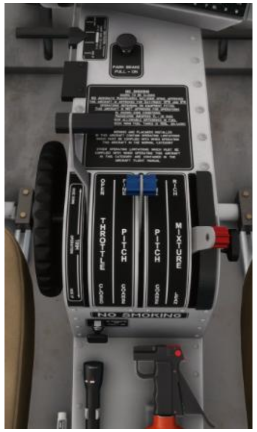
Air conditioning controls

At the bottom left of the co-pilot's panel are the air conditioning and windshield de-icing controls. At the top-left is the cabin fan knob, with the OFF, LO and HI settings. At the top right is the FRESH AIR control lever which, when pulled, will allow the introduction of outside air and venting of the cabin.

The bottom two levers are the windshield demisting levers. One for the left and one for the right windshield, when pulled they allow for hot air to blow on the windshield and demist it.

2.6 PEDESTAL

The pedestal is located between the pilot seats and is dominated by the engine control levers and elevator trim wheel.



Engine controls

Going left-to-right, the engine controls are:

- **Throttle lever (black grip)**
- **Propeller lever (blue grip):** Allows the pilot to control the engine RPM when in the constant speed range from 1800 to 2700RPM.
- **Mixture lever (red grip):** Allows the pilot to control the air/fuel mixture by introducing more fuel (forward) or less fuel (back).

As the aircraft climbs into thinner air, the mixture must be leaned to keep the engine running at its maximum power output. This is done by gradually pulling back on the mixture lever as the aircraft climbs. A rule of thumb is to start leaning after 3,000ft MSL.

WARNING

If you fly the aircraft at a mixture that is too rich, the spark plugs will start getting fouled ("dirty") from polymerised or unburnt fuel. You may notice that the engine is not producing sufficient power or the RPM is fluctuating. In such a case, leaning the mixture can clean up the fouling and restore the engine to a good operating condition.

FAILURES

Parking brake lever

The parking brake lever is located atop the pedestal, right in front of the engine controls. Pulling the lever out will set the parking brake, pushing it into the pedestal will release it.

Elevator trim

The Airvan incorporates an hinged elevator trim system, which will rotate the entire elevator assembly when applying trim.

The elevator trim is controlled through a wheel located left of the engine controls. Rotating the wheel forward (counter-clockwise from the pilot's perspective) will trim the nose down. Rotating the wheel backwards (clockwise from the pilot's persepective) will trim the nose up.

The elevator trim indicator is a sliding-type pointer, situated forward of the trim wheel. Markings next to the pointer show the take-off trim range and elevator trim limits.

Alternate Air handle

The Alternate Air handle is located below the throttle lever and will open a port on the cabin that can be used as an alternate static source for the altimeter.

2.7 OVERHEAD

The overhead panel contains the electrical system switches and circuit breakers. Switches and circuit breakers connected to BUS 1 are outlined with a white stripe, while all other switches and breakers are connected to BUS 2. Overhead backlighting is controlled through the “OVERHEAD” knob on the co-pilot panel.

A reading light with a flexible “goose neck” and an Outside Air Temperature (OAT) indicator are located left of the overhead panel.

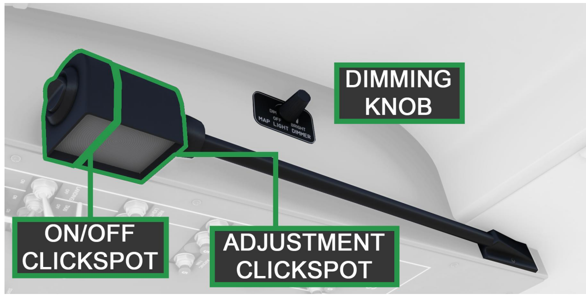
Overhead switches and circuit breakers

The overhead switches control the electrical and avionics BUS connections, lighting, pitot heat and electrical fuel boost pump. Switches pointing forward are ON, while switches pointing back are OFF.

The circuit breakers’ normal position is in/closed. If a circuit breaker is out/open, a white collar can be seen around its base to assist in visually identifying it.

Reading light

The reading light has a power switch located at the front of the light. For facilitation to the users, the forwardmost 1/4 of the lightbulb is clickable and will toggle the light switch. The light’s brightness can be adjusted from a dimming knob on the side of the overhead panel.



The reading light can be positioned by clicking & dragging the rear 3/4 of the lightbulb, which will allow you to move the light left, right up or down. Scrolling on the same area will rotate the light around its longitudinal axis.

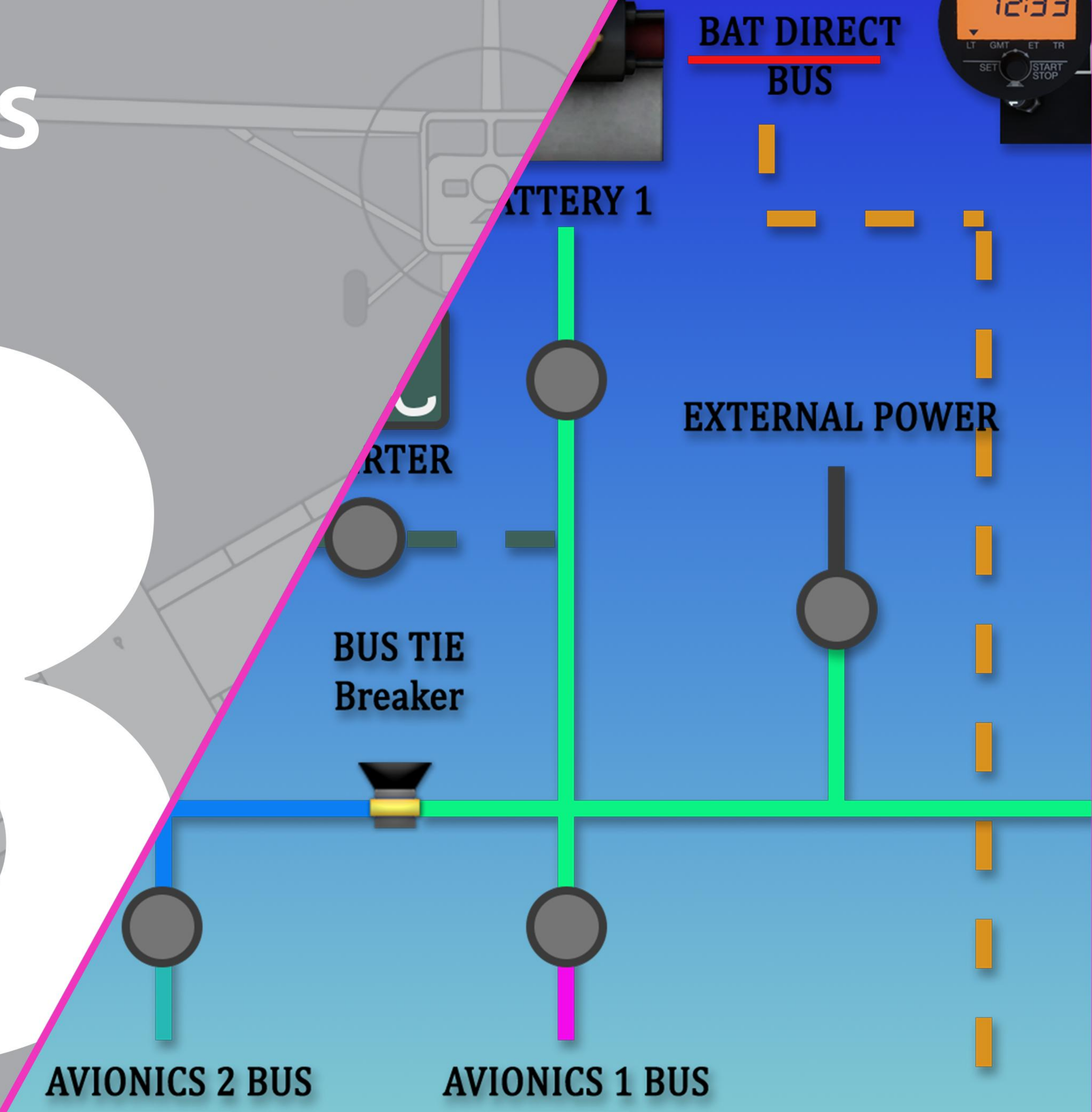
Outside Air Temperature (OAT) indicator

An Scott-type Thermometer probe is located above the pilot’s brow window. The OAT probe can be seen on the outside, with the indicator located in the cockpit, directly below the probe’s location.

The OAT sensor contains two temperature scales, indicated by the same needle. The outer scale indicates temperature in in °F and the inner scale in °C. The indicated temperature ranges are -65 to 145°F and -45 to 60°C.

SYSTEMS

3


BAT DIRECT
BUS
EXTERNAL POWER
BUS TIE
Breaker
AVIONICS 2 BUS
AVIONICS 1 BUS

3.1 ENGINE

General description

The GA-8 Airvan is powered by a six-cylinder IO-540-K1A5, delivering 300 hp at 2,700 rpm. It is a direct-drive, horizontally opposed air-cooled engine and uses continuous fuel injection for precise mixture control throughout the entire flight envelope, while dual magnetos installation supply redundant ignition.

Table 3.1 - Engine limits

POWER	RPM	MANIFOLD PRESSURE	MAX TEMP		FUEL PRESSURE	
			CHT	Oil	Min	Max
Max Takeoff 300BHP	2700 (max. 2 minutes)	Full throttle	260°C (500°F)	118°C (245°F)	18psi	55psi
Max Continuous	2500					

Accessory gearbox FAILURES

The engine's accessory gearbox is an important component of the engine, as it provides power to several essential engine components. The SWS Airvan's accessory gearbox powers the engine tachometer, alternator, oil pump, vacuum pump and starter.

Propeller

Thrust on the Airvan is provided by an 84-inch, two-bladed, constant-speed propeller. The propeller blades can rotate from 11.4°, to 29° and their pitch angle is controlled by the propeller governor. The propeller governor receives oil through the oil system, which it further pressurises and uses it to hydraulically rotate the propeller blades in order to maintain a constant propeller RPM.

At RPM below the governor threshold, the propeller will operate like a fixed pitch propeller, with the blade angle fixed at 11.4°. Increasing power will make the engine RPM increase. Upon providing sufficient power and crossing 1800RPM the governor takes over and it will try to maintain the selected prop RPM setting regardless of the power setting.

3.2 OIL SYSTEM

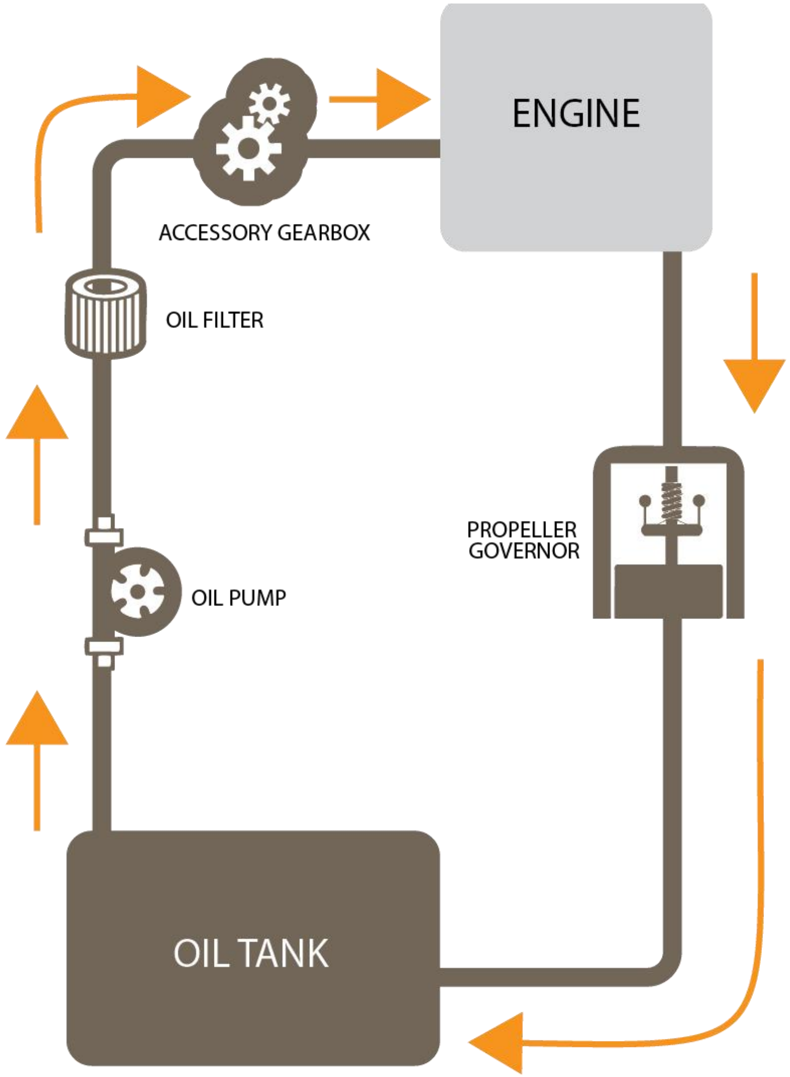
The oil system on the SWS Airvan consists of the oil tank, oil pump, oil filter and oil piping. The oil tank is filled with oil which is pressurised by the oil pump and circulated to provide lubrication to the engine, accessory gearbox and operate the propeller governor. Before circulating, the oil passes through an oil filter that prevents any particles or other contaminants from going into the oil circuit.
The oil system quantities and pressure limits are shown in the table below.

Table 3.2 - Oil system quantities and limits			
Oil capacity	**Oil quantity**	**Min. pressure**	**Max. pressure**
Total	**12 US Quarts**	**55 psi**	**95 psi**
Usable	**9.3 US quarts**		
Minimum safe	**2.8 US Quarts**		

The engine will consume oil at a rate that depends on the engine's power setting. The limit for the K1A5 model is 0.92 US quarts per hour at maximum power setting. Oil levels can be checked in pre-flight by opening the oil cap and checking the level on the oil dipstick. The top cutout is equivalent to 12 US quarts, which is a full tank of oil. The bottom cutout is equivalent to 2.8 US quarts which is the minimum safe level.

The oil system is only simulated in the failure expansion module. In the base aircraft, the oil level remains constant.

FAILURES



3.3 FUEL SYSTEM

The Airvan fuel system uses MSFS' modern fuel system to provide an accurate simulation of the real aircraft equivalent.

The Airvan fuel system consists of:

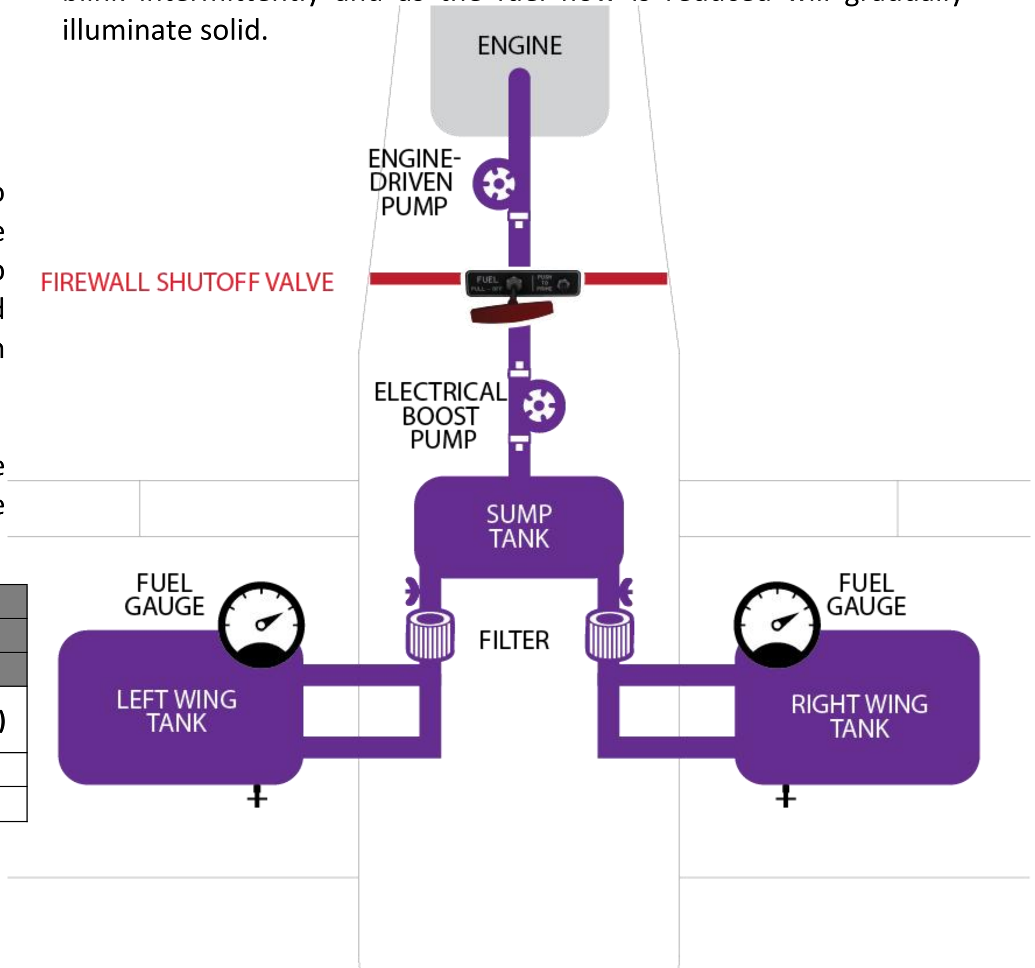
- One integral fuel tank in each wing
- A sump fuel tank in the fuselage floor

Each of two integral fuel tanks gravity-feeds independently into through its own fuel filter and into strainer bowls located below the forward right hand seat and then to the ***sump tank***. From the sump tank, fuel flows through an ***electric boost pump***, then forward through the firewall shutoff valve and to the engine-driven mechanical fuel pump and injection system.

Two fuel gauges are provided to show fluid levels in each tank. The sump tank does not have a gauge, as its content is deemed unusable and should not be considered for flight planning.

Table 3.3 - Fuel tank capacities				
Shown as Total (usable)	Imperial		Metric	
	US Gallons	Pounds	Liters	Kilograms
Wing tanks (each)	44.9 (43.8)	269.4 (262.8)	170 (166)	122.5 (119.5)
Sump tank	2.4 (0)	14.4 (0)	9 (0)	6.5 (0)
Total	92.2 (87.7)	553.2 (526.2)	349 (332)	251.5 (239)

Optical sensors in the wing tank to sump tank lines detect air bubbles passing down the line and will illuminate the FUEL CHECK caution lights on the main panel to indicate that fuel flow from the wing tank to the sump tank is interrupted. The FUEL CHECK caution light will blink intermittently and as the fuel flow is reduced will gradually illuminate solid.



Fuel filter blockage FAILURES

In the even of a fuel filter blockage, fuel flow from the integral wing tank to the Sump Tank will be interrupted and the FUEL CHECK light for the respective tank will illuminate.

In the event that both integral wing tanks stop feeding with fuel, either due to a fuel filter blockage or being empty, the FUEL CHECK lights accompanied by the SUMP TANK LOW FUEL light will illuminate. Such a situation constitutes an emergency and you should plan to land as soon as possible.

Hot starts FAILURES

When the engine has been shut down and is still hot from operation, the engine might become vapor locked. This is a situation where the fuel pipes close to the engine get heated from it and the fuel inside it can be vaporised. When this happens, colder fuel coming to the engine can't move into the fuel lines. To break the vapor lock, open the mixture and run the electrical fuel pump for 3-5 seconds so that cold fuel is forced through the pipes.

Vapor lock probability increases when engine temperature exceeds 120°F.

Cold starts FAILURES

When you are attempting to start the engine in temperatures that are extremely cold, which can make the fuel more difficult to ignite.

To start a cold engine at temperatures below 0°C, the engine must be preheated to get the oil to the right viscosity and ensure that the engine's metals don't experience excessive wear.

Preheating is not currently simulated.

The next step is to prime the engine to facilitate combustion. Priming is a critical step in the process. Under-priming the engine will not help it achieve combustion and the fuel will be pushed out of the exhaust. On the other hand, over-priming the engine can result in a backfire or engine fire. Therefore, it is important to prime the engine correctly.

To prime the engine:

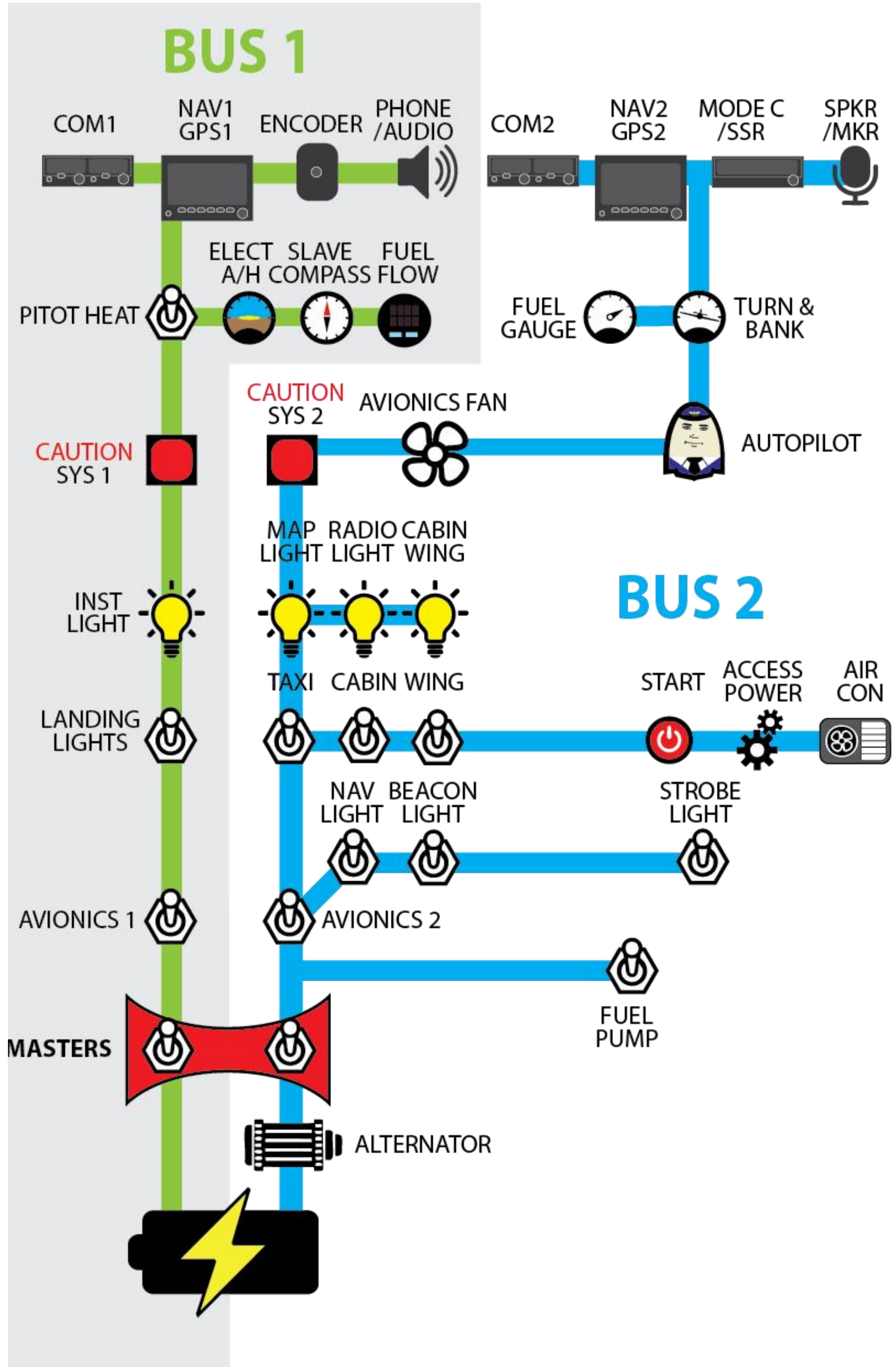
1. Turn on the Fuel Pump
2. Set mixture to Rich
3. Prime using the switch
4. Mixture to Cutoff, Fuel Pump OFF
5. Start the engine. On firing, set the mixture to full rich

3.4 ELECTRICAL SYSTEM

The Airvan employs a 12/14V DC electrical system energized by a 12-volt, 35-Ah lead-acid battery and an engine-driven, self-regulating alternator that delivers a nominal 14 V/100 A. Power is distributed through two independent main buses -BUS 1 and BUS 2- that are brought online with their respective master switches. A combined volt/ammeter and an amber “ALT” light on the instrument panel give the pilot instant confirmation of bus voltage and alternator output.

BUS 1 is battery-fed and is reserved for essential services such as landing lights, COMM 1, GPS, and instrument lighting; it remains powered any time the BUS 1 MASTER is ON. BUS 2 carries all remaining loads and supplies field current to the alternator. Turning the BUS 2 MASTER ON connects both the battery and the alternator to the system. All line-replaceable circuit breakers are grouped on the overhead panel, clearly labelled BUS 1 or BUS 2. BUS 1 circuits are outlined by a white box for quick identification.

An external ground-power receptacle is fitted on the left fuselage floor aft of the pilot seats, enabling battery charging or engine starts from a GPU.



PERFORMANCE

4

4.1 REFERENCE SPEEDS

Table 4.1 - Reference speeds		
Symbol	KIAS	Description
V_{SO}	57	Stall, full flap 38°
V_R	60	Rotation (normal take- off, 14° flap)
V_S	64	Stall, flaps UP
V_2	71	Take- off safety speed at 50 ft
V_{REF}	71	Approach at 50 ft, full flap
V_X	71	Best angle climb (14° flap, full power)
V_Y	78	Best rate climb, flaps UP
V_{GLIDE}	78	Best glide (4 000 lb, flaps UP)
V_{FE}	97	Max with flaps extended
V_A	121	Manoeuvring speed (4 000 lb)
V_{TURB}	121	Recommended turbulence penetration
V_{NO}	143	Max structural cruise
V_{NE}	185	Never- exceed speed
Max X- wind	15	Max demonstrated cross- wind (kt)

4.2 TAKE-OFF ROLL

Table 4.2.1 - Take-off distance in feet, 0% slope, no wind, ground roll (50ft obstacle)							
OAT	Altitude	Weight (lbs)					
		2200	2600	3000	3400	3800	4000
-25°C (-13°F)	0						
	2000						
	4000	390 (610)	520 (840)	600 (1000)	740 (1200)	860 (1550)	960 (1580)
	6000	500 (800)	600 (1000)	780 (1240)	860 (1550)	1150 (1900)	1200 (2000)
	8000	580 (960)	760 (1240)	920 (1540)	1150 (1900)	1400 (2300)	1480 (2460)
	10000	800 (1300)	1000 (1650)	1260 (2050)	1500 (2480)	1760 (2900)	1900 (3160)
-15°C (5°F)	0	250 (420)	380 (580)	450 (750)	520 (900)	620 (1060)	700 (1180)
	2000	350 (570)	440 (730)	550 (900)	650 (1080)	800 (1300)	850 (1430)
	4000	430 (720)	550 (900)	700 (1140)	830 (1380)	1000 (1630)	1100 (1800)
	6000	600 (990)	700 (1340)	850 (1400)	1050 (1740)	1250 (2030)	1380 (2230)
	8000	670 (1100)	860 (1420)	1100 (1800)	1350 (2190)	1600 (2600)	1750 (2800)
	10000	820 (1370)	1100 (1800)	1380 (2220)	1680 (2750)	2000 (3250)	2180 (3530)

Table 4.2.1 - Take-off distance in feet, 0% slope, no wind, ground roll (50ft obstacle) - Continued							
OAT	Altitude	Weight (lbs)					
		2200	2600	3000	3400	3800	4000
-5°C (23°F)	0	300 (550)	400 (650)	500 (800)	600 (1000)	750 (1220)	800 (1300)
	2000	390 (630)	500 (820)	630 (1020)	780 (1250)	930 (1530)	1000 (1650)
	4000	500 (820)	650 (1080)	800 (1350)	990 (1600)	1150 (1900)	1200 (2050)
	6000	600 (1000)	800 (1300)	1000 (1600)	1200 (1970)	1400 (2350)	1550 (2580)
	8000	550 (1220)	1000 (1620)	1240 (2030)	1550 (2550)	1800 (2950)	1950 (3200)
	10000	980 (1600)	1250 (2100)	1600 (2600)	1940 (3150)	2290 (3700)	2480 (4020)
5°C (41°F)	0	360 (600)	450 (760)	590 (970)	700 (1180)	810 (1400)	900 (1450)
	2000	420 (700)	510 (890)	680 (1100)	800 (1350)	980 (1600)	1050 (1750)
	4000	500 (820)	650 (1100)	800 (1370)	1000 (1640)	1200 (2000)	1330 (2180)
	6000	650 (1100)	890 (1430)	1100 (1800)	1370 (2200)	1600 (2600)	1700 (2800)
	8000	800 (1360)	1100 (1800)	1400 (2240)	1680 (2760)	2000 (3250)	2180 (3550)
	10000	1050 (1750)	1400 (2300)	1780 (2880)	2150 (3470)	2550 (4180)	2750 (4450)

Table 4.2.1 - Take-off distance in feet, 0% slope, no wind, ground roll (50ft obstacle) - Continued							
OAT	Altitude	Weight (lbs)					
		2200	2600	3000	3400	3800	4000
15°C (59°F)	0	380 (600)	500 (800)	610 (980)	770 (1220)	900 (1400)	980 (1600)
	2000	480 (780)	600 (1000)	750 (1250)	930 (1550)	1080 (1630)	1200 (2000)
	4000	600 (980)	780 (1280)	1000 (1600)	1200 (1950)	1350 (2250)	1550 (2500)
	6000	730 (1250)	950 (1650)	1200 (1950)	1350 (2370)	1650 (2700)	1900 (3100)
	8000	950 (1330)	1150 (1940)	1500 (2450)	1800 (3000)	2100 (3600)	2350 (3940)
	10000	1150 (1920)	1490 (2460)	1860 (3100)	2280 (3800)	2700 (4530)	2950 (4950)
25°C (77°F)	0	400 (640)	520 (880)	650 (1100)	830 (1370)	980 (1630)	1070 (1790)
	2000	480 (820)	660 (900)	820 (1380)	1010 (1700)	1210 (2040)	1300 (2200)
	4000	650 (1100)	860 (1420)	1040 (1780)	1280 (2360)	1500 (2560)	1600 (2780)
	6000	800 (1340)	1030 (1670)	1300 (2200)	1570 (2640)	1900 (3180)	2080 (3450)
	8000	1050 (1680)	1300 (2200)	1650 (2760)	2080 (3360)	2380 (4000)	2550 (4350)
	10000	1300 (2100)	1650 (2700)	2050 (3400)	2500 (4200)	2950 (5000)	3200 (5400)

Table 4.2.1 - Take-off distance in feet, 0% slope, no wind, ground roll (50ft obstacle) - Continued							
OAT	Altitude	Weight (lbs)					
		2200	2600	3000	3400	3800	4000
35°C (95°F)	0	450 (800)	620 (1020)	780 (1260)	900 (1540)	1100 (1820)	1200 (2000)
	2000	580 (980)	760 (1240)	950 (1450)	1120 (1850)	1360 (2240)	1500 (2450)
	4000	700 (1200)	960 (1580)	1210 (1940)	1450 (2360)	1700 (2820)	1840 (3050)
	6000						
	8000						
	10000						
45°C (113°F)	0	520 (850)	700 (1160)	870 (1390)	1000 (1660)	1200 (2000)	1320 (2150)
	2000						
	4000						
	6000						
	8000						
	10000						

Table 4.2.1 - Take-off distance in metres, 0% slope, no wind, ground roll (50ft obstacle)							
OAT	Altitude	Weight (lbs)					
		2200	2600	3000	3400	3800	4000
-25°C (-13°F)	0						
	2000						
	4000	120 (190)	160 (260)	180 (300)	230 (370)	260 (470)	290 (480)
	6000	150 (240)	180 (300)	240 (380)	260 (470)	350 (580)	370 (610)
	8000	180 (290)	230 (380)	280 (470)	350 (580)	430 (700)	450 (750)
	10000	240 (400)	300 (500)	380 (620)	460 (760)	540 (880)	580 (960)
-15°C (5°F)	0	90 (130)	110 (180)	130 (230)	170 (270)	190 (310)	210 (360)
	2000	110 (170)	130 (220)	170 (270)	200 (330)	240 (400)	260 (440)
	4000	130 (220)	170 (270)	210 (350)	250 (420)	300 (500)	340 (550)
	6000	180 (300)	210 (410)	260 (430)	320 (530)	380 (620)	420 (680)
	8000	200 (340)	260 (430)	340 (550)	410 (670)	490 (790)	530 (850)
	10000	250 (420)	340 (550)	420 (680)	510 (840)	610 (990)	660 (1080)

Table 4.2.1 - Take-off distance in metres, 0% slope, no wind, ground roll (50ft obstacle) - Continued							
OAT	Altitude	Weight (lbs)					
		2200	2600	3000	3400	3800	4000
-5°C (23°F)	0	90 (170)	120 (200)	150 (240)	180 (300)	230 (370)	240 (400)
	2000	120 (190)	150 (250)	190 (310)	240 (380)	280 (470)	300 (500)
	4000	150 (250)	200 (330)	240 (410)	300 (490)	350 (580)	370 (620)
	6000	180 (300)	240 (400)	300 (490)	370 (600)	430 (720)	470 (790)
	8000	170 (370)	300 (490)	380 (620)	470 (780)	550 (900)	590 (980)
	10000	300 (490)	380 (640)	490 (790)	590 (960)	700 (1130)	760 (1230)
5°C (41°F)	0	110 (180)	140 (230)	180 (300)	210 (360)	250 (430)	270 (440)
	2000	130 (210)	160 (270)	210 (340)	240 (410)	300 (490)	320 (530)
	4000	150 (250)	200 (340)	240 (420)	300 (500)	370 (610)	410 (660)
	6000	200 (340)	270 (440)	340 (550)	420 (670)	490 (790)	520 (850)
	8000	240 (410)	340 (550)	430 (680)	510 (840)	610 (990)	660 (1080)
	10000	320 (530)	430 (700)	540 (880)	660 (1060)	780 (1270)	840 (1360)

Table 4.2.1 - Take-off distance in metres, 0% slope, no wind, ground roll (50ft obstacle) - Continued							
OAT	Altitude	Weight (lbs)					
		2200	2600	3000	3400	3800	4000
15°C (59°F)	0	120 (180)	150 (240)	190 (300)	230 (370)	270 (430)	300 (490)
	2000	150 (240)	180 (300)	230 (380)	280 (470)	330 (500)	370 (610)
	4000	180 (300)	240 (390)	300 (490)	370 (590)	410 (690)	470 (760)
	6000	220 (380)	290 (500)	370 (590)	410 (720)	500 (820)	580 (940)
	8000	290 (410)	350 (590)	460 (750)	550 (910)	640 (1100)	720 (1200)
	10000	350 (590)	450 (750)	570 (940)	690 (1160)	820 (1380)	900 (1510)
25°C (77°F)	0	120 (200)	160 (270)	200 (340)	250 (420)	300 (500)	330 (550)
	2000	150 (250)	200 (270)	250 (420)	310 (520)	370 (620)	400 (670)
	4000	200 (340)	260 (430)	320 (540)	390 (720)	460 (780)	490 (850)
	6000	240 (410)	310 (510)	400 (670)	480 (800)	580 (970)	630 (1050)
	8000	320 (510)	400 (670)	500 (840)	630 (1020)	730 (1220)	780 (1330)
	10000	400 (640)	500 (820)	620 (1040)	760 (1280)	900 (1520)	980 (1650)

Table 4.2.1 - Take-off distance in metres, 0% slope, no wind, ground roll (50ft obstacle) - Continued							
OAT	Altitude	Weight (lbs)					
		2200	2600	3000	3400	3800	4000
35°C (95°F)	0	140 (240)	190 (310)	240 (380)	270 (470)	340 (550)	370 (610)
	2000	180 (300)	230 (380)	290 (440)	340 (560)	410 (680)	460 (750)
	4000	210 (370)	290 (480)	370 (590)	440 (720)	520 (860)	560 (930)
	6000						
	8000						
	10000						
45°C (113°F)	0	160 (260)	210 (350)	270 (420)	300 (510)	370 (610)	400 (660)
	2000						
	4000						
	6000						
	8000						
	10000						

4.3 CLIMB PERFORMANCE

4.3.1 Scheduled climb

Power:	Full throttle
Engine Speed:	2500RPM
Airspeed:	78KIAS
Flaps:	UP

Table 4.3.1 - Rate of Climb (ft/min) - Weight in LBS							
Weight (Lbs)	Press. Altitude (ft)	Outside Air Temperature					
		-20°C (-29°F)	0°C (32°F)	15°C (59°F)	30°C (89°F)	45°C (113°F)	ISA
4000	0	1025	885	787	695	608	*787*
	2000	895	756	659	568	481	*684*
	4000	769	631	535	443	357	*584*
	6000	646	509	412	321	234	*487*
	8000	526	388	292	201	114	*393*
	10000	408	270	173	82	-	*301*
3600	0	1202	1054	951	855	764	951
	2000	1065	919	818	723	633	844
	4000	933	789	689	595	507	741
	6000	806	663	565	472	384	642
	8000	683	542	444	352	265	546
	10000	564	424	327	235	149	455
3200	0	1415	1256	1147	1045	949	1147
	2000	1269	1113	1006	906	812	1034
	4000	1129	976	871	773	681	925
	6000	995	845	742	646	557	823
	8000	867	720	619	525	437	725
	10000	745	601	502	410	325	633

Power:	Full throttle
Engine Speed:	2500RPM
Airspeed:	78KIAS
Flaps:	UP

Table 4.3.1 - Rate of Climb (ft/min) - Weight in LBS - Continued							
2800	0	1681	1508	1389	1278	1174	1389
	2000	1522	1352	1237	1129	1029	1266
	4000	1370	1205	1093	988	891	1150
	6000	1226	1066	957	855	762	1042
	8000	1091	935	829	731	641	940
	10000	964	813	710	616	529	846
2400	0	2026	1831	1698	1575	1461	1698
	2000	1847	1659	1530	1412	1302	1563
	4000	1679	1496	1372	1258	1153	1436
	6000	1521	1345	1225	1116	1015	1318
	8000	1373	1204	1090	985	890	1209
	10000	1237	1075	966	867	776	1110

Power: Full throttle
Engine Speed: 2500RPM
Airspeed: 78KIAS
Flaps: UP

Table 4.3.2 - Rate of Climb (ft/min) - Weight in kg							
Weight (Lbs)	Press. Altitude (ft)	Outside Air Temperature					
		-20°C (-29°F)	0°C (32°F)	15°C (59°F)	30°C (89°F)	45°C (113°F)	ISA
1814	0	1025	885	787	695	608	787
	2000	895	756	659	568	481	684
	4000	769	631	535	443	357	584
	6000	646	509	412	321	234	487
	8000	526	388	292	201	114	393
	10000	408	270	173	82		301
1700	0	1133	988	887	793	703	887
	2000	999	856	757	663	574	782
	4000	870	728	629	537	449	680
	6000	744	604	506	414	326	582
	8000	622	483	385	294	207	487
	10000	504	365	268	177	90	396
1500	0	1354	1198	1091	990	896	1091
	2000	1210	1058	952	854	761	979
	4000	1073	923	819	723	632	873
	6000	941	794	692	597	508	771
	8000	815	670	570	476	389	674
	10000	694	551	453	361	275	582

Table 4.3.2 - Rate of Climb (ft/min) - Weight in kg - Continued							
1300	0	1633	1462	1345	1236	1134	1345
	2000	1476	1309	1195	1089	990	1224
	4000	1326	1164	1053	949	853	1110
	6000	1184	1026	918	818	725	1002
	8000	1050	897	792	694	604	901
	10000	924	775	673	579	492	808
1100	0	2002	1808	1676	1554	1441	1676
	2000	1824	1637	1509	1392	1282	1542
	4000	1657	1476	1353	1239	1134	1416
	6000	1500	1325	1207	1098	998	1299
	8000	1353	1185	1071	967	872	1190
	10000	1218	1056	948	849	759	1092

4.3.2 Take-off configuration climb

Power:	**Full throttle**
Engine Speed:	**2500RPM**
Airspeed:	**71KIAS**
Flaps:	**14°**
Sea level gradient of climb: 9.4% (1:10.6) 1.75nm per 1000ft climbed	

4.3.3. Landing Configuration Climb

Power:	**Full throttle**
Engine Speed:	**2500RPM**
Airspeed:	**65KIAS**
Flaps:	**38°**
Sea level gradient of climb: 8.3% (1:12.1) 2nm per 1000ft climbed	

4.4 CRUISE

Engine Speed: 2500RPM

Altitude (ft)	Manifold Pressure (in. Hg)	RPM	Fuel Flow		True Airspeed (knots)
			(lbs/hr)	(gallons/hr)	
4000	23	2300	89	14.8	118
	24	2400	98	16.3	121
	25	2500	113	18.8	125
6000	19	2000	60	10.0	106
	23	2300	87	14.5	118
	23	2400	93	15.5	124
	23	2500	106	17.7	125
8000	17	2000	48	8.0	90
	20	2000	59	9.8	104
	22	2300	86	14.3	120
	22	2400	89	14.8	121
	22	2500	95	15.8	122

4.5 LANDING DISTANCE

Table 4.5.1 -Landing distance in feet, 0% slope, no wind, ground roll (50ft obstacle)							
OAT	Altitude	Weight (lbs)					
		2200	2600	3000	3400	3800	4000
-25°C (-13°F)	0						
	2000						
	4000						
	6000	400 (1290)	420 (1370)	450 (1450)	470 (1540)	500 (1620)	510 (1660)
	8000	410 (1320)	430 (1400)	460 (1490)	480 (1570)	510 (1660)	520 (1700)
	10000	420 (1360)	450 (1450)	470 (1530)	500 (1620)	530 (1710)	540 (1750)
-15°C (5°F)	0	370 (1210)	400 (1290)	420 (1370)	440 (1440)	470 (1520)	480 (1560)
	2000	390 (1250)	410 (1330)	430 (1410)	460 (1490)	480 (1570)	500 (1610)
	4000	400 (1280)	420 (1360)	440 (1440)	470 (1530)	500 (1610)	510 (1650)
	6000	410 (1320)	430 (1400)	460 (1490)	480 (1570)	510 (1660)	520 (1700)
	8000	420 (1360)	450 (1450)	470 (1530)	500 (1620)	530 (1710)	540 (1750)
	10000	430 (1390)	460 (1480)	480 (1570)	510 (1660)	540 (1750)	550 (1790)

Wind component: Add 15% for every 5kts of tail wind, subtract 15%

Table 4.5.1 - Landing distance in feet, 0% slope, no wind, ground roll (50ft obstacle) - Continued							
OAT	Altitude	Weight (lbs)					
		2200	2600	3000	3400	3800	4000
-5°C (23°F)	0	380 (1230)	400 (1310)	430 (1390)	450 (1460)	470 (1540)	490 (1580)
	2000	390 (1270)	420 (1350)	440 (1430)	470 (1510)	490 (1590)	500 (1630)
	4000	400 (1300)	430 (1380)	450 (1460)	480 (1550)	500 (1630)	510 (1670)
	6000	410 (1330)	440 (1420)	460 (1500)	490 (1590)	520 (1680)	530 (1720)
	8000	420 (1370)	450 (1460)	480 (1550)	500 (1640)	530 (1730)	540 (1770)
	10000	430 (1400)	460 (1490)	490 (1580)	510 (1670)	540 (1760)	560 (1810)
5°C (41°F)	0	380 (1240)	410 (1320)	430 (1400)	460 (1480)	480 (1560)	490 (1600)
	2000	400 (1280)	420 (1360)	440 (1440)	470 (1530)	500 (1610)	510 (1650)
	4000	400 (1310)	430 (1390)	460 (1480)	480 (1560)	510 (1650)	520 (1690)
	6000	420 (1350)	440 (1440)	470 (1520)	500 (1610)	520 (1700)	540 (1740)
	8000	430 (1390)	460 (1480)	480 (1570)	510 (1660)	540 (1750)	550 (1790)
	10000	440 (1420)	470 (1510)	490 (1600)	520 (1690)	550 (1780)	560 (1830)

Table 4.5.1 - Landing distance in feet, 0% slope, no wind, ground roll (50ft obstacle) - Continued							
OAT	Altitude	Weight (lbs)					
		2200	2600	3000	3400	3800	4000
15°C (59°F)	0	390 (1260)	410 (1340)	440 (1420)	460 (1500)	490 (1580)	500 (1620)
	2000	400 (1300)	430 (1380)	450 (1460)	480 (1550)	500 (1630)	510 (1670)
	4000	410 (1330)	430 (1410)	460 (1500)	490 (1580)	510 (1670)	530 (1710)
	6000	420 (1360)	450 (1450)	470 (1540)	500 (1630)	530 (1720)	540 (1760)
	8000	430 (1400)	460 (1490)	490 (1580)	510 (1670)	540 (1760)	560 (1810)
	10000	440 (1430)	470 (1520)	500 (1620)	530 (1710)	550 (1800)	570 (1850)
25°C (77°F)	0	390 (1270)	420 (1350)	440 (1430)	470 (1520)	490 (1600)	500 (1640)
	2000	400 (1310)	430 (1390)	460 (1480)	480 (1560)	510 (1650)	520 (1690)
	4000	410 (1340)	440 (1430)	470 (1510)	490 (1600)	520 (1690)	530 (1730)
	6000	430 (1380)	450 (1470)	480 (1560)	510 (1650)	540 (1740)	550 (1780)
	8000	440 (1420)	470 (1510)	490 (1600)	520 (1690)	550 (1780)	560 (1830)
	10000	450 (1450)	470 (1540)	500 (1640)	530 (1730)	560 (1820)	580 (1870)

Table 4.5.2 -Landing distance in metres, 0% slope, no wind, ground roll (50ft obstacle)							
OAT	Altitude	Weight (kg)					
		1000	1180	1360	1540	1720	1814
-25°C (-13°F)	0						
	2000						
	4000						
	6000	259 (836)	272 (888)	292 (940)	305 (998)	324 (1050)	330 (1076)
	8000	266 (855)	279 (907)	298 (966)	311 (1017)	330 (1076)	337 (1102)
	10000	272 (881)	292 (940)	305 (991)	324 (1050)	343 (1108)	350 (1134)
-15°C (5°F)	0	240 (784)	259 (836)	272 (888)	285 (933)	305 (985)	311 (1011)
	2000	253 (810)	266 (862)	279 (914)	298 (966)	311 (1017)	324 (1043)
	4000	259 (829)	272 (881)	285 (933)	305 (991)	324 (1043)	330 (1069)
	6000	266 (855)	279 (907)	298 (966)	311 (1017)	330 (1076)	337 (1102)
	8000	272 (881)	292 (940)	305 (991)	324 (1050)	343 (1108)	350 (1134)
	10000	279 (901)	298 (959)	311 (1017)	330 (1076)	350 (1134)	356 (1160)

Table 4.5.2 - Landing distance in metres, 0% slope, no wind, ground roll (50ft obstacle) - Continued							
OAT	Altitude	Weight (lbs)					
		2200	2600	3000	3400	3800	4000
-5°C (23°F)	0	246 (797)	259 (849)	279 (901)	292 (946)	305 (998)	318 (1024)
	2000	253 (823)	272 (875)	285 (927)	305 (978)	318 (1030)	324 (1056)
	4000	259 (842)	279 (894)	292 (946)	311 (1004)	324 (1056)	330 (1082)
	6000	266 (862)	285 (920)	298 (972)	318 (1030)	337 (1089)	343 (1115)
	8000	272 (888)	292 (946)	311 (1004)	324 (1063)	343 (1121)	350 (1147)
	10000	279 (907)	298 (966)	318 (1024)	330 (1082)	350 (1140)	363 (1173)
5°C (41°F)	0	246 (804)	266 (855)	279 (907)	298 (959)	311 (1011)	318 (1037)
	2000	259 (829)	272 (881)	285 (933)	305 (991)	324 (1043)	330 (1069)
	4000	259 (849)	279 (901)	298 (959)	311 (1011)	330 (1069)	337 (1095)
	6000	272 (875)	285 (933)	305 (985)	324 (1043)	337 (1102)	350 (1128)
	8000	279 (901)	298 (959)	311 (1017)	330 (1076)	350 (1134)	356 (1160)
	10000	285 (920)	305 (978)	318 (1037)	337 (1095)	356 (1153)	363 (1186)

Table 4.5.2 - Landing distance in metres, 0% slope, no wind, ground roll (50ft obstacle) - Continued							
OAT	Altitude	Weight (lbs)					
		2200	2600	3000	3400	3800	4000
15°C (59°F)	0	253 (816)	266 (868)	285 (920)	298 (972)	318 (1024)	324 (1050)
	2000	259 (842)	279 (894)	292 (946)	311 (1004)	324 (1056)	330 (1082)
	4000	266 (862)	279 (914)	298 (972)	318 (1024)	330 (1082)	343 (1108)
	6000	272 (881)	292 (940)	305 (998)	324 (1056)	343 (1115)	350 (1140)
	8000	279 (907)	298 (966)	318 (1024)	330 (1082)	350 (1140)	363 (1173)
	10000	285 (927)	305 (985)	324 (1050)	343 (1108)	356 (1166)	369 (1199)
25°C (77°F)	0	253 (823)	272 (875)	285 (927)	305 (985)	318 (1037)	324 (1063)
	2000	259 (849)	279 (901)	298 (959)	311 (1011)	330 (1069)	337 (1095)
	4000	266 (868)	285 (927)	305 (978)	318 (1037)	337 (1095)	343 (1121)
	6000	279 (894)	292 (953)	311 (1011)	330 (1069)	350 (1128)	356 (1153)
	8000	285 (920)	305 (978)	318 (1037)	337 (1095)	356 (1153)	363 (1186)
	10000	292 (940)	305 (998)	324 (1063)	343 (1121)	363 (1179)	376 (1212)

Table 4.5.2 - Landing distance in metres, 0% slope, no wind, ground roll (50ft obstacle) - Continued							
OAT	Altitude	Weight (lbs)					
		2200	2600	3000	3400	3800	4000
35°C (95°F)	0	259 (829)	272 (881)	285 (933)	305 (991)	324 (1043)	330 (1069)
	2000	266 (855)	279 (907)	298 (966)	311 (1017)	330 (1076)	337 (1102)
	4000	279 (901)	298 (959)	311 (1017)	330 (1076)	350 (1134)	356 (1160)
	6000						
	8000						
	10000						
45°C (113°F)	0	259 (842)	279 (894)	292 (946)	311 (1004)	324 (1056)	330 (1082)
	2000						
	4000						
	6000						
	8000						
	10000						

4.6 GLIDING

The maximum horizontal distance travelled in still air is determined to be 1.65 nautical miles per 1000ft of altitude lost.

Power:	**OFF**
Flaps:	**UP**
Wind:	**None**
Propeller:	**Stopped or windmilling in full coarse**

Table 4.7 - Best glide speeds		
Weight		Indicated Airspeed
Lbs	Kg	Knots
4000	**1814**	**78**
3600	**1600**	**73**
3200	**1400**	**69**
2800	**1200**	**64**
2400	**1000**	**58**

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TABLET

5

5.1 TABLET OVERVIEW

With the aircraft being the centerpiece, the SWS Tablet has been designed as a supplement to it. Its intention is to provide easy access to the manual & checklists, quickly load the aircraft and customise it where possible. The tablet will evolve along with this and other SWS aircraft, but our intention is to only add features that serve a purpose in the sim and not bloat it with excess features that are seldom used.

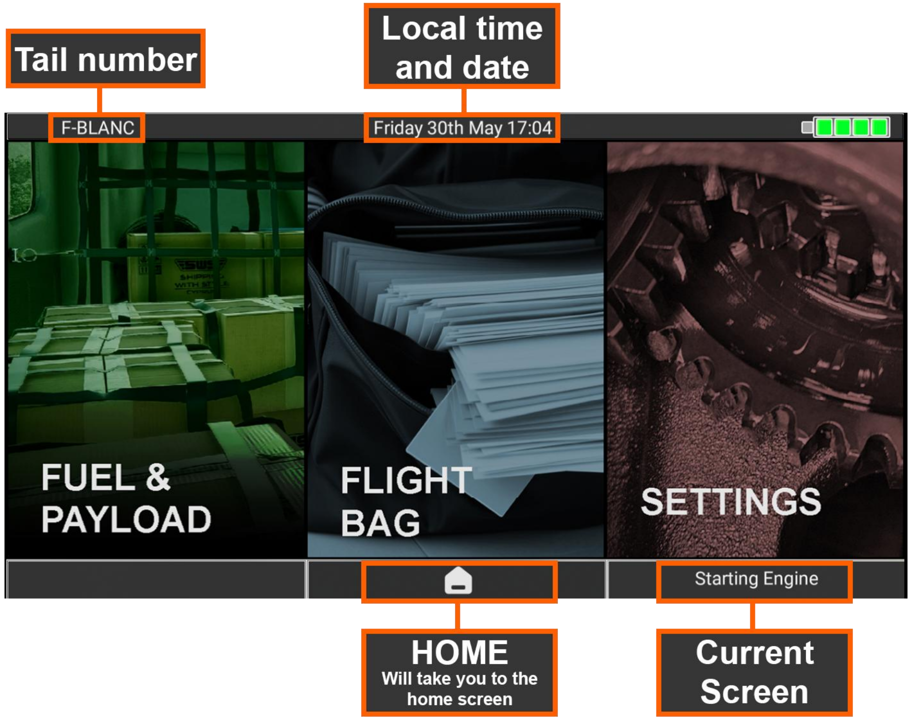
Keeping in mind that it is not really in your hands, but a “screen within a screen”, the design philosophy has been to use colour-coded, big clickspots. This way you can access the various functions while still looking out the windshield, ensuring that you fly the plane and maintain situational awareness.

Where more interaction is necessary, we tried to automate the chain of events in order to make things more dynamic, while reducing the clicking on the side of the user.

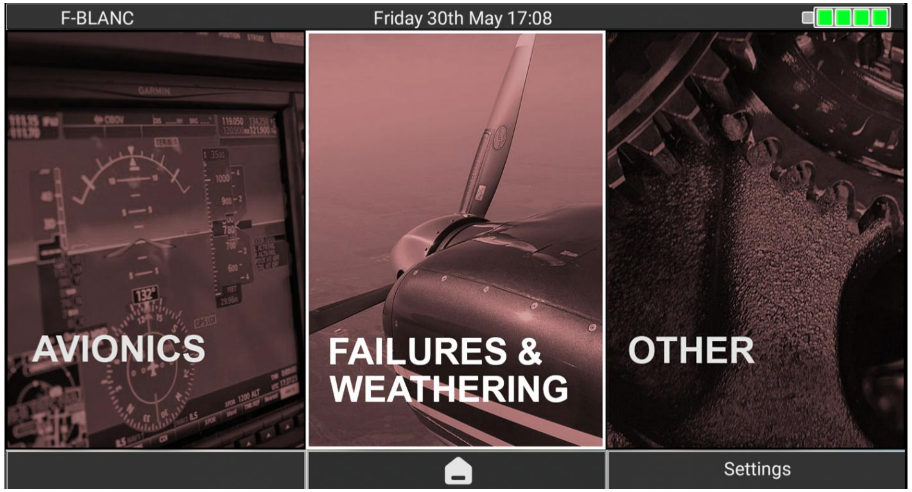
Externally, the tablet has three buttons: Volume Inc, Volume Dec and the Lock button. Currently, only the lock button is functional and allows you to turn the tablet’s screen on and off.

To stow or unstow the tablet you can click on the windshield at the base of the suction cap.

When first loading into each flight, the tablet will show up an initialisation screen with a loading bar. After the tablet’s initialisation is complete, you will be greeted with the main menu screen, as shown below. The annotations explain the layout, which is consistent throughout all screens.



When entering a sub-menu, that page will have the same colour tint as the button you clicked to get here. For example, the fuel and payload page is bright green-themed, while the settings page is red-themed.



5.2 FUEL AND PAYLOAD

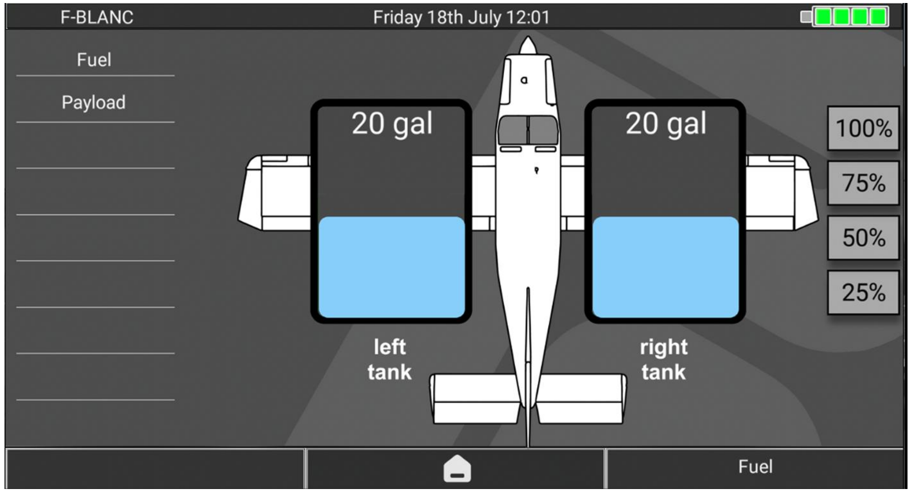
The fuel and payload section allows you to fuel and load the aircraft. The tablet recognises certain keywords on the simobject's title and loads the appropriate cabin layout for the aircraft.

For repainters: these keywords are in the titles of the forthcoming sections, after the phrase "Payload - " so make sure to use the correct keyword when naming your repaints. The library of keywords may expand with future aircraft releases to include more variants.

Fuel

Fuelling the aircraft is done by clicking on each tank, which will increase or decrease the fuel to reach the clicking point. The screen will indicate the fuel volume in each tank in US Gallons. Loading fuel is only possible when on the ground and stationary.

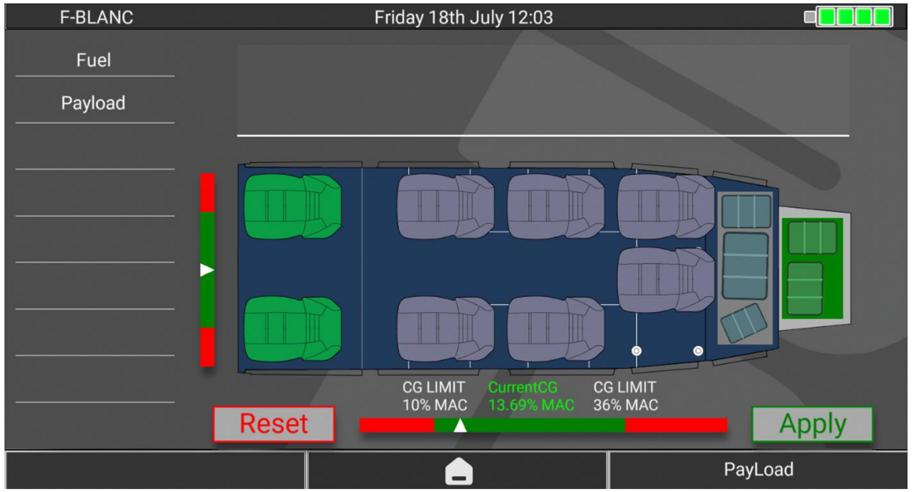
While fuel loading is done in the background in 5% increments, the screen will show the fuel volume as percentages are useless for flight planning.



Payload - Commuter

The Commuter variant can carry six passengers in three rows of two seats each. Clicking on a seat will load a pilot or passenger to that position. Clicking again will unload them. Once you are happy with the loading, click apply to load the aircraft with the appropriate weights. Passenger and baggage weight are randomly generated - within reasonable limits.

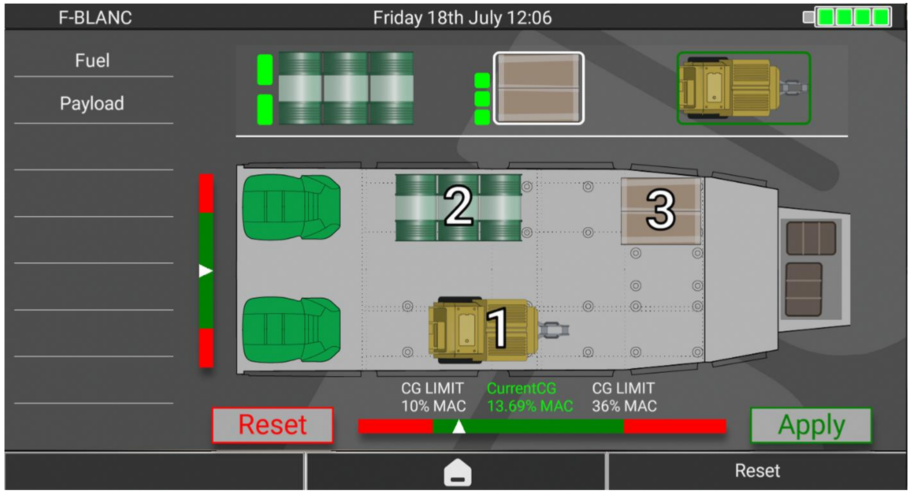
Clicking "RESET" will zero the cabin weights on the tablet screen, but you still need to click "APPLY" to see the change in the aircraft's weight. This is done to avoid accidental loading.



Each loaded passenger comes with their baggage allowance, which varies depending on whether you are in the base or cargo pod variant. The passenger baggage is loaded in the cabin baggage shelf and cargo pod, whereas the crew luggage is loaded in the aft luggage bin. Where applicable, loading happens fore-to-aft to maintain the center of gravity within limits.

Payload - Cargo

The Cargo variant allows you to select cargo types and where to load them in the cabin. Certain cargo types, like boxes, can be stacked multiple times on top of each other. Larger types of cargo -like barrels or generators- take up more than one position or do not stack at all.

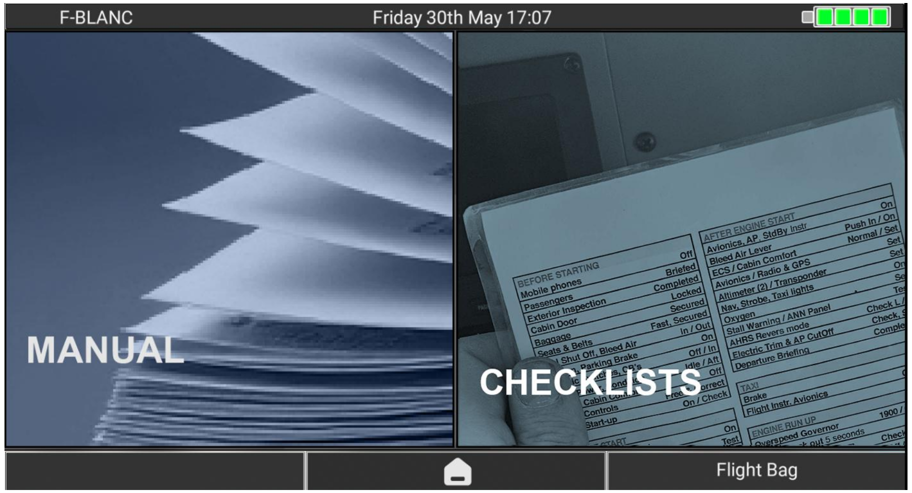


To load a cargo type to the cabin:

- Click on the item at the top bar to select it. If it is stack-able, click on it multiple times to keep stacking or reset it, which will be shown with green boxes to the side of the item.
- Once you have selected what item and how many to load, click on the station where you want to load it. The number shown over the icon will show you how many items are stacked on that station.
- Once you are happy with the loading, click "APPLY" to load the aircraft with the items.
- To unload the cabin, click the "RESET" button.

5.3 FLIGHT BAG

The Flight Bag contains the aircraft checklists and this manual, for quick reference by the user. The flight bag will be expanded as necessary to include more items pertaining to the aircraft's operation and maintenance.



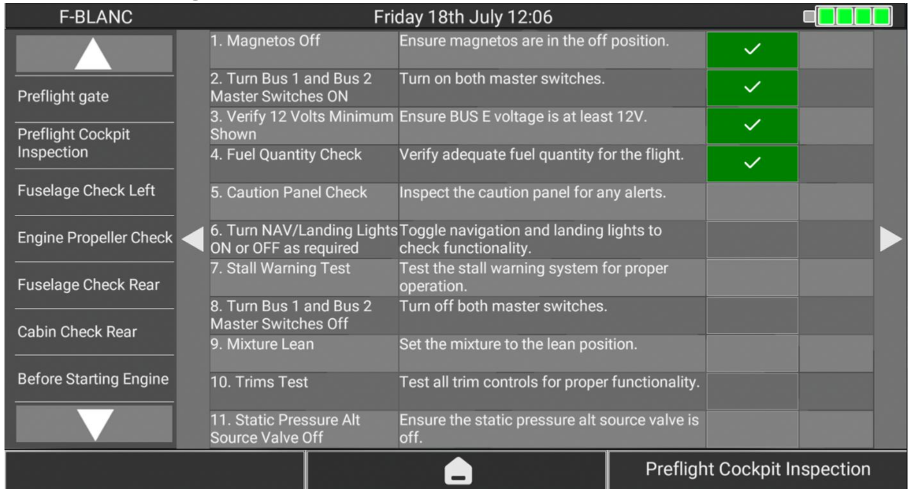
Manual

The manual is included in the tablet to be accessible offline and always be current with the aircraft version.

On the left side you will find the various chapters, with the right side showing the page. Clicking at the top of the page will take you to the previous one, clicking at the bottom to the next one.

Checklists

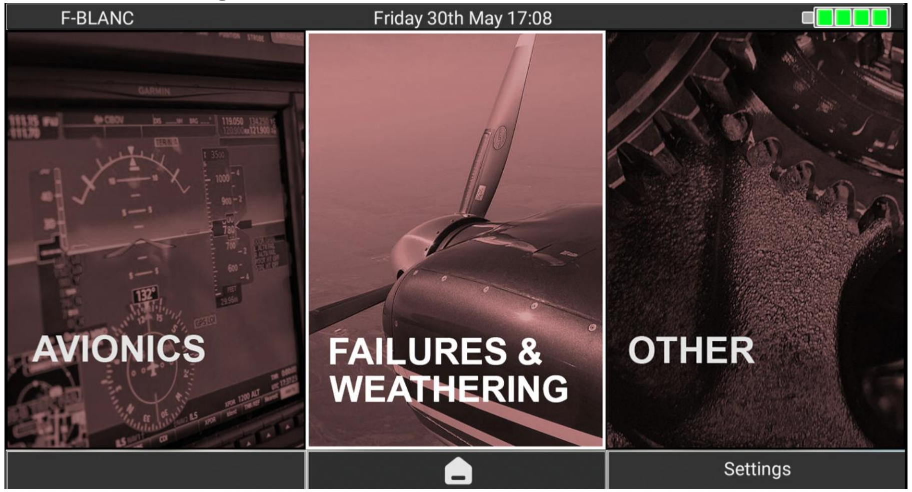
The aircraft checklists are included in the tablet. The left sidebar is a list of the checklist categories. If the sidebar has more categories than the checklist can fit, arrows at the top and bottom can be used to scroll through additional checklists.



The right 3/4 of the screen contain the checklist itself. Each item on the checklist has a short name, a description of the action you need to perform and a checkbox area that you can click to mark that the checklist item has been executed. If the checklist has more items than the screen can fit, arrows on the left and right allow you to "flip" through pages on that checklist.

5.4 SETTINGS

The settings section allows you to change options pertaining to the aircraft avionics, failures, weathering and other settings, each accessible through its own button.



Avionics

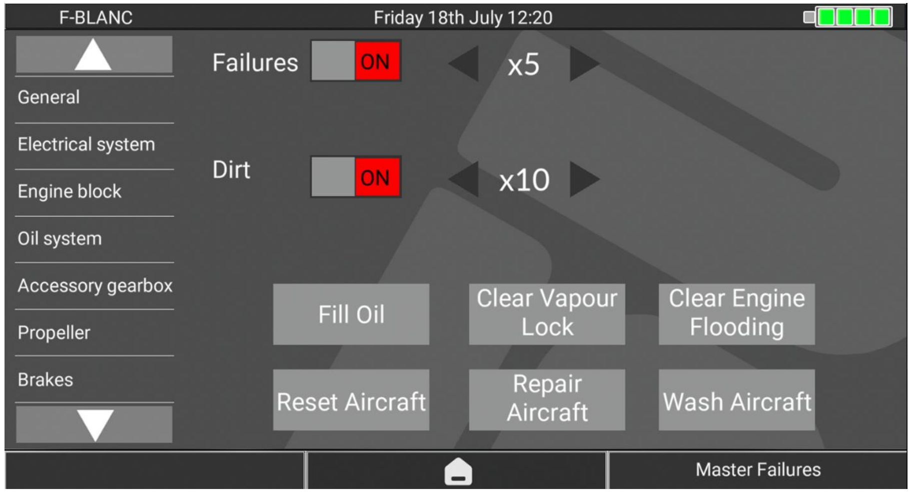
The avionics page allows you to select through the three different avionics stacks available with the aircraft. The navigator currently active will be shown with a green background, while inactive ones will be shown over a gray one.

By default the plane starts with the Working Title GNS530/430. Upon selecting a different set, it will be remembered by the aircraft.

Failures & weathering

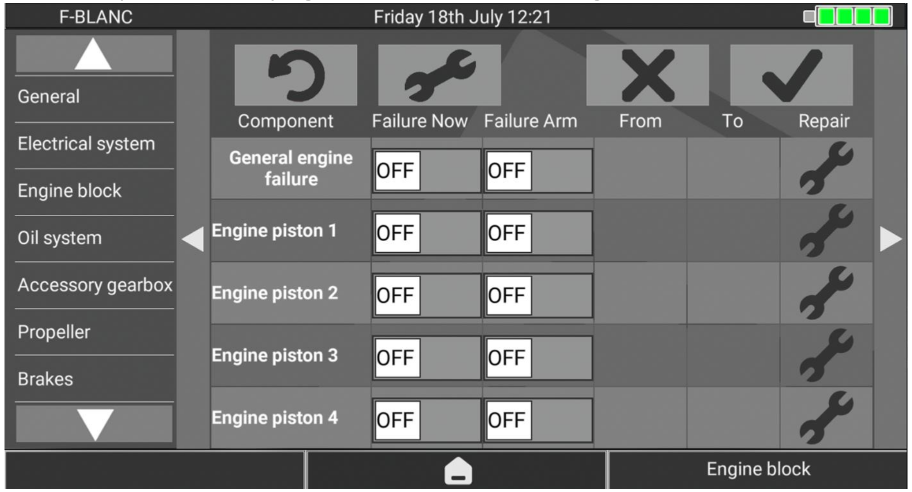
This page allows you to customise the aircraft weathering and damage modelling. The various option categories are organised on the sidebar.

The first item on the sidebar, named “General”, contains the basic options options that allow you to activate or deactivate the failures and weathering. Next to the toggles are controllers allowing you to adjust the rate at which they happen. At the bottom are controls that allow you to refill the engine oil, clear certain types of failures and reset the entire aircraft.



Failures can be set up through each page’s list and require SystemsPulse for the Airvan to be installed.

An example failures page is shown in the image below.



The four big buttons at the top apply to the entire system and are:


Reset active failulres


Reset failures and repair all


Cancel changes


Apply changes

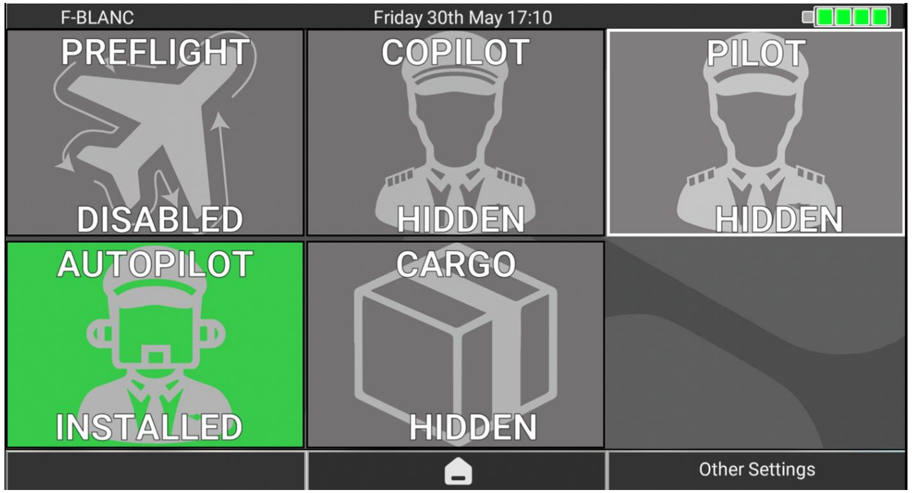
Below the system buttons, you have the following:

- The Failure name is in the first column. If a failure has happened automatically, the cell will be highlighted in red
- To trigger one or more failures, click on the switch under “Fail Now”, which will instantly fail that system upon clicking “Apply”.
- To Arm a failure to happen within a time range, click the “Failure Arm” switch and set the From/To timer in the next two columns. The timer is in minutes.
- To repair a component, click the “Wrench” icon on its row.

After selecting your desired options, click on the “Apply” button for your settings to run or “Cancel” to revert to the aircraft’s current state.

Triggering certain failures can cause dependant systems to also fail. In such an event you will need.
Toggle and Arm failure are mutually exclusive. You cannot have both active at the same time.

Other settings



Other settings allows the customisation of items that pertain to user preference. Available options:

- **Preflight:** when set to “Disabled”, all preflight items are removed from the aircraft. Enabling Preflight will not install the items automatically, but next time you start a flight the plane will have its covers on. This option is persistent. FS2020+
- **Copilot/pilot visibility:** allows showing or hiding the crew when in the cockpit camera, regardless of weight setting.
- **Autopilot:** as the GA-8 autopilot is an optional feature, you can install or uninstall the autopilot from this menu.
- **Cargo visibility:** allows you to show or hide the SWS cargo in the cabin. This can be used if you don’t want to see our cargo in the cabin.

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FAILURES

6

6.1 INTRODUCTION TO FAILURES

If you have purchased the optional SystemsPulse expansion pack for the Airvan, then you have turned your base flight simulator aircraft into a living, breathing virtual machine! The module supports more than 70 failures that can be triggered through the tablet, or happen organically over time.

Take care of your aircraft and it will work in optimal condition for as long as possible -or don't and face the consequences when you go past the safety margins!

How SystemsPulse works

SystemsPulse breaks down the aircraft into key parts like engine, oil system, fuel system. Each system is then broken down into individual parts; each part has a service life and tolerances that need to be respected for the aircraft to operate in good order. The manufacturer of each part specifies inspection and overhaul intervals, where components are checked or replaced and always include a substantial safety margin.

An engine with an overhaul interval of 1800 hours is not likely to suddenly fail at 1800h. It should continue to work just fine after the threshold, but the probability of failure increases beyond the threshold that the materials scientists, design engineers and legislators deem acceptable.

First of all, the part has a lifetime which is based on the replacement interval. The closer a part is to the end of its service life, the more likely it is to fail. Lifetime is not only counted when a part is in active use, but also when it is disabled. For example, your propeller is affected by dust when it is spinning but also when still but it is raining!

The next thing is respecting the part's limitations. A part that is operated at or below the limits will wear down more slowly, compared to one that is ran at or above the limit. An engine that does 20 daily flights of 30 minutes will have a higher probability of breaking compared to an engine that does one 10h flight a day:

- The short-hopper will have 30 take-offs and 30-landings at 2700RPM. If we assume 3 minutes per flight, that can be 90 minutes/day running at maximum speed.
- The 10h flyer only has one take-off and one landing, spending the rest of their flight running at 2000RPM. That induces much less wear on the engine.

Even a factory-fresh part has a slim chance of failing. So don't be surprised if something breaks in your very first flight.

Additional factors, are external to the part itself, will affect it. Lubrication, G-Forces and the environment the aircraft is flying in have an effect in how quickly it will wear down.
Finally, the aircraft will accumulate wear throughout different sessions. If you fly it on Monday and come back to it in a month, the airplane will be dirtier and parts will be older. While the wear and

tear won't be as much as if you used it, it will still age. When starting a flight, the sim will track how long it has been since you last used it and add the time to the previous known usage.

Due to limitations, every time the flight is restarted, the hours will be added again. The bug does not occur if you end the flight and start a new one from the menu.

6.2 ENGINE FAILURES

The IO-540 engine has six cylinders and six spark plugs that ignite the fuel in the combustion chamber. As the pistons move up and down in their housing, the metal gets worn down from thermal fatigue, friction, oil contamination and external factors. The engine has an overhaul interval of 1800 hours and this applies to all parts referenced herein unless otherwise specified.

For certain engine failures to work you need to have ENGINE STRESS DAMAGE set to ENABLED from Flight Simulator's Assistance Settings.

Pistons

Thermal fatigue is caused from the combustion cycle during engine operation. As the fuel is ignited in the combustion chamber, this causes the piston head to heat up and then cool down as the gasses exit through the exhaust port. This cycle happens hundreds of times a minute for each piston. The cooling of the engine after shutdown and the heating during start-up are long-term heating cycles that, over hundreds of hours, will degrade the material's durability.

Cylinder Head Temperature is the main metric a pilot has and the optimal range is indicated on the CHT indicator in green colour. If an engine is running at higher-than-normal temperatures this will cause the material to wear faster and therefore increase the probability of failure over time.

Friction fatigue is caused from the pistons' up-and-down movement and to minimise friction, oil is used to lubricate the perimetre of the piston. Ensuring that the engine has sufficient oil quantity and that it is being ran through the engine at the recommended pressure and temperature is key to ensure proper lubrication.

Lack of lubrication will not only cause damage due to friction, but also increase thermal fatigue as the cylinder temperature will increase.

Oil contamination is when a foreign body makes it into the oil circuit. That foreign body can find its way to one of the pistons. In the event of a metal chip, this has the potential to cause a catastrophic failure of the piston and the engine.

External factors in the engine's case are G-Forces. While the airframe can sustain forces above or below 1G, the engine is at its most comfortable at 1G. So while you can perform sustained turns at 3G, doing so will wear down the engine much more quickly than flying normally. Sparkplugs typically last 300h.

Spark plugs

Spark plugs create an electrical spark inside the combustion chamber that causes the fuel-air mixture to ignite. They can either fail or get fouled.

Spark plug failure occurs simply when the part has gone through its number of uses and it will no longer ignite the fuel-air mixture, leading to power loss and RPM fluctuations.

Spark plug fouling will occur if the fuel-air mixture is excessively rich in fuel. When there is too much fuel in the mixture, some of the excess fuel is polymerised and the resulting "soot" can accumulate on the spark plug. As that "soot" builds up can insulate the spark plug and prevent it from igniting the mixture. This will lead to RPM fluctuations and white smoke can be seen coming out of the exhausts. It is possible to de-foul the spark plugs by leaning the mixture to optimal levels, which will gradually burn off the accumulated fuel.

Magnetos

The engine is equipped with dual magnetos, which ensures redundancy and optimal combustion. Just like other parts, though, the magnetos have a finite lifetime and will eventually need replacement. If one of the magnetos fails, the pilot will notice a permanent drop in engine RPM. A magneto check is performed during the initial engine run-up.

Accessory gearbox

The accessory housing is a mounting point for various engine accessories and the drive gears that provide power to them. The accessory drive powers the oil pump, starter, tachometer, vacuum pump and alternator. Therefore, failure of the accessory gearbox will mean loss of the aforementioned systems and dependent functions.

Failure of the accessory gearbox can happen when it exceeds its lifetime, or if a metal chip finds its way to the accessory drive gear through the oil system.

6.3 OIL SYSTEM FAILURES

As modelled in the Airvan, the oil system has three failure modes: oil leak, oil filter blockage and oil pump failure.

Oil leak

While oil level will fall over time with normal use, oil leaks can develop due to wear and tear in the oil pipes. Wear and tear can be accelerated if the airplane is flown in abnormal attitudes and high G-Forces.

Oil filter blockage

Before being routed to the various engine parts, the oil goes through a filter that will stop any contaminants from moving downstream. This ensures good lubrication and protects components from foreign objects that can damage them.

The oil filter should be replaced every 50h of operation or every four months, whichever comes first.

When the oil filter is blocked, oil is routed through a bypass that allows it to continue flowing through the engine. As the oil is no longer filtered, though, this introduces the risk of contaminants reaching the various engine parts.

Oil pump failure

An oil pump failure can occur due to wear from normal use, or loss of power from the accessory drive. In either case, losing the oil pump will result in the oil pressure rapidly dropping.

Loss of oil pressure will result in higher engine temperatures, increased engine wear and loss of governor control.

6.4 PROPELLER FAILURES

The propeller is mounted forward of the engine and has an overhaul interval of 2000 hours. Simulated failures for the propeller are propeller failure, governor failure and propeller strike.

Propeller failure

The propeller will wear down over time with use. Visible signs of wear can be seen during preflight, as the leading edges and paint will chip and peel off. It is recommended that you replace your propeller if you notice signs of significant wear. It is worth noting that the propeller weathering rate will vary based on ambient conditions, altitude and humidity.

Flying at low altitude over the water or sand will result in water or sand particles coming in contact with your propeller and wearing it down faster, comparing to flying at higher altitudes.

While there is no visual effect modelled for a failed propeller blade, a failed propeller will result in loss of the engine as the failure will result in loss of balancing of the feathers and the high rotational speed will cause the engine to fail.

Governor failure

The governor is a hydraulic system that pressurises the engine oil and uses it to control the propeller pitch angle. There are three ways for the propeller governor to fail.

Failure from wear will occur when the governor exceeds its lifetime. Should the propeller governor fail in this mode, the pitch will fall to the fine pitch stop. Expect to see an increase in RPM and be ready to pull back on the throttle to avoid over-speeding the engine.

Failure from loss of oil pressure will occur if the oil level drops below a critical level. That can happen due to an oil leak or oil pump failure and will result in the propeller pitch falling to the fine pitch stop.

Failure from oil contamination is when a metal chip will find its way to the governor. That can cause the governor to fail in two modes; it will either fall to the fine pitch stop, or be stuck in the current position. The latter failure mode will result in engine under-speeding when you throttle back, as the reduced engine power, combined with the higher resistance from the propeller's rotation will make the RPM reduce.

Propeller strike

A propeller strike occurs when the propeller comes into contact with the ground or another obstacle goes through the propeller disc. Due to the aircraft's fixed landing gear and the ample clearance of the propeller from the ground, having a propeller strike requires a distinctive lack of pilot skill and awareness. A propeller strike will result in total engine failure.

6.5 FUEL SYSTEM FAILURES

The GA-8 fuel system is described in more detail in the Systems section. Currently, three failure types are supported: oil filter blockage, engine-driven pump failure and boost pump failure.

Fuel filter blockage

As the fuel filters are situated between each wing tank and the sump tank, a blocked fuel filter blockage means that fuel flow from that tank will cease. The yellow FUEL CHECK light for the respective tank will illuminate indicating the condition. Fuel filters should be replaced every 500 hours or every 12 months, whichever comes first.

Engine-driven pump failure

Loss of the engine-driven pump will lead to the fuel pressure dropping to 0, followed by an engine shut-down.

Electric boost pump failure

An electrical boost pump failure is likely to go unnoticed in-flight, as the engine-driven pump pressurises the fuel. It will be evident during the start-up process, though, as the fuel pressure will remain at zero despite turning the pump on.

6.6 ELECTRICAL FAILURES

Electrical components of the airplane are split into three major categories: battery, alternator and circuits. Battery and alternator are self-explanatory, while circuits is a category that includes the lights, avionics, starter, electrically-powered instrumentation and various electrical circuits.

Alternator failure

While installed in the engine's Accessory Housing, the alternator is listed with the electrical failures as it is a key component to the electrical system of the aircraft. It provides power to BUS 2 of the electrical system and excess current is used to recharge the aircraft's battery.

The alternator can fail due to wear coming from normal use, or due to losing accessory power. Loss of the alternator will result in power being provided only by the battery.

Battery failure

The aircraft's on-board battery will degrade over time with use. Under certain conditions such as extremely cold weather, the battery will degrade considerably faster. As the battery degrades, the maximum voltage it can supply will get lower.
Battery voltage can be monitored on the Volt/Amp meter installed on the pilot's panel, by switching to BUS1 and selecting Voltage to be displayed.

The battery will automatically start charging as soon as sufficient excess current is available from the alternator and BUS 2 is connected to the electrical system.

Circuit failures

While too many to detail individually, circuit failures depend on hours of usage and the power setting of each circuit. Using the reading light as an example, the brighter the light setting you select, the quicker it will burn out. This principle applies to all the circuits of the aircraft.

For your convenience, the various circuit failures are broken down into sub-categories in the tablet. Therefore you will see avionics, lighting, instruments and electrical system failures.


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