Xtreme Prototypes

XTPRO_GLJ25_v1_MSFS2020_MANUAL_En_01.pdf
Rev. 01 - 07/02/2025

GATES LEARJET MODEL 25
FLIGHT MANUAL

ADD-ON CLASSIC BUSINESS JET
for Microsoft® Flight Simulator® 2020

RELEASE NOTES

XTREME PROTOTYPES GLJ MODEL 25 FOR MSFS 2020/2024

In this manual, the “**GLJ Model 25**” addon refers to our **Gates Learjet Model 25 Classic SE v1.0** add-on business jet for **Microsoft Flight Simulator 2020 for Windows.**

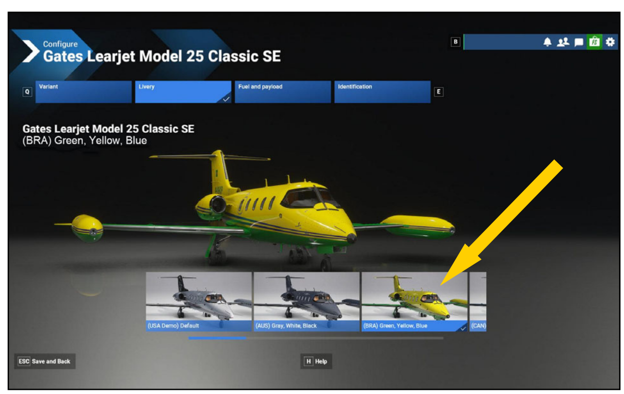
While the current addon version for MSFS 2020 is also compatible with MSFS 2024, we are currently working on a new native version for MSFS 2024 to be released at a later date. Please visit our website regularly for new product announcements and pricing information.

XTREME PROTOTYPES GLJ MODEL 28 FOR MSFS 2020/2024

Our **GLJ Model 28** business jet addons for **Microsoft Flight Simulator 2020/2024** are currently in production and will be available at a later date. Please visit our website regularly for new product announcements and pricing information.

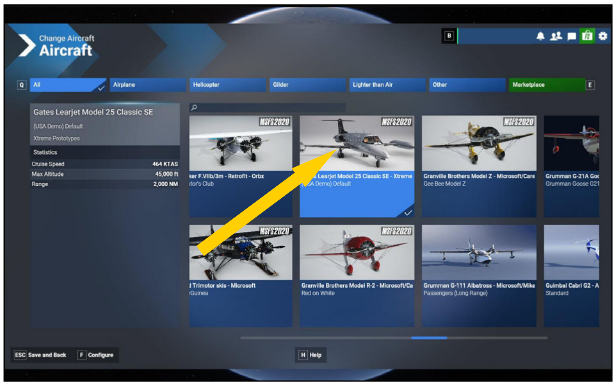
MSFS 2024 COMPATIBILITY AND POSSIBLE ISSUES

The current software version is a **native** MSFS add-on aircraft that was developed and tested for **MSFS 2020**. At the time of this writing, we have not thoroughly tested the aircraft in MSFS 2024, and some issues might not yet have been reported by our testers.



We always appreciate **constructive feedback** from our users, especially after the launch of new products. Please don’t hesitate to report any bug or other issue you may encounter while installing or flying our GLJ Model 25

RELEASE NOTES



addon in either MSFS 2020 or MSFS 2024.

Note: *The Xtreme Prototypes GLJ Model 25 for MSFS 2020 is our first project for this new platform for which there were many fixes and updates by Microsoft/Asobo since 2020, not mentioning the release of MSFS 2024 a few months ago with its own list of updates. We do not pretend our software to be 100 % bug free, although we tried our best to resolve most issues that were encountered during development and the beta testing phase. Refer to "Known Issues" in appendix 6, for more information.*

FULLY REVISED MANUAL

This is a new, **completely revised** version of our Gates Learjet Model 25 Flight Manual, fully updated for Microsoft Flight Simulator 2020*. As with any first edition, errors may have crept in and escaped our notice despite our rigorous review process. Please feel free to report any errors or omissions while browsing the manual. **Thank you for helping us create better products!**

**: A manual update will be available for MSFS 2024 at a later date.*

XBOX VERSION

The Xtreme Prototypes GLJ Model 25 addon for MSFS is a **study level** aircraft simulator that is too complex to be compatible with Xbox in its present form. We are evaluating the possibility of creating a lighter and less complex version that would be compatible with Xbox to be released at a later date. Please visit our website regularly for new product announcements and pricing information.

MSFS MARKETPLACE

Our GLJ Model 25 addon for MSFS is currently **not available** from the MSFS Marketplace nor from any other third-party reseller. We have not decided yet if our new addons for MSFS 2020/24 for Windows would be available through the Marketplace. Like in the past 20 years, you may continue to purchase and download your Xtreme Prototypes addons directly from your account page on our website.

"XTPRO" PREFIX

All Xtreme Prototypes addons for Microsoft Flight Simulator 2020 or later now have the prefix "**XTPRO**". This is to avoid any confusion with the "XP" prefix used for our FSX and Prepar3D addons.

GROUND SERVICES

The GLJ Model 25 addon can receive three ground services including **pushback**, **fuel supply**, and **external power supply**.

These services can be requested through ra-

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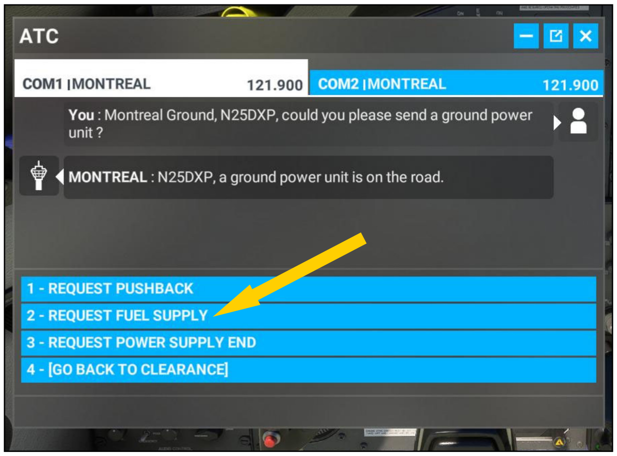


dio communication by opening the **ATC window** from the **icon** located at the top of the main screen (option 9, **GROUND SERVICES**). To request a service via ATC, avionics power must be available for the radio units to function.

Note: *COM1/COM2 radios require avionics power, usually: Battery Switches [8-9, fig. 5-30]* ***ON*** *or Engine Generator Switch [6, 11, fig. 5-30]* ***GEN****, and Radio Master Switch (Avionics) [14, fig. 5-29]* ***ON****.*

It is also possible to request these services by using shortcuts on your keyboard (depending on your MSFS configuration) if electricity is not available, generally:

- For external power supply (GPU): "**SHIFT-Q**" and " **SHIFT -W**"
- For fuel supply: "**SHIFT -F**"
- For pushback: "**SHIFT-P**"

The GLJ Model 25 addon is compatible with the ground power units that are included with MSFS. A GPU supplies 28 VDC to the aircraft during maintenance, training, and preflight procedures. The GPU is available when the aircraft is **parked in selected areas** of most airports.

To preserve battery power during ground procedures up until the engines have started and the generators are turned on, it is sometimes suggested to use an external power source to power up the aircraft.

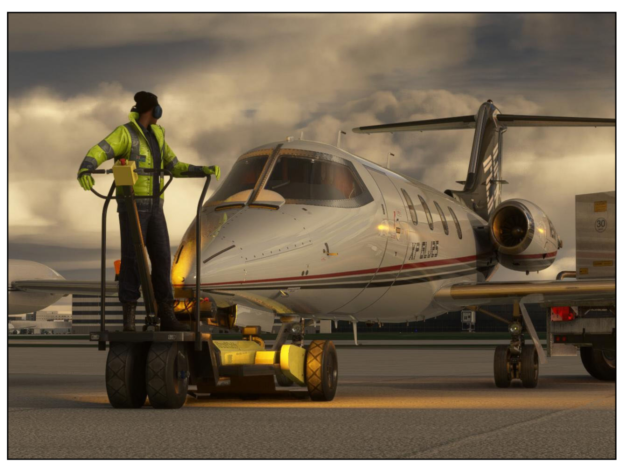
The GPU must be **disconnected** after the engines have started and the generators are turned on.

In the real world, GPUs are rarely used with this aircraft because the ground procedures can be performed in a relatively short period of time.

Note: *The GLJ Model 25 addon for MSFS uses the basic ground power units that are already available in the simulator. There is no Xtreme Prototypes custom GPU model in this software version, compared to our Prepar3D versions. Note that a GPU may not be available in some parking places and that connection cables may not be visible.*

In both the addon and the real aircraft, refueling is performed through a filler cap on top of each wingtip tank. In the simulator, refueling is achieved through the “**Weight and Balance**” panel or by requesting a fuel truck in **certain parking areas**.

Finally, pushback (sometimes necessary) is available when the aircraft is **parked in selected areas** of most airports.



RELEASE NOTES

ADDITIONAL RECOMMENDED SETTINGS

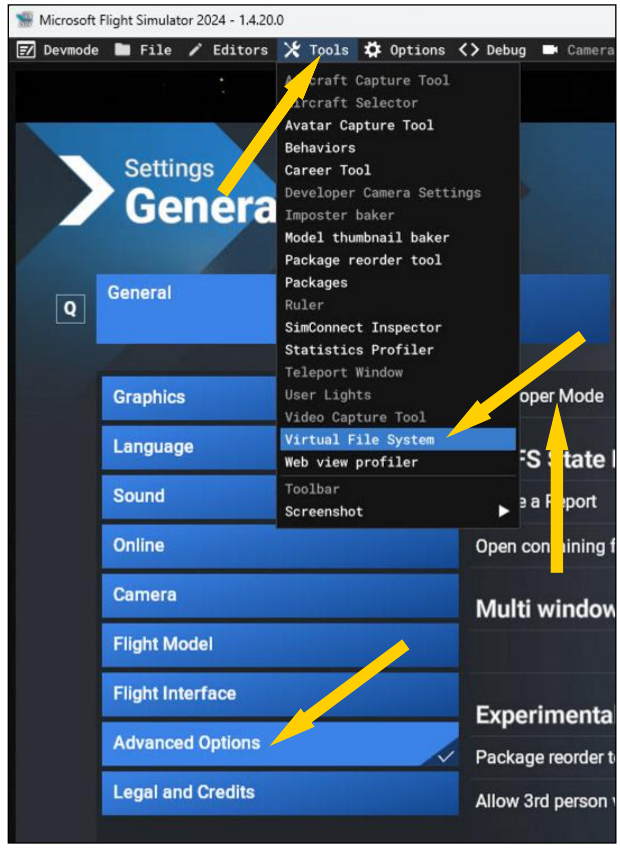
The following settings are in addition to the recommended (optional) settings listed on page 9 and following in section 2. These have been added due to the default configuration of the simulator, some of whose settings may interfere with some custom systems specific to the GLJ Model 25 addon:

1. In “MSFS > Options > Assistance Options > **Piloting** pull-down menu”, set “AI Auto-Trim” to **OFF**.

2. In “MSFS > Options > Assistance Options > **Piloting** pull-down menu”, set “AI Radio Communications (ATC)” to **OFF**.

See "**Frequently Asked Questions**" and "**Known Issues**" in appendices 5 and 6 for more details.

INSTALLATION IN MSFS 2024



To install the aircraft in MSFS 2024, copy the GLJ Model 25 add-on aircraft package folder (“**xtpro-aircraft-glj25-classic-se**”) to the MSFS 2024 **Community Folder** when in **Developer Mode.**

Check “**Developer Mode**” to turn **ON** the Developer Mode: “MSFS 2024 > Settings > General Settings > Advanced Options > **Developer Mode**”.

The MSFS 2024 **Community Folder** is accessible through the MSFS **Virtual File System** from the Developer Mode **top menu bar** (“MSFS 2024 > Devmode Top Menu Bar > Tools > **Virtual File System**”).

Make sure to **quit** and **restart** the simulator after the add-on aircraft package is copied to your MSFS 2024 Community Folder.

Please read our release notes about using this addon in MSFS 2024, on pages 1-2. Refer to section 2, page 4, for more installation instructions.

THANK YOU FOR PURCHASING YOUR SOFTWARE LICENSE!

Xtreme Prototypes is an independent add-on aircraft developer for the most popular consumer flight simulation platforms. As a small studio, we largely depend on your ideas and support to create better products. Contributions from our users, in the form of software license purchases, allow us to pursue our mission. By doing so, you are contributing to the making of unique high quality addons for serious desktop pilots. In addition, your license gives you access to free personalized online technical support, patches, and rebates on selected products.

This manual is to be used in conjunction with the **Xtreme Prototypes GLJ Model 25** addon for **Microsoft Flight Simulator 2020** only. It is part of a software package, and it is subject to the terms and conditions of the end-user software license agreement (see section 1, page 13).

You are authorized to print a copy of this manual for your own use, in conjunction with the Xtreme Prototypes GLJ Model 25 add-on software for which you obtained a user license.

WELCOME ABOARD!

Welcome to our GLJ Model 25 SE, our new study level Gates Learjet 20 Series classic business jet addon for Microsoft Flight Simulator 2020!

Your new GLJ Model 25 addon is a **native** MSFS aircraft from top to bottom! 3D models and animations from our previous versions for other platforms needed to be fully revised, modified and optimized for the new simulator. Collision meshes, “occluders”, and new “levels of details” were added to the models to conform to the official recommendations and to improve performance in multiplayer and AI modes. Aircraft systems were rebuilt in accordance with the new simulator’s requirements, and over 30,000 lines of code for the model behaviors had to be rewritten and organized within the new MSFS XML template system. New PBR materials and textures were created, along with new dynamic lights and visual effects. Our Gates Learjet 25 model has never appeared more impressive than within the visually stunning graphics environment of the new Microsoft Flight Simulator.

Most notably, we also produced a new sound package in Audiokinetic Wwise, a powerful sound authoring software for video games that sets new standards in MSFS. Authoring interactive sounds and implementing an immersive, realistic, and accurate representation of a simulated environment with Wwise for our Learjet Model 25 addon was a complicated task but the impact on the simulation is worth mentioning.

Nicknamed “**fighters in civilian clothing**” because of their sleek design and amazing performance, the classic Lear Jet/Gates Learjet 20 Series aircraft were the first true private jets and redefined business aviation during the 1960s and 70s, flying high above the weather at transonic speeds. Their capabilities earned them a place among the extreme aircraft, setting record after record. Capable of maneuvers you would never attempt with another civilian aircraft, their performances as general aviation business jets are simply unequaled, according to real-world Learjet 20 Series pilots, even by today’s standards!

With the longer-range **Gates Learjet Model 25D**, by which your new addon is inspired, came a longer cabin, increased seating capacity, more flexible loading options, greater fuel capacity and a sleek-looking stretched fuselage.

The Xtreme Prototypes GLJ Model 25 for MSFS is a next generation addon designed to take advantage of the new and more powerful gaming computers and graphics hardware that are available today. Nothing was spared in our efforts to faithfully reproduce its retrofitted instrument panels, still in use today, carefully modeling, and animating each “steam gauge” and mechanical device with all the necessary moving parts. Except for the GNS 530 and radar screens, the ADDUs, and the new radio’s VFD displays, which are flat by nature, no legacy 2D gauges are used in our model.

The result is a unique addon that strives to bring you not only the actual feeling of flying a high-performance aircraft now equipped with modern avionics, but also the spirit of maneuvering such a vehicle at times where large LCD screens and powerful computers did not exist, and where pilots needed to know how to fly and navigate with minimal resources and rely on their own experience, abilities, and judgment.

We believe our GLJ Model 25 addon is the most advanced, detailed, and faithful classic Learjet simulation you can find.

Becoming one of our users makes you an important member of our development team. This new version of our GLJ Model 25 addon is the product of the many ideas, comments, and suggestions we received from desktop pilots like you from around the world since version 1 of our 20 Series business jet addons for Microsoft Flight Simulator X was launched back in 2009.

We wish to express our gratitude to all our users, followers, reviewers, test pilots (real and desktop), ex-Learjet employees, partners, and friends for their contribution to the making and success of this extreme aircraft simulator. Thank you for your continuous support!

Xtreme Prototypes

The development team at Xtreme Prototypes
June 2025

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INTRODUCTION AND PRODUCT DESCRIPTION

SECTION 1

ABOUT THE REAL 20 SERIES

Up until the 1960s, business executives flew around in piston-powered propeller aircraft. These vehicles were usually conversions from World War II light bombers and transporters. Although many of them were faster, hot-rodded versions of the originals, as airlines adopted turbine power many executives were now considering commercial travel to save time and gain the comfort of flying above the weather in a pressurized cabin.

William Powell "Bill" Lear (1902-1978) recognized this as a market opportunity and became focused on providing businesspeople with personal jet-propelled transportation worldwide. As an inventive entrepreneur, Lear was already providing converted WWII machines to the market he coveted so he understood what his customers needed. Nothing other than a high-performance jet would do.

Lear's son, Bill Jr., who was working in Switzerland at the time, came across a jet fighter aircraft design which he thought would serve as a base for the new jet's design. The **FFA P-16,** or **Swiss P-16** as it was then known, had an aerodynamic configuration that served the purpose well and so the **Swiss American Aircraft Corpor**ation was founded. The new executive aircraft would be called the SAAC-23.

After the initial honeymoon, the working culture of the Americans and the Swiss seemed irreconcilable, so Lear swiftly decided to move the entire operation to Wichita, Kansas, and changed the name of the company to **Lear Jet Corporation**. After months of 24/7 shifts, the small company saw its efforts rewarded on September 15th, 1963, when the first **Lear Jet Model 23** was rolled out. Less than a month later, N801L, the world's first civilian private jet, took off for a successful first flight, and on July 1st, 1964, the Model 23 was awarded its FAA certification.

Although the new aircraft promised to take the executive market by storm, cash flow difficulties threatened the project. Lear's response was to sell Lear Jet Corporation stock to the public. The company became public in November 1964.

During the next couple of years, a few accidents earned the small jet the reputation of a difficult aircraft to fly. These accidents were later blamed on insufficient pilot training and insufficient systems redundancy. Lear Jet Corporation responded with the **Model 24** which although similar to the Model 23 now had airline-style systems with the appropriate redundancy to remain safe in all weather conditions. Pilot training programs were also put in place to ease the transition for private pilots moving up from propeller airplanes.

Such aeronautical successes were not enough unfortunately to counter persistent financial problems within the corporation as sales declined amid a general economic recession. Instead of shutting down the company until the economy recovers, Bill Lear decided to sell out his ownership to another company. In 1967, the **Gates Rubber Company**, headed by Charles C. Gates, became the controlling shareholder of Lear Jet Corporation. With the backing of such solid ownership, Lear Jet could now concentrate on its development.

Under Gates ownership, the company changed its name to the **Gates Learjet Corporation**. The **20 Series** continued to be developed into state-of-the-art precision flying machines, becoming better, more luxurious, and easier to fly. The **Xtreme Prototypes GLJ Model 25** add-on is inspired by the Learjet 20 Series aircraft of the Gates era.

In the late 1960s, as Learjet's customers' needs evolved and grew, so did the aircraft they came to love. With the **Model 25**, and later the longer-range **Model 25D** with greater fuel capacity, came a longer cabin, increased seating capacity and more flexible loading options, not to mention a sleek-looking stretched fuselage.

The Model 25's shape became synonymous with flying coolness and would remain so to this day, were it not for the aging CJ610 turbojet engine. Nonetheless, improved versions of the power plant gave the 20 Series yet another increase in performance.

Gates ownership saw the transition from straight turbojet to more efficient turbofan power. Up to then, the 20 Series aircraft were all powered by the ubiquitous **General Electric CJ610-8A engine**, a simple, lightweight, and powerful **single-spool turbojet** derived from the military GE J85 engine.

The CJ610 engine gave the 20 Series an astonishing climb performance and high-altitude cruise. It was, however, very noisy and fuel-thirsty, so it was no surprise that in the wake of the 1973 fuel crisis, a new engine, the **Gar-**

rett TFE731-2 turbofan, was chosen. Although slightly less spirited than the CJ610 it replaced, the TFE731 offered far better range, less noise, and less air pollution.

The Garrett-powered Learjets became known as the **30 Series** and warranted yet another fuselage stretch. **Models 35** and **36** were presented to the public in mid-1973.

During the 1970s, the Learjet 20 Series aircraft continued to be developed and sold, as many operators preferred their simplicity and performance.

In august 1977, a new aircraft emerged from the Gates Learjet hangar. It had a new wing dubbed the "**Longhorn**" that replaced the traditional tip tanks of the Model 25 with upswept winglets which provided a dramatic reduction of induced drag, therefore stretching range with no increase in fuel, and enhancing climb performance. It was known as the **Model 28**, and along with its longer-range sister ship, the **Model 29**, represented the epitome of the straight-turbojet executive aircraft. Both aircraft received their FAA certification in January 1979 and became the first production aircraft to sport winglets.

The Learjet Model 28 was essentially a Model 25 with a new long-span wing. The Model 29 was identical to the Model 28 but stored an extra 100 gallons of fuel in the fuselage tank for additional range at the expense of two passenger seats.

On February 21, 1979, former NASA astronaut Neil Armstrong, who at the time was a board member of the Gates Learjet Corporation, and Learjet test pilot Pete Reynolds set five world records for altitude gain and sustained altitude in a business jet when their Model 28 climbed from the ground to nearly 50,000 feet in about 12 minutes.

Unfortunately, both models were unsuccessful commercially although they were appealing to customers with a requirement for good altitude performances. Only five Learjet 28s and four Learjet 29s were constructed before production ceased in 1982. Both types were subsequently replaced by the **Learjet 31** in the late 1980s, the first Learjet to incorporate tail-mounted "Delta Fins" in addition to the "Longhorn" wing of the Model 28/29.

The end of the 1970s saw the turbofan taking over the market and the 20 Series was gradually abandoned. At the end of the 1980s, many airports around the world had banned the 20 Series aircraft due to noise restrictions. Today, a few remain in marginal use, some as cargo aircraft and some in service in countries where altitude considerations predominate.

In the 1980s, development continued with the **Model 55**, essentially a Learjet with a larger

fuselage and a stand-up cabin and later, trans-continental range.

By the end of the decade, ownership of the company had changed hands a few times, eventually being acquired by Montreal-based **Bombardier Aerospace** in 1990. The **Model 60**, an improved version of the Model 55, was rolled out the same year.

By mid-1990s, Learjet was totally integrated into Bombardier's operations which made the Canadian company the world's third largest aircraft manufacturer. Under Bombardier ownership, the **40 Series** came to life with the **Bombardier Learjet Model 45**, a technologically advanced, roomy, and efficient aircraft for the new millennium, entirely designed with computers. Then came the **models 70, 75** and **85.**

The development of the Model 85 was canceled in October 2015 for financial reasons as Bombardier decided to concentrate its operations on its C Series (ultimately sold to and developed by Airbus and known as the A220) and Global 7000/8000 aircraft instead.

In February 2021, Bombardier announced the end of production of all Learjet aircraft but that the company would continue to support the Learjet fleet into the future. It delivered its final Learjet, a Model 75, in March 2022 after more than 60 years of production. Nevertheless, the longevity of this aircraft family is a testimony to Bill Lear's original vision and the way it forever changed business travel. It is estimated that more than **2,000** Learjets remain in service today.

GLJ MODEL 25 CLASSIC SE ADDON DESCRIPTION

General Features

14 aircraft variations inspired by actual and fictitious models and liveries*:

- (USA Demo) White, Black, Gray and Red (fictitious tail number N25XP)
- (AUS) Gray, White and Black (fictitious tail number VH-KVXP)
- (BRA) Green, Yellow and Blue (fictitious tail number PR-KBHXP)
- (CAN) White, Turquoise and Red (fictitious tail number C-KJVXP)
- (CHL) Blue, Gray and Yellow (fictitious tail number CC-KFGXP)
- (DEU) White, Gray and Turquoise (fictitious tail number D-GFXP)
- (FRA) White, Blue, Red and Gray (fictitious

tail number F-QAXP)

- (GBR) White, Blue and Red (fictitious tail number G-AGXP)
- (MEX) White, Brown and Black (fictitious tail number XA-KZXP)
- (NASA Research) White and Blue (fictitious tail number N617XP)
- (US Army) Green Camo (fictitious tail number 68076XP)
- (USA) Black, Orange and White (fictitious tail number N384XP)
- (USA Charter) Red, White and Blue (fictitious tail number N256XP)
- (USA) Red, White, Blue and Gold (fictitious tail number N958XP)

**: All liveries are imaginary, though some may be inspired by actual airplane liveries. Any match with actual tail numbers is a pure coincidence. See appendix 7.*

Flight Model Features

Optimized 20 Series flight dynamics to simulate the performance of a high-powered civilian jet aircraft, within the present limitations and capabilities of the available simulation platforms:

- Two General Electric CJ610-8A single-spool turbojet engines (2,950-pound static thrust at sea level)
- Service ceiling: 45,000 ft.
- Absolute ceiling: 51,000 ft.
- Maximum speed: 359 KIAS
- Maximum Mach: Mach 0.82 (at 24,000 ft.)

20 Series Aircraft Systems

The following Learjet 20 Series aircraft systems are simulated to conform as closely as possible to the operation of the real airplane, within the present limitations and capabilities of the available simulation platforms:

- Flight controls
- Stall/overspeed warning systems with stick nudger/puller and stick shaker
- Electrical system (can be connected to a GPU available in the simulator)
- Emergency batteries

- Cockpit and cabin lighting systems with independent controls and dimmers, including emergency lighting
- Hydraulic system (including an electric auxiliary hydraulic pump)
- Landing gear, anti-skid system, differential brakes
- Fuel system (including cross-feeding, and a wingtip tanks fuel jettison system)
- CJ610-8A power plant
- Fire detection and suppression system
- Pneumatic (high pressure), bleed air, pressurization, and environmental control systems
- Air conditioning and cabin temperature systems
- Anti-ice system (simulated within the limitations of the of the available simulation platforms), with ice effects on the windshield, windows, and exterior aircraft surfaces
- Automatic flight control system (AFCS) with autopilot, flight director, dual yaw damper, and speed hold mode *(the Lear J.E.T. autopilot is retrofitted to be fully functional in GPS/GNS mode and compatible with the default autopilot available in the simulator)*
- RVSM system, complete with digital altimeters/altitude preselectors (ADDUs) with blue VFD display, analog standby altimeter, and control panel
- Caution and warning system (annunciator panel)
- Avionics, radios, and classic navigation systems: COM1, COM2, NAV1, NAV2, ADF1, ADF2, transponder, DME, marker beacons
- Generic GNS 530 navigation system *(see "**Aircraft Interior 3D Model Features**" for details, below)*
- Generic weather radar 3D model *(see "**Aircraft Interior 3D Model Features**" for details, below)*
- Custom ground proximity warning system (GPWS) with aural alerts
- Emergency gear extension system
- Crew and passenger oxygen system
- Main entry door (fully animated)

Aircraft Exterior 3D Model Features

Fully animated exterior 3D model, inspired by the real Gates Learjet Model 25D aircraft

(optimized for MSFS):

- 7 levels of details (LODs) to improve performance in multiplayer and AI modes
- 4096 x 4096 high resolution PBR textures
- High resolution decals and markings
- Unique livery for each aircraft variation
- Movable aerodynamic control surfaces:
    - Movable horizontal stabilizer (vertical trim)
    - Elevator
    - Ailerons with trim and balance tabs
    - Flaps
    - Vertical stabilizer/rudder with trim tab
    - Spoilers
- Fully animated landing gear, complete with flexible hoses, landing and taxi lights, anti-skid system, snubbers, and more
- Fully animated main (passenger and crew) door lower and upper sections
- Detailed CJ610-8A power plant with animated (compressor and turbine) blades and inlet guide vanes
- Fully animated and highly detailed thrust reverser on both engines
- Dynamic lights with real projected light beams:
    - Independent left/right 2-intensity landing and taxi lights
    - Animated rotating beacon lights (belly, tail)
    - Right wing inspection light
    - Recognition lights (optional on the left wingtip tank)
    - Navigation lights (wing, tail)
    - Strobe lights (wing, tail)
- Animated stall vanes on the nose
- Optional nose boom with animated vanes
- Three user-selectable pilots (with headset and optional sunglasses)
- “Remove before flight” items

Aircraft Interior 3D Model Features

- 8 levels of details (LODs) to improve perfor-

mance in multiplayer and AI modes

- High resolution virtual cockpits with retro-fitted instrument panels
- Full-3D animated “steam” gauges, switches, knobs, levers, light indicators, and flight instruments with localized tooltips in both English and French
- New radios with yellow digital VFD front displays and standby frequencies to replace the original sets with analog displays from the 1960s: COM1, COM2, NAV1, NAV2, ADF1, ADF2, ATC/XPDR
- Fully animated 3D model of a **generic GNS 530** navigation system, pre-programmed for the basic GNS 530 that comes with MSFS. Screen, light, buttons and knobs can be programmed to work with most existing and future third-party navigation systems*. Experimentation may be required.
- Fully animated 3D model of a **generic weather radar**. Dummy radar screen included. Screen, light, buttons and knobs can be programmed to work with most existing and future third-party radars*. Experimentation may be required.

  **: Optional third-party GPS/GNS navigation systems and radars are not included and must be purchased separately.*

- Highly detailed instrument panels:
  - Captain’s panel
  - Center panel
  - Copilot’s panel
  - Annunciator panel
  - Thrust reverser control panel
  - Center pedestal
- 4096 x 4096 high resolution PBR textures
- Advanced cockpit lighting system:
  - Dimmable cockpit/cabin ceiling lights (0-100 % brightness)
  - Dimmable map lights (captain’s, copilot’s, controlled independently, 0-100 % brightness)
  - Dimmable glareshield yellow flood lights (captain’s side, copilot’s side, controlled independently, 0-100 % brightness)
  - Dimmable backlit panels (0-100 % brightness)
  - Dimmable annunciators and other panel lights (0-100 % brightness)
  - Dimmable landing gear status lights (0-100 % brightness)
  - Dimmable instrument lights and post

  lights with independent controls for captain/center/copilot instrument panels (0-100 % brightness)

  - Cockpit/cabin emergency lighting
  - Cabin lighting system (ceiling lights, signs, entry lights, refrigerator blue light, passenger reading lights with individual switches)

  Note: *Cockpit and cabin environment lights, panel instrument lights, panel post lights and flood lights are true dynamic lights, like in the real world.*

- Animated control columns and yokes (hidable, user-selectable), with functional autopilot remote buttons
- Stick nudger/puller and stick shaker with animation and sound
- Animated rudder pedals with differential brakes
- RVSM system, complete with digital altimeters/altitude preselectors (ADDUs) with blue VFD display, analog standby altimeter, and control panel
- Automatic flight control system (AFCS) with autopilot, flight director, yaw damper and speed hold mode
- NAV1 or GPS/GNS navigation modes
- DME head
- Ground proximity warning system (GPWS)
- Lear engine sync spinner
- Analog and digital clocks with stopwatch
- Lear Jet Stereo “Jetstar 8” 8-track tape player that plays selected music tracks *(a tribute to the inventive genius of Bill Lear)*
- Oxygen valves and fan control knob
- Pilot seats with adjustable/retractable armrests
- Optional sheepskin pilot seat covers
- Animated sun visors (foldable, slidable)
- Hidable throttle quadrant
- Thrust reverser subthrottles
- Black leather interior with dark honey beech wood cabinets
- Fully modeled passenger seats, cabin tables with props, cabin toilet, front and rear cabin curtains
- Cabin refrigerator with light, animated door

and props

- Cabin TV

Dynamic Lights and Visual Effects

- Cockpit/cabin lights*: panel yellow flood lights, ceiling lights, map lights, instrument lights, panel post lights, passenger reading lights, entry lights, refrigerator light, bounce and ambient lights

  **: Cockpit instruments and all interior objects are illuminated with real dynamic lights, like in the real world*

- Aircraft lights, some animated: landing, taxi, recognition, navigation, strobes, rotating beacon, wing inspection
- Engine smoke effect
- Engine exhaust heat effect
- Engine contrail effect
- Fuel jettison effect
- Wing vortices and vapor trails
- Windshield and windows rain effect
- 40 visual effects in total

Sound Effects

- Genuine interactive sound package entirely authored in Audiokinetic Wwise (soundbank)
- 20 Series 3D sound set, including starter and engine sounds recorded from the real aircraft and positioned in the 3D space
- Over 80 additional cockpit stereo sound effects, many from the real aircraft: switches, knobs and levers, pneumatic valves, blower fan, alerts and horns, Learjet unique brake sounds, nose wheel steering sound, cabin door, music for the tape player
- More than 100 sounds in total

Miscellaneous

- Easy MSFS method of installation ("Community Folder")
- 8 basic cockpit presets (*.flt) for the different phases of the flight, including "Cold and Dark" (hangar and parking/apron) and "Auto Start" (taxi, runway, climb, cruise, approach, final)
- 24 interior camera views
- 14 exterior camera views

- A 300-page flight manual available in English or French (printable PDF format, requires Adobe Reader)
- Advanced MSFS localized instrument tooltips in English or French
- Customization packages, including a "paintkit" for creating your own aircraft liveries

Note (1): *Software features, prices and release dates are subject to change without notice. Please refer to the "Release Notes" at the beginning of the manual for last minute changes. Some functionalities may differ from those in the real aircraft due mainly to software limitations in MSFS.*

Note (2): *The GNS 530 physical 3D model in the virtual cockpit is preprogrammed for the basic GNS 530 that comes with MSFS. The weather radar model shows a dummy radar screen by default. Navigation system and radar 3D models are user-programmable and may be compatible with most existing and future third-party add-on software. Instructions are provided in appendix 2 of the manual for adding third-party addons to the cockpit of the GLJ Model 25 add-on aircraft. Experimentation may be required.*

Note (3): *Optional GNS navigation systems and radars are not included and must be purchased separately from third-party vendors/ developers (MSFS basic GNS 530 is included). Some third-party navigation systems may change the behavior of the autopilot. Some third-party add-on software may not be compatible with the latest versions of MSFS.* ***Please contact the developer for support. Xtreme Prototypes cannot provide technical assistance for third-party addons.***

WHAT ARE PBR TEXTURES?

The Xtreme Prototypes GLJ Model 25 addon for MSFS features new **PBR materials and textures.** Physically based rendering (or PBR) is a method of shading and rendering that provides a more accurate representation of how light interacts with surfaces. The results are 3D models that look almost real under different lighting conditions.

PROJECT SCOPE

The Xtreme Prototypes GLJ Model 25 addon for MSFS is inspired by a series of real-world aircraft known in the 1970s/80s as the Lear Jet/Gates Learjet 20 Series (models 23 to 29). The package strives to recreate the general look and feel of the original aircraft for the desktop pilot's enjoyment.

While we regard this addon as a real **mini aircraft simulator** rather than just a game, we do not pretend that it is one hundred percent historically or technically accurate, or that it faithfully reproduces all the systems and flight characteristics of the real aircraft, which would be impossible in MSFS. Nevertheless, we've always paid attention to details, and we did our best to make sure we provide our users with the best flight simulation experience they can get within the limitations of the currently available simulation platforms.

This manual contains detailed information for the installation and operation of the Xtreme Prototypes GLJ Model 25 addon for MSFS.

Nearly all Learjet 20 Series systems that can be reproduced in MSFS are simulated, unless otherwise noted.

Note: *There are differences between the virtual model and the real aircraft. Xtreme Prototypes addons and manuals for the general public are considered edutainment software and should not be used for real-world pilot training.*

GIVE THE MANUAL A CHANCE

The operation of the Xtreme Prototypes GLJ Model 25 addon for MSFS is very similar to the operation of the real aircraft by which it is inspired. For proper operation and enhanced realism, it is suggested that users read the present flight manual and follow the procedures in sections 8/9 very carefully.

This addon strives to bring you not only the actual feeling of flying a high-performance aircraft now equipped with modern avionics, but also the spirit of maneuvering such a vehicle at times where large LCD screens and powerful computers didn't exist, and where pilots needed to know how to fly and navigate with minimal resources and rely on their own experience, abilities, and judgment. We believe our GLJ Model 25 addon for MSFS is the most advanced, detailed, and faithful classic Learjet simulation you can find.

While this addon allows for comprehensive procedural IFR flights, it is up to you to decide which level of complexity you want to achieve. If you're feeling overwhelmed by the cockpit of your new business jet addon, we suggest giving the manual a chance as it was written with non-experienced pilots in mind. The addon is quite rewarding once mastered, but as with most things in life, **practice makes perfect!**

A WORD ABOUT PIRACY

Piracy is not a victimless crime!

Developing study level, high quality addons for the latest simulation platforms has become extremely challenging and very complex. It requires the contribution of a dedicated and passionate team of artists, programmers, technicians, engineers, and pilots. These products are costly to develop and require many months of research and hard work. They are aimed at a relatively limited market of serious flight simulation enthusiasts.

Xtreme Prototypes is an independent add-on aircraft developer. As a small studio, we largely depend on your ideas and support to create better products. Contributions from our users, in the form of software license purchases, allow us to pursue our mission.

As a user and important member of our development team, you are responsible for the protection and good use of this software product for which you obtained a license. Your activation key is unique, personal, non-transferable, and traceable.

Piracy kills quality addons. Posting and/or downloading illegal copies of this addon over the Internet is a crime.

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FOR
XTREME PROTOTYPES GLJ MODEL 25 ADD-ON AIRCRAFT FOR MSFS

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GETTING STARTED

The **Xtreme Prototypes GLJ Model 25** is an add-on software package that requires **Microsoft Flight Simulator 2020** (or later*, see below) to be installed on your personal computer. The software is not a stand-alone product and cannot be used without the underlying simulation platform.

Note: *The Xbox version is not available at this time (see "Release Notes" at the beginning of the manual).*

MINIMUM SYSTEM REQUIREMENTS

Xtreme Prototypes next generation addons are designed to take advantage of the new and more powerful gaming computers that are available today. **Increased performance will be noticed on more powerful systems.**

- **Flight Simulation Platform:** Microsoft Flight Simulator (MSFS) 2020 (or later*) for Windows PCs.
- **Operating System:** Microsoft Windows 10 (update 1909)/11 or later, 64 bits (Windows 11 recommended)**
- **Computer Memory (RAM):** 16 GB (32 GB or more recommended)**
- **Processor:** Quad Core 3.0 GHz (Octa Core 3.7 GHz or better recommended)**
- **Hard Drive Space:** Downloaded compressed zip file size approx. 3 GB; addon size approx. 6 GB when copied to your MSFS community folder (MSFS 2020 requires at least 150 GB**)
- **Graphics Card:** A high-end graphics card with at least 8 GB GDDR5 or better is highly recommended. Make sure you have the latest driver for your graphics card.
- **Graphics:** DirectX 11/12**
- **Internet Connection:** 20 Mbps (50 Mbps or better recommended)**
- **Other:** Monitor, wheel mouse, game con-

troller (joystick or yoke), pedals (optional), sound card and speakers, Adobe Acrobat Reader and a printer (for reading/printing the manual). A wheel mouse is required to actuate 3-position switches and knobs.

***:** *This software version is a native MSFS 2020 add-on aircraft that is also compatible with MSFS 2024. New addon versions may become available for future versions of MSFS, including MSFS 2024 (see "Release Notes" at the beginning of the manual). Make sure you download and install the correct addon version for your version of MSFS.*

****:** *Refer to the MSFS 2020/2024 documentation for more information about minimum system requirements.*

Important

- In this manual, the **GLJ Model 25** addon refers to the **Xtreme Prototypes GLJ Model 25 Classic SE v01**addon for **MSFS 2020**. Patches, updates, additional cockpits and liveries, and new versions for present and/or future versions of MSFS may become available at later dates with their own sets of instructions and revised documentation.
- This addon is not compatible with Microsoft Flight Simulator X or earlier.
- This addon is not compatible with Lockheed Martin Prepar3D (all versions).

DOWNLOADING YOUR ADDON

Our products are available for download only. At this time, you should have downloaded the compressed **zip file** that contains the **setup program** for the GLJ Model 25 addon from our website and received your personal **activation key** by email.

Note (1): *Please contact us if you have not received your activation key by email or were unable to download your addon's zip file after your order was processed.*

Note (2): *The Xtreme Prototypes GLJ Model 25 addon is not available from the MSFS Marketplace at this time (see "Release Notes" at the beginning of this manual).*

The currently available zip file is:

- "**XTPRO_GLJ25_Classic_SE_v01_MSFS2020.zip**" (contains the installer for the GLJ Model 25 addon for MSFS 2020)

Other zip files for future versions of MSFS (including 2024) may be added later.

Each compressed zip file weighs approximately **3 GB** and is usually downloaded to your Windows "**Downloads**" folder.

Note: *All Xtreme Prototypes addons for Microsoft Flight Simulator 2020 or later now have the prefix "**XTPRO**". This is to avoid any confusion with the "XP" prefix used for our FSX and Prepar3D addons.*

Possible Download Issues

- The GLJ Model 25 addon is contained in a **single compressed zip file**. Normally, it should not take more than a few minutes to download the zip file over a reliable high-speed Internet connection. If you don't have a high-speed Internet connection or experience intermittent connection issues, you may be timed out or disconnected while downloading your addon.
- If you are not able to download your addon after several attempts, we recommend using another and better Internet connection.
- We recommend using your Internet browser to download your addon. Do not use a third-party download manager or you may experience problems that have been reported by some users.
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You can download your addon again at any time by logging in to your account on our website. You may download your addon a limited number of times. After that, you will need to contact us for assistance.

The replacement of lost downloaded files and activation keys is not guaranteed.

Please make backup copies of the downloaded file{s) and save your activation key in a safe place.

Extracting the Installer from the Zip File

1. To extract the installer from the downloaded zip file, **right click the zip file** and select "**Extract All...**".

The installer is:

- "**XTPRO_GLJ25_Classic_SE_v01_MSFS2020_setup.exe**"

SOFTWARE INSTALLATION

Nothing is simpler than installing (or removing) a new add-on aircraft in MSFS. The GLJ Model 25 addon consists of a unique "**add-on package**" to be copied to your MSFS **Community Folder**. This is the only method of installation recommended by Microsoft for third-party addons (beside purchasing and installing your addon through the MSFS Marketplace).

***Note:** The Xtreme Prototypes GLJ Model 25 addon is not available from the MSFS Marketplace at this time (see "Release Notes" at the beginning of this manual).*

The package provides a centralized set of all the components necessary to add the add-on aircraft to the simulator and make it work.

MSFS uses a "**virtual file system**" (**VFS**) that may use different paths for copying the software and all its components, including third-party addons. The MSFS **Community Folder**, which is accessible through the VFS, contains all installed third-party addons that are not acquired through the MSFS Marketplace, such as the Xtreme Prototypes GLJ Model 25 add-on aircraft.

To avoid any previously reported installation issue related to the location of the MSFS Community Folder on different computers, the installer will not copy the GLJ Model 25 add-on aircraft package to your MSFS Community Folder directly. Instead, the package will be copied **to a temporary folder of your choice** during installation. After this is done, you will need to copy (or drag and drop with the right mouse button) the package to your MSFS Community Folder, as instructed below.

Your **name**, **email address** and **activation key** are required to run the installer. Your personal activation key is unique and was sent to you by email moments after you purchased your user license from our website.

***Note:** Please contact us if you have not received your activation key by email after your order was processed.*

Decompressing, Validating and Copying the Addon Package

1. Make sure you have selected the **correct installer** for your version of MSFS (if more than one addon version are available).

2. **Right-click the installer file** ("XTPRO_GLJ25_Classic_SE_v01_MSFS2020_setup.exe"). We always recommend running the "setup" program as "**administrator**" to avoid possible installation issues.

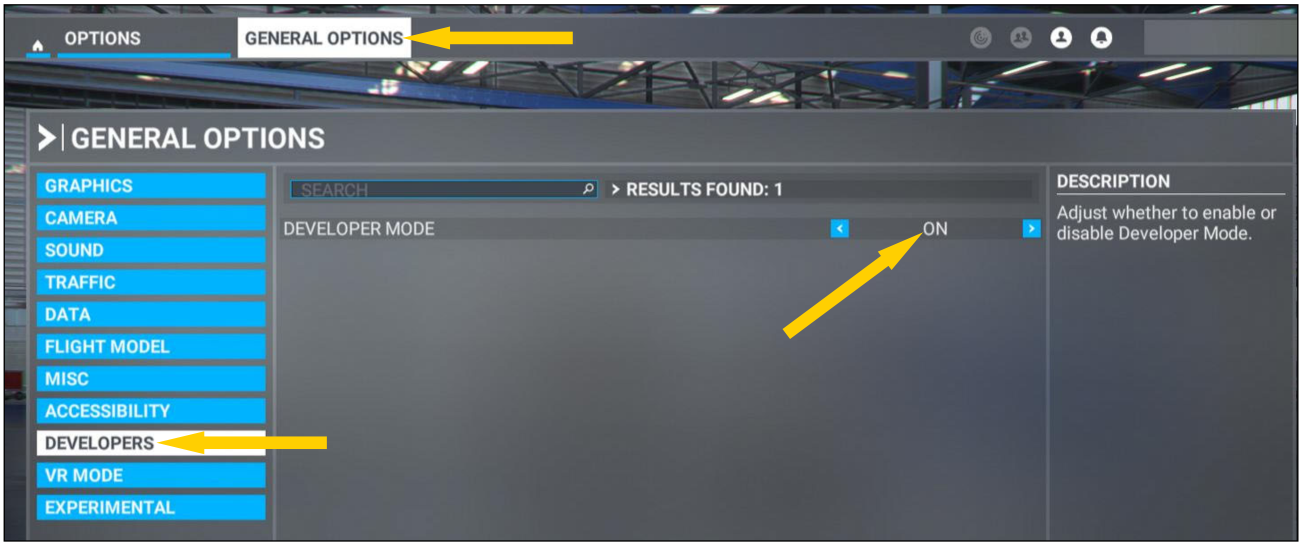
3. Click "**Run as administrator**". Due to the large size of the compressed single setup file, it might take a few seconds before the first setup screen opens.

4. **Follow the instructions that appear on the screen.** Enter your user information and personal activation key when asked. You must accept the end-user license agreement and enter your full name, email address, and activation key before continuing.

5. By default, the installer will decompress and copy the add-on package to a newly created "**XTPRO MSFS Addons**" folder inside your "Documents" folder. Should you want the installer to copy the package to another location, please **enter the correct path** to your preferred destination folder.

6. **Please confirm the path to the folder where you want the installer to copy the add-on package.**

7. **Click "Next" when ready to proceed**. The installer will copy the GLJ Model 25 add-on aircraft package to your "XTPRO MSFS Addons" folder or to your preferred desti-



nation folder.

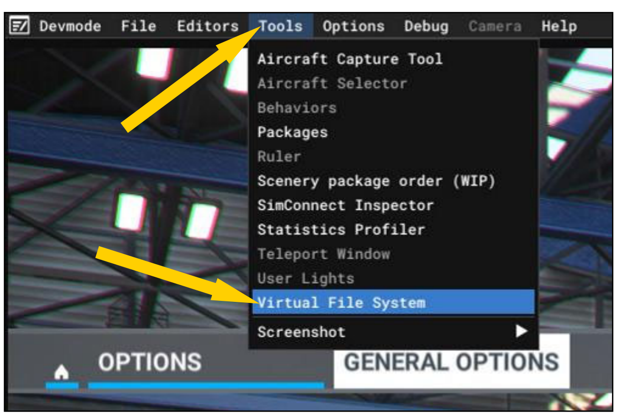
8. Make sure the add-on aircraft package folder ("**xtpro-aircraft-glj25-classic-se**") was **copied correctly** to your "XTPRO MSFS Addons" folder or to your preferred destination folder.

Copying the Addon Package to your MSFS Community Folder

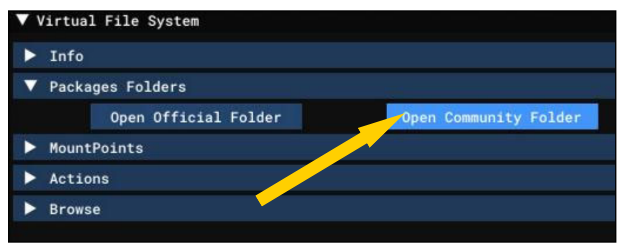
1. **Start Microsoft Flight Simulator**.

2. If not already enabled, turn **ON** the **Developer Mode** ("MSFS > Options > General Options > Developers tab > **Developer Mode**"). *See above.*

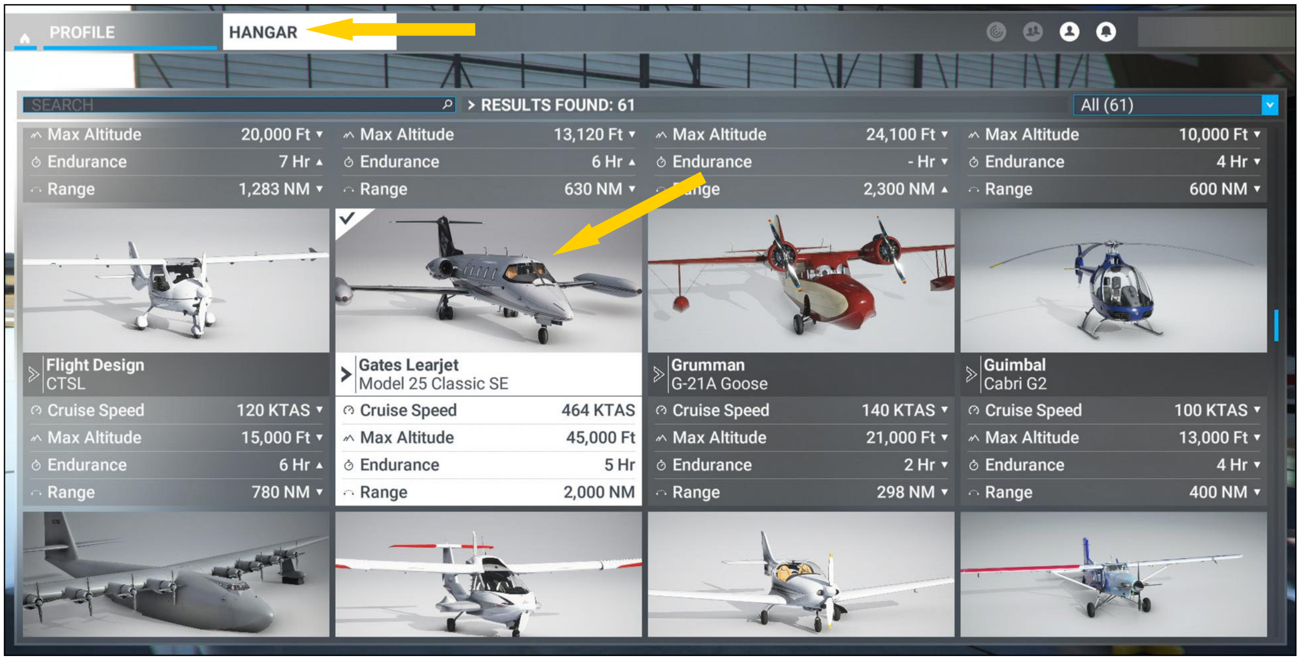
3. In the top menu bar, **click "Virtual File System"** ("MSFS > Devmode Top Menu Bar > Tools > **Virtual File System**").



4. **Optional:** If the Virtual File System window does not show because it is off screen, simply reset the windows layout to the default layout ("MSFS > Devmode Top Menu Bar > Options > Layouts > **Load Default Layout**").



5. In the Virtual File System window, **click "Open Community Folder".** This will open a standard Windows Explorer window showing the MSFS Community Folder and all its contents (if any).
Note: *On most computers, the path to this folder is:*
"C:\Users\yourname\AppData\Local\Packages\Microsoft.FlightSimulator_8wekyb3d8bbwe\LocalCache\Packages\Community", but seems to vary from one computer to the other. This is the reason why for the moment we prefer a manual method of installation to avoid any frustrating folder path issue.



6. **Copy** (or drag and drop with the right mouse button) the GLJ Model 25 add-on aircraft package folder ("**xtpro-aircraft-glj25-classic-se**") from your "XTPRO MSFS Addons" folder (or your preferred destination folder) to the MSFS **Community Folder**.

7. **Close Windows Explorer**, then **Exit** and **restart** MSFS.

8. **Voilà!** Your new Gates Learjet 25 addon is now installed and ready to go!

Checking the Installation

You may visit the **Hangar** (see above) for a rapid check of your new GLJ Model 25 addon and all of its available liveries ("MSFS > Profile > **My Hangar**"). When in the hangar, click

Change Aircraft ("**F11**") to select the **Gates Learjet Model 25 Classic SE** aircraft. You may select your preferred livery by clicking **Liveries** ("**F12**").

The GLJ Model 25 addon consists of **14 different variations** (liveries) of the Gates Learjet Model 25D business jet.

Icons in the upper right corner of the screen allow you to play a pre-programmed showcase animation or inspect the aircraft exterior or interior. Aircraft specifications can be shown by clicking **See Specifications** ("**F10**").

Removing the Addon

Removing the GLJ Model 25 addon from your computer is simply a matter of **removing the add-on aircraft package folder** ("**xtpro-aircraft-glj25-classic-se**") from your MSFS Community Folder.

CUSTOMIZATION

Customizing your GLJ Model 25 addon is very different from modifying an aircraft in FSX or Prepar3D and requires some pretty good knowledge of the Microsoft Flight Simulator SDK and of the Developer Mode. While in-dept programming experience is not absolutely necessary, a good understanding of the XML markup language and of the MSFS template system driving the "model behaviors" is mandatory. Creating additional assets such as new Wwise soundbanks, PBR textures (liveries) and special effects is also very demanding and requires additional experience and artistic talent using specialized software such as Audiokinetic Wwise and/or Adobe Photoshop. Adding third-party software such a navigation system (GPS/GNS) and radar is also tricky, although we have designed our file structure to make this task a bit less complicated.

We do not recommend customizing your addon unless you know exactly what you are doing. Xtreme Prototypes cannot support addons that have been modified and cannot provide technical assistance in customizing your GLJ Model 25 addon.

Please visit our website regularly for **new additions** to your GLJ Model 25 addon, including additional cockpits and liveries, patches and updates, and future versions as well. Refer to appendix 2 for more information about customizing your GLJ Model 25 addon.

Important

- Please be aware that some third-party navigation systems (GPS/GNS) may interfere with the basic MSFS 2020 autopilot that is used in the GLJ Model 25 add-on aircraft and change the behavior of some of the autopilot modes. In some cases, modifications to the autopilot “model behaviors” might be required. In doubt, refer to the documentation included with your third-party navigation system and/or contact the developer for more information. **Xtreme Prototypes cannot provide technical assistance for third-party addons.**

ABOUT PERFORMANCE

Because there are as many computers as they are users, it is impossible to recommend unique settings that would fit all systems and configurations. However, as a rule of thumb, if Microsoft Flight Simulator is running properly on your computer, and assuming that your computer meets the minimum system requirements or better (see section 2, page 1), you should be able to fly the GLJ Model 25 add-on aircraft without major issues.

Frame rate may vary depending on your hardware and several factors such as your graphics options, the complexity of the scene (especially with add-on sceneries), installed third-party addons, multiplayer mode, etc. For example, it is normal for the frame rate to drop over high-density sceneries such as big cities or airports (with any aircraft). Also, it is usually normal for external camera views to cause a slightly lower frame rate because they show not only the exterior (aircraft) model, but also some parts from the interior model such as seats, pilots, cabin lights, instrument panels, etc.

The GLJ Model 25 addon is a **complex aircraft simulator** (not a toy). It cannot be compared to some third-party addons with limited functionalities and systems, low resolution textures and 3D models, or equipped with a single glass cockpit.

The custom aircraft systems that were developed for this addon are responsible for thousands of calculations at each computer cycle. These systems, combined with high-resolution models, 4096 x 4096 PBR textures, hundreds of cockpit animations, third-party software (if installed), and some of the visual and sound effects, may affect your frame rate on slower

processors and graphics cards, depending on your simulation platform's configuration and settings.

It is always a dilemma for developers (and users) to manage quality and detail vs performance. For our part, we've decided to invest in detail, quality, systems, and features, as we expect computer systems to evolve and to become more powerful in the future.

We also invested in performance. Your GLJ Model 25 addon comes with seven (7) optimized levels of details (LODs) for the exterior model, and eight (8) levels of details for the interior model to improve overall performance in multiplayer and AI modes notably. LODs are a series of 3D models with different triangle (polygon) counts that allow MSFS to optimize the geometry and materials used by the aircraft based on how far away from the camera it is being viewed to keep an optimal framerate when playing in real time.

We encourage you to tweak your simulator's settings to improve performance. You can try moving the cursors to their middle position to see if it makes a difference. Combining aggressive settings with a next generation addon such as our GLJ Model 25 may affect performance, depending on your system.

Adjust your simulation platform's display, world, traffic and weather options to fix most performance issues or upgrade your computer with a better CPU, more memory and a high-end graphics card.

The graphics card is often the weakest component of any given system. Unless you own one of the latest generation high-end graphics cards, we suggest setting your frame rate limit to the recommended **"50 % OF THE MONITOR REFRESH RATE"** ("MSFS > Options > General Options > Graphics tab > **Frame Rate Limit**"). 30-60 fps, depending on your monitor settings, is usually enough for flight simulation

and should improve performance on slower systems.

We do not recommend flying the GLJ Model 25 addon in MSFS if your computer does not meet the minimum system requirements recommended by Microsoft. More recent gaming computers that are especially designed for running complex 3D games have the necessary processing power, motherboard, graphics hardware, RAM, and data storage, to handle the most advanced simulation platforms such as MSFS.

Refer to the documentation included with your simulation platform for more information about minimum system requirements and how to optimize your settings for the best overall performance.

Remember that third-party addons such as complex gauges, navigation systems, radars, sceneries, and airports may affect performance and frame rate. Use moderation when adding components to your simulation platform and refer to the documentation included with your third-party addons for optimal installation and settings.

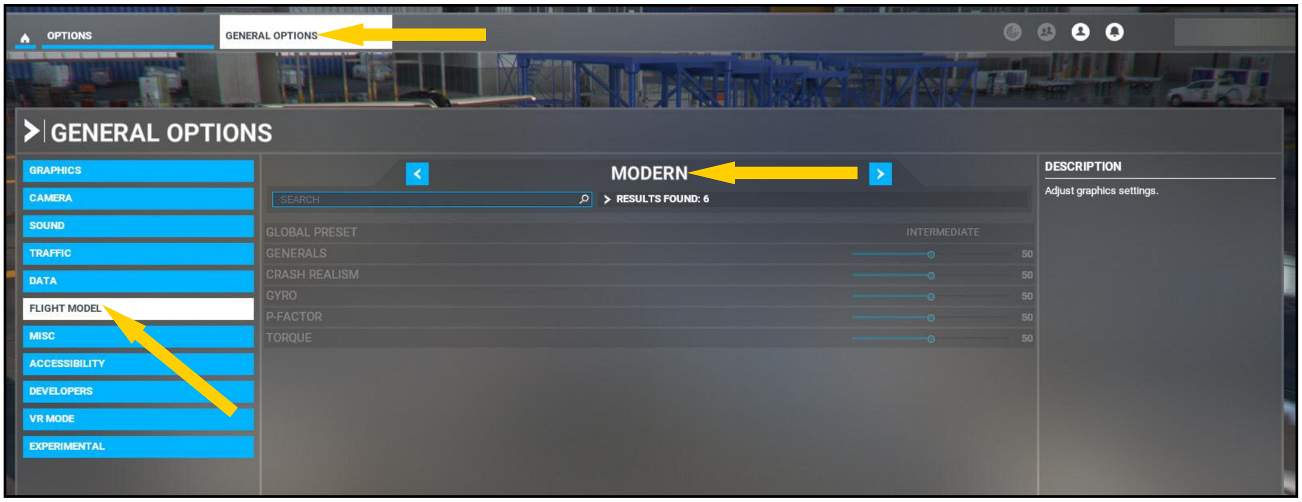
Important

- Make sure you have the minimum system requirements for running MSFS.
- Use moderation when adding components and third-party addons to your simulation platform.
- Make sure you have the latest driver for your graphics card and that your operating system is up do date.
- Make sure the latest MSFS updates are installed.
- Make sure your simulation platform is the only graphic-intensive program running on your computer when flying your addon. This could greatly affect performance.
- Make sure your antivirus program is not scanning your system while flying your addon. This could also affect performance.

RECOMMENDED SETTINGS

Below are a few **optional but recommended** settings that may improve performance when flying the Xtreme Prototypes GLJ Model 25 in MSFS. Some of these settings may also help you when learning how to fly the aircraft.

1. In “MSFS > Options > General Options > **Graphics** tab”, set “Anti-Aliasing” to **TAA**.
2. In “MSFS > Options > General Options > **Graphics** tab”, set “Frame Rate Limit” to **50 % MONITOR REFRESH RATE**.



3. In “MSFS > Options > General Options > **Graphics** tab”, set “DirectX Version” to **DX11**. *DirectX 12 support in MSFS 2020 was still under development at the time of this writing.*

4. In “MSFS > Options > General Options > **Flight Model** tab”, set the flight model to **MODERN**.

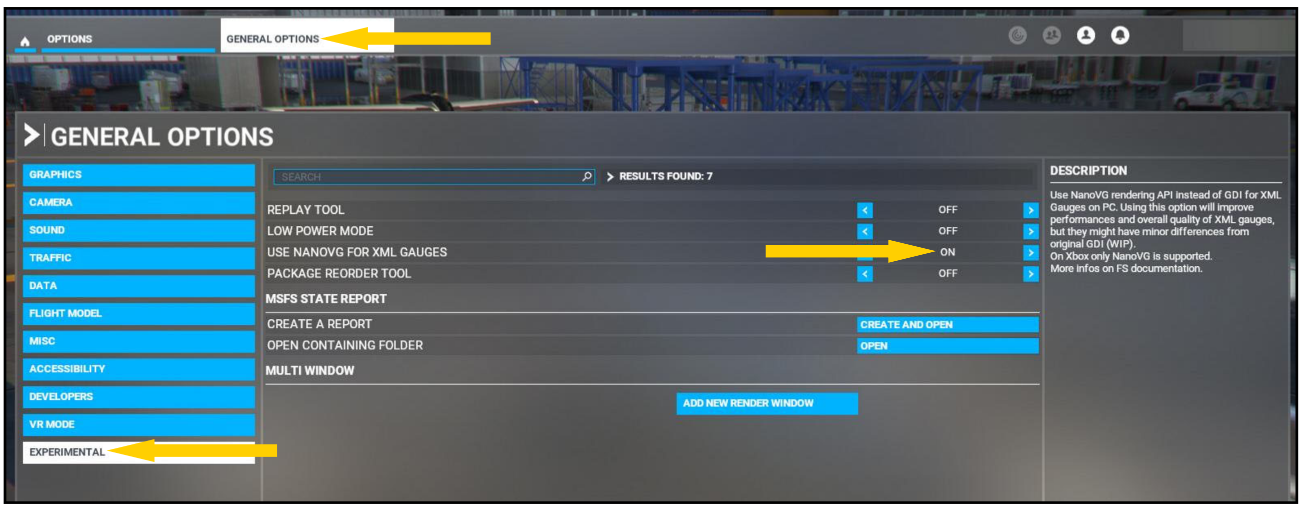
5. In “MSFS > Options > General Options > **Misc** tab”, set “Language” to **EN-US** or **FR-FR**. *The GLJ Model 25 addon uses advanced localized instrument tooltips in both English or French (more languages may become available in future updates).*

6. In “MSFS > Options > General Options > **Misc** tab”, set “Units of Measurement” to **U.S. SYSTEM**. *The Gates Learjet Model 25 is an American aircraft from the 1970’s/80’s.*

7. In “MSFS > Options > General Options > **Accessibility** tab”, set both “Instrument Name Tooltips” and “Instrument Description Tooltips” to **INSTANT**. *This is to make sure that the instrument tooltips in the cockpit are fully displayed. These settings are very useful for cockpit familiarization and may be disabled (set to **OFF**) later when you have more experience as a Gates Learjet 25 desktop pilot.*

8. In “MSFS > Options > General Options > **Experimental** tab”, set “Use NanoVG for XML Gauges” to **ON**. *The current version of the GLJ Model 25 addon uses a few vector XML gauges (radio and ADDU displays) that look better with NanoVG antialiasing.*

9. In “MSFS > Options > Assistance Options > **Aircraft Systems** pull-down menu”, set “Automixture” to **ON**.



10. In “MSFS > Options > Assistance Options > **Aircraft Systems** pull-down menu”, set “Unlimited Fuel” to **OFF**.

11. In “MSFS > Options > Assistance Options > **Aircraft Systems** pull-down menu”, set “Aircraft Lights” to **OFF**.

12. In “MSFS > Options > Assistance Options > **Aircraft Systems** pull-down menu”, set “Gyro Drift” to **OFF**. *This may be set to* ***ON*** *if you prefer. If so, you will be required to make manual gyro drift corrections in areas where magnetic references are not reliable.*

13. In “MSFS > Options > Assistance Options > **Failure and Damage** pull-down menu”, set “Crash Damage” to **DISABLED.**

14. In “MSFS > Options > Assistance Options > **Failure and Damage** pull-down menu”, set “Aircraft Stress Damage” to **DISABLED.**

15. In “MSFS > Options > Assistance Options > **Failure and Damage** pull-down menu”, set “Engine Stress Damage” to **DISABLED.**

16. In “MSFS > Options > Assistance Options > **Failure and Damage** pull-down menu”, set “Icing Effect” to **ON.** *If set to* ***OFF*** *(your choice), icing will have no physical impact on your flight and the visual ice effects won’t be visible on the windshield and oth-*

er exterior parts of the aircraft.

17. In “MSFS > Options > Assistance Options > **Piloting** pull-down menu”, set “Auto-Rudder” to **OFF**.

18. In “MSFS > Options > Assistance Options > **User Experience** pull-down menu”, set “G-Effect” to **OFF**.

19. In “MSFS > Options > Assistance Options > **User Experience** pull-down menu”, set “End Flight when Aircraft Shuts Down” to **OFF**.

20. If necessary, adjust the Advanced Settings options of the Graphics tab (“MSFS > Options > General Options > Graphics tab > **Advanced Settings**”) for optimal performance depending on your computer’s capabilities and limitations. Will require experimentation on your part.

21. If necessary, adjust the **Traffic** options ("MSFS > Options > General Options > **Traffic** tab") for optimal performance depending on your computer's capabilities and limitations. Will require experimentation on your part.

22. **Highly recommended:** You may want to configure **trim buttons** for your joystick or yoke ("MSFS > Options > Control Options > **Your joystick or yoke**"). The elevator trim tab (horizontal stabilizer on the Learjet), along with the aileron and rudder trim tabs are animated features and fully operational on the GLJ Model 25 addon. Proper trimming is an absolute and constant necessity with this aircraft.

Other settings not mentioned above are left for you to experiment with.

We also recommend that you use moderation when setting the Flight Conditions while creating your flight plan in the World Map ("MSFS > Welcome Screen > World Map > **Flight Conditions**").

See "**Release Notes**", at the beginning of the manual (page 5), for more recommended settings.

Note: *If you are still experiencing performance issues after optimizing your simulation platform, you may need to upgrade your computer. Refer to appendices 5 and 6 for more information.*

AIRCRAFT DESCRIPTION AND SPECIFICATIONS

SECTION 3

AIRCRAFT DESCRIPTION

The Gates Learjet Model 25 is a twin turbo-jet-powered light civilian aircraft.

The Model 25 was first tested in the summer of 1966 and introduced in the fall of 1967. An estimated 368 aircraft were built over a period of almost 15 years.

Your GLJ Model 25 addon for MSFS is inspired by the **Gates Learjet Model 25D**, a longer-range, improved version of the original Model 25 with greater fuel capacity, introduced in the mid-1970s. It has a short wing with tip tanks and a stretched fuselage compared to previous 20 Series models, allowing more passengers (7 seats +2) and loading options.

The Model 25 has a low wing with a very slight (15 degrees) sweep. Its T-tail is also swept.

The wing is equipped with hydraulically powered, single-slotted Fowler flaps and hydraulically powered spoilers.

Roll control is achieved through cable-actuated ailerons. Both ailerons are equipped with a balance tab while the left aileron also has an electrically powered trim tab.

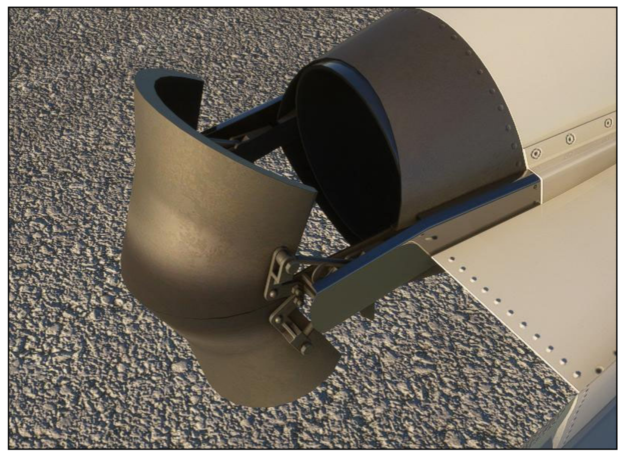
The electrically powered movable stabilizer is the primary pitch trim. The cable-controlled elevator is the primary pitch control.

The rudder is also cable-actuated and has an electrically powered trim tab.

AIRCRAFT SPECIFICATIONS

Power Plant

The Model 25 is equipped with the reliable General Electric CJ610-8A single-spool turbojet engine. Rated at 2,950 lbs. static thrust per side at sea level, the CJ610 provides the aircraft with fighter-like performance.



A single-spool turbojet engine will provide more thrust at altitude than a like-rated modern turbofan engine. This makes all 20 Series aircraft well-suited for high altitude flights. The downside is that fuel consumption and noise are far greater.

The aircraft is also equipped with thrust reversers that may be used anytime the airplane is on the ground to produce shorter stopping distances. Each engine is equipped with a Dee Howard target thrust reverser system which consists of upper and lower clamshell doors, pivoted near the engine centerline. The reverser's doors are hydraulically actuated and electrically controlled.

Dimensions

- **Length:** 47 ft. 7 in.
- **Wingspan:** 35 ft. 7 in.
- **Height (top of vertical fin to ground):** 12 ft. 3 in.
- **Wing area:** 231.8 sq. ft.
- **Wheelbase:** 19 ft. 2 in.
- **Tread:** 8 ft. 3 in.

Weight

- **Gross weight (including fuel and internal load):** approx. 15,000 lbs.
- **Empty weight:** approx. 8,121 lbs.

- **Maximum ramp weight:** approx. 15,500 lbs.
- **Maximum landing weight:** 13,300 lbs.

Limitations

- **Maximum Mach:** Mach 0.82 (at 24,000 ft.)
- **Maximum speed:** 359 KIAS (306 KIAS under 14,000 feet for protection against bird strikes)
- **Service ceiling:** 45,000 ft.
- **Absolute ceiling:** 51,000 ft.

TAIL NUMBERS

A tail number, also known as the aircraft registration number, is unique to a single aircraft and is required by international convention to be marked on the exterior of every aircraft. Although called a "number", it can include both numbers and/or letters.

The numbers painted on the variations of the GLJ Model 25 addon are **fictitious**. Any match with actual tail numbers is a pure coincidence.

The tail numbers are painted on the PBR textures that are mapped to the exterior 3D model and cannot be changed.

Note: *Future updates may incorporate new liveries that include customizable tail numbers.*

The tail number on the white label [6, fig. 5-15] located under the Anti-Skid Generator Lights on the captain's instrument panel can be changed in the aircraft customization page of the World Map ("MSFS > Welcome Screen > World Map > Aircraft Icon (Top Left Corner) > Customization > **Tail Number**") - see below.

Note: *We do not recommend changing the tail number by editing the "aircraft.cfg" file in the add-on aircraft package.*

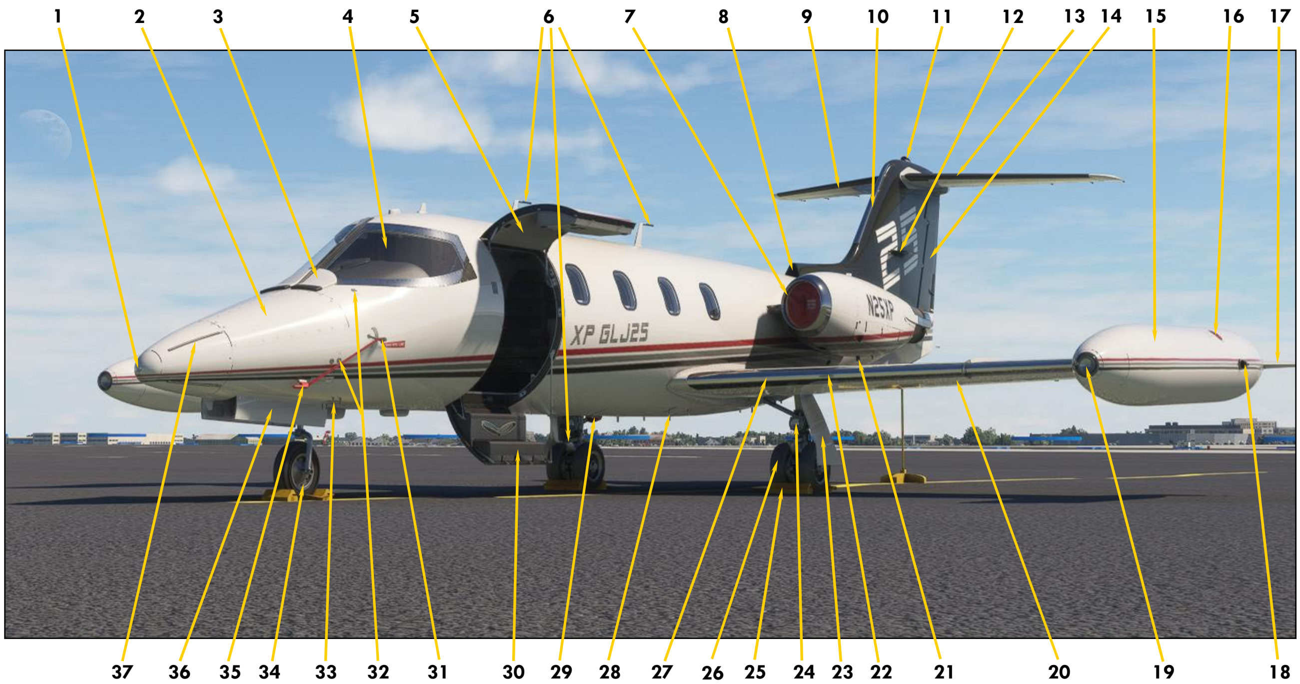


Figure 3-1

1. Radome Alcohol Outlet
2. Nose Compartment
3. Windshield De-Icing Nozzles and Defog Outlets
4. Windshield
5. Main (Passenger and Crew) Door Upper Section
6. Radio Antennas
7. Engine Nacelle De-Icing Lip
8. Dorsal RAM Air Inlet (air intake)
9. Movable Stabilizer
10. Vertical Fin
11. Rotating Beacon Light
12. VOR/Localizer Antenna
13. Stabilizer Heated Edge (Blanket)
14. Rudder
15. Wingtip Tank
16. Fuel Filler Cap
17. Wingtip Tank Fin
18. Navigation and Strobe Lights
19. Left Recognition Light (see opposite)
20. Wing
21. External (GPU) Power Receptacle
22. Stall Strip
23. Main Gear Door
24. Landing/Taxi Light (2 light intensities)
25. Wheel Chock
26. Main Landing Gear
27. Wing Heated Leading Edge
28. Drains and Valves
29. Rotating Beacon Light
30. Main (Passenger and Crew) Door Lower Section
31. Stall Warning Vane
32. Static Ports
33. Drains and Valves
34. Nose Gear
35. Pitot Head
36. Nose Gear Door
37. Radome with Static Dischargers

Left Optional Recognition Light *[19] (installed by default) - To remove/install the light, click the* ***white label*** *[27, fig. 5-2] under the Trim Indicator Panel in the lower section of the captain's instrument panel. Having one or two recognition lights is a matter of personal choice.*

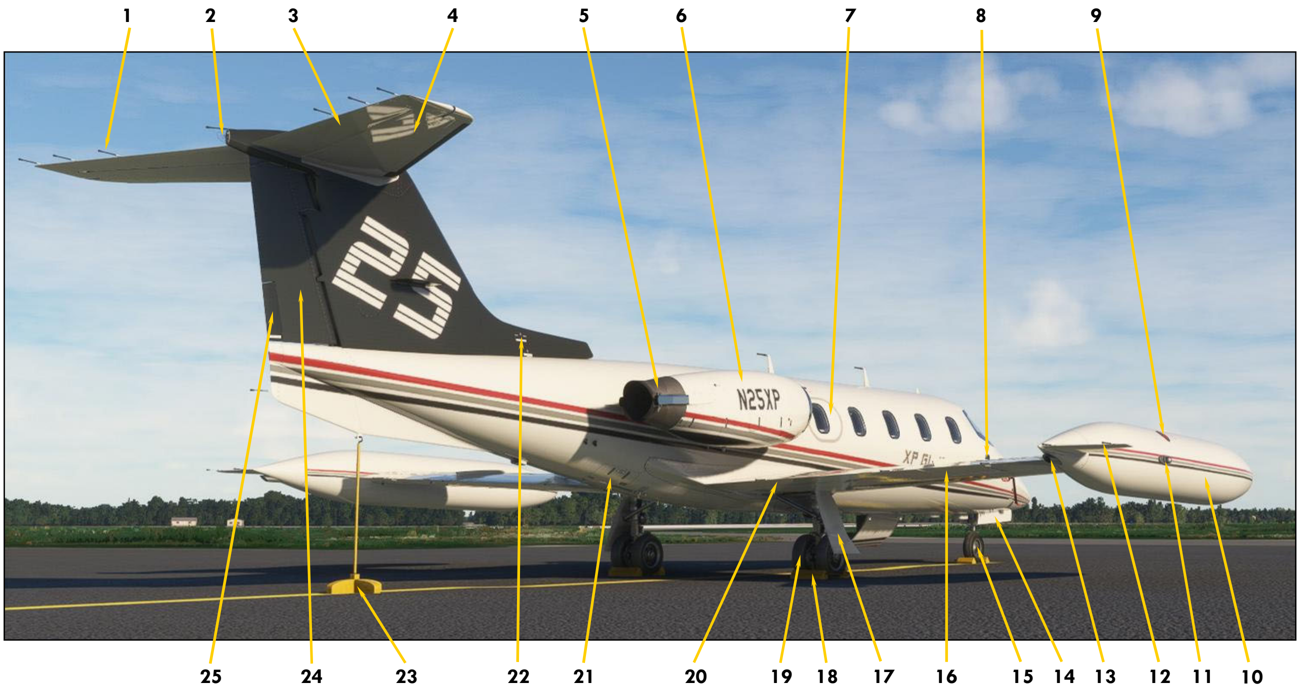
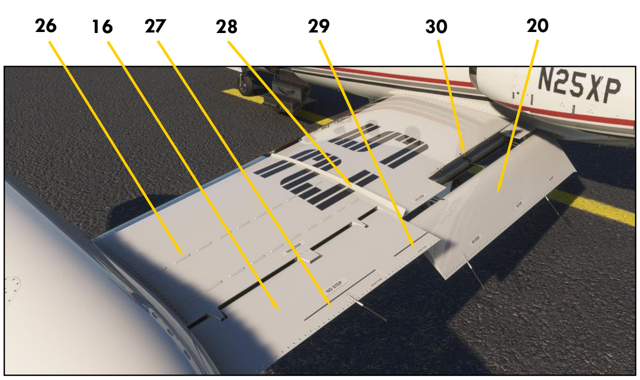
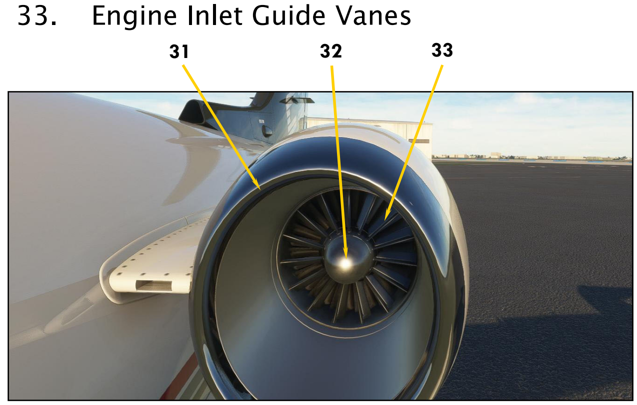


Figure 3-2

1. Static Discharger (Wick)
2. Navigation and Strobe Lights
3. Elevator
4. Movable Stabilizer
5. Thrust Reverser
6. Engine Nacelle
7. Emergency Exit Door
8. Right Wing Inspection Light
9. Fuel Filler Cap
10. Wingtip Tank
11. Navigation and Strobe Lights
12. Wingtip Tank Fin
13. Wingtip Tank Fuel Jettison Tube
14. Nose Gear Door
15. Nose Gear
16. Aileron
17. Main Gear Door
18. Wheel Chock
19. Main Gear
20. Flap
21. Tail Cone Access Door
22. Oxygen Tank Valve Access Door
23. Tail Stand
24. Rudder
25. Rudder Trim Tab
26. Boundary Layer Energizers
27. Aileron Balance Tab
28. Wing Fence
29. Aileron Trim Tab
30. Spoiler
31. Engine Nacelle De-Icing Lip
32. Engine Nose Cone
33. Engine Inlet Guide Vanes





VIRTUAL COCKPIT

SECTION 4

To make the instrument panels of our 20 Series addons more appealing to our desktop pilots, given the way most aircraft are flown nowadays, we have chosen to equip the cockpit of our GLJ Model 25 for MSFS with **modern avionics**, like those found in some of the real Learjet 25 aircraft still in service. However, it is important to remember that the Gates Learjet Model 25 is a 1970s aircraft originally equipped with **analog instrument panels** and **mechanical "steam gauges"** from that period, some of which have been retained.

In our efforts to modernize the cockpit with the addition of new instruments, radios, a GPS navigation system, and a radar, we were keen to maintain the look and feel of the original Learjet instrument panels. This was quite a challenge given the rather limited space available for new devices and equipment. We also wanted to give our users the ability to add their own equipment and systems purchased from third-party developers as they become available for MSFS (see appendix 2).

Because of the significant differences between all possible panel configurations, aircraft systems and third-party addons, it was not possible to create a "one-size-fits-all" cockpit. Instruments, panels, and sub-panels had to be moved around or replaced to make room for modern avionics and new devices. Systems had to be reprogrammed; panels reconfigured.

To avoid confusion when installing third-party addons, to improve performance, and to allow for the best panel rearrangement, we opted for one virtual cockpit for each available panel configuration, present or future.

Included with your GLJ Model 25 addon for MSFS is the **Classic Retrofitted GNS 530 Virtual Cockpit**. This represents the interior of a typical retrofitted Gates Learjet Model 25D business jet still in use today.

Note: *More cockpit/panel configurations, such as with GTN and G1000 navigation systems, may become available as separate Xtreme Prototypes addons for this aircraft in the future. As your learning experience progresses and your flying methods evolve, you may eventually select another configuration and add more*

complex systems to your GLJ Model 25 addon as they become available for MSFS.

The Classic Retrofitted GNS 530 Virtual Cockpit

The **Classic Retrofitted GNS 530 Virtual Cockpit** features the basic Learjet analog instrument panel from the early 1980s and strives to bring you the spirit and the actual feeling of flying a high-performance business jet at a time where large LCD computer screens did not exist. New radios with yellow VFD displays have replaced the original sets with mechanical displays from the 1960's. A generic GNS 530 navigation system, with built-in COM and NAV radios, and a generic weather radar are also installed.

Note (1): *The GNS 530 physical 3D model in the virtual cockpit is preprogrammed for the basic GNS 530 that comes with MSFS. The weather radar model shows a dummy radar*

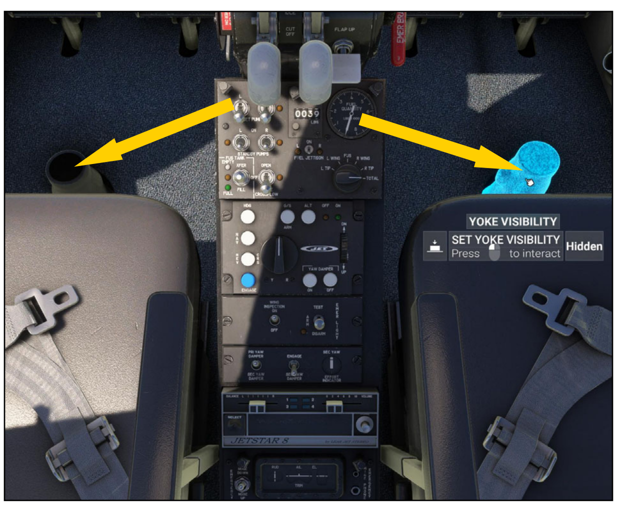
screen by default. The models are user-programmable and may be compatible with most existing and future third-party add-on software. Instructions are provided in appendix 2 for adding third-party addons to the cockpit of the GLJ Model 25 add-on aircraft. Experimentation may be required.

__Note (2):__ Optional navigation systems and radars are not included and must be purchased separately from third-party vendors/developers. Some third-party navigation systems may change the behavior of the basic MSFS autopilot that is used in the GLJ Model 25 add-on aircraft, and/or may not be compatible with the latest versions of MSFS. __Please contact the developer for support. Xtreme Prototypes cannot provide technical assistance for third-party addons.__

CONFIGURING THE VIRTUAL COCKPIT

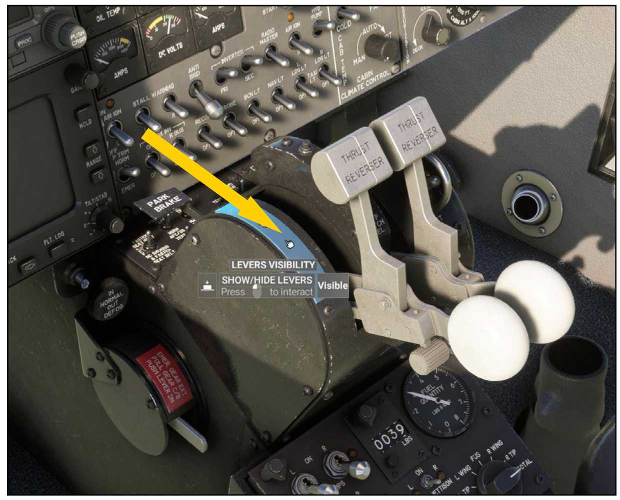
Hiding the Control Columns and Yokes

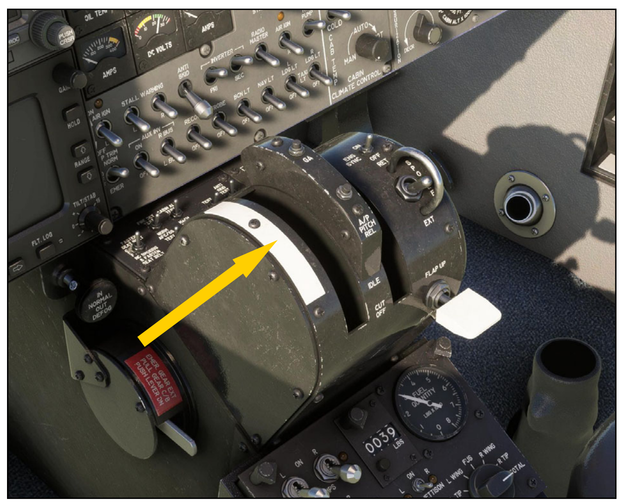
You can hide the control columns and yokes by clicking the **leather boot** at their base. This gives the pilot a better view of the main instrument panel, making the switches and controls more accessible and the instruments more readable. Click the boot again to show the column. Each column/yoke is independent.



Hiding the Throttles

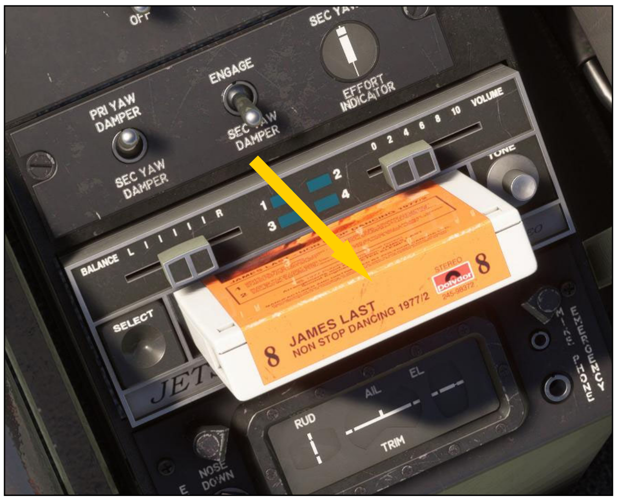
You can hide the throttles, subthrottles and parking brake lever by clicking the **white strip** on the throttle quadrant [5, fig. 5-43]. This gives the pilot a better view of the switches on the electrical panel and center pedestal. Click the white strip again to show the throttles and parking brake lever.

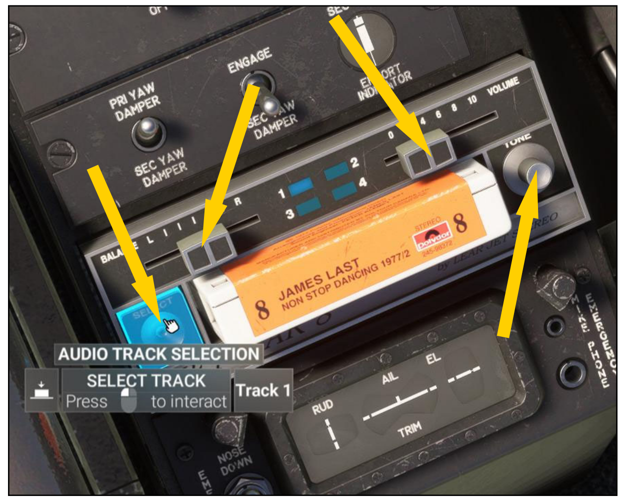




Playing Music

As a tribute to the inventive genius of Bill Lear, the GLJ Model 25 addon for MSFS features a functional **"Jetstar 8" 8-track tape player** [fig. 5-48] installed in the center pedestal that can





play up to four different tracks of stereo music, like the original player.

For demonstration purposes, we've preprogrammed **four original music tracks** (under license from Adobe Stock) that can be played at different phases of the flight:

Track 1: Suggested for takeoff and climb.
"Fly Away Now"
Colorof Music/Jamendo (Adobe)

Track 2: Suggested for cruise.
"Summer Travel"
Dopestuff Beats/Music Revolution (Adobe)

Track 3: Suggested for cruise.
"Habana Kitchen"
Play Days 2021/Music Revolution (Adobe)

Track 4: Suggested for approach and landing.
"Happy Day"
Benjamin Cornelius/Music Revolution (Adobe)

Note: *It is not possible to play your own music tracks at this time, like in our addon versions for Prepar3D. We are working hard to make this feature available in a future version.*

To insert an 8-track tape cartridge into the player, left click the **player's door** [1, fig. 5-48].

To eject the cartridge from the player, right click the **cartridge** [5, fig. 5-48].

To push the cartridge in and play the music, use the mouse wheel (up). Requires DC power.

To pull the cartridge out and stop the music, use the mouse wheel (down).

To switch track, click the **Track Selector Button** [2, fig. 5-48].

You may adjust the volume, the balance and the tonal quality of the audio by moving the control **cursors** and **knob** [3, 6, 7, fig. 5-48].

Note: *Bill Lear introduced the world's first Lear Jet Stereo 8-track player for automobiles back in the spring of 1965 through the Lear Jet Stereo division, an extension of Lear Jet Corporation. The format was largely adopted by the music industry and major electronics and car manufacturers from the mid-1960's to the late 1970's.*

Releasing the Armrests

The **seat armrests** can be pushed (released) or pulled (raised) by clicking and dragging them with the mouse.

Using the Sun Visors

Click the **green plastic flap** to lower or to raise the sun visor. Click and drag the **hinge** to slide the sun visor along the track.

To Show/Hide the Sheepskin Seat Covers

Click either the pilot's or the copilot's **seat lever** to switch from leather to sheepskin.

To Show/Hide the Pilots

Click either **headphone hanger** to show or hide the pilots (visible from the exterior camera views). When the headphones and seatbelts are visible, the crew is absent. When the headphones and seatbelts are not visible, the crew is present.

To Select the Pilots

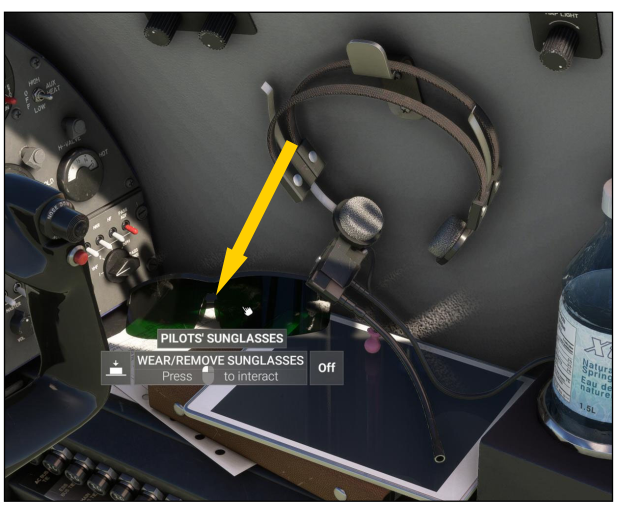
Click the **Learjet 25 logo** at the center of the yoke on the captain's side to select the captain that appears in the cockpit of the exterior model. Click the Learjet 25 logo on the copi-

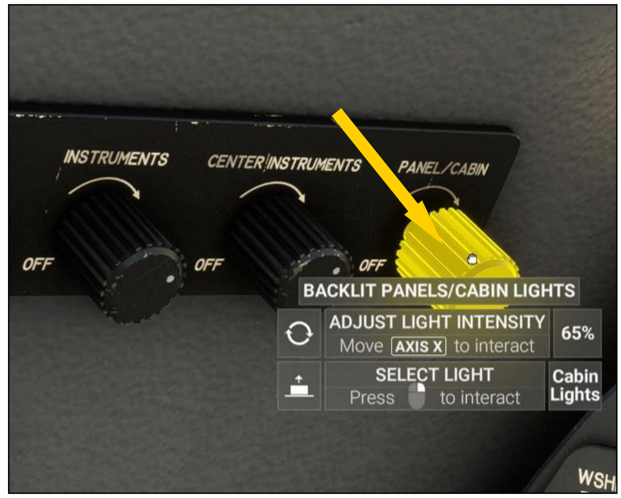
lot's side to select the copilot. You can choose between three different character figures. Crew must be aboard the aircraft.

Note: *The GLJ Model 25 addon uses its own custom pilot character figures. Pilot selection from the MSFS settings is disabled in this software version. Other options may become available in future versions.*

To Show/Hide the Pilots' Sunglasses

Click the pair of **sunglasses** on the copilot's right console (or the whisky compass **correction card**) [3, 5, fig. 5-50] to show or hide the pilot's sunglasses. When the sunglasses are visible on the copilot's right console, the pilots are not wearing sunglasses.





To Illuminate the Cockpit and the Instrument Panels

Use the mouse wheel (or click and drag) on the left and right-side **dimmers** to adjust the brightness of the cockpit and panel lights (0-100 % brightness). The dimmers can also be clicked and dragged from left to right with the mouse, as instructed in the tooltips. Refer to fig. 5-49 for more details. Requires DC power.

CONFIGURING THE CABIN

To Open/Close the Refrigerator Door

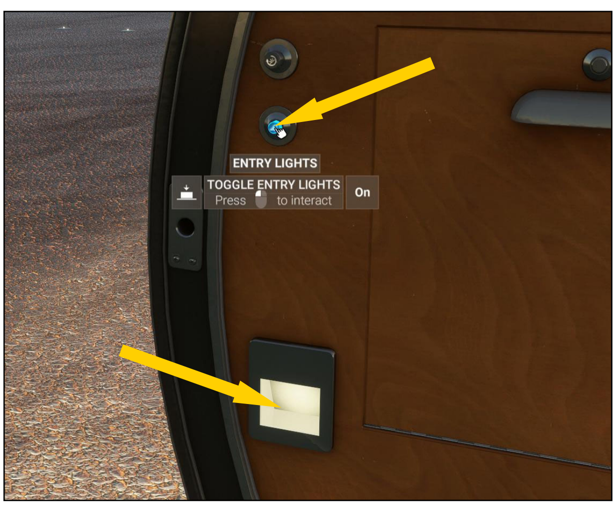
Click the refrigerator **door** (glass or frame) [12, fig. 5-52] to open or close the door.

To Turn the Cabin Ceiling Lights On/Off (+Dim)

Use the mouse wheel on the **Cabin Lights Dimmer** [6, fig. 5-52] to adjust the brightness of the cabin and cockpit ceiling lights (0-100 % brightness). The dimmer can also be clicked and dragged from left to right with the mouse, as instructed in the tooltip.

To Turn the Entry Lights On/Off

Click the **Entry Lights Switch** [5, fig. 5-52] to turn the lights on/off. Entry lights cannot be dimmed. Requires DC power.



To Turn the Passenger Reading Lights On/Off

Click the **light button** [10, fig. 5-54] to turn the passenger reading light on/off. Passenger reading lights cannot be dimmed.

To Turn the Cabin TV On/Off

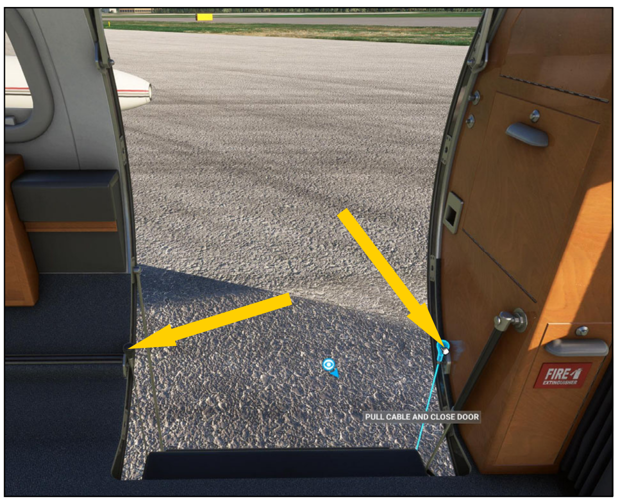
Click the **logo** at the bottom of the screen to turn the TV on/off. Requires DC/AC power.

To Open/Close the Main Door

When the door is closed, click the **red handle** [7, fig. 5-54] in the top section of the door to open or close the clamshell (passenger and crew) door. When the door is open, click either **handle of the retaining metal cables** [2, fig. 5-54] to close the door.

From the cockpit, it is also possible to open/close the door by clicking the **Door Unsecured Annunciator** [10, fig. 5-32a] located on the glareshield.

Note: *By default, the "SHIFT+E" keyboard shortcut cannot be used for opening or closing the door in MSFS.*

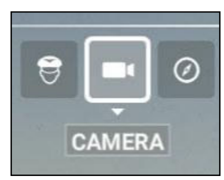


Moving Around the Cockpit and Cabin

While visibility is excellent looking forward in the GLJ Model 25 cockpit, it may be helpful from time to time, and especially during take-off and landing, or during preflight procedures, to move the pilot's viewpoint (or camera) in the virtual cockpit.

While it is always possible to move the camera around the cockpit and cabin by using your mouse, keyboard and joystick/yoke, depending on your MSFS configuration, we have programmed **24 different cockpit cameras** to make your task of moving around easier (see pages 11-15, at the end of this section).

By clicking the **camera icon** in the top section of the main MSFS window, you can select one of the pilot cameras that are available in the **COCKPIT** tab:



Under the **PILOT** dropdown menu:

- "**PILOT**" = A normal view from the captain's seat.
- "**CLOSE**" = A closer view of the captain's instrument panel.
- "**LANDING**" = An upper view from the captain's seat.
- "**COPILOT**" = A normal view from the copilot's seat.

Under the **INSTRUMENT** dropdown menu:

- "**CAPTAIN'S PANEL**" = A close-up view of the captain's instrument panel.
- "**CENTER PANEL**" = A close-up view of the center instrument panel.
- "**COPILOT'S PANEL**" = A close-up view of the copilot's instrument panel.
- "**GLARESHIELD**" = A view of the glareshield, including the thrust reverser control box and the main annunciator panel.
- "**TEST SWITCH PANEL**" = A close-up view of the test switch panel, between the main instrument panel and the throttle quadrant.
- "**THROTTLE QUADRANT**" = A close-up view of the throttle quadrant.
- "**CENTER CONSOLE**" = A normal view of the center console.
- "**CABIN VIEW 1**" = A view of the cabin from the entry door (looking backward).
- "**CABIN VIEW 2**" = A view from the front left cabin seat, looking forward.
- "**CABIN VIEW 3**" = A view from the middle right cabin seat, looking backward.

Under the **QUICKVIEW** dropdown menu:

- "**QUICKVIEW 1**" = A view from the captain's seat, looking through the left side of the windshield.
- "**QUICKVIEW 2**" = A view from the captain's seat, looking through the right side of the windshield.
- "**QUICKVIEW 3**" = A view from the captain's seat, looking backward at the cabin.
- "**QUICKVIEW 4**" = A view of the cabin from the entry door (looking backward).
- "**QUICKVIEW 5**" = A view from the front right cabin seat, looking forward at the entry door.
- "**QUICKVIEW 6**" = A view from the front left cabin seat, looking forward.
- "**QUICKVIEW 7**" = A view from the back cabin seats, looking forward.
- "**QUICKVIEW 8**" = A view from the middle right cabin seat, looking backward.

Important

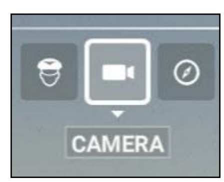
- The cockpit and cabin use "**collision meshes**" (a recommended feature in MSFS) to prevent the camera from moving outside the interior model or to move through objects such as walls and seats. These invisible "walls" may prevent you from moving freely inside the cockpit and cabin. You can use the keyboard's arrow keys with the mouse to move your way around these obstacles from a first-person perspective. Depending on your MSFS configuration, you may also use the mouse wheel to zoom in or out. Please note that collision meshes are not an absolute science in MSFS and that because of their inaccuracy, there may be places in the cockpit where some depth issues appear.

Tips

- At any time, you can click **RESET POSITION** under **COCKPIT** tab to go back to the selected **PILOT** view .
- Depending on your MSFS configuration, you may cycle the different cockpit camera views by clicking buttons on your joystick/yoke/throttle or depressing selected keys on your keyboard.

Looking at the Aircraft from the Outside

From time to time, you may need to look at the outside of the aircraft while in the air or during pre-flight procedures.



By clicking the camera icon in the top section of the main MSFS window, you may select one of the **14 external cameras** that are available in the **EXTERNAL** tab (see pages 15 to 17, at the end of this section):

Under the **DEFAULT** dropdown menu:

- "**DEFAULT**" = A outside view looking at the aircraft from behind.

Under the **QUICKVIEW** dropdown menu:

- “**QUICKVIEW 1**” = An outside view, looking at the left side of the aircraft.
- “**QUICKVIEW 2**” = An outside view looking at the aircraft from the front.
- “**QUICKVIEW 3**” = An outside view, looking at the right side of the aircraft.
- “**QUICKVIEW 4**” = An outside view looking at the aircraft from the top.
- “**QUICKVIEW 5**” = An outside view, looking at the right side of the aircraft, with an angle from the front.
- “**QUICKVIEW 6**” = An outside view, looking at the left side of the aircraft, with an angle from the front.
- “**QUICKVIEW 7**” = An outside view, looking at the right side of the aircraft, with an angle from the rear.
- “**QUICKVIEW 8**” = An outside view, looking at the left side of the aircraft, with an angle from the rear.

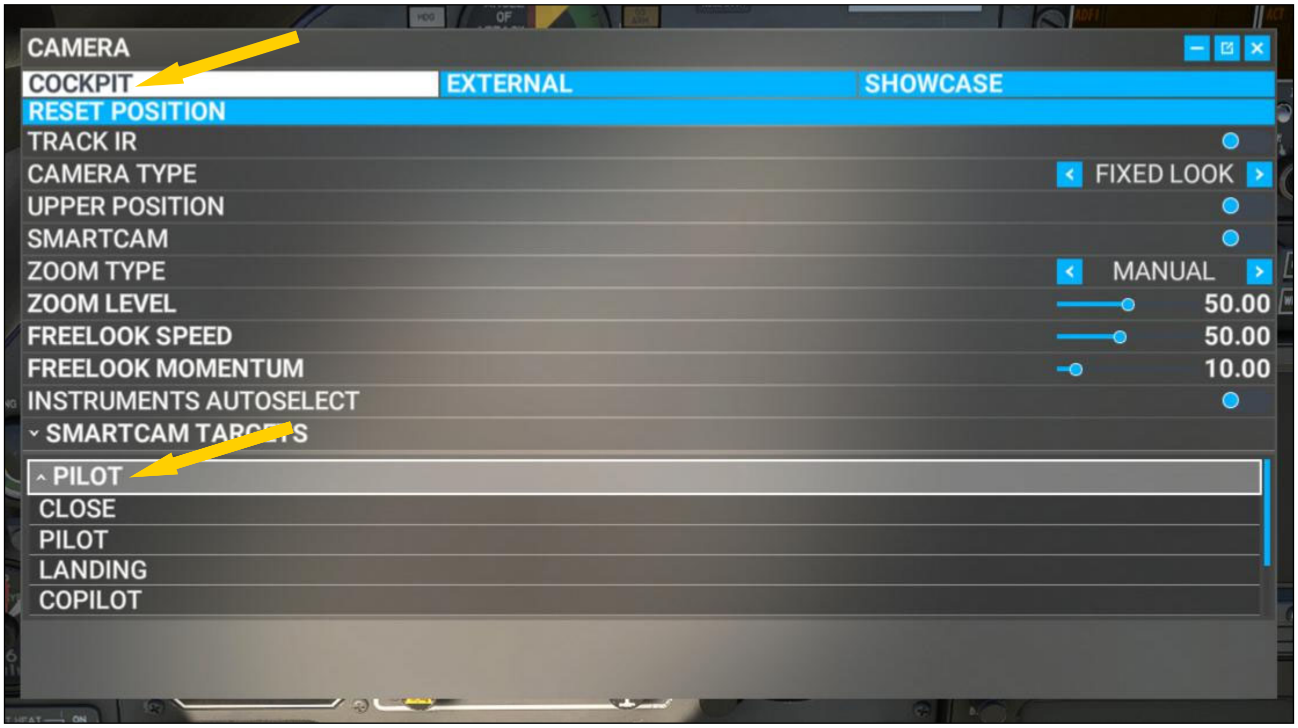
In addition to the external views, you may also select one of the **fixed** external cameras that are available in the **SHOWCASE** tab (see pages 16-17, at the end of this section):

Under the **FIXED CAMERA** dropdown menu:

- “**EXTERNAL 1**” = A outside close view looking at the aircraft from behind.
- “**EXTERNAL 2**” = An outside close view, looking at the left side of the aircraft.
- “**EXTERNAL 3**” = An outside close view, looking at the right side of the aircraft.
- “**EXTERNAL 4**” = A outside close view looking at the landing gear from under the aircraft.
- “**EXTERNAL 5**” = An outside close view looking at the aircraft from the front.

Tips

- At any time, you can click **RESET POSITION** under the **EXTERNAL** or **SHOWCASE** tabs to go back to the selected default external view.
- Depending on your MSFS configuration, you may cycle the different external camera views by clicking buttons on your joystick/yoke/throttle or depressing selected keys on your keyboard.


CAMERA
COCKPIT
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RESET POSITION
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CAMERA TYPE
FIXED LOOK
UPPER POSITION
SMARTCAM
ZOOM TYPE
MANUAL
ZOOM LEVEL
50.00
FREELOOK SPEED
50.00
FREELOOK MOMENTUM
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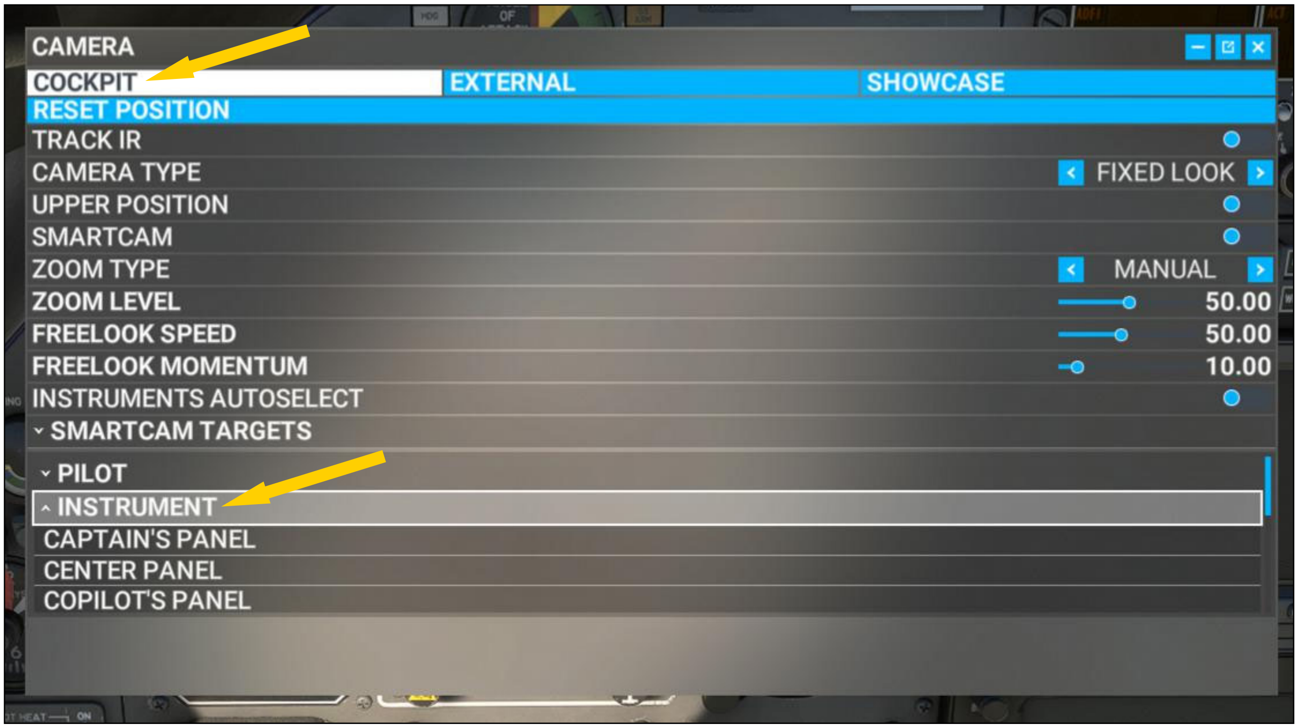
INSTRUMENTS AUTOSELECT
SMARTCAM TARGETS
PILOT
CLOSE
PILOT
LANDING
COPILOT


CLOSE


PILOT


LANDING


COPILOT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INSTRUMENTS AUTOSELECT
SMARTCAM TARGETS
PILOT
INSTRUMENT
CAPTAIN'S PANEL
CENTER PANEL
COPILOT'S PANEL


CAPTAIN'S PANEL


CENTER PANEL


COPILOT'S PANEL


GLARESHIELD


TEST SWITCH PANEL
STROBE
FASTEN SEAT BELT
FIRE DET TEST
CABIN ALT TEST
NORM AFC/SS TEST
MACH TEST L STALL
TEST
ANTI SKID TEST
NO SMOKING & FASTEN SEAT BELT
HORN SILENCE
R STALL
STALL WARN
A/P TEST
TRIM MON UP
ON
STICK N/P ON

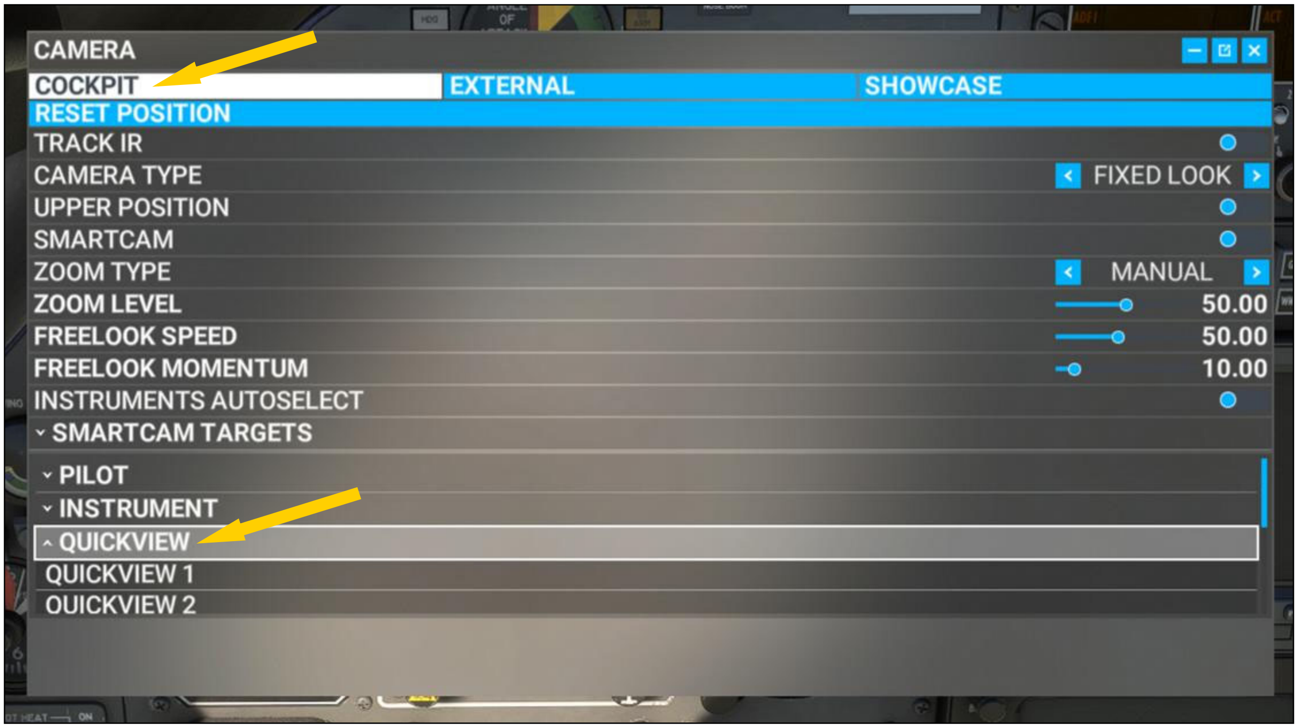

THROTTLE QUADRANT
PARK BRAKE
THRUST REVERSER
THRUST REVERSER
A/P PITCH REL
IDLE
CUT OFF
FLAP UP
EXT
SPOILER
EMER BRAKE


CENTER CONSOLE
JETSTAR 8


CABIN VIEW 1


CABIN VIEW 2


CABIN VIEW 3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INSTRUMENTS AUTOSELECT
SMARTCAM TARGETS
PILOT
INSTRUMENT
QUICKVIEW
QUICKVIEW 1
QUICKVIEW 2


QUICKVIEW 1


QUICKVIEW 2


QUICKVIEW 3

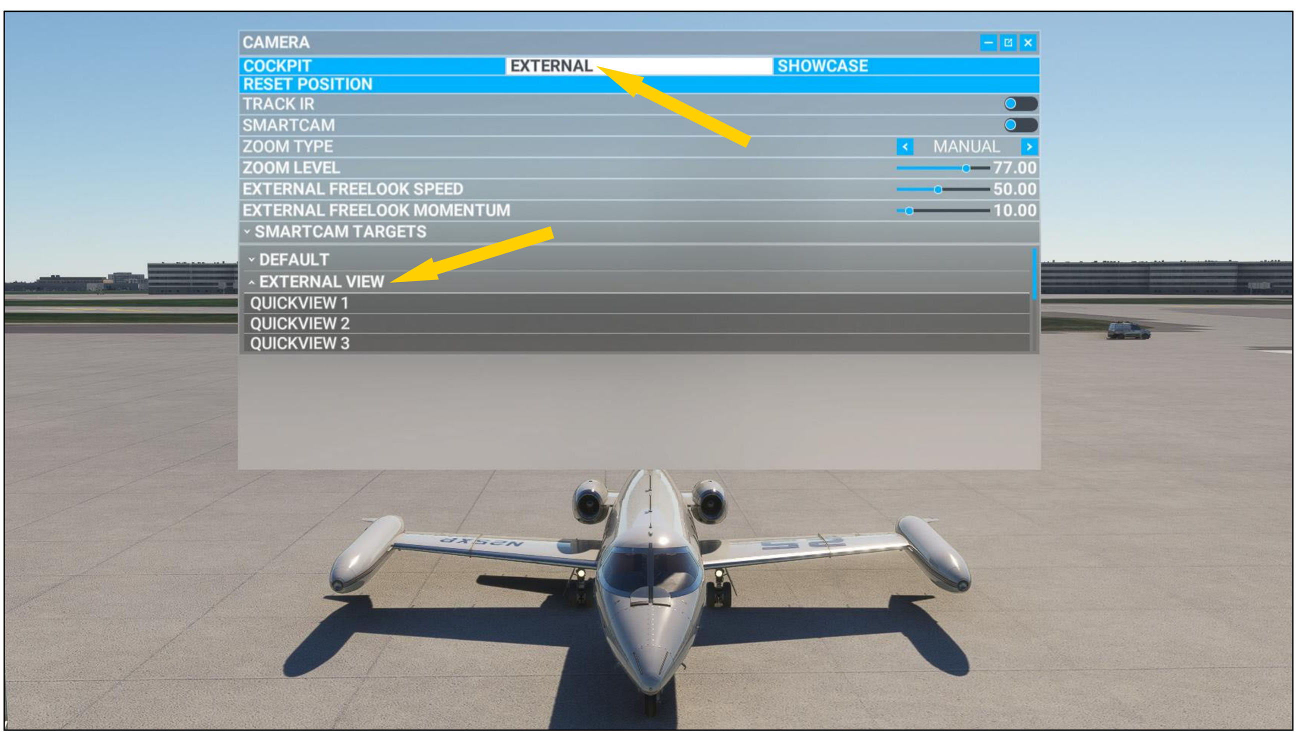

QUICKVIEW 4


QUICKVIEW 5


QUICKVIEW 6


QUICKVIEW 7


QUICKVIEW 8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EXTERNAL
SHOWCASE
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TRACK IR
SMARTCAM
ZOOM TYPE
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EXTERNAL FREELOOK SPEED
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EXTERNAL FREELOOK MOMENTUM
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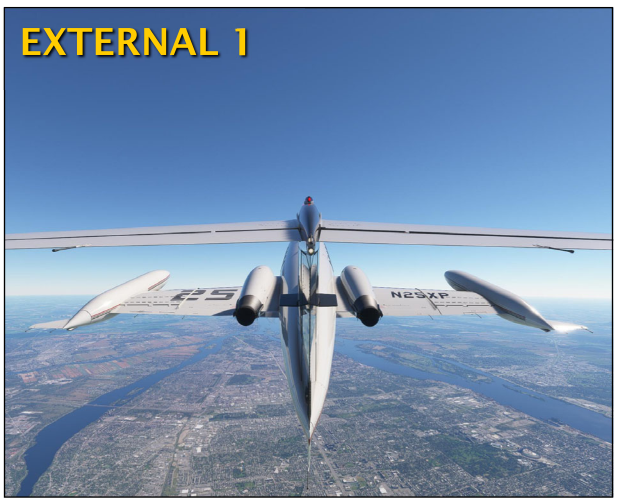
SMARTCAM TARGETS
DEFAULT
EXTERNAL VIEW
QUICKVIEW 1
QUICKVIEW 2
QUICKVIEW 3


CAMERA
COCKPIT
EXTERNAL
SHOWCASE
RESET POSITION
TRACK IR
DRONE FOLLOW MODE
DRONE LOCK MODE
DRONE FOCUS MODE
DISABLED
DRONE FOCUS
0.00
ZOOM LEVEL
50.00
DRONE SPEED
30.00
DRONE ROTATION SPEED
90.00
FREE CAMERA
FIXED CAMERA
EXTERNAL 1
EXTERNAL 2
EXTERNAL 3


EXTERNAL 1


EXTERNAL 2
N25XP


EXTERNAL 3
N25XP
XP GLJ25


EXTERNAL 4


EXTERNAL 4


EXTERNAL 5

INSTRUMENT PANELS

SECTION 5

The Xtreme Prototypes GLJ Model 25 add-on aircraft for MSFS comes with highly detailed instrument panels with **fully modeled** animated "steam gauges" and other devices. Full-3D interior models allow for total immersion into the Gates Learjet Model 25 cockpit and cabin.

FULL 3D "STEAM" GAUGES

Legacy 2D gauges that are "projected" onto the various instrument panels can still be found in the virtual cockpits of some third-party add-on aircraft. When viewed from an angle, these gauges appear flat even though they might contain needles, ribbons, buttons, knobs, and other movable parts that are not flat in the real world.

2D gauges are generally created with layers of animated drawings, while some may also include vector text and graphics. Many of these gauges use low-resolution graphics that are limited in size.

Xtreme Prototypes virtual cockpits do not use 2D gauges, except for CRT/LCD screens and

for some LED/VFD digital displays that are flat by nature, like in the GNS 530, radar and radio displays. Our virtual cockpits feature **fully modeled** analog flight instruments and gauges with all their "mechanical" moving parts instead, like in the real world.

The virtual cockpit that comes with the GLJ

Model 25 addon contains hundreds of animated objects that can be **interacted with**, such as gauges, switches, knobs, levers, light indicators, and other devices. These objects all have advanced MSFS integrated "**tooltips**", localized in both **English** or **French**, that display useful information and instructions to the desktop pilot when hovered over or clicked with the mouse.

Note: *More languages may be added in future updates.*

Nearly all levers, knobs and switches are clickable to perform useful functions, unless otherwise noted in the following pages.

Important

- Multiple **camera views** are provided when in the virtual cockpit for entering the passenger cabin or for helping the desktop pilot with some switches and other cockpit items in areas that are difficult to reach. Refer to section 4, page 8, for a complete description.

DYNAMIC LIGHTING

Instrument panels in the virtual cockpits of the GLJ Model 25 addon are illuminated with **real dynamic lights**, like in the real world. No static light maps (textures) are used for creating

the illusion of illuminating the cockpit, like in many legacy addons. **Instruments, instrument eyebrows, and panel post lights have their own dynamic light effects built in.**

With static light maps, mobile objects in gauges and panels (like the attitude tape in the ADI, a switch, or a knob) move along with their shadows and bright spots. This is because the lighting effect comes from a fixed "emissive" texture applied to these objects. In the real world, shadows and bright spots on animated objects aren't supposed to move when the light source is fixed, like a panel post light projecting its light beam onto a gauge. It is also impossible to simulate partly illuminated panels with static light maps.

In the GLJ Model 25 addon, instruments lights and panel post lights are independent and separated into three sections: the **captain's panel**, the **center panel** (including the center

pedestal), and the **copilot's panel**. Each section has its own light dimmer located on each side of the cockpit.

The **yellow flood lights** above the main instrument panel are separated into two sections (one on the captain's side and the other on the copilot's side) and are controlled by separate dimmers on each side of the cockpit.

Additional **lights and annunciators** can be tested, and their brightness adjusted with a dimmer switch located under the glareshield. The **landing gear lights** on the center panel have their own independent dimmer.

Backlit instrument panels can be dimmed with their own dimmer located on the captain's side wall. The panel light dimmer has a dual function and can be used to control the **cockpit and cabin ceiling lights** as well.

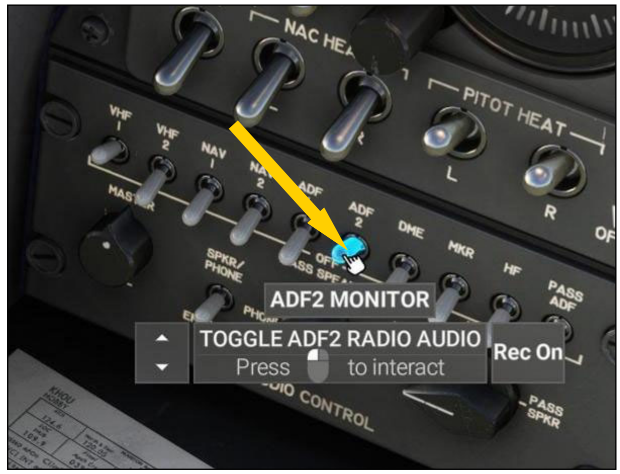
The captain's and copilot's **map lights** are also controlled individually by their own dimmer on each side of the cockpit, adjacent to the light fixture.

Note: *The brightness of the lights, annunciators, and backlit panels can be adjusted to any intensity from 0 % to 100 %.*

HOW TO ACTUATE SWITCHES, BUTTONS, AND KNOBS

- Most **2-position switches** can be turned ON or OFF with a simple left click with the mouse pointer positioned over the switch actuator. If a switch or button does not respond to clicks, it is probably a 3-position switch. Try the mouse wheel or click and drag the switch lever instead (see below).

  Note: *2-position switches will not respond to mouse wheel movements.*



- Most **3-position switches** can be turned to their UP position from their MIDDLE (or center) position by turning the mouse wheel up. Turning the mouse wheel down will move the switch actuator down one position at a time (UP, MID, DOWN). Turning the mouse wheel up will move the switch actuator up again one position at a time (DOWN, MID, UP). It is also possible to click and drag the switch lever with the mouse. Simply click the switch lever with the left mouse button, drag the lever to the desired position, and release the mouse button.

  Note: *Single-clicking with the left mouse button has no effect on most 3-position switches. Make sure you are using a wheel mouse.*

- **2-position switch guards** can be opened or closed with a simple left click with the mouse pointer positioned over the guard, like with 2-position switches (see above).

- **Push-button switches** can be actuated (ON/OFF) with a single left click on the center button/plunger.

- **Momentary-on push-buttons and switches** can be actuated (ON) with a single left click on the center button/plunger/lever (in certain cases, it may be necessary to hold the button down). Releasing the mouse button will return the button/switch to OFF.

- Some **levers** and **handles** can be clicked and dragged with the mouse to the desired position. Simply click on the handle with the left mouse button, drag the handle to the desired position, and release the mouse button.

- **Control columns** and **yokes** cannot be clicked and dragged with the mouse because they are synchronized with the movements of your controller or other devices (pitch and roll).

- The **rudder pedals** are synchronized with the rotation movement of your joystick or your flight sim pedals. Note that the toe brakes are synchronized with the brake buttons on your joystick/yoke or with the toe brakes on your flight sim pedals.

  Note: *The GLJ Model 25 addon uses differential brakes.*

- **Knobs**, **volume controls** and **dimmers** can be rotated with the mouse wheel. Turning the mouse wheel up will turn the knob clockwise (or up), turning the mouse wheel down will turn the knob counterclockwise (or down). It is also possible to rotate the knob by clicking and dragging it with the mouse. Simply click the knob with the left mouse button, drag (rotate) the knob to the desired position, and release the mouse button. Some knobs have a dual function. Turning the mouse wheel will trigger the first function while left or right clicking will trigger the second function. On some knobs, like the autopilot Turn Command Knob [2, fig. 5-46], left clicking the knob will return it to its center position.

- Other **clickable objects** (and **hot spots**) can be interacted with using a single left mouse click. Some objects can be actuated by turning the mouse wheel (or by clicking and dragging), like 3-position switches.

- **Tooltips** are small rectangles with useful information and instructions that appear when hovering over or clicking objects with the mouse. They are integrated to every clickable object in the cockpit and cabin. When the selected object turns blue and the tooltip is displayed, the device can usually be actuated with the mouse (the object will then turn yellow). MSFS features advanced tooltips that usually show the object's description, instructions on how to interact using the mouse, and the status or some useful data about the task being performed. Tooltips are localized in English or French (see section 2, page 10).

Important

- Several options are available in MSFS regarding how tooltips are displayed. Tooltips can also be disabled. Refer to "MSFS > Options > General Options > Accessibility > **User Interface**".
- A **wheel mouse** is required to actuate 3-position switches and knobs. Refer to "**Minimum System Requirements**" in section 2, page 1.
- In MSFS, it is sometimes possible to click objects through other objects. Collision meshes are not an exact science (see section 4, page 9).

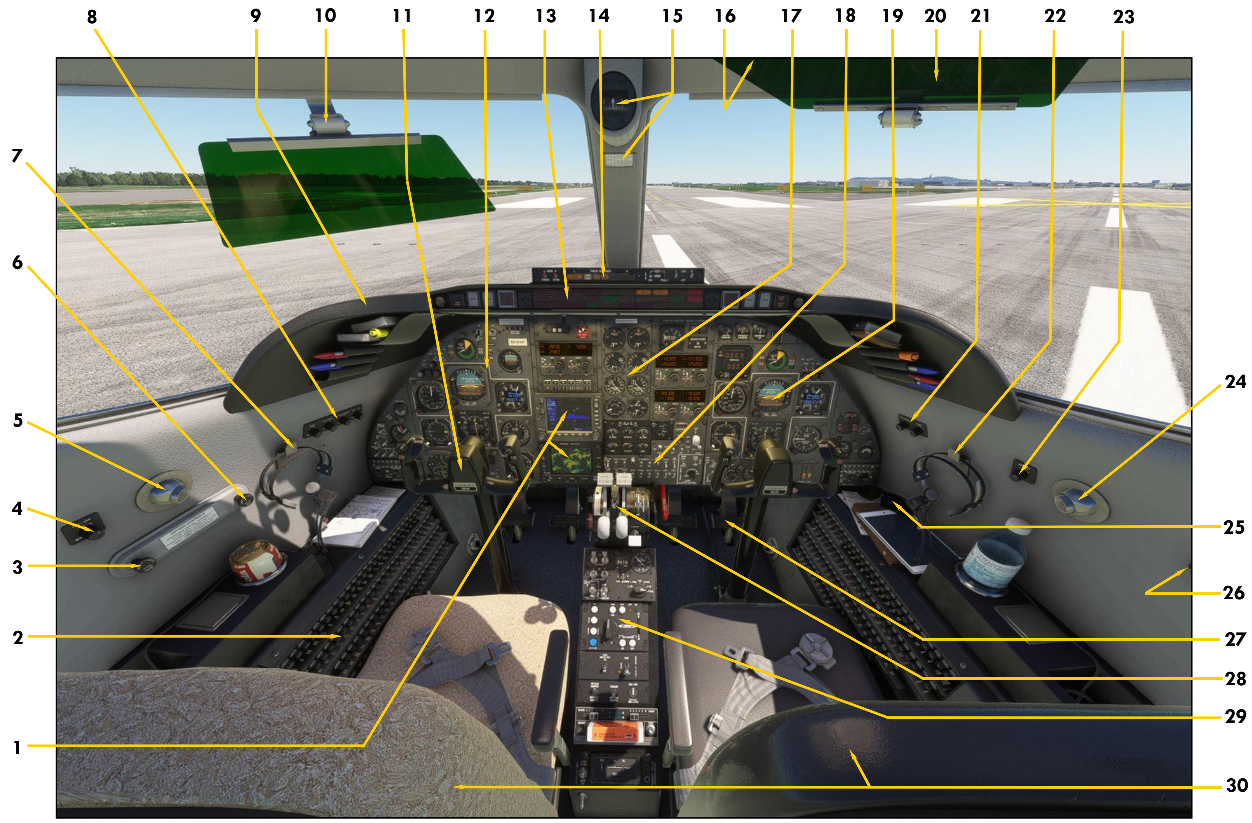


Figure 5-1

1. Generic GNS 530 and Radar
2. Breaker Panel (n/s)*
3. Passenger Oxygen Mask Valve
4. Captain's Map Light Dimmer
5. Captain's Map Light
6. Passenger Oxygen Valve
7. Headphone Hanger
   Click to show/hide crew.
8. Cockpit Light Dimmers
9. Glareshield
10. Sun Visor Hinge
    Click and drag to move around.
11. Control Column and Yoke (hidable)
12. Captain's Instrument Panel
13. Fire and Main Annunciator Panels
14. Thrust Reversers Control Panel
15. Magnetic ("Whiskey") Compass
    Click the correction card to make your pilots wear sunglasses.
16. Cockpit Ceiling Lights and Speakers (not shown)
17. Center Instrument Panel
18. Electrical Panel
19. Copilot's Instrument Panel
20. Sun Visor
21. Cockpit Light Dimmers
22. Headphone Hanger
    Click to show/hide crew.
23. Copilot's Map Light Dimmer
24. Copilot's Map Light
25. Sunglasses
    Click to make your pilots wear sunglasses.
26. Cooling Fan Control (not shown)
27. Rudder and Brake Pedals
28. Throttle Quadrant (hidable)
29. Center Pedestal
30. Pilot Seats
    Click side handle to switch seat cover.

***:** *(n/s) = Not Simulated. (p/s) = Partially simulated. Device may be animated and may also have limited functionality and a tooltip. Some features may not be available in MSFS.*

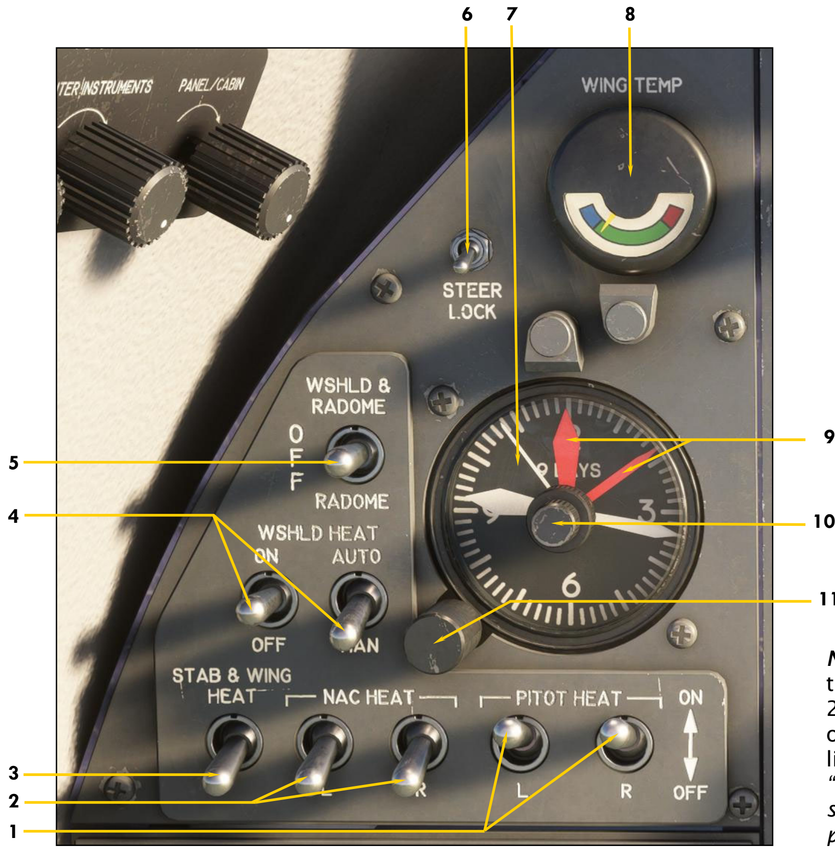
Figure 5-2

1. Audio Panel
2. Ice Protection Switches
3. Analog Clock
4. Wing Temperature Gauge
5. Directional Gyro and Gyro Drift Compensation Knob
6. Radio Magnetic Indicator (RMI)
7. Airspeed/Mach Indicator (ASI)
8. Marker Beacon Lights
9. Gyro Switches (partially simulated)
10. Flight Director Annunciators
11. Left Angle-of-Attack Indicator
12. Attitude Director Indicator (ADI)
13. Horizontal Situation Indicator (HSI)
14. Emergency Batteries Switches
15. Optional Nose Boom Icon
    Click to install/remove the nose boom.
16. Label
    Click to install/remove the "Remove Before Flight" items.
17. Anti-Skid Generator Lights
18. Tail Number Plaque
19. Standby (Horizon) Gyro
20. Standby Gyro Caging/Adjustment Knob
21. Autopilot NAV1/GPS Switch
22. Altimeter/ADDU
23. Vertical Speed Indicator (VSI)
24. Trim Indicators
25. Radio Altimeter
26. Radio Altimeter Power Switch
27. Label
    Click to install/remove the left recognition light [19, fig. 3-1].
28. Alternate Static Source Switch (n/s)

Figure 5-3

1. COM1 Monitor Switch
   *Set both COM1/COM2 Monitor Switches to **ON** [1-2] to receive on both radios.*
2. COM2 Monitor Switch
   *Set both COM1/COM2 Monitor Switches to **ON** [1-2] to receive on both radios.*
3. NAV1 Monitor Switch
   Allows the pilot to listen to navigation code identifiers.
4. NAV2 Monitor Switch
   Allows the pilot to listen to navigation code identifiers.
5. ADF1 Monitor Switch
   Allows the pilot to listen to navigation code identifiers.
6. ADF2 Monitor Switch
   Allows the pilot to listen to navigation code identifiers.
7. DME Monitor Switch
   Allows the pilot to listen to navigation code identifiers.
8. Marker Beacon Monitor Switch
   Allows the pilot to listen to navigation code identifiers.
9. HF Monitor Switch (n/s)
   This aircraft is not equipped with a short wave (HF) transceiver.
10. ADF (AM Radio) to Passengers Switch (n/s)
    Allows selected ADF (or AM radio) stations to be broadcast in the cabin. Not simulated.
11. Audio Transmit Selector Knob
    *Select **COM1** or **COM2** for radio transmit. Will turn COM1/COM2 Monitor Switches [1-2] ON/OFF accordingly for radio reception on selected unit. HF radio, interphone and passenger speakers positions are not simulated.*
12. Passenger Speakers Volume Control Knob (n/s)
13. Audio Output Selector Switch (n/s)
14. Master Volume Control Knob
    Use the mouse wheel or click and drag to adjust the volume (set to 50 % by default).

***Note:** COM1and COM2 refer to the VHF voice communication transceivers [fig. 5-18]. NAV1 and NAV2 refer to the navigation receivers [fig. 5-19]. ADF1 and ADF2 refer to the low-frequency NDB (ADF) receivers [fig. 5-20]. DME refers to the distance measuring equipment installed in this aircraft (see “DME Head,” fig. 5-38). Marker Beacon refers to the old VHF radio beacons used in conjunction with ILS [fig. 5-5]. Navigation code identifiers are broadcast in Morse. The GLJ Model 25 addon is not equipped with a short wave (HF) transceiver because it is not supported in MSFS. P.A. system and intercom are not simulated.*



Note: The ice protection system installed in the GLJ Model 25 addon is different to the one in the real aircraft due to limitations in MSFS. Refer *to “20 Series Anti-Ice System” in section 6, page 11, for a complete discussion.*

Figure 5-4

1. Pitot Heat Switches
These switches turn on heating elements in the pitot tubes and angle-of-attack vanes.
2. Engine Nacelle Heat Switches
These switches turn on heating elements and energize control valves that allow bleed air from the engine to circulate and prevent ice formation on the engine inlet components.
3. Wing and Stabilizer Heat Switch
*This switch energizes the control valve that allows bleed air to circulate and prevent ice formation on the wing leading edges. It also turns on heating elements on the stabilizer leading edges if the aircraft is in flight. Requires the Bleed Air Switch [1, fig. 5-41] to be set to **NORM** or **MAX**.*
4. Windshield Heat Switches
*These switches control the valve that allows bleed air from the engine to enter the footwarmer and defrost system and to heat the windshield if the Windshield Defog Knob [8, fig. 5-43] is **pulled out**. Requires the Bleed Air Switch [1, fig. 5-41] to be set to **NORM** or **MAX**.*
5. Anti-Ice Alcohol Switch
*This switch activates the system that supplies methyl alcohol to the windshield or radome to prevent ice formation. When the switch is set to **RADOME**, the system supplies only the radome with alcohol for 120 minutes with a full reservoir. When the switch is set to **WSHLD & RADOME**, the system supplies both the radome and the captain’s windshield with alcohol for 45 minutes with a full reservoir. Requires the Bleed Air Switch [1, fig. 5-41] to be set to **NORM** or **MAX**.*
6. Electrical Nose Wheel Steering Switch
*Click this momentary switch to engage electrical nose wheel steering. A green annunciator [14, fig. 5-32a] will illuminate on the main annunciator panel. Click the switch again to disengage electrical nose wheel steering (the annunciator will go off). This switch is spring loaded. Nose wheel steering is engaged automatically in MSFS at lower speeds. Steering is locked automatically at higher speeds. See also “**Wheel Master Button**” [2, fig. 5-51].*
7. Analog Clock
8. Wing Temperature Gauge
Blue arc: temperature below 35˚F. Green arc: above 35˚ F and below 215˚F. Red arc: above 215˚F. Make sure the needle is in the green.
9. Clock Red Hands (Bugs)
10. Clock Red Hands Setting Knobs
Outer (large) for hours, inner (small) for minutes. Red hands are used as markers (bugs) on this clock model. Stopwatch functions are available with the Copilot’s Digital Clock [fig. 5-40].
11. Time Setting Knob
Use the mouse wheel or click and drag to set. Click the right mouse button to toggle between hours and minutes.

MARKER BEACON / GYRO PANEL

Figure 5-5

1. Middle Marker* Light (yellow)
   Push to test.
2. Inner Marker* Light (white)
   The old airway or fan/z marker light is replaced by the Inner Marker Light in the simulator. Push to test.
3. Outer Marker* Light (blue)
   Push to test.
4. Captain's Auxiliary Heat Switch (n/s)
5. Marker Beacon* Sound Volume Knob
   Use the mouse wheel or click and drag to adjust the volume (set to 50 % by default).
6. Marker Beacon* Monitor Light
   *Illuminates when the Marker Beacon Monitor Switch [8, fig. 5-3] on the audio panel is **ON**.*
7. Vertical Gyro Erect Switch (p/s**)
   This switch is used to re-erect the gyroscope if the ADI tumbles and becomes temporarily unusable after experiencing strong unusual attitudes. Use this switch to cage (lock in place) the gimbals in the ADI to prevent damage to the gyroscope. Actuating this switch will disengage the autopilot.
8. Gyro Drift Compensation Switch
   Assuming the gyro operates in free mode, use the mouse wheel or click and drag to manually compensate gyro drift (refer to section 6, page 36, for more information). Moving this switch will disengage the autopilot. You can also use the Directional Gyro's Gyro Drift Compensation Knob [5, fig. 5-2] to compensate gyro drift.
9. Directional Gyro Free/Slave Switch (p/s**)
   Unsupported in MSFS. Free gyro type is assumed by default (refer to section 6, page 36, for more information). Moving this switch will disengage the autopilot. It has no other function.

**: Marker beacons are legacy VHF radio beacons normally used in conjunction with ILS to provide indications of an aircraft's position along a route. They are becoming obsolete. **: (p/s) = Partially simulated.*

Figure 5-6

1. REV (Reverse Course Mode Engaged) Annunciator
2. NAV CAPT (Course Captured) Annunciator
3. NAV ARM (Navigation Hold Mode Engaged) Annunciator
4. HDG (Heading Hold Mode Engaged) Annunciator
5. Angle-of-Attack Indicator
   - *Alive above 80 KIAS (to prevent needle oscillation when the aircraft is on the ground and the wind causes the vane to move)*
   - ***Green arc:** Safe maneuvering range*
   - ***Yellow arc:** Caution range, impending stick shaker condition*
   - ***Red line:** Stall, stick nudger condition (or system being tested)*
6. GS ARM (Glideslope Approach Mode Engaged) Annunciator
7. GS CAPT (Glideslope Captured) Annunciator
8. EXT (Course and Glideslope Captured) Annunciator
9. GA (Takeoff/Go-Around Mode Engaged) Annunciator

***Note:** Refer to section 6, page 44, for a complete discussion about the Flight Director annunciators. The angle-of-attack needle will move into the red zone when testing the stall warning system (see 14-15, fig. 5-43). The Left Angle-of-Attack Indicator is independent from the Right Angle-of-Attack Indicator.*

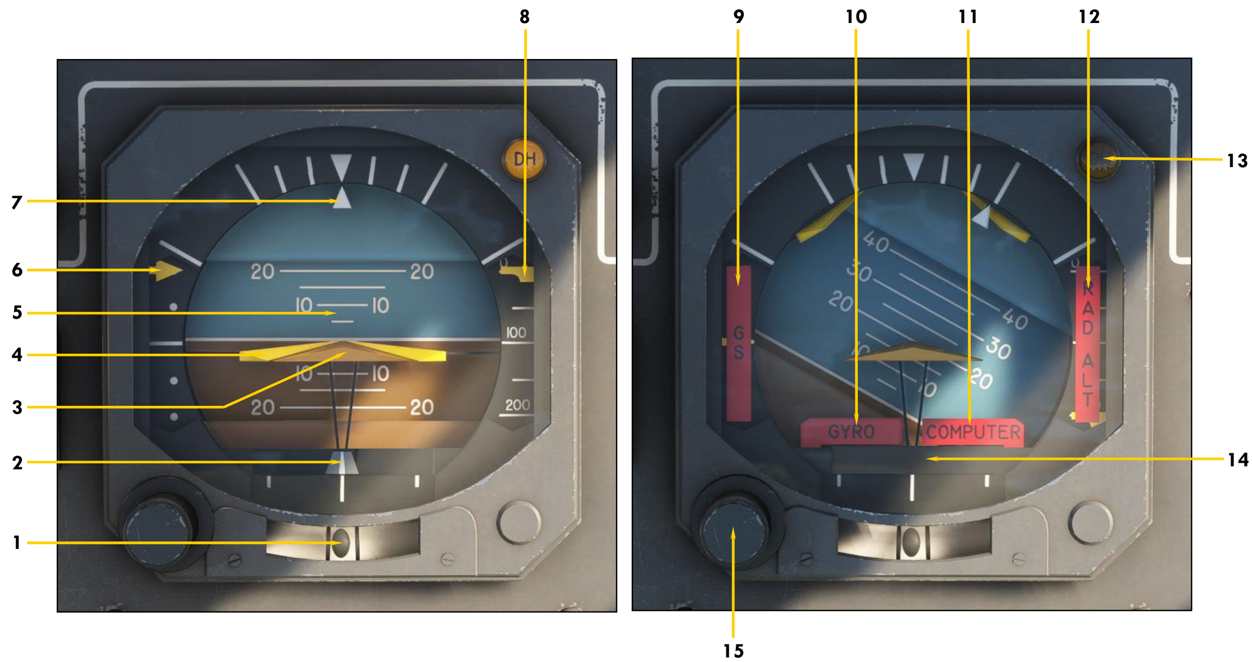


Figure 5-7

1. Inclinometer Ball Indicator
   Indicates slip/skid condition (if the turn is coordinated, the ball is centered).
2. Localizer Deviation Runway Symbol
   Repeats the HSI CDI indication [3, fig. 5-8] when a valid localizer signal is present. If the runway symbol is aligned with the middle reference bar, the aircraft is on course and aligned with the runway.
3. Fixed Airplane Symbol
   A stationary reference symbol that represents the aircraft.
4. Flight Director Command Bars
   *Maneuvering guidance - **Advisory**. Turn **ON** the Flight Director Switch [2, fig. 5-22a] to activate the command bars. The bars are parked and inactive when the Flight Director Switch is **OFF**. Refer to section 6, page 33, for a complete discussion about the flight director and the command bars.*
5. Attitude Tape (Pitch)
   Rotates for roll, moves up and down for pitch.
6. Glideslope Deviation Indicator
   Repeats the HSI glideslope deviation indication [6, fig. 5-8]. The arrow represents the glideslope. When the arrow is above the middle reference line, you are too low. When the arrow is below the middle reference line, you are too high. When the arrow is aligned with the middle reference line, you are on the glideslope.
7. Bank Indicator
   Indicates present bank angle.
8. Radio Altimeter Below 200 ft. Indicator
   *Indicates the last 200 feet above ground. See "**Radio Altimeter**", fig. 5-13.*
9. Glideslope Warning Flag
   Indicates unreliable or non-existent glideslope signal.
10. Gyro Warning Flag
    Indicates inoperative gyroscope (requires DC power).
11. Computer Warning Flag
    Indicates inoperative AFCS computer.
12. Radio Altimeter Warning Flag
    Indicates unreliable or non-existent radio altimeter signal.
13. Decision Height Annunciator
    *Indicates aircraft at or below the selected decision height. See "**Radio Altimeter**", fig. 5-13.*
14. Runway Symbol Shutter
    Indicates unreliable or non-existent localizer signal (when the runway symbol is masked).
15. Pitch Scale Adjustment Knob
    Use the mouse wheel or click and drag to rotate this knob and adjust the pitch scale (attitude tape [5]) depending on your viewing angle.

Note: *All NAV indications coupled to NAV1 or GPS, depending on the position of the NAV/GPS Switch [12, fig. 5-22b].*

Main Panel (both sides)	HORIZONTAL SITUATION INDICATOR (HSI)

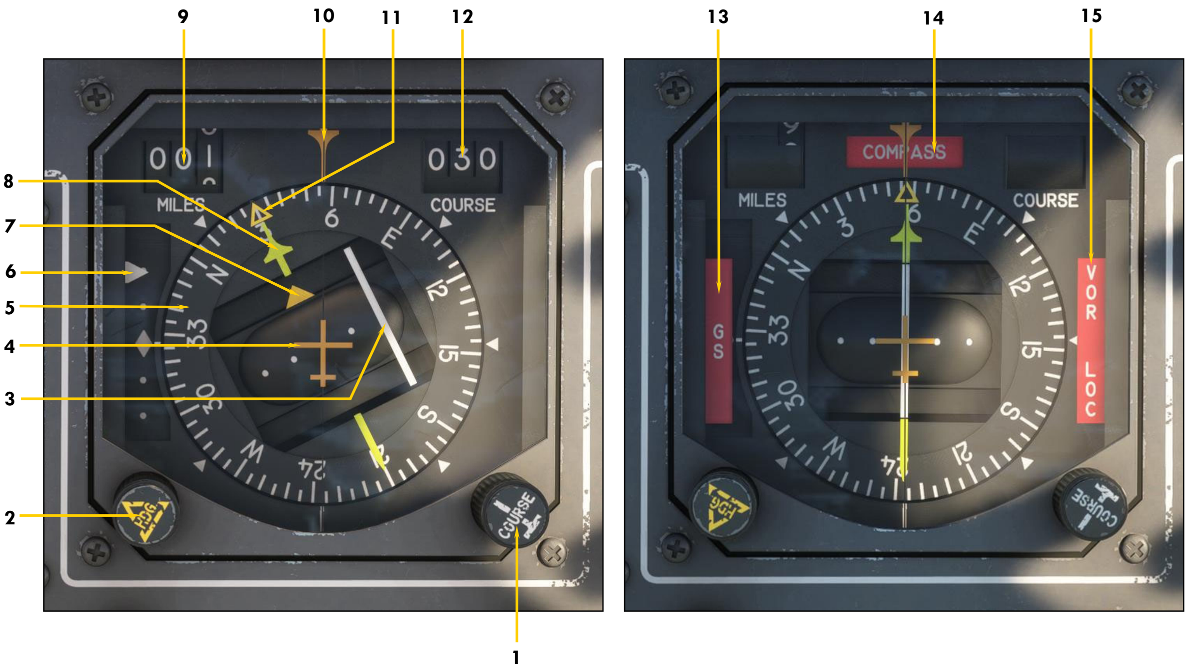


Figure 5-8

1. NAV1 Course Selector Knob
Rotating this knob rotates the NAV1 Course Needle [8] to the desired course.
2. Heading Selector Knob
Rotating this knob rotates the yellow Heading Bug [11] to the desired heading.
3. Course Deviation Indicator (CDI)
This line indicates the lateral deviation from a captured VOR/LOC course. When the bar is aligned with the NAV1 Course Needle [8], the aircraft is on course. If the line deflects to the left (one or two dots), you are too far right and must steer left to bring the aircraft back on course. If the line deflects to the right (one or two dots), you are too far left and must steer right to bring the aircraft back on course.
4. Fixed Airplane Symbol
A stationary reference symbol that represents the aircraft.
5. Heading (Compass) Card
Aircraft heading is indicated on this rotating card, under the Lubber Line [10].
6. Glideslope Deviation Indicator
When the arrow is above the middle reference line, you are too low. When the arrow is below the middle reference line, you are too high. When the arrow is aligned with the middle reference line, you are on the glideslope.
7. To/From (Yellow) Needle
Indicates whether you are flying towards or away from the VOR.
8. NAV1 Course Needle
This needle points to the VOR/LOC selected course. It is good practice to align the NAV1 Course Needle with the actual heading at the beginning of a flight and before engaging the autopilot. The NAV1 Course Needle should be aligned with the Course Deviation Indicator [3] when following a captured and valid VOR/LOC course. Used with all AP/FD NAV hold modes.
9. NAV1 DME Readout
Displays the distance to/from the selected DME station in nautical miles. Shuttered when distance information is unreliable or non-existent.
10. Lubber Line
11. Heading Bug
This yellow bug indicates the selected heading and can be rotated to any heading with the Heading Selector Knob [2]. It is good practice to align the bug with the actual aircraft heading at the beginning of a flight and before engaging the autopilot. Used with the AP/FD HDG hold mode.
12. Course Readout
Displays the VOR/LOC selected course in degrees. Shuttered when the instrument is turned off.
13. Glideslope Warning Flag
Indicates unreliable or non-existent glideslope signal.
14. Compass Warning Flag
Indicates unreliable or non-existent magnetic heading signal.
15. VOR/LOC Warning Flag
Indicates unreliable or non-existent NAV1signal.

***Note:** All NAV indications coupled to NAV1 or GPS, depending on the position of the NAV/GPS Switch [12, fig. 5-22b].*

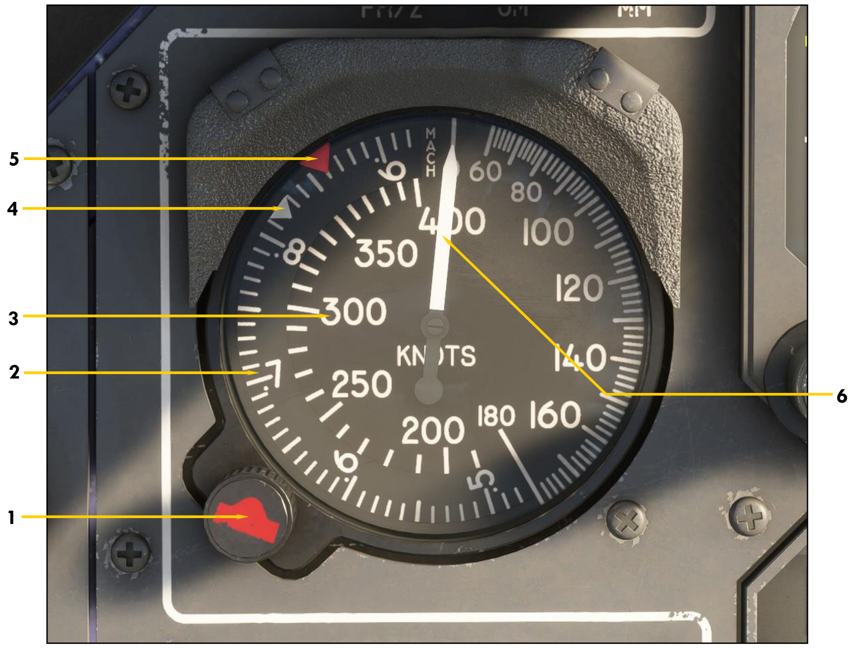


Figure 5-9

1. Reference Bug Knob
   Use the mouse wheel or click and drag to rotate the bug. Click the right mouse button to select Knots or Mach.
2. Mach Scale
3. Airspeed Scale (knots IAS)
4. Mach Bug (white)
   This bug is linked to the Mach scale and can be rotated with the Reference Bug Knob [1]. The bug is preset to Mach 0.82.
5. Airspeed Bug (red)
   This bug can be rotated with the Reference Bug Knob [1]. The bug is preset to 350 knots (IAS).
6. Indicated Air Speed Needle
   Also indicates the Mach number on the Mach scale [2].

Main Panel (both sides)

RADIO MAGNETIC INDICATOR (RMI)

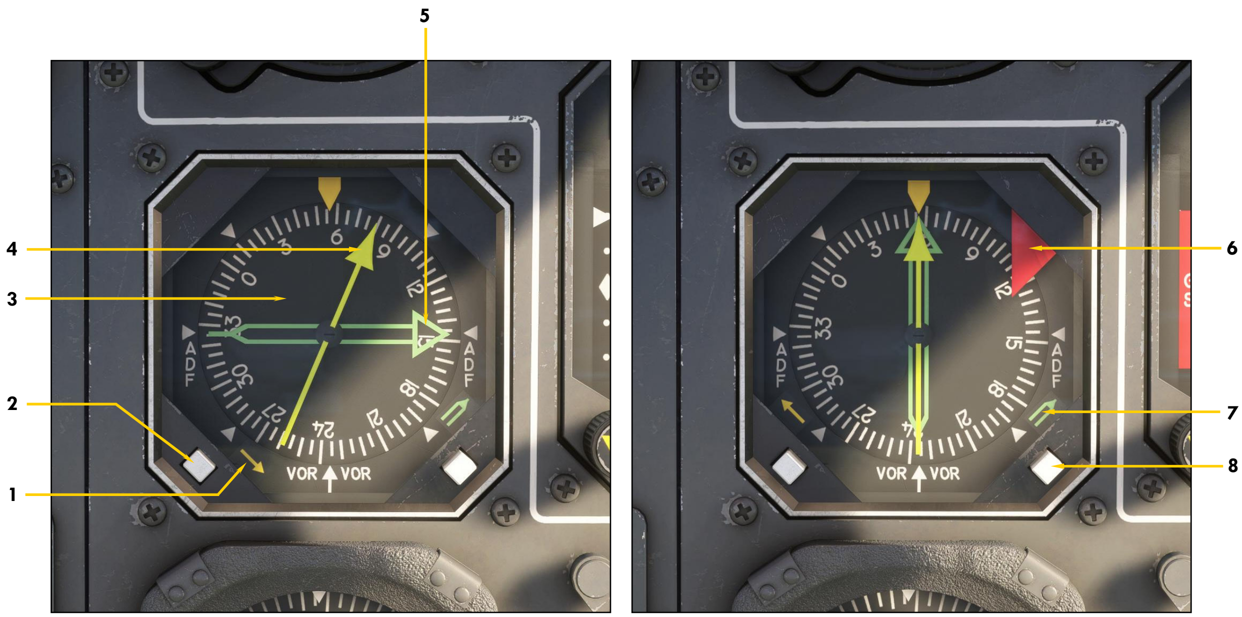
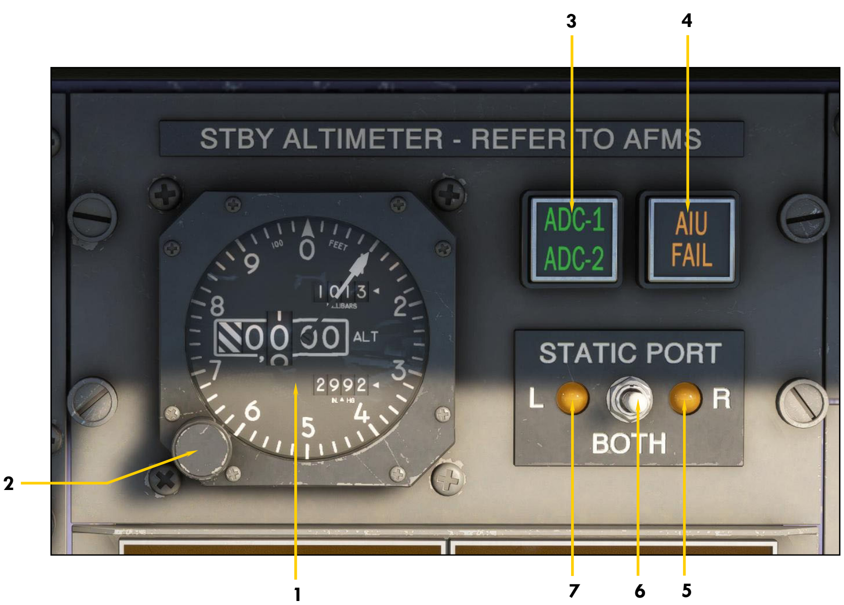


Figure 5-10

1. Yellow Needle Selection Flag
   Indicates which radio navigation signal is sent to the yellow needle [4], either ADF1 or NAV1/VOR1.
2. Yellow Needle Signal Selector Button
   This button is used to select the radio navigation signal that is sent to the yellow needle [4], either ADF1 or NAV1.
3. Compass Card
   Aircraft heading is indicated on this rotating card, below the yellow pointer.
4. Yellow Needle (ADF1 or NAV1/VOR1)
   This single needle points to the selected VOR1 or ADF1 (NDB) station. The VOR1 station is tuned on the NAV1 radio [fig. 5-19] and the ADF1 station is tuned on the ADF1 radio [fig. 5-20]. The pointer on the needle indicates the magnetic heading to the station and the tail indicates the magnetic heading away from the station. If no signal is present, the needle will point to the east (90 degrees).
5. Green Needle (ADF2 or NAV2/VOR2)
   This double needle points to the selected VOR2 or ADF2 (NDB) station. The VOR2 station is tuned on the NAV2 radio [fig. 5-19] and the ADF2 station is tuned on the ADF2 radio [fig. 5-20]. The pointer on the needle indicates the magnetic heading to the station and the tail indicates the magnetic heading away from the station. If no signal is present, the needle points to the east (90 degrees).
6. Heading Warning Flag
   Indicates unreliable or non-existent magnetic heading signal.
7. Green Needle Selection Flag
   Indicates which radio navigation signal is sent to the green needle [5], either ADF2 or NAV2.
8. Green Needle Signal Selector Button
   This button is used to select the radio navigation signal that is sent to the green needle [5], either ADF2 or NAV2.

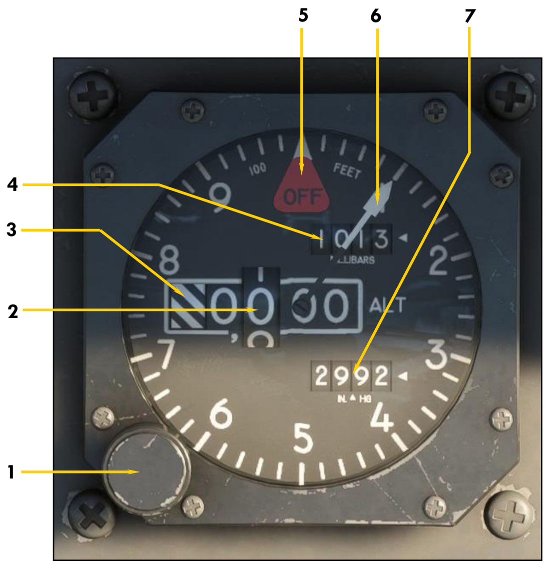
AIR DATA DISPLAY UNIT (ADDU)
Figure 5-11a

1. Barometric Setting Knob
   Right-click to toggle between inHg or Millibars.
2. Autopilot Altitude Preselector Knob
   Selects the desired altitude for the AFCS. Right-click to toggle between 1000's and 100's. Refer to section 6, page 38, for details.
3. Preselected Altitude Readout
4. Altitude Readout (Thousands, Ft.)
5. Standby Annunciator (n/s)
6. Altitude Scale (Hundreds, Ft.)
7. Altitude Alerter Annunciator
   Illuminated with aural warning if within 1000/300 feet of the selected altitude.
8. Active Annunciator (n/s)
9. Altitude Readout (Hundreds, Ft.)
10. Altitude Needle
11. Failure Indicators (n/s)
12. Barometric Setting Readout (inHg or MB)



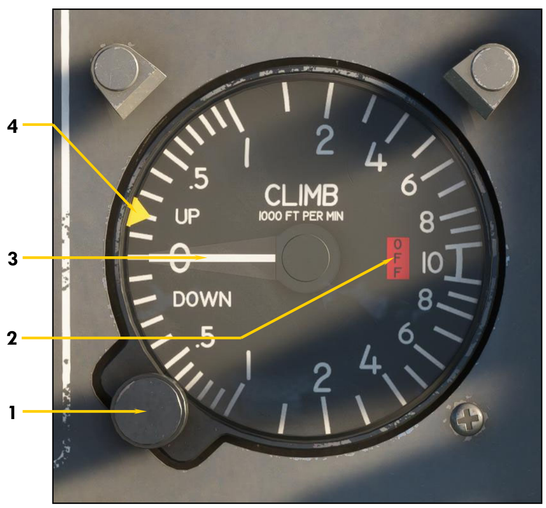
AIR DATA PANEL (p/s)
Figure 5-11b

1. Standby Altimeter
   Refer to fig. 5-11c (next page).
2. Barometric Setting Knob
3. Air Data Source Switch and Annunciator
   Selects (and displays in green) the air data source - ADDU 1 or 2 - for altitude preselect, altitude alerting, altitude reporting and the air data inputs to the AIU.
4. AIU Fail Annunciator
   Indicates that the Analog Interface Unit that converts digital data from the ADDUs to analog signals for the autopilot is not working properly.
5. Right Static Port Annunciator
   Indicates that the right static port is selected. OFF when both ports are cross coupled.
6. Static Port Selector Switch
   *Selects the active static port (left, right or both). Normally centered (**BOTH**).*
7. Left Static Port Annunciator
   Indicates that the left static port is selected. Off when both ports are cross coupled.



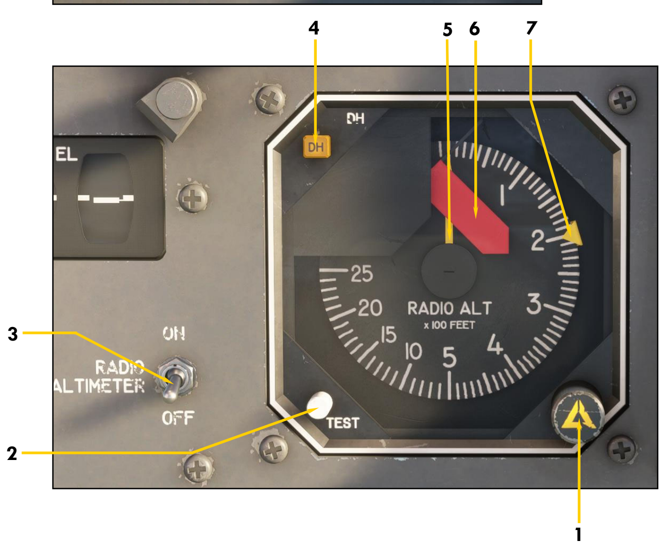
STANDBY ALTIMETER
Figure 5-11c

1. Barometric Setting Knob
2. Altitude Readout
3. Warning Strips
   Indicates altitude is below 10,000 feet.
4. Barometric Setting Readout (millibars)
5. Failure Warning Flag
6. Altitude Needle
7. Barometric Setting Readout (inHg)



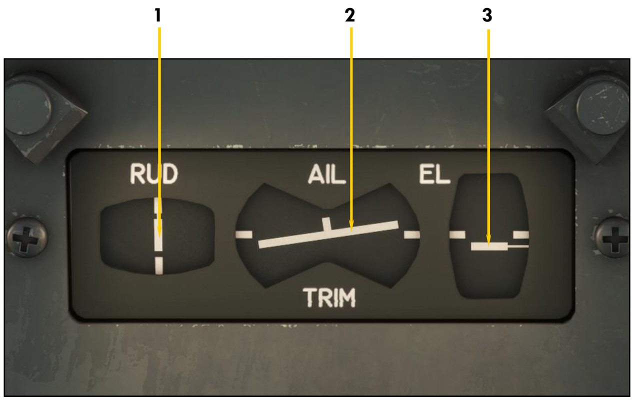
VERTICAL SPEED INDICATOR (VSI)
Figure 5-12

1. (Autopilot) Vertical Speed Selector Knob
   This is the vertical speed setting knob for the autopilot and the flight director. Refer to section 6, page 39, for more details.
2. Failure Warning Flag
3. Vertical Speed Needle
4. Autopilot Vertical Speed Bug
   This is the vertical speed command bug for the autopilot and the flight director. Refer to section 6, page 39, for more details.



RADIO ALTIMETER
Figure 5-13

1. Radio Altimeter Decision Height Selector Knob
2. Radio Altimeter Test Button
3. Radio Altimeter Power Switch
4. Radio Altimeter Decision Height Annunciator
5. Radio Altimeter Needle
6. Failure Warning Flag
7. Radio Altimeter Decision Height Bug
   Indicates the height above ground that triggers the decision height annunciators and aural alerts [4; 13, fig. 5-7; 1, fig. 5-33; 8, fig. 5-35].



TRIM INDICATORS
Figure 5-14

1. Rudder Trim Indicator
2. Aileron Trim Indicator
3. Elevator Trim Indicator
   Takeoff trim is typically one needle thickness below neutral.

Note: *Autopilot "effort indicators", like in the real aircraft, are not available in MSFS. In the simulator, this panel is essentially a repeater of the Trim Indicator Panel installed on the center pedestal [6, fig. 5-44; fig. 5-47].*

EMERGENCY BATTERY SWITCHES AND ANTI-SKID LIGHTS
Figure 5-15

1. Optional Nose Boom
   Click this icon to show/hide the optional nose boom (with test probes and vanes). The nose boom is normally installed during test flights.
2. Main Emergency Battery Switch and Light
   This switch provides power to the standby gyro [fig. 5-16], to its associated avionics and to its indicator light. An emergency power pack, consisting of two batteries, an inverter and associated circuitry, provides DC and AC power. The switch indicator light illuminates only when the emergency battery is powering the aircraft. A 3-second delay is normal before the relays are energized and the aircraft is powered again.
3. Standby Emergency Battery Switch and Light
   *This switch provides power to its indicator light and to its associated circuits, normally the gear, flaps, and spoilers. The **STBY** position is used to conserve battery power by removing power to the gear, flaps, and spoilers.*
4. Label
   Click this label to install/remove the "Remove Before Flight" items on the exterior model.
5. Anti-Skid Generator Lights
   *These four red lights should go off when the Anti-Skid Power Switch [8, fig. 5-29] is set to **ON** and AC power is available. Illumination of these lights indicates anti-skid system malfunction or under test. The Anti-Skid Test Switch is located on the test switch panel [16, fig. 5-43]. Outboard lights represent outboard wheels and inboard lights represent inboard wheels (on the main landing gear). The Anti-Skid Test Switch is spring loaded to its middle position to allow for separate testing of outboard and inboard systems when moved forward or aft.*
6. Aircraft ATC Call
   (Registration Number Plaque)
   Shows the aircraft tail number (see section 3, page 3).

STANDBY GYRO & NAV1/GPS SWITCH
Figure 5-16

1. Standby Gyro (Emergency Attitude Indicator)
   *Powered by the emergency batteries in case of a general power failure. The Emergency Battery Switch [2, fig. 5-15] or the Standby Emergency Battery Switch [3, fig. 5-15] must be set to **ON** or **STBY** in case of a power failure to provide AC power to the instrument. During normal operation, the Standby Gyro is powered by the main AC bus.*
2. Attitude Tape
   Rotates for roll, moves up and down for pitch.
3. Fixed Airplane Symbol
   A stationary reference symbol that represents the aircraft.
4. Autopilot NAV1/GPS Switch
   Selects the autopilot mode of navigation (NAV1 or GPS). Refer to section 6, page 37, for more details.
5. Bank Indicator
   Indicates present bank angle.
6. Failure Warning Flag
   Indicates instrument inoperative or gyro caged.
7. Standby Gyro Caging/Adjustment Knob
   Use the mouse wheel or click and drag to rotate this knob and adjust the pitch scale (attitude tape [2]) depending on your viewing angle. If the indicator tumbles and becomes temporarily unusable after experiencing strong unusual attitudes, right-click this knob to cage (lock in place) the gimbals to prevent damage to the gyroscope. Right-click again to uncage.

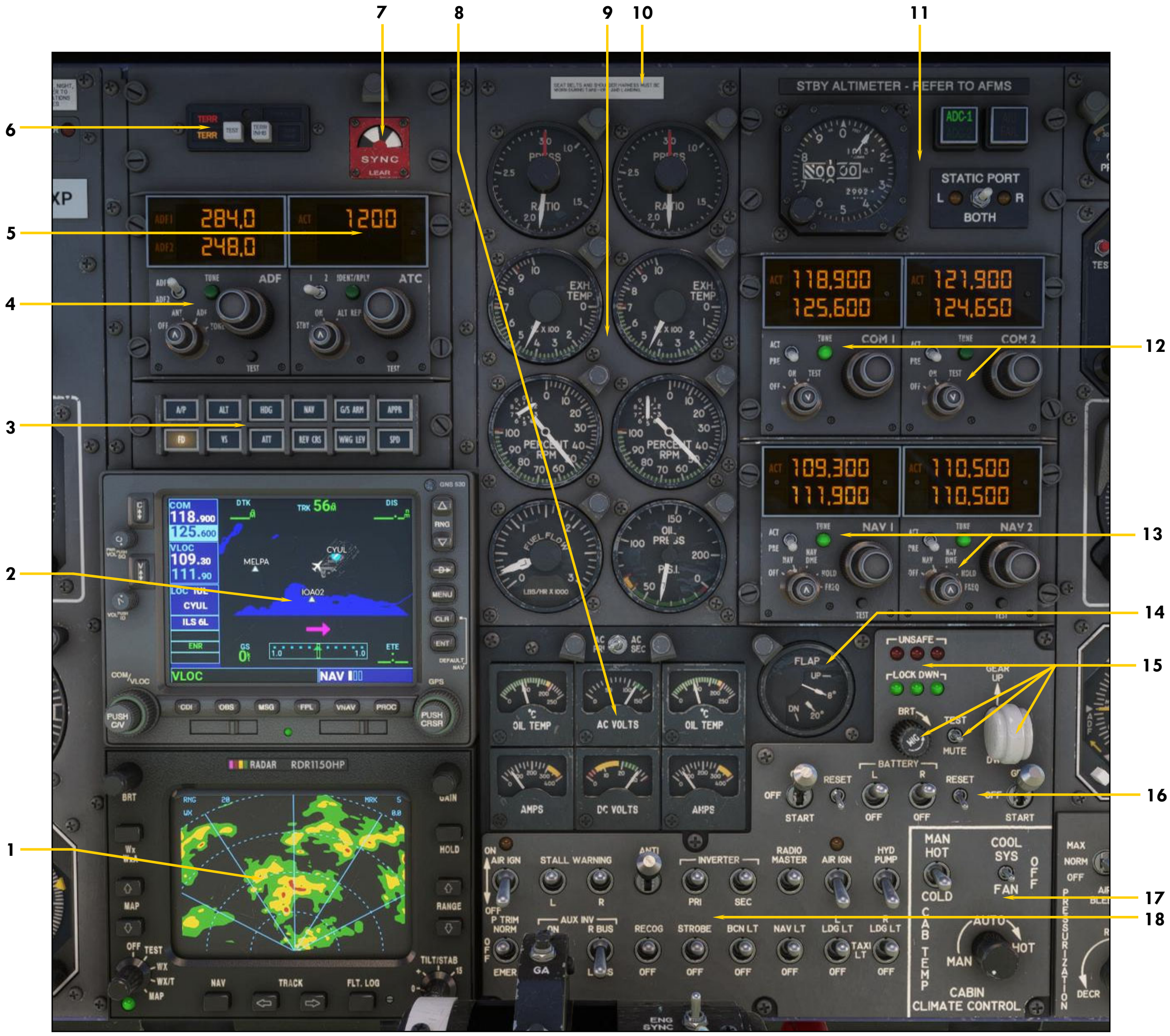


Figure 5-17

1. Radar
   The default dummy radar display can be replaced by third-party radars when available. See appendix 2. Requires DC and AC power.
2. GNS 530 (GPS/COM1/NAV1)
   The default MSFS GNS 530 can be replaced by third -party navigation systems when available. See appendix 2. Requires avionics power.
3. Autopilot/Flight Director Mode Selector Panel
4. ADF1/ADF2 Radios
5. Transponder
6. Ground Proximity Warning System
7. Engine Sync Spinner Indicator
8. Electrical Gauge Cluster
9. Engine Gauge Cluster
10. Label
    Oxygen and emergency air refill. Click to fill the tanks.
11. RVSM Air Data Panel
12. COM1/COM2 Radios
13. NAV1/NAV2 Radios
14. Flaps Position Indicator
15. Gear Controls and Lights
16. Engine Starting Panel
17. Cabin Temperature Control Panel
18. Electrical Panel

COM1/COM2 RADIOS
Figure 5-18

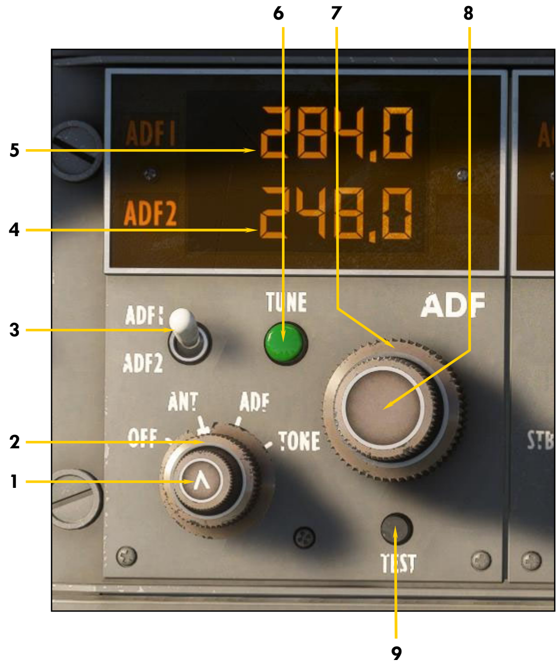
1. Volume Control Knob
   Use the mouse wheel or click and drag to adjust the volume (set to 50 % by default).
2. Function Selector Knob
   - ***OFF*** *- Turns off the radio*
   - ***ON*** *- Normal operation*
   - ***TEST*** *- Squelch disabling test,* ***COM1*** *or* ***COM2*** *radio must be selected in the audio panel [1-2, fig. 5-3]*
3. Frequency Swap Switch
   Swaps the active frequency (ACT) with the standby frequency (PRE). Return the switch to ***PRE*** *before tuning in to another standby frequency. Repeat to swap. Active frequency cannot be tuned in, only swapped with the standby frequency.*
4. Standby (PRE) Frequency Readout
5. Active (ACT) Frequency Readout
6. Transmit Select Light
   Illuminated when the ***COM1*** *or* ***COM2*** *radio is selected for transmit on the audio panel [1-2, fig. 5-3].*
7. Standby Frequency Selector Knob (Whole)
   Use the mouse wheel or click and drag to tune in to the desired frequency.
8. Standby Frequency Selector Knob (Fraction)
   Use the mouse wheel or click and drag to tune in to the desired frequency.

Note: *COM1/COM2 radios require avionics power, usually: Battery Switches [8-9, fig. 5-30]* ***ON*** *or Engine Generator Switch [6, 11, fig. 5-30]* ***GEN****, and Radio Master Switch (Avionics) [14, fig. 5-29]* ***ON****.*

NAV1/NAV2 RADIOS
Figure 5-19

1. Volume Control Knob
   Use the mouse wheel or click and drag to adjust the volume (set to 50 % by default).
2. Function Selector Knob
   - ***OFF*** *- Turns off the radio*
   - ***NAV*** *- Normal operation*
   - ***NAV DME*** *- n/s*
   - ***HOLD*** *- n/s*
   - ***FREQ*** *- Test tone, NAV1 or NAV2 radio must be selected in the audio panel [3-4, fig. 5-3]*
3. Frequency Swap Switch
   Swaps the active frequency (ACT) with the standby frequency (PRE). Return the switch to ***PRE*** *before tuning in to another standby frequency. Repeat to swap. Active frequency cannot be tuned in, only swapped with the standby frequency.*
4. Standby (PRE) Frequency Readout
5. Active (ACT) Frequency Readout
6. Tune Light
   Illuminated when a navigation signal is detected or captured.
7. Standby Frequency Selector Knob (Whole)
   Use the mouse wheel or click and drag to tune in to the desired frequency.
8. Standby Frequency Selector Knob (Fraction)
   Use the mouse wheel or click and drag to tune in to the desired frequency.
9. Test Button
   Push to test unit.

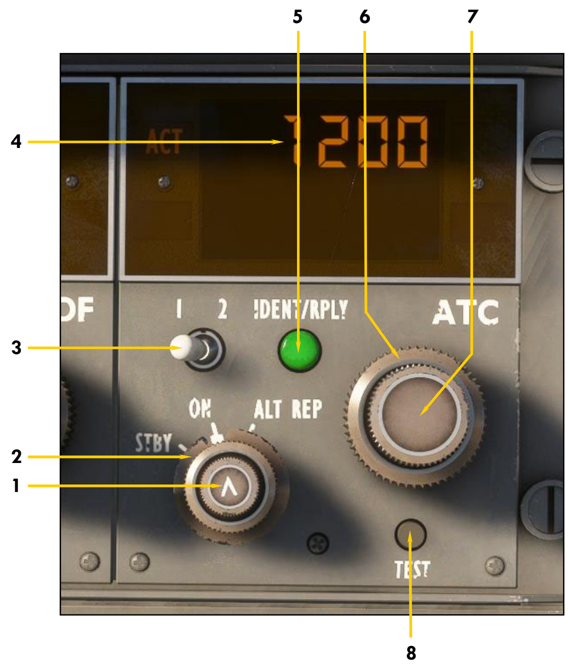
Note: *NAV1/NAV2 radios require avionics power, usually: Battery Switches [8-9, fig. 5-30]* ***ON*** *or Engine Generator Switch [6, 11, fig. 5-30]* ***GEN****, and Radio Master Switch (Avionics) [14, fig. 5-29]* ***ON****.*



ADF RADIOS
Figure 5-20

1. Volume Control Knob
   Use the mouse wheel or click and drag to adjust the volume (set to 50 % by default).
2. Function Selector Knob
   - ***OFF** - Turns off the radio*
   - ***ANT** - Switches from the loop antenna to the sense antenna for monitoring stations. RMI ADF needle will point to the east (90 degrees). Not supported in the simulator.*
   - ***ADF** - Normal operation.*
   - ***TONE** - Test tone, **ADF1** or **ADF2** radio must be selected in the audio panel [5-6, fig. 5-3]*
3. ADF Radio Selector Switch
   Selects the ADF radio to be tuned (ADF1 or ADF2).
4. ADF2 Frequency Readout
5. ADF1 Frequency Readout
6. Tune Light
   Illuminated when the ADF radios are active (navigation signal is detected and tuned in).
7. Standby Frequency Selector Knob (Whole)
   *With the ADF Radio Selector Switch [3] set to **ADF1**, use the mouse wheel or click and drag to tune in to the desired frequency for ADF1. With the ADF Radio Selector Switch [3] set to **ADF2**, use the mouse wheel or click and drag to tune in to the desired frequency for ADF2.*
8. Standby Frequency Selector Knob (Fraction)
   *With the ADF Radio Selector Switch [3] set to **ADF1**, use the mouse wheel or click and drag to tune in to the desired frequency for ADF1. With the ADF Radio Selector Switch [3] set to **ADF2**, use the mouse wheel or click and drag to tune in to the desired frequency for ADF2.*
9. Test Button
   Push to test unit. RMI ADF needle will point to the east (90 degrees).

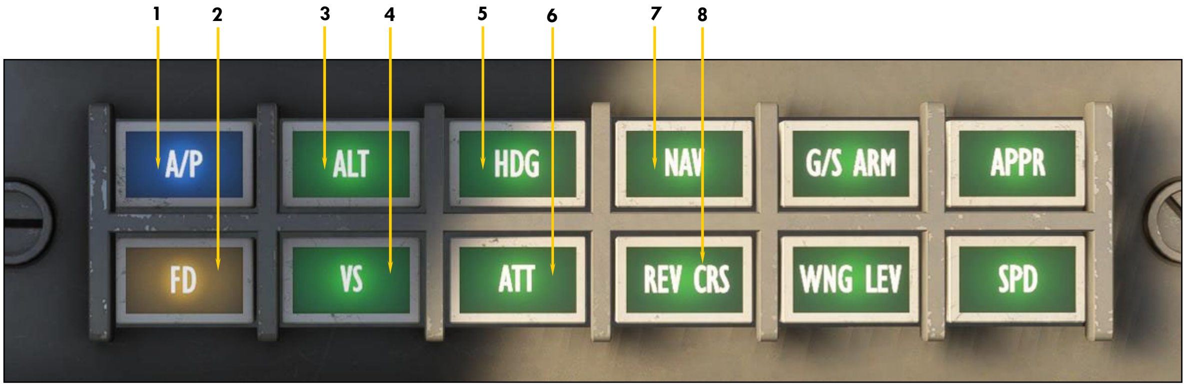
***Note:** ADF1/ADF2 radios require avionics power, usually: Battery Switches [8-9, fig. 5-30] **ON** or Engine Generator Switch [6, 11, fig. 5-30] **GEN**, and Radio Master Switch (Avionics) [14, fig. 5-29] **ON**.*



TRANSPONDER (ATC RADIO)
Figure 5-21

1. Volume Control Knob (n/s)
2. Function Selector Knob
   - ***STBY*** *- Turns off the radio*
   - ***ON*** *- Normal operation*
   - ***ALT REP*** *- Altitude Reporting mode of operation (A+C Mode) - not available with the basic transponder that comes with the simulator.*
3. Transponder Radio Selector Switch (n/s)
4. Transponder Code Readout
5. Transponder Activity Light
   Simulates transponder activity.
6. Transponder Selector Knob (First Digit)
   Use the mouse wheel or click and drag to select the first digit of the desired transponder code.
7. Transponder Selector Knob (Last Three Digit)
   Use the mouse wheel or click and drag to select the last three digits of the desired transponder code.
8. Test Button
   Push to test unit.

Note: *The transponder requires avionics power, usually: Battery Switches [8-9, fig. 5-30]* ***ON*** *or Engine Generator Switch [6, 11, fig. 5-30]* ***GEN****, and Radio Master Switch (Avionics) [14, fig. 5-29]* ***ON****.*

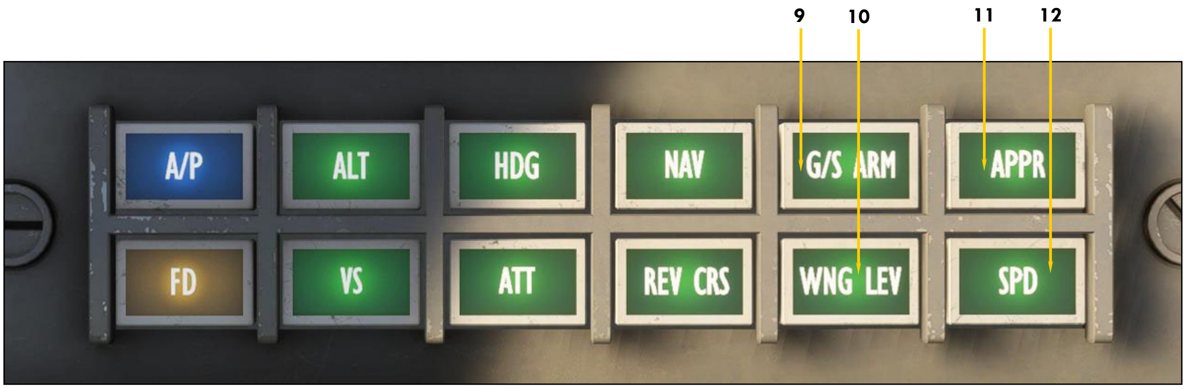


AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS) / AUTOPILOT / FLIGHT DIRECTOR MODE SELECTOR PANEL
Figure 5-22a

1. A/P (Autopilot Engage) Switch and Light
   Engages the autopilot, captures and maintains the aircraft's pitch attitude (ATT hold mode) and levels the wing (WING LEV). The autopilot assumes aircraft control.
2. Flight Director Switch and Light
   Toggles the flight director on/off. The flight director goes on automatically when some autopilot modes are engaged.
3. ALT (Altitude Hold Mode) Switch and Light
   Engages the Altitude Hold mode. If the selected altitude [2-3, fig. 5-11a] differs from the current altitude, the AFCS will calculate a path to the selected altitude at the selected vertical speed [1, 3, fig. 5-12]. The pilot is responsible for managing airspeed (unless the SPD Hold mode [12, fig. 5-22b] is engaged).
4. VS (Vertical Speed Hold Mode) Switch and Light
   This switch engages the Vertical Speed Hold mode that keeps and sets the aircraft's pitch based on the selected vertical speed. Pitch can be adjusted with the Vertical Speed Selector Knob [1, fig. 5-12].
5. HDG (Heading Hold Mode) Switch and Light
   Engages the Heading Hold mode. The autopilot will turn the airplane as necessary and fly a heading selected by the position of the Heading Bug on the HSI [2, 11, fig. 5-8].
6. ATT (Attitude Hold Mode) Switch and Light
   This switch engages the Attitude Hold mode that keeps the aircraft's pitch at the state that existed when the switch was depressed. In the simulator, the Attitude Hold mode does not keep the aircraft's roll (bank) or heading. The ATT mode is engaged by default when the autopilot is engaged.
7. NAV (Navigation/Localizer Hold Mode) Switch and Light
   Engages the Navigation Hold mode, the autopilot automatic tracking of a VOR course, GPS course, or localizer for navigation. The NAV1 radio signal will be tracked unless the NAV1/GPS Switch (see 12, fig. 5-22b) is set to GPS.
8. REV CRS (Reverse Course Approach Mode) Switch and Light
   This switch engages the autopilot's Back Course Approach mode, enabling automatic tracking of a localizer (or GPS) back course for instrument approaches. When engaged, the function is like the APPR mode, except the glideslope is disabled and the autopilot's response to a localizer signal is reversed.

Continued on next page...

Note:** The AFCS (autopilot and flight director) requires DC and avionics power, usually: Battery Switches [8-9, fig. 5-30]* ***ON *or Engine Generator Switch [6, 11, fig 5-30]* ***GEN****, and Radio Master Switch (Avionics) [14, fig 5-29]* ***ON****. Refer to section 6, page 32, for a complete discussion about the AFCS, the autopilot and the flight director. Interrelations between the different modes are summarized in section 6, pages 46-49. Please be aware that some third-party navigation systems (GPS, GNS, GTN, G1000) may interfere with the basic MSFS autopilot modes that are described above and used in the GLJ Model 25 add-on aircraft.*



AUTOMATIC FLIGHT CONTROL SYSTEM / AUTOPILOT / FLIGHT DIRECTOR MODE SELECTOR PANEL
Figure 5-22b

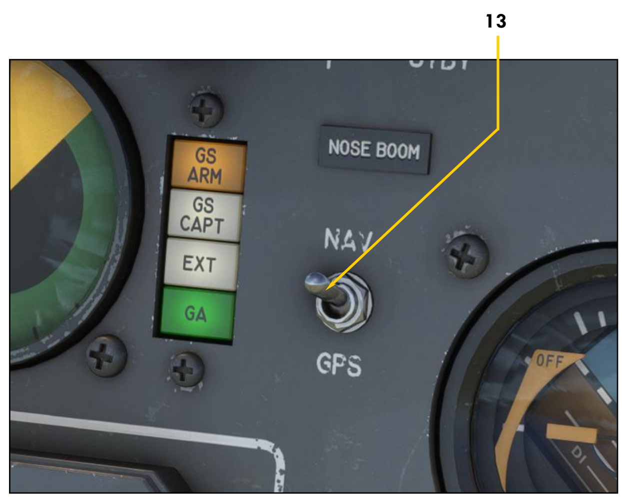
9. G/S ARM (Glideslope Tracking Mode) Switch and Light
When the G/S ARM switch is depressed, the autopilot will capture and track the ILS glideslope signal.

10. WING LEV (Wing Leveler) Switch and Light
This switch engages the Wing Leveler that keeps the aircraft's wing level. The WING LEV mode is engaged by default when the autopilot is engaged.

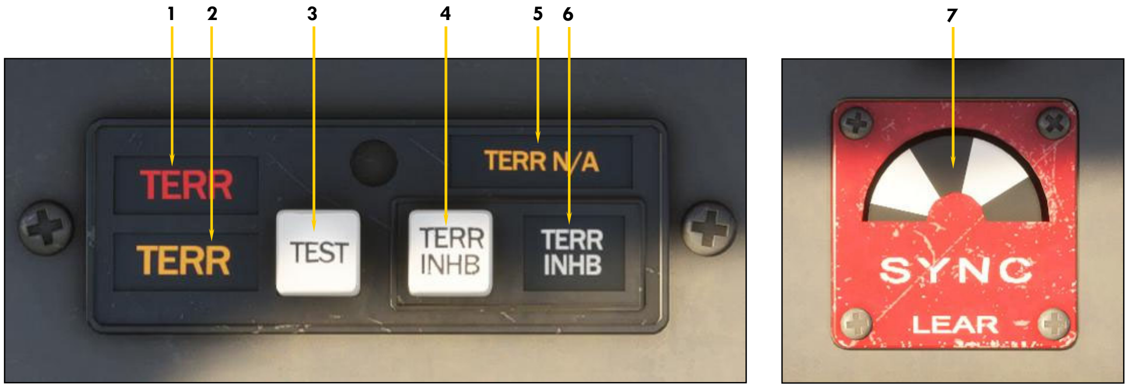
11. APPR (Coupled Approach Mode) Switch and Light
Engages the Coupled Approach mode (navigation plus glideslope) when a valid ILS signal is present on the NAV1 radio. It is recommended to engage the APPR mode only after initial localizer interception, with intercept angles shallower than 45 degrees. The coupled glideslope signal is best intercepted from below once the localizer course is established and the recommended approach speed is stabilized.

12. SPD (Speed Hold Mode) Switch and Light
This switch engages the autopilot Speed Hold mode. This mode maintains the aircraft at the indicated airspeed that existed when the switch was depressed. The SPD Hold Switch must be used at altitudes below 29,000 feet. Like in the real aircraft, above 29,000 feet, the autopilot will automatically switch to the MACH Hold mode. In the simulator, this is assumed by the autothrottle.

13. Autopilot NAV/GPS Switch
*Toggles between NAV1and GPS driving NAV1 and Autopilot. Must be set to **GPS** for GPS navigation. See section 6, page 37, for details.*



***Note:** The AFCS (autopilot and flight director) requires DC and avionics power, usually: Battery Switches [8-9, fig. 5-30] **ON** or Engine Generator Switch [6, 11, fig 5-30] **GEN**, and Radio Master Switch (Avionics) [14, fig 5-29] **ON**. Refer to section 6, page 32, for a complete discussion about the AFCS, the autopilot and the flight director. Interrelations between the different modes are summarized in section 6, pages 46-49. Please be aware that some third-party navigation systems (GPS, GNS, GTN, G1000) may interfere with the basic MSFS autopilot modes that are described above and used in the GLJ Model 25 add-on aircraft.*



GROUND PROXIMITY WARNING SYSTEM (GPWS)
ENGINE SYNCHRONIZATION INDICATOR
Figure 5-23

1. TERR (Red) Annunciator
   Terrain is very near. *This annunciator will illuminate if the airplane is at or less than 200 feet from the ground.*
2. TERR (Amber) Annunciator
   Terrain is near. *This annunciator will illuminate if the airplane is at or less than 1,000 feet from the ground.*
3. GPWS Test Button
   Activates the GPWS computer self-test.
4. TERR INHB Button
   Push this button to place the GPWS in standby mode.
5. TERR NA (Amber) Annunciator
   Terrain information not available. *This annunciator will illuminate above 2,500 feet.*
6. TERR INHB (White) Annunciator
   GPWS is in standby mode. *This annunciator will illuminate if the GPWS is on standby - or off - mode.*
7. Engine Synchronization Indicator
   This rotating disc, often called a "spinner", indicates if the engines are synchronized (running together perfectly). The disc rotates clockwise when the right engine runs faster than the left engine and counterclockwise when the left engine runs faster than the right engine. The disc stops spinning when both engine RPMs are matched.

Note (1): *The GPWS requires AC and avionics power, usually: Battery Switches [8-9, fig. 5-30]* ***ON*** *or Engine Generator Switch [6, 11, fig 5-30]* ***GEN****, Radio Master Switch (Avionics) [14, fig 5-29]* ***ON****, and either Inverter Switch [10, 12, fig 5-29]* ***ON****).*

Note (2): *MSFS does not provide front detection that would allow for a complete TAWS or enhanced GPWS. Such systems may be available with third-party addons like special gauges, GNS, GTN and radars. Only ground proximity is detected in this software version. The annunciator's illumination is based on the radio height.*

Note (3): *Original 20 Series aircraft were not equipped with a GPWS. However, various GPWS were installed in later retrofitted models, some still in service.*

Note (4): *This addon uses a custom GPWS. The GPWS parameters can be changed in the GPWS template and subtemplate located in the "Templates" and "Subtemplates" subfolders in the addon's main "Model" folder. We do not recommend editing these files unless you know exactly what you are doing. Please make backup copies of the files before making any change. Aural alerts are stored in the aircraft Wwise soundbank and cannot be modified. If you don't like how the GPWS behaves, it can be turned off by clicking the TERR INHB Button [4, above].*

Figure 5-24a

1. COM/VLOC Standby Frequency Selector Knob (Fraction) and Button
   Use the mouse wheel or click and drag to tune in to the desired COM1 or NAV1 frequency. Right-click to toggle between COM1 and VLOC (NAV1).
2. COM/VLOC Standby Frequency Selector Knob (Whole)
   Use the mouse wheel or click and drag to tune in to the desired COM1 or VLOC (NAV1) frequency.
3. VLOC VOL/ID Volume Knob and Button
   Use the mouse wheel or click and drag to adjust the NAV1 radio volume (set to 50 % by default). Right-click to test.
4. VLOC Flip-Flop (Swap) Button
   Swaps the VLOC (NAV1) active frequency with the standby frequency.
5. COM PVOWR/L/SQ Volume Knob and Button
   Use the mouse wheel or click and drag to adjust the COM1 radio volume (set to 50 % by default). Right-click to test. Note that the power switch (when the knob is turned fully counterclockwise to turn the unit OFF) is disabled in this addon version.
6. COM Flip-Flop (Swap) Button
   Swaps the COM1 active frequency with the standby frequency.
7. LCD Screen
   In this simulation, as an added feature, brightness can be adjusted with the radar screen Brightness Control Knob [6, fig. 5-26].
8. Photocell
9. Map Range Button (Zoom)
   Click the lower section to zoom in, click the upper section to zoom out.
10. Direct-To Button
11. Menu Button
12. Clear Button
13. Enter Button

Continued on next page...

Figure 5-24b

14. Page Group Selector Knob
Use the mouse wheel or click and drag to navigate between page groups.
15. Page Selector Knob and Cursor Button
Use the mouse wheel or click and drag to navigate between pages. Right-click to activate/deactivate the cursor.
16. Procedure Button
Toggles procedure edition.
17. Vertical Navigation (Terrain) Button
Toggles vertical navigation. Inoperative with the basic GNS 530 that comes with MSFS.
18. Terrain Data Card
Inoperative. May be used for some extra functions with some third-party software.
19. Flight Plan Button
Toggles flight plan edition.
20. Power LED (cards inserted)
Illuminated when unit is on and cards inserted.
21. Message Button
Checks messages.
22. OBS (Omni Bearing Selector) Button
Inoperative.
23. Navigation Data Card
Inoperative. May be used for some extra functions with some third-party software.
24. Course Deviation Indicator Button
Inoperative but used like the Autopilot NAV1/GPS Switch [13, fig. 5-22b]. Toggles between NAV1and GPS driving NAV1 and Autopilot.

Note: *The GNS 530 requires avionics power, usually: Battery Switches [8-9, fig. 5-30]* ***ON*** *or Engine Generator Switch [6, 11, fig. 5-30]* ***GEN****, and Radio Master Switch (Avionics) [14, fig. 5-29]* ***ON****. The unit is pre-configured for the basic GNS 530 that comes with MSFS. Some functionalities may not be available. Refer to appendix 2 if you want to modify the default configuration and add a third-party navigation system when available. Please be aware that some third-party navigation systems may interfere with the basic MSFS autopilot modes that are used in the GLJ Model 25 add-on aircraft.*

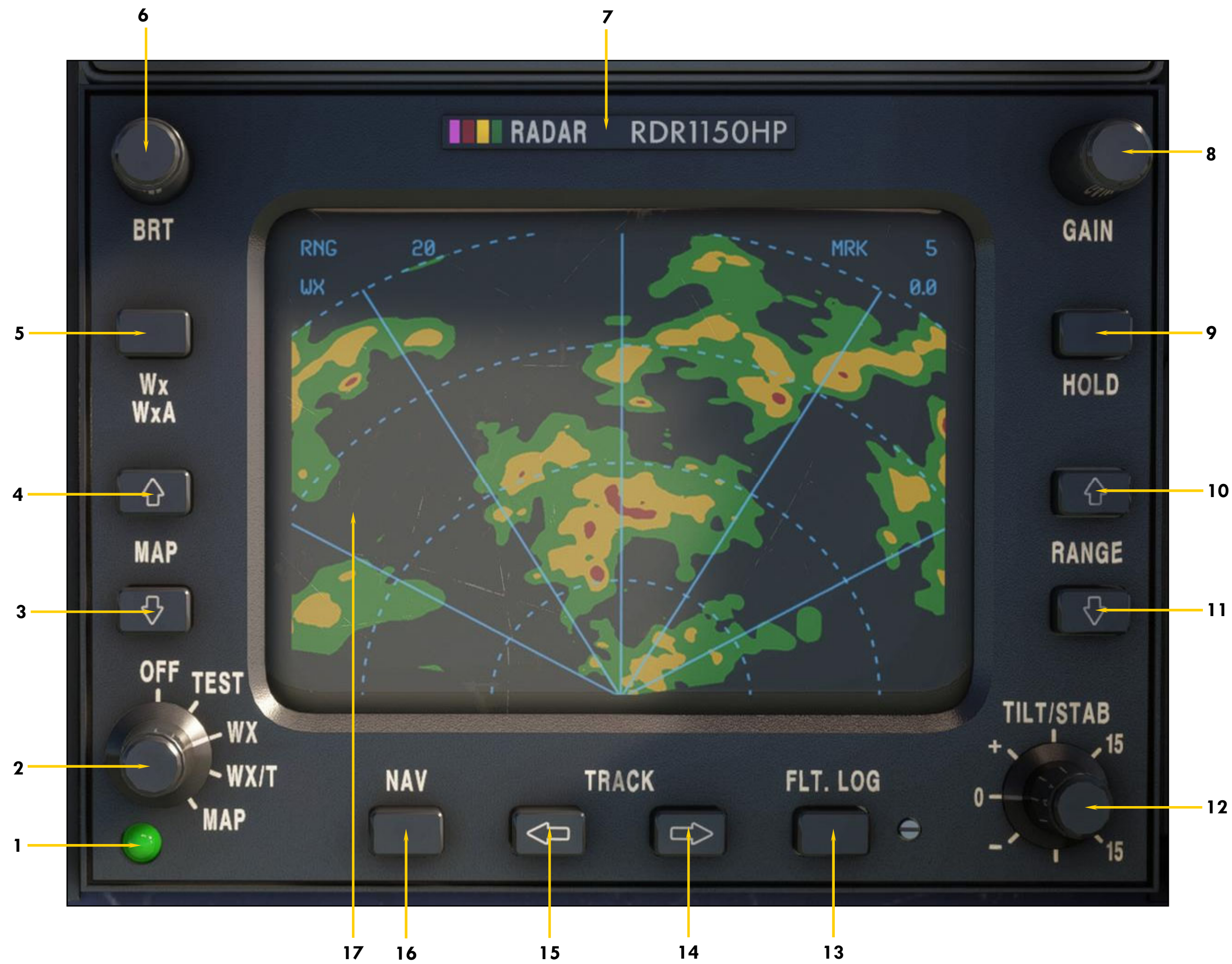


Figure 5-26

1. Power LED
2. Mode Selector Knob
   - ***OFF***
   - ***TEST***
   - ***WX*** *(precipitation)*
   - ***WX/T*** *(precipitation and turbulence*
   - ***MAP*** *(ground terrain detection)*
3. Map Down Button
4. Map Up Button
5. Wx/WxA Toggle Button
6. Brightness Control Knob
   Controls the brightness of the radar screen. Also controls the brightness of the GNS 530 screen.
7. Radar Logo
   Click the logo to display an alternate data screen with useful information about the simulation that cannot be read on the cockpit instruments.
8. Gain Control Knob
   Controls the sensitivity of the radar receiver.
9. Hold Button
10. Range Up Button
    Adjusts the displayed distance (zoom out).
11. Range Down Button
    Adjusts the displayed distance (zoom in).
12. Tilt Control Knob
    Adjusts the angle of the radar beam.
13. Flight Log Button
14. Track Up Button
15. Track Down Button
16. Nav Button
17. Radar Screen
    Brightness can be adjusted with the radar Brightness Control Knob [6].

Note: *The radar requires AC power, usually: Battery Switches [8-9, fig. 5-30]* ***ON*** *or Engine Generator Switch [6, 11, fig 5-30]* ***GEN****, and either Inverter Switch [10, 12, fig 5-29]* ***ON****). By default, the unit will show a dummy radar screen when no radar software is installed. Refer to appendix 2 if you want to modify the default configuration and add a third-party radar when available. All buttons and knobs are programmable. Optional radar software is not included.*

Figure 5-27

1. Label
   Oxygen and emergency air refill. Click to fill the tanks.
2. Left Engine Target EPR Bug
   Same for the right engine.
3. Left Engine Target EPR Selector Knob
   Same for the right engine.
4. Left Engine Pressure Ratio (EPR) Needle
   Same for the right engine.
5. Left Engine Exhaust Gas Temperature (EGT) Needle
   Same for the right engine.
6. Engine Revolutions per Minute (RPM) Vernier Needle
   Used for fine power settings. Same for the right engine.
7. Engine Revolutions per Minute (RPM) Needle
   Used for coarse power settings. Same for the right engine.
8. Left & Right Engine Oil Pressure Needles
   Requires AC power from the inverters.
9. Left & Right Engine Fuel Flow Needles

Figure 5-28

1. Primary/Secondary AC Bus Selector Switch
   *This switch selects which AC bus voltage is sent to the AC voltmeter [3]. To read the voltage from the primary AC bus, set the switch to **AC PRI**. To read the voltage from the secondary AC bus, set the switch to **AC SEC**.*
2. Right Engine Oil Temperature Needle
3. AC Voltmeter Needle
   Indicates the available AC voltage from the primary, secondary, or auxiliary inverters.
4. Left Engine Oil Temperature Needle
5. Right DC Ammeter Needle
   Indicates the load on the right generator.
6. DC Voltmeter Needle
   Indicates the available voltage on the main DC bus.
7. Left DC Ammeter Needle
   Indicates the load on the left generator.

***Note:** Refer to section 6, page 3, for more information about the electrical system.*

ELECTRICAL SWITCHES

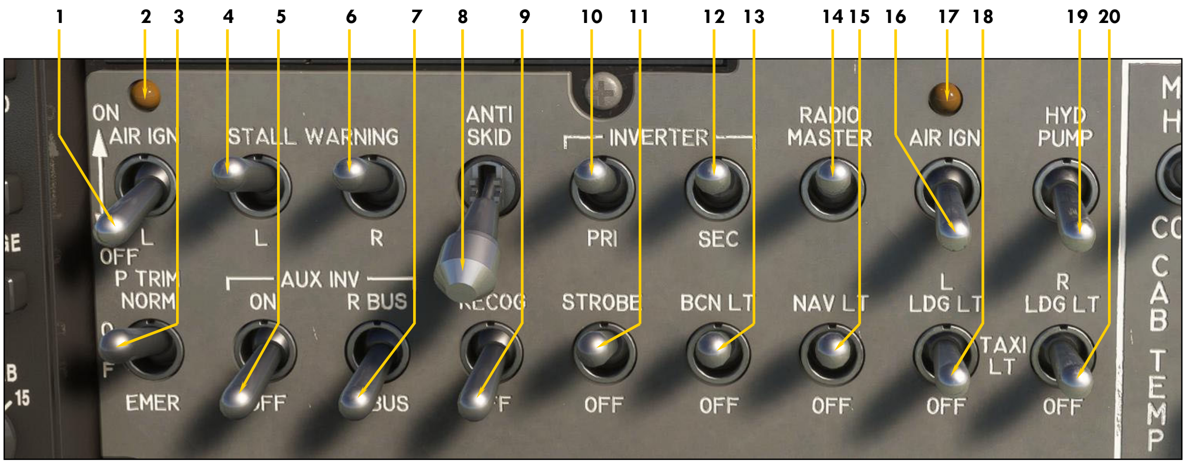


Figure 5-29

1. Left Engine Air Ignition Switch
*This switch, when set to **AIR IGN**, provides for continuous operation of the ignition system for the left engine. The switch should be set to **OFF** unless ambient conditions require ignition to stay on.*
2. Left Engine Ignition Light
This light illuminates when left air ignition is operating or the system is in a start cycle.
3. Emergency Pitch Trim Selector Switch
*This switch is normally set to **NORM**, unless emergency trim is required. The Emergency Trim Switch is on the center pedestal [2, fig. 5-47].*
4. Left Stall Warning Switch
*This switch is normally set to **ON** and the red L STALL annunciator [3, fig. 5-32a] should go off. The switch energizes the left stall warning system and the stick shaker. In the real aircraft, this switch also energizes the stick nudger/puller. In the simulation, a separate switch is provided for the stick nudger/puller on the center pedestal [21, fig. 5-43].*
5. Auxiliary Inverter Switch
The auxiliary inverter can be used in case of a failure of the main inverters. Inverters provide AC power to several aircraft systems. Inverters require battery or generator power (including emergency power in case of a general power failure).
6. Right Stall Warning Switch
*This switch is normally set to **ON** and the red R STALL annunciator [6, fig. 5-32a] should go off. The switch energizes the right stall warning system.*
7. Auxiliary Inverter Bus Selector Switch
This switch can be used to select which AC bus is powered by the auxiliary inverter in case of a malfunction of one of the main inverters.
8. Anti-Skid Power Switch
*When AC power is available, set this switch to **ON** to energize the anti-skid system installed on the main landing gear. The four Anti-Skid Generator Lights [5, fig. 5-15] should go off when this switch is set to **ON** and AC power is available.*
9. Recognition Lights Switch
10. Primary Inverter Switch
Inverters provide AC power to several aircraft systems. Inverters require battery or generator power (including emergency power in case of a general power failure). This switch energizes the primary inverter that provides power to the primary AC bus.
11. Strobe Lights Switch
12. Secondary Inverter Switch
This switch energizes the secondary inverter that provides power to the secondary AC bus.
13. Rotating Beacon Lights Switch
14. Radio Master Switch (Avionics)
The avionics bus provides DC power to the navigation systems and to some flight instruments, systems, and other devices.
15. Navigation Lights Switch
16. Right Engine Air Ignition Switch
Same as 1 above, but for the right engine.
17. Right Engine Ignition Light
Same as 2 above, but for the right engine.
18. Left Taxi/Landing Light Switch
*This 3-position switch controls the intensity of the light installed on the left landing gear. Down position - **OFF**, Middle position - **Taxi Light**, Up position - **Landing Light (full intensity)**.*
19. Electric Auxiliary Hydraulic Pump Switch
*This switch, when set to **HYD PUMP**, energizes the auxiliary hydraulic pump. This pump may be used in case of a main hydraulic system failure or for operating subsystems with no engine running.*
20. Right Taxi/Landing Light Switch
Same as 18 above, but for the light installed on the right landing gear.

Note: *Refer to section 6, page 3, for more information about the electrical system, and to pages 40-41, for information about the stick nudger/puller.*

FLAPS / GEAR / ENGINE STARTER PANEL

Figure 5-30

1. Flaps Position Indicator
*Indicates the position of the flaps: **0 degrees (full up)**, **8 degrees**, **20 degrees**, **40 degrees (full down)**. An audible alert will sound if the flaps are extended beyond 25 degrees, and the landing gear is not down and locked. Requires DC power. Flaps require hydraulic power.*

2. Brightness Control Knob
Rotate to adjust the intensity (0-100 % brightness, preset to 50 % by default) of the Landing Gear Position Lights [3].

3. Landing Gear Position Lights (left, center, right)
Lights require DC power.
   - ***Red:** The indicated gear is unsafe or in transit, and/or the gear door is not closed, and/or either engine RPM is below 70 %, and/or the flaps are extended beyond 25 degrees, and the gear is not down and locked.*
   - ***Green:** The indicated gear is down and locked.*
   - ***No light:** The indicated gear is up and locked and the gear door is closed, or there is an electrical system failure.*
   - ***All lights on:** The system is being tested.*

4. Landing Gear Warning System Test Switch
*A warning horn will blow, and the three red Position Lights [3] will illuminate if the flaps are extended beyond 25 degrees, and/or either engine RPM is below 70 %, and the landing gear is not down and locked. Set this 3-position switch to **TEST** to test the gear warning system. The horn will blow, and the six red and green Position Lights [3] will illuminate. Reset the switch to **OFF** (middle position) when the test is finished. Setting the switch to **MUTE** will silence the warning horn in all conditions. Default position is **OFF**.*

5. Landing Gear Selector Switch
*Move this switch to the **GEAR UP** position to retract the landing gear. Move the switch to the **GEAR DWN** position to extend the landing gear. Requires DC power. Gear also requires hydraulic power.*

6. Right Engine Starter/Generator Switch
*Move this switch down to **START** for engine start. After the engine has started, move the switch up to **GEN** to engage the generator. Refer to section 8, page 15, for complete starting procedures.*

7. Right Engine Generator Reset Switch
This momentary switch will reset the right generator.

8. Right Battery Switch
Interconnects the right battery bus to the battery charging bus and relay.

9. Left Battery Switch
Interconnects the left battery bus to the battery charging bus and relay.

10. Left Engine Generator Reset Switch
This momentary switch will reset the left generator.

11. Left Engine Starter/Generator Switch
*Move this switch down to **START** for engine start. After the engine has started, move the switch up to **GEN** to engage the generator. Refer to section 8, page 15, for complete starting procedures.*

***Note:** Refer to section 6, page 3, for more information about the electrical system.*

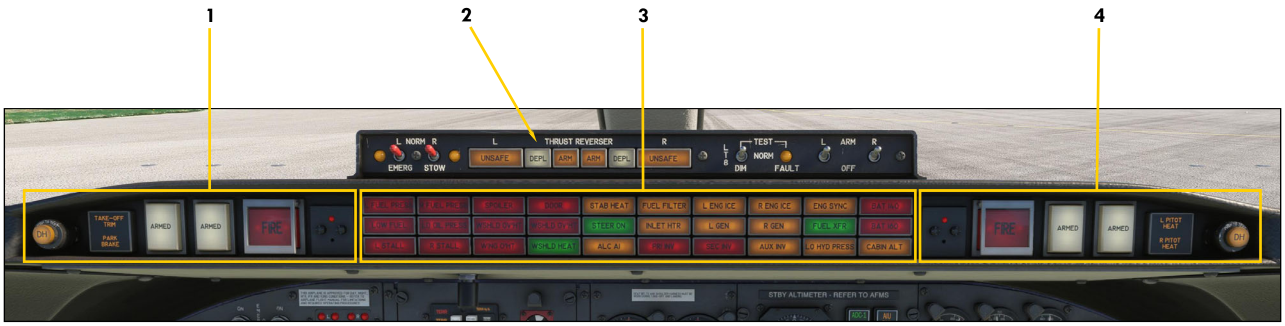


Figure 5-31

1. Captain’s Fire Panel
2. Thrust Reversers Control Box
3. Main Annunciator Panel
4. Copilot’s Fire Panel

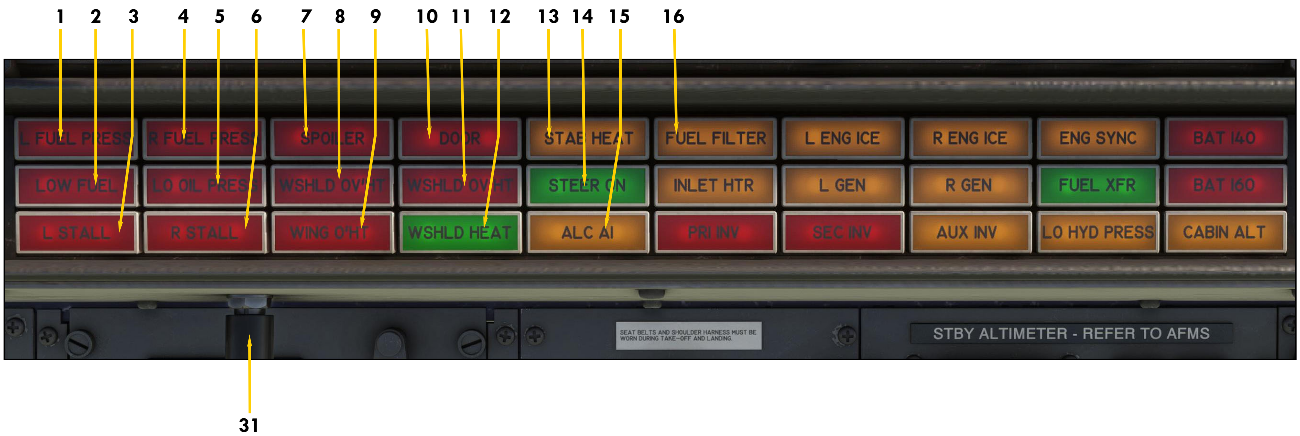


Figure 5-32a

1. Left Engine Low Fuel Pressure
*Indicates left engine fuel pressure below 10 psi. The light should extinguish when the left jet pump and/or the left standby pump are operating (refer to "**20 Series Fuel System**", section 6, page 21).*
2. Low Fuel Remaining
*This annunciator will illuminate when there is less than 50 gallons (approx. 335 pounds) of fuel in either wing tank or, if the Fuselage Tank Switch [6, fig. 5-45] is set to **XFER**, in the center fuselage tank (refer to "**20 Series Fuel System**", section 6, page 26).*
3. Left Stall
*Flashing with audible alert and stick shaker: Indicates left wing stall or left system is being tested. Steady: System has failed or Left Stall Warning Switch [4, fig. 5-29] is **OFF**.*
4. Right Engine Low Fuel Pressure
*Indicates right engine fuel pressure below 10 psi. The light should extinguish when the right jet pump and/or the right standby pump are operating (refer to "**20 Series Fuel System**", section 6, page 26).*
5. Low Oil Pressure
Indicates oil pressure below 5 psi in one or both engines.
6. Right Stall
*Flashing with audible alert and with or without stick shaker: Indicates right wing stall or right system is being tested. Steady: System has failed or Right Stall Warning Switch [6, fig. 5-29] is **OFF**.*
7. Spoilers Extended
Indicates wing spoilers out of retracted position.
8. Left Windshield Overheat
Indicates left windshield overheat (above 215˚F). *Mouseover to display the temperature. Usually occurs if the Windshield Heat Switch [4, fig. 5-4] is ON (manual or auto mode) when the aircraft is not moving, and warm conditions exist (refer to "**Windshield Heating System**", section 6, page 14).*
9. Wing Overheat
*Indicates wing anti-ice overheat (above 215˚F). Mouseover to display the temperature. Usually occurs if the Wing and Stabilizer Heat Switch [3, fig. 5-4] is **ON** when the aircraft is not moving, and warm conditions exist (refer to "**Wing Heating System**", section 6, page 18).*
10. Main (Passenger and Crew) Door Unsecured
Indicates Main Door not closed and locked. Click to open/close the door from the cockpit.
11. Right Windshield Overheat
*Indicates right windshield overheat (above 215˚F). Mouseover to display the temperature. Usually occurs if the Windshield Heat Switch [4, fig. 5-4] is **ON** (manual or auto mode) when the aircraft is not moving, and warm conditions exist (refer to "**Windshield Heating System**", section 6, page 14).*
12. Windshield Heat Applied
*Indicates windshield heat **ON** [4, fig. 5-4]. Refer to "**Windshield Heating System**", section 6, page 14.*
13. Stabilizer Heat Power Failure (n/s)
*Indicates a power failure in the leading-edge element of the stabilizer heating blanket. Won't occur in this software version. Refer to "**Horizontal Stabilizer Heating System**", section 6, page 19.*
14. Nose Wheel Steering Engaged
When illuminated, indicates electrical nose wheel steering [6, fig. 5-4] is engaged (used for taxiing). When off, indicates nose wheel steering is disengaged. Nose wheel steering is initiated automatically in MSFS when taxiing at speeds lower than approx. 45 knots. Above 45 knots, the nose gear will lock (see 6, fig. 5-4 and 2, fig. 5-51, and section 6, page 5).
15. Anti-Ice Alcohol Reservoir Empty
*Illuminates when the alcohol reservoir is empty. Mouseover to check the remaining alcohol. Click to fill reservoir with 1.75 gallons of alcohol (see "**Windshield and Radome Alcohol Anti-Ice System**", section 6, page 17).*
16. Fuel Filter Clogged (n/s)
Indicates an abnormal pressure drop across either engine fuel filter.

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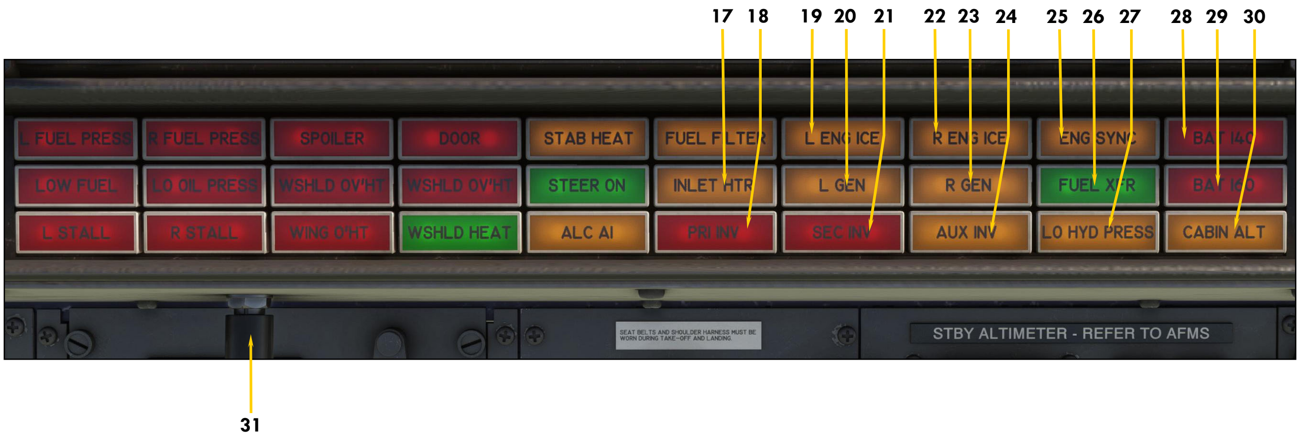


Figure 5-32b

17. Engine Inlet Heater Overheat
*Indicates an overheat condition in an engine inlet heater when the aircraft is on the ground. Mouseover to display the temperature. The annunciator illuminates when either nacelle temperature reaches 190 ˚F and extinguishes at 180 ˚F. When this happens, the Engine Nacelle Heat Switches [2, fig. 5-4] must be turned **OFF**. In flight, this annunciator is disabled by the right gear squat switch. Refer to "**Engine Anti-Ice System**", section 6, page 20.*

18. Primary Inverter Inoperative
Indicates low AC voltage from the primary inverter.

19. Left Engine Anti-Ice Warning
*Indicates insufficient bleed air pressure for adequate anti-ice protection. When the aircraft is on the ground, 70 % RPM is required to extinguish the annunciator. Refer to "**Engine Anti-Ice System**", section 6, page 20.*

20. Left Generator Inoperative
Indicates low DC voltage from the left engine generator.

21. Secondary Inverter Inoperative
Indicates low AC voltage from the secondary inverter.

22. Right Engine Anti-Ice Warning
*Indicates insufficient bleed air pressure for adequate anti-ice protection. When the aircraft is on the ground, 70 % RPM is required to extinguish the annunciator. Refer to "**Engine Anti-Ice System**", section 6, page 20.*

23. Right Generator Inoperative
Indicates low DC voltage from the right engine generator.

24. Auxiliary Inverter ON
*Indicates that the auxiliary inverter has been switched **ON** [5, fig. 5-29]. In the real aircraft, this annunciator indicates failure or low AC voltage from the auxiliary inverter if turned **ON**.*

25. Engine Sync ON
*Indicates that the Engine Sync Switch [23, fig. 5-43] is **ON** (see 7, fig. 5-23).*

26. Fuel Transfer Pump ON
*Indicates that the fuselage tank transfer pump is operating. In the simulator, this indicates that the Fuselage Tank Switch [6, fig. 5-45] is set to **XFER** and that engines are fed from the center fuselage tank (refer to "**20 Series Fuel System**", section 6, page 27).*

27. Low Hydraulic Pressure
Indicates hydraulic pressure below 1,200 psi.

28. Battery Overheat (140)
Indicates overheating battery, over 140˚ C. Mouseover to display the temperature. Do not turn on the battery switches [8-9, fig. 5-30] when the batteries are fully charged, and the generators (or the GPU) are operating to prevent the Ni-Cd batteries from overheating! The Battery Temperature Gauges [14, fig. 5-37] must be monitored constantly.

29. Battery Overheat (160)
Indicates overheating battery, over 160˚ C. Mouseover to display the temperature. See notes above [28].

30. Cabin Altitude Annunciator
Flashing: Indicates cabin altitude is above 9,000 feet. Flashing, with audible alert: Indicates cabin altitude is above 10,100 feet. Audible alert can be muted with the Horn Silence Switch [11, fig. 5-43] on the test switch panel.

31. Annunciator Test Button and Dimmer
Press to test the bulbs in all annunciators and lights. The autopilot and the flight director also have a separate test switch [11, fig. 5-43] on the test switch panel. Use the mouse wheel or click and drag to rotate the button (dimmer) to adjust the brightness of all lights and annunciators (0-100 % brightness, preset to 50 % by default).

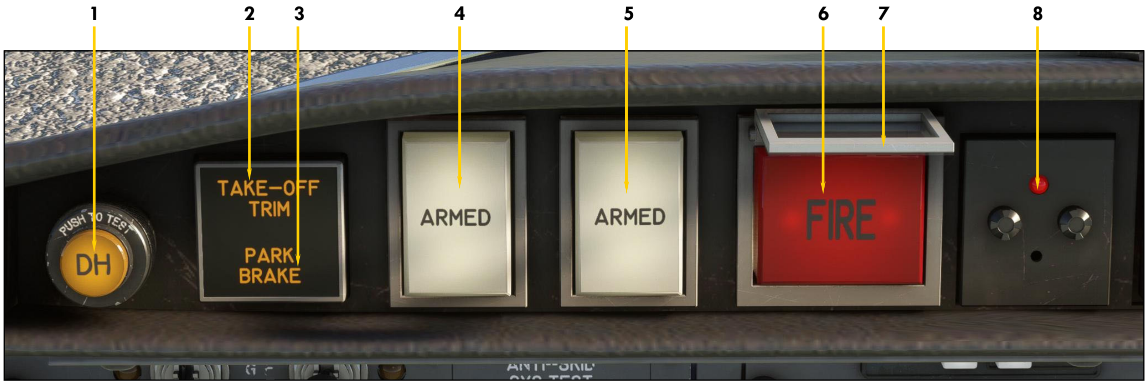
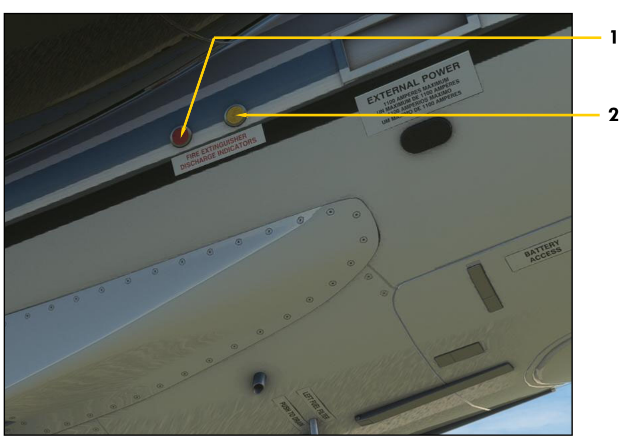


Figure 5-33

1. Decision Height Light
*Illuminates when the aircraft is at or below the selected decision height. Refer to "**Radio Altimeter**", fig. 5-13. Push to test.*
2. Takeoff Trim Alert Annunciator
*Illuminates when pitch trim is out of takeoff range. The annunciator is disabled in flight. Takeoff trim is typically one needle thickness below neutral. Refer to "**Trim Indicators**", fig. 5-14 or fig. 5-47.*
3. Parking Brake Annunciator
Indicates that the parking brake is set. Parking brake is set by pulling a lever located on the left side of the throttle quadrant [9, fig. 5-43].
4. First Fire Extinguisher Armed Annunciator and Discharge Button
Illuminates when the Left Engine Extinguisher Arming/Firewall Shutoff Button [6] has been pressed. Indicates that the first fire extinguisher bottle is ready for use. Press to discharge the first fire extinguisher bottle into the left engine nacelle.
5. Second Fire Extinguisher Armed Annunciator and Discharge Button
Illuminates when the Left Engine Extinguisher Arming/Firewall Shutoff Button [6] has been pressed. Indicates that the second fire extinguisher bottle is ready for use. Press to discharge the second fire extinguisher bottle into the left engine nacelle.
6. Left Engine Fire Alarm Annunciator and Extinguisher Arming/Firewall Shutoff Button
Indicates a fire in the left engine nacelle. Press to close the left engine nacelle firewall shutoff valves and arm both fire extinguisher bottles (the engine will shut off). Discharged bottles cannot be armed and the Fire Extinguisher Armed Annunciator [4-5] for the discharged bottle(s) will remain off.
7. Left Engine Extinguisher Arming/Firewall Shutoff Button Guard
Click to open guard.
8. Left Engine Firewall Shutoff Valve Pin Light
Indicates that the left engine nacelle firewall shutoff valves are closed if DC power is available.

***Note:** In MSFS, the two-bottle fire-extinguishing system is common to both engines. Either of two bottles of extinguishing agent can be discharged to either engine, or both bottles can be discharged to the same engine. Refer to section 9 for more details about emergency procedures in case of an engine fire.*



EXTERIOR EXTINGUISHER DISCHARGE INDICATORS
Figure 5-34

1. Thermal Discharge Indicator (Red Disc) (n/s)
Disc is ruptured (appears black) if one or both thermal relief valves have released extinguisher bottle pressure.
2. Extinguisher Bottle Discharge Indicator (Yellow Disc)
Disc is ruptured (appears black) if either extinguisher bottle is discharged.

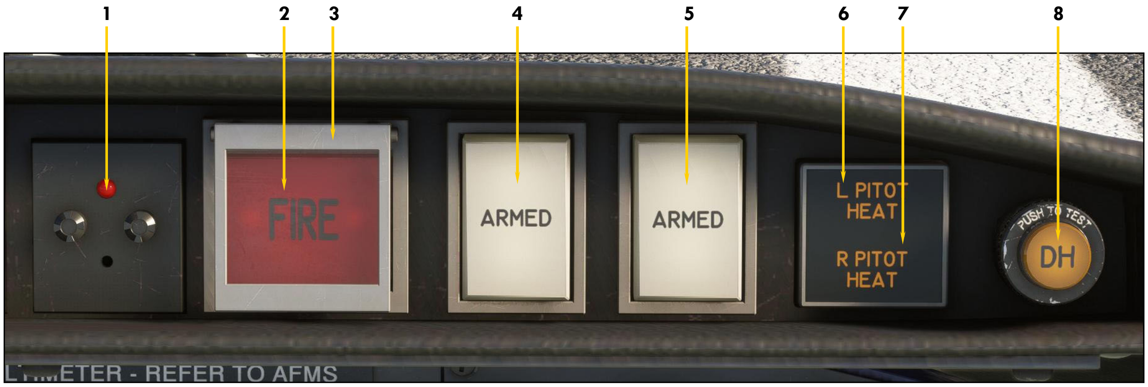


Figure 5-35

1. Right Engine Firewall Shutoff Valve Pin Light
   Indicates that the right engine nacelle firewall shutoff valves are closed if DC power is available.
2. Right Engine Fire Alarm Annunciator and Extinguisher Arming/Firewall Shutoff Button
   Indicates a fire in the right engine nacelle. Press to close the right engine nacelle firewall shutoff valves and arm both fire extinguisher bottles. Discharged bottles cannot be armed and the Fire Extinguisher Armed Annunciator [4-5] for the discharged bottle(s) will remain off.
3. Right Engine Extinguisher Arming/Firewall Shutoff Button Guard
   Click to open guard.
4. First Fire Extinguisher Armed Annunciator and Discharge Button
   Illuminates when the Right Engine Extinguisher Arming/Firewall Shutoff Button [2] has been pressed. Indicates that the first fire extinguisher bottle is ready for use. Press to discharge the first fire extinguisher bottle into the right engine nacelle.
5. Second Fire Extinguisher Armed Annunciator and Discharge Button
   Illuminates when the Right Engine Extinguisher Arming/Firewall Shutoff Button [2] has been pressed. Indicates that the second fire extinguisher bottle is ready for use. Press to discharge the second fire extinguisher bottle into the right engine nacelle.
6. Left Pitot Heat Inoperative Annunciator
   *Indicates pitot probe heaters are **OFF** [1, fig. 5-4].*
7. Right Pitot Heat Inoperative Annunciator
   *Indicates pitot probe heaters are **OFF** [1, fig. 5-4].*
8. Decision Height Light
   *Illuminates when the aircraft is at or below the selected decision height. Refer to “**Radio Altimeter**”, fig. 5-13. Push to test.*

Note: *In MSFS, the two-bottle fire-extinguishing system is common to both engines. Either of two bottles of extinguishing agent can be discharged to either engine, or both bottles can be discharged to the same engine. Refer to section 9 for more details about emergency procedures in case of an engine fire.*

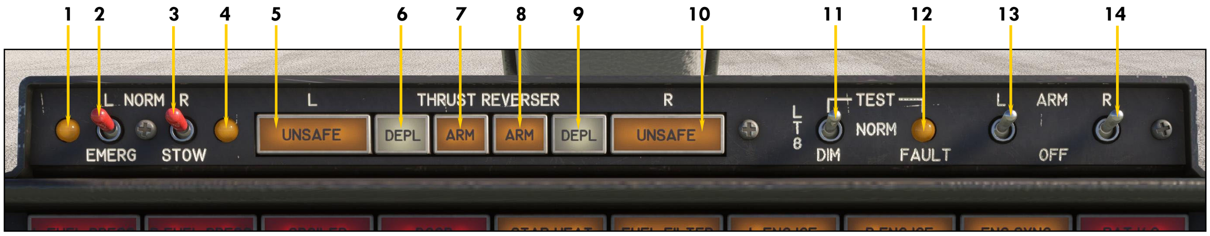


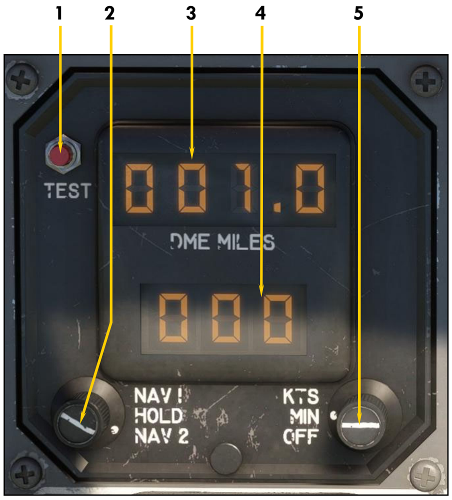
Figure 5-36

1. Left Thrust Reverser Emergency Stow Light
Illuminates during emergency stowing of the left thrust reverser, under certain conditions.
2. Left Thrust Reverser Emergency Stow Switch
*By default, this switch is set to the **NORMAL** position. In the real aircraft, setting the switch to **EMER STOW** will electrically stow the left thrust reverser if the aircraft is on the ground, if the left throttle is at **IDLE** and if the Left Thrust Reverser Arm Switch [13] is set to **OFF** (not possible in MSFS, see note below). This is used in case of a hydraulic system failure. Return the switch to **NORMAL** after the thrust reverser is stowed.*
3. Right Thrust Reverser Emergency Stow Switch
Same as [2], but for the right engine.
4. Right Thrust Reverser Emergency Stow Light
Illuminates during emergency stowing of the right thrust reverser, under certain conditions.
5. Left Thrust Reverser Unsafe Annunciator
Indicates that the left thrust reverser is in transit (not fully deployed or stowed, or in an incorrect position). Will flash for a few seconds at the first movement of the thrust reverser subthrottle.
6. Left Thrust Reverser Deployed Annunciator
Indicates that the left thrust reverser is deployed (not stowed).
7. Left Thrust Reverser Armed Annunciator
*Indicates that the left thrust reverser is armed. The left thrust reverser can be armed only if the aircraft is on the ground, if the left throttle is at **IDLE** and if the Left Thrust Reverser Emergency Stow Switch [2] is set to **NORMAL**.*
8. Right Thrust Reverser Armed Annunciator
Same as [7], but for the right engine.
9. Right Thrust Reverser Deployed Annunciator
Indicates that the right thrust reverser is deployed (not stowed).
10. Right Thrust Reverser Unsafe Annunciator
Indicates that the right thrust reverser is in transit (not fully deployed or stowed, or in an incorrect position). Will flash for a few seconds at the first movement of the thrust reverser subthrottle.
11. Thrust Reversers Control Panel Lights Test and Dim Switch
*Set this switch to **TEST** to test the bulbs in the thrust reversers control panel lights and annunciators. The T/R panel lights can be dimmed by setting the switch to **DIM**.*
12. Annunciator System Fault Light (n/s)
Indicates a fault in the thrust reversers system.
13. Left Thrust Reverser Arm Switch
*This switch arms the left thrust reverser if the aircraft is on the ground, if the left throttle is at **IDLE** and if the Left Thrust Reverser Emergency Stow Switch [2] is set to **NORMAL**. In MSFS, thrust reversers are armed by default. Setting this switch to **OFF** has no effect in the simulator (see note below).*
14. Right Thrust Reverser Arm Switch
Same as [13], but for the right engine.

***Note:** Because of current limitations in MSFS, thrust reverser controls have limited functionalities in this software version. In the simulator, thrust reversers can be deployed by pressing the "**F2**" key when the throttles are set to **IDLE,** and the aircraft is on the ground. When deployed, thrust can be reduced by pressing the "**F3**" key. Pressing the "**F1**" key will return both throttles and thrust reverser subthrottles to **IDLE**, under certain conditions. In MSFS, thrust reversers are always armed when the aircraft is on the ground. In the GLJ Model 25 addon, reverse thrust is limited to **85%** RPM, like in the real aircraft.*

Figure 5-37

1. Pressurization Panel
2. Radio Magnetic Indicator (RMI)
3. Airspeed/Mach Indicator (ASI)
4. DME Head
5. Mini Gauge Cluster & Miscellaneous Annunciators
6. Flight Director Annunciators
7. Right Angle-of-Attack Indicator
8. Attitude Director Indicator (ADI)
9. Horizontal Situation Indicator (HSI)
10. Gyro Switches (partially simulated)
11. Marker Beacon Lights
    Push to test.
12. Altimeter/ADDU
13. Vertical Speed Indicator (VSI)
14. Battery Temperature Indicators
15. Digital Clock
16. Auxiliary Heat Switch (n/s)
17. Ram Air Temperature Warning Annunciator
    Illuminates if the total air temperature is below -20˚ C or above 20˚ C.
18. Ram Air Temperature Gauge
19. H-Valve Position Indicator
20. Audio Panel



DME HEAD
Figure 5-38

1. DME Head Test Button
2. NAV1/NAV2 Selector Knob
   *Use this knob to select which DME signal to track (**NAV1** or **NAV2**). The **HOLD** position will keep the last readouts as reference only, even if other stations are tuned in on the navigation radios. This is a convenience feature only, and it differs from the real instrument that has extra circuitry for holding the last frequency.*
3. Distance Readout
   Indicates the distance to/from the selected DME station in nautical miles. NAV1 readout is repeated on the HSI (see 9, fig. 5-8).
4. Ground Speed or Estimated Time to Arrival Readout
   *Ground speed (in knots) is the closing speed to the station, not the actual aircraft ground speed. ETA (in minutes) is valid only when flying **to** the station.*
5. Ground Speed/Estimated Time to Arrival Selector Knob
   *Rotate this knob to **KTS** to select ground speed (in knots) or to **MIN** to select the estimated time of arrival (in minutes). The **OFF** position turns off the DME head.*

MINI GAUGE CLUSTER
Figure 5-39

1. Oxygen Cylinder Discharge Indicator (Green Disc, exterior view)
   Disc is ruptured (appears gray) when the oxygen cylinder located in the dorsal fin is discharged.
2. Oxygen Pressure Gauge
   *Provides a direct reading of the pressure in the oxygen cylinder located in the dorsal fin. This green cylinder provides oxygen to the passengers and crew through a network of valves and regulators. Click the label [1, fig. 5-27] to fill the cylinder. See also "**Oxygen Valves**" [2,4, fig. 5-49].*
3. Hydraulic Pressure Gauge
   *Provides a direct reading of the pressure in the hydraulic system. Refer to "**Hydraulic System**", section 6, page 4.*
4. Emergency Air Pressure Gauge
   *Provides a direct reading of the pressure in the emergency air bottle. The bottle is in the nose compartment and supplies compressed air to the emergency gear extension system. Click the label [1, fig. 5-27] to fill the air bottle. See also "**Emergency Gear Extension Lever**" [6, fig. 5-43, and section 9, page 5].*
5. Left Engine Low Oil Pressure Annunciator
   Indicates oil pressure below 5 psi in the left engine.
6. Low Hydraulic Pressure Annunciator
   Indicates hydraulic pressure below 1,200 psi.
7. Crossflow (Crossfeed) Valve Open Annunciator
   *In the simulator, this light indicates that the cross-feed valves are positioned for cross-feeding fuel from one wing tank to one or both engines (refer to "**Crossfeed**", section 6, pages 24 and 26).*
8. Right Engine Low Oil Pressure Annunciator
   Indicates oil pressure below 5 psi in the right engine.

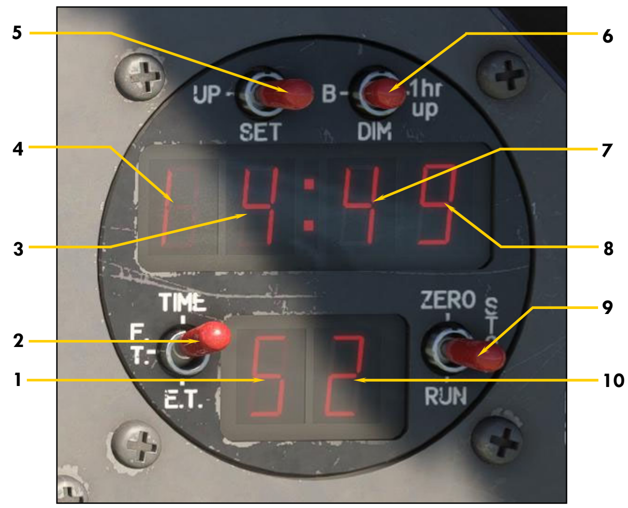
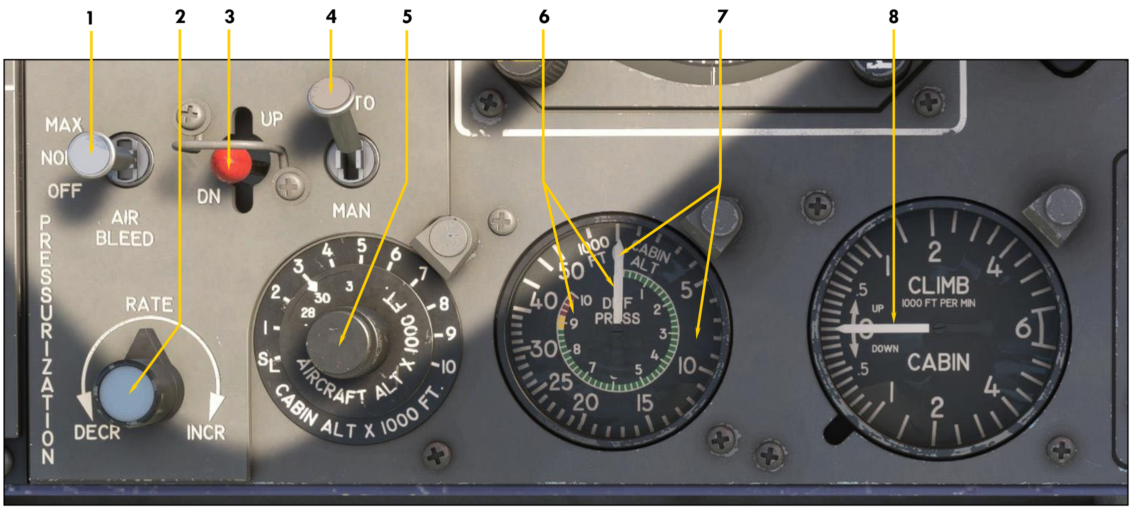


Figure 5-40

1. Tens of Seconds Readout
2. Time Switch
   - *Position 1* ***(TIME)*** *selects real time in hours, minutes, and seconds.*
   - *Position 2* ***(F.T.)*** *selects flight time, in hours, minutes and seconds of actual flight time. The flight time recorder will start as soon as the aircraft leaves the ground. It will stop when the aircraft lands and touches the ground. The flight time can be zeroed only by having aircraft power off and moving the stopwatch switch [9] to the* ***ZERO*** *position. The pilot can have total flight time on a trip with several stops if he avoids returning the fight time recorder to zero.*
   - *Position 3* ***(E.T.)*** *selects elapsed time in hours, minutes, and seconds. This is the stopwatch mode of operation. The recorder can be started, stopped, and reset to zero with the stopwatch switch [9]. It will continue to operate even if the aircraft power is off.*
3. Hours Readout
4. Tens of Hours Readout
5. Set Switch
   - *Position 1 (**UP**) is a momentary position to increment the clock one minute forward.*
   - *Position 2 (**SET**) is the normal position.*
   - *Position 3 (**D**) is a momentary position to reset seconds to zero.*
6. Dim Switch
   - *Position 1 (**B**) is the "bright" position of the display for daytime use.*
   - *Position 2 (**DIM**) is the "dimmed" position of the display for nighttime use.*
   - *Position 3 (**1hr up**) is a momentary position to increment the clock one hour ahead.*
7. Tens of Minutes Readout
8. Minutes Readout
9. Stopwatch Switch
   - *Position 1 (**ZERO**) is a momentary position to set the elapsed time recorder to zero. Use this position to reset the flight time recorder to zero when the aircraft power is off.*
   - *Position 2 (**STOP**) will stop the elapsed time recorder.*
   - *Position 3 (**RUN**) will start the elapsed time recorder.*
10. Seconds Readout

Note: *No aircraft voltage is necessary for the clock to operate. The clock has its own internal battery. Aircraft power is required to illuminate the LED display only.*



PRESSURIZATION PANEL
Figure 5-41

1. Bleed Air Switch
*Bleed air from the engine compressor section is necessary for cabin pressurization, wing/stabilizer heat, windshield heat, cabin temperature control and hydraulic reservoir pressurization. This switch should be set to **NORM** or **MAX** for the duration of the flight, but to **OFF** during ground operations (unless required).*

2. Auto Rate Control Knob
Use this knob to control the rate at which the cabin climbs or descends when in auto mode. In auto mode, the cabin controller maintains the desired rate of climb or descent until the selected cabin altitude is attained. Use the mouse wheel or click and drag to decrease or increase the rate.

3. Manual Rate “Cherry Picker” Control Switch (p/s)
Use this switch to control the rate at which the cabin climbs or descends when in manual mode. Manual mode can be used in case of a cabin controller malfunction. The switch can be used to increase or decrease the cabin altitude in either the automatic or manual mode. Please note that the manual mode is not available in MSFS. The cabin controller always maintains the desired rate of climb or descent until the selected cabin altitude is attained. Use the mouse wheel or click and drag to decrease or increase the rate.

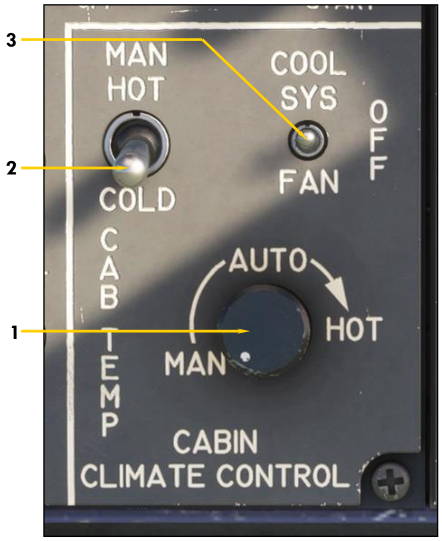
4. Pressurization Mode Switch (p/s)
*Use this switch to select the auto or manual mode of pressurization. The switch is normally set to **AUTO** (manual mode is not available in MSFS). In auto mode, the cabin controller automatically regulates cabin pressure and maintains the desired rate of climb or descent until the selected cabin altitude is attained.*

5. Target Altitude Selector Knob (Cabin Altitude Controller)
Rotating this knob aligns an index between two scales. The outer scale represents the cabin altitude, and the inner scale (seen through a window) represents the target aircraft altitude. Simply set the knob for flight plan altitudes on the inner scale before takeoff and during flight, and for the destination field elevation before descent. When in auto mode, the cabin controller regulates cabin pressure in relation to the altitude that is set on the altitude selector knob. Please note that the manual mode of operation is not available in MSFS. The cabin controller always maintains the desired rate of climb or descent until the selected cabin altitude is attained.

6. Cabin Differential Pressure Scale and Needle
Indicates the cabin differential pressure (the difference of pressure between the cabin and the outside air) in PSI. Design cabin pressure: 10 psi. Max. differential pressure: 8.9 psi.

7. Cabin Altitude Scale and Needle
Pressure inside the cabin is normally referred to as “cabin pressure altitude”.

8. Cabin Rate Needle
Indicates the cabin climb or descent rates, between 0 and 6,000 feet per minute.



CABIN TEMPERATURE CONTROL PANEL
Figure 5-42

1. Automatic Mode Cabin Temperature Control Knob
Turning the knob fully counterclockwise will result in manual temperature control. Use this knob to adjust temperature when in auto mode. Make sure to keep the H-Valve position between 1/2 and 3/4. H-Valve movement is observed on the H-Valve Position Indicator [19, fig. 5-37].
2. Manual Mode Cabin Temperature Control Switch
*Use the mouse wheel or click and drag to increase or decrease the cabin temperature if the Automatic Mode Cabin Temperature Control Knob [1] is set to **MAN** (leftmost position). Make sure to keep the H-Valve position between 1/2 and 3/4. H-Valve movement is observed on the H-Valve position indicator [19, fig. 5-37].*
3. Cooling System Selector Switch
In the real aircraft, this switch selects either the fan or the freon-type air conditioner for the cooling system.

***Note:** Cabin temperature selection will affect the H-Valve (Hot Air Valve/Heat Valve) [19, fig. 5-37] position. In the real aircraft, cabin temperature control is assumed by conditioning the engine bleed air used for pressurization. The H-Valve controls the amount of engine bleed air that passes through the heat exchanger. The cabin heating system can be controlled manually or automatically.*

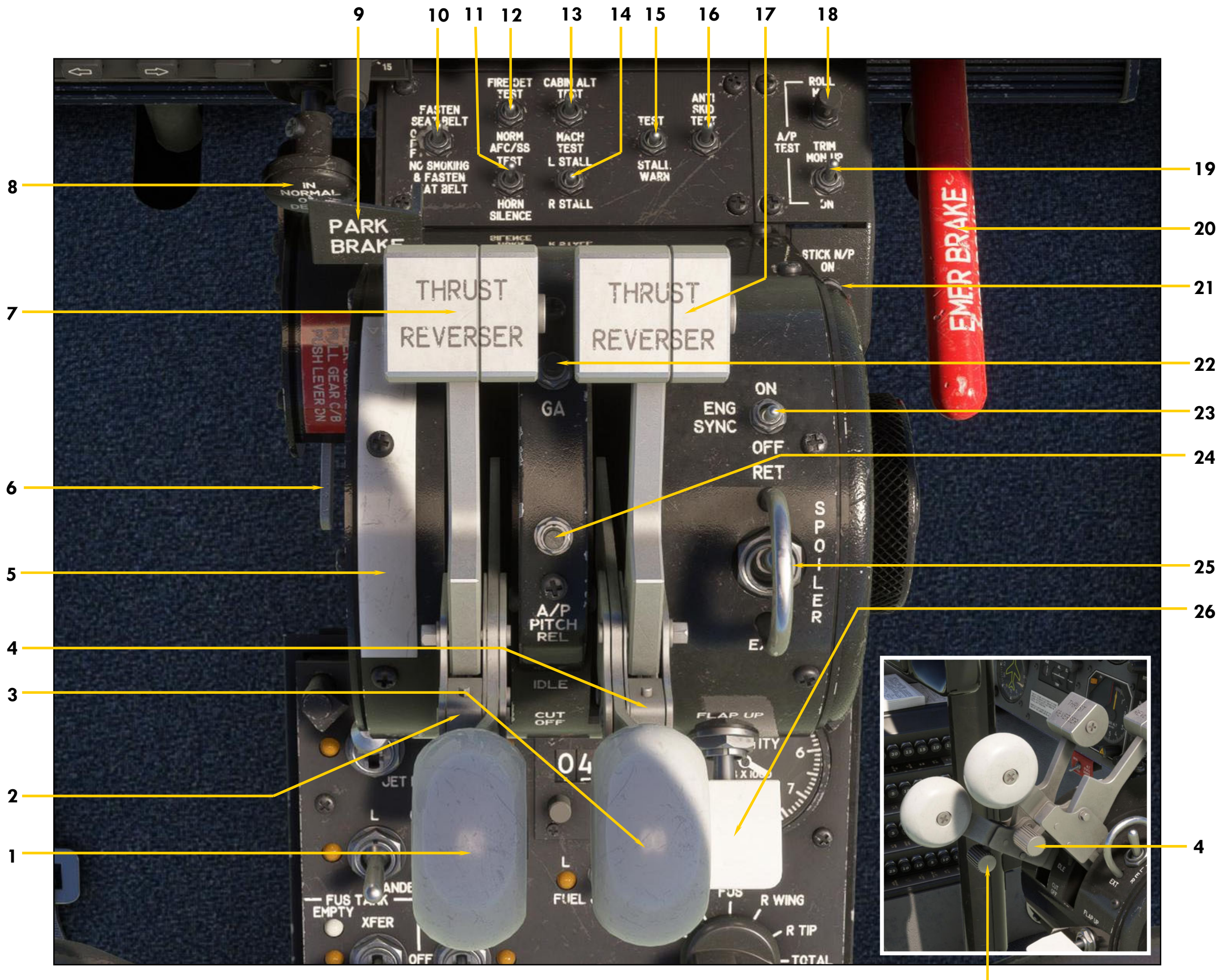


Figure 5-43

1. Left Throttle Lever
   *Actuate this lever beyond the **IDLE** ("**F1**") mark to control thrust (left engine RPM). In the real aircraft, the Left Throttle Lever will not move if the Left Throttle Release Lever [2] is not raised. The throttle can be clicked and dragged, or moved with the mouse wheel, or moved with "**F2/F3**".*
2. Left Throttle Release Lever
   *This lever must be raised to open the fuel valve and move the Left Throttle Lever from the **CUT OFF** position to the **IDLE** position or vice versa. During the engine starting sequence, this is normally done around 10 % RPM for the selected engine, like in the real aircraft. Clicking this lever after the engine has started will move the Left Throttle Lever back to **CUT OFF** and will shut off the engine (fuel valve closed).*
3. Right Throttle Lever
   Same as [1], but for the right engine.
4. Right Throttle Release Lever
   Same as [2], but for the right engine.
5. Show/Hide Throttles Icon
   Click to show/hide the throttles and the parking brake lever.
6. Emergency Gear Extension Lever
   *This lever is used to extend the landing gear in case of a hydraulic system failure. The Landing Gear Selector Switch [5, fig. 5-30] should be placed in the **DWN** position prior to using the lever. The emergency air tank [4, fig. 5-39] supplies compressed air to operate the emergency gear extension system.*
7. Left Thrust Reverser Subthrottle
   *Use this lever to deploy or stow the thrust reversers and to control engine RPM in reverse. The subthrottle can be clicked and dragged, or moved with the mouse wheel, or moved with "**F2/F3**". The aircraft must be on the ground, the thrust reversers armed [see 7-8, 13-14, fig. 5-36] and the throttle set to **IDLE** ("**F1**").*
8. Windshield Defog Knob
   *External windshield defogging is accomplished by **pulling out** the Windshield Defog Knob. This will*

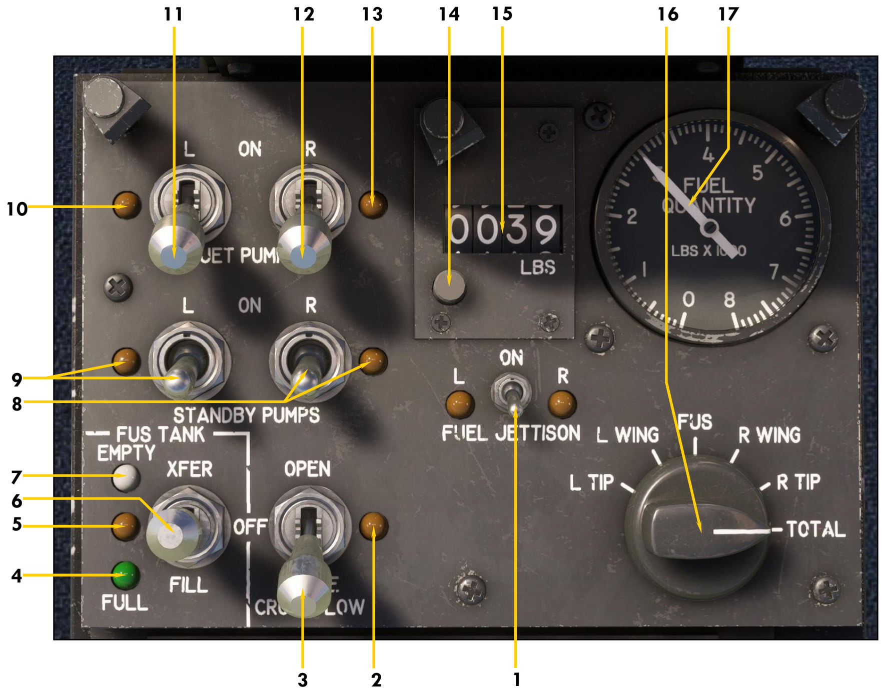
Continued on next page...

*allow hot bleed air from the engine to enter the external defog outlets and to heat the windshield if the Windshield Heat Switches [4, fig. 5-4] are properly set. When the knob is **pushed in**, hot bleed air will be directed to the crew footwarmers (normal position). Requires the Bleed Air Switch [1, fig. 5-41] to be set to **NORM** or **MAX**.*

9. Parking Brake Lever
*Parking brake is set by **pulling** this lever that traps hydraulic pressure in the brake assemblies.*
10. No Smoking/Seatbelts Switch
11. AFCSS/Horn Silence Test Switch
*In the simulator, setting this 3-position switch to **AFC/SS** will test all the bulbs in the autopilot and flight director lights and annunciators. In the real aircraft, this position is used to test the autopilot stability system. Setting this switch to **HORN SILENCE** will silence most audible alerts. Default position is **OFF** (middle position).*
12. Fire Detection Test Switch
*Set this switch to **FIRE DET TEST** to test the continuity of the sensing elements and control units of the fire detection system. This will cause the fire panel lights [fig. 5-33; 5-35] to illuminate or to flash. Return the switch to **NORM** to end the test.*
13. Cabin Alt Warning/Mach Test Switch
*When set to **CABIN ALT**, this 3-position switch is used to test the cabin altitude alert. When set to **MACH TEST**, this switch is used to test the overspeed warning system and alert, and the stick puller. The Stick Nudger/Puller Switch [21] must be set to **ON** prior to testing the stick puller. Default position is **OFF** (middle position).*
14. Stall Warning Test Vane Selector Switch
This switch is used for selecting which stall warning system (left or right) to test with the Stall Warning System Test Switch [15].
15. Stall Warning Systems Test Switch
*This switch is used in conjunction with the Vane Selector Switch [14] to test the left and right stall warning systems, the stick shaker, and the stick nudger. The Stall Warning Switches [4, 6, fig. 5-29] must be set to **ON** and AC power must be available. The Stick Nudger/Puller Switch [21] must be set to **ON** prior to testing.*
16. Anti-Skid Test Switch
*With the Anti-Skid Power Switch [8, fig. 5-29] set to **ON**, this 3-position switch is used to test the anti-skid system installed on each inboard or outboard wheel of the main landing gear, depending on the switch position. Under normal conditions, the four Anti-Skid Generator Lights [5, fig. 5-15] should be off. Testing the anti-skid systems will cause some of the lights to illuminate, each light representing one wheel. Reset the switch to its middle (**OFF**) position after performing the tests.*
17. Right Thrust Reverser Subthrottle
Same as [7], but for the right engine.
18. Autopilot Roll Monitor Test Button
*This button is used to test the autopilot disengage function when an improper signal is introduced to the roll function. The button has two positions: hold to **TEST** and a spring-loaded **OFF** position. Pushing this button to **TEST** will disengage the autopilot.*
19. Autopilot Pitch Trim Monitor Switch
*This 3-position switch is used to test the autopilot disengage function when an improper signal is introduced to the pitch function. The switch is spring-loaded to the **OFF** position. Setting this switch to **UP** or **DN** will disengage the autopilot.*
20. Emergency Brake Lever (partially simulated)
This lever will set the parking brake (no emergency brake is provided in the simulator).
21. Stick Nudger/Puller Switch
*In the simulator, this switch is used to activate or deactivate the stick nudger/puller (see section 6, pages 40-41). When the switch is set to **ON** and the autopilot is engaged, the stick nudger will be activated if a stall condition is detected, and the stick puller will be activated if an overspeed condition is detected. The switch is set to **OFF** by default.*
22. Autopilot Go-Around Button
Depressing this button disengages the autopilot pitch and roll hold modes (if the autopilot is engaged) and engages the Takeoff/Go-around mode. Throttles automatically advance to takeoff power, wings level, vertical speed is set to 4,000 fpm, and the flight director indicates takeoff pitch. The TO/GA mode can be used for takeoff, or for a go-around on landing. Releasing the button disengages the TO/GA mode.
23. Engine Sync Switch
*This switch is used to synchronize the left engine RPM with the right engine RPM. The switch must be set to **OFF** for takeoff, landing, descent, single engine operation, and below 70 % RPM. Engine synchronization for jet engines is not available in MSFS. However, we've programmed the throttles so that the right lever will stick to and follow the left lever if both throttle levers are close to one another when the switch is set to **ON**. This will synchronize both engine RPMs.*
24. Autopilot Pitch Release Button
When depressed, this button disengages the autopilot pitch hold modes. Releasing the switch engages the ATT Hold mode, maintaining the airplane's pitch attitude.
25. Spoilers Switch
*When this switch is set to **EXT**, the spoilers extend and the SPOILER annunciator [7, fig. 5-32a] illuminates on the main annunciator panel. The full extension is about 40º. Returning the switch to **RET** causes the spoilers to fully retract and the annunciator to go off. Like in the real aircraft, spoiler deployment is programmed to cause a nose down pitching moment which should be anticipated. Spoilers are electrically controlled and hydraulically actuated.*
26. Flap Selector Switch
*Click or use the mouse wheel to extend or retract the flaps. In the simulator, four flap positions are provided: **0˚ full up**, **8˚ down**, **20˚ down** and **40˚ full down**. An audible alert will sound if the flaps are extended beyond 25º, and the landing gear is not down and locked. Flaps are electrically controlled and hydraulically actuated.*

Figure 5-44

1. Fuel Control Panel
2. Flight Controller (AFCS/Autopilot)
3. Emergency Lights Panel
4. Yaw Damper System Panel
5. 8-Track Tape Player
6. Trim Indicators Panel



Note: *Refer to "20 Series Fuel System" in section 6, page 21, for a complete discussion about the fuel system.*

Figure 5-45

1. Fuel Jettison Switch and Lights
This switch is used to jettison fuel from the wing tip tanks. The lights are illuminated when the fuel jettison valves are open and will go off when the tanks are emptied.
2. Crossflow (Crossfeed) Valve Transit Light
In the simulator, this light indicates that the crossfeed valves are in transit.
3. Crossflow (Crossfeed) Switch
In the simulator, this switch controls the crossfeed valves that allow fuel from one wing tank to feed the opposite or both engines by "isolating" the other wing tank. Used in conjunction with the Standby Pump Switches [8-9].
4. Fuselage Tank Full Light
*When the Fuselage Tank Switch [6] is set to **FILL**, this green light will come on if the fuselage tank is full.*
5. Fuselage Tank Valves Transit Light
This light indicates that the fuselage tank valves are in transit.
6. Fuselage Tank Switch
*In the simulator, this switch, when set to **XFER**, is used to feed the engines from the fuselage tank when fuel in the main wing tanks is critically low. Normally set to **OFF**.*
7. Fuselage Tank Empty Light
*When the fuselage tank switch is set to **XFER**, this white light will come on if the fuselage tank is empty.*
8. Right Standby Pump Switch and Transit Light
*Controls the right boost pump. Used for cross-feeding fuel or in case of a jet pump failure. Normally **OFF**.*
9. Left Standby Pump Switch and Transit Light
*Controls the left boost pump. Used for cross-feeding fuel or in case of a jet pump failure. Normally **OFF**.*
10. Left Motive Flow Valve Transit Light
If the position of the valve does not correspond to the position of the switch, the light will come on.
11. Left Jet Pump Switch (Fuel Pump)
*Should be **ON** for the duration of the flight. Allows motive flow to the wingtip/wing tank jet pumps.*
12. Right Jet Pump Switch (Fuel Pump)
*Should be **ON** for the duration of the flight. Allows motive flow to the wingtip/wing tank jet pumps.*
13. Right Motive Flow Valve Transit Light
If the position of the valve does not correspond to the position of the switch, the light will come on.
14. Fuel Counter Reset Button
This button, when depressed, resets the Fuel Counter [15] to zero.
15. Fuel Counter
This counter indicates the total amount of fuel burned (in pounds) since the last engine start or reset. Often called a "fuel totalizer".
16. Fuel Tank Selector Knob
This selector knob enables the pilot to read the remaining fuel quantity in each of the five tanks as well as the total system quantity, on the Fuel Quantity Gauge [17].
17. Fuel Quantity Gauge
This gauge indicates the remaining fuel quantity (as weight) for the selected tank or for the total system.

FLIGHT CONTROLLER (AFCS)
Automatic Flight Control System / Autopilot

Figure 5-46

1. A/P (Autopilot Engage) Button and Light
Engages the autopilot, captures and maintains the aircraft's pitch attitude (ATT hold mode) and levels the wing (WING LEV). The autopilot assumes aircraft control.
2. Turn Command Knob
In the simulator, this knob will command bank angles (aileron trim) but will disengage any autopilot horizontal mode. Use the mouse wheel or click and drag to control the bank. Right-click the knob to center the knob and level the wing (aileron trim reset to 0 degree).
3. REV CRS (Reverse Course Approach Mode) Button and Light
The REV CRS button engages the autopilot's Back Course Approach mode, enabling automatic tracking of a localizer (or GPS) back course for instrument approaches. When engaged, the function is like the APPR mode, except the glideslope is disabled and the autopilot's response to a localizer signal is reversed.
4. NAV (Navigation Hold Mode) Button and Light
Engages the Navigation Hold mode, the autopilot automatic tracking of a VOR course, GPS course, or localizer for navigation. The NAV1 radio signal will be tracked unless the NAV1/GPS Switch (see 12, fig. 5-22b) is set to GPS.
5. HDG (Heading Hold Mode) Button and Light
Engages the Heading Hold mode. The autopilot will turn the airplane as necessary and fly a heading selected by the position of the Heading Bug on the HSI [2, 11, fig. 5-8].
6. G/S ARM (Glideslope Tracking Mode) Button and Light
When the G/S ARM button is depressed, the autopilot will capture and track the ILS glideslope signal.
7. ALT (Altitude Hold Mode) Button and Light
Engages the Altitude Hold mode. The aircraft climbs/descends to the altitude set on the Altitude Preselector [2-3, fig. 5-11a] at the rate set on the Vertical Speed Selector [1, 3, fig. 5-12].
8. Autopilot OFF Light
The amber Autopilot OFF Light is illuminated anytime the AFCS has power available, but the autopilot is not engaged.
9. Autopilot ON Light
The green Autopilot ON Light is illuminated when the autopilot is engaged with any pitch and/or roll mode engaged.
10. Pitch Command Wheel
With the autopilot engaged, click and drag to rotate the wheel and change the airplane's pitch attitude up or down (using the pitch trim).
11. Primary Yaw Damper OFF Button
*Depressing the **YAW DAMPER OFF** Button will disengage the primary yaw damper system.*
12. Primary Yaw Damper ON Button and Light
*The **YAW DAMPER ON** Button engages the primary yaw damper system which helps eliminate unwanted aircraft yaw and keeps turns coordinated.*

Note: *Refer to section 6, page 32, for a complete discussion about the AFCS, the autopilot and the flight director. Please be aware that some third-party navigation systems (GPS, GNS, GTN, G1000) may interfere with the basic MSFS autopilot modes that are described above and used in the GLJ Model 25 add-on aircraft.*

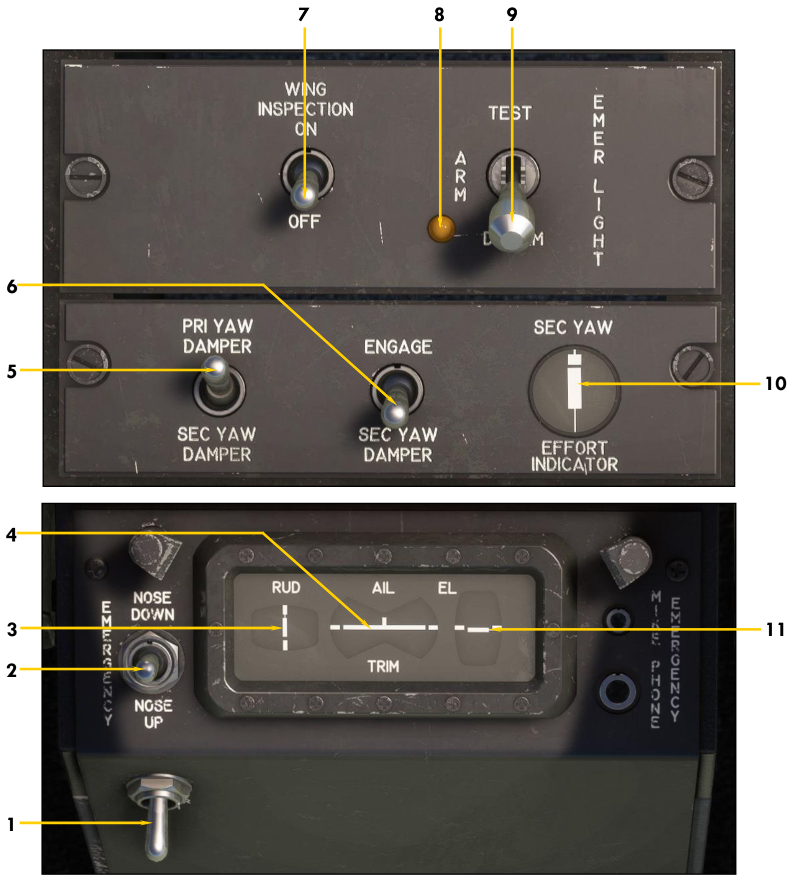
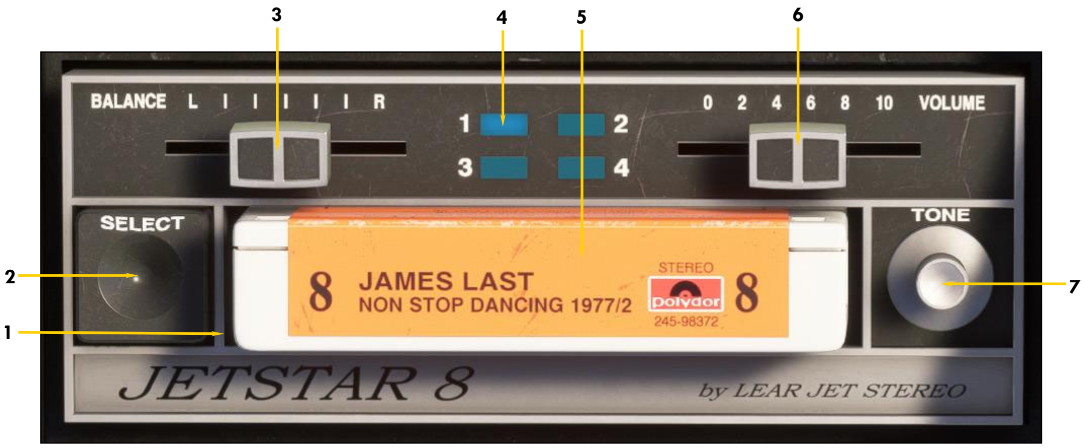


Figure 5-47

1. Rudder Trim Control Switch
This switch is used for trimming the rudder. Use the mouse wheel or click and drag to trim.
2. Emergency Pitch Trim Control Switch
*This switch is used in case of a failure of the primary trim system. The Emergency Pitch Trim Switch [3, fig. 5-29] should be set to **EMER** for the emergency pitch trim system to energize. Use the mouse wheel or click and drag to trim.*
3. Rudder Trim Indicator
4. Aileron Trim Indicator
5. Yaw Damper Selector Switch
*This switch selects the primary yaw damper system when set to **PRI YAW DAMPER** and the secondary yaw damper system when set to **SEC YAW DAMPER**. The GLJ Model 25 addon is equipped with a dual (primary and secondary) yaw damper system, like the real aircraft. Each system is completely independent and only one yaw damper system can be engaged at a time.*
6. Secondary Yaw Damper Switch
*This switch engages or disengages the secondary yaw damper system in case of an emergency. To engage the secondary yaw damper system, the Yaw Damper Selector Switch [5] must be set to **SEC YAW DAMPER**. Selecting the primary yaw damper system will disengage the secondary yaw damper system.*
7. Wing Inspection Light Switch
The GLJ Model 25 addon is equipped with a right-wing inspection light that is normally used for ice detection on the wing.
8. Emergency Lighting System OFF Warning Light
*This amber light indicates that the emergency lighting system is not armed. The Emergency Lights Switch [9] should be set to **ARM** prior to takeoff.*
9. Emergency Lights Switch
*This switch, when set to **ARM**, arms the self-powered emergency cabin lighting system that illuminates the cockpit and the cabin in case of a DC power failure. In the simulator, the system will turn on the cabin ceiling lights in case of a power failure. Set the switch to **TEST** to test the system. Cabin lights will need to be turned off manually [14, fig. 5-49].*
10. Rudder Activity Indicator
In the simulator, this indicator shows rudder activity. A yaw damper effort indicator is not available in MSFS.
11. Elevator Trim Indicator
Takeoff trim is typically one needle thickness below neutral.



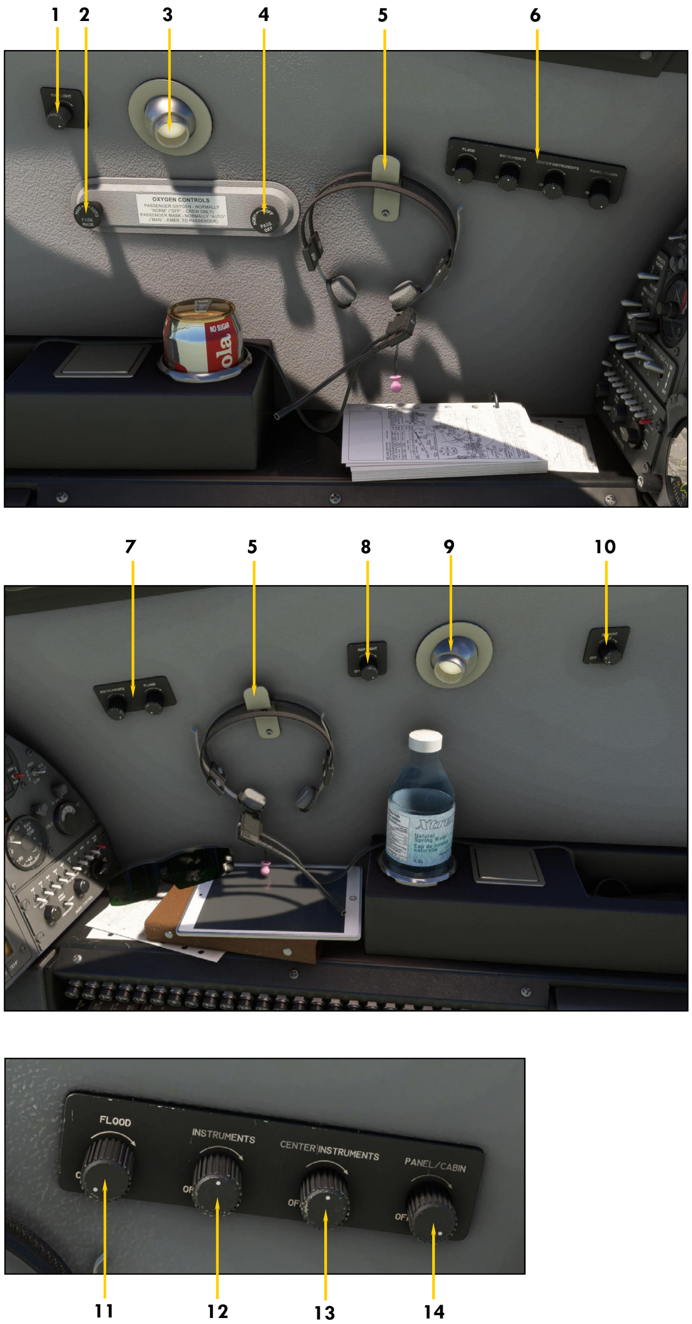
"LEAR JET STEREO"
JETSTAR 8 STEREO 8-TRACK TAPE PLAYER
A tribute to the inventive genius of Bill Lear.

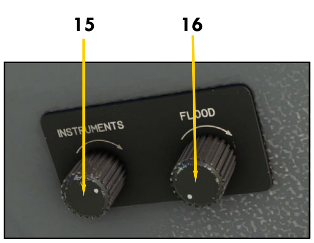
Figure 5-48

1. Cartridge Player Door (not shown)
   Click the door to open the door and insert an 8-track tape cartridge into the player. Right -click the cartridge [5, below] to eject the cartridge and close the door.
2. Track Selector Button
   Click to switch tracks. A "Lear Jet Stereo" 8-track cartridge (a format largely adopted by the music industry and major electronics and car manufacturers from the mid-1960's to the late 1970's) has four stereo tracks. On some real players, tracks can be played continuously - in a loop - or they can switch automatically to the next track when they are finished playing. When the last track is finished playing, the music can stop or the player can switch to and start playing the first track again, depending on the user's preferences. One of the main purposes of the 8-track player is to play music in a loop, continuously, without the need to rewind the tape or switch side. In the simulator, each track is played in a loop, and the pilot needs to switch tracks manually by clicking this button.
3. Balance Control Cursor
   Move this cursor to balance the sound volume between the left and right audio channels.
4. Track LED Indicators
   Indicates which stereo track is playing (1-4).
5. Stereo 8-Track Tape Cartridge
   To push the cartridge in and to play the music, use the mouse wheel (up). To pull the cartridge out and stop the music, use the mouse wheel (down). Right-click the cartridge to eject the cartridge from the player.
6. Volume Control Cursor
   Move this cursor to adjust the sound volume.
7. Tone Control Knob
   Rotate this knob to adjust the "tonal quality" (bass and treble combined) of the audio output.

Note: *The 8-Track Tape Player requires DC power. Refer to section 4, pages 3-5, for more information about the Jetstar 8 player installed in the GLJ Model 25 add-on aircraft and the pre-programmed music tracks.*

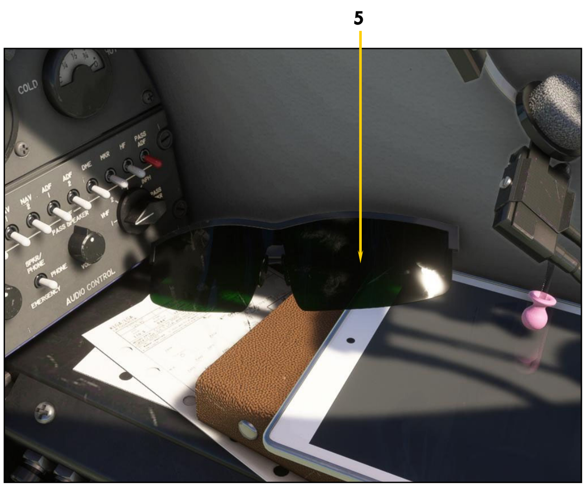
Figure 5-49

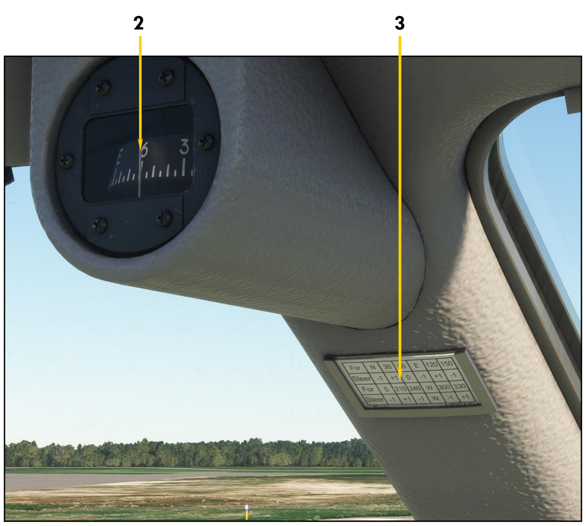




Note: *Refer to "Cockpit and Cabin Lighting System" in section 6, pages 7-10, for more details about cockpit lights and dimmers.*

1. Captain's Map Light Dimmer
   Rotate to adjust the brightness of the captain's map light (0-100 %).
2. Passenger Oxygen Mask Valve
   *This valve is normally set to **AUTO**. Rotating this valve to **MAN** with the Passenger Oxygen Flow Valve [4] set to **NORM**, oxygen will be provided to the passenger masks.*
3. Captain's Map Light
4. Passenger Oxygen Flow Valve
   *This valve, when normally set to **NORM**, will automatically deliver oxygen to the passengers if the cabin altitude reaches 14,000 feet and DC power is available. In the real aircraft, the passenger masks will be deployed, and the cabin lights will illuminate. If the valve is set to **OFF**, oxygen will not be available to the passengers. Oxygen is always provided to the crew. The crew distribution system consists of the pilot's and copilot's oxygen masks stowed on the pilot's and copilot's sidewalls. In the simulator, with only the crew being provided with oxygen, and the oxygen tank [2, fig. 5-39] filled to 1,500 psi, oxygen will last for about 120 minutes. With the crew and seven passengers being provided with oxygen, oxygen will last for about 30 minutes. Click the Label [1, fig. 5-27] to fill the oxygen tank to 1,500 psi, if needed.*
5. Headphone Hanger
   Click to show/hide the flight crew. When the headphones and seatbelts are visible, the pilots are absent from the cockpit.
6. Captain's Light Dimmers
7. Copilot's Light Dimmers
8. Copilot's Map Light Dimmer
   Rotate to adjust the brightness of the copilot's map light (0-100 %).
9. Copilot's Map Light
10. Cockpit Fan Control Knob
11. Captain's Flood Lights Dimmer
    Rotate to adjust the brightness of the panel yellow flood lights that are located under the glareshield, on the captain's side (0-100 %).
12. Captain's Instrument Lights Dimmer
    Rotate to adjust the brightness of the instrument lights, the panel post lights and the instrument eyebrows on the captain's side (0-100 %).
13. Center Instruments Lights Dimmer
    Rotate to adjust the brightness of the instrument lights, the panel post lights and the instrument eyebrows on the center panel and center pedestal (0-100 %).
14. Panel/Cabin Lights Dimmer
    Rotate to adjust the brightness of the panel back lights or the cockpit/cabin ceiling lights (0-100 %). Right-click to toggle between the panel lights and the cockpit/cabin lights.
15. Copilot's Instrument Lights Dimmer
    Rotate to adjust the brightness of the instrument lights, the panel post lights and the instrument eyebrows on the copilot's side (0-100 %).
16. Copilot's Panel Flood Lights Control
    Rotate to adjust the brightness of the panel yellow flood lights that are located under the glareshield, on the copilot's side (0-100 %).





MISCELLANEOUS COCKPIT ITEMS
Figure 5-50

1. Sun Visor Hinge
   Click and drag the hinge to slide the sun visor along the track.
2. Whiskey Compass
3. Whiskey Compass Correction Card
   Click the compass correction card (or the sunglasses on the copilot's right console [5, below]) to show or hide the pilot's sunglasses. When the sunglasses are visible on the copilot's right console, the pilots are not wearing sunglasses.
4. Sun Visor
   Click the green plastic flap to lower or to raise the sun visor.
5. Pilot's Sunglasses
   Click the sunglasses on the copilot's right console (or the whisky compass correction card [3, above]) to show or hide the pilot's sunglasses. When the sunglasses are visible on the copilot's right console, the pilots are not wearing sunglasses.

Figure 5-51

1. Control Yoke
Click the Learjet 25 logo at the center of the yoke on the captain's side to select the captain that appears in the cockpit of the exterior model. Click the Learjet 25 logo on the copilot's side to select the copilot. You can choose between three different pilot character figures. Crew must be aboard the aircraft.
2. Wheel Master Button
Click this momentary push button to engage electrical nose gear steering (up to 10˚ in either direction below 45 knots). A green annunciator [14, fig. 5-32a] will illuminate on the main annunciator panel. Click the switch again to disengage electrical nose wheel steering (the green annunciator will go off). In the real aircraft, this switch, when held depressed, will engage the wheel master mode (steering of 40˚ to 50˚ in either direction, for taxi up to 10 knots). Nose wheel steering is initiated automatically in MSFS when taxiing at speeds lower than approx. 45 knots. Above 45 knots, the nose gear will lock (see also 6, fig. 5-4).
3. Four-Way Trim Pad Arming Button
When this button at the center of the four-way trim pad [4] is momentarily depressed, the AP pitch and roll modes are disengaged. Releasing the button reengages the autopilot, maintains the pitch and levels the wing.
4. Four-Way Trim Pad (n/s)
In the real aircraft, when the autopilot is engaged and the pad's center arming button [3] is depressed, this four-position switch is used to trim the control surfaces in both pitch and roll. This can be configured on your controller (joystick or yoke).
5. Maneuver Control Button
Depressing this button momentarily disconnects the AP pitch and roll modes. Releasing the button reengages the autopilot, maintains the pitch and levels the wing.
6. Pitch Sync Button
When depressed, this button disengages the autopilot pitch modes. Releasing the button reengages the autopilot, maintains the pitch and levels the wing.
7. Stick Shaker Motor-Vibrator
Actuation of the stick shaker causes low-frequency, high-amplitude vibration in the control column. This is used in conjunction with the stall warning systems and the stick nudger.

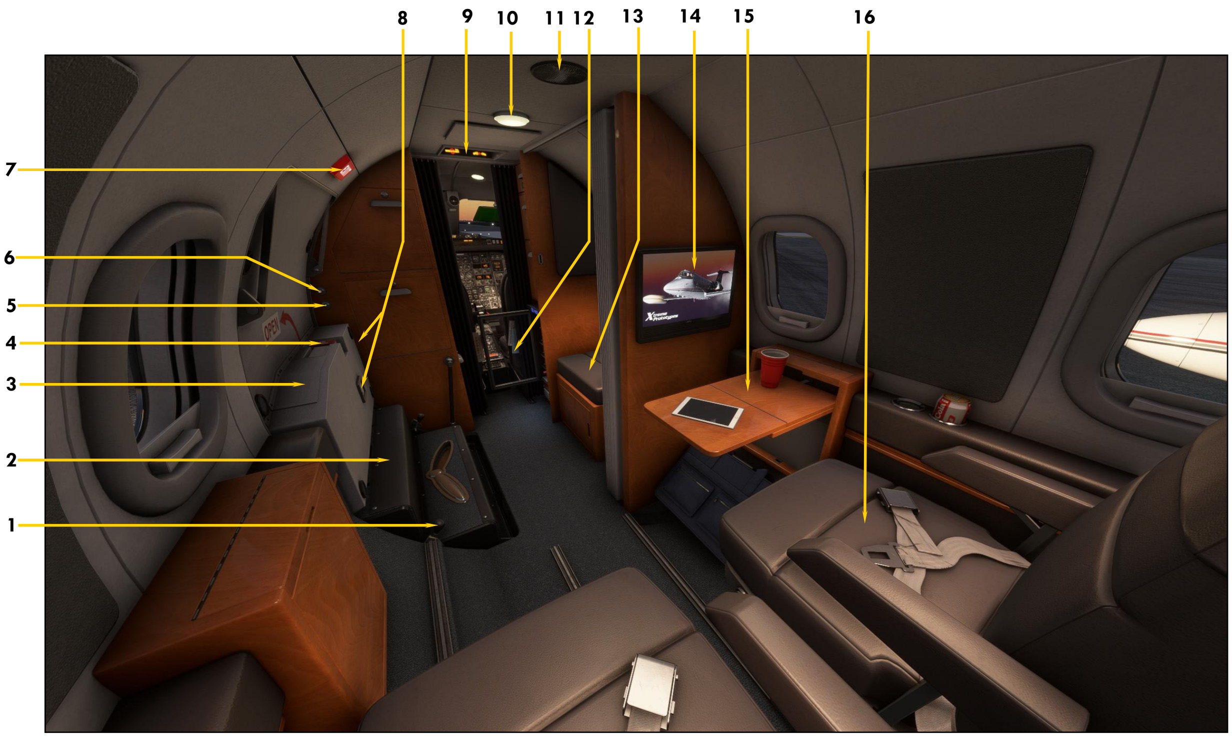


Figure 5-52

1. Main Door Lower Section Support Cable Handle (both sides)
Click the handle to close the door from the inside, when the door is open.
2. Main Door Lower Section
3. Main Door Upper Section
4. Main Door Handle
Click to open/close the door.
5. Entry Lights Switch
Click the switch to turn the entry lights [8] on/off.
6. Cabin Ceiling Lights Dimmer
Rotate the dimmer to adjust the brightness of the cabin and cockpit ceiling lights [10] (0-100 % brightness).
7. Exit Sign
Always on when the aircraft is powered.
8. Entry Lights (side and upper door)
Click the Entry Lights Switch [5] to turn the lights on/off.
9. No Smoking/Seatbelts Sign
See also "No Smoking/Seatbelts Switch" [10, fig. 5-43]. Requires DC power.
10. Cabin Ceiling Light
Rotate the Cabin Ceiling Lights Dimmer [6] to adjust the brightness of the cabin and cockpit ceiling lights (0-100 % brightness). Requires DC power.
11. Cabin Speaker
12. Refrigerator
Click the refrigerator door (glass or frame) to open or close.
13. Toilet (Cover/Extra Seat Closed)
14. Cabin TV
Click the logo at the bottom of the TV screen to turn the TV on/off. The Cabin TV screen is a standard XML gauge that displays a static image. Users can use their own image to replace the default image. Refer to appendix 2, page 11, for more information.
15. Passenger Table
16. Passenger Seat

Note: *By default, the "SHIFT+E" keyboard shortcut to open the main exit door in FSX/Prepar3D is not functional in MSFS. Cabin tables, seats, cabinet doors, curtains, and window shades cannot be moved in this software version for MSFS, like in our Prepar3D versions. MSFS imposes stringent limitations on the complexity of aircraft models, which include constraints on the number of polygons, materials, textures, animations, and other assets for performance reasons.*

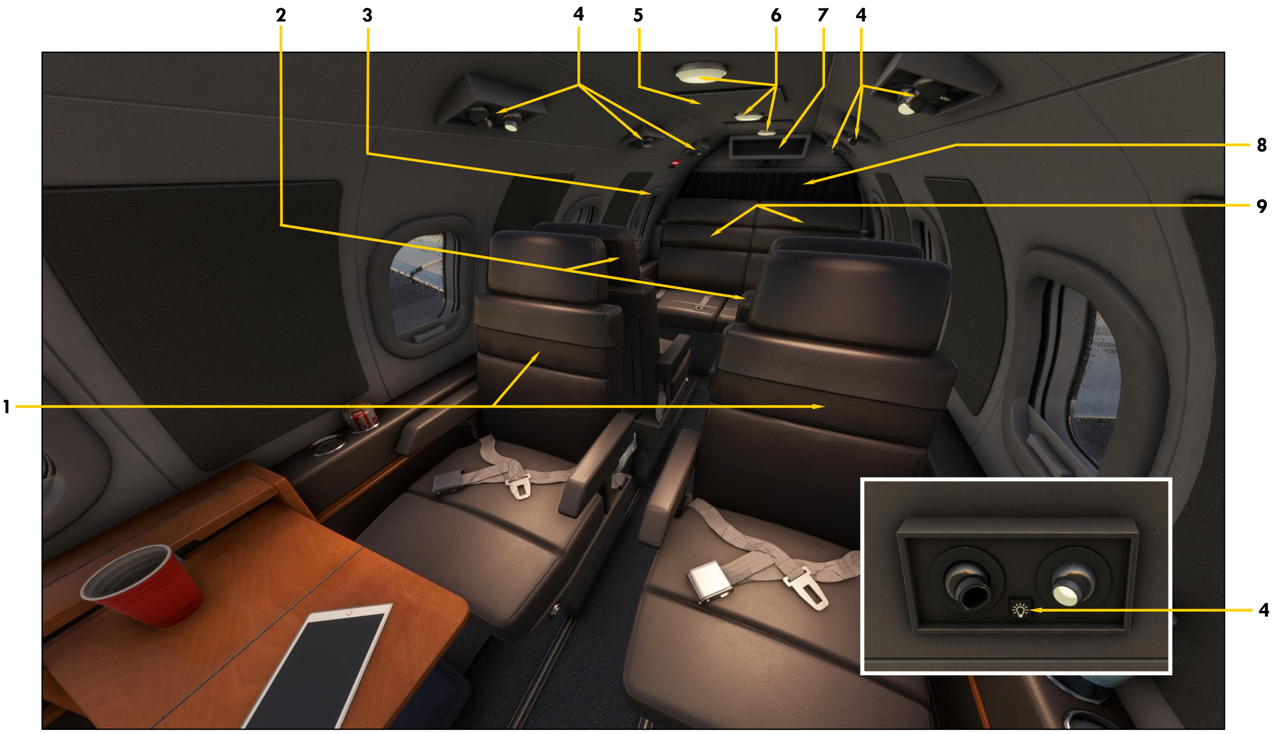


Figure 5-53

1. Passenger Front Seats
2. Passenger Middle Seats
3. Emergency Door, Handle and Light
   The light needs DC power.
4. Passenger Reading Lights
   Click the illuminated on/off button to turn the reading light on/off. Passenger reading lights cannot be dimmed. Requires DC power.
5. Oxygen Mask Compartment
6. Cabin Ceiling Lights
   Rotate the Cabin Ceiling Lights Dimmer [6, fig. 5-52; 12, fig. 5-54] to adjust the brightness of the cabin and cockpit ceiling lights (0-100 % brightness). Requires DC power.
7. A/C Blower Duct (with diverters)
8. Baggage Compartment
9. Passenger Back Seats

Note: *Cabin tables, seats, cabinet doors, curtains, and window shades cannot be moved in this software version for MSFS, like in our Prepar3D versions. MSFS imposes stringent limitations on the complexity of aircraft models, which include constraints on the number of polygons, materials, textures, animations, and other assets for performance reasons.*

MAIN (PASSENGER AND CREW) DOOR
Inside View

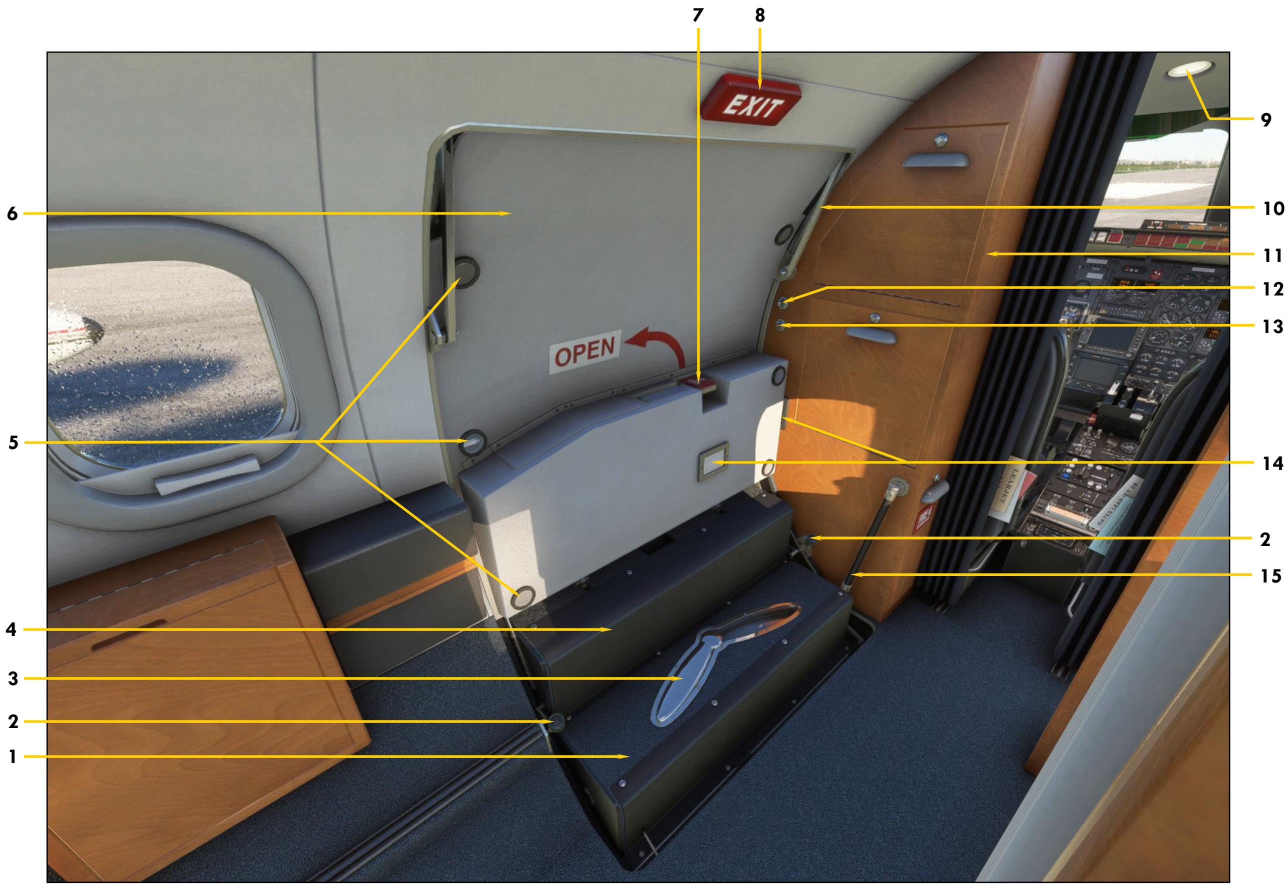


Figure 5-54

1. Main Door Lower Section
2. Main Door Lower Section Support Cable Handle
   Click to close the door from the inside, when the door is open.
3. Main Door Lower Section Locking Handle
4. Main Door Lower Section Rubber Carpet Protector
5. Lock Pin Inspection Windows
6. Main Door Upper Section
7. Main Door Handle
   Click to open/close the door.
8. Exit Sign
   Always on when the aircraft is powered.
9. Cabin and Cockpit Ceiling Lights
   Rotate the Cabin Ceiling Lights Dimmer [12] to adjust the brightness of the cabin and cockpit ceiling lights (0-100 % brightness). Requires DC power.
10. Main Door Upper Section Torsion Bar
11. Utility Cabinet
12. Cabin Ceiling Lights Dimmer
    Rotate the dimmer to adjust the brightness of the cabin and cockpit ceiling lights [9] (0-100 % brightness).
13. Entry Lights Switch
    Click the switch to turn the entry lights [14] on/off.
14. Entry Lights (side and upper door)
    Click the Entry Lights Switch [13] to turn the lights on/off.
15. Main Door Lower Section Damper and Torsion Bar

***Note:** By default, the "SHIFT+E" keyboard shortcut to open the main exit door in FSX/Prepar3D is not functional in MSFS. Cabinet doors cannot be opened in this software version for MSFS, like in our Prepar3D versions. MSFS imposes stringent limitations on the complexity of aircraft models, which include constraints on the number of polygons, materials, textures, animations, and other assets for performance reasons.*

Figure 5-55

1. Main Door Lower Section Retainer

Note: *By default, the "SHIFT+E" keyboard shortcut to open the exit door in FSX/Prepar3D is not functional in MSFS. Exterior model interaction is not enabled in MSFS (no clickable hotspots). For example, it is not possible to open the door from the outside by clicking the external door handle, like in our Prepar3D version.*

SYSTEMS DESCRIPTIONS

SECTION 6

20 SERIES AIRCRAFT SYSTEMS

The following pages contain important information about the aircraft systems installed in the Xtreme Prototypes GLJ Model 25 addon for Microsoft Flight Simulator.

Although the virtual model is inspired by the classic Gates Learjet 20 Series aircraft family, there are some differences in systems when compared to the real aircraft. These differences are due in part to software limitations in the simulation platforms.

Unless otherwise noted, the following systems are simulated to conform as closely as possible to their counterparts in the real aircraft, within the limitations and capabilities of the currently available simulation platforms:

- Flight controls
- Stall/overspeed warning systems with stick nudger/puller and stick shaker
- Electrical system (can be connected to a GPU available in the simulator)
- Emergency batteries
- Cockpit and cabin lighting systems with independent controls and dimmers, including emergency lighting
- Hydraulic system (including an electric auxiliary hydraulic pump)
- Landing gear, anti-skid system, differential brakes, parking brake
- Fuel system (including cross-feeding, and a wingtip tanks fuel jettison system)
- CJ610-8A power plant
- Fire detection and suppression system
- Pneumatic (high pressure), bleed air, pressurization, and environmental control systems

- Air conditioning and cabin temperature (H-valve) system

- Anti-ice system *(simulated within the limitations of the available simulation platforms)*, with ice effects on the windshield, windows, and exterior aircraft surfaces

- Automatic flight control system (AFCS) with autopilot, flight director, dual yaw damper, and speed hold mode *(the Lear J.E.T. autopilot is retrofitted to be fully functional in GPS/GNS mode and compatible with the default autopilot available in the simulator)*

- RVSM system, complete with digital altimeters/altitude preselectors (ADDUs) with blue VFD display, analog standby altimeter, and control panel

- Caution and warning system (annunciator panel)

- Avionics, radios, and classic navigation systems: COM1, COM2, NAV1, NAV2, ADF1, ADF2, transponder, DME, marker beacons

- Generic GNS 530 navigation system *(basic MSFS GNS 530 installed, can be replaced by third-party navigation systems when available, see appendix 2)*

- Generic weather radar (*physical model only, dummy radar screen included, can be configured for third-party radars when available, see appendix 2)*

- Custom ground proximity warning system (GPWS) with aural alerts

- Emergency gear extension system

- Crew and passenger oxygen system

- Main (passenger and crew) door

Nearly all systems, gauges, switches, light indicators, and flight instruments are fully functional and behave like their original counterparts in the real aircraft, unless otherwise noted.

Advanced MSFS tooltips, localized in English or French, are provided for each interactive object in the interior model, and can be used for cockpit familiarization (identifying the instruments, gauges and switches and memorizing their location on the different panels).

Note: *More languages may be added in future updates.*

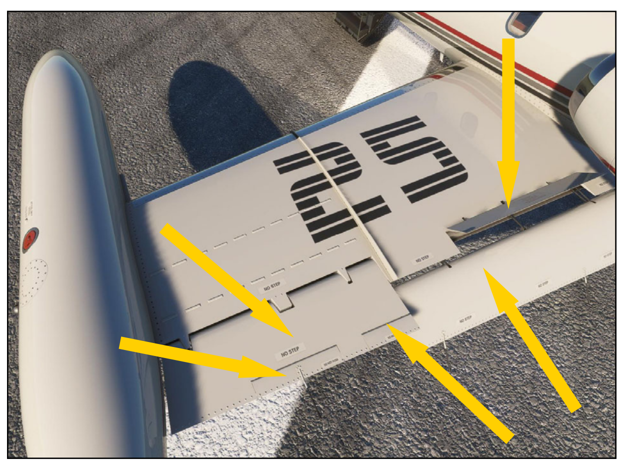
Tooltips usually show the object's description, instructions on how to interact using the mouse, and the status or some useful data about the task being performed.

Below is a basic description of the most important systems, followed by complete discussions about the anti-ice system, the fuel system and the automatic flight control system installed in this software version.

Additional information about controls, switches, gauges, lights, and annunciators can be found in section 5. Refer to section 8 for detailed operating procedures.

Flight Controls

The GLJ Model 25 add-on aircraft is equipped with manually powered primary flight control systems. These consist of the elevator, ailerons, and rudder. The secondary systems are either electric (stabilizer and other trims) or hydraulic (flaps and spoilers).



The controls are balanced to provide reasonable effort and feel for the pilot.

The aircraft should be controlled with only constant and light movements of the joystick/ yoke. The controls should never be pushed hard and should be properly trimmed at all times.

Remember: *Trims are there to help you, but they are not primary flight controls. As a qualified pilot, you should hold the desired attitude with the controls and trim until the effort is gone. Do not let go of the controls and use trim to get the required attitude. This is sloppy flying and can lead to loss of control, especially with this aircraft.*

Refer to section 3, fig. 3-1, 3-2, for the location of the different flight control surfaces on the Gates Learjet Model 25.

Electrical System

The add-on aircraft's electrical system consists of two rechargeable 24-volt Ni-Cd batteries, two main battery busses, a battery charging bus, two 28-volt DC/400-amperes engine-driven starter-generators, two main DC buses, two essential DC buses, two 115-volt AC/1,000VA inverters, one auxiliary inverter, two AC buses and associated transformers, switches and gauges.

During normal operation, the generators supply DC power to the left and right DC buses where most components are connected and to the avionics bus, which powers most flight instruments, including the GPS/GNS and the communication and navigation radios. The generators also charge the batteries.

Two inverters (devices that convert DC current to AC current) provide 115 VAC (or 26 VAC through transformers) to different aircraft systems, including the radar. These are called the primary and secondary inverters. An auxiliary inverter is also installed for safety purposes since critical instruments depend on AC power to tell up from down.

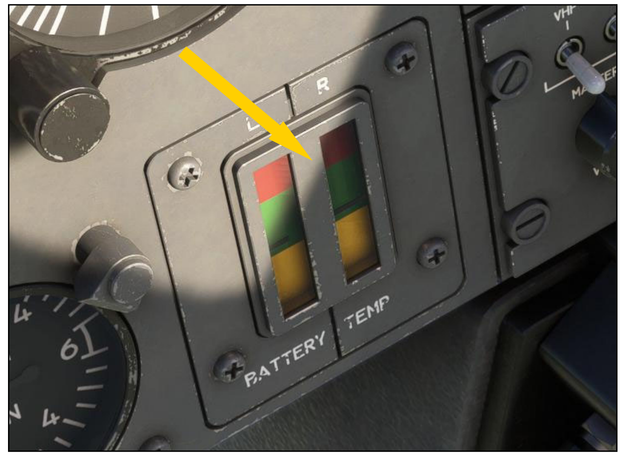
Note: *The radar needs at least one Inverter Switch [5, 10, 12, fig. 5-29] to be turned* ***ON*** *to work (it needs both DC and AC power). The avionics (radios, transponder, navigation systems) only requires DC power and the Radio Master (Avionics) Switch [14, fig. 5-29] to be turned* ***ON****, like in the real aircraft.*

Electrical control switches and meters are in the center section of the main instrument panels [fig. 5-28 to fig. 5-30].

The instrument panel is also equipped with a standby gyro horizon [fig. 5-16], powered by two emergency batteries when DC power is not available from the main DC buses. This means that in case of a loss of battery and generators, the pilot will have attitude indication for as long as the emergency batteries last (typically enough for a precautionary landing).

The dual emergency battery system is controlled with two power switches at the top of the captain's instrument panel [2-3, fig. 5-15].

The GLJ Model 25 addon is compatible with the ground power units that are included with MSFS. A GPU supplies 28 VDC to the aircraft during maintenance, training, and pre-



flight procedures. The GPU is normally available when the aircraft is parked in selected areas of most airports.

To preserve battery power during ground procedures up until the engines have started and the generators are turned on, it is strongly suggested to use an external power source to power up the aircraft.

To call for a GPU in the simulator, use the default keyboard shortcuts “**SHIFT+Q**” or “**SHIFT+W**” (or the **ATC** window). You can assign other keyboard shortcuts as well in the simulator’s settings.

The GPU must be **DISCONNECTED** after the engines have started and the generators are turned on.

Very Important!

- Like in the real aircraft, **do not turn on the battery switches** [8-9, fig. 5-30] when the batteries are fully charged, and the GPU (or the generators) are operating to prevent the Ni-Cd batteries from overheating. In the real aircraft, this may cause a fire!

Hydraulic System

The hydraulic system [3, fig. 5-39] consists of two engine-driven hydraulic pumps and a backup fluid reservoir. The hydraulic system


powers the landing gear and brakes, the flaps, and the spoilers. Like the real aircraft, the addon is also equipped with an electric auxiliary hydraulic pump [19, fig. 5-29] for operations on the ground or in case of emergency.

Landing Gear

The landing gear is of the tricycle, retractable type, and is electrically controlled and hydraulically operated.

The main gear has dual wheels while the nose gear has a single, steerable wheel. An emergency air system is provided to extend the landing gear in case of hydraulic or electrical failure [6, fig. 5-43; 4, fig. 5-39].

The main gear is equipped with multi-disc hydraulic brakes controlled by an anti-skid computer, sensors, and modulator valves. The anti-skid system [8, fig. 5-29] provides maximum braking performance.

The nose gear incorporates an electrical steering system that can be engaged by the pilot [6, fig. 5-4; 2, fig. 5-51]. The rudder is inoperative when electric nose gear steering is engaged, and the aircraft is on the ground, like in the real aircraft.

Note: *In MSFS, nose wheel steering when taxiing is initiated automatically, and at slower speeds only, whether it is engaged by the pi-*

lot manually or not. Nose wheel steering will not work above a certain speed. Because this is controlled by the simulator, there is very little we can do about it until more options to control nose wheel steering at any speed become available. When taxiing, you will need to reduce speed to initiate nose wheel steering (under about 45 knots). Above that speed, the nose gear will lock.

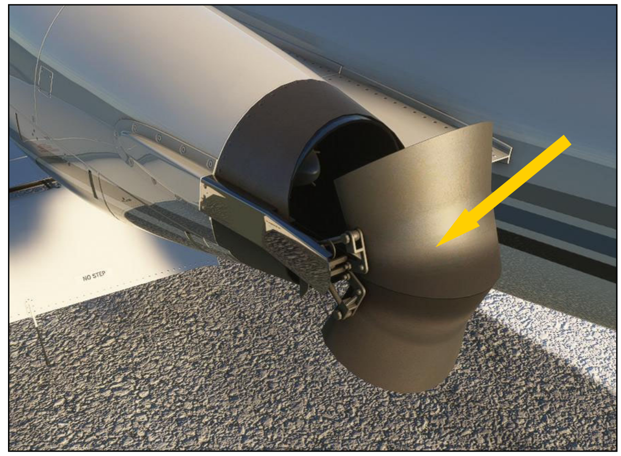
Power Plant

Like the real aircraft, the GLJ Model 25 addon is equipped with the reliable General Electric CJ610-8A single-spool turbojet engine. Rated at 2,950 lbs. static thrust per side at sea level, the CJ610 provides the aircraft with fighter-like performance (especially at low weights). It was said that a lightly loaded 20 Series aircraft could outperform the legendary Lockheed T-33!

The single-spool turbojet engine will produce higher thrust at altitude than a modern turbofan engine with similar ratings. This makes the 20 Series aircraft well-suited for high altitude flights. The downside is that fuel consumption and noise are far greater. The GLJ Model 25 addon is no exception, so plan adequate fuel for your trip (see “**Flight Planning**”, in section 7)!

Thrust Reversers

The GLJ Model 25 addon is equipped with fully modeled Dee Howard target thrust reversers consisting of upper and lower clamshell doors, pivoted near the engine centerline. The reverser’s doors are hydraulically actuated and electrically controlled.



The thrust reversers are an additional deceleration system which may be used anytime the airplane is on the ground to produce shorter stopping distances.

***Note:** Because of current limitations in the simulator, thrust reverser controls have limited functionalities in this software version. In the simulator, thrust reversers can be deployed by pressing the “**F2**” key when the throttles are set to **IDLE**, and the aircraft is on the ground. When deployed, thrust can be reduced by pressing the “**F3**” key. Pressing the “**F1**” key will return both throttles and thrust reverser subthrottles to **IDLE**, under certain conditions. In the simulator, thrust reversers are always armed when the aircraft is on the ground. In the GLJ Model 25 addon, reverse thrust is limited to 85% RPM, like in the real aircraft.*

Fire Detection and Suppression System

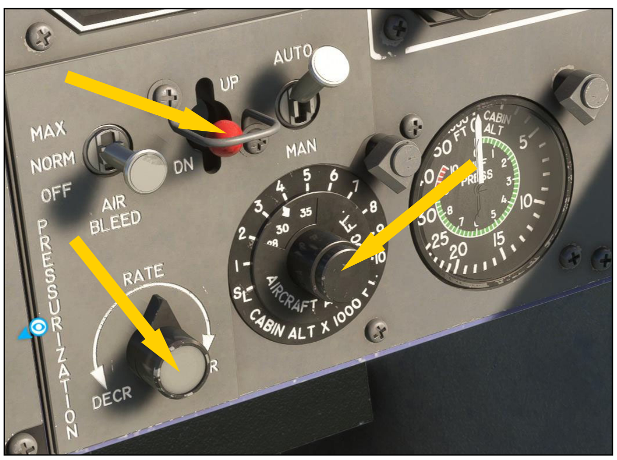
Each engine nacelle is equipped with a fire detection system. Two fire extinguisher bottles in the fuselage may discharge to either engine as needed. Each engine has its own fire control panel installed in the glareshield [fig. 5-33 to fig. 5-35].

Refer to “**Abnormal/Emergency Procedures**”, in section 9, for more details.

Note: *In the current simulation platforms, the two-bottle fire-extinguishing system is common to both engines. Either of two bottles of extinguishing agent can be discharged to either engine, or both bottles can be discharged to the same engine.*

Environmental Control System

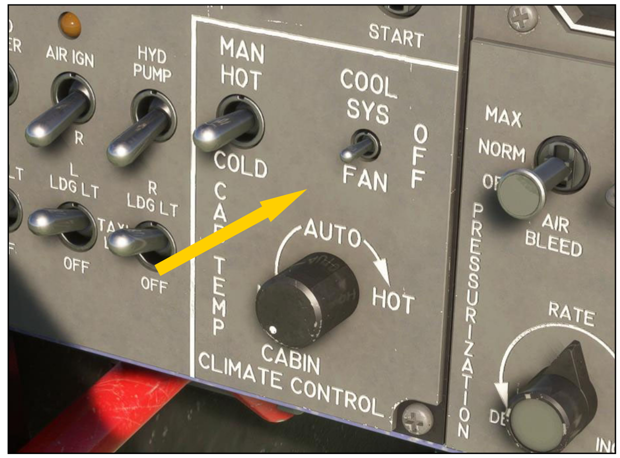
The Gates Learjet Model 25 is meant to operate at high altitudes, where the air is thin and very cold. The addon is therefore equipped with a high-performance pressurization system, like the real aircraft.



The pressurization system bleeds high-pressure air from the engine compressors and the dorsal RAM air inlet [8, fig. 3-1] and directs it into the cabin to maintain pressurization. The pressure is regulated through an outflow valve slaved to the pressurization controller. Before takeoff and during flight, the pilot sets the target altitude of the flight [5, fig. 5-41], and the pressurization controller will take care of the rest.

Manual adjustment of the automatic cabin climb/descent rate is available via a control knob [2, fig. 5-41] on the pressurization panel. The “cherry picker” switch [3, fig. 5-41] controls the cabin rate when in “manual” mode.

Note: *The manual mode of operation is not available in MSFS. The cabin controller always maintains the desired rate of climb or descent until the selected cabin altitude is attained.*



Bleed air is quite hot as it leaves the engine. This heat is used to control cabin temperature as well. By mixing hot bleed air with bleed air cooled in a heat exchanger, a comfortable cabin temperature can be obtained.

In the Learjet, the mixing of these two airflows takes place in the so-called “H-valve” [19, fig. 5-37]. As the cabin temperature is set on the temperature control panel [fig. 5-42], make sure to monitor the H-valve position indicator accordingly.

Cockpit and Cabin Lighting System

The cockpit and cabin lighting system in the GLJ Model 25 addon is almost identical to lighting system in the real aircraft and consists of:

- Captain’s instrument lights and post lights
- Center instrument lights and post lights
- Copilot’s instrument lights and post lights

- Main instrument panel left and right (yellow) flood lights
- Backlit instrument panels
- Instrument panel lights and annunciators
- Captain's and copilot's map lights
- An emergency lighting system with its own battery
- Cabin and cockpit ceiling lights
- Two cabin entry lights
- Passenger reading lights
- A cabin refrigerator light

All lights are connected to the main DC bus. They require at least one battery switch [8-9, fig. 5-30] to be turned on (or the generators/ GPU/emergency batteries to be operational).

To avoid entering a completely dark cockpit at night, you may use the flashlight that is provided in MSFS ("**ALT+L**").

The cabin entry lights are controlled by the Entry Light Switch [13, fig. 5-54] located on the large wood cabinet near the main passenger and crew door. The cabin entry lights cannot be turned on when the door is closed.

The Cabin Light Dimmer [12, fig 5-54] controls the intensity of the cabin and cockpit ceiling lights (0-100 % brightness).

Tip

- The cabin and cockpit lights can also be controlled from the cockpit by using the Panel/Cabin Lights Dimmer located on the captain's side wall [14, fig. 5-49]. Right-click the dimmer to toggle between the panel lights and the cockpit/cabin lights.

Passenger reading lights [4, fig. 5-53] have their own illuminated switch and can be turned on or off individually. Passenger reading lights cannot be dimmed.

The captain’s and copilot’s map lights [3, 9, fig. 5-49] are controlled individually (0-100 % brightness) by their own dimmer on each side of the cockpit, adjacent to the light fixture [1, 8, fig. 5-49].

The yellow flood lights above the main instrument panel are separated into two sections (one on the captain’s side and the other on the copilot’s side) and are controlled (0-100 % brightness) by separate dimmers on each side of the cockpit [11, 16, fig. 5-49].

Instruments lights and post lights on the main instrument panel and center console are separated into three sections: the captain’s side, the center section, and the copilot’s side. Each section has its own independent dimmer (0-100 % brightness) located on each side of the cockpit [12-13, 15, fig. 5-49].

The aircraft is also equipped with an emergency lighting system connected to its own battery located under the captain’s seat. The system will turn on the cockpit and cabin ceiling lights in case of emergency. Controls for the emergency lighting system are located on the center console [8-9, fig. 5-47]. In this software version, it is necessary to turn off the ceiling lights manually (with its own dimmer [14, fig. 5-49]) after testing the emergency lighting system.

Additional lights and annunciators on the different instrument panels in the cockpit can be tested and controlled (0-100 % brightness) with their dedicated dimmer/switch located under the glareshield [31, fig. 5-32a/b]. The landing gear lights have their own independent dimmer [2, fig. 5-30].

Backlit instrument panels can be dimmed (0-100 % brightness) with the Panel Light Dimmer [14, fig. 5-49] located on the captain's side wall.

Note: *The GLJ Model 25 addon uses real dynamic light effects for illuminating the cabin, the cockpit, and the instrument panels, like in the real world.*

"Cold and Dark" and "Auto Start" Cockpit Presets (addon-related)

Eight (8) basic MSFS **cockpit presets** (*.flt) for the different phases of the flight are provided in this software version.

The cockpit is automatically set to its "**Cold and Dark**" state when the aircraft is parked in the **hangar** or in a **parking space** (apron) at the beginning of a flight in the simulator. The engines are shut down and all aircraft systems are turned off.

When a new flight is started with the aircraft already **taxiing** or **ready for takeoff on the runway**, engines will be running and all systems turned on and ready for the flight. The same is true if the aircraft is already in the following states when a new flight is started: **climb**, **cruise**, **approach** and **final**.

"Remove Before Flight" Items (addon-related)

The "Remove Before Flight" items (ribbons and Pitot covers, wheel chocks, engine inlet covers, tail stand) need to be installed manually after the aircraft is parked. Click the white label above the Anti-Skid Lights in the virtual cockpit [4, fig. 5-15] to install/remove the "Remove Before Flight" items.

The "Remove Before Flight" items cannot be installed if the aircraft is not parked, not on the ground or if the starters/engines are running. Please note that the tail stand is installed only when the aircraft is full of fuel (85% or more, CoG near aft limit).

Note: *The "Remove Before Flight" items are* *installed automatically when the aircraft is parked in the hangar or in a parking space (apron) at the beginning of a flight ("Cold and Dark" state).*

Crew (addon-related)

The captain and the copilot appear by default in the cockpit of the exterior model when the aircraft model is loaded in the simulator.

To install/remove the flight crew, you can click either headphone hanger [5, fig. 5-49] located on the cockpit side walls. When the headphones and the pilot's seatbelts are visible inside the cockpit, the crew is absent. When the headphones and the pilot's seatbelts are not visible, the crew is present.

You can select between three pilot character figures. Switching pilots is done by clicking the Learjet logo at the center of each yoke in the virtual cockpit [1, fig. 5-51]. You can also make your pilots wear sunglasses by clicking the sunglasses located on the copilot's side console in the cockpit [2, fig. 5-50].

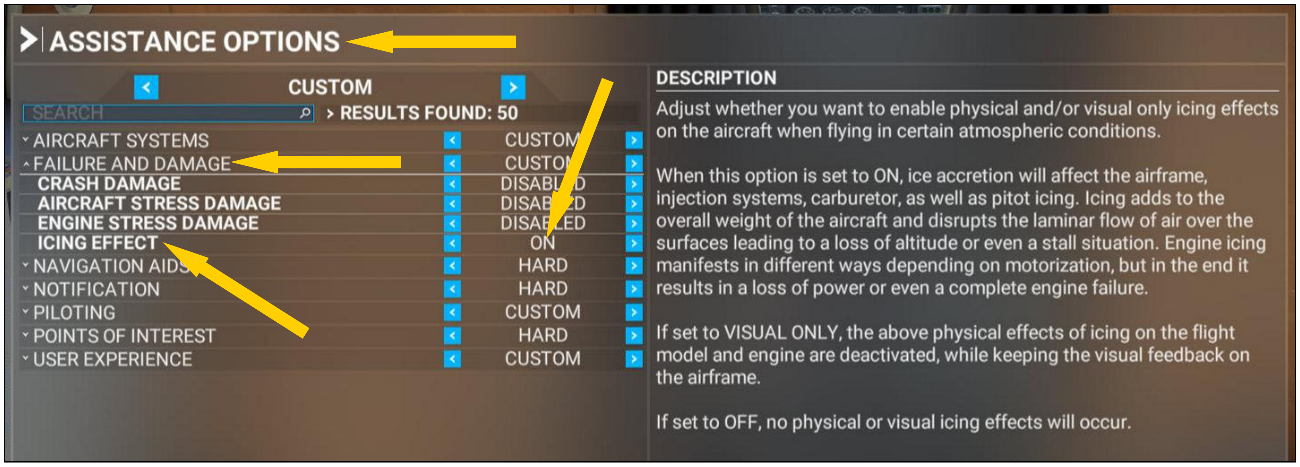
Note: *The GLJ Model 25 addon uses its own custom pilot character figures. Pilot selection from the MSFS settings is disabled in this software version.*

For more details about these and other systems, please refer to section 5.

20 SERIES ANTI-ICE SYSTEM

The GLJ Model 25 addon is equipped with a unique anti-ice system that is almost identical to the one installed in the real aircraft. Ice buildup on the windshields, cabin windows, engine nacelles and exterior surfaces is visible when icing conditions exist during flight (precipitations or visible moisture present, and ram-air temperature below 10 degrees Celsius) or on the ground (precipitations or visible moisture present, and very low exterior temperature).

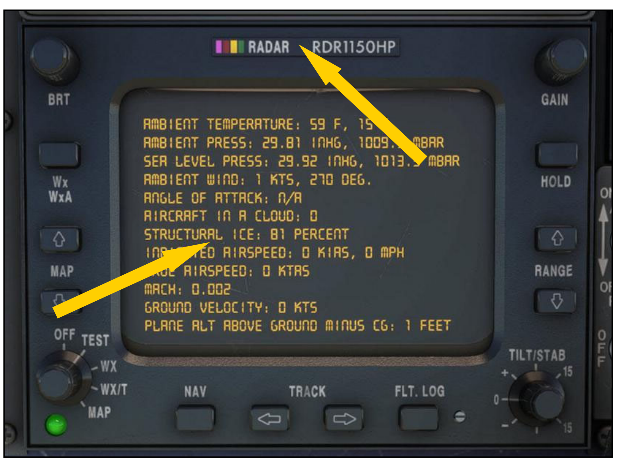
Important: *Due to serious limitations for the display of ice effects on the windshield, windows and aircraft structures in MSFS 2020, it was not possible to separate specific ice effects from the combined effects that cover the entire exterior model and/or the windshield and windows. For example, it was not possible to separate the ice on the left windshield from the ice on the right windshield, or the ice from the left engine nacelle from the ice on the right engine nacelle (like in our Prepar3D version). This has no impact on the simulation or on the physical effects of the*



accumulation of ice on the aircraft structures if enabled in MSFS. Almost all anti-ice subsystems from the real aircraft are simulated.

Tip

- In MSFS, visual ice effects on the exterior model are disabled by default. To enable visual (or physical) ice effects, go to "MSFS > Options > Assistance Options > Failure and Damage > **Icing Effect**" and set "Icing Effect" to **ON** or **VISUAL ONLY**. Refer to the description on the "Assistance Options" page for more information (see above).



Tip

- Click the radar logo [7, fig. 5-26, see image above] to display an alternate data screen with useful information regarding icing conditions, notably the ambient temperature, if the aircraft is in a cloud, and the percentage of structural ice.

All anti-icing equipment must be turned on before icing conditions are encountered to avoid a serious hazard of safety during flight. The Ram Air Temperature Warning Indicator and the Ram Air Temperature Gauge [17-18, fig. 5-37] should be monitored frequently when flying in areas where icing may occur.

Like in the real aircraft, the anti-ice system in the GLJ Model 25 addon will prevent ice buildup on:

- The windshield
- The radome
- Pitot probes, angle-of-attack vanes, and static ports
- The leading edges of the wing
- The leading edges of the horizontal stabilizer
- The engines (nacelle inlet front lips, inlet guide vanes and nose cone)

The windshield, the wing leading edges and the engine front frames use engine hot bleed air for de-icing. An alcohol defrosting system is installed in the nose of the aircraft and takes care of the radome and the pilot's windshield if needed. Other components are de-iced through electrically heated systems.

Ice Detection

During daylight operation, ice buildup on the windshields and other surfaces can be visually detected.

At night, red spots from special ice-detection lights located on top of the glareshield become visible on the inside of both the captain's and copilot's windshields. These lights continuously shine on the windshield's interior and are generally unnoticeable during the day or at night when no ice is accumulating. The lights are always turned on when the aircraft is powered.

The red light on the captain's side is located inside the anti-ice airstream coming from the exterior defog nozzles. The red light on the copilot's side is located outside the anti-ice airstream coming from the exterior defog nozzles. For this reason, it is important to monitor the red light on the copilot's side for ice buildup when the windshield defog system is on (heat or alcohol).

Note: *The red-light reflection on the windshield is subtle and varies based on lighting, viewing angle, and ice accumulation. It may not always be visible.*

The Wing Inspection Light located on the right side of the aircraft [8, fig. 3-2] can be turned on to inspect the right wing's leading edge at night. The Wing Inspection Light Switch is located on the center pedestal [7, fig. 5-47]. Recognition lights, installed in the nose of the Model 25's wingtip fuel tanks [19, fig. 3-1] can also be used for detecting ice accumulation on the tanks and wings. The

Recognition Lights Switch [9, fig. 5-29] is on the electrical panel, in the center section of the main instrument panel.

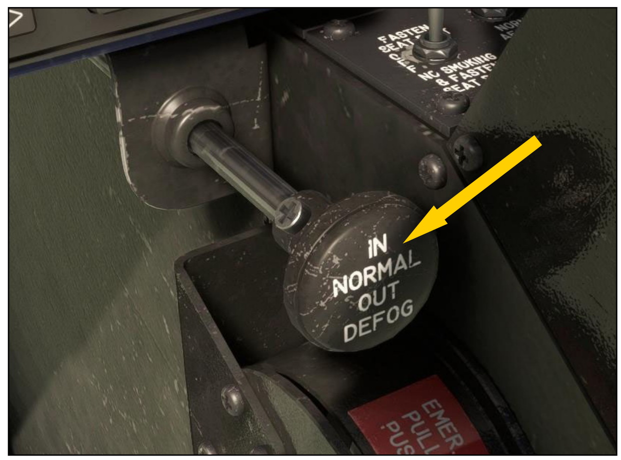
Windshield Heating System

The windshield heating system uses hot bleed air from the engines redirected to exterior defog nozzles located at the base of the windshield [3, fig. 3-1]. An alcohol anti-ice system (see page 17, in this section) can also be used to de-ice/defog the captain's windshield should it becomes necessary.

Note: *In the real aircraft, the windshield heating system can also be used to supplement cockpit heating and to provide an alternate source of air for emergency pressurization.*

The windshield heating system can be controlled either manually or automatically. Switches are provided on the ice protection panel, to the left of the captain's main instrument panel [see fig. 5-4]. Annunciators are also installed on the main annunciator panel [see fig. 5-32a/b].

The Windshield Defog Knob [8, fig. 5-43], located under the captain's main instrument panel, near the throttle quadrant, is used to divert the hot bleed air to the windshield defog nozzles or to footwarmers inside the cockpit. When the knob is pushed in, to its



NORMAL position, the bleed air is diverted to the cockpit. When the knob is pulled out, to its **DEFOG** position, the hot air is diverted to the windshield. The knob is normally kept pushed in but must be pulled out for heating the windshield.

Hot bleed air from the engine compressor sections is necessary for heating the windshield. The Bleed Air Switch [1, fig. 5-41] on the environmental control panel (located at the bottom of the copilot's main instrument panel) should be set to **NORM** or **MAX** for the system to work. This switch opens or closes the flow control valves that allows bleed air from the engines to enter the cabin and the anti-ice system.

__Note:__ The Bleed Air Switch should always be set to __NORM__ or __MAX__ for the duration of the flight, but to __OFF__ during ground operations (unless required).

Two important valves are at the base of the windshield heating system: the pressure-regulator valve and the shutoff valve.

The pressure-regulator valve is energized open when the aircraft is powered. It regulates the hot bleed air from the engines to 16 psi.

Two Windshield Heat Switches, marked WSHLD HEAT ON/OFF and WSHLD HEAT AUTO/MAN [4, fig. 5-4], located on the ice protection panel, are used concurrently with the Bleed Air Switch and the Windshield Defog Knob to heat the windshield. These switches control the shutoff valve that allows hot bleed air from the engines to enter the windshield heating system.

Automatic Mode of Operation

When the WSHLD HEAT AUTO/MAN switch [4 right, fig. 5-4] is set to **AUTO**, the flow of hot bleed air to the windshield is controlled automatically by two low/high limit thermoswitches installed in each of the exterior defog nozzles. The pilot has nothing to do, except making sure the system is working properly.

When the aircraft is on the ground, if a low limit thermoswitch senses 215˚F, the left or right red Windshield Overheat Annunciator (marked WSHLD OVHT) on the main annunciator panel [8, 11, fig. 5-32a] illuminates, the shutoff valve closes, and the green Windshield Heat Applied annunciator (marked WSHLD HEAT) [12, fig. 5-32a] goes out.

When the aircraft is in flight, the windshield heat cycles off the low limit thermoswitch. When the temperature reaches 215˚F, the left or right red Windshield Overheat Annunciator (marked WSHLD OVHT) on the main annunciator panel illuminates, the shutoff valve closes, and the green Windshield Heat Applied annunciator (marked WSHLD HEAT) goes out. When the thermoswitch cools, the left or right Windshield Overheat Annunciator goes off, the shutoff valve opens, and the green Windshield Heat Applied annunciator (marked WSHLD HEAT) illuminates, and the cycle repeats.

__In the real aircraft:__ If the low limit thermoswitch fails, the temperature may rise above 250˚F to trigger the high limit thermoswitch and close the pressure-regulator valve. This won't happen with the GLJ Model 25 addon.

To heat the windshield in AUTO mode (engines must be running and the aircraft powered):

1. Bleed Air Switch [1, fig. 5-41] - **NORM** or **MAX**.

2. Windshield Defog Knob [8, fig. 5-43] - Pulled out, to its **DEFOG** position.

3. WSHLD HEAT AUTO/MAN Switch [4 right, fig. 5-4] - **AUTO**.

To stop windshield heating in AUTO mode:

1. WSHLD HEAT ON/OFF Switch [4 left, fig. 5-4] – **OFF.**

2. WSHLD HEAT AUTO/MAN Switch [4 right, fig. 5-4] - **MAN**. The green Windshield Heat Applied annunciator (marked WSHLD HEAT) [12, fig. 5-32a] on the main annunciator panel should go out.

   Or

   Windshield Defog Knob [8, fig. 5-43] - Pulled in, to its **NORMAL** position.

Manual Mode of Operation

When the WSHLD HEAT AUTO/MAN switch [4 right, fig. 5-4] is set to **MAN**, the shutoff valve can be opened or closed manually with the WSHLD HEAT ON/OFF 3-position switch [4 left, fig. 5-4].

With the WSHLD HEAT ON/OFF switch set to **ON**, the shutoff valve opens. When the switch is set to **OFF**, the shutoff valve closes. Nothing happens when the switch is held to **NEUTRAL** (its middle position). **For this reason, it is necessary to reset the switch to OFF to close the shutoff valve if it was previously set to ON (and vice-versa).**

Note: *In the real aircraft, this switch is spring loaded to **NEUTRAL** and must be held to the ON or OFF position to open or close the shutoff valve.*

When the valve is open or not fully closed, the green Windshield Heat Applied annunciator [12, fig. 5-32a] on the main annunciator panel illuminates. This indicates that heat is applied to the windshield.

To heat the windshield in MANUAL mode (engines must be running and the aircraft powered):

1. Bleed Air Switch [1, fig. 5-41] - **NORM** or **MAX**.

2. Windshield Defog Knob [8, fig. 5-43] - Pulled out, to its **DEFOG** position.

3. WSHLD HEAT AUTO/MAN Switch [4 right, fig. 5-4] - **MAN**.

4. WSHLD HEAT ON/OFF Switch [4 left, fig. 5-4] – **ON.** The green Windshield Heat Applied annunciator (marked WSHLD HEAT) [12, fig. 5-32a] on the main annunciator panel should illuminate.

To stop windshield heating in MANUAL mode:

1. WSHLD HEAT ON/OFF Switch [4 left, fig. 4-4] – **OFF.** The green Windshield Heat Applied annunciator (marked WSHLD HEAT) [12, fig. 5-32a] on the main annunciator panel should go out.

   Or

   Windshield Defog Knob [8, fig. 5-43] - Pulled in, to its **NORMAL** position.

When the aircraft is on the ground, if a low limit thermoswitch senses 215˚F, the left or red Windshield Overheat Annunciator (marked WSHLD OVHT) [8, 11, fig. 5-32a] on the main annunciator panel illuminates, but the shutoff valve and the pressure-regulator valve do not close, and the green Windshield Heat Applied annunciator (marked WSHLD HEAT) [12, fig. 5-32a] remains illuminated.

If the temperature rises above 250 ˚F, the high limit thermoswitch closes the pressure-regulator valve but the shutoff valve remains open.

When the aircraft is in flight, the low limit

thermoswitch is disabled. Overheat protection is provided by the high limit thermoswitch which closes the pressure-regulator valve if the temperature rises above 250 ˚F.

Tip

- Mouse overing the red Windshield Overheat (WSHLD OVHT) [8, 11, fig. 5-32a] annunciators will display a tooltip with the temperature of the thermoswitches in the exterior defog nozzles.

Important

- In manual mode, the pilot decides when heat must be applied to the windshield and should monitor the red Windshield Overheat (WSHLD OVHT) [8, 11, fig. 5-32a] and Windshield Heat Applied (WSHLD HEAT) [12, fig. 5-32a] annunciators constantly.

Windshield and Radome Alcohol Anti-Ice System

1.75 gallons of methyl alcohol stored in a reservoir located in the left side of the nose compartment is used to prevent ice formation on the radome. The system may also be used for defogging the captain's windshield, as a backup for the windshield heating system.

When the Anti-Ice Alcohol Switch [5, fig. 5-4] is set to **RADOME**, the system supplies only the radome with alcohol for 120 minutes with a full reservoir. When the switch is set to **WSHLD & RADOME**, the system supplies both the radome and the captain's windshield with alcohol for 45 minutes with a full reservoir.

The amber ALC AI annunciator on the main annunciator panel [15, fig. 5-32a] illuminates when the alcohol reservoir is empty.

Tip

- Mouse overing the amber ALC AI [15, fig. 5-32a] annunciator will display a tooltip with the remaining quantity of alcohol in the reservoir. You can click the annunciator to service the reservoir with 1.75 gallons of alcohol.

DC power and bleed air from the engines is required for the system to work. Moving the switch from the **OFF** position to either **RADOME** or **WSHLD & RADOME** also opens both a shutoff valve and a pressure regulator in the engine's bleed air supply line to pressurize the reservoir with 2.3 psi of bleed air. The alcohol is then forced through a filter and a 3-way shutoff valve that is positioned to the selected switch position.

To deice the radome only (engines must be running and the aircraft powered):

1. Bleed Air Switch [1, fig. 5-41] - **NORM** or **MAX**.

2. Anti-Ice Alcohol Switch [5, fig. 5-4] - **RADOME**.

To deice the radome and the captain's windshield (engines must be running and the aircraft powered):

1. Bleed Air Switch [1, fig. 5-41] - **NORM** or **MAX**.

2. Anti-Ice Alcohol Switch [5, fig. 5-4] – **WSHLD & RADOME**.

To stop the flow of alcohol:

1. Anti-Ice Alcohol Switch [5, fig. 5-4] – **OFF**.

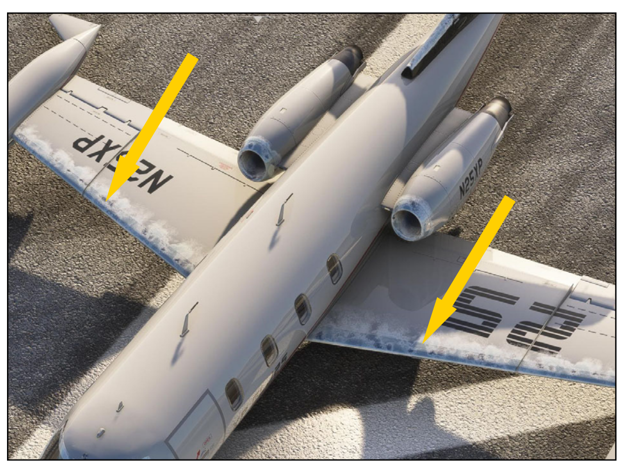
Note: *Because of limitations for the display of ice effects in MSFS 2020, it was not possible to separate the ice on the left windshield from the ice on the right windshield.*

Wing and Horizontal Stabilizer Anti-Ice System

Hot bleed air from the engines is used to prevent ice buildup on the wing leading edges. Two heated electrical blankets are used to protect the horizontal stabilizer leading edges from ice formation.

Wing Heating System

When the Wing and Stabilizer Heat Switch [3, fig. 5-4] is turned **ON**, a shutoff valve opens to allow hot bleed air from the engines to flow through a 16-psi pressure regulator and



is routed on to tubes in the wing leading edges. The air is then vented outboard through scuppers located under the wing.

The red WING O'HT annunciator on the main annunciator panel [9, fig. 5-32a] illuminates when the right-wing leading edge's temperature reaches 215˚F. The system should not be used when the annunciator is illuminated.

Tip

- Mouse overing the red WING O'HT annunciator [9, fig. 5-32a] will display a tooltip with the wing temperature.

DC power and bleed air from the engines is required for the system to work.

To heat the wing leading edges (engines must be running and the aircraft powered):

1. Bleed Air Switch [1, fig. 5-41] - **NORM** or **MAX.**
2. Wing and Stabilizer Heat Switch [3, fig. 5-4] - **ON.**

To stop heating the wing leading edges:

1. Wing and Stabilizer Heat Switch [3, fig. 5-4] - **OFF.**

The Wing Temperature Gauge [8, fig. 5-4] provides a visual representation of the changes in wing temperature:

- **Blue arc:** temperature below 35˚F
- **Green arc:** above 35˚F and below 215˚F
- **Red arc:** above 215˚F

Make sure the needle is in the green. Monitor pressurization and reduce RPM when the nee-

dle is in the red (or turn **OFF** the Wing and Stabilizer Heat Switch [3, fig. 5-4]).

Horizontal Stabilizer Heating System

When the aircraft is in flight and the Wing and Stabilizer Heat Switch [3, fig. 5-4] is turned **ON**, electrical current is supplied to two heating blankets on the horizontal stabilizer leading edges to protect the stabilizer against ice accumulation. **On the ground, the stabilizer heating system is disabled by the right gear squat switch.**

Intermittent DC electrical power is applied to elements inside the heating blankets, from front to rear, in sequences of 15 seconds for each element. Power is also applied continuously to the front leading-edge element.

The amber STAB HEAT annunciator on the main annunciator panel [13, fig. 5-32a], when illuminated, indicates a power failure in the leading-edge element of the stabilizer heating blanket.

***Note:** Power failure of the leading-edge element of the stabilizer heating blanket is not simulated in this software version. The amber STAB HEAT annunciator should remain off.*

When power is applied to the blankets, the left and right ammeters on the electrical gauge cluster panel [5, 7, fig. 5-28] reflect a current drain of about 60 amperes (total) in 15-second cycles. This is the only indication that the system is working.

DC power is required for the system to work, and **the aircraft must be in flight**.

To heat the horizontal stabilizer leading edges when the aircraft is in flight:

1. Wing and Stabilizer Heat Switch [3, fig. 5-4] - **ON**.

To stop heating the horizontal stabilizer leading edges when the aircraft is in flight:

1. Wing and Stabilizer Heat Switch [3, fig. 5-4] - **OFF**.

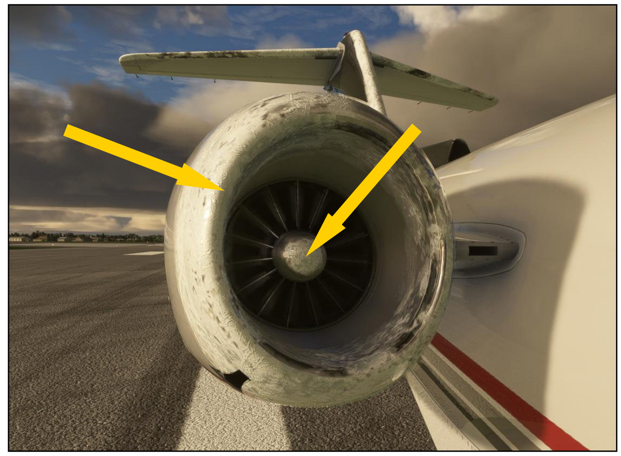
Heating will stop as soon as the aircraft touches the ground.

Engine Anti-Ice System

The engine anti-ice system protects the engine nacelle inlet front lips, nose cone and inlet guide vanes. The nose cone and inlet guide vanes are heated pneumatically (with hot bleed air), and the nacelle inlet front lips are heated electrically.

When either Engine Nacelle Heat Switch [2, fig. 5-4] is turned **ON**, electric power is supplied to heat the selected engine nacelle inlet front lips. Heating elements in each nacelle require about 50 to 60 amperes.

At the same time, hot bleed air from the engine is allowed to recirculate through the engine nose cone and inlet guide vanes. Bleed



air reentering the engine causes a decrease in the engine pressure ratio (EPR) [4, fig 5-27].

When illuminated, the amber L ENG ICE and R ENG ICE annunciators [19, 22, fig. 5-32b] on the main annunciator panel indicate **insufficient bleed air pressure** for adequate anti-ice protection. When the aircraft is on the ground, **70 % RPM is required** to extinguish the annunciators.

When the aircraft is on the ground, the amber INLET HTR annunciator [17, fig. 5-32b], when illuminated, indicates an overheat condition in an inlet heater. The annunciator illuminates when either nacelle temperature reaches 190 ˚F and extinguishes at 180 ˚F. When this happens, the Engine Nacelle Heat Switch [2, fig. 5-4] must be turned **OFF**. In flight, this annunciator is disabled by the right gear squat switch.

Tip

- Mouse overing the amber INLET HTR annunciator will display a tooltip with the left and right engine inlet temperatures.

To heat an engine nacelle:

1. (Left or Right) Engine Nacelle Heat Switch [2, fig. 5-4] - **ON**.

To stop heating an engine nacelle:

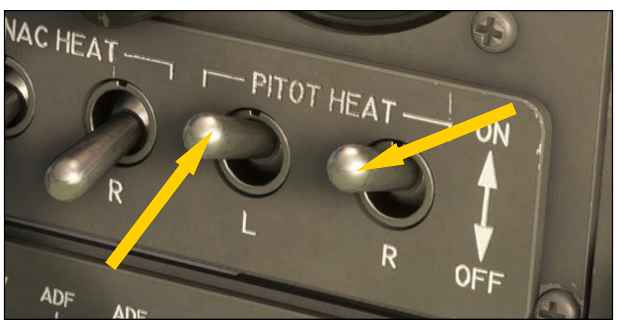
1. (Left or Right) Engine Nacelle Heat Switch [2, fig. 5-4] - **OFF**.

***Note:** Because of limitations for the display of ice effects in MSFS 2020, it was not possible to separate the ice on the left nacelle from the ice on the right nacelle.*

Pitot, AofA Vane, and Static Port Anti-Ice System

The left and right pitot tubes, angle-of-attack vanes, and static ports (located on the aircraft's nose) contain heating elements to prevent ice accumulation that may lead to failures of critical aircraft systems and hazardous situations.

Heat is applied to the pitot tubes and angle-of-attack vanes by setting the left and right Pitot Heat Switches [1, fig. 5-4] to **ON**.



Two amber annunciators located on the copilot's fire panel [6-7, fig. 5-35] illuminate when the pitot tube heaters are turned off.

To heat the pitot tubes and the angle-of-attack vanes:

1. (Left or Right) Pitot Heat Switches [1, fig. 5-4] - **ON**.

To stop heating the pitot tubes and the angle-of-attack vanes:

1. (Left or Right) Pitot Heat Switches [1, fig. 5-4] - **OFF**.

The static port heaters are connected to the pitot heat circuit, but not to the Pitot Heat Switches. Therefore, static ports are heated as soon as the aircraft is powered.

***Note:** Because of limitations for the display of ice effects in MSFS 2020, it was not possible to separate the ice on the left pitot tube and angle-of-attack vane from the ice on the right pitot tube and angle-of-attack vane.*

20 SERIES FUEL SYSTEM

The fuel system in the GLJ Model 25 addon is very similar but not totally identical to the rather peculiar fuel system installed in the real aircraft. However, all the switches, gauges and annunciators are provided to emulate the real system as closely as possible and to simulate every procedure you would normally perform with the real aircraft. The differences between the addon and the real aircraft are fully explained in the following pages.

Like in the real Gates Learjet Model 25 aircraft, the addon's fuel system is divided into left and right tankage, each feeding the corresponding engine. It consists of two wingtip tanks, two wing tanks and a center fuselage tank.

Fuel Mixture (addon-related)

Releasing the throttles with the Throttle Release Levers [2, 4, fig. 5-43] opens the fuel valves, like in the real aircraft. During the engine startup cycle, when the fuel valves open and the fuel gets in contact with the igniters, the engines should start.

In MSFS however (like in FSX and Prepar3D), if the **fuel mixture** is not rich enough, the engines won't start. In the real world, jet engines don't require fuel mixture adjustments like piston engines. Unfortunately, the simulator seems to make no distinction and mixture control is available even for jet engines.

Make sure the fuel mixture is set to "**rich**" before starting the engines (by default, "**SHIFT+CTRL+.**" on your keyboard - shortcut may vary depending on your MSFS settings). You can also use the mixture lever on your physical throttle quadrant or controller, if available.

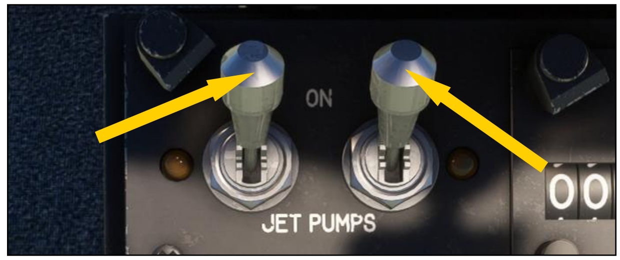
Note (1): *You may program your own keyboard shortcut to set the mixture rich in "MSFS > Options > Control Options > Keyboard tab >* ***Set Mixture Rich****".*

Note (2): *Setting the automixture to* ***ON*** *in "MSFS > Options >* Assistance Options > *Aircraft Systems >* ***Automixture****" seems to have no effect.*

Note (3): *In this software version, we have programmed the Throttle Release Levers [2, 4, fig. 5-43] to set the mixture rich before they open the fuel valves when actuated. This should take care of this issue.*

Fuel Pumps

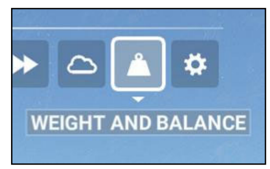
While the real aircraft uses pumps to assist in emptying the wingtip tanks and the center tank into the main wing tanks, the GLJ Model



25 addon uses mainly gravity. However, the addon is also equipped with two fuel pumps to assist transferring fuel from the tanks to the power plants. Two switches [11-12, fig. 5-45] are provided on the addon's fuel panel to energize the fuel pumps, one for each engine.

In the real aircraft: *The top half-part of each wingtip tank will gravity flow into the wing tank automatically. An ejector-type jet pump in each wingtip tank is used to transfer the remaining wingtip tank fuel into the respective wing tank.*

Refueling



In both the addon and the real aircraft, refueling is performed through a filler cap on top of each wingtip tank. In the simulator, refueling is achieved through the "**Weight and Balance**" panel or by requesting a fuel truck ("**SHIFT+F**" or via **ATC**) in certain parking areas. Refer to your simulation platform's documentation for more details.

See also "**Flight Planning**", in section 7.

Wingtip Tanks

Like the real aircraft, the addon is equipped with two wingtip tanks. Both tanks have a fuel jettison system at the rear. The right wingtip tank has a recognition light installed in the nose and a capacity of **1,195 pounds**

of fuel. The left wingtip tank may or may not have a recognition light installed in the nose (user-selectable) and has a capacity of **1,195** or **1,235 pounds** of fuel.

Tip

- The left wingtip tank's capacity is preset to **1,195 pounds** of fuel by default. You may increase the quantity of fuel in the left wingtip tank to 1,235 pounds (184.3283 gallons) if you decide to remove the recognition light in the nose of the left wingtip tank by editing the "flight_model.cfg" in the add-on aircraft package. *We do not recommend editing the flight model unless you know what you are doing.*

Fuel is automatically transferred from each wingtip tank into its respective wing tank. The totality of the fuel in the wingtip tank can be jettisoned through a valve in the tank's tail cone (see next page).

Wing Tanks

The wing is divided by a center bulkhead into two separate compartments which serve as sealed, full span, integral fuel tanks. Fuel is not stored in the landing gear wheel well and in the wing leading edge area. By default, the left engine uses fuel from the left-wing tank and the right engine uses fuel from the right-wing tank. Each wing tank has a capacity of **1,160 pounds** of fuel.

Center Fuselage (Storage) Tank

The center fuselage tank is used as a storage tank in both the addon and the real aircraft. The fuselage tank has a capacity of **1,305 pounds** of fuel.

A Fuselage Tank Switch [6, fig. 5-45] is provided on the addon's fuel panel to feed both engines with fuel contained in the fuselage tank when fuel in the wing tanks is critically low.

Because of limitations in the current software version, the addon's Fuselage Tank Switch cannot be used to pump fuel from the center fuselage tank into the wing tanks, like in the real aircraft. The Fuselage Tank Switch is used to directly connect both engines to the center fuselage tank instead. Like a real Learjet pilot, the desktop pilot must constantly monitor fuel in the wing tanks to prevent engine starvation.

The Fuselage Tank Switch must be set to **XFER** when the fuel in the main wing tanks is critically low. Switching from the main wing tanks to the center fuselage tank is not done automatically and must be performed manually, which is like the fuel transfer procedure in the real aircraft. The "Low Fuel Remaining" annunciator [2, fig. 5-32a] will illuminate when there is less than 50 gallons (approx. 335 pounds) of fuel in either wing tank - or in the center fuselage tank if the Fuselage Tank Switch is set to **XFER**.

In the real aircraft: *The fuselage tank consists of four bladder-type cells. Like in the addon, the fuselage tank is only a storage tank, and fuel must be pumped into the wing tanks for use by the engines. This is done by setting the Fuselage Tank Switch to XFER.*

Crossfeed

A Crossfeed Valve Switch (labeled "Crossflow") [3, fig. 5-45] and two Standby Pump Switches [8-9, fig. 5-45] are provided on the addon's fuel panel for cross-feeding fuel from one wing tank to the opposite engine or to both engines. In this case, the unused tank is "isolated" from its power plant.

This may be used to balance fuel between the two wing tanks or during single engine operation.

The Crossfeed Valve Switch cannot be used to transfer fuel from one wing tank into the other, like in the real aircraft.

Note: *Crossflow between tanks is not available in this software version.*

In the real aircraft: *A crossflow valve is provided to balance fuel between the two wing tanks, especially in case of single engine operation. The crossflow valve is used in conjunction with the two standby (boost) pumps. During cross-flowing, the Crossflow Switch is set to OPEN while the Standby Pump Switch for the heavy wing is turned ON and the standby pump switch for the light wing is turned OFF.*

Fuel Jettison

The GLJ Model 25 addon is equipped with a fuel jettison system [1, fig. 5-45]. The fuel jettison system will jettison fuel from the wingtip tanks only, like in the real aircraft. It takes a few minutes to empty both wingtip

tanks, depending on the remaining fuel. Fuel jettisoning can be interrupted at any time and will stop automatically when both wingtip tanks are empty. Fuel cannot be jettisoned from the wing tanks or from the center fuselage tank.

Note: *Due to some limitations in MSFS, fuel will first be jettisoned from the left wingtip tank, then from the right wingtip tank. The pilot will need to compensate for the fuel imbalance until both tanks are emptied.*

In the real aircraft: *The fuel jettison system is applicable to the wingtip tanks only. Both wingtip tanks are emptied simultaneously. It takes about five minutes to empty both wingtip tanks. Very few Learjet 25D are equipped with a fuel jettison system because fuel is burned so quickly on this type of aircraft that fuel jettisoning is almost never required.*

Fuel System Limitations

- **Maximum ramp weight:** 15,500 lbs.
- **Maximum takeoff weight:** 15,000 lbs.
- **Maximum landing weight:** 13,300 lbs.
- **Zero fuel weight:** 11,400 lbs. including everything except fuel.
- **Maximum altitude with no jet or standby pumps:** 25,000 ft.
- **If fuel temperature is -30° C or below:** Do not take off!
- **Maximum wingtip tank landing weight:** 800 lbs. for each tank
- Do not cross feed with Jet Pumps inoperative!
- With Low Fuel Remaining Annunciator [2, fig. 5-32a] ON, limit nose up attitude to a maximum of 25 degrees.

Fuel System Controls, Gauge, Lights and Annunciators

Left and Right Jet Pump Switches (Electric Fuel Pump Switches in MSFS)
[11-12, fig. 5-45]

The two Jet Pump Switches control the motive flow valves and allow motive flow to their respective wingtip tank and wing tank (all aircraft) jet pumps. They should always be in the **ON** position. These two switches control the electric fuel pumps in the simulator. There is one fuel pump for each engine. The Low Fuel Pressure Annunciators [1, 4, fig. 5-32a] should go out when the fuel pumps are operating.

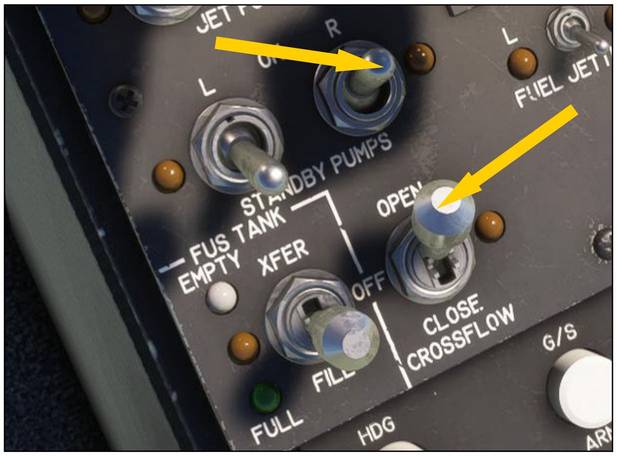
Left and Right Jet Pump Flow Valve Lights
[10, 13, fig. 5-45]

These two amber lights next to the Jet Pump Switches monitor the position of their respective motive flow valve. If the position of the valve does not correspond to the position of the switch, the light will come on. It is normal for the light to come on for about one second when the Jet Pump Switch is set, indicating that the motion flow valve is in transit.

Left and Right Standby (Boost) Pump Switches
[8-9, fig. 5-45]

The two Standby Pump Switches control the boost pumps. They are normally set to **OFF** except during cross-feeding or in the case of a jet pump failure. Regardless of the position of the switches, the boost pumps will be automatically energized when the fuselage tank switch [6, fig. 5-45] is set to **FILL** or when the starter engaged (the boost pumps supply fuel during engine starts) and de-energized when the fuselage tank switch is set to **XFER**.

To feed both engines with fuel from the left-wing tank only, set the Crossflow Switch [3, fig. 5-45] to **OPEN** (see below). Then set the



Left Standby Pump Switch to **ON,** and the Right Standby Pump Switch to **OFF**. This will isolate the right-wing tank and both engines will be fed by the left-wing tank.

To feed both engines with fuel from the right -wing tank only, set the Crossflow Switch to **OPEN** (see above). Then set the Left Standby Pump Switch to **OFF,** and the Right Standby Pump switch to **ON**. This will isolate the left-wing tank, and both engines will be fed by the right-wing tank.

Left and Right Standby (Boost) Pump Flow Valve Lights

These two amber lights next to the Standby Pump Switches [8-9, fig. 5-45] monitor the position of their respective motive flow valve. If the position of the valve does not correspond to the position of the switch, the light will come on. It is normal for the light to come on for about one second when the Standby Pump Switch is set, indicating that the motion flow valve is in transit.

Low Fuel Pressure Annunciators
[1, 4, fig. 5-32a]

These two red annunciators, marked L FUEL PRESS and R FUEL PRESS, indicate low engine fuel pressure below 10 psi. (one for each engine). They should go OFF when the jet pumps or the standby (boost) pumps are operating, or after the engines have started.

Low Fuel Remaining Annunciator
[2, fig. 5-32a]

This red annunciator, marked LOW FUEL, will illuminate when there is less than 50 gallons (approx. 335 pounds) of fuel in either wing tank - or in the center fuselage tank, if the Fuselage Tank Switch [6, fig. 5-45] is set to **XFER**. When there is less than 300 pounds of fuel in either wing tank and the annunciator is illuminated, it is time to switch to the center fuselage tank by turning the Fuselage Tank Switch to **XFER**.

Crossflow Switch (Crossfeed Switch in the simulator)
[3, fig. 5-45]

In the real aircraft, this switch, marked CROSSFLOW, controls the crossflow valve allowing fuel to flow between the wing tanks. In the addon, this switch controls the crossfeed valves which allow fuel from one wing tank to feed the opposite engine or both engines by “isolating” the other wing tank.

Note: *The CROSSFLOW Switch cannot be used to transfer fuel from one wing tank into the other in this software version, like in the real aircraft.*

The Crossflow Switch must be used in conjunction with the two Standby Pump Switches [8-9, fig. 5-45] (see above).

To crossfeed fuel from the left-wing tank to both engines, the Crossflow Switch must be set to **OPEN,** and the Left Standby Pump Switch must be set to **ON** while the Right Standby Pump Switch is set to **OFF** (this will isolate the right tank and feed both engines from the left-wing tank).

To crossfeed fuel from the right-wing tank to both engines, the Crossflow Switch must be set to **OPEN,** and the Left Standby Pump Switch must be set to **OFF** while the Right Standby Pump Switch is set to **ON** (this will isolate the left tank and feed both engines from the right-wing tank).

This technique can be used to balance fuel between the two wingtip/wing tanks by feeding both engines from the heavy side until balance is achieved. It can also be used for single-engine operation (cross-feeding fuel to one engine only, if only one engine is running).

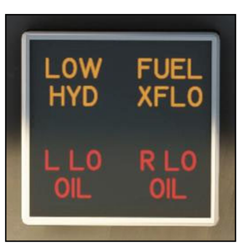
To stop cross-feeding fuel, the Crossflow Switch and the two Standby Pump Switches must be returned to **OFF**.

Crossfeed will not occur if both Standby Pump Switches are set to **ON** to prevent isolating both wing tanks which would cause engine starvation. **Do not crossfeed fuel if the Jet Pumps are inoperative as engine starvation may also occur.**

Crossfeed will not occur either if the Fuselage Tank Switch [6, fig. 5-45] is not in the **OFF** (middle) position.

Crossflow Valve Light (Crossfeed Valves Light in the simulator)
[2, fig. 5-45]

In the simulator, this amber light indicates that the crossfeed valves are in transit. It is normal for this light to come on for about one second when the Crossflow (crossfeed) Switch is moved.



Crossflow Valve OPEN Annunciator (Crossfeed Annunciator in the simulator)
[7, fig. 5-39]

In the simulator, this annunciator, located on the copilot's instrument panel and marked FUEL XFLO, indicates that the crossfeed valves are positioned for cross-feeding fuel from one wing tank to one or to both engines.

Fuselage Tank Switch
[6, fig. 5-45]

In both the addon and the real aircraft, the fuselage tank is used as a storage tank only. In the real aircraft, fuel from the center fuselage tank must be pumped into the wing tanks to be used by the engines. In the simulator, due to limitations in this software version, fuel must be ***transferred*** from the fuselage tank to the engines directly, without passing through the wing tanks.

By default, the left engine uses fuel from the left-wing tank and the right engine uses fuel from the right-wing tank (fuel is automatically transferred from each wingtip tank into its respective wing tank). In the addon, the Fuselage Tank Switch is used to feed the engines from the center fuselage tank when fuel in the main wing tanks is critically low.

When the Fuselage Tank Switch is set to **XFER**, both engines are fed from the center fuselage tank. In this software version, the addon's Fuselage Tank Switch cannot be used to transfer fuel from the center fuselage tank into the wing tanks, like in the real aircraft. The Fuselage Tank Switch is used to connect the engines to the center fuselage tank directly.

In the real aircraft, the switch is also used during filling of the center fuselage tank. The standby (boost) pumps automatically fill the fuselage tank when the Fuselage Tank Switch is set to **FILL**. This is normally done on the ground with both engines shut off during servicing and rarely in flight for CG considerations. When the tank is full, the pumps stop automatically, and fuel is no longer transferred. In the addon, setting this switch to **FILL** has no special function except for monitoring if the center fuselage tank is full. Both engines will still be connected to their respective wing tank when the Fuselage Tank Switch is set to **FILL**.

Note: *In both the addon and the real aircraft, refueling is accomplished through a filler cap on top of each wingtip tank. In the simulator, refueling is achieved through the "**Weight and Balance**" panel or by requesting a fuel truck ("**SHIFT+F**" or via **ATC**) in certain parking areas. Refer to your simulation platform's documentation for more details. See also "**Flight Planning**", in section 7.*

In the addon, engines are fed from their respective wing tank when the Fuselage Tank Switch is set to **OFF**: The left engine is fed from the left-wing tank, and the right engine is fed from the right-wing tank. The Fuselage Tank Switch is set to **OFF** by default at the beginning of each flight and should remain in the **OFF** position until the fuel level in the wing tanks is critically low (below 300 pounds typically). When this happens, the Fuselage Tank Switch must be positioned to **XFER** for the engines to be fed from the center fuselage tank. Switching from the wing tanks to the fuselage tank is not done automatically and must be performed manually by the desktop pilot, a procedure similar to transferring fuel from the fuselage tank into the wing tanks in the real aircraft.

Known Issue: *The addon's fuel panel uses its own custom variables which to this date are still not entirely kept by the simulator when a flight is saved. For example, if the engines were both fed by the fuselage tank when the flight was saved (Fuselage Tank Switch set to **XFER**), settings will return to their default state when the flight is reloaded. In this case, the Fuselage Tank Switch will return to its default **OFF** position and the engines will be fed by their respective wing tank until the switch is returned to **XFER** again. Therefore, it is important **to leave some fuel in the wing tanks** before switching to the center fuselage tank to avoid engine starvation. This should be done as a standard procedure.*

*By default, the Fuselage Tank Switch is set to **OFF** at the beginning of each flight, allowing both wing tanks to be selected and to feed their respective engine. If the engines were both fed by the fuselage tank when a flight was saved (Fuselage Tank Switch set to **XFER**), settings will return to their default state when the flight is reloaded. In this case, the Fuselage Tank Switch will return to its **OFF** position and the engines will be fed by their respective wing tank until the switch is returned to **XFER**. Again, it is important **to leave some fuel in the wing tanks** before switching to the center fuselage tank to avoid engine starvation. This should be done as a standard procedure.*

Fuselage Tank Full Light
[4, fig. 5-45]

When the Fuselage Tank Switch is set to **FILL**, this green light will come on if the center fuselage tank is full. This light is off when the Fuselage Tank Switch is set to **OFF** or to **XFER**.

Fuselage Tank Empty Light
[7, fig. 5-45]

When the Fuselage Tank Switch is set to **XFER**, this white light will come on if the center fuselage tank is empty. This light is off when the Fuselage Tank Switch is set to **OFF** or to **FILL**.

Fuselage Tank Valves (unmarked) Light
[5, fig. 5-45]

This amber light indicates that the fuselage tank valves are in transit. It is normal for this light to come on for about one second when the Fuselage Tank Switch is moved.

Fuselage Tank Transfer Pump ON Annunciator
[26, fig. 5-32b]

This annunciator, located in the main annunciator panel and marked FUEL XFR, indicates that the fuselage tank transfer pump is operating. In the simulator, this indicates that the engines are fed from the center fuselage tank.

Fuel Counter and Reset Button
[14-15, fig. 5-45]

This counter, often called a “fuel totalizer”, indicates the total amount of fuel burned (in pounds) since the last engine start or reset. The reset button, when depressed, resets the counter to zero. The counter should be reset to zero before starting the first engine. The counter is powered by the main DC bus.

Fuel Tank Selector Knob
[16, fig. 5-45]

This selector knob enables the pilot to read the remaining fuel quantity in each tank as well as the total system quantity, on the Fuel Quantity Gauge [17, fig. 5-45].

Note: *This knob is not a fuel tank selector switch to assign fuel tanks to engines. It is used in conjunction with the Fuel Quantity Gauge only to select the tank for which the remaining fuel quantity can be read on the gauge.*

Fuel Quantity Gauge
[17, fig. 5-45]

This gauge indicates the remaining fuel quantity (as weight) for the selected tank or for the total system in increments of 100 pounds and should be constantly monitored. Tank selection is made by rotating the Fuel Tank Selector Knob [16, fig. 5-45]. The gauge is powered by the main DC bus.

Fuel Jettison Switch
[1, fig. 5-45]

When set to **ON**, this switch is used to jettison fuel from the wingtip tanks only. It takes a few minutes to empty both wingtip tanks, depending on the remaining fuel. Fuel jettisoning can be interrupted at any time and will stop automatically when both wingtip tanks are empty. Fuel cannot be jettisoned from the wing tanks or from the center fuselage tank.

Note: *Due to some limitations in MSFS, fuel will first be jettisoned from the left wingtip tank, then from the right wingtip tank. The pilot will need to compensate for the fuel imbalance until both tanks are emptied.*

Fuel Jettison Lights (both sides of the Fuel Jettison Switch)

These amber lights, adjacent to the Fuel Jettison Switch, indicate that the fuel jettison valves are energized (and that fuel is being jettisoned). They will go off when the tanks are emptied.

FUEL SYSTEM PROCEDURES

Refueling

1. Battery switches [8-9, fig. 5-30] (or external power source) - **ON**.

2. All circuit breakers - Check **DEPRESSED**.

3. Fuselage Tank Switch [6, fig. 5-45] - **FILL**.

Note: *In both the addon and the real aircraft, refueling is accomplished through a filler cap on top of each wingtip tank. In the simulator, refueling is achieved through the “**Weight and Balance**” panel or by requesting a fuel truck (“**SHIFT+F**” or via **ATC**) in certain park-*

ing areas. Refer to your simulation platform's documentation for more details. See also "Flight Planning", in section 7.

4. After the fuselage tank is full as desired (the green Fuselage Tank Full Light [4, fig. 5-45] will come on when the fuselage tank is full), set the Fuselage Tank Switch to **OFF**. The green Fuselage Tank Full Light will come off.

In the real aircraft: *During fuselage fill, the crossflow valve will open, both standby (boost) pumps will turn on and the fuselage transfer valve will open. When the fuselage tank is full, the crossflow valve will close, both standby pumps will turn off and the fuselage transfer valve will be closed automatically. The green Fuselage Tank Full Light will come on until the Fuselage Tank Switch is set to **OFF**.*

Preflight

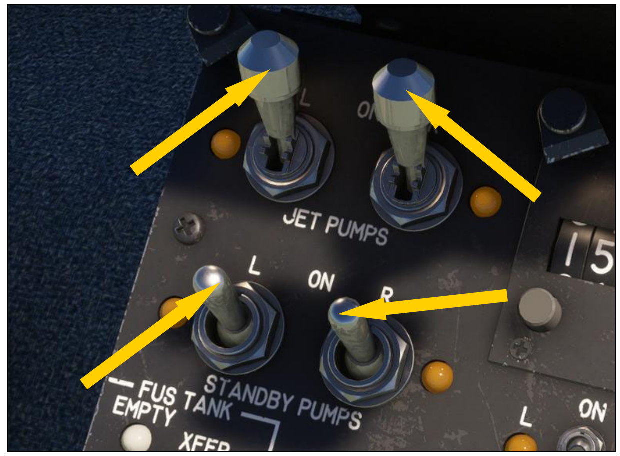
1. Left Jet Pump Switch [11, fig. 5-45] - **ON** and watch for the amber Motive Flow Valve Light [10, fig. 5-45] beside the Left Jet Pump Switch to come on and then off while the motive flow control valve is in transit. Check that the left Low Fuel Pressure Annunciator [1, fig. 5-32a] goes out.

2. Left Jet Pump Switch - **OFF** and watch for the amber Motive Flow Valve Light beside the Left Jet Pump Switch to come on and then off while the motive flow control valve is in transit.

3. Right Jet Pump Switch [12, fig. 5-45] - **ON** and watch for the amber Motive Flow Valve Light [13, fig. 5-45] beside the right Jet Pump Switch to come on and then off while the motive flow control valve is in transit. Check that the Right Low Fuel Pressure Annunciator [4, fig. 5-32a] goes out.

4. Right Jet Pump Switch - **OFF** and watch for the amber Motive Flow Valve Light beside the Right Jet Pump Switch to come on and then off while the motive flow control valve is in transit.

5. Left Standby Pump Switch [9, fig. 5-45] - **ON**, check that the Left Low Fuel Pressure Annunciator [1, fig. 5-32a] goes out.



6. Left Standby Pump Switch - **OFF**.

7. Right Standby Pump Switch [8, fig. 5-45] - **ON**, check that the Right Low Fuel Pressure Annunciator [4, fig. 5-32a] goes out.

8. Right Standby Pump Switch - **OFF**.

9. Left Jet Pump Switch [11, fig. 5-45] - **ON**.

10. Right Jet Pump Switch [12, fig. 5-45] - **ON**.

11. Crossflow (Crossfeed) Valve Switch [3, fig. 5-45] - **OPEN** and check for the amber in-transit light beside the Crossflow Valve Switch [2, fig. 5-45] to come on and then off while the crossflow valve is in transit.

12. Crossflow (Crossfeed) Valve Switch - **CLOSE**.

13. If the fuselage tank is full, set the Fuselage Tank Switch [6, fig. 5-45] to **FILL** and check for the green Fuselage Full Light [4, fig. 5-45] to come on. Then turn the switch to **OFF** and the green light will come off.

Engine Start (same for both engines)

1. When the Starter Generator Switch [6, 11, fig. 5-30] is set to **START**, the motive flow control valve closes, the standby pump is energized, and ignition is armed. When the throttle [1, 3, fig. 5-43] is **released** and set to **IDLE**, ignition

comes on and fuel flow is obtained. When the Starter Generator Switch is set to **GEN**, the motive flow control valve opens, the standby pump is de-energized, ignition goes off, the generator comes on and the Low Fuel Pressure Annunciator [1,4, fig. 5-32a] remains out.

Takeoff

1. Both Jet Pump Switches [11-12, fig. 5-45] - Check **ON**.
2. Both Standby Pump Switches [8-9, fig. 5-45] - Check **OFF**.
3. Crossflow (Crossfeed) Valve Switch [3, fig. 5-45] - Check **CLOSE**.
4. Fuselage Tank Switch [6, fig. 5-45] - Check **OFF**.
5. Both Air Ignition Switches [1, 16, fig. 5-29] - **OFF**, except if required *(see "Normal Procedures and Check Lists" in section 8)*.

Cruise

To switch from the wing tanks to the center fuselage tank when the remaining fuel quantity in either wing tank is below 300 pounds and the red Low Fuel Remaining Annunciator [2, fig. 5-32a] is illuminated, proceed as follows:

1. Fuselage Tank Switch [6, fig. 5-45] - **XFER**. If there is more than 50 gallons of fuel (about 335 pounds) remaining in the center fuselage tank, the red Low Fuel Remaining Annunciator will go out. The green Fuselage Tank Transfer Pump ON Annunciator [26, fig. 5-32b] will illuminate, indicating that the fuselage tank transfer pump is operating and that both engines are fed from the center fuselage tank.

Note: *This procedure is similar to transferring fuel from the fuselage tank into the wing tanks, like in the real aircraft.*

Crossfeed

To balance fuel between wing tanks, proceed as follows:

1. Fuselage Switch [6, fig. 5-45] - **OFF**.
2. Crossflow Valve Switch [3, fig. 5-45] - **OPEN**.

To crossfeed fuel from the left-wing tank (heavy side) to both engines:

3. Left Standby Pump Switch [9, fig. 5-45] - **ON**.
4. Right Standby Pump Switch [8, fig. 5-45] - **OFF**.

To crossfeed fuel from the right-wing tank (heavy side) to both engines:

3. Left Standby Pump Switch [9, fig. 5-45] - **OFF**.
4. Right Standby Pump Switch [8, fig. 5-45] - **ON**.

Monitor fuel balance between tanks as it takes little time for fuel to balance unless out of balance by large amounts.

5. When the wing tanks are balanced, set both Standby Pump Switches to **OFF**.
6. Crossflow Valve Switch - **CLOSE**.

Note: *In this software version, the Crossflow Switch cannot be used to transfer fuel from one wing tank into the other.*

Single Engine Operation

To crossfeed fuel to the operating engine, proceed as follows:

1. Fuselage Tank Pump Switch [6, fig. 5-45] - **OFF**.
2. Crossflow Valve Switch [3, fig. 5-45] - **OPEN**.
3. Standby Pump Switch [8 or 9, fig. 5-45] of operative engine - **OFF**.
4. Standby Pump Switch [8 or 9, fig. 5-45] of inoperative engine - **ON**.

AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS)

The GLJ Model 25 addon is equipped with an automatic flight control system (AFCS) that consists of a modified J.E.T. FC-110 autopilot and a modified Collins FD-108 Integrated Flight System (flight director). Both units have been modified from the ones installed in the real aircraft because of software limitations in MSFS, but also for the desktop pilot to benefit from additional AP/FD modes that are available in the simulator, but not available in the real aircraft (refer to the comparison table on pages 46-49, at the end of this section, for more details).

Important

- Please be aware that some optional third-party navigation systems (GPS/GNS) may interfere with the basic MSFS autopilot that is used in the GLJ Model 25 add-on aircraft and change the behavior of some of the autopilot modes described in the following pages. In some cases, modifications to the autopilot "model behaviors" might be required (see appendix 2). In doubt, refer to the documentation included with your third-party navigation system and/or contact the developer for more information. **Xtreme Prototypes cannot provide technical assistance for third-party addons.**

Autopilot

The autopilot (AP) reduces the pilot's workload by flying the airplane to and maintaining desired altitudes, attitudes, and headings. It can also capture and track VOR/ILS radio signals, among other functions.

The modified J.E.T. FC-110 autopilot installed in the GLJ Model 25 addon can:

- Level the wing so that the airplane does not turn
- Maintain a selected altitude
- Maintain a selected rate of climb or descent
- Maintain the aircraft's current pitch attitude
- Maintain a selected heading
- Follow a VOR radial
- Track a localizer or localizer back course
- Track the localizer and glide slope of an instrument landing system (ILS)
- Track a GPS course (and waypoints)
- Assist the pilot during takeoff and go-around (TO/GA)
- Maintain a selected airspeed or Mach number
- Remove unwanted yaw (yaw damping)
- React in case of an overspeed or stall condition by automatically pulling or pushing the stick

The flight controller (FC-110 control panel) [fig. 5-46] is mounted in the center pedestal, below the fuel panel. The system requires AC, DC, and avionics power: Battery [8-9, fig. 5-30] and/or Generator Switches [6, 11, fig. 5-30] **ON**, Inverter Switches [10, 12, fig. 5-29] **ON**, and Master Radio (Avionics) Switch [14, fig. 5-29] **ON**.

The flight controller contains several mode buttons, the Autopilot Engage Button, the ON/OFF lights, the Turn Command Knob, and the Pitch Command Wheel. Yaw damper ON/OFF buttons are also included. The dual yaw damper system is independent from the autopilot and additional controls are available in the yaw damper panel in the center pedestal, below the flight controller [fig. 5-47].

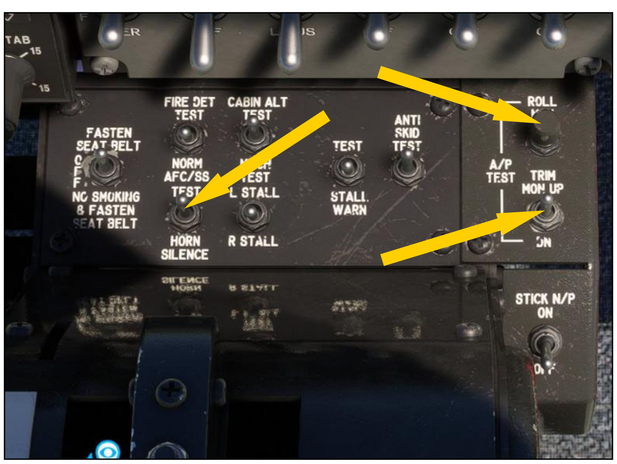
Autopilot effort indicators, normally installed on the main instrument panel in front of the pilot, are not available in MSFS and have been replaced by surface trim indicators [1-3, fig. 5-14; 3-4, 11, fig. 5-47].

In the real aircraft, the autopilot controls are separate from the flight director's controls. In the GLJ Model 25 addon, the autopilot modes are interrelated with the flight director modes to comply with the way the autopilot and the flight director work together in the simulator. Additional AP/FD modes are available by depressing Korry switches located on the main instrument panel [fig. 5-22a/b].

A NAV/GPS Switch [13, fig. 5-22b] is provided on the main instrument panel for selecting which navigation signal - either from the NAV1 radio or from the installed navigation system (GPS/GNS) - is sent to the AFCS.

Autopilot Test Switches

Switches are provided on the center pedestal, between the main instrument panel and the throttle quadrant, to test the autopilot. These switches are functional and can be used to simulate standard procedures.



AFC/SS (Autopilot/Stability System) Test Switch
[11, fig. 5-43]

In the simulator, this 3-position switch, when set to the AFC/SS position, is used to test the bulbs in all the AFCS and flight director lights and annunciators. In the real aircraft, it also tests the AFCS stability system.

Autopilot Roll Monitor Test Button
[18, fig. 5-43]

This button, marked ROLL MON, is used to test the autopilot disengage function when an improper electrical signal is introduced to the roll function. The button has two positions: hold to TEST and a spring-loaded OFF position. In the simulator, pushing this button to **TEST** will disengage the autopilot.

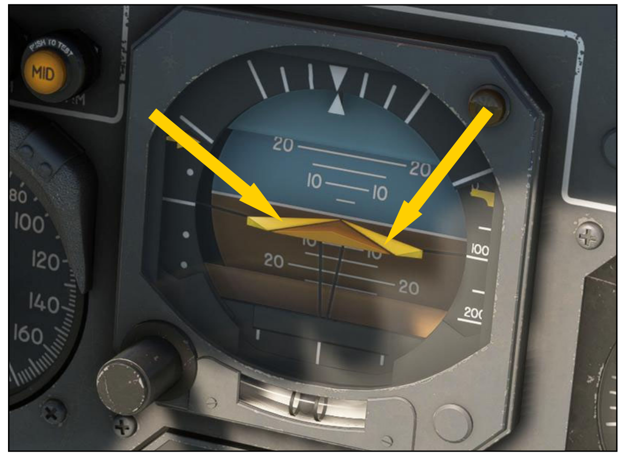
Autopilot Pitch Trim Monitor Switch
[19, fig. 5-43]

This 3-position switch, marked TRIM MON UP/DN, is used to test the autopilot disengage function when an improper electrical signal is introduced to the pitch function. The switch is spring-loaded to the middle **OFF** position. In the simulator, setting this switch to **UP** or **DN** will disengage the autopilot.

Flight Director

The flight director (FD) helps the pilot do manually what the autopilot would do if it were engaged. It provides visual commands to the pilot to manually maintain a desired attitude, capture and maintain a desired heading, capture and maintain a desired VOR course, and capture and maintain an ILS course and glide path.

The flight director requires the pilot to select an operating mode. With the flight director turned ON and autopilot modes selected - but the autopilot not engaged - the flight director shows what the autopilot would do if it were engaged. When both the flight director and the autopilot are engaged, the flight director shows what the autopilot is doing.



The modified Collins FD-108 Integrated Flight System (flight director) installed in the GLJ Model 25 addon includes:

- A flight director power switch [2, fig. 5-22a]
- An attitude director indicator (ADI) [fig. 5-7]
- A horizontal situation indicator (HSI) [fig. 5-8]
- Course [1, fig. 5-8] and heading [2, fig. 5-8] selector knobs located on the HSI
- A mode selector panel with Korry switches [fig. 5-22a/b]
- Two annunciator panels [fig. 5-6]
- A pitch sync and other buttons located on the control yokes [fig. 5-51]

The flight director provides indication of airplane heading on the HSI and roll and pitch attitude and sideslip on the ADI.

Two yellow flight director command bars on the ADI [4, fig. 5-7] - sometimes called chevron or V-bars - indicate deviation from the suggested heading and pitch attitude. The idea is to move the yoke to keep the orange chevron [3, fig. 5-7] (that represents the aircraft) nestled just under the yellow command bars. In other words, to follow the command bars or to keep them centered.

The aircraft should be maneuvered to satisfy the flight director's command bars on the ADI. However, the flight director may sometimes command a momentary large correction to an important deviation from the calculated attitude. The pilot should not follow these large variations implicitly but rather interpret them as advisory.

Remember: *You are still hand-flying the aircraft, so common sense still applies, and exaggerated attitudes should be avoided.*

The command bars are biased out of view when the flight director is not engaged. The basic attitude reference mode is energized when AC and DC power is applied to the airplane but with no AP/FD modes selected on the mode selector panel and on the flight controller.

The Flight Director Power Switch, marked FD, [2, fig. 5-22a] toggles the flight director ON and OFF.

Note: *If you suspect that the flight director is not giving you correct indications, you may have to reset the flight director by turning the switch to **OFF**, then back to **ON**.*

Attitude Director Indicator (ADI)

The attitude director indicator (ADI) [fig. 5-7] provides a visual representation of the airplane attitude, localizer and glideslope deviation, bank angle, and airplane slip or skid.

When the flight director is engaged, command bars on the ADI appear in view to provide the computed roll and pitch commands. These bars move up or down to command pitch, and clockwise or counterclockwise to command bank. The pilot must maneuver the airplane so that the fixed airplane symbol (the orange chevron) is "flown into" the yellow command bars and the two are aligned to satisfy the commands.

Pitch Scale Adjustment Knob
[15, fig. 5-7]

You may rotate this knob to adjust the pitch scale (attitude tape [5, fig. 5-7]) depending on your viewing angle.

Horizontal Situation Indicator (HSI)

The horizontal situation indicator (HSI) [fig. 5-8] displays airplane position and heading with respect to magnetic north, selected heading, slant range DME distance from a selected station, lateral deviation from a selected VOR or localizer course, and vertical deviation from the center of a glideslope beam.

Two controls are located on the HSI:

Heading Selector Knob
[2, fig. 5-8]

Rotating the HDG selector knob sets the yellow heading marker (bug) to the desired heading as read on the azimuth card.

NAV1 Course Knob
[1, fig. 5-8]

The COURSE selector knob rotates the course arrow to a magnetic heading and/or selects a VOR or localizer course tuned on the NAV1 radio.

Gyro Drift Compensation Switch, Directional Gyro Compensation Knob, and Directional Gyro Free/Slave Switch

By default, the direction indicators (HSI, RMI, directional gyro, etc.) in the cockpit of the GLJ Model 25 addon are configured to be slaved to an electro-magnetic slaved compass. This mode of operation normally requires no gyro drift correction on the part of the pilot and is used in areas where magnetic references are reliable. When this mode of operation is selected in MSFS (Directional Gyro Free/Slave Switch [9, fig. 5-5] set to **SLAVE**), it is still possible to make manual corrections by using the Gyro Drift Compensation Switch [8, fig. 5-5] or the Directional Gyro Compensation Knob [5, fig. 5-2]. In the real aircraft, this would only be possible when the switch is set to **FREE**.

Therefore, the Directional Gyro Free/Slave Switch has no special function in this software version, except to disengage the autopilot when clicked.

In "MSFS > Options > Assistance Options > **Aircraft Systems** pull-down menu", you may set "Gyro Drift" to **OFF** or **ON.** If set to ON, you will be required to make manual gyro drift corrections in areas where magnetic references are not reliable.

In the real aircraft: *The directional gyroscope in the real aircraft can operate in two modes: the SLAVE mode and the FREE mode. When the Directional Gyro Free/Slave Switch is set to SLAVE, the directional gyro is slaved to the magnetic flux valve for correcting the apparent gyro drift. When the switch is set to FREE, the pilot is free to make manual corrections with the Gyro Drift Compensation Switch (or the Directional Gyro Compensation Knob). The SLAVE position is the normal mode of operation in areas where magnetic references are reliable.*

Autopilot/Flight Director Buttons, Switches, Knobs, and Lights

While all the mode buttons in the real aircraft are solenoid engaged and stay depressed until canceled by other operations, the buttons in the GLJ Model 25 addon are of the **momentary type**. When the ENGAGE button or any mode button on the flight controller is depressed, a light inside the button will illuminate and extinguish when the mode is disengaged, like in the real aircraft.

A/P (Autopilot Engage) Button and Light [1, fig. 5-46]

When depressed, this (blue) button engages the autopilot, captures and maintains the aircraft's pitch attitude and levels the wing, like in the real aircraft.

This is a very convenient feature, especially after takeoff. With a nose up pitch of about 15 to 20 degrees and speed stabilized, you can engage the autopilot and it will capture and keep the aircraft's attitude and level the wing.

You can use the Autopilot Pitch Command Wheel [10, fig. 5-46] to control the pitch. You can also initiate a turn with the Autopilot Turn Command Knob [2, fig. 5-46] (this will disengage the wing leveler).

Please remember that when the autopilot is engaged, the pilot cannot control the aircraft. Either the autopilot is controlling the aircraft, or the pilot is. When the autopilot is engaged, it controls both pitch and roll, and the flight director displays both pitch and roll commands.

Important

- **The autopilot should never be used for takeoff.** If the autopilot was tested or engaged with one vertical mode selected prior to takeoff, always remember to turn it off and check the Elevator Trim Indicator [3, fig. 5-14; 11, fig. 5-47] for the correct takeoff position (about one needle thickness below center). When engaged with a vertical mode selected, while the aircraft is still on the ground, the autopilot will try to compensate by moving the horizontal stabilizer (elevator trim on the Learjet 25) out of range for takeoff to follow the flight director. If unnoticed, you may lose control of the aircraft during takeoff. For the same reason, do not attempt to control the aircraft manually with your controller while the autopilot is engaged. The autopilot will compensate by running the trim and could even disengage itself after hitting the trim limits. This may lead to very unpleasant situations.

Note: *It is good practice to verify that the heading bug, altitude select, and course select are properly set before engaging the au-*

topilot.

NAV/GPS Switch
[13, fig. 5-22b]

This switch, located on the main instrument panel, is used for selecting which navigation signal - either from the NAV1 radio or from the installed navigation system (GPS/ GNS) - is sent to the AFCS.

If the NAV/GPS Switch is set to **NAV**, the autopilot intercepts, captures and tracks the VOR course or localizer tuned on the NAV1 radio [fig. 5-19] and set on the course needle on the HSI [8, fig. 5-8].

If the NAV/GPS Switch is set to **GPS**, the autopilot will follow the programmed GPS course (from the installed navigation system) to each lateral waypoint in sequence. However, **the GPS does not provide vertical guidance** (glideslope) to the autopilot.

Note (1): *Like in the real aircraft, the autopilot/flight director cannot track signals coming from the NAV2 radio.*

Note (2): *The Course Deviation Indicator Button on the default MSFS GNS 530 [24, fig. 5-24b] has the same function as the NAV/GPS switch on the main panel.*

Turn Command Knob
[2, fig. 5-46]

With the autopilot engaged, this knob will command bank angles, but it will disengage any horizontal mode that was engaged before (HDG, NAV, APPR, REV CRS). It will also disengage the Wing Leveler. Use the mouse wheel to control the bank.

Note: *In the simulator, this knob controls the aileron trim.*

REV CRS (Reverse Course Approach Mode) Button and Light
[3, fig. 5-46]

The REV CRS Button engages the autopilot Reverse Course Approach mode, enabling automatic tracking of a localizer (or GPS) back course for instrument approaches. The navigation radio [fig. 5-19] must be tuned to a localizer frequency and when engaged, the function is like the APPR mode, except the glide slope is disabled and the autopilot's response to a localizer signal is **reversed.**

Depressing the REV CRS button will disengage the NAV and G/S modes and will turn on the flight director if the autopilot is disengaged.

Note: *In MSFS, the APPR Switch [11, fig. 5-22b] will be illuminated when the REV CRS mode is engaged. This is because the simulator recognizes the REV CRS mode as an approach mode.*

NAV (Navigation Hold Mode) Button and Light
[4, fig. 5-46]

The NAV Button is pressed to engage the autopilot Navigation Hold mode, the autopilot automatic tracking of a VOR course, GPS course, or localizer for navigation. If the NAV1/GPS Switch [13, fig. 5-22b] is set to **NAV**, the autopilot intercepts, captures and tracks the VOR course or localizer tuned on the NAV1 radio [fig. 5-19] and set on the course needle on the HSI [8, fig. 5-8]. If the NAV1/GPS Switch is set to **GPS**, the aircraft captures and tracks the course to the next GPS waypoint.

Engaging the NAV Hold mode will disengage the APPR and REV CRS modes. It will also turn on the flight director if the autopilot is disengaged.

HDG (Heading Hold Mode) Button and Light
[5, fig. 5-46]

The HDG Button is pressed to activate the Heading Hold mode of the autopilot. This mode commands the autopilot to turn the airplane as necessary and fly a heading selected by the position of the yellow heading bug on the HSI [2, 11, fig. 5-8].

In MSFS, this mode has priority over other horizontal modes including the NAV mode. It will also disengage the WING LEV, ATT, and REV CRS modes, and will engage the flight director if the autopilot is disengaged.

G/S ARM (Glideslope Tracking Mode) Button and Light
[6, fig. 5-46]

When the G/S ARM Button is pressed, the autopilot will capture and track the ILS glideslope signal. For the G/S mode to function, the NAV1 radio [fig. 5-19] must be tuned to a localizer frequency and an active glideslope signal must be present.

When a valid ILS signal is present on the NAV1 receiver, the system will intercept and capture the localizer path and the glideslope.

It is sometimes recommended that the interception be initiated on HDG Hold mode until a shallow interception angle is established.

For the autopilot to capture a glideslope, you must intercept it from below. Although it is possible to capture a glideslope from above, standard operating procedure is to intercept and capture glideslopes from below.

When the G/S mode is engaged, the NAV and REV CRS modes are disengaged. The APPR mode will also be disengaged if the coupled approach mode is disengaged (G/S mode only). The flight director will turn on if the autopilot is disengaged.

ALT (Altitude Hold Mode) Button and Light
[7, fig. 5-46]

The ALT Button engages the autopilot Altitude Hold mode. When engaged, the aircraft climbs/descends to the altitude set on the Altitude Preselector on the ADDU [2, fig. 5-11a] at the rate set with the Vertical Speed Selector Knob [1, fig. 5-12].

By varying the selected vertical speed, pitch control is obtained. Because the Learjet 25 has an amazing climb performance, power management during climb is very important. When the ALT Hold mode is engaged, the ATT mode is disengaged. The flight director will turn on if the autopilot is disengaged.

Autopilot OFF Light
[8 fig. 5-46]

The amber Autopilot OFF Light is illuminated anytime the AFCS is powered up with the autopilot not engaged.

Autopilot ON Light
[9, fig. 5-46]

The green Autopilot ON Light is illuminated when the autopilot is engaged with any pitch and/or roll mode engaged.

Pitch Command Wheel
[10, fig. 5-46]

When the autopilot is engaged and the Pitch Command Wheel is rotated, the autopilot will change the aircraft's pitch attitude in response to the pitch command rotation and will follow the flight director's pitch angle.

Primary Yaw Damper Buttons
[11-12, fig. 5-46]

The **YAW DAMPER ON** Button engages the primary yaw damper system which helps eliminate unwanted aircraft yaw and keeps turns coordinated. Depressing the **YAW DAMPER OFF** Button will disengage the primary yaw damper system.

The GLJ Model 25 addon is equipped with a dual (primary and secondary) yaw damper system, like in the real aircraft. Each system is completely independent and only one yaw damper system can be engaged at a time. To engage the primary yaw damper system, the Yaw Damper Selector Switch on the yaw damper panel [5, fig. 5-47] must be set to **PRI YAW DAMPER**. Selecting the secondary yaw damper system will disengage the primary yaw damper system.

Yaw Damper Selector Switch
[5, fig. 5-47]

The Yaw Damper Selector Switch on the yaw damper panel selects the primary yaw damp-

er system when set to **PRI YAW DAMPER** and the secondary yaw damper system when set to **SEC YAW DAMPER**. Only one yaw damper system can be engaged at a time.

Secondary (Emergency) Yaw Damper Switch
[6, fig. 5-47]

The Secondary Yaw Damper Switch on the yaw damper panel engages or disengages the secondary yaw damper system in case of emergency. To engage the secondary yaw damper, the Yaw Damper Selector Switch [5, fig. 5-47] must be set to **SEC YAW DAMPER**. Selecting the primary yaw damper will disengage the secondary yaw damper.

Autopilot Effort Indicators (Surface Trim Indicators in the simulator)
[1-3, fig. 5-14]

In the real aircraft, an autopilot effort monitor senses the autopilot output signals (forces being applied to the autopilot servo actuators). Autopilot effort indicators, normally installed on the main instrument panel in front of the captain, are not available in MSFS and have been replaced by surface trim indicators. We believe that installing surface trim indicators in front of the captain's seat

is much more convenient than at the bottom of the center pedestal, like in the real aircraft.

***Note:** This panel is essentially a repeater of the Trim Indicator Panel installed in the center pedestal [3-4, 11, fig 5-47].*

Important

- If the autopilot is engaged before takeoff with one vertical mode selected, the autopilot will move the horizontal stabilizer (elevator pitch trim on the Learjet 25) out of range for takeoff to follow the flight director. Prior to takeoff, **disengage** the autopilot and set the elevator trim correctly for takeoff - normally about one needle thickness below center [3, fig. 5-14]. **Do not engage the autopilot before takeoff**.

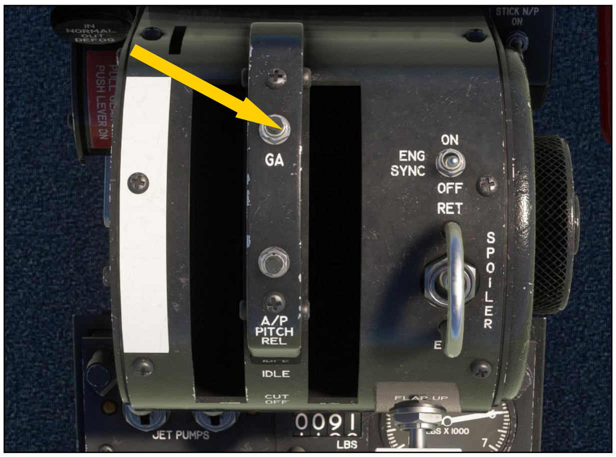
Autopilot Vertical Speed Selector Knob
[1, fig. 5-12]

The Autopilot Vertical Speed Selector Knob (and yellow bug) on the Vertical Speed Indicator (VSI) enables the selection of a climb/descent rate for the autopilot to use when climbing or descending to the altitude set on the Altitude Preselector [2, fig. 5-11a] when the ALT Hold mode (or the VS mode) is en-

gaged. By varying the selected vertical speed with the Autopilot Vertical Speed Selector Knob, pitch control is obtained. Because the Learjet 25 has an amazing climb performance, power management during climb is very important.

Note: *By default, vertical speed is set to 1,000 ft./min. when the ALT Hold mode is engaged, like in the real aircraft.*

GA (Takeoff/Go-Around) Button
[22, fig. 5-43]



Depressing the GA Button, located on top of the throttle quadrant, disengages all autopilot pitch, roll and speed modes, turns on the flight director and engages the autothrottle Takeoff/Go-Around (TOGA) mode. Throttles automatically advance to takeoff power, the WING LEV is engaged, vertical speed is set to 4,000 fpm, and the flight director indicates takeoff pitch. The pilot still has manual control of the pitch until the autopilot is engaged. The autopilot can be engaged after the aircraft has taken off and will follow the flight director's takeoff pitch.

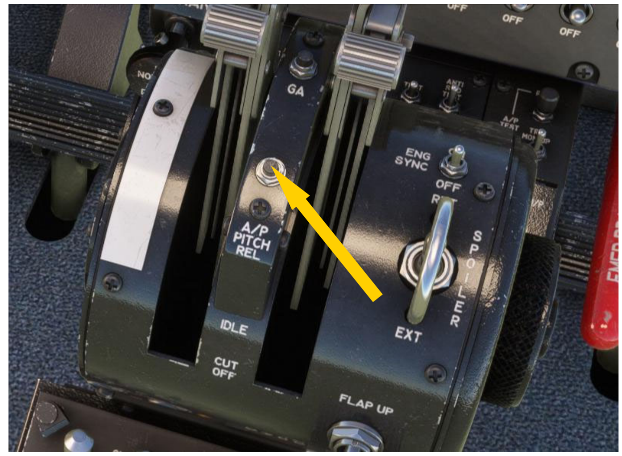
Releasing the button disengages the TO/GA mode, engages the autopilot, levels the wing, and captures and maintains the aircraft's pitch attitude. The TO/GA mode can be used for takeoff, or for a go-around on landing.

Note: *The autothrottle is not available in the real aircraft.*

Important

- The autopilot should never be engaged before depressing the GA button for takeoff. The elevator trim should always be checked and set correctly before takeoff.

A/P PITCH REL (Autopilot Pitch Release) Button
[24, fig. 5-43]



When depressed, this button, located on top of the throttle quadrant, disengages the autopilot pitch modes (ATT, ALT, APPR, G/S). Releasing the button engages the autopilot (if not already engaged), captures and maintains the aircraft's pitch attitude and engages the WING LEV.

Stick Nudger/Puller

Autopilot Stick Nudger/Puller Switch
[21, fig. 5-43]

This switch, marked STICK N/P, is used to toggle on/off the autopilot stick nudger (pusher)/puller. If this switch is set to **ON**, the autopilot will automatically push the stick in case of a stall condition or pull the stick in case of an overspeed condition. When the aircraft recovers from an overspeed or stall condition, the stick nudger/puller releases and the autopilot maintains the pitch attitude and levels the wing. The pilot may compensate with the Autopilot Pitch Command Wheel [10, fig. 5-46], if needed. By default, this switch is set to **OFF**.

Control Yoke Buttons

It’s never been easy to click small buttons on a moving yoke [fig. 5-51] while flying the aircraft in the simulator. However, you still have the option to program the switches and buttons on your controller (joystick/yoke) to trigger some of the actions described below, such as momentarily disconnecting the autopilot to retake control of the aircraft. Refer to the documentation included with your simulation platform and controller for instructions on how to assign simulator commands to buttons and switches on your controller.

Tip

- In MSFS, you can configure buttons on your joystick or yoke in the “Control Options” page (“MSFS > Options > Control Options > **Your joystick or yoke**”).

Four-Way Trim Switch (Pad)
[4, fig. 5-51]

In the real aircraft, with the autopilot engaged and the center arming button [3, fig. 5-51] momentarily depressed, this four-position switch (similar to a directional pad on a video game controller) is used to change the attitude of the aircraft - in pitch and roll - when the autopilot’s pitch and roll modes are disengaged. This switch is disabled in the simulator. However, buttons may be programmed on your controller for pitch and roll trim.

Trim Switch Arming Button
[3, fig. 5-51]

When this button is momentarily depressed, the autopilot and all pitch and roll modes are disengaged, allowing for manual control of the aircraft with the Four-Way Trim Switch. Releasing the button reengages the autopilot, levels the wing and maintains the aircraft’s pitch attitude.

Maneuver Control Button
[5, fig. 5-51]

Depressing this button momentarily disconnects the autopilot pitch and roll modes. Releasing the button reengages the autopilot, levels the wing and maintains the aircraft’s pitch attitude.

Pitch Sync Button
[6, fig. 5-51]

When depressed, this button disengages the autopilot pitch modes. Releasing the button reengages the autopilot, levels the wing and maintains the aircraft's pitch attitude.

AP/FD Mode Selector Panels (Korry Switches)

Additional autopilot/flight director modes are available by depressing Korry switches in the mode selector panel located on the main instrument panel [fig. 5-22a/b].

The light indicates that the mode is engaged.

Note: *Some switches have the same functions as the buttons on the flight controller (see pages 36-38, in this section).*

A/P (Autopilot Engage) Switch and Light
[1, fig. 5-22a]

Same as the A/P ENGAGE Button and Light [1, fig. 5-46] on the flight controller *(see page 36)*.

ALT (Altitude Hold Mode) Switch and Light
[3, fig. 5-22a]

Same as the ALT Hold Mode Button and Light [7, fig. 5-46] on the flight controller *(see page 38)*.

HDG (Heading Hold Mode) Switch and Light
[5, fig. 5-22a]

Same as the HDG Hold Mode Button and Light [5, fig. 5-46] on the flight controller *(see page 37)*.

NAV (Navigation Hold Mode) Switch and Light
[7, fig. 5-22a]

Same as the NAV Hold Mode Button and Light [4, fig. 5-46] on the flight controller *(see page 37)*.

G/S ARM (Glideslope Tracking Mode) Switch and Light
[9, fig. 5-22b]

Same as the G/S ARM Button [6, fig. 5-46] on the flight controller *(see page 38)*.

APPR (Coupled Approach Mode) Switch and Light
[11, fig. 5-22b]

The APPR Switch disengages the NAV mode and engages the autopilot Coupled (navigation plus glideslope) Approach mode or C/APPR, enabling automatic tracking of a VOR course, GPS course, localizer, and glideslope for instrument approaches. Localizer capture in the C/APPR mode is identical with the NAV mode. In addition, the C/APPR mode provides for glideslope arm and capture.

If the NAV1/GPS Switch on the main instrument panel [13, fig. 5-22b] is set to **NAV**, the autopilot intercepts, captures and tracks the VOR course, localizer and glideslope tuned on the NAV1 radio [fig. 5-19] and set on the course needle on the HSI [8, fig. 5-8]. If the NAV1/GPS Switch is set to **GPS**, the autopilot will follow the programmed GPS course to each lateral waypoint in sequence. However,

the GPS does not provide vertical guidance (glideslope) to the autopilot.

Engaging the C/APPR mode in the simulator will disengage the NAV mode and will turn on the flight director if the autopilot is disengaged.

In MSFS, the APPR Switch is illuminated when the REV CRS mode is engaged but not when the G/S mode is engaged. This is because the simulator recognizes the REV CRS mode as an approach mode. Following the same logic, the simulator does not recognize the G/S mode as a true approach mode.

When the APPR Switch is depressed, the G/S mode is also engaged in a **coupled approach** mode (C/APPR). Both the G/S and APPR switches are still illuminated.

This may be a bit confusing at first, but the logic makes sense.

When the APPR mode is engaged, the flight director is turned on if the autopilot is disengaged. When the APPR mode is disengaged, the G/S mode is disengaged.

The flight director NAV ARM (or NAV CAPT) and GS ARM (or GS CAPT) annunciators [fig. 5-6] are both illuminated when the C/APPR (Coupled Approach) mode is engaged.

Flight Director Switch and Light
[2, fig. 5-22a]

Toggles the flight director on/off. The flight director comes on automatically when some autopilot modes are engaged.

VS (Vertical Speed Hold Mode) Switch and Light
[4, fig. 5-22a]

This switch engages the Vertical Speed Hold mode that keeps and sets the aircraft's pitch based on the selected vertical speed. Pitch can be adjusted with the Vertical Speed Selector Knob [1, fig. 5-12] on the VSI.

ATT (Attitude Hold Mode) Switch and Light
[6, fig. 5-22a]

In MSFS, the ATT Hold Switch disengages the HDG and REV CRS modes and engages the Attitude Hold mode which keeps the aircraft's pitch at the state that existed when the switch was depressed. By turning the Pitch Command Wheel [10, fig. 5-46] you can control the pitch when the ATT Hold mode is engaged. Depressing the ATT Switch will also turn on the flight director (if the autopilot is disengaged) and level the wing.

REV CRS (Reverse Course Approach Mode) Switch and Light
[8, fig. 5-22a]

Same as the REV CRS Button and Light [3, fig. 5-46] on the flight controller *(see page 37).*

Note: *In MSFS, the APPR Switch [11, fig. 5-22b] will be illuminated when the REV CRS mode is engaged. This is because the simulator recognizes the REV CRS mode as an approach mode.*

WING LEV (Wing Leveler) Switch and Light
[10, fig. 5-22b]

The WING LEV Switch disengages the HDG, NAV, APPR and REV CRS modes and engages the Wing Leveler which keeps the aircraft's wing level. The Wing Leveler is engaged automatically when the autopilot and/or some AP/FD modes are engaged. The flight director is turned on when the WING LEV is engaged and the autopilot is disengaged.

SPD (Airspeed Hold Mode) Switch and Light
[12, fig. 5-22a]

This switch, when depressed, will engage the autopilot Airspeed Hold mode. The SPD Hold mode maintains the aircraft at the indicated

airspeed that existed when the switch was depressed. The SPD mode works at altitudes below 29,000 feet. Like in the real aircraft, above 29,000 feet, the autopilot will automatically switch to the Mach Hold mode if the SPD switch light is illuminated.

In MSFS, the SPD/Mach Hold functions are always assumed by the autothrottle.

Note: *The real Gates Learjet 20 Series aircraft were not equipped with an autothrottle for the autopilot Speed Hold mode (SPD), even though we are giving our users the option to use the autothrottle that is available in MSFS. We know purists may find this feature unrealistic in the case of the Learjet 25, but the vast majority of our users still appreciate the convenience of an autothrottle, especially when learning how to fly the aircraft when there is so much to do.*

In some of the real Learjet aircraft, the autopilot maintained speed by varying the aircraft's pitch. The "Speed Hold by Pitch" mode is not natively supported in MSFS and was not available in most Learjet 20 Series aircraft.

Flight Director Annunciators

The flight director annunciators are located on each side of the angle-of-attack indicators [fig. 5-6], in the upper section of both the captain's and copilot's instrument panels.

HDG (Heading Hold Mode) Annunciator
[4, fig. 5-6]

This white annunciator, when illuminated, indicates that the HDG Hold mode is engaged.

NAV ARM (Navigation Arm) Annunciator
[3, fig. 5-6]

In the simulator, this amber annunciator, when illuminated, indicates that one of the NAV/APPR/REV CRS modes is engaged, but that a course signal has not yet been captured. When course capture is achieved, the NAV ARM Annunciator will go off and the NAV CAPT Annunciator (below) will illuminate.

NAV CAPT (Course Capture) Annunciator
[2, fig. 5-6]

This white annunciator, when illuminated, indicates that course capture is achieved.

REV (Reverse Course Mode) Annunciator
[1, fig. 5-6]

This amber annunciator, when illuminated, indicates that the REV CRS mode is engaged.

GS ARM (Glideslope Arm) Annunciator
[6, fig. 5-6]

In the simulator, this amber annunciator, when illuminated, indicates that either the (coupled) APPR mode or the G/S mode is engaged, but that a glideslope has not yet been captured.

When the glideslope is captured, the GS ARM Annunciator will go off and the GS CAPT Annunciator (below) will illuminate. Glideslope capture is independent of localizer capture. Glideslope capture is possible when the aircraft is approaching the glideslope from below or from above the actual glideslope.

GS CAPT (Glideslope Capture) Annunciator
[7, fig. 5-6]

This white annunciator, when illuminated, indicates that glideslope capture is achieved.

EXT (Course and Glideslope Capture) Annunciator
[8, fig. 5-6]

This white annunciator, when illuminated, indicates that both navigation course and glideslope are captured.

GA (Takeoff/Go-Around Mode) Annuncia-

tor
[9, fig. 5-6]

This green annunciator, when illuminated, indicates that the Takeoff/Go-Around mode is engaged.

AP/FD OPERATION COMPARED TO THE REAL AIRCRAFT

The GLJ Model 25 addon uses the native basic autopilot and flight director that come with MSFS. While we have modified some of the logic that governs the interrelations between the different AP/FD modes of operation to make these systems comparable to the ones installed in the real aircraft, there are still some differences that persist. This is for the most part due to how the autopilot works in the simulator. Because of software limitations in MSFS, the new logic only applies to the AP/FD switches, buttons, and knobs in the virtual cockpit. The new logic won't apply to the simulator's keyboard shortcuts that have their own built-in logic.

If you prefer a mode of operation that is closer to the one with the real aircraft, we suggest that you use the controls in the virtual cockpit and not the keyboard shortcuts. If you prefer the default AP/FD logic from the simulator, you can use the keyboard shortcuts.

Below is a detailed comparison between the autopilot and the flight director in the Xtreme Prototypes GLJ Model 25 addon and their counterparts installed in the real aircraft.

- *Pitch mode: ALT, G/S, C/APPR (APPR+G/S), VS, ATT*
- *Roll modes: HDG, NAV, APPR, REV CRS, WING LEV*

Autopilot/Flight Director Comparison

AP/FD Mode or Function	**Real Gates Learjet Model 25 Aircraft J.E.T FC-110 Autopilot/Collins FD 108 Flight Director**		**Xtreme Prototypes GLJ Model 25 Addon Modified MSFS Autopilot/Flight Director**	
	Engaged, ON, Depressed or Moved	**Disengaged, OFF, Released or Reset**	**Engaged, ON, Depressed or Moved**	**Disengaged, OFF, Released or Reset**
ENGAGE AP	▪ Illuminated when the AP is engaged ▪ Engages the AP ▪ FD already on ▪ Engages pitch and roll axes, maintains heading and levels wing	▪ Off when the AP is disengaged ▪ Disengages the AP ▪ Disengages pitch and roll axes	▪ Illuminated when the AP is engaged ▪ Engages the AP and the FD ▪ Captures and maintains the aircraft's pitch attitude (ATT) ▪ Engages the WING LEV	▪ Off when the AP is disengaged ▪ Disengages the AP ▪ Disengages all modes (except SPD) if the FD is off
FD	▪ The FD becomes active when the AFCS is powered up ▪ Basic attitude reference provided when energized	▪ The FD is off when the AFCS is off	▪ Illuminated when the FD is on ▪ Turns on the FD	▪ Off when the FD is off ▪ Turns off the FD and disengages all modes (except SPD) if the AP is disengaged
REV CRS	▪ Illuminated when REV CRS is engaged ▪ Engages REV CRS ▪ Disengages HDG	▪ Off when REV CRS is disengaged ▪ Disengages RV CRS	▪ Illuminated when REV CRS is engaged ▪ Engages REV CRS ▪ Turns on the FD if the AP is disengaged ▪ Engages APPR ▪ Disengages HDG, NAV, G/S (can be reengaged later)	▪ Off when REV CRS is disengaged ▪ Disengages REV CRS
NAV or NAV LOC	▪ Illuminated when NAV LOC is engaged ▪ Engages NAV LOC ▪ Disengages HDG ▪ NAV and LOC modes are combined	▪ OFF when NAV LOC is disengaged ▪ Disengages NAV LOC	▪ Illuminated when NAV is engaged ▪ Engages NAV ▪ Turns on the FD if the AP is disengaged ▪ Disengages HDG, WING LEV, ATT, APPR (but not G/S)	▪ Off when NAV is disengaged ▪ Disengages NAV

Continued on next page...

AP or FD Mode or Function	Real Gates Learjet Model 25 Aircraft J.E.T FC-110 Autopilot/Collins FD 108 Flight Director		Xtreme Prototypes GLJ Model 25 Addon Modified MSFS Autopilot/Flight Director	
	Engaged, ON, Depressed or Moved	**Disengaged, OFF, Released or Reset**	**Engaged, ON, Depressed or Moved**	**Disengaged, OFF, Released or Reset**
VS	▪ Not available	▪ Not available	▪ Illuminated when VS is engaged ▪ Engages VS mode ▪ Turns on the FD if the AP is disengaged ▪ Disengages ATT, ALT	▪ Off when VS is disengaged ▪ Disengages VS
APPR or C/APPR	▪ Illuminated when C/APPR is engaged ▪ Engages C/APPR (NAV+G/S)	▪ Off when C/APPR is disengaged ▪ Disengages C/APPR (NAV+G/S)	▪ Illuminated when APPR is engaged ▪ Engages C/APPR (NAV+G/S) ▪ Engages G/S ▪ May engage REV CRS if previously engaged ▪ Turns on the FD if the AP is disengaged ▪ Disengages NAV, HDG	▪ Off when APPR is disengaged ▪ Disengages APPR ▪ Disengages G/S, REV CRS
HDG	▪ Illuminated when HDG is engaged ▪ Engages HDG ▪ Disengages NAV, REV CRS	▪ Off when HDG is disengaged ▪ Disengages HDG	▪ Illuminated when HDG is engaged ▪ Engages HDG ▪ Turns on the FD if the AP is disengaged ▪ Disengages NAV, REV CRS, ATT, WING LEV, APPR (but not G/S)	▪ Off when HDG is disengaged ▪ Disengages HDG
G/S ARM	▪ Illuminated when G/S is engaged ▪ Engages G/S capture and tracking	▪ Off when G/S is disengaged ▪ Disengages G/S capture and tracking	▪ Illuminated when G/S is engaged ▪ Engages G/S capture and tracking ▪ Turns on the FD if the AP is disengaged ▪ Disengages REV CRS, NAV (can be reengaged later)	▪ Off when G/S is disengaged ▪ Disengages G/S, NAV, APPR
ALT	▪ Illuminated when ALT is engaged ▪ Engages ALT	▪ Off when ALT is disengaged ▪ Disengages ALT	▪ Illuminated when ALT is engaged ▪ Engages ALT ▪ Turns on the FD if the AP is disengaged ▪ Disengages ATT	▪ Off when ALT is disengaged ▪ Disengages ALT
ATT	▪ Not available ▪ Pitch axis engaged when the AP is engaged, maintaining pitch attitude	▪ Not available ▪ Pitch axis disengaged when the AP is disengaged	▪ Illuminated when ATT is engaged ▪ Engages ATT ▪ Captures and maintains the airplane's pitch attitude ▪ Turns on the FD if the AP is disengaged ▪ Disengages ALT, NAV, HDG, REV CRS	▪ Off when ATT is disengaged ▪ Disengages ATT

Continued on next page...

AP or FD Mode or Function	Real Gates Learjet Model 25 Aircraft J.E.T FC-110 Autopilot/Collins FD 108 Flight Director		Xtreme Prototypes GLJ Model 25 Addon Modified MSFS Autopilot/Flight Director	
	Engaged, ON, Depressed or Moved	**Disengaged, OFF, Released or Reset**	**Engaged, ON, Depressed or Moved**	**Disengaged, OFF, Released or Reset**
WING LEV	▪ Not available ▪ Roll axis engaged when the AP is engaged, levelling the wing	▪ Not available ▪ Roll axis disengaged when the AP is disengaged	▪ Illuminated when the WING LEV is engaged ▪ Engages the WING LEV ▪ Levels the wing ▪ Turns on the FD if the AP is disengaged ▪ Disengages HDG, NAV, REV CRS, APPR (but not G/S)	▪ Off when the WING LEV is disengaged ▪ Disengages the WING LEV
OFF Light	▪ Illuminated when the AFCS is powered but with no autopilot mode engaged	▪ Off when the AFCS is not powered up, or powered up with at least one mode engaged	▪ Illuminated when the AFCS is powered but with no autopilot mode engaged	▪ Off when the AFCS is not powered up, or powered up with at least one mode engaged
ON Light	▪ Illuminated when the AFCS is powered up with any autopilot mode engaged	▪ Off when the AFCS is not powered up, or powered up with no autopilot mode engaged	▪ Illuminated when the AFCS is powered up with any autopilot mode engaged	▪ Off when the AFCS is not powered up, or powered up with no autopilot mode engaged
Turn Command Knob	▪ Commands bank angles up to 30 degrees ▪ Disengages all horizontal modes if the AP is engaged	▪ Knob must be in detent mode (centered) for the AP to engage horizontal modes	▪ Commands bank angles up to 30 degrees, AP must be engaged ▪ Disengages all horizontal modes if AP is engaged ▪ Uses the aileron trim	▪ n/a
Pitch Command Wheel	▪ Changes the aircraft's pitch attitude when the AP is engaged ▪ Disengages ALT, C/APPR, G/S	▪ n/a	▪ Changes the aircraft's pitch attitude if the AP and/or FD are engaged ▪ Changes the FD pitch angle (up or down) ▪ Uses the AP pitch trim	▪ n/a
SPD	▪ Autothrottle not available	▪ Autothrottle not available	▪ Illuminated when SPD is engaged ▪ Engages SPD (autothrottle) ▪ Maintains airspeed below 29,000 ft. or Mach above 29,000 ft. ▪ Independent from AP/FD ▪ Disabled when the aircraft is on the ground	▪ Off when SDP is disengaged ▪ Disengages SPD
SPD P on some aircraft	▪ Illuminated when SPD P is engaged ▪ Engages SPD P ▪ Maintains speed (or Mach above 29,000 ft.) during climb or descent by vary-	▪ Off when SPD P is disengaged ▪ Disengages SPD P	▪ Not available	▪ Not available
Throttle Quadrant Pitch Release Button	▪ Disengages all pitch modes ▪ Allows the aircraft's pitch attitude to be changed manually	▪ Maintains the pitch attitude and levels the wing	▪ Disengages all pitch modes: ALT, G/S, APPR, VS, ATT ▪ Allows the aircraft's pitch attitude to be changed manually	▪ Engages the AP (if not engaged) ▪ Captures and maintains the aircraft's pitch attitude (ATT) ▪ Engages the WING LEV

Continued on next page...

AP or FD Mode or Function	Real Gates Learjet Model 25 Aircraft J.E.T FC-110 Autopilot/Collins FD 108 Flight Director		Xtreme Prototypes GLJ Model 25 Addon Modified MSFS Autopilot/Flight Director	
	Engaged, ON, Depressed or Moved	**Disengaged, OFF, Released or Reset**	**Engaged, ON, Depressed or Moved**	**Disengaged, OFF, Released or Reset**
Throttle Quadrant TA/GA Button	▪ Disengages all pitch, roll and speed modes ▪ Engages the pitch axis ▪ The AP follows the FD takeoff pitch ▪ Pilot controls power (no autothrottle) and speed	▪ Maintains the pitch attitude and levels the wing	▪ Disengages all pitch, roll and speed modes: ALT, G/S, APPR, VS, ATT, HDG, NAV, APPR, REV CRS, SPD ▪ Engages the TA/GA mode ▪ Throttles advance to takeoff power (autothrottle mode) ▪ Vertical speed is set to 4,000 fpm ▪ Engages the WING LEV ▪ The AP follows the FD take-off pitch when engaged	▪ Disengages TA/GA ▪ Engages the AP (if not engaged) ▪ Captures and maintains the aircraft's pitch attitude (ATT) ▪ Engages the WING LEV
Yoke Maneuver Control Button	▪ Disengages all pitch and roll modes ▪ Allows the aircraft to be flown manually	▪ Maintains the pitch attitude and levels the wing	▪ Disengages the AP and all pitch and roll modes: ALT, G/S, APPR, VS, ATT, HDG, NAV, APPR, REV CRS, WING LEV ▪ Allows the aircraft to be flown manually	▪ Engages the AP (if not engaged) ▪ Captures and maintains the aircraft's pitch attitude (ATT) ▪ Engages the WING LEV
Yoke Pitch Sync Button	▪ Disengages all pitch and modes ▪ Allows the aircraft's pitch attitude to be changed manually	▪ Maintains the pitch attitude and levels the wing	▪ Disengages all pitch modes: ALT, G/S, APPR, VS, ATT ▪ Allows the aircraft's pitch attitude to be changed manually	▪ Engages the AP (if not engaged) ▪ Captures and maintains the aircraft's pitch attitude (ATT) ▪ Engages the WING LEV
Yoke Trim Switch Arming Button	▪ Disengages the AP and all pitch and roll modes ▪ Allows for the Four-Way Trim Switch to be actuated to change the attitude of the aircraft manually (pitch and roll)	▪ Reengages the AP, maintains the pitch attitude and levels the wing	▪ Disengages the AP and all pitch and roll modes: ALT, G/S, APPR, VS, ATT, HDG, NAV, APPR, REV CRS, WING LEV ▪ Allows for the Four-Way Trim Switch (not simulated) to be actuated to change the attitude of the aircraft manually (pitch and roll)	▪ Engages the AP ▪ Captures and maintains the aircraft's pitch attitude (ATT) ▪ Engages the WING LEV
Yoke Four-Way Trim Switch	▪ When armed, this four-way trim switch is used to change the attitude of the aircraft manually (pitch and roll)	▪ n/a	▪ Not simulated ▪ Can be replaced by buttons on your controller (joystick or yoke)	▪ n/a
Test Switch Panel AP Pitch Trim Monitor Switch	▪ Disengages the AP ▪ Used for testing the AP pitch trim monitor system	▪ Sets system to normal mode of operation	▪ Disengages the AP	▪ Sets system to normal mode of operation
Test Switch Panel AP Roll Monitor Test Button	▪ Disengages the AP ▪ Used for testing the AP roll monitor system	▪ Sets system to normal mode of operation	▪ Disengages the AP	▪ Sets system to normal mode of operation
Stick Nudger/ Puller	▪ Disengages all pitch modes: ALT, C/APPR, G/S ▪ Pushes the stick in case of a stall condition ▪ Pulls the stick in case of an overspeed condition	▪ Maintains the pitch attitude and levels the wing	▪ Disengages all pitch modes: ALT, G/S, APPR, VS, ATT ▪ Pushes the stick in case of a stall condition ▪ Pull the stick in case of an overspeed condition	▪ Engages the AP (if not engaged) ▪ Captures and maintains the aircraft's pitch attitude (ATT) ▪ Engages the WING LEV

FLIGHT PLANNING

SECTION 7

This section presents a set of simplified criteria for **planning** your Gates Learjet Model 25 flights in Microsoft Flight Simulator. In the real world, you would normally use many complicated charts and tables to determine the exact performance criteria required for a flight. We have purposely omitted this complexity from the following procedures because we feel that desktop pilots should be flying and having fun, instead of worrying about numbers.

Nonetheless, there are a few steps that are definitely required:

1. **Determine the Fuel Required and the Gross Weight** - The gross weight is the total weight of the aircraft including fuel and payload. This number is crucial to the aircraft's performance.

2. **Determine Takeoff Data** - Takeoff data includes V_1 decision speed, V_r rotation speed, and V_2 takeoff safety speed. Runway length requirements are also important, especially in hot-and-high conditions with a heavy aircraft.

3. **Plan Climb and Cruise** - Calculate fuel requirements based on time, distance, altitude, and temperature.

4. **Determine Approach and Landing Data** - Approach and landing data includes V_{ref} landing reference speed and runway length requirements, again quite important in hot-and-high conditions with a heavy aircraft.

Determine the Fuel Required and the Gross Weight

- Assume a cruise at FL450, at Mach 0.78.
- On a standard day, your true air speed (TAS) will be around 460 knots.
- Assume 100 nautical miles for climb.

- Assume 100 nautical miles for descent.
- Estimate around 1,000 lbs. of fuel for take-off and climb (100 % RPM for takeoff; 90 % RPM for climb).
- Estimate around 1,300 lbs. of fuel for the first hour of cruise.
- Estimate around 1,200 lbs. of fuel for the second hour of cruise.
- Estimate around 1,100 lbs. of fuel for the third hour of cruise.
- Add 1,000 lbs. of fuel for reserve.

See **Table 6-1**. For example:

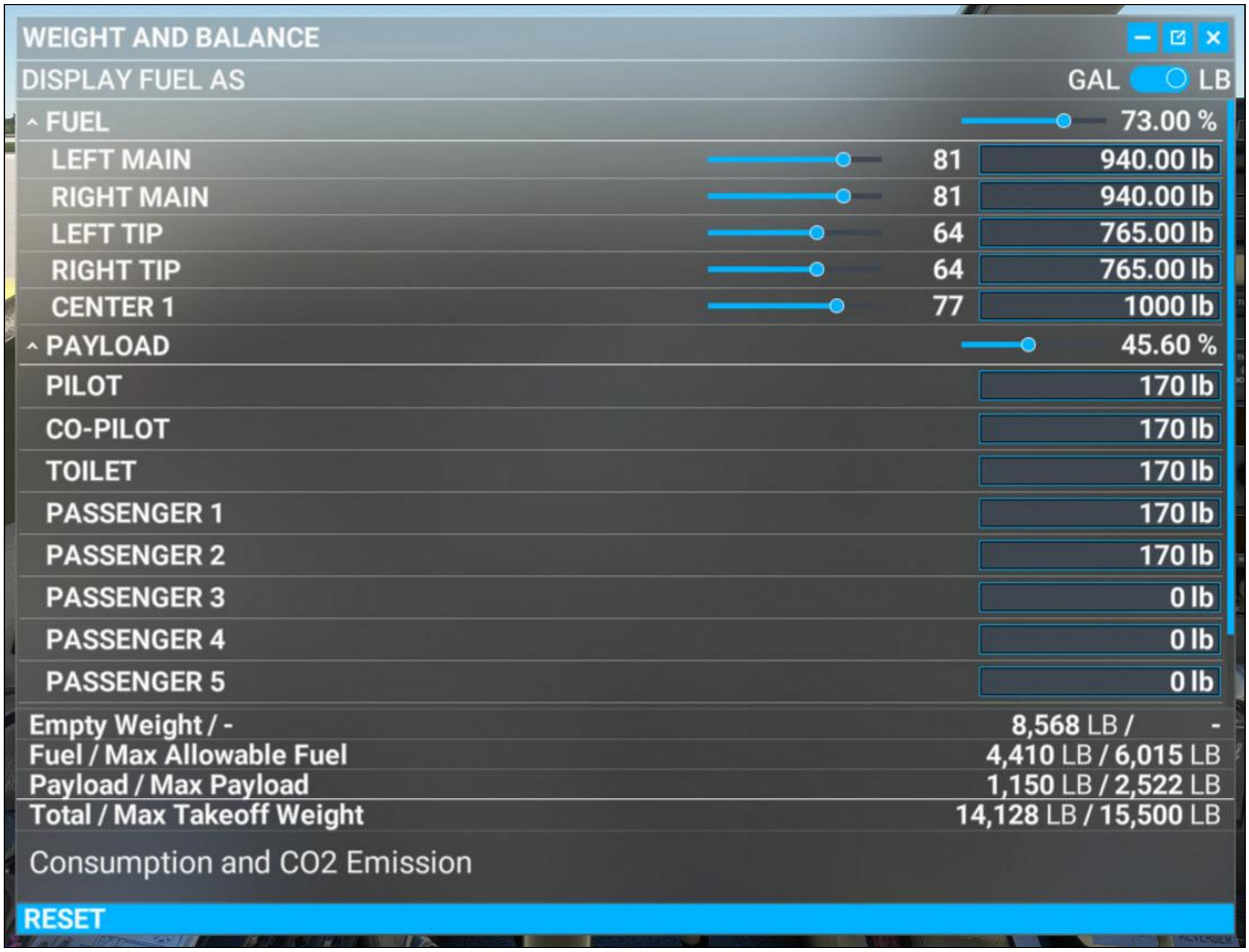
Flight plan distance = 950 nautical miles

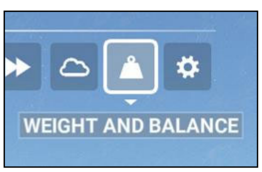
- *Allow 100 nautical miles for climb. Fuel burn = 1,000 lbs.*
- *Allow 100 nautical miles for descent. Fuel burn = 350 lbs.*
- *Remaining distance = 950-100-100 = 750 nautical miles*

Table 6-1
ESTIMATED FUEL REQUIREMENTS
(see assumptions below)

	APPROX FUEL BURN (LBS.)
Takeoff + climb	1,000
First hour cruise	1,300
Second hour cruise	1,200
Third hour cruise	1,100
Descent + landing	350

- *At 460 KTAS, 750 NM = 98 minutes = 1 hour + 38 minutes*
- *First hour fuel burn: 1,300 lbs.*
- *Remaining 38 minutes: 38 / 60 x 1200 = 760 lbs.*
- *Reserves: 1,000 lbs.*
- *Total fuel required: 1,000 + 1,300 + 760 + 350 + 1,000 =* ***4,410 lbs.***





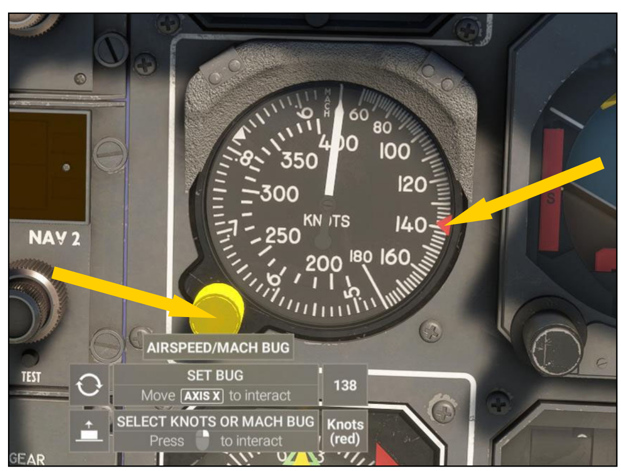
In the "**Weight and Balance**" panel ("MSFS Main Screen > Top Icon Bar > **Weight and Balance Icon**"), add the necessary fuel for your flight and load the crew, passengers and luggage. Read the total gross weight and use it to determine the takeoff data.

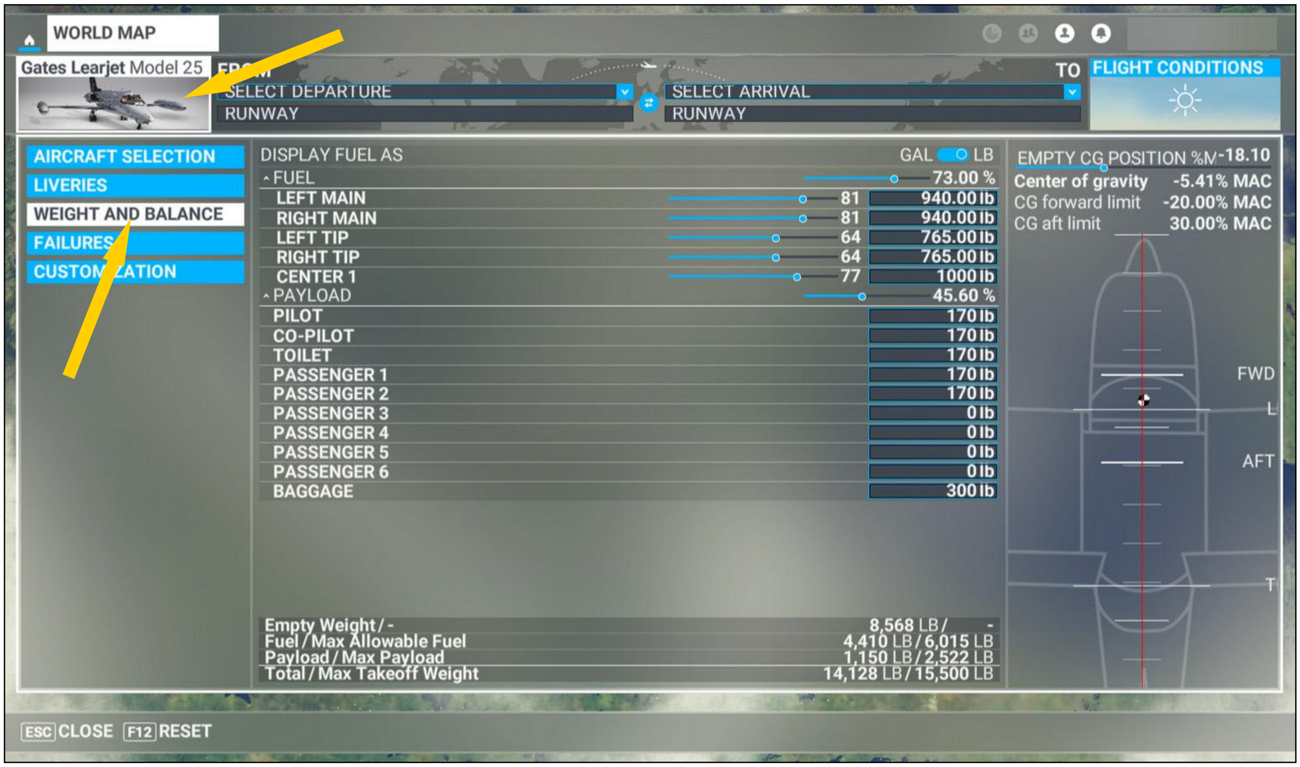
Note: *The "Weight and Balance" panel is also available from the World Map when planning your flight plan ("MSFS > World Map > Top Left Aircraft Icon >* ***Weight and Balance"*** *- see next page).*

Determine Takeoff Data

Takeoff data in this case refers to three critical speeds (V_1, V_r and V_2) that you will need during takeoff. Refer to appendix 1 and to section 8 for more details.

The Airspeed Indicators in the GLJ Model 25 addon are equipped with **independent speed bugs** [1, 5, fig. 5-9]. It is suggested to set the captain's bug on V_1 and the copilot's bug on V_r (or the reverse if the copilot is performing the takeoff). The pilot flying decides to abort at V_1 or to continue, and the pilot not flying calls for rotation.




WORLD MAP
Gates Learjet Model 25
SELECT DEPARTURE
RUNWAY
TO
SELECT ARRIVAL
RUNWAY
FLIGHT CONDITIONS
AIRCRAFT SELECTION
LIVERIES
WEIGHT AND BALANCE
FAILURES
CUSTOMIZATION
DISPLAY FUEL AS
GAL LB
FUEL 73.00 %
LEFT MAIN 81 940.00 lb
RIGHT MAIN 81 940.00 lb
LEFT TIP 64 765.00 lb
RIGHT TIP 64 765.00 lb
CENTER 1 77 1000 lb
PAYLOAD 45.60 %
PILOT 170 lb
CO-PILOT 170 lb
TOILET 170 lb
PASSENGER 1 170 lb
PASSENGER 2 170 lb
PASSENGER 3 0 lb
PASSENGER 4 0 lb
PASSENGER 5 0 lb
PASSENGER 6 0 lb
BAGGAGE 300 lb
Empty Weight / - 8,568 LB / -
Fuel / Max Allowable Fuel 4,410 LB / 6,015 LB
Payload / Max Payload 1,150 LB / 2,522 LB
Total / Max Takeoff Weight 14,128 LB / 15,500 LB
EMPTY CG POSITION %M -18.10
Center of gravity -5.41% MAC
CG forward limit -20.00% MAC
CG aft limit 30.00% MAC
FWD
L
AFT
T
ESC CLOSE
F12 RESET

To determine the takeoff data, you will also need the outside air temperature (OAT), which you can get either from ATC or better still, from the Ram Air Temperature Gauge [18, fig. 5-37] on the copilot's panel.

It is assumed that 100 % RPM will be used for takeoff power and that the flaps will be extended to 8 degrees [1, fig. 4-30]. First, from **Table 6-2**, determine your V_1 takeoff decision speed. This speed will be used to decide if you abort or continue the takeoff, should an engine failure occur (refer to "**Abnormal/ Emergency Procedures**", in section 9).

Next, from **Table 6-4**, determine the rotation speed (V_r) and the takeoff safety speed (V_2). During the takeoff roll, the pilot should raise the nose at Vr. Once airborne, accelerating to V_2 will ensure single-engine climb performance.

Table 6-2
V_1 TAKEOFF DECISION SPEED (KIAS)
Flaps 8°

	OUTSIDE AIR TEMPERATURE °C					
GROSS WT	**20**	**24**	**28**	**32**	**36**	**38**
16,000	135	135	136	136	138	140
15,000	130	130	132	134	134	136
14,000	127	127	129	129	130	132
13,000	122	124	126	126	128	128
12,000	118	118	119	120	120	121
11,000	112	113	114	114	115	116
10,000	106	106	106	110	110	112
9,000	105	105	106	108	109	110

Table 6-3
DENSITY ALTITUDE (FEET)

	DEPARTURE FIELD ELEVATION (FEET)				
OAT °C	**S.L.**	**2,500**	**5,000**	**7,500**	**10,000**
-30	-5,000	-2,000	1,200	4,500	7,500
-20	-4,000	-500	2,500	5,500	8,500
-10	-3,000	2,000	3,500	6,500	9,500
0	-2,000	2,000	5,000	7,500	11,000
10	-500	3,500	6,000	9,000	12,500
20	500	4,000	7,000	10,000	13,000
30	1,500	5,000	8,000	11,000	14,000
40	3,500	6,500	9,500	13,500	15,500

Table 6-4
V_r ROTATION SPEED / V_2 TAKEOFF SAFETY SPEED (KIAS)
Flaps 8°

	GROSS WEIGHT (LBS.)							
	9,000	**10,000**	**11,000**	**12,000**	**13,000**	**14,000**	**15,000**	**16,000**
V_r	120	124	124	128	132	134	136	140
V_2	124	128	130	132	136	138	140	144

Table 6-5 **TAKEOFF DISTANCE REQUIREMENTS (FEET)**								
	GROSS WEIGHT (LBS.)							
DENSITY ALTITUDE	**9,000**	**10,000**	**11,000**	**12,000**	**13,000**	**14,000**	**15,000**	**16,000**
-5,000	2,000	2,200	2,400	2,600	2,900	3,200	3,500	4,000
-2,500	2,500	2,700	2,900	3,100	3,400	3,700	4,000	4,500
0	2,500	2,700	2,900	3,300	3,700	4,100	4,500	5,500
2,500	3,000	3,300	3,600	4,000	4,500	5,000	5,500	6,500
5,000	3,500	3,800	4,200	4,700	5,200	5,800	6,500	7,000
7,500	4,000	4,400	4,800	5,400	6,000	6,500	7,000	9,500
10,000	4,500	5,000	6,600	7,200	8,000	8,800	9,500	11,000
12,500	5,000	6,000	7,000	8,000	9,000	10,000	11,000	12,500
15,000	5,500	6,500	7,700	8,800	9,900	11,000	12,500	14,000

Finally, you need to determine if you have enough runway to perform the takeoff. To do this, you first need to know the density altitude of the departure field. This depends on the outside air temperature (OAT) and the field elevation that can be extrapolated from **Table 6-3**.

Once you know the density altitude of the field, you can determine the runway distance necessary for takeoff from **Table 6-5**.

Plan Climb and Cruise

The next few pages contain simplified tables for planning your climb and cruise. The numbers are for reference only as many factors can affect fuel consumption in the simulator which sometimes differs from the real world.

Table 6-6 **CLIMB TIME (MIN) / FUEL (LBS) / DISTANCE (NM)**							
ALT X 1,000 FT		INITIAL CLIMB WEIGHT X 1,000 LBS					
		15	**14**	**13**	**12**	**11**	**10**
45	TIME	-	-	32.9	22.0	17.3	14.2
	FUEL	-	-	1,136	845	700	596
	DIST	-	-	218	145	114	94
41	TIME	24.5	19.7	16.5	14.2	12.3	10.6
	FUEL	1,050	881	761	665	583	512
	DIST	162	130	104	93	80	70
35	TIME	13.8	12.3	10.9	9.8	8.7	7.7
	FUEL	742	666	598	536	479	425
	DIST	90	80	71	63	56	50
25	TIME	7.7	7.0	6.4	5.8	5.2	4.7
	FUEL	498	454	414	375	338	303
	DIST	49	44	40	36	33	29
11	TIME	2.4	2.2	2.1	1.9	1.7	1.5
	FUEL	191	175	161	147	133	120
	DIST	14	12	11	10	9	9
300 KIAS up to 25,000 ft. Inlet Mach 0.70 up to 45,000 ft. Inlet Mach 0.72 above 45,000 ft. Both engines running, OAT 15 ˚C							

You should monitor the fuel counter and the fuel quantity gauge [15, 17, fig. 5-45] at all times during flight and follow the standard procedures for switching from the wing tanks

Table 6-7 **FUEL REQUIREMENTS - CRUISE FL250**								
OAT °C	MACH 0.77	GROSS WEIGHT (LBS.)						
		9,000	**10,000**	**11,000**	**12,000**	**13,000**	**14,000**	**15,000**
-10	**LBS./HR**	1,985	2,032	2,072	2,123	2,166	2,211	2,264
	KTAS	438	438	438	438	438	438	438
0	**LBS./HR**	2,069	2,118	2,159	2,213	2,258	2,304	2,359
	KTAS	447	447	447	447	447	447	447
10	**LBS./HR**	2,160	2,211	2,255	2,310	2,357	2,405	2,462
	KTAS	457	457	457	457	457	457	457
20	**LBS./HR**	2,247	2,300	2,344	2,402	2,451	2,501	2,560
	KTAS	466	466	466	466	466	466	466

Table 6-8 **FUEL REQUIREMENTS - CRUISE FL350**								
OAT °C	MACH 0.77	GROSS WEIGHT (LBS.)						
		9,000	**10,000**	**11,000**	**12,000**	**13,000**	**14,000**	**15,000**
-10	**LBS./HR**	1,351	1,387	1,442	1,499	1,558	1,629	1,703
	KTAS	425	425	425	4425	425	425	425
0	**LBS./HR**	1,415	1,452	1,510	1,570	1,632	1,706	1,783
	KTAS	435	435	435	435	435	435	435
10	**LBS./HR**	1,481	1,520	1,580	1,643	1,708	1,785	1,866
	KTAS	445	445	445	445	445	445	445
20	**LBS./HR**	1,547	1,588	1,651	1,716	1,784	1,855	1,949
	KTAS	455	455	455	455	455	455	455

Table 6-9 **FUEL REQUIREMENTS - CRUISE FL410**								
OAT °C	MACH 0.77	GROSS WEIGHT (LBS.)						
		9,000	**10,000**	**11,000**	**12,000**	**13,000**	**14,000**	**15,000**
-10	**LBS./HR**	1,145	1,210	1,275	1,358	1,444	1,541	1,653
	KTAS	428	428	428	428	428	428	428
0	**LBS./HR**	1,197	1,265	1,332	1,419	1,509	1,610	1,727
	KTAS	437	437	437	437	437	437	437
10	**LBS./HR**	1,256	1,327	1,397	1,488	1,583	-	-
	KTAS	448	448	448	448	448	-	-
20	**LBS./HR**	1,309	1,383	-	-	-	-	-
	KTAS	457	457	-	-	-	-	-

Table 6-10
FUEL REQUIREMENTS - CRUISE FL450

OAT °C	MACH 0.77	GROSS WEIGHT (LBS.)						
		9,000	**10,000**	**11,000**	**12,000**	**13,000**	**14,000**	**15,000**
-10	**LBS./HR**	1,077	1,151	1,246	1,345	1,468	-	-
	KTAS	431	431	431	431	431	-	-
0	**LBS./HR**	1,128	1,205	1,305	1,409	-	-	-
	KTAS	441	441	441	441	-	-	-
10	**LBS./HR**	1,180	1,261	-	-	-	-	-
	KTAS	451	451	-	-	-	-	-
20	**LBS./HR**	1,233	-	-	-	-	-	-
	KTAS	461	-	-	-	-	-	-

My Own Table
FUEL REQUIREMENTS - CRUISE FL________

OAT °C	MACH 0.77	GROSS WEIGHT (LBS.)						
		9,000	**10,000**	**11,000**	**12,000**	**13,000**	**14,000**	**15,000**
-10	**LBS./HR**							
	KTAS							
0	**LBS./HR**							
	KTAS							
10	**LBS./HR**							
	KTAS							
20	**LBS./HR**							
	KTAS							

My Own Table
FUEL REQUIREMENTS - CRUISE FL________

OAT °C	MACH 0.77	GROSS WEIGHT (LBS.)						
		9,000	**10,000**	**11,000**	**12,000**	**13,000**	**14,000**	**15,000**
-10	**LBS./HR**							
	KTAS							
0	**LBS./HR**							
	KTAS							
10	**LBS./HR**							
	KTAS							
20	**LBS./HR**							
	KTAS							

My Own Table **FUEL REQUIREMENTS - CRUISE FL_______**								
OAT ˚C	MACH 0.77	GROSS WEIGHT (LBS.)						
		9,000	**10,000**	**11,000**	**12,000**	**13,000**	**14,000**	**15,000**
-10	**LBS./HR**							
	KTAS							
0	**LBS./HR**							
	KTAS							
10	**LBS./HR**							
	KTAS							
20	**LBS./HR**							
	KTAS							

My Own Table **FUEL REQUIREMENTS - CRUISE FL_______**								
OAT ˚C	MACH 0.77	GROSS WEIGHT (LBS.)						
		9,000	**10,000**	**11,000**	**12,000**	**13,000**	**14,000**	**15,000**
-10	**LBS./HR**							
	KTAS							
0	**LBS./HR**							
	KTAS							
10	**LBS./HR**							
	KTAS							
20	**LBS./HR**							
	KTAS							

My Own Table **FUEL REQUIREMENTS - CRUISE FL_______**								
OAT ˚C	MACH 0.77	GROSS WEIGHT (LBS.)						
		9,000	**10,000**	**11,000**	**12,000**	**13,000**	**14,000**	**15,000**
-10	**LBS./HR**							
	KTAS							
0	**LBS./HR**							
	KTAS							
10	**LBS./HR**							
	KTAS							
20	**LBS./HR**							
	KTAS							

to the fuselage tank when fuel in the wing tanks reaches critical level. See section 6, pages 23-24 and 27-28, for details.

After a few flights, you will be able to plot your own charts and tables, based on your own flying habits. Advanced users may find more complete charts and tables about climb/cruise planning on the Internet.

Determine Approach and Landing Data

The same way you determined takeoff data, you will need to determine the landing reference speed (Vref) at which you will cross the runway threshold (see appendix 1). For this, you need to know the landing weight of the aircraft which differs from the takeoff weight by the amount of fuel used for the flight.

You may compute this weight and cross-check it during approach using the Fuel Counter (totalizer) [15, fig. 5-45]. During the pre-landing checks, the airspeed bugs [5, fig. 5-9] may be set to Vref.

It is assumed that flaps will be fully extended at 40 degrees for landing. However, other speeds are available from table 6-11 for partial flaps. No-flaps landing should only be attempted in an emergency.

You may now determine the required landing distance. Again, you will require the density altitude from **Table 6-13**, but this time of the destination field.

You need an approximation of the outside air temperature (OAT) on the ground which means you cannot use the addon's Ram Air Temperature Gauge while in flight.

Table 6-11
Vref LANDING REFERENCE SPEED (KIAS)

GROSS WT (LBS.)	FLAPS POSITION			
	40°	**20°**	**8°**	**UP**
16,000	136	142	161	166
15,000	134	140	157	164
14,000	130	139	152	160
13,000	126	137	148	156
12,000	122	135	144	152
11,000	118	132	140	148
10,000	114	128	136	144
9,000	112	124	134	142
8,000	110	120	130	140

Table 6-12
DENSITY ALTITUDE (FEET)

OAT °C	DESTINATION FIELD ELEVATION (FEET)				
	S.L.	**2,500**	**5,000**	**7,500**	**10,000**
-30	-5,000	-2,000	1,200	4,500	7,500
-20	-4,000	-500	2,500	5,500	8,500
-10	-3,000	2,000	3,500	6,500	9,500
0	-2,000	2,000	5,000	7,500	11,000
10	-500	3,500	6,000	9,000	12,500
20	500	4,000	7,000	10,000	13,000
30	1,500	5,000	8,000	11,000	14,000
40	3,500	6,500	9,500	13,500	15,500

Determine the landing distance required from **Table 6-12**.

The data assumes a full-flaps landing, spoilers extended, thrust reversers deployed on touchdown, and normal braking effort with anti-skid engaged.

Check that the chosen airfield has enough runway for the conditions of your flight. If not, you may need to either unload the aircraft, choose another airfield, or wait for colder weather.

Jot down your reference speeds so you have them available during the flight. You should now be ready for a successful flight in your new GLJ Model 25 business jet addon!

Table 6-13
LANDING DISTANCE REQUIREMENTS (FEET)

DENSITY ALTITUDE (FEET)	LANDING WEIGHT (LBS.)						
	9,000	**10,000**	**11,000**	**12,000**	**13,000**	**14,000**	**15,000**
-5,000	4,500	4,600	4,700	4,800	4,900	5,000	5,200
-2,500	4,500	4,600	4,800	4,900	5,000	5,100	5,200
0	4,500	4,600	4,700	4,900	5,000	5,300	5,500
2,500	5,000	5,100	5,200	5,300	5,400	5,500	5,500
5,000	5,000	5,100	5,300	5,500	5,700	5,900	6,000
7,500	5,500	5,600	5,700	5,800	5,800	5,900	6,000
10,000	5,500	5,700	5,800	5,900	6,000	6,300	6,500
12,500	6,000	6,100	6,200	6,300	6,400	6,500	6,500
15,000	6,000	6,200	6,400	6,700	6,900	7,200	7,500

NORMAL PROCEDURES AND CHECK LISTS

SECTION 8

This section contains the detailed "**Normal Procedures and Check Lists**" for the operation of the Xtreme Prototypes GLJ Model 25 add-on aircraft for Microsoft Flight Simulator.

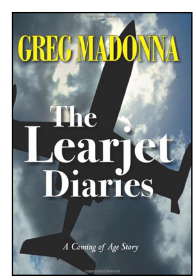
The operation of the GLJ Model 25 addon is very similar to the operation of the real aircraft. In the following pages, we will teach you how to operate your new classic business jet addon, both on the ground and in the air. We encourage you to follow each step presented in this section very carefully.

A condensed version of these procedures is provided in section 10. You may refer to the "**Quick Start Procedures**" when you are more familiar with both your simulation platform and your new GLJ Model 25 addon.

Refer to section 9 for "**Abnormal and Emergency Procedures**" and to section 7, for "**Flight Planning**". Key "**Reference Information**" about the aircraft is presented in appendix 1.

Note: *The following procedures are inspired from the original Gates Learjet 20 Series flight manuals and from other sources.*

Tip



- As a complement to this section, may we suggest the captivating book by Greg Madonna, "**The Learjet Diaries**", a work of semi-fiction inspired from the author's own experience as a young Learjet pilot back in the 1970s. Never flown a Learjet? The book describes in detail what it was like to fly one of the top high-performance business jets at times where training was virtually nonexistent, and jet flying was new to general aviation pilots more accustomed to flying slower and more forgiving prop driven airplanes. A required reading for every classic Learjet fan!

GETTING STARTED

The Xtreme Prototypes GLJ Model 25 is an **add-on software package** that requires Microsoft Flight Simulator (MSFS) to be installed on your computer. Refer to section 2 for more information.

Launching the Simulator

1. Please make sure that MSFS and the GLJ Model 25 addon are **properly installed** on your computer before proceeding.

2. Make sure your controller (joystick/yoke) and pedals are **properly connected** to your computer and have been previously configured and tested with MSFS. A joystick/yoke is essential to fly the GLJ Model 25 addon. Rudder pedals are optional but recommended.

3. Make sure your mouse has a center (scroll) wheel. A wheel mouse is essential to actuate some controls in the virtual cockpit, such as 3-position switches and rotating knobs.

4. **START MSFS.**

***Note:** The user interface may vary between different versions of MSFS. However, the commands and settings are essentially the same.*

Recommended Settings for Beginners

These **optional** MSFS settings will make your first flights in the GLJ Model 25 addon more enjoyable. You can reset them to their default states (or to your preferred states) when you have more experience as a Learjet desktop pilot:

1. In the “MSFS > Options > General Options > **Flight Model**” tab, set the flight model to: **MODERN.**

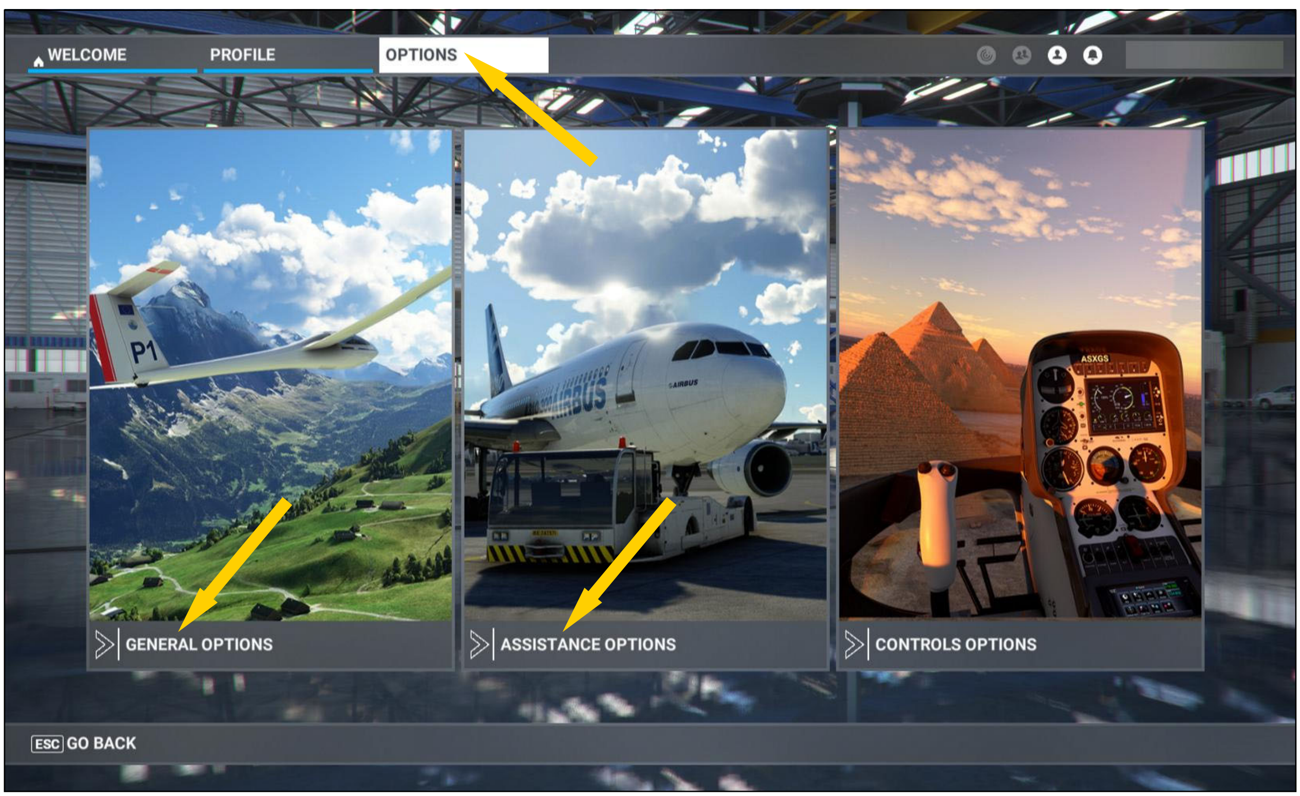
2. In the “MSFS > Options > General Options > **Experimental**” tab, set the followings:

   a. Use NanoVG for XML gauges - **ON.**

3. In the “MSFS > Options > Assistance Options > **Aircraft Systems**” pull-down menu, set the followings:

   a. Automixture - **ON.**

   b. Unlimited fuel - **OFF.**



c. Aircraft lights - **OFF.**

d. Gyro drift - **OFF.**

4. In the "MSFS > Options > Assistance Options > **Failure and Damage**" pull-down menu, set the followings:

   a. Crash damage - **DISABLED.**

   b. Aircraft stress damage - **DISABLED.**

   c. Engine stress damage - **DISABLED.**

   d. Icing effect - **ON.**

5. In the "MSFS > Options > Assistance Options > **Piloting**" pull-down menu, set the followings:

   a. Auto-rudder - **OFF.**

6. In the "MSFS > Options > Assistance Options > **User Experience**" pull-down menu, set the followings:

   a. G-effect - **OFF.**

   b. End Flight when Aircraft Shuts Down - **OFF.**

7. Click **APPLY AND SAVE** to save your changes, then **GO BACK** and **WELCOME** to return to the "MSFS > **Welcome Screen**".

For more setting options, refer to section 2.

Adjusting the Sound Volume

Depending on your sound system and settings, you may want to adjust the volume levels in the "MSFS > Options > General Options > **Sound**" tab:

1. Under "**Volume Levels**", adjust the **volume levels** for the engine and other sounds according to your preferences.

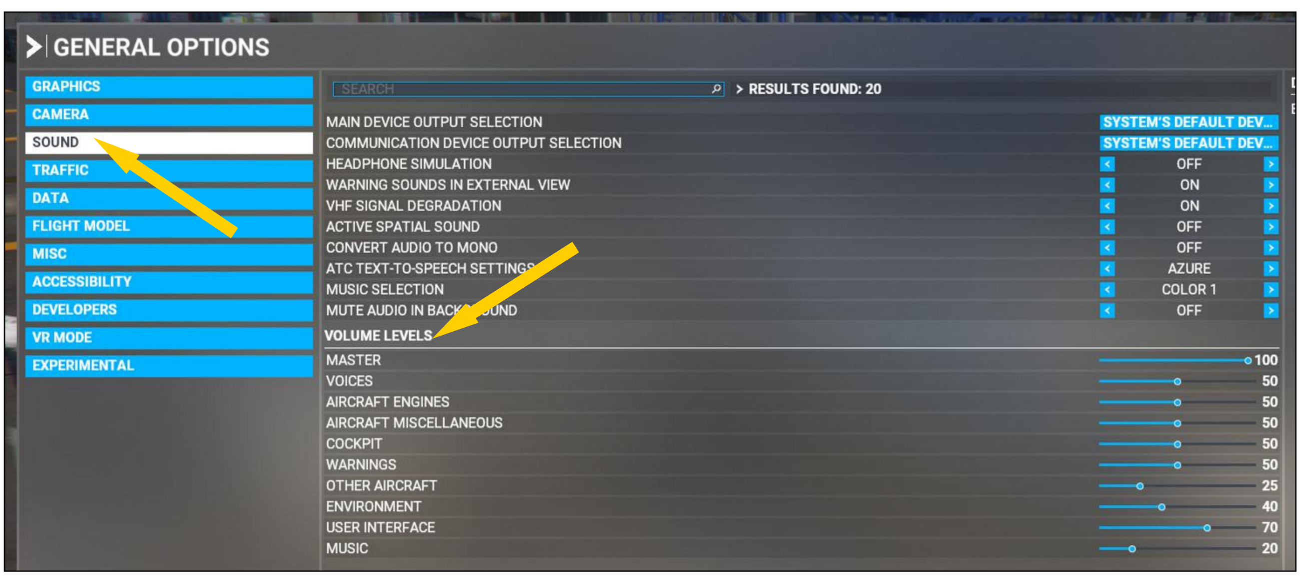
2. Master volume - **Up to 100 %** (depending on your sound system and preference).

3. Click **APPLY AND SAVE** to save your changes, then **GO BACK** and **WELCOME** to return to the "MSFS > **Welcome Screen**".

To reduce the volume of the engines, try a setting of between 30 % to 50 %. If you like more rumble, noise, and vibrations, try anything from 50 % to 70 %. A setting of about 50 % seems acceptable for most computer sound systems and will produce the level of noise, whine, and rumble one would expect from the noisy CJ610-8A single-spool turbojet engine.

A little experimentation may be necessary to find the optimal settings, depending on your sound system configuration and personal preferences.

Please note that the addon's CJ610 engines will produce a high level of noise, recorded from the real aircraft, especially when in an outside view. It is normal for the engine sounds to be attenuated when in the cockpit or cabin, and when the door is closed.



In addition to the basic aircraft and engine sounds, the GLJ Model 25 addon features over 100 extra sound effects (mainly cockpit sounds) and four music tracks for the JetStar 8 tape player installed in the cockpit [fig. 5-48].

Note: *To maintain continuity when switching from the cockpit to an external camera view, music from the JetStar 8 can still be heard when in an external view. Volume, balance and tone controls are provided on the player to adjust the audio to your preferences [3, 6, 7, fig. 5-48].*

Unit of Measurement

1. Please make sure that the unit of measurement used by the simulator ("MSFS > Options > General Options > Misc tab > International Settings > **Units of Measurement**") is set to **U.S. SYSTEM (FEET, INCHES)**, or you may encounter issues with some flight instruments.

Remember that the Gates Learjet Model 25 is an American airplane from the 1970s/80s.

"Cold and Dark" and "Auto Start" Cockpit Presets

The cockpit is automatically set to its "**Cold and Dark**" state when the aircraft is parked in the **hangar** or in a **parking space** (apron) at the beginning of a flight in the simulator. When in a "Cold and Dark" state, the engines are shut down and all aircraft systems are turned off.

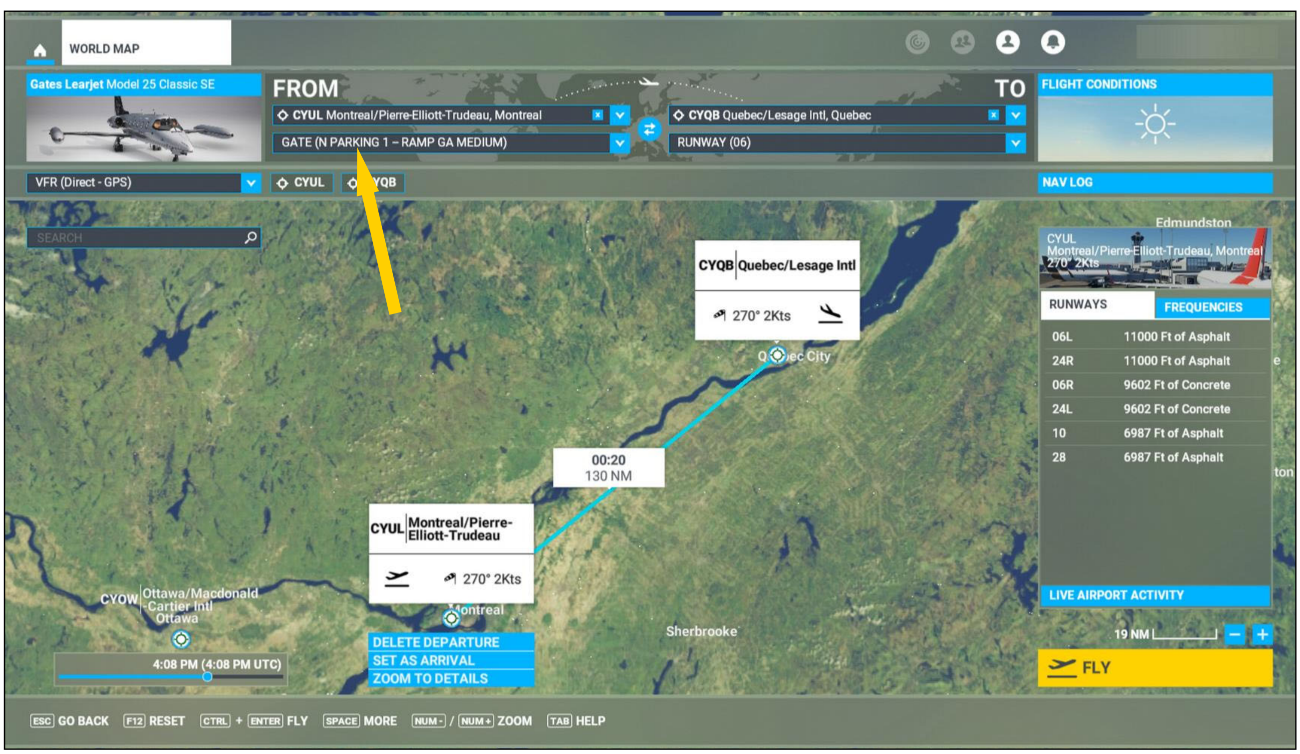
When a new flight is started with the aircraft already **taxiing** or ready for takeoff on the **runway**, engines will be running and all systems turned on and ready for the flight. The same is true if the aircraft is already in the following states when a new flight is started: **climb**, **cruise**, **approach** and **final**.

Eight (8) basic MSFS cockpit presets (*.flt files) for the different phases of the flight are provided in this software version.

Starting a New Flight

In order for you to follow all the steps and procedures described in this section, including the very important preflight procedures, we recommend starting a new flight in the "**Cold and Dark**" state. For this, you will need to select a **parking place** for your Gates Learjet Model 25 at the airport of your choice.

Refer to the documentation included with Microsoft Flight Simulator for complete instructions on how to create a **flight plan** in the



World Map. Make sure that you depart from a parking place, and not from a runway or taxiway. Departing from a parking place will ensure that the aircraft will be in its “Cold and Dark” state at the beginning of your flight.

Select one of the Xtreme Prototypes GLJ Model 25 aircraft variations (liveries) included with your add-on package by clicking the **aircraft icon** in the upper left corner of the **World Map**, then “**LIVERIES**”. The GLJ Model 25 addon comes with 14 aircraft variations (liveries).

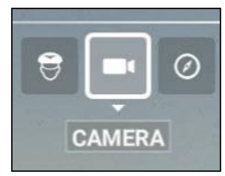
Tips

- You may also select your aircraft and livery from the Hangar (“MSFS > Profile > My Hangar > **Liveries**”).

After selecting your aircraft and completing your flight plan in the World Map, you may click the “**FLY”** icon in the bottom right corner of the screen to **start your flight**.

Exterior Inspection

An **exterior description** of the GLJ Model 25 addon is available in section 3 of the manual [fig. 3-1, 3-2]. It is recommended to familiarize yourself with the general exterior arrangement of the aircraft before your first flight.



Several preset external camera views are provided for looking at the aircraft from the outside. By clicking the camera icon in the top section of the screen, you may select one of the cameras in the **EXTERNAL** tab. Refer to section 4, pages 8-17, for a complete description of all the available external cameras.

Note: *Interactive “hotspots” on the exterior model are not available in our GLJ Model 25 addon for MSFS compared to our Prepar3D versions. For example, it is not possible to open the aircraft door by clicking the door handle on the exterior model. This is due to software limitations in MSFS 2020.*

Tips

- At any time, you can click **RESET POSITION** under the **EXTERNAL** (or **SHOWCASE**) tabs to go back to the selected default external view.
- Depending on your MSFS configuration, you may cycle the different external camera views by clicking buttons on your joystick/yoke/throttle or depressing selected keys on your keyboard.

- Depending on your MSFS configuration, you may use the "**END**" key on your keyboard to toggle between the external view and the cockpit view.

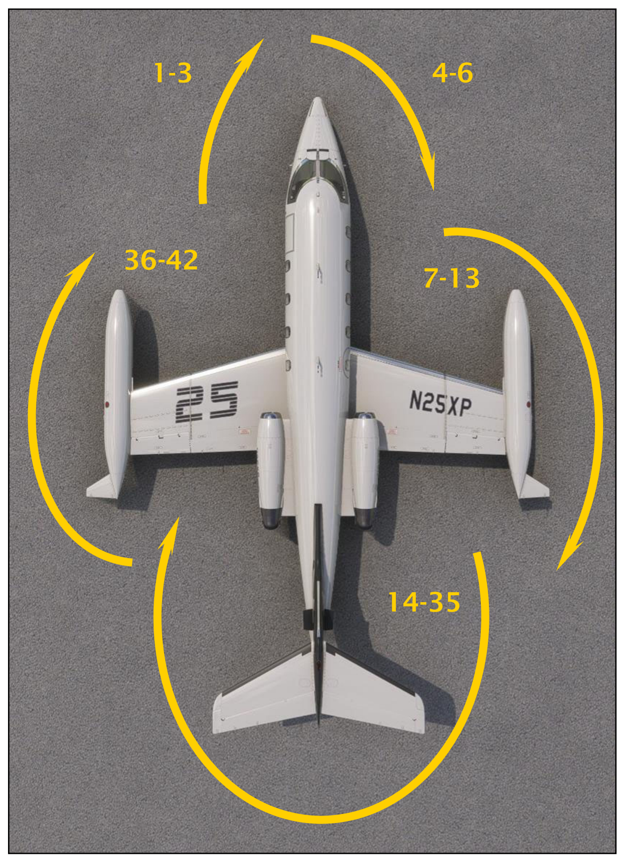
Complete Walkaround

In the real world, the crew (usually the copilot) will perform a complete exterior power off inspection of the aircraft before every flight, even though it has been checked and re-checked by expert mechanics on the ground. The "**walkaround**" is performed clockwise and starts at the left front section of the aircraft.

The purpose of the inspection is to make sure everything is secure, in perfect condition, that there are no obstructions or leaks, that movable parts can move freely, etc. In addition, Learjet pilots take great care of their birds. Everything must be spotless, polished, and shiny, inside out, for the next executive ride. **There is no such thing as a dirty Learjet!**

Here is a summary of what needs to be checked:

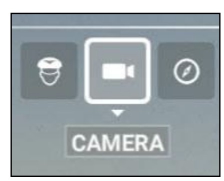
1. Left pitot tube, static ports, shoulder static port, static port drains and stall warning vane
2. Captain's windshield, windshield defog outlet and nozzle
3. Nose gear, nose gear well, wheel and tire
4. Radome, radome static dischargers, radome alcohol discharge port
5. Right pitot tube, static ports, shoulder static port, static port drains and stall



warning vane

6. Copilot's windshield, windshield defog outlet and nozzle
7. Wing inspection light
8. Lower rotating beacon light and antennas
9. Upper antennas
10. Cabin windows
11. Emergency exit door
12. Right wing leading edge, stall strip, fence, boundary layer or vortex generators, heat scuppers, access panels, fuel vents
13. Right wingtip tank, right recognition light, tank fuel cap, right navigation light and strobe, tank fin and static discharge wicks, fuel jettison tube
14. Right aileron and aileron balance tab
15. Right spoiler, flap, and static discharge wicks
16. Right landing gear, gear doors, well, brakes, brake hoses, wheels, and tires
17. Right landing/taxi light
18. Right engine inlet
19. Right engine access doors, oil filler cap and door, drains
20. Right engine thrust reverser
21. Right engine turbine exhaust area
22. Rear lower fuselage valves, vents, and drains (both sides)
23. Tail cone interior and access door
24. Oxygen servicing door, filler valve and discharge disk
25. Tail VOR/LOC antennas
26. Upper rotating beacon light
27. Horizontal stabilizer, stabilizer leading edge blankets, rudder, rudder trim tab, elevator, static discharge wicks, navigation lights and strobe, tail access doors
28. External power port
29. Fire extinguisher disks
30. Left engine turbine exhaust area
31. Left engine thrust reverser
32. Left engine access doors, oil filler cap and door, drains
33. Left engine inlet
34. Left landing gear, landing gear doors, well, brakes, brake hoses, wheels, and tires
35. Left landing/taxi light
36. Left spoiler, flap and static discharge wicks
37. Left aileron, aileron balance tab and trim tab
38. Left wingtip tank, left recognition light (if installed), tank fuel cap, left navigation light and strobe, tank fin and static discharge wicks, fuel jettison tube
39. Left wing leading edge, stall strip, fence, boundary layer or vortex generators, heat scuppers, access panels, fuel vents
40. Cabin windows
41. Main passenger and crew door, door handles, lock, upper and lower sections, snubber, restraint cables and pole (retainer)
42. Cabin entry lights

CHECKLIST



1. Click the camera icon in the top section of the screen to select one of the pilot cameras in the **COCKPIT** tab.
2. Under the PILOT dropdown menu, select "**PILOT**" (a normal view from the captain's seat).

Tip

- Depending on your MSFS configuration, you may use the "**END**" key on your keyboard to toggle between the external view and the cockpit view.

While it is always possible to move the camera around the cockpit and cabin by using your mouse, keyboard and joystick/yoke, depending on your MSFS configuration, we have programmed 24 different cockpit cameras to make your task of moving around easier. Refer to section 4, pages 8-17 for a complete description of all the available cockpit camera views.

Important

- The cockpit and cabin use "**collision meshes**" (a recommended feature in MSFS) to prevent the camera from moving outside the interior model or to move through objects such as walls and seats. These invisible "walls" may prevent you from moving freely inside the cockpit and cabin. You can use the keyboard's arrow keys with the mouse to move your way around these obstacles from a first-person perspective. Depending on your MSFS configuration, you may also use the mouse wheel to zoom in or out. Please note that collision meshes are not an absolute science in MSFS and that because of their inaccuracy, there may be places in the cockpit where some depth issues appear.

Tips

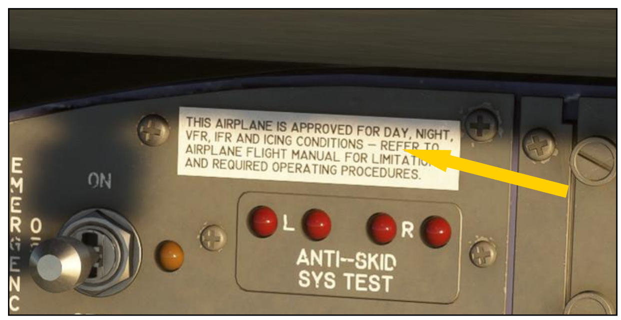
- At any time, you can click **RESET POSITION** under **COCKPIT** tab to go back to the selected **PILOT** view.

- Depending on your MSFS configuration, you may cycle the different cockpit camera views by clicking buttons on your joystick/yoke/throttle or depressing selected keys on your keyboard.

- When entering a dark cockpit, especially at night, you may use the flashlight that is provided in MSFS ("**ALT+L**"), depending on your MSFS configuration).

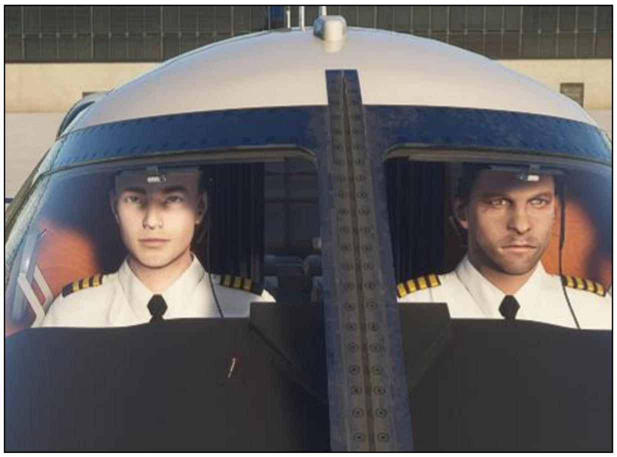
Before Preparing the Cockpit

1. Main (Passenger and Crew) Door [fig. 5-54] - **OPEN**. *Click the **Main Door Unsecured Annunciator** [10, fig. 5-32a] to open/close the door from the cockpit.*



2. "Remove Before Flight" Items - **REMOVED**. *Click the **white label** above the Anti-Skid Generator Lights [4, fig. 5-15] to remove the items. You may switch to the external view ("**END**") to check that the items have been removed. Then return to the virtual cockpit ("**END**").*

3. Flight Crew - **ON BOARD**. *To show/hide the flight crew, click either **headphone hanger** [5, fig. 5-49] on the cockpit side walls. When the headphones and the pilot's seatbelts are visible inside the cockpit, the crew is absent. When the headphones and the pilot's seatbelts are not visible, the crew is present. You may switch to the external view to check if the captain and the copilot are present in the cockpit. Then return to the virtual cockpit.*



4. Captain - **SELECT PILOT**. *Click the **Learjet logo** [1, fig. 5-51] at the center of the captain's yoke to select the pilot of your choice.*

5. Copilot - **SELECT PILOT**. *Click the **Learjet logo** at the center of the copilot's yoke to select the pilot of your choice.*

6. Sunglasses - **OPTIONAL.** *If you want your pilots to wear sunglasses, click the **sunglasses** on the copilot's right console [5, fig. 5-50] or the **whiskey compass correction card** [3, fig. 5-50] to show/hide the sunglasses.*

7. Pilots - **CHECK.** *Switch to the external view to check the pilots in the cockpit. Then return to the virtual cockpit.*

***Note:** The GLJ Model 25 addon uses its own custom pilot character figures. Pilot selection from the MSFS settings is disabled in this software version.*

8. Seats - **ADJUST ARMRESTS** *(see "**Configuring the Virtual Cockpit**", section 4, page 5).*

9. Flight controls - **FREE.** *Hide the control columns and yokes if desired. You can show/hide the control columns and yokes by clicking their **respective boot** (see "**Hiding the Control Columns and Yokes**", section 4, page 3).*

Cockpit Preparation (Power OFF)

1. Parking brake [9, fig. 5-43] - **SET.**

2. All switches - **OFF.**

3. All circuit breakers - Check **IN (CLOSED).** *Not simulated.*

4. Oxygen Pressure Gauge [2, fig. 5-39] - **IN GREEN.** *Click the label above the engine gauge cluster [1, fig. 5-27] to fill the oxygen cylinder if necessary.*

5. Emergency Air Pressure Gauge [4, fig. 5-39] - **IN GREEN**. *Click the label above the engine gauge cluster [1, fig. 5-27] to fill the tank if necessary.*

6. Passenger Oxygen Flow Valve [4, fig. 5-49] - **NORM**, if passengers are present.

7. Passenger Oxygen Mask Valve [2, fig. 5-49] - **AUTO**, if passengers are present.

8. Landing Gear Selector Switch [5, fig. 5-30] - Check **DOWN**.

9. Bleed Air Switch [1, fig. 5-41] - Check **OFF**.

10. Pressurization Mode Switch [4, fig. 5-41] - **AUTO**.

11. Auto Rate Control Knob [2, fig. 5-41] - Check **CENTERED**.

12. Windshield Defog Knob [8, fig. 5-43] - **IN (NORMAL)**.

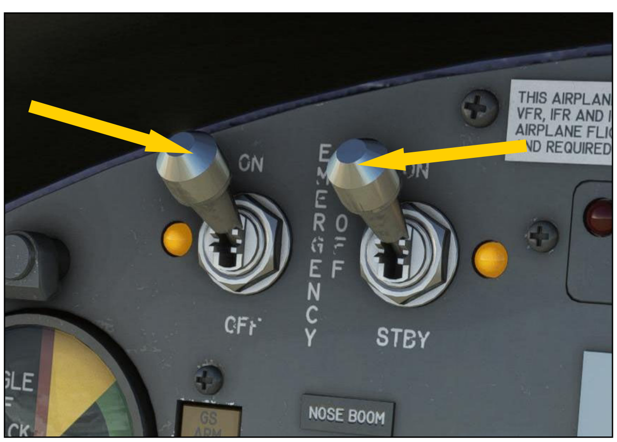
13. "ALC AI" annunciator [15, fig. 5-32a] - **CHECK** alcohol level (1.75 gallons). *Click to fill the reservoir if necessary.*

Testing the Emergency Batteries

1. Main Emergency Battery Switch [2, fig. 5-15] - **ON**.

2. Check the amber light next to the Main Emergency Battery Switch **ON**, after a brief delay.

3. Standby Gyro [fig. 5-16] - Check **OPERATIONAL.** Uncage and adjust pitch scale [7, fig. 5-16] if necessary.



4. Main Emergency Battery Switch - **OFF**.

5. Standby Emergency Battery Switch [3, fig. 5-15] - **ON**.

6. Check the amber light next to the Standby Emergency Battery Switch **ON**, after a brief delay.

7. Standby Emergency Battery Switch - **OFF**, then **STBY**.

8. Check the amber light next to the Standby Emergency Battery Switch **ON**, after a brief delay.

9. Standby Gyro [fig. 5-16] - Check **OPERATIONAL.**

10. Standby Emergency Battery Switch - **OFF**.

External Power Source (Optional)

To preserve battery power during ground procedures up until the engines have started and the generators are turned on, it is strongly suggested to use an external power source to power up the aircraft:

1. Depending on your MSFS configuration, you may press "**SHIFT+Q**" on your keyboard - or use the **ATC** window - to call for a ground power unit (GPU). The GPU supplies 28 VDC to the aircraft during ground procedures or maintenance.

Note: *The GLJ Model 25 addon for MSFS uses the basic ground power units that are already available in the simulator. There is no Xtreme Prototypes custom GPU model in this software* *version, compared to our Prepar3D versions. Note that a GPU may not be available in some parking places and that connection cables may not be visible.*

Important!

- Don't forget to **DISCONNECT** the GPU after the engines have started and the generators are turned on ("**SHIFT+Q**" or "**SHIFT+W**", depending on your MSFS configuration, or via **ATC**).

Cockpit Preparation (Power ON)

1. Make sure the GPU is **DISCONNECTED** if the batteries are used.
2. Battery Switches [8-9, fig. 5-30] - **ON**, if the GPU is not operational.

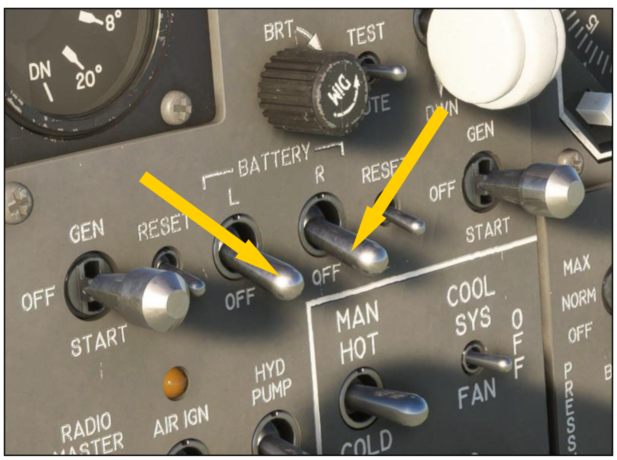
Very Important!

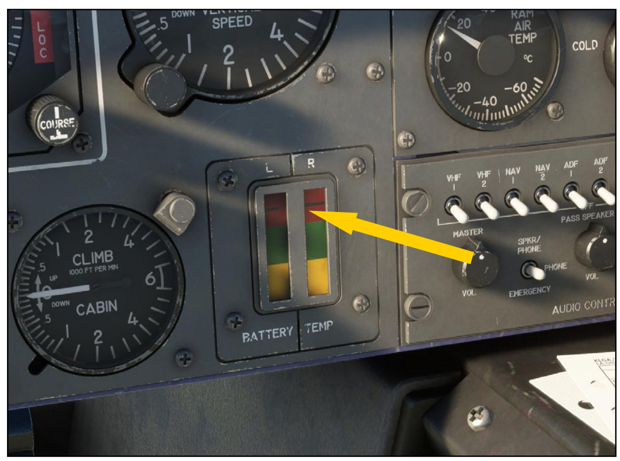
- Like in the real aircraft, **do not turn on the battery switches** when the batteries are fully charged, and the GPU (or the generators) are operating to prevent the Ni-Cd batteries from overheating. ***This may cause a fire!***

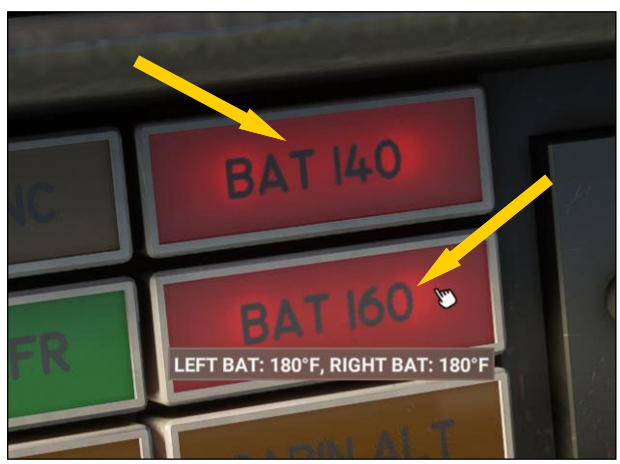
Tip

- Mouse overing either Battery Overheat Annunciator [28-29, fig. 5-32b] will display a tooltip with the temperature of the left or right Ni-Cd battery.

3. Cockpit lights - **ADJUSTED** to your preferences. *See "Cockpit and Cabin Lighting System" in section 6, pages 7-10.*
4. Landing Gear Selector Switch and Lights [5, 3, fig. 5-30] - Check **DOWN + 3 GREEN**, **GEAR DOWN**.
5. Both Primary and Secondary Inverter Switches [10,12, fig. 5-29] - **ON**.
6. Radio Master Switch (Avionics) [14, fig. 5-29] - **ON**.







7. Instrument Warning Flags - **OUT OF VIEW.**

8. Annunciators:

   a. Annunciator Panel Test Button and Dimmer [31, fig. 5-32a/b] - **DE-PRESSED** (**ON**). *You can* ***set the intensity*** *(0-100 %) of the panel lights and annunciators by rotating the dimmer.*

   b. All annunciators and most panel and center console lights - **ON.**

   c. Decision height lights on the ADIs [13, fig. 5-7] and radio-altimeter [4, fig. 5-13] - **ON.**

   d. Altitude alert lights on the ADDUs [7, fig. 5-11a] - **ON.**

   e. Annunciator Panel Test Button - **RE-LEASED** (**OFF**).

9. Decision height lights on the captain's and copilot's fire panels [1, fig. 5-33; 8, fig. 5-35] - **PUSH TO TEST (ON/OFF).**

10. Marker Beacon Lights on the captain's and copilot's panels [1-3, fig. 5-5; 11, fig. 5-37] - **PUSH TO TEST (ON/OFF).**

11. Electric Auxiliary Hydraulic Pump Switch [19, fig. 5-29] - **ON.**

12. Hydraulic Pressure Gauge [3, fig. 5-39] - **RISING, then IN GREEN.**

13. Electric Auxiliary Hydraulic Pump Switch - **OFF.**

Warning Systems Tests

1. Landing Gear Warning System Test Switch [4, fig. 5-30] - **TEST.** Check all six Landing Gear Position Lights [3, fig. 5-30] **ON** with aural warning.

2. Landing Gear Warning System Test Switch - **CENTER (OFF).**

3. No Smoking/Seat Belt Switch [10, fig. 5-43] - **TEST (BOTH POSITIONS).** Return switch to **OFF** after test.

4. Electric Auxiliary Hydraulic Pump Switch [19, fig. 5-29] - **ON.**

5. Stall warning system test:

   a. Both Stall Warning Switches [4, 6, fig. 5-29] - **ON.** Check annunciators [3, 6, fig. 5-32a] **OFF.**

   b. Stick Nudger/Puller Switch [21, fig. 5-43] - **ON.**

   c. Stall Warning Test Vane Selector Switch [14, fig. 5-43] - **RIGHT (R STALL).**

   d. Stall Warning System Test Switch [15, fig. 5-43] - **ON.**

e. Right Angle-of-Attack Indicator [7, fig. 5-37] - **IN RED**. Check for aural alert, stick shaker, stick nudger (pusher) and Right Stall Warning Annunciator [6, fig. 5-32a] **FLASHING**.

f. Stall Warning Test Vane Selector Switch [14, fig. 5-43] - **LEFT (L STALL)**.

g. Left Angle-of-Attack Indicator [5, fig. 5-6] - **IN RED**. Check for aural alert, stick shaker, stick nudger (pusher) and Left Stall Warning Annunciator [3, fig. 5-32a] **FLASHING**.

h. Stall Warning System Test Switch - **OFF**.

i. Stick Nudger/Puller Switch [21, fig. 5-43] - **OFF**.

j. Both Stall Warning Switches - **OFF**. Check annunciators [3, 6, fig. 5-32a] **ON**.

6. Anti-skid system test:

a. Anti-Skid Power Switch [8, fig. 5-29] - **ON**. Check Anti-Skid Generator Lights [5, fig. 5-15] **OFF**.

b. Anti-Skid System Test Switch [16, fig. 5 -43] - **FORWARD (OUTBOARD)**. Check Anti-Skid Generator Lights **OUTBOARD ON**.

c. Anti-Skid System Test Switch - **AFT (INBOARD)**. Check Anti-Skid Generator Lights **INBOARD ON**.

d. Anti-Skid System Test Switch - **CENTER (OFF)**.

e. Anti-Skid Power Switch - **OFF**. Check Anti-Skid Generator Lights **ON**.

7. Overspeed warning test:

a. Stick Nudger/Puller Switch [21, fig. 5-43] - **ON**.

b. Cabin Altitude Warning/Mach Test Switch [13, fig. 5-43] - **AFT (MACH TEST)**. Check for aural alert and stick puller.

c. Cabin Altitude Warning/Mach Test Switch - **CENTER (OFF)**.

d. Stick Nudger/Puller Switch [21, fig. 5-43] - **OFF**.

8. Electric Auxiliary Hydraulic Pump Switch [19, fig. 5-29] - **OFF**.

9. Fire detection system test:

a. Fire Detection System Test Switch [12, fig. 5-43] - **ON**. Check both captain and copilot fire annunciators [fig. 5-33; fig. 5-35] **ON** or **FLASHING**.

b. Fire Detection System Test Switch - **OFF**. Check both captain and copilot fire annunciators **OFF**.

10. Cabin altitude warning test:

a. Cabin Altitude Warning/Mach Test Switch [13, fig. 5-43] - **FORWARD (CABIN ALT TEST)**. Check Cabin Altitude Annunciator [30, fig. 5-32b] **FLASHING** (with aural alert).

b. Cabin Altitude Warning/Mach Test Switch - **CENTER (OFF)**. Check Cabin Altitude Annunciator **OFF**.

Before Starting the Engines

1. Thrust reversers:

a. Thrust Reverser Lights Test Switch [11, fig. 5-36] - **TEST**. Check all thrust reverser annunciators and lights **ON**.

b. Thrust Reverser Lights Test Switch - **NORM**. Check all thrust reverser annunciators and lights **OFF**.

c. Engine Throttles [1, 3, fig. 5-43] - **IDLE** (“**F1**” or **FULL AFT** on your controller) if released, or **CUTOFF** if locked. *In the real aircraft, throttles cannot be moved if locked.*

d. Thrust Reverser Subthrottles [7, 17, fig.

5-43] - **PUSHED FORWARD** or **IDLE 0 %** (“**F1**”).

e. Thrust Reverser Arm Switches [13-14, fig. 5-36] - **ARM**. Check Thrust Reverser Armed Annunciators [7, 8, fig. 5-36] **ON**.

f. Thrust Reverser Arm Switches - **OFF**. Check Thrust Reverser Armed Annunciators **OFF**.

g. Thrust Reverser Emergency Stow Switches [2-3, fig. 5-36] - **NORM (UP)**. Check Thrust Reverser Emergency Stow Lights [1, 4, fig. 5-36] **OFF**.

h. Thrust Reverser Unsafe Annunciators [5, 10, fig. 5-36] - **OFF**.

i. Thrust Reverser Deployed Annunciators [6, 9, fig. 5-36] - **OFF**.

2. Autopilot check:

a. AFC/SS Test Switch [11, fig. 5-43] - **FORWARD (AFCS TEST)**. Check all AFCS (autopilot/flight director) mode annunciators and lights **ON**.

b. AFC/SS Test Switch - **CENTER (OFF)**.

c. Autopilot Engage Button [1, fig. 5-46] - **PRESS ON** to engage, then **PRESS OFF** to disengage. Check for aural alert when the autopilot is disengaged.

d. Autopilot Engage Button - **PRESS ON**. Check FD **ON**, ATT **ON** and WING LEV **ON**.

e. Autopilot Roll Monitor Test Button [18, fig. 5-43] - **DEPRESS TO TEST**. Autopilot will disengage. Release to **OFF.**

f. Autopilot Engage Button - **CHECK ON**.

g. Autopilot Pitch Trim Monitor Switch [19, fig. 5-43] - **TEST UP AND DOWN**. Autopilot will disengage. Reset to **CENTER (OFF)**.

h. Autopilot Engage Button - **PRESS ON.** Check FD **ON**, ATT **ON** and WING LEV **ON**.

i. Turn Command Knob [2, fig. 5-46] - **TEST (ROTATE) LEFT/RIGHT**. Check WING LEV **OFF**, then **RESET** knob to **CENTER (0 %)**.

j. Autopilot Engage Button - **PRESS OFF**, then **PRESS ON**. Check FD **ON**, ATT **ON** and WING LEV **ON**.

k. Pitch Command Wheel [10, fig. 5-46] - **TEST (ROTATE) UP/DOWN**, then **RESET** to **0 degrees**.

l. Autopilot Engage Button - **PRESS OFF**.

m. Yaw Damper Selector Switch [5, fig. 5-47] - **PRI YAW DAM**PER.

n. Primary Yaw Damper ON Button [11, fig. 5-46] - **PRESS ON** to engage.

o. Primary Yaw Damper OFF Button [12, fig. 5-46] - **PRESS OFF** to disengage. Check for aural alert when primary yaw damper is disengaged.

p. Yaw Damper Selector Switch - **SEC YAW DAMPER**.

q. Secondary Yaw Damper Switch [6, fig. 5 -47] - **ENGAGE**.

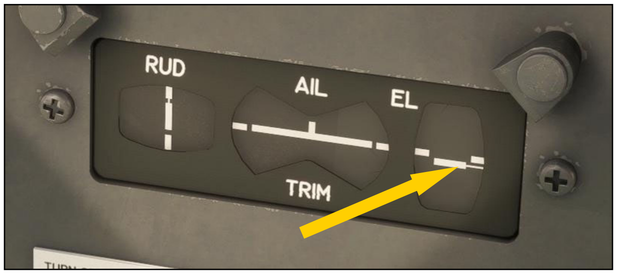
r. Secondary Yaw Damper Switch - **OFF**. Check for aural alert when secondary yaw damper is disengaged.

s. Yaw Damper Selector Switch - Back to **PRI YAW DAMPER**.

3. Emergency Pitch Trim Selector Switch [3, fig. 5-29] - **NORM**.

4. Trim:

   a. Elevator trim (trim button on your controller) - Check that the Elevator Trim Indicator [3, fig. 5-14] is about **one needle thickness below center.** Listen for trim in motion clicker (autopilot must be disengaged).



   b. Takeoff Trim Alert Annunciator [2, fig. 5-33] - **OFF.**

   c. Aileron trim (Turn Command Knob [2, fig. 4-46] or trim button on your controller) - **CHECKED 0 %.**

   d. Rudder trim [1, fig. 5-47] - **CHECKED (0 deg.).**

5. Fuel quantity [17, fig. 5-45]:

   a. Check **sufficient quantity** for flight. *Refer to “Flight Planning”, in section 7 for details.*

   b. Check for **imbalance** between L/R tanks. *See section 6, pages 26-28, for more information about cross-feeding fuel.*

6. Fuel counter [15, fig. 5-45] - Click button [14, fig. 5-45] to **RESET TO ZERO.** *Fuel counter indicates fuel consumed since the last engine start (after reset). Must be reset manually.*

7. Crossflow (Crossfeed) Switch [3, fig. 5-45] - **CLOSE.** *See “Crossflow (Crossfeed) Switch”, section 6, pages 26-28, for more information about cross-feeding fuel.*

8. Fuselage Tank Switch [6, fig. 5-45] - **OFF (CENTER).**

9. Fuel Jettison Switch [1, fig. 5-45] - **OFF.** *Refer to “Fuel Jettison”, section 6, pages 24-25, for more information about the fuel jettison system.*

10. Jet pumps:

    a. Jet Pumps Switches [11-12, fig. 5-45] - Both **ON.**

    b. Motive Flow Valve Lights [10, 13, fig. 5-45] - Both **ON** for one second (valve in transit), then **OFF.**

    c. Engine Low Fuel Pressure Annunciators [1,4, fig. 5-32a] - **OFF.**

11. Standby Pump Switches and Lights [8-9, fig. 5-45] - **OFF.**

12. Main (Passenger and Crew) Door - **CLOSED AND SECURED.** *Click the **Main Door Unsecured Annunciator** [10, fig. 5-32a] to open/close the door from the cockpit.*

13. Main Door Unsecured Annunciator [10, fig. 5-32a] - **OFF.**

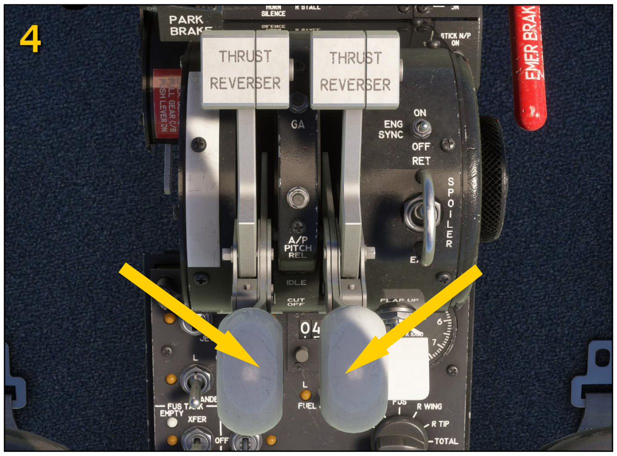
Right Engine Start
(same procedures for the left engine)

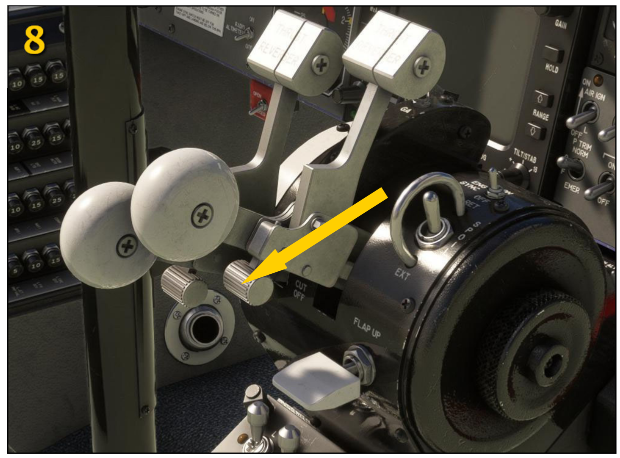
***Note:** If the engine won’t start, make sure the fuel mixture is set to “**rich**” before proceeding. Refer to “Fuel Mixture”, in section 6, page 22, for more information.*

1. Right Engine Throttle [3, fig. 5-43] - **IDLE** (“**F1**” or **FULL AFT** on your controller).

2. Right Thrust Reverser Subthrottle [17, fig. 5-43] - Check **FULL FORWARD** (**IDLE** or “**F1**”).

3. Right Throttle Release Lever [4, fig. 5-43] - Check **DOWN AND LOCKED** (throttle set





to cutoff, fuel valve closed).

4. Right Engine Throttle - Check **CUTOFF** (full down position).

5. Rotating Beacon Lights [13, fig. 5-29] - **ON.**

6. Right Starter/Generator Switch [6, fig. 5-30] - **START.** Check for Right Ignition Light [17, fig. 5-29] **ON.**

7. Right engine RPM [7 right, fig. 5-27] - Check about **10 to 15%.**

8. Right Throttle Release Lever - **UP AND RELEASED** (throttle set to idle, fuel valve open). *Click to release lever when RMP is above 10 %.*

9. Right Engine Throttle - Check **IDLE** (“**F1**”

or **FULL AFT** on your controller).

10. Right engine EGT [5 right, fig. 5-27] - Monitor and make sure **WITHIN GREEN ARC**.
11. Right engine RPM - Check about **50 %.**
12. Right Starter/Generator Switch - Set to **OFF**, then to **GEN** when the engine is stable at **IDLE**.
13. Right Engine Ignition Light - **OFF**.
14. Right Generator Inoperative Annunciator [23, fig. 5-32b] - **OFF**.
15. Right DC Ammeter [5, fig. 5-28] - Check **MOVING**.

16. Right Engine Low Fuel Pressure Annunciator [4, fig. 5-32a] - Check **OFF**.
17. Primary & Secondary Inverter Switches [10, 12, fig. 5-29] - Check **ON**. *AC power is required for the engine oil pressure gauge (see 18, below).*
18. Right engine oil pressure and temperature [8 right, fig. 5-27; 2, fig. 5-28] - Check **BOTH IN GREEN**.
19. Fuel flow [9 right, fig. 5-27] - **NORMAL.**
20. Hydraulic pressure [3, fig. 5-39] - **IN GREEN**.
21. Engine Sync Indicator [7, fig. 5-23] - **SPINNING.**

22. GPU - **DISCONNECTED**, if it was used for pre-flight procedures ("**SHIFT+Q**" or "**SHIFT+W**", depending on your MSFS configuration, or via **ATC**).
23. Battery Switches [8-9, fig. 5-30] - Make sure the batteries are fully charged, then **OFF**. *Do not turn on the battery switches when the batteries are fully charged, and the generators (or GPU) are operating to prevent the Ni-Cd batteries from overheating. **This may cause a fire!***

Left Engine Start (optional at this time)

Repeat the above procedures for the **left engine** if desired (can be performed later just before takeoff).

1. Engine Sync Indicator [7, fig. 5-23] - **STABILIZING**, when both engines are running.

Note: To save fuel, some Learjet pilots prefer to taxi with only one engine running, depending on their flight plan. It's up to you to decide if you want to taxi with one or two engines running. Taxiing on a single engine takes a little practice.

Before Taxi

1. Primary & Secondary Inverter Switches [10, 12, fig. 5-29] - Check **ON**.
2. Auxiliary Inverter Switch [5, fig. 5-29] - Check **OFF**.
3. Radio Master Switch (avionics) [14, fig. 5-29] - Check **ON**.
4. Engine instruments [fig. 5-27] - **CHECKED**.
5. Navigation Lights [15, fig. 5-29] - **ON**.
6. Strobe Lights [11, fig. 5-29] - **ON**.
7. Recognition Lights [9, fig. 5-29] - **ON (if required).**
8. Taxi Lights [18, 20, fig. 5-29] - **ON (TAXI LT)**. *Middle position.*

9. Emergency Lights Switch [9, fig. 5-47] - **ARM**. Check Emergency Lighting System OFF Warning Light [8, fig. 5-47] **OFF.**

Note: *If the emergency lighting system is tested by turning the switch to TEST, then back to ARM or OFF, a manual reset of the cockpit and ceiling lights relay may be required by rotating the Cabin Light Dimmer [14, fig. 5-49] fully counterclockwise to turn off the cockpit and cabin lights.*

10. Spoilers:

   a. Spoilers Switch [25, fig. 5-43] - Check **RET**.

   b. Spoilers Extended Annunciator [7, fig. 5-32a] - Check **OFF.**

11. Bleed Air Switch [1, fig. 5-41] - **NORMAL** or **MAX.**

12. Anti-ice:

   a. Windshield Defog Knob [8, fig. 5-43] - **AS REQUIRED.**

   b. Windshield Heat Switches [4, fig. 5-4] - **AS REQUIRED.**

   c. Wing and Stabilizer Heat Switch [3, fig. 5-4] - **AS REQUIRED.**

   d. Engine Nacelle Heat Switches [2, fig. 5-4] - **AS REQUIRED.**

   e. Pitot Heat Switches [1, fig. 5-4] - **AS REQUIRED.**

   f. Anti-Ice Alcohol Switch [5, fig. 5-4] - **RADOME, AS REQUIRED.**

Note: *All anti-icing equipment must be turned on* ***before icing conditions are encountered*** *to avoid a serious hazard of safety during flight. The Ram Air Temperature Warning Indicator and the Ram Air Temperature Gauge [17, 18, fig. 5-37] should be monitored frequently when flying in areas where icing may occur. Refer to "20 Series Anti-Ice System", in section 6, pages 11-21, for more information about icing conditions, ice detection, and system operation.*

Tip

- Click the radar logo [7, fig. 5-26] to display an alternate data screen with useful information regarding icing conditions.

13. Parking brake [9, fig. 5-43] - **RELEASED.**

14. Anti-Skid Power Switch [8, fig. 5-29] - **ON.**

15. Anti-Skid Generator Lights [5, fig. 5-15] - **ALL OFF.**

Taxi

1. Radios [fig. 5-18 to fig. 5-21] - Check **ON** and **SET.**

2. ATC clearance - **OBTAINED** from appropriate authority. **SET** radios accordingly.

3. GPS/GNS [fig. 5-24a/b] - **ON** and **SET** according to flight plan and ATC clearance (if available/needed).

4. Flight controls - **CHECKED.**

5. Thrust reversers controls [fig. 5-36] - **CHECKED.**

6. Nose wheel steering:

    a. Nose Gear Steer Lock Switch [6, fig. 5-4; 2, fig. 5-51] - **DEPRESS MOMENTARILY** to **ENGAGE** electric nose wheel steering.

    b. Nose Wheel Steering Engaged Annunciator [14, fig. 5-32a] - **ON**.

7. Engine Throttle(s) [1, 3, fig. 5-43] - **AS NEEDED** for taxi. *Taxiing with only one engine running requires some practice.*

8. Aircraft rolling above 5 knots:

    a. Toe brakes - **APPLIED**. Listen for “birds in the cockpit” sounds. *Learjet brake sounds.*

    b. Verify aircraft deceleration.

    c. Toe brakes - **RELEASED**.

Before Takeoff

1. Cabin pressurization:

    a. Bleed Air Switch [1, fig. 5-41] - Check **NORMAL** or **MAX**.

    b. Cabin Altitude Controller Knob [5, fig. 5-41] - **SET** to **initial planned cruise altitude**.

2. Cabin temperature:

    a. Cabin Temperature Control Knob/ Switch [1 or 2, fig. 5-42] - **SET** to **desired temperature.**

    b. H-Valve Position Indicator [19, fig. 5-37] - Check, **about 1/2**.

    c. Lower cabin temperature **if necessary**.

3. Anti-ice:

    a. Bleed Air Switch [1, fig. 5-41] - Check **NORMAL** or **MAX**.

    b. Windshield Defog Knob [8, fig. 5-43] - **AS REQUIRED**.

    c. Windshield Heat Switches [4, fig. 5-4] - **AS REQUIRED**.

d. Wing and Stabilizer Heat Switch [3, fig. 5-4] - **AS REQUIRED.**

e. Engine Nacelle Heat Switches [2, fig. 5-4] - **AS REQUIRED.**

f. Pitot Heat Switches [1, fig. 5-4] - **AS REQUIRED.**

g. Anti-Ice Alcohol Switch [5, fig. 5-4] - **RADOME, AS REQUIRED.**

4. All external lights, except landing lights [fig. 5-29] - **ON.**

5. Avionics:

   a. ADI Gyro and Computer Warning Flags [10-11, fig. 5-7] - **OUT OF VIEW.**

   b. HSI Compass Warning Flag [14, fig. 5-8] - **OUT OF VIEW.**

   c. Radios and transponder [fig. 5-18 to

fig. 5-21] - Check **ON** and **SET** according to flight plan and ATC clearance.

d. GPS/GNS [fig. 5-24a/b] - **ON** and **SET** according to flight plan and ATC clearance (if available/needed).

e. Radar [fig. 5-26] - **ON** and **SET** (if available/needed).

6. Gyro:

a. Directional Gyro Free/Slave Switch [9, fig. 5-5] - Check **SLAVE**.

b. Gyro Drift Compensation Switch [8, fig. 5-5] - If Directional Gyro Free/Slave Switch is set to **FREE** (magnetic references unreliable), **use as needed** to synchronize directional gyros with ground indications (the Directional Gyro Drift Knob [5, fig. 5-2] can also be used). *See section 6, page 35.*

7. Flight instruments:

a. Barometric pressure on ADDUs/standby altimeter [1, 12, fig. 5-11a; 1, 7, fig. 5-11c] - **SET**, according to nearest weather station.

b. Airspeed bugs [1, 5, fig. 5-9] - **SET** to V_1 and V_R **as needed**. *Refer to "Flight Planning", in section 7, and to appendix 1.*

c. Initial course on HSI [1, 8, fig. 5-8] - **SET**.

d. Initial heading on HSI [2, 11, fig. 5-8] - **SET**.

e. RMI [fig. 5-10] - **SET, as needed**.

f. DME head [fig. 5-38] - **SET, as needed**.

g. All directional indicators as aircraft turns while taxiing - **CHECKED**.

8. Autopilot Altitude Preselector [2-3, fig. 5-11a] - **SET** to **initial ATC clearance altitude.**

9. Flight Director Switch [2, fig. 5-22a] - **OFF,** then **ON (reset).** Check the Flight Director Command Bars [4, fig. 5-7] **IN RANGE** on the ADI.

10. Radio altimeter check:

a. Radio Altimeter Power Switch [3, fig. 5-13] - **ON** (to test).

b. Radio altimeter flags [12, fig. 5-7; 6, fig. 5-13] - Check **OUT OF VIEW**.

c. Radio Altimeter Power Switch [3, fig. 5-13] - **OFF** if not needed for takeoff. Otherwise **ON**.

11. Spoilers:

a. Spoilers Switch [25, fig. 5-43] - Check **RET**.

b. Spoilers Extended Annunciator [7, fig. 5-32a] - Check **OFF**.

12. Flaps:

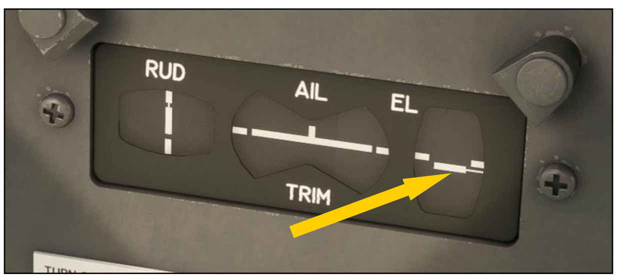
a. Flaps Switch [26, fig. 5-43] - **PUSH DOWN AS NEEDED**.

b. Flaps Position Indicator [1, fig. 5-30] - Check for correct **TAKEOFF POSITION (8° or AS NEEDED)**. *Refer to "**Flight Planning**", in section 7.*

13. Emergency Pitch Trim Switch [3, fig. 5-29] - **NORM**.

14. Trim:

a. Elevator trim (trim button on your controller) - **SET FOR TAKEOFF**. Check that the Elevator Trim Indicator [3, fig. 5-14] is about **one needle thickness below center**. *Forward center of gravity requires more trim. No clicker sound with flaps extended more than 3 degrees. The autopilot must be disengaged.*



b. Takeoff Trim Alert Annunciator [2, fig. 5-33] - Check **OFF**.

c. Aileron trim (Turn Command Knob [2, fig. 4-46] or trim button on your controller) - **CHECKED 0 %**.

d. Rudder trim [1, fig. 5-14; 3, fig. 5-47] - **CHECKED (0 deg.)**. *Use a trim button on your controller or the Rudder Trim Control Switch [1, fig. 5-47] to adjust, if needed.*

Left Engine Start

1. Repeat the above "**Right Engine Start**" procedures (pages 15-17, in this section) and apply them to the left engine for **STARTING** the left engine if only the right engine was used for taxi.

2. Engine Sync Indicator [7, fig. 5-23] - **STABILIZING**, when both engines are running.

Takeoff

1. Fuel quantity [17, fig. 5-45] - With both engines running, check for **imbalance** between the L/R wing tanks. *You may have to perform a cross-feeding operation now or later to balance the L/R wing tanks. See "**Crossflow (Crossfeed) Switch**", section 6, pages 26 -28, for more information.*

2. **Prepare passengers** for takeoff.

3. No Smoking/Seat Belt Switch [10, fig. 5-43; 9, fig. 5-52] - **NO SMOKING AND SEAT BELTS (ON)**.

4. Flight controls:

a. Check - **FREE**.

b. **HIDE** control columns and yokes if desired. *Control columns can be hidden by clicking their respective boot (see "Hiding the Control Columns and Yokes", section 4, page 3).*

5. Nose wheel steering:

a. Nose Gear Steer Lock Switch [6, fig. 5-4] - **DEPRESS MOMENTARILY** to **DISENGAGE** electric nose wheel steering.

b. Nose Wheel Steering Engaged Annunciator [14, fig. 5-32a] - **OFF**.

6. Anti-Skid Power Switch [8, fig. 5-29] - Check **ON**.

7. Anti-Skid Generator Lights [5, fig. 5-15] - Check **OFF.**

8. Engine Air Ignition Switches [1, 16, fig. 5-29] - Normally **OFF** (can be turned **ON** if wet or turbulent conditions).

9. Stall Warning Switches [4, 6, fig. 5-29] - Both **ON.** Check annunciators [3, 6, fig. 5-32a] **OFF.**

10. Pitot Heat Switches [1, fig. 5-4] - Check, both **ON.**

11. Thrust Reverser Arm Switches [13-14, fig. 5-36] - **ARM.**

12. Thrust Reverser Armed Annunciators [7, 8, fig. 5-36] - **ON.**

13. Annunciator panel - **CHECKED**, no warnings or abnormal indications. *It is normal for the amber L ENG ICE and R ENGINE ICE annunciators [19, 22, fig. 5-32b] to be illuminated on the ground when their respective engine RPM is under 70 %. See “Engine Anti-Ice System”, section 6, page 20.*

14. ATC clearance - **OBTAINED** from the appropriate authority.

15. Landing Lights [18, 20, fig. 5-29] - **ON (LDG LT).** *Up position.*

16. All external lights - **ON.**

17. Toe Brakes:

    a. Brakes - **APPLIED.**

Takeoff Sequence

Important

- In case of an engine failure, refer to “**Abnormal/Emergency Procedures**” in section 9.
- The Gates Learjet Model 25 is a **very high-performance jet aircraft.** The takeoff sequence happens **quite fast** and requires an efficient drill to observe and maintain altitude and speed clearances.

1. Throttles [1,3, fig. 5-43]:

    a. **ADVANCE** slowly to **takeoff power** (**100 % RPM**).

2. Toe Brakes:

    a. Brakes - **RELEASED.**

3. **ACCELERATE** to **V_1**:

    a. If the engine fails before V_1, **ABORT** takeoff. *Refer to “Abnormal/*

Emergency Procedures” in section 9.

b. If the engine fails after V_1, **CONTINUE** takeoff. *Refer to “Abnormal/Emergency Procedures” in section 9*.

4. Vr attained:

   a. **ROTATE** to **15 degrees** (nose up).

   b. Airspeed (red) bugs [1, 5, fig. 5-9] - **SET** to **V_2 as needed**. *Refer to “Flight Planning”, in section 7*.

5. Angle-of-Attack:

   a. Angle-of-Attack Indicators [5, fig. 5-6] - **MAINTAIN IN GREEN.**

6. Positive rate of climb:

   a. Landing Gear Selector Switch [5, fig. 5-30] - **UP**.

   b. Landing Gear Position Lights [3, fig. 5-30] - Check **RED ON** in transit, then all **OFF**.

   c. **ACCELERATE** to **V_2 + 15.**

7. Flaps [26, fig. 5-43]:

   a. **RETRACT** on schedule. *Refer to “Maximum Flap Placard Speeds” in appendix 1*.

8. Landing and Taxi Lights [18, 20, fig. 5-29] - **OFF**. *Landing and taxi lights will turn off automatically when the landing gear is retracted.*

9. Engine Air Ignition Switches [1, 16, fig. 5-29] - **OFF** (can be turned **ON** if wet or turbulent conditions during flight).

10. Anti-Skid Power Switch [8, fig. 5-29] - **OFF**.

11. Anti-Skid Generator Lights [5, fig. 5-15] - Check **ON**.

12. Thrust Reverser Arm Switches [13-14, fig. 5-36] - **OFF**.

13. Thrust Reverser Armed Annunciators [7, 8, fig. 5-36] - **OFF**.

14. **ACCELERATE** to **climb speed** - (**MAX 250 KIAS** if ATC-restricted, **MAX 306 KIAS** under FL140). *An aural alert will sound if airspeed is above 306 KIAS under 14,000 feet (bird strike protection).*

15. Cabin pressure [6-7, fig. 5-41] - **CHECKED**.

16. No Smoking/Seat Belt Switch [10, fig. 5-43; 9, fig. 5-52] - **OFF**.

Climb

1. Throttles [1, 3, fig. 5-43]:

   a. **SET** to climb power (**90 % RPM**) [7, fig. 5-27].

2. Autopilot Engage Button [1, fig. 5-46 or 1, fig. 5-22a] - **PRESS ON** (if desired) to

engage the autopilot. *The autopilot will capture and maintain the pitch and level the wing (ATT Hold mode and Wing Leveler engaged).*

3. Anti-ice:

   a. Bleed Air Switch [1, fig. 5-41] - Check **NORMAL** or **MAX.**

   b. Windshield Defog Knob [8, fig. 5-43] - **AS REQUIRED.**

   c. Windshield Heat Switches [4, fig. 5-4] - **AS REQUIRED.**

   d. Wing and Stabilizer Heat Switch [3, fig. 5-4] - **AS REQUIRED.**

   e. Engine Nacelle Heat Switches [2, fig. 5-4] - **AS REQUIRED.**

   f. Pitot Heat Switches [1, fig. 5-4] - **AS REQUIRED.**

   g. Anti-Ice Alcohol Switch [5, fig. 5-4] - **RADOME, AS REQUIRED.**

4. Cabin pressure [6-7, fig. 5-41] - **MONITORED.**

5. Transition level (18,000 feet maximum):

   a. Barometric pressure on ADDUs/ standby altimeter [1, 12, fig. 5-11a; 1, 7, fig. 5-11c] - **SET** to **29.92.**

6. Airspeed:

   a. **ACCELERATE** to **0.7 Mach.**

Cruise

1. Engine instruments [fig. 5-27] - Check **WITHIN LIMITS.**

2. Cabin pressure [6-7, fig. 5-41] - **MONITORED.**

3. Engine Sync Switch [23, fig. 5-43] - **ON, if needed.** *Check Engine Sync Indicator [7, fig. 5-23]. Throttles need to be close to one another.*

4. Engine Sync ON Annunciator [25, fig. 5-32b] - Check **ON** *(if the Engine Sync Switch is set to ON).*

5. Yaw Damper Selector Switch [5, fig. 5-47] - Check **PRI YAW DAMPER.**

6. Primary Yaw Damper ON Button [11, fig. 5-46] - **PRESS ON** *(Primary Yaw Damper engaged).*

7. Fuel status:

   a. **MONITOR** fuel **at all times** [17, fig. 5-45].

   b. **ENSURE** fuel burn [15, fig. 5-45] is **consistent with the flight plan**. *Refer to "Flight Planning", in section 7.*

   c. **SWITCH TO THE FUSELAGE TANK** if the fuel level in the wing tanks **becomes critically low** [6, fig. 5-45]. *Refer to "Fuselage Tank Switch", section 6, pages 27-29, for details and full procedures.*

8. Autopilot Engage Button [1, fig. 5-46 or 1, fig. 5-22a] - **PRESS ON** (if desired), to engage the autopilot. *The autopilot will capture and maintain the pitch and level the wing (ATT Hold mode and Wing Leveler engaged).*

9. Autopilot Speed Hold Mode Switch [12, fig. 5-22b] - **PRESS ON** to engage (if desired).

10. Other autopilot modes [fig. 5-22a/b; fig. 5-46] - **PRESS ON** to engage (if desired).

Descent

1. ATC clearance - **OBTAINED**. Set the radios accordingly.

2. Pressurization:

   a. Set **destination field elevation** [5, fig. 5-41]. *Refer to "Flight Planning" in section 7.*

3. Anti-ice:

   a. Bleed Air Switch [1, fig. 5-41] - Check **NORMAL** or **MAX**.

   b. Windshield Defog Knob [8, fig. 5-43] - **AS REQUIRED**.

   c. Windshield Heat Switches [4, fig. 5-4] - **AS REQUIRED**.

   d. Wing and Stabilizer Heat Switch [3,

fig. 5-4] - **AS REQUIRED.**

   e. Engine Nacelle Heat Switches [2, fig. 5-4] - **AS REQUIRED.**

   f. Pitot Heat Switches [1, fig. 5-4] - **AS REQUIRED.**

   g. Anti-Ice Alcohol Switch [5, fig. 5-4] - **RADOME, AS REQUIRED.**

4. Throttles:

   a. During descent, **MAINTAIN 75% RPM** minimum until 12,000 ft. *The CJ610 axial-flow turbojet engine does not provide enough bleed air to maintain pressurization and de-icing at low RPMs, due to its rather primitive 8-stage compressor design.*

5. Fuel quantity [17, fig. 5-45] - **MONITORED.**

6. Hydraulic Pressure Gauge [3, fig. 5-39] - **IN GREEN.**

7. Spoilers [25, fig. 5-43] - **AS REQUIRED.**

8. Transition level (18,000 feet maximum):

   a. Barometric pressure on ADDUs/standby altimeter [1, 12, fig. 5-11a; 1, 7, fig. 5-11c] - **SET** to **local setting.**

Approach

1. ATC clearance - **OBTAINED.** Set the radios accordingly.

2. Fuel balance between L/R wing tanks [17, fig. 5-45] - **CHECKED.**

3. Thrust Reverser Arm Switches [13-14, fig. 5-36] - **ON.** Thrust Reverser Armed Annunciators [7-8, fig. 5-36] will remain **OFF** until the aircraft touches down. *Thrust reversers cannot be armed with the engine throttles above idle.*

4. Hydraulic Pressure [3, fig. 5-39] - **IN GREEN.**

5. Emergency Air Pressure [4, fig. 5-39] - **IN GREEN.**

6. **Prepare passengers** for landing.

7. No smoking/seat belts sign:

   a. No Smoking Switch [10, fig. 5-43; 9, fig. 5-52] - **NO SMOKING and SEATBELTS ON.**

8. Cabin Pressure [6-7, fig. 5-41] - **CHECKED.**

9. Engine Sync Switch [23, fig. 5-43] - **OFF.**

10. Engine Sync ON Annunciator [25, fig. 5-32b] - Check **OFF.**

11. Spoilers:

a. Spoilers Switch [25, fig. 5-43] - Check **RET**.

b. Spoilers Extended Annunciator [7, fig. 5-32a] - Check **OFF**.

12. Radio altimeter:

a. Radio altimeter power switch [3, fig. 5-13] - **ON**.

Before Landing

1. Landing gear:

a. Landing Gear Selector Switch [5, fig. 5-30] - **DOWN**.

b. Check Landing Gear Position Lights [3, fig. 5-30] - **RED ON** in transit, then all **GREEN** when down and locked.

2. Landing Lights [18, 20, fig. 5-29] - Both **ON (LDG LT)**. *Up position.*

3. Parking brake [9, fig. 5-43] - Check **RELEASED**.

4. Anti-Skid Power Switch [8, fig. 5-29] - **ON**.

5. Anti-Skid Generator Lights [5, fig. 5-15] - Check **OFF**.

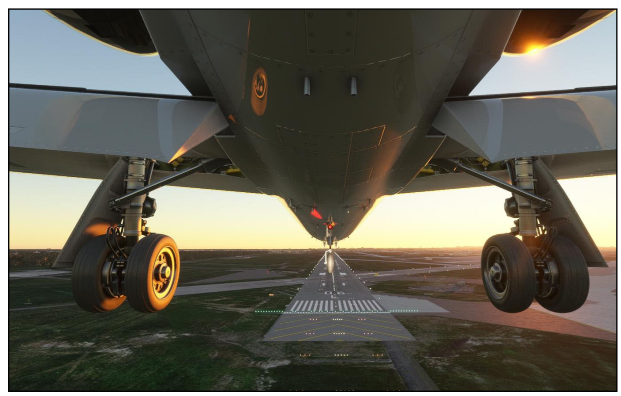
6. Flaps:

a. **DOWN AS REQUIRED** [26, fig. 5-43; 1, fig. 5-30]. *Refer to "Flight Planning" in section 7.*

7. Engine Air Ignition Switches [1, 16, fig. 5-29] - Normally **OFF**, or **ON** if wet or turbulent conditions.

8. Primary Yaw Damper OFF Button [12, fig. 5-46] - **PRESS OFF (primary yaw damper disengaged).**

9. Secondary Yaw Damper Switch [6, fig. 5-47] - **OFF (secondary yaw damper disengaged).**



Landing (after Touchdown)

1. Spoilers:

a. Spoilers Switch [25, fig. 5-43] - **EXT. (spoilers extended as needed).**

b. Spoilers Extended Annunciator [7, fig. 5-32a] - **ON** (if extended).

2. Thrust reversers (if needed):

a. Thrust Reverser Subthrottles [7, 17, fig. 5-43] - **PULLED AFT ("F2" AS NEEDED) to deploy thrust reversers.**

Up to 85% RPM in reverse.

b. Thrust Reverser Deployed Annunciators [6, 9, fig. 5-36] - **ON**.

3. Thrust reversers (if needed, after deceleration):

   a. Thrust Reverser Subthrottles - **PUSHED FORWARD ("F1" to IDLE).**

   b. Thrust Reverser Deployed Annunciators - **OFF**.

4. Thrust Reverser Arm Switches [13-14, fig. 5-36] - **OFF**.

5. Thrust Reverser Armed Annunciators [7, 8, fig. 5-36] - **OFF**.

6. Spoilers (after deceleration):

   a. Spoilers Switch - **RET (spoilers retracted).**

   b. Spoilers Extended Annunciator - **OFF**.

Before Clearing the Runway

1. Anti-Skid Power Switch [8, fig. 5-29] - **OFF**.

2. Anti-Skid Generator Lights [5, fig. 5-15] - Check **ON**.

3. Flaps:

   a. Flaps Switch [26, fig. 5-43] - **UP (AS NECESSARY).**

   b. Confirm flaps position [1, fig. 5-30] - **FULL UP**.

2. Nose wheel steering:

   a. Nose Gear Steer Lock Switch [6, fig. 5-4] - **DEPRESS MOMENTARILY** to **ENGAGE** electric nose wheel steering.

   b. Nose Wheel Steering Engaged Annunciator [14, fig. 5-32a] - **ON**.

After Clearing the Runway

1. Engine Air Ignition Switches [1, 16, fig. 5-29] - **OFF**. Check Engine Air Ignition Lights [2, 17, fig. 5-29] **OFF**.

2. Taxi Lights [18, 20, fig. 5-29] - **ON (TAXI LT)**. *Middle position. Landing lights will go off.*

3. Strobe Lights [11, fig. 5-29] - **OFF**.

4. Recognition Lights [9, fig. 5-29] - **OFF**.

5. Both Stall Warning Switches [4, 6, fig. 5-29] - **OFF**.

6. Anti-ice:

   a. Bleed Air Switch [1, fig. 5-41] - **NORMAL** if needed or **OFF**.

   b. Windshield Defog Knob [8, fig. 5-43] - **AS REQUIRED**.

   c. Windshield Heat Switches [4, fig. 5-4] - **AS REQUIRED**.

   d. Wing and Stabilizer Heat Switch [3, fig. 5-4] - **OFF**.

   e. Engine Nacelle Heat Switches [2, fig. 5-4] - **OFF**.

   f. Pitot Heat Switches [1, fig. 5-4] - **OFF**.

   g. Anti-Ice Alcohol Switch [5, fig. 5-4] - **OFF**.

8. Bleed Air Switch [1, fig. 5-41] - **OFF**, if not needed for anti-ice or cabin temperature control.

9. Unnecessary avionics - **OFF**.

10. Emergency Lights Switch [9, fig. 5-47] - **DISARM**.

Shutdown

Once the aircraft is parked:

1. Parking brake:

   a. Parking Brake Lever [9, fig. 5-43] - **SET**.

2. Anti-ice:

   a. Bleed Air Switch [1, fig. 5-41] - **OFF**.

   b. Windshield Defog Knob [8, fig. 5-43] - **NORMAL (PUSHED).**

   c. Windshield Heat Switches [4, fig. 5-4] - **OFF**.

   d. Wing and Stabilizer Heat Switch [3, fig. 5-4] - **OFF**.

   e. Engine Nacelle Heat Switches [2, fig. 5

-4] - **OFF**.

f. Pitot Heat Switches [1, fig. 5-4] - **OFF**.

g. Anti-Ice Alcohol Switch [5, fig. 5-4] - **OFF.**

3. Battery Switches [8-9, fig. 5-30] - **ON**.

4. Engine Starter/Generator Switches [6, 11, fig. 5-30] - **OFF**.

5. Engine shutoff:

a. Thrust Reverser Subthrottles [7, 17, fig. 5-43] - **FULL FORWARD TO IDLE (“F1”).**

b. Throttles [1, 3, fig. 5-43] - **FULL AFT TO IDLE** (“**F1**” or **FULL AFT** on your controller).

c. Jet Pump Switches [11-12, fig. 5-45] - **OFF**.

d. Standby Pump Switches [8-9, fig. 5-45] - Check **OFF**.

e. Throttle Release Levers [2, 4, fig. 5-43] - **DOWN AND LOCKED** (throttles set to cutoff, fuel valves closed). *Click to push down and lock. Engines will shut off.*

6. Rotating Beacon Lights [13, fig. 5-29] - **OFF**.

7. All remaining exterior lights [fig. 5-29] - **OFF**.

8. Emergency Battery Switches [2-3, fig. 5-15] - Check **OFF**.

9. Standby Gyro [fig. 5-16] - **CAGED**. Pull knob [7, fig. 5-16] to cage.

10. Radio Master Switch (Avionics) [14, fig. 5-29] - **OFF**.

11. Primary, Secondary and Auxiliary Inverter Switches [10,12, 5, fig. 5-29] - **OFF**.

12. All remaining panel switches - **OFF**.

13. Battery Switches [8-9, fig. 5-30] - **OFF**.

14. Controls - **LOCKED**.

15. Main (Passenger and Crew) Door [fig. 5-54] - **OPEN**. *Click the **Main Door Unsecured Annunciator** [10, fig. 5-32a] to open/close the door from the cockpit.*

16. Flight Crew - **LEAVING**. *To show/hide the flight crew, click either **headphone hanger** [5, fig. 5-49] on the cockpit side walls. When the headphones and the pilot’s seatbelts are visible inside the cockpit, the crew is absent. When the headphones and the pilot’s seatbelts are not visible, the crew is present.*

17. “Remove Before Flight” Items - **INSTALLED**. *Click the **white label** above the Anti-Skid Generator Lights [4, fig. 5-15] to install the wheel chocks, engine covers, tail stand, protectors and flags.*

18. Main (Passenger and Crew) Door - **CLOSED**. *Click the **Main Door Unsecured Annunciator** to open/close the*

*door from the cockpit. You may also click the door **handle** [7, fig. 5-54] from inside the cabin.*

19. You may switch to the external view ("**END**") to check if the aircraft is properly parked, if the "Remove Before Flight" items are installed, if the crew has left, and if the door is closed.

Welcome to your destination!

ABNORMAL/EMERGENCY PROCEDURES

SECTION 9

This section contains the procedures in case of an emergency.

ENGINE FAILURE

Engine Failure on Takeoff

If below V_1, ABORT takeoff - may require spoilers/thrust reversers and maximum braking energy.

If above V_1:

1. **MAINTAIN** directional control.
2. **PERFORM** single engine takeoff.
3. **ACCELERATE** to **V_2 + 10**.
4. **TRIM** rudder as needed.
5. **INFORM** ATC and request amended clearance if possible.
6. **RETURN** for landing if cleared by ATC.

Engine Failure in Cruise

1. **MAINTAIN** directional control.
2. **TRIM** rudder as needed.
3. **ATTEMPT** in-flight engine restart.

If engine won't restart:

1. Affected engine - **SECURE**:

    a. Throttle and Subthrottle [1 or 3, 7 or 17, fig. 5-43] - to **IDLE (“F1”).**

    b. Throttle Release Lever [2 or 4, fig. 5-43] - **LOCKED (fuel valve closed).** *This will set the throttle to **CUTOFF**. Engine will shut off.*

    c. Manual and air ignition [6 or 11, fig. 5-30; 1 or 16, fig. 5-29] - **OFF**.

2. **INFORM** ATC, request lower altitude..

3. **EVALUATE** fuel status [17, fig. 5-45].

4. Fuel Crossfeed Switch [3, fig. 5-45] and Standby Pump Switches [8-9, fig. 5-45] - **AS REQUIRED.** *See “**Crossflow (Crossfeed) Switch**”, section 6, pages 26-28, for more information.*

5. **COMPLETE** flight at lower altitude if possible and/or **PERFORM a precautionary landing** if needed.

Engine Failure on Approach

1. Same as above. Engine restart and cross-feeding optional.

2. **MAINTAIN** directional control and **TRIM** rudder as needed.

3. **INFORM** ATC.

4. **PERFORM** a normal approach at slightly higher speed if field length allows (may preclude full flaps).

ENGINE FIRE

1. Fire Alarm Annunciator [6, fig. 5-33 or 2, fig. 5-35] - **ON.** Identify engine on fire.

2. **THROTTLE BACK** engine to **IDLE (“F1”)** and **MONITOR** Fire Alarm Annunciator.

3. If fire persists after 10 seconds, **PRESS** Firewall Shutoff Button [6, fig. 5-33 or 2, fig. 5-35]. *Open button guard first. This will arm the fire extinguisher and shut off the engine.*

4. Confirm firewall and engine shutoff:

    a. Pin light [8, fig. 5-33 or 1, fig. 5-35] - **ON** with **ENGINE SHUTOFF.**

5. Affected engine - **SECURE**:

    a. Throttle and Subthrottle [1 or 3, 7 or 17, fig. 5-43] - to **IDLE (“F1”).**

b. Throttle Release Lever [2 or 4, fig. 5-43] - **LOCKED (fuel valve closed).** *This will set throttle to* ***CUTOFF***.

c. Manual and air ignition [6 or 11, fig. 5-30; 1 or 16, fig. 5-29] - **OFF**.

6. Confirm extinguishers **ARMED** [4-5, fig. 5-33 or 4-5, fig. 5-35] - **ON**.

7. If fire persists after 10 seconds, **PUSH** First Fire Extinguisher Discharge Button [4, fig. 5-33 or 4, fig. 5-35].

8. If fire persists after 10 more seconds, **PUSH** Second Fire Extinguisher Discharge Button [5, fig. 5-33 or 5, fig. 5-35].

9. If fire persists after 10 more seconds, **DECLARE EMERGENCY** to ATC and **LAND as soon as possible.**

ELECTRICAL AND/OR HYDRAULIC SYSTEMS FAILURE

Simplified Procedures in Case of a Total Engine/ Generator Failure

1. Main Battery Switches [8-9, fig. 5-30] - **ON** (if generators failed).

2. Engine Starter/Generator Switches [6, 11, fig. 5-30] - **OFF** (if generators failed**).**

3. Auxiliary Inverter Switch [5, fig. 5-29] - **ON** (if main inverters failed).

4. Primary and Secondary Inverter Switches [10, 12, fig. 5-29] - **OFF** (if failed).

5. **REDUCE** electrical load by turning **OFF** all unnecessary equipment.

6. Electric Auxiliary Hydraulic Pump Switch [19, fig. 5-29] - **ON** to test, then **OFF** and **ON** again only when hydraulic power is

needed (flaps, spoilers, landing gear, brakes).

7. Hydraulic Pressure Gauge [3, fig. 5-39] - **IN GREEN** when electric auxiliary hydraulic pump is **ON.**

8. Frequently **CHECK** airspeed/Mach, altitude, attitude, and angle-of attack.

9. **DECLARE EMERGENCY** to ATC and **LAND as soon as practical**.

After main batteries are depleted:

1. Main Emergency Battery Switch [2, fig. 5-15] - **ON.** The amber light next to the switch will come **ON** after about 1 to 3 seconds, indicating that power is supplied to the aircraft by the emergency battery.

2. Standby Emergency Battery Switch [3, fig. 5-15] - **ON** (if needed). The amber light next to the switch will come **ON.**

3. Standby Gyro [fig. 5-16] - **UNCAGED** and **CHECKED.**

4. Battery Switches [8-9, fig. 5-30] - **OFF.**

On approach:

1. Electric Auxiliary Hydraulic Pump Switch [19, fig. 5-29] - **ON.**

2. Hydraulic Pressure Gauge [3, fig. 5-39] - **IN GREEN.**

3. Spoilers:

   a. Spoilers Switch [25, fig. 5-43] - Check **RET**. *Spoilers retracted.*

   b. Spoilers Extended Annunciator [7, fig. 5-32a] - Check **OFF.**

4. Flaps:

   a. **DOWN AS REQUIRED** [26, fig. 5-43; 1, fig. 5-30]. *Refer to "**Flight Planning**" in section 7.*

   b. Confirm flaps position [1, fig. 5-30] - **DOWN.**

5. Landing gear:

   a. Landing Gear Selector Switch [5, fig. 5-30] - **DOWN.**

   b. Check Landing Gear Position Lights [3, fig. 5-30] - **RED ON** in transit, then all **GREEN** when down and locked.

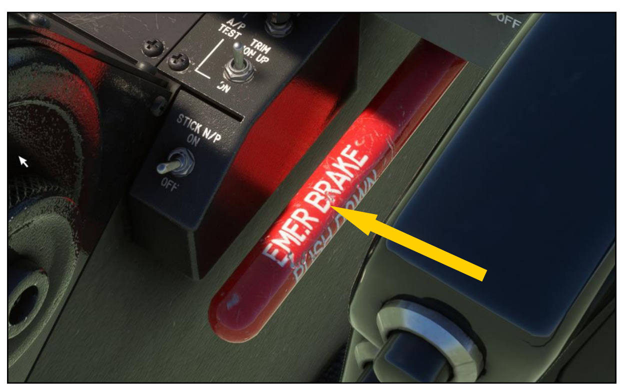
If electric auxiliary hydraulic pump fails, on approach:

1. Check Emergency Air Pressure Gauge [4, fig. 5-39] - **IN GREEN.** You may c*lick the label above the engine gauge cluster [1, fig. 5-27] to fill the tank if necessary.*
2. Spoilers:
   a. Spoilers Switch [25, fig. 5-43] - Check **RET**. *Spoilers retracted.*
   b. Spoilers Extended Annunciator [7, fig. 5-32a] - Check **OFF**.
3. Flaps:
   a. **DOWN AS REQUIRED** (and as much as possible) [26, fig. 5-43; 1, fig. 5-30]. *Refer to "**Flight Planning**" in section 7.*
   b. Confirm flaps position [1, fig. 5-30] - **DOWN.**
4. Landing gear:
   a. Landing Gear Selector Switch [5, fig. 5-30] - **DOWN**.
   b. Check Landing Gear Position Lights [3, fig. 5-30] - **RED ON** in transit, then all **GREEN** when down and locked.

If landing gear won't extend:

1. Check Emergency Air Pressure Gauge [4, fig. 5-39] - **IN GREEN.** You may c*lick the label above the engine gauge cluster [1, fig. 5-27] to fill the tank if necessary.*
2. Landing Gear Selector Switch [5, fig. 5-30] - **DOWN.**

3. Emergency Gear Extension Lever [6, fig. 5-43] - **DOWN.** *Click several times until landing gear is fully extended.*
4. Check Landing Gear Position Lights [3, fig. 5-30] - **RED ON** in transit, then all **GREEN** when down and locked.
5. Frequently **CHECK** airspeed/Mach, altitude, attitude, and angle-of attack.
6. **LAND** as soon as possible.
7. **USE** the **Emergency Brake** [20, fig. 5-43] in case of a total brake failure after touchdown.



WINDSHIELD ANTI-ICE SYSTEM FAILURE

In case of a failure of the windshield heating system, the **Windshield and Radome Alcohol Anti-Ice System** can be used to de-ice/defog the captain's windshield.

Note: *Because of limitations for the display of ice effects in MSFS 2020, it was not possible to separate the ice on the left windshield from the ice on the right windshield. In the real aircraft, the alcohol system will not de-ice/defog the co-pilot's windshield. Refer to section 6, page 17, for more information.*

To de-ice the radome and the captain's windshield (engines must be running and the aircraft powered):

1. Bleed Air Switch [1, fig. 5-41] - **NORM** or **MAX**.
2. Anti-Ice Alcohol Switch [5, fig. 5-4] – **WSHLD & RADOME**.

To stop the flow of alcohol:

1. Anti-Ice Alcohol Switch [5, fig. 5-4] – **OFF** or **RADOME** only (if required).

When the switch is set to **WSHLD & RADOME**, the system supplies both the radome and the captain's windshield with alcohol for about 45 minutes with a full reservoir.

The amber ALC AI annunciator on the main annunciator panel [15, fig. 5-32a] illuminates when the alcohol reservoir is empty. *Mouseover to check the remaining alcohol. You may click the annunciator to fill the reservoir with 1.75 gallons of alcohol.*

QUICK START PROCEDURES

SECTION 10

You may follow these **simplified procedures** to operate the Xtreme Prototypes GLJ Model 25 for Microsoft Flight Simulator without going through the detailed (and illustrated) procedures presented in the previous section. We recommend using the "**Quick Start Procedures**" only if you are familiar with both your simulation platform and the Gates Learjet Model 25 systems described in sections 4, 5 and 6.

We assume that you have already started your simulation platform and created a new flight plan for your Learjet in the World Map. We also assume that you are departing from a **parking place**, and not from a runway or taxiway. Departing from a parking place will ensure that the aircraft will be in its "**Cold and Dark**" state at the beginning of your flight, with the engines and all systems shut off.

Note: *There is no "electronic" checklist included with this software version. A MSFS-type electronic checklist is currently under development and may become available in future versions and/or updates.*

1. Click the camera icon in the top section of the screen to select one of the pilot cameras in the **COCKPIT** tab.
2. Under the PILOT dropdown menu, select "**PILOT**" (a normal view from the captain's seat).

Tip

- Depending on your MSFS configuration, you may use the "**END**" key on your keyboard to toggle between the external view and the cockpit view.

CHECKLIST

Before Preparing the Cockpit

1. Main (Passenger and Crew) Door - **OPEN**.
2. "Remove Before Flight" Items - **REMOVED**.
3. Flight Crew - **ON BOARD**.
4. Captain - **SELECT PILOT**.

5. Copilot - **SELECT PILOT**.

6. Sunglasses - **OPTIONAL**.

8. Pilots - **CHECK**.

9. Seats - **ADJUST ARMRESTS**.

10. Flight controls - **FREE**.

Cockpit Preparation (Power OFF)

1. Parking brake - **SET**.

2. All switches - **OFF**.

3. All circuit breakers - Check **IN (CLOSED).**

4. Oxygen Pressure Gauge - **IN GREEN**.

5. Emergency Air Pressure Gauge - **IN GREEN**.

6. Passenger Oxygen Flow Valve - **NORM**, if passengers are present.

7. Passenger Oxygen Mask Valve - **AUTO**.

8. Landing Gear Selector Switch - Check **DOWN**.

9. Bleed Air Switch - Check **OFF**.

10. Pressurization Mode Switch - **AUTO**.

11. Auto Rate Control Knob - Check **CENTERED**.

12. Windshield Defog Knob - **IN (NORMAL).**

13. "ALC Al" annunciator - **CHECK** alcohol level (1.75 gallons).

Testing the Emergency Batteries

1. Main Emergency Battery Switch - **ON**.

2. Check the amber light next to the Main Emergency Battery Switch **ON**, after a brief delay.

3. Standby Gyro - Check **OPERATIONAL.** Uncage and adjust pitch scale if necessary.

4. Main Emergency Battery Switch - **OFF**.

5. Standby Emergency Battery Switch - **ON.**

6. Check the amber light next to the Standby Emergency Battery Switch **ON**, after a brief delay.

7. Standby Emergency Battery Switch - **OFF**, then **STBY**.

8. Check the amber light next to the Standby Emergency Battery Switch **ON**, after a brief delay.

9. Standby Gyro - Check **OPERATIONAL.**

10. Standby Emergency Battery Switch - **OFF**.

External Power Source (Optional)

1. Depending on your MSFS configuration, you may press "**SHIFT+Q**" on your keyboard - or use the **ATC** window - to call for a ground power unit (GPU).

Cockpit Preparation (Power ON)

1. Make sure the GPU is **DISCONNECTED** if the batteries are used.

2. Battery Switches - **ON**, if the GPU is not operational.

3. Cockpit lights - **ADJUSTED** to your preferences.

4. Landing Gear Selector Switch and Lights - Check **DOWN + 3 GREEN**.

5. Both Primary and Secondary Inverter Switches - **ON**.

6. Radio Master Switch (Avionics) - **ON**.

7. Instrument Warning Flags - **OUT OF VIEW**.

8. Annunciators:

   a. Annunciator Panel Test Button and Dimmer - **DEPRESSED** (**ON**).

   b. All annunciators and most panel and center console lights - **ON**.

   c. Decision height lights on the ADIs and radio-altimeter - **ON.**

d. Altitude alert lights on the ADDUs - **ON.**

e. Annunciator Panel Test Button - **RELEASED (OFF).**

9. Decision height lights on the captain's and copilot's fire panels - **PUSH TO TEST (ON/OFF).**

10. Marker Beacon Lights on the captain's and copilot's fire panels - **PUSH TO TEST (ON/OFF).**

11. Electric Auxiliary Hydraulic Pump Switch - **ON.**

12. Hydraulic Pressure Gauge - **RISING, then IN GREEN.**

13. Electric Auxiliary Hydraulic Pump Switch - **OFF.**

Warning Systems Tests

1. Landing Gear Warning System Test Switch - **TEST.** Check all six Landing Gear Position Lights **ON** with aural warning.

2. Landing Gear Warning System Test Switch - **CENTER (OFF).**

3. No Smoking/Seat Belt Switch - **TEST (BOTH POSITIONS).** Return switch to **OFF** after test.

4. Electric Auxiliary Hydraulic Pump Switch - **ON.**

5. Stall warning system test:

   a. Both Stall Warning Switches - **ON.** Check annunciators **OFF.**

   b. Stick Nudger/Puller Switch - **ON.**

   c. Stall Warning Test Vane Selector Switch - **RIGHT (R STALL).**

   d. Stall Warning System Test Switch - **ON.**

   e. Right Angle-of-Attack Indicator - **IN RED.** Check for aural alert, stick shaker, stick nudger (pusher) and Right Stall Warning Annunciator **FLASHING.**

   f. Stall Warning Test Vane Selector Switch - **LEFT (L STALL).**

   g. Left Angle-of-Attack Indicator - **IN RED.** Check for aural alert, stick shaker, stick nudger (pusher) and Left Stall Warning Annunciator **FLASHING.**

   h. Stall Warning System Test Switch - **OFF.**

   i. Stick Nudger/Puller Switch - **OFF.**

   j. Both Stall Warning Switches - **OFF.** Check annunciators **ON.**

6. Anti-skid system test:

   a. Anti-Skid Power Switch - **ON.** Check Anti-Skid Generator Lights **OFF.**

   b. Anti-Skid System Test Switch - **FORWARD (OUTBOARD).** Check Anti-Skid Generator Lights **OUTBOARD ON.**

   c. Anti-Skid System Test Switch - **AFT (INBOARD).** Check Anti-Skid Generator Lights **INBOARD ON.**

   d. Anti-Skid System Test Switch - **CENTER (OFF).**

   e. Anti-Skid Power Switch - **OFF.** Check Anti-Skid Generator Lights **ON.**

7. Overspeed warning test:

   a. Stick Nudger/Puller Switch - **ON.**

   b. Cabin Altitude Warning/Mach Test Switch - **AFT (MACH TEST).** Check for aural alert and stick puller.

   c. Cabin Altitude Warning/Mach Test Switch - **CENTER (OFF).**

   d. Stick Nudger/Puller Switch - **OFF.**

8. Electric Auxiliary Hydraulic Pump Switch - **OFF.**

9. Fire detection system test:

   a. Fire Detection System Test Switch - **ON.** Check both captain and copilot fire annunciators **ON** or **FLASHING.**

   b. Fire Detection System Test Switch - **OFF.** Check both captain and copilot fire annunciators **OFF.**

10. Cabin altitude warning test:

    a. Cabin Altitude Warning/Mach Test Switch - **FORWARD (CABIN ALT TEST).** Check Cabin Altitude Annunciator **FLASHING** (with aural alert).

    b. Cabin Altitude Warning/Mach Test Switch - **CENTER (OFF).** Check Cabin Altitude Annunciator **OFF**.

Before Starting the Engines

1. Thrust reversers:

    a. Thrust Reverser Lights Test Switch - **TEST**. Check all thrust reverser annunciators and lights **ON**.

    b. Thrust Reverser Lights Test Switch - **NORM**. Check all thrust reverser annunciators and lights **OFF**.

    c. Engine Throttles - **IDLE** ("**F1**" or **FULL AFT** on your controller) if released, or **CUTOFF** if locked.

    d. Thrust Reverser Subthrottles - **PUSHED FORWARD** or **IDLE 0 %** ("**F1**").

    e. Thrust Reverser Arm Switches - **ARM.** Check Thrust Reverser Armed Annunciators **ON**.

    f. Thrust Reverser Arm Switches - **OFF**. Check Thrust Reverser Armed Annunciators **OFF**.

    g. Thrust Reverser Emergency Stow Switches - **NORM (UP).** Check Thrust Reverser Emergency Stow Lights **OFF**.

    h. Thrust Reverser Unsafe Annunciators - **OFF**.

    i. Thrust Reverser Deployed Annunciators - **OFF**.

2. Autopilot check:

    a. AFC/SS Test Switch - **FORWARD (AFCS TEST).** Check all AFCS (autopilot/flight director) mode annunciators and lights **ON**.

    b. AFC/SS Test Switch - **CENTER (OFF).**

    c. Autopilot Engage Button - **PRESS ON** to engage, then **PRESS OFF** to disengage. Check for aural alert when the autopilot is disengaged.

    d. Autopilot Engage Button - **PRESS ON.** Check FD **ON**, ATT **ON** and WING LEV **ON.**

    e. Autopilot Roll Monitor Test Button - **DEPRESS TO TEST.** Autopilot will disengage. Release to **OFF.**

    f. Autopilot Engage Button - **CHECK ON.**

    g. Autopilot Pitch Trim Monitor Switch - **TEST UP AND DOWN.** Autopilot will disengage. Reset to **CENTER (OFF).**

    h. Autopilot Engage Button - **PRESS ON.** Check WING LEV **ON.**

    i. Turn Command Knob - **TEST (ROTATE) LEFT/RIGHT.** Check WING LEV **OFF**, then **RESET** knob to **CENTER (0 %).**

    j. Autopilot Engage Button - **PRESS OFF**, then **PRESS ON.** Check FD **ON**, ATT **ON** and WING LEV **ON.**

    k. Pitch Command Wheel - **TEST (ROTATE) UP/DOWN**, then **RESET** to **0 degrees**.

    l. Autopilot Engage Button - **PRESS OFF.**

    m. Yaw Damper Selector Switch - **PRI YAW DAM**PER.

    n. Primary Yaw Damper ON Button - **PRESS ON** to engage.

    o. Primary Yaw Damper OFF Button - **PRESS OFF** to disengage. Check for aural alert when primary yaw damper is disengaged.

    p. Yaw Damper Selector Switch - **SEC YAW DAMPER.**

    q. Secondary Yaw Damper Switch - **ENGAGE**.

    r. Secondary Yaw Damper Switch - **OFF.** Check for aural alert when secondary yaw damper is disengaged.

    s. Yaw Damper Selector Switch - Back to **PRI YAW DAMPER**.

3. Emergency Pitch Trim Selector Switch - **NORM.**

4. Trim:

   a. Elevator trim (trim button on your controller) - Check that the Elevator Trim Indicator is about **one needle thickness below center**. Listen for trim in motion clicker (autopilot must be disengaged).

   b. Takeoff Trim Alert Annunciator - **OFF.**

   c. Aileron trim (Turn Command Knob or trim button on your controller) - **CHECKED 0 %.**

   d. Rudder trim - **CHECKED (0 deg.).**

5. Fuel quantity:

   a. Check **sufficient quantity** for flight.

   b. Check for **imbalance** between L/R tanks.

6. Fuel counter - Click button to **RESET TO ZERO.**

7. Crossflow (Crossfeed) Switch - **CLOSE.**

8. Fuselage Tank Switch - **OFF (CENTER).**

9. Fuel Jettison Switch - **OFF.**

10. Jet pumps:

    a. Jet Pumps Switches - Both **ON.**

    b. Motive Flow Valve Lights - Both **ON** for one second (valve in transit), then **OFF.**

    c. Engine Low Fuel Pressure Annunciators - **OFF.**

11. Standby Pump Switches and Lights - **OFF.**

12. Main (Passenger and Crew) Door - **CLOSED AND SECURED.**

13. Door Unsecured Annunciator - **OFF.**

Right Engine Start
(same procedures for the left engine)

***Note:** If the engine won't start, make sure the fuel mixture is set to "**rich**" before proceeding.*

1. Right Engine Throttle - **IDLE** ("**F1**" or **FULL AFT** on your controller).

2. Right Thrust Reverser Subthrottle - Check **FULL FORWARD** (**IDLE** or "**F1**").

3. Right Throttle Release Lever - Check **DOWN AND LOCKED** (throttle set to cutoff, fuel valve closed).

4. Right Engine Throttle - Check **CUTOFF** (full down position).

5. Rotating Beacon Lights - **ON.**

6. Right Starter/Generator Switch - **START.** Check for Right Ignition Light **ON.**

7. Right engine RPM - Check about **10 to 15%.**

8. Right Throttle Release Lever - **UP AND RELEASED** (throttle set to idle, fuel valve open).

9. Right Engine Throttle - Check **IDLE** ("**F1**" or **FULL AFT** on your controller).

10. Right engine EGT - Monitor and make sure **WITHIN GREEN ARC.**

11. Right engine RPM - Check about **50 %.**

12. Right Starter/Generator Switch - Set to **OFF**, then to **GEN** when the engine is stable at **IDLE.**

13. Right Engine Ignition Light - **OFF.**

14. Right Generator Inoperative Annunciator - **OFF.**

15. Right DC Ammeter - Check **MOVING.**

16. Right Engine Low Fuel Pressure Annunciator - Check **OFF.**

17. Primary & Secondary Inverter Switches - Check **ON.**

18. Right engine oil pressure and temperature - Check **BOTH IN GREEN.**

19. Fuel flow - **NORMAL.**

20. Hydraulic pressure - **IN GREEN.**

21. Engine Sync Indicator - **SPINNING.**

22. GPU - **DISCONNECTED**, if it was used for pre-flight procedures ("**SHIFT+Q**" or "**SHIFT+W**", depending on your MSFS configuration, or via **ATC**).

23. Battery Switches - Make sure the batteries are fully charged, then **OFF**.

Left Engine Start (optional at this time)

Repeat the above procedures for the **left engine** if desired (can be performed later just before takeoff).

1. Engine Sync Indicator - **STABILIZING**, when both engines are running.

Note: *To save fuel, some Learjet pilots prefer to taxi with only one engine running.*

Before Taxi

1. Primary & Secondary Inverter Switches - Check **ON.**

2. Auxiliary Inverter Switch - Check **OFF.**

3. Radio Master Switch (avionics) - Check **ON**.

4. Engine instruments - **CHECKED.**

5. Navigation Lights - **ON.**

6. Strobe Lights - **ON.**

7. Recognition Lights - **ON (if required).**

8. Taxi Lights - **ON (TAXI LT).**

9. Emergency Lights Switch - **ARM**. Check Emergency Lighting System OFF Warning Light **OFF.**

10. Spoilers:

    a. Spoilers Switch - Check **RET**.

    b. Spoilers Extended Annunciator - Check **OFF.**

11. Bleed Air Switch - **NORMAL** or **MAX.**

12. Anti-ice:

    a. Windshield Defog Knob - **AS REQUIRED.**

    b. Windshield Heat Switches - **AS REQUIRED.**

    c. Wing and Stabilizer Heat Switch - **AS REQUIRED.**

    d. Engine Nacelle Heat Switches - **AS REQUIRED.**

    e. Pitot Heat Switches - **AS REQUIRED.**

    f. Anti-Ice Alcohol Switch - **RADOME, AS REQUIRED.**

Note: *All anti-icing equipment must be turned on* ***before icing conditions are encountered*** *to avoid a serious hazard of safety during flight.*

Tip

- You may click the radar logo to display an alternate data screen with useful information regarding icing conditions.

13. Parking brake - **RELEASED.**

14. Anti-Skid Power Switch - **ON.**

15. Anti-Skid Generator Lights - **ALL OFF.**

Taxi

1. Radios - Check **ON** and **SET**.

2. ATC clearance - **OBTAINED** from appropriate authority. **SET** radios accordingly.

3. GPS/GNS - **ON** and **SET** according to flight plan and ATC clearance (if available/needed).

4. Flight controls - **CHECKED.**

5. Thrust reversers controls - **CHECKED.**

6. Nose wheel steering:

    a. Nose Gear Steer Lock Switch - **DEPRESS MOMENTARILY** to **ENGAGE** electric nose wheel steering.

    b. Nose Wheel Steering Engaged Annunciator - **ON.**

7. Engine Throttle(s) - **AS NEEDED** for taxi.

8. Aircraft rolling above 5 knots:
    a. Toe brakes - **APPLIED**. Listen for "birds in the cockpit" sounds.
    b. Verify aircraft deceleration.
    c. Toe brakes - **RELEASED.**

Before Takeoff

1. Cabin pressurization:
    a. Bleed Air Switch - Check **NORMAL** or **MAX.**
    b. Cabin Altitude Controller Knob - **SET** to **initial planned cruise altitude.**
2. Cabin temperature:
    a. Cabin Temperature Control Knob/ Switch - **SET** to **desired temperature**.
    b. H-Valve Position Indicator - Check, **about 1/2**.
    c. Lower cabin temperature **if necessary.**
3. Anti-ice:
    a. Bleed Air Switch - Check **NORMAL** or **MAX.**
    b. Windshield Defog Knob - **AS REQUIRED**.
    c. Windshield Heat Switches - **AS REQUIRED**.
    d. Wing and Stabilizer Heat Switch - **AS REQUIRED.**
    e. Engine Nacelle Heat Switches - **AS REQUIRED.**
    f. Pitot Heat Switches - **AS REQUIRED.**
    g. Anti-Ice Alcohol Switch - **RADOME, AS REQUIRED.**
4. All external lights, except landing lights - **ON.**
5. Avionics:
    a. ADI Gyro and Computer Warning Flags - **OUT OF VIEW.**
    b. HSI Compass Warning Flag - **OUT OF VIEW.**
    c. Radios and transponder - Check **ON** and **SET** according to flight plan and ATC clearance.
    d. GPS/GNS - **ON** and **SET** according to flight plan and ATC clearance (if available/needed).
    e. Radar - **ON** and **SET** (if available/ needed).
6. Gyro:
    a. Directional Gyro Free/Slave Switch - Check **SLAVE.**
    b. Gyro Drift Compensation Switch - If Directional Gyro Free/Slave Switch is set to **FREE** (magnetic references unreliable), **use as needed** to synchronize directional gyros with ground indications (the Directional Gyro Drift Knob can also be used).
7. Flight instruments:
    a. Barometric pressure on ADDUs/ standby altimeter - **SET**, according to nearest weather station.
    b. Airspeed bugs - **SET** to V_1 and V_R **as needed.**
    c. Initial course on HSI - **SET.**
    d. Initial heading on HSI - **SET.**
    e. RMI - **SET, as needed.**
    f. DME head - **SET, as needed.**
    g. All directional indicators as aircraft turns while taxiing - **CHECKED.**
8. Autopilot Altitude Preselector - **SET** to **initial ATC clearance altitude.**
9. Flight Director Switch - **OFF, then ON (reset).** Check the Flight Director Command Bars **IN RANGE** on the ADI.
10. Radio altimeter check:
    a. Radio Altimeter Power Switch - **ON** (to test).

b. Radio altimeter flags - Check **OUT OF VIEW.**

c. Radio Altimeter Power Switch - **OFF** if not needed for takeoff. Otherwise **ON.**

11. Spoilers:

    a. Spoilers Switch - Check **RET.**

    b. Spoilers Extended Annunciator - Check **OFF.**

12. Flaps:

    a. Flaps Switch - **PUSH DOWN AS NEEDED.**

    b. Flaps Position Indicator - Check for correct **TAKEOFF POSITION (8**° or **AS NEEDED).**

13. Emergency Pitch Trim Switch - **NORM.**

14. Trim:

    a. Elevator trim (trim button on your controller) - **SET FOR TAKEOFF.** Check that the Elevator Trim Indicator is about **one needle thickness below center.**

    b. Takeoff Trim Alert Annunciator - Check **OFF.**

    c. Aileron trim (Turn Command Knob or trim button on your controller) - **CHECKED 0 %.**

    d. Rudder trim - **CHECKED (0 deg.).** *Use a trim button on your controller or the Rudder Trim Control Switch to adjust, if needed.*

Left Engine Start

1. Repeat the above "**Right Engine Start**" procedures and apply them to the left engine for **STARTING** the left engine if only the right engine was used for taxi.

2. Engine Sync Indicator - **STABILIZING,** when both engines are running.

Takeoff

1. Fuel quantity - With both engines running, check for **imbalance** between the L/R wing tanks. *You may have to perform a cross-feeding operation now or later to balance the L/R wing tanks.*

2. **Prepare passengers** for takeoff.

3. No Smoking/Seat Belt Switch - **NO SMOKING AND SEAT BELTS (ON).**

4. Flight controls:

    a. Check - **FREE.**

    b. **HIDE** control columns and yokes if desired.

5. Nose wheel steering:

    a. Nose Gear Steer Lock Switch - **DEPRESS MOMENTARILY** to **DISENGAGE** electric nose wheel steering.

    b. Nose Wheel Steering Engaged Annunciator - **OFF.**

6. Anti-Skid Power Switch - Check **ON.**

7. Anti-Skid Generator Lights - Check **OFF.**

8. Engine Air Ignition Switches - Normally **OFF** (can be turned **ON** if wet or turbulent conditions).

9. Stall Warning Switches - Both **ON.** Check annunciators **OFF.**

10. Pitot Heat Switches - Check, both **ON.**

11. Thrust Reverser Arm Switches - **ARM.**

12. Thrust Reverser Armed Annunciators - **ON.**

13. Annunciator panel - **CHECKED,** no warnings or abnormal indications. *It is normal for the amber L ENG ICE and R ENGINE ICE annunciators to be illuminated on the ground when their respective engine RPM is under 70 %.*

14. ATC clearance - **OBTAINED** from the appropriate authority.

15. Landing Lights - **ON (LDG LT).**

16. All external lights - **ON.**

17. Toe Brakes:

a. Brakes - **APPLIED.**

Takeoff Sequence

Important

- In case of an engine failure, refer to "**Abnormal/Emergency Procedures**".

1. Throttles:

   a. **ADVANCE** slowly to **takeoff power** (**100 % RPM**).

2. Toe Brakes:

   a. Brakes - **RELEASED.**

3. **ACCELERATE** to V_1:

   a. If the engine fails before V_1, **ABORT** takeoff.

   b. If the engine fails after V_1, **CONTINUE** takeoff.

4. V_r attained:

   a. **ROTATE** to **15 degrees (nose up).**

   b. Airspeed (red) bugs - **SET** to V_2 **as needed.**

5. Angle-of-Attack:

   a. Angle-of-Attack Indicators - **MAINTAIN IN GREEN.**

6. Positive rate of climb:

   a. Landing Gear Selector Switch - **UP.**

   b. Landing Gear Position Lights - Check **RED ON** in transit, then all **OFF.**

   c. **ACCELERATE** to V_2 **+ 15.**

7. Flaps:

   a. **RETRACT** on schedule.

8. Landing and Taxi Lights - **OFF.**

9. Engine Air Ignition Switches - **OFF** (can be turned **ON** if wet or turbulent conditions during flight).

10. Anti-Skid Power Switch - **OFF.**

11. Anti-Skid Generator Lights - Check **ON.**

12. Thrust Reverser Arm Switches - **OFF.**

13. Thrust Reverser Armed Annunciators - **OFF.**

14. **ACCELERATE** to **climb speed** - (**MAX 250 KIAS** if ATC-restricted, **MAX 306 KIAS** under FL140). *An aural alert will sound if airspeed is above 306 KIAS under 14,000 feet (bird strike protection).*

15. Cabin pressure - **CHECKED.**

16. No Smoking/Seat Belt Switch - **OFF.**

Climb

1. Throttles:

   a. **SET** to climb power (**90 % RPM**).

2. Autopilot Engage Button - **PRESS ON** (if desired) to engage the autopilot. *The autopilot will capture and maintain the pitch and level the wing (ATT Hold mode and Wing Leveler engaged).*

3. Anti-ice:

   a. Bleed Air Switch - Check **NORMAL** or **MAX.**

   b. Windshield Defog Knob - **AS REQUIRED.**

   c. Windshield Heat Switches - **AS REQUIRED.**

   d. Wing and Stabilizer Heat Switch - **AS REQUIRED.**

   e. Engine Nacelle Heat Switches - **AS REQUIRED.**

   f. Pitot Heat Switches - **AS REQUIRED.**

   g. Anti-Ice Alcohol Switch - **RADOME, AS REQUIRED.**

4. Cabin pressure - **MONITORED.**

5. Transition level (18,000 feet maximum):

   a. Barometric pressure on ADDUs/ standby altimeter - **SET** to **29.92.**

6. Airspeed:
    a. **ACCELERATE** to **0.7 Mach**.

Cruise

1. Engine instruments - Check **WITHIN LIMITS**.
2. Cabin pressure - **MONITORED**.
3. Engine Sync Switch - **ON, if needed**. *Throttles need to be close to one another.*
4. Engine Sync ON Annunciator - Check **ON** *(if the Engine Sync Switch is set to ON).*
5. Yaw Damper Selector Switch - Check **PRI YAW DAMPER**.
6. Primary Yaw Damper ON Button - **PRESS ON**.
7. Fuel status:
    a. **MONITOR** fuel **at all times**.
    b. **ENSURE** fuel burn is **consistent with flight plan**.
    c. **SWITCH TO THE FUSELAGE TANK** if the fuel level in the wing tanks **becomes critically low**.
8. Autopilot Engage Button - **PRESS ON** (if desired), to engage the autopilot. *The autopilot will capture and maintain the pitch and level the wing (ATT Hold mode and Wing Leveler engaged).*
9. Autopilot Speed Hold Mode Switch - **PRESS ON** to engage (if desired).
10. Other autopilot modes - **PRESS ON** to engage (if desired).

Descent

1. ATC clearance - **OBTAINED**. Set the radios accordingly.
2. Pressurization:
    a. Set **destination field elevation**.
3. Anti-ice:
    a. Bleed Air Switch - Check **NORMAL** or **MAX**.
    b. Windshield Defog Knob - **AS REQUIRED**.
    c. Windshield Heat Switches - **AS REQUIRED**.
    d. Wing and Stabilizer Heat Switch - **AS REQUIRED**.
    e. Engine Nacelle Heat Switches - **AS REQUIRED**.
    f. Pitot Heat Switches - **AS REQUIRED**.
    g. Anti-Ice Alcohol Switch - **RADOME, AS REQUIRED.**
4. Throttles:
    a. During descent, **MAINTAIN 75% RPM** minimum until 12,000 ft.
5. Fuel quantity - **MONITORED**.
6. Hydraulic Pressure Gauge - **IN GREEN**.
7. Spoilers - **AS REQUIRED**.
8. Transition level (18,000 feet maximum):
    a. Barometric pressure on ADDUs/ standby altimeter - **SET** to **local setting**.

Approach

1. ATC clearance - **OBTAINED**. Set the radios accordingly.
2. Fuel balance between L/R wing tanks - **CHECKED**.
3. Thrust Reverser Arm Switches - **ON.** Thrust Reverser Armed Annunciators will remain **OFF** until the aircraft touches down.
4. Hydraulic Pressure - **IN GREEN**.
5. Emergency Air Pressure - **IN GREEN**.
6. **Prepare passengers** for landing.
7. No smoking/seat belts sign:

a. No Smoking Switch - **NO SMOKING and SEATBELTS ON.**

8. Cabin Pressure - **CHECKED.**

9. Engine Sync Switch - **OFF.**

10. Engine Sync ON Annunciator - Check **OFF.**

11. Spoilers:

    a. Spoilers Switch - Check **RET.**

    b. Spoilers Extended Annunciator - Check **OFF.**

12. Radio altimeter:

    a. Radio altimeter power switch - **ON.**

Before Landing

1. Landing gear:

    a. Landing Gear Selector Switch - **DOWN.**

    b. Check Landing Gear Position Lights - **RED ON** in transit, then all **GREEN** when down and locked.

2. Landing Lights - Both **ON (LDG LT).**

3. Parking brake - Check **RELEASED.**

4. Anti-Skid Power Switch - **ON.**

5. Anti-Skid Generator Lights - Check **OFF.**

6. Flaps:

    a. **DOWN AS REQUIRED.**

7. Engine Air Ignition Switches - Normally **OFF**, or **ON** if wet or turbulent conditions.

8. Primary Yaw Damper OFF Button - **PRESS OFF (primary yaw damper disengaged).**

9. Secondary Yaw Damper Switch - **OFF (secondary yaw damper disengaged).**

Landing (after Touchdown)

1. Spoilers:

    a. Spoilers Switch - **EXT. (spoilers extended as needed).**

    b. Spoilers Extended Annunciator - **ON** (if extended).

2. Thrust reversers (if needed):

    a. Thrust Reverser Subthrottles - **PULLED AFT ("F2" AS NEEDED) to deploy thrust reversers.** *Up to 85% RPM in reverse.*

    b. Thrust Reverser Deployed Annunciators - **ON.**

3. Thrust reversers (if needed, after deceleration):

    a. Thrust Reverser Subthrottles - **PUSHED FORWARD ("F1" to IDLE).**

    b. Thrust Reverser Deployed Annunciators - **OFF.**

4. Thrust Reverser Arm Switches - **OFF.**

5. Thrust Reverser Armed Annunciators - **OFF.**

6. Spoilers (after deceleration):

    a. Spoilers Switch - **RET (spoilers retracted).**

    b. Spoilers Extended Annunciator - **OFF.**

Before Clearing the Runway

1. Anti-Skid Power Switch - **OFF.**

2. Anti-Skid Generator Lights - Check **ON.**

3. Flaps:

    a. Flaps Switch - **UP (AS NECESSARY).**

    b. Confirm flaps position - **FULL UP.**

2. Nose wheel steering:

    a. Nose Gear Steer Lock Switch - **DEPRESS MOMENTARILY** to **ENGAGE** electric nose wheel steering.

    b. Nose Wheel Steering Engaged Annunciator - **ON.**

After Clearing the Runway

1. Engine Air Ignition Switches - **OFF**. Check Engine Air Ignition Lights **OFF.**
2. Taxi Lights - **ON (TAXI LT).**
3. Strobe Lights - **OFF.**
4. Recognition Lights - **OFF.**
5. Both Stall Warning Switches - **OFF.**
6. Anti-ice:
    a. Bleed Air Switch - **NORMAL** if needed or **OFF.**
    b. Windshield Defog Knob - **AS RE-QUIRED.**
    c. Windshield Heat Switches - **AS RE-QUIRED.**
    d. Wing and Stabilizer Heat Switch - **OFF.**
    e. Engine Nacelle Heat Switches - **OFF.**
    f. Pitot Heat Switches - **OFF.**
    g. Anti-Ice Alcohol Switch - **OFF.**
8. Bleed Air Switch - **OFF**, if not needed for anti-ice or cabin temperature control.
9. Unnecessary avionics - **OFF.**
10. Emergency Lights Switch - **DISARM.**

Shutdown

Once the aircraft is parked:

1. Parking brake:
    a. Parking Brake Lever - **SET.**
2. Anti-ice:
    a. Bleed Air Switch - **OFF.**
    b. Windshield Heat Switches - **OFF.**
    c. Windshield Defog Knob - **OFF.**
    d. Wing and Stabilizer Heat Switch - **OFF.**
    e. Engine Nacelle Heat Switches - **OFF.**
    f. Pitot Heat Switches - **OFF.**
    g. Anti-Ice Alcohol Switch - **OFF.**
3. Battery Switches - **ON.**
4. Engine Starter/Generator Switches - **OFF.**
5. Engine shutoff:
    a. Thrust Reverser Subthrottles - **FULL FORWARD TO IDLE (“F1”).**
    b. Throttles - **FULL AFT TO IDLE** (“**F1”** or **FULL AFT** on your controller).
    c. Jet Pump Switches - **OFF.**
    d. Standby Pump Switches - Check **OFF.**
    e. Throttle Release Levers - **DOWN AND LOCKED** (throttles set to cutoff, fuel valves closed). *Engines will shut off.*
6. Rotating Beacon Lights - **OFF.**
7. All remaining exterior lights - **OFF.**
8. Emergency Battery Switches - Check **OFF.**
9. Standby Gyro - **CAGED.** Pull knob to cage.
10. Radio Master Switch (Avionics) - **OFF.**
11. Primary, Secondary and Auxiliary Inverter Switches - **OFF.**
12. All remaining panel switches - **OFF.**
13. Battery Switches - **OFF.**
14. Controls - **LOCKED.**
15. Main (Passenger and Crew) Door - **OPEN.**
16. Flight Crew - **LEAVING.**
17. “Remove Before Flight” Items - **IN-STALLED.**
18. Main (Passenger and Crew) Door - **CLOSED.**

You may switch to the external view (“**END**”) to check if the aircraft is properly parked, if the “Remove Before Flight” items are installed, if the crew has left, and if the door is closed.

Welcome to your destination!

ABNORMAL/EMERGENCY PROCEDURES

Below are the procedures in case of abnormal operation or emergency.

ENGINE FAILURE

Engine Failure on Takeoff

If below V_1, ABORT takeoff - may require spoilers/thrust reversers and maximum braking energy.

If above V_1:

1. **MAINTAIN** directional control.
2. **PERFORM** single engine takeoff.
3. **ACCELERATE** to **V_2 + 10**.
4. **TRIM** rudder as needed.
5. **INFORM** ATC and request amended clearance if possible.
6. **RETURN** for landing if cleared by ATC.

Engine Failure in Cruise

1. **MAINTAIN** directional control.
2. **TRIM** rudder as needed.
3. **ATTEMPT** in-flight engine restart.

If engine won't restart:

1. Affected engine - **SECURE**:
   a. Throttle and Subthrottle - to **IDLE ("F1").**
   b. Throttle Release Lever - **LOCKED (fuel valve closed).** *This will set the throttle to **CUTOFF**. Engine will shut off.*
   c. Manual and air ignition - **OFF.**
2. **INFORM** ATC.
3. **EVALUATE** fuel status.
4. Fuel Crossflow (Crossfeed) Switch and Standby Pump Switches - **AS REQUIRED.**
5. **COMPLETE** flight at lower altitude if possible and/or **PERFORM** a precautionary landing if needed.

Engine Failure on Approach

1. Same as above. Engine restart and crossfeeding optional.
2. **MAINTAIN** directional control and **TRIM** rudder as needed.
3. **INFORM** ATC.
4. **PERFORM** a normal approach at slightly higher speed if field length allows (may preclude full flaps).

ENGINE FIRE

1. Fire Alarm Annunciator - **ON.** Identify engine on fire.
2. **THROTTLE BACK** engine and **MONITOR** Fire Alarm Annunciator.
3. If fire persists after 10 seconds, **PRESS** Firewall Shutoff Button. ***OPEN** button guard first. This will arm the fire extinguisher and shut off the engine.*
4. Confirm firewall and engine shutoff:
   a. Pin light - **ON** with engine shutoff.
5. Affected engine - **SECURE**:
   a. Throttle and Subthrottle - to **IDLE ("F1").**
   b. Throttle Release Lever - **LOCKED (fuel valve closed).** *This will set throttle to **CUTOFF**. Engine will shut off.*
   c. Manual and air ignition - **OFF.**
6. Confirm extinguishers **ARMED** - Annunciators **ON.**
7. If fire persists after 10 seconds, **PUSH** First Fire Extinguisher Discharge Button.
8. If fire persists after 10 more seconds, **PUSH** Second Fire Extinguisher Discharge Button.

9. If fire persists after 10 more seconds, **DECLARE EMERGENCY** to ATC and **LAND** as soon as possible.

ELECTRICAL AND/OR HYDRAULIC SYSTEMS FAILURE

Simplified Procedures in Case of a Total Engine/ Generator Failure

1. Main Battery Switches - **ON** (if generators failed).
2. Engine Starter/Generator Switches - **OFF** (if generators failed)**.**
3. Auxiliary Inverter Switch - **ON** (if main inverters failed).
4. Primary and Secondary Inverter Switches - **OFF** (if failed).
5. **REDUCE** electrical load by turning **OFF** all unnecessary equipment.
6. Electric Auxiliary Hydraulic Pump Switch - **ON** to test, then **OFF** and **ON** again only when hydraulic power is needed (flaps, spoilers, landing gear, brakes).
7. Hydraulic Pressure Gauge - **IN GREEN** when electric auxiliary hydraulic pump is **ON.**
8. Frequently **CHECK** airspeed/Mach, altitude, attitude, and angle-of attack.
9. **DECLARE EMERGENCY** to ATC and **LAND** as soon as practical.

After main batteries are depleted:

1. Main Emergency Battery Switch - **ON.** The amber light next to the switch will come **ON** after about 1 to 3 seconds, indicating that power is supplied to the aircraft by the main emergency battery.
2. Standby Emergency Battery Switch - **ON** (if needed). The amber light next to the switch will come **ON.**
3. Standby Gyro - **UNCAGED** and **CHECKED.**
4. Battery Switches - **OFF.**

On approach:

1. Electric Auxiliary Hydraulic Pump Switch - **ON**.
2. Hydraulic Pressure Gauge - **IN GREEN.**
3. Spoilers:
    a. Spoilers Switch - Check **RET**.
    b. Spoilers Extended Annunciator - Check **OFF.**
4. Flaps:
    a. **DOWN AS REQUIRED**.
    b. Confirm flaps position - **DOWN.**
5. Landing gear:
    a. Landing Gear Selector Switch - **DOWN**.
    b. Check Landing Gear Position Lights - **RED ON** in transit, then all **GREEN** when down and locked.

If electric auxiliary hydraulic pump fails, on approach:

1. Check Emergency Air Pressure Gauge - **IN GREEN**. You may c*lick the label above the engine gauge cluster to fill the tank if necessary.*
2. Spoilers:
    a. Spoilers Switch - Check **RET**.
    b. Spoilers Extended Annunciator - Check **OFF**.
3. Flaps:
    a. **DOWN AS REQUIRED**.
    b. Confirm flaps position - **DOWN.**
4. Landing gear:
    a. Landing Gear Selector Switch - **DOWN**.
    b. Check Landing Gear Position Lights - **RED ON** in transit, then all **GREEN** when down and locked.

If landing gear won’t extend:

1. Check Emergency Air Pressure Gauge - **IN GREEN**. You may c*lick the label above the engine gauge cluster to fill the tank if necessary.*

2. Landing Gear Selector Switch - **DOWN.**

3. Emergency Gear Extension Lever - **DOWN**. *Click several times until landing gear is fully extended.*

4. Check Landing Gear Position Lights - **RED ON** in transit, then all **GREEN** when down and locked.

5. Frequently **CHECK** airspeed/Mach, altitude, attitude, and angle-of attack.

6. **LAND** as soon as possible.

7. Use the **Emergency Brake** in case of a total brake failure after touchdown.

WINDSHIELD ANTI-ICE SYSTEM FAILURE

In case of a failure of the windshield heating system, the **Windshield and Radome Alcohol Anti-Ice System** can be used to de-ice/defog the captain’s windshield.

Note: *In the real aircraft, the alcohol system will not de-ice/defog the co-pilot’s windshield.*

To de-ice the radome and the captain’s windshield (engines must be running and the aircraft powered):

1. Bleed Air Switch - **NORM** or **MAX.**

2. Anti-Ice Alcohol Switch – **WSHLD & RADOME.**

To stop the flow of alcohol:

1. Anti-Ice Alcohol Switch – **OFF** or **RADOME** only (if required).

When the switch is set to **WSHLD & RADOME**, the system supplies both the radome and the captain’s windshield with alcohol for about 45 minutes with a full reservoir.

The amber ALC AI annunciator on the main annunciator panel illuminates when the alcohol reservoir is empty.

Mouseover to check the remaining alcohol. You may click the annunciator to fill the reservoir with 1.75 gallons of alcohol.

APPENDICES

XTREME PROTOTYPES GATES LEARJET MODEL 25 FOR MSFS
AIRCRAFT REFERENCE INFORMATION

Maximum Gross Weight – Gates Learjet Model 25	**15,000 lbs.**

Note: *To adjust fuel and payload, please refer to “Flight Planning” in section 7.*

V_{MO} - Maximum Operating Speed	**359 KIAS**
M_{MO} - Maximum Operating Mach (at 24,000 ft.)	**0.82 Mach**
V_A - Maneuvering Speed 10,000 lbs. (sea level)	**160 KIAS**
V_A - Maneuvering Speed 10,000 lbs. (20,000 ft.)	**165 KIAS**
V_A - Maneuvering Speed 10,000 lbs. (45,000 ft.)	**170 KIAS**
V_A - Maneuvering Speed 15,000 lbs. (sea level)	**200 KIAS**
V_A - Maneuvering Speed 15,000 lbs. (20,000 ft.)	**205 KIAS**
V_A - Maneuvering Speed 15,000 lbs. (45,000 ft.)	**220 KIAS**
V_{LO} - Maximum Gear Operating Speed	**200 KIAS**
V_{LE} - Maximum Landing Gear Extension Speed	**265 KIAS**

Maximum Flap Placard Speeds

Flaps degrees	KIAS
8	**202**
20	**200**
40	**153**

Note: *For complete V-speed tables covering various loading and atmospheric conditions, please refer to “Flight Planning” in section 7.*

V_1 - Takeoff Decision Speed
(dry runway, standard temperature, flaps 8°)

9,000 lbs.	**105 KIAS**
15,000 lbs.	**135 KIAS**

V_R - Rotation Speed
(dry runway, standard temperature, flaps 8°)

9,000 lbs.	**120 KIAS**
15,000 lbs.	**138 KIAS**

V_2 - Minimum Climb Speed
(standard temperature)

9,000 lbs.	**124 KIAS**
15,000 lbs.	**140 KIAS**

V_{REF} - Landing Reference Speed
(flaps 40°, standard temperature, sea level pressure altitude)

8,000 lbs.	**110 KIAS**
15,000 lbs.	**134 KIAS**

NOT AN EASY TASK...

Customizing your GLJ Model 25 addon for the most recent versions of Microsoft Flight Simulator is very different (and needless to say, more complicated) from modifying an aircraft for FSX or Prepar3D. It is very time consuming and requires some pretty good knowledge of the MSFS **SDK** and **Developer Mode**. While it is still possible to create and edit some assets and configuration files directly inside the add-on aircraft package with external tools, converters and plugins, without too many issues, some of the required tasks may need to be finalized in Developer Mode.

While in-dept programming experience is not absolutely necessary for modifying or replacing aircraft systems, a fairly good understanding of the **XML markup language** and of the MSFS **template system** driving the "**model behaviors**" is mandatory. Creating additional assets such as new **Wwise** "**soundbanks**", **PBR textures** (for liveries) and **special effects** is also very demanding and requires additional experience, not mentioning artistic talent, using specialized software such as Audiokinetic Wwise, Adobe Substance 3D Painter and/or Photoshop, to name a few. Adding **third-party software** like a navigation system (GPS/GNS) or a weather radar is also tricky, although we have designed our file structure to make this task a bit less complicated for programmers.

A fully detailed tutorial on how to modify an existing aircraft, create new assets, or develop a new aircraft for MSFS goes beyond the scope of this manual. You will find a wide range of documentation, tutorials and samples in the online MSFS SDK that covers most aspects of the work that needs to be done. We encourage you to learn as much as possible about the MSFS Developer Mode for which you will also find a comprehensive guide in the SDK. You may also visit a few flight simulation forums to discover what other users and developers have done.

In the following pages, you will find some information specific to our GLJ Model 25 for MSFS that we think will be helpful to you should you decide to modify (even improve) some aspects and features of your new Gates Learjet 25 add-on business jet.

We do not pretend that this guide offers the only methods you should use to customize your addon. It summarizes, however, some of the procedures we would use if we had to do it ourselves, at the time of this writing. As simulation platforms evolve, and new tools become available, other methods may become more practical and efficient.

Customizing your GLJ Model 25 addon will require a lot of **research** and **experimentation** on your part.

Important

- **We do not recommend customizing your addon unless you know exactly what you are doing.** Xtreme Prototypes cannot support addons that have been modified and cannot provide technical assistance in customizing your GLJ Model 25 addon.

Please visit our website regularly for new additions to your GLJ Model 25 addon, including extra cockpits and liveries, language packs, new assets, patches and updates, and future versions as well.

ADDING THIRD-PARTY SOFTWARE

The virtual cockpit of the GLJ Model 25 addon contains fully animated 3D representations of the **GNS 530** navigation system and of a generic **weather radar**.

The GNS 530 model is functional and configured for the basic GNS 530 that comes with MSFS.

The radar is not functional and shows a dummy radar screen.

At the time of this writing, there were very few third-party seamless options for replacing the MSFS GNS 530 with a more advanced navigation system. We tested the Working Title GNS 530 that comes with MSFS 2020 that is more elaborate, and it worked just fine. However, for some reasons, the system interfered with the basic MSFS autopilot that is used in the GLJ Model 25 and changed the behavior of some of the autopilot modes (the basic MSFS autopilot conforms better to the autopilot installed in the real aircraft). The Working Title GNS 530 still remains an option for users who can live with a different autopilot.

As for the radar, we did not find any option (in or out of MSFS) that suited our needs, therefore the background software required to make the radar truly functional is not included. However, all buttons and knobs on the device are animated and functional and can communicate with almost any third-party radar software. During our search for a compatible weather radar, we have tested the *Asobo* Airbus A320 Neo radar that comes with MSFS 2020 and replaced our default dummy radar screen with the Airbus radar display. The results were not impressive, and we have decided to leave the dummy radar screen in place for now. Nevertheless, users are free to reinstall the Airbus radar for experimentation purposes.

Future updates and/or versions of our GLJ Model 25 addon may propose other solutions as new navigation systems and radars are being developed by Microsoft/Asobo, third parties, and Xtreme Prototypes as well.

As we have done in the past for our FSX and Prepar3D versions, we have programmed both our GNS 530 and radar physical 3D models in such a way that all screens, lights, buttons, and knobs can be configured to work with almost any MSFS-compatible third-party GNS 530 and radar add-on software that may become available in the future.

Some legacy FSX or Prepar3D third-party software may still be compatible with MSFS. We did not test these addons with our GLJ Model 25 and you will need to contact their developers for more information. Please make sure that your third-party addons are fully compatible with your version of MSFS.

The following pages contain useful information for adding typical third-party addons to the virtual cockpit of the GLJ Model 25 add-on aircraft. Don’t be discouraged if your third-party addons don’t work as expected the first time you install them. Configuration errors are frequent and may prevent your third-party addons or the GLJ Model 25 aircraft from functioning properly.

Important

- Please be aware that some third-party addons may not be fully compatible with the latest versions of MSFS or might interfere with other aircraft systems installed in the GLJ Model 25 addon, including the autopilot. **In doubt, please contact the developer for support**.
- Xtreme Prototypes is not responsible for changes in third-party software that would prevent the GLJ Model 25 add-on aircraft or the third-party software from performing or being used, including the discontinuation of such third-party software.
- We recommend **that you don’t use** third-party setup utilities to install third-party addons in the cockpit of the GLJ Model 25, and to follow the instructions in the following pages instead. We believe that this simple “manual” approach gives you maximum flexibility while remaining in full control of the changes that are being made to your files.
- It is always good practice to **back up** your files before making any change to the aircraft’s model behavior templates and configuration files. Should anything go wrong when installing your third-party addons, simply revert to your backups and start over.
- **Xtreme Prototypes cannot provide technical assistance for third-party add-on software. Please contact the developer for support**.

REPLACING THE GNS 530

Third-party navigation systems first consist of a vector (and/or bitmap) display that comes in the form of a standard, MSFS-compatible **HTML** or **XML** “**gauge**” that needs to fit inside the “LCD” screen portion of the GNS 530 physical model inside the virtual cockpit. This gauge is added to the instrument panel like any other MSFS gauge and therefore requires a few lines in the “**panel.cfg**” configuration file located in the aircraft’s “**panel**” folder.

Some systems also require custom **XML** “**templates**” to be included (referenced) and configured in the “**XTPRO_GLJ20S_GPS.xml**” system template that drives the GNS 530 physical model. These templates contain all the “**model behaviors**” that make the system work. The “XTPRO_GLJ20S_GPS.xml” template is located in the aircraft’s “**model\Templates**” folder.

Follow the procedures below when replacing the default MSFS GNS 530 navigation system with another device.

Installing the Gauge

1. Make sure that your third-party navigation system is **fully compatible** with your version of MSFS, has been **installed properly** in the simulator according to the instructions provided by the developer, and is **working well** with other aircraft installed on your system.

2. Make a **backup copy** of the aircraft's "**panel.cfg**" file.

3. Using a text editor like Notepad, open the aircraft's "**panel.cfg**" file.

4. Based on the example below, **add or replace the text in RED** in the "**panel.cfg**" file with the required custom entries for your third-party navigation system. Refer to the documentation included with your add-on software for the correct modifications that need to be made. **Be careful not to change anything else in the file.** If this is not done correctly, your third-party navigation system and/or your GLJ Model 25 add-on aircraft may not work properly.

Note: *Only the relevant sections of the "panel.cfg" are shown in the example below. We have purposely left the commented ("//") section for the installation of the Working Title GNS 530 should you want to experiment with it. To install the Working Title GNS 530, simply comment the other sections and uncomment the Working Title GNS 530 section. As mentioned before, installing the Working Title GNS 530 instead of the default MSFS GNS 530 may change the behavior of some autopilot modes.*

```
// GNS530 GPS Display ------------------------------------

[Vcockpit01]
background_color=10,10,10
backlight=1
texture=Gauge_GPS

// My GNS530 Navigation System
size_mm=350,262
pixel_size=350,262
htmlgauge00=MyNavigationSystems/GPS/GNS530/GNS530.html,7,6,343,254

// Default MSFS GNS530
// size_mm=350,262
// pixel_size=350,262
// htmlgauge00=NavSystems/GPS/AS530/AS530.html,7,6,343,254

// Optional Working Title GNS530 - May affect autopilot modes, see notice in the
manual
// size_mm=336,250
// pixel_size=336,250
// htmlgauge00=NavSystems/GPS/WT530/WT530.html,8,8,320,234
```

5. **Save** the "**panel.cfg**" file.

Experimentation will be required to **fit the gauge** into the "LCD" screen of the GNS 530 physical model. The **coordinates** and **gauge size** above are for the MSFS GNS 530. You will need to adjust these parameters for your own third-party navigation system.

The **correct folder path** for the gauge is also very important. Please refer to your third-party software documentation for the correct path to use.

Please note that the lines above are provided as an example only and that experimentation on your part will be required.

Configuring Buttons and Knobs

The “**XTPRO_GLJ20S_GPS.xml**” system template (located in the aircraft’s “**model\Templates**” folder) includes all the “**model behavior**” templates that are needed for the navigation system to work properly and to communicate with the GNS 530 physical model in the virtual cockpit.

Note: *The “XTPRO_GLJ20S_GPS.xml” system template was created for the purpose of* ***isolating and centralizing*** *all the model behaviors related to the GNS 530 navigation system at a single location. This should help you when configuring your third-party navigation system.*

To maintain compatibility with the two GNS 530 navigation systems that come with MSFS 2020, we have included the simulator’s default GNS 530/430 model behavior templates and input files in the main upper section of the “**XTPRO_GLJ20S_GPS.xml**” template (in **RED**):

```
<Include ModelBehaviorFile="Asobo\GPS\AS530.xml"/>
<Include ModelBehaviorFile="Asobo\GPS\AS430.xml"/>
<Include ModelBehaviorFile="Asobo\GPS\Inputs\AS430_Inputs.xml"/>

<!--GNS530-->
<Template Name="XTPRO_GLJ20S_GNS530_Basic_Template">

  <UseTemplate Name="ASOBO_AS530_Template">
    <ID>1</ID>
    <AS430>AS530</AS430>
    <RANGE_HTML_ID>AS530_Default</RANGE_HTML_ID>
    <USE_VNAV_BUTTON>True</USE_VNAV_BUTTON>
    <RANGE_BUTTON_LAYOUT_DIRECTION>Y</RANGE_BUTTON_LAYOUT_DIRECTION>
    <POTENTIOMETER>20</POTENTIOMETER>
    <EMISSIVE_DEFAULT_VALUE>1</EMISSIVE_DEFAULT_VALUE>
    <DIMMING_FACTOR>1</DIMMING_FACTOR>
    <CIRCUIT_ID>36</CIRCUIT_ID>
    <NAV_INDEX>1</NAV_INDEX>
    <COM_INDEX>1</COM_INDEX>
 </UseTemplate>

 <UseTemplate Name="ASOBO_AS430_Template"></UseTemplate>

</Template>
```

These default MSFS GNS 530/430 model behavior templates are used by the “**XTPRO_GLJ20S_GNS530_Basic_Template**” (in **BLUE**). This template is the bridge to the main “Interior” model behavior template (“**GLJ25_CLASSIC_SE_v01_interior.xml**”, located in the aircraft’s “**model**” folder) and **must not be removed** for the system to work.

We have also kept the **same NODE_IDs** (part names) and “**ANIM_NAMEs**” (animation names) that are used in the above mentioned MSFS model behavior templates for all the standard buttons and knobs that are in our GNS 530 physical model. These NODE_IDs and ANIM_NAMEs are **hard coded** in the physical model and **cannot be changed.**

Using custom templates from a third-party developer to replace the default MSFS templates would require them to use the same NODE_IDs and ANIM_NAMEs for the system to work (or to provide some way for configuring their templates with the names that are used by the MSFS templates and that are hard-coded in the physical model). Note that **you may or may not** have to use custom templates with your third-party navigation system.

The table below lists all the NODE_IDs used in our GNS 530 physical model. You might need this list when configuring your third-party navigation system. We also provide the number of animation frames for each animated object.

XTREME PROTOTYPES GNS 530 PHYSICAL 3D MODEL OBJECTS			
Object Description	**NODE_ID**	**Frames**	**Model Behavior Template**
GNS530 Left Outer Knob	AS430_Knob_Mhz_1	36	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Left Inner Knob	AS430_Knob_Khz_1	36	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Left Inner Knob Push Button Dummy	AS430_Push_COM_NAV_Select_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Right Outer Knob	AS430_Knob_GPS_1	36	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Right Inner Knob	AS430_Knob_CRSR_1	36	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Right Inner Knob Push Button Dummy	AS430_Push_CRSR_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Top Volume Knob	AS430_Knob_COM_Volume_1	100	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Top Volume Knob Push Button Dummy	AS430_Push_Squelch_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Bottom Volume Knob	AS430_Knob_NAV_Volume_1	100	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Bottom Volume Knob Push Button Dummy	AS430_Push_ID_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 COM Flip-Flop Button	AS430_Push_COM_Swap_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 VLOC Flip-Flop Button	AS430_Push_NAV_Swap_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Course Deviation Indicator Button	AS430_Push_CDI_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Omni Bearing Selector Button	AS430_Push_OBS_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Message Button	AS430_Push_Message_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Flight Plan Button	AS430_Push_FlightPlan_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Vertical Navigation Button	AS430_Push_VerticalNavigation_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Procedure Button	AS430_Push_Procedure_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Range Button	AS430_Switch_Range_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Direct-To Button	AS430_Push_DirectTo_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Menu Button	AS430_Push_Menu_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Clear Button	AS430_Push_Clear_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Enter Button	AS430_Push_Enter_1	2	XTPRO_GLJ20S_GNS530_Basic_Template
GNS530 Power LED	LIGHT_GPS_Data_Card	n/a	XTPRO_GLJ20S_LIGHT_GNS530_Power_Template
GNS530 Screen Gauge	GAUGE_GNS530_Display_VIS	n/a	XTPRO_GLJ20S_VIS_GNS530_Screen_Gauge_Template
GNS530 Data Card 1	ICON_GNS530_Data_Card_1	2	XTPRO_GLJ20S_GNS530_Data_Card_1_Template
GNS530 Data Card 2	ICON_GNS530_Data_Card_2	2	XTPRO_GLJ20S_GNS530_Data_Card_2_Template

***Note:** The **ANIM_NAME** for each object **is the same** as the **NODE_ID**.*

The last four objects in the table are custom buttons and other items unique to our GNS 530 physical model. They have their own model behavior templates in the bottom section of the "**XTPRO_GLJ20S_GPS.xml**" system template. **We do not recommend making changes to these templates unless absolutely necessary**.

All other parts in the table are linked to the "**XTPRO_GLJ20S_GNS530_Basic_Template**" that includes the "**ASOBO_AS530_Template**" and "**ASOBO_AS430_Template**" templates, that are the default model behavior templates for the MSFS GNS 530 or Working Title GNS 530 that come with the simulator.

The MSFS GNS 530 model behavior templates mentioned above use the **standard** simulator variables (**SimVars**) and commands (**Event IDs**) for controlling the GPS and communicating with the GNS 530 physical model inside the virtual cockpit. **If your third-party navigation system uses the same MSFS GNS 530/430 templates, and the standard simulator variables and commands**

for the GPS/GNS, you have nothing to do.

Note: *If your third-party navigation system gives you the option to switch between a custom set of variables and commands and the standard ones used by the simulator,* ***you should use the standard option****.*

About custom variables: *Third-party addons (such as navigation systems and radars) usually make use of* ***custom variables*** *that are useful for storing the state of their buttons and knobs, among other functions. These variables become very important when configuring animations in model behavior templates.* ***They allow third-party addons to send valuable data to the virtual cockpit, and not just the other way around.*** *For example, if you change the position of a knob on your third-party navigation system using a keyboard shortcut, the change should be reflected on the corresponding 3D knob on the physical model in the virtual cockpit. This is possible because the physical model is also capable of receiving data from the third-party addon software.*

Using custom sets of NODE_IDs, ANIM_NAMEs, SimVars and Event IDs would require **replacing** the default MSFS GNS 530/430 templates with custom, third-party model behavior templates in the main upper section of the "**XTPRO_GLJ20S_GPS.xml**" system template. Please refer to the documentation included with your third-party navigation system for more information or contact the developer for support.

REPLACING THE RADAR

Third-party radars first consist of a vector (and/or bitmap) display that comes in the form of a standard, MSFS-compatible **HTML** or **XML** "**gauge**" that needs to fit inside the "CRT" screen portion of the radar physical model inside the virtual cockpit. This gauge is added to the instrument panel like any other MSFS gauge and therefore requires a few lines in the "**panel.cfg**" configuration file located in the aircraft's "**panel**" folder.

Radars also require custom **XML** "**templates**" to be included (referenced) and configured in the "**XTPRO_GLJ20S_Radar.xml**" system template that drives the radar physical model. These templates contain all the "**model behaviors**" that make the radar work. The "XTPRO_GLJ20S_Radar.xml" template is located in the aircraft's "**model\Templates**" folder.

Follow the procedures below when replacing the default dummy radar with another device.

Installing the Gauge

1. Make sure that your third-party radar is **fully compatible** with your version of MSFS, has been **installed properly** in the simulator according to the instructions provided by the developer, and is **working well** with other aircraft installed on your system.

2. Make a **backup copy** of the aircraft's "**panel.cfg**" file.

3. Using a **text editor** like Notepad, **open** the aircraft's "**panel.cfg**" file.

4. Based on the example below, **replace the text in RED** in the "**panel.cfg**" file with the required custom entries for your third-party radar. Refer to the documentation included with the add-

on software for the correct modifications that need to be made. **Be careful not to change anything else in the file.** If this is not done correctly, your third-party radar and/or your GLJ Model 25 add-on aircraft may not work properly.

Note: *Only the relevant sections of the "panel.cfg" are shown in the example below. We have purposely left the commented ("//") section for the installation of the Asobo Airbus A320 Neo radar should you want to experiment with it. To install the Asobo Airbus A320 Neo radar, simply comment the other sections and uncomment the Asobo Airbus A320 Neo radar section.*

```
// Radar Display -------------------------------------------

[Vcockpit02]
background_color=0,0,0
backlight=1
texture=Gauge_Radar

// My third-party radar
size_mm=1024,1024
pixel_size=1024,1024
htmlgauge00=MyRadar/MyRadar.html,55,200,920,660

// Dummy radar display - May be replaced by a third-party radar gauge
// size_mm=1024,1024
// pixel_size=1024,1024
// gauge00=Gauges\XTPRO_GLJ20S!display_dummy_radar.xml,55,200,920,660

// Asobo Airbus Radar - For testing puposes only!
// size_mm=2560,2560
// pixel_size=2560,2560
// htmlgauge00=Airliners/A320_Neo/MFD/A320_Neo_MFD.html, 640,680,1280,1280
```

5. **Save** the "**panel.cfg**" file.

Experimentation will be required to **fit the gauge** into the "CRT" screen of the radar physical model. The **coordinates** and **gauge size** above are for the dummy radar screen that is installed by default. You will need to adjust these parameters for your own third-party radar.

The **correct folder path** for the gauge is also very important. Please refer to your third-party software documentation for the correct path to use.

Please note that the lines above are provided as an example only and that experimentation on your part will be required.

Configuring Buttons and Knobs

The "**XTPRO_GLJ20S_Radar.xml**" system template (located in the aircraft's "**model\Templates**" folder) includes all the "**model behavior**" templates that are needed for the radar software to work properly and to communicate with the radar physical model in the virtual cockpit.

Note: *The "XTPRO_GLJ20S_Radar.xml" system template was created for the purpose of* ***isolating and centralizing*** *all the model behaviors related to the radar at a single location. This should help you when configuring your third-party radar.*

The top section of the "**XTPRO_GLJ20S_Radar.xml**" system template may include custom model behavior templates that are used by a specific radar. In the case of the default dummy radar, this is not necessary because all the model behavior templates used for controlling the screen, light, buttons and knobs of the physical model are included in the bottom section of the template. When using a third-party radar however, you will need to include the model behavior templates that are unique to your radar in the top section of the “XTPRO_GLJ20S_Radar.xml” system template.

Note: *We have left but commented the lines for using the Asobo Airbus A320 Neo weather radar templates in the top section of the “XTPRO_GLJ20S_Radar.xml” system template for testing purposes only, should you want to experiment with it.*

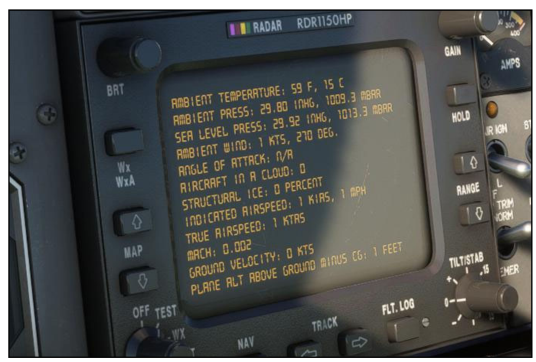
The custom model behavior templates that are included in the bottom section of the “XTPRO_GLJ20S_Radar.xml” system template are used for controlling the screen, light, buttons and knobs of our radar physical model. They must be kept in place because they are connected to the main “**GLJ25_CLASSIC_SE_v01_interior.xml**” template (located in the aircraft’s “**model**” folder).

Note: *We **do not recommend** editing the main “GLJ25_CLASSIC_SE_v01_interior.xml” template.*

You may modify some of the custom model behavior templates that are included in the bottom section of the “**XTPRO_GLJ20S_Radar.xml**” system template for adding commands and/or variables that are unique to your third-party radar, for communicating with the radar physical model in the cockpit.

For example, if your third-party radar has a “**Map Up**” button, you may add a command and/or variable to the “**XTPRO_GLJ20S_RADAR_Map_Up_Button_Template**” template that tells your radar software to move the map up when the button is depressed.

Refer to the documentation that comes with your third-party radar for the full list of commands and/or variables that are available to you.



Our radar physical model includes a second (optional) screen that is unique to our model and not related to any radar function. By clicking the radar logo [7, fig. 5-26], the radar will show an alternate data screen with useful information for the virtual pilot, notably regarding icing conditions (ambient temperature, if the aircraft is in a cloud, the percentage of structural ice, etc.). Please **do not remove, replace or edit** the model behavior templates related to the radar screens and other non-standard objects or functions unless absolutely necessary. These are the templates that (ideally) should not be modified:

XTPRO_GLJ20S_LIGHT_RADAR_Power_Template
XTPRO_GLJ20S_VIS_RADAR_Screen_Gauge_Template
XTPRO_GLJ20S_VIS_RADAR_Data_Screen_Gauge_Template
XTPRO_GLJ20S_RADAR_Brightness_Knob_Template
XTPRO_GLJ20S_RADAR_Logo_Template

Other templates may be edited if needed.

About custom variables: *Third-party addons (such as navigation systems and radars) usually make use of **custom variables** that are useful for storing the state of their buttons and knobs, among other functions. These variables become very important when configuring animations in model behavior templates. **They allow third-party addons to send valuable data to the virtual cockpit, and not just the other way around.** For example, if you change the position of a knob* *on your third-party radar using a keyboard shortcut, the change should be reflected on the corresponding 3D knob of the physical model in the virtual cockpit. This is possible because the physical model is also capable of receiving data from the third-party addon.*

A complete programming tutorial on how to modify these XML templates goes beyond the scope of this manual. Please refer to the online MSFS **SDK** for a complete discussion about **model behaviors** and **templates**. As mentioned in the introduction, even though in-dept programming experience is not absolutely necessary, a fairly good understanding of the XML markup language and of the MSFS template system is essential.

Finally, it is also possible to get rid of the "XTPRO_GLJ20S_Radar.xml" system template and to create your own model behavior template from scratch if you know what you are doing. The third-party developer may also provide one or more templates to replace the "XTPRO_GLJ20S_Radar.xml" system template. In both cases, changes to the radar section of the main **"GLJ25_CLASSIC_SE_v01_interior.xml"** template will be necessary, something **we do not recommend** unless you know what you are doing.

Whatever option you decide, you will need the information below about the screen, light, buttons and knobs of the radar physical model that is installed in the virtual cockpit. These include the "**NODE_ID**" (part name) and the "**ANIM_NAME**" (animation name) for each for each object. NODE_IDs and ANIM_NAMEs are hard coded in the physical model and **cannot be changed**.

Below are the descriptions, "NODE_IDs" and "ANIM_NAMEs" for the screen, light, buttons and knobs of the radar physical 3D model inside the cockpit of the GLJ Model 25 add-on aircraft. The fourth column is for the number of frames for the animation (if the object is animated). Also included are the names of the custom model behavior templates that are related to these objects, should you need them for your project.

XTREME PROTOTYPES RADAR PHYSICAL 3D MODEL OBJECTS				
Object Description	**NODE_ID**	**ANIM_NAME**	**Frs**	**Model Behavior Template**
Radar Power LED	LIGHT_Radar_Power	None	n/a	XTPRO_GLJ20S_LIGHT_RADAR_Power_Template
Radar Main Screen Gauge	GAUGE_Radar_Display_VIS	None	n/a	XTPRO_GLJ20S_VIS_RADAR_Screen_Gauge_Template
Radar Data Screen Gauge	GAUGE_Radar_Display_Data_VIS	None	n/a	XTPRO_GLJ20S_VIS_RADAR_Data_Screen_Gauge_Template
Radar Power/Mode Knob	KNOB_Radar_Mode_Selector_ANIM	GLJ20S_RADAR_Knob_Mode_Select	5	XTPRO_GLJ20S_RADAR_Mode_Select_Knob_Template
Radar Tilt Stab Knob	KNOB_Radar_Tilt_ANIM	GLJ20S_RADAR_Knob_Tilt	30	XTPRO_GLJ20S_RADAR_Tilt_Knob_Template
Radar Brightness Knob	KNOB_Radar_Brightness_ANIM	GLJ20S_RADAR_Knob_Brightness	100	XTPRO_GLJ20S_RADAR_Brightness_Knob_Template
Radar Gain Knob	KNOB_Radar_Gain_ANIM	GLJ20S_RADAR_Knob_Gain	100	XTPRO_GLJ20S_RADAR_Gain_Knob_Template
Radar WX/WXA Button	BUTTON_MOM_Radar_Wx_ANIM	GLJ20S_RADAR_Button_WX	2	XTPRO_GLJ20S_RADAR_WX_Button_Template
Radar MAP UP Button	BUTTON_MOM_Radar_Map_Up_ANIM	GLJ20S_RADAR_Button_Map_Up	2	XTPRO_GLJ20S_RADAR_Map_Up_Button_Template
Radar MAP DOWN Button	BUTTON_MOM_Radar_Map_Down_ANIM	GLJ20S_RADAR_Button_Map_Down	2	XTPRO_GLJ20S_RADAR_Map_Down_Button_Template
Radar NAV Button	BUTTON_MOM_Radar_NAV_ANIM	GLJ20S_RADAR_Button_NAV	2	XTPRO_GLJ20S_RADAR_NAV_Button_Template
Radar TRACK LEFT Button	BUTTON_MOM_Radar_Track_Left_ANIM	GLJ20S_RADAR_Button_Track_Left	2	XTPRO_GLJ20S_RADAR_Track_Left_Button_Template
Radar TRACK RIGHT Button	BUTTON_MOM_Radar_Track_Right_ANIM	GLJ20S_RADAR_Button_Track_Right	2	XTPRO_GLJ20S_RADAR_Track_Right_Button_Template
Radar FLT LOG Button	BUTTON_MOM_Radar_Flight_Log_ANIM	GLJ20S_RADAR_Button_Flight_Log	2	XTPRO_GLJ20S_RADAR_Flight_Log_Button_Template
Radar RANGE DOWN Button	BUTTON_MOM_Radar_Range_Down_ANIM	GLJ20S_RADAR_Button_Range_Down	2	XTPRO_GLJ20S_RADAR_Range_Down_Button_Template
Radar RANGE UP Button	BUTTON_MOM_Radar_Range_Up_ANIM	GLJ20S_RADAR_Button_Range_Up	2	XTPRO_GLJ20S_RADAR_Range_Up_Button_Template
Radar HOLD Button	BUTTON_MOM_Radar_Hold_ANIM	GLJ20S_RADAR_Button_Hold	2	XTPRO_GLJ20S_RADAR_Hold_Button_Template
Radar Logo	ICON_Radar_Logo	GLJ20S_ICON_Radar_Logo	0	XTPRO_GLJ20S_RADAR_Logo_Template

CHANGING THE CABIN TV IMAGE

You can change the **image** that is shown on the **TV screen** in the cabin of the GLJ Model 25 add-on aircraft by creating your own image and modifying a few lines in the aircraft's "**panel.cfg**" located in the aircraft's "**panel**" folder.

Changing the Image

Creating a new image requires a paint program like Adobe Photoshop. Adding the image to the TV requires a text editor like Notepad that comes with Windows.

Note: *The GLJ Model 25 addon comes with three (3) different images for the TV screen. By default, image no. 3 is displayed (image_TV_25_**3**.bmp). Instead of creating your own image, you may select one of the available images for the TV screen. The images are stored in the "**XTPRO_GLJ20S**" gauge folder, inside the aircraft's "**panel/gauges**" folder.*

1. Open your paint program and **create a new image** for the TV screen. The dimensions for the new image must be: **996 pixels by 572 pixels**.

2. **Save the image** as a "**image_TV_25_4.bmp**" (RGB, 8 bits/channel, Windows bitmap format).

3. **Copy** the new "**image_TV_25_4.bmp**" to the "**XTPRO_GLJ20S**" folder, inside the aircraft's "**panel/gauges**" folder.

4. With you text editor, **open** the "**display_TV.xml**" XML gauge inside the "**XTPRO_GLJ20S**" gauge folder.

5. **Replace** the default image with your newly created image ("**image_TV_25_4.bmp**"):

```
<Image id="image_TV" Name="image_TV_25_4.bmp">
```

6. **Save the file** and exit.

7. Start the simulator, load the aircraft, and **test your image** on the TV screen.

Note: *The TV can be turned on/off by clicking the **TV logo** at the bottom of the screen. The TV requires DC and AC power.*

CREATING YOUR OWN AIRCRAFT LIVERIES

Creating new liveries (often called exterior "*repaints*") for your GLJ Model 25 add-on aircraft can be fun, exciting and very rewarding, but it has become a bit more challenging since the mandatory use of **PBR textures** and the introduction of **Microsoft Flight Simulator 2020**. It requires some fairly good knowledge about creating and editing projects in the MSFS **Developer Mode**, and experience using a large set of tools, plugins, converters, and rather complicated **painting software** (not mentioning talent and creativity). Understanding the concepts behind PBR textures and how they are created for and used in MSFS is also primordial.

Each livery consists of **several sets of PBR textures** that are applied to an aircraft exterior 3D model (often called a "*mesh*") by the simulator in real time. **Physically Based Rendering** (or **PBR**) is a method of shading and rendering that provides a more accurate representation of how light interacts with surfaces. The result is a 3D model that looks almost real in the simulator, under different lighting conditions.

The Xtreme Prototypes GLJ Model 25 add-on aircraft already comes with **14 different liveries**, each with their own set of PBR textures (see appendix 7). Extra liveries may become available in the future, and users can also create their own liveries and share them with other users.

The following guidelines do not constitute a complete tutorial about creating PBR textures and building new livery packages for MSFS. It would simply be impossible for us to cover all the tools, apps, and plugins that are now available to you for completing these tasks. These tools usually come with their own comprehensive tutorials and documentation, not to mention the vast amount of information (a lot from users like you) that can be found in flight simulation forums.

The **Developer Mode** section of the online MSFS **SDK** contains a substantial amount of information about assembling and building new livery packages for your MSFS aircraft (see "**Project Editor**"). You will find a "**LiveryAircraft**" (package) project included in the "**Samples**" section. The SDK also provides information about PBR materials and textures. **Adobe Photoshop** also comes with its own documentation, and you will find several videos on YouTube about creating PBR textures in Photoshop. Free utilities, toolboxes and plugins also have their own instruction sets.

For a basic discussion about **Physically Based Rendering**, we recommend "**The PBR Guide**" by Wes McDermott, available free from Adobe:

https://substance3d.adobe.com/tutorials/courses/the-pbr-guide-part-1

https://substance3d.adobe.com/tutorials/courses/the-pbr-guide-part-2

In the following pages, you will find additional information about how the original liveries were created, organized and exported for the Xtreme Prototypes GLJ Model 25 add-on aircraft.

Basic Photoshop **templates** for the exterior model textures are also provided with the official "**paintkit**" in a separate package that registered users can download from their online account page on our website. A sample **livery package project** for our GLJ Model 25 is also included.

Some Background

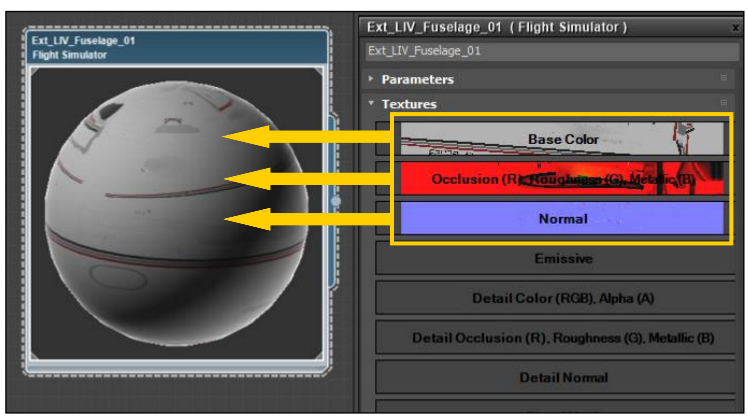
During production, several **Flight Simulator PBR materials** were applied to the objects that form the 3D meshes of our aircraft model. Each material has its own set of **PBR textures** called "**maps**".

Producing PBR textures for MSFS is different from producing conventional textures for FSX or early versions of Prepar3D and requires a different method or "workflow". The "**Metal/Roughness**" workflow must be followed when producing PBR textures for MSFS.

With this method, at least three different maps are created for each PBR material in the 3D model: the **Albedo (or Base Color)** map, the **Composite (or Occlusion, Roughness, Metallic)** map, and a **Normal** map. The Normal map is not always required, depending on the model and on what the artist wants to accomplish. Illuminated objects have an additional **Emissive** map. Other types of maps may also be needed for special materials. These maps are special **multi-channel textures** created and exported from a **paint program that can produce PBR textures** such as Adobe Photoshop or Adobe Substance 3D Painter.

Note: *Textures that were created for FSX or Prepar3D following the legacy "Specular/Glossiness" workflow (with Diffuse, Specular, Reflection maps, etc.) will not work with the Flight Simulator PBR material and cannot be used for the GLJ Model 25 addon.*

In the example opposite, the "Ext_LIV_Fuselage_01" Flight Simulator PBR material has three (3) textures (or maps).



In our aircraft models, PBR textures with the prefix "**EXT_LIV**" are **livery textures** for the aircraft's **exterior model**, for example:

EXT_LIV_FUSELAGE_01_ALBD.PNG.DDS

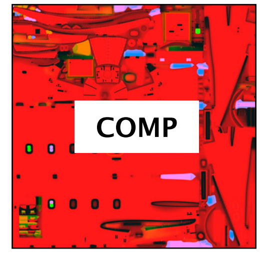
EXT_LIV_FUSELAGE_01_COMP.PNG.DDS

EXT_LIV_FUSELAGE_01_NORM.PNG.DDS

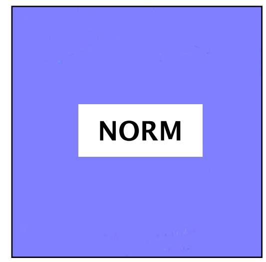
In this example, the **ALBD**, **COMP** and **NORM** textures are forming a set of three maps for a single Flight Simulator material ("**Ext_LIV_Fuselage_01**") that is applied to a number of objects in the physical 3D model, as mentioned above.

Original textures for the GLJ Model 25 addon were 3D-painted in Adobe Substance 3D Painter. Some details were imported from Adobe Photoshop. This method of painting directly on 3D objects requires the use of a 3D mesh of the aircraft model that is not currently available to users. Consequently, to produce your own PBR liveries, you will need a **2D painting program that can export PBR textures**.

PBR textures are usually **exported as PNG files** and **converted** to a special **DDS** format that can be used by the simulator. The conversion is normally done when **building the aircraft (or the extra livery package)** in the "**Project Editor**" of the MSFS **Developer Mode**. Third-party converters may also be used, though more complicated to configure.

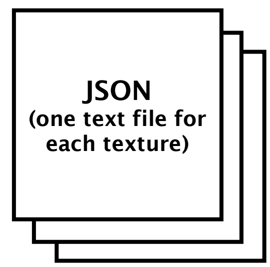


PNG image files **cannot be copied directly** to the aircraft's livery folders. They must first be converted to the DDS format that is compatible with the simulator. After the conversion process is over, the converted PNG files will bear the extension "**PNG.DDS**". Each texture will also be "linked" to a special "**JSON**" text file (generated during the export process) that contains useful data for the simulator. Both the "PNG.DDS" and "JSON" files are **stored together** in the same livery folder.

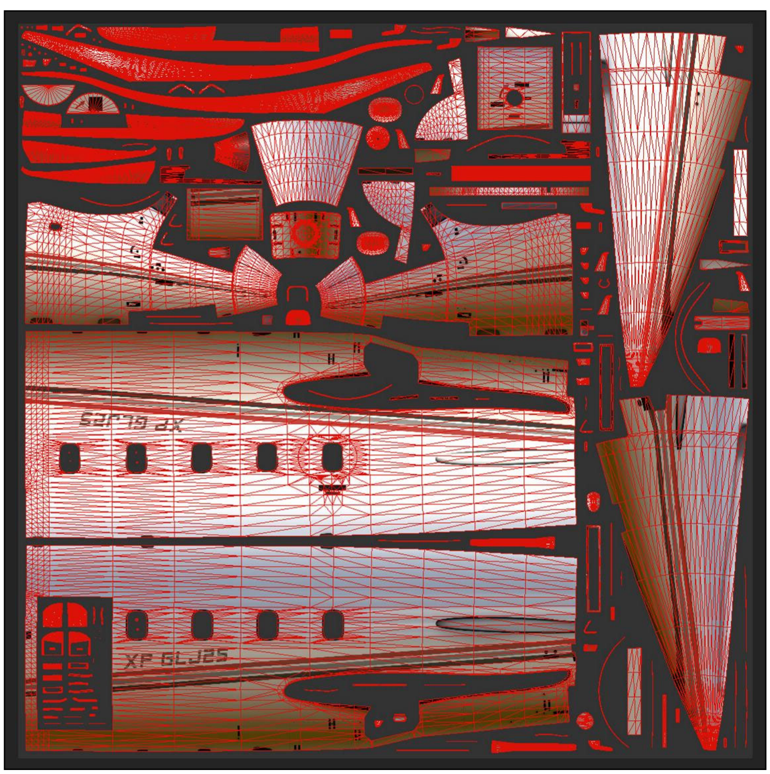


In the add-on aircraft package, each original livery is contained in a **unique livery folder** in the main aircraft folder ("**XTPRO_GLJ25_Classic_SE_v01**" folder). For example, the "**texture.00.default**" livery folder contains the PBR textures for the original GLJ Model 25 "demo" variation that comes with the aircraft package.

(Similarly, your own aircraft liveries will be contained in separate folders in your extra livery package.)



The "**texture.base**" and "**texture. interior**" folders contain other PBR textures, mainly for the interior model and for external parts that are common to all aircraft variations. These extra textures **don't have** the "EXT_LIV" prefix and **should not be modified or replaced**. You don't have to create repaints for the interior model or for the common parts of the exterior model.



Note: We do not recommend** modifying the original aircraft liveries that are part of the GLJ Model 25 add-on aircraft package. **Extra livery packages should be created instead.

Creating the Artwork

To produce your own aircraft liveries, you will need a **2D painting program that can export PBR textures**.

Included with the "**paintkit**" are basic Photoshop **templates** for creating your own PBR textures. The **UV mapping** (contours of the objects to paint) for each texture is also included in the templates (left).

Organizing your Textures

Each livery consists of five (5) sets of **three textures** (**ALBD**, **COMP** and **NORM**), stored in a **single livery folder**. There must be a **different nam**e for each livery folder.

Each livery folder name must have the **"texture" prefix** followed by a **name of your choice** (for example: "**texture.14.my_own_livery**"). Beware of duplicate names.

Each set of three textures corresponds to one material in the 3D model (and to one template in the "paintkit"). The textures must have the same names as below, for each livery folder:

- EXT_LIV_FUSELAGE_01_ALBD.PNG.DDS
- EXT_LIV_FUSELAGE_01_COMP.PNG.DDS
- EXT_LIV_FUSELAGE_01_NORM.PNG.DDS

- EXT_LIV_FUSELAGE_02_TAIL_ALBD.PNG.DDS
- EXT_LIV_FUSELAGE_02_TAIL_COMP.PNG.DDS
- EXT_LIV_FUSELAGE_02_TAIL_NORM.PNG.DDS

- EXT_LIV_LJ25_TANKS_ALBD.PNG.DDS
- EXT_LIV_LJ25_TANKS_COMP.PNG.DDS
- EXT_LIV_LJ25_TANKS_NORM.PNG.DDS

- EXT_LIV_LJ25_WING_ALBD.PNG.DDS
- EXT_LIV_LJ25_WING_COMP.PNG.DDS
- EXT_LIV_LJ25_WING_NORM.PNG.DDS

- EXT_LIV_WING_02_NACELLES_ALBD.PNG.DDS
- EXT_LIV_WING_02_NACELLES_COMP.PNG.DDS
- EXT_LIV_WING_02_NACELLES_NORM.PNG.DDS

Note: *Some textures in specific livery folders don't have the "EXT_LIV" prefix and* ***should not be modified or replaced.*** *One example is the "pilots" texture in our "U.S. Army" variation.*

Building your Project and Creating and Exporting your Extra Livery Package

After you have created and organized all the textures required for your own liveries, you will need to create and export your extra **livery package** that will be added to your MSFS "**Community Folder**". Although this can be done from scratch using external toolsets and apps, we recommend using the "**Project Editor**" of the MSFS **Developer Mode** to avoid any issue. MSFS will save your project, automatically convert all your textures to the correct format needed by the simulator, and create and export your extra livery package for the GLJ Model 25 add-on aircraft.

You may use the **aircraft livery package project** included with the **paintkit** as a basic template for building and exporting your own livery packages for the GLJ Model 25 add-on aircraft.

Once exported, your extra livery package(s) **must be copied** to your "**Community Folder**", like the original aircraft package.

Please refer to the online **MSFS SDK** for instructions on how to create an add-on livery package for your aircraft:

https://docs.flightsimulator.com/html/Developer_Mode/Project_Editor/The_Project_Editor.htm

You will also find a "**LiveryAircraft**" (package) project example in the "**Samples**" section of the SDK:

https://docs.flightsimulator.com/html/Samples_And_Tutorials/Samples/SimObjects_Aircraft/LiveryAircraft.htm

We hope you will enjoy creating new liveries for your GLJ Model 25 addon. Feel free to experiment and share your own creations.

Please note that Xtreme Prototypes may release extra livery packages for the GLJ Model 25 addon in the future.

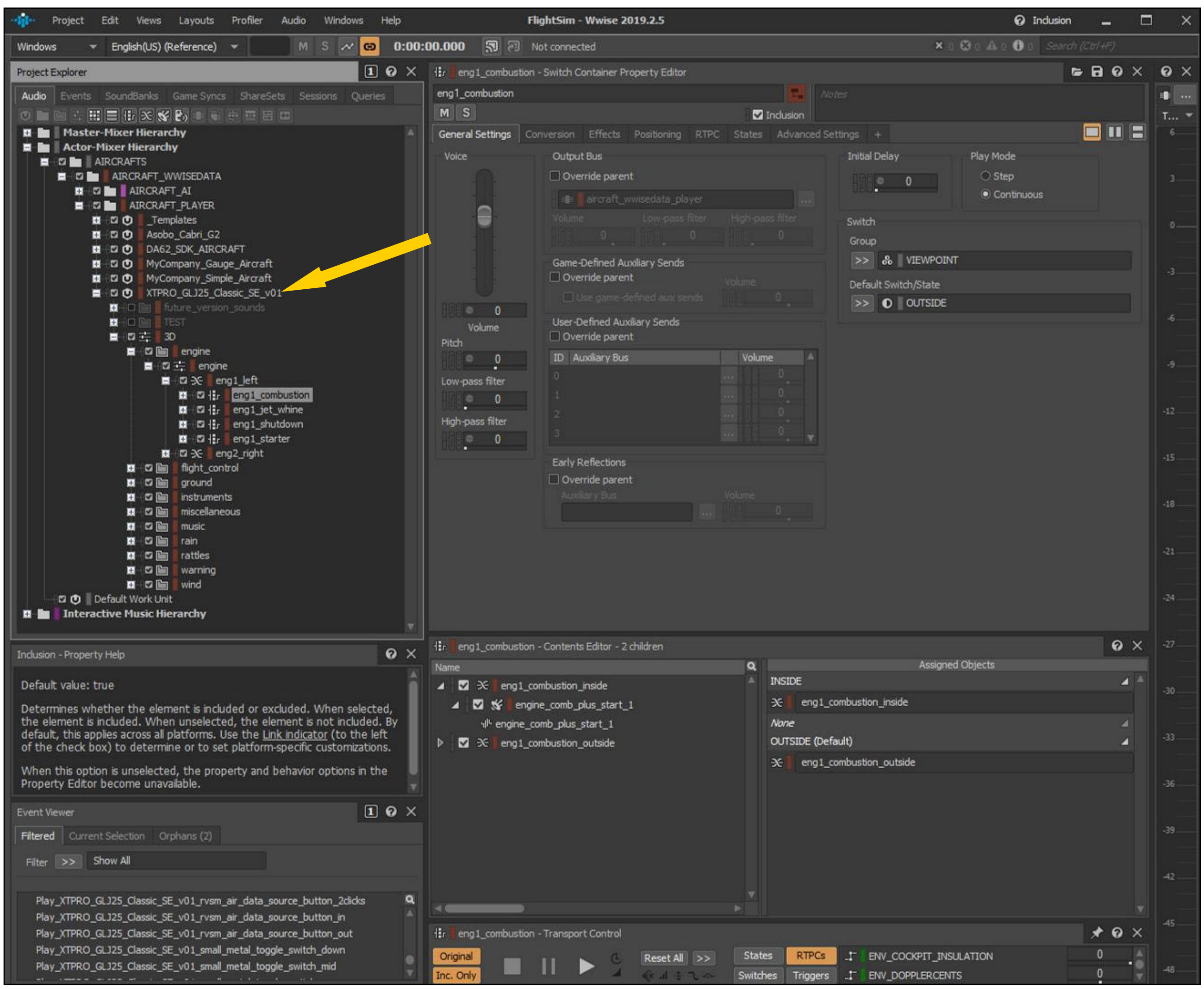
CREATING YOUR OWN SOUND PACKAGE

Aircraft audio for the GLJ Model 25 for MSFS was developed using the “**Wwise data pipeline**”. The “wave data pipeline” used in FSX and Prepar3D is now considered a legacy system and is no longer used by Xtreme Prototypes.

Audiokinetic Wwise is a powerful sound authoring software for video games that sets new standards in MSFS. Authoring interactive sounds and implementing an immersive, realistic, and accurate representation of a simulated environment with Wwise for our Learjet Model 25 addon was a complicated task, but the final result is worth mentioning.

In MSFS, all sound effects are contained in a custom Wwise “**soundbank**” that also includes instructions for how and when to play the sounds. For each aircraft, there is a “**main soundbank**” and a “**AI soundbank**” (if the aircraft is used in AI). Wwise soundbanks are compiled and cannot be edited. Should you want to create new sounds for your aircraft, you will need to create a new Wwise soundbank.

Creating a new soundbank for your GLJ Model 25 addon **is a project in itself** that requires some experience in audio recording and editing, and in game sound design. You also need to be familiar with the Wwise sound authoring software and understand how audio is implemented in MSFS.



Fortunately, Audiokinetic offers a comprehensive **online tutorial** for beginners, along with an exhaustive **online documentation**:

https://www.audiokinetic.com/en/library/edge/?source=Help&id=welcome_to_wwise

Information and examples on how to integrate and configure audio in MSFS can be found in the **SDK**:

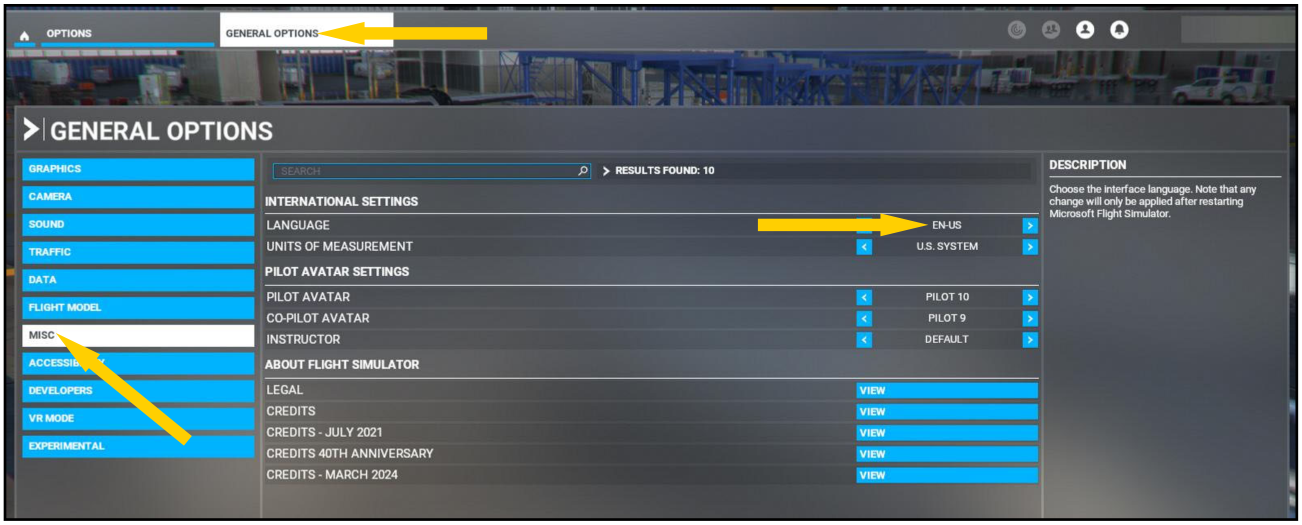
https://docs.flightsimulator.com/html/mergedProjects/How_To_Make_An_Aircraft/Contents/Audio/Aircraft_Audio.htm

https://docs.flightsimulator.com/html/Content_Configuration/Sounds/Sounds.htm

The SDK also provides a **sample Wwise audio project** that must be used as the foundation for your own soundbank project.

The "**WwiseEvent**(s)" that are used in the model behavior templates for triggering and playing sounds are listed in the "**sound.xml**" file located in the aircraft's "**sound**" folder.

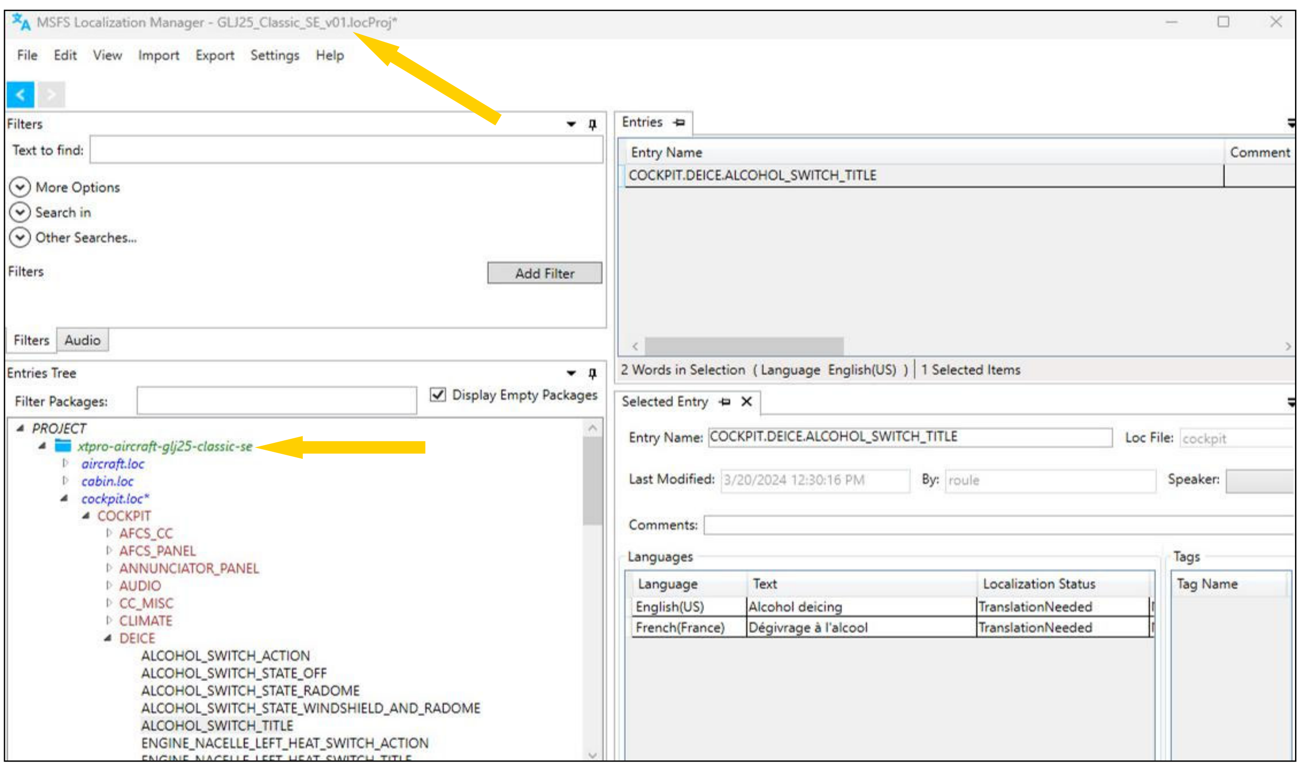
You will need these event names, along with other parameters and variables included in the "**sound.xml**" file, when authoring your own soundbank in Wwise.



LOCALIZING THE TOOLTIPS

The advanced MSFS **tooltips** that provide desktop pilots with useful information about how to interact with the different instruments and switches in the cockpit can be displayed in both **English** or **French**, depending on your preferred language set in the MSFS "**General Options**" page (see image above).

You may use the MSFS **Localization Manager** (below) to add more languages or to edit existing captions in the original localization package.



The MSFS **SDK** provides detailed instructions on how to create or modify a localization project file and to export a localization package:

https://docs.flightsimulator.com/html/Additional_Information/Tools/MSFS_Localization_Manager.htm

You can download the original **localization project files** that we have used for the GLJ Model 25 from your account page on our website. The localization project includes captions for the aircraft, cockpit and cabin ("**aircraft.loc**", "**cabin.loc**" and "**cockpit.loc**" files). You may use these files to add more **localization packages (locPak)** using the MSFS Localization Manager.

The currently available localization packages for the GLJ Model 25 addon are:

en-US.locPak
English

fr-FR.locPak
French

These files are located in the **main add-on aircraft package folder**.

These files can be edited directly or used as templates for your own localization packages, although using the MSFS Localization Manager is much more convenient and user friendly.

Note: We do not recommend *editing the original English and French packages, unless it is absolutely necessary.* ***Extra or replacement packages should be created instead.***

Please note that Xtreme Prototypes may release more localization packages for the GLJ Model 25 addon in the future.

SELECTED BIBLIOGRAPHY **APPENDIX 3**

These books, manuals and films provided us with invaluable information during the development of our Gates Learjet 20 Series addons and we highly recommend them to all Learjet fans. Some are out of print but are still available online or at public libraries.

Books

Stormy Genius: The Rags to Riches Life of Bill Lear (biography)
Richard Rashke
Publisher: KR Books (1985, 2017 reprint)
Paperback: 351 pages
ISBN-13: 978-1499217858

Learjets: The World's Executive Aircraft
Donald J. Porter
Publisher: Tab Books (1990)
Paperback: 120 pages
ISBN: 0-8306-2440-6

The Learjet Diaries (semi-fiction)
Greg Madonna
Publisher: Middle River Press (2020)
Paperback: 388 pages
ISBN: 978-1-946886-15-6

Learjets
Geza Szurovy
Publisher: Motorbooks International (1996)
Paperback: 96 pages
ISBN: 0-7603-0049-6

Flying the Classic Learjet (Models 35/36)
Peter D. Condon
Publisher: Peter D. Condon (2007)
Paperback: 210 pages.
ISBN: 978-0-646-48135-7

Manuals

Gates Learjet 25B/C/D/F Manuals
Publisher: Gates Learjet Corporation (1969 and 1977)
Paperback: 1,500 pages (approx.)

Gates Learjet 28/29 Manuals
Publisher: Gates Learjet Corporation (1977)
Paperback: 1,500 pages (approx.)

Learjet 20 Series Pilot Training Manual Volume 1 - Maneuvers and Procedures
Publisher: Flight Safety (1998)
Paperback: 65 pages

Learjet 20 Series Pilot Training Manual Volume 2 - Aircraft Systems
Publisher: Flight Safety (2005)
Paperback: 373 pages

Learjet 24/25
Cockpit Reference Handbook
Publisher: CAE SimuFlite (2010)
Paperback: 592 pages

Learjet 25
Operating Handbook
Publisher: CAE SimuFlite (2005)
Paperback: 132 pages

DVDs (Video)

Ameristar Learjet 24/Falcon 20 DVD
Studio: World Air Routes
DVD Release Year: 2005
Run Time: 185 minutes

HELP AND SUPPORT

Answers to most technical questions can be found in the present manual.

We've added a "**Frequently Asked Questions**" section in appendix 5 to help you find answers to the most common questions you may have about your new GLJ Model 25 addon for MSFS.

Known issues are discussed in the "**Known Issues**" section in appendix 6.

If you don't find what you are looking for in the present manual and need further assistance, please contact us. We'll try our best to answer you the same day or within two business days.

We offer free, personalized technical support in **English** or **French** via email to **registered users only**.

How to Contact Us

The best way to reach us is by using the contact forms on our website.

For sales support and general inquiries - If you need support related to your online purchase or simply want to send us a message, please use our general contact form:

https://xtremeprototypes.com/shopcustcontact.asp

For technical support - If you need technical support for your addon beyond what is available in the present manual, please fill out our technical support request form:

https://xtremeprototypes.com/shopcustcontactsupport.asp

Make sure all the required fields in the form are filled out properly and provide us with as much information as possible about your technical issue(s).

Please note that we do not answer support requests and inquiries via Facebook, social media, or flight simulation forums.

Software Patches

When available, patches for your Xtreme Prototypes addons are listed at the bottom of each product page on our website. To download these files, please login to your user account and review your previous orders.

Manuals

Manuals are updated regularly. Please make sure you have the latest version:

http://xtremeprototypes.com/shopcontent.asp?type=manuals

We Need Your Feedback!

Our products are designed to evolve with time, according to the feedback we receive from our users. Please let us know your comments, ideas and suggestions and feel free to report any bug or other issue you may encounter while installing or operating your new addon. **Thank you for helping us create better products!**

If you are a real-world Learjet pilot or were involved in the development of the real Lear Jet/Gates Learjet 20 Series aircraft during the 1960s/70s/80s, it will be an honor to hear from you.

FREQUENTLY ASKED QUESTIONS

APPENDIX 5

Answers to most questions can be found in the present manual. Answers to other questions may be found in this section.

GENERAL

Is the Xtreme Prototypes GLJ Model 25 addon for MSFS 2020 an upgrade to previous versions for FSX or Prepar3D?

No. The GLJ Model 25 addon for Microsoft Flight Simulator 2020 is a completely **new product** with different features and improvements over our previous versions for other simulation platforms.

Is the Xtreme Prototypes GLJ Model 28 addon for MSFS 2020 also available?

At the time of this writing, the Xtreme Prototypes GLJ Model 28 addon for MSFS 2020 was still in production and will be released at a later date. Please visit our website regularly for new products announcements and pricing information.

Will the GLJ Model 25 and the GLJ Model 28 addons for MSFS 2020 be sold separately?

Yes. Please visit our website regularly for new products announcements and pricing information.

Is the GLJ Model 25 addon for MSFS 2020 compatible with both MSFS 2020 and MSFS 2024?

Yes. The current software version is a native MSFS 2020 add-on aircraft that is also compatible with the new MSFS 2024. At the time of this writing, we haven't thoroughly tested the aircraft in MSFS 2024. and some issues might not yet have been reported by our testers. We always appreciate **constructive feedback** from our users, especially after the launch of new products. Please don't hesitate to report any bug or other issue you may encounter while installing or flying our GLJ Model 25 addon for MSFS in either MSFS 2020 or 2024.

Note: *The Xtreme Prototypes GLJ Model 25 for MSFS 2020 is our first project for this new platform for which there were many fixes and updates by Microsoft/Asobo since 2020, not mentioning the release of MSFS 2024 a few months ago with its own list of updates. We do not pretend our software to be 100 % bug free, although we tried our best to resolve most issues that were encountered during development and the beta testing phase. Refer to "**Known Issues**" in appendix 6, for more information.*

Are you planning to release a new native version for MSFS 2024 as well?

Yes. We are currently working on a new native version for MSFS 2024 to be released at a later date. Please visit our website regularly for new product announcements and pricing information.

Is the GLJ Model 25 addon compatible with the Xbox gaming console?

Not at this time. The Xtreme Prototypes GLJ Model 25 addon for MSFS is a **study level** aircraft simulator that is too complex to be compatible with Xbox in its present form. We are evaluating the possibility of creating a lighter and less complex version that would be compatible with Xbox to be released at a later date. Please visit our website regularly for new product announcements and pricing information.

Is the GLJ Model 25 addon available through the MSFS Marketplace?

Not at this time. Our GLJ Model 25 addon for MSFS is currently **not available** from the MSFS Marketplace nor from any other third-party reseller. We have not decided yet if our new addons for MSFS would be available through the Marketplace. Like in the past 20 years, you may continue to purchase and download your Xtreme Prototypes addons directly from your account page on our website. Please check our website regularly for further development.

Is the Xtreme Prototypes GLJ Model 25 addon still available for Microsoft Flight Simulator X and Prepar3D?

Yes. The Xtreme Prototypes GLJ Model 25 v4 addon is available for Prepar3D v5.4*. Our v3 is also available for both Prepar3D and FSX. Please note that there are significant differences between the different versions and simulation platforms. Please visit our website for complete product information.

**: We are currently working on an update for Prepar3D v6. New addon versions for future versions of Prepar3D may also become available based on demand.*

Why are your using the prefix "XTPRO" instead of "XP" for your new addons for MSFS?

Xtreme Prototypes addons for Microsoft Flight Simulator 2020 and later now use the prefix "XTPRO" to differentiate from the "XP" prefix used for FSX and Prepar3D addons.

Is the GLJ Model 25 addon for MSFS 2020 compatible Lockheed Martin Prepar3D?

No. The GLJ Model 25 addon for MSFS 2020 is compatible with Microsoft Flight Simulator 2020/24 only. Please visit our website for information about our Prepar3D versions.

Is the GLJ Model 25 addon for MSFS 2020 compatible with Microsoft Flight Simulator X?

No. The GLJ Model 25 addon for MSFS 2020 is compatible with the Microsoft Flight Simulator 2020/24 only. Please visit our website for information about our FSX versions.

Is the GLJ Model 25 addon for MSFS 2020 compatible with Microsoft Flight Simulator 2004 and earlier?

No. The GLJ Model 25 addon for MSFS 2020 is compatible with the Microsoft Flight Simulator 2020/24 only. Please visit our website for information about our FSX versions.

Is the GLJ Model 25 addon for MSFS 2020 compatible with Laminar Research X-Plane?

No.

Is this addon compatible with the latest version of Windows?

Yes. Windows 11/10 or later is required to install and fly this addon in MSFS. Please refer to the MSFS documentation and to section 2 for more information about minimum system requirements.

Is this addon compatible with the latest version of DirectX?

Yes and no. DirectX 12 support in MSFS 2020 was still under development at the time of this writing and is not recommended for this platform. Refer to your simulation platform's documentation for more information about the recommended version of DirectX.

Is the manual available in PDF?

Yes. A 300-page printable PDF manual (the present document) in English or French is available for this addon. Adobe Reader is required to view the manual.

Was the manual updated for MSFS 2020?

Yes. The present manual is a new, **completely revised** version of our Gates Learjet Model 25 Flight Manual, fully updated for Microsoft Flight Simulator 2020*. As with any first edition, errors may have crept in and escaped our notice despite our rigorous review process. Please feel free to report any errors or omissions while browsing the manual. Thank you for helping us create better products!

**: A manual update will be available for MSFS 2024 at a later date.*

Where is the manual?

You can download the complete manual for your new GLJ Model 25 addon from our "**Manuals**" section on our website. Our manuals are free and available online. Registered users can print copies of the manual for their own use. Please refer to the End-user Software License Agreement in section 1, page 13, for details about proper usage of the manual.

Le manuel est-il disponible en français ? (Is the manual available in French?)

Oui. La version française du présent manuel de 300 pages est maintenant entièrement disponible en français. Visitez la section « **Manuels** » de notre site Internet pour télécharger le manuel français. Nous offrons également à nos utilisateurs francophones enregistrés une **assistance technique en ligne personnalisée en français** pour l'ensemble de nos produits. Xtreme Prototypes est l'un des rares développeurs indépendants à offrir de la documentation et de l'assistance technique en français. Nous travaillons très fort à rendre nos manuels disponibles en français.

Are all the Gates Learjet 25 systems simulated?

The Xtreme Prototypes GLJ Model 25 addon for MSFS is a **study level** Gates Learjet 20 Series business jet simulator. Nearly all systems that can be reproduced in MSFS are simulated, except where otherwise noted in the documentation.

Due to limitations in the currently available simulation platforms, some systems may operate differently from those in the real aircraft. In the case of systems that are not fully simulated, we have strived to provide you with working switches and knobs to allow you to fully follow the procedures outlined in the manual for a more realistic experience. The virtual cockpit allows for complete IFR flights, and contains all the instruments, radios, annunciators, switches and knobs necessary to do so. As simulation platforms evolve, so will the systems in future versions of this addon.

How realistic is the GLJ Model 25 addon?

The Xtreme Prototypes GLJ Model addon is inspired by a series of real-world aircraft known in the 1970s/80s as the Lear Jet/Gates Learjet 20 Series (models 23 to 29). The package strives to recreate the general look and feel of the original aircraft for the desktop pilot's enjoyment.

The operation of the addon is very similar to the operation of the real aircraft. Nearly all systems, gauges, switches, light indicators and instruments are functional and behave like their original counterparts.

While we regard this addon as a **mini aircraft simulator** rather than just a game, we do not pretend that it is one hundred percent historically or technically accurate, or that it faithfully reproduces all the systems and flight characteristics of the real aircraft, which would be impossible in MSFS. Nevertheless, we've always paid attention to details, and we did our best to make sure we provide our users with the best flight simulation experience they can get within the limitations of the currently available simulation platforms.

This addon strives to bring you not only the actual feeling of flying a high-performance aircraft now equipped with modern avionics, but also the spirit of maneuvering such a vehicle at times where large LCD screens and powerful computers didn't exist, and where pilots needed to know how to fly and navigate with minimal resources and rely on their own experience, abilities, and judgment. We believe our GLJ Model 25 addon for MSFS is the most advanced, detailed, and faithful classic Learjet simulation you can find.

Note: *Xtreme Prototypes addons and manuals for the general public are considered edutainment software and should not be used for real-world training.*

I am a Learjet fan but a beginner desktop pilot. Is the GLJ Model 25 addon too complex for me?

While this addon allows for comprehensive procedural IFR flight, we at Xtreme Prototypes recognize that not everyone has the time, patience, or inclination to read a 300-page manual, which is why our addons remain relatively simple to operate. Anyone who masters the simulator's default jet aircraft can fly the GLJ Model 25 addon in MSFS. It's up to you, the desktop pilot, to decide which level of complexity you want to achieve.

If you are a true Learjet fan and already have some knowledge about the aircraft and a desire to learn more, this addon is for you. This is your chance to go beyond books and films and hop into the cockpit of this extraordinary aircraft in a compelling simulation environment.

All the necessary information to fly the aircraft is in the present manual. There are two sets of instructions: a detailed set (section 8), which contains all the "**Normal Operating Procedures**" with images and additional information; and a condensed set called "**Quick Start Procedures**" (section 9), for experienced desktop pilots who prefer shorter check lists.

Like a real Learjet pilot, the desktop pilot needs some time to become familiar with the cockpit and the operation of the aircraft. If you're feeling overwhelmed by the cockpit of the GLJ Model 25 addon, we suggest giving the manual a chance as it was written with non-experienced pilots in mind. The addon is quite rewarding once mastered, but as with most things in life, practice makes perfect!

What are PBR textures?

The Xtreme Prototypes GLJ Model 25 addon features new PBR materials and textures. Physically based rendering (or PBR) is a method of shading and rendering that provides a more accurate representation of how light interacts with surfaces. The result is a 3D model that looks almost real under different lighting conditions.

Can I create my own PBR liveries?

Yes. However, creating PBR liveries for MSFS is different from creating liveries for FSX or early versions of Prepar3D. Some learning and experimentation will be required. Please refer to appendix 2, page 12, for information about how to create your own PBR aircraft liveries.

Is a "paintkit" available so I can repaint the aircraft?

Yes. A "paintkit" is available for registered users. Please visit your account page on our website and refer to appendix 2, page 12, for more details.

Why are the tail numbers on your liveries not accurate?

The tail numbers on the aircraft variations included with the GLJ Model 25 addon are fictitious. Any match with actual tail numbers is a pure coincidence. Some liveries are inspired by actual airplane liveries, and some are our original creations. You can use the available "paintkit" to create new liveries with your own tail numbers. Refer to appendix 2, page 12, for more details.

What are full-3D "steam" gauges?

Some third-party addons still use legacy (FSX-style) 2D gauges that are "projected" onto the various instrument panels. When viewed from an angle, these gauges appear flat even though they might contain needles, ribbons, buttons, knobs, and other movable parts that are not flat in the real world.

2D gauges are generally created with layers of animated drawings, while some may also include vector text and graphics. Most of these gauges use low-resolution graphics that are limited in size.

Xtreme Prototypes virtual cockpits do not integrate 2D gauges, except for CRT/LCD screens and for some LED/VFD digital displays that are flat by nature, like in GPS/GNS, radar and radio displays. Our panels feature **fully modeled** instruments and "steam" gauges with real moving parts instead, like in the real world.

Does my GLJ Model addon for MSFS come with 2D panels?

No. Xtreme Prototypes next generation addons no longer include 2D panels found in legacy products. They are replaced by fully functional, 3D virtual cockpits. 2D panels are not natively supported in MSFS, although some addons may include 2D popup windows for special functions and settings.

What is the maximum speed of my GLJ Model 25 addon?

Your GLJ Model 25 addon can cruise at Mach 0.82 at altitude. Maximum airspeed is 359 KIAS (306 KIAS under FL140). Please refer to section 3 for more information.

What is the maximum altitude that can be reached with my GLJ Model 25 addon?

Your GLJ Model 25 addon can reach FL510 at lighter weights. 51,000 feet is the absolute ceiling. 45,000 feet is the service ceiling. See section 3.

Is the GNS 530 and weather radar add-on software included?

No. Third-party GNS 530 and radar software are not included and must be purchased separately from third-party vendors/developers when available.

However, the virtual cockpit contains fully animated, physical 3D models of these devices. As we have done in the past for our FSX and Prepar3D versions, we have programmed both our GNS 530 and radar physical models in such a way that all screens, lights, buttons, and knobs can be configured to work with almost any MSFS-compatible third-party GNS 530 and radar add-on software that is or may become available in the future.

For users who don't plan to install third-party addons, the GNS 530 model is functional and pre-configured for the basic GNS 530 that comes with MSFS. The radar is not functional and shows a dummy radar screen by default.

Future updates and/or versions of our GLJ Model 25 addon may propose other solutions as new navigation systems and radars are being developed by Microsoft/Asobo, third-party developers, and Xtreme Prototypes as well.

Refer to appendix 2 for more information about customizing your GLJ Model 25 addon for MSFS.

Important:

Please be aware that some third-party addons may not be fully compatible with the latest versions of MSFS or might interfere with other aircraft systems installed in the GLJ Model 25 addon, like the autopilot. In doubt, please contact the developer for support.

Xtreme Prototypes is not responsible for changes in third-party software that would prevent the GLJ Model 25 add-on aircraft or the third-party software from performing or being used, including the discontinuation of such third-party software.

Xtreme Prototypes cannot provide technical assistance for third-party add-on software. Please contact the developer for support.

Installing and configuring third-party addons for the GLJ Model 25 add-on aircraft may re-

quire some research and experimentation on the part of the user.

Can I add my own third-party navigation system and radar to the virtual cockpit?

Yes. Please read the above notes and refer to appendix 2 for details.

Is a glass cockpit available for this addon?

Not at this time. However, a (fictitious) fully retrofitted G1000 glass cockpit is currently under development and may be sold separately at a later date. Please visit our website for future product announcements.

SOFTWARE INSTALLATION AND SETUP

What are the minimum system requirements for installing the GLJ Model 25 addon for MSFS?

The Xtreme Prototypes GLJ Model 25 is an add-on software package that requires Microsoft Flight Simulator 2020 (or later*) to be installed on your PC. The software is not a stand-alone product and cannot be used without the underlying simulation platform. Make sure that your simulation platform has been properly installed according to the instructions provided by the developer.

Note: *The Xbox version is not available at this time (see "Release Notes" at the beginning of this manual).*

Xtreme Prototypes next generation addons are designed to take advantage of the new and more powerful gaming computers that are available today. **Increased performance will be noticed on more powerful systems.**

Refer to "**Minimum System Requirements**" in section 2, page 1, for more details.

***:** *New addon versions may become available for future versions of MSFS, including MSFS 2024 (see "**Release Notes**" at the beginning of this manual). Make sure you download and install the correct addon version for your version of MSFS.*

****:** *Refer to the MSFS 2020/2024 documentation for more information about minimum system requirements.*

I have trouble downloading my addon. The file transfer keeps getting interrupted. What can I do?

The GLJ Model 25 addon is contained in a **single compressed zip file**. Normally, it should not take more than a few minutes to download the zip file over a reliable high-speed Internet connection. If you don't have a high-speed Internet connection or experience intermittent connection issues, you may be timed out or disconnected while downloading your addon.

If you are not able to download your addon after several attempts, we recommend using another and better Internet connection.

We recommend using your Internet browser to download your addon. Do not use a third-party download manager or you may experience problems that have been reported by some users.

Some antivirus programs may prevent you from downloading your addon. Make sure your antivirus does not interfere with your downloads. Some antivirus software won't allow you to download zip files. You can disable your antivirus temporarily while downloading your addon to solve this issue. Don't forget to reactivate your antivirus after the file is downloaded.

Can I re-download my addon if I lose the original zip file?

Yes. You can download your addon again at any time by logging in to your account on our website. You may download your addon a limited number of times. After that, you will need to contact us for assistance.

The replacement of lost downloaded files is not guaranteed. Please make backup copies of the files and save your activation key in a safe place. Refer to the End-User Software License Agreement, in section 1, page 13, for more details.

How do I install the GLJ Model 25 addon on my computer?

Nothing is simpler than installing (or removing) a new add-on aircraft in MSFS. The GLJ Model 25 addon consists of a unique "**add-on package**" (xtpro-aircraft-glj25-classic-se) to be copied to your MSFS "**Community Folder**". Please refer to section 2 for complete installation instructions.

How do I remove the GLJ Model 25 addon from my computer?

Removing the GLJ Model 25 addon from your computer is simply a matter of **removing the add-on aircraft package folder** (xtpro-aircraft-glj25-classic-se) from your MSFS Community Folder. Please refer to section 2.

Where do I find my software activation key?

An **activation key** is required for validating and making the GLJ Model 25 addon ready for installation on your computer. Your activation key was issued when you purchased your addon from our website and was sent to you by email. Please contact us if you have not received your activation key after your order was processed.

I've lost my personal activation key. May I contact you to obtain another one?

Yes. You will be reissued the same activation key that was linked to your original purchase. Please use our general contact form:

https://xtremeprototypes.com/shopcustcontact.asp

Make sure you are using the same email address as the one that appears on your account page on our website.

AIRCRAFT OPERATION AND PROCEDURES

How do I fly my GLJ Model 25 add-on aircraft?

Complete instructions on how to fly the GLJ Model 25 addon are in the present manual. Please refer to "**Normal Procedures and Check Lists**" in section 8, and/or to "**Quick Start Procedures**" in section 9 for complete checklists and procedures.

Is an electronic checklist available for the GLJ Model 25 add-on aircraft?

Not at this time. A MSFS "electronic" checklist is currently under development and may become available in future updates. Complete instructions on how to fly the GLJ Model 25 addon are in the present manual. Please refer to "**Normal Procedures and Check Lists**" in section 8, and/or to "**Quick Start Procedures**" in section 9 for complete checklists and procedures.

What's the easiest way to start the engines without going through the entire check lists and procedures?

Going through the full procedures, starting with a "**cold and dark**" cockpit and a **parked aircraft**, makes for a much more enjoyable and realistic experience.

That being said, eight (8) MSFS **cockpit presets** (*.flt) for the different phases of the flight have already been pre-programmed for the GLJ Model 25 add-on aircraft. One of these cockpit presets is automatically loaded for you at the beginning of a new flight, according to your flight plan and depending on where the aircraft is positioned when starting your flight.

The cockpit is automatically set to its "**Cold and Dark**" state when the aircraft is parked in the **hangar** or in a **parking space** (apron). The engines are shut down and all aircraft systems are turned off.

When a flight is started with the aircraft already **taxiing** or **ready for takeoff on the runway**, engines will be running and all systems turned on and ready for the flight. The same is true if the aircraft is already in the following states when a new flight is started: **climb**, **cruise**, **approach** and **final**.

When in a "cold and dark" cockpit, can I use "CTRL+E" to start the engine?

Yes, but not recommended. "**CTRL+E**" will start the engines, but you will need to turn on a few custom systems that are unique to this aircraft manually before taxiing and taking off. Most important, the Inverter Switches [10, 12, fig. 5-29] must be turned **ON** for some systems to function. Flight instruments will also need to be set manually, including most Autopilot controls and the very important Cabin Altitude Controller [5, fig. 5-41].

Why can't I reach the maximum altitude?

Like in the real world, maximum cruise altitude can only be reached with lighter weights. As your aircraft burns fuel during cruise, you may step-climb from FL410 up to FL510 at a low vertical speed (sometimes not greater than 500 feet per minute).

It must be remembered that FL510 is never reached during normal operation with the real aircraft. To reach this level, you would need perfect conditions, an almost empty plane and about 2,000 pounds of fuel.

With the real aircraft, there is no way you can reach this high level directly after taking off with 5,000 pounds of fuel and 7 passengers plus crew. It is normal to climb at 500 fpm above FL400. If your climb rate is more than 500 fpm above FL450, be careful!

I noticed that you need to put a lot of power in for the plane to begin rolling. Is this normal?

It depends how much fuel and payload are on board. With the maximum ramp weight, to break the inertia you sometimes have to apply more than 85% RPM with the real aircraft, according to our real-world Learjet pilot. In the simulator, it is around **70 % RPM**, and this is perfectly normal.

After loading a saved flight, some switches were not in the state they were in when the flight was saved. Consequently, I had to change the status of those switches manually. Are you aware of this and is there a plan to fix it?

Unfortunately, this is normal and is due to some limitations in the simulation platforms.

Our Learjet 20 Series addons are complex aircraft simulators with many custom systems, switches and controls that are not currently supported in the simulator and that you won't find in the stock aircraft (for example: the Inverter Switches [10, 12, fig. 5-29] or the 3-position Starter/Generator Switches [6, 11, fig. 5-30]). These custom systems use their own sets of proprietary variables and commands.

Currently, some but not all custom local variables are kept by the simulator when a flight is saved.

This explains why some of the switches may need to be reset manually after loading a saved flight.

A solution would be to limit ourselves to the basic aircraft systems that are natively supported by the simulator and to stop implementing custom systems in our Learjet addons at the price of realism. We believe our fans would prefer to keep the Learjet custom systems intact even if it means resetting a few switches manually after loading a saved flight.

Is a GPU available so we may proceed with the preflight procedures without depleting the batteries?

The GLJ Model 25 addon is compatible with the ground power units that are included with MSFS. A GPU supplies 28 VDC to the aircraft during maintenance, training, and preflight procedures. The GPU is available when the aircraft is **parked in selected areas** of most airports.

To preserve battery power during ground procedures up until the engines have started and the generators are turned on, it is strongly suggested to use an external power source to power up the aircraft.

To call for a GPU in the simulator, use the default keyboard shortcuts "**SHIFT+Q**" or "**SHIFT+W**" (or the **ATC** window). You can assign other keyboard shortcuts as well in the simulator's settings.

The GPU must be **disconnected** after the engines have started and the generators are turned on.

Like in the real aircraft, **do not turn on** the battery switches [8-9, fig. 5-30] when the batteries are fully charged, and the GPU (or the generators) are operating to prevent the Ni-Cd batteries from overheating.

In the real world, GPUs are rarely used with this aircraft because the ground procedures can be performed in a relatively short period of time.

How come there is no pilot in the cockpit?

The captain and the copilot appear by default in the cockpit of the **exterior model only**, when the aircraft is loaded in the simulator.

You can click either **headphone hanger** [5, fig. 5-49] on the cockpit side walls to show or hide the pilots. When the headphones and the pilot's seatbelts are visible inside the cockpit, the crew is absent. When the headphones and the pilot's seatbelts are not visible, the crew is present.

Click the **Learjet 25 logo** at the center of the yoke on the captain's side to select the captain that appears in the cockpit of the exterior model. Click the Learjet 25 logo on the copilot's side to select the copilot. You can choose between three different character figures. Crew must be aboard the aircraft.

Click the **sunglasses** on the copilot's right console (or the whisky compass **correction card**) [3, 5, fig. 5-50] to show or hide the pilot's sunglasses. When the sunglasses are visible on the copilot's right console, the pilots are not wearing sunglasses.

Note: *The GLJ Model 25 addon uses its own custom pilot character figures. Pilot selection from the MSFS settings is disabled in this software version. Other options may become available in future versions.*

How do I install the "Remove Before Flight" items after the aircraft is parked?

The "Remove Before Flight" items (ribbons and Pitot covers, wheel chocks, engine inlet covers, tail stand) need to be installed manually after the aircraft is parked. Click the **white label** above the Anti-Skid Lights in the virtual cockpit [4, fig. 5-15] to install/remove the "Remove Before Flight" items. The "Remove Before Flight" items cannot be installed if the aircraft is not parked, not on the ground or if the starters/engines are running. Please note that the tail stand is installed only when the aircraft is full of fuel (85% or more, CoG near aft limit).

The landing gear won't retract. What do I do?

We suspect your landing gear was damaged during takeoff because of the strong acceleration (Gates Learjet 20 Series aircraft are equipped with powerful military-type engines and have an astonishing climb performance). The landing gear must be retracted as soon as the aircraft is airborne to avoid it being damaged by excessive speed.

You may reset the flight, then in "MSFS > Options > Assistance Options > **Failure and Damage** pull-down menu"), set "Aircraft Stress Damage" to **DISABLED**.

Refer to "**Recommended Settings**" in section 2, page 11.

The yoke pushes the aircraft in a steep dive or a steep climb after a stall or an overspeed condition, even when the autopilot is engaged. Is this normal?

The GLJ Model 25 addon is equipped with a **stick nudger/puller** like in the real aircraft. It is normal for the yoke to react to stall and overspeed conditions when the autopilot stick nudger/puller is active. While stall and overspeed should always be avoided under normal conditions, you can activate or disable the stick nudger/puller with the **Autopilot Stick Nudger/Puller Switch** [21, fig. 5-43]. By default, the stick N/P system is **OFF**. Please refer to section 6, page 40, for more details.

For some reason I can only climb after takeoff, basically vertically until stalling. Thought it might be a trim issue. Can you help?

The autopilot should never be used for takeoff or landing. If the autopilot was tested or engaged with one vertical mode selected prior to takeoff, always remember to turn it off and check the Elevator Trim Indicator [3, fig. 5-14; 3-4, 11, fig. 5-47] for the correct takeoff position (about one needle thickness below center). When engaged with a vertical mode selected, while the aircraft is still on the ground, the autopilot will try to compensate by moving the horizontal stabilizer (elevator trim) out of range for takeoff to follow the flight director. If unnoticed, you may lose control of the aircraft during takeoff. For the same reason, do not attempt to control the aircraft manually with your controller while the autopilot is engaged. The autopilot will compensate by running the trim and could even disengage itself after hitting the trim limits. This may lead to very unpleasant situations.

Before takeoff, make sure the Takeoff Trim Alert Annunciator [2, fig. 5-33] is extinguished. If you cannot turn off the Takeoff Trim Alert Annunciator before takeoff by using the trim controls on your joystick, it means that the latter may not be calibrated properly. Elevator trim is indicated on the main panel, in front of the captain's yoke [3, fig. 5-14]. The needle should move when adjusting your trim with the buttons on your joystick. **A calibrated joystick is a must.**

After takeoff, adjust your trim to maintain the proper rate and angle of climb (around 15 degrees nose up). When speed is stabilized, you have the option to engage the autopilot [1, fig. 5-22a; 1, fig. 5-46]. It will capture and maintain the pitch (attitude) and level the wing. Always check your speed during all phases of the flight and engage the autopilot SPD Hold Mode [12, fig. 5-22b] if necessary. You may need to use the spoilers and the throttle to reduce velocity.

Your addon should be controlled with only constant and light movements of the joystick/ yoke. The controls should never be pushed hard and should always be properly trimmed. Trims are there to help you, but they are not primary flight controls. As a qualified pilot, you should hold the desired attitude with the controls and trim until the effort is gone. Do not let go of the controls and use trim to get the required attitude. This is sloppy flying and can lead to loss of control.

We recognize that the takeoff sequence happens quite fast and requires an efficient drill in order to observe and maintain altitude, speed and climb rate. The Learjet 20 Series is a very performant aircraft and the climb rate right after takeoff could easily get out of control.

Please refer to section 8 for complete takeoff and climb procedures.

***Note:** The GLJ Model 25 addon has its own flight dynamics that have been tweaked, tested and retested by our aeronautical engineer, our real-world Learjet pilot and some beta testers in order to emulate as closely as possible the behavior of the real Gates Learjet 20 Series aircraft within the limitations of the current simulation platforms. We do not pretend however that the flight model is 100 % accurate, which would be impossible in MSFS.*

When using the autothrottle TO/GA mode, the aircraft always stalls and crashes upon takeoff. Am I doing something wrong?

This happens usually because the autopilot was engaged before the TO/GA Button [22, fig. 5-43] was depressed. The autopilot should never be used for takeoff (see previous Q/A).

If the autopilot was tested or engaged with one vertical mode selected prior to takeoff, always remember to turn it off and check the Elevator Trim Indicator [3, fig. 5-14; 3-4, 11, fig. 5-47] for the correct takeoff position (about one needle thickness below center). When engaged with a vertical mode selected, while the aircraft is still on the ground, the autopilot will try to compensate by moving the horizontal stabilizer (elevator trim) out of range for takeoff to follow the flight director. If unnoticed, you may lose control of the aircraft during takeoff. The elevator trim should always be checked and set correctly before takeoff.

In the simulator, depressing the TO/GA Button disengages all autopilot pitch, roll and speed modes, turns on the flight director and engages the autothrottle* Takeoff/Go-Around mode. Throttles automatically advance to takeoff power, the WING LEV is engaged, vertical speed is set to 4,000 fpm, and the flight director indicates takeoff pitch.

Remember that you, the pilot, still have manual control of the aircraft's pitch until the autopilot is engaged. The autopilot can be engaged after the aircraft has taken off and it will follow the flight director takeoff pitch.

Releasing the TO/GA Button disengages the TO/GA mode, engages the autopilot (if not already engaged), levels the wing, and captures and maintains the aircraft's pitch attitude.

***:** The autothrottle is not available in the real aircraft.*

The spoilers caused the aircraft to climb when extended. Isn't it supposed to be the opposite?

This is how the real airplane behaves when the spoilers are deployed, and this is how we have programmed our addon to reproduce the effect. Learjet pilots are aware of this unusual behavior, and they anticipate it. It is part of their training. With the Learjet 25 (the real one and the addon), extending the spoilers causes a climb because of the location of the spoilers with respect to the center-of-gravity. Each aircraft has its own challenges.

I'm using a third-party navigation system and radar, and I cannot power up the units in the virtual cockpit. Am I forgetting something?

The GNS 530 navigation system needs **DC and avionics power**. Please make sure the Battery Switches [8-9, fig. 5-30] (or the Generator Switches [6, 11, fig. 5-30]) are **ON**, and the Radio Master Switch (avionics) [14, fig. 5-29] is **ON**.

The radar needs **AC power** (Inverter Switches [10, 12, fig. 5-29] **ON**) in addition to DC power. Navigation systems and radars may also have a power or selector switch/knob that must be turned **ON**.

Most third-party addons also have different power up options. Please refer to the documentation included with your navigation system or radar. **Xtreme Prototypes cannot provide technical assistance for third-party addons.**

The autopilot cannot track the GPS. Can you help?

Normally, the autopilot will track the GPS when the Autopilot NAV1/GPS Switch [13, fig. 5-22b] is set to **GPS**. However, some third-party navigation systems have different options that need to be set in their control panel for the simulator's autopilot to track the GPS. Please refer to the documentation included with your third-party addon or contact the developer for further assistance. **Xtreme Prototypes cannot provide technical assistance for third-party addons.**

The autopilot/flight director cannot track signals coming from the NAV2 radio. Is this normal?

Yes, like in the real aircraft. For the same reason, the single GNS 530 unit is set for NAV1 only.

I am trying to engage the autopilot, but nothing works, and the lights remain off. What's wrong?

The autopilot requires **DC power**. In flight, make sure the Battery Switches [8-9, fig. 5-30] (or the Generator Switches [6, 11, fig. 5-30] with the engine running) are **ON**. The autopilot needs to be engaged (blue button illuminated on the flight controller [1, fig. 5-46] or the first Korry switch illuminated [1, fig. 5-22a] on the captain's panel).

3-position switches in the virtual cockpit don't work when clicked on. Is this an issue?

No. 3-position switches and knobs require a wheel mouse. Refer to "**How to Actuate Switches, Buttons, and Knobs**" in section 5, pages 4-5, for more information.

The radios, the autopilot and the GPS don't work, the AP altitude preselector cannot be changed, ADF is not working and not tunable. Please help!

Please make sure that the **avionics are powered up**. You need to have the Radio Master Switch [14, fig. 5-29] **ON** with the Battery Switches [8-9, fig. 5-30] **ON** (or the engines running and the Generator Switches [6, 11, fig. 5-30] **ON**). The autopilot and the radar, among other systems, also need **AC power** (both Inverter Switches [10, 12, fig. 5-29] **ON**). Please review sections 4, 5 and 6 for details.

I am unable to tune the radio frequencies. Can they be tuned manually?

Yes, you can tune radio frequencies manually or they can be tuned automatically by the simulator. To change this setting, go to "MSFS > Options > Assistance Options > Piloting pull-down menu > AI Radio Communications (ATC)". Set it to **ON** for automatic tuning based on your flight plan, or **OFF** for manual selection. By default, this feature seems to be set to ON in MSFS 2020.

I can't see the tooltips in the virtual cockpit. What's wrong?

In "MSFS > Options > General Options > **Accessibility** tab"), set both "Instrument Name Tooltips" and "Instrument Description Tooltips" to **INSTANT**. This is to make sure that the instrument tooltips in the cockpit are fully displayed. These settings are very useful for cockpit familiarization and may be disabled (set to **OFF**) later when you have more experience as a Gates Learjet 25 desktop pilot. See section 2, page 10.

The engine throttles can be moved even when they are supposed to be locked. How come?

In the real aircraft, the Engine Throttles and Subthrottles [1, 3, 7, 17, fig. 5-43] cannot move when they are locked (**CUTOFF** position). However, due to current limitations in the simulator, they can still move in this addon version. We are currently working on a fix for a future update.

No "pitch trim in motion" clicker sound. Why?

Like in the real aircraft, there is no clicker sound when the autopilot is engaged and/or the flaps are extended more than 3 degrees.

Is it normal to hear the "pitch trim in motion" clicker sound continuously, and how can I turn it off?

The pitch trim clicker sounds in the cockpit whenever the elevator trim is manually adjusted by the pilot or automatically by the simulator's AI when the autopilot is disengaged and the flaps are up. To stop this sound during AI trimming, set AI Auto Trim to **OFF** ("MSFS > Options > Assistance Options > Piloting pulldown menu > AI Auto-Trim > **OFF**"). By default, this feature seems to be set to ON in MSFS 2020.

If you prefer AI Auto Trim to be ON, click the first data card on the GNS 530 model [23, fig. 5-24b] to **disable** the pitch trim clicker.

The fuel tanks are empty or half full at the beginning of a new flight. How is this possible?

We always take for granted that all tanks are full before starting a new flight. However, the simulator might have decided otherwise and set the total fuel quantity to 50 %. Please make sure to check your fuel status at the beginning of each flight and service the aircraft when necessary. Refer to "**20 Series Fuel System**" in section 6, page 21, and to "**Flight Planning**" in section 7, for more details.

The batteries are overheating. Why?

Like in the real aircraft, do not turn on the battery switches [8-9, fig. 5-30] when the batteries are fully charged, and the GPU (or the generators) are operating to prevent the Ni-Cd batteries from overheating. **In the real aircraft, this may cause a fire!**

Where's the parabrake (parachute)?

Although a parabrake (parachute) was installed in some early 20 Series aircraft, your GLJ Model 25 addon doesn't have one. You may use the thrust reversers and the spoilers instead of the parabrake for deceleration.

Ice effects on the windshield, windows and aircraft structures are not visible. Have I forgot something?

In MSFS, visual ice effects on the exterior model are disabled by default. To enable visual (or physical) ice effects, go to "MSFS > Options > Assistance Options > Failure and Damage > **Icing Effect**" and set "Icing Effect" to **ON** or **VISUAL ONLY**. Refer to the description on the "Assistance Options" page for more information.

Why are the ice effects not displayed properly?

Due to serious limitations for the display of ice effects on the windshield, windows and aircraft structures in MSFS 2020, it was not possible to separate specific ice effects from the combined effects that cover the entire exterior model and/or the windshield and windows. For example, it was not possible to separate the ice on the left windshield from the ice on the right windshield, or the ice from the left engine nacelle from the ice on the right engine nacelle (like in our Prepar3D version). This has no impact on the simulation or on the physical effects of the accumulation of ice on the aircraft structures if enabled in MSFS. Almost all anti-ice subsystems from the real aircraft are simulated.

There was no autothrottle in the real aircraft. Why is an autothrottle provided with the GLJ Model 25 addon?

The real Gates Learjet 20 Series aircraft were not equipped with an autothrottle for the autopilot Speed Hold mode (SPD), even though we are giving our users the option to use the autothrottle that is available in MSFS. We know purists may find this feature unrealistic in the case of the Learjet 25 (see note below), but the vast majority of our users still appreciate the convenience of an autothrottle, especially when learning how to fly the aircraft when there is so much to do.

Note: *In some of the real Learjet aircraft, the autopilot maintained speed by varying the aircraft's pitch. The "Speed Hold by Pitch" mode is not natively supported in MSFS and was not available in most Learjet 20 Series aircraft.*

All lights and annunciators are extinguished. How do I fix this?

If the aircraft is powered (DC), make sure all light dimmers are not turned fully counterclockwise or off. This includes the Annunciator Test Button and Dimmer located under the glareshield [31, fig. 5-32a/b].

I experienced low frame rate while flying the GLJ Model 25 addon. Is this normal?

Yes and no. Frame rate may vary depending on your hardware and several factors such as your graphics options, the complexity of the scene (especially with add-on sceneries), installed third-party addons, multiplayer mode, etc. For example, it is normal for the frame rate to drop over high-density sceneries such as large cities and/or airports (with any aircraft). Also, it is usually normal for external camera views to cause a slightly lower frame rate because they show not only the exterior (aircraft) model, but also some parts from the interior model such as seats, pilots, cabin lights, instrument panels, etc.

The GLJ Model 25 addon is a complex aircraft simulator (not a toy). It cannot be compared to some third-party addons with limited functionalities and systems, low resolution textures and 3D models, or equipped with a single glass cockpit.

The custom aircraft systems that were developed for this addon are responsible for thousands of calculations at each computer cycle. These systems, combined with high-resolution models, 4096x4096 PBR textures, hundreds of cockpit animations, third-party software (if installed), and some of the visual and sound effects, may affect your frame rate on slower processors and graphics cards, depending on your simulation platform's configuration and settings.

It is always a dilemma for developers (and users) to manage quality and detail vs performance. For our part, we've decided to invest in detail, quality, systems, and features, as we expect computer systems to evolve and to become more powerful in the future.

We also invested in performance. Your GLJ Model 25 addon comes with seven (7) optimized levels of details (LODs) for the exterior model, and eight (8) levels of details for the interior model to improve overall performance in multiplayer and AI modes notably. LODs are a series of 3D models with different "triangle" (polygon) counts that allow MSFS to optimize the geometry and materials used by the aircraft based on how far away from the camera it is being viewed to keep an optimal framerate when playing in real time.

We encourage you to tweak your simulator's settings to improve performance. You can try moving the cursors to their middle position to see if it makes a difference. Combining aggressive settings with a next generation addon such as our GLJ Model 25 may affect performance, depending on your system.

Adjust your simulation platform's display, world, traffic and weather options to fix most performance issues or upgrade your computer with a better CPU, more memory and a high-end graphics card.

The graphics card is often the weakest component of any given system. Unless you own one of the latest generation high-end graphics cards, we suggest setting your frame rate limit to the recommended **"50 % OF THE MONITOR REFRESH RATE"** ("MSFS > Options > General Options > Graphics tab > **Frame Rate Limit**"). 30-60 fps, depending on your monitor settings, is usually enough for flight simulation and should improve performance on slower systems.

We do not recommend flying the GLJ Model 25 addon in MSFS if your computer does not meet the minimum system requirements recommended by Microsoft. More recent gaming computers that are especially designed for running complex 3D games have the necessary processing power, motherboard, graphics hardware, RAM, and data storage, to handle the most advanced simulation platforms such as MSFS.

Refer to the documentation included with your simulation platform for more information about minimum system requirements and how to optimize your settings for the best overall performance.

Remember that third-party addons such as complex gauges, navigation systems, radars, sceneries, and airports may affect performance and frame rate. Use moderation when adding components to your simulation platform and refer to the documentation included with your third-party addons for optimal installation and settings.

Refer to section 2, page 9, for additional information about how to optimize your system for this addon.

TROUBLESHOOTING

I have several installation, display and performance issues with my new GLJ Model 25 addon. Could you help me troubleshooting my problems?

Because there are as many computers as they are users, it is impossible to recommend unique settings that would fit all systems and configurations. However, as a rule of thumb, if Microsoft Flight Simulator is running properly on your computer, and assuming that your computer meets the minimum system requirements or better (see section 2, page 1), you should be able to fly the GLJ Model 25 add-on aircraft without major issues.

If however you are experiencing issues with your new GLJ Model 25 addon, please review the answers provided in the previous pages and the information contained in section 2 and in appendix 6. If you still cannot solve your issue(s) after reading the manual and the present FAQ section, please consider the followings:

1. **Is the GLJ Model 25 addon for MSFS 2020 compatible with your simulation platform?** The GLJ Model 25 addon for MSFS 2020 is compatible with MSFS 2020/24 (or later*) only. It will not work with previous versions of Flight Simulator (FSX, FS2004, etc.). It will not work with Lockheed Martin Prepar3D (all versions).

   **: New addon versions may become available for future versions of MSFS.*

2. **Did you install the correct version of the GLJ Model 25 addon for your version of MSFS?** When downloading your addon from our website, make sure you have selected the correct addon version for your version of MSFS*.

   **: New addon versions may become available for future versions of MSFS.*

3. **Is MSFS running smoothly on your system?** If not, this might be a simulator issue (or a computer issue, see below). You may have to reinstall the simulator if necessary.

4. **Is your simulator up to date?** Make sure the latest updates for your version of MSFS are installed.

5. **Is the GLJ Model 25 addon the only addon aircraft installed on your computer that is causing the issue(s)?** If not, the GLJ Model 25 addon is not causing the issue(s).

6. **Do you have the latest iteration of the GLJ Model 25 addon?** Please visit our website to check for patches and updates for your addon.

7. **Is your version of DirectX compatible with your simulation platform and graphics card?** DirectX 12 support in

MSFS 2020 was still under development at the time of this writing. Refer to the MSFS website for minimum system requirements.

8. **Are you able to see the GLJ Model 25 aircraft in the Hangar?** You may visit the Hangar for a rapid check of your new GLJ Model 25 addon and all of its available liveries ("MSFS > Welcome Screen > Profile > **My Hangar**"). When in the hangar, click **CHANGE AIRCRAFT** ("**F11**") to select the Gates Learjet Model 25 Classic SE aircraft. You may select your preferred livery by clicking **LIVERIES** ("**F12**"). The GLJ Model 25 addon consists of 14 different variations (liveries) of the Gates Learjet Model 25D business jet (see section 2, page 5). If you don't see the aircraft, the addon has not been installed properly and you may have to reinstall it. Refer to section 2 and follow the instructions carefully to reinstall your addon if necessary.

9. **Can you power up the aircraft? Can you start the engines?** If not, the addon is not installed properly. You will need to reinstall your addon with the proper credentials and a valid activation key. Make sure you are using the same email address that appears on your original receipt. Refer to section 2 and follow the instructions carefully to reinstall your addon.

10. **Are your third-party addons (navigation systems, GPS/GNS, radar - if installed) fully compatible with your version of MSFS?** Please be aware that some third-party addons may not be fully compatible with the latest versions of MSFS or might interfere with other aircraft systems installed in the GLJ Model 25 addon, like the autopilot. In doubt, please contact the developer for support. *Xtreme Prototypes is not responsible for changes in third-party software that would prevent the GLJ Model 25 add-on aircraft or the third-party software from performing or being used, including the discontinuation of such third-party software.* ***Xtreme Prototypes cannot provide technical assistance for third-party add-on software. Please contact the developer for support.***

11. **Did you make changes to the GLJ Model 25 add-on aircraft package?** Be careful when making changes to the add-on aircraft package for the purpose of customizing your addon. If this is not done correctly, your GLJ Model 25 add-on aircraft (or third-party add-on software) may not work properly. We do not recommend customizing your addon unless you know what you are doing. It is always good practice to back up your files before making any change to the aircraft's model behavior templates and configuration files. Should anything go wrong, simply revert to your backups and start over. Please refer to appendix 2 for a complete discussion about customizing your addon. ***Xtreme Prototypes cannot support addons that have been modified and cannot provide technical assistance in customizing your GLJ Model 25 addon.***

12. **Did you install the latest updates for your Windows operating system?** Make sure your Windows operating system is up to date.

13. **Did you install the latest driver for your graphics card?** Many times, it solves display issues.

14. **Did you try tweaking the different parameters and options that are available in MSFS?** If you experience low frame rate, try different display/graphics parameters. Moderate traffic, weather and scenery settings may also improve your system performance. Refer to section 2.

15. **Are other graphic-intensive programs running on your computer when flying your addon?** Make sure your simulation platform is the only graphic-intensive program running on your computer when flying your addon. This could greatly affect performance.

16. **Is your antivirus program scanning your system when flying your addon?** Make sure your antivirus program is not scanning your system while flying your addon. This could also affect performance.

17. **Do you suspect the GLJ Model 25 addon package you downloaded from our website of being corrupt?** In doubt, please login to your user account on our website,

download the latest version of the software, and reinstall the addon. Refer to section 2.

18. **Do you have the minimum system requirements to run the software?** You may need a new computer or graphics card. Refer to “**Minimum System Requirements**” in section 2, page 1.

If you are still unable to solve your issue(s), please contact us for technical support:

https://xtremeprototypes.com/shopcustcontactsupport.asp

Make sure all the required fields in the form are filled out properly and provide us with as much information as possible about your technical issue(s).

Please note that we do not answer support requests and inquiries via Facebook, social media, or flight simulation forums.

TECHNICAL SUPPORT AND CONTACT INFORMATION

I have another question about my GLJ Model 25 addon. Can I contact you?

Yes. We’ll try our best to answer you the same day or within two business days.

For sales support or general inquiries:

If you need support related to your online purchase or simply want to send us a message, please use our general contact form:

https://xtremeprototypes.com/shopcustcontact.asp

For technical support:

If you need technical support for your addon beyond what is available in the present manual, please fill out our technical support request form:

https://xtremeprototypes.com/shopcustcontactsupport.asp

Make sure all the required fields in the form are filled out correctly and provide us with as much information as possible about your technical issue(s).

We offer free, personalized technical support in **English** or **French** via email to **registered users only**.

Please note that we do not answer support requests and inquiries via Facebook, social media, or flight simulation forums.

How do I get product patches and updates?

When available, patches and updates for your Xtreme Prototypes addons are listed at the bottom of each product page on our website. To download these files, please login to your user account and review your previous orders.

I’m a real-world Learjet pilot and I have some ideas about improving the GLJ Model 25 addon. May I contact you?

Yes. We’ll be most happy to hear from you. Please use our general contact form:

https://xtremeprototypes.com/shopcustcontact.asp

I was involved in the development of the real Lear Jet/Gates Learjet 20 Series aircraft during the 1960s/70s/80s, and I would be interested in helping you with your future projects. May I contact you?

Yes. It will be an honor to hear from you. Please use our general contact form:

https://xtremeprototypes.com/shopcustcontact.asp

We Need Your Feedback!

Our products are designed to evolve with time, according to the feedback we receive from our users. Please let us know your comments, ideas and suggestions and feel free **to** report any bug or other issue you may encounter while installing or operating your new addon. **Thank you for helping us create better products!**

KNOWN ISSUES

APPENDIX 6

As is common with most computer software, particularly addons to third-party platforms over which independent developers have limited control, a few **known issues** persist in the current version of the GLJ Model 25 addon for Microsoft Flight Simulator 2020.

Some of these issues are **related to the simulator**, in which case there is little that can be done from our side, except proposing a workaround and expecting a fix from the platform developer. Other issues are **related to the addon** itself, in which case we are working hard to get them resolved.

The Xtreme Prototypes GLJ Model 25 for MSFS 2020 is our first project for this new platform for which there were many fixes and updates by Microsoft/Asobo since 2020, not mentioning the release of MSFS 2024 a few months ago with its own list of updates. We do not pretend our software to be 100 % bug free, although we tried our best to resolve most issues that were encountered during development and the beta testing phase.

The current software version is a **native** MSFS add-on aircraft that was developed and tested for **MSFS 2020**. At the time of this writing, we have not thoroughly tested the aircraft in MSFS 2024, and some issues might not yet have been reported by our testers.

We always appreciate **constructive feedback** from our users, especially after the launch of new products. Please don't hesitate to report any bug or other issue you may encounter while installing or flying our GLJ Model 25 addon for MSFS 2020 in either MSFS 2020 or 2024.

The present manual is **completely revised** version of our Gates Learjet Model 25 Flight Manual, fully updated for Microsoft Flight Simulator 2020*. As with any first edition, errors may have crept in and escaped our notice despite our rigorous review process. Please feel free to report any errors or omissions while browsing the manual.

**: A manual update will be available for MSFS 2024 at a later date.*

To report bugs, errors or other technical issues, please fill out our technical support request form:

https://xtremeprototypes.com/shopcustcontactsupport.asp

Make sure all the required fields in the form are filled out correctly and provide us with as much information as possible about your technical issue(s).

We offer free, personalized technical support in **English** or **French** via email to **registered users only**.

Please note that we do not answer support requests and inquiries via Facebook, social media, or flight simulation forums.

Thank you for helping us create better products!

Because there are as many computer systems as they are users, **you may or may not** experience the following issues depending on:

- Your computer and graphics hardware (including drivers and settings)
- Your operating system (including updates and settings)
- Your version of DirectX
- Your version of MSFS (including updates (and settings)
- Your GLJ Model 25 addon version (including patches and updates, if any)
- Your third-party addons, software, systems, gauges, sceneries, airports (if installed)

As more issues are reported by users, they will be added to this appendix, along with their solutions and/or workarounds. **Our manuals are updated regularly, please make sure you have the latest revision.**

Fire extinguishing can be performed only once during a flight

This is how the fire extinguishers work in MSFS. The two-bottle fire-extinguishing system is common to both engines. Either of two bottles of extinguishing agent can be discharged to either engine, or both bottles can be discharged to the same engine. The flight needs to be reset, or a new flight initiated for the simulator's extinguishers (bottles) to recharge.

After loading a saved flight, several switches are not in the same state they were in when the flight was saved

Unfortunately, this is normal and is due to some limitations in the simulation platforms.

Our Learjet 20 Series addons are complex aircraft simulators with many custom systems, switches and controls that are not currently supported in the simulator and that you won't find in the stock aircraft (for example: the Inverter Switches [10, 12, fig. 5-29] or the 3-position Starter/Generator Switches [6, 11, fig. 5-30]). These custom systems use their own sets of proprietary variables and commands.

Currently, some but not all custom local variables are kept by the simulator when a flight is saved. This explains why some of the switches may need to be reset manually after loading a saved flight.

A solution would be to limit ourselves to the basic aircraft systems that are natively supported by the simulator and to stop implementing custom systems in our Learjet addons at the price of realism. We believe our fans would prefer to keep the Learjet custom systems intact even if it means resetting a few switches manually after loading a saved flight.

The flight director behaves erratically

On some occasions, it might be necessary to reset the flight director if the V-bars are not responding properly (sometimes after the autopilot has been turned on and off). If you suspect that the flight director is not giving you the correct indications, simply reset the flight director by turning the Flight Director Power Switch [2, fig. 5-22a] to **OFF**, then back to **ON** again. We don't know what is causing this uncommon issue.

The fuel tanks are empty or half full at the beginning of a new flight

We always take for granted that all tanks are full before starting a new flight. However, the simulator might have decided otherwise and set the total fuel quantity to 50 %. Please make sure to check your fuel status at the beginning of each flight and service the aircraft when necessary. Refer to “**20 Series Fuel System**” in section 6, pages 21-31, and to “**Flight Planning**” in section 7, for more details.

Tooltips won’t show

In “MSFS > Options > General Options > **Accessibility** tab”), set both “Instrument Name Tooltips” and “Instrument Description Tooltips” to **INSTANT**. This is to make sure that the instrument tooltips in the cockpit are fully displayed. These settings are very useful for cockpit familiarization and may be disabled (set to **OFF**) later when you have more experience as a Gates Learjet 25 desktop pilot. See section 2, pages 10-11.

Tooltips are limited to English or French only

Advanced MSFS tooltips, localized in English or French, are provided for each interactive object in the interior model, and can be used for cockpit familiarization.

At this time, tooltips are displayed only in English or French, depending on your preferred language (“MSFS > Options > General Options > **Misc** tab > **Language**” set to **EN-US** or **FR-FR**).

More languages may be added in future updates. It is also possible to create your own captions for the tooltips. Please refer to appendix 2, page 10 for details.

Nose wheel steering seems not to work all the time when taxiing

In MSFS, nose wheel steering when taxiing is initiated automatically, and at slower speeds only, whether it is engaged by the pilot manually or not. Nose wheel steering will not work above a certain speed. Because this is controlled by the simulator, there is very little we can do about it until more options to control nose wheel steering at any speed become available. When taxiing, you will need to reduce speed to initiate nose wheel steering (under about 45 knots). Above that speed, the nose gear will lock. To add a touch of realism, we have disabled the rudder animation when nose wheel steering is engaged by the pilot.

The Directional Gyro Free/Slave Switch has no special function

This is due to the method of selecting free and slave modes in MSFS which is done by external settings. In “MSFS > Options > Assistance Options > **Aircraft Systems** pull-down menu”), you may set “Gyro Drift” to **OFF** or **ON**. If set to ON, you will be required to make manual gyro drift corrections in areas where magnetic references are not reliable.

Therefore, the Directional Gyro Free/Slave Switch has no special function in this software version, except to disengage the autopilot when clicked. In a future release we want to be able to link the switch position to the simulator settings.

By default, the direction indicators (HSI, RMI, directional gyro, etc.) in the cockpit of the GLJ Model 25 addon are configured to be slaved to an electro-magnetic slaved compass. This mode of operation normally requires no gyro drift correction on the part of the pilot and is used in areas where magnetic references are reliable. When this mode of operation is selected (Directional Gyro Free/Slave Switch [9, fig. 5-5] set to **SLAVE)**, it is still possible to make manual corrections by using the Gyro Drift Compensation Switch or the Directional Gyro Compensation Knob. In the real aircraft, this would only be possible when the switch is set to **FREE**.

In the real aircraft: *The directional gyroscope in the real aircraft can operate in two modes: the SLAVE mode and the FREE mode. When the Directional Gyro Free/Slave Switch is set to SLAVE, the directional gyro is slaved to the magnetic flux valve for correcting the apparent gyro drift. When the switch is set to FREE, the pilot is free to make manual corrections with the Gyro Drift Compensation Switch (or the Directional Gyro Compensation Knob). The SLAVE position is the normal mode of operation in areas where magnetic references are reliable.*

Engines won’t start when the fuel valves open and the throttles are released

Releasing the throttles with the Throttle Release Levers [2, 4, fig. 5-43] opens the fuel valves, like in the real aircraft. During the engine startup cycle, when the fuel valves open and the fuel gets in contact with the igniters, the engines should start.

In MSFS however (like in FSX and Prepar3D), if the **fuel mixture** is not rich enough, the engines won't start. In the real world, jet engines don't require fuel mixture adjustments like piston engines. Unfortunately, the simulator seems to make no distinction and mixture control is available even for jet engines.

Make sure the fuel mixture is set to "**rich**" before starting the engines (by default, "**SHIFT+CTRL+.**" on your keyboard - shortcut may vary depending on your MSFS settings). You can also use the mixture lever on your physical throttle quadrant or controller, if available.

In this software version, we have programmed the Throttle Release Levers [2, 4, fig. 5-43] to set the mixture rich before they open the fuel valves when actuated. This should take care of this issue if you are clicking the Throttle Release Levers [2, 4, fig. 5-43] in the virtual cockpit. If you are using buttons on your physical external throttle to release the throttle and open the fuel valves, make sure to program your buttons to (1) make the fuel rich, and (2) to open the fuel valves.

***Note:** You may program your own keyboard shortcut to set the mixture rich in "MSFS > Options > Control Options > Keyboard tab > **Set Mixture Rich**". Setting the automixture to **ON** in "MSFS > Options > Aircraft Systems > **Automixture**" seems to have no effect.*

Third-party addons won't show in the virtual cockpit (no display)

Make sure that your navigation systems and radar are powered up. GPS/GNS systems need **DC** and/or **avionics power**, and the radar needs **AC power** (inverters **ON**).

Make sure the Main Battery Switches [8-9, fig. 5-30] (or the Generator Switches [6, 11, fig. 5-30]) are **ON**, the Inverter Switches [10, 12, fig. 5-29] are **ON** and the Radio Master Switch (avionics) [14, fig. 5-29] is **ON**.

Refer to appendix 2 for more information about adding third-party addons to the cockpit of the GLJ Model 25 add-on aircraft.

Ice effects on the windshield, windows and aircraft structures are not visible

In MSFS, visual ice effects on the exterior model are disabled by default. To enable visual (or physical) ice effects, go to "MSFS > Options > Assistance Options > Failure and Damage > **Icing Effect**" and set "Icing Effect" to **ON** or **VISUAL ONLY**. Refer to the description on the "Assistance Options" page for more information.

Ice effects are not displayed properly

Due to serious limitations for the display of ice effects on the windshield, windows and aircraft structures in MSFS 2020, it was not possible to separate specific ice effects from the combined effects that cover the entire exterior model and/or the windshield and windows. For example, it was not possible to separate the ice on the left windshield from the ice on the right windshield, or the ice from the left engine nacelle from the ice on the right engine nacelle (like in our Prepar3D version). This has no impact on the simulation or on the physical effects of the accumulation of ice on the aircraft structures if enabled in MSFS. Almost all anti-ice subsystems from the real aircraft are simulated.

Tail numbers on the exterior model cannot be changed

The tail numbers are painted on the PBR textures that are mapped to the exterior 3D model and cannot be changed.

***Note:** Future updates may incorporate new liveries that include customizable tail numbers.*

The tail number on the white label [6, fig. 5-15] located under the Anti-Skid Generator Lights on the captain's instrument panel can be changed in the aircraft customization page of the World Map ("MSFS > Welcome Screen > World Map > Aircraft Icon (Top Left Corner) > Customization > **Tail Number**").

***Note:** We do not recommend changing the tail number by editing the "aircraft.cfg" file in the add-on aircraft package. The numbers painted on the variations of the GLJ Model 25 addon are fictitious. Any match with actual tail numbers is a pure coincidence. See appendix 7.*

My third-party navigation system changes the behavior of some autopilot modes

Please be aware that some third-party navigation systems (GPS/GNS) may interfere with the basic MSFS 2020 autopilot that is used in the GLJ Model 25 add-on aircraft and change the behavior of some of the autopilot modes. In some cases, modifications to the autopilot "model behaviors" might be required. In doubt, refer to the documentation included with your third-party navigation system and/or contact the developer for more information. **Xtreme Prototypes cannot provide technical assistance for third-party addons.**

Note: *The GNS 530 physical 3D model in the virtual cockpit is preprogrammed for the default GNS 530 that comes with MSFS. Optional navigation systems are* ***not included*** *and must be purchased separately from third-party vendors/developers. Some third-party navigation systems may not be compatible with the latest versions of MSFS.* ***Please contact the developer for support.***

The radar is not working

This is **not an issue** but it is worth mentioning.

The radar requires AC power, usually: Battery Switches [8-9, fig. 5-30] **ON** or Engine Generator Switch [6, 11, fig 5-30] **GEN**, and either Inverter Switch [10, 12, fig 5-29] **ON**).

By default, the unit will show a dummy radar screen when no third-party radar software is installed. Radar software is **not included** and must be purchased from third-party vendors/developers.

As we have done in the past for our FSX and Prepar3D versions, we have programmed the radar physical 3D model in such a way that all screens, lights, buttons, and knobs can be configured to work with almost any MSFS-compatible third-party radar add-on software that may become available in the future.

Refer to appendix 2 if you want to modify the default configuration and add a third-party radar when available.

Note: *Future updates and/or versions of our GLJ Model 25 addon may propose other solutions as new navigation systems and radars are being developed by Microsoft/Asobo, third parties, and Xtreme Prototypes as well.*

Radio frequencies cannot be tuned manually

This is not an issue as such but is worth mentioning since it is related to a configuration parameter that is usually set by default in the simulator.

Radio frequencies can be tuned manually by the pilot or they can be tuned automatically by the simulator. To change this setting, go to "MSFS > Options > Assistance Options > Piloting pull-down menu > AI Radio Communications (ATC)". Set it to ON for automatic tuning based on your flight plan, or OFF for manual selection. By default, this feature seems to be set to ON in MSFS 2020.

Cabin tables and seats cannot be moved, like in our Prepar3D versions

Cabin tables, seats, cabinet doors, curtains, and window shades cannot be moved in this software version for MSFS, like in our Prepar3D versions. MSFS imposes stringent limitations on the complexity of aircraft models, which include constraints on the number of polygons, materials, textures, animations, and other assets for performance reasons. Consequently, we made the decision not to animate these items and to remove a few non essential props from the cabin, allowing us to conserve valuable polygons and materials for other critical features. The only animated objects in the cabin are the main exit doors, light switches and buttons, and the refrigerator door.

The engine throttles can be moved even when they are supposed to be locked

In the real aircraft, the Engine Throttles and Subthrottles [1, 3, 7, 17, fig. 5-43] cannot be moved when they are locked (**CUTOFF** position, release levers [2,4, fig. 5-43] **down**). However, due to current limitations in the simulator, they can still move in this addon version. We are currently working on a fix/workaround for a future update.

No custom GPU

The GLJ Model 25 addon for MSFS uses the basic ground power units that are already available in the simulator. There is no Xtreme Prototypes custom GPU model in this software version, compared to our Prepar3D versions. The GPU is available when the aircraft is parked in selected areas of most airports. To call for a GPU in the simulator, use the default keyboard shortcuts "**SHIFT+Q**" or "**SHIFT+W**" (or the **ATC** window). You can assign other keyboard shortcuts as well in the simulator's settings.

MSFS Virtual File System window not visible, impossible to open the Community Folder (Developer Mode)

When in Developer Mode, if the Virtual File System window ("MSFS > Devmode Top Menu Bar > Tools > **Virtual File System**") does not show because it is off screen, simply reset the windows layout to the default layout ("MSFS > Devmode Top Menu Bar > Options > Layouts > **Load Default Layout**"). See section 2, page 4.

Custom music tracks cannot be played with the 8-track tape player installed in the virtual cockpit

It is not possible to play your own music with the Lear Jet Stereo JetStar 8 player at this time, like in our Prepar3D versions. We are working hard to make this feature available in a future version.

Music from the 8-track tape player can still be heard when in an outside camera view

To maintain momentum and continuity when switching from the cockpit to an external camera view, music from the JetStar 8 player can still be heard when in an external view. Volume, balance and tone controls are provided on the player to adjust the audio to your preferences [3, 6, 7, fig. 5-48].

The "pitch trim in motion" clicker sounds continuously

This is not an issue as such but is worth mentioning since it is related to a configuration parameter that is usually set by default in the simulator.

The pitch trim clicker sounds in the cockpit whenever the elevator trim is manually adjusted by the pilot or automatically by the simulator's AI when the autopilot is disengaged and the flaps are up. To stop this sound during AI trimming, set AI Auto Trim to **OFF** ("MSFS > Options > Assistance Options > Piloting pull-down menu > AI Auto-Trim > **OFF**"). By default, this feature seems to be set to ON in MSFS 2020.

If you prefer AI Auto Trim to be ON, click the first data card on the GNS 530 model [23, fig. 5-24b] to **disable** the pitch trim clicker.

The keyboard "SHIFT-E" shortcut to open the door does not work

By default, the keyboard shortcut "SHIFT+E" cannot be used for opening or closing the door in MSFS, like in FSX or Prepar3D. This is a simulator issue.

When the door is closed, click the **red handle** [7, fig. 5-54] in the top section of the door to open or close the clamshell door. When the door is open, click either **handle of the retaining metal cables** [2, fig. 5-54] to close the door.

From the cockpit, it is also possible to open/close the door by clicking the **DOOR annunciator** [10, fig. 5-32a] located on the glareshield.

No interactive hotspots on the exterior model, like in Prepar3D

Interactive "hotspots" on the exterior model are not available in our GLJ Model 25 addon for MSFS 2020 compared to our Prepar3D versions. For example, it is not possible to open the aircraft door by clicking the door handle on the exterior model. This is due to software limitations in MSFS 2020.

The "Remove Before Flight" items are not always be visible when the aircraft is parked in the hangar or outside, in a parking place

We have programmed the "Remove Before Flight" items for them to be installed automatically when the aircraft is parked in the hangar or in a parking space (apron) at the beginning of a flight ("Cold and Dark" state). For an unknown reason, they don't show all the time after the flight is loaded. This seems to be a simulator issue in MSFS 2020. We don't know what else might be causing this issue.

Note: *We've set the custom variable "RemoveBeforeFlightItemsInstalled" to 1 in the [LocalVars.0] section of the preset "hangar.flt" and "apron.flt" files, located in the main aircraft folder. Normally, the items should be installed at the beginning of a flight when the aircraft is parked in the hangar or in a parking place.*

The cockpit and cabin ceiling lights (cabin lights) remain ON after testing the emergency lighting system

The aircraft is equipped with an emergency lighting system connected to its own battery located under the captain's seat. The system will turn on the cockpit and cabin ceiling lights in case of emergency. Controls for the emergency lighting system are located on the center console [8-9, fig. 5-47]. In this software version, it is necessary to turn off the ceiling lights manually (with its own dimmer [14, fig. 5-49]) after testing the emergency lighting system. We are working on a fix for a future update.

The cockpit and cabin use invisible "collision meshes" that may prevent free camera movements in the interior model

The cockpit and cabin use "collision meshes" (a recommended feature in MSFS) to prevent the camera from moving outside the interior model or to move through objects such as walls and seats. These invisible "walls" may prevent you from moving freely inside the cockpit and cabin. You can use the keyboard's arrow keys with the mouse to move your way around these obstacles from a first-person perspective. Depending on your MSFS configuration, you may also use the mouse wheel to zoom in or out. In MSFS, it is even sometimes possible to click objects through other objects (an old simulator issue). Please note that collision meshes are not an absolute science in MSFS and that because of their inaccuracy, there may be places in the cockpit where some depth issues appear.

Default MSFS pilots cannot be selected

The GLJ Model 25 addon uses its own custom pilot character figures. Pilot selection from the MSFS settings is disabled in this software version. Other options may become available in future versions.

There is no checklist when clicking the Checklist icon in the top section of the screen

There is no "electronic" checklist included with this software version. A MSFS-type electronic checklist is currently under development and may become available in future versions and/or updates. Please refer to sections 8 and 9 for complete procedures and checklists.

The pressurization system's manual mode of operation does not work

The manual mode of operation for pressurizing the aircraft is not available in MSFS. The cabin controller always maintains the desired rate of climb or descent automatically, until the selected cabin altitude is attained.

Red spots from the special ice-detection lights are not always visible on the windshield

At night, red spots from special ice-detection lights located on top of the glareshield should become visible on the inside of both the captain's and copilot's windshields. These lights continuously shine on the windshield's interior and are generally unnoticeable during the day or at night when no ice is accumulating. The lights are always turned on when the aircraft is powered.

Unfortunately, the red-light reflection on the windshield is very subtle and varies based on lighting, viewing angle, and ice accumulation. The red spots may not always be visible. This is due in part to the MSFS special "windshield" material that must be used for windshields and windows.

Crossflow replaced by Crossfeed

In the real aircraft, the Crossflow Switch [3, fig. 5-45] controls the crossflow valve allowing fuel to flow between the wing tanks. In the GLJ Model 25 addon, this switch controls the crossfeed valves which allow fuel from one wing tank to feed the opposite engine or both engines by "isolating" the other wing tank.

The Crossflow (crossfeed) Switch cannot be used to transfer fuel from one wing tank into the other in this software version, like in the real aircraft. This feature may become available in a future version.

See section 6, pages 26-28, for more information about cross-feeding fuel.

Thrust reverser controls are limited

Because of current limitations in the simulator, thrust reverser controls have limited functionalities in this software version. In MSFS, thrust reversers can be deployed by pressing the "**F2**" key when the throttles are set to IDLE, and the aircraft is on the ground. When deployed, thrust can be reduced by pressing the "**F3**" key. Pressing the "**F1**" key will return both throttles and thrust reverser subthrottles to **IDLE**, under certain conditions. In the simulator, thrust reversers are always armed when the aircraft is on the ground. In the GLJ Model 25 addon, reverse thrust is limited to **85%** RPM, like in the real aircraft.

The "Speed Hold by Pitch" autopilot mode is not available

In some of the real Learjet aircraft, the autopilot maintained speed by varying the aircraft's pitch. The "Speed Hold by Pitch" mode is not natively supported in MSFS and was not available in most Learjet 20 Series aircraft.

The Speed Hold mode (SPD) included with the GLJ Model 25 addon maintains the aircraft at the indicated airspeed that existed when the SPD switch [12, fig. 5-22a] was depressed. The SPD Switch must be used at altitudes below 29,000 feet. Like in the real aircraft, above 29,000 feet, the autopilot will automatically switch to the Mach Hold mode.

In MSFS, the SPD/Mach Hold functions are always assumed by the autothrottle.

***Note:** The real Gates Learjet 20 Series aircraft were not equipped with an autothrottle for the autopilot Speed Hold mode (SPD), even though we are giving our users the option to use the autothrottle that is available in MSFS. We know purists may find this feature unrealistic in the case of the Learjet 25, but the vast majority of our users still appreciate the convenience of an autothrottle, especially when learning how to fly the aircraft when there is so much to do.*

The "STAB HEAT" annunciator always remain OFF

Power failure of the leading-edge element of the stabilizer heating blanket is not simulated in this software version. The amber STAB HEAT annunciator [13, fig. 5-32a] should remain off.

Failure of the windshield heating system low limit thermoswitch is not simulated

In the real aircraft, if the low limit thermoswitch fails, the temperature may rise above 250°F to trigger the high limit thermoswitch and close the pressure-regulator valve. This is not simulated in the GLJ Model 25 addon in this software version (the low limit thermoswitch never fails).

Both wingtip tanks are not emptied simultaneously (fuel jettison system)

Due to some limitations in MSFS, fuel will first be jettisoned from the left wingtip tank, then from the right wingtip tank. The pilot will need to compensate for the fuel imbalance until both tanks are emptied.

In the real aircraft, both wingtip tanks are emptied simultaneously. It takes about five minutes to empty both wingtip tanks. Very few Learjet 25D are equipped with a fuel jettison system because fuel is burned so quickly on this type of aircraft that fuel jettisoning is almost never required.

Autopilot modes differ from the real aircraft

This is intentional. The GLJ Model 25 addon is equipped with a modified J.E.T. FC-110 autopilot and a modified Collins FD-108 Integrated Flight System (flight director). Both units have been modified from the ones installed in the real aircraft because of software limitations in MSFS, but also for the desktop pilot to benefit from additional AP/FD modes that are available in the simulator, but not available in the real aircraft.

Refer to the comparison table in section 6, pages 46-49, for details.

The GLJ Model 25 addon uses the native autopilot and flight director that come with MSFS.

While we have modified some of the logic that governs the interrelations between the different AP/FD modes of operation to make these systems comparable to the ones installed in the real aircraft, there are still some differences that persist. This is for the most part due to how the autopilot works in the simulator. Because of software limitations in MSFS, the new logic only applies to the AP/FD switches, buttons, and knobs in the virtual cockpit. The new logic won't apply to the simulator's keyboard shortcuts that have their own built-in logic.

If you prefer a mode of operation that is closer to the one with the real aircraft, we suggest that you use the controls in the virtual cockpit and not the keyboard shortcuts. If you prefer the default AP/FD logic from the simulator, you can use the keyboard shortcuts.

Please be aware that some third-party navigation systems (GPS/GNS) may interfere with the basic MSFS 2020 autopilot that is used in the GLJ Model 25 add-on aircraft and change the behavior of some of the autopilot modes. In some cases, modifications to the autopilot "model behaviors" might be required. In doubt, refer to the documentation included with your third-party navigation system and/or contact the developer for more information. **Xtreme Prototypes cannot provide technical assistance for third-party addons.**

Ground crew, fuel trucks, GPUs and other ground vehicles colliding with aircraft during ground operations

The GLJ Model 25 addon incorporates a special mesh known as an "occluder" within the aircraft interior model. This invisible mesh serves the purpose of preventing environmental effects and objects, such as rain, snow, trees, bushes, and grass, from being visible inside the cockpit.

At the time of this writing, however, "occluders" (or "collision meshes") are not supported for the aircraft exterior model in MSFS 2020. This limitation may result in ground vehicles and human characters occasionally colliding with the aircraft during ground operations and taxiing.

We expect this simulator issue, common to all aircraft, to be fixed eventually.

Exterior lights, mainly from ground vehicles, shine into the aircraft's cabin and cockpit

This long-standing issue in Microsoft Flight Simulator (and Prepar3D) persists in MSFS 2020. Lights from ground vehicles and other sources can pass through walls, floors, ceilings, and other obstacles in the aircraft's 3D model, entering the cockpit and cabin.

We expect this simulator issue to be fixed eventually.

The stick nudger/puller not always working correctly under certain conditions

It has been observed that with some physical joysticks or yokes, the stick nudger/puller does not move the control column in the cockpit if the stick is set to its neutral/center position. If the stick is not set to neutral, the stick nudger/puller operates correctly. The stick nudger/puller is programmed to push or pull the stick in case of a stall or overspeed condition (moving the elevator down or up), regardless of the position of the physical stick or yoke. Efforts are being made to determine the cause of this issue, which does not occur in our FSX or Prepar3D versions.

Some aircraft lights are not displayed properly even though their light beams (effects) are visible

This issue rarely occurs after resyncing the aircraft multiple times when using the aircraft editor in developer mode. We don't know the cause. To resolve this, turn all aircraft lights **ON** and **OFF** a few times using the “**L**” key on your keyboard, or reset the flight.

Yokes and throttles can be moved with their physical counterparts when auto-pilot modes are engaged

This seems to be normal in MSFS 2020 (common to all aircraft).

MSFS 2020 aircraft contrails and other basic special effects used with the GLJ Model 25 addon have a different look in MSFS 2024

This will be fixed in the upcoming native version for MSFS 2024.

AIRCRAFT VARIATIONS *(1 of 2)* APPENDIX 7


(USA Demo)
White, Black, Gray and Red


(AUS)
Gray, White and Black


(BRA)
Green, Yellow and Blue


(CAN)
White, Turquoise and Red


(CHL)
Blue, Gray and Yellow


(DEU)
White, Gray and Turquoise


(FRA)
White, Blue, Red and Gray


(GBR)
White, Blue and Red

AIRCRAFT VARIATIONS *(2 of 2)*

(MEX)
White, Brown and Black

(NASA Research)
White and Blue

(USA)
Black Orange and White

(USA Charter)
Red, White and Blue

(USA)
Red, White, Blue and Gold

(US ARMY)
Green Camo

IMAGE GALLERY

APPENDIX 8

All images are original, untouched production screenshots
captured in Microsoft Flight Simulator 2020.


N25DXP
LEARJET
25


XP GLJ25


25
N25XP
XP GLJ25
N25XP


N25XP
XP GLJ25
JET FUEL ONLY


XA-KZXP


VH-KVXP


N958XP


617
N617XP
FLIGHT RESEARCH CENTER
NASA


N25XP
XP GLJ25


N25XP

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