

# **E-JETS FAMILY**

by X-CRAFTS

# USER MANUAL

**X-CRAFTS**

## DISCLAIMER

The information contained in this **document is for simulation use only**, within the X-Plane flight simulator. This document may not always be up to date with the latest version of the E-Jets Family product. This document is intended for entertainment only, and may not be used in situations involving real-life aircraft, or real-life aviation.

This document may be copied and distributed by X-Crafts customers for entertainment only.

## FMS DOCUMENTATION

All FMS related documentation can be found on our [website](#). We plan to create a separate and detailed FMS manual in a future update. In the meantime, you can learn how to use the FMS by following the [Demo Flight instructions](#) on our website.

On the Demo Flight page, we provide detailed instructions to fully load and edit a flight plan, as well as show you the entire process in a series of videos. We also explain how to use the FMS in conjunction with the EFB, and how to enter the performance data.

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# INTRODUCTION

**Hello and thank you for purchasing one or more of the E-Jets Family products!**

We hope you have as much enjoyment flying your new aircraft as we did creating it and improving it to its latest version.

This manual is applicable to all of the E-Jets Family by X-Crafts products: E170, E175, E190, E195, and Lineage 1000.

## COPYRIGHT

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## TECH SUPPORT

If you need any customer support, please feel free to visit us at:

[www.xcrafts.com/tech-support](http://www.xcrafts.com/tech-support)

# GETTING STARTED

## TUTORIALS & DEMO FLIGHTS

Learning how to fly complex airliners can sometimes be frustrating and time consuming. We have designed a Getting Started page which will make this process fun and quick.

This is the one place where you will find all the Demo flights with simple instructions and videos, detailed FAQs, Tutorials and more. Additionally, we are always here for you in our forums if you need any help getting started.

All can be found here: <https://www.xcrafts.com/ejets-family/getting-started>

## INSTALLATION

To install any of the aircraft or the bundled set(s), simply extract the zipped folder(s) into X-Plane/Aircraft/... in a folder of your choice.

- We suggest that the folder name and path contain no non-unicode characters.
- The folder also must not be a system folder.
- If you have more than one X-Crafts product, you can have them all in one *X-Crafts* sub-folder like this (*X-Plane/aircraft/X-Crafts*).

## ACTIVATION

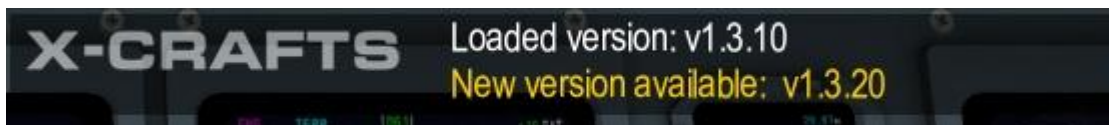
You will need to activate your products before you can use them. Please follow the activation instructions on our website: <https://www.xcrafts.com/activate>



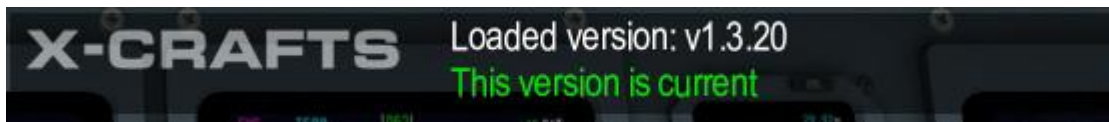
## VERSION CHECKING

- The ERJ Family uses the SkunkCrafts updater to enable pilots to keep their product current. This is covered on our website [www.xcrafts.com/update-download](http://www.xcrafts.com/update-download)
- Every time you load the plane, a pop-up will appear in the lower right corner informing you whether you are using the most up to date version.
- This is done with a very brief check of the online update repository and shares no information of any kind whatsoever.

The pop-up will look like this if an update is available:



The pop-up will look like this if you are up to date:



You will also see other messages if for some reason the version checker runs into issues. This can be anything from a loss of internet connectivity to some kind of local file error in the updater configuration.

This message appears during aircraft initialization and then fades out. You can dismiss it immediately simply by clicking on it. This last bit may be especially useful if you immediately start clicking on things the second you get into the cockpit and the update notification inhibits your mouse focus.

## **VIEWING OPTIONS**

### **FIELD OF VIEW**

Recommended field of view is 70-80 degrees. Change this in X-Plane under Settings > Rendering Options > Special Viewing Options > Lateral field of view

### **QUICK LOOKS**

For ease of viewing different parts of the cockpit, cabin or exterior, you can set a custom Quicklook . The steps are as follows:

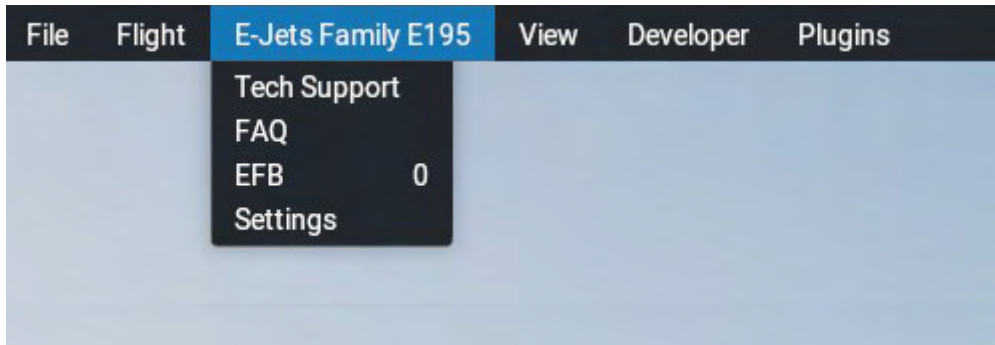
1. In the 3D cockpit view, set the desired view. Or even an exterior view ...
2. Now press Ctrl+ "1" (or any other digit from 0 to 9). The number must be on the number pad on the keyboard.
3. Thus stored, you now can see this view by pressing the "1" (without ctrl) on the number pad.
4. Pressing "1" again, the previous view is restored.
5. These 20 Quick Looks can be tied to different joystick buttons. This can be done as usual in the menu "joystick, keyboard and devices" - "Extra Buttons".
6. The saved views are aircraft specific. They are saved directly in the appropriate directory of the Aircraft, stored as "Aircraft Name\_prefs.txt"

X-Plane offers up to 20 Quick Look's, but you have to assign the storage commands to keys other than the 10 original storage (CTRL + ??) on the number pad.

## PLUGINS & SETTINGS

The product comes with several plugins and settings menus.

### X-PLANE TOP BAR DROP DOWN MENU



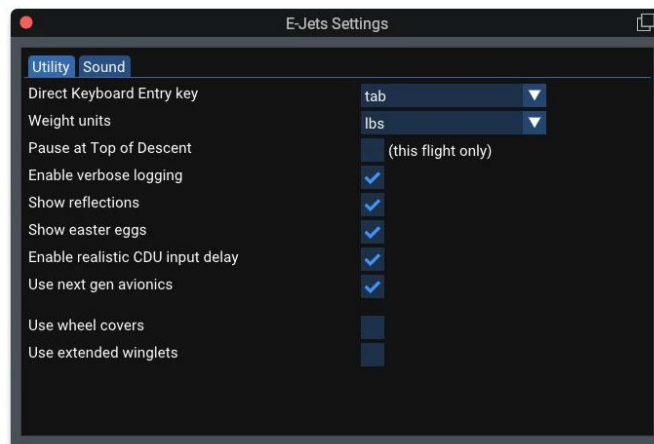
This dropdown menu gives you access to:

- Direct link to our Tech Support
- Direct link to our FAQ page
- Opening the EFB in a pop-up window
- Settings menu to configure your preferences

## SETTINGS MENU

This menu is intended for setting up default preferences, as it will remember the settings between sessions.

### UTILITY TAB



Allows you to set various preferences for your flight.

### Direct Keyboard Entry (DKE) Key

- When DKE is active, you can use your keyboard to type directly into the scratchpads of the MCDU. The default key for triggering DKE is **<TAB>** on your keyboard, however, this key is sometimes used in other applications or you may have it assigned to any other function.
- This setting allows you to change the default toggle for DKE to be **<CAPS LOCK>**

### Pause at Top of Descent

- The simulator will automatically pause before it reaches Top of Descent. This is useful if you want to step away from the computer while in cruise.
- **Note:** May not work if you have increased the time-speed of the simulator

### Enable verbose logging

- If there is any technical issue, we may ask you to enable this so that more information is written out into the log.txt. This would help us better diagnose your issue.

## **Show reflections**

- Toggles the screen reflections

## **Show Easter eggs**

- Toggles the Easter eggs.

## **Enable realistic CDU input delay**

- The real FMS has a bit of a delay when inserting data, pressing the side soft keys or changing pages. We have added this delay to emulate the real feel.
- You can disable this delay, in which case the pages will respond instantly

## **Use next gen avionics**

- This toggles between the older Load 25 and Load 27 visuals for the PFD.
- In real life, there are many differences across all the avionics between these two versions, however, we have developed everything based on Load 27, and the only change is the visual representation of the PFD.

## **Use wheel covers**

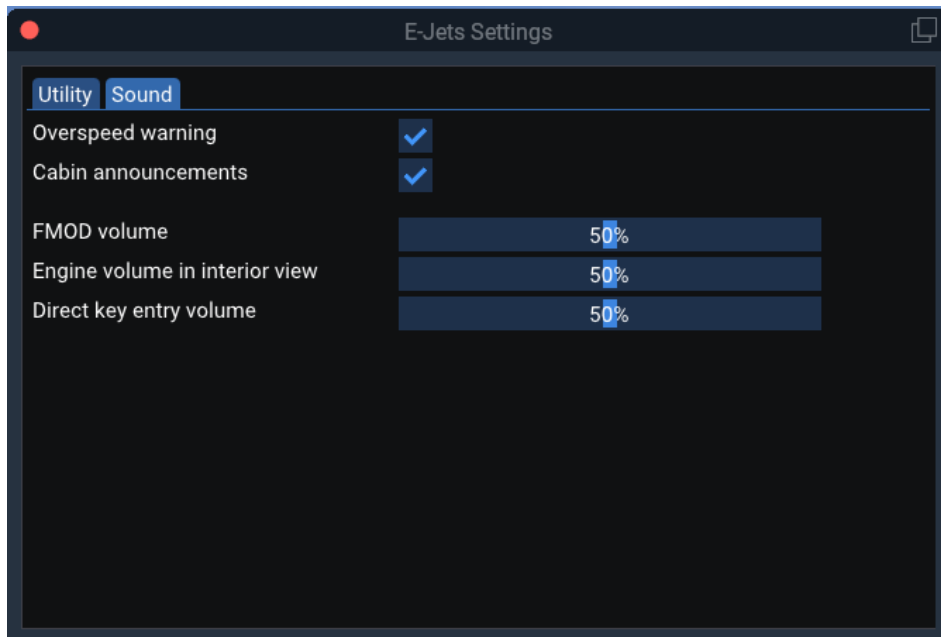
- Toggles the wheel covers

## **Use LR winglets**

- Toggles between the standard and wide winglets
- Only available on the E175

## SOUND TAB

- Allows you to set various sound preferences.
- Recommended settings for the most realistic experience:
  - FMOD volume: **50%**
  - Engine volume in interior view: **50%**
  - Direct Key entry volume: **50%**



## EFB

The **EFB (Electronic Flight Bag)** is our in-house plugin that helps flight crews perform flight management tasks more easily and efficiently.

- We have created a comprehensive video tutorial where we cover all features of the EFB and how to use them.
- The information in this manual mainly describes the features included, but we advise you to watch the tutorial to learn how to use each feature properly
- You can watch it [here](#).



## OPENING THE EFB IN A POP-UP WINDOW

1. Done by clicking on the “**Home**” **Button** of the tablet.
2. Through the X-Plane top bar **Drop-down menu**
3. By assigning a **command to a key** on your keyboard.
  - You will find the command under X-Plane Settings > Keyboard > Search for **XCrafts** > “**efb1**”.

**Note:** Sometimes, when trying to close the Pop-Up EFB by the keyboard command, there is a conflict of keystrokes, where the EFB won't know if you are trying to type into the EFB, or you are trying to close the EFB. In such case, we recommend that you, either:

- A. Close the EFB with your mouse, by clicking on the red button in the top left corner of the window.
- B. Click somewhere outside the EFB screen to disable the EFB key entry focus, and then press the key on your keyboard to close it.

## HIDING THE EFB

- You can hide the EFB by clicking on the clipboard below the EFB.



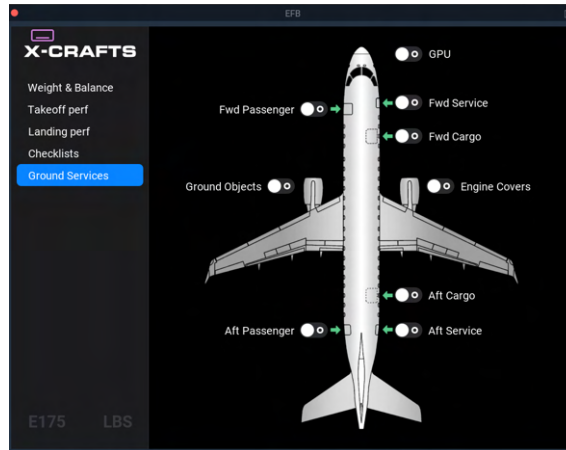
## ROTATING THE EFB

- You can rotate and reposition the EFB by grabbing onto its sides.



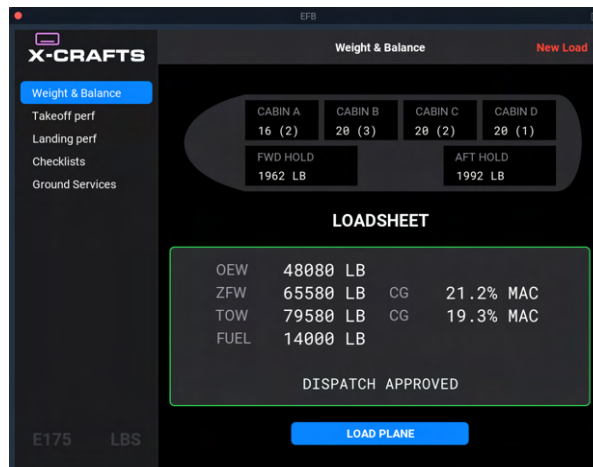
## GROUND SERVICES

- Opening and closing of the doors.
- Connecting the GPU.
- Toggling the Chocks, Remove before flight tags, and Engine Covers.



## WEIGHT & BALANCE

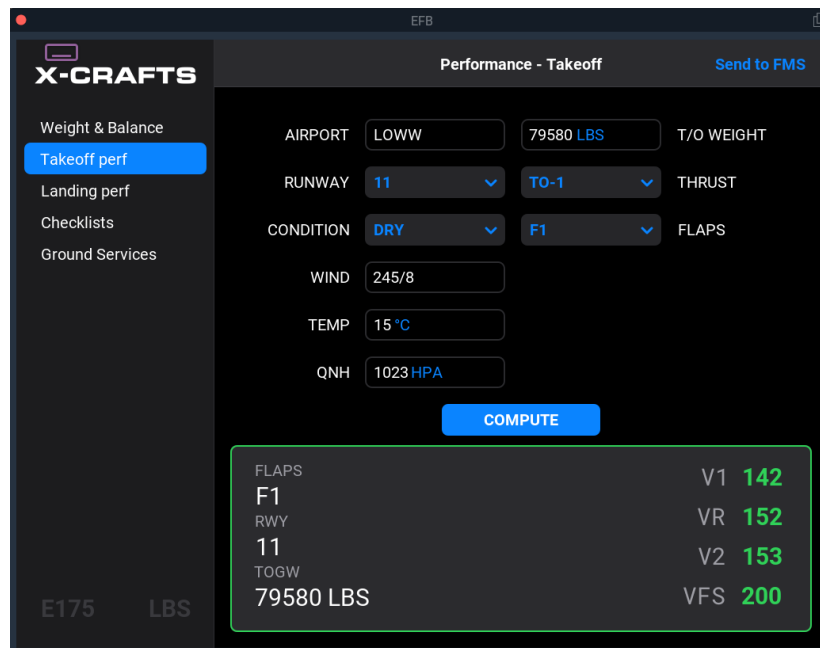
- To get a weight and balance Loadsheet, you have to enter the Payload or Zero Fuel Weight, and Fuel Weight.
- You can enter these manually or fetch them directly from your last generated Simbrief flight plan by entering your Simbrief Pilot ID as shown in the tutorial.
- The number in each of the zones is adults and (children).



- You can accept the load sheet by clicking on **LOAD PLANE**, which will load the plane according to the load sheet.

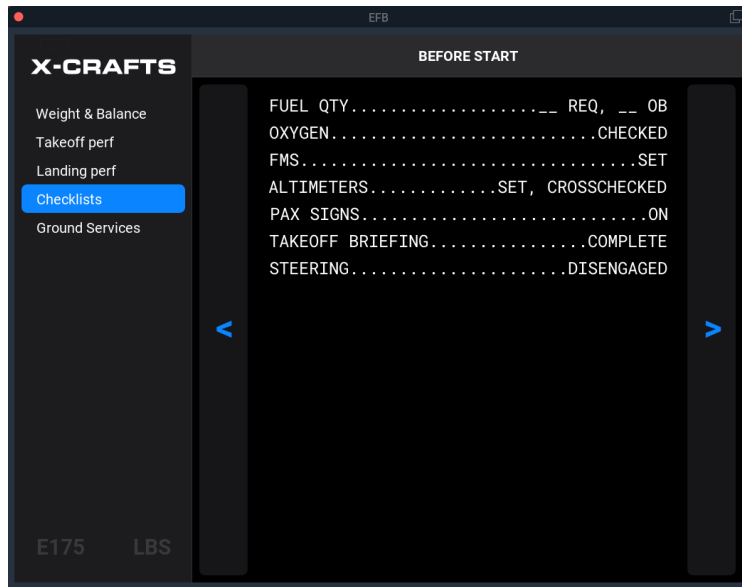
## TAKEOFF & LANDING PERF

- These pages can be used to calculate Takeoff & Landing Performance data and send it to the FMS
  1. Fill out the input fields > Press **COMPUTE**.
  2. You can then enter the Vspeeds manually into the FMS, or you can send the VSpeeds to the FMS by pressing "**Send to FMS**" in the top right corner.
    - You can then load the vspeeds in the **FMS**: Press the **DLK** (datalink) button. You will now see the landing speeds option highlighted green. If you press the right soft key next to the highlighted text, you will load the vspeeds
- You can enter HPA or IN values for QNH, and the tablet will use the correct units based on your format
- You can use the same process for landing speeds from the Landing perf page on the EFB.



## CHECKLISTS

- You can access the checklists and you can also modify it based on your preference.
- Watch our video at the beginning of this section for detailed explanation.



## AVITAB

- Avitab is a third-party plugin that is useful for a very wide variety of functions. It can be downloaded for free on [X-Plane.org from this link](#). Support is also offered in [this thread](#).
- If Avitab is installed, a new TAB called Avitab will display on the EFB below Ground Services. This will allow you to access Avitab via the EFB.
- You can open Avitab in a separate Pop-Up window by clicking on the tablet “Home” button, same as the EFB.
- **Note:** Any issues related to Avitab are out of our hands, we are simply providing Avitab as it is, but if it doesn't work, that would need to be reported to the developers of it.



# USING YOUR KEYBOARD FOR DIRECT INPUT FOR THE FMS, EFB & AVITAB

## DIRECT KEYBOARD ENTRY (DKE)

- DKE function is only used for the **FMS**. If DKE is active, you will not be able to use the EFB or Avitab.
- Toggling DKE is done by:
  - a. Pressing TAB on your keyboard (or CAPS LOCK, based on your preference in the Settings menu.)
  - b. Clicking on the MDCU scratchpad
- If DKE is active, you'll hear a beep for each keystroke. This is designed so that you are aware that DKE is enabled.
- You can adjust the volume of the beep in the Settings menu.

## EFB

- Clicking on the screen enables the focus on the screen and allows you to enter any input with your keyboard. The focus is indicated by a blue edge around the screen.
- If you click outside of the EFB screen, the blue edge will disappear, which means the focus is no longer on the EFB screen and you can use your keyboard as usual.
- In the Pop-Up EFB window, input focus is indicated by a magenta blinking keyboard icon

**Note:** If the screen edge of the EFB is blue, **but the EFB is not registering any keyboard input**, try using the pop-up version of the EFB where there should be no issue with the keyboard input.

## AVITAB

- Clicking on the screen enables the focus on the screen and allows you to enter any input with your keyboard.
- You can also bring Avitab up in the 2D Popup window, by clicking on the "Tablet Home button"

## **RECOMMENDED 3<sup>RD</sup> PARTY PLUGINS**

### **SKUNKCRAFTS UPDATER**

We recommend that you use the SkunkCrafts Updater which will automatically detect any new updates, and will allow you to install them through the plugin interface, bypassing the need to redownload the aircraft from the store after every update.

[You can get the updater here.](#)

More information about how to use the Skunkcrafts Updater can be found on [our website](#).

### **TERRAIN RADAR**

We recommend that you download and install the Terrain Radar plugin by DrGluck. This plugin enables the MFD to display Terrain in MAP mode.

[You can get the Terrain Radar here.](#)

# AIRCRAFT OPERATION

## AUTOPILOT & TAKEOFF MODES

### AUTOPILOT

- Autopilot engagement:
  - AP button is pushed on the Guidance panel
  - AP/FD button is pushed on the yoke.
- Autopilot disengagement:
  - Either AP/TRIM DISC button is pushed on the yoke.
  - AP button is pushed on the Guidance panel.
  - Any manual pitch trim is activated.
  - Stick Shaker activated.
- Default modes for the autopilot are: Roll Hold (ROLL) and FPA.
  - **Note:** In the current version of the product, The default vertical mode is Pitch Hold, which is essentially FPA, except we do not have the ability to change the FPA. So if you want to change the FPA angle, just hit FPA on the guidance panel again.

## TAKEOFF MODES

There are several Take off settings and modes related to either the, Thrust Rating Setting (TRS), Autothrottle or Lateral and Vertical guidance. Understanding the differences is key to properly configuring the aircraft for takeoff.

### 1. THRUST RATING SETTING (TRS) TAKEOFF MODES

- Unrelated to lateral and vertical guidance.
- TRS limits the N1 for Takeoff based on the setting in the MCDU.
- Represented on the EICAS engine section as **TO-1** or **TO-2**, accompanied with the ATTCS setting.
- More detailed information on the TRS can be found in the FMS manual.

### 2. AUTOTHROTTLE TAKEOFF MODE (TO AT)

- Represented on the **left** side of the FMA.
- Engaged by pushing the TO/GA button on the throttle levers when on ground.
- Can be disengaged by pulling the throttles back to idle and pressing AT on the guidance panel.

#### Arming TO AT mode:

1. TLA (Throttle Lever Angle) must be below the TO/GA position.
  2. AT on the guidance panel must be pressed.
- TO AT arming is confirmed by a white **TO** on the FMA.

#### Engaging TO AT mode:

1. TO AT must be previously armed.
  2. TLA must be moved past the TO/GA position.
- TO AT engagement is confirmed by a green **TO** on the FMA.

AUTOMATIC AUTOTHROTTLE MODE TRANSITIONS:		
<b>At 60 kts</b>	<b>TO</b> automatically changes to <b>HOLD</b> mode, which holds max thrust.	
	<b>Flight plan <u>not</u> loaded:</b>	<b>Flight plan <u>loaded</u>:</b>
<b>At 1200 ft</b>	<b>HOLD</b> automatically switches to the <b>SPD<sub>T</sub> AT</b> mode.	<b>HOLD</b> automatically switches to the <b>SPD<sub>E</sub> AT</b> mode.



## 2. LATERAL AND VERTICAL GUIDANCE TAKEOFF MODES (TO)

- Represented on the **right** side of the FMA.
- Represented by crossbars FD and is used during the takeoff phase to maintain a pitch attitude.
- Deactivated when another vertical mode is selected.

### Engaging TO mode:

- Engaged by pressing the TO/GA button on the throttle lever.
- **ROLL** and **TO** appears on the right side of the FMA. ROLL is the lateral mode, and TO is the vertical mode.
- If the flightplan has been loaded, white **LNAV** and **VNAV** modes will be indicated as armed.

AUTOMATIC LATERAL & VERTICAL MODE TRANSITIONS:		
<b>At 100 kts</b>	<b>ROLL</b> mode changes to <b>TRACK</b> lateral guidance mode which will hold the current track.	
	<b>Flight plan <u>not</u> loaded:</b>	<b>Flight plan <u>loaded</u>:</b>
<b>At 400 ft</b>	No action.	At 400ft, <b>TRACK</b> lateral mode automatically switches to <b>LNAV</b> mode.
<b>At 1200 ft</b>	<b>TO</b> automatically switches to <b>FPA</b> mode.  <b>TRACK</b> remains the lateral mode until a different lateral mode has been selected.	<b>TO</b> vertical mode automatically switches to VNAV flight level change mode <b>FLCH</b> .

## GO-AROUND MODE

- Represented on the **right** side of the FMA.
- Represented by crossbars FD and is used during the Go Around phase to maintain a pitch attitude.
- Engaged by pushing the TO/GA button during approach.
- Deactivated when another vertical mode is selected.

## AUTOTHROTTLE

AT sets the correct engine thrust with the synchronized N1 for its various operating modes.

Normal disengagement:

- AT disconnect button on thrust lever or
- AT button on the guidance panel.

Automatically disengaged when one of the following occurs:

- After airplane touchdown
- Thrust levers beyond the TO/GA position (**Note:** this is implemented only with hardware throttles)

### AUTOTHROTTLE MODES:

#### Takeoff mode - TO

- Armed on ground by pressing the AT button on the guidance panel.
- Engages when thrust levers are at a high TLA.
- TLA NOT TOGA will be displayed on the CAS if the thrust levers are not in the TOGA detent by 60 kts.

#### Takeoff hold mode - HOLD

- Prevents undesired thrust lever movement during the takeoff phase.
- Engaged at or above 60 KIAS during the takeoff roll.

#### Speed on thrust mode $SPD_T$

- Controls the selected airspeed adjusting the engine thrust by moving the thrust levers.
- Vertical modes related to SPDT: FPA, VS, GS, PTH, GP, ALT, ASEL
- SPDT is the active mode when the FD is turned OFF (no active modes on FMA).

#### Speed on elevator - $SPD_E$

- AT maintains a fixed thrust setting, and the flight director adjusts the pitch attitude to maintain the selected airspeed.
- Vertical modes related to SPDE: FLCH, OVSP, VNAV flight level change (FLCH magenta)

## Retard mode - RETD

- On the real plane, RETD reduces the thrust levers to idle during flare on landing when below 30 ft. However, we discovered that this mode was causing an issue for some users that have hardware throttles.

### Therefore RETD currently works in the following way:

- During flare below 30 ft, RETD starts flashing, notifying the pilot that he needs to reduce the thrusts manually. AT gets disengaged

After discussing it with real pilots, this was the best compromise we could come up with, that would ensure the throttles get reduced for all users, with or without hardware throttles.

## Go Around mode - GA

- Automatically advances the thrust levers to the TO/GA position.
- Engaged with the TO/GA button on the throttle levers.

## Limit mode - LIM

- Autothrottle authority is not sufficient to achieve or maintain the selected airspeed.

## Override mode - OVRD

- AT can be overridden by moving the thrust lever in any direction without causing its disengagement.
- **Note:** This only works if the user uses hardware throttles.

# VERTICAL & LATERAL FLIGHT GUIDANCE

## FLIGHT GUIDANCE MODE COLOR DESIGNATION

The color of the mode annunciator will define whether a mode is managed by the pilot or by the FMS.

- All **GREEN** modes are manual/managed
- All **MAGENTA** modes are controlled by the FMS

## LATERAL MODES

### Roll **ROLL**

- Holds the selected bank (roll) angle
- Roll hold is the basic lateral mode and it is activated when:
  - The active lateral mode is deactivated.
  - The TO mode is selected on ground by pressing TOGA button.
  - The A/P is engaged with no other FGCS modes active.

### Heading **HDG**

- The heading select mode activates when the HDG pushbutton on the GP is pressed.
- The heading select mode is deactivated when:
  - HDG pushbutton is pressed a second time.
  - A different lateral mode is selected.
  - Armed LNAV, LOC or BC modes are activated.
- Pressing the HDG selector knob synchronizes the heading bug to the current heading. With HDG mode active, the FD follows the selected heading and respects the side to which the turn was commanded if the turn is greater than 180 degrees.

### Lateral Navigation **LNAV**

- The FD provides lateral guidance commands for interception, capture, and tracking of FMS-generated courses.
- The LNAV mode is selected when the NAV button is pressed on the guidance panel with the FMS as the source of navigation displayed on the PFD.

- The FD will not arm or track a VOR signal in LNAV. VOR tracking must be done manually in HDG mode.

## Localizer **LOC**

- Localizer mode guidance is computed based on PFD data. The LOC mode is selected via the NAV or APP buttons on the GP.
- The APP button will arm the LOC (and GS) modes if a valid localizer frequency is tuned and either PREV or V/L is selected on the PFD.
- The NAV button is selected when the GS mode is not possible or not desired.

## Track Hold **TRACK**

- The track hold mode maintains an inertial-derived aircraft track from the IRS.
- This mode is engaged automatically when GA or TO is selected by the TOGA.
- The automatic transition from ROLL to TRACK occurs when:
  - IAS is greater than 100 kt for TO or greater than 100 kt for GA.
  - And bank angle is at 3° or below for more than 10 seconds.
- Selecting another lateral flight director mode disengages track mode.

## VERTICAL MODES

### Flight Path Angle **FPA**

- Flight path angle ( $\pm 9.9^\circ$ ) is selected by the FPA SEL selector knob on the guidance panel. This mode will hold the selected pitch.
- The FPA is the basic vertical mode. FPA mode becomes the active FD mode when:
  - The FPA pushbutton on the guidance panel is pressed.
  - Engaging the autopilot if no FD mode is active.
  - When a lateral mode is activated and there is no vertical flight director guidance mode active.
  - Deselecting the current vertical mode.

### Takeoff **TO**

- The takeoff mode is a FD only mode. In TO mode, a dual-cue flight director (crossbar) is presented on the PFD.
- Lateral mode changes are allowed while the active vertical mode is TO.
- The Flight Path Vector (FPV) is not displayed while the TO mode is active.

## Flight Level Change **FLCH**

- The FLCH mode provides pitch guidance to climb or descend at the speed which has been selected via the Speed Selector Knob.
- FLCH guidance is associated with the SPDE autothrottle mode.
- The selected speed is displayed in the box on top of the speed tape.
- The FLCH button on the GP activates the FLCH mode. The FLCH mode deactivates when another vertical mode is activated.
- Although FLCH mode attempts to hold the selected speed with pitch, it will not cause a vertical reversal; i.e., it will not command a climb when a lower altitude is selected, and it will not command a descent when a higher altitude is selected.

## Altitude Hold **ALT**

- The altitude hold mode maintains the altitude existing upon activation.
- ALT mode is automatically activated after ASEL successfully captures a selected altitude.
- After ALT mode engagement at the selected altitude, change to another vertical mode is possible only after selecting a different altitude via the ALT SEL knob, or by de-selecting ALT with the ALT button on the Glareshield Panel(GP). This logic is valid for all vertical modes, except for Glide Slope (GS) and Go-Around (GA). Switching from ALT mode to GS mode may occur without change in ALT SEL selection. Also, switching from ALT mode to GA mode will occur upon activation of the TOGA button without change of ALT SEL selection.
- Altitude Hold can also be activated manually by pressing the ALT button on the GP. In this case, ALT holds the altitude existing at the moment the button was pressed, not the altitude set in the pre-select window.

## Vertical Speed **VS**

- The VS mode maintains a vertical speed.
- The VS mode is activated by pressing the VS button on the GP.
- Vertical speed is selected by rotating the vertical speed thumbwheel on the GP.
- The vertical speed command range goes from -8000 ft/min. to +6000 ft/min.

## Overspeed **OVSP**

- Flight Director provides overspeed protection during FLCH, VS and FPA modes.
- The OVSP protection limits the aircraft speed to VMO/MMO by commanding pitch adjustments to limit the airspeed.

- When the OVSP protection activates, an amber OVSP indication displays on the FMA. The previous active mode is displayed as armed (white) and becomes active again when OVSP protection is no longer active.

## Glideslope **GS**

- The GS mode arms when the APP button is pressed and activates when the glide slope is captured.
- GS mode can only be active when LOC is the active lateral mode (i.e., the localizer must be captured before the glideslope can be captured).
- GS will deactivate if a different lateral mode is selected.

## Go Around **GA**

- GA mode will maintain an 8° pitch attitude

## VNAV Path **PTH**

- The VNAV Path mode provides vertical guidance to intercept and track an FMS-generated vertical path descent to meet a waypoint altitude constraint.
- For more information, see the FMS manual and the VNAV section.

## Vertical Navigation **VNAV**

- VNAV can be engaged manually by pressing VNAV button on the GP
- VNAV engages automatically at 1200ft if the flight plan has been loaded and TOGA was pressed before takeoff (arming LNAV&VNAV).
- For more information, see the FMS manual and the VNAV section.

# AIRPLANE GENERAL

## COCKPIT CONCEPT

The cockpit uses Dark & Quiet philosophy, therefore if everything is running as it should, all the buttons will be dark and quiet.

When a white stripe is illuminated in a button, it indicates the button is not in its normal position.





## OVERHEAD PANEL



DVDR CONTROL PANEL	ENGINE 1 FIRE HANDLE	FIRE EXTINGUISHER PANEL	ENGINE 2 FIRE HANDLE	WINDSHIELD HEATING / ICE PROTECTION
ELECTRICAL PANEL		APU CONTROL PANEL		
	COCKPIT LIGHTS	FUEL PANEL	WIPERS PANEL	HYDRAULIC PANEL
PAX SIGNS PANEL		EXTERNAL LIGHTS	PRESSURIZATION PANEL	
				PAX OXYGEN PANEL

## DVDR CONTROL PANEL

DVDR CONTROL PANEL	ENGINE 1 FIRE HANDLE	FIRE EXTINGUISHER PANEL	ENGINE 2 FIRE HANDLE	WINDSHIELD HEATING / ICE PROTECTION
ELECTRICAL PANEL	FUEL PANEL	APU CONTROL PANEL	HYDRAULIC PANEL	AIR COND / PNEUMATIC PANEL
		WIPERS PANEL		
COCKPIT LIGHTS	PAX SIGNS PANEL	EXTERNAL LIGHTS	PRESSURIZATION PANEL	PAX OXYGEN PANEL

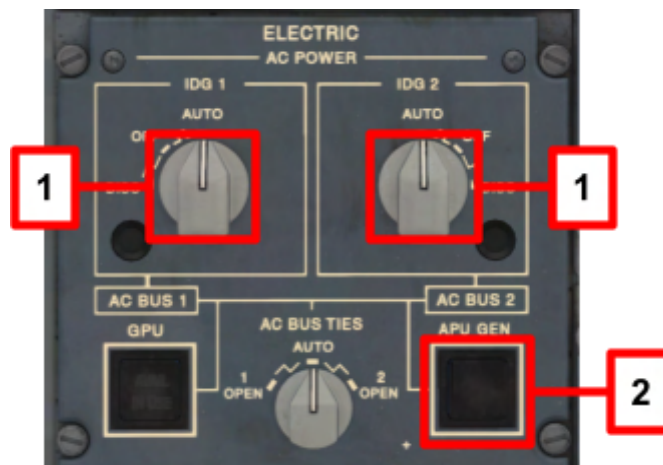
- The digital voice data recorder system (DVDR) combines a flight data recorder (FDR) and a cockpit voice recorder (CVR) in a single unit.
- **Note:** This panel is not simulated in the current version.



## ELECTRICAL PANEL

### AC POWER

DVDR CONTROL PANEL	ENGINE 1 FIRE HANDLE	FIRE EXTINGUISHER PANEL	ENGINE 2 FIRE HANDLE	WINDSHIELD HEATING / ICE PROTECTION
AC POWER		APU CONTROL PANEL		
DC POWER	FUEL PANEL	WIPERS PANEL	HYDRAULIC PANEL	AIR COND / PNEUMATIC PANEL
COCKPIT LIGHTS	PAX SIGNS PANEL	EXTERNAL LIGHTS	PRESSURIZATION PANEL	PAX OXYGEN PANEL

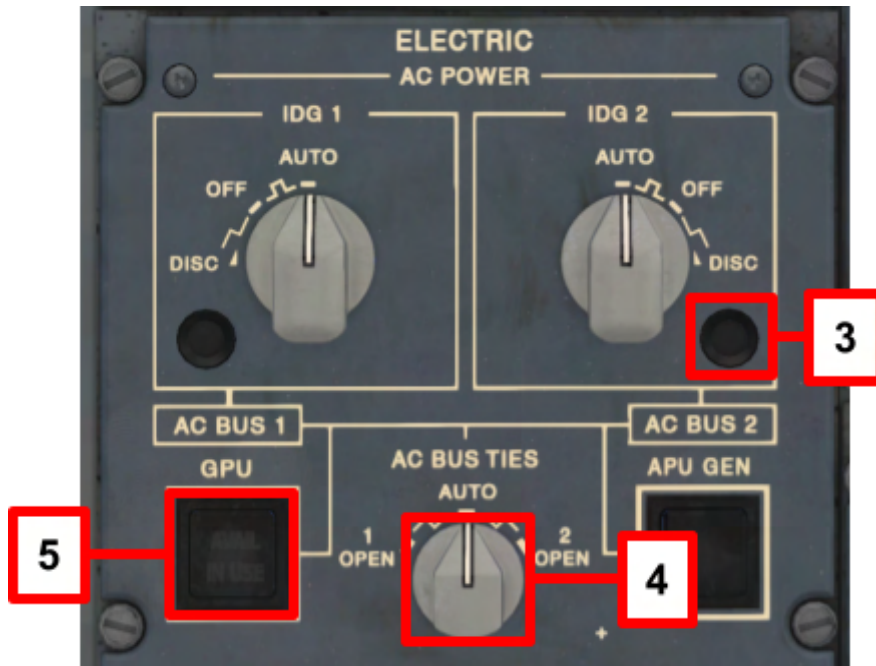


#### 1. IDG (INTEGRATED DRIVE GENERATOR) 1 and IDG 2 SELECTOR KNOBS

- One IDG can supply the entire electrical system
- **AUTO**: Closes the IDG contactor, connecting the IDG to the respective AC BUS. When an engine starts, the IDG will automatically come on line, powering the respective AC BUS. The previous power source is disconnected from that AC BUS.
- **OFF**: Opens the IDG contactor, isolating the IDG from the respective AC BUS.
- **DISC (Not simulated in this version)** This is used on the real aircraft to mechanically disconnect the IDG.
  - Source priority for the AC BUS 1 and 2: Respective IDG (Onside), APU Generator (Inside), Ground Power Unit (Outside), Opposite IDG (Cross-side)

## 2. APU GENERATOR

- APU generator has the same power rating as the IDGs.
- **PUSH IN (DARK)**: Automatically connects the APU Generator to the AC BUS TIE, according to the source priority.
- **PUSH OUT (WHITE STRIPE)**: Opens the APU Generator contactor and isolates the APU generator from the AC BUS TIE.



## 3. IDG OIL INDICATOR

- Illuminates for low/high oil pressure, indicating which IDG must be disconnected (**Note:** This feature is not simulated in the current version)
- Illuminates during ANNUNCIATOR TEST

## 4. AC BUS TIE SELECTOR KNOB

- **1 OPEN:** Opens the BUS Tie Contactor (BTC) 1, segregating AC BUS 1 from AC BUS 2.
- **AUTO:** This position controls the operation of the BTCs, according to system logic. If one of the AC power sources fails, both AC electrical networks are automatically connected by BTCs.
- **2 OPEN:** Opens the BUS Tie Contactor (BTC) 2, segregating AC BUS 2 from AC BUS 1.

## 5. GROUND POWER UNIT (GPU BUTTON)

- **DARK:** The GPU is not connected
- **AVAIL:** The GPU is connected to the airplane, but not to the AC BUS TIE
- **IN USE:** AC GPU is powering the airplane.
  
- If the APU Generator is providing power to the AC BUS TIE, GPU will disconnect from the AC BUS TIE and the button will go from IN USE to AVAIL according to system logic

## GROUND POWER UNIT (GPU)

- The GPU can be connected through the EFB Ground Services page.
- If the GPU is connected and the GPU button shows IN USE, the GPU provides AC power to the electrical busses.

## DC POWER

DVDR CONTROL PANEL	ENGINE 1 FIRE HANDLE	FIRE EXTINGUISHER PANEL	ENGINE 2 FIRE HANDLE	WINDSHIELD HEATING / ICE PROTECTION
AC POWER	FUEL PANEL	APU CONTROL PANEL	HYDRAULIC PANEL	AIR COND / PNEUMATIC PANEL
DC POWER		WIPERS PANEL		
COCKPIT LIGHTS	PAX SIGNS PANEL		PRESSURIZATION PANEL	PAX OXYGEN PANEL

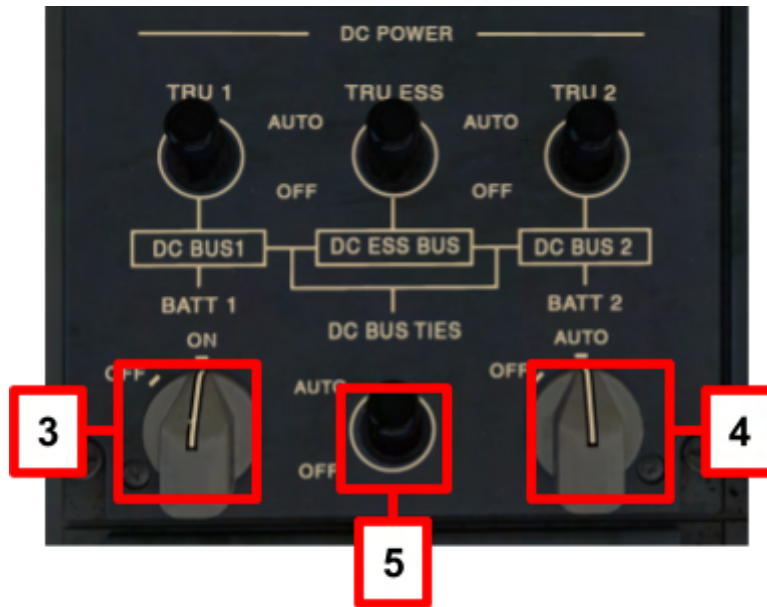


### 1. TRU (TRANSFORMER RECTIFIER UNIT) 1 AND TRU 2 TOGGLE SWITCH

- Converts AC power to DC power
- AUTO: Automatic operation of the electrical system. Connects TRU 1 (2) to the respective DC BUS
- OFF: Isolates TRU 1 (2) from the respective DC BUS

## 2. TRU ESS SWITCH

- AUTO: Automatic operation of the electrical system. Connects TRU ESS to the ESS BUS 3
- OFF: TRU ESS is isolated from ESS BUS 3



## 3. BATT 1 SELECTOR KNOB

- ON: Connects Battery 1 to DC ESS BUS 1
- OFF: Disconnects Battery 1

## 4. BATT 2 SELECTOR KNOB

- ON: Connects Battery 2 to DC ESS BUS 2
- OFF: Disconnects Battery 2

## 5. DC BUS TIES

- AUTO: Allows automatic operation of the electrical system.
- OFF: DC BUS TIES disconnected

## ELECTRICAL SYSTEM

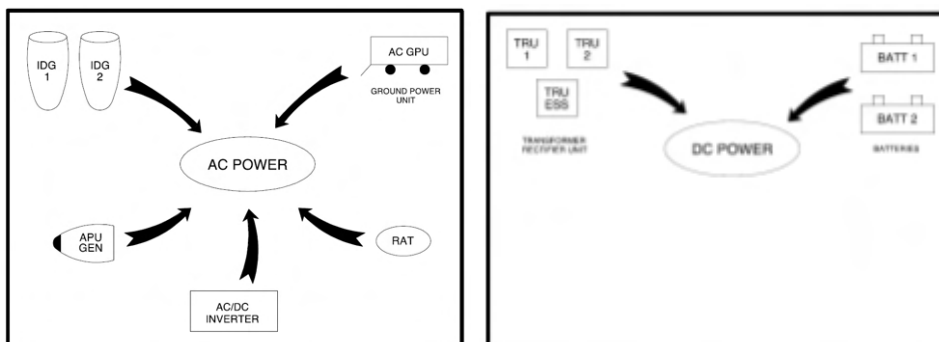
- Two independent networks provide complete segregation and fault isolation
- GPU-powered aircraft with an engine started at the gate will have a split electrical system

## AC ELECTRICAL SYSTEM

- **Two IDGs, APU generator, RAT, AC/DC inverter, AC GPU**
- Once AC power is established, all displays, panel lights, cockpit lights and instruments are operational

## DC ELECTRICAL SYSTEM

- Three TRUs, Two batteries,
- DC GPU is not simulated.



## INITIAL POWER-UP / ELECTRICAL EMERGENCY

If the airplane is only powered from the DC Electrical system, for example during power up or in an electrical emergency, the following items are operational:

- Guidance panel, MFD (CA side), EICAS, IESS, Clock, MCDU 2, CCD1, Audio control panels and compass backlight.



## COCKPIT LIGHTS PANEL

DVDR CONTROL PANEL	ENGINE 1 FIRE HANDLE	FIRE EXTINGUISHER PANEL	ENGINE 2 FIRE HANDLE	WINDSHIELD HEATING / ICE PROTECTION
ELECTRICAL PANEL	FUEL PANEL	APU CONTROL PANEL	HYDRAULIC PANEL	AIR COND / PNEUMATIC PANEL
		WIPERS PANEL		
COCKPIT LIGHTS	PAX SIGNS PANEL	EXTERNAL LIGHTS	PRESSURIZATION PANEL	PAX OXYGEN PANEL



### 1. MAIN PNL KNOB

- OFF: Turns the lights off.
- BRT: lights full bright.
- Rotate knob to adjust brightness of the main panel integral lighting.

### 2. OVHD PNL KNOB

- OFF: Turns the lights off.
- BRT: lights full bright.
- Rotate knob to adjust brightness of the overhead panel integral lighting.

### 3. PEDESTAL KNOB

- OFF: Turns the lights off.
- BRT: lights full bright.

- Rotate knob to adjust brightness of the pedestal panel integral lighting.

#### **4. ANNUNCIATORS TEST BUTTON (Momentary position)**

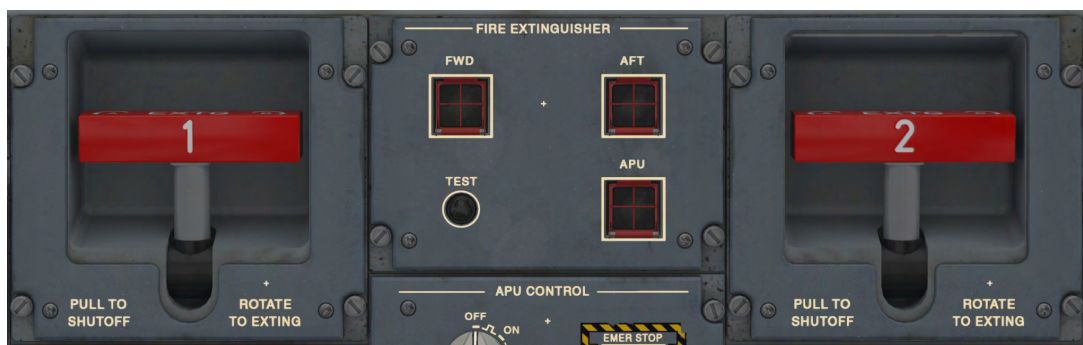
- Illuminates the white/amber striped bars and caption indications verifying the lamp integrity.
- Does NOT check Parking brake ON light, AC GPU Button, or Fire lights

#### **5. DOME SWITCH**

- ON: Turns 2 cockpit dome lights ON
- OFF: Turns 2 cockpit dome lights OFF

## ENGINE FIRE HANDLE

DVDR CONTROL PANEL	ENGINE 1 FIRE HANDLE	FIRE EXTINGUISHER PANEL	ENGINE 2 FIRE HANDLE	WINDSHIELD HEATING / ICE PROTECTION
ELECTRICAL PANEL	FUEL PANEL	APU CONTROL PANEL	HYDRAULIC PANEL	AIR COND / PNEUMATIC PANEL
		WIPERS PANEL		
COCKPIT LIGHTS	PAX SIGNS PANEL	EXTERNAL LIGHTS	PRESSURIZATION PANEL	PAX OXYGEN PANEL



### ENGINE FIRE HANDLE

- PULL 1: Discharges the A (left) fire extinguisher bottle into the associated engine
- PULL 2: Discharges the B (right) fire extinguisher bottle into the associated engine

**Note:** On the real aircraft, both handles can extinguish either fire bottle by rotating in the associated direction. This is not simulated in this version.

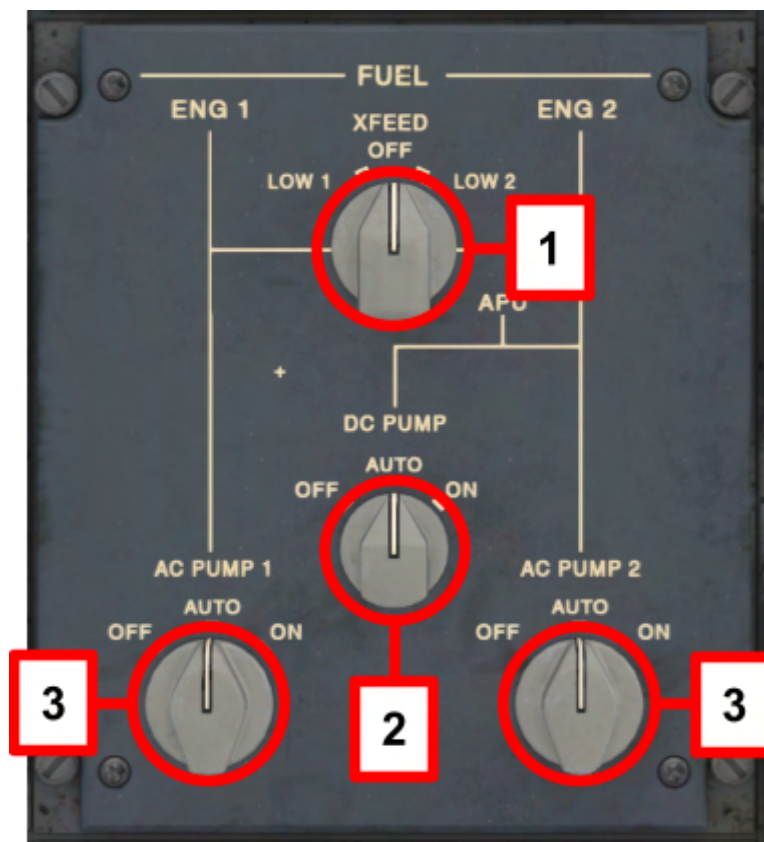
### ENGINE FIRE INDICATION

- Engine Fire handle illuminates
- EICAS displays ENG (1) (2) FIRE message
- Master Warning triple chime and Fire bell
- **FIRE** displayed on the respective engine ITT gauge
- Master Warning lights on glareshield illuminate



## FUEL PANEL

DVDR CONTROL PANEL	ENGINE 1 FIRE HANDLE	FIRE EXTINGUISHER PANEL	ENGINE 2 FIRE HANDLE	WINDSHIELD HEATING / ICE PROTECTION
ELECTRICAL PANEL	<b>FUEL PANEL</b>	APU CONTROL PANEL	HYDRAULIC PANEL	AIR COND / PNEUMATIC PANEL
COCKPIT LIGHTS	PAX SIGNS PANEL	EXTERNAL LIGHTS	PRESSURIZATION PANEL	PAX OXYGEN PANEL



### 1. XFEED SELECTOR KNOB

- LOW 1: Opens the crossfeed valve and automatically activates AC PUMP 2, supplying fuel to both engines from the right wing tank
- OFF: Closes the crossfeed valve

- LOW 2: Opens the crossfeed valve and automatically activates AC PUMP 1, supplying fuel to both engines from the left wing tank

## 2. DC PUMP SELECTOR KNOB

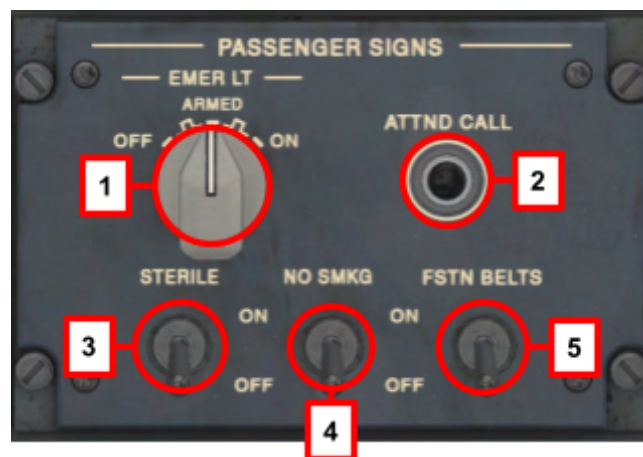
- OFF: Deactivates the DC Fuel pump
- AUTO: Automatically operates the DC fuel pump according to system logic
- ON: Activates the DC fuel pump

## 3. AC PUMP SELECTOR KNOBS

- OFF: Deactivates the associated AC Fuel pump
- AUTO: Automatically operates the associated AC fuel pump according to system logic
- ON: Activates the associated AC fuel pump

# PASSENGER SIGNS PANEL

DVDR CONTROL PANEL	ENGINE 1 FIRE HANDLE	FIRE EXTINGUISHER PANEL	ENGINE 2 FIRE HANDLE	WINDSHIELD HEATING / ICE PROTECTION
ELECTRICAL PANEL	FUEL PANEL	APU CONTROL PANEL	HYDRAULIC PANEL	AIR COND / PNEUMATIC PANEL
		WIPERS PANEL		
COCKPIT LIGHTS	PAX SIGNS PANEL	EXTERNAL LIGHTS	PRESSURIZATION PANEL	PAX OXYGEN PANEL



## **1. EMER LT SELECTOR KNOB**

- OFF: Prevents all emergency lights from illuminating if electrical power is turned off or fails.
- ARMED: Automatically illuminates all emergency lights if the airplane loses electrical power or if airplane electrical power is turned off
- ON: Turns on all emergency lights

## **2. ATTND CALL**

- PUSH: Single Hi/Lo tone chime in passenger cabin

## **3. STERILE SWITCH**

- ON: Illuminates the sterile rainbow light in the cabin
- OFF: Turns off the sterile rainbow light in the cabin

## **4. NO ELEC DEVICES / NO SMKG SWITCH**

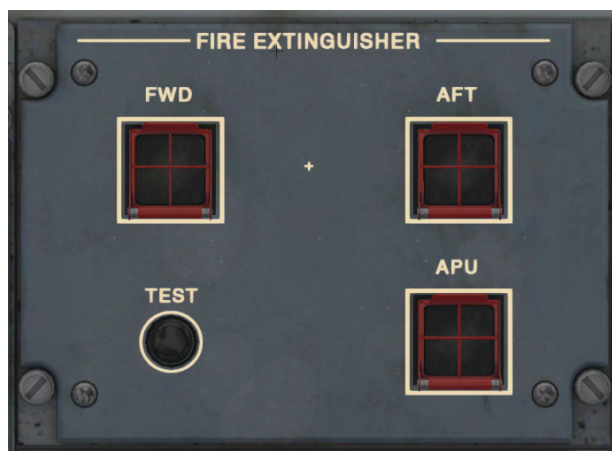
- ON: Illuminates the respective signs
- OFF: Turns off the respective signs

## **5. FSTN BELTS SWITCH**

- ON: Illuminates the FASTEN SEAT BELTS signs
- OFF: Turns off the FASTEN SEAT BELTS signs

## FIRE EXTINGUISHER PANEL

DVDR CONTROL PANEL	ENGINE 1 FIRE HANDLE	FIRE EXTINGUISHER PANEL	ENGINE 2 FIRE HANDLE	WINDSHIELD HEATING / ICE PROTECTION
ELECTRICAL PANEL	FUEL PANEL	APU CONTROL PANEL	HYDRAULIC PANEL	AIR COND / PNEUMATIC PANEL
		WIPERS PANEL		
COCKPIT LIGHTS	PAX SIGNS PANEL	EXTERNAL LIGHTS	PRESSURIZATION PANEL	PAX OXYGEN PANEL



### 1. FWD/AFT CARGO FIRE DETECTION/EXTINGUISHER BUTTON (Guarded)

Button illuminates if smoke is detected in the respective cargo compartment.

**Note:** Cargo compartment fire is not simulated in this version.

### 2. FIRE DETECTION SYSTEM TEST BUTTON (Momentary position)

- Tests the engine fire, APU fire, and cargo smoke detection systems
- Press and hold the button for a minimum of 3 seconds
- **Note:** Automatic APU Shutdown after holding for 10 seconds is currently not simulated

## FIRE DETECTION SYSTEM TEST

- Displays fire detection/extinguishing system messages on EICAS

The following warnings happen during a FIRE DETECTION SYSTEM TEST:

### OVERHEAD PANEL (6 lights)

- Fire Handle 1
- Fire Handle 2
- Cargo smoke (FWD) extinguisher button
- Cargo smoke (AFT) extinguisher button
- APU Extinguisher button
- APU EMER STOP (top half of button)

### GLARESHIELD (2 lights)

- Master Warning Light (Left)
- Master Warning Light (Right)

### EICAS (7 lights)

- ENG 1 FIRE (CAS message)
- ENG 2 FIRE (CAS message)
- CARGO AFT SMOKE (CAS message)
- CARGO FWD SMOKE (CAS message)
- APU FIRE (CAS message)
- **FIRE** displayed on the respective engine ITT gauge

### AURAL WARNING ( 2 aural warnings)

- Master Warning Triple Chime
- Fire Bell

## 3. APU FIRE EXTINGUISHER BUTTON (Guarded)

- **Note:** APU fire is not simulated in this version of the product



## APU CONTROL PANEL

DVDR CONTROL PANEL	ENGINE 1 FIRE HANDLE	FIRE EXTINGUISHER PANEL	ENGINE 2 FIRE HANDLE	WINDSHIELD HEATING / ICE PROTECTION
ELECTRICAL PANEL	FUEL PANEL	APU CONTROL PANEL	HYDRAULIC PANEL	AIR COND / PNEUMATIC PANEL
		WIPERS PANEL		
COCKPIT LIGHTS	PAX SIGNS PANEL	EXTERNAL LIGHTS	PRESSURIZATION PANEL	PAX OXYGEN PANEL



### 1. APU SELECTOR KNOB

- OFF: Normal shutdown is initiated. Electric power is removed at the end of a 1-minute cooldown. Rotating the knob back to ON during shutdown cancels the shutdown sequence
- ON: Normal position when running
- START (Momentary position): Initiates the APU start cycle. The knob can be turned to START position only after the Yellow box on the APU section of EICAS stops flashing (Around 3 seconds).

### 2. APU EMERGENCY STOP BUTTON

- **Note:** This function is not simulated in this version of the product. On the real aircraft, this button shuts down the APU without cooldown

## AUXILIARY POWER UNIT (APU)

- Gas turbine engine that provides AC power and bleed air to the airplane

### APU START

- To avoid unsuccessful start attempt it is recommended to wait 30 seconds after the EICAS is energized to start the APU.
- APU electrical and pneumatic power are available after reaching ~95% rpm.
- AC GPU cannot be used to start the APU

### APU BLEED

- Primarily used for: ECS on the ground, engine starting on the ground, assist with engine start ( $\leq$ FL210), and bleed source for pressurization, and heating and cooling ( $\leq$ 15000 MSL)

## WINDSHIELD WIPER PANEL

DVDR CONTROL PANEL	ENGINE 1 FIRE HANDLE	FIRE EXTINGUISHER PANEL	ENGINE 2 FIRE HANDLE	WINDSHIELD HEATING / ICE PROTECTION
ELECTRICAL PANEL	FUEL PANEL	APU CONTROL PANEL	HYDRAULIC PANEL	AIR COND / PNEUMATIC PANEL
		WIPERS PANEL		
COCKPIT LIGHTS	PAX SIGNS PANEL	EXTERNAL LIGHTS	PRESSURIZATION PANEL	PAX OXYGEN PANEL



### 1. WINDSHIELD WIPER

- TIMER: Not simulated in this version of the product.
- OFF: Windshield wiper stops in the stowed position
- LOW: Operates at a low speed
- HI: Operates at a high speed

## EXTERNAL LIGHTS PANEL

DVDR CONTROL PANEL	ENGINE 1 FIRE HANDLE	FIRE EXTINGUISHER PANEL	ENGINE 2 FIRE HANDLE	WINDSHIELD HEATING / ICE PROTECTION
ELECTRICAL PANEL	FUEL PANEL	APU CONTROL PANEL	HYDRAULIC PANEL	AIR COND / PNEUMATIC PANEL
		WIPERS PANEL		
COCKPIT LIGHTS	PAX SIGNS PANEL	EXTERNAL LIGHTS	PRESSURIZATION PANEL	PAX OXYGEN PANEL



### 1. NAV SWITCH

- ON: Nav lights on
- OFF: Nav lights off

### 2. STROBE SWITCH

- ON: Strobe lights on
- OFF: Strobe lights off

### **3. RED BCN SWITCH**

- ON: Red beacon lights on
- OFF: Red beacon lights off

### **4. LOGO SWITCH**

- ON: Logo lights on
- OFF: Logo lights off
- Logo lights are located on the horizontal stabilizer and illuminate the logo on the vertical stabilizer

### **5. TAXI LIGHT SWITCHES**

- ON: Respective taxi light on
- OFF: Respective taxi light off

### **6. INSP LIGHT SWITCHES**

- ON: Wing inspection lights on
- OFF: Wing inspection lights off
- Inspection lights are mounted on either side of the fuselage forward of the wing. They illuminate the engine intakes and the wing leading edges.

### **7. LANDING LIGHT SWITCHES**

- ON: Respective landing light on
- OFF: Respective landing light off

## HYDRAULIC PANEL

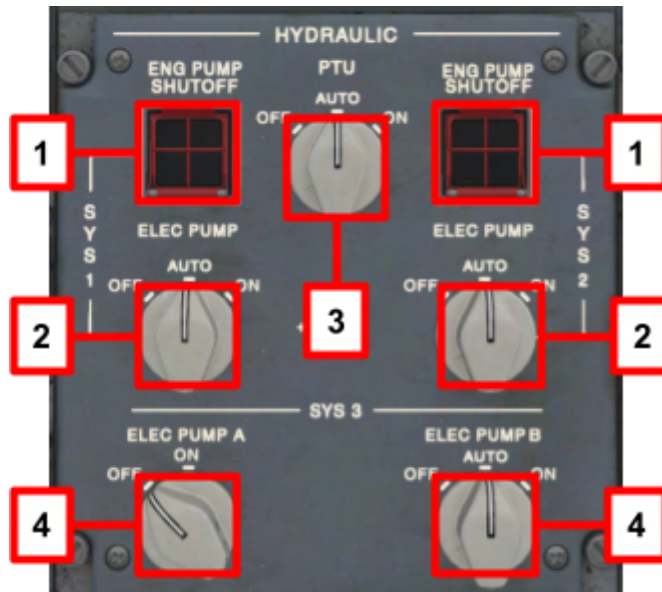
DVDR CONTROL PANEL	ENGINE 1 FIRE HANDLE	FIRE EXTINGUISHER PANEL	ENGINE 2 FIRE HANDLE	WINDSHIELD HEATING / ICE PROTECTION
ELECTRICAL PANEL	FUEL PANEL	APU CONTROL PANEL	HYDRAULIC PANEL	AIR COND / PNEUMATIC PANEL
		WIPERS PANEL		
COCKPIT LIGHTS	PAX SIGNS PANEL	EXTERNAL LIGHTS	PRESSURIZATION PANEL	PAX OXYGEN PANEL

## HYDRAULIC SYSTEM

- 3 independent systems
- **Note:** System 3 is not simulated properly due to limitations of X-Plane. Future updates of X-Plane will hopefully allow us to also simulate a third hydraulic system properly.
- Primary and secondary flight controls, landing gear, brakes, nosewheel steering, thrust reversers and spoilers.

## HYD SYS 1 & 2

- Normal operating pressure 3000 psi
- Engine Driven Pump (EDP) is primary and the AC Electric hydraulic pump is backup
- Engine Driven Pump (EDP) cannot be disabled



## 1. ENG PUMP SHUTOFF BUTTON (Guarded)

- **Note:** This function is not simulated in this version of the product

## 2. ELECTRIC HYDRAULIC PUMP SELECTOR KNOBS

- OFF: Turns the respective pump off
- AUTO: In this version of the product, AUTO acts as the ON position. Pump operates continuously.

## 3. PTU (POWER TRANSFER UNIT) KNOB

- **Note:** This function is not simulated in this version of the product

## 4. HYDRAULIC SYSTEM 3 SELECTOR KNOBS

- ON: Turns the respective pump on
- OFF: Turns the respective pump off
- AUTO (3B): Turns 3B on automatically if AC pump 3A fails. Note that this is not simulated in this version of the product.

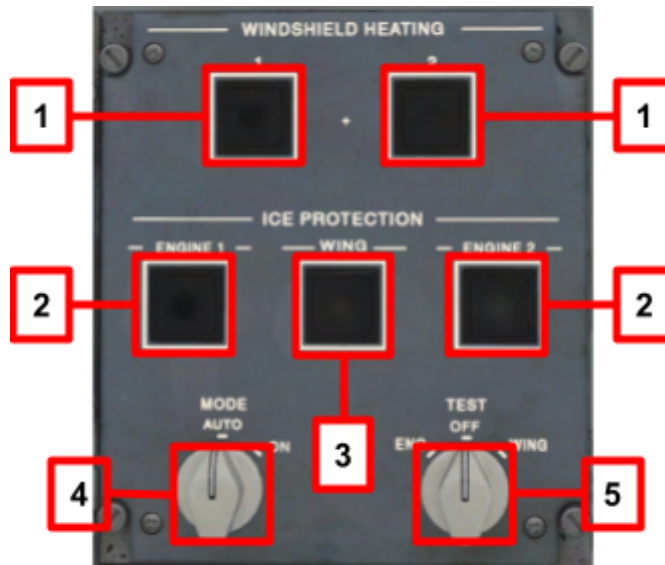
## PRESSURIZATION PANEL

- **Note:** This function is not simulated in this version of the product
- Pressurization operates automatically, according to standard X-Plane pressurization logic.



## WINDSHIELD HEATING / ICE PROTECTION PANEL

DVDR CONTROL PANEL	ENGINE 1 FIRE HANDLE	FIRE EXTINGUISHER PANEL	ENGINE 2 FIRE HANDLE	WINDSHIELD HEATING / ICE PROTECTION
ELECTRICAL PANEL	FUEL PANEL	APU CONTROL PANEL	HYDRAULIC PANEL	AIR COND / PNEUMATIC PANEL
		WIPERS PANEL		PAX OXYGEN PANEL
COCKPIT LIGHTS	PAX SIGNS PANEL	EXTERNAL LIGHTS	PRESSURIZATION PANEL	



## 1. WINDSHIELD HEATING (1) (2) BUTTON:

- PUSH IN (Dark): Activates the respective heating system
- PUSH OUT (White stripe): Deactivates the respective heating system
- Buttons are not independent, they both operate windshield heating of the entire windshield in this version of the product.

## 2. ICE PROTECTION ENGINE (1)(2) BUTTON:

- PUSH IN (Dark): Activates the respective engine anti-ice system
- PUSH OUT (White stripe): Deactivates the respective engine anti-ice system

## 3. WING ICE PROTECTION BUTTON

- PUSH IN (Dark): Activates the respective heating system
- PUSH OUT (White stripe): Deactivates the respective heating system.

## 4. ICE PROTECTION MODE SELECTOR KNOB

- AUTO: In this version of the product, AUTO acts as the ON position
- It is not possible to rotate the switch to the ON position as it has the same function in the AUTO position.

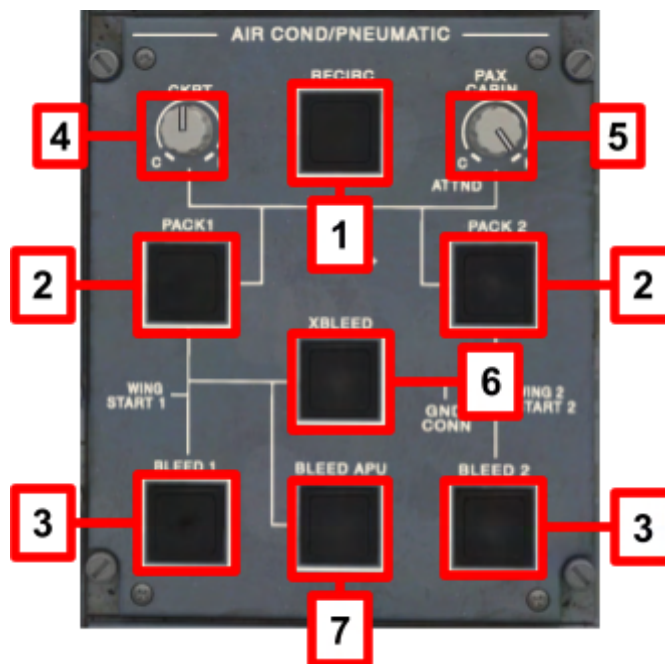
## 5. ICE PROTECTION TEST SELECTOR KNOB

- **Note:** This function is not simulated in this version of the product



## AIR COND / PNEUMATIC PANEL

DVDR CTRL PANEL	ENGINE 1 FIRE HANDLE	FIRE EXT PANEL	ENGINE 2 FIRE HANDLE	WINDSHIELD HEATING / ICE PROTECTION
ELECTRICAL PANEL	FUEL PANEL	APU CTRL PANEL	HYDRAULIC PANEL	AIR COND / PNEUMATIC PANEL
		WIPERS PANEL		
COCKPIT LIGHTS	PAX SIGNS PANEL	EXTERNAL LIGHTS	PRESSURIZATION PANEL	PAX OXYGEN PANEL



### 1. RECIRC BUTTON

- PUSH IN (Dark): Turns on both recirculation fans, according to system logic
- PUSH OUT (White stripe): Turns off both recirculation fans

### 2. PACK (1) (2) BUTTON

- PUSH IN (Dark): Opens respective pack flow control valve
- PUSH OUT (White stripe): Manually closes the respective pack flow control valve

### 3. BLEED (1) (2) BUTTON

- PUSH IN (Dark): Commands the respective engine bleed valves, according to system logic
- PUSH OUT (White stripe): Manually closes the respective engine bleed valves

### 4. CKPT TEMPERATURE SELECTOR

- Controls cockpit temperature relative to the knob position

### 5. PAX CABIN TEMPERATURE SELECTOR

- Controls cabin temperature relative to the knob position

### 6. XBLEED BUTTON

- PUSH IN (Dark): Opens the cross-bleed valve, according to system logic
- PUSH OUT (White stripe): Manually closes the cross-bleed valve

### 7. BLEED APU BUTTON

- PUSH IN (Dark): Commands automatic operation of the APU bleed valve, according to system logic.
- PUSH OUT (White stripe): Manually closes the the APU bleed valve

## PASSENGER OXYGEN PANEL

- **Note:** This function is not simulated in this version of the product



# GLARESHIELD PANEL



## GLARESHIELD LIGHTS / COMMUNICATION CONTROL PANEL



### 1. COMP/CLK LIGHT KNOB

- Regulates the brightness of the compass/clock lighting

### 2. MFD, PFD and EICAS LIGHT KNOB

- Regulates the brightness of the MFD, PFD or EICAS

### 3. FLOOD/STORM LIGHT KNOB

- Turns on/off and regulates the brightness of the flood/storm panel lighting

### 4. CHART LIGHT KNOB

- Turns on/off and regulates the brightness of associated chart holder lighting

### 5. PTT BUTTON

- **Note:** This function is not simulated in this version of the product

## MASTER CAUTION/WARNING PUSHBUTTONS



### 1. MASTER WARNING PUSHBUTTON

- PUSH: Acknowledges the warning messages and extinguishes the light

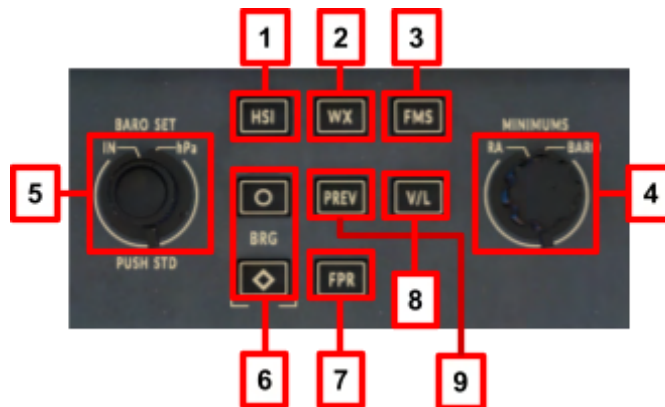


### 2. MASTER CAUTION PUSHBUTTON

- PUSH: Acknowledges the caution messages and extinguishes the light



## DISPLAY CONTROLLER PANEL (LEFT/RIGHT)



### 1. HORIZONTAL SITUATION INDICATOR (HSI) BUTTON

- Selects between full compass, arc, or map mode for the PFD

### 2. WEATHER RADAR (WX) BUTTON

- Displays WX Radar information on PFD (HSI in arc map mode only)

### 3. FMS SELECTION / FMS SOURCES

- Selects FMS as the primary navigation source

### 4. MINIMUMS SELECTOR KNOB

- Outer Knob
  - RA: Sets radio altimeter minimums. Used for ILS CAT II Approaches
  - BARO: Sets barometric minimums. Used for ILS CAT I Approaches
- Inner Knob
  - Selects decision height (DH), decision altitude (DA) or minimum descent altitude (DA) based on position of RA/BARO selector knob

### 5. BAROMETRIC SET KNOB

- Inner Knob
  - Sets barometric altimeter correction
  - Pushing this control knob sets barometric correction to standard
- Outer Knob
  - IN: Sets barometric correction format to inches of mercury
  - hPa: Sets barometric correction format to HectoPascals

## 6. BEARING SOURCES (BRG) BUTTON

- CIRCLE (o): Allows VOR1, ADF1 selection for the PFD display
- DIAMOND (♦): Allows VOR2, ADF2 selection for the PFD display

## 7. FLIGHT PATH REFERENCE (FPR) BUTTON

- Commands the flight path reference line and the flight path digital readout
- **Note:** This function is not simulated in this version of the product

## 8. VOR/LOC BUTTON (V/L)

- Selects VOR or LOC as the primary navigation source for the PFD
- Toggles between VOR1/LOC1 and VOR2/LOC2 (NAV1/NAV2)

## 9. PREVIEW BUTTON

- Selects the preview mode when the FMS is the primary navigation source. The course and the lateral/vertical deviation can be previewed
  - Pressing the first time: enables the VOR1/LOC1 preview
  - Pressing the second time: enables the VOR2/LOC2 preview
  - Pressing the third time: disables the preview mode

## GUIDANCE PANEL

### STATUS INDICATORS



Although, there are light indicators above the buttons on the GP, they **do not illuminate** to indicate armed or active status.

This is not a bug. Instead, it is an airline option to disable them and that is how it is on the majority of the real E-Jets.

The reason behind this is that the pilots should only ever look at the FMA to verify the AP status and keep their eyes on the PFD.



#### 1. FD BUTTON

- Turns ON and OFF the Flight Director presentation on PFD
- If no modes are selected, the FD displays once a lateral or vertical mode is selected, or once TOGA is pressed on the throttles.

#### 2. AP BUTTON

- Engages or disengages the Autopilot

#### 3. YD BUTTON

- Engages or disengages the Yaw Damper

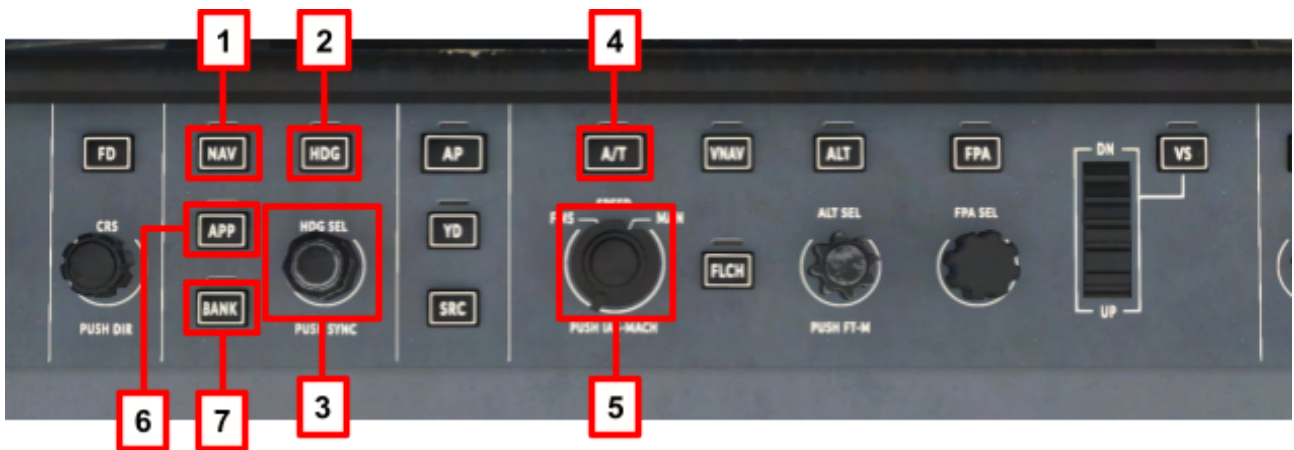
#### 4. SRC BUTTON

- Alternates between the Captain and First Officer FMA modes as source for the autopilot. A green arrowhead on the FMA indicates the respective source selected.
- **Note:** This function is not simulated in this version of the product

#### 5. CRS BUTTON

- Manually sets the desired course on CDI as described below.
- CDI displaying V/L: Sets CDI course

### SPEED MODECONTROLS AND LATERAL GUIDANCE CONTROLS



#### 1. NAV BUTTON

- On the ground:
  - Button arms/disarms LNAV
- In the air:
  - According to the presentation selected for the CDI the NAV Button engages:
    - LOC: If the CDI is selected V/L (Green) and the source ILS frequency is tuned.
    - LNAV: If the CDI is selected FMS (Magenta)
  - Pressing NAV with LOC or LNAV engaged reverts the lateral guidance to ROLL



## 2. HDG BUTTON

- Selects and deselects the heading select mode

## 3. HDG SELECTOR KNOB

- Manually selects the desired heading
- Pressing this knob synchronizes the heading select to the current heading

## 4. A/T BUTTON

- Engages or disengages the Autothrottle

## 5. SPEED SELECTOR KNOB

- FMS: Selected airspeed readout is controlled by the FMS logic
- MAN: Selected airspeed readout is controlled manually
  - Pressing this knob alternates the speed presentation on PFD selected airspeed readout window between IAS and MACH.

## 6. APP BUTTON

- Arms, activates, or deactivates approach modes based on the navigation source displayed on the PFD
- The following lateral and vertical mode annunciations are displayed on the FMA after the APP button is pressed:
  - LOC and GS for the ILS Approach mode
  - LNAV and GP for the VGP approach mode (This approach is not currently simulated)

**Note:** If you have PREV active and you pressed APP to arm an ILS approach, the autopilot source will automatically switch from FMS to V/L once the localizer deviation is less than 0.5 dots.

## 7. BANK BUTTON

- Enables and disables bank angle limit of 17° used by the Heading mode.

## VERTICAL GUIDANCE CONTROLS



### 1. FLCH BUTTON

- Selects and deselects the Flight Level Change mode.

### 2. VNAV BUTTON

- On the ground: Button arms/disarms VNAV
- In the air: Selects and deselects the VNAV mode (FMS vertical navigation).

### 3. ALT BUTTON

- Selects and deselects the altitude holding mode (ALT).

### 4. ALT SELECTOR KNOB

- Selects the desired altitude.
- Pressing this knob displays on the PFD the following altitudes, in meters.
  - The selected altitude, above the selected altitude readout window
  - The actual airplane altitude, above the altitude rolling digits readout window.

### 5. FPA BUTTON

- Selects and deselects the Flight Path Angle mode.
- Pilot selectable pitch altitude on degrees of climb or descent.

### 6. FPA SELECTOR KNOB

- Manually selects the desired Flight Path Angle.

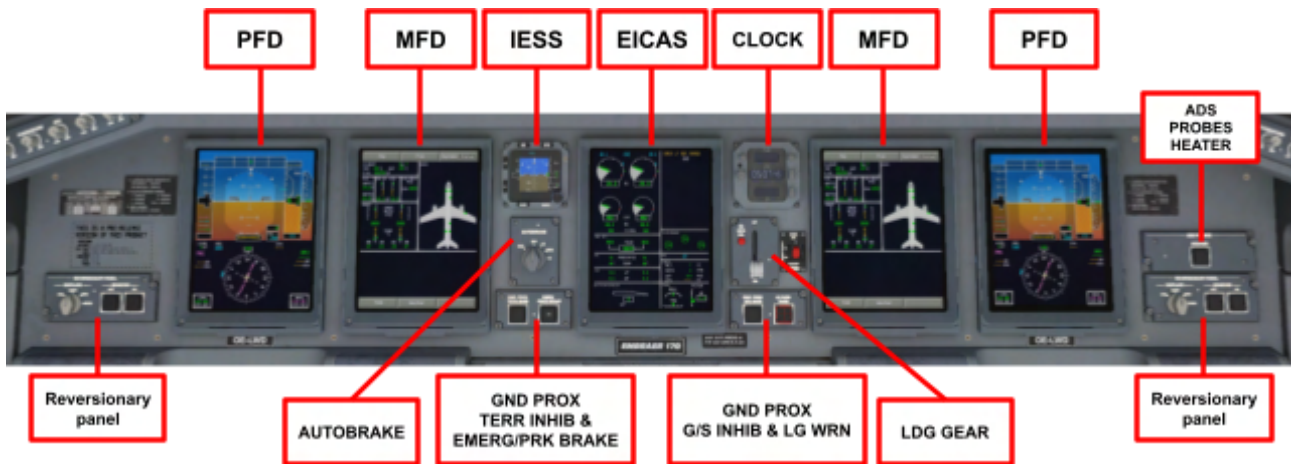
### 7. VS BUTTON

- Selects and deselects the Vertical Speed mode

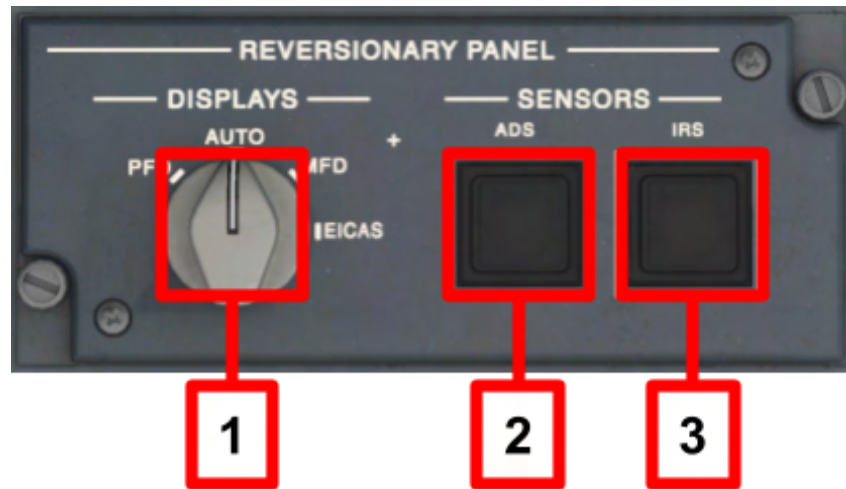
### 8. VS THUMB WHEEL SELECTOR

- The thumb wheel selector manually selects the desired vertical speed rate.

## MAIN PANEL



## REVERSIONARY PANEL



### 1. DISPLAY SELECTOR KNOB

- PFD: Displays PFD information on the associated MFD
- AUTO: Automatically reverts the MFD in case of display failure (Not currently simulated as we cannot simulate display failures)
- MFD: Displays MFD information on the associated MFD
- EICAS: Displays EICAS information on the associated MFD

### 2. ADS SENSOR BUTTON (Momentary action)

- **Note:** This function is not simulated in this version of the product

### 3. IRS SENSOR BUTTON (Momentary action)

- **Note:** This function is not simulated in this version of the product

## PRIMARY FLIGHT DISPLAY (PFD)



## AVAILABLE AVIONICS VERSIONS

- You can change the PFD avionics version in the E-Jets Settings.
- This is only a visual change of the background, all systems and settings were developed based on Load 27.

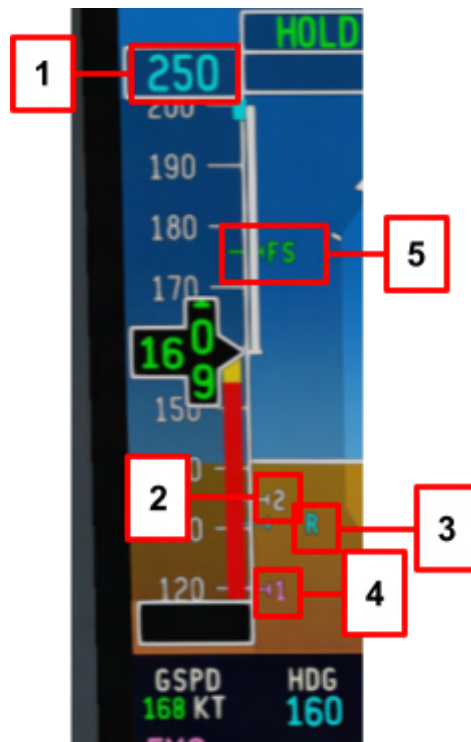


Avionics Load 27



Avionics Load 25

## AIRSPEED READOUT



### 1. SELECTED AIRSPEED READOUT

- Displays speed/mach values
- **MAGENTA**: Automatically set by the FMS
- **CYAN**: Manually entered by the pilot

### 2. $V_2$ SPEED (2)

- Takeoff safety speed

### 3. $V_R$ SPEED (R)

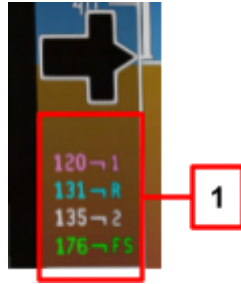
- Takeoff rotation speed

### 4. $V_1$ SPEED (1)

- Takeoff decision speed

### 5. $V_{FS}$ SPEED (FS)

- Takeoff final segment speed



## 1. $V_{SPEED}$ BUGS

- Preview mode displays in the lower portion of the airspeed tape. When no valid data is available and the aircraft is on the ground, cyan dashes are displayed.

## 2. LOADING $V_{SPEEDS}$

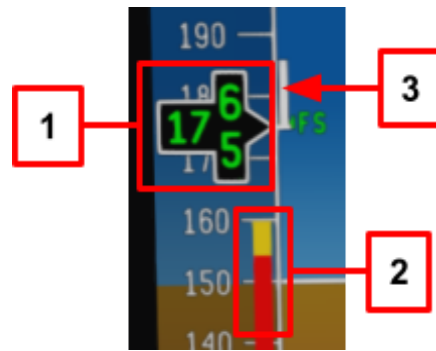
- $V_{SPEEDS}$  are entered in the MCDU manually, or automatically via the EFB
  - A. Go to the EFB > Takeoff perf > Fill out all the fields based on the weights calculated on the EFB and weather/airport conditions > Press "Compute". After the Vs speeds have been computed, you can send them to the FMS by pressing "**Send to FMS**" in the top right corner.
  - B. **Authentic FMS:** Press the DLK (datalink) button. You will now see the landing speeds option highlighter green. If you press the right soft key next to the highlighted text, you will load the vs speeds

**Note:** You can use the same process for landing speeds from the Landing perf page on the EFB.

## AIRSPPEED TRANSITION

- Airspeed transitions automatically between IAS and Mach and vice versa at approx 29,000ft.





## 1. AIRSPEED ROLLING DIGITS

- GREEN: Normal range
- AMBER: Airspeed is at the amber low speed awareness tape
- RED INVERSE VIDEO: Airspeed is at the red low speed awareness tape or at the  $V_{MO}/M_{MO}$  barber pole

## 2. LOW SPEED AWARENESS (LSA) TAPE

- Indicates the margin to the stick shaker speed. It rises from the bottom of the speed tape and has two colored ranges.

## 3. AIRSPEED TREND VECTOR

- White thermometer starting at the airspeed reference line and extends to the airspeed the aircraft is at in 10 seconds, based on current acceleration.



## 1. $V_{MO}/M_{MO}$ BARBER POLE

- Displayed when the  $V_{MO}/M_{MO}$  is within the viewable range, and covers speeds at or above  $V_{MO}/M_{MO}$
- $V_{MO}/M_{MO}$  redline on PFD is 280 knots up to 8000ft, then increases linearly to 320 knots at 10,000' until mach changeover and then decreases.
- Overspeed Barber pole is also affected by the flaps/slats positions:
  - i. Flaps 1..... 230 KIAS
  - ii. Flaps 2..... 215 KIAS
  - iii. Flaps 3..... 200 KIAS
  - iv. Flaps 4..... 180 KIAS
  - v. Flaps 5..... 180 KIAS
  - vi. Flaps Full..... 165 KIAS

o

## 2. SELECTED AIRSPEED BUG

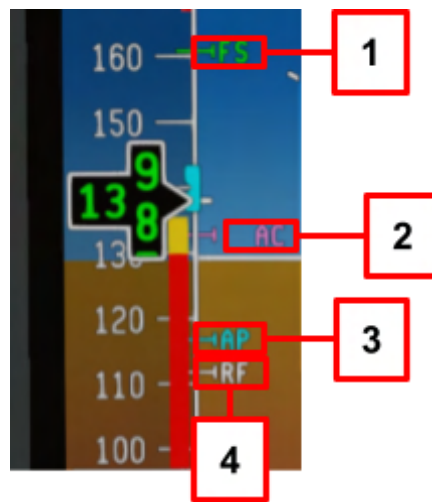
- o **MAGENTA**: Displayed at the FMS airspeed target when FMS mode is valid.
- o **CYAN**: Displayed at the MAnual mode airspeed target.

## 3. MACH AIRSPEED DIGITAL DISPLAY

- o Mach digital display

## 4. GOUNDSPEED

- o Displayed in the upper left corner of the HSI just below the airspeed tape.



### 1. $V_{FS}$ SPEED (FS)

- o Takeoff final segment speed

### 2. $V_{AC}$ SPEED (AC)

- o Approach climb speed

### 3. $V_{AP}$ SPEED (AP)

- o Approach speed

### 4. $V_{RF}$ SPEED (RF)

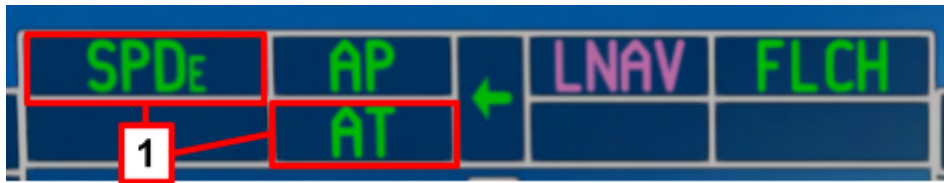
- o Reference speed

## FLIGHT MODE ANNUNCIATION DISPLAY (FMA)

### FMA AND PFD SOURCE MODES

- **MAGENTA**: AP modes that are using FMS data
- **GREEN**: Manual AP modes

### AUTOTHROTTLE ANNUNCIATIONS ON FMA



#### LEFT COLUMN

- The top row indicates autothrottle engagement mode, bottom row indicates autothrottle armed mode.

#### RIGHT COLUMN

- Depicts whether the Autothrottle is engaged or disengaged

AUTOTHROTTLE (AT) MODE FIELD ANNUNCIATORS		
Annunciator	Status	Mode Description
TO	Armed	AT Take-off Mode Armed
TO	Active	AT Take-off Mode Active
HOLD	Active	AT HOLD Active
SPD <sub>T</sub>	Active	AT Speed on Throttle Mode
SPD <sub>E</sub>	Active	AT Speed on Elevator Mode
RETD	Armed	AT Retard Mode
RETD	Active	AT Retard Mode
GA	Active	AT GO-Around Mode
LIM	Active	AT Limit Mode

<b>AT</b>	<b>Engaged</b>	<b>AT is Engaged</b>
<b>AT</b>	<b>Disengaged</b>	<b>AT has been disengaged</b>
<b>OVRD</b>	<b>Active</b>	<b>AT Override is Active</b>

## AUTOPILOT ANNUNCIATIONS ON FMA



### 1. AUTOPILOT ENGAGE ANNUNCIATOR

AUTOPILOT MODE FIELD ANNUNCIATORS		
Annunciator	Status	Mode Description
<b>AP</b>	<b>Engaged</b>	<b>AP is Engaged</b>
<b>AP</b>	<b>Disengaged</b>	<b>AP is Disengaged (Flashes in Red)</b>

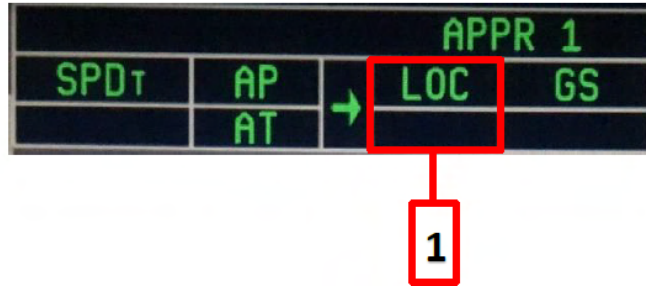
### 2. AUTOPILOT/AUTOTHROTTLE SOURCE SELECTION

- PFD source that currently supplies the references (primary NAV source and selected airspeed reference) for the AP
- **Note:** This function is not simulated in this version of the product

### 3. APPROACH STATUS INDICATION

- Approach armed status shows to the left side of the source selector in white
- Approach engaged status is shown to the right of the source selector in green
- APPR 1 - CAT I capable
- APPR 2 - CAT II capable

## LATERAL FLIGHT DIRECTOR MODES



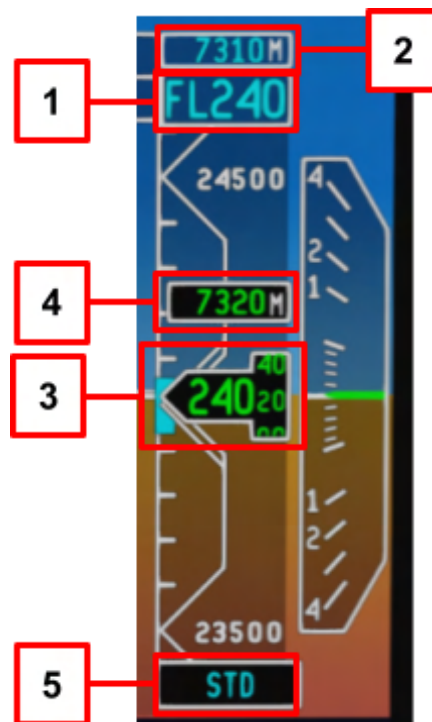
LATERAL MODE FIELD ANNUNCIATORS		
Annunciator	Status	Description
<b>Armed Modes (Bottom row)</b>		
<b>LOC</b>	Armed	Localizer Mode
<b>LNAV</b>	Armed	Lateral Navigation Mode
<b>Active Modes (Top Row)</b>		
<b>ROLL</b>	Active	Roll Hold Mode
<b>HDC</b>	Active	Heading Hold Mode
<b>TRACK</b>	Active	Take Off or GO-Around Mode
<b>LOC</b>	Active	Localizer Mode
<b>LNAV</b>	Active	Lateral Navigation Mode

## VERTICAL FLIGHT DIRECTOR MODES



VERTICAL MODE FIELD ANNUNCIATORS		
Annunciator	Status	Description
<b>Armed Modes (Bottom row)</b>		
<b>GS</b>	Armed	Glideslope Mode
<b>VNAV</b>	Armed	Vertical NAV Mode
<b>Active Modes (Top Row)</b>		
<b>GS</b>	Active	Glideslope Mode
<b>ALT</b>	Active	Altitude Hold Mode
<b>FLCH</b>	Active	Flight Level Change Mode
<b>TO</b>	Active	Takeoff Mode
<b>FPA</b>	Active	Flight Path Angle Mode
<b>ASEL</b>	Active	Altitude Select Mode
<b>VS</b>	Active	Vertical Speed Mode
<b>VNAV</b>	Active	Vertical NAV Mode
<b>FLCH</b>	Active	Flight Level Change Mode (From FMS)
<b>ASEL</b>	Active	Altitude Select Mode (From FMS)
<b>ALT</b>	Active	Altitude Hold Mode (From FMS)
<b>PTH</b>	Active	Path Mode and Vertical PAtH (From FMS)
<b>OVSP</b>	Active	Overspeed Protection is Active

## ALTITUDE READOUT



### 1. SELECTED ALTITUDE DIGITAL READOUT

- Displays altitude rounded to 100ft
- Format is in thousands of feet or FL, depending on the STD setting. More below in number 5.
- Displays cyan dashes on ground power-up. These disappear once you rotate the altitude knob for the first time
- Altitude alert sounds when the aircraft is within 1000 ft of selected altitude

### 2. METRIC SELECTED ALTITUDE READOUT

- This readout shows the preselected altitude in meters.
- It can be displayed or removed by the PUSH FT-M button that is in the middle of the ALT knob

### 3. ALTITUDE ROLLING DIGITS DISPLAY

- Actual altitude rolled to a resolution of 1 foot, but labeled every 20 feet.
- Altitudes above 0 but less than 10,000 ft have a green black dashed box symbol that replaces the ten thousand digit

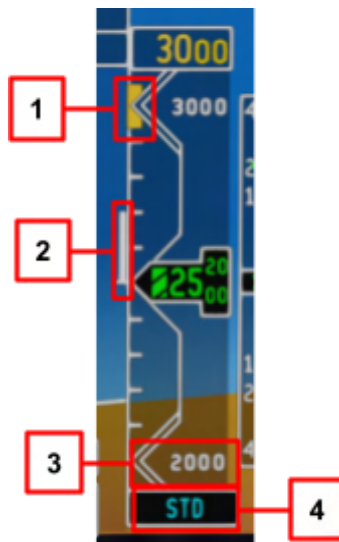


## 4. METRIC ALTITUDE DISPLAY

- Current altitude in meters is displayed to a resolution of 5 meters.

## 5. BARO ALTIMETER SETTING

- Value is adjusted with BARO SET knob on the Guidance panel
- When the PUSH STD button on the BARO SET knob is pushed
  - i. The altimeter setting window changes to STD
  - ii. The correction is set to 29.92 in Hg or 1013 hPA
  - iii. Dialed altitude is shown in the Flight Level Format. (Example: “FL210” instead of “21 000”)
- Selected altitude digital readout then displays Flight Level (e.g. “FL300” instead of 30,000ft)



### 1. SELECTED ALTITUDE BUG

- Corresponds to the altitude value set in the altitude alert select digital display.
- When the selected altitude is off the displayed range, half of the bug remains on the top or bottom of the scale to indicate the direction to the selected altitude.

## 2. ALTITUDE TREND VECTOR

- White thermometer starting at the altitude reference line and extends to the altitude the aircraft will be at in 6 seconds, based on current vertical speed.

## 3. BAROMETRIC ALTITUDE TAPE

- Moving scale.
- White tick marks are at 100-foot increments, except the white chevrons are at the 500-foot increments. Double chevrons are displayed at the 1,000-foot increments.

## 4. BARO (BAROMETRIC) ALTIMETER SETTING

- Value is adjusted with BARO SET knob on the guidance panel.
- When the PUSH STD button on the BARO SET knob is pushed the altimeter setting window changes to STD and the correction is set to 29.92 in Hg or 1013 hPa.

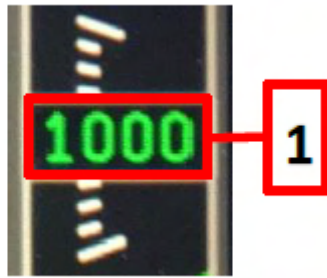


## 1. SELECTED VERTICAL SPEED READOUT and BUG

- Displayed when VS is the active vertical flight director mode.
- Vertical speed is manually entered by using the VS when AP is in VS mode.
- Cyan arrows above or below the display indicate the aircraft must climb or descend to attain the target vertical speed.

## 2. VERTICAL SPEED SCALE

- Fixed scale with moving green pointer.
- Green pointer indicates the vertical speed on the scale.
- Cyan filled bug is displayed on the vertical speed scale and is positioned at the selected vertical speed readout value.



## 1. VERTICAL SPEED DIGITAL READOUT

- Displays digital vertical speed.
- If TCAS RA is active, vertical speed readout is removed.
- At vertical speeds greater than 9,900 FPM, when the pressure altitude data received is invalid, or when the altitude rate data is invalid the readout displays:



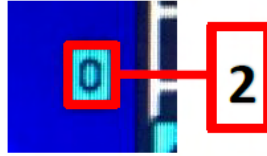
## 1. RADIO ALTITUDE READOUT

- Only displayed when radio altitude is valid and less than 2,500 feet.

## 2. SELECTED MINIMUM RA/BARO ALTITUDE READOUT AND BUG

- Set using the MINIMUMS rotary knob when BARO is selected on the MINIMUMS RA/BARO select switch.
- If additional counterclockwise clicks occur after the display reads 0, display is removed from view.
- **B** Selected BARO altitude bug (with a horizontal L that sticks out from the left edge of the altitude tape).

- **R** Selected Radio Altitude bug (with a horizontal L that sticks out from the left edge of the altitude tape).



## 2. MARKER BEACONS

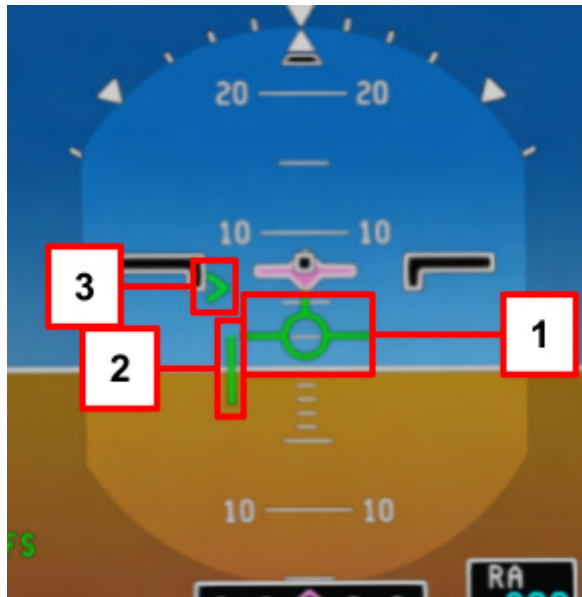
- Located in the upper right corner

Annunciator	Marker	Color
<b>O</b>	Outer	Cyan
<b>M</b>	Middle	Yellow
<b>I</b>	Inner	White

## FLIGHT DIRECTOR (FD)

- Automatically displays if either is true:
  - TOGA button actuation
  - Autopilot is activated
- FD automatically transitions from TAKEOFF MODE to GUIDANCE CUE upon reaching 1200ft after Takeoff.

<b>FLIGHT DIRECTOR GUIDANCE CUE (Diamond with short wings)</b>	<b>FLIGHT DIRECTOR GUIDANCE CUE IN TAKEOFF MODE (Cross bars)</b>
<ul style="list-style-type: none"> <li>• Displayed as a magenta diamond with short wings.</li> <li>• Fits within the flight path vector symbol.</li> </ul>	<ul style="list-style-type: none"> <li>• Magenta vertical and horizontal bar</li> <li>• Displayed only when TOGA is pressed on the throttle which activates the TO flight director mode</li> <li>• Maintains extended runway centerline.</li> <li>• Maintains pitch attitude based on appropriate configuration.</li> </ul>
<p>The diagram shows a cockpit instrument display with a magenta diamond symbol containing a small aircraft icon with short wings. The diamond is centered within a larger flight path vector symbol. The background shows a horizon line with a blue sky and brown ground, and various scale markings (10, 20) are visible.</p>	<p>The diagram shows a cockpit instrument display with a magenta crosshair symbol (vertical and horizontal bars) centered on the flight path vector. The background shows a horizon line with a blue sky and brown ground, and various scale markings (10, 20) are visible. A digital display at the bottom right shows the number '10' and the label 'RA'.</p>



## 1. FLIGHT PATH VECTOR (FPV)

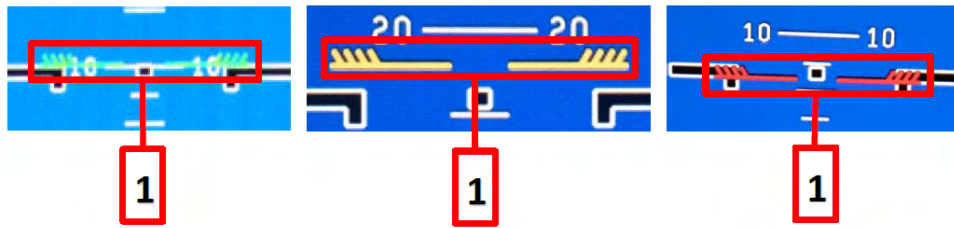
- Consists of a green aircraft symbol that indicates the current flight path angle in reference to the horizon line.
- FPV is removed when excessive pitch is exceeded.

## 2. FLIGHT PATH VECTOR SPEED ERROR TAPE

- Green tape that rises or descends from the left wing of the FPA symbol.
- Represents the difference between the selected airspeed and the current airspeed.
- Down indicates current airspeed is less than the selected airspeed, and up indicates more.

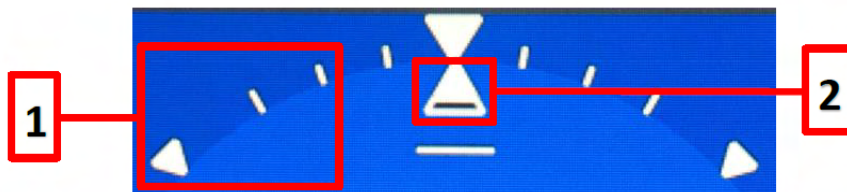
## 3. FLIGHT PATH VECTOR ACCELERATION POINTER

- Displayed when FD is selected and gives an analog indication of acceleration and deceleration rate along the flight path.
- Moves up for increasing values of flight path acceleration and moves down for decreasing values of flight path acceleration.



## 1. PITCH LIMIT INDICATOR (PLI)

- Pitch-based indication between stick shaker angle of attack and airplane's angle of attack.
- PLI is displayed as Green, Amber, or Red.
- Red PLI - stick shaker is activated.



## 1. ROLL SCALE

- Tick marks are located every 10° up to 30°.
- Inverted triangles are displayed at 0° and 45° of roll.

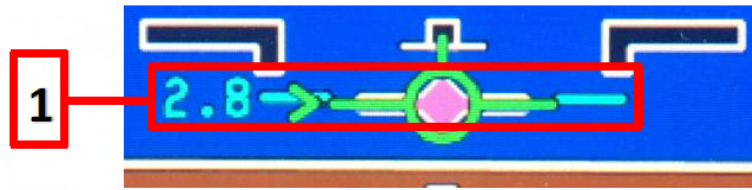
## 2. ROLL POINTER AND SLIP/SKID INDICATION

- The triangle is the roll pointer. Bottom half of the roll pointer is used as a slip/skid indicator.
- Lower portion of the triangle moves left or right to show the slip or skid condition.



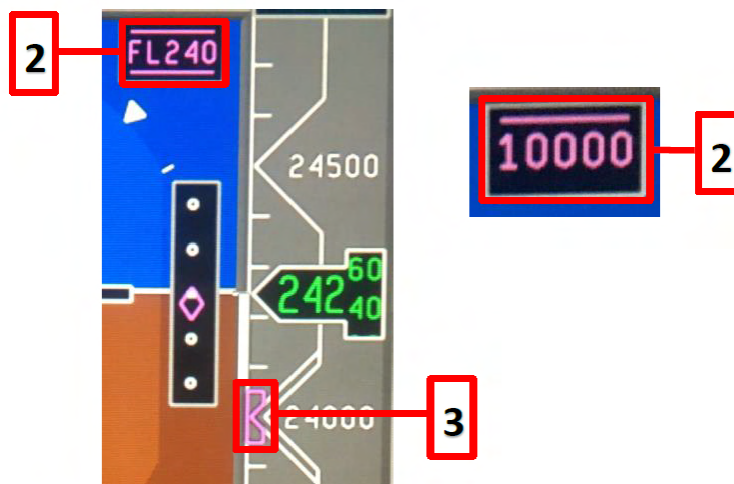
## 3. LOW BANK LIMIT ARC

- Helps the pilot to fly with low bank angles during turns
- Automatically displayed above FL250



## 1. FLIGHT PATH ANGLE (FPA)

- indicates the current flight path in reference to the horizon line.



## 2. VNAV ALTITUDE WAYPOINT CONSTRAINT READOUT

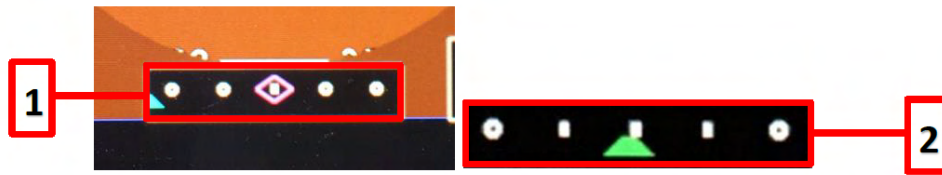
- Displays an active waypoint constraint altitude automatically honored by the FMS prior to arrival at the preselected altitude.

Constraint Type and Phase of Flight	Display Method
AT	<u>XXXXX</u> over-scored and under-scored
AT OR ABOVE	<u>XXXXX</u> under-scored
AT OR BELOW	<u>XXXXX</u> over-scored

## 3. VNAV TARGET ALTITUDE BUG

- Displayed when a VNAV target altitude is valid and the FMS is the primary NAV source.



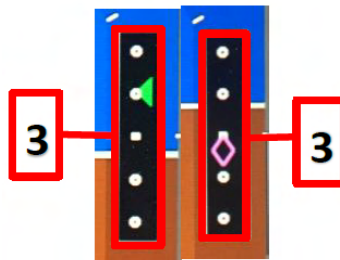


## 1. ADI LATERAL DEVIATION

- Magenta diamond for FMS deviation. Green trapezoid pointer used for LOC.
- When both are displayed during PREV mode the trapezoid is displayed in cyan.
- When a valid deviation is not available, a **X** is depicted.

## 2. EXPANDED LATERAL DEVIATION

- Replaces the ADI scale for CAT II operations.
- Higher lateral deviation sensitivity.



## 3. VERTICAL DEVIATION SCALE AND POINTER

- Pointer is controlled by the selected primary navigation source (PNS).
- Vertical deviation scale is displayed when:
  - Localizer (LOC) is selected as the PNS.
  - FMS is selected as the PNS, and the FMS commands the VNAV vertical scale in view.
- ILS LOC deviation pointer is a green trapezoid.
- VNAV FMS is a magenta hollow diamond
- When glideslope data is invalid or when the vertical deviation scale is commanded into view by the FMS and a valid deviation is not available a **X** is depicted.
- Preview vertical deviation is displayed when LOC is the PREV source.
- LOC and FMS deviation are displayed the same way as the lateral deviation.



**FULL COMPASS MODE**



**ARC MODE**

## HORIZONTAL SITUATION INDICATOR (HSI) DISPLAYS

- Heading display on the HSI has 3 selectable modes: Full compass, Arc, and Map mode.
- Modes are selected by pushing the HSI button.

### FULL COMPASS MODE

- Displayed on initialization.
- 360-degree compass view.
- Present heading is indicated by a fixed lubber line at the top of the heading scale with a digital heading readout directly above the lubber line.

### ARC MODE

- 90 degrees of compass view.
- Weather is displayed when the **WX** button is pushed



## 1. SELECTED HEADING DIGITAL READOUT AND BUG

- Displays the digital value for the aircraft selected heading.
- Cyan heading select bug is positioned by rotating the HDG SEL knob.
- Pushing the PUSH SYNC button on the HDG SEL knob synchronizes the heading bug and readout to the current aircraft heading.

## 2. DRIFT ANGLE BUG

- Represented by an inverted solid white triangle displayed on the outside edge of the heading scale.
- The difference between the aircraft heading and the aircraft ground track is the drift angle.
- The drift angle bug is placed on the edge of the heading scale and aligned to the drift angle with respect to the lubber line.
- When the drift angle is 0°, the drift bug fits inside the heading bracket notch.

## 3. WIND DISPLAY

- Digital readout for wind speed and an arrow vector for direction.



### 1. PRIMARY NAV SOURCE ANNUNCIATOR

- Selected using the V/L or FMS buttons.

- The **V/L (VOR/LOC)** button selects the available SRN (short-range navigation) source, displayed in green.
  - The associated annunciators are **VOR 1** **VOR 2** **LOC 1** **LOC 2**
- The **FMS** button selects FMS as the source, displayed in magenta.
  - With dual FMS systems installed the identifier will show **FMS1** or **FMS2** (this feature is not currently implemented)

## 2. PRIMARY NAV DISTANCE IDENTIFIER

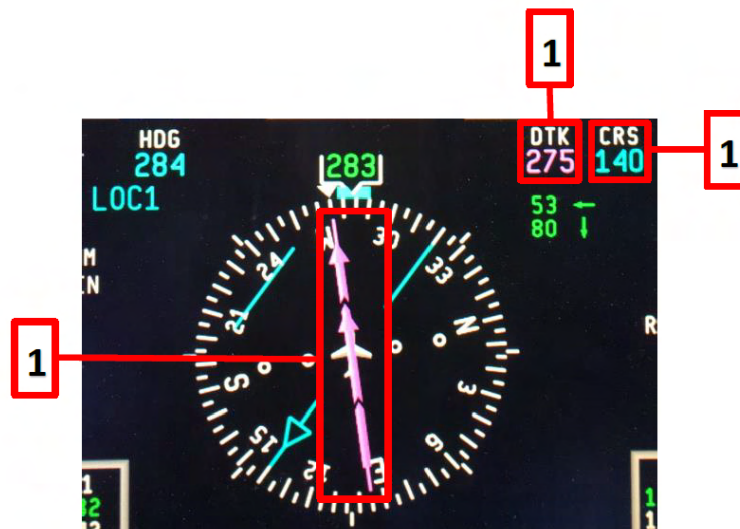
- Displays the NAV source station identifier.
- The next magenta TO waypoint identifier is displayed.

## 3. PRIMARY NAV DISTANCE READOUT

- Distances of 100 NM or more, the digits are displayed with 1 NM resolution.
- Distances of less than 100 NM, the digits are displayed with 0.1 NM resolution.

## 4. PRIMARY NAV ESTIMATED TIME ENROUTE

- Time is always displayed in minutes.



## 1. COURSE SELECT/DESIRED TRACK POINTER AND READOUT

- Green for VOR and LOC navigation and the label is **CRS**
  - When VOR or LOC is selected, the track pointer is positioned by turning the CRS knob.
- Magenta for FMS navigation and the label is **DTK**
  - Value of the desired track is supplied by the FMS.
- Course deviation bar moves laterally and shows lateral deviation.



## 1. COURSE DEVIATION INDICATOR (CDI) AND LATERAL DEVIATION SCALE

- Only displayed when a navigation source is active.
- Deviation bar moves left or right to show the deviation from the selected NAV source.



## 2. BEARING POINTERS

- Source is either VOR, ADF, or FMS.
- Source is selected using the **BRG** ○ or **BRG** ◊ buttons on the guidance panel



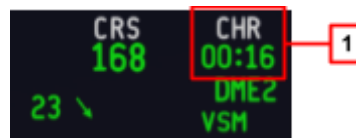
## 1. DME SOURCE ANNUNCIATOR

- DME source is selected by pushing the V/L button.
- DME source annunciation reflects the short-range navigation source selection.
- VOR1/LOC1 displays **DME1** VOR2/LOC2 displays **DME2**
- When the primary NAV source is FMS, the last selected VOR/LOC is used for the DME distance display.

- When the same source is used, the DME data is displayed in amber.

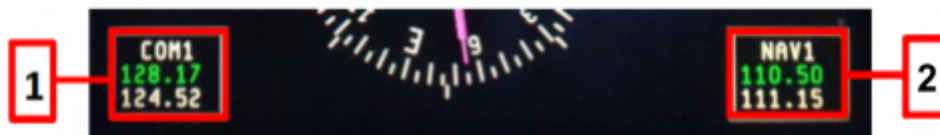
## 2. DME STATION IDENTIFIER, DISTANCE, AND TTG READOUT

- DME source station identifier is displayed directly below the DME source annunciator.
- Distance to go to the waypoint identified by the DME station identifier is shown in nautical miles.
- TTG to the waypoint identified by the DME station identifier is shown in minutes.



## 1. ELAPSED TIMER

- Located in the top right corner of the HSI.
- Displays time in hours and minutes (HH:MM) or minutes and seconds (MM:SS).
- Controlled by the CHRONO button on the control yoke.
- 1st push - displays readout with the readout counting up from 00:00. Next push pauses the readout. Next push resets the readout back to 00:00 and pauses. Next push restarts the count.



## 1. COM FREQUENCY AND IDENTIFIER DISPLAY

- White COM source identifier annunciator.
- Green COM active frequency active frequency.
- White COM standby frequency

## 2. NAV FREQUENCY AND IDENTIFIER DISPLAY

- White NAV source identifier annunciator
- Green active frequency when manually tuned or magenta when auto tuned.
- White NAV standby frequency.

## PREVIEW MODE

- When FMS is the primary navigation source and preview is selected, course, lateral deviation and vertical deviation are displayed.
- This is usually used when nearing the approach, prior to switching to VOR/LOC for the approach.
- Only available in full compass or arc mode.



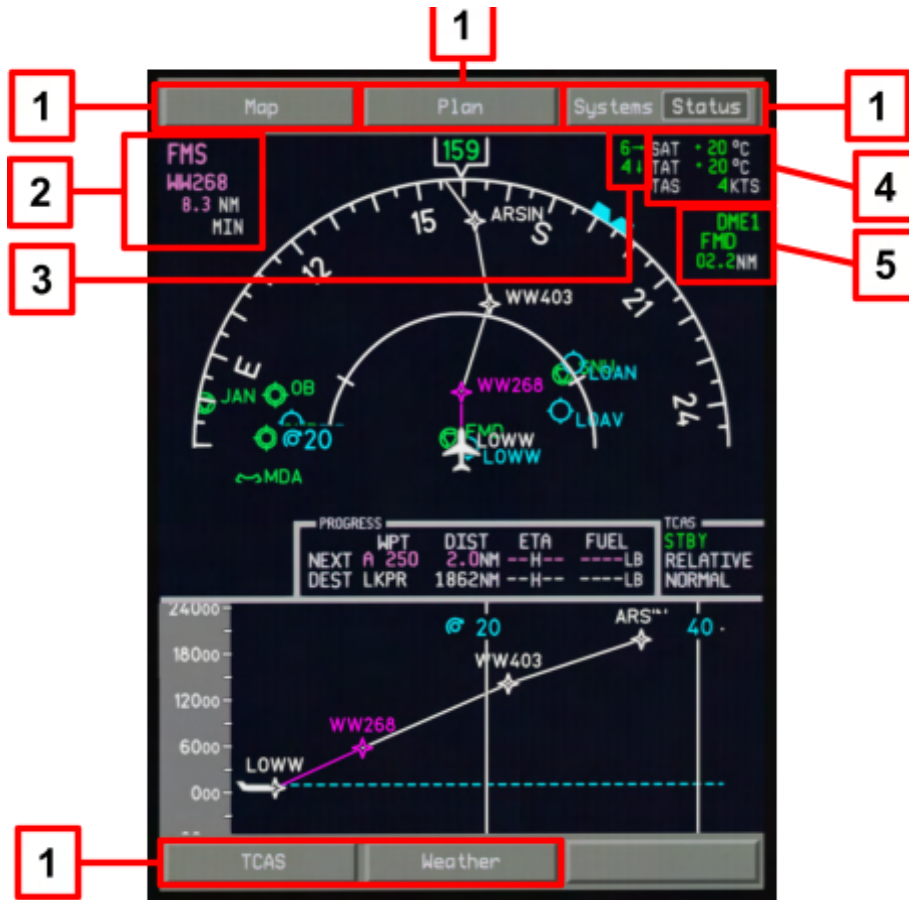
### 1. PREVIEW NAVIGATION SOURCE

- Preview NAV source is annunciated in cyan to the right of the primary NAV source.
- Available annunciations are: **VOR1** **VOR2** **LOC1** **LOC2**.

### 2. PREVIEW COURSE POINTER, DEVIATION BAR, and DIGITAL READOUT

- Cyan course arrow and deviation bar displayed at the same time as the primary NAV source DTK pointer and deviation bar.
- Changed by turning the on-side CRS select knob when PREV is displayed.
- TO/FROM pointer is a smaller cyan arrowhead that is displayed at the top (TO) or bottom (FROM) of the deviation bar.

## MULTIFUNCTION DISPLAY (MFD)



### 1. TITLE MENU BUTTONS (HOT KEYS)

- Each have menus to control and show the associated MFD display pages.
- Controlled using the Cursor Control Device (CCD)
- **Note:** TCAS and Weather submenus are not simulated in the current version. These sub menus contain additional settings for TCAS and weather radar which are not available to us in the simulator. Otherwise, TCAS and Weather overlays are triggered through the MAP or PLAN dropdown menu.

### 2. PRIMARY NAV SOURCE, TO WAYPOINT IDENTIFIER, DISTANCE, and TIME DISPLAY

- Displays the primary NAV source on the top row, waypoint identifier, Distance readout below and the bottom line contains the time-to-go readout (If the aircraft is not moving, time-to-go is not displayed).



### 3. WIND DISPLAY, CARTESIAN

- Cartesian wind display displays two vector arrows.

### 4. FLIGHT INFORMATION DISPLAY

- Displays Static Air Temperature (SAT), Total Air Temperature (TAT), and True Airspeed (TAS).
- Use SAT when ATC asks for OAT.
- SAT should be used when entering temperatures in the EFB Performance pages.

### 5. DME DISPLAY

- Displays DME source, Station Identifier on the middle row, and distance readout on the bottom row.

## LOWER MFD SECTION



### 1. PROGRESS DISPLAY

- Displays waypoint name, destination, distance-to-go, ETA/ETE, and fuel remaining based on calculations received from the FMS.

## **2. VERTICAL SCALE TAPE**

- Used as an altitude reference for the pilot.

## **3. SELECTED ALTITUDE INDICATOR**

- Shows the selected altitude set by the altitude select knob.

## **4. HALF-AND FULL-RANGE INDICATORS**

- Vertical scaling ranges are selected based on the horizontal half-range currently shown.
- When range is controllable it is displayed in cyan. When the range is not controllable it is displayed in white.

## **5. AIRCRAFT TRAJECTORY LINE**

- Shows the vector trend of the aircraft in the vertical axis based on the current flight path angle.

## **6. WAYPOINT DISPLAYS**

- Contains a waypoint symbol, waypoint identifier, waypoint altitude, and when required a hold annunciator.

## **7. VERTICAL TRACK LINES**

- Connect continuous waypoints in the flight plan.

## **8. AIRCRAFT SYMBOL**

- Gives a horizontal and vertical reference point for downpath waypoints.

## FLIGHT PLAN EDITING VISUALIZATION

When editing a flight plan, for example when you are adding new waypoints, the FMS goes into the MOD mode.

- In this mode, any new route segments will be displayed in cyan on the FMS, and they will be visualized with dashes, until the new flight plane is ACTIVATED on the FMS.
- If you remove a waypoint, nothing will be displayed in dashes, as there isn't a new segment to be displayed.



In the example above, we added EVAXI and ABTAN after MALUG, and we can see that those two segments are dashed, and the waypoints are blue on the FMS, since we did not activate these changes yet.

## MAP MODE vs PLAN MODE



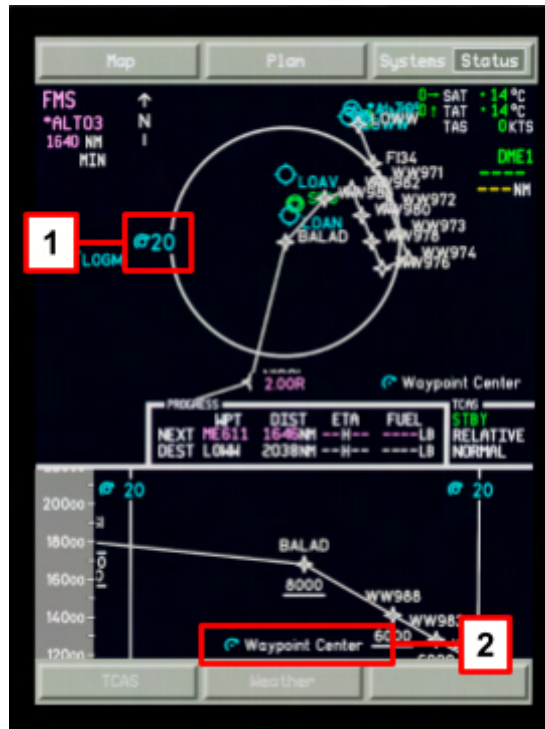
**MAP MODE**



**PLAN MODE**

Function	Map Mode	Plan Mode
<b>Display Orientation</b>	Heading up	North up
<b>View</b>	Looking at map from nose of aircraft	Looking at map relative to North Up
<b>Nonmoving reference at center of display</b>	Airplane	Next Waypoint (Aircraft centered not implemented)
<b>Heading indication</b>	Compass	Aircraft symbols nose (no compass displayed)
<b>What moves (on display)</b>	The Map	The Aircraft
<b>Range measured from:</b>	Aircraft symbol	Waypoint
<b>TCAS overlay</b>	YES	NO
<b>Weather overlay</b>	YES	NO
<b>EGPWS overlay</b>	YES	NO
<b>Cycle through the fplan</b>	NO	YES

## MAP ZOOM and CYCLING THROUGH THE PLAN



### 1. CHANGING THE MAP RANGE

- This number shows the range of the white circle (half range). In this particular case, it is 20 miles.
- **This is also a hidden manipulator!** You can use it to **zoom in or out on the map**. The official way of doing that is by rotating the knob on the pedestal under the FMS, which is also possible, but we found the manipulator on the screen much more convenient for a sim use.
- Displays waypoint name, destination, distance-to-go, ETA/ETE, and fuel remaining based on calculations received from the FMS.

### 2. CYCLING THROUGH THE FLIGHT PLAN IN PLAN MODE

You have several ways of cycling through the flight plan:

#### 1. Hidden Manipulator

Highlighted with number two on the screenshot above is a hidden manipulator. When you are in the PLAN MODE, click here (left or right, or scroll with your

mouse wheel) to cycle through the flight plan.

## 2. **Knob on the pedestal**

Use the **inner** knob on the pedestal that is located just below the left FMS (below). This is how it is done in the real aircraft.

## 3. **Use your keyboard**

Assign our custom commands to any key on your keyboard or hardware in order to easily cycle through the flight plan.

Go to the X-Plane Keyboard settings, and in the command field, search for “xcrafts” and then in the FMS section, you’ll see two commands:

1. ***Center the plan map on the next waypoint***
2. ***Center the plan map on the last waypoint***

## **TCAS PAGE**

Traffic Collision Avoidance System. If **TCAS is selected** on the map Dropdown menu and TCAS **mode is TA/RA**, traffic will be displayed on the MFD.

- If Vertical Situation Display is displayed, traffic will be displayed **on the map**
- If Vertical Situation Display is not displayed, Traffic will be displayed on **the lower section of the screen.**

### **TCAS INDICATIONS:**

- RESOLUTION ADVISORY (RA) INDICATION: Red solid square.
- TRAFFIC ADVISORY (TA) INDICATION: Amber solid circle.
- PROXIMATE TRAFFIC INDICATION: Cyan solid diamond.
- OTHER TRAFFIC INDICATION: Cyan hollow diamond.

### **TCAS MODE**

- Annunciates the TCAS operating modes: OFF - STBY - TA/RA (ACTIVE)



**TCAS Indications**

## WEATHER PAGE

- Displays target in colors.
- The real aircraft displays weather in different modes. X-Plane only allows us to show weather in the WX mode: Color indicates rain intensity.

The **Weather** dropdown menu on the bottom of the MFD is disabled, as it is only used to switch between different weather modes and enable features which are not implemented.



## WEATHER RADAR ANNUNCIATIONS

**First line:** Tilt angle readout: displays the tilt angle. (always 0.0 as we cannot tilt the antenna in X-Plane. White A annunciation: ACT is active.

**Second line:** Weather radar mode annunciation.

**Third line:** Stabilization annunciation (STAB): radar stabilization is inhibited.



## EPGWS ON THE MFD (TERRAIN RADAR)

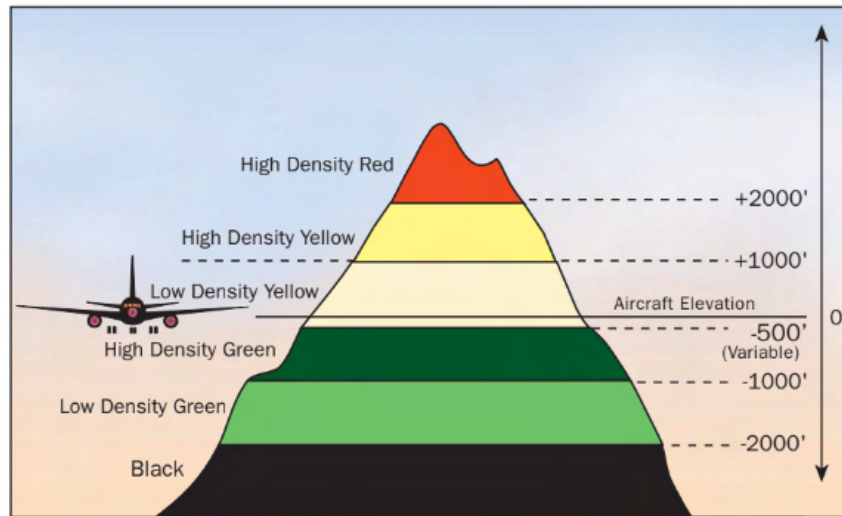
**Note:** This feature only works if a 3rd party plugin is installed in X-Plane: [Terrain radar + Vertical Situation Display by DrGluck](#).

The **EGPWS** is a Terrain Awareness and Alerting system providing terrain alerting and display functions with additional features.



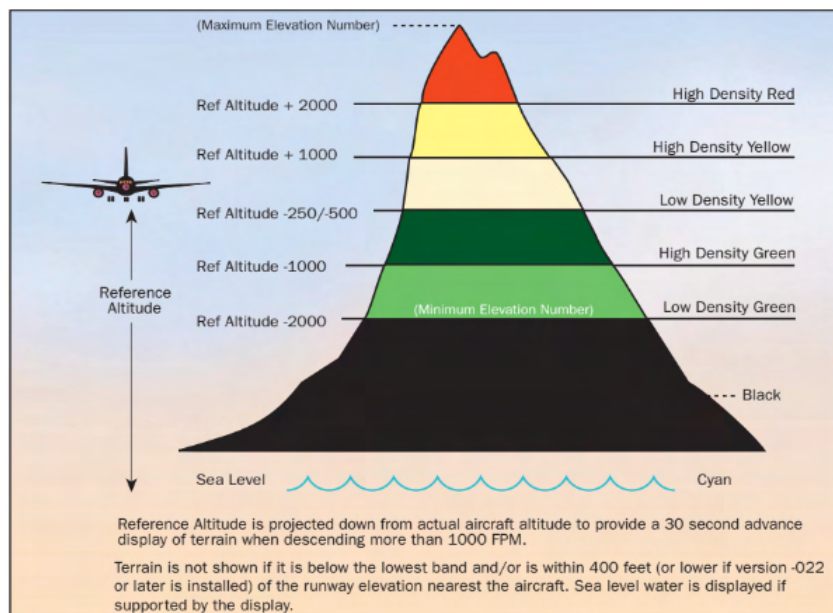
- Only displayed in the Map format
- Selected by checking the TERRAIN button on the Map dropdown menu
- The plugin can work in both modes: **Non-peaks terrain display** and **Peaks terrain display**.
- The two numbers in the TERRAIN BOX represent the upper and lower boundaries of the currently displayed terrain in hundreds of feet. If the display has a red/yellow terrain, then the upper number will be red/yellow.
- If the highest and lowest altitude numbers are the same, the lower altitude number will not be displayed.
- If the terrain is more than 2000 feet below, then the display changes to **Peaks mode**. In this mode, the terrain is displayed only in green. Display shows only the highest mountains in the area.

The **Non-Peaks display** provides a graphical plan-view image of the surrounding terrain as varying density patterns of green, yellow, and red as illustrated in the following graphics.



**Peaks Display** has all the characteristics of the Non-Peaks Display but with additional terrain display features for enhanced situational awareness independent of the aircraft altitude. The principle additions are:

The digital display of the highest and lowest terrain/obstacle elevations currently displayed, The display of additional solid or lower density color bands, including the addition of the graphic representation of sea level (0 feet MSL)



## SYSTEMS SYNOPTIC PAGES

### STATUS PAGE

- This is the only available Synoptic page of the MFD when the airplane is powered from DC power only.

Displays the following information:

- Flight info
- Temperature (TAT, SAT)
- Gross Weight
- Batteries voltage indication
- Oil Level indication
- Cockpit oxygen pressure indications
- Emergency parking brake accumulator pressure indication
- Brake temperature indication (not simulated correctly in this version)
- Doors: Green - Closed / Red - Open



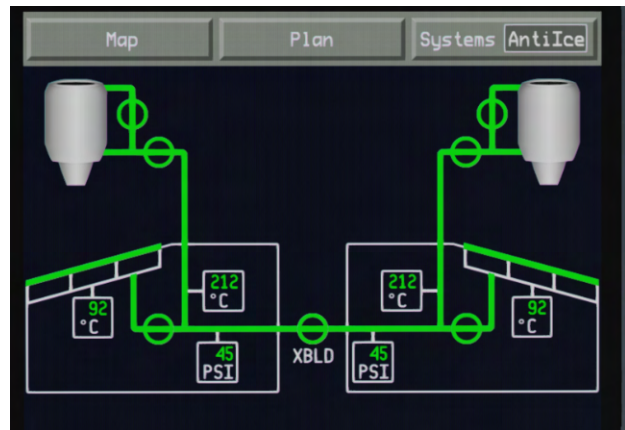
### Bleed Pressure Readouts



- They display the Bleed pressure in the engine manifolds in PSI.
- Generally, pressure should be around 45PSI, but it will change depending on the APU and Engine startups.
- Air is normally tapped from the 6<sup>th</sup> stage compressor. Pushing the thrust levers up from idle to around 55% N1 causes the 10<sup>th</sup> stage to take over and supply air and you'll see the pressure drop from 45PSI to 30PSI and then increase again.
- These readouts are identical on the STATUS, ECS and ANTI-ICE pages.
- The readouts disappear from the STATUS page when engines are fully started.

## ANTI-ICE PAGE

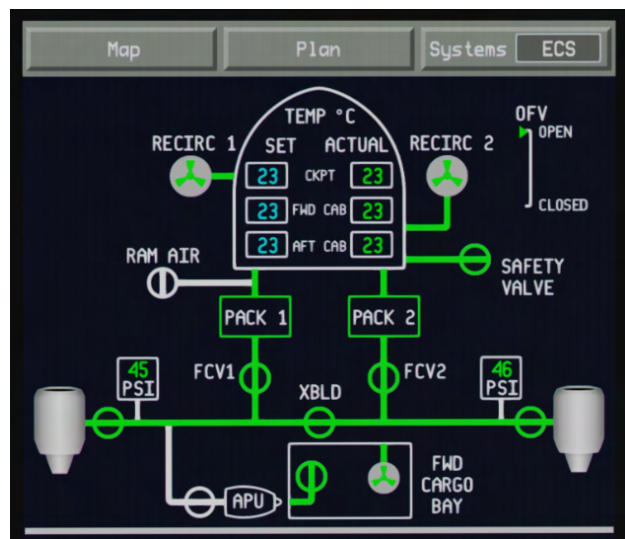
- Bleed Air System Valves Status
- Bleed Air Temperature Indication
- Bleed Air Pressure Indication
- Wing Anti-Ice Temperature Indication
- Ice Condition Annunciation



## ECS PAGE

Displays the operation of the Environmental control system and contains the following elements:

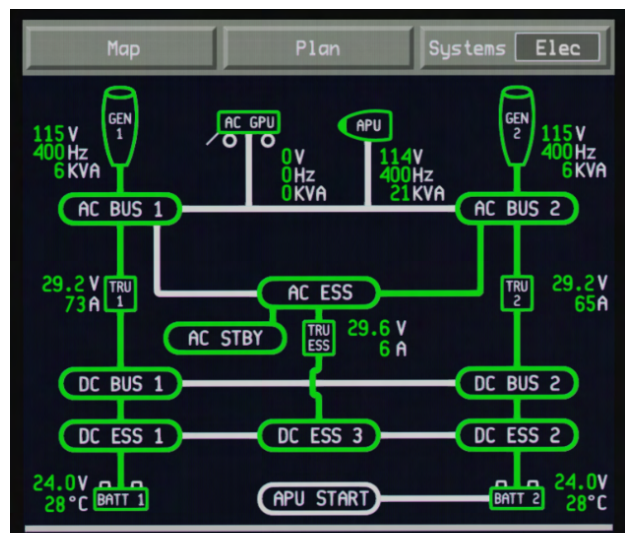
- Air shutoff valves status
- Pack Status
- Recirculation Fan Status
- Cockpit/Cabin Temperature Indication
- Outflow Valve (OFV) Position Indication
- Manifold Pressure Indication
- Flow Line
- Ground Cart



## ELEC PAGE

Displays the operation of the electrical busses and contains the following elements:

- IDGs (Integrated Drive Generators)
- AC EXTERNAL POWER (AC GPU)
- APU (AUXILIARY POWER UNIT)
- TRUs (Transformer Rectifier Units)
- BATTERIES
- RAT(RAM AIR TURBINE)



## FLIGHT CONTROL PAGE

Displays the control surfaces position status.

- **Note:** the STATUS section is always on ON or STBY in the current version of the simulator
- ELEC PBIT and HYDR PBIT are Digital remaining time readouts which display the hours until the electrical and hydraulic Power On Built In Tests expire.
- PBIT are automatic tests that happen after power-up and take 3 minutes to complete (Electrical PBIT) and 1 minute to complete (Hydraulic Power up test)

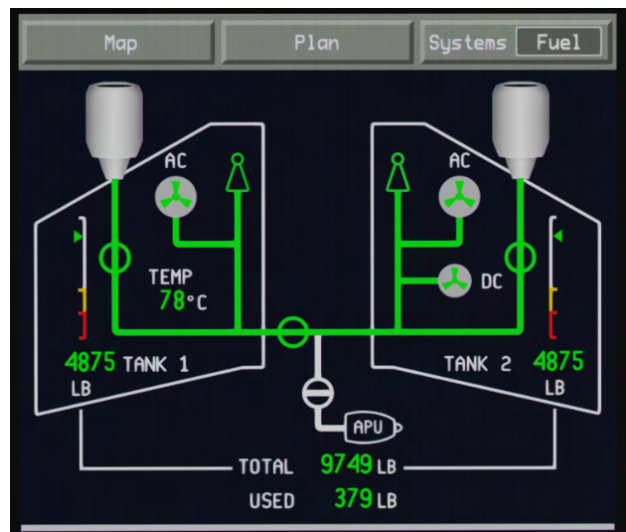


**Note:** PBIT is not simulated in this version of the product, therefore the readouts change over time but never expire.

## FUEL PAGE

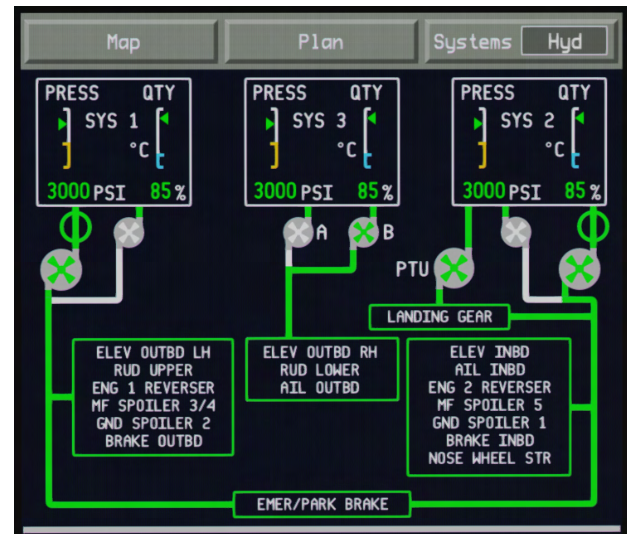
Displays the status of the fuel system on the airplane. The following indications are displayed:

- Temperature indication
- Jet pump indication
- Electric Fuel Pump Status
- Fuel System Valves Status
- Fuel Tank Quantity Indication (Tank 1 and Tank 2)
- Fuel Flow lines
- Total Fuel Quantity indication
- Total Fuel Used indication



## HYDRAULIC SYSTEM PAGE

- Pressure indication
- Quantity indication
- Temperature indication
- Engine Pump Shutoff Valve Status
- Electric Hydraulic Pump Status
- Engine Driven Hydraulic Pump Status
- Power Transfer Unit Status
- Hydraulic Flow line
- Hydraulic System Distribution Boxes



## INTEGRATED ELECTRONICS STANDBY SYSTEM (IESS)



- An integrated standby instrument system (ISIS) is an electronic aircraft instrument.
- It is intended to serve as backup in case of a failure of the standard glass cockpit instrumentation, allowing pilots to continue to receive key flight-related information.
- Takes about 90 seconds to align.

## BRIGHTNESS ADJUSTMENT BUTTONS (+ -)

- Adjusts brightness

## AIRSPEED ROLLING DIGITS

- Indicates actual calibrated airspeed.

## ILS BUTTON

- Selects the display of ILS 1 deviations.

## REFERENCE BAROMETRIC PRESSURE INDICATION

- Indicates the barometric pressure as set by the barometric rotary knob.

## STANDARD BUTTON

- Sets the barometric pressure to standard atmospheric pressure.

## ALTITUDE INDICATION

- Indicates actual altitude.
- Green hashed box appears on the left side of the numeric digits when altitude is below 10,000 ft.
- Minus (-) symbol appears on the left side when altitude is below sea level.

## BARO ROTARY KNOB

- Adjusts the barometric setting.

## CAGE BUTTON

- Resets attitude to zero, eliminating accumulated drift when the button is pressed for more than 2 seconds.
- **Note:** This feature is not simulated in this version.

## **AUTOBRAKE SELECTOR KNOB**



- RTO: Selects Rejected Takeoff deceleration rate.
- OFF: Autobrake is deactivated.
- LO: Selects the low deceleration rate.
- MED: Selects the medium deceleration rate.
- HI: Selects the high deceleration rate.



## PROX TERR INHIB BUTTON & EMERG/PRKG BRAKE LIGHT PANEL



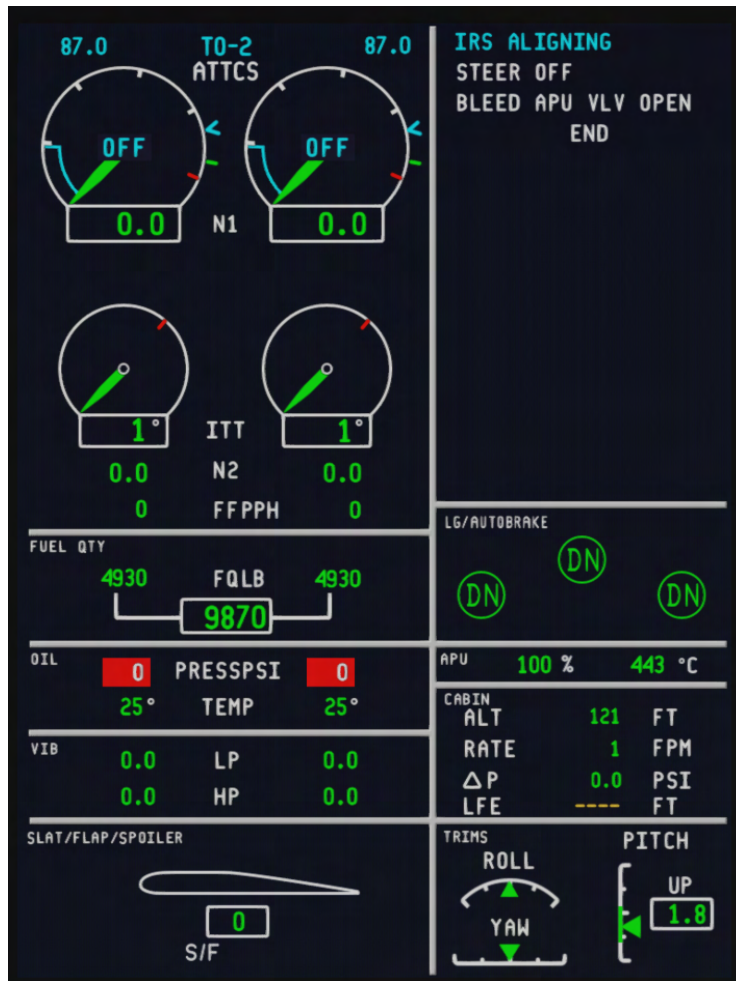
### 1. PROX TERR INHIB BUTTON

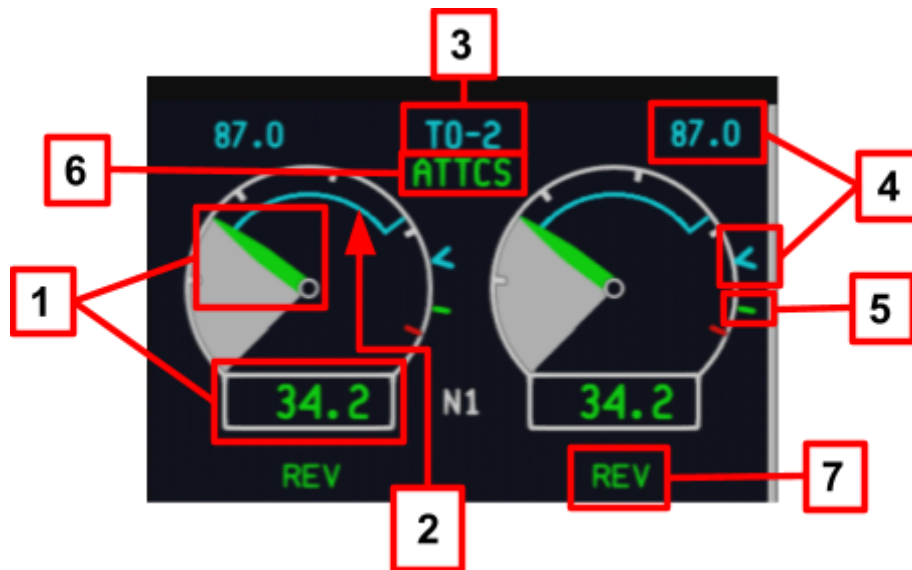
- When pushed out (WHITE STRIPE), inhibits EGPWS and thus avoids unwanted terrain alerts in airports not covered by EGPWS database.
- **Note:** This is currently not simulated

### 2. EMERG/PRKG BRAKE LIGHT

- ON: Illuminates when the emergency/parking brake is actuated and there is hydraulic pressure on the brake line

## EICAS DISPLAY





## 1. N1 INDICATION

- Displays the percentage of N1 rpm.
  - Green - normal operating range
  - Red - Operating limit exceeded
  - Amber dashed - invalid information or value out of displayable range.
- **OFF** Displays when the engine is shut down.

## 2. N1 REQUEST INDICATION

- Indicates the momentary difference (transient) between actual N1 and requested N1 applied by TLA.

## 3. THRUST RATING MODE INDICATION

- Indicates the current thrust-rating mode.

### ENGINE THRUST RATINGS

- FADEC calculates the maximum N1 for each thrust rate mode

#### Available thrust modes:

##### TAKEOFF (TO-1, TO-2)

- Thrust used for a normal takeoff.
- Manual switching between the takeoff modes is possible in flight on the MCDU-TRS page.

##### MAXIMUM CONTINUOUS RATING (CON)

- Used in emergency situations where thrust higher than usual is required.

### **MAXIMUM CLIMB RATING (CLB-1, CLB-2)**

- Whenever the selected takeoff thrust is lower than CLB-1 the CLB-2 mode becomes the default.
- Manual switching between the climb modes is possible in flight on the MCDU-TRS page.

### **MAXIMUM CRUISE RATING (CRZ)**

- Maximum  $N_1$ , that can be used for a normal cruise flight.
- Automatically selected when level at the Cruise altitude

## **4. N1 TARGET INDICATION (DIGITAL READOUT AND BUG)**

- Maximum N1 for the engine thrust rating mode indicated on EICAS.

## **5. MAXIMUM N1 INDICATION**

- Indicates the maximum allowable N1 (maximum thrust) for the current thrust rating and operating conditions.

## **6. ATTCS INDICATION**

- Displayed to indicate the Automatic Takeoff Thrust Control System status.
- Green - engaged (only when TL reach TO/GA position), White-armed, Blank - not selected.

## **AUTOMATIC TAKEOFF THRUST CONTROL SYSTEM (ATTCS)**

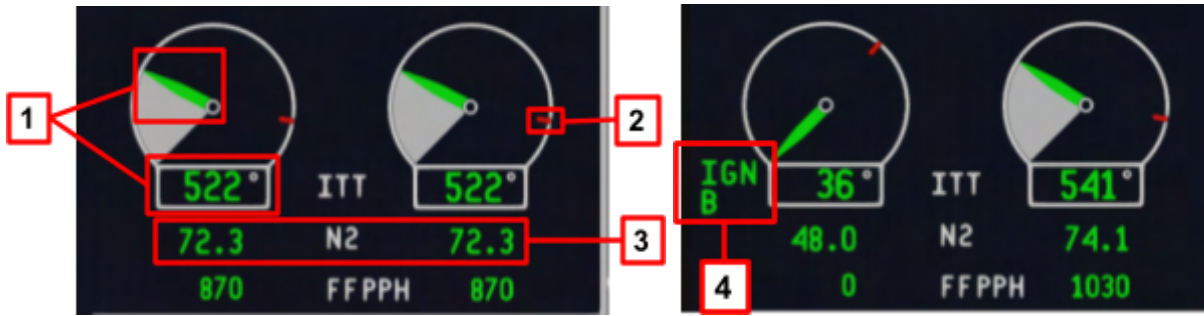
- Controlled by the FADEC and is available on takeoff and go-around.
- Selection is made in the MCDU on the TAKEOFF DATASET MENU
- Takeoff with ATTCS OFF is prohibited.

## **7. THRUST REVERSER INDICATION**

- Indicates the thrust reverser position.
- Green - fully deployed, Amber - in transition
- Red - discrepancy between selected and actual reverser position.

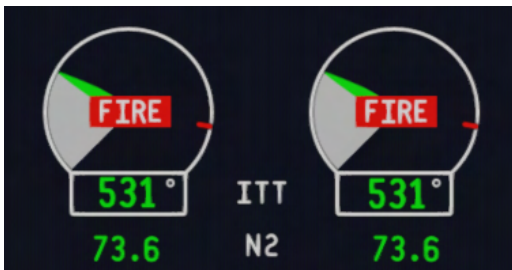
## **8. N1 RED LINE**

- Indicates the N1 limit.



## 1. INTERTURBINE TEMPERATURE (ITT) INDICATION

- Green - normal operating range, Red - operating limit exceeded.
- FIRE Indicates engine fire condition.



## 2. ITT RED/AMBER LINE

- Maximum allowable ITT for the current flight phase.
- Limits thrust, thereby avoiding the maximum allowable ITT to be exceeded.

## 3. N2 INDICATION

- Displays the percentage of N2 rpm.
- Green - normal operating range, Red - operating limit exceeded.

## 4. IGNITION CHANNEL INDICATION

- Indicates the enabled ignition channel



## 1. FUEL FLOW INDICATION

- Indicates the left and right engine fuel flow in pounds per hour.

## 2. FUEL QUANTITY INDICATION

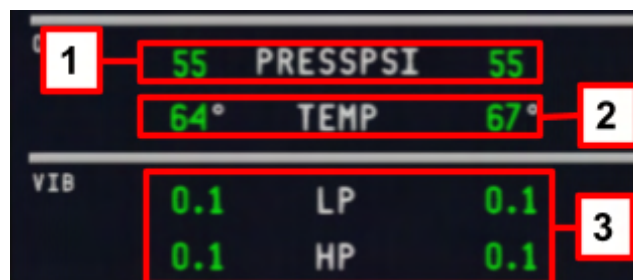
- Indicates left and right wing tanks fuel quantities separately.
- Total fuel in all tanks is indicated inside a gray box.
  - **Green** - normal operating range
  - **Amber** - cautionary operating range
  - **Red** - low fuel quantity.

## FUEL TANKS

- Two integral fuel tanks, one in each wing. Each tank incorporates: collector tank and a surge tank.
- Collector tank (inboard section) keeps the fuel pumps submerged, ensuring a constant fuel flow to the respective engine.
- Surge tank (outboard section) is designed to collect any fuel that may enter the vent system during wing down and uncoordinated maneuvers.
- Vented through a vent tank in the surge tank.
- Fuel cannot be transferred from tank to tank or dumped overboard.

## FUEL QUANTITY INDICATION

- Electrical sensors measure the fuel quantity in each tank.
- Declare min fuel at 2660 lbs/1200kg.
- Declare emergency fuel at 1300 lbs / 600kg.



## 1. OIL PRESSURE INDICATION

- Indicates the engine oil pressure.
- Green - normal operating range, Amber-cautionary operating range, Red-operating limit exceeded.

## 2. OIL TEMPERATURE INDICATION

- Indicates the engine oil temperature.
- Green - normal operating range, Amber - cautionary operating range.

## 3. ENGINE VIBRATION INDICATION

- Indicates low-pressure (LP) and high-pressure (HP) vibration levels for both engines.
- Transient LP or HP high vibration indication without any other abnormal engine parameter indication may be considered normal.



### 1. SLAT/FLAP POSITION

- Displays the slat/flap position. If the information is invalid, the indication will be removed from the display.
- Cyan pointers show the slat/flap commanded position and the green slat/flap depictions show the actual slat/flap position.

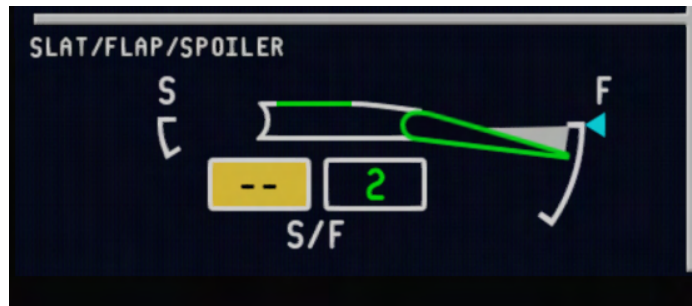
### 2. SLAT/FLAP READOUT

- Displays the slat/flap surface position.
- Green dashes indicate slat/flap in transit.

### 3. SPEEDBRAKE INDICATION

- Displays a white SPDBRK annunciation when the airplane is in the air.
- Displays a white GND SPLR annunciation when the airplane is on the ground.

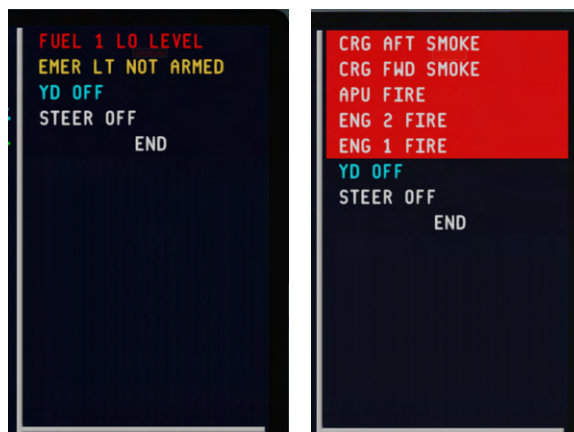
**Note:** During DC power, not all systems are operational and therefore the SLAT/FLAP/SPEEDBRAKE indication looks like this:



The indications will display normal once AC power has been established.

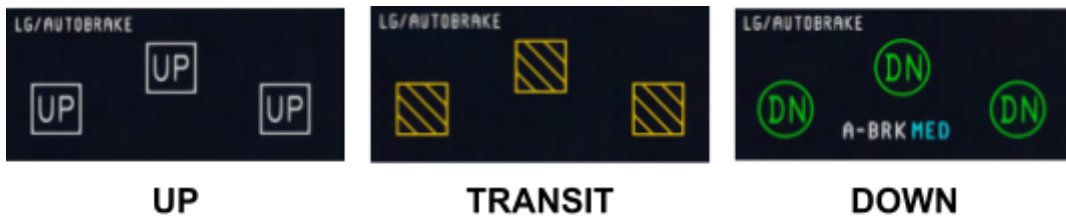
## CREW ALERTING SYSTEM (CAS) WINDOW

Four message priority levels: **Warning, Caution, Advisory, Status**



- **WARNING (red):** Indicates an emergency or airplane system condition that requires immediate corrective or compensatory crew action.
- **CAUTION (amber):** Indicates abnormal operational or airplane system conditions that require immediate crew awareness and should require a subsequent corrective or compensatory action.
- **ADVISORY (cyan):** Indicates operational or airplane conditions that require crew awareness. Subsequent or future crew action may be required.
- **STATUS (white):** Indicates information/status messages.





## LANDING GEAR POSITION INDICATION

- **UP:** the white UP label inside a white box indicates that the respective landing gear is up and locked.
- **TRANSIT:** the amber cross-hatched box indicates that the respective landing gear is in transit.
- **DOWN:** the green DN label inside a green circle indicates that the respective landing gear is down and locked.

## AUTOBRAKE EICAS INDICATION

- Autobrake status is shown on EICAS in the LG/AUTOBRAKE box.
  - A-BRK indicates the autobrake is armed.
  - Cyan labels indicate the selected mode: **RTO HI MED LO**
  - **---** Indicates the data is invalid

## AUXILIARY POWER UNIT (APU)

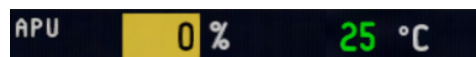
- The APU indication shows OFF if the APU is off.

### APU START

- Rotating the APU switch to the ON position displays yellow dashes for 3 seconds. It is not possible to rotate the APU switch to the START position while the dashes are displayed.



- After 3 seconds, the display changes to a yellow box indicating the APU is ready to be started.



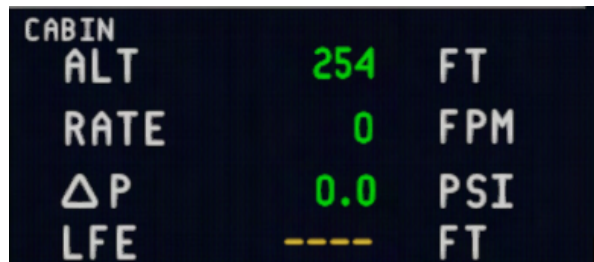
- Rotating the switch to the momentary START position starts the APU.
- It takes about 1 minute for the APU to start.



## APU SHUTDOWN

- Rotating the APU switch to the OFF position will initiate the APU cooldown sequence (about 1 minute) followed by the APU shutdown sequence.
- Rotating the APU switch back to the ON position during the shutdown sequence will cancel the APU shutdown.

## CABIN ALTITUDE INDICATION

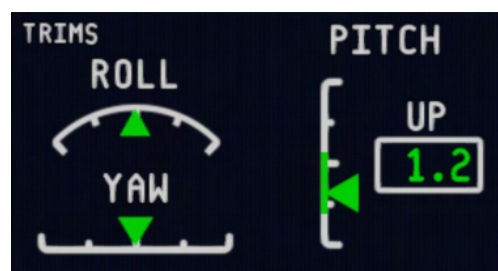


Indicates the following parameters:

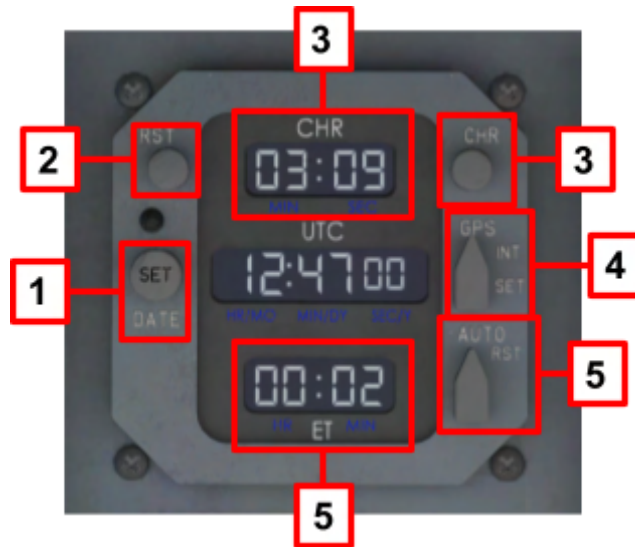
- Cabin altitude indication
- Cabin rate of change indication
- Differential pressure indication
- Landing Field Elevation indication (This is taken from the FMS)

## TRIM INDICATION

- Displays the Roll/Pitch/Yaw trim scales
- There is a green takeoff band on the pitch trim scale, corresponding to the allowable pitch trim position for takeoff.
- Pitch Digital trim readout displays the horizontal stabilizer trim position.  
UP/DOWN is displayed above or below the readout.
  - UP means Nose up
  - DOWN means Nose down



## CLOCK/CHRONOMETER



### 1. DATE/SET KNOB/BUTTON

- **Note:** This feature is not simulated in the current version. The clock follows the time of the simulator.

### 2. RESET BUTTON

- Resets the chronometer to zero.
- Display is blanked when the RST button is pressed and the chronometer was stopped, because the value is now 00:00.

### 3. CHRONOMETER BUTTON

- Starts/stops the chronometer.

### 4. GPS/INT/SET SELECTOR

- **Note:** This feature is not simulated in the current version. The clock follows the time of the simulator. The selector is permanently on GPS.
- GPS: synchronizes with UTC and DATE from GPS.

### 5. ELAPSED TIME SELECTOR

- AUTO: automatically starts the chronometer on liftoff. This is always active.
- RST: Resets the elapsed time if Weight-on-Wheels (wow) is present.

## LANDING GEAR



### LANDING GEAR LEVER

- **UP:** Retracts the landing gear.
- **DOWN:** Extends the landing gear.

### DOWNLOCK RELEASE BUTTON

- Lock protects against inadvertent landing gear retraction when weight-on-wheels.
- **Note:** This feature is not simulated in the current version

## EMERGENCY LOCATOR TRANSMITTER (ELT) ARTEX ELT

- This feature is not simulated in the current version



## GND PROX G/S INHIB BUTTON



- **Note:** This feature is not simulated in the current version
- Used to manually cancel glideslope alerts
- Illuminates when pressed any time below 2000ft nominal radar altitude and will be automatically reset (light off) by climbing above 2000ft nominal or descending below 30ft

## ADS PROBES HEATER BUTTON

- **Note:** This feature is not simulated in the current version



# PEDESTAL & CONTROL WHEEL

## POWERPLANT POWER



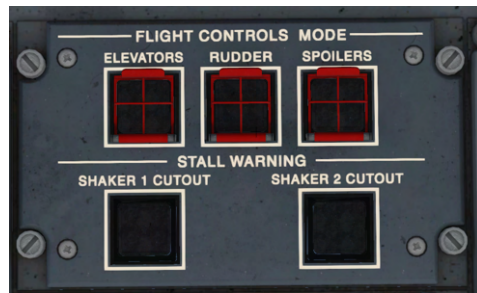
### 1. START/STOP SELECTOR KNOB

- STOP: commands the FADEC to shut down the engine, provided the associated thrust lever is in the IDLE position.
- RUN: normal position for engine operation.
- START (momentary action): initiates the engine start sequence

### 2. IGNITION SELECTOR KNOB

- OFF: deactivates the ignition system.
- AUTO: FADEC automatically controls the ignition system, depending on engine requirements.
- OVRD: enables FADEC to continuously activate both exciters when the engine is running.
- **Note:** OVRD feature is not simulated in the current version
- **Note:** This knob is by default on the AUTO position and it does not need to be touched during normal startup sequence.

## FLIGHT CONTROL MODE BUTTONS



- **Note:** This panel is not simulated in the current version

## T/O CONFIG BUTTON

Pressing this button checks the takeoff configuration:

- Flap position based on the FMS takeoff performance pages.
- Parking brake OFF.
- Pitch trim configured for TO.
- Spoiler panels not deployed.



## EICAS FULL BUTTON

Automatic de-clutter occurs after landing gear retraction and flap/slat retraction, if all parameters are displaying normal indications. Pressing this button will show the decluttered information.

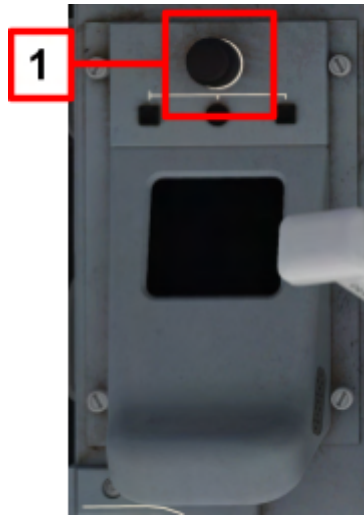
- **PUSH OUT (Dark):** Enables the automatic EICAS de-clutter logic.
- **PUSH IN (White stripe):** EICAS full information presented



De-clutter is disabled when the landing gear is extended and/or flap/slat is not at 0.

## CURSOR CONTROL DEVICE (CCD)

In real life, this serves as a mouse that allows the pilots to control the screens. In the simulator, all the functional features on the screens can be directly manipulated with the cursor of your mouse on the screen.



### 1. The only functionality we left on the CCD was the knob.

- The inner ring of the knob is used for cycling through the flight plan when you are in the PLAN mode on the MFD
- The outer ring of the knob is used for changing the range on the map.
- To make it more user friendly, we have also added a manipulator directly on the map, located on the half range indicator, that can be used to zoom in and out of the map.



## SPEEDBRAKE LEVER

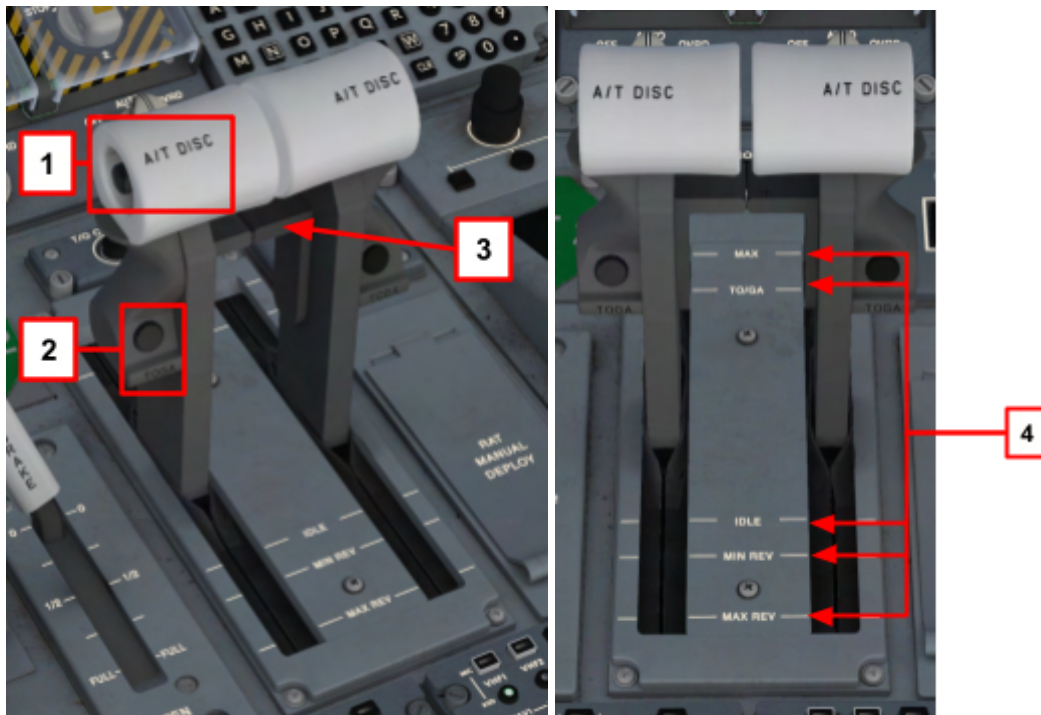


- Symmetrically deploys the multi-function panels. All multi-function spoiler panels deploy at the same angle in response to the speed brake lever position.

### SPOILER SYSTEM

- 5 spoiler panels on each wing.
- 3 outboard multifunction spoilers on each wing
  - Multifunction spoilers have 3 modes of operation:
    - Roll Control: Deployed asymmetrically for roll augmentation by pilots control wheel.
    - **Speed Brakes:** Deploys all six multifunction spoiler panels symmetrically during flight by speed brake handle position.
    - **Ground Spoilers:** All ten spoiler panels deployed symmetrically to the fully extended position during landing roll.
- Maximum deflection in the air: 30°
- Maximum deflection on the ground: 60°
- Spoilers will not deploy past flaps 1 or below 180 knots

## THRUST LEVER QUADRANT



### 1. AUTOTHROTTLE DISCONNECT BUTTON (A/T DISC)

- Disengages the autothrottles.

### 2. TAKEOFF AND GO AROUND BUTTON (TO/GA)

- Selects the TO (Take Off) or GA (Go Around) Flight Director Modes.

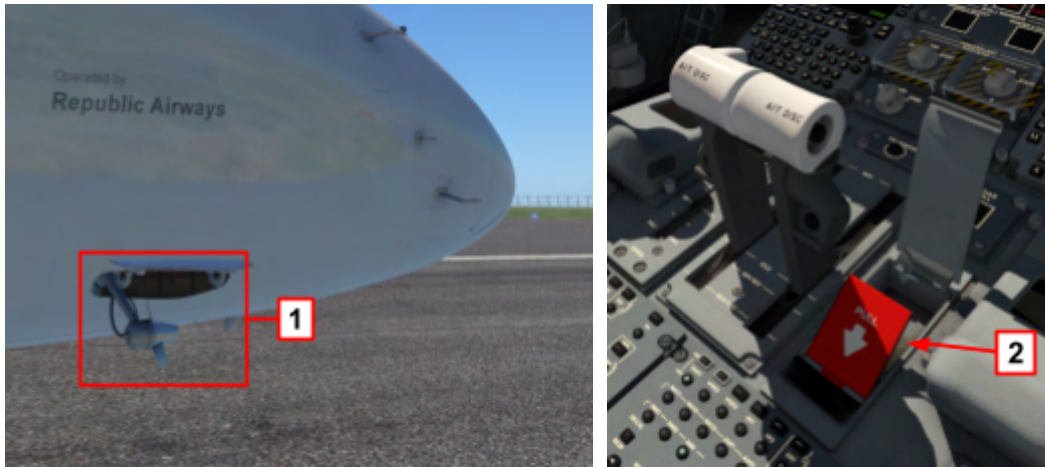
### 3. THRUST REVERSER TRIGGER

- Pulling the thrust reverser trigger allows reverser activation when weight on wheels.

### 4. THRUST LEVER DETENTS

- **MAX:** provides the maximum thrust rating available for dual or single engine operation
- **TO/GA:** selects takeoff, maximum continuous, and go-around mode settings.
- **IDLE:** Selects idle thrust settings.
- **MIN REV:** provides minimum reverse thrust
- **MAX REV:** provides maximum reverse thrust. The thrust lever must be pulled against a spring to achieve the maximum reverse thrust.

## RAM AIR TURBINE (RAT)



### 1. RAM AIR TURBINE (RAT)

- RAT powers the AC ESS BUS
- No altitude restriction for RAT deployment
- RAT provides a lower power output than the APU and IDGs.

### 2. RAM AIR TURBINE DEPLOYMENT HANDLE

- Manually deploys the Ram Air Turbine which can be used in case of AC power loss in flight.

## GND PROX FLAP OVRD BUTTON

- Inhibits triggering flap alerts in case of landings where flap configuration is different from normal landing flap configuration.
- **Note:** This feature is not simulated in this version.



## SLAT/FLAP SELECTOR LEVER

- Selects slat/flap position by unlatching the lever and lifting a trigger below the head.



### SLATS/FLAP SYSTEM

- Consists of:
  - 4 slats per wing.
  - Two flaps per wing.

**Note:** Position 4 and 5 are the same slat/flap degrees.

- **Position 4** logic is for **takeoff** and does not provide for the landing gear aural warning on landing.
- **Position 5** logic is for **landing**.

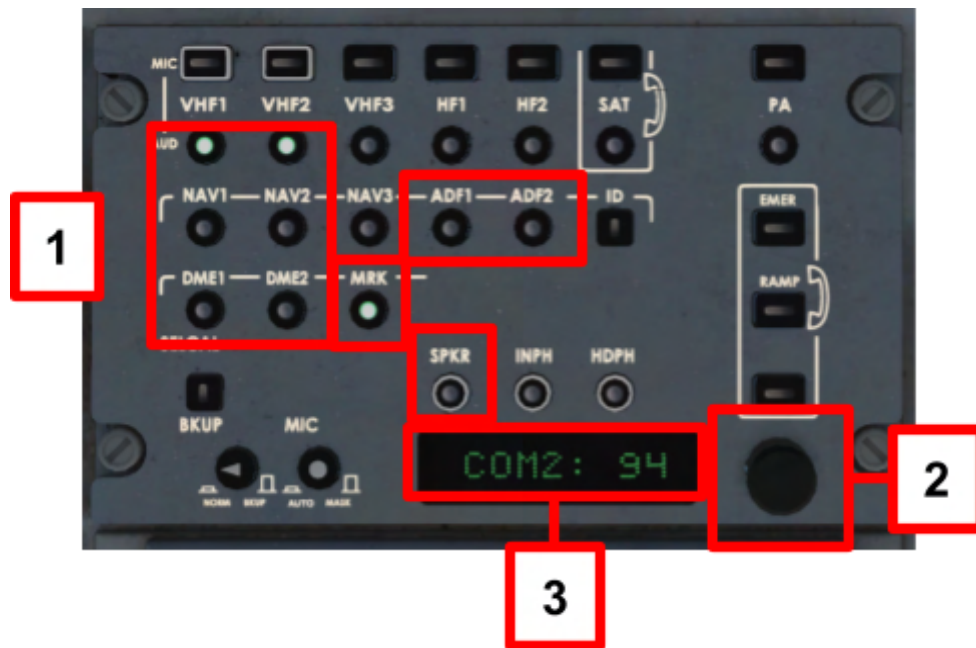
**Caution:** Using position 4 for landing is prohibited.

- Flap settings approved for takeoff are: 1, 2, and 4.
- Flap settings approved for landing are: 5 and FULL.
- Go-Around:
  - Flaps 5 select flaps 2.
  - Flaps FULL select flaps 4.

# AUDIO CONTROL PANEL

## 1. AUDIO CONTROL BUTTONS

- Pressing the buttons enables reception for selected audio channel.
- The following audio control buttons are functional in the current version, according to the limitations of X-Plane.



## 2. MASTER VOLUME CONTROL KNOB

- Allows adjustment of the most recently selected audio.

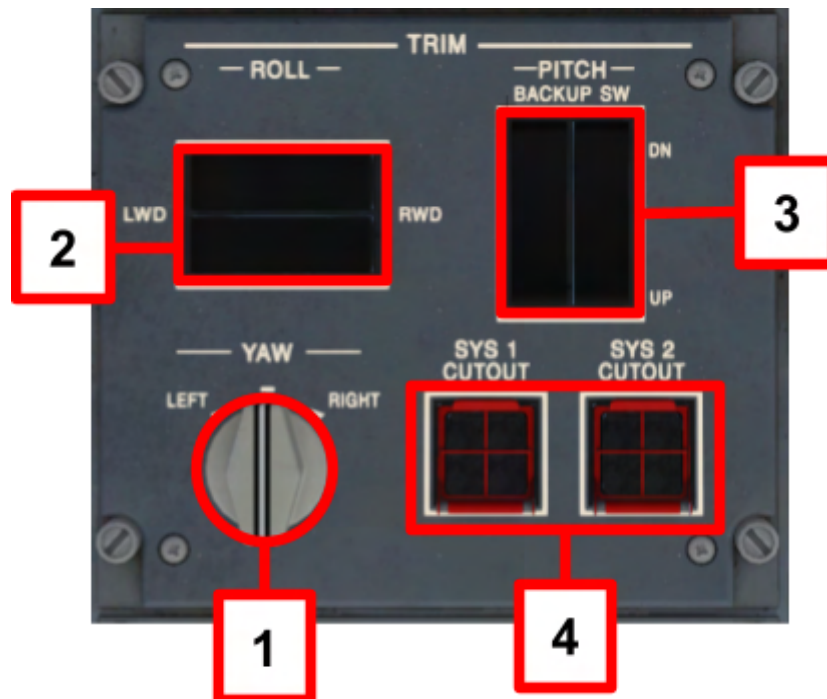
## 3. ACP DISPLAY

- Displays the selected transmission channel and volume information.

## RADIO TUNING

- Radio tuning is performed via the MCDU RADIO page.

## TRIM PANEL



### 1. YAW TRIM KNOB (SPRING-LOADED TO NEUTRAL)

- Actuates the yaw trim to the left or right.

### 2. ROLL TRIM SWITCH (SPRING-LOADED TO NEUTRAL)

- Actuates the roll trim to the left or right.

### 3. PITCH TRIM BACK-UP SWITCH (SPRING LOADED TO NEUTRAL)

- Operation of the switch while the autopilot is engaged causes the autopilot to disengage.
- After 3 seconds, an aural warning “TRIM” triggers.

### 4. PITCH TRIM SYS 1 & SYS 2 CUTOUT BUTTON (GUARDED)

- **Note:** This feature is not simulated in this version

## EMERGENCY/PARKING BRAKE HANDLE

- Actuates the emergency/parking brake.
- The handle will lock when pulled up to the fully actuated position.



## COCKPIT DOOR CONTROL PANEL

- **Note:** This panel is not simulated in this version.



## PASSENGER ADDRESS PTT BUTTON

- **Note:** This panel is not simulated in this version.



## ELEVATOR & AILERON DISCONNECT HANDLES

- These handles isolate the CA and FO control columns for elevator / aileron control
- **Note:** This panel is not simulated in this version.





## CONTROL WHEEL



## HIDING THE CONTROL WHEEL

The yokes can be hidden by:

- Clicking in the middle of them (above the manufacturer's logo)
- By pressing "Y" on your keyboard.



## 1. PITCH TRIM SWITCH (SPRING-LOADED TO NEUTRAL)

- Trims the airplane when the autopilot is not engaged.

## 2. CONTROL WHEEL COMMUNICATIONS SWITCH

- **Note:** This feature is not simulated in this version.

## 3. AP/TRIM DISCONNECT BUTTON

- Pressing once disengages the autopilot.
- Trim-related functions are not simulated

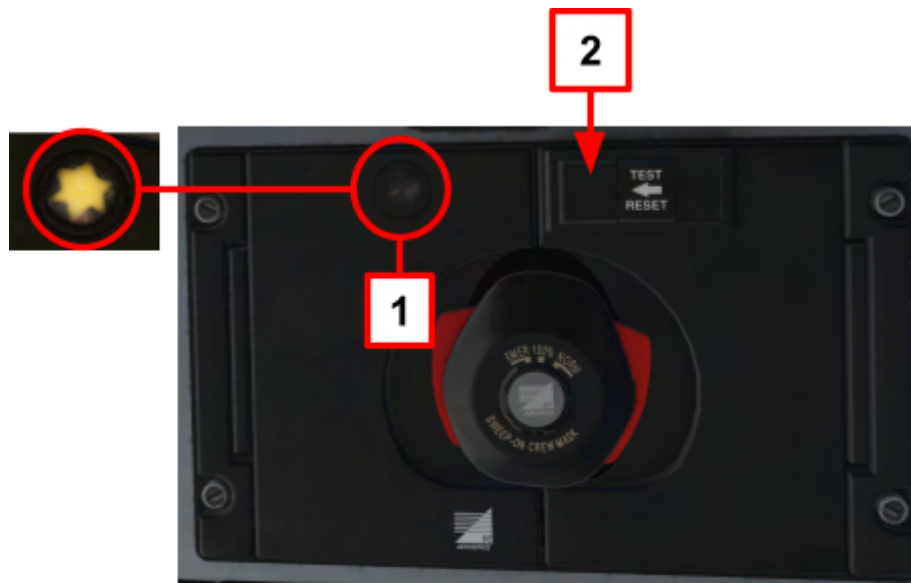
## 4. TOUCH CONTROL STEERING BUTTON (TCS)

- TCS is currently set to use [X-Plane's Control Wheel Steering mode](#)

## 5. CHRONOMETER BUTTON

- Starts/stops/resets the chronometer displayed on the PFD

## OXYGEN MASK



### 1. FLOW INDICATOR

- A bright yellow star when visible indicates that oxygen is flowing.

### 2. TEST/RESET BUTTON (SPRING LOADED)

- Pressing this button with the mask stowed tests the oxygen mask.
- The flow indicator star momentarily blinks and oxygen flow will be audible through the audio system.

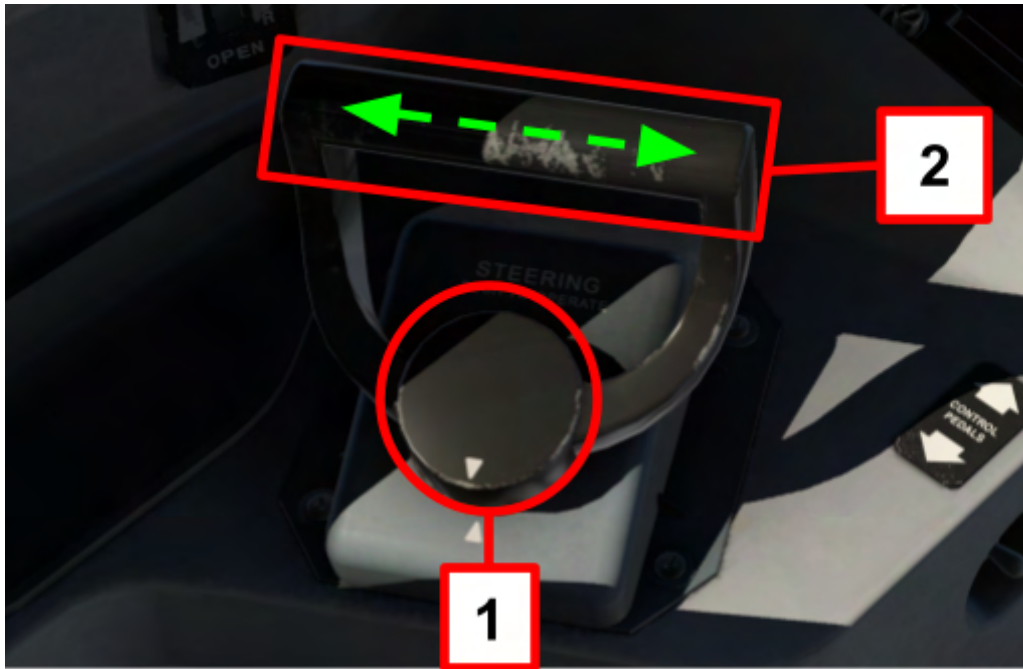
## HORN

### 1. HORN BUTTON

- Pressing this triggers the horn sound



## STEERING HANDLE



### 1. STEERING HANDLE TOGGLE

- The handle must be pushed down to engage the steering system. This is done by clicking on the middle of the handle (1).
- Pressing the handle again will disable steering and will return the handle to the inactive position.

### 2. STEERING HANDLE MANIPULATOR

- After toggling the steering tiller, the handwheel becomes a manipulator. Rotating the handwheel left or right then commands steering.
- Alternatively, your hardware (mouse, yoke, joystick) can be used for steering.

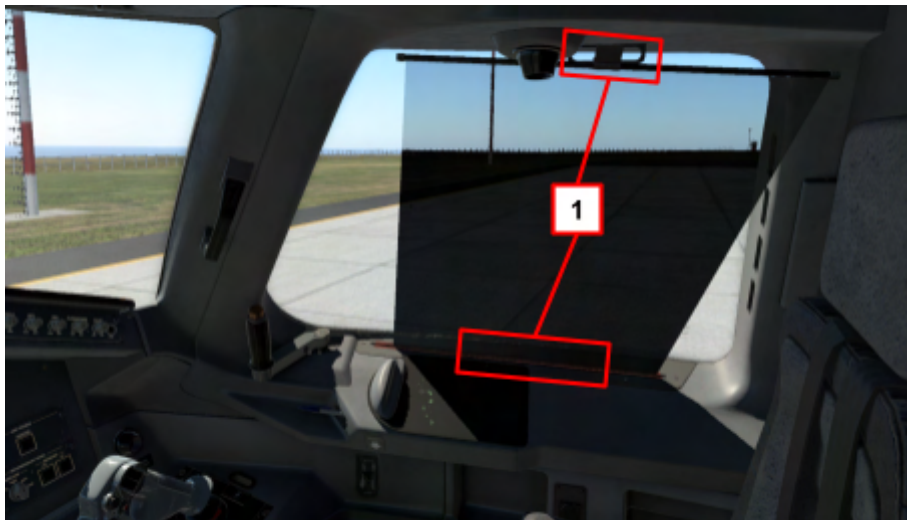
## CLICKABLE REGIONS

There are many moving parts around the airplanes. They are all toggled by clicking on them. Here's a list of parts you can manipulate by clicking:

- FWD Main Door (Can also be controlled through the EFB)
- AFT Main Door (Can also be controlled through the EFB)
- FWD Service Door (Can also be controlled through the EFB)
- AFT Service Door (Can also be controlled through the EFB)
- FWD Cargo Door (Can also be controlled through the EFB)
- AFT Cargo Door (Can also be controlled through the EFB)
- Left & Right Cockpit Windows
- Pilot Seats can be moved back and to the side for the pilots to get in the seats
- Pilot Seat armrests can be stowed
- Cockpit door
- Jump Seat
- Spot Lights can be aimed into any allowable direction
- Torches (if you click on the torch holder, you will toggle the flashlight)

I encourage you to visualize the clickable regions through the X-Plane Menu > View and explore the airplane! You may find other moving parts or even some easter eggs ;)

You can also trigger the Side window shades. You'll first need to hide the EFB by clicking on the paper holder, after which you can click on the Window shade (1).



Similarly you can also toggle the front windshield sunshades which are located next to the flashlight, near the pedals. You can then adjust the position of the sunshade on the rail by dragging it.

## ENGINE START UP PROCEDURE

We have made a series of videos that will walk you through the engine startup sequence. You can find them on our [website](#) or our [youtube](#) channel.