



# Boeing 787

## FSX Flight Deck Panel

### Documentation

### Version 2

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## **INSTALLATION**

If you are reading this you have already unzipped the ZIP file. To install the panel on any aircraft simply copy the panel.cfg and B787.cab to the aircraft panel sub-directory either replacing the existing panel sub-directory or as "panel.XX" where XX is the name on the "panel=" entry in the aircraft.cfg.

Note that you **MUST** use the new panel.cfg. Version 2 will not work with the Version 1 panel.cfg. The B787V2.CAB file replaces the B787.CAB file which can be deleted.

This aircraft has a new GPS module replacing the standard Garmin GPS500. To install it copy the GPSNEW.CAB to either your \panel directory or, if you want to install it in other aircraft, in the \gauges directory. Please read the GPS Gauge Manual to understand its new features and capabilities.

### ***Aircraft Models***

There is no default Boeing 787 model and two models have been used for testing this panel: the Tuunku Studios (TDS) model and the model from FSLightman (FSL). Both models can be found on flightsim.com. The TDS model is an excellent pictorial representation of the Boeing 787 however the FSL model has exaggerated wing curvature, doors that are too large, and a fuselage that appears more like a Boeing 767. Aerodynamically the TDS model flies level with excessive pitch up which can not be corrected as the model does not seem to respond to elevator trim commands. The FSL model has a similar problem but lesser in degree. Both aircraft pitch down when on the ground – the TDS model by over 2 degrees. This may not necessarily be wrong as the Boeing diagrams seem to indicate a slight pitch down but this is not clear.

The FSL model has an unusual flap deployment system very different to the TDS model which is probably correct. This means that for the FSL model the Flap deployment graphic in the EICAS does not display correctly although the flaps do deploy correctly. Some TDS models have been found to not function correctly at all giving a wrong flaps display on the EICAS.

The TDS model is supplied without any sound however the FSL model has an excellent sound package and this can be used for the TDS model.

### ***Changes to Aircraft.cfg***

As delivered the TDS model does not load at all. This is because in the aircraft.cfg, although TDS helpfully explain that the title= parameter can not be longer than 127 characters, they supply a title that is 158 characters long. This causes the message that the aircraft can not be loaded. To load the aircraft reduce the length of the title= to below 127 characters.

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## **[Fuel]**

The FSL model does not include a Centre fuel tank. This means that the Centre fuel tank always shows zero quantity and there is always an EICAS caution message. This can be corrected by changing the [Fuel] entry to:

```
[Fuel]
fuel_type          = 2
number_of_tank_selectors= 2
electric_pump      = 1
LeftMain = -19.67, -30.0, 2.6, 5600.0, 0.0
RightMain= -19.67, 30.0, 2.6, 5600.0, 0.0
Center1 = 13.45, 0.000, -7.01, 22500, 50
```

This may affect the weight and balance of the aircraft so the change is optional as the aircraft will still fly without it.

Note that the number of tank selectors must equal 2 for the fuel system to work correctly.

## **[Deice\_system]**

There needs to be a de ice section in the aircraft.cfg for the Wing Deice switches to work correctly. Ensure that the following appears somewhere in the aircraft.cfg:

```
[deice_system]
Structural_deice_type=1
```

## **[Autopilot]**

Default\_vertical\_speed is better set to 1800 instead of zero.

## **[Exits]**

The TDS model has four separate exits which work well. TDS has set it up for the jetway to connect to exit 2 although it does not align correctly. To fix this under [Exits] change Exit.0 to:

```
exit.0 = 0.2, 34.70, -8.20, 5.06, 0
```

This correctly aligns to exit 2. To align to exit 1, use the following entry instead:

```
exit.0 = 0.2, 62.70, -7.0, 5.06, 0
```

Note that the Jetway does not align well with exit 1 because of the curvature of the fuselage.

The FSL model opens all four passenger doors front and rear from the main exit control but has no jetway entry in the aircraft.cfg. To make jetways work on this model add the following entry under [Exits]:

```
exit.0 = 0.2, 55.0, -8.0, 11.5, 0
```

Because the doors are much too large the jetway does not completely cover the doors.

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## **Callout Sounds**

Altitude Callout sounds for approach are built into the software and require only the sounds by Jimmy Foong which are available on Flightsim.com as cmp777cl.zip. A copy of the sounds is included with this package – just copy the CALLOUT directory to the FSX\Sounds folder and copy CALLOUT\_SOUND.dll by Doug Dawson to the FSX\Gauges directory.

## **When all else fails read the Instructions**

It is recommended to study the instructions before using this complex panel. It may seem daunting however there are many useful hidden features described below. There are many instances where features do not work because some other function has not been done.

## **INSTRUCTIONS**

### ***Introduction***

This panel is a new panel based on photographs of Boeing 787 flight decks and with functionality based as closely as possible on the Boeing Flight Crew Operations Manual. It is specifically designed for use on 1920X1080 monitors with FSX and will not work on smaller monitors since much of the text is already very small.

All gauges are XML gauges so although this has been tested on FSX it may work on FS9 as well although many features such as the TAWS maps are not supported on FS9.

The Boeing 787 flight deck is a further development of the Boeing 777 flight deck and has many similarities to the Boeing 777. Boeing designed the flight deck to ensure that minimal training was needed to convert pilots from the Boeing 777 to the Boeing 787. The CRT displays however are very different in concept to the 787 with much larger displays each split into two parts.

The gauges on this panel are all new and specific to the Boeing 787. The EICAS has an expanded set of messages available. There is also a fully functional Heads Up Display (HUD) with the two displays (Cluttered and Uncluttered) as per the Boeing Manual. Other features include a full function EFIS panel, two Display Select Panels, electronic checklists, and both large and small MFDs. The MFDs (and the PFD mini-map) include both terrain and TAWS maps.

This panel includes data for V-speeds and MLWs for the Model 8 only as data was not available for the Model 9. Note that as these V speeds and MLWs are based on Boeing data they may not necessarily be correct for the FSX model

Although this is a fairly complex panel it can nevertheless be flown easily as all of the additional features are purely optional. The key feature however is that everything works although with such a large number of key combinations there is bound to be something that causes problems.

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## ***Changes in Version 2***

Version 2 has little change in functionality compared to version 1 however there are a lot of internal changes to give clearer displays and some small enhancements.

The biggest change is that although the panel is still designed for 1920X1080 screen sizes it is now scaleable to other sizes.

There is also an additional Co-pilot's EFIS to control the right hand MFD which makes it easier to have different displays on the left and right CRTs.

Other changes include metric and imperial measurements for fuel weight depending on the FSX setting, double action covered switches on the overhead, elimination of the MFD display outside the cockpit and various sundry bug fixes.

## ***Graphics***

It has been found that the panel displays clearly only when using the Directx 10 preview option. When using Directx 9 some portions of the text appear blurred. This may be because of my particular graphics card – possibly later cards do not support Directx 9. This causes a problem in that all the Boeing 787 models I have found are based on AI aircraft and do not display external textures when using Directx 10.

## ***Model Selection***

Although this panel has V speeds and MLWs for the Boeing 787-8 only, it can still be used with the Boeing 787-9: only the V speeds and MLWs will not be correct.

The model can be specified under the [General] section of your aircraft.cfg with the ATC\_MODEL= parameter. ATC\_MODEL should equal one of the following:

787-8

787-9

Default is 787-8 if anything else is shown. On this panel the only difference this makes is the display of the model name on the main panel. For Version 2 I still have not found data for the 787-9 or later models..

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## Night Lighting



Backlighting can be switched on and off with the two switches on the bottom left of the Overhead panel: the OVHD PANEL switch is for the Overhead Panel and the GLARESHIELD PNL/FLOOD Switch for the Main panel, Throttle Quadrant, and Glareshield. The STORM Switch can be used to switch the FSX default panel lighting on and off.

When switching the backlighting on and off there is a small delay each time it is switched.

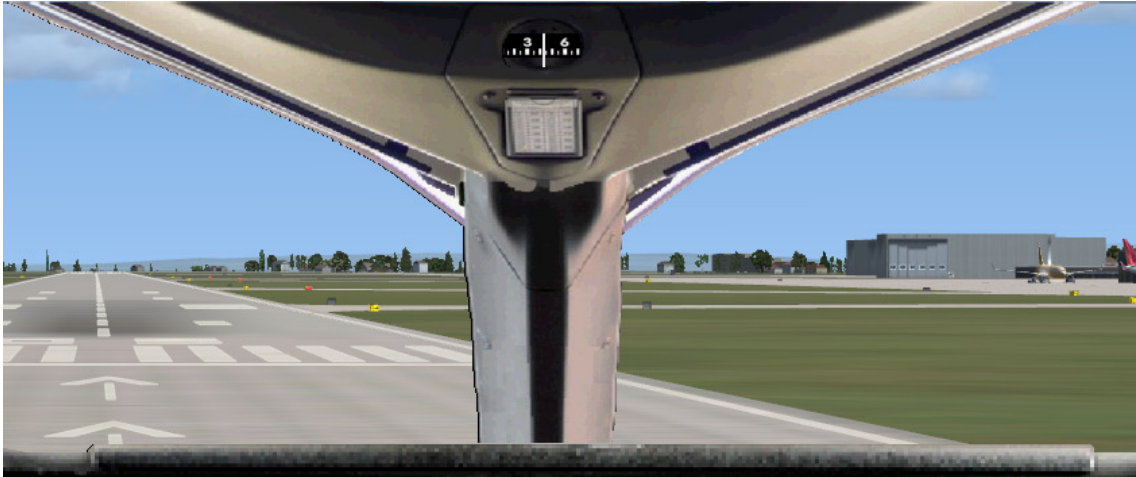
## Icons



There are the standard icons on the bottom left of the main panel with three additional icons. The first is the “Compass” icon which displays the Standby Compass at the top of the screen. The second is the Maximum Landing Weight (MLW) calculator described below. The last icon is to switch HUD on or off.

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## Compass



This is a standard Standby Compass used on all Boeing aircraft. Unfortunately the artwork available for the Compass and the supporting strut was limited so this panel is not as realistic as it should be.

## Maximum Landing Weight (MLW) Calculator

MLW CALCULATOR BOEING 787-800	
RUNWAY LENGTH 9000 FEET	AIRPORT TEMPERATURE 20 °C
AIRPORT ALTITUDE 1000 FEET	MAXIMUM LANDING WEIGHT 229654 KGS (CLW)
WIND COMPONENT 0 KNOTS	FUEL TO REMAIN (for Fuel Dump)
DRY	96000 KGS

This is a small popup calculation window to allow the calculation of the Maximum Landing Weight using Runway Length, Airport Altitude, Wind, Wet or Dry, and Temperature as parameters. The MLW is used for Fuel Jettison and to check the landing weight prior to landing.

The MLW is the lower of the Field Landing Weight (FLW) or the Climb Limit Weight (CLW) and the calculator indicates which of these has been selected. FLW is calculated for Flaps 30 and CLW is calculated for approach at Flaps 20 and landing at Flaps 25 or 30.

The Airport Temperature affects only the CLW whilst Runway length, Wind, and Wet or Dry affect only the FLW.

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## **Panel Controls**

This panel behaves a little differently than most other panels. In order to operate any of the dials the left button on the mouse is clicked to turn anti-clockwise and the right button is clicked to turn clockwise. Some dials in the EFIS Panel have a centre press function and this is done by pressing the centre button on the mouse (which in many mice is done by pressing the mouse wheel).

This method makes it much easier to operate as there is only one mouse area per dial so any button can be pressed anywhere on the dial.

Simple on/off switches still use the left button as usual.

See the Throttle Quadrant section to see how this has been taken a step further to simplify operating the Throttles.

A new feature in Version 2 for covered switches means that to operate a covered switch follow the following steps:

1. Press left or right mouse button to open the cover.
2. Press the left button to turn the switch on or off
3. Press the right mouse button to close the cover.

Note that the cover can be closed whether the switch is on or off. The right button never operates the switch – only the cover. The left button only is used to operate the switch.

## **The Main Panel**



On the real aircraft the Captain and First Officer each have two large CRT displays in front of them. This panel reproduces the Captain's CRTs plus the left display from the First Officer's side. In FSX this is useful as extra subsidiary panels can be displayed in the First Officer's panel.

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Each panel has the same default settings as specified by Boeing:

- the first panel is split to show the Auxiliary display on the left and the PFD on the right
- the second panel shows the MFD on the left and the EICAS on the right
- the FO panel shows the full sized MFD

The PFD panel remains fixed and the other two CRTs are controlled by two Display Select panels on the glareshield. The EFIS panel on the Glareshield controls the settings for the Captain's MFD and PFD but not the First Officer's. These are controlled by the EFIS/DSP Synoptic display (see below).

## **The Master Caution and Warning Lights**



The Master Caution and Warning lights have two lights to signal non-normal configuration or emergencies. As there can be a large number of causes for these lights to illuminate further investigation is needed from the EICAS messages.

These lights come on in the following cases:

WARNING: - any Red ALERT message on the EICAS

CAUTION: - any Yellow CAUTION message on the EICAS

Clicking on the Master Warning button stops them flashing.

See the EICAS section below for more information on EICAS messages.

## **The EFIS**



This panel controls the settings in the Captain's MFD display although the WXR, TFC, and TERR buttons control the settings in both displays.

# Boeing 787 Panel

<b>EFIS</b>		
<b>Switch</b>	<b>Function</b>	<b>Action</b>
RST Dial	Increases or decreases the Decision Height for landing. This can be seen in the PFD and will be reflected in the Callouts during Approach.	Left click to decrease or right click to increase the Decision Height. Limits are 0 and 360 feet. Centre click will switch between Radio and Barometric heights.
FPV Button	Switches on the Flight Path Vector on the PFD.	Click once to switch on or off
CTR Dial	Select between Map and Plan mode for display on the MFD. Usually leave on Map for best detail.	Click on the left to move anti-clockwise or right for clockwise. Centre click to switch the MFD between Rose and Expanded display.
MTRS Button	Display altitudes in Metres on the PFD	Click to display metres and click again to switch off.
TFC Dial	Alters the range on the MFD from 5 to 640 nautical miles.	Left click to move anti-clockwise or right click for clockwise. Below 40 nm it increments by 2 nm; above 40 nm the increment is by 10 nm.
STD Dial	Increases or decreases the barometric pressure and switches between Millibars and Inches of Mercury (IN) on the PFD and on the Standby Altimeter.	Left click to move anti-clockwise or right click for clockwise. Click in the centre to switch between inHg and Mb.
<b>Buttons</b>		
WXR	In the real aircraft this button displays the weather radar map. As this is not supported in FSX it is used to switch the map display to a TAWS map	To Activate TAWS click once on TERR, then once on WXR, then again on TERR. The TAWS map refreshes with every 500 foot change in altitude.
TFC	Switches on the TCAS radar display on the MFD	Click once to display TCAS aircraft and again to switch off the display
TERR	Displays terrain in colour with colours depicting altitude of the terrain above sea level. The colours follow the Garmin schema and are more readable than the default colours. The water colour is also modified to give greater contrast.	Press once to see a monochrome terrain map and again for the full colour map. Press a third time to cancel the maps.

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## The Display Select Panel



There are two of these panels: the left one controls the Captain's CRT and the right controls the First Officer's CRT.

Display Select		
Switch	Function	Action
L	Selects the left half of the CRT for changing the panel display.	Click to select the left half of the CRT. Clicking on R will deselect L. Clicking again on L will also deselect the left half of the CRT
R	Selects the right half of the CRT for changing the panel display.	Click to select the left half of the CRT. Clicking on L will deselect R. Clicking again on R will also deselect the left half of the CRT
SYS	Selects a menu for Synoptic displays.	Click to display the SYS menu in the CRT.
CDU	On the real aircraft this displays the CDU screen on the CRT. In FSX the CDU screen is not available so this button displays the EICAS.	Click to display the EICAS panel and click again to revert to the default for the selected CRT. Note that only one EICAS can be displayed across both CRTs.
INFO	On the real aircraft this button displays a detailed airport map. As this function is not available in FSX this button displays a panel of flight information.	Click to display the Flight Information panel and click again to revert to the default for the selected CRT.
CHKL	Displays the Checklists Main Menu Panel on the selected CRT.	Click to display the Checklists Menu panel and click again to revert to the default for the selected CRT.
COM	On the real aircraft this button displays a panel for company communications. As this function is not useful in FSX this button displays an information panel for radio set frequencies and status.	Click to display the Communications panel and click again to revert to the default for the selected CRT.

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Display Select (continued)		
Switch	Function	Action
ND	Displays the MFD on the CRT. Note that if both halves of the CRT have ND selected the large MFD will display across the whole CRT.	Click to display the MFD and click again to revert to the default for the selected CRT.
EICAS	Swaps the EICAS display between the Captain's and First Officer's CRT. Whatever is displayed in the non-EICAS side will go across to the other side.	Click to swap the EICAS with the other CRT. Click again to swap back.
ENG	This button switches the secondary engine data on or off in the EICAS. By default the secondary data is visible.	Click to switch off the secondary engine data. Click again to switch it on.
CANC/RCL	This button controls the messages which appear on the EICAS screen.	If there are multiple pages of messages on the EICAS this button will go to the next page. Another click will clear the EICAS messages leaving only Warning and Memo messages. A third click will restore the hidden messages.

## The Autopilot



This Autopilot is almost identical to that on the Boeing 777 however Boeing has inexplicably halved the size of the buttons even though the panel size is the same.

# Boeing 787 Panel

<b>AUTOPILOT</b>		
<b>Switch</b>	<b>Function</b>	<b>Action</b>
A/P	Autopilot Master Switch. White bar when on.	Click to turn on Autopilot. Click to turn off Autopilot. Does not turn Autothrottle on or off.
F/D ON	Switches the Flight Director on or Off. Autothrottle must be armed first. Also sets Takeoff Power	Click up for On and down for Off.
A/T ARM	Arms the Autothrottle before activating.	Click up for on and down for off.
CLB CON	Maintain the current N1 setting. Only operative above 400 feet altitude.	Click to set N1 hold to the current rate and again to disengage N1 setting.
A/T	Engage or disengage Autothrottle to maintain speed shown in the IAS window.	Click once to engage and once to disengage.
IAS / MACH Switch	Switches IAS window from Speed display to Mach number display.	Click once to switch from one to the other.
IAS / MACH WINDOW	Display the desired Indicated Air Speed (IAS) or the Mach Number depending on the setting of the IAS/Mach Switch.	Left click decrease the desired speed or right click to increase.
IAS Dial	Adjusts the speed shown in the IAS / MACH Window.	Left click decrease the desired speed or right click to increase.
LNAV Button	Engages or disengages navigation mode. When engaged the aircraft will fly along the flight path already entered in the flight plan. Note that this button also automatically connects or disconnects NAV1 to the GPS navigation.	Click once to engage and again to disengage.
VNAV Button	Engages Vertical Navigation mode which is essentially the same as Altitude hold. Engaging this button will also engage Altitude hold and vice versa.	Click once to engage and again to disengage.
FLCH Button	If current airspeed or mach is greater than that set in the window then the current airspeed will be set in the window otherwise no action.	Click once to engage and again to disengage.

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<b>AUTOPILOT (continued)</b>		
<b>Switch</b>	<b>Function</b>	<b>Action</b>
A/P DISENGAGE	Clicking on this will disconnect both Autopilot and Autothrottle. Clicking again will not reconnect them however.	Click once to disconnect Autopilot and Autothrottle. After clicking once yellow and black bars are displayed. The Autopilot can not be re-engaged until this switch is clicked again and returned to its normal status. Clicking this button again does NOT however reconnect the Autopilot.
HDG/TRK Switch	Switches Heading window and PFD between HDG and TRK but has no effect on the numerical display.	Click once to display TRK and again to display HDG
Heading Window	Displays the selected Heading in Degrees (0 to 359).	Right click increase the desired Heading and left click to decrease.
Bank Limit Dial	Changes to the Bank Limit do not work in FSX. The bank limit is set in the aircraft.cfg and for the Boeing 787 is 25 degrees (although the FSL model is set to 30). This dial can be used to alter the heading.	Left click to rotate heading left or right click to rotate right.
Heading Hold Button	Activate or deactivate the Autopilot Heading Hold function which will turn the aircraft to the heading magnetic selected in the Heading window.	Click once to engage and again to disengage.
V/S FPA Button	Switches between VS and FPA mode in the Vertical Speed window.	Clicking on this button will show the vertical angle at which the aircraft is moving in the VS window. This is NOT the pitch – e.g. if the aircraft is flying level even with positive pitch the FPA is zero.
V/S Window	Displays the Vertical Speed of the aircraft in plus or minus feet per minute.	The default for ascent or descent is set in the aircraft.cfg and is usually 1800 feet per minute
V/S Dial	Dial up or down to increase or decrease the Vertical speed.	Use the mouse wheel to rotate the dial Up or Down
VS/FPA Button	Activates or deactivates the Autopilot Vertical speed hold function. Activates automatically when Altitude hold is selected.	Click once to engage and again to disengage.
Altitude Window	Displays the Autopilot selected altitude in feet.	Right click increase the desired Altitude or left click to decrease.
Display Selector	Alters the Altitude window and switches between displaying altitude in the Altitude window in feet or thousands of feet.	Left click to decrease and right click to increase Altitude. Centre click to switch between display in 000s and normal.

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AUTOPILOT (continued)		
Switch	Function	Action
Altitude Hold Button	Activates or deactivates the Autopilot Altitude hold function.	Click once to engage and again to disengage.
LOC Button	When activated the aircraft will fly to the Localiser selected by NAV1 radio but will NOT follow the glideslope.	Click once to engage and again to disengage.
APP Button	When activated the aircraft will fly to the Localiser selected by NAV1 radio then will follow the Approach glideslope.	Click once to engage and again to disengage.
A/P	Autopilot Master Switch. White bar when on.	Click to turn on Autopilot. Click to turn off Autopilot. Does not turn Autothrottle on or off.
F/D ON	Switches the Flight Director on or Off	Click up for On and down for Off.

## The Standby PFD



The Boeing 787 comes without separate backup Altimeter, Airspeed, and Attitude indicators - only with a backup PFD. Getting such a small gauge to work seemed an impossible task however the result has been quite reasonable and the gauge works well. It contains most but not all the functions of the PFD as per the Boeing manual. Everything works except the brightness controls (+ and -)

# Boeing 787 Panel

## The Landing Gear Panel



This is a fair replica of the Landing Gear panel in the original aircraft. Only the gear lever and the Autobrake dial are functional

Switches on the panel work as follows:

LANDING GEAR		
Switch	Function	Action
Gear Lever	Raises or lowers the Landing Gear	Click to raise the landing gear and click again to lower the landing gear. Can also be operated using "G" from the keyboard.
ALTN GEAR NORM	Switches on the Alternate Landing Gear mechanism.	Non-working.
**AUTO BRAKE	Set for Automatic braking on landing or to RTO for automatic braking for aborted takeoff.	Click on the right to rotate the dial clockwise and on the left to rotate anti-clockwise.

### \*\* Notes on Autobrake function

In FSX the standard Autobrake function applies brakes on touchdown and maintains the brakes until the aircraft is stopped. This is not a realistic scenario as normally brakes are not applied at high speed and normally the pilot does not wish to completely stop the aircraft.

This panel replaces the FSX standard Autobrake function with deploying reversers and spoilers on touchdown and maintaining them until the speed falls below 30 knots. The Autobrake function will then return to off. The pilot may also manually apply brakes at his option during or after the Autobrake sequence. The power of the reverser varies according to the Autobrake selection made by the pilot (1, 2, 3, or Max). Spoilers are deployed in each case. The same system applies to aborted takeoff (RTO setting) when maximum reverse thrust is applied. The RTO function will activate when the speed is over 85 knots and throttles are retarded to idle.

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## *The CRTs*



There are three large CRTs on the main display. The first CRT is fixed and contains the Auxiliary panel plus the PFD. The second and third panels are each split in two and can display a wide range of displays called by Boeing “Synoptic Displays”. The two halves of one CRT can also be joined to display one large MFD which is the default for the Flight Officer’s CRT.

## **The Auxiliary Display**



The Auxiliary Display occupies the left one third of the left CRT. The top part of this display replaces the Boeing clock and also displays some flight information. At the bottom of this part is the UTC (GMT) time display and the date.

At take-off, when the wheels leave the ground, the Elapsed Time timer starts and displays in the bottom right of this display. It continues until 30 seconds after landing when the Elapsed Time continues to display until another take-off when it resets.

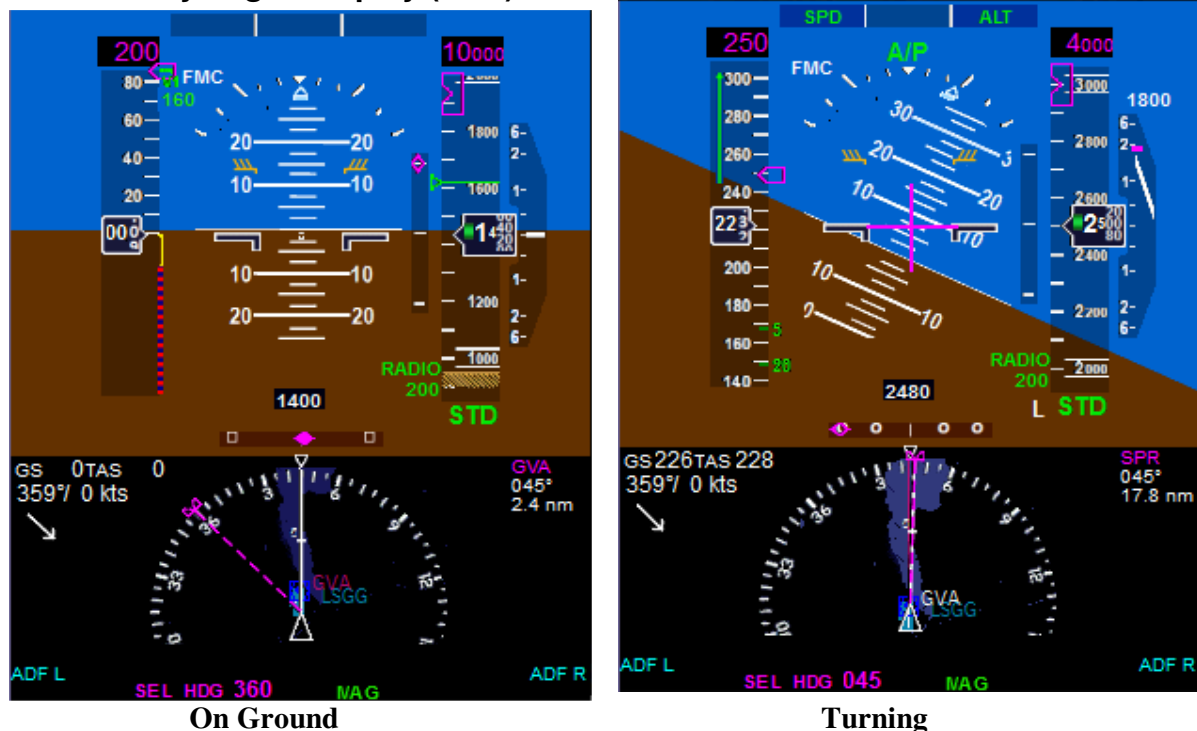
# Boeing 787 Panel

The blank area at the top right of the display contains the stopwatch / seconds timer. This can be controlled by clicking on this area as follows:

- **Left Click:** Clock appears and timer starts. Left click again and timer stops.
- **Right Click:** Clock appears but does not start. Right click again the clock disappears. Right click while the clock is running and the clock resets to zero then continues.

The bottom two thirds of the Auxiliary display is used on the real aircraft to display information on data uplinks. As FSX does not support this function the bottom of the Auxiliary display has been used to show the Flap Limits. This does not appear here on the real aircraft and if not liked it can be removed by deleting gauge06 Flap Limits from the panel.cfg without affecting any other functions.

## The Primary Flight Display (PFD)



The PFD is located in the right hand two-thirds of the left CRT and displays all information about the orientation of the aircraft including Heading, Speed, Attitude, rate of climb, as well as substantially more information. This is a close replica of the appearance of the PFD on the real aircraft. Although the general format is similar to previous gauges on the Boeing 777, Boeing has made a coloured background over the whole gauge with translucent tapes. There is also a small mini-MFD at the bottom which provides basic information from the MFD.

# **Boeing 787 Panel**

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The PFD displays V speeds along the left speed tape as well as Flap retraction speeds. The calculation includes the criteria: wet or dry runways, temperature, wind, and altitude. The only criterion not included is runway slope which can not be determined in FSX. The adjustment for slope is rarely more than 1 knot so this is not too serious. Note that the calculation for V1, VR, and V2 is made only on the ground when flaps are in a valid takeoff configuration which on the Boeing 787 is Flaps 5, 15, or 20. The calculation for Vref is made only when airborne and flaps are in landing configuration: Flaps 20, Flaps 25, or Flaps 30.

Takeoff V speeds are based on maximum thrust for takeoff and are MINIMUM speeds.

The PFD Radio Altimeter measures altitude from its antenna to the ground but should display altitude with wheels down from its wheels to the ground. A correction factor equal to the height of the antenna above the ground is automatically applied by this panel at startup which will be correct for any aircraft if it is on the ground. If not on the ground a correction factor of 18 feet is applied which is correct for most Boeing 787 models.

## ***The Synoptic Displays***

The Synoptic Displays are similar in range and layout to the Boeing 777 however they are now accessed through an on-screen menu with the pilot using a point-and-click device similar to a mouse. The on-screen menu is accessed using the SYS key on the Display select panel. This will display the menu at the top of the selected screen. Underneath the display will depend on circumstances as described in the Boeing manual:

- **The Status Synoptic:** if the aircraft is airborne; or
- **The Flight Controls Synoptic:** if the aircraft is on the ground with engines running; or
- **The Fuel Synoptic:** if the aircraft is on the ground without any engine running; or
- Any synoptic which has a corresponding CAUTION message displayed on the EICAS (The button label will display in Yellow with dark green background)

If multiple synoptics have related CAUTION messages then multiple buttons will display yellow labels but the synoptic display will display one of the first three defaults.

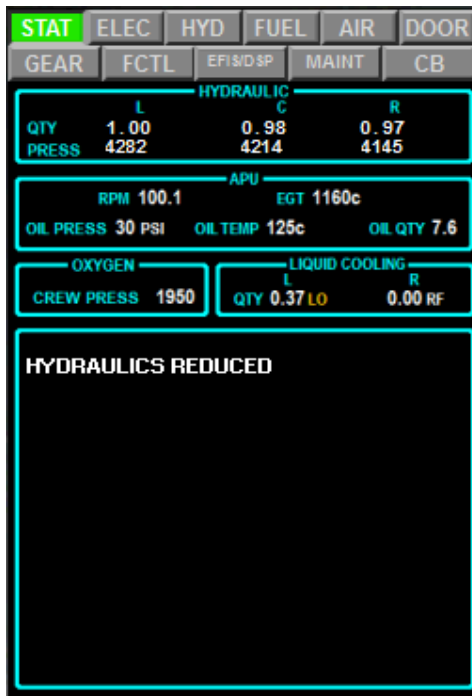
# Boeing 787 Panel

## The SYS Display



The SYS display has 11 buttons at the top of the screen which may be used to access any of the following Synoptic Displays

## The Status Panel



The Hydraulic information on this panel is as per Boeing but the APU, Crew Oxygen, and Liquid cooling numbers below it are dummy since this data is not available in FSX.

The screen permanently displays messages describing failures and events during the flight. Unlike the EICAS these messages do not disappear when the condition no longer exists – e.g. if an engine fire is extinguished the FIRE message will disappear from the EICAS but remain on the status panel. On the real aircraft there is a large range of messages describing minor failures not available in FSX (e.g. LAV-GALLEY FAN R). In FSX this panel only shows messages for failures supported by FSX so the screen is often empty and the messages themselves are FSX rather than Boeing messages.

It will usually show “HYDRAULICS REDUCED” on startup as the hydraulic pressure initialises at zero.

An additional FSX message “UNLIMITED FUEL” has been added when FSX is set to unlimited fuel to indicate that fuel displays are meaningless.

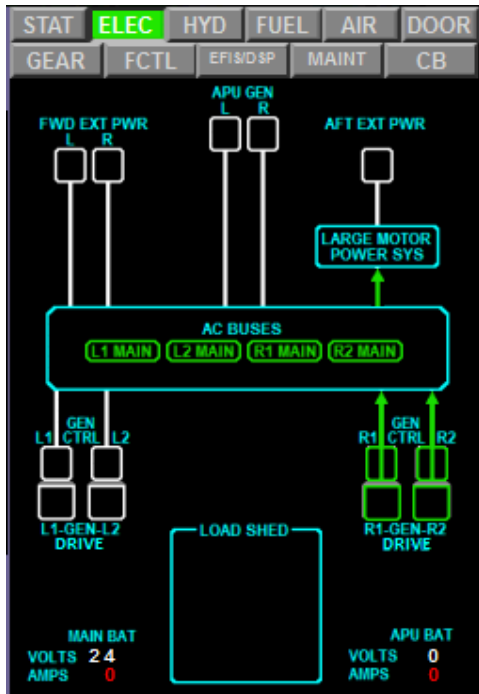
# **Boeing 787 Panel**

A list of possible messages on this panel follows (not all are applicable for the Boeing 787).

<b>STATUS MESSAGES</b>	
<b>Message</b>	<b>Message Logic</b>
FIRE ENGINE 1 or 2	Fire in Engine
FIRE APU	Fire in APU
UNLIMITED FUEL	FSX is set to Unlimited Fuel
OIL LEAK ENGINE L or R	Oil leak in Engine
DAMAGE ENGINE L or R	Damaged Engine
FAILED ENGINE L or R	Engine Failure
FAILED ADF	ADF Failed
FAILED AIRSPEED	Airspeed measurement failed
FAILED ALTITUDE	Altitude measurement failed
FAILED ATTITUDE	Attitude measurement failed
FAILED COMM	Communications Radio Failed
FAILED COMPASS	Auto compass failed
FAILED ELECTRICAL	Electrical System failed
FAILED AVIONICS	Avionics systems failed
FAILED ENGINE GAUGE	EICAS failed
FAILED FUEL INDICATOR	Fuel measurement failed
FAILED HEADING	Heading measurement failed
FAILED VS INDICATOR	Vertical Speed measurement failed
FAILED TRANSPONDER	Transponder failed
FAILED NAV	NAV Radio failed
FAILED PITOT	Pitot measurement failed
FAILED TURN COORDINATOR	Turn Coordination failed
FAILED VACUUM	Failed Vacuum system
DAMAGE FLAPS	Flaps damaged by speed
DAMAGE GEAR	Landing Gear damaged by speed
HYDRAULICS REDUCED	Hydraulics pressure low

# Boeing 787 Panel

## The ELEC Synoptic



The Electrical Panel diagrammatically displays the settings on the Electrical Switch Panel on the left of the Overhead Panel. Changes to the switches on this Overhead panel will result in changes to the diagram. Note that, to start the APU, the APU Switch is clicked to START followed by switching on the APU GEN switch. The DRIVE will be off if the engine is not running as shown for the left engine in the above picture.

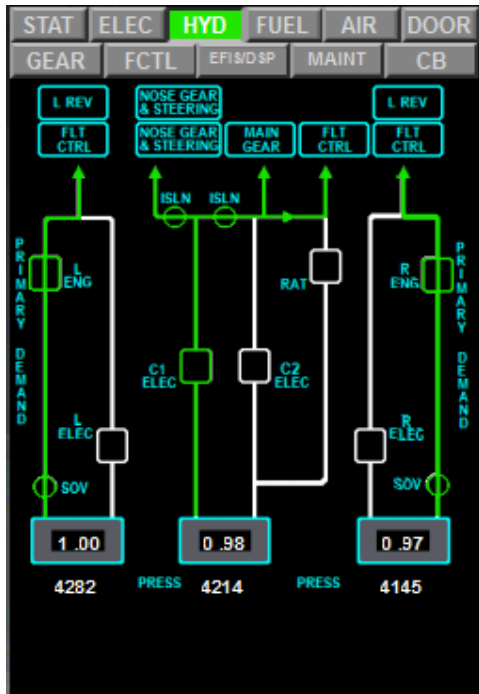
The Main Bat Amps and APU Bat fields do not work in FSX.

This diagram is almost identical to the Boeing diagram.

The layout of this Synoptic is much simpler than that for the Boeing 777 due to the greater degree of automation on the Boeing 787. Note that the Load Shed box is used on the real aircraft to display information on any load shedding carried out automatically due to overload. This function is not supported in FSX so this box remains blank – as it would in normal operation.

# Boeing 787 Panel

## The HYD Synoptic

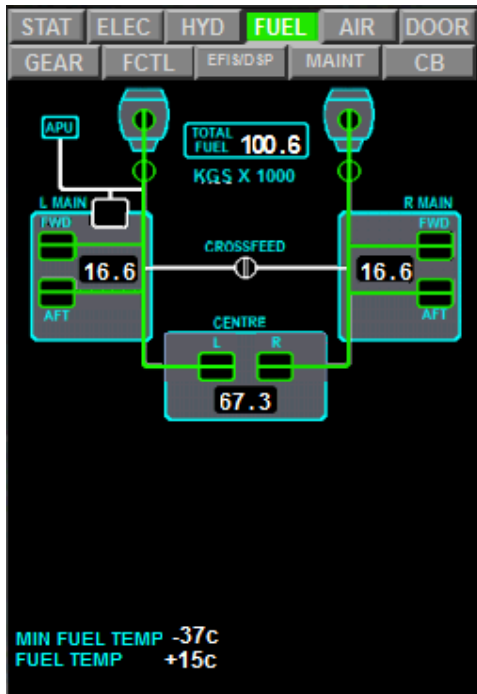


The Hydraulics Panel diagrammatically displays the settings on the Hydraulics Switch Panel left of centre on the Overhead Panel. Changes to the switches on this Overhead panel will result in changes to the diagram. Note that “Fault” will be displayed on the Overhead panel if the engines are not running but the Hydraulics Display panel does not directly show if the engines are running or not – although it can be inferred from the diagram.

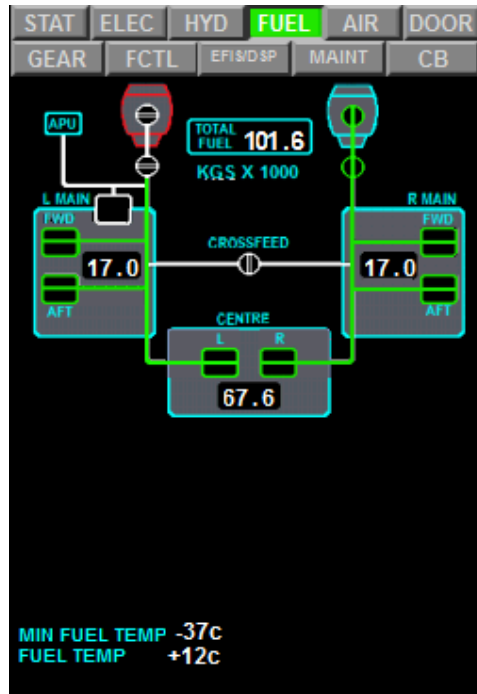
This diagram is almost identical to the Boeing diagram and very similar to the Boeing 777 diagram but notice that the Boeing 787 does not have air powered hydraulic pumps.

# Boeing 787 Panel

## The FUEL Synoptic



**Both Engines On**



**Left Engine Off**

The Fuel Panel diagrammatically displays the settings on the Fuel Switch Panel right of centre on the Overhead Panel. Changes to the switches on this Overhead panel will result in changes to the diagram. The diagram shows fuel available in each of the tanks together with the selected fuel flow. The engines appear red when off and Aqua when running.

Note that to start the APU, the APU Switch is clicked to START then the either or both APU GEN switches are switched on to operate the two generators connected to the APU.

This diagram is almost identical to the Boeing diagram apart from the colour change in the engines. This does not happen on the Boeing aircraft as it is usually obvious that engines are running however in FSX it is not always obvious – especially when many engine sound files continue after engines are shutdown.

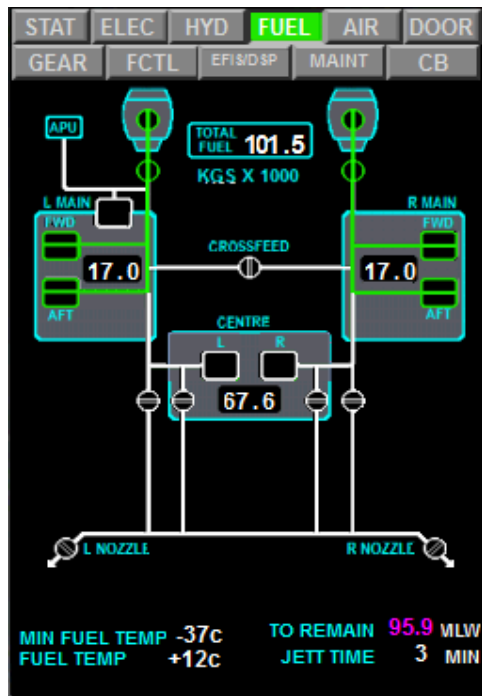
It is also very similar to the Boeing 777 but there is only one crossfeed valve on the Boeing 787.

Note that if the FSL aircraft model is used without changes to the aircraft.cfg the Centre tank on this diagram will always show zero.

# Boeing 787 Panel

## Fuel Jettison

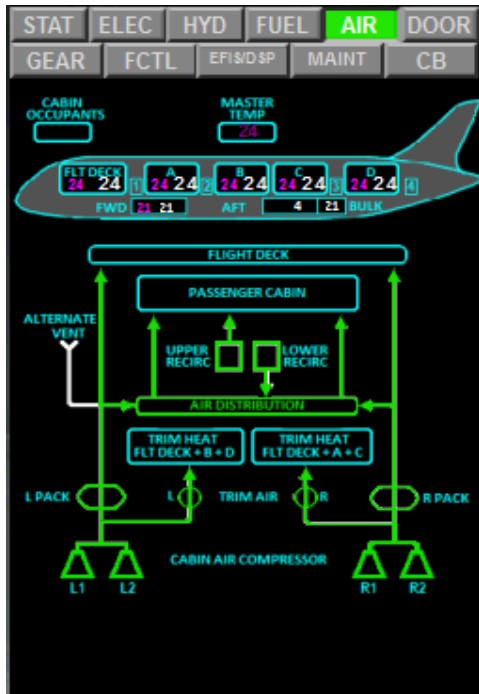
When Fuel Jettison is armed the following sub-panel appears on the FUEL panel:



Fuel to remain is displayed for the Maximum Landing Weight (MLW) with the Jettison time displayed based on a jettison rate of 2000 kgs/minute. See under Fuel Jettison in the Overhead Panel section for more details of how this works.

# Boeing 787 Panel

## The AIR Synoptic



The AIR Synoptic diagrammatically displays the settings on the Air Conditioning Panel in the top right of the Overhead Panel. Changes to the switches on these Overhead panels will result in changes to the diagram. The diagram depicts temperatures in the cabin and Flight Deck which, in a simulator, are fanciful. The temperatures can be adjusted using the Flight Deck and Cabin Temperature Dials in the top left of the Overhead Panel. The rest of the Display diagram changes with changes to the switches on this Panel.

It can be interesting to adjust the various switches and see the effect on the diagram. It has no effect on the flying of the aircraft in the simulator.

This diagram is almost identical to the Boeing diagram.

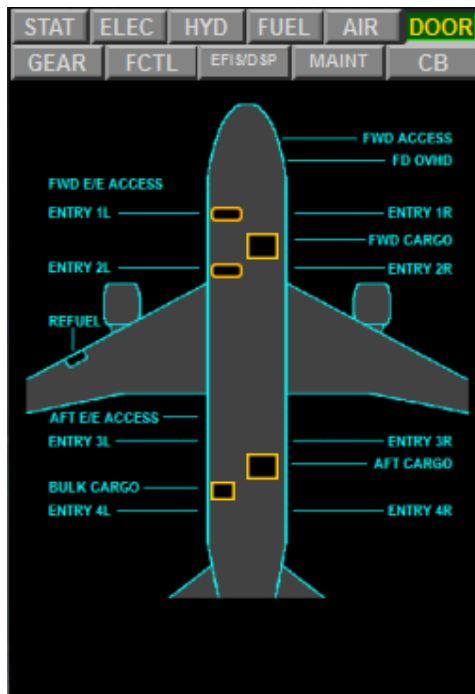
This Synoptic is very much simpler than the diagram on the Boeing 777 due to the greater degree of automation on the Boeing 787. In FSX however nothing on this panel affects the simulation as these functions are not supported in FSX.

# Boeing 787 Panel

## The DOOR Synoptic



**All Doors Auto**



**All Doors Open**

The Door Synoptic diagrammatically displays the exits and their status. This panel follows the Boeing system to display doors open but only for four doors. The settings for this panel in FSX correspond to the TDS model which has four exits:

- Main Exit (M)
- Entry 2L (2)
- Bulk Cargo (R)
- Fwd and Aft Cargo (C)

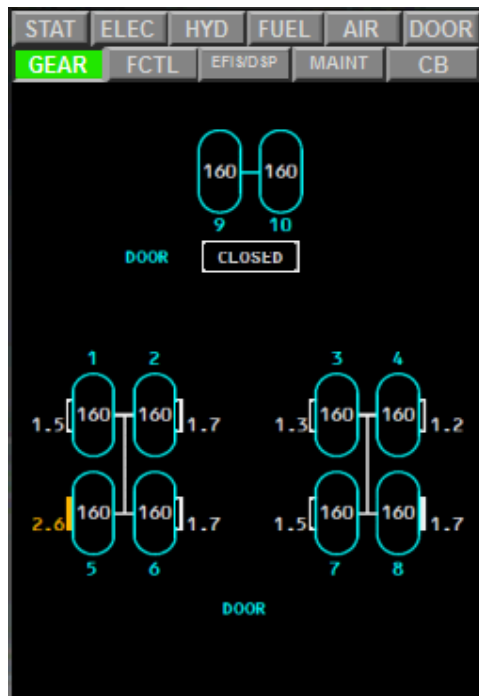
This diagram is very similar to the Boeing diagram and the Boeing method of depicting open doors is used but only for 4 doors. When the door is closed a white M displays to show the door is in Manual Mode and a green A displays when the door is in Auto mode. For the purposes of FSX: M displays when the door is closed and engines are not running; A displays when they are closed and engines are running.

The FSL model has only two opening doors:

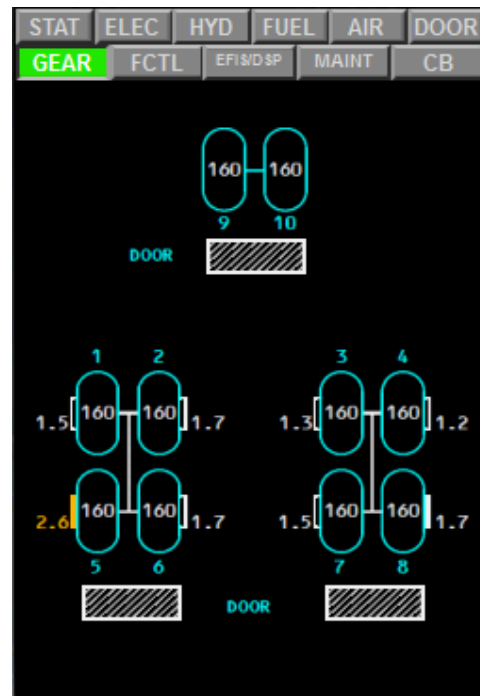
- Main Exit (M): this opens the two forward and two aft passenger doors (Doors 1L, 4L, 1R, and 4R)
- Cargo (C): This opens the Forward and Aft Cargo doors.

# Boeing 787 Panel

## The GEAR Synoptic



**Gear Down**



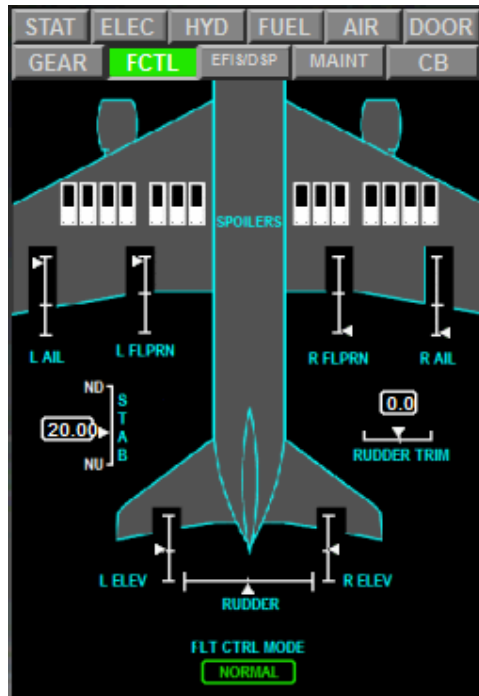
**Gear in Transit**

The Gear Synoptic shows the tyre pressure and brake temperature in all individual tyres on the aircraft. Since FSX does not simulate tyre pressures or brake temperatures this synoptic is mostly a dummy panel with unchanging numbers. Nevertheless it does display Gear in transit with diagonal lines and the “Closed” box will disappear when the Gear is down. Note that the Nose Gear shows “Closed” when the Gear is down as per the Boeing manual.

This diagram is very similar to the Boeing diagram but obviously does not emulate all its functions.

# Boeing 787 Panel

## The FCTL Synoptic

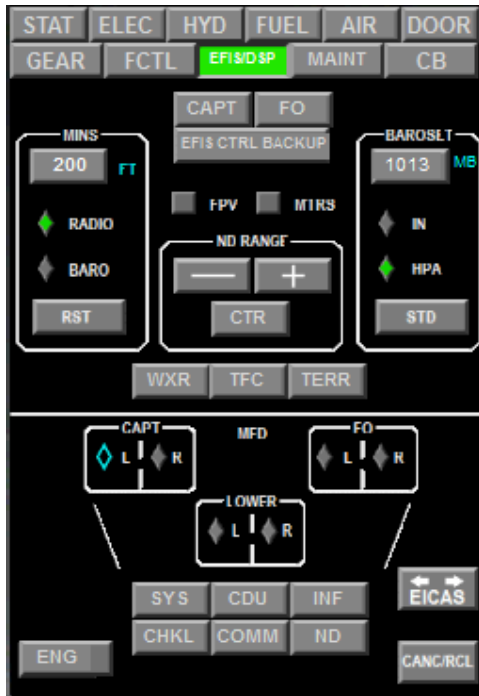


The Flight Controls or FCTL Synoptic diagrammatically shows the position of the various flight control surfaces: Ailerons, Flaps, Elevators, Rudder, and Spoilers. Changes to the diagram can be seen when manipulating the flight controls.

This diagram is very close to the Boeing diagram and replicates most of its functions. It is also almost identical to the Boeing 777 diagram.

# Boeing 787 Panel

## The EFIS/DSP Synoptic



This is a new Synoptic only in the Boeing 787. It is an electronic reproduction of the EFIS and Display Select Panel from the Glareshield and can carry out all of their functions and more.

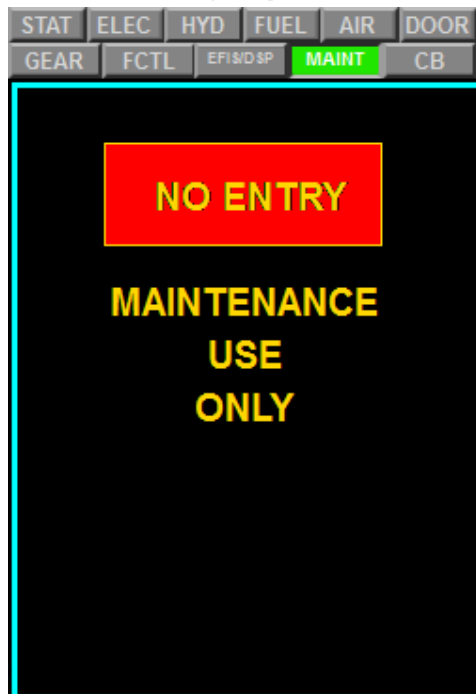
The screen is divided into two sections: the EFIS on top and the Display select on the bottom. The display select panel can be used straight away but the EFIS panel must be activated. Activation is performed by clicking on either the CAPT or FO button then clicking the EFIS/CTRL BACKUP. On the real aircraft this EFIS is used as a backup if the main EFIS panel fails. For FSX this panel is used to control the First Officer's MFD as his EFIS is not shown on the Glareshield. All of the buttons on this panel have the same functions as those on the main EFIS panel.

The Display Select section can be used in the same way as the Glareshield Display Select but any of the displays can be selected on either the Captain's or First Officer's CRTs. Note that if a selection is made on the current CRT (Aqua diamond) it will wipe out the EFIS/DSP Synoptic.

# Boeing 787 Panel

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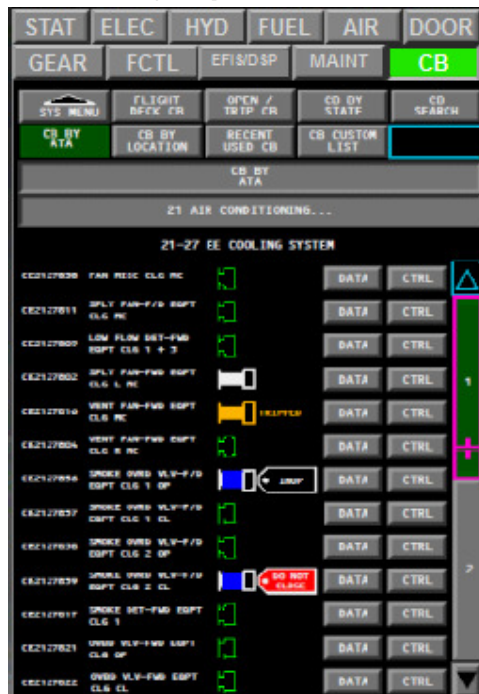
## The MAINT Synoptic



This is for Ground Maintenance use only and displays a message to that effect. This is not an authentic Boeing message as it is not known what displays if this button is pressed.

# Boeing 787 Panel

## The CB Synoptic



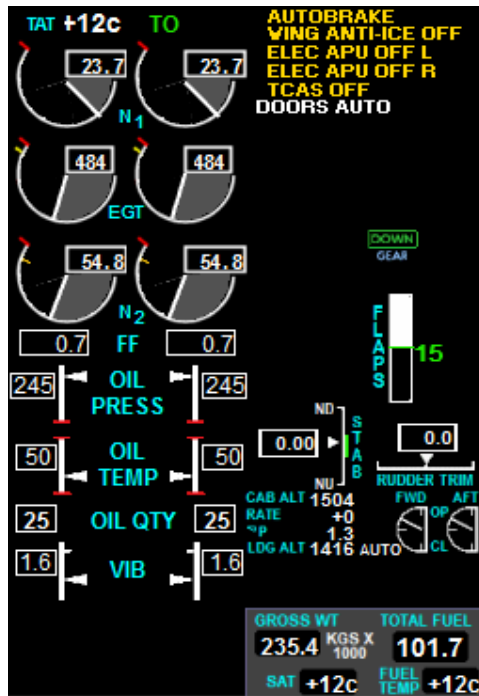
The CB Synoptic is meant for maintenance and accesses a large range of sub-menus displaying information on a wide range of electrical components. A sample page has been included to give an idea of its appearance but this page is non-functional (and almost illegible).

# Boeing 787 Panel

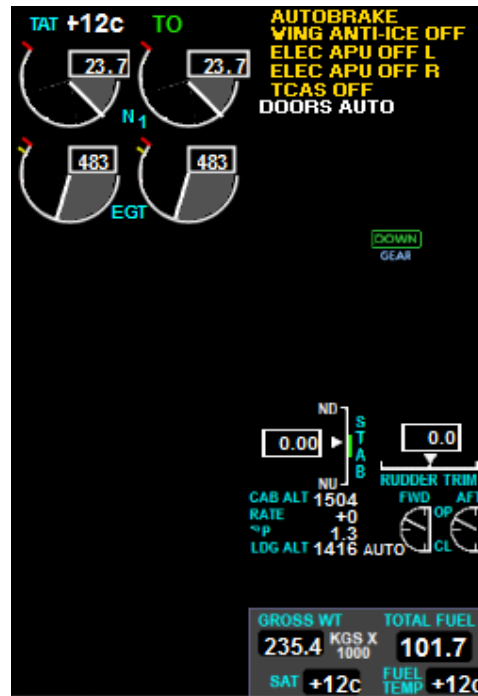
## *The Display Select Synoptic Displays*

The following panels are selected directly from the Display Select panel and not from the SYS panel.

### **The EICAS Display (CDU Button)**



**With Secondary Data**

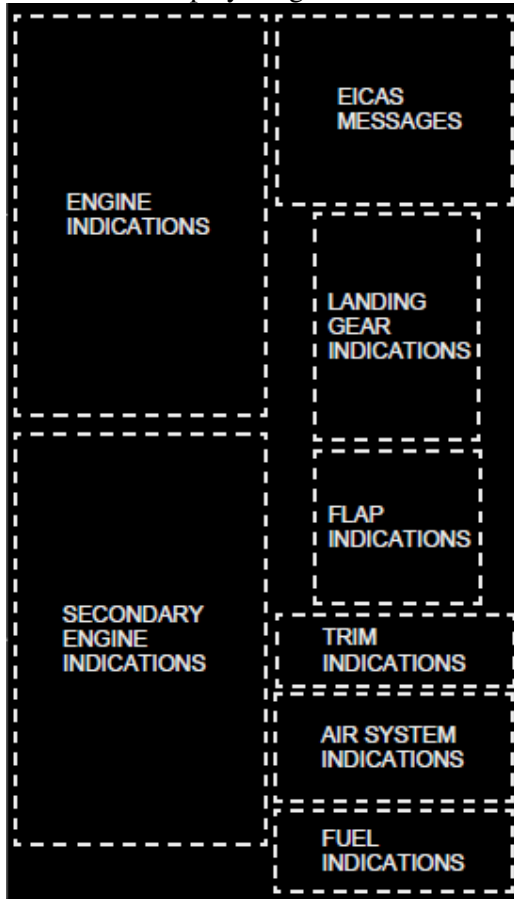


**Without Secondary Data**

The EICAS Display is the default display for the right of the Captain's CRT. It can be displayed in the First Officer's display but only if closed in the Captain's display first or swapped using the EICAS button.

# Boeing 787 Panel

The EICAS displays engine and other data in the following format:



The Engine Indications and Secondary Engine Indications both display by default. The Secondary Engine Indications can be switched off with the ENG button on the Display Select panel.

Flap Indications appears only when Flaps are deployed. It becomes blank when Flaps are fully retracted.

The Trim indications remain visible at all times in this panel although in the real aircraft they appear only when unusual conditions are present. The same is true for the Air System Indications.

Basic Fuel Indications remain visible at all times but an expanded information panel appears in certain circumstances:

- When either main fuel tank is less than 10% full
- When the Centre Fuel tank is less than 10% full AND has been selected for either engine
- When there is a Fuel Imbalance condition
- When Fuel Dump is armed
- When the Fuel crossfeed valve is open

# **Boeing 787 Panel**

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## **EICAS Messages**

There is an extensive library of possible messages which are listed below. All of the messages follow the specifications in the Boeing Operations Manual but only a subset of messages are available as many messages are for functions not supported in FSX. Messages are prioritised as follows with the highest priority appearing first:

### **WARNING (Red):**

The highest priority: reporting an abnormal condition which is a threat to the safety of the aircraft and requiring immediate attention. These messages can not be cancelled by the CANC/RCL button.

### **ALERT (Yellow):**

- **Caution** Messages are the next highest priority after Warning messages. They can be cancelled or recalled by pressing the CANC/RCL button
- **Advisory** Messages are the lowest priority alert messages and are indented one space to indicate their lower priority. They can be cancelled or recalled by pressing the CANC/RCL button.

### **MEMO (White):**

Reminder messages of the state of controls or systems. They can not be cancelled by pressing the CANC/RCL button.

Boeing specifies an additional category of Communication messages however these are not supported in this panel.

Note that many messages are accompanied by aural warnings however these are beyond the scope of this panel.

# Boeing 787 Panel

The following table lists the messages that can be seen in this panel:

<b>EICAS MESSAGES</b>		
<b>Message</b>	<b>Level</b>	<b>Message Logic</b>
<b>ALERTS</b>		
FIRE ENG L or R	Alert	Fire in Engine
FIRE APU	Alert	Fire in APU
CONFIG FLAPS	Alert	Aircraft on ground; and Throttles at Takeoff Power; and Flaps not set to Takeoff Configuration
CONFIG PARK BRAKE	Alert	Aircraft on ground; and Throttles at Takeoff Power; and Parking brake is on
CONFIG GEAR	Alert	Altitude above ground below 800 feet with throttles idle and gear not fully extended
CONFIG SPOILERS	Alert	Takeoff Power applied; and Spoilers Deployed
CONFIG DOORS	Alert	Takeoff Power applied; and Any Door open
CABIN ALTITUDE	Alert	Cabin Altitude is greater than 10000 feet
AUTOPILOT DISC	Alert	The Autopilot is disconnected
OVERSPEED	Alert	Airspeed is greater than VMO/MMO
STALL WARNING	Alert	Stall Warning is normally the stick shaker but since many FSX users do not have one this message is displayed instead.
SPEEDBRAKE	Alert	Aircraft on ground; and Throttle below Takeoff power; and Speed greater than 85 knots; and Speedbrakes not deployed
SINK RATE	Alert	Vertical Speed more than 2000 feet / minute downwards
TOO LOW FLAPS	Alert	Altitude above ground less than 1000 feet; and Aircraft is descending; and Flaps are not in Landing configuration
TOO LOW GEAR	Alert	Altitude above ground less than 1000 feet; and Aircraft is descending; and Landing Gear is not down
TOO LOW TERRAIN	Alert	Altitude above ground less than 500 feet; and Aircraft is descending; and Aircraft is not on approach

# Boeing 787 Panel

EICAS MESSAGES (continued)		
Message	Level	Message Logic
<b>CAUTION</b>		
ENG SHUTDOWN L or R	Caution	The engine is shut down
ENG SHUTDOWN	Caution	Both engines are shut down
FUEL QTY LOW	Caution	Fuel less than 10% in either main tank.
FUEL LOW CENTRE	Caution	Fuel less than 10% in Centre tank; and Centre tank selected by either engine
AUTOTHROTTLE DISC	Caution	Autothrottle not connected
DOOR AFT CARGO	Caution	Aft Cargo Door is open
DOOR FWD CARGO	Caution	Forward Cargo door is open
ALTITUDE ALERT	Caution	More than 300 feet from assigned altitude
SPEEDBRAKE EXTEND	Caution	Spoilers are deployed and Aircraft less than 800 feet above ground; or Flaps more than 15 degrees extended; or Throttle levers are idle
AIRSPPEED LOW	Caution	Airspeed is below minimum manoeuvring speed
PACK L+R	Caution	Both Bleed Air Packs are off
ENG OIL PRESS L or R	Caution	Oil pressure is less than 4000 psf
FUEL PRESS ENG L or R	Caution	Fuel pressure below 5 psi

# Boeing 787 Panel

EICAS MESSAGES (continued)		
Message	Level	Message Logic
<b>ADVISORY</b>		
ELEC GEN OFF L1, L2, R1, or R2	Advisory	Engine Generator is Off
AUTOBRAKE	Advisory	Autobrakes are Off
PARKING BRAKE SET	Advisory	Parking Brake is on
FUEL PUMP L AFT, R AFT L FWD, or R FWD	Advisory	Fuel Pump is off
FUEL IN CENTRE	Advisory	Centre Fuel tank not selected but more than 10% full.
FUEL LOW CENTRE	Advisory	Centre Fuel tank selected but less than 10% full.
FUEL PRESS EN L+R	Advisory	Fuel Pressure in both engines less than 5 psi
FUEL IMBALANCE	Advisory	Fuel in main tanks differs by more than 500 kgs
RAT UNLOCKED	Advisory	The RAM Air Turbine is deployed
ENG AUTOSTART L or R	Advisory	Engine Autostart in progress
DOOR BULK CARGO	Advisory	The Bulk Cargo (Luggage) door is open.
DOOR ENTRY 1L	Advisory	The main entry door is open
DOOR ENTRY 2L	Advisory	The 2 <sup>nd</sup> passenger door is open
LANDING ALTITUDE	Advisory	There is no Flight Plan
PACK L or R	Advisory	The Pack is switched off
TRIM AIR L or R	Advisory	The Trim Air Switch is off
VENTILATION ALTN	Advisory	Ventilation Fans are set to Alternate
RECIRC FANS UPR OFF LWR OFF	Advisory	The Air recirculating fan is off
ANTI-ICE ON	Advisory	Both Engine anti-ice switches are on
WING ANTI-ICE OFF	Advisory	The Wing Anti-ice switch is off
WINDOW HEAT	Advisory	More than two window heat switches are off
WINDOW HEAT L FWD, R FWD L SIDE, or R SIDE	Advisory	Window Heat on one window is off.
NO AUTOLAND	Advisory	Autopilot has been blocked
ELEC BATTERY OFF	Advisory	The Master Battery is off
ELEC APU OFF L or R	Advisory	The APU Generator is off
EQUIP CLG OVRD FWD AFT	Advisory	Equipment Cooling Fan is off
ELEC IFE/STS OFF	Advisory	IFE/SEATS Switch is off
ELEC CABN/UTL OFF	Advisory	Cabin Utility Switch is off
ELEC EEC MODE L or R	Advisory	Alternate EEC mode is on.
BOTTLE1 DISCH ENG	Advisory	Engine Fire Bottle 1 Discharged
BOTTLE2 DISCH ENG	Advisory	Engine Fire Bottle 2 Discharged
STABILIZER CUTOUT	Advisory	Stabilizer Trim is off
HYD QTY LOW L or R	Advisory	Hydraulic Fluid is less than 10%
TCAS OFF	Advisory	TCAS Radar is switched off

# Boeing 787 Panel

EICAS MESSAGES (continued)		
Message	Level	Message Logic
MEMO		
AUTOBRAKE RTO, DISARM, 1, 2, 3, 4, MAX	Memo	Autobrakes are at the displayed setting
SEATBELTS ON	Memo	Seatbelts sign is on
APU RUNNING	Memo	The APU is on
SPEEDBRAKES ARMED	Memo	Speedbrake is armed.
DOORS AUTO	Memo	All doors set to Auto
DOORS MANUAL	Memo	Some doors are set to Manual
FUEL CROSSFEED ON	Memo	Fuel Crossfeed valve is open

## The INFO Display

FLIGHT DATA	
AIRCRAFT Boeing B787	REG A7-BCA
AIRLINE Qatar Airways	
FLIGHT No. 075	
CURRENT LOC LAT: 46° 14' N	LONG: 6° 5' E
FLIGHT PLAN LSGG to LSZH	
Geneva	TO Zurich
No. OF WAYPOINTS 11	IFR HIGH ALT
FP ALT 21000 FEET	DEST ALT 1416 FEET
ETA 00:00	(Local Time)
NEXT WAYPOINT GVA	
DISTANCE 2nm	DIRECTION 45° M
ETA 13:49	(Local Time)
CURRENT GROUND SPEED 0	KNOTS
CURRENT GROUND ALTITUDE 1411	FEET
CURRENT ALT ABOVE GROUND 1390	FEET
LOCAL TIME (GMT+2)	ZULU TIME (GMT)
13:49:46	11:49:46

On the real aircraft this button displays a detailed airport map which is not available in FSX. Instead there is an information panel displaying tabular information about the flight including details like Flight Number, Airline, Current position, Flight plan details, ground speed, and local time.

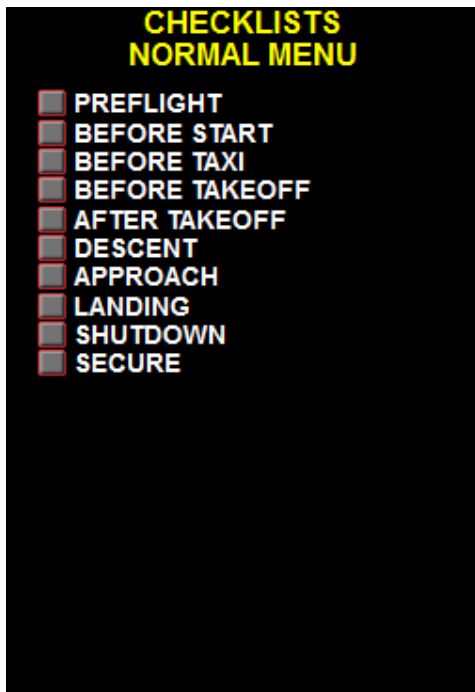
Note that local time in FSX is often wrong: e.g. it shows Singapore/Malaysia as GMT+6 when it is supposed to be GMT+8. East coast Australia however is correct at GMT+10.

Much of the information on this panel can not be seen elsewhere so it can be very useful.

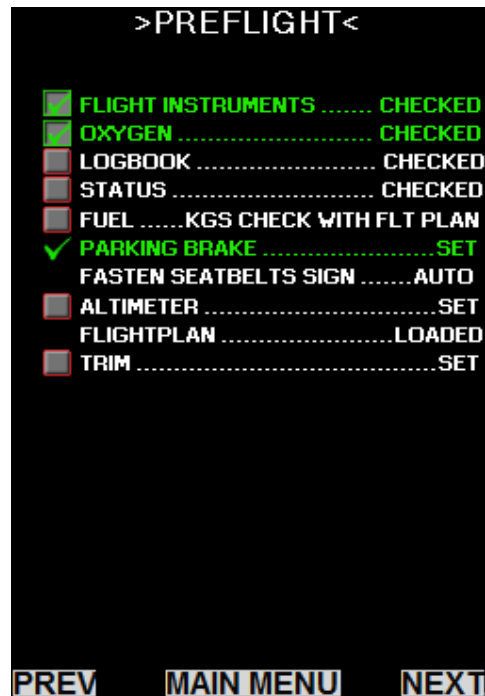
The panel is not based on a Boeing panel.

# Boeing 787 Panel

## The CHKL Display



**Main Checklist Menu**



**Preflight Checklist**

The initial Checklists Menu shows a list of all 10 available Checklists. These Checklists have been adapted to make them suitable for FSX with steps shown in similar sequence as they occur in FSX. For this reason although the Checklists do resemble the Boeing Checklists, they are not the same nor are they as comprehensive as the Boeing system. Only Normal checklists are available – there are no non-normal checklists.

On the Checklists Menu, clicking in the box next to the Checklist name will display that Checklist. Each checklist can have up to 15 items. Some items have a gray box next to them, others do not. Those with a gray box are manually clicked on when they have been done. Other items without a gray box will show as done when another event takes place – e.g. the pressing of a switch.

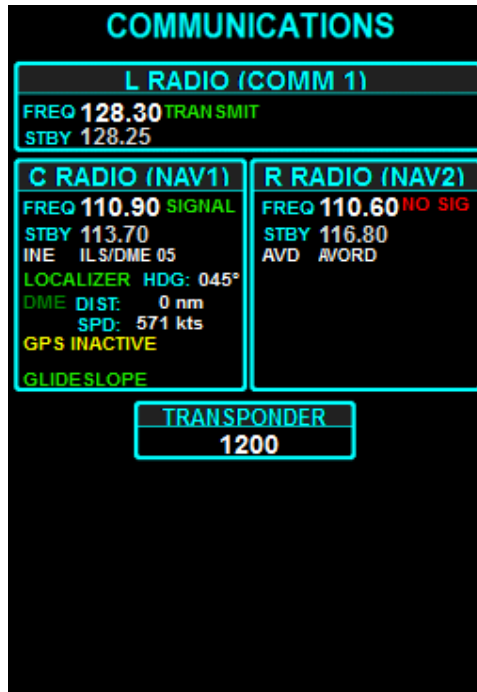
Each line shows white until it is done when it changes to Green and a Green tick appears. Each line shows the Checklist item followed by the expected response from the First Officer. When a Checklist has all been done “Checklist Complete” will appear at the bottom of the Checklist and a green tick will appear against the Checklist on the Checklist Menu.

At the bottom of the screen clicking on “Next” brings you to the next Checklist, “Prev” to the Previous Checklist and “Main Menu” to the Checklist Menu.

The Checklists are not linked to the Flight controls so do not prevent the aircraft from being flown if the items are not done. They are an additional option which may or may not be used.

# Boeing 787 Panel

## The COM Display



This button on the real aircraft controls company communications which is not supported in FSX. Instead this button displays information about the radios and their status.

On the Boeing 787 there are 3 radios each with a standby radio designated L, C, and R. Radio L is used solely for voice communications whilst radios C and R can be used for either data or voice.

For FSX Radio L has been designated COM 1 and there is no COM 2. Radio C is NAV 1 and Radio R is NAV 2.

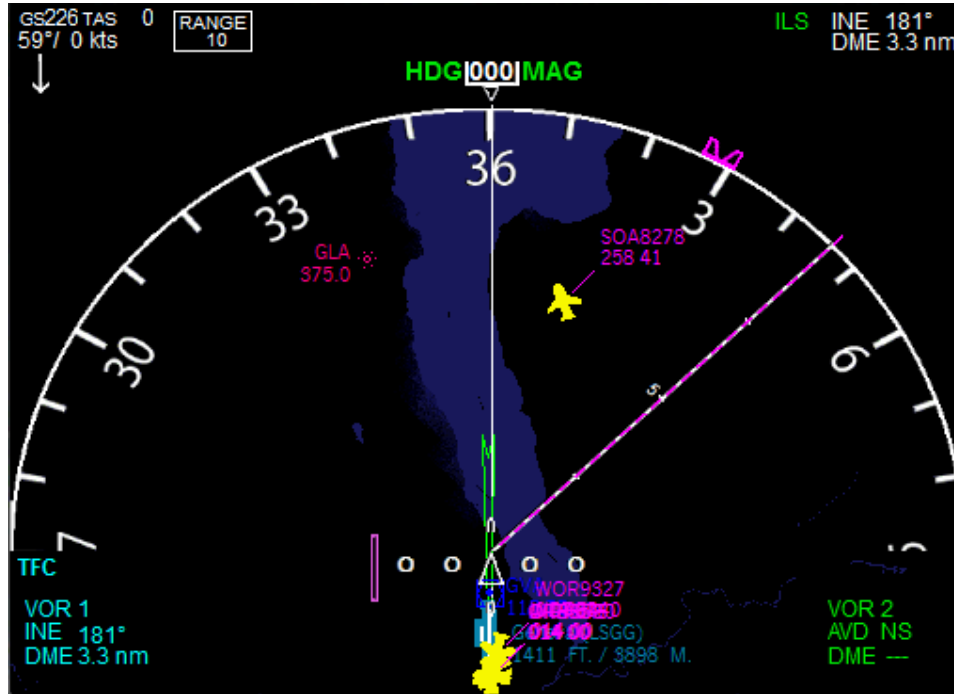
This panel displays useful information about the tuned stations which can not be seen on the radio panel.

This diagram has no resemblance to any Boeing Panel.



# Boeing 787 Panel

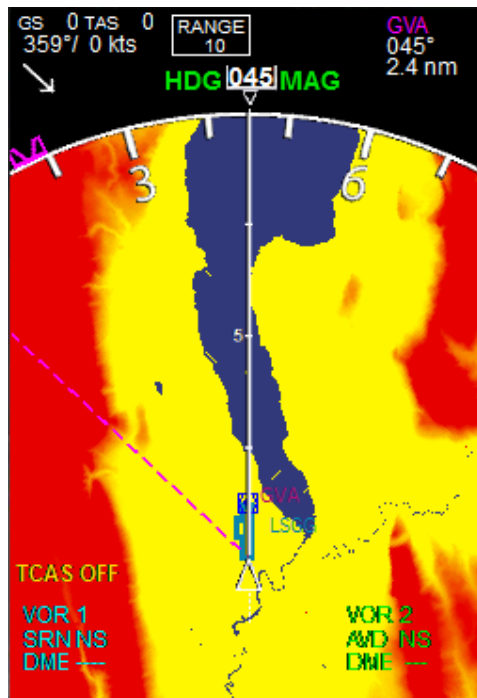
On the large display the range can be adjusted by right and left clicking anywhere on the map with the same rules as using the CTR button. Centre click anywhere on the display also switches between the Rose and Expanded display.



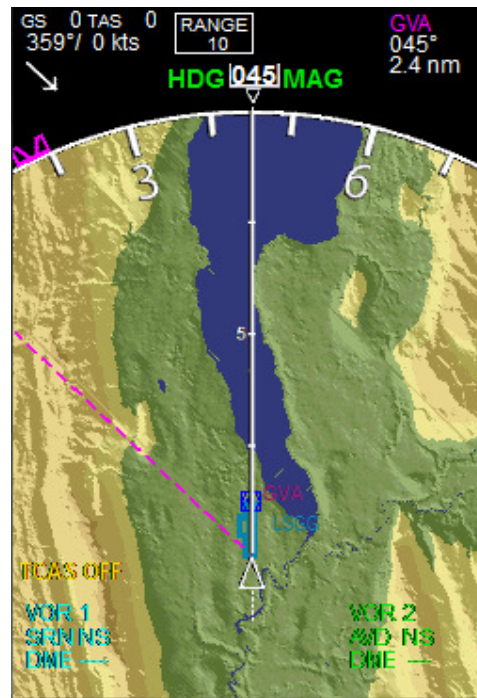
Large MFD with Monochrome Map and TCAS

# Boeing 787 Panel

## The TAWS Map



**TAWS Map**



**Terrain Map**

The Terrain Awareness (TAWS) Map is a map which measures terrain altitudes from the height of the aircraft rather than from sea level. The system used on this aircraft follows the colour scheme specified for a Boeing 737-800 however does not have the same accuracy as colours can only be defined in FSX per 1000 feet instead of 250 feet as needed by the specification.

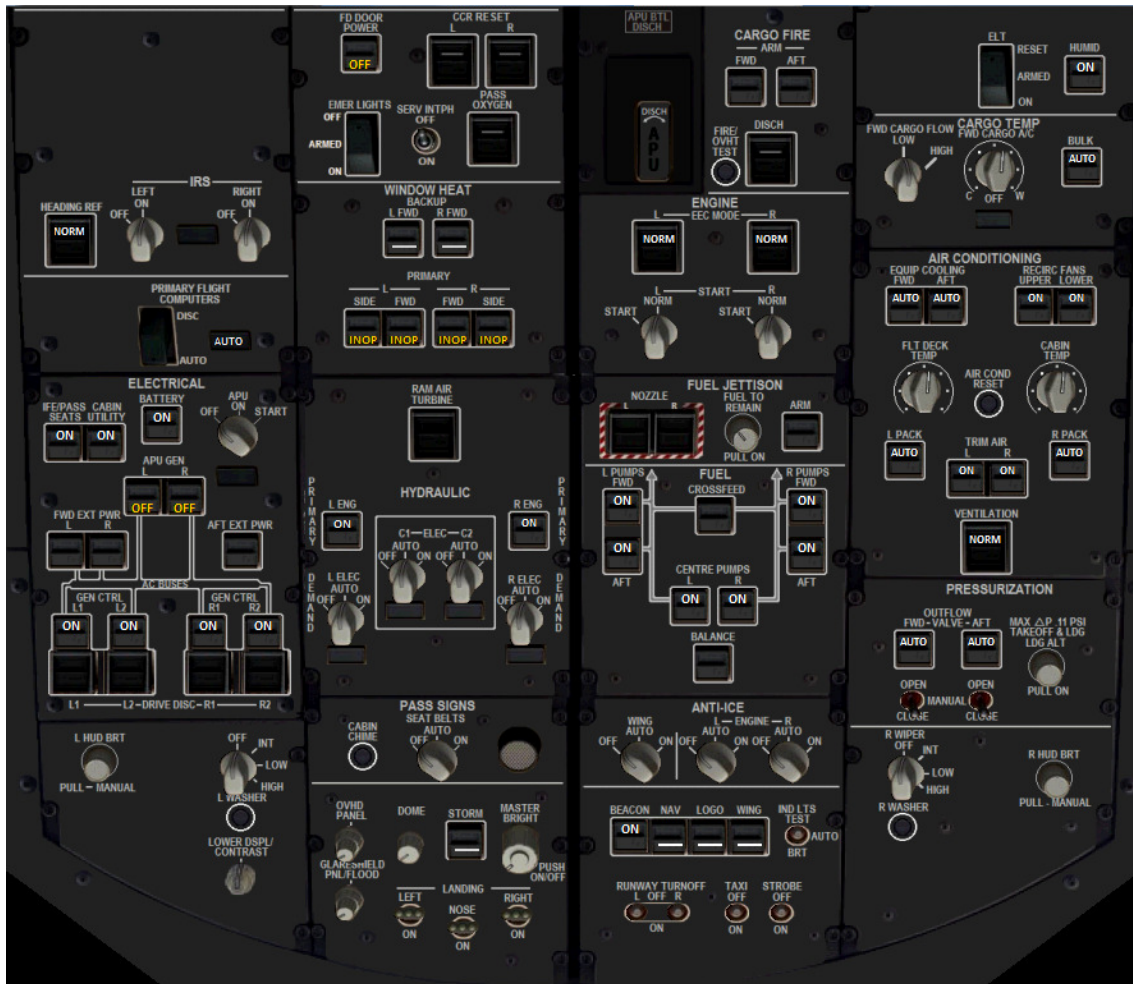
This TAWS map shows terrain from 2000 feet below the aircraft to 1000 feet below the aircraft in Green, from 1000 feet below to 2000 feet above the aircraft as Yellow, and Terrain more than 2000 feet above the aircraft as Red. Other terrain is not shown. The map above is what you see if the aircraft is on the ground. The specification states that the Green should extend to 500 feet below the aircraft (or 250 feet if gear extended) and the Yellow above that.

The TAWS map continues to be temperamental in Version 2. Experiment has shown that the TAWS map will not load after a Terrain map has been displayed. It will only load after a monochrome map has been displayed. The way to display it is therefore first to press the TERR button once for the monochrome map then the WXR button for the TAWS map. Other key combinations have been disabled.

Note that this TAWS map does not support look ahead terrain as this is not modelled in FSX.

# Boeing 787 Panel

## *The Overhead Panel*



The overhead panel on the Boeing 787 is very similar indeed to the Boeing 777 panel although Boeing has made the panels more curvaceous (which can not be seen on this panel). Most of the switches work and the majority perform their assigned function.

The Overhead Panel is divided into several sub-panels some of which are linked to the Synoptic displays. The following sections detail the sub-panels and their functions:

# Boeing 787 Panel

## Overhead Primary Flight Computers Panel (Top left)



OVERHEAD		
Primary Flight Computers Panel (Top Left)		
Switch	Function	Action
HEADING REF	This switch switches between Magnetic Heading and True North Heading modes. As FSX does not support True heading lock this is a dummy switch	Click to switch to True and again to switch back to Norm.
IRS	These two dials are to switch on the Inertial Reference System in the real aircraft. The PFD and NAV displays should not work when these are off but there is no documentation of what happens when these are off so they are dummy, but working, dials	Left Click for Off and Right Click for On.
PRIMARY FLIGHT COMPUTE RS	The Primary Flight Computers assist the operation of Flight Controls and interact with the Autopilot. This switch switches off all the displays as well as the Autopilot and Autothrottle.	Click to switch off the primary Flight Computers. Click again to switch them back on. The Autopilot will not automatically reconnect.

# Boeing 787 Panel

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## Overhead Electrical Panel (Left)



The Electrical Panel Buttons control the functions displayed on the Electrical Panel Display selected from the SYS Synoptic Menu.

The Boeing 787 has two generators on each engine and one APU with two Generators. Having two generators per engine and per APU is not supported in FSX but this panel simulates them.

Note in particular that, to start the APU, click on APU Start will start the APU then clicking on the APU GEN buttons switches on the generators.

Note also that clicking on a DRIVE DISC button will irreversibly shut down the generator which is usually highly undesirable and only done in reality if there is a malfunction. It must be reset again by ground engineers. Clicking again on the Drive button will not restart the generator.

# Boeing 787 Panel

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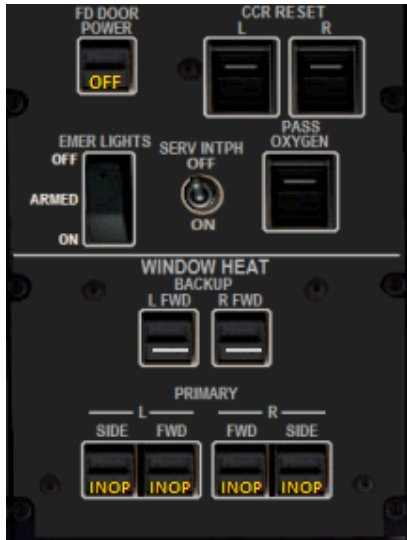
## Overhead Windscreen Wiper Panels (Bottom Left and Right)



Two panels at left and right at the bottom of the Overhead Panel control the windscreen wipers and washers. These switches are non-functioning in this panel. HUD brightness also can not be changed.

# Boeing 787 Panel

## Overhead Window Heat Panel (Top left Centre)



Window heat is essential to ensure that there is always visibility through the Flight Deck windows. There is no such function in FSX however this panel simulates them and the switches appear in the checklists. Other switches work but perform no function in FSX although dropping passenger masks can not be reversed.

Window Heat Panel		
Switch	Function	Action
FD DOOR POWER	The Flight Deck Door power switch automatically locks the flight deck door when on and leaves it unlocked when off.	Click to lock Flight Deck door. Click again to unlock.
CCR RESET	Common Computing Resource (CCR) reset Switches reset the CCR and causes a system restart.	Left clicking the switch switches it on and releasing the switch turns it off.
EMER LIGHTS	Switches Emergency lights on or off	Click to switch on and click again to switch off.
SERV INTPH	Connects the service and flight interphone systems.	Click to connect the systems and click again to disconnect.
PASS OXYGEN	When switched on it causes the Passenger Oxygen Masks to drop.	Click to deploy Oxygen Masks. Not reversible.
BACKUP	Switches the backup Window Heat on or off.	Click to switch on and again to switch off
WINDOW HEAT	Switches on Window heaters. EICAS messages appear if any window heaters are not on so these switches are a checklist item.	Click to switch on.

# Boeing 787 Panel

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## Overhead Hydraulics Panel (Centre left)



The Hydraulic Panel Buttons control the functions displayed on the Hydraulic Panel Display selected from the SYS Synoptic Menu.

Note that "Fault" appears in the boxes below the dials if the dial is set to off or if Hydraulic pressure is low (e.g. when the engines are off).

It can be interesting to try the buttons in conjunction with the Hydraulic Display Panel to see the effect of the various switches.

# Boeing 787 Panel

## Overhead PASS SIGNS Panel

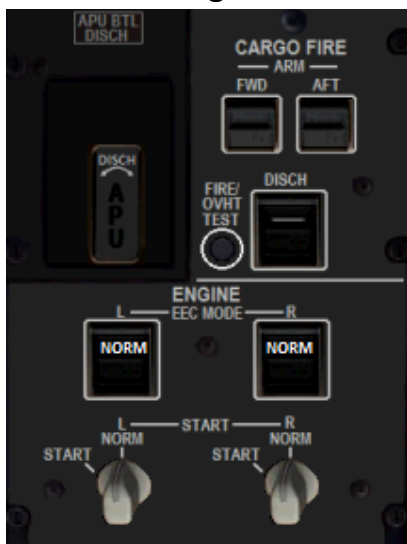


This panel includes the landing lights and panel backlighting switches.

Passenger Signs Panel		
Switch	Function	Action
CABIN CHIME	Sounds a chime in the cabin.	Click to chime (if the sound effect is installed).
SEAT BELTS	Switch to Auto for the sign to illuminate below 10000 feet, when flaps are down, or when depressurisation occurs.	Right click right to turn clockwise and left click to turn anti-clockwise.
OVHD PANEL	Switches on the Overhead panel background lighting.	Click once to switch on the Overhead Panel backlights and again to turn them off. Note that there is a small delay when switching them on or off.
DOME	Adjusts the overhead Dome light brightness	Dummy Switch.
STORM	Switches the default FSX lighting on and off. This can be as well as or instead of the backlighting.	Click once to switch on FSX lighting and again to turn it off.
MASTER BRIGHT	Controls the brightness of Flight Deck lights.	Dummy Switch
GLARESHIELD PNL/FLOOD	Switches the Main Panel and Glareshield backlighting on or off	Click once to switch on the Main Panel backlights and again to turn them off. Note that there is a small delay when switching them on or off.
LANDING LIGHTS	Switches Landing Lights on or off.	Clicking once on any of the three landing lights switches will turn on all Landing Lights. Clicking again on any of the switches will turn them all off.

# Boeing 787 Panel

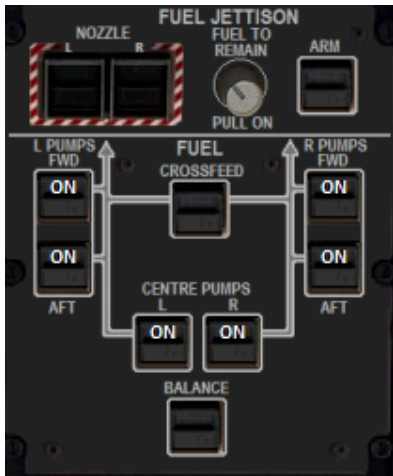
## Overhead Engine Start Panel (Top Right Centre)



Engine Start Panel		
Switch	Function	Action
APU Fire	Illuminates if there is a fire in the APU. Turning once discharges the fire extinguisher.	Click once to discharge the fire extinguisher if illuminated.
Fire Test	Click on this button to test the APU and Engine fire handles on the Throttle Quadrant. All handles illuminate when pressed.	Click left and right on the Engine fire handles to discharge the extinguishers and click once on the APU handle. Click the Fire Test button again to return all to normal state.
Cargo Fire Arm Switch	Arms the Cargo Compartment fire extinguishers.	Click to arm and again to disarm.
Cargo Fire Switch	The Disch switch discharges the fire extinguisher bottles into the cargo compartment.	Click to discharge the fire extinguisher.
EEC Mode Switches	Sets N1 as the parameter for the computer to control the engines.	Click once to switch to ALT mode and again to switch back to NORM. Performs no function in FSX.
START	Clicking on either dial will automatically start the corresponding engine.	Click once to start the engine. There is no manual start option on the Boeing 787.

# Boeing 787 Panel

## Overhead Fuel Panel (Right Centre)



The Fuel Panel Buttons control the functions displayed on the Fuel Panel Display selected from the SYS Synoptic Menu.

Note that clicking on Fuel Jettison “ARM” will show the Fuel Jettison sub-panel on the Fuel Panel display. Fuel can then be jettisoned using the Left and right nozzles. The fuel remaining can be adjusted by dialling the Fuel to Remain dial.


It can be interesting to try the buttons in conjunction with the Fuel Display Panel to see the effect of the various switches.

## Fuel Jettison

When the Fuel Jettison is armed a fuel jettison diagram will appear at the bottom of the Fuel Synoptic. By default this will show the amount of fuel to remain at the Maximum Landing Weight (MLW). If Fuel Jettison is armed while FSX is paused this number will be wrong and after switching off pause mode the Fuel Jettison must be disarmed and rearmed again.

The maximum landing weight is calculated based on the Boeing Operations Manual so if the aircraft.cfg does not match the Boeing specifications the calculation will be wrong.

The Fuel to remain is displayed on both the Fuel panel and the EICAS with the text MLW. If a different fuel remaining is desired this can be selected using the Fuel remaining dial. In this case MLW will change to MAN for manual selection.

MLW has default values for a 9000 foot runway at an altitude of 1000 feet in dry conditions. This can be changed with a small popup calculator which can be seen by pressing the  icon in the bottom of the main panel. The parameters can be altered on this calculator for a new MLW. See the earlier section for description of this calculator.

# Boeing 787 Panel

The rate of Fuel Jettison varies widely on a real aircraft and depends on many factors including number of pumps used, number of nozzles used, temperature, altitude etc. In FSX however there is only one jettison rate regardless of number of pumps or number of nozzles. This is defined in aircraft.cfg under [Fuel] as fuel\_dump\_rate=. A figure often recommended for this parameter is 0.0167 however this results in the entire fuel load being dumped in about 5 minutes which is far from the real rate.

For a more realistic rate the figure 0.000167 can be used which roughly gives a dump rate of 2000 kgs per minute which is realistic. In real life of course it takes a long time to dump a lot of fuel – sometimes more than an hour so the more realistic rate can be tedious.

In this simulation, unlike the real aircraft, fuel can be dumped on the ground so experimentation with different numbers is feasible.

## Overhead ANTI-ICE Panel (Centre Right Bottom)



The Anti-Ice switches can be set to Off, Auto or On. When set to Auto the Wing anti-ice switches on and off automatically as ice is detected. On the real aircraft the Engine de-icers do the same but in FSX ice can not be detected on the engines so when the switch is AUTO, the deice heating comes on when the temperature is below 10 degrees Celsius. See the aircraft.cfg section at the front of the manual to see the required change to make the Wing anti ice work.

The effect of the Beacon, NAV, Logo, Wing, and other switches on this panel will vary according to the FSX model used:

- The TDS model has Beacon, NAV, Strobe light in the tail, and Taxi lights.
- The FSL model has Beacon NAV, Strobe lights at the wingtips, and Taxi lights. The Logo and Wing lights are permanently on and can not be switched off.

Clicking on any of the Switches will turn the operating lights on and off. The IND LTS Switch does not perform any function.

# Boeing 787 Panel

## Overhead CARGO TEMP Panel (Top Right)



Switches on this panel control the temperature in the cargo compartment. This is a customer option on the Boeing 787 and this panel assumes there is a temperature controlled compartment although FSX does not support this.

CARGO TEMP Panel		
Switch	Function	Action
ELT	The Emergency Location Transmitter (ELT) Switch is switched on to activate a locator beacon in case of emergency.	Working switch but has no function.
HUMID	Switches the Flight Deck air humidifier on or off	Click to switch off and again to switch on.
FWD CARGO FLOW	Controls the airflow to the forward temperature controlled cargo compartment.	Click for High and again for Low.
FWD CARGO A/C	The dial adjusts the temperature in the forward cargo hold. 21 degrees C is the default (mid-point) temperature.	Left click to decrease or right click to increase cargo hold temperature.
BULK	Normally set to AUTO to heat the bulk cargo compartment. This switch is only switched off if there is a fault in the heating system.	Click to switch off and again to switch back to AUTO.

# Boeing 787 Panel

## Overhead Air Conditioning Panel



This panel controls the air circulation in the aircraft and therefore has limited utility in FSX. It controls the functions displayed on the Air Panel Display selected from the SYS Synoptic Menu.

Air Conditioning Panel		
Switch	Function	Action
EQUIP COOLING	This system cools the electronic equipment on the flight deck and electronics bay. It normally operates continuously and is only switched off if there is a fault.	Click to switch of and again to set back to AUTO.
RECIRC FANS	The air recirculation fans normally operate continuously and are only switched off in case of a fault.	Click to switch off and again to switch on.
FLT DECK TEMP	The dial adjusts the temperature on the flight deck. 24 degrees C is the default (mid-point) temperature.	Left click to decrease or right click to increase flight deck temperature.
AIR COND RESET	Resets valves to attempt restart after a fault.	Non-working
CABIN TEMP	The dial adjusts the temperature in the passenger cabin. 24 degrees C is the default (mid-point) temperature.	Left click to decrease or right click to increase passenger cabin temperature.
L PACK R PACK	Cabin Air compressors switch. Normally operates throughout flight unless there is a fault.	Click to switch off and again to switch back to AUTO.
TRIM AIR	When ON the Trim Air valve is open.	Click to close the Trim Air and click again to reopen.
VENTILAT ION	Switch to ALTN in case of fault in the ventilation system.	Click to switch to ALTN and click again to return to NORM.

# Boeing 787 Panel

## Overhead Pressurization Panel



This panel controls the pressurization of the aircraft which is displayed in the bottom right of the EICAS.

Pressurization Panel		
Switch	Function	Action
OUTFLOW	The pressurization system is normally fully automatic. This switch switches off the automatic to prepare for depressurization.	Click to switch pressurization to manual and again to switch back to AUTO.
LDG ALT	This dial is used to manually set the Landing Altitude. This is normally automatically set from the Flight plan however can be manually set if there is no flight plan.	Right click to increase landing altitude and left click to decrease.
MANUAL	Switching this switch will cause depressurization if the corresponding outflow valve is set to manual. Closing the valve and resetting to AUTO will repressurize the aircraft.	Click to open valve and click again to close.

# Boeing 787 Panel

## *The Throttle Quadrant*



At first sight the Throttle Quadrant appears identical to that for the Boeing 777 but a closer look reveals differences – mainly no Elevator Trim lever. This Throttle Quadrant suffers a bit from lack of artwork but all of the functions work.

## **Throttle Operation**

Using the mouse grip function to control the Throttle Quadrant has always been tricky. This panel uses a new simpler way of controlling the throttle quadrant with the mouse wheel and both mouse buttons.

All levers are operated with left and right mouse clicks: left click to pull the lever and right click to push the lever. This can be done anywhere in the single mouse area for each lever. The Throttle itself is operated with the mouse wheel in a similar way to the slider on a joystick. More details are given under throttles.

# **Boeing 787 Panel**

<b>THROTTLE QUADRANT</b>		
<b>Switch</b>	<b>Function</b>	<b>Action</b>
Parking Brake	The Parking Brake for use on the Ground.	Click to set the brake and click again to release the brake. The Parking Brake can also be set using the “.” Key and also from the Ground Handling window.
ALTN Pitch Trim	Normal Pitch trim is located on the Yoke which is not modelled in this panel. These switches are usually for ALTN pitch trim in case of failure but in this panel can be used to alter the pitch trim. Note that although the pitch trim changes in the EICAS, the TDS model does not respond to pitch trim settings.	Left click for Nose Down and right click for Nose Up.
STAB	These switches switch off the Elevator Trim. FSX does not have this function however switching this switch does reset the Elevator Trim to zero.	Click on either switch to reset the Elevator Trim.
Speed Brake	The Speed Brakes are deployed using mouse clicks and the mouse wheel	See below for detail on how to operate the Speed Brakes.
Throttles	The main Throttle levers for the two engines.	See below for details of how to operate the throttles.
Fuel Control	When engines are running these will be in the RUN position. To shut down engines move to CUTOFF.	Click on each switch once to shut down engines. To restart an engine the Autostart button on the Overhead Panel must be used.
Flaps Lever	Moving this lever will deploy flaps to the degrees indicated on the Pedestal	Left click to incrementally deploy flaps and right click to incrementally retract them.

## **Speed Brakes**

To operate the speed brakes first left click to Arm them. To fully deploy the speed brakes left click again. To fully retract the speed brakes at any time use right click.

When in-flight and the speed brakes are armed they can be incrementally deployed using the mouse wheel. One click of the mouse wheel deploys them one eighth of their travel. The mouse wheel can not be used when on the ground.

# **Boeing 787 Panel**

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## **Throttles and Reversers**

The Throttles have a simple up and down sliding action. The use of the mouse may take a little getting used to but is very simple in practice.

Moving the mouse wheel up while positioned on either Throttle mouse area will increase the throttles and moving the wheel down will decrease them. By default moving the mouse wheel will move both throttles together.

To move an individual engine throttle right click anywhere in either throttle mouse area. Following the right click only the engine on which the mouse is positioned will move when the mouse wheel is turned. Moving the mouse to the other engine will also move that engine individually. To return to synchronised engine movement right click again however note that Engine 1 throttle will move to the same position as Engine 2 on clicking the right button again.

Left click to return engines to idle either individually or together.

If you are reducing throttle with the mouse note that it will stop at idle but clicking on the centre mouse button will allow the deployment of the reversers from the mouse wheel.

The use of the mouse wheel is fairly smooth however note that each click of the wheel increases or decreases the throttle by 10%. For the reversers each click increases or decreases the reverse thrust by 20% of the maximum reverse thrust of 25% of the forward thrust (so 5 clicks to the maximum reverse thrust).

## **Fire Panel**

The Fire handles for the two engines are located behind the throttle quadrant while the fire handle for the APU is located on top of the Overhead panel.

All of the fire handles can be tested by clicking on the test switch on the Overhead panel next to the APU fire handle.

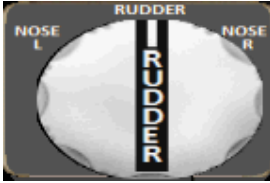
In test mode all of the fire levers illuminate (there should be only one in a real fire). The fire bottles can then be discharged using the left mouse button to discharge the left bottle and the right button to discharge the right bottle. Note that the APU has only one bottle. Clicking on the Overhead test switch again returns the handles to normal and recharges the fire bottles.

Apologies for the poor artwork in this area however there were no good photos available.

# Boeing 787 Panel

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## Rudder Trim



The Throttle Quadrant has an additional Popup panel underneath which can be seen by clicking anywhere on the narrow band panel at the back of the Throttle Quadrant.

The Rudder trim can be adjusted by left and right clicks on the Rudder trim dial.

## *The Radio Stack*



The Radio Stack panel is a new panel modelled on the Radio panel on the Boeing 787. On the real aircraft this panel has several sub-panels and options for HF, SAT, CAB, GPWS, WXR, and XPDR. These options are not available in this radio stack – only VHF radio.

The Boeing 787 has three VHF radios, each with a standby, labelled L, C, and R.

Radio L is used only for voice communication and is COM 1 in FSX terms.

Radios C and R can be used for both voice and data but for FSX they are designated NAV 1 and NAV 2.

Note that although the radio has three decimal places FSX supports only two.

# Boeing 787 Panel

Radio frequencies can be set as follows:

## 1. Key in a frequency

- Select a radio by clicking on one of the buttons next to the radio to be tuned
- Type in a frequency by clicking on the number keys in the panel. Do not type a decimal point
- When you have typed 5 digits OR when you click on Store Active the frequency you have typed will replace the frequency of the radio selected

## 2. Increment or Decrement an existing Frequency (only STBY Radios)

- To change the whole number of the frequency position the cursor on the number and left click to decrease or right click to increase the number.
- To change the decimal of the frequency position the cursor on the decimal portion and left click to decrease or right click to increase.
- Note that the decimal will click over the whole number when increasing or decreasing over zero
- It is not necessary to click the select button next to the radio to use this method.
- To swap the STBY frequency with the active frequency select the radio (Active or Standby) and click on the XFR button

Method 1 is the authentic way to change the frequency while method 2 is usually more convenient.

## *The Heads Up Display (HUD)*




**Cluttered Mode**

The Boeing 787 comes with a Heads Up Display (HUD) for both Captain and First Officer. The HUD can be very useful especially during landing. It can also be used for blind takeoffs although this option is not modelled in this HUD.

# Boeing 787 Panel

The HUD is based on the Boeing Operations Manual and has been modelled as accurately as possible on the actual HUD used in the Boeing 787. It has been done in a large size with the maximum viewing area available. The main panel drops away with only the Glareshield visible.

In the real aircraft the pilot manually pulls down the HUD from the ceiling and it starts automatically. In this simulation this is done by clicking on the  HUD Icon and again to return the HUD to stowage.

The real HUD aligns itself with the horizon however after much research and trials this has been found to be impractical in FSX due to the restricted field of view and inconsistent responses to the View change commands. Nevertheless the HUD does align to the horizon when on the ground and can be aligned to the horizon in-flight using the FSX Ctrl-Q and Shift-Ctrl-Q commands. It is recommended that these commands be mapped to Joystick keys (with repeat on) to obtain a smooth response.



**Uncluttered Mode**

Clicking anywhere on the HUD will switch it to Uncluttered Mode and clicking again will go back to Cluttered mode. The Unusual Attitude screen is not modelled in this HUD.

On Approach aligning the HUD to the horizon will result in a fairly precise alignment of the runway edge lines, when they appear at 300 feet, with the runway and almost perfect alignment with the centreline. Note that the Runway edge lines only appear in Uncluttered mode.

# Boeing 787 Panel

## *The Ground Handling Panel*



This is a small heads-up display that appears only when the left engine is shut down. Parking Brakes must be applied before any of the other functions work: clicking on the Parking Brakes switch on the panel is one way to apply them.

Where there is a Jetway it can be connected by clicking on the “Press for Jetway” Switch. Note that Jetways will generally only be visible if Scenery Complexity is set to “Dense” or more and not in FS9.

Up to 4 doors can be opened individually by clicking on “M” (Main) “2” (2<sup>nd</sup>), “R” (Rear), and “C” (Cargo) Buttons under Exits. The 4 Exits open can be seen on the DOOR display panel selected from the EFIS/DSP Synoptic. These will display even if the FSX aircraft does not have all animated opening doors. These switches correspond to the TDS model but only M and C work with the FSL model.

The door opening function should not be used when the simulator is Paused as it becomes confused about which doors are open. Due to the method used by FSX to operate doors they can be quite temperamental and the buttons need to be pressed with a pause between each one.

A Fuel Truck can be requested by clicking on the “Not Requested” button.

Finally pushback can be easily done first by selecting the direction required then clicking on “Pushback Off”.

Note that as this panel only becomes visible when the left engine is off and FSX starts by default with engines running, it is necessary to shut down the engine before you can see this panel. The panel will disappear when the engine is restarted which normally happens after pushback.

# **Boeing 787 Panel**

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