



Boeing 727

FSX Flight Deck Panel

Version 1.0

Documentation

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Boeing 727-200 Panel

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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 directory with its contents to the FSX \Simobjects\Aircraft\B727 either replacing the existing panel sub-directory or as “panel.XX” where XX is the name on the “panel=” entry in the aircraft.cfg.

To install the Cockpit sounds:

1. Copy the B727Sound.gau file to the FSX \Gauges Directory
2. Copy the whole B727Sounds directory to the FSX \Gauges Directory

These cockpit sounds are for the sounds made by switches etc in the cockpit. They are additional to any other sound package which may be installed.

Aircraft.cfg

The aircraft.cfg file in the \Simobjects\Aircraft\B727 directory should be checked to make sure that the parameters shown below are correctly set. Some features of this panel will not work unless these parameters are set correctly.

[exits]

If you would like to be able to connect to Jetways then the entry under [Exits] for the Vistaliners model should be as follows:

```
number_of_exits = 2
```

```
exit.0 = 0.3, 64, -4, 5, 0 //openclose rate percent per second,  
                           longitudinal, lateral,  
                           vertical positions from datum (feet),  
                           type (0=Main 1=Cargo 2=Emergency)  
exit.1 = 0.12, 42, 9, -7, 1 //openclose rate percent per second,  
                             longitudinal, lateral,  
                             vertical positions from datum (feet),  
                             type (0=Main 1=Cargo 2=Emergency)
```

If there are any exit_rate entries under [Exits] they can be deleted.

Note that the numbers other than 0.12 under exit.1 do not matter. The numbers under exit.0 worked on the model tested however the longitudinal number (i.e. 64) may need adjustment for different models.

N.B. The Thomas Ruth model has 4 exits in the aircraft.cfg and can be left unchanged.

[electrical]

Max_battery_voltage should = 28

Generator_alternator_voltage should = 115

Electric_always_available should = 0

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[hydraulic_system]

Electric_pumps should = 2

Normal_pressure should = 3025

Engine_map should = 1,1,0,0

[radios]

Entry under radios should be replaced by the following:

Audio.1 = 1

Com.1 = 1, 0

Com.2 = 1, 0

Nav.1 = 1, 0, 1

Nav.2 = 1, 0, 0

Adf.1 = 1

Adf.2 = 1

Transponder.1 = 1

Marker.1 = 1

[autopilot]

Default_vertical_speed is recommended to be 1800

Yaw_damper_gain should = 1

[fuel]

Number_of_tank_selectors must equal 3

Electric_pump should = 1

Fuel_dump_rate is recommended to = 0.00167

[deice_system]

Structural_deice_type should = 1

[attitude_indicators]

This section should have the following entries:

attitude_indicator.0=2

attitude_indicator.1=1

[flaps]

Make sure that the Leading Edge Flaps (Type=2 – usually [Flaps.1]) are set to the following positions:

Flaps-position.0 = 0

Flaps-position.1 = 1

Flaps-position.2 = 2

Trailing edge flaps should have only positions 0, 2, 5, 15, 25, 30, and 40. Any extra positions should be deleted.

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INSTRUCTIONS

Introduction

This is the first panel I have done of a “classic” aircraft – i.e. one without a glass cockpit. Although the gauges are technically less complex, the artwork is more challenging. As far as possible I have tried to make the artwork as realistic as possible and the background is based on a photo of a real aircraft whilst the popup panels are cartoons but not too bad.

This panel also includes the flight engineers workstation with all the dials and switches working but not all have a function in FSX.

Testing for this panel has been done mostly with the freeware model Vistaliners Silverjet 727 with the model by Eric Cantu designed for FS9. The Virtual Cockpit (VC) is designed for Thomas Ruth’s model only as the Vistaliners model has no VC. This panel should work on other models and probably will work on FS9 as no specialised FSX features have been used. It will also most likely work in P3D.

Note that although FSX has an option for metric or imperial measurements, this panel operates on imperial only for weights and pressure, and in Centigrade for temperatures. Altitudes are in feet.

The functionality and gauge designs are based on the Boeing Aircraft Operations Manual which sometimes is not clear so there is some occasional guesswork.

The Boeing 727 did not have GPS navigation however my GPSNEW window (replacement for the Garmin GPS500) has been included to enable this. GPSNEW will not work on FS9.

The Virtual Cockpit

A Virtual Cockpit (VC) is included which works on Thomas Ruth’s Boeing 727 model only.

The main panel works quite well however the engineer’s panel can only be use as read-only. There are a number of switches built into the model in the VC which perform very simplistic functions which do not match the main 2D panel. This is particularly the case with the fuel switches as the 2D panel incorporates a full function fuel management system which works the same as the real aircraft. This fuel management system overrides the settings on the VC Fuel panel so the switches there have no effect.

The Thomas Ruth model has quite a number of flaws in it – in particular it can not be run in DEBUG mode. If your machine has DEBUG set up as default, a deliberate flaw has been built into one of the VC gauges so that the DEBUG mode can be cancelled. If it is not cancelled then the model will cause FSX to crash.

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Night Lighting



On the Boeing 727 the panel lighting is manually controlled by a row of dials near the bottom of the Overhead panel.



These dials control the panel lighting as follows:

MAP Dial:	Dummy
LEFT FWD SIDE PANEL Dial:	Left Side Main Panel
CENTER FWD PANEL Dial:	Central Main Panel
FWD PANEL BACKGROUND Dial:	Main Panel Background Lighting
FWD PANEL FLUOR Dial:	FSX Default Flood Lighting
OVERHEAD PANEL Dial:	Overhead Panel Lighting
CONTROL STAND RED Dial:	Dummy
CONTROL STAND WHITE Dial:	Pedestal Background Lighting
RIGHT FWD & SIDE PANELS Dial:	First Officer's Panel
MAP Dial:	Dummy

Note that lighting on the Boeing 727 was mostly floodlight by fluorescent lights. There was backlighting on the Flight Engineer's Panel and partially on the Overhead Panel but apparently not elsewhere. For the Overhead Panel however this panel will show backlighting by rotating the Overhead Panel Dial beyond the ON position. The closest to realistic lighting is to switch on the basic lighting plus the FSX Default lighting. Back lighting can also be done on the main Panel with the FWD PANEL BACKGROUND dial but this backlighting would have been fluorescent lights on the real aircraft.

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Similarly the lighting on the Flight Engineer's Panel is controlled by four dials on the lower right panel:



These dials control the lighting as follows:

PANEL FLUOR Switch:	FSX Default Lighting (all panels)
PANEL Dial:	Flight Engineer Gauge Lighting
PANEL BACKGROUND Dial:	Flight Engineer Panel Backlighting
CIRCUIT BREAKER Dial:	Dummy
TABLE Dial:	Dummy

Icons



The standard icons appear below the PFD with an additional  icon which enables the switch off of the upper Compass and dummy overhead switches. The other additional icon is the  icon which switches the Flight Engineer's Panel on or off.

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.

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

Simple on / off switches can use the left or right mouse buttons.

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

Boeing 727-200 Panel

Main Panel



The main panel has several sub-panels with the flight control gauges in the left two sub-panels, the Standby Attitude indicator and Yaw Damper controls in the third sub-panel, Engine displays in the Centre panel, with Flaps and landing gear displays and control on the right panel. On the Glareshield is the Autopilot and the Fire control handles. The arrangement of all of these gauges correspond closely to the original aircraft.

More detailed descriptions of the sub-panels appear below:

The Airspeed Gauge



A standard airspeed gauge for this era displaying airspeed in knots and a “barber pole” indicating the maximum allowable airspeed.

The Autopilot Airspeed bug can be rotated using the dial at the bottom left.

Boeing 727-200 Panel

The Automatic Direction Finder (ADF)



A standard ADF for this era displaying the direction to the tuned VOR on both NAV1 and NAV 2. The buttons at the bottom of the gauge can be clicked on to switch between VOR and ADF (upwards pointing is VOR). The single (interior) arrow points to the tuned VOR or ADF on NAV1 or ADF1. The double (outer) arrow points to the tuned VOR or ADF on NAV2 or ADF2.

The yellow indicators on left and right display when there is no signal for the tuned frequency for the corresponding VOR or ADF.

A similar yellow indicator appears at the top of the gauge when there is an electrical failure to the gauge.

The Engine Warning Light



The Engine Warning light illuminates if Auto Track Trip is armed (See Flight Engineer's Upper panel) whenever one or more engines are not running during takeoff.

The Comparator Lights



The Comparator is partially hidden by wiring but still functions as follows:

- The HDG light is illuminated when the Autopilot is set to Heading mode.
- The GS light is illuminated when the aircraft is locked on to the Glideslope.
- The ALT light is illuminated when the Autopilot is set to maintain a set Altitude.

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The Attitude Indicator



In addition to showing the Attitude of the aircraft, this gauge shows a ball indicator below the gauge which moves horizontally within its bubble to show the slip and an Acceleration meter which moves horizontally below the Attitude window.

The “GLD SLP” shutter displays on the right if the aircraft is in Glideslope Hold mode but no Glideslope signal has been detected on the HSI. Conversely if the Glideslope is detected a Glideslope variance display will display in the same position.

The text “MIN” will display in the bottom right corner when the aircraft is in flight and more than 50 feet below the set minimum radio height.

The text “GND PROX” will display when any of the following conditions exist:

Radio Altitude is between 50 and 2500 feet AND:

- Sink Rate more than 1500 feet per minute (Aural Message: “Sink Rate”) OR
- Sink Rate more than 2000 feet per minute (Aural Message: “Pull Up”) OR
- Altitude loss after take off or go around (Aural Message: “Don’t Sink”) OR
- Below 800 feet altitude and no Flaps set (Aural Message: “Too Low Terrain”) OR
- Below Glideslope (Aural Message: “Glideslope”)

A hatched red rectangle will appear below the Attitude indicator if the Autopilot has been set to GS but no Glideslope has been found. Once the Glideslope has been found a horizontal deviation indicator for the Localiser will appear.

The Pitch Trim dial at the bottom left of the gauge can be rotated to adjust the pitch trim using the left and right mouse keys.

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The Horizontal Situation Indicator (HSI)



The HSI displays the position of the aircraft in relation to the VOR tuned in NAV1 or NAV2 (depending on the setting of the Deviation switch below the gauge)

The bottom left handle adjusts the Heading for the Autopilot which is indicated by the yellow triangle on the HSI Dial.

The right handle adjusts the manual course set and the compass bearing is displayed in the top right of the HSI.

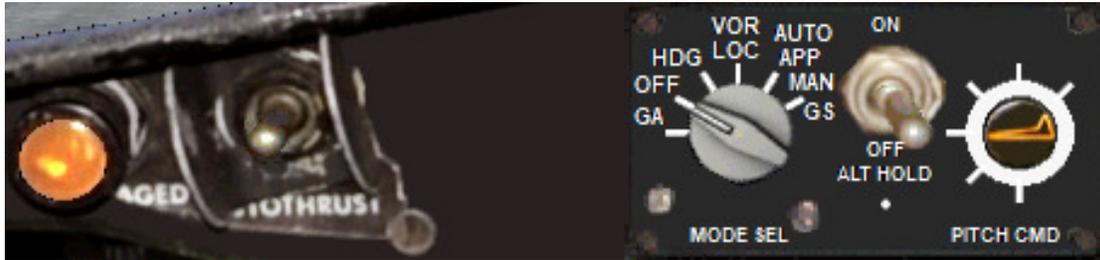
The top left box of the HSI displays the distance in nautical miles to the tuned VOR or is blank if there is no DME available.

A Red “GLD SLP” vertical box appears on the left if the Autopilot is set to GS and no Glideslope has been found.

A Red “VOR LOC” box appears on the right if no VOR has been detected on the selected NAV radio.

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The Autopilot



The Autopilot on the Boeing 727 is rather messy compared to modern aircraft with functions split across several gauges. Airspeed hold is set ON with the Autothrust switch but is set using the bug on the Airspeed Indicator. Similarly the Heading set with the bug on the HIS.

The real aircraft was flown more manually using VORs and Course settings than modern aircraft however this simulation provides Navigation mode by using the VOR LOC setting in the mode selector. Whilst a VOR to VOR flight plan should normally be chosen, setting the Autopilot to VOR LOC will also follow a GPS flight plan. The GPSNEW can be used to assist with navigation as well although in the actual aircraft the pilots would use paper maps to navigate.

The individual controls from left to right are:

- | | |
|---------------------------------|---|
| Autopilot Master Warning Light: | Illuminates yellow when Autopilot is off. |
| Autothrust Switch: | Holds the Airspeed at the Airspeed Indicator Bug speed |
| Mode Selection Dial: | This dial has several settings as follows: |
| • GA: | Go Around Mode |
| • OFF: | Autopilot Master is off (Automatically switches off Flight Director). |
| • HDG: | Set Autopilot to Heading mode (Automatically switches on Flight Director) |
| • VOR LOC: | Set Autopilot to Navigation Mode (VOR to VOR or GPS) |
| • APP: | Set Autopilot to Approach Mode (Auto Glideslope) |
| • GS | Set Autopilot to LOC Mode (Manual Glideslope) |
| Altitude Hold Switch: | Set Autopilot Altitude Hold |
| Pitch CMD Dial: | Rotate to set aircraft Pitch |

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The Wheel Well Light and Fire Handles



These lights and handles work as follows:

Wheel Well Light: Dummy Light – FSX can not detect Wheel Well fires.

Fire Handles:

- Click once to pull fire handle;
- Select Fire Bottle left or right using BOTTLE TRAP Switch
- Click fire handle again to discharge fire bottle.
- Applicable Bottle Discharge Light illuminates yellow

The Autopilot Altitude Set Window



The Autopilot Altitude can be set by rotating the Knob on the right.

The ALTITUDE ALERT Light will illuminate yellow when the aircraft is within 900 feet of the preset Altitude. It goes out when the aircraft is within 300 feet of the preset Altitude.

N.B. Centre clicking on the Altitude Set Knob will switch the ALTITUDE ALERT light on or off

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The Flight Director and Approach Annunciator Lights



The Lights are illuminated as follows:

F/D ON Light: Illuminates when the Flight Director is on

VOR LOC: Illuminates when the VOR LOC mode is selected (Navigation mode is on)

GLIDE

SLOPE: Illuminates when AUTO APP or MAN GS are selected

GO

AROUND: Illuminates when GA mode is selected

The Altimeter



An analogue barometric altimeter typical of the era. Thousands of feet show in the window and hundreds of feet altitude around the dial. The barometric pressure may be adjusted using the bottom left knob.

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The Absolute Altitude Gauge



This is the radio altimeter which works up to 2500 feet of altitude above terrain. Rotating the bottom right knob will rotate the altitude bug around the circumference of the gauge.

The Vertical Speed Indicator



The Vertical Speed Indicator (VSI) shows the vertical speed in thousands of feet per minute with a maximum of 6000 feet per minute.

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The DME Gauge



The Distance Measuring Gauge will display the distance in nautical miles to the DME tuned by NAV1 above and NAV2 below. If no station is tuned or if the station is not a DME station a striped shutter will display as above.

The Standby Attitude Indicator



The Standby Attitude Indicator displays the aircraft attitude based on the secondary Attitude Indicator

Boeing 727-200 Panel

The Yaw Damper Gauge and Switches



The analogue gauge displays the movement of the Rudder and Elevators. When the upper or lower Yaw Damper is off an orange window displays at top or bottom to indicate.

The Boeing 727 did not have auto-braking on landing. The pilot had to manually start reverse thrust, braking, and spoilers. This is difficult to do in FSX with only one mouse so a facility for Autobraking is provided using the AUTOPILOT SERVO ELEVATOR knob. Setting this knob to D or AD will set reversers to 50% or 100% reverse thrust and deploy spoilers on landing.

The “Master Warn” light comes on when the all of the Engine generators plus the APU generator are off.

The upper and lower Yaw Dampers can be switched on or off using the two Yaw Damper Engage covered switches.

Boeing 727-200 Panel

The Engine Gauges Panel

The Engines Panel has three columns of engine gauges corresponding to each of the three engines. The Gauges and their descriptions are as follows:



Engine Pressure Ratio (EPR)

This gauge displays the Engine Pressure Ratio as a ratio. The EPR bug can be moved by rotating the knob at the bottom right. The setting of the EPR Bug displays in the lower window.

Engine N1 RPM

The Engine N1 compressor rotor speed is shown as a percentage of the maximum N1 RPM. A small sub dial is graduated in ten divisions for each 10 percent change in speed.

Exhaust Gas Temperature (EGT)

The EGT indicates the exhaust gas temperature in the turbine exhaust case. The temperature is displayed in hundreds of degrees Celsius.

Engine N2 RPM

The Engine N2 compressor rotor speed is shown as a percentage of the maximum N2 RPM. A small sub dial is graduated in ten divisions for each 10 percent change in speed.

Fuel Flow Indicator

Provides a visual indication of the Fuel Flow rate measured in thousands of pounds per hour.

Boeing 727-200 Panel

The Total Air Temperature Gauge

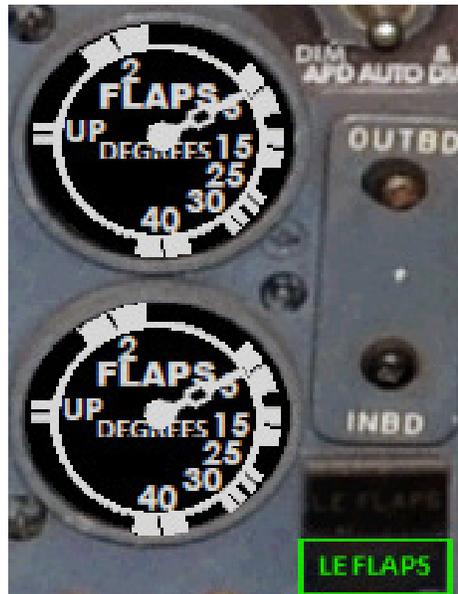


This mechanical gauge displays the Total Air Temperature or stagnant air temperature in degrees Celsius.

The Flaps Indicators



Flaps in Transit



Flaps Extended

The two Flaps Indicators – one above the other – display the flaps settings for the Outboard and Inboard flaps respectively. In FSX and in normal operation both flap indicators have the same indication. The “LE FLAPS” annunciator displays in Amber when the flaps are in transit and in Green when flaps are extended. No annunciators display when flaps are fully retracted.

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The Low Oil Pressure Annunciators



The Low Oil Pressure Light comes on when oil pressure for the applicable engine falls below 35 psi.

The Filter Bypass Light comes on when the oil pressure for the applicable engine is approximately 36.5 psi.

The Optional Radio Altimeter



This Radio Altimeter appears on many Boeing 727 panels however did not appear on this panel. It is included as an optional gauge as it does not appear in the correct position.

It is fully functional and the Decision Height can be altered using the knob in the bottom right of the gauge.

The window at the top displays “ON” whenever the aircraft is at or below the Decision Height.

If not liked it can be removed by commenting out or deleting gauge54 in the panel.cfg.

Boeing 727-200 Panel

The Landing Gear Lever



The Landing Gear Annunciators illuminate amber when the Landing Gear is in Transit and Green when the Landing Gear is locked down.

The landing Gear can be operated by clicking on the Landing Gear Lever or by keying "G".

Boeing 727-200 Panel

Overhead Panel



The Overhead panel is based on a cartoon representation of an actual Boeing 727 panel. There were wide variations between aircraft for all of the aircraft panels so this Overhead is a typical layout. All of the switches and dials work however some perform no function in FSX.

The Overhead Panel is divided into several sub-panels as described below (from top left to bottom right).

Boeing 727-200 Panel

Overhead Aileron, Spoiler, Elevator, and Rudder Panel



The switches on this panel are used to select individual hydraulic systems for each of the ailerons, spoilers, elevators, and rudder. They are used when one of the hydraulic systems have failed. In FSX they are dummy switches which perform no function.

Overhead Yaw Damper Panel



These Yaw Damper switches switch the Upper and Lower Yaw Dampers on or off. They perform the same function as the Yaw Damper switches on the main panel.

Boeing 727-200 Panel

Overhead Anti-Skid Panel



The Anti-skid Braking system is switched on from the covered switch on the Anti-Skid Panel. The Anti-skid Test Switch displays “REL” on the Inboard or Outboard indicator lights depending on the setting of the switch. The indicator lights are normally blank.

Overhead Stall Warning Panel



The Stall Warning light illuminates when the switch is set to NORMAL. When the switch is set to TEST the Stall Warning sounds, the Stall Warning light illuminates, and the circle rotates.

Boeing 727-200 Panel

Overhead AUXVG Panel



This panel indicates discrepancies between different ADIs and CDIs and allows selection between devices. As multiple devices are not supported in FSX the knobs and warning light dim switch are dummy switches.

The comparator test button displays all comparator warning lights when clicked on.

The Automatic Direction Finder (ADF) Panels



There are two identical ADF sub-panels on the Overhead – the left panel operates ADF1 and the right panel ADF2.

A striped shutter displays over the frequency window when the GAIN knob is set to OFF.

The ADF can be tuned by rotating the TUNE knob.

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Overhead Windshield Wiper Panel



The Windshield Wiper knob activates the windshield wipers which are not animated in this panel.

The Emergency Exit Lights Covered Switch should be set to ARMED for flight. This switch has no effect in FSX.

Boeing 727-200 Panel

Overhead Continuous Ignition and Engine Start Panel



The Continuous Ignition Switch switches ignition for combustion chamber 7 on. It has no effect in FSX.

Each of the respective Engine Start button can start the corresponding engine. Left clicking will set the Engine Starter ON then after waiting for N1 to come to 20% the corresponding Fuel Cut-off Lever on the Pedestal should be set to ON.

The Lights at the bottom of the panel will illuminate when the corresponding engine is not running.

Overhead Alternate Flaps Panel



On the real aircraft this panel provides an alternative manual means to retract or extend the flaps. FSX does not support this function so these switches are dummy switches.

Boeing 727-200 Panel

Overhead Transponder Panel



The Transponder Panel is used to set the Transponder code either by rotating the individual digits in the window or by rotating the IDNT knob to increment the whole code.

If the ATC Switch is set to STBY the Transponder code will reset to zero.

The Mode and ALT RPTG switches have no effect in FSX.

Clicking on the test switch will illuminate the REPLY light.

Overhead Cabin Attendant Panel



The No Smoking and Fasten Seat Belts signs can be set On or Off from this panel.

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Overhead Window Heat Panel



Switching on the Window Heat switches will illuminate the corresponding Green light.

Right clicking on the Window Heat Test Switch will illuminate all the Amber lights. Left clicking on this switch will illuminate all Green lights.

As FSX does not support window heating the Window Overheat light does not come on except in test.

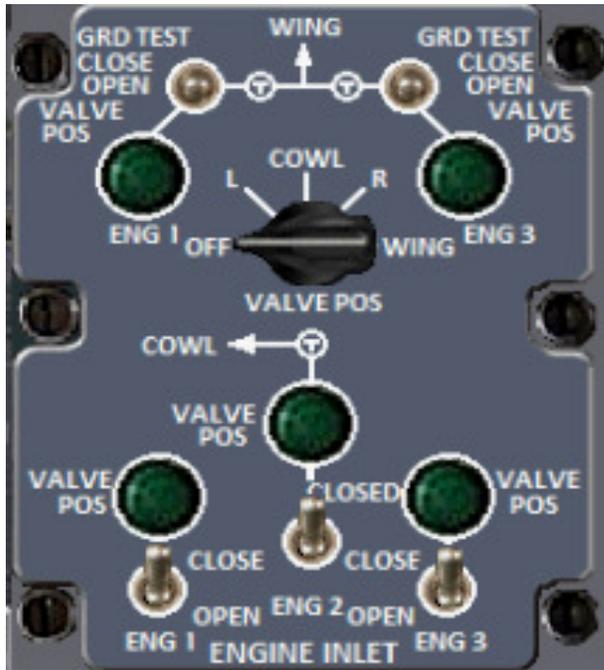
Overhead Anti-Ice Duct Temperature Panel



FSX does not support Duct Air temperature so this gauge displays the Engine Oil Temperature instead for the engine selected using Duct Temp Knob.

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Overhead Anti-Ice Panel



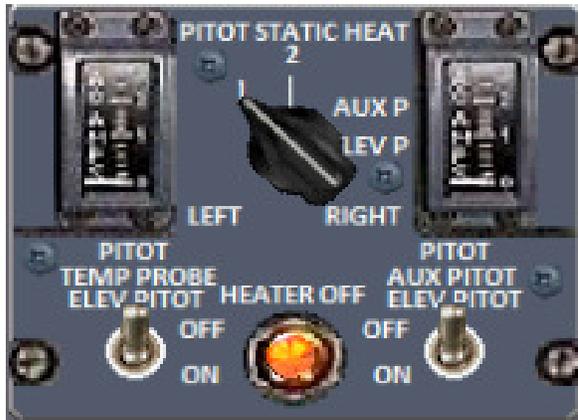
The left and right Wing Anti-ice switches switch the anti-ice on or off on the left and right wing respectively. As FSX only supports a single Wing anti-ice on/off function, in this simulation switching on either switch switches on anti-ice in both wings.

The Engine anti-ice switches switch the anti-ice for the respective engine on or off.

For all switches the corresponding green lights illuminate when the respective anti-ice switch is switched on.

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Overhead Pitot Heat Panel



The Pitot Heat Ammeters on this panel do not work as there is no way to measure the Amps in FSX.

The Pitot Heat Ammeter selection knob does operate but performs no function.

The Pitot Heat Temp Probe Switch switches Pitot Heat on or off. When pitot heat is off the adjacent Amber light illuminates.

The Pitot Aux Pitot Elev Pitot Switch operates but performs no function.

Overhead Internal Lights Control Panel



The internal lights control panel has knobs which control the individual panel lighting throughout the forward panels. The individual functions of the knobs are described in the section “Night Lighting” above.

Note that the dials can be switched on with a single click but can be rotated further by holding done the right mouse button. Rotating the Overhead Panel Knob further illuminates the full backlighting for that panel but on other knobs it has no effect.

The DOME WHITE switch turns on the FSX default lighting.

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Overhead External Lights Control Panel



The External Lights Panel controls all external lights on the aircraft.

Clicking on any of the Landing Lights Switches illuminates all Landing Lights.

The effect of the other switches will depend on the FSX aircraft model being used. The following actions take place for each of the switches:

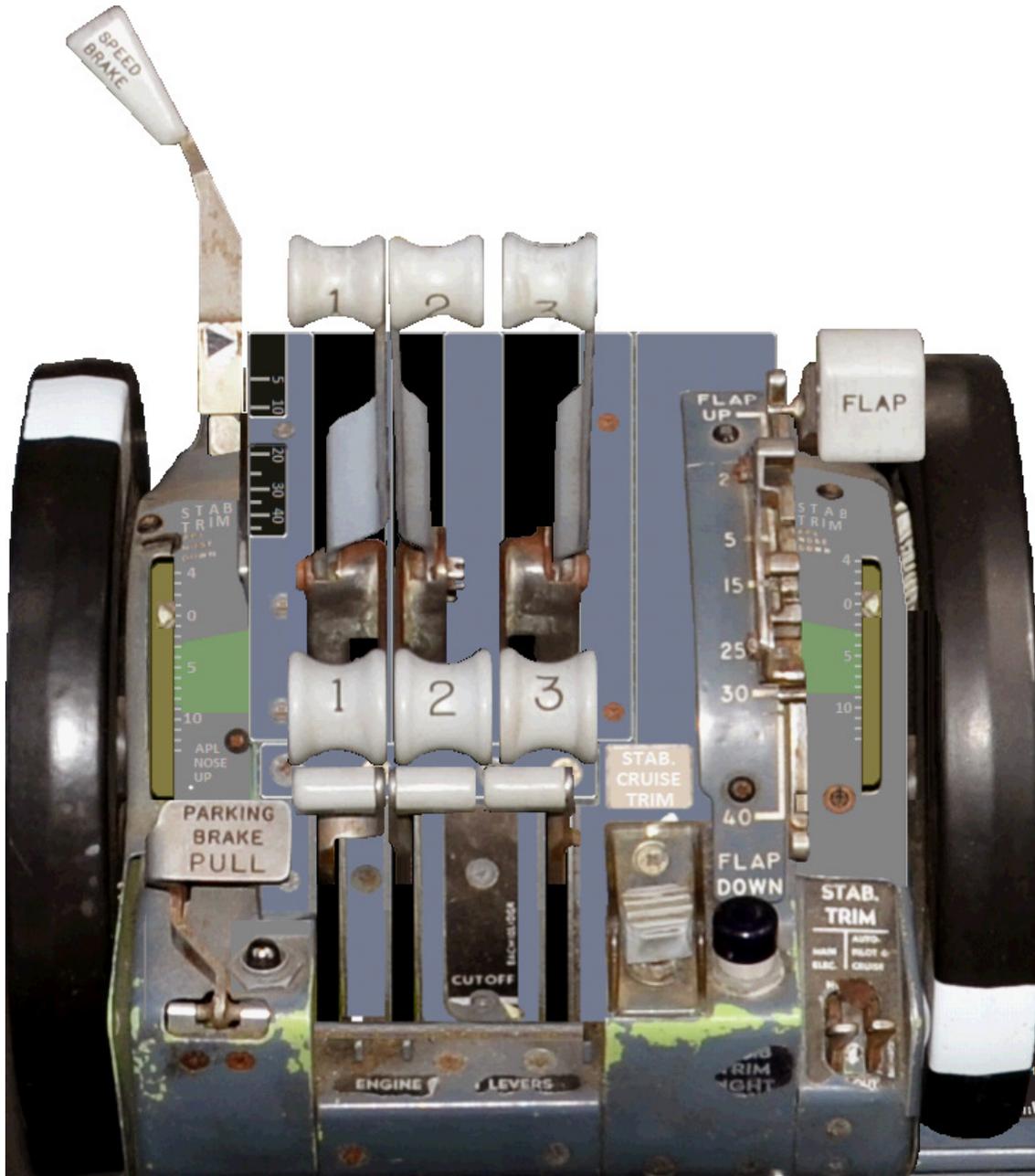
Taxi Switch:	Switches FSX Taxi Light
Left Runway Turnoff Switch:	Switches (L:Left Runway Turnoff Light, bool)
Right Runway Turnoff Switch:	Switches (L:Right Runway Turnoff Light, bool)
NAV Flash Switch:	Switches (L:NAV Flash Switch, bool)
NAV Lights Switch:	Switches FSX NAV Lights
Beacon Lights Switch:	Switches FSX Beacon Lights
Wing Lights Switch:	Switches FSX Wing Lights
Wheel Well Light Switch:	Switches (L:Wheel Well Light, bool)

Note that those switches using “L:” variables will only switch if these variables are used in the model – otherwise they are dummy switches.

On the model used for testing only the Landing Lights and Taxi Lights worked.

Boeing 727-200 Panel

Throttle Quadrant



Apologies for some of the artwork in this panel not being so good.

Boeing 727-200 Panel

Throttle Operation

All levers in this panel 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.

Pitch Trim

The pitch trim is operated by the large wheels on both sides of the Throttle Quadrant. Either wheel can be used to adjust the pitch trim up or down: left click for nose down, right click for nose up.

Speed Brake

The Speed Brake can be used with Mouse Wheel. One click arms the Speed Brakes and further clicks extend the Speed Brakes up to a maximum of 45 degrees (fully extended).

Parking Brake

This is a simple click once to apply and once again to release.

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 any Throttle mouse area will increase the throttles and moving the wheel down will decrease them. By default moving the mouse wheel will move all three throttles together.

To move an individual engine throttle left click anywhere in the throttle mouse area. Following the left click only that engine will move when the mouse is positioned on it. Moving the mouse on either of the other two throttles will move both of the other throttles. To return to synchronised engine movement click the right button however note that the three engines will move to a common setting on synchronisation.

If you are reducing throttle with the mouse note that it will stop at idle. Centre clicking allows the throttle to move into reverse thrust but although it can be preset in-flight, reversers will not deploy unless the aircraft is on the ground.

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).

Flaps

As with other levers the left button on the mouse deploys the Flaps by one increment and the right button retracts by one increment.

Boeing 727-200 Panel

Stabilizer Trim Light

The Stabilizer Trim Light illuminates Amber when the Stabilizer Trim is outside the Green zone (3-9 degrees)

Flight Engineer's Station Panels



The Engineer's Station contains three main sub-panels – the Upper Panel, the Lower Panel, and the Auxiliary Panel to the right. The panels in this simulation are an accurate portrayal of the various gauges, switches, and dials contained in these panels. Most of the switch and knobs work although many perform no function in FSX.

Each sub panel is described separately in the below sections.

Boeing 727-200 Panel

The Flight Engineer's Upper Panel



The Flight Engineer's Upper Panel consists of several smaller sub-panels which are each described below:

FE AC Generator Power Panel



The Three Disconnect red covered switches disconnect the CSD from the corresponding engine in case of generator failure. It can not be reconnected again.

The three Low Pressure lights illuminate when the Engine oil pressure for the respective engine falls below 125 psi.

The three Drive Temperature Switches are dummy switches and have no effect in FSX.

The Galley Power switches switch power to the two Galleys. They have no effect in FSX.

Boeing 727-200 Panel

FE Engine Generator Panels

These three vertical sub-panels show information for each of the three engines.



This gauge displays the Engine Oil Temperature.

The BUS TIE light will illuminate when the corresponding engine is not running. The Bus Tie trip switch will switch off the Generator.

The GEN Light will illuminate when the corresponding Generator is not running and the GEN Switch will switch off the Engine Generator.

The FIELD Light will illuminate when the generator is not running and the FIELD Switch will switch off the Generator.

The RVAR Gauge displays the corresponding Generator Bus Amperage.

The FREQ Knob controls the Electrical frequency. In FSX it has no effect.

The above functions are a simplified version of what happens on the actual aircraft as not all the data is available in FSX.

Boeing 727-200 Panel

FE Power Panel



The Essential Power Knob switches between sources of Essential Power however is a dummy switch on this panel.

The Standby Source Failure light illuminates when there is no power to the Avionics Bus.

This meter displays the main Bus voltage or the APU voltage depending on the Voltage Selection knob below. Clicking on the Ref Voltage Button switches to a 0-30 volts scale.

This meter is a dummy meter that shows the voltage frequency. It always shows 400 which is the normal frequency.

The voltage Selection Knob selects the source of power displayed in the AC Volts meter. In this panel APU displays the APU voltage, BUS TIE and EXT PWR display the main bus voltage, and GEN1, GEN2, and GEN3 display the respective Engine Generator voltage.

FE Oxygen Pressure System Panel



The two gauges show the pressure in the Oxygen system. The left gauge shows the pressure in the Flight Crew Oxygen system. It always displays 10.

The right gauge displays the pressure in the Passenger Oxygen System. It always shows zero unless the Oxygen Switch is turned on when it shows 190.

The Oxygen System Switch deploys passenger oxygen masks when switched on and the light on the right illuminates.

Boeing 727-200 Panel

FE Barometric Pressure Panel



This panel displays the Kohlsman setting for Barometric Pressure in inches of mercury.

FE Engine Strut Overheat Panel



These lights display when the Engine strut is overheated. In FSX they only come on when the Overheat Test Button is clicked on otherwise they are dummy.

FE DC Voltage Panel



The DC VOLTS meter displays the Battery Bus Voltage.

The DC AMPS meter displays the Battery load in Amperes.

The Battery On/Off Switch switches the main battery on or off.

The Voltage selection knob is a dummy knob.

Boeing 727-200 Panel

FE Bleed Air Control Panel



FSX provides only a basic bleed air function. This panel simulates as far as possible the full functions of bleed air and Pack control. While these functions are vital in the real aircraft the settings have no effect in FSX.

The Cargo Heat Outflow and Gasper Fan Switches are dummy switches.

The cooling door switches are dummy switches but the Pack dials rotate to show if the Cooling doors are open or closed.

The Green Auto pack trip Armed light illuminates when:

- The aircraft is on the ground prior to takeoff; AND
- The Pack Trip Switches are ON; AND
- The Inboard Trailing Edge Flaps are extended; AND
- Engine EPR is greater than 1.5 on all engines

There is an Auto-Trip system matching the real aircraft which trips the pack switches off when one or more engines have less than 1.5 EPR

The two meters at the top are supposed to show the air conditioning pack temperature but in fact are showing the Oil Temperature from Engines 1 and 3 in this simulation.

The third meter below displays the Bleed air pressure from the engines.

Boeing 727-200 Panel

FE Cabin Temperature Control Panel



The Cabin Temperature Control Panel displays and allows adjustment of temperature in the Flight deck and in the passenger cabin.

The left and right Cabin Temperature Selector knobs can be set to Auto or Manual Mode. Centre clicking on the knob switches between modes. In Auto mode the knob can be adjusted to the desired temperature by setting in the upper part of the dial. When set to manual mode the knob rotates to point to the bottom of the knob and can be adjusted up or down using the left and right mouse buttons. Note that in manual mode after each click it is spring-loaded to return to the zero position.

The meter below and left of the left Cabin Temperature Selector measures the difference between Cabin Altitude and outside air pressure with the long needle and the difference between the Cabin Altitude and the expected cabin altitude with the short needle.

The meter below the Cabin Altitude meter shows the rate of change of Cabin Altitude in feet per second.

The meter below the Cabin Temperature selector displays a value based on the setting of the Cabin Temperature Selector knob. The value has no real meaning.

Boeing 727-200 Panel

The Air Temperature knob is supposed to select different temperatures however is a dummy knob in this simulation.

Below the Cabin temperature selector is a row of four annunciators. These annunciators will illuminate in the following cases:

Annunciator 1:

Displays “AUTO FAIL” if:

- The rate of change of the Cabin Altitude exceeds 1800 feet per minute; OR
- The Cabin Altitude exceeds 14250 feet; OR
- All of the Engine Generators are not running.

Annunciator 2:

Displays “OFF SCH DESCENT” if:

- The indicated altitude is more than 500 feet below the autopilot altitude; AND
- The rate of descent exceeds 100 feet per minute.

Annunciator 3:

Displays “STANDBY” if the Pressurisation Mode Selector (bottom right) is set to Standby.

Annunciator 4:

Displays “MANUAL” if the Pressurisation Mode Selector is set to either Manual position.

Below the annunciators is a display panel showing various altitudes which can be adjusted with the knobs for each of the displayed number.

The first display shows the cruising altitude as defined in the flight plan. This altitude can be adjusted in increments of 100 feet with the knob below the display.

The second display displays the Landing Altitude of the destination from the flight plan. This can be adjusted using the knob below. Centre clicking on the knob will revert the altitude back to the original flight plan altitude.

The Standby Cabin Rate knob can be rotated but performs no function.

The Cabin Altitude display is the target cabin altitude for the flight. It can be adjusted using the knob below in increments of 53 feet.

The Cabin Outflow Switch operates but performs no function other than moving the needle on the meter above.

The Flight / Ground Switch is a dummy switch except that if set to Ground when on the ground it will automatically open the outflow valve and depressurise the aircraft.

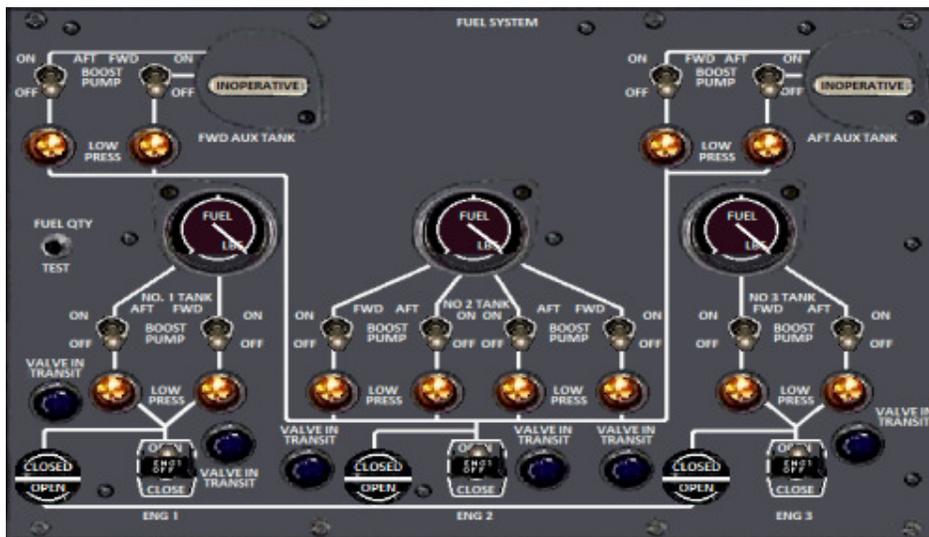
The Pressurisation Mode Selector knob sets the annunciators as described above but otherwise performs no function.

Boeing 727-200 Panel

The Flight Engineer's Lower Panel



FE Fuel Panel



This panel is a fully functioning fuel management panel. Fuel flows will be changed according to the settings of this panel and engines will shut down if this panel does not provide fuel to the engine.

In the 1980s an airworthiness directive was issued requiring Auxiliary Fuel Tanks to be disabled due to fire risk. This panel depicts the Auxiliary tanks in this state of disconnection. If there are Auxiliary Tanks in the aircraft.cfg the fuel in them will be ignored by the fuel management system.

Boeing 727-200 Panel

Each of the three fuel tanks have boost pumps – two for the wing tanks and four for the centre tank. The aircraft has an automatic system to switch to an engine driven pump if the boost tank switches are off. To start the engines however at least one boost pump switch must be ON and for Engine 2 the cross feed valve must be OPEN.

Various configurations can be set up to feed fuel from any selected tank to any engine by the use of the crossfeed valves. The Valve in Transit blue lights illuminate only while the valve is in transit.

The three meters show the fuel level in each of the three fuel tanks.

Note that the three covered switches are the same as the Fuel Cut-offs on the Pedestal. Switching these off will cut the fuel flow to the corresponding engine. These switches can also be used instead of the Pedestal switches when starting engines.

FE MIC Selector and Fuel Heat Panel



All of the switches on the MIC Selector sub-panel are dummy switches.

The G Force display shows the G Force on the aircraft as calculated by FSX.

The GPWS covered switch will switch off all GPWS warnings if set to OFF.

The Fuel Heat Amber lights change to the Green lights when the corresponding Fuel Heat switch below is switched on.

The Fuel Temperature meter below actually displays the outside temperature plus 20 degrees when the Fuel Temp switch is on as Fuel Temperature is not available in FSX.

Boeing 727-200 Panel

FE Oil Meters



These meters display the Engine Oil Quantity, Engine Oil Temperature, and Engine Oil Pressure for each of the three engines.

Boeing 727-200 Panel

FE Hydraulics Panel



There are three Hydraulic systems on the Boeing 727 – System A, System B, and Standby System. System A is driven by Engine driven pumps on Engines 1 and 2 while System B is driven by electric pumps. In this simulation the Standby system is dummy.

The ENG1 and ENG2 PUMP lights illuminate when hydraulic pressure from Engine 1 or Engine 2 respectively falls below 950 psi.

The two covered switches in System A can be used to switch off the Hydraulic system pumps from the respective engines.

The two covered switches are to shut off the system during a fire warning but in this simulation they perform no function.

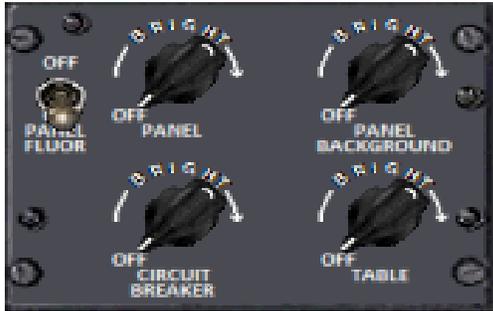
The switches below the warning lights in both System A and B will switch off the corresponding Hydraulic Pump.

The Ground Connect Switch is a dummy switch.

The Hydraulic Pressure meters correctly show the Hydraulic pressure in each of the systems. Note however that the Hydraulic Quantity meters show the actual quantities in gallons for each system. System A will show 4.4 gallons with wheels down or 3.6 gallons with wheels up when the reservoir is full. The full quantity in System B is 1.78 gallons while the full quantity in the Standby system is 0.52 gallons.

Boeing 727-200 Panel

FE Panel Lights Control Panel



These knobs control the Panel lighting for the Flight Engineer's panel.

The PANEL knob switches on the lighting in all of the meters in the Flight Engineer's panel. The PANEL BACKGROUND knob switches on the background lighting for the Flight Engineer's panel.

The other two knobs perform no function in FSX.

FE Clock and Doors Annunciator



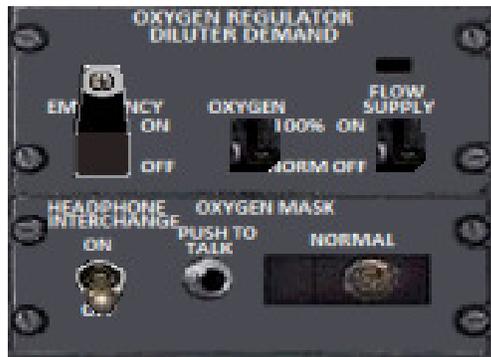
This sub-panel displays the Flight Engineer's clock and the aircraft registration in the top part.

Below is a panel showing the status of all aircraft doors (shown here with all doors open in test).

Although most of these doors can not be modelled by FSX, these lights can be set on using the drop-down menu in the Ground Handling Panel. See that section for more information.

Boeing 727-200 Panel

FE Oxygen Regulator Panel



The switches on this panel all work however they perform no function in FSX.

FE Oil Cooler Panel



The Oil Cooler CSD Switch operates but performs no function in FSX.

Boeing 727-200 Panel

The Flight Engineer's Auxiliary Panel



The Flight Engineer's Auxiliary Panel is a vertical Panel which on the real aircraft is on the right of the Flight Engineer's station. There are a number of sub-panels which are described below.

Boeing 727-200 Panel

FE Auxiliary Fuel Dump Panel



This panel can be used to dump fuel by switching any of the tank switches to OPEN then selecting one or more of the nozzles to OPEN. In order for this function to work in FSX the fuel_dump_rate must be set in the aircraft.cfg.

On the real aircraft individual fuel tanks can be selected to dump and the rate of dumping increases if two nozzles are opened. In FSX however fuel can only be dumped from all tanks simultaneously and the rate of dumping is fixed at the rate defined in the aircraft.cfg.

The blue lights illuminate while the corresponding valve is in transit.

FE Engine Fire Detection Panel



The Fire Detector Selector switches work but perform no function in FSX.

Boeing 727-200 Panel

FE Radar Rotation Switch



The covered Radar Rotation switch works but performs no function in FSX.

FE Auxiliary Power Unit (APU) Panel



This panel is used to start and stop the APU and to switch the APU Generator on or off.

If the APU START switch is clicked when the aircraft is on the ground and at least one engine is off then the APU will start up. Right click on the APU START switch to stop the APU.

The APU generator works by right clicking on the Field Switches after the APU has reached 97% of its operating rpm.

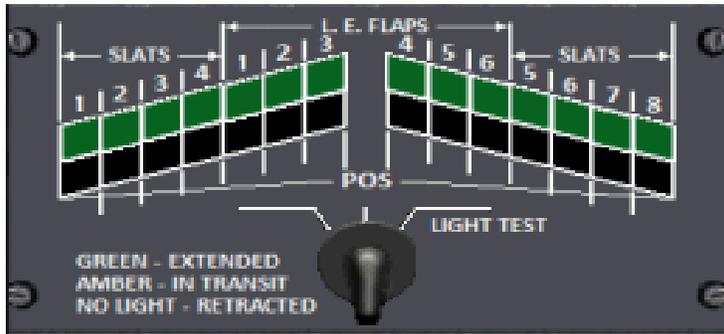
The Auto Fire Shutdown and Fire Test Switches work but perform no function.

The Ammeter shows the total load in Amperes when the APU Generator is running.

The APU EGT meter actually shows a dummy number as APU EGT is not available in FSX.

Boeing 727-200 Panel

FE Leading Edge Flap Annunciators



The Leading Edge Flap Annunciators displays the position of the Leading Edge Flaps and Slats.

The Lights can be tested by right clicking on the dial under the display.

FE Electrical Annunciators

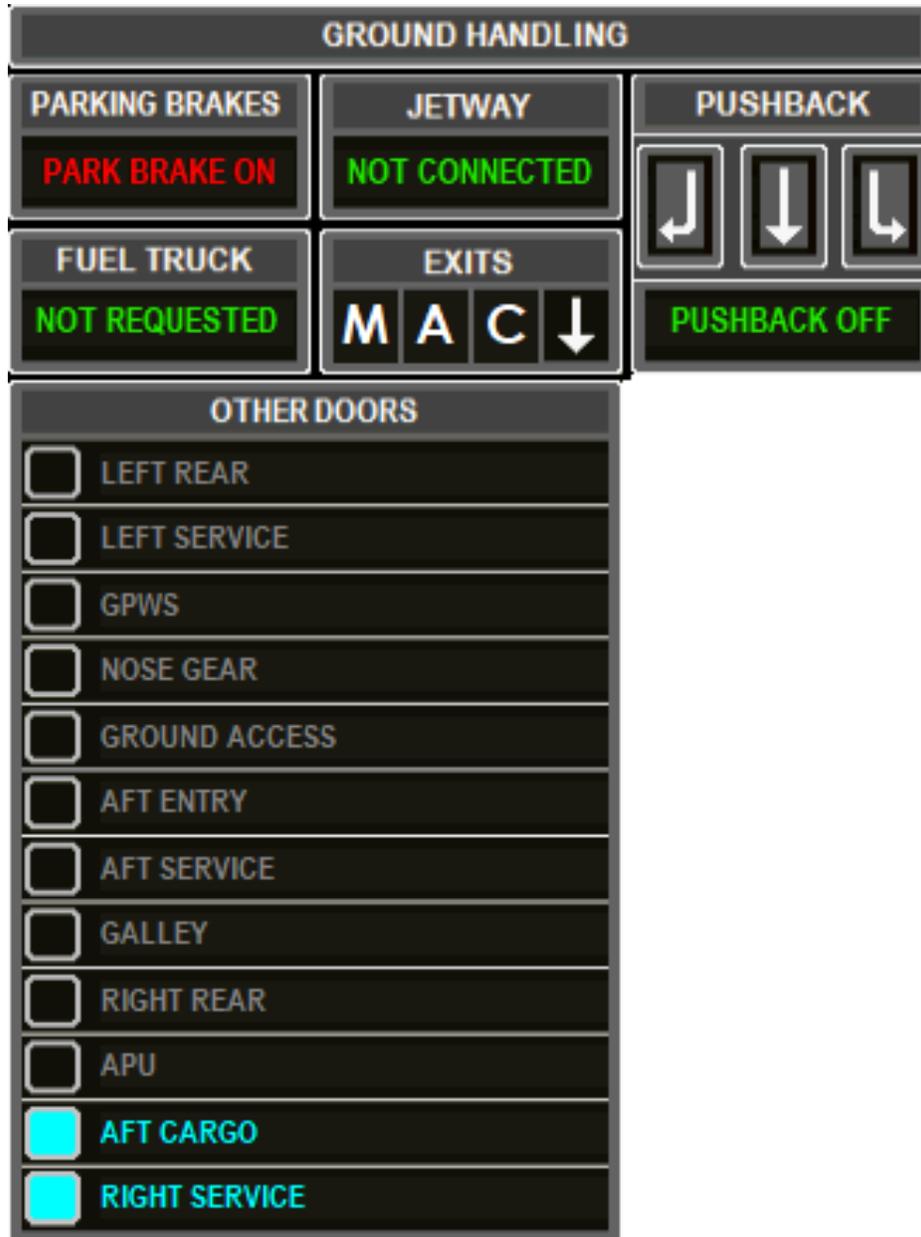


These annunciators display when electrical faults are detected. The various annunciators display under the following conditions (n is the Engine number):

OVERVOLTAGE SYSTEM n:	Generator Bus Voltage is greater than 115 volts
UNDERVOLTAGE SYSTEM n:	Generator Bus Voltage is less than 100 volts
DIFF FAULT SYSTEM n:	Generator Bus Voltage is less than 5 volts
OVEREXCITED SYSTEM n:	Generator Bus Voltage is greater than 130 volts
UNDEREXCITED SYSTEM n:	Generator Bus Voltage is less than 50 volts
APU BLEED:	APU RPM is greater than 97%
PHASE IMBALANCE:	Non functional
APU CRANK:	APU is being Started

Boeing 727-200 Panel

Ground Handling Panel



This is a small heads-up display that appears only when the left side engines are 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.

Boeing 727-200 Panel

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

The Main Door, the Rear Airstairs, and the Forward Cargo Door can be selected Open or Closed by clicking on the M, A, or C respectively. Other service doors can also be selected Open from a drop down list which can be displayed as shown above clicking on the down arrow.

These service doors only work from local variables so generally will not be animated in whatever model is used. A model can be made using the local variables from this gauge. Nevertheless when the doors are opened they will be shown on the Flight Engineer’s Doors Annunciator on his Lower Panel.

If this panel is not liked it can be disabled by commenting it out in the panel.cfg (put “//” in front of the gauge51=B727!B727 Ground Handling Panel, 10, 100, 330, 470 under [Window00]).

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

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