

JELAIR "HUD2008" for FSX

JELAIR - "HUD for commercial jets for FSX – (2008-03-03)"

'Heads Up Display'

version #3.03, March 3rd, 2008, by Jacob Larsen.

This software is FREEWARE (you may copy and use it free of charge for non-commercial use)
Freeware-addon designers can include it in their own freeware-addons if they like.

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Sections:

- #1: abstract info - **RED**
- #2: gauge operation - **BLUE**
- #3: cockpit-installation - **YELLOW**

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Abstract info:

This FREEWARE addon-gauge (for FSX) is for pilots flying jets (including supersonic jets such as the Concorde. It might work with turbo-props also, although this has not been tested)

It is designed to be usable during the entire flight-envelope (takeoff, climb, cruise, approach and landing). It can be used as a stand-alone panel.

It is designed for a screen-resolution of 1280x1024 (full-screen mode), although it should work fine with other resolution's also (and in window-mode)

It may or may not work in FS2004 (FS9)

Known issues, trouble, bugs, short-comings, etc:

(last updated on: [date of release](#))

General issues:

The gauge should be started at least once while the aircraft is still on the ground. This is to reset and calibrate the radar-altimeter (so it will show zero-height when on the ground, instead of the fuselage belly-altitude which is a positive number of several feet)

This is not an error.

Some of the specialized functions of the HUD-autopilot can only be operated by mouse. All normal radio, auto-pilot and aircraft-systems, plus a few of the specialized, can be operated via keyboard.

Some of the specialized auto-pilot systems (such as auto-land, auto-take-off and others) will not work with all aircraft.

The screen's zoom-setting must be 1, or some of the displays will indicate incorrectly.

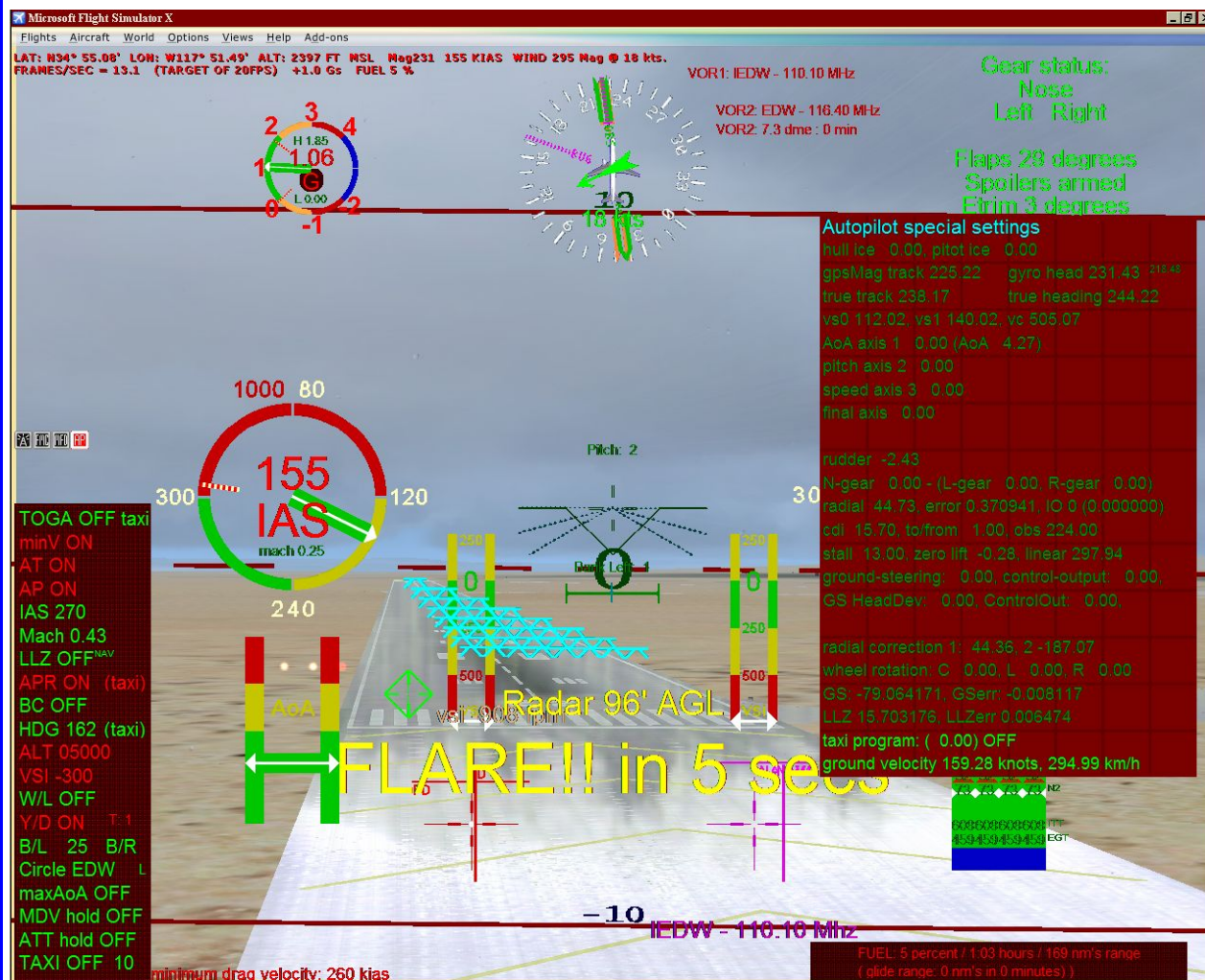
What to do if you find a software-bug:

Do a clean reboot of your system and try to re-produce the error. If the error is repeatable, please email a complete report to JELAIR. Thank you.

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Gauge operation

Full-screen view



General info:

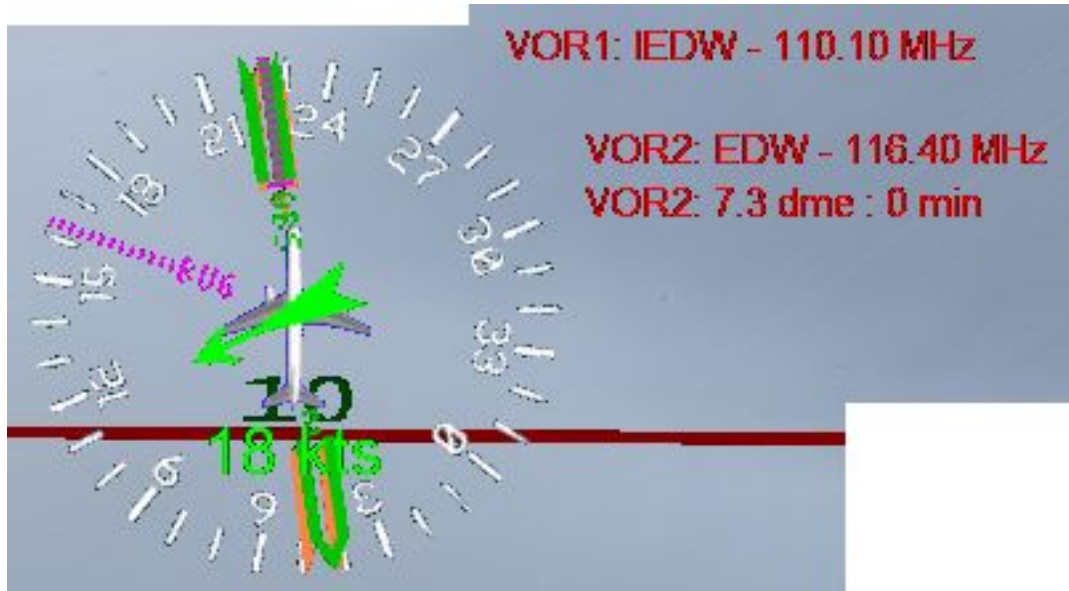
The gauge is outlined by a small beige-colored line. This is so you can drag and resize the gauge-window in case it does not fill out the entire screen.

During reverse-thrust operations, and when airspeed is below 60 knots, most indicators will disappear to give better runway visibility.

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Gauge operation

Weather-vane and RMI



 heading bug

 GPS suggested-heading bug

 OBS indicator

 VOR1 needle

 adf needle

Shows where the wind comes from in relation to the aircraft (the little green arrow in the middle), and it's speed in knots.

In the image the wind-speed is showing 18 knots, coming from the front right (296@18).

The purple line at heading-162 is the autopilot's heading-bug.

A GPS heading-bug will show when GPS-mode is ON. This bug points in the direction you should fly to track the GPS-course (the flightplan)

The OBS-indicator shows the OBS-setting.

The green double-arrow (the big arrow pointing towards 042 degrees (almost straight down)) is the VOR2-indicator (with extended VOR info seen at the top right)

When a VOR1-signal is received an orange VOR-needle will show.

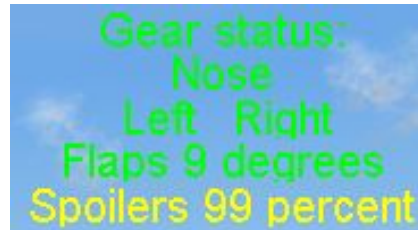
A cyan-colored arrow is shown when an NDB (adf) is received.

A ground-tracking indicator (not shown on image) is located above the compass-dial. It shows the aircraft's ground-track.

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Gauge operation

Gear, flaps, spoiler, elevator-trim and auto-brake status



When gear, flaps and spoiler are up, and when the trimmer is trimmed to the center and the autobrake is OFF, the indications won't show on the display.

The gear will show in red color during transit, and green when it is down and locked.

Flaps show both leading-edge and trailing-edge flaps (for both left and right wing) in degrees as well as notches.

A normal trim during approach is usually between 2-5 degrees.

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Gauge operation

Sub-screen selector-buttons.



These 4 buttons can either be clicked on with the mouse (left-button), or operated using the F-keys.

F9: Radio-panel. This is where com and nav radios are located.

F10: FMC-panel. This is where aircraft-systems are located.

F11: MFD-panel. This is where HUD-settings are located.

F12: Technical-panel. Pilot's should not use this panel. It is used as a scratch-pad during gauge-design. It must be activated inside the gauge for the button to become visible.

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Gauge operation
Radar-altimeter

Radar 680' AGL

It is calibrated to show zero when aircraft is settled on the ground (unless you start the gauge while in mid-air, then the gauge will show the normal radio-height (which is usually a positive number between 5-10 feet))

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Gauge operation
Indicated airspeed and mach-number



The large green arrow shows the airspeed in knots.
The numbers located around the outside of the dial are knots.
The barber-pole shows the aircraft's never-exceed-velocity, the Vne.
Inside the dial a digital airspeed reading is shown.
The speed-arrow ranges from 78 knots to 1000 knots.
An indicator will show the dialed velocity on the auto-pilot when hold-mode is active.

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Gauge operation

Vertical speed indicator, in feet-per-minute



The vsi comes on during the final part of the approach.

It ranges from -750 feet-per-minute, to +250 fpm.

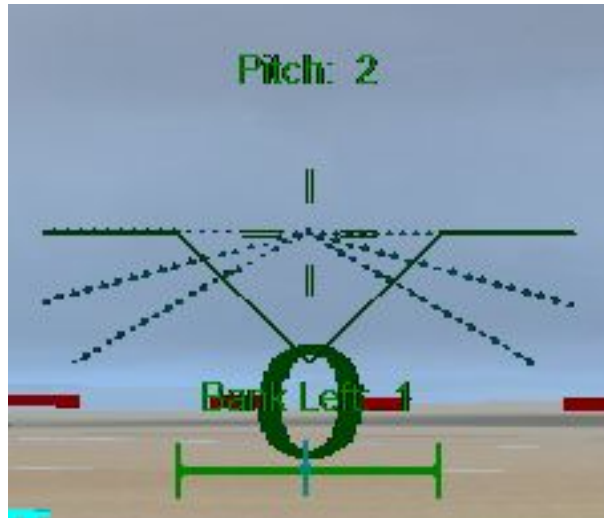
The HUD has 2 of these indicators, located on each side of the center-plane.

They only show during final approach and not while on the ground or taking off.

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Gauge operation

Pitch-ladder that follows the horizon



The green cross above the horizon is the center-plane (this is where the aircraft-nose is pointing)

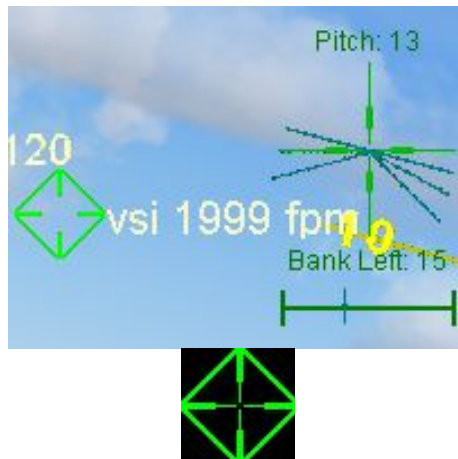
The angled radials sticking out below are bank-indicators for a 15-degree and 30-degree bank.

The horizontal line below the text "Bank Level" is the 'turn-and-slip' ball (showing yaw moment)
Pitch and bank are also indicated digitally.

The pitch-ladder has full range and follows the actual horizon (unless the zoom-setting is changed from 1)

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Gauge operation
Velocity-vector



This cross moves around the HUD and shows where the aircraft is currently moving towards (the center of the cross)
To the side of it you can read the current vertical-speed in feet-per-minute.

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Gauge operation Altimeter



The large green arrow shows the current indicated altitude.

The small green line makes a full round for each 1000 feet you climb or descend. When it points straight down, your altitude is a VFR-level (i.e. XX500 feet)

The numbers on the outside of the dial shows altitude in flight-levels (which is feet divided by 100, i.e. 030 is 3000 feet).

The range is from 1,000 feet, to 100,000 feet (the blue-colored text A100 indicates 100,000 feet, aka FL1000 or 'angels-100')

Inside the dial a digital altitude is shown in flight-levels. And below this you can see the VSI reading in feet-per-minute.

An indicator will show the dialed altitude on the auto-pilot when hold-mode is active.

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Gauge operation

Autopilot panel

TOGA OFF taxi
minV OFF
AT OFF N1 N2
AP ON 093%
IAS 240
Mach 0.36
LLZ OFF^{NAV}
APR OFF (taxi)
BC OFF
HDG 320 (taxi)
ALT 03000 TFO
VSI 1000
W/L OFF
Y/D OFF T: 1
B/L 25 B/R
Circle LUB L
maxAoA OFF
MDV hold OFF
ATT hold OFF
TAXI OFF 10

Here you can see how the autopilot is set.

Green shows the control is off, and red shows when it is on.

From top to bottom they show:

-**TOGA-mode** (TOGA is TakeOff/Go-Around. When the selected airspeed (270 in the image) is reached the autopilot will automatically switch from TOGA-mode to airspeed-hold mode, so make sure this speed is properly set before takeoff (it defaults to 240 whenever the aircraft's electrical power is switched off). AT must be ON)

-**taxi** (controls the nose-gear steering. Aircraft will track center-line in the runway's takeoff direction)

-**minV-hold** (minV is minimum velocity, which is useful during final approach as it will maintain the aircraft's slowest safe-speed. AT must be ON)

-**auto-throttle**

-**autopilot master-arm**

-**indicated airspeed hold** (in knots and mach)

-**NAV1-hold** (Plus nav/gps switch. Localizer-tracking. OBS-setting is set on the radio-panel)

-**full approach-mode** (localizer and glideslope. With auto-land)

-**(taxi)** (controls the nose-gear steering. Aircraft will track center-line in the runway's approach direction)

-**back-course hold** (localizer back-tracking)

-**heading hold** (in degrees)

-**(taxi)** (controls the nose-gear steering. Aircraft will track the heading-bug)

-**indicated altitude hold** (in feet), plus terrain-following mode.

-**Climb/descent rate hold** (feet-per-minute)

-**wing-leveler**

-**yaw-damper** (which actively controls the rudder to dampen yaw-movement. It can only be switched ON when the autopilot is ON)

-**T** (select the yaw-damper type that bests control the aircraft)

-**Bank-hold** (left, right, and max bank-angle (bank-angle choices are set in the aircraft.cfg file))

-**Circle VOR** (will circle NAV2-VOR either Left or Right)

-**MaxAoA hold** (will control pitch to maintain max safe AoA. Switch ON for automated takeoffs)

-**MDV hold** (Minimum Drag Velocity hold. Use this during descents to auto-maintain MDV (plus/minus 20 knots))

-**ATT hold** (attitude hold)

-**TAXI** (auto-taxi throttle-control)

You control the autopilot by moving your mouse over the values and clicking left (on/off/decrease) or right (increase) mouse-button or using your scroll-wheel.

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Enhanced auto-pilot operation (Continued from above)

Auto-taxi:

3 taxi-systems (related to steering-control) are available: Takeoff, landing and heading-bug taxi.
(The taxi auto-throttle is a separate 4th system)

Heading-bug mode:

Dial the heading on the autopilot and switch on the taxi-mode (the button next to the heading indication). Now the aircraft will turn to the selected heading when you increase thrust (or if you engage the taxi auto-throttle, which is the button at the bottom)

If you have the keyboard set up so you can control the heading-bug via the keyboard, then you can steer the aircraft this way instead of using rudder-pedals.

Auto-takeoff:

First make sure you have dialed the ils-frequency for the runway you are to depart from (the runway's approach-ils frequency)

Before rolling out on the runway to line-up for departure, engage the take-off auto-taxi (the taxi-button located next to the toga-button on the top will go red, but you will still be in control of the rudder/nose-gear tiller)

When the aircraft is closing in on the center-line, the auto-taxi will take-over and align the aircraft with the runway-centerline (it may swivel back and forth 3 to 4 times before stabilizing)

Make sure you don't exceed 10 knots ground-speed when lining up.

Keep the taxi-system active during takeoff-roll (it will auto-disengage when airborne and passing 100 feet above-ground-level), but be ready to take over manual rudder-control (just kick the rudder, then the auto-taxi will disengage) at any time during the roll (the auto-taxi precision can be highly weather-dependent, depending on the aircraft it's used with (some aircraft might even be incompatible all-together with the auto-taxi, in which case you must steer manually))

Auto-landing:

First make sure the ils for the landing-runway is dialed in.

At any time engage the auto-taxi button next to the approach-button (so it lights-up red).

At touch-down the taxi-system will automatically take control of the rudder and attempt to keep the aircraft on the runway-centerline (use same caution as during auto-takeoff).

Disengage the system when you are to turn off the runway.

Taxi-autothrottle: (toggled on/off with key: 'd', or the mouse)

This can even be switched on while airborne, in which case it will automatically grab the throttle-control when the aircraft touches down. It will also do reverse-thrusting during the landing-roll.
(Notice that the 'minV'-system will also do reverse-thrusting if left on while landing)

The number next to the taxi-button shows the approximate ground-speed in knots the system will attempt to hold (Precision is aircraft-dependent and can be plus/minus 10 knots (it is not very strict))

Keyboard-control:

Airspeed and taxi-speed can be dialed using the throttle-up and down button (F2 and F3).

Altitude can be dialed using the trim-up and down button.

Sub-screens can be opened/closed using F9, F10, F11 and F12.

Enhanced auto-pilot operation
(Continued from above)

Terrain Following mode:

First make sure the TF-mode reads TF0 in green (this means the system is OFF)

Then engage the autopilot and select altitude-hold ON.

The aircraft will climb or descend to the selected altitude (barometric). Adjust this until you are at the correct altitude above ground.

Now engage TF-mode (so it reads TF1 in red)

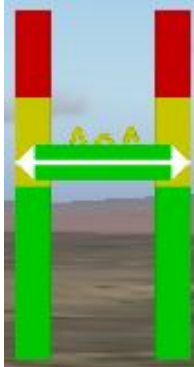
The aircraft will then 'grab' the present radar-altitude and maintain it by automatically adjusting the barometric altitude-to-hold in increments or decrements of 100 feet-per-minute.

If you dial in another barometric altitude while the TerrainFollowing-mode is ON, the aircraft will first climb or descend to this new altitude and then 'grab' the present radar-altitude and maintain that from there on.

The TF-mode can negotiate landscapes with a maximum relative climb-level of up to ~500 feet-per-minute.

It has a 'peak-hold' descend-mode to help it maintain a safe altitude when flying over hills or small mountains (by avoiding excessive 'roller-coaster' riding into the valleys)

Gauge operation
Angle-of-Attack indicator

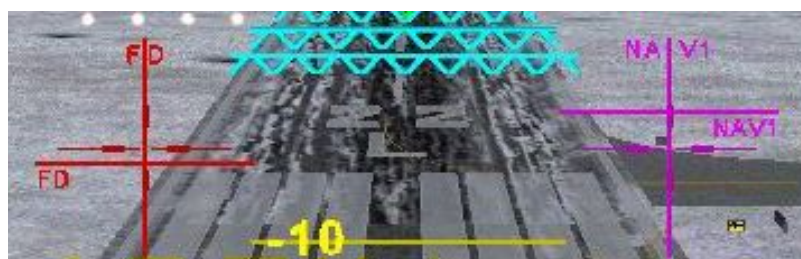


The arrow will climb higher as you approach the stall-angle.

Don't let it get into the red at the top.

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Gauge operation
Flight-director and LLZ/GS-indicator



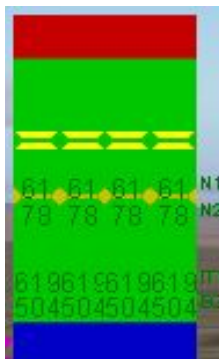
The red cross on the left (the captain-side) is the flight-director.

The purple cross on the right (pilot-side) is the LLZ/GS indicator.

Beneath it you can read the distance to the touchdown-zone in nautical-miles, the time until you reach it in minutes, the runway's ICAO-ID, and the tuned NAV1-frequency.

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Gauge operation Throttle-quadrant



This image shows a 4-engine aircraft, but will change according to the number of engines on the aircraft.

The 4 small dark-yellow lines show the throttle-handles position.

When reverse-thrusting, these will go down into the blue section at the bottom.

The 4 large bright-yellow lines show the engine's N1 rpm in percent.

The numbers (from top to bottom) shows N1 (percent), N2 (percent), ITT (degrees celsius) and EGT (degrees celsius)

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Gauge operation Situational message

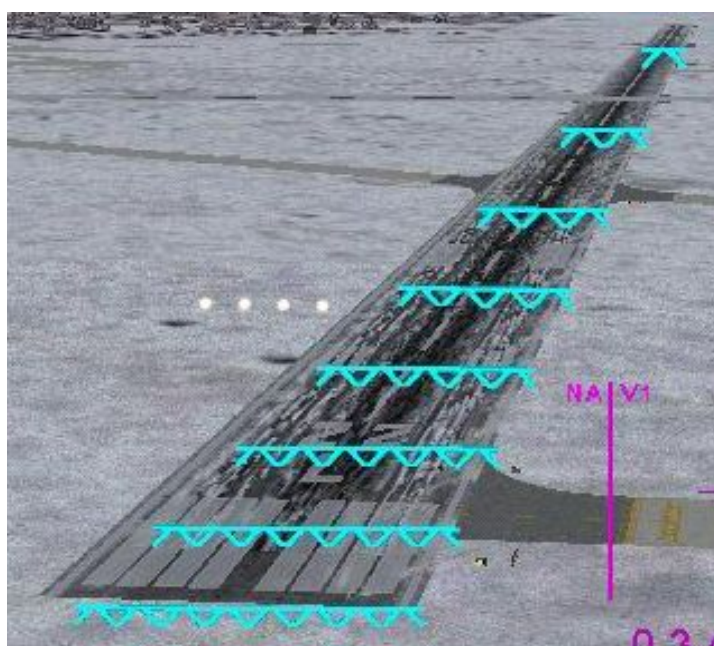
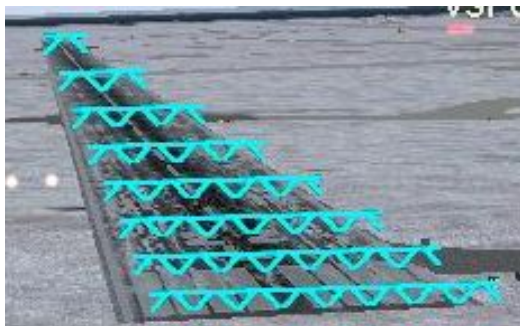


Here you can read various messages depending on your flight-condition.

The message on the image shows you the proposed time to begin a gentle flare before touchdown. Other warning-messages are such as stall and overspeed, or if you exceed the aircraft's MTOW.

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Gauge operation Artificial runway

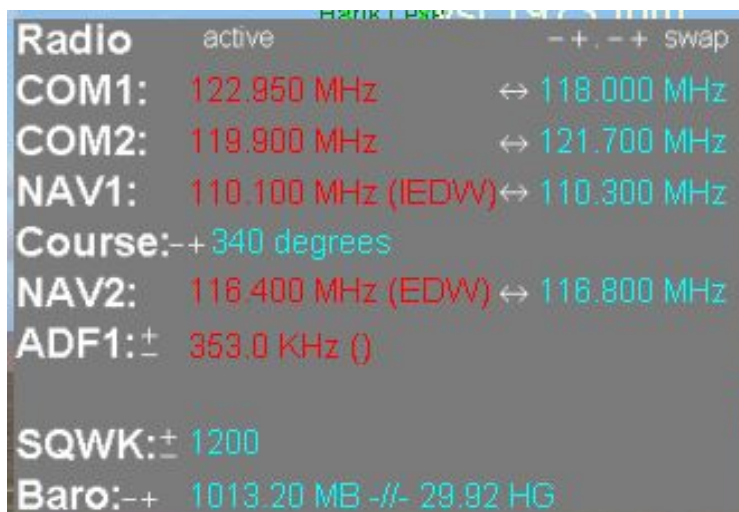


This is mainly for low-visibility approaches (fog, rain, snow or in case of no runway-lights during nighttime)

It shows a graphical representation of the runway, as it is situated in relation to the aircraft. It shows the relative center-line, roll, pitch, yaw and altitude relations, but not distance.

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Gauge operation Radio-panel



You change the values by moving your mouse over them and clicking (left button either decreases or selects/toggles and right button increases) or using your scrollwheel.

For the radio-frequencies; the red values are the active, and the cyan are the standby (those are the ones you set, then click the arrows to activate)

The course (showing 340 degrees) is the OBS-setting (localizer)

The squawk and ADF are operated by single digits.

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Gauge operation FMC-panel

(image of FMC-panel not shown here)

You change the values by moving your mouse over them and clicking (left button either decreases or selects/toggles and right button increases) or using your scrollwheel.

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Gauge operation
G-force



Shows the current G-force, and the max and minimum attained since last reset.

Click on the large 'G' in the center to reset max and min values.
H means high and L means low.

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Gauge installation

Copy the "JELAIR_HeadsUpDisplay-2008_(FSX_1280x1024).CAB"-file (it is just 1 file) to the JELAIR-folder located in the GAUGES-folder (create the JELAIR-folder if you haven't got it already)

Now you're ready to proceed with the actual panel-installation:

Panel installation

(getting the HUD into the cockpit)

Installing the HUD-gauge requires the use of a text-editor (such as windows-notepad) or any 'WYSIWYG' panel-editor capable of installing XML-gauges.

Open the panel.cfg file of the aircraft you are installing the gauge into.

Then locate the following section (it is in the beginning of the file):

```
[Window Titles]
Window00=Main Panel
Window01=GPS
Window02=Avionics
```

(This is just an example of how it may look)

Then create the following entry (if it isn't already there):

```
Window03=JELAIR-HUD
```

(the windowXX number, which is 03 in this example, must be the preceding window-number plus 1 (the preceding window in this example is the avionics-window which is 02))

Then scroll down through the file until you get to [Window03]

If [Window03] isn't there (it should follow [Window02]) then create it by copying the following:

```
[Window03]
Background_color=0,0,0
size_mm=1280,1024
window_size_ratio=1.000
position=0
visible=0
ident=30
```

```
gauge00=JELAIR\JELAIR_HeadsUpDisplay-2008_(FSX_1280x1024)!
JELAIR_HeadsUpDisplay-2008,0,0,1280,1024
```

(The gauge-line is just 1 line even though it is shown as 2 here due to the text-formatting)

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2 important notes:

The 'ident=30' must be a unique number, so if any other window uses '30' you should change one of them to something else (any number will do, just as long as it is unique)

The size of the gauge, when displayed on the panel inside the sim, is influenced by 2 things:

#1: the panel grid-size of [Window00] (the entry labeled 'size_mm')

This gauge is optimized for screen-sizes of 1280x1024, which should look like this in the panel-file:

```
[Window00]  
size_mm=1280
```

#2: the gauge-size on the gauge-line (with this gauge it is 1280x1024):

```
gauge00=JELAIR\JELAIR_HeadsUpDisplay-2008_(FSX_1280x1024)!  
JELAIR_HeadsUpDisplay-2008,0,0,1280,1024
```

If the [Window00] size_mm is 640, or 800, or any other number than 1280, you have to change the gauge-size to make it fit:

640 means you must change the gauge-size to 640, 480

800 means you must change the gauge-size to 800, 600

1024 means you must change the gauge-size to 1024, 768

etc.

In FS you should press [shift-4] to open the gauge.

(or [WindowXX] + 1 . So if you have it on [window07], instead of [window03], you should use [shift-8])

That's it :)

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JELAIR "HUD2008" for FSX

Thanks for flying JELAIR.
(virtual airline & space corp.)

JEL/jacob.

Main email: jelstudio@hotmail.com (have patience if expecting a reply to your email)

JELAIR on the web: <http://home.tiscali.dk/8x066050/JELAIR/>

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