San Francisco

GPS Gauge

Version 1.3
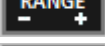
Documentation

30 November 2015

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GPS Gauge

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INSTALLATION

If you are reading this you have already unzipped the ZIP file.

This gauge is intended as a replacement for the Garmin GPS 500 standard gauge which was designed for earlier versions of Flight Simulator than FSX. It can be installed on pretty much any aircraft but only in FSX. There are high resolution maps and displays which are not compatible with FS9.

To share it between several aircraft **copy the GPSNEW.CAB to the FSX \Gauges folder**. If it is only for one aircraft the GPSNEW.CAB can be copied to that aircraft's \panel sub-directory.

It can be installed one of several ways in the panel.cfg – as a direct replacement for the Garmin GPS 500, as a new popup gauge, or it can be incorporated into a main panel.

If you are unfamiliar with changing the panel.cfg file please note that the panel.cfg file is in a \panel subdirectory of your aircraft folder (which is at …\Simobjects\Airplanes\[Your aircraft]) and can be edited using Microsoft NotePad.

Update Previous Version
1. copy the GPSNEW.CAB to replace the old one.
2. Change **BackgroundColor=0,0,0** in the panel.cfg to **BackgroundColor=0,0,10** (See below for optional Background colour setting.
3. Please read the new manual with the description of how to use the new Direct-to function.

If you had the first version with "GPS.CAB" then delete this and change "GPS!" to "GPSNEW!" throughout your panel.cfg.

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Garmin GPS 500 (or 295) Replacement

To replace the Garmin GPS 500 or 295 look for the following lines in the panel.cfg:

```
[Window02]
Background_color=0,0,0
size_mm=456,378
window_size_ratio=1.0
position=2
visible=0
ident=GPS_PANEL
window_size= 0.36, 0.370

gauge00=fs9gps!gps_500,  0,0,456,378
```

Any lines that start with // can be ignored. Your [Window02] line will most likely have a different number. Other lines may have different numbers than shown above or be missing. The key thing you will find is **fs9gps!gps_500** or **fs9gps!gps_295.**

Replace all of the above with:

```
[Window02]
Background_color=0,0,10
size_mm=800,670
windowsize_ratio=0.76
position=7
visible=0
ident=GPS_PANEL

gauge00=GPSNEW!GPS,  0,0,800,670
```

Make sure that the [Window02] line is the same as your original – i.e. if the old one showed [Window05] then make sure the new one is also [Window05]. The key things to change are underlined.

That is all that is needed but **see below for background colour and positioning and sizing**.

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New Popup Gauge

To create a new popup gauge the following text needs to be inserted into the panel.cfg after the last [Windownn] section in the panel.cfg.

```
[Windownn]
Background_color=0,0,10
size_mm=800,670
windowsize_ratio=0.76
position=7
visible=0
ident=537

gauge00=GPSNEW!GPS,  0,0,800,670
```

[Windownn] needs to be changed to a number one greater than the last [Windownn] in the panel.cfg.

In addition there needs to be an additional Windownn= statement at the beginning of the panel.cfg. nn needs to be the same number as the inserted [Windownn]. The new window can be called anything – e.g. Window07=New GPS.

See below for background colour and positioning and sizing

The ident of 537 is for use with the GPS Icon described below. If you want to call this panel using other methods this can be changed but it will then not be called by the GPS Icon in the package.

To load this panel you can use the icon that is supplied and add the following line to your main panel:

gaugenn=GPSNEW!GPS Icon, xx, yy, 25, 25

xx and yy are the coordinates where to locate the icon and 25,25 is the size. It is best to position it next to other icons on the screen and size it to a matching size. nn needs to be different to all other gauges in the panel – it can continue beyond 100 but no gaps in the sequence are allowed after a certain point – around 50.

Note that although this icon has the same picture as the FSX GPS icon it is not the same.

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Adding the Gauge to the Main Panel

The following line needs to be added to your main panel:

```
gaugenn=GPSNEW!GPS,  xx, yy, 608, 509
```

Again nn needs to be a unique number while xx and yy are the coordinates on the panel. A size of 608, 509 is suggested but can be changed to suit the panel you are fitting to. The width of the gauge should always be wider than the height.

Ensure that the panel colour of the location where you insert it is the background colour you would like for the gauge as the gauge is now designed as a "see-through" gauge.

A note on GPSNEW

GPSNEW is the name of the .CAB file but the name is not critical and can be renamed to any name such as "Tom.cab", "Dick.cab", or "Harry.cab". The critical thing is to ensure that the name in the gaugexx= in the panel.cfg file is the same as the .cab name – e.g. "Tom!", "Dick!" or "Harry!". The only restriction is that the .cab file can not be called "GPS" as this confuses FSX.

Notes for Update 1.2

This purpose of this update is to improve scalability in the gauge ensuring that headings line up and text is the correct size when changing the size of the gauge. This does not mean the gauge is infinitely scaleable. The gauge needs to be wider than it is high to get a good column display however the changes mean that the ratio of the length of the sides is less important.

A few cosmetic changes have been made and some small bugs fixed. There is no change to how the gauge works. There is some additional information in this manual to clarify how some features work.

One noticeable change is that text on the Map has been given a black background to ensure they are easily readable on all maps.

The maximum map range has been increased to 2650 nm which is the FSX limit.

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Notes for Update 1.3

This update has some additional functions at the request of some users. Additional features are as follows:

- Displays Ground Speed at bottom left of map
- Display Latitude and Longitude for selected nearest Airport
- Counts down the total distance to the final destination
- Allows a Direct-to flight plan for a selected Airport, VOR, NDB, or Intersection
- Allows a change to the flight plan to go Direct to any selected waypoint
- Allows selectable background colour (optional)

See below for details on these features.

Different Colour Background (optional)

Previous versions allowed only a black background on the Flight Plan, Approach, and Nearest panels. This version is a "see-through" version that allows you to have any background colour you wish. A dark colour is recommended.

To set a background colour then set the **Background_color=0,0,10** parameter in the panel.cfg to be **Background_color=aaaa,bbb,ccc** where aaa, bbb, and ccc are the decimal RGB values for the desired background colour. These numbers can be found from MS-Paint by selecting the colour wanted and noting the decimal RGB values. Some examples are shown below.
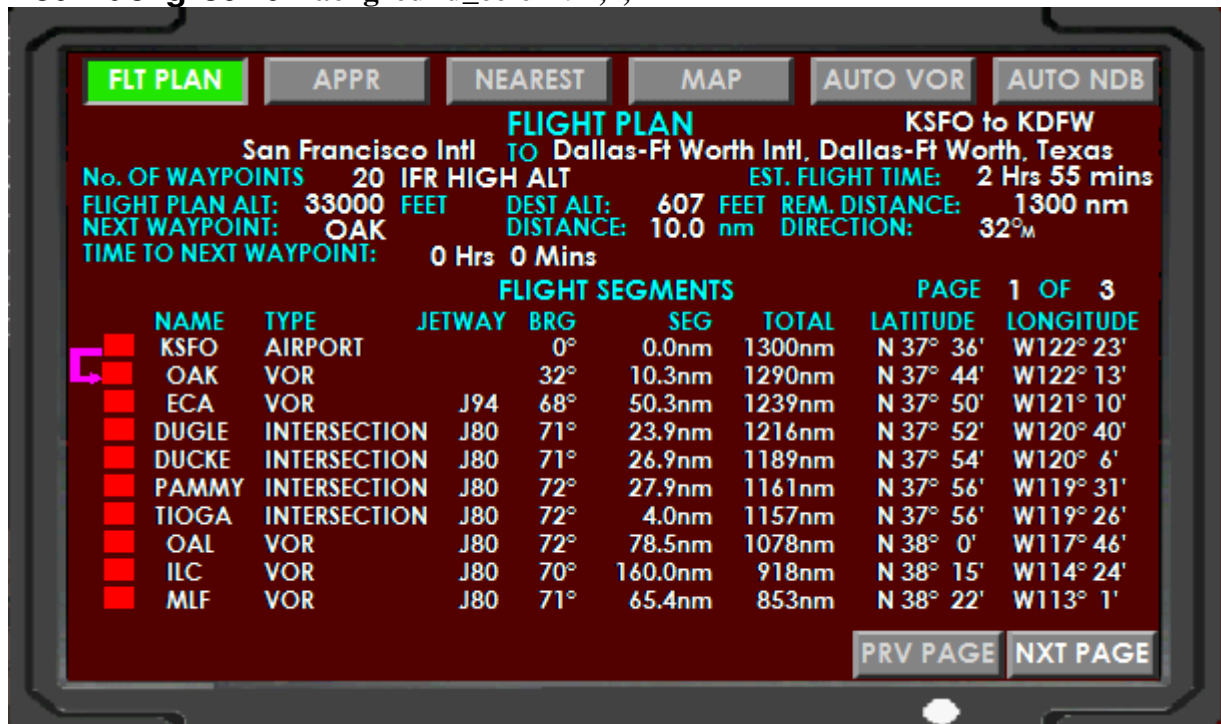
Note that any selected background colour does not apply to any of the maps.

Blue Background **Background_color=17,20,64**

| FLT PLAN | APPR | NEAREST | MAP | AUTO VOR | AUTO NDB |

FLIGHT PLAN   **KSFO to KDFW**

San Francisco Intl   TO   las-Ft Worth Intl, San Francisco, California

No. OF WAYPOINTS   20   IFR HIGH ALT   EST. FLIGHT TIME: 2 Hrs 55 mins

FLIGHT PLAN ALT: 33000   FEET   DEST ALT: 607   FEET   REM. DISTANCE: 1300 nm

NEXT WAYPOINT: OAK   DISTANCE: 10.0   nm   DIRECTION: 32°ᴍ

TIME TO NEXT WAYPOINT: 0 Hrs   0 Mins

FLIGHT SEGMENTS   **PAGE   1 OF   3**

| NAME	TYPE	JETWAY	BRG	SEG	TOTAL	LATITUDE	LONGITUDE
KSFO	AIRPORT		0°	0.0nm	1300nm	N 37° 36'	W122° 23'
OAK	VOR		32°	10.3nm	1290nm	N 37° 44'	W122° 13'
ECA	VOR	J94	68°	50.3nm	1239nm	N 37° 50'	W121° 10'
DUGLE	INTERSECTION	J80	71°	23.9nm	1216nm	N 37° 52'	W120° 40'
DUCKE	INTERSECTION	J80	71°	26.9nm	1189nm	N 37° 54'	W120° 6'
PAMMY	INTERSECTION	J80	72°	27.9nm	1161nm	N 37° 56'	W119° 31'
TIOGA	INTERSECTION	J80	72°	4.0nm	1157nm	N 37° 56'	W119° 26'
OAL	VOR	J80	72°	78.5nm	1078nm	N 38° 0'	W117° 46'
ILC	VOR	J80	70°	160.0nm	918nm	N 38° 15'	W114° 24'
MLF	VOR	J80	71°	65.4nm	853nm	N 38° 22'	W113° 1'

| PRV PAGE | NXT PAGE |

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Red Background Background_color=92,7,12

Green Background Background_color=10,50,21
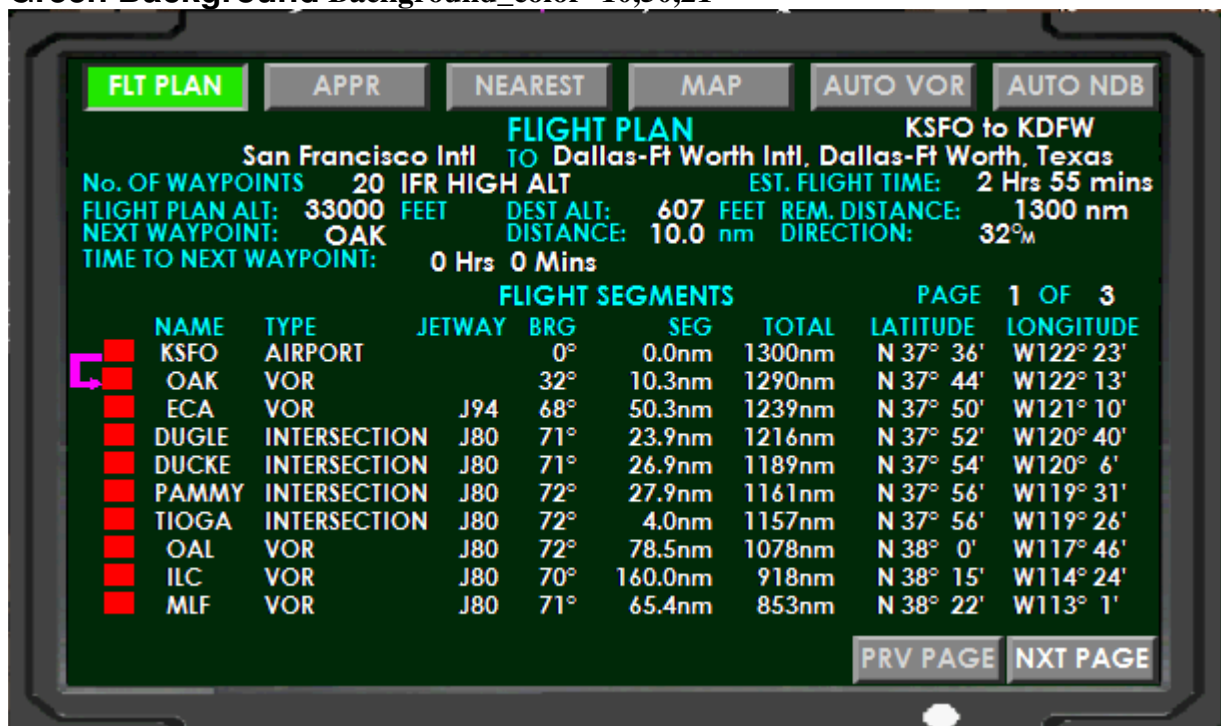
POSITIONING AND SIZING

For those already familiar with positioning and sizing gauges in FSX (or FS9) this section is redundant. It is intended as a simple explanation for those not familiar with how to reposition or resize a gauge. It is not intended to be exhaustive.

Standard Positioning

In FSX there are a number of standard positions that can easily be changed. These positions are defined by the **position=** parameter in the panel.cfg file.

The standard position suggested in the installation instructions above is 7. Altogether there are 9 standard positions in FSX. These are:

0 = top left corner
1 = top side middle
2 = top right corner
3 = middle left side
4 = middle of screen
5 = middle right side
6 = bottom left corner
7 = bottom side middle
8 = bottom right corner

So to easily reposition the gauge the parameter **position=** can be made equal to any of the above numbers.

Custom Positioning

Positioning the gauge to any point on the screen is a little more complex and should really only be done by those with a good understanding of how it works. Positioning a popup panel is different to positioning on a main panel. It is assumed that anyone inserting this gauge into a main panel will be familiar with how to position on the panel. This section only deals with positioning of a window.

In all versions of Flight Simulator positions are defined as x and y coordinates starting from the top left corner of the screen and pointing to the top left corner of the object being positioned. Units are effectively pixels so on a 1920X1080 screen the coordinate 1920,1080 points to the extreme bottom right corner of the screen. This is a vertical inversion of the typical mathematical x,y coordinate graph.

The position of a window on a screen is defined by using the parameter **window_pos=**. Use of this parameter overrides the standard **position=** parameter. The format is:

```
Window_pos= x.xxxx, y.yyyy
```

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In this case x.xxxx and y.yyyy do not represent a number of pixels. They represent a proportion of the side of the screen. So if the screen is 1920 pixels wide and x.xxxx is 0.5 then it points to a point halfway across the screen – i.e. position 960 in this case. Similarly if y.yyyy is equal to 0.5 and the screen height is 1080 then it points to a position half way down the screen – i.e. position 540. So if **Window_pos=0.5, 0.5** then the window will be positioned with its top left corner exactly in the middle of any screen.

To position the window precisely usually needs some experimentation. It can be positioned to the nearest pixel using a number to 4 decimal places.

Simple Sizing

Simple sizing is done by defining a proportion of the original size of the window. It is done using the parameter:

```
Windowsize_ratio=n.nn
```

In the installation instructions a ratio of 0.76 has been recommended on a screen size of 1920X1080. This yields a screen size similar to the Garmin GPS 500 although the overall gauge size is significantly smaller. You may prefer a smaller or larger size depending on your screen size and the panel you are using. This can easily be changed simply by changing the Windowsize_ratio to whatever fraction of 1 preferred. The parameter can be set greater than 1 if desired but this is not recommended for this gauge.

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Custom Sizing

Custom sizing of a window is done using the parameter:

```
Window_size=xx.xxxx, yy.yyyy.
```

Window_size= overrides any **Windowsize_ratio=** setting.

xx.xxxx and yy.yyyy are similar to the positioning parameters in that they represent a proportion of the side of the screen. In this case however the proportion is of the side of the object. If you want an object to appear as 500 pixels wide on a 1920X1080 pixel screen then the parameter xx.xxxx would be 0.2604 (500/1920). Similarly if you wanted the same object to be 500 pixels tall on the same screen yy.yyyy would be 0.4630 (500/1080). From this it can be seen that a square object does not have equal parameters for the two sides. Note that the original size of the object does not matter – the object can be stretched or squeezed in either direction. For this gauge it is important for formatting that the width should be greater than the height but other than that any size can be used that is suitable.

For a detailed explanation of the parameters in the panel.cfg including the positioning and sizing please refer to the Microsoft website:

https://msdn.microsoft.com/en-us/library/cc526956.aspx.

GPS Gauge

INSTRUCTIONS

Introduction

This gauge was developed as a replacement for the standard Garmin GPS 500 / 295 gauge which is found in many panels. The GPS 500 was developed for earlier versions of Flight Simulator and has a fairly low resolution as well as difficult to operate for both novice and experienced users.

This new gauge carries out all pretty much all the functions if the GPS 500 with many additional features added. Some of the new features are:

- Tuning of ILS frequencies (no more map lookups)
- Auto Tuning to VORs and NDBs
- Selectable tuning to VORs and NDBs
- Nearest Airports, VORs, NDBs, and Intersections can be searched to any number
- High resolution terrain Maps with terrain shadowing
- Other aircraft display (TCAS)
- TAWS Map
- Flight Plan Map
- Uncluttered Maps with selectable overlays
- Detailed Flight Plan
- Easy navigation between pages
- Approach selected and activated with two mouse clicks
- Localiser and Glideslope Nav aids
- Direct-to feature
- Background colour

Although this gauge is not based on any real gauge it is meant to have a similar look and feel to the interactive synoptic displays on the Boeing 787.

This gauge is for FSX. It does not work on earlier versions of Flight Simulator. It can work on pretty much any aircraft. It will work on any screen size although reasonably high resolution is recommended. It is unlikely to look good on a 640X480 screen.

GPS Gauge

Flight Plan
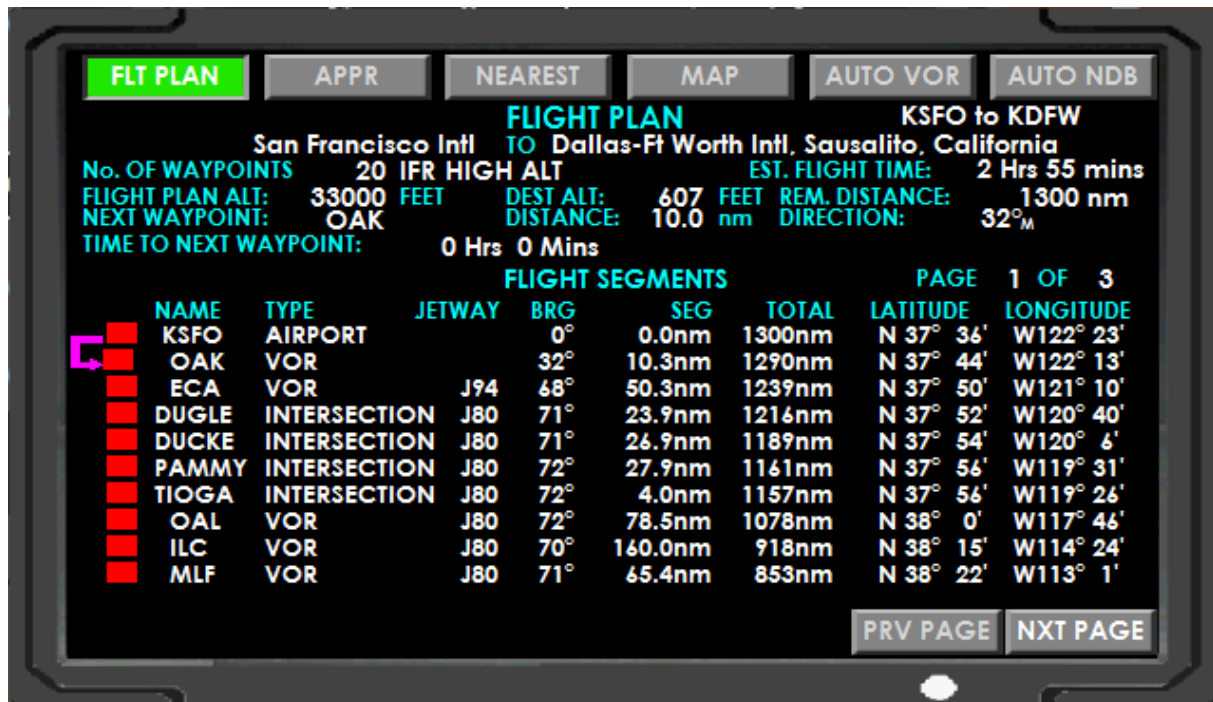
If no Flight Plan is loaded the message "No Flight Plan Active" will display on a blank screen. Although both Flight Plan and Approach do not work if there is no Flight Plan, the Maps, Nearest, and VOR tuning functions still work.

The Flight Plan displays a list of all the flight segments to however many pages are needed. Clicking on the red box next to a Waypoint will open an information box about that Waypoint. This gauge has no limit on the number of flight segments however the FSX Flight Planner has a limit of somewhere around 45 segments.

An arrow on the left indicates the current flight segment being travelled.

The **Estimated flight time** is calculated in one of two ways:
1. When the aircraft is on the ground it is calculated using the defined aircraft cruising speed and distance by the flight plan to the destination plus 30 minutes contingency.
2. When the aircraft is airborne it is calculated using the FSX estimated flight time which is based on the actual ground speed without contingency.

The calculation can not be as accurate as is done in real airline operation but it gives a reasonable indication.

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Approach

The Approach screen is the first screen that displays at startup. It contains the basic flight plan information at the top and displays a list of all approaches at the destination airport. Provision is made for up to 48 approaches to display. The highest number of approaches found has been 34 at Dallas-Fort Worth Airport. If anybody can find an airport with more than 48 approaches then I will rewrite this section.

Clicking on a red box selects that approach then clicking the "Confirm" box goes to the next screen.

After confirmation all available information about the selected approach then displays. At this point the Approach is not activated.
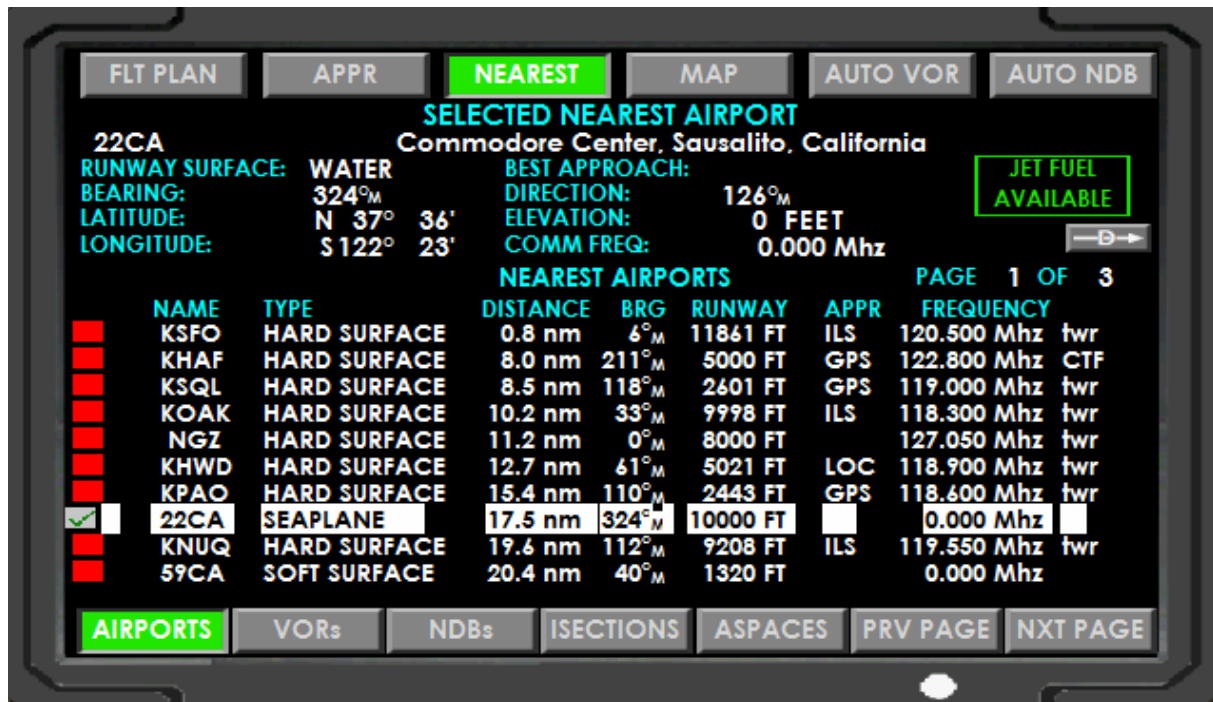
GPS Gauge
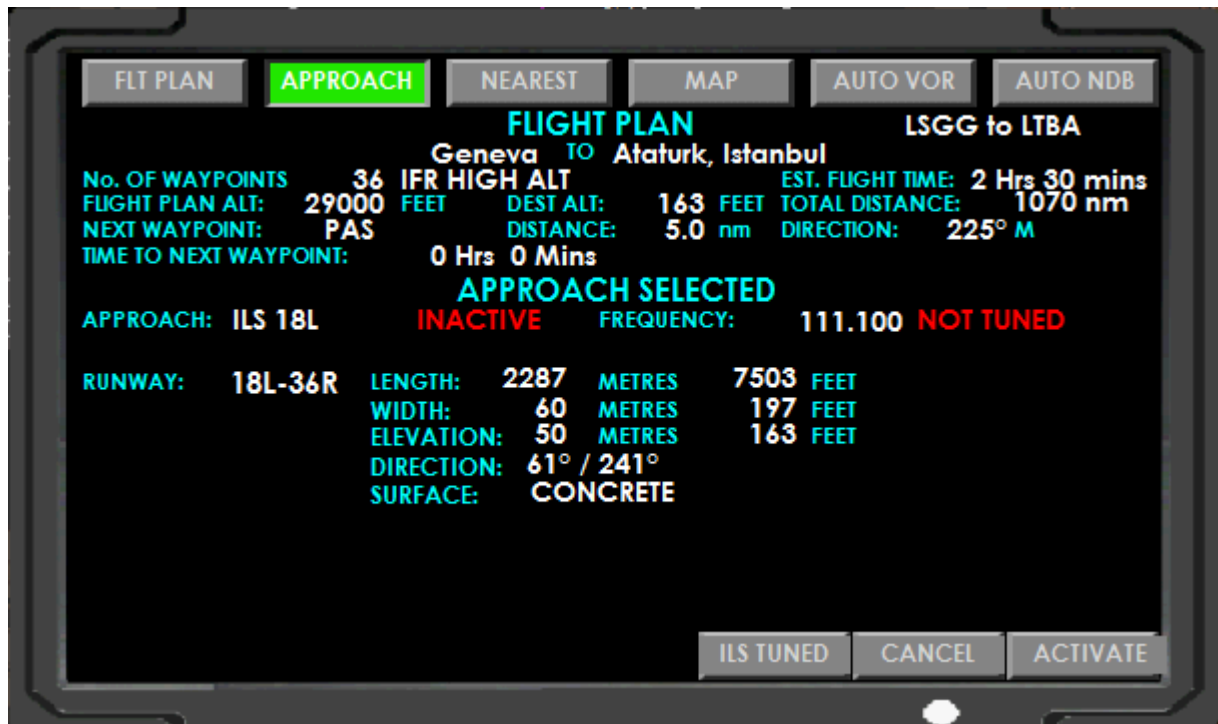
To activate the Approach click on the "Activate" button. After activation a track from the aircraft current position to the Approach entry point is added to the flight plan. For an ILS approach, to tune the NAV1 radio to the ILS frequency click on the ILS Tuned box. The screen will indicate when the radio is tuned and whether or not there is a signal.

An Approach can be cancelled at any time by clicking on the "Cancel" button even if it has been activated. On cancellation the screen will revert to the Approach select screen.

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Nearest

Clicking on the nearest button initially goes to a list of nearest Airports. As this gauge can be used on large or small aircraft there is no filtering on this list and all airports are shown. On entry details of the nearest airport are always shown in the upper section.

Clicking on VORs, NDBs, or Isection boxes produces a similar list of the nearest ones to the aircraft.

The Airspaces box is slightly different – it will give a list of nearest airspaces but if the aircraft is already in an airspace it will only display those airspaces covering the aircraft position – i.e. those at different altitudes at the present position.

Clicking on the red box next to the item will display details of that item in the header part of the screen and will also display the Direct-to button in the upper right.

On the VOR and NDB screen an item can be selected and either NAV1, NAV2 or ADF1 can be tuned automatically by clicking on the appropriate "TUNE" box.

GPS Gauge
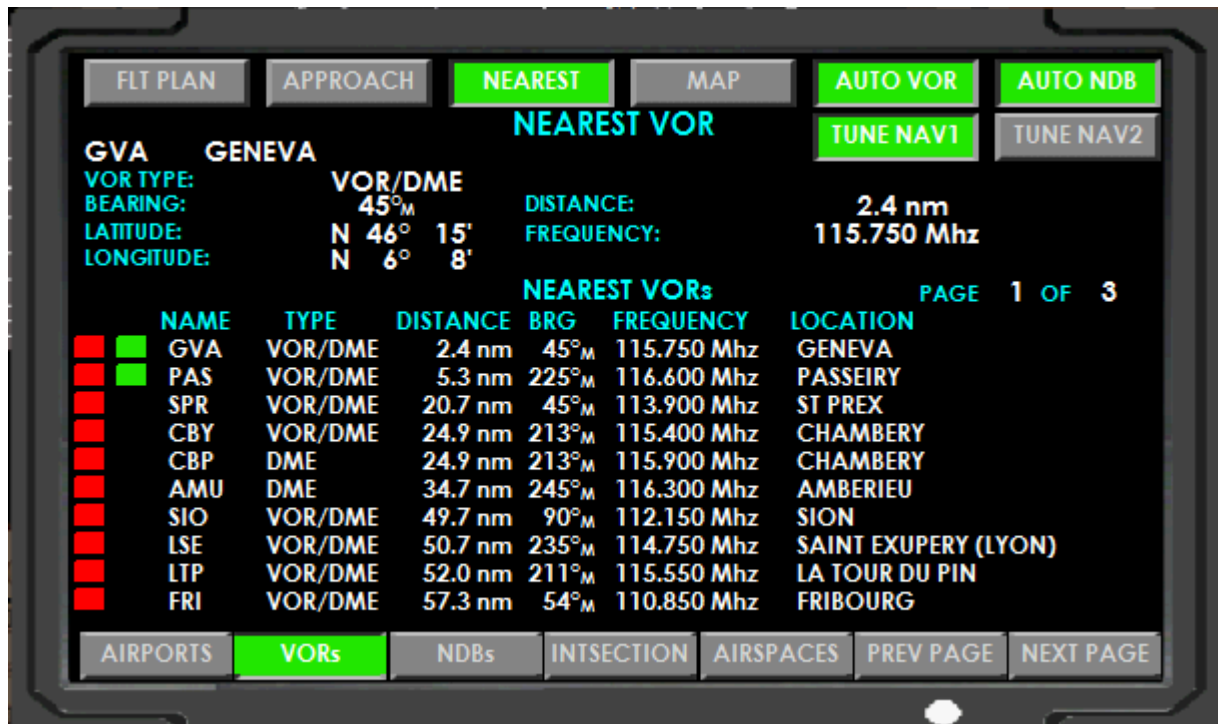
Clicking on "AUTO VOR" will automatically tune NAV1 to the nearest VOR and NAV2 to the 2nd nearest. This will happen continuously until the Auto VOR is switched off. It is essential to switch off Auto VOR before the ILS is tuned on the Approach screen otherwise NAV1 will revert to the nearest VOR. Similarly Auto NDB will automatically tune ADF1 to the nearest NDB throughout the flight.

Obviously these automatic functions are not always desirable and might only be switched on at certain times inflight. Note that while these auto functions are on a NAV radio or ADF can not be manually tuned using any other gauge. To manually tune a VOR or NDB using this or any gauge the corresponding Auto function must first be switched off.

GPS Gauge
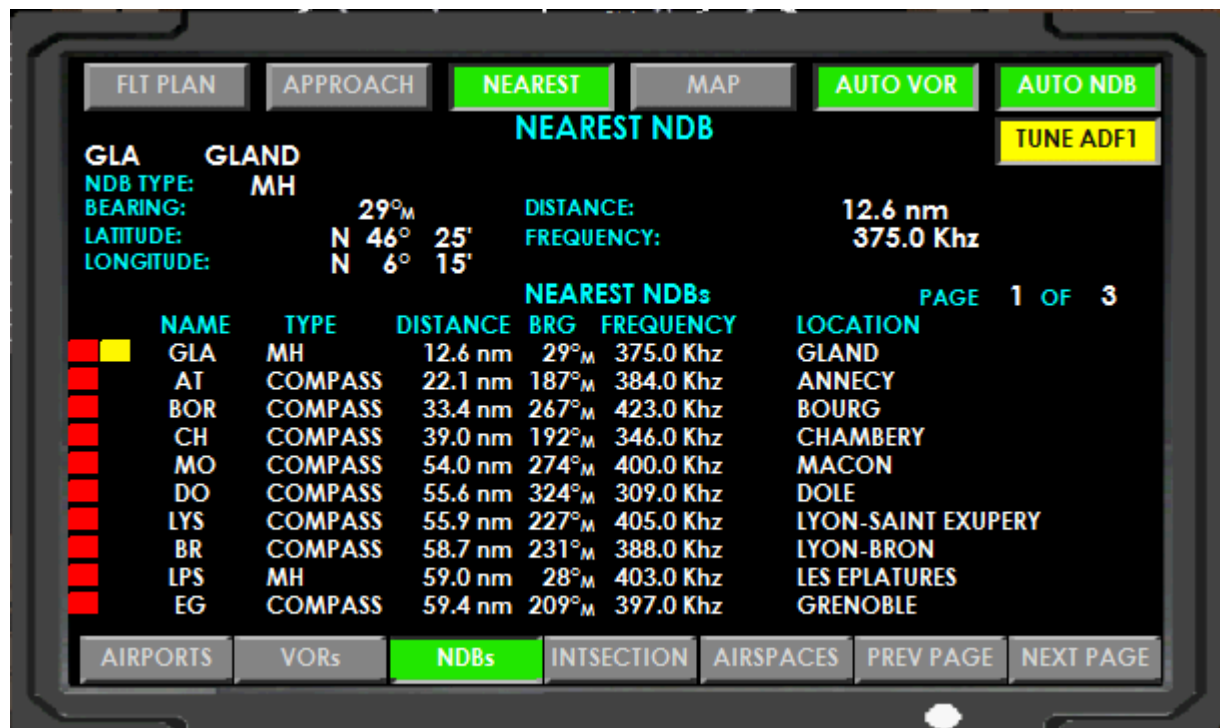
On the VORs and NDBs screen a green box appears against a station that is tuned. The box is yellow if the station is tuned but there is no signal.

On the Airport display screen a green box will appear if fuel is available at a selected airport. Note that it will only display if there is appropriate fuel available – e.g. if you are in a jet aircraft it will only display if jet fuel is available: for a piston engine it will display only if Avgas is available. The messages are very dubious as, according to FSX, there is no fuel available at many large airports including Singapore Changi and Jakarta International and in the example shown it believes there is Jetfuel at a Seaplane base..

GPS Gauge
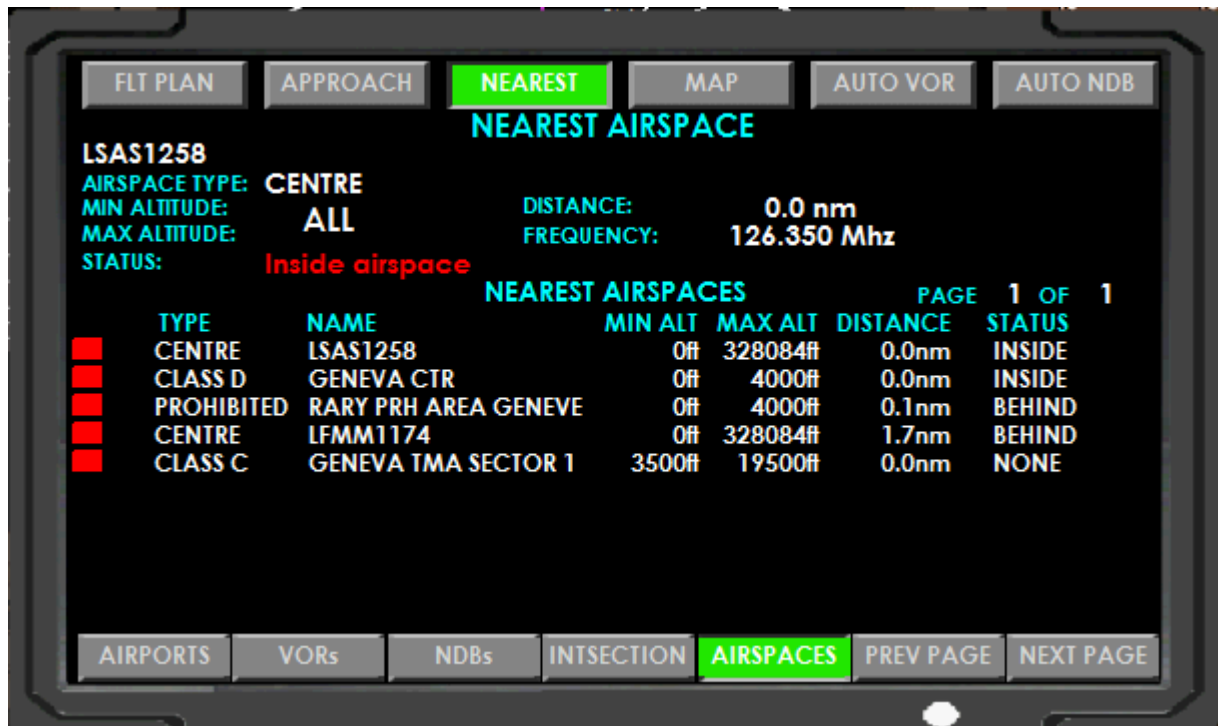
On the Airspaces screen the status of the Airspace will display both in the header and in then detail section. The one in the Header is colour coded. This status is the equivalent of the Messages in the GPS 500.

Changing Number of Pages

By default 3 pages of Nearest items will appear. When inflight this limit can be increased up to 99 pages by right clicking on the total pages but each increase will slow the response time. Each time an increase is done the increase will not be completed until the contents of the page change. This can take a long time on trans-oceanic flights so the default limit of 3 pages is designed to decrease the need for this function.

The number of pages can also be decreased by left clicking on the number of pages. Reducing the maximum pages to 1 will ensure the fastest loading speed.

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The Direct-to Function

On the Nearest Screens

If an item is selected on any of the Nearest Screens (Airports, VORs, NDBs, Isections, but not Aspaces) a Direct-to icon [—D→] will appear on the right side. Clicking on this icon will create a flight plan to fly directly to that point replacing the pre-existing flight plan (if any). If the point is an Airport then a list of Approaches will be available for that airport but if not the aircraft will just fly in circles when it arrives at that point. The new flight plan will also display on the map.

After clicking the [—D→] icon it will turn green [—D→] to indicate that a Direct-to flight plan is in effect. The new flight plan can be seen on the Flight Plan screen with the start location being the location where the Direct-to was selected. Note that the full name of the destination will not display on the Flight Plan – this name can only be seen on the Nearest screen where it was selected. This is due to a limitation in FSX.

To reinstate the original flight plan click on the green Direct-to icon. If there was no original flight plan it will revert to no flight plan. To change to another Direct-to destination first click on the green icon to de-deselect the old Direct-to destination then select the new destination and click on the Direct-to icon again.

On the Flight Plan Screen

If a Waypoint is selected on the Flight Plan screen then the [—D→] icon will appear as on the Nearest screens. The function however is slightly different – clicking on the icon will delete all waypoints prior to the selected waypoint and the aircraft will fly directly to the selected waypoint. All waypoints after the selected waypoint remain unchanged so the aircraft will still continue to its original destination.
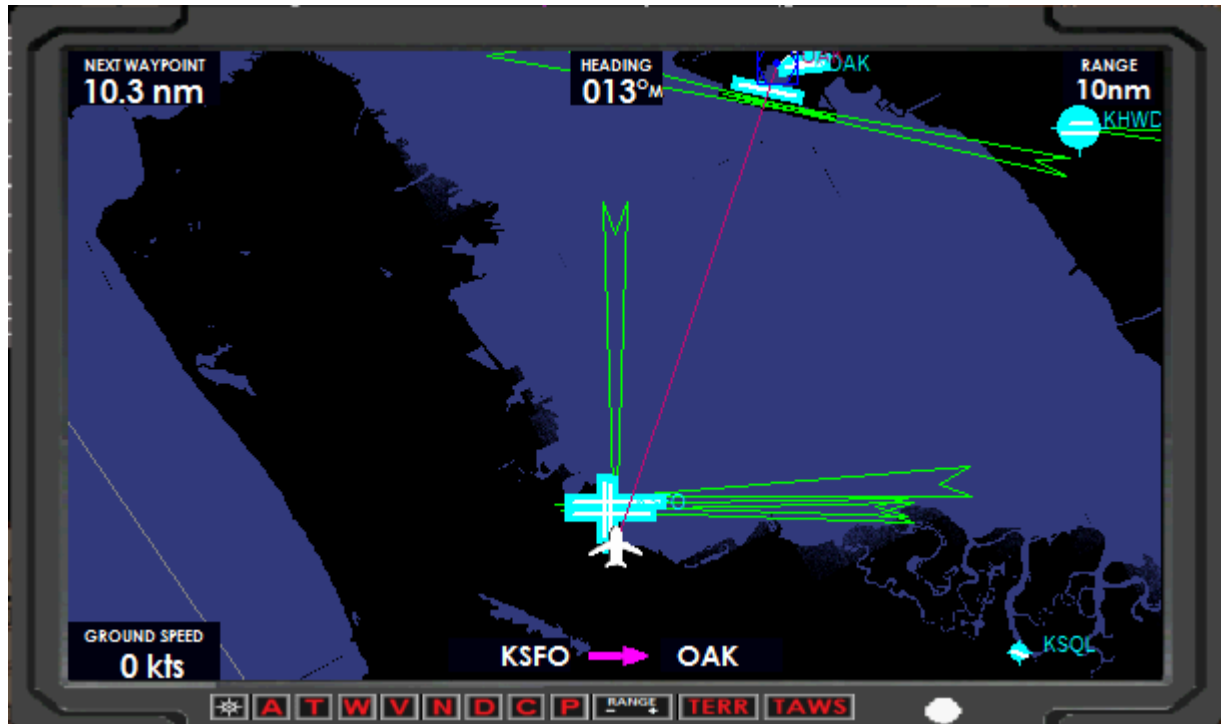
THIS FUNCTION CAN NOT BE REVERSED.
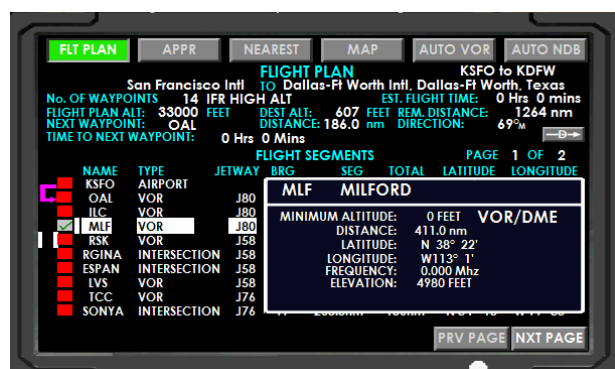
Before	After

N.B. The use of the Direct-to function has a small risk of system failure. The risk is low but if a system failure does occur when using Direct-to this is due to FSX not due to the gauge.

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MAP

Clicking on the MAP button will initially display a monochrome map centred on the aircraft with a range of 10 nm and with the heading of the aircraft towards the top. A series of icons to control the display appears at the bottom of the screen.

Positioning the mouse on any icon will bring up a message describing its function (provided "Show cockpit ToolTips" is ticked in Settings-Aircraft).
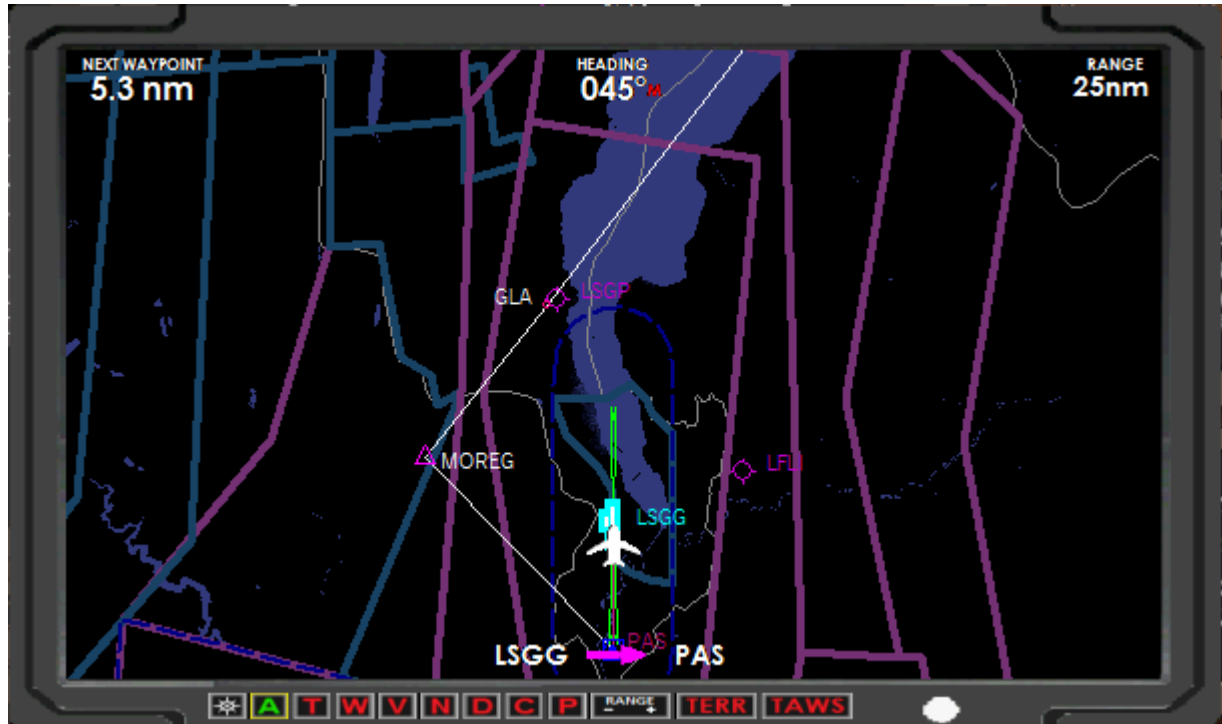
The functions of the Icons are as follows:

Clicking this icon switches the map off and returns to the last screen displayed.

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![A]

Clicking this icon displays Airspace boundaries on the map as shown below

GPS Gauge

T

Clicking on this icon displays other aircraft on the map as shown below.

GPS Gauge

W

Clicking on this icon displays Waypoints on the map as well as an information panel for the next Waypoint on the left side of the map as shown below.

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V

Clicking on this icon displays VORs on the map as shown below.

N

Clicking on this icon displays NDBs on the map. NDBs are not so common so there are not always any visible.

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D

Clicking on this icon displays more textual detail on the map as shown below. This can result in a very cluttered display and should be used with care.

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![C icon]

Clicking on this icon displays a compass rose on the map centred on the aircraft as shown below.

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P

Clicking on this icon will display a map oriented north showing the whole flight plan centred on the next waypoint (NOT the aircraft) as shown below. The map attempts to set a scale that will fit in the whole flight plan but if more than 640 nm will limit the scale to that distance. The map can be manually expanded up to 2650 nm – the maximum range for FSX. The aircraft symbol is oriented to its current heading.

Clicking the Flight Plan view off will revert to the previous scale on the main map.
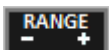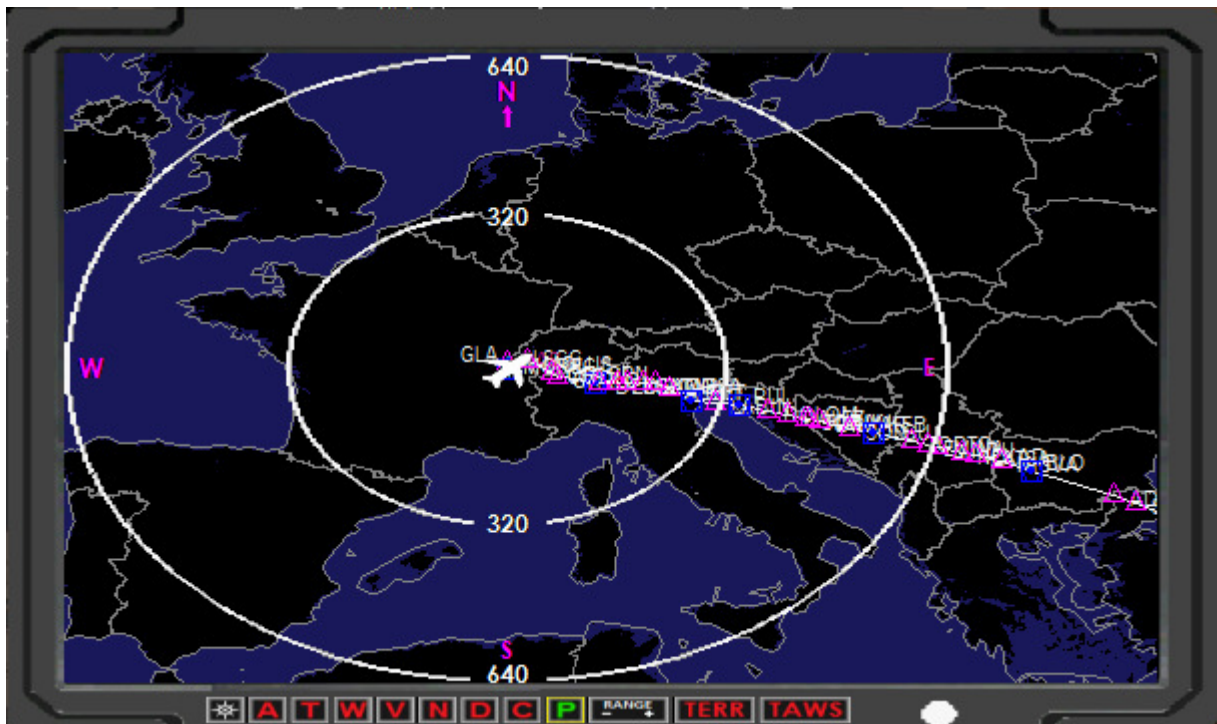

RANGE

Clicking on the Range icon will increase or decrease the range by 10 nm for the main map or by 50 nm for the Flight Plan map. The map will go down to 5 nm and up to 2650 nm. The range is precisely the distance from the centre of the aircraft symbol to the top of the map.

N.B. Range is increased by right clicking on the icon or left clicking to decrease.

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TERR

Clicking on the TERR icon will display a high resolution terrain map as shown below. Terrain elevation colours are based on the Garmin system and have terrain shadowing to enhance the effect.
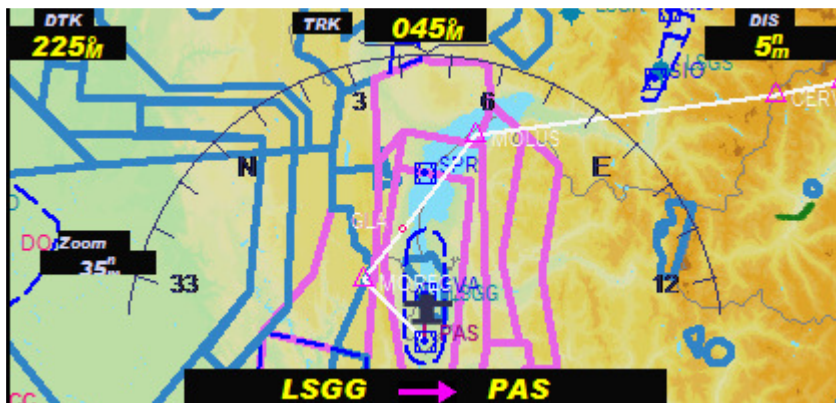


GPS 500 Map of the same Terrain

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TAWS

The Terrain Awareness (TAWS) Map shown below 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 above the aircraft as Yellow, and Terrain more than 2000 feet above the aircraft as Red. If the aircraft is more than 2000 feet above terrain the display is the same as the monochrome map. 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 icon can only be clicked on after first clicking the TERR icon. The map will reload with every 500 foot change in aircraft altitude and the screen will go blank during the reload. It can be slow to load and temperamental. When flying at high altitude the map will have the same appearance as the standard monochrome map but will still go blank from time to time when reloading.

The example map shown is with the aircraft on the ground.
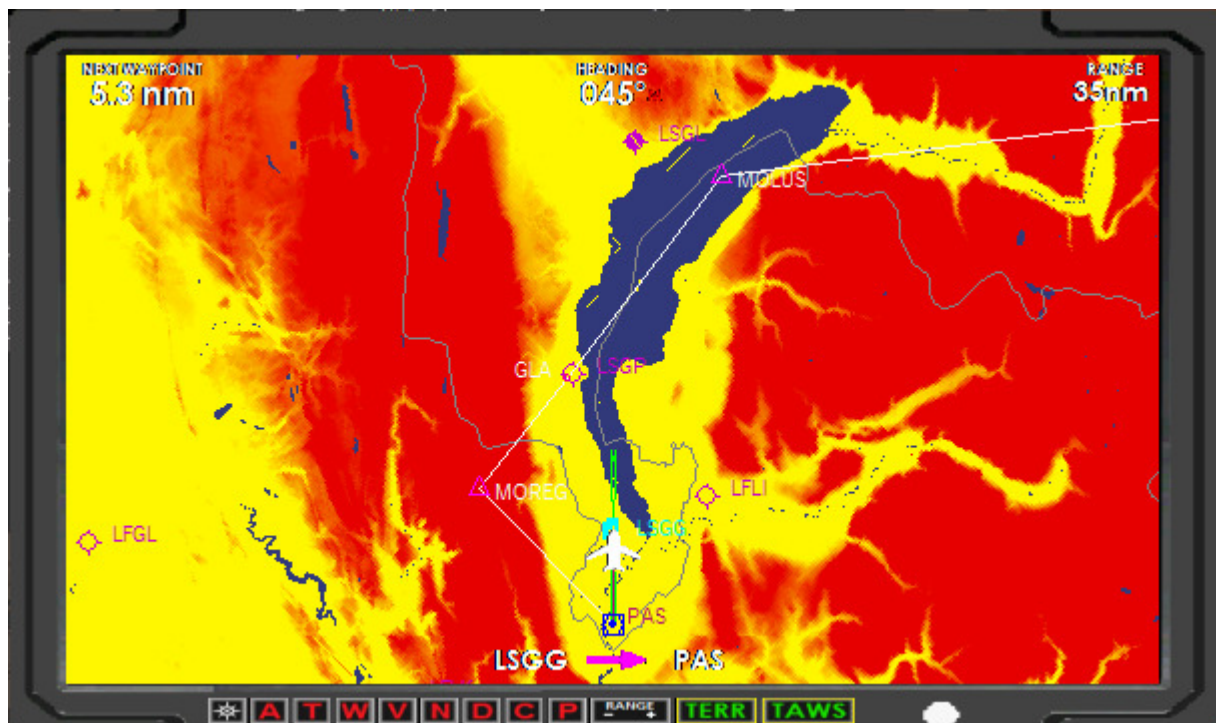
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