

Using the GPS

A guide to global positioning system receivers in Flight Simulator



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What is GPS?

GPS, or global positioning system, is a network of satellites that transmit coded data that receivers on the ground can use to determine their position on earth. GPS receivers determine location by comparing the angular relationships between the receiver and orbiting satellites. In this way, GPS is really quite similar to celestial navigation, which early pilots used to determine their whereabouts. The difference is that a GPS receiver uses a computer to compute position, while a pilot navigating with the stars had to operate a sextant and use complex tables.

The computer on board an aviation GPS receiver does much more than just tell a pilot where he is. It can also tell him where any other point on the planet is, and how to get there. GPS receivers are amazing pieces of technology, and are getting more sophisticated every year. Learning how to use one is fun, and the payoff for a bit of study and practice is huge. Fly with a GPS receiver once, and it's hard to go back.

A GPS receiver with its many knobs and colorful display might look intimidating, but there's nothing to be afraid of: It's just a computer that provides you (or the autopilot) with information. And as with most computers, you don't have to know how to do everything to use it effectively. Learning how to use the GPS is a process:

1. Read this article.
2. Experiment.
3. Repeat as necessary.

You'll be an expert in no time.



This article is based on the *Garmin GPS 500 Pilot's Guide and Reference manual*, published by Garmin Corporation, and was adapted with permission for use with Flight Simulator.



Using The GPS

Get a quick GPS overview

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What Can I Do with a GPS Receiver?

The GPS units in Flight Simulator can help you:

- Determine where you are.
- Determine where your destination is.
- Determine how to get from your current

location to your destination.

- See a graphic depiction of the terrain.
- Find information about airports, intersections, NDBs, and VORs.
- Locate the nearest airport, intersection, NDB, VOR, or airspace.
- Proceed direct to any airport, intersection, NDB, or VOR.
- Follow a VFR or IFR flight plan.
- Fly instrument procedures.
- Be aware of the airspace boundaries in your vicinity.

Basic Concepts

Before diving into the details of operating the GPS in Flight Simulator, it's helpful to understand some basic concepts. Take a few minutes to read this section, and you'll be better prepared for the details that follow.



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Two GPS Units, Same Functionality

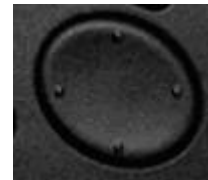
Flight Simulator includes two GPS units, a "panel-mounted" version and a "portable" version. Both Flight Simulator GPS units have nearly the same functionality, modeled after the real-world Garmin GPS 500 receiver, although the portable version *looks* like a Garmin GPSMAP 295. The two units have buttons in different places, but they do the same things.

Using the GPSMAP 295

The GPS 500 has a large knob and a small knob. The GPSMAP 295 has a rocker switch that performs the same functions as the knobs on the GPS 500. Whenever the procedures in this document mention a knob on the GPS 500, use the rocker switch if you're flying with the GPSMAP 295.



GPS 500 small and large knob



GPSMAP 295 rocker switch

When the instructions in this article say to turn the small knob on the GPS 500, click the left or right side of the rocker switch on the GPSMAP 295. To turn the large knob, click the top or bottom of the rocker switch. Whereas the GPS 500 has a **CRSR** button integrated into the small knob, the GPSMAP 295 has a separate **CRSR** button.



Garmin GPS 500 in Flight Simulator



Garmin GPSMAP 295 in Flight Simulator

Flight Simulator aircraft equipped with panel-mounted Garmin GPS 500 GPS receivers

- Boeing 737-400
- Boeing 747-400
- Boeing 777-300
- Beechcraft Baron 58
- Beechcraft King Air 350
- Bombardier Learjet 45
- Cessna Skyhawk SP Model 172
- Cessna Skylane Model 182S
- Cessna Caravan C208 Amphibian
- Cessna Grand Caravan C208B
- Mooney M20M "Bravo"

Flight Simulator aircraft equipped with portable Garmin GPSMAP 295 GPS receivers


- 1903 Wright Flyer
- Bell 206B JetRanger III
- Curtiss JN-4D "Jenny"
- de Havilland DH-88 "Comet"
- Douglas DC-3
- Extra 300S
- Ford 4-AT-E Tri-Motor
- Model 5B and 5C Vega
- Piper J-3C-65 Cub
- Robinson R22 Beta II

- Ryan NYP "Spirit of St. Louis"
- Schweizer SGS 2-32
- Vickers F.B.27A Vimy

Displaying the GPS Receiver

Flight Simulator displays the GPS units in pop-up windows on top of the main instrument panel. You can access them using either the mouse or the keyboard, and you can move, resize, and undock them just like any other Flight Simulator window. To learn more about windows, see [Using Views and Windows](#).

To display the GPS while flying any aircraft

- Click the  **GPS** icon
- or-
- Press **SHIFT+3**
- or-
- On the **Views** menu, point to **Instrument Panel**, and select **GPS**.

Moving the GPS

You can move the GPS anywhere on screen. Just click and drag.

Using the Mouse

To manipulate the knobs and buttons on the GPS units, use your mouse just like you'd use your hand in a real cockpit.

Rollover Descriptions

You can discover each button or knob's name by moving the pointer over it; a description will appear.



Buttons

Press buttons to activate them. When the instructions say to press a button, move the pointer over the button and click it.



Knobs

The GPS 500 includes two adjustment knobs: an inner **small knob** and an outer **large knob**. When the instructions say to turn a knob, move the mouse over the arrows on the knob. A hand with either a - (minus sign) or a + (plus sign) will appear.

- When the hand with the - appears, click to turn the knob to the left.
- When the hand with the + appears, click to turn the knob to the right.



You can also use the mouse wheel to turn the knobs. Move the cursor over the knob until the cursor changes to a hand, and then roll the mouse wheel to change the control.

Using the Keyboard

If you prefer, you can use the keyboard to control the knobs and buttons on the GPS units. There are no keyboard shortcuts assigned by default, but you can map them yourself. To learn more, see [Using the Keyboard](#).

About Page Groups and Pages

The information that appears on the GPS screen is presented on pages, and you can only view one page at a time. Some pages are organized into groups of related pages, called page groups. Think of page groups as chapters in a book, and pages as the pages within each chapter.

There are three page groups in the Flight Simulator GPS units.

The **Navigation** page group includes:

- **Default NAV**
- **Map**

The **Waypoint** page group includes:

- **Airport Location**
- **Airport Runway**
- **Airport Frequency**
- **Airport Approach**
- **Intersection**
- **NDBs**
- **VOR**

The **Nearest** page group includes:

- **Nearest Airport**
- **Nearest Intersection**
- **Nearest NDB**
- **Nearest VOR**
- **Nearest Airspace**

There are also two stand-alone pages:

- **Active Flight Plan**
- **Procedures**

All of the page groups and pages are explained in detail in the sections below, in the order they appear above.

Navigating Between Page Groups and Pages

On the GPS 500, navigate between the various page groups using the large knob and/or the appropriate buttons. Navigate between pages within a group using the small knob.

Remember: On the GPSMAP 295, use the rocker switch instead of the knobs

When the instructions in this article say to "turn" the small knob on the GPS 500, click on the left or right rocker switch buttons on the GPSMAP 295. To "turn" the large knob, click on the top or bottom rocker switch buttons.

To access the different page groups

- Rotate the **large knob** to switch between the **Navigation**, **Waypoint**, and **Nearest** page groups.
-or-
- Press the **NRST** button to jump directly to the **Nearest** page group.
To return to the page you were looking at before you pressed the button, press the button again.

You can jump directly to the stand-alone pages using their respective buttons.

To access the stand-alone pages

1. Press the **FPL** button (or the **ROUTE** button on the GPSMAP 295) to jump directly to the **Active Flight Plan** page.
2. Press the **PROC** button to jump directly to the **Procedures** page.
To return to the page you were looking at before you pressed the button, press the button again.



The bottom right corner of this GPS screen indicates that the GPS is displaying the first of the two pages in the NAV page group.

The bottom right corner of the screen indicates which page group is currently being displayed (for example, **NAV**, **WPT**, or **NRST**), the number of screens available within that group (indicated by rectangular page icons) and the placement of the current screen within that group (indicated by the highlighted icon). To select a different page within the group, rotate the **small knob**.

The pages within a page group are persistent. That is, if you switch to a different page group, and then return to the group you were using, the GPS will display the page that you were last looking at within that group.

Scrolling

Whenever the GPS displays a list of information that is too long for the display screen, a scroll bar will appear along the right side of the display.

To scroll down to see the rest of a page

1. Press the **CRSR** button to activate the cursor.
2. Rotate the **large knob** to scroll through the list (or press the top or bottom of the rocker switch on the GPSMAP 295).



The Buttons and Knobs

Like any computer, the GPS units in Flight Simulator are equipped with both a display and an input device. Use the GPS receiver's buttons and knobs—which take the place of a standard computer keyboard—to switch among pages and page groups, and to access and enter information.



The GPS 500



The GPSMAP 295

Both the "panel-mounted" and "portable" GPS units in Flight Simulator offer nearly the same functionality, as illustrated on the figures above.

1. The **Range** button (or the **IN** and **OUT** buttons on the GPSMAP 295) allows you to select the desired

map scale. Use the up arrow side of the button to zoom out to a larger area, or the down arrow side to zoom in to a smaller area.

2. The **Direct-to** button provides access to the direct-to function, which allows you to enter a destination waypoint and establishes a direct course to the selected destination.
3. The **Menu** button is used to activate a specific leg in an active flight plan (not available on the GPSMAP 295).
4. The **Clear** button (or the **QUIT** button on the GPSMAP 295) is used to erase information or cancel an entry. Press and hold this button to immediately display the **Default NAV** (navigation) page, regardless of which page is currently displayed.

Lost Among the Pages?

Press and hold the **CLR** button (or the **QUIT** button on the GPSMAP 295) to immediately display the **Default NAV** page, regardless of which page is currently displayed.

5. The **Enter** button is used to approve an operation or to complete data entry.
6. The **large knob** (top and bottom of the rocker switch on the GPSMAP 295) is used to select between the various page groups: **NAV**, **WPT**, **FPL**, or **NRST**. With the on-screen cursor enabled, the large knob allows you to move the cursor about the page.
7. The **small knob** (left and right of the rocker switch on the GPSMAP 295) is used to select between the various pages within one of the groups listed above.
8. The **cursor** button displays the on-screen cursor. The cursor allows you to enter data and/or make a selection from a list of options.
9. The **Nearest** button displays the **Nearest Airports** page. Rotating the small right knob steps through the other **NRST** pages.
10. The **OBS** (Omnibearing Selector) button (not available on the GPSMAP 295) is used to select manual or automatic sequencing of waypoints. Pressing this button selects **OBS** mode, which will retain the current "active-to" waypoint as your navigation reference even after passing the waypoint (that is, it prevents sequencing to the next waypoint). Pressing the **OBS** button again will return to normal operation, with automatic sequencing of waypoints.
11. The **Message** button (not available on the GPSMAP 295) is used to view Airspace Alerts.
12. The **Flight Plan** button (**ROUTE** button on the GPSMAP 295) allows you to see and follow a flight plan you've created using the Flight Planner, and to access instrument approaches.
13. The **Terrain** button allows you to add a graphical depiction of the terrain to the **Default NAV** page and to the **Map** page.
14. The **Procedures** button allows you to add instrument approaches to your flight plan. When using a flight plan, available procedures for your arrival airport are offered automatically. Otherwise, you may select the desired airport, then the desired procedure.

The Nav/GPS Switch



Flight Simulator aircraft featuring the GPS 500 (as well as the Bell 206B JetRanger III and the Extra 300S) have a Nav/GPS switch on the instrument panel:

- When the switch is in the **Nav** position, the aircraft's VOR 1 indicator (or HSI) and autopilot/flight director use data from the Nav 1 radio.
- When the switch is in the **GPS** position, the aircraft's VOR 1 indicator (or HSI) and autopilot/flight director use data from the GPS receiver.

Note: To couple the GPS to the Nav 1 receiver (or HSI) and/or to the autopilot/flight director in order to follow the course in the GPS, set the **Nav/GPS** switch to **GPS**. Note that the GPS only provides lateral guidance to the Nav 1 indicator (or HSI) and the autopilot/flight director. You cannot fly an ILS or land automatically using the GPS as the sole source of navigational data.

Navigation Page Group

The Navigation (**NAV**) page group includes two pages: the **Default NAV** page and the **MAP** page. While viewing any NAV page, rotate the **small knob** to select the other NAV page.

To select a NAV page

1. Press and hold the **CLR** button (**QUIT** button on the GPSMAP 295).
- or-
- Rotate the **large knob** all the way to the left to select the

NAV page group. **NAV** will appear in the lower right corner of the screen.

2. Rotate the **small knob** to select the desired **NAV** page.

Default NAV Page

You can quickly select the first **NAV** page, the **Default NAV** page, from any page by pressing and holding the **CLR** button.



The default NAV page

The **Default NAV** page provides a look-ahead map display indicating your current position. Additionally:

- The top of the page displays ground track (**TRK**), the direction of your current flight path over the ground (not your heading).
- The bottom of the page displays your ground speed (**GS**). This will differ from your indicated airspeed if there is wind.

Note: If you do not select a flight plan or direct-to waypoint, the GPS will only display speed and track data. All other data types will appear blank until you select a destination.

If you have an active flight plan or direct-to waypoint:

- The top of the page displays desired track (**DTK**), ground track (**TRK**), and distance to destination waypoint (**DIS**).
- The bottom of the page indicates ground speed (**GS**), active to/from waypoints (or just active to, for a direct-to destination), and estimated time en route (**ETE**).
- A graphic course deviation indicator (**CDI**) also appears at the bottom of the page. Unlike the angular limits used on a mechanical CDI coupled to a VOR or ILS receiver, full scale limits for this CDI are defined by a GPS-derived distance (0.3, 1.0, or 5.0 nautical miles). By default, the CDI scale will automatically adjust to the desired limits based upon the current phase of flight: en route, terminal area, or approach.
The graphic CDI shows your position at the center of the indicator, relative to the desired course (the moving course-deviation needle). As with a traditional mechanical CDI, simply steer toward the needle when you're off course. The **TO/FROM** arrow in the center of the scale indicates whether you are heading to the waypoint (an up arrow) or if you have passed the waypoint (a down arrow).
- Along the left side of the page are additional data fields that display the next waypoint (**WPT**), the bearing to the next waypoint (**BRG**), the course to steer (**CTS**), the estimated time of arrival at the destination waypoint (**ETA**), the vertical speed required (**VSR**) to reach the altitude of the next waypoint or the destination runway, the track angle error (**TKE**), and the crosstrack error (**XTK**).

Note: A GPS receiver cannot determine an aircraft's heading, only its track across the ground. Never assume that the **TRK** (track) on the GPS display is the same as your heading. If there's a crosswind, it won't be.

Default NAV Page Glossary

BRG (bearing): The compass direction from your current position to a destination waypoint.

CTS (course to steer): The recommended direction to steer in order to reduce course error or stay on course. Provides the most efficient heading to get back to the desired course and proceed along your flight plan.

CUM (cumulative distance): The total of all legs in a flight plan.

DIS (distance): The great circle distance from your current position to a destination waypoint.

DTK (desired track): The desired course between the active **from** and **to** waypoints.

ETA (estimate time of arrival): The estimated time at which you will reach your destination waypoint, based upon current speed and track.

ETE (estimated time en route): The time it will take to reach the destination waypoint from your current position, based upon current ground speed.

GS (ground speed): The velocity you are traveling, relative to a ground position.

HDG (heading): The direction your aircraft is pointed, based on indications from a magnetic compass or a properly set directional gyro.

TKE (track angle error): The angle difference between the desired track and your current track. To reduce the track angle error to zero: if the displayed TKE is a negative number, turn left; if a positive number, turn right.

TRK (track): The direction of movement relative to a ground position. Also referred to as "ground track."

VSR (vertical speed required): The vertical speed necessary to descend/climb from current position and altitude to reach the altitude of the next waypoint or the destination runway, based upon your current ground speed.

XTK (crosstrack error): The distance you are off a desired course in either direction, left or right.

Terrain

You can add terrain to the map display to more easily visualize your position relative to the surrounding terrain.

To add a graphical depiction of the terrain to the Default NAV page

- Press the **TERR** button. Press the **TERR** button again to remove the terrain.

Declutter

You can quickly remove items from the map, to make it easier to see only what you need.

To declutter the map display

- Press the **CLR** button (or the **QUIT** button on the GPSMAP 295) repeatedly to select the desired amount of map detail: all details; no Class B or C airspace; no nav aids; no airports. Waypoints in an active flight plan are always shown. Depending on the amount of detail removed, **-1**, **-2**, or **-3** will display next to the **Zoom** number on the left side of the screen.

Changing the Scale










The scale of the look-ahead map display appears on the left side, using one of 20 scale settings, ranging from 500 feet to 500 nautical miles (nm). Use the **RNG** button (or the **IN** and **OUT** buttons on the GPSMAP 295) to select the desired scale.

To adjust the map scale

- Press the up arrow on the **RNG** button (**OUT** button on the GPSMAP 295) to zoom out to a larger area.
- or-
- Press the down arrow on the **RNG** button (**IN** button on the GPSMAP 295) to zoom in to a smaller area.

Symbols

The GPS receiver uses the following symbols directly above the graphic CDI on the **Default NAV** page to depict the active leg of a flight plan or direct-to:










	Direct-to a waypoint
	Course to a waypoint, or desired course between two waypoints
	Vectors to final
	Left procedure turn
	Right procedure turn
	DME arc to the left
	DME arc to the right
	Left-hand holding pattern
	Right-hand holding pattern

Note: The GPS receiver always navigates TO a waypoint unless you set the OBS switch (on the GPS 500) to prevent automatic waypoint sequencing, or you have passed the last waypoint in your flight plan.

The active leg of your flight plan (or the direct-to destination when using the **Direct-to** button) appears directly above the CDI. The display will automatically sequence to the next leg of your flight plan as you reach each interim waypoint. If you haven't selected a flight plan or direct-to destination, this line will remain blank.

The GPS display uses different symbols to distinguish between waypoint types, and also displays the identifiers for on-screen waypoints. Special-use and controlled airspace boundaries appear on the map, showing the individual sectors in the case of Class B or Class C airspace.

The GPS units in Flight Simulator use the following symbols to depict the various airports and navigation aids on both the **Default NAV** page and the **Map** page:

	Airport with hard-surface runway(s) (runways shown when zoomed in)
	Airport with soft-surface runway(s) only (runways shown when zoomed in)
	Airport with fuel
	Seaplane base
	Intersection
	VOR
	VOR/DME
	NDB
	Localizer

Map Page

The second **NAV** page, the **Map** page, displays your current position (an airplane symbol in the center of the screen), along with nearby airports, navigation aids, airspace boundaries, lakes, and coastlines. Whereas the **Default NAV** page is oriented with the current GPS track up, the **Map** page is oriented with north up.



The **Map** offers 20 scale settings, ranging from 500 feet to 500 nm. The GPS receiver indicates the scale on the left side of the map display; this represents the top-to-bottom distance covered by the map display.

To adjust the map scale

- Press the up arrow on the **RNG** button (the **OUT** button on the GPSMAP 295) to zoom out to a larger area.
-or-
- Press the down arrow on the **RNG** button (the **IN** button on the GPSMAP 295) to zoom in to a smaller area.

You can add terrain to the map display to more easily visualize your position relative to the surrounding terrain.

To add a graphical depiction of the terrain to the Map page

- Press the **TERR** button. Press the **TERR** button again to remove the terrain.

You can also quickly remove items from the map, to make it easier to see only what you need.

To declutter the map display

- Press the **CLR** button (the **QUIT** button on the GPSMAP 295) repeatedly to select the desired amount of map detail: all details; no Class B or C airspace; no nav aids; no airports. Waypoints in an active flight plan are always shown.
Remember that pressing and holding the button will return you to the **Default NAV** page.

Along the left side of the page, the GPS unit displays the same data fields as on the **Default NAV** page. (See the Default NAV Page section for more details.)

Waypoint Page Group

The Waypoint (**WPT**) page group provides information for the thousands of airports, VORs, NDBs, intersections, runways, frequencies, and procedures stored in the Flight Simulator navigation database.

To select a WPT page

1. From any page, press and hold the **CLR** button (the **QUIT** button on the GPSMAP 295) to select the **Default NAV** page.
2. Rotate the **large knob** to select the **WPT** page group. **WPT** will appear in the lower right corner of the screen.
3. Rotate the **small knob** to select the desired WPT page.

The **WPT** page group includes seven pages. While viewing any WPT page, rotate the **small knob** to select a different WPT page. The first four pages provide detailed information for the selected airport: location, runways, frequencies, and approaches. The last three pages provide information for intersections, NDBs, and VORs.

Note: To view a different WPT page, the on-screen cursor must not be visible. Press the **CRSR** button to remove the cursor, if necessary. Rotate the **small knob** to select the desired WPT page.

After you select a WPT page, you can view information for a waypoint by entering the identifier (or name) of the desired waypoint.

To enter a waypoint identifier

1. Select the desired WPT page and press the **CRSR** button to activate the cursor.
2. Rotate the **small knob** to select the first character of the waypoint's identifier.

3. Rotate the **large knob** to select the next character field.
 4. Rotate the **small knob** to select the desired character.
 5. Repeat steps 3 and 4 until the identifier is selected, then press the **ENT** button.
 6. To remove the flashing cursor, press the **CRSR** button.
- Note:** Instead of steps 3, 4, and 5 above, you can type the identifier on your keyboard.

Duplicate Waypoints

As you enter an identifier, the GPS receiver will scroll through the database, displaying those waypoints matching the characters you have entered to that point. If duplicate entries exist for an entered identifier, a duplicate waypoint page will appear once you select the identifier by pressing the **ENT** button. All waypoints with the same identifier are listed, along with their country codes. Use the **large knob** to scroll through the list.



The Duplicate Waypoints page

To select a waypoint identifier from a list of duplicates

1. Select the desired airport or navigation aid identifier. A **Duplicate Waypoints** window will appear.
2. Rotate the **large knob** to select the desired waypoint and press the **ENT** button.
3. To remove the flashing cursor, press the **CRSR** button.

Airport Location Page

The Airport Location page displays the latitude, longitude, and elevation of the selected airport. The Airport Location page also displays facility name and location, as well as fuel availability, and the best available instrument approach. The GPS display uses the following descriptions and abbreviations:

- **Type:** Usage type (public, military, or private)
- **Position:** Latitude/Longitude
- **Elevation:** In feet
- **Fuel:** Fuel available (AvGas and/or jet)
- **Approach:** Best available approach: **ILS, MLS, LOC, LDA, SDF, GPS, VOR, RNAV (RNV), LORAN (LOR), NDB, or TACAN (TCN)**



The Airport Location page

Finding the Desired Airport

The Flight Simulator GPS receivers use ICAO identifiers for all airports. All United States airport identifiers that contain only letters (except Alaska and Hawaii) use the prefix "K". For example, Los Angeles International is KLAX under the ICAO standard. Other airports that contain numbers in the identifier, such as Otten Memorial (3VS), do not require the "K" prefix. Alaska, Hawaii and many countries use two letter prefixes; different countries use different prefixes.

If you encounter difficulty when selecting an airport, try retrieving the desired airport using the facility name. (This only works on the Airport Location page; it will not work when searching for NDBs or VORs.)

Airport Runway Page

The **Airport Runway** page displays runway designations, length, and surface type for the selected airport. The GPS unit also displays a map image of the runway layout and surrounding area on the Airport Runway page. The map image scale appears in the lower left corner and is adjustable using the **RNG** button. For airports with multiple runways, information for each runway is available.



The Airport Runway page showing a list of available runways

To display information for each additional runway

1. Press the **CRSR** button to activate the cursor.
2. Rotate the **large knob** to place the cursor on the **Runway** field.
3. Rotate the **small knob** to display a window listing all runways for the selected airport.
4. Continue rotating the **small knob** to select the desired runway.

5. Press the **ENT** button to display information for the selected runway on the **Airport Runway** page.
6. To remove the flashing cursor, press the **CRSR** button.

To adjust the scale of the airport map image

1. Press the down-arrow side of the **RNG** button (or the **IN** button on the GPSMAP 295) to display a smaller map area.
2. Press the up-arrow side of the **RNG** button (or the **OUT** button on the GPSMAP 295) to display a larger map area.

The **Airport Runway** page notes the following runway surface types: concrete, asphalt, grass, turf, dirt, coral, gravel, oil, steel, bituminous, brick, macadam, planks, sand, shale, tarmac, snow, ice, and water.

Airport Frequency Page

The **Airport Frequency** page displays radio frequencies and frequency types for the selected airport. If the selected airport has a localizer-based approach, the page also lists the localizer frequency. The Airport Frequency page may be used for reference to tune external COM or VOR/ILS frequencies.



The Airport Frequency page

To view a desired frequency

1. Press the **CRSR** button to activate the cursor.
2. Rotate the **large knob** to scroll through the list, placing the cursor on the desired frequency.
If there are more frequencies in the list than the GPS unit can display on the screen, a scroll bar along the right-hand side of the screen will indicate where you are within the list.
3. Manually enter the selected frequency in the external COM transceiver or VOR/ILS receiver.
4. To remove the flashing cursor, press the **CRSR** button.

Some listed frequencies may include designations for **TX** (transmit only) or **RX** (receive only).

Tip: Instead of manually entering a desired frequency from the Airport Frequency page into the Comm 1 or Nav 1 radio, you can simply highlight the facility name (for example, "Tower") and then press the **ENT** button. The GPS receiver will automatically enter the frequency into the standby side of the Comm 1 radio.

The GPS display uses the following terminology on the **Airport Frequency** page:

Communication frequencies:

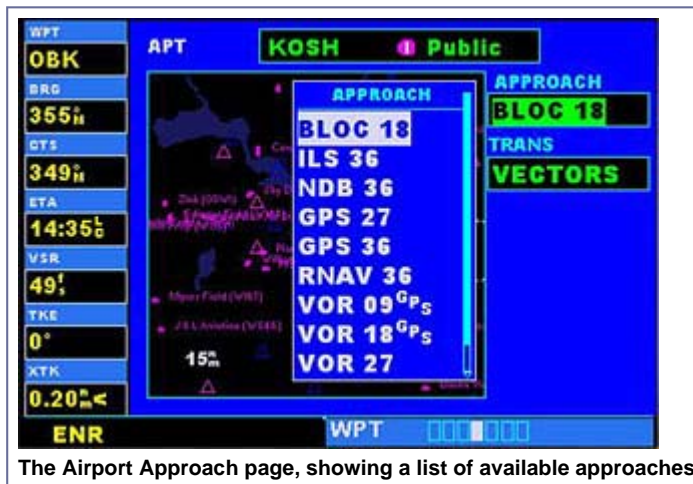
- Approach
- ATIS, ASOS, AWOS
- Unicom
- Multicom
- Clearance
- Ground
- Tower
- Departure
- FSS

Navigation frequencies:

- ILS
- LOC

Airport Approach Page

The **Airport Approach** page shows the available approach procedures for the selected airport. Where multiple initial approach fixes (IAFs) and feeder routes are available, the GPS may also display that information. A map image provides a layout diagram for each approach and transition.



The Airport Approach page, showing a list of available approaches

To scroll through the available approaches and transitions

1. Press the **CRSR** button to activate the cursor.
2. Rotate the **large knob** to place the cursor on the **APPROACH** field.
3. Rotate the **small knob** to display a window of available approaches for the selected airport.
4. Continue rotating the **small knob** to select the desired approach.
5. Press the **ENT** button. The cursor will move to the transitions (**TRANS**) field.
6. Rotate the **small knob** to display a window of available transitions.
7. Continue rotating the **small knob** to select the desired transition
-or-
Select **VECTORS** for guidance only along the final course segment of the approach.
8. Press the **ENT** button.
9. To remove the flashing cursor, press the **CRSR** button.

Note: Not all approaches in the Flight Simulator database are approved for **GPS** use. As you select an approach, a GPS designation to the right of the procedure name indicates the procedure can be flown using the GPS receiver. Some procedures will not have this designation, meaning the GPS receiver may be used for supplemental navigation guidance only. ILS approaches, for example, must be flown by tuning

the external VOR/ILS receiver to the proper frequency and following the external CDI (or HSI) for guidance.

Intersection Page

The **Intersection** page displays the latitude, longitude, and region code for the selected intersection. The **Intersection** page also displays the identifier, radial, and distance from the nearest VOR or VOR/DME. The following descriptions and abbreviations are used:

- **Position:** Latitude/Longitude (degrees/minutes or degrees/minutes/seconds)
- **RAD:** Radial from nearest VOR, in degrees magnetic
- **DIS:** Distance from nearest VOR, in nautical miles




The Airport Intersection page

Note: The VOR displayed on the **Intersection** page is the nearest VOR, not necessarily the VOR used to define the intersection.

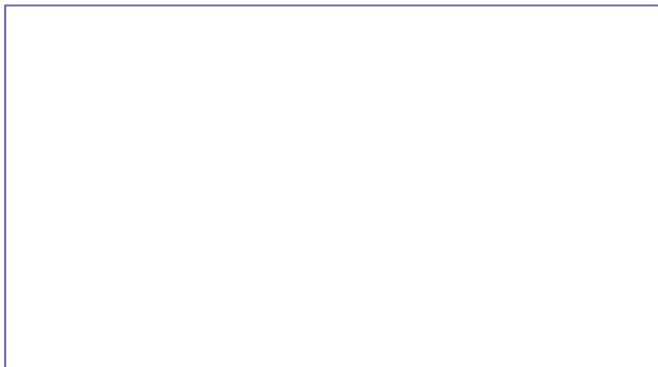
Intersections may only be selected by identifier.

NDB Page

The NDB page displays the facility name, city, region/country, latitude, and longitude for the selected NDB. The NDB page also displays the frequency. The GPS uses the following descriptions and abbreviations:

- **Symbol:**  (NDB)
- **Position:** Latitude and longitude
- **FREQ:** Frequency, in kilohertz (kHz)

NDBs may only be selected by identifier.





The NDB page

Note: Instead of manually entering a desired frequency from the **NDB** page into the ADF radio, you can simply highlight the frequency and then press the **ENT** button. The GPS will automatically enter the frequency into the ADF radio.

VOR Page

The **VOR** page displays the facility name, city, region code, magnetic variation, latitude, and longitude for the selected VOR. The VOR page also displays the frequency. The GPS uses the following descriptions and abbreviations:

- **Symbol:** (VOR) or (VOR DME)
- **VAR:** Magnetic variation, in degrees
- **Position:** Latitude and longitude
- **FREQ:** Frequency, in megahertz (MHz)

VORs may only be selected by identifier.



The VOR page

Note: Instead of manually entering a desired frequency from the **VOR** page into the Nav 1 radio, you can simply highlight the frequency and then press the **ENT** button. The GPS will automatically enter the frequency into the standby side of the Nav 1 radio.

Nearest Page Group

The Nearest page group (**NRST**) provides detailed information for the nine nearest airports, VORs, NDBs, and

intersections within 200 nm of your current position.

To select a NRST page

1. From any page, press the **NRST** button to select the **Nearest Airport** page.
-or-
Rotate the **large knob** all the way to the right to select the **NRST** page group.
NRST will appear in the lower right corner of the screen.
2. Rotate the **small knob** to select the desired **NRST** page.

The GPS cannot display all nine of the nearest airports, VORs, NDBs, or intersections on the corresponding **NRST** page at once. The **Nearest Airport** page displays detailed information for the five nearest airports, with a scroll bar along the right hand side of the page indicating which part of the list is currently displayed. The **NRST** pages for VORs, NDBs, intersections, and user waypoints will display nine waypoints at a time. Use the flashing cursor and **large knob** to scroll and view the rest of the waypoints or airspace in the list.

To scroll through the list of nearest airports, VORs, NDBs, or intersections

1. Select the desired **NRST** page, using the steps outlined above.
2. Press the **CRSR** button to activate the cursor.
3. Rotate the **large knob** to scroll through the list.
The scroll bar along the right-hand side of the page will indicate which part of the list is currently being displayed.
4. Press the **CRSR** button to remove the flashing cursor.

Navigating to a Nearby Waypoint

The **NRST** pages can be used in conjunction with the direct-to function to quickly set a course to a nearby facility. This feature can be a real time saver compared to retrieving information from the database using the **WPT** pages. More importantly, it instantly provides navigation to the nearest airport in case of an in-flight emergency.

To select a nearby airport, VOR, NDB, intersection or user waypoint as a direct-to destination

1. Use the flashing cursor to scroll through a **NRST** page list and highlight the desired nearest waypoint, as explained above.
2. Press the **Direct-to** button to display the **Select Direct-to Waypoint** page.
3. Press the **ENT** button to accept the selected waypoint's identifier and press the **ENT** button a second time (with **Activate?** highlighted) to begin navigating to the selected waypoint.

Nearest Airport Page

The **Nearest Airport** page displays the identifier, symbol, and bearing of the nine nearest airports (within 200 nm of your current position), as well as the distance to each airport. For each airport listed, the **Nearest Airport** page also indicates the bearing to the airport, the distance, the best available approach, the common traffic advisory frequency (CTAF), and the length of the longest runway.



WPT	NEAREST AIRPORT			
0BK	APT	BRG	DIS	APR
BRG	KPWK	137 ^M	2.5 ^N	ILS
355 ^M	twr	119.900	rwpy	5001 ^f
CTS	KORD	172 ^M	10.0 ^N	ILS
349 ^M	twr	120.750	rwpy	12996 ^f
ETA	IL68	249 ^M	10.5 ^N	
14:35 ^L		000.000	rwpy	2500 ^f
VSR	LL09	321 ^M	10.6 ^N	
49 ^f		000.000	rwpy	2000 ^f
TKE	06C	219 ^M	11.7 ^N	
0°				
XTK				
0.20 ^N <				
ENR	NRST			

The Nearest Airport page

You can also use the **Nearest Airport** page to quickly find the communication frequencies at a nearby airport for manually tuning the external COM transceiver.

Additional communication frequencies, runway information, and other details are available from the **Nearest Airport** page by highlighting the identifier of the desired airport and pressing the **ENT** button.

To view additional information for a nearby airport

1. Select the **Nearest Airport** page.
2. Press the **CRSR** button to activate the cursor.
3. Rotate the **large knob** to scroll through the list, highlighting the identifier of the desired airport.
4. Press the **ENT** button to display the **Airport Location** page for the selected airport.
5. To view additional **WPT** pages for the selected airport (including the **Airport Runway** and **Airport Frequency** pages) press the **CRSR** button to remove the flashing cursor.
6. Rotate the **small knob** to display the additional WPT pages.
7. When finished, press the **CRSR** button to return the flashing cursor to the screen.
8. To return to the **Nearest Airport** page, press the **NRST** button.

Nearest Intersection Page

The **Nearest Intersection** page displays the identifier, symbol, and bearing of the nine nearest intersections (within 200 nm of your current position), as well as the distance to each intersection.

WPT	NEAREST INTERSECTION		
0BK	INT	BRG	DIS
BRG	CUTEY	356 ^M	3.3 ^N
355 ^M	CHIKO	356 ^M	3.4 ^N
CTS	JAMIG	068 ^M	4.6 ^N
349 ^M	OXULY	210 ^M	4.9 ^N
ETA	LEAMA	207 ^M	5.0 ^N
14:35 ^L	PLUNC	262 ^M	5.4 ^N
VSR	IFCUH	267 ^M	5.7 ^N
49 ^f	ROLGE	084 ^M	6.0 ^N
TKE	EPEHI	210 ^M	6.1 ^N
0°			
XTK			
0.20 ^N <			
ENR	NRST		

The Nearest Intersection page

To view additional information for a nearby intersection

1. Select the **Nearest Intersection** page.
2. Press the **CRSR** button to activate the cursor.
3. Rotate the **large knob** to scroll through the list, highlighting the identifier of the desired intersection.
4. Press the **ENT** button to display the intersection page for the selected intersection.
5. To return to the **Nearest Intersection** page, press the **NRST** button.

Nearest NDB Page

The **Nearest NDB** page displays the identifier, symbol, and frequency of the nine nearest NDBs (within 200 nm of your current position), as well as the bearing and distance to each NDB.

WPT		NEAREST NDB			
OBK	BRG	NDB	BRG	DIS	FREQ
355 ^M		OH	207 ^M	5.0 ^N	368.0
		OR	210 ^M	6.1 ^N	394.0
349 ^M		ME	201 ^M	11.3 ^N	350.0
		ME	201 ^M	11.3 ^N	350.0
14:35 ^L		IA	146 ^M	11.8 ^N	414.0
		UG	019 ^M	20.1 ^N	379.0
49 ^I		EN	352 ^M	25.2 ^N	389.0
		HK	171 ^M	26.0 ^N	332.0
0°		MX	156 ^M	26.7 ^N	248.0
0.20 ^M <					
ENR		NRST			

The Nearest NDB page

To view additional information for a nearby NDB

1. Select the **Nearest NDB** page.
2. Press the **CRSR** button to activate the cursor.
3. Rotate the **large knob** to scroll through the list, highlighting the identifier of the desired NDB.
4. Press the **ENT** button to display the intersection page for the selected NDB.
5. To return to the **Nearest NDB** page, press the **NRST** button.

Nearest VOR Page

The **Nearest VOR** page displays the identifier and symbol of the nine nearest VORs (within 200 nm of your current position), as well as the bearing and distance to each VOR. For each VOR listed, the **Nearest VOR** page also indicates the frequency of the nearby VOR for reference in tuning a VOR receiver.

WPT	NEAREST VOR			
OBK	VOR	BRG	DIS	FREQ
BRG	OBK	355 ^M	4.6 ^N	113.00
355 ^M	ORD	171 ^M	9.6 ^N	113.90
CTS	DPA	231 ^M	23.8 ^N	108.40
349 ^M	ENW	002 ^M	27.3 ^N	109.20
ETA	BUU	335 ^M	36.4 ^N	114.50
14:35 ^L	HRK	010 ^M	37.5 ^N	117.70
VSR	JOT	206 ^M	39.7 ^N	112.30
49 ^I	CGT	157 ^M	41.5 ^N	114.20
TKE	EON	174 ^M	52.9 ^N	113.20
0°				
XTK				
0.20 ^N <				
ENR	NRST			

The Nearest VOR page

To view additional information for a nearby VOR

1. Select the **Nearest VOR** page.
2. Press the **CRSR** button to activate the cursor.
3. Rotate the **large knob** to scroll through the list, highlighting the identifier of the desired VOR.
4. Press the **ENT** button to display the intersection page for the selected VOR.
5. To return to the **Nearest VOR** page, press the **NRST** button.

Nearest Airspace Page

The last page in the **NRST** group, the **Nearest Airspace** page, will alert you to as many as nine controlled or special-use airspaces near or in your flight path. Alerts are provided according to the following conditions:

- If your projected course will take you inside a controlled or special-use airspace within the next ten minutes, the **Airspace ahead—less than 10 minutes** alert will appear. The **Nearest Airspace** page will show the airspace as **Ahead**.
- If you are within two nautical miles of a controlled or special-use airspace and your current course will take you inside that airspace, the message **Airspace near and ahead** will appear. The **Nearest Airspace** page will show the airspace as **Ahead < 2nm**.
- If you are within two nautical miles of a controlled or special-use airspace and your current course will not take you inside, the message **Near airspace less than 2nm** will appear. The **Nearest Airspace** page will show **Within 2nm of airspace**.
- If you have entered a controlled or special-use airspace, the message **Inside Airspace** will appear. The **Nearest Airspace** page will show **Inside of airspace**.

WPT	NEAREST AIRSPACE	
OBK	CHICAGO	
BRG	Inside of airspace	
CTS	CHICAGO	
343 ^M	Inside of airspace	
ETA	CHICAGO	
14:36 ^L	Ahead	2:18
VSR	CHICAGO	
18 ^I	Within 2nm of airspace	
TKE	CHICAGO	
-6°		
XTK		
0.19 ^N <		
ENR	MSG	NRST

The Nearest Airspace page

Note that the airspace alerts are based on three-dimensional data (latitude, longitude, and altitude) to avoid nuisance alerts. The alert boundaries for controlled airspace are also divided into sectors to provide complete information on any nearby airspace. Once one of the described conditions exists, the message annunciator above the **MSG** button will flash, alerting you of an airspace message. An altitude buffer of 200 feet is included to provide an extra margin of safety above and below the published limits.

To view an airspace alert message (GPS 500 only)

1. When the message annunciator (**MSG**) above the **MSG** button flashes, press the **MSG** button.
2. The message will display.
3. Press the **MSG** button again to dismiss the message.

Once you have been provided an airspace alert message, detailed information concerning the specific airspace can be viewed on the Nearest Airspace page. The **Nearest Airspace** page displays the airspace name, status (**Ahead**, **Ahead < 2nm**, etc. as described on the previous page), and an estimated time to entry (if applicable).

If you're distracted by near-constant flashing of the message annunciator when flying in an area with lots of controlled airspace, it's easy to temporarily disable the airspace alert messages.



To disable airspace alert messages (GPS 500 only)

1. Press and hold the **MSG** button for two seconds.
2. "OFF" will display in the message annunciator space above the **MSG** button.
3. Press the **MSG** button again to re-enable airspace alert messages.

Direct-To Navigation

The GPS's direct-to function provides a quick method of setting a course to a destination waypoint. Once a direct-to is activated, the GPS will establish a point-to-point (great circle) course line from your current position to the selected direct-to destination. Navigation data on the various **NAV** pages will provide steering guidance until the direct-to is replaced by a new destination.



The Select Direct-to Waypoint page

To select a direct-to destination

1. Press the **Direct-to** button.
The **Select Direct-to Waypoint** page will appear, with the waypoint identifier field highlighted.
2. Use the **small and large knobs** to enter the identifier of the desired destination waypoint.
(The **large knob** moves the cursor; the **small knob** dials letters and numbers.)
3. Press the **ENT** button once to confirm the selected waypoint, and again to activate the direct-to function.
Note: After you've turned the small knob to highlight the first letter, you can type the identifier on your keyboard.

If you're navigating to a waypoint using direct-to and get off course, the direct-to function may also be used to re-center the CDI needle and proceed to the same waypoint.

To recenter the CDI needle to the same destination waypoint

- Press the **Direct-to** button, followed by the **ENT** button twice.

Note: If you're navigating an approach with the missed approach point (MAP) as the current destination, recentering the CDI needle with the Direct-to button will cancel the approach.

Selecting a Destination by Facility Name

In addition to selecting a destination by identifier, the Select Direct-to Waypoint page also allows you to select airports, VORs, and NDBs by facility name. If the database includes duplicate entries for the facility name or city you enter, you can view additional entries by continuing to rotate the small right knob during the selection process.



Selecting a destination by facility name

To select a direct-to destination by facility name

1. Press the **Direct-to** button.
The **Select Direct-to Waypoint** page will appear, with the waypoint identifier field highlighted.
2. Rotate the **large knob** to highlight the facility name (second line in the figure above) or the city field (third line).
3. Use the **small and large knobs** to enter the facility name of the desired destination waypoint.
As you spell the facility name, the GPS will select the first entry in the database based upon the characters you have entered up to that point.
4. Continue rotating the small right knob to scroll through any additional database listings for the selected facility

5. name or city. You can also scroll backwards with the small right knob if you scroll past the desired waypoint. Press the **ENT** button once to confirm the selected waypoint, and again to activate the direct-to function.
Note: After you've turned the small knob to highlight the first letter, you can type the facility name on your keyboard.

Selecting a Destination from the Active Flight Plan

If you're navigating an active flight plan, you can select any waypoint contained in the flight plan as a direct-to destination from the **Select Direct-to Waypoint** page. (See Active Flight Plan Page below for more information on flight plans.)



Selecting a destination from the active flight plan

To select a direct-to destination from the active flight plan

1. Press the **Direct-to** button.
The **Select Direct-to Waypoint** page will appear, with the waypoint identifier field highlighted.
2. Rotate the **large knob** to highlight the flight plan (**FPL**) field.
3. Rotate the **small knob** to display a window showing all waypoints in the active flight plan.
4. Continue rotating the **small knob** to scroll through the list and highlight the desired waypoint.
5. Press the **ENT** button once to confirm the selected waypoint, and again to activate the direct-to function.

Selecting the Nearest Airport as a Direct-to Destination

The **Select Direct-to Waypoint** page always displays the nearest airports (to your current position) on the NRST field. Navigating directly to a nearby airport is always just a few simple steps away.





Selecting a destination from the active flight plan

To select a nearby airport as a direct-to destination

1. Press the **Direct-to** button.
The **Select direct-to waypoint** page will appear, with the waypoint identifier field highlighted.
2. Rotate the **large knob** to highlight the nearest airport (**NRST**) field.
3. Rotate the **small knob** to display a window showing as many as nine nearby airports.
4. Continue rotating the **small knob** to scroll through the list and highlight the desired airport.
5. Press the **ENT** button once to confirm the selected waypoint, and again to activate the direct-to function.

Direct-To Shortcuts

Shortcuts are available when using the **Direct-to** button, allowing you to bypass the use of the **small and large knobs** to enter the destination waypoint's identifier. You can perform a direct-to from any page displaying a single waypoint identifier (such as the **WPT** pages for airports and navigation aids) by simply pressing the **Direct-to** button and then the **ENT** button twice. For pages that display a list of waypoints (e.g., the **Nearest Airport** page), you must highlight the desired waypoint with the cursor before pressing the **Direct-to** button.

To select an on-screen waypoint as a direct-to destination

If a single airport, navigation aid, or user waypoint is displayed:

1. Press the **Direct-to** button.
2. Press the **ENT** button twice.

-or-

If a list of waypoints is displayed:

1. Press the **CRSR** button to activate the cursor.
2. Rotate the **large knob** to highlight the desired waypoint.
3. Press the **Direct-to** button.
4. Press the **ENT** button twice.

Active Flight Plan Page

If you create a VFR or IFR flight plan using the Flight Planner, Flight Simulator will automatically load the flight plan into the GPS and activate the plan for use in navigation. (For more information, see [Using the Flight Planner](#).)

The **Active Flight Plan** page provides information for the active flight plan (or direct-to).

To select the Active Flight Plan page

- Press the **FPL** button.

Note: You cannot create flight plans in the Flight Simulator GPS. Instead, use the Flight Simulator Flight Planner. The flight plan will automatically be loaded into the GPS and activated for use. You can, however create a "direct-to" to a destination.



ACTIVE FLIGHT PLAN				
00 KORD to KOSH				
WAYPOINT	DTK	DIS	CUM	
KORD				
OBK	358 ^M	5 ^M	5 ^M	
WIPED	346 ^M	32 ^M	36 ^M	
BONOT	346 ^M	9 ^M	45 ^M	
BAE	346 ^M	15 ^M	60 ^M	
EDENN	348 ^M	34 ^M	95 ^M	
KOSH	348 ^M	19 ^M	114 ^M	

The Active Flight Plan page

With an activated direct-to or flight plan loaded, the **Active Flight Plan** page will show each waypoint for the flight plan (or a single waypoint for a direct-to), along with the desired track (**DTK**), distance (**DIS**) for each leg, and cumulative distance (**CUM**).

You can select any leg within the active flight plan as the active leg (the leg which will currently be used for navigation guidance), using the **MENU** button.

To activate a specific leg of the active flight plan

- From the **Active Flight Plan** page, press the **CRSR** button to activate the cursor.
- Rotate the **large knob** to highlight the desired destination waypoint.
- Press the **MENU** button, select the "Activate Leg?" option, and press the **ENT** button. (GPS 500 only)
-or-
Press the **Direct-to** button twice. (GPS 500 and GPS 295)
A confirmation window will appear.
- With **Activate?** highlighted, press the **ENT** button.

During instrument procedures, you can use this feature not only to activate a specific point-to-point leg, but also to activate the procedure turn portion of an approach, follow a DME arc, or activate a holding pattern.

You can review any approach on the **Airport Approach** page in the WPT page group. (For more information, see the Waypoint Page Group section.)

Procedures Page

The Flight Simulator GPS units allow you to fly nonprecision approaches to airports with published instrument approach procedures. Display the **Procedures** page by pressing the **PROC** button. The **Procedures** page provides direct access to approaches based upon the active flight plan or direct-to destination. In either case, the destination airport must have published procedures associated with it.

To select the Procedures page

- Press the **PROC** button.



The Procedures page

To select an approach

1. Press the **PROC** button to display the **Procedures** page.
2. Rotate the **large knob** to highlight **Select Approach?** and press the **ENT** button.
A window will appear listing the available procedures.
3. Rotate the **large knob** to highlight the desired approach and press the **ENT** button.
A second window will appear listing the available transitions.
4. Rotate the **large knob** to highlight the desired transition waypoint and press the **ENT** button.
(The **Approach Vectors** option assumes you will receive vectors to the final course segment of the approach and will provide navigation guidance relative to the final approach course.)
5. Rotate the **large knob** to highlight **Load?** or **Activate?** and press the **ENT** button.
Load? will add the approach to the flight plan without immediately using it for navigation guidance. This allows you to continue navigating the original flight plan, but keeps the procedure available on the **Active Flight Plan** page for quick activation when needed.

To activate a departure or arrival, follow the steps later in this section.



Selecting an approach on the Procedures page

Note: Not all approaches in the database are approved for **GPS** use. As you select an approach, a GPS designation to the right of the procedure name indicates the procedure can be flown using the GPS receiver. Some procedures will not have this designation, meaning the GPS receiver may be used for supplemental navigation guidance only. ILS approaches, for example, must be flown by tuning the external VOR/ILS receiver to the proper frequency and using the external CDI (or HSI) for guidance.

If you're flying a GPS approach, or a nonprecision approach approved for GPS, and you plan on using the aircraft's VOR 1 indicator to fly the approach, make sure the **Nav/GPS** switch on the aircraft instrument panel is set to **GPS**. If, however, you want to fly the approach using data from the Nav 1 radio, and plan to use the GPS only for situational awareness, then make sure the **Nav/GPS** switch is set to **NAV**.

Once you select an approach, you may activate it for navigation from the **Procedures** page. Activating the approach overrides the en route portion of the active flight plan, proceeding directly to the approach portion (for a full approach, directly to the initial approach fix). Activating the approach also initiates automatic CDI scaling transition as the approach progresses.



Activating an approach on the Procedures page

To activate a previously loaded approach

1. Press the **PROC** button to display the **Procedures** page.
2. Rotate the **large knob** to highlight **Activate Approach?**
3. Press the **ENT** button.

Another **Procedures** page option allows you to activate the final course segment of the approach. This option assumes you will receive vectors to the final approach fix (FAF) and guides you to intercept the final course, before reaching the FAF.

To activate the previously loaded approach, with vectors to final

1. Press the **PROC** button to display the **Procedures** page.
2. Rotate the large right knob to highlight **Activate Vectors-To-Final?**
3. Press the **ENT** button.

In many cases, it may be easiest to load the full approach while still some distance away, en route to the destination airport. Later, if vectored to final, use the steps above to select **Activate Vectors-To-Final**—which makes the inbound course to the FAF waypoint active. Otherwise, activate the full approach using the **Activate Approach?** option.

Basic Approach Operations

The Flight Simulator GPS units provide nonprecision approach guidance. The GPS receiver can also be used as a supplemental aid for precision approaches and nonprecision localizer-based approaches, but external localizer and glide slope receivers **must** be used for primary approach course guidance.

Approaches designed specifically for GPS are often very simple and don't require overflying a VOR or NDB. Currently, many nonprecision approaches have GPS overlays to let you fly an existing procedure (VOR, VOR/DME, NDB, RNAV, and so forth.) more accurately using GPS.

Many overlay approaches are complex in comparison to GPS-only approaches. The GPS displays and guides you through each leg of the approach—automatically sequencing through each of these legs, including the missed approach procedure. Approaches may be flown "as published" with the full transition—using any published feeder route or initial approach fix (IAF)—or may be flown with a vectors-to-final transition.

To fly a typical approach using the GPS

1. Prior to departing, select the destination using the **Direct-to** button
-or-
Create a flight plan using the Flight Planner.
2. While en route, ATC will inform you which approach to expect.
(You can choose another if you'd like).
3. Press the **PROC** button and choose the **Select Approach?** option.
4. Load the expected approach (often while en route) in anticipation of its future use.
This places the approach in the active flight plan, but retains course guidance in the en route section until the approach is activated.
5. Activate the full approach or vectors-to-final approach, as appropriate.
In some scenarios, you may find it more convenient to immediately activate the approach and skip the load process.

Points to Remember for All Approaches

1. The GPS is designed to complement your printed approach plates and vastly improve situational awareness throughout the approach. However, *you must always fly an approach as it appears on the approach plate.*
2. The active leg (or the portion of the approach currently in use) is depicted in magenta on the Map page. As you fly the approach, the GPS will automatically sequence through each leg of the approach.
3. The published missed-approach course is shown as a dotted white line extending beyond the missed approach point (MAP). As you pass the MAP, the GPS will sequence to the first missed approach waypoint. Land, or fly the published missed approach procedure.

Approaches with Procedure Turns

The GPS stores the procedure turn portion of an approach as one of the legs of the approach. For this reason, the GPS requires no special operations from the pilot—other than flying the procedure turn itself—beyond what is required for any other type of approach.

To fly the procedure turn

1. Within 30 nm of the destination airport, the GPS will switch from **en route** mode to **terminal** mode (as indicated in the lower left corner of the screen), and the course deviation indicator (CDI) scale will transition from a 5.0 to 1.0 nm full scale deflection.
2. Several miles prior to reaching the initial approach fix (IAF), you may wish to review the approach sequence.
 - Press the **FPL** button to display the **Active Flight Plan** page.
 - Press the **CRSR** button and Rotate the **large knob** to review each segment of the approach.
 - When finished, press the **FPL** button again to return to the previous page.
3. As you approach the IAF, dial the outbound course into the aircraft's CDI (or HSI) using the OBS knob and initiate a standard rate turn to this course heading.
4. Fly the outbound course, keeping the CDI needle centered.
5. After approximately 90 seconds, turn 45 degrees left or right (as indicated on chart or GPS) to initiate the procedure turn.
The Flight Simulator GPS receivers will provide course guidance relative to the outbound leg from the FAF, and through the procedure turn itself. (The GPS will display

the procedure turn on the **Map** page, and will indicate the procedure turn as the active leg on the **Default NAV** and **Active Flight Plan** pages.) The CDI needle will start moving to the right.

6. After approximately one minute, make a 180-degree right turn to intercept the inbound course.
The GPS will sequence to the inbound leg to the FAF, and the CDI needle will swing to the opposite side to provide proper sensing along the final course segment.
7. As the CDI needle starts to center, make a right turn to the final approach course.
8. Within 10 nm of the airport, the GPS will switch from **terminal** mode to **approach** mode.
CDI scaling will be tightened from 1.0 to 0.3 nautical mile, full scale deflection.
9. As you approach the FAF, make any course adjustments necessary for the final course segment (FAF to MAP).
10. As you cross the FAF, the destination sequences to the MAP (for example, **RW04**, the runway threshold).
11. With the needle centered, fly toward the MAP, observing the altitude minimums indicated by the approach plate.
12. As you pass the MAP, the GPS will sequence to the first missed approach waypoint.
13. Land, or fly the published missed approach procedure.

Missed Approaches

After you pass the MAP, you must execute a missed approach if the runway isn't in sight. As you pass the MAP, the GPS will sequence to the first waypoint in the published missed approach, and then to each missed approach waypoint in sequence, including taking you through the hold.



Flying a missed approach

To initiate and fly the missed approach procedure

1. Follow the missed approach procedures, as published on your approach plate, for proper climb and heading instructions.
The GPS will guide you through the published procedure to the holding pattern, and will provide course guidance through the holding pattern, including a modified entry.
2. When leaving the holding pattern to refly the approach (or another approach), press the **PROC** button to **Select Approach?** or **Activate Approach?** as previously described.
-or-
Use the **Direct-to** button to select another destination.

Approaches with a Hold

If an approach begins with a holding pattern, the GPS can make simple work of it.



Flying an approach with a hold

To fly an approach with a hold

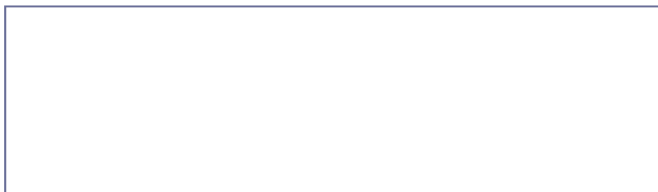
1. Within 30 nm of the airport, the GPS will switch from **en route** mode to **terminal** mode, and the CDI scale will transition from 5.0 to 1.0 nm, full scale deflection.
2. The GPS will display the holding pattern on the **Map** page, and indicate the holding pattern as the active leg on the **Default NAV** and **Active Flight Plan** pages.
3. The GPS will provide course guidance through the holding pattern, including a modified entry.
Note: If you need to lose extra altitude or speed by going around the holding pattern again, press the **OBS** button to manually suspend waypoint sequencing before crossing the holding waypoint the second time. If you've already passed this waypoint, reactivate the holding pattern on the **Active Flight Plan** page.
4. Within 10 nm of the airport, the GPS will switch from **terminal** mode to **approach** mode. CDI scaling will be tightened from 1.0 to 0.3 nautical mile, full scale deflection.
5. Make any course adjustments necessary for the final course segment (FAF to MAP).
6. As you cross the FAF, the GPS will sequence the destination to the MAP (for example, **RW21**, the runway threshold). With the needle centered, fly toward the MAP, observing the altitude minimums dictated by the approach plate.
7. As you pass the MAP, the GPS will sequence to the first missed approach waypoint.
8. Land, or fly the published missed approach procedure.

DME Arc Approaches

The GPS overlay for a DME arc approach uses additional [Jeppesen](#)-provided waypoints to define the arc. These waypoints are indicated by a **D** as the first letter in the waypoint name, followed by three numbers indicating the radial the waypoint lies on; the last letter indicates the radius of the arc.

When cleared for a DME arc approach, you may do either of the following to intercept the arc

- Follow a specified radial inbound to intercept the IAF.
- Follow ATC vectors which allow you to intercept the arc at any point along the arc.





Flying a DME Arc approach

To fly a DME arc approach

1. Within 30 nm of the destination, the GPS will switch from **en route** mode to **terminal** mode and the CDI scale will transition from 5.0 to 1.0 nm, full scale deflection.
2. If you haven't already activated the approach, be sure to do so when cleared for the approach.
3. If you plan on using the aircraft's VOR 1 indicator to fly the approach, make sure the **Nav/GPS** switch on the aircraft instrument panel is set to **GPS**.
-or-
If you want to fly the approach using data from the Nav 1 radio, and use the GPS just for situational awareness, then make sure the **Nav/GPS** switch is set to **Nav**.
4. Follow the arc, keeping the CDI needle centered.
5. The next point in the approach is probably an intermediate fix. When the fix becomes the active waypoint, initiate a standard rate turn toward it.
6. Within 10 nm of the airport, the GPS will switch from **terminal** mode to **approach** mode. CDI scaling will be tightened from 1.0 to 0.3 nautical mile, full scale deflection.
7. Turn to the final course segment (FAF to MAP) heading.
8. As you cross the FAF, the destination sequences to the MAP (for example, **RW22**, the runway threshold). With the needle centered, fly toward the MAP, observing the altitude minimums dictated by the approach plate.
9. As you pass the MAP, the GPS will sequence to the first missed approach waypoint.
10. Land, or fly the published missed approach procedure.

Vectors-to-Final Approaches

If ATC tells you to "expect vectors" onto the final approach course, there are several ways to select "vectors to final." The first two options below normally require the least effort.





Flying a Vectors-to-Final approach

To select vectors to final

- When the approach is first selected, choose **VECTORS** from the transitions (**TRANS**) window.

-or-

1. Load a full approach, including the IAF from the transitions window.
2. When cleared, press the **PROC** button and select **Activate Vectors-To-Final?**

-or-

1. Load the full approach.
2. On the **Active Flight Plan** page, highlight the desired leg of the approach, then press the **MENU** button.
3. Press the **ENT** button to activate the leg.

The GPS has no way of knowing how ATC will vector you, just that you will intercept the final approach course somewhere outside the FAF. Thus, with a vectors-to-final approach activated, the **Map** page will display an extension of the final approach course in magenta (remember, magenta is used to depict the active leg of the flight plan) and **VTF** will appear as part of the active leg on the **Default NAV** page (as a reminder that the approach was activated with vectors to final). The CDI needle will remain off center until you're established on the final approach course, and the GPS will sequence to the next leg (FAF to MAP) as you cross the FAF.

Note that during the vectoring phase of a vectors-to-final approach, all of the information displayed in the GPS data blocks (**DTK**, **DIS**, **CTS**, and so forth) references the FAF. The GPS doesn't know where you will intercept the final approach course, just that you will eventually reach the FAF.

Vectors to Final Using an Autopilot

To fly a vectors-to-final approach using an autopilot, be sure to use **Heading** mode, not **Nav** mode. ATC will vector you to the final approach course and you can follow these vectors by moving the heading bug. Once you intercept the final approach course, you can switch to **Nav** or **Approach** mode as appropriate. Set the **Nav/GPS** switch to GPS to have the **GPS** course displayed on the Nav 1 indicator (or HSI). Set the switch to **Nav** to manually follow a VOR, Localizer, or ILS course tuned on the Nav 1 radio.

- CDI scaling will be tightened from 1.0 to 0.3 nautical mile, full scale deflection.
7. As you cross the FAF, the destination sequences to the MAP (for example, **RW22**). With the needle centered, fly toward the MAP, observing the altitude minimums depicted on the approach plate.
 8. As you pass the MAP, the GPS will sequence to the first missed approach waypoint.
 9. Land, or fly the published missed approach procedure.

Frequently Asked Questions

How do I turn off the airspace alert messages on the GPS 500?

If you're distracted by near-constant flashing of the message annunciator when flying in an area with lots of controlled airspace, it's easy to temporarily disable the airspace alert messages. To disable airspace alert messages, press and hold the **MSG** button for two seconds. The message annunciator will display an **OFF** message in the space above the **MSG** button.

Press the **MSG** button again to re-enable airspace alert messages.

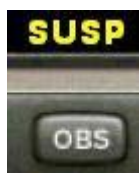


Can I connect the GPS to the Nav 1 indicator (or HSI) and/or an autopilot or flight director?

Yes. If you're flying a Flight Simulator aircraft featuring the GPS 500 (or the Bell 206B JetRanger III or the Extra 300S), there will be a **Nav/GPS** switch on the instrument panel. If you want the GPS to provide data to the Nav 1 indicator (or HSI) and the autopilot or flight director, make sure the **Nav/GPS** switch on the aircraft's instrument panel is in the **GPS** position. The Nav 1 indicator (or HSI) needle will indicate the course to follow to track the active flight plan or direct-to in the GPS, and the autopilot or flight director will follow this course when in **Nav** mode. (Remember to switch to **Heading** mode during the vectoring phase of a vectors-to-final approach.)

If the **Nav/GPS** switch is set to **Nav**, the needle will indicate the course to or from the VOR radial selected with the OBS, and tuned on the Nav 1 radio. The autopilot or flight director will follow that course. In this case, the GPS is just used for situational awareness.

What does the OBS button do and when do I use it? (GPS 500 only)



The **OBS** button is used to select automatic sequencing of waypoints. Pressing the **OBS** button holds your current 'active to' waypoint as your navigation reference and prevents the GPS from sequencing to the next waypoint. A **SUSP** message displays directly above the **OBS** button. When you cancel OBS mode, automatic waypoint sequencing resumes, and the GPS will automatically select the next waypoint in the flight plan once the aircraft has crossed the current active-to waypoint.

Why won't my GPS automatically sequence to the next waypoint?

The GPS will only sequence flight plan waypoints when automatic sequencing is enabled (that is, when there's no **SUSP** message directly above the **OBS** button). For automatic sequencing to occur, you must also cross the "bisector" of the turn you are navigating, and be within 10 nm of the active waypoint. The bisector is a perpendicular line between two flight plan legs which crosses through the waypoint common to both legs.

How do I skip a waypoint in an approach, departure, or arrival?

The GPS allows you to manually designate any approach, departure, or arrival leg as the active leg of your flight plan. From the **Active Flight Plan** page, highlight the desired waypoint and press the **MENU** button, then **ENT** to activate the leg. The GPS will then provide navigation along the selected flight plan leg, so be sure you have clearance to that position.

When does the CDI scale change, and what does it change to?

The GPS will begin a smooth CDI scale transition from 5.0-nm scale (**en route** mode) to 1.0-nm scale (**terminal** mode) when you reach a point 30 nm from the destination airport. The CDI scale will further transition to 0.3-nm scale (**approach** mode) within 10 nm of the airport during an active approach. The CDI scale will also be 1.0 nm (**terminal** mode) within 30 nm of the departure airport.

How do I reselect the same approach, or activate a new approach, after a missed approach?

After flying all missed approach procedures, you may reactivate the same approach from the **Procedures** page for another attempt. Once you have been given clearance for another attempt, activate the approach from the **Procedures** page by highlighting **Activate Approach?** and then pressing the **ENT** button. The GPS will provide navigation along the desired course to the waypoint and rejoin the approach in sequence from that point on.

To activate a new approach for the same airport, select the new procedure from the **Procedures** page.

To activate a new approach to a different airport, create a direct-to.

Note: Do not attempt to reactivate the same approach you're currently executing prior to crossing the missed approach point (MAP). If you attempt to do so, the GPS will direct you back to the transition waypoint and will not take into consideration any missed approach procedures.

Abbreviations and Terminology

Abbreviations

The GPS receivers use the following abbreviations:

ACTV:	active
ALT:	altitude
APR:	approach
APT:	airport
ARSPC:	airspace
ARTCC:	air route traffic control center
ARVL:	arrival
BRG:	bearing to
CDI:	course deviation indicator
CLR:	clear
CRSR:	cursor
CTAF:	common traffic advisory frequency
CTR:	center (see ARTCC)
CTS:	course to steer
CUM:	cumulative
DEP:	departure
DIS:	distance
DME:	distance measuring equipment
DTK:	desired track
ELEV:	elevation
ENR:	en route
ENT:	enter
ETA:	estimated time of arrival

ETE:	estimated time en route
FPL:	flight plan
fpm:	feet per minute
FREQ:	frequency
FSS:	flight service station
ft:	feet
G/S:	glide slope
GPS:	global positioning system
GS:	ground speed
HDG:	heading
ID:	identifier
ILS:	instrument landing system
INT:	intersection
kHz:	kilohertz
km:	kilometers
kph:	kilometers per hour
kt:	knots
LAT/LON:	latitude and longitude
LCL:	local
LOC:	localizer
Lrg:	large
°M:	degrees magnetic
m:	meters
Med:	medium
MHz:	megahertz
mi:	statute miles
MOA:	military operations area
mph:	statute miles per hour
mpm:	meters per minute
mps:	meters per second
MSG:	message
MSL:	mean sea level
mul:	multicom
NATNL:	national
NAV:	navigation
NAVAID:	navigational aid
NDB:	nondirectional radio beacon
nm:	nautical miles
NRST:	nearest
NUM:	number
OBS:	omnibearing selector

PROC:	procedure(s)
PWR:	power
RAD:	radial
REF:	reference
REQ:	required or requirements
RESTRICTD:	restricted
RNG:	range
RX:	receive
Sml:	small
SPD:	speed
SRFC:	surface
SUA:	special use airspace
SUSP:	suspend waypoint sequencing
°T:	degrees true
TAS:	true airspeed
TERM:	terminal
TKE:	track angle error
TMA:	ICAO terminal control area
TRANS:	transition
TRK:	track (also ground track)
TRSA:	terminal radar service area
twr:	tower
uni:	unicom
UTC:	coordinated universal time (also known as Greenwich Mean Time or Zulu time)
VAR:	variation
VFR:	visual flight rules
VNAV:	vertical navigation
VOR:	VHF omnidirectional radio
VS:	vertical speed
VSR:	vertical speed required
WPT:	waypoint
WX:	weather
XTK:	crosstrack error

The GPS receivers use the following navigation terms:

ALT (altitude):	Height above mean sea level (MSL).
BRG(bearing):	The compass direction from your current position to a destination waypoint.
CAS (calibrated airspeed):	Indicated airspeed corrected for instrument errors.
CTS (course to steer):	The recommended direction to steer in order to reduce course error or stay on course. Provides the most efficient heading to get back to the desired course and proceed along your flight plan.

CUM (cumulative distance):	The total of all legs in a flight plan.
DIS (distance):	The great circle distance from your current position to a destination waypoint.
DTK (desired track):	The desired course between the active from and to waypoints.
ETA (estimate time of arrival):	The estimated time at which you will reach your destination waypoint, based upon current speed and track.
ETE (estimated time en route):	The time it will take to reach the destination waypoint, from current position, based upon current ground speed.
GS (ground speed):	The velocity you are traveling relative to a ground position.
HDG (heading):	The direction your aircraft is pointed, based upon indications from a magnetic compass or a properly set directional gyro.
IND (indicated):	Information provided by properly calibrated and set instrumentation in the aircraft panel (e.g., "indicated altitude").
TKE (track angle error):	The angle difference between the desired track and your current track.
TRK (track):	The direction of movement relative to a ground position; also referred to as "ground track."
VSR (vertical speed required):	The vertical speed necessary to descend or climb from current position and altitude to a defined target position and altitude, based upon your current ground speed.
XTK (crosstrack error):	The distance you are off a desired course in either direction, left or right.

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