GPS 150
Pilot’s Guide

DEN → SLC  gs  408 kts
dis  331 nmi  trk  279°
++ ++ ++ ++ ++ ++  ete  0:49

GARMIN

OWNER’S MANUAL & REFERENCE
INTRODUCTION

Foreword

Software Version 3.00 or above

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The GPS system is operated by the United States government, which is solely responsible for its accuracy and maintenance. The system is subject to changes which could affect the accuracy and performance of all GPS equipment. Although the GARMIN GPS 150 is a precision electronic NAVigation AID (NAVAID), any NAVAID can be misused or misinterpreted, and therefore become unsafe.

Use the GPS 150 at your own risk. To reduce the risk of unsafe operation, carefully review and understand all aspects of this Owner's Manual and thoroughly practice using the simulator mode prior to actual use. When in actual use, carefully compare indications from the GPS 150 to all available navigation sources, including the information from other NAVAIDS, visual sightings, charts, etc. For safety, always resolve any discrepancies before continuing navigation.

The altitude calculated by the GPS 150 is geometric height above mean sea level and could vary significantly from altitude displayed by pressure altimeters in aircraft. NEVER use GPS altitude for vertical navigation.

The Jeppesen database incorporated in the GPS 150 must be updated regularly in order to ensure that its information is current. Updates are released every 28 days. A database information packet is included in your GPS 150 package.

Pilots using an out-of-date database do so entirely at their own risk.

CAUTION! The GARMIN GPS 150 has no user serviceable parts. Should you ever encounter a problem with the unit, please take it to an authorized GARMIN dealer for repairs.
Congratulations on choosing the finest, most full-featured panel-mount VFR GPS available. The GPS 150 represents GARMIN’s commitment to provide an accurate, easy-to-use GPS for all of your aviation needs.

Before installing and getting started with your unit, please check to see that your package includes the following items. If any parts are missing or damaged, please see your GARMIN dealer immediately.

**Standard Package:**

- GPS 150 unit w/ Rechargeable Battery Pack and NavData® Card
- Aviation Installation and Antenna Kit
- Pilot’s Guide & Quick Reference Guide
- Database Subscription Packet

**Optional Accessories**

- AC Adaptor
- PC 150 Interface Kit
- User Data Card

To obtain accessories for your GPS 150, please contact your nearest GARMIN dealer.
Designed for accurate performance and intuitive operation, the GPS 150 is a powerful navigation device that allows you to navigate easily, no matter where your destination may take you.

**Precision Performance**

- MultiTrac™ receiver tracks and uses up to 8 satellites for fast, accurate positioning and speed, with continuous, 1 second updates

- Jeppesen® database lists airports, VORs, NDBs, FSSs, intersections, comm frequencies, runway info, minimum safe altitude, SUA information and more

- Vacuum fluorescent display to provide easy viewing, even in direct sunlight

- Battery backup of up to 4 hours for powering the GPS 150 in case of aircraft electrical power failure

**Advanced Navigation**

- Stores 1,000 user waypoints and 20 reversible flight plans of up to 31 waypoints each

- Stores user comments on up to 250 items (airports, VORs, etc.)

- Interfaces with existing autopilot, moving maps, CDI, HSI and other equipment
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**Key and Knob Functions**

- The power/brightness knob controls unit power and screen brightness.

- The direct-to key performs an instant direct-to, allows you to enter a waypoint, and sets a direct course to the destination.

- The nearest key is used to obtain information on the 9 nearest airports, VORs, NDBs, intersections, user waypoints and 2 nearest FSSs. The nearest key also accesses any active SUA information. (See Section 4 for more information on the nearest waypoints).

- The set key allows you to customize the settings on your unit to your preference. (See Section 5 for more information on unit settings).

- The route key enables you to create, edit, activate and invert routes. Search-and-rescue, parallel offset and closest point of approach are also performed using the route key. (See Section 3 for more information on routes).

- The waypoint key is used to view information such as runways, frequencies, position and comments on airports, VORs, NDBs, intersections and user waypoints. (See Section 2 for more information on the database).

The GPS 150 is designed to minimize keystrokes when performing operations. There are typically several ways to perform the same operation. In general, using the knobs will decrease keystrokes and time spent using the GPS 150. Experiment to find the most effective way to use the GPS 150 to your advantage.
The navigation key is used to view navigation and position information. Planning operations are also performed using the \textit{NAV} key. (See Section 1 for more information on navigation and planning operations).

The cursor key is used to activate/deactivate the cursor. An active cursor is indicated by flashing characters on the screen. It is used to highlight fields for data entry, changing information, or cycling through available options.

The clear key is used to erase information or cancel an entry.

The status key is used to view receiver and satellite status, as well as system messages (See Section 5 for more information on receiver status).

The enter key is used to approve an operation or complete data entry. It is also used to confirm information, such as during power on.

The outer knob is used to advance through pages, advance the cursor, or move through data fields.

The inner knob is used to change data or scroll through information that cannot fit on the screen all at once.

This manual will describe entering data using the \( \bigcirc \) and \( \bigcirc \) knobs. Experiment with them and become efficient in entering data with the concentric knobs. This will greatly reduce the amount of time required to navigate with the GPS 150.
The GARMIN GPS 150 is a powerful navigational tool that provides pilots with accurate navigational data and provides a host of database information at their fingertips. The next few pages are designed to familiarize you with the operation of the GPS 150, including powering up the unit, entering data and doing a simple direct-to. This section also briefly covers the Position and CDI navigation pages, which will be used for most of your in-flight navigation.

Once you’re familiar with what the keys and knobs do, consult the reference section of the manual for instructions on specific tasks, and an overview of what the GPS 150 can do for you. This introduction uses the GPS 150’s simulator mode, so it can be performed at home or at the office using the optional AC adaptor. If you have changed any of the factory default settings (position format, units of measure, selectable fields, etc.), the pictures used may not match your configuration.

**Powering up the GPS 150**

Turn the GPS 150 on by rotating \( \odot \) (the power/ brightness knob) clockwise. Notice that rotating it clockwise will also brighten the display. This knob locks the NavData® card in place, so it may not be removed while the unit is on. After you turn the unit on, the Welcome page will be displayed while the unit performs a self-test. When the self-test is complete, you will be prompted to select which operating mode you would like, either Simulator or Normal.

Simulator mode will enable all of the functions of the GPS 150, but will not acquire satellites and use calculated position information or navigational guides. Simulator mode will allow you to mark, create, edit and store waypoints and routes.

The operating mode screen will NOT be displayed when using aircraft power. Although you may use the GPS 150 inside the cockpit if main power is off, it is not recommended to keep you from accidentally navigating the aircraft using Simulator mode. If aircraft power is lost during flight, the GPS 150 will automatically switch to its internal battery to provide safe navigation information for up to four hours.
To enter Simulator mode from the Operating Mode page:

1. Rotate the outer knob (O) one stop to the left or right to highlight the operating mode.
2. Rotate the inner knob (K) to display 'Simulator?'.
3. Rotate (O) to highlight 'ok?'.
4. Press (E) to accept.

This will display the Database page, which states the current database information contained on the NavData® card. On this page, information including valid operating dates, cycle number and database type is shown. Databases are updated every 28 days. Information on subscribing to the database is available inside your GPS 150 package.

1. Press (E) to acknowledge the database information.

The Initial Position Reference page will now appear. Since simulator mode does not acquire satellites and obtain a GPS position, it needs a reference point to begin your trip. Let's enter an airport in Bakersfield, CA (identifier L45) as our initial reference point.

1. Rotate (O) to highlight the blank identifier field.
2. Rotate (K) to display 'L'.
3. Rotate (O) to advance the cursor position.
4. Rotate (K) to display '4'.
5. Rotate (O) to advance the cursor position.
6. Rotate (K) to display '5'.
7. Press (E) to accept the entry. (If you make a mistake, use (O) to highlight the character again and change it using (K), or press (CLR) to clear the present entry).
This will display the Waypoint Confirmation page which, for an airport, contains identifier, altitude, fuel services available, position, approach information and radar services.

1. Press **ENT** to confirm the waypoint information.
2. Press **ENT** again to accept the waypoint as the initial starting point.

The Position page will now be displayed. Information on this page includes altitude, minimum safe altitude, position and nearest airport. Notice that the annunciator (†) next to the **STAT** key is flashing.

**To view any system message:**

1. Press **STAT**.

The ‘Do not use for nav’ message will appear to warn you that the information being displayed is only valid for simulation, and is not your actual position, speed or altitude.

1. Press **STAT** again or **NAV** to return to the Position page.

Now that the Position page is displayed, let's view the other main navigational page, the CDI page.

**To view the CDI page from the Position page (while the cursor is not flashing):**

1. Rotate ⬛ left one position.

The CDI page is the main page used while navigating to a destination. It contains information including the active waypoint, ground speed, track, course deviation indicator (CDI), distance and estimated time enroute (ETE). These fields will typically only contain information if you have selected a destination (performed a direct-to or activated a route) and a speed. In our simulated trip, we will begin at Bakersfield Municipal Airport and go to Delano Municipal Airport.
Getting Started

To perform a direct-to at any time:

1. Press D. (For our simulated trip we will go to KDLO, Delano Municipal).
2. Rotate until ‘K’ is displayed.
3. Rotate one position to advance the cursor.
4. Repeat steps 2 and 3 until ‘KDLO’ is displayed.
5. Press to accept the entry.

This will bring up the Waypoint Confirmation page again, but this time, it will contain the Delano Municipal Airport information.

1. Press to confirm the direct-to.

This brings you back to the CDI page, which will allow you to enter a ground speed toward the destination. The waypoint you have selected as your destination will now be referred to as the ‘active to’ waypoint.

To set a ground speed from the CDI page:

1. Press to obtain a cursor.
2. Rotate to highlight the ground speed (‘gs’) field.
3. Using to change the data, and to move the cursor, enter a ground speed of 140 knots.
4. Press when finished.

This will calculate and display the ETE and distance as you approach the destination. The CDI page also displays the course deviation indicator in the lower left part of the display. The CDI slides horizontally to show the direction and distance you are off course (in simulator mode, it will always be on course). The default is for the CDI to deflect full scale at 5 distance units (mi, km, etc.) of crosstrack error. Crosstrack error is the distance you have deviated from the course set when you activated the destination waypoint.
The CDI page contains three fields which may be configured to display other information.

The 'dis' field can be configured to display any of the following:
- **dis** – Distance to destination waypoint
- **str** – Steer direction and distance away from established course

The 'trk' field can be configured to display any of the following:
- **trk** – Track angle
- **brg** – Bearing to waypoint
- **cts** – Course to steer (to get back on course most efficiently)
- **dtk** – Desired track
- **obs** – Omni-directional Bearing Select (Inbound Course Select)
- **trn** – Turn angle

The 'ete' field can be configured to display any of the following:
- **eta** – Estimated time of arrival
- **ete** – Estimated time enroute
- **trk** – Track angle
- **vn** – Vertical navigation

You can change these fields by highlighting them with the cursor and rotating until the desired data is displayed. This is covered completely in Section 1, page 13.

Any time you would like to set a direct course for a destination, simply highlight the waypoint identifier and press . This can be done from any page. It will cancel any active routes, vertical navigation, or offset navigation that may be in effect. This is especially useful when locating the nearest airport, and setting a direct course for it.

**To display the nearest airport, press** After the nearest airport is displayed, you may perform a direct-to and begin navigating towards that destination.

**To go directly to the nearest airport:**
1. Press **CNR** to highlight the identifier.
2. Press **** to perform a direct-to.

This will display the Waypoint Confirmation page for the selected airport.

3. Press **ENT** to accept and begin navigating toward the nearest airport.
The abbreviations used in the diagram on the right are:

- **BRG**: bearing
- **DIS**: distance
- **DTK**: desired track
- **GS**: ground speed
- **STR**: steer direction & distance
- **TRK**: track angle
- **WPT**: waypoint

The GPS 150 is a precision navigational device that provides speed, course and track information to the pilot at the touch of a button. The diagram below shows the basic navigational features and fields used in the GPS 150. The abbreviations used are listed on the left hand side of this page.
Section 1
Navigating with the GPS 150

Prior to using your GPS 150 for the first time in flight, we recommend that you taxi to a location that is well away from buildings and other aircraft. The first time you use the GPS 150 it will automatically collect satellite data, and should not be interrupted.

1. Turn on your GPS 150 by rotating clockwise.
2. Press to acknowledge database dates and cycle.

This will display the Receiver Status page, which, for the first use of your GPS 150, will be ‘Searching the Sky’. This means the unit is acquiring data to establish almanac and satellite orbit information, which can take 7 1/2 to 30 minutes. A message will inform you that the unit is ‘Searching the sky’.

When the GPS 150 has located at least one satellite, and is beginning to collect information on all satellites, a ‘Collecting data’ message will be displayed. This is a good indication that you are receiving satellite signals, and that satellite lock and position fix will occur.

Following the first use of your GPS 150, the amount of time required for a position fix will vary, usually from 2 to 5 minutes. If the GPS 150 has not been operated for a period of six months, or it has moved over 300 miles without being on, it may be required to Search the Sky to collect new data. This will be done automatically.

If only enough satellites can be acquired for 2D navigation (no altitude), the unit will use the altitude provided by your altitude serializer, if installed. If not, you will be prompted to enter the altitude with a ‘Need alt - press NAV’ message. If this message occurs, press and use and to enter the altitude shown on your altimeter. Press when you are finished.
The Position page will be displayed when the GPS 150 has locked on to satellites and is ready for navigation. Note that if you begin using the GPS 150 in any way before it has obtained a fix, it will not automatically display the Position page, but will inform you when the GPS 150 is displaying current navigation information with the ‘Ready for navigation’ message.

Typically, if you turn on the GPS 150 when you leave the hangar, it will have acquired satellites and be ready for navigation before you are ready to take off. Satellite acquisition times can be as little as 15 seconds, or as long as 5 minutes. If the antenna has a clear view of the sky, it should not take over 5 minutes, unless the unit is acquiring new satellite data. This condition will be accompanied by a ‘Searching the sky’ message.

If you are having trouble acquiring satellites on a routine basis, check the antenna installation and cabling to the GPS 150 rack. If the installation appears to be in good order, this may signal that there is a problem with the unit. If you feel there may be a problem with your GPS 150, please contact your local avionics dealer.
The GPS 150 displays all navigation data on pages accessed using the NAV key. The GPS 150 contains four NAV pages:

The **Position page** displays current position and altitude information and also provides reference waypoint information.

The **CDI page** indicates the speed, steering and distance information.

**NAV Menus 1 and 2** contain prompts to perform various planning functions and in-flight calculations. The entire list of functions the NAV menus perform appears later in this section.

The NAV pages may be accessed by pressing NAV and rotating the outer knob (O).

---

**CDI page**

**Position page**

When using the GPS 150, you may rotate the outer knob either direction to display other information or pages.

The pages are accessed in a cyclic manner, and can be displayed in different ways.

For example, instead of rotating the outer knob to display subsequent pages, you may repeatedly press NAV. This will also display the other three NAV pages.
The Position page contains the following information:

Altitude (above mean sea level)  MSA or ESA

Position (lat/lon)

Proximity Field

The MSA/ESA field can display either the minimum safe altitude (MSA) or the enroute safe altitude (ESA). MSA is the recommended minimum altitude within a ten mile radius of your present position. ESA is the recommended minimum altitude within a ten mile radius of your course on an active route or direct-to. This information is determined using the database and generally includes mountains, buildings and other permanent features.

For example, if you are on a route from New York City to Los Angeles, the MSA at KJFK would be 2700 ft. to account for objects in the area. However, the ESA would be 16,700 feet to account for the course through the Rocky Mountains.

To change the ESA/MSA field on the Position page:

1. Press \texttt{C} if necessary, to obtain a flashing cursor.
2. Rotate \texttt{O} until the 'ESA/MSA' field is highlighted.
3. Rotate \texttt{K} to display the desired data.
4. Press \texttt{C} to return to normal navigation.

MSA and ESA are computed based on data stored in the NavData card. This information cannot be solely relied upon as an absolute measure of safe altitude in your area, particularly if the data card is out of date. Consult current charts and NOTAMS for more complete information.
The Proximity field can display the following:

- Range, bearing and identifier of the nearest airport, VOR, NDB, intersection, or user waypoint, or;
- Range and bearing from a user entered waypoint.

This will display ANY waypoint’s distance and bearing on the bottom of the Position page. This is especially useful when trying to locate your position on a sectional. The default setting is to display the nearest airport.

To change the proximity field:

1. Press \textsc{crsh}.
2. Rotate \textsc{ro} to highlight the proximity field after the ‘fr’.
3. Rotate \textsc{osr} until the type of waypoint you would like is displayed. (Choose ‘apt’, ‘vor’, ‘ndb’, ‘int’, ‘usr’, or choose ‘wpt’ if you would like a specific waypoint’s range and bearing to be displayed.)
4. Press \textsc{crsh} to remove the cursor, or, if you have selected ‘wpt’:
5. Rotate \textsc{ro} to highlight the identifier field.
6. Use \textsc{osr} and \textsc{ro} to enter the identifier name. (This waypoint identifier can be an airport, VOR, NDB, intersection, or user waypoint). Press \textsc{ent}.
7. Press \textsc{crsh} to complete.

\textbf{Remember!} The NAV pages will only display information AFTER the position and navigational information has been calculated from the satellites. If you are on the Position page before the unit has calculated a GPS position, you will be able to enter an approximate position and altitude. This is helpful in speeding satellite acquisition only if the unit has moved without tracking satellites.
The CDI page is the primary NAV page used for enroute navigation. It displays information such as the active waypoint, ground speed, course deviation indicator (CDI), steering information, distance, etc.

To display the CDI page:

1. Press \( \text{NAV} \) and rotate \( \bigcirc \) until the CDI page is displayed:

```
Active waypoint
---
Ground Speed

---

Distance field

---

Steer field

---

Messages or CDI

---

ETE, ETA, Track, or VNAV
```

The following distance functions may be displayed in the distance field:

- **dis** – Distance from present position to the ‘active to’ waypoint.
- **str** – Steer direction and distance. ‘L’ or ‘R’ to indicate which direction to steer, and the distance to indicate how far you are off course.

The following steering functions may be displayed in the steer field:

- **trk** – Track, or the direction of movement relative to the ground.
- **brg** – Bearing, or the direction to the destination waypoint.
- **cts** – Course to steer to reduce cross track error and stay on course.
- **dtk** – Desired track, or the course between the ‘active from’ and the ‘active to’ waypoint.
- **obs** – OBS, or course select mode allows the pilot to set the inbound course to the ‘active to’ waypoint. (See page 13 to set the OBS.)
- **trn** – Off course error. ‘L’ or ‘R’ to indicate which direction to turn, and the degrees indicate the angle you are off course.
The following information can be displayed in the ETE field:

- **ETA** – Estimated Time of Arrival (at the ‘active to’ waypoint).
- **ETE** – Estimated Time Enroute (to the ‘active to’ waypoint).
- **trk** – Track, or the direction of movement relative to the ground.
- **vn** – Vertical Navigation, or VNAV. If VNAV has been activated (see page 17), this field indicates either the elapsed time before the VNAV maneuver is to begin, or the VNAV altitude if a maneuver is in progress. The VNAV altitude displayed is the suggested altitude you should be flying in order to complete the maneuver.

To change any of the fields on the CDI page to display other information:

1. Press **CHR** if necessary, to activate the cursor.
2. Rotate **O** until the field you would like to change is highlighted.
3. Rotate **O** until the field displays the desired information.
4. Use **O** to highlight another field, or **CHR** to complete.

When navigating towards a destination, it is sometimes desirable to intercept that waypoint on a certain radial. The OBS (Omni-directional Bearing Select, or inbound course select) allows the pilot to set the desired inbound course to the destination waypoint. This is similar to selecting the desired course on a VOR indicator.

**To set the OBS (You must have an ‘active to’ waypoint):**

1. Highlight the steer field and select ‘obs’ as shown above.
2. Rotate **O** until the number field to the right of ‘obs:’ is highlighted.
3. Use **O** and **O** to enter the OBS course (0-359º).
4. Press **ENT** to accept.

The CDI will guide you to intercept the desired radial upon reaching the waypoint.
In addition to the Position and CDI pages, the NAV key features two menu pages to perform many planning and navigation functions. **NAV Menu 1** contains options to perform the following functions:

- Trip Planning
- Fuel Planning
- VNAV Planning
- Density altitude/true air speed calc.
- Winds aloft calculations
- Checklists

**To display NAV Menu 1:**

1. Press NAV.
2. Rotate until NAV Menu 1 is displayed.

**Trip Plan** is the first function listed on NAV Menu 1. Trip planning allows the pilot to view distance, ESA, bearing and estimated time enroute (ETE) between any two waypoints, and for programmed route. The ground speed can be varied manually to calculate several possible ETEs.

**To use the trip planning function:**

1. Press NAV and rotate until NAV Menu 1 is displayed.
2. Press CSCR then ENT to access trip planning.
3. Rotate to select ‘wpt’ for waypoint-to-waypoint planning, or select the route you would like to use. Press ENT.
4. If you have selected a route, use to select either ‘cum’ for cumulative or the leg of the trip you wish to plan for. Press ENT.
5. If using waypoint-waypoint, then use and to enter the ‘to’ and ‘from’ waypoints. (To use the current position as a waypoint, leave the corresponding waypoint field blank). Press ENT after each identifier, then press ENT on the waypoint confirmation pages to accept.
6. Use and to enter the ground speed. Press ENT to calculate the values and CSCR to complete.

This will display the trip direction, distance, ESA and ETE.
The density altitude/true air speed function is also accessed from NAV Menu 1.

To calculate the density altitude and true air speed:

1. Press **NAV** and rotate **O** until NAV Menu 1 is displayed.
2. Press **CSR** and rotate **O** to highlight the 'Dalt/tas?'.
3. Press **ENT** to access the density altitude page.
4. Use **K** and **OO** to enter the indicated altitude (ialt) according to the altimeter. Press **ENT**.
5. Use **K** and **O** to enter the calibrated air speed (cas). Press **ENT**.
6. Use **K** and **O** to enter the air pressure ('pres') obtained from local weather stations or from the altimeter (assuming the altimeter is calibrated). Press **ENT**.
7. Use **K** and **O** to enter the total air temperature according to aircraft instruments.
8. Press **ENT** and the density altitude and true air speed will be calculated and displayed.
9. Press **CSR** to remove the cursor.

If your installation includes components to provide any of the information required on the density altitude page, they will be displayed as the defaults.

The Fuel Planning page will display fuel requirements for both direct-to navigation, and for programmed routes. The fuel planning function requires the pilot to know the initial amount of fuel on board and the flow rate of fuel in the aircraft. The fuel planning feature allows you to enter different ground speeds to view various information based on different travel times. If your installation has interfaced a fuel flow sensor to the GPS 150, the flow rate and other information will be used from the fuel flow sensor, and do not need to be entered manually.
To perform fuel planning operations:

1. Press NAV and rotate until NAV Menu 1 is displayed.

2. Press CRSP and rotate until 'Fuel Plan?' is highlighted. Press ENT.

3. Rotate ▲ to select either 'wpt' for direct navigation or the desired route number. Press ENT.

4. For waypoint-waypoint navigation, use ▲ and ▼ to enter the ‘to’ and ‘from’ waypoints. Press ENT to accept the waypoints. (To use the current position as a waypoint, leave the corresponding waypoint field blank).

5. For route calculations, choose either ‘cum’ for cumulative route fuel requirements (from beginning to end) or the leg desired by rotating ▲.

If leg is selected, it displays the amount of fuel required to fly until that leg is complete.

**For example:** The fuel required to complete leg 2 is leg 1 + leg 2.

Fuel required to complete leg 4 is leg 1 + leg 2 + leg 3 + leg 4.

6. Rotate ▼ to advance the cursor to ‘fob:’ or ‘gs:’ (Depending on which is displayed).

7. Use ▲ and ▼ to enter the fuel on board or the ground speed. Press ENT.

8. Rotate ▼ back two positions to highlight the ‘fob:’ or ‘gs:’ field again.

9. Rotate ▲ to display the other information. Press ENT.

10. Use ▲ and ▼ to enter the remaining data. Press ENT.

11. Use ▲ and ▼ to enter the flow rate, in units per hour, if needed. Press ENT.

The GPS 150 will calculate the range and endurance (how long the fuel will last) of your aircraft. These are found in the first field on the bottom row. It will also calculate leftover fuel on board (fob) and reserve after the selected direct-to, leg, or route is completed. These are found in the second field on the bottom row. These may be changed by highlighting the field with the cursor, and using ▲ to change the data.
The GPS 150 will also perform winds aloft calculations to inform you of the true direction and speed of the wind. The GPS 150 will also display whether you are flying with a headwind or tailwind, and its speed.

To calculate winds aloft:

1. Press \text{NAV} and rotate \text{C} until NAV Menu 1 is displayed.
2. Press \text{C} and rotate \text{C} until ‘Winds?’ is highlighted. Press \text{ENT}.
3. Use \text{C} and \text{C} to enter your present heading in the ‘hdg:’ field. If your installation includes a fuel/air data computer, this will be displayed automatically. Press \text{ENT}.
4. Use \text{C} and \text{C} to enter your true air speed (TAS) in the ‘tas:’ field. If you have previously calculated it using the density altitude/true air speed function it will be displayed as the default. Press \text{ENT}. The wind direction and speed and the value of the head/tail wind will be displayed.

The GPS 150 will calculate vertical navigation requirements to achieve a certain altitude before or after a waypoint. This is helpful when you would like to descend to a certain altitude near an airport, or climb to a certain altitude before reaching a waypoint or NAVAID.

To calculate vertical navigation parameters:

1. Press \text{NAV} and rotate \text{C} until NAV Menu 1 is displayed.
2. Press \text{C} and rotate \text{C} until ‘Vnav Plan?’ is highlighted. Press \text{ENT}.
3. Use \text{C} and \text{C} to enter the initial (from) altitude. Your GPS altitude will be displayed as the default. Press \text{ENT}.
4. Use \text{C} and \text{C} to enter the desired final (to) altitude. Press \text{ENT}.
5. Use \text{C} and \text{C} to enter the distance from the waypoint. Press \text{ENT}.
6. Use \text{C} to select ‘before’ or ‘after’ the waypoint. Press \text{ENT}.
7. Use \( \text{K} \) and \( \text{O} \) to enter the waypoint identifier. If you are on a route or a direct-to, the 'active to' identifier will be displayed automatically. This may be changed to another waypoint, but it must be contained in the active route. Press \( \text{E} \).

You will now notice that the vertical speed field has been calculated. If you desire a more rapid climb or descent, you may enter that value now.

8. Use \( \text{K} \) and \( \text{O} \) to enter the new desired vertical speed, or press \( \text{E} \) to accept the calculated value.

9. Press \( \text{E} \) to 'activate?' the vertical navigation.

If you enter a more rapid climb or descent, the GPS 150 will display the elapsed time before the maneuver is to begin. At 15 seconds, you will be informed with the message 'Start altitude chng'. The VNAV altitude may be displayed on the CDI page in the ETE field. The VNAV altitude displayed is the suggested altitude you should fly in order to complete the maneuver as programmed. The VNAV function will automatically be cancelled if the active route is changed, and you will be informed with a 'VNAV cancelled' message.

The GPS 150 will also allow you to create checklists to remind you of repetitive tasks that can be called up at any time for review. Examples include pre-flight checklists, landing checklists, emergencies, etc. You can program up to nine checklists with thirty items in each list. Each name or checklist item can have up to 16 characters each.

**To create a checklist:**

1. Press \( \text{NAV} \) and rotate \( \text{O} \) until NAV Menu 1 is displayed.
2. Press \( \text{CSR} \) and rotate \( \text{O} \) until 'Chklist?' is highlighted. Press \( \text{E} \).
3. Press \( \text{CSR} \) and use \( \text{O} \) to highlight the checklist number you would like to create or edit. (If there are no checklists, you must select checklist number 1). Press \( \text{E} \).
4. Use \( \text{O} \) and \( \text{E} \) to enter the title of the checklist. Press \( \text{E} \).

This will display the checklist items page. On this page, you can enter each task, such as 'Check Fuel', etc.
5. Use \( \circ \) and \( \bullet \) to enter the checklist item. Press **ENT**.
6. You may repeat step 5 to enter more items, or press **CRSR** when you are finished.

**To execute a checklist:**

1. Press **NAV** and rotate \( \bullet \) until NAV Menu 1 is displayed.
2. Press **CRSR** and rotate \( \circ \) until 'Chklist?' is highlighted. Press **ENT**.
3. Scroll through available checklists using \( \circ \).
4. Press **CRSR** and use \( \circ \) to highlight the checklist you would like to see. Press **ENT**.
5. Press **ENT** to check off list items.

The final NAV page is **NAV Menu 2**. NAV Menu 2 contains the following functions:

- **Approach timer**
- **Trip Timer**
- **Scheduler**
- **Clock (Date and time)**
- **GPS Planning**
- **Sunrise and sunset calculations**

The **approach timer** acts as either a count up or a count down timer.

**To activate/change/view the approach timer:**

1. Press **NAV** and rotate \( \circ \) until NAV Menu 2 is displayed.
2. Press **CRSR** and rotate \( \circ \) until 'Appr Time?' is highlighted. Press **ENT**.
3. Rotate \( \circ \) to select either 'Count up' or 'Count down'. Press **ENT**.
4. Use \( \circ \) and \( \bullet \) to set the time to begin counting from. Press **ENT**.
5. Rotate \( \bullet \) to select the function you would like to perform, 'Start', 'Stop', or 'Reset'. Press **ENT**. Reset returns the timer to the original count up/count down time.

When the count down timer reaches zero, you will be informed with a 'Timer expired' message. It will then begin to count up, to indicate how long it has been since it expired.
The GPS 150 keeps track of both UTC time (Greenwich Mean Time, or Zulu Time, calculated from the satellites) and local time. The GPS 150 will allow you to set the local time and date for your reference so you do not have to do a UTC to local time conversion manually. The times displayed elsewhere on the unit can be either local time or UTC.

To set the local date/time:
1. Press NAV and rotate until NAV Menu 2 is displayed.
2. Press CRSR and rotate until 'Clock?' is highlighted. Press ENT.
3. Use ○ to select either 'UTC' or 'local' time to be displayed in the time fields. Press ENT.
4. Use ○ and ○ to set the local date. Press ENT.
5. Use ○ and ○ to set the local time. Press ENT.
6. Press CRSR to complete.

The GPS 150's trip timer will automatically keep track of the length of the current trip. This can help you maintain accurate records and logs.

To view or reset the trip timer:
1. Press NAV and rotate ○ until NAV Menu 2 is displayed.
2. Press CRSR and rotate ○ until 'Trip time?' is highlighted. Press ENT.

This will display the current time, departure time, and time enroute. To reset, press ENT. If you don’t want to reset the timer, press CRSR. The timer can be configured to run when the GPS 150 is on, or when your ground speed exceeds a value you enter. Setting this feature is covered in Section 5, page 57.
The **GPS planning** function allows you to make sure there are no GPS coverage outages for any location or waypoint, any day of the year. Now that the GPS constellation is complete and has been declared operational by the U.S. Department of Defense, it is unlikely that instances of poor coverage will occur.

However, if satellites are damaged or are no longer functioning before new ones can be deployed, the GPS 150 cannot use data from those satellites in calculating position, speed, or course information. The GPS 150 will obtain information about the condition of the constellation from other operational satellites and then determine which ‘healthy’ satellites will be in view at any point on the earth.

**To check GPS coverage:**

1. Press **NAV** and rotate until NAV Menu 2 is displayed.
2. Press **CRSR** and rotate until ‘GPS Plan?’ is highlighted. Press **ENT**.
3. Use **○** and **△** to enter the waypoint at which you would like to check coverage, or leave it blank to use your current position. Press **ENT**.
4. Use **○** and **△** to enter the day, month and year of the information desired. Current date will be displayed automatically. Press **ENT**.
5. Rotate **○** to select which fix you require, either a 2D or 3D position. (A 2D position will not contain altitude). Press **ENT**.
6. The ‘Compute?’ field will be highlighted automatically. Press **ENT** to compute information.

When the computations are complete, the GPS 150 will display the times (of 15 minutes or greater) of poor GPS coverage. They will be displayed on line three and, if more than two exist, may be viewed by rotating **○**. If no 15 minute periods of poor coverage are found, the GPS 150 will display ‘24 hour coverage’.
The scheduler function will display reminder messages after a certain elapsed time such as Change oil, Switch fuel tanks, Overhaul, etc. For example, if you enter 'Change Oil' to be displayed in 30 hours, the message 'Change Oil' will be displayed after the GPS 150 has been on in Normal operating mode for 30 hours. After appearing, the message will be displayed each time the GPS 150 is turned on until it is changed or deleted.

**To enter a scheduled message:**

1. Press NAV and rotate C to display NAV Menu 2.
2. Press C and rotate C until 'Scheduler?' is highlighted. Press ENT.
3. Rotate K to display the message you would like to edit. Press C and rotate C to highlight the message you would like to edit. (To delete, press CLR, then ENT).
4. Use K and O to enter the message. Press ENT.
5. Use K and O to set the elapsed time until the message is displayed, in hours and minutes, up to 99 hours and 59 minutes. (This time is cumulative and counts whenever the GPS 150 is on in Normal operating mode). Press ENT.

You may edit another by repeating steps 3, 4 and 5, or if you are finished, press C.

**To calculate sunrise and sunset times at a waypoint, or at your present location:**

1. Press NAV and rotate C until NAV Menu 2 is displayed.
2. Press C and rotate C to highlight 'Sunrise?'. Press ENT.
3. Use C and O to enter the waypoint identifier, or leave blank to use current position. Press ENT.
4. Press ENT to accept the waypoint information.
5. Use C and O to enter the date desired.
6. Press ENT and the sunrise and sunset times will be calculated and displayed.
Section 2
Waypoint and Database Information

The database in your GPS 150 is contained on a NavData® card providing information for either the Americas, International or Worldwide coverage. The Americas database covers North, Central and South America. The International database covers Europe, Asia and Africa. The Worldwide database contains both Americas and International. The following information is contained on your NavData card:

- **Airports** - Identifier, city/state, country, facility name, position (lat/lon), elevation, fuel services, control and approach information, runways and communications frequencies.

- **Runways** - Runway designation, length, surface, lighting, ILS/localizer identifier and frequency and pilot controlled lighting frequency.

- **Communication** - Approach, arrival, control area, departure, class B, TMA, class C, and TRSA with sector, altitude and text usage. In addition: ATIS, clearance delivery, tower, ground, unicom, pre-taxi and other frequencies are also included.

- **VORs** - Identifier, city/state, country, facility name, position (lat/lon), frequency, magnetic variation, co-located DME or TACAN and weather broadcast indication.

- **NDBs** - Identifier, city/state, country, facility name, position (lat/lon), frequency and weather broadcast indication.

Please note that your GPS 150 uses ICAO identifiers for all airport names. All U.S. airport identifiers which contain only letters use the prefix 'K'. For example, Los Angeles International is KLAX under the ICAO standard. Other airports, such as Otten Memorial (3VS), that contain numbers in the identifier, do not require the 'K' prefix. Many foreign countries use 2 letter prefixes. For more information on ICAO identifiers, contact:

Document Sales Unit
International Civil Aviation Organization
1000 Sherbrooke, Suite 400
Montreal, Quebec
Canada H3A 2R2

Phone: (514) 285-8022
FAX: (514) 288-4772
• **Intersections** - Identifier, country, position (lat/lon), nearest VOR.

• **FSS** - Identifier, reference VOR, frequency and usage.

• **Minimum Safe Altitude** - Minimum altitude you can fly and remain above obstructions in the region. Enroute Safe Altitude (ESA) is the minimum safe altitude along a route or direct-to.

• **Controlled and Special Use Airspace** - Type, name, controlling agency, boundaries, floor and ceiling altitudes and controlling airport identifier.

Updates for the GPS 150 database may be purchased from Jeppesen on a one-time basis or by subscription. A packet supplied with your GPS 150 details the subscription cycles and prices.

The GPS 150 database information is accessed using the WPT key. The GPS 150 contains four pages under the WPT key. These pages are:

The **Waypoint Menu** page lets the user select the type of waypoint they would like to see information regarding. After selecting the waypoint type, the user may enter the identifier, location, or facility name to access the data contained on the NavData card.

The **Proximity Waypoint** page lists all of the proximity waypoints the user has entered. Proximity waypoints notify the pilot if the aircraft comes within a user entered range of the waypoint’s position.
The **User Waypoint Catalog** page lists all of the user entered waypoints in alphabetical order.

The **Waypoints Comment Catalog** page lists all of the waypoints which have user entered comments.

The waypoint pages may be accessed by pressing `WPT` and rotating the outer knob (O).

---

**Waypoint Menu**

<table>
<thead>
<tr>
<th>Select waypoint type</th>
<th>Proximity waypoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>apt? vor? ndb?</td>
<td>1: KMCI dis: 25.6m</td>
</tr>
<tr>
<td>int? user?</td>
<td>2: ______ dis: ____m</td>
</tr>
</tbody>
</table>

**Proximity Waypoint page**

**Wpts with comments**

L45 KLAX ARCH KIXD

**Waypoints Comment Catalog page**

**User Waypoint Catalog page**

---

Note: Any time you would like information on a waypoint, highlight the identifier with the cursor and press `ENT`. This will display the Waypoint Identification or Position page, and allow you to view the information in the same manner as listed in this section.

If the waypoint identifier is not contained in the database, you will be able to create a user waypoint as described on pages 34 & 35.
To choose a waypoint type (for viewing information):

1. Press \( W \) and, if necessary, rotate \( O \) until the Waypoint Menu page is displayed.
2. Press \( C \) and rotate \( O \) until the desired waypoint type is highlighted. Press \( E \).

Airports, VORs and NDBs may be entered by either the identifier, the facility name, or the city and state in which it is located. Intersections and user waypoints must be entered by identifier.

To enter waypoints by identifier:

1. Use \( K \) and \( O \) to enter the waypoint identifier in the first field on the page.
2. As the identifier is entered, the GPS 150 will display any waypoint with the same identifier you have entered so far. When the desired waypoint is displayed, press \( C \) to remove the cursor.

To obtain waypoint information by entering the facility name of an airport, VOR or NDB, or the city in which an airport, NDB or VOR is located:

1. Press \( W \) and rotate \( O \) until the Waypoint Menu is displayed.
2. Press \( C \) and rotate \( O \) to highlight the type of waypoint you wish to view.
3. Press \( E \) to accept the waypoint type.
4. Use \( V \) to highlight the middle field to enter the city, or:
5. Use \( G \) to highlight the bottom field to enter facility name, or VOR/NDB name.
6. Use \( K \) and \( O \) to enter the location or the name (do not use punctuation).
7. Press \( C \) to remove the cursor when the desired waypoint is displayed.
As soon as the desired identifier or location is displayed, press C. This will leave the following Waypoint Identification page displayed:

Waypoint type and identifier
Region / Country
Location (city/state)
Facility name

If the city and/or facility name is too long to fit on the displayed line, it will scroll to show more information when the cursor is removed.

Airport Information

When an airport is entered, the Waypoint Identification page above will be displayed. The airport also contains a Position page, a Communications page, a Runway Information page and a Comments page.
To display the Airport Position page:

1. Rotate until the Airport Position page is displayed (with the cursor not flashing).

### The fields on the Airport Position page display the following information:

**Elevation**
- In feet or meters.

**Usage/Fuel**
- If the airport is for military use, it will display `'military'`. If it is private, the GPS 150 will display `'private'`. If it is a public airport, it will display the fuel type(s) available:
  - `av gas` - 80-87 octane, 100 LL, 100-130 octane, or mogas
  - `jet` - Jet A, Jet A-1, or Jet A+
  - `av/jet` - Both av gas and jet are available

**Approach Info**
- displays the airport approaches available:
  - `no apr` - No approach is available.
  - `np-apr` - Non-precision approach is available.
  - `loc` - Localizer approach is available.
  - `ils` - ILS approach is available.
**Controlled Airspace** - displays controlled airspace type and if radar is available.

**Radar Information**
- class B
- class C
- cta - ICAO control area
- tma - ICAO terminal control area
- radar - indicates radar is present

The GPS 150 database also contains most communication frequencies used at the facility.

To view the Airport Communications page from any of the airport information pages:

1. Rotate while the cursor is not flashing to display the Communication page.
2. Rotate to scroll through more communication frequencies (if available) and sector or altitude restrictions.

**Frequencies without restriction information:**
- ats - Automatic terminal information service (ATIS)
- ptx - Pre-taxi
- clr - Clearance delivery
- gnd - Ground
- twr - Tower
- uni - Unicom
- mul - Multicom
- atf - Aerodrome traffic frequency
- ctf - Common traffic advisory frequency (CTAF)
- mf - Mandatory frequency
- oth - Other frequencies

**Frequencies with restriction information:**
- dep - Departure
- apr - Approach
- arv - Arrival
- class B
- tma - ICAO terminal control area
- cta - ICAO control area
- class C
- trsa - Terminal radar service area frequency
If the frequency is receive only, the frequency type will be followed by 'rx'. If the frequency is transmit only, it will be followed by 'tx'. If the displayed frequency has sector and/or altitude restrictions, they will also be displayed. Sector restrictions define a range of radials from the applicable facility. Altitude restrictions may describe an area above, below, or between altitudes. In some instances, narrative restrictions that will not fit on the displayed line will scroll to display more information.

To view runway information from any of the airport information pages:

1. Make sure that the cursor is not flashing. If it is, press C.
2. Rotate until the Runway Information page is displayed.

The Runway Information page displays the following information:

To access more runway information while the cursor is not flashing, rotate K.

If a localizer and ILS are used on the same runway, rotating K will display both sets of information.
The following runway information can be displayed on the Runway Information page:

**Runway surfaces:**
- hard - Hard (concrete, asphalt, etc.)
- turf - Turf (grass)
- seal - Sealed surface
- grav - Gravel surface
- dirt - Dirt surface
- soft - Unknown soft surface
- unkn - Unknown surface
- watr - Water landing site

**Runway lighting:**
- pt lights - Part time lights
- ft lights - Full time lights
- pc - Pilot controlled (with frequency)
- no lights - No runway lighting

**VOR Information**

After entering a VOR identifier, location, or name (as described on page 26), the VOR Identification page will be displayed. The GPS 150 contains three pages for each VOR: the VOR Identification page, the VOR Position page, and the Comments page.
To view the VOR Position page:

1. Make sure the cursor is not flashing. If it is, press \[C\].
2. Rotate \(\circ\) until the VOR Position page is displayed.

‘dme’ or ‘tacan’ is displayed on the bottom line of the VOR Position page if there is a DME or TACAN facility also located with the VOR. The ‘\textbf{wx bdcst}’ indicates that the VOR also transmits weather information. The station declination displayed on the top right is the magnetic orientation to which the VOR is set.
NDB Information

After entering the NDB identifier, city, or name, the NDB Identification page will be displayed. Like VORs, the GPS 150 displays NDB information on three pages: the NDB Identification page, the NDB Position page, and the Comments page.

To view the NDB Position page:

1. Make sure the cursor is not flashing. If it is, press CLR.
2. Rotate until the Position page is displayed.
**Intersection Information**

When an intersection identifier is entered, the following information will be displayed:

- **Waypoint type and identifier**
- **Region / Country**
- **Location (lat/lon)**
- **Nearest VOR facility, bearing and distance**

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

**User Waypoint Information**

User waypoints are created or modified using the WPT key. Selecting 'usr' as shown on page 26 will allow you to enter the waypoint identifier and modify the user waypoint. Note that this can also be done AT ANY time you are entering an identifier. If the identifier chosen is not contained in the database, the GPS 150 will assume you would like to create a new waypoint. There are three ways to create a user waypoint’s position:

1. Enter the exact position of the new waypoint.
2. Reference a known waypoint (range and bearing from an airport, VOR, etc.)
3. Enter a range and bearing from your current position.

**To create, edit or view a user waypoint:**

1. Press WPT and rotate until the Waypoint Menu is displayed.
2. Press CRSR and rotate until the 'user?' field is highlighted. Press ENT.
3. Use and to enter the waypoint identifier. Press ENT.
If the waypoint is new, you will be prompted to select the method to enter the waypoint into the database. If the waypoint exists, skip the next step.

4. Select the method to enter the waypoint using \( \text{OK} \) and press \( \text{ENT} \).

You will automatically be placed on either the latitude and longitude (if you selected ‘enter posn?’), or on the ‘from’ field (if you selected ‘ref wpt?’), or on the ‘brg’ field (if you selected ‘rng/brg from posn?’) (see User Waypoint page at right).

**To enter the position of the user waypoint:**

1. Use \( \text{K} \) and \( \text{O} \) to enter the latitude. You may select either north or south and enter a latitude up to (but not including) 90°. Press \( \text{ENT} \).

2. Use \( \text{K} \) and \( \text{O} \) to enter the longitude. You may select either east or west and enter a longitude up to (but not including) 180°. Press \( \text{ENT} \).

You may also enter a reference waypoint to calculate a bearing and distance.

**To enter the reference waypoint, bearing and distance:**

1. Use \( \text{K} \) and \( \text{O} \) to enter the reference waypoint’s identifier. Press \( \text{ENT} \).

This will display the latitude and longitude of the identifier, if you have not entered the user waypoint’s position. If you have, it will remain unchanged, and the unit will calculate the bearing and distance to the identifier. If you would like to change this information, or did not enter the waypoint position, enter them now using \( \text{K} \) and \( \text{O} \), and \( \text{ENT} \) to accept. All of these functions may be used together to pinpoint the location of the new user waypoint.

If you have chosen to create a waypoint at a certain bearing and distance from your current position, your current position will be displayed, and you will enter the bearing and distance from present position at which you would like the new waypoint to be located. This will calculate the latitude and longitude of the new waypoint. Press \( \text{ENT} \) to accept.
User waypoints may also be created using AutoStore™. This will save your current position as a user waypoint and can instantly be added to any route.

**To AutoStore your current position as a waypoint:**

1. Press NAV and rotate until the Position page is displayed. Press ENT.

This will display the AutoStore page which will allow you to rename the waypoint if you would like and also to choose the route to which it will be added.

**To change the waypoint name or the route of an AutoStore waypoint:**

1. Rotate until the name field or the route number field is highlighted.
2. Enter the new name or route number by using to change the character and to advance the cursor. Press ENT to accept.

If the waypoint name is already used, you will be informed with the message ‘WPT exists ____’. The default waypoint number will be redisplayed. The waypoint will be added to the end of the route you select, or none, if the field is left blank. If the route you choose already contains 31 waypoints, you will be informed with a ‘Route is full’ message. If this occurs, select another route to add waypoints.

**User Comments on Waypoints**

All of the waypoint types contain pages for the user to enter up to two lines of comments for later reference. You may add comments on up to 250 waypoints, which are saved even when the unit is off.

**To enter user comments from any of the waypoint pages:**

1. Rotate while the cursor is not flashing until the ‘Comments’ page is displayed.
2. Press CRSR and rotate to highlight the comment you would like to edit, or the blank field to enter a new one.
3. Use \( \text{K} \) and \( \text{O} \) to enter the comment.
4. Press \( \text{ENT} \) to accept, and repeat, if desired, to enter information on another line.
5. Press \( \text{CLR} \) to complete.

**Proximity Waypoints**

The GPS 150 will allow you to enter up to 9 proximity waypoints, which will display an alert message when you come within a user entered distance of them.

**To create or edit a proximity waypoint:**

1. Press \( \text{WPT} \) and rotate \( \text{O} \) until the Proximity Waypoint page is displayed.
2. Press \( \text{CSR} \) and rotate \( \text{O} \) to highlight the first available field to create a new one, or the desired proximity waypoint.
3. Use \( \text{K} \) and \( \text{O} \) to enter the identifier. It may be an airport, VOR, NDB, intersection, or user waypoint. Press \( \text{ENT} \).

   This will display the Waypoint Confirmation page. Press \( \text{ENT} \) to confirm the waypoint.
4. Use \( \text{K} \) and \( \text{O} \) to enter the distance away from the waypoint that you wish to be alerted. Press \( \text{ENT} \).

   If you enter two proximity waypoints whose alert regions overlap, you will be informed with the message ‘Proximity overlap’. This message will be displayed each time you turn on the GPS 150 as long as the overlap remains.

**WARNING:** If you enter the overlap area you will only be informed of the nearest proximity waypoint.
To delete a waypoint from the Proximity Waypoints page:

1. Rotate \( K \) to display the waypoint you would like to remove.
2. Press \( C \), if necessary, to obtain a cursor.
3. Rotate \( O \) to highlight the waypoint you would like to remove.
4. Press \( \text{CLR} \) to erase the name and then \( \text{ENT} \) to delete.

If you enter the proximity region, a ‘Prox alarm - press NAV’ message will be displayed. Pressing NAV will display the Position page, and the proximity waypoint’s identifier, range and bearing will be listed in the proximity field at the bottom of the page.

**User Waypoint Catalog**

The User Waypoint Catalog is available to quickly scan, edit, activate, rename, or delete user waypoints.

To display the User Waypoint Catalog:

1. Press \( \text{WPT} \) and rotate \( K \) until the User Waypoint Catalog is displayed.
2. Rotate \( O \) to scroll through all of the available user waypoints.

When the User Waypoint Catalog is displayed, notice that any waypoint which is contained in a route or acts as a proximity waypoint is designated. To edit, activate, rename, or delete waypoints, the desired waypoint must be highlighted.

To highlight a waypoint that is displayed on the User Waypoint Catalog:

1. Press \( \text{CLR} \) and rotate \( O \) until the desired waypoint is highlighted.
To edit a waypoint:
1. Press \textbf{ENT} while the waypoint is highlighted to obtain the Waypoint Position page. Edit the waypoint as described on pages 34 & 35.

To activate a user waypoint (perform a direct-to) from the list:
1. Press \textbf{D} while the waypoint is highlighted.

To delete a waypoint from the list (cannot be contained in a route or be a proximity waypoint):
1. Press \textbf{CLR} while the waypoint is highlighted. Press \textbf{ENT} to delete.

To rename a waypoint from the list:
1. Press \textbf{CLR} while the waypoint is highlighted to clear the name. Use \textbf{K} and \textbf{O} to enter a new identifier for the waypoint.
2. Press \textbf{ENT} on the Rename Waypoint Confirmation page to change the name, or press \textbf{CLR} to cancel.

\textbf{Waypoint Comment Catalog}

The Waypoint Comment Catalog lists all waypoints which have user comments.

To review the waypoints with comments:
1. Press \textbf{WPT} and use \textbf{O} to display the Waypoint Comment Catalog page.
2. Rotate \textbf{O} to scroll through the list.

These waypoints may be highlighted, reviewed, changed, etc. just as they would if they were accessed from the Waypoint Menu. The waypoint comments appear first, and other pages can be viewed by rotating \textbf{O}.
Duplicate identifiers for waypoints sometimes exist when identifier names have been used in more than one location. For example, the identifier MA is used in nineteen different locations throughout the world (fewer are contained on the Americas or International databases).

When you enter an identifier (as listed throughout the manual) that is a duplicate, you will be prompted to select which waypoint you desire with a Duplicate Waypoint page BEFORE the Waypoint Confirmation page appears (as shown on the left). The Duplicate Waypoint page will display the number of duplicate waypoints, the identifier, and the region or country in which each waypoint is located. This list is sorted with the nearest waypoint listed first.

To select the desired waypoint on the Duplicate Waypoint page:

1. Rotate \( \mathbb{O} \) to select the desired waypoint and press \( \text{ENT} \) to choose the highlighted waypoint as the desired location.

This displays the Waypoint Confirmation page, and you may continue normal operation.

Locked waypoints exist when a waypoint contained in a route or used as a proximity waypoint is not contained on the NavData Card, or no card is inserted. When this occurs, you will be informed with either a ‘Proximity wpt locked’ or a ‘Route wpt locked’ when the unit is powered up. Additionally, if a waypoint that contains a user comment is locked, you will be informed with a ‘Wpt comment locked’ message on startup.

In these cases, you will not be able to obtain information on or navigate to these waypoints. You may display the identifier of each locked waypoint by highlighting the ‘lockd’ with the cursor and pressing \( \text{ENT} \). Anywhere these waypoints’ identifiers are to be displayed will be replaced with a ‘lockd’ message. You may delete these waypoints from routes, the User Comment Catalog, or the Proximity Waypoint page, but you cannot activate them for navigation.
Section 3
Routes

All routes are created, edited, activated and copied using the <RTE> key. Routes are a series of waypoints flown in order to arrive at the desired destination. The GPS 150 contains two route pages, the Active Route page and the Route Catalog page. Pressing <RTE> will display one of the route pages, and rotating <O> will display the other. The Active Route page contains the following information:

The active leg field displays the beginning and ending waypoint identifiers of the leg you are currently navigating. The first waypoint identifier is the ‘active from’ waypoint. The second waypoint is the ‘active to’ waypoint. The line connecting these waypoints is known as the ‘active leg’ (see diagram at right).

The ‘cum or leg’ field can be selected to display ‘cum’ for cumulative distance and ete, or ‘leg’ to display each leg’s distance and ete. If cumulative is selected, the first leg’s distance will be displayed, and the second leg’s distance will be the first plus the second, and so on. This also applies to the ete field. If leg is selected, each leg’s distance and ete/eta will be displayed. If dtk or eta is displayed in the ete/eta field, it will be unaffected by the cum/leg selection - it will always display the desired track of the leg or the time it will be complete.
To add waypoints to the active route (while on the Active Route page):

1. Make sure the cursor is not flashing. If it is, press \CRS\.
2. Rotate \O\ to display the waypoint you would like to insert the new waypoint BEFORE.
3. Press \CRS\.
4. Rotate \O\ to highlight the waypoint you would like to insert the new waypoint BEFORE.
5. Use \K\ and \O\ to enter the new waypoint identifier. Press \ENT\.

You will be prompted to accept the new waypoint with the Waypoint Confirmation page. If you make a mistake entering the waypoint, or do not wish to add the waypoint, press \CLR\, or press \ENT\ to add the new waypoint.

To display the Route Catalog page:

1. Press \RTE\ and rotate \O\, if necessary.

The Route Catalog page displays the following information:

- **Route number**
- **Route action field**
- **Route length**
- **Parallel track distance selection** (Route 0 only) or **Comments (Routes 1-19)**
- **Origin/Destination identifiers**
- **Parallel trk: L 0.0%**

You can create routes by either adding new waypoints to the active route (if it is empty) as shown on the right, or by editing any of the other 19 routes as described on page 44.
Rotate \( \odot \) to scroll through the available routes. You may perform the following functions on any of the routes in the route action field:

- **Activate** - activate the route for navigation
- **Reverse** - activate a route in reverse order
- **Edit** - create a new route, or edit existing routes
- **Delete** - delete a route
- **Copy** - copy a route to an empty route
- **CPA** - (Closest Point of Approach) calculate the closest point a route passes a waypoint
- **Search** - Perform search and rescue ladder operations

**To activate a route:**

1. Press R and rotate \( \odot \), if necessary, to display the Route Catalog page.
2. Rotate \( \odot \) until the route you would like to activate is displayed.
3. Press ENT and rotate \( \odot \) until 'activate?' is displayed. Press E.

If the route is empty, you will be informed with a 'Route is empty' message. When any route is activated, it is automatically copied to route 0. Route 0 is always the active route. Before you create a new route 0, or edit route 0, be sure to copy it to another route, or it will be deleted. After traveling a route, or creating one using AutoStore™ (see page 36), you can activate the route in reverse order to return to the starting point quickly and easily.

**To activate a route in reverse order:**

1. Press R and rotate \( \odot \), if necessary, to display the Route Catalog page.
2. Rotate \( \odot \) until the route you would like to reverse is displayed.
3. Press CRSH and rotate \( \odot \) until 'reverse?' is displayed. Press E.

This will copy the route in reversed order to route 0 and display the Active Route page.
To edit a route (add or delete waypoints):

1. Press \( \text{RTE} \) and rotate \( \circ \), if necessary, to display the Route Catalog page.
2. Rotate \( \circ \) until the route you would like to edit is displayed.
3. Press \( \text{CISR} \) then \( \text{ENT} \) when 'edit?' is highlighted.

This will display the Route Review page.

To add a waypoint:

1. Rotate \( \circ \) until the waypoint you would like to insert the new waypoint BEFORE is displayed.
2. Press \( \text{CISR} \) and use \( \circ \) to highlight the above waypoint.
3. Use \( \circ \) and \( \circ \) to enter the new waypoint identifier. Press \( \text{ENT} \).

The GPS 150 will display the Waypoint Confirmation page, or allow you to modify the waypoint, if it is a new user waypoint. (See pages 34 & 35 for user waypoint editing.)

3. Press \( \text{ENT} \) to accept.

You may repeat to enter more waypoints, or press \( \text{CISR} \) to finish.

To delete a waypoint:

1. Press \( \text{CISR} \) and rotate \( \circ \) until the waypoint you would like to delete is highlighted.
2. Press \( \text{CLR} \) to clear the name, then press \( \text{ENT} \) to delete.

You may repeat to delete more, or press \( \text{CISR} \) to finish.

To delete an entire route:

1. Press \( \text{RTE} \) and rotate \( \circ \), if necessary, to display the Route Catalog page.
2. Rotate \( \circ \) until the route you would like to delete is displayed.
3. Press \( \text{CISR} \) and rotate \( \circ \) to display 'delete?'. Press \( \text{ENT} \) to delete, or \( \text{CLR} \) to cancel.
To copy a route:

1. Press R and rotate O, if necessary, to display the Route Catalog page.
2. Rotate O until the route you would like to copy TO is displayed. (The route must be empty.)
3. Press CRSR and rotate O to display 'copy?'. Press ENT.
4. Use O to select the route you would like to copy from. The origin/destination identifiers will be displayed for your reference. Press ENT to copy the route.

The GPS 150 will also calculate the closest distance that a route will pass a waypoint. This is helpful when creating a new waypoint on your route referenced to a NAVAID. See page 46 for a diagram of the CPA function.

To calculate the closest point of approach (CPA) for any route:

1. Press R and rotate O, if necessary, to display the Route Catalog page.
2. Rotate O until the desired route is displayed.
3. Press CRSR and rotate O to display 'cpa?'. Press ENT.
4. Use O and CRSR to enter the identifier of the waypoint from which the distance will be calculated.
5. Press ENT and the bearing and distance of the waypoint to the closest point on the route will be displayed. Press ENT to accept and insert into the route.

If the waypoint does not fall between the waypoints on the route, you will be informed with a 'Invalid CPA wpt ____' message. If the waypoint cannot be added to memory, you will be informed with a 'Wpt memory full' message. If you attempt to insert the CPA waypoint in a route that already contains 31 waypoints, you will be informed with the message 'Route is full'. The CPA waypoint will still be stored in the database.
The following diagram displays how the CPA function works. The route is from KDAL to KLIT, and the user desires to create a waypoint on the route in reference to TXK. The GPS 150 calculates the closest point the route comes to TXK, which the unit calls TXKO. The unit will display TXKO's range and bearing from TXK.

**Closest Point of Approach (CPA)**

The GPS 150 will attempt to match the NAVAIDs identifier to create a new identifier for the CPA waypoint. The GPS 150 will always add a numeral as the last character in the new identifier.
Search and rescue operations

The GPS 150 will also guide you on search and rescue operations, navigating in a ladder pattern to maximize coverage and minimize navigational planning. This is done in reference to two waypoints, called the anchor waypoints. The first leg of the route will be a line connecting the anchor waypoints. The increment distance is the distance between each subsequent leg. The ladder can be created on either side of the waypoints.

To perform a search and rescue operation:
1. Create a route of ONLY two waypoints as described on page 42 or 44.
2. Press R and rotate O, if necessary, to display the Route Catalog page.
3. Rotate O until the 2-waypoint route to use as anchor waypoints is displayed.
4. Press CRSR and rotate O until ‘search?’ is displayed. Press ENT.
5. Use O and O to enter the leg increment value, and R(right) or L(left). Press ENT.
6. If you are restarting a search, rotate O to highlight the initial offset field, and use O and O to enter the initial offset value, and R or L.
7. Press ENT three times to accept the Search and Rescue operation values, and begin navigation.

After activating the search and rescue, you will be informed with an ‘Offset nav in effect’ message each time you traverse the route offset from the anchor waypoints. Upon arrival at the destination waypoint, the leg increment will be added to your present offset, and the route will automatically be reversed.
The GPS 150 will also allow you to add one line of comments to each route, which will be displayed on the Route Catalog page. This excludes route 0, which will display the offset navigation field.

**To add user comments to any route (except route 0):**

1. Press **RTE** and rotate **○**, if necessary, to display the Route Catalog page.
2. Rotate **○** until the route you would like to add comments to is displayed.
3. Press **CLR** and rotate **○** to highlight the bottom row.
4. Use **○** and **△** to enter the comments, and press **ENT**.

To erase, press **CLR** followed by **ENT**.

During en route navigation, it is sometimes desirable to navigate a certain distance away from the 'active leg'. This can help avoid certain airspaces or regions. The GPS 150 will automatically guide you along a parallel track of a route.

**To use offset navigation, or parallel track:**

1. Press **RTE** and rotate **○**, if necessary, to display the Route Catalog page.
2. Rotate **○** until route 0 is displayed. (Parallel track can only be used on the active route).
3. Press **CLR** and use **○** to highlight the parallel track distance field.
4. Use **○** and **△** to enter the distance from the actual route you would like to navigate, and either **R** (right) or **L** (left). Press **ENT**.

Offset navigation is only available on route navigation, not direct-to. When offset navigation is activated, an 'Offset nav in effect' message will be displayed. If you enter too large an offset, you will be informed with the message 'Ofst too big for rte'. If you change the active route in any way, or perform a direct-to, offset navigation will be stopped, and you will be informed with the message 'Offset nav cancelled'. See the diagram on the left for offset navigation reference.
Section 4
Nearest Waypoints

The GPS 150 will locate and display the nine nearest airports, VORs, NDBs, intersections and user waypoints within 200 nautical miles of your current position. In addition, it will also display the two nearest Flight Service Station (FSS) points of communication, and any Special Use Airspace alert information and messages that could affect your flight. SUAs are either controlled or restricted airspace.

To begin viewing the nearest waypoint information:

1. Press \[ \text{NEXT} \].

This will display the nearest airport. The airport shown is subject to the runway surface type and minimum runway length you may have selected. (See Section 5, page 56). To scroll through the next eight nearest waypoints, rotate \[ \text{O} \]. The other nearest waypoints of each type may be viewed by rotating \[ \text{O} \]. For any of the nearest airports, you may examine both the communication frequencies and the runway information directly from the Nearest Airport page.

To view more comm/runway information:

1. Press \[ \text{CLR} \] and rotate \[ \text{O} \] to highlight the comm field or the runway field.
2. Rotate \[ \text{O} \] to scroll through more information, if available.

To perform a direct-to from any of the nearest waypoint pages:

1. Press \[ \text{CLR} \], if necessary, and highlight the identifier by rotating \[ \text{O} \].
2. Press \[ \text{ENT} \].

This will display the Waypoint Confirmation page. To accept, press \[ \text{ENT} \]. To cancel the operation, press \[ \text{CLR} \].
The SUA Alert page will inform you if any restricted or controlled airspace is near or in your flight path, according to the following conditions:

- If your projected course will take you inside an SUA within the next 10 minutes, the message 'SUA ahead < 10 min' will be displayed.
- If you are within two nautical miles of an SUA and your current course will take you inside, the message 'SUA near & ahead' will be displayed.
- If you are within two nautical miles of an SUA and your current course will not take you inside, the message 'Near SUA < 2nm' will be displayed.
- If you have entered an SUA, the message 'Inside SUA' will be displayed.

To view the SUA alerts (if present):

1. Press and rotate to display the SUA Alert page.
2. Rotate to scroll through more information, or more SUAs.

The SUA Alert page contains the following information:

The 'SUA number' field displays which SUA you are viewing. SUAs are listed with 'sua1' being the highest priority, and 'sua9' being the lowest priority from your current position. The GPS 150 will not flash an alert, however, if they have been turned off, or your altitude is such that you will not enter the buffered airspace. Turning off SUA alerts and setting the altitude buffer is covered in Section 5, page 59. ANY SUA that meets the above conditions will be displayed on the nearest pages.

NOTE: The nearest SUA with controlling agency displayed.

The 'Alert type' field displays the corresponding alert message for this SUA, such as near, near and ahead, etc. The ETE (estimated time enroute) will be displayed only if you are projected to enter the airspace. The 'SUA type' field displays the controlled airspace type.

The SUA Alert page will inform you if any restricted or controlled airspace is near or in your flight path, according to the following conditions:

- If your projected course will take you inside an SUA within the next 10 minutes, the message 'SUA ahead < 10 min' will be displayed.
- If you are within two nautical miles of an SUA and your current course will take you inside, the message 'SUA near & ahead' will be displayed.
- If you are within two nautical miles of an SUA and your current course will not take you inside, the message 'Near SUA < 2nm' will be displayed.
- If you have entered an SUA, the message 'Inside SUA' will be displayed.

To view the SUA alerts (if present):

1. Press and rotate to display the SUA Alert page.
2. Rotate to scroll through more information, or more SUAs.

The SUA Alert page contains the following information:

The 'SUA number' field displays which SUA you are viewing. SUAs are listed with 'sua1' being the highest priority, and 'sua9' being the lowest priority from your current position. The GPS 150 will not flash an alert, however, if they have been turned off, or your altitude is such that you will not enter the buffered airspace. Turning off SUA alerts and setting the altitude buffer is covered in Section 5, page 59. ANY SUA that meets the above conditions will be displayed on the nearest pages.

NOTE: The nearest SUA with controlling agency displayed.

The 'Alert type' field displays the corresponding alert message for this SUA, such as near, near and ahead, etc. The ETE (estimated time enroute) will be displayed only if you are projected to enter the airspace. The 'SUA type' field displays the controlled airspace type.

The SUA Alert page will inform you if any restricted or controlled airspace is near or in your flight path, according to the following conditions:

- If your projected course will take you inside an SUA within the next 10 minutes, the message 'SUA ahead < 10 min' will be displayed.
- If you are within two nautical miles of an SUA and your current course will take you inside, the message 'SUA near & ahead' will be displayed.
- If you are within two nautical miles of an SUA and your current course will not take you inside, the message 'Near SUA < 2nm' will be displayed.
- If you have entered an SUA, the message 'Inside SUA' will be displayed.

To view the SUA alerts (if present):

1. Press and rotate to display the SUA Alert page.
2. Rotate to scroll through more information, or more SUAs.

The SUA Alert page contains the following information:

The 'SUA number' field displays which SUA you are viewing. SUAs are listed with 'sua1' being the highest priority, and 'sua9' being the lowest priority from your current position. The GPS 150 will not flash an alert, however, if they have been turned off, or your altitude is such that you will not enter the buffered airspace. Turning off SUA alerts and setting the altitude buffer is covered in Section 5, page 59. ANY SUA that meets the above conditions will be displayed on the nearest pages.

NOTE: The nearest SUA with controlling agency displayed.

The 'Alert type' field displays the corresponding alert message for this SUA, such as near, near and ahead, etc. The ETE (estimated time enroute) will be displayed only if you are projected to enter the airspace. The 'SUA type' field displays the controlled airspace type.
The following SUA types can appear in the SUA type field:

<table>
<thead>
<tr>
<th>Message</th>
<th>Airspace Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>alrt</td>
<td>- Alert</td>
</tr>
<tr>
<td>caut</td>
<td>- Caution</td>
</tr>
<tr>
<td>cl B</td>
<td>- Class B</td>
</tr>
<tr>
<td>cl C</td>
<td>- Class C</td>
</tr>
<tr>
<td>cta</td>
<td>- ICAO Control Area</td>
</tr>
<tr>
<td>dngr</td>
<td>- Danger</td>
</tr>
<tr>
<td>moa</td>
<td>- Military Operations Area</td>
</tr>
<tr>
<td>proh</td>
<td>- Prohibited</td>
</tr>
<tr>
<td>rstd</td>
<td>- Restricted</td>
</tr>
<tr>
<td>tma</td>
<td>- ICAO Terminal Control Area</td>
</tr>
<tr>
<td>trng</td>
<td>- Training</td>
</tr>
<tr>
<td>trsa</td>
<td>- Terminal Radar Service Area</td>
</tr>
<tr>
<td>unsp</td>
<td>- Unspecified</td>
</tr>
<tr>
<td>warn</td>
<td>- Warning</td>
</tr>
</tbody>
</table>

The SUA name is displayed on the center line initially and the controlling agency can be viewed by rotating ☺. You may also view SUA controlling agency communication frequencies by highlighting the controlling airport identifier with the cursor and pressing ENTER. The following are examples of what can appear in the altitude fields:

<table>
<thead>
<tr>
<th>Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>8000ftM</td>
<td>- 8000 feet mean sea level (MSL)</td>
</tr>
<tr>
<td>3000ftA</td>
<td>- 3000 feet above ground level (AGL)</td>
</tr>
<tr>
<td>ground</td>
<td>- ground level</td>
</tr>
<tr>
<td>msl</td>
<td>- mean sea level</td>
</tr>
<tr>
<td>notam</td>
<td>- See Notice to Airmen (NOTAM) for altitude restrictions</td>
</tr>
<tr>
<td>not sp</td>
<td>- Altitude is not specified</td>
</tr>
<tr>
<td>unlimtd</td>
<td>- Altitude is unlimited</td>
</tr>
</tbody>
</table>
All SUA alerts (except for prohibited areas) may be turned on or off to avoid unnecessary alerts. Alerts for prohibited areas will always be displayed. An altitude buffer also may be set to extend the vertical profile of your aircraft to provide earlier warnings when climbing or descending.

For example, if you are 1500 feet above an SUA, and the altitude buffer is set to 1000 feet, you will not be notified with an alert message. Turning the SUA alerts on and off and setting the altitude buffer is covered in Section 5, page 59. The SUA information will still be displayed on the SUA Alert page using the key.

To view any of the other nearest waypoints (VORs, NDBs, intersections, user waypoints and FSSs):

1. Press.
2. Rotate to display the nearest waypoint of each type.
3. When the desired waypoint type is displayed, rotate to scroll through the next eight nearest waypoints of the same type (FSSs will have only two entries).

To perform a direct-to at any time, simply highlight the identifier with the cursor and press. To view more information on the waypoint, highlight the identifier and press. This will take you to the waypoint pages as described in Section 3.

The FSS page displays information on the two nearest FSS points of communication.

To view additional frequency information regarding FSSs:

1. Press and rotate to view additional FSS frequencies.

The FSS page will display 't' and the VOR the FSS transmits through, if applicable. Frequencies which are transmit or receive only are designated with a 't' or 'x', respectively.
Section 5
Unit Settings and Satellite Status

The GPS 150 will allow you to customize many settings to your preferences. Also, it will provide information on the satellites it is currently tracking, which is helpful in alerting you to possible problems with antenna installation, or receiver problems.

All of the GPS 150's settings are accessed using the \textbf{SET} key. After pressing \textbf{SET}, the following pages can be accessed by rotating \textbf{O} when the cursor is not flashing.

- CDI Scale/Arrival Alarm settings
- Route settings (Auto leg sequencing and auto leg selection)
- Magnetic variation setting
- Nearest airport search (Runway length and surface type)
- Battery saver (Timeout delay)
- Trip timer setting
- Navigation units (Distance, speed, position, etc.)
- SUA settings (On or off and altitude buffer)
- Map datums
- I/O Channels 1 & 2 settings
- Arinc 429 Output configuration
- Data transfer
The course deviance indicator (CDI) may be set to deflect full scale at either 5 distance units (mi, nm, km) or 1.25 distance units. This setting will cause the CDI to deflect appropriately when you have cross track error. This page also contains the arrival alarm settings. The arrival alarm can be set to alert the pilot a specified distance from the destination waypoint. When this distance is reached, the message ‘Arrival at ____’ will be displayed.

To change the CDI sensitivity scale and arrival alarm:

1. Press SET and rotate until the CDI Scale/Arrival Alarm page is displayed.
2. Press CRSR and use to select either 5 units or 1.25 units. Press ENT.
3. Use and to enter the arrival alarm distance. Enter zero to turn the alarm off.
4. Rotate to highlight ‘ok?’ . Press ENT to confirm settings.

The GPS 150 automatically sequences the active leg of the current route to the next leg when you pass the ‘active to’ waypoint. This is known as automatic leg sequencing. It will also select the leg of a route nearest your current position when a route is activated. This is known as automatic leg selection. Both automatic leg sequencing and automatic leg selection may be turned off.

To change route settings (auto leg sequencing and selection):

1. Press SET and rotate until the Route Settings page is displayed.
2. Press CRSR and use to turn the auto leg sequencing on or off.
3. Rotate to advance the cursor and use to turn auto leg selection on or off.
4. Press CRSR when finished.
If you turn automatic leg sequencing off, you must manually advance the route you are navigating to the next waypoint.

**To manually sequence the active route legs:**

1. Press and rotate until the Active Route page is displayed.
2. Rotate until the next desired destination waypoint is displayed.
3. Press and rotate to highlight the next destination waypoint.
4. Press . Press to confirm the waypoint.

This will change the leg of the active route, making the selected waypoint the ‘active to’ waypoint.

Similarly, if you turn automatic leg selection off, you must manually select the starting leg.

**To manually select the active (starting leg):**

1. Activate the desired route as described in Section 3, page 43.
2. Rotate until the beginning waypoint of the desired leg is displayed.
3. Press and rotate until the beginning waypoint of the desired leg is highlighted.
4. Press . Press to confirm the waypoint.

An on-route direct-to will provide course guidance to the selected waypoint and then provide guidance to navigate the remaining legs of the route (providing automatic leg sequencing is on).
The next Settings page contains the magnetic variation options. The GPS 150 offers three magnetic variation settings. True, automatic, or user defined magnetic corrections will be applied to all track, course and heading information.

**To set the magnetic variation:**

1. Press \[SET\] and rotate \[O\] until the Magnetic Variation page is displayed.
2. Press \[CRSR\] and rotate \[K\] to select ‘auto mag’, ‘true hdg’ or ‘user mag’.
3. If ‘user mag’ is selected, use \[O\] to highlight the magnetic variation value field and \[K\] and \[O\] to enter the value, and E or W. Press \[ENT\] to accept.
4. Press \[CRSR\] to complete.

If ‘auto mag’ is selected, all heading information will be corrected with the automatic magnetic variation computed by the GPS 150, depending on your position. If you select ‘true hdg’, all heading information will be referenced to true north. If ‘user mag’ is selected, all heading information will be corrected by the value you enter.

When using the nearest function to locate the nine nearest airports, it will display the nine closest airports according to the parameters you may choose. A surface type and minimum runway length may be selected to prevent airports with small runways, or runways that are not of appropriate surface from being displayed.

**To set the minimum runway length and runway surface:**

1. Press \[SET\] and rotate \[O\] until the Nearest Airport Search page is displayed.
2. Press \[CRSR\] and use \[K\] and \[O\] to enter the minimum runway length required for your aircraft to land (up to 9999 units). Press \[ENT\].
3. Rotate \[O\] to display the surface selection you desire. Choices include:
   - any surface
   - soft/hard surface
   - hard only surface
   - water only surface
4. Rotate \[O\] to select ‘ok?’ and press \[ENT\] to confirm. Press \[CRSR\] to complete.
In the event of power failure, the GPS 150 can automatically turn off the display while using battery power, if desired. This will greatly increase the GPS 150's battery life while navigating without aircraft power. During the time the display is off, the GPS 150 will continue to navigate and track satellites, but not display information until a key is pressed, or a knob is turned.

To set the display timeout:

1. Press and rotate until the Battery Saver page is displayed.
2. Press and rotate until the desired value is displayed (0, 30, 60, or 90 seconds). Entering 0 will leave the display on at all times.
3. Press to complete.

The trip timer (described in Section 1, page 20) can be configured to run when the power is on, or when your ground speed exceeds a specified minimum.

To change the trip timer settings:

1. Press and rotate until the Trip Timer Settings page is displayed.
2. Press and rotate to display either 'pwr is on' or 'gs exceeds'.
3. If you choose 'pwr is on', press to complete.
4. If you choose 'gs exceeds', rotate to highlight the speed field.
5. Use and to enter the ground speed to be used as the minimum.
6. Press to accept, and to complete.

Battery Saver page set to 30 second display timeout.

Trip Timer Settings page

Trip timer settings run when pwr is on

Trip timer settings run when gs exceeds 100 knots.
The GPS 150 will display all distance, position, speed, fuel type, fuel quantity, altitude, pressure and temperature fields in several different measuring systems.

To change the measurement units:

1. Press \( \text{SET} \) and rotate \( \circ \) until the Navigational Units page is displayed.
2. Press \( \text{CPRS} \) and rotate \( \circ \) to highlight the field you would like to change.
3. Rotate \( \circ \) to change the unit.
4. Rotate \( \circ \) to highlight another field, or press \( \text{CPRS} \) when finished.

The available units are:

- **position**: degrees, minutes and seconds (dms) \([hddd^\circ \ mm' \ ss'']\)
  
  degrees and minutes (dm) \([hddd^\circ \ mm.mmm']\)

- **altitude**: feet (ft)

- **vertical speed**: feet per minute (fpm)

- **nav units**: nautical miles and knots (nm, kt)

- **statute miles and miles per hour** (mi, mh)

- **kilometers and kilometers per hour** (km, kh)

- **fuel**: gallons (gl)

- **fuel type**: aviation gas (avgs)

- **imperial gallons** (ig)

- **kilograms** (kg)

- **jet fuel type A** (jetA)

- **pounds** (lb)

- **jet fuel type B** (jetB)

- **liters** (lt)

- **pressure**: inches of mercury (hg)

- **temperature**: degrees Fahrenheit (°F)

- **millibars** (mb)

- **degrees Celsius** (°C)
The GPS 150 will allow you to turn the SUA alert messages on or off. This will not affect the airspace being listed on the SUA Alert page, it will simply turn off the alert messages when you are approaching or near an SUA. You can turn off alerts for the following airspaces:

- **class B / cta**: ICAO control area
- **moa**: Military operations area
- **class C / tma**: ICAO Terminal Control Area
- **other**: Other areas
- **rstcd**: Restricted areas

Other areas include alert, caution, danger, training, unspecified, unknown and warning airspaces.

The ‘alt’ field is an altitude buffer which may be set so that SUA alerts do not appear if you are a given vertical distance above or below an SUA.

For example, if the buffer is set at 500 feet, and you are at least 500 vertical feet away from an SUA and NOT projected to enter it, then you will not be notified with an SUA alert message.

**To set the warnings or change the altitude buffer:**

1. Press SET and rotate until the SUA Settings page is displayed.
2. Press CRSR and rotate to highlight the field you would like to change.
3. Rotate to change to ‘on’ or ‘off’.
4. To change the altitude buffer, highlight the buffer value, and use and to change the data. Press ENT to accept.
5. Press CRSR to complete.
The GPS 150 contains over 100 map datums for you to use when navigating with the GPS 150. By default, your GPS 150 calculates positions using the WGS-84 map datum. If you are using charts based on another datum, you must set the GPS 150 to use that datum if you are using the coordinates provided on that chart. Using the WGS-84 datum on the GPS 150 while using a different datum for maps or other navigation devices could result in significant differences in position information.

If you are using maps for reference only, the GPS 150 will provide correct navigation guidance to the waypoints contained in the database regardless of the datum selected.

To change the map datum to one listed in Appendix E:

1. Press SET and rotate until the Map Datum page is displayed.
2. Press CRSR to highlight the current map datum.
3. Rotate to change the datum.
4. Press CRSR to complete.

To create a user datum:

1. Press SET and rotate until the Map Datum page is displayed.
2. Press CRSR and rotate to highlight ‘Define user datum?’ Press ENT.
3. Enter the 5 parameters of the map datum using and . Press ENT to accept a field. The sign of each value (+/-) should follow the convention: WGS84-local geodetic system.
4. Rotate to highlight ‘ok?’ and press ENT.
5. To activate the user datum, select ‘USER’ on the map datum page as described above.
The GPS 150 features two RS-232 data ports which can be configured to accept input from altitude serializers, fuel flow systems, fuel/air data computers or output aviation data to moving maps, fuel flow sensors, or the GARMIN PC 150 software kit.

Channel 1 **input** selections correspond to the following:

- Icarus Model 3000 Mode C serializer (icarus-alt)
- Shadin serial altitude (shadin-alt)
  - 8800T Series Encoder System
  - 9000T Serializer System
  - 9200T Series Serializer System
- Shadin fuel information (shadin-fuel)
  - Shadin 91204XT Digital Fuel Management System
  - Shadin 91053XT Digital Fuel Management System
- Fuel information (arnav/ei-fuel)
  - Arnav Model FC-10 Fuel Computer
  - Arnav Model FT-10 Fuel Totalizer
  - Electronics International Model FP-5L Fuel Flow Computer
- Shadin Model 962801 Fuel/Air Data Computer (shadin-fac)

Channel 1 **output** selection corresponds to the following:

- Serial position, velocity, and navigation data (aviation)
  - Argus Model 3000 Moving Map
  - Argus Model 5000 Moving Map
  - Argus Model 7000 Moving Map
  - Stormscope, Series II with Navaid, Moving Map
  - Shadin 91204X[T] Digital Fuel Management System
  - Shadin 91053X[T] Digital Fuel Management System
  - Shadin Model 962801 Fuel/Air Data Computer
  - Electronics International Model FP-5L Fuel Flow Computer
To change the Input/Output settings (channel 1 or channel 2):

1. Press SET and rotate until the I/O Channel 1 (or 2) page is displayed.
2. Press CRSR and rotate to select the field you would like to change.
3. Rotate to select the proper setting.
4. Rotate to highlight another, or CRSR to complete.
5. To use the PC 150 interface kit, the GPS 150 channel 2 settings must be:
   in: off, out: plotting. Set the baud rate to 9600. Press CRSR to complete.

Channel 2 Setup for use with the PC 150 interface kit.

The GPS 150 can also output data to EFIS and other ARINC 429 devices used for navigation. The unit may be configured to output the data with or without GAMA labels. GAMA labels are required if the device uses route specific information such as identifiers, location, etc., or to use the nearest waypoint information.

To set the ARINC 429 output:

1. Press SET and rotate until the ARINC 429 Output page is displayed.
2. Press CRSR and rotate to change to ‘off’, ‘with GAMA labels’, or ‘w/o GAMA labels’.
3. Press CRSR to complete.
The GPS 150 can also interface to another GPS 150 to transfer user waypoints, settings and other user information between units. These operations are performed from the Data Transfer page.

**To receive user data from another GPS 150:**

1. Press SET and rotate until the Data Transfer page is displayed.
2. Press CRSP and rotate to highlight ‘Receive?’. Press ENT.

You may choose to ‘Update user data?’ or ‘Replace user data?’. Updating user data will update ONLY the data received from the other GPS 150, and other data will not be affected. Replacing user data will erase the user data contained in the GPS 150 and replace it with data received from the other GPS 150. This only applies to data which can be updated by the user, such as user waypoints and routes.

3. Use to select either ‘Replace user data?’ or ‘Update user data?’. Press ENT.

The GPS 150 will now begin receiving data from the other GPS 150. Press ENT to stop.

**To download user data to another GPS 150:**

1. Press SET and rotate until the Data Transfer page is displayed.
2. Press CRSP and rotate to highlight ‘Download?’. Press ENT.

The GPS 150 will now begin transmitting data to the other GPS 150. Press ENT to stop.
The GPS 150 is designed to allow the user to obtain satellite information at any time to monitor signal strengths and relative accuracy of the position information the receiver is calculating. This is especially helpful when you might be experiencing a problem with low signal levels due to poor coverage or installation problems.

To obtain receiver status and satellite signal levels:

1. Press \text{STAT} (while the \text{U} is NOT flashing).

This will display the Receiver Status page:

- **EPE/DOP** field
- **Satellites in view**
- **Signal strength of satellite being tracked (1-9)**
- **Satellite in view but not receiving signal**

Dilution of precision (DOP) is a measure of the satellite geometry quality and therefore, the relative accuracy of your position, with 1 meaning good geometry and 10 meaning poor. Estimated position error (EPE) is an overall measure of your positional accuracy using signal and data quality, receiver tracking status and DOP as factors in computing the value displayed.

To view or change the EPE/DOP field:

1. Press \text{STAT}.
2. If the desired field (EPE or DOP) is not displayed, press \text{CIR}.
3. Rotate \text{CIR} to change between 'epe' and 'dop'. Press \text{CIR} to complete.
The Receiver Status field can display the following messages:

**Search Sky** - The GPS 150 is searching the sky for visible satellites. You will be informed with the message ‘Searching the sky’.

**Acquiring** - The GPS 150 is acquiring satellites for navigation.

**2D Nav** - The GPS 150 is in 2D navigation mode. If your installation does not include an altitude serializer, you must enter the altitude manually.

**3D Nav** - The GPS 150 is in 3D navigation mode and will compute altitude.

**Simulator** - The GPS 150 is in simulator mode, which should only be used for practice and trip planning. **NEVER** use simulator mode for actual navigation.

**Poor Cvrge** - The GPS 150 cannot acquire sufficient satellites for navigation.

**Need Alt** - The GPS 150 needs altitude in order to start/continue navigation. Select the Position page and enter the altitude. (See Section 1 for more information.)

**Not Usable** - The GPS 150 is unusable due to incorrect initialization or abnormal satellite conditions. Turn the unit off and back on again. If this does not help, contact an authorized GARMIN dealer for service.
The GPS 150 will also display information regarding each satellite in view.

To view individual satellite information:

1. Press STAT (while the U is NOT flashing).
2. Press CRSR to obtain a cursor.
3. Rotate ○ to highlight the satellite you wish to view.
4. Press ENT.

The Satellite Detail page will display the satellite number, elevation angle, rising/set-ting indication, user range accuracy (URA), azimuth and signal strength. Other satellites may also be viewed:

5. Rotate ○ to view information on the next satellite.
6. Rotate ○ and press CRSR on the Receiver Status page when you are finished.
Appendix A
NavData® and User Data Installation and Operation

The NavData card supplied with your GPS 150 can be installed or removed ONLY when the GPS 150 is turned off.

Insert the card with the thumb tab at the top, and the beveled corner on the bottom right.

The User Data card can be used to make a backup of user waypoints, routes, checklists, proximity alarms, etc. for later reference and use. The UserData card can also be used to transfer the same information to another GPS 150.

To save the user data to the User Data card:

1. Install the UserData card while the unit is off.
2. Turn the GPS 150 on by rotating clockwise.
3. Rotate to highlight 'Save user data?'.
4. Press Ent.

The message 'Saving to card' is displayed while the GPS 150 transfers all user data to the User Data card. It may take a few minutes to complete the transfer. When all user data is transferred, the GPS 150 will instruct you to turn the unit off, remove the user card and insert the Jeppesen NavData card. After this is complete, the GPS 150 is ready for normal operation.

User Data card transfers.

User Data cards are available from your local GARMIN dealer.
To restore user data from a User Data card to the GPS 150:

1. Install the User Data card while the unit is off.
2. Turn the GPS 150 on by rotating clockwise.
3. Rotate to highlight ‘Restore user data?’ and press ENT.

The GPS 150 will ask you which type of data to replace. You may choose checklists, scheduler messages, user waypoints, proximity waypoints, routes, waypoint comments, or all data.

4. Rotate to select the type of data to replace.

You may either replace or update the information in the database. Replacing the data will replace ALL user data with the data from the card. Updating the data will not delete unrelated material, but will only change what is necessary to use the data received from the User Data card.

5. Rotate to select either ‘Replace?’ or ‘Update?’.

6. Press ENT to begin transferring data to the GPS 150. The GPS 150 will now transfer all of the data requested. This may take a few minutes.

7. To continue with more data transfer types, repeat steps 4, 5 and 6; otherwise, press ENT when ‘ok?’ is highlighted.

8. Turn the GPS 150 off and replace the User Data card with a NavData® card. The GPS 150 is now ready for normal operation.

The GPS 150 may be powered from an optional AC adaptor when used away from the aircraft. The AC adaptor will both power the unit, and charge the NiCad battery. With the GPS 150 off, a full charge will occur in 12-14 hours. The GPS 150 should not remain connected to the AC adaptor for more than 24 hours continuously. Connect the AC adaptor as shown on the left.
Appendix B
Installation, Removal and Maintenance of the GPS 150

The aviation rack is designed to allow easy removal of the GPS 150. This enables you to use the unit at home to create routes, interface to a PC, etc.

To install the GPS 150 into the aviation rack:
1. Insert a 3/32" allen wrench in the small hole adjacent to the dual knob.
2. Rotate the wrench counterclockwise until it stops to ensure the pawl latch is in the proper position.
3. Insert the GPS 150 into the aviation rack and rotate the wrench clockwise to secure the unit.

To ensure proper connector seating, gently press on the left side of the unit until tightened.

To remove the GPS 150 from the aviation rack:
1. Insert a 3/32" allen wrench into the small hole adjacent to the dual knob.
2. Rotate the wrench counterclockwise until the GPS 150 can be removed from the rack.
Maintenance

The GPS 150 is built to exacting standards and does not require user maintenance. Should the faceplate and lens require cleaning, use a soft cloth and non-abrasive cleaner.

The user data is maintained by an internal battery with a projected life of 3 to 5 years. If the GPS 150 detects a low memory battery, you will be informed with the message 'Memory battery low'. Failure to replace the battery may result in loss of data each time you turn your unit off. This will GREATLY increase satellite acquisition time and no user data will be saved. This condition will be accompanied by the message 'Stored data lost'.

The GPS 150 contains a crystal oscillator, which may drift after many years of operation. If the unit detects excessive oscillator drift, you will be informed with the message 'Osc needs adjustment'. When this occurs, contact an authorized GARMIN service center for service. Failure to do so may result in severely degraded acquisition performance.
Appendix C

GPS 150 Messages and Abbreviations

The GPS 150 uses the Message Page to communicate important information to you. Some messages are advisory in nature, others are warnings that may require your intervention. This appendix provides a complete list of GPS 150 messages and their meanings.

Altitude input fail - The altitude serializer input is not available to the GPS 150. Check the I/O settings and/or the serializer installation.

Approaching offset _____ - You are less than one minute from reaching the indicated waypoint offset by the parallel track distance. You may use the CTS option on the CDI page to help set the autopilot heading if a course change is necessary.

Approaching _____ - You are less than one minute from reaching the indicated waypoint. You may use the CTS option on the CDI page to help set the autopilot heading if a course change is necessary.

Arrival at _____ - Your craft has entered the arrival alarm circle for the indicated waypoint.

Arrival at offset _____ - Your craft has entered the arrival alarm circle for the indicated waypoint offset by the parallel track distance.

Battery low - The battery pack is low on power. The battery pack should be recharged for continued operation.

Battery reqs service - A problem has been detected in the battery pack. The unit should be taken to an authorized GARMIN service center.

Cannot chng actv wpt - An attempt has been made to modify the position of the ‘active to’ or ‘active from’ waypoint. The GPS 150 will not allow the modifications.

Cannot nav lockd rte - An attempt has been made to activate a route containing a locked waypoint. The GPS 150 cannot perform navigation in this situation.

Cannot offset goto rte - An attempt has been made to engage the offset navigation feature while the GPS 150 is navigating using a single waypoint route. The GPS 150 will not allow offset navigation in this situation.
<table>
<thead>
<tr>
<th>Message Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checklist is full</td>
<td>The selected checklist is full. No new items can be added until existing items are deleted.</td>
</tr>
<tr>
<td>Collecting data</td>
<td>The GPS 150 is collecting orbital data while searching the sky. The antenna should have a good view of the sky and the GPS 150 should be allowed to finish data collection before turning the unit off.</td>
</tr>
<tr>
<td>Comment memory full</td>
<td>The waypoint comment memory is full. You must delete existing waypoint comments before adding new ones.</td>
</tr>
<tr>
<td>Data card failed</td>
<td>The GPS 150 has detected a problem with the data card. The data is not usable and the card should be returned to an authorized GARMIN service center.</td>
</tr>
<tr>
<td>Data card write fail</td>
<td>The user data card failed to program.</td>
</tr>
<tr>
<td>Degraded accuracy</td>
<td>The accuracy of the GPS 150 position is degraded beyond 500 meters due to satellite geometry or data quality. Additional cross checking should be performed by the user to verify the integrity of the GPS 150 position.</td>
</tr>
<tr>
<td>Do not use for nav</td>
<td>The GPS 150 is in the simulator mode and must not be used for actual navigation.</td>
</tr>
<tr>
<td>Final altitude alert</td>
<td>The suggested altitude is within 1000 feet of the final altitude entered on the VNAV Planning page.</td>
</tr>
<tr>
<td>Fuel/Air input fail</td>
<td>The fuel and/or air data input is not available to the GPS 150. Check the I/O settings or fuel/air data system.</td>
</tr>
<tr>
<td>Inside SUA</td>
<td>The unit has entered a Special Use Airspace.</td>
</tr>
<tr>
<td>Invalid CPA wpt ___</td>
<td>The closest point of approach cannot be created from the waypoint entered on the CPA Page. This occurs when the computed point does not fall on one of the route legs, or when a unique waypoint name for the closest point of approach cannot be found.</td>
</tr>
<tr>
<td>Invalid copy route</td>
<td>A non-empty route was selected for a copy operation. A route must be empty before another route can be copied to it.</td>
</tr>
<tr>
<td>Invalid CPA route</td>
<td>The selected route contains less than two waypoints and cannot be used for CPA operations.</td>
</tr>
</tbody>
</table>
**Invalid SAR route** - The selected route does not contain exactly two waypoints and cannot be used for SAR operations.

**Leg not smoothed** - The upcoming leg is too short for smooth waypoint transitions. Expect a rapid change in the CDI.

**Memory battery low** - The battery that sustains user memory is low and should be replaced by an authorized GARMIN service center as soon as possible. Failure to do so may result in loss of stored data, including all user waypoints and routes.

**Near SUA < 2 nm** - Your position is within 2 nautical miles of an SUA and your current course will NOT take you inside.

**Need alt - press NAV** - The GPS 150 needs altitude input in order to start and/or continue 2D navigation. Press the NAV key and enter your antenna altitude on the Position page. The altitude you enter should be as accurate as possible. An inaccurate altitude will directly translate into inaccurate position information.

**No altitude input** - The GPS 150 has failed to receive altitude data from the serializer.

**Offset nav cancelled** - Offset navigation has been cancelled due to a direct-to operation or modification of the active route.

**Offset nav in effect** - Offset navigation mode is in effect.

**Ost too big for rte** - The parallel track distance is too large for the active route.

**Osc needs adjustment** - The GPS 150 has detected excessive drift in its internal crystal oscillator which may result in longer acquisition time. The unit should be taken to an authorized GARMIN service center immediately.

**Poor GPS coverage** - The GPS 150 cannot acquire sufficient satellites necessary to provide navigation.

**Prox alarm-press NAV** - Your craft has penetrated the alarm circle of a proximity waypoint. Press NAV to see the bearing and distance to the proximity waypoint.

**Proximity overlap** - The circles defined by two proximity waypoints overlap. When entering the area of the overlap, the GPS 150 will warn you of the closest proximity waypoint, but not both. You should be certain this condition is desirable.
**APPENDIX C**

**GPS 150 Messages**

- **Proximity wpt locked** - At least one proximity waypoint is locked because the waypoint has been removed from the Jeppesen NavData®, the data card is missing, or the data card has failed.

- **Proximity wpt moved** - One or more proximity waypoints were moved at least 0.33 arc minutes due to a database change.

- **Proximity wpt deleted** - One or more proximity waypoints were deleted while receiving data from the PC 150 Interface Kit.

- **Pwr down and re-init** - The GPS 150 is unusable until power has been cycled and the unit re-initialized. Abnormal satellite conditions may exist.

- **RAM failed** - The GPS 150 has detected a failure in its internal memory. If the message persists, the GPS 150 is unusable and should be taken to an authorized GARMIN service center.

- **Ready for navigation** - The GPS 150 is ready for navigation.

- **Received invalid wpt** - A waypoint was received in an upload operation that has an invalid identifier or position.

- **Receiver failed** - The GPS 150 has detected a failure in the receiver hardware. If the message persists, the GPS 150 is unusable and should be taken to an authorized GARMIN service center.

- **ROM failed** - The GPS 150 has detected a failure in its permanent memory. If this message occurs, the unit is unusable and should be taken to an authorized GARMIN service center.

- **Route is empty** - An attempt has been made to activate an empty route.

- **Route is full** - An attempt has been made to add more than 31 waypoints to a route. The GPS 150 will not allow more than 31 waypoints per route.

- **Route wpt deleted** - One or more route waypoints were deleted while receiving data from the optional PC150 Interface Kit.

- **Route wpt locked** - At least one route waypoint is locked because the waypoint has been removed from the Jeppesen NavData®, the data card is missing, or the data card has failed.
Route wpt moved - One or more route waypoints were moved at least 0.33 arc minutes due to a database change.
Searching the sky - The GPS 150 is in the search-the-sky mode. Allow the unit to complete data collection before turning it off.
Start altitude chng - The altitude change entered on the VNAV Planning page is about to begin.
Steep turn ahead - This message appears approximately one minute prior to a turn that requires a bank angle in excess of 25 degrees in order to stay on course.
Stored data lost - Stored user data, including waypoints, routes and satellite orbital data have been lost due to a low memory battery, or inadvertant master reset.
SUA ahead < 10 min - The projected course and current speed will take you inside an SUA within the next 10 minutes.
SUA near & ahead - Your position is within two nautical miles of an SUA and its current course will take you inside.
Timer expired - The approach timer has expired.
User data RX started - Data receive operations have started.
Usr data TX complete - Data transmit operations are complete.
VNAV cancelled - The VNAV function has been cancelled due to a change in the active route.
WGS 84 datum selectd - The system map datum was changed to WGS 84.
Wpt comment locked - At least one waypoint comment is locked because the waypoint has been removed from the Jeppesen NavData®, the data card is missing, or the data card has failed.
Wpt exists _____ - You have entered a waypoint name on the AutoStore™ Page or User Waypoint Catalog Page that already exists in memory. Enter a waypoint name that does not exist.
Wpt memory full - The waypoint memory is full. You should delete unused waypoints to make room for new waypoints.
This section of Appendix C provides a complete list of GPS 150 abbreviations and their meanings.

ALT- Altitude
APP- Approach
APR- Approach
APT- Airport Waypoint
ARV- Arrival
ATF- Aerodrome Traffic Frequency
ATS- Automatic Terminal Information Service (ATIS)
AVGS- Aviation gas
AZM- Azimuth (bearing)
BRG- Bearing
CAS- Calibrated Airspeed
CDI- Course Deviation Indicator
CL B- Class B
CL C- Class C
CLR- Clearance Delivery
CPA- Closest Point of Approach
CTA- ICAO Control Area
CTAF- Common Traffic Advisory Frequency
CTF- Common Traffic Advisory Frequency
CTS- Course To Steer
CUM- Cumulative
DALT- Density Altitude
DEG- Degrees
DEP- Departure
DIS- Distance To Waypoint
DME- Distance Measuring Equipment
DOP- Dilution of Precision
DTK- Desired Track
ELEV- Elevation
ENDUR- Endurance
EPE- Estimated Position Error
ESA- Enroute Safe Altitude
ETA- Estimated Time of Arrival
ETE- Estimated Time Enroute
FLOW- Fuel Flow Rate
FOB- Fuel On Board
FPM- Feet Per Minute
FR- From
FSS- Flight Service Station
FT- Feet
FT- Full time
GL- Gallons
GND- Ground
GPS- Global Positioning System
GS- Ground Speed
HDG- Heading
HG- Inches of Mercury
IALT- Indicated Altitude
ILS- Instrument Landing System
IG- Imperial gallons
INT- Intersection Waypoint
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>JET A</strong></td>
<td>Jet fuel - Type A</td>
</tr>
<tr>
<td><strong>JET B</strong></td>
<td>Jet fuel - Type B</td>
</tr>
<tr>
<td><strong>KH</strong></td>
<td>Kilometers Per Hour</td>
</tr>
<tr>
<td><strong>KM</strong></td>
<td>Kilometers</td>
</tr>
<tr>
<td><strong>KT</strong></td>
<td>Knots</td>
</tr>
<tr>
<td><strong>LB</strong></td>
<td>Pounds</td>
</tr>
<tr>
<td><strong>LCL</strong></td>
<td>Local</td>
</tr>
<tr>
<td><strong>LEN</strong></td>
<td>Length</td>
</tr>
<tr>
<td><strong>LFOB</strong></td>
<td>Leftover Fuel On Board</td>
</tr>
<tr>
<td><strong>LFLOW</strong></td>
<td>Left fuel flow</td>
</tr>
<tr>
<td><strong>LOC</strong></td>
<td>Localizer</td>
</tr>
<tr>
<td><strong>LT</strong></td>
<td>Liters</td>
</tr>
<tr>
<td><strong>MAG VAR</strong></td>
<td>Magnetic Variation</td>
</tr>
<tr>
<td><strong>MB</strong></td>
<td>Millibars Of Pressure</td>
</tr>
<tr>
<td><strong>MF</strong></td>
<td>Mandatory Frequency</td>
</tr>
<tr>
<td><strong>MH</strong></td>
<td>Statute Miles Per Hour</td>
</tr>
<tr>
<td><strong>MI</strong></td>
<td>Statute Miles</td>
</tr>
<tr>
<td><strong>MIN</strong></td>
<td>Minimum</td>
</tr>
<tr>
<td><strong>MIN</strong></td>
<td>Minutes</td>
</tr>
<tr>
<td><strong>MOA</strong></td>
<td>Military Operations Area</td>
</tr>
<tr>
<td><strong>MPM</strong></td>
<td>Meters Per Minute</td>
</tr>
<tr>
<td><strong>MPS</strong></td>
<td>Meters Per Second</td>
</tr>
<tr>
<td><strong>MSA</strong></td>
<td>Minimum Safe Altitude</td>
</tr>
<tr>
<td><strong>MT</strong></td>
<td>Meters</td>
</tr>
<tr>
<td><strong>MUL</strong></td>
<td>Multicom</td>
</tr>
<tr>
<td><strong>NDB</strong></td>
<td>NDB Waypoint</td>
</tr>
<tr>
<td><strong>NM</strong></td>
<td>Nautical Miles</td>
</tr>
<tr>
<td><strong>NP</strong></td>
<td>Non-precision</td>
</tr>
<tr>
<td><strong>NR</strong></td>
<td>Nearest</td>
</tr>
<tr>
<td><strong>OBS</strong></td>
<td>Omni-directional Bearing Select (Inbound Course Select)</td>
</tr>
<tr>
<td><strong>OTH</strong></td>
<td>Other</td>
</tr>
<tr>
<td><strong>ºC</strong></td>
<td>Degrees Celsius</td>
</tr>
<tr>
<td><strong>ºF</strong></td>
<td>Degrees Fahrenheit</td>
</tr>
<tr>
<td><strong>PC</strong></td>
<td>Pilot Controlled</td>
</tr>
<tr>
<td><strong>PRES</strong></td>
<td>Barometric Pressure (Altimeter setting)</td>
</tr>
<tr>
<td><strong>PROX</strong></td>
<td>Proximity</td>
</tr>
<tr>
<td><strong>PRX</strong></td>
<td>Proximity</td>
</tr>
<tr>
<td><strong>PT</strong></td>
<td>Part Time</td>
</tr>
<tr>
<td><strong>PTX</strong></td>
<td>Pre-Taxi</td>
</tr>
<tr>
<td><strong>PWR</strong></td>
<td>Power</td>
</tr>
<tr>
<td><strong>RDR</strong></td>
<td>Radar</td>
</tr>
<tr>
<td><strong>REQ</strong></td>
<td>Required</td>
</tr>
<tr>
<td><strong>RF</strong></td>
<td>Reference</td>
</tr>
<tr>
<td><strong>RFLOW</strong></td>
<td>Right fuel flow</td>
</tr>
<tr>
<td><strong>RNG</strong></td>
<td>Range</td>
</tr>
<tr>
<td><strong>RNWY</strong></td>
<td>Runway</td>
</tr>
<tr>
<td><strong>RSTCD</strong></td>
<td>Restricted</td>
</tr>
<tr>
<td><strong>RSV</strong></td>
<td>Reserves</td>
</tr>
<tr>
<td><strong>RTE</strong></td>
<td>Route</td>
</tr>
</tbody>
</table>
## APPENDIX C
### GPS 150 Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RX-</td>
<td>Receive only</td>
</tr>
<tr>
<td>SAR-</td>
<td>Search And Rescue</td>
</tr>
<tr>
<td>SEC-</td>
<td>Seconds</td>
</tr>
<tr>
<td>SEQ-</td>
<td>Sequence</td>
</tr>
<tr>
<td>SGL-</td>
<td>Signal</td>
</tr>
<tr>
<td>SLCT-</td>
<td>Select</td>
</tr>
<tr>
<td>SRFC-</td>
<td>Surface</td>
</tr>
<tr>
<td>STR-</td>
<td>Steer To</td>
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Specifications

PHYSICAL

Size: 6.25”W x 5.8”D x 2”H (159mm x 147mm x 51mm)
Weight: 34 ounces (0.96kg)
Rack Size: 6.32”W x 5.64”D x 2”H (161mm x 143mm x 51mm)
Rack Weight: 11 ounces (0.31kg)

POWER

Input: Rechargeable battery pack (life of up to 4 hours)
10-33V DC with power cable (aircraft power)
115V or 230V AC w/adaptor

ENVIRONMENTAL

Temperature: 5° F to 158° F (-15°C to 70°C) Operating
-40°F to 158°F (-40°C to 70°C) Storage

PERFORMANCE

Receiver: MultiTrac™
Acquisition Time: 2-2.5 minutes (typical)
15 seconds (warm start, with ephemeris)
Update Rate: 1 per second, continuously
Accuracy: 15 meters (49ft.) RMS**
Dynamics: 999 knots velocity, 3g acceleration

INTERFACES

ARINC 429, Plotting (NMEA 0183 V2.0), Aviation, PC 150 Interface,
Altitude Serializer, Fuel Sensor, Fuel/Air Data Computer

** Subject to accuracy degradation to 100m 2DRMS under
the US DOD-imposed Selective Availability Program.
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