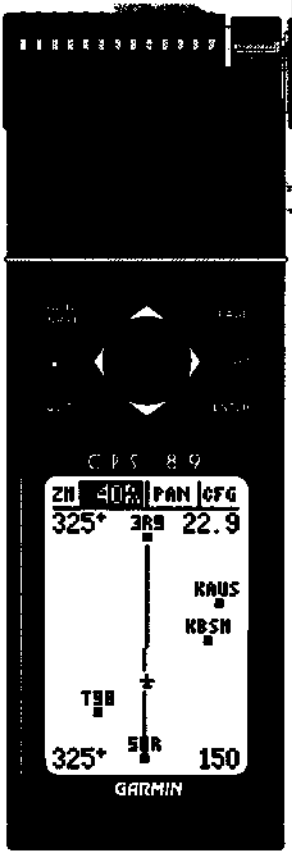
Owner's Manual & Reference



GPS 89™ Personal Navigator™

GARMIN.

Software Version 2.0 or above

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GPS 89 Personal Navigator™

OWNER'S MANUAL

The GPS 89 represents GARMIN's continuing commitment to provide pilots with quality navigation information in a versatile, accurate and user-friendly design you'll enjoy for years to come. To get the most from your new GPS unit, it is important that you take the time to read through the owner's manual to understand the operating features of the GPS 89. The manual is organized into three sections for your convenience:

Section One takes you through step-by-step instructions to initialize the receiver for first-time use.

Section Two introduces you to the basic features of the unit and provides a Takeoff Tour orientation to the GPS 89. This section has been designed to acquaint you with the unit and provide a basic working knowledge necessary to use the unit in typical conditions.

Section Three provides you with a detailed reference to the advanced features and operations of the GPS 89 in a topical format. This allows you to concentrate on a specific topic quickly, without reading through entire sections of text that you may not need.

Packing List

Before getting started with your GPS, check to see that your GARMIN GPS 89 package includes the following items. If you are missing any parts, please contact your dealer immediately.

Standard Package:

- GPS 89 Unit
- Owner's Manual
- 4 AA Batteries
- Lanyard
- Quick Reference Card
- Carrying Case

CAUTION

The GPS system is operated by the government of the United States, 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 GPS 89 is a precision electronic NAVigation AID (NAVAID), any NAVAID can be misused or misinterpreted and therefore, become unsafe.

Use the GPS 89 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 operation using the simulator mode prior to actual use. When in actual use, carefully compare indications from the GPS 89 to all available navigation sources including the information from other NAVAIDs, visual sightings, charts, etc. For safety, always resolve any discrepancies before continuing navigation.

NOTE: This device complies with Part 15 of the FCC limits for Class B digital devices. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to other equipment, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by relocating the equipment or connecting the equipment to a different circuit than the affected equipment. Consult an authorized dealer or other qualified service technician for additional help if these remedies do not correct the problem. Operation is subject to the following conditions: (1) This device cannot cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. The GPS 89 does not contain any user-serviceable parts. Repairs should only be made by an authorized GARMIN service center. Unauthorized repairs or modifications could void your warranty and your authority to operate this device under Part 15 regulations.

SECTION ONE Introduction/Getting Started

SECTION TWO Takeoff Tour

SECTION THREE Reference

Introduction

GPS Definitions

The GPS 89 is a powerful navigation tool that can guide you anywhere in the world. To better understand its operation and capabilities, it may be helpful to review the basic terms and concepts briefly explained below.

Other navigation and GPS definitions used in the manual are defined in the appropriate reference sections of the manual.

Almanac Data

Satellite constellation information (including location and health of satellites) that is transmitted to your receiver from every GPS satellite. Almanac data must be acquired before GPS navigation can begin.

Bearing

The compass direction from your position to a destination.

Course Made Good (CMG)

The bearing from the 'active from' position (your starting point) to your present position.

Crosstrack Error (XTE)

The distance you are off a desired course in either direction.

Desired Track (DTK)

The compass course between the 'active from' and 'active to' waypoints.

Differential GPS (DGPS)

An extension of the GPS system that uses land-based radio beacons to transmit position corrections to GPS receivers.

Estimated Time of Arrival (ETA)

The time of day of your arrival at a destination.

Estimated Time Enroute (ETE)

The time left to your destination at your present speed.

Grid

Coordinate system that projects the earth on a flat surface, using square zones for position measurements. UTM/UPS and Maidenhead formats are grid systems.

Ground Speed

The velocity you are traveling relative to a ground position.

Latitude

The north/south measurement of position perpendicular to the earth's polar axis.

Longitude

An east/west measurement of position in relation to the Prime Meridian, an imaginary circle that passes through the north and south poles.

Navigation

The process of travelling from one place to another and knowing where you are in relation to your desired course.

Position

An exact, unique location based on a geographic coordinate system.

Track (TRK)

The direction of movement relative to a ground position.

Universal Transverse Mercator (UTM)

A grid coordinate system that projects global sections onto a flat surface to measure position in specific zones.

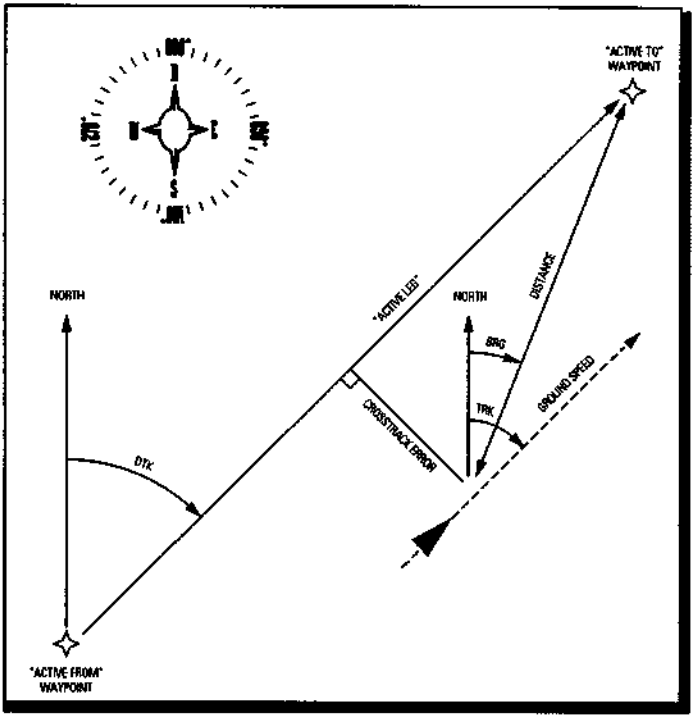
Velocity Made Good (VMG)

The speed you are traveling in the direction of the destination.

Waypoint

A specific location saved in the receiver's memory.

The GPS 89 provides steering guidance and navigation information using degrees, a measurement measured in a clockwise direction from a north reference. North is described as 000°, east as 090°, south as 180°, and west as 270°. The diagram and compass rose below provide a graphic illustration of the navigation terms used by the GPS 89.



The GPS 89's two-speed thumbkey allows convenient, one-handed entry of information. Press on a particular arrow key once to scroll through data options slowly. Press and hold down an arrow key for faster scrolling.

Use the up and down arrow keys to select alphanumerical characters and menu choices, and to move the field highlight from field to field.

Use the left and right arrow keys to move the selected character field, and to move the field highlight from field to field

The GOTO/NRST key quickly sets a direct course to a selected destination. Pressing GOTO twice activates the NRST mode.

The POWER key turns the unit on and off and activates screen backlighting. To turn the unit off, press and hold the POWER key for three seconds.

The QUIT key returns you to a previous page, or clears data entry and restores a data field's previous value.

The PAGE key scrolls through main data pages in sequence and returns the display from a submenu page to the previous page viewed. It also displays the message screen when a message alert appears.

The WPT key accesses the GPS 89's internal database of airports, VORs and other waypoints, as well as the AutoStore function.

The ENTER key confirms data entry and on-screen responses. This key also activates highlighted fields to allow data entry.

Initializing the GPS 89 for First-Time Use

The GPS 89 calculates your position and movement by tracking signals sent from GPS satellites. Each of the 21 active GPS satellites circles the earth twice a day in a very precise orbit, and transmits information back to earth. In order to determine a position fix, your GPS receiver needs to continuously "see" at least three satellites.

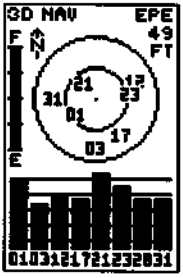
Because a GPS receiver can only see satellites above the horizon, it needs to know what satellites to look for at any given time. By using an almanac (a timetable of satellite numbers and their orbits) stored in the receiver's memory, the GPS 89 can determine the distance and position of any GPS satellite.

To use this almanac data, your GPS needs to know where you are or be given the opportunity to "find itself." Once you initialize the unit to this position, the GPS 89 will usually compute a fix within a few minutes.

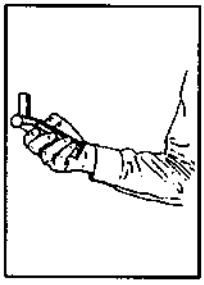
Remember, this process is only necessary under the following conditions:

- First-time use from the factory.
- The receiver has been moved over 500 miles from the last calculated position with power off.
- The receiver's memory has been cleared and all stored data has been lost.

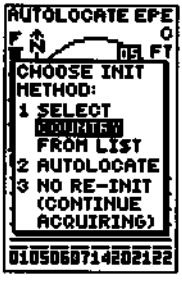
Because the GPS 89 relies on satellite signals to provide you with navigation guidance, the receiver needs to have an unobstructed, clear view of the sky for best performance. The GPS receiver's view of the sky will generally determine how fast you get a position fix, or if you get a fix at all. GPS signals are relatively weak, and do not travel through metal, buildings, people, mountains and other significant structures, so you need to make sure that you're not standing next to any obstructions when acquiring satellites.



The GPS 89's satellite status page will help you determine what satellites are in view, and whether or not any satellites are being "shaded," or blocked from the receiver's antenna.



Hold the receiver parallel to the ground and rotate the antenna perpendicular to the ground.



The EZinit prompt will automatically appear if the receiver needs to be initialized. The prompt may also appear during normal use if the antenna is shaded or the unit is indoors.

Before You Initialize

Once the GPS 89 has calculated a position fix, you'll usually have anywhere from four to eight satellites in view. The GPS 89 will now continuously select the best satellites in view to update your position. If some of the satellites in view get blocked or "shaded", the receiver can simply use an alternate satellite to maintain the position fix. Although a GPS receiver needs four satellites to provide a 3D fix, the GPS 89 can maintain a 2D fix with only three satellites.

Take the GPS 89 outside in a large, open area that has a clear view of the sky from horizon to horizon. Hold the receiver at a comfortable height, at arm's length from your body, and rotate the external antenna perpendicular to the ground.

⚠ ***Do your best to stay away from buildings or other structures that could block the path of signals to the receiver. GPS signals do not travel through rocks, mountains, buildings, metal surfaces or other significant structures.***

To turn the GPS 89 on:

1. Hold the unit at arm's length and rotate the antenna so it's perpendicular to the ground.
2. Press and hold ▮ until the receiver turns on.

Welcome Page and EZinit

The welcome page will be displayed while the unit conducts a self test. Once testing is complete, the welcome page will be replaced by the database page, showing the database issue date. After a few seconds, the status page will appear ready for you to select one of two initialization methods:

- Select Country— allows you to initialize the receiver by selecting your present position from a list of countries in the GPS 89's internal database. This feature provides a position fix in 3-5 minutes.
- AutoLocate™— allows the GPS 89 to initialize itself and calculate a position fix without knowing your present position. This feature provides a position fix in 7.5-15 minutes.

If the EZinit prompt has not automatically appeared on the status page, press the ◀ key.

EZinit

If you've already initialized the GPS 89 and the EZinit prompt appears, highlight the 'no re-init' selection with the arrow keypad and press . The EZinit prompt may appear if you've had the unit on in normal mode while indoors, or if the antenna is shaded while acquiring satellites in normal or battery saver mode.

To initialize the receiver:

1. Use ▲ or ▼ to highlight the 'country' option and press .
2. Use the ▼ key to scroll through the country listings until the country where you are presently located appears.
3. Use the ▲ or ▼ key to highlight the country/state/region you're in. If the country you're in is not listed, select another country within 500 miles of your present position.
4. Press to finish.

Use the arrow keypad to highlight the country and region or state (if necessary) of your present position from the list and press ENTER. If the country is not listed, select the closest country instead.

Acquiring Satellites

The GPS 89 will now begin searching for the appropriate satellites for your position and should acquire a fix within three to five minutes. You can verify that you have acquired a fix by watching the status page transition to the position page (provided you haven't pressed any other keys) or by looking for a 2D or 3D NAV status at the top-left corner of the status page. To prevent accidental battery power loss, the GPS 89 will shut off 10 minutes after the last keystroke if the unit is not tracking at least one satellite and has never acquired a position fix. If you have trouble initializing the receiver or getting a position fix, check the following:

- **Does the antenna have a clear view of the sky?**

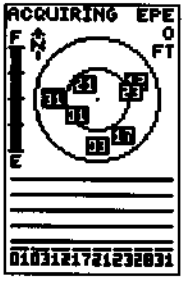
  If there are large buildings, metal surfaces, or other obstructions, the unit may not be receiving enough satellite signals to calculate a fix.

- **Is the right country/state selected from the EZinit list?**

  Check for the correct approximate lat/lon on the position page or reselect the appropriate country from the list to restart the initialization.

- **Have you moved more than 500 miles from the last calculated position with the receiver off?**

  Reinitialize the receiver, selecting the country/state of your new location from the EZinit list.

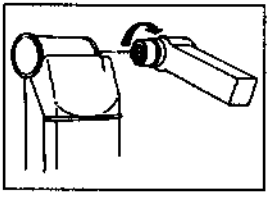


The Satellite Status Page will display 'ACQUIRING' as it searches for satellite signals.

Antenna Removal

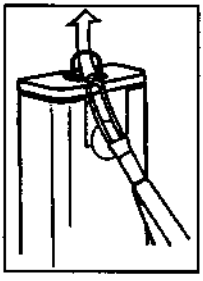
The GPS 89's antenna may be removed to attach to the aircraft windscreen. (Using the suction cup mount adapter.)

To remove the antenna:



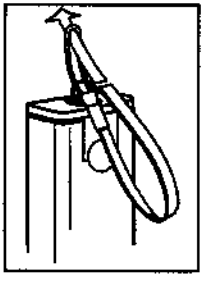
- Rotate the knurled knob (located at the bottom-left of the antenna) one quarter turn toward the front of the unit.
- Pull the antenna gently away from the unit.

- To install the suction cup cable leads, mate the BNC connector notches with the mounting posts and turn the knurled knob one-quarter turn clockwise.



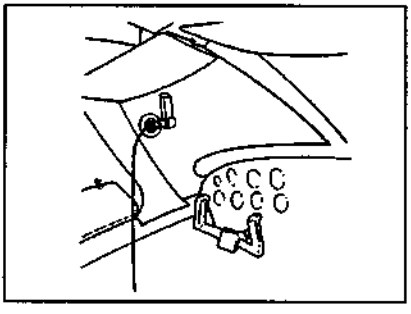
Lanyard Attachment

To attach the GPS 89's lanyard, thread the strap through the D-ring on the battery compartment cover.



Next, take the solid end of the lanyard, insert it through the eye at the other end, and tighten.

Antenna Installation



The GPS 89's portable antenna should be used with the suction cup adapter and extension cable and mounted to the inside of your windscreen. Remember to attach the antenna and cable where it does not block your vision of primary instruments and does not interfere with yoke control in any way. Try to orient the antenna so it has the best possible view of the sky, as perpendicular to the ground as the windshield slope allows.

Takeoff Tour

The GARMIN GPS 89 is a powerful navigation tool that offers pilots a host of advanced features that help make flying safer and more efficient. The Takeoff Tour is designed to quickly guide you through basic features and functions of the GPS 89 using a simulated trip.

Once you've completed the tour and become familiar with the main pages and features of the unit, refer to the reference section for complete instructions on installation, initialization and performing specific tasks and functions.

The Takeoff Tour assumes you have initialized the receiver and have not changed any of the default settings for the unit. If you have changed any settings, the descriptions and pictures used may not match your configuration.

You're now ready to power up and take off with the world of GARMIN GPS!

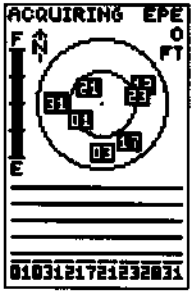
1. Press and hold the **PWR** key until the welcome page appears.
2. After the unit performs a self-test, the database information page will appear, listing the issue date of the aviation database.

The database page reflects the worldwide database of airports and VOR's contained in the GPS 89. Database updates and subscriptions are available from GARMIN and Jeppesen.

After a few seconds, the database information page will be replaced with the satellite status page. The status page provides a visual reference of satellite acquisition and status, with signal strength bars and a satellite sky view in the center of the screen. The battery level gauge provides an indication of remaining battery life and appears only when you are connected to external power.

Welcome Page

This page is displayed as the GPS 89 conducts a self test.

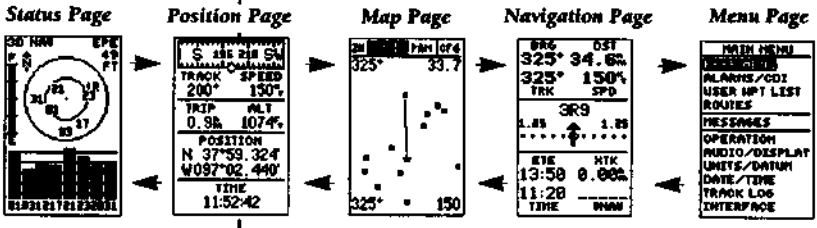


Status Page

Use the status page to instantly view satellite usage, current signal strength, and battery level.

Scrolling Through the Main Pages

The GPS 89 features five main pages in a continuous loop: Satellite Status, Position, Map, Navigation, and Main Menu. Try scrolling through the pages by pressing the key. You can also scroll the opposite direction (or return to a previous page) by pressing the key.



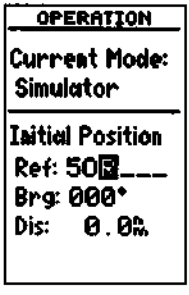
Simulator Mode

To continue the Takeoff Tour, you'll need to put the GPS 89 in simulator mode:

1. Press repeatedly until the main menu page appears.
2. Use the ▲ or ▼ arrow key to move the field highlight to the 'Operation' option.
3. Press the key.
4. Once the Operation page appears, use the ▼ key to highlight the 'Current Mode' field.
5. Press to begin selection of the operating mode.
6. Use the ▲ and ▼ keys to toggle through and select the 'Simulator' option. Press to confirm.

The field highlight will move to the Initial Position field, where we can enter the starting position of our simulated flight, Lockhart Municipal Airport (50R, the ICAO identifier), in Lockhart, Texas:

1. Press to begin initial position entry.
2. Use the ▼ key to scroll through and select '5', the first number of the identifier.
3. Press the ▶ key to move the field highlight to the next character position.
4. Repeat steps 2 and 3 until you have spelled out '50R' in the waypoint identifier field. Press to confirm.



When the GPS 89 is in the normal or battery saver mode, entering an initial position by referencing a currently stored waypoint will shorten the amount of time needed for initialization.

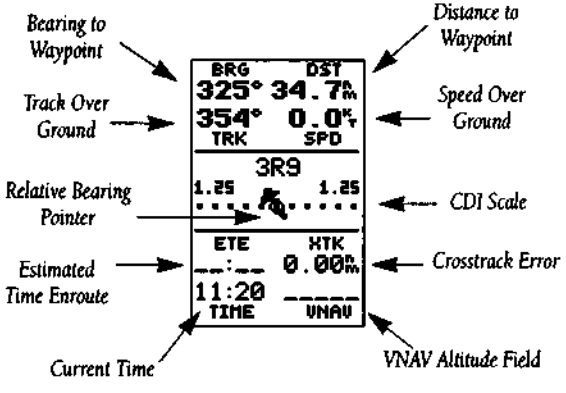
Since we'll be taking off from the airport, keep the position and bearing values at zero (to keep our position located at the airport). To return to the main menu page:

1. Press the key.

Activating a GOTO

Once you have entered the starting position of your flight, the next step is to select our GOTO destination, Lakeway Airport (3R9), in Austin, Texas:

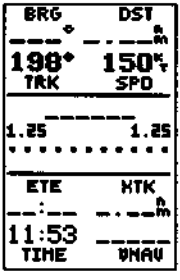
1. Press the key.
2. The GOTO page will appear with the identifier field ready to accept changes.
3. Use the ▲ and ▼ keypad to enter the identifier of the destination waypoint (3R9). Press the key to confirm.



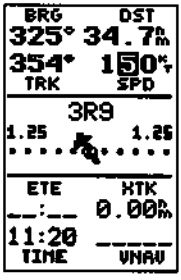
When the GOTO page appears, the waypoint appearing first on the waypoint list will be displayed as the default.

Navigation Page

Once a GOTO is activated, the navigation page will display the bearing (BRG) and distance (DST) to the destination, along with your present speed (SPD) and track over ground (TRK). The GOTO destination is listed above the course deviation indicator, with your estimated time enroute (ETE), cross track error (XTK) and time displayed at the bottom of the page. A relative bearing pointer, located above the CDI scale, points to the direction of your destination.

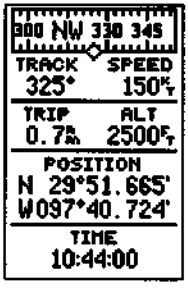


If the GPS 89 is not navigating to a destination waypoint, the navigation page will only display your speed and track over ground.



Navigation Page

In simulator mode, speed may be entered from the speed field. NOTE: Never use simulator mode for actual navigation.



Position Page

Simulated Speed Entry

Now we'll need to enter a speed for the aircraft:

1. Use the arrow keypad to highlight to the 'SPD' field.
2. Press the key to begin ground speed entry.
3. Enter a speed of 150 knots, and press to confirm.

Once a speed has been entered, the navigation page will continuously update as we make our way to the destination airport. We now need to enter the cruising altitude of our flight, which can be entered from the position page:

1. Press the key until the position page appears.
2. Press the ▲ key to move the field highlight to the altitude field and press .
3. Use the arrow keypad to enter an altitude of 2,500 feet (leave the first altitude digit at zero).
4. Press to confirm the altitude.

Position Page

The GPS 89 position page displays your present latitude, longitude and altitude, along with your current track and speed over the ground. The top of the page also features a graphic heading indicator, which displays your cardinal heading as you're moving. The time of day, displayed in UTC or local time, is indicated at the bottom of the page. To enter a local time offset, see page 49.

Most of your in-flight navigation with the GPS 89 will center around the navigation and moving map pages. Now that we're on our way, let's move on to the map page:

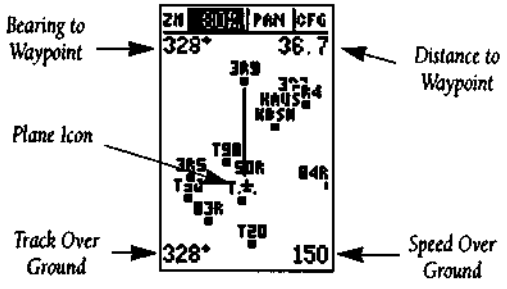
1. Press the key.

Moving Map Page

The GPS 89's moving map page provides extensive capabilities and information on your present position, nearby facilities and waypoints, and your active route. Let's zoom in for a closer look at our progress:

1. Use the ▼ key to highlight the zoom field.
2. Press the key.
3. Press the ▼ key once to change the scale to the 40nm setting, and to confirm.

Moving Map Page (continued)



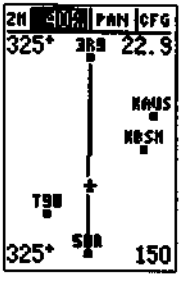
At the 80 nm scale, you'll be able to see your plane and nearby airports. The line up the center of the page represents the track-up route from your starting point (50R) to the destination airport (3R9), with your present position indicated by the plane icon. Notice that your plane remains centered on the map, while nearby waypoints pass by relative to your present speed and track.

The moving map page can be broken down into three parts: the **zoom, pan and configuration fields**, located at the top of the page; the **moving map field**; and the **speed, distance and angle fields**, located in the four corners of the map. The zoom and pan fields provide access to the map scale and scrolling cursor functions. The configuration field allows you to determine which items are displayed on the screen, while the map field lets you highlight on-screen airports and waypoints for immediate review. The speed, distance and angle fields are display fields only, and do not provide access to other functions.

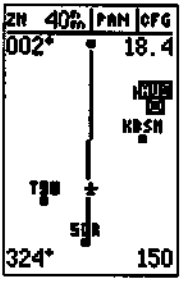
The default placement of the cursor highlight is on the zoom field. To move the cursor to the pan field or through the on-screen waypoints, simply use the arrow keypad to move in the desired direction, and press ENT to activate the function or review the selected waypoint. Try selecting KAUS, just to the right of our current route, to practice:

1. With the field cursor on the zoom field, press the ▼ key repeatedly until the KAUS identifier is highlighted.
2. Press ENT to review the waypoint page for KAUS.

The waypoint page will appear, showing elevation, latitude and longitude. Press ENT to return to the map page.

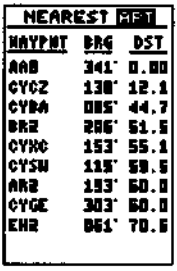


Zooming in to lower scales will show fewer waypoints and make the screen less crowded. *(See page 35.)*



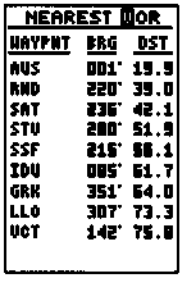
Use the ARROW KEYPAD to select on-screen waypoints by moving the cursor onto the waypoint name.

Whenever a waypoint identifier is highlighted, pressing ENTER will allow you to review the waypoint page.



Nearest Airport Page

The bearing and distance to the nine nearest airport may be quickly accessed for use in an emergency or for general information.



Nearest VOR Page

Information on the nine nearest VOR's is also available.

Nearest Waypoints Page

In addition to displaying nearby airports, VORs and user waypoints on the map display, the GPS 89 will also provide information on nearby waypoints through the nearest waypoints list. The nearest waypoints page displays the nine nearest airports, VORs, and user waypoints to your present position, and is extremely useful for located the nearest facility during an in-flight emergency. To view the nearest waypoints of a particular category (airports, VORs, or user waypoints), select the desired category from the category field at the top of the nearest waypoint page:

1. Press the key twice to display the nearest page.
2. Press to begin selection of the desired category.
3. Press the ▼ key to select a waypoint category.
4. Press to confirm.

Once you've selected and confirmed a category, the GPS 89 will display the nine nearest locations and provide the distance and bearing to each waypoint in the list. To review the waypoint page for a nearest waypoint:

1. Highlight the desired waypoint and press .
2. Press again to return to the nearest list. The field highlight will sequence to the next waypoint on the list.
3. Press to exit the nearest function and return to the previously viewed page.

Now let's return to the map page to continue the tour. If you're not already on the map page:

1. Press repeatedly until the map page appears.

AutoZoom

You may have noticed that as we make our way toward the destination airport, the map scale has automatically zoomed in to provide a closer look at the airport. What you're actually seeing is the GPS 89's AutoZoom feature. Whenever you select a GOTO destination, the map page will default to the 80 nm setting and gradually zoom down the map scale to the 1 nm setting.

AutoZoom (continued)

The map scale will zoom to the next lowest setting (i.e., from 80 nm to 40 nm) whenever the map can fit both your present position and your destination on the screen. If you manually zoom in the map scale before this point, the AutoZoom feature will resume once it catches up to the map scale you have selected (down to 2 nm). If the map is manually zoomed out beyond the AutoZoom scale, the AutoZoom will be cancelled, and the GPS 89 will assume you want to stay at the scale you have manually selected.

Cancelling GOTO Navigation

By now, our plane should be approaching 3R9, the destination airport. The map will continue to zoom down to the 1 nm scale. To finish the tour and complete our approach, let's move back to the navigation page:

1. Press the [NAV] key to display the navigation page.

Once we fly past the airport, notice that the GPS 89 continues to provide navigation to 3R9, with the relative bearing pointer and ETE fields indicating we are past our destination. The GOTO destination may be cancelled by activating another GOTO or cancelling the current GOTO destination. To cancel the current GOTO:

1. Press the [GOTO] key.
2. Press ◄ once to clear the destination field (pressing ◄ clears a selected field when the cursor is in the left most character position). Press [ENT] to confirm.

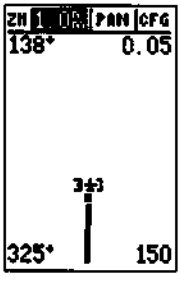
Power Off

Congratulations! You've now mastered some of the basic features of the GPS 89, and you're ready to take off with a powerful tool that can help make your flights smoother and more efficient. Be sure to carefully review the sections on initialization, installation and the internal database so you can get the most out of your new GPS.

To turn the GPS 89's power off:

1. Press and hold the [PWR] key for three seconds.

Thank you for choosing the GARMIN GPS 89. We hope it will be a valuable navigation tool for you, wherever your course may take you.

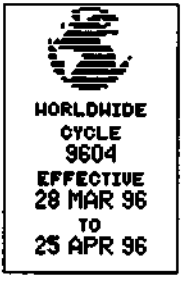


AutoZoom

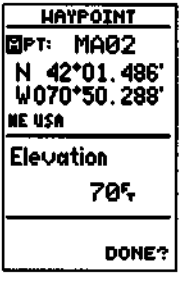
As you approach a destination, the moving map will automatically zoom down to the 1 nm scale.

Cancel GOTO

Use the LEFT ARROW key to cancel GOTO navigation and press ENTER to confirm.



The database information page shows the effective date of the navigation database. Database updates are available from GARMIN or Jeppesen



You may select from the Airport (APT), VOR, and User (USR) waypoint categories.

Waypoint Categories and Submenus

The GPS 89 uses an internal Jeppesen® database to provide position and facility information for thousands of airports and VORs. Each facility in the database is stored as a waypoint with its own latitude/longitude, identifier (up to six letters and/or numbers) and other pertinent information. Up to 250 user waypoints may also be created and stored in memory.

Waypoint information is available through the GPS 89's key. Waypoints are divided into three categories for your convenience. Each category provides different types of detailed information for a selected facility:

- **Airports**— Identifier, region and country, position (lat/lon), and elevation.
- **VORs**— Identifier, regional and country, position (lat/lon), and frequency.
- **User**— Identifier (name), position (lat/lon), user comments and reference waypoint.

To view the waypoint information for a desired waypoint, select the waypoint category from the category field (located at the top left of the waypoint page, next to the identifier field.)

To choose a waypoint category:

1. Press to display the waypoint page.
2. Use the arrow keypad to highlight the category field.
3. Press to begin selection of the waypoint category.
4. Use the ▲ or ▼ keys to select the desired category.
5. Press to confirm the category selection.

After a waypoint category is selected, information for a waypoint can be viewed by entering the identifier or name of the desired waypoint.

To enter a waypoint identifier:

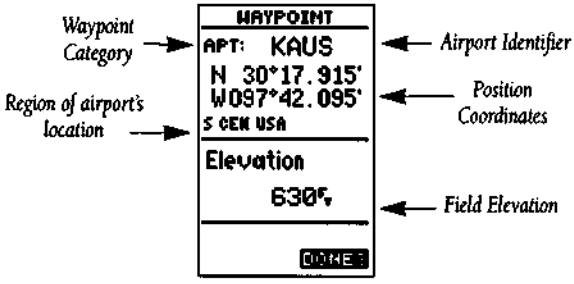
1. Highlight the identifier field and press .
2. Use the ▲ and ▼ keys to spell out the desired identifier, using the ▶ key to move to the next character position.
3. Once the desired waypoint appears, press .

Waypoint Review Pages

Once a waypoint category and identifier have been selected, the GPS 89 will provide extensive information through various waypoint review pages. The following waypoint information is available:

Airport Information

The GPS 89's airport waypoint page allows you to enter a desired airport by identifier, and displays the selected airport's position, region/country and elevation.



To view waypoint information for an airport:

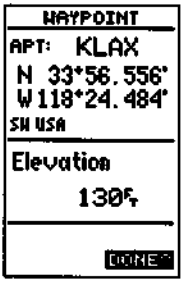
1. Select the APT category from any waypoint category field.
2. Enter the identifier or region of country of the desired APT.
3. Press the ENT key.

VOR Information

The GPS 89's VOR waypoint page allows you to enter a desired VOR by identifier and displays the selected facilities position, region/country and frequency.

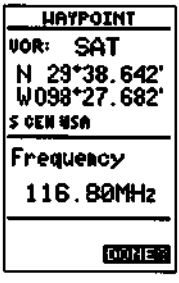
To view waypoint information for a VOR:

1. Select the VOR category from any waypoint category field.
2. Enter the identifier name of the desired VOR.
3. Press the ENT key.



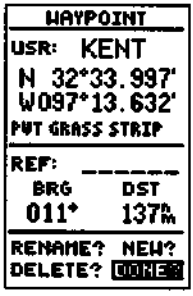
Airport Waypoint Page

The GPS 89's internal Jeppesen database uses ICAO identifiers for all airport names. All U. S. airports which contain only letters use the prefix 'K'. For example, Los Angeles International is KLAX under the ICAO standard.



VOR Waypoint Page

VOR frequency is displayed at the bottom half of the VOR waypoint page.



User Waypoint Page

Up to 250 user waypoints can be stored in the GPS 89.

To create a new waypoint manually, highlight the 'NEW?' prompt and press ENTER. The new waypoint's coordinates may be entered manually or calculated using a distance and bearing from a stored waypoint.

User Waypoint Page

The last waypoint category available from the GPS 89's WPT key is user waypoints. The user waypoint page allows entry of a desired waypoint by name/identifier and displays the waypoint's position, user comments and a reference waypoint field to calculate the distance and bearing to any other waypoint in the database. The user waypoint page can also be used to create up to 250 waypoints by manually entering a position or defining a range and bearing from an existing waypoint.

To view waypoint information for a user waypoint:

1. Select the USR category from any waypoint category field.
2. Enter the identifier/name of the desired user waypoint.
3. Press the key.

The user waypoint page allows you to create new waypoints three ways:

- Enter the exact position of the new waypoint.
- Reference a waypoint already in the database.
- Enter a range and bearing from your present position.

The first step in creating a new waypoint (regardless of what method you're using) is to assign a name/identifier.

To create a new waypoint from the user waypoint page:

1. Highlight the 'NEW' field at the bottom of the page and press . Note: The user field must be occupied in order to create a new waypoint.
2. Enter the new waypoint name and press to confirm.

Once the name has been entered, the field highlight will move to the position field, where you can manually enter the position of the new waypoint:

To manually enter a new waypoint's coordinates:

1. Press to begin entry of the waypoint position.
2. Use the arrow keypad to enter the lat/lon. The ◀ and ▶ keys will advance the cursor to each character position
3. After the latitude and longitude entry is complete, press to save the new waypoint.

Reference Waypoints

If you are defining the new waypoint position by referencing (entering a distance and bearing from) a known waypoint or your present position:

1. Use the ▼ key to highlight the 'REF' field.
2. (If you are referencing a waypoint), press [ ] and use the arrow keypad to enter the identifier of the reference waypoint, (If you want to reference your present position, leave the 'REF' field blank).
3. Press the [ ] key.

The field highlight will automatically advance to the bearing field. To enter a bearing and range from the reference position:

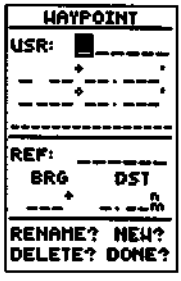
1. Press [ ] to begin entry of the compass bearing.
2. Use the arrow keypad to enter the bearing of the new waypoint from the reference position.
3. Press [ ] to confirm the bearing. The field highlight will automatically move to the distance field.
4. Press [ ] to begin entry of the distance.
5. Use the arrow keypad to enter the distance of the new waypoint from the reference position.
6. Press [ ] to confirm the distance. The GPS 89 will calculate the coordinates and save the new waypoint.

Waypoint Comments

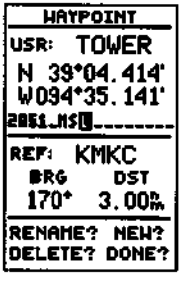
Whenever a new user waypoint is saved, the GPS 89 will assign a default user comment (the date and time of creation) to the waypoint. The default comment can be changed to a 16-character custom comment at any time from the user waypoint page.

To enter a user comment:

1. Use the arrow keypad to highlight the comment field.
2. Press the [ ] key.
3. To clear the default comment, press the ◀ key.
4. Use the arrow keypad to enter the comment.
5. Press [ ] to confirm.

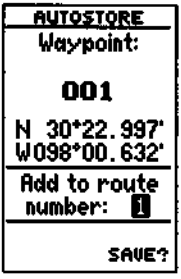


A six-character name can be assigned to all 250 user waypoints.



Use the comments field to enter important information about user, airport or VOR waypoints.

To confirm the new user waypoint name, highlight the 'Yes?' prompt and press ENTER.



To save an AutoStore waypoint to the end of a route, enter the desired route number in the route field before confirming the 'SAVE?' prompt.

Deleting or Renaming a User Waypoint

The delete and rename prompts, located at the bottom of the user waypoint page, allow you to quickly remove a waypoint from memory or change the name of a waypoint.

To delete a user waypoint:

1. Use the ◀ key to move the field highlight from the 'DONE' prompt to the 'DELETE' prompt and press ENT.
2. Use the ◀ key to highlight the 'Yes' prompt and press ENT.

To rename a user waypoint:

1. Use the arrow keypad to highlight the 'RENAME' prompt.
2. Press the ENT key.
3. Use the arrow keypad to enter the new waypoint name.
4. Press ENT. The highlight will advance to the 'Yes' prompt.
5. Press ENT to accept the new name, or CLR to cancel.

Creating Waypoints with AutoStore

The WPT key is also used to save new waypoints using the GPS 89's AutoStore™ function. AutoStore allows you to quickly store your present position and add the new waypoint to a selected route if desired.

To save your present position using AutoStore:

1. Press the WPT key twice to capture your position (if you're already on a waypoint page, you'll only need to press the WPT key once).

The AutoStore page will appear, showing the captured position and a default three-digit waypoint name. To change the default position name:

1. Highlight to the name field and press ENT.
2. Use the arrow keypad to enter the name.
3. Press ENT. The field highlight will move to the 'route' field.

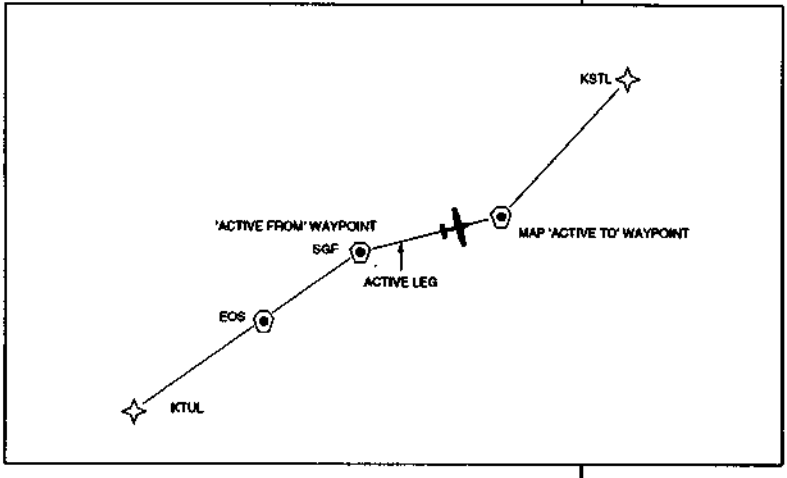
If you'd like to add the waypoint to a route:

1. Press the ENT key.
2. Enter the desired route number and press ENT.
3. 'Save' will automatically be highlighted. Press ENT to confirm.

Going To a Destination

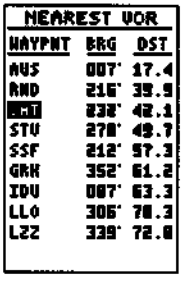
One of the many benefits of GPS navigation is the ability to fly directly to a waypoint or fly a chain of waypoints without relying totally on ground-based navigation aids. To take advantage of the convenience and efficiency of point-to-point GPS navigation, the GPS 89 provides three methods of selecting a destination for your flight: GOTO, TracBack and route navigation.

The GOTO function provides a fast way to set a course to a destination from your present position, while the route function allows you to create a chain of waypoints to fly in sequence toward a selected destination.



Whether you're flying a GOTO course or a route, there are a few basic concepts and terms that apply to all point-to-point GPS navigation. Routes are broken down and navigated in smaller segments called 'legs'. The diagram above shows a basic route consisting of five waypoints and four legs. The waypoint you are going to in a leg is called the 'active to' waypoint (MAP), and the waypoint immediately behind you is called the 'active from' waypoint (SGF). The line between the 'active to' and the 'active from' waypoint is called the 'active leg'. When you activate a route with the GPS 89, it will automatically select the route leg closest to your position as the active leg, and provide navigation guidance directly to the 'active to' waypoint of that leg.

To cancel GOTO navigation, use the LEFT ARROW key to clear the identifier field, and press ENTER.



You may access the nearest waypoints page from the GOTO page by pressing the GOTO key.

GOTO Function

The GPS 89's GOTO function lets you choose any stored waypoint as a destination and quickly set a course from your present position. Once a GOTO has been activated, the navigation page will provide you with steering guidance to your destination.

To activate the GOTO function:

1. Press the key.
2. The GOTO page will appear with the waypoint field ready to select a destination. Enter your destination waypoint.
3. Press the key to confirm the waypoint.

You can also quickly activate the GOTO function from any other page by simply highlighting a waypoint, pressing the GOTO key and confirming the GOTO page. This method can be used to recenter the CDI to the destination waypoint, or to fly a route out of sequence.

Once a GOTO is activated, the GPS 89 will provide navigation guidance to the selected waypoint until the GOTO is cancelled.

To cancel an active GOTO:

1. Press the key.
2. Use the left arrow keypad to clear the field.
3. Press to complete the cancellation.

TracBack Navigation

Another method of navigating to a destination is by using the GPS 89's TracBack feature. The TracBack function allows you to quickly and easily retrace your path using the track log automatically stored in the receiver's memory. The advantage of the TracBack feature is to eliminate the need to mark waypoints along the way and manually create and activate a route back to where you began your trip.

The TracBack route is created by reducing your current track log into a route of up to 30 waypoints, and activating an inverted route along those points. Once activated, a TracBack route will lead you back to the oldest track log point stored in memory, so it's usually a good idea to clear the existing track log at the start of your current trip before you take off.

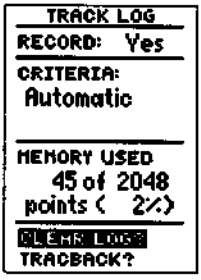
To clear the track log and define a starting point for a TracBack route:

1. From the menu or map configuration page, highlight the 'TRACK LOG' option.
2. Press ENT to access the track log page.
3. Use the ▲ key to highlight the 'CLEAR LOG?' option.
4. Press ENT. The clear log confirmation page will appear.
5. Use ◀ to highlight the 'Yes?' prompt and press ENT.

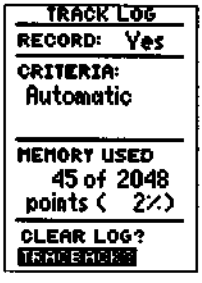
To activate a TracBack route:

1. From the menu page, highlight the 'TRACK LOG' option.
2. Press ENT to access the track log page.
3. Highlight the 'TRACBACK?' option and press ENT.

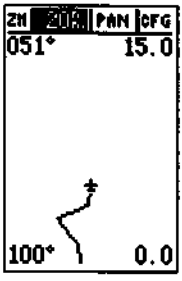
Once the TracBack function has been activated, the GPS 89 will take the track log currently stored in memory and divide it into segments called legs. Up to 30 temporary waypoints (e.g., 'T001') will be created to mark the most significant features of the track log in order to duplicate your exact path as closely as possible. A TracBack route from your present position to the oldest track log point will be created as the active route (the active route page will appear), and provide steering guidance to each waypoint back to the starting point of your track log.



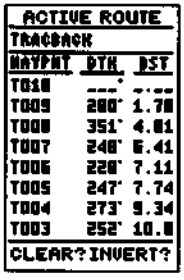
To define the starting point for TracBack navigation, clear the track log at the beginning of each trip.



To begin navigation of a TracBack route, highlight the 'TRACBACK?' prompt and press ENTER.



The TracBack function allows you to navigate your track log back to the oldest track point in memory.



Once a TracBack is activated, a series of temporary waypoints will be used to divide the track log into legs. To save a TracBack route, be sure to copy route 0 to another route. To save a temporary waypoint, simply rename it following the instructions on page 20.

Tips on Creating and Using the TracBack Feature

The GPS 89's TracBack feature is designed to help you quickly create and activate a route that follows your path back to a user-defined starting point. To get the most out of the TracBack feature, remember the following tips:

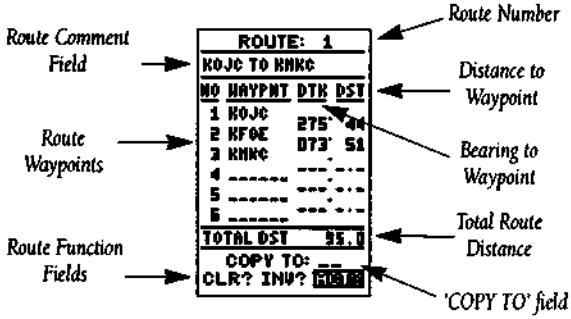
- Always clear your track log at the exact point which you will want to go back to (airport, landing field, etc.).
- The 'RECORD' option on the track log setup page must be set to the 'Yes' position.
- There must be at least two track log points stored in memory to create a TracBack route.
- If there are not enough available waypoints in memory to create a TracBack route, you will be alerted with a 'waypoint memory full' message. The receiver will use any available waypoints to create a TracBack route with an emphasis on the track log closest to the destination (the oldest track log point in memory).
- If the 'CRITERIA' option on the track log setup page is set to a time interval, the TracBack route may not follow your exact path (keeping the criteria set to automatic will always provide the best TracBack route).
- If the changes in direction and distance of your track log are very complex, 30 waypoints may not be enough to accurately mark your exact path. The receiver will then assign the 30 waypoints to the most significant points of your track and simplify segments with fewer changes in direction.
- If you want to save a TracBack route, copy route 0 to an open storage route before activating another TracBack. Activating another TracBack or storage route will overwrite the existing TracBack route.
- Whenever a TracBack route is activated, the receiver will automatically erase any temporary waypoints (e.g., 'T001') that are not contained in routes 1-19. If there are temporary waypoints stored in routes 1-19, the receiver will create any new temporary waypoints using the first three-digit number available.

Route Definition Page

The GPS 89 lets you create and store up to 20 routes of 30 waypoints each. Routes are created, copied and edited through the route definition page, which is accessed through the main menu page.

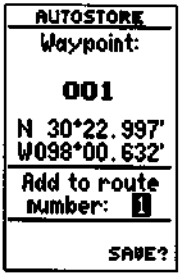
To select the route definition page:

1. Press [MENU] until the main menu page appears.
2. Use the arrow keypad to highlight the 'routes' option.
3. Press the [ENT] key to display the routes page.
4. To return to the main menu page, press [QUIT].



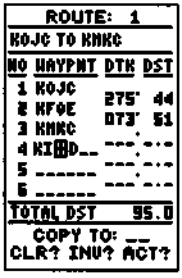
The route number field is displayed at the top of the page, with a 16-character comment field below. If no user comment is entered, the field will display the first and last waypoint in the route. The waypoint list accepts up to 30 waypoints for each route, with fields for desired track and distance between legs. (If the leg distance exceeds 999 nm, the field will remain blank.)

Below the waypoint list are the route page function fields which let you copy, clear, invert or activate the displayed route. Routes 1-19 are used as storage routes, with route 0 always serving as the active route you are navigating. If you want to save a route currently in route 0, be sure to copy it to another open route, as it will be overwritten by the next route activation.



A route may also be created using the GPS 89's AutoStore function. Simply enter a route number in the route field before saving the waypoint.

Note: If you enter the number of an existing route, the waypoint you are adding will be added to the end of that route. It will not be geographically placed between the beginning and end of the route.



You can construct a route manually by entering the names of individual waypoints in any order you choose.

To copy a route , simply highlight the 'COPY TO:' field, press ENTER, and enter the route number.

To create a route in the GPS 89:

1. Press ENT to begin route number selection.
2. Use the ▲ or ▼ key to enter a route number.
3. Press the ENT key to confirm the route number.
4. Press ENT to begin entry of a route comment. (Note that the default [first and last waypoint] comment will only appear if the comment field is blank).
5. Enter your comment and press the ENT key.
6. Highlight the No. 1 waypoint field and press ENT.
7. Enter the name of the first route waypoint and press ENT.
8. Continue entering the rest of your waypoints in order, using the ENT key to start and confirm each field entry. You may enter up to 30 waypoints.
9. After you have finished entering all your waypoints, press ESC to return to the menu page.

Copying and Clearing Routes

The route definition page is also used to copy a route to another route number. This feature is useful when you make changes to the active route (route 0) and want to save the new route and the original route.

To copy a route:

1. Press ENT to begin route number selection.
2. Enter the route number to be copied and press ENT.
3. Move the field highlight to the 'COPY TO ROUTE' field and press the ENT key.
4. Use the arrow keypad to scroll through the available routes and select a destination route number. Only open routes will be available as choices.
5. Press the ENT key to copy the route.
6. Press the ESC key to return to the menu page.

The route action fields, located at the bottom of the route definition page, allow you to clear, invert and activate the routes stored in the GPS 89.

To clear a route:

1. Press [key] to begin entry of the route number.
2. Enter the route number and press [key].
3. Select the 'CLR' field and press [key].

A warning page will appear, asking you to confirm that you want to remove all waypoints from the route.

1. Highlight the 'Yes' field with the ◀ key and press [key].
2. Press [key] to return to the menu page.

To clear a route, highlight the 'Yes?' prompt and press ENTER.

Activating or Inverting a Route

After a route has been entered in the GPS 89, it can be activated in its defined sequence or inverted (in reverse order). The process of activating or inverting a stored route takes a storage route (routes 1-19) and copies it into the active route (route 0) for navigation.

This system allows you to have an active route that you may edit during navigation and save as an entirely new route from the original. You will have to copy the active route to an unused storage route to save it, since new route or TracBack activation overwrites route 0.

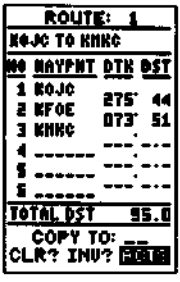
To activate a route:

1. Select the route definition page and press the [key] key to activate the route number field.
2. Enter the route number to be activated and press [key].
3. Highlight the 'ACT' field and press [key].

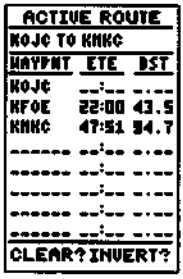
Inverting a route allows you to navigate route legs in reverse order without editing the original route.

To activate a route in inverted order:

1. Follow the same steps as above, but select the 'inv' command field and press the [key] key.

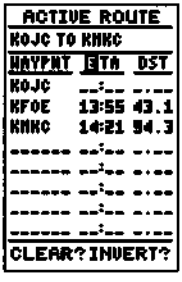


To activate a route, highlight the 'ACT?' prompt and press ENTER.



Active Route Page

Use the active route page to keep track of the estimated time enroute and distance to upcoming waypoints.



The active route page can be configured to display the ETA for each route waypoint.

Active Route Page

Once a route has been activated, the active route page will appear, displaying the waypoint sequence of your route with the estimated time enroute (ETE) at your present speed and distance to each waypoint. As long as you are navigating an active route, the active route page will become part of the main page sequence of the unit.

The active route page will also allow you to change the ETE field to display desired track (DTK) or estimated time of arrival (ETA) for each leg. You can also clear or invert the active route.

To display DTK or ETA for each leg:

1. Highlight the 'ETE' field and press the key.
2. Use the ▲ or ▼ to select 'DTK' or 'ETA' and press .

To invert a route from the active route page:

1. Press the ▲ key once to move the field highlight to the 'invert' field.
2. Press the key to invert the route.

To clear the active route from the active route page and stop route navigation:

1. Use the ▲ and ◀ keys to select the 'clear' field.
2. Press . Highlight the 'Yes' prompt on the warning page and press to complete.

Once a route has been created and stored in the GPS 89, it can be edited at any time-even as an active route.

To edit a route from the Active Route Page or the route submenu page:

1. Use the ▲ and ▼ keys to select the waypoint to edit and press .

An on-screen menu of editing choices will appear, with options for reviewing, inserting, deleting or changing the waypoint field highlighted. Use the ▲ and ▼ arrow keys to select among the editing choices.

Reviewing & Editing Routes

Once you've selected a waypoint from the route list, choose a menu function:

1. To review the definition page for the waypoint, highlight the 'review' field and press ENT.
2. To add a new waypoint that precedes the selected waypoint, highlight the 'insert' field and press ENT.
3. To remove the selected waypoint, highlight the 'remove' field and press the ENT key.
4. To replace the selected waypoint with a new waypoint, highlight the 'change' field and press ENT.

To complete your changes, use the waypoint editing instructions described earlier (see page 20) for creating a route. If you're editing the active route (route 0), copy the new route version to an empty route to save it. Otherwise, it will be overwritten by a new route activation. If you add, delete or change the first or last waypoint of a route, the default comment (first and last waypoint) will automatically be updated after you make the changes.

Select a route edit option from the pop-up window.

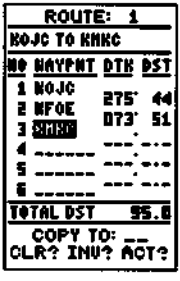
On-Route GOTOs

At the beginning of the route section, we mentioned that the GPS 89 will automatically select the route leg closest to your position as the active leg. This will give you steering guidance to the 'active to' waypoint of that leg, based on the desired track of the active leg. If you would prefer to navigate directly toward the 'active from' waypoint, you can perform an 'on-route GOTO' right from the active route page.

To perform an on-route GOTO:

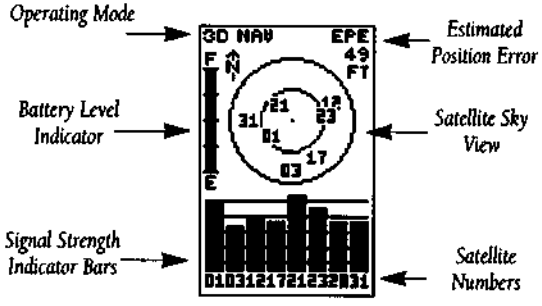
1. Use the ▲ and ▼ keys to highlight the desired route waypoint and press the ▶ key.
2. Once the GOTO page appears, press ENT to confirm the on-route GOTO waypoint.

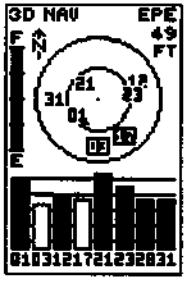
Once you reach the GOTO waypoint, the GPS 89 will resume navigation of the rest of the active route in sequence.



To fly to a waypoint out of sequence in the active route, simply highlight the waypoint you want to navigate to and press GOTO.

Satellite Status Page





Satellites in view but not currently in use (03 & 17) will be highlighted with a black rectangle, and will show a corresponding "hollow" signal strength bar.

The satellite status page displays the status of various receiver functions. This status information helps you understand what the GPS is doing at any given time, and tells you whether or not the receiver has calculated a position fix.

The sky view and signal strength bars give you an indication of what satellites are visible to the receiver, whether or not they are being used to calculate a position fix, and the signal quality. The sky view in the center of the page shows a bird's-eye view of the position of each satellite relative to the receiver's last known position. The outer circle represents the horizon (north up); the inner circle 45° above the horizon; and the center point a position directly overhead.

When the receiver is looking for a particular satellite, the corresponding signal strength bar will be blank and the sky view indicator will be displayed as white numbers in a black box. Once the receiver has found the satellite, a hollow signal strength bar will appear and indicate that the satellite has been found and the receiver is collecting data from it. The satellite number in the sky view will also change to black numbers with no box surrounding them. As soon as the GPS 89 has collected the necessary data to use the satellite for positioning, the hollow bar will become solid.

Receiver status is indicated at the top left of the screen, with the current horizontal accuracy (estimated position error, in feet or meters) at the top right. The status field will show one of the following conditions:

Searching— the GPS 89 is looking for any available satellites in view.

AutoLocate™— the GPS 89 is initializing and collecting new almanac data. This may take 7.5 to 15 minutes.

Acquiring— the receiver is collecting data from available satellites but has not collected enough data to calculate a 2D fix.

2D Navigation— at least three satellites with good geometry have been locked onto, and a 2-dimensional position fix (latitude and longitude) is being calculated. '2D Diff' will appear when you are receiving DGPS corrections in 2D mode.

3D Navigation— at least four satellites with good geometry have been locked onto and your position is now being calculated in latitude, longitude and altitude. '3D Diff' will appear when you are receiving DGPS corrections in 3D mode.

Poor GPS Coverage— the receiver is no longer tracking enough satellites for a 2D or 3D fix.

Not Usable— the receiver is unusable, possibly due to incorrect initialization or abnormal satellite conditions. Turn the unit off and back on to reset.

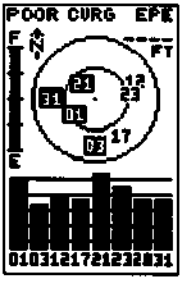
Simulating Navigation— the receiver is in simulator mode.

The satellite status page also provides access to the EZinit prompt whenever a position fix has not been calculated (the unit must be in searching, AutoLocate, acquiring, simulator or poor coverage mode). This prompt allows you to manually reinitialize the unit. Its a useful feature if you have travelled over 500 miles with the receiver off and you know it must be initialized to your new position (the GPS 89 will also automatically offer the EZinit prompt after 10 minutes of unsuccessful satellite acquisition).

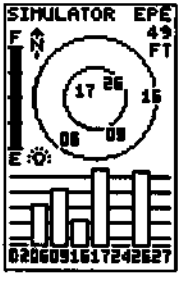
Battery Level Indicator

The satellite status page also features a battery level indicator, located below the status field to the left of the sky view, which provides a graphic display of the condition of the batteries.

The battery level indicator is calibrated for alkaline batteries. Ni-Cad and lithium batteries will not accurately display the battery level due to voltage differences. No other receiver functions are affected by using Ni-Cad or lithium batteries.

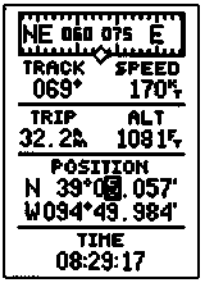


A poor coverage status will appear if the receiver has lost the number of satellites required to compute a fix.

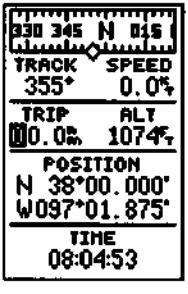


A bulb icon will appear on the status page whenever the screen backlighting is on.

The backlighting has an automatic shutoff timer which will reset after every keystroke.



To speed up initialization, enter your position coordinates manually.



The trip odometer may be reset to measure your distance travelled.

Position Page

The GPS 89's position page displays your current position's latitude, longitude, altitude and time numerically. It displays your track (compass direction) and speed whenever you're moving.

The position page lets you enter a position's latitude and longitude manually. During satellite acquisition, the position displayed is the last computed position stored in memory. To speed up the acquisition process, you can enter a more accurate initial position or reference airport (see page 19). Be sure to accurately enter the latitude and longitude to the nearest degree.

To manually enter a position:

1. Press the ▼ key until the position field is highlighted.
2. Press ENT to begin entry of your position.
3. Use the arrow keypad to enter the new position.
4. Press the ENT key to confirm your changes.

When the GPS 89 is acquiring satellites or navigating in the 2D mode, the last known altitude will be used to compute your position. You may also manually enter an altitude. Keep in mind that GPS altitude may vary significantly from pressure altimeters. Never use GPS altitude for vertical navigation.

To enter an altitude manually:

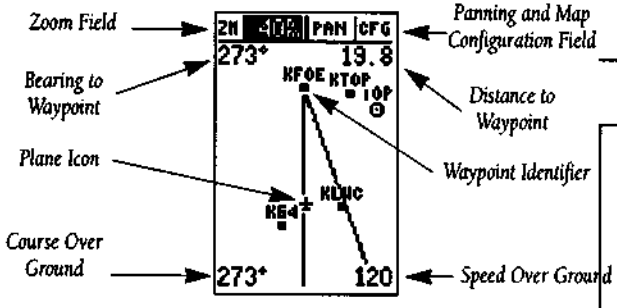
1. Press the ▼ key until the altitude field is highlighted.
2. Press ENT to begin entry of your altitude.
3. Use the arrow keypad to enter the altitude.
4. Press the ENT key to confirm the altitude.

The position page also features a resettable trip odometer to measure the total distance traveled while navigating.

To reset the trip odometer:

1. Press the ▼ key until the trip field is highlighted.
2. Press ENT, followed by ◀ and then press ENT again to finish.

Map Page

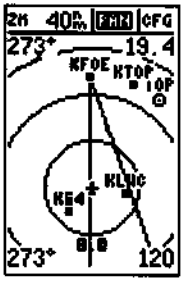


The GPS 89's map page plots your course and route on a moving map. The map page also provides you with a moving map cursor that will let you pan ahead and review nearby waypoints, determine the distance and bearing to map position and mark new waypoints. The map page can be broken down into three sections:

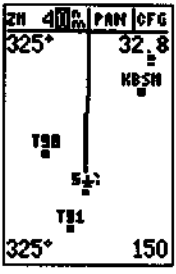
The **zoom, panning control and map configuration fields** are all located at the top of the screen. There are 12 selectable zoom ranges from 0.2 to 320 miles or 0.5 to 600 km, measured vertically. The pan field provides access to the map cursor, while the configuration field allows you to specify what items are displayed and when they appear.

The **map portion** of the page shows your movement over ground. Your present position is indicated by a plane icon (in track up mode), or a position diamond (in other modes), with your track and/or route displayed as a solid line. Nearby waypoints are represented as squares, with the waypoint name also listed. Through the map configuration page, you may select which features are displayed (see page 36 for more information).

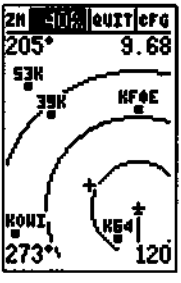
The **data fields** located at the four corners of the map, show various navigational data, including the bearing and distance to a destination waypoint and your current track and speed over ground. The two fields at the top corners of the map show your bearing and distance to one of three selectable destinations: an active destination waypoint, a highlighted on-screen waypoint, or the target crosshair. If you are not navigating to a waypoint or using the panning function, the top data fields will not be displayed.



The GPS 89 has on-screen range rings to help you estimate distances relative to your present position. The value of each ring is determined by the current zoom scale. Range rings may be turned on or off through the map configuration menu.



The GPS 89 offers 12 zoom scales from 0.2 to 320 nm.



Use the panning mode to view the area surrounding your current position and nearby waypoints.

Map Page Functions

There are four main functions you can perform from the map page— zooming, pointing, panning and map configuration. Each of these functions has its own 'field', which may be selected and activated for use.

Basic Zooming and Panning

Whenever the map page first appears, the zoom field (at the top left) is always selected. The map page has 12 map scales which are selected through the zoom field.

To select a zoom scale:

1. Press ◀ or ▶ to highlight the zoom field.
2. Press the key to begin range selection.
3. Use the ▲ or ▼ keys to scroll through and find the desired range scale. Press to confirm your selection.

The second function field on the map page is the pan field, located at the top right corner of the screen. The pan function allows you to move the map with the four arrow keys to view areas outside the current map.

To activate the pan function:

1. From the zoom field, use the ▶ key to highlight the pan field and press .
2. Use the arrow keys to move the map in any direction.

As you begin to move the map, a crosshair will appear. This crosshair will serve as a target marker for the moving map. The distance and bearing to destination (at the bottom of the page) will now be replaced by the distance and bearing from your present position to the target crosshair.

As you pan around the moving map display, you'll notice that the target crosshair will 'snap' to on-screen waypoints and highlight the waypoint name. Once a waypoint name is highlighted, you can review its waypoint definition page or execute a GOTO function by using the or key.

To stop the panning function and return to your present position:

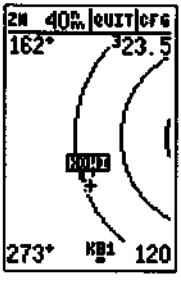
1. Press the key.

From the zoom or pan fields, the cursor highlight may be moved into the map display by pressing the ▼ key. The arrow keys will now move the highlight through the map and 'point' at on-screen waypoints.

To point at a displayed waypoint:

1. Use the arrow keys to move the cursor highlight from the zoom field into the map field.
2. Once you are in the map field, use the four arrow keys to scroll through on-screen waypoints. The arrow key you use will determine the direction of your scroll.
3. When you have scrolled through all the on-screen waypoints, the cursor will move back to the zoom or pan function field.
4. To return the field highlight to the zoom field, press [key].

Once a waypoint has been selected in the map field, its distance and bearing from your present position will be displayed in the destination field.



To highlight an on-screen waypoint, simply place the cursor on top of the waypoint. A black box will appear around the waypoint with the name shown in white letters.

Advanced Zooming & Panning

To get the most out of panning, you'll need to be able to zoom in and out while you're panning. This lets you move the map at a faster speed and zoom in for waypoint details. Once the pan function is activated, the cursor highlight moves back to the zoom field.

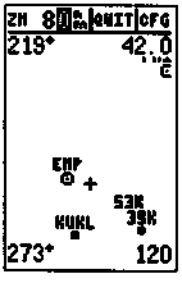
To adjust the zoom range while panning:

1. Press the [key] key to begin zoom scale selection.
2. Use the ▲ and ▼ keys to select the map scale.
3. Press [key] to return to normal panning mode.

During panning, the crosshair represents a target position on the map, with the range and bearing to the target displayed at the bottom of the screen. You can also use the target crosshair to mark a new waypoint position or as a GOTO destination right from the map field.

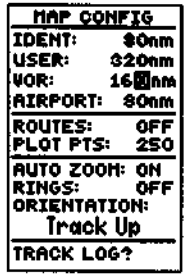
To mark the target crosshair position as a new waypoint:

1. Press the [key] key to capture the position.
2. Enter a new name and route number if you wish.
3. Press the [key] key to return to the map page.



While panning, you may change the zoom scale without having to switch from the panning mode.

Be sure to rename the "MAP" waypoint when you save it, as it will be overwritten when you perform your next goto.



Map Configuration Page

You may custom tailor the map to your needs by selecting from a variety of changeable options which are controlled from the map configuration page.

Advanced Zooming and Panning (continued)

You can also use the target crosshair as an instant GOTO destination. This function will AutoStore the position and set a course for a new waypoint called 'MAP'.

To GOTO the target crosshair:

1. Press the key to capture the position.
2. Press the key to confirm the MAP GOTO.
3. Press to return to the Map Page.

In saving the MAP waypoint, be sure to rename it, as it will be overwritten the next time a map GOTO is executed.

Map Configuration

The last function you can perform from the map page is map configuration, which lets you select what features are displayed on the map, set the map orientation and manage the track log functions.

To access the map configuration function:

1. Highlight the "CFG" field on the map page and press .

Map Configuration Page

The map configuration page will appear. Map options are identified using four fields: waypoint category viewing scale, routes and plot point options, AutoZoom and orientation, and track log.

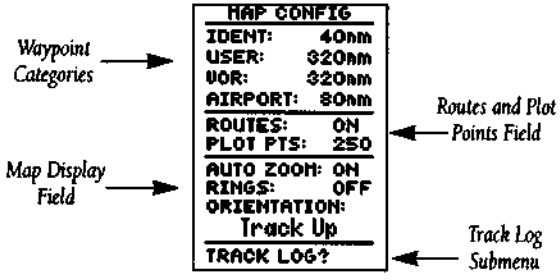
Waypoint Category Viewing Scale

The top section of the page lists the four waypoint categories: IDENT, USER, VOR and AIRPORT. These let you designate a minimum map scale below which the specific category icon will appear or turn the category off altogether. For example, in the picture to the left, airport icons will not be shown unless the map scale you are viewing is at or below 80 nautical miles. Each category has 13 adjustable settings, from 0.2 nm to 320 nm.

To change the waypoint category viewing scale:

1. Highlight the desired category viewing scale and press .
2. Use ▲ and ▼ to select the desired setting, and press .

Map Configuration Page (continued)



Routes and Plot Point Options

The next section of the map configuration page is routes and plot pts. The routes submenu allows the user to select whether or not the GPS 89 will display the straight-leg lines between the waypoints of an active route and display all route waypoint names. The plot points sets the number of points the unit will attempt to plot. The maximum number of points that can be displayed is 999, with 2048 maximum points recorded. Note: Once you've reached the maximum number of plot points allowed in memory, the older points will be lost as new ones are added.

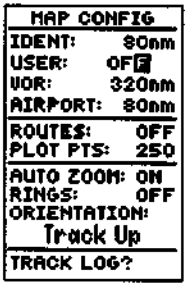
To change the routes or plot points setting:

1. Highlight the desired field to change, and press .
2. Use ▲ and ▼ to select the desired setting, and press .

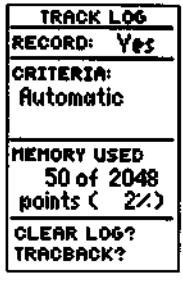
AutoZoom and Track Log

The map display field of the configuration page lets you turn the GPS 89's AutoZoom (see page 38) and range ring features on or off and define a map orientation. The display field lets you set the map to a north up, track up (the direction of current travel) or a desired track up (the direction of an active route leg) orientation.

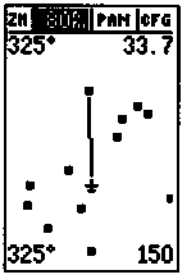
At the bottom of the map configuration page is the track log submenu. This controls all the track log features available in the GPS 89. To find out about feature information and how to set up the track log see pages 50-51. The track log can be set up through the map configuration page or through the track log submenu on the main menu page.



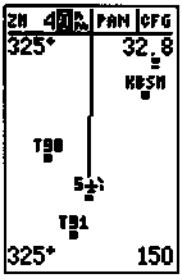
The icons for selected waypoints can be set to appear when the map scale you are viewing is either at or below the scale specified or turned off through the map configuration page.



The track log page is available from the map configuration and main menu pages.



AutoZoom automatically uses the largest scale which will show your current position and the destination waypoint.



Using the AutoZoom function will allow manual map scale changes without turning automatic map scaling off.

To set AutoZoom, range rings, or map orientation:

1. Highlight the desired map display field setting and press .
2. Use ▲ and ▼ to select the desired setting, and press .

AutoZoom Mode

The GPS 89's AutoZoom mode automatically changes the map scale to keep your present position and destination on the display at all times. Whenever a GOTO or route is activated, AutoZoom will default to the largest map scale that will fit your present position and 'active to' waypoint. As you head toward the destination, the scale will change to the next lower scale when your present position and the destination can be displayed on that particular scale. The AutoZoom feature will stop when the scale has reached the 1 nm setting.

The AutoZoom feature is designed to allow you to manually change the map scale without turning the automatic map scaling off. AutoZoom determines whether or not to change the scale based upon the current status of the map:

- If the map scale is manually zoomed in before an AutoZoom takes place, the automatic scaling will resume once it reaches the scale you have selected.
- If the map scale is manually changed to a setting higher than the current AutoZoom setting, automatic map scaling will be cancelled unless the map scale is manually returned to the current or smaller AutoZoom setting.
- If you leave the Map page and miss an automatic scale adjustment, AutoZoom will assume you want to keep the last selected map scale and cancel AutoZoom.
- If the zoom field is active (it has been highlighted and the key has been pressed) when the map is ready to scale down to the next level, the AutoZoom feature will be cancelled.

The AutoZoom feature is designed to be most effective when you are continuously navigating a GOTO or a route from the map page. It can be turned off through the map configuration setup described on page 36.

Main Menu Page

The GPS 89's main menu page provides access to submenus and functions that are used to select and customize operation and navigation setup. The listings are divided into categories by function. The route management features are discussed on pages 26-27. Now lets learn about the rest of the listings in the order they appear on the main menu page.

To select a submenu page from the main menu page:

1. Highlight the submenu/function you want to select.
2. Press the key to display the submenu/function page.
3. To return to the main menu page, press the key.

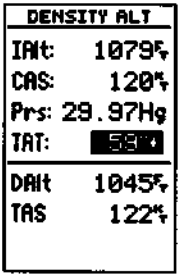
E6-B Menu

The first listing on the menu page is the E6-B menu, which provides access to the GPS 89's density altitude and winds aloft functions. The E6-B menu also allows access to trip and fuel usage, sunrise and sunset, and vertical navigation profiles.

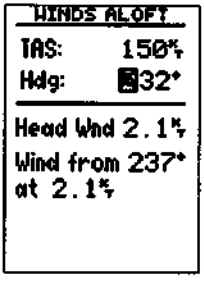
To calculate density altitude and true air speed:

1. Highlight the indicated altitude field (Alt) and press .
2. Enter the altitude from your altimeter and press .
3. Press to begin entry of your calibrated airspeed (CAS).
4. Enter the calibrated airspeed and press .
5. Press to begin entry of your current altimeter setting.
6. Enter the altimeter pressure and press .
7. Press to begin entry of the total air temperature (TAT).
8. Enter the TAT (standard outside air temperature gauge on most piston aircraft) and press the key. The calculated density altitude and true airspeed will be displayed at the bottom of the page.

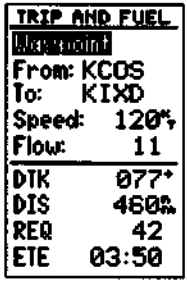
Highlight 'E6-B Menu' and press ENTER to access navigation utilities such as trip and fuel usage and vertical navigation profiles.



To make individual entries for use with the E6-B, simply highlight the specific field, (such as total air temperature above), press ENTER, and enter the desired value.



Winds aloft may be calculated by entering your true air speed and current heading.



Navigational information and fuel usage may be calculated for a trip between any two waypoints.

Winds Aloft Function

The GPS 89's winds aloft function will calculate the wind direction, speed and head/tail wind conditions for you by entering your true air speed and current heading.

To calculate winds aloft:

1. Highlight the true airspeed field (TAS) and press .
2. Enter the TAS (use the density altitude function if you do not know TAS) and press .
3. Press to begin entry of your current heading (Hdg).
4. Enter your heading and press . The wind direction, speed and the head/tail wind conditions will be displayed at the bottom of the page.

Trip and Fuel Planning Function

The GPS 89's trip and fuel planning function will calculate the desired track, distance, estimated time enroute and fuel requirements between any two waypoints or any programmed route. The first field (top left of the planning page) allows you to select between waypoint or route planning.

To perform a waypoint-to-waypoint trip and fuel plan:

1. Highlight the Waypoint/Rte field and press .
2. Use the arrow keypad to select the 'Waypoint' option and press . The field highlight will move to the 'From' field.
3. Press to begin selection of the 'From' waypoint.
4. Enter the starting waypoint for the trip, or leave the field blank to start from your present position, and press . The field highlight will advance to the 'To' field.
5. Press to begin selection of the 'To' waypoint.
6. Enter the destination waypoint and press .
7. Press to begin entry of the trip speed.
8. Enter the trip speed and press . The field highlight will advance to the 'Flow' field.
9. Press to begin entry of the fuel flow.
10. Enter the fuel flow for the trip and press . The desired track (DTK), distance (DIS), fuel requirement (REQ), and estimated time enroute (ETE) of the trip will be displayed at the bottom of the page.

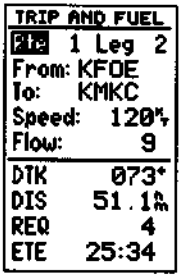
Route Planning

The GPS 89's route planning function will calculate the trip information for any programmed route and provide data on both the entire route and each individual route leg.

To perform a route trip and fuel plan:

1. Highlight the Waypoint/Rte field and press ENT.
2. Select the 'Rte' option and press ENT. The field highlight will move to the route number field.
3. Press ENT to begin selection of the desired route.
4. Enter the route number and press ENT. The field highlight will advance to the 'Leg' field. Select either 'All' or a specific route leg(Leg 1, etc.) to calculate, and press ENT.
5. Press ENT to begin entry of the route or leg speed.
6. Enter the trip speed and press ENT. The field highlight will advance to the 'Flow' field.
7. Press ENT to begin entry of the hourly fuel flow.
8. Enter the fuel flow for the route or leg and press ENT.

The GPS 89 will display the distance, fuel requirement and estimated time enroute for the route or route leg, and provide the desired track for each leg.



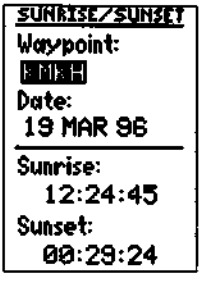
If your flight will follow an existing route, you may calculate trip and fuel information for individual legs or the entire route.

Sunset/Sunrise Calculator

The next E6-B function available is the sunrise/sunset calculator, which will allow you to calculate the sunrise and sunset for any known waypoint or your present position for a specific date.

To calculate sunrise/sunset information:

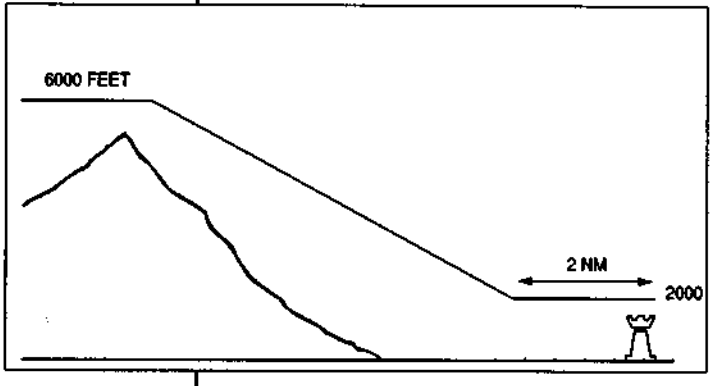
1. Highlight the waypoint field and press ENT.
2. Use the arrow keypad to enter the desired waypoint, or leave the waypoint field blank to calculate the sunrise/sunset for your present position, and press ENT. The field highlight will automatically advance to the date field.
3. Press ENT to begin entry of the date. The default date will be the current date as calculated by the GPS satellites.
4. Use the arrow keypad to enter the desired date, month and year (the last two digits).
5. Press ENT. The sunrise and sunset for the entered date will be displayed at the bottom of the page.

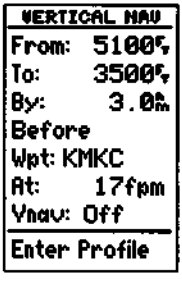


Sunrise and sunset for any waypoint or your current position may be determined by using the sunset/sunrise calculator.

Vertical Navigation Function

The last option featured on the GPS 89's E6-B menu is the vertical navigation (VNAV) function, which lets you create a rate of descent profile from your present position and altitude to a final altitude at a specified location. To use the VNAV feature, your aircraft's ground speed must be greater than 35 knots, and you must be navigating an active GOTO or route.





While on an active GOTO, you may create a vertical decent profile by using the VNAV function.

To perform a VNAV calculation:

1. Highlight the 'From' field and press ENT.
2. Enter the initial altitude and press ENT.
3. Press ENT to begin entry of the final (To) altitude.
4. Enter the desired final altitude and press ENT.
5. Press ENT to begin entry of the offset (the distance from the waypoint you'll be referencing for your final altitude).
6. Press ENT and use the arrow keypad to select the 'Before' or 'After' option for the distance offset.
7. Press ENT to confirm.
8. Press ENT and use the arrow keypad to enter the waypoint you want to use as a reference for your final altitude. If you are navigating an active route, the waypoint field will offer the route waypoints for the reference waypoint.
9. Press ENT to confirm the waypoint. The vertical speed for the descent will appear in the 'At' field.

VNAV (continued)

To activate the VNAV function:

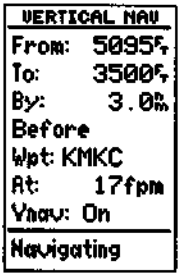
1. Review the calculated vertical speed. If the calculated speed does not fit within the performance guidelines of your aircraft, manually enter the appropriate speed in the 'At' field and press ENT.
2. Highlight the 'Vnav' field and press ENT.
3. Use the arrow keypad to select the 'On' setting. Press ENT.

The VNAV status at the bottom of the page will change from 'Enter Profile' to 'Begin In _____', indicating the time remaining to begin the descent. Once you are less than 15 seconds from the starting point of the descent, you'll be informed with a 'Start Altitude Change' message. If the maneuver has already started, the status field will display a 'Navigating' status.

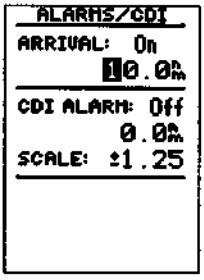
While the VNAV function is active, the vertical navigation page will provide a continuous display of the recommended altitude you should be at (the 'From' field) and the vertical speed required (the 'At' field) to complete the maneuver.

When the recommended altitude is within 1,000 feet of the final altitude, you'll be informed with a 'Final Altitude Alert' message. The recommended altitude during any active VNAV maneuver is also displayed at the bottom right of the Navigation Page.

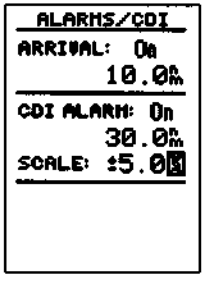
The VNAV function will be cancelled automatically if the active route or GOTO is changed in any way (e.g., performing an on-route GOTO or adding a waypoint to a route). Whenever this happens, you'll be informed with a 'VNAV Cancelled' message. If your current speed does not exceed 35 knots, or a route waypoint that has already been past is selected, the status line will display 'Invalid Profile'. If there is no active GOTO or route, the status field will display 'No Active Waypoint'.



Once the VNAV function has been initiated, a 'Navigating' status will appear at the bottom of the page.



The arrival alarm can be used to notify you when you have reached a set distance from a destination waypoint.



The CDI alarm will alert you if you are off course by more than the selected scale.

Alarm and CDI Functions

The next listing on the main menu page is the Alarms/CDI, which is used to set arrival and CDI alarms and define the course deviation indicator scale.

Arrival Alarm

The first function available from the alarms/CDI page is the waypoint arrival alarm, which activates an alarm message once you've come within a set distance to a destination waypoint. The user can select from On, Off or Auto.

To set the arrival alarm:

1. Highlight the arrival field and press .
2. Use the arrow keypad to select the 'ON' setting.
3. Press to begin entry of the alarm distance.
4. Use the arrow keypad to enter a distance (to 99.9 nm).
5. Press the key.

CDI/Crosstrack Alarm

The last section of the alarms/CDI page allows you to set a CDI/crosstrack alarm and define the course deviation indicator scale. The CDI alarm will provide a message when your crosstrack error exceeds a specified distance.

To set the CDI alarm:

1. Highlight the 'CDI ALARM' field and press .
2. Use the arrow keypad to select the 'ON' setting.
3. Press to begin entry of the alarm distance.
4. Use the arrow keypad to enter a distance (to 99.9 nm).
5. Press the key.

The CDI scale field lets you select the +/- range of the CDI bar scale that appears on the nav page. Three scales are available: +/- 0.25, 1.25 and 5.0 miles or kilometers, with 1.25 being the default setting.

To select a CDI scale:

1. Highlight the 'SCALE' field and press .
2. Use the arrow keypad to select a scale and press .

User Waypoint List

The last two options in the first section are the user waypoint list and the route management function. The routes option is covered in the routes section. The user waypoint list provides you with a complete list of all user waypoints stored in the GPS 89. The total number of used and empty waypoints is indicated at the top of the page. From the user waypoint list, you can quickly GOTO a selected waypoint, review a selected waypoint's waypoint page or delete all user waypoints.

To select a waypoint as a GOTO destination:

1. Highlight the desired waypoint and press .
2. Press to activate the GOTO.

To review the waypoint page of a listed waypoint:

1. Highlight the desired waypoint and press the key.
2. To return to the waypoint list, press again.

To delete all user waypoints:

1. Use the arrow keypad to highlight the 'DELETE ALL WPTS?' prompt and press .
2. Use the ◄ key to move the field highlight to the 'Yes?' prompt on the delete waypoints confirmation page.
3. Press the key.

Message Submenu

The message submenu displays all current messages in the GPS 89. There are two types of messages: temporary alerts (eg. approaching a waypoint) and condition alerts (eg. battery power is low). All messages are initially indicated by a flashing on-screen indicator. After a temporary alert has been viewed, it is cleared from the message page. Condition alerts are displayed on the messages page until the condition has been resolved. For a complete list of messages, see Appendix A.

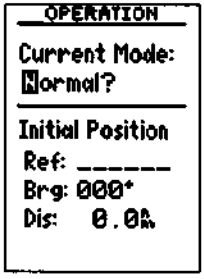
To view the messages page:

1. Move the field highlight to the 'Messages' field and press . To return to the main menu page, press .

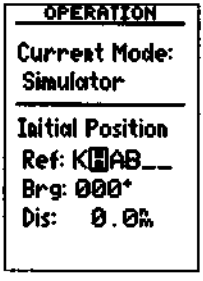
The GPS 89 can store up to 250 user waypoints.

To view a specific user waypoint page, highlight the waypoint name and press ENTER.

To confirm a waypoint deletion, highlight the 'Yes?' prompt and press ENTER.



Choose from between the Normal, Battery Saver, and Simulator modes.



To speed up calculation of the initial position, you may reference an existing waypoint to assist the GPS 89.

Operation

The third section of the main menu allows you to specify the operating mode and enter an initial position by manually entering coordinates or by using a reference waypoint.

The GPS 89 has three available operating modes:

Normal Mode operates the unit at maximum performance, and should provide a battery life of 15 hours on alkaline batteries.

Battery Saver Mode is suitable for most applications, and extends battery life to up to 20 hours on alkaline batteries by reducing the unit's update rate when navigational conditions permit (e.g., you're travelling a steady course without constant speed or heading variations).

Simulator Mode allows you to operate the unit without acquiring satellites, and is ideal for practicing or entering waypoints and routes while at home.

To select an operating mode:

1. Move the field highlight to the 'mode' field and press ENT.
2. Use the arrow keypad to choose a mode and press ENT.
3. The 'Ref' field will then be highlighted to enable entry of a reference waypoint, if desired. Press OUT to finish.

Initial Position Entry

The initial position field allows you to enter a beginning position either to speed up the acquisition process if the unit has moved more than several hundred miles with the power off or define a starting point for a simulated trip. You may select a known waypoint as your starting position, or define a distance and bearing from a known waypoint to calculate your starting latitude and longitude.

Keep in mind that while entering an initial position may speed up acquisition, entering an incorrect initial position will have an adverse effect on the receiver's ability to find the necessary satellites in order to calculate an accurate position.

To enter an initial position reference:

1. Move the field highlight to the 'Ref' field and press ENT.
2. Use the arrow keypad to enter the identifier of the reference position waypoint and press ENT.

Initial Position Entry (continued)

If the GPS 89 is in simulator mode, the field highlight will advance to the 'Brg' field, where you may define your position in reference to the selected waypoint (the GPS 89 will calculate the position coordinates for you).

To enter a bearing:

1. With the field highlight on the 'Brg' field, press [ENT].
2. Use the arrow keypad to enter the bearing and press [ENT].

To enter a distance from the reference waypoint:

1. With the field highlight on the "Dis" field, press [ENT].
2. Enter the distance and press [ENT].

Audio/Display Options

The Audio/Display allows the user to determine the display contrast of the crystal display screen. The next submenu is the backlight timer. From the timer, the user has six different adjustable settings to choose from; 0, 15, 30, 60, 120 and 240 seconds. The submenu tones at the bottom of page allow the user to select from three settings; MSG only, MSG and Keystroke, and None. The '0' setting will keep the screen backlighting on as long as the unit is on. Whenever screen backlighting is on, a bulb icon will appear on the status page.

To set the backlight timer:

1. Highlight the 'Backlight time' field and press [ENT].
2. Use the arrow keypad to toggle through and select the desired setting. Confirm the setting by pressing [ENT].
3. To turn backlighting on and off, press [LIGHT].

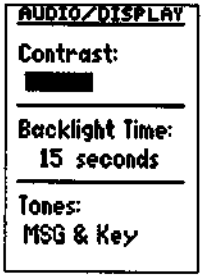
To set the screen contrast:

1. Highlight the 'Contrast' field and press the [ENT] key.
2. Use the ◀ and ▶ keys to adjust the bar scale for the desired contrast and press the [ENT] key.

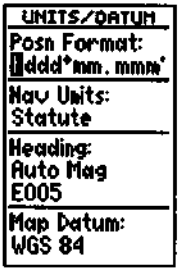
The audio/display field lets you specify an audible tone for message alerts and keystroke confirmation.

To select a tone setting:

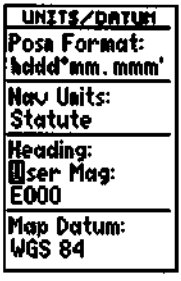
1. Highlight the 'Tones' field and press the [ENT] key.
2. Select the desired level tone level and press [ENT].



Contrast, backlight timer, and tone may be controlled from the audio/display page.



To change the position format, highlight the 'Posn Format' field and press ENTER.



Magnetic Heading

The 'User Mag' setting makes it possible to compensate for specific degrees of magnetic variation.

Units/Datum

The settings the GPS 89 uses for displaying navigation information may be changed using the units/datum page. From this page, you may select preferences for position format, nav units, heading calculations and map datum.

Position Format

The default position setting is latitude and longitude in degrees and minutes (hddd°mm.mmm'). You may also select degrees, minutes and seconds (hddd°mm'ss.s"); degrees only (hddd.ddddd°); UTM/UPS coordinates; or Taiwan, Swiss, Swedish, Maidenhead, Irish, German,or British Grid formats.

To select a position format:

1. Highlight the 'Posn Format' field and press .
2. Use the arrow keypad to select a format and press .

Navigation Units

You may select from statute, metric, or nautical navigation units for all speed and distance fields.

To select the navigation units :

1. Highlight the 'Nav Units' field and press .
2. Use the arrow keypad to choose units and press .

Heading Display

The GPS 89's heading information can be displayed referencing magnetic north (automatic or user-defined), true north or calculated grid headings. The default setting is automatic magnetic north, which is suitable for most applications.

To select a heading preference:

1. Highlight the heading field and press .
2. Use the arrow keypad to select a heading preference and press .

To enter a magnetic heading:

1. Select the 'user mag' heading and press .
2. Enter the degrees of magnetic variation.
3. Press the key to confirm.

Map Datum Setting

The map datum is located just below the heading field, and comes with a WGS 84 default setting. Although 104 map datums are available for use (see the map datum list in Appendix B), you should only change the datum if you are using charts that specify a different datum than WGS 84.

To select a map datum:

1. Move the field highlight to the 'datum' field and press ENTER.
2. Use the arrow keypad to toggle through and select the desired setting. Confirm the setting by pressing ENTER.

Warning: Using the wrong map datum can seriously affect the accuracy of your GPS 89.

Date/Time and Timer Options

The Date/Time submenu provides access to the local time offset and timer functions. The date and time field is located at the top half of the Date/Time page. The date and time are calculated from satellites and cannot be edited. Because the time shown is UTC time, you will need to enter a time offset to display the correct local time for your area. To determine the time offset for your area, refer to the chart on page 55.

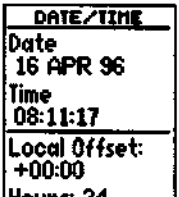
To enter the time offset:

1. Move the field highlight to the 'offset' field and press ENTER.
2. Enter the time offset for your longitude and press ENTER. Remember to select a positive or negative indicator for your offset (you'll have to move the field highlight to the left of the offset to enter a + or - for the offset).
3. Press the ENTER key to confirm the offset.

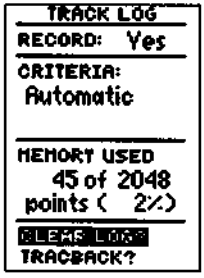
The GPS 89's timer function will count down from an entered interval and alert you with a message, or it will keep a running timer that will count up to 99:59:59.

To set the countdown timer:

1. Highlight the up/down field and press the ENTER key.
2. Use the arrow keypad to select the 'Down' setting. The highlight will advance to the time field. Press ENTER.
3. Enter the countdown time (hours, minutes and seconds).
4. Press ENTER to confirm and begin the countdown.

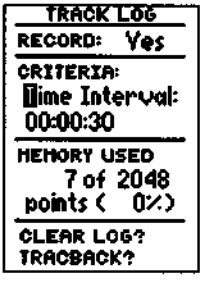


To reset the timer, highlight the 'Timer:' field and press the LEFT ARROW key.



Track Log Page

Clear the track log to unclutter the screen or to begin a TracBack.



You may select how often track points are laid down, which will effect the display on the map page.

Countdown Timer (continued)

When the timer expires (at 00:00:00), you will be informed with a message. The timer will also automatically transition to the count up mode and display how much time has elapsed since the timer expired. The count up timer will keep a running clock until it is manually reset.

To set the count up timer or enter a starting time:

1. With the timer field in the count 'Up' setting, highlight the time field and press ENTER.
2. Press the ◀ key to reset the field, or use the arrow keypad to enter a starting time for the timer. Press ENTER to finish and restart the timer.

Track Log Options

The next listing on the main menu page is the track log, which lets you manage and erase the GPS 89's tracking data. From the track log page, you can select whether or not to record a track and define how it is recorded.

The track log option sets the number of points the unit will attempt to display on the map page. The default setting of 250 points provides good resolution with minimal screen clutter. The maximum setting is 2048 points. Once you've reached the maximum number of track points, the older points will be lost as new points are added. Note that adjusting the track points displayed will not affect whether or not the receiver records a track log or the ability to create a TracBack route. The track log setup page lets you manage the GPS 89's tracking data. From this page, you can select whether or not to record a track and how it is recorded.

To turn the track log on or off:

1. Highlight the 'RECORD' field and press ENTER.
2. Select 'Yes' or 'No' and press ENTER. NOTE: Turning the track recording off will disable the TracBack feature.

The stored track criteria determines how often positions are stored in the track log. The default setting is automatic, and stores tracks based on resolution. This setting gives you the most efficient use of track memory and provides the most accurate TracBack route.

Track Log Setup (continued)

To change the criteria to record points based upon a specific time interval:

1. Highlight the 'criteria' field and press ENTER.
2. Use ▲ or ▼ to select 'Time Interval' and press ENTER.
3. Press ENTER to begin entry of the interval.
4. Enter a value in hours, minutes and seconds and press the ENTER key.

The rest of the track log setup page displays the percentage of memory used to store the current track log data and contains function fields used to clear the track log memory and activate the TracBack feature.

To clear the track log:

1. Highlight 'CLEAR LOG?' and press ENTER.
2. A warning page will appear, asking you to confirm your actions. Use the ◀ key to move the field highlight to the 'Yes?' field and press ENTER.

To clear the track log, highlight the 'Yes?' prompt and press ENTER.

TracBack Function

The TracBack option lets you activate a TracBack route using the track log (see pages 23-24 for more information.)

To activate a TracBack route:

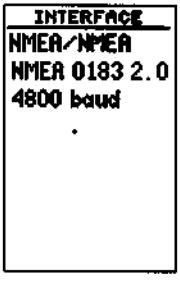
1. Highlight 'TracBack?' and press ENTER.

Interface Setup

The last listing available from the main menu is the Interface, where you can specify the interfacing formats for connecting external devices. Five I/O options are available: GRMN/GRMN, None/None, None/NMEA, RTCM/None, and RTCM/NMEA. Each format lists the input format first, followed by the output format.

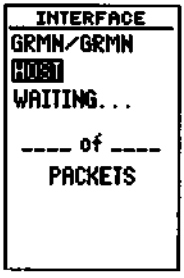
To select I/O format:

1. Highlight the I/O field and press ENTER.
2. Use the ▲ and ▼ keys to toggle through and select the desired setting, and press ENTER.

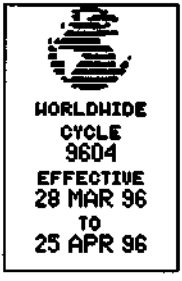


NMEA Interface

Once an NMEA interface option is chosen, 0183 version 2.0 with a baud rate of 4800 will automatically be selected. See Appendix C for a list of NMEA sentences in 0183 version 2.0 format.



When preparing to update the GPS 89 database, ensure the 'GRMN/GRMN' interface format is chosen and 'HOST' is displayed in the transfer option field.



After the database update is completed, the GPS 89 will automatically display the database page.

Interface Setup (continued)

The GRMN/GRMN setting is a proprietary format that lets you exchange user data between two GPS 89s or a PC with an optional GARMIN PC kit. During data transfer, the number of packets being exchanged will be displayed on screen.

To select a transfer option:

1. Highlight the 'host' field and press ENT.
2. Use ▲ and ▼ to select the desired setting, and press ENT.

To disable all GPS 89 interfacing capabilities, select the None/None setting. If you want to output NMEA data to compatible external devices without any differential input capability, select the None/NMEA setting. Once a NMEA setting has been selected (with or without RTCM input), the NMEA setting of 0183 version 2.0 with a baud rate of 4800 will automatically appear and is not selectable.

Updating the GPS 89 Database

The GPS 89's internal worldwide Jeppesen database may be updated from a PC computer using GARMIN's optional PC Database Update Software and an interface cable. For information on ordering, see appendix D. Please note that an IBM-compatible computer is required to perform an update.

To update the database:

1. Connect one end of the PC interface cable to COM port 1 or 2 on your computer. Connect the other end to the back of your GPS 89.
2. On your GPS 89 unit, display the interface setup page, highlight the interface format field, and press ENT.
3. Use ▲ or ▼ to select 'GRMN/GRMN' and press ENT. Ensure the 'HOST' transfer option is selected.

(All remaining database update instructions apply only to your PC.)

4. Place the update software in the appropriate drive on your PC and from DOS and select that drive to work from.
5. Type 'UPDATEDB' and press ENTER. If the PC cannot establish a link with the GPS 89, the message 'unable to establish communication with unit' will appear on your monitor.

6. As soon as a link is established, the current database will be erased. Upon completion, the message 'database has been erased' will appear on your screen.

7. Next, the new database will be loaded in sections called "packets". As this is occurring, the number of packets 'sent' will be displayed on the screen.

8. Once the update is complete, the GPS 89 will automatically initialize and display the database page. Note: It will take approximately 5-10 minutes to transfer the new database.

DGPS Interface Setup

The last two format settings allow the GPS 89 to accept DGPS corrections in RTCM 104 version 2.0 format. The RTCM/NONE format will allow you to connect to any manually-tuned beacon receiver to the proper interface, with the baud rate selectable from the GPS 89. The RTCM/NMEA selection controls the GARMIN GBR-21 beacon receiver.

Once a RTCM setting has been selected, the GPS 89 will automatically try to tune the last frequency and bit rate you selected, or it will switch to the default frequency of 304.0 kHz with a bit rate of 100 bps if no previous beacon has been tuned. You may also enter your own frequency and bit rate if desired.

To enter a DGPS beacon frequency:

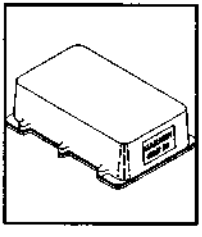
1. Highlight the 'freq' field and press ENT.
2. Enter the desired frequency and press ENT.
3. Highlight the 'rate' field and press ENT.
4. Use ▲ and ▼ to select the rate and press ENT.

When the GPS 89 is receiving DGPS corrections, the 'beacon receiver' section of the I/O setup page will display the frequency and signal strength, as well as the distance from the transmitter to the beacon receiver. A status message will constantly keep you informed of DGPS activity:

- A 'tuning' message will be displayed while a beacon signal is being tuned. Once the signal has been tuned, the message 'receiving' will be displayed.
- If a signal is tuned and no corrections are being received, a 'no data' message will be displayed.
- If a beacon signal cannot be tuned, a 'no status' message will be displayed.

DGPS Interface

Once a RTCM option is selected, you must manually tune the beacon receiver from the frequency field.



DGPS corrections are accepted on RTCM-104 v. 2.0 format. The GARMIN GBR 21 is the recommended beacon receiver for use with the GPS 89. Other receivers with the correct RTCM format may be used, but may not correctly display status or allow tuning control.

Appendix A

Messages and Time Offsets

The GPS 89 uses a flashing on-screen message indicator to alert you to important information. Whenever the message indicator appears, press PAGE to view the message page. There are two types of messages: temporary alerts and condition alerts. Temporary alerts are cleared from the message page after viewing, while condition alerts remain until the condition has been resolved. Pay careful attention to all messages for your own safety.

Accuracy has been Degraded—The accuracy of the GPS 89 has been degraded beyond 500 meters due to poor satellite geometry or data quality. You should check other navigational sources to verify the position indicated.

Already Exists—The name you are entering already exists in the GPS 89's memory.

Approaching—You are one minute away from reaching a destination waypoint.

Arrival At—You are within the arrival alarm circle of the indicated waypoint.

Battery Power is Low—The batteries are low and should be replaced.

Cannot Navigate Locked Route—You have attempted to navigate a route with a locked waypoint. A waypoint can be 'locked' when the database is updated if the waypoint does not exist in the new database.

Can't Change Active Waypoint—You have attempted to change the 'Active To' or 'Active From' waypoint. Clear the active route or GOTO before making your changes.

CDI Alarm—Your course deviation has exceeded the limit specified on the alarms setup page.

Final Altitude Alert—The current altitude is within 1000 feet of the final altitude entered on the VNAV page.

Inside SUA—Your aircraft has entered the boundaries of special use or controlled airspace.

Leg Not Smoothed—The upcoming route leg is too short for smooth waypoint transitions.

No DGPS Position—Not enough data is available to compute a DGPS position.

No RTCM Input—The beacon receiver is improperly connected or baud rates do not match.

Poor GPS Coverage—The GPS 89 cannot acquire the necessary number of satellites to compute a position. Try another location with a clearer view of the sky.

Power Down and Re-init—The GPS 89 is not able to calculate a position due to abnormal satellite conditions. Turn the unit off and verify the last position shown by other means. Try the unit again later, possibly in a different location.

Read Only Mem has Failed—The permanent memory has failed and the unit is not operable. Take your unit to an authorized GARMIN dealer for repairs.

Received an Invalid WPT—A waypoint was received during upload transfer that has an invalid identifier.

Receiver has Failed—A failure in receiver hardware has been detected. If this message persists, do not use the unit and take it to an authorized dealer for repair.

Route is Full—You have attempted to add more than 30 waypoints to a route.

Route is not Empty—You have attempted to copy into a route already in use.

Route Waypoint Can't be Deleted—The waypoint you are trying to delete is part of a route. Delete the waypoint from the route before removing it from memory.

Route Waypoint was Deleted—A route waypoint entered does not exist in the database and has been deleted from the route.

RTCM Input has Failed—DGPS data being received has been lost. You are no longer receiving the beacon signal.

Searching the Sky—The GPS 89 is in searching the sky for almanac data or the unit is in AutoLocate™ mode.

Start Altitude Change—The altitude change entered on the VNAV 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 was Lost—All waypoints, routes, time and almanac data has been lost due to battery failure or clearing the receiver's memory.

SUA Ahead < 10 min—Your projected course and current altitude will place you within a SUA within 10 minutes, based on your current track over ground.

SUA Near and Ahead—Your present position is within 2 nm of a SUA based upon your current course and altitude.

Timer Has Expired—The countdown timer has expired.

Transfer has been Completed—The receiver is finished uploading or downloading information to the connected device.

Vertical Nav Cancelled—The VNAV function has been cancelled due to a change in the active route.

WPT Memory is Full—You have used all 250 waypoints in the GPS 89. Delete unwanted waypoints to make room for new entries.

Time Offset Chart

The table below gives approximate UTC time offset for various longitudinal zones. If you are in daylight savings time, add one hour to the offset.

Longitudinal Zone	Offset	Longitudinal Zone	Offset
W180.0° to W172.5°	-12	E007.5° to E022.5°	1
W172.5° to W157.5°	-11	E022.5° to E037.5°	2
W157.5° to W142.5°	-10	E037.5° to E052.5°	3
W142.5° to W127.5°	-9	E052.5° to E067.5°	4
W127.5° to W112.5°	-8	E067.5° to E082.5°	5
W112.5° to W097.5°	-7	E082.5° to E097.5°	6
W097.5° to W082.5°	-6	E097.5° to E112.5°	7
W082.5° to W067.5°	-5	E112.5° to E127.5°	8
W067.5° to W052.5°	-4	E127.5° to E142.5°	9
W052.5° to W037.5°	-3	E142.5° to E157.5°	10
W037.5° to W022.5°	-2	E157.5° to E172.5°	11
W022.5° to W007.5°	-1	E172.5° to E180.0°	12
W007.5° to E007.5°	0		

Appendix B

Map Datums

The following list shows the map datums available for the GPS 89. Menu page abbreviations are listed first, followed by the corresponding map datum name and area. The default map datum for the GPS 89 is WGS 84.

Adindan	Adindan- Ethiopia, Mali, Senegal, Sudan
Afgooye	Afgooye- Somalia
AIN EL ABD '70	AIN EL ANBD 1970- Bahrain Island, Saudi Arabia
Anna 1 Ast '65	Anna 1 Astro '65- Cocos Isl.
ARC 1950	ARC 1950- Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, Zimbabwe
ARC 1960	ARC 1960- Kenya, Tanzania
Ascnsn Isld '58	Ascension Island '58- Ascension Island
Astro B4 Sorol	Astro B4 Sorol Atoll- Tern Island
Astro Bcn "E"	Astro Beacon "E"- Iwo Jima
Astro Dos 71/4	Astro Dos 71/4- St. Helena
Astr Stn '52	Astronomic Stn '52- Marcus Island
Astrln Geod '66	Australian Geod '66- Australia, Tasmania Island
Astrln Geod '84	Australian Geod '84- Australia, Tasmania Island
Bellevue (IGN)	Efate and Erromango Islands
Bermuda 1957	Bermuda 1957- Bermuda Islands
Bogata Observ	Bogata Observatry- Colombia
Campo Inchspe	Campo Inchauspe- Argentina
Canton Ast '66	Canton Astro 1966- Phoenix Islands
Cape	Cape- South Africa
Cape Canavrl	Cape Canaveral- Florida, Bahama Islands
Carthage	Carthage- Tunisia
CH-1903	CH 1903- Switzerland
Chatham 1971	Chatham 1971- Chatham Island (New Zealand)
Chua Astro	Chua Astro- Paraguay
Corrego Alegr	Corrego Alegre- Brazil
Djakarta	Djakarta (Batavia)- Sumatra Island (Indonesia)
Dos 1968	Dos 1968- Gizo Island (New Georgia Islands)
Easter Isld 67	Easter Island 1967
European 1950	European 1950- Austria, Belgium, Denmark, Finland, France, Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland
European 1979	European 1979- Austria, Finland, Netherlands, Norway, Spain, Sweden, Switzerland
Finland Hayfrd	Finland Hayford- Finland
Gandajika Base	Gandajika Base- Republic of Maldives
Geod Datm '49	Geodetic Datum '49- New Zealand
Guam 1963	Guam 1963- Guam Island
Gux 1 Astro	Gux 1 Astro- Guadalcanal Island
Hjorsey 1955	Hjorsey 1955- Iceland
Hong Kong '63	Hong Kong '63- Hong Kong
Hu-Tzu-Shan	Hu-Tzu-Shan- Taiwan
Indian Bngldsh	Indian- Bangladesh, India, Nepal
Indian Thailand	Indian- Thailand, Vietnam
Indonesia '74	Indonesia 1974- Indonesia
Ireland 1965	Ireland 1965- Ireland
ISTS 073 Astro	ISTS 073 ASTRO '69- Diego Garcia
Johnston Island	Johnston Island Kandawala Kandawala- Sri Lanka
Kerguelen Islnd	Kerguelen Island
Kertau 1948	Kertau 1948- West Malaysia, Singapore
L. C. 5 Astro	Cayman Brac Island
Liberia 1964	Liberia 1964- Liberia
Luzon Mindanao	Luzon- Mindanao Island
Luzon Philippine	Luzon- Philippines (excluding Mindanao Island)
Mahe 1971	Mahe 1971- Mahe Island
Marco Astro	Marco Astro- Salvage Island

Appendix B

Map Datums

Massawa	Massawa- Eritrea (Ethiopia)
Merchich	Merchich- Morocco
Midway Ast '61	Midway Astro '61- Midway
Minna	Minna- Nigeria
NAD27 Alaska	North American 1927- Alaska
NAD27 Bahamas	North American 1927- Bahamas (excluding San Salvador Island)
NAD27 Canada	North American 1927- Canada and Newfoundland
NAD27 Canal Zone	North Am. 1927- Canal Zone
NAD27 Caribbn	North American 1927- Caribbean (Barbados, Caicos Islands, Cuba, Dom. Rep., Grand Cayman, Jamaica, Leeward and Turks Islands)
NAD27 Central	North American 1927- Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua)
NAD27 CONUS	North Am. 1927- Mean Value
NAD27 Cuba	North American 1927- Cuba
NAD27 Grnland	North American 1927- Greenland (Hayes Peninsula)
NAD27 Mexico	N. American 1927- Mexico
NAD27 San Sal	North American 1927- San Salvador Island
NAD83	North American 1983- Alaska, Canada, Central America, CONUS, Mexico
Nhrwn Masirah	Nahrwn- Masirah Island (Oman)
Nhrwn Saudi A	Nahrwn- Saudi Arabia
Nhrwn United A	Nahrwn- United Arab Emirates
Naparima BWI	Naparima BWI- Trinidad and Tobago
Observtorio '66	Observatorio 1966- Corvo and Flores Islands (Azores)
Old Egyptian	Old Egyptian- Egypt
Old Hawaiian	Old Hawaiian- Mean Value
Oman	Oman- Oman
Ord Srvy GB	Old Survey Gt Britn- England, Isle of Man, Scotland, Shetland Isl., Wales
Pico De Las Nv	Canary Islands
Pitcairn Ast '67	Pitcairn Astro '67- Pitcairn Isl.
Prov S Am '56	Prov So Amricn '56- Bolivia, Chile,Colombia, Ecuador, Guyana, Peru, Venezuela
Prov S Chln '63	Prov So Chilean '63- S. Chile
Puerto Rico	Puerto Rico & Virgin Islands
Qatar National	Qatar National- Qatar
Qornoq	Qornoq- South Greenland
Reunion	Reunion- Mascarene Island
Rome 1940	Rome 1940- Sardinia Island
RT 90	Sweden
Santo (Dos)	Santo (Dos)- Espirito Santo Island
Sao Braz	Sao Braz- Sao Miguel, Santa Maria Islands (Azores)
Sapper Hill '43	Sapper Hill 1943- East Falkland Island
Schwarzeck	Schwarzeck- Namibia
Sth Amrcn '69	South American '69- Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Venezuela, Trinidad and Tobago
South Asia	South Asia- Singapore
SE Base	Southeast Base- Porto Santo and Madiera Islands
SW Base	Southwest Base- Faial, Graciosa, Pico, Sao Jorge and Terceira Islands (Azores)
Timbalai 1948	Timbalai 1948- Brunei and E. Malaysia (Sarawak and Sabah)
Tokyo	Tokyo- Japan, Korea, Okinawa
Tristan Ast '68	Tristan Astro 1968- Tristan da Cunha
Viti Levu 1916	Viti Levu 1916- Viti Levu/ Fiji Islands
Wake-Eniwetok	Wake-Eniwetok- Marshall Isl.
WGS 72	World Geodetic System 1972
WGS 84	World Geodetic System 1984
Zanderij	Zanderij- Surinam

Appendix C

Specifications and Wiring

The GPS 89 is constructed of high-quality materials and should not require user maintenance. Should your unit ever need repair, please take it to an authorized GARMIN service center. The GPS 89 has no user-serviceable parts. Never attempt any repairs yourself. To protect your GPS 89, keep it in its carrying case when not in use, and never allow gasoline or other solvents to come into contact with the case. Clean the case and lens with a soft cloth and a household window cleaner.

PHYSICAL

Case:	Waterproof, dry nitrogen-filled
Size:	6.15"H x 2"W x 1.23"D (15.6 x 5.1 x 1.23 cm)
Weight:	Approx 9.5 ounces (269g) w/ batteries
Temperature Range:	5° to 158°F (-15° to 70°C)

PERFORMANCE

Receiver:	Differential-ready MultiTrac8™
Acquisition Time:	Approx. 20 seconds (warm start)
	Approx. 2 minutes (cold start)
	Approx. 7.5 minutes (AutoLocateTM)
Update Rate:	1/second, continuous
Position Accuracy:	5-10 meters (16-33 ft.) with DGPS corrections*
	15 meters (49 ft.) RMS**
Velocity Accuracy:	0.1 knot RMS steady state
Dynamics:	Performs to specification to 3g's

POWER

Input:	Four 1.5 volt AA batteries or 10-40vDC
Current Consumption:	0.16 amps max.
Battery Life:	Up to 12 hours (normal mode)
(w/ alk. batt.)	Up to 20 hours (battery saver mode)

NOTE: Alkaline batteries lose a significant amount of their capacity as temperature decreases. If you're using the GPS 89 in below freezing temperatures, use lithium batteries for longer battery life. Extensive use of screen backlighting will also significantly reduce battery life.

Specifications subject to change without notice.

* With optional GARMIN GBR 21 Beacon Receiver Input.

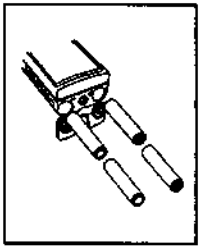
** Subject to accuracy degradation to 100m 2DRMS under the US DOD-imposed Selective Availability Program.

Battery Replacement

GPS 89 uses 4 AA alkaline batteries to provide up to 12 hours of operation in normal mode or 20 hours of operation in battery-saver mode. Rechargeable Ni-Cad or lithium batteries may also be used. Note that the battery level indicator is calibrated for alkaline batteries, and Ni-Cad or lithium batteries will only show battery life at partial scale.

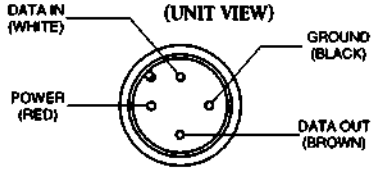
To replace batteries:

1. **Remove the battery cover by turning the thumb loop at the bottom of the unit 1/4 turn counter-clockwise.**
2. **Remove used batteries and insert new batteries into position. The battery pole you can still see should match the symbol marked on the case.**
3. **Replace and secure the battery cover by turning the thumb loop 1/4 turn clockwise.**



Battery Replacement

Be sure to install batteries with the poles matching the symbol marked on the case.



Battery Replacement

Three optional cables are available to connect the GPS 89 to an external power source or interface with another unit or PC:

- Cigarette Lighter Adapter— Allows connection to a 12- volt DC cigarette lighter plug.
- Data Cross-Load Cable— Allows data transfer between GPS 38/40/45/89 units.
- PC Kit Data Cable— PC interface cable with 9-pin 'D' serial data connector.

The GPS 89 can drive three NMEA devices using NMEA 0183 version 2.0. Approved sentences:

GPGGA, GPGLL, GPGSA, GPGSV, GPRMB, GPRMC, GPRTE, GPWPL, GPBOD

Proprietary sentences:

PGRME (estimated error), PGRMM (map datum), PGRMZ (altitude), PSLIB (beacon receiver control)

Appendix D

Accessories

GARMIN offers a full line of accessories for the GPS 89, which are available from your local dealer or GARMIN direct. Prices are subject to change without notice.

Orders may be placed Monday through Friday from 8AM-5PM CST by calling 1-800-800-1020, or by fax at 1-913-397-8282.

Name _____

Address _____

City _____ State _____ Zip _____

Country _____ Daytime Phone _____

Method of Payment

Visa MC AMEX Discover

Account # _____ Expires _____

Authorized Signature _____

Description	Part #	Price	Qty	Ext. Price
Yoke Mount	010-10063-00	$68.25		
Remote Antenna Kit	010-10052-02	$160.00		
Database Update Software	010-10104-00	$125.00		
PC Interface/Update Cable	320-00037-00	$30.00		
Navigation Software Kit	010-10043-00	$99.00		
Owner's Manual	190-00108-00	$15.00		
Quick Reference Card	010-00108-01	$4.50		

Subtotal _____

Shipping (Ground)* & Handling- $5.00 US, $35 International _____

CA, FL, KS & NJ add Sales Tax _____

Total Due _____

****Express shipping available. Please call for pricing.***

Appendix I
Index

Appendix I

Index

GARMIN LIMITED WARRANTY

GARMIN warrants this product to be free from defects in materials and workmanship for one year from the date of purchase. GARMIN International, Inc. will at its sole option, repair or replace any components which fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor. The customer is, however, responsible for any transportation costs. This warranty does not cover failures due to abuse, misuse, accident or unauthorized alteration or repairs. GARMIN International, Inc. assumes no responsibility for special, incidental, punitive or consequential damages, or loss of use.

The warranties and remedies contained herein are exclusive and in lieu of all other warranties expressed or implied, including any liability arising under warranty of merchantability or fitness for a particular purpose, statutory or otherwise. This warranty gives you specific legal rights, which may vary from state to state.

To obtain warranty service, call the GARMIN Customer Service department for a returned merchandise tracking number. The unit should be securely packaged with the tracking number clearly marked on the outside of the package, and sent freight prepaid and insured to a GARMIN warranty service station. A copy of the original sales receipt is required as the proof of purchase for warranty and flat rate repairs.

Once your standard warranty expires, GARMIN's flat rate service policy provides a low-cost, fast-turnaround factory repair for three additional years. The flat rate is set at the time of purchase, and costs you nothing until you need it. If your GPS should ever need service or repair, return it to a GARMIN service center.

The flat rate service policy applies to the original owner, and is void if the product exhibits any evidence of physical abuse, neglect or intentional damage determined at the sole discretion of GARMIN.

A copy of the original sales receipt is required to verify the service rate in effect at the time of purchase. If a receipt is not available or not included with the unit, it will be repaired at the current three-year flat rate.

Software and database updates are not included in the warranty or flat rate program. GARMIN may, however, change the operating software and/or database at its discretion at no additional cost. Unit repair or replacement will be made at the sole discretion of GARMIN.

1200 E. 151st Street, Olathe, KS USA 66062

GARMIN (Europe) LTD
Unit 5, The Quadrangle, Abbey Park Industrial Estate, Romsey, U.K. SO51 9AQ

Part Number 190-00108-00 Rev. B