GARMIN

GNS 480™

color GPS/WAAS/NAV/COM

pilot's guide

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CAUTION: The Global Positioning System is operated by the United States government, which is solely responsible for its accuracy and maintenance. The system is subject to changes which could affect the accuracy and performance of all GPS equipment. Although the Garmin GNS 480 is a precision electronic NAVigation AID (NAVAID), any NAVAID can be misused or misinterpreted and therefore become unsafe.

CAUTION: Use the GNS 480 at your own risk. To reduce the risk of unsafe operation, carefully review and understand all aspects of this Owner's Manual and the Flight Manual Supplement, and thoroughly practice basic operation prior to actual use. When in actual use, carefully compare indications from the GNS 480 to all available navigation sources, including the information from other NAVAIDS, visual sightings, charts, etc. For safety, always resolve any discrepancies before continuing navigation.

WARNING: The altitude calculated by the GNS 480 is geometric height above mean sea level and could vary significantly from altitude displayed by pressure altimeters in aircraft. GPS accuracy may be degraded by the U.S. Department of Defense-imposed Selective Availability (SA) programs.

WARNING: The Jeppesen database incorporated in the GNS 480 must be updated regularly in order to ensure that its information is current. Updates are released every 28 days. A database information packet is included in your GNS 480 package. Pilots using an out-of-date database do so entirely at their own risk!

CAUTION: GPS receivers operate by receiving and decoding very low power radio signals broadcast by satellites. It is possible that in some situations other radio equipment or electronic equipment used in close proximity to a GPS receiver may create electromagnetic interference (EMI) which may affect the ability of the GPS receiver to receive and decode the satellite signals. In such event, the interference may be reduced or eliminated by switching off the source of interference or moving the GPS receiver away from it.

Cautions

NOTE: This device complies with Part 15 of 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. Furthermore, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference, the user is encouraged to try to 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 avionics technician for additional help if these remedies do not correct the problem.

Operation of this device is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Accessories and Packing List

To obtain accessories for your GNS 480 please contact your Garmin dealer.

*Help us better support you by completing our on-line registration form today! Registration ensures that you will be notified of product updates and new products and provides lost or stolen unit tracking. Please, have the serial number of your GNS 480 handy, connect to our web site (**www.garmin.com**) and look for our Product Registration link on the home page.*

The GNS 480 display lens is coated with a special anti-reflective coating which is very sensitive to skin oils, waxes, and abrasive cleaners. It is very important to clean the lens using an eyeglass cleaner that is specified as safe for anti-reflective coatings (one suitable product is Wal-Mart Lens Cleaner) and a clean, lint-free cloth.

CAUTION: The Garmin GNS 480 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 authority to operate this device under FCC Part 15 regulations.

CAUTION: The electronic chart is an aid to navigation and is designed to facilitate the use of authorized government charts, not replace them. Only official government charts and notices to mariners contain all information needed for save navigation – and, as always, the user is responsible for their prudent use.

Congratulations on choosing the world's finest panel-mounted GPS IFR navigation/communication system certified for primary navigation! The GNS 480 represents Garmin's continued commitment to providing you with the most advanced technology available today — in an accurate, easy-to-use design suitable for all your flying needs.

Before installing and getting started with your new system, please ensure that your package includes the following items. If any parts are missing or are damaged, please contact your Garmin dealer.

Standard Package:

- GNS 480 Unit and NavData Card
- Mounting Tube and Installation Kit
- Pilot's Guide and Quick Reference Guide
- GNS 480 Interactive Training CD
- Database Subscription Packet
- Warranty Registration Card
- ** GPS Antenna kit is available as a separate option selected at the time of order*

Your Garmin dealer will perform the installation and configuration of your new GNS 480. After installation, the NavData card will already be installed into the unit. The GNS 480 will be secured in the mounting tube with the proper wiring connections. Have your dealer answer any questions you may have about the installation — such as location of antennas or any connections to other equipment in the panel.

Preface

Thank you for choosing the Garmin GNS 480. The GNS 480 utilizes the proven performance of Garmin GPS and full-featured mapping to create an unsurpassed aviation navigation system. Please take a moment now to compare the contents of this package with the packing list on the outside of the box. If any pieces are missing, please contact your Garmin dealer immediately.

About This Manual

To get the most out of your new navigation system, take time to read this manual and learn the operating procedures for your unit in detail. This manual is organized into the following chapters.

The **Introduction** chapter contains the Table of Contents.

The **Getting Started** chapter provides information such as an overview of unit features and how to turn the unit on and adjust the backlight. The GNS 480 also contains a simulator mode to help you get acquainted with its functions and features.

The **Basic Operation** chapter provides you with information about basic features such as using the Moving Map, Com and Nav radios, navigating a route, and using waypoints. There are also step-by-step directions to assist you in these operations.

The **Appendix** contains information such as specifications, optional accessories, and maintenance information. You can also find warranty, safety, and FCC information in the Appendix.

An **Index** is provided at the end of the manual for reference. Simply look up the topic you wish to learn about and read the page or pages listed.

Welcome

The GNS 480 uses GPS technology in order to find your precise location. GPS stands for Global Positioning System, a group of 24 satellites, circling the earth twice a day at an altitude of about 12,000 miles. The satellites transmit very low power radio signals containing position and time information, allowing anyone with a GPS receiver to determine their location on the Earth within 100 meters or better. For more detailed information regarding GPS, Garmin has prepared a booklet titled "GPS Guide for Beginners" available from our Web site at www.garmin.com.

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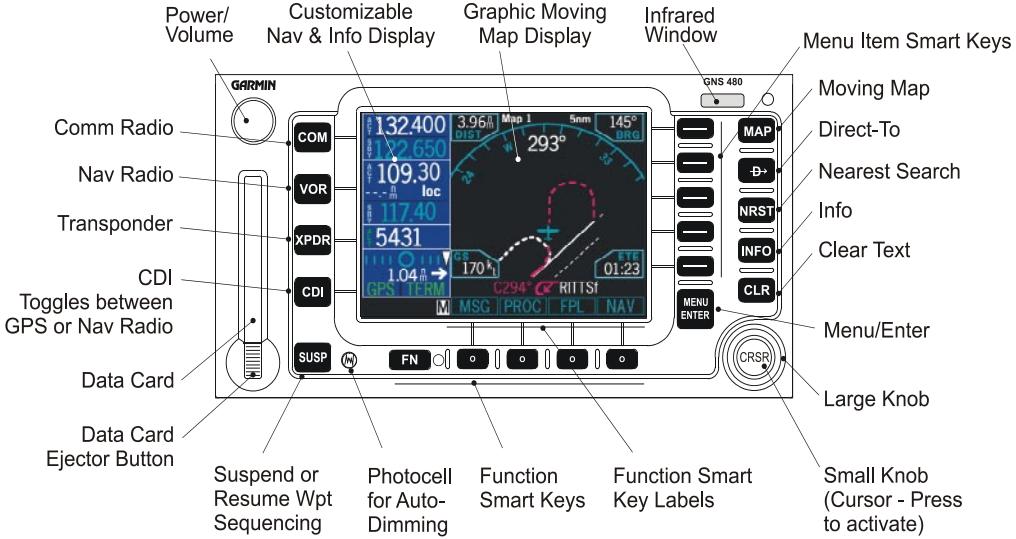
This guide describes the operation of the GNS 480 (CNX80) Color GPS/WAAS NavCom. The GNS 480 (CNX80) provides a new, higher level of accuracy. integrity, integration, flight planning capability, and convenience for the pilot. The GNS 480 (CNX80) combines a large number of easily accessible controls to use the high-resolution color multi-function display, Nav and Com transceivers, GPS/WAAS navigator, and transponder controller all in a single unit. The GNS 480 (CNX80) with the GPS/WAAS navigator is certified for use as primary navigation equipment for both VFR and IFR operations.

This Pilot's Guide covers the details, so you can get the most out of your GNS 480 (CNX80), quickly. For more details and examples, refer to the GNS 480 (CNX80) Computer-Based Training (CBT) compact disc and in-flight demo DVD which are provided for your convenience. These documents and the Quick Reference Guide, when used with the simulator for practice, will prepare you to get the most out your equipment.



Push the PWR/VOL knob in to turn the unit on. Press the COM, VOR, XPDR keys to activate that mode. Press CDI to select the CDI source. Press SUSP to suspend waypoint sequencing.

Press the "smart" key below the function label to activate the named function. Pressing FN scrolls available functions.

Controls

Power/Volume

The knob at the top left corner of the GNS 480 controls power on/off and the radio volume. Push the **PWR/VOL** knob in to turn power on. Pull the knob out to turn power off. When the power knob is pulled out, a time-out message and counter will appear for five seconds. Turning the knob will control the volume of the COM radio, unless the NAV radio is active then the NAV volume is controlled. A white border surrounding the Com, VOR, and XPDR information will flash and the values you can change will be highlighted when each mode is activated.

FN and Function Smart Keys

Press the **FN** key to page through the available group of Functions that appear at the bottom of the display. The "Smart" function keys located below each label will activate that function.

COM

Select Com radio mode. Press **COM**. The function and menu item smart keys access more features.

VOR

Select Nav radio mode. Press **VOR**. The function and menu item smart keys access more features.

XPDR

Select the External Transponder mode, if installed. Press **XPDR**. The function and menu item smart keys access more features.

CDI

Toggles the main CDI output between GPS and internal VOR/LOC radio sources.

SUSP

Suspends or resumes flight plan waypoint sequencing. When waypoint sequencing is suspended, the SUSP annunciator will be displayed in the bottom left corner of the display. The GNS 480 will auto-suspend when required for certain procedures, such as Vectors-To-Final (VTF) mode. In VTF mode, if you are within 45° of the inbound course and you are on the TO side, the "SUSP" mode will turn off and return to normal sequencing.

MAP
Selects the moving Map mode. Press **MAP** twice to view Map page 1. Turn the Large knob to view all four MAP pages. The function and menu item smart keys access more features.

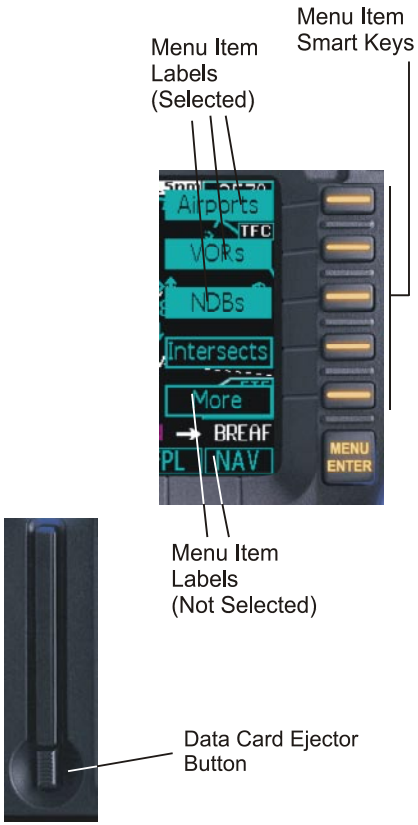
Direct-To
Selects the Direct-To page. Menu options allow setting up Direct-To (D->), setting a customized holding pattern around a waypoint (Hold), Course To (CrsTo) a waypoint, Course From (CrsFr) a waypoint, OBS mode uses input from your CDI Course Selector, and jumping to a given leg of your active flight plan (FlyLeg). The function and menu item smart keys access more features.

NRST
Activates Nearest Search. You can search through the closest 20 of airports, NDBs, VORs, intersections, airspaces, user-created waypoints, Flight Service Station (FSS) with frequency data, and Air Route Traffic Control Center (ARTCC) with frequency data. The function and menu item smart keys access more features.

INFO
Activates Info mode for the highlighted waypoint or the active flight plan (ActFP) waypoint. Information about the selected waypoint such as location, name, a map, frequencies, and more depending on the waypoint type is provided. When frequencies are provided and highlighted, pressing the **<-SBY** or **<-A->** keys will insert the selected frequency into the appropriate radio. The function and menu item smart keys access more features.

CLR
Clears text when editing or deletes the highlighted item.

Press MAP to view the moving map. Press D-> to go direct-to a selection. Press NRST to search for the Nearest . Press INFO to view information about a selected waypoint. Press CLR to clear information or ignore a choice.



MENU/ENTER and Menu Item Keys

When editing information, or a response is required, pressing the **Menu/Enter** key accepts the value or confirms the response. In COM, VOR, XPDR, and MAP modes, pressing this key will bring up a list of menu items on the right side of the display allowing the pilot to select. The menu items are then selected by pressing the key to the right of it. Pressing the **Menu/Enter** key while the menu items are shown will remove them from view.

Large/Small Knobs

You can move the cursor or highlight information by turning the **Large** knob. Turn the **Small** knob to change information.

CRSR

Press the **Small** knob in to activate the cursor (CRSR). The area on the display that you can now edit will be highlighted. Now you can change information with the **Small** knob and move the cursor to the next area to edit with the **Large** knob. If you are in Map mode, pressing the **CRSR** activates PAN mode. In Transponder mode, it allows editing squawk codes. In Direct-To and Flight Plan (FPL) modes, activating the CRSR control will help narrow a waypoint search.

Datacard

The Map database and other information is stored on a data card. The use of a data card allows you to easily update information.

NOTE: Only change the data card when the power is turned off or you may damage your unit.

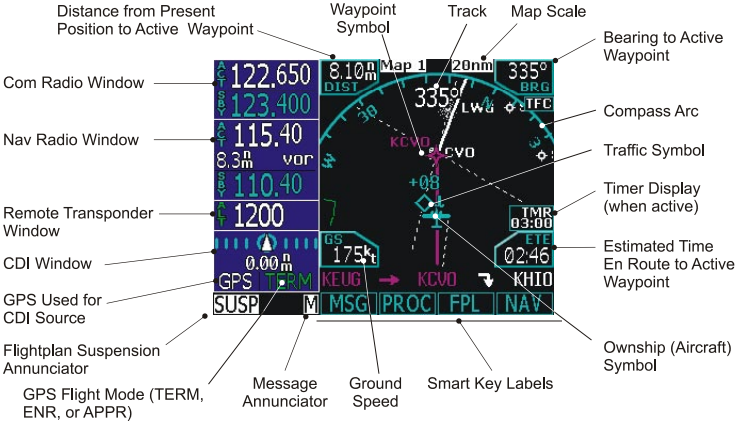
Handle your data card carefully. Do not touch the connector edge of the data card. To eject the card, press the data card ejector. Gently pull the card straight out of the slot. Insert a data card by pushing the card straight into the slot. When fully inserted, the data card and eject button will be flush and slightly recessed into the bezel.

When contacting your dealer or the Garmin customer service staff, eject the data card and write down the information shown on the label.

***NOTE:** Never insert or eject the data card with the power on.*

Display

The GNS 480 uses a high-resolution color display to provide information about the different functions. Information and "smart keys" unique for each mode of operation are displayed. Sample displays with a description of common elements are shown below.



When you press the **COM**, **VOR**, or **XPDR** keys on the left side of the display, the window for that function will be outlined and the information active for editing will be highlighted.

The labels for the bottom row of Function smart keys will change for each function selected. Press **Menu/Enter** to display Menu Item smart keys. The Menu Item smart keys will adjust to the options for each function.

Using the Moving Map

The Map mode provides a moving map for a graphic display of your flight including the surrounding area, as well as navigation information to aid your situational awareness. You can customize each of the four Map pages for the Map range and the information displayed, such as Airports, VORs, NDBs, Intersections, User Waypoints, Airspace, Traffic from TIS or Skywatch, Hi and Lo Airways, Flight Plan course line, or Nav information items. When decluttering is selected, the map is automatically decluttered to remove map detail for clarity as you increase the map range.

1. Press **MAP** to reach Map mode. Radio, Nav, Transponder, CDI, Annunciator, or pilot-customized information is shown on the left side of the display and the map display is shown on the right side.
2. There are four Map pages that you select by turning the **Large** knob.
3. Turn the Small knob to change the Map range. Map pages 2-4 allow you to customize the Nav display items on the left side of the display and map display detail.
4. Press Menu/Enter to view the Menu items for the choices to customize your display.
5. Press the key next to the Menu item to change the item values.
6. Press the **More** key to go to the next page of Menu items.

The following symbols are used on the map display to depict active legs of flight, waypoint types, and your aircraft.

	Turn Left for next flight plan leg		Airport		Ownship - Single
	Turn Right for next flight plan leg		VOR		Ownship - Twin
	No course change		VORTAC		Ownship - Jet
	Left Procedure Turn Outbound		VOR-DME		Ownship - Helicopter
	Arc to the Left		NDB		Flight Plan Waypoint
	Arc to the Right		User Waypoint		Intersection
	Left Procedure Turn Inbound		Entering Procedure Turn Left		Left Hand Holding Pattern Inbound
	Entering Procedure Turn Right		Direct-To		Left Hand Holding Pattern Outbound
	Right Hand Holding Pattern Outbound		Right Hand Holding Pattern Inbound		

COM Group

Com Radio - Main Page

Weather Frequencies

Signal Level

Audio Levels

Save Channel

Moving Map Group

Map - Menu Page 1

Map - Menu Page 2

Map - Menu Page 3

Map - Menu Page 4

Direct-To Group

Direct-To - Page 1

Direct-To - Page 2

Direct-To - Dest

Direct-To - Hold

Nearest Waypoint Group

NRST - Page 1

NRST - Page 2

NRST - Page 3

XPDR Group

*XPDR - Menu Page**

*XPDR - Code Select Page**

** Available with appropriate external equipment*

Info Group

INFO - Airport Page

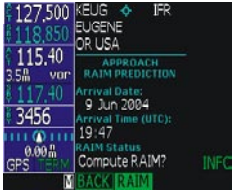
Present Position Page

Frequency Page

Frequency Narrative Page

Map Page

Runway/Approach Info Page



RAIM Prediction Page

NAV Group

Nav Radio - Main Page

Test Log

Signal Level, Audio Levels, and Save Channel are the same as the Com radio

Function Key Group

Messages

Procedures

Flight Plan Library

Nav with VDI

Pan Mode

Checklist

User Waypoint

System - GPS Page

System - Versions

System - Configuration

Press the FN key to show the available functions.
Press the function smart key to access the function.

Within each function, the function and menu smart keys display more information.

Pressing the FN key will display the main functions on the bottom of the display.

** Available with appropriate external equipment*

Parallel Track

Timers

*Traffic Display**

*Traffic Menu**

*Traffic Advisory Pop-Up**

Annunciations

The following annunciations appear on the appropriate displays to provide status or information. All annunciations are available on the moving map display. Annunciations may be output to external annunciators.

Annunciation	Description
GPS	Indicates GPS is being used as the navigation source. Appears in lower left corner of the display.
VOR/ILS/LOC	Indicates VOR/ILS/LOC is being used as the navigation source. Appears in lower left corner of the display.
ENR	Appears to the right of the "GPS" annunciator when in En Route mode. When > 30 nm from departure or destination and not on departure or arrival procedure. CDI resolution is ± 2 nm.
TERM	Appears to the right of the "GPS" annunciator when performing approach navigation within 30 nm of departure or arrival airport. CDI resolution is ± 1 nm.
APPR	Appears to the right of the "GPS" annunciator when GPS approach is active, and on Final Approach course (i.e. VTF or FAF, MAP, or the first Missed Approach waypoint is active. CDI resolution is variable for all approaches and becomes more sensitive as you near the runway.
LOI	"LOI" (Loss of Integrity) appears on the left side of the map display when WAAS/GPS is unable to calculate the integrity of the position or calculated integrity is insufficient to support the current phase of flight.
BC	The Back Course annunciation appears to the right of "LOC" when the Back Course Localizer mode is enabled.
DR	The Dead Reckoning annunciator appears on the left side of the map display when GPS position is unavailable and the GNS 480 is in Dead Reckoning mode. Dead Reckoning mode will continue until GPS position is restored or the first Pilot Nav leg is reached.
PTK	The Parallel Track annunciator appears in the lower left corner of the display when parallel track is active.
SUSP	Suspend annunciation appears in the lower left corner of the display when automatic sequencing of waypoints in the active flight plan is suspended.

M	Message annunciation appears in the lower left corner of the display when a message is available for viewing. A blinking “M” indicates a new message.
VTF	Vector To Final annunciation appears in the lower left corner of the display when “Vector To Final” approach mode is active, which may be activated manually or automatically.
ALT	Appears for Lnav/Vnav or LPV approaches when the aircraft’s estimated height is lower than the Final Approach waypoint height by more than the current VPL plus 50 meters.
CDI Window	Shows course deviation, heading, or PILOT NAV.
CDI Window: Rwy Dist/Brg	Shows distance To runway and a bearing direction indicator for LPV, LNAV, and Lnav/Vnav approaches.
CDI Window: FLAGGED	No active guidance is available for the selected Nav source (VHF Nav radio or GPS receiver). For GPS, the usual causes are Loss of GPS position, Loss Of Integrity, or inadequate GPS HPL or VPL on the Final Approach leg.
CDI Window: HDG xx°	Displayed when a PILOT NAV Heading Leg is the active flight plan leg. The current heading is shown. If heading information is not available, the field is dashed.
CDI Window: PILOT NAV	Guidance is not provided on this leg by the GNS 480. Use other flight instruments to fly this leg.
TFC, TFC Fail, TFC STBY, TFC Test, TFC N/A	Status of the external traffic source.
LPV, Lnav/Vnav, LNAV	LPV is for GPS precision approaches. Amber indicates the current vertical (VPL) or horizontal protection level (HPL) exceeds the alarm limit. Green indicates the VPL and HPL are acceptable for LPV or LNAV/VNAV approaches (WAAS environment). Lnav/Vnav indicates an LNAV approach with vertical guidance. LNAV indicates an LNAV only approach with no vertical guidance.

Starting Up

The GNS 480 performs internal checks and shows the status of the tests during start up. The startup screen, owner name (if entered), testing, position, and database information shows on the screen for several seconds and then shows the first Map page. It is not generally necessary to enter a GPS seed position unless the unit has either been moved several hundred miles or been unused for six months or so with the power off. A seed position should have been entered the first time the unit was turned on during installation.

Power Up

1. Push the **PWR/VOL** knob in to turn on power.
2. When the position display appears, you can press **CHG** to manually enter your present position or just wait a few seconds for the GNS 480 to establish your position.
3. The GNS 480 performs a number of tests at startup to ensure proper operation. You may press **SKIP** to bypass the startup tests, however, completing these tests is required for IFR flight. Any failures will be noted by a message.

Start-Up Display

Set Fuel Full and Reserve

If a Fuel/Air Data Computer is installed, Fuel Full and Fuel Reserve amounts are entered manually in the Configuration page of System mode and are reflected in the start-up screens. On start-up, you will be prompted for the Total Fuel on Board.

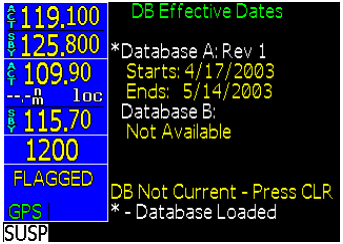
Press the **Menu/Enter** key to accept the displayed amount of fuel or change the displayed amount with the **Small** knob and then press the **Menu/Enter** key.

Self-Tests

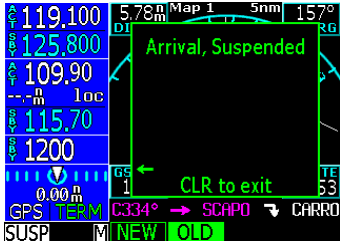
The GNS 480 performs internal checks and shows the status of the tests during start up. After these internal checks, the GNS 480 is ready to navigate.

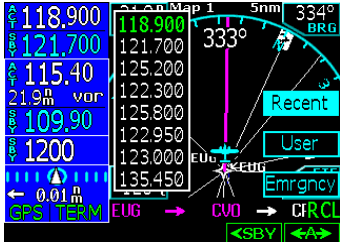
Database Check

The GNS 480 verifies the integrity and expiration date of the database. Up to two database cycles are supported. The GNS 480 will load the appropriate current database cycle and also let you know if a database is not current (dates invalid).



Database Verification





The database information can be checked after start-up in the SW Version page of the System function. Press the **Menu/Enter** key to continue after you have verified the dates. Valid databases are in green. The database being used has an asterisk (*) next to it, if there are two databases. Expired databases are amber.

View Checklists

Use a checklist to review preparation for flight.

1. Press **FN** and then the **CHK** function smart key.
2. Turn the **Large** knob to select the desired list and press **Menu/Enter**.
3. Press **CHCK** or **Menu/Enter** as you check each item on the list. The next item in the list will then be highlighted. Checking the last item will take you back to the main Checklist page.

View Messages

You can review system messages by pressing the **MSG** function smart key. Turn the **Large** knob to switch between New and Old messages. Turn the **Small** knob to scroll through the available messages. The Message annunciator (M) will flash until all unread messages have been read. While old messages exist and there are no new messages, the Message annunciator will remain solid. The Message annunciator will not appear when there are no messages.

Set Com and Nav Frequencies

You can set the Com and Nav frequencies manually

1. Press **Com** for VHF Com frequencies or press **VOR** for VOR/LOC/ILS frequencies.
2. Turn the **Large** knob to select MHz and turn the **Small** knob for kHz of the stand-by frequency.
3. Press the **<—>** key to flip-flop the active and stand-by frequencies.
4. Press **MON** to toggle monitoring of the stand-by frequency.
5. Turn the **PWR/VOL** knob to adjust the audio level.

Using the Remote Transponder

The Transponder Control Mode will allow you to control a compatible remotely mounted transponder from the GNS 480 front panel. Press **XPDR** to activate Transponder mode.

Change the Transponder (Squawk Code) - Two Methods

1. Turn the **Large** knob to highlight the Squawk Code.
2. Turn the **Small** knob to select a number and then turn the **Large** knob to move to the next character.
3. The Ident is automatically saved after selecting the fourth character.

OR

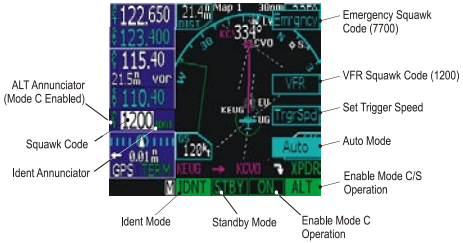
1. Press the Cursor (**CRSR**) knob in.
2. Press the function or menu item smart keys next to the numbers 0-9 shown on the bottom and right side of the display in the order desired.
3. The Ident is automatically saved after selecting the fourth character.

Transponder Options

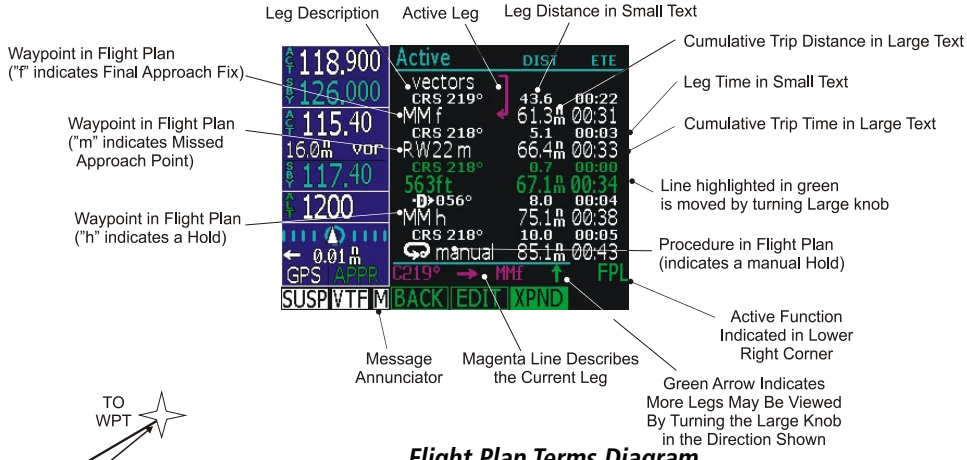
Press **Menu/Enter** to view options. Controls and features may vary depending on the transponder.

- Press the **Emrgncy** menu item key and then **Menu/Enter** to insert the 7700 squawk code.
- Press the **VFR** menu item key to insert the 1200 squawk code.
- Press the **TrgrSpd** menu item key to select the speed that will "trigger" the automatic activation of the transponder (SL70 only) when in Auto mode.
    1. Turn the **Large** and **Small** knobs to select the trigger speed.
    2. Press **Menu/Enter** to save the trigger speed.
- Press **Auto** to toggle the Auto Activate mode. The transponder (SL70 only) automatically goes from standby to active when accelerating past the Trigger Speed and goes from active to standby when decelerating below the Trigger Speed.
- Press **IDNT** to activate Ident mode.
- Press **STBY** to place the transponder in Standby.
- Press **ON** to enable Mode A operation (sends a squawk code).
- Press **ALT** to enable Mode C/S operation (sends a squawk code and altitude data).

Changing the transponder squawk code

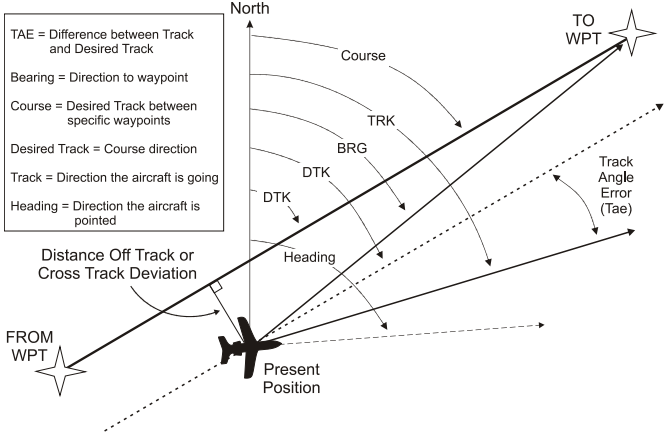


Transponder details



Flight Plan Terms Diagram

Nav Terms Diagram



Create a New Flight Plan (Quick Method)

The Flight Planning function lets you set up and store flight plans where you can name the flight plan, insert a series of waypoints, and then add comments. The Active flight plan is the flight plan that the GNS 480 is currently using for navigation guidance. The Modified flight plan is a temporary copy of the active flight plan that you can edit prior to executing or saving the changes. The active plan won't be affected until you execute the modified plan. A remote flight plan is one that has been received from another connected GNS 480, but while the units are not setup for Cross-Link (X-Link) mode. The Library flight plans are stored flight plans for future use. This is a quick start overview of flight planning. See the Flight Planning section for more detail.

1. Press **FN** and then the **FPL** function smart key.
2. Press **New**.
3. Use the **Large** and **Small** knobs to select the Origin waypoint and then press **Menu/Enter**.
4. Use the **Large** and **Small** knobs to select the Destination waypoint and then press **Menu/Enter**. This allows you to select the appropriate terminal procedures from the database.
5. Highlight the departure waypoint and insert a waypoint or airway. Continue inserting waypoints or airways until the route is complete.
6. The flight plan is automatically saved into the Library and named by the Origin and Destination waypoints.
7. Press the **Exec** key to execute the flight plan and make it the active flight plan.

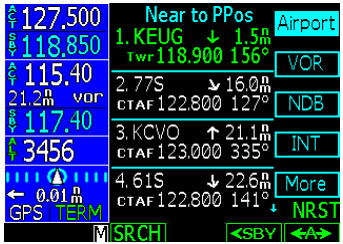
Select a Direct-To a Waypoint in Your Flightplan

1. Press the **D->** key.
2. Turn the **Large** knob to highlight a waypoint.
3. Press the **Direct** menu selection key.

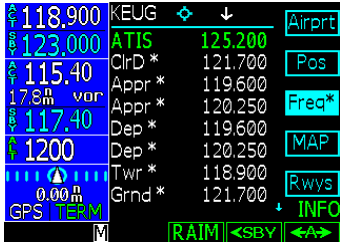
Select a Direct To Waypoint Not in Your Flightplan

1. Press the **D->** key and then the **DB** function smart key.
2. Select a waypoint using the **Small** knob to select a character and the **Large** knob to move to another character.
3. Press the **Direct** menu item key.

Flying Direct-To a new destination (Direct-To - DEST)



Nearest waypoint search - Airport (TWR/CTAF - Frequencies)



Nearest airport frequencies

Find a Nearest Waypoint

The Nearest (NRST) Waypoint Search function allows you to search for the 20 waypoints nearest to your present position in each of eight waypoints types: Airport, VOR, NDB, INT, User, FSS (Flight Service Station), Airspace, and Air Route Traffic Control Center (ARTCC). You can also set Limits to select a range of airport types to show up for the Nearest Airport type. You can then look up information about a waypoint or fly direct to it

1. Press **NRST**. The default waypoint type is Airport.
2. Press the menu item key for the desired waypoint type. Press the **More** menu item key to display more types.
3. Turn the **Large** knob to scroll through the list.
4. Press the Standby (**<-SBY**) or Active (**<-A->**) smart keys to insert the frequency into the Com radio.
5. Press **D->** to fly direct to the highlighted waypoint or press **INFO** to display information about that waypoint.
6. Press the **RAIM** function key to perform a RAIM prediction.

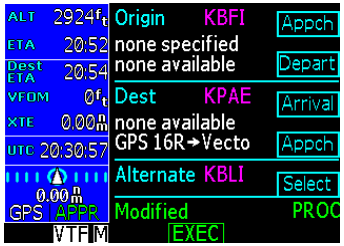
Find a Nearest Waypoint Frequency

1. Press **NRST** and then press the menu item key for the desired waypoint type. Turn the **Large** knob to highlight the desired waypoint.
2. If the desired frequency is shown in the Nearest list, press the Standby (**<-SBY**) or Active (**<-A->**) smart keys to insert the frequency into the Com or Nav radios.
3. If you need another frequency for an airport, press **INFO** and then the **Freqs** menu item key.
4. Turn the **Large** knob to highlight the desired frequency.
5. If the frequency has an asterisk, press the **Freq*** menu item key to display more narrative information about that frequency. Turn the **Large** knob to scroll through the narrative information of the other frequencies.
6. Press **<SBY** to insert the selected frequency into the Standby position or press **<A>** to insert it into the Active position in the Com or Nav radio.

Inserting Terminal Procedures and Approaches

After creating your flight plan, you can select an approach, departure, or arrival procedure so the GNS 480 can guide you through the flight plan.

1. Press the **PROC** function smart key for Procedure Mode. The Origin and Destination waypoint of your active flight plan are shown.
2. Press the **Depart** menu item smart key to select the Departure procedure. If available, select the departure runway (with the **Small** knob or the menu item keys).
3. Turn the **Large** knob to highlight the transition and turn the **Small** knob to make the selection. Press **Menu/Enter** to accept the selections.
4. Press the **BACK** function smart key to return to the Procedures mode. Depending on the procedure for your destination, press the Destination **Arrival** or **Appch** menu item smart key.
5. Choose the transition and the runway by moving to a selection with the **Large** knob and listing the choices with the **Small** knob. Press **Menu/Enter** to accept the procedure.
6. If desired, select an alternate airport by pressing the Alternate **Select** menu item key.
7. Press **EXEC** to activate the procedures for your flight plan.

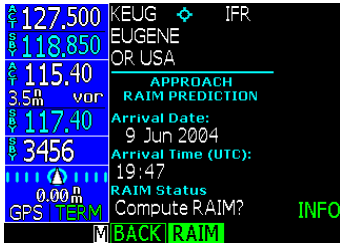


Setup procedures and approaches for your flightplan

Perform a RAIM Prediction

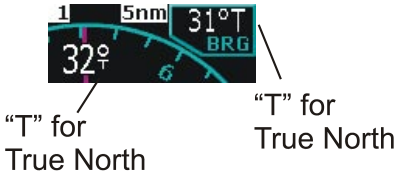
RAIM prediction predicts if GPS coverage is available for any waypoint. This is used when WAAS satellites are not available.

1. Highlight a waypoint in the active flight plan or select a waypoint from the database. Press **INFO** and then press the **RAIM** function smart key when it is shown.
2. Press the **CRSR** knob in. One of the fields will be highlighted. Change the values of the Arrival Date and/or Arrival Time (in UTC time) with the **Small** knob while moving to a value with the **Large** knob. The default calculation is the ETA to the last waypoint in the active flight plan. When selecting a waypoint from the database other than one in the active flight plan, the default calculation is the ETA from the present position to the waypoint.
3. After setting the values, press the **Menu/Enter** key to compute the RAIM prediction.



Compute RAIM for your destination

Map Mode - Page 1



True North indication in Map Mode

Moving Map Mode (MAP)

The Map mode provides a moving map for a graphic display of your flight including the surrounding area as well as navigation information. Maps are generally drawn with Ground Track magnetic North at the top of the display (Up). You can customize each of the four Map pages for the Map scale and the information displayed, such as Airports, VORs, NDBs, Intersections, User Waypoints, Airspace, Traffic, Hi and Lo Airways, Flight Plan course, or Nav items. Other information is available depending on equipment installation and services.

1. Press **MAP** to reach Map mode. Radio, Nav, Transponder, CDI, Annunciator, or pilot-customized information is shown on the left side of the display and the map display is shown on the right side.
2. There are four Map pages that you select by turning the **Large** knob.
3. Turn the **Small** knob to change the Map scale. Map pages 2-4 allow you to customize the Nav display items on the left side of the display and map display detail.
4. Press **Menu/Enter** to view the Menu items for the choices to customize your display.
5. Press the key next to the Menu item to control the display of information.
6. Press the **More** key to go to the next page of Menu items.

True North

The Map can be referenced to True North after setting the Magnetic Variation to 0° in the Configuration section of System mode. When set to True North, the degree values on the map display will show a "T" along with the degree symbol. Magnetic North is used for normal operation and is not indicated. In some situations, True North may be used such as in northern Canada.

Moving Map Mode Menu Items

Menu Item	Description
Airports, VORs, NDBs, Intersections, User Waypoints, Lo and Hi Airways	Solid reversed label means identifier and location symbol are displayed. A bold outline means only the location symbol will be displayed. A thin outline means this item will not be displayed on the map.
Airspace	Solid reversed means the airspace outline and sector lines are displayed. A bold outline means that only the outline of airspace is displayed. A thin outline means that airspaces will not be displayed on the map.
Traffic	Toggles on/off the display of traffic when it is installed.
Flight Plan	Map pages 2-4. Toggles display of route line on/off.
Declutter	Auto-Declutter - Toggles decluttering of the display of labels and icons on/off at the higher zoom levels.
Nav Data/Sel Data	Customize the Nav information on map pages 2-4. Press the **Nav Data** key and then the **Sel Data** key. Then turn the **Large** knob to move the cursor to the different fields in the Nav information part of the Map display. Turn the **Small** knob to view the available choices of information. Press **Menu/Enter** to confirm and save your choices.

GNS 480 Map Mode Nav Data Options

The following table shows the choices of the options you can make for setting up the Map Mode display in your GNS 480. You can customize the Nav information displayed on the left side of the display for Map Mode pages 2, 3, and 4. You can select these options as described below.

1. Press **MAP** to reach Map mode.
2. Turn the **Large** knob to select pages 2-4. You can't change the Nav information options for page 1.
3. Press the **Menu/Enter** key.
4. Press the **More** selection key until the Nav Data selection is available.
5. Press the **Nav Data** menu item key.
6. Press the **Sel Data** menu item key to activate selection of options of Nav Data information.
7. Turn the **Large** knob to highlight the desired Nav Data item. Turn the **Small** knob to change the displayed option.
8. Press **Menu/Enter** when you have completed your selections.
9. If desired, turn the **Large** knob to another Map Mode page and customize that page.

Selectable Nav Data Fields for Map Pages 2-4			
Option Name	Abbrev.	Description	Units
Altitude	ALT	Baro corrected pressure altitude. Value is dashed out when there is no valid source.	Feet (ft) or meters (m) at whole unit resolution.
Bearing	BRG	Bearing to station for the active waypoint. If the active leg is a pilot nav leg or heading leg, or position is invalid, this will be dashed.	0 to 359 degrees at 1-degree resolution.
Cabin Pressure	Cab Prs	The current cabin pressure value when an external carbon monoxide is installed.	Feet (ft) or meters (m) in whole units.
Cabin Temperature	Cab Tmp	The current cabin temperature value when an external carbon monoxide is installed.	In degrees Celsius (ºC).
CO Level	CO Lvl	The current carbon monoxide (CO) level inside the cabin when an external carbon monoxide is installed.	ppm (parts per million)
Estimated Time of Arrival at Final Destination	Dest ETA	The estimated time of arrival to the final destination waypoint is based upon ground speed. If the active leg is not part of the flight plan (ie direct-to outside flight plan), ground speed is less than or equal to five knots, or position is invalid, this will be dashed.	Hours and minutes, 00:00 to 23:59, based on a 24 hour clock

Selectable Nav Data Fields for Map Pages 2-4			
Option Name	Abbrev.	Description	Units
Estimated Time En Route to Final Destination	Dest ETE	The estimated time en route to the final destination waypoint using the same information as the Dest ETA field except it is calculating the time en route. If the active leg is not part of the flight plan (ie direct-to outside the flight plan), ground speed is less than or equal to five knots, or position is invalid, this will be dashed. If the current leg is a pilot nav leg, OBS or heading leg, this value will be dashed.	Hours and minutes, 00:00 to 99:59 and when less than 1 hour away, minutes and seconds 00:00 to 59:59.
Estimated Fuel Remaining at Final Destination	Dest FUEL REM	The estimated fuel remaining at the final destination waypoint using the flight plan information estimated fuel flow, and ground speed. If the active leg is not part of the flight plan (ie direct-to outside the flight plan), ground speed is less than or equal to five knots, or position is invalid, this will be dashed. If the current leg is a pilot nav leg, OBS or heading leg, this value will be dashed.	0.0 to 99999.9 US gallons (usg), Imperial gallons (img), liters (L), pounds (lbs), or kilograms (kg) at tenths of unit resolution

Selectable Nav Data Fields for Map Pages 2-4			
Option Name	Abbrev.	Description	Units
Distance	DIST	This is the distance to the next waypoint. If the current leg is a pilot nav leg or heading to manual termination, then the distance is dashed. If the position is invalid, then the distance is dashed.	Nautical miles (nm), statute miles (sm), or kilometers (km). 0.00 to 9.99 units at 0.01 unit resolution, 10.0 to 99.9 units at 0.1 unit resolution, and 1 unit resolution otherwise.
Distance to Destination	DIST TO Dest	This is the distance to the end of the flight plan. If a leg is not to a waypoint or is a pilot nav leg, then the distance is be estimated. If the current leg is a pilot nav leg, OBS or heading leg, the distance is dashed. If the position is invalid, then the distance is dashed. If the active leg is not part of the flight plan (ie direct-to outside flight plan), it is dashed.	Nautical miles (nm), statute miles (sm), or kilometers (km). 0.00 to 9.99 units at 0.01 unit resolution, 10.0 to 99.9 units at 0.1 unit resolution, and 1 unit resolution otherwise.
Desired Track	DTK	This is the current DTK to the active waypoint. If the current leg is a pilot nav leg or heading leg, or position is invalid, then the DTK will be dashed.	0 to 359 degrees at 1-degree resolution.

Selectable Nav Data Fields for Map Pages 2-4			
Option Name	Abbrev.	Description	Units
Estimated Time of Arrival	ETA	The estimated time of arrival is to the active waypoint. It does not give consideration for a curved path. If the active leg is a pilot nav leg or to a manual termination (unless FM or HM leg), ground speed is less than or equal to five knots, or position is invalid, this will be dashed.	Hours and minutes, 00:00 to 23:59, based on a 24 hour clock.
Estimated Time En Route	ETE	The estimated time remaining en route to the active waypoint. It does not give consideration for a curved path. If the active leg is a pilot nav leg or to a manual termination (unless FM or HM leg), ground speed is less than or equal to five knots, or position is invalid, this will be dashed.	Hours and minutes, 00:00 to 99:59 and when less than 1 hour away, minutes and seconds 00:00 to 59:59.
Fuel Endurance	FUEL ENDUR	Fuel endurance is calculated from the fuel remaining and the current flow rate. Value is dashed out when there is no valid source.	Hours and minutes, 00:00 to 99:59.
Fuel Flow	FUEL FLOW L or R	Fuel flow is displayed on a per engine rate for twin engines (L and R) or single engine rate (no L or R). Value is dashed out when there is no valid source.	0.0 to 9999.9 US gallons (gph), Imperial gallons (gph), liters (lph), pounds (pph), or kilograms (kph) per hour at tenths of unit resolution.

Selectable Nav Data Fields for Map Pages 2-4			
Option Name	Abbrev.	Description	Units
Fuel Remaining	FUEL REM	For FADC that provide fuel remaining, the GNS 480 shall use the report value from the FADC. For FADC that do not provide fuel remaining, the GNS 480 will calculate the fuel remaining from the initial fuel entered at start-up subtracting fuel used. Value is dashed out when fuel used information is not available.	0.0 to 99999.9 US gallons (usg), Imperial gallons (img), liters (L), pounds (lbs), or kilograms (kg) at tenths of unit resolution.
Estimated Fuel to Final Destination	FUEL TO Dest	The estimated fuel used to reach the final destination waypoint using the flight plan data like Dest FUEL REM does. If the active leg is not part of the flight plan (i.e. direct-to off the flight plan), ground speed is less than or equal to five knots, or position is invalid, this will be dashed. If the current leg is a pilot nav leg, OBS or heading leg, the distance will be dashed.	0.0 to 99999.9 US gallons (usg), Imperial gallons (img), liters (L), pounds (lbs), or kilograms (kg) at tenths of unit resolution.

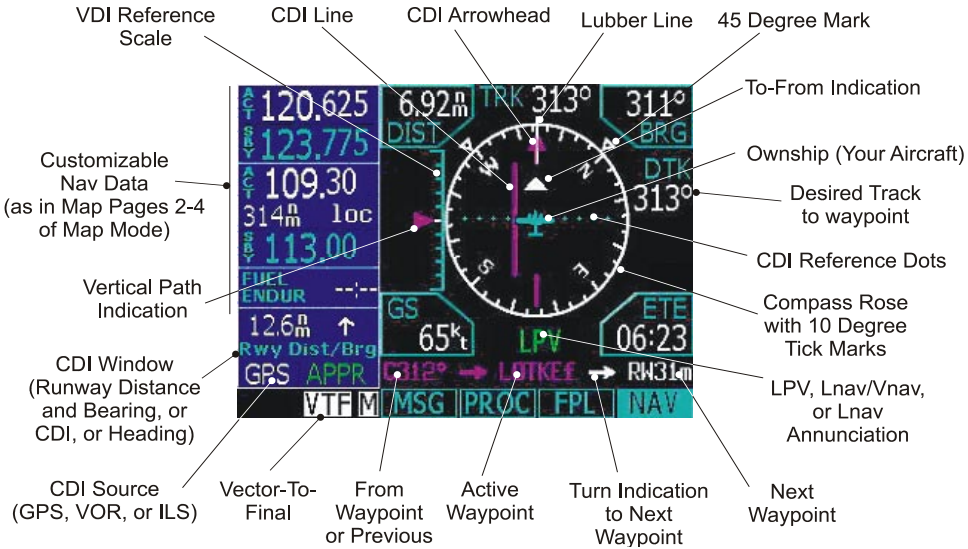
Selectable Nav Data Fields for Map Pages 2-4			
Option Name	Abbrev.	Description	Units
Fuel to Waypoint	FUEL TO WPT	Fuel to the next waypoint will be calculated given the current fuel flow rate and the ETE to the waypoint. If the active leg is not part of the flight plan (ie direct-to outside the flight plan), active is a pilot nav leg, active leg is to manual termination, ground speed is less than or equal to five knots, or position is invalid, this will be dashed.	.0 to 99999.9 US gallons (usg), Imperial gallons (img), liters (L), pounds (lbs), or kilograms (kg) at tenths of unit resolution.
GPS Altitude	GPS ALT	If available, this provides GPS altitude, referenced to MSL. Note that this altitude will not be the same as baro-corrected altitude, when airborne.	Feet (ft) or meters (m) in whole unit resolution
GPS Vertical Rate	GPS VS	If available, this provides GPS-based vertical speed.	Feet/minute (ft/m) or meters/minute (m/m). Shall support at least range of -9999 units to 9999 units. Value shall be rounded to 10 unit resolution
Ground Speed	GS	The ground speed of the aircraft. Value is dashed out when position is invalid or ground speed less than 5 kts.	Knots (kt), kilometers per hour (k/h), or miles per hour (m/h). 0 to 999 units at 1 unit resolution.
Heading	HDG	The direction the nose of the aircraft is pointing. This requires a heading input via an ADC or HSI bootstrap.	0 to 359 degrees at 1-degree resolution.

Selectable Nav Data Fields for Map Pages 2-4			
Option Name	Abbrev.	Description	Units
Horizontal Figure of Merit	HFOM	The current 95% confidence horizontal accuracy value, as reported by the GPS engine.	Feet (ft) or meters (m) in whole unit resolution.
Minimum Safe Altitude	MSA	The minimum safe altitude in the aircraft's present vicinity. This value is dashed out if data is unknown or the database is invalid.	Feet (ft) or meters (m) in whole unit resolution.
Outside Temperature	OAT	The current outside air temperature value. This requires an ADC input.	Degrees Celsius (ºC)
True Airspeed	TAS	The true airspeed is only available if an air data computer is providing it. Value is dashed out otherwise.	Knots (kt), kilometers per hour (k/h), or miles per hour (m/h). 0 to 999 units at 1 unit resolution.
Track Angle Error	TKE	The Track Angle Error (TKE) is the difference between the aircraft's track and desired track. TKE is followed by an L or an R, indicating left or right of DTK (if value is 0 or 180, then L/R will not be displayed). Value is dashed out if TRK or DTK is unavailable.	0 to 180 degrees at one-degree resolution.
Track	TRK	The aircraft's ground track angle. Value is dashed out if position is invalid.	0 to 359 degrees at 1-degree resolution.

Selectable Nav Data Fields for Map Pages 2-4			
Option Name	Abbrev.	Description	Units
Zulu Time	UTC	The current system time determined from GPS if available. Time is displayed in UTC (Universal Coordinated Time) using the 24-hour clock. Value is dashed out if position is invalid.	Hours, minutes, and seconds, 00:00:00 to 23:59:59.
Vertical Figure of Merit	VFOM	The current 95%-confidence vertical accuracy value, as reported by the GPS engine.	Feet (ft) or meters (m) in whole units.
Wind	WND	Shown by a flag or arrow oriented for the wind with the wind speed to the right. Value is dashed out if not available or unable to calculate internally.	Knots (kt), kilometers per hour (k/h), or miles per hour (m/h). 0 to 999 units at 1 unit resolution.
Cross Track Error	XTE	This is straight-line distance. Value is dashed out if position is invalid.	Nautical miles (nm), statute miles (sm), or kilometers (km). 0.00 to 9.99 units at 0.01 unit resolution, 10.0 to 99.9 units at 0.1 unit resolution, and 1 unit resolution otherwise. Arrow pointing left before number shall indicate that the plane is right of course. Arrow pointing right after number shall indicate that the plane is left of course. No arrow is displayed when value is 0.00.

Nav/HSI Display (NAV)

The GNS 480 displays a track-based Horizontal Situation Indicator (HSI) view. The Nav function is reached by pressing the NAV smart function key. The layout, annunciations, and nav data are similar to Map mode. Distance to the destination is shown in the top left corner. Bearing to the destination is shown in the top right corner. Current Ground Speed (GPS determined) is shown in the lower left corner. The Estimated Time En Route from your current position to the next waypoint. You may also select the categories of Nav Data shown on the left side of the display. When vertical guidance is provided, a vertical deviation indicator is shown on the left side of the display. The CDI/VDI is driven by one of the following: GPS data if GPS CDI annunciation is selected or Nav radio data if LOC, VOR, or ILS annunciation is selected.



Nav Mode HSI Display With VDI

The Nav/HSI function is useful for aircraft with autopilots that do not have roll steering capabilities.

When a Nav radio is driving the display, the needles are green.

When the GPS receiver is driving the display, the needles are magenta.

The CDI line will become thicker on full-scale or off-scale deflection.

When Auto-switching is enabled in the System-Configuration function, the CDI source will automatically switch from GPS to ILS.

Selecting Displayed Nav Data Information

1. Press the **Menu/Enter** key.
2. Press the **Nav Data** menu item key and while it is highlighted press the **Sel Data** menu item key.
3. While both **Nav Data** and **Sel Data** keys are highlighted, you may now select Nav Data items displayed on the left side of the display.
4. Note that the top Nav Data item is highlighted. Turn the **Large** knob to move the highlight to other items. Turn the **Small** knob to scroll through the available Nav Data items.
5. After selecting the desired items, press either the **Menu/Enter** or **Sel Data** keys.

The compass rose rotates to align with the track angle of your aircraft at the top. Tick marks are placed every 10 degrees with a larger one every thirty degrees. Small triangles are positioned at 45 degrees to the left and right of your current track at the top of the compass rose circle as an aid in intercepting courses.

A lubber line is centered at the top of the compass rose circle. The ownship (your aircraft) symbol is at the center of the HSI and always points straight up to your current track. The CDI arrowhead is shown at the top of the HSI just under the lubber line. When GPS navigation is selected, the CDI arrowhead is magenta and is aligned with your desired track angle. If OBS mode is active the CDI arrowhead will align to the current OBS course input angle instead of the desired track. If LOC, ILS, or VOR navigation is selected, the CDI arrowhead is green and is aligned with your the OBS course input.

The CDI line is the long vertical line in the center of the HSI and will move horizontally to represent cross-track deviation. The CDI line will match the color of the CDI arrowhead. The CDI line doubles in thickness when cross-track deviation reaches or goes beyond full-scale deflection. Five equally spaced dots are placed on either side of the center of the HSI. The fifth dot represents full-scale deflection.

A white triangle above the center of the HSI points in the same direction of the CDI arrowhead if the CDI is in the To state. The white triangle will be below the center of the HSI and point in the opposite direction of the CDI arrowhead if the CDI is in the From state.

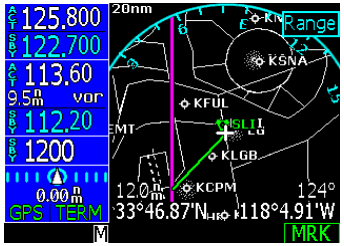
LPV, Lnav/Vnav, or Lnav annunciations are centered and appear below the compass rose when these approaches are active. The approach type is displayed in green if HPL and VPL alarm limits are met and yellow if they do not.

The VDI is displayed on the left side of the display when LPV or Lnav/Vnav approaches meet the requirements for VDI being active and when glideslope is active during ILS navigation guidance. The vertical path indication is shown with a magenta triangle for GPS-based navigation or a green triangle for ILS-based navigation. The vertical bar line represents the proportionate distance relative to full-scale vertical deviation from the center.

Panning (PAN)

The Panning feature of the Map mode allows you to check out the area near your present position. You can activate the Panning feature by pressing the **PAN** key or by pressing the **CRSR** button on the **Small** knob when in Map mode.

The crosshair cursor (+) starts at your present position when you start the Pan function. The crosshair cursor remains in the center of the map display. Move the map around the crosshair by turning the **Large** (pans left and right of pan track) and **Small** (pans forward and back of pan track) knobs. A green line will be drawn between your present position and the crosshair cursor position. The range and bearing to the crosshair cursor position from your present position and the Lat/Lon of the crosshair position is shown at the bottom of the map display.



Map Mode Panning Function

Range

Press the **Range** key to highlight the Range menu item. When Range is selected, turning the **Small** knob will change the map range to zoom in or out at the crosshair position.

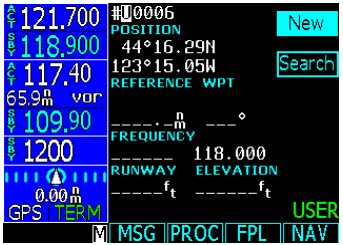
Create a New User waypoint

User waypoints allow you to create unique waypoints not already present in the database.

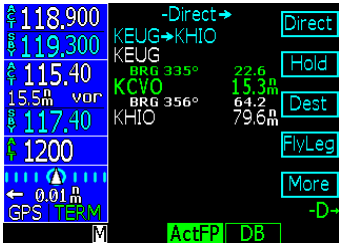
1. While in the Pan function, press **MRK**.
2. Press **Menu/Enter** to save the displayed user name.

or

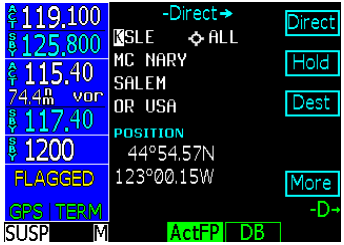
3. Create a name of your choice and add other information as desired using the **Small** knob to change characters and the **Large** knob to move the cursor. Press **CLR** to delete a highlighted character. Then, press **Menu/Enter** to save the information.



Press MRK to create a User waypoint with the Panning function



Choose a Direct-To waypoint from the flight plan



Choose a Direct-To waypoint from the database

Direct-To

Press the **Direct-To** key to get to the Direct-To function which allows you to quickly navigate from your present position directly to a selected waypoint. You can also use this function to make changes to a flight plan, set up a user-defined holding pattern, sequence directly to a selected leg in your flight plan, and fly a Course To or Course From a selected waypoint.

ActFP

Press the **ActFP** key to select a given leg from the active flight plan. Turn the **Large** knob to highlight waypoints in your flight plan.

DB

Press the **DB** key to select any waypoint from the database. Use the **Large** and **Small** knobs to select the waypoint.

Direct

The Direct Menu selection key activates the direct course to the displayed waypoint.

1. When you press **Direct-To**, the default waypoint shown will be the highlighted waypoint in your flight plan (unless another waypoint is highlighted in another operation, then that waypoint would be used). You can turn the **Large** knob to select a different leg in your flight plan.
2. You may select a waypoint that is not in your flight plan by pressing the **DB** key and then use the **Large** and **Small** knobs.
3. Press the **Direct** key to navigate directly to the selected waypoint.

NOTE: Going Direct-To a waypoint does not make a destination. The GNS 480 must know what the active destination is in order to retrieve the appropriate terminal procedures and approaches.

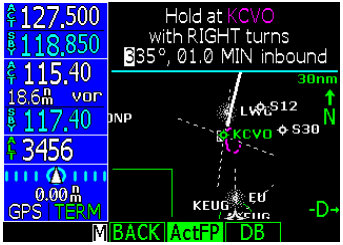
Inserting a Hold at a Waypoint in the Active Flight Plan

The Hold function of the Direct-To mode prepares you for entering a holding pattern at a waypoint either in your flight plan or from the database. You are limited to one en route holding point at a time.

1. Press **Direct-To**.
2. Select a waypoint for the holding pattern.
   a. Press **ActFP** (default) to select a waypoint along your flight plan by turning the **Large** knob to highlight the waypoint. Press **HOLD**. Using this method, you will continue to fly your flight plan and then enter the holding pattern at the selected waypoint.

   or

   b. Press **DB** to select a waypoint from the database with the **Large** and **Small** knobs. Press **HOLD**. Using this method, you will go direct to the waypoint and then hold.
3. Use the **Large** and **Small** knobs to select Right or Left turns, hold course, and hold length (nm or km) or hold time (minutes).
4. Press **Menu/Enter**. The Hold pattern will be drawn on the display and the GNS 480 will provide CDI guidance for the holding pattern based on the selected inbound course. When you near the holding pattern, flight plan sequencing is suspended. Press **SUSP** (SUSP annunciator will turn off) to exit the holding pattern and return to the flight plan. Roll steering capable autopilots may fly the hold entry and pattern automatically.



Inserting a Hold

Destination (Dest)

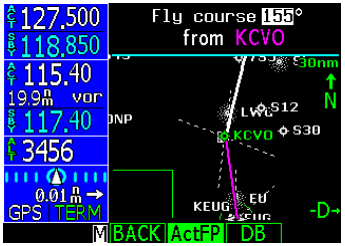
The **Dest** menu item smart key replaces the active flight plan with a direct course to a new destination waypoint. This provides a quick way to proceed to an alternate airport. You can choose a waypoint from your flight plan (**ActFP**) or another waypoint from the database (DB).

1. When you press **Direct-To**, the default waypoint shown will be the highlighted waypoint in your flight plan when the **ActFP** smart key is highlighted. You can turn the **Large** knob to select a different a different waypoint in your flight plan.
2. You may select a waypoint that is not in your flight plan by pressing the **DB** smart key and then use the **Large** and **Small** knobs to select the new waypoint.
3. Press the **DEST** key to navigate directly to the selected waypoint.

NOTE: You can use the NRST function to find nearby airports.

Use DEST key to go Direct to a new destination

Setting a Direct-To Course To



Setting a Direct-To Course From

4. Press **Menu/Enter** to accept the new destination waypoint. Press **Menu/Enter** again to activate it. By changing the destination, the PROC or FPL Edit modes can be used to load and execute Arrival and/or Approach procedures to the new destination. This feature replaces the active flight plan with a new one-leg flight plan direct from your present position to the selected destination.

NOTE: The BACK key returns you to the original Direct-To page.

Course-To (CrsTo)

Course-To operation allows you to select an inbound intercept course for the selected waypoint. The default course to the operation is the course from the present position to the selected waypoint. Upon reaching the selected waypoint, if the waypoint is in the active flight plan, the flightplan will sequence to the next waypoint in the flightplan normally.

1. Press **Direct-To**. Use the **Large** knob to highlight a waypoint in the active flight plan or press **DB** to select a new waypoint with the **Large** and **Small** knobs.
2. Press **CrsTo**. A map is displayed showing the selected course.
3. Change the course bearing, if desired. Turn the **Large** knob to change the value in 10° increments. Turn the **Small** knob to change the value in 1° increments.
4. Press **Menu/Enter**.

Course From (CrsFr)

The Course From operation allows you to navigate from a waypoint on a pre-defined course. The default course for the Course From operation will depend on whether your aircraft is heading toward the selected waypoint or away from it. If your aircraft is heading toward the selected waypoint, the default course will be the bearing from the present position to the selected waypoint. If you are heading away from the waypoint, the default course will be the bearing from the waypoint to your present position. The length of the magenta course line will always be 100 nm.

When the Course From operation is executed, the To-From indicator will indicate FROM and the flightplan will go into suspend mode (SUSP); it will not automatically sequence the flightplan waypoints. To rejoin your flight plan, highlight a waypoint in your active flight plan and either press the Direct or FlyLeg menu item keys.

1. Press **Direct-To**. Use the **Large** knob to highlight a waypoint in the active flight plan or press **DB** and select a new waypoint, if desired, with the **Large** and **Small** knobs.
2. Press **CrsFr**. A map is displayed showing the selected course.
3. Change the course bearing, if desired. Turn the **Large** knob to change the value in 10° increments. Turn the **Small** knob to change the value in 1° increments.
4. Press **Menu/Enter**.

OBS

This function activates the OBS mode where the CDI/HSI resolver controls the selected course to a selected waypoint when an external resolver is installed. This allows you to treat any waypoint as though it were a VOR station. Automatic flight plan sequencing will be suspended initially.

NOTE: When using OBS mode with a VOR station, the GNS 480 will use the station declination of the VOR. For other waypoints, the GNS 480 will use magnetic variation based on your present position.

OBS to a Waypoint in Your Flight Plan

If the OBS waypoint is on the map display, a magenta line will be drawn for the Course-To. After you intercept that line, the GNS 480 will track the course inbound to the selected OBS fix. The white line on the Map is the Course-From the OBS fix. Once the aircraft intercepts the OBS course, the GNS 480 will fly the course inbound and then continue outbound until you terminate the OBS mode. However, if you unsuspend, the GNS 480 will terminate OBS mode and continue to sequence en route on the flight plan. You will also terminate OBS mode by making another flight leg active or going Direct-To another waypoint.

1. Press **Direct-To**. With the **ActFP** smart key highlighted, select a waypoint in the flight plan with the **Large** knob.
2. Press **OBS**. Now use the external CDI/HSI resolver to control the selected course. The GNS 480 will read the OBS information and will change the course displayed on the Map displays.
3. After the course is selected, press **SUSP** to allow for normal sequencing back to your flight plan once you've reached the waypoint.

OBS to a Waypoint Not in Your Flight Plan

1. Press **Direct-To**. Press the **DB** smart key.
2. Select a new waypoint outside of your flight plan with the **Large** and **Small** knobs.
3. Press **OBS**. Now use the external CDI/HSI resolver to control the selected course. The GNS 480 will read the OBS information and will change the course displayed on the Map displays.
4. After reaching the waypoint, the GNS 480 will continue to track outbound. You may terminate this mode by going Direct-To any waypoint or use the FlyLeg function.

FlyLeg

With the FlyLeg Menu selection you can activate a particular leg of your flight plan. This feature allows you to bypass a leg in your flight plan. This is useful when you are vectored onto an airway. If you have picked a leg that cannot be activated for navigation, a message will appear to advise you. Press **CLR** to exit.

1. Press **Direct-To**.
2. Select the desired leg of your flight plan with the **Large** knob (the **ActFP** smart key is highlighted).
3. Press the **FlyLeg** key to activate the selected leg.
4. Continue to fly the assigned heading until the course is alive. If you are not on an assigned heading, roll steering will fly a 45° intercept to the active leg (roll steering autopilots only).

Nearest (NRST) Search

The Nearest Search function allows you to search for the 20 items nearest to your present position in each type. There are eight search types: Airport, VOR, NDB, INT, User, FSS (Flight Service Station), Airspace, and Air Route Traffic Control Center (ARTCC). The last Menu selection lets you set Limits to select a range of airport types to show up for the Nearest Airport type. You can then look up information about that waypoint by pressing **INFO** or fly direct to it by pressing the **Direct-To** key.

1. Press **NRST** to display the Nearest waypoints.
2. The Nearest waypoint type labels are shown on the right side of the display. Press the Line Selection key next to the waypoint type label that you want.
3. Turn the **Large** knob to highlight (green) the waypoint you want to select.

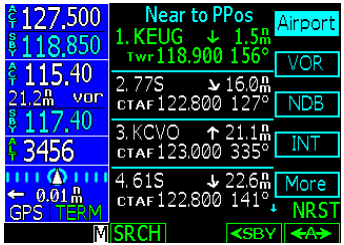
Search Around a Reference Point (SRCH)

Search for the 20 nearest items from a selected waypoint in your flight plan (FP) or in the database (DB).

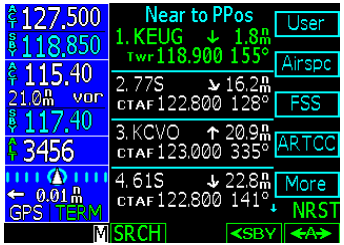
Nearest Frequency

While viewing the Nearest waypoints that have frequency information, you can transfer the displayed frequency to the Active or Standby frequency. The GNS 480 automatically knows if it is a Com or a VOR frequency.

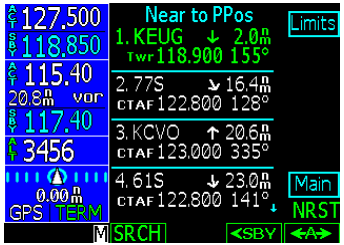
1. Press **NRST**.
2. Press the menu item key for the waypoint type you want to search.
3. Turn the **Large** knob to scroll thru the list of nearest waypoints, such as Airport, VOR, User if a frequency is present, FSS, or ARTCC. Highlight the desired waypoint.
4. Press **<-SBY** to insert the highlighted frequency into the Standby position or **<-A->** to insert the frequency into the Active position.



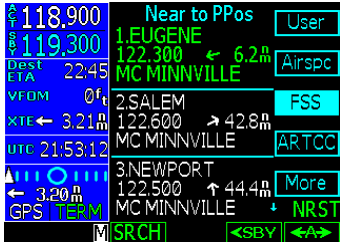
Choose a Nearest Waypoint and Its Information

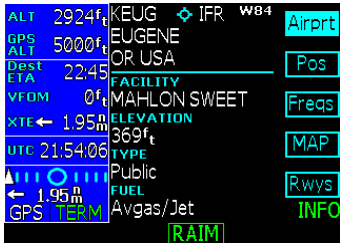


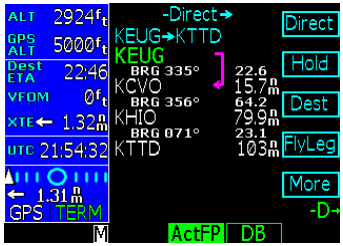
Airport Information - Second Page



Airport Information - Third Page







FSS and ARTCC Frequencies

Many FSS and ARTCC locations have multiple frequencies. All frequencies for each FSS or ARTCC may be viewed by turning the **Small** knob.

You can quickly insert the frequencies into the Com radio.

Press **<-SBY** to insert the highlighted frequency into the Standby position or **<-A->** to insert the frequency into the Active position.

Info on Nearest Waypoint

1. Press **NRST**.
2. Press the key for the waypoint type you want to search.
3. Turn the **Large** knob to select the nearest waypoint.
4. Press the **INFO** button.

Fly Direct-To a Nearest Waypoint

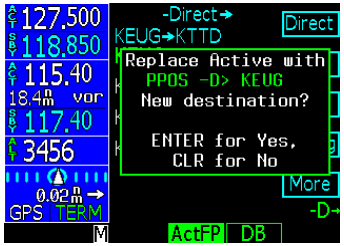
1. Press **NRST**.
2. Press the key for the waypoint type you want to search. Press **More** to view more types.
3. Turn the **Large** knob to scroll thru the list of nearest waypoints. Highlight the desired waypoint.
4. Press the **Direct-To** key.
5. Press the **Direct** key.

Using the NRST Function to Change Your Destination to a Nearest Airport

1. Press **NRST**.
2. Turn the **Large** knob to select the desired nearest airport.
3. Press the **INFO** key. Note, if "IFR" is listed with the identifier, instrument approaches are available. Press **INFO** again to toggle back to the Nearest Waypoint list.
4. With the desired airport selected, press the **D->** key.
5. Press the **Dest** key. Press **Menu/Enter** to activate the new flight plan direct to the selected waypoint.

Pressing the Dest key will erase the active flight plan and build a one-leg flight plan direct from your present position to the new destination airport. This makes the arrivals and approaches available for the new destination airport.

6. Press **PROC**.
7. Press **Appch** for the destination waypoint. Select the approach with the **Large** and **Small** knobs. You can also select the type of approach with the selection keys on the right side of the display. Press **Menu/Enter**.
8. Press **EXEC**. The GNS 480 will ask if you want to replace the Active flight plan with the Modified flight plan. Press **Menu/Enter** to accept the change.



Flying Direct To a New Airport

Information on Waypoints (INFO)

Info mode allows you to view information about the selected waypoint. Examples of selecting a waypoint can be: highlighted waypoint in the flight plan, waypoint selected from Nearest Waypoint list, waypoint selected in Pan mode, or a waypoint selected from the database. The WGS-84 map datum is noted as W84. Other map datums are noted as unknown (unk). When viewing information that contains Com or VOR frequencies, pressing the **<-SBY** or **<-A->** keys will insert the highlighted frequency into the appropriate radio.

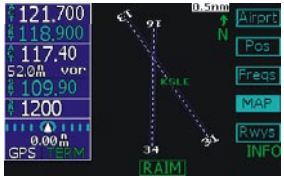
Airport Information

- Identifier, city/facility name, state, country, elevation, type, map datum, and fuel
- Position: bearing and distance from present position, sunrise/sunset in UTC, lat/lon coordinates, and magnetic variation.
- Frequencies
- Map of area and runway
- Runway information: length, lighting, surface type, category type, LOC or ILS, and frequency (if available)

Airport Information

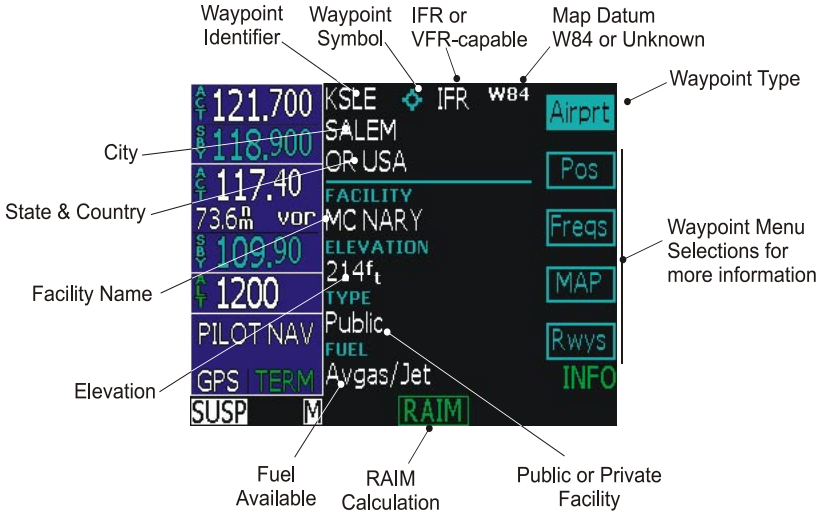
Airport Position Information

Airport Frequency Information



Airport Map

Airport Runway Information

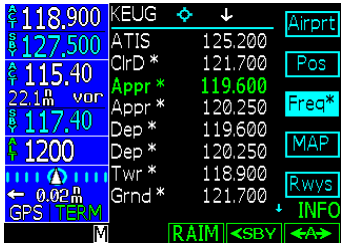


Info Mode - Airport Information

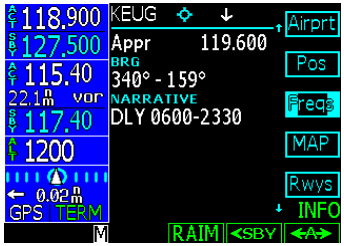
Airport Frequency Information

Additional information is available for Airport Frequencies that have an asterisk (*) by the frequency type.

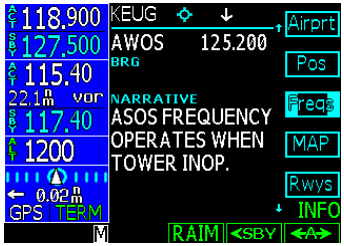
1. Turn the **Large** knob to highlight the desired frequency. Frequencies with an asterisk will have more information available.
2. Press the **Freq** key again to display more information, such as time of operation, bearings, runways, and other comments. The **Freq** key will now be half highlighted.
3. Turn the **Large** knob to scroll through the list of frequencies for that airport while still displaying the extra information. Blue arrows on the right side of the display will show the direction where more frequencies are available.
4. Press the **Freq** key again to return to the frequency list.



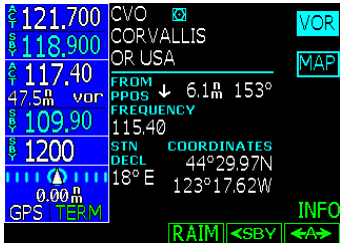
Info Mode - Frequency Information



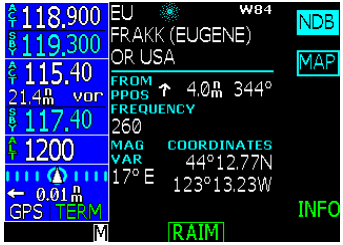
Press the Freq key for frequency details



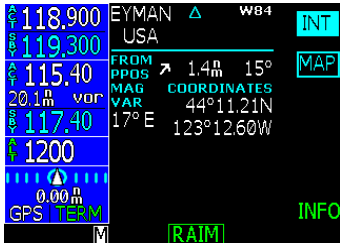
Turn the Large knob for detail on more frequencies



Info Mode - VOR Information



Info Mode NDB



Info Mode Airway Intersection

VOR Information

- Identifier, city, state, country, bearing and distance (GPS-determined distance) from present position, frequency, lat/lon coordinates, and station declination at the VOR.
- Map of area

NDB Information

- Identifier, city, state, country, bearing and distance from present position, frequency, lat/lon coordinates, and magnetic variation.
- Map of area

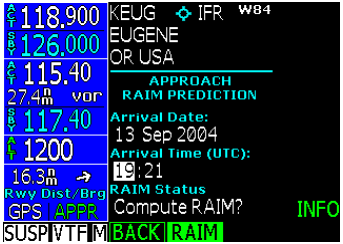
Airway Intersection Information

- Identifier, country, bearing and distance from present position, lat/lon coordinates, and magnetic variation.
- Map of area

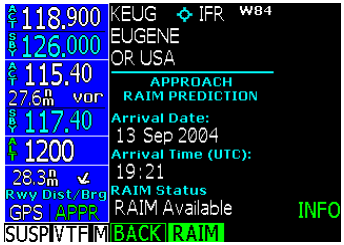
RAIM Prediction

Receiver Autonomous Integrity Monitoring (RAIM) is a method of predicting possible system accuracy errors that may be caused by bad satellite data. The RAIM algorithm requires that more satellites are available and usable than is required for a normal GPS position fix. RAIM prediction is used when you are operating outside of areas served by WAAS coverage or if WAAS is unavailable. Use the results of the calculation to verify signal integrity.

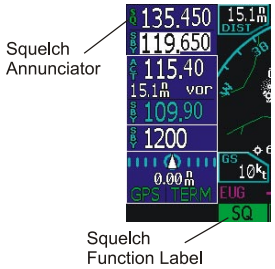
1. While in INFO mode, press the **RAIM** smart key when it is shown.
2. Press the **CRSR** knob in. One of the fields will be highlighted. Change the values of the Arrival Date and/or Arrival Time (in UTC time) with the **Small** knob while moving to a value with the **Large** knob.
3. After setting the values, press the **Menu/Enter** key to compute the RAIM prediction.

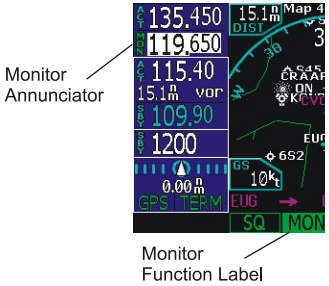


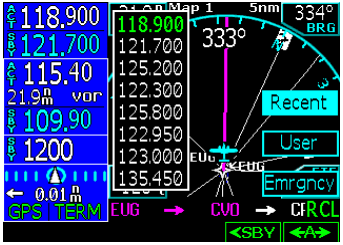
Info Mode RAIM Prediction Page



Info Mode RAIM Prediction Completed







Com Radio (COM)

Press **COM** to activate control of the internal Com Radio. Pressing **COM** again returns you to the previous mode. All other functions will continue to function normally, such as navigation of active flight plans. Turn the **PWR/VOL** knob to control the Com volume. External controls for the Flip-Flop and up/down control can be made depending on installation.

Squelch (SQ)

Press the **SQ** key to toggle the Com receiver squelch function. When squelch is active, the Squelch (SQ) annunciator will appear on the left side of the active frequency display and the SQ function label will be highlighted.

Tx/Rx

Transmit (Tx) or Receive (Rx) indications replace the "SQ" indication when they are used. Tx appears when the mic is keyed. Rx appears when a receiving.

Monitor (MON)

Press the **MON** key to toggle the Standby channel monitoring function. When Monitor mode is active, the MON annunciator will appear on the left side of the standby frequency and the MON function label will be highlighted. Frequency monitoring allows you to listen to the Standby frequency while the GNS 480 monitors the Active frequency for activity. When the Active frequency receives a signal, you will hear the Active frequency until its activity stops. The frequency monitoring function is inhibited while you are transmitting.

Recall (RCL)

1. Press the **RCL** key to display the menu of Recent, User, or Emergency frequencies.
2. Press the **<SBY** key to insert the selected frequency as the Standby frequency.
3. Press the **<A>** key to insert the selected frequency as the Active frequency and set the previous Active frequency as Standby frequency.

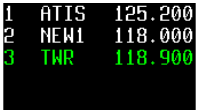
Recent

1. Press the **Recent** key to bring up a list of the last eight frequencies used as the Active frequency.
2. Turn the **Large** knob to highlight a frequency.
3. Press the **<SBY** or **<A>** keys to insert the frequency.
4. Press the **Menu/Enter** key if no choice is desired.

User

The Com radio will store up to 25 User-saved frequencies. The Com and Nav User lists are separate sets of 25.

1. Press the **User** key to bring up a list of User frequencies.
2. Turn the **Large** knob to highlight a frequency.
3. Press the **<SBY** or **<A>** keys to insert the frequency.
4. Press the **Menu/Enter** key if no choice is desired.



User Frequency List

Emergency

Press the **Emrgncy** menu item key to insert the Emergency frequency (121.500) as the Standby frequency.

Flip/Flop

Press the **<–>** (flip/flop) function smart key to swap the Active and Standby frequencies.

Signal

The Signal function allows you to view RF Level and Noise Level values. These values are useful for trouble-shooting installations as a measure of signal quality. You won't normally need to use these values.

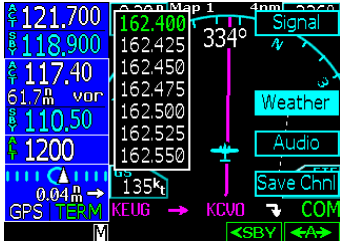
1. Press **Menu/Enter** and then the **Signal** key. The Signal menu label will be highlighted.
2. Press the **Signal** key again to turn the value display off.

Com Signal Levels

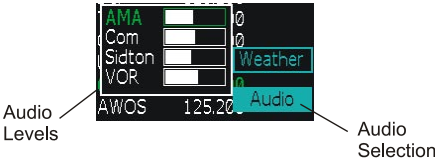
Weather

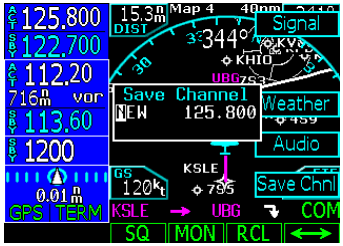
The GNS 480 holds a list of Weather frequencies that can be placed in the Active or Standby position for listening. You may not transmit on a Weather frequency. Weather frequencies are not available in some locations. Weather frequencies cannot be tuned, they must be selected through the **Weather** key.

1. Press **Menu/Enter** and then the **Weather** key to bring up the list of Weather frequencies. The Weather menu label will be highlighted.
2. Turn the **Large** knob to highlight a frequency.
3. Press **<SBY** to insert the highlighted frequency as the Standby frequency or **<A>** to insert it as the Active frequency.
4. Press the **Weather** key again to turn the value display off.



Com Mode Weather Frequencies





Saving a Com Channel

Audio

The Audio function allows you to control audio levels of the Com radio. The AMA setting adjusts the volume level of the message tones. The Com setting adjusts the Com radio audio level. The Sidetone setting adjusts the feedback level from the microphone into the headset headphone. The VOR (Nav radio) setting adjusts the Nav radio volume for idents, HIWAS, or other services with audio.

The GNS 480 provides the following three aural alerts: 500 foot callout, Localizer Alive, and Missed Approach Point. If audio is inhibited, the audio alert messages are not played. Audio messages do not require any pilot input.

1. Press **Menu/Enter** and then the **Audio** key to bring up the Audio Level values. The Audio menu label will be highlighted.
2. Press the **Audio** key again to turn the value display off.
3. Turn the **Large** knob to highlight the Audio Message Annunciator (AMA) volume, Com radio volume, Sidetone level, and Nav radio volume.
4. Use the **Small** knob to adjust the values.

Save Channel

This function allows you to save and name the current Active frequency in the User frequency list.

1, Press **Menu/Enter** and then the **Save Chnl** key to bring up the Save Channel box. The Save Chnl menu label will be highlighted.
2. Press the **Save Chnl** key again to turn the value display off.
3. Turn the **Small** knob to change the value.
4. Turn the **Large** knob to move the cursor to another character.
5. Press the **Menu/Enter** key to save the name and frequency.

Nav Radio (VOR)

Press **VOR** to activate control of the internal Nav Radio. All other functions will continue to function normally, such as navigation on active flight plans.

DME Distance

Distances, such as to a Localizer/DME waypoint (equivalent to Localizer DME), are based on calculated distances from GPS information. The GNS 480 will choose the DME that is the closest to your geographical location within 200 nm. If a station identifier has been decoded by the NAV radio, the closest DME from the list with matching frequency and station identifier is used to determine distance. If no station identifier has been decoded and there are multiple DME's with the same frequency found within the list, no GPS distance will be displayed. If only one DME is found that matches frequency and the DME is not part of an ILS, it will be selected to determine the GPS distance. This means, if a DME is found that is part of an ILS, a decoded identifier match is required. If the decoded identifier is not in the list no distance will be provided. No distance will be shown for a localizer that does not have a co-located DME.

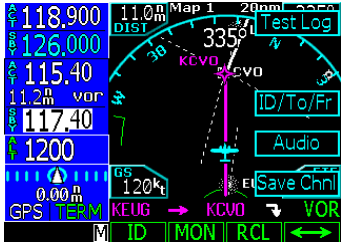
ID

Press the **ID** key to toggle the Nav audio between Off, On and Voice only. The On selection is indicated by ID replacing the ACT annunciator to the left of the Active frequency and pressing the **ID** key so ID is highlighted. The Voice selection is indicated by VOX replacing the ACT annunciator to the left of the Active frequency. The ID function label will be partially highlighted when Voice is selected and fully highlighted when On is selected. The Monitor function is turned off when any ID mode is active.

Monitor (MON)

Press the **MON** key to toggle the Nav channel monitoring function. When monitor mode is active, a MON annunciator will appear on the left side of the standby frequency, the standby radial replaces the active identifier, and the MON function label will be highlighted.

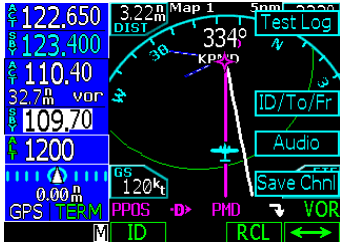
Frequency monitoring allows you to listen to the Standby VOR frequency while the GNS 480 monitors the Active frequency for activity. Radial information for the monitored VOR frequency will also be displayed. When Active frequency receives a signal, you will hear the Active frequency until its activity stops. Pressing **MON** will



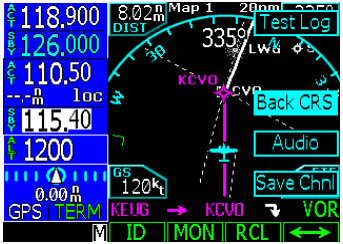
Nav Mode Menu Selections

Nav Mode Monitor Selection

VOR - Recall of recent frequencies



Nav Mode ID/To/Fr Selection



Nav Mode Back Course Selection

be ignored for ILS frequencies. If Voice or ID functions are active, the Nav radio will temporarily turn off the ID function until the Monitor function is turned off.

Recall (RCL)

1. Press the **RCL** key to bring up a list of the last eight VOR/ILS frequencies used as the Active frequency.
2. Turn the **Large** knob to highlight a frequency.
3. Press the **<SBY** or **<A>** keys to insert the frequency.
4. Press the **VOR** key again if no choice is desired.

Flip/Flop

Press the **<->** (flip/flop) key to swap the Active and Standby frequencies.

ID/To/Fr

When the Active frequency is a VOR, you can view the current course To/Fr the VOR as well as the Identifier and distance. This value appears between the Active and Standby VOR frequencies and to the right. Press Menu/Enter and then each press of the **ID/To/Fr** key will toggle between the display of the ID (Identifier), To radial, or From radial values.

Back Course

When the Active frequency is an ILS, the Back Course mode will be available for ILS frequencies. Press **Menu/Enter** and then the **Back CRS** key to turn Back Course mode on. Back Course mode reverses needle sensing. When on, the Back CRS menu label will be highlighted and the BC annunciator will appear. When you are using the backcourse mode in the GNS 480, **do not** use the back course mode on your autopilot if it has a back course mode.

Audio

This function operates the same as in Com mode.

User

This function operates the same as in Com mode. The Com and Nav User lists are separate sets of 25.

Save Channel

This function operates the same as in Com mode.

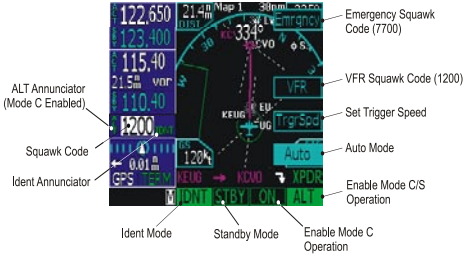
Test Log

The Test Log function allows you to store information about the last time you tested your Nav receiver. The information you can enter includes: Date (month, day, year), Type of test (Differential, Ground, Air), Location (text), Bearing Error (-5 to +5), and name of person logging the test information (text).

1. In the Nav function, Press **Menu/Enter** and then the **Test Log** key.
2. Press the **EDIT** key. The month of the Date will be highlighted.
3. Turn the **Small** knob the change the month of the date. Turn the **Large** knob to move to Day of the Date.
4. Turn the **Small** knob to change the day. Turn the **Large** knob to move to the year. Turn the **Small** knob to change the year.
5. Turn the **Large** knob to move to the Type selection. Turn the **Small** knob to choose between Differential, Ground, or Air. Differential means the value was referenced to another calibrated source or unit. Ground means the unit was calibrated while on the ground. Air means the unit was calibrated while in the air.
6. Turn the **Large** knob to move to the Location selection. Press the **Cursor** knob in to start editing. Turn the **Small** knob to change the character. Turn the **Large** knob to the next character and turn the **Small** knob to change the character. When editing is complete, press the **Cursor** knob again to exit editing the Location.
7. Turn the **Large** knob to move to the Brg Error selection. Turn the **Small** knob the change the value required to center the needle. Left for "-" and right for "+" corrections.
8. Turn the **Large** knob to move to the Name selection. This value if for recording the name of the person entering the values in the Test Log. Press the **Cursor** knob in to start editing. Turn the **Small** knob to change the character. Turn the **Large** knob to the next character and turn the **Small** knob to change the character. When editing is complete, press the **Cursor** knob again to exit editing the Name.

Nav Mode Test Log Information

Transponder Mode Smart Keys



Transponder Control (XPDR)

If a remote compatible transponder is connected and setup to operate with the GNS 480, the Transponder Control Mode will allow you to control your transponder from the GNS 480 front panel. Some features are common to the available transponders and are explained below. Press **XPDR** to activate Transponder mode.

Ident

Press the **IDNT** key once to activate the Ident mode. The key label will be highlighted and an IDNT annunciator will appear by the squawk code for 20 seconds.

Standby

Press the **STBY** key to place the transponder in Standby mode. No information will be transmitted while in Standby mode. A SBY annunciator will appear to the left of the squawk code.

ON

Press the **ON** key to enable Mode A operation. An ON annunciator will appear to the left of the squawk code.

ALT

Press the **ALT** key to enable Mode C/S operation, which also sends altitude data along with your squawk code. An ALT annunciator will appear to the left of the squawk code.

Transponder Line Selection Keys

Press the **Menu/Enter** key to display the keys on the right side of the screen.

Emergency

Press the **Emrgncy** key to select the emergency 7700 squawk code. This menu item is available when used with the SL70, SL70R, GTX 32, GTX 327, GTX 33, and GTX 330.

VFR

Press the **VFR** key to select the VOR 1200 squawk code. This value can be set in the System Configuration mode. This menu item is available when used with the SL70, SL70R, GTX 32, GTX 327, GTX 33, and GTX 330.

TrgrSpd

The **TrgrSpd** key allows you to edit the aircraft speed that will switch the transponder automatically between active and standby. See the Auto mode description below. This menu item is available with the SL70/SL70R.

Auto

When Auto mode is selected, the transponder will automatically become active after the aircraft reaches the Trigger speed. While the aircraft is below the Trigger speed, your transponder will not send any information. This menu item is available with the SL70/SL70R.

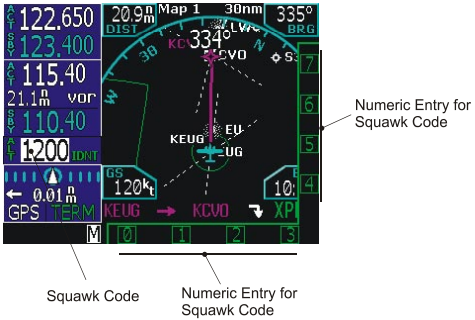
1. In Transponder mode, press **Menu/Enter**.
2. If necessary, edit the Trigger Speed. Press **TrgrSpd**. Select the desired Trigger Speed with the **Large** and **Small** knobs. Press **Menu/Enter**.
3. Press **Menu/Enter**. Press the **Auto** key. Auto mode is active when it is highlighted. Press **Auto** again when you want to deactivate the Auto mode.

Flight ID

For GTX33/330 installations, the Flight ID can be either tied to the tail number of the aircraft (set at installation time) or set to another value by the flight crew as needed. The **Flight ID** key allows you to either just view the Flight ID or view and edit the Flight ID. For installations that allow editing of the Flight ID, care should be taken that the Flight ID has no more than 7 characters, is left justified (characters start on the left), and there are no spaces. This is in accordance with ICAO Doc 8168 [PANS-OPS] Vol. I, Part VIII, 1.3, which states that flight crew of aircraft equipped with Mode S having an aircraft identification feature shall set the aircraft identification in the transponder. Refer to ICAO Doc 8168 Vol. I, Part VIII, 1.3 for more information.

1. Press **Flight ID** to allow entry of a Flight ID. This menu item is available with the GTX 33 and GTX 330. This allows the GTX 33/330 to view and modify the Flight ID.

XPDR Mode - Trigger Speed Setting (SL70 only)



XPDR Mode - Manual Squawk Code Entry

Selecting the transponder squawk code.

2. Turn the **Small** knob to change characters. Turn the **Large** knob to move to the next character. Press the **CLR** key to delete a character.
3. Press the **Menu/Enter** key to end editing and save the values.

Ground

When the Ground selection is pressed the GTX 33 or 330 will be placed in Ground mode where the transponder operation will operate normally except no Mode A or C replies are allowed. Squitter replies to discretely addressed Mode S interrogations are allowed. GND will be annunciated to the left of the squawk code on the GNS 480. GND mode also allows the GTX 33 and 330 to transition to ALT based on the GTX criteria for ground to airborne determination.

Manually Select a Squawk Code

1. Press the **CRSR** in or turn the **Large** knob to activate squawk code editing. Numbers 0 - 7 will be displayed adjacent to the Smart and Line Selection keys.
2. Press the key for the desired number. After pressing a numbered key, the next number to the right will be active for editing.

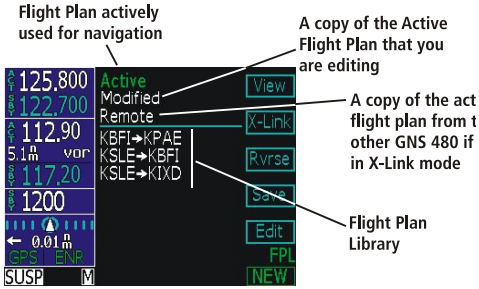
or

1. Change the number value with the **Small** knob and move to the next number with the **Large** knob.
2. After selecting the fourth number, turning the **Large** knob or pressing **Menu/Enter** key will end editing.
3. You can press the **CRSR** knob while editing to cancel any changes.

NOTE: The current squawk code will be replaced by four yellow dashes, if the remote transponder was never established. The last valid squawk code used will be displayed in yellow, if communication with the transponder is lost while in use.

Flight Planning (FPL)

The Flight Planning function lets you set up and store flight plans where you can name the flight plan, insert a series of waypoints, airway segments, departure, arrival, and approach procedures, add comments, save the plan, and execute it. There are two groupings of flight plans: a Defined Flight Plan group and the Library Flight Plans. The Defined Flight Plan group shows the Active flight plan followed by the Modified flight plan and then the Remote flight plans (dual installations only) which are listed below the Library flight plans. Turn the **Large** knob to highlight the flight plan to perform the operation on.



Active Flight Plan

The Active flight plan is the flight plan that the GNS 480 is currently using for navigation guidance. The Active plan stays active until you replace it with another flight plan or clear it. With the Active plan highlighted, the menu items are: View, Reverse, Save, or Edit.

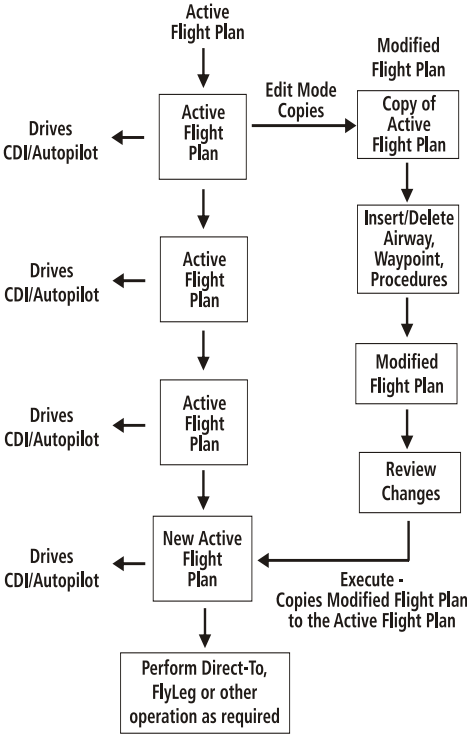
If you press the **CLR** key, you will be prompted to verify that you want to clear all information out of the Active plan which is the same as cancelling your flight plan. The Active plan is cleared of all information, but the Library flight plan of that name is not changed.

Modified Flight Plan

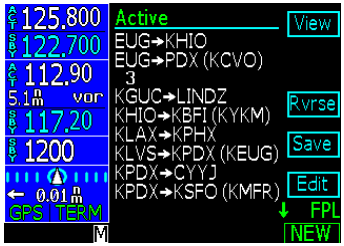
The Modified flight plan is a temporary copy of the Active flight plan that you can edit prior to executing or saving the changes. The Active plan won't be affected by the Modified flight plan until you execute it. When you execute a flight plan, it becomes the Active flight plan. With the Modified plan highlighted, the menu items are: Execute, Save, or Edit.

Remote Flight Plan

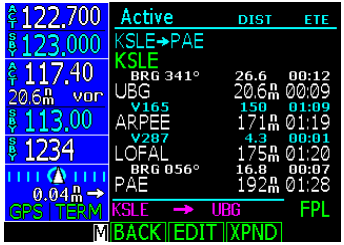
A Remote flight plan is the active flight plan received from another connected GNS 480 when not in Cross Link (X-Link) mode. The Library flight plans are list of flight plans stored for future use. With the Remote plan highlighted, the menu items are: View, Execute, or Save.



Work flow for modifying a flight plan



List of Flight Plans



Expanding a flight plan for more detail

Library Flight Plan

The flight plan Library contains up to 50 flight plans you have created and saved. With a Library flight plan highlighted, the menu items are: Execute, Comment (Cmnt), Copy, or Edit. When you Execute (EXEC) a flight plan from the Library, you select a flight plan by scrolling through the Library list with the **Large** knob and press **EXEC**. Press **Menu/Enter** to confirm the action to replace the Active flight plan with a Library flight plan. A copy of the flight plan is then set as the Active plan that your GNS 480 will use to navigate. The flight plan in the Library remains separate from the Active flight plan. The Comment (CMNT) menu item allows you to add a line of text below the flight plan name.

Flight Plan Functions

The function and the menu item smart keys adjust to reflect the appropriate commands for the flight plan or operation you are viewing.

View

Displays the active flight plan.

Back

Press the **BACK** function smart key to return to the previous display. No change is made to the page you were viewing.

Edit

Use this feature to edit an existing flight plan. Editing a displayed flight plan will not change the active flight plan.

Expand (XPND)

Pressing the **XPND** key toggles between a simple view of the waypoints in the flight plan and one that shows the details of the procedures and airways.

Cross Link (X-Link)

Two GNS 480's can be connected and set up during installation to work together. Flight plans and User waypoints are shared. Pressing the **SUSP** key on either unit will suspend waypoint sequencing on both units. When the X-Link function is activated, the units will share control of the active flight plan. Pressing the **X-Link** menu key activates the Cross Link function. The X-Link menu item will be highlighted when X-Link is active. Both units will then show "Active Linked" on the top line of the Flight Plan page. Any changes made to the active plan on any unit will be sent to the other unit. Pressing the **X-Link** menu key again will deactivate the Cross Link function and the term "Linked" will be removed from the active flight plan name.

Remote Flight Plans

When the Cross Link function is not activated, changes to the active flight plan will be sent to the other unit for viewing only and noted as "Remote." The Remote flight plans exist as part of the library of flight plans shared by the two units. The units do not share the Active flight plan used for navigating unless Cross Link (X-Link) is activated.

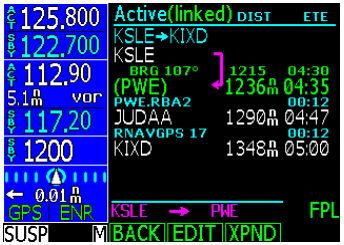
When the units are powered on, they synchronize their flight plans and User waypoints. The unit with the most recent flight plans and User waypoints will take precedence and replace the plans and User waypoints in the other unit. To avoid confusion and loss of flight plan information, power both units on at the same time and keep both units on when they are used.

Reverse (Rvrse)

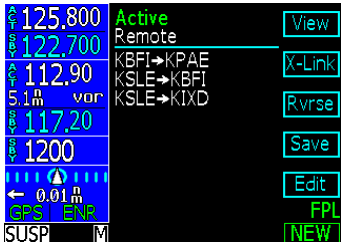
Pressing the **Rvrse** key will create a Modified flight plan that is a copy of the active flight plan and reverse the waypoints. Any procedures or approaches will be removed from the Modified flight plan.

Save

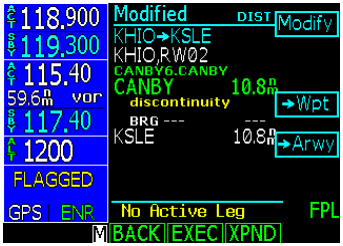
Press the **Save** key to save the active flight plan to memory. If a flight plan exists with the same name, the GNS 480 will create a comment and attach it to the flight plan to show the difference. Press **Menu/Enter** for Yes or **CLR** for No.



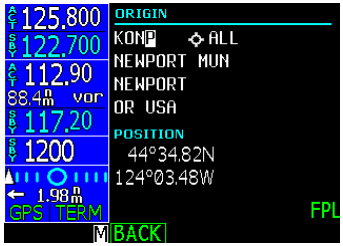
Flight Plan with X-Link Active



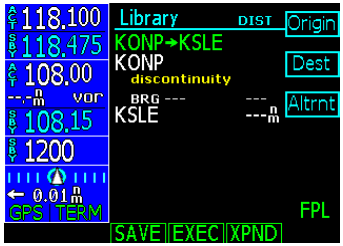
Remote Shared Flight Plan



Modified Flight Plan



Select an Origin Waypoint for Flight Plan



Removing a discontinuity from a Flight Plan

Edit

Pressing the **Edit** menu item key, while highlighting the Active flight plan, creates a copy of the active flight plan, which is called the "Modified" flight plan. Making a copy protects you from accidently changing your active flight plan. You can now edit the "Modified" flight plan. If you are already viewing a "Modified" flight plan, you will be prompted to replace the current modified flight plan (**Menu/Enter**) or keep the current one (**CLR**).

1. Turn the **Large** knob to move to the leg to modify (highlighted in green).
2. Press **Modify** to change the selected leg or procedure. Use the **Large** and **Small** knobs to select a new waypoint and press **Menu/Enter**.
3. Press the →**Wpt** key to insert another Waypoint or press the **Arwy** key to insert an Airway.
4. After modifying the flight plan, the smart keys give you the choice of Back, Executing, or Expanding and viewing details in the new Flight Plan

Execute (Exec)

Use the Execute command to make the highlighted flight plan the Active flight plan. A flight plan that is being modified will not be used until you press **Exec** and confirm the activation.

Comment (Cmnt)

This function allows you to place a comment, of up to one line of text, for the flight plan. The comment will be placed just below the flight plan name.

Copy

The Copy function creates a duplicate of the selected flight plan. You can use the Copy function as a timesaving method to create a new flight plan when you will reuse many of the same waypoints and procedures.

Discontinuity

A Discontinuity is a message placed in the affected position in a flight plan indicating the GNS 480 needs to know how you want to go between the two waypoints. Discontinuities are also inserted into the flight plan when a standard instrument departure (SID) does not match the first waypoint in the en route section of the flight plan or when STAR or approach end points do not match or when a STAR terminating waypoint does not match the IAF of the approach.

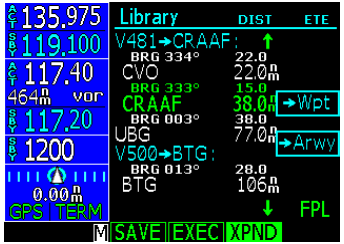
Close the gap between waypoints by inserting waypoints or airways, or remove the discontinuity. You may delete the Discontinuity by turning the **Large** knob to highlight it and then pressing the **CLR** key. Deleting a discontinuity results in a direct path between those waypoints.

When the discontinuity is caused by an aspect of the flight plan, such as an approach, the needed action may not be known before the flight begins. It is not necessary to remove the discontinuity, immediately. At some point in the flight, the pilot needs to fill in the information needed to complete the flight plan and remove the discontinuity. If the discontinuity is not removed, "disco" will be displayed on the bottom of the map display for the next and then the active legs as a reminder to correct the flight plan.

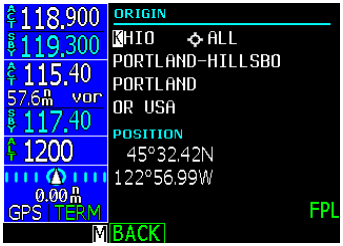
Pilot Nav Legs

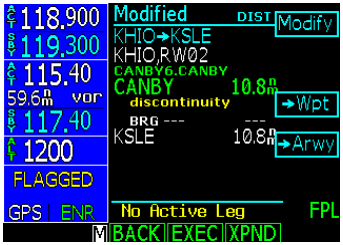
When the "Pilot Nav" message appears on a leg in your flight plan it means the GNS 480 will not provide guidance on that leg. You will have to use other flight instruments or autopilot modes to fly the given procedure leg.

The GNS 480 will go into Suspend mode when the current leg is a Pilot Nav leg. Pressing **SUSP** again sequences you to the next leg in the procedure. If the next leg is a course-based leg, the course deviation indicator will begin to center on intercept. You may engage the appropriate NAV mode on your autopilot or flight director.



Setting up IFR Flight Plan waypoints





Searching for Waypoints to Insert into a Flight Plan

The following steps describe in general how you can select a waypoint for one of the points in a flight plan.

1. Press the **FN** key (if necessary) and then the **FPL** key.
2. Press the **NEW** key. The waypoint database will be displayed. You can choose to search for a waypoint by the Identifier, Facility Name, Location, or Waypoint Type.
3. Select by Identifier

   a. With the first character of the Identifier highlighted, turn the **Small** knob to select the desired character.

   b. Turn the **Large** knob clockwise (CW) to the next character and select the character by turning the **Small** knob.
4. Select by Waypoint Type

   a. With the first character of the Identifier highlighted, press the **CRSR** knob in. The whole Identifier field will be highlighted. Now turn the **Large** knob counter-clockwise (CCW) one turn to highlight the waypoint type field.

   b. Turn the **Small** knob to display the different waypoint types.
5. Select by Facility Name

   a. With the first character of the Identifier highlighted, press the **CRSR** knob in. The whole Identifier field will be highlighted. Now turn the **Large** knob CCW one turn to highlight the Facility Name field.

   b. Turn the **Small** knob to display the facilities in alphabetic sequence.
6. Select by Location

   a. With the first character of the Identifier highlighted, press the **CRSR** knob in. The whole Identifier field will be highlighted. Now turn the **Large** knob CCW one turn to highlight the Location field.

   b. Turn the **Small** knob to display the facilities in alphabetic sequence.

Activate a Flight Plan

1. Press the **FPL** function smart key to display the Flight Plan library. If the active flight plan is displayed, press the **BACK** function smart key.
2. Turn the **Large** knob to the desired active flight plan.
3. Press the **EXEC** function smart key.

Delete the Active Flight Plan

1. Press the **FPL** function smart key to display the Flight Plan library.
2. Turn the **Large** knob if necessary to highlight the active flight plan.
3. Press the **CLR** key.

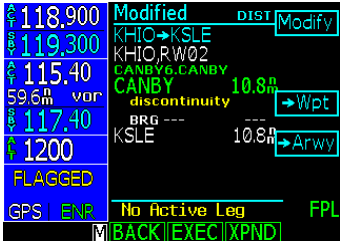
Edit a Flight Plan

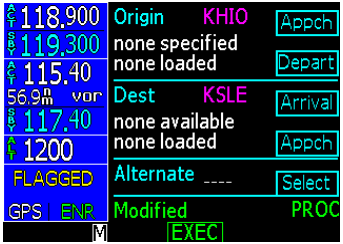
Changing Origin, Destination, & Alternate Waypoints

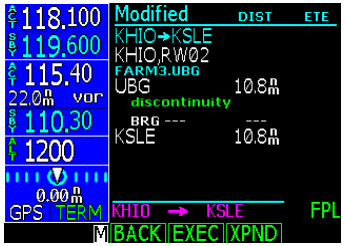
1 Press **FN** and then the **FPL** function smart key.
2. Turn the **Large** knob to highlight the flight plan to edit and press the **EDIT** function smart key.
3. Turn the **Large** knob to highlight the flight plan name.
4. Press the **Origin** or **Dest** or **Alternate** menu item smart keys to change these waypoints.
5. The flight plan is renamed and shown in the Library by the new Origin and Destination waypoint names.
6. Press the **SAVE** function smart key to save the flight plan.

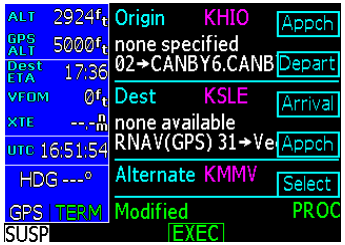
Inserting a Waypoint or Airway in Your Flight Plan

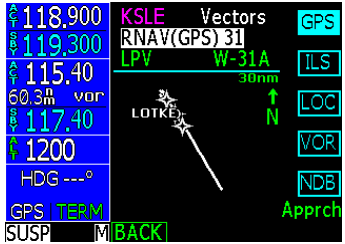
1. Highlight a waypoint with the **Large** knob.
2. Press the **->Wpt** menu item smart key to insert another waypoint.
3. Use the **Large** and **Small** knobs to select a waypoint and then press **Menu/Enter**. The new waypoint will be inserted after the highlighted waypoint or en route intersection.
4. If the waypoint is on an airway (such as a VOR), Airways will be available to insert into your flight plan. Press the **->Arwy** menu item smart key. Use the **Large** and **Small** knobs (or smart keys) to select the Airway and exit waypoints. Press **Menu/Enter**.
5. Press the **XPND** function smart key to expanded view all of the waypoints inserted automatically by inserting the airway.











Deleting a Waypoint or Airway in Your Flight Plan

1. While editing your flight plan, turn the **Large** knob to highlight the waypoint or airway, in the compressed view (XPND is not highlighted), you want to delete.
2. You can edit in the expanded or compressed view of your flight plan. In the expanded view, you can select each individual leg of your plan. In the compressed view, you can select and remove waypoints or airways that will also include associated part of that waypoint or airway.
3. Press the **CLR** key to remove a waypoint or airway. Deleting an airway generates a message you must acknowledge.
4. Press the **SAVE** function smart key to save your changes and return to the flight plan library.

Steps for Setting Up a Simple Flight Plan

1. Press the **FN** key (if necessary) and then the **FPL** key.
2. Press the **NEW** key. The waypoint database will be displayed. You can choose to search for a waypoint by the identifier, facility name, city, or waypoint type.
3. Select the Origin waypoint as described in "Edit a Flight Plan" above. Press **Menu/Enter**.
4. Select the Destination waypoint. Press **Menu/Enter**.
5. Select the final operation for creating this flight plan: Save or Execute. Press **SAVE** to store the flight plan in the Library for future use or press **EXEC** to both save the Library plan and make the plan the Active flight plan.

Steps for Setting Up a Flight Plan Using Terminal Procedures and Airways

Procedures can be inserted at the time you are creating the flight plan (as described here) or later with the Procedure (PROC) function. The general phases of flight are shown below with the details following.

NOTE: If the datum for an airport is unknown, terminal and/or instrument procedures will be available, however navigating with them will cause a reminder message, "Non WGS-84 waypoint navigation." The Jeppesen database can only show one procedure type per runway (i.e. ILS, GPS, VOR). The procedures are present, but must be selected from multiple transitions. Note that the name may not match the paper approach. Verify the sequence of waypoints to ensure you have selected the desired procedure.

Take off

A. Set Origin, Destination, and Alternate Waypoints.

B. Add Standard Instrument Departure Procedure (SID), if required.

C. Insert en route flight plan of Airways and/or Waypoints.

En Route

D. Modifying a Flight Plan While in Flight

Approach and Landing

E. Add Arrival Procedures (STAR).

F. Add Approach Procedures when you receive clearance.

A. Set Origin, Destination, and Alternate Waypoints

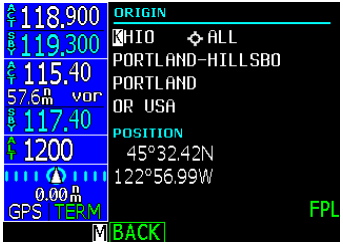
1. In Flight Plan mode, press the **NEW** key.
2. Use the **Large** and **Small** knobs to select the Origin waypoint. Press **Menu/Enter**.
3. The Destination waypoint selection page will now be displayed. Select the Destination waypoint and press **Menu/Enter**.
4. Set an Alternate airport, if desired. Turn the **Large** knob CCW to highlight the flight plan name. Press the **Altrnt** key and select an alternate airport/waypoint along the flight plan with the **Large** and **Small** knobs. The alternate airport will be added in parentheses to the flight plan name.
5. Press **SAVE**.

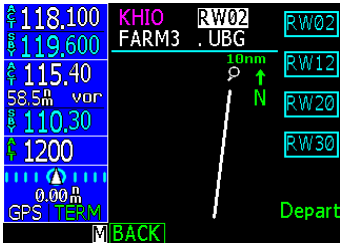
B. Add a Standard Instrument Departure (SID) Procedure

SIDs may be modified in either the Flight Plan (FPL) or Procedure (PROC) modes. The Procedure mode method is shown.

1. In Flight Plan mode, highlight the flight plan name and press **EXEC**.
2. Press **FN** and then **PROC**.
3. In the Origin section press the **Depart** key.

NOTE: Guidance is not provided for Pilot Nav legs or Vectored SIDs. (Not in the database)





4. The runway is highlighted. Use the **Small** knob or menu item keys on the right side of the display to select a runway.
5. Turn the **Large** knob to select the departure procedure and transition.
6. Verify your flight plan and resolve any discontinuities. Press **Menu/Enter** to insert the procedure into your modified flight plan.

C. Insert En Route Flight Plan Airways and/or Waypoints

1. While in Edit mode, turn the **Large** knob CW to highlight the waypoint where you want to insert a waypoint or Airway in your flight plan after it. Press **→Wpt** or **→Arwy**. In this example, Airway is selected.
2. Turn the **Small** knob or press one of the Menu Item keys next to the available airways to select the airway.
3. Turn the **Large** knob CW one position to highlight the Intersection choices. Turn the **Small** knob to choose the desired waypoint to exit the Airway. Press **Menu/Enter**.

D. Modifying a Flight Plan While In Flight

Flight plans may be modified in either the Flight Plan (FPL) or Procedure (PROC) modes. In Flight Plan mode you can modify the entire flight plan. In Procedure mode you can modify procedures for the Origin and Destination airports. Both methods are shown below.

Using Flight Plan Mode to Modify a Flight Plan

1. Press the **FN** key and then the **FPL** key.
2. If necessary, highlight the Active flight plan. Press the **EDIT** key.
3. If you want to change the Origin, Destination, or Alternate airports, press the appropriate selection key on the left side of the display when the flight plan name is highlighted. If you want to insert a waypoint or airway, go to step 5.
4. Turn the **Large** knob to highlight the leg where you want to make the change.
5. Press **→Wpt** to insert a waypoint or **→Arwy** to insert an airway following the highlighted leg. If the airway choice is not available there are no airways available for that waypoint. Delete a waypoint or airway by pressing the **CLR** key.
6. Press **XPND** to display all of the legs of the flight plan.
7. Review your flight plan to resolve any discontinuities as desired and then press the **EXEC** key to execute.

Selecting an Alternate Airport

1. Press **FN** and then **PROC** to go to the Procedure Mode.
2. Press the **Select** key next to the Alternate airport.
3. Next, press the **Load** key to load the alternate to the destination airport into your flight plan. \
4. If you want to choose a different Alternate airport, press **Modify**, choose another airport with the **Large** and **Small** knobs and press **Menu/Enter**. If you do not have an Alternate airport, select one by pressing **Modify** and select one with the **Large** and **Small** knobs followed by pressing **Menu/Enter**.
5. Insert any waypoints, or airways, for the diversion and then press **EXEC**.

NOTE: When you execute the changed plan, you will not have an active leg until you activate a new flight plan leg with either the FlyLeg, Direct-To, or CrsTo functions.

For an alternate nearby airport, use the NRST function and fly Direct-To a new DEST (destination).

E. Add Arrival Procedures (STARS)

1. Press the **Arrival** key in the Destination section.
2. Use the **Large** and **Small** knobs to select the runway, arrival, and transition.
3. Press **Menu/Enter**.

F. Add Approach Procedures

1. Press the **Appr** key. Select the approach with the **Large** and **Small** knobs, or the keys on the right side of the display. Press **Menu/Enter**.
2. Press the **XPND** (Expand) key to view all waypoints and legs in the flight plan. Every waypoint, airway, procedure, and intersection is shown with the bearing and distance of each leg. Verify the waypoints in your flight plan and resolve any discontinuities.
3. Press **EXEC**.

Flying Direct to a Waypoint in a Flight Plan

1. Press **Direct-To**. The flight plan waypoint list will be displayed.
2. Turn the **Large** knob to highlight the desired waypoint.
3. Press the **Direct** key on the right side of the display.

Making a Flight Plan Leg Active

With the FlyLeg Menu selection, you can activate a particular leg of your flight plan. This feature allows you to bypass a waypoint in your flight plan.

1. Press **Direct-To**.
2. Select the desired leg of your flight plan with the **Large** knob (**ActFP** smart key is highlighted).
3. Press the **FlyLeg** key to activate the selected leg.

LEG TYPES

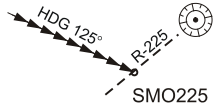
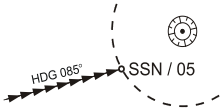
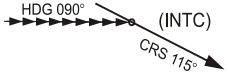
The GNS 480 is the only panel mount navigator to implement all the available leg types that currently exist in airways, instrument procedures, and approaches. These legs are described in the following diagrams, with associated descriptions of each leg. Because the GNS 480 supports these leg types, it automatically sequences through the majority of the flight plan legs, or allows for a simple one keystroke interface to sequence when automatic sequencing is not available. This greatly reduces the pilot's workload during critical phases of flight, such as departure or approach and landing.

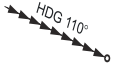
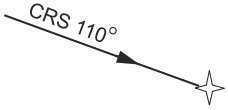
An example of how these leg types are implemented can be found in a simple SID procedure, such as the Farmington Three Departure at KHIO. If we depart on runway 30 the text of the departure on the Jeppesen plate is as follows: Turn LEFT to a 120 degree heading, then intercept and proceed via UBG R-346 to UBG VOR. Thence via assigned route.

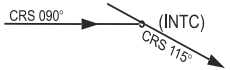
To dissect this example, look on the flight plan page after inserting the departure and see the legs the GNS 480 automatically inserts, the first being a heading of 305 degrees to an altitude of 604' MSL. This is because no turns are allowed below 400' AGL for an instrument departure. Upon reaching the required altitude, the GNS 480 will sequence automatically to a heading to intercept leg of 120 degrees to the 166 degree course to UBG. The heading leg of 120 degrees is shown as a Pilot Nav leg and sequencing may be accomplished by pressing the **SUSP** key once. Once the flight plan sequences, the guidance to the 166 degree course will be active on your CDI to complete the intercept. Roll steering is active and you may engage the NAV mode or roll steering mode as appropriate. After reaching UBG, the system will automatically sequence to the next leg in your en route flight plan. Roll steering or course guidance is not available on heading legs.

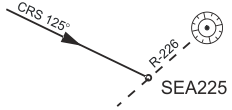
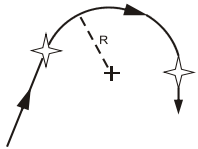
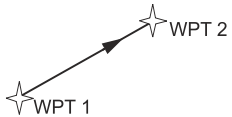
Turn Short Path Calculation

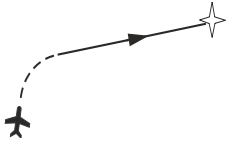
The GNS 480 will automatically calculate a turn short curved path as it sequences between waypoints, when allowed. The size of the turn short curved path radius is calculated based upon aircraft ground speed. This is shown in magenta on the moving map adjacent to the active waypoint and leading to the course to the next waypoint. The GNS 480 roll steering autopilot commands will follow the magenta curved path.

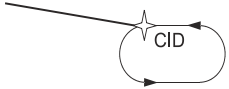
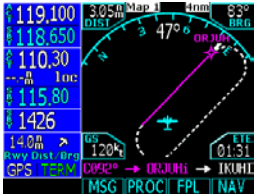
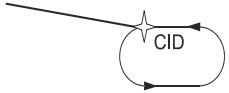
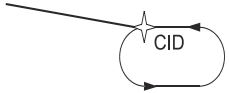
Leg Types	Flight Plan Page	Active From/To/Next Waypoints	Description
 **Heading to a VOR Radial**			(PILOT NAV) The heading to a radial leg defines a heading to fly and a VOR radial at which the leg terminates. The VOR radial is defined by both the VOR identifier and the radial number. The pilot will have to maintain the desired heading manually and initiate sequencing manually upon approaching the specified radial. This can be easily accomplished using the VOR receiver.
 **Heading to a DME Distance**			(PILOT NAV) The heading to a DME distance leg defines a heading to fly and a DME distance at which the leg terminates. The distance is defined by both the identifier of the DME fix and the distance. The pilot will have to maintain the desired heading manually and initiate sequencing manually upon reaching the specified DME distance.
 **Heading to Intercept**			(PILOT NAV) The heading to an intercept leg defines a heading to intercept the next leg. The pilot will have to maintain the desired heading manually and initiate sequencing manually upon intercepting the next leg of the flight plan. The next course will be shown on the moving map.

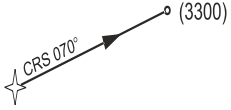
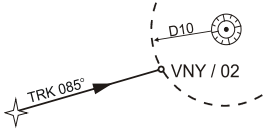
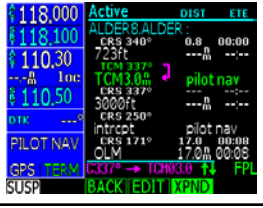
Leg Types	Flight Plan Page	Active From/To/Next Waypoints	Description
 **Heading to a Manual Termination (Vector)**			The heading to a manual termination leg defines a heading to fly until the pilot initiates sequencing. Like the fix to a manual termination leg, this type of leg is most often used where the pilot is to expect vectors from air traffic control. The pilot will have to maintain the desired heading manually and initiate sequencing manually when appropriate.
Heading to an Altitude			The heading to an altitude leg defines a heading to fly and an altitude at which the leg sequences. The pilot will have to maintain the desired heading manually, but sequencing to the next leg in the flight plan happens automatically upon reaching the specified altitude.
 **Course to a Fix**			The course to a fix leg defines a path to a fix on a specific course. When a course to a fix leg is used for a vectors-to-final approach transition, the course is preceded by the word "vectors" in the flight plan view.

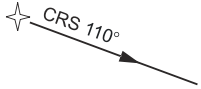
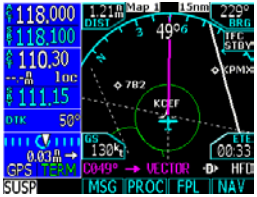
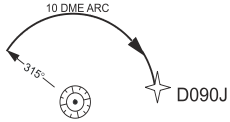
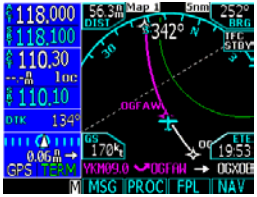
Leg Types	Flight Plan Page	Active From/To/Next Waypoints	Description
Course to an Altitude			The course to an altitude leg defines a specific course to be flown from the position at which the leg is initiated and an altitude at which the leg terminates. Sequencing occurs automatically upon reaching the specified altitude.
Course to a DME Distance			(PILOT NAV) The course to a DME distance leg defines a specific course to be flown from the position at which the leg is initiated and a DME distance at which the leg terminates. The distance is defined by both the identifier of the DME fix and the distance, as shown in the example the Course-To is C238 and the Identifier is VIL with the DME distance of 0.70 nm is shown in brackets. The pilot will have to maintain the desired course manually and initiate sequencing manually upon reaching the specified DME distance.
 **Course to Intercept**			(PILOT NAV) The course to an intercept leg defines a specific course to be flown from the position at which the leg is initiated. It terminates upon intercepting the next leg. The pilot will have to maintain the desired course manually and initiate sequencing manually upon intercepting the next leg of the flight plan.

Leg Types	Flight Plan Page	Active From/To/Next Waypoints	Description
 **Course to a VOR Radial**			(PILOT NAV) The course to a radial leg defines a specific course to be flown from the position at which the leg is initiated and a VOR radial at which the leg terminates. The VOR radial is defined by both the VOR identifier and the radial number. The pilot will have to maintain the desired course manually and initiate sequencing manually upon approaching the specified radial. This can be easily accomplished using the VOR receiver.
 **Constant Radius Arc**			The constant radius arc leg is similar to an arc to a fix leg. This leg can occur at any location and will define an arced path between two other legs. Also, unlike the arc to a fix leg, there should be no separate turn required at the beginning or end of this type of leg. You may fly this leg keeping the CDI centered as you fly the curved path.
 **Track to a Fix**			The track to a fix leg is the most commonly used leg type for GPS navigation. It defines a geodesic (or great circle) path from the previous database fix to the next database fix.

Leg Types	Flight Plan Page	Active From/To/Next Waypoints	Description
Initial Fix			The initial fix defines a database fix to be used in the flight plan, not an actual leg. The fix will serve to define the beginning of a leg that follows such as a track to fix or course from fix leg. .
Procedure Turn			The procedure turn leg defines a course reversal procedure starting at a database fix, with a specific course, and a direction, left or right, to initiate the turn. A maximum distance in which the turn must be accomplished is also defined and drawn on the moving map. This type of leg is always followed by a course to a fix leg that establishes the inbound course after the turn is completed.
 Direct to a Fix			The direct to a fix leg allows navigation directly to a database fix from your present position. When direct to navigation is initiated by the user, the GNS 480 will create a curved path that aligns the aircraft on a direct course to the fix. Direct to fix legs are also used in some procedures.

Leg Types	Flight Plan Page	Active From/To/Next Waypoints	Description
 **Hold to a Fix**			The hold to a fix leg defines a holding pattern that is to be flown only once. This leg is most often used in newer RNAV procedures in place of a procedure turn to accomplish a course reversal.
 **Hold to an Altitude**			The hold to an altitude leg defines a holding pattern to be flown and an altitude at which the holding pattern is to be terminated. This leg is most often used in a departure where a certain altitude must be attained in a hold before continuing en route.
 **Hold from a Fix to a Manual Termination**			The hold to a manual termination leg defines a holding pattern to be flown for an indefinite number of turns. These can be added using the Hold function under the Direct-To key. They almost always are the termination of a published missed approach.

Leg Types	Flight Plan Page	Active From/To/Next Waypoints	Description
 **Course from a Fix to an Altitude**			(PILOT NAV) The fix to an altitude leg defines a specific course to be flown away from a database fix and an altitude at which the leg terminates. The pilot will have to maintain the desired course manually and initiate sequencing manually upon reaching the specified altitude.
Track from a Fix to a Distance			(PILOT NAV) The fix from a distance leg defines a specific course to be flown away from a database fix and a distance from the fix at which the leg terminates. The pilot will have to maintain the desired course manually and initiate sequencing manually upon reaching the specified distance from the fix.
 **Fix to a DME Distance**			(PILOT NAV) The fix to a DME distance leg defines a specific course to be flown away from a database fix and a DME distance at which the leg terminates. Since the leg does not necessarily start at the DME, the distance is defined by both the identifier of the DME fix and the distance. The pilot will have to maintain the desired course manually and initiate sequencing manually upon reaching the specified DME distance.

Leg Types	Flight Plan Page	Active From/To/Next Waypoints	Description
 **Course from a Fix to a Manual Termination**			The fix to a manual termination leg defines a specific course to be flown away from a database fix to an unspecified location. This type of leg is most often used where the pilot is to expect vectors from air traffic control, for example, at the end of an arrival. The pilot will have to initiate sequencing manually when appropriate. If this fix to manual termination leg was initiated by the pilot using the course-from function under the Direct-To key, then sequencing will not be allowed.
 **DME Arc**			The arc to a fix leg is used to define a DME arc leg. A DME distance and the terminating fix are used to define this leg. This leg is typically used in VOR-DME approaches. The GNS 480 provides guidance on curved path DME arcs. The pilot can maintain the arc by keeping the CDI centered manually or by using the autopilot.

Procedures

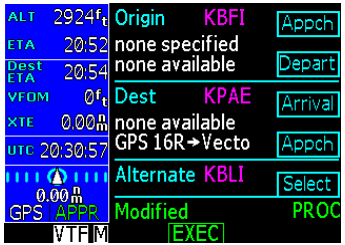
The Procedure mode allows you to add or modify procedures to standard locations within the active flight plan. No options will be available if there is not an active flight plan. When you start adding or modifying procedures, a modified (copy of the active) flight plan is created. You can only change the Origin approach and departure procedures, Destination arrival and approach procedures, and select an alternate airport. At the bottom of the screen, the flight plan status of either Active or Modified will be shown.

Selecting Procedures

1. Press **FN** and then the **PROC** function smart key.
2. Press the **Appch** (Approach), **Depart** (Departure), or **Arrival** menu item smart keys for the Origin or Destination (Dest) waypoints.
3. For approaches, a list of procedure types is shown on the right side of the screen. Pressing the menu item key next to the procedure type (GPS, ILS, LOC, VOR, or NDB) will make those types available on the top line of the screen.
4. Use the **Large** knob to move between fields and the **Small** knob to scroll through the available procedure choices. A representative map is shown below the procedure name.
5. You can press the **BACK** function smart key to back up to the main Procedure page without making any changes.
6. Press Menu/Enter to select the procedure. This inserts it into the Modified Flight Plan and proceeding to Flight Plan Edit mode for review and execution.

Activating an Approach

After selecting the procedures for your flight plan, press the **EXEC** function smart key to activate the modified flight plan with the added procedures. When you press the **EXEC** key, you will be prompted to press the **Menu/Enter** key to replace the Active flight plan with the Modified flight plan. Pressing **BACK** takes you back to the Procedures page without activating the modified plan. Pressing the **VTF** (Vector To Final) key creates and activates a leg in the flight plan that is an extension of the Final Approach Course beyond the FAF.



Steps for approach operations

- Edit mode
- Modify flight plan
- Review flight plan modifications against published charts
- Execute the flight plan

Basic Approach Operations Examples

The GNS 480 provides precision and non-precision approach guidance using its built-in GPS receiver. The moving map pages can also be used as a supplemental aid to situational awareness for ILS approaches (and non-precision localizer-based approaches), but the localizer and glideslope receivers MUST be used for primary approach course guidance. The GNS 480 also provides GPS precision approach capability, known as LPV approaches.

Approaches designed specifically for GPS are often very simple and don't require overflying a VOR or NDB. Currently, many non-precision approaches have "GPS overlays" to let you fly an existing procedure (VOR, VOR/DME, NDB, RNAV, etc.) more accurately using GPS. To date, there are over 2,400 GPS-only approaches and over 2,900 GPS overlay approaches worldwide.

Many overlay approaches are more complex (in comparison to GPS-only approaches). The GNS 480 displays and guides you through each leg of the approach — automatically sequencing through each of these legs, up to the missed approach point (MAP). Approaches may be flown "as published" with the full transition — using any published feeder route or initial approach fix (IAF) — or may be flown with a vectors-to-final transition.

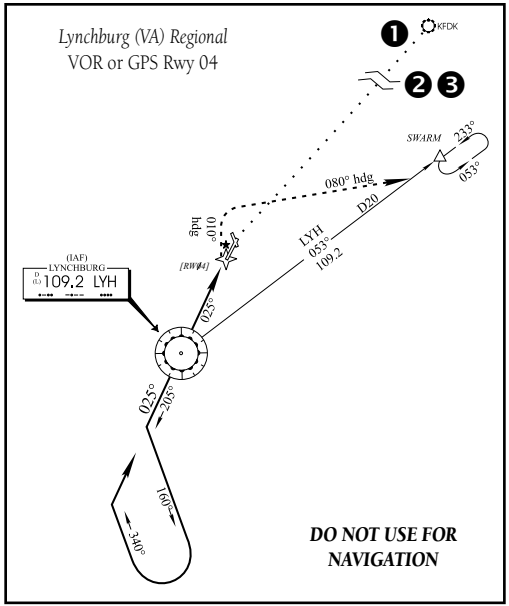
Approach operations on the GNS 480 typically begin with the same basic steps:

1. Select the destination airport using the **Direct-To** key (and **DEST** function), use an existing flight plan, or use the Procedure Mode.
2. "Load" the approach (often while en route) in anticipation of its future use. This places the approach in the "modified" flight plan, but retains course guidance from the active flight plan until the approach is "Executed."
3. "Execute" the full approach and vectors-to-final, if appropriate. In some scenarios, you may find it more convenient to immediately execute the approach and fly direct to the Initial Approach Fix (IAF), if cleared to do so. Verify the flight plan changes prior to executing the active flight plan.

NOTE: If you load an approach with a transition with a procedure turn and then subsequently are vectored, selection of Vector To Final (VTF) mode removes the procedure turn and extends the final approach course from the FAF.

Approaches with Procedure Turns

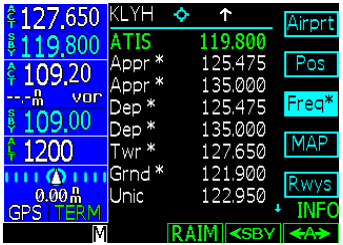
The procedure turn portion of an approach is stored as one of the legs of the approach. For this reason, the GNS 480 requires no special operations from the pilot — other than flying the procedure turn itself — beyond what is required for any other type of approach. The procedure turn is automatically inserted based on the approach transition selection.

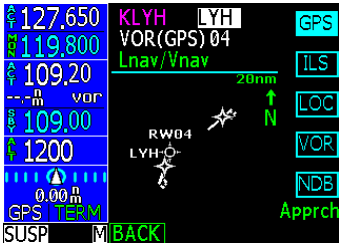


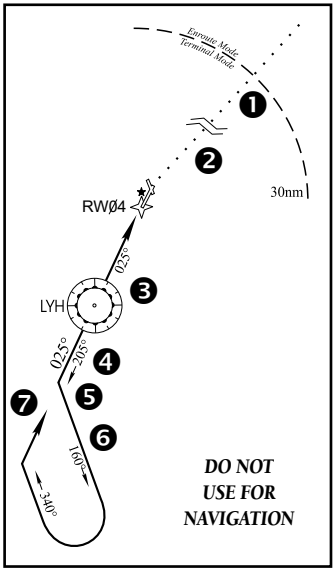
This example uses the VOR Runway 04 approach for Lynchburg (Virginia) Regional Airport, KLYH, and assumes a departure from Frederick (Maryland) Municipal Airport, KFDK direct to KLYH or via an airway. The steps required to set up and fly the approach are detailed below:

1. While en route to KLYH, some 40-50 nautical miles away, you select the ATIS frequency to monitor airport conditions and runway usage. This is accomplished by displaying the INFO Page and selecting the ATIS frequency from the list. Press **<-SBY** to place the frequency on standby. Use the **COM** monitor function to listen to the ATIS frequency. Your active frequency will not be affected.
2. From ATIS you learn that runway 04 is in use and plan your approach accordingly. Press the **PROC** key and select the "VOR 04" approach. From the transitions field, select LYH VOR (the IAF). Press **Menu/ Enter** to load the approach into the modified flight plan.
3. After you review the modified flight plan, execute it. If you are cleared direct to the IAF, you may highlight the IAF on the Direct page and select **Direct**.

NOTE: Course change messages appear 10 seconds before reaching the change location.







Flying the Procedure Turn

1. Within 30 nautical miles of the destination airport, the GNS 480 switches from "en route" mode to "terminal" mode (as indicated in the lower left corner of the screen). The switch to terminal mode is accompanied by a gradual Course Deviation Indicator (CDI) scale transition from 2.0 to 1.0 nautical miles, full scale deflection.

2. For non-roll steering autopilots or manual flight, as you approach the IAF (LYH), a waypoint message appears in the bottom of the screen. As the distance (DIST) to the IAF approaches zero, the message is replaced by a turn advisory ("Left/Right TO TRK 209°"). Dial the outbound course of 205° into the CDI (or HSI) using the **OBS** knob and initiate a standard rate turn to this course heading.

3. Fly the outbound course, keeping the CDI needle centered.

4. Once you have flown approximately one minute past the IAF (LYH), the message "LEFT TO TRK 164°" appears on the bottom of the screen. You may initiate the procedure turn at any time after receiving this alert message.

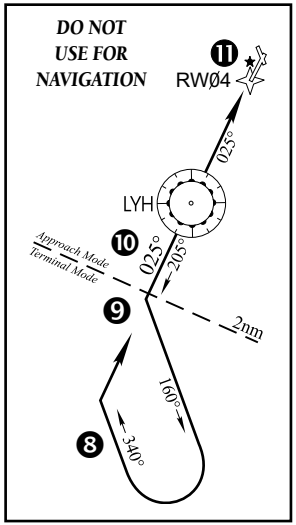
5. Turn left to a heading of 160° to initiate the procedure turn. Course guidance is provided relative to the outbound leg from the FAF. The procedure turn is displayed on the Map Page and indicated as the active leg on the Default NAV and Active Flight Plan pages. The CDI needle starts moving to the right.

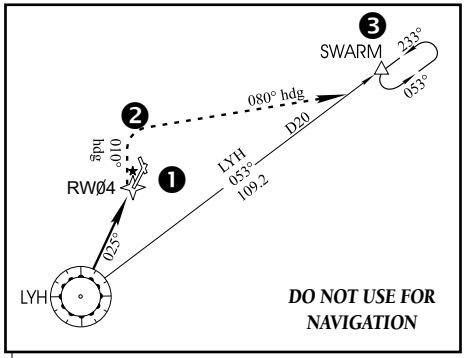
6. After approximately one minute, the GNS 480 will provide a message "RIGHT TO TRK 340°," the CDI needle swings to the opposite side to provide proper sensing along the final course segment and "RIGHT TO TRK 025°" appears on the bottom of the screen when the final approach course becomes the active leg.

NOTE: For roll steering-capable autopilots, the final approach course may be set at the IAF. The GNS 480 will fly the entire procedure automatically.

7. As the CDI needle starts to center, make a right turn to 025° — the final approach course.

8. Within 2.0 nautical miles of the FAF (LYH), the GNS 480 switches from terminal mode to "approach" mode. CDI scaling is tightened from either 2° or 1.0 to 0.3 nautical miles, full scale deflection, whichever is smaller.
9. As you approach the FAF, a waypoint message on the bottom of the display "RIGHT TO TRK 025°" appears. Make any course adjustments necessary for the final course segment (FAF to MAP).
10. As you cross the FAF, the destination sequences to the MAP ("RW04"), the runway threshold). With the needle centered, fly toward the MAP, observing the altitude minimums dictated by the approach plate.
11. As you cross the MAP, you will receive an audio message "missed approach point" unless there is activity on the active Com frequency.





Flying the Missed Approach

After you pass the MAP, if you cannot continue the approach and land, usually you must execute a missed approach. The GNS 480 will automatically sequence to the first leg of the missed approach. Fly the heading legs manually. When the heading to intercept course leg becomes active (080° heading), press the **SUSP** key to "unsuspend" waypoint sequencing. You may reengage roll steering on your autopilot, when the course comes alive. The GNS 480 will then fly the Hold Entry and Holding automatically. Non-roll steering autopilots or manual flight may be accomplished by flying to the CDI. Refer to the Holding section.

*NOTE: Remember that heading legs must be flown manually or by using Heading mode on your autopilot. If you have a "Pilot Nav" leg in the approach, the GNS 480 will suspend waypoint sequencing. Press the **SUSP** key once to sequence to the next leg.*

1. Follow the missed approach procedures, as published on your approach plate and for proper climb. The GNS 480 guides you to the holding pattern, along the 053° radial from LYH VOR. The leg for the 010° heading will sequence automatically after reaching the appropriate altitude. The heading leg for the 080° heading will suspend. Establish the airplane on a 080° heading, as required. Once established, press the **SUSP** key once to cause the GNS 480 to sequence to the next leg. When the 053° course comes alive, complete the intercept manually, or automatically using the autopilot.
2. A message on the bottom of the screen recommends entry procedures for the holding pattern (i.e., "HOLD DIRECT", "HOLD PARALLEL", or "HOLD TEARDROP"). As you fly the holding pattern, you may manually fly the dashed magenta holding pattern on the moving map. The hold is automatically sized for a one minute leg. Roll steering-capable autopilots will fly the hold and hold entry automatically.
3. The GNS 480 provides course guidance only on the inbound course to the holding fix. When leaving the holding pattern to re-fly the approach (or another approach) press the **PROC** key to activate Vector To Final (VTF) mode for vectors or for a full procedure direct to LYH using the **Direct-To** key as described earlier.

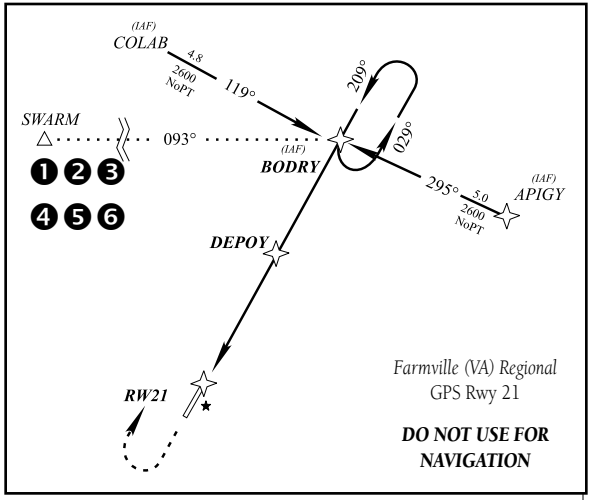
NOTE: In the event that you wish to divert direct to another destination airport, use the Destination (DEST) function on the Direct-To page.

Flying an Approach with a Hold

Starting where the previous example left off, we'll assume weather conditions resulted in a missed approach at Lynchburg Regional. Now, you've decided to divert to Farmville Regional (KFVX) instead. If KFVX is nearby, press the **NRST** key and use the **Large** knob to highlight KFVX.

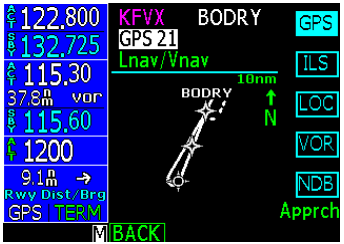
1. Press the **Direct-To** key.
2. Press the **DEST** menu item key. .
3. Press **Menu/Enter** to confirm.

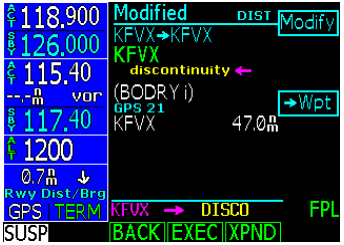
This time, you select the GPS runway 21 approach into Farmville Regional. The GPS runway 21 approach begins with a holding pattern at the IAF, BODRY intersection.

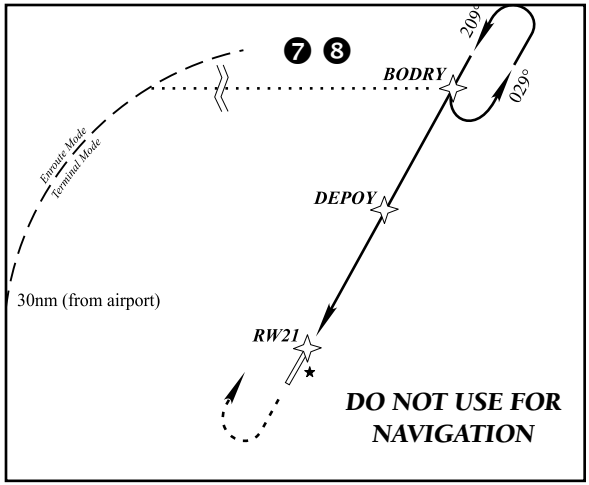


4. Press **PROC** and select the "GPS 21" approach.
5. From the transitions window, select the BODRY intersection as the IAF. Review the loaded approach and select "Execute (**EXEC**)" to activate the approach. When cleared, select Direct-To BODRY.
6. As in the last example, within 30 nautical miles of the airport, the GNS 480 switches from en route mode to terminal mode, and the CDI scale transitions from 2.0 to 1.0 nautical miles, full scale deflection.

NOTE: For transitions requiring a course reversal, the GNS 480 will fly the course reversal automatically. For transitions marked "NoPT," the GNS 480 will sequence to the next leg to the DEPOY intersection.







7. Just prior to crossing the BODRY intersection, a message — "HOLD TEARDROP" — appears on the bottom of the screen to suggest the proper holding pattern entry. "HOLD DIRECT AHEAD" or "HOLD TEARDROP AHEAD" may be offered on other similar approaches.

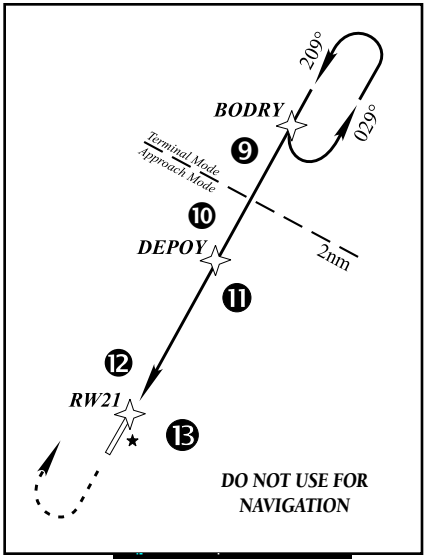
8. As mentioned in the missed approach example, the holding pattern will be sized correctly for your ground speed and a one minute leg. If air data is available to the GNS 480, the hold will be reshaped to create standard rate turns at both ends.

*NOTE: If you need to lose extra altitude or speed by going around the holding pattern again, press **SUSP** to manually suspend waypoint sequencing BEFORE crossing the holding waypoint the second time.*

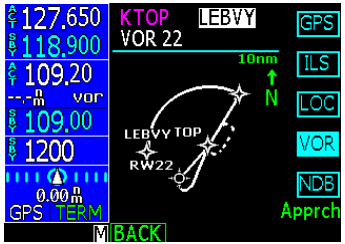
9. At 2.0 nautical miles from the FAF (DEPOY intersection), the GNS 480 switches from terminal mode to approach mode. CDI scaling is tightened from either 2° or 1.0 to 0.3 nautical mile, full scale deflection, whichever is smaller.
10. As you approach the FAF, a waypoint alert in the bottom of the screen ("NEXT DTK 209°") appears. Make any course adjustments necessary for the final course segment (FAF to MAP).
11. As you cross the FAF, the destination sequences to the MAP ("RW21"), the runway threshold). With the needle centered, fly toward the MAP, observing the altitude minimums dictated by the approach plate.

NOTE: When viewing the Map Page, you'll note that the final course segment is displayed in magenta — the active leg of the flight plan always appears in magenta.

12. As you approach the MAP, a waypoint message ("NEXT TRACK 212°") appears in the lower right corner of the screen.
13. As you cross the MAP, you will hear the Audio "MISSED APPROACH POINT." Follow the missed approach instructions. The GNS 480 will sequence to the first leg of the missed approach procedure, which is a course of 209° to 2600 feet. It will then automatically sequence direct to BODRY for holding once the altitude requirement is met. Fly the guidance shown on the GNS 480 to the hold.



The circle at the end of a leg indicates the point of meeting the altitude constraint for that leg. It is the same for heading to altitude legs, except the line is dashed and magenta.



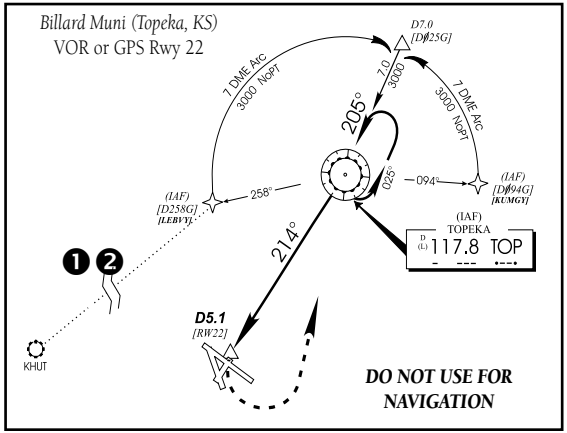
DME Arc Leg shown on moving map and in the course direction description line at the bottom of the screen.

Flying a DME Arc Approach

The VOR DME arc approach uses additional Jeppesen-provided waypoints to define the arc. These waypoints are indicated by "D" as the first letter in the waypoint name. This is followed by three numbers indicating the radial the waypoint lies on. The last letter indicates the radius of the arc.

NOTE: The letter/number DME arc names are being replaced with standard five-letter intersection names. You may encounter either naming convention for an approach you select

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

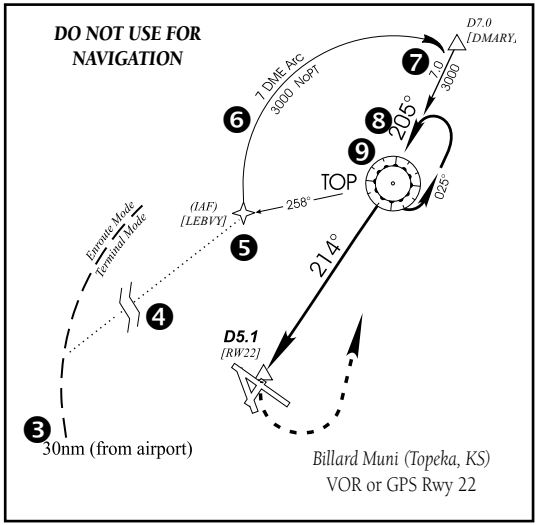


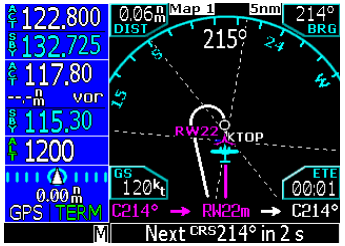
- Fly direct to the IAF on the DME Arc.
- Follow ATC vectors which allow you to intercept the arc at any point along the arc. If so, use the Flyleg function in Direct-To to activate the DME Arc leg.

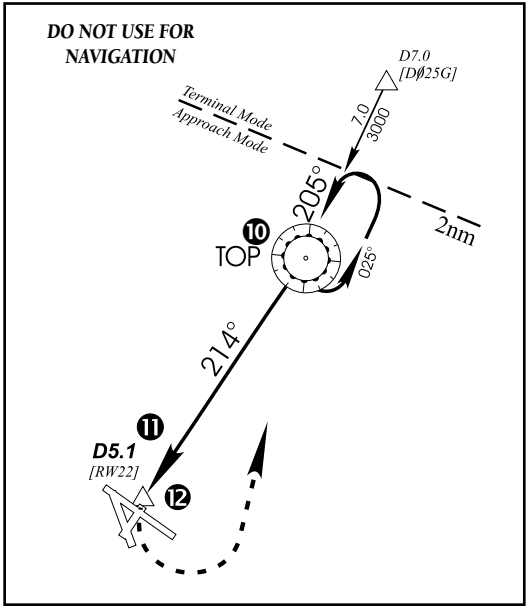
This example is based upon a flight from Hutchinson (Kansas) Municipal (KHUT) to Billard Municipal (KTOP) in Topeka, Kansas. The VOR/DME runway 22 approach is selected, along with "LEBVY" as the IAF.

1. Select Billard Muni (KTOP) as your destination, with the **DEST** key.
2. Press the **PROC** key and select the "VOR 22" approach. From the transitions field, select "LEBVY" as the IAF. Review the modified flight plan and execute. When cleared to LEBVY, press the **Direct-To** key, highlight LEBVY with the **Large** knob, and press **Direct**. You will receive a message to change the VOR frequency to 117.80 unless you tuned this frequency already.

3. Within 30 nautical miles of KTOP, the GNS 480 switches from en route mode to terminal mode and the CDI scale transitions from 2.0 to 1.0 nautical miles, full scale deflection.
4. As you approach the IAF (LEBVY), a waypoint message ("LEFT TO TRK 352°") appears on the bottom of the screen. As the distance to the IAF approaches zero, the message begins to count down to the turn 10 seconds prior to initiating the turn.
5. Follow the arc and keep the CDI needle centered. When using a non-roll steering autopilot, the course select on the CDI (or HSI) must be periodically updated with the desired track (DTK) to ensure proper tracking through the arc. If you are using a roll steering-capable autopilot which will fly the arc automatically. If you are vectored to intercept the arc, press the **Direct-To** key, highlight the waypoint D025G with the **Large** key which has a small arc symbol above it. Press the **FlyLeg** menu item key to make the arc leg guidance active on the CDI.
6. The next point in the approach is an intermediate fix, labeled "DMARY." As you approach this intermediate fix, a waypoint message ("RIGHT TRK 205°") appears on the bottom of the screen. As the distance to this fix approaches zero, the message is replaced by a 10 second countdown message prior to the turn.
7. Dial this course into the CDI (or HSI) using the OBS knob and initiate a standard rate turn to this course heading.







8. As you approach the FAF, a waypoint message ("RIGHT TO TRK 214°") on the bottom of the screen appears. As this is not a GPS overlay, press the **CDI** key to switch from the GPS to the VOR source for the CDI. Select this course on the CDI (or HSI) using the OBS knob and turn to the final course segment (FAF to MAP) heading.

9. As you cross the FAF, the destination sequences to the MAP ("RW22", the runway threshold). With the needle centered, fly toward the MAP, observing the altitude minimums dictated by the approach plate. When viewing the Map Page, you'll note that the final course segment is displayed in magenta (the active leg of the flight plan always appears in magenta) and a dashed magenta line shows the first leg of the missed approach.

10. As you approach the MAP, a waypoint message with countdown time appears on the bottom of the screen.

11. The Missed Approach consists of a course to altitude leg of 214° to an altitude of 1281 feet. Press the **CDI** key to switch the CDI source from the VOR back to GPS. Fly the guidance provided by the GNS 480. It will automatically sequence at the MAP to the missed approach. After reaching 1281 feet, the GNS 480 will automatically sequence direct to the TOP VOR for the hold.

NOTE: For roll steering-capable autopilots: after crossing the MAP, you may reengage the autopilot roll steering to allow the GNS 480 to fly the Missed Approach automatically.

Vectors To Final

Let's take a second look at the "VOR 22" approach into Billard Municipal (KTOP). Instead of following the DME arc, ATC tells you to expect vectors onto the final approach course. There are several ways to select "vectors to final" (VTF) with the GNS 480. The two options below normally require the least workload to accomplish:

- When the approach is first selected, choose "VECTORS" from the transitions field.
- Load a full approach — including the IAF from the transitions window.
- Then, when cleared, press **PROC** and select VTF (Vectors-To-Final).

NOTE: If a transition with a procedure turn or course reversal in holding is selected, and ATC subsequently vectors you to the final approach course, VTF mode will automatically remove the procedure turn and make the in-bound course active for the intercept.

To select "VECTORS" from the transitions field:

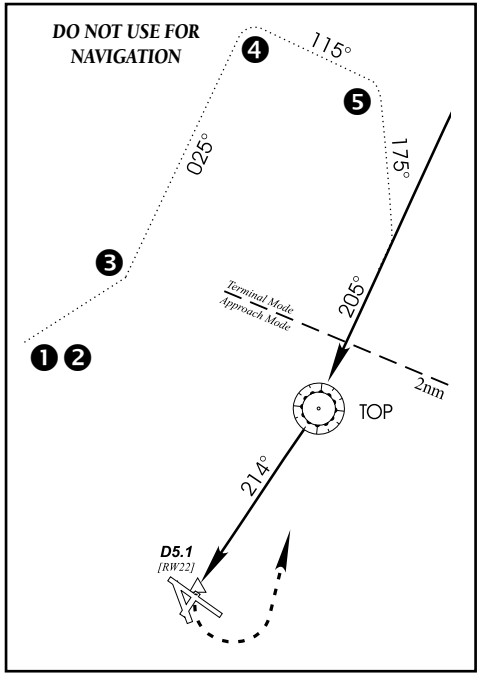
1. Press the **PROC** key and select the "VOR 22" approach.
2. From the transitions field, select "VECTORS."
3. Review the modified flight plan and execute it.

To activate vectors-to-final from the procedures page:

Regardless of what transition was selected, press the **VTF** function smart key to activate vectors to final.

When you are in the Terminal area, you may be directed to fly a vector to final approach.

1. Press **FN** and then **PROC**.
2. Press **VTF**.
3. Follow the guidance from the GNS 480 as the inbound course to the Final Approach Fix (FAF) is now active.

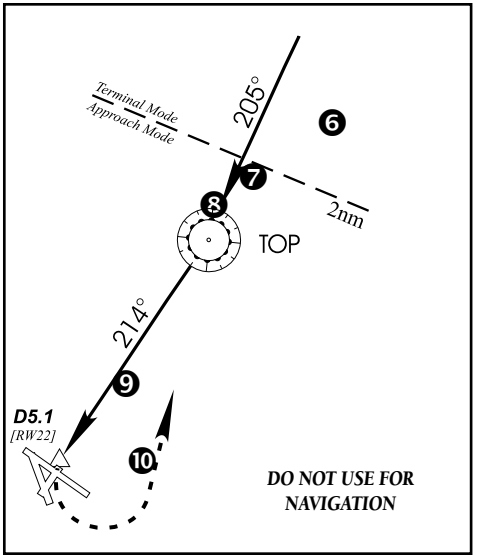


Flying a Vectored Approach

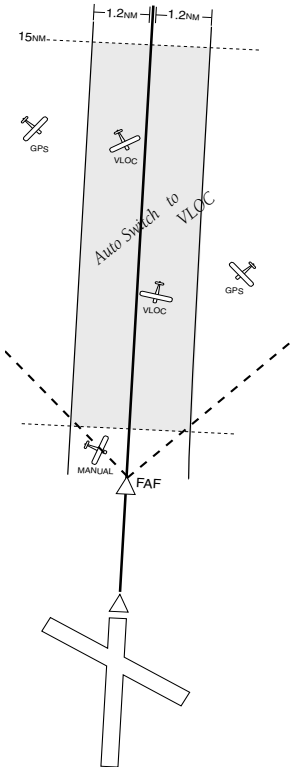
With "Vectors-To-Final" selected, the CDI needle remains off center until you're established on the final approach course. The Map Page displays an extension of the final approach course in magenta (remember, magenta is used to depict the active leg of the flight plan) and "VTF" is annunciated in the lower left corner of the screen (as a reminder that the approach was activated with vectors-to-final). In this example, we'll assume ATC vectors result in a rectangular course to intercept final, as follows:

1. Within 30 nautical miles of KTOP, the GNS 480 switches from en route mode to terminal mode and the CDI scale transitions from 2.0 to 1.0 nautical miles, full scale deflection.
2. If you haven't already done so, activate VTF mode and set the inbound course on the CDI. This allows the GNS 480 to guide you to the final approach course. Verify that "VTF" is annunciated.
3. ATC instructs you to turn left to a heading of 025°. This places you parallel to the final approach course in the opposite direction. CDI needle deflection is to the left.
4. ATC instructs you to turn right to a heading of 115°.
5. ATC instructs you to turn right to a heading of 175° to intercept the final approach course. As you converge with the final approach course the needle moves toward the center. In the illustration, the needle has returned to the on-screen CDI and your current position is less than 1.0 nm right of the final approach course.

6. As the CDI needle centers, make any remaining course corrections to establish yourself on the final approach course.
7. As you approach the FAF, a waypoint alert on the bottom of the screen ("RIGHT TO TRK 214°") appears. Make any course adjustments necessary for the final course segment (FAF to MAP).
8. As you cross the FAF, the destination sequences to the MAP ("RW22"). With the needle centered, fly toward the MAP, observing the altitude minimums dictated by the approach plate.
9. As you approach the MAP, a waypoint message appears on the bottom of the screen and an audio message occurs.
10. See the Flying the Missed Approach.



In VTF mode, if you are within 45° of the inbound course and you are on the TO side, the "SUSP" mode will turn off and return to normal sequencing.



ILS Approaches

Precision approaches can be performed with the GNS 480's built-in VLOC (VOR/localizer/glideslope) receivers. The GPS receiver can be used for guidance prior to reaching the final approach fix, but once there, the proper frequency must be selected on the VLOC window (left side of screen) and the CDI output set to "VLOC".

The GNS 480 can be set to automatically switch the external CDI output from GPS to VLOC as you intercept the final approach course. When the ILS approach is activated (and the correct ILS frequency is active in the VLOC window), the GNS 480 automatically switches within 1.2 nautical miles left or right of the final approach course. The following criteria must be met for the CDI autoswitch to occur based on your present position: 1) the aircraft must be before the FAF, 2) within 15 nm of the FAF, 3) aircraft and ground track is within 90° of the final approach course, 4) within 1.2 nm of cross track error, 5) there are no course reversals in the flight plan to be performed, and 6) the ILS frequency is valid with a decoded ident.

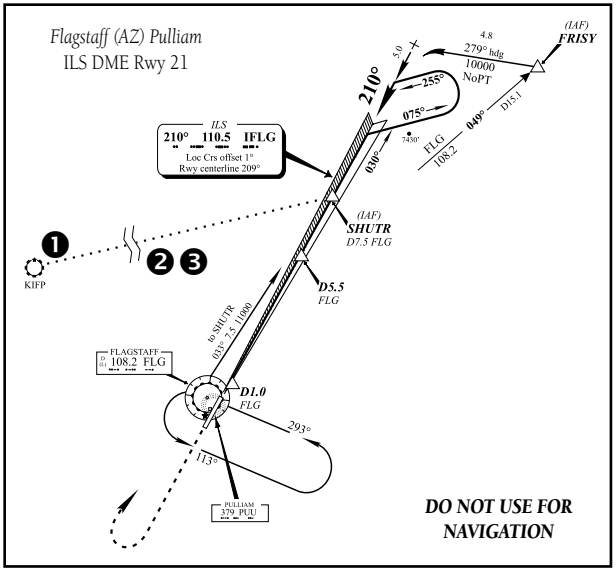
The illustration shows both multiple locations along the approach path and the CDI selection that you can expect: GPS or VLOC. Within the area of the shaded box, the automatic switch from GPS to VLOC should occur. The pilot will receive a message "SWITCHING FROM GPS TO NAV."

*NOTE: If an unusual approach intercept is made, the GNS 480 may not be able to autoswitch, based on the required criteria. In this case, press the **CDI** key to manually switch from GPS to VLOC.*

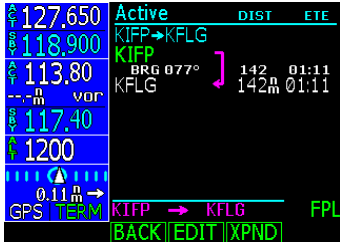
The automatic switch from GPS to VLOC is not immediate, but instead occurs gradually to prevent abrupt CDI changes when coupled to an autopilot. The CDI selection can also be changed manually by pressing the **CDI** key. If a missed approach is required, the GNS 480 will automatically switch back to GPS for the missed approach. If you fly the approach again using VTF mode or with a procedure turn, autoswitch will reset and switch again. To prevent automatic ILS CDI selection, choose the "Manual" ILS CDI setting, (the factory default setting is "Auto", which enables the automatic switch to VLOC).

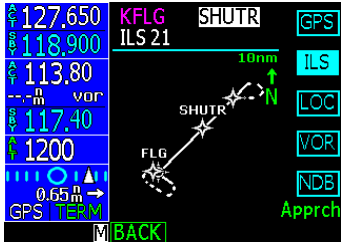
Selecting an ILS Approach

For this example, we'll use a flight from Laughlin Bullhead (Arizona) International to Flagstaff Pulliam (KFLG) and select the ILS runway 21 approach. "SHUTR" intersection is selected as the IAF, which includes an outbound leg and a procedure turn. Of course, vectors-to-final could also be selected, as previously described.



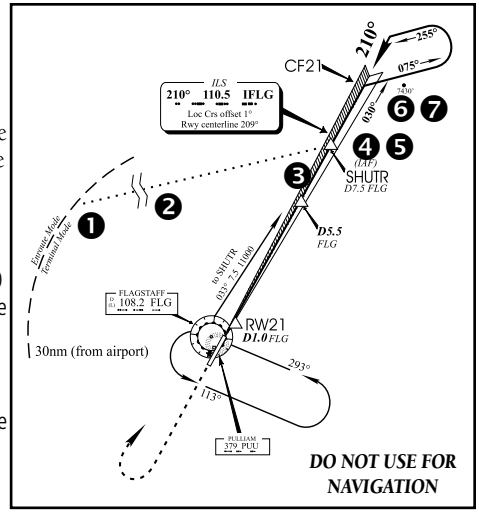
1. Select Flagstaff Pulliam (KFLG) as your destination, with the **DEST** key or build a new flight plan.
2. Press the **PROC** key and select the "ILS 21" approach.
3. From the transitions field, select "SHUTR" as the IAF. Review and execute the modified flight plan. Go direct to SHUTR when cleared for the approach.
4. When you "Execute" an ILS approach, the ILS frequency is automatically checked. If the correct frequency is not in the active field, you will receive a message informing you of the correct frequency. Press **Menu/Enter** to put the frequency into the active field or **CLR** to put it into the standby field.
5. A reminder message appears, indicating that GPS can only be used for approach monitoring. As mentioned previously, you need to use the VLOC receiver for this approach. Press **CLR** to acknowledge the message.





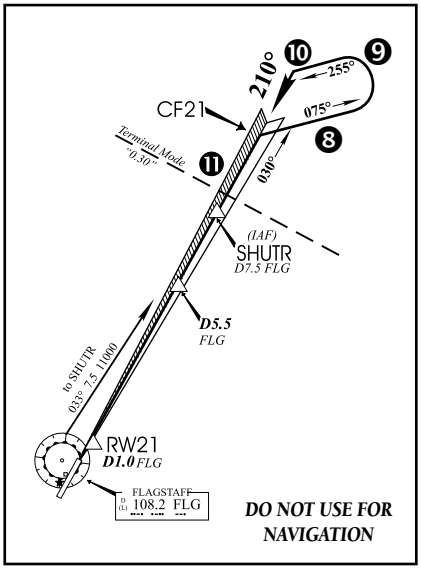
Flying the ILS Approach

When you "Execute" an ILS approach, automatic switching of the external CDI is enabled (unless turned off from the CDI/Alarms line on the System-Configuration Page). When you are established on the inbound course to the FAF, the external CDI guidance automatically switches from "GPS" (shown in green text) to "LOC". *If you have forgotten to tune the ILS frequency, automatic selection of "LOC" does not occur.*



1. Within 30 nautical miles of KFLG, the GNS 480 switches from en route mode to terminal mode and the CDI scale transitions from 2.0 to 1.0 nautical miles, full scale deflection.
2. As you approach the IAF (SHUTR), a waypoint message ("LEFT TO TRK 030°") appears on the bottom of the screen.
3. Verify that the ILS frequency ident has been automatically decoded on the display.
4. As the distance (DIS) to the IAF approaches zero, the message is replaced by a turn advisory that counts down 10 seconds prior to the turn.
5. Fly the outbound course (030°), keeping the needle centered on the external CDI (or HSI).
6. Once you have flown approximately one minute past SHUTR intersection, the message "RIGHT TO TRK 075°" appears in the lower right corner of the screen.

7. Turn right to a heading of 075° to initiate the procedure turn. The external CDI needle starts moving to the left. For roll steering-capable autopilots, you may select the in bound course (210°) and let the GNS 480 fly the procedure turn automatically.
8. After approximately one minute, the GNS 480 will provide a message for you to "LEFT TO TRK 255°." Turn left to start the intercept.
9. The GNS 480 sequences to the inbound leg and "LEFT TO TRK 210°" appears in the lower right corner of the screen. CDI coupling automatically switches from the "GPS" receiver to the "VLOC" receiver as you complete the inbound turn. If the ILS frequency has not been tuned, this automatic CDI switch does not occur.



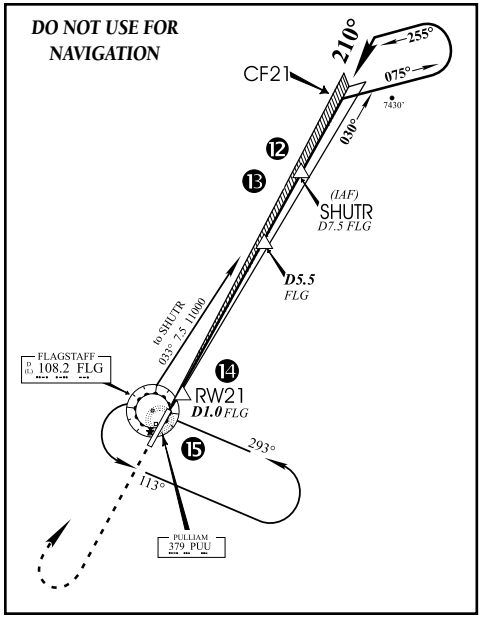
NOTE: From this point on, primary navigation is provided by the VLOC receiver. You may continue to use the GPS receiver for supplemental navigation guidance only. If automatic CDI switching is disabled. You must press CDI to manually switch CDI output to the VLOC receiver and continue the approach.

10. As the CDI needle starts to center, make a left turn to 210° to track the ILS approach course.

11. Also as you approach SHUTR, a waypoint message ("NEXT TO TRK 210°") appears on the bottom of the screen.
12. As you cross SHUTR, the destination sequences to the MAP ("RW21", the runway threshold). With the needle on the external CDI (or HSI) centered, fly toward the MAP, observing the altitude minimums dictated by the approach plate.

When viewing the Map Page, you'll note that the final course segment is displayed in magenta (the active leg of the flight plan always appears in magenta).

13. As you approach the MAP, a waypoint message ("NEXT CRS 210°") appears on the bottom of the screen.
14. At the DH/DA, initiate the missed approach, if necessary. Once the GNS 480 crosses the MAP (Defined as the runway end waypoint), the GNS 480 will autoswitch back to GPS data.



*NOTE: If you have turned autoswitch off, press the **CDI** key to manually switch external CDI output to the GPS receiver. "GPS" is indicated next to the **CDI** key.*

15. The first missed approach leg is a course of 210° to 9000 ft. Track this outbound course.

16. The GNS 480 will automatically sequence upon reaching the required altitude Direct-To FLG for the missed approach hold. Continue to fly the CDI needle guidance and the missed approach hold, as described earlier.

Selecting an LPV Approach

For this example, we'll use a flight from Eugene Oregon (KEUG) to Salem Oregon (KSLE) and select the RNAV runway 31 approach. "GLORR" intersection is selected as the IAF. Of course, vectors-to-final could also be selected, as previously described for the non-precision approach examples.

1. With Salem (KSLE) as your destination in your flight plan, press the **PROC** key and select the "RNAV (GPS) 31" approach.
2. From the transitions field, select "GLORR" as the IAF. Review and execute the modified flight plan. Go direct to GLORR when cleared "Direct GLORR" for the approach.

Flying the LPV Approach

1. Within 30 nautical miles of KSLE, the GNS 480 switches from en route mode to terminal mode and the CDI scale transitions from 2.0 to 1.0 nautical miles, full scale deflection.
2. As you approach the IAF (GLORR), a waypoint message ("LEFT TO TRK 312°") appears on the bottom of the screen.
3. As the distance (DIST) to the IAF approaches zero, the message is replaced by a turn advisory that counts down 10 seconds prior to the turn.
4. As you approach the FAF (LOTKE), the GNS 480 will begin to automatically rescale in an angular fashion. This will allow the LPV approach to be flown in an identical fashion to a standard ILS. At 2.0 nautical miles from the FAF, CDI scaling is tightened from either 2° or 1.0 to 0.3 nautical miles, full scale deflection, whichever is smaller.
5. Sixty seconds prior to reaching the FAF (LOTKE), the GNS 480 will check the required Horizontal Alarm Limit (HAL) and Vertical Alarm Limit (VAL) to ensure the GPS position integrity is within limits to complete the LPV precision approach. In the event the HAL or VAL limits are exceeded, the approach will be downgraded to a non-precision approach indicated by "Lnav" on the moving map, a message that the approach is downgraded, and the glideslope indicator will be flagged. You may continue the approach using LNAV non-precision minimums if there are LNAV minimums for this approach. In the rare event the GPS HAL or VAL limits cannot meet non-precision limits, the GNS 480 will send a message to the pilot to abort the approach. The GNS 480 will revert to terminal limits to support navigation to the missed approach.

6. When LOTKE (the FAF) becomes the active waypoint, the glideslope flag will be removed and the glideslope will become active. Capture the glideslope as you would an ILS glideslope.
7. As you cross LOTKE, the destination sequences to the MAP ("RW31", the runway threshold). With the needle on the external CDI (or HSI) centered, fly toward the MAP, observing the altitude minimums dictated by the approach plate.
8. When viewing the Map Page, you'll note that the final course segment is displayed in magenta (the active leg of the flight plan always appears in magenta).
9. As you approach the MAP, a waypoint message ("NEXT TRK 312°") appears on the bottom of the screen.
10. At the Decision Height/Decision Altitude (DH/DA), initiate the missed approach, if necessary. Once the GNS 480 crosses the MAP (defined as the runway end waypoint), the GNS 480 will automatically sequence to the first leg of the missed approach.

NOTE: For missed approaches with heading legs, fly manually until the first active course leg is reached, as described in earlier sections.

11. Fly the guidance provided by the GNS 480 to the ARTTY intersection and hold.

Lnav/Vnav and Lnav Approaches with Advisory Vertical Guidance

Non-precision approaches with vertical guidance may be either Lnav/Vnav or Lnav approaches with advisory vertical guidance. Lnav-only approaches with advisory vertical guidance only have Lnav minima listed on the bottom of the approach plate. The glidepath is typically denoted by a light dashed line on the vertical profile (Jeppesen only) with an associated glidepath angle (usually in the 3.00° range).

In either case, the GNS 480 will annunciate "Lnav/Vnav" on the bottom of the moving map and vertical guidance will be provided. For approaches with Lnav/Vnav minimums, those will be controlling. For Lnav approaches with advisory vertical guidance, the Lnav minimums will be controlling.

NOTE: When Flying Lnav approaches with advisory vertical guidance, the vertical guidance may be ignored and descent is accomplished in accordance with published step-down altitudes and MDA.

Points to Remember for All Approaches

- The GNS 480 is designed to complement your printed approach plates and vastly improve situational awareness throughout the approach. However, *you must always fly an approach as it appears on the approach plate*.
- The active leg (or the portion of the approach currently in use) is depicted in magenta on the bottom of the Map or Flight Plan pages. As you fly the approach, the GNS 480 automatically sequences through each leg of the approach unless suspended (the SUSP annunciator is displayed on the bottom left of the screen). "SUSP" indicates that automatic sequencing of approach waypoints is *suspended* on the current leg and normally appears at holding patterns or upon reaching a Pilot Nav Leg.
- For roll steering autopilots: roll steering is terminated when approach mode is selected on the autopilot and is available after passing the MAP.
- Auto-Suspend is active for Vectors To Final (VTF) until on the "TO" side of the FAF and the aircraft ground track is within a 45° course of the published in bound course. At this point, it will automatically extinguish.

Points to Remember for Localizer or VOR-based Approaches

- The default factory setting allows the CDI output to automatically switch from the GPS receiver to the LOC receiver. If the "ILS Autoswitch" setting is changed to "Manual", *you* must determine when to select "GPS" or "VLOC" guidance during the approach. Remember, "LOC" is required for the final course segment from Final Approach Fix (FAF) to MAP.
- If the CDI output has not automatically switched from GPS to ILS upon reaching the FAF, you must manually switch to the VLOC receiver by pressing the **CDI** key. Verify that "LOC" or "VOR" is displayed directly next to the **CDI** key.
- Automatic switching of CDI output is available for ILS, localizer, SDF and LDA approaches. Automatic CDI switching is *not* available for backcourse approaches or VOR approaches.

- When flying an approach with the autopilot coupled, you must monitor system functions at all times and verify that the autopilot and external CDI (or HSI) switch to the VLOC receiver with sufficient time to capture and track the approach course. Switching to "VLOC" late in the approach may not provide the autopilot enough time to respond and intercept the approach course prior to the FAF (depending upon the performance characteristics of your autopilot and aircraft). In such instances, you should manually fly the approach or refer to the documentation provided with your autopilot.
- When an ILS or VOR approach is first selected or executed, the frequency is automatically checked, if correct. If the frequency is correct, you will not receive a message regarding the frequency. If the frequency is incorrect, you will receive a message and you must place the ILS frequency in the active frequency field by pressing the ***Menu/Enter*** key when the frequency message is received.
- When flying a localizer-based approach (other than backcourse) with automatic CDI switching enabled:
  1. "GPS" guidance may be used while flying outbound and on the initial portion of the procedure turn.
  2. "LOC" guidance is used on the remainder of the approach from the time you turn inbound on the procedure turn. You will receive a message stating "AUTOSWITCH FROM GPS TO NAV."
  3. The localizer frequency must be active to use "LOC" guidance at the MAP. The GNS 480 will automatically switch back to GPS data for the missed approach.
- When flying a localizer-based approach with automatic CDI switching disabled:
  1. You may select "LOC" guidance at any point on the approach prior to reaching the FAF.
  2. The localizer frequency must be active to use "LOC" guidance.

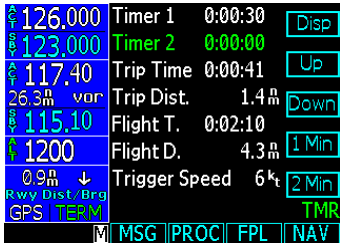
Course Transitions Greater Than 270°

For procedures that have heading or course changes in excess of 270 degrees, roll steering will not be available until you have passed the point where a turn less than 270 degree turn can be accomplished. At this point a dashed magenta line will show the path to the next leg in the flight plan. You may engage your roll steering autopilot at this point.

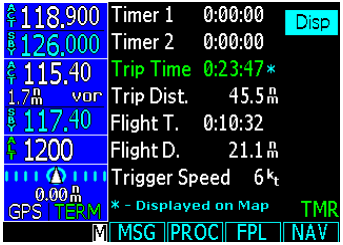
For an example where this might occur, see the Casper, WY (KCPR) departure, ALCOS3, from runway 12.

Timers (TMR)

The Timer Mode allows you to set or view several timing functions. You can set one or two timers as count up or count down timers. You can view the Trip Time, Trip Distance, Flight Time, and Flight Distance. The Trip Time and Trip Distance show the time and distance traveled since being reset. The Flight Time and Flight Distance show the time and distance traveled since the Trigger Speed was reached. Enter the Trigger Speed to set the threshold where the Flight timers start after the aircraft reaches the selected speed. Use the **Large** knob to highlight the selection to change.



Timer Selections



Timer 1 and Timer 2

Edit the Timer values by pressing in the **CRSR** knob, move the cursor with the **Large** knob, change the value with the **Small** knob, and then press the **Enter** key. Press the **1 Min** or **2 Min** keys to instantly insert one or two minutes as the time. Press the **Disp** key to display the Timer value on the Map pages. The **Disp** key will be highlighted and an asterisk will appear next to the value that will be displayed on the Map pages. Press the **CLR** key to reset the values to 0.

Trip Time and Distance

The Trip Time and Distance counters display the time and distance traveled since the last time they were reset.

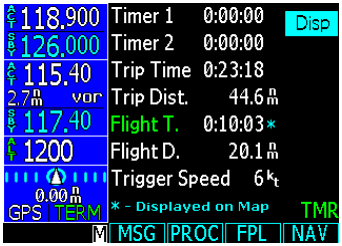
1. Turn the **Large** knob to highlight Trip Time.
2. Press the **Disp** key to display the Trip Timer value on the Map pages.
3. To clear the Trip Time and Trip Distance values, press the **CLR** key.

Flight Time and Distance

The Flight Time and Distance counters start and stop according to two rules:

1) The counters reset and start once the aircraft goes above the Trigger Speed for ten seconds.

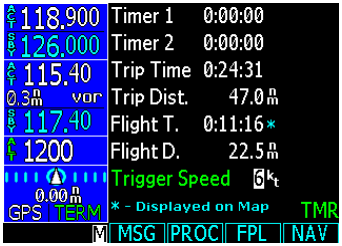
2) The counters stop after the aircraft has been below the Trigger Speed for 30 seconds or more.



Trigger Speed

Set the Trigger Speed for the speed where you want the Flight Time and Distance counters to start and stop.

1. Turn the **Large** knob to highlight Trigger Speed.
2. Press the **CRSR** knob in. The Trigger Speed will now be highlighted.
3. Turn the **Small** knob to the desired speed and then press the **CRSR** knob again or press the **Menu/ Enter** key.



Customizing a Checklist

Checklist (CHK)

The Checklist function allows you to create up to eight checklists with up to 100 items in each list. You can use this feature as a method to create customized checklists for in-cockpit review.

Creating a New or Editing an Existing Checklist

1. Press **FN** and then the **CHK** key to start the Checklist function.
2. Press the **NEW** or **EDIT** key. Press the **CRSR** knob in and use the **Small** and **Large** knobs to name the new list. Press **Menu/Enter** when finished.
3. With the name of your new list highlighted, press the **EDIT** key.
4. Turn the **Small** knob to choose the desired checklist item. See the following table for available checklist items. If you want to make your own item, press the **CRSR** knob in and use the **Small** and **Large** knobs to name the new item. Press **Menu/Enter** when finished.
5. Then, turn the **Large** knob to the checklist result for that item. Turn the **Small** knob to choose the desired checklist result. See the following table for available checklist results. If you want to make your own result, press the **CRSR** knob in and use the Small and Large knobs to name the new result. Press **Menu/Enter** when finished.
6. Turn the **Large** knob to the next checklist item. Continue with the process in the previous steps until finished with your list. Press the **LIST** key or other key to leave the Checklist function.

Using Your Checklist

1. Press **FN** and then the **CHK** key to start the Checklist function.
2. Turn the **Large** knob to highlight the desired list and then press **Enter/Menu**. The selected list will be displayed with the first line highlighted.
3. Press the **CHK** key, or the **Menu/Enter** key, as you check each item in the list. After pressing the **CHK** key, the next item in the list will be highlighted.
4. After the last item is checked, the >CHECKLIST COMPLETE< line will be highlighted. Press **CHK** to check this item and return to the main Checklist page.

Move a Checklist

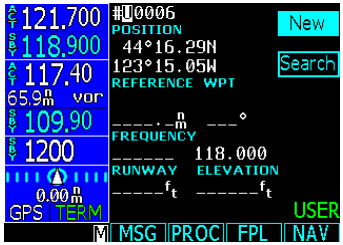
1. Press **FN** and then the **CHK** key to start the Checklist function.
2. Press the **MOV** key.
3. Turn the **Large** knob to the position in the order of lists where you want to put the highlighted list and press the **Menu/Enter** key.

Checklist Items		
Altimeter &, Instruments	Altimeters	Annunciator Lights
Approach Briefing	Auto Ignition	Autopilot
Battery Switch	Bleed Air Valves	Cabin Door Light
Cabin Temp Mode	Cabin	Circuit Breakers
Control Lock	Cowl Flaps	Crossfeed Valve
Electric Trim	Engine Instruments	Environmental System
Flaps	Flight Controls	Flight Data Recorder
Fuel Control Heat	Fuel	Generators
Inverter	Inverters	Landing Gear Handle
Lights &, Strobes	Lights	Mags
O2 Control/Pressure	Oil Pressure	Overspeed Governors
Papers	Parking Brake	Power Levers
Primary Governors	Prop Feather	Prop Sync
Propeller Levers	Radar	Rotating Beacon
Stabilizer Trim	Takeoff Briefing	Transfer Pumps
Vent Blower	Voltmeters	Windshield Heat

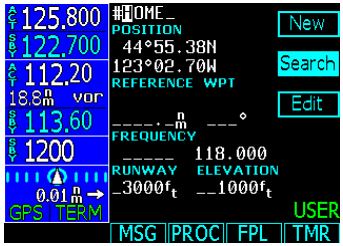
Checklist Results		
AS REQD	AUTO	CHECK BOTH
CHECK ON	CHECKED	CHECKED AS REQD
CHECKED OFF	CHECKED OUT	CHECKED SET
COMPLETE	CUT-OFF	DOWN
EXCERCISED	FEATHER	FREE CORRECT
FULL RICH	HI RPM	IDLE
LO IDLE	LOW RPM	NORMAL
NS/FSB	OFF	OFF AS REQD
ON	ON CHECKED	OPEN
REVIEWED	SET	SET PRESS.
TESTED CLEAR	UP	

User Waypoints (USER)

The GNS 480 can hold up to 500 user-defined waypoints. These waypoints can be based on either lat/lon position or range and bearing from a reference point. In the User Waypoint function, you can create new waypoint, edit existing ones, or search for a User waypoint. User waypoints may also be created in Pan mode.



Creating a User Waypoint



Searching for a User Waypoint

Creating or Editing a User Waypoint

1. Press **FN** and then the **USER** key to start the User Waypoint function. You can also create User waypoint by using the PAN function.
2. Press the **NEW** or **EDIT** key.
3. Use the **Small** and **Large** knobs to name or edit the waypoint name. You can also set a range and bearing from a reference waypoint.
4. Turn the **Large** knob to go to each field on the page and edit the values.
5. Press **Menu/Enter** when finished.

Searching for a User Waypoint

1. Press **FN** and then the **USER** key to start the User Waypoint function.
2. Press the **SEARCH** key.
3. Use the **Small** and **Large** knobs to select the waypoint name. You can also search through a given field by pressing the **CRSR** knob, moving to a field with the Large knob, and then searching within a field by turning the **Small** knob.
4. Press **Menu/Enter** when finished.

System Mode (SYS)

The System mode provides information about GPS status (GPS), System Software Versions (VERS), and allows for configuring the system for individual installations (CNFG).

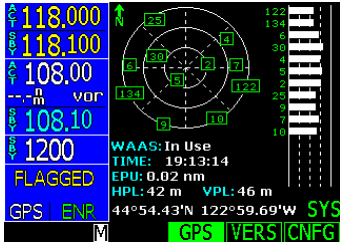
GPS Status

1. Press **FN** and then the **SYS** key to reach the System functions.
2. The GPS function shows a map of the satellite locations with ID and other system information. On the right side of the display, a bar graph is shown for each satellite ID.

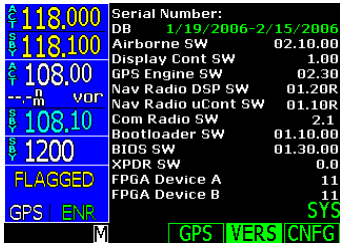
WAAS:	"In use" indicates WAAS corrections are being used. "Standby" is shown if WAAS corrections are not being used. WAAS corrections may be enabled or disabled on the Configuration page. "Disabled" indicates that WAAS corrections have either been disabled using the Configuration setting, or the use of WAAS is prohibited for the selected approach.
Time:	Current UTC time computed from the GPS constellation.
EPU:	Estimated Position uncertainty in meters. Dashes are shown if the value is not valid.
HPL:	Horizontal Protection Level in meters. Dashes are shown if the value is not valid.
VPL:	Vertical Protection Level in meters. Dashes are shown if the value is not valid.
Lat/Lon:	Current position in degrees, minutes, and hundredths of minutes.

Software Versions

The Software Version page shows you the serial number for the GNS 480 and the versions of the software in your unit. Current database versions are shown in green. Out of date database versions are shown in yellow. This information is useful should you need to talk with Technical Support at Garmin. Please copy the values for the information on this display before calling Garmin Product Support (913) 397-3200.



GPS Status Page



Software Versions

Configuration

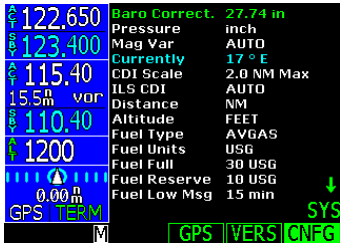
The Configuration page lets you customize many of the settings and unit measurements for your installation or local needs.

1. Press **FN** and then the **CNFG** key to reach the Configuration functions.
2. Turn the **Large** knob to highlight the value you want to change. The green arrow on the right side of the display indicates the direction to turn the **Large** knob to view more choices.
3. Press the **CRSR** knob in to start editing.
4. Turn the **Small** knob to change the value.
5. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

Barometric Correction

You can set a barometric correction value to enter known values. If pressure is in inches, the value range can be set between 27.00 and 34.99. If pressure is in millibars, the value range can be set between 914 and 1117. This is not required for installations with barometric altimeter inputs. The GNS 480 will prompt you for the values if an input is not available.

1. Turn the **Large** knob to highlight the Baro Correct selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

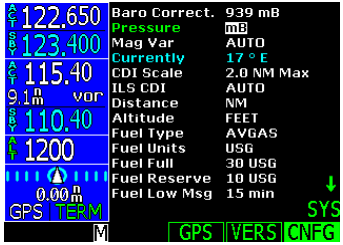


Barometric Correction Value

Barometric Pressure Units

You may reference barometric pressure values to either inches or millibars.

1. Turn the **Large** knob to highlight the Baro Pressure selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

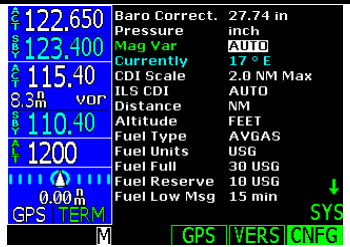


Barometric Pressure Units

Magnetic Variation Selection

You may choose either automatic or manual magnetic variation selection. When navigation information needs to be referenced to True North, manually set magnetic variation to zero.

1. Turn the **Large** knob to highlight the Mag Var selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to choose Automatic or Manual.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

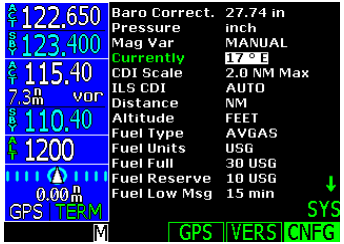


Magnetic Variation Selection

Magnetic Variation Degree Value

After choosing Manual Magnetic Variation, you can select the desired value.

1. Turn the **Large** knob to highlight the magnetic variation degrees selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

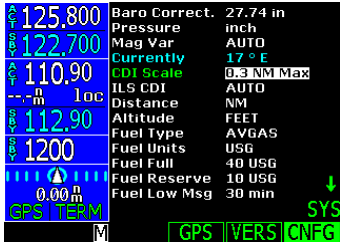


Magnetic Variation Manual Setting

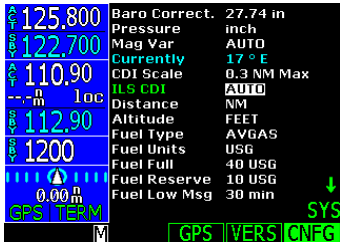
CDI Scale

The maximum CDI scale deflection can be set. CDI scaling is used to allow the CDI needle to be more sensitive and prevent "scalloping" or slalom tracks for certain autopilots. The value can be set to 0.3, 1.0, or 2.0 nm.

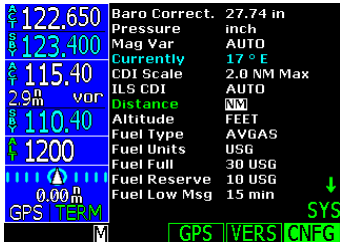
1. Turn the **Large** knob to highlight the CDI scale selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.



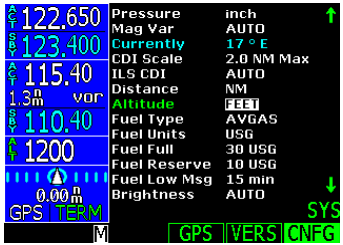
CDI Scale Setting



ILS CDI Auto-Switching Setting



Distance Units



Selecting Altitude Units

ILS CDI

Switching the CDI from GPS to ILS for ILS approaches can be set to either Auto or manual. The Auto setting allows the CDI output to automatically switch from the GPS receiver to the LOC receiver during ILS or LOC approaches.

1. Turn the **Large** knob to highlight the magnetic variation degrees selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to select AUTO or MANUAL.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

Distance Units

This selection allows you to display distance information in units of nautical miles (nm), kilometers (km), or statute miles (sm).

1. Turn the **Large** knob to highlight the Distance Units selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

Altitude Units

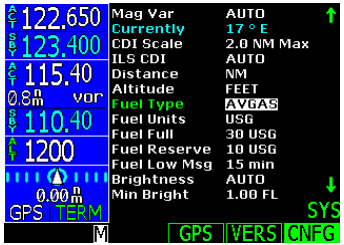
This selection allows you to display altitude information in units of feet or meters.

1. Turn the **Large** knob to highlight the Altitude selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the Menu/Enter key to save the value.

Fuel Type

This selection allows you to choose the type of fuel for your reference. Choices are: Avgas, Jet A, or JP4.

1. Turn the **Large** knob to highlight the Fuel Type selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

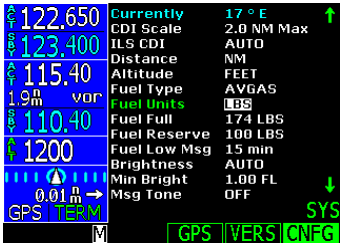


Selecting Fuel Type

Fuel Units

This selection allows you to choose the units of measure for your fuel capacity. Units of measure include: US Gallons (USG), Imperial Gallons (IMG), Liters (L), Pounds (LBS), Kilograms (KG).

1. Turn the **Large** knob to highlight the Baro Pressure selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

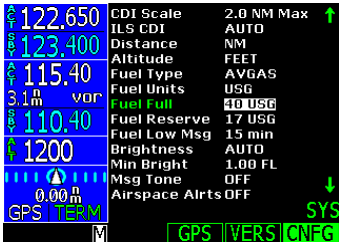


Selecting Fuel Units

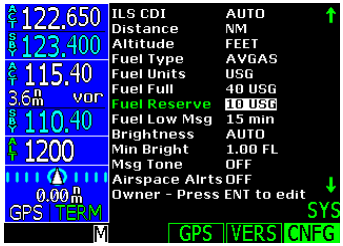
Fuel Full Amount

Set the amount of fuel when the aircraft fuel tanks are full in the currently selected fuel units.

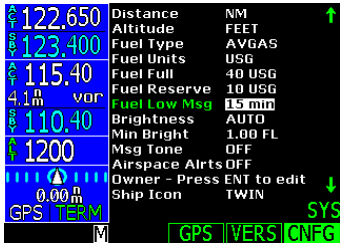
1. Turn the **Large** knob to highlight the Fuel Full selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.



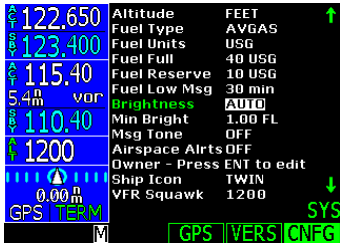
Setting Fuel Full Quantity



Setting Fuel Reserve Amount



Setting Low Fuel Message Level



Display Brightness Auto/Manual Selection

Fuel Reserve Amount

Set the amount of fuel you want set aside for reserve in the currently selected fuel units.

1. Turn the **Large** knob to highlight the Fuel Reserve Amount selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

Fuel Low Message

Set the time when an alert will appear announcing when the Fuel Reserve value is reached base on current speed. Time is selectable between 0 and 59 minutes.

1. Turn the **Large** knob to highlight the Fuel Low Message selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

Display Brightness Selection

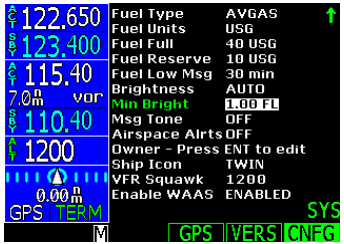
Select between Automatic and Manual Display Brightness. Automatic Display Brightness is controlled by the ambient light readings by a photosensor on the front panel. The Manual Display Brightness selection allows you to control the display brightness with the Power/Volume knob.

1. Turn the **Large** knob to highlight the Display Brightness selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

Minimum Brightness Value

When the Display Brightness selection is set to Automatic, the Minimum Brightness value can be set between 0.20 and 130.00 foot-lamberts of light.

1. Turn the **Large** knob to highlight the Minimum Brightness selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

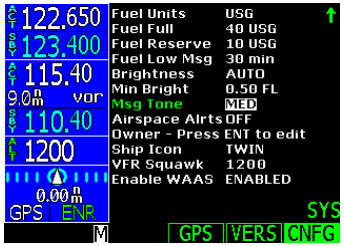


Setting Minimum Brightness Value

Message Tone

The Message Tone selection allows you to turn the audio annunciator for messages to low, medium, high, or off. Set the AMA value to an adequate level first and then setting this value so the "ding" volume is adequate.

1. Turn the **Large** knob to highlight the Message Tone selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

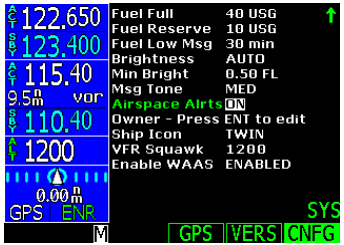


Setting Message Tone Volume Level

Airspace Alerts

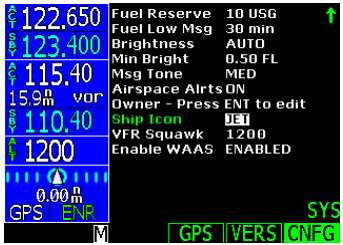
The Airspace Alerts selection allows you to turn the audio annunciator for messages to be turned on or off. When alerts are turned on, a message will be given when the selected airspaces are entered.

1. Turn the **Large** knob to highlight the Airspace Alerts selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

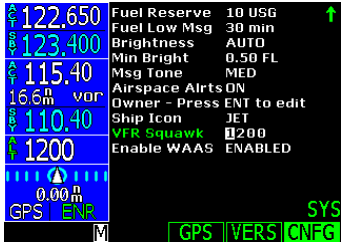


Turning Airspace Alerts On/Off

Entering Owner Information



Selecting an Aircraft Icon



Setting the VFR Squawk ID Code

Owner Information

The Owner Information selection allows you to enter up to two rows of information about the owner or aircraft.

1. Turn the **Large** knob to highlight the Owner Name selection.
2. Press **Menu/Enter** key to start editing the Owner information.
3. Press the **Small** knob to select characters.
4. Use the **Large** knob to move the cursor.
5. When you are finished editing the Owner Information, press the **Menu/Enter** key to save the information and return to the System menu. Pressing the **CLR** key clears all the Owner information.

Aircraft Icon

You can select an icon to represent the aircraft as it appears on the Map display. Choices include Single, Twin, Jet, or Helicopter.

1. Turn the **Large** knob to highlight the Aircraft Icon selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value. Use the **Large** knob to move the cursor.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

VFR Squawk

You may store the frequency that will be the default squawk frequency for VFR operations in the Transponder mode.

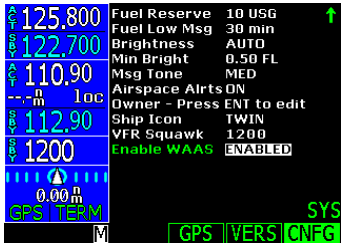
1. Turn the **Large** knob to highlight the VFR Squawk selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.

Enable WAAS

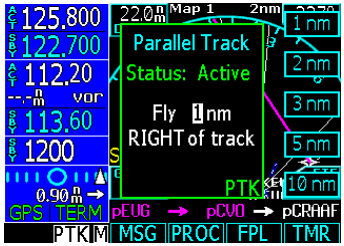
You may manually enable or disable WAAS corrections to your GPS signals. Normally WAAS should be enabled, but there are some situations where it is useful to disable it.

You may want to prevent WAAS corrections in fringe WAAS coverage areas where WAAS corrections are received for a subset of the total available GPS satellites. In these areas, even with good GPS satellite coverage you may receive a Loss of Integrity error due to WAAS correction reception being below the required standards because WAAS corrections are not available from all satellites in view.

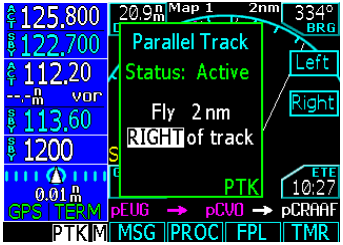
1. Turn the **Large** knob to highlight the Enable WAAS selection.
2. Press the **CRSR** knob in to start editing.
3. Turn the **Small** knob to change the value.
4. Press the **CRSR** knob in again or press the **Menu/Enter** key to save the value.



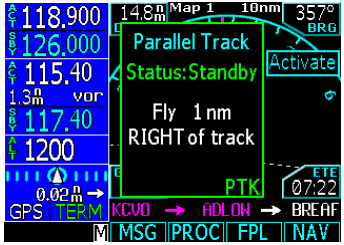
Entering Owner Information



Setting Parallel Track Distance



Setting Parallel Track Direction



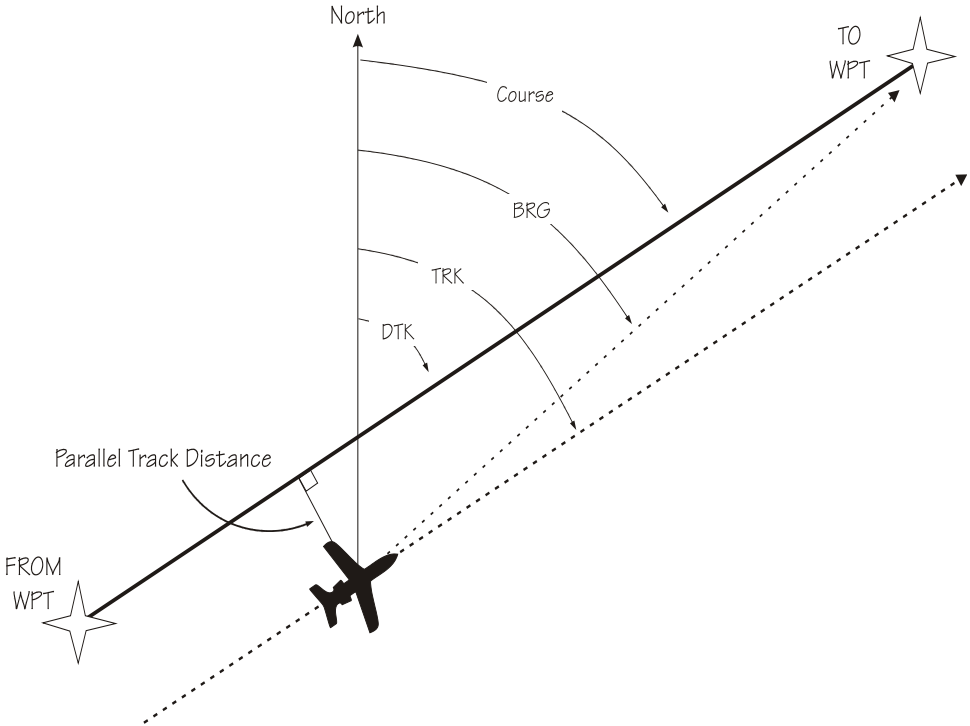
Press Activate to use Parallel Track

Parallel Track (PTK)

The Parallel Track (PTK) function allows you to create a parallel course offset of 1 to 99 nm to the left or right of your current flight plan. You must have FROM and TO waypoints defined. Parallel Track cannot be activated if you set a course using Direct-To or if the active leg is the first leg of the departure procedure, or the Initial Approach Fix (IAF) has been passed. Attempting to activate Parallel Track with these conditions results in the message "Cannot Activate Parallel Track for Current Leg." Choose Left or Right of the current course, and the offset distance. When Parallel Track is activated, the course line drawn on the Map pages will show the parallel course, a PTK annunciation will be shown in the lower left corner of the display, and waypoint names will have a lower case "p" preceding their identifier. Using Direct-To, loading an approach, holding pattern, or editing and executing your flight plan will automatically cancel Parallel Track. Parallel track is cancelled if a course change occurs greater than 120° or the parallel tracks overlap as a result of the course change.

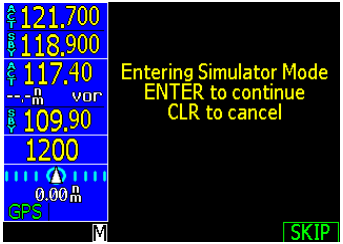
Activating Parallel Track

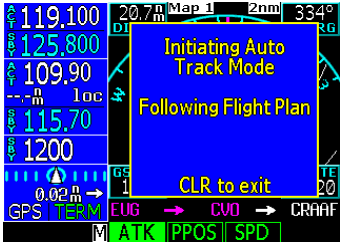
1. Press **FN** and then the **PTK** key to reach the Parallel Track function.
2. Press the **CRSR** knob.
3. Turn the **Small** knob to change the value for the Distance parallel from the flight track. With the Distance field showing, selections or 1 nm, 2 nm, 3 nm, 5 nm, or 10 nm can be selected by pressing the appropriate Menu Selection key.
4. Turn the **Large** knob to move between the Distance and the Direction from Track. With the Direction selection highlighted, turn the **Small** knob to select between Right or Left of Track. When the Direction field is shown, selections of Right and Left can be selected by pressing the appropriate Menu Selection key.
5. Press the **Menu/Enter** key or the **CRSR** knob when you are finished making selections.
6. Press the **Activate** or **Standby** key to activate or deactivate the Parallel Track values selected.

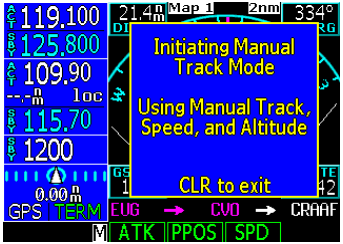


Parallel Track Description

When Parallel Track is Activated, "p" is added to the waypoint names in the "From-To-Next" line at the bottom of the map and on the waypoints shown on the map. The PTK annunciator is shown in the left corner of the screen.







Simulator Mode

The GNS 480 has a built-in simulator so you can practice with your unit without being in flight. You can set your present position, ground speed, and track. The track can also be set to Auto to simulate use with an autopilot. The Com and Nav radios, and transponder will appear to operate normally, but will not send any signals. If the GNS 480 is configured to connect to a second GNS 480 and is run in simulator mode, an error message will appear: Ignore the message, press **CLR**, and continue using the Simulator.

NOTE: *If the GNS 480 is configured to connect to a second GNS 480 and is run in simulator mode, the following message will appear: "No communication with previously configured GNS 480 unit. User MUST configure each unit manually.* ***ENTER*** *for Master* ***CLR*** *for Slave." Ignore the message, press* ***CLR****, and continue using the Simulator.*

1. After the GNS 480 start-up screen (clouds and title) ends and the left side of the display information just appears, press **SUSP** three times.
2. Press **Menu/Enter** to continue in Simulator mode or press **CLR** to continue with normal operation.
3. Turn the **Small** knob, if desired, to change the Local Altimeter Setting. Press **Menu/Enter** to continue to the start-up test phase. Press **SKIP** to bypass the start-up tests.
4. Select Automatic Track mode, present position, and airspeed as described below.

Automatic Track (ATK)

Press the **ATK** key to enable/disable the Automatic Track mode. When enabled, the simulator ownship will follow the tracking of the flight plan. Press **CLR** to exit and enable Automatic Track. Press **ATK** and **CLR** again to disable Automatic Track.

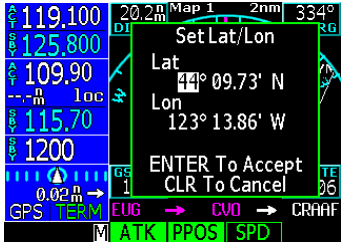
Manual Track

Press the **ATK** key to enable/disable the Manual Track mode. When Manual Track Mode is active, press **SPD** and set the Track by highlighting the Track with the **Large** knob and selecting the value with the **Small** knob. Press **Menu/Enter** after selecting the values.

Present Position (PPOS)

Press the **PPOS** key to bring up a display for selecting a Lat/Lon position for your ownship starting point.

1. Turn the **Large** knob to select the item to change.
2. Turn the **Small** knob to change the values.
3. Press **Menu/Enter** to accept the displayed values or press **CLR** to cancel the selection and return to the previous display.

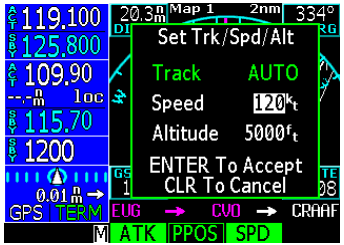


Set Lat/Lon for Present Position

Airspeed

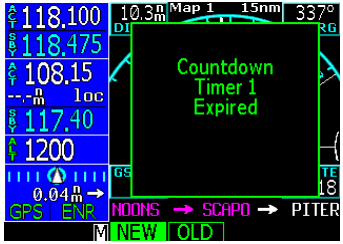
The Airspeed (**SPD**) key brings up a display where you can select the Track, Speed, and Altitude.

1. Turn the **Large** knob to select the item to change.
2. Turn the **Small** knob to change the values.
3. Press **Menu/Enter** to accept the displayed values or press **CLR** to cancel the selection and return to the previous display.

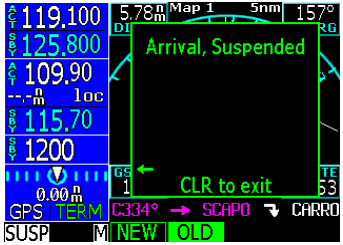


Set Simulator Airspeed

Messages (MSG)



New Message



Old Message

Message mode lets the pilot know about conditions that require immediate attention. Depending on the level of importance, a message box may appear on the display over the active mode. A flashing annunciator "M" will appear at the bottom of the display when a message is available for viewing. The GNS 480 provides both visual text and audio messages. Audio messages do not require pilot input and can be turned on or off in the System mode. The message annunciator ("M") stays on when a modified flight plan exists to remind you that the flight plan needs to be executed.

1. Press the **FN** key until the **MSG** key label is available.
2. Press the **MSG** key.
3. Turn the **Large** knob, or press the **New** or **Old** keys, to switch between the Old and New Messages.
4. Turn the **Small** knob to list the available New or Old messages.

Text Messages

Message	Description
Inside of x, Within x nm of SUA, Within x min of SUA	Special Use Area alert. Pilot awareness of upcoming pilot action required.
For Loaded Approach Do NOT use GPS For Primary Navigation Guidance	Selected approach does not meet requirements for primary guidance by GPS.
PTK end in x sec	Parallel track course ending.
GPS Fault Code: xxxx	GPS error report. Note fault code to notify Customer Service.
CAUTION Low Battery Voltage: Unit Needs Service	Low internal battery voltage is detected. This battery backs up memory for user entered information, such as user waypoints and stored flight plans. Battery requires replacement.

Message	Description
Parallel Track Ending within x minutes/x seconds	Pilot awareness of upcoming pilot action required.
CAUTION Communications lost with cross-linked unit	Communications have failed between the reporting and an external GNS 480.
CAUTION Communications lost with Com Radio	Communications have failed between the GNS 480 and its Com radio
CAUTION Stuck Microphone	Mic key has been pressed for a continuous period and should be checked.
CAUTION Communications lost with Nav Radio	GNS 480 has not received any valid messages for 2 second. Active/Standby frequency digits changed to yellow. No Nav radio changes are allowed.
Altitude Out of Range, Check Altitude Encoder	Pilot awareness. Check unit prior to next flight.
CAUTION Altitude Encoder Communications Failure	Altitude information is not being received by the GNS 480.
CAUTION Fuel/Air Data Communications Failure	Fuel/Air Data Computer information is not being received by the GNS 480.
CAUTION Fuel Data Communications Failure	Fuel Data sensor information is not being received by the GNS 480.
Library Flight Plan Memory Loss x Library Plans Deleted	A checksum error has occurred and x number of plans have been deleted.
WARNING Low Fuel Less Than x Min Check Tanks	Fuel air data computer reports remaining fuel is below the user-selected value.
Countdown Timer 1 Expired	User selected timer value has expired.
Countdown Timer 2 Expired	User selected timer value has expired.

Message	Description
Database Invalid: Integrity check failed	Check to see if card is seated properly. Replace datacard if necessary.
Using Manual Mag Var: <deg>x<E or W>	User may have set Mag Var to manual. If received with Database Invalid message, see above.
NAV Radio Memory Error Unit Requires Service	Nav radio still usable, but automatic features are not available. Contact factory service.
NAV Radio Resolver Error Recalibration Necessary	Do not use CDI for instrument approach or navigation in IMC.
CAUTION Transponder Failure	Pilot awareness.
CAUTION Unable to Command Transponder	Pilot awareness.
Active Flight Plan Memory Loss	Reload flight plan and activate as required.
Initiating Auto Track Mode Following Flight Plan	Simulator mode only.
Initiating Manual Track Using Manual Track, Speed, and Altitude	Simulator mode only.
Steep Turn Ahead (or others)	Pilot awareness.
Arrival (or) Arrival in x sec	Pilot awareness.
Pilot Nav (or) Pilot Nav in x sec	Pilot awareness.
DISCONTINUITY Ahead	Modify flight plan or perform Direct-To function.
DISCONTINUITY	Modify flight plan or perform Direct-To function to reestablish navigation.
Hold (Parallel, Teardrop, or Direct)	Pilot awareness.
Excessive Heat, Possible loss of cooling	GNS 480 may fail or behave erratically.

Message	Description
WARNING Loss of Integrity Cross-Check NAV	GPS position integrity lost. Verify by cross-checking with VHF Nav.
Integrity Restored Normal Ops	Pilot awareness.
WARNING Loss of Navigation - Insufficient Sats	GPS position lost. Use other Nav equipment.
WARNING Loss of Navigation - Position Error	GPS position lost. Use other Nav equipment.
WARNING Loss of Navigation - Loss of GPS Com	GPS position lost. Use other Nav equipment.
Config Failure: Unit needs servicing	Do not use for IFR ops or primary navigation. Contact dealer or Customer Service.
Config Corrupt: Use Ground Maint Mode to correct	Checked on power-up. System configuration invalid. See dealer or call Customer Service.
Config Error: Verify User Settings	Go to System Configuration page and check user settings.
CDI Selection Should be set To (Localizer, ILS, or VOR)	Pilot awareness.
Standby VOR Frequency Set To xxx.xx For Approach ENTER: Flip to Active	Pilot awareness.
Database Invalid: Database needs updating	Database unavailable until updated.
Database Invalid: Software needs updating	Database unavailable until unit software is updated.
Database Not Current Starts: (date) Ends (date)	Database should be updated.
Altimeter correction failed switching to alternate correction mode	Altimeter corrections failed. Unit will prompt for other inputs.
Flight Plan Mismatch with Database Invalid Waypoints Found	Flight plan waypoints are no longer in the Nav database.

Message	Description
Baro Correction xx.yy **CRSR** to Change, **ENTER** to Accept	Input correct baro setting.
WARNING Loss of Navigation Abort Approach	Execute missed approach using other nav equipment.
WARNING CO Level Alarm	
No valid OBS input detected. OBS course frozen	
Approach downgraded. Use LNAV minima.	
WARNING Loss of Navigation - Abort Approach	The GNS 480 cannot be used for navigation. Abort the approach and use other means of navigation until navigation with the GNS 480 is available.
KEY INOP	A key is inoperative. Contact customer service.
Switching CDI to (ILS, LOC, or GPS)	CDI autoswitching is taking place.
Modified Flight Plan Has Not Been Executed	
CAUTION Traffic Source Data Failure	Communication lost with data source.
CAUTION Transponder Failure Traffic Failure	Communication lost with GTX33/330. Configured for TIS.
Non WGS-84 waypoint navigation	Pilot awareness

Audio Messages

The GNS 480 provides audio messages, as well as text. A tone accompanies every new text message. The tone is a short “ding” that lasts less than one second. Message tones will not be generated for messages already in the message list. If message tones are turned on, they will be played even if audio is inhibited. If a second text message is generated while the tone is being played, a second tone will not be generated.

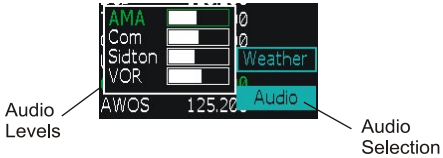
The GNS 480 provides the following three aural alerts: 500 foot callout, Localizer Alive, and Missed Approach

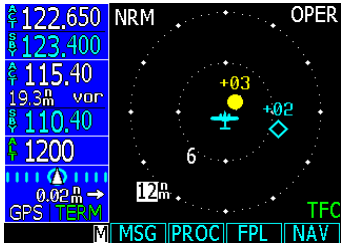
Point. 500 foot callout: using baro-corrected altitude, after descending from at least 2000 feet above the surface elevation at the destination, an audio message will occur once when the aircraft descends below 500 feet from the surface elevation at the destination. Localizer Alive: an audio message will occur once when a Localizer, back-course, or ILS approach is loaded and the Localizer is valid with cross-track deviation of 90%, or less. Missed Approach: when flying an approach and the MAP has been passed an audio message will occur once. The Missed Approach message will not be played for an ILS or LPV approach (unless the LPV approach has been downgraded). If audio is inhibited, the audio alert messages are not played. Audio messages do not require any pilot input.

Message tones can be turned on or off through the system configuration pages. The volume of the messages and tones are set in the Com or Nav modes with the Audio function.

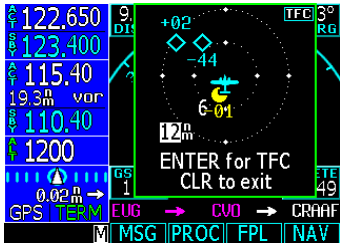
Setting Message Audio Level

1. Press **COM** or **VOR**.
2. Press **Menu/Enter** to bring up the Menu items. Press **Audio**.
3. With the AMA selection highlighted, turn the **Small** knob to adjust the level.
4. Press **Menu/Enter** to save your settings.





Traffic Mode Display



Traffic Alert Pop-Up Overlay

Traffic Overlay in Map Mode

Traffic (TFC)

The GNS 480 displays traffic when the GTX 33/330 Transponder or Skywatch system are configured with the GNS 480. When available, the Traffic function is reached by pressing the **FN** key and then the **TFC** function smart key. Traffic is displayed relative to the latest reported position. The relative altitude of the traffic from your aircraft is shown as above (+) or below (-) in hundreds of feet. An altitude that is invalid is shown by three dashes below the symbol. An arrow next to the altitude value shows the direction of traffic that is climbing or descending at a rate greater than 500 fpm. See your traffic sensor documentation for more details on symbols and other attributes of your particular system.

A Traffic pop-up screen will appear on any other page when a traffic advisory condition occurs.

The Map display can also be configured to add traffic as an overlay with the other map selections.

Traffic Display Range Ring

Range rings are used to display relative distances on the display. The current range values are shown on the lower left edge the rings. The range is changed by turning the **Small** knob. At the 2 nm level only one ring is displayed.

Traffic Symbols

- Traffic Advisories - filled amber circle outlined in black is positioned to show its relative bearing and distance to the Traffic advisory aircraft.

- Proximate Traffic - filled cyan diamond. (Skywatch only)

- Other Traffic - cyan diamond outline.

- Traffic Direction Indicator (TIS only) - an indicator line is oriented to the approximate track that the TIS traffic is flying. Direction data is provided in 45° increments.

Traffic Pop-Up

A small Traffic window will "Pop-Up" when a Traffic Advisory (TA) occurs. The Traffic Pop-Up will appear over any existing display except for the Traffic mode display. The default pop-up has a range of 6nn/2nm.

When the Traffic Pop-Up appears you can:

- Press **Menu/Enter** to go to Traffic Mode.
- Turn the **Small** knob to change the Traffic Pop-Up range.
- Press **CLR** to remove the Traffic Pop-Up window.

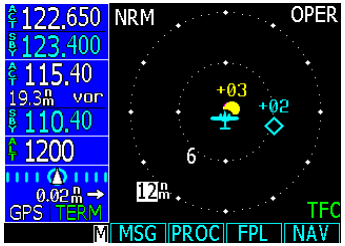
No-Bearing Traffic Advisories (Skywatch Only)

A No Bearing advisory is issued when a Skywatch intruder has no computed bearing and is a Traffic Advisory. The message will appear as amber text in the lower center/right of the display and includes range and altitude with the vertical arrow, if altitude is available.

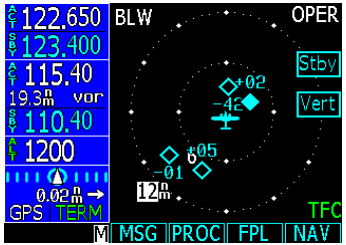
An example message would read, "TA 1.2 + 12↓" for a threat that is 1.2 nm away and 1200 feet above your position and descending at a rate greater than 500 fpm.

A no bearing advisory that has an invalid altitude will leave the altitude information blank. An example would read, "TA 1.2" indicating a threat is 1.2 nautical miles away with an unknown altitude. If the no-bearing threat causes a pop-window to appear, the advisory text will not appear on the lower part of the display.

Traffic Alert Pop-Up Window



Normal - Vertical Display Mode



Below - Vertical Display Mode (Skywatch Only)

Vertical Display Modes

The Vertical Display Mode selection is available only when Skywatch is installed. When selected, the display of Vertical information can be selected as Normal (NRM), Look Down (Below - BLW), Unrestricted (UNR), or Loop Up (Above - ABV) as described in the Skywatch documentation. The display mode refers to the altitude range relative to your altitude for reporting traffic.

- NRM - -2700 ft to +2700 ft
- BLW - -9000 ft to +2700 ft
- ABV - -2700 ft to +9000 ft
- UNR - -9900 ft to +9900 ft

1. In Traffic mode, press the **Menu/Enter** key.
2. Pressing the **Vert** key will step through the available choices. The label for the currently selected view will be displayed in the upper left corner.

Operate/Standby

Use this function to toggle the Traffic information display between Operational (OPER) and on Stand-By (STBY). The current state is shown in the upper right corner of the display.

1. Press **Menu/Enter**.
2. Press **Stby** or **Oper** to toggle between the two states.

Test

Use this function to initiate a Skywatch self-test. The test function is only available when the Skywatch unit is in a Standby or Failed state.

1. Press **Menu/Enter**.
2. Press **Test** to initiate the self-test.

Traffic in Map Mode

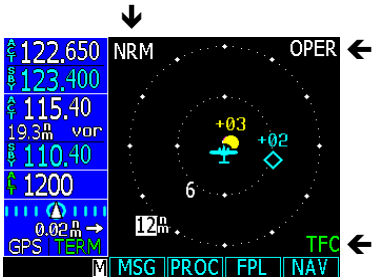
Traffic may be viewed on any of the Map mode displays by pressing the Traffic display Menu Item selection in Map mode.

Traffic Annunciations

Interruption of information from the traffic sensor will be reported on the GNS 480 display by an annunciation on the Map and Traffic mode pages. The table below describes the annunciations.

Map Mode	Traffic Mode	Description
TFC	OPER	Traffic is on and available.
CST 0:06	CST 0:06	TIS only annunciations. TIS data is coasted. This message is displayed when data has not been received for 6-12 seconds.
RMVD 0:30	RMVD 0:30	TIS only annunciations. Traffic is removed from the display. This message is displayed when data has not been received for 13-59 seconds. After 60 seconds, the message will transition to TFC Unavailable.
TFC N/A	Not Available	TIS only annunciations. Aircraft is outside the TIS coverage area.
TFC STBY	Standby	Traffic is in Standby state. Set Traffic to Operational in Traffic mode.
TFC FAIL	Failed	Traffic sensor has failed.
TFC FAIL	Data Fail	Skywatch only. No Skywatch data received for 2 seconds, TAS data fail, or TAS Data Time out.
TFC TEST	Skywatch Test	Skywatch only. Displayed while the Skywatch unit is running its self-test.

Map Mode Annunciation



Traffic Mode Annunciations

Specifications

Physical Specifications

Size:	6.25" W x 3.3" H x 11.7" D (15.9 x 8.4 x 29.7 cm)
Weight:	5.8 lbs (2.6 kg) unit only
	0.7 lbs (0.3 kg) mounting tube
Display:	3.8" diagonal (9.65 cm) 256-color display with backlighting (320 x 240 pixels)

Power

Source:	10–36 VDC

Environmental

Temp. Range:	-4°F to 131°F (-20°C to 55°C) operating range
Humidity:	95% at 55°C
Altitude:	35,000 feet (continuous)

GPS Performance

Receiver:	15 parallel channel receiver (12 GPS and 3 GPS/WAAS/SBAS)
Acquisition Times:	Approx. 10 seconds (reacquisition)
	Approx. 1:45 minutes TTFF (Time To First Fix))
Update Rate:	0.2 per second (5 Hz), continuous
GPS Accuracy:	< 1 meter RMS typical with WAAS (horizontal/vertical)
Maximum Velocity:	1000 knots
Datum:	WGS-84

VHF Comm Performance

Channels:	760 (25 kHz spacing)
Frequency Range:	118.000 to 136.975 MHz
Transmit Power:	8 watts minimum at >12 VDC

VOR Performance

Frequency Range:	108.00 MHz to 111.75 MHz

Localizer Performance

Frequency Range:	108.00 MHz to 111.95 MHz

Glideslope Performance

Frequency Range:	329.150 MHz to 335.00 MHz

Care Information

Cleaning the Unit

The GNS 480 is constructed of high quality materials and does not require user maintenance other than cleaning. The front bezel, keypad, and display can be cleaned with a soft cotton cloth dampened with clean water. DO NOT use any chemical cleaning agents. Care should be taken to avoid scratching the surface of the display.

To resolve problems that cannot be remedied using this guide, contact Garmin Product Support in the U.S.A. at 800/800.1020 or Garmin Europe at 44/1794.519944.

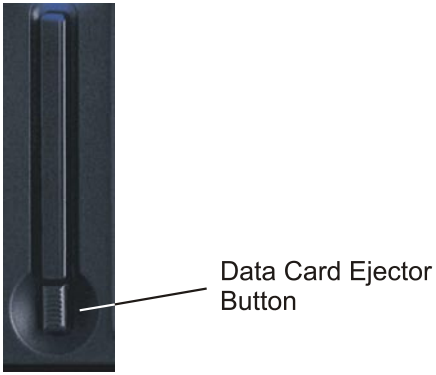
Battery Replacement

The GNS 480 includes an internal battery that will last about 10 years. The battery is used for internal RAM memory and GPS system information. Regular planned replacement is not necessary. The GNS 480 will display a "low battery" message when replacement is required. Once the low battery message is displayed, the battery should be replaced within 1 to 2 months. If the battery is not replaced and becomes totally discharged, the GNS 480 will remain fully operational, but the GPS signal acquisition time will be increased. This acquisition time can be reduced by entering a new seed position each time the unit is powered on. There is no loss of function or accuracy of the GNS 480 with a dead battery. The battery is not user replaceable. To replace the battery, contact the Garmin repair station or factory authorized repair station.

Display Backlight

The display backlight is rated by the manufacturer as having a usable life of 20,000 hours. This life may be more or less than the rated time depending on the operating conditions of the GNS 480. Over time, the backlight will dim and the display will not perform as well in direct sunlight conditions. The user must determine by observation when the display brightness is not suitable for its intended use. Contact Garmin AT repair station or factory authorized repair station when the backlight requires service.

Garmin Data Cards



Installing and Removing Data Cards

The GNS 480 uses an optional Garmin data card to display digital charts and maps on-screen or save user data. Install the data card in the card slots located on the left side of the unit. Install or remove the data card only when the unit is off.

To install a data card:

1. Insert the card with the label facing to the left of the unit into the slot.
2. Firmly push the card into the unit. It is not necessary to force the card. The handle is still exposed when it is properly inserted. DO NOT insert or remove the data card while the unit is powered on.

If you insert a data card and get a 'card format not recognized' message, try removing the card and reinserting it. If the card is still not recognized, contact the Garmin or your Garmin dealer for assistance. Data cards are not waterproof, should not be exposed to moisture or excessive static charges, and should be stored in the case supplied with the card.

To remove a data card:

1. Press in on the data card ejector for easy removal.
2. Pull the card out of the card slot on the bottom of the unit.

Contacting the Factory

If the GNS 480 unit fails to operate despite troubleshooting efforts, contact Garmin Technical Support for assistance.

GARMIN International, Inc.
1200 East 151st Street
Olathe, KS 66062-3426
USA

Phone: (913) 397-8200

FAX: (913) 397-8282

http://www.garmin.com

Be prepared to offer the following information about the installation:

- Installation configuration (list of any accessories)
- Model number, part number with mod levels, and serial number
- Software Versions
- Description of problem
- Efforts made to isolate the problem

Glossary

Accuracy— Estimated position accuracy in feet or meters.

Altitude—Height above mean sea level (MSL).

Backcourse— Localizer backcourse approach where the signal on the "back" side of the localizer is used for alignment to the runway opposite of normal localizer alignment. Without compensation the CDI would reverse sense.

Battery Timer— The time remaining on the battery before it is fully discharged.

Bearing—The direction from your current location to a destination.

Course—The direction from your starting location to a destination.

Course to Steer— The recommended direction to steer in order to reduce cross-track error and return to the course line.

Cross Track— The distance you are off a desired course in either direction, left or right.

Decluttering— Reduction in displayed elements on the moving map at higher zoom scales.

Distance (Destination)— The 'great circle' distance from current location to a Go To destination, or the final waypoint in a route.

Distance (Next)— The 'great circle' distance from current location to a Go To destination, or the next waypoint in a route.

ETA (Destination)— Estimated Time of Arrival. The estimated time you will reach a Go To destination, or the final waypoint in a route.

ETA (Next)— Estimate Time of Arrival. The estimated time you will reach a Go To destination, or the next waypoint in a route.

ETE (Destination)— Estimated Time En route. The estimated time required to reach a Go To destination, or the final waypoint in a route.

ETE (Next)— Estimated Time En route. The estimated time required to reach a Go To destination, or

the next waypoint in a route.

Elevation— The altitude (height) above or below sea level.

Flight Timer—The length of time for the current flight.

Fuel Timer—The fuel required to travel from current location to the indicated route waypoint.

Glide Ratio—The ratio of horizontal distance travelled to vertical distance travelled. For example, a 6:1 glide ratio indicates a 1000' vertical descent for every 6000' horizontal distance travelled.

Glide Ratio to Target—The glide ratio required to descend from present position and altitude to the target altitude at the location specified on the VNAV screen.

Glideslope—

HIWAS— Hazardous Inflight Weather Advisory Service.

Max Speed—The maximum speed the unit has moved.

Mode A— Transponder mode only reporting the squawk code.

Mode C— Transponder mode reporting squawk code and altitude.

Mode S— Transponder mode reporting squawk code, altitude, and supports selective aircraft interrogation.

Next Course— The remaining distance of the route.

Next Turn—The remaining distance to the next waypoint on the route.

Ownship— Your aircraft

Sidetone— The Sidetone setting adjusts the feedback level from the microphone into the headset headphone.

Skywatch®— An active surveillance traffic advisory system. Skywatch is a registered trademark of L3 Communications.

Speed—Display rate of travel in miles/kilometers/nautical miles per hour.

Squitter— Mode S transmissions without the need for being interrogated.

Sunrise—The time at which the sun rises on this day.

Sunset—The time at which the sun sets on this day.

Time—The time for the selected time zone.

Track— The direction of movement relative to a ground position. Also referred to as 'ground track'.

Trip Avg Speed (Moving)— Average speed of unit when moving since last reset.

Trip Avg Speed (Total)— Average speed of unit for both moving and stopped speeds since last reset.

Trip Odometer—A running tally of distance travelled since last reset.

Trip Timer (Moving)— Time the unit has been moving since last reset of the trip timers.

Trip Timer (Total)— Total time the unit has been in operation since last reset of the trip timers.

Turn—The angle difference (in degrees) between the bearing to your destination and your current line of travel. 'L' means turn Left. 'R' means turn Right.

User Timer— Display the user timer set in the Main Menu.

Velocity Made Good—The speed at which you are closing on a destination along a desired course.

Vert Speed To Target—Your rate of altitude gain/loss over time.

Vertical Speed—The rate of climb or descent.

Voltage— Direct current voltage level of an external power source.

Waypoint (Destination)— The final waypoint in the route, or the destination waypoint.

Waypoint (Next)— The next waypoint in the route.

Abbreviations

The following is a list of abbreviations and acronyms used on the GNS 480 and their meanings:

ABV — Above
ACTFP — Active Flight Plan
ACTV — Active
ALT — Altitude
APPR, APPCH — Approach
APT — Airport
ARTCC — Air Route Traffic Control Center
ARWY — Airway
ATC — Air Traffic Control
ATK — Automatic Track
AUX — Auxiliary
AVGAS — Aviation-grade Gasoline

BARO — Barometric Pressure
BRG — Bearing To
BLW — Below

°C — Degrees Celsius
CAS — Calibrated Airspeed
CCW — Counter-Clockwise
CDI — Course Deviation Indicator
CHCK, CHK — Check
CHG — Change
CHNL — Channel
CLR — Clear
CNFG — Configuration
COM — Communications Transceiver
CRS — Course
CRSFR — Course From
CRSR — Cursor
CRSTO — Course To
CTA — ICAO Control Area
CTAF — Common Traffic Advisory Frequency
CTR — Center (see ARTCC)
CW — Clockwise

DA — Decision Altitude
DB — Database
DEST — Destination
DH — Decision Height
DIST — Distance
DME — Distance Measuring Equipment
DOP — Dilution of Precision
DP — Departure Procedure
DR — Dead Reckoning
DTK — Desired Track

ELEV — Elevation
EMI — Electromagnetic Interference
ENDUR — Endurance
ENR — En Route
ENT — Enter
EPE — Estimated Position Error
EPU — Estimated Position Uncertainty
ETA — Estimated Time of Arrival

ETE — Estimated Time En Route

°F — Degrees Fahrenheit
FADC — Fuel/Air Data Computer
FAF — Final Approach Fix
FDE — Fault Detection and Exclusion
FM LEG — Fix to Manual Termination Leg
FN — Function
FP, FPL — Flight Plan
fpm — Feet Per Minute
FREQ — Frequency
FSS — Flight Service Station
ft — Feet

G/S — Glideslope
gl — Gallons
GND — Ground
GPH — Gallons Per Hour
GPS — Global Positioning System
GS — Ground Speed

HDG — Heading
HFOM — Horizontal Figure Of Merit
hg — Inches of Mercury
HM LEG — Hold to Manual Leg
HPL — Horizontal Protection Level
HSI — Horizontal Situation Indicator

IAF — Initial Approach Fix
ID, IDNT, IDENT — Identifier
ILS — Instrument Landing System
IMC — Inclement Meteorological Conditions
img — Imperial Gallons
IND — Indicated
INT — Intersection
INTEG — Integrity

kg — Kilograms
kHz — Kilohertz
km — Kilometers
kph — Kilometers Per Hour
kt — Knots

LAT/LON — Latitude/Longitude
lb — Pounds
LCL — Local
LFOB — Left-over Fuel On Board
LNAV — Lateral Navigation
LOC — Localizer
LOI — Loss of Integrity
lph — Liters per hour
LPV — Lateral Precision Performance with Vertical Guidance
Lrg — Large
lt — Liters
LVL — Level

°M — Degrees Magnetic
m — Meters
mb — Millibars of Pressure
MDA — Minimum Decision Altitude

Med — Medium
MHz — Megahertz
mi — Statute Miles
MOA — Military Operations Area
MON — Monitor
MOV — Move
mph — Statute Miles Per Hour
mpm — Meters Per Minute
mps — Meters Per Second
MRK — Mark
MSA — Minimum Safe Altitude
MSG — Message
MSL — Mean Sea Level

NAV — Navigation, Nav Radio
NAVAID — Navigational Aid
NDB — Non-Directional Radio Beacon
nm — Nautical Miles
NoPT — No Procedure Turn Required
NRM — Normal
NRST — Nearest

OBS — Omnibearing Selector

ppm — Parts per million
PPOS — Present Position
PROC — Procedure(s)
PTK — Parallel Track
PWR — Power

RAD — Radial
RAIM — Receiver Autonomous Integrity Monitoring
RCL — Recall
REF — Reference
REQ — Required / Requirements
RESTRICTD — Restricted
RMVD — Removed
RNAV — Area Navigation
RNG — Range
RX — Receive

SEL — Select
SID — Standard Instrument Departure
sm — Statute Miles
Sml — Small
SPD — Speed
SQ — Squelch
SRCH — Search
SRFC — Surface
STAR — Standard Terminal Arrival Route
STBY, SBY — Standby
SUA — Special Use Airspace
SUSP — Waypoint Sequencing Suspended
SYS — System

°T — Degrees True
TACAN — Tactical Air Navigation
TAS — True Airspeed

TEMP — Temperature
TERM — Terminal
TFC — Traffic
TKE — Track Angle Error
TMA — ICAO Terminal Control Area
TMR — Timer
TRK — Track (also Ground Track)
TRSA — Terminal Radar Service Area
twr — Tower
TX — Transmit

uni — Unicom
UNR — Unrestricted
usg — US gallons
UTC — Coordinated Universal Time (also GMT or “zulu”)

VDI — Vertical Deviation Indicator
VERS — Version
VFOM — Vertical Figure Of Merit
VFR — Visual Flight Rules
VHF — Very High Frequency
VLOC — VOR/Localizer Receiver
VNAV — Vertical Navigation
VOL — Volume
VOR — VHF Omnidirectional Radio Range
VPL — Vertical Protection Level
VS — Vertical Speed
VTF — Vector-To-Final

WAAS — Wide Area Augmentation System
WND — Wind
WPT — Waypoint
WX — Weather

XPDR — Transponder
XPND — Transponder
XTE — Cross Track Error

WAAS

What is WAAS?

The Wide Area Augmentation System (WAAS) is an F.A.A. funded project to improve the overall integrity of the GPS signal. It is a space-based system that broadcasts integrity information and correction data as determined by ground reference stations. Current tests have shown the actual accuracy to be on the order of 2–3 meters. For more information, go to *http://gps.faa.gov/Programs/WAAS/waas.htm*.

NOTE: *If you are using the GNS 480 outside of the U.S.A., it is recommended that you turn off WAAS for the most accurate location fix.*

Safety Information

Safety Information

WARNING: The GNS 480 contains a lithium ion rechargeable battery. The battery used in this device may present a risk of fire or chemical burn if mistreated. Do not recharge out of the unit, disassemble, heat above 140°F (60°C), or incinerate.

WARNING: If original battery must be removed for replacement, dispose of used battery properly. Contact your local waste disposal department for information on proper disposal of lithium-ion batteries. Keep used battery away from children. Do not disassemble and do not dispose of in fire.

WARNING: Only replace with Garmin Lithium-Ion Battery Pack (Garmin Part Number 010-10517-00). Use of another battery may present a risk of fire or explosion.

Compliance, License, and Warranty Information

FCC Compliance

The GNS 480 complies with Part 15 of the FCC interference limits for Class B digital devices FOR HOME OR OFFICE USE. These limits are designed to provide more reasonable protection against harmful interference in a residential installation, and are more stringent than “outdoor” requirements.

Operation of this device is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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 radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The GNS 480 does not contain any user-serviceable parts. Repairs should only be made by an authorized Garmin service center. Unauthorized repairs or modifications could result in permanent damage to the equipment, and void your warranty and your authority to operate this device under Part 15 regulations.

Software License Agreement

BY USING THE GNS 480, YOU AGREE TO BE BOUND BY THE TERMS AND CONDITIONS OF THE FOLLOWING SOFTWARE LICENSE AGREEMENT. PLEASE READ THIS AGREEMENT CAREFULLY.

Garmin grants you a limited license to use the software embedded in this device (the "Software") in binary executable form in the normal operation of the product. Title, ownership rights, and intellectual property rights in and to the Software remain in Garmin.

You acknowledge that the Software is the property of Garmin and is protected under the United States of America copyright laws and international copyright treaties. You further acknowledge that the structure, organization, and code of the Software are valuable trade secrets of Garmin and that the Software in source code form remains a valuable trade secret of Garmin. You agree not to decompile, disassemble, modify, reverse assemble, reverse engineer or reduce to human readable form the Software or any part thereof or create any derivative works based on the Software. You agree not to export or re-export the Software to any country in violation of the export control laws of the United States of America.

Product Registration and Support

Help us better support you by completing your online registration today! Have the serial number of your GNS 480 handy and connect to the Garmin Web site (www.garmin.com). Look for the Product Registration link on the home page. Also, be sure to record your serial number in the space provided to the left.

If you have any questions, Garmin's Product Support department may be reached Monday through Friday, 8:00 AM to 5:00 PM Central Standard Time, by phone at **1-800-800-1020**, or by e-mail at **sales@garmin.com**.

Compliance, License, and Warranty Information

Serial Number

Use this area to record the serial number in case it is lost, stolen, or needs service. Be sure to keep your original sales receipt in a safe place or attach a photocopy inside the manual. The 8-digit number is located on the back of the unit.

Serial Number:

☐☐☐☐☐☐☐☐

NOTE: *If you have previously registered a Garmin product purchase, we invite you to re-register using our NEW on-line system. Many services provided by our new product registration system are now being automated and re-registering your purchase ensures you the best possible support from Garmin.*

Compliance, License, and Warranty Information

Limited Warranty

This Garmin product is warranted to be free from defects in materials or workmanship for one year from the date of purchase. Within this period, Garmin will at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost. This warranty does not cover failures due to abuse, misuse, accident or unauthorized alteration or repairs.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED OR STATUTORY, INCLUDING ANY LIABILITY ARISING UNDER ANY 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.

IN NO EVENT SHALL GARMIN BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE, OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT. Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you.

Garmin retains the exclusive right to repair or replace the unit or software or offer a full refund of the purchase price at its sole discretion. SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

To obtain warranty service, call your local Garmin authorized dealer. Or call Garmin Customer Service at one of the numbers listed to the left for shipping instructions and an RMA tracking number. The unit should be securely packed with the tracking number clearly written on the outside of the package. The unit should be sent, freight charges prepaid, to any Garmin warranty service station. A copy of the original sales receipt is required as the proof of purchase for warranty repairs.

Products sold through online auctions are not eligible for rebates or other special offers from Garmin. Online auction confirmations are not accepted for warranty verification. To obtain warranty service, an original or copy of the sales receipt from the original retailer is required. Garmin will not replace missing components from any package purchased through an online auction.

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