GTN 625/635/650 SOFTWARE v6.50
PILOT'S GUIDE UPGRADE SUPPLEMENT

This supplement contains the pages revised in the GTN 625/635/650 Pilot's Guide, P/N 190-01004-03, Rev N, regarding the new features of software v6.50. Change bars are placed adjacent to the revised information as described in the revision summary table.

This supplement, in combination with the GTN 625/635/650 Pilot's Guide, P/N 190-01004-03, Rev. M, is equivalent to the GTN 625/635/650 Pilot's Guide, P/N 190-01004-03, Rev. N.

Current documents are available at flyGarmin.com

Printed copies may be purchased by contacting Garmin Customer Support.

***NOTE**: Depending on which version of software is installed and how it is configured, the actual features and screen images may differ from what is shown. For more information regarding feature availability for specific software versions refer to the GTN 625/635/650 Pilot's Guide, P/N 190-01004-03.*

This manual reflects the operation of system software v6.50 or later. Some differences in operation may be observed when comparing the information in this manual to later software versions.

This part shall comply with Garmin Banned and Restricted Substances document, 001-00211-00.

United States radar data provided by NOAA; European radar data collected and provided by Meteo France.

For information regarding the Aviation Limited Warranty, refer to Garmin's website.

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GTN 625/635/650 Pilot's Guide Revision N, Change Summary

Section	Page	Description
Section 4 – Flight Plans		
4	4-1	Updated menu options in figure 4-1, "Flight Plan Functional Diagram."
4.1	4-2	Updated screen image in figure 4-4, "Remove Single Existing Waypoint."
4.2.1	4-4	Updated screen image in figure 4-8, "Active Flight Plan Wpt Options."
4.2.1.2	4-6	Updated screen image in figure 4-11, "Active Flight Plan Insert Waypoint Before Option."
4.2.1.4	4-7	Added "Along Track Offsets" section.
4.2.1.5	4-9	Revised sequence steps for clarity.
4.3	4-23	Updated screen image in figure 4-43, "Flight Plan Menu."
		Updated menu options in figure 4-44, "Flight Plan Menu Functional Diagram."
4.3.2	4-24	Added note regarding removal of ATKs.
4.3.3	4-25	Added "En Route Vertical Navigation" section.
4.3.4	4-32	Added "Temperature Compensated Altitude" section.
4.3.5	4-33	Added note regarding en route vertical navigation availability.
4.3.6	4-35	Added Altitude and Flight Path Angle to list of user-selectable data fields.
		Added information related to VNAV functionality.
4.3.7.2	4-37	Added note regarding the removal of ATKs.
Section 5 – Direct-To		
5.5	5-6	Updated screen image in figure 5-9, "Touch the Map to Create a MAPWPT as the Direct-To Course Destination."
Section 6 – Procedures		
6	6-1	Revised note regarding bar-corrected altitude to include en route vertical navigation.
6.2	6-4	Added note regarding advisory climb altitudes.
6.3	6-8	Added note about verifying altitudes when using Descent VNAV.

Section	Page	Description
6.4	6-9	Added note about verifying altitudes (including ATC cleared altitudes) when using Descent VNAV.
	6-12	Added table 6-2, "Loading and Activating an Approach."
Section 7 – Waypoint Info		
7.7	7-15	Added note pertaining to user airport feature availability. Added information related to user airports.
7.8	7-18	Updated screen image in figure 7-24, "Waypoint Info - Create User Waypoint."
		Updated Create Waypoint key icon.
		Added step 4. Includes associated key icon.
	7-19	Updated screen image in figure 7-26, "Waypoint Info - Create User Waypoint Type."
		Added step 8. Includes associated key icon.
7.8.2	7-20	Updated screen image in figure 7-28, "Waypoint Info - Set Lat/Lon Coordinate Selection."
7.9	7-23	Added information about overwriting existing user waypoints during import.
Section 8 – Map		
8.1.2	8-9	Added Altitude Constraints menu option to figure 8-10, "Map Setup Functional Diagram."
8.1.2.1	8-11	Added Altitude Constraint feature to table 8-2, "Map Setup Map Options."
	8-15	Added "Altitude Constraints" subsection.
8.6	8-42	Added User Airport, TOD/BOD, and ATK to table 8-19, "Map Symbols."
Section 9 – Traffic		
9.5.2	9-19	Updated screen image in figure 9-11, "ADS-B Traffic Menu."
9.5.2.1		Added "ADS-B Display" subsection.
Section 10 – Terrain		
10.1	10-1	Added table 10-1, "Terrain Configurations."
10.2	10-2	Added "GPS Altitude for Terrain" section.

Section	Page	Description
10.5	10-10	Added "Terrain Alerting" section.
Section 11 – Weather		
11.3	11-32	Updated hyperlink to Connext weather page on Garmin website.
11.3.4	11-36	Revised Connext Weather activation information.
Section 14 – Utilities		
14	14-1	Updated screen image in figure 14-1, "Utilities Home Page."
		Added table 14-1, "Utilities Page Features." Includes descriptions for VNAV and Logs pages.
	14-3	Added VNAV and Logs menu options to figure 14-2, "Utilities Functional Diagram."
14.1	14-4	Added note regarding feature/page exclusivity.
Section 15 – System		
15	15-2	Added Keyboard to Setup menu options in figure 15-2, "System Function Summary."
15.4	15-15	Added Keyboard to list of System Setup page functions.
		Added COM Sidetone Control and Keyboard menu options to figure 15-19, "System Setup Functions."
	15-16	Updated screen image in figure 15-20, "System Setup Page."
15.4.3	15-19	Added information regarding Include User Airports function.
		Updated screen image in figure 15-25, "Select Nearest Airport Criteria."
	15-20	Added step 5 to reflect addition of Include User Airports key.
15.4.4.3	15-22	Added "COM Sidetone Control" section.
15.4.5	15-23	Added "Keyboard Format" section.
15.7	15-32	Added unit values for Position Format to table 15-9, "System Units Setup."

Section	Page	Description
15.7.3	15-35	Added list of available position formats.
		Added information about regional position formats.
		Added figure 15-48, "British National Grid Position Format Detail."
	15-36	Added figure 15-49, "Irish National Grid Position Format Detail."
		Added figure 15-50, "Swiss National Grid Position Format Detail."
		Updated screen image in figure 15-51, "Position Format Selection."
15.11.2	15-42	Added information about passkey verification.
Section 16 – Messages		
16	16-24	Added VNAV related messages to table 16-1, "Messages."
Section 17 – Symbols		
17.1	17-1	Added User Airport, TOD/BOD, and ATK to table 17-1, "Map Page Symbols."
Section 18 – Appendix		
18.4	18-21	Rewrote "Glove Qualification Procedure" section.

4 FLIGHT PLANS

The GTN 6XX lets you create up to 99 different flight plans, with up to 100 waypoints in each flight plan. The Flight Plan function is accessed by touching the **Flight Plan** key on the Home page. The Flight Plan function allows you to create, store, edit, and copy flight plans.

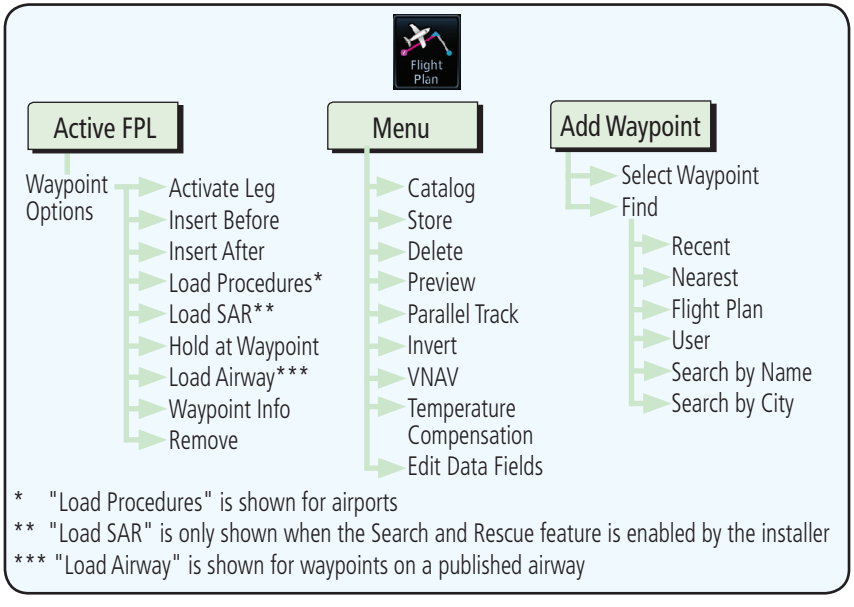


Figure 4-1 Flight Plan Functional Diagram

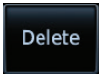
NOTE: *Navigation is provided for fixed wing aircraft above 30 kts and for rotorcraft above 10 kts.*

4.1 Creating a New Flight Plan

NOTE: *If a flight plan that includes a procedure that has been modified by the pilot is saved into the flight plan catalog, the GTN cannot check the accuracy of that procedure when that flight plan is used on a later flight. It is recommended that flight plans with modified procedures not be saved in the flight plan catalog.*

1. From the Home page, touch **Flight Plan**.

Figure 4-2 Create New Flight Plan



2. If there is already an Active Flight Plan, touch **Menu** and then the **Delete** and **OK** keys to delete the existing active flight plan.

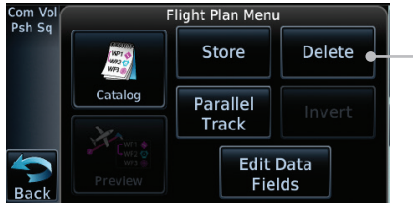
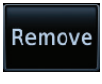


Figure 4-3 Delete Existing Flight Plan



A single waypoint may be deleted by touching the waypoint and then touching the **Remove** key.

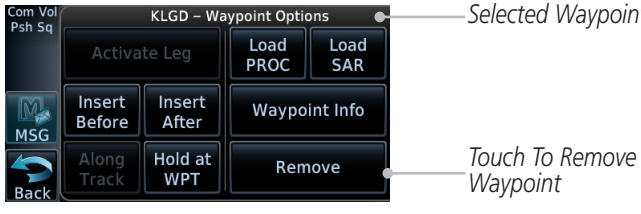


Figure 4-4 Remove Single Existing Waypoint

4.2 Active Flight Plan Page

The Active Flight Plan Page provides information and editing functions for the flight plan currently in use for navigation. Once you have activated a flight plan, the Active Flight Plan Page shows each waypoint for the flight plan, along with the Desired Track (DTK), Distance (DIST) for each leg and Cumulative Distance (CUM). The data fields are user-selectable and may be changed to display Cumulative Distance (CUM), Distance (DIST), Desired Track (DTK), En Route Safe Altitude (ESA), or Estimated Time of Arrival (ETA).

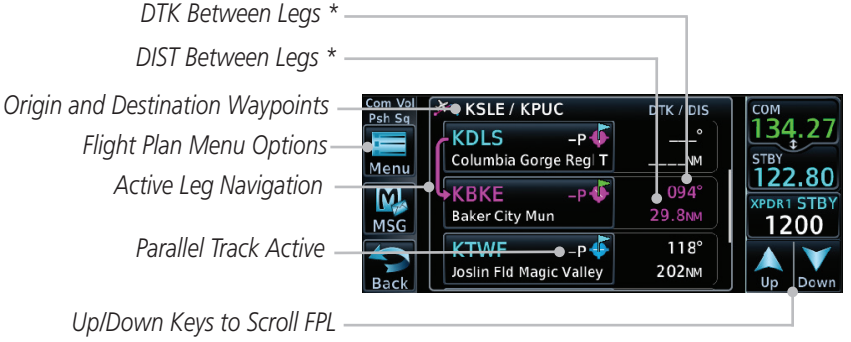
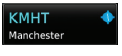


Figure 4-7 Active Flight Plan Page

* The field types may be changed using the Edit Data Fields function in the Flight Plan page Menu.

4.2.1 Waypoint Options



1. While viewing the Active Flight Plan page, touch the desired flight plan waypoint. The Waypoint Options menu opens.

Figure 4-8 Active Flight Plan Wpt Options

2. Touch one of the options to perform the selected action. Cancel the option selection by touching the **Back** key.

4.2.1.2 Insert Before

The Insert Before option allows you to insert a new waypoint into the active flight plan before the selected waypoint.

1. On the Active Flight Plan page, touch the desired waypoint in the flight plan. The Waypoint Options list will be displayed.

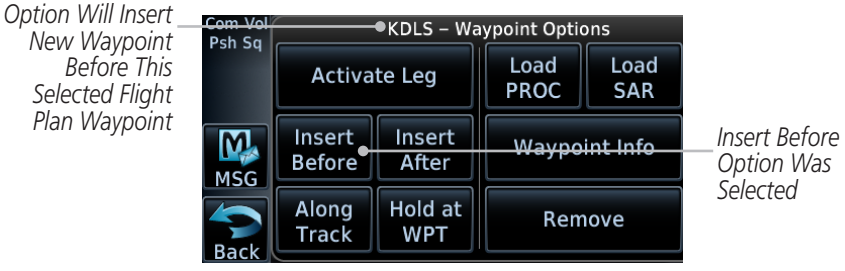


Figure 4-11 Active Flight Plan Insert Waypoint Before Option

2. Touch the **Insert Before** key to select a new waypoint before the selected waypoint.
3. Select a waypoint identifier with the alphanumeric keypad.

Figure 4-12 Use the Alphanumeric Keypad to Select Waypoint to Insert Before

4. Then, touch **Enter** to confirm the selection or touch **Cancel** to cancel any changes. The new flight plan will be shown.

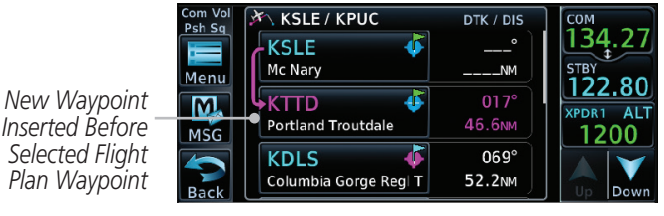


Figure 4-13 New Waypoint Is Inserted Before the Selected Waypoint

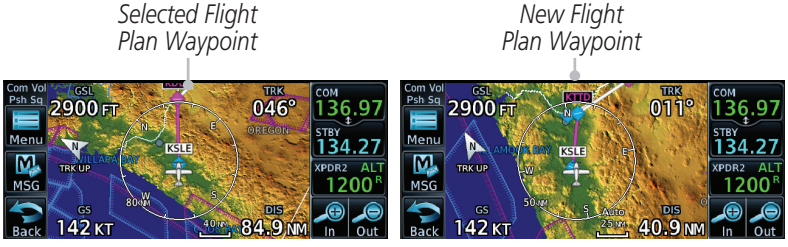


Figure 4-14 Flight Plan Before and After New Waypoint Inserted

4.2.1.3 Insert After

The Insert After option allows you to insert a new waypoint into the active flight plan after the selected waypoint.

1. On the Active Flight Plan page, touch the desired waypoint in the flight plan. The Waypoint Options list will be displayed.
2. Touch the **Insert After** key to select a new waypoint after the selected waypoint.
3. Select a waypoint identifier with the alphanumeric keypad. Then, touch **Enter** to confirm the selection, or touch the **Cancel** key to cancel the operation and return to the Waypoint Options window.

4.2.1.4 Along Track Offsets

NOTE: *This feature is available in software v6.50 and later.*

An along track (ATK) represents a temporary lateral position (or checkpoint) relative to an existing waypoint in the flight plan. Offset distance values range between 1 nm and 200 nm, and may be specified in 1 nm increments.

Unlike database waypoints, ATKs indicate a temporary route fix in the flight plan. Once created, their position remains fixed until deleted by the pilot. Subsequent changes to the flight plan do not update the ATK's position.

ATKs appear in flight plan route depictions on the Active Flight Plan and Map pages.

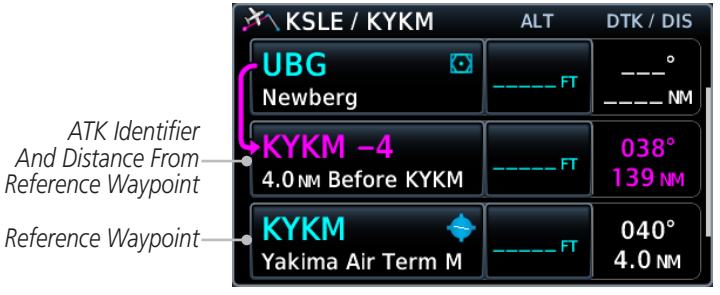


Figure 4-15 ATK Inserted Before Reference Waypoint

Inserting the ATK before the selected waypoint results in a negative offset value. Inserting it after the selected waypoint results in a positive value. The flight plan allows multiple entries.

Figure 4-16 Along Track Offset Keypad

Once entered, offset distances are not editable. If the offset requires adjustment, delete the existing ATK from the flight plan, and then create a new ATK with the correct offset distance.

Map indications include a dedicated icon and an identifier label. The identifier label denotes the adjacent waypoint's ID and offset distance from the specified ATK.

Figure 4-17 ATK Indications on Map Page

To create an ATK:

1. While viewing the Active Flight Plan page, select a waypoint. The Waypoint Options menu opens.

2. Touch the **Along Track** key.
3. Specify an offset distance using the controls on the keypad.

4. Select **Before** or **After** to place the ATK before or after the reference waypoint.

5. Touch **Enter**.

To create an ATK for an altitude constraint:

1. While viewing the Active Flight Plan page, select an altitude constraint. The VNAV Options menu opens.

2. Touch the **Along Track** key.
3. Specify an offset distance using the controls on the keypad.

4. Select **Before** or **After** to place the ATK before or after the reference waypoint.

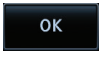
5. Touch **Enter** and then **Save**.

4.2.1.5 Remove

The Remove option allows you to remove the selected waypoint from the active flight plan.

1. On the Active Flight Plan page, touch the desired waypoint in the flight plan. The Waypoint Options menu opens.

2. Touch **Remove** and then **OK**.



4.3 Flight Plan Menu

The Flight Plan menu provides access to functions to manage your flight plans. The functions included are: View Catalog, Store Flight Plan, Delete Flight Plan, Preview Flight Plan, Parallel Track, Invert Flight Plan, and Edit Data Fields.

Touch the **Menu** key to access Flight Plan menu options.

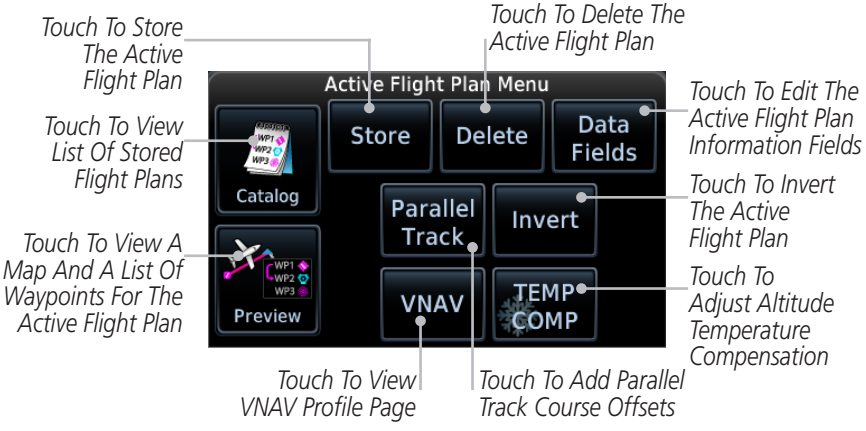


Figure 4-43 Flight Plan Menu

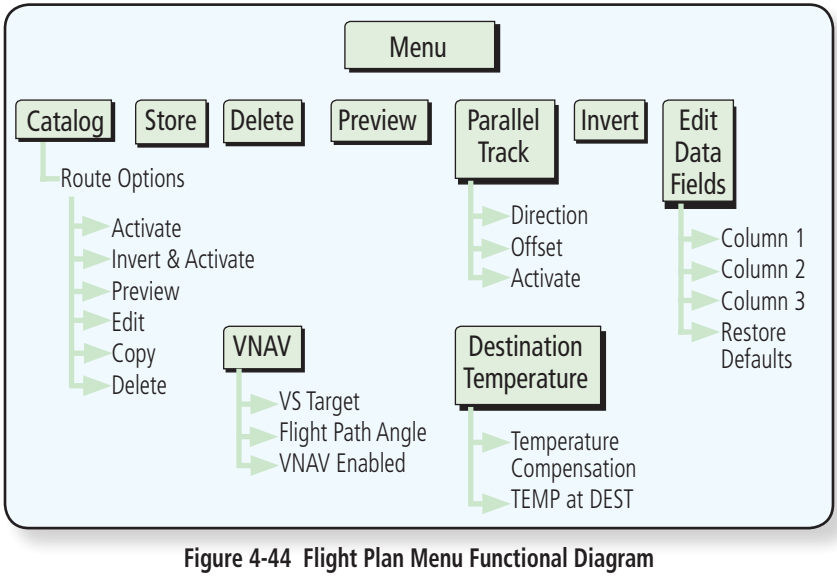


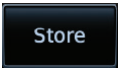
Figure 4-44 Flight Plan Menu Functional Diagram

4.3.1 Store Flight Plan

A flight plan must be saved to the Catalog to be used in future flights. The Store Flight Plan function will save the Active Flight Plan to the Catalog.

NOTE: *If a flight plan that includes a procedure that has been modified by the pilot is saved into the flight plan catalog, the GTN cannot check the accuracy of that procedure when that flight plan is used on a later flight. It is recommended that flight plans with modified procedures not be saved in the flight plan catalog.*

1. While viewing the Active Flight Plan page, touch the **Menu** key. The Flight Plan menu opens.



2. Touch the **Store** key to store the current Active Flight Plan into the Catalog. The flight plan will be named by the beginning and ending waypoints.
3. When a duplicate flight plan is created, the **Store** key will not be available and the flight plan will be saved with a numeral at the end of the destination waypoint.

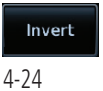
Figure 4-45 Duplicate Flight Plan Naming

4.3.2 Invert Flight Plan

NOTE: *Inverting a flight plan removes all ATKs.*

This option allows you to reverse the active flight plan and use it for navigation guidance back to your original departure point. The original flight plan stored in the catalog is not affected.

1. While viewing the Active Flight Plan page, touch the **Menu** key. The Flight Plan menu opens.



2. Touch **Invert**.

4.3.3 En Route Vertical Navigation

NOTE: *This feature is available in software v6.50 and later.*

The vertical navigation (VNAV) feature provides vertical profile guidance during the descent phase of flight. Guidance is based on altitude constraints associated with lateral waypoints in the active flight plan. Functions:

- Presents vertical path guidance to the descending path as either a line joining two waypoints with specified altitudes or a linear deviation from the desired path (i.e., the vertical angle from the specified waypoint or altitude)
- Integrate vertical waypoints into the active flight plan
- Support both manual and autopilot coupling

4.3.3.1 VNAV Requirements

- Enablement by the installer
- A baro-corrected altitude source

If en route vertical navigation is not enabled, the GTN provides a single waypoint vertical calculator. For more information, refer to section 14.1.

For installation details related to en route vertical navigation, consult the AFMS.

4.3.3.2 VNAV Limitations

The GTN allows you to create a vertical navigation path with multiple altitude constraints in the flight plan. These altitudes are removed when the flight plan is stored in the flight plan catalog.

Most flight plan waypoints may be assigned an altitude constraint for use in vertical navigation. Exceptions include:

- Flight plan legs containing headings
- Flight plan legs that terminate at an altitude (e.g., a climb to 1,800 ft before making a turn and proceeding direct to fix)

4.3.3.3 VNAV Profile Page

Active vertical navigation profile information displays on the VNAV Profile page. This page is accessible from both the Flight Plan menu and the Utilities page.

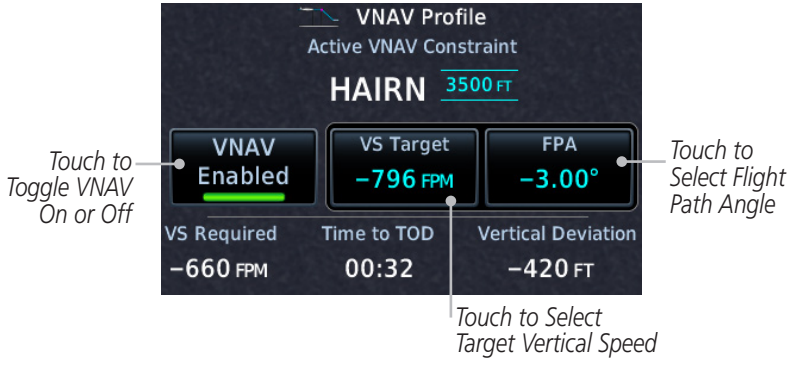
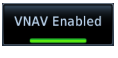


Figure 4-46 VNAV Profile Page

To enable VNAV guidance:

1. While viewing the Active Flight Plan page, touch **Menu**.

2. Select **VNAV**. The VNAV Profile page opens.



3. Touch **VNAV Enabled**.

To disable VNAV guidance, touch **VNAV Enabled** again.

Disabling vertical navigation:

- Invalidates required vertical speed, time to Top of Descent (TOD)/Bottom of Descent (BOD), and vertical deviation data
- Removes vertical deviation and required vertical speed indications from the PFD

VS Required, Time to TOD/BOD, and Vertical Deviation fields display dashes when VNAV is off

VNAV automatically re-enables when the pilot initiates a Direct-To.

4.3.3.4 Altitude Constraints

NOTE: *Altitude constraints loaded from the database are jet altitudes. Some adjustment may be necessary for other types of aircraft. For the adjustment procedure, refer to the published chart.*

Depending on the specific instance, altitude constraints are either manually entered into the Active Flight Plan page, or automatically retrieved from the published altitudes in the navigation database.

Constraint values display in MSL or flight level (FL). Constraints at airports may be specified as MSL or AGL.

Figure 4-47 Waypoint Altitude Constraints

The system automatically uses altitudes loaded with arrival and approach procedures (up to and including the FAF) for computing vertical deviation guidance. These values, accompanied by an altitude restriction bar(s), display in cyan. The position of the value (above or below the bar, or between two bars) denotes the required aircraft altitude relative to that constraint. Dual values annunciate when the aircraft needs to cross between two altitudes.

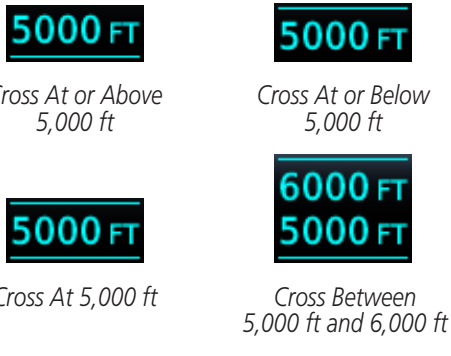


Figure 4-48 Altitude Constraint Examples

Indication	Color	Description
	White	• Altitude calculated by system • Estimate of aircraft altitude as it passes over the navigation point • Absence of bar(s) indicates it is not a potential constraint
		• Altitude retrieved from navigation database • Bar above and/or below the value indicates constraint type • Altitude is for reference only. Not for use in determining vertical guidance
	Cyan	• Altitude designated for use in determining vertical guidance • Pencil icon indicates manual designation or manual data entry
		• Constraint invalid • System cannot use altitude to determine vertical guidance

Table 4-1 Altitude Constraint Color Conventions

An altitude constraint is invalid if:

- Meeting the constraint requires the aircraft to climb
- Meeting the constraint requires the aircraft to exceed the maximum flight path angle (6° downward) or maximum vertical speed (-4,000 fpm)
- It results in a TOD behind the aircraft's current position
- It is within a leg type that does not support altitude constraints
- It is added to a waypoint past the FAF

The altitude restriction from the database displays when the following three conditions are present.

1. A pilot-specified altitude constraint is deleted
2. Navigation database contains an altitude restriction for the lateral waypoint
3. A predicted altitude is not available

Once added to the flight plan, an altitude constraint may be modified or deleted using the controls in the VNAV Options menu. Select a value in the ALT column to display available options.

Selection	Function
Type	• Opens a list of available constraint types • Options: At, At or Above, At or Below, and Between
Altitude Data Entry	• Opens a keypad. Specify an altitude value for the selected constraint type • Unit options: MSL, AGL, and Flight Level
Revert Constraint	• Returns a modified altitude constraint to its original published value
Remove Constraint	• Removes the VNAV designation from the altitude • Value remains displayed for reference purposes. It is no longer used to compute vertical guidance • Removing the VNAV designation from an altitude may invalidate other displayed altitudes or cause them to change after recalculation

Table 4-2 Altitude Constraint Options

To designate a waypoint altitude for use with vertical guidance:

1. Select a waypoint altitude constraint.

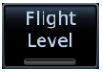
2. Touch **Save**.

The altitude color changes to cyan, indicating it is usable for vertical guidance.

To enter or modify an altitude constraint:

1. Select an altitude constraint.

2. Touch **Type** and select the constraint type.



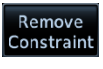
3. Select the altitude data key. Enter an altitude constraint value using the keypad. Touching **Flight Level** enters the value as a flight level.

4. Touch **Enter** to accept the altitude.

5. Touch **Save**.

To delete an altitude constraint:

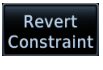
1. Select an altitude constraint.



2. Touch **Remove Constraint**.
3. Confirm the request by selecting **OK**.

To return a modified altitude constraint to its original database value:

1. Select an altitude constraint containing the pencil icon.



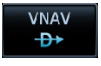
2. Touch **Revert Constraint**.
3. Confirm the request by selecting **OK**.

4.3.3.5 VNAV Direct-To

The VNAV Direct-To function creates a vertical navigation path from the aircraft's current position and altitude to a selected waypoint's location and altitude. By removing any VNAV constraints between the aircraft and the selected waypoint, it allows the pilot to fly the lateral flight plan in a continuous descent and reach the waypoint at the specified altitude.

To initiate a VNAV Direct-To:

1. Select an altitude constraint.



2. Touch **VNAV Direct-To**.
3. Confirm the request by selecting **OK**.

4.3.3.6 Transition to Approach

Function availability dependent on installer configuration. For more information, refer to the AFMS.

Approach Type	VNAV Response
Transition to Approach Enabled	• Vertical path attempts a smooth transition from en route to approach vertical guidance • Aircraft intercepts with approach guidance from below the glidepath/glideslope
Transition to Approach Not Enabled	• En route VNAV terminates at the waypoint prior to the FAF on approaches with vertical guidance • En route VNAV terminates at the FAF (LNAV only)

Table 4-3 VNAV Approach Response

4.3.4 Temperature Compensated Altitude

NOTE: *GTNs and TXi displays use only one destination airport temperature for calculating compensated altitudes. Changing the temperature on one of these units automatically recalculates the value across all connected GTNs and GDUs.*

A temperature compensation function calculates loaded approach altitudes based on the pilot-specified destination temperature. Once the pilot enters a destination temperature, the system increases the approach altitudes accordingly.

4.3.4.1 Temperature Compensation Requirements

- A destination airport is present in the active flight plan
- GDU 700( )/1060 for access via PFD Minimums menu

4.3.4.2 Setting Temperature Compensated Altitude

Temperature compensation controls are accessible from two locations:

- Destination Temperature Compensation window
- Minimums menu (PFD only)

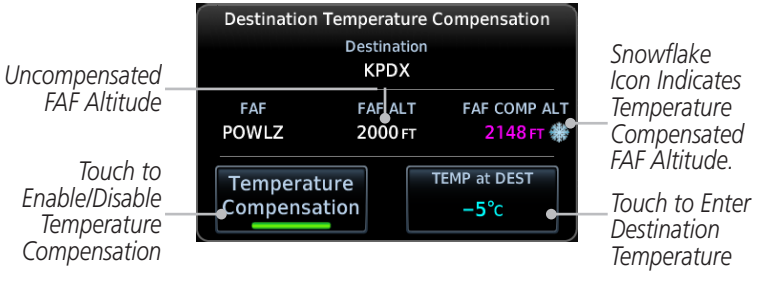


Figure 4-49 Destination Temperature Compensation Window

To activate temperature compensated altitude:

1. While viewing the Active Flight Plan page, touch **Menu**.

2. Touch **TEMP COMP**. The Destination Temperature Compensation pop-up opens.

3. Touch **Temperature Compensation**.

4. Touch **TEMP at DEST** and specify the destination airport temperature.

The temperature compensated FAF altitude displays in magenta.

4.3.5 Parallel Track

NOTE: *En route vertical navigation is unavailable while the parallel track function is active.*

Parallel track allows you to create a parallel course offset of 1 to 99 NM to the left or right of your current flight plan. After setting a parallel track to your current flight plan, a magenta parallel track line will be drawn offset from the original by the selected distance. The original course line will be drawn in gray. The aircraft will navigate to the parallel track course line and external CDI/HSI guidance will be driven from the parallel track.

When you reach the end of the flight plan, a message will state, "Parallel offset terminating in X seconds." The message will be given when the aircraft reaches the offset distance from the end of the parallel track. This will give the pilot sufficient time to intercept the original course.

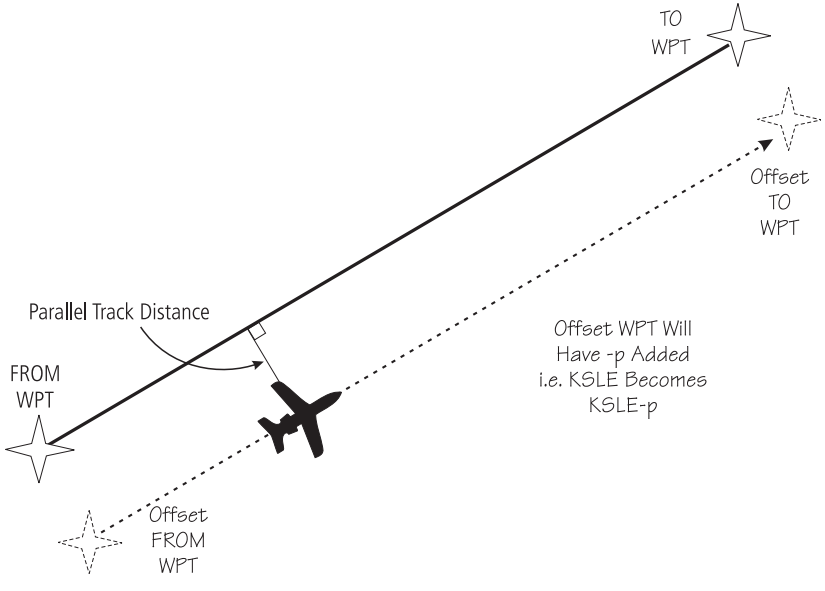


Figure 4-50 Parallel Track Description

NOTE: *In software v6.21 and earlier, graphically editing a flight plan cancels the parallel track function.*

4.3.6 Edit Data Fields

The Active Flight Plan Page shows each waypoint for the flight plan, along with the Desired Track (DTK), Distance (DIS) for each leg, and Cumulative Distance (CUM). Data fields are user-selectable and may be changed to display:

ALT - Altitude	ESA - En Route Safe Altitude
CUM - Cumulative Distance	ETA - Estimated Time of Arrival
DIS - Distance	ETE - Estimated Time En route
DTK - Desired Track	FPA - Flight Path Angle

When configured for VNAV, the GTN automatically selects the altitude data field for the first column.

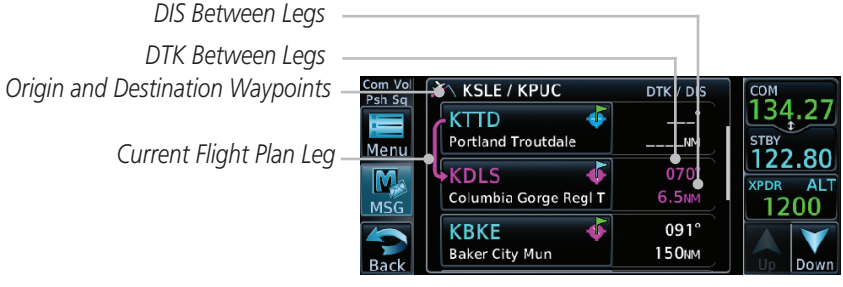


Figure 4-53 Flight Plan Data Fields

1. While viewing the Flight Plan page, touch the **Menu** key, and then the **Edit Data Fields** key.

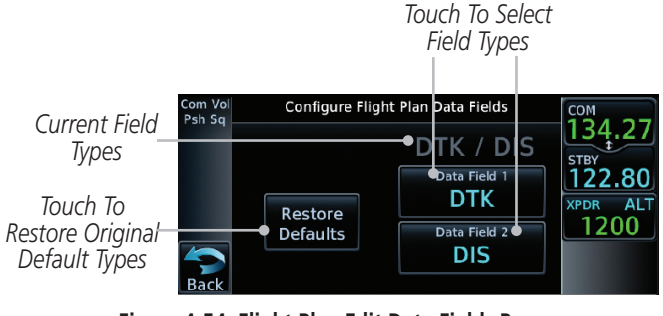


Figure 4-54 Flight Plan Edit Data Fields Page

2. Touch one of the field keys to select from the list.

Figure 4-57 Flight Plan Catalog Route Options

3. Touch the Route Option key for the desired option to act on the selected flight plan.

4.3.7.1 Catalog Route Option - Activate

1. While viewing the Flight Plan Catalog page, touch the desired flight plan to select it. The Route Options menu will be displayed.

2. Touch the **Activate** key and then touch **OK**. The selected flight plan will be activated.

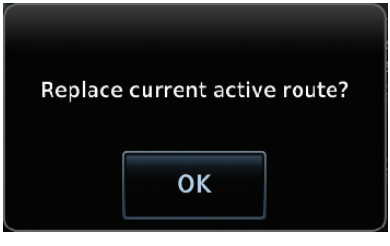


Figure 4-58 Touch OK to Replace the Existing Active Flight Plan

3. The Active Flight Plan page will now be displayed.

4.3.7.2 Catalog Route Option - Invert & Activate

NOTE: *Inverting a flight plan removes all ATKs.*

1. While viewing the Flight Plan Catalog page, touch the desired flight plan to select it. The Route Options menu will be displayed.

2. Touch the **Invert & Activate** key and then touch **OK**. The selected flight plan will be inverted and activated.

5.5 Direct-To Map Waypoint

A Direct-To course may be set to any waypoint selected on the Map page. The waypoint is selected by touching an item such as an airport, VOR, or NDB or any other location. Touching the map page at any place not having an existing location name will create a waypoint with the name "MAPWPT." Touching the **Direct-To** key will automatically insert the selected waypoint as the Direct-To waypoint.

1. On the Map page, touch the map at the location intended to be the Direct-To waypoint.

2. Press the **Direct-To** key on the right side of the unit.

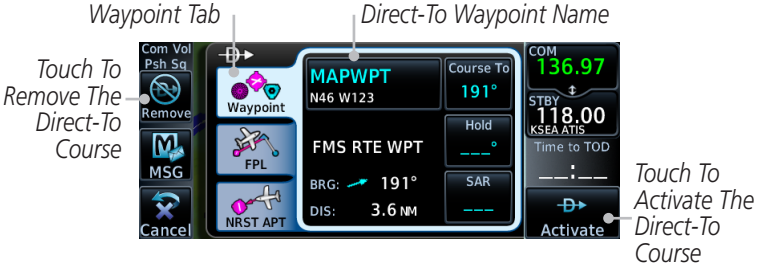
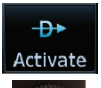


Figure 5-9 Touch the Map to Create a MAPWPT as the Direct-To Course Destination



3. Touch the **Activate** key or press the **small right** knob to activate the selection.

6 PROCEDURES

The GTN 6XX allows you to fly non-precision and precision approaches to airports with published instrument approach procedures. The system can also provide visual approach guidance to most airports.

The Procedures Page is displayed by touching the **PROC** key on the Home page. The Procedures Page provides access to approaches, departures and arrivals. Selections are also shown to: Activate Approach, Vectors to Final, and Activate Missed Approach.

NOTE: *Baro-corrected altitude is not required by the GTN unit to meet the requirements of TSO-C146c; however, to take full advantage of the GTN unit's capabilities, an optional baro-corrected altitude source is recommended for (1) automatic sequencing of altitude leg types, and (2) en route vertical navigation. If the GTN does not receive baro-corrected altitude data, altitude leg types require manual sequencing, and en route vertical navigation is not available.*

6.2 Selecting a Departure

A Departure Procedure (DP) is loaded at the departure airport in the flight plan. Only one departure can be loaded at a time in a flight plan. If a departure is loaded when another departure is already in the active flight plan, the new departure replaces the previous departure. The route is defined by selection of a departure, the transition waypoint, and a runway.

NOTE: *Vector-only departures are not available in the Procedures database as the GTN 6XX cannot provide navigational guidance on vectored legs.*

1. Touch the **PROC** key on the Home page and then touch the **Departure** key to display the Departure list.

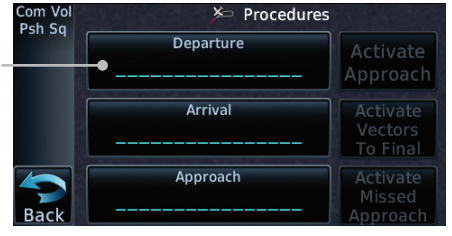


Figure 6-2 Select Departure

2. If necessary, touch the **Airport** key and enter the departure airport. Touch the key for the desired Departure.

NOTE: *Advisory climb altitudes for SIDs may not match charted altitudes. Do not rely solely on GTN advisory altitudes.*

3. Touch the key for the desired Transition.

Figure 6-3 Selecting a Departure Transition

5. Touch the key for the desired Runway, if necessary. The completed Arrival page will be displayed.

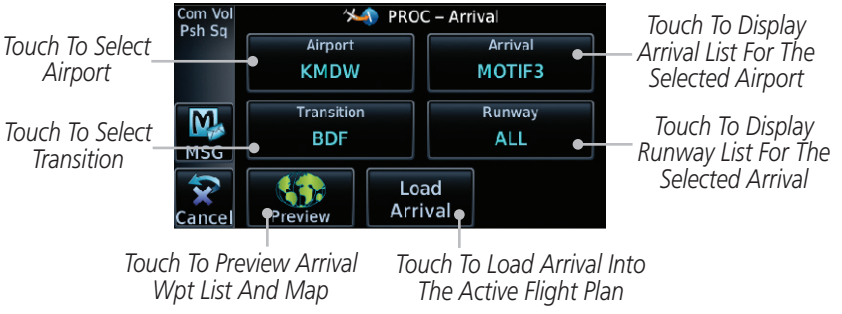


Figure 6-12 Completed Arrival Page

NOTE: *If the selected runway is depicted as RW10B, for instance, this means both runways 10L and 10R.*

6. Touch the **Preview** key. A preview of the Arrival and the Sequence List will be displayed.

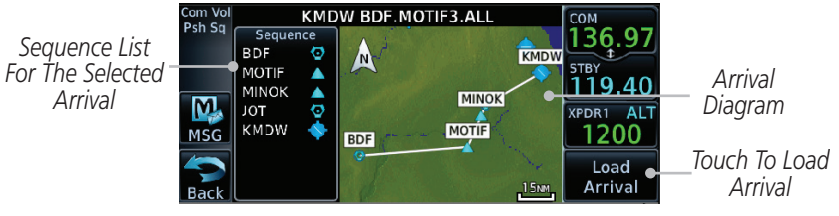
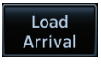


Figure 6-13 Arrival Map Preview and Sequence List



7. Touch the **Load Arrival** key to insert the arrival into the flight plan. The Active Flight Plan page will be displayed.

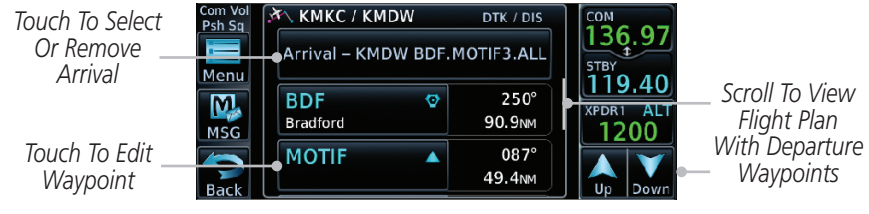


Figure 6-14 Flight Plan With Arrival Loaded

NOTE: *If using Descent VNAV, verify that the altitudes for the selected procedure match the charted altitudes and are appropriate for the airframe type.*

6.4 Selecting an Approach

Only one approach can be loaded at a time in a flight plan. If an approach is loaded when another approach is already in the active flight plan, the new approach replaces the previous approach. The route is defined by selection of an approach, the transition waypoint, and a runway.

NOTE: *In software v6.21 and later, the pilot may load an alternate approach during a missed approach procedure. The GTN retains all missed approaches in the flight plan.*

1. Touch the **PROC** key on the Home page. The Approach, Arrival, and Departure fields will be dashed until a selection is made.

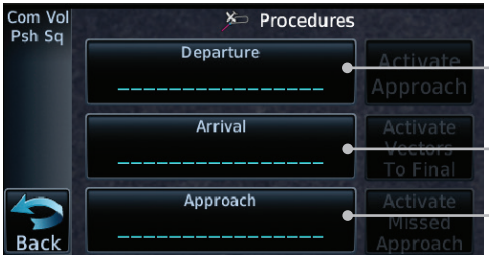
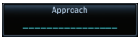


Figure 6-15 Procedures Selection Window



2. Touch the **Approach** key on the Procedures page to select an approach for the destination airport. Confirm that the intended airport is shown or touch the **Airport** key and select the desired airport.

NOTE: *If using Descent VNAV, verify that the altitudes for the selected procedure match the charted or ATC cleared altitudes and are appropriate for the airframe type.*

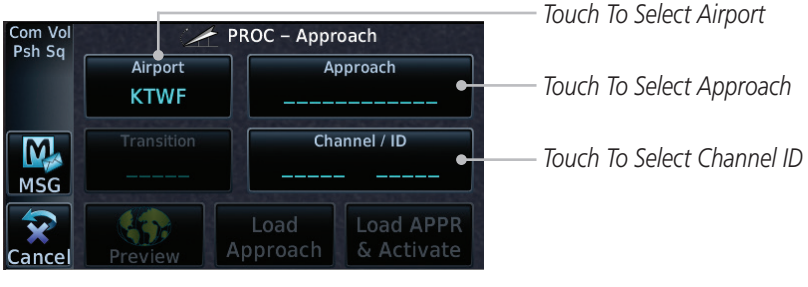


Figure 6-16 Selecting an Approach

v5.13 and Earlier or v6.50 and Later	v6.00 Through v6.41
If you build your flight plan with the destination airport at the end and then load an approach procedure, you will navigate all the way to the destination airport before joining the procedure. Be sure when LOADING and not ACTIVATING an approach procedure that the route to be flown is correct.	If you build your flight plan with the destination airport at the end and then load an approach procedure, the destination airport will be removed from the end of the flight plan. If the leg to the destination airport is the active leg when loading an approach procedure, you will navigate all the way to the destination airport before joining the procedure. Be sure when LOADING and not ACTIVATING an approach procedure that the route to be flown is correct.

Table 6-2 Loading and Activating an Approach

9. Touch the **Load APPR & Activate** key, which makes the active leg Direct-To the selected transition waypoint, or for Vector approaches to activate a leg that is an extended final approach course. You can also "activate" the selected procedure on the Procedures page, if the approach is not activated on this page.

NOTE: *When re-activating an approach, the decision as to whether a hold is inserted at the IAF or not is assumed to be the same as the first time the approach was activated, regardless of current aircraft position. If the pilot wishes to have the hold inserted or removed from the procedure, the procedure must be re-loaded or activated from the PROC-Approach page.*

7.7 User Waypoints

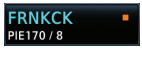
NOTE: *User airport feature is available in software v6.50 and later.*

In addition to the airport, VOR, NDB and intersection information contained in the navigation database, the GTN 6XX allows you to store up to 1,000 user-defined waypoints. The User Waypoint Page displays the waypoint name (up to six characters long), location, and elevation (user airports only).

To minimize nuisance terrain alerting when landing at airports not in the navigation database, user waypoints may be configured as user airports. User airports display on both the Waypoint Info and Nearest Airport pages.

Figure 7-21 Waypoint Info for a User Waypoint

7.7.1 Select User Waypoint by Name



1. While viewing the User Waypoint page, touch the User Waypoint Name.

2. Use the keypad to select the characters for the name and then touch **Enter**.

7.8 Create Waypoint

User waypoints are created from the Create User Waypoint page. To create a new user waypoint, simply enter its name (identifier) and position, or reference another waypoint by radial and distance.

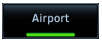
Figure 7-24 Waypoint Info - Create User Waypoint

1. From the Waypoint Info page, touch the **Create Wpt** key.

2. Touch the **User Identifier** key.

3. Use the keypad to type the waypoint name (up to six characters) and then touch **Enter**.

Figure 7-25 Waypoint Info - Create User Waypoint Name



4. If desired, touch the **Airport** key to make the waypoint a user airport.

5. Touch the **Comment** key to add a short comment for the new waypoint.

6. Touch the **Position** key and then **Lat/Lon**, **Radial/Radial**, or **Radial/Distance** to assign the type. See the following instructions for more detail.

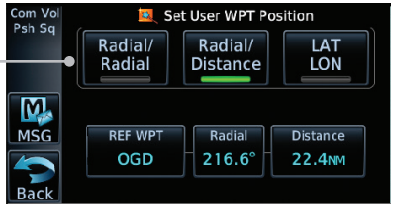
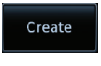


Figure 7-26 Waypoint Info - Create User Waypoint Type

7. If desired, touch the **Temporary?** key to create the waypoint for only temporary use. Temporary waypoints will be removed when the power is cycled.

8. For user airports, touch the **Elevation** key and specify airport elevation.



9. When finished with all selections, touch the **Create** key to create the new waypoint.

7.8.1 Mark On Target

NOTE: *This feature is available in software v4.00 and later.*

If an external Mark On Target (MOT) switch is installed, pressing that switch will result in the creation of a User waypoint called MOTxxx at the point in space where the MOT switch was pushed. The waypoints are created in increasing numeric order up to number 999, at which point they will start replacing existing waypoints at the beginning of the list.

When a Mark on Target waypoint is created, it may not be immediately visible on the moving map page because the ownship icon will be directly on top of the waypoint. Creation of the waypoint can be verified by changing zoom scales on the map or viewing the User Waypoints page.

7.8.2 Waypoint Location Based on LAT/LON

1. From the Create User Waypoint page, touch the **Position** key and then the **LAT/LON** key. Next, touch the **Latitude/Longitude** value key.

Figure 7-27 Waypoint Info - Create User Waypoint Type - LAT/LON

2. The Lat/Lon coordinate values will be highlighted. Touch the **Lat** or **Lon** key to toggle selection of the hemisphere values and highlight the selected value. The **Large** knob may also be used for cursor movement and characters selected with the **Small** knob. Use the **Large** knob to backspace or move the cursor to the left.

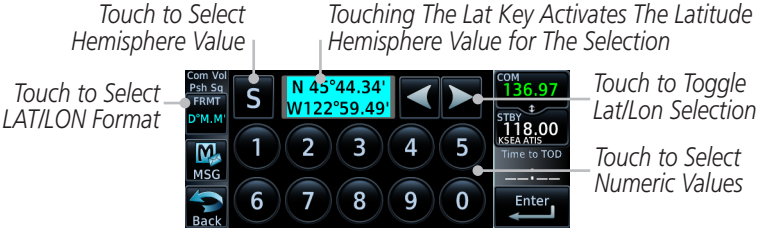
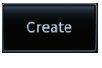


Figure 7-28 Waypoint Info - Set Lat/Lon Coordinates

3. Touch the desired hemisphere keys to select the desired values. After selecting the hemisphere value, the cursor will advance to the first character of the adjacent numeric value for selection. Even when the hemisphere values are highlighted, touching a valid numeric key will always place the cursor at the first numeric value.

4. When finished with the Lat/Long selections, touch the **Enter** key.



5. When finished with all selections, touch the **Create** key to create the new waypoint.

7.9 Import User Waypoints (Datacard)

NOTE: *This feature is available in software v5.10 and later.*

The GTN can import user generated waypoints from a file on the datacard. The created waypoints will be at the latitude and longitude specified in the file with the specified name and comment. This function overwrites any existing user waypoints with the same name.

When a user waypoint file is on the datacard, a key will be available on the Waypoint Info page for importing user waypoints.

1. Insert a datacard with the User waypoints into the GTN.
2. From the Waypoint Info page, touch the **Import Waypoints** key.
3. Touch **OK** to acknowledge the pop-up to import all of the user waypoints in the file.

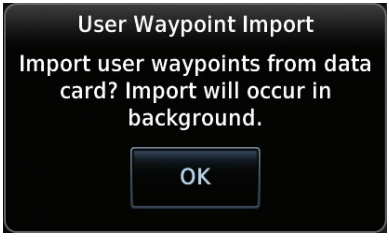


Figure 7-31 Start User Waypoint Import

4. The pilot is informed of the status of the user waypoint import via one of the following system messages.

8.1.2 Map Setup

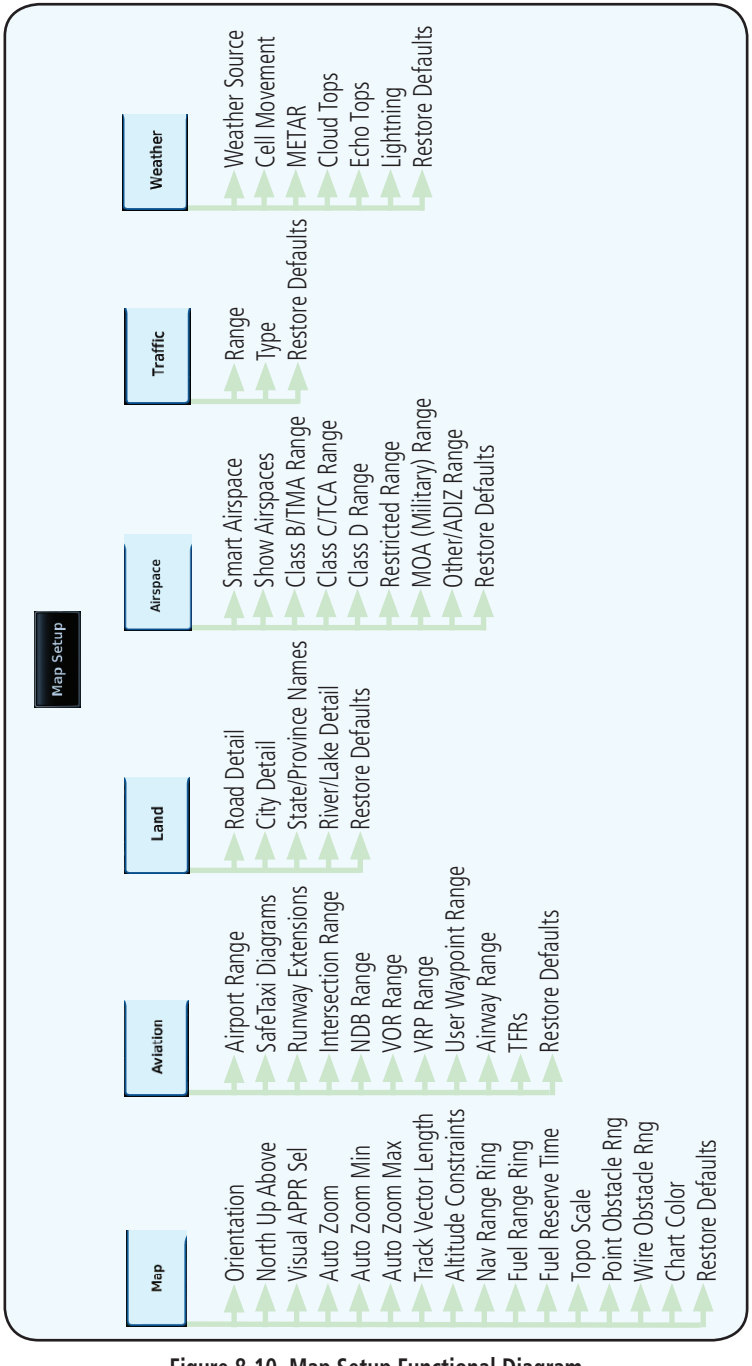


Figure 8-10 Map Setup Functional Diagram

8.1.2.1 Map

The Map option defines the behavior and display of information on the Map page such as: Orientation, North Up Above, Auto Zoom, Nav Range Ring, Topo Scale, Obstacle Range, and Restore Defaults. The default values are shown in **bold** type.

Feature	Selection
Orientation	North Up, **Track Up**, Heading Up
North Up Above	Off, 10 NM, 15 NM, 25 NM, **40 NM**, 50 NM, 75 NM, 100 NM, 150 NM, 250 NM
Visual APPR Selector	Off, 2.5 NM, 4 NM, 5 NM, 7.5 NM,**10 NM**, 15 NM,25 NM
Auto Zoom	Off, **On**
Auto Zoom Min	250 ft, 400 ft, 500 ft, 750 ft, 1000 ft, 1500 ft, 2500 ft, 0.5 NM, 0.75 NM, 1 NM, **1.5 NM**, 2.5 NM, 4 NM, 5 NM, 7.5 NM, 10 NM, 15 NM, 25 NM, 40 NM, 50 NM, 75 NM, 100 NM, 150 NM, 250 NM, 400 NM
Auto Zoom Max	250 ft, 400 ft, 500 ft, 750 ft, 1000 ft, 1500 ft, 2500 ft, 0.5 NM, 0.75 NM, 1 NM, 1.5 NM, 2.5 NM, 4 NM, 5 NM, 7.5 NM, 10 NM, 15 NM, **25 NM**, 40 NM, 50 NM, 75 NM, 100 NM, 150 NM, 250 NM, 400 NM
Track Vector Length	OFF, 30 SEC, **60 SEC**, 2 MIN, 5 MIN, 10 MIN, 20 MIN
Altitude Constraints	Off, Selected Only, **Selected & Active**, All
Nav Range Ring	Off, **On**
Fuel Range Ring	**Off**, On
Fuel Reserve Time	30 MIN, **45 MIN**, 60 MIN, 90 MIN
Topo Scale	**Off**, On
Point Obstacle Range	Off, 4 NM, **5 NM**, 7.5 NM, 10 NM, 15 NM
Wire Obstacle Range	Off, 1 NM, **1.5 NM**, 2.5 NM
Restore Defaults	Returns values to original factory settings

Table 8-2 Map Setup Map Options

Altitude Constraints

NOTE: *This feature is available in software v6.50 and later.*

Enabling this feature displays altitude constraints from the flight plan. The active constraint is the altitude to which VNAV is currently providing guidance. For more information about altitude constraints, refer to section 4.3.3.

Figure 8-18 Altitude Constraints

8.6 Map Symbols

Various symbols are used to distinguish between waypoint types. The identifiers for any on-screen waypoints can also be displayed. Special-use and controlled airspace boundaries appear on the map, showing the individual sectors in the case of Class B, Class C, or Class D airspace. The following symbols are used to depict the various airports and navaids on the Map Page.

Symbol	Description	Symbol	Description
	Airport with hard surface runway(s); Non-Serviced, Primary runway shown		Airport with hard surface runway(s); Serviced, Primary runway shown
	Airport with soft surface runway(s) only, Non-Serviced		Airport with soft surface runway(s) only, Serviced
	Restricted (Private) Airfield		Unknown Airport
	Heliport		NDB
	Intersection		Locator Outer Marker
	VOR		VOR/DME
	VORTAC		DME
	TACAN		TOD/BOD
	User Waypoint		User Airport
	ATK		VRP

Table 8-19 Map Symbols

9.5.1 Traffic Applications - SURF, AIRB, etc.

The GTN ADS-B traffic display is capable of running in two "modes:" Airborne Situational Awareness (AIRB) and Surface Situation Awareness (SURF).

AIRB is in operation in the en route environment, outside of five NM from and 1,500 feet above the nearest airport.

SURF is in operation within the terminal environment (within five NM and less than 1,500 feet above field elevation). When SURF is running, and the zoom scale on the traffic display is less than two NM, the airport environment (including taxiways and runways) is displayed in addition to traffic. This is to aid in situational awareness of runway occupancy/availability, etc.

Due to the varying precision of the data received via ADS-B, ADS-R, and TIS-B, all traffic targets may not be depicted on the traffic display. Because higher data precision is required for display in the SURF environment, some targets eligible for AIRB will not be displayed while SURF is active. Individual eligibility for AIRB and SURF is depicted in the selected traffic data on the traffic page.

9.5.2 ADS-B Traffic Menu

The Traffic Menu allows control of the traffic information display.

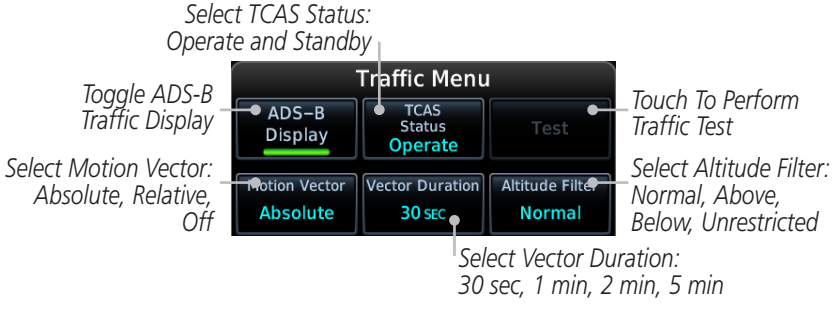
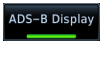


Figure 9-11 ADS-B Traffic Menu

9.5.2.1 ADS-B Display



Touching **ADS-B Display** toggles the display of ADS-B traffic and ADS-B traffic alerting.

10 TERRAIN

10.1 Terrain Configurations

NOTE: *Obstacles are removed from the Terrain and TAWS pages at ranges greater than 10 NM.*

During power-up of the GTN 6XX, the terrain/obstacle database versions are displayed along with a disclaimer. At the same time, the Terrain system self-test begins. A failure message is issued if the terrain test fails.

Garmin provides the following terrain awareness solutions within the GTN 6XX environment.

Alerting functions are designed to increase situational awareness and help reduce controlled flight into terrain (CFIT).

Terrain Type	Features
(H)Terrain Proximity	• Standard terrain function displaying relative elevations on moving map • Does not provide aural or visual alerts
(H)Terrain Alerting	• Basic terrain alerting function • Provides aural and visual alerts • Does not meet TSO-C151c or TSO-C194 requirements for certification
HTAWS	• Optional terrain alerting function for rotorcraft • Satisfies TSO-C194 requirements for certification
TAWS-A	• Optional TSO-C151c Class A terrain alerting system • Provides aural and visual alerts when terrain and obstacles are within a given altitude threshold from the aircraft
TAWS-B	• Optional TSO-C151c Class B terrain alerting system • Provides aural and visual alerts

Table 10-1 Terrain Configurations

10.2 GPS Altitude for Terrain

GPS altitude is derived from satellite measurements. To require an accurate 3-D fix (latitude, longitude, altitude), a minimum of four operating satellites must be in view of the GPS receiver antenna.

The terrain system uses GPS altitude and position data to:

- Create a 2-D image of surrounding terrain and obstacles relative to the aircraft's position and altitude
- Calculate the aircraft's flight path in relation to surrounding terrain and obstacles
- Predict hazardous terrain conditions and issue alerts

10.2.1 GSL Altitude & Indicated Altitude

The GTN converts GPS altitude data to GSL altitude (i.e., the geometric altitude relative to MSL) for use in terrain functions. All Terrain page depictions and elevation indications are in GSL.

Variations between GSL altitude and the aircraft's corrected barometric altitude (or indicated altitude) are common. As a result, Terrain page altitude data may differ from current altimeter readings. Both GSL altitude and indicated altitude represent height above MSL, but differ in accuracy and reliability.

Altitude Type	Features
GSL	• Highly accurate and reliable geometric altitude source • Does not require local altimeter settings to determine height above MSL • Not subject to pressure and temperature variations • Affected primarily by satellite geometry
Indicated	• Barometric altitude source corrected for pressure variations • Requires frequent altimeter setting adjustment to determine height above MSL • Subject to local atmospheric conditions • Affected by variations in pressure, temperature, and lapse rate

Table 10-2 GSL and Indicated Altitude Features

10.5 Terrain Alerting

Terrain alerting functions increase situational awareness and help reduce controlled flight into terrain (CFIT). Visual and aural annunciations alert the pilot when terrain and obstacles are within the given altitude threshold from the aircraft.

10.5.1 Terrain Alerting Requirements

- A valid terrain/obstacle database
- A valid 3-D GPS position solution

10.5.2 Terrain Alerting Limitations

NOTE: *The data contained in the databases comes from government agencies. Garmin accurately processes and cross-validates the data but cannot guarantee its accuracy or completeness.*

Terrain alerting uses terrain and obstacle information supplied by government sources. Terrain information is based on terrain elevation information in a database that may contain inaccuracies. Individual obstructions may be shown if available in the database. The data undergoes verification by Garmin to confirm accuracy of the content.

10.5.3 Using Terrain Alerting

During unit power-up, the terrain/obstacle database versions are displayed. At the same time, the terrain system self-test begins, and one of the following aural messages is generated:

- *"Terrain System Test OK"*
- *"Terrain System Failure"*

On the Map page, terrain and obstacles with heights greater than 200 feet Above Ground Level (AGL) display in yellow and red. The GTN 6XX adjusts colors automatically as the aircraft altitude changes.

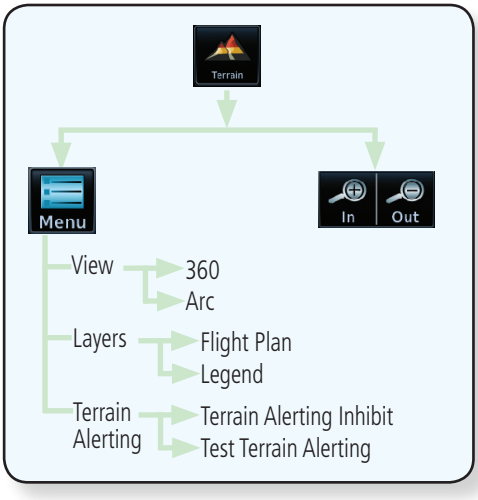


Figure 10-5 Terrain Alerting Page Functional Diagram

10.5.4 Displaying Terrain Alerting Data

Terrain uses yellow (caution) and red (warning) to depict terrain and obstacles alerts relative to aircraft altitude. Colors are adjusted automatically as the aircraft altitude changes. The colors and symbols shown below are used to represent terrain, obstacles, and threat locations. Obstacles are removed when more than 2000 ft below the aircraft.

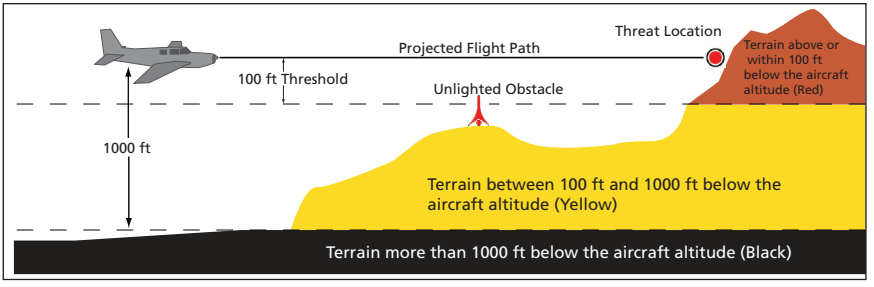


Figure 10-6 Terrain Altitude/Color Correlation for Terrain Proximity

Obstacle Symbol	Unlighted Obstacle		Lighted Obstacle		Threat Location Indicator	Terrain Color	Terrain/ Obstacle Location	Alert Level
	< 1000 ft AGL	> 1000 ft AGL	< 1000 ft AGL	> 1000 ft AGL				
						Red	Terrain/ Obstacle at or within 100 ft below current aircraft altitude	WARNING (Red)
						Yellow	Terrain/ Obstacle between 100 ft and 1000 ft below current aircraft altitude	CAUTION (Yellow)
						White	Terrain/ Obstacle between 1000 ft and 2000 ft below current aircraft altitude	

Table 10-5 Terrain/Obstacle Colors and Symbology

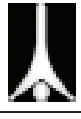
Tower	Windmill	Windmill in Group	Power Line
			

Table 10-6 Obstacle Icon Types

Grouped obstacles are shown with an asterisk (as shown in the Windmill in Group example above). The color of the asterisks is tied to the relative altitude of the highest obstacle in the group, not other obstacles within that group. Obstacles are grouped when they would otherwise overlap.

10.5.5 Terrain Page

Terrain information is displayed on the Map and Terrain pages. The Terrain page is specialized to show terrain, obstacle, and threat location data in relation to the aircraft's current altitude, without clutter from the basemap. Flight plan information (airports, VORs, and other NAVAIDs) included in the flight plan are displayed for reference. If an obstacle and the projected flight path of the aircraft intersect, the display automatically zooms in to the closest threat location on the Terrain page.

Aircraft orientation on this map is always heading up unless there is no valid heading. If orientation is not heading up, it will be track up. Two views are available relative to the position of the aircraft: the 360° default display and the radar-like ARC (120°) display. Map range is adjustable with the **In** and **Out** keys from 1 to 200 NM, as indicated by the map range rings (or arcs).

10.5.5.1 Terrain Page Layers

1. While viewing the Terrain page, touch the **Menu** key.

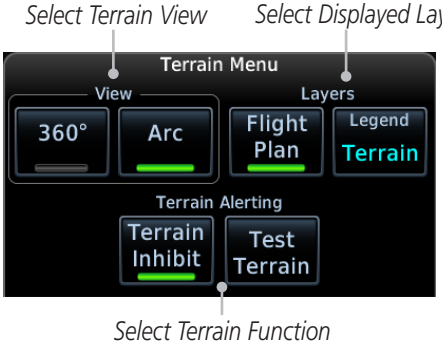


Figure 10-7 Terrain Menu

2. Touch the **Flight Plan** key to toggle the display of the active flight plan.

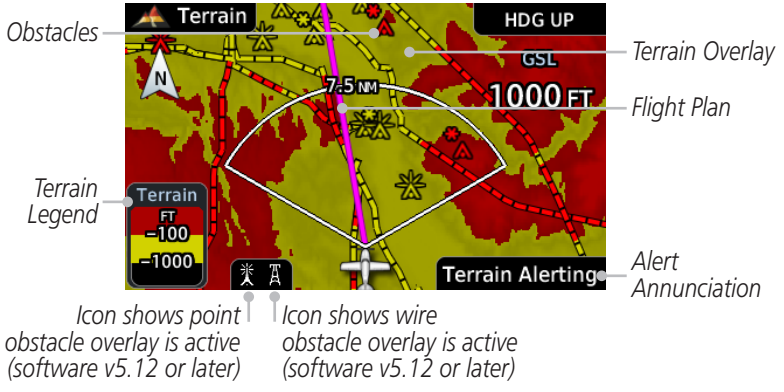
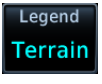


Figure 10-8 Flight Plan and Legend Shown On Terrain Page

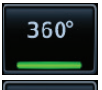


3. Touch the **Legend** key and select a legend for display on the Terrain page. Options include terrain, obstacle, and off.

10.5.5.2 Terrain Page View

Select the 120º Arc or 360º rings overlay for the Terrain page with either the **360º** or **Arc** keys from the Menu.

1. While viewing the Terrain page, touch the **Menu** key.



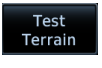
2. Touch the **360º** or **Arc** key.

10.5.5.3 Terrain Alerting Selections

An inhibit function allows you to manually inhibit aural terrain alerts. After cycling power, terrain alerting functions will no longer be inhibited.

1. While viewing the Terrain page, touch the **Menu** key.

2. Touch the **Terrain Inhibit** key to toggle the inhibiting of terrain alerts.



3. Touch the **Test Terrain** key to perform an internal test of the terrain alerting system. This function is not available when the aircraft is in the air.

10.5.6 Terrain Alerts

Alerts are issued when flight conditions meet parameters that are set within terrain alerting software algorithms. When an alert is issued, visual annunciations are displayed and aural alerts are simultaneously issued. Alert types are shown in the Terrain Alerts Summary with corresponding annunciations and aural messages.

When an alert is issued, annunciations appear on the Terrain page. If the page is not displayed at the time, a pop-up alert appears over the page being viewed.

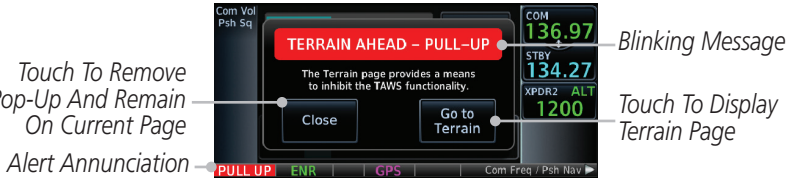


Figure 10-9 Terrain Alert Pop-Up

To acknowledge the pop-up alert:

Go to Terrain — Touch the **Go to Terrain** key (accesses the Terrain page)

OR

Close — Touch the **Close** key to remove the pop-up alert

If the pilot takes no action, the pop-up will be removed when the alert is no longer active.

10.5.6.1 Terrain Alerting Colors and Symbology

Color and symbols are also associated with terrain alerts. The three alert levels and their associated text coloring as well as any associated symbology are shown in the following table.

Alert Level	Annunciator Text	Threat Location Indicator	Example Visual Annunciation
Warning	White text on red background		PULL UP
Caution	Black text on yellow background		TERRAIN
Informational	Black text on white background	Not Applicable	TER INHB

Table 10-7 Terrain Alert Colors and Symbology

Alert Type	Alert Annunciation	Aural Message
FLTA Terrain Warning (RTC-W, ITI-W)	PULL UP	"Terrain Ahead, Pull Up; Terrain Ahead, Pull Up"* or "Terrain, Terrain; Pull Up, Pull Up"
FLTA Obstacle Warning (ROC-W, IOI-W)	PULL UP	"Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up"* or "Obstacle, Obstacle; Pull Up, Pull Up"
FLTA Wire Warning (ILI-W, RLC-W)	PULL UP	"Wire Ahead Pull Up, Wire Ahead Pull Up"
FLTA Terrain Caution (RTC-C, ITI-C)	TERRAIN	"Terrain Ahead; Terrain Ahead"* or "Caution, Terrain; Caution, Terrain"
FLTA Obstacle Caution (ROC-C, IOI-C)	OBSTCL	"Obstacle Ahead; Obstacle Ahead"* or "Caution, Obstacle; Caution, Obstacle"
FLTA Wire Caution (ILI-C, RLC-C)	WIRE	"Wire Ahead"
Premature Descent Alert Caution (PDA)	TERRAIN	"Too Low, Terrain"

Alert Type	Alert Annunciation	Aural Message
Voice Call Out (VCO-500)	None	"Five-Hundred"

** Alerts with multiple messages are configurable at installation and are installation-dependent. Alerts for the default configuration are indicated with asterisks.*

Table 10-8 Alerts Summary

10.5.6.2 Forward Looking Terrain Avoidance

Reduced Required Terrain Clearance (RTC), Reduced Required Line Clearance (RLC), and **Reduced Required Obstacle Clearance (ROC)** alerts are issued when the aircraft flight path is above terrain, yet is projected to come within the minimum clearance values in the FLTA Alert Minimum Terrain and Obstacle Clearance Values table. When an RTC, RLC, and/or a ROC alert is issued, a threat location indicator is displayed on the Terrain page.

Imminent Terrain Impact (ITI), Imminent Line Impact (ILI), and **Imminent Obstacle Impact (IOI)** alerts are issued when the aircraft is below the elevation of a terrain or obstacle cell in the aircraft's projected path. ITI, ILI, and IOI alerts are accompanied by a threat location indicator displayed on the Terrain page. The alert is annunciated when the projected vertical flight path is calculated to come within minimum clearance altitudes in the following table.

Flight Phase	Minimum Clearance Altitude (feet)	
	Level Flight	Descending
En Route	700	500
Terminal	350	300
Approach	150	100
Departure	100	100

Table 10-9 FLTA Alert Minimum Terrain and Obstacle Clearance Values

During final approach, FLTA alerts are automatically inhibited when the aircraft is below 200 feet AGL while within 0.5 NM of the approach runway or below 125 feet AGL while within 1.0 NM of the runway threshold.

10.5.6.3 Premature Descent Alerting

A Premature Descent Alert (PDA) is issued when the system detects that the aircraft is significantly below the normal approach path to a runway.

PDA alerting begins when the aircraft is within 15 NM of the destination airport and ends when the aircraft is either 0.5 NM from the runway threshold or is at an altitude of 125 feet AGL while within 1.0 NM of the threshold. During the final descent, algorithms set a threshold for alerting based on speed, distance, and other parameters.

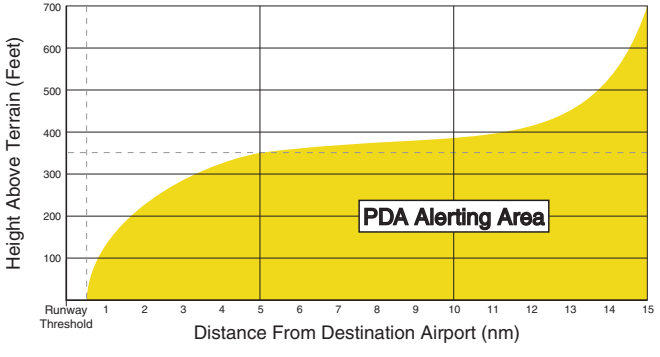


Figure 10-10 PDA Alerting Threshold

PDA and FLTA aural and visual alerts can be manually inhibited. Discretion should be used when inhibiting terrain alerts and the system should be enabled when appropriate. When terrain alerting is inhibited, the alert annunciation "TER INHB" is shown.

10.5.6.4 Inhibiting/Enabling PDA/FLTA Alerting

Inhibit mode deactivates the PDA/FLTA aural and visual alerts. Pilots should use discretion when inhibiting terrain alerts and always remember to enable the system when appropriate. Only the PDA and FLTA alerts are disabled in the inhibit mode. After cycling power, the terrain alerting function will no longer be inhibited.

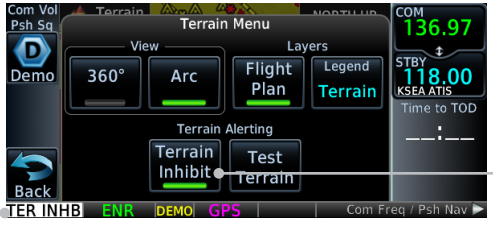
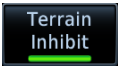


Figure 10-11 Terrain Alerting Inhibited Annunciation

1. While viewing the Terrain page, touch the **Menu** key.



2. Touch the **Terrain Inhibit** key to inhibit or enable terrain alerting (choice dependent on current state). A green bar in the key indicates the inhibit function is active.

10.5.6.5 Altitude Voice Call Out (VCO)

Terrain provides aural advisory alerts as the aircraft descends, beginning at 500 feet above the terrain, as determined by the radar altimeter (if greater than 5 NM from the nearest airport) or 500 feet above the nearest runway threshold elevation (if less than 5 NM from the nearest airport). Upon descent to this altitude, the terrain system issues the aural alert message "Five-hundred."

10.5.6.6 Terrain Not Available Alert

Terrain requires a 3-D GPS position solution along with specific vertical accuracy minimums. Should the position solution become degraded or if the aircraft is out of the database coverage area, the annunciation "TER N/A" is generated in the annunciation window and on the Terrain page. The aural message "Terrain Not Available" is generated. When the GPS signal is re-established and the aircraft is within the database coverage area, the aural message "Terrain Available" is generated (when the aircraft is airborne).

10.5.6.7 Terrain Failure Alert

Terrain continually monitors several system-critical items such as database validity, hardware status, and GPS status. If the terrain/obstacle database is not available, the aural message "Terrain System Failure" is generated along with a "TER FAIL" annunciation.

10.5.7 Terrain System Status

During power-up, the terrain system conducts a self-test of its aural and visual annunciations. This test can also be manually initiated. An aural alert is issued at test completion. Terrain system testing is disabled when ground speed exceeds 30 knots.

Alert Type	Alert Annunciation	Aural Message
Terrain Available	None	"Terrain Available"
Terrain System Test in Progress	TER TEST	None
Terrain System Test Pass	None	"Terrain System Test OK"
Terrain N/A	TER N/A	Terrain Not Available
Terrain Alerting is Disabled	TER INHB	None
Terrain System Test Fail	TER FAIL	"Terrain System Failure"

Table 10-10 Terrain System Test Status Annunciations

Connext Weather coverage is available throughout most of Europe, Canada and the U.S. Additional radar coverage areas are added continuously. For the latest radar coverage information, visit: https://fly.garmin.com/fly-garmin/connext/worldwide-weather/

Various world-wide weather subscription package options provide weather reporting for most of Europe, Canada, Australia, and the U.S.

11.3.1 Using Connext Satellite Weather Products

NOTE: *A system can be configured for multiple weather products, but only one may be selected for viewing in the Weather or map pages at a given time.*

When a weather product is active on the Weather Data Link Page or the Navigation Map Page, the age of the data is displayed on the screen. The age of the product is based on the time difference between when the data was assembled on the ground and the current GPS time. Weather products are refreshed at selectable intervals.

Weather products expire at intervals based on each product. When the data expires, it is removed from the display. This ensures that the displayed data is consistent with what is currently being broadcast by Connext Satellite Radio services. If more than half of the expiration time has elapsed from the time the data is received, the color of the product age displayed changes to yellow.

Waypoint Connext Data Request

1. Touch the **Waypoint** key to request that weather information will be shown around the selected waypoint.

2. Select the waypoint and then press **ENT.**

Diameter/Route Width Connext Data Request

After selecting a coverage option in the previous section, select the desired **Diameter** and then press **ENT.**

11.3.3.3 Connext Weather Map Orientation

1. While viewing the Connext Weather Menu, touch the **Orientation** key.
2. Touch the orientation choices of North Up, Track Up, and Heading Up and to accept the displayed value and return to the Connext Weather Menu.

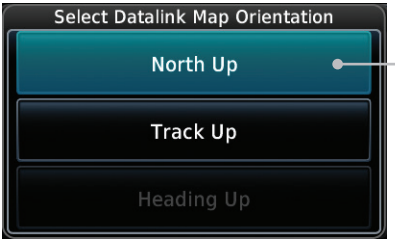
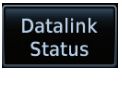


Figure 11-59 Connext Weather Map Orientation

11.3.4 Register with Connext

To access Connext Weather, visit flyGarmin.com and create a Connext Satellite Services account. Be ready to provide the GTN system ID, airframe information (model, tail number), and Iridium serial number. Garmin will issue an access code for entry on the Connext Registration page. If access code and system ID are correct, the airframe registration details will display.



1. While viewing Connext Settings Menu, touch the **Datalink Status** key.

14 UTILITIES

The Utilities page provides a group of features that make flight planning easier and more efficient.

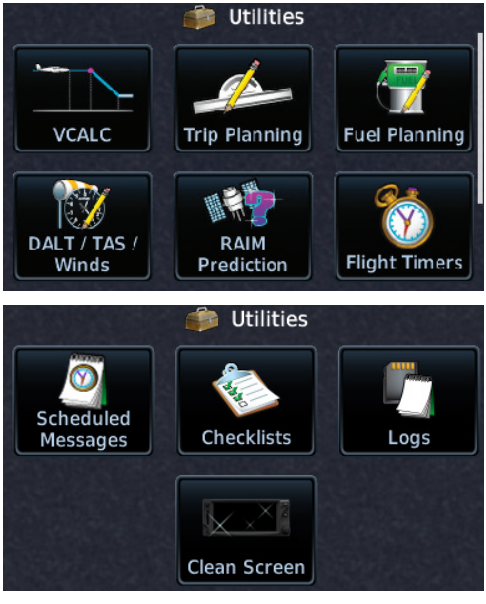


Figure 14-1 Utilities Home Page

Feature	Description
VNAV [1]	• Enable en route vertical guidance • Specify a target vertical speed and flight path angle • View active constraint data
VCALC [1]	Calculate time to TOD and vertical speed required to reach target altitude at the specified location.
Trip Planning	View DTK, DIS, ETE, ESA and ETA information for a direct-to, point-to-point between two specified waypoints or for any programmed flight plan.
Fuel Planning [2]	View fuel conditions along the active direct-to or flight plan.
DALT/TAS/Winds	Calculate altitude, airspeed, and winds.

Feature	Description
RAIM Prediction	Determine GPS coverage availability for the current location or a specified waypoint at any time and date. RAIM performs checks to ensure the GTN unit has adequate satellite geometry during flight.
Flight Timers	Monitor time in flight using three available timer types.
Scheduled Messages	Create custom reminder messages and set when they will display.
Checklists	Review a built-in version of the aircraft checklist.
Logs	Export a flight data log.
Clean Screen	Lock touchscreen controls to prevent accidental activation while cleaning the display.

Table 14-1 Utilities Page Features

Note 1: VCALC and VNAV functions are mutually exclusive. Enabling one automatically disables the other.

Note 2: Aircraft must be equipped with fuel flow and/or fuel on board sensors.

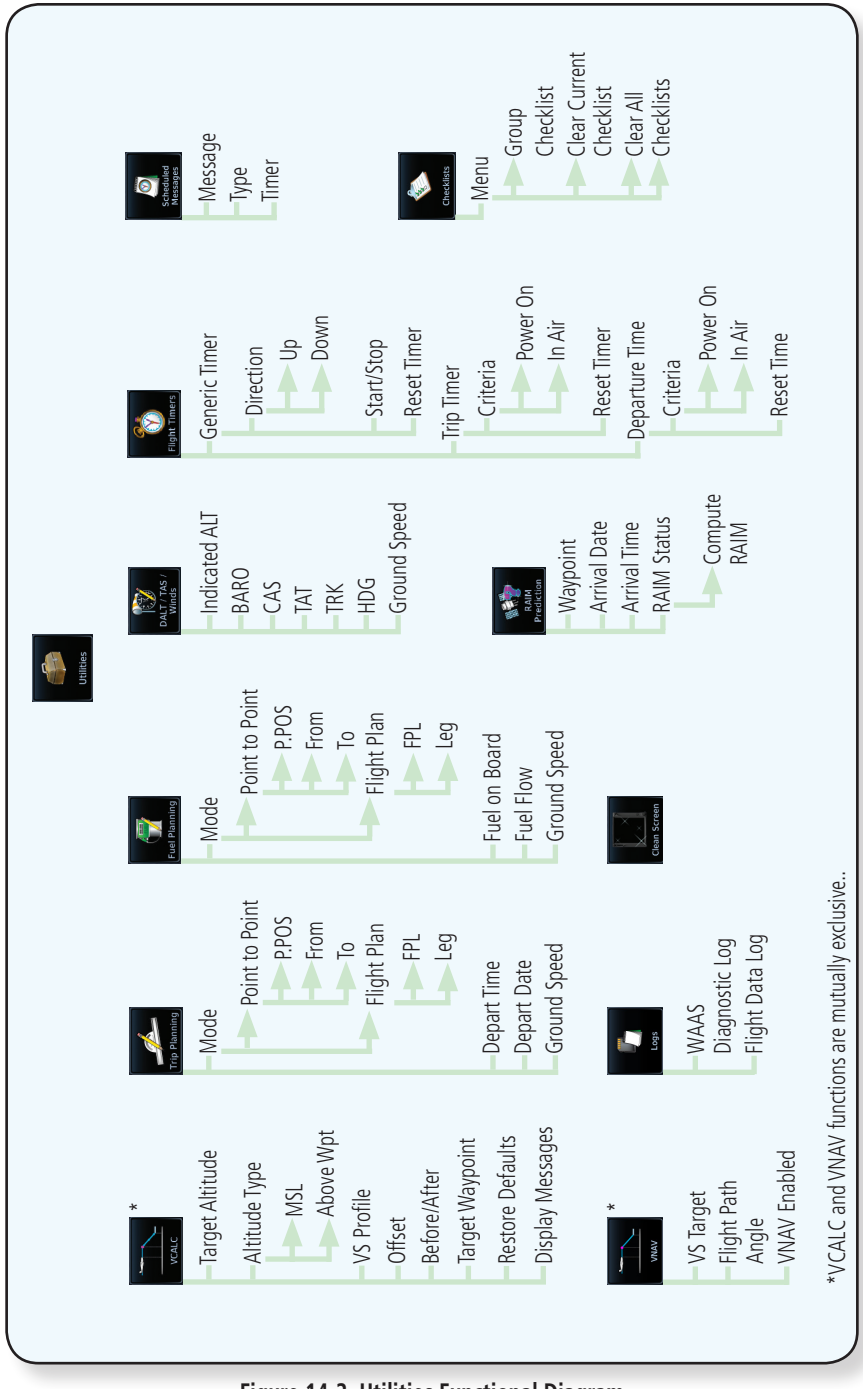


Figure 14-2 Utilities Functional Diagram

14.1 Vertical Calculator (VCALC)

NOTE: *If VNAV is enabled, the VCALC page is replaced with the VNAV Profile page. For more information, refer to section 4.3.3.*

The Vertical Calculator (VCALC) function allows you to create a three-dimensional profile which guides you from your present position and altitude to a final (target) altitude at a specified location. This is helpful when you'd like to descend to a certain altitude near an airport. Once the profile is defined, message alerts and additional data can be configured on the Default NAV and Map Pages to keep you informed of your progress.

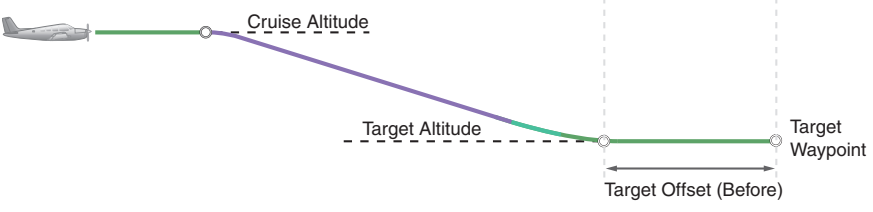


Figure 14-3 VCALC Target

VCALC is inhibited in the following conditions:

- Groundspeed is less than 35 knots
- No active flight plan or direct-to destination
- SUSP mode
- Vectors-to-Final mode
- VLOC mode
- After the FAF on an approach
- OBS mode

WARNING: *Do not use VCALC messages as the only means of either avoiding terrain/obstacles or following ATC guidance. VCALC provides advisory information only and must be used in concert with all other available navigation data sources.*

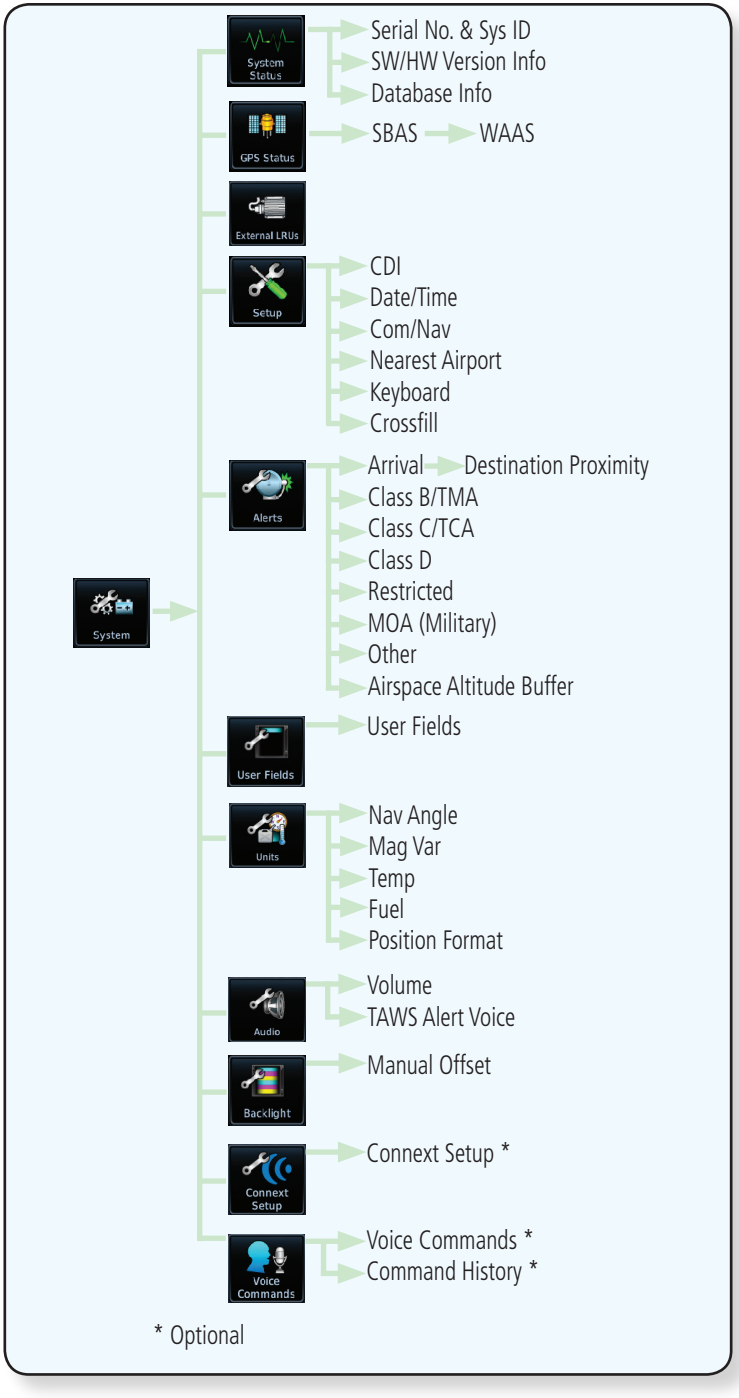


Figure 15-2 System Function Summary

15.4 Setup

The System Setup page allows you to:

- Select CDI scale and ILS CDI capture type
- Specify time format and local offset
- Access nearest airport search filtering options
- Access COM/NAV radio settings
- Select keyboard format
- Enable crossfilling to a second GTN or GNS unit

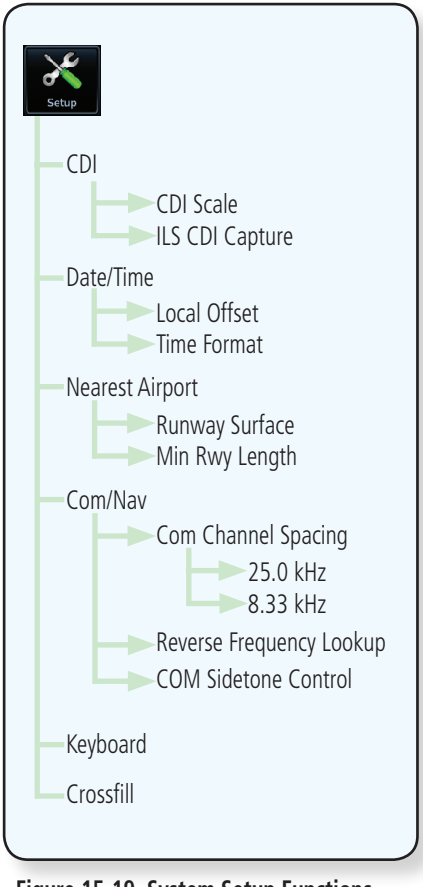


Figure 15-19 System Setup Functions

1. While viewing the System page, touch the **Setup** key.

Figure 15-20 System Setup Page

2. After making the desired selections, touch the **Back** key to return to the Setup page.

15.4.1 CDI Scale Selection

The CDI source and ILS CDI Capture type may be selected manually or automatically. The selected CDI Scale will be reflected in the annunciation bar at the bottom of the display.

CDI Scale Selection allows you to define the scale for the course deviation indicator (both on the GTN unit's on-screen CDI and the external CDI). The scale values represent full scale deflection for the CDI to either side. The default setting is "Auto." At this setting, the CDI scale is set to 2.0 NM during the "en route" phase of flight. Within 31 NM (terminal area) of your destination airport, the CDI scale linearly ramps down to 1.0 NM over a distance of 1 NM. Likewise, when leaving your departure airport the CDI scale is set to 1.0 NM and gradually ramps up to 2 NM beyond 30 NM (from the departure airport). During GPS approach operations the CDI scale gradually transitions down to an angular CDI scale. At 2.0 NM before the final approach fix (FAF), CDI scaling is tightened from 1.0 NM to the angular full scale deflection (typically the angular full-scale deflection is 2.0°, but will be as defined for the approach).

15.4.3 Nearest Airport Criteria

Nearest Airport Criteria defines the surface type and minimum runway length used when determining the 25 nearest airports to display on the Nearest Airport Page. A minimum runway length and/or surface type may be entered to prevent the display of airports with small runways, or runways that do not have an appropriate surface. Deselecting **Include User Airports** excludes user-defined airports from the nearest airport search.

Default settings are "0 feet (or meters)" for runway length and "any" for runway surface type.

1. While viewing the System Setup page, touch the **Nearest Airport** key.

Figure 15-25 Select Nearest Airport Criteria

2. Touch the **Runway Surface** key to display the options. Select the desired surface type.

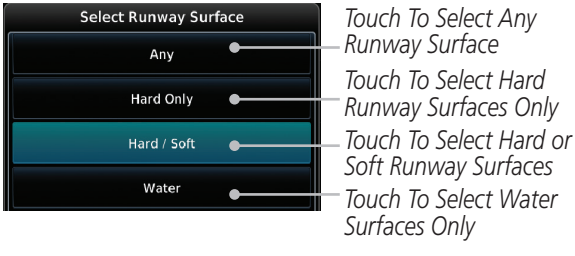
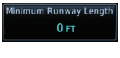


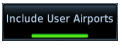
Figure 15-26 Nearest Airport Runway Surface Type



3. Touch **Minimum Runway Length** to display the keypad for selecting the minimum runway length. Select the desired minimum runway length with the numeric keypad. A selection of "0" will allow any length.

Figure 15-27 Nearest Airport Minimum Runway Length

4. After selecting the minimum runway length, touch the **Enter** key to save the entered values, or touch the **Cancel** key to return to the System Setup page without saving a value.



5. Touch **Include User Airports** to include or exclude user created airports

15.4.4 Com/Nav Setup

15.4.4.1 Com Channel Spacing

Com transceiver channel spacing may be selected between 8.33 kHz and 25.0 kHz.

1. While viewing the System Setup page, touch the **Com/Nav** key.

2. Touch **COM Channel Spacing** to toggle between 8.33 kHz and 25.0 kHz channel spacing.

15.4.4.3 COM Sidetone Control

NOTE: *This feature is available in software v6.50 and later. It requires enablement by the installer.*

COM sidetone is audio spoken into the COM microphone that is played back in real-time over the headset. An offset setting determines sidetone volume for the COM during radio transmission. Controls allow adjustment of the amount that the COM sidetone volume level is offset from the COM receiver volume or the configured sidetone volume.

Figure 15-29 COM Sidetone Controls

To adjust the offset from the COM receiver volume:

1. While viewing the System Setup page, touch the **Com/Nav** key.

2. Select **Link to COM VOL**.
3. Adjust offset as necessary.

To adjust the offset from the configured sidetone volume, deselect **Link to COM VOL** and then adjust the offset as necessary.

15.4.5 Keyboard Format

NOTE: *QWERTY and ABC keyboard formats are available in software v6.50 and later.*

The GTN 6XX employs three keypad types to serve specific settings and functions.

Tapping **Keyboard** changes the format between ABC and QWERTY.

Figure 15-30 Keyboard Formats

Keyboard	Description
ABC	Alphabetical layout
QWERTY	U.S. standard keyboard layout
Slider	Key selector on bottom bar displays five keys at any given time

Table 15-5 Keyboard Formats

15.7 Units Settings

The Units Setup page allows you to select the conventions for the various units that are displayed.

Units Type	Units Values
Altitude/Vertical Speed	Feet(FT/FPM), Meters (M/MPS)
Distance/Speed	Nautical Miles (NM/KT), Kilometers (KM/KPH), Statue Miles (SM/MPH)
Fuel[1]	Gallons (GAL), Imperial Gallons (IG), Kilograms (KG), Liters (LT), or Pounds (LB)
Nav Angle[1]	Magnetic (°), True (°T), User (°u)
Magnetic Variation	Enter numeric value, E or W
Position Format	LAT/LON DD.D°, LAT/LON DD° MM.M', LAT/TON DD° MM'SS", MGRS, UTM, Swiss Grid, Irish Grid, British National Grid
Pressure	Inches of Mercury (IN), Hectopascals (HPA), Millibars (MB)
Temperature[1]	Celsius (°C) or Fahrenheit (°F)

Table 15-9 System Units Setup

Note 1: Only these unit types will be crossfilled in dual GTN installations.

15.7.1 Setup Units

Use these settings to set the units for values displayed in the unit operation.

1. While viewing the System page, touch the **Units** key.

Figure 15-41 System Units Page

2. Touch the key for the desired units. A window with a list of unit values will appear. Touch the desired value on the list.

15.7.3 Position Format Selection

There are multiple position formats available.

LAT/LON DD.D° **	British National Grid **	MGRS *
LAT/LON DD°MM.M'	Irish National Grid **	UTM *
LAT/LON DD°MM'SS" **	Swiss National Grid **	

* Software v4.10 and later.
** Software v6.50 and later.

The selected format is used in all locations where position information is available.

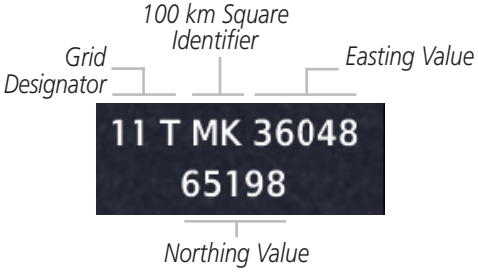


Figure 15-46 MGRS Position Format Detail

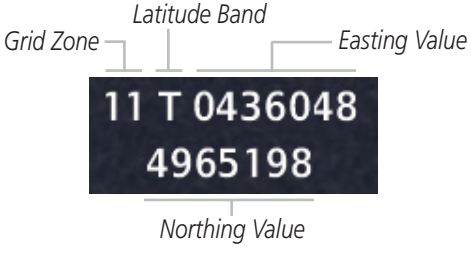


Figure 15-47 UTM Position Format Detail

In the case of regional position formats (e.g., Swiss National Grid), the GTN defaults to displaying LAT/LON for any positions outside of the grid region.

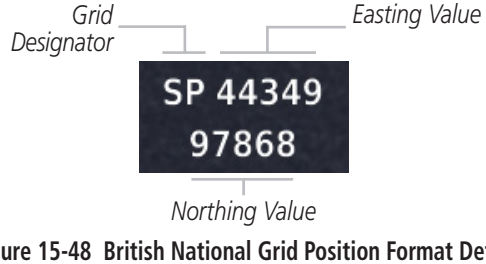


Figure 15-48 British National Grid Position Format Detail

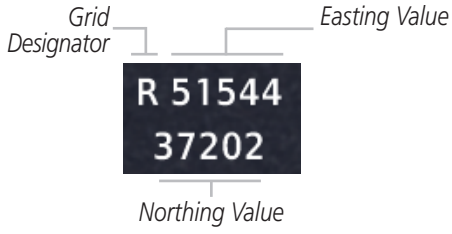


Figure 15-49 Irish National Grid Position Format Detail

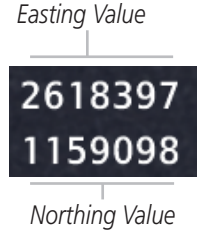


Figure 15-50 Swiss National Grid Position Format Detail

1. While viewing the System page, touch **Units** key.
2. Touch the **Position Format** key.

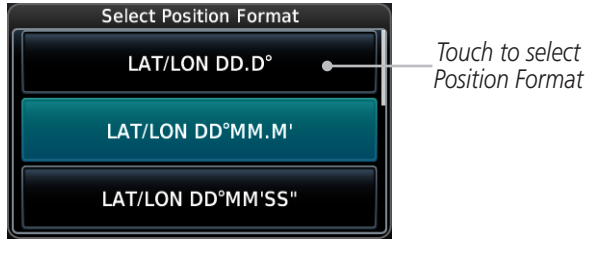


Figure 15-51 Position Format Selection

3. Touch the desired Position format.

15.11.2 Pairing a Device

New devices can only be paired with the Flight Stream when it is in "Pairing Mode." The Flight Stream will be in pairing mode when the GTN is navigated to the Connext Setup page and/or the Manage Paired Devices page. The pairing must be initiated by the portable device. Pop-ups display on both the portable device and GTN to confirm the pairing. Verify the passkey displayed on the GTN matches that on the portable device.

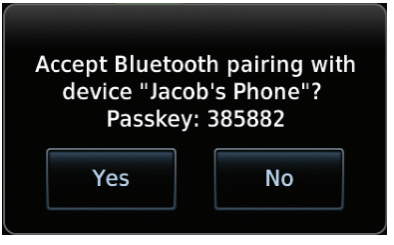


Figure 15-60 Confirm Pairing With A New Device

Selecting "Manage Paired Devices" opens a page that lists all of devices paired to the Flight Stream.

Message	Description	Action
VLOC RECEIVER - Navigation receiver has failed.	The nav radio is not communicating property with the system.	Use GPS based navigation. Contact dealer for service.
VLOC RECEIVER - Navigation receiver needs service.	The nav radio is reporting to the GTN that it needs service. The nav radio may continue to function.	Use GPS based navigation. Contact dealer for service.
VNAV - Unable to reach vertical waypoint.	Current altitude constraint cannot be reached based on current ground and vertical speeds.	Attempt to intercept vertical path by adjusting aircraft altitude.
VNAV - Unavailable. Upcoming flight plan leg not supported.	The lateral flight plan contains a procedure turn, vector, or other unsupported leg type prior to the active vertical waypoint.	Treat the flight plan segments before and after the affected leg as separate vertical profiles. The GTN cannot provide automatic guidance between the two segments.
VNAV - Unavailable. Excessive crosstrack error.	Current crosstrack exceeds limit, causing vertical path guidance to become invalid.	Navigate within 10 nm of flight plan centerline, or edit flight plan to allow for vertical navigation.
VNAV - Unavailable. Excessive track angle error.	Current track angle error exceeds limit, causing vertical path guidance to become invalid.	Navigate within 70° of active flight plan course.
VNAV - Unavailable. Parallel course selected.	Selecting a parallel course causes vertical path guidance to become invalid.	Disable parallel track if vertical path guidance is desired.

Message	Description	Action
VNAV - Unavailable. Barometric altitude lost.	A loss of data from the barometric altitude sensor causes vertical path guidance to become invalid.	Contact dealer for service.
WAYPOINT - Arriving at [wpt name].	User has configured the arrival alarm and is within the specified distance.	No action is necessary; message is informational only.

Table 16-1 Messages

Note 1: There are several reference datums that waypoints can be surveyed against. TSO-C146 normally requires that all waypoints be referenced to the WGS84 datum, but allows for navigation to waypoints that are not referenced to the WGS84 datum so long as the pilot is notified. Certain waypoints in the navigation database are not referenced to the WGS84 datum, or their reference datum is unknown. If this is the case, this message is displayed. Garmin cannot determine exactly how close the non-WGS84 referenced waypoint will be to the WGS84 datum that the GTN uses. Typically, the distance is within two nautical miles. The majority of non-WGS84 waypoints are located outside of the United States.

17 SYMBOLS

The following tables describe the symbols that are found on the Map display.

17.1 Map Page Symbols

Symbol	Description	Symbol	Description
	Airport with hard surface runway(s); Non-Serviced, Primary runway shown		Airport with hard surface runway(s); Serviced, Primary runway shown
	Airport with soft surface runway(s) only, Non-Serviced		Airport with soft surface runway(s) only, Serviced
	Restricted (Private) Airfield		Unknown Airport
	Heliport		NDB
	Intersection		Locator Outer Marker
	VOR		VOR/DME
	VORTAC		DME
	TACAN		TOD/BOD
	User Waypoint		User Airport
	ATK		VRP

Table 17-1 Map Page Symbols

18.4 Glove Qualification Procedure

NOTE: *This procedure is not authorized for completion during flight. Perform all tasks while the aircraft is on the ground.*

The touchscreen uses capacitive touch technology to sense the proximity of skin to the display. A glove creates a barrier between the skin and the display glass, potentially reducing the ability of the display to detect touches.

This procedure qualifies a specific glove for use with the touchscreen. Due to differences in finger size, glove size, and touchscreen between the GTN 6XX and GTN 7XX units, the qualification procedure is specific to the pilot/glove and GTN combination. Multiple units must be evaluated individually.

Glove Selection Considerations

- Thinner gloves perform better than thicker gloves
- Leather gloves, and gloves designed specifically for use with capacitive touchscreen devices, are often found to be acceptable
- To improve touchscreen sensitivity while wearing gloves, use the pad of your finger instead of the tip during touch interactions

Glove Qualification Guidance

- Table 18-3 contains the tasks required to qualify a glove
- Table 18-4 contains tasks that are not required to qualify a glove, but may limit how some functions are accessed while wearing a glove

Glove Qualification Steps

Complete only the tasks for the capabilities relevant to the installed GTN(s).

1. Sit in the pilot's seat.
2. Start the GTN in demo mode by pressing and holding the **Direct To** key during power up.
3. Perform the tasks listed in Table 18-3 and Table 18-4, tapping each key with a non-gloved finger. It is not necessary to record any results for this step.
4. Repeat step 3 using a gloved hand.
5. For each task, determine whether the touchscreen response is the same or worse than without the glove.
6. Record the results in the applicable table. Items that may cause the operation to be worse include, but are not limited to:
    a. Multiple attempts to select a key
    b. Unintentional selection of adjacent key(s)
    c. Excessive force on the touchscreen to select a key
7. If all applicable tasks produce the same response with and without a glove, the pilot may use the glove in flight.

Glove Qualification Procedure

Pilot: _____

Glove Description: _____

Circle the applicable GTN.

6XX 7XX

Task	Operation With Glove (circle one)	
Starting from the Home page:		
Demo	Same	Worse
GPS	Same	Worse
Waypoint	Same	Worse
Type the airport identifier "KSLE."	Same	Worse
Enter	Same	Worse
Return to the Home page.		

Task	Operation With Glove (circle one)	
Flight Plan	Same	Worse
Add Waypoint	Same	Worse
Type the airport identifier "KSLE."	Same	Worse
Enter	Same	Worse
Add each of the following waypoints in the same manner.		
KMMV	Same	Worse
KONP	Same	Worse
BTG	Same	Worse
Select **BTG**.	Same	Worse
Load Airway	Same	Worse
V23	Same	Worse
ALFOR	Same	Worse
Load	Same	Worse
Scroll the list of flight plan waypoints up and down using the arrow keys.	Same	Worse
Back	Same	Worse
GTN 635/650/750 only		
Select the COM STBY frequency field.	Same	Worse
Type a valid frequency.	Same	Worse
Enter	Same	Worse
Select the active COM frequency field. Observe the two frequency values swap positions.	Same	Worse
GTN 750 only		
Select the active NAV frequency field. Observe the two frequency values swap positions.	Same	Worse
GTN 650 only		
Menu	Same	Worse

Table 18-3 Tests Required for Glove Qualification

Task	Operation With Glove (circle one)	
Open the Active Flight Plan page.	Same	Worse
With one finger on the page, drag the waypoint list up and down.	Same	Worse
With one finger, tap and swipe the list up or down.	Same	Worse
Back	Same	Worse
Open the Map page.	Same	Worse
Graphically Edit FPL	Same	Worse
Tap and drag KONP to an empty area of the map, panning and zooming as necessary. Observe that KONP is removed from the flight plan.	Same	Worse
Drag the leg between KMMV and BTG to KSPB. Observe that KSPB is added to the flight plan.	Same	Worse

Table 18-4 Tests Not Required for Glove Qualification

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