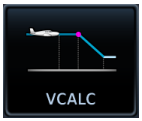
4 Planning

PLANNING APPS & FUNCTIONS

The following features make flight planning easier and more efficient.



VCALC

Input:

- Target Altitude
- Altitude Profile
- Target Waypoint

GTN computes:

- Time to TOD
- VS Required

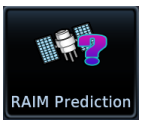
Trip Planning

Input:

- Route
- Depart Date/Time
- Ground Speed

GTN computes:

- DIS
- DTK
- ESA
- ETA
- ETE
- Sunrise/Sunset



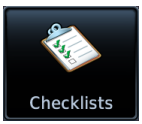
RAIM Prediction

Input:

- Waypoint
- Arrival Date/Time

GTN computes:

- RAIM Status



Checklists

- Review and complete aircraft checklists

Fuel Planning

Input:

- Route
- Fuel Data
- Ground Speed

GTN computes:

- Fuel Required
- Reserve
- Range
- Efficiency
- Endurance

DALT/TAS/Winds

Input:

- Air Data
- Track
- Heading
- Ground Speed

GTN computes:

- Density ALT
- TAS
- Wind Direction
- Wind Speed
- Head Wind

VCALC and VNAV are mutually exclusive. Which app you have is dependent upon installer configuration. For information about VNAV functions and operations, read *En Route Vertical Navigation* in section 3.

VCALC

Calculate time to TOD and vertical speed required to reach target altitude at the specified location.

WARNING

Do not rely on 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.

FEATURE LIMITATIONS

This feature is inhibited when:

- *Groundspeed is < 35 knots*
- *No active flight plan or direct-to destination is available*
- *One of the following modes is active: SUSP, Vectors-to-Final, OBS*
- *Navigating to a waypoint after the FAF*

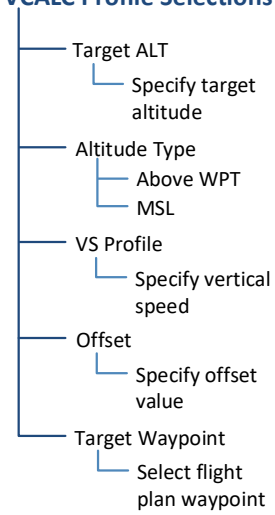
Define a VCALC Profile

WHERE TO FIND IT

Home
Utilities
VCALC

With the Vertical Calculator (VCALC) feature, you can create a 3D profile to guide you from your present position and altitude to a final (target) altitude at a specified location. Once defined, you may configure message alerts and additional data on Map to stay informed of your progress.

Creating a profile is helpful when you want to descend to a certain altitude near an airport.



Profile selections allow you to:

- Specify a target altitude and offset
- Choose a target type
- Specify vertical speed
- Select a target waypoint from the active flight plan

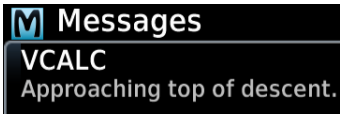
Target ALT	• Specify the final (target) altitude for the course
Altitude Type	• Altitude reference used for VCALC calculations • Toggles between "MSL" and "Above WPT" • Above WPT is available for airports only
VS Profile	• Specify the vertical speed value
Offset	• Distance value representing the geographical location at the target altitude • Distance is measured from the target waypoint along the flight path
Before/After	• Select whether the offset distance defines a point before or after reaching the target waypoint • "After" option not available for last destination in flight plan (key changes to a non-selectable "Before" indication)
Target Waypoint	• Reference location specified in the flight plan or active direct-to that will be used for planning a descent • When using a flight plan, the target waypoint is a reference that can be specified from the waypoints in the flight plan • Last waypoint in the flight plan is the default target setting

STATUS & VS REQUIRED INDICATIONS

Status
VCALC status messages display here.

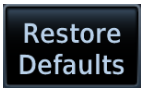
VS Required
Shows the vertical speed required to reach target altitude and offset.

VCALC Setup



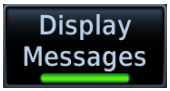
Setup options allow you to restore default app settings and display VCALC related advisory messages.

Restore Defaults



- Resets VCALC settings to their default values
- Excludes Target Waypoint

Display Messages



- Allows VCALC related advisory messages to display on the Messages page

GTN 650Xi SERIES

VCALC Menu
- Restore Defaults
- Display Messages

Tap **Menu** to access setup controls.

GTN 750Xi SERIES

Setup controls reside on the profile page.

Trip Planning

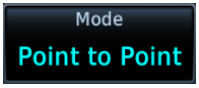
View DTK, DIS, ETE, ESA, and ETA information for a direct course between two specified waypoints or any programmed flight plan.

WHERE TO FIND IT

Home
Utilities
Trip Planning

Trip statistics are based on route and ground speed.

Trip Planning Modes



Tapping **Mode** toggles the active trip planning mode between Point to Point and Flight Plan. Point to Point is the default mode setting.

Point-to-Point Mode	Flight Plan Mode
Calculate trip data between two waypoints in the database, or between the aircraft's present position and a selected waypoint.	Calculate trip data for a specific flight plan leg, or for the cumulative flight plan.

Use the mode specific controls to define the flight path (leg or route). Required input values are dependent upon mode selection.

Departure date and time and ground speed data are required independent of mode selection.

MODE	SELECTION	DESCRIPTION
Point-to-Point	**P. Position**	• Enters the current aircraft coordinates as the departure location (or From waypoint) • Aircraft latitude and longitude fields replace the From waypoint key
	From	• Specify a waypoint from the database as the departure location (or From waypoint) • Not available when P. Position is active
	To	• Specify a waypoint from the database as the destination (or To waypoint)
Flight Plan	**Flight Plan**	• Opens a list of available flight plans • Options include the active flight plan or one from the catalog • Defaults to the active flight plan if no selection is made
	Leg	• Options dependent on flight plan selection • Defaults to cumulative leg option if no selection is made
Both	**Depart Time**	• Specify the departure time (local time at From waypoint)
	Depart Date	• Specify the year, month, and day of departure
	Use Sensor Data	• Utilize current GPS ground speed data
	Ground Speed	Behavior based on state of **Use Sensor Data** key. **Use Sensor Data key inactive:** • Function selectable • Specify ground speed **Use Sensor Data key active:** • Function not selectable • Displays current GPS ground speed when the **Use Sensor Data** key is active

COMPLETED LEG INDICATION

Dashes indicate when the selected flight plan leg is completed or the data cannot be computed.

Trip Statistics

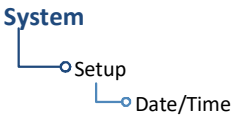
Trip statistics include:

- Desired track (DTK)
- Distance (DIS)
- Destination sunrise/sunset times
- Est. time en route (ETE)
- Est. time of arrival (ETA)
- En route safe altitude (ESA)

Trip data calculations are based on the selected trip planning mode and specified input values.

This information is for planning purposes only.

DESTINATION SUNRISE/SUNSET TIMES



The time zone on which destination sunrise/sunset calculations are based depends on the system Time Format setting. This option resides in the System – Setup Date/Time feature.

Local 12 or 24 hour. Calculations are based on the time zone of the From waypoint. A flight plan originating in the Pacific time zone and ending in the Central time zone would show sunrise/sunset times at the destination in Pacific time.

UTC. Calculations use Universal Time Coordinated (time zones are not considered). There is no potential offset.

ETA CALCULATIONS

The method for calculating ETA varies based on mode selection.

Point-to-Point mode. ETA = ETE + departure time

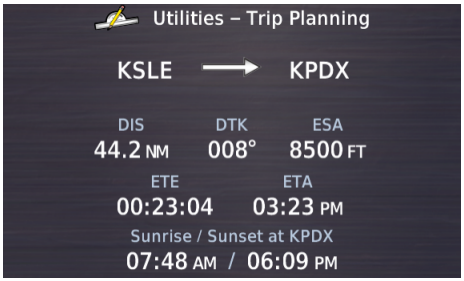
Flight Plan mode. Calculations depend on flight plan selection:

If	Then
Active Flight Plan	*ETA reflects the present position and active leg:* ETA = current time + ETE of each leg from the active leg up to and including the selected leg
Catalog Route	ETA = departure time + ETE of each leg up to and including the selected leg

If you select the entire flight plan, the last leg of the flight plan is treated as the selected leg. This is true whether the selected flight plan is active or inactive.

GTN 650Xi SERIES

To calculate trip data, enter all required input values and then tap **Compute Data**.



Statistics for the selected leg or route display on a dedicated data page.

To return to the data entry page, tap **Edit Input Data**.

GTN 750Xi SERIES

Trip data calculates automatically upon entry. Statistics for the selected leg or route display on the lower half of the page.

COMPUTE TRIP STATISTICS

1. Select a trip planning mode.
2. Define a leg or route.
   - If "Flight Plan" is set, select the flight plan and leg. Selecting the active flight plan sets the starting waypoint at the aircraft's current position.
   - If "Point to Point" is set, select From and To waypoints, or use the aircraft's current position as the From waypoint.
3. Specify the departure date and time.
4. Specify ground speed or elect to use sensor data.
5. Tap **Compute Data** (GTN 650Xi Series only).
6. Tap **Next** or **Prev** to view statistics for other legs in the flight plan (if applicable).

Fuel Planning

View fuel conditions along any flight plan (active or cataloged) or between two waypoints (including the active direct-to).

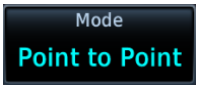
WHERE TO FIND IT

Home
Utilities
Fuel Planning

The fuel planning feature computes fuel conditions based on route, ground speed, fuel on board, and fuel flow.

Input values may be entered manually or supplied by sensors, if connected.

Fuel Planning Modes



Tapping **Mode** toggles the active fuel planning mode between Point to Point and Flight Plan. Point to Point is the default mode setting.

Point-to-Point Mode	Flight Plan Mode
Calculate fuel between two waypoints in the database, or between the aircraft's present position and a selected waypoint.	Calculate fuel for a specific flight plan leg, or for the cumulative flight plan.

Use the mode specific controls to define the flight path (leg or route). Required input values are dependent upon mode selection.

Fuel on board, fuel flow, and ground speed data are required independent of mode selection.

For Planning Purposes Only

- When interfaced with a Garmin EIS, Fuel on Board and Fuel Flow values are supplied by EIS. If an EIS is not present, or if the Use Sensor Data function is not active, these values are specified by the pilot and are not an indication of actual fuel on board or fuel flow.
- Fuel Required to <destination> is a calculated prediction. It is not a direct indication of actual fuel quantity once the aircraft reaches its destination.
- All data entries on this page are used exclusively by the Fuel Planning app.
- Fuel computations are for planning purposes only.

MODE	SELECTION	DESCRIPTION
Point-to-Point	**P. Position**	• Enters the current aircraft coordinates as the departure location (or From waypoint) • Aircraft latitude and longitude fields replace the From waypoint key
	From	• Specify a waypoint from the database as the departure location (or From waypoint) • Not available when P. Position is active
	To	• Specify a waypoint from the database as the destination (or To waypoint)
Flight Plan	**Flight Plan**	• Opens a list of available flight plans • Options include the active flight plan or one from the catalog • Defaults to the active flight plan if no selection is made
	Leg	• Options dependent on flight plan selection • Defaults to cumulative leg option if no selection is made
Both	**Fuel on Board**	• Specify the amount of fuel on board (gallons) • Amount decreases once per second based on specified fuel flow value or sensor data
	Fuel Flow	• Specify the current fuel flow rate (gallons per hour)
	Use Sensor Data[1]	• Toggle on to utilize current GPS ground speed data and fuel sensor data (if available) • Toggle off for manual data entry
	Ground Speed	• Specify ground speed

[1] When inactive, ground speed and fuel data functions are selectable. When active, these functions are not selectable.

Adjust fuel on board and fuel flow values as necessary to account for changes in performance.

Fuel Statistics

Fuels statistics include:

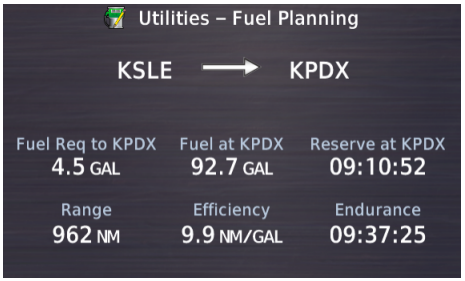
- Fuel required for leg
- Fuel after leg
- Reserve after leg
- Range
- Efficiency
- Endurance

Compute and display fuel data based on the selected fuel planning mode and specified input values.

This information is for planning purposes only.

GTN 650Xi SERIES

To calculate fuel data, enter all required input values and then tap **Compute Data**.



Statistics for the selected leg or route display on a dedicated data page.

To return to the data entry page, tap **Edit Input Data**.

GTN 750Xi SERIES

Fuel data calculates automatically upon entry. Statistics for the selected leg or route display on the lower half of the page.

COMPUTE FUEL STATISTICS

1. Select a fuel planning mode.
2. Define a leg or route.
    - If "Flight Plan" is set, select the flight plan and leg. Selecting the active flight plan sets the starting waypoint at the aircraft's current position.
    - If "Point to Point" is set, select From and To waypoints, or use the aircraft's current position as the From waypoint.
3. Specify the amount of fuel on board and average fuel flow rate.
4. Specify ground speed or elect to use sensor data.
5. Tap **Compute Data** (GTN 650Xi Series only).
6. Tap **Next** or **Prev** to view statistics for other legs in the flight plan (if applicable).

If total fuel quantity or fuel flow values are supplied via sensor, GTN uses the data from this app to calculate the Fuel Range Ring overlay on Map. Fuel range rings indicate an estimate of remaining flight distance based on fuel onboard, fuel consumptions rates, and current ground speed.

Map depicts two separate rings: one displaying range to reserve fuel, the other displaying total endurance range. Both offer additional situational awareness regarding fuel remaining and endurance.

DALT/TAS/Wind Calculator

Calculate density altitude, true airspeed, and winds.

FEATURE REQUIREMENTS

- *Air data computer for automatic data entry*
- *Valid sensor data*

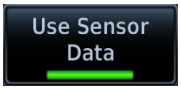
An air data computer is not required for manual data entry.

WHERE TO FIND IT

Home
Utilities
DALT/TAS/Winds

This function computes density altitude, true airspeed, and wind data to provide the theoretical altitude at which your aircraft performs. Information is based on several input variables, which may be provided manually or via an air data computer.

Edit Input Data



Tapping **Use Sensor Data** inputs data from the connected sensors. When active, the available sensor data populate the appropriate fields.

Sensor data values are not selectable for editing. Toggle the function off for manual data entry.

Indicated ALT	• Specify indicated altitude value • Use **+/-** keys to indicate above or below sea level • Mutually exclusive with Pressure ALT[1]
BARO	• Specify barometric pressure value[2]
CAS	• Specify calibrated air speed value
TAT	• Specify true air temperature • Use **+/-** keys to indicate above or below 0°
HDG	• Specify heading value
TRK	• Specify track angle value
Use Sensor Data	• Inputs reference values (internal or received from air data computer) • Replaces indicated altitude with pressure altitude received from fuel/air data computer
Ground Speed	• Specify ground speed

[1] Toggles to Pressure ALT indication when sensor data is in use and the sensor is providing pressure altitude.
[2] Not present if Use Sensor Data is active and the ADC is providing pressure altitude.

DALT/TAS/Wind Statistics

Compute and display density altitude and current wind conditions. Calculations are based on current input values.

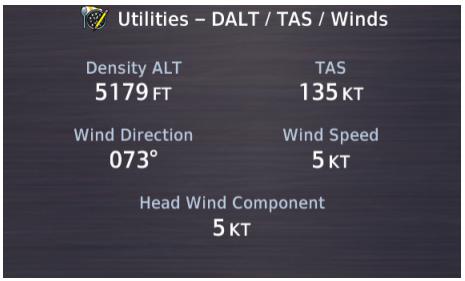
This information is for planning purposes only.

Density Altitude	Wind Data
• Pressure altitude corrected for nonstandard temperature • Units display in increments of ten	• Wind direction and speed • Headwind • True air speed

Density altitude and true airspeed calculations are dependent on indicated altitude, barometric pressure, and total air temperature. Total air temperature includes temperature and the heating effect of speed, as read on a standard outside temperature gauge.
Wind data calculations are dependent on aircraft heading and track, true airspeed, and ground speed.
Wind direction is dependent on the NAV Angle system unit setting.
If wind speed is zero, wind direction displays as dashes.

GTN 650Xi SERIES

To calculate density altitude and wind data, enter all required input values and then tap **Compute Data**.



Statistics display on a dedicated data page.

To return to the data entry page, tap **Edit Input Data**.

GTN 750Xi SERIES

Data calculates automatically upon entry. Statistics for the selected leg or route display on the lower half of the page.

INVALID INPUT DATA INDICATION

Dashes indicate when input values are invalid.

RAIM Prediction

Determine GPS coverage availability for the current location or a specified waypoint at any time and date. RAIM performs checks to ensure that the navigator has adequate satellite geometry during flight.

NOTE

RAIM availability prediction is for use in areas where WAAS coverage is not available. It is not required in areas where WAAS coverage is available.

FEATURE REQUIREMENTS

- *Active flight plan or off-route direct-to waypoint (arrival date and time)*

FEATURE LIMITATIONS

FAA's TSO requirements for non-precision approaches specify significantly greater satellite coverage than is required during other phases of flight. As a result, RAIM may not be available for all approaches.

RAIM prediction results are valid for up to 90 days from the current date. Arrival dates beyond 90 days, or in the past, may not provide accurate results.

This feature predicts the availability of fault detection integrity. It cannot predict the availability of LPV or L/VNAV approaches.

Use a non-GPS based approach when RAIM is not available. To determine WAAS availability, including for LPV approaches, visit the FAA's NOTAM service.

WHERE TO FIND IT

Home
Utilities
RAIM Prediction

This feature can help you plan for a pending flight by confirming GPS operation before an approach.

RAIM Features

- Automatically monitors RAIM during approach operations and warns when RAIM is not available
- Near 100% availability in Oceanic, En route, and Terminal phases of flight
- **Waypoint Identifier**, **Arrival Date**, and **Arrival Time** setup keys
- **Compute RAIM** key

Calculate RAIM Status

Calculate RAIM availability for the specified waypoint, date, and time. Prediction results annunciate once the calculation is complete.

WAYPOINT SEARCH OPTIONS

A **Waypoint Identifier** key allows you to specify a destination airport using multiple search options.

ARRIVAL DATE & TIME

These setup controls allow you to set the expected date and time of arrival at the specified airport. Values default to the current date and time in the absence of an active flight plan and off-route direct-to waypoint.

CHECK RAIM AVAILABILITY

1. Specify a destination waypoint.
2. Specify the expected arrival date and time.
3. Tap **Compute RAIM**.

RAIM STATUS INDICATIONS

Dashes indicate when the destination waypoint is invalid.

ANNUNCIATION	DESCRIPTION
Computing	Status is pending.
RAIM Available	RAIM is available at the specified waypoint.
RAIM Unavailable	RAIM is not available at the specified waypoint.

Checklists

Review an electronic version of your aircraft checklist(s). Depending on the number of inspection items, these lists may be scrollable.

This icon appears only when GTN detects a checklist on your SD card.

NOTE

Garmin strongly recommends the author of the checklist file to carry out a functional system test prior to in-flight use. Validation should be carried out on the GTN Xi Series hardware while the aircraft is on ground.

FEATURE REQUIREMENTS

- *SD card for storing checklist files*
- *Garmin Aviation Checklist Editor software tool for authoring and grouping*

FEATURE LIMITATIONS

- *Check boxes automatically clear following a unit power cycle*
- *Feature title dependent on installer configuration*

WHERE TO FIND IT

Home
Utilities
Checklists/Task Lists

Depending on configuration, this feature may be titled "Checklists" or "Task Lists."

Disclaimer

Operational approval may be required for the use of any electronic checklist developed for certified aircraft. Any checklist created with the checklist tool for certified aircraft may require additional operational airworthiness approval and cannot replace the official Flight Manual and/or checklist required by the Type Certificate or Supplemental Type Certificate. **Do not use an unapproved checklist during flight operations.**

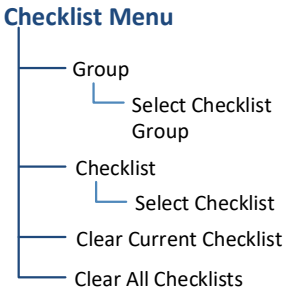
User generated checklists are created using the free Aviation Checklist Editor software available at flyGarmin.com.

Define properties for groups, checklists, and new entries using the features provided in the software tool.

Save checklists in the *chklist.ace* format. Copy the file to the root folder of an SD card.

For download instructions and system requirements, visit the Aviation Product Support page at flyGarmin.com.

View a Checklist

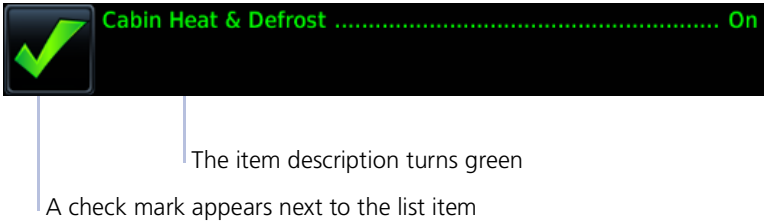


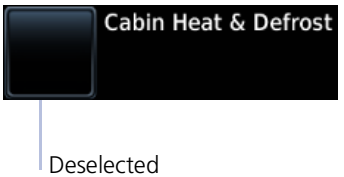
Tap **Menu** to access available group and checklist selections. Functions for clearing check boxes on the active list and all other checklists on the datacard also reside here.

Group	Select from the list of existing groups. Group properties are defined during checklist creation.
Checklist	Select a checklist for viewing and completion.
Clear Current Checklist	Clears all check boxes for the active list.
Clear All Checklists	Clears the check boxes for all available checklists on the installed SD card.

CHECK BOXES

To mark an item as completed, tap the corresponding check box.





Tapping the box again deselects the item.

LIST STATUS ANNUNCIATIONS

Completion status annunciates at the bottom of the list.

	One or more list items are not marked as complete. Review the list and complete the remaining inspection items.
	All check boxes are marked as complete. Proceed to the next checklist or select a different list from the menu.

COMPLETE A CHECKLIST

1. Insert SD card containing the file titled *chklist.ace*.
2. Open the Checklist menu (Home > **Utilities** > **Checklists** > **Menu**).
3. Select a group.
4. Select a checklist.
5. Select **Clear Current Checklist** or **Clear All Checklists** (if necessary).
6. Review and complete all inspection items.

Upon completion, select from the following options.

- *Advance to the next available checklist:* Tap **Go to Next Checklist**.
- *Exit the function:* Tap **Back**.
- *Select another checklist:* Tap **Menu** and select another group and/or checklist.