



# GMX 200<sup>™</sup>

Pilot's Guide  
& Reference

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# INTRODUCTION

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To receive additional copies of this GMX 200 Pilot's Guide, order Part Number 190-00607-02. The GMX 200 Quick Reference Guide is Part Number 190-00607-03.

# Introduction

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**NOTE:** *The GMX 200 display lens is coated with a special anti-reflective coating which is very sensitive to skin oils, waxes, and abrasive cleaners. It is very important to clean the lens using an eyeglass cleaner that is specified as safe for anti-reflective coatings and a clean, lint-free cloth.*

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### **Welcome...**

Welcome to a new era of aviation navigation. Once again, Garmin has set new standards in features and ease of use for the general aviation public. The GMX 200 Multi-Function Display provides a focal point for integrating many of your navigation needs in an easy to use and convenient package.

The GMX 200 presents a wealth of information on its six-inch diagonal, 640x480 pixel, color display. The many features are organized as distinct functions. Each function allows varying degrees of customization. The custom map function is customizable so you can create a display for almost any configuration you require. The other functions provide more limited levels of customization.

The GMX 200 is capable of creating powerful overlay views where information from a variety of sources can be presented simultaneously in proper relationship to each other, thus greatly increasing situational awareness for the pilot.

You can be confident in knowing that you are the owner of the state-of-the-art in aviation and navigation. The GMX 200 architecture is designed to support full expansion for both software and hardware enhancements. This flexibility protects your investment and allows for the ease of adding new features. Our products are built to last and to allow the flexibility to meet your needs as they change in the future.

### **About This Manual**

This manual may be used as a summary, a reference, and a learning tool. Information is provided about all of the functions available to the GMX 200. Your specific installation may not include all of these functions.

Take a few moments to familiarize yourself with the various sections in this manual. The Getting Started section gives an introduction to the controls, basic operation, and organization of the functions in your GMX 200. Be sure to read the Getting Started section to learn the rules for using the GMX 200. The Detailed Operation section (starting on page 15) is the reference for each of the functions in the GMX 200. Refer to the Detailed Operation section when you want to get into the details on every function and option along with step-by-step instructions.

Not every function is available in every installation.

### **Limitations**

**The Traffic function is not a collision avoidance system. It is an aid to visual acquisition and does not relieve the flight crew of their responsibility to “see and avoid.” There are no evasive aircraft maneuvers authorized, recommended, or provided for as a result of displayed traffic targets. Refer to the traffic sensor documentation for additional information.**

All pilots/operators are reminded that the airborne equipment that displays other ADS-B equipped aircraft and transponder equipped aircraft via TIS-B is for pilot situational awareness and is not approved as a collision avoidance tool. Any deviation from an air traffic control clearance based on cockpit information must be approved by the controlling ATC facility prior to

commencing the maneuver. Uncoordinated deviations may place an aircraft in close proximity to other aircraft under ATC control not seen on the airborne equipment and may possibly result in the issuance of a pilot deviation.

The Terrain function shows you the general terrain elevations relative to your altitude and are advisory in nature. Individual obstructions may be shown if available in the database. **Terrain is displayed from database information and may therefore contain errors. The Terrain function does not relieve the flight crew of their responsibility to “see and avoid.” Do not use this information for navigation.**

The moving map, weather information, and other displayed information are meant to be aids to situational awareness. The pilot should rely on the appropriate primary means of navigation and consult official and approved data sources prior to and during each flight.

Refer to your airplane flight manual supplement for more information.

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## GETTING STARTED

This section explains how to get started using the GMX 200. Information in this section describes the controls, data card, display, and basic operation. After reading this section, go to the Detailed Operation section for expanded explanations for each feature.

### **Functions**

The GMX 200 contains fourteen major separate functions for the display of information. The function names are shown as “smart” keys at the bottom of the display. The “smart” key is the combination of a label above a triangle key at the bottom of the display. The labels above the triangle keys change to reflect the choices available to you for each function. Press the **FN** key to show the available functions. Press the “smart” key below the function label to go to the desired function. While in each function, press the **MENU/ENT** key to show the options for each function. The options are shown on the right side of the display. Press the **Menu Item** key to manipulate the options. Some options toggle on/off, while some are tri-state (three choices) and others cycle through a series of choices.

### **GMX 200 Function List**

- **MSG** - Message Log
- **MAP** - Custom Map
- **IFR** - IFR Chart
- **VFR** - VFR Chart
- **Split** - Split Screen
- **Traffic** - TAS/TCAD/IHAS
- **Traffic** - ADS-B TRAF
- **Traffic** - TIS-A
- **FPL** - Flight Plan
- **TER** - Internal/TAWS Terrain
- **FIS-B** - Flight Information Service (GDL 90 UAT)
- **FIS** - Flight Information Service (GDL 69/69A)
- **XM** - XM Satellite Radio
- **LT** - Lightning Strikes
- **CHART** - FliteChart or ChartView
- **RADAR** - Weather Radar
- **SYS** - System Information

The **Message Log** displays information from the GMX 200 or reported to the GMX 200 by its external sensors. A flashing MSG annunciator notifies you of a new message that should be viewed.

The **Custom Map** function allows you to completely customize the displayed map by overlaying selected information. The Custom Map can become cluttered if you choose every option, so use discretion.

The **IFR Chart** function provides an IFR en route style map on the display.

The **VFR Chart** function provides a VFR sectional style map on the display.

The **Split Screen** function allows up to two of the other functions to be displayed side by side and an optional vertical profile across the bottom of the display. The terrain and profile features are not available if altitude data is not available or if a TAWS sensor is connected to the GMX 200.

The **Traffic** function (when installed) shows nearby traffic and details about each target.

The **Flight Plan** function provides details about your flight plan and each waypoint.

The **Terrain** function shows a color coded map of terrain elevation in relation to your altitude. An altitude sensor or TAWS sensor is required to provide altitude data.

The **Flight Information Services (FIS)** function is capable of displaying text and graphic weather information with GDL 90 UAT- and GDL 69/69A installations. A subscription for the services is required with the GDL 69/69A,

The **Lightning (LT)** function, when connected to the L3 WX500 Stormscope, displays lightning strike information.

The **Chart** feature provides the capability to view Garmin FliteChart or Jeppesen Sanderson Inc. electronic charts. Garmin's FliteChart shows approach charts. Jeppesen Sanderson's ChartView provides approach charts and airport surface charts.

The **XM** function allows the reception of XM Satellite Radio entertainment broadcasts when the GDL 69A is installed and a subscription to the XM Radio service is activated.

The **Radar** Function allows weather radar from the Garmin GWX 68, ART2000, ART2100, RS 811A, or RS 181A to be displayed.

The **System** Information function lets you set general preferences, show software version information, and test the display.

### Display

The GMX 200 display provides text and graphic information to give a “picture” of your flight and surroundings. The display brightness may be set manually or allowed to automatically adjust to ambient light conditions. At the bottom of the display, labels above the function keys change to show the different choices for each function to allow access to commonly used actions. A typical Custom Map function display is shown below.



### Message Flag



The Message flag will appear on the lower left side of the display when a new message is posted. Go to the Message function to view the information about the operation or status of the GMX 200.

### Controls

#### Power On

The power switch is located in the upper right corner of the GMX 200. Press the “+” rocker switch to turn the power on. The GMX 200 will progress through a series of startup screens. The final startup screen shows System Information and the results of the Self-Test.

#### Power

The power and display brightness are controlled by a rocker switch.



Power Rocker Switch

Press both the “-” and “+” rocker switches and hold them down for at least three seconds to turn the power off.

#### Brightness

Press the “-” and “+” rocker switches individually to adjust the display brightness manually. Press the “-” and “+” rocker switches at the same time for one to three seconds, then release them to have the GMX 200 set the brightness automatically based on current lighting conditions.

#### Rotary Knob

The rotary knob on the lower right corner of the GMX 200 is used to move the cursor in Pan mode and to zoom in and out while viewing maps. The rotary knob complements the action of the function keys in some functions by pressing and turning the knob. Arrows will appear above the function keys indicating the direction to turn the rotary knob for the same effect. A round push button symbol (“o”) will appear indicating that pressing the rotary knob will have the same effect.

Arrows indicate rotary knob direction  
Round push-button symbol indicates the function affected when the rotary knob is depressed



Rotary Knob



Rotary Knob / Function Keys

#### Function (FN) Key

The Function keys are made up of one dedicated key on the lower left side of the display and the four “smart” keys to the right of it. Press the function (FN) key repeatedly to scroll through the available functions. The functions will appear above the “smart” function keys in turquoise.

“Smart” Function Key Labels



“Smart” Function Keys

Function Keys

Use the **FN** key to display a list of the main functions, such as Map, IFR, Terrain, etc. Each time you press the **FN** key you will step through the list of functions. After you press one of the function “smart” keys at the bottom of the display, the function keys change to provide options to control the display related to the current function, now in green. Change the function keys back to the function list by pressing the **FN** key.



### **MENU/ENT**

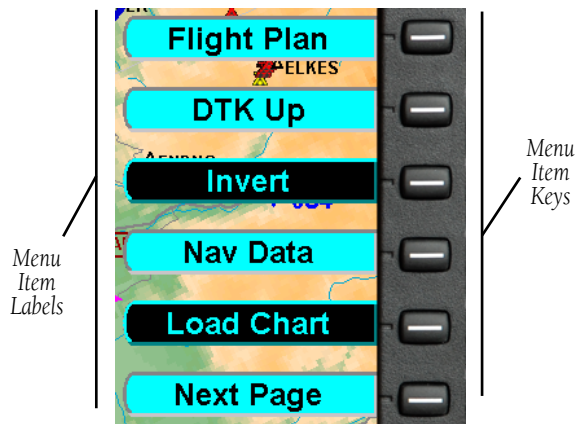
The **MENU/ENT** key is located on the bottom right corner of the GMX 200. Press the **MENU/ENT** key to show a menu of options to modify the display of the current function. Press the **MENU/ENT** key to hide the menu. If no action is taken, the menu will automatically extinguish in 20 seconds.



**MENU/ENT Key**

### **Menu Item**

The Menu Item keys are on the right side of the GMX 200. Press the **MENU/ENT** key to see the options for the current function. Press the **Menu Item** key next to each option to scroll through the choices for each option. Some options support tri-state or multiple choices, such as in Map mode. When you select a tri-state option, the option label will change with each key press between filled cyan (active), filled white (intermediate), and black (inactive).



**Menu Item Key Layout**

### **Data Card**

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

Only change the data card when the power is turned off.

Only Garmin-approved datacards can be used.



**Data Card and Slot**

Handle your data card carefully. Do not touch the connector edge of the data card. To eject the card, press the card in until it “clicks” and then pull the card straight out of the slot. Insert a data card by pushing the card straight into the slot until it “clicks.” When fully inserted, the data card will be flush and slightly recessed into the bezel.

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

### **Annunciations**

Advisory flags, data flags, and messages appear on the display to give information about the status of the GMX 200 or to provide operating information.

### **Advisory Flags**

Annunciations will appear on the upper left side of the display to provide advisories for Traffic, Terrain, and Lightning. Advisory information is monitored and displayed regardless of the selected function. Advisory flags will flash for approximately 10 seconds when they first appear and then turn solid while they are still valid. Advisory icons will reduce in size if more than two advisory conditions exist.

#### **Advisory Flags**



### **ADS-B Traffic**

The Traffic advisory flag will appear on the left side of the display when the GDL 90 reports a traffic alert. This Traffic advisory is only available when the ADS-B system with a UAT data link is installed and operational. Refer to the TIS Traffic section for a description of TIS-A and TIS-B.

### **TAS/TCAD/TIS-A Traffic**

The Traffic Advisory/Alert will appear in amber on the left side of the display when the traffic sensor indicates an alerting condition. Refer to the TIS Traffic section for a description of TIS-A and TIS-B.

### **Radar**

The Radar Alert flag will appear when Target Alerts are present on two consecutive sweeps within 10° of your heading.

### **Terrain**

The Terrain advisory flag will appear on the left side of the display when the terrain surface or obstacle altitude is within approximately 100 feet of your altitude and within approximately two minutes of flight in any direction.

### **Lightning**

The Lightning advisory flag will show on the left side of the display when the WX500 sends an indication that lightning has been detected within 50 NM of your location. See the WX500 manual for details about range and other capabilities.

### **Data Flags**

Data flags appear on the left side of the display to notify you when there is a loss of reported information. The data usually displayed, such as lightning or nearby terrain, may still exist, but may not be displayed for technical reasons. For instance, when the amber TRAF data flag appears it means that the GMX 200 is not receiving Traffic information from the sensor. Any existing traffic will not be displayed on the GMX 200. All data flags are yellow unless otherwise indicated.

### **ADS-B Status Annunciation**



When the GMX 200 Code Edit option is enabled, an annunciation will appear in the top left portion of the display to indicate the Flight ID broadcast status and the current ADS-B code.

The top half will indicate the operation being used: Broadcast FID (FID), Broadcast VFR (VFR), or Stand-By (STBY). The bottom half will show the transponder code that is being used. When a ADS-B code has not been selected, the code in the bottom half will be replaced by dashes.

Data Flag	Description
<b>POS</b>	No valid position information is available from the source. Do not expect a valid position representation on the maps.
<b>FPL</b>	No valid route (flight plan) is available from the external navigation source. Route (flight plan) information will not be shown on the maps.
<b>ALT</b>	No valid altitude information is available from the external source. Altitude related functions will not operate, such as terrain awareness.
<b>TRAF</b>	No traffic information is received from the optional traffic sensor. Traffic will not be displayed.
<b>ADSB</b>	The GPS receiver in the GDL 90 UAT is not reporting a valid position. ADS-B broadcast will not include a valid position report.
<b>LT</b>	No valid lightning detection information is being received from the optional Stormscope sensor. Strike and cell information will not be displayed.
<b>TER</b>	Terrain coverage is not available for some part of the terrain advisory coverage area. Terrain advisories may not be provided.
<b>NAV</b>	When connected to the SL30, indicates the SL30 is not available or valid. ILS, OBS, and VORs will not be highlighted.
<b>RDR</b>	Indicates that radar status information is not available from the optional external radar transmitter head. Radar related functionality may not be available.
<b>RDR</b> (Green)	Indicates that the radar is ON and transmitting RF energy. Appropriate precautions should be taken.
<b>RDR</b> (Green Flashing)	Indicates that the radar is in Hold and is transmitting RF energy. Appropriate precautions should be taken.
<b>IDENT</b> (Green)	Displayed when the GDL 90 is in Ident mode.
<b>TAWS</b>	No valid terrain information is available from the optional external source.
<b>LINK</b>	No valid data link information is available from the optional external source.

All data flags are yellow, except as noted.

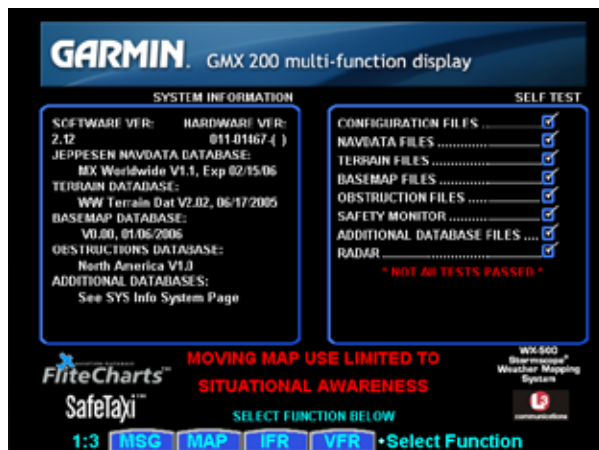
### Basic Operation

Use the following items to get a basic feel for the operation of the GMX 200. The basic steps for using any of the separate functions of the GMX 200 are:

- Turn the power on.
- Adjust the brightness or leave in automatic mode.
- Check that all tests pass on the Start Up screen.
- Press the **FN** key to view available functions. Each press of the **FN** key will step through the lists of functions.
- Press the key below the function label to select the desired function.
- Confirm or enter the current barometric pressure (if prompted).
- Press the **MENU/ENT** key to display available options.
- Press the **Menu Item** key next to the displayed option to choose desired capabilities. Some options use multiple key presses for different states for the option. Press the **MENU/ENT** key again to extinguish the option display.
- Refer to the Detailed Operation section for more details on each function.

### Start Up Screen

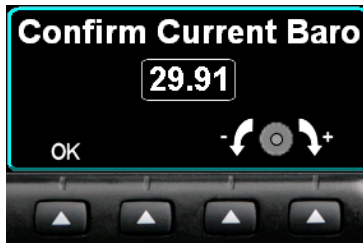
The Start Up screen is displayed while the GMX 200 goes through its initialization and testing routines. System information is shown that provides the GMX 200 software, hardware, and database versions. The results of the self test are shown. A check mark shows that the test passed. If any of the Self-Tests fail (red “x”), contact your dealer or the factory.



Start Up Screen After Passing Tests.  
Hardware version will vary depending on the configuration you have.

### **Confirm Current Baro Correction**

When the altitude source is an altitude encoder, a window that displays the current barometric value will appear after you press the first “smart” key, and then every 30 minutes. This window will not appear when GPS altitude is used. You must verify the current value or enter a new value. Press **+** or turn the rotary knob clockwise to increase the value. Press **-** or turn the rotary knob counter-clockwise to decrease the value. Press **OK** to confirm the existing values or to accept changes you have just entered.



**Barometric Pressure Confirmation**

### **Function Selection**

Press the **FN** key to view the different Functions. The functions are shown above the function “smart” keys on the lower part of the display in blue. Press the function key under the function label to activate that function. The labels above the function key will change to reflect the custom “smart” controls for that function (in green). All of the described functions may not be available in each installation.

<b>Function</b>	<b>Description</b>
MSG	Message Log Function
MAP	Custom Map Function
IFR	IFR En Route Map
VFR	VFR Sectional Map
SPLIT	Split Screen (Displays Two Functions)
TRAF	Traffic Display
FPL	Flight Plan Information
TER	Terrain Depiction
FIS	Flight Information Service - Graphic and Text Weather
XM	XM Satellite Radio Audio
LT	Lightning Detection and Reporting
CHART	Chart (FliteChart) or Chart (ChartView)
RADAR	Weather Radar Function
SYS	System Information

### **Advisory Hot Key**

The “Advisory Hot Key” feature allows advisory conditions to be quickly viewed with minimal effort by the pilot. This feature is comprised of three components:

1. A white advisory flag on the left side of the screen indicates an advisory condition. The corresponding Function label will also be highlighted in white when selecting a new Function with the **FN** key. This feature allows any Function with a pending advisory to be quickly recognized in the Function menu.
2. When a function is entered that has an advisory posted, the zoom level will be adjusted to show the advisory causing object (terrain for example), and the map orientation will be forced to “Track Up 360” to get a good view of what is around the aircraft.
3. When returning to the previous Function after viewing a Function with an advisory, the original zoom and map mode will be restored.

This feature is designed to allow the pilot to establish a preferred “cruise” map setup and quickly view an advisory, then return back to the previous setting. For example:

### **Normal Cruise Condition**

Custom Map Function is being viewed at 5 NM in the ARC mode.

Terrain Advisory Occurs at 10 NM in front of aircraft: The Terrain Advisory Indicator flashes then goes steady on the left side of the display.

### **Viewing the Advisory**

The pilot presses the **FN** key and sees the TER Function highlighted in white, indicating it has an advisory condition. Pressing the **TER** key to enter the

Terrain Function at this point will automatically adjust the zoom level to 10 NM and place the unit in full “360” mode to show overall situational awareness.

### **Returning To Normal Condition**

After evaluating the advisory, to return to normal viewing simply select the original Function that was being viewed before the advisory was viewed. When this is done, the zoom level will be set back to 5 NM and the display mode will be returned to ARC mode.

### **Alert Hot Key**

Traffic alerts go one step further than the Advisory hot key feature and will automatically bring up the Function Menu showing the Traffic function. This is called the “prompt” mode. A single key press can then be used to switch the display to the Traffic function. The Alert hot key feature will automatically clear when the traffic alert condition no longer exists.

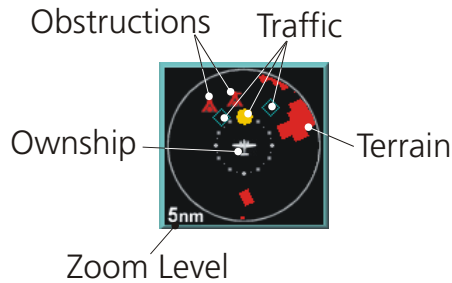
Also note that a “pop-up” mode can be enabled on the Traffic function, which makes the Traffic page “pop-up” when a Traffic Advisory occurs. The “prompt” or “pop-up” mode is selected in the Traffic function.

### **Options Menu**

Most functions have a number of options available. Press the **MENU/ENT** key to see the options for the current function. You change an option by pressing one of the **Menu Item** keys that are to the right of the displayed option. Many options have more than two choices. Press the same **Menu Item** key repeatedly to view or select the available choices. Some functions have several pages of options. The lower **Menu Item** key will allow you to reach the Next Page when multiple pages are available. Press the **MENU/ENT** key a second time to remove the menu from view or wait 20 seconds for the options to automatically extinguish.

## Thumbnail Feature

The Thumbnail feature provides a small map depiction that is overlaid in the upper left corner of the GMX 200 display. It provides for enhanced traffic and terrain situational awareness when not specifically viewing traffic or terrain related functions. For example, both traffic and terrain situational awareness can be maintained while viewing the Flight Plan Function.



**Thumbnail view of conflicting terrain and traffic**

The Thumbnail is shown in both a small and large format, depending on the function currently being viewed. The Thumbnail is typically presented in the larger format when overlaid on a map. However, on some functions where the Thumbnail would overlay critical information, the smaller format is utilized.

The Thumbnail provides a fixed 5 NM range view with a solid circle and a 2 NM inner circle. The range depicted by the Thumbnail is not affected by the current zoom scale set on the main map functions.

### Traffic on Thumbnail

TIS, TAS, TCAS, or ADS-B traffic is shown on the Thumbnail in the same symbology used within the Traffic Function. Any traffic within sensor range and 5 NM is shown, in addition to traffic causing an amber Traffic Alert (TA) traffic. Note that the GMX 200 supports one traffic sensor in any installation.

### Terrain on the Thumbnail

Only “Red” terrain within the 5 NM range is presented on the Thumbnail. This correlates directly to terrain that is rendered in red on the normal Terrain Function based on the internal terrain database. External TAWS-based terrain from the Goodrich Landmark is not shown on the Thumbnail.

### Obstructions on the Thumbnail

Only “Red” obstructions within the 5 NM range are presented on the Thumbnail. This correlates directly to obstructions that are rendered in red on the other functions.

### Thumbnail Activation

The Thumbnail incorporates logic that will either show or hide the thumbnail from view. It will only be shown when there is data to be presented and will be removed if not. For example, if there is no “Red” terrain or traffic within 5 NM, the Thumbnail will be hidden from view. The Thumbnail will not appear on the Traffic Function page if only traffic would be presented in the Thumbnail. Correspondingly, it is not shown on the Terrain page if only terrain would be presented in the Thumbnail. This logic eliminates redundant views that would be created by the Thumbnail and normal views of traffic and terrain. Additionally, the Thumbnail is disabled while operating on the ground. This state is determined by the “En Route/ Ground Transition Speed” set in the System Function page and is based on GPS ground speed.

### **Traffic Information Services (TIS)**

There are two versions of TIS: TIS-A and TIS-B. Both are described below.

In the TIS-A system, ground radar sensors collect target information. The ground radar sensor then determines the targets in the vicinity of your aircraft and their bearing relative to your track. Up to eight of the targets are transmitted by the ground radar sensor the next time it communicates with your TIS-A enabled transponder.

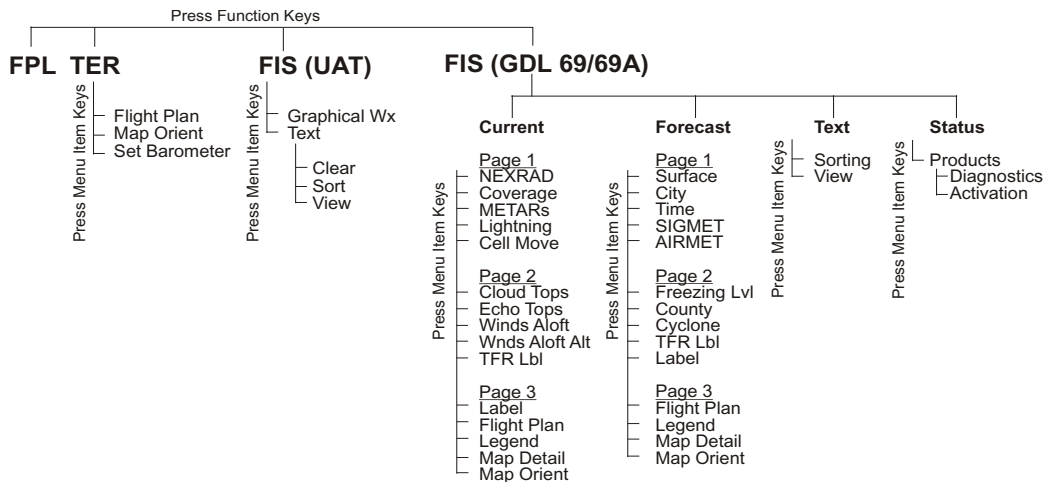
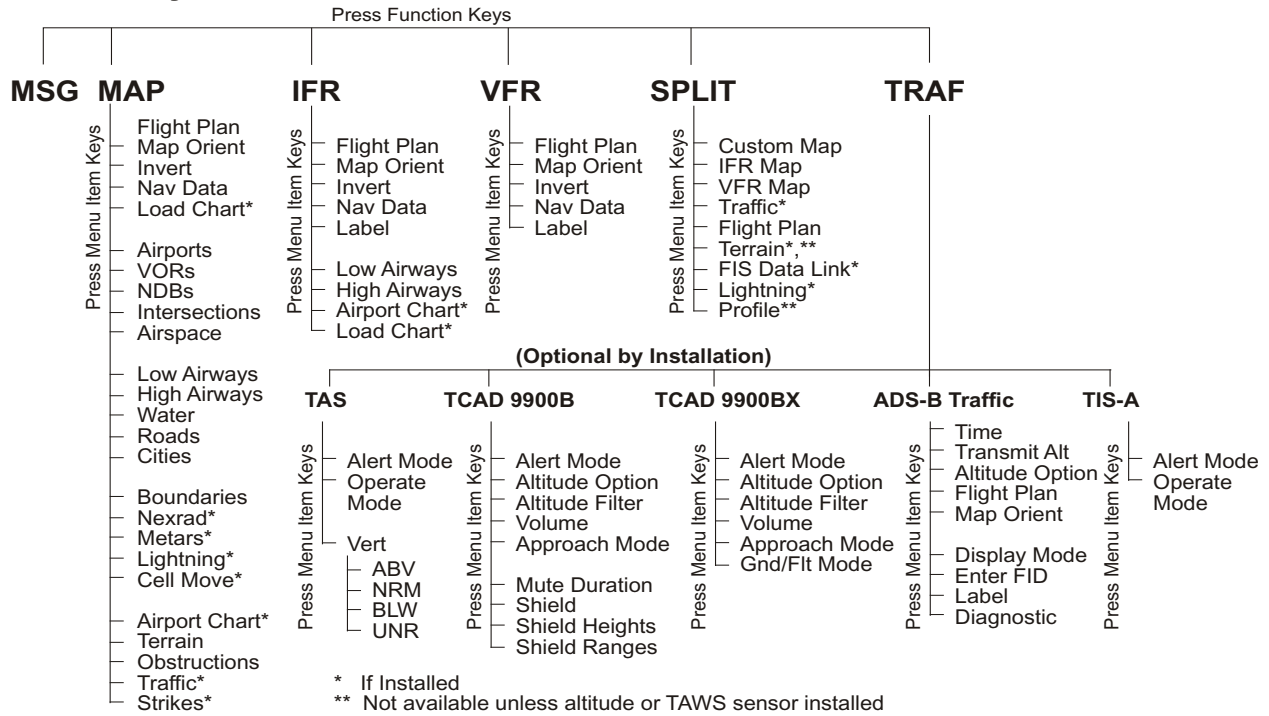
In the TIS-B system, the ground radar sensors collect target information much the same as in the TIS-A system. However, with TIS-B, all targets collected by the ground radar sensor are broadcast to all aircraft equipped with UAT data link radios and that are within coverage of UAT ground broadcast stations.

### **Polar Navigation**

When operating the GMX 200 in polar areas (above 72° north latitude or below 60° south latitude), the external position source must be set to True North navigation. Select True North navigation by setting Magnetic Variation to zero in the position source.

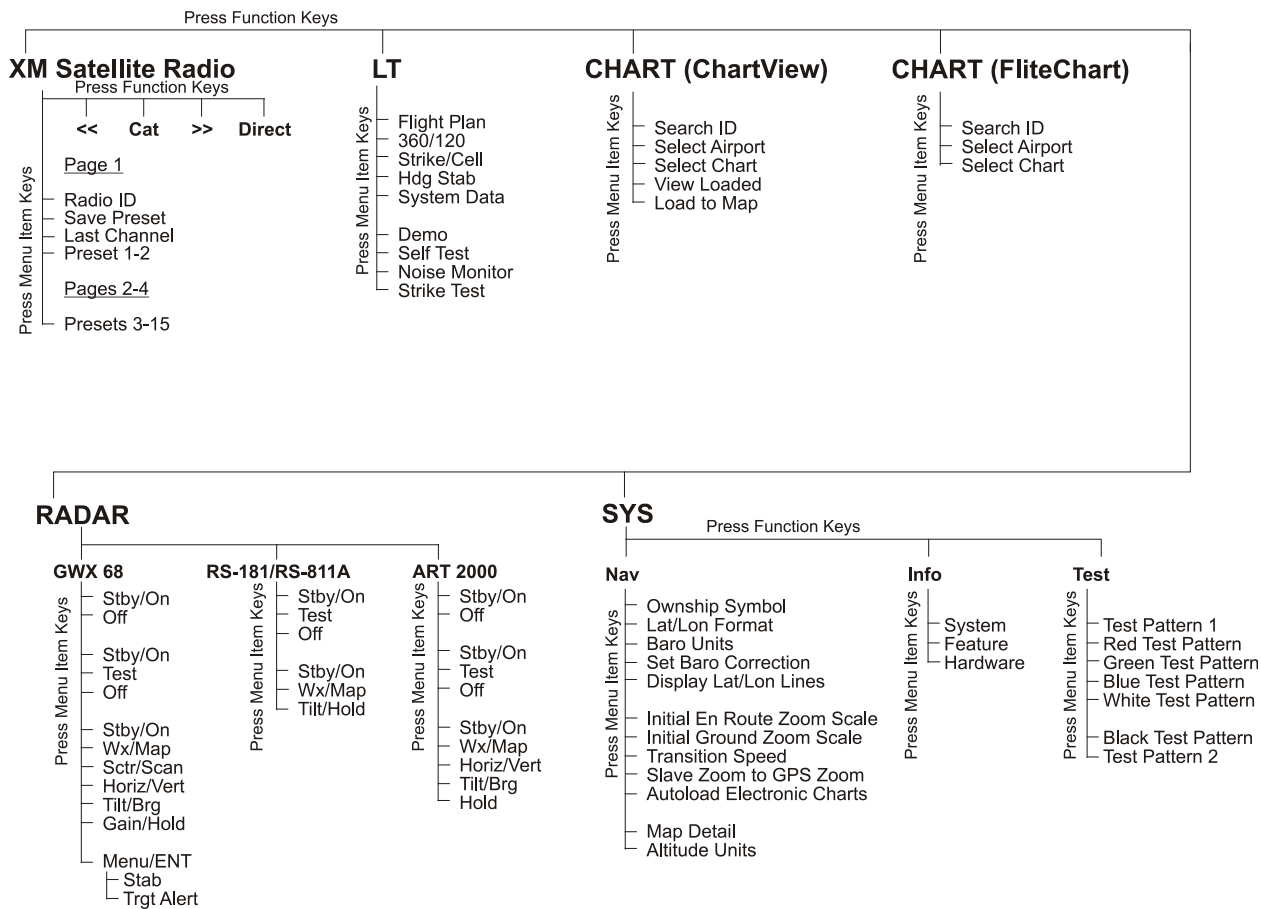


### Summary



# Getting Started

## Function Summary



## DETAILED OPERATION

### Message Log (MSG)

The Message function displays information about the GMX 200 or the external sensors. The amber MSG flag will flash until the message is viewed. The MSG flag will remain in view while any messages remain in the message log. New messages that have not been viewed will be highlighted as bold text.

The text “SYSTEM” in the source column with “Reset code was” followed by a four-digit code in the Message column may appear after a unit reset when the software encounters an unexpected set of conditions. This code may provide information about the cause of the reset and should be reported to Garmin Technical Support as soon as practical for further analysis. Garmin Technical Support may also request a copy of other files located on the front loading datacard to assist with the analysis. If an error condition does not return after the unit resets, the cause is likely temporary and the unit will continue to operate properly.



#### Message Log Function Display

1. Press **FN** until you see the **MSG** function key.
2. Press the **MSG** key.
3. Use the **UP/DOWN** arrow “smart” keys to move to additional messages, if more than one page of messages exist.
4. Press **CLEAR** to remove the stored messages.

## Custom Map (MAP)

The Custom Map function provides a graphic display of map features in relation to the aircraft location to help improve situational awareness. Review the Limitations section in the front of this guide that apply to using data displayed on the moving map. The custom map function is unique in allowing you to selectively “overlay” all available types of information onto a single display. Press the **MENU/ENT** key to display a list of options on the right side of the screen. Press the **Menu Item** key next to the displayed option. Repeated presses of the **Menu Item** key will scroll through the available selections for each option. Turning on too many layers may clutter the display.

The “smart” keys at the bottom of the display over the function keys control the map scale by zooming in or out, moving the map view around with the Pan feature, and viewing Info about the current destination waypoint.

### Initial Zoom Level

The initial zoom level that is used on start-up is determined by a setting made in the System Function.

### Map Scale

The In and Out function keys control the map scale by zooming in and out. You can zoom in to 0.25 NM and zoom out to 1250 NM. The scale distance is measured from the location of your aircraft symbol to the top of the screen. The Map Scale is shown in the lower left corner of the screen. The map orientation appears above the map scale.

Map Orientation

Zoom: (North Up)  
30<sup>n</sup><sub>m</sub>

Zoom Level

Map Orientation and  
Zoom Level (Map  
Scale)

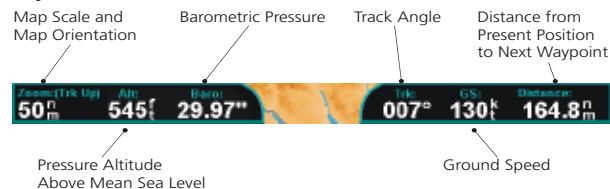
### Auto Zoom

Auto Zoom is activated by adjusting the zoom level to the far extremes of the zoom range. When activated, the indicated zoom level will change from a number to the text “A,” followed by the zoom scale.

While in the Auto Zoom mode, the screen will automatically adjust the current zoom level to maintain the current “TO” waypoint on the screen. When approaching the waypoint, the zoom level will not drop below 2 NM. When the waypoint is reached and the next waypoint in the flight plan becomes active, the zoom level will automatically adjust to bring that waypoint on the map.

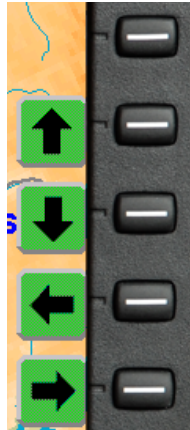
When installed with a GNS 480-series GPS receiver, the GMX 200 zoom level can be controlled by the GNS 480. This feature must be enabled in the System function with the “Slave Zoom to GPS Zoom” setting enabled.

To exit the autozoom mode, simply increase or decrease the current zoom level to re-enter the manual adjust mode.



### **Pan**

The Pan keys are used to move the display around so you can see beyond the initial boundaries of the screen. The **PAN** function key is one of the “smart” keys available at the bottom of the screen. Pressing the rotary knob will also activate the Pan function. When you select the Pan function, four “arrow” keys appear on the right side of the screen next to the **Menu Item** keys. Move the map in the desired direction by pressing the **Menu Item** key next to the arrow that shows which way you want the map to move. Press the **PAN** key again to exit the Pan mode. While panning, a green reference line is drawn from the center of the viewed area back to your current position.



**Panning Controls**

### **Info**

Press the **INFO** key to toggle viewing of information about the current “TO” waypoint. Press the **INFO** key again to hide the information.

Each press of the **↓** key will step through the available information for the current “TO” waypoint. The number of pages depends on the amount of information about the waypoint. Press the **WX** key to view any available METARs for the selected waypoint. Note that not all airports will have METARs available. The **Wx** key is available with the GDL 90 UAT and GDL 69/69A FIS sensors.

Runway diagrams of airports will be displayed in the same orientation as the main map (i.e., North Up, Track Up, or DTK Up). If SafeTaxi information is available for the selected airport, the SafeTaxi detail will be shown.

SLE Airport	214ft
MC NARY	
SALEM OR USA	
ATIS	124.55
TWR	119.10
GRND	121.90
CTAF	119.10
Air 500f	
WX	Info Custom

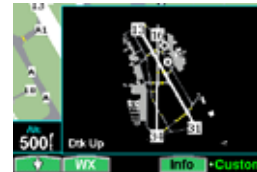
**Info page 1**

AWOS	124.55
UNIC	122.95
FSS	122.60
CNTR	125.80
ILS 110.30 Runway 31	
Air 500f	
WX	Info Custom

**Info page 2**



**Info page 3**



**Info page 3 with SafeTaxi**

13 / 31	5800ft
16 / 34	5100ft
Air 500f	
WX	Info Custom

**Info page 4**

METAR K5LE 062314Z	
Wind Direction 128	
Wind Speed 15KT	
Wind Gusts 20KT	
Visibility 10SM	
Temperature 12C 53F	
Dew Point 7C 45F	
Pressure 30.03 in. Hg	
Clouds 29000 BROKEN	
30000 OVERCAST	
Air 500f	
WX	Info Custom

**Info Weather**

### **Info In Pan Mode**

The **INFO** smart key supports operation in conjunction with the PAN feature.

On any of the maps (Custom Map, IFR and VFR), entering the INFO mode while pan is active, will show information about the nearest airport to the center of the screen. This allows panning around the immediate area and obtaining information about airports in the vicinity without changing the current “TO” waypoint.

While in this mode, only the **INFO** smart key is highlighted. The **PAN** key is highlighted when exiting the Info mode. Only information about airports can be obtained with this feature.

**Custom Map Menu Option Page 1**

The first option page of the Custom Map function lets you select options for the choices of Flight Plan, map orientation, Invert, Nav Data, and Load Chart. The last option selection takes you to the next page of options. For menu items with tri-state options, the active option is color coded in the item key label. When the option is clear, the icons and labels are not displayed. When the option has a cyan background, icons and labels are all shown. When the option box has a white background, only the icons are shown.



Custom Map page with Menu Items (page 1)

**Flight Plan**

The Flight Plan option controls the display of the Flight Plan course line. Pressing the **Menu Item** key next to the Flight Plan option toggles between showing or not showing the Flight Plan route line.

If the flight plan provided by the navigator to the GMX 200 has an invalid cross track error, the ownship symbol will have a red “X” placed over it.

**Map Orientation**

This option controls the screen orientation in reference to the aircraft symbol. You may select from

North Up, Track Up, Track Up Arc, Track Up 360, and Desired Track Up. **North Up** sets magnetic north as the top of the screen. **Track Up** sets the current track of the aircraft as the top of the screen. **Track Up Arc** sets the current track of the aircraft and a 120° arc at the top of the screen. **Track Up 360** sets the current track of the aircraft at the top of the screen and a 360° ring with the aircraft symbol position in the center. **Desired Track Up** sets the desired track to the next waypoint as the top of the screen. Press the **Menu Item** key next to this option to scroll through the options.

**Invert**

The Invert option changes the display of text and the background color. Depending on which layers are turned on, inverting the display may help readability for the current lighting conditions. For instance, when Terrain is shown, the Invert option switches between white and black text. When terrain is turned off, the Invert option switches between a white background with black text and a black background with white text.

**Nav Data**

The Nav Data option controls the display of navigation data. Subsequent presses of the **Menu Item** key for this option provides choices of no nav data, nav data in the corners (waypoint, bearing, zoom, and distance), or full nav data. The full nav data option includes the information in the four corners selection plus altitude, barometer setting, track, and ground speed.



**NOTE:** Altitude and barometer setting information is not shown in TAWS installations.



**NOTE:** When GPS altitude is configured, the barometer setting is not displayed.



Full Nav data information shown



Partial Nav data information shown



Minimum Nav data information shown

### Load Chart (Optional)

When Load Chart is selected with no destination airport entered in a flight plan, the nearest 15 airports are displayed. If a destination airport is entered and charts exist, that airport and the 14 airports nearest to the aircraft's present position are displayed.

After selecting an airport, the individual approach chart to be overlaid can be loaded from a list of geo-referenced approach charts available for that airport. Not all approach charts can be overlaid in this fashion and only geo-referenced charts will be presented for selection from the Custom Map. Because of this, it is possible that approach charts that are viewable under the Chart-View Function may not be presented in this list.



**NOTE:** The pilot must be aware that not all charts in the loaded database can be used as an overlay. The Load Chart function is automatic when connected to a GNS 480-series GPS receiver and the AutoLoad Chart option is enabled in the SYS function.

Overlaid chart labels are always oriented North-Up. To prevent confusion, Intersection labels from the underlying map may be deselected.

Load Chart is not available with FliteCharts.

Press the Next Page **MENU ITEM** key to display the next page of menu items.

### Custom Map Menu Option Page 2

The second option page of the Custom Map function lets you select options for the choices of Airports, VORs, NDBs, Intersections, and Airspace. The last option selection takes you to the next page of options.



Custom Map page with Menu Items (page 2)

### Airports

The Airports option allows you to choose the level of airport information displayed on the Map screen. You may select the display of airport icon and identifier, icon only, or no information by each subsequent press of the Airport **MENU ITEM** option key.

# Detailed Operation

## Custom Map



Custom Map page with NDBs, Intersections, and Airspace selected with Menu Items (Page 2)

When SafeTaxi airport diagrams are available, they are displayed when airports with labels and airports without labels are drawn and when the zoom scale is 15 NM or lower. Each lower scale shows more information.



Custom Map page with detail for an-airport where SafeTaxi information is available.

## Hot Spots

Airport diagrams may show areas where extra vigilance is recommended due to traffic congestion, visibility constraints, or other unique circumstances. These areas are called “hot spots” and are identified by circular or elliptical lines. Although these areas are highlighted as places where extra caution is warranted and advised, they do not relieve the pilot of the responsibility to “see and avoid” other traffic or obstacles, on the airport surface or in the air. All taxiway and runway intersections should be approached with caution, whether they are marked with hot spots or not. Runways where Land and Hold Short Operations (LAHSO) may be in effect are identified with yellow lines across the runway labeled “LAHSO”. Other areas where extra vigilance is recommended, such as construction zones, may also be outlined with yellow lines. Hot spots and other outlined areas are derived from database information and may therefore contain errors or may not be included in the database.



Custom Map page with detail for an-airport where SafeTaxi Hot Spots and LAHSO information is available.



## VORs

The VORs option allows you to choose the type of VOR information displayed on the Map screen. You may select the display of VOR icon and identifier, icon only, or no information by each subsequent press of the VOR **MENU ITEM** key.



VOR information detail

The GMX 200 supports full integration with the GNS 480, CNX80, and SL30 Nav/Com. This feature allows tuned VORs along with ILS and localizer approaches to be shown on the GMX 200 moving map. This high level of integration is designed to provide additional, simple to interpret situational awareness during high work-load phases of flight. The graphic display of Nav/Comm information on the GMX 200 provides another source to help make sure you are using the intended navigational aid and your To/From orientation to the reference station is as desired.

You can turn the display of VOR and ILS information in the Custom Map page on or off. VOR and ILS information is always shown in the IFR and VFR Chart functions. VOR symbols on an airway are always displayed when Low Airways or High Airways is selected.

### VOR Highlight

The GMX 200 highlights the VOR in magenta on the moving map when the SL30 is either tuned to or monitoring a nearby VOR station. The highlighted VOR station is determined by using the tuned or monitored VOR frequency of the SL30 with the GMX 200 internal database.



Custom Map information when connected to SL30

*The SL30 must be receiving a valid signal from the VOR.*

The VOR information detail for the selected VOR will show the distance and radial-from bearing between your present position and the VOR. The radial and distance information comes from your GPS, not the SL30.

The GMX 200 must have VOR symbols turned on for this feature to be active in the Custom Map function. VOR information is always shown in the IFR and VFR Chart functions.

### VOR OBS

The OBS (Omni-Bearing Selector) value selected in the SL30 will be shown as a line from the tuned VOR station in magenta on the GMX 200 display. The selected value will be shown on the line. This feature provides a quick view of your position relative to both the VOR and the tuned radial to help improve situational awareness. The OBS line will only be drawn from the active VOR, not the monitored VOR.

The SL30 must be receiving a valid signal from the VOR and the GMX 200 must have VOR symbols turned on for this feature to be active.

**ILS/Localizer Depiction**

When either an ILS or localizer is tuned on the SL30, the GMX 200 will display the currently tuned approach on the appropriate airport runway. The SL30 Nav function provides an overall graphic view of the selected airport and approach based on runway extensions and the selected frequencies. The standard ILS symbol is shown in magenta on the GMX 200 display.



ILS for currently tuned approach by SL30

**Localizer Back Course Display**

The GMX 200 will draw the “front course” on its display when a localizer frequency is tuned into the SL30. If you enable the localizer back course feature of the SL30, the GMX 200 will then draw a localizer “front course” graphic extending from the reciprocal runway.

The localizer front course graphic is shaded on the right side. The localizer back course graphic is shaded on the left side. Since the SL30 reverse-senses the needles, a standard “chase the needle” approach may be made and the localizer “front course” graphic is always used on the GMX 200. A published localizer

back course approach at the airport is not necessary to enable this feature.

The SL30 must be receiving a valid ILS, or localizer, and the GMX 200 must have airports turned on for this feature to be active.

**NDBs**

The NDBs option allows you to choose the type of NDB information displayed on the Map screen. You may select the display of NDB icon and identifier, icon only, or no information by each subsequent press of the NDB **MENU ITEM** key.

**Intersections**

The Intersections option allows you to choose the type of Intersection information displayed on the Map screen. You may select the display of the Intersection icon and identifier, icon only, or no information by each subsequent press of the Intersection **MENU ITEM** key. Intersections are drawn when the zoom scale is 100 NM, or less, and are labeled at 75 NM or less.

**Airspace**

The Airspace option allows you to control the display of airspaces. Pressing the **MENU ITEM** key next to Airspace toggles between either the display of airspace boundaries and altitude information, boundaries alone, or no display of airspaces. Airspaces defined as Class B, C, Alert, Caution, Danger, Training, Warning, MOA, Restricted, and Prohibited are depicted on the display. TFRs, when available from an FIS sensor, are displayed when Airspaces are enabled. Note that not all airspaces may be defined in the database as one of these airspaces. Class D airspaces are not drawn; however, a circular airspace with a five mile radius is drawn around airports with control towers. Airspaces defined as Unknown, such as the Grand Canyon, are

not drawn on the display.

Press the Next Page **MENU ITEM** key to display the next page of menu items.

### **Custom Map Menu Option Page 3**

The third option page of the Custom Map function lets you select options for the choices of Low Airways, High Airways, Water, Roads, and political boundaries. The last option selection takes you to the next page of options.



Custom Map page with Low Airways, High Airways, and Menu Items (Page 3)

### **Low Airways**

The Low Airways option allows you to control the display of Low Airways. You may select the display of the airway and label, airway alone, or no display of Low Airways by each subsequent press of the **MENU ITEM** key. Low Airways are drawn when the zoom scale is 150 NM or less.

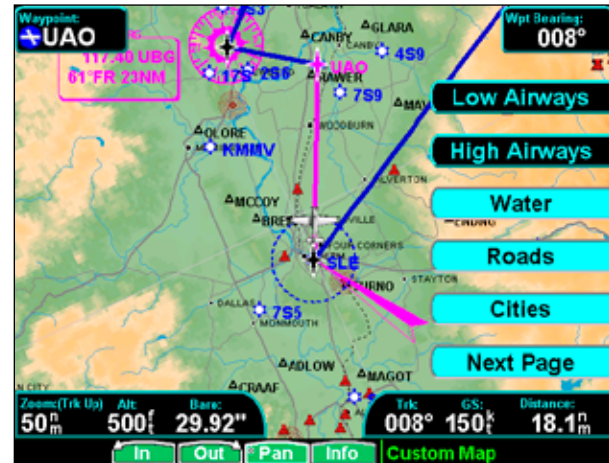
### **High Airways**

The High Airways option allows you to control the display of High Airways. You may select the display of the airway and label, airway alone, or no display of Low Airways by each subsequent press of the **MENU**

**ITEM** key. High Airways are drawn when the zoom scale is 150 NM or less.

### **Water**

The Water option allows you to control the display of streams, rivers and lakes. Pressing the **MENU ITEM** key next to Waters toggles between either the display or no display of the bodies of water.



Custom Map page with Water, Roads, Cities, and Menu Items (Page 3)

### **Roads**

The Roads option allows you to control the display of interstate and state highways. Pressing the **MENU ITEM** key next to Roads toggles between the display or no display of the road features.

### **Cities**

The City option allows you to control the display of cities. Pressing the **MENU ITEM** key for the Cities menu item toggles between the display or no display of the City symbols and labels.

### Custom Map Menu Option Page 4

The fourth option page of the Custom Map function lets you select options for choices of Boundaries, Nexrad, Metars, Lightning, and Cell Movement.



Custom Map page with Boundaries, Nexrad, Metars, Lightning, and Cell Movement Menu Items (Page 4)

#### Boundaries

The Boundaries option allows you to select the display of political boundaries on the Map displays.

#### Nexrad

The Nexrad option allows you select the overlay of weather information on the Custom Map if the optional weather products are installed and active. Pressing the Nexrad menu item toggles the display of Nexrad information on and off.

#### METARs

The METARs option allows you select the overlay of METAR symbols on the Custom Map if the optional weather products are installed and active. Pressing the METARs menu item toggles the display of METAR symbols on and off.

#### Lightning

The Lightning option allows you select the overlay of Lightning strike symbols on the Custom Map, if the optional FIS lightning sensor is installed and active. Pressing the Lightning menu item toggles the display of Lightning symbols on and off.

#### Cell Move

When optional equipment is installed and enabled, Cell Movement shows the storm cells identified by the ground-based system. The movement is depicted by an arrow. The tip of the arrow represents where the cell is expected to be in 10 minutes from the time the cell location was determined.

Press the Next Page **MENU ITEM** key to display the next page of menu items.

### Custom Map Menu Option Page 5

The fifth option page of the Custom Map function lets you select options for choices of Airport Charts, Terrain, Obstructions, Traffic, and Lightning Strikes.



Custom Map page with Airport Charts, Terrain, Obstructions, Traffic, and Storm Cells Menu Items (Page 5)

## Airport Chart (ChartView)

Airport surface charts provide a graphical presentation of the airport surface area (runways, taxiways, buildings, towers, and other objects), within the immediate airport vicinity. The Airport Chart items are not available with FliteCharts.



Custom Map page with ChartView loaded and Menu Items (Page 1)

From either the Custom Map or the IFR En Route Map, airport surface charts will automatically be loaded and displayed as an overlay if the following conditions are met:

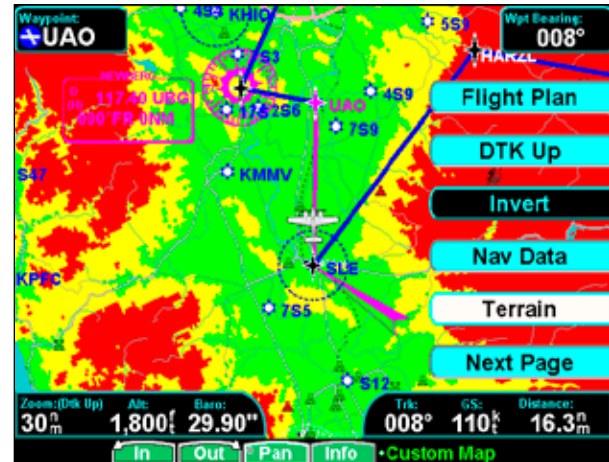
- The airport surface chart is within the loaded database
- The airport surface chart is geo-referenced by Jeppesen
- Airport Chart menu layer is turned on
- The aircraft position is within the coverage of the chart
- A loaded approach chart is not being “flown”

If an airport diagram is available in both the Safe-Taxi and ChartView databases and the Airport Chart option is enabled, the ChartView airport chart will

be displayed. The SafeTaxi airport diagram will be displayed if the Airport Chart option is disabled.

## Terrain

The Terrain option allows you select the display of topographical features. Pressing the **MENU ITEM** key next to the Terrain option scrolls between sectional (absolute), terrain awareness (relative), or no display of topographical features. The sectional (absolute) display shows a display similar to a sectional map. The terrain awareness (relative) display shows a color coded view where the colors relate to terrain elevation relative to your altitude.



Custom Map page with Terrain and Menu Items (Page 4)

For more information about the terrain awareness option, see the Terrain function section. When you turn the Terrain feature off, the background is either black or white depending on your selection in the Invert option. When no terrain data is available, the missing areas will be shown in light blue. Water will not be shown in relative mode. Review the Limitations section in the front of this guide.

### Obstructions

Obstructions, such as towers and other man-made objects, are part of the GMX 200 updateable database. Obstructions over 250 feet high are shown on the maps with tower symbols. The symbol is color coded to signify the relative altitude of the tower to your aircraft's altitude and follows the same conventions as the color coding for terrain.



#### Obstruction icons

Objects that are within 100 feet of your altitude are shown in red; objects that are within 1000 feet of your altitude are shown in yellow; objects with towers that are more than 1000 feet below your altitude are colored green. When altitude data is lost, objects are shown in cyan. Obstructions are shown on the Custom Map and in the Terrain function. For information on the Internal GMX 200-Based Terrain color coding, see the Terrain Function description in the Detailed operation section. Review the Limitations section in the front of this guide.



Custom Map page with Obstructions, Traffic, Lightning Strikes, and Menu Items (Page 4)

Current coverage for obstructions is North America only and are drawn only when the zoom scale is 50 NM or less.

### Traffic

The Traffic option turns the display of traffic information on or off. ADS-B Traffic information includes the location and identifier of a reporting aircraft, its direction of travel, elevation, and the estimated path for the selected time interval. See the section on the Traffic mode for more details on how traffic information is used.

A small thumbnail presentation of traffic is presented in the upper left corner of the display. Traffic targets can also be overlaid on the Custom Map page.

The Traffic function is an optional installation. Check your Approved Flight Manual Supplement to verify if this feature is available. Review the Limitations section in the front of this guide.

### Strikes

The Strikes menu option controls the display of lightning strike information if the GMX 200 receives strike data from an external source, such as the WX500. Each reported lightning strike is shown as an "x" on the display. Strikes are not shown if the zoom scale is below 20 NM, or above 400 NM.



Lightning strike icon ("x")

Press the **Main Menu** key to return to the first page of menu items.

### IFR En Route (IFR) Chart Function

The IFR En Route Chart function shows an IFR en route style map for the display. The IFR display shows navigational aid information and the flight plan course line. The “smart” keys on the bottom of the screen control zooming in and out, panning, and the display of information on the current TO waypoint. The menu of options available for the IFR mode include Flight Plan, map orientation, Invert, turning labels on or off, low and high airways, Airport Chart, or Load Chart. The zoom scale is limited to a maximum of 300 NM.

This data is advisory only and does not replace primary indicators, such as the CDI. Navigation should not be based on the data presented on the GMX 200. Review the Limitations section in the front of this guide.

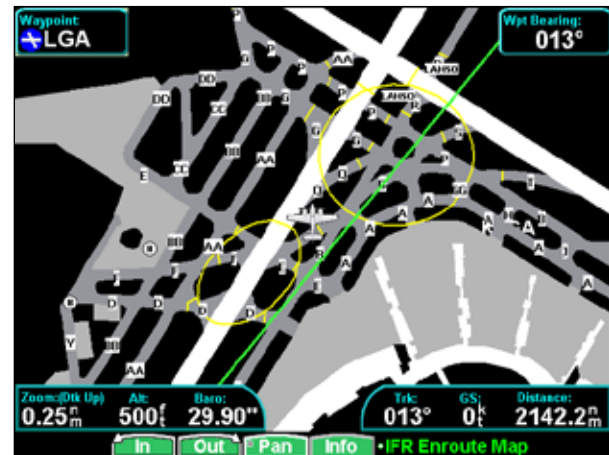
### SafeTaxi

SafeTaxi airport diagrams are always drawn if available in the database. SafeTaxi airport diagrams are drawn when the zoom scale is 15 NM or lower with progressively more details shown as the scale decreases.

### Hot Spots

Airport diagrams may show areas where extra vigilance is recommended due to traffic congestion, visibility constraints, or other unique circumstances. These areas are called “hot spots” and are identified by circular or elliptical lines. Although these areas are highlighted as places where extra caution is warranted and advised, they do not relieve the pilot of the responsibility to “see and avoid” other traffic or obstacles, on the airport surface or in the air. All taxiway and runway intersections should be approached with

caution, whether they are marked with hot spots or not. Runways where Land and Hold Short Operations (LAHSO) may be in effect are identified with yellow lines across the runway labeled “LAHSO”. Other areas where extra vigilance is recommended, such as construction zones, may also be outlined with yellow lines. Hot spots and other outlined areas are derived from database information and may therefore contain errors or may not be included in the database.



IFR En Route Chart page with Hot Spots & LAHSO

# Detailed Operation

## IFR En Route Chart

### IFR Option Page 1

The first option page of the IFR Chart function lets you select options for the choices of Flight Plan, Map Orientation, Invert display, Nav Data, and Labels. The last option selection takes you to the next page of options.



IFR En Route Chart page with Menu Items (Page 1)

### Flight Plan

The Flight Plan option controls the display of the Flight Plan course line. Pressing the **MENU ITEM** key next to the Flight Plan option toggles the Flight Plan route line on and off.

If the flight plan provided by the navigator to the GMX 200 has an invalid cross track error, the ownship symbol will have a red "X" placed over it.

### Map Orientation

This option controls the screen orientation in reference to the aircraft symbol. You may select from North Up, Track Up, Track Up Arc, Track Up 360, and Desired Track Up. **North Up** sets magnetic north as the top of the screen. **Track Up** sets the current track of the aircraft as the top of the screen. **Track Up Arc**

sets the current track of the aircraft and a 120° arc at the top of the screen. **Track Up 360** sets the current track of the aircraft at the top of the screen and a 360° ring with the aircraft symbol position in the center.

**Desired Track Up** sets the desired track to the next waypoint as the top of the screen. Press the **MENU ITEM** key next to this option to scroll through the options.

### Invert

The Invert option changes the display of text and the background color. The Invert option switches between a white background with black text and a black background with white text.



IFR En Route Chart page inverted

### Nav Data

The Nav Data option allows you to control the display of navigation data on the Map displays. Each press of the **MENU ITEM** key provides choices of no nav data, nav data in the corners (waypoint, bearing, zoom, and distance), or full nav data. The full nav data option includes the information in the four corners selection plus altitude, barometer setting, track, and ground speed.





**NOTE:** The barometer setting is not displayed if the TAWS sensor is connected to the GMX 200 or if GPS altitude is used.

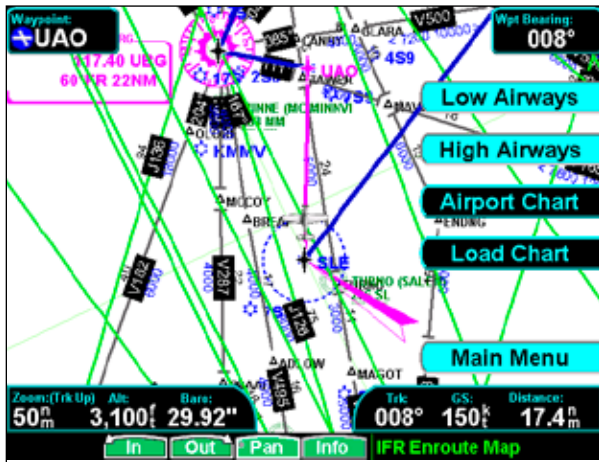
### Label

The **LABEL** key turns the labels for each item on or off for easy decluttering. When Labels are turned off, only the symbol for waypoints along the flight plan will remain in view when the flight plan is enabled.

Press the Next Page **MENU ITEM** key to display the next page of menu items.

### IFR Option Page 2

The second option page of the IFR Chart function lets you select options for the choices of Low Airways, High Airways, Airport Chart, and Load Approach Chart. The last option selection takes you back to the first page of options.



IFR En Route Chart page with Menu Items (Page 2)

### Low Airways

The Low Airways option allows you to control the display of Low Airways. You may select the display of the airway and label, airway alone, or no display of Low Airways by each subsequent press of the **MENU ITEM** key.

### High Airways

The High Airways option allows you to control the display of High Airways. You may select the display of the airway and label, airway alone, or no display of Low Airways by each subsequent press of the **MENU ITEM** key.

### Airport Chart (Jepp ChartView)

Airport surface charts provide a graphical presentation of the airport surface area (runways, taxiways, buildings, towers, and other objects), within the immediate airport vicinity. The Airport Chart item is not available with FliteCharts.

From either the Custom Map or the IFR en route Map, airport surface charts will automatically be loaded and displayed as an overlay if the following conditions are met:

- The airport surface chart is within the loaded database
- The airport surface chart is geo-referenced by Jeppesen
- Airport Chart menu layer is turned on
- The aircraft position is within the coverage of the chart
- A loaded approach chart is not being “flown”

If an airport diagram is available in both the Safe-Taxi and ChartView databases and the Airport Chart option is enabled, the ChartView airport chart will be displayed. The SafeTaxi airport diagram will be displayed if the Airport Chart option is disabled.

### **Load Chart**

Once the airport is selected, the individual approach chart to be overlaid can be loaded from a list of geo-referenced approach charts available for that airport. Not all approach charts can be overlaid in this fashion and only geo-referenced charts will be presented for selection from the Custom Map. Because of this, it is possible that approach charts that are viewable under the ChartView Function may not be presented in this list. The Load Chart item is not available with FliteCharts.



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**NOTE:** *The pilot must be aware that not all charts in the loaded database can be used as an overlay. The Load Chart function is automatic when connected to a GNS 480-series GPS receiver and the AutoLoad Chart option is enabled in the SYS function.*

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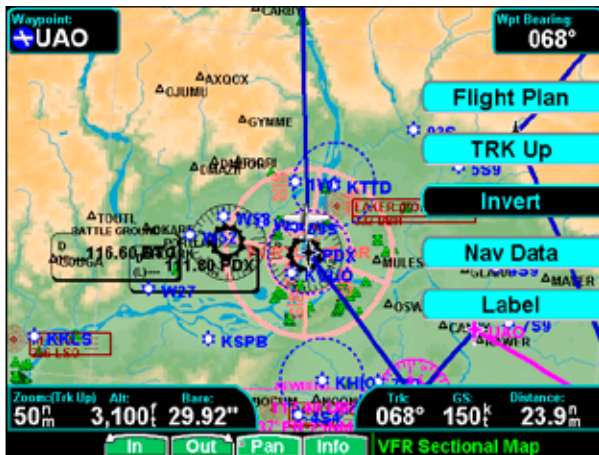
Press the **Main Menu** key to return to the first page of menu items.

## VFR Chart (VFR) Function

The VFR Chart function shows a VFR sectional style map for the display. Topographic features are shown. The VFR display shows navigational aid information and the flight plan course line. The “smart” keys on the bottom of the screen control zooming in and out, panning, and the display of information about the current TO waypoint. The options available for the VFR mode include Flight Plan, screen orientation, Invert, and turning labels on or off. Review the Limitations section in the front of this guide for the limitations that apply to the data displayed on the moving map. The zoom scale is limited to a maximum of 300 NM.

### SafeTaxi

SafeTaxi airport diagrams are always drawn if available in the database. SafeTaxi airport diagrams are drawn when the zoom scale is 15 NM, or lower, with progressively more details shown as the scale decreases.



VFR En Route Chart page with Menu Items

### Hot Spots

Airport diagrams may show areas where extra vigilance is recommended due to traffic congestion, visibility constraints, or other unique circumstances. These areas are called “hot spots” and are identified by circular or elliptical lines. Although these areas are highlighted as places where extra caution is warranted and advised, they do not relieve the pilot of the responsibility to “see and avoid” other traffic or obstacles, on the airport surface or in the air. All taxiway and runway intersections should be approached with caution, whether they are marked with hot spots or not. Runways where Land and Hold Short Operations (LAHSO) may be in effect are identified with yellow lines across the runway labeled “LAHSO”. Other areas where extra vigilance is recommended, such as construction zones, may also be outlined with yellow lines. Hot spots and other outlined areas are derived from database information and may therefore contain errors or may not be included in the database.



VFR En Route Chart page with Hot Spots and LAHSO

### **Flight Plan**

The Flight Plan option controls the display of the Flight Plan course line. Pressing the **MENU ITEM** key next to the Flight Plan option toggles between showing and not showing the Flight Plan route line.

If the flight plan provided by the navigator to the GMX 200 has an invalid cross track error, the ownship symbol will have a red “X” placed over it.

### **Map Orientation**

This option controls the screen orientation in reference to the aircraft symbol. You may select from North Up, Track Up, Track Up Arc, Track Up 360, and Desired Track Up. **North Up** sets magnetic north as the top of the screen. **Track Up** sets the current track of the aircraft as the top of the screen. **Track Up Arc** sets the current track of the aircraft and a 120° arc at the top of the screen. **Track Up 360** sets the current track of the aircraft at the top of the screen and a 360° ring with the aircraft symbol position in the center.

**Desired Track Up** sets the desired track to the next waypoint as the top of the screen. Press the **MENU ITEM** key next to this option to scroll through the options.

### **Invert**

The Invert option changes the text and background color. Inverting the display may help readability for the current lighting conditions and the color of the terrain in a given area.

### **Nav Data**

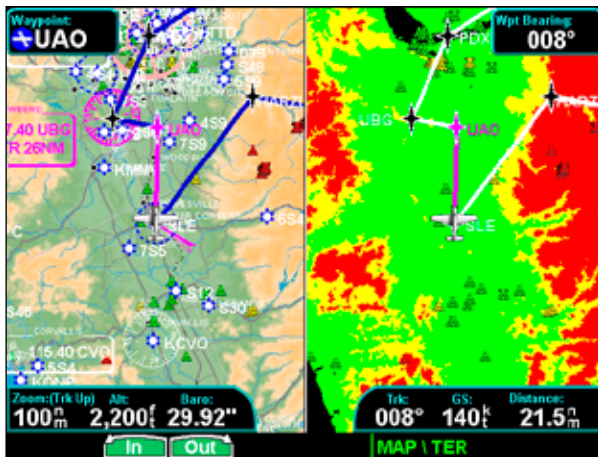
The Nav Data option allows to control the display of navigation data on the Map displays. Subsequent presses of the **MENU ITEM** key for this option provides choices of no nav data, nav data in the corners (waypoint, bearing, zoom, and distance), or full nav data. The full nav data option includes the information in the four corners selection plus altitude, barometer setting, track, and ground speed.

### **Label**

The **LABEL** key turns the labels over each item of information on or off. When Labels are turned off, only the symbol for waypoints along the flight plan will remain in view when the flight plan is enabled.

### Split Screen (SPLIT) Function

The Split Screen capability allows you to display up to two enabled functions side by side. Press the **MENU ITEM** key next to the desired map to highlight the selection. When two functions are displayed, you must first deselect a highlighted selection before selecting another function. Review the Limitations section in the front of this guide for the limitations that apply to the data displayed on the moving map.



Split Screen showing Custom Map and Flight Plan pages with Menu Items

A vertical profile may be optionally selected to be shown on the lower portion of the display. The profile view is only available when there is no TAWS sensor enabled and the Terrain function is based on the internal terrain database. The profile display is always oriented in the Track-Up mode, where the depicted terrain is a cross-section of the terrain just below the aircraft's current track. Obstacles are not shown on the profile display and the aircraft current altitude is provided next to the ownship symbol. The altitude scale adjusts automatically with the aircraft altitude.

The zoom scale and map orientation are displayed in the upper right corner of the profile display.



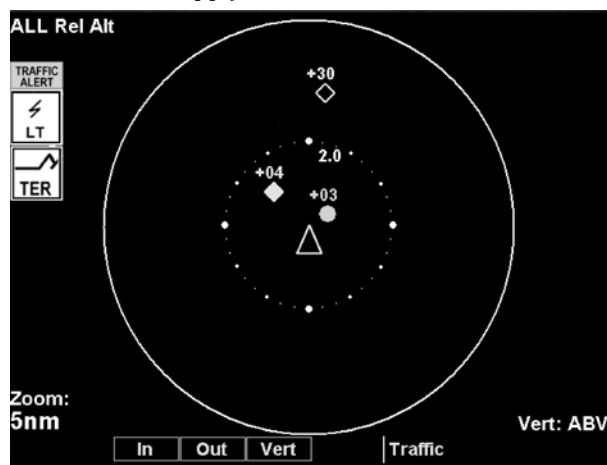
Split Screen showing Custom Map and Flight Plan pages along with the Vertical Profile & Menu Items

When two functions are displayed, the left and right quarter of each function is not displayed, leaving the center half of the original display. The image is not compressed from full width to half width.

Functions with an ownship symbol are displayed in Track-Up map orientation and do not include the track line and compass rose.

## TAS / TCAD Traffic (TRAF) Function

The GMX 200 I/O Traffic model supports interfaces to third party traffic sensors. The traffic function, when interfaced to a TAS sensor (such as, Honeywell IHAS), or the Ryan TCAD is capable of displaying traffic targets as supplied by those sensors. Standard TCAS-type symbology is used and several menu options are available for adjusting the traffic presentation. Review the Limitations section in the front of this guide for the limitations that apply to traffic data.



TAS/TCAD Traffic page showing 360 degree arc

The traffic menu options vary depending on the traffic source selected during the installation procedures, but the display symbology is the same.

### Traffic Depiction

Your position (ownship symbol) is located at the tip of the aircraft icon at center of the screen. The traffic function is always shown in heading mode, meaning that track based flight plan information is not overlaid. Traffic can also be shown on the Custom Map and in a small thumbnail view presented in the upper left corner of the screen.

### Symbology

Traffic is shown with either the relative or absolute altitude indicated above or below the target symbol. If the traffic is below or equal to your ownship altitude, the label is shown below the symbol. If the traffic is above your ownship altitude, the label is shown above the symbol. For traffic with no altitude information, the label will be shown as dashes (---).



**Traffic alert target with direction of descent and relative altitude**



**Traffic advisory target with relative altitude**



**"Other" traffic target with relative altitude**

- Traffic shown with an amber filled circle corresponds to traffic generating an alerting condition
- Traffic shown with a cyan filled diamond corresponds to traffic generating an advisory condition
- Traffic shown with a cyan open diamond is considered "other traffic"

### Alert Hot Key

Traffic alerts go one step further than the Advisory hot key feature and will automatically bring up the Function Menu showing the TAS/TCAD function. A single key press can then be used to switch the display to the Traffic function. The Alert hot key feature will automatically clear when the traffic alert condition no longer exists.

### Traffic Alert Pop-Up

When a Traffic Alert occurs, the system can automatically switch to the Traffic function and the zoom

level will be adjusted to 5 NM, unless TAWS alert mode is active. The Alert Hot Key or Traffic Alert Pop-Up mode option is selectable in the Traffic menu and only occurs when the display is set to some function other than Traffic.



Traffic Alert thumbnail

### **Vert Smart Key (TAS)**

The Vertical Mode (Vert) “smart” key is used to select the vertical filtering mode for the TAS unit. The following options are available and will allow traffic that is within the indicated range relative to your aircraft altitude to be displayed:

- ABV (Above)                                   +9000/-2700
- NRM (Normal)                                +2700/-2700
- BLW (Below)                                 +2700/-9000
- UNR (Unrestricted)                        No Limit

### **Traffic Status Indicators**

#### ***Off Scale***

If a Traffic Alert target is not shown on the display because the zoom scale is set too low, an amber Traffic Off Scale (OS) indicator will show on the display.

#### ***Standby (TAS)***

If the traffic sensor is in the Standby Mode, a white TAS Standby message will show on the display.

#### ***Test (TAS)***

TAS Test will be displayed if the Traffic sensor is in the Test Mode.

#### ***Not Displayed***

An amber “Traffic Not Displayed” will be shown if the Traffic sensor has failed.

#### ***TAS Fail***

System Failure, shown in yellow in the lower right corner.

#### ***TAS Data Fail***

Label set sent by the TAS unit has failed the integrity check. Shown in yellow in the lower right corner.

#### ***TAS Data Time-Out***

GMX 200 is not receiving labels from the TAS unit. Shown in yellow in the lower right corner.

### **No Bearing Advisories**

Traffic advisories without a valid bearing will be listed in text form below the ownship symbol.

### **TAS Menu Options**

#### ***Traffic Alert Mode (Pop-Up/Prompt)***

The Traffic Alert mode allows you to configure the currently selected Traffic Alert response. If Pop Up is selected, the Traffic function will automatically pop up when a Traffic Alert occurs. If the Prompt mode is selected, the Traffic Alert hot key prompt is shown when a Traffic Alert occurs. If the Traffic function is already being viewed, neither will occur.

#### ***Standby Mode***

The Standby mode places the TAS unit into the standby mode. In this mode, the unit will not display traffic targets or generate traffic alerts. See the TAS Users Guide for additional information.

#### ***Self-Test***

When in Standby Mode, a TAS Self-Test can be initiated by selecting this option.

### **TCAD 9900B Menu Options**

#### ***Altitude Option (Relative/Pressure)***

The Altitude option lets you select between relative and pressure altitude in hundreds of feet. The Altitude option choice is shown in the upper left corner of the screen. Relative altitudes are shown with a “+” or “-”, while absolute altitudes are shown as just a number.

#### ***Filter***

An altitude filter allows targets that are outside of a  $\pm 2000'$  vertical range to be filtered off the display. The current mode is shown in the upper left corner of the display as “ALL” (no filtering) or “ $\pm 2000$ ” when the filtering is active.

#### ***Volume***

The volume of the TCAD voice alert can be adjusted by pressing the Volume button. This opens a text menu where a value from 0 – 10 can be entered.

#### ***Approach Mode***

The Approach Mode sends the approximate elevation of the destination airport to the TCAD unit for Approach mode operations. See the TCAD operator’s manual for additional details.

#### ***Mute Duration***

The Mute Duration allows the duration of the mute command to be sent to the TCAD unit. See the TCAD operator’s manual for additional details.

#### ***Shield***

This allows the current shield to be selected from a pop-up window. En Route, Unrestricted, Terminal, Ground, and Standard are the available modes. See the TCAD operator’s manual for additional details.

#### ***Shield Heights***

This allows the shield heights to be adjusted for the En Route, Standard, and Terminal shield modes. See the TCAD operator’s manual for additional details.

#### ***Shield Ranges***

This allows the shield ranges to be adjusted for the En Route, Standard, and Terminal shield modes. See TCAD operator’s manual for additional details.

### **TCAD 9900BX Menu Options**

#### ***Altitude Option (Relative/Pressure)***

The Altitude option lets you select between relative and pressure altitude in hundreds of feet. The Altitude option choice is shown in the upper left corner of the screen. Relative altitudes are shown with a “+” or “-”, while absolute altitudes are shown as just a number.

#### ***Filter***

An altitude filter allows targets that are outside of a  $\pm 2000'$  vertical range to be filtered off the display. The current mode is shown in the upper left corner of the display as “ALL” (no filtering) or “ $\pm 2000$ ” when the filtering is active.

#### ***Volume***

The volume of the TCAD voice alert can be adjusted by pressing the Volume button. This opens a text menu where a value from 0 – 10 can be entered.

#### ***Approach Mode***

The Approach Mode sends the approximate elevation of the destination airport to the TCAD unit for approach mode operations. See the TCAD operator’s manual for additional details.

#### ***Ground/Flight Mode***

The GND/FLT mode commands the TCAD unit into the corresponding mode. See the TCAD operator’s manual for additional details.



### ADS-B Traffic (TRAF) Function

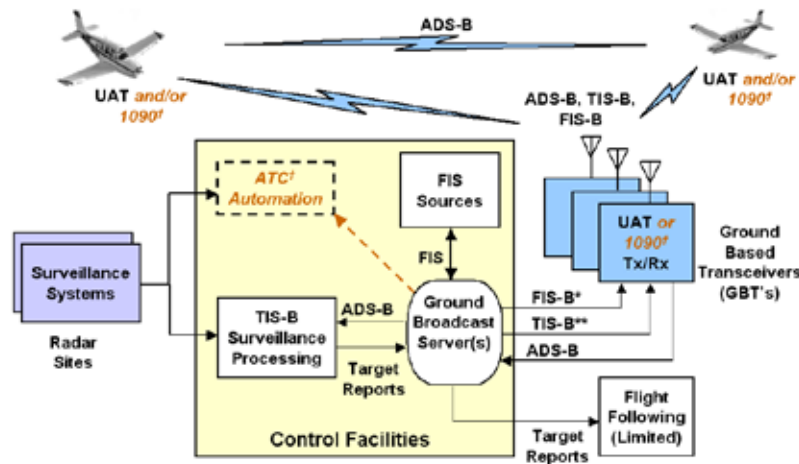
The ADS-B Traffic Function allows you to view other traffic in the area, when installed with a UAT data link radio. This screen can also show your flight plan. Traffic is shown in relationship to your aircraft. “Smart” keys allow you to zoom in and out, and select an individual traffic target. Review the Limitations section in the front of this guide for the limitations that apply traffic data.

Automatic Dependent Surveillance-Broadcast (ADS-B) is a surveillance technology being deployed in selected areas of the NAS. ADS-B equipment broadcasts a radio transmission approximately once per second containing the aircraft’s position, velocity, identification, and other information. ADS-B equipment can also receive reports from other suitably equipped aircraft within reception range. Additionally, these broadcasts can be received by Ground Based Transceivers (GBTs) and used to provide air traffic surveillance services, along with fleet operator monitoring of aircraft. No ground infrastructure is necessary for ADS-B equipped aircraft to detect each other.



ADS-B Traffic page showing 360 degree arc

In the United States, two different data links have been adopted for use with ADS-B: 1090 MHz Extended Squitter (1090 ES) and the Universal Access Transceiver (UAT). The 1090 ES link is intended for aircraft that primarily operate at FL180 and above, whereas the UAT link is intended for use by aircraft that primarily operate at 18,000 feet and below. From a pilot’s standpoint, the two links operate similarly and support ADS-B and Traffic Information Service-Broadcast (TIS-B). The UAT link additionally supports Flight Information Services-Broadcast (FIS-B).



Identifies: Initial System Capabilities  
† Future System Capabilities

\* No FIS-B over 1090 links  
\*\* TIS-B over 1090 NOT available at present

# Detailed Operation

## ADS-B Traffic

ADS-B equipment may be certified as an air-to-air system for enhancing situational awareness and as a surveillance source for air traffic services. Refer to the aircraft's flight manual supplement for the specific aircraft installation.

ADS-B enables improved surveillance services, both air-to-air and air-to-ground, especially in areas where radar is ineffective due to terrain or where it is impractical or cost prohibitive. Initial NAS applications of air-to-air ADS-B are for “advisory” use only, enhancing a pilot's visual acquisition of other nearby equipped aircraft either when airborne or on the airport surface. Additionally, ADS-B may enable ATC and fleet operators to monitor aircraft throughout the available ground station coverage area. Other applications of ADS-B may include enhanced search and rescue operations and advanced air-to-air applications such as spacing, sequencing, and merging.

ADS-B avionics allow pilots to enter the aircraft's Flight ID and Air Traffic Control (ATC)-assigned squawk (or “4096”) code. This code should be entered as either the transponder code on standard transponders, or the ADS-B code on ADS-B equipment, depending on the installation.



**NOTE:** Some ADS-B avionics panels are not interconnected to the transponder. In this case, the ADS-B code entry should be disabled, so that ATC cannot receive different transponder and ADS-B codes from the same aircraft. There should be one and only one place for the pilot to enter the ATC code. Consult your installing avionics shop with questions.

Additionally, UAT systems provide a VFR mode that may be used by pilots when not wanting to receive air traffic services. The “Set 1200” feature will broadcast a “VFR” Flight ID to other aircraft and ground receivers, similar to using a “1200” transponder code.

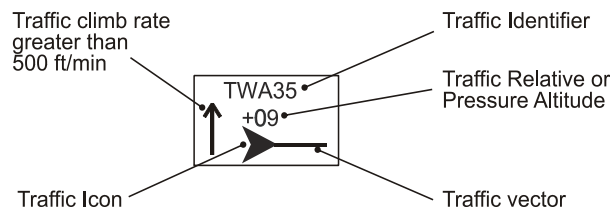
ADS-B is intended to be used both in-flight and on the airport surface. ADS-B systems should be turned “on” -- and remain “on” -- whenever operating in the air and on the airport surface, unless a change to “standby” was requested by ATC.

**The ADS-B cockpit display of traffic is NOT intended to be used as a collision avoidance system and does not relieve the pilot's responsibility to “see and avoid” other aircraft. ADS-B shall not be used for avoidance maneuvers during IMC or other times when there is no visual contact with the other target aircraft. ADS-B is intended only to assist in visual acquisition of other aircraft. No avoidance maneuvers are provided for, nor authorized, as a direct result of an ADS-B target being displayed in the cockpit.**

Use of ADS-B air traffic service is limited to the service volume of the GBT. Note that the coverage volume of GBTs is limited to line-of-sight.

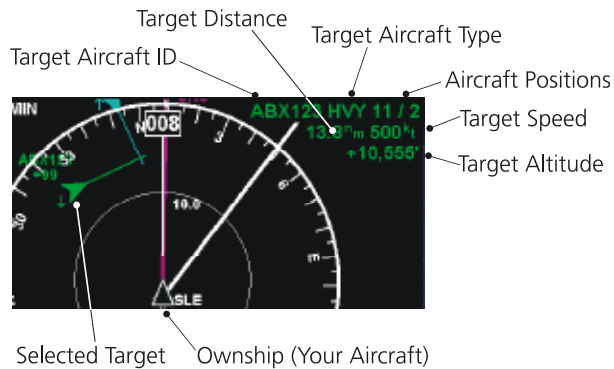
### Traffic Description

Your position is located at the tip of the empty triangle (Ownship symbol). The other traffic is shown as a large solid cyan (light blue) arrow pointing in its direction of travel. Next to the traffic arrow symbol is the traffic identifier, and altitude. Altitude is selected as either Pressure or Relative Altitude as noted in the upper left corner of the display.



ADS-B Traffic information detail

A small up or down arrow next to the identifier indicates that the traffic is climbing or descending at a rate of at least 500 feet per minute. The end of the vector line that extends beyond the point of the traffic arrow indicates where it will be at the end of the selected time interval. The currently selected time interval is indicated in the upper left corner of the display.



**Selected ADS-B Target Information Detail**

### **TIS-B Traffic**

Traffic Information Service – Broadcast (TIS-B) is supported by displaying non ADS-B equipped aircraft that are received over the UAT data link radio. Non ADS-B equipped aircraft that are detected by ground-based radar can be up-linked to all aircraft in the area that are UAT data link equipped and within the GBT service volume.

As TIS target location is determined by ground based radar, coverage, range and target positional accuracy are highly dependent on relative location to the actual radar site.

Traffic Information Services-Broadcast (TIS-B) is the broadcast of traffic information to ADS-B equipped aircraft from ADS-B ground stations. The source of this traffic information is derived from ground-based

air traffic surveillance sensors, typically radar. TIS-B is intended to provide ADS-B equipped aircraft with a more complete traffic picture in situations where not all nearby aircraft are equipped with ADS-B. The advisory-only application enhances a pilot's visual acquisition of other traffic. TIS-B service is becoming available in selected locations where there are both adequate surveillance coverage from ground sensors and adequate broadcast coverage from Ground Based Transceivers (GBTs). The quality level of traffic information provided by TIS-B is dependent upon the number and type of ground sensors available as TIS-B sources and the timeliness of the reported data.

In order to receive TIS-B services, the following conditions must exist:

1. The host aircraft must be equipped with a UAT ADS-B transmitter / receiver or transceiver. As the ground system evolves, the ADS-B data link may be either UAT or 1090 ES, or both.
2. The host aircraft must fly within the coverage volume of a compatible GBT that is configured for TIS-B uplinks. (Not all GBTs provide TIS-B due to a lack of radar coverage or because a radar feed is not available).
3. The target aircraft must be within the coverage of, and detected by, at least one of the ATC radars serving the GBT in use.

Only transponder-equipped targets (i.e., Mode A/C or Mode S transponders) are detected. Current radar siting may result in limited radar surveillance coverage at lower altitudes near some general aviation airports, with subsequently limited TIS-B Service volume coverage. If there is no radar coverage in a given area, then there will be no TIS-B coverage in that area.

### *TIS-B Limitations*

1. **TIS-B is NOT intended to be used as a collision avoidance system and does not relieve the pilot's responsibility to "see and avoid" other aircraft. TIS-B shall not be used for avoidance maneuvers during times when there is no visual contact with the aircraft. TIS-B is intended only to assist in the visual acquisition of other aircraft. No avoidance maneuvers are provided for, nor authorized, as a direct result of a TIS-B target being displayed in the cockpit.**
2. While TIS-B is a useful aid to visual traffic avoidance, its inherent system limitations must be understood to ensure proper use.
  - (a) A pilot may receive an intermittent TIS-B target of their own aircraft, typically when maneuvering (e.g., climbing turn) due to the radar not tracking the aircraft as quickly as ADS-B.
  - (b) The ADS-B-to-radar association process within the ground system may at times have difficulty correlating an ADS-B report with corresponding radar returns from the same aircraft. When this happens the pilot will see duplicate traffic symbols (i.e., "TIS-B shadows") on the cockpit display.
  - (c) Updates of TIS-B traffic reports will occur less often than ADS-B traffic updates. (TIS-B position updates will occur approximately once every 3-13 seconds depending on the radar coverage. In comparison, the update rate for ADS-B is nominally once per second).
3. **Pilots and operators are reminded that the airborne equipment that displays TIS-B targets is for pilot situational awareness only and is not approved as a collision avoidance tool. Unless there is an immediate emergency requiring immediate action, any deviation from an air traffic control clearance based on TIS-B displayed cockpit information must be approved by the controlling ATC facility prior to commencing the maneuver. Uncoordinated deviations may place an aircraft in close proximity to other aircraft under ATC control not seen on the airborne equipment, and may result in a pilot deviation.**
  - (d) The TIS-B system only detects and uplinks data pertaining to transponder equipped aircraft. Aircraft without a transponder will not be displayed as a TIS-B target. Always assume that there are more aircraft in the vicinity of your aircraft.
  - (e) There is no indication provided when any aircraft is operating inside (or outside) the TIS-B Service Volume, therefore it is difficult to know if one is receiving uplinked TIS-B traffic information. Assume that not all aircraft are displayed as TIS-B targets.

### Degraded Target

Degraded targets are shown with the “bullet” symbol. A degraded target has limited positional accuracy and can either be an uplinked TIS-B target, or an ADS-B target whose GPS position has degraded. When a degraded target is selected via the **SELECT** key in the Traffic function, no distance to the target is displayed, as it cannot be computed accurately.



Degraded Target Symbol

### Target Color

Service vehicle targets and aircraft targets reporting on the ground are colored in tan. Airborne aircraft targets are usually cyan in color. However, the target will be yellow if it is within 5 NM and 2,000 feet vertically above or below your position. Selected targets are green in color.

### Surface Targets

Surface vehicle targets, in addition to ADS-B targets, are supported and are shown as tan, rectangular icons. They are displayed both on the Traffic Function page, and on the Custom Map when traffic is turned on.



Surface Vehicle Target

### Traffic Altitude Values

Altitudes shown next to the traffic icon are in hundreds of feet (09 = 900 feet). Altitude values shown in all other locations and displays are the actual values in feet (+100 = 100 feet).

### Ident

The **Ident** smart key allows the pilot to initiate a sequence that is equivalent to a standard transponder “Ident,” as requested by ATC. When pressed, the Ident flag will be displayed while the GDL 90 UAT broadcasts the ident. The GMX 200 must be configured to be the UAT’s control panel for this function to be available.



### Operation

The controls at the bottom of the screen allow you to zoom in and out, initiate an Ident when connected to a GDL 90 UAT, and to select each traffic target on the screen.

1. Press the **FN** key to reach the Function page showing the **TRAF** (Traffic) “smart” key.
2. Press **TRAF**.
3. Press the **IN** key to zoom in. Press the **OUT** key to zoom out.
4. With the GDL 90 UAT only, press the **Ident** key to initiate an Ident for ATC purposes. A green flag will appear on the left side of the display when the GDL 90 UAT reports that it is sending an ident over the air.
5. Press the **Select** key to consecutively select each Traffic item that is shown on the display. When a target is selected, additional information about that target is shown in the upper right corner of the display. The selected target will be highlighted in green on the display. Surface vehicle targets cannot be selected.

Information about the selected target includes:

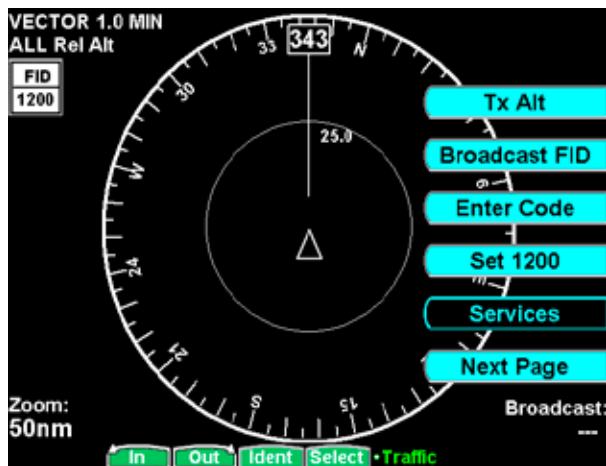
# Detailed Operation

## ADS-B Traffic

ID, aircraft type, position between target and ownship, distance, speed, and altitude. Position is noted in clock numerals as relative to direction of travel for each aircraft. For instance, a position noted as 11/2 means that the traffic is at your aircraft (ownship) 11 o'clock position and your aircraft (ownship) is at the target's 2 o'clock position.

### Traffic Option Page 1

The first option page of the Traffic function lets you select options for the choices of Transmit Status, Broadcast (FID) Mode, Enter (ADS-B) Code, Set ADS-B code to 1200, and Services. The last option selection takes you to the next page of options.



ADS-B Traffic Menu Items (Page 1)

### Transmit Status

(ADS-B Broadcast Options)

Selecting **Tx Alt** allows ADS-B position reports to be transmitted with altitude information. **Tx Alt Off** removes altitude information from the ADS-B position reports. **Standby** suspends ADS-B position reports, but displays other aircraft data when available. These modes are similar to “ALT,” “ON,” and “Standby” on a

standard transponder. The GMX 200 must be configured as the UAT's control panel to make this function available.

### ADS-B Broadcast Mode Control

For ADS-B equipped installs, this feature allows the pilot to control the broadcast mode of their aircraft.

Broadcast options are controlled via the Traffic Function Menu and allow the pilot to toggle between Broadcast FID / Broadcast VFR. The GMX 200 must be configured as the UAT's control panel to make this function available.

### Broadcast FID

Causes the currently set Flight ID and permanently assigned ICAO address to be broadcast with the aircraft's current position. The Flight ID and the ICAO address are shown on the lower right corner of the Traffic Function page. The Flight ID is pilot-settable via the menu option **Enter FID** in alphanumeric characters. The ICAO address is a value set during system install by the installer.

### Broadcast VFR

Causes a fixed Flight ID of “VFR” and a randomly generated temporary address to be broadcast with the aircraft's current position. This mode is similar to squawking “VFR 1200” on a standard transponder.

### Enter Code (ADS-B Air Traffic Source)

This is where you enter the ATC-assigned ADS-B code. This code entered into the GMX 200 does **NOT** control the code on Mode A, C, or S transponders. It only sends the selected code to the GDL 90 UAT for inclusion into the position report. The GMX 200 must be configured as the UAT's control panel and Code Edit enabled to make this function available.

### Set 1200

Pressing the **Set 1200** key sets the ADS-B code to 1200. This code entered into the GMX 200 does **NOT** control the code on Mode A, C, or S transponders.

### Services

The Services option allows emergency/service codes to be sent over the data-link radio. When pressed, a list of standard emergency/service codes will be presented. The desired emergency/service code can be selected and broadcast by pressing the **Trans** (Transmit) “smart” key or cancelled by pressing the **Cancel** “smart key.” When an emergency/service code is being transmitted, the **Services** menu option key label is illuminated. To terminate the broadcast, press the **Services** key again. Three of the emergency/service codes temporarily change the ADS-B code value. Once the emergency/service code is terminated, the ADS-B code will revert back to the previously set ADS-B code. The GMX 200 must be configured as the UAT’s control panel to make this function available.

Press the **Next Page** key to display the next page of menu items.

### Traffic Menu Option Page 2

The second menu option page of the Traffic function lets you select options for the choices of Time, Altitude Filter, Altitude type, Flight Plan, and Traffic Map Orientation.



ADS-B Traffic Menu Items (Page 2)

### Time

The time interval option sets the amount of time to estimate the path and location of the traffic. The path of the traffic is shown by the line extending from the point on the end of the traffic arrow icon. The end of the line shows the point where the traffic item will be at the end of the selected time interval. Select 1, 1.5, 2-5, or 10 minutes with each press of the **Time** key.

### Traffic Altitude Filter

For ADS-B equipped installs, an altitude filter allows targets that are outside of a  $\pm 2000$  foot vertical range to be filtered off the display.

This option is controlled via the Traffic Function Menu and causes the on-screen mode to change from “ALL” to “ $\pm 2000$ ” in the upper left of the Traffic Function screen.

In the “ALL” mode, all targets, regardless of their

## Detailed Operation

### ADS-B Traffic

altitude, are shown. In  $\pm 2000$  foot mode, only targets that are within 2000 feet above or below the ownship altitude are shown.

#### Altitude Option (Relative/Absolute)

The altitude option lets you select between relative and absolute pressure altitude in hundreds of feet. The altitude option choice is shown on the upper left corner of the screen while in the graphic display option. When Relative Altitude is selected, the altitude value on the traffic is shown relative to your altitude. A “+” indicates the target is above your altitude. A “-” indicates the target is below your altitude. For instance, if a value of +80 is shown, the value means that the indicated traffic is 8000 feet above your altitude. When Absolute Altitude is selected, if a value of 121 is shown, the value means that the indicated traffic is at 12,100 feet absolute pressure altitude. Absolute Pressure altitude does not show a + or -. Remember that Absolute Pressure altitude can be substantially different than the baro-corrected altitude shown on the altimeter in your aircraft.

#### Flight Plan

The Flight Plan option controls the display of the Flight Plan course line. Pressing the **Menu Item** key next to the Flight Plan option toggles between showing and not showing the Flight Plan route line.

If the flight plan provided by the navigator to the GMX 200 has an invalid cross track error, the ownship symbol will have a red “X” placed over it.

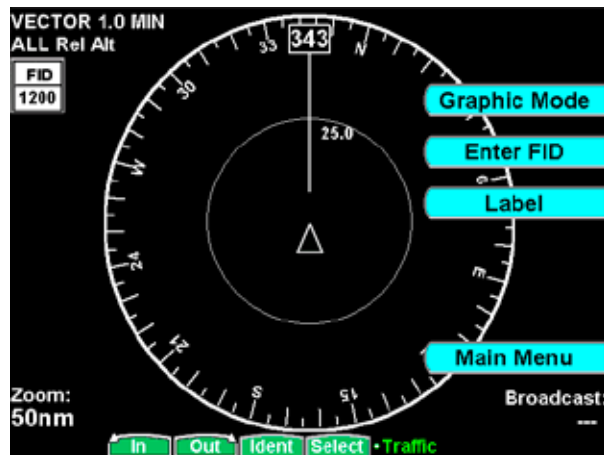
#### Traffic Map Orientation

The Traffic Map Orientation option lets you choose between a 360-degree compass rose or an arc that covers about 90 degrees over the top of the display. Your aircraft position (ownship) is shown by an empty white triangle near the center of the display. The Traffic function display is always in the Track Up mode.

Press the **Next Page** key to display the next page of menu items.

#### Traffic Menu Option Page 3

The third menu option page of the ADS-B Traffic function lets you select options for the choices of Graphic or Text Mode, Enter FID (Flight ID), and the display of traffic target Labels.



ADS-B Traffic Menu Items (Page 3)

#### Display Mode

The display mode lets you select either a graphic or text version of traffic information.

#### *Graphic Display*

The graphic traffic display shows your location, nearby traffic, and information about the traffic.

#### *Text Display*

The text traffic display shows the distance to the traffic item, flight id, category, position, speed, and altitude. The currently selected target is shown in green. The traffic list is sorted by distance with the closest traffic to your current position shown on the top line. The total number of targets tracked is shown



in the upper left corner. Up to 12 of the nearest targets are listed.



ADS-B Target List						
4 Targets						
Dist(NM)	FlightID	Cat.	Position	Speed(kts)	Altitude	
15.4	ABX123	HVY	12 / 3	500	-1,000'	
16.2	UPS189	LRG	1 / 1	450	-1,000'	
17.0	FDX514	HVY	4 / 9	250	-1,000'	
31.2	UPS350	XLG	11 / 9	300	-1,000'	

ADS-B Traffic Text Display

### Enter FID

The Enter Flight ID option allows you to edit your broadcasted Flight ID when the editing function is enabled. The Function “smart” keys at the bottom of the screen change to arrow keys. Use the **UP/DOWN** arrow keys to change the characters. Use the **LEFT/RIGHT** arrow keys to move between characters. Press the **MENU/ENT** key to save the displayed Flight ID. The Flight ID is only sent when the Flight ID broadcast option is enabled. Note that the GDL 90 UAT does not allow the space or period characters. The GMX 200 must be configured as the UAT’s control panel to make this function available.

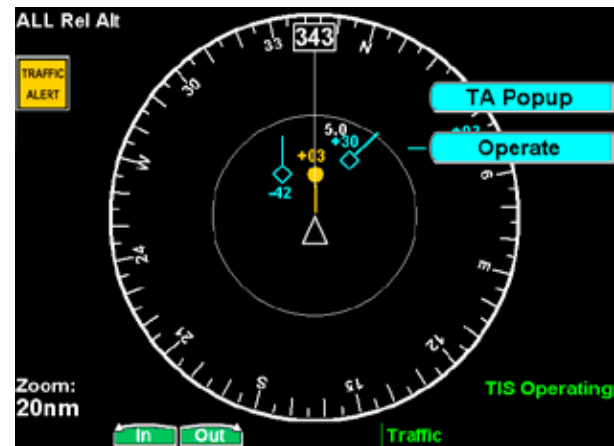
### Label

The **LABEL** menu key toggles the state of the labels adjacent to the target symbols. Turning labels off will remove the Flight ID and flight vector.

Press the **Main Menu** key to return to the first page of menu items.

## TIS-A Traffic (TRAF) Function

The GMX 200 I/O supports the Traffic Information Services – Addressed (TIS-A) function when interfaced to a third party TIS-A sensor. The traffic function, when interfaced to the Garmin GTX 330 is capable of displaying traffic targets supplied by that sensor. Standard TCAS-type symbology is used and several menu options are available for adjusting traffic presentation and sensor operation. Review the Limitations section in the front of this guide for the limitations that apply to traffic data.



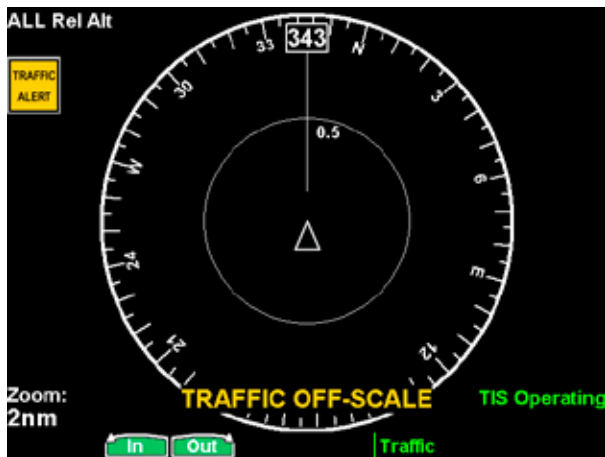
TIS-A Traffic Page with Menu Items



**NOTE:** TIS-A is not a collision avoidance system. It is an aid to visual acquisition and does not relieve the flight crew of their responsibility to “see and avoid.” There are no evasive aircraft maneuvers authorized, recommended, or provided for as a result of displayed TIS-A targets. Refer to the TIS-A Sensor documentation for additional information.

### Traffic Depiction

It is important to note that not all traffic may be displayed and that TIS-A is only an aide to visual acquisition. TIS-A is there to assist you to visually acquire other aircraft around you and does not provide any information other than making you aware of other aircraft around you that the Mode-S terminal radar can “see.” This may not include all traffic around you. Only transponder-equipped aircraft that are visible to the terminal radar sensor will be broadcast to your aircraft. Up to eight (8) targets may be displayed at any given time. This is a limitation of the ground sensor since the ground sensor provides the data via the radar pulse.



TIS-A Traffic Page with Traffic Off-Scale

Your position (ownship symbol) is located at the tip of the triangle icon. The traffic function is always shown in heading mode, meaning that track-based flight plan information is not overlaid. Traffic can also be shown on the Custom Map and in a small thumbnail view presented in the upper left corner of the screen.

Traffic targets are displayed relative to the ownship symbol and include a relative altitude in 100's of feet above (+) or below (-) your aircraft's altitude. Targets also include a climb (↑) or descent arrow (↓) next to the relative altitude when the climb or descent rates are greater than 500 feet per minute.

Targets are displayed at full brightness for the first six (0 to 6) seconds. If the TIS-A data is not refreshed, the targets will be displayed at a reduced brightness for the next six (6 to 12) seconds during an interval known as “coasting,” and removed from the display after 12 seconds. “Coasting” usually results from the TIS-A sensor missing a radar sweep. This typically happens because the aircraft antenna line of sight to the radar has been obstructed, most likely by either terrain or because the aircraft is banking.

### TIS-A Menu Options

The GMX 200 displays the current operating mode when the **MENU** key is pressed.

#### **Alert Hot Key (TA Prompt)**

When selected and viewing another function, this feature will automatically display the function menu at the bottom of the screen with the TRAF function highlighted when a Traffic Advisory (TA) alert is received from the TIS-A sensor. You may select the traffic function by pressing the corresponding Smart key or continue to view the currently displayed function.

#### **Traffic Alert Pop-Up (TA Popup)**

When selected and viewing another function, this feature will automatically display the traffic function screen when a Traffic Advisory (TA) alert is received from the TIS-A sensor. You may then view another function by pressing the **FN** key and selecting the desired function.

**Operate/Standby**

The GMX 200, when installed with a control wire to the GTX 330, controls the TIS-A sensor operating mode. The TIS-A sensor defaults to “Operate” when turned on.

**Symbology**

- TIS-A targets are categorized as either “Proximate Traffic” or “Traffic Advisories.”
- Proximate Traffic targets are depicted as hollow blue diamonds.
- Traffic Advisory targets are depicted as solid yellow/amber circles.
- Vectors extending from the targets indicate the target’s direction of travel as reported by the TIS-A sensor. The vector length has no meaning.



Ownship (Your Aircraft)



Proximate traffic target with direction of flight vector and relative altitude



Traffic advisory target with direction of flight vector and relative altitude

**Traffic Status Indicators**

The following status indicators are displayed in the lower right portion of the display:

“TIS Operating” to indicate the TIS-A Sensor is operating and within TIS-A service coverage.

“TIS Coasting” to indicate that the target information is between 6 and 12 seconds old. This may happen if the TIS-A sensor has missed a radar sweep. Target brightness is also reduced to indicate this condition.

“TIS Unavailable” to indicate the TIS-A sensor is operating, but outside of TIS-A service coverage.

“TIS Standby” to indicate the TIS-A sensor is in standby mode and not processing TIS-A information, even if it is available.

“Traffic Off Scale,” noted in amber in the lower center of the display, indicates that traffic has been reported but is not displayed because it is beyond the current map scale (zoom level).

## Flight Plan (FPL) Function

Use the Flight Plan function to view details about your flight plan route. Press the **UP/DOWN** arrow “smart” keys to step through the waypoints in your flight plan. Press the **INFO** key to view information about the waypoint. The Flight Plan Function shows the Current Flight Plan that is active in the connected navigation source (i.e. GPS receiver). The Current To Waypoint box shows the current leg of the flight plan. The Current Flight Plan box shows all of the legs of your flight plan with the current leg indicated in magenta. Listed are each leg with the bearing and distance between the legs. The Current Nav Data box shows the aircraft current position in latitude and longitude, ground speed, and track. In the lower right corner information for the current waypoint is displayed in the Waypoint Info box. The Nearest Center frequency is shown just above the flight plan. The Flight Plan function does not have any options.

If the flight plan provided by the navigator to the GMX 200 has an invalid cross track error, the ownship symbol will have a red “X” placed over it.



## METARs

When METARs are available for an airport in the flight plan, the airport symbol is replaced with a METAR icon. When the **Wx** smart key is pressed, the METAR text will be displayed.



Flight Plan Information with METAR information

Runway diagrams of airports will be displayed in the same orientation as the Custom map (i.e., North Up, Track Up, or DTK Up).

1. Press the **FPL** function key to reach the Flight Plan function.

Current To Waypoint		
Ident	Distance	Bearing
✦ UAO	22.4 nm	008°

Center Frequency		Current Nav Data	
SEATTLE	125.80	GS: 120 kt N 44° 54' 40.74"	TRK:008° W123° 00' 4.28"

Current Flight Plan			Waypoint Info	
Ident	Bearing	Dist(NM)		
✦ SLE	009°	22.5	UAO Airport	200ft
→ ✦ UAO	289°	10.8	AURORA STATE	
✦ UBG	032°	21.4	AURORA OR USA	
✦ PDX	066°	45.0	APPR	126.00
✦ 4S2	085°	15.9	CLR	119.95
✦ DLS	163°	57.1	DEP	126.00
			CTAF	122.70

Flight Plan Information (UAO selected)

- Press the **Up** or **Down** function smart keys to move up and down the flight plan list in the Current Flight Plan window. The details for the selected waypoint are shown in the Waypoint Info window on the right side of the screen.

Current To Waypoint		
Ident	Distance	Bearing
✦ UAO	17.3 nm	008°

Center Frequency		Current Nav Data	
SEATTLE	125.80	GS: 120 kt N 44° 59' 17.93"	TRK:008° W122° 56' 54.56"

Current Flight Plan			Waypoint Info	
Ident	Bearing	Dist(NM)		
✦ SLE	009°	22.5	PDX Airport	30ft
✦ UAO	289°	10.8	PORTLAND INTL	
✦ UBG	032°	21.4	PORTLAND OR USA	
→ ✦ PDX	066°	45.0	ATIS	120.62
✦ 4S2	085°	15.9	ATIS	128.35
✦ DLS	163°	57.1	APPR	118.10
			APPR	124.35

Flight Plan Information (PDX selected)

- Each press the **Info** function key will step through the available pages of Waypoint Information.

## Terrain (TER) Function

The Terrain Function shows a map of the terrain in the area relative to your airplane's position and altitude. The GMX 200 has a standard internally based terrain function. The GMX 200 also supports an external TAWS sensor. When the external TAWS sensor is connected, it replaces the GMX 200's internal Terrain function.

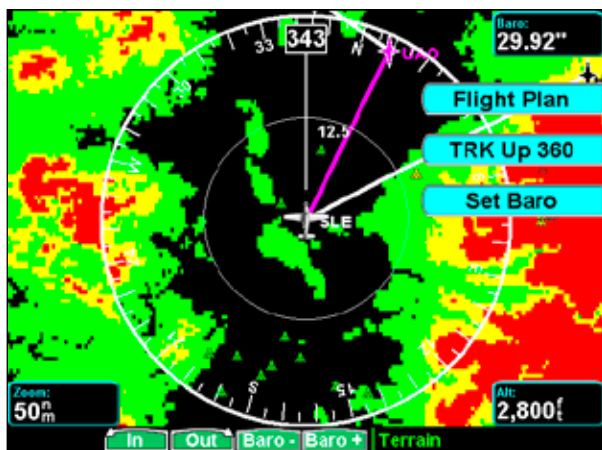
Terrain information can be supplied by one of two sources:

- Internal GMX 200-Based Terrain
- External TAWS-Based Terrain

Review the Limitations section in the front of this guide for the limitations that apply to the terrain data.

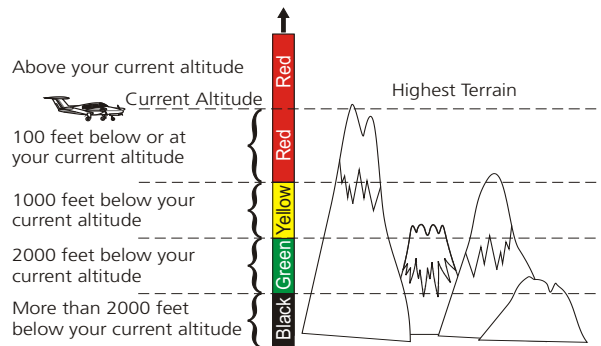
### Internal GMX 200-Based Terrain

The altitude information comes from an external altitude encoder or GPS altitude depending on your installation. For pressure altitude, displayed altimeter setting has to be adjusted, or baro-corrected, just like the one in your aircraft's instrument panel.



Terrain Page with GMX 200-Based Data

The terrain screen has a 360-degree and a 120-degree display. Both screens will show terrain relative to your position. Colors used for terrain display are shown below.



### Terrain Elevation Color Coding Reference (Normal Terrain Model)



**NOTE:** The Terrain function shows you the general terrain elevations relative to your altitude and are advisory in nature. Individual obstructions may be shown if available in the database. Terrain is displayed from database information and may therefore potentially contain some degree of error. Do not use this information for navigation.

### Obstructions

Obstructions, such as towers and other man-made objects, are part of the GMX 200 updateable database. Obstructions over 250 feet high are shown on the maps with tower symbols. The symbol is color coded to signify the relative altitude of the tower to your aircraft's altitude and follows the same conventions as the color coding for terrain.



Obstruction icons

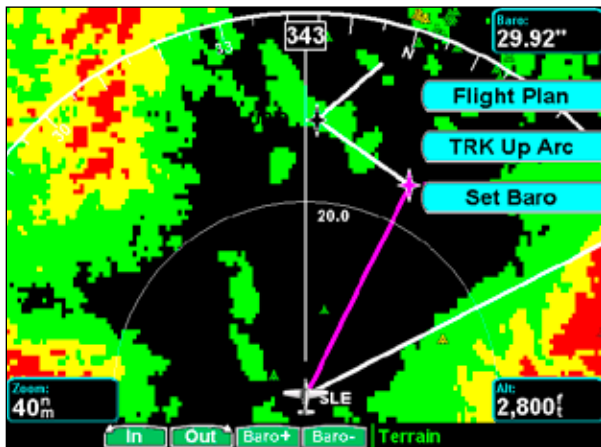
Objects that are at your altitude are shown in red; objects that are near your altitude are shown in yellow; objects with towers that are significantly below your altitude colored green. Obstructions are shown on the

Custom Map and in the Terrain function. Use the **IN** and **OUT** keys at the bottom of the screen to zoom in and zoom out. The zoom scale is shown in the lower left corner of the screen.

Use the **BARO+** and **BARO-** keys at the bottom of the screen to make minor adjustments to the barometric pressure value.

### Terrain Option Page

The Terrain option page lets you select options for the choices of Flight Plan, Map Orientation, and setting the barometric pressure.



Terrain option page showing 120 degree arc

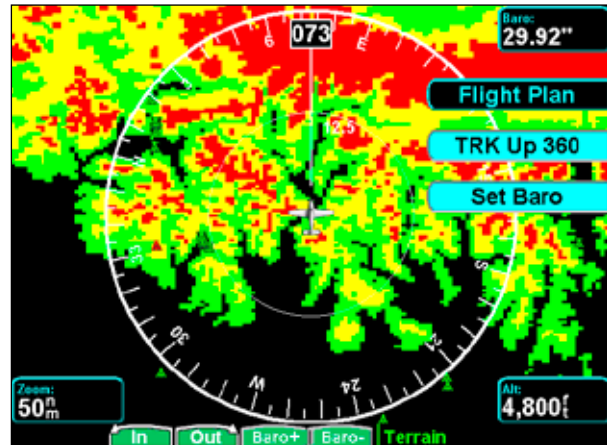
### Flight Plan

The Flight Plan option controls the display of the Flight Plan course line. Pressing the **Menu Item** key next to the Flight Plan option toggles between showing and not showing the Flight Plan route line.

If the flight plan provided by the navigator to the GMX 200 has an invalid cross track error, the ownship symbol will have a red "X" placed over it.

### TRK Up Arc/TRK Up 360

The Terrain function display is always in the Track Up mode. Pressing the **Menu Item** key toggles the map orientation between **Track Up Arc** and **Track Up 360**.



Terrain option page showing 360 degree arc

### Set Barometer (Pressure Altitude only)

Use the Set Barometer option to enter the correct barometric pressure for your area or adjust the current value. This option is best for making large changes. The **BARO +** and **BARO -** keys are more useful for minor corrections. Use the **UP/DOWN** arrow keys to increase or decrease the values. Use the **LEFT/RIGHT** arrow keys to move between characters. Press the **MENU/ENT** key to save the displayed barometric pressure.

A "Confirm Current Baro" message is displayed at the initial power-up and again once every 30 minutes of operation as a reminder to check your baro setting.

Pressing the push button will toggle the rotary knob control between IN/OUT and Baro +/Baro -.



# Detailed Operation

## Terrain

When Baro +/-Baro – are highlighted, you may then use the knob to adjust the barometric setting with the Rotary knob.

### TER Data Flag

The TER flag will appear if no terrain data is available for the advisory coverage area.

### External TAWS-Based Terrain Display

The external TAWS-based Terrain feature shows terrain as provided by an external TAWS sensor when connected to and configured to receive that data from either the KGP-560, Landmark 8000, or KMH 820.

When displaying external TAWS-based terrain, the external sensor determines the color coding and graphical presentation of terrain in the proximity of the aircraft. See the Pilots Guide for the Honeywell KGP-560 or KMH 820, or L3 (Goodrich) Landmark for additional information on how to interpret this information.



**NOTE:** When the GMX 200 is configured for an external Terrain Awareness and Warning System (TAWS), the “Baro” and “Alt” fields normally present on the Navigational Bar in the Custom Map function will not be displayed.

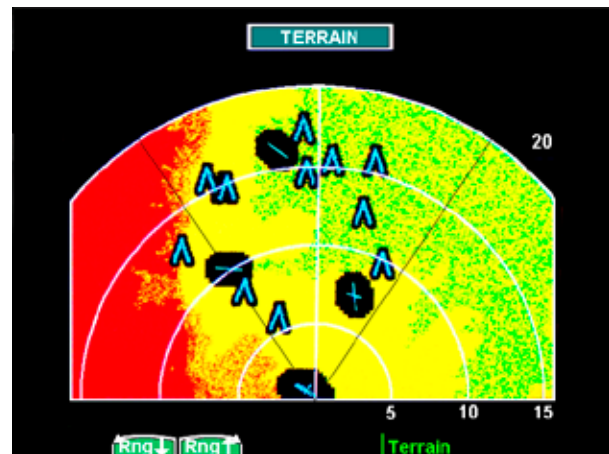
The following table describes annunciations that may occur in the TAWS function. These annunciations are based on external information. If an annunciation appears, check the TAWS equipment and documentation for further information.

Annunciation	Description
<b>INOP</b>	TAWS sensor is inoperative. Do not use TAWS information.
<b>INHIBIT</b>	TAWS sensor alerts are inhibited.

Annunciation	Description
<b>NOT AVAIL</b>	TAWS sensor is not available. Do not use TAWS information. Check the TAWS equipment and documentation for guidance.
<b>PULL UP</b>	Your aircraft may be too low. Check the TAWS equipment for guidance.
<b>TERR TEST</b>	The TAWS equipment is in Test mode. Check the TAWS equipment for guidance.
<b>TERR</b>	Your aircraft may be too low. Check the TAWS equipment for guidance.

### TAWS Pop-Up Modes

The GMX 200 will detect TAWS based terrain alerts and will force a pop-up of the Terrain Function when required. Terrain based Pop-Ups have higher priority over traffic based pop-up functionality.



Terrain Display of External TAWS-Based Data



## UAT Flight Information Service (FIS) Function

The FIS Function is a graphic weather display capable of displaying graphical weather information on UAT equipped installations. Graphical data is overlaid on the map indicating the rainfall detected by ground based radar for a specific area. The colors indicating increasing levels of rainfall progresses from light green for light rainfall to magenta for heavy rainfall. Review the Limitations section in the front of this guide for the limitations that apply to the FIS data. Rainfall data is color coded as follows:

Brown/Blue (transparent color)	Zero rainfall
Light Green	Light rainfall
Dark Green	↑
Yellow	↕
Amber	↓
Red	Heavy rainfall
Magenta	No rainfall data available
Cyan	

A cyan checkerboard pattern indicates that no data is available for that area, and rainfall in that area is unknown.

When weather data is received, the airborne system will display that data for 20 minutes. If no new data has been received for a given area, the rainfall will be removed after 20 minutes and the area will revert back to the cyan checkerboard pattern.

The FIS Function is based on a ground-to-air data link and requires that the appropriate ground systems are broadcasting weather data and the aircraft is within reception range of the Ground Broadcast Transceiver (GBT).



UAT FIS Graphic Weather Info with GDL 90

If any weather data has been received in the previous two minutes, the “Service” indicator will be displayed in the lower right corner of the screen. This indicator shows if the aircraft is currently within reception coverage of a ground station with weather broadcast capabilities.

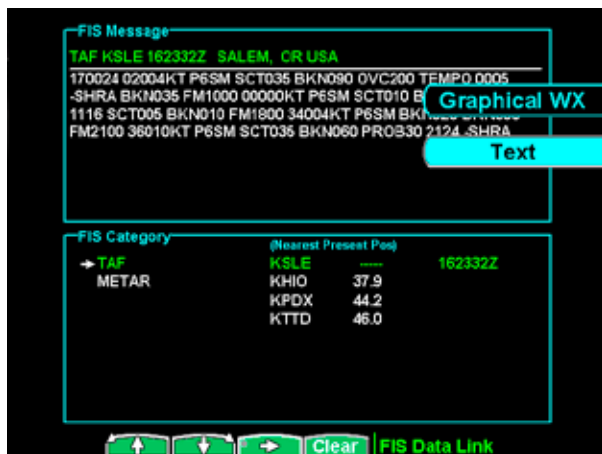
The ground system determines the weather coverage area and extent of data that is transmitted by each ground station. The GMX 200 can display weather from multiple sources.

# Detailed Operation

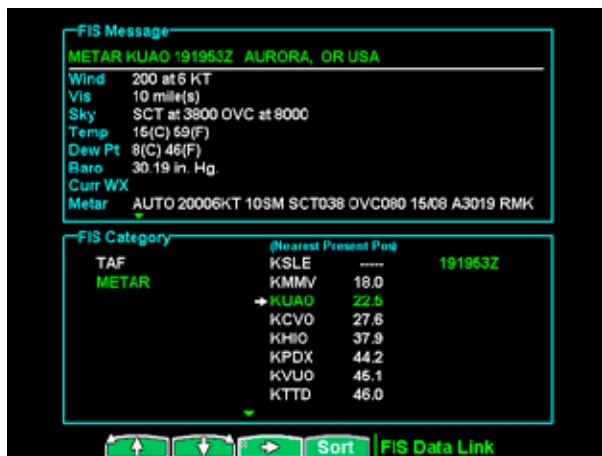
## UAT - FIS

### Text Display

FIS text messages are available on the text display and include METARs and TAFs. Messages are composed of four parts: message type, location, time, and message body.



UAT FIS Text Weather Info with GDL 90



UAT FIS Text Weather Message Time Stamp

### Viewing Text

1. Press the **FN** key and then the **FIS** function key when displayed.
2. Press the **MENU/ENT** key brings up the menu items.

3. Press the **Text** key to select the Text (**Text**) sub-function.
4. Press the **↑** or **↓** function smart keys, or use the rotary knob, to move up or down the FIS category list to highlight TAF or METAR.
5. Press the **→** arrow key to move to the items in the list for the TAF or METAR category.
6. While in the list for the selected category, press the **↑** or **↓** function smart keys to highlight a particular message for the selected category. The text for the selected message is shown in the FIS Message window in the upper portion of the screen.
7. Press the **→** arrow key to move to the FIS message time stamp in the farthest right column. The smart key to the farthest right on the bottom of the screen will change to **View**. Press **View** to expand the FIS Message window at the top of the screen. A green arrow at the bottom of the FIS Message window indicates that more text is available.

### Clearing Text FIS Messages

While the FIS Category is highlighted, the smart key to the farthest right on the bottom of the screen will be labeled **Clear**. Pressing the **Clear** key will clear all FIS messages for the highlighted category type. Messages will be displayed again as they are received from the GBT.

### Sorting Text FIS Messages

While the cursor is in the Ident column, the smart key to the farthest right on the bottom of the screen will be labeled **Sort**. Pressing the Sort key repeatedly will step through the sorting choices of: Nearest Final Waypoint, Nearest Present Position, or Nearest Next Waypoint.

## GDL 69/69A Flight Information Service (FIS) Function

The FIS Function is capable of displaying graphical weather information through the XM Satellite Radio Service when activated in the optional installation of the GDL 69/69A. A variety of graphical data can be overlaid on the map at the touch of a button. Review the Limitations section in the front of this guide for the limitations that apply to the FIS data. To minimize the possibility of display clutter, up to four weather products may be displayed at any one time. When four weather products are displayed, you must first disable a product before enabling another.

XM Satellite Radio offers several subscriptions, that are differentiated by the products provided with each level. Refer to the XM Satellite Radio web site for a description of the subscription options. The GMX 200 provides options via the menu item keys for all supported functions, even those that are not available for each subscription level.



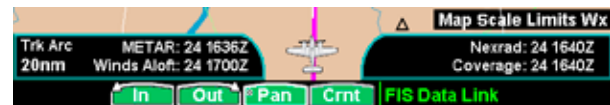
GDL 69/69A FIS Menu Page 1

1. Press the **FN** key and then the **FIS** function key when displayed.

2. The first two function smart keys at the bottom of the screen zoom **IN** and **OUT** on the map.
3. The **PAN** key brings up the movement menu item keys at the right of the screen that allow you to move the view of the map.
4. The fourth function smart key on the right will step through the four sub-functions of GDL 69/69A FIS: Current, Forecast, Text, and Status.
5. The **MENU/ENT** key brings up menu items for more detail on each sub-function.

### Weather Product Zoom Scale

The weather products available using the GDL 69/69A are generally drawn at all zoom settings except in three cases.



### Weather in Current Function Limited to 20 NM or more

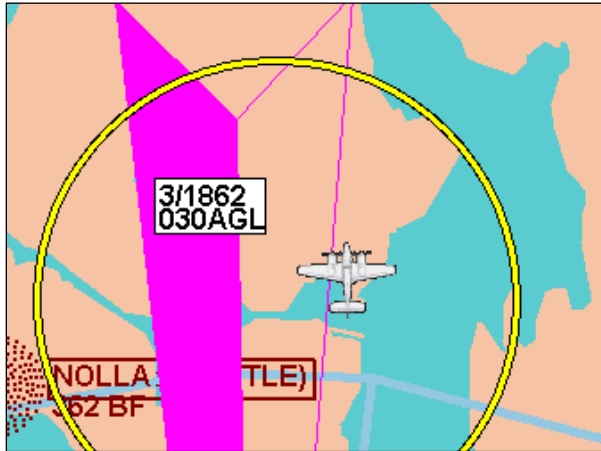
Freezing Levels and Radar Coverage are shown at zoom levels greater than 15 NM. When Freezing Levels or Radar Coverage are selected and the zoom level is less than 20 NM, “Map Scale Limits Wx” will be displayed in the lower right corner.

Surface Analysis is shown at zoom levels greater than 40 NM. When Surface Analysis is selected and the zoom level is less than 50 NM, “Map Scale Limits Wx” will be displayed in the lower right corner.

### Temporary Flight Restrictions (TFRs)

Temporary Flight Restrictions (TFRs) indicate areas where flight restrictions have been imposed. They are depicted as areas with yellow outlines. The area may also contain the TFR identifier label. The TFR identifier label includes the TFR number and upper

altitude. Press the **TFR Lbl** key to toggle the TFR Identifier Labels on and off. TFRs are drawn on the FIS page when provided by the FIS sensor and can not be enabled or disabled. TFR text information is described on page 66.



**TFR Outline with TFR Number and Upper Altitude**

### **NEXRAD Description**

WSR-88D weather surveillance radar or NEXRAD (NEXt generation RADar) is a Doppler radar system that has greatly improved the detection of meteorological events such as thunderstorms, tornadoes, and hurricanes. An extensive network of NEXRAD stations provides almost complete radar coverage of the continental United States, Alaska, and Hawaii. The unobstructed range of each NEXRAD is 124 nautical miles.

### **NEXRAD Abnormalities**

There are possible abnormalities regarding displayed NEXRAD images. Some, but not all, causes of abnormal displayed information include:

- Ground Clutter
- Strokes and spurious radar data
- Sun strokes, when the radar antenna points directly at the sun
- Military aircraft deploy metallic dust which can

cause alterations in radar scans

- Interference from buildings or mountains, which may cause shadows
- Scheduled maintenance may put a radar off-line

### **NEXRAD Limitations**

Certain limitations exist regarding the NEXRAD radar displays. Some, but not all, are listed for the user's awareness:

- NEXRAD base reflectivity does not provide sufficient information to determine cloud layers or precipitation characteristics (hail vs. rain, etc).
- NEXRAD base reflectivity is sampled at the minimum antenna elevation angle. An individual NEXRAD site cannot depict high altitude storms at close ranges, and has no information about storms directly over the site.
- The resolution of displayed NEXRAD data is 2 kilometers. Therefore, when zoomed in on the display, each square block is 2 kilometers. The intensity level reflected by the square will be the highest level sampled within the 2 kilometer square area.

### **NEXRAD Intensity**

Colors are used to identify the different NEXRAD echo intensities (reflectivity) measured in dBZ (decibels of Z). "Reflectivity" is the amount of transmitted power returned to the radar receiver. Reflectivity (designated by the letter Z) covers a wide range of signals (from very weak to very strong). So, a more convenient number for calculations and comparison, a decibel (or logarithmic) scale (dBZ), is used. The dBZ values increase as the strength of the signal returned to the radar increases. There are five gradations for rain, three gradations for mixed rain and snow, and three gradations for snow.

NEXRAD			
DBZ	RAIN	MIXED	SNOW
>55	Red	Red	Red
>50			
>45	Yellow	Magenta	Blue
>40			
>30	Green	Light Purple	Cyan
>20			
>10			

NEXRAD Color Legend

**Current**

The Current sub-function provides an overlay of the currently selected weather information. The three pages of menu item selections allow you to modify the display of NexRad, radar coverage, METARs, lightning, thunderstorm cell movement, cloud tops, echo tops, winds aloft, information labels, flight plan course line, weather legends, map and nav aids, and map orientation.

1. Press the **FN** key and then the **FIS** function key when displayed.
2. Press the fourth function smart key on the right to select the Current (**Crnt**) sub-function.
3. The **MENU/ENT** key brings up menu items for current weather products and more detail on each sub-function.

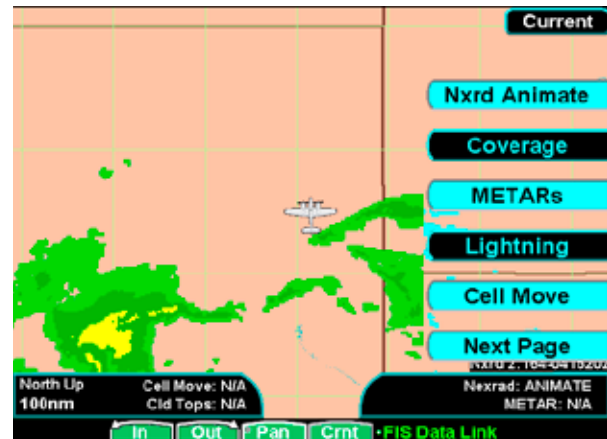


GDL 69/69A FIS Current Menu Page 1 with NEXRAD Activated

**NEXRAD**

When enabled, NEXRAD weather information is shown. Composite data from all of the NEXRAD radar sites in the United States is shown. This data is composed of the maximum reflectivity from the individual radar sweeps. The display of the information is color-coded to indicate the weather level severity. Information about which sites are operational or off-line is also available (see coverage below). The update rate is every five minutes. Refer to the legend for a description of the color code.

The Nexrad option has selections of Nxr On, Nxr Off, and Animate. The Animate selection will step through a number of time intervals to provide a view of weather trends.



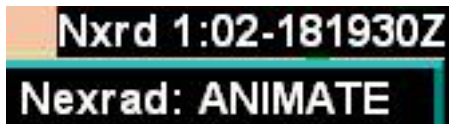
GDL 69/69A FIS Current Menu Page 1 with NEXRAD Animation

Up to the last 12 images are looped continuously. The age of individual images is shown in the lower right corner of the display. The time format shows hours and minutes with the Zulu date and time. For instance, 1:02 - 181930Z means the information is one hour and 2 minutes old and was reported on the 18th day of the month at 1930 Zulu time. When Nexrad animation is turned on, Coverage, METARs, Lightning, Cell Move, Cloud Tops, Echo Tops, and

# Detailed Operation

## GDL 69/69A - FIS

Winds Aloft are not available and will be noted as “N/A” in their data fields, as opposed to when data is not received from the GDL 69/69A, the data fields are shown as dashes “---”.



NEXRAD animation detail showing image age

When Nexrad animation is turned on, all other enabled weather products are disabled. Only images received from the GDL 69/69A since power was applied are displayed.

### Coverage

The Coverage menu item when selected shows shaded areas where NEXRAD radar coverage is not available. Areas where radar capability exists, but is not active or is off-line (e.g. maintenance), will also be shown as not available.



GDL 69/69A FIS Radar Coverage and Winds Aloft

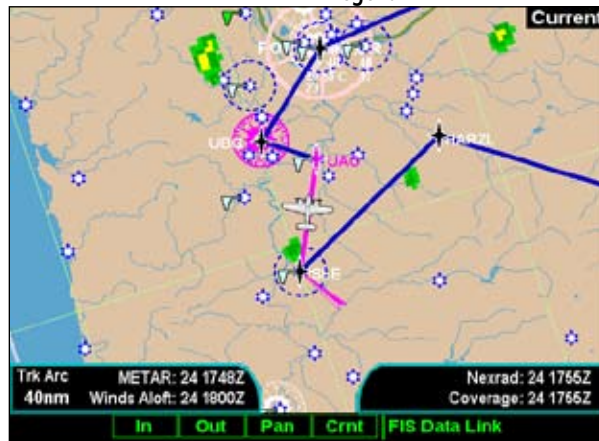
### METARs

When enabled, METARs (METeoro logical Aviation Reports) are shown as colored flags at airports that provide METAR reports. Press the **METARs** key to enable or disable METARs. Refer to the Legend for a

description of the color code. The update rate is every 12 minutes.



METAR Legend



GDL 69/69A FIS METARs

### Lightning

When enabled, lightning strikes and cells are shown. Lightning information indicates the location of cloud-to-ground lightning strikes. The update rate is every five minutes.

### Cell Movement

When enabled, Cell Movement shows the storm cells identified by the ground-based system. The movement is depicted by an arrow. The tip of the arrow represents where the cell is expected to be in 10 minutes from the time the cell location was determined.

Press the **Next Page** key to display the next page of menu items.

**GDL 69/69A FIS Current Menu Page 2**

The second menu option page of the Current FIS function lets you select options for the choices of: Cloud Tops, Echo Tops, Winds Aloft, Winds Aloft Altitude, and TFR Labels.



GDL 69/69A FIS Current Menu Page 2

**Cloud Tops**

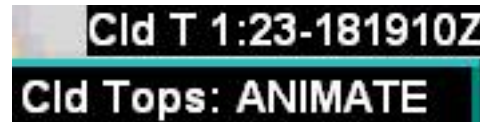
Press **MENU/ENT** key and then press the **Cloud Tops** key to toggle Cloud Tops on and off.

When enabled, Cloud Tops data depicts the cloud top altitude determined from satellite imagery. Refer to the legend for a description of the Cloud Tops color coding. The update rate is every 15 minutes.

The Cloud Tops function has selections of CT On, CT Off, and CT Animate. The Animate selection will step through a number of time intervals to provide a view of weather trends.

Up to the last 12 images are looped continuously. The age of individual images is shown in the lower right corner of the display. The time format shows hours and minutes with the Zulu date and time. For instance, 1:23 - 181910Z means the information is one hour and 23 minutes old and was reported on the 18th day of the month at 1910 Zulu time. When Cloud Top

animation is turned on, Coverage, METARs, Lightning, Cell Move, Echo Tops, and Winds Aloft are not available. Selecting Nexrad Animation will disable CT On and CT Animate. Only images received from the GDL 69/69A since power was applied are displayed.



Cloud Top animation detail showing image age



GDL 69/69A FIS Cloud Tops



**NOTE:** *Cloud Tops and Echo Tops use the same color scaling to represent altitude. Both products can not be displayed at the same time. Selecting Cloud Tops automatically disables Echo Tops.*



Cloud Top Legend

### Echo Tops

Echo Tops indicate the location, elevation, and direction the highest radar echo. This is typically associated with storms. This may not indicate the top of a storm or clouds, only the highest radar return echo. The information is derived from NEXRAD information and indicates the highest altitude at which precipitation is falling. Refer to the Legend for a description of the Echo Tops coding. The update rate is every 7.5 minutes.

Press **MENU/ENT** key and then press the **Echo Tops** key to toggle Echo Tops on and off.



GDL 69/69A FIS Echo Tops



Echo Tops Legend

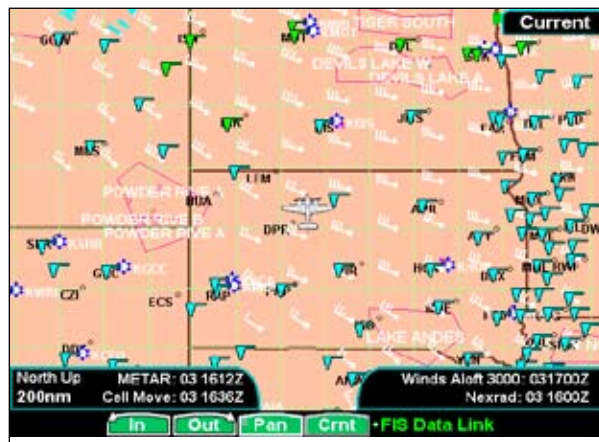


**NOTE:** Cloud Tops and Echo Tops use the same color scaling to represent altitude. Both products can not be displayed at the same time. Selecting Echo Tops automatically disables Cloud Tops.

### Winds Aloft

The Winds Aloft selection provides the pilot with the wind speed and direction. The winds at a given altitude are selected in the Winds Aloft Alt menu item. The selected altitude is shown along with the product time. The update rate is every 12 minutes.

Press **MENU/ENT** key and then press the **Winds Aloft** key to toggle the display of Winds Aloft on and off.



XM FIS Winds Aloft



Winds Aloft Legend

### Winds Aloft Altitude

The Winds Aloft Altitude selection provides the pilot with the ability to select the wind altitude from the ground up to 42,000 feet in 3,000 foot increments. When no data is shown at a given altitude, the data for that altitude has not been received. Wait for the next update. The update rate is every 12 minutes. The selected altitude is depicted in the Product Time window at the bottom of the display.



**TFR Label**

Press **MENU/ENT** key and then press the **TFR Lbl** key to toggle the TFR Identifier Labels on and off. The TFR Identifier Labels note the TFR number and upper altitude near the TFR outline.

Press the **Next Page** key to display the next page of menu items.

**GDL 69/69A FIS Current Menu Page 3**

The third menu option page of the Current FIS function lets you select options for the choices of: Label, Flight Plan, Legend, Map Detail, and Map Orientation.



GDL 69/69A FIS Current Menu Page 3

**Label**

Press **MENU/ENT** key and then press the **Label** key to toggle the station labels on and off.

**Flight Plan**

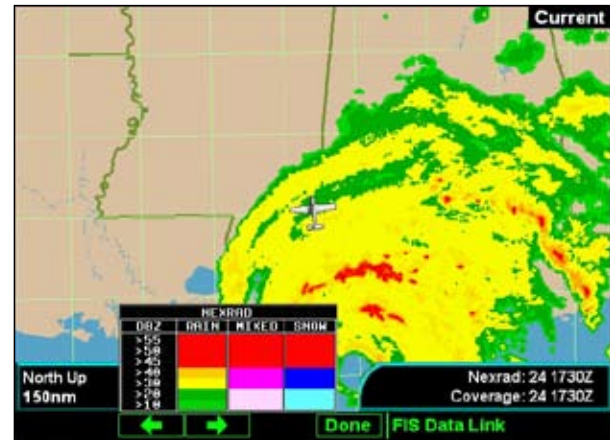
Press **MENU/ENT** key and then press the **Flight Plan** key to toggle the Flight Plan course line on and off. The magenta line is the active leg.

If the flight plan provided by the navigator to the

GMX 200 has an invalid cross track error, the ownship symbol will have a red “X” placed over it.

**Legend**

Press **MENU/ENT** key and then press the **Legend** key to display the legends describing the graphic display coding.



GDL 69/69A FIS with NEXRAD Weather and Legend

1. Press the **←** or **→** arrow keys to display the legends for the selected services.
2. Press **Done** to turn the Legends off.

Press the **Main Menu** key to return to the first page of menu items.

# Detailed Operation

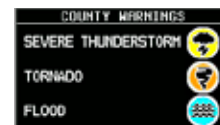
GDL 69/69A - FIS



AIRMET/SIGMET Legend



NEXRAD Legend



County Warnings Legend



City Forecast Legend



Cloud Tops Legend



Freezing Levels Legend



METAR Legend



Echo Tops Legend



Winds Aloft Legend

## Map Detail

Press **MENU/ENT** key and then press the **Map Detail** key to choose between the display of No Overlays, the Base Map, or Map and Nav Aids. SafeTaxi airport diagrams are drawn when Map and NavAids are drawn and the airport diagrams are available in the database. SafeTaxi airport diagrams are drawn when the zoom scale is 15 NM, or lower, with progressively more details shown as the scale decreases. Airport diagrams may show areas where extra vigilance is recommended due to traffic congestion, visibility constraints, or other unique circumstances. These areas are called “hot spots” and are identified by circular or elliptical lines. Although these areas are highlighted as places where extra caution is warranted and advised, they do not relieve the pilot of the responsibility to “see and avoid” other traffic or obstacles, on the airport surface or in the air. All taxiway and runway intersections should be approached with caution, whether they are marked with hot spots or not. Runways where Land and Hold Short Operations (LAHSO) may be in effect are identified with yellow lines across the runway labeled “LAHSO”. Other areas where extra vigilance is recommended, such as construction zones, may also outlined with yellow lines. Hot spots and other outlined areas are derived from database information and may therefore contain errors or may not be included in the database.

## Map Orientation

Press **MENU/ENT** key and then press the Map Orientation key to choose the configuration of the map orientation of **DTK Up**, **North Up**, **TRK Up**, **TRK Up Arc**, or **TRK Up 360**.

Press the **Main Menu** key to return to the first page of menu items.

### Product Times

Dtk Up 40nm	Coverage: 07 1725Z METAR: 07 1724Z	Winds Aloft 3000: 07 1700Z Nexrad: 07 1725Z
----------------	---------------------------------------	--

Product times are shown on the lower portion of the display and cannot be hidden. The times for each of the enabled products (up to four at a time) are displayed. The time format shows day of month and then hours and minutes in Zulu time. For instance, METAR: 24 2036Z would mean that product time reported was on the 24th of the current month at 20:36 Zulu time. The following product times are shown: **Nexrad** for NEXRAD radar, **Coverage** for active NEXRAD radar coverage areas, **METAR**, **Echo Tops**, **Cloud Tops**, **Lightning**, and **Winds Aloft**. Times are Zulu times when the data was assembled on the ground, not the time the data was received or displayed by the FIS sensor. The Winds Aloft product time includes the selected Winds Aloft Altitude.

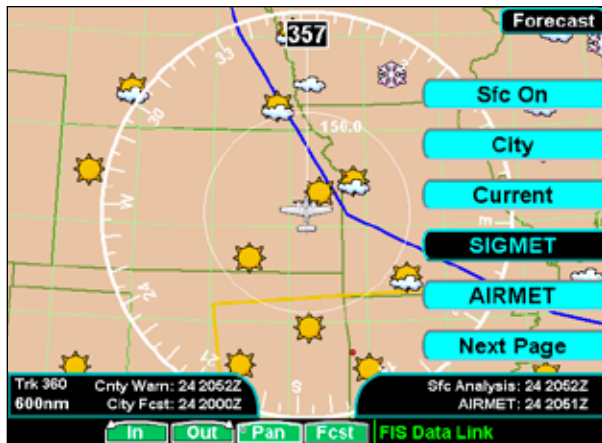
Product times are shown in white when they are initially shown and change to blue and then yellow as they pass certain age thresholds. A product time aging table is shown below. For a GMX 200 that does not have time available from a GPS receiver, age is based on the time the data was received from the GDL 69/69A sensor. In this case, the age of the data may be older than what is shown by the color coding.

Animating Nexrad, Cloud Tops, or Surface Analysis products will disable the depiction of other enabled products. The product time for the other enabled products will be displayed as “N/A” while animation is active.

FIS Product Times		
	Goes Blue After (Minutes)	Goes Yellow After (Minutes)
NEXRAD	8	13
Graphical METAR	15	75
Lightning	8	23
Cell Movement	4.25	5.5
Radar Coverage	8	13
Echo Tops	10.5	18
Winds Aloft	15	75
AIRMET	15	51
SIGMET	15	51
Cyclone	15	51
County Warnings	8	23
Freezing Level	15	75
City Forecasts	15	51
Surface Analysis	15	195
Cloud Tops	10.5	18

### Forecast

Weather forecast information is provided for an available City, SIGMETs, AIRMETs, Freezing Levels, County warnings, and Cyclones. While using this feature you can also customize the display of information showing map labels, flight plan line, and legend.



XM FIS Forecast Menu Item Page 1

1. Press the **FN** key and then the **FIS** function key when displayed.
2. Press the fourth function smart key on the right to select the Forecast (**Fcst**) sub-function.
3. The **MENU/ENT** key brings up menu items for more sub-functions. Of the following sub-functions, only four may be selected at any given time: Sfc On or Sfc Animate, City, SIGMET, AIRMET, Frz Lvl, County, or Cyclone.



**NOTE:** Forecasts are intended to provide data on expected conditions. Actual conditions may deviate from the forecast. It is the pilot's responsibility to obtain current information from official sources and to update this information during the flight.

### Surface Analysis

When enabled, the Surface Analysis forecast shows frontal lines indicating weather fronts and the direction they are moving. High and Low pressure centers are noted with a large H or L. Forecasts are available for intervals of current, 12, 24, 36, and 48 hours. The Forecast Time menu item will step through the intervals manually. The Surface Animate selection will automatically step through the times to provide an indication of how the weather systems are expected to move. Animating Surface Analysis products will disable the depiction of other enabled products. The product time for the other enabled products will be displayed as "N/A" while animation is active.

A Cold Front is a front where cold air replaces warm air. A blue line with blue triangles that point in the direction of the cold air flow.



A Warm Front is where warm air replaces cold air. An orange line with orange half moons that point in the direction of the warm air flow.



A Stationary Front is a front with very little horizontal movement. The line alternates with orange and blue sections which point in opposite directions to symbolize little movement.



An Occluded Front is where a cold front has overtaken and merged with a warm front. The line alternates with the blue triangle and orange half moon symbols on the same side of the line pointing in the direction the front is moving.





XM FIS Forecast Surface Analysis

### City

When enabled, the City forecast shows current or forecast conditions in available cities. Forecasts are available for intervals of 12, 24, 36, and 48 hours. This menu item key enables or disables this product. Use the menu item key below the **City** key to select the current or forecast time. The update rate is every 12 minutes.

### Forecast Time

The forecast time range can be selected to cover the **Current** conditions, **12 Hours**, **24 Hours**, **36 Hours**, or **48 Hours**. Each press of the Forecast Time key will step through times.

### SIGMET

When enabled, SIGMETs (SIGnificant METeo-logical Information) advise the pilot of potentially hazardous weather, other than convective activity, to all aircraft. The advisory covers an area of at least 3,000 square miles at any one time. SIGMET data covers icing, turbulence, dust, and volcanic ash as issued by the National Weather Service. The update rate is every 12 minutes.



XM FIS AIRMET and SIGMET Legend

Refer to the Legend for a description of the color coding.

1. Press the ◀ or ▶ arrow keys to display the legends for the selected services.
2. Press **Done** to turn the Legends off.

### AIRMET

AIRMETs (AIRman's METeoro-logical Information) advises the pilot of weather that may be hazardous to single engine, other light aircraft, and Visual Flight Rule (VFR) pilots. This advisory affects an area of at least 3,000 square miles at any one time and provides data about ceiling, obscuration, and turbulence issued by the National Weather Service (NWS). The update rate is every 12 minutes.

When enabled, the following AIRMETs are available for display:

- Icing
- Turbulence
- IFR conditions
- Mountain obscuration
- Surface winds

Refer to the Legend for a description of the color coding.

1. Press the ◀ or ▶ arrow keys to display the legends for the selected services.
2. Press **Done** to turn the Legends off.

Press the **Next Page** key to display the next page of menu items.

**GDL 69/69A FIS Forecast Menu Page 2**

The second menu option page of the Forecast (Fcst) FIS function lets you select options for the choices of: Freezing Levels, County Warnings, Cyclones, TFR Labels, and Label.



**XM FIS Forecast Menu Item Page 2**

**Freezing Levels**

This product is not available at this time.

**County**

The County selection provides specific public awareness and protection weather warnings for Hurricanes, Tornados, Severe Thunderstorms, Floods\*, Flash Floods\*, and special Maritime conditions\* provided by the National Weather Service (NWS).

\* These conditions are noted by a single common symbol.

Refer to the Legend for a description of the color coding.



**XM FIS County Warnings Legend**

1. Press the ◀ or ▶ arrow keys to display the legends for the selected services.
2. Press **Done** to turn the Legends off.

**Cyclone**

This product is not available at this time.

**TFR Label**

Press **MENU/ENT** key and then press the **TFR Lbl** key to toggle the TFR Identifier Labels on and off. The TFR Identifier Labels note the TFR number and upper altitude near the TFR outline. When selected, TFR labels will be displayed when the zoom scale is 50 NM or less.

**Label**

Press **MENU/ENT** key and then press the **Label** key to toggle the station labels on and off.

Press the **Next Page** key to display the next page of menu items.

**GDL 69/69A FIS Forecast Menu Page 3**

The third menu option page of the Forecast (Fcst) FIS function lets you select options for the choices of: Flight Plan, Legend, Map Detail, and Map Orientation.



XM FIS Forecast Menu Item Page 3

### Flight Plan

Press **MENU/ENT** key and then press the **Flight Plan** key to toggle the Flight Plan course line on and off. The magenta line is the active leg.

If the flight plan provided by the navigator to the GMX 200 has an invalid cross track error, the ownship symbol will have a red “X” placed over it.

### Legend

Press **MENU/ENT** key and then press the **Legend** Menu Item key to display the legends describing the graphic display colors. Press the **◀** or **▶** arrow keys to display the legends for the selected services. Press **Done** to turn the Legends off. A graphic of each product legend is shown on page 62.

### Map Detail

Press **MENU/ENT** key and then press the Map Detail key to choose between the display of No Overlays, the Base Map, or Map and Nav Aids.

SafeTaxi airport diagrams are always drawn if available in the database. SafeTaxi airport diagrams are drawn when the zoom scale is 15 NM, or lower,

with progressively more details shown as the scale decreases.

Airport diagrams may show areas where extra vigilance is recommended due to traffic congestion, visibility constraints, or other unique circumstances. These areas are called “hot spots” and are identified by circular or elliptical lines. Although these areas are highlighted as places where extra caution is warranted and advised, they do not relieve the pilot of the responsibility to “see and avoid” other traffic or obstacles, on the airport surface or in the air. All taxiway and runway intersections should be approached with caution, whether they are marked with hot spots or not. Runways where Land and Hold Short Operations (LAHSO) may be in effect are identified with yellow lines across the runway labeled “LAHSO”. Other areas where extra vigilance is recommended, such as construction zones, may also outlined with yellow lines. Hot spots and other outlined areas are derived from database information and may therefore contain errors or may not be included in the database.

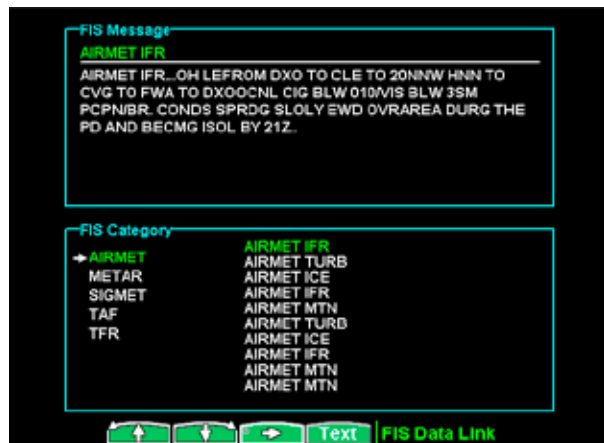
### Map Orientation

Press **MENU/ENT** key and then press the Map Orientation Menu to choose the configuration of the map orientation of **DTK Up**, **North Up**, **TRK Up**, **TRK Up Arc**, or **TRK Up 360**.

Press the **Main Menu** key to return to the first page of menu items.

### Text

The Text sub-function displays text messages of the available weather information. Use the function smart keys at the bottom of the display to select the message that you would like to view from the list in the FIS Category window. The text message for the selected item is displayed in the FIS Message window at the top portion of the display.

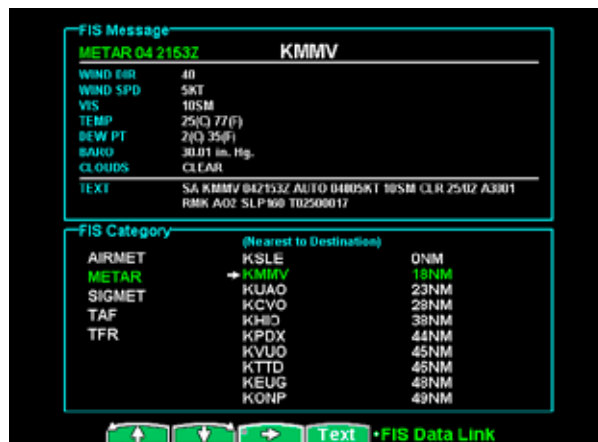


XM FIS Text Messages (AIRMET Selected)

1. Press the **FN** key and then the **FIS** function key when displayed.
2. Press the fourth function smart key on the right to select the **Text** (Text) sub-function.
3. The **MENU/ENT** key brings up menu items for more detail on each sub-function.

### Selecting Categories and Messages

1. Press the **↑** or **↓** function smart keys to move up or down the FIS category list. The selected category is highlighted.



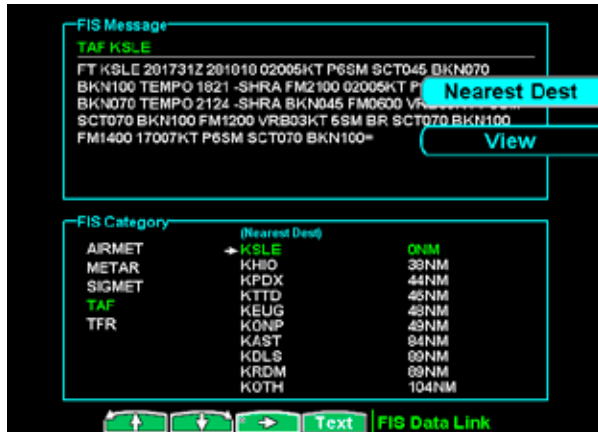
XM FIS Text Messages (METAR Selected)

2. Press the **→** arrow key to move to the items in the list for that category.
3. While in the list for a category, press the **↑** or **↓** function smart keys to highlight a particular message. The text for the selected message is shown in the FIS Message window in the upper portion of the screen.
4. Press the **→** arrow key again to return to the category list.



### Sorting METAR, TAF, and TFR Text Messages

Displayed text products can be sorted by distance from your present position (Nearest Pos), distance from destination (Nearest Dest), or alphabetically (Alpha).



#### Sorting Text Messages (Nearest Position For TAFs Shown)

1. Press **MENU/ENT**.
2. Press the top menu item key to go through the choices.

#### View

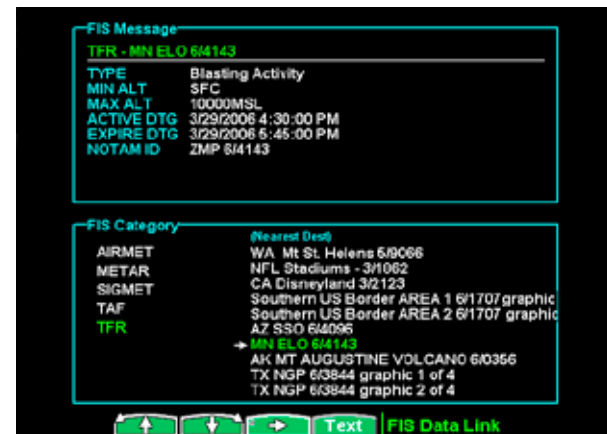
Some text products may provide more information than can be shown in the message window when the category window is also shown. You can customize the Text display to show both the FIS Category and FIS Message windows at the same time or to view the FIS Messages only.

1. Press **MENU/ENT**.
2. Press the **View** menu item to toggle between the choices.

### Temporary Flight Restrictions (TFRs)

The full page view of the TFR is available when TFR Text is selected. TFR information includes: type, minimum and maximum altitude, and Notam ID. If TFR text extends beyond the page size, no scrolling is available.

1. Press the **FN** key and then the **FIS** function key when displayed.
2. Press the fourth function smart key on the right to select the **Text** (Text) sub-function.



#### Viewing TFR Text

3. Press the **▲** or **▼** function smart keys to move up or down the FIS category list to highlight TFR.
4. Press the **➡** arrow key to move the items in the list for the TFR category.
5. While in the list for the TFR category, press the **▲** or **▼** function smart keys to highlight a particular message for the selected category. The text for the selected message is shown in the FIS Message window in the upper portion of the screen.

## Detailed Operation

### GDL 69/69A - FIS

- The **MENU/ENT** key brings up the menu items. Press **View**, if necessary, to display the full screen FIS Message.

#### Status

The Status sub-function displays information about the available XM products, receiver performance, and subscription level.

Product Name	Status	Products
NEXRAD	Available	
Graphical METAR	Available	242235Z
Lightning	Available	242224Z
TFR	Available	
Cell Move	Not Available	
Radar Coverage	Available	242230Z
Textual METAR	Available	242224Z
Echo Tops	Available	242230Z
Winds Aloft	Available	242300Z
ARMET	Available	242227Z
SIGMET	Not Available	
Cyclone	Not Available	
County Warnings	Available	242232Z
Freezing Level	Not Available	
City Forecasts	Available	242200Z
Surface Analysis	Available	242228Z
Textual TAF	Available	242224Z
Cloud Tops	Available	242226Z

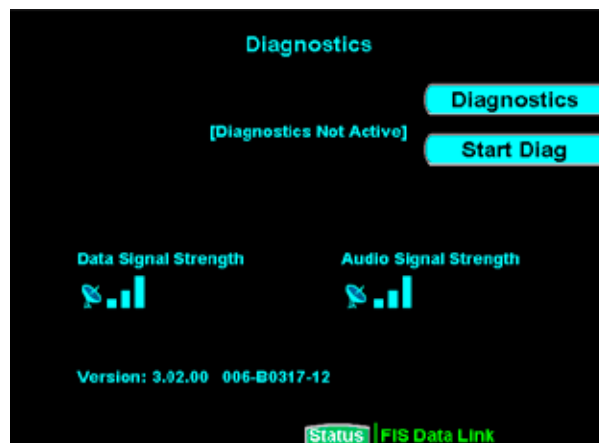
XM FIS Data Product Status

- Press the **FN** key and then press the **FIS** function key when displayed.
- Press the fourth function smart key on the right to select the **Status** (Status) sub-function.
- The **MENU/ENT** key brings up the Menu Item.
- Press the top Menu Item key on the right to step through the pages for Product Status, Diagnostics, and Activation.

#### Product Status

The Product Status page displays a list of all products supported by the GMX 200. The status is shown as available or not available. **Available** means the product is a part of your chosen subscription level and the GMX 200 has data that can be displayed. A time stamp will indicate the last received product

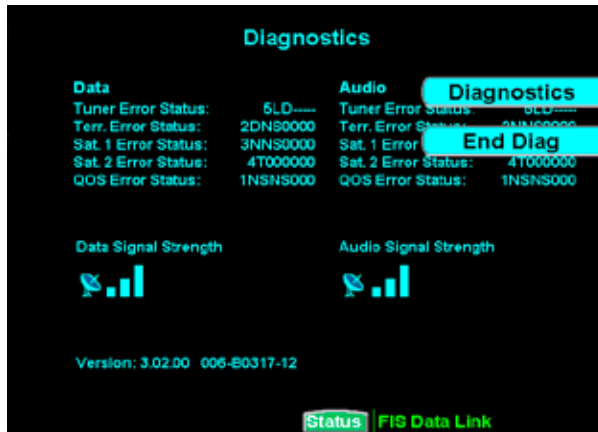
time, which is the time the product was generated for transmission. **Not Available** means the product is not included in your chosen subscription level or that data has not been received since the last power cycle of the GMX 200.



XM FIS Product Status

#### Diagnostics

The Diagnostics page shows error status codes generated by the XM radio receivers. One receiver is for weather data and the other receiver is for audio entertainment. Signal strength is shown as one of four levels. The GDL 69/69A software version is shown in the lower left section of the display. Press **End Diag** to exit Diagnostics.



XM FIS Diagnostics

1. While in the Status page, press **MENU/ENT**.
2. Press the **Products** key to toggle to the Diagnostics display. The Diagnostics page information is displayed.
3. Press the **Start Diag** key to activate GDL 69/69A diagnostics.



**NOTE:** After diagnostics have been run, power to the GDL 69/69A must be recycled to return to proper operation, for GDL 69/69A software versions prior to version 2.13.

### Activation

The Activation page shows the radio identification numbers for one or both receivers. These numbers are needed to start a subscription. The Service Class is the name of the data subscription level. The Weather Products section shows the products contained in the selected subscription level.



XM FIS Data Activation

1. Press the **FN** key and then the **FIS** function key when displayed.
2. Press the fourth function smart key on the right to select the **Status** (Status) sub-function.
3. Press **MENU/ENT** to display the Products menu item.
4. Press the **Products** key to toggle to the Diagnostics display. The Diagnostics page information is displayed, including Radio IDs, Service Class, and Weather Products.
5. Follow the XM Satellite Radio Activation procedure and press **Accept** at the appropriate time.

### Activating XM Radio Services

Before the GDL 69/69A can be used, the unit must be activated by XM Satellite Radio and services are subscribed to XM Satellite Radio. Please note that the GDL 69 is a weather data link. The GDL 69A is a weather data link and audio receiver. The data link service and the audio entertainment services must be activated separately.

### Gather Information

Your GDL 69 or GDL 69A is shipped with one or two radio hardware identifications, respectively. These IDs serve as identification codes for your XM-

equipped GDL 69/69A and are needed in the activation process. The ID(s) is attached to this instruction sheet and printed on a label on the back of the unit. The IDs can also be retrieved through the GMX 200 in the Activation page of the Status sub-function. Contact your dealer or customer service if you are unable to locate the radio hardware IDs.

#### ***XM Satellite Radio Activation***

Weather and/or audio data from your GDL 69/69A are provided by XM Satellite Radio, a company separate and independent from Garmin Corporation. Have your radio hardware IDs ready before contacting XM Satellite Radio. During the process, you can select services for subscription. Keep in mind that the GDL 69 has no audio capability, audio services will not be available with the unit.

Follow the GDL 69/69A XM Satellite Radio Activation Instructions (190-00355-04) enclosed with your GDL 69/69A unit to activate the XM products.

## Lightning Strikes (LT) Function

The Lightning Strike function allows you to view lightning strikes that are reported by an L3 WX500 Stormscope Weather Mapping Sensor. The “T” marks are used as reference marks to aid in locating strikes in reference to your position. Your display range must be selected to be greater than 25 NM to display lightning strikes. The display range is shown in the lower left corner of the display. For instance, if you zoom In to a range of 20 NM, no strikes will be shown, but if you zoom Out to 30 NM strikes will be shown. Review the Limitations section in the front of this guide for the limitations that apply to the Lightning data.

The **In** and **Out** keys control the map scale (zoom in or out). The **Clear** key clears the current lightning strikes, which will be refreshed on the next update cycle.

### Lightning Menu Page 1

The first option page of the Lightning function lets you select menu items for the choices of Flight Plan, Display view, Lightning groups, Heading Stabilization, and Stormscope (System Data) info. The last option selection (Next Page) takes you to the next page of menu items.



Lightning Function Menu Items (Page 1)

### Flight Plan

The **Flight Plan** key controls the display of the Flight Plan course line. Pressing the **Flight Plan** key toggles between showing and not showing the Flight Plan route line.

If the flight plan provided by the navigator to the GMX 200 has an invalid cross track error, the ownship symbol will have a red “X” placed over it.

### Display View (360/120)

Two display views of the lightning information may be selected. The 360 view shows a 360° view the air-space surrounding your aircraft. The 120 view shows a 120° forward view from your aircraft’s position and the display is divided into three segments.

### Lightning

The WX500 detects electrical discharges within a range determined by the installation of your Stormscope. These discharge locations are noted as Lightning strikes and displayed as an “x.” You may select either single Strike or Cell (groups) of lightning representations.

### **Strike**

Individual strikes are noted.

### **Cell**

Only lightning strikes associated with a group, or cell, of strikes are displayed.

### **Heading Stabilization**

The Heading Stabilization function of the WX500 can be turned on or off with this selection.

### **System Data**

Press the **System Data** key to display information about the WX500.

Press the **Next Page** key to display the next page of menu items.

### **Lightning Menu Page 2**

The second option page of the Lightning function lets you select options for the choices of Demo, Self-Test for the Stormscope, Noise Monitor, and Strike Test. The last menu item key takes you back to the first page of menu items.



Lightning Function Menu Items (Page 2)

### **Demo**

The Demo option places the WX500 sensor in a demonstration mode that simulates lightning strikes.

### **Self-Test**

The Self-Test option performs a number of tests on the operation of the WX500 and provides a report of its status.

### **Noise Monitor**

The Noise Monitor feature is a function of the WX500. For details about using this feature refer to the WX500 owner's documents.

The Noise Monitor displays reports of electrical noise, whether they are from lightning or other noise sources within the range of the system. This function is used to help determine if electrical noise is present that may affect normal system operation.

### **Strike Test**

The Strike Test feature is a function of the WX500. For details about using this feature refer to the WX500 owner's documents.

The Strike Test feature is used by installers to verify proper operation of the WX500. Test strikes are sent to the antenna. The received test strike is then visually presented on the screen.

### **Antenna Change Message**

When an "Antenna Change" message is shown, the lightning sensor may have failed. When this message is displayed, the sensor is automatically shut down for the remainder of the flight. The installation should be inspected before the lightning function is used again.

### FliteChart (CHART) Function (Optional)

The optional GMX 200 FliteChart feature provides the capability to view Garmin electronic charts. Depending on the charts available in the database, the following chart types may be viewed: Approach charts, airport surface charts, SIDS, STARS, Airspace Charts alternate minimums, and take-off minimums.

The in-flight data resides on the pilot removable front-loading data card and is updated by the pilot using a home PC-based data loader.

The GMX 200 FliteChart feature does not currently represent a sole replacement for the paper chart within the cockpit. The presentation of the chart data is intended for supplemental use and to provide additional situational awareness. The pilot must still have access to the printed chart as required by FAA regulations.

When viewed in the FliteChart Function, more selection options are available for locating a specific chart among the charts in the database, and the chart is displayed similar to a standard chart manual (north up) with no position overlay.

Airport surface charts available in the FliteChart database are not the same as the airport surface diagrams available in the SafeTaxi database. FliteChart airport surface charts are not geo-referenced, meaning they can be displayed only in the Chart function and cannot be viewed on a moving map with position overlay. SafeTaxi airport surface diagrams are geo-referenced and are displayed only on the moving map with position overlay and cannot be viewed in the Chart function. SafeTaxi and FliteChart databases are derived from different sources and are regularly updated. They may not contain airport surface chart and airport

surface diagrams for the same set of airports.

#### **Data Card**

Managing the charts that are loaded onto the data card is performed using the data loader software tool provided by Garmin. The GMX 200 FliteChart data card can hold approximately 10,000 charts at a given time.

#### **FliteChart Function**

The FliteChart Function is accessed by pressing the **FN** Function key and selecting the FliteChart (**CHART**) function.

The FliteChart Function incorporates three menu items that control two basic operations:

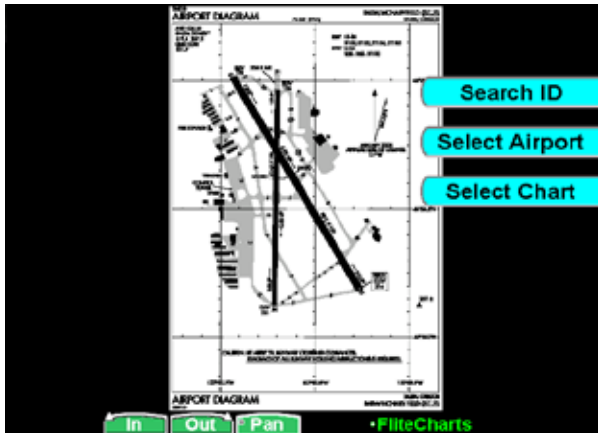
- **Search ID:** allows charts to be accessed by selecting the associated airport.
- **Select Airport:** allows the charts to be accessed from a list of nearest airports, up to the nearest 25, with the destination airport as the first airport in the list.
- **Select Chart:** is used to designate a specific chart from a list of charts for the selected airport.

The FliteChart Function will retain the last view settings and will not change the chart, zoom level, or pan setting when the function is exited and re-entered, allowing it to operate similar to a physical chart manual.



**FliteChart Example:**

1. Press **FN** and then **CHART**.
2. Press **MENU/ENT**.

**Menu Items for the FliteChart Function**

3. Press the **Search ID** Menu Item key and select the Airport ID. Use the two keys on the left, or the rotary knob, to choose the letters and the two keys on the right to move the cursor. The knob push button moves the cursor to the right by one position with each press. Press **MENU/ENT** to select the desired Airport ID.



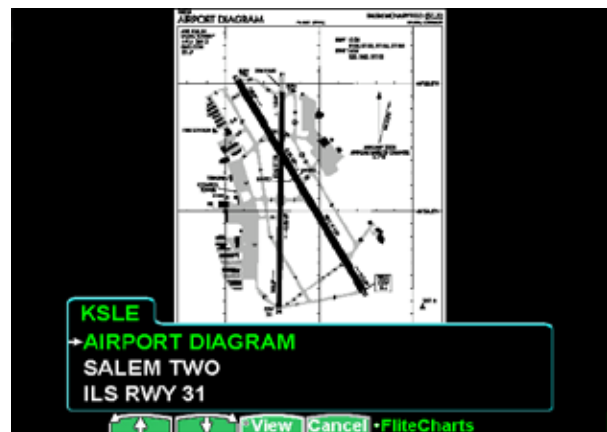
Search for the Airport ID in the FliteChart Function

4. Press the **Select Airport** Menu Item key and highlight the desired airport with the arrow "smart" keys, or the rotary knob, and then press the **Select** key or the knob pushbutton.



Selecting the airport for a Chart in the FliteChart Function

5. Highlight the desired chart with the arrow keys or the rotary knob and then press **View** or the rotary knob pushbutton. You may also press the **Cancel** key.



Selecting the Chart for an Airport in the FliteChart Function

## Detailed Operation

### FliteChart - Chart

- View the chart. Adjust the zoom level using the **In** or **Out** keys, or the rotary knob. Press the **Pan** key and use the movement Menu Item keys on the right side of the display.

#### Menu Items

- Press **FN** and then **CHART**.
- Press **MENU/ENT** and then the Menu Item key for the desired function.



Menu Items for the FliteChart Function

#### Search ID

The Search ID menu item within the FliteChart Function allows you to search for a specific airport identifier. As this operation requires multiple key-strokes to look up a specific chart, it is not recommended as the primary mechanism for accessing the charts, but does allow for flexibility. When an airport is located, it will be set as the currently selected airport. Airport identifiers must be entered with the prefix; in the United States, the prefix is "K".

- Press **MENU/ENT** and then press the **Search ID** Menu Item key and select the Airport ID.



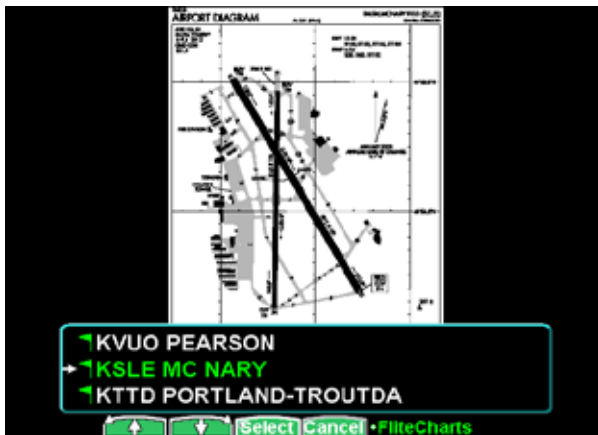
Search for the Airport ID in the FliteChart Function

- Use the two keys on the left, or the rotary knob, to choose the letters and the two keys on the right to move the cursor. Pressing the knob pushbutton moves the cursor to the right.
- Press **MENU/ENT** to select the desired Airport ID.

### Select Airport

The Select Airport operation allows the airport of interest to be selected from a pop-up list. Up to 25 airports may be listed. The airports presented in the list are determined based on the destination waypoint as the first entry, and a nearest type search for the remaining entries.

1. Press **MENU/ENT** and then press the **Select Airport** Menu Item key.
2. Highlight the desired airport with the arrow "smart" keys, or the rotary knob, and then press the **Select** key or the knob pushbutton.



#### Selecting the airport for a Chart in the FliteChart Function

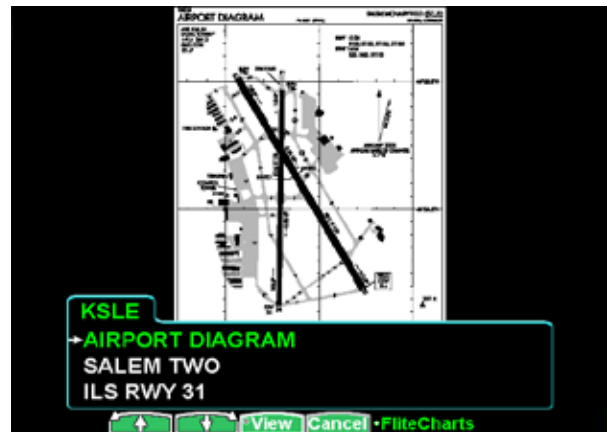
3. Once the airport is located, the Select Chart menu is presented (see below), allowing a specific chart for that airport to be viewed.

### Select Chart

The Select Chart operation allows the list of charts for the currently **selected** airport to be listed in a pop-up list.

1. If this page was not reached automatically from the Select Airport selection, press **MENU/ENT** and then press the **Select Chart** Menu Item key.

Highlight the desired chart with the arrow keys or the rotary knob.



#### Selecting the Chart for an Airport in the FliteChart Function

2. Press the **View** key or the knob pushbutton.
3. View the chart. Adjust the zoom level using the **In** or **Out** keys. Press the **Pan** key and use the movement Menu Item keys on the right side of the display.

## ChartView (CHART) Function (Optional)

The optional GMX 200 ChartView feature provides the capability to view Jeppesen Sanderson Inc. electronic charts. Two basic types of charts can be viewed: Approach charts and airport surface charts.

Approach charts can be manually loaded and overlaid on the moving map during flight, while airport surface charts are automatically overlaid while on the ground. Both types of charts are also viewable from the ChartView Function in a manual fashion. Approach charts may also be loaded automatically when installed with a GNS 480-series GPS receiver.

The electronic chart data is generated from the standard Jeppesen CD ROM product, which is distributed and updated by Jeppesen or from the Jeppesen web site. Charts are updated on a two-week schedule. The in-flight data resides on the pilot removable front-loading data card and is updated by the pilot using a home PC-based data loader.

The GMX 200 ChartView feature does not currently represent a sole replacement for the paper chart within the cockpit. The presentation of the chart data is intended for supplemental use and to provide additional situational awareness. The pilot must still have access to the printed chart as required by FAA regulations.



ChartView as viewed on the Custom Map Page

### Overview

- Charts are viewed either as a dynamic overlay on the Custom/IFR Map, or as a static page through the dedicated ChartView Function (“Chart” on the function menu).
- When viewed as a dynamic overlay on the Custom/IFR Map, the chart will be properly georeferenced with respect to the base map. Orientation (track up, north up, etc.), zoom scale, and aircraft position will all be properly presented relative to the chart data, using the standard map controls.
- When viewed in the ChartView Function, more selection options are available for locating a specific chart among the charts in the database, and the chart is displayed similar to a standard chart manual (north up) with no position overlay.
- A given approach chart must be “loaded” for map overlay usage by first selecting the airport of interest, then selecting the individual chart for that airport. Approach charts can be loaded from either the Custom/IFR Map or from the ChartView Function.

- Pressing the **Info** key while a chart is loaded or being viewed will bring up the header, profile, and minimums associated with the chart.

### **Chart Data Source**

The same set of charts that are available in electronic form from the Jeppesen JeppView™ product are available for loading onto the GMX 200 platform. These consist of approaches, SIDS, STARS, airspace charts, and airport surface diagrams. The GMX 200 can display all of these charts from the ChartView Function, or a limited sub-set as dynamic overlays on the “Custom Map” when the corresponding chart has been “Geo-Referenced” by Jeppesen.

### ***Data Card***

Managing the charts that are loaded onto the data card is performed using the data loader software tool provided by Jeppesen. The GMX 200 ChartView data card can hold approximately 10,000 charts at a given time.

### ***Chart Geo-Referencing***

For the ownship position to be overlaid on the chart (as viewed from the Custom/IFR Map), the chart must be available in a “Geo-Referenced” version, as supplied by Jeppesen. Currently not all charts and airport surface charts are geo-referenced.

When a chart is viewed and a red “X” is present on the earth symbol (to the left of the chart name), the chart is NOT geo-referenced and thus cannot be “loaded.”

### ***Hot Spots***

Airport diagrams may show areas where extra vigilance is recommended due to traffic congestion, visibility constraints, or other unique circumstances. These areas are called hot spots and are identified by

circular or elliptical lines. Although these areas are highlighted as places where extra caution is warranted and advised, they do not relieve the pilot of the responsibility to “see and avoid” other traffic or obstacles, on the airport surface or in the air. All taxiway and runway intersections should be approached with caution, whether they are marked with hot spots or not. Hot spots are derived from database information and may therefore contain errors or may not be included in the database.

### **Chart Overlay in the Custom/IFR Map**

On the Custom Map or the IFR En Route Map, approach charts (not airport surface charts) must be manually “loaded” as there are multiple approach charts that can apply for a given region (i.e. multiple approach charts for the same airport). An approach chart will be displayed as an overlay when the following conditions are met:

- The approach chart is within the database on the card
- The approach chart is geo-referenced
- The approach chart has been loaded
- The aircraft position is within the coverage of the approach chart
- The aircraft speed is above the air/ground threshold (aircraft is in flight)

Load a specific approach chart for use as an overlay by first selecting the airport and then selecting the approach chart.

### ***Selecting the Airport***

Pressing the **Load Chart** key on the Custom or IFR Map function will present a list of airports that have geo-referenced approach charts available. The first airport within the list is the destination waypoint as

selected on the external GPS navigator, with additional airports listed based on a nearest to destination search. Airports and approach charts that are not geo-referenced will not be shown for selection on this menu.



**NOTE:** Prior to loading an approach chart, there is an operational benefit to selecting the desired airport on the GPS navigator as the destination waypoint. The GMX 200 can then detect this and will place the corresponding airport at the top of the airport list.

The remaining number of airports within the list will vary depending on the complexity of the database within the current region and the number of geo-referenced approach charts associated with the airports in the area. The GMX 200 performs a complex filtering process that eliminates airports and associated approach charts that are not geo-referenced, based on present position.

### Loading the Approach Chart

Once the airport is selected, the individual approach chart to be overlaid can be loaded from a list of geo-referenced approach charts available for that airport. Not all approach charts can be overlaid in this fashion and only geo-referenced charts will be presented for selection from the Custom Map. Because of this, it is possible that approach charts that are viewable under the ChartView Function may not be presented in this list.



**NOTE:** The pilot must be aware that not all charts in the loaded database can be used as an overlay.

Once the approach chart is loaded, a green Annunciator will illuminate at the top of the screen indicating the airport name and specific chart that has been loaded.



Selecting an Approach Chart in the IFR Function

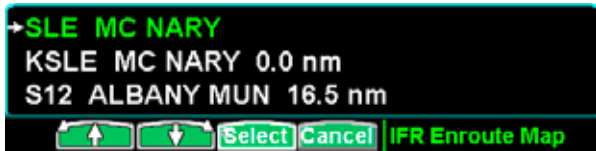
### Overlay Chart Loading Example

1. Press **FN** and then **MAP** or **IFR**.
2. Press **MENU/ENT** and then the **Load Chart** key.



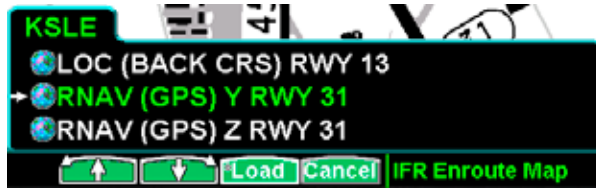
Selecting an Approach Chart in the IFR Function

3. Highlight the desired airport with the **arrow** keys and then press the **Select** key.



#### Selecting an Airport in the IFR Function

- Highlight the desired approach with the **arrow** keys and then press the **Load** key.



#### Selecting an Approach Chart in the IFR Function

- Adjust the zoom level using the **In** or **Out** keys.

### Viewing the Chart as an Overlay

#### Display of Coverage Area

Once the desired approach chart has been loaded, a green Annunciator bar with the approach name is illuminated at the top of the Custom and IFR maps. If the aircraft is outside the coverage area of the approach chart, a black rectangular box will be presented that shows the coverage of the chart itself.

Once the aircraft has entered the coverage area, the chart contents will be displayed on the screen. Note that a loaded approach chart is only viewable when the aircraft is in flight, otherwise, the airport surface chart has priority and the approach chart must be viewed in the ChartView function.

#### Chart Zooming

Auto zoom mode is supported from the Custom Map and is recommended to reduce the workload associated with maintaining an appropriate zoom

level. In auto zoom mode (entered by zooming all the way down or all of the way up), the zoom scale will be calculated to maintain the active waypoint of your GPS receiver on the screen at all times.

When an approach chart is loaded and being displayed, the auto zoom mode will limit the low-end zoom level to 5 NM as the current waypoint is being approached. This prevents the display from zooming into a level where the overall situational awareness relative to the approach as a whole is lost. This can be over-ridden by taking the unit out of auto zoom mode. This limit does not apply when the auto-zoom mode is tied to the GNS 480-series GPS receiver.

#### Chart Panning

Panning on the loaded chart is currently not supported. Entering the panning mode will disable the display of the chart and allow the underlying map layers to be presented.

#### Chart Orientation

When the chart overlay is presented, the orientation is identical to the currently selected orientation of the map itself (North up, track up or desired track up) with the ownship position correctly geo-referenced and presented on the chart. Note that rotation of the text on the charts themselves is not supported, meaning that text may not be oriented horizontally when displayed in track-up fashion.

#### Chart Info

Pressing the **Info** key when a chart is loaded will change the smart key labels to Header, Profile, Mins, and Info. Pressing the corresponding keys will allow the different parts of the chart to be presented along the bottom of the screen. Pressing the **Info** key will disable this mode and return the menu to the normal map controls.



Selecting INFO for a Chart in the IFR Function

### ChartView Function

The ChartView Function is accessed by pressing the **FN** Function key and selecting the ChartView (**CHART**) function.

The ChartView Function incorporates five menu items that control two basic operations:

- Selecting a chart (for static viewing)
- Loading a chart (for map overlay)

The term “Selecting a chart” is used to designate that a given chart is selected for static viewing on the screen. This is typically done by first specifying the airport, then the specific chart for that airport.

The term “Loading a chart” is used to designate that a given chart is loaded for flight operations and can be used as an actual overlay on the maps. Loading a chart through the ChartView Function is identical to loading a chart from the Custom/IFR map as described in previous sections.

All charts within the database, geo-referenced or not, can be statically viewed from the ChartView Function. Only geo-referenced charts can be loaded for map overlay purposes.

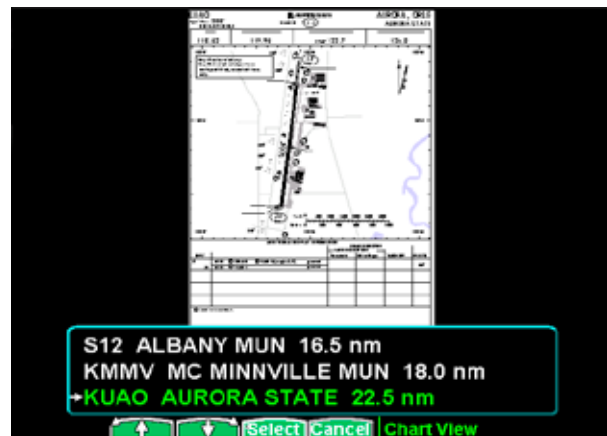
The ChartView Function will retain the last view set and will not change the chart, zoom level, or pan setting when the function is exited and re-entered, allowing it to operate similar to a physical chart manual. An exception to this is when a chart is loaded in the Custom or IFR Map functions. When this is done, the loaded chart is set as the currently selected chart in the ChartView function.

### ChartView Example:

1. Press **FN** and then **CHART**.
2. Depending on the Chart status last used:
  - a. Press **MENU/ENT** and then the **Select Airport** key;

or

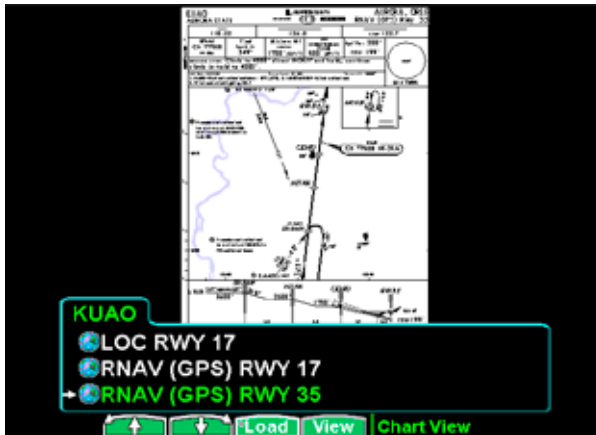
  - b. Highlight the desired airport with the arrow “smart” keys and then press the **Select** key.



Selecting the airport for a Chart in the ChartView Function

3. Highlight the desired chart with the arrow keys and then press the **Load** or **View** key.





Selecting the airport for a Chart in the ChartView Function

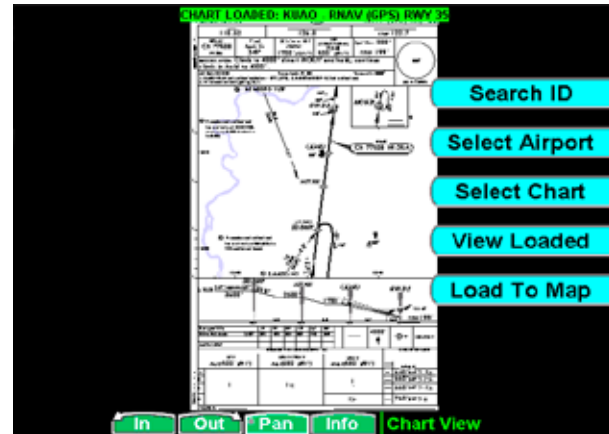
- View the chart. Adjust the zoom level using the **In** or **Out** keys. Press the **Pan** key and use the movement Menu Item keys on the right side of the display. Use the **Info** key to step through the different details of the chart.



Chart Loaded in the ChartView Function

### Menu Items

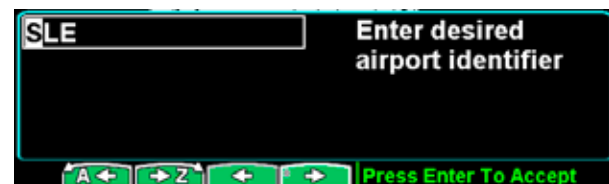
- Press **FN** and then **CHART**.
- Press **MENU/ENT** and then the Menu Item key for the desired function.



ChartView Function Menu Items

### Search ID

The Search ID menu item within the ChartView Function allows you to search for a specific airport identifier. As this operation requires multiple key-strokes to look up a specific chart, it is not recommended as the primary mechanism for accessing the charts, but does allow for flexibility. When an airport is located, it will be set as the currently selected airport. Airport identifiers can be entered with or without the “K” prefix.



Searching for an Airport by Ident in Chart Function

# Detailed Operation

## ChartView - Chart

### Select Airport

The Select Airport operation allows the airport of interest to be selected from a pop-up list. The airports presented in the list are determined based on the destination waypoint as the first entry, and a nearest type search for the remaining entries. This method allows the airport to be quickly located based on the current flight plan on the external GPS navigator.

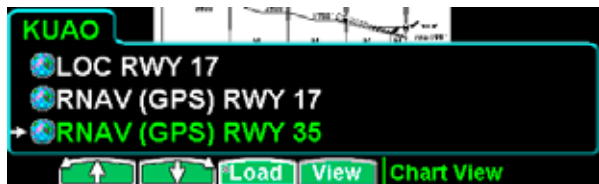


Selecting an Airport from a list in the Chart Function

Once the airport is located, the Select Chart menu is presented (see below), allowing a specific chart for that airport to be either loaded or simply viewed.

### Select Chart

The Select Chart operation allows the list of charts for the currently **selected** airport to be listed in a pop-up list. Within this list, a circular earth symbol indicates that the chart is geo-referenced and therefore can be loaded for use as an overlay on the maps. If a red "X" is presented through the earth symbol, then that specific chart is not geo-referenced and can be viewed, but not loaded as a map overlay.



Selecting a Chart from a list in the Chart Function

### View Loaded

The Select Loaded operation allows the currently **loaded** chart to be **selected** for viewing. This is typically done if a given chart was **LOADED** from the Custom/IFR Map, and viewing it from the ChartView Function is desired. Note that loading a chart from the Custom/IFR Map will also load and select the chart for viewing.

### Load to Map

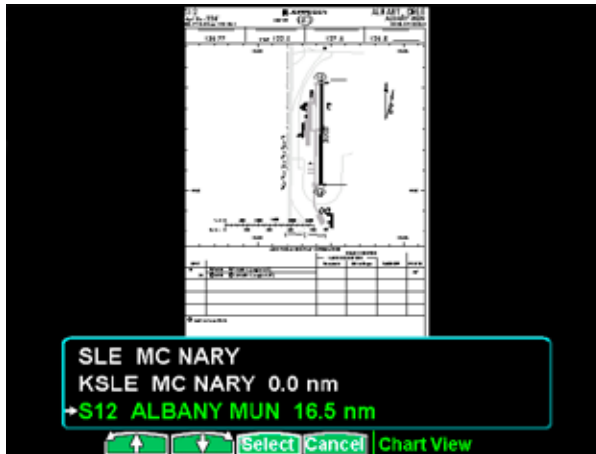
The Load Current operation allows the current (viewed) approach chart to be set as the **LOADED** approach chart. When this operation is performed, any previously loaded chart is replaced with the chart that is currently being viewed.



Load the Current Chart for Viewing

### Airport Surface Charts

Airport surface charts provide a graphical presentation of the airport surface area (runways, taxiways, buildings, towers, and other objects), within the immediate airport vicinity.



Selecting a Surface Chart

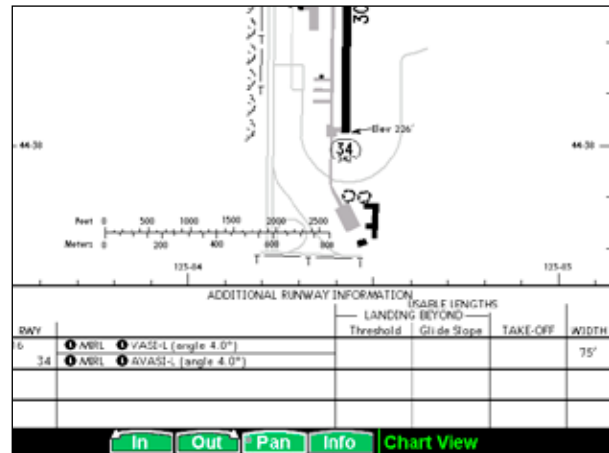
From either the Custom Map or the IFR en route Map, airport surface charts will automatically be loaded and displayed as an overlay if the following conditions are met:

- The airport surface chart is within the loaded database
- The airport surface chart is geo-referenced
- Airport Chart menu layer is turned on
- The aircraft position is within the coverage of the chart
- A loaded approach chart is not being “flown”

In typical operation, the above conditions are met when the unit is turned on, meaning that the airport surface map is displayed as soon as GPS position is acquired. Note that the Initial Zoom Scale feature determines the initial zoom scale that is set when the aircraft is on the ground, which is important when working with surface charts.

### Viewing Surface Charts

The airport surface charts are treated similarly to approach type charts in that they can be viewed through both the ChartView Function and on the Custom Map/IFR Map as an overlay. However, as there is only one unique surface chart for a given airport, it does not need to be manually loaded for display. The nearest available airport surface chart will always be used. When viewed from the ChartView Function, the airport surface chart shows up as the first available chart for the selected airport of interest. Thus, after selecting the airport of interest, the list of charts will have an “Airport” entry as the first item in the list. As with standard approach charts, when viewed from the ChartView Function, the aircraft’s ownship position is not shown on the airport surface chart.



Viewing Surface Chart Detail

If an approach chart is currently loaded and being displayed (aircraft is in the air), it will take priority over displaying the airport surface chart. Once the aircraft touches down and the speed drops below the air/ground transition speed, it is assumed that a missed approach procedure is not being flown. At this point,

the approach chart is unloaded and the airport surface chart is displayed. While on the ground, airport surface charts will take priority over any loaded approach chart.

### **Operational Considerations**

#### ***When to Load a Chart***

An approach chart can be loaded at any point during the flight, including on the ground before takeoff. Note that the approach will not be shown on the map itself until the aircraft's speed is above the air/ground transition speed. The approach will be automatically unloaded when the aircraft's speed goes below the air/ground transition speed.

#### ***Flying an Approach***

It is important to recognize that the charts function is not intended to provide guidance information for flying an approach. It is meant to provide basic situational awareness for your current position relative to the approach as a whole. Standard IFR-approved instruments and charts **MUST** be used to actually provide the navigational information required under IFR conditions.

#### ***Approach to Surface Map Transitions***

Logic is incorporated that will automatically transition the display from an in-flight approach chart display to a zoomed in view of the airport surface chart upon landing. The intent is to provide a hands-free transition from the approach phase of flight to the airport surface navigation phase without having to manually un-load the approach and adjust the zoom scale.

The transition logic is based solely on aircraft ground speed.

When an approach chart is loaded and being

flown, and the aircraft ground speed drops below the air/ground transition speed (set in the SYS Function), it is assumed that a landing has been performed. At this point, the loaded approach chart is automatically unloaded and the airport surface chart will be presented on the screen showing runways, taxiways, etc.

However, if approach chart is loaded and being flown and the aircraft crosses the missed approach point without slowing, it is assumed that a missed approach procedure is being performed. In this case, the automatic transition to surface maps does not occur and the approach is not automatically unloaded. See the Initial Zoom and Transition Speed selections in the System Function.

#### ***Chart NOTAMS***

Any applicable NOTAMS that apply for a given chart are shown under the **INFO** key when that chart is selected. The chart should be viewed for NOTAMS before use.

#### ***Important System Limitations***

Note that while on the ground and viewing airport surface charts, the display can be oriented in the "Track Up" mode. In this mode, the last known GPS-based track as obtained from the external GPS navigation system is used to orient the map. GPS track is typically not accurate at low speeds and does not reflect the actual heading of the aircraft at all times.

#### ***Invert Option***

As with the basic maps, the chart image can be inverted using the standard **Invert** key.

#### ***Hot Spots***

Airport diagrams may show areas where extra vigilance is recommended due to traffic congestion, visibility constraints, or other unique circumstances.

These areas are called “hot spots” and are identified by circular or elliptical lines. Although these areas are highlighted as places where extra caution is warranted and advised, they do not relieve the pilot of the responsibility to “see and avoid” other traffic or obstacles, on the airport surface or in the air. All taxiway and runway intersections should be approached with caution, whether they are marked with hot spots or not. Runways where Land and Hold Short Operations (LAHSO) may be in effect are identified with lines across the runway labeled “LAHSO”. Other areas where extra vigilance is recommended may also be outlined. Hot spots and other outlined areas are derived from database information and may therefore contain errors or may not be included in the database.

#### **Typical Operational Scenario**

The following scenarios make the assumption that:

- The appropriate charts are available and geo-referenced
- The default ground zoom level is set to 0.5 NM
- The default air zoom level is set to “AUTO”
- Airport Chart menu item is enabled

#### **Typical Taxi Scenario**

On power up and GPS position acquisition, the Custom Map Function will show the aircraft on the surface chart at a zoom level of 0.5 NM. The aircraft will be shown relative to taxiways and runways throughout the taxi procedure.

#### **Typical Take Off Scenario**

On take off roll, when the aircraft reaches the air/ground transition speed, the display will automatically transition to the en route zoom mode of “AUTO” and adjust the display to show the active waypoint.

#### **Typical Approach Scenario**

Setting the last waypoint in the flight plan to the destination airport on the GPS navigation system and pressing **LOAD CHART** from the Custom/IFR Map will present the destination airport in the selection list. Selecting this airport will then bring up the approach charts that are available for that airport, which can then be loaded by pressing the **Load** key.

#### **Typical Landing Scenario**

With an approach chart being “flown,” upon touchdown and rollout, the chart will be unloaded and the map will automatically switch to the airport surface chart with the zoom level set to 0.5 NM.

## Radar (RADAR) Function

The GMX 200 I/O Radar product supports an interface for the Garmin GWX 68, Allied Signal/Bendix-King ART2000/2100, and RS 181A/RS 811A weather radars. The GWX 68, RS 181A/RS 811A, and ART2000 weather radars are seamlessly integrated with the other functionality of the GMX 200 with a “RADAR” function available from the main function menu. Note that auto-tilt is not supported for the ART2000/2100. The ART2100 must be configured to emulate the ART2000. As a result, only the ART2000 functions are available with the ART2100.

The GMX 200 operates as both a display and control head, allowing direct replacement of older display systems. The modes and features supported by the GMX 200 for each of the radar heads are detailed in the following table. Review the Limitations section in the front of this guide for the limitations that apply to the radar data.

Function	GWX 68	ART2000	RS 181A/ RS 811A
Ground Map	●	●	●
Weather	●	●	●
Horizontal Display	●	●	●
Vertical Display	●	●	
Hold Mode	●	●	●
Tilt Control	●	●	●
Bearing Control	●	●	
Range Control	●	●	●
Gain Control	●	●	●
Bearing Cursor	●	●	
Tilt Cursor	●	●	●
Stabilization	●	●	●
Sector/Scan	●		

Function	GWX 68	ART2000	RS 181A/ RS 811A
Target Alert	●		
Radar Alert	●		

On initial power-up and entry to the Radar Function, the radar unit may go to the Off mode. Selections can be made to command the unit into one of the following initial modes:

- STBY
- ON
- TEST
- OFF

Once activated, the different operating modes of the radar are selected by pushing the corresponding Menu Item keys. The Rotary Knob provides easy adjustment of Range, Tilt, Gain, and Bearing. Pressing the Rotary Knob toggles between the functions. Turning rotary knob adjusts the values. The active function will be highlighted and show arrows.



Rotary knob Adjusting Tilt Values

Descriptions of the different modes are as follows, with the currently selected mode being highlighted in green:

### Off Mode

On GMX 200 power-up, the radar antenna is placed in the OFF mode. In this mode, the radar antenna head is not energized and is not transmitting.

### Standby/On Mode

In the standby mode, the radar head is powered up, but is not transmitting. Placing the unit into standby mode initiates the warm-up sequence that

is required by the transmitter within the radar head assembly. Pressing the **STBY/ON** key while in Standby mode turns on the radar in the Weather Mode. While in the ON mode in both Map and Weather modes, the green RDR annunciator is on solid indicating that the radar is energized and transmitting.

### **Test Mode**

Pressing the **TEST** key while in the Standby mode places the radar in the Test mode. The radar then sends a test pattern that is displayed on the GMX 200.

### **Weather Mode**

In the weather (WX) mode, the antenna is transmitting and painting reflected returns on the screen. This mode is intended for painting airborne weather and is the normal operating mode for the unit. Radar returns are painted in the following colors:

- Black
- Green
- Yellow
- Red
- Magenta

Black is the weakest return while Magenta shows where the strongest returns were obtained. While in the weather mode (GWX 68 only), the gain can be adjusted with the **Gain -** and **Gain +** keys.

### **MAP Mode**

The Map (MAP) mode is used for obtaining returns from the ground. Map mode is available for the GWX 68, ART2000/2100, RS 811A, and RS 181A. In this mode, the return data is rendered in the following colors:

<u>GWX 68</u>	<u>ART2000/ART2100/RS 181A/RS 811A</u>
---------------	--

- |           |           |
|-----------|-----------|
| • Black   | • Black   |
| • Cyan    | • Cyan    |
| • Yellow  | • Green   |
| • Magenta | • Yellow  |
| • Blue    | • Red     |
|           | • Magenta |

While in the Map mode, the gain can be adjusted with the **Gain -** and **Gain +** keys.

### **Manual Gain (GWX 68 only)**

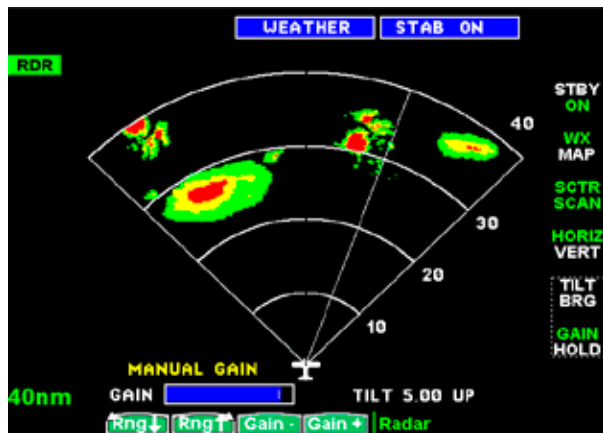
Activating the **Gain -** and **Gain +** keys will result in changing the blue Manual Gain bar displayed above the key labels. Adjusting the level to the reference line at the right of the bar scale will return the radar to Automatic Gain.

# Detailed Operation

## Radar

### Horizontal Mode

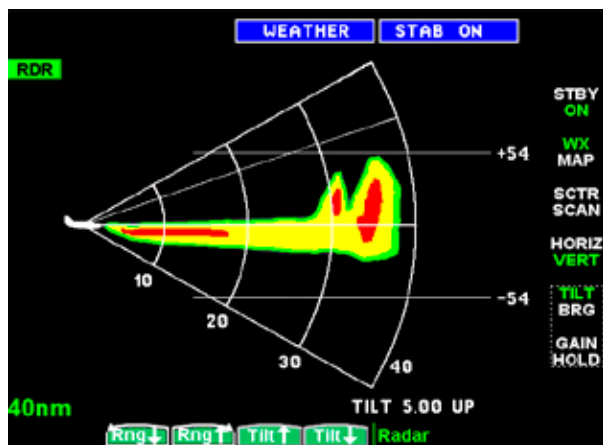
The Horizontal Mode (HORIZ) commands the radar head to scan in the horizontal plane at a pilot selectable tilt angle. In this mode, the current Tilt angle is shown on the lower half of the display.



Radar Horizontal View

### Vertical Mode (GWX 68 and ART2000/2100 only)

The Vertical Mode (VERT) commands the radar head to scan in the vertical plane at a pilot selectable bearing off of the nose of the aircraft. In this mode, the current Bearing angle is shown on the lower half of the display.



Radar Vertical View

### Range Control

The range can be adjusted using the **Rng ↑** and **Rng ↓** keys. Values for the radar are shown in the table below.

Unit	GWX 68	ART2000	RS 181A/RS 811A
Range (NM)	2.5 - 320	10 - 240	10 - 240

### Tilt Control

The Tilt (TILT) control is used to adjust the current tilt angle of the radar head when horizontal sweeping is being performed.

While in the Horizontal mode, the tilt is adjusted using the **Tilt ↑** and **Tilt ↓** keys. Values for the radar are shown in the table below.



Radar Tilt Control

Unit	GWX 68	ART2000	RS 181A/RS 811A
Tilt (°)	-15° - +15°	-15° - +15°	-15° - +15°

### Bearing Control (GWX 68/ART2000/2100 only)

The Bearing (BRG) control is used to adjust the current bearing angle of the radar head when vertical sweeping is being performed. While in the Vertical mode, the bearing is adjusted using the **Brg →** and **Brg ←** keys. Values shown in the table below are in degrees from straight ahead.



Radar Range and Bearing Control



Unit	GWX 68	ART2000	RS 181A/RS 811A
Bearing (°)	45L - 45R	45L - 45R	NA

### Gain Control

Available in MAP mode with the GWX 68, ART2000, and RS 181A/RS 811A; and also in WX mode with the GWX 68. In the GWX 68, the gain settings are set separately for the Map and WX modes. The gain is used to adjust the sensitivity of the radar receiver. It can be used in map mode to adjust the characteristics of the returns from the surface.

While in the Ground mode, the gain is adjusted using the **Gain +** and **Gain -** keys. Pressing a Gain adjustment key will show a Gain bar graph. The white reference line on the right side of the bar graph is only present in the GWX 68. Values are shown in decibels in the table below.



Automatic Radar Gain Control (GWX 68)



Manual Radar Gain Control (GWX 68)



Manual Radar Gain Control  
(ART2000/2100 and RS 181A/RS 811A)

	GWX 68	ART2000/2100	RS 181A/ RS 811A
Gain (dB)	-28 - +3.5 (Weather and Map modes)	-31.5 - 0 (Map mode only)	-31.5 - 0 (Map mode only)

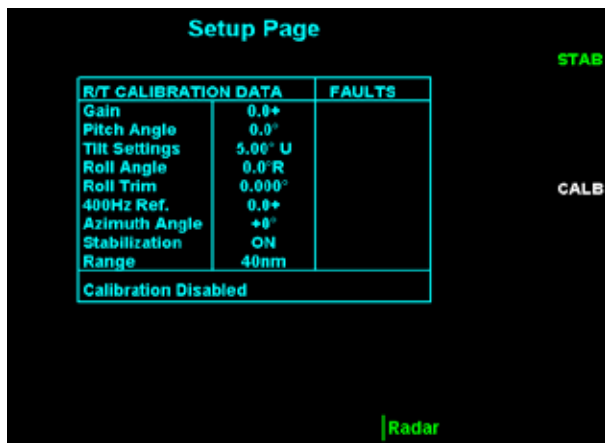
### Hold Control

The Hold mode is used to freeze the display. While in the hold mode, the green RDR indicator flashes indicating that the display is not being updated, but the radar is continuing to transmit.

### Cursor Pre-Select Operation (GWX 68 and ART2000/2100 only)

Cursor pre-select option can be used to pre-select a Bearing Line or Antenna Tilt angle prior to switching the vertical or horizontal scan mode of the display. The cursor is a cyan line extending along the Radar's projected path and can be displayed in both the horizontal and vertical modes.

For example, if horizontal scanning is occurring, a cursor line can be activated to pre-select a specific bearing to a weather cell of interest. Once selected, changing the scan mode to vertical will automatically set the bearing of the vertical sweeps to the bearing previously indicated by the cursor line.



Radar Setup Page

Conversely, if vertical scanning is occurring, a cursor line can be activated to pre-select a specific tilt to a weather cell of interest. Once selected, changing the scan mode to horizontal will automatically set the tilt angle of the horizontal sweeps to the tilt angle previously indicated by the cursor line.

The Bearing Cursor is activated any time the Tilt/Bearing control is changed from its default position. When in Horizontal scanning, setting the Bearing will cause the radar to scan at that bearing when it is switched to Vertical scanning. When in Vertical scanning, setting the Tilt will cause the radar to scan at that tilt when it is switched to Horizontal scanning.

### **Sector Scan (GWX 68 only)**

Sector scanning is only available in the GWX 68. Pressing the **SCTR/SCAN** key toggles between Sector Scan (SCTR) and Normal Scan (SCAN). Selecting Sector Scan reduces the scan angle to  $\pm 10^\circ$  in horizontal scanning and  $\pm 5^\circ$  in vertical scanning. The Sector Scan can be moved horizontally by changing the Bearing and vertically by changing the Tilt.

### **Radar Alert (GWX 68 only)**

The Radar Alert feature is only available in the GWX 68. A Radar Alert is issued when a Target Alert is active for two consecutive sweeps within  $10^\circ$  of the current heading. When the Radar Alert is active, a flag appears and is displayed for 60 seconds after the end of the last Target Alert. The flag will be displayed along the left side of the display, regardless of the active function.

See *Target Alert* on the following page.

### **Radar Setup Page**

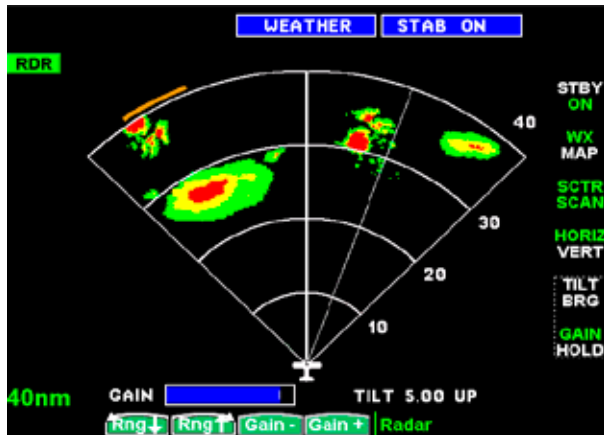
Pressing the **MENU** key while in the Radar Function will display the Setup page. The currently selected mode is displayed at the top of the radar screen during normal operations.

### **Stabilization (STAB)**

Pressing the **MENU/ENT** and then the **STAB** key while in the Setup Function allows the stabilization to be turned on or off. When Stabilization is On, a command is sent to the radar head instructing it to use the supplied gyro commands to compensate the sweep patterns for pitch and roll of the aircraft. When stabilization is activated, the STAB label will be green. When Stabilization is turned off, the STAB label is white. Additional status information is also shown while the radar menu is active.

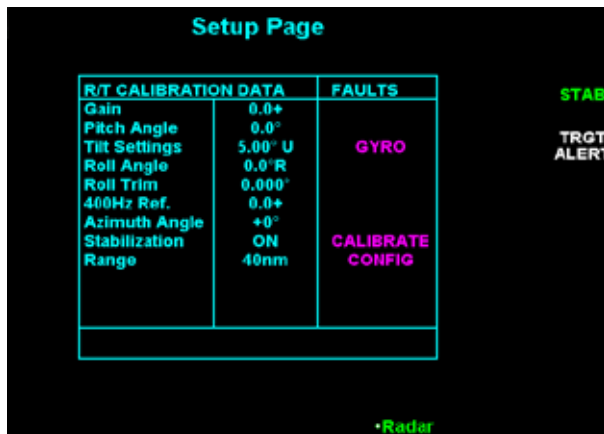
### **Target Alert (GWX 68 only)**

The Target Alert feature is only available in the GWX 68. The Target Alert feature will indicate where a sufficiently high amount of total echo energy is located in the scan between the ranges of 80 and 320 NM regardless of the zoom scale. These echoes are shown with a segment drawn beyond the farthest displayed distance arc.



Radar Page with Target Alert Active

Target Alerting is enabled by pressing the **MENU/ENT** key when the Radar is in TEST or ON modes. Press the **MENU/ENT** key and then the **TRGT ALERT** key to enable and disable Target Alerting.



Radar Setup Page with Target Alert

Fault Message	Description	Action
ELE	Electrical fault with the radar hardware or the aircraft power bus.	Power off the radar. The radar needs service.
400 Hz	A previously available analog 400 Hz reference signal is no longer detected. Analog altitude information will not be available.	An external sensor has failed and needs service.
GYRO	No valid source of attitude information. Antenna stabilization will not be available.	An external sensor has failed and needs service.
HV	An irregularity with the onboard high voltage power supply. It may be hazardous to place the radar in transmit mode.	Power off the radar. The radar needs service.
AFC	The Automatic Frequency Control is unable to lock on to the transmit frequency. Radar performance will be impaired and indicated return intensity is not reliable.	Power off the radar. The radar needs service.
TEMP	The temperature is too high to safely activate the radar transmitter.	Power off the radar. Do not use the radar until its temperature falls and the fault clears.
XMITTER	A problem is detected in the receiver or transmitter. The unit may be hazardous to use.	Power off the radar. The radar needs service.
CALIBRATE	A problem has been detected with the internal factory-calibration settings.	Power off the radar. The radar needs service.
CONFIG	The configuration settings are corrupted or missing.	Power off the radar. The radar needs service.
EEPROM or RAM	A problem has been detected with the internal memory.	Turn the power off and then back on. If the message persists the radar needs service.
FPGA	A problem has been detected with the internal FPGA device.	Turn the power off and then back on. If the message persists the radar needs service.

### **Garmin GWX 68 Radar Description**

The Garmin GWX 68 Airborne Color Weather Radar is a four color digital pulsed radar with 6.5 kilowatts of power. It combines excellent range and adjustable scanning profiles with a high-definition target display. The pulse width is four microseconds on all ranges except the 2.5 NM range. The GWX 68 uses a one microsecond pulse width at this range to reduce the smearing of targets on the display. This allows better target definition at close range.

To focus radar scanning on specific areas, Sector Scanning offers pilot-adjustable horizontal scan angle of 10 degrees. A vertical scanning function helps to analyze storm tops, gradients and cell buildup activity at various altitudes.

### **Principles of Pulsed Airborne Weather Radar**

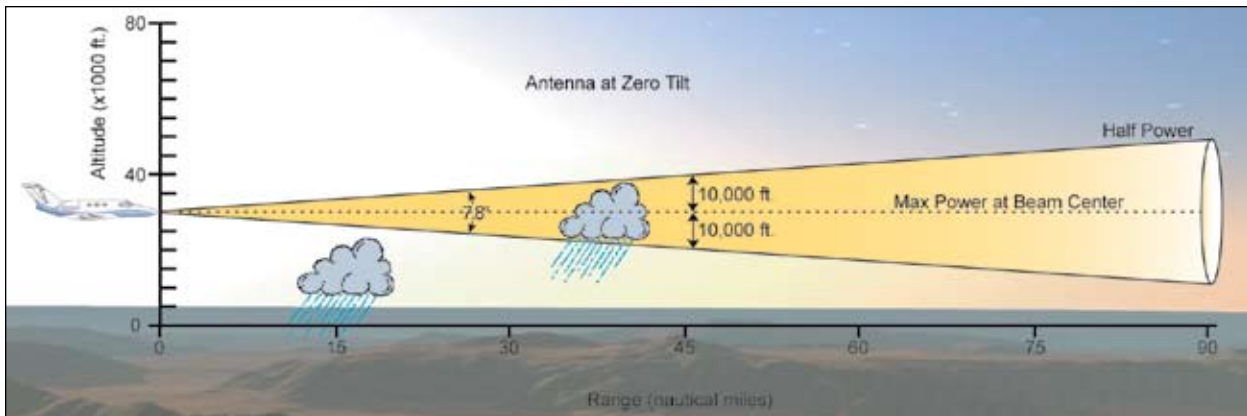
The term RADAR is an acronym for RAdio Detecting and Ranging. Pulsed radar locates targets by transmitting a microwave pulse beam that, upon encountering a target, is then reflected back to the radar receiver as a return “echo.” The microwave pulses are focused and radiated by the antenna, with the most intense energy in the center of the beam and decreasing intensity near the edge. The same antenna is used for both

transmitting and receiving. The returned signal is then processed and displayed on the GMX 200 MFD.

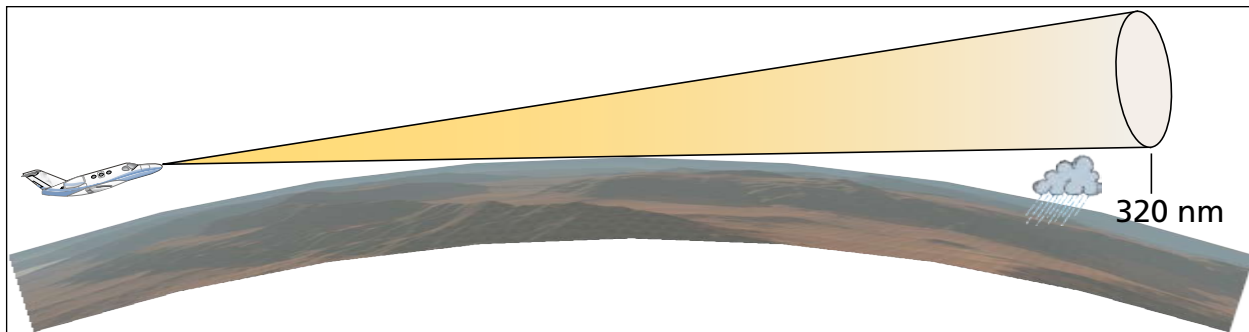
Radar detection is a two-way process that requires 12.36 micro-seconds for the transmitted microwave pulses to travel out and back for each nautical mile of target range. It takes 123.6 micro-seconds for a transmitted pulse to make the round trip if a target is 10 nautical miles away.

The GWX 68 weather radar should be used to avoid severe weather, not for penetrating severe weather. The decision to fly into an area of radar targets depends on target intensity, spacing between the targets, aircraft capabilities and pilot experience. Pulse type weather radar detects only precipitation, not clouds or turbulence. The display may indicate clear areas between intense returns, but this does not necessarily mean it is safe to fly between them. Only Doppler radar can detect turbulence.

Airborne weather radar has other capabilities beyond weather detection. It also has the ability to detect and provide distance to objects on the ground, such as, cities, mountains, coastlines, rivers, lakes, and oceans.



**Radar Beam from 12 inch Antenna**



**Radar Beam in Relation to the Curvature of the Earth**

It is important to understand the concept of the antenna beam illumination. The radar beam is much like the beam of a spotlight. The farther the beam travels, the wider it gets. The radar is only capable of “seeing” what is inside the boundaries of the beam. The figure on the previous page depicts a radar beam’s characteristics. The figure illustrates vertical dimensions of the radar beam, although the same holds true for the horizontal dimensions. In other words, the beam will be as wide as it is tall. Note that it is possible not to see areas of precipitation on the radar display because of the antenna tilt setting. With the antenna tilt set to zero in this illustration, the beam overshoots the precipitation at 15 nautical miles. The curvature of the earth can also be a factor, especially at range settings of 150 nautical miles or more, as shown in the above figure.

### **Radar Signal Attenuation**

The phenomena of weather attenuation needs to be kept in mind whenever operating the weather radar. When the radar signal is transmitted, it is progressively absorbed and scattered, making the signal weaker. This weakening, or attenuation, is caused by two primary sources, distance and precipitation.

Attenuation because of distance is due to the fact

that the amount of radar energy at a distance from the antenna is inversely proportional to the square of the distance. The reflected radar energy from a target 40 miles away that fills the radar beam will be one fourth the energy reflected from an equivalent target 20 miles away. This would appear to the operator that the storm is gaining intensity as the aircraft gets closer. Internal circuitry within the GWX 68 system compensates for much of this distance attenuation.

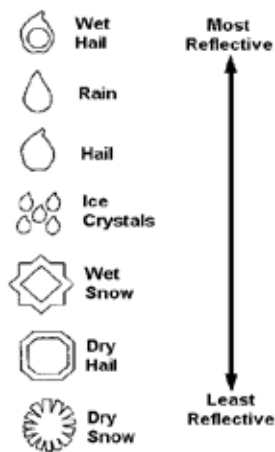
Attenuation due to precipitation is not as predictable as distance attenuation. It is also more intense. As the radar signal passes through moisture, a portion of the radar energy is reflected back to the antenna. However, much of the energy is absorbed. If precipitation is very heavy, or covers a large area, the signal may not reach completely through the area of precipitation. The weather radar system cannot distinguish between an attenuated signal and area of no precipitation. If the signal has been fully attenuated, the radar will display a “radar shadow”. **This appears as an end to the precipitation when, in fact, the heavy rain may extend much further.** A cell containing heavy precipitation may block another cell located behind the first, preventing it from being displayed on the radar. Never fly into these shadowed areas and never assume that all of the heavy precipitation is being displayed

unless another cell or a ground target can be seen beyond the heavy cell.

### **Radar Signal Reflectivity**

#### ***Precipitation***

Precipitation or objects more dense than water, such as earth or solid structures, will be detected by the weather radar. The weather radar will not detect clouds, thunderstorms or turbulence directly. It detects precipitation associated with clouds, thunderstorms, and turbulence. The best radar signal reflectors are raindrops, wet snow or wet hail. The larger the raindrop the better it reflects. The size of the precipitation droplet is the most important factor in radar reflectivity. Because large drops in a small concentrated area are characteristic of a severe thunderstorm, the radar displays the storm as a strong return. Ice, dry snow, and dry hail have low reflective levels and often will not be displayed by the radar. A cloud that contains only small raindrops, such as fog or drizzle, will not reflect enough radar energy to produce a measurable target return.



**Precipitation Type and Reflectivity**

#### ***Ground Returns***

The intensity of ground target returns depends upon the angle at which the radar beam strikes the ground target (Angle of Incidence) and the reflective properties of that target. The gain can be adjusted so shorelines, rivers, lakes, and cities are well defined. Increasing gain too much causes the display to fill in between targets, thus obscuring some landmarks.

Cities normally provide a strong return signal. While large buildings and structures provide good returns, small buildings can be shadowed from the radar beam by the taller buildings. As the aircraft approaches, and shorter ranges are selected, details become more noticeable as the highly reflective regular lines and edges of the city become more defined.

Bodies of water such as lakes, rivers, and oceans are not good reflectors, and normally do not provide good returns. The energy is reflected in a forward scatter angle with inadequate energy being returned. They can appear as dark areas on the display. However, rough or choppy water is a better reflector and will provide stronger returns from the downwind sides of the waves.

Mountains also provide strong return signals to the antenna, but also block the areas behind. However, over mountainous terrain, the radar beam can be reflected back and forth in the mountain passes or off canyon walls using up all or most of the radar energy.

**In this case, no return signal is received from this area causing the display to show a dark spot which could indicate a pass where no pass exists.**

### **Angle of Incidence**

The angle at which the radar beam strikes the target is called the Angle of Incidence. Incident angle (“A”) is illustrated below. This directly affects the detectable range, the area of illumination, and the intensity of the displayed target returns. A large incident angle gives the radar system a smaller detectable range and lower display intensity due to minimized reflection of the radar energy.

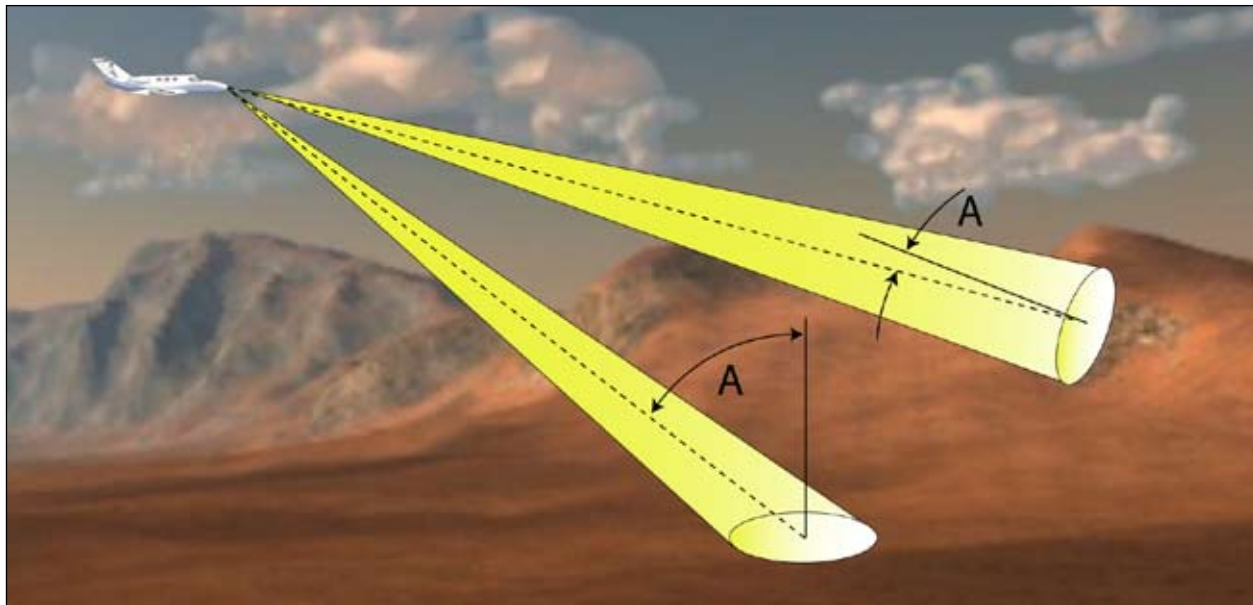
A smaller incident angle gives the radar a larger detectable range of operation and the target display will show a higher intensity. Since more radar energy is reflected back to the antenna with a low incident angle, the resulting detectable range is increased for mountainous terrain.

### **Operating DISTANCE**

The following information establishes a minimum safe distance from the antenna for personnel near an operating airborne weather radar. The minimum safe distance is based upon the FCC’s exposure limit at 9.3 to 9.5 GHz for general population/uncontrolled environments which is 1 mW/cm<sup>2</sup>. See Advisory Circular 20-68B for more information on safe distance determination.

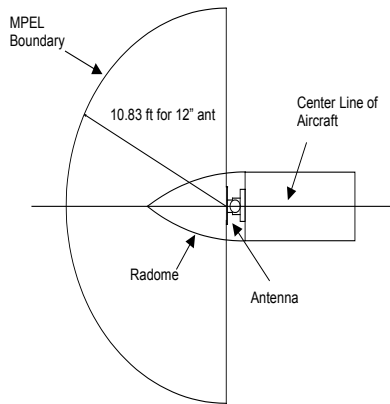
### **MAXIMUM PERMISSIBLE EXPOSURE LEVEL (MPEL)**

The zone in which the radiation level exceeds the US Government standard of 1 mW/cm<sup>2</sup>, is the semi-circular area of at least 10.83 ft from the 12” antenna as indicated in the illustration below. All personnel must remain outside of this zone. With a scanning or rotating beam, the averaged power density at the MPEL boundary is significantly reduced.



**Angle of Incidence**





**MPEL Boundary**

### **Antenna Tilt Setup at Cruise Altitude**

The following discussion is a simple method for setting up the weather radar antenna tilt for most situations. It is not to be considered an all encompassing setup that will work in all situations, but this method does provide good overall parameters for the monitoring of threats.

With the aircraft flying level, adjust the antenna tilt so ground returns are displayed at a distance that equals the aircraft's current altitude (AGL) divided by 1,000. For example, if the aircraft is at 14,000 feet, adjust the tilt so the front edge of ground returns are displayed at 14 nautical miles. Note this antenna tilt angle setting. Now, raise the antenna tilt 6 degrees above this setting. The bottom of the radar beam is now angled down 4 degrees from level.

At this point, when flying at altitudes between 2,000 and 30,000 feet AGL, any displayed target return should be scrutinized. If the displayed target advances on the screen to 5 nautical miles of the aircraft, avoid it. This may be either weather or ground returns that are 2,000 feet or less below the aircraft. Raising

the antenna tilt 4 degrees can help separate ground returns from weather returns in relatively flat terrain. This will place the bottom of the radar beam level with the ground. Return the antenna tilt to the previous setting after a few sweeps.



**NOTE:** At aircraft altitudes under 5,000 feet AGL, false returns are possible due to reflections from side-lobe beams.

If the aircraft is above 29,000 feet, be cautious of any target return that gets to 30 nautical miles or closer. This is likely a thunderstorm that has a top high enough that the aircraft cannot fly over it safely.

If the aircraft altitude is 15,000 feet or lower, set the displayed range to 60 miles. Closely monitor anything that enters the display.

Also, after setting up the antenna tilt angle in this manner, ground returns can be monitored for possible threats. A ratio of approximately 100 to 1 exists between vertical distance from the aircraft and horizontal distance. Therefore, at this antenna tilt setting, a target return at 1 NM is approximately 400 feet below the aircraft; at 10 NM, 4,000 feet below; at 50 NM, 20,000 feet, etc. In other words, at this tilt setting, a ground return (such as a mountain peak) being displayed at 10 NM would have a **maximum** clearance of 4,000 feet. If that ground target return moves to 5 NM, **maximum** clearance will be 2,000 feet.

This setup will provide a good starting point for practical use of the GWX 68 Weather Radar System. There are many other factors to consider in order to become proficient at using weather radar in all situations.

**Weather Mapping and Interpretation****Weather display Interpretation**

When evaluating various target returns on the weather radar display, the colors denote approximate rainfall intensity and rates as shown in the table below.

Weather Mode Color	Approximate Intensity	Approximate Rainfall Rate
BLACK	< 23 dBZ	< .01 in./hr.
GREEN	23 dBZ to < 32 dBZ	.01 - 0.1 in./hr.
YELLOW	32 dBZ to < 41 dBZ	0.1 - 0.5 in./hr.
RED	41 dBZ to < 50 dBZ	0.5 - 2 in./hr.
MAGENTA	50 dBZ and greater	> 2 in./hr.

**Precipitation Intensity Levels****Thunderstorms**

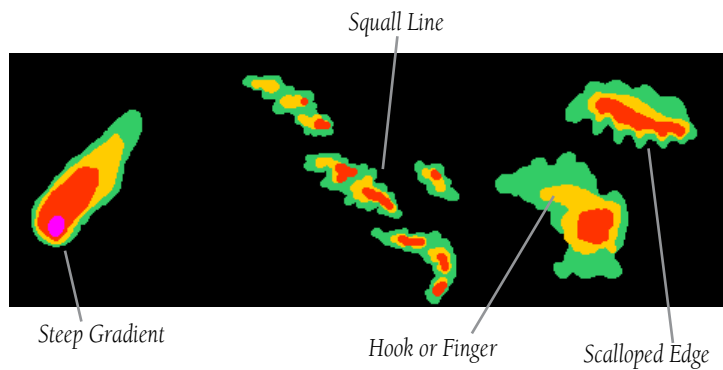
Updrafts and downdrafts in thunderstorms carry water through the cloud. The more severe the drafts, the greater the number and size of the precipitation droplets. With this in mind, the following interpretations can be made from what is displayed on the weather radar. Avoid these areas by an extra wide margin.

- When the displayed target intensity is red or magenta (large amounts of precipitation) the turbulence is considered severe.
- The steeper the color gradient (rate of change in the rainfall rate over distance) in a target, the stronger the turbulence.
- Areas that show red or magenta are associated with hail or turbulence, as well as heavy precipitation. Vertical scanning and antenna tilt management is necessary to identify areas of maximum intensity.

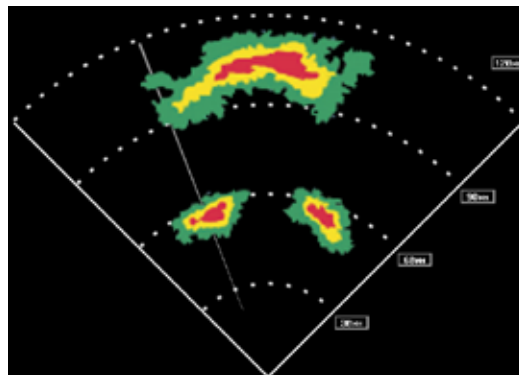
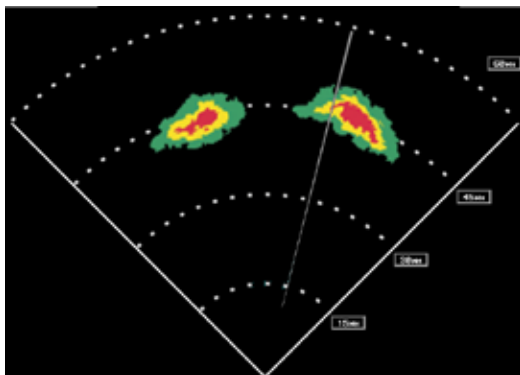
Along squall lines, individual cells are in different stages of development. Areas between closely spaced, intense targets may contain developing clouds not having enough moisture to produce a return. However, these areas could have strong updrafts or downdrafts. Targets showing wide areas of green are generally precipitation without severe turbulence. In areas of multiple heavy cells, use the Vertical Scan feature along with antenna tilt management to examine the less benign areas before maneuvering around the cells. Remember, avoid shadowed areas.

Turbulence can also be identified by irregularities in the target return. These can be identified as 'hooks', "fingers", or a scalloped edge. These irregularities may be present in green areas, with no yellow, red, or magenta areas and should be treated as highly dangerous areas. Avoid these areas as if they were red or magenta areas.

Thunderstorm development is rapid. A course may be blocked within a short time. When displaying shorter ranges, periodically select a longer range to see if problems are developing further out. That can help prevent getting trapped in a "blind alley".



Cell Irregularities



The "Blind Alley"

### ***Tornadoes***

There is no conclusive radar target return characteristics which will identify a tornado, however, tornadoes may be present if the following characteristics are observed:

- A narrow, finger-like portion, as shown on the previous page, extends and, in a short time, curls into a hook and closes on itself.
- A “hook” which may be in the general shape of the numeral 6, especially if bright and projecting from the southwest quadrant (northeast quadrant in the southern hemisphere) of a major thunderstorm moving eastward.
- V- shaped notches
- Doughnut shapes.

These shapes do not always indicate tornadoes, nor are tornado returns limited to these characteristics. Confirmed radar observations of tornadoes most often have not shown shapes different from those of a normal thunderstorm display.

### ***Hail***

Hail results from updrafts carrying water high enough to freeze. Therefore, the higher the top of a thunderstorm, the greater the probability that it contains hail. The height can be determined by vertically scanning the target return.

Hail usually has a film of water on its surface making its reflective characteristics similar to a very large water droplet. Because of this water film, and because hail stones usually are larger than water droplets, thunderstorms with large amounts of wet hail return stronger signals than those with rain. Some hail shafts are extremely narrow (100 yards or less) and

make poor radar targets. In the upper regions of the cell, where ice particles are “dry” (no liquid coating), target returns are less intense.

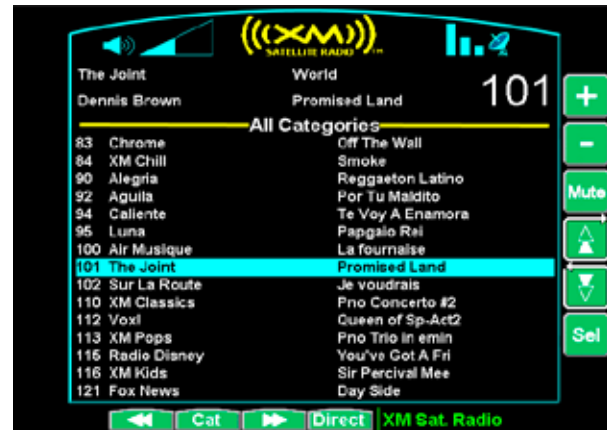
Hail shafts are associated with the same radar target return characteristics as tornadoes. U-shaped cloud edges 3 to 7 miles across can also indicate hail. These target returns appear quite suddenly along any edge of the cell outline. They also change in intensity and shape in a matter of seconds, making vigilant monitoring essential.

## XM Satellite Radio (XM) Function

Audio entertainment is available through the XM Satellite Radio Service when activated in the optional installation of the GDL 69A. The GMX 200 serves as the display and control head for your remotely mounted GDL 69A. XM Satellite Radio allows you to enjoy a variety of radio programming over long distances without having to constantly search for new stations. Based on signal from satellites, coverage far exceeds land-based transmissions. When enabled, the XM Satellite Radio audio entertainment is accessible by using the **XM** function smart key.

The information on the XM Satellite Radio display is composed of four areas: the Active channel, available Channels, Category of the highlighted channel, and the Volume setting. The Active Channel window shows the Channel Name and Number, artist, Song Title, Category, and provides an indication of signal strength. A bar graph next to the antenna symbol describes the signal strength. Maximum signal strength is shown by three full bars.

The **rotary knob**, initially, will allow you to scroll through the song list. Pressing the rotary knob changes to Category Selection and pressing it again changes to Volume Control. Pressing the **rotary knob** again will return to song list scrolling.



XM Radio with Active Channel

1. Press the **FN** key and then the **XM** function key when displayed.
2. The function smart keys at the bottom of the screen let you control the Category (**Cat**) or select the channel directly by entering the number (**Direct**).  
The keys on the right let you control Volume, muting, and Channel scrolling and selection.
3. The **MENU/ENT** key brings up menu items for more detail on each sub-function.

# Detailed Operation

## XM Satellite Radio

### Menu Page 1

The first menu item page of the XM Radio function lets you select the options for viewing the Radio ID, saving a channel preset, going to the last channel, or selecting preset channels 1 and 2. The last option takes you to the next pages of options for preset channels 3 through 15.



XM Radio Menu Page 1

### Radio ID

Each XM radio contains a unique ID that allows XM to communicate over the air with the radio. The owner must activate XM service by providing the Radio ID to XM to authorize the installed services for that radio. Activation information is included in a separate information package included with your unit.

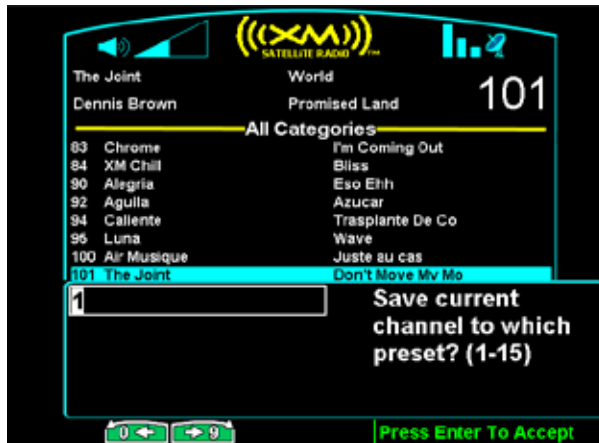


XM Data and Audio Radio ID shown at top of screen

1. In the XM radio function, press the **MENU/ENT** key.
2. Press the **Radio ID** key.
3. Information about the XM weather data services that are authorized for use by the installed radio are shown.

### Save Preset

The Save Preset menu item allows you to store the displayed channel into a selected preset position for easy later recall.



#### Saving XM Audio Radio Channel Presets

1. In the XM radio function, press the **MENU/ENT** key.
2. Press the **Save Preset** key.
3. Press the **↑** or **↓** arrow function smart keys to select the desired preset number.
4. Press the **MENU/ENT** key to save the channel into the selected preset number.

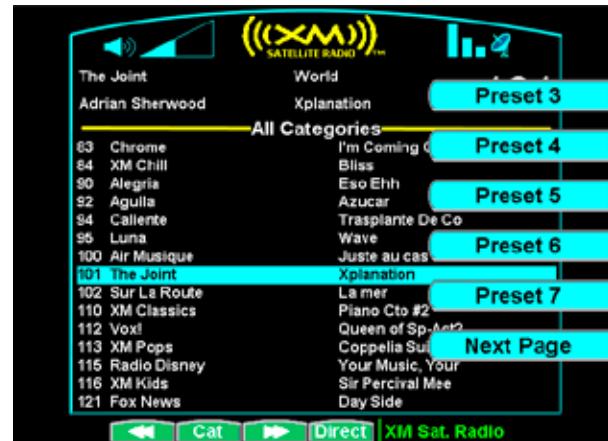
### Last Channel

The Last Channel menu item allows you to return to the last tuned channel.

1. In the XM radio function, press the **MENU/ENT** key.
2. Press the **Last Channel** key.
3. The last tuned channel in the XM Radio function will be selected.

### Menu Pages 2-4

The second, third, and fourth option pages list Presets 3 through 15. The last option of each page takes you to the next page of options. The last option on Menu page 4 of this function returns you to the Main Menu page.



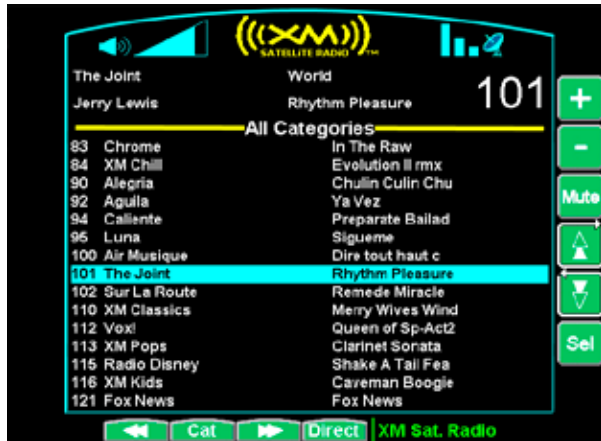
XM Audio Radio Menu Items (Page 2)

# Detailed Operation

## XM Satellite Radio

### Volume

The Volume control allows you to set the audio volume level, as well as mute the audio.



XM Audio Radio Volume Controls

1. In the XM radio function, press the **+** or **-** keys to increase or decrease the audio volume.

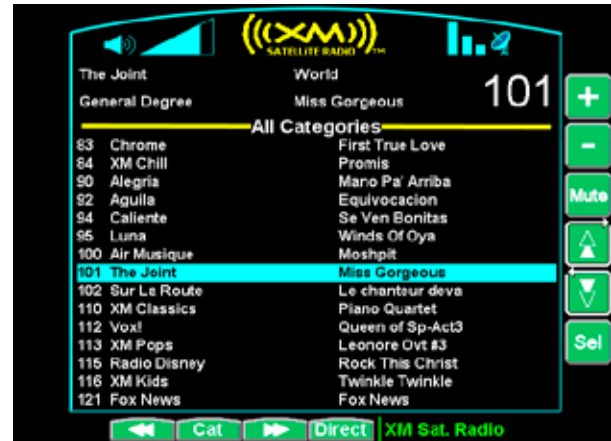
### Mute

1. In the XM radio function, press the **Mute** key to mute or un-mute the audio.

Note that the volume is muted when the GDL 69A is turned on.

### Channels

The Channel feature is used to navigate through the channels in the selected category.



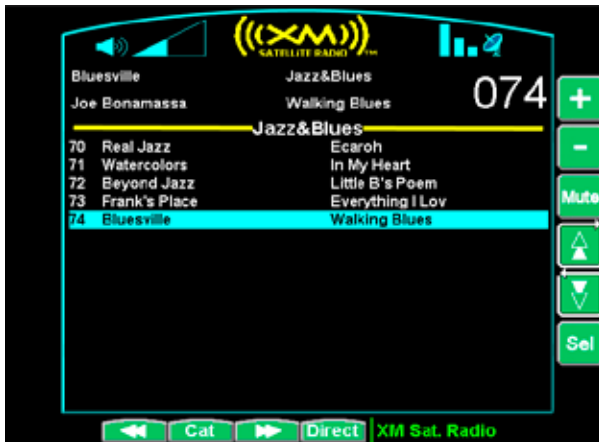
XM Audio Radio Channel Selection Controls

1. In the XM radio function, press the double **Λ** or **∨** keys to up or down through the available channels.
2. Press the **Sel** key to select the highlighted channel for listening.



### Categories

Categories of channels, such as Jazz, Rock, or News, can be selected to list the available channels for a type of music or other contents.



#### XM Audio Radio Categories

1. In the XM radio function, press the **Cat** function smart key on the bottom of the display to return to the Category currently playing.
2. Press the double arrow function keys to move through the available categories.
3. Press the **Sel** menu item key to select the highlighted category.
4. You can now use the Channel function to select a channel from the category list selected.

### Direct Access

Channels can be accessed directly by entering the channel number using the smart keys.



#### Direct Access of XM Audio Radio Channels

1. In XM mode, press the **Direct** function smart key. The number values will be shown above the function and to the left of the menu item smart keys.
2. Press the function and menu item keys for the three digit channel number. A leading "0" must be entered for channel numbers below "100."
3. Press **MENU/ENT**.

#### **Activating XM Satellite Radio Services**

Before audio entertainment can be used, the unit must be activated by XM Satellite Radio and services are subscribed to XM Satellite Radio. Please note that the GDL 69 is a weather data link. The GDL 69A is a weather data link and audio entertainment receiver.

1. Press the **FN** key and then the **XM** function key when displayed.
2. Press **MENU/ENT** to display the Radio ID menu item.
3. Press the **Radio** key to display the Radio IDs, Service Class, and Weather Products.
4. Follow the XM Satellite Radio Activation procedure and press **Accept** at the appropriate time.

#### **Gather Information**

Your GDL 69 or GDL 69A is shipped with one or two radio hardware identifications, respectively. These IDs serve as identification codes for your XM-equipped GDL 69/69A and are needed in the activation process. The ID(s) is attached to this instruction sheet and printed on a label on the back of the unit. The IDs can also be retrieved through the GMX 200 in the Radio ID page of the XM Satellite Radio function. Contact your dealer or customer service if you are unable to locate the radio hardware IDs.

#### **Contact XM Satellite Radio**

Weather and/or audio data from your GDL 69/69A are provided by XM Satellite Radio, a company separate and independent from Garmin Corporation. Have your radio hardware IDs ready before contacting XM Satellite Radio. During the process, you can select services for subscription. Keep in mind that the GDL 69 has no audio capability, audio services will not be available with the unit.

Follow the GDL 69/69A XM Satellite Radio Activation Instructions (190-00355-04) enclosed with your GDL 69/69A unit to activate the XM products.

**XM Advisory Messages**

<b>Message</b>	<b>Condition</b>	<b>Description</b>
Check Antenna	Antenna not connected	The XM antenna(s) or antenna cable are disconnected from the radio.
Updating	Updating encryption code	The encryption code has been changed over the air by XM and the radio has not received the newest code information yet from the XM signal.
No Signal	Loss of signal	The radio is not able to receive a strong enough XM signal to decode it.
Loading	Acquiring channel audio or information	Either the corresponding audio or text is temporarily unavailable for a given channel selected because the radio still has to receive and decode this information.
Off Air	Channel not in service	A valid XM channel number (and its corresponding service ID) is not broadcasting any programming.
--- or Channel ---	Channel no longer available	
---	Corresponding Artist Name/ Feature or Song/Program Title are empty	
--- or Channel ---	No channel available for the chosen category	

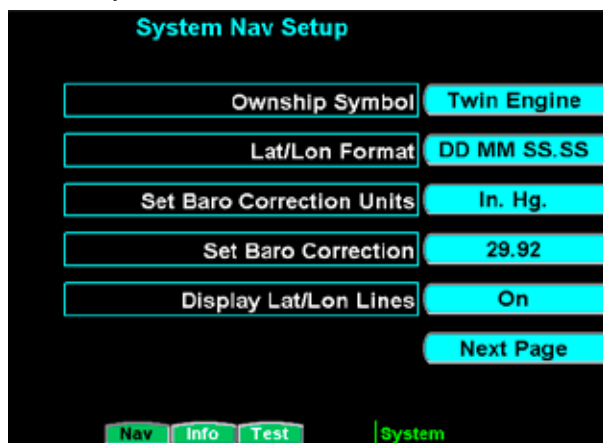
### System (SYS) Function

The System function allows you to set general Nav preferences, obtain version information, and perform tests on the operation of your GMX 200.

Press the **FN** key and then press the **SYS** key to reach the System functions.

#### **System Nav Pages**

Press the Nav function key, if necessary, to display the Nav System functions.



System Nav Setup Menu Items (Page 1)

#### **Ownship Symbol**

The Ownship Symbol option allows you to choose the type of icon that will represent your aircraft on the display. You can make selections of Single, Twin, Jet, or Helicopter .

#### **Lat/Lon Format**

The Lat/Lon format option allows you to select between two choices for the display of Lat/Lon coordinates. Choose between degrees-minutes-seconds-seconds decimals (DD MM SS.SS) or degrees-minutes-minutes decimals (DD MM.MM).

#### **Set Baro Correction Units (Pressure Altitude Source only)**

Baro-Correction (QNH) can now be entered in Millibars in addition to in. Hg.

#### **Set Baro Correction (Pressure Altitude Source only)**

You may enter the corrected barometric pressure so that the proper pressure altitude will be displayed.

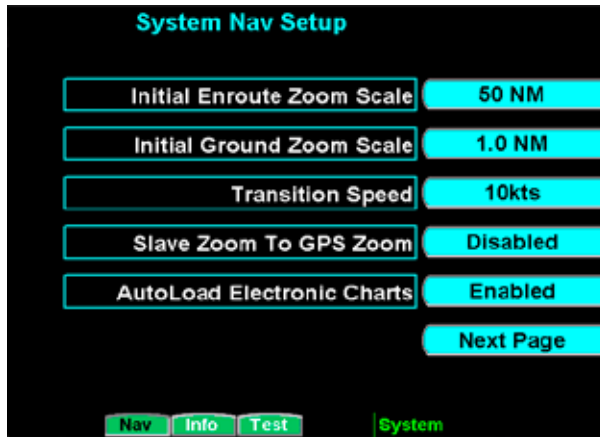
1. Press the **MENU ITEM** key for Set Baro Correction.
2. The Function "smart" keys at the bottom of the display will have direction arrows above them. Press the **UP/DOWN** arrow keys to change the value of the highlighted number. Press the **LEFT/RIGHT** arrow keys to move to another number.
3. Press **MENU/ENT** to save the changed values and leave the Set Baro Correction option.

#### **Display Latitude/Longitude Lines**

Use this option to choose to display or not display Lat/Lon lines on the map displays.

Press the **Next Page** key to display the next page of menu items.

## Initial En Route Zoom Scale, Initial Ground Zoom Scale, and Transition Speed



System Nav Setup Menu Items (Page 2)

A zoom scale auto-transition point is supported that helps to reduce the pilot workload by automating the selection of the zoom scale based on the phase of flight. The two transitions are:

- Ground-to-Air mode (Takeoff)
- Air-to-Ground mode (Landing)

When the aircraft transitions from Ground-to-Air, the zoom scale is automatically set to a user selected “en route” zoom scale. When the aircraft transitions from Air-to-Ground, the zoom scale is automatically set to a user selected “Ground” zoom scale. The transition point is based on a user selected Transition Speed and is based on GPS ground speed.

The Auto-Transition feature allows for optimal close-in viewing while on the ground and optimal long range viewing while in flight, without the user having to make manual zoom scale adjustments while in the takeoff and landing phases of flight. The Zoom scale is shown in the lower left corner of the display.

The En Route and Ground zoom scales and the transition point are adjusted under the SYS Function.

“Transition Speed” – 10-100 kts

“Initial En Route Zoom Scale” – Auto, 0.25 – 300 NM

“Initial Ground Zoom Scale” – 0.25 – 20 NM

The recommended settings for the initial zoom scales are Auto for the en route mode and 0.5 NM for the ground mode.

1. Press **FN** until you see the **SYS** function key.
2. Press the **SYS** function key.
3. With the “NAV” selection highlighted press **MENU/ENT**.
4. Press the **Next Page** key.
5. Press the Menu Item keys as needed to select the settings.

### Slave Zoom to GPS Zoom

This is only available when installed with a GPS navigator that supports the MapMX communication protocol (e.g., GNS 480 series). The communication protocol is selected during the installation configuration. Refer to the checklist for your installation to determine if the MapMX communication protocol has been selected. When enabled and the GMX 200 is in Auto Zoom mode, the GMX 200 will automatically set the zoom scale to that used on the GPS navigator. This feature must be disabled when the GPS navigator does not support the MapMX communication protocol.

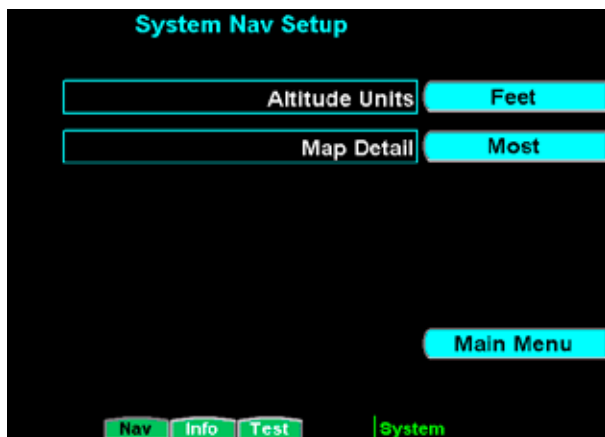
### AutoLoad Electronic Charts

This is only available when installed with a GPS navigator that supports the MapMX communication protocol (e.g., GNS 480 series). This feature must be disabled when the GMX 200 is connected to a GPS navigator that does not support the MapMX communication protocol. It allows the GPS navigator to instruct the GMX 200 to load a selected approach chart.

Press the **Next Page** key to display the next page of menu items.

### Altitude Units

Press the **Altitude Units** key to set the display of altitude in either feet or meters. Altitude units cannot be set to meters if a traffic source is installed.



System Nav Setup Menu Items (Page 3)

### Map Detail

Press the **Map Detail** key to toggle the choices for decluttering the map displays. In areas where there is a great number of information available, these selections will help you control the amount of displayed information at various zoom levels.

### System Info Pages

Press the **Info** function key, if necessary, to display the System Info pages. These pages show System Information, Port Status, Data Link Status, Additional Features, and Hardware status for your GMX 200 system. This information will be useful should you need to contact customer service. Press the key to the right of the menu label to reach the desired Info page.

### System Information

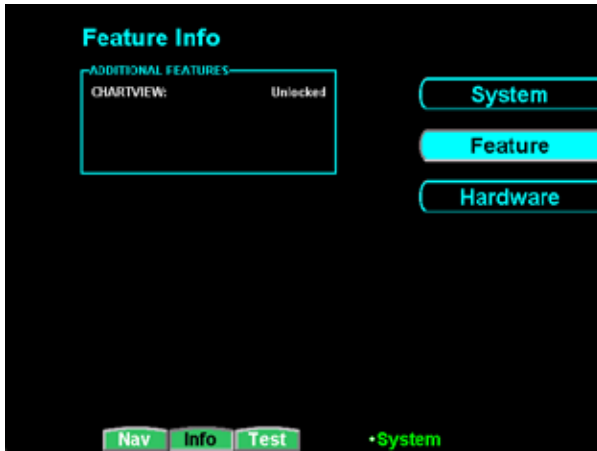
The System Information window shows the System ID and the Software and Hardware versions, as well as the installed Databases and their expiration dates or version.



System Info - System Page

### Feature Information

The Feature Info page shows the installed Additional Features and if they are unlocked for use.



System Info - Feature Page

### Hardware Information

The Hardware Info page shows the Port and Data Link Status.



System Info - Hardware Page

### Port Status

The Port Status window lists the status of each port including the connected device, if data is present, and

that the information is valid. When a GDL 90 UAT is connected, the NIC and NACP are displayed.

### Data Link Status

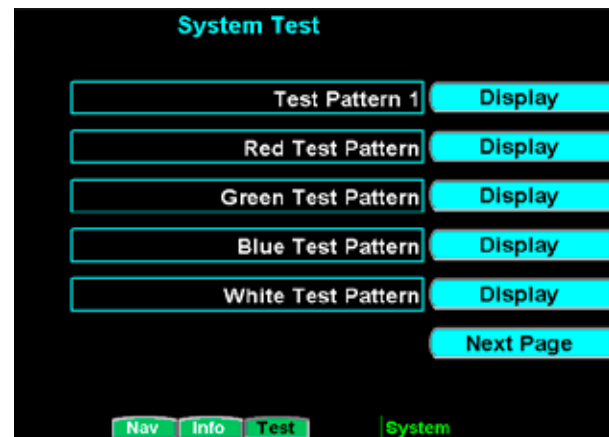
When the GMX 200 is connected to a GDL 90 UAT, the status of the link is displayed.

Data-link information is monitored as follows:

Name	Description
HB	Heart-Beat from the UAT data-link radio
ADS-B	ADS-B broadcast packets received
FIS TX	Textual weather data packets received
FIS WX	Graphical weather data packets received

### System Test Pages

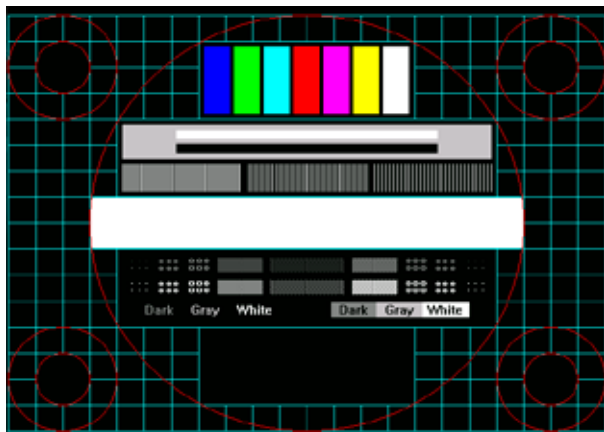
The System Test Page allows you to test the display of the GMX 200 to ensure proper operation. Press the menu item key next to the desired test to perform the test. Press the **MENU/ENT** key to return to the menu.



System Test Page 1 Menu Items

### Test Pattern 1

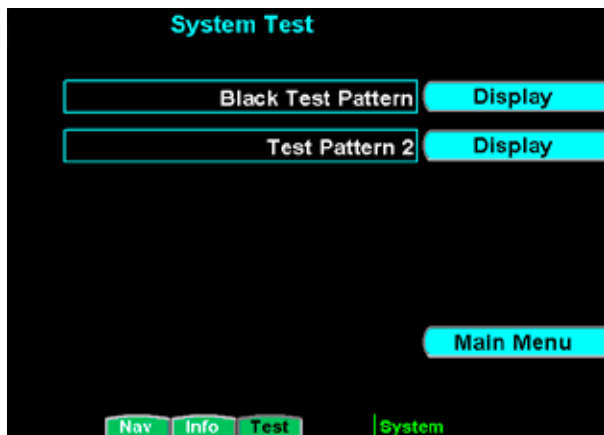
The Test Pattern option displays a number of patterns and colors to test the GMX 200 display. Use this option to verify proper operation of the display or when contacting Customer Service.



System Test Pattern 1

### Red, Green, Blue, White, and Black Test Patterns

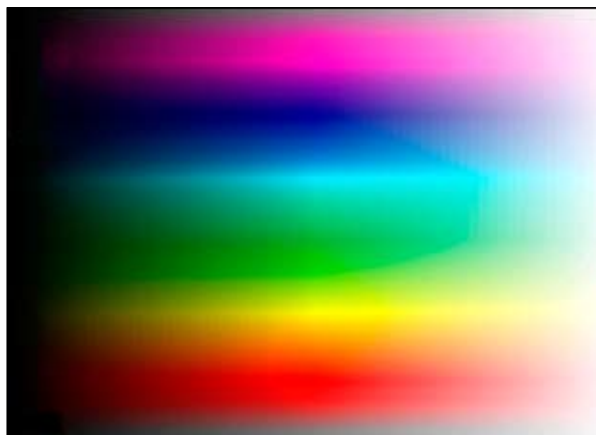
Choosing the Red, Green, Blue, White, or Black options floods the screen with the selected color. Use this option to verify proper operation of the display or when contacting Garmin Customer Service.



System Test Page 2 Menu Items

### Test Pattern 2

Test Pattern 2 shows the gamut of colors available on the GMX 200 display.



System Test Pattern 2



## Troubleshooting

This section contains information to troubleshoot the GMX 200 when improper operation is observed. The following table lists possible problems you could encounter. Examine the possible causes of the problem and take the action listed to correct the problem. If you cannot correct the problem, contact your dealer. If your dealer is unavailable, contact the Garmin factory at the address and phone number listed in the preceding section. Be sure to have the information from the System Info page and the data card available before you contact your dealer or the factory.

<b>Problem</b>	<b>Possible Cause</b>	<b>Action</b>
Unit does not power on or blank screen	Wiring problem	Check for proper wiring and connections. Check the fuse/circuit breaker
	Improper brightness setting Low temperature	Check the display brightness setting Allow the GMX 200 to heat up for approx. 60 seconds
	Data card	Make sure the data card is fully inserted
Unit fails during start up test	Data card	Make sure the data card is fully inserted
	System failure	Contact your dealer or the factory
POS data flag shows	Antenna or wiring	Check the antenna and wiring of your GPS navigator
	Position source wpt	Ensure that a waypoint is selected as the current destination and a Nav flag is not shown
	Position source serial data	Ensure that the serial data output is configured properly
	Interference	Have dealer/installer check for any interference sources
	Installation setup	Have dealer/installer check for proper GMX 200 setup
ALT (Altitude) flag	Serial altitude source	Ensure the serial altitude encoder is powered up and working properly Have dealer/installer check for proper installation and setup of the encoder If altitude data is provided by an Apollo GX product, ensure that the GPS position has been acquired and a waypoint is selected as the current destination

## Appendix Troubleshooting

Problem	Possible Cause	Action
RTE (Route) flag	Position source route	Ensure that the external position source has an active route engaged.
LT (Lightning) flag	WX500 installation	Have dealer/installer check for proper installation of the WX500.
TER (Terrain) flag	Altitude source	Have dealer/installer check for proper altitude input
No traffic display	ADS-B system installation	You must have the ADS-B system installed and configured. If you do have an ADS-B system, check the antennas and other components for proper operation. Have dealer/installer check for proper GMX 200 setup.
“Special Terrain” message	GMX 200 configuration	Must be set to normal.
TCAD flag	TCAD Installation	Ensure that the TCAD unit is installed and functional.
TAS flag	TAS Installation	Ensure that the TAS unit is installed and functional.
RDR (Amber) flag	Radar Installation	Ensure that the Radar unit is installed and functional.
LINK flag	FIS Sensor Installation	Ensure that the FIS unit is installed and functional.
XPDR flag	TIS-A Sensor Installation	Ensure that the TIS-A unit is installed and functional.
ADSB flag	GDL 90 is reporting that its internal GPS is not reporting a position or is reporting an invalid position. Note that ADS-B broadcasts do not include position reports when this flag is present.	Ensure the GDL 90 is installed and functional. Ensure the GDL 90 GPS antenna has a clear view of the sky to receive GPS signals.
IDENT (green) flag	This is not a problem. This flag appears when the GDL 90 is in the Ident mode.	None required.
Radar Alert flag	This is not a problem. This flag appears when a persistent Target Alert is active. Target and Radar Alerts are available only in the GWX 68.	None required.

See the Installation Manual for additional troubleshooting procedures.

## GDL 69/69A FIS Legends

The following legends describe the graphical information on the GDL 69/69A FIS displays.

AIRMET	
ICING	
TURBULENCE	
IFR	
MTN. OBSCR.	
SURFACE WINDS	
SIGMET	

AIRMET/SIGMET Legend

NEXRAD			
DBZ	RAIN	MIXED	SNOW
>55			
>50			
>45			
>40			
>30			
>20			
>10			

NEXRAD Legend



Cloud Tops Legend

CITY FORECAST	
SUNNY	SNOW
PARTLY SUNNY	WINDY
CLOUDY	FOGGY
RAINY	HAZE
T. STORM	

City Forecast Legend

METAR	
VFR	
MVFR	
IFR	
LIFR	

METAR Legend



Echo Tops Legend

COUNTY WARNINGS	
SEVERE THUNDERSTORM	
TORNADO	
FLOOD	

County Warnings Legend

FREEZING LEVELS	
2000 FT	12000 FT
4000 FT	14000 FT
6000 FT	16000 FT
8000 FT	18000 FT
10000 FT	20000 FT

Freezing Levels Legend



Winds Aloft Legend

## Sample GDL 69/69A FIS Displays

The following displays provide examples of information shown in the GDL 69/69A FIS function.



XM FIS METARs



XM FIS with NEXRAD Weather and Legend



XM FIS Echo Tops



XM FIS Radar Coverage



XM FIS City Forecast



XM FIS Winds Aloft

## Specifications

### **Physical Specifications**

Size: 6.27" W x 5.04" H x 8.0" D  
 (15.9 x 12.7 x 20.3 cm)

Weight: 4.30 lbs (1.95 kg) standard unit only  
 4.60 lbs (2.1 kg) I/O unit only  
 0.73 lbs (0.33 kg) mounting tube

Display: 6.5 in. diagonal (16.5 cm)  
 65,535-color display with backlighting (640 x 480 pixels)

### **Power**

14 VDC  
 GMX 200: 2.24 A Max

GMX 200 I/O: 2.45 A Max

28 VDC  
 GMX 200: 1.16 A Max

GMX 200 I/O: 1.32 A Max

### **Environmental**

Temp. Range: -4°F to 131°F  
 (-20°C to 55°C)  
 operating range

Humidity: 95% at 55°C

Altitude: 55,000 feet (continuous)

## **Care Information**

### **Cleaning the Unit**

Your GMX 200 has a durable display with specialized coatings. Reasonable care must be taken to maintain its performance and life. To remove stains, smudges, fingerprints, and so forth, we recommend these cleaning methods. If the first method fails to remove the problem, try the next method.

- Wipe with a clean, dry, non-abrasive fabric (for example, cotton or handi-wipes). Do NOT use paper products, such as paper towels or facial tissues.
- Blow on the area to condense moisture on the display and then wipe the area with the clean fabric.
- Moisten a clean fabric with a small amount of water and wipe the display area.
- Apply a small amount of glass cleaner (without ammonia) to the fabric and wipe the area.
- Apply a small amount of isopropyl alcohol and wipe the area (this is your last resort).

### **Contacting the Factory**

If efforts to resolve the problem fail, contact your dealer or the factory for technical assistance. The Garmin customer service staff will gladly assist you.

Garmin International, Inc.  
Customer Service Department  
1200 East 151st Street  
Olathe, KS 66062-3426 USA  
(913) 397-8200  
FAX (913) 397-8282

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

## Glossary

**Accuracy**— Estimated position accuracy in feet or meters.

**Advisories and Alerts** — all alerting on the GMX 200 is advisory in nature only. Any alerting must be accompanied by visual acquisition of the traffic or terrain and no aircraft maneuvering is allowed based upon data presented by the GMX 200.

**Altitude**—Height above mean sea level (MSL).

**Back Course** — Localizer backcourse approach where the signal on the “back” side of the localizer is used for alignment to the runway opposite of normal localizer alignment. Without compensation the CDI would reverse sense.

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

**Coasting** — With regard to TIS, coasting indicates that a radar sweep was missed and displayed data is not the latest.

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

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

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

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

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

**FliteChart** — The feature provides the capability to view Garmin electronic charts. Depending on the charts available in the database, the following chart types may be viewed: Approach charts, airport surface charts, SIDS, STARS, Airspace Charts alternate minimums, and take-off minimums.

**Geo-Referenced** — a proper relationship is established between displayed information and real-world coordinates. For instance, the ChartView charts are geo-referenced because they are correctly oriented on the map display in relationship to actual coordinates.

**Ownship** — Your aircraft. A variety of symbols are available to represent your aircraft on the display.

**SafeTaxi** — The Garmin SafeTaxi airport diagrams help pilots navigate unfamiliar airports with confidence. Over 650 U.S. airport diagrams come pre-loaded on the unit. The charts identify runways, taxiways, and hangars, as well as the aircraft’s location on the field.

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

**Time** —The time for the selected time zone.

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

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

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

## Abbreviations

The following is a list of abbreviations and acronyms used on the GMX 200 and their meanings:

<b>ABV</b> —	Above	<b>ENR</b> —	En Route
<b>ADS-B</b> —	Automatic Dependent Surveillance - Broadcast	<b>ETP</b> —	Echo Tops
<b>ALT</b> —	Altitude	<b>EULA</b> —	End User License Agreement
<b>ARTCC</b> —	Air Route Traffic Control Center	<b>°F</b> —	Degrees Fahrenheit
<b>ARWY</b> —	Airway	<b>FID</b> —	Flight Identification
<b>ATC</b> —	Air Traffic Control	<b>FIS</b> —	Flight Information System
<b>BARO</b> —	Barometric Pressure	<b>FISDL</b> —	Flight Information System Data Link
<b>BRG</b> —	Bearing To	<b>FN</b> —	Function
<b>BLW</b> —	Below	<b>FP, FPL</b> —	Flight Plan
<b>°C</b> —	Degrees Celsius	<b>ft</b> —	Feet
<b>CCW</b> —	Counter-Clockwise	<b>GBT</b> —	Ground Based Transceiver
<b>CDI</b> —	Course Deviation Indicator	<b>GM</b> —	Greenwich Mean Time
<b>CHART</b> —	ChartView	<b>GND</b> —	Ground
<b>Crnt</b> —	Current	<b>GPS</b> —	Global Positioning System
<b>CW</b> —	Clockwise	<b>GS</b> —	Ground Speed
<b>dB</b> —	Decibel	<b>hg</b> —	Inches of Mercury
<b>dBZ</b> —	Decibel of Reflectivity	<b>ICAO</b> —	International Civil Aviation Organization
<b>DIS, DIST</b> —	Distance	<b>ID, IDENT</b> —	Identifier
<b>DTK</b> —	Desired Track	<b>IFR</b> —	Instrument Flight Rules
		<b>ILS</b> —	Instrument Landing System
		<b>INFO</b> —	Information



<b>kg</b> —	Kilograms	<b>NEXRAD</b> —	Next Generation RADAR
<b>kHz</b> —	Kilohertz	<b>NM</b> —	Nautical Miles
<b>km</b> —	Kilometers	<b>NOTAM</b> —	Notice to Airmen
<b>kph</b> —	Kilometers Per Hour	<b>NRM</b> —	Normal
<b>kt</b> —	Knots	<b>OBS</b> —	Omnibearing Selector
<b>LAT/LON</b> —	Latitude/Longitude	<b>OS</b> —	Off Scale
<b>lb</b> —	Pounds	<b>OVRL</b> —	Overlay
<b>LINK</b> —	Data Link	<b>POS</b> —	Position
<b>LT</b> —	Lightning	<b>RD, RDR</b> —	RADAR
<b>°M</b> —	Degrees Magnetic	<b>RTE</b> —	Route
<b>m</b> —	Meters	<b>SCTR</b> —	Sector
<b>mb</b> —	Millibars (of Pressure)	<b>SIDS</b> —	Standard Instrument Departures
<b>METAR</b> —	Meteorological Aviation Report	<b>SIGMET</b> —	Significant Meteorological Information
<b>MHz</b> —	Megahertz	<b>STAB</b> —	Stabilization
<b>mi</b> —	Statute Miles	<b>STARS</b> —	Standard Terminal Arrival Route
<b>MOA</b> —	Military Operations Area	<b>STBY</b> —	Standby
<b>MON</b> —	Monitor	<b>SYS</b> —	System
<b>mph</b> —	Statute Miles Per Hour	<b>TAF</b> —	Terminal Aerodrome Forecast
<b>MSG</b> —	Message	<b>TAS</b> —	Traffic Advisory System
<b>MSL</b> —	Mean Sea Level		
<b>NAV</b> —	Navigation		
<b>NAVAID</b> —	Navigational Aid		
<b>NDB</b> —	Non-Directional Radio Beacon		

## Appendix

### Abbreviations

<b>TAWS</b>	—	Terrain Awareness and Warning System
<b>TCAD</b>	—	Traffic/Collision Avoidance Device
<b>TCAS</b>	—	Traffic Alert/Collision Avoidance System
<b>TER</b>	—	Terrain
<b>TFR</b>	—	Temporary Flight Rules
<b>TIS-A</b>	—	Traffic Information Services - Addressed
<b>TIS-B</b>	—	Traffic Information Service - Broadcast
<b>TRAF</b>	—	Traffic
<b>TRANS</b>	—	Transmit
<b>TRK</b>	—	Track (also Ground Track)
<b>UAT</b>	—	Universal Access Transceiver
<b>UNR</b>	—	Unrestricted
<b>VFR</b>	—	Visual Flight Rules
<b>VOL</b>	—	Volume
<b>VOR</b>	—	VHF Omnidirectional Radio Range
<b>WB</b>	—	Warning Boxes
<b>WX</b>	—	Weather
<b>XPDR</b>	—	Transponder

## License and Registration Information

### Serial Number

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

The serial number is located on the back of the unit.

### Serial Number:

--	--	--	--	--	--	--	--

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

## Contacting the Factory

If the GMX 200 unit fails to operate despite troubleshooting efforts, contact Garmin Technical Support for assistance.

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

Phone: (913) 397-8200

FAX: (913) 397-8282

<http://www.garmin.com>

Be prepared to offer the following information about the installation:

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

## Software License Agreement

BY USING THE GMX 200, YOU AGREE TO BE BOUND BY THE TERMS AND CONDITIONS OF THE FOLLOWING SOFTWARE LICENSE AGREEMENT. PLEASE READ THIS AGREEMENT CAREFULLY.

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

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

## Product Registration and Support

Help us better support you by completing your online registration today! Have the serial number of your GMX 200 handy and connect to the Garmin Web site ([www.garmin.com](http://www.garmin.com)). Look for the Product Registration link on the home page. Also, be sure to record your serial number in the space provided to the left.

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

## Limited Warranty

This Garmin product is warranted to be free from defects in materials or workmanship for 24 months from the date of purchase. Within this period, Garmin will at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost. This warranty does not cover failures due to abuse, misuse, accident or unauthorized alteration or repairs.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED OR STATUTORY, INCLUDING ANY LIABILITY ARISING UNDER ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUTORY OR OTHERWISE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, WHICH MAY VARY FROM STATE TO STATE.

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

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