

G1000[™]

Optional Equipment Pilot's Guide

Record of Revisions

Revision	Date of Revision	Revision Page Range	Description
A	12/08/04	8B-1 - 8B-43	Initial release.
B	01/21/05	8B-1 - 8B-43	<ol style="list-style-type: none"> 1. Changed document title to "Optional Equipment Addendum" from "Optional Interface Addendum". 2. Changed all references throughout the Addendum from "interfaces" to "equipment". 3. Added a note on page 8B-1 informing the user that this Addendum is generic, not specific to any OEM airframe. 4. Changed part numbers throughout the document to Rev. "B". 5. Added text to note on page 8B-3. 6. Added lightning age chart on page 8B-3.
C	05/16/05	All	<p>Changed document title to "Optional Equipment Pilot's Guide". Changed pagination format. Changed Figure numbering format. Added operational differences between SKYWATCH and KTA 870. Clarified Traffic Section. Changed Winds Aloft timeout value from 60 to 90 seconds. Edited GDL 69A Section. Added XM Radio Lock Activation information. Added Figure 11.4.15, Lock Activation Window. Used color Warning and Caution symbols throughout document. Updated Figure 11.2.5.</p>
D	7/12/05	All	<p>Revised Stormscope and GDL 69/69A Sections. General editing throughout.</p>

11.1 INTRODUCTION

The G1000 provides the display and control interface for the following optional weather and audio entertainment systems:

- L-3 STORMSCOPE® WX-500 Series II Weather Mapping Sensor
- L-3 SKYWATCH® Traffic Advisory System (Model SKY497)
- L-3 SKYWATCH® HP Traffic Advisory System (Model SKY899)
- Honeywell® KTA870 TAS/KMH880 Multi-Hazard Awareness System
- Ryan TCAD 9900B and 9900BX
- GDL 69/69A XM® Radio System



WARNING: Do not use any G1000 Weather Data for thunderstorm penetration. Weather Data is approved only for weather avoidance, not penetration.



CAUTION: NEXRAD weather data is to be used for long-range planning purposes only. Due to inherent delays and relative age of the data that can be experienced, NEXRAD weather data should not be used for short-range avoidance of weather.



NOTE: The information contained in this Pilot's Guide must be supplemented with detailed information contained in the G1000 Multi Function Display Operation Section. This section assumes the user has experience operating the G1000 MFD and is also familiar with the applicable optional equipment User's Guide.

This Pilot's Guide is divided into four sections: Section 11.1 - Introduction, Section 11.2 - Stormscope, Section 11.3 - TAS, and Section 11.4 - GDL 69/69A.

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11.2 STORMSCOPE INTERFACE



NOTE: Refer to the WX-500 User's Guide for a detailed description of Stormscope operation.

DISPLAYING STORMSCOPE LIGHTNING DATA ON THE NAVIGATION MAP PAGE



NOTE: The Stormscope has to be receiving valid heading information in order for Stormscope lightning data to be displayed on the G1000.



NOTE: If heading is lost, strikes and/or cells must be cleared manually after the execution of each turn. This is to ensure that the strike and/or cell positions are displayed accurately in relation to the node of the aircraft.

The Navigation Map Page (Figure 11.2.1) displays cell or strike data using the yellow lightning strike symbology shown in Table 11.2.1.

Lightning Age	Symbol
Strike is less than 6 seconds old	
Strike is between 6 and 60 seconds old	
Strike is between 1 and 2 minutes old	
Strike is between 2 and 3 minutes old	

Table 11.2.1 Lightning Age and Symbols

To display Stormscope Lightning Data on the Navigation Map Page:

1. Press the **MAP** softkey. Press the **STRMSCP** softkey (pressing the **STRMSCP** softkey again removes Stormscope Lightning Data from the Navigation Map Page).

In normal operation, the mode and rate are displayed in the top right corner of the Navigation Map Page. The mode is described by the word 'STRIKE' when in strike mode, or 'CELL' when in cell mode.



NOTE: "Cell mode" uses a clustering "program" to identify clusters of electrical activity that indicate cells. Cell mode is most useful during periods of heavy storm activity. Displaying cell data during these periods frees the pilot from sifting through a screen full of discharge points and helps to better determine where the storm cells are located.

Stormscope Lightning Data Display Range

Stormscope lightning data can be displayed up to 2000 nm zoom range (north up) on the Navigation Map Page. **In the 'track up' mode there is a portion of Stormscope lightning data that could be behind the aircraft which cannot be seen at this range.** Since the range of the Stormscope is 200 nm (in front) in addition to another 200 nm (behind) (400 nm diameter total), the 500 nm range (in north up mode) shows all the data.

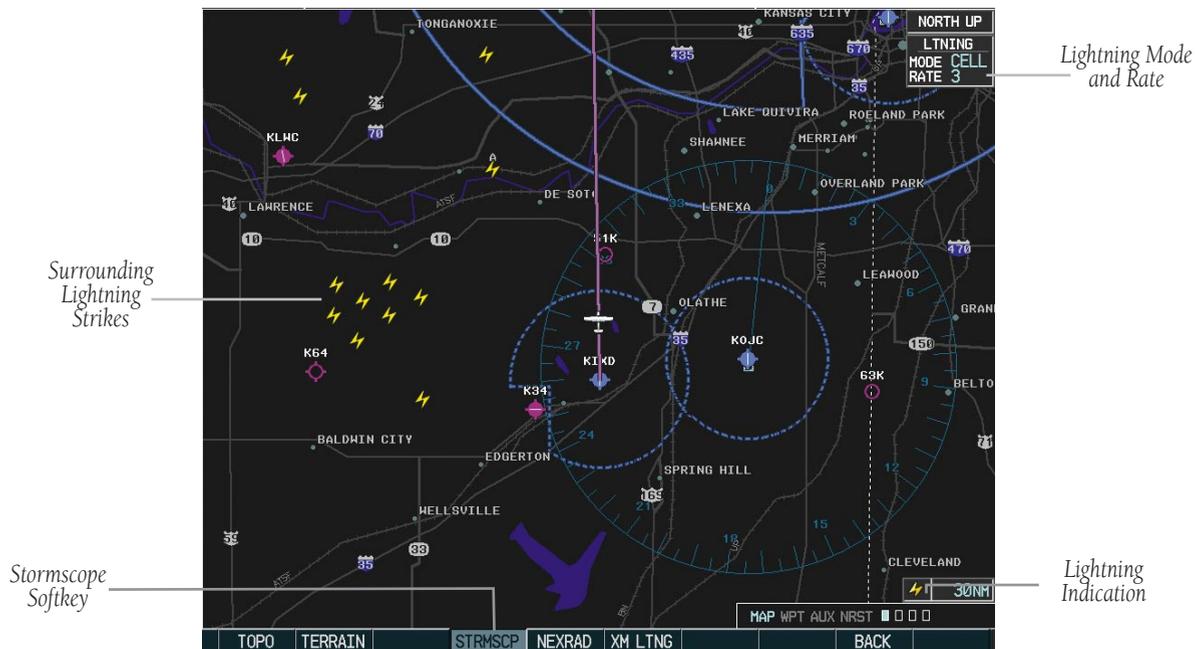


Figure 11.2.1 Navigation Map Page Displaying Stormscope Lightning Data

To change the display range on the Navigation Map Page, turn the joystick clockwise to zoom out or turn the joystick counter-clockwise to zoom in.



NOTE: At a map range of less than 25 nm, Stormscope lightning data is not displayed but can still be present. The presence of Stormscope lightning data is indicated by the annunciation in the upper right hand corner 'LTNG < 25 nm' (Figure 11.2.2).



Figure 11.2.2 Lightning Display Range Annunciation

Customized Display

The pilot can customize the display of Stormscope lightning data on the Navigation Map Page using the Weather Group Options in the Map Setup Menu (Figure 11.2.3).

To display the Weather Group Options:

1. With the Navigation Map Page displayed, press the **MENU** key to display the Navigation Map Setup Menu. The cursor flashes on the 'Map Setup' option.
2. Press the **ENT** key. The Map Setup Menu is displayed. Turn the **small FMS** knob to select the 'Weather' group.

To turn Stormscope Lightning Data on or off:

1. With the Weather Group selected, press the **ENT** key. The cursor flashes on 'STRMSCP LTNG'.

2. Turn the **FMS** knob to display the 'On/Off' window.
3. Turn the **FMS** knob to select 'On' or 'Off' and press the **ENT** key.
4. Press the **FMS** knob to return to the Navigation Map Page.

To select 'cell' or 'strike' as the Stormscope lightning mode:

1. With the Weather Group selected, press the **ENT** key. The cursor flashes on 'STRMSCP LTNG'.
2. Turn the **large FMS** knob to select 'STRMSCP MODE'.
3. Turn the **FMS** knob to display the 'Cell/Strike' window.
4. Turn the **FMS** knob to select 'Cell' or 'Strike'. Press the **ENT** key.
5. Push the **FMS** knob to return to the Navigation Map Page.



Figure 11.2.3 Weather Group Map Setup Menu

To select a Stormscope lightning symbol zoom range:

1. With the Weather Group selected, press the **ENT** key. The cursor flashes on 'STRMSCP LTNG.
2. Turn the **large FMS** knob to select 'STRMSCP SMBL'.
3. Turn the **small FMS** knob to display the range window.
4. Turn the **FMS** knob to select the desired range and press the **ENT** key.
5. Push the **FMS** knob to return to the Navigation Map Page.

Clearing Stormscope Lightning Data Using the Navigation Map Page Options Menu (Figure 11.2.4)

Stormscope data can be cleared from the Navigation Map Page by using the third Navigation Map Page Menu option, 'Clear Lightning Data'.



NOTE: Periodically clearing Stormscope lightning data while monitoring thunderstorms is a good way to determine if a storm is building or dissipating. Stormscope lightning data in a building storm will reappear faster and in larger numbers. Stormscope lightning data in a dissipating storm will appear slower and in smaller numbers.

To remove Stormscope lightning data from the Navigation Map Page:

1. Press the **MENU** key with the Navigation Map Page displayed.
2. Turn the **FMS** knob to highlight 'Clear Lightning Data' and press the **ENT** key.

STORMSCOPE PAGE

Stormscope lightning data is displayed on the Stormscope Page in addition to the Navigation Map Page.

To select the Stormscope Page:

1. Turn the **large FMS** knob until the Map Page group is selected.
2. Turn the **small FMS** knob until the Stormscope Page is selected (Figure 11.2.5).

Stormscope Page Operations

The following Stormscope Page operations are available using softkeys or page menu options:

- Changing the display range
- Changing the lightning mode between cell and strike
- Changing the viewing mode between 360° and 120° ARC
- Clearing Stormscope lightning data

To change the display range:

To change the display range on the Stormscope Page, turn the **joystick** clockwise to zoom out or turn the **joystick** counter-clockwise to zoom in. Display ranges are 25 nm, (25 and 50) nm, (50 and 100) nm, and (100 and 200) nm.



Figure 11.2.4 Navigation Map Page Options Menu

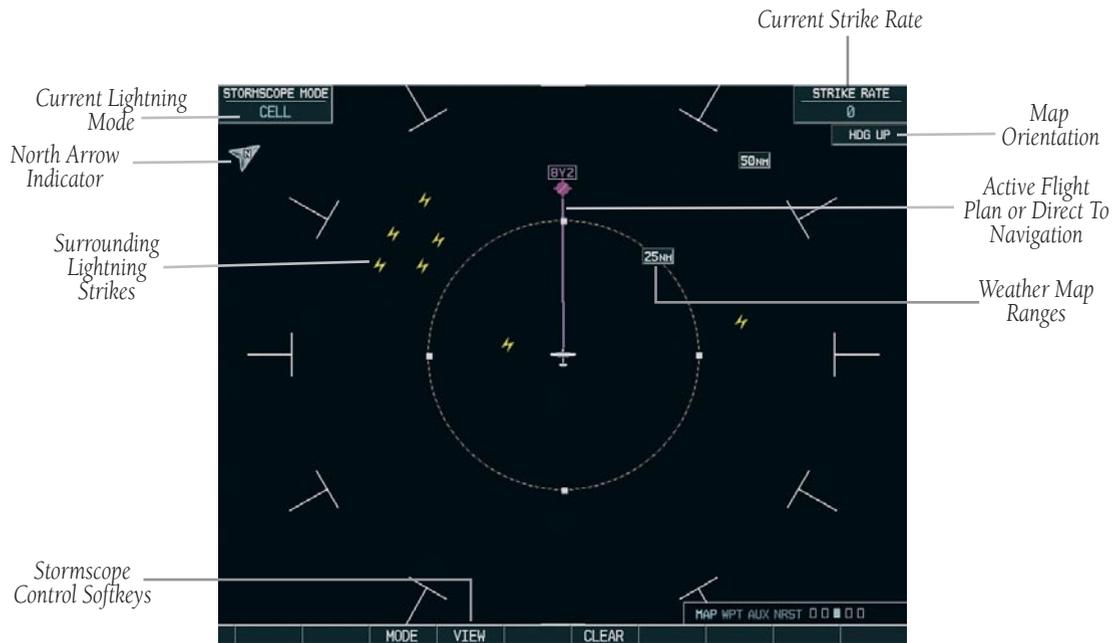


Figure 11.2.5 Stormscope Page

To change the Stormscope lightning mode between 'cell' and 'strike':

1. Select the Stormscope Page.
2. Press the **MODE** softkey. The **CELL** and **STRIKE** softkeys are displayed. Press the **CELL** softkey to display 'CELL' data or press the **STRIKE** softkey to display 'STRIKE' data. 'CELL' or 'STRIKE' is displayed in the mode box located in the upper left corner of the Stormscope Page

OR:

3. Press the **MENU** key. The page menu is displayed with 'Strike Mode' or 'Cell Mode' highlighted (Figure 11.2.6). Press the **ENT** key on the desired selection.

To change the viewing mode between 360° and 120°:

1. Select the Stormscope Page.
2. Press the **VIEW** softkey. The **360** and **ARC** softkeys are displayed. Press the **360** softkey to display a 360° viewing area or press the **ARC** softkey to display a 120° viewing area

OR:

3. Press the **MENU** key. The page menu is displayed. Turn the **FMS** knob to select the desired view. Press the **ENT** key on the desired selection.

To clear Stormscope lightning data from the display:

1. Press the **CLEAR** softkey to remove all Stormscope lightning data from the display
- OR: Press the **MENU** key. Select 'Clear Lightning Data' and press the **ENT** key.

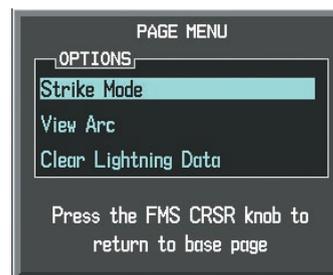


Figure 11.2.6 Stormscope Page Options Menu

11.3 TRAFFIC ADVISORY SYSTEMS



NOTE: This addendum assumes the user has experience operating the G1000 Multi Function Display and is familiar with the G1000 MFD Pilot's Guide and the applicable Traffic System Pilot's Guide.



NOTE: This section describes the G1000 for TAS only. The G1000 Multi Function Display Pilot's Guide describes the standard TIS interface.

INTRODUCTION

The G1000 provides an optional display interface for the following Traffic Advisory Systems:

- L-3 SKYWATCH Traffic Advisory System (Model SKY497)
- L-3 SKYWATCH HP Traffic Advisory System (Model SKY899)
- Bendix/King KTA870 TAS/KMH880 Multi-Hazard Awareness System
- Ryan 9900B and 9900BX TAS Systems

Displaying and Configuring TAS Traffic on the Navigation Map Page

The display of TAS traffic on the Navigation Map Page is designed to closely resemble the display symbology used on the SKYWATCH. **TAS Traffic is only displayed on the Navigation Map Page if aircraft heading data is available.** When heading is not available, Traffic Advisories are displayed as non-bearing banners on the Navigation Map Page.

To display TAS traffic on the Navigation Map Page:

Select the Navigation Map Page, press the **MAP** softkey, then press the **TRAFFIC** softkey

To configure TAS traffic on the Navigation Map Page:

1. Select the Navigation Map Page.
2. Press **MENU** to display the Page Menu. Turn the small right knob to select 'Map Setup' and press the **ENT** key.
3. The flashing cursor highlights the 'GROUP' field. Turn the **small FMS** knob to select Traffic and press ENT.
4. Turn the **large FMS** knob to select the desired Traffic Mode option. Turn the **small FMS** knob to select the desired option and press the **ENT** key. Repeat the step for Traffic Symbol and Traffic Label.
5. Return to the Map Page by pressing the **FMS** knob or momentarily pressing and holding the **CLR** key.

Traffic mode allows the pilot to choose which traffic is displayed (all traffic, traffic and proximity advisories, or traffic advisories only). The traffic symbol is the symbol used to depict the type of traffic (the G1000 and L-3 use the same symbology):

- Traffic Advisories (TA)—Solid Yellow Circles
- Proximity Advisories (PA)—Solid White Diamonds
- Other—Hollow White Diamonds

Proximity Advisories (PA) are displayed as solid white diamonds (SKYWATCH shows these PAs as hollow diamonds since the SKYWATCH display is monochrome). PAs are defined as traffic within the 5.0-nm range, within ± 1200 ft. of altitude separation, and are not a traffic advisory (TA).

Traffic Map Page (Figure 11.3.1)

The Traffic Map Page controls the source of traffic data on the Navigation Map Page. **NOTE: When the G1000 is configured for TAS, the system only receives TAS traffic. Otherwise, if TAS is not configured, the system provides TIS traffic data.**

To select the Traffic Map Page:

1. Turn the **large FMS** knob until the Map Page group is selected.
2. Turn the **small FMS** knob until the Traffic Map page is selected.

Monitoring Traffic

See the information in the SKYWATCH Pilot's Guide regarding monitoring traffic on the display and the corresponding actions to take.

Failure Response

Errors indicated by a FAILED screen prevent continued use of the TAS interface. See the applicable Pilot's Guide for detailed information on Failure Response.

Description of Traffic Advisory Criteria

For a description of Traffic Advisory criteria and display interpretation see the applicable TAS Pilot's Guide.

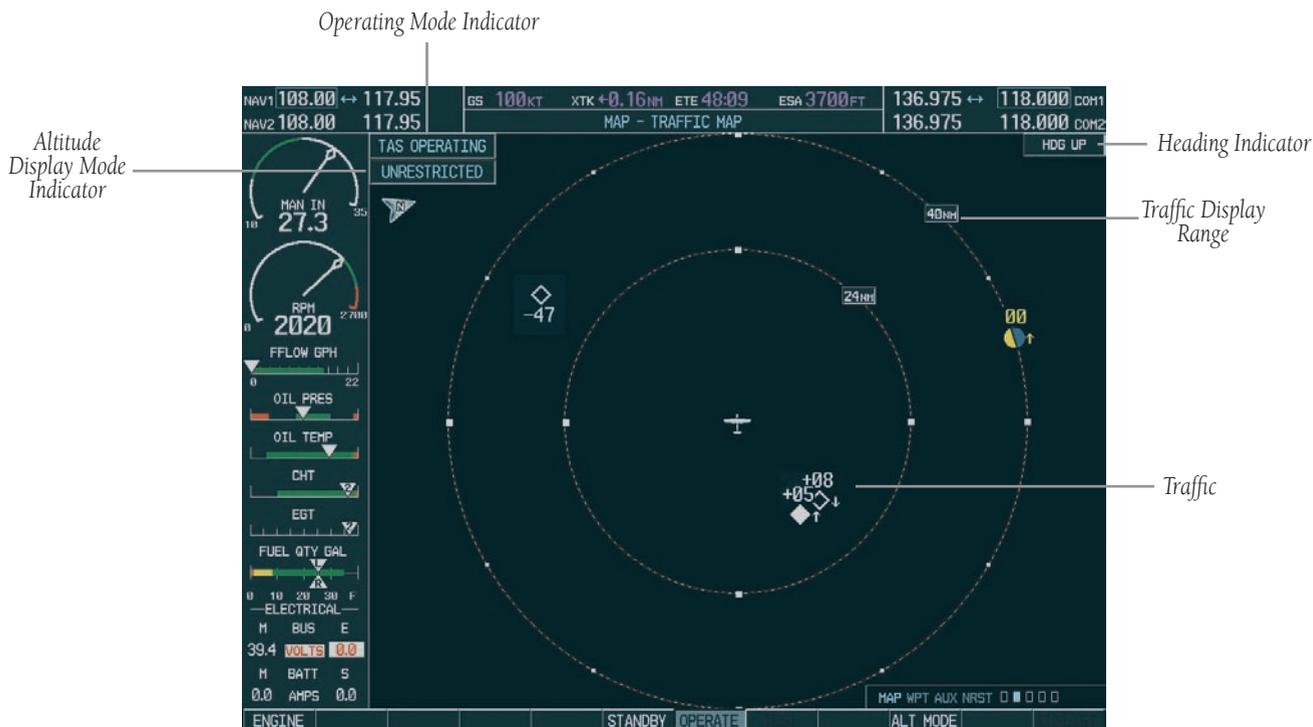


Figure 11.3.1 Traffic Map Page

L-3 SKYWATCH TRAFFIC ADVISORY SYSTEMS (SKY497 AND SKY899)



NOTE: Refer to the *SKYWATCH User's Guide* for a detailed description of Skywatch operation.

Power-up Self-Test

Check for the following test criteria on the Traffic Map Page during power-up:

1. If the SKYWATCH passes the power-up test and is on the ground, the Standby Screen is displayed.
2. If the SKYWATCH passes the power-up test and your aircraft is airborne, the Traffic Map Page is displayed on the last map range used display range and in the unrestricted altitude display mode.
3. If the SKYWATCH continues to fail, refer to the failure response section in the SKYWATCH Pilot's Guide on actions to take.

In addition to the power-up test, the SKYWATCH performs a continuous self-test. This continuous self-test is performed several times per minute.

To begin tracking intruder aircraft:

Press the **OPERATE** softkey.

Switching Between Standby and Various Operating Modes

The unit must be in operating mode for traffic to be displayed. The ability to switch out of standby into operating mode on the ground is especially useful for scanning the airspace around the airport before takeoff.

To switch into Operating Mode from Standby Mode:

1. Press the **OPERATE** softkey or menu 'Operating Mode'.
2. If 'Operating Mode' is selected from the FMS menu, press the **ENT** key to confirm and place the SKYWATCH in operating mode.

To switch into Standby Mode from the Traffic Page:

Press the **STANDBY** softkey.

Altitude Display Mode

To change the Altitude Display Mode:

1. Press the **ALT MODE** softkey then press one of the following options: BELOW, NORMAL, ABOVE, UNREST.

With each selection, the screen changes to display the traffic detected within the selected altitude display range. The G1000 screen also displays unrestricted traffic (UNREST) having a range of maximum specified by the SKYWATCH Pilot's Guide. Refer to the SKYWATCH Pilot's Guide for information regarding altitude display ranges. Note that confirmation is not required. The mode is changed immediately when selected.

Traffic Map Page Display Range

The pilot can change the display range on the Traffic Map Page at any time.

To change the display range on the Traffic Page:

1. Turn the **RNG** knob to zoom through the following range options:
 - SKYWATCH (SKY 497)—2 nm, 2 and 6 nm, 6 and 12 nm.
 - SKYWATCH HP (SKY 899)—2 nm, 2 and 6 nm, 6 and 12 nm, 12 and 24 nm.

Skywatch Voice Announcements

See the SKYWATCH Pilot's Guide for information on voice announcements.

BENDIX/KING KTA 870/KMH 880



NOTE: Refer to the *KTA 870/KMH 880 Pilot's Guide* for a detailed description of BK product operation.

User-Initiated Test



NOTE: A user initiated test can only be performed when the system is in standby or failed mode.

To perform a user-initiated test:

1. Press the **TEST** softkey or use the menu to select 'Test Mode'. Self-test is best accomplished with the range set to 2 and 6 nm, and will last approximately 8 seconds. The following is displayed when a user-initiated test is performed:
 - A Traffic Advisory (yellow circle) appears at 9 o'clock, range of 2 miles, 200 feet below and climbing.

- Proximity Traffic (solid white diamond) appears at 1 o'clock, range 3.6 miles, 1000 feet below, descending.
- Non-Threat traffic (open white diamond) appears at 11 o'clock, range of 3.6 miles, flying level 1000 feet above.

If the KTA 870/KMH 880 successfully completes self-test, a synthesized voice announces: "TAS SYSTEM OK". The unit should switch to OPERATE mode at the completion of the test. Should a failure be detected during self-test, the audio message says: "TAS SYSTEM FAIL". The unit should revert back to STANDBY mode if a self-test failure is detected.

KTA 870/KMH 880 Voice Announcements

See the KTA 870/KMH 880 Pilot's Guide for information on voice announcements.

To begin tracking intruder aircraft:

Press the **OPERATE** softkey.

Switching Between Standby and Various Operating Modes

The unit must be in operating mode for traffic to be displayed. The ability to switch out of standby into operating mode on the ground is especially useful for scanning the airspace around the airport before takeoff.

To switch into Operating Mode from Standby Mode:

1. Press the **OPERATE** softkey or menu 'Operating Mode'.
2. If 'Operating Mode' is selected from the FMS menu, press the **ENT** key to confirm and place the KTA 870/KMH 880 in operating mode.

To switch into Standby Mode from the Traffic Page:

Press the **STANDBY** softkey.

Altitude Display Mode

To change the Altitude Display Mode:

1. Press the **ALT MODE** softkey then press one of the following options: BELOW, NORMAL, ABOVE, UNREST.

With each selection, the screen changes to display the traffic detected within the selected altitude display range. The G1000 screen also displays unrestricted traffic (UNREST) having a range of maximum specified by the KTA 870/KMH 880 Pilot's Guide. Refer to the KTA 870/KMH 880 Pilot's Guide for information regarding altitude display ranges. Note that confirmation is not required. The mode is changed immediately when selected.

Traffic Map Page Display Range

The pilot can change the display range on the Traffic Map Page at any time.

To change the display range on the Traffic Page:

1. Turn the **RNG** knob to zoom through the following range options:
 - Bendix/King KTA 870/KMH 880—2 nm, 2 and 6 nm, 6 and 12 nm, 12 and 24 nm, and 24 and 40 nm.

RYAN 9900BX

The Ryan 9900BX functions the same as SKYWATCH HP (SKY 899) except for a user-initiated test mode. See the Ryan 9900 Pilot's Guide for more information.



Figure 11.3.2 Traffic Map Page (KTA 870 Test Mode)

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11.4 GARMIN GDL 69/69A OPTIONAL INTERFACE

INTRODUCTION

The Garmin GDL 69/69A receiver interfaces with the G1000 to bring XM Weather and XM Digital Audio Entertainment to the cockpit. XM Weather and XM Radio operate in the S-band frequency range to provide continuous uplink capabilities at any altitude throughout North America.



IMPORTANT: Before the GDL 69/69A can be used, it has to be activated by XM Satellite Radio. The GDL 69/69A XM Satellite Radio Activation Instructions that were delivered with the aircraft contain important information required to initiate XM satellite radio subscription for the GDL 69/69A.

GDL 69 WEATHER

XM weather information provided by the GDL 69 is displayed on the following MFD Maps and Pages:

- Navigation Map Page (NEXRAD and XM Lightning only)
- Weather Data Link Page (complete GDL 69 capability)
- Nearest Pages (NEXRAD and XM Lightning only)
- Airport Information Page (NEXRAD and XM Lightning only)
- Flight Planning Maps (NEXRAD and XM Lightning only)
- AUX - Trip Planning Map (NEXRAD and XM Lightning only)
- Weather Information Page - part of the Waypoint Airport Information Page (METAR and TAF information only)



NOTE: Temporary Flight Restrictions (TFRs) are displayed on all pages. Radar coverage is always displayed with NEXRAD data.

XM weather information is also displayed on the Primary Flight Display Inset Map. See the G1000 PFD Pilot's Guide for more information.

Complete weather products include the following:

- Graphical NEXRAD Data (NEXRAD)
- Graphical METAR Data (METAR)
- Textual METAR Data
- Textual Terminal Aerodrome Forecasts (TAF)
- City Forecast Data
- Graphical Wind Data (WIND)
- Graphical Echo Tops (ECHO TOP)
- Graphical Cloud Tops (CLD TOP)
- Graphical Lightning Strikes (XM LTNG)
- Graphical Storm Cell Movement (CELL MOV)
- NEXRAD Radar Coverage (displayed with NEXRAD data)
- SIGMETs/AIRMETs (SIG/AIR)
- Surface Analysis including City Forecasts (SFC)
- County Warnings (COUNTY)
- Freezing Levels (FRZ LVL)
- Hurricane Track (CYCLONE)
- Temporary Flight Restrictions (TFR)

Displaying XM Weather Products on the Navigation Map Page (Figure 11.4.1)

The Navigation Map Page displays NEXRAD, Cell Movement, TFRs, and XM Lightning data.

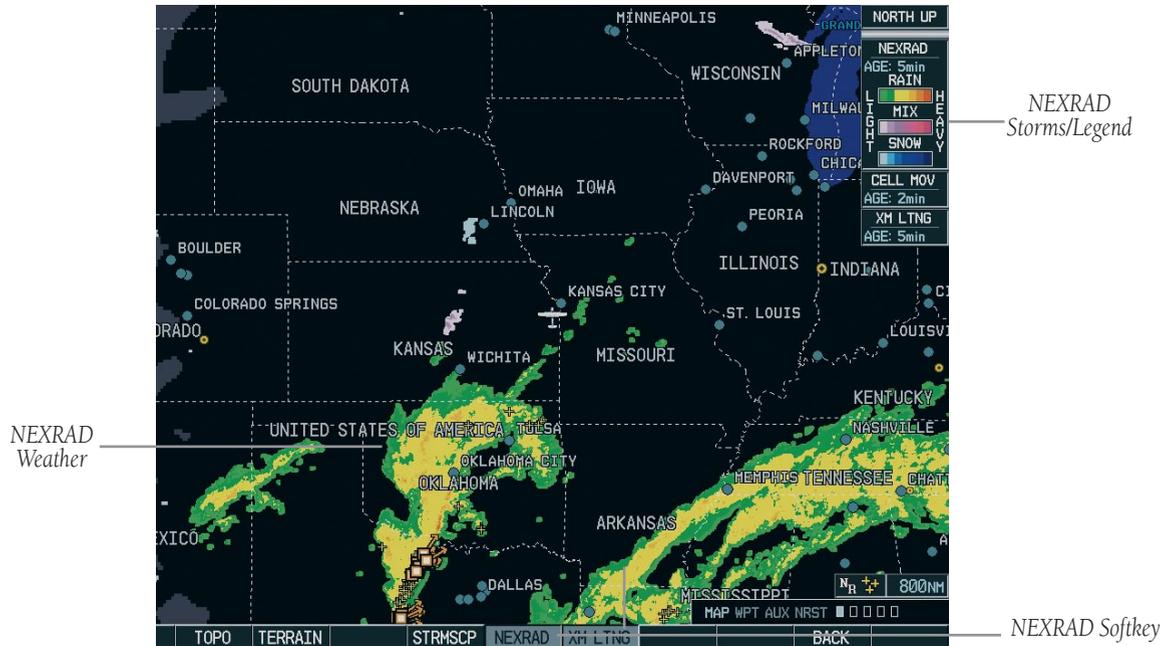


Figure 11.4.1 Navigation Map Page Displaying NEXRAD Weather

Navigation Map Page Weather Control Softkeys

The following softkeys control the display of NEXRAD and XM Lightning weather products on the Navigation Map Page:

NEXRAD – pressing the **NEXRAD** softkey displays NEXRAD weather and coverage information. **The NEXRAD option is mutually exclusive with the TOPO, TERRAIN, and STORMSCOPE options**, that is, when NEXRAD is activated, TOPO and/or TERRAIN, and/or STORMSCOPE are turned off.

XM LTNG – pressing the **XM LTNG** softkey displays XM lightning information. XM Lightning is mutually exclusive with the STORMSCOPE option.

To display weather data on the Navigation Map Page:

1. Press the **MAP** softkey.
2. Press the **NEXRAD** or **XM LTNG** softkey to display the desired weather. Press the applicable softkey again to remove weather data from the Navigation Map Page.

Navigation Map Setup Options (Figure 11.4.2)

The user can customize the display of XM weather on the Navigation Map Page by using the Map Setup Weather Group Options Menu. The following options are available:

- NEXRAD DATA - Turns the display of NEXRAD data and radar coverage on or off and selects the desired display range.
- XM LTNG - Turns the display of XM Lightning on or off and selects the desired display range.

- CELL MOVEMENT - Turns the display of storm cell movement on or off. The Cell Movement option is only shown when NEXRAD is turned on.



Figure 11.4.2 Map Setup Options



NOTE: In Figure 11.4.2, the Stormscope menu options are only shown when the Stormscope unit is installed. Stormscope is not a GDL 69 Weather Product.

To customize the Navigation Map Page:

1. Press the **Menu** key on the Navigation Map Page.
2. Select 'Map Setup' and press the **ENT** key.
3. Turn the **small FMS** knob to display the group selection window. Turn the **small FMS** knob to select the 'Weather Group' and press the **ENT** key.
4. While the Map Setup menu is displayed, turn the **large FMS** knob to highlight and move between the product selections. When an item is highlighted, turn the **small FMS** knob to select the desired option and press the **ENT** key.

Displaying Weather Data on the Nearest Pages

In addition to the Navigation Map Page, the Nearest Pages display Stormscope, NEXRAD, and XM Lightning data.

Displaying METAR and TAF information on the Airport Information Page

METAR and TAF text is displayed on the Airport Information Page when the **WX** softkey is pressed. **Once the WX softkey is pressed the page title changes from 'WPT - Airport Information' to 'WPT - Weather Information'**. The METAR data that is displayed is first displayed in a decoded fashion, then the raw text is displayed. TAF information is only displayed in its raw form.



NOTE: METAR is the Aviation Routine Weather Report and is generally standard around the world. The temperatures are given in Celsius degrees. The atmospheric pressure however is reported in hecto pascals everywhere, but the US where the atmospheric pressure is reported in inches of mercury. For aviation purposes the standard temperature and atmospheric pressure are 59° F (15°C) and 29.92 in. Hg (1013.2 hPa).



NOTE: TAF is an airport forecast. TAF is generally standard around the world. TAF forecasts significant weather changes, temporary changes, probable changes and expected changes in weather conditions..

To display METAR and TAF text on the Airport Information Page:

1. Turn the **large FMS** knob to select the WPT Page Group.
2. Turn the **small FMS** knob to select the Airport Information Page.
3. Press the **WX** softkey to display METAR and TAF text (METAR and TAF information is updated every 12 minutes).

Displaying Weather Data on the AUX - Trip Planning Page Map

NEXRAD and XM Lightning Data can be displayed on the AUX - Trip Planning Page Map by pressing the **NEXRAD** and **XM LTNG** softkeys.

Displaying Weather Data on the Flight Plan Page Maps

NEXRAD and XM Lightning Data can be displayed on the Flight Plan Page Maps by pressing the **NEXRAD** and **XM LTNG** softkeys.

Displaying Weather on the Weather Data Link Page (Figure 11.4.3)

The Weather Data Link Page displays all available weather products. The display of the weather data can either be selected by softkeys located at the bottom of the display or through the Weather Data Link Setup menu.

To select the Weather Data Link Page:

1. Turn the **large FMS** knob to select the Map Page Group.
2. Turn the **small FMS** knob to select the Weather Data Link Page.

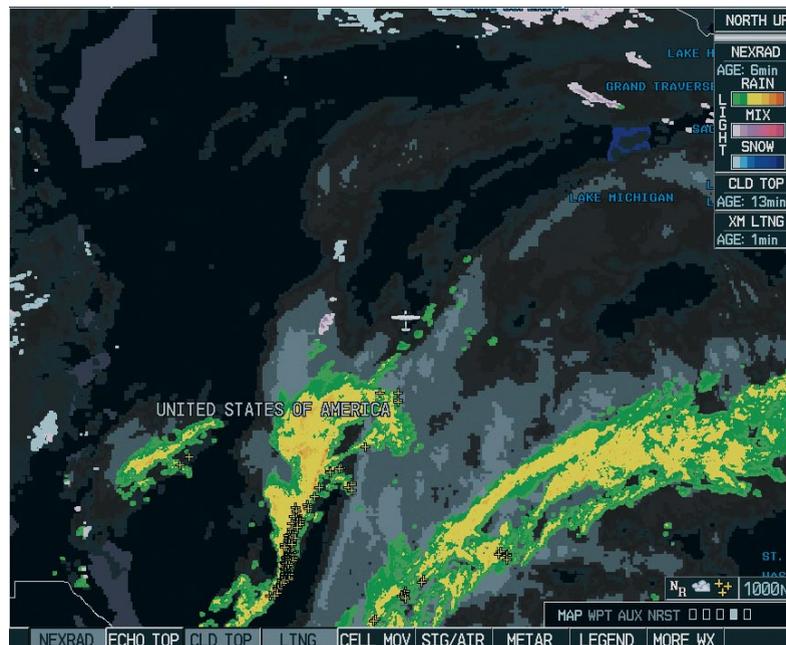


Figure 11.4.3 Weather Data Link Page

Weather Data Link Page Softkeys

The following softkeys perform the GDL 69 weather functions on the Weather Data Link Page:

NEXRAD – press the **NEXRAD** softkey to show NEXRAD weather and radar coverage information (both are activated at the same time). 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. The update rate is every five minutes. Refer to the legend for a description of the color code.



NOTE: *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, of those include:

- Ground Clutter
- Strokes and spurious radar data
- Sun strokes, when the radar antenna points directly at the sun
- Interference from buildings or mountains, which may cause shadows
- Military aircraft deploy metallic dust which can cause alterations in radar scans

NEXRAD Limitations

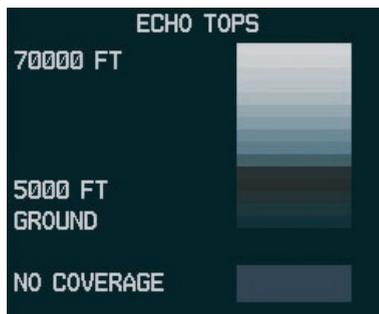
Certain limitations exist regarding the NEXRAD radar displays. Some, but not all, are listed here for the user's awareness:

- 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.

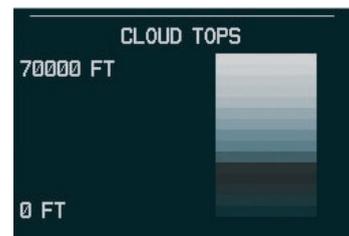
ECHO TOP – press the **ECHO TOP** softkey to show the location, elevation, and direction of the highest radar echo. This may not indicate the top of a storm or clouds, only the highest radar return echo. The information is derived from NEXRAD information and indicates the highest altitude at which precipitation is falling. ECHO TOPS and Radar coverage are activated at the same time. ECHO TOPS are mutually exclusive from both NEXRAD and CLOUD TOPS, that is, when ECHO TOPS is activated, NEXRAD and CLOUD TOPS are removed. Refer to the Legend for a description of the ECHO TOPS coding. The update rate is every 7.5 minutes.



NOTE: *Cloud Tops and Echo Tops use the same color scaling to represent altitude. Turning on both products at the same time is not allowed.*

RADAR COVERAGE – The display of Radar Coverage is always active when NEXRAD and ECHO TOPS are selected and indicates the currently available NEXRAD Radar coverage and ECHO TOPS areas by showing the area in a grayish-purple color where information is not being collected. Areas where radar capability exists, but is not active or is off-line, will not be shown as available. Areas where radar coverage is not available will be shown in grayish-purple. The update rate is every five minutes.

CLD TOP – press the **CLD TOP** softkey to show 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.

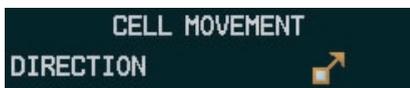


LTNG – pressing the **LTNG** softkey shows the location of cloud-to-ground lightning strikes. The update rate is every five minutes.

NOTE: *Strike location falls within a 2 km region. Therefore, the exact location of the strike is not displayed.*



CELL MOV – pressing the **CELL MOV** softkey shows the storm cells identified by the ground-based system. The movement is depicted by an arrow. The update rate is every 12 minutes.



SIG/AIR – pressing the **SIG/AIR** softkey shows SIGMET and AIRMET information to advise the pilot of potentially hazardous weather. The advisory covers an area of at least 3,000 square miles at any one time. The update rate is every 12 minutes.



NOTE: *SIGMETs are broadcast for hazardous weather that is considered of extreme importance to all aircraft. SIGMETs (acronym for "SIGnificant METeorological information") warn of the following weather hazards: severe icing, severe and extreme turbulence, dust storms, sandstorms, or volcanic ash lowering visibility to less than 3 miles. A Convective SIGMET (WST) is issued for hazardous convective weather (such as tornadoes, thunderstorms, hail) and covers severe or great turbulence, severe icing, and low-level wind shear. A localized SIGMET is a significant weather condition occurring at a localized geographical position.*



NOTE: *AIRMETs are broadcast for weather phenomena that potentially affects all aircraft. For pilots of light aircraft, AIRMET (acronym for "AIRman's METeorological information) gives valuable information about the following conditions: moderate icing, moderate turbulence, sustained winds 30 knots or greater at the surface, widespread area with a ceiling of less than 1,000 feet and/or visibility less than 3 miles and extensive obscurement of mountains. These are important to light aircraft, as they have limited flight capabilities due to lack of equipment and/or instrumentation.*



When enabled, the following AIRMETS can be displayed:

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

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

METAR – press the **METAR** softkey to display METARs (METeorological Aviation Reports). METARs are shown as colored flags at airports providing METAR reports. Refer to the legend for a description of the color code. The update rate is every 12 minutes.



LEGEND – press the **LEGEND** softkey to display the Weather Legend Window. Turn the small or large **FMS** knob to scroll up or down through the legend list. Press the small or large **FMS** knob or the **ENT** key to remove the legend display. The Weather Legends Window describes the graphic symbols and color coding of the information for each product that is active.

To view the available legends:

1. Press the **LEGEND** softkey to display the available legends.
2. Turn either the small or large **FMS** knob to scroll through the legends if more are available than fit in the window.
3. To return to the previous page and remove the legend window, press the **LEGEND, ENT, CLR** key, or the **FMS** knob.

OR:

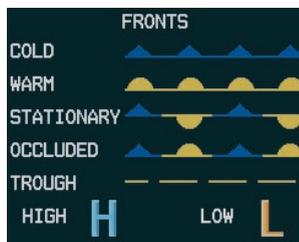
4. On the Weather Data Link Page, press the **LEGEND** softkey which displays the Page Menu Options. Turn either the large or small **FMS** knob to select 'Weather Legend' and press the **ENT** key.

MORE WX – press the **MORE WX** softkey to display the following group of softkeys for additional weather control:



NOTE: *City Forecast and METAR information is only displayed within the installed Aviation Database service area.*

SFC – pressing the **SFC** softkey for Surface Analysis shows current or forecast conditions. The city forecasts information is combined with the surface conditions. The **SFC** softkey label changes to reflect the forecast time selected. Forecasts are available for intervals of 12, 24, 36, and 48 hours. The update rate is every 12 minutes.



FRZ LVL – press the **FRZ LVL** softkey to display contour lines for freezing levels. The update rate is every 12 minutes.



NOTE: When no data is shown at a given altitude for any of the weather features, the data for that altitude has not been received or the data is out of date and has been removed from the display. Wait for the next update. The update rate is every 12 minutes.

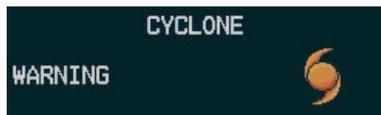
WIND – press the **WIND** softkey to show wind speed and direction at a selected altitude from the ground up to 42,000 feet in 3,000 foot increments. The **WIND** softkey label changes to reflect the winds aloft altitude selected. The update rate is every 12 minutes.



COUNTY – pressing the **COUNTY** softkey provides specific public awareness and protection weather warnings for Tornado, Severe Thunderstorm, and Flood conditions provided by the National Weather Service (NWS). Refer to the Legend for a description of the county warning icon. The update rate is every 5 minutes.



CYCLONE – pressing the **CYCLONE** softkey shows the current location of cyclones (hurricanes) and their projected track at various time intervals. The update rate is every 12 minutes.



Weather Data Link Page Setup

The pilot can customize the display of XM Weather data on the Weather Data Link Page using the Weather Page Options Menu (Figure 9-9).

To customize the display of weather data on the Weather Data Link Page:

1. Press the **Menu** key on the Weather Data Link Page.
2. Select 'Weather Setup' on the Page Menu and press the **ENT** key.
3. Turn the **large FMS** knob to highlight and move between the product selections. Turn the **small FMS** knob to select an option for each selection and press the **ENT** key.

Map Panning Information-Weather Data Link Page

Map panning moves the map beyond its current limits without adjusting the map range. When the panning function is selected by pushing the joystick, a panning arrow flashes on the Weather Data Link Page. Panning over AIRMETs, County Warnings, TFRs, Echo Tops, METARs, SIGMET's, and Cell Movement displays text information for the selection. This information is displayed in the same location as the "map pointer information" on the Navigation Map Page.

To display information for selected weather products:

1. Push in the **joystick** to display the panning arrow.
2. Move the **joystick** to place the panning arrow on the desired product. Press the **ENT** key to display pertinent information for the selected product.

Note that pressing the **ENT** key when panning over an AIRMET or a SIGMET displays an information box that gives the actual text of that alert. Panning over an airport with METAR information does not display more information but allows the user to press the **ENT** key and select that Airport's Information Page and displays the actual text. Pressing the **ENT** key when panning over a TFR displays TFR specific information for the panned TFR.

WEATHER PRODUCT SYMBOLS

Figure 11.4.4 shows the symbol for each weather product (read from left to right) . When a weather product is active, the product symbol is displayed in the lower right of the screen.

- NEXRAD
- Cloud Top/Echo Top
- XM Lightning
- Cell Movement
- SIGMETs/AIRMETs
- METARs
- City Forecast
- Surface Analysis
- Freezing Levels
- Winds Aloft
- County Warnings
- Cyclone Warnings

Weather Product Age (Table 11.4.1)

The times for each of the enabled products are displayed on the right side of the display. Times are based on Zulu times when the data was assembled on the ground, not the time the data was received by the FIS sensor. When the age of a weather product is greater than half of the expiration time, the product time will change from cyan to amber in color.

Current weather products use an age stamp, 'Age: _ _ _' in minutes. Reported (forecasted) weather products use a date/time stamp; '_ _ / _ _ / _ _ : _ _'.



Figure 11.4.4 Weather Product Symbols

Weather Product	Expires After "n" minutes
SIGMETs/AIRMETs	60
City Forecasts	60
County Warnings	60
Cyclone Warnings	60
Echo Tops	30
Freezing Levels	60
METARs	90
Lightning	30
NEXRAD	30
Radar Coverage	30
Cell Movement	30
Surface Analysis	60
TFRs	60
Winds Aloft	90
TAFs	60
Clouds Tops	60

Figure 11.4.1 Weather Product Age

GDL 69A – XM DIGITAL AUDIO ENTERTAINMENT

Digital audio entertainment is available through the XM Satellite Radio Service using the GDL 69A. XM Satellite Radio allows for a variety of radio programming over long distances without having to constantly search for new stations. Based on signals from satellites, coverage far exceeds land-based transmissions.

XM Information Page

The **XM Information Page** provides XM Radio identification numbers, service level, and weather products.

To select the XM Information Page (Figure 11.4.5):

1. Turn the **large FMS** knob to select the Auxiliary Page Group.
2. Turn the **small FMS** knob to select the Aux - XM Page. Radio and Info softkeys are displayed.
3. Press the **INFO** softkey to show the XM Information Page where information about the XM Satellite Radio feature is displayed.
4. Press the **RADIO** softkey to show the XM Radio Page where the audio entertainment is controlled.

Data and Audio Radio ID

Each GDL 69A contains a unique Data Radio ID and Audio Radio ID that allows XM to communicate with the radio. The owner must activate XM service by providing the Radio ID(s) to XM to authorize the installed services for that radio.



Figure 11.4.5 XM Information Page

Service Class

The 'Service Class' refers to the groupings of weather products available for subscription.

Weather Products Window

The Weather Products Window shows the list of available weather products and indicates the selected products for the current subscription. The boxes for active weather products are filled. Before activation, all boxes are clear.

XM RADIO PAGE (FIGURE 11.4.6)

The XM Radio Page provides information and control of the audio entertainment features of the XM Satellite Radio.

XM Radio Softkeys

The following XM Radio softkeys are located below the display and provide control of the GDL 69A :

RADIO – press the **RADIO** softkey to access the XM Satellite Radio audio functions.

INFO – press the **INFO** softkey to show XM Information, such as Radio IDs, Service Class, and Weather Products.

DONE – the **DONE** softkey is used during the activation process as described on page 9-7.

CHNL – press the **CHNL** softkey to allow selection of radio channels.

CATGRY – press the **CATGRY** softkey to allow selection of radio categories.

VOL – press the **VOL** softkey to adjust the audio volume or to mute the audio.

PRESETS – press the **PRESETS** softkey to access preset channels (**PS1** - **PS15**) or to set a new preset (**SET**).

Active Channel

The Active Channel field on the XM Radio Page displays the currently selected channel that the XM Radio is using. The Channel feature is used to navigate through the channels in the selected category. You can step through the channels one at a time or you may also select a channel directly by channel number.

Channels

The Channels window of the XM Radio Page shows a list of the available channels for the selected category.

To step through channels one at a time:

1. While on the XM Radio page, press the **CHNL** softkey. The user can also push the **FMS** knob to highlight the channel list and turn the **large FMS** knob to scroll through the channels.
2. Press the **CH +** softkey to go up through the list in the Channel window or move down the list with the **CH –** softkey.

To select a channel directly:

1. While on the XM Radio Page, press the **CHNL** softkey.
2. Press the **DIR CH** softkey. The channel number in the Active Channel window will be highlighted (Figure 9-14) .
3. Press the numbered softkeys located on the bottom of the display to directly select the desired channel number.
4. Press the **ENT** key to activate the selected channel.



Figure 11.4.6 XM Radio Page

Category

The 'Category' field of the XM Radio Page displays the currently selected category of audio. 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. One of the optional categories is 'PRESETS' if the user desires to view what channels have been programmed.



Figure 11.4.7 Categories List

To select a category:

1. Press the **CATGRY** softkey key on the XM Radio Page.
2. Turn the **small FMS** knob to display the 'Categories' list (Figure 9-13). Highlight the desired category with the **small FMS** knob and press the **ENT** key. Selecting 'All Categories' places the channels from 'All Categories' in the Channels field (press the **CAT +** and **CAT -** softkeys to cycle through the categories).

Volume

The Volume 'control' (Figure 11.4.8) sets the audio volume level, as well as mutes the audio. Pressing the **VOL** softkey brings up the Volume bar graph, muting softkey, and the Volume control softkeys.



Figure 11.4.8 Volume Control

To adjust the volume:

1. With the XM Radio Page displayed, press the **VOL** softkey.
2. Press the **VOL -** softkey to reduce volume or press the **VOL +** softkey to increase volume. (once the **VOL** softkey is pressed, the volume can also be adjusted using the **small FMS** knob). Pressing the **MUTE** softkey toggles the muting of the radio audio volume.

Presets

Up to 15 channels from any category can be assigned a preset number. The preset channel can then be selected directly and added to the Active Channel list for listening.

To set a preset channel number:

1. On the Radio Page while listening to the Active Channel that you want to assign as a preset, press **PRESETS**.
2. Press the **SET** softkey.
3. Press the preset key (**PS1 - PS15**) to assign to the active channel. Press the **MORE** softkey if necessary.

To select a preset channel number:

1. While on the Radio page, press the **PRESETS** softkey.
2. Press the numbered softkeys (**PS1 - PS15**) on the bottom of the screen to directly select the desired preset channel. Press **MORE**, if necessary.

GDL 69 TROUBLESHOOTING

Although it is the responsibility of the facility that installed the GDL 69/69A to correct any hardware problems, the user can perform some quick troubleshooting steps to find the possible cause of a failure.

First, ensure that the owner/operator of the aircraft in which the GDL 69/69A is installed has subscribed to XM Radio, and that it has been activated. Perform a quick check of the circuit breakers to ensure the GDL 69/69A has power applied. If a failure still exists, review the messages listed in Table 11.4.1. The advisory messages may provide insight to a possible failure.

For troubleshooting purposes, the Status, Serial Number, and Software Version numbers for the GDL 69/69A are displayed in the LRU Information Window on the System Status Page (Figure 11.4.9).

To select the System Status Page:

1. Turn the **large FMS** knob to select the AUX Page Group.
2. Turn the **small FMS** knob to select the System Status Page.

LRU INFO			
	STATUS	SERIAL NUMBER	VERSION
GDC1	✓	0x00000000	0.00
GDL69	✓	0x00000000	0.00
GEA1	✓	0x00000000	0.00
GIA1	✓	0x00000000	0.00
GIA2	✓	0x00000000	0.00
GMA1	✓	0x00000000	0.00
GMU1	✓	0x00000000	0.00
GRS1	✓	0x00000000	0.00
GTX1	✓	0x00000000	0.00
MFD1	✓	0x00000000	0.00
WX	✓	0x00000000	0.00

Figure 11.4.9 LRU Information Window

Message	Description
CHECK ANTENNA – XM Radio Page, the active channel is replaced with this message	Antenna is not connected
UPDATING – XM Radio Page, the active channel is replaced with this message	Updating encryption code
NO SIGNAL – XM Radio Page, the active channel is replaced with this message; also displayed on the Weather Data Link Page when the signal strength is too low for the receiver	Loss of signal
LOADING – XM Radio Page, the active channel is replaced with this message	Acquiring channel audio or information
OFF AIR – XM Radio Page, the active channel is replaced with this message	Channel not in service
--- – XM Radio Page, the active channel is replaced with this message	Missing channel information
WEATHER DATA LINK FAILURE – Weather Data Link Page, displayed in the center of the screen in yellow	No communication with the GDL 69 within the last five minutes
ACTIVATION REQUIRED – Weather Data Link Page, displayed in the center of the screen in yellow	XM Data receiver is not activated

Table 11.4.1 Advisory Messages



Garmin International, Inc.
1200 East 151st Street
Olathe, KS 66062, U.S.A.
p: 913.397.8200 f: 913.397.8282

Garmin AT, Inc.
2345 Turner Road SE
Salem, OR 97302, U.S.A.
p: 503.391.3411 f: 503.364.2138

Garmin (Europe) Ltd.
Unit 5, The Quadrangle
Abbey Park Industrial Estate
Romsey, SO51 9DL, U.K.
p: 44/0870.8501241 f: 44/0870.8501251

Garmin Corporation
No. 68, Jangshu 2nd Road
Shijr, Taipei County, Taiwan
p: 886/2.2642.9199 f: 886/2.2642.9099

www.garmin.com