

**ENSTROM 480B OPERATOR'S MANUAL  
AND  
FAA APPROVED  
ROTORCRAFT FLIGHT MANUAL  
SUPPLEMENT  
GARMIN GDL 69AH XM WX SATELLITE  
WEATHER/RADIO RECEIVER**

\* \* \* \* \*

REPORT NO. 28-AC-062

HELICOPTER SERIAL NO. \_\_\_\_\_

HELICOPTER REGISTRATION NO. \_\_\_\_\_

\* \* \* \* \*

**THIS SUPPLEMENT MUST BE CARRIED IN THE HELICOPTER AT ALL TIMES IF EQUIPPED WITH THE GARMIN GDL 69AH. CHAPTERS 1, 2, 3, AND 4 ARE FAA APPROVED.**

FAA APPROVED BY: Ronald O M Elise  
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FEDERAL AVIATION ADMINISTRATION

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THE ENSTROM HELICOPTER CORPORATION  
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**ROTORCRAFT FLIGHT MANUAL SUPPLEMENT  
GARMIN GDL 69AH**

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## INTRODUCTION

### Intro-1. General

This supplement contains the operating instructions, procedures, and limitations for the Garmin GDL 69AH. The supplement is divided into two basic parts, the FAA approved RFM Supplement and Supplemental Data provided by the Enstrom Helicopter Corporation (Enstrom). Chapters 1, 2, 3, and 4 make up the FAA approved RFM Supplement. It is required by Federal Regulations that this supplement be carried in the helicopter at all times if the Garmin GDL 69AH unit is installed.

For additional information regarding the supplement format and text emphasis or definitions, refer to the Basic Flight Manual.

Abbreviations noted in this supplement are listed in Table Intro- 1.

**Table Intro-1. List of Abbreviations**

AIRMET	Airmen's Meteorological Information
AIREPS	Air Report
ATC	Air Traffic Control
CB	Circuit Breaker
METAR	Meteorological Aviation Report
MFD	Multi-Function Display
NEXRAD	Next Generation Radar
NM	Nautical Mile
PIREPS	Pilot Weather Reports
SIGMET	Significant Meteorological Information
TAFS	Terminal Aerodrome Forecasts
WX	Weather Receiver
XM	Satellite Radio

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## CHAPTER 1. OPERATING LIMITATIONS

### 1-1. General

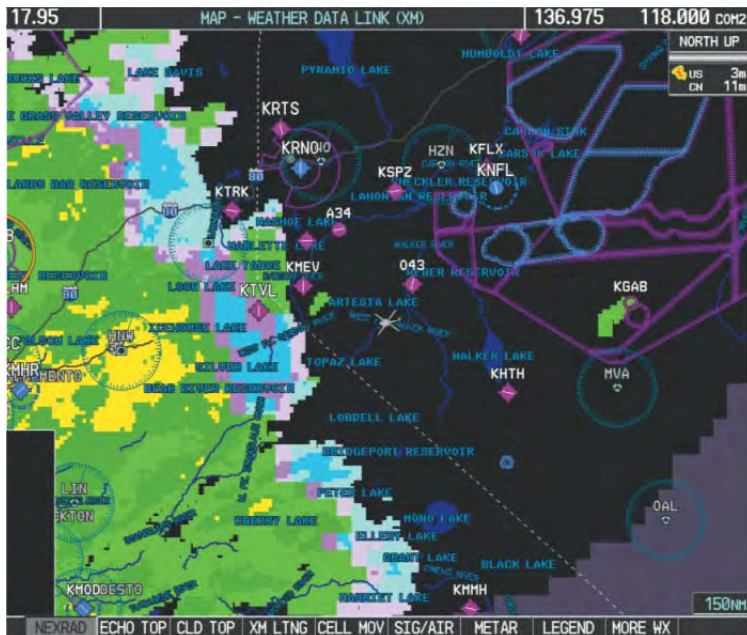
1. The weather information displayed is limited to supplemental use only and may not be used in lieu of an official weather data source.
2. The GDL 69AH must utilize software version 4.02 or later FAA approved version.
3. Because of the time required to detect, assemble and distribute the NEXRAD weather product, the displayed weather information contained within the product may be significantly older than the current radar synopsis and may not depict the current weather conditions. The NEXRAD weather product should never be used as a basis for making decisions to maneuver in, near, or around areas of hazardous weather regardless of the information it contains.
4. NEXRAD radar images may have certain limitations:
  - NEXRAD base reflectivity does not provide sufficient information to determine cloud layers or precipitation characteristics (wet hail vs. rain). For example, it is not possible to distinguish between wet snow, wet hail, and rain.
  - NEXRAD base reflectivity is sampled at the minimum antenna elevation angle. An individual NEXRAD site cannot depict high altitude storms at close ranges. It has no information about storms directly over the site.
  - When zoomed in to a range of 30 nm, each square block on the display represents an area of four square kilometers. The intensity level reflected by each square represents the highest level of NEXRAD data sampled within the area.
  - Unknown precipitation below 52°N is displayed as rain regardless of actual precipitation type.

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## CHAPTER 2. NORMAL PROCEDURES

### 2-1. General

1. Pilot control of the GDL 69AH is through the interfaced control and display unit, GDU 1040H (MFD). Received graphical weather information and associated text is displayed on the MFD. See section 7 for operational procedures for the various weather products.
2. The pilot can view the principal map for viewing weather information on the Weather Data Link Page in the Map Page Group. Turn the large FMS knob to select Map Page Group then turn the small FMS knob to select Weather Data Link Page.



**Figure 2-1. Weather Data Link (XM) Page**

- Softkeys control the display of weather information on the MFD. When a weather product is selected for display, the corresponding softkey label changes to gray to indicate the product is enabled. See Figure 2-2.



**Figure 2-2. Weather Data Link (XM) Page Weather Product Softkeys**

- Certain SiriusXM Weather products can be viewed on multiple maps. Figure 2-3 displays a list of available weather products for each map.

Weather Product	Navigation Map Page	Weather Data Link (XM) Page	Weather Information Page	AUX - Trip Planning Page	Nearest Page Group	Flight Plan Pages
NEXRAD	+	+		+	+	+
No Radar Coverage	+	+		+	+	+
Cloud Top (CLD TOP)		+				
Echo Top (ECHO TOP)		+				
SiriusXM Lightning (XM LTNG)	+	+		+	+	+
Cell Movement (CELL MOV)	+	+		+	+	+
SIGMETs/AIRMETs (SIG/AIR)		+				
METARs	+	+	+	+	+	+
City Forecast (CITY)		+				
Surface Analysis (SFC)		+				
Freezing Levels (FRZ LVL)		+				
Winds Aloft (WIND)	+	+				
County Warnings (COUNTY)		+				
Cyclone Warnings (CYCLONE)		+				
Icing Potential (ICNG)		+				
PIREPs		+	+			
AIREPs		+	+			
Turbulence (TURB)		+				
TFRs	+	+	+	+	+	+
TAFs		+	+			

**Figure 2-3. Weather Product Display Maps**

## 2-2. Weather Product Operation

### 2-2-1. Displaying NEXRAD weather information:

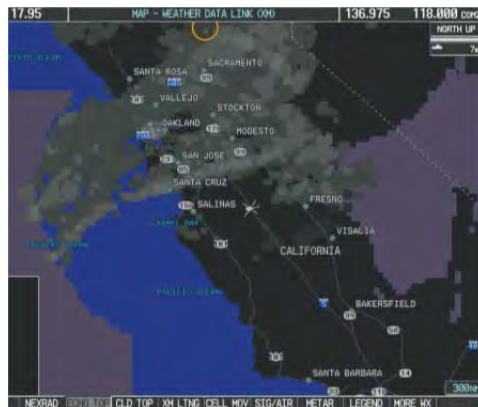
- 1) Select the MAP Softkey. This step is not necessary on the Weather Data Link (XM) Page.
- 2) Select the NEXRAD Softkey.



**Figure 2-4. NEXRAD Data**

### 2-2-2. Displaying Echo Tops information:

- 1) Select the Weather Data Link (XM) Page.
- 2) Select the ECHO TOP Softkey.



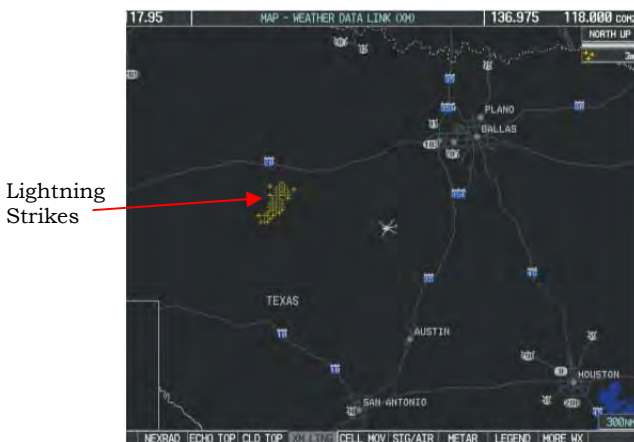
**Figure 2-5. Echo Tops Data**

**2-2-3. Displaying Cloud Tops information:**

- 1) Select the Weather Data Link (XM) Page.
- 2) Select the CLD TOP Softkey.

**Figure 2-6. Cloud Tops Data****2-2-4. Displaying Lightning information:**

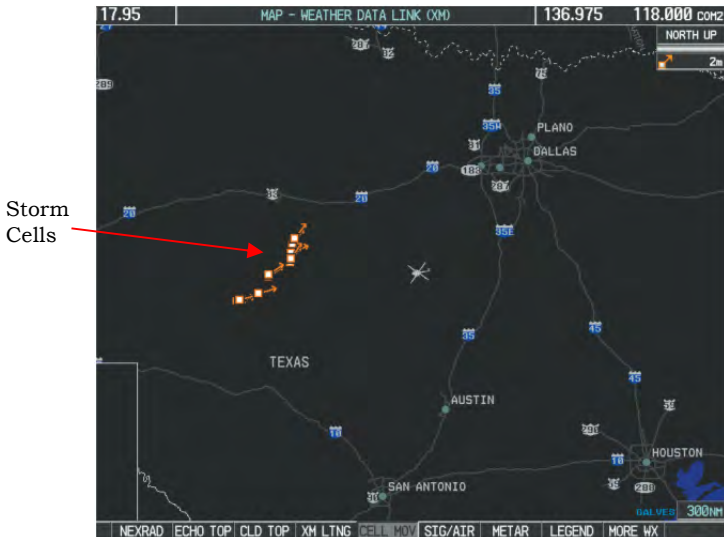
- 1) Select the MAP Softkey. This step is not necessary on the Weather Data Link (XM) Page.
- 2) Select the XM LTNG Softkey.

**Figure 2-7. SiriusXM Lightning Weather Product**



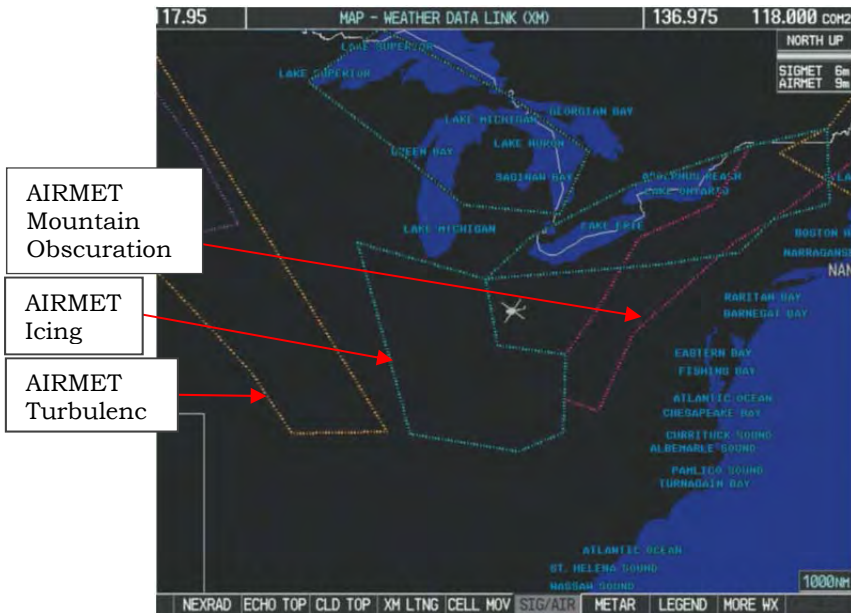
**2-2-5. Displaying Cell Movement information:**

- 1) Select the MAP Softkey. This step is not necessary on the Weather Data Link (XM) Page.
- 2) Select the NEXRAD Softkey (CEL MOV Softkey on the Weather Data Link (XM) Page). For Cell Movement to be displayed on maps other than the Weather Data Link (XM) Page, Cell Movement must be turned on in the Navigation Map Setup Menu (see “Setting Up SiriusXM Weather”).

**Figure 2-8. Cell Movement Weather Product**

**2-2-6. Displaying SIGMETs and AIRMETs:**

- 1) Select the Weather Data Link (XM) Page.
- 2) Select the SIG/AIR Softkey.
- 3) To view the text of the SIGMET or AIRMET, press the RANGE Knob and move the Map Pointer over the icon.
- 4) Press the ENT key.

**Figure 2-9. SIGMET and AIRMET Weather Products**

**2-2-7. Displaying METAR:**

- 1) On the Weather Data Link (XM) Page, select the METAR Softkey.
- 2) Press the RANGE Knob and pan to the desired airport.
- 3) Press the ENT Key. The Weather Information Page is shown with METAR and TAF text.
- 4) Turn the FMS Knob or the ENT Key to scroll through the METAR text.
- 5) Press the FMS Knob or the CLR Key to return to the Weather Data Link (XM) Page.

Or:

- 1) Select the Weather Information Page.
- 2) Turn the large FMS Knob to select the Waypoint Page Group.
- 3) Select the WX Softkey to select the Weather Information Page.
- 4) Press the FMS Knob to display the cursor.
- 5) Use the FMS Knob to enter the desired airport and press the ENT Key.
- 6) Use the FMS Knob or the ENT Key to scroll through the METAR text.



**Figure 2-10. METARs Flags (Weather Data Link Page)**



**Figure 2-11. METAR (Weather Information Page)**

### 2-2-8. Displaying Surface Analysis and City Forecast information:

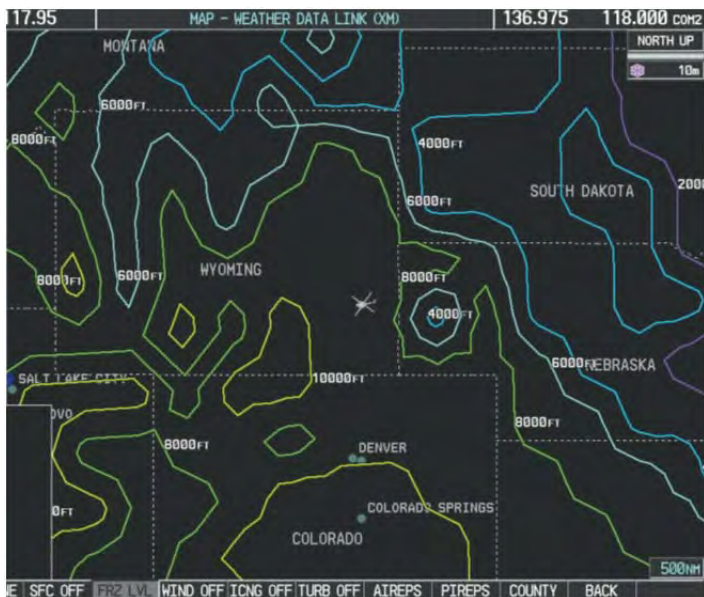
- 1) Select the Weather Data Link (XM) Page.
- 2) Select the MORE WX Softkey.
- 3) Select the SFC Softkey.
- 4) Select the desired forecast time: CURRENT, 12 HR, 24 HR, 36 HR, or 48 HR. The SFC Softkey label changes to reflect the forecast time selected.



**Figure 2-12. 24 Hr Surface Analysis and City Forecast Data**

**2-2-9. Displaying Freezing Level information:**

- 1) Select the Weather Data Link (XM) Page.
- 2) Select the MORE WX Softkey.
- 3) Select the FRZ LVL Softkey.

**Figure 2-13. Freezing Level Data****2-2-10. Displaying Winds Aloft data:**

- 1) Select the Weather Data Link (XM) Page.
- 2) Select the MORE WX Softkey.
- 3) Select the WIND Softkey.
- 4) Select the desired altitude level: SFC (surface) up to 42,000 feet. Select the NEXT or PREV Softkey to cycle through the altitude soft keys. The WIND Softkey label changes to reflect the altitude selected.



**Figure 2-14. Winds Aloft Data**



**Figure 2-15. Navigation Map Page with Winds Aloft**

**2-2-11. Displaying County Warning information:**

- 1) Select the Weather Data Link (XM) Page.
- 2) Select the MORE WX Softkey.
- 3) Select the COUNTY Softkey.

**Figure 2-16. County Flood Warning**



## 2-2-12 Displaying cyclone (hurricane) track information:

- 1) Select the Weather Data Link (XM) Page.
- 2) Select the MORE WX Softkey.
- 3) Select the CYCLONE Softkey.



**Figure 2-17. Cyclone Weather Product**

## 2-2-13. Displaying Icing data:

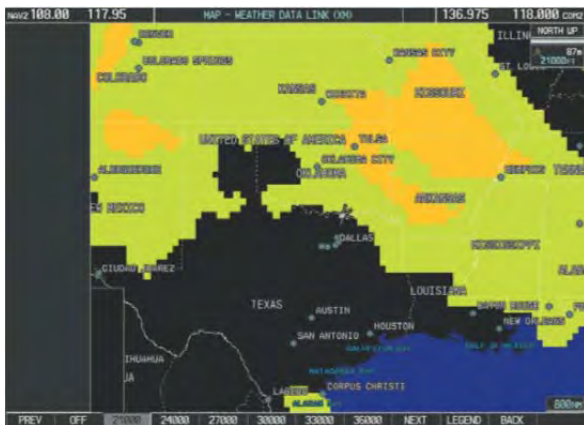
- 1) Select the Weather Data Link (XM) Page.
- 2) Press the MORE WX Softkey.
- 3) Press the ICNG Softkey.
- 4) Select the desired altitude level: 1,000 feet up to 30,000 feet. Press the NEXT or PREV Softkey to cycle through the altitude softkeys. The ICNG Softkey label changes to reflect the altitude selected.



**Figure 2-18. Icing Data at 6,000ft.**

### 2-2-14. Displaying the Turbulence weather product:

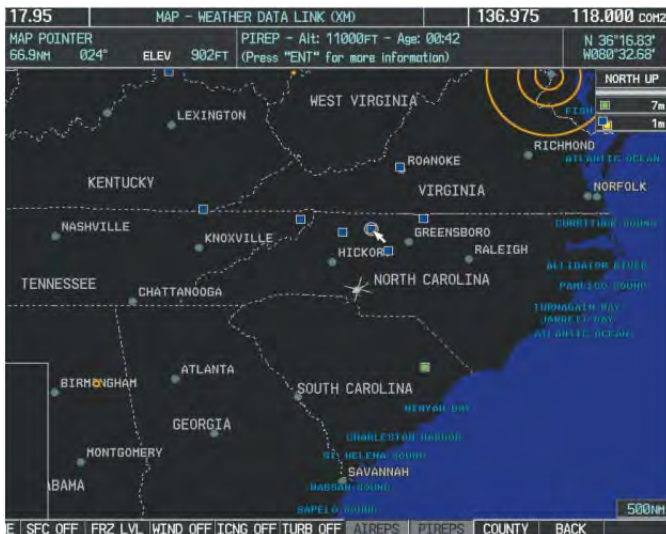
- 1) Select the Weather Data Link (XM) Page.
- 2) Press the MORE WX Softkey.
- 3) Press the TURB Softkey.
- 4) Select the desired altitude level: 21,000 feet up to 45,000 feet. Press the NEXT or PREV Softkey to cycle through the altitude softkeys. The TURB Softkey label changes to reflect the altitude selected.



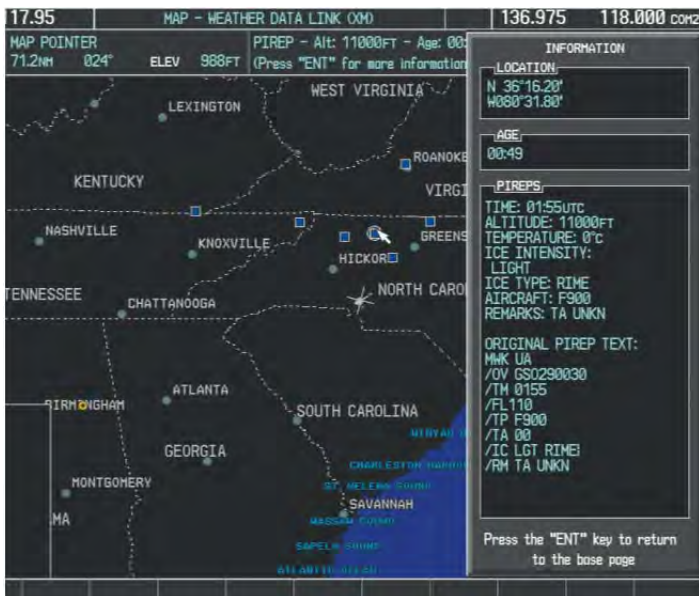
**Figure 2-19. Turbulence Weather Product**

**2-2-15. Displaying PIREP and AIREP text:**

- 1) Select the Weather Data Link (XM) Page.
- 2) Press the MORE WX Softkey.
- 3) Press the AIREPS or PIREPS Softkey.
- 4) Press the RANGE Knob and pan to the desired weather report. A gray circle will appear around the weather report when it is selected.
- 5) Press the ENT Key. The Weather Information Page is shown with PIREP or AIREP text. The data is first displayed in a decoded fashion, followed by its original text. Note the original text may contain additional information not found in the decoded version.
- 6) Use the FMS Knob or the ENT Key to scroll through the PIREP or AIREP text.
- 7) Press the FMS Knob or the CLR Key to return to the Weather Data Link (XM) Page.



**Figure 2-20. AIREPS and PIREPS on the Weather Data Link Page**



**Figure 2-21. PIREPS Text on Weather Data Link Page**

## **CHAPTER 3. EMERGENCY PROCEDURES**

### **3-1. General**

Refer to the basic RFM.

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## **CHAPTER 4. PERFORMANCE DATA**

### **4-1. General**

Refer to the basic RFM.

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**CHAPTER 6. WEIGHT/BALANCE AND LOADING****6-1. General****Table 6-1. GDL 69AH Weight and Balance**

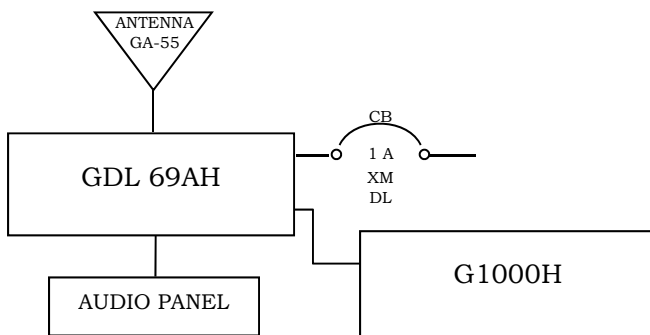
Weight with Rack (lbs)	Moment Arm (in)	Moment (in-lb)
2.94	64.5	189.63

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## CHAPTER 7. SYSTEM DESCRIPTION AND OPERATION

### 7-1. System Description

1. The GDL 69AH unit is a remote datalink receiver that delivers XM WX Satellite Weather™ to a Garmin navigation system such as the G1000H.
2. Data is provided through XM Satellite Radio's XM WX Weather Service using location-specific WxWorx information. Real time weather coverage is available at any altitude across the continental United States.
3. The GDL 69AH interfaces with the cockpit audio panel control to provide XM Satellite Radio audio entertainment through the aircraft's audio system.
4. Power to the GDL 69AH unit is provided via the **XM DL** circuit breaker (CB) (1 Amp) located on the circuit breaker panel in the console.



**Figure 7-1. GDL 69AH System Interface**


















## 7-2. General

1. Before the GDL 69AH can be used, the unit must be activated by XM Satellite Radio with a service subscription through XM Satellite Radio. The weather data link and the additional audio entertainment services must be activated separately.
2. Pilot control of the GDL 69AH is through the interfaced control and display unit, such as the G1000H.
3. For additional information on GDL 69AH data linked weather displays and interfaces, refer to the applicable Garmin Pilot's Guide listed in Table 1-1.

## 7-3 Operation

1. For each enabled SiriusXM Weather product, the system displays a weather product icon and a product age. The product age is the elapsed time since the weather provider compiled the weather product. The product age display does not indicate the age of the information contained within the weather product, which can be significantly older than the displayed weather product age.
2. The weather service broadcasts weather at specific intervals. If for any reason, a product does not broadcast within the expiration time intervals, the system removes the expired data from the display and shows dashes instead of product age.
3. If more than half the expiration time has elapsed, the color of the product age changes to yellow.
4. If the data for the weather product is not available, the system displays 'N/A' next to the weather product symbol instead of the product age.

**Table 7-1. SiriusXM Weather Product Symbols and Data Timing**

SiriusXM Weather Product	Symbol	Expiration Time (Minutes)	Broadcast Rate (Minutes)
Next-generation Radar (NEXRAD)		30	5 (U.S.) 10 (Canada)
Cloud Top (CLD TOP)		60	15
Echo Top (ECHO TOP)		30	7.5
XM Lightning (LTNG)		30	5
Cell Movement (CELL MOV)		30	12
SIGMETs/AIRMETs (SIG/AIR)		60	12
Meteorological Aerodrome Report (METARs)		90	12
City Forecast (CITY)		60	12
Surface Analysis (SFC)		60	12
Freezing Levels (FRZ LVL)		60	12
Winds Aloft (WIND)		60	12
County Warnings (COUNTY)		60	5
Cyclone Warnings (CYCLONE)		60	12
Icing Potential (CIP and SLD) (ICNG)		90	22
Pilot Weather Report (PIREPs)		90	12
Air Report (AIREPs)		90	12
Turbulence (TURB)		180	12
No Radar Coverage (RADAR CVRG)	no product image	30	5
Temporary Flight Restrictions (TFRs)	no product image	60	12
Terminal Aerodrome Reports (TAFs)	no product image	60	12

## **7-4. Weather Products Descriptions**

### **7-4-1. Page Set Up and Customizing**

The setup menus for the Navigation Map Page and the Weather Data Link (XM) Page control the map range settings above which weather products data are decluttered from the display. If a map range larger than the weather product map range setting is selected, the weather product data is removed from the map. The page menus also provide a means in addition to the softkeys for enabling/disabling display of weather products.

#### **Weather Data Link (XM) Page:**

- 1) Select the Weather Data Link (XM) Page.
- 2) Press the MENU Key.
- 3) With 'Weather Setup' highlighted, press the ENT Key (Figure 7-2).
- 4) Turn the small FMS Knob to select 'PRODUCT GROUP 1' or 'PRODUCT GROUP 2', and press the ENT Key (Figure 7-2).
- 5) Turn the large FMS Knob or press the ENT Key to scroll through product selections.
- 6) Turn the small FMS Knob to scroll through options for each product (ON/OFF, range settings, etc.).
- 7) Press the ENT Key to select an option.
- 8) Press the FMS Knob or CLR Key to return to the Weather Data Link (XM) Page with the changed settings.



**Figure 7-2. Weather Data Link Page Setup**

**Navigation Map Page:**

- 1) Select the Navigation Map Page.
- 2) Press the MENU Key.
- 3) With 'Map Setup' highlighted, press the ENT Key (Figure 7-3).
- 4) Turn the small FMS Knob to select the 'Weather' Group and press the ENT Key (Figure 7-3).
- 5) Turn the large FMS Knob or press the ENT Key to scroll through product selections (Figure 7-4).
- 6) Turn the small FMS Knob to scroll through options for each product (ON/OFF, range settings).
- 7) Press the ENT Key to select an option.
- 8) Press the FMS Knob or CLR Key to return to the Navigation Map Page with the changed settings.

**Figure 7-3. Navigation Map Page Menu**





**Figure 7-4. Navigation Map Setup Menu**

**Viewing legends for displayed weather products:**

- 1) Select the Weather Data Link (XM) Page or Navigation Map Page.
- 2) If viewing the Navigation Map Page, select the Map Softkey.
- 3) Select the LEGEND Softkey to display the legends for the displayed weather products.

Or:

- a) Press the MENU Key.
  - b) Select 'Weather Legend' and press the ENT Key.
- 4) Turn the FMS Knob to scroll through the legends if more are available than fit in the window.
  - 5) To remove the XM Weather Legends Window, select the LEGEND Softkey, or press the ENT Key, the CLR Key, or FMS Knob.

Additional information about the following weather products can be displayed by panning over the weather product on the map:

• Echo Tops • Cell Movement • SIGMETs • AIRMETs • METARs • County Warnings • TFRs • AIREPs • PIREPs

The map panning feature is enabled by pressing the RANGE Knob. The map range is adjusted by turning the RANGE Knob.

### **7-3-2. NEXRAD**

The National Weather Service (NWS) operates the WSR-88D, or NEXRAD (NEXt-generation RADar) system, an extensive network of 156 high-resolution Doppler radar systems. The NEXRAD network provides centralized meteorological information for the continental United States and selected overseas locations. The maximum range of a single NEXRAD site is 250 nm. In addition to a wide array of services, the NEXRAD network provides important information about severe weather and air traffic safety. Individual NEXRAD sites supply the network with radar images, and the images from each radar site may arrive at the network at different rates and times. Periodically, the weather data provider compiles the available individual site images from the network to form a composite image, and assigns a single time to indicate when it created the image. This image becomes the NEXRAD weather product. Individual images--gathered from each NEXRAD site--differ in age, and are always older than the displayed NEXRAD weather product age. The data provider then sends the NEXRAD data to the SiriusXM Weather service, whose satellites transmit this information during the next designated broadcast time for the NEXRAD weather product.

### **7-3-3. ECHO TOPS**

The Echo Tops weather product shows the location, elevation, and direction of the highest radar echo. The highest radar echo does not indicate the top of a storm or clouds; rather it indicates the highest altitude at which precipitation is detected. Information is derived from NEXRAD data.

### **7-3-4. Cloud Tops**

The Cloud Tops weather product depicts cloud top altitudes as determined from satellite imagery.

### **7-3-5. SiriusXM Lightning**

The SiriusXM Lightning weather product shows the approximate location of cloud-to-ground lightning strikes. A strike icon represents a strike that has occurred within a two-kilometer region. The exact location of the lightning strike is not displayed.

### **7-3-6. Cell Movement**

The Cell Movement weather product shows the location and movement of storm cells as identified by the ground-based system. Cells are represented by yellow squares, with direction of movement indicated with short, orange arrows.

### **7-3-7. SIGMETS and AIRMETS**

SIGMET (SIGnificant METeorological Information) and AIRMET (AIRmen's METeorological Information) are issued for potentially hazardous weather. A Convective SIGMET is issued for hazardous convective weather such as severe or widespread thunderstorms.

### **7-3-8. METARS**

METARs (METeorological Aerodrome Reports) typically contain information about the temperature, dewpoint, wind, precipitation, cloud cover, cloud heights, visibility, and barometric pressure at an airport or observation station. They can also contain information on precipitation amounts, lightning, and other critical data. METARs reflect hourly observations; non-routine updates include the code "SPECI" in the report. METARs are shown as colored flags at airports that provide them.

### **7-3-9. Surface Analysis and City Forecast**

Surface Analysis and City Forecast information is available for current and forecast weather conditions. Forecasts are available for intervals of 12, 24, 36, and 48 hours.

### **7-3-10. Freezing Levels**

The Freezing Level weather product shows the color-coded contour lines for the altitude and location at which the first isotherm is found. When no data is displayed for a given altitude, the data for that altitude has not been received, or is out of date and has been removed from the display. New data appears when it becomes available.

### **7-3-11. Winds Aloft**

The Winds Aloft weather product shows the forecasted wind speed and direction at the surface and at selected altitudes. Altitude can be displayed in 3,000-foot increments from the surface up to 42,000 feet MSL.

### **7-3-12. County Warnings**

The County Warning weather product provides specific public awareness and protection weather warnings from the National Weather Service (NWS). This can include information on tornadoes, severe thunderstorms, and flood conditions.

### **7-3-13. Cyclone**

The Cyclone weather product shows the current location of cyclones (hurricanes), tropical storms, and their projected track date and time (DD/HH:MM).

### **7-3-14. Icing (CIP and SLD)**

Current Icing Product (CIP) data shows a graphical view of the current icing environment. Icing severity is displayed in four categories: light, moderate, severe, and extreme (not specific to aircraft type). The CIP product is not a forecast, but a presentation of the current conditions at the time of the analysis.

Supercooled Large Droplet (SLD) icing conditions are characterized by the presence of relatively large, super cooled water droplets indicative of freezing drizzle and freezing rain aloft. SLD threat areas are depicted as magenta dots over the CIP colors.

### **7-3-15. Turbulence**

The Turbulence weather product identifies the potential for erratic movement of high-altitude air mass associated winds. Turbulence is classified as light, moderate, severe or extreme (not specific to aircraft type), at altitudes between 21,000 and 45,000 feet. Turbulence information is intended to supplement AIRMETs and SIGMETs.

### **7-3-16. PIREPS and AIREPS**

Pilot Weather Reports (PIREPs) are in-flight weather reports collected from pilots. When significant weather conditions are reported or forecast, Air Traffic Control (ATC) facilities are required to solicit PIREPs. A PIREP may contain adverse weather conditions, such as low in-flight visibility, icing conditions, wind shear, or turbulence. The report may also include pilot remarks and type of aircraft flown. PIREPs are issued as either Routine (UA) or Urgent (UUA).

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