# GARMIN

# G1000™

*cockpit reference guide*
*for Cessna Nav III*

This manual reflects the operation of System Software versions 0394.00 or later for Cessna 172R aircraft, 0395.00 or later for Cessna 172S aircraft, 0371.09 or later for normally aspirated Cessna 182 aircraft, 0372.08 or later for turbocharged Cessna 182 aircraft, 0373.05 or later for normally aspirated Cessna 206 aircraft, and 0374.05 or later for turbocharged Cessna 206 aircraft.  Some differences in operation may be observed when comparing the information in this manual to earlier or later software versions.

> *NOTE: Cessna Nav III aircraft include the Cessna 172R, the Cessna 172S, the normally aspirated Cessna 182 (182), the turbocharged Cessna 182 (T182), the normally aspirated Cessna 206 (206), and the turbocharged Cessna 206 (T206).  Unless otherwise indicated, information in the G1000 Cockpit Reference Guide pertains to all Cessna Nav III aircraft.*

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| Part Number | Change Summary |
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| 190-00384-03 (Rev A) | Added XM Radio and XM Weather<br>Added DME capability<br>Added BRG1/BRG2 pointers<br>Added dual audio panel operation<br>Added C172 parameters<br>Changed Airspeed Trend Vector<br>Changed Altitude Trend Vector<br>Added Checklist capability<br>Added Flight ID capability |

| Revision | Date of Revision | Affected Pages | Description |
|---|---|---|---|
| A | 12/15/04 | i – 158 | Initial release |
| B | 01/13/05 | Back cover, i-ii | Corrected system software versions. |

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**WARNING:** *Navigation and terrain separation must NOT be predicated upon the use of the terrain function. The G1000 Terrain Proximity feature is NOT intended to be used as a primary reference for terrain avoidance and does not relieve the pilot from the responsibility of being aware of surroundings during flight. The Terrain Proximity feature is only to be used as an aid for terrain avoidance and is not certified for use in applications requiring a certified terrain awareness system. Terrain data is obtained from third party sources. Garmin is not able to independently verify the accuracy of the terrain data.*

**WARNING:** *The displayed minimum safe altitudes (MSAs) are only advisory in nature and should not be relied upon as the sole source of obstacle and terrain avoidance information. Always refer to current aeronautical charts for appropriate minimum clearance altitudes.*

**WARNING:** *The Garmin G1000, as installed in Cessna Nav III aircraft, has a very high degree of functional integrity. However, the pilot must recognize that providing monitoring and/or self-test capability for all conceivable system failures is not practical. Although unlikely, it may be possible for erroneous operation to occur without a fault indication shown by the G1000. It is thus the responsibility of the pilot to detect such an occurrence by means of cross-checking with all redundant or correlated information available in the cockpit.*

**WARNING:** *For safety reasons, G1000 operational procedures must be learned on the ground.*

**WARNING:** *The altitude calculated by G1000 GPS receivers is geometric height above Mean Sea Level and could vary significantly from the altitude displayed by pressure altimeters, such as the GDC 74A Air Data Computer, or other altimeters in aircraft. GPS altitude should never be used for vertical navigation. Always use pressure altitude displayed by the G1000 PFD or other pressure altimeters in aircraft.*

**WARNING:** *The Jeppesen database used in the G1000 system must be updated regularly in order to ensure that its information remains current. Updates are released every 28 days. A database information packet is included in the G1000 package.* ***Pilots using an outdated database do so entirely at their own risk****.*

**WARNING:** *The basemap (land and water data) must not be used for navigation, but rather only for non-navigational situational awareness. Any basemap indication should be compared with other navigation sources.*

**CAUTION:** *The United States government operates the Global Positioning System and is solely responsible for its accuracy and maintenance. The GPS system is subject to changes which could affect the accuracy and performance of all GPS equipment. Portions of the Garmin G1000 utilize GPS as a precision electronic NAVigation AID (NAVAID). Therefore, as with all NAVAIDs, information presented by the G1000 can be misused or misinterpreted and, therefore, become unsafe.*

*CAUTION: To reduce the risk of unsafe operation, carefully review and understand all aspects of the G1000 Pilot's Guide documentation and the G1000 Flight Manual Supplement. Thoroughly practice basic operation prior to actual use. During flight operations, carefully compare indications from the G1000 to all available navigation sources, including the information from other NAVAIDs, visual sightings, charts, etc. For safety purposes, always resolve any discrepancies before continuing navigation.*

*CAUTION: The Garmin G1000 does not contain any user-serviceable parts. Repairs should only be made by an authorized Garmin service center. Unauthorized repairs or modifications could void both the warranty and the pilot's authority to operate this device under FAA/FCC regulations.*

*CAUTION: The GDU 1040 PFD and MFD displays use a lens coated with a special anti-reflective coating that is very sensitive to skin oils, waxes, and abrasive cleaners. CLEANERS CONTAINING AMMONIA WILL HARM THE ANTI-REFLECTIVE COATING. It is very important to clean the lens using a clean, lint-free cloth and an eyeglass lens cleaner that is specified as safe for anti-reflective coatings.*

*CAUTION: All visual depictions contained within this document, including screen images of the G1000 panel and displays, are subject to change and may not reflect the most current G1000 system. Depictions of equipment may differ slightly from the actual equipment.*

*CAUTION: The illustrations in this guide are only examples. Never use the G1000 to attempt to penetrate a thunderstorm. Both the FAA Advisory Circular, Subject: Thunderstorms, and the Aeronautical Information Manual (AIM) recommend avoiding "by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo."*

*CAUTION: There are several atmospheric phenomena in addition to nearby thunderstorms that can cause isolated discharge points in the strike display mode. However, clusters of two or more discharge points in the strike display mode do indicate thunderstorm activity if these points reappear after the screen has been cleared. Avoid the clusters to avoid the thunderstorms. In the cell display mode, even a single discharge point may represent thunderstorm activity and should therefore be avoided.*

*WARNING: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

*WARNING: Use of the Stormscope interface for hazardous weather penetration (thunderstorm penetration) is prohibited. Weather information on the G1000 MFD is approved only for weather avoidance, not penetration.*

⚠ **WARNING:** *Traffic information shown on the G1000 Multi Function Display is provided as an aid in visually acquiring traffic.  Pilots must maneuver the aircraft based only upon ATC guidance or positive visual acquisition of conflicting traffic.*

⚠ **WARNING:** *Use of the GDL 69 Weather Interface for hazardous weather penetration (thunderstorm penetration) is prohibited.  Weather information provided by the GDL 69 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 in data transmission and the relative age of the data, NEXRAD weather data should not be used for short-range weather avoidance.*

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# SECTION 1: INTRODUCTION

This document is designed to provide an overview of the G1000 Integrated Cockpit System as installed in Cessna Nav III aircraft.

The G1000 system includes the following Line Replaceable Units (LRUs):

- GDU 1040 Primary Flight Display (PFD)
- GDU 1040 Multi Function Display (MFD)
- GIA 63 Integrated Avionics Units (2)
- GEA 71 Engine/Airframe Unit
- GDC 74A Air Data Computer (ADC)
- GRS 77 Attitude and Heading Reference System (AHRS)
- GMU 44 Magnetometer
- GMA 1347 Audio System with integrated Marker Beacon Receiver
- GTX 33 Mode-S Transponder
- GDL 69/69A Data Link

The LRUs are further described in the following section. All LRUs have a modular design, which greatly eases troubleshooting and maintenance of the G1000 system. A top-level G1000 block diagram is given in Figure 1-1. Additional or optional interfaces are depicted in Figure 1-2.

## 1.1   PURPOSE AND SCOPE

The purpose of this Cockpit Reference Guide is to introduce the Cessna pilot to the major features of the  G1000 System.  **It is not intended to be a comprehensive operating guide.**  Complete operating procedures for all of the system features are found in the documents listed below:

- G1000 Multi Function Display Pilot's Guide

- G1000 Multi Function Display Optional Interface Addendum
- G1000 Primary Flight Display Pilot's Guide
- G1000 Engine Indication System Pilot's Guide
- G1000 Audio Panel Pilot's Guide
- G1000 VHF NAV/COM Pilot's Guide
- G1000 Mode S Transponder Pilot's Guide

This guide gives the pilot a basic overview of  the Primary Flight Display (PFD), Multi Function Display (MFD), and the GMA 1347 Audio System.

*NOTE: The pilot should read and thoroughly understand the Cessna Aircraft Flight Manual for limitations, procedures and performance information not contained in this Cockpit Reference Guide, The Cessna Aircraft Flight Manual always takes precedence over the information found in this guide.*

*NOTE: Throughout this document references made to Cessna Nav III shall apply equally to the 172, 182, T182, 206, and T206 except where specifically noted.*

*NOTE: All visual depictions contained within this Cockpit Reference Guide, including screen images of the G1000 panel and displays, are subject to change and may not reflect the most current G1000 system software. Depictions of equipment may differ slightly from the actual equipment.*

High-Speed Data Bus (Ethernet)

**GDU 1040** (PFD)

**GMA 1347**
Audio Panel

**GDU 1040** (MFD)

Reversionary
Control

Reversionary
Control

**GDC 74A**
Air Data
Computer

OAT
Airspeed
Altitude
Vertical Speed

**No. 1 GIA 63**
Integrated Avionics Unit

System Inegration Processors
I/O Processors
VHF COM
VHF NAV/LOC
GPS
Glideslope

GPS Output

**No. 2 GIA 63**
Integrated Avionics Unit

System Integration Processors
I/O Processors
VHF COM
VHF NAV/LOC
GPS
Glideslope

GPS Output

**GRS 77**
AHRS

Attitude
Rate of Turn
Slip/Skid

**GMU 44**
Magnetometer

Heading

**Honeywell
KAP 140**
Autopilot
(If equipped)

**GTX 33**
Transponder

**GEA 71**
Engine/Airframe
Unit

**Figure 1-1  Basic G1000 System**

High-Speed Data Bus (Ethernet)

**No. 2 GIA 63**
**Integrated Avionics Unit**

System Integration Processors
I/O Processors
VHF COM
VHF NAV/LOC
GPS
Glideslope

**GDL 69/69A**
**Data Link**
Real-time Weather
Digital Audio Entertainment

**L3**
**Stormscope**
Lightning Strike and
Thunderstorm Detection

**Honeywell**
**KR 87**
ADF Receiver

**Honeywell**
**KN 63**
DME
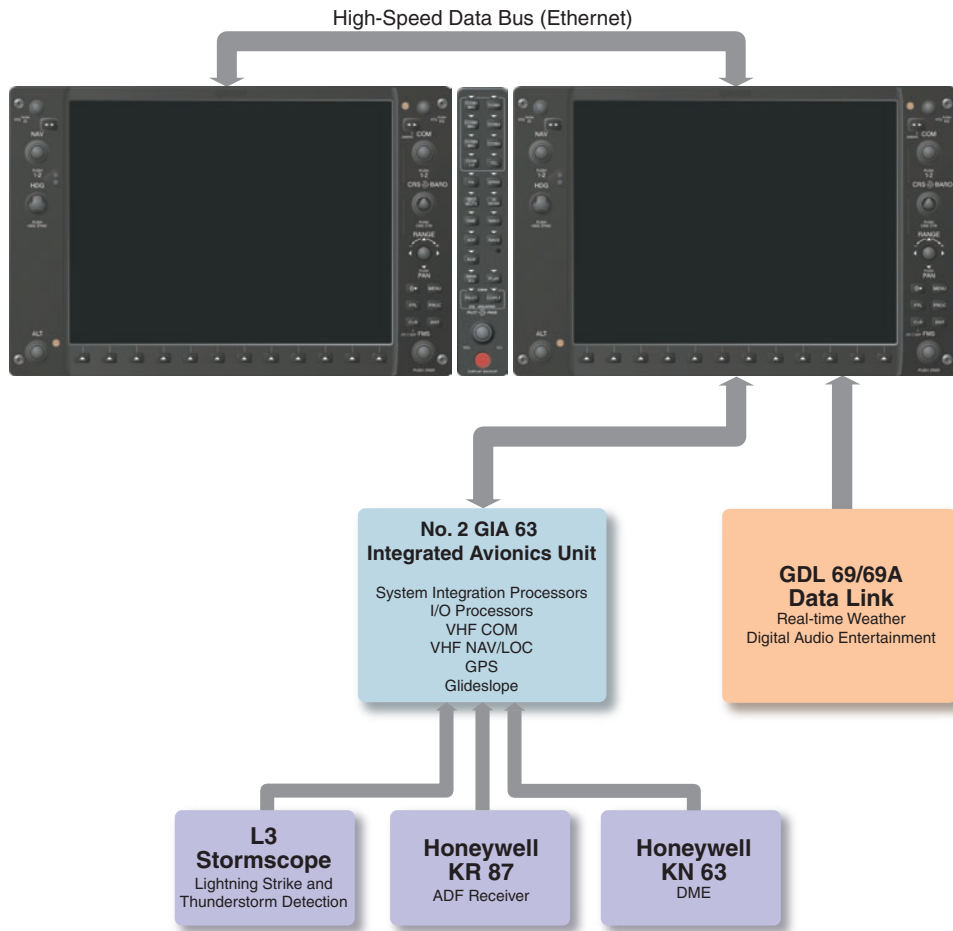
**Figure 1-2  G1000 Optional Interfaces**

*NOTE: For information on all optional equipment shown in Figure 1-2, please refer the Garmin G1000 MFD Optional Interface Addendum as well as the Multi Function Display Optional Interfaces section of this document. This document assumes that the reader is already familiar with the operation of this additional equipment.*

## 1.2 PFD/MFD CONTROLS
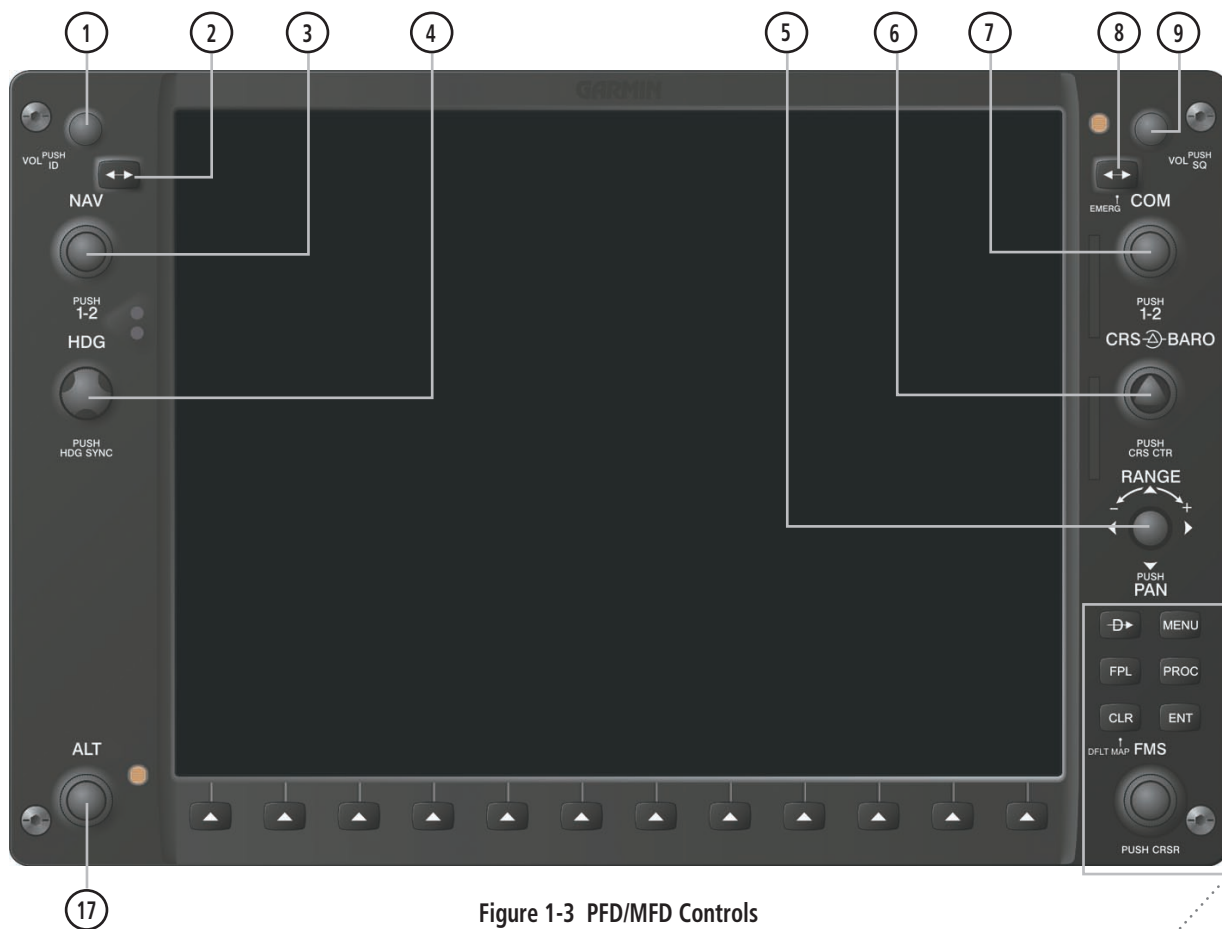


**Figure 1-3  PFD/MFD Controls**

1. NAV VOL/ID Knob
2. NAV Frequency Toggle Key
3. NAV Knob
4. Heading Knob
5. Range Joystick
6. Course/Baro Knob
7. COM Knob
8. COM Frequency Toggle Key
9. COM VOL/SQ Knob
10. Direct-to Key
11. Flight Plan Key
12. Clear Key
13. Flight Management System Knob
14. Menu Key
15. Procedure Key
16. Enter Key
17. Altitude Knob
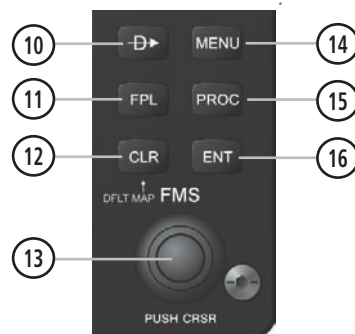
The G1000 controls and keys have been designed to simplify the operation of the system and minimize workload as well as the time required to access sophisticated functionality. The following list provides an overview of the controls located on the display bezel.

- **(1) NAV VOL/ID Knob –** Controls the NAV audio level. Press to toggle the Morse code identifier ON and OFF. Volume level is shown in the field as a percentage.
- **(2) NAV Frequency Toggle Key –** Toggles the standby and active NAV frequencies.
- **(3) Dual NAV Knob –** Tunes the MHz (large knob) and kHz (small knob) standby frequencies for the NAV receiver. Press to toggle the tuning cursor (cyan box) between the NAV1 and NAV2 fields.
- **(4) Heading Knob –** Manually selects a heading when turned. Synchronizes the heading bug with the compass lubber line when pressed.
- **(5) Joystick –** Changes the map range when rotated. Activates the map pointer when pressed.
- **(6) CRS/BARO Knob –** The **large** knob sets the altimeter barometric pressure and the **small** knob adjusts the course. The course is only adjustable when the HSI is in VOR1, VOR2, or OBS/SUSP mode. Pressing this knob centers the CDI on the currently selected VOR.
- **(7) Dual COM Knob –** Tunes the MHz (**large** knob) and kHz (**small** knob) standby frequencies for the COM transceiver. Pressing this knob toggles the tuning cursor (cyan box) between the COM1 and COM2 fields.
- **(8) COM Frequency Toggle Key –** Toggles the standby and active COM frequencies. Pressing and holding this key for two seconds automatically tunes the emergency frequency (121.5 MHz) in the active frequency field.

- **(9) COM VOL/SQ Knob –** Controls COM audio level. Pressing this knob turns the COM automatic squelch ON and OFF. Audio volume level is shown in the field as a percentage.
- **(10) Direct-to Key ( ⟲ ) –** Allows the user to enter a destination waypoint and establish a direct course to the selected destination (specified by the identifier, chosen from the active route, or taken from the map cursor position).
- **(11) FPL Key –** Displays the active Flight Plan Page for creating and editing the active flight plan, or for accessing stored flight plans.
- **(12) CLR Key (DFLT MAP) –** Erases information, cancels an entry, or removes page menus. To display the Navigation Map Page immediately, press and hold **CLR** (MFD only).
- **(13) Dual FMS Knob –** Used to select the page to be viewed (only on the MFD). The **large** knob selects a page group (MAP, WPT, AUX, NRST), while the **small** knob selects a specific page within the page group. Pressing the **small** knob turns the selection cursor ON and OFF. When the cursor is ON, data may be entered in the different windows using the **small** and **large** knobs. The **large** knob is used to move the cursor on the page, while the **small** knob is used to select individual characters for the highlighted cursor location. When the G1000 displays a list that is too long for the display screen, a scroll bar appears along the right side of the display, indicating the availability of additional items within the selected category. Press the **FMS/PUSH CRSR** knob to activate the cursor and turn the **large FMS** knob to scroll through the list.
- **(14) MENU Key –** Displays a context-sensitive list of options. This list allows the user to access additional features, or to make setting changes that relate to certain pages.

- **(15) PROC Key –** Selects approaches, departures and arrivals from the flight plan. If a flight plan is used, available procedures for the departure and/or arrival airport are automatically suggested. If a flight plan is not used, the desired airport and the desired procedure may be selected. This key selects IFR departure procedures (DPs), arrival procedures (STARs) and approaches (IAPs) from the database and loads them into the active flight plan.
- **(16) ENT Key –** Accepts a menu selection or data entry. This key is used to approve an operation or complete data entry. It is also used to confirm selections and information entries.
- **(17) Dual ALT Knob –** Sets the reference altitude in the box located above the Altimeter. The **large** knob selects the thousands, while the **small** knob selects the hundreds.

> **NOTE:** *The selected COM (displayed in green) is controlled by the COM MIC key on the audio panel (GMA 1347).*

> **NOTE:** *Please refer to the Pilot's Guide Appendices for instructions on updating the aviation database.*

## 1.3  SECURE DIGITAL CARDS

The GDU 1040 data card slots use Secure Digital (SD) cards. SD cards are used for aviation database updates and terrain database storage.

### To install an SD card:

1. Insert the SD card in the SD card slot located on the right side of the display bezel (the front of the card should be flush with the face of the display bezel).

### To remove an SD card:

1. Gently press on the SD card to release the spring latch and eject the card.

## 1.4  SYSTEM POWER-UP

While the system begins to initialize, test annunciations are displayed to the pilot at power-up, as shown in Figure 1-5  All system annunciations should be cleared within one (1) minute of power-up.  The GMA 1347 also annunciates all bezel lights briefly upon power-up.

✓ **NOTE:** *Please see the Aircraft Flight Manual (AFM) for specific procedures concerning avionics power application and emergency power supply operation.*

On the PFD, the AHRS system displays the 'AHRS ALIGN: Keep Wings Level' message and begins to initialize.  The AHRS should display valid attitude and heading fields within one (1) minute of power-up.  The AHRS can align itself both while taxiing and during level flight.

✓ **NOTE:** *Please refer to the Pilot's Guide Appendices for AHRS initialization bank angle limitations.*

✓ **NOTE:** *See the Annunciations and Alerts Pilot's Guide for additional information regarding system annunciations and alerts.*



**Figure 1-4  PFD Initialization**

When the MFD powers up, the MFD Power-up Page displays the following information:

- System version
- Copyright
- Checklist filename
- Land database name and version
- Obstacle database name and version
- Terrain database name and version
- Aviation database name, version and effective dates

When this information has been reviewed for currency (to ensure that no databases have expired), the pilot is prompted to continue.  Current database information is displayed with the valid operating dates, cycle number and database type.

Press the **ENT** key to acknowledge this information and proceed to the Navigation Map Page.  When the system has acquired a sufficient number of satellites to determine a position, the Navigation Map Page appears, showing the aircraft current position.



**Figure 1-5  MFD Power-up Page**

**Garmin G1000 Cockpit Reference Guide for Cessna Nav III**

## 1.5   WORKING WITH MENUS

Much of the G1000 operation is accomplished using a menu interface.  The G1000 has a bezel-mounted dedicated **MENU** key that when pressed, displays a context-sensitive list of options.  This options list allows the pilot to access additional features or make setting changes which specifically relate to the currently displayed window.  There is no all-encompassing menu.  The pilot must select the window for which to see a desired list of options.

Some menus provide access to additional submenus that are used to view, edit, select and review options.

There may be more options than can be displayed; therefore the pilot may have to turn the **small or large FMS** knob to scroll through the list to identify them.  In all cases, once the menu appears, turn the **small or large FMS** knob to highlight an item and press the **ENT** key.  The pilot may press the **CLR** key to remove the menu and cancel the operation.  Pressing the **FMS** knob also removes the displayed menu.
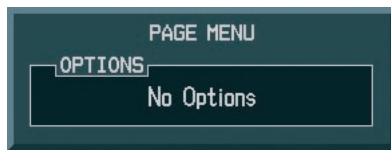
**Figure 1-6  PFD Menu – No Options With NRST Window Displayed**
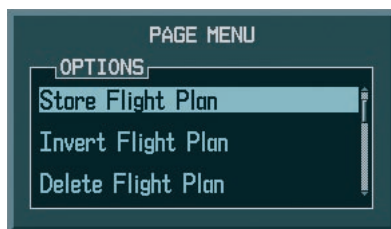
**Figure 1-7  PFD Menu – Options With FPL Window Displayed**

## 1.6   SYSTEM OPERATION

### Normal Mode

The PFD and MFD are connected together on a single Ethernet bus, allowing for high-speed communication between the two units.  Each GIA 63 is connected to a single display, as shown in Figure 1-1.  This allows the units to share information, thus enabling true system integration.

In normal operating mode, the PFD displays graphical flight instrumentation in lieu of the traditional gyro instruments.  Attitude, heading, airspeed, altitude and vertical speed are all shown on one display.  The MFD shows a full-color moving map with navigation information.  Both displays offer control for COM and NAV frequency selection, as well as for the heading, course/baro and altitude reference functions.  On the left of the MFD display, the Engine Indication System (EIS) cluster shows engine and airframe instrumentation.  Figure 1-8 gives an example of the G1000 system in normal mode.



**Figure 1-8  Normal Mode**

## Reversionary Mode

Should a failure occur in either display, the G1000 automatically enters reversionary mode. In reversionary mode, all important flight information is shown on the remaining display. An example of reversionary mode entry due to a failed PFD is shown in Figure 1-9.

> **NOTE:** Refer to the System Overview in the G1000 Cessna Nav III Pilot's Guide for more information regarding sub-system availability in reversionary mode.

> **NOTE:** The system alerts the pilot when backup paths are utilized by the LRUs. Refer to the Annunciations and Alerts Pilot's Guide for further information regarding these and other system alerts.

Reversionary mode may also be manually activated by the pilot if the system fails to detect a display problem. Reversionary mode is activated manually by pressing the red **DISPLAY BACKUP** button at the bottom of the GMA 1347. Pressing this button again deactivates reversionary mode.



**Figure 1-9  Reversionary Mode (Failed PFD)**

## 1.7 AHRS OPERATION

In addition to using internal sensors, the GRS 77 AHRS uses GPS information, magnetic field data and air data to assist in attitude/heading calculations. In normal (primary) mode, the AHRS relies upon GPS and magnetic field measurements. If either of these external measurements is unavailable or invalid, the AHRS uses air data information for attitude determination. Four AHRS modes of operation are available (see table below) and depend upon the combination of available sensor inputs. Loss of air data, GPS, or magnetometer sensor inputs is communicated to the pilot by message advisory alerts.

### GPS Input Failure

The G1000 system provides two sources of GPS information. If a single GPS receiver fails, or if the information provided from one of the GPS receivers is unreliable, the AHRS seamlessly transitions to using the other GPS receiver. An alert message informs the pilot of the use of the backup GPS path. If both GPS inputs fail, the AHRS continues to operate in reversionary 'No GPS' mode so long as the air data and magnetometer inputs are available and valid.

### Air Data Input Failure

A failure of the air data input has no effect on AHRS output while AHRS is operating in normal/primary mode. A failure of the air data input while the AHRS is operating in reversionary 'No GPS' mode results in invalid attitude and heading information on the PFD (as indicated by red 'X' flags).

### Magnetometer Failure

If the magnetometer input fails, the AHRS transitions to one of the reversionary 'No Magnetometer' modes and continues to output valid attitude information. However, the heading output on the PFD does become invalid (as indicated by a red 'X').

> **NOTE:** Please refer to the Annunciations and Alerts Pilot's Guide for specific AHRS alert information.

> **NOTE:** Pilots should be aware that aggressive maneuvering in any of the three reversionary modes listed below can degrade AHRS accuracy.

| AHRS Mode | Available AHRS Functions | | | Available Sensor Inputs | | |
|---|---|---|---|---|---|---|
| | Pitch | Roll | Heading | GPS Input (At least one) | GMU 44 Magnetometer | GDC 74A Air Data Computer |
| Normal/Primary | X | X | X | X | X | X |
| Reversionary: No GPS | X | X | X | - | X | X |
| Reversionary: No Magnetometer | X | X | - | X | - | X |
| Reversionary: No Magnetometer No Air Data | X | X | - | X | - | - |

# SECTION 2: PRIMARY FLIGHT DISPLAY

## 2.1   INTRODUCTION

This section of the Cockpit Reference Guide introduces the pilot to the major features of the Primary Flight Display (PFD). A complete description of the PFD with detailed operating procedures is presented in the G1000 Primary Flight Display Pilot's Guide.

## 2.2   PFD DESCRIPTION

The display portion of the G1000 Integrated Cockpit System in the Cessna Nav III installation consists of two 10.4 inch liquid crystal displays (LCDs). During normal operations, the left display is configured as the Primary Flight Display (PFD).

## 2.3   PFD POWER-ON

The PFD powers on when the master switch is placed in the ON position.

## 2.4   BACKLIGHTING

Backlighting adjustment (displays and keys) is primarily through the avionics dimmer control (see the Cessna Aircraft Flight Manual). Backlighting for both displays can alternatively be controlled from the PFD, which has two adjustment modes:

- Auto - When the avionics dimmer control is rotated to counterclockwise position, the G1000 automatically adjusts the display backlighting based on the amount of light in the cockpit.
- Manual - Allows the pilot to manually adjust the backlighting from the PFD.

The backlighting intensity scale ranges from 0.14% to 100.00%. "AUTO" is the default setting.

> **NOTE:** *No other window can be displayed in the lower right corner of the PFD when pressing the* **MENU** *key to change backlighting.*

**To manually adjust the backlight for the PFD and MFD:**

1. Press the **MENU** key on the PFD to display the PFD Setup Menu window.

2. Press the **small FMS** knob to activate the cursor. 'PFD DSPL > AUTO' is now highlighted.

3. Turn the **small FMS** knob to display the selection window.

4. Turn the **small or large FMS** knob to select 'MANUAL', then press the **ENT** key.

5. With the intensity value now highlighted, turn the **small FMS** knob to select the desired backlighting.

6. Turn the **large FMS** knob to highlight 'MFD DSPL > AUTO' and repeat steps 3 through 6.
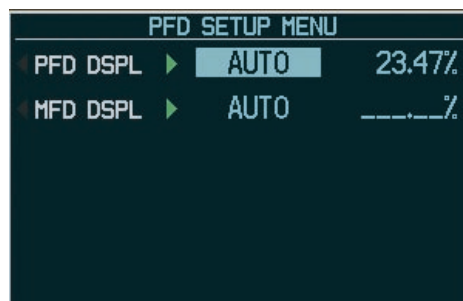


**Figure 2-1  PFD Setup Menu Window**

## 2.5 PFD SOFTKEYS

The PFD softkeys perform the following functions:

**INSET** – Press to display the Inset Map in the lower left corner of the PFD.

*OFF* – Press to disable the Inset Map.

*DCLTR* (Declutter) – Press momentarily to select the desired amount of map detail. The declutter level appears adjacent to the DCLTR softkey.

- No declutter: All map features are visible
- DCLTR – 1: Declutters land data
- DCLTR – 2: Declutters land and SUA data
- DCLTR – 3: Declutters large NAV data

*TRAFFIC* – Press to display traffic on the map.

*TOPO* – Press to display topographical data on the map.

*TERRAIN* – Press to display terrain information on the map using color-coded red and yellow terrain tiles based upon the aircraft's current altitude.

*BACK* – Press to return to the default softkey configuration.

LTNG – Press to display Stormscope data on the Inset Map.

**PFD** – Press to display the additional softkeys for additional configurations of the PFD.

*METRIC* – Press to display the current and reference altitudes in meters. Pressing the metric softkey also changes the barometric setting to hectopascals.

*DFLTS* – Press to reset default settings on the PFD.

*DME* (optional) – Press to display the DME information window.

*BRG1 (bearing)* – Press to cycle through the following information:

*NAV1* – Displays NAV1 waypoint frequency or identifier and DME information in the BRG1 information window.

*GPS* – Displays GPS waypoint identifier and GPS distance information in the BRG1 information window.

*OFF* – Removes the BRG1 information window.

*360 HSI* – Press to display the 360° compass rose.

*ARC HSI* – Press to display the 140° viewable arc.

*BRG2 (bearing)* – Press to cycle through the following information:

*NAV2* – Displays NAV2 waypoint frequency or identifier and DME information in the BRG2 information window.

*GPS* – Displays GPS waypoint identifier and GPS distance information in the BRG2 information window.

*OFF* – Removes the BRG2 information window.

*STD BARO* – Press to set the barometric pressure to 29.92 inches of mercury (1,013 hPa) by pressing the **METRIC** softkey.

*BACK* – Press to return to the previous level softkeys.

**CDI** – Press to switch navigation mode on the CDI between GPS, NAV1 and NAV2.

**DME** (optional) – Press to display the DME Tuning window.

**OBS** - Press to select OBS mode on the CDI when navigating by GPS.

**XPDR –** Press to display the transponder mode selection softkeys.

*STBY –* Press to select standby mode.

*ON –* Press to select mode A.

*ALT –* Press to select altitude reporting mode.

*VFR –* Press to automatically squawk the VFR code (1200 in U.S.).

*CODE –* Press to display transponder code selection softkeys 0-7.

**0 through 7** - Press numbers to enter code.

**BKSP** - Press to remove numbers entered one at a time.

*IDENT –* Press to provide special aircraft position identification to Air Traffic Control (ATC).

*BACK –* Press to return to the previous level softkeys.

**IDENT –** Press to provide special aircraft position identification to ATC.

**TMR/REF –** Press to display the References window.

**NRST –** Press to display the Nearest Airports window.

**ALERTS –** Press to display the Alerts window.



Press the BACK or OFF softkey to return to the top level softkeys
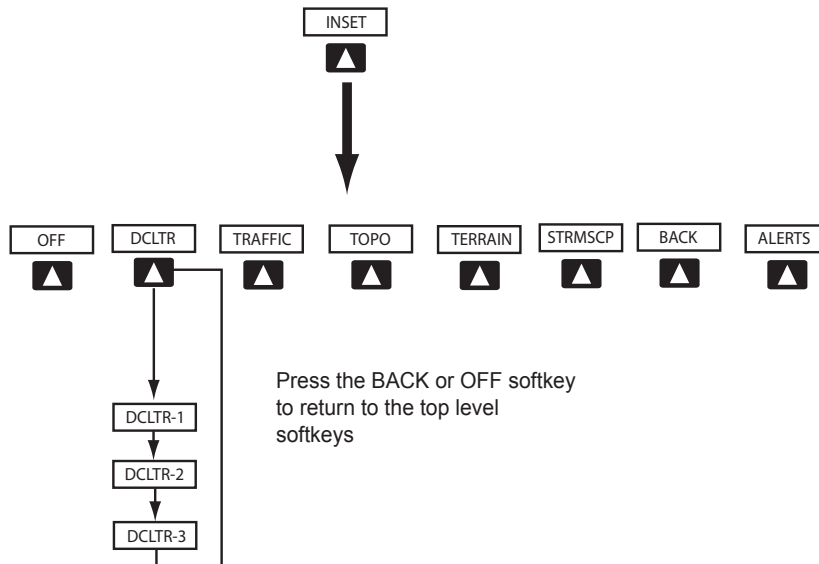
**Figure 2-2a  PFD Softkeys (1 of 2)**

PFD

METRIC  DFLTS  (optional) DME  BRG1  360 HSI  ARC HSI  BRG2  STD BARO  BACK
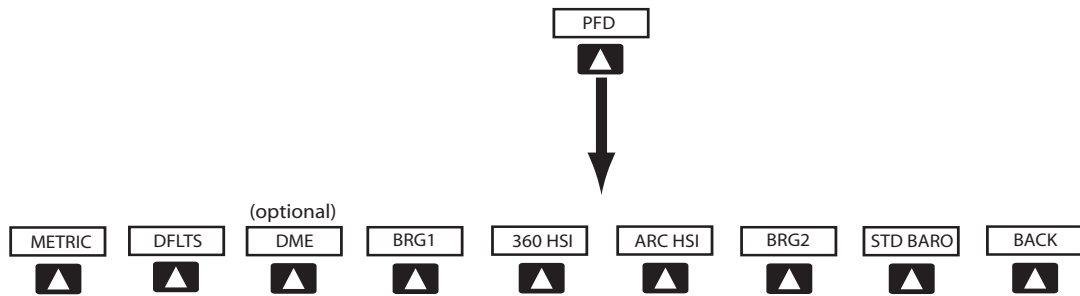
Press the **DFLTS** softkey to change the PFD metric values to standard

Press the **STD BARO** or **BACK** softkeys to return to the top level softkeys

OBS  CDI  (optional) DME  XPDR  IDENT  TMR/REF  NRST  ALERTS

CDI (NAV1)

CDI (NAV2)

Press the BACK softkey to return to the top level softkeys

STBY  ON  ALT  VFR  CODE  IDENT  BACK  ALERTS

Press the BACK softkey to return to the top level softkeys

0  1  2  3  4  5  6  7  IDENT  BKSP  BACK  ALERTS
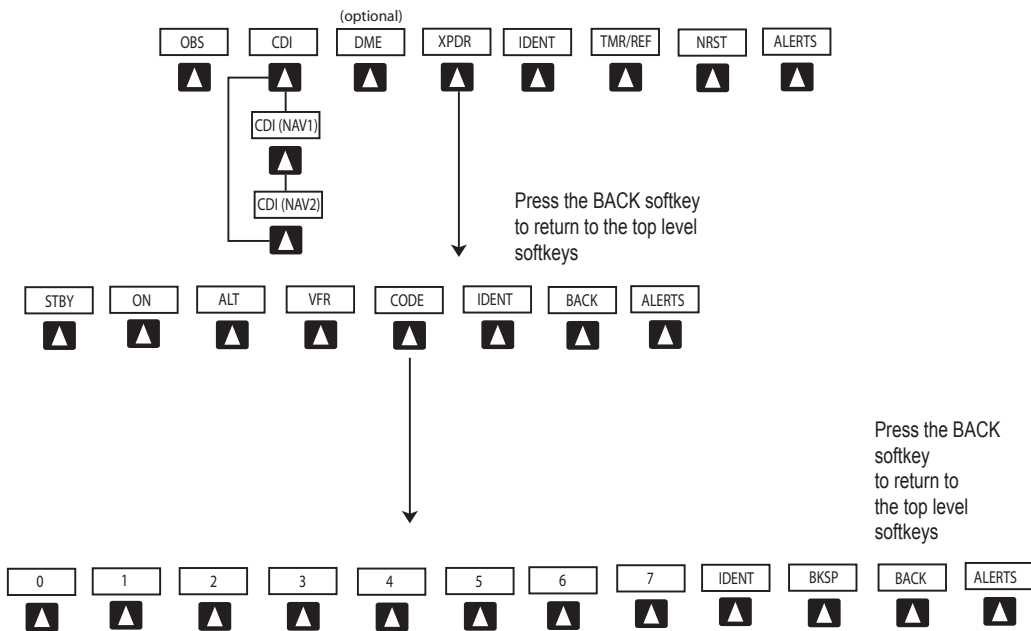
**Figure 2-2b  PFD Softkeys (2 of 2)**

**Figure 2-3  Default PFD Information**

| | |
|---|---|
| (1) NAV Frequency Window | (10) Turn Rate Indicator |
| (2) Airspeed Indicator | (11) Barometric Setting Box |
| (3) True Airspeed Box | (12) Vertical Speed Indicator |
| (4) Heading Box | (13) Altimeter |
| (5) Horizontal Situation Indicator | (14) Altitude Reference Box |
| (6) Outside Air Temperature Box | (15) COM Frequency Window |
| (7) Softkeys | (16) Navigation Status Bar |
| (8) System Time Box | (17) Slip/Skid Indicator |
| (9) Transponder Status Bar | (18) Attitude Indicator |

| 1 | Traffic Annunciation | 7 | Alerts Window |
| 2 | Selected Heading Box | 8 | Selected Course Box |
| 3 | Inset Map | 9 | Annunciation Window |
| 4 | BRG1 Information Window | 10 | Vertical Deviation/Glideslope Indicator |
| 5 | DME Information Window | 11 | Marker Beacon Annunciation |
| 6 | BRG2 Information Window | | |

**Figure 2-4  Additional PFD Information**

## 2.6 FLIGHT INSTRUMENTS

The Flight Instruments include airspeed, attitude, altitude, vertical speed, and heading in a standard aircraft "T" arrangement.  This primary display information is complemented with other communication, navigation, flight control, annunciation and planning information.

### Airspeed Indicator

The Airspeed Indicator displays airspeed on a rolling number gauge using a moving tape.  The following additional information is also displayed:

- Speed indication
- Speed ranges
- Airspeed Trend Vector
- Vspeed references
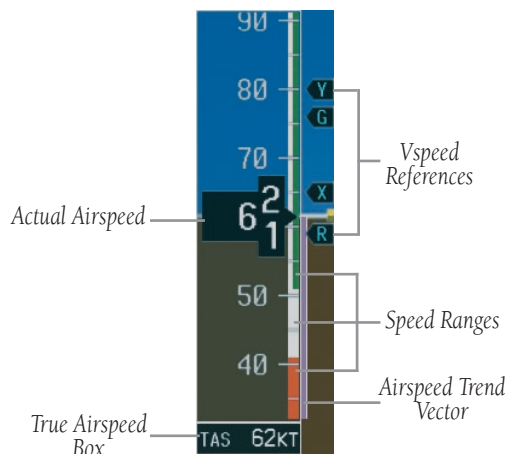


**Figure 2-5  Airspeed Indicator**

### Speed Indication

The numeric labels and major tick marks on the moving tape are marked at intervals of 10 knots, while minor tick marks on the moving tape are indicated at intervals of 5 knots.

Speed indication starts at 20 knots, with 60 knots of airspeed viewable at one time. The indicated airspeed is displayed inside the black pointer.  The pointer remains black until reaching never exceed speed (Vne) at which it turns red.
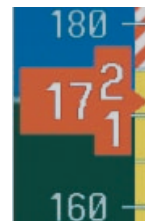


**Figure 2-6  Red Pointer at Vne**

### Speed Ranges

A color-coded (white, green, yellow, and red) speed range strip is located on the moving tape.  The colors denote flaps operating range, normal operating range, and never exceed speed (Vne).  A red range is also present for low speed awareness.  Refer to the Aircraft Flight Manual (AFM) for airspeed limitations and indicator markings.

### Airspeed Trend Vector

This vertical, magenta line extends up or down on the airspeed scale located right of the color-coded speed range strip.  The end of the trend vector displays approximately what the airspeed will be in 6 seconds if the current rate of acceleration is maintained.  The trend vector is absent if the speed remains constant or if any data needed to calculate airspeed is not available due to a system failure.

### Vspeed References

Vspeeds are set using the **TMR/REF** softkey.  Glide, Vr, Vx and Vy are shown on the References window.  When active (ON), the Vspeeds are displayed at their respective locations to the right of the airspeed scale.  Refer to the Cessna Aircraft Flight Manual for the Vspeed values and the Auxiliary Windows section in the PFD Pilot's Guide for information on setting and displaying Vspeeds.

### True Airspeed Box

The True Airspeed box, located below the Airspeed Indicator, displays the true airspeed in knots.

### Attitude Indicator

The Attitude Indicator displays the following information over a blue virtual sky and brown virtual ground with a white virtual horizon line. The yellow inverted "V" represents the aircraft.

- **Pitch Scale –** Major pitch marks and numeric labels at 10, 20, 30, 40, 50, 60, 70, and 80 degrees are shown above and below the horizon line. Minor pitch marks at 5, 15, and 25 degrees above and 5, 15, 25, 35, and 45 degrees below are shown.
- **Pitch Warning –** Red extreme pitch warning chevrons pointing toward the horizon are displayed starting at 50 degrees above and 30 degrees below the horizon line.

- **Roll Scale –** The Roll Indicator shows tick marks at 0, 10, 20, 30, 45, and 60 degrees roll to the left and right.
- **Slip/Skid Indicator –** The Slip/Skid Indicator is the white bar beneath the roll pointer. The indicator moves with the roll pointer and moves laterally away from the pointer to indicate lateral acceleration. A slip/skid is indicated by the location of the indicator relative to the roll pointer. One Slip/Skid indicator displacement is equal to one ball displacement when compared to a traditional slip/skid indicator.
- **Failure Indication –** In the event of indicator failure, the pitch ladder is disabled and a red 'X' is displayed over the center of the artificial horizon. Yellow text indicating "ATTITUDE FAIL" is also shown. If either roll or pitch angle is invalid, the artificial horizon shows a black background at a pitch and roll of zero degrees.
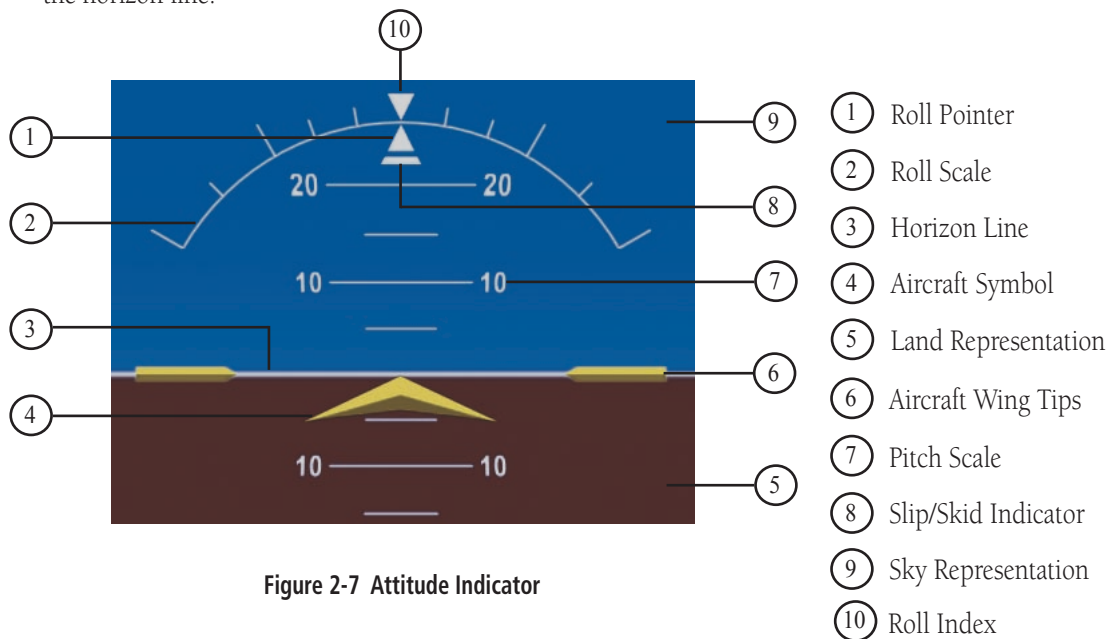


**Figure 2-7  Attitude Indicator**

| | |
|---|---|
| 1 | Roll Pointer |
| 2 | Roll Scale |
| 3 | Horizon Line |
| 4 | Aircraft Symbol |
| 5 | Land Representation |
| 6 | Aircraft Wing Tips |
| 7 | Pitch Scale |
| 8 | Slip/Skid Indicator |
| 9 | Sky Representation |
| 10 | Roll Index |

## Altimeter

The Altimeter displays barometric altitude values in feet on a rolling number gauge using a moving tape. The Altimeter also displays the following additional information:

- Current altitude value
- Altitude Reference Bug
- Altitude Trend Vector
- Metric display



*Altitude Reference Box*

*Altitude Trend Vector*

*Current Altitude*

*Altitude Reference Bug*

*Barometric Setting Box*
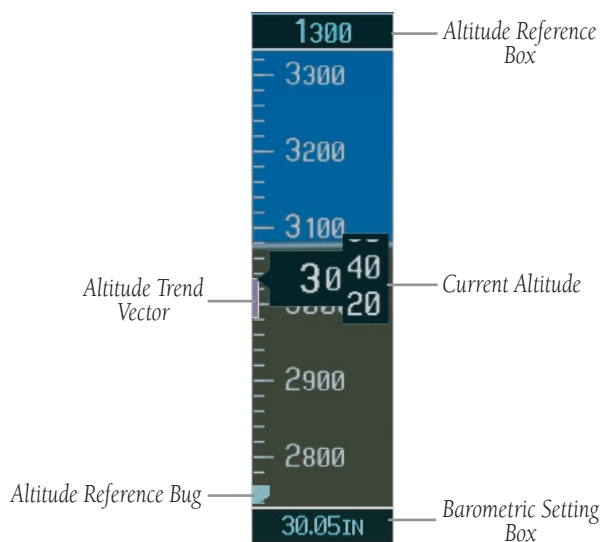
**Figure 2-8  Altimeter**

## Altitude Values

The numeric labels and major tick marks are shown at intervals of 100 feet. Minor tick marks are at intervals of 20 feet. The current altitude is displayed in the black pointer box.

## Altitude Reference Bug

The Altitude Reference Bug is displayed at the reference altitude to provide increased altitude awareness. If the reference altitude is above or below the displayed altitude scale, the Altitude Reference Bug is displayed at the top or bottom edge of the tape, respectively.

### To set the altitude reference bug:

1. Turn the **ALT** knobs to set the altitude reference bug. The **small ALT** knob sets the hundreds and the **large ALT** knob sets the thousands. This altitude also appears in the altitude reference box above the altimeter.

## Altitude Trend Vector

This vertical magenta line extends up or down the altitude scale located left of the numeric labels. The end of the trend vector displays approximately what the altitude will be in 6 seconds if the current rate of vertical speed is maintained. The trend vector is absent if altitude remains constant or if any data needed to calculate it is not available due to a system failure.

## Altitude Reference Box

The Altitude Reference box displays the  reference altitude in feet. The metric value, when selected, is displayed on top the Altitude Reference box.

## Barometric Setting Box

The Barometric Setting box displays the barometric pressure in inches of mercury (IN.) or hectopascals (hPa).

### To select barometric pressure:

1. Turn the **large BARO** knob to select the desired setting.

## Vertical Deviation/Glideslope Indicator

The Vertical Deviation/Glideslope Indicator is a window on the left side of the Altimeter. The window appears when an ILS is tuned in the active NAV field (and selected on the audio panel). A green diamond appears and acts as the vertical deviation indication, just like a glideslope needle on a conventional indicator.

## Marker Beacon Annunciations

Marker Beacon Annunciations are displayed on the PFD to the left of the Altitude Reference Box. Outer marker reception is indicated by a blue light. Middle marker reception is indicated by an amber light. Inner marker reception is indicated by a white light (refer to the Audio Panel Pilot's Guide for more information).



*Marker Beacon Annunciation*

*Vertical Deviation/Glideslope Indicator*
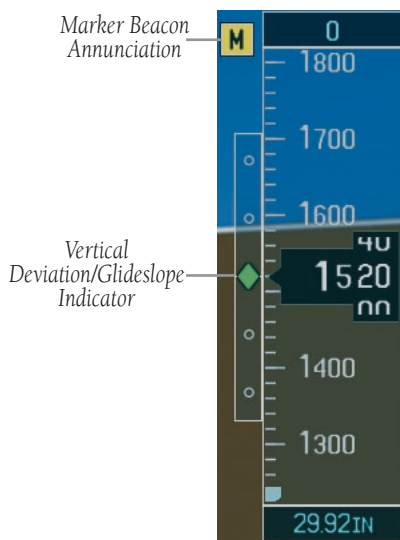
**Figure 2-9  Marker Beacon and Vertical Deviation**

## Vertical Speed Indicator

The Vertical Speed Indicator displays the aircraft vertical speed in feet per minute (fpm) with numeric labels and tick marks at 1000 fpm and 2000 fpm in each direction on the non-moving tape. Minor tick marks are at intervals of 500 fpm.



*Vertical Speed Pointer*
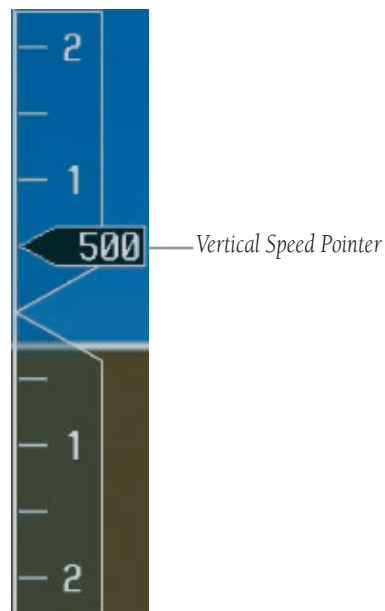
**Figure 2-10  Vertical Speed Indicator**

## Vertical Speed Pointer

The Vertical Speed Pointer displays the current vertical speed and points to that speed on the tape. If the rate of climb or descent is greater than 2000 fpm, the pointer appears at the top or bottom, respectively, of the non-moving tape and the number of feet per minute appears inside the pointer.

> **NOTE:** *Digits appear in the pointer when the climb or descent rate is >100 fpm.*

## Horizontal Situation Indicator (HSI)

### ARC HSI

The Arc HSI is a 140° expanded section of the compass rose. The Arc contains a course pointer arrow, TO/FROM indicator, sliding deviation indicator (the TO/FROM and sliding deviation indicator are one in the same), and deviation scale. Upon station passage the arrowhead flips and points to the tail of the aircraft just like the conventional TO/FROM flag. Depending on the source of navigation, the CDI on the Arc HSI can appear a couple of different ways:

- GPS,OBS,VOR – appears as a arrowhead
- Localizer – appears as a diamond

**NOTE:** *If the pilot makes a heading change greater than 105° with respect to the course, the CDI switches to the opposite side of the deviation scale and displays reverse sensing.*



*Lateral Deviation Scale*     *Course Deviation TO/FROM Indicator*
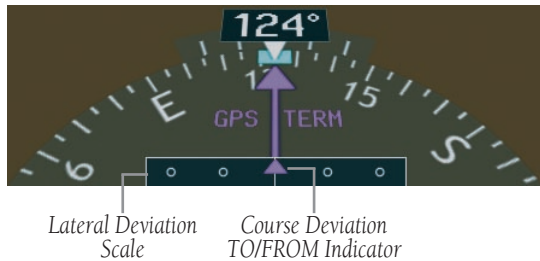
**Figure 2-11  ARC HSI**

**NOTE:** *When the Arc HSI is displayed, the BRG1 and BRG2 information windows are disabled.*

## Heading Indication

A digital reading of the current magnetic heading appears on top of the HSI. A rotatable heading bug on the compass rose and arc marks the desired heading.
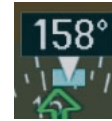


**Figure 2-12  Current Heading**

The selected heading appears in a box left of the lubber line, next to the HSI. The color of the digital readout is cyan (light blue).
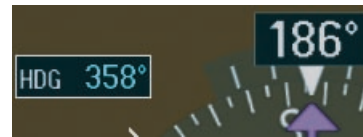


**Figure 2-13  Selected Heading Box**

The selected course appears in a box right of the lubber line, next to the HSI. The color of the digital readout appears in magenta if the navigation source is GPS, or green if navigation source is NAV1 or NAV2.



**Figure 2-14  Selected Course Box**

**NOTE:** *The heading displayed on the HSI is always magnetic, even if the NAV ANGLE is set to 'TRUE' in the AUX System Setup Page on the MFD.*

## Turn Rate Indicator

The Turn Rate Indicator resides directly above the rotating compass card. Each tick mark is at 9 (half standard rate) and 18 (standard rate) degrees to the left and right of the lubber line. A wide magenta line displays the current turn rate up to 24 degrees. A magenta arrowhead appears at 25 degrees and disappears at 24 degrees. This trend vector provides the pilot with a prediction of what the heading will be in 6 seconds at the present turn rate.



**Figure 2-15 Turn Rate Indicator and Trend Vector**

## Course Deviation Indicator

The HSI contains a course deviation indicator (CDI), with a course pointer arrow, a TO/FROM arrow, a sliding deviation bar and scale. The course pointer is a single line arrow (GPS, VOR1 and LOC1) or double line arrow (VOR2 and LOC2) which points in the direction of the set course. The TO/FROM arrow rotates with the course pointer and is displayed when the active NAVAID is received. The sliding deviation bar moves left or right from the course pointer along a scale to display aircraft position relative to the course. When the pilot selects a course, a digital reading appears for three seconds in a box right of the lubber line, next to the HSI.



**Figure 2-16 Arc CDI and Compass Rose CDI**

When coupled to a VOR or LOC, the CDI has the same angular limits as a mechanical CDI . When coupled to GPS, the full scale limits for the CDI are defined by a GPS-derived distance (5.0, 1.0 or 0.3 nm). The CDI scale automatically adjusts to the desired limits based upon the current phase of flight (enroute 5.0 nm, terminal area 1.0 nm, or approach 0.3 nm). The desired GPS scale settings may be selected manually from the MFD (refer to the MFD Pilot's Guide).
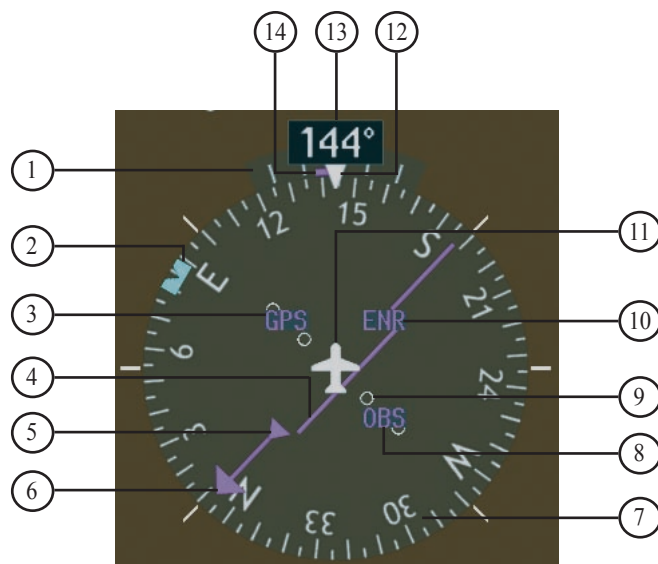
**Figure 2-17  Horizontal Situation Indicator**

| | | | |
|---|---|---|---|
| ① | Turn Rate Indicator | ⑧ | OBS Mode |
| ② | Heading Bug | ⑨ | Lateral Deviation Scale |
| ③ | Navigation Source | ⑩ | Flight Phase |
| ④ | Course Deviation Indicator | ⑪ | Aircraft Symbol |
| ⑤ | TO/FROM Indicator | ⑫ | Lubber Line |
| ⑥ | Course Pointer | ⑬ | Heading |
| ⑦ | Rotating Compass Rose | ⑭ | Turn Rate and Heading Trend Vector |

## Bearing Pointers and Information Windows

Pressing the PFD softkey provides access to the BRG1 and BRG2 softkeys. The BRG1 pointer is a single cyan (light blue) line with an open arrowhead at the end. The BRG2 pointer is a double cyan (light blue) line with an open arrowhead at the end.

> ✓ **NOTE:** Distance displayed in the BRG information windows is GPS-derived distance.

> ✓ **NOTE:** DME distance is <u>not</u> shown in the BRG information windows, even with a NAV radio selected. DME distance is only shown in the DME information window. The BRG information windows show only GPS distance.

When a bearing pointer is displayed, its associated information window is also displayed. The BRG1 information window is displayed to the lower left of the HSI and includes the bearing source (NAV1), a pointer icon, frequency and distance (NAV1 and GPS) to the bearing source. The BRG2 information window is displayed to the lower right of the HSI and includes the bearing source (NAV2), a pointer icon, frequency and distance (NAV2) to the bearing source.

If GPS is the bearing source, the active waypoint identifier is displayed in lieu of a frequency. If an active waypoint is not selected, the bearing pointer is removed from the HSI and "NO DATA" is displayed in the information window.

If the NAV radio is the bearing source and is tuned to an ILS frequency, the bearing pointer is removed from the HSI and the frequency is replaced with "ILS". If the NAV radio is not receiving the tuned VOR station, the bearing pointer is removed from the HSI and the frequency displayed in the information window is replaced with "NO DATA".

When NAV1 or NAV2 is the selected bearing source, the frequency is replaced by the station identifier when the station is in range.
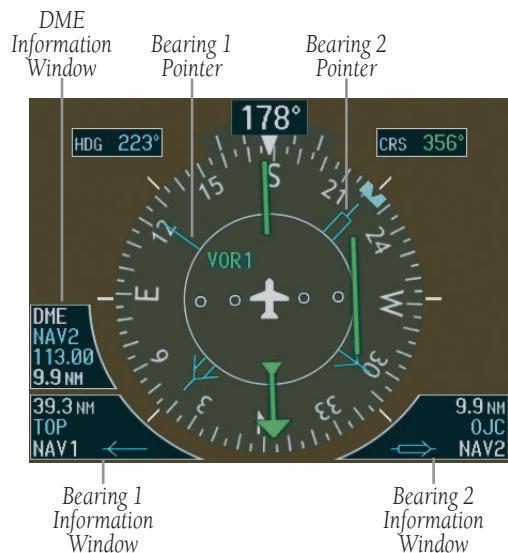


**Figure 2-18  HSI with Bearing Information**
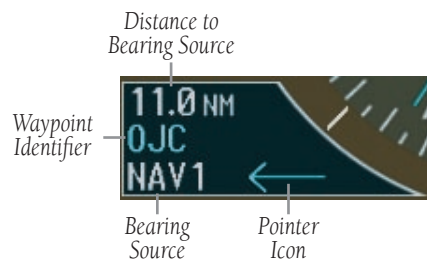


**Figure 2-19  BRG1 Information Window**
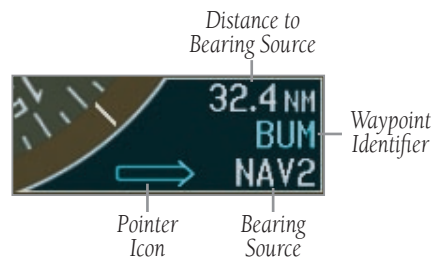


**Figure 2-20  BRG2 Information Window**

## DME Radio (optional)

The DME information window is displayed by pressing the **PFD** softkey followed by the **DME** softkey.

The DME information window is displayed above the BRG1 information window. The DME information window displays the DME label, tuning mode (NAV1, NAV2, or HOLD), frequency and distance. When a signal is invalid, the distance is replaced by "–.– – NM"

The pilot may select from three DME tuning modes:

- **NAV1 –** DME is from NAV1

- **NAV2 –** DME is from NAV2

- **HOLD –** Holds the last selected NAV radio frequency.

When switching from NAV1 or NAV2 mode to HOLD mode, the DME frequency remains at the last selected NAV radio frequency until HOLD mode is removed.

*NOTE: DME radio installation is optional.*

**Figure 2-21  DME Information Window**

## DME Tuning Window (optional)

The DME Tuning window is displayed by pressing the **DME** softkey. This window provides display and control of the DME radio.

*NOTE: The Radio Tuning window is only available if a DME radio is installed.*
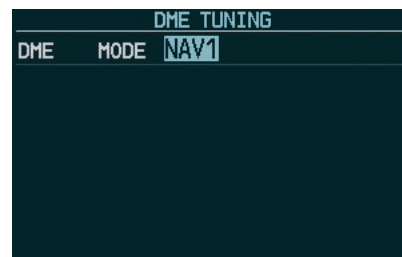
**Figure 2-22  Radio Tuning Window**

### To change the DME mode:

1. From the Radio Tuning window, turn the **large FMS** knob to highlight the DME mode field.

2. Turn the **small FMS** knob to display the selection window. Turn the **FMS** knob to select the desired mode and press the **ENT** key.

**Figure 2-23  DME Selection Window**

### Navigation Source

The HSI can display two sources of navigation, GPS or NAV (VOR, localizer, and glideslope). In GPS mode the flight plan legs are sequenced automatically. Enabling OBS mode suspends auto sequencing of waypoints, but retains the current "active-to" waypoint as the navigation reference even after passing the waypoint. When OBS is disabled, the GPS returns to normal operation, with automatic sequencing of waypoints. OBS mode also allows the pilot to set the desired course TO/FROM a waypoint.

Color indicates the current navigation source, magenta (for GPS ) or green (for VOR and LOC). As the user crosses the MAP, "SUSP" appears on the HSI in place of OBS and the **OBS** softkey now reads "SUSP", indicating that automatic sequencing of approach waypoints is suspended at the MAP. A yellow 'INTEG' and 'WARN' may appear on the HSI when the following occurs:

- INTEG – RAIM is not available
- WARN – GPS detects a position error

### To change between navigation sources:

1. Press the **CDI** softkey to change from GPS to VOR1 or LOC1. This places the cyan tuning box over the NAV1 standby frequency in the upper left corner of the PFD.

2. Press the **CDI** softkey again to change from VOR1 or LOC1 to VOR2 or LOC2. This places the cyan tuning box over the NAV2 standby frequency.

3. Press the **CDI** softkey a third time to return to GPS.

### To enable/disable OBS mode while navigating with GPS:

1. Press the **OBS** softkey to select OBS Mode.

2. Turn the **small CRS** knob to select the desired course TO/FROM the waypoint.

3. Press the **OBS** softkey again to return to normal operation.



**Figure 2-24  GPS INTEG, GPS SUSP, LOC1 and VOR2**

## True Airspeed (TAS) Box

The True Airspeed Box displays true airspeed in knots. If data is invalid, the box is marked with a red 'X' and yellow text spelling 'TAS'.

**Figure 2-25  True Airspeed Box**

## Outside Air Temperature Box

The outside air temperature (OAT) is displayed in °C with the "OAT" label.  °F can be displayed by changing the temperature units setting on the AUX System Setup Page (refer to the MFD Pilot's Guide).

**Figure 2-26  Outside Air Temperature Box**

## Barometric Setting Box

The barometric setting box displays barometric pressure in either inches of mercury (IN) or hectopascals (hPa) depending on the system setting.
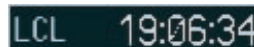
**Figure 2-27  Barometric Setting Box**

## System Time Box

The System Time Box displays the local time. Time and date are obtained from the satellites and cannot be changed.  The pilot may select the desired time format and offset.  There are three time formats available: Local 12 hr., Local 24 hr. and Coordinated Universal Time (UTC).  The Time Offset (Time Zone) is the number of hours plus or minus UTC.

**Figure 2-28  System Time Box**

## 2.7   AUXILIARY WINDOWS

The lower right area of the PFD is a shared area that, at any one time, can present the following windows:

- TIMER/REFERENCES
- NEAREST
- DIRECT-TO
- FLIGHT PLAN
- PROCEDURES
- ALERTS
- PFD SETUP (Lighting)

### References Window

The Timer/References window (Figure 2-29) is enabled and disabled by pressing the **TMR/REF** softkey. The following Vspeeds and Vspeed bugs can be set using the Timer/References window:

- Rotation speed reference (Vr)
- Vr bug (ON, OFF)
- Best angle-of-climb speed reference (Vx)
- Vx bug (ON, OFF)
- Best rate-of-climb speed reference (Vy)
- Vy bug (ON, OFF)
- Best glide speed reference
- Best glide speed bug (ON, OFF)
- Generic timer
- Timer direction (count UP or DOWN)
- START, STOP or RESET

Vspeed values for Cessna Nav III aircraft are found in their respective Aircraft Flight Manuals.  All default speeds can be restored by pressing the **MENU** key, selecting 'Restore Defaults' and pressing the **ENT** key.  Default settings are automatically restored when power is cycled, and are consistent with the values in the Cessna Aircraft Flight Manual.  The G1000 PFD Pilot's Guide describes Vspeed settings and operations in detail.

### Flight ID

Flight status automatic reporting of aircraft identification (ID) is transmitted from the GTX 33 to the ground stations and other aircraft.

The flight ID is set to fixed ("SAME AS TAIL" and "CONFIG ENTRY"), or variable ("PFD ENTRY") at the time of installation.  The two fixed selections do not require any action from the pilot.  The variable ("PFD ENTRY") flight ID requires the pilot to enter the flight ID on the Timer/References window each time the G1000 is powered on.

> **NOTE:** If the G1000 is set to variable ("PFD ENTRY") and the flight ID entry field on the Timer/References window is not visible, the pilot should contact a Garmin-authorized Service Center.

### To enter or change the Flight ID:

1.   Press the **TMR/REF** softkey, then turn the **large FMS** knob to highlight the flight ID field.

2.   Turn the **FMS** knobs to enter the desired flight ID.  Press the **ENT** key to update the flight ID.



| REFERENCES | | | |
|---|---|---|---|
| TIMER | 00:00:00 | UP | START? |
| GLIDE | 76KT | ◀ ON ▶ | |
| Vr | 59KT | ◀ ON ▶ | |
| Vx | 65KT | ◀ ON ▶ | |
| Vy | 80KT | ◀ ON ▶ | |
| FLIGHT ID | | N59GA | |

*Vspeed References* — Vr, Vx, Vy

*Flight ID* — N59GA

**Figure 2-29   References Window**

## Nearest Airports Window

The Nearest Airports window (Figure 2-30) is enabled and disabled by pressing the **NRST** softkey. The Nearest Airports window displays the following information:

- Identifier
- Airport Symbol
- Bearing to
- Distance to
- Approach with lowest minimums available
- Primary communications frequency
- Length of longest hard surface runway (or soft surface, if no hard surface runway exists)

*NOTE: All Nearest Airports window operations are described in detail in the G1000 Pilot's Guide.*



*Bearing TO*  
*Distance*  
*Airport Symbol*  
*Identifier*  
*Runway Length*  
*Primary COM Frequency*
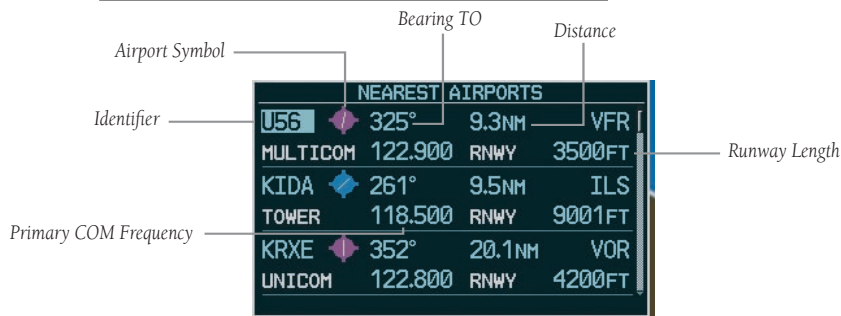
**Figure 2-30  Nearest Airports Window**

## Direct-to Window

The Direct-to window (Figure 2-31) is enabled and disabled by pressing the **Direct-to** key. The following information is displayed for the currently selected waypoint:

- Identifier
- Waypoint symbol
- Waypoint location
- Facility name
- Flight plan waypoint identifier
- Nearest waypoint list
- Bearing to waypoint
- Distance to waypoint
- Latitude/longitude
- Course to selected waypoint



*Waypoint Symbol*  
*Identifier*  
*Waypoint Location*  
*Facility Name*  
*Flight Plan Waypoint*  
*Nearest Waypoint*  
*Bearing to Waypoint*  
*Lat/Lon*  
*Distance from Waypoint*  
*Course to Selected Waypoint*
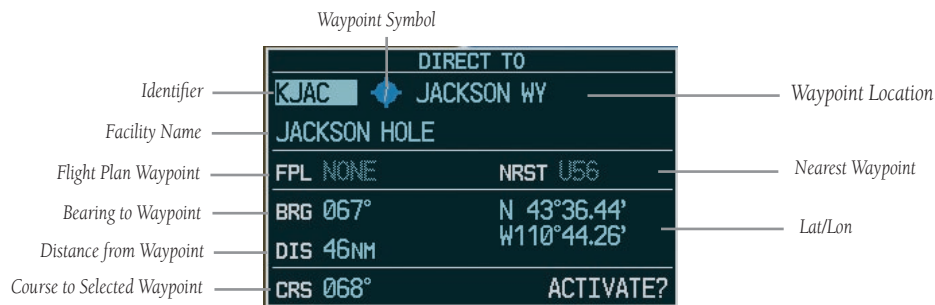
**Figure 2-31  Direct-to Window**

## Direct-to Window Operations

Selection of a waypoint for Direct-to navigation by:

- Specifying the identifier, waypoint location, or facility name.
- Selecting from a list of waypoints in the active flight plan.
- Selecting from a list of the 25 nearest airports.

> **NOTE:** Activation and cancellation of Direct-to navigation can also be performed.

> **NOTE:** All Direct-to operations are described in detail in the G1000 PFD and MFD Pilot's Guides.

## Flight Plan Window

Flight plans can be viewed and edited from the PFD Flight Plan window (Figure 2-32) by pressing the **FPL** key. The Flight Plan window displays the following information:

- Flight plan title
- Indication of active leg (magenta line and arrow)
- List of waypoints in flight plan, including the identifier
- Leg distance
- Leg desired track (DTK)



**Figure 2-32  PFD Flight Plan Window**

## Flight Plan Window Operations

### To display the options menu:

1.  Press the **MENU** key.

The following Flight Plan window operations can be performed from the Flight Plan Options Menu.

- Store, invert and delete flight plans
- Load departures, arrivals and approaches, and waypoints
- Remove departures, arrivals, and approaches
- View the closest point of the active flight plan
- Change the fields
- Restore defaults

> *NOTE: All Flight Plan operations are described in detail in the G1000 MFD Pilot's Guide.*

## Procedures Window

The Procedures window (Figure 2-33) is enabled by pressing the **PROC** bezel-mounted key. The following Procedures Page operations can be performed:

- Activate a vectors-to-final for a loaded approach
- Activate a loaded approach
- Select an approach
- Select an arrival
- Select a departure
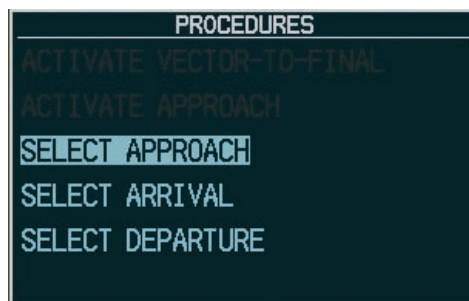


**Figure 2-33  Procedures Window**

## Inset Map

The Inset Map (Figure 2-34) is taken directly from the Navigation Map Page on the MFD. It appears in the lower left corner of the PFD and is displayed by pressing the **INSET** softkey. A detailed description of the Inset Map is given in the G1000 PFD Pilot's Guide. The Inset Map displays the following information:

- Moving map with orientation references
  - North Up
  - Track Up
  - DTK Up
  - HDG Up
- Zoom range legend
- De-clutter levels (3)
- Aircraft icon
- Traffic data
- Topo data
- Terrain data
- Stormscope data
- Enabled map features
- Active navigation route
- Track vector and fuel ring (reserve fuel)

The following Inset Map operations can be performed:

- Change the map range
- Change the de-clutter level
- Enable/disable traffic data
- Enable/disable topo data
- Enable/disable terrain data
- Enable/disable lightning data
- Pan
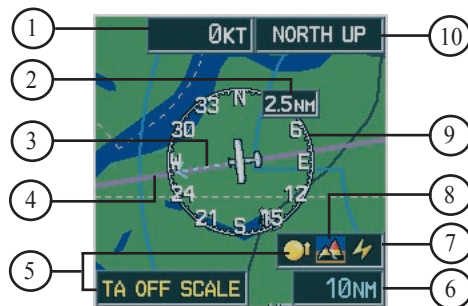


**Figure 2-34  Inset Map**

1. Wind Vector
2. NAV Compass Range
3. Track Vector
4. Active Navigation Route
5. Traffic Icon and Range
6. Map Range
7. Lightning Icon
8. Terrain Icon
9. NAV Compass
10. Map Orientation

*NOTE: Map orientation and other map features are enabled on the MFD (refer to the G1000 MFD Pilot's Guide).*

*NOTE: The inset map items shown in Figure 2-34 must be selected on the MFD.*

## 2.8   ADDITIONAL PFD FUNCTIONALITY

In addition to the PFD and associated operation, the PFD also contains the following:

### PFD Navigation Status Bar

The PFD navigation status bar (Figure 2-35) displays the following information:

- The next waypoint in the active flight plan
- Distance to the next waypoint
- Desired track to the next waypoint
- Current track
- GPS navigation annunciations

> *NOTE: The fields in the PFD navigation status bar cannot be changed.*



**Figure 2-35  PFD Navigation Status Bar**

## 2.9   DISPLAY BACKUP

The PFD is designed to enter a reversionary (backup) mode should one of the displays become unavailable in flight, based on automatic fault monitoring and detection and internal switching.   Reversionary mode can also be set manually by pressing the **DISPLAY BACKUP** button at the bottom of the audio panel (refer to the Audio Panel Pilot's Guide).   In reversionary mode, the displays are re-configured to present the PFD symbology together with the engine parameters.

Transition for the pilot is straightforward since PFD parameters are presented in the same format as that prior to the re-configuration. In the event of a complete display failure, the pilot loses one NAV, COM, and GPS depending on which display fails.  The list below shows what is lost:

- PFD Fails: NAV1, COM1, and GPS1 are lost.
- MFD Fails: NAV2, COM2, and GPS2 are lost.

> *NOTE: Refer to the System Overview in the G1000 Pilot's Guide for a detailed description of Reversionary Mode.*

*Engine Indications*



**Figure 2-36  PFD Backup Mode Display**

# SECTION 3:  NAV/COM AND TRANSPONDER

On both the Primary Flight Display (PFD) and the Multi Function Display (MFD), the G1000 VHF NAV/COM window occupies the top portion of the panel.  As shown in Figure 3-1, the NAV-related controls, windows and fields are located on the left side, whereas the COM-related controls, windows and fields are located on the right side.  The DME Tuning window is located to the right of the HSI on the PFD.

This section provides information on the following aspects of the G1000 VHF NAV/COM window:

- Windows and fields
- Radio selection
- Color code
- Tuning box
- Frequency Toggle Arrow
- Radio status indications
- Controls

*NAV Controls*

*NAV Frequency Window*

*COM Frequency Window*

*COM Controls*



**Figure 3-1  G1000 VHF NAV/COM Interface (PFD)**

*DME Tuning Window*

## 3.1 WINDOWS AND FIELDS

On both the PFD and the MFD, the NAV and COM Frequency windows are located at the top of the display on either side of the Navigation Status bar.

- The **NAV Frequency window** is displayed to the left of the Navigation Status bar.

- The **COM Frequency window** is displayed to the right of the Navigation Status bar.

Each radio frequency sub-window is composed of two (2) fields, a **standby field** and an **active field**.

- In the NAV Frequency window, the active frequency field is located on the right side, while the standby frequency field is located on the left side.

- In the COM Frequency window, the active frequency field is located on the left side, while the standby frequency field is located on the right side.

## 3.2 RADIO SELECTION

Radio selection is performed as follows:

- **NAV radio selection** is performed via the **CDI** softkey located on the PFD:
  - When NAV1 radio is selected, a single green arrow labeled either 'VOR1' or 'LOC1' is displayed on the HSI.
  - When NAV2 radio is selected, a double green arrow labeled either 'VOR2' or 'LOC2' is displayed on the HSI.

- **COM radio selection** is performed via the **COM1 MIC** or **COM2 MIC** keys located on the audio panel:
  - **COM1 MIC** key selects COM1 radio.
  - **COM2 MIC** key selects COM2 radio.

Standby NAV Frequency Field | Selected NAV Radio | Navigation Status Bar | Selected COM Radio | Standby COM Frequency Field

| NAV1 | 109.90 | ↔ | 114.10 | BNA | GS | 92KT | DIS | 11.4NM | ETE | 07:25 | ESA | 3300FT | 126.050 | ↔ | 118.500 | COM1 |
| NAV2 | 111.60 | | 110.60 | CKV | | | | WPT – VOR INFORMATION | | | | | 118.400 | | 121.400 | COM2 |

Tuning Box | Active NAV Frequency Field | Active COM Frequency Field | Tuning Box
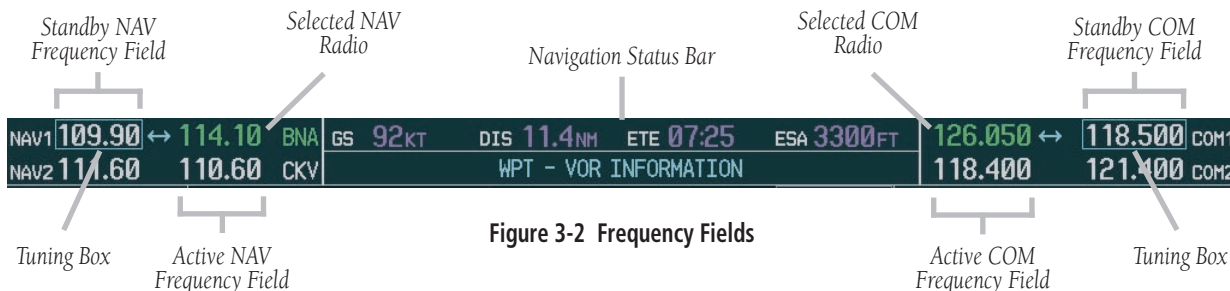
**Figure 3-2  Frequency Fields**

## 3.3 COLOR CODE

Frequencies located in the **active field** are displayed in **either green or white**.

- An active frequency that is displayed in **green** indicates that the corresponding radio is selected (i.e., in use) on the audio panel (COM) or on the HSI (NAV).

- An active frequency that is displayed in **white** indicates that the corresponding radio is not selected on the audio panel (COM) or on the HSI (NAV).

> **NOTE:** *In GPS mode, both active NAV frequencies are displayed in white.*

Frequencies located in the **standby field** are displayed in **white**.

## 3.4 TUNING BOX

On both the PFD and the MFD, a cyan (i.e., light blue) tuning box appears around the standby frequency field and can be moved from one standby frequency field to another for the purpose of tuning or radio selection by pressing the dual **COM** or **NAV** knob.

135.100    126.050 COM1
118.600 ↔ 121.900 COM2

*Frequency Toggle Arrow* ———      ——— *Tuning Box*

**Figure 3-3  Frequency Toggle Arrow and Tuning Box**

## 3.5 FREQUENCY TOGGLE ARROW

In both the COM and NAV windows, a **Frequency Toggle Arrow** appears next to the tuning box, between the active and standby frequencies. Pressing the dual **COM** or **NAV** knob toggles both the frequency tuning box and the **Frequency Toggle Arrow** between the radios.

> **NOTE:** *If the frequency tuning box is on a selected COM sub-window when a signal is transmitted for this radio, the **Frequency Toggle Arrow** is replaced by a **TX** indication.*

> **NOTE:** *Pressing the **Frequency Toggle** key places the standby frequency into the active field, and vice versa.*

## 3.6 RADIO STATUS INDICATIONS

- **TX –** When a COM radio is keyed, a white **TX** indication appears to the right of the corresponding COM frequency for the duration of the signal transmission.

- **ID –** When the Morse code identifier is ON for a NAV radio, a white **ID** indication appears to the left of the corresponding active NAV frequency and the Morse code identifier for this frequency can be heard if the corresponding NAV radio is selected on the audio panel.

## 3.7 CONTROLS

The controls associated with the NAV window are as follows:

- A **VOL/PUSH ID** knob
  - **Turn** to adjust the NAV radio volume level.
  - **Press** to turn the Morse code identifier ON and OFF.

- A **Frequency Toggle** key
  - **Press** to toggle the NAV frequencies between the active and standby fields.

- A dual **NAV** knob
  - **Turn** to tune a NAV frequency in the NAV tuning box (**large** knob for **MHz**; **small** knob for **kHz**).
  - **Press** to toggle the NAV tuning box between the NAV radios.

The controls associated with the COM window are as follows:

- A **VOL/PUSH SQ** knob
  - **Turn** to adjust the COM radio volume level.
  - **Press** to turn automatic squelch ON and OFF.

- A **Frequency Toggle** key
  - **Press** to toggle the COM frequencies between the active and standby fields.
  - **Press and hold** for approximately two (2) seconds to tune the emergency frequency (121.500 MHz) automatically in the active COM field.

- A dual **COM** knob
  - **Turn** to tune a COM frequency in the COM tuning box (**large** knob for **MHz**; **small** knob for **kHz**).
  - **Press** to toggle the COM tuning box between the COM radios.

**NAV Controls**     **COM Controls**

*VOL/PUSH ID* Knob     *VOL/PUSH SQ* Knob

*Frequency Toggle* Key

*Dual* **NAV** *Knob*     *Dual* **COM** *Knob*

- *Turn* to tune in desired frequencies.
- *Press* to change tuning box positions.
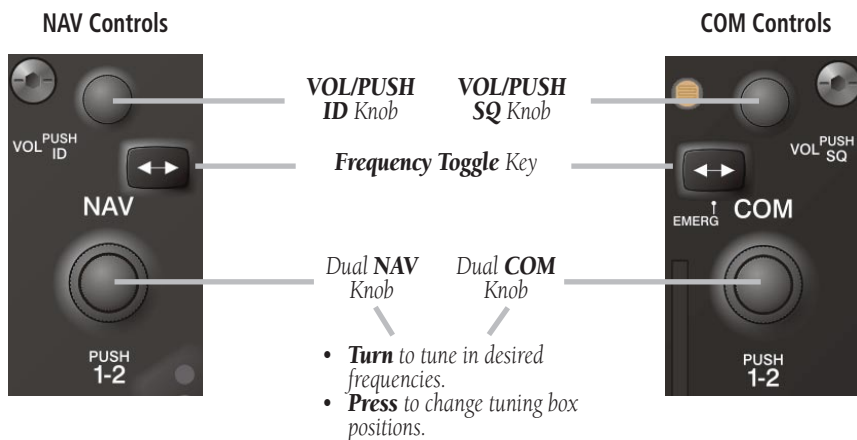
**Figure 3-4  NAV/COM Controls**

## 3.8 COM FREQUENCY WINDOW

The G1000 COM radios can be tuned either over the 118.000 to 136.975 MHz frequency range with 25 kHz spacing selected or over the 118.000 to 136.990 MHz frequency range with 8.33 kHz spacing selected.

> **NOTE:** COM channel spacing can be configured through the MFD, in the System Setup Page of the AUX Page group.

The Communications Frequency window is located to the right of the Navigation Status bar, provides the control and display of dual VHF Radio Communication Transceivers (COM1 and COM2) and displays the following information:

- COM1 and COM2 active and standby frequencies

- Color-coded indication of the selected COM radio

- Indication of signal transmission

### Volume

COM radio volume level can be adjusted from 0 to 100% of available volume (in increments of 3.25 percentage points) using the **VOL/PUSH SQ** knob located above the **COM Frequency Toggle** key. Turning the **VOL/PUSH SQ** knob clockwise increases volume level for the COM radio on which the tuning box is placed, while turning this knob counterclockwise decreases volume level for this COM radio.

When adjusting volume level for a COM radio, volume level is displayed in place of the corresponding standby COM frequency and the associated COM radio name (i.e., 'COM1' or 'COM2') is replaced by the term 'VOLUME'. Volume level remains displayed in the COM Frequency window for a duration of two seconds after volume level is last changed.

**Figure 3-5  COM Volume Level**

### Automatic Squelch

Automatic squelch provides maximum sensitivity to weaker signals while canceling most localized noise sources. Automatic squelch can be disabled for a COM radio by pressing the **COM** knob to select the desired COM sub-window, then by pressing the **VOL/PUSH SQ** knob. When automatic squelch is disabled for a COM radio, COM audio remains continuously open.

> **NOTE:** Pressing the **VOL/PUSH SQ** knob when automatic squelch is disabled reactivates the automatic squelch function.

## Switching the Tuning Box Between COM Radios

Pressing the dual **COM** knob toggles the frequency tuning box between the COM1 and COM2 fields.

> **NOTE:** When a different COM MIC is selected on the audio panel, the frequency tuning box also moves on both the PFD and MFD.

*Pushing the dual **COM** knob switches the tuning box from one COM radio to the other.*
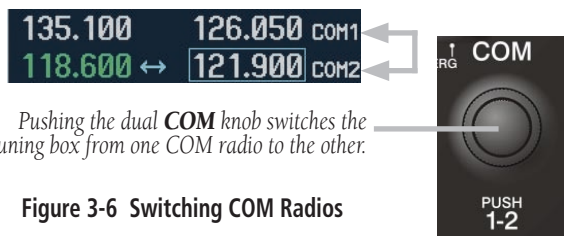
**Figure 3-6  Switching COM Radios**

## Manually Tuning a COM Frequency

COM frequency manual tuning is performed by using the dual **COM** knob.

- The MHz (left) portion of the frequency can be tuned by turning the large **COM** knob.

- The kHz (right) portion of the frequency can be tuned by turning the small **COM** knob.

The frequency is tuned in the standby frequency field of the COM Frequency window.

## Toggling COM Frequencies

Pressing the **COM Frequency Toggle** key toggles the COM frequencies between the active and standby fields of the COM radio on which the **Frequency Toggle Arrow** is located.

*Pressing the **COM Frequency Toggle** key toggles the COM frequencies.*
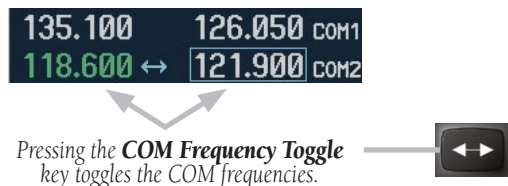
**Figure 3-7  Toggling COM Frequencies**

## Selecting a COM Radio

The desired COM radio can be selected using the **COM MIC** keys located on the audio panel.  When a **COM MIC** key is annunciated on the audio panel, the corresponding active COM frequency is displayed in green in the COM Frequency window.

*Top portion of the audio panel*

*COM radio selection is performed via the audio panel.*
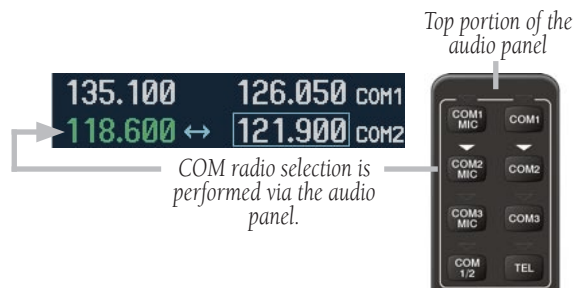
**Figure 3-8  Selecting a COM Radio**

> **NOTE:** Please see the Audio Panel Pilot's Guide for further details on the **COM MIC** keys.

## Radio Status

When a COM radio is keyed, a white **TX** indication appears to the right of the active COM frequency to indicate that a transmission is in progress. The **TX** indication disappears once COM transmission is completed.
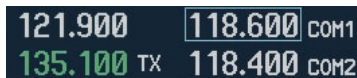
**Figure 3-9  Radio Status Indications**

*NOTE: If a signal is transmitted on a COM radio for which frequency toggling is enabled (i.e., on which the tuning box is located), the **Frequency Toggle Arrow** disappears and is replaced by a **TX** indication.*

## Emergency Frequency (121.500 MHz)

When a COM tuning failure is detected by the system, the emergency frequency (121.500 MHz) is automatically loaded into the active frequency field of the COM radio for which the tuning failure was detected.

**Figure 3-10  COM Tuning Failure**

*NOTE: In the event of a dual display failure, the emergency frequency (121.500 MHz) automatically becomes available to the pilot through the pilot headset.*

## Quickly Tuning and Activating 121.500 MHz

Pressing and holding the **COM Frequency Toggle** key for approximately two (2) seconds automatically loads the emergency COM frequency (121.500 MHz) into the active frequency field of the COM radio for which frequency toggling is enabled.
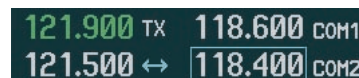
**Figure 3-11  Quickly Tuning 121.500 MHz**

## Stuck Microphone

If the COM1 (or COM2) push-to-talk (PTT) switch becomes stuck, or is accidentally left in the keyed position, or if a signal continues to be transmitted after the switch is released, the COM transmitter automatically times out (i.e., ceases to transmit) after 35 seconds of continuous transmitting, and an alert appears on the PFD to advise the crew of a stuck COM microphone (see Figure 3-12).
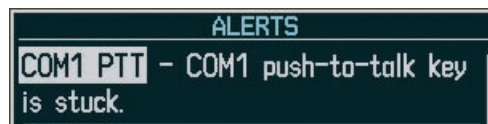
**Figure 3-12  Stuck COM Microphone Alert**

## 3.9 NAV FREQUENCY WINDOW

The G1000 NAV radios can be tuned over the 108.00 to 117.95 MHz frequency range with 50 kHz spacing. The Navigation Frequency window is located to the left of the Navigation Status bar, provides the control and display of dual VOR/ILS receivers (NAV1 and NAV2) and displays the following information:

- NAV1 and NAV2 active and standby frequencies
- NAV1 and NAV2 identifier indication (if the active NAV frequency is a valid frequency and its Morse code identifier signal is received by the system).
- Color-coded indication of the selected NAV radio
- Indication of the Morse code identifier status

### Volume

NAV radio volume level can be adjusted from 0 to 100% of available volume (in increments of 3.25 percentage points) using the **VOL/PUSH ID** knob located above the **NAV Frequency Toggle** key. Turning the **VOL/PUSH ID** knob clockwise increases volume level for the NAV radio on which the tuning box is placed, while turning this knob counterclockwise decreases volume level for this NAV radio. When adjusting volume level for a NAV radio, volume level is displayed in place of the corresponding standby NAV frequency and the associated NAV radio name (i.e., 'NAV1' or 'NAV2') is replaced by the term 'VOLUME'. Volume level remains displayed in the NAV Frequency window for a duration of two seconds after volume level is last changed.
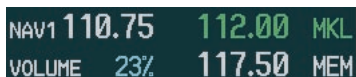


**Figure 3-13  NAV Volume Level**

### Morse Code Identifier

Pressing the **VOL/PUSH ID** knob toggles the Morse code identifier ON and OFF for the active NAV frequency next to which the tuning box is located. When the Morse code identifier is ON, an **ID** indication appears to the left of the corresponding active NAV frequency.
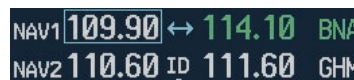


*The Morse code identifier is ON for the GHM VOR.*

**Figure 3-14  ID Indication**

The Morse code identifier for an active NAV frequency can only be heard if the Morse code identifier for the corresponding NAV radio is turned on (i.e., if the ID indication appears next to the active NAV frequency) and if the corresponding NAV radio is selected on the audio panel (i.e., if the associated NAV radio annunciator light is illuminated on the audio panel).



*Here, since NAV2 is the only NAV radio selected on the audio panel, only the Morse code identifier for the GHM VOR can be heard.*

*NAV portion of the audio panel*

**Figure 3-15  Morse Code Identifier Audio**

> **NOTE:** When a VOR signal is received, the VOR/LOC name identifier is displayed to the right of the corresponding active NAV frequency, regardless of the status of the Morse code identifier.

### Switching the Tuning Box Between NAV Radios

Pressing the dual **NAV** knob toggles the frequency tuning box between the NAV1 and NAV2 sub-windows.



*Pushing the dual **NAV** knob switches the tuning box from one NAV radio to the other.*
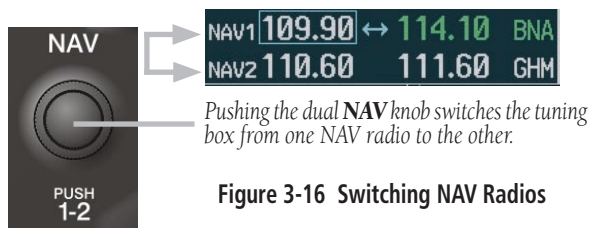
**Figure 3-16  Switching NAV Radios**

> **NOTE:** When a different NAV radio is selected on the HSI via the **CDI** key, the NAV frequency tuning box also moves on the PFD and MFD.  However, the NAV frequency tuning box does not move when GPS mode is selected.

### Manually Tuning a NAV Frequency

NAV frequency manual tuning is performed by using the dual **NAV** knob.

- The MHz (left) portion of the frequency can be tuned by turning the large **NAV** knob.

- The kHz (right) portion of the frequency can be tuned by turning the small **NAV** knob.

The frequency is tuned in the standby frequency field of the NAV Frequency window.  Turning either knob clockwise increases the tuned frequency.  Conversely, turning either knob counterclockwise decreases the tuned frequency.

### Toggling NAV Frequencies

Pressing the **NAV Frequency Toggle** key toggles the NAV frequencies between the active and standby fields of the NAV radio on which the **Frequency Toggle Arrow** is located.



*Pressing the **NAV Frequency Toggle** key toggles the NAV frequencies.*
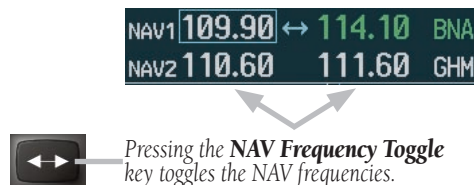
**Figure 3-17  Toggling NAV Frequencies**

## Selecting a NAV Radio

The desired NAV radio can be selected using the **CDI** softkey located on the PFD. The three navigation modes that can be selected with the **CDI** softkey are as follows:

- **VOR1** (or **LOC1**) – If NAV1 is selected as the NAV mode, a **single green arrow** labeled either 'VOR1' or 'LOC1' is displayed on the HSI and the active NAV1 frequency is displayed in green.

- **VOR2** (or **LOC2**) – If NAV2 is selected as the NAV mode, a **double green arrow** labeled either 'VOR2' or 'LOC2' is displayed on the HSI and the active NAV2 frequency is displayed in green.

- **GPS** – If GPS mode is selected, a **single magenta arrow** appears on the HSI and neither NAV radio is selected.

> **NOTE:** In GPS mode, both active NAV frequencies are displayed in white.

> **NOTE:** When a VOR signal is received, the corresponding VOR/LOC name identifier is displayed to the right of the associated active NAV frequency.



*NAV radio selection is performed via the **CDI** softkey.*



**Figure 3-18  Selecting a NAV Radio**

## 3.10 OPTIONAL NAV RADIOS

Optionally, the G1000 system can support up to two (2) remotely-mounted Honeywell KN 63 DME transceivers and up to two (2) panel-mounted Honeywell KR 87 ADF radios.

> **NOTE:** *Operational information relative to the optional Honeywell KR 87 ADF radio can be found in the Honeywell Silver Crown Plus™ Avionics Systems Pilot's Guide.*

### DME Tuning Window

Tuning of the DME radio is performed via the DME Tuning window. The DME Tuning window is an Auxiliary window that is located to the right of the HSI on the PFD. Pressing the top-level **DME** softkey toggles the DME Tuning window ON and OFF.

> **NOTE:** *When another Auxiliary window is turned on, the DME Tuning window is removed from the PFD.*

*DME Modes*
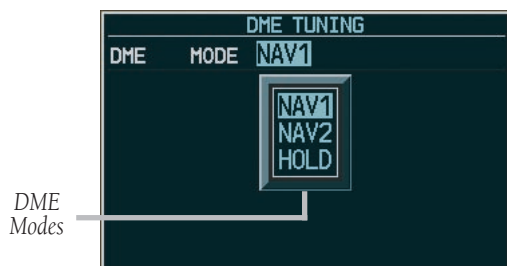
**Figure 3-19  DME Tuning Window**

### Selecting the DME Transceiver Tuning Mode

The following DME transceiver tuning modes can be selected:

- **NAV1** – Tunes the DME frequency from the selected NAV1 frequency.

- **NAV2** – Tunes the DME frequency from the selected NAV2 frequency.

- **HOLD** – When transitioning from NAV1 or NAV2 mode to HOLD mode, the DME frequency remains set to the last selected NAV frequency.

### To select a DME transceiver tuning mode:

1.  Turn the **small FMS** knob to select the desired DME tuning mode.

2.  Press the **ENT** key to validate the selection.

> **NOTE:** *Pressing the **CLR** key while in the process of selecting DME tuning mode causes the system to cancel data entry and revert back to the previously selected DME tuning mode.*

> **NOTE:** *Pressing the **FMS** knob activates/deactivates the cursor in the DME Tuning window.*

> **NOTE:** *Please refer to the Primary Flight Display Pilot's Guide for information on the DME Information window.*

## 3.11 FREQUENCY AUTO-TUNING

The G1000 system offers multiple auto-tuning capabilities that help reduce cockpit workload.  The PFD allows for the auto-tuning of COM frequencies associated with the nearest airports, while the MFD provides auto-tuning of both COM and NAV frequencies from various pages.  In addition, regardless of the display, the pertinent primary NAV frequency is entered automatically in the NAV window upon approach loading or approach activation.

In brief, frequencies can be automatically loaded into their respective frequency windows in the following ways:

- By using the **ENT** key when the frequency is high-lighted on the appropriate page (PFD and MFD).

- Upon loading or activating an approach (PFD and MFD).

> *NOTE: Turn the **FMS** knob to scroll through a list of frequencies.*

*Press the **ENT** key to load a highlighted frequency into the associated frequency window.*

*Turn the **FMS** knob to scroll through a list of frequencies.*
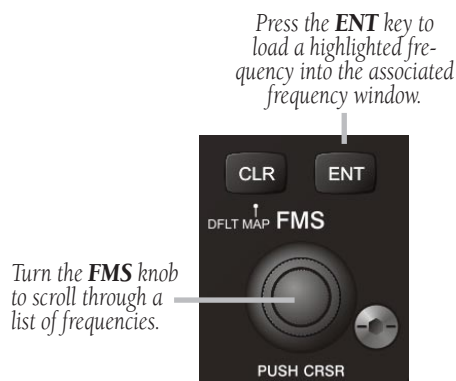
**Figure 3-20  Loading Frequencies**

### Auto-tuning on the PFD

COM frequencies for the nearest airports may be viewed and automatically loaded from the Nearest Airports window on the PFD.

#### To auto-tune a COM frequency for a nearby airport:

1.  Press the **NRST** softkey to open the Nearest Airports window, which displays the list of airport identifiers and corresponding COM frequencies.

2.  Turn either **FMS** knob to highlight the desired COM frequency, and ensure that the COM frequency tuning box is on the desired COM sub-window.

3.  Press the **ENT** key to load the COM frequency into the COM tuning box.

> *NOTE: When the desired frequency is entered in the tuning box, it becomes a standby frequency. Pressing the **Frequency Toggle** key places this standby frequency into the active field.*

*Pressing the **NRST** softkey opens the Nearest Airports window*

**Figure 3-21  Nearest Airports Window (PFD)**

## Auto-tuning on the MFD

Frequencies can be selected and loaded from the following MFD pages:

- WPT – Airport Information

- WPT – VOR Information

- NRST – Nearest Airports

- NRST – Nearest VOR

- NRST – Nearest Frequencies

**MAP WPT** AUX NRST ☐ ☐ ☐ ☐ ■ ☐

**Figure 3-22  MFD Page Group Icon**

*NOTE: In NAV mode, upon any VOR/ILS approach activation, the appropriate NAV frequency is automatically loaded into the **standby field of the selected NAV** radio, regardless of the current MFD page that is displayed.*

*NOTE: In GPS mode, upon any VOR/ILS approach activation, the appropriate NAV frequency is automatically loaded into the **active field of NAV1**, regardless of the current MFD page that is displayed.*

## WPT – Airport Information Page

The Airport Information Page displays runway information and a list of frequencies for the selected airport identifier as well as departure, arrival and approach information.

### To display the entire list of frequencies for a desired airport:

1. On the Airport Information Page, press the **INFO** softkey to display runway and frequency information for a specific airport.

2. Press the **FMS** knob to activate the selection cursor in the window.

3. Turn the **FMS** knob to select the desired airport identifier and press the **ENT** key.  A list of all available frequencies for the selected airport appears.



**Figure 3-23  WPT – Airport Information Page (INFO)**

**To load the desired COM frequency into the COM tuning box:**

1. When the list of frequencies for the selected airport is displayed, highlight the desired frequency by turning the **large FMS** knob.

2. Press the **ENT** key.

> NOTE: The runway Pilot Controlled Lighting (PCL) frequency (located in the Runways box of the INFO portion of the Airport Information Page) may also be highlighted with the **large FMS** knob and loaded into the COM tuning box by pressing the **ENT** key.

**To load the primary approach NAV frequency into the NAV tuning box:**

1. On the Airport Information Page, press the **APR** softkey to display approach information for a specific airport.

2. Press the **FMS** knob to activate the selection cursor in the window.

3. Turn the **large FMS** knob to highlight the primary NAV frequency located in the Primary Frequency box.

4. Press the **ENT** key.



**Figure 3-24  WPT – Airport Information Page (APR)**

### WPT – VOR Information Page

The VOR Information Page displays information specific to individual VORs, including the airport that is nearest to the selected VOR.

#### To load a VOR frequency into the NAV window:

1. On the VOR Information Page, press the **FMS** knob to activate the VOR Information window.

2. Turn the **FMS** knob as needed to select the desired VOR and press the **ENT** key to validate the selection.

3. Turn the **large FMS** knob to highlight the VOR frequency and press the **ENT** key to load this frequency into the tuning box of the NAV Frequency window.

> **NOTE:** If the **MENU** key is pressed when on the VOR Information Page, the 'View Recent VOR List' menu option is displayed for quick access to recently used VORs. However, if no VOR frequencies have been tuned, this menu option is grayed out.



**Figure 3-25  WPT – VOR Information Page**

### NRST – Nearest Airports Page

The Nearest Airports Page displays a list of the nearest airports as well as related runway, frequency and approach information.  On this page, any frequency associated with the selected airport can be loaded into the NAV or COM Frequency window.

**To display the entire list of frequencies for a nearby airport and load a frequency from that list:**

1. On the Nearest Airports Page, press the **FMS** knob to activate the selection cursor in the Nearest Airports window.

2. Turn the **FMS** knob to scroll through the list of nearest airport identifiers until the desired nearest airport is highlighted.

3. Press the **FREQ** softkey to activate the selection cursor in the Frequencies box.

4. Turn the **FMS** knob to scroll through the list of frequencies for the selected airport.

5. When the desired frequency is highlighted, press the **ENT** key to load this frequency into the tuning box of the appropriate Frequency window (NAV or COM).



**Figure 3-26  NRST – Nearest Airport Page**

### NRST – Nearest VOR Page

The Nearest VOR Page displays a list of the nearest VORs together with related information, including the associated VOR frequency.

#### To load a VOR frequency into the NAV window:

1. On the Nearest VOR Page, press the **FMS** knob to activate the Nearest VOR window.

2. Turn the **FMS** knob to scroll through the list of nearest VORs until the desired nearest VOR is highlighted.

3. Press the **FREQ** softkey to activate the selection cursor in the Frequency box and press the **ENT** key to load the frequency into the tuning box of the NAV Frequency window.
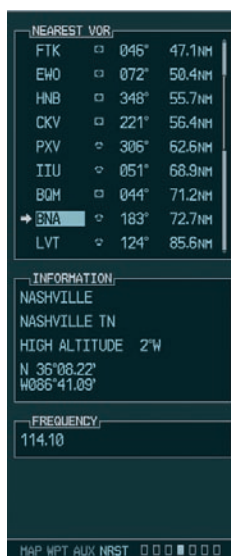
**Figure 3-27  NRST – Nearest VOR Page**

### NRST – Nearest Frequencies Page

The Nearest Frequencies Page displays a list of nearest ARTCC, FSS and WX frequencies.  For the purpose of frequency selection, the selection cursor can be activated on the ARTCC, FSS, or WX windows by using the **ARTCC**, **FSS** and **WX** softkeys, respectively.

#### To view a nearest ARTCC frequency and load it into the standby frequency field:

1. Press the **ARTCC** softkey to activate the selection cursor in the Nearest ARTCC window.

2. Turn the **small FMS** knob to scroll through the list of ARTCC names, then the **large FMS** knob to highlight the desired ARTCC frequency.

3. Press the **ENT** key to load the desired ARTCC frequency into the tuning box.

> NOTE: The Nearest ARTCC window contains a numbered list of ARTCC names as well as associated bearing and distance information.

#### To view a nearest FSS frequency and load it into the standby frequency field:

1. Press the **FSS** softkey to activate the selection cursor in the Nearest FSS window.

2. Turn the **small FMS** knob to scroll through the list of FSS names, then the **large FMS** knob to highlight the desired FSS frequency.

3. Press the **ENT** key to load the desired FSS frequency into the tuning box.

> NOTE: The Nearest FSS window contains a numbered list of FSS names as well as associated bearing and distance information.

**To view a nearest WX frequency and load it into the standby frequency field:**

1.  Press the **WX** softkey to activate the selection cursor in the Nearest WX window.

2.  Turn the **FMS** knob to highlight the desired WX frequency.

3.  Press the **ENT** key to load the desired WX frequency into the tuning box.
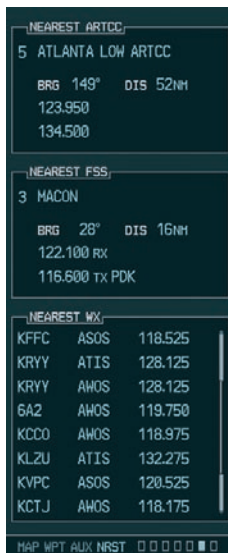


**Figure 3-28  NRST – Nearest Frequencies Page**

### Auto-Tuning Upon Approach Activation (NAV Frequencies)

NAV frequencies can be automatically loaded into the NAV Frequency window upon approach activation, regardless of the display unit being used.

⚠️ *NOTE: The primary NAV frequency also becomes auto-tuned upon **loading of an approach**.*

**To auto-tune a NAV frequency if the desired approach is not already loaded:**

1.  Press the **PROC** key to open the Procedures window.

2.  Turn the **large FMS** knob to highlight the 'SELECT APPROACH' menu option and press the **ENT** key.

3.  Use both the **FMS** knob and the **ENT** key as needed to select the desired airport, VOR/ILS approach and transition.

4.  Turn the **large FMS** knob to highlight either the 'LOAD?' or 'ACTIVATE?' prompt and press the **ENT** key.  The primary NAV frequency for the activated approach becomes loaded into the standby field of the selected NAV radio.
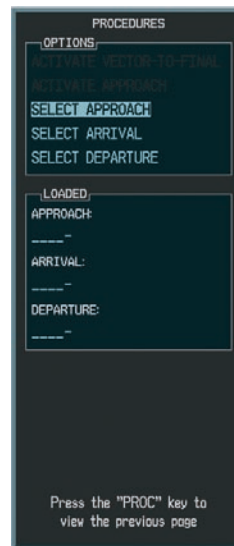


**Figure 3-29  Selecting an Approach**
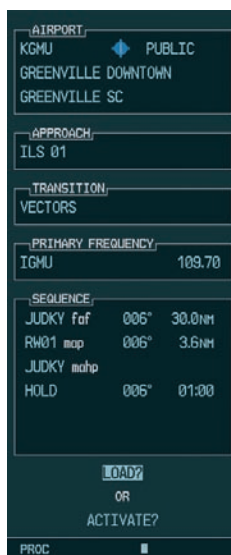
**Figure 3-30  Loading an Approach**

### To auto-tune a NAV frequency if the desired approach is already loaded:

1. Press the **PROC** key to open the Procedures window.

2. Turn the **large FMS** knob to highlight the 'ACTIVATE APPROACH' menu option and press the **ENT** key. The approach primary NAV frequency becomes automatically loaded into the standby field of the selected NAV radio.

> **NOTE:** *If the system is in GPS mode when a VOR/ILS approach is loaded or activated, the approach primary NAV frequency is automatically loaded into the **active field of NAV1**.*

> **NOTE:** *Before loading or activating an approach, the associated primary NAV frequency may be loaded into the NAV tuning box by highlighting the frequency in the Select Approach window via the **FMS** knob, then by pressing the **ENT** key.*

> **NOTE:** *Automatic loading of the NAV frequency also occurs upon vector-to-final activation, if the NAV frequency is not already loaded into either the standby or the active field of the selected NAV radio.*

> **NOTE:** *Approach activation can also be performed via the **MENU** key when the Flight Plan window is open.*



**Figure 3-31  Activating an Approach**

> **NOTE:** *When a VOR/ILS approach has been activated in GPS mode, if the ILS CDI Capture option on the AUX 4 Page is set to AUTO, the system automatically switches to NAV mode as the final approach course is intercepted (if within 15 nm from the FAF). Please see the Multi Function Display Pilot's Guide for details on this feature.*

## 3.12 TRANSPONDER

On the G1000 system, the GTX 33 transponder interface resides on the Primary Flight Display (PFD), on the lower portion of the screen (see figures below).

### Transponder Softkeys

When the **XPDR** softkey is pressed, the following softkeys associated with the transponder appear in the softkey bar (see Figure 3-33): **STBY**, **ON**, **ALT**, **VFR**, **CODE**, **IDENT**, **BACK**.

When the **CODE** softkey is pressed, the following softkeys appear in the softkey bar (see Figure 3-34): **0**, **1, 2**, **3**, **4**, **5**, **6**, **7**, **IDENT**, **BKSP, BACK**.

> **NOTE:** Digits "8" and "9" are not available for code entry.

> **NOTE:** Pressing the **BACK** softkey when the Code Selection softkeys are displayed reverts to the Mode Selection softkeys shown in Figure 3-33. Similarly, pressing the **BACK** softkey when the Mode Selection softkeys are displayed reverts to the Top-level softkeys shown in Figure 3-32.

> **NOTE:** After 45 seconds of transponder softkey inactivity, the system automatically reverts to the Top-level softkeys shown in Figure 3-32.

### Transponder Status Bar

The Transponder Status bar is located to the left of the System Time box and contains, from left to right, a four-digit code field, a mode field and a reply status field, as illustrated in the figures below. In Standby mode, both the code field and the mode field appear in white; in all other modes, these fields appear in green.

*Transponder Status Bar*

| OAT | 0°C | | | | | | | | | XPDR | 6543 | ALT | R | LCL | 00:05:52 |
| | INSET | | | PFD | CDI | OBS | XPDR | IDENT | TMR/REF | NRST | ADVISORY |

**Figure 3-32  Top-level Softkeys**

*Pressing **XPDR** displays the Mode Selection softkeys*

*Pressing **BACK** displays the Top-level softkeys*

| OAT | 0°C | | | | | | | | | XPDR | 6543 | ALT | R | LCL | 00:07:29 |
| | | STBY | ON | ALT | | VFR | CODE | IDENT | | BACK | ADVISORY |

**Figure 3-33  Mode Selection Softkeys**

*Pressing **CODE** displays the Code Selection softkeys*

*Pressing **BACK** displays the Mode Selection softkeys*

| OAT | 0°C | | | | | | | | XPDR | 6543 | ALT | R | LCL | 00:08:55 |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | IDENT | BKSP | BACK | ADVISORY |

**Figure 3-34  Standby Mode**

## Mode Selection

Mode selection can either be automatic (Ground and Altitude modes) or manual (Standby, ON and Altitude modes). The **STBY**, **ON** and **ALT** softkeys can be accessed by pressing the **XPDR** softkey (see Figures 3-32 and 3-33).

### Ground Mode (Automatic)

Ground mode is automatically selected when the aircraft is on the ground, and a green "GND" indication appears in the mode field of the Transponder Status bar, as shown in the figure below. In Ground mode, the transponder does not allow Mode-A and Mode-C replies, but it does permit acquisition squitter and replies to discretely addressed Mode-S interrogations (please see the Mode-S Transponder Functionality section for more information on acquisition squitter).

**Figure 3-35  Ground Mode**

> **NOTE:** Ground mode can be overridden by pressing any one of the Mode Selection softkeys.

### Standby Mode (Manual)

The Standby mode can be selected at any time by pressing the **STBY** softkey. In Standby mode, no transponder transmissions are allowed, but code selection can still be performed. If the Standby mode is selected, a white "STBY" indication appears in the mode field of the Transponder Status bar, as shown in the figure below.

**Figure 3-36 Standby Mode**

> **NOTE:** In Standby mode, position identification via the **IDENT** softkey cannot be performed, for transmissions are inhibited.

### ON Mode (Manual)

The ON mode can be selected at any time by pressing the **ON** softkey. In ON mode, altitude reporting is inhibited, but replies to Mode A, Mode C and Mode S interrogations can be sent. In this mode, a green "ON" indication appears in the mode field of the Transponder Status bar, as shown in the figure below.

**Figure 3-37 ON Mode**

### Altitude Mode (Automatic or Manual)

Altitude mode is automatically selected when the aircraft becomes airborne. Altitude mode may also be selected manually by pressing the **ALT** softkey.

If Altitude mode is selected, a green "ALT" indication is displayed in the mode field of the Transponder Status bar (as shown in Figure 3-38) and all transponder replies requesting altitude information are provided with pressure altitude information.

**Figure 3-38  Altitude Mode**

> **NOTE:** Altitude mode can be overridden by pressing any one of the Mode Selection softkeys.

### Reply Status

When the transponder sends replies to interrogations, an "R" indication appears momentarily in the reply status field of the Transponder Status bar, as shown in Figure 3-39.

| XPDR | 6543 ALT | R | LCL | 00:05:52 |
|------|----------|---|-----|----------|
| ENT  | TMR/REF  |   | NRST | ADVISORY |
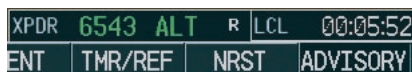
**Figure 3-39  Reply Indication**

### Code Selection

A total of 4,096 discrete identification codes can be selected via the Code Selection softkeys.

#### To enter an identification code:

1.  Press the **XPDR** softkey to display the transponder Mode Selection softkeys.

2.  Press the **CODE** softkey to display the transponder Code Selection softkeys, which includes the digit softkeys.

3.  Press the appropriate digit softkeys to enter the code in the four-digit code field of the Transponder Status bar. Five seconds after the fourth digit has been entered, the transponder code becomes activated.

| XPDR | 645 | ALT |   | LCL | 00:14:18 |
|------|-----|-----|---|-----|----------|
| ENT  | BKSP |    |   | BACK | ADVISORY |
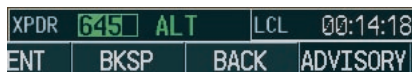
**Figure 3-40  Entering a Code**

> **NOTE:** When entering a code, press the **BKSP** softkey as needed to back up and change code digits.

### VFR Code

The VFR code can either be entered manually by entering each digit with the digit softkeys, or more readily by pressing the **XPDR** softkey, then the **VFR** softkey. When the **VFR** softkey is pressed, the pre-programmed VFR code is automatically displayed in the code field of the Transponder Status bar.

> **NOTE:** Pressing the **VFR** softkey again restores the previous identification code.

> **NOTE:** The pre-programmed VFR code is set at the factory to "1200".

### Important Codes

Following is a list of important codes:

-   1200 – VFR code in the U.S. (please refer to the ICAO standards for VFR codes in other countries).
-   7000 – VFR code commonly used in Europe (please refer to the ICAO standards).
-   7500 – Hijack code.
-   7600 – Loss of communication code.
-   7700 – Emergency code.
-   7777 – Military interceptor operations code (NEVER ENTER THIS CODE).
-   0000 – Code for military use (in the U.S.).

### IDENT Function

Position identification for Air Traffic Control (ATC) is performed by pressing the **IDENT** softkey. The **IDENT** softkey appears within the Top-level, the Mode Selection and the Code Selection softkeys.

When the **IDENT** softkey is pressed, a green "IDNT" indication is displayed in the mode field of the Transponder Status bar (as shown in Figure 3-41) for a duration of 18 seconds. This causes the entered identification code to flash on ATC radar screens and thereby provides air traffic controllers with aircraft position information.

XPDR  6543  IDNT  R  LCL    00:15:31
ENT    TMR/REF    NRST    ADVISORY
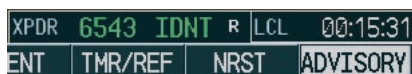
**Figure 3-41  IDENT Indication**

*NOTE: As soon as the **IDENT** softkey is pressed when at the Mode or Code Selection softkey level, the system reverts to the Top-level softkeys.*

*NOTE: In Standby mode, the **IDENT** softkey is inoperative.*

## Mode-S Transponder Functionality

**Flight ID Reporting –** In accordance with ICAO standards, the flight crew of an aircraft equipped with Mode-S capability and having an aircraft identification feature should set the appropriate flight ID on the aircraft transponder. The flight ID is not to exceed seven (7) characters, and no zeros, dashes, or spaces are to be added when the aircraft identification consists of less than seven (7) characters (please see ICAO documents 8168, 4444 and 8585 for further details).

If the Flight ID Type field is set to 'PFD ENTRY' on the Transponder Configuration Page of the G1000 system, the crew is required to enter the appropriate flight ID on the References window of the PFD each time the system is powered up.

*NOTE: Please see the Primary Flight Display Pilot's Guide for further information on entering a flight ID on the G1000 system.*

**Acquisition Squitter –** Acquisition squitter, or short squitter, is the transponder transmission (i.e., a 24-bit identification address) that is sent periodically, regardless of the presence of interrogations. The purpose of acquisition squitter is to enable Mode-S ground stations and Traffic Collision Avoidance System (TCAS) equipped aircraft to become aware of the presence of Mode-S-equipped aircraft so that the latter can in turn be selectively interrogated.

## Traffic Information Service (TIS)

Mode S provides a data link for Traffic Information Service (TIS). TIS is a ground-based service that sends out location, direction, altitude and climb/descent information relative to all transponder-equipped aircraft within a specific service coverage volume.

For aircraft not equipped with TCAS, TIS provides a graphic display of traffic information. TIS displays up to eight (8) traffic targets within 7.5 nautical miles from 3,000 feet below to 3,500 feet above the requesting aircraft. TIS data is updated approximately once every five (5) seconds.

*NOTE: TIS is intended only to assist in visual acquisition of other aircraft in Visual Meteorological Conditions (VMC).*

*NOTE: Please refer to the G1000 Multi Function Display Pilot's Guide for additional information on TIS.*

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# SECTION 4: AUDIO PANEL

## 4.1  INTRODUCTION

This section of the Cockpit Reference Guide describes the major features of the G1000 Audio Panel (GMA 1347) and also contains some basic operating procedures for the most frequently used audio panel features.

> **NOTE:** *A complete audio panel description with full operating procedures is presented in the G1000 Audio Panel Pilot's Guide and Cessna Nav III Supplement.*

> **CAUTION:** *When the GMA 1347 audio panel is turned OFF or is inoperative, certain autopilots are affected.  No warning tone is supplied when the autopilot disengages and the middle marker sense signal is not supplied.*

## 4.2  DESCRIPTION

The GMA 1347 features three (3) major groups of keys as shown in Figure 4-1:

- Communication keys
- Navigation keys
- Intercom system (ICS) keys

Each key is labeled to indicate the name of the function.  The triangular key annunciator above the keys are white when illuminated.

The knobs at the bottom of the unit control ICS volume and squelch threshold levels.  The **small** knob adjusts the volume/squelch level for the pilot.  The **large** knob adjusts the volume/squelch level for the copilot/passenger.  The red **DISPLAY BACKUP** button below the dual volume/squelch knob controls reversionary mode selection.

## 4.3  AUDIO PANEL CONTROLS

- Transceiver audio selector keys
  (**COM1**, **COM2**) COM3 disabled
- Transmitter (audio/mic) selection keys
  (**COM1 MIC**, **COM2 MIC**) COM3 MIC disabled
- Split COM key (Not available)
  (**COM 1/2**)
- Dedicated telephone interface key (disabled)
  (**TEL**)
- Passenger address key
  (**PA**)
- Speaker key
  (**SPKR**)
- Marker beacon receiver audio select/mute key
  (**MKR/MUTE**)
- Marker beacon receiver high sensitivity key
  (**HI SENS**)
- Aircraft radio audio selector keys
  (**NAV1**, **NAV2**, **ADF**, **DME**, **AUX**) AUX disabled
- Intercom manual squelch mode key
  (**MAN SQ**)
- Digital recording playback key
  (**PLAY**)
- Intercom system (ICS) isolation mode keys
  (**PILOT**, **COPLT**)
- Volume/squelch knob
  (**VOL/SQ**)
- Reversionary mode button
  (**DISPLAY BACKUP**)
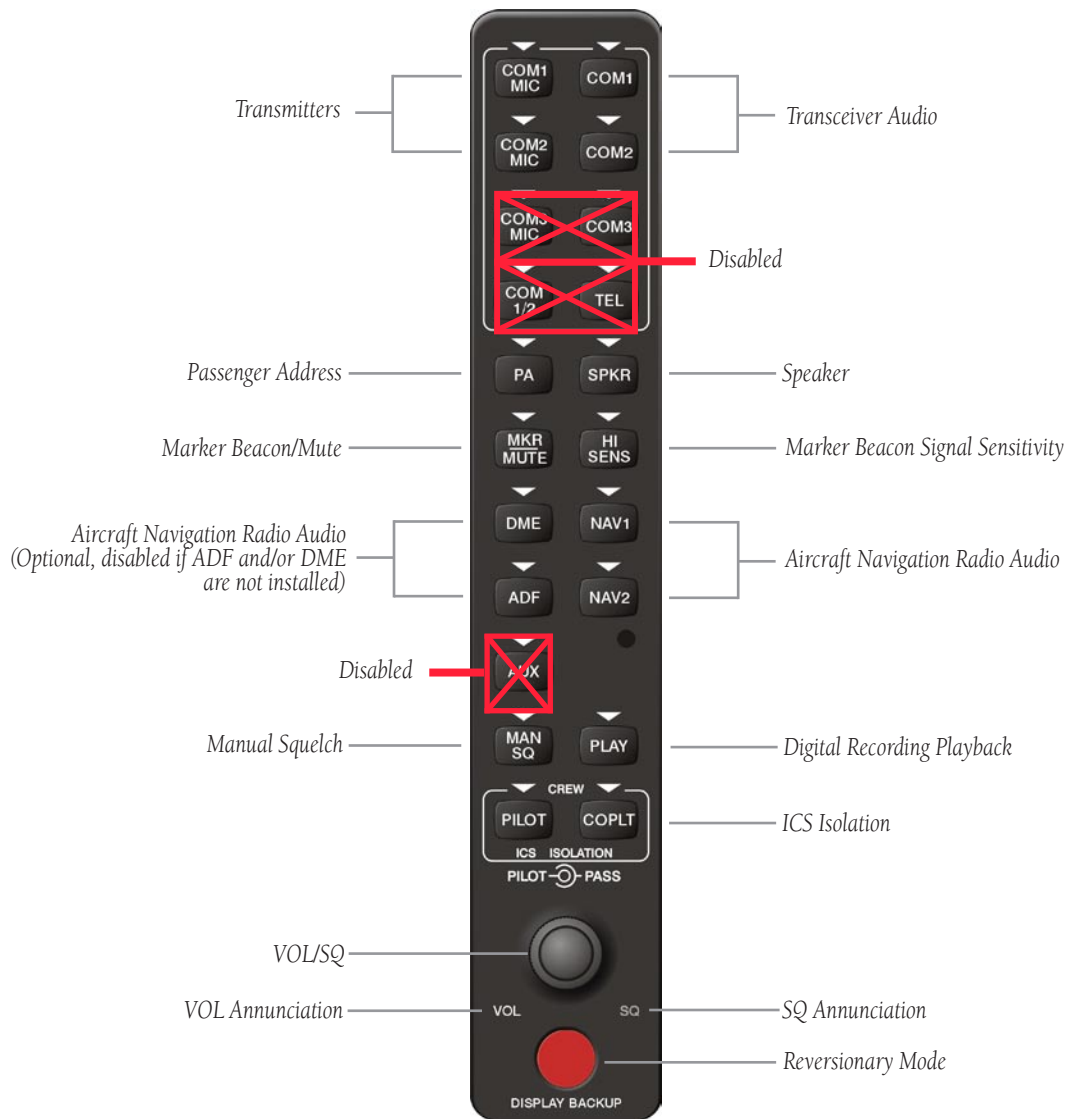
**Figure 4-1  Front Panel Controls**

## 4.4 UNIT OPERATION

### Microphones

The GMA 1347 features two different microphone channeling modes:

- COM1 MIC
- COM2 MIC

⚠️ *NOTE: A push-to-talk (PTT) switch must be pressed to transmit on the selected channel.*

Each audio panel can accept up to six (6) microphone inputs, allowing for a two-person crew and up to four (4) passenger intercom stations in the aircraft.

### Mono/Stereo Headsets

The Cessna 172 and Cessna 182 are equipped with four (4) stereo headset jacks (pilot, copilot and two passengers). The Cessna 206 is equipped with six (6) stereo headset jacks (pilot, copilot and four passengers).

Use of a monaural headset in a stereo jack shorts the right headset channel output to ground. A person listening on a monaural headset hears only the left channel in both ears. If a monaural headset is used at one of the passenger positions, any other passenger listening on a stereo headset hears audio in the left ear only, unless the headset has a mono/stereo switch that is set to mono.

### Unmuted/Unswitched Inputs

The unit provides four (4) unmuted/unswitched inputs that are always present on the headsets or speaker. These inputs are the following aural warnings:

- ALTITUDE WARNING
- UNSWITCHED 1
- UNSWITCHED 2
- UNSWITCHED 3

### Power-up Settings

The GMA 1347 performs a self-test during power-up. All panel annunciator lights illuminate for approximately two (2) seconds. Once the self-test is completed, the settings are restored to the ones in use before the unit was last turned off.

### Fail-safe Mode

A fail-safe circuit connects the pilot's headset and microphone directly to COM1 in case power is interrupted or the unit is turned off. In this case, audio is not available on the speaker.

### Selecting and Deselecting Keys

LED annunciators indicate when a key function is selected. Pressing a key activates and deactivates the function, turning the annunciator light on and off.

### Lighting

LED key annunciators and backlighting are controlled automatically by the G1000 Control Display Unit (CDU).

### Transceiver Keys

Pressing the **COM1 MIC** or **COM2** key selects the COM radio as the active transceiver. The receiver audio key, **COM1** or **COM2** is also selected. The COM frequency is highlighted green in the active frequency field of the PFD and MFD.

Only one microphone source can be selected at a time. If **COM2 MIC** is pressed when **COM1 MIC** is active, the unit switches to COM2.

Pressing the **COM1** or **COM2** receiver key selects the COM radio as an active receiver source. Any combination of radios can be selected separately or simultaneously regardless of the active transceiver selection. The active COM radio is always heard through the headsets.



**Figure 4-2 Transceivers**

### Transmitting

When a transmitter is keyed, the active transceiver MIC key annunciator blinks approximately once per second. A white TX indication appears next to the active COM frequency on both the PFD and the MFD during transmission.

> **NOTE:** *Audio level of the COM radio(s) is controlled by the COM volume controls located on both the PFD and MFD (see the VHF NAV/COM Pilot's Guide).*

### Optional COM Muting

The COM muting on receive and COM muting on transmit options can each be disabled in configuration mode. When COM muting on receive is enabled, all secondary COM audio is muted upon detection of a received primary COM signal. When COM muting on transmit is enabled, all secondary COM audio is muted during transmission over the primary COM radio.

### PA Function

A passenger address function is provided by pressing the **PA** key. Push-to-talk (PTT) must be used to deliver PA announcements over the headsets.

### Cabin Speaker

All of the radios can be heard over the cabin speaker. Pressing the **SPKR** key selects and deselects the cabin speaker. Speaker audio is muted when the PTT switch is keyed.

The speaker volume is adjustable above and below a nominal value. Contact a Garmin-authorized service center for details.

## Marker Beacon Receiver

The GMA 1347 marker beacon is used as part of the ILS system.  The marker beacon receiver is always ON and receives at 75 MHz.  The GMA 1347 provides a marker audio muting capability.

The receiver detects the three (3) marker tones, **outer**, **middle** and **inner**, and illuminates the appropriate marker beacon indicators.  The marker indicators are located to the left of the altimeter on the PFD (Figure 4-4).  The outer marker frequency is 400 Hz with a blue indicator, the middle marker frequency is 1,300 Hz with an amber indicator and the inner marker frequency is 3,000 Hz with a white indicator.  Refer to Table 4-1 for a summary of the marker beacon signal characteristics.

When the **MKR/MUTE** key is selected, the annunciator light becomes illuminated and the audio signal can be heard over the speaker or headsets during marker reception.

When the **MKR/MUTE** key is annunciated and a marker beacon tone is received, pressing the **MKR/MUTE** key mutes the audio but does not affect the annunciators.  The audio returns when the next marker signal is received.  If the **MKR/MUTE** key is pressed during signal reception, while marker beacon audio is muted, marker audio and the **MKR/MUTE** key annunciator light are turned off.

> **NOTE:** *The marker beacon receiver lights operate independently of the marker beacon audio and cannot be turned off.*

## Marker Beacon Signal Sensitivity

The **HI SENS** key can be pressed for increased marker beacon signal sensitivity.  The HI SENS function is used to receive an earlier indication of nearing a marker during an approach.



**Figure 4-3  Marker Beacon**

The lamp and audio keying of the marker beacon receiver are summarized in Table 4-1.

| Beacon | Audio Frequency | Audio Keying | Rate | Lamp Color |
|--------|----------------|--------------|------|-----------|
| Outer Marker | 400 Hz | — — — | 2 dashes per second | Blue |
| Middle Marker | 1,300 Hz | • — • — | 95 dot-dash combinations **per minute** | Amber |
| Airway/Inner Marker | 3,000 Hz | • • • • | 6 dots per second | White |

**Table 4-1  Marker Beacon Signal Characteristics**



Inner Marker  Middle Marker  Outer Marker
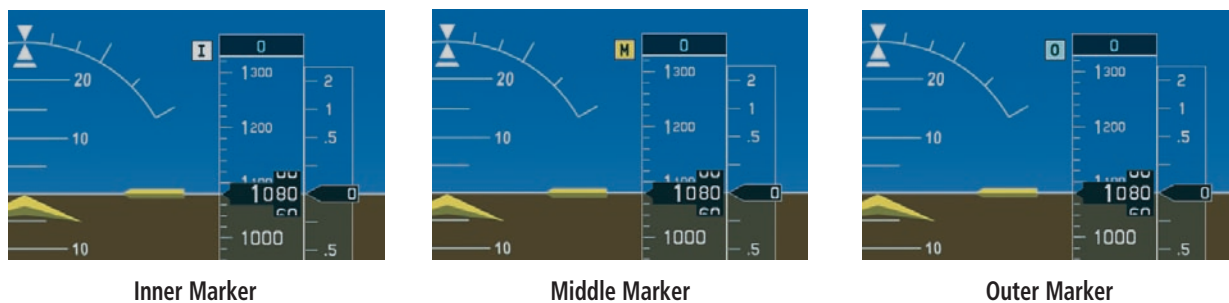
**Figure 4-4  Marker Beacon Signal Indicator Lights on the PFD**

## Navigation Radios

Pressing **DME**, **ADF**, **NAV1**, or **NAV2** selects and deselects the radio source and activates the annunciator. Selected audio can be heard over the headset and the speakers. All radio keys can be selected individually or together.



**Figure 4-5  Navigation Radios**

## Intercom System (ICS) Isolation

The intercom system (ICS) provides four (4) isolation modes: ALL**,** PILOT, COPILOT and CREW. The desired mode can be selected or deselected using the **PILOT** and **COPLT** keys.

### PILOT Mode

PILOT mode is selected when only the **PILOT** key is annunciated. In PILOT mode, the pilot can hear the selected radios, the copilot can hear MUSIC 1, the passengers can hear MUSIC 2, and the copilot and passengers can communicate with each other.

### COPILOT Mode

COPILOT mode is selected when only the **COPLT** key is annunciated. In COPILOT mode, the copilot is isolated from everyone else. The pilot and passengers can hear the selected radios and communicate with each other. In this mode, the pilot can hear MUSIC 1, while the passengers can hear MUSIC 2.

The possible ICS isolation states are summarized in Table 4-2.



**Figure 4-6  ICS Isolation**

| | Current ICS Isolation State | | | |
|---|---|---|---|---|
| **Input** | **PILOT** | **COPILOT** | **CREW** | **ALL** |
| **PILOT Key Press** | ALL | CREW | COPILOT | PILOT |
| **COPLT Key Press** | CREW | ALL | PILOT | COPILOT |

**Table 4-2  ICS Isolation Mode Transitions**

### CREW Mode

CREW mode is selected when both the **PILOT** and **COPLT** keys are annunciated.  In CREW mode, both the pilot and copilot can hear the selected radios and communicate with each other, while the passengers can only hear MUSIC 2.

### ALL Mode

ALL mode is selected when the **PILOT** and the **COPLT** keys are not annunciated.  In ALL mode, everyone hears the selected radios and is able to communicate with everyone else.  In this mode, both the pilot and copilot can hear MUSIC 1, while the passengers hear MUSIC 2.

Table 4-3 summarizes the ICS operation for the four (4) ICS isolation modes and telephone distribution.

## Entertainment Inputs

The current ICS isolation mode affects the distribution of the entertainment inputs MUSIC 1 and MUSIC 2.

### MUSIC 1

MUSIC 1 can be heard by the pilot in COPILOT mode and in ALL mode, and can be heard by the copilot in PILOT mode and in ALL mode.

#### MUSIC 1 Muting

MUSIC 1 muting occurs when aircraft radio, marker beacon, or ICS activity is heard.

Muting of MUSIC 1 is also triggered by marker beacon activity when in ALL, CREW or COPILOT mode.  After muting ceases, MUSIC 1 gradually returns to its original volume level.  This characteristic is known as "soft mute."  The time required for MUSIC 1 to return to its original volume level at the headset outputs is between 0.5 and 4 seconds.

> ⚠ **NOTE:** *If the **MKR/MUTE** key is pressed and held for three (3) seconds, the GMA 1347 toggles music muting ON and OFF during radio signal reception.  Upon toggling, either one (1) or two (2) beeps can be heard; one (1) beep indicates that music muting is enabled and two (2) beeps indicate that music muting is disabled.*

### MUSIC 2

MUSIC 2 can only be heard by the passengers and is never muted.

| Mode | PILOT LED | COPLT LED | Pilot Hears | Copilot Hears | Passenger Hears |
|------|-----------|-----------|-------------|---------------|-----------------|
| **ALL** | OFF | OFF | Selected radios; pilot; copilot; passengers; MUSIC 1 | Selected radios; pilot; copilot; passengers; MUSIC 1 | Selected radios; pilot; copilot; passengers; MUSIC 2 |
| **PILOT** | ON | OFF | Selected radios; pilot | Copilot; passengers; MUSIC 1 | Copilot; passengers; MUSIC 2 |
| **COPILOT** | OFF | ON | Selected radios; pilot; passengers; MUSIC 1 | Copilot | Selected radios; pilot; passengers; MUSIC 2 |
| **CREW** | ON | ON | Selected radios; pilot; copilot | Selected radios; pilot; copilot | Passengers; MUSIC 2 |

**Table 4-3  ICS Isolation Modes & Telephone Distribution**

## Volume/Squelch Control

When the GMA 1347 **MAN SQ** key is selected, pressing the **VOL/SQ** knob toggles between volume and squelch adjustment. When the unit is in volume adjustment mode, the **VOL** annunciation on the lower left of the **VOL/SQ** knob is lit and volume can be adjusted. When the unit is in squelch mode, the **SQ** annunciation on the lower right of the **VOL/SQ** knob is lit and squelch threshold level can be adjusted.



**Figure 4-7  Volume/Squelch Control**

> **NOTE:** When the **MAN SQ** key is not selected (auto-squelch is active), pressing the **VOL/SQ** knob has no effect on the VOL/SQ selection state and **VOL** is automatically annunciated.

When transitioning from auto to manual squelch, the unit returns to the previous VOL/SQ selection (see table below).

> **NOTE:** The volume and squelch controls for the COM and NAV radios are located on the PFD and MFD bezels (refer to the VHF NAV/COM Pilot's Guide for details).

### Intercom VOL/SQ State

#### Intercom Volume Control

Intercom volume can be controlled with the **VOL/SQ** knob. The **small** knob controls the pilot ICS volume. The **large** knob controls the copilot/passenger ICS volume. Turning either knob clockwise increases audio level. Turning either knob counterclockwise decreases audio level. When **MAN SQ** is off (key not annunciated) volume adjustment is automatically selected and the **VOL** annunciation is lit.

| | | Current VOL/SQ State | | |
|---|---|---|---|---|
| **Input** | | **Auto, VOL selected** | **Manual, VOL selected** | **Manual, SQ selected** |
| **MAN SQ Key Press** | **Previous State: Manual, VOL selected** | Manual, VOL selected | Auto, VOL selected | Auto, VOL selected |
| | **Previous State: Manual, SQ selected** | Manual, SQ selected | | |
| **GMA 1347 VOL/SQ Knob Press** | | Auto, VOL selected | Manual, SQ selected | Manual, VOL selected |

**Table 4-4  Transitioning from Auto to Manual Squelch Mode**

**To adjust ICS volume when the MAN SQ key is not annunciated:**

1.  Turn the appropriate **VOL/SQ** knob.

**To adjust ICS volume when the MAN SQ key is annunciated**, perform one of the following steps:

1a.  If the unit is in manual squelch threshold adjustment mode (**SQ** annunciation at the lower right of the **VOL/SQ** knob is lit), press the **VOL/SQ** knob to toggle to ICS volume adjustment mode, and turn the appropriate **VOL/SQ** knob.

1b.  If the unit is already in ICS volume adjustment mode (**VOL** annunciation at at the lower left of the **VOL/SQ** knob is lit), turn the appropriate **VOL/SQ** knob.

### Intercom Squelch Threshold Control

Each microphone input has an automatic squelch threshold.  Manual squelch override as well as keyed ICS operation (for noisier cockpits) is also available.

The **VOL/SQ** knob manually adjusts squelch threshold when the **MAN SQ** key is annunciated and the **SQ** annunciation is lit.  The small **VOL/SQ** knob controls pilot squelch threshold and the large **VOL/SQ** knob controls copilot/passenger squelch threshold.  Turning either knob clockwise increases the threshold.  Turning either knob counterclockwise decreases the threshold.

> **NOTE:** *In manual squelch mode, when the **VOL/SQ** knob is adjusted to minimum, all crew audio inputs can break squelch.  When the **VOL/SQ** knob is adjusted to maximum, the ICS audio is heard only when an ICS PTT is pressed.*

**To adjust squelch threshold level manually if the MAN SQ key is not annunciated:**

1.  Press the **MAN SQ** key:

2a.  If the **VOL** annunciation is lit, press the **VOL/SQ** knob for **SQ** annunciation and turn the **VOL/SQ** knob.

2b.  If the **SQ** annunciation is already lit, turn the **VOL/SQ** knob.

**To adjust squelch threshold level manually if the MAN SQ key is already annunciated:**

1a.  If the **VOL** annunciation is lit, press the **VOL/SQ** knob for **SQ** annunciation and turn the **VOL/SQ** knob.

1b.  If the **SQ** annunciation is already lit, turn the **VOL/SQ** knob.

### Master Avionics Squelch (MASQ)

MASQ (Master Avionics Squelch) reduces ambient noise from the aircraft radios.  When no audio is detected, MASQ processing further reduces the amount of background noise from the radios.

The Master Avionics Squelch (MASQ) threshold level can be adjusted or disabled by a Garmin-authorized service center.

### Digital Clearance Recorder with Playback Capability

The GMA 1347 provides a digital clearance recorder with playback capability of up to 2.5 minutes of COM signal recording.  Recorded COM signals are stored in separate memory blocks.  Signals from all of the selected COM radios are recorded and can be played back.  Anyone able to hear the selected COM radios is able to hear the COM signal playback.

Once the 2.5 minutes of recording time have been reached, the recorder begins recording over the stored memory blocks, starting from the oldest block.  Powering off the unit automatically clears all recorded blocks.



**Figure 4-8  Playback**

The **PLAY** key controls the playback function.

- Pressing **PLAY** once plays back the latest recorded memory block, then returns to normal operation.
- Pressing **PLAY** during playback of a memory block halts the playback of this block and plays back the preceding recorded block.  The **PLAY** key can be used to backtrack through the recorded memory blocks to reach and play back any desired block.

> **NOTE:** Pressing the **MKR/MUTE** key during playback halts playback and returns the recorder/playback to normal operation.

During playback, the **PLAY** annunciator light blinks approximately once per second.  If a COM input signal is detected during playback, playback is halted and the new COM input signal is recorded as the latest block.

> **NOTE:** If the COM muting on receive option is enabled, only the primary COM radio signal reception is recorded by the digital clearance recorder.

### Reversionary Mode

The red **DISPLAY BACKUP** button selects the reversionary mode for all displays.  Reversionary mode operation displays important flight and engine information on both the PFD and MFD, in case of display failure.

In dual audio panel configuration the **DISPLAY BACKUP** button operates on the pilot side only.



**Figure 4-9  Reversionary Mode key**

### Interface to Cockpit Voice Recorder

The GMA 1347 provides the ability to interface to a cockpit voice recorder (CVR).  The unsquelched pilot microphone input (all vocal inputs from the pilot) is combined with all audio heard on the pilot's headset and cabin speaker and is output to the pilot CVR channel.  The unsquelched copilot microphone input is combined with all audio heard on the copilot's headset and the cabin speaker and is output to the copilot CVR channel.

## Dual Panel Operation

In a dual installation, one GMA 1347 is in the pilot position, the other is in the copilot position. The units are referred to as the pilot side and copilot side audio panels. Both the pilot and the copilot can transmit at the same time from either the pilot side unit or copilot side unit.

ICS key selections (PILOT and COPILOT) and the telephone key (TEL) annunciate together in a dual installation. When a key is pressed on either the pilot side or the copilot side, both units annunciate the same selection. COM3 MIC and the TEL have no priority.

> **NOTE:** In dual configuration, the pilot always hears the audio selected on the pilot's audio panel and the copilot always hears the audio selected on the copilot's audio panel.

Intercom operation of dual audio panels is identical to that of single audio panel operation. The passengers hear selected radios from the pilot or copilot side, depending on the installation.

When ICS is connected to the copilot side in PILOT mode, the passengers hear radios selected by the copilot, the passenger audio, the copilot and MUSIC 2. When ICS is connected to the copilot side in COPILOT mode, the passengers hear the passenger audio, the pilot and MUSIC 2

## Simultaneous COM Transmission

Dual GMA 1347 installations allow both the pilot and copilot to transmit simultaneously over separate radios. When either COM transmitter is keyed, transmit-interlock shuts off the other COM receiver. This prevents interference from the active COM transmitter.

With two pilots aboard, transmit-interlock may interfere with communications. When either the pilot or copilot transmits on a COM radio, no audio is heard on the other COM receiver. This means that if the pilot is communicating with ATC on COM1, while the copilot is transmitting on COM2, all of the pilot's reception is lost during the time of copilot transmission.

If transmit-interlock is not activated, all the selected receivers are heard at all times. Without transmit-interlock, during simultaneous transmission, interference may be heard on the COM receivers. Transmission by one radio produces static or squeal, resulting in loss of communication on other radios.

Dual COM performance varies significantly depending on the distance between the antennas and the tuned frequency separation.

*Speaker not available on copilot's side*

*Reversionary mode operates on Pilot side only*

Pilot Side          Copilot Side

**Figure 4-10  Dual G1000 Audio Panels (GMA 1347)**

# SECTION 5: MULTI FUNCTION DISPLAY

## 5.1   INTRODUCTION

This section of the G1000 Cockpit Reference Guide introduces the pilot to the major features of the Multi Function Display.  A complete description of the MFD with detailed operating procedures is contained in the G1000 Multi Function Pilot's Guide and the G1000 Engine Indication System Pilot's Guide.

## 5.2   MFD DESCRIPTION

The display portion of the G1000 Integrated Cockpit System in the Cessna Nav III installation consists of two 10.4 inch liquid crystal displays (LCDs).  During normal operation, the right display is configured as the Multi Function Display (MFD).

## 5.3   MFD POWER-ON

The MFD powers on when the Avionics BUS 2 switch is placed in the ON position.

## 5.4   BACKLIGHTING

See Section 2.4 for backlighting information.

## 5.5   MFD SOFTKEYS

Softkeys located below the display glass provide control over flight management functions including GPS and NAV management, engine and airframe monitoring, terrain, and traffic.

At the top level, the MFD softkeys perform the following functions:

**ENGINE –** Pressing the **ENGINE** softkey makes available the **LEAN** and **SYSTEM** softkeys which in turn access the Lean Page and the System Page, respectively.

**MAP –** pressing the **MAP** softkey enables the following softkeys:

> **TRAFFIC –** pressing the **TRAFFIC** softkey displays/removes Mode S Traffic on the Navigation Map.

> **TOPO –** pressing the **TOPO** softkey displays or removes topographic information on the Navigation Map.

> **TERRAIN –** pressing the **TERRAIN** softkey displays/removes terrain information on the Navigation Map.

> **BACK –** pressing the **BACK** softkey displays the **ENGINE** and **MAP** top level softkeys.

**DCLTR (declutter) –** pressing the **DCLTR** softkey removes map information in three levels.

**CHKLIST** (checklist) **–** pressing the **CHKLIST** softkey displays the Checklist Page.

ENGINE

MAP

DCLTR

CHKLIST

Press the BACK softkey on this level to return to the top softkey level

ENGINE   LEAN   SYSTEM   BACK

DCLTR-1

DCLTR-2

DCLTR-3

Press the BACK softkey on this level to return to the top softkey level

Press the BACK softkey on this level to return to the top softkey level

ENGINE   LEAN   SYSTEM   CYL SLCT   ASSIST   BACK

TRAFFIC   TOPO   TERRAIN   BACK

Press the ENGINE softkey on any level to return to the LEAN and SYSTEM softkey level

Press the BACK softkey on this level to return to the top softkey level

ENGINE   LEAN   SYSTEM   RST USED   BACK

The DONE softkey changes to UNDO when the checklist item is already checked

ENGINE   DONE   EXIT   EMERGCY

CLR

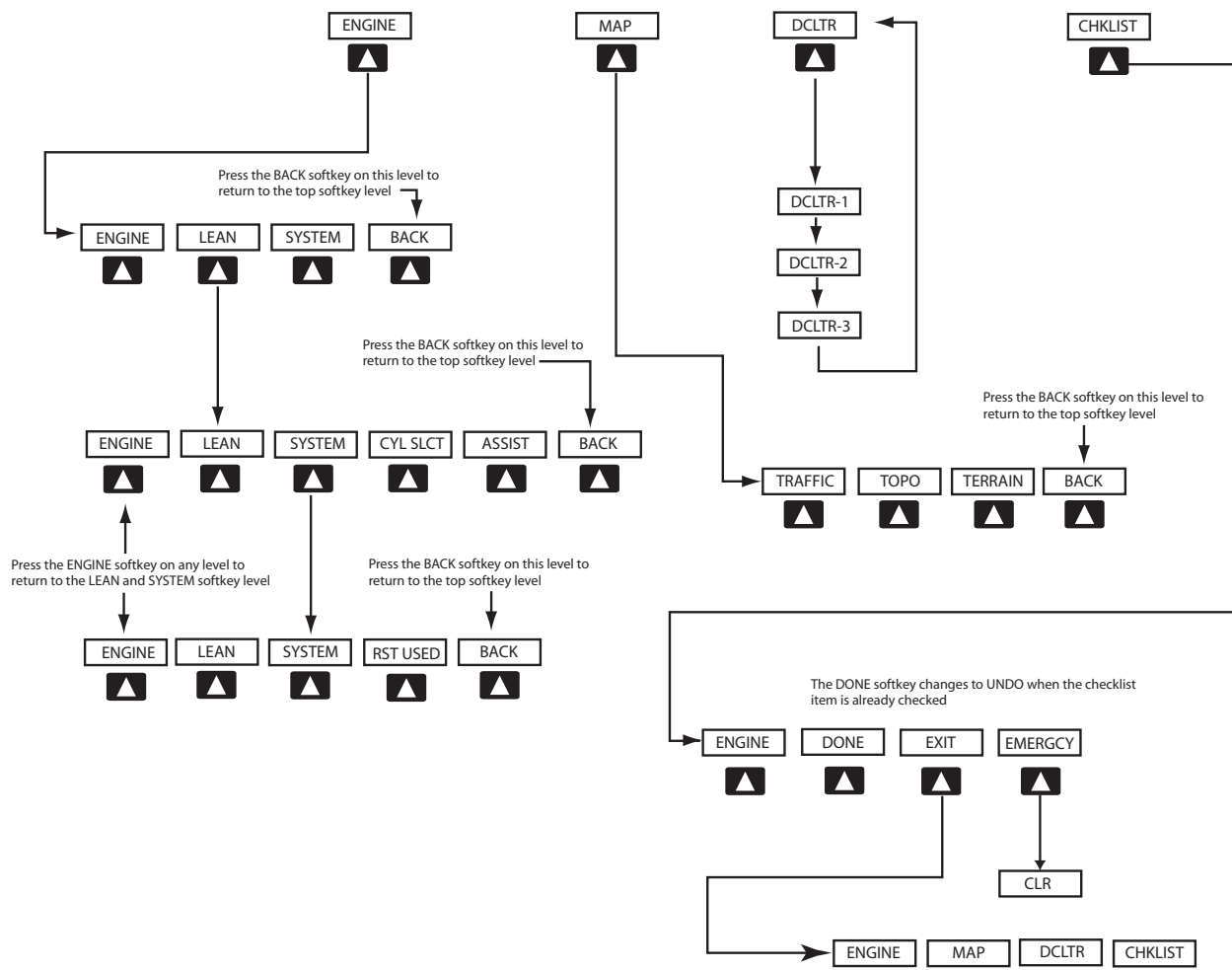ENGINE   MAP   DCLTR   CHKLIST

**Figure 5-1  MFD Softkeys**

## 5.6 ELECTRONIC CHECKLISTS

The G1000 Multi Function Display installed in the Cessna Nav III provides Normal, Abnormal, and Emergency checklists which allow a pilot to quickly find the proper procedure on the ground and during each phase of flight.

> NOTE: The checklist information described in this section is not intended to replace the checklist information described in the Nav III Information Manual and the Pilot Safety and Warning Supplements document.

> NOTE: Garmin is not responsible for the content of the checklists. Checklists are created by the aircraft manufacturer and cannot be edited by the user. Additionally, modifications or updates to the checklists are coordinated through the aircraft manufacturer.

### Displaying the Checklist Page

The Power-up Page displays the current checklist file that is installed for the Nav III aircraft. If no checklist is present, then the Power Up Page displays the text "CHECKLIST FILE NOT PRESENT" and the **CHKLIST** softkey is greyed out.

#### To select the Checklist Page:

1. From any page, press the **CHKLIST** softkey.

### Selecting a Procedure Group

Checklist procedures are arranged in groups that relate to importance. These groups might be designated as Normal, Abnormal, and Emergency, but can be anything deemed appropriate by the aircraft manufacturer.

#### To select a procedure group:

1. Press the **CHKLIST** softkey.
2. Turn the **large FMS** knob to select the 'GROUP' field.
3. Turn the **small FMS** knob to select the desired procedure and press the **ENT** key.

### Selecting a Checklist within the Procedure Group

1. Turn the **large FMS** knob to select the 'Checklist' field.
2. Turn the **large or small FMS** knob to select the desired checklist and press the **ENT** key.

### Selecting a Checklist Item

Two methods are available to select a checklist item: (1) pressing the **ENT** key; or (2) pressing the **DONE** softkey.

(1) Pressing the **ENT** key:
With the desired checklist displayed, turn the **large or small FMS** knob to move up and down the checklist and highlight an item with a hollow white rectangle. The default color for non-selected checklist items is blue and once the item is highlighted, the color turns white. To select a checklist item that is highlighted, press the **ENT** key. The selected item turns green in color again for ease of identification, and then a check mark is placed in the box next to the item. As an item is selected, the next item is automatically highlighted for selection.

(2) Pressing the **DONE** Softkey:
Pressing the **DONE** softkey produces the same results as pressing the **ENT** key.

> NOTE: All warnings are displayed in yellow for ease of identification.

### Removing the Check Mark from a Checklist Item

Press the **CLR** key to remove a check mark from an item.

### Advancing to the Next Checklist

Once the last item in a checklist is selected, the 'GO TO THE NEXT CHECKLIST?' text is highlighted. Press the **ENT** key to advance to the next checklist.

### One-Button Access to Emergency Procedures

The **EMERGCY** softkey is available at all times when the checklist page is displayed. Press the **EMERGCY** softkey at any time to immediately access the emergency procedures.

### Exiting the Checklist Page

The **EXIT** softkey is available as long as the Checklist Page is displayed. Press the **EXIT** softkey at anytime to exit the Checklist Page and return to the last page that was displayed before the Checklist Page was selected. Pressing the **CLR** key will return to the Navigation Map Page.
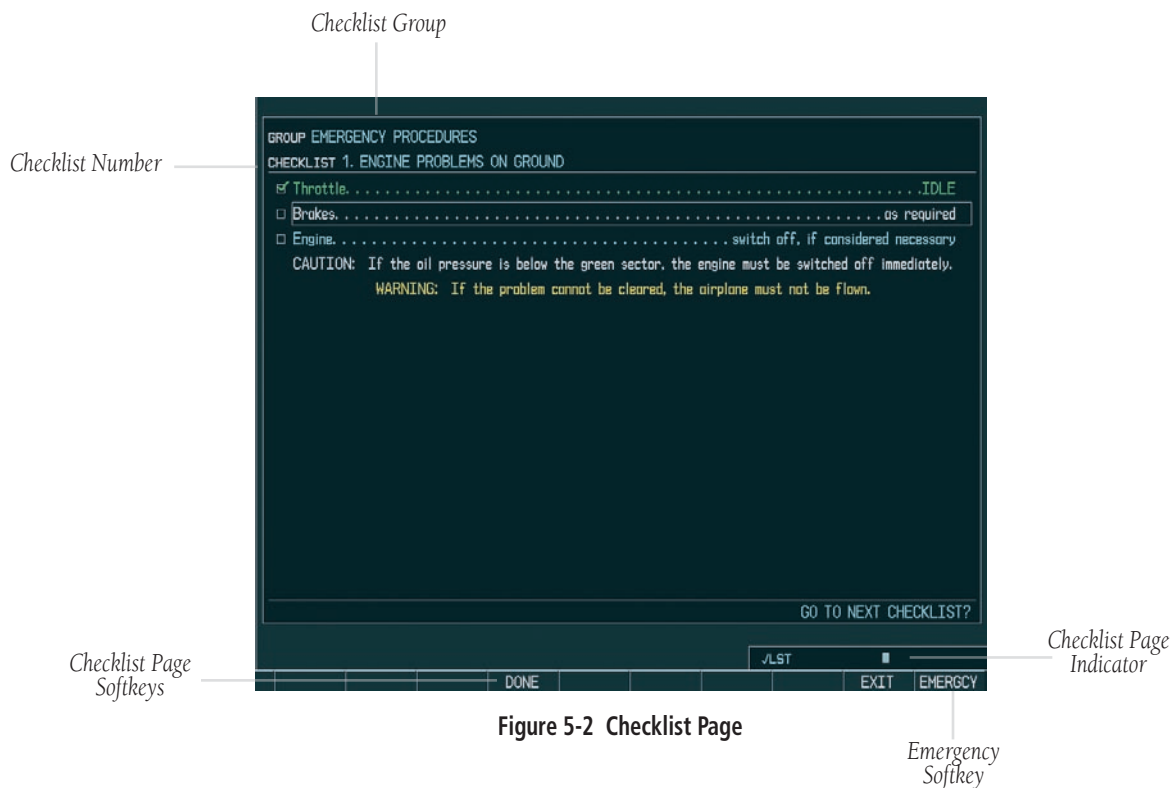


*Checklist Group*

*Checklist Number*

GROUP EMERGENCY PROCEDURES
CHECKLIST 1. ENGINE PROBLEMS ON GROUND
☑ Throttle. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .IDLE
☐ Brakes. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . as required
☐ Engine. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . switch off, if considered necessary
    CAUTION:  If the oil pressure is below the green sector, the engine must be switched off immediately.
          WARNING:  If the problem cannot be cleared, the airplane must not be flown.

GO TO NEXT CHECKLIST?

√LST

DONE          EXIT  EMERGCY

*Checklist Page Softkeys*

*Checklist Page Indicator*

*Emergency Softkey*

**Figure 5-2  Checklist Page**

## 5.7 ENGINE INDICATION SYSTEM WINDOW

The Engine Indication System (EIS) Display is located on the left portion of the MFD (or on the left portion of any CDU in reversionary mode). The EIS window display is a full-time dedicated display of the following engine electrical gauges:

- **MANIFOLD PRESSURE GAUGE (MAN IN)** Displays engine manifold pressure in inches of mercury (Hg).

> ⚠ *NOTE: The 172 Engine Page does not display a Manifold Pressure gauge.*

- **TACHOMETER (RPM) –** Displays current propeller speed in revolutions per minute.
- **FUEL FLOW GAUGE (FFLOW GPH) –** Displays current fuel flow in gallons per hour.
- **OIL PRESSURE GAUGE (OIL PRES) –** Displays engine oil pressure in pounds per square inch (psi).
- **OIL TEMPERATURE GAUGE (OIL TEMP)–** Displays the current oil temperature in degrees Fahrenheit.
- **CYLINDER HEAD TEMPERATURE GAUGE (CHT) –** Displays the temperature of the hottest cylinder head in degrees Fahrenheit and indication of the associated cylinder.

> ⚠ *NOTE: The 172 configuration only displays cylinder head temperature on the LEAN Engine Page.*

- **EGT INDICATOR (EGT) (normally aspirated)** Displays the temperature of the exhaust gas from each cylinder, which is taken from the exhaust stack(s). An indication of the associated cylinder appears in the pointer.
- **TIT INDICATOR (TIT) (turbocharged)** Displays the temperature of the turbine inlet in degrees Fahrenheit.
- **FUEL QUANTITY GAUGE (FUEL QTY GAL)** Displays the amount of fuel remaining in the left and right fuel tanks in gallons. A full (F) indication equates to 26 gallons for the 172 and 35 gallons on the 182, T182, 206 and T206
- **VOLTMETER –** Displays the main and essential bus voltage.
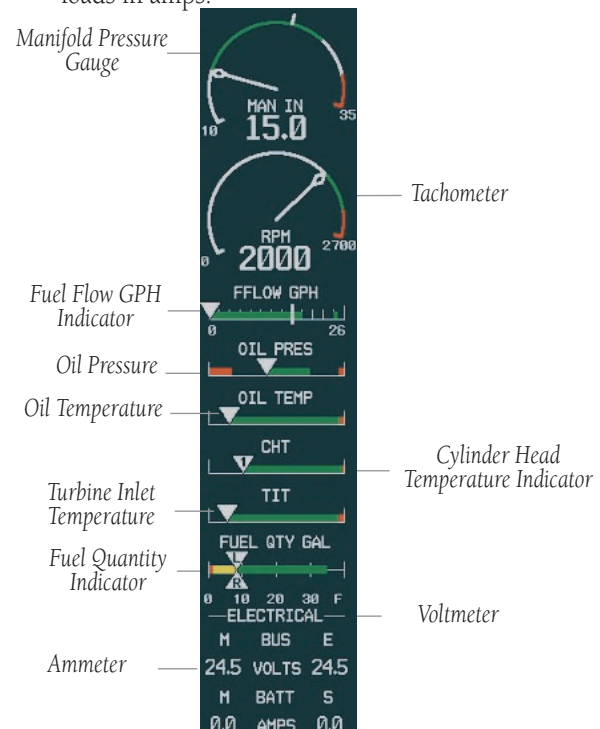- **AMMETER –** Displays the main and standby battery loads in amps.



**Figure 5-3 Engine Indication Window (T182 Shown)**

## Engine Indication System Pages

Pressing the **ENGINE** softkey makes available the **LEAN** and **SYSTEM** softkeys which in turn access the Lean Page and the System Page, respectively.

### LEAN Page

Pressing the **LEAN** softkey displays the Lean Page with the following information:

**MAN IN –** Displays the engine manifold pressure in inches of mercury (Hg).

**TACHOMETER –** Displays the current propeller speed in revolutions per minute.

**FFLOW GPH –** Displays the fuel flow in gallons per hour.

**TIT °F (turbocharged) –** Displays the turbine inlet temperature in degrees Fahrenheit.

**EGT °F –** Displays the exhaust gas temperature for each cylinder in degrees Fahrenheit.

**CHT °F –** Displays the cylinder head temperature for each cylinder in degrees Fahrenheit.

**FUEL QTY –** Displays the amount of fuel remaining in the left and right fuel tanks in gallons.

Pressing the **CYL SLCT** softkey allows EGT and CHT information to be displayed for a particular cylinder.

> **NOTE:** *The cylinder select and lean functions are described in detail in the G1000 Engine Indication System Pilot's Guide.*



*Manifold Pressure Gauge*

*Tachometer*

*Fuel Flow Indicator (GPH )*

*Exhaust Gas Temperature*

*Cylinder Head Temperature*
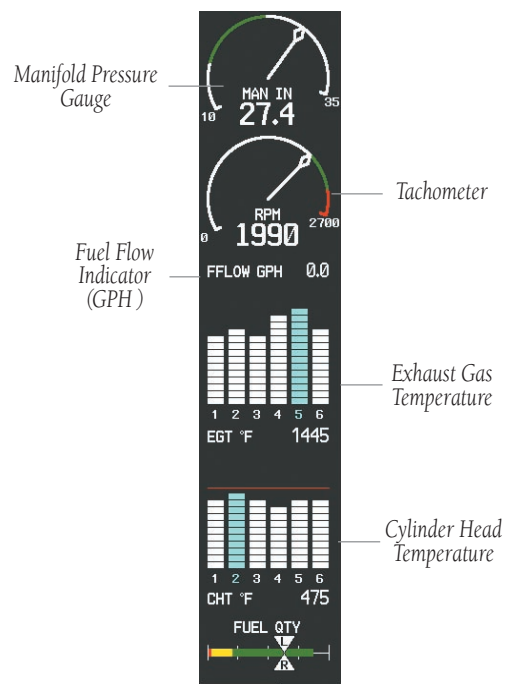
**Figure 5-4  LEAN Page (182 Shown)**

### SYSTEM Page

Pressing the **SYSTEM** softkey displays the following system and fuel calculation information:

**MAN IN –** Displays the engine manifold pressure in inches of mercury (Hg).

**TACHOMETER –** Displays the current propeller speed in revolutions per minute.

**OIL PSI –** Displays the engine oil pressure in pounds per square inch (psi).

**OIL °F –** Displays the current oil temperature in degrees Fahrenheit.

**ENG HRS –** Displays the engine hours (tach time)

**VAC –** Displays the vacuum pressure in pounds per square inch.

**FFLOW GPH –** Displays the current fuel flow in gallons per hour.

**GAL USED –** Displays the quantity of fuel used in gallons.

**FUEL QTY –** Displays the current remaining fuel in the system

**VOLTMETER –** Displays the main and essential bus voltage.

**AMMETER –** Displays the main and standby battery load in amperes.

The second-level softkeys are available by pressing the **SYSTEM** softkey:

- **RST USED**

### To reset the fuel used totalizer to zero:

1. From the System Page, press the **RST USED** softkey.

Pressing the engine page (**ENGINE)** softkey removes the Lean or System Pages and displays the default engine parameters.

## Engine Indication System Operation

See the G1000 Engine Indication System Pilot's Guide for complete engine instrumentation procedures and operational information.
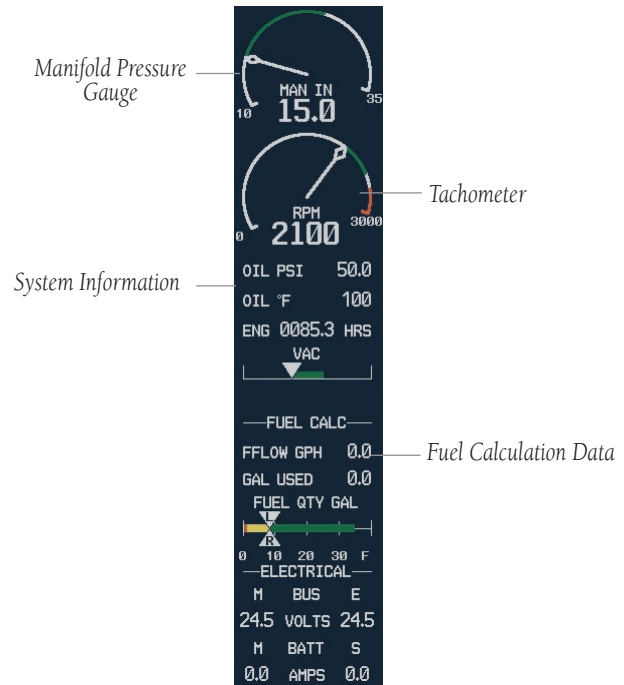


**Figure 5-5  Engine System Window (206 Shown)**

## 5.8 MULTI FUNCTION WINDOW

The central area of the MFD contains the Multi Function window, which displays the GPS/Navigation flight information.

### Multi Function Window Page Groups

This guide only describes the Map Page Group, for this is the group typically used during most flight operations. The G1000 Multi Function Display Pilot's Guide describes the remaining page groups in detail.

The Multi Function window of the MFD displays information from four main page groups:

- **Map** (MAP) – three pages
- **Waypoint** (WPT) – five pages
- **Auxiliary** (AUX) – five pages
- **Nearest** (NRST) – seven pages

#### To select a specific page group:

1. Turn the **large FMS** knob until the desired page group is selected.

#### To select a different page within the group:

1. Turn the **small right FMS** knob. As the **large** knob is turned, the bottom right corner of each page indicates the page group that is currently being displayed (e.g., MAP or NRST, etc.), the number of pages available within that group (indicated by rectangle icons) and the placement of the current page within that group (indicated by a solid icon).

The following keys which are used in association with all page group operations:

- **CLR** – Erases information or cancels an entry. Press and hold **CLR** to immediately display the Default Navigation Map Page, regardless of the page currently displayed.
- **ENT** – Accepts a menu selection or data entry. Approves an operation or completes data entry. Also, confirms information.
- **MENU** – Displays a context-sensitive list of options that allows access to additional features or that allows the pilot to change the settings which relate to the currently displayed page.
- **BACK Softkey** – Resets the MFD softkeys to the top softkey level.
- **DCLTR Softkey** – With each key-press, removes information from the moving map in a progressive manner.
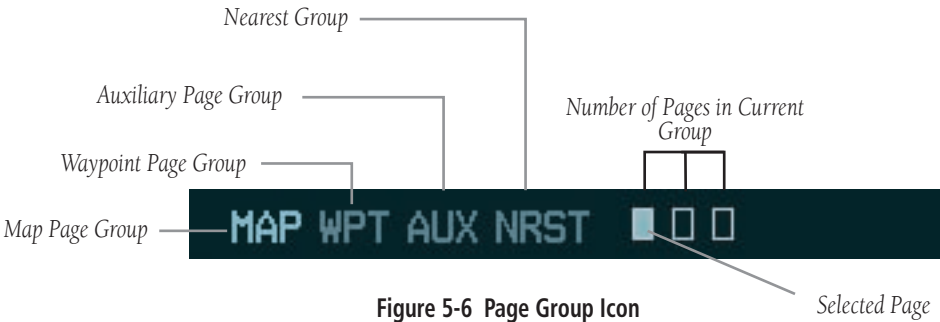
Nearest Group

Auxiliary Page Group

Number of Pages in Current Group

Waypoint Page Group

Map Page Group

MAP WPT AUX NRST

Selected Page

**Figure 5-6  Page Group Icon**

### Navigation Map Page

The first page in the map group is the Navigation Map Page, which displays the following information:

- Moving map showing airports, airspaces, NAVAIDS, land data (roads, lakes, borders, etc.) and labels
- Map pointer information (distance and bearing to pointer, location of pointer, name and other pertinent information of item under the pointer)
- Zoom range legend
- Heading
- Plane icon
- Icons for enabled map features
- Track vector (optional)
- Topography scale (optional)
- Map Declutter Icon

**WARNING:** *The map display should not be used for navigation, but only for non-navigational situational awareness. Any map display indication should be compared with approved navigation sources.*
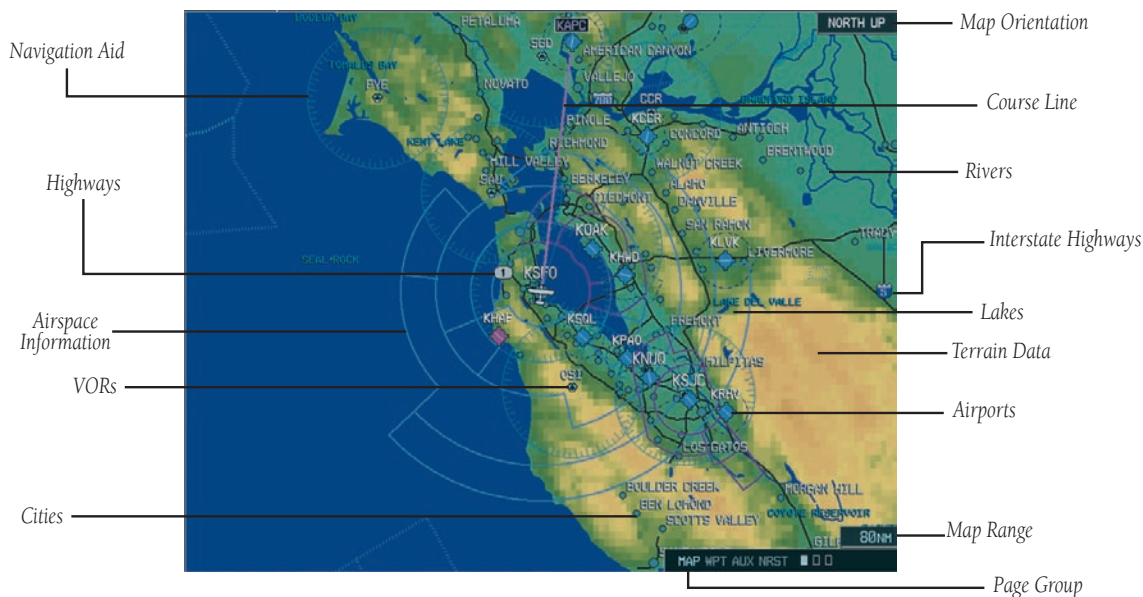


**Figure 5-7  Navigation Map Page**

### Navigation Map Page Operations

The following operations (see the G1000 Multi Function Display Pilot's Guide for a full listing) can be performed from the Navigation Map Page:

- **Changing map feature settings of Traffic, Topography, and Terrain**: Pressing the **MAP** softkey makes available the traffic, topo (topographic), and terrain features.

- **Displaying Traffic on the Navigation Map Page**: Pressing the **TRAFFIC** softkey displays TIS Traffic on the Navigation Map. Traffic symbology appears next to the map range in the bottom right corner of the display and indicates the presence of traffic data on the map. This traffic capability enables the reception of the FAA TIS information, including location, direction, altitude, and climb/descent information of nearby aircraft. TIS displays traffic within seven nautical miles from 3,000 feet below to 3,500 feet above the requesting aircraft. Pressing the **TRAFFIC** softkey again removes traffic data from the Map.

- **Displaying Topographic data on the Navigation Map Page**: Pressing the **TOPO** softkey displays topographical data on the Map Page. When TOPO data is removed from the display, all cartographic data is automatically removed and the Jeppesen Nav Data is presented on a black background. Pressing the **TOPO** softkey again switches the display back to default map mode.

- **Displaying Terrain data on the Navigation Map Page**: Pressing the **TERRAIN** softkey displays terrain information on the Map Page using color-coded red and yellow terrain tiles based upon the aircraft's current altitude. Terrain symbology appears next to the map range in the bottom right corner of the display and indicates the presence of terrain data on the Map.

> **NOTE:** Pressing **TERRAIN** again removes terrain data from the Map.

Color scale interpretation is as follows:

- **Red –** land elevation is 100 feet above or below the aircraft altitude.
- **Yellow –** land elevation is between 100 feet and 1000 feet below the aircraft altitude.
- **Black/Transparent –** land elevation is over 1000 feet below the aircraft altitude.

- **Setting the declutter level of the map**: By pressing the **DCLTR** softkey momentarily (or as often as needed) to select the desired amount of map detail. The declutter level appears on the declutter softkey.

> **NOTE:** Features will be decluttered automatically at certain map ranges, depending on the "Map Setup" configuration for each map feature.

The following is a listing of the features that are turned off at each declutter level:

**NOTE:** "SUA" listed in the table below stands for Special Use Airspace. These are controlled airspaces, military zones, etc.

| Map Features Always Displayed | No Declutter | Declutter ( –1) | Declutter (-2) | Declutter (-3) |
|---|---|---|---|---|
| Flight plan route lines | All Map features are visible | River/Lakes names only | User waypoints | Large airports |
| Flight plan route waypoints | | Land/country text | Latitude/longitude grid | Medium airports |
| Rivers/lakes | | Large city | VORs | Small airports |
| Topography data | | Medium city | NDBs | SUA Group 3 |
| Terrain proximity data | | Small city | Intersections | SUA Group 4 |
| Map borders | | Small town | SUA Group 0 | Runway labels |
| Bearing line | | Freeways | SUA Group 1 | Lightning strike data (when installed) |
| | | National highways | SUA Group 2 | Nexrad data |
| | | Local highways | SUA Group 5 | Traffic symbols |
| | | Local roads | SUA Group 6 | Traffic labels |
| | | Local road labels | SUA Group 7 | |
| | | Railroads | | |
| | | Major political boundaries | | |

- **Changing the range of the map**: The current map range is indicated in the lower right corner of the display. The map range is adjustable from 500 feet to 2,000 nm. The auto zoom feature is described in the G1000 Multi Function Display Pilot's Guide.

### To change the map range:

1. Rotate the **JOYSTICK** control.

- **Panning around the map**: Panning allows you to move the map beyond its current limits without adjusting the map range. When the panning function is selected by pushing the **JOYSTICK** in, a panning arrow flashes on the map display. A window appears at the top of the map display, showing the latitude/longitude position of the pointer as well as the bearing and distance to the pointer from the aircraft present position.

### To pan the map:

1. Press the **JOYSTICK** control to display the panning arrow.

2. Move the **JOYSTICK** to place the panning arrow at the desired location. When the panning arrow is placed on an object, the object name is highlighted, even if the name was not originally displayed on the map.

> **NOTE:** This feature applies to everything that is displayed on the map with the exception of route lines. When an airport, navaid, or user waypoint is selected on the map display, information about the waypoint can be reviewed and the waypoint can be designated as the direct-to destination.

3. To turn off the panning arrow and return to the display to the current position, press the **JOYSTICK** again, or in one minute the panning arrow is removed.

- **Restoring default page settings**: Pressing the **BACK** softkey resets the MFD softkeys to their original settings.

- **Identifying Map Symbols**: The G1000 Multi Function Display Pilot's Guide describes the aviation, basemap, weather, traffic, and miscellaneous symbology used on the Navigation Map Page.

> **NOTE:** Other Navigation Map operations such as changing the map heading reference, and measuring the bearing and distance between points are described in the G1000 Multi Function Display Pilot's Guide.

### Traffic Map Page

The Traffic Map Page displays traffic information received from the Traffic Information Service (TIS) only. Traffic is displayed on the Traffic Map Page, the second Map Page in the Navigation Map Page group.

> **NOTE:** *Traffic Information Service (TIS) is not available in all areas. Refer to Appendix E of the G1000 Pilot's Guide.*

### To select the TRAFFIC MAP Page:

1. Turn the **small FMS** knob to the right while on the Navigation Map Page. Traffic mode status is displayed in the upper left corner of the display and a traffic display banner is displayed at the bottom left corner of the display.

The Traffic Map Page displays the following :
- Map showing surrounding traffic, current aircraft location and range marking rings

- Current traffic mode
- Traffic alert message (operate, standby, failed, no data, test)

### Traffic Map Page Operations

The following operations can be performed from the Traffic Map Page:

- **Changing map range**: rotate the **JOYSTICK** control clockwise to display a larger area or rotate counter-clockwise to display a smaller area. Map ranges are 2 nm, 6 nm and 12 nm.
- **Changing traffic operation mode between ON and STANDBY**: The traffic mode can be switched between ON and STANDBY by pressing the **MODE** softkey, then by pressing **STBY** or **ON** to select the desired mode of operation.

> **NOTE:** *Refer to the G1000 Multi Function Display Pilot's Guide for detailed information regarding the Traffic Map Page.*



**Figure 5-8  Traffic Map Page**

### Terrain Proximity Page

Terrain data is displayed on the Terrain Proximity Page, the fourth page in the map group.  A color-coded bar scale indicating terrain height is displayed in the lower right corner of the page.

> *NOTE: Terrain data is not displayed when the aircraft latitude is greater than 75 degrees (north or south).*

The Terrain Proximity Page displays the following information:

- Map showing surrounding terrain
- Current aircraft location
- Range marking rings
- Color scale

### Terrain Proximity Page Operations

The following operations can be performed from the Terrain Proximity Page:

- **Changing the viewing mode between 360° and 120°**: Two terrain viewing options are available by pressing the **VIEW** softkey, each shown relative to the position of the aircraft.  When the **ARC** softkey is pressed, the alternate selection is shown.  This option is used to switch between a radar-like 120° display, forward-looking view of the data and the 360° default display.
- **Changing the map range on the Terrain Proximity Page**: Rotate the **JOYSTICK** control clockwise to display a larger area or rotate counter-clockwise to display a smaller area.  Map ranges are '25 nm', '25 and 50 nm', '50 and 100 nm', and '100 and 200 nm'.



*Range Marking Rings*

*Surrounding Terrain*

*Terrain Scale*
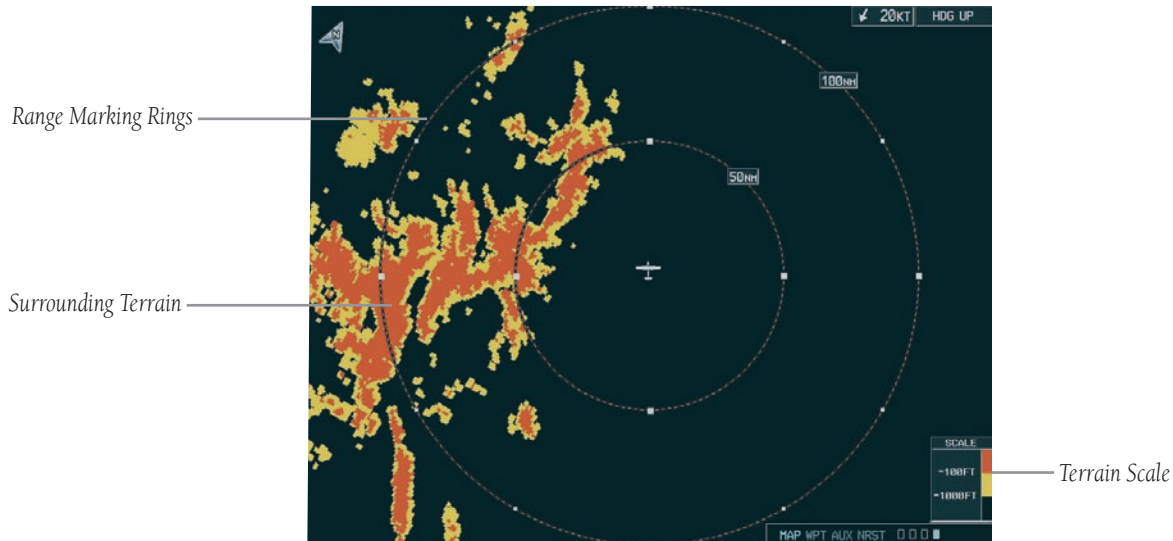
**Figure 5-9  Terrain Proximity Page**

## 5.9   MFD AUXILIARY PAGES

This section introduces the MFD Auxiliary Pages. See the G1000 Multi Function Display Pilot's Guide for a full description of the auxiliary pages.

### Flight Plan Page Group

The FPL Page group includes three pages:

- **Active Flight Plan Page –** The Active Flight Plan Page provides information and editing features for the flight plan currently in use.
- **Flight Plan Catalog Page –** The Flight Plan Catalog Page serves as the main page for creating new flight plans, as well as editing or activating previously created flight plans. Up to 99 flight plans may be created, with up to 31 waypoints in each flight plan. Flight plans are created, edited and activated using the **FPL** key.
- **Vertical Navigation Page –** The Vertical Navigation Page allows the pilot to create a three-dimensional profile which guides the aircraft from its present position and altitude to a target altitude at a specified location.

> ✓ *NOTE: Since using flight plans is one of the more complex features of the G1000, only the Active Flight Plan Page is covered in this guide. Answers to additional questions about flight plans can be found in the G1000 Multi Function Display Pilot's Guide.*

### Active Flight Plan Page

The Active Flight Plan Page shows waypoint names and data for the route currently being used for navigation guidance. Once a direct-to or flight plan is activated, the Active Flight Plan Page shows each waypoint for the flight plan (or a single waypoint for a direct-to), along with the desired track (DTK), and distance (DIS) between the "TO" and "FROM" waypoints for each leg. For the active leg (identified by a magenta line), the distance to go to the active waypoint is displayed. Once the active leg is completed, the magenta line moves to the next leg, and the previously flown leg DTK and DIS fields display blank lines.

The Active Flight Plan Page also shows the active leg information, which shows the course being flown from the beginning point of the leg to the end of the leg and an enroute safe altitude (ESA) in feet for the selected leg. The Active Flight Plan Page gives flight plan information, the total remaining distance in the flight plan and the total remaining distance to the destination. ESA for the entire flight plan is also displayed.

Pressing the **FPL** key displays the Active Flight Plan Page and allows the user to perform the operations listed in this section.

> ✓ *NOTE: The Active Flight Plan Page operations are described in detail in the G1000 Multi Function Display Pilot's Guide.*

The Active Flight Plan Page displays the following information:

- Flight plan title
- Flight plan number
- A list of waypoints, including the waypoint identifier

It also displays two of the following, as configured by the pilot:

- Cumulative distance
- Leg distance
- Leg desired track
- Leg Enroute Safe Altitude (ESA)
- ETA at waypoint
- Leg ETE
- Brief description of the active/selected leg
- Active/selected leg ESA
- Flight plan distance remaining
- Flight plan total distance
- Flight plan ESA
- Graphical (map) depiction of the active flight plan

**Active Flight Plan Page Operations**

The following operations can be performed from the Active Flight Plan Page:

- Changing the flight plan title
- Adding a waypoint to any position
- Loading a departure procedure
- Loading an approach procedure
- Loading a Standard Terminal Arrival Route (STAR)
- Activating a selected leg
- Saving the active flight plan
- Inverting the active flight plan
- Deleting the active flight plan
- Removing an approach procedure
- Removing a STAR
- Removing a departure procedure
- Accessing the Closest Point of Flight Plan Page
- Changing the configurable data fields in the waypoint list
- Restoring default data fields in the waypoint list
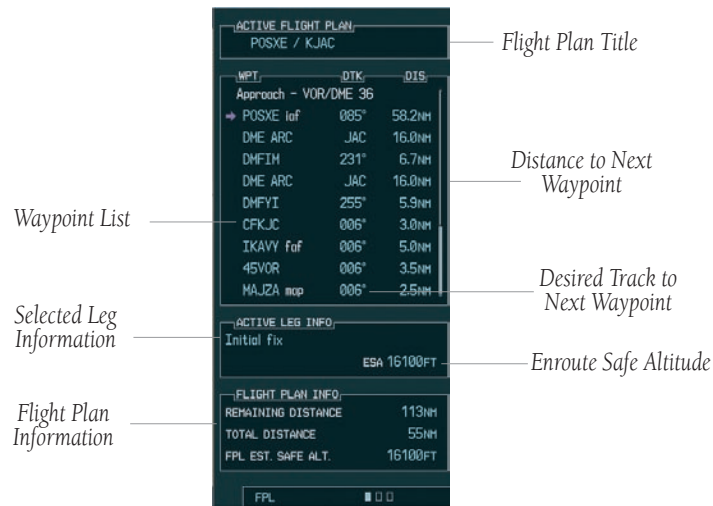


**Figure 5-10  Active Flight Plan Page**

The following sections provide instructions on entering a flight plan, navigating a flight plan, and editing a flight plan. Complete Flight Plan Page operations are described in the G1000 Multi Function Display Pilot's Guide.

**To enter a Flight Plan:**

1.  Press the **FPL** key and turn the **small FMS** knob to display the Flight Plan Catalog (second page).

2.  Press the **MENU** key to display the Flight Plan Catalog Options.

3.  Turn the **large FMS** knob to highlight 'Create New Flight Plan' and press the **ENT** key.

4.  A blank flight plan page appears for the first empty storage location. Use the **small and large FMS** knobs to enter the identifier of the departure waypoint and press the **ENT** key.

5.  Repeat step 4 above to enter the identifier for each additional flight plan waypoint.

6.  Once all waypoints have been entered, press the **small FMS** knob to return to the Flight Plan Catalog.

**To navigate a Flight Plan:**

1.  Press the **FPL** key and turn the **small FMS** knob to display the Flight Plan Catalog.

2.  Press the **small FMS** knob to activate the cursor.

3.  Turn the **large FMS** knob to highlight the desired flight plan and press the **MENU** key to display the Flight Plan Catalog Options.

4.  Turn the **large FMS** knob to highlight 'Activate Flight Plan' and press the **ENT** key. Press the **ENT** key again to confirm.

**To stop navigating a Flight Plan:**

1.  Press the **FPL** key. The Active Flight Plan Page appears.

2.  Press the **MENU** key to display the Active Flight Plan Options.

3.  Turn the **large FMS** knob to highlight 'Delete Flight Plan' and press the **ENT** key.

4.  Press the **ENT** key again to confirm.

**To edit a Flight Plan:**

1.  Press the **FPL** key and turn the **small FMS** knob to display the Flight Plan Catalog.

2.  Press the **small FMS** knob to activate the cursor.

3.  Turn the **large FMS** knob to highlight the desired flight plan and press the **ENT** key.

4.  To add a waypoint to the flight plan: Turn the **large FMS** knob to select the point where you wish to add the new waypoint. (If an existing waypoint is highlighted, the new waypoint will be placed directly in front of this waypoint.) Use the **small and large FMS** knobs to enter the identifier of the new waypoint and press the **ENT** key.

5.  To delete a waypoint from the flight plan: Turn the **large FMS** knob to select the waypoint you wish to delete and press the **CLR** key to display a 'remove waypoint?' confirmation window. With 'OK' highlighted, press the **ENT** key to remove the waypoint.

6.  Once all changes have been made, press the **small FMS** knob to return to the Flight Plan Catalog.

## Direct-to Navigation

### Direct-to Page

The Direct-to Page allows the user to navigate directly to any point in the internal or user-defined database. It can also be used to obtain information on any point in the database.

The Direct-to Page displays selected waypoint information including the following:

- Identifier
- Symbol
- Name
- Location
- Bearing
- Distance
- Region
- Latitude/longitude
- List of the waypoints in the active flight plan
- List of the 25 nearest airports
- Course to the selected waypoint
- Graphical (map) depiction of the selected waypoint

### Direct-to Page Operations

Pressing the **Direct-to** key allows the user to enter a destination waypoint and establish a direct course (as opposed to planning a route) to the selected destination. The waypoint can be selected by identifier, from the active route list, from the nearest airports list, or from the map cursor position. The G1000 direct-to function provides a quick means of setting a course to a destination waypoint. Once Direct-to is activated, the G1000 establishes a point-to-point course line from the aircraft present position to the selected direct-to destination. A destination can be selected from any page with the **Direct-to** key.
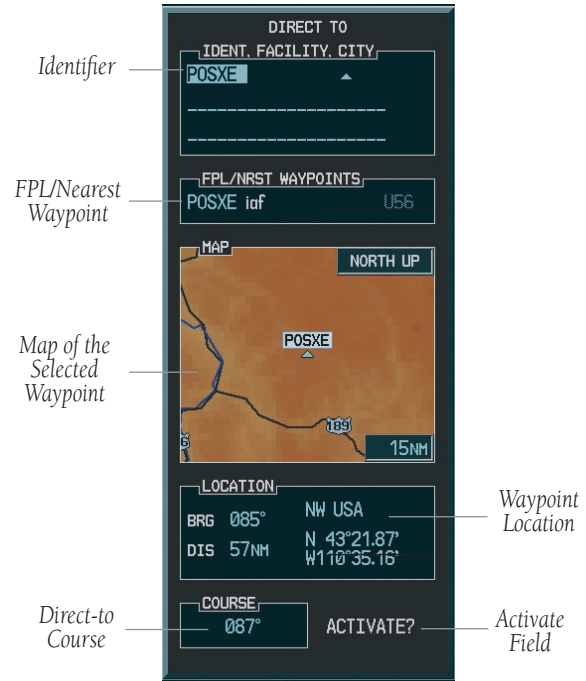
**Figure 5-11  Direct-to Page**

The following operations can be performed from the Direct-to Page:

- Selecting a waypoint for direct-to navigation by specifying:
  – The <u>identifier</u>
  – The <u>name</u>
  – The <u>location</u>
- Selecting from a list of waypoints in the active flight plan
- Selecting from a list of the nearest airports
- Specifying a course to fly TO the waypoint
- Activating direct-to navigation to the selected waypoint

### To select a Direct-to Destination:

1. Press the **Direct-to** key. The Direct-to Waypoint Page appears with the destination field highlighted.

2. Turn the **small FMS** knob to enter the first letter of the destination waypoint identifier. The destination waypoint may be an airport, a VOR, an NDB, an intersection or a user waypoint, as long as it is in the database or provided it is stored in memory as a user waypoint.

3. Turn the **large FMS** knob clockwise to move the cursor to the next character position.

4. Repeat steps 2 and 3 to spell out the rest of the waypoint identifier.

5. Press the **ENT** key to confirm the identifier. The 'Activate' function field is highlighted.

6. Press the **ENT** key to activate a Direct-to course to the selected destination.

### To cancel a Direct-to:

1. Press the **Direct-to** key to display the Direct-to Waypoint Page.

2. Press the **MENU** key to display the Direct-to Options menu.

3. With 'Cancel Direct-To NAV?' highlighted, press the **ENT** key. If a flight plan is still active, the G1000 resumes navigating the flight plan along the closest leg.

### To select a Direct-To Destination from the Navigation Map Page:

1. Select the Navigation Map from the Map page group.

2. Press the **JOYSTICK** to display a panning arrow.

3. Rock the **JOYSTICK** to place the panning pointer at the desired destination location.

4. If the panning pointer is placed on an existing airport, navaid or user waypoint, the waypoint name will be highlighted. Press the **Direct-to** key, then press the **ENT** key twice to navigate to the waypoint.

5. If the panning pointer is placed on an open location, press the **Direct-to** key, then press the **ENT** key twice to create a waypoint at the pointer location (named 'MAPWPT') and navigate to it.

**To Select a Direct-to Destination by Facility Name or City:**

1. Press the **Direct-to** key. The Direct-to Waypoint Page appears with the waypoint identifier field highlighted.

2. Turn the **large FMS** knob to highlight the facility name field or the city.

3. Turn the **small and large FMS** knobs to enter the facility or city location of the desired way- point. As you spell the facility name or city, the G1000's "Spell'N'Find" feature selects the first entry in the database based on the characters you have entered to that point.

4. Continue turning the **small FMS** knob to scroll through any additional database listings for the selected facility name or city. You can scroll backwards with the **small FMS** knob if you scroll past the desired waypoint.

5. Press the **ENT** key to confirm the selected waypoint, and the **ENT** key again to activate a direct-to function.

**To select a Direct-to destination from the Active Flight Plan:**

1. Press the **FPL** key. The Active Flight Plan Page appears.

2. Press the **small FMS** knob to activate the cursor.

3. Turn the **large FMS** knob to select the desired direct-to waypoint.

4. Press the **Direct-to** key. The Direct-to Waypoint Page appears with the waypoint identifier field highlighted.

5. Press the **ENT** key to confirm the selected way- point, and press the **ENT** key again to activate a direct-to function.

### 5.10 Introduction to Instrument Approach Procedures

#### Arrivals and Departures

Based upon the active flight plan or direct-to destination, the Procedures Page provides direct access to approaches, departures (DPs) and arrivals (STARs). In either case, the departure and destination airports must have associated published procedures. The Procedures Page is displayed by pressing the **PROC** key.



**Figure 5-12  Procedures Page**

#### To select a departure:

1. Press the **PROC** key to display the Procedures Page.

2. Turn the **large FMS** knob to highlight 'Select Departure' and press the **ENT** key.

3. The 'Departure Loading' page appears with the list of departure options for the departure airport. Use either the **large or small FMS** knob to enter the desired departure. Press the **ENT** key.

4. 'Load?' is highlighted. Press the **ENT** key. The departure becomes part of the Flight Plan.

#### To select an arrival:

1. Press the **PROC** key to display the Procedures Page.

2. Turn the **large FMS** knob to highlight 'Select Arrival' and press the **ENT** key.

3. The procedures page appears. Use the **large and small FMS** knobs to enter the desired arrival.

4. 'Load?' is highlighted. Press the **ENT** key. The arrival becomes part of the Flight Plan.

## Approaches

The G1000 allows you to fly non-precision and precision approaches to airports with published instrument approach procedures. All available approaches are part of the Jeppesen database stored internally in each PFD and MFD.

The G1000 provides both lateral and vertical guidance for ILS precision approaches on the PFD, and lateral guidance for non-precision Localizer, GPS, and VOR and ADF overlay approaches. GPS position information is also provided on the mapping portion of the MFD and the inset map window on the PFD for pilot reference only.

## G1000 Navigational Guidance for Approaches

The G1000 supports all ARINC leg types that have associated waypoint fixes. The G1000 can accept and display the following leg types:

- AF – DME arc to a fix
- CF – Course to a fix
- DF – Direct to a fix
- FA – Course from fix to an altitude
- FC – Course from fix to distance
- FD – Course from fix to DME distance
- FM – Course from fix to manual termination
- HA – Hold terminating at altitude
- HF – Hold terminating at a fix
- HM – Hold with manual termination
- IF – Initial fix
- PI – Procedure turn to course intercept
- RF – Constant radius turn to fix
- TF – Track between two fixes

Each of these legs is displayed on the active flight plan. The leg types which the G1000 does not support are the following ones:

- CA – Course to an altitude
- CD – Course to a DME distance
- CI – Course to an intercept
- CR – Course to a radial
- VA – Heading vector to an altitude
- VD – Heading vector to DME distance
- VI – Heading vector to an intercept
- VM – Heading vector to manual termination
- VR – Heading vector to a radial

> **NOTE:** The G1000 does not provide steering guidance for hold legs and procedure turns (HA, HF, HM and PI leg types). However, these legs are drawn on the map and are shown in the flight plan.

> **NOTE:** The approach charts shown in this section are not drawn to scale and are not to be used for navigation.

### Selecting Approaches

In order to select an approach, there must be an active direct-to or flight plan which terminates at an airport with a published approach.

#### To select an approach:

1. Press the **PROC** key to display the Procedures Page.

2. Turn the **large FMS** knob to highlight 'Select Approach' and press the **ENT** key.

3. Turn the **large FMS** knob to select the APPROACH field.

4. Turn the **large FMS** knob to highlight select the desired approach.  Press the **ENT** key.

5. The cursor will move to the TRANSITIONS field. Turn the **large FMS** knob to highlight the desired transition waypoint and press the **ENT** key. (The approach "Vectors" option assumes you will receive vectors to the final course segment of the approach and will provide navigation guidance relative to the final approach course.)



**Figure 5-14 Selecting an Approach Transition**

6. Turn the **large FMS** knob to highlight 'Load?' or 'Activate?' and press the **ENT** key. 'Load?' will add the procedure to the flight plan without immediately using it for navigation guidance. This allows you to continue navigating the original flight plan, but keeps the procedure available on the Active Flight Plan Page for quick activation when needed. 'Activate?' overrides the "enroute" portion of the active flight plan, proceeding directly to the "approach" portion.

> ⚠ **NOTE:** You can also load an approach by pressing the **APR** softkey.



**Figure 5-13 Selecting an Approach Procedure**

Not all approaches in the database are approved for GPS use.  As you select an approach, a "GPS" designation to the right of the procedure name indicates the procedure can be flown using the GPS receiver.  Some procedures will not have this designation, meaning the GPS receiver can be used for supplemental navigation guidance only. If the GPS receiver cannot be used for primary guidance, you must use the appropriate receiver for the selected approach (e.g., VOR or ILS).  The final course segment of ILS approaches, for example, must be flown by tuning the Nav receiver to the proper frequency and selecting that Nav receiver on the CDI.

⚠️ **CAUTION:** *The G1000 is designed to complement your printed approach plates and improve situational awareness throughout the approach. The approach must be flown as it appears on the approach chart.*

An approach can be activated or loaded (after selection). Activating the approach also initiates automatic CDI scaling transition as the approach progresses. In many cases, it can be easiest to "Load" the full approach while still some distance away, enroute to the destination airport. Later, if vectored to final, use the following steps to select "Activate Vector-To-Final" – which makes the inbound course to the FAF waypoint active. Otherwise, activate the full approach using the 'ACTIVATE APPROACH' option.

### To activate an Approach Procedure:
1.    With an approach loaded in the active flight plan, press the **PROC** key to display the Procedures Page.
2.    Turn the **large FMS** knob to highlight 'ACTIVATE?'.
3.    Press the **ENT** key.
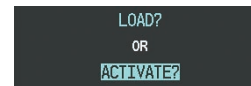
**Figure 5-15  Activating an Approach Procedure**

## GPS Approach Examples

### No Procedure Turn

An approach where there is typically no procedure turn required to get established on the inbound course to the FAF is our example. We use GPS RWY 12 to show how the G1000 sequences through an approach and what type of annunciation and scale factor changes can be expected. This example is based upon an active flight plan from KFLG (Flagstaff, AZ Pulliam Airport) to KPRC (Prescott, AZ Love Airport).

1.  Select KPRC as the destination, via the **Direct-to** key or as the last waypoint in a flight plan.

2.  Press the **PROC** key and select the GPS RWY 12 approach. From the transitions window, select IRODY as the IAF (select 'LOAD?' to load, but not activate, the approach).

3.  Once you are cleared for the approach, press the **PROC** key and select 'ACTIVATE APPROACH?'.

4.  Within 30 nm of the destination, the G1000 switches from enroute mode to terminal mode. The switch to terminal mode is accompanied by a gradual CDI scale transition from 5.0 to 1.0 nm full scale deflection.

5.  Several miles prior to reaching the IAF (IRODY), you may wish to review the approach sequence. Press the **FPL** key to display the Active Flight Plan Page. Press the **small FMS** knob and turn the **large FMS** knob to review each segment of the approach. When finished press the **FPL** key again to return to the previous page. If you haven't already activated the approach be sure to do so when cleared for the approach.

6.  As you approach the IAF (IRODY), a waypoint message (NEXT DTK 204°) appears in the navigation status bar on the PFD. As the distance to the IAF approaches zero, the message is replaced by a turn advisory (TURN TO 204°).

7.  As you approach the IAF (OKAPY), a waypoint message (NEXT DTK 124°) appears. As the distance approaches zero the message is replaced by a turn advisory (TURN TO 124°).

8.  At 2.0 nm from the FAF (MULHU), the G1000 switches from terminal mode to approach mode. CDI scaling is tightened from 1.0 to 0.3 nm full scale deflection.

9.  As you cross the FAF "NEXT DTK 124°" appears and the destination sequences to the MAP (RW12map, the runway threshold). Keeping the needle centered, fly toward the MAP, observing the altitude minimums dictated by the approach plate.

10. As you approach the MAP, a waypoint message (ARRIVING AT WAYPOINT) appears.

11. As you reach the MAP, "SUSP" appears in the HSI and directly above the **SUSP** softkey, indicating that automatic sequencing of approach waypoints is suspended at the MAP. A "FROM" indication is displayed on the CDI, but course guidance along the final approach course continues. If a missed approach is required, use the **SUSP** softkey to initiate the missed approach sequence.

> **NOTE:** *If the message "RAIM is not available" appears in the Navigation Status Bar on the PFD, a missed approach must be executed.*
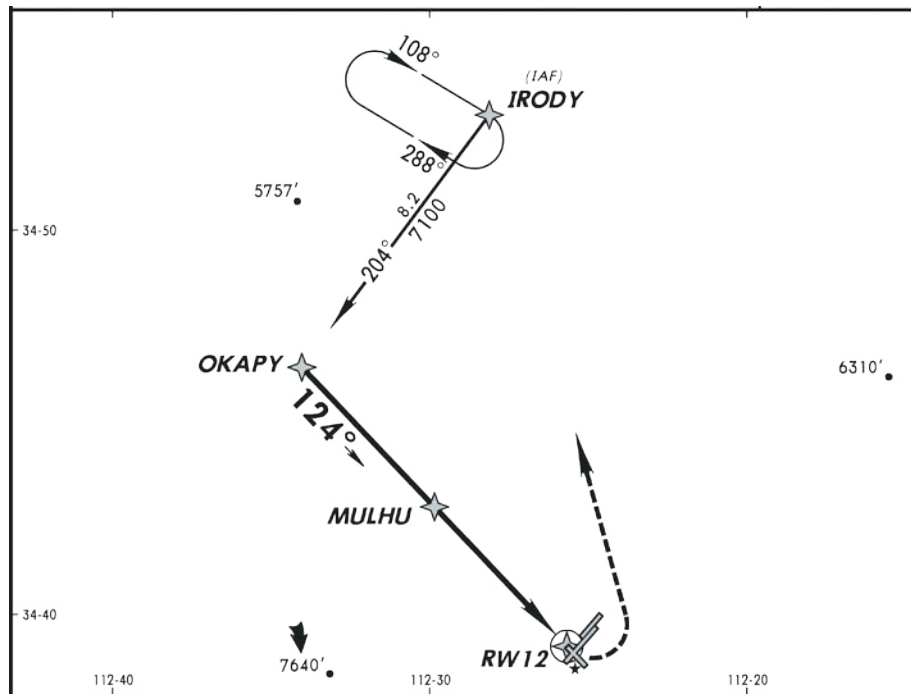
**Figure 5-16   Approach with No Procedure Turn**

**Flying the Missed Approach**

When you reach the MAP, execute the missed approach procedure. The G1000 continues to give guidance along an extension of the final course segment (FAF to MAP) until you manually initiate the missed approach procedure.

1. As you reach the MAP, a waypoint message (ARRIVING AT WAYPOINT) appears in the navigation status bar on the PFD. "SUSP" appears in the HSI and directly above the **SUSP** softkey, indicating that automatic sequencing of approach waypoints is suspended. A "FROM" indication is displayed on the CDI, but course guidance along the final approach course continues. Use the **SUSP** softkey to initiate the missed approach sequence. Press the **CDI** softkey to resume GPS navigation.

2. Press the **SUSP** softkey. The missed approach holding point (IRODY) is automatically offered as the destination waypoint.

3. Follow the missed approach procedures, as dictated by the approach plate. The G1000 gives guidance to the holding pattern.

4. A message appears in the navigation status bar on the PFD recommending entry procedures for the holding pattern (HOLD PARALLEL).

5. The G1000 provides course guidance only on the inbound side of the holding pattern. When leaving the holding pattern to re-fly the approach, press the **PROC** key to "Select Approach?" or "Activate Approach?" (or use the **Direct-to** key to select another destination).

> **NOTE:** If the message "RAIM is not available" appears in the Navigation Status Bar on the PFD a missed approach must be executed.
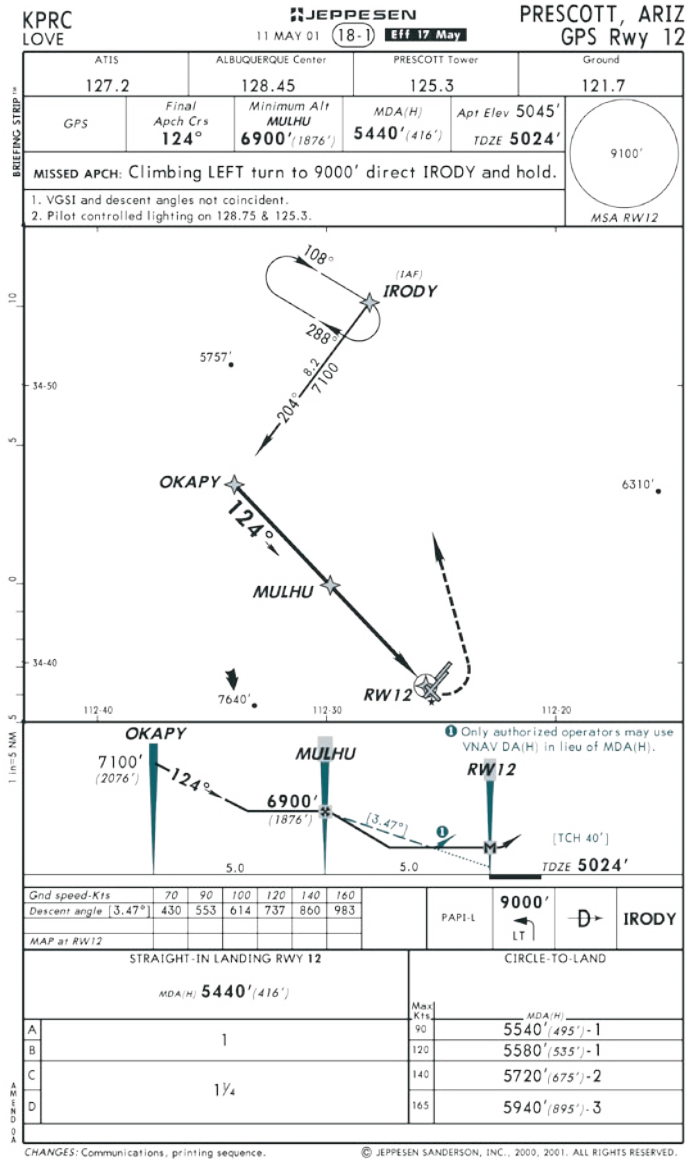
**Figure 5-17  Flying the Missed Approach**

### Flying the Procedure Turn

The procedure turn portion of the approach is stored as one of the legs of the approach. For this reason the G1000 requires no special operations from the pilot (other than flying the procedure turn itself). This example is based upon a flight from KILG (Wilmington, DE New Castle County) to KMIV (Millville, NJ Municipal). The approach into KMIV will be NDB or GPS RWY 14 with the RNB transition.

1. Select KMIV as your destination, via the **Direct-To** key or as the last waypoint in a flight plan.

2. Press the **PROC** key and select the NDB or GPS RWY 14 approach. From the transitions window select RNB as the IAF (select 'LOAD?' to load, but not activate, the approach).

3. Once you are cleared for the approach, press the **PROC** key and select "ACTIVATE APPROACH?".

4. Within 30 nm of the destination, the G1000 switches from enroute mode to terminal mode. The switch to terminal mode is accompanied by a gradual scale transition from 5.0 to 1.0 nm, full scale deflection.

5. Several miles prior to reaching the IAF (RNB), you may wish to review the approach sequence. Press the **FPL** key to display the Active Flight Plan Page. Press the **small FMS** knob and turn the **large FMS** knob to review each segment of the approach. When finished, press the **FPL** key again to return to the previous page.

6. As you approach the IAF (RNB), a waypoint message (NEXT DTK 327°) appears in the navigation status bar on the PFD. As the distance approaches zero the message is replaced by a turn advisory (TURN TO 327°).

7. Fly the outbound course keeping the CDI needle centered.

8. Once you have flown approximately one minute past the IAF, the message (START PROC TURN) appears.

9. Turn left to a heading of 282° to initiate the procedure turn. No guidance through the procedure turn is given. The procedure turn is displayed in magenta indicating the active leg. The CDI needle starts moving to the right.

10. After approximately one minute, make a 180° right turn to a heading of 102° to intercept the inbound course. The G1000 sequences to the inbound leg to the FAF, the CDI needle swings to the opposite side to provide proper sensing along the final course segment and "NEXT DTK 147°" appears in the navigation status bar on the PFD.

11. As the CDI needle starts to center, make a right turn to 147° to intercept the final approach course.

12. At 2.0 nm from the FAF (RNB), the G1000 switches from terminal mode to approach mode. CDI scaling is tightened from 1.0 to 0.3 nm, full scale deflection.

13. As you reach the FAF, the message (NEXT DTK 147°) appears and the destination sequences to the MAP (RW14map, the runway threshold). Keeping the CDI needle centered, fly toward the MAP, observing the altitude minimums dictated by the approach plate.

14. As you approach the MAP, a waypoint message (ARRIVING AT WAYPOINT) appears.

15. As you reach the MAP, "SUSP" appears in the HSI and directly above the **SUSP** softkey, indicating that automatic sequencing of approach waypoints is suspended. A "FROM" indication is displayed in the CDI, but course guidance along the final approach course continues. If a missed approach is required, use the **SUSP** softkey to initiate the missed approach sequence.

> **NOTE:** Once you cross the FAF, the final course segment is displayed in magenta and a dashed line extends the course beyond the missed approach point. The dashed line is provided for situational awareness only and should NOT be used for navigation. Follow the published missed approach procedures.

> **NOTE:** If the message "RAIM is not available" appears in the Navigation Status Bar on the PFD a missed approach must be executed.



**Figure 5-18  Flying the Procedure Turn**
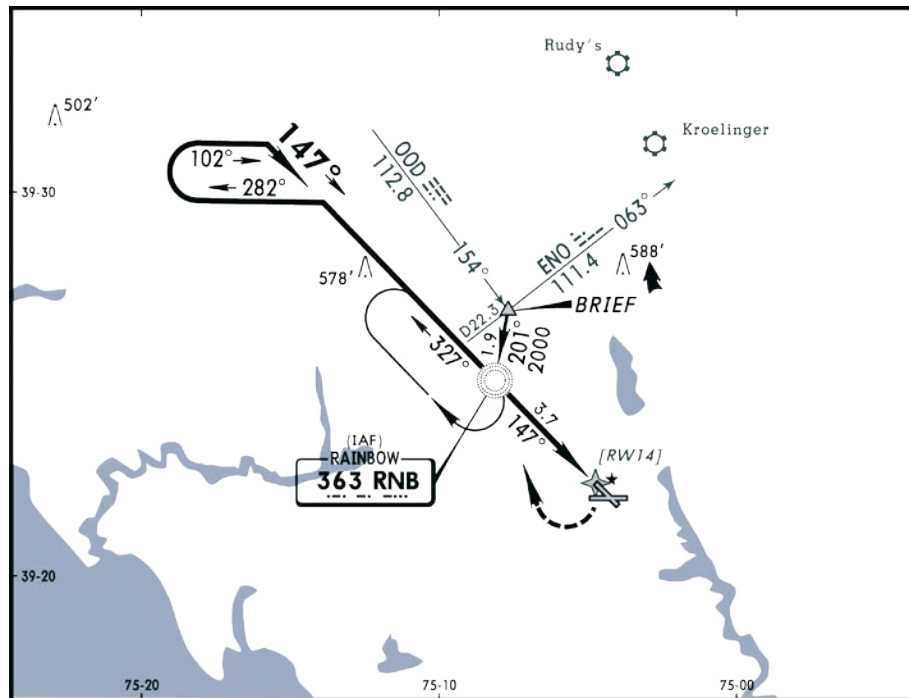
Reproduced with permission of Jeppesen Sanderson, Inc.  Not to be used for navigation.

### Flying the DME ARC

The GPS overlay for a DME arc approach uses additional Jeppesen provided waypoints to define the arc. When cleared for a DME arc approach, you may do either of the following to intercept the arc:

- Follow a specified radial inbound to intercept the IAF.
- Follow ATC vectors, which allow you to intercept the arc at any point along the arc.

This example is based on a flight from KSAF (Santa Fe, NM Municipal) to KFMN (Farmington, NM Four Corners Regional). The VOR DME RWY 7 approach is selected along with "HIDOX" as the IAF.

1. Select KFMN as your destination, via the **Direct-to** key or as the last waypoint in a flight plan.

2. Press the **PROC** key and select the VOR DME RWY 7 approach. From the transitions window, select "HIDOX" as the IAF. Choose 'LOAD?' or 'ACTIVATE?' as appropriate.

3. Within 30 nm of KFMN, the G1000 switches from enroute mode to terminal mode. The CDI scale gradually transitions from 5.0 to 1.0 nm, full scale deflection.

4. If you haven't already activated the approach, be sure to do so when cleared for the approach.

5. As you approach the IAF (HIDOX), a waypoint message (NEXT DTK 206°) appears in the navigation status bar on the PFD. As the distance to the IAF approaches zero, the message is replaced by a turn advisory (TURN TO 206°).

6. Follow the arc, keeping the CDI needle centered.

7. The next point in the approach is an intermediate fix "WILDE". As you approach "WILDE" a waypoint message (NEXT DTK 072°) appears. As the distance to this fix approaches zero the message is replaced by a turn advisory (TURN TO 072°). Initiate a standard rate turn to this course.

8. At 2.0 nm from the FAF (PINTO), the G1000 switches from terminal mode to approach mode. CDI scaling is tightened from 1.0 to 0.3 nm, full scale deflection.

9. As you approach the FAF, a waypoint message (NEXT DTK 072°) appears. Make any adjustments necessary for the final course segment (FAF to MAP).

10. As you cross the FAF, the destination sequences to the MAP (RW07map, the runway threshold). Keeping the CDI needle centered, fly toward the MAP, observing the altitude minimums dictated by the approach plate.

11. As you approach the MAP, a waypoint message (ARRIVING AT WAYPOINT) appears.

12. As you cross the MAP, "SUSP" appears in the HSI and directly above the **SUSP** softkey, indicating that automatic sequencing of approach waypoints is suspended. A "FROM" indication is displayed on the CDI, but course guidance along the final approach course continues. If a missed approach is required, use the **SUSP** softkey to initiate the missed approach.
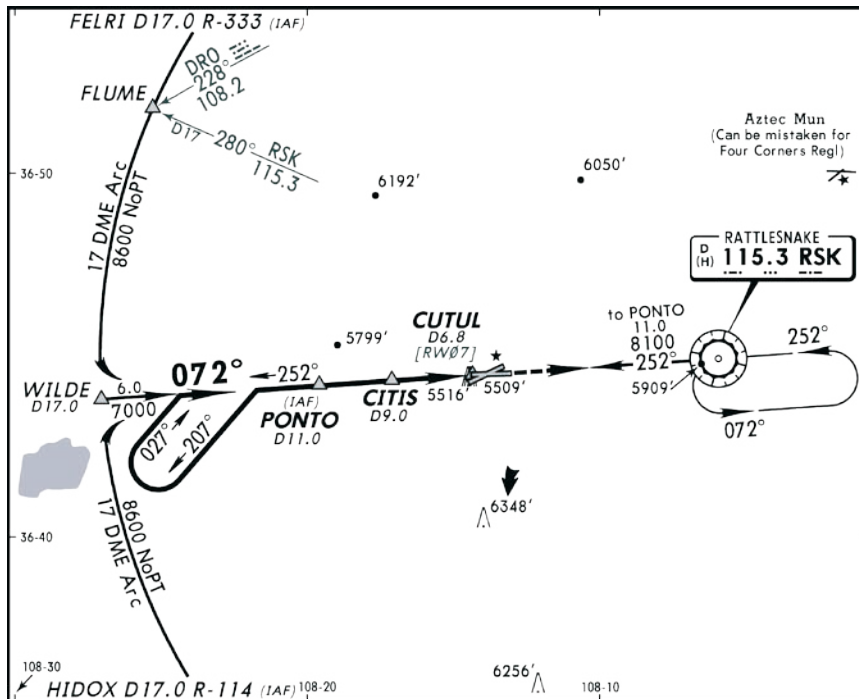
**Figure 5-19  Flying the DME Arc**

### Flying the Holding Pattern

This example is based upon a missed approach from KSOP (Moore County, NC). Now you've decided to divert to KIGX (Chapel Hill, NC) instead. You select the RNAV (GPS) RWY 9 approach into KIGX. The RNAV (GPS) RWY 9 approach begins with a holding pattern at the IAF, FIKKA.

1. Press the **Direct-to** key.

2. Use the **small and large FMS** knobs to enter the destination airport's identifier (KIGX).

3. Press the **ENT** key twice. This time you select the RNAV (GPS) RWY 9 approach into KIGX. The approach begins with a holding pattern at the IAF (FIKKA).

4. Press the **PROC** key and select the RNAV (GPS) RWY 9 approach.

5. From the transitions window, select FIKKA as the IAF, then you will be asked "Hold at FIKKA?" Select Yes or No and press the **ENT** key. Choose "ACTIVATE?", this will load and activate the approach.

6. Once you activate the approach, the Active Flight Plan Page appears. You may review the approach sequence by pressing the **small FMS** knob and turning the **large FMS** knob to review each segment of the approach.

7. Within 30 nm of the airport, the G1000 switches from enroute mode to terminal mode. The CDI scale transitions from 5.0 to 1.0 nm, full scale deflection.

8. Prior to crossing FIKKA, a message "HOLD DIRECT" appears in the navigation status bar on the PFD to suggest the proper holding pattern entry.

9. Fly the holding pattern (the holding pattern is displayed in magenta, indicating the active leg).

10. As you cross the IAF, "SUSP" appears in the HSI and directly above the **SUSP** softkey indicating that automatic sequencing of approach waypoints is suspended. As you make the turn inbound, "SUSP" is cancelled and the G1000 returns to automatic sequencing.

11. As you approach FIKKA from within the holding pattern, a waypoint message (NEXT DTK 090°) appears.

12. At 2.0 nm from the FAF, the G1000 switches from terminal mode to approach mode. CDI scaling is tightened from 1.0 to 0.3 nm, full scale deflection.

13. As you approach the FAF, a waypoint message (NEXT DTK 090°) appears. Make any course adjustments necessary for the final course segment (FAF to MAP).

14. As you reach the FAF, the destination sequences to the MAP (RW09map, the runway threshold). Keeping the needle centered fly toward the MAP, observing the altitude minimums dictated by the approach plate.

> **NOTE:** When viewing the Navigation Map Page, the final course segment is displayed in magenta (the active leg of the flight plan always appears in magenta) and a dashed line extends the course beyond the MAP. Do NOT follow this extended course. Instead, follow the published missed approach procedures.

As you approach the MAP, a waypoint message (AR-RIVING AT WAYPOINT) appears.

As you cross the MAP, "SUSP" appears in the HSI and directly above the **SUSP** softkey, indicating that automatic sequencing of approach waypoints is suspended at the MAP. A "FROM" indication is displayed on the CDI, but course guidance along the final approach course continues. If a missed approach is required, use the **SUSP** softkey to initiate the missed approach sequence.

> **NOTE:** When the message "RAIM is not available" appears in the Navigation Status Bar on the PFD a missed approach must be executed.
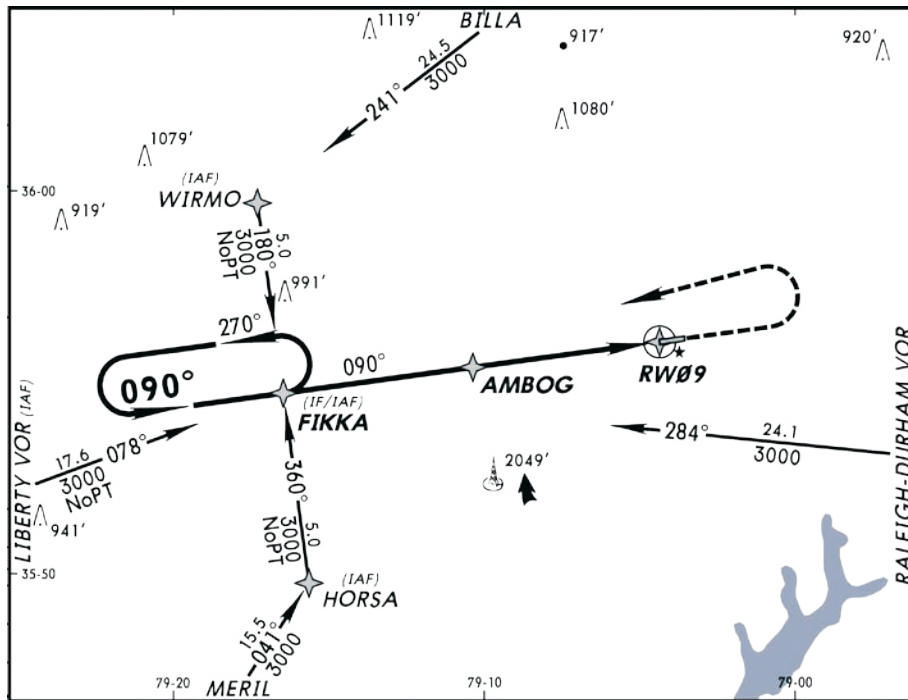


**Figure 5-20  Flying the Holding Pattern**

## 5.11 MFD NAVIGATION STATUS WINDOW

The MFD Navigation Status window is located between the COM and NAV Frequency windows at the top of the MFD. The MFD Navigation Status window displays four user configurable fields which show the following data (see the G1000 MFD Pilot's Guide for instructions on configuring these fields):

- Bearing to next waypoint (BRG)
- Distance to next waypoint (DIS)
- Desired track to next waypoint (DTK)
- En-route safe altitude (ESA)
- ETA (estimated time of arrival)
- ETE (estimated time enroute)
- GS (ground speed)
- MSA (minimum safe altitude)
- Track angle error (TKE)
- Track angle (TRK)
- Vertical speed required (VSR)
- Cross Track Error (XTK)

### MFD Waypoint Status Window Operations

MFD Waypoint Status window operations are described in the G1000 Multi Function Display Pilot's Guide.
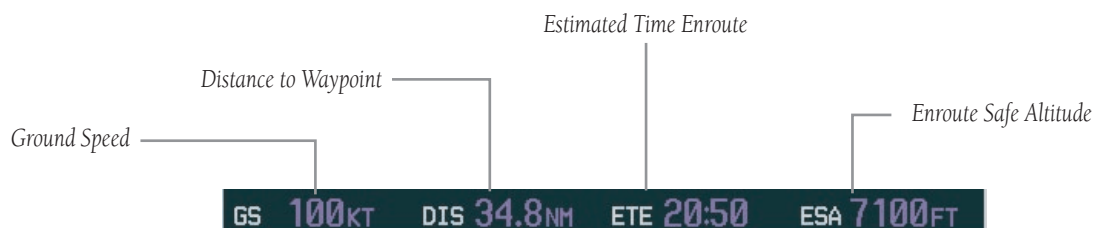


**Figure 5-21  Waypoint Status Window**

# SECTION 6: MULTI FUNCTION DISPLAY OPTIONAL INTERFACES

## 6.1 INTRODUCTION

This section of the Cockpit Reference Guide introduces the pilot to the major features of the optional interfaces to the Multi Function Display. A complete description of the interfaces with detailed operating procedures is presented in the G1000 Multi Function Display Optional Interface Addendum.

This section describes the G1000 MFD interface capability for the following optional traffic, weather, and audio entertainment systems:

- L-3 STORMSCOPE® WX-500 Series II Weather Mapping Sensor
- GDL 69/69A XM Radio System

> **NOTE:** *This section assumes the user has experience operating the G1000 Multi Function Display and is familiar with the G1000 MFD Pilot's Guide and the applicable optional Interface User's Guide.*

## 6.2 STORMSCOPE® INTERFACE

The G1000 provides a display interface for the L-3 Stormscope WX-500 Series II Weather Mapping Sensor.

> **WARNING:** *Use of the Stormscope interface for hazardous thunderstorm penetration is prohibited. Weather information on the G1000 MFD is approved only for weather avoidance, not penetration.*

> **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

The Navigation Map Page displays cell or strike data using yellow Stormscope lightning strike symbology. This capability improves situational awareness, which makes it much easier for the pilot to relate storm activity to airports, navaids, obstacles and other ground references.

> **NOTE:** *For accurate display interpretation, look at the examples in the WX-500 User's Guide which are designed to help the pilot relate the cell or strike patterns to the size and location of thunderstorms that may be near the aircraft.*

### To display Stormscope Lightning Data on the Navigation Map Page:

1. Press the **MAP** softkey.

2. Press the **STRMSCP** softkey. Press the **STRMSCP** softkey again to remove 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 800 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.
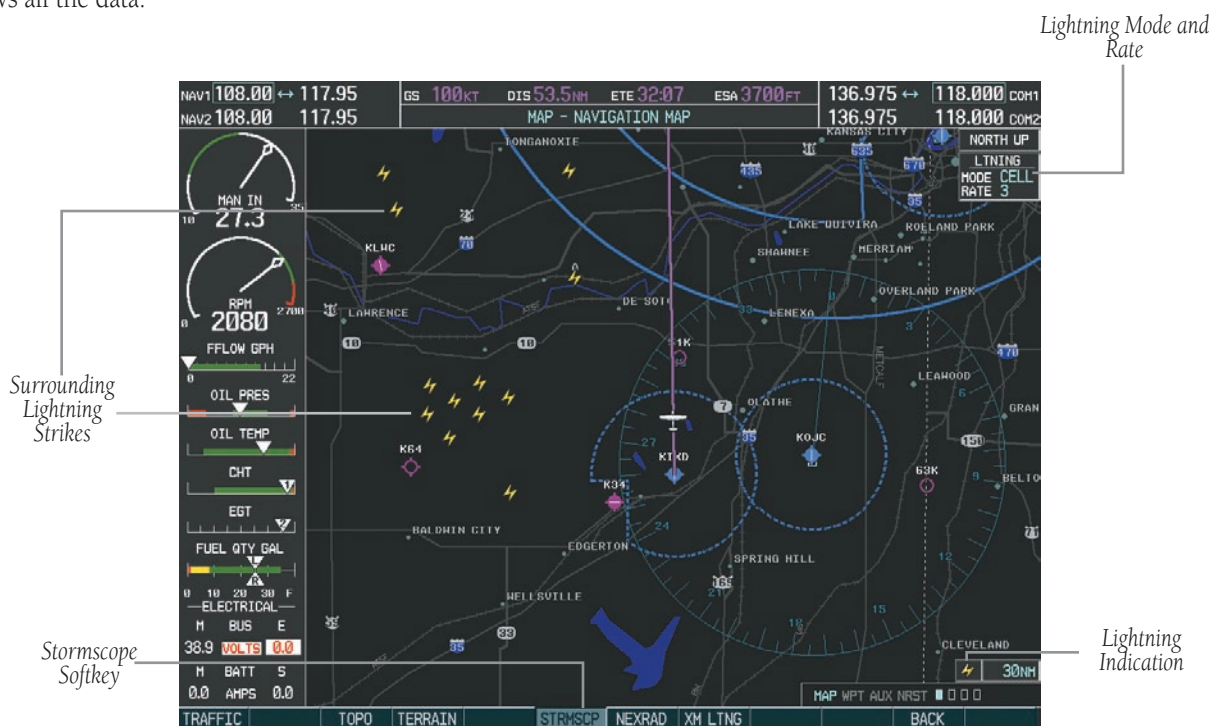


**Figure 6-1  In-Flight Navigation Map Page Displaying Stormscope Lightning Data**

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'.*
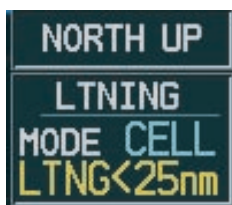


**Figure 6-2  Lightning Display Range Annunciation**

### Customized Display

> *NOTE: The Stormscope has to be receiving valid heading information in order for Stormscope lightning data to be displayed.*

The pilot can customize the display of Stormscope lightning data on the Navigation Map Page using the Weather Group Options Menu.

### To display the Weather Group Options Menu:

1.  With the Navigation Map Page displayed, press the **MENU** key to display the Navigation Map Page 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.
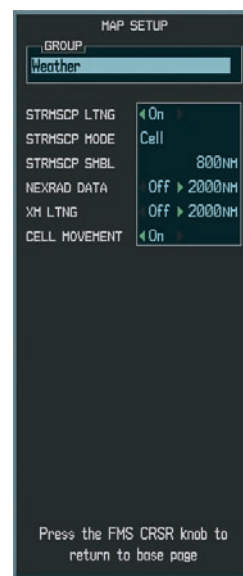


**Figure 6-3  Weather Group Options Menu**

The followings options are available:

### To display/remove Stormscope Lightning Data:

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

2.  Turn the **small or large FMS** knob to display the 'On/Off' window.

3.  Turn either the **small or large FMS** knob to select 'On' (display Stormscope lightning) or 'Off' (remove Stormscope lightning). 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 either the **small or large FMS** knob to display the 'Cell/Strike' window.

4. Turn either the **small or large FMS** knob to select 'Cell' or 'Strike'. Press the **ENT** key.

5. Push the **FMS** knob to return to the Navigation Map Page.

**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 either the **small or large FMS** knob to select the desired range. Press the **ENT** key.

5. Push the **FMS** knob to return to the Navigation Map Page.

### Removing Stormscope Lightning Data

The third Navigation Map Page Menu option, 'Clear Lightning Data' provides a quick and easy method for removing Stormscope lightning data from the Navigation Map Page.

> NOTE: Clearing Stormscope lightning data periodically 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 either the **small or large FMS** knob to highlight the 'Clear Lightning Data' field 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. Note: as the knob is turned, the bottom right corner of each page indicates the page group that is currently being displayed (e.g., MAP or NRST, etc.), the number of screens available within that group (indicated by rectangle icons) and the placement of the current page within that group (indicated by a solid cyan rectangle icon). The page group and active page title window are displayed above the display.

The Stormscope Page displays the following information:

- Map showing surrounding lightning strikes (in strike or cell mode), current aircraft location, and range marking rings, in 360° mode or 120° mode
- Current lightning mode
- Current strike rate
- Wind vector
- Heading direction
- Current weather data status, or none if no problems with lightning data are detected
- Map orientation
- North arrow indicator
- Active Flight Plan or Direct-to Navigation



**Figure 6-4  Stormscope Page**

### Stormscope Page Operations

The following Stormscope Page operations can be performed using softkeys or page menu options:

- Change display range
- Change the lightning mode between cell and strike
- Change the viewing mode between 360° and 120° ARC
- Remove 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.

### 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. 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 are or press the **ARC** softkey to display a 120° viewing area OR:
3. Press the **MENU** key. The page menu is displayed. Turn the **small or large FMS** knob to select the desired view. Press the **ENT** key on the desired selection.

### To remove 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.
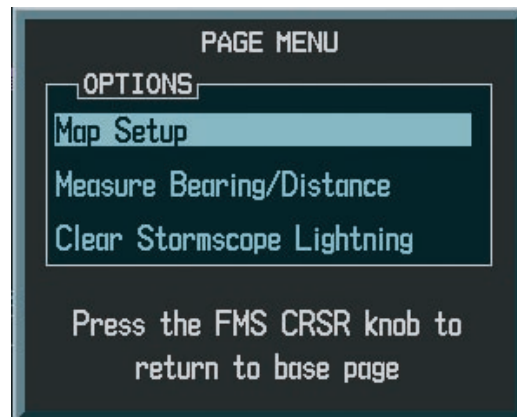


**Figure 6-5  Stormscope Page Options Menu**

## 6.3 WEATHER AND DIGITAL AUDIO ENTERTAINMENT INTERFACE

The GDL 69 is a remote sensor that is capable of receiving XM Weather and displaying it on the G1000 Multi Function Display and the Primary Flight Display Inset Map. The GDL 69A is capable of receiving both XM Weather as well as XM Radio Services. XM Weather and XM Radio operate in the S-band frequency range to provide continuous uplink capabilities at any altitude throughout North America.

⚠ **WARNING:** *Use of the GDL 69 Weather Interface for hazardous (thunderstorm penetration) is prohibited. Weather information provided by the GDL 69 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.*

*Data Radio ID*

*Audio Radio ID*

*Weather Products*

*INFO Softkey*

*DONE Softkey*

**Figure 6-6  XM Information Page**

### GDL 69 Weather Interface

Flight Information Services (FIS) 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)
- WPT - Weather Information Page - part of the WPT - Airport Information Page (METAR and TAF information only)

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

> **NOTE:** Temporary Flight Restrictions (TFRs) are displayed on all pages. Cell Movement is always displayed with NEXRAD data.

Complete GDL 69 capabilities include:

- 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)

> **NOTE:** FIS (also known as Flight Information Services - Broadcast, or FIS-B) supplies real-time weather information and other flight advisory information to pilots for enhanced situational awareness, 24 hours a day, 7 days a week.

### Displaying Weather Data on the Navigation Map Page

When appropriately configured, the Navigation Map Page displays NEXRAD, Cell Movement, TFRs, and XM Lightning data. This capability improves situational awareness, which makes it much easier for the pilot to relate storm activity to airports, navaids, obstacles, and other ground references.

#### Navigation Map Page Weather Control Softkeys

The following softkeys control the display of GDL 69 weather data 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.
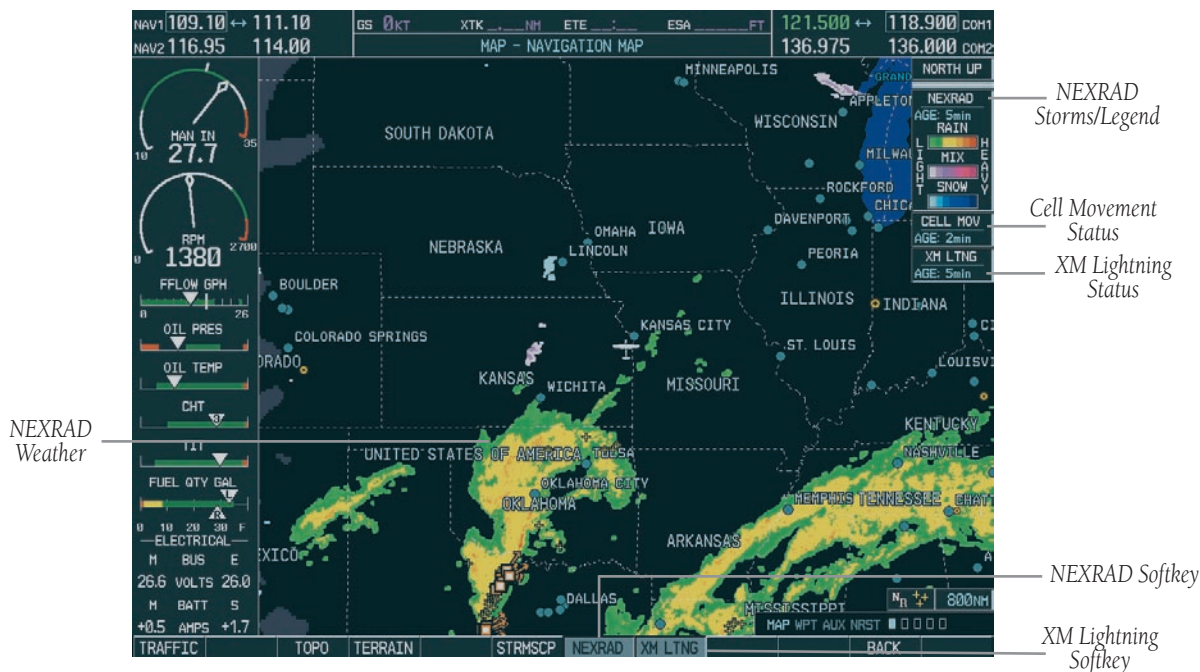


**Figure 6-7  Navigation Map Page Displaying NEXRAD Weather**

### Navigation Map Setup Options

The user can customize the display of GDL 69 weather data 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.

> **NOTE:** Stormscope (when installed) and all GDL 69 Weather Products are mutually exclusive.

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

> **NOTE:** In Figure 6-7, the Stormscope menu options are only shown when the Stormscope unit is installed.  Stormscope is not a GDL 69 Weather Product.
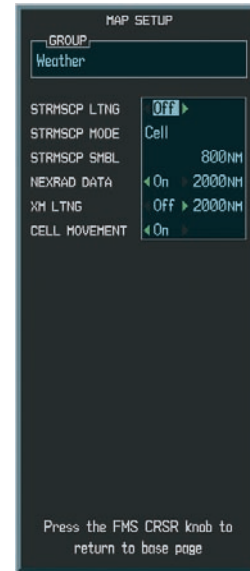


**Figure 6-8  Map Setup Options**

### To customize the Navigation Map Page:

1. On the Navigation Map page, press the **Menu** key.

2. While the 'Map Setup' selection is highlighted on the Page Menu, press the **ENT** key.

3. Turn the **small FMS** knob to display the group selection window. Turn either the **small or large 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 displays Stormscope, NEXRAD, and XM Lightning data.
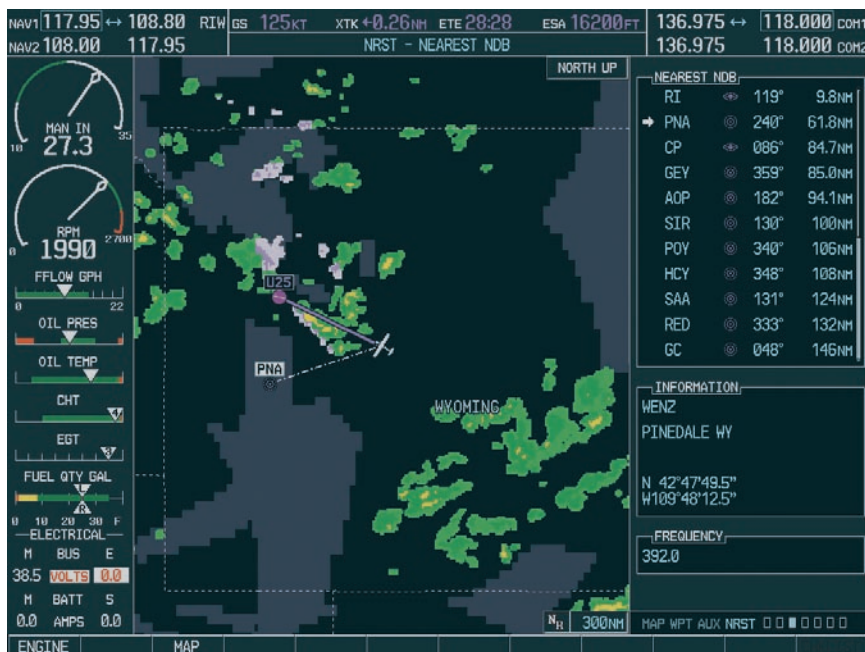


**Figure 6-9  Weather Display on the Nearest NDB Page**

### 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. 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).



*METAR Text*

*TAF Text*

*WX Softkey*

**Figure 6-10  METAR and TAF Text Displayed on the Airport (Weather) Information Page**

**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.



**Figure 6-11  AUX – Trip Planning Page Map Displaying NEXRAD Weather**
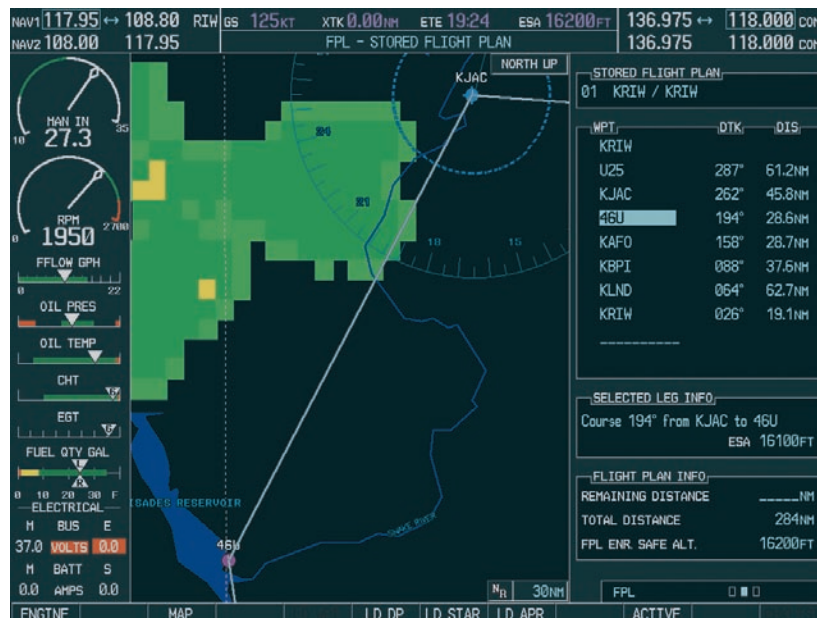


**Figure 6-12  Stored Flight Plan Page Map Displaying Weather Data**

### Displaying Weather on the Weather Data Link Page

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.
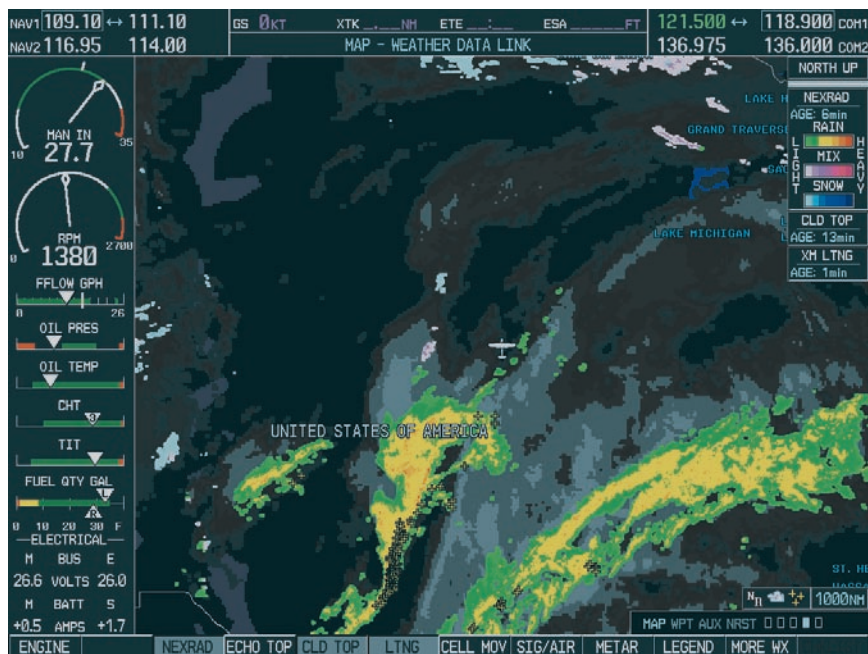


**Figure 6-13  Weather Data Link Page**

### 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
- Strobes and spurious radar data
- Sun strobes, 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 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.
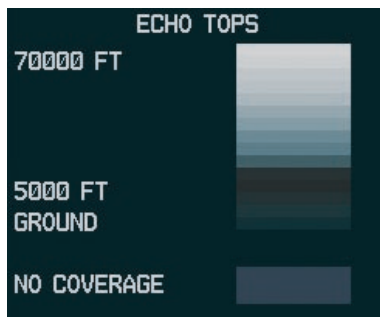


> NOTE: Cloud Tops and Echo Tops use the same color scaling to represent altitude. Turning on both products at the same time is not allowed.

**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.
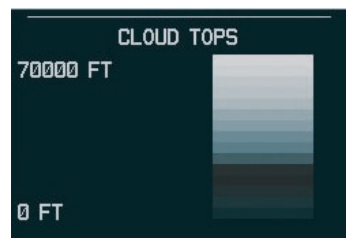


**LTNG –** pressing the **LTNG** softkey shows the location of cloud-to-ground lightning strikes. The update rate is every five minutes.

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

```
        LIGHTNING
STRIKE                +
```

**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.

```
       CELL MOVEMENT
DIRECTION           ◢
```

**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 broadcasted 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 broadcasted 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.*

```
       SIGMET / AIRMET
SIGMET             ----------
LOCALIZED SIGMET      ◇

ICING              ... .. . .. . ..
TURBULENCE         ... .. . .. . ..
IFR                ... .. . .. . ..
MTN OBSCR          ... .. . .. . ..
SURFACE WINDS      ... . . .. . ..
```

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 **FMS** knob to scroll up or down through the legend list. Press the **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.
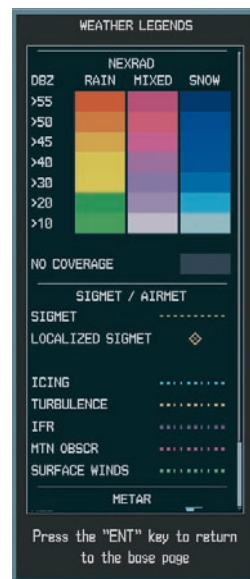


**Figure 6-14  Weather Legends Window**

**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 are 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.
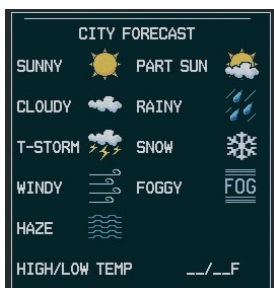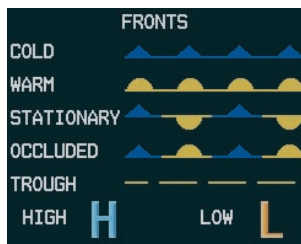




**FRZ LVL –** press the **FRZ LVL** softkey to display contour lines for freezing levels. The update rate is every 12 minutes.



*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.

| WINDS ALOFT | |
| --- | --- |
| 0 KNOTS | • |
| 5 KNOTS OR LESS | |
| 10 KNOTS OR LESS | |
| 50 KNOTS OR LESS | |
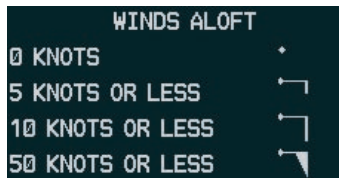
**COUNTY –** pressing the **COUNTY** softkey provides specific public awareness and protection weather warnings for Tornado, Severe Thunderstorm, and Flood conditions provided by the National Weather Service (NWS). Refer to the Legend for a description of the county warning icon. The update rate is every 5 minutes.

| COUNTY WARNINGS | |
| --- | --- |
| SEVERE THUNDERSTORM | |
| TORNADO | |
| FLOOD | |

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

| CYCLONE | |
| --- | --- |
| WARNING | |
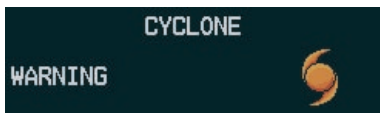
### Weather Data Link Page Setup

The pilot can customize the display of XM Weather data on the Weather Data Link Page using the Weather Setup Menu.

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

1. On the Weather Data Link Page, press the **Menu** key.

2. While the Weather Setup selection is highlighted on the Page Menu, press the **ENT** key. If necessary, turn the **small FMS** knob to select 'Weather Setup' and then press the **ENT** key.

3. While the Data Link Setup menu is displayed, 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.

| PAGE MENU |
| --- |
| OPTIONS |
| Weather Setup |
| Weather Legend |
| Press the FMS CRSR knob to return to base page |
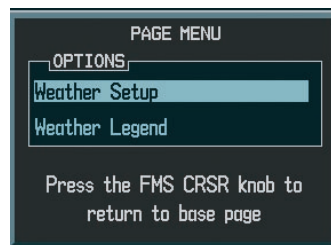
**Figure 6-15  Weather Data Link Page Menu**

### 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, SIGMETs, 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 AIRMETs, TFRs, METARs, or SIGMETs. 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.
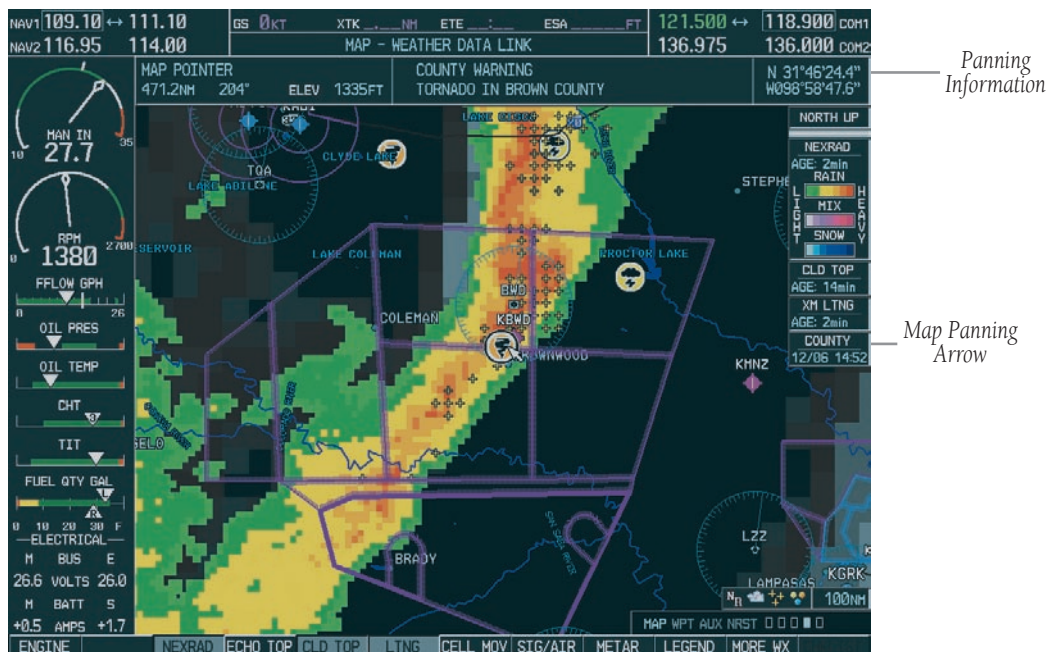


**Figure 6-16  Panning on the Weather Data Link Page**

### Weather Product Symbols

Figure 6-17 depicts 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

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; '_ _/_ _/_ _:_ _'.

| 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 | 60 |
| TAFs | 60 |
| Clouds Tops | 60 |

Echo Top (Cloud Top and Echo Top Mutually Exclusive)



**Figure 6-17  Weather Product Symbols**

## GDL 69A Digital Audio Entertainment Interface

Digital Audio entertainment is available through the XM Satellite Radio Service using the GDL 69A interface. 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:

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.
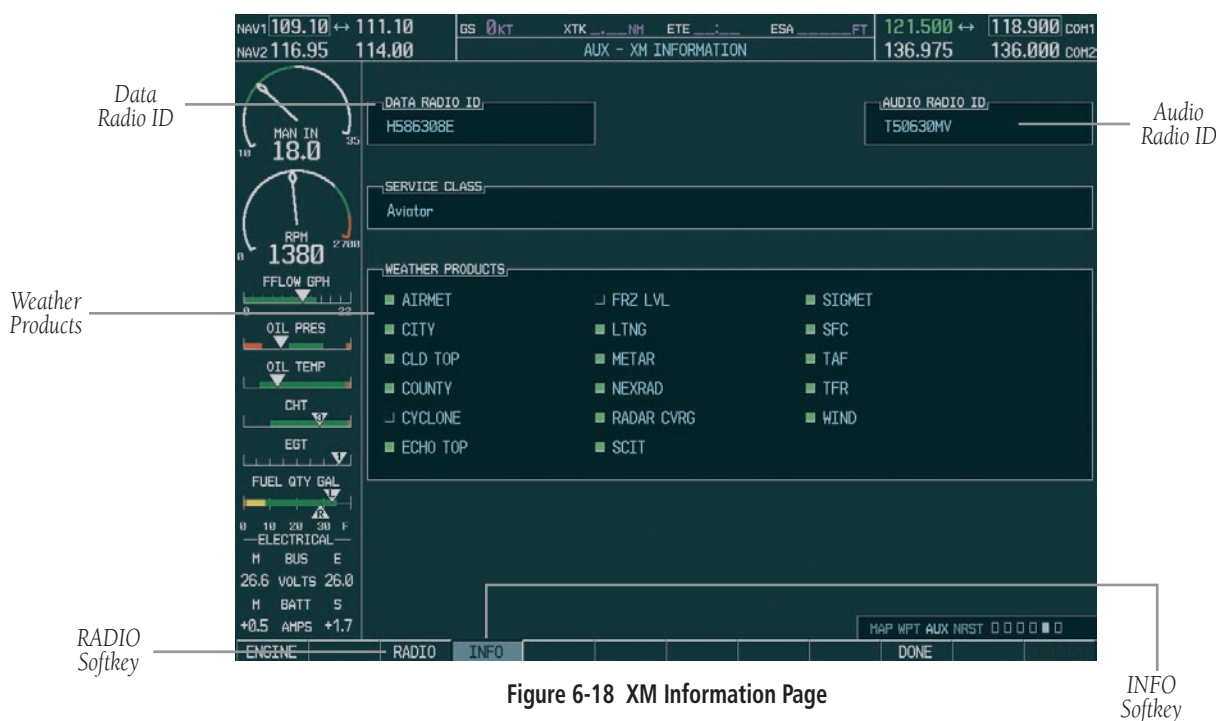


**Figure 6-18  XM Information Page**

### 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.

### Service Class

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

### Weather Products

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.



**Figure 6-19  XM Radio Page**

### XM Radio Page

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

### XM Radio Interface Softkeys

The following MFD softkeys are located below the display and provide control over functions for the GDL 69A interface:

**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** – press the **DONE** softkey to verify authorization is complete prior to activating programming.

**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.



**Figure 6-20  Channels Page**

### 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 **large 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.

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 6-21  Direct Channel Selection**

### 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 6-22  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.  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' 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 6-23  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 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 the table at the end of this section. 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.

**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.



**Figure 6-24  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 6-1  GDL 69 Advisory Messages**

# ANNUNCIATIONS AND ALERTS

## A.1 INTRODUCTION

⚠ *NOTE: The Aircraft Flight Manual takes precedence over any conflicting information found in this document.*

The G1000 Alerting System conveys alerts to the pilot using a combination of the following items:

- **Annunciation Window:** The Annunciation window displays abbreviated annunciation text. Text color is based on alert levels described later in the Alert Levels Definitions section. The Annunciation window is located to the right of the Altitude and Vertical Speed windows on the display. Up to 12 annunciations can be displayed simultaneously in the Annunciation window. A white horizontal line separates annunciations that are acknowledged from annunciations that are not yet acknowledged. Higher priority annunciations are displayed towards the top of the window. Lower priority annunciations are displayed towards the bottom of the window.

- **Alerts Window:** The Alerts window displays alert text messages. Up to 64 prioritized alert messages can be displayed in the Alerts window. Pressing the **ALERTS** softkey displays the Alerts window. Pressing the **ALERTS** softkey a second time removes the Alerts window from the display. When the Alerts window is displayed, the pilot can use the **large FMS** knob to scroll through the alert message list.

- **Softkey Annunciation:** During certain alerts, the **ALERTS** softkey may appear as a flashing annunciation to accompany an alert. The **ALERTS** softkey assumes a new label consistent with the alert level (WARNING, CAUTION, or ADVISORY). By pressing the softkey annunciation, the pilot acknowledges awareness of the alert. The softkey then returns to the previous **ALERTS** label. If alerts are still present, the **ALERTS** label will be displayed in inverse video (white background with black text). The pilot can press the **ALERTS** softkey a second time to view alert text messages.

- **System Annunciations:** Typically, a large red 'X' appears in windows when a failure is detected in the LRU providing the information to the window. See the G1000 System Annunciations section for more information.

- **Audio Alerting System:** The G1000 system issues audio alert tones when specific system conditions are met. See the Alert Levels Definitions section for more information.



*System Annunciation Red 'X'*

*Annunciation Window*

*Alerts Window*

*ALERTS Softkey Annunciation*
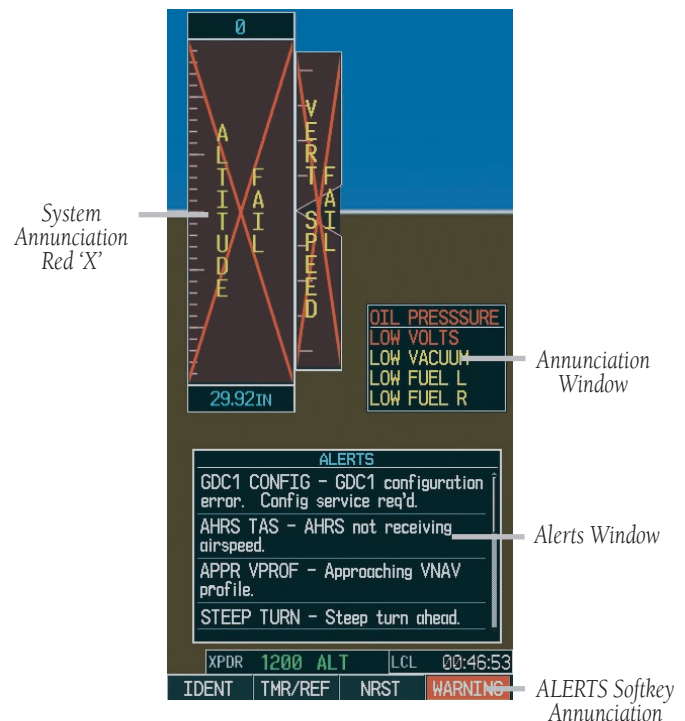
**Figure A-1  G1000 Alerting System**

## A.2  ALERT LEVEL DEFINITIONS

The G1000 Alerting System, as installed in Cessna Nav III aircraft, uses three alert levels.

- **WARNING:**  This level of alert requires immediate pilot attention.  A warning alert is accompanied by an annunciation in the Annunciation window.  Text appearing in the Annunciation window is RED.  A warning alert is also accompanied by a flashing **WARNING** softkey annunciation, as shown in Figure A-2.  Pressing the **WARNING** softkey acknowledges the presence of the warning alert and stops the aural tone, if applicable.

- **CAUTION:**  This level of alert indicates the existence of abnormal conditions on the aircraft that may require pilot intervention.  A caution alert is accompanied by an annunciation in the Annunciation window.  Text appearing in the Annunciation window is  YELLOW.  A caution alert is also accompanied by a flashing **CAUTION** softkey annunciation, as shown in Figure A-3.  Pressing the **CAUTION** softkey acknowledges the presence of the caution alert.

- **MESSAGE ADVISORY:**  This level of alert provides general information to the pilot. A message advisory alert does not issue annunciations in the Annunciation window.  Instead, message advisory alerts only issue a flashing **ADVISORY** softkey annunciation, as shown in Figure A-4.  Pressing the **ADVISORY** softkey acknowledges the presence of the message advisory alert and displays the alert text message in the Alerts window.

The following additional Safe Operating alert level is used by Cessna T182 and T206 only, as well as by normally aspirated 206 aircraft equipped with the propeller de-ice option:

- **Safe Operating Annunciation:**  The purpose of the safe operating annunciation is to inform the pilot that certain airframe systems and/or functions are within safe operating limits.  Safe operating annunciations only appear in the Annunciation window.  Safe operating annunciation text is GREEN.



**Figure A-2  WARNING Softkey Annunciation**



**Figure A-3  CAUTION Softkey Annunciation**



**Figure A-4  ADVISORY Softkey Annunciation**

## A.3  CESSNA NAV III AIRCRAFT ALERTS

The following alerts are configured specifically for Cessna Nav III aircraft.  See the appropriate Aircraft Flight Manual for recommended pilot actions.

### Voice Alerts

The following voice alerts can be configured for 'Male' or 'Female' gender by using the Aux System Setup Page on the MFD.

| Voice Alert | Alert Trigger |
|---|---|
| "Traffic" | Played when a Traffic Advisory (TA) is issued. |
| "Traffic Not Available" | Played when the traffic system fails or cannot communicate. |

> **NOTE:**  Voice alerts are provided to the G1000 by GIA 63 #1.  Should this unit fail, audio and voice alerts will no longer be available.

### WARNING Alerts

| Annunciation Window Text | Audio Alert |
|---|---|
| OIL PRESSURE | Continuous Aural Tone |
| LOW VOLTS | Continuous Aural Tone* |
| PITCH TRIM | No Tone |

*Aural tone is inhibited while the aircraft is on the ground.

### CAUTION Alerts

| Annunciation Window Text | Audio Alert |
|---|---|
| LOW VACUUM | Single Aural Tone |
| LOW FUEL L | Single Aural Tone |
| LOW FUEL R | Single Aural Tone |
| STBY BATT | Single Aural Tone |

### CAUTION Alerts (T182, T206, and 206 with Prop De-Ice Only)

| Annunciation Window Text | Audio Alert |
|---|---|
| PROP HEAT | Single Aural Tone |

### Safe Operating Annunciation (T182, T206, and 206 with Prop De-Ice Only)

| Annunciation Window Text | Audio Alert |
|---|---|
| PROP HEAT | No Tone |
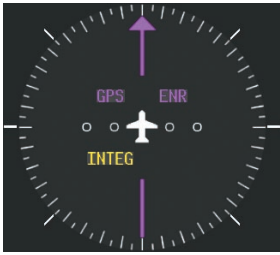
## A.4  G1000 SYSTEM ANNUNCIATIONS

When an LRU or an LRU function fails, a large red 'X' is typically displayed on windows associated with the failed data.  The following section describes various system annunciations.  Refer to the Aircraft Flight Manual for additional information regarding pilot responses to these annunciations.

**NOTE:** *Upon power-up of the G1000 system, certain windows remain invalid as G1000 equipment begins to initialize.  All windows should be operational within one minute of power-up.  Should any window continue to remain flagged, the G1000 system should be serviced by a Garmin-authorized repair facility.*

| System Annunciation | Comment |
|---|---|
|  | Attitude and Heading Reference System is aligning. |
|  | Display system is not receiving attitude information from the AHRS. |
|  | Display system is not receiving airspeed input from the air data computer. |
|  | Display system is not receiving altitude input from the air data computer. |

| System Annunciation | Comment |
|---|---|
|  | Display system is not receiving vertical speed input from the air data computer. |
|  | Display system is not receiving valid heading input from the AHRS. |
|  | The GPS information is either not present or is invalid for navigation. Note that the AHRS utilizes GPS inputs during normal operation.  AHRS operation may be degraded if GPS signals are not present (see AFMS). |
|  | Display system is not receiving valid transponder information. |
| Other Various Red X Indications | A red 'X' through any other display field (such as the engine instrumentation fields) indicates that the field is not receiving valid data. |

A red 'X' may be the result of an LRU or an LRU function failure. The figure presented below illustrates all possible flags and the responsible LRUs.
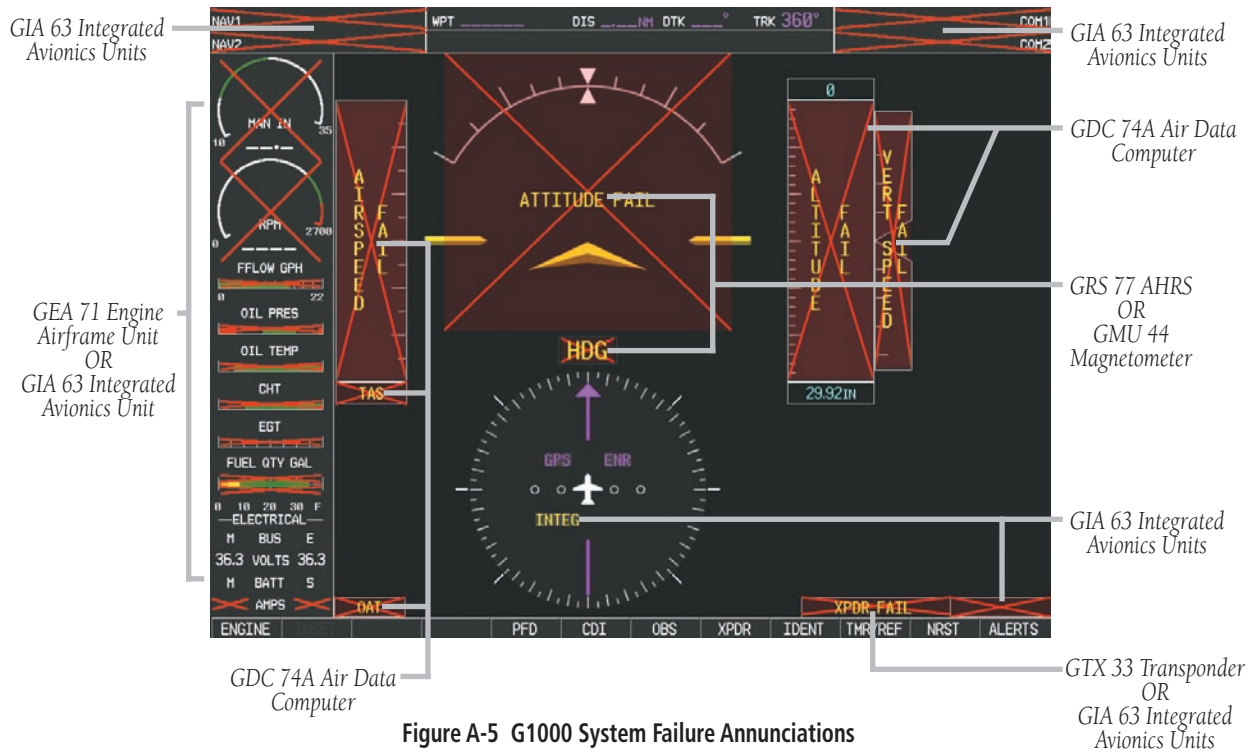


**Figure A-5  G1000 System Failure Annunciations**

## A.5   G1000 SYSTEM MESSAGE ADVISORIES

This section describes various G1000 system message advisories.  Certain messages are issued due to an LRU or an LRU function failure.  Such messages are normally accompanied by a corresponding red 'X' annunciation as shown previously in the G1000 System Annunciation section.

> **NOTE:** *This Section provides information regarding G1000 message advisories that may be displayed by the system.  Knowledge of the aircraft, systems, flight conditions, and other existing operational priorities must be considered when responding to a message.  Always use sound pilot judgment. The Aircraft Flight Manual takes precedence over any conflicting guidance found in this section.*

### MFD & PFD Message Advisories

| Message | Comments |
|---|---|
| **DATA LOST** – Pilot stored data was lost.  Recheck settings. | The pilot profile data was lost.  System reverts to default pilot profile and settings.  The pilot may reconfigure the MFD & PFD with preferred settings, if desired. |
| **XTALK ERROR** – A flight display crosstalk error has occurred. | The MFD and PFD are not communicating with each other.  The G1000 system should be serviced. |
| **PFD1 SERVICE** – PFD1 needs service.  Return unit for repair. | The PFD and/or MFD self-test has detected a problem.  The G1000 system should be serviced. |
| **MFD1 SERVICE** – MFD1 needs service.  Return unit for repair. | |
| **PFD1 CONFIG** – PFD1 configuration error.  Config service req'd. | The PFD and/or MFD configuration settings do not match backup configuration memory.  The G1000 system should be serviced. |
| **MFD1 CONFIG** – MFD1 configuration error.  Config service req'd. | |
| **SW MISMATCH** – GDU software mismatch.  Xtalk is off. | The MFD and PFD have different software versions installed.  The G1000 system should be serviced. |
| **MANIFEST** – PFD1 software mismatch.  Communication halted. | The PFD and/or MFD has incorrect software installed.  The G1000 system should be serviced. |
| **MANIFEST** – MFD1 software mismatch.  Communication halted. | |
| **PFD1 COOLING** – PFD1 has poor cooling.  Reducing power usage. | The PFD and/or MFD is overheating and is reducing power consumption by dimming the display.   If problem persists, the G1000 system should be serviced. |
| **MFD1 COOLING** – MFD1 has poor cooling.  Reducing power usage. | |
| **PFD1 "KEY" KEYSTK** – Key is stuck. | A key is stuck on the PFD and/or MFD bezel.  Attempt to free the stuck key by pressing it several times.  The G1000 system should be serviced if the problem persists. |
| **MFD1 "KEY" KEYSTK** – Key is stuck. | |

## Database Message Advisories

| Alerts Window Message | Comments |
|---|---|
| **MFD1 DB ERR** – MFD1 aviation database error exists. | The MFD and/or PFD detected a failure in the aviation database. Attempt to reload the aviation database.  If problem persists, the G1000 system should be serviced. |
| **PFD1 DB ERR** – PFD1 aviation database error exists. | |
| **MFD1 DB ERR** – MFD1 basemap database error exists. | The MFD and/or PFD detected a failure in the basemap database. |
| **PFD1 DB ERR** – PFD1 basemap database error exists. | |
| **MFD1 DB ERR** – MFD1 terrain database error exists. | The MFD and/or PFD detected a failure in the terrain database. Ensure that the terrain card is properly inserted in display.  Replace terrain card.  If problem persists, The G1000 system should be serviced. |
| **PFD1 DB ERR** – PFD1 terrain database error exists. | |
| **DB MISMATCH** – Aviation database version mismatch.  Xtalk is off. | The PFD and MFD have different aviation database versions installed.  Crossfill is off. Install correct aviation database version in both displays. |
| **DB MISMATCH** – Aviation database type mismatch.  Xtalk is off. | The PFD and MFD have different aviation database types installed (Americas, European, etc.).  Crossfill is off.  Install correct aviation database type in both displays. |

## GMA 1347 Message Advisories

| Alerts Window Message | Comments |
|---|---|
| **GMA1 FAIL** – GMA1 is inoperative. | The audio panel self-test has detected a failure.  The audio panel is unavailable.  The G1000 system should be serviced. |
| **GMA1 CONFIG** – GMA1 configuration error.  Config service req'd. | The audio panel configuration settings do not match backup configuration memory. The G1000 system should be serviced. |
| **MANIFEST** – GMA1 software mismatch.  Communication halted. | The audio panel has incorrect software installed.  The G1000 system should be serviced. |
| **GMA1 SERVICE** – GMA1 needs service.  Return unit for repair. | The audio panel self-test has detected a problem in the unit.  Certain audio functions may still be available, and the audio panel may still be usable.  The G1000 system should be serviced when possible. |
| **BACKUP PATH** – Audio panel using backup data path. | The audio panel is using a backup communication path.  The G1000 system should be serviced when possible. |

## GIA 63 Message Advisories

| Alerts Window Message | Comments |
|---|---|
| **GIA1 CONFIG** – GIA1 configuration error.  Config service req'd.<br>**GIA2 CONFIG** – GIA2 configuration error.  Config service req'd. | The GIA1 and/or GIA2 configuration settings do not match backup configuration memory.  The G1000 system should be serviced. |
| **GIA1 COOLING** – GIA1 temperature too low.<br>**GIA2 COOLING** – GIA2 temperature too low. | The GIA1 and/or GIA2 temperature is too low to operate correctly.  Allow units to warm up to operating temperature. |
| **GIA1 COOLING** – GIA1 over temperature.<br>**GIA2 COOLING** – GIA2 over temperature. | The GIA1 and/or GIA2 temperature is too high.  If problem persists, the G1000 system should be serviced. |
| **GIA1 SERVICE** – GIA1 needs service.  Return the unit for repair.<br>**GIA2 SERVICE** – GIA2 needs service.  Return the unit for repair. | The GIA1 and/or GIA2 self-test has detected a problem in the unit.  The G1000 system should be serviced. |
| **MANIFEST** – GIA1 software mismatch.  Communication halted.<br>**MANIFEST** – GIA2 software mismatch.  Communication halted. | The GIA1 and/or GIA 2 has incorrect software installed.  The G1000 system should be serviced. |
| **COM1 TEMP** – COM1 over temp.  Reducing transmitter power.<br>**COM2 TEMP** – COM2 over temp.  Reducing transmitter power. | The system has detected an over temperature condition in COM1 and/or COM2.  The transmitter will operate at reduced power.  If the problem persists, the G1000 system should be serviced. |
| **COM1 SERVICE** – COM1 needs service.  Return unit for repair.<br>**COM2 SERVICE** – COM2 needs service.  Return unit for repair. | The system has detected a failure in COM1 and/or COM2.  COM1 and/or COM2 may still be usable.  The G1000 system should be serviced when possible. |
| **COM1 PTT** – COM1 push-to-talk key is stuck.<br>**COM2 PTT** – COM2 push-to-talk key is stuck. | The COM1 and/or COM2 external push-to-talk switch is stuck in the enable (or "pressed") position.  Press the PTT switch again to cycle its operation.<br>If the problem persists, the G1000 system should be serviced. |

## GIA 63 Message Advisories (Cont.)

| Alerts Window Message | Comments |
|---|---|
| **COM1 RMT XFR** – COM1 remote transfer key is stuck. | The COM1 and/or COM2 transfer switch is stuck in the enabled (or "pressed") position. Press the transfer switch again to cycle its operation. If the problem persists, the G1000 system should be serviced. |
| **COM2 RMT XFR** – COM2 remote transfer key is stuck. | |
| **RAIM UNAVAIL** – RAIM is not available from FAF to MAP waypoints. | GPS satellite coverage is insufficient to perform Receiver Autonomous Integrity Monitoring (RAIM) from the FAF to the MAP waypoints. |
| **RAIM UNAVAIL** – RAIM is not available. | GPS satellite coverage is insufficient to perform Receiver Autonomous Integrity Monitoring (RAIM) for the current phase of flight. |
| **POSN ERROR** – RAIM has determined GPS position is in error. | When a RAIM position error is detected, GPS is flagged and the system no longer provides GPS-based guidance. |
| **DGRD GPS ACC** – GPS position accuracy degraded & RAIM unavailable. | GPS position accuracy has been degraded and RAIM is not available. |
| **GPS1 FAIL** – GPS1 is inoperative. | A failure has been detected in the GPS1 and/or GPS2 receiver. The receiver is unavailable. The G1000 system should be serviced. |
| **GPS2 FAIL** – GPS2 is inoperative. | |
| **GPS1 SERVICE** – GPS1 needs service. Return unit for repair. | A failure has been detected in the GPS1 and/or GPS2 receiver. The receiver may still be available. The G1000 system should be serviced. |
| **GPS2 SERVICE** – GPS2 needs service. Return unit for repair. | |
| **NAV1 SERVICE** – NAV1 needs service. Return unit for repair. | A failure has been detected in the NAV1 and/or NAV2 receiver. The receiver may still be available. The G1000 system should be serviced. |
| **NAV2 SERVICE** – NAV2 needs service. Return unit for repair. | |
| **NAV1 RMTXFR** – NAV1 remote transfer key is stuck. | The remote NAV1 and/or NAV2 transfer switch is stuck in the enabled (or "pressed") state. Press the transfer switch again to cycle its operation. If the problem persists, the G1000 system should be serviced. |
| **NAV2 RMTXFR** – NAV2 remote transfer key is stuck. | |

## GIA 63 Message Advisories (Cont.)

| Alerts Window Message | Comments |
|---|---|
| **G/S1 FAIL** – G/S1 is inoperative. | A failure has been detected in glideslope receiver 1 and/or receiver 2. The G1000 system should be serviced. |
| **G/S2 FAIL** – G/S2 is inoperative. | |
| **G/S1 SERVICE** – G/S1 needs service. Return unit for repair. | A failure has been detected in glideslope receiver 1 and/or receiver 2. The receiver may still be available. The G1000 system should be serviced when possible. |
| **G/S2 SERVICE** – G/S2 needs service. Return unit for repair. | |

## GEA 71 Message Advisories

| Alerts Window Message | Comments |
|---|---|
| **GEA1 CONFIG** – GEA1 configuration error. Config service req'd. | The GEA 71 configuration settings do not match those of backup configuration memory. The G1000 system should be serviced. |
| **MANIFEST** – GEA1 software mismatch. Communication halted. | The GEA 71 has incorrect software installed. The G1000 system should be serviced. |
| **BACKUP PATH** – EIS using backup data path. | The GEA 71 is using a backup communication path. The G1000 system should be serviced when possible. |

## GTX 33 Message Advisories

| Alerts Window Message | Comments |
|---|---|
| **XPDR1 CONFIG** – XPDR1 config error. Config service req'd. | The transponder configuration settings do not match those of backup configuration memory. The G1000 system should be serviced. |
| **MANIFEST** – GTX1 software mismatch. Communication halted. | The transponder has incorrect software installed. The G1000 system should be serviced. |
| **BACKUP PATH** – Transponder using backup data path. | The transponder is using a backup communications path. The G1000 system should be serviced when possible. |

## GRS 77 Message Advisories

| Alerts Window Message | Comments |
|---|---|
| **AHRS TAS** – AHRS not receiving airspeed. | The AHRS is not receiving true airspeed from the air data computer. The AHRS relies on GPS information to augment the lack of airspeed.  The G1000 system should be serviced. |
| **AHRS GPS** – AHRS using backup GPS source. | The AHRS is using the backup GPS path.  Primary GPS path has failed.  The G1000 system should be serviced when possible. |
| **AHRS GPS** – AHRS not receiving GPS information. | The AHRS is not receiving any or any useful GPS information.  Check AFMS limitations.  The G1000 system should be serviced. |
| **AHRS GPS** – AHRS not receiving backup GPS information. | The AHRS is not receiving backup GPS information.  The G1000 system should be serviced. |
| **AHRS GPS** – AHRS operating exclusively in no-GPS mode. | The AHRS is operating exclusively in no-GPS mode.  The G1000 system should be serviced. |
| **MANIFEST** – GRS1 software mismatch. Communication halted. | The AHRS has incorrect software installed.  The G1000 system should be serviced. |
| **BACKUP PATH** – AHRS using backup data path. | The AHRS is using a backup communications data path.  The G1000 system should be serviced when possible. |
| **AHRS SERVICE** – AHRS Magnetic-field model needs update. | The AHRS earth magnetic field model is out of date.  Update magnetic field model when practical. |
| **GEO LIMITS** – Too far North/South, no magnetic compass. | The aircraft is outside geographical limits for approved AHRS operation.  Heading is flagged as invalid. |

## GMU 44 Message Advisories

| Alerts Window Message | Comments |
|---|---|
| **HDG FAULT** – A magnetometer fault has occurred. | A fault has occurred in the GMU 44.  Heading is flagged as invalid.  The AHRS uses GPS for backup mode operation.  The G1000 system should be serviced. |
| **MANIFEST** – GMU1 software mismatch.  Communication halted. | The GMU 44 has incorrect software installed.  The G1000 system should be serviced. |

## GDL 69 Message Advisories

| Alerts Window Message | Comments |
|---|---|
| **GDL69 CONFIG** – GDL 69 configuration error.  Config service req'd. | GDL 69 configuration settings do not match those of backup configuration memory.  The G1000 system should be serviced. |
| **GDL69 FAIL** – GDL 69 has failed. | A failure has been detected in the GDL 69.  The receiver is unavailable.  The G1000 system should be serviced |

## GDC 74A Message Advisories

| Alerts Window Message | Comments |
|---|---|
| **GDC1 CONFIG** – GDC1 configuration error.  Config service req'd. | GDC 74A configuration settings do not match those of backup configuration memory.  The G1000 system should be serviced. |
| **MANIFEST** – GDC1 software mismatch.  Communication halted. | The GDC 74A has incorrect software installed.  The G1000 system should be serviced. |
| **BACKUP PATH** – Airdata using backup data path. | The GDC 74A is using a backup communications data path.  The G1000 system should be serviced when possible. |

## Miscellaneous Message Advisories

| Alerts Window Message | Comments |
|---|---|
| **FPL WPT LOCK** – Flight plan waypoint is locked. | Upon power-up, the G1000 system detects that a stored flight plan waypoint is locked.  This occurs when an aviation database update eliminates an obsolete way-point.  The flight plan cannot find the specified waypoint and flags this message.  This can also occur with user waypoints in a flight plan that is deleted.<br>Remove the waypoint from the flight plan if it no longer exists in any database, OR<br>update the waypoint name/identifier to reflect the new information. |
| **FPL WPT MOVE** – Flight plan waypoint moved. | The system has detected that a waypoint coordinate has changed due to a new aviation database update.  Verify that stored flight plans contain correct waypoint locations. |
| **TIMER EXPIRD** – Timer has expired. | The system notifies the pilot that the timer has expired. |
| **DB CHANGE** – Database changed.  Verify user modified procedures. | This occurs when a stored flight plan contains procedures that have been manually edited.   This alert is issued only after an aviation database update.  Verify that the user-modified procedures in stored flight plans are correct and up to date. |
| **FPL TRUNC** – Flight plan has been truncated. | This occurs when a newly installed aviation database eliminates an obsolete ap-proach or arrival used by a stored flight plan.  The obsolete procedure is removed from the flight plan.  Update flight plan with current arrival or approach. |
| **APPR VPROF** – Approaching VNAV profile. | Aircraft is approaching VNAV profile.  Prepare to climb or descend to meet VNAV profile. |
| **APPR TRG ALT** – Approaching target altitude. | Aircraft is approaching target altitude.  Prepare to level aircraft. |

## Miscellaneous Message Advisories (Cont.)

| Alerts Window Message | Comments |
|---|---|
| **LOCKED FPL** – Cannot navigate locked flight plan. | This occurs when the pilot attempts to activate a stored flight plan that contains locked waypoint. Remove locked waypoint from flight plan. Update flight plan with current waypoint. |
| **WPT ARRIVAL** – Arriving at waypoint -[xxxx] | Arriving at waypoint [xxxx], where [xxxx] is the waypoint name. |
| **STEEP TURN** – Steep turn ahead. | A steep turn is 15 seconds ahead. Prepare to turn. |
| **INSIDE ARSPC** – Inside airspace. | The aircraft is inside the airspace. |
| **ARSPC AHEAD** – Airspace ahead less than 10 minutes. | Special use airspace is ahead of aircraft. The aircraft will penetrate the airspace within 10 minutes. |
| **ARSPC NEAR** – Airspace near and ahead. | Special use airspace is near and ahead of the aircraft position. |
| **ARSPC NEAR** – Airspace near – less than 2 nm. | Special use airspace is within 2 nm of the aircraft position. |
| **LEG UNSMOOTH** – Flight plan leg will not be smooth. | The approaching flight plan waypoints are too close to allow for smooth turns. Prepare for steep turns ahead and expect noticeable course deviations. |
| **APPR INACTV** – Approach is not active. | The system notifies the pilot that the loaded approach is not active. Activate approach when required. |
| **SLCT AUTOSEQ** – Select auto sequence mode. | The system notifies the pilot to select auto-sequence mode. Press the OBS softkey to deactivate the OBS mode. |
| **SLCT FREQ** – Select appropriate frequency for approach. | The system notifies the pilot to load the approach frequency for the appropriate NAV receiver. Select the correct frequency for the approach. |
| **SLCT NAV** – Select NAV on CDI for approach. | The system notifies the pilot to set the CDI to the correct NAV receiver. Set the CDI to the correct NAV receiver. |
| **NO WGS84 WPT** – Non WGS 84 waypoint for navigation -[xxxx] | The selected waypoint [xxxx] does not use the WGS 84 datum. Cross-check position with alternate navigation sources. |
| **TRAFFIC FAIL** – Traffic device has failed. | The traffic information system TIS has failed. The G1000 system should be serviced. |
| **STRMSCP FAIL** – Stormscope has failed. | Stormscope has failed. The G1000 system should be serviced. |
| **BACKUP PATH** – Stormscope using backup path. | Stormscope is using the backup communication path. The G1000 system should be serviced when possible. |

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**Garmin G1000 Cockpit Reference Guide for Cessna Nav III**

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