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G1000™

Pilot's Guide for Cessna Nav III

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190-00498-00 (Rev. A)	Initial release.

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Revision	**Date of Revision**	**Revision Page Range**	**Description**
A	11/05	i through I-8	Initial release.

This manual reflects the operation of System Software versions 0394.06 or later for Cessna 172R aircraft, 0395.07 or later for Cessna 172S aircraft, 0371.15 or later for normally aspirated Cessna 182 aircraft, 0372.14 or later for turbocharged Cessna 182 aircraft, 0373.10 or later for normally aspirated Cessna 206 aircraft, and 0374.10 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 Pilot's Guide binder pertains to all Cessna Nav III aircraft.*

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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 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 Airman's Information Manual (AIM) recommend avoiding "by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo."*

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. 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.*

NOTE: *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.*

NOTE: *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.*

NOTE: *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.*

LIMITED WARRANTY

This Garmin product is warranted to be free from defects in materials or workmanship for two years from the date of purchase. Within this period, Garmin will, at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts and labor, provided that the customer shall be responsible for any transportation cost. This warranty does not cover failures due to abuse, misuse, accident, or unauthorized alterations or repairs.

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Garmin retains the exclusive right to repair or replace the unit or software, or to offer a full refund of the purchase price, at its sole discretion. SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

To obtain warranty service, contact your local Garmin Authorized Service Center. For assistance in locating a Service Center near you, visit the Garmin Web site at "http://www.garmin.com" or contact Garmin Customer Service at 800-800-1020.

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SECTION 1 SYSTEM OVERVIEW

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System Overview

1.1 SYSTEM DESCRIPTION

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.

NOTE: *Please refer to the Pilot's Guide Appendices for detailed specifications regarding the G1000 LRUs.*

1.2 LINE REPLACEABLE UNITS

- **GDU 1040 –** The GDU 1040 features a 10.4-inch LCD display with 1024 x 768 resolution. The left display is configured as a PFD and the right display is configured as an MFD. Both GDU 1040s link and display all functions of the G1000 system during flight. The displays communicate with each other through a High-Speed Data Bus (HSDB) Ethernet connection. Each display is also paired via an Ethernet connection with a GIA 63 Integrated Avionics Unit.

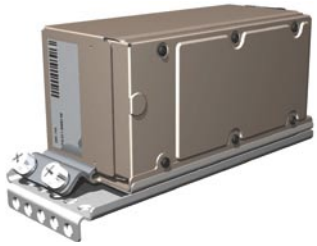
- **GMA 1347 –** The GMA 1347 Audio Panel integrates NAV/COM digital audio, intercom system and marker beacon controls. The GMA 1347 also controls manual display reversionary mode (red **DISPLAY BACKUP** button) and is installed between the MFD and the PFD. The GMA 1347 communicates with both GIA 63s using an RS-232 digital interface.

- **GIA 63 –** The GIA 63 is the central Integrated Avionics Unit (IAU) of the G1000 system. The GIA 63 functions as a main communication hub, linking all LRUs with the PFD and the MFD displays. Each GIA 63 contains a GPS receiver, VHF COM/NAV/GS receivers, and system integration microprocessors. Each GIA 63 is paired with a respective GDU 1040 display through Ethernet. The GIAs are not paired together and do not communicate with each other directly.

- **GRS 77 –** The GRS 77 is an Attitude and Heading Reference System (AHRS) that provides aircraft attitude and heading information to both the G1000 displays and the GIA 63s. The unit contains advanced sensors, accelerometers and rate sensors. In addition, the GRS 77 interfaces with both the GDC 74A Air Data Computer and the GMU 44 Magnetometer. The GRS 77 also utilizes GPS signals sent from the GIA 63. Attitude and heading information is sent using an ARINC 429 digital interface to both GDU 1040s and GIA 63s. AHRS modes of operation are discussed later in this document.

- **GMU 44 –** The GMU 44 Magnetometer measures local magnetic field information. Data is sent to the GRS 77 AHRS for processing to determine aircraft magnetic heading. This unit receives power directly from the GRS 77 and communicates with the GRS 77 using an RS-485 digital interface.

- **GDC 74A –** The GDC 74A Air Data Computer processes information from the pitot/static system as well as the outside air temperature (OAT) sensor. The GDC 74A provides pressure altitude, airspeed, vertical speed and OAT information to the G1000 system, and communicates with the GIA 63s, GDU 1040s and GRS 77 using an ARINC 429 digital interface.



- **GEA 71 –** The GEA 71 receives and processes signals from the engine and airframe sensors. Sensor types include engine temperature and pressure sensors as well as fuel measurement and pressure sensors. The GEA 71 communicates with both GIA 63s using an RS-485 digital interface.

- **GTX 33 –** The GTX 33 is a solid-state, Mode-S transponder that provides Modes A, C and S operation. The GTX 33 is controlled through the PFD and communicates with both GIA 63s through an RS-232 digital interface.

- **GDL 69/69A –** The GDL 69/69A is an XM satellite radio receiver that provides real-time weather information to the G1000 MFD. The GDL 69A also provides digital audio entertainment in the cockpit. The GDL 69/69A communicates with the MFD on the High-Speed Data Bus. A subscription to the XM Satellite Radio service is required for the GDL 69/69A to be used.

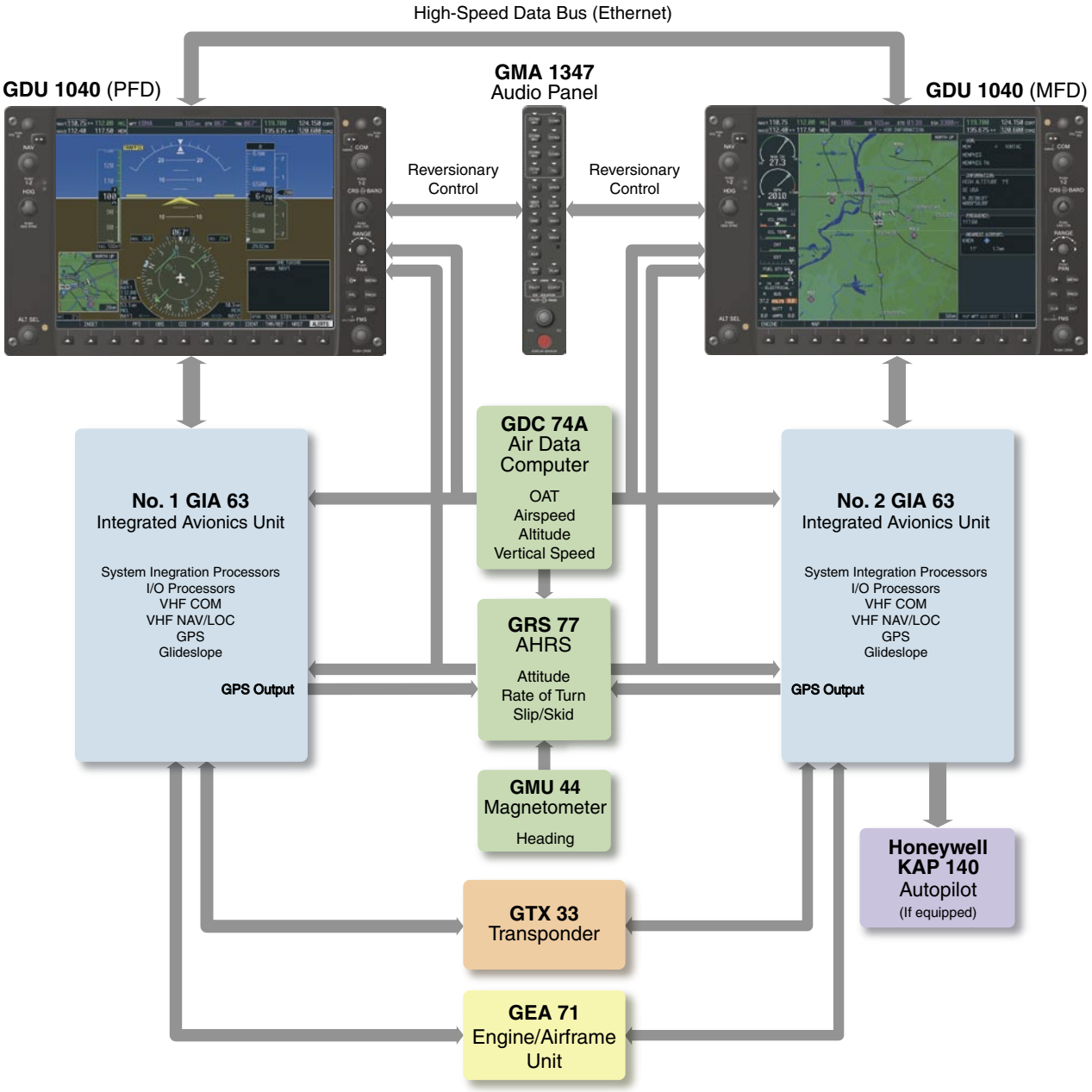


Figure 1-1 Basic G1000 System

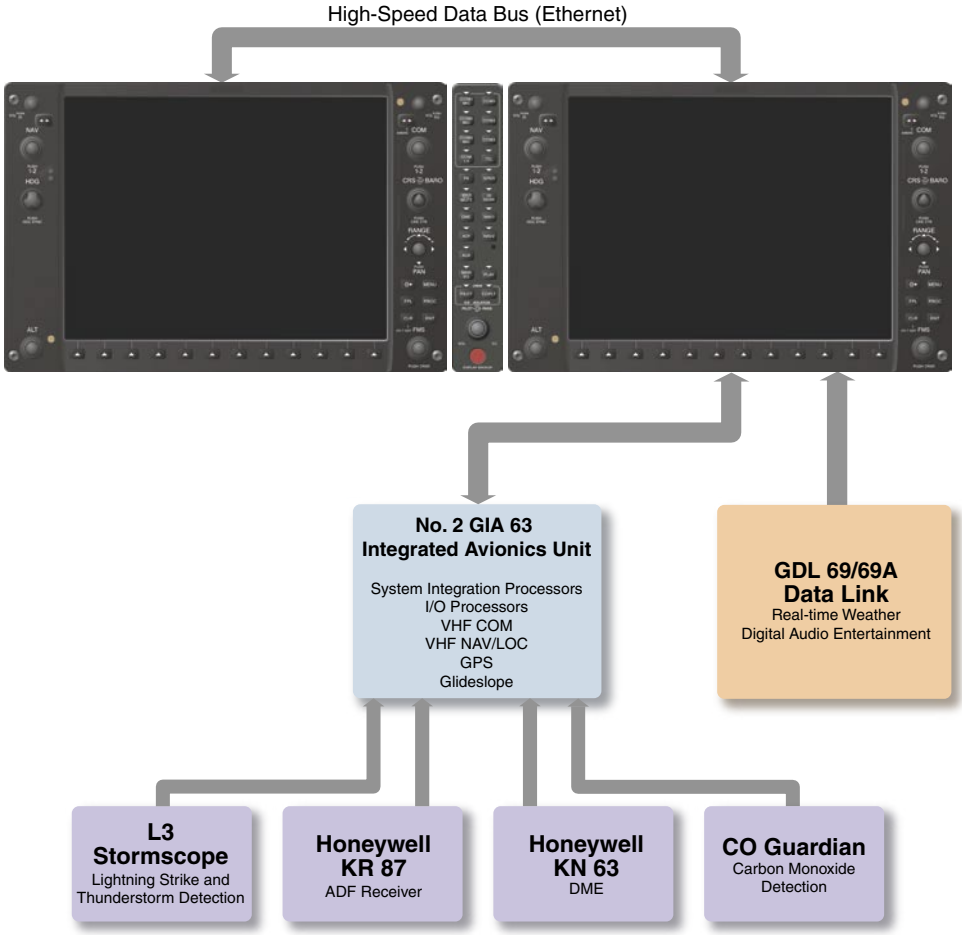


Figure 1-2 G1000 Optional Interfaces

NOTE: *For information on all optional equipment shown in Figure 1-2, please consult the applicable user's guide supplied with the optional equipment. This document assumes that the reader is already familiar with the operation of this additional equipment.*

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1.3 PFD/MFD CONTROLS

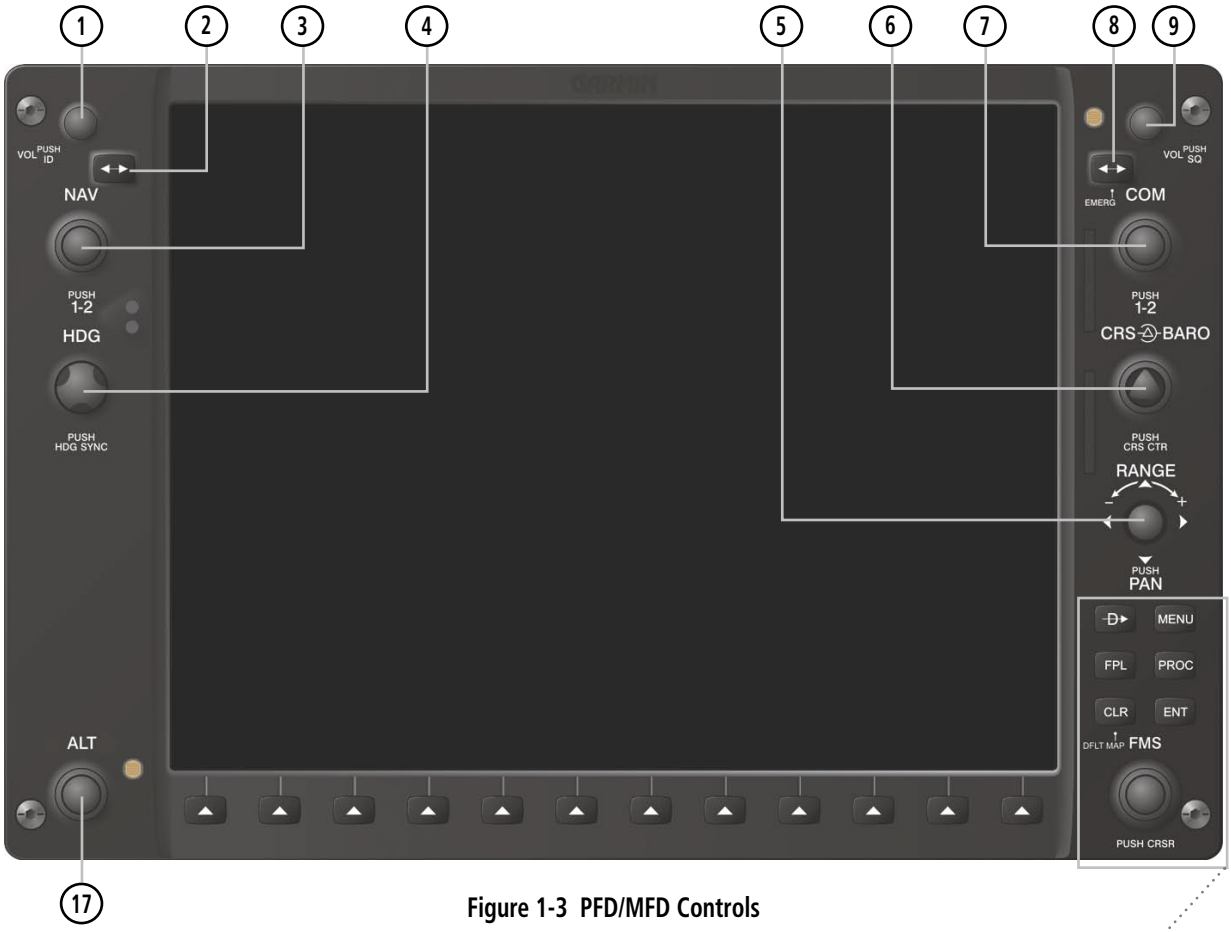
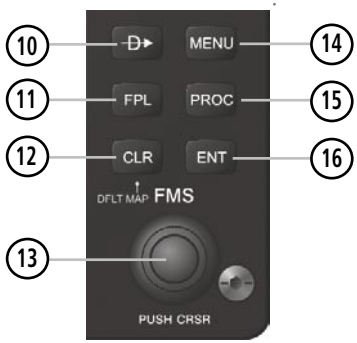


Figure 1-3 PFD/MFD Controls



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 (D▸) –** 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).*

1.4 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.

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

1.5 SYSTEM POWER-UP

The G1000 system is integrated with the aircraft electrical system and receives power directly from electrical busses. The Garmin G1000 PFD/MFD and supporting sub-systems include both power-on and continuous built-in test features that exercise the processor, RAM, ROM, external inputs and outputs to provide safe operation.

While the system begins to initialize, test annunciations are displayed to the pilot at power-up, as shown in the following figure. All system annunciations should be cleared within one (1) minute of power-up. The Audio Panel 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.*

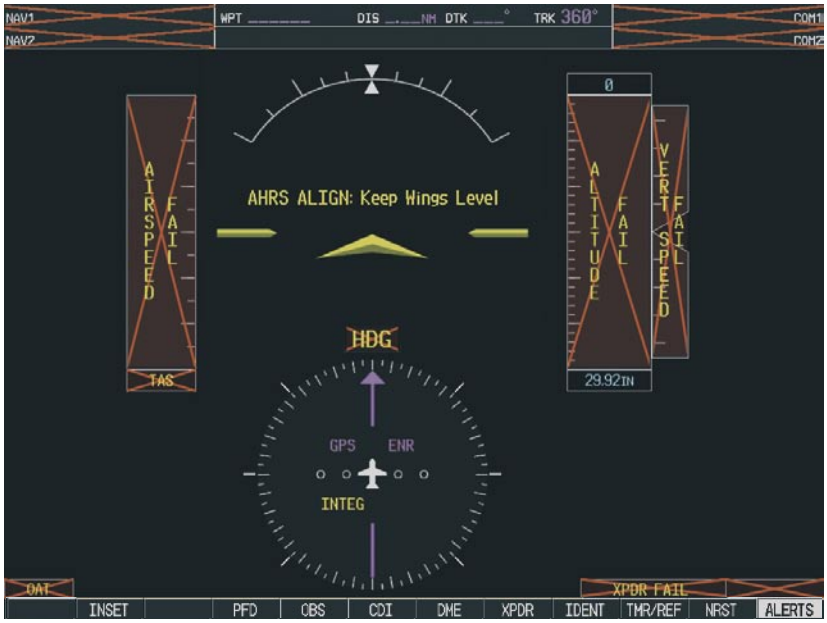


Figure 1-4 PFD Initialization

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

1.6 DISPLAY BACKLIGHTING

The G1000 PFD and MFD displays use photocell technology to automatically adjust for ambient lighting conditions. Photocell calibration curves are pre-configured to optimize display appearance through a broad range of cockpit lighting conditions. The PFD, MFD, and Audio Panel bezel/key lighting is normally controlled directly by the existing instrument panel dimmer bus.

If desired, the PFD and MFD display backlighting may be adjusted manually. The PFD, MFD and Audio Panel bezel/key brightness can also be adjusted manually. The Audio Panel bezel/key brightness is directly tied to the MFD bezel/key adjustment.

NOTE: *Please refer to the Primary Flight Display Pilot's Guide for instructions on adjusting backlighting manually.*

1.7 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 1-6 gives an example of the G1000 system in normal mode.

Figure 1-6 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 1-7.

If a display fails, the GIA 63-GDU 1040 Ethernet interface is cut off. Thus, the GIA can no longer communicate with the remaining display (refer to Figure 1-1), and the NAV and COM functions provided to the failed display by the GIA are flagged as invalid on the remaining display, as a result. The system reverts to using backup paths for the GRS 77, GDC 74A, GEA 71 and GTX 33, as required. The change to backup paths is completely automated for all LRUs, and no pilot action is required.

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 Audio Panel. Pressing this button again deactivates reversionary mode.

Figure 1-7 Reversionary Mode (Failed PFD)

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	-	-

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Primary Flight Display

2.1 INTRODUCTION

***WARNING:** In the event that the airspeed, attitude, altitude, or heading indications become unusable, please refer to the backup instruments.*

This section describes the major features of the G1000 Primary Flight Display (PFD) as installed on Cessna Nav III aircraft. Information is displayed using the G1000's two 10.4-inch color flat-panel displays. During normal operation, the left display is configured as a Primary Flight Display.

The PFD provides increased situational awareness by replacing the traditional instrument "six pack" on the pilot's panel with an easy-to-scan display that provides a large horizon and airspeed, attitude, altitude, vertical speed, navigation, communication, annunciation, terrain, traffic, and lightning (optional) information. The PFD also controls the operation of the transponder, the selection of NAV/COM frequencies, audio volume, and many navigation features. The operation of these features is explained in other supporting sections.

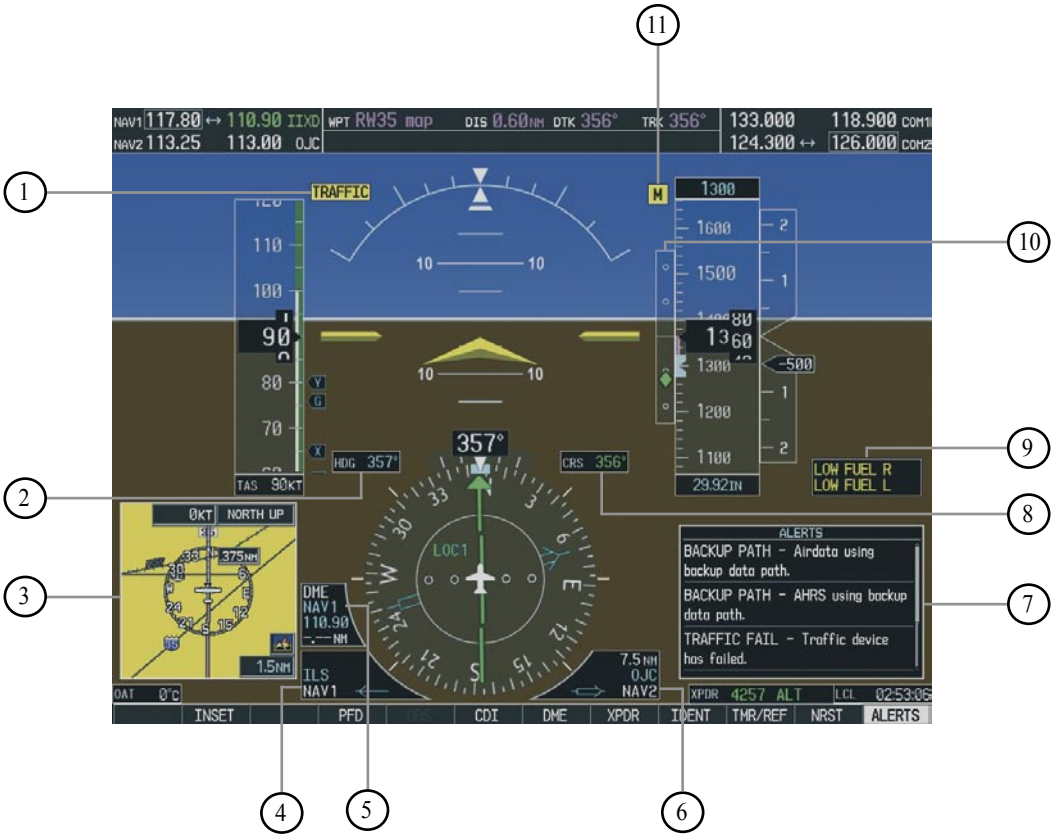
The G1000 system controls were designed so that, regardless of which seat the pilot is flying from, the aircraft can be flown with one hand and the controls manipulated with the other hand.

The PFD displays the following:

- Navigation (NAV) Frequency Window
- Navigation Status Bar
- Communication Frequency Window
- Airspeed Indicator
- True Airspeed Box
- Attitude Indicator
- Slip/Skid Indicator
- Horizontal Situation Indicator
- Turn Rate Indicator
- Bearing Pointers
- DME Information Window (optional)
- Bearing Information Windows
- Radio Tuning Window (if equipped with DME)
- Altimeter
- Altitude Reference Box
- Barometric Setting Box
- Vertical Deviation/Glideslope Indicator
- Marker Beacon Annunciations
- Vertical Speed Indicator
- Alerts Window
- Annunciation Window
- System Time Box
- Transponder Status Bar
- Outside Air Temperature Box
- Inset Map
- Direct-to Window
- Flight Plan Window
- Procedures Window
- Timer/References Window
- Nearest Airports Window

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

Figure 2-1 Default PFD Information



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

Figure 2-2 Additional PFD Information

2.2 BACKLIGHTING

NOTE: The backlighting can only be adjusted from the PFD, except in reversionary mode.

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

The backlighting of both the display and keys can be adjusted for the PFD and MFD. The backlighting intensity ranges from 0.14% to 100.00%. Two modes exist for adjustment:

- **Auto** (default) – The G1000 adjusts backlighting automatically with reference to the amount of light in the cockpit
- **Manual** – Allows the pilot to manually adjust backlighting

To manually adjust the backlighting for the PFD and MFD:

Turn the avionics knob (for location refer to the Aircraft Flight Manual).

OR

1. Press the **MENU** key on the PFD to display the PFD Setup Menu Window. 'AUTO' is now highlighted next to 'PFD DSPL'.
2. Turn the **small FMS** knob to display the selection window. Turn the **FMS** knob to select 'MANUAL', then press the **ENT** key.
3. With the intensity value now highlighted, turn the **small FMS** knob to select the desired backlighting, then press the **ENT** key.
4. Turn the **large FMS** knob to highlight 'AUTO' next to 'MFD DSPL', and repeat steps 2 and 3. Press the **CLR** or **MENU** key to remove the window.

To manually adjust the backlighting for the PFD and MFD keys:

Turn the avionics knob (for location refer to the Aircraft Flight Manual).

OR

1. Press the **MENU** key on the PFD to display the PFD Setup Menu Window. 'AUTO' is now highlighted next to 'PFD DSPL'.
2. Turn the **large FMS** knob to highlight 'PFD DSPL'. Turn the **small FMS** knob in the direction of the green arrowhead to display 'PFD KEY'.
3. Turn the **large FMS** knob to highlight 'AUTO'. Turn the **small FMS** knob to display the selection window. Turn the **FMS** knob to select 'MANUAL', then press the **ENT** key.
4. With the intensity value now highlighted, turn the **small FMS** knob to select the desired backlighting, then press the **ENT** key.
5. Turn the **large FMS** knob to highlight 'MFD DSPL' and turn the **small FMS** knob in the direction of the green arrowhead to display 'MFD KEY'. Repeat steps 3 and 4. Press the **CLR** or **MENU** key to remove the window.

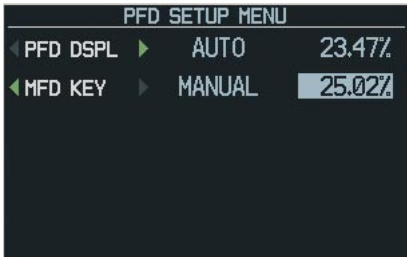


Figure 2-3 PFD Setup Menu Window

2.3 SOFTKEY FUNCTION

When a softkey is turned on, its color changes to black text on gray background and remains this way until it is turned off, at which time it reverts to white text on black background. The **CDI**, **IDENT**, **ADF/DME**, **TMR/REF**, **NRST**, and **ALERTS** softkeys change momentarily to black text on gray background and automatically switch back to white text on black background.

Figure 2-4 Softkey On

Figure 2-5 Softkey Off

The PFD softkeys listed provide control over flight management functions including GPS, NAV, terrain, traffic, and lightning (optional).

- **INSET –** Displays Inset Map in PFD lower left corner
  - ***OFF*** **–** Removes Inset Map
  - ***DCLTR*** (3) **–** Selects desired amount of map detail; declutter level appears adjacent to the **DCLTR** softkey:
    - *NO DECLUTTER*: All map features visible
    - *DECLUTTER – 1*: Declutters land data
    - *DECLUTTER – 2*: Declutters land and SUA data
    - *DECLUTTER – 3*: Declutters large NAV data remaining (removes everything except the active flight plan)
  - ***TRAFFIC*** **–** Displays traffic on Inset Map
  - ***TOPO*** **–** Displays topographical data (i.e., coastlines, terrain, rivers, lakes, etc.) and elevation scale on Inset Map
  - ***TERRAIN*** **–** Displays terrain information on Inset Map
  - ***STRMSCP*** (optional) **–** Displays lightning data on Inset Map (within 200-nm radius of aircraft)
  - ***NEXRAD*** (optional) **–** Displays NEXRAD weather and coverage information.
  - ***XM LTNG*** (optional) **–** Displays XM lightning information
  - ***BACK*** **–** Returns to previous level softkeys
- **PFD –** Displays second-level softkeys for additional PFD configurations
  - ***METRIC*** **–** Displays current and reference altitudes in meters, in addition to feet; also changes barometric setting to hectopascals from inches of mercury (in Hg)
  - ***DFLTS*** **–** Resets PFD to default settings
  - ***DME*** (optional) **–** Displays DME Information Window which shows actual DME distance
  - ***BRG1*** (Bearing 1) **–** Cycles through the following information in the BRG1 Information Window:
    - *NAV1* – Displays NAV1 waypoint frequency or identifier and GPS-derived distance
    - *GPS* – Displays GPS waypoint identifier and GPS-derived distance
    - ADF – Displays ADF (if equipped)
    - *OFF* – Removes BRG1 Information Window
  - ***BRG2*** (Bearing 2) **–** Cycles through the following information in the BRG2 Information Window:
    - *NAV2* – Displays NAV2 waypoint frequency or identifier and GPS-derived distance
    - *GPS* – Displays GPS waypoint identifier and GPS-derived distance
    - ADF – Displays ADF (if equipped
    - *OFF* – Removes BRG2 Information Window
  - ***STD BARO*** **–** Sets barometric pressure to 29.92 in Hg (1013 hPa if **METRIC** softkey is pressed)
  - ***BACK*** **–** Returns to previous level softkeys

- **CDI –** Changes navigation mode on the CDI to GPS, NAV1, or NAV2
- **DME** (optional) – Displays DME Tuning Window
- **OBS –** Selects OBS mode on the CDI when navigating by GPS (only available with active leg)
- **XPDR –** Displays transponder mode selection softkeys:
  STBY – Selects standby mode
  ON – Selects Mode A
  ALT – Selects altitude reporting mode
  VFR – Automatically enters the VFR code (1200 in the U.S.A. only)
  CODE – Displays transponder code selection softkeys 0-7
  0 through 7 – Use numbers to enter code
  IDENT – Provides special aircraft position identification to Air Traffic Control (ATC)
  BKSP – Removes numbers entered one by one
  BACK – Returns to previous level softkeys
  IDENT – Provides special aircraft position identification to ATC
  BACK – Returns to previous level softkeys
- **IDENT –** Provides special aircraft position identification to ATC
- **TMR/REF –** Displays Timer/References Window
- **NRST –** Displays Nearest Airports Window
- **ALERTS –** Displays Alerts Window

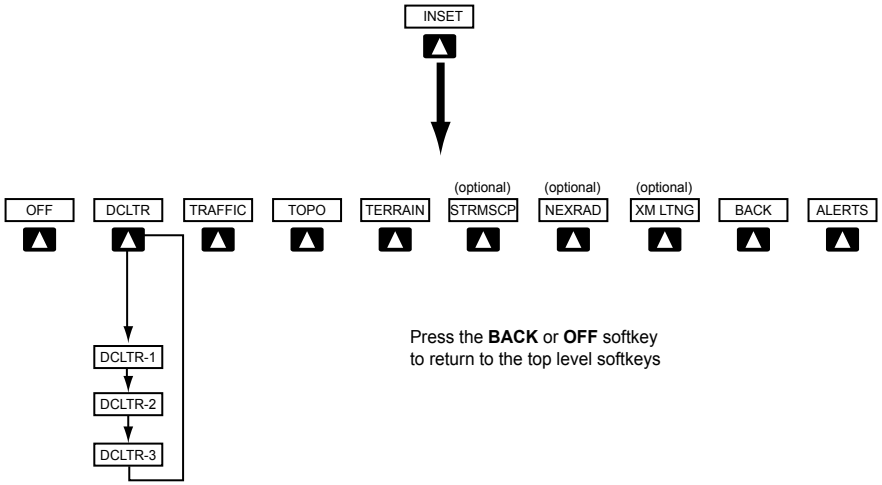


Figure 2-6 PFD Softkey Flow Chart – 1

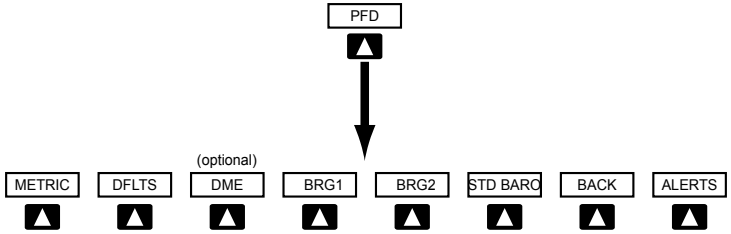


Figure 2-7 PFD Softkey Flow Chart – 2

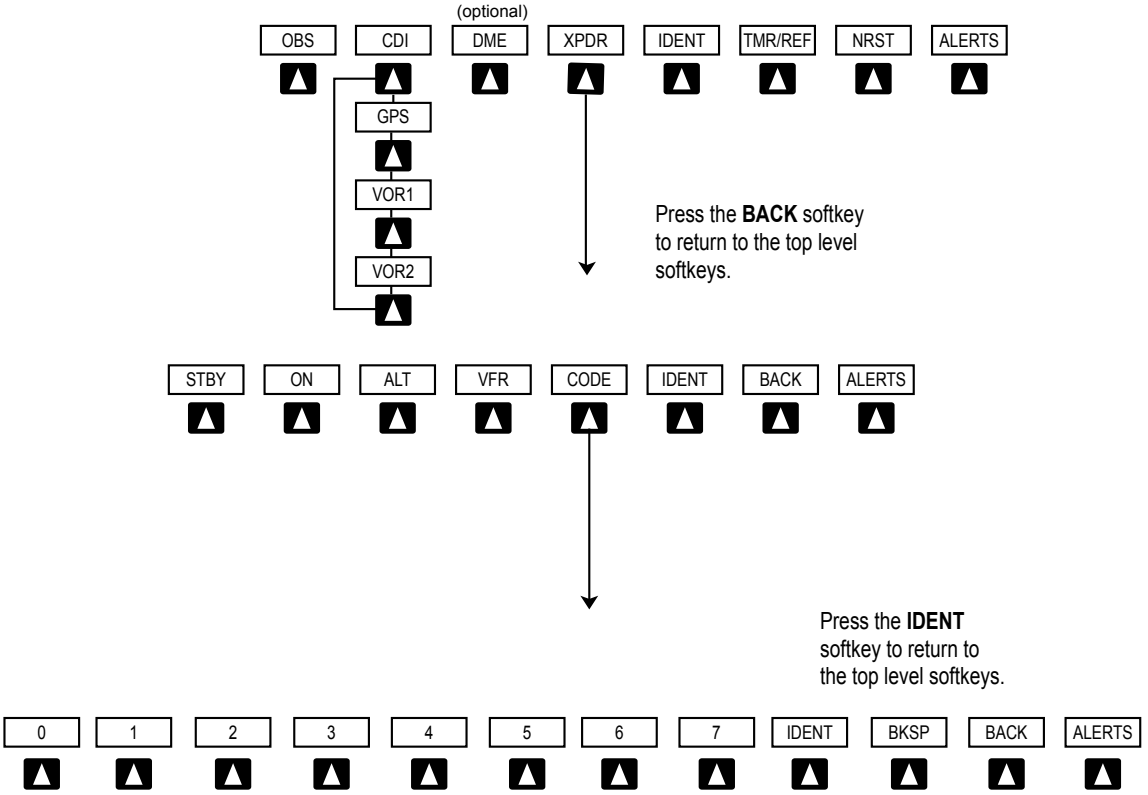


Figure 2-8 PFD Softkey Flow Chart – 3

2.4 FLIGHT INSTRUMENTS

AIRSPEED INDICATOR

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

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

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 actual airspeed is displayed inside the black pointer. The pointer remains black until reaching never-exceed speed (V_{NE}), at which point it turns red.

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, caution range, and never exceed speed (V_{NE}). A red range is also present for low speed awareness. Refer to the Aircraft Flight Manual (AFM) for speed criteria.

Airspeed Trend Vector

The Airspeed Trend Vector is a vertical, magenta line, extending up or down on the airspeed scale, located to the right of the color-coded speed range strip. The end of the trend vector displays approximately what airspeed will be reached in six 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, V_R, V_X, and V_Y are shown in the References Window. When active (ON), the Vspeeds are displayed at their respective locations to the right of the airspeed scale (refer to the Auxiliary Windows portion of this Flight Instruments section for setting and displaying Vspeeds).

True Airspeed Box

The True Airspeed Box is located below the Airspeed Indicator and displays the true airspeed in knots.

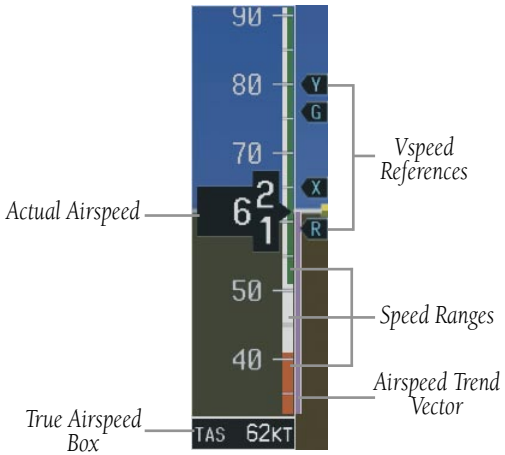


Figure 2-9 Airspeed Indicator

Figure 2-10 Red Pointer at V_{NE}

ATTITUDE INDICATOR

Attitude information is displayed over a virtual blue sky and brown ground with a white Horizon Line. The Attitude Indicator displays the following information:

- Pitch indication
- Roll indication
- Slip/Skid indication

NOTE: *Supplemental flight data, such as the Inset Map and the Alerts and Annunciation Windows, disappear from the PFD when pitch exceeds +30˚ or -20˚ or when a 65˚ bank angle is reached.*

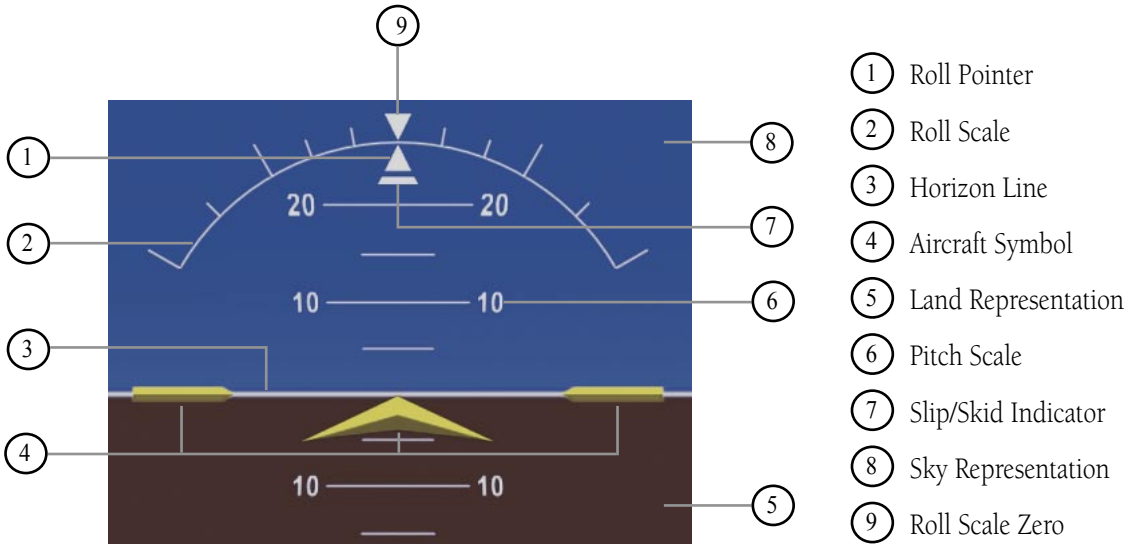


Figure 2-11 Attitude Indicator

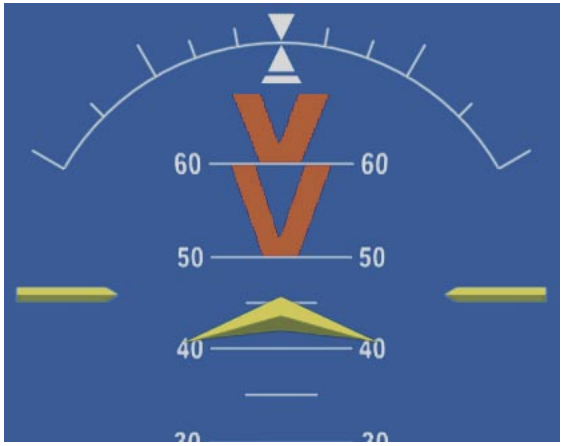


Figure 2-12 Attitude Indicator Nose High

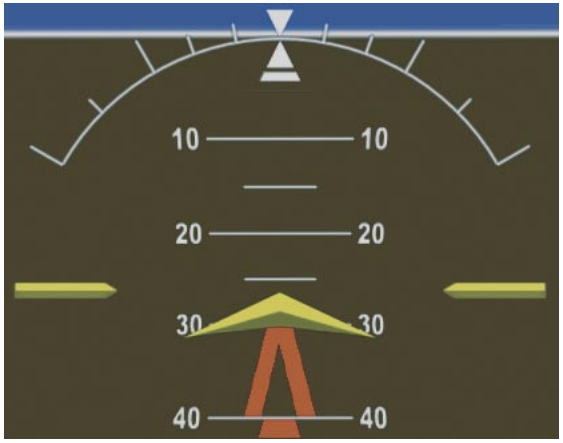


Figure 2-13 Attitude Indicator Nose Low

Pitch Indication

The Horizon Line is part of the Pitch Scale. Above and below the Horizon Line, major pitch marks and numeric labels are shown for every 10°, up to 80°. Minor pitch marks are shown for intervening 5° increments, up to 25° above and 45° degrees below the Horizon Line are shown.

Red extreme pitch warning chevrons pointing toward the horizon are displayed, starting at 50° above and 30° below the Horizon Line (refer to the figures on the next page).

Roll Indication

The inverted white triangle indicates zero on the Roll Scale. Major tick marks at 30° and 60° and minor tick marks at 10°, 20°, and 45° are shown to the left and right of the zero on the Roll Scale. Angle of bank is indicated by the position of the Roll Pointer on the Roll Scale.

Slip/Skid Indication

The Slip/Skid Indicator is the 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 Slip/Skid Indicator relative to the Roll Pointer. One Slip/Skid Indicator displacement is equal to one ball displacement on a traditional Slip/Skid Indicator.

ALTIMETER

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

- Altitude values
- Altitude Reference Bug
- Altitude Trend Vector
- Altitude Reference Box
- Barometric Setting Box
- Metric display

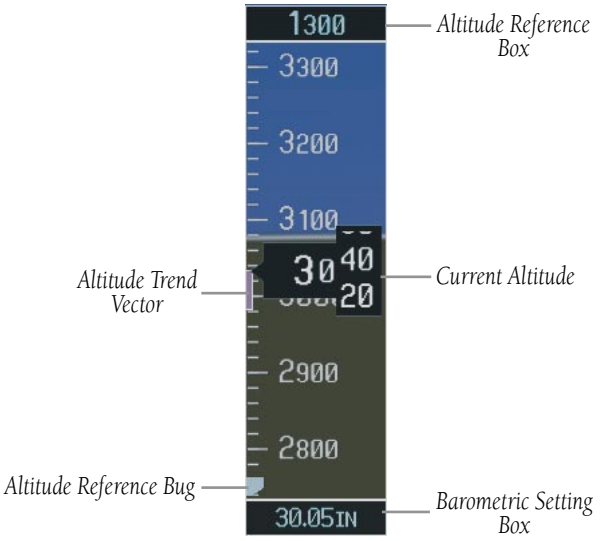


Figure 2-14 Altimeter

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.

Altitude Reference Bug

The Altitude Reference Bug is displayed at the reference altitude or the edge of the tape (whichever is closer to the current altitude) to provide increased altitude awareness.

To set the Altitude Reference Bug:

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 altitude will be reached in six 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 of the Altitude Reference Box.

***NOTE:** The Altitude Reference Box is not part of the autopilot altitude preselect system and is used to aid the pilot in altitude control.*

Barometric Setting Box

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

To select barometric pressure:

Turn the **large BARO** (outer) knob to select the desired setting.

Metric Display

Reference and current altitude can be displayed in meters. The barometric pressure may also be displayed in hectopascals.

To display altitude in meters and barometric pressure in hectopascals:

1. Press the **PFD** softkey to display the second-level softkeys.
2. Press the **METRIC** softkey to display altitude in meters and barometric pressure in hectopascals. Press the **BACK** softkey to return to the top-level softkeys.

Figure 2-15 Altimeter (Metric)

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 by amber, and inner by white (refer to the Audio Panel section for more information).

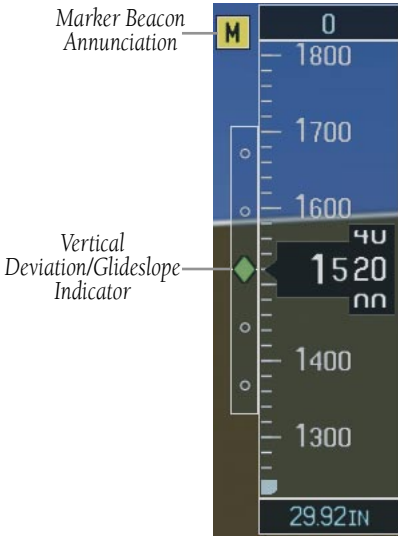


Figure 2-16 Marker Beacon and Vertical Deviation

VERTICAL SPEED INDICATOR

The Vertical Speed Indicator displays the aircraft vertical speed with numeric labels and tick marks at 1,000 and 2,000 feet in each direction on the non-moving tape. Minor tick marks are at intervals of 500 ft.

Vertical Speed Pointer

The Vertical Speed Pointer displays the current vertical speed and points to that speed on the non-moving tape. If the rate of ascent exceeds 2,000 feet per minute, the pointer appears at the top edge of the non-moving tape and the rate in fpm appears inside the pointer. If the rate of descent exceeds 2,000 fpm, a negative sign is displayed in the pointer (-2,000) for negative (down) vertical speed and the pointer appears at the bottom edge of the non-moving tape.

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

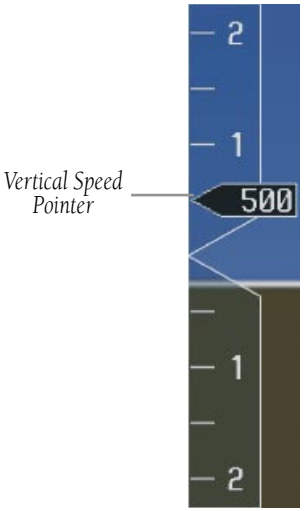


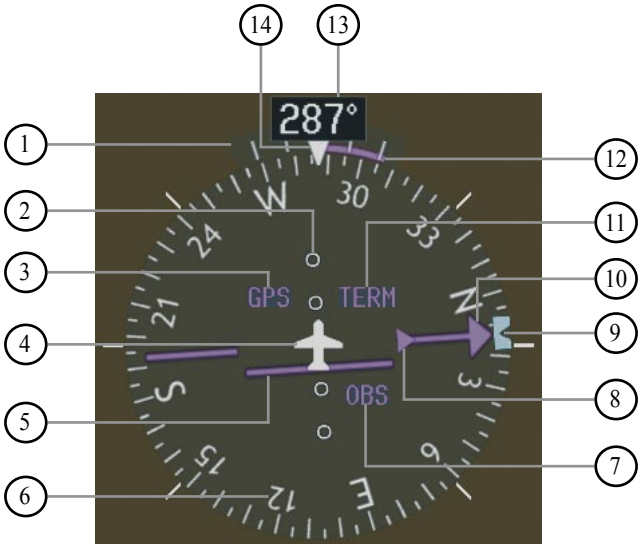
Figure 2-17 Vertical Speed Indicator

HORIZONTAL SITUATION INDICATOR

The Horizontal Situation Indicator (HSI) displays a rotating compass card with letters at the cardinal points and numeric labels every 30 degrees. Major tick marks are at 10-degree intervals and minor tick marks are at 5-degree intervals. The HSI is displayed in a heading-up orientation. The HSI displays the following information:

- Heading indication
- Turn Rate Indicator
- Course Deviation Indicator
- Bearing pointers
- Bearing Information Windows
- Navigation source

The 360° HSI compass rose contains a course deviation indicator (CDI) with a course pointer arrow, a TO/FROM arrow, and 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.



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

Figure 2-18 Horizontal Situation Indicator

Heading Indication

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

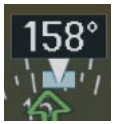


Figure 2-19 Current Heading

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 2-20 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 the navigation source is NAV1 or NAV2.

Figure 2-21 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 is located directly above the rotating compass card. Tick marks to the left and right of the lubber line denote half-standard and standard turn rates. A magenta turn rate trend vector shows the current turn rate. The end of the trend vector gives the heading predicted in six seconds, based on the present turn rate. At rates greater than 4 deg/sec, an arrowhead appears at the end of the magenta trend vector and the prediction is no longer valid.

Figure 2-22 Turn Rate Indicator and Trend Vector

A standard-rate turn (3 deg/sec) is shown on the indicator by the trend vector stopping at the standard turn rate tick mark, corresponding to a predicted heading of 18 degrees from the current heading.

Figure 2-23 Standard-Rate Turn Indication

Course Deviation Indicator

The Course Deviation Indicator (CDI) moves to the left or right of the course pointer along a deviation scale to display aircraft position relative to the course.

The CDI has the same angular limits as a mechanical CDI when coupled to a VOR or LOC. 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 on the current phase of flight (en route: 5.0 nm, terminal area: 1.0 nm, or approach: 0.3 nm). The desired GPS scale settings may be selected manually on the MFD (refer to the Multi Function Display section).

Figure 2-24 CDI

Bearing Pointers and Information Windows

Up to two bearing pointers can be displayed on the HSI. Pressing the **PFD** softkey provides access to the **BRG1** and **BRG2** softkeys. The BRG1 pointer is a single cyan line with an open arrowhead at the end. The BRG2 pointer is a double cyan line with an open arrowhead at the end. The bearing pointers never override the CDI. When at least one bearing pointer is displayed (but not necessarily visible if there is no data available), a white ring appears around the center of the compass rose to visually separate the bearing pointer(s) from the CDI.

When a bearing pointer is displayed, its associated information window is also displayed.

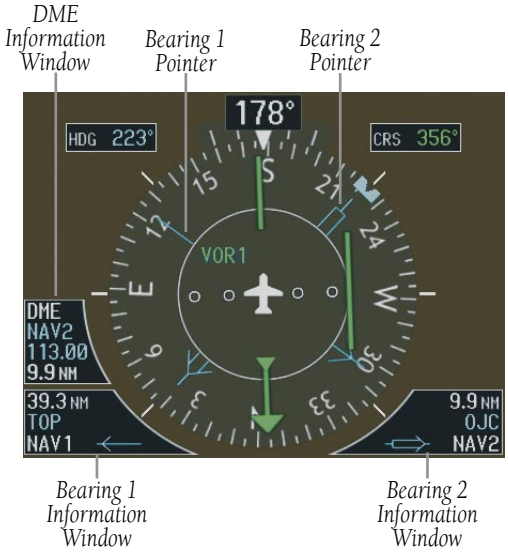


Figure 2-25 HSI with Bearing Information

***NOTE:** ADF radio installation is optional.*

The Bearing 1 Information Window is displayed to the lower left of the HSI and includes the bearing source (NAV1, GPS, or ADF), a pointer icon, frequency (NAV1), and distance (NAV1 and GPS) to the bearing source.

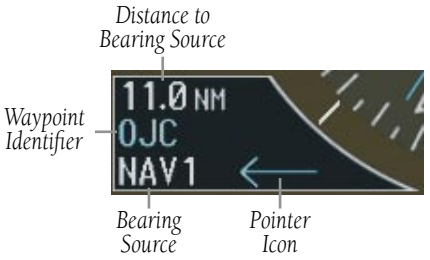


Figure 2-26 BRG1 Information Window

The Bearing 2 Information Window is displayed to the lower right of the HSI and includes the bearing source (NAV2, GPS, or ADF), a pointer icon, frequency (NAV2), and distance (NAV2 and GPS) to the bearing source.

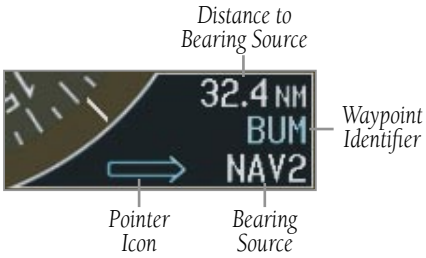


Figure 2-27 BRG2 Information Window

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 field displays "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.

ADF Radio (optional)

The ADF radio is a Honeywell KR 87 digital, remote-mounted ADF radio receiver that operates in the 200 to 1799 kHz frequency range.

The ADF bearing source is selected by pressing the **PFD** softkey, then the **BRG1** and/or **BRG2** softkey until ADF is displayed in the respective Bearing Information Window.

***NOTE:** ADF frequency is tuned on the KR 87 unit.*

Figure 2-28 ADF Selected in BRG2 Information Window

DME Radio (optional)

The optional DME radio is a Honeywell KN63 remote-mounted, 200-channel, 100-watt, all-solid-state digital DME which provides distance information to the G1000.

Press the **PFD** softkey followed by the **DME** softkey to display the DME Information Window. The DME Information Window is displayed above the BRG1 Information Window. The DME label, tuning mode (NAV1, NAV2, or HOLD), frequency, and distance are displayed in the DME Information Window. When a signal is invalid, the distance is replaced by "–.– – NM".

The pilot may select from three DME tuning modes:

- **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.

NOTE: *When navigating in GPS mode, the distance displayed is the GPS-derived great-circle distance, not the actual DME distance.*

Figure 2-29 DME Information Window

Radio Tuning Window (optional)

NOTE: *The Radio Tuning Window is only available if a DME radio is installed.*

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

Figure 2-30 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 2-31 DME Selection Window

Navigation Source

NOTE: OBS is only available with the active flight plan leg, when navigating under GPS.

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 the waypoint is passed. 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 (GPS) or green (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. The following yellow annunciations may appear on the HSI:

- **INTEG** – RAIM not available
- **WARN** – GPS detects 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.

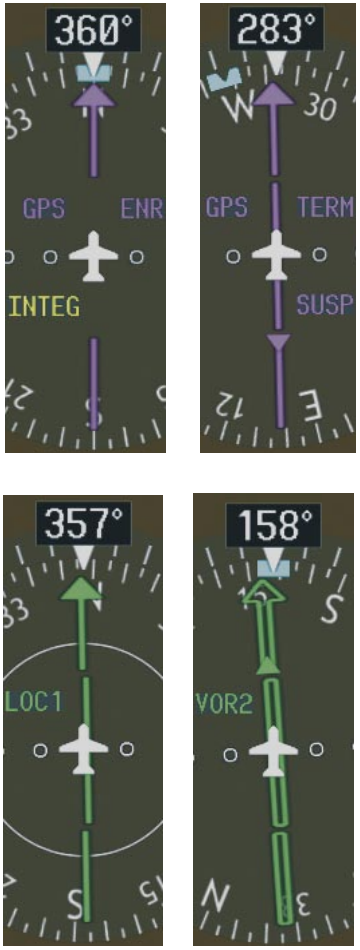


Figure 2-32 GPS INTEG, GPS SUSP, LOC1 and VOR2

2.5 COMMUNICATION, NAVIGATION & SURVEILLANCE

COMMUNICATION FREQUENCY WINDOW

The Communication (COM) Frequency Window, located in the upper right corner of the PFD, provides control and display of dual VHF Radio Communication Transceivers (COM1 and COM2). The COM Frequency Window displays the following information:

- COM1 and COM2 active and standby frequencies
- Color-coded indication of the active COM transceiver

NOTE: *Operating procedures for the COM Frequency Window are located in the VHF NAV/COM section.*

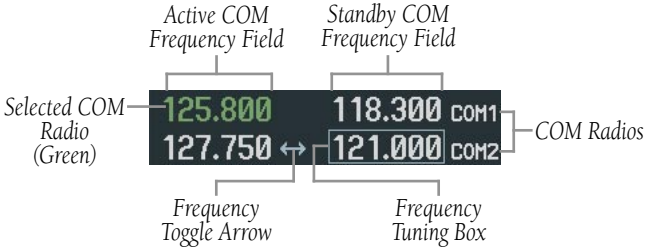


Figure 2-33 Communication Frequency Window

NAVIGATION FREQUENCY WINDOW

The Navigation (NAV) Frequency Window, located in the upper left corner of the PFD, provides control and display of dual VOR/ILS receivers (NAV1 and NAV2). The NAV Frequency Window displays the following information:

- NAV1 and NAV2 active and standby frequencies
- NAV1 and NAV2 identifier, if the active NAV1 or NAV2 frequency is a valid, identified frequency
- Color-coded indication of the active NAV receiver

NOTE: *Operating procedures for the NAV Frequency Window are located in the VHF NAV/COM section.*

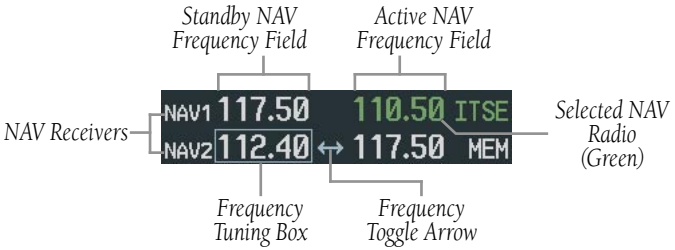


Figure 2-34 Navigation Frequency Window

NAVIGATION STATUS BAR

The Navigation Status Bar is located at the top of the PFD and displays valuable information while flying a route:

- The next waypoint in the active flight plan
- Distance to the next waypoint (DIS)
- Desired track to the next waypoint (DTK)
- Current track angle (TRK)
- GPS Navigation Annunciations

NOTE: *The fields in the PFD Navigation Status Bar cannot be changed.*

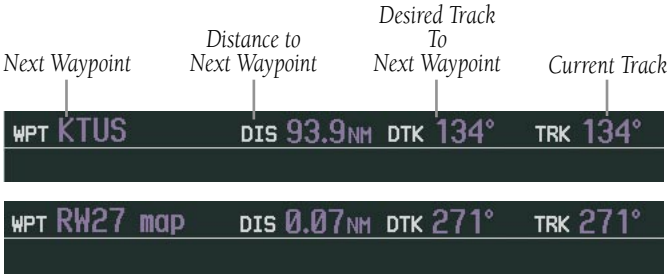


Figure 2.5.3 Navigation Status Bar Information Examples

Figure 2-35 Navigation Status Bar Messages

TRANSPONDER STATUS BAR

The Transponder Status Bar displays the transponder code, reply symbol, and mode of operation.

Figure 2-36 Transponder Status Bar

TIS (Traffic Information System) surveillance data up-linked by ATC radar through the GTX 33 Mode S Transponder appears on the PFD Inset Map and on the MFD Navigation and Traffic Map Pages (refer to the Multi Function Display section). If the transponder is configured with Automated Airborne Determination, normal operation begins when lift-off is sensed.

When the aircraft is on the ground, the window automatically displays "GND". The transponder does not respond to ATCRBS (ATC Radar Beacon System) interrogations when GND is annunciated. If a delay time is set in Configuration Mode, the transponder waits a specified length of time after landing before changing to GND mode.

Transponder Operation

Pressing the **XPDR** softkey displays the second-level softkeys:

- **STBY –** Selects standby mode (transponder does not reply to any interrogations)
- **ON –** Selects Mode A (transponder replies to interrogations, as indicated by the Reply Symbol, R; replies do not include altitude information)
- **ALT –** Selects Mode C

  In ALT mode, the transponder replies to identification and altitude interrogations, as indicated by the Reply Symbol (R). Replies to altitude interrogations include the standard pressure altitude received from an external altitude source (not adjusted for barometric pressure). The ALT mode may be selected in aircraft not equipped with an optional altitude encoder; however, in this case, the reply signal only replies to mode A interrogations. The transponder also responds to interrogations from TCAS-equipped aircraft.
- **VFR –** Sets the transponder code to the pre-programmed VFR code selected in Configuration Mode (this is set to 1200 at the factory in the U.S.A. only; please refer to ICAO standards for VFR codes in other countries)
- **CODE –** Displays the transponder code selection softkeys, which include digits **0-7** and **BKSP**
- **IDENT –** Activates the Special Position Identification (SPI) Pulse for 18 seconds, identifying the transponder return on the ATC screen

Transponder Code Selection

Transponder code selection is performed with eight softkeys (0-7) providing 4,096 active identification codes. Pushing one of these softkeys begins the code selection sequence. The new code is activated five seconds after the fourth digit is entered. Pressing the **BKSP** softkey removes one digit at a time until the status bar is empty (refer to the Mode S Transponder section).

2.6 SUPPLEMENTAL FLIGHT DATA

OUTSIDE AIR TEMPERATURE BOX

The outside air temperature (OAT) is displayed in °C. On the MFD AUX System Setup Page, OAT can be configured to be displayed in °F instead of °C (refer to the Multi Function Display section).

Figure 2-37 Outside Air Temperature Box

SYSTEM TIME BOX

The System Time Box displays the local time. Time and date is 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) represents the number of hours plus or minus UTC (refer to the Multi Function Display section).

Figure 2-38 System Time Box

TRAFFIC ANNUNCIATION

NOTE: *Refer to the Appendix for detailed information on the Traffic Information Service (TIS).*

NOTE: *Refer to the Multi Function Display section for detailed information on the Traffic Advisory System (TAS).*

The G1000 system displays Traffic Information Service (TIS) or Traffic Advisory System (TAS) traffic on the PFD Inset Map and the MFD Navigation Map Page. When a Traffic Advisory (TA) is detected, the following automatically occurs:

- The Inset Map is enabled and displays the traffic
- A single "TRAFFIC" aural alert is generated
- A flashing black-on-yellow "TRAFFIC" annunciation appears to the top left of the Attitude Indicator for 5 seconds and remains displayed until no TAs are detected in the area

NOTE: *If a second TA appears or if the TAs displayed decrease and then increase, new aural and visual alerts are generated.*

Figure 2-39 Traffic Annunciation

TERRAIN PROXIMITY

***NOTE:** Refer to the Multi Function Display section for detailed Terrain Proximity discussion.*

The G1000 contains terrain and obstacle databases. Terrain Proximity provides terrain and obstacle data only as an aid to situational awareness. No aural messages or textual annunciations are displayed during flight regarding the presence of terrain or obstacles.

Terrain Proximity (Inset Map) shows terrain and obstacle data for objects higher than 200 feet Above Ground Level (AGL). The G1000 automatically adjusts colors on the Inset Map as the aircraft altitude changes.

Terrain Color Scale

***NOTE:** Terrain data is not displayed when the aircraft latitude is greater than 75° N or 60° S.*

Terrain Color	Terrain Location
Red (WARNING)	Terrain within 100 ft of the aircraft altitude or above
Yellow (CAUTION)	Terrain within 1000 ft of the aircraft altitude
Black (NO DANGER)	Terrain more than 1000 ft below the aircraft altitude

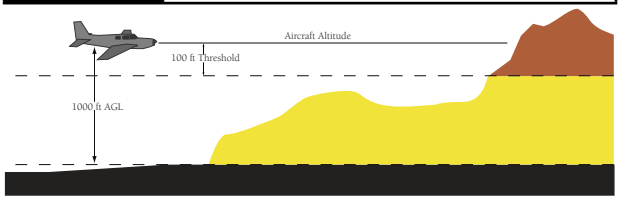


Figure 2-40 Terrain Proximity Colors

Obstacle Data

Obstacle Color	Obstacle Location
Red (WARNING)	Obstacle within 100 ft of the aircraft altitude or above
Yellow (CAUTION)	Obstacle within 1000 ft of the aircraft altitude
Gray (NO DANGER)	Obstacle more than 1000 ft below the aircraft altitude

Unlighted Obstacle – Height less than 1000 ft AGL	Lighted Obstacle – Height less than 1000 ft AGL
	

Unlighted Obstacle – Height greater than 1000 ft AGL	Lighted Obstacle – Height greater than 1000 ft AGL
	

Figure 2-41 Obstacle Colors and Symbols

TERRAIN AWARENESS AND WARNING SYSTEM (TAWS) (OPTIONAL)

***NOTE:** Refer to the Annunciations & Alerts and Multi Function Display sections for detailed TAWS discussions.*

Terrain Awareness and Warning System (TAWS) is only available when the G1000 is configured for TAWS-B installation. Class B TAWS provides these principal alerting functions:

- Forward Looking Terrain Avoidance (FLTA) – which looks ahead of the aircraft along and below the aircraft's lateral and vertical flight path and provides alerts if a potential Controlled Flight into Terrain (CFIT) threat exists
- Premature Descent Alert (PDA) – uses the aircraft's current position and flight path information as determined from a suitable navigation source and airport database to determine if the aircraft is significantly below the normal approach path for the destination runway
- Excessive Descent Rate Alert (EDR) – when the aircraft is determined to be closing (descending) upon terrain at an excessive speed
- Negative Climb Rate Alert (NCR) – when the system detects the aircraft is losing altitude (closing upon terrain) after takeoff
- "Five-Hundred" Aural Alert – when the aircraft descends within 500 feet of the terrain or nearest runway elevation

The FLTA and PDA features can be disabled to prevent nuisance alerts while flying VFR into areas where unique terrain exist and could cause the system to annunciate.

TAWS Alert Annunciations

The following alert annunciations appear on the PFD and MFD:

Figure 2-42 TAWS Annunciations

TAWS Color Scale

***NOTE:** Terrain data is not displayed when the aircraft latitude is greater than 75° N or 60° S.*

The G1000 automatically adjusts the color on the Inset Map as the aircraft altitude changes.

Terrain Color	Terrain/Obstacle Location	Suggested Pilot Response
Red (WARNING)	Terrain/Obstacle within 100 ft of the aircraft altitude or above	Initiate climb and/or turn away from terrain/obstacle.
Yellow (CAUTION)	Terrain/Obstacle within 1000 ft of the aircraft altitude	Be aware of surroundings. Be prepared to take action.
Black (NO DANGER)	Terrain/Obstacle more than 1000 ft below the aircraft altitude	No action required.

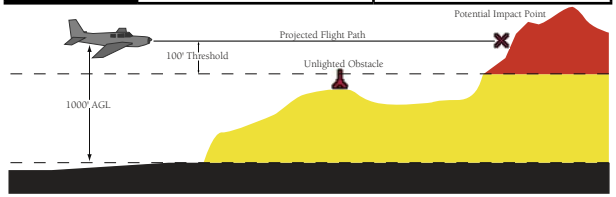


Figure 2-43 TAWS Colors

INSET MAP

NOTE: *The Inset Map orientation is always the same as that for the MFD Navigation Map Page.*

NOTE: *Map orientation and other map features are enabled on the MFD (refer to the Multi Function Display section).*

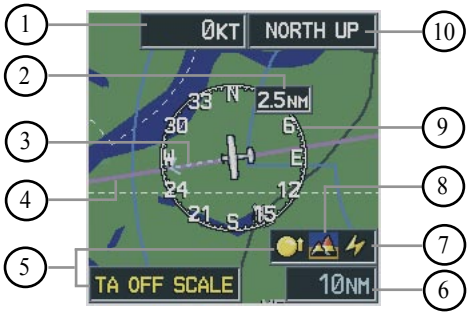
NOTE: *Refer to the Multi Function Display section for a detailed explanation of the declutter levels.*

The Inset Map is a smaller version of the MFD Navigation Map Page. It appears in the lower left corner of the PFD and is displayed by pressing the **INSET** softkey. The map disappears from the PFD when pitch exceeds +30° or –20° or when a 65° bank angle is reached. The direct-to function is not available from the Inset Map. The fuel reserve rings are enabled and disabled from the MFD only. The Inset Map displays the following information:

- Moving map with orientation references
  - North Up
  - Track Up
  - DTK Up
  - HDG Up
- Zoom range legend
- Declutter levels (3)
- Aircraft icon
- Traffic data
- Topographic data
- Terrain data
- Weather information (optional)
- Enabled map features
- Active navigation route
- Track vector
- Fuel ring (reserve)

The following Inset Map operations can be performed independently of the MFD:

- Change zoom range
- Change declutter level
- Enable/disable traffic data
- Enable/disable topographic data
- Enable/disable terrain data
- Enable/disable weather information (optional)
- Pan map



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

Figure 2-44 Inset Map

To change the zoom range:

Turn the **joystick** clockwise to increase or counterclockwise to decrease the range. Zoom ranges from 500 feet to 2,000 nautical miles.

To change the declutter level:

1. Press the **INSET** softkey.
2. Press the **DCLTR** softkey to remove background map details until the desired amount of detail is depicted. The declutter level appears above the softkey (i.e., DCLTR-1). Refer to the Multi Function Display section for more details.

To enable/disable traffic data:

1. Press the **INSET** softkey.
2. Press the **TRAFFIC** softkey to display Traffic Information Service (TIS) or Traffic Advisory System (TAS) traffic. Traffic symbology appears next to the aircraft icon and in the bottom right corner of the map.
2. Press the **TRAFFIC** softkey again to remove data from the map.

NOTE: *TIS displays traffic within seven nautical miles from 3,000 feet below to 3,500 feet above the requesting aircraft, and includes location, direction, altitude, and climb/descent information.*

NOTE: *Refer to the Multi Function Display section for more details about Traffic Advisory System (TAS).*

To enable/disable topographic data:

1. Press the **INSET** softkey.
2. Press the **TOPO** softkey to display topographic land colors, which represent land elevation.
3. Press the **TOPO** softkey again to remove topographic data from the map.

NOTE: *When topographic data is removed from the display, all cartographic data is automatically removed and the Jeppesen Nav Data is presented on a black background.*

To enable/disable terrain data:

1. Press the **INSET** softkey.
2. Press the **TERRAIN** softkey to display color-coded terrain tiles, which are based upon the aircraft current altitude. A mountain icon appears above the zoom range in the lower right corner of the map, showing that terrain is selected.
   - **Red** (warning) – Land elevation is within 100 ft or above the aircraft current altitude.
   - **Yellow** (caution) – Land elevation is greater than 100 ft to 1,000 ft below aircraft altitude.
   - **Black** – Land elevation greater than 1,000 ft below aircraft altitude.
3. Press the **TERRAIN** softkey again to remove the terrain data from the map.

NOTE: *Terrain data is not displayed when the aircraft latitude is greater than 75˚ N or 60˚ S.*

NOTE: *Refer to the Appendix for more details about terrain.*

NOTE: Refer to the Multi Function Display section for more details about the weather interface.

To enable/disable Stormscope (optional), NEXRAD (optional), or XM lightning (optional) data:

1. Press the **INSET** softkey.
2. Press the **STRMSCP** (optional), **NEXRAD** (optional), or **XM LTNG** (optional) softkey to display weather information.
3. Press the **STRMSCP, NEXRAD,** or **XM LTNG** softkey again to remove the weather information from the map.

To pan the map:

NOTE: The joystick on the PFD operates independently from the one on the MFD.

1. Push in the **joystick** to display the panning pointer. This allows the pilot to move the map beyond its current limits without adjusting the range.
2. Push in and move the **joystick** to pan the map in the general direction of the desired location. When the pointer is placed on an object, the name of the object is highlighted for approximately four seconds (even if the name was not originally displayed on the map). This feature applies to everything displayed on the map except for route lines.
3. Push in the **joystick** again to cancel the panning function and return to the present position on the map.

NOTE: The airspace boundary stays highlighted for approximately four seconds before returning to normal shading.

WORKING WITH MENUS

NOTE: Pressing a softkey does not display a menu or sub-menu.

Much G1000 operation is accomplished using a menu interface. The G1000 has a bezel-mounted dedicated **MENU** key that displays a context-sensitive list of options when pressed. This option list allows the pilot to access additional features or make setting changes specifically relating to the currently displayed window. There is no all-encompassing menu. Some menus provide access to additional sub-menus that are in turn used to view, edit, select, and review options.

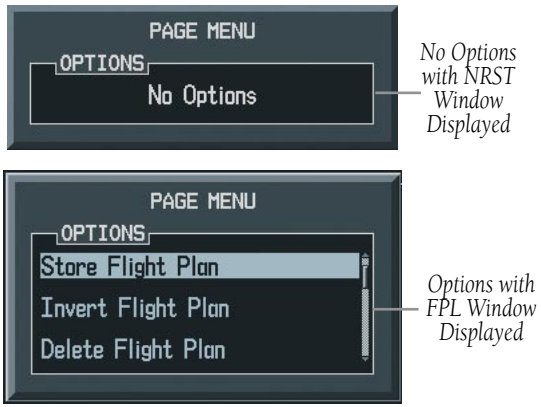


Figure 2-45 Page Menu Examples

To navigate the Page Menu Window:

1. Turn the **FMS** knob to scroll through a list of available options (a scroll bar always appears to the right of the window when the option list is longer than the window).
2. Press the **ENT** key to select the desired option.
3. The **CLR** key or the **FMS** knob may be pressed to remove the menu and cancel the operation.

AUXILIARY WINDOW KEYS

The main keys which are used in association with PFD Auxiliary Window operations are listed below:

(1) **DIRECT-TO –** Activates the direct-to function and allows the user to enter a destination waypoint and establishes a direct course to the selected destination (specified by identifier chosen from the active route)

(2) **FPL –** Displays the active Flight Plan Page for creating and editing the active flight plan or accessing stored flight plans

(3) **CLR –** Erases information, cancels an entry, or removes page menus

(4) **MENU –** Displays a context-sensitive list of options

This option list allows the user to access additional features or make setting changes which relate to certain pages.

The MENU key opens the PFD Setup Menu if no Auxiliary Window is open.

(5) **PROC –** Selects approaches, departures and arrivals for the flight plan.

When using a flight plan, available procedures for departure and/or arrival airport are offered automatically. If a flight plan is not used, the desired airport, then the desired procedure may be selected. This key selects IFR departure procedures (SIDs), arrival procedures (STARs) and approaches (SIAPs) from the database and loads them into the active flight plan.

(6) **ENT –** 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 information.

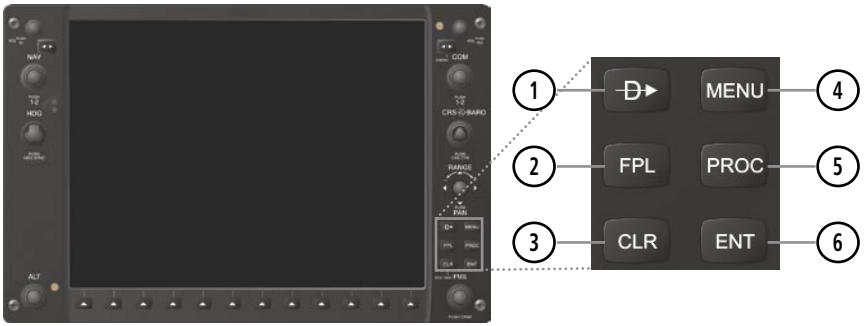


Figure 2-46 PFD Auxiliary Window Keys

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

Timer/References Window

NOTE: Refer to the Aircraft Flight Manual (AFM) for limitations.

The Timer/References Window is enabled and disabled by pressing the **TMR/REF** softkey.

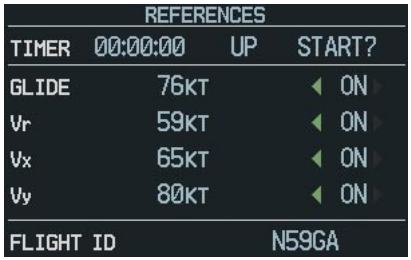


Figure 2-47 Timer/References Window

The following Vspeeds and Vspeed bugs can be set using the Timer/References Window:

- Best glide speed reference
- Best glide speed bug (ON, OFF)
- Rotation speed reference (V_R)
- V_R bug (ON, OFF)
- Best angle-of-climb speed reference (V_X)
- V_X bug (ON, OFF)
- Best rate-of-climb speed reference (V_Y)
- V_Y bug (ON, OFF)

Generic Timer

The Generic Timer displays time (hr:min:sec), timer count direction (UP or DOWN), and timer status (START, STOP, or RESET).

To change the Generic Timer:

1. Press the **TMR/REF** softkey, then turn the **large FMS** knob to select the time field (hr:min:sec).
2. Turn the **FMS** knobs to set the desired time, then press the **ENT** key. The UP/DOWN field is now highlighted.
3. Turn the **small FMS** knob to display the UP/DOWN window.
4. Turn the **FMS** knob to select 'UP' or 'DOWN', then press the **ENT** key. 'START?' is now highlighted.
5. Press the **ENT** key to START, STOP, or RESET the timer (if the timer is counting DOWN, it must be reset manually).
6. Press the **CLR** key or the **TMR/REF** softkey to remove the window.

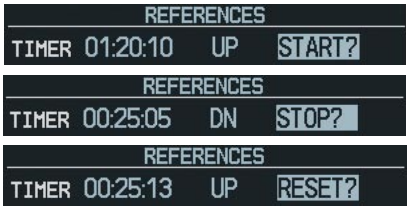


Figure 2-48 Timer Status Prompts

Flight ID

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.*

Aircraft identification (ID) is transmitted from the GTX 33 transponder 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.

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.
3. Press the **ENT** key to update the flight ID.

Vspeeds and Vspeed Bug Status

NOTE: *Default settings are automatically restored when power is cycled.*

Vspeed values for the aircraft can be found in the Aircraft Flight Manual (AFM). The Vspeeds can be changed and the Vspeed bug can be turned ON or OFF.

To change Vspeeds and turn the Vspeed bug ON or OFF:

1. Press the **TMR/REF** softkey, then turn the **large FMS** knob to highlight the field of the Vspeed to be changed.
2. Turn the **small FMS** knob to select the desired speed and press the **ENT** key (when a speed has been changed, an asterisk appears next to the speed). The ON/OFF field is now highlighted.
3. To change each setting individually, turn the **small FMS** knob in the direction of the green arrowhead.
4. All Vspeed references can be changed simultaneously by pressing the **MENU** key and selecting 'All References ON' or 'All References OFF', then by pressing the **ENT** key.

To restore all defaults:

1. From the Timer/References Window, press the **MENU** key.
2. Turn the **FMS** knob to highlight 'Restore Defaults' and press the **ENT** key.
3. Press the **TMR/REF** softkey to remove the window.

Nearest Airports Window

Pressing the **NRST** softkey enables/disables the Nearest Airports Window. From the Nearest Airports Window, information for a selected airport can be viewed, the active primary communications frequency can be selected, and direct-to navigation can be activated.

The Nearest Airports Window displays the 25 nearest airports with the following information:

- Identifier
- Airport Symbol
- Bearing to
- Distance from
- Best approach available
- Primary communications frequency
- Length of longest hard surface runway (or soft surface, if no hard surface runway exists)

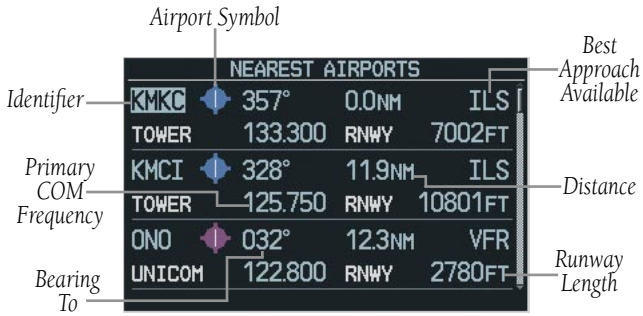


Figure 2-49 Nearest Airports Window

To view information about an airport:

1. Press the **NRST** softkey to display a list of the Nearest Airports.
2. Turn the **FMS** knob to select the desired airport and press the **ENT** key. The airport information is displayed with 'BACK' highlighted at the bottom of the window.
3. When finished viewing the airport information, press the **ENT** key to return to the nearest airports list.

Figure 2-50 Airport Information Window

To select an airport by the airport identifier, location, and name fields from the Airport Information Window:

1. From the Nearest Airport Window, turn the **large FMS** knob to highlight the desired field.
2. Turn the **FMS** knobs to select the desired location, then press the **ENT** key.
3. Turn the **large FMS** knob to highlight 'BACK', then press the **ENT** key.

To activate a Direct-to from the Nearest Airports Window:

1. From the Nearest Airports Window, turn the **large FMS** knob to highlight the desired airport, then press the **Direct-to** key. The Direct-to Window appears.
2. Press the **ENT** key twice to activate.

To activate a Direct-to from the Airport Information Window:

1. From the Airport Information Window, press the **Direct-to** key.
2. Press the **ENT** key twice to activate.

To select a COM frequency:

From the Nearest Airports Window, turn the **large FMS** knob to highlight the desired frequency, then press the **ENT** key. The frequency is tuned in the standby COM frequency field selected by the tuning box.

Direct-to Window

The Direct-to Window is enabled/disabled by pressing the **Direct-to** key.

Figure 2-51 Direct-to Window

The currently selected waypoint displays the following information:

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

Direct-to Navigation

Selection of a waypoint for Direct-to navigation may be done in the following ways:

- By specifying the identifier, waypoint location or facility name
- By selecting from a list of waypoints in the active flight plan
- By selecting from a list of the 25 nearest airports

NOTE: When entering an all-letter/alphabetical airport identifier (only in the USA), the pilot must precede it with the letter "K" (KMCI). If the airport identifier is alpha-numeric, simply enter the three-digit identifier (51K). The full ICAO identifier must be entered for all waypoints.

To select a Direct-to by identifier:

1. Press the **Direct-to** key, then turn the **FMS** knobs to select the desired waypoint identifier. Press the **ENT** key to confirm the selection.
2. Press the **ENT** key again to activate the direct-to.

To select a Direct-to by city or facility name:

1. Press the **Direct-to** key, then turn the **large FMS** knob to highlight the city field (to the right of the identifier) or facility field (directly below the identifier) field.
2. Turn the **FMS** knobs to enter the city (to the right of the identifier field), or the facility (directly below the identifier field). Once the desired city or facility name is displayed, press the **ENT** key to confirm the selection.
3. Press the **ENT** key again to activate the direct-to.

To select a Direct-to from a list of waypoints in an active flight plan:

1. Press the **Direct-to** key, then turn the **large FMS** knob to highlight the FPL field.
2. Turn the **small FMS** knob to display a selection window showing all waypoints in the active flight plan.
3. Turn the **FMS** knob to scroll through the list and highlight the desired waypoint, then press the **ENT** key.
4. Press the **ENT** key again to activate the direct-to.

To select a Direct-to from the Nearest Airports list:

1. Press the **Direct-to** key, then turn the **large FMS** knob to highlight the NRST field.
2. Turn the **small FMS** knob to display a selection window showing the 25 nearest airports.
3. Turn the **FMS** knob to scroll through the list and highlight the desired airport, then press the **ENT** key.
4. Press the **ENT** key again to activate the direct-to.

To select a specific course to a waypoint:

1. Press the **Direct-to** key, then turn the **FMS** knobs to select the desired destination waypoint, then press the **ENT** key.
2. Turn the **large FMS** knob to highlight the 'CRS' field. Turn the **FMS** knobs to select the desired course and press the **ENT** key.
3. Press the **ENT** key to activate the direct-to using the selected course to the destination.

To cancel a Direct-to:

1. Press the **Direct-to** key, then press the **MENU** key to display the Direct-to Options menu.
2. Press the **ENT** key to cancel direct-to navigation. If a flight plan is still active, the G1000 resumes navigating the flight plan along the closest leg.

Figure 2-52 Cancel Direct-To NAV

Flight Plan Window

***NOTE:** COM frequency and stored flight plans cannot be loaded from the PFD Flight Plan Window.*

The Flight Plan Window is enabled and disabled by pressing the **FPL** key.

Figure 2-53 Flight Plan Window

Flight plans can be created, edited and activated from the PFD. The G1000 allows for the creation up to 99 flight plans, with up to 31 waypoints in each flight plan.

The Flight Plan Window on the PFD displays the following information:

- Flight plan title
- Indication of active leg (magenta line and arrow)
- Flight plan waypoint, including airport identifiers
- Leg distance
- Leg desired track

The following options are available for the Flight Plan Window:

- Activate Leg
- Store Flight Plan
- Invert Flight Plan
- Delete Flight Plan
- Load Departure
- Load Arrival
- Load Approach
- Remove Departure
- Remove Arrival
- Remove Approach
- Closest Point of FPL
- Change Fields
- Restore Defaults

Create New Flight Plan

***NOTE:** An 'active' flight plan is created as soon as the first two waypoints are entered on the Active Flight Plan Page.*

New flight plans can be created on the PFD and MFD. The system can store up to 99 flight plans with up to 31 waypoints in each flight plan.

To create a new flight plan:

1. Press the **FPL** key, then press the **FMS** knob to activate the cursor. The waypoint field is now highlighted.
2. Turn the **small FMS** knob to activate the Waypoint Information Window.
3. Turn the **FMS** knobs to enter the identifier of the airport/waypoint and press the **ENT** key. The system returns to the Flight Plan Window, with the cursor flashing on the next waypoint field.
4. Repeat step 3 above to enter the identifier for each additional waypoint.

Activate Leg

Activate leg selects the highlighted leg as the "active leg" (the flight plan leg which is currently used for navigation guidance).

To activate a flight plan along a specific leg:

1. From the active Flight Plan Window, press the **FMS** knob to activate the cursor, and turn the **large FMS** knob to highlight the desired destination waypoint.
2. Press the **MENU** key, highlight 'Activate Leg' and press the **ENT** key. A confirmation window is displayed with 'ACTIVATE' highlighted. Press the **ENT** key.

Figure 2-54 Activate Leg Confirmation Window

Store Flight Plan

NOTE: The active flight plan is erased when the unit is turned off and when another flight plan is activated.

When storing flight plans with an approach, departure, or arrival, the G1000 uses the waypoint information from the current database to define the waypoints. If the navigation database is changed or updated, the G1000 automatically updates the information if the procedure has not been modified. If an approach, departure, or arrival procedure is no longer available, the flight plan becomes locked until the procedure is deleted from the flight plan or until the correct navigation database is installed.

To store a flight plan:

1. From the Flight Plan Window, once all of the waypoints have been entered, press the **MENU** key to display the page menu options.
2. Turn the **FMS** knob to select 'Store Flight Plan', then press the **ENT** key. The Store Flight Plan Window is displayed with 'OK' highlighted.
3. Press the **ENT** key to store the flight plan.
4. To cancel, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.

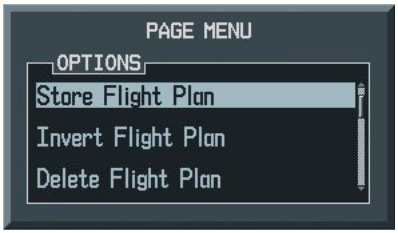


Figure 2-55 Page Options Menu

Invert Flight Plan

The Invert Flight Plan option reverses the active flight plan. After traveling along a flight plan, the pilot may wish to reverse the route for navigation back to the original departure point.

To activate an existing flight plan in reverse:

1. From the Flight Plan Window, press the **MENU** key to display the page menu options.
2. Turn the **FMS** knob to highlight 'Invert Flight Plan', then press the **ENT** key. The flight plan is now reversed and activated.

Figure 2-56 Invert Flight Plan Confirmation Window

Delete Flight Plan

The entire flight plan or selected waypoints within the flight plan may be deleted.

To delete the entire flight plan:

1. From the Flight Plan Window, press the **MENU** key to display the page menu options.
2. Turn the **FMS** knob to highlight 'Delete Flight Plan', then press the **ENT** key. The 'Delete All Waypoints in Flight Plan' message is displayed with 'OK' highlighted.
3. Press the **ENT** key to delete all waypoints in the flight plan.
4. To cancel, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.

To delete selected waypoints in the flight plan:

1. From the Flight Plan Window, turn the **large FMS** knob to select the desired waypoint.
2. Press the **CLR** key. The 'Remove Waypoint Name' Window is displayed with 'OK' highlighted. Press the **ENT** key to delete the selected waypoint.
3. To cancel, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.

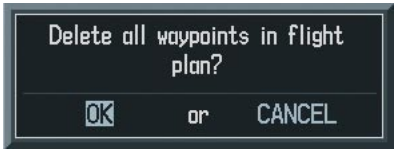


Figure 2-58 Delete Flight Plan Confirmation Window

Load Departure

Load departure allows the pilot to select a published standard instrument departure (SID) for the departure airport or replace the current departure with a new selection. When using a direct-to, the G1000 uses the nearest airport as a reference for displaying available departures.

*NOTE: The **PROC** key can also be used to load a departure, an approach, or an arrival.*

To select a departure for the departure airport:

1. From the Flight Plan Window , press the **MENU** key to display the page menu options.
2. Turn the **FMS** knob to highlight 'Load Departure', then press the **ENT** key. A window appears listing the available departures for the departure airport.

Figure 2-59 Departure

3. Turn the **FMS** knob to select the desired departure, then press the **ENT** key.
4. A window may appear listing runways for the departure. Turn the **FMS** knob to select the desired runway, then press the **ENT** key. The transition window is now displayed.

Figure 2-60 Departure Runway

NOTE: *The runway window is not displayed for every departure. 'ALL' may appear in the runway field, indicating that the departure procedure applies to all runways. For airports with parallel runways, 'B' may appear at the end of the runway designation to indicate that the departure procedure applies to both runways.*

5. Turn the **FMS** knob to select the desired transition waypoint, then press the **ENT** key.

Figure 2-61 Departure Transition

6. With 'LOAD?' highlighted, press the **ENT** key.

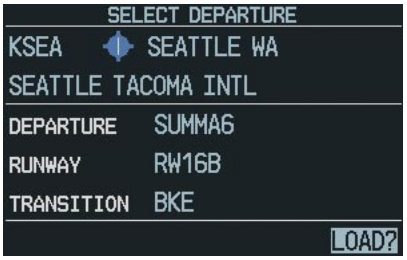


Figure 2-62 Select Departure Window

Load Arrival

Load Arrival allows the pilot to select a published standard terminal arrival route (STAR) for the destination airport or replace a current arrival with a new selection.

NOTE: *The **PROC** key can also be used to load a departure, an approach, or an arrival.*

NOTE: *When adding an arrival to an active flight plan, the pilot may need to remove a duplicate destination waypoint from the flight plan list.*

To select an arrival for a direct-to or flight plan destination airport:

1. From the Flight Plan Window, press the **MENU** key to display the page menu options.
2. Turn the **FMS** knob to highlight 'Load Arrival', then press the **ENT** key. A window appears listing the available arrivals for the destination airport.
3. Turn the **FMS** knob to select the desired arrival, then press the **ENT** key. A window appears listing available transitions for the arrival.
4. Turn the **FMS** knob to select the desired transition waypoint, then press the **ENT** key.
5. A window may appear listing runways for the arrival. Turn the **FMS** knob to select the desired runway, then press the **ENT** key.

NOTE: *The runway window is not displayed for every arrival. 'ALL' may appear in the runway field, indicating that the arrival procedure applies to all runways. For airports with parallel runways, 'B' may appear at the end of the runway designation to indicate that the arrival procedure applies to both runways.*

6. With 'LOAD?' highlighted, press the **ENT** key.

Load Approach

Load Approach allows the pilot to select a published instrument approach for the destination airport, or replace the current approach with a new selection.

To select an approach for a direct-to or flight plan destination airport:

1. From the Flight Plan Window, press the **MENU** key to display the page menu options.
2. Turn the **FMS** knob to highlight 'Load Approach', then press the **ENT** key. A window appears listing the available approaches for the destination airport.
3. Turn the **FMS** knob to select the desired approach, then press the **ENT** key. A window appears listing the available transitions for the approach.
4. Turn the **FMS** knob to select the desired transition or vectors, then press the **ENT** key.

NOTE: *The 'Vectors' option assumes that the pilot will receive vectors from ATC to the final course segment of the approach.*

5. With 'LOAD?' highlighted, press the **ENT** key to load the approach.
6. To activate the approach, turn the **large FMS** knob to highlight 'ACTIVATE?', then press the **ENT** key.

NOTE: *'LOAD' adds the approach to the flight plan without immediately using the approach for navigation guidance. This allows the pilot to continue navigating the original flight plan until cleared for the approach, but keeps the approach available for quick activation when needed. 'ACTIVATE' adds the approach to the flight plan and begins navigating the approach course.*

Remove Departure, Arrival, or Approach

Remove Departure, Arrival, or Approach deletes the current standard instrument departure (SID), terminal arrival route (STAR), or selected approach from the active flight plan.

To remove a departure, an arrival, or an approach from a direct-to or active flight plan:

1. From the Flight Plan Window, press the **MENU** key to display the page menu options.
2. Turn the **FMS** knob to highlight 'Remove Departure', 'Remove Arrival', or 'Remove Approach', then press the **ENT** key. A confirmation window appears listing the procedure that is about to be removed, with 'OK' highlighted.
3. Press the **ENT** key to remove the procedure.
4. To cancel, turn the **large FMS** knob to highlight 'CANCEL', then press the **ENT** key.

Closest Point of FPL

Closest Point of FPL calculates the bearing and closest distance at which a flight plan passes from a reference waypoint. It may also be used to create a new user waypoint along the flight plan at the location closest to a chosen reference waypoint.

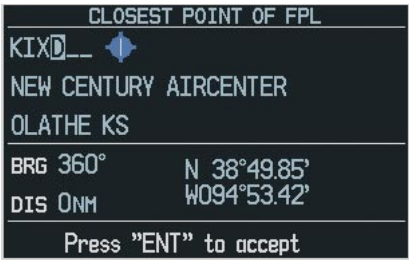


Figure 2-63 Closest Point of FPL Window

To determine the closest point along the active flight plan to a selected waypoint:

1. From the Flight Plan Window, press the **MENU** key to display the page menu options.
2. Turn the **FMS** knob to highlight 'Closest Point of FPL', then press the **ENT** key. A window appears with the reference waypoint field highlighted.
3. Turn the **FMS** knobs to enter the identifier of the reference waypoint, then press the **ENT** key. The G1000 displays the bearing (BRG) and distance (DIS) to the closest point along the flight plan from the selected reference waypoint.
4. To create a user waypoint at this location and add it to the flight plan, press the **ENT** key. The name for the new user waypoint is derived from the identifier or the reference waypoint.

Change Fields

Change Fields allows the pilot to select the desired data items to be displayed on the Flight Plan Window. The user-selectable data fields can be changed to display the following information:

- Cumulative Distance (CUM)
- Distance (DIS)
- Desired Track (DTK)
- En route Safe Altitude (ESA)
- Estimated Time of Arrival (ETA)
- Estimated Time En route (ETE)

Figure 2-64 Change Fields on Flight Plan

To change a data field on the Flight Plan Window:

1. From the Flight Plan Window, press the **MENU** key to display the page menu options.
2. Turn the **FMS** knob to highlight 'Change Fields', then press the **ENT** key. The cursor flashes on one of the data fields.
3. Turn the **large FMS** knob to highlight the desired field to be changed.
4. Turn the **small FMS** knob to display a window with optional data items.
5. Turn the **FMS** knob to select the desired data item, then press the **ENT** key.
6. Press the **small FMS** knob to remove the cursor.

Restore Defaults

Restore Defaults restores all data fields to the factory default settings.

To restore factory default settings for data fields on the Flight Plan Window:

1. From the Flight Plan Window, press the **MENU** key to display the page menu options.
2. Turn the **FMS** knob to highlight 'Restore Defaults', then press the **ENT** key.

Procedures Window

The Procedures Window is enabled/disabled by pressing the **PROC** key. The following options are available from the Procedures Window:

- Activate Vector-To-Final
- Activate Approach
- Select Approach
- Select Arrival
- Select Departure

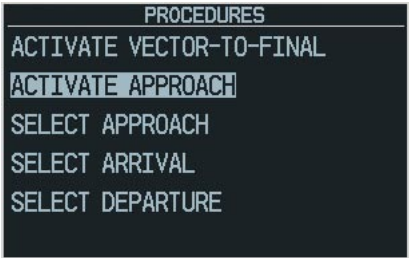


Figure 2-65 Procedures Window

Select Approach

Select Approach allows the pilot to choose a published instrument approach for the destination airport or replace the current approach with a new selection.

To select an approach for a direct-to or flight plan destination airport:

1. From an active flight plan, press the **PROC** key to display the Procedures options window.
2. Turn the **large FMS** knob to highlight 'Select Approach', then press the **ENT** key. A window appears listing the available approaches for the destination airport.

Figure 2-66 Approach

3. Turn the **FMS** knob to select the desired approach, then press the **ENT** key. A window appears listing the available transitions for the approach.

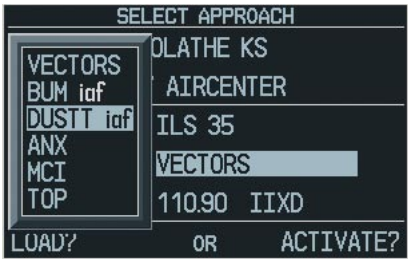


Figure 2-67 Approach Transition

4. Turn the **FMS** knob to select the desired transition or vectors, then press the **ENT** key.

NOTE: *The 'Vectors' option assumes that the pilot will receive vectors from ATC to the final course segment of the approach.*

Figure 2-68 Select Approach Window

5. With 'LOAD?' highlighted, press the **ENT** key to load the approach.
6. To activate the approach, turn the **large FMS** knob to highlight 'ACTIVATE?', then press the **ENT** key.

NOTE: *'LOAD' adds the approach to the flight plan without immediately using the approach for navigation guidance. This allows the pilot to continue navigating the original flight plan until cleared for the approach, but keeps the approach available for quick activation when needed. 'ACTIVATE' adds the approach to the flight plan and begins navigating the approach course.*

Select Arrival

Select Arrival allows the pilot to choose a published standard terminal arrival route (STAR) for the destination airport, or replace a current arrival with a new selection.

To select an arrival for a direct-to or flight plan destination airport:

1. From an active flight plan, press the **PROC** key to display the Procedures options window.
2. Turn the **large FMS** knob to highlight 'Select Arrival', then press the **ENT** key. A window appears listing the available arrivals for the destination airport.

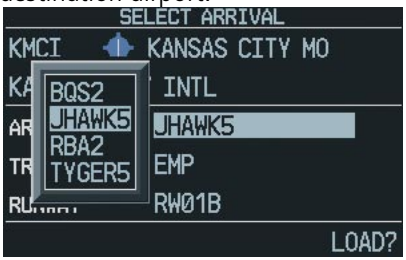


Figure 2-69 Arrival

3. Turn the **FMS** knob to select the desired arrival, then press the **ENT** key. A window appears listing the available transitions for the arrival.

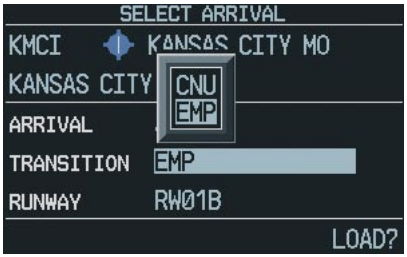


Figure 2-70 Arrival Transition

4. Turn the **FMS** knob to select the desired transition, then press the **ENT** key.
5. A window may appear listing runways for the arrival. Turn the **FMS** knob to select the desired runway, then press the **ENT** key.

NOTE: *The runway window is not displayed for every arrival. 'ALL' may appear in the runway field, indicating that the arrival procedure applies to all runways. For airports with parallel runways, 'B' may appear at the end of the runway designation to indicate that the arrival procedure applies to both runways.*

Figure 2-71 Arrival Runway

6. With 'LOAD?' highlighted, press the **ENT** key.

NOTE: When adding an arrival to an active flight plan, the pilot may need to remove a duplicate destination waypoint from the flight plan list.

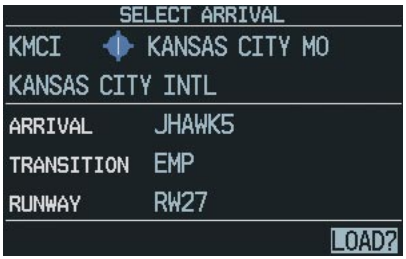


Figure 2-72 Select Arrival Window

Select Departure

Select Departure allows the pilot to choose a published standard instrument departure (SID) for the departure airport, or replace the current departure with a new selection. When using a direct-to, the G1000 uses the nearest airport as a reference when displaying available departures.

To select a departure for the departure airport:

1. From an active flight plan, press the **PROC** key to display the Procedures options window.
2. Turn the **large FMS** knob to highlight 'Select Departure', then press the **ENT** key. A window appears listing the available departures for the departure airport.
3. Turn the **FMS** knob to select the desired departure, then press the **ENT** key.
4. A window may appear listing runways for the departure. Turn the **FMS** knob to select the desired runway, then press the **ENT** key. The transition window is now displayed.

NOTE: The runway window is not displayed for every departure. 'ALL' may appear in the runway field, indicating that the departure procedure applies to all runways. For airports with parallel runways, 'B' may appear at the end of the runway designation to indicate that the departure procedure applies to both runways.

5. Turn the **FMS** knob to select the desired transition, then press the **ENT** key.
6. With 'LOAD?' highlighted, press the **ENT** key.

Activate Approach

Activate Approach allows the pilot to activate the approach when ready to begin navigating the approach course (cleared for the approach).

To activate the approach for a direct-to or flight plan destination airport:

1. From an active flight plan, press the **PROC** key to display the Procedures options window.
2. Turn the **large FMS** knob to highlight 'Activate Approach', then press the **ENT** key.

Activate Vector-To-Final

Activate Vector-To-Final allows the pilot to activate the final course segment of the approach. This option assumes that the pilot will receive vectors to the final approach fix (FAF) and provides guidance to intercept the final course, before reaching the FAF.

To activate the approach with vectors to final:

1. From an active flight plan, press the **PROC** key to display the Procedures options window.
2. Turn the **FMS** knob to highlight 'Activate Vector-To-Final', then press the **ENT** key.

2.7 REVERSIONARY MODE

NOTE: Refer to the System Overview for a detailed description of Reversionary mode.

The PFD is designed to enter reversionary (backup) mode based on automatic fault monitoring and detection, internal switching. Reversionary mode can also be activated manually by pressing the dedicated **DISPLAY BACKUP** button at the bottom of the Audio Panel (refer to the Audio Panel section).

In reversionary mode, the computer display units (CDUs) are re-configured to present the PFD symbology together with the engine parameters (engine parameters are incorporated on the left side of the display). Reversionary PFD parameters are presented in the same format as prior to re-configuration. In the event of a display failure, the pilot loses one NAV, one COM, and GPS:

- PFD failure – NAV1, COM1 and GPS1 are lost
- MFD failure – NAV2, COM2 and GPS2 are lost

Figure 2-73 PFD Reversionary Mode

2.8 ALERTS AND ANNUNCIATIONS

NOTE: For a detailed description of all annunciations and alerts, refer to the Annunciations and Alerts section.

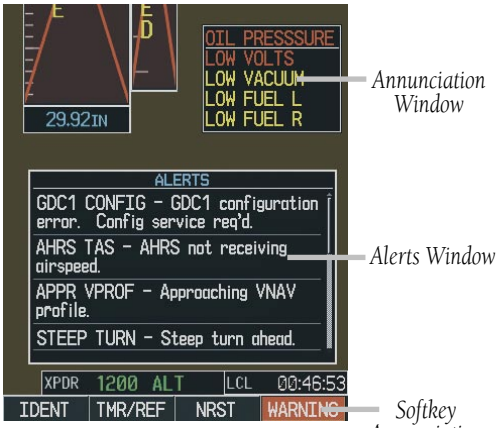


Figure 2-74 G1000 Alerting System

ALERTS WINDOW

The Alerts Window appears in the lower right corner of the PFD when a warning, caution, or advisory alert message occurs. This window allows system alert messages to be displayed simultaneously. The **FMS** knobs can be used to scroll through the alerts. Pressing the **ALERTS** softkey enables/disables the Alerts Window.

Alert Messages

These messages are provided to make the pilot aware of G1000 system problems or status and may not require pilot action. An alert message is accompanied by a flashing white **ALERTS** softkey label to alert the pilot. Pressing the **ALERTS** softkey acknowledges the presence of the advisory alert and opens the Alerts Window.

Figure 2-75 Alerts Softkey

ANNUNCIATION WINDOW

The Annunciation Window appears to the right of the Vertical Speed Indicator and displays abbreviated annunciation text. Text color is based on alert level. New alerts, regardless of priority, are displayed at the top of the Annunciation Window, separated by a white line from acknowledged alerts. Once acknowledged, they are sequenced based on priority.

SOFTKEY ANNUNCIATIONS

The **ALERTS** softkey label changes to display the appropriate annunciation when an alert is issued. The annunciation flashes and the appropriate aural alert sounds until acknowledged by depressing the softkey. The softkey then reverts to the **ALERTS** label and, when pressed again, displays a description of the annunciation in the Alerts Window.

Warnings are time-critical and require immediate pilot attention. A flashing "WARNING" softkey annunciation and an aural tone (single chime every two seconds) are used to alert the pilot of any warnings. The aural tone and flashing "WARNING" annunciator continue until acknowledged by the pilot (by pressing the **WARNING** softkey).

Figure 2-76 Warning Softkey Annunciation

Caution indicates the existence of abnormal conditions on the aircraft that may require pilot intervention. A flashing "CAUTION" softkey annunciation and a single aural tone (one chime) are used to alert the pilot of any cautions. The flashing "CAUTION" annunciator continues to flash until acknowledged by the pilot (by pressing the **CAUTION** softkey).

Figure 2-77 Caution Softkey Annunciation

An advisory provides general information to the pilot that may not need immediate attention. A flashing "ADVISORY" softkey annunciation (no aural tone) is used to alert the pilot of any message advisories. The flashing "ADVISORY" annunciator continues to flash until acknowledged by the pilot (by pressing the **ADVISORY** softkey).

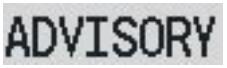


Figure 2-78 Advisory Softkey Annunciation

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GARMIN

G1000™

NAV/COM

3.1 OVERVIEW

The NAV/COM frequency controls and windows are located in the top corners of the Primary Flight Display (PFD) and Multi Function Display (MFD). The NAV controls and NAV frequency window are located on the left side, the COM controls and COM frequency window are on the right. The DME Tuning window is located in the lower right corner on the PFD, as shown in the figure below.

The NAV/COM interface includes:

- Windows and fields
- Radio selection
- Tuning boxes
- Frequency Transfer Arrows
- Radio status indications
- Controls

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

WINDOWS AND FIELDS

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

- 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 window is composed of two fields, a standby field and an active field.

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

RADIO SELECTION

Frequencies in the active window are displayed in either green or white.

- An active COM frequency is displayed in green indicating that the COM radio is selected on the audio panel (**COM1 MIC** or **COM2 MIC** keys). White numbers indicate that the radio is not selected.
- An active NAV frequency is displayed in green indicating the NAV radio is selected for navigation on the HSI. NAV radio selection is made with the PFD **CDI** softkey.
- NAV1 selected: a single green arrow with 'VOR1' or 'LOC1' displayed on the HSI.
- NAV2 selected: a double green arrow with 'VOR2' or 'LOC2' displayed on the HSI.
- Both active NAV frequencies displayed in white indicate that GPS is in use.

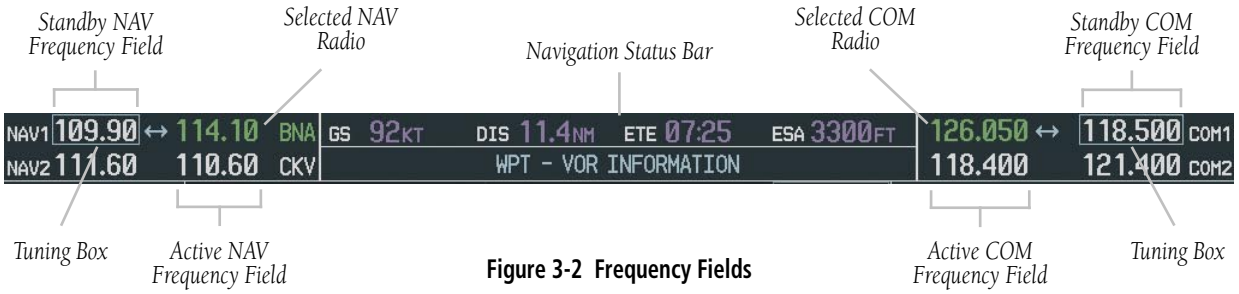

Figure 3-2 Frequency Fields

CONTROLS

The NAV Frequency window is controlled by knobs and keys on the left, the COM Frequency window by knobs and keys on the right.

The NAV controls:

- **VOL/PUSH ID** knob
  - **Turn** to adjust the NAV radio volume level.
  - **Press** to turn the Morse code ID ON and OFF.
- **Frequency Transfer** key
  - **Press** to transfer the NAV frequencies between the active and standby fields.
- Dual **NAV** tuning knob
  - **Turn** to tune a NAV frequency in the NAV tuning box (large knob for MHz; small knob for kHz).
  - **Press** to transfer the NAV tuning box between the NAV1 and NAV2 radios.

The COM controls:

- **VOL/PUSH SQ** knob
  - **Turn** to adjust the COM radio volume.
  - **Press** to turn automatic squelch ON and OFF.
- **Frequency Transfer** key
  - **Press** to transfer the COM frequencies between the active and standby fields.
  - **Press and hold** for two seconds to tune the emergency frequency (121.500 MHz) in the active COM field.
- Dual **COM** tuning knob
  - **Turn** to tune a COM frequency in the COM tuning box (large knob for MHz; small knob for kHz).
  - **Press** to transfer the COM tuning box between the COM1 and COM2 radios.

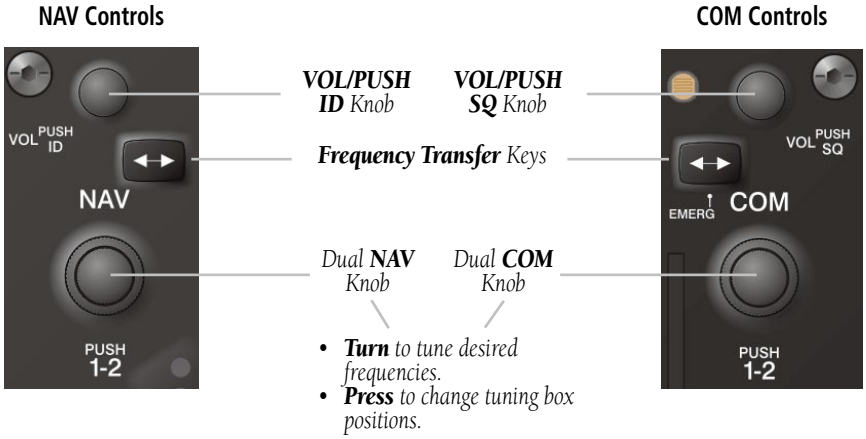

Figure 3-3 NAV/COM Controls

TUNING BOX

A light blue tuning box is displayed around the radio standby frequency window, on both the PFD and MFD. Pressing the small **COM** or **NAV** knob transfers the tuning box back and forth between the two windows.

Frequencies located in the standby window are displayed in either white.

Figure 3-4 Frequency Transfer Arrow and Tuning Box

SWITCHING BETWEEN RADIOS

Pressing the small **COM** or **NAV** knob transfers the tuning box between the radio frequency windows.

When a different COM transceiver is selected on the audio panel, the COM frequency tuning box highlights the frequency on both the PFD and MFD.

When a different NAV radio is selected on the HSI, the NAV frequency tuning box highlights the frequency on the PFD and MFD. The NAV frequency tuning box does not change when GPS mode is selected.

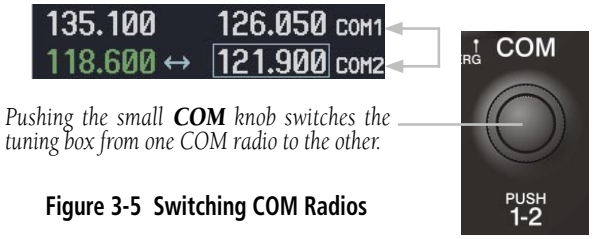

Figure 3-5 Switching COM Radios

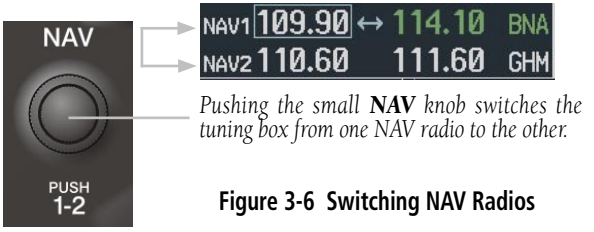

Figure 3-6 Switching NAV Radios

MANUALLY TUNING A FREQUENCY

The dual **COM** and dual **NAV** frequency knobs are used for manual COM and NAV radio tuning. The frequencies are tuned in the standby field.

- The MHz frequency digits are tuned with the large **COM** and **NAV** knobs.
- The kHz frequency digits are tuned with the small **COM** and **NAV** knobs.

Turning the knobs clockwise increases frequency. Turning the knobs counterclockwise decreases frequency.

RADIO INDICATORS

- **RX** – During COM signal reception, a white RX appears by the active COM frequency.
- **TX** – During COM transmission, a white TX appears by the active COM frequency replacing the Frequency Transfer Arrow.

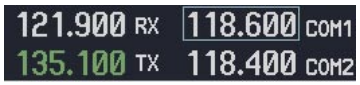

Figure 3-7 COM Radio Status Indications

- **ID** – When the Morse code identifier is ON for a NAV radio, a white **ID** appears to the left of the active NAV frequency.

The Morse code identifier is ON for the GHM VOR.

Figure 3-8 ID Indication

VOLUME

Radio volume level can be adjusted from 0 to 100% using the **VOL/PUSH SQ** knob for COM or **VOL/PUSH ID** knob for NAV. Turning the knob clockwise increases volume, counterclockwise decreases volume.

When adjusting, the level is displayed in place of the standby frequencies. Volume level indication remains for two seconds after the change.

Figure 3-9 COM and NAV Volume Levels

FREQUENCY TRANSFER ARROW

The Frequency Transfer Arrow is displayed between the COM and NAV active and standby frequencies for the active radio. Pressing the **Frequency Transfer** key toggles the frequencies. Pressing the small **COM** or **NAV** knob transfers the frequency tuning box and the Frequency Transfer Arrow between the radios.

NOTE: *When a COM signal is received or transmitted, the Frequency Transfer Arrow is replaced by a white RX or TX indication.*

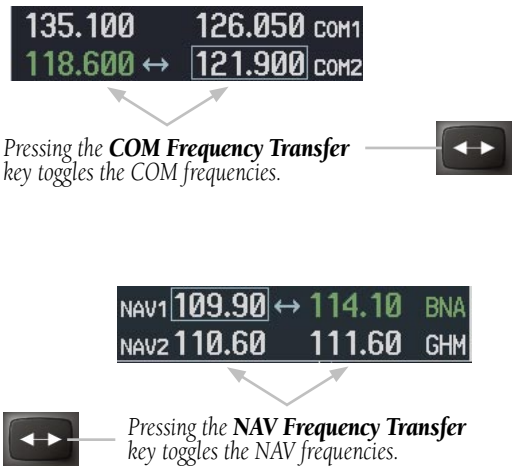

Figure 3-10 Transferring COM and NAV Frequencies

3.2 COM OPERATION

FREQUENCY SPACING

The G1000 COM radios can tune either 25 kHz spacing (118.000 to 136.975 MHz) or 8.33 kHz spacing (118.000 to 136.990 MHz) for 760-channel or 3040-channel configuration.

COM channel spacing is configured through the MFD on the System Setup Page of the AUX Page group.

AUTOMATIC SQUELCH

Automatic squelch quiets unwanted static noise when no audio signal is received, while still providing reasonable sensitivity to weak COM signals. To disable auto squelch, press the **VOL/PUSH SQ** knob.

When automatic squelch is disabled, COM audio reception is always on. Continuous static noise is heard over the speaker and phones, and an RX indication appears on the display.

Figure 3-11 Overriding Automatic Squelch

To enable automatic squelch, press the **VOL/PUSH SQ** knob again.

SELECTING A COM RADIO

The desired COM radio is selected by pressing the **COM MIC** keys on the audio panel. When the **COM MIC** key is annunciated, the associated active COM frequency is displayed in green in the COM Frequency window.

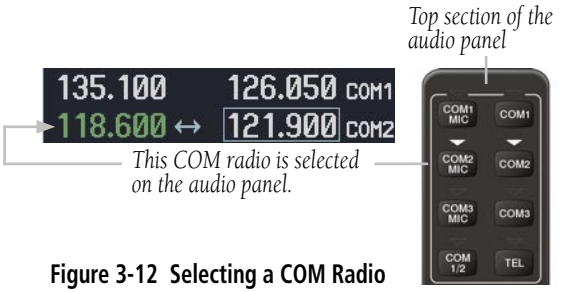

Figure 3-12 Selecting a COM Radio

NOTE: *When PA mode is selected on the audio panel, the COM MIC annunciator is no longer lit and the active COM frequency changes to white, indicating that there is no COM activity.*

NOTE: *Refer to the Audio Panel section for more details on transceiver selection.*

EMERGENCY FREQUENCY (121.500 MHZ)

In case of a COM system tuning failure, the emergency frequency (121.500 MHz) is automatically tuned in the radio in which the tuning failure occurred.

Figure 3-13 COM Tuning Failure

NOTE: *In case of a dual display failure, the COM radios are automatically tuned to the emergency frequency (121.500 MHz).*

QUICK-TUNING AND ACTIVATING 121.500 MHZ

Pressing and holding the **COM Frequency Transfer** key for two seconds automatically loads the emergency COM frequency (121.500 MHz) in the active field of the active COM radio (the one with the transfer arrow).

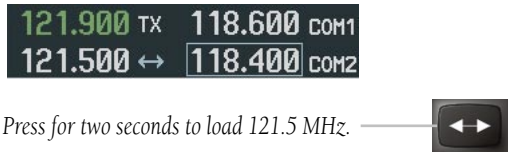

Figure 3-14 Quickly Tuning 121.500 MHz

STUCK MICROPHONE

If the push-to-talk (PTT) switch becomes stuck, the COM transmitter stops transmitting after 35 seconds of continuous operation. An alert appears on the PFD to advise the crew of a stuck microphone.

Figure 3-15 Stuck Microphone Alert

The **COM1 MIC** or **COM2 MIC** key annunciator on the audio panel continues to blink as long as the PTT switch remains stuck.

3.3 NAV OPERATION

FREQUENCY RANGE

The NAV radios receive in the VOR/ILS frequency range of 108.00 to 117.95 MHz with 50 kHz spacing. The NAV Frequency window displays the following information:

- NAV1 and NAV2 active and standby frequencies
- NAV1 and NAV2 identifier indication (if the Morse code identifier is received by the system)
- Color-coded indication of the selected NAV radio
- Morse code identifier status

MORSE CODE IDENTIFIER

Press the **VOL/PUSH ID** knob to turn the Morse code identifier ON and OFF. When the identifier is ON, a white ID indication appears to the left of the active NAV frequency, and the Morse code is heard on the NAV audio. The VOR/LOC Morse code identifier is displayed next to the active NAV frequency.

When the identifier is OFF, the ID indication disappears and the Morse code is off.

NAV audio is available with the ID filtered out for listening to HIWAS and FSS transmissions on VOR stations.

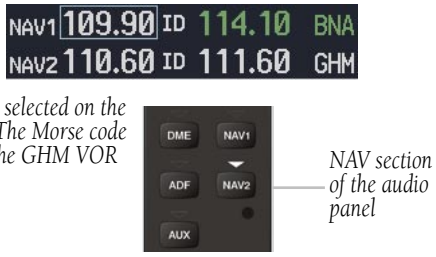

Figure 3-16 Morse Code Identifier Audio

NAV RADIO SELECTION FOR NAVIGATION

The desired NAV radio is selected for navigation by pressing the **CDI** softkey located on the PFD. The three navigation modes that can be selected are:

- **VOR1** (or **LOC1**) – If NAV1 is selected, a single green arrow (shown) 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, a double green arrow (not shown) 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 (not shown) appears on the HSI and neither NAV radio is selected.

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

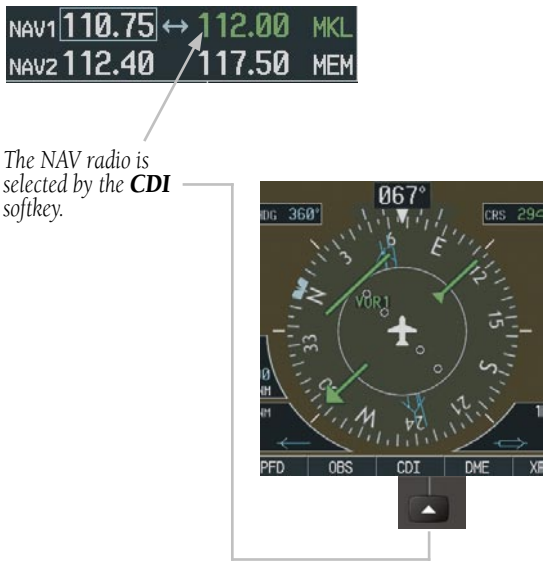

Figure 3-17 Selecting a NAV Radio

ADF/DME TUNING

The optional BendixKing KR-87 ADF is not tuned by the G1000 system. Refer to the Honeywell BendixKing KR 87 ADF Operators manual for ADF information. ADF volume is also adjusted through the KR 87.

The G1000 system tunes the optional DME transceiver. The UHF DME frequency is paired with a VHF NAV frequency, providing DME distance information. Frequency pairing is automatic and only the VHF NAV frequency is shown on the display.

DME TUNING

The DME radio is tuned by selecting the associated NAV system or HOLD in the DME Tuning window. The DME Tuning window is located to the right of the HSI on the lower right corner of 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 replaced on the PFD.*

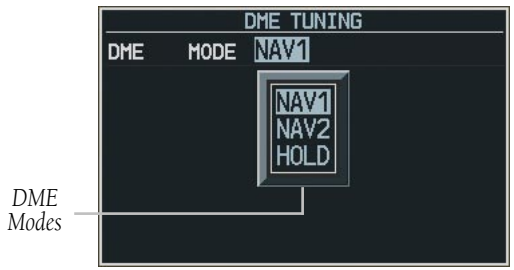

Figure 3-18 DME Tuning Window

Selecting DME Transceiver Pairing

The following DME transceiver pairing 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 in the HOLD position, the DME frequency remains tuned to the last selected NAV frequency.

NOTE: *When turning ON the G1000 for use, the system remembers the last frequency used for DME Tuning and the* **NAV1**, **NAV2** *or* **HOLD** *state prior to shutdown.*

To select DME transceiver tuning:

1. Turn the small **FMS** knob to select the desired DME tuning.
2. Press the **ENT** key to complete the selection.

NOTE: *Pressing the* ***CLR*** *key while in the process of DME tuning cancels the data entry and reverts back to the previously selected DME tuning state.*

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

3.4 FREQUENCY AUTO-TUNING

The G1000 system offers multiple auto-tuning capabilities. The PFD allows auto-tuning of COM frequencies associated with the nearest airports. The MFD provides auto-tuning of both COM and NAV frequencies from waypoint and nearest pages. In addition, the primary NAV frequency is entered automatically in the NAV window during approach loading or approach activation.

Frequencies can be automatically loaded into the frequency windows in the following ways:

- By using the **ENT** key when the frequency is highlighted on the appropriate page (PFD and MFD).
- When loading or activating an approach (PFD and MFD).

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

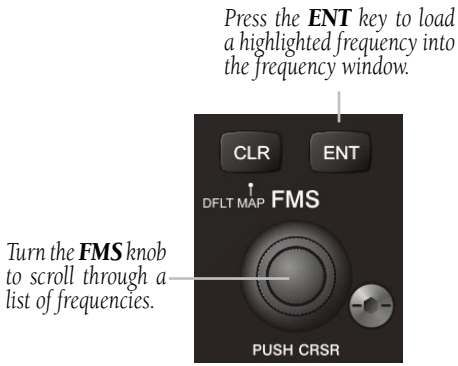

Figure 3-19 Loading Frequencies

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 COM frequencies.
2. Turn either **FMS** knob to highlight the desired COM frequency.
3. Press the **ENT** key to load the COM frequency into the COM tuning box.

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

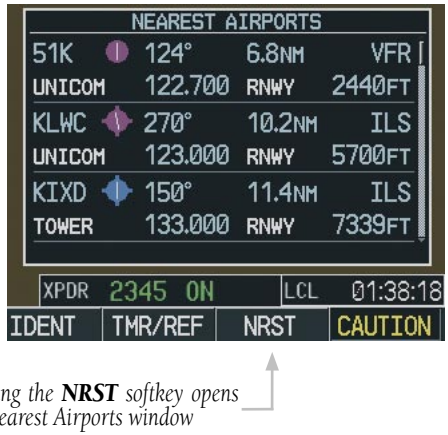

Figure 3-20 Nearest Airports Window (PFD)

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 (ARTCC, FSS, WX) Frequencies

Figure 3-21 MFD Page Group Icon

In NAV mode during any VOR/ILS approach activation, the NAV frequency is automatically loaded into the standby field of the selected NAV radio.

In GPS mode during any VOR/ILS approach activation, the appropriate NAV frequency is automatically loaded into the active field of NAV1.

WPT – Airport Information Window

The Airport Information Window 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 an airport:

1. On the Airport Information Window, 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.

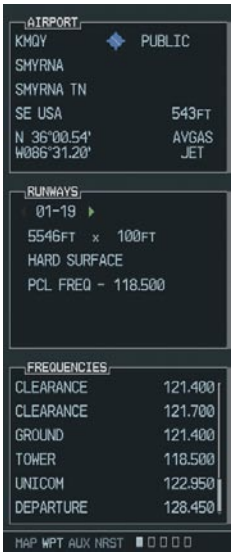

Figure 3-22 WPT – Airport Information Window

To load a 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.

The Pilot Controlled Lighting (PCL) frequency, located in the Runways box of the INFO portion of the Airport Information Page, may also be highlighted and loaded into the COM tuning box.

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

1 On the Airport Information Window, 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 3-23 WPT – Airport Information Page (APR)
(Cessna 172 Shown)

WPT – VOR Information Window

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

To load a VOR frequency into the NAV window:

1. On the VOR Information Window, 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 Window, the 'View Recent VOR List' menu option is displayed for quick access to recently used VORs. If no VOR frequencies have been tuned, this menu option is grayed out.*

Figure 3-24 WPT – VOR Information Menu (Cessna T206 Shown)

NRST – Nearest Airports Window

The Nearest Airports Window displays a list of the nearest airports with runway, frequency, and approach information. In this window, 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 Window, press the **FMS** knob to activate the cursor in the Nearest Airports Window.
2. Turn the **FMS** knob to scroll through the list of nearest airport identifiers until the desired 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 NAV or COM Frequency window.

Figure 3-25 NRST – Nearest Airport Window

NRST – Nearest VOR Window

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

To load a VOR frequency into the NAV window:

1. On the Nearest VOR Window, 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 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 3-26 NRST – Nearest VOR Window

NRST – Nearest Frequencies Windows

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

The Nearest ARTCC and FSS frequency windows contain a numbered list of names as well as bearing and distance information from the transmitting antenna.

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

1. Press the **ARTCC** or the **FSS** softkey to activate the selection cursor in the Nearest window.
2. Turn the small **FMS** knob to scroll through the list of names, then the large **FMS** knob to highlight the desired frequency.
3. Press the **ENT** key to load the desired frequency into the COM tuning box.

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

Figure 3-27 NRST – Nearest Frequencies Windows

AUTO-TUNING ON APPROACH ACTIVATION (NAV FREQUENCIES)

NAV frequencies are automatically loaded into the NAV Frequency window on approach activation, regardless of the display unit being used.

NOTE: *The primary NAV frequency becomes auto-tuned upon loading 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 is loaded into the standby field of the selected NAV radio.

Figure 3-28 Selecting an Approach

Figure 3-29 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.

When loading or activating an approach, the primary NAV frequency may be loaded into the NAV tuning box by highlighting the frequency in the Select Approach window using the ***FMS*** knob, then pressing the ***ENT*** key.

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.

The NAV frequency is automatically loaded upon vector-to-final activation. An approach can also be activated with the ***MENU*** key when the Flight Plan window is open.

Figure 4-30 Activating an Approach

NOTE: *When a VOR/ILS approach has been activated in GPS mode, and the ILS CDI Capture option is set to AUTO, the system switches to NAV mode as the final approach course is intercepted (within 15 nm from the FAF). See the Multi Function Display section for details.*

GARMIN

G1000™

Transponder

4.1 TRANSPONDER DESCRIPTION

The GTX 33 transponder is integrated into the G1000 system, offering Mode A, Mode C and Mode S interrogation and reply capabilities. This pilot's guide provides a description of the transponder operation and information on Mode S capability.

The transponder controls are located on the G1000 Primary Flight Display (PFD) on the lower portion of the screen (see figures below).

TRANSPONDER SOFTKEYS

The transponder function spans three levels of softkeys; the Top-level, the Mode Selection and the Code Selection softkeys.

When the Top-level **XPDR** softkey is pressed, the following softkeys appear in the softkey bar (Figure 4-2): **STBY**, **ON**, **ALT**, **VFR**, **CODE**, **IDENT**, **BACK**.

When the **CODE** softkey is pressed, the number softkeys appear in the softkey bar (Figure 4-3): **0**, **1, 2**, **3**, **4**, **5**, **6**, **7**, **IDENT**, **BKSP, BACK**. The digits **8** and **9** are not used for code entry. Pressing the **BKSP** softkey backs up code selection to the previous digit.

Pressing the **BACK** softkey during code selection reverts to the **MODE** Selection softkeys (Figure 4-2). Pressing the **BACK** softkey during Mode Selection reverts to the Top-level softkeys (Figure 4-1).

NOTE: *After 45 seconds of transponder softkey inactivity, the system reverts back to the Top-level softkeys (Figure 4-1).*

TRANSPONDER STATUS BAR

The Transponder Status bar is located to the left of the System Time box and contains, a four-digit code field, a mode field and a reply status indicator. 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

Figure 4-1 Top-level Softkeys

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

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

Figure 4-2 Mode Selection Softkeys

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

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

Figure 4-3 Code Selection Softkeys

MODE S FEATURES

The GTX 33 transponder is equipped with selective addressing or **Mode Select** (Mode S), capability. Mode S functions include the following features:

- Level-2 reply data link capability (used to exchange information between aircraft and various ATC facilities)
- Surveillance identifier capability
- Flight ID reporting
- Altitude reporting
- Airborne status determination
- Transponder capability reporting
- Mode S Enhanced Surveillance (EHS) requirements
- Acquisition squitter

Flight ID Reporting – The G1000 transponder reports aircraft identification as either the aircraft registration or a FLT ID (Flight Identification). The system is configured for either option by an authorized Garmin service center.

If configured for Flight ID entry, the pilot must enter the appropriate flight ID on the PFD. After the correct Flight ID is entered, the aircraft identification reported in response to ATC radar interrogations is properly correlated with the associated call sign for voice communication.

The flight ID is not to exceed seven (7) characters. No space is needed when entering Flight ID. When a Flight ID contains a space, the system automatically removes it upon completion of Flight ID entry. (See ICAO documents 8168, 4444 and 8585 for further details).

If the Flight ID is set to 'SAME AS TAIL' no entry is required. In this configuration, the transponder then reports the aircraft registration number to ATC.

Acquisition Squitter – Acquisition squitter, or short squitter, is the transponder 24-bit identification address. The transmission 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 recognize the presence of Mode S-equipped aircraft for selective interrogation.

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 radius of 55 miles from select sites.

For aircraft not equipped with TCAS or TAS, 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 your 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: *Aircraft without an operating transponder are invisible to TIS.*

4.2 OPERATION

MODE SELECTION

Mode selection can 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.

Ground Mode (Automatic)

Ground mode is automatically selected when the aircraft is on the ground. A green **GND** indication appears in the mode field of the Transponder Status bar. 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.

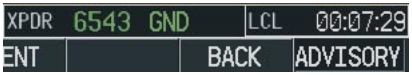

Figure 4-4 Ground Mode

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, the transponder does not reply to interrogations, but new codes can be entered. If the Standby mode is selected, a white **STBY** indication appears in the mode field of the Transponder Status bar.

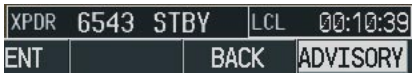

Figure 4-5 Standby Mode

NOTE: *In Standby mode, the **IDENT** function is inhibited.*

Manual ON Mode

The **ON** mode can be selected at any time by pressing the **ON** softkey. **ON** mode generates Mode A and Mode S replies, but Mode C altitude reporting is inhibited. In **ON** mode, a green **ON** indication appears in the mode field of the Transponder Status bar.

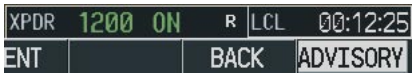

Figure 4-6 ON Mode

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, and all transponder replies requesting altitude information are provided with pressure altitude information.

Figure 4-7 Altitude Mode

Reply Status

When the transponder sends replies to interrogations, an **R** indication appears momentarily in the reply status field of the Transponder Status bar.

Figure 4-8 Reply Indication

CODE SELECTION

Entering a Code

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

To enter a transponder 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, for digit entry.
3. Press the digit softkeys to enter the code in the code field. When entering the code, the next key in sequence must be pressed within 10 seconds, or the entry is cancelled and restored to the previous code. Five seconds after the fourth digit has been entered, the transponder code becomes active.

Figure 4-9 Entering a Code

NOTE: *When entering a code, press the **BKSP** (backspace) softkey to back up and change code digits.*

VFR Code

The VFR code can be entered either manually, each digit at a time, or 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.

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

IDENT FUNCTION

Pressing the **IDENT** softkey sends an ID indication to Air Traffic Control (ATC). The ID return distinguishes your transponder from all others on the air traffic controller's radar screen.

The **IDENT** softkey appears in all levels of transponder softkeys. When the **IDENT** softkey is pressed, a green **IDENT** indication is displayed in the mode field of the Transponder Status bar for a duration of 18 seconds.

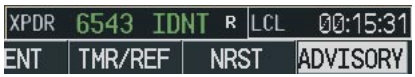

Figure 4-10 IDENT Indication

When the ***IDENT*** softkey is pressed while in Mode or Code Selection, the system reverts to the Top-level softkeys.

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

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GARMIN

G1000™

Audio Panel

5.1 AUDIO PANEL DESCRIPTION

The GMA 1347 is an audio control panel and marker beacon system. Pressing the audio panel keys controls audio selection of COM, NAV, and intercom. LED annunciators indicate when a key function is selected.

The audio panel includes a four-position intercom system (ICS) with electronic cabin noise de-emphasis and two stereo music inputs. Separate knobs control intercom audio level for the pilot and copilot/passenger. The intercom provides four selectable modes of isolation (All, Crew, Pilot, Copilot).

A cabin speaker is available for listening to selected aircraft radios. MASQ (Master Avionics Squelch) processing reduces ambient noise from the avionics inputs.

Each microphone input has an automatic squelch threshold. Manual squelch is available by pressing the **MAN SQ** key.

The audio panel provides a digital recorder that can play back up to two and a half minutes of COM audio. Recording is automatic when a COM signal is received. Playback is controlled by pressing the **PLAY** key. Playback can be stopped by pressing the **MKR/MUTE** key.

The unit controls marker beacon receiver audio and features marker beacon audio muting.

As part of the G1000 Integrated Cockpit System, the GMA 1347 also controls the display reversionary mode.

WARNING: 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.

The audio panel features controls for three (3) major function groups:

- Communication
- Navigation
- Intercom system (ICS)

The controls are labeled to indicate the name of the function. The triangular annunciator above each key indicates when the key function is selected.

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.

TRANSCEIVERS

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

The audio panel handles two separate transceivers:

- **COM1 MIC**
- **COM2 MIC**

MONO/STEREO HEADSETS

Stereo headsets are recommended for use in this aircraft.

Using a monaural headset in a stereo jack shorts the right headset channel output to ground. While this does not damage the audio panel, 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 other positions, any other listener using a stereo headset hears audio in the left ear only, unless their headset has a mono/stereo switch that is set to mono.

UNMUTED/UNSWITCHED INPUTS

The audio panel 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

FRONT PANEL CONTROLS

- Transceiver audio selector keys (**COM1**, **COM2**)
- Transmitter (audio/mic) selection keys (**COM1 MIC**, **COM2 MIC**)
- 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**)
- Intercom manual squelch key (**MAN SQ**)
- Digital recording playback key (**PLAY**)
- Intercom system (ICS) isolation keys (**PILOT**, **COPLT**)
- Volume/squelch knob (**VOL/SQ**)
- Reversionary mode button (**DISPLAY BACKUP**)

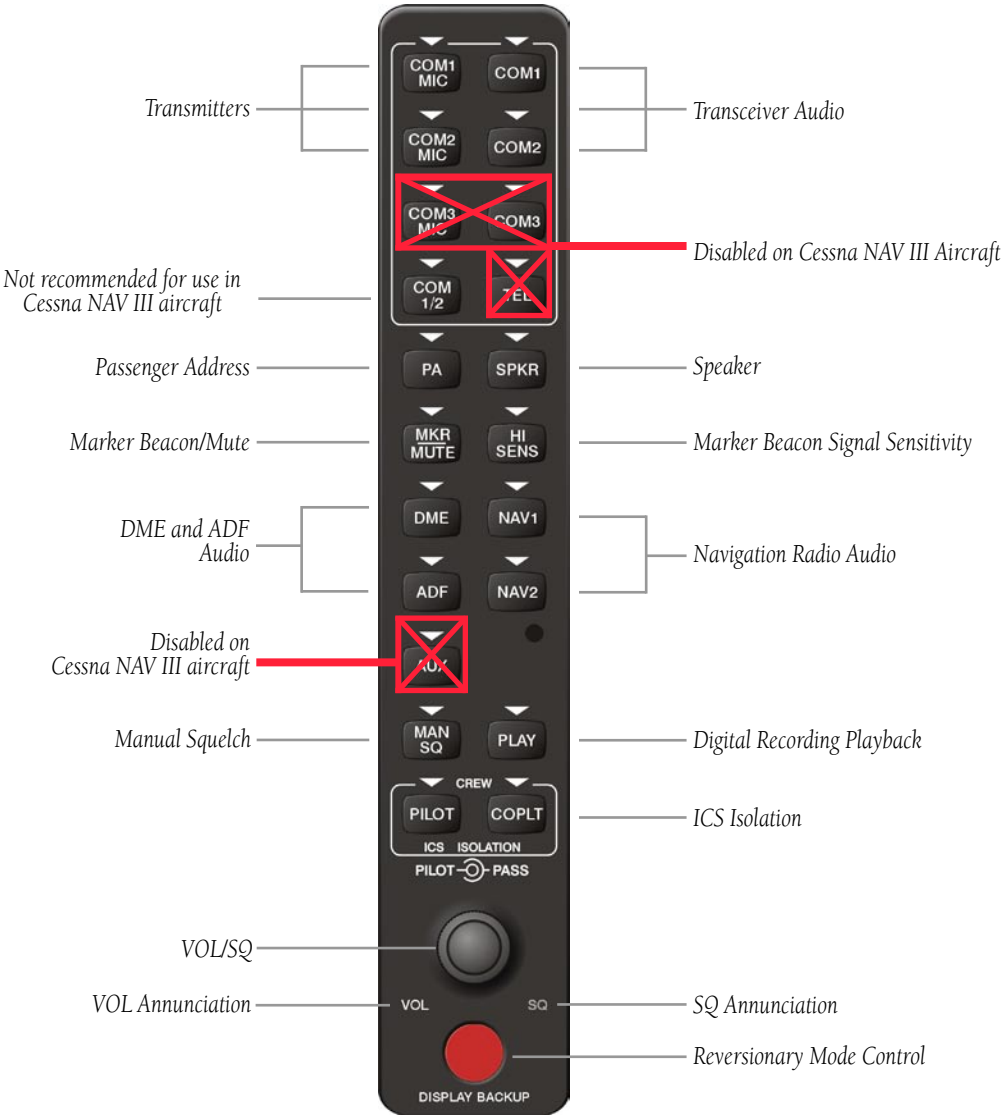


Figure 5-1 Front Panel Controls

5.2 OPERATION

POWER-UP AND FAIL-SAFE OPERATION

Power-up

The audio panel performs a self-test during power-up. All panel annunciator lights illuminate for approximately two seconds. Once the self-test is completed, most settings are restored to the ones in use before the unit was last turned off. The exceptions are the speaker and intercom, which are always selected during power up.

Fail-safe Operation

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.

KEY ANNUNCIATORS

Pressing any key on the audio panel activates and deactivates the function. Triangular annunciators above each key illuminate to show when the function is on or off (Figure 5-2).

LIGHTING

Key annunciators and backlighting are controlled automatically by the PFD.

TRANSCEIVER KEYS

The following four (4) transceiver keys appear at the top of the audio panel front panel: **COM1 MIC**, **COM2 MIC**, **COM1,** and **COM2** (Figure 5-2). COM audio can be selected by pressing either the desired COM key or by pressing a COM MIC key.

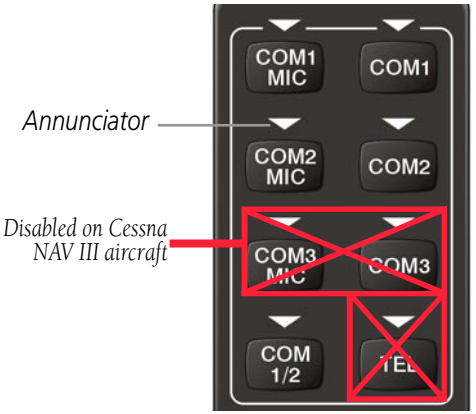


Figure 5-2 Transceiver Keys

COM MIC Keys

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

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

COM Keys

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

Transmitting

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

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.

OPTIONAL COM MUTING

COM muting on receive and COM muting on transmit options can be disabled if desired. Contact a Garmin-authorized service center for details.

COM Muting on Receive

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

When COM muting on receive is enabled, all secondary COM audio is muted during detection of received primary COM audio.

COM Muting on Transmit

When COM muting on transmit is enabled, all secondary COM audio is muted during transmission over the primary COM radio.

SPLIT COM FUNCTION

NOTE: *Split COM performance varies significantly across installations and is affected by both the distance between the antennas and the separation of the tuned frequencies.*

Pressing the **COM 1/2** key selects the split COM function. During split COM operation, the **COM1**, **COM1 MIC**, **COM2,** and **COM2 MIC** keys are active.

When the **COM 1/2** key is selected, COM1 is used by the pilot for transmission and COM2 is used by the copilot. The COM1 MIC annunciator blinks when the pilot's microphone is keyed and the COM2 MIC annunciator blinks when the copilot's microphone is keyed.

In this mode, both the pilot and the copilot can transmit simultaneously over separate radios. The pilot can still monitor NAV1, NAV2, DME, ADF, and MKR audio as selected, but the copilot is only able to monitor COM2.

Split COM mode is cancelled by pressing the **COM 1/2** key again.

PA FUNCTION

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

When PA is selected on the audio panel, the annunciator blinks about once per second, the COM MIC annunciator is no longer lit, and the active COM frequency for that audio panel changes to white, indicating that there is no COM selected.

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

Description and Operation

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

NOTE: *The GMA 1347 is capable of driving external marker beacon lamps.*

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 5-4). The outer marker frequency is 400 Hz with a blue indicator, the middle marker frequency is 1300 Hz with an amber indicator, and the inner marker frequency is 3000 Hz with a white indicator. Refer to Table 5-1 for a summary of the marker beacon signal characteristics.

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

When the **MKR/MUTE** key is selected, the annunciator light illuminates 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.

The marker beacon audio output level is adjustable by a Garmin-authorized service center.

Marker Beacon Signal Sensitivity

Press the **HI SENS** key (Figure 5-3) for increased marker beacon signal sensitivity. The HI SENS function is used to receive an earlier indication of nearing a marker during an approach.

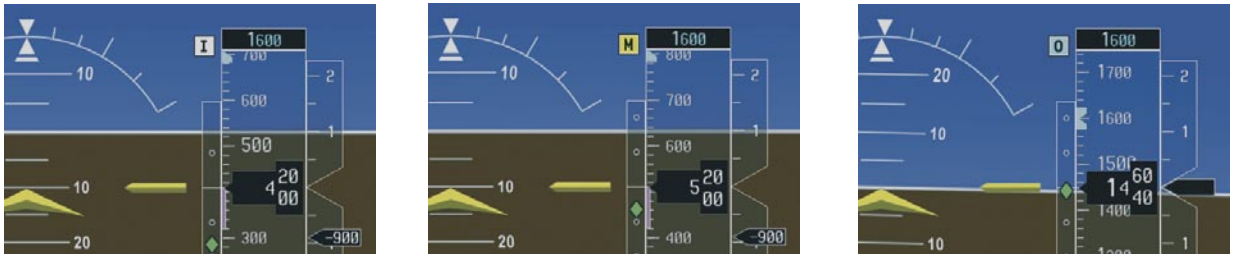
Figure 5-3 Marker Beacon Keys

MARKER BEACON VOLUME ADJUSTMENT

The level of marker beacon receiver audio can be adjusted by a Garmin-authorized service center, if desired.

Beacon	Audio Frequency	Audio Keying	Rate	Lamp Color
Outer Marker	400 Hz	— — —	2 dashes per second	Blue
Middle Marker	1300 Hz	• — • —	95 dot-dash combinations per minute	Amber
Airway/Inner Marker	3000 Hz	• • • •	6 dots per second	White

Table 5-1 Marker Beacon Signal Characteristics



Inner Marker **Middle Marker** **Outer Marker**

Figure 5-4 Marker Beacon Signal Indicator Lights on the PFD

NAVIGATION RADIOS

Pressing **NAV1, NAV2** or optional **DME** or **ADF** selects and deselects the radio source and the annunciator (Figure 5-5). Selected audio can be heard over the headset and the speakers. All radio keys can be selected independently.

When no further navigation radio audio is heard, the amount of background noise is reduced by the Master Avionics Squelch (MASQ) feature.

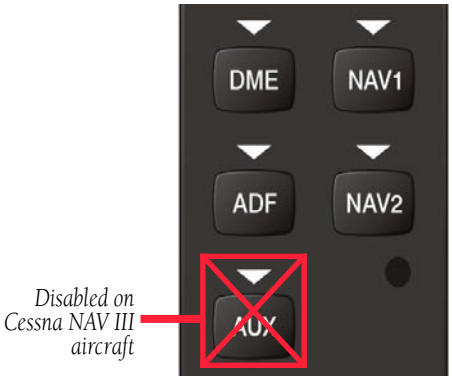


Figure 5-5 Navigation Radio Keys

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. The four (4) possible ICS isolation states are summarized in the table below.

PILOT Mode

PILOT isolation is selected when only the **PILOT** key annunciator is lit. In PILOT mode, the pilot can hear the selected radios. The copilot and passengers can communicate with each other.

COPILOT Mode

COPILOT isolation is selected when only the **COPLT** key annunciator is lit. In COPILOT mode, the copilot is isolated from the selected radios and everyone else. The pilot and passengers can hear the selected radios and communicate with each other.

CREW Mode

CREW mode is selected when both the **PILOT** and **COPLT** key annunciators are lit. In CREW mode, both the pilot and copilot can hear the selected radios and communicate with each other, while the passengers are isolated but can communicate with each other.

ALL Mode

ALL mode is selected when the **PILOT** and the **COPLT** key annunciators are not lit. In ALL mode, everyone hears the selected radios and is able to communicate with everyone else.

Figure 5-6 ICS Isolation Keys

Mode	PILOT KEY ANNUNCIATOR	COPLT KEY ANNUNCIATOR	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 5-2 ICS Isolation Modes

INTERCOM VOLUME AND SQUELCH

The **MAN SQ** key and **VOL/SQ** knob control the volume and squelch of the intercom. The **MAN SQ** key allows either automatic or manual control of the squelch setting. The **VOL/SQ** knob controls volume or manual squelch adjustment for the pilot and copilot/passenger.

When the SQ annunciator is not lit (auto-squelch is on), the **VOL/SQ** knob controls only the volume. When the SQ annunciator is lit (manual squelch), the **VOL/SQ** knob controls both volume and squelch.

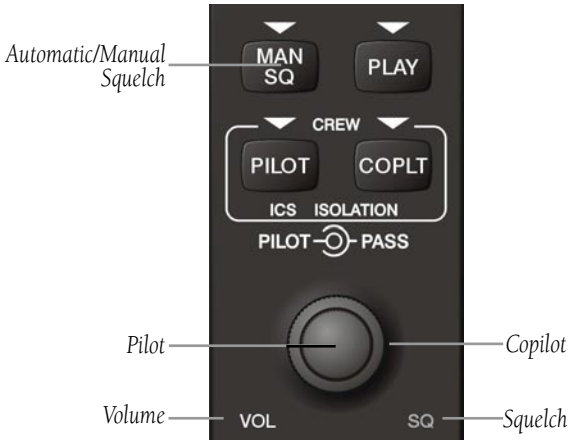


Figure 5-7 Volume/Squelch Control

Intercom Volume Control

The intercom volume is controlled with the **VOL/SQ** knob. The small knob controls the pilot volume. The large knob controls the copilot/passenger volume. Turning the knob clockwise increases volume, turning counterclockwise decreases volume. When squelch is automatic (MAN SQ annunciator is not lit) and the VOL annunciator at the bottom of the unit is lit, intercom volume may be adjusted.

*NOTE: When the **MAN SQ** key is not lit (auto-squelch is active), pressing the **VOL/SQ** knob has no effect on the VOL/SQ selection.*

Intercom Manual Squelch Control

The intercom squelch function has the ability to quiet the ambient cockpit noise when no person is talking. Each microphone input has an automatic squelch threshold. Manual squelch adjustment is also available if desired.

Pressing the **MAN SQ** key toggles between the automatic and manual squelch mode. When in manual squelch, the MAN SQ annunciator is lit.

In manual squelch mode the **VOL/SQ** knob adjusts either the volume or squelch threshold level.

Pressing the **VOL/SQ** knob toggles between volume and squelch adjustment. The annunciator at the bottom of the unit indicates which function the knob is controlling.

In manual squelch mode, the small **VOL/SQ** knob controls pilot squelch threshold. The large **VOL/SQ** knob controls copilot/passenger squelch threshold. Turning either knob clockwise increases squelch level, counterclockwise decreases squelch.

ENTERTAINMENT INPUTS

The GMA 1347 provides two stereo auxiliary entertainment inputs; MUSIC 1 and MUSIC 2. These inputs are compatible with popular portable entertainment devices such as MP3 and CD players. Two 3.5 mm stereo phone jacks are installed in convenient locations for audio connection. The headphone outputs of the entertainment devices are plugged into the MUSIC 1 or MUSIC 2 jacks.

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

NOTE: *MUSIC 1 and MUSIC 2 cannot be completely turned off. Audio level for these inputs can be set above and below a nominal value. Contact a Garmin-authorized service center for adjustment.*

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. MUSIC 1 is always soft-muted when an interruption occurs from an aircraft radio. Soft muting is the gradual return of MUSIC 1 to its original volume level. The time required for MUSIC 1 volume to return at the headset outputs is between one-half and four seconds.

NOTE: *MUSIC 1 muting during ICS activity can be disabled. Contact a Garmin-authorized service center for details.*

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

MUSIC 2

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

GDL 69/69A XM RADIO SYSTEM

When no external entertainment music is connected to the audio panel through MUSIC 1 and MUSIC 2 jacks, audio from the optional GDL 69A is heard by the pilot and passengers simultaneously.

Connecting a stereo input to either MUSIC 1 or MUSIC 2 removes the GDL 69A audio from that input. For example, if passengers prefer music while the pilot listens to the GDL 69A, the entertainment audio would be connected to the MUSIC 2 jack.

Refer to the Optional Equipment Section for more details on the GDL 69/69A.

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 audio panel contains a digital clearance recorder that plays back up to 2.5 minutes of COM signal recording. Recorded COM audio is stored in separate memory blocks. Audio 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 audio 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 5-8 Playback Key

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 audio is recorded as the latest block.

NOTE: ***The recorder can be permanently disabled by a Garmin-authorized service center.***

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

REVERSIONARY MODE

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

Figure 5-9 Reversionary Mode Button

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GARMIN

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Engine Indication System

6.1 INTRODUCTION

The G1000 Engine Indication System (EIS) provides the flight crew with gauges, bar graphs, and numeric readouts of engine parameters. The EIS is displayed on the left side of the MFD during normal operations. In reversionary mode, the GDUs are re-configured to present PFD symbology together with the EIS (the EIS is displayed on the left side).

NOTE: *Refer to the System Overview for information regarding reversionary mode.*

EIS PAGES

The EIS has information on three pages, which are accessed using the **ENGINE** softkey:

- **Engine Page –** This is the default page, which displays all critical engine, fuel, and electrical information.
- **Lean Page –** This page provides engine leaning information and a user interface to perform engine leaning.
- **System Page –** This page displays a numeric readout for the critical engine, fuel and electrical indicators.

EIS INDICATORS

The EIS Pages display engine information using round dial gauges, horizontal bar indicators, bar graphs (see Lean Page), and digital readouts:

NOTE: *All EIS pages show the gauge(s), Fuel Quantity Indicator, and fuel flow.*

Round Dial Gauges

The gauges are color-coded and have a white pointer. A white digital readout appears beneath the gauge.

Figure 6-1 Round Dial Gauges: Manifold Pressure Gauge and Tachometer

Tachometer (RPM)

The tachometer is displayed as a round dial gauge near the top of the page. Propeller speed is shown in revolutions per minute (RPM).

Colors along the arc of the gauge represent:

- **White** (low RPM) – Below normal flight operating range
- **Green** – Normal flight operating range
- **White** (high RPM) – Above normal flight operating range (Models 206 and T206)
- **Red** – Propeller overspeed

Manifold Pressure Gauge (MAN IN) - Models 182, T182, 206, T206

The Manifold Pressure gauge displays the engine power in inches of mercury (in Hg). A white tick mark is displayed indicating the cruise manifold pressure (Model T182 only).

Colors along the arc of the gauge represent:

- **White** (low pressures) – Below normal operating range
- **Green** – Normal operating range
- **White** (high pressures) – Above normal operating range
- **Red** – Maximum manifold pressure (turbocharged)

Horizontal Bar Indicators

These indicators are color-coded and have triangular pointers. Pointers appear in white to indicate operation within the acceptable range. The pointer color changes to yellow or red when operating outside the normal range. The green bands on the horizontal bar indicators represent normal ranges of operation.

Figure 6-2 Horizontal Bar Indicator: Fuel Quantity

Fuel Quantity (FUEL QTY GAL)

The Fuel Quantity Indicator displays the quantity of fuel in the tanks in gallons. The indicator ranges from 0 to F (full). Tick marks are at every 10 gallons, up to 30 gallons (20 gallons for the Model 172). Two pointers labeled L (left) and R (right) indicate the number of gallons in each fuel tank. When full, the indicator displays to 35 gallons per side (26 gallons for the Model 172).

- **Green** – Normal
- **Yellow** – Caution (low)
- **Red** – Warning

Digital Readouts

These readouts appear as white text on a black background, representing areas of normal operation. The color changes to black text on a yellow background (caution) or white text on a red background (warning) upon exceeding areas of normal operation.

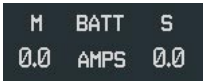

Figure 6-3 Digital Readout: Ammeter

EIS PAGE REVERSION

The EIS automatically defaults back to the Engine Page from the Lean or System Page when any of the following parameters are exceeded:

Parameter	Criterion
Cylinder Head Temperature*	> 500 °F
Oil Temperature	> 245 °F
Oil Pressure	< 20 PSI or > 120 PSI
Battery Current (Main)	< -1 A (discharge)
Battery Current (Standby)	< 0 A (discharge)
Electrical Bus Voltage (Main or Essential)	< 24.5 V or > 32.0 V

Table 6-1 Engine Page Default Criteria

Fluctuations in engine speed and fuel quantity above certain levels, depending on the airframe, also cause reversion back to the Engine Page.

(*) The Cylinder Head Temperature reversion criterion does not apply to the Model 172.

6.2 ENGINE PAGE

The Engine Page is the default page for the EIS page group, and is accessed the first time the **ENGINE** softkey is pressed from the MFD. The Engine Page can be displayed after viewing other EIS pages by pressing the **ENGINE** softkey.

At the top of the page are the dial gauge(s). Beneath are horizontal bar indicators and readouts for critical engine and electrical parameters.

Fuel Flow (FFLOW GPH)

The Fuel Flow Indicator displays current fuel flow in gallons per hour (GPH). Green indicates normal fuel flow, while any area beyond the green band is an indication of abnormal fuel flow.

For turbocharged aircraft, the Fuel Flow Indicator displays a small stand-alone green band indicating maximum takeoff fuel flow, and a wide, vertical white tick mark indicating the maximum cruise fuel flow (Model T182 only).

Oil Pressure (OIL PRES)

The Oil Pressure Indicator displays the pressure of the oil supplied to the engine in pounds per square inch (PSI).

- **Green –** Normal operating range
- **Red –** Warning (minimum and maximum)

Oil Temperature (OIL TEMP)

The Oil Temperature Indicator displays the engine oil temperature in degrees Fahrenheit.

- **Green –** Normal operating range
- **Red –** Warning

Cylinder Head Temperature (CHT) - Models 182, T182, 206, T206

The Cylinder Head Temperature (CHT) Indicator displays the temperature of the hottest cylinder in degrees Fahrenheit. The number of the hottest cylinder appears in the triangle.

- **Green –** Normal operating range
- **Red –** Warning

Exhaust Gas Temperature (EGT)-Normally-Aspirated Aircraft

For normally-aspirated aircraft, the Exhaust Gas Temperature (EGT) Indicator displays the exhaust gas temperature of the hottest cylinder in degrees Fahrenheit. The number of the associated cylinder is indicated in the triangle. There are no color bands associated with this indicator.

Turbine Inlet Temperature (TIT) - Turbocharged Aircraft

NOTE: *The pilot should refer to the Aircraft Flight Manual (AFM) for limitations.*

The Turbine Inlet Temperature (TIT) Indicator displays the temperature at the turbine inlet in degrees Fahrenheit.

- **Green –** Normal operating range
- **Red –** Warning

Vacuum Pressure (VAC) - Model 172

Vacuum pressure is shown on a horizontal bar indicator. The normal operating range is indicated by the green band.

Engine Hours (ENG HRS) - Model 172

Engine hours are shown as a numeric readout beneath the Fuel Quantity Indicator.

Voltmeter (VOLTS)

The Voltmeter displays the main and essential bus voltage.

- **White –** Normal
- **Yellow –** Caution (low and high)
- **Red –** Warning (minimum and maximum)

Ammeter (AMPS)

The Ammeter displays the main and standby battery load in amperes.

- **White –** Normal
- **Yellow –** Caution

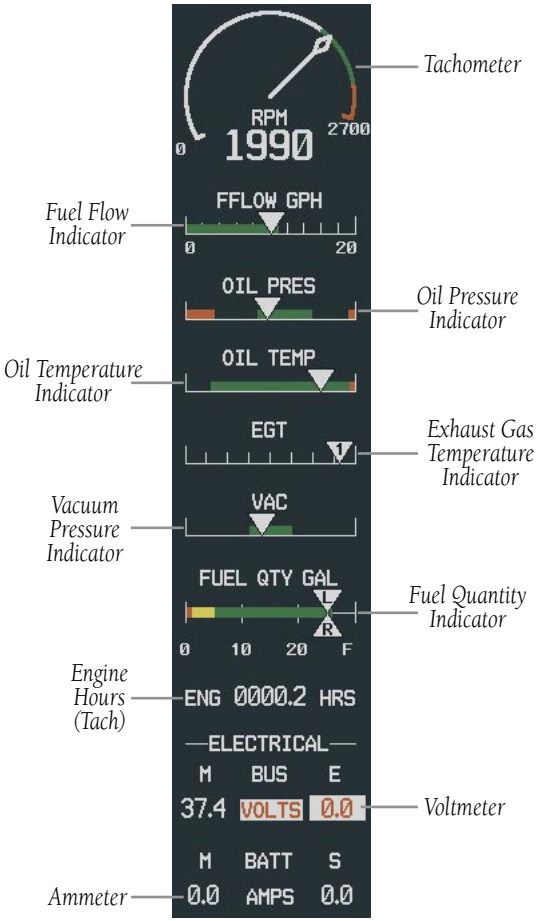

Figure 6-4 Engine Page (172)

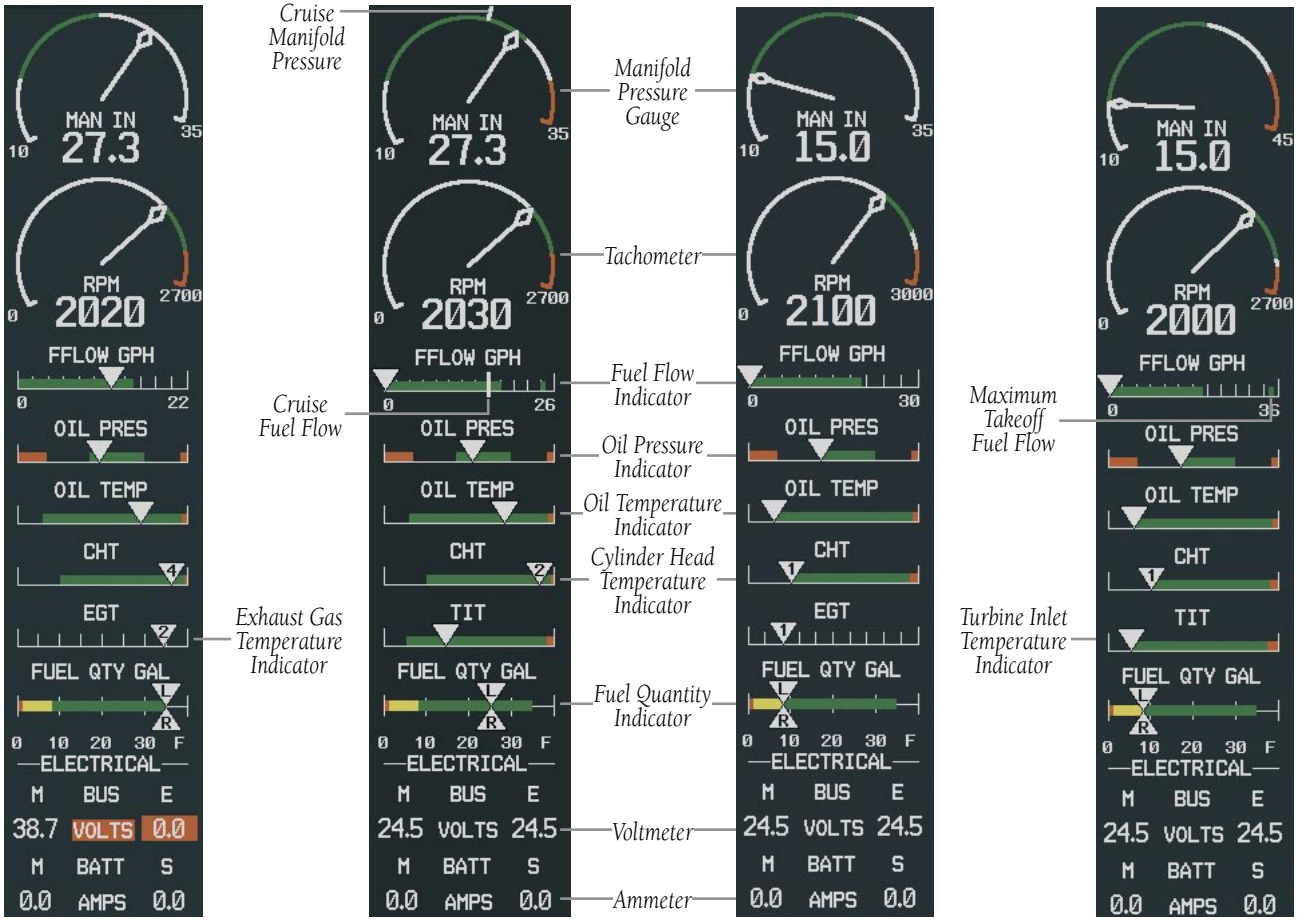

Figure 6-5 Engine Page (182, T182, 206, T206)

6.3 LEAN PAGE

NOTE: *The pilot should follow the engine manufacturer's recommended leaning procedures in the Aircraft Flight Manual (AFM).*

The Lean is accessed by pressing the **LEAN** softkey on the MFD from within the EIS page group. The Lean Page provides information and a user interface for performing engine leaning.

The engine gauge(s) and Fuel Quantity Indicator remain on the Lean Page. The Fuel Flow is listed as a numeric readout.

EGT and CHT Bar Graphs

EGT and CHT for all cylinders are displayed graphically and the numeric readouts for the selected cylinder are provided under the EGT and CHT bar graphs. By default, the hottest cylinder is selected on the EGT and CHT bar graphs. Bars are color-coded as follows:

Cyan (light blue) – Selected Cylinder
White – Normal
Yellow – Caution (CHT only)
Red – Warning (CHT only)

For turbocharged aircraft, the TIT Indicator and readout are shown above the EGT bar graph.

The pilot can utilize the **CYL SLCT** and **ASSIST** softkeys to obtain information about specific cylinders.

Cylinder Select

NOTE: *The CYL SLCT softkey is disabled when the ASSIST softkey is pressed.*

The **CYL SLCT** softkey becomes available after the **LEAN** softkey is pressed. The **CYL SLCT** softkey can be utilized to obtain EGT and CHT information about a particular cylinder. Pressing the **CYL SLCT** softkey cycles through the cylinders.

This softkey is disabled when a cylinder experiences a caution (yellow bar on graph) or warning (red) condition, and remains disabled until the temperature returns to normal (white).

Assist

The **ASSIST** softkey becomes available after pressing the **LEAN** softkey. The **ASSIST** softkey aids in the leaning process by identifying the peak of the first cylinder whose temperature falls. This cylinder's bar on the EGT and CHT bar graphs is highlighted in cyan as the selected cylinder. If the temperature of the peaked cylinder exceeds the peak value, the peak value is not updated.

Monitoring of the cylinder continues until the **ASSIST** softkey is pressed again. Pressing the **ASSIST** again will disable lean assist, remove the peak block from the bar graph and the ΔPEAK Readout, and returns the readout to seeking the hottest cylinder.

Normally Aspirated Aircraft

When a cylinder peaks, its peak is represented by a hollow block on the EGT Bar Graph. The EGT Readout for the peaked cylinder, indicated in cyan, appears directly beneath the bar graph. The system automatically switches to the first peak obtained and displays the temperature deviation from peak (ΔPEAK) in degrees Fahrenheit below the EGT Readout.

Turbocharged Aircraft

Leaning is done with reference to the Turbine Inlet Temperature (TIT) Indicator. When the temperature peaks, the numeric readout (ΔPEAK) appears below the TIT Indicator and displays the difference between peak and current TITs, in degrees Fahrenheit. If a peak is not displayed, underscores are shown until one is established.

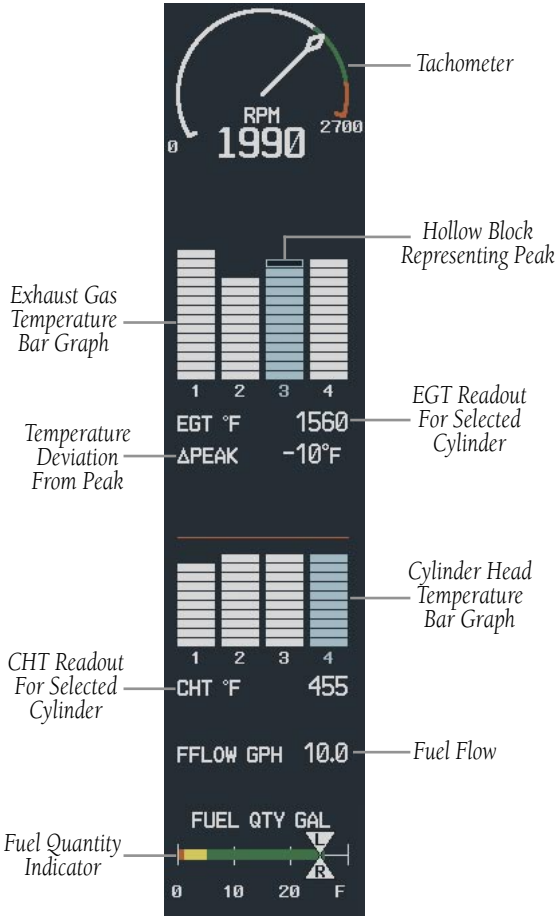

Figure 6-6 Lean Page (172)

Model 182 **Model T182** **Model 206** **Model T206**

Figure 6-7 Lean Page (182, T182, 206, T206)

6.4 SYSTEM PAGE

The System Page is accessed by pressing the **SYSTEM** softkey. Critical engine, fuel, and electrical parameters are displayed on the page. Fuel calculations are also shown on this page.

The engine gauge(s) and Fuel Quantity Indicator remain on the System Page. Numeric readouts for oil pressure and temperature are displayed, and for Models 182, T182, 206, and T206, the Engine Hour Readout and Vacuum Pressure Indicator are also shown. The electrical indicators are at the bottom of the page.

Fuel Calculations

NOTE: *Fuel calculations do not use the aircraft Fuel Quantity Indicator and are calculated from the last time the fuel used was reset.*

NOTE: *The pilot should refer to the Aircraft Flight Manual (AFM) for fuel values and limitations.*

The fuel calculation portion of the System Page is based on the fuel flow totalizer and displays the following:

- **FFLOW GPH –** Fuel flow in gallons per hour
- **GAL USED –** Quantity of fuel used in gallons
- **GAL REM –** Current fuel remaining in gallons as set by the pilot and adjusted for fuel burn since last set

The pilot may use the **RST FUEL** and **GAL REM** softkeys to adjust the amount of fuel remaining for totalizer calculations.

Reset Fuel

Press the **RST FUEL** (Reset Fuel) softkey to reset the amount of fuel used and gallons remaining to zero. Press the **GAL REM** (Gallons Remaining) softkey to display the quantity adjustment softkeys. The **-10 GAL**, **-1 GAL**, **+1 GAL**, **+10 GAL** softkeys may be used to increase or decrease the remaining fuel quantity by the amount denoted by the softkey. Two additional adjustment softkeys are displayed that are airframe specific.

172 - **35 GAL** (filler neck tab) and **53 GAL** (full)

182, T182, 206, T206 - **64 GAL** (filler neck tab) and **87 GAL** (full)

Press these softkeys to enter that amount as gallons remaining.

NOTE: *Fuel calculations do not use the aircraft fuel quantity indicators, and are calculated from the last time the fuel was reset.*

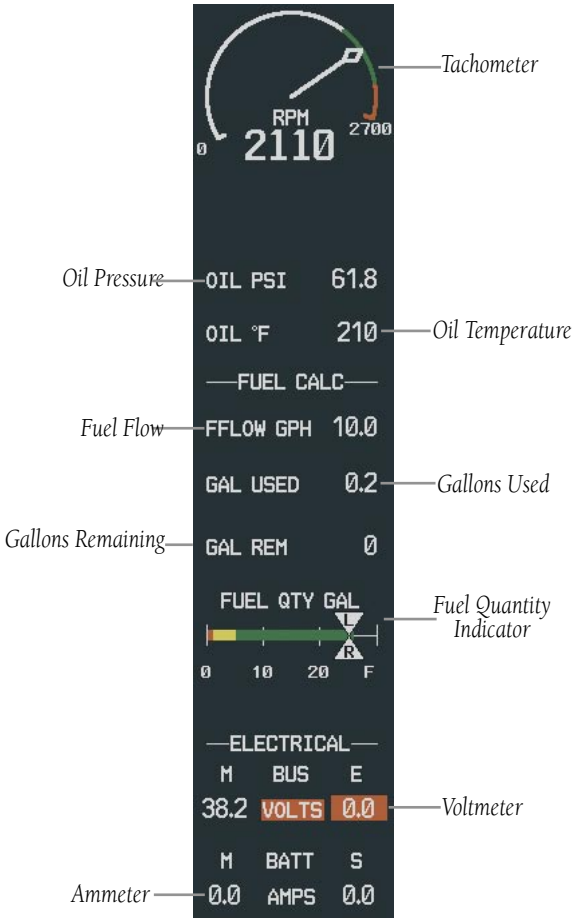

Figure 6-8 System Page (172)

Model 182 **Model T182** **Model 206** **Model T206**

Figure 6-9 System Page (182, T182, 206, T206)

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GARMIN

G1000™

Multi Function Display

7.1 INTRODUCTION

This G1000 Pilot's Guide describes the Multi Function Display (MFD) as installed in the Cessna Nav III aircraft.

DESCRIPTION

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

REVERSIONARY MODE

Should a failure occur in either display, the G1000 automatically enters reversionary mode. In reversionary-mode, critical flight instrumentation is combined with engine instrumentation on the remaining display. Minimal navigation capability is also available on the reversionary mode display. See the System Overview Section for a detailed explanation of the reversionary mode.

OPTIONAL EQUIPMENT

This MFD Pilot's Guide describes the configurable features of the G1000 for the Nav III. Descriptions and procedures relating to the following optional equipment are covered in Section 8.

- L-3 STORMSCOPE® WX-500 Series II Weather Mapping Sensor
- Honeywell® KTA870 TAS/
- GDL 69/69A XM® Radio System

Figure 7-1 MFD Splash Screen

MFD POWER-UP

MFD power up is part of the system power up procedure. See the G1000 System Overview Pilot's Guide for details.

Splash Screen Information

The MFD splash screen (Figure 7-1) displays general system information such as software version and database versions to the pilot upon power-up of the G1000 system. To acknowledge the Splash Screen information and proceed to the Navigation Map Page press the **ENT** key or the right most softkey twice.

***NOTE:** Screen images in this pilot's guide are subject to change and may not reflect current G1000 system software.*

MFD BACKLIGHTING

See the Primary Flight Display Pilot's Guide for instructions on adjusting MFD backlighting.

MFD SOFTKEYS

The MFD softkeys are located below the display screen and provide control over flight management functions including GPS Navigation and flight planning. Figure 7-2 shows an MFD flowchart identifying what functions are available via the softkey labels.

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 optional) – pressing the **CHKLIST** softkey displays the Checklist Page.

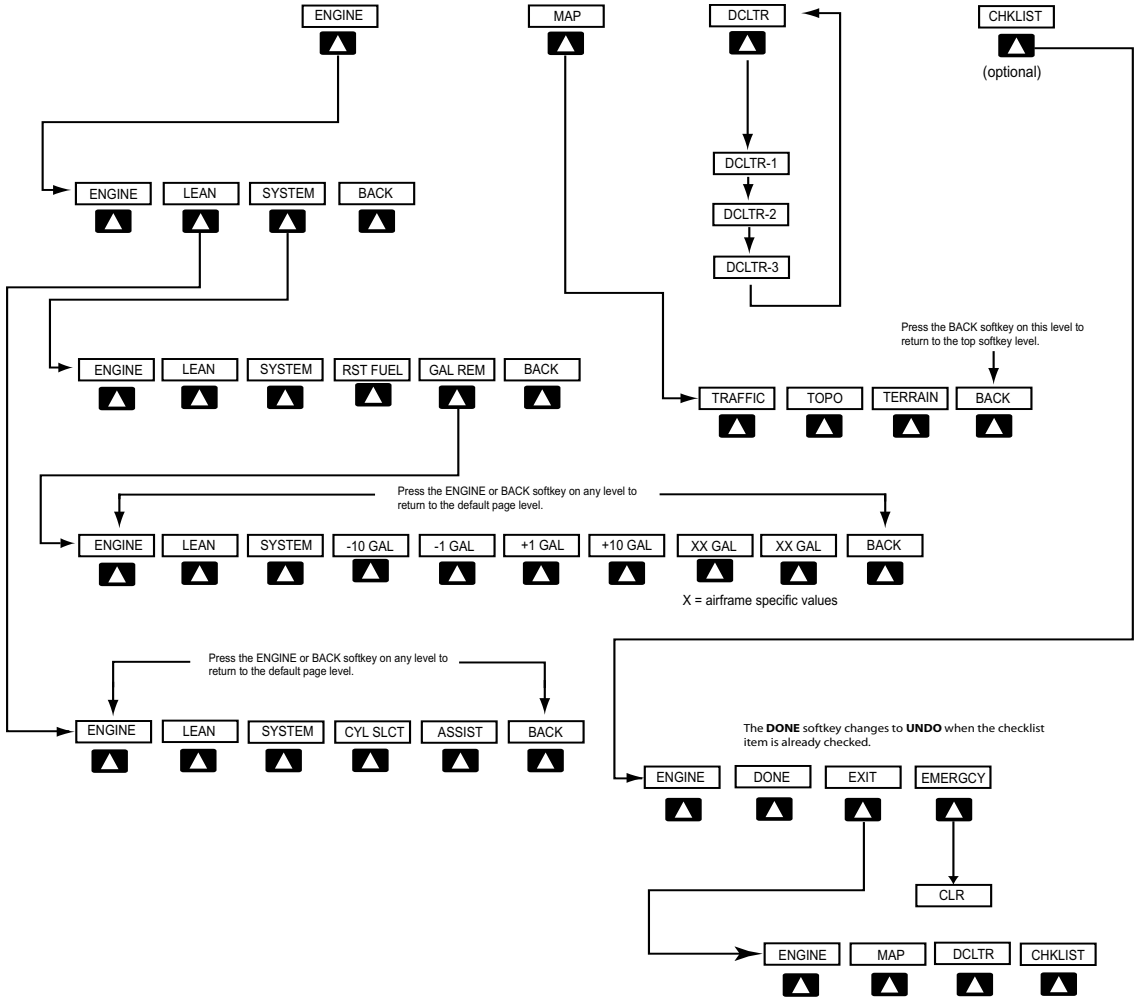

Figure 7-2 MFD Softkeys

ELECTRONIC CHECKLISTS (OPTIONAL)

The G1000 Multi Function Display provides optional 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 Aircraft Flight Manual and the Pilot Safety and Warning Supplements document.*

NOTE: *Garmin is not responsible for the content of the checklists. User-defined checklists are created by the aircraft manufacturer. Additionally, modifications or updates to the checklists are coordinated through the aircraft manufacturer. The user cannot edit the checklists.*

Displaying the Checklist Page (Figure 7-3)

The Splash Screen displays the current checklist file that is installed for the Cessna Nav III aircraft. If no checklist is present, then the Spalsh Sceen 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

Depending on the specific airframe, there are a certain number of groups of procedures with their respective checklists available to the pilot.

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 **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 **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 displayed.

One-Button Access to Emergency Procedures

The **EMERGENCY** softkey is available at all times when the checklist page is displayed. Press the **EMERGENCY** 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 or momentarily hold down the **CLR** key at anytime to exit the Checklist Page and return to the last page that was displayed before the Checklist Page was selected.

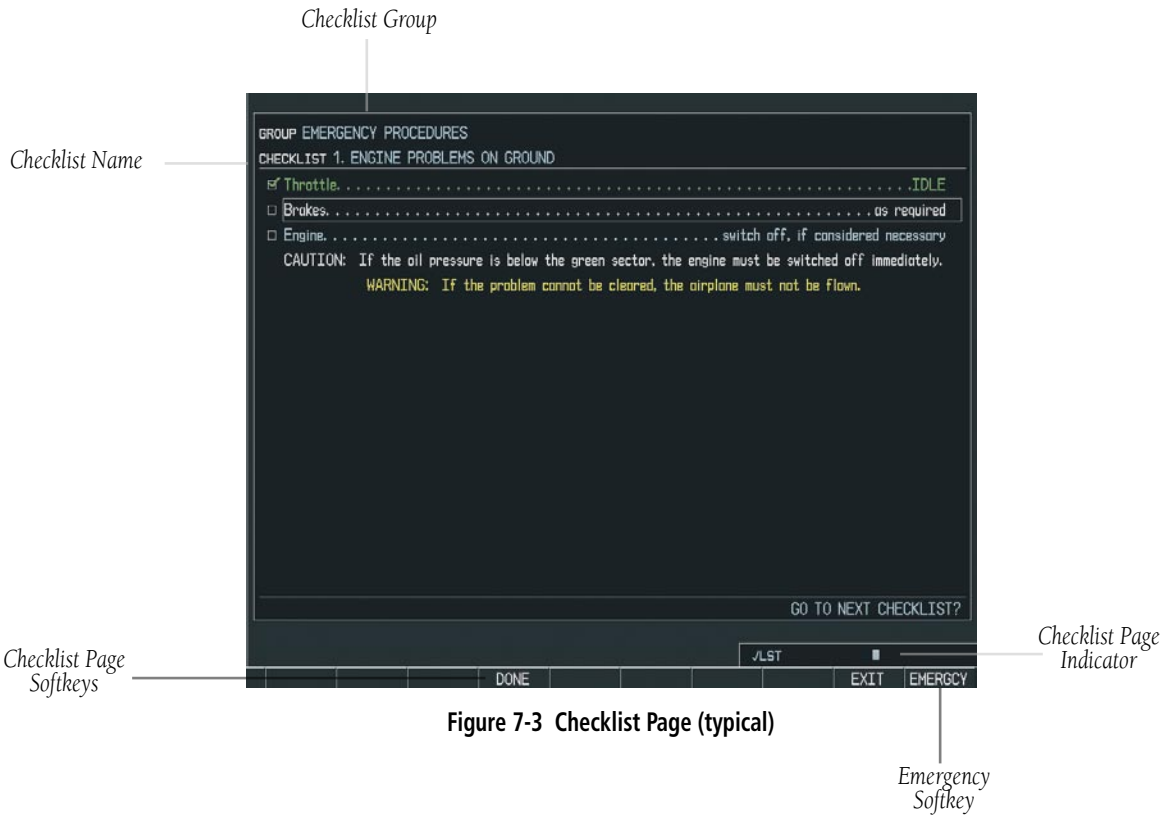

Figure 7-3 Checklist Page (typical)

MFD PAGE GROUPS

The MFD displays GPS/Navigation flight information in four main page groups:

- **Map** (MAP):
  Navigation Map Page
  Traffic Map Page
  Weather Datalink Page (optional)
  Terrain Proximity Page (unless TAWS is configured)
  TAWS (optional)
- **Waypoint** (WPT) :
  Airport Information Page
  Intersection Information Page
  NDB Information Page
  VOR Information Page
  User Waypoint Information Page
- **Auxiliary** (AUX):
  Trip Planning Page
  Utility Page
  GPS Status Page
  System Setup Page
  System Status Page
- **Nearest** (NRST):
  Nearest Airports Page
  Nearest Intersections Page
  Nearest NDB Page
  Nearest VOR Page
  Nearest User Waypoints Page
  Nearest Frequencies Page
  Neatest Airspaces Page

To select a specific page group:

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

Figure 7-4 Page Group Window

To select a different page within the group:

1. Turn the **small right FMS** knob. 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 pages 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 below the status bar.

Figure 7-5 Page Title Window

WORKING WITH MENUS

Much of the operation of the G1000 MFD is accomplished using a menu interface. The G1000 has a bezel-mounted dedicated menu key (**MENU**) when pressed, displays a context-sensitive list of options. This options list allows the pilot to access additional features or make settings changes which specifically relate to the currently displayed page. Some menus provide access to additional submenus that are used to view, edit, select, and review options. Some menus display 'NO OPTIONS' when there are no options for the page selected.

The main keys which are used in association with all page group operations are listed below:

- **CLR –** erases information or cancels an entry. Press and hold **CLR** to immediately display the 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.
- **BACK –** resets the MFD softkeys to their default settings (ENGINE, MAP, DCLTR, MODE, VIEW, etc).
- **DCLTR –** removes information from the moving map in a progressive manner with each key-press.
- **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.

NOTE: *Data is entered using the large and small FMS knob. Practice with them to become efficient at entering data. This will greatly reduce the amount time spent operating the MFD in flight.*

If there are more options than can be displayed turn the **FMS** knob to scroll through the list to identify them. In all cases, once the menu is displayed the **FMS** knob is turned to highlight an item and the **ENT** key is pressed to select that item or the **CLR** key removes the menu and cancels the operation. ***Pressing the softkeys does not display a menu or submenu.***

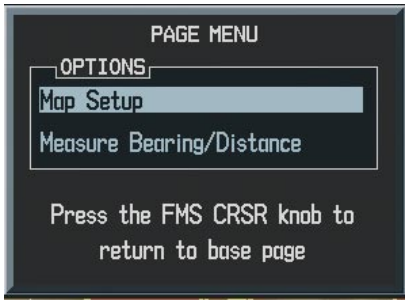

Figure 7-6 Menu with Options

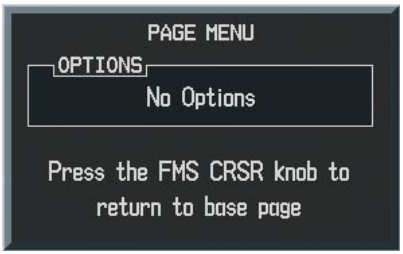

Figure 7-7 Menu with No Options

7.2 NAVIGATION MAP PAGE

***WARNING**: Use of the Navigation Map Page for pilotage navigation is prohibited. The Navigation Map is intended only to enhance situational awareness. Navigation is to be conducted using only current charts, data, and authorized navigation facilities.*

The Navigation Map Page is the first page in the map page group and provides the pilot with the following GPS/Navigation display capability:

- Map display showing airports, navaids, airspaces, land data (highways, cities, lakes, rivers, borders, etc.) with names (labels)
- Map pointer information (distance and bearing to pointer, location of pointer, name and other pertinent information)
- TIS Traffic Data
- Obstacle Data
- Map Zoom Range Legend
- Wind Direction and Speed
- Heading Indication
- Aircraft icon representing present position
- Icons for enabled map features
- Track Vector
- Topography Scale
- Fuel Range Ring
- Topography Data
- Terrain Proximity Data
- TAWS Data

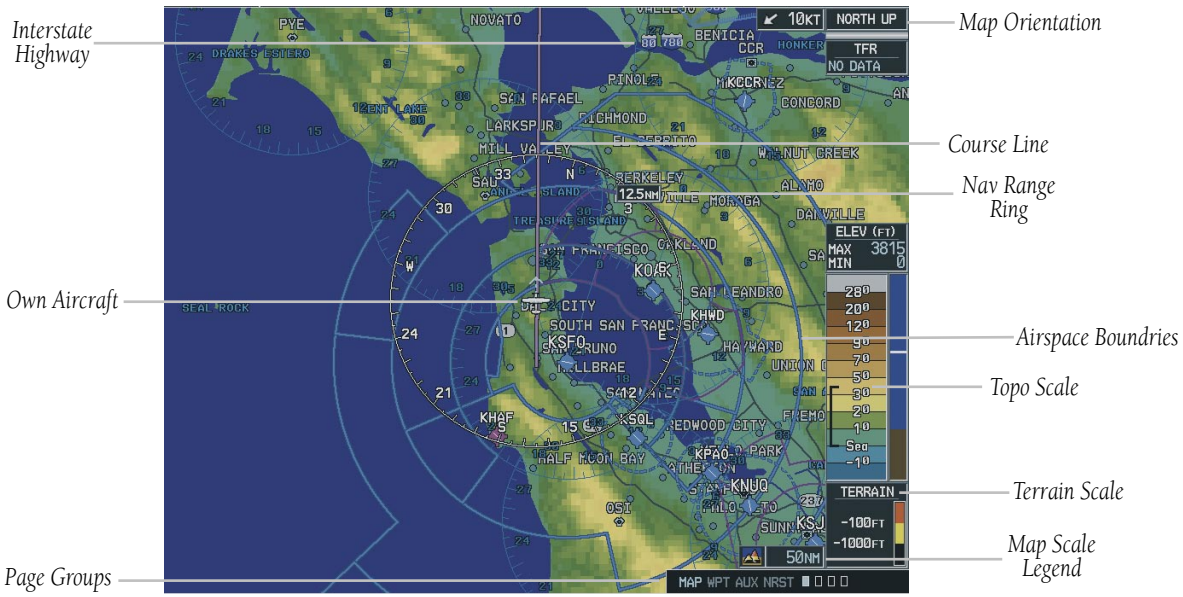

Figure 7-8 Navigation Map Page
(not all features shown)

To select the Navigation Map Page:

1. Turn the **large FMS** knob to select the Map Page group.
2. Turn the **small FMS** knob to select the Navigation Map Page. The page group name and page title is displayed below the navigation status bar; MAP – NAVIGATION MAP. In addition to turning the **large and small FMS** knobs, the Navigation Map Page can be selected from any page by pressing and momentarily holding the **CLR** (DFLT MAP) key.

NAVIGATION MAP PAGE OPERATIONS

The following Navigation Map Page operations can be performed:

- Changing the Map Orientation
- Selecting a Map Range
- Using the Auto Zoom Feature
- Identifying Aviation Map Data
- Decluttering the Map
- Panning the Map
- Displaying Topographic Information on the Navigation Map Page
- Displaying Terrain Information on the Navigation Map Page
- Displaying Traffic on the Navigation Map Page
- MFD Navigation Status Window
- Navigation Map Page Options Menu

Changing the Map Orientation

See the map setup section of this MFD Pilot's Guide for instructions on how to change the map orientation.

Selecting a Map Range

The Navigation Map Page can be set to 23 different range settings from 500 feet to 2000 nautical miles. The current range is indicated in the lower right corner of the Navigation Map Page and represents the **top-to-bottom distance covered by the map**. To change the map range turn the joystick counter-clockwise to zoom in, turn it clockwise to zoom out.

Using the Auto Zoom Feature

The autozoom feature automatically adjusts the map from an enroute range of 2000 nm through each lower range, stopping at a range of 1.5 nm as the aircraft approaches the destination waypoint. See the Map Setup section in this MFD Pilot's Guide for instructions on enabling/disabling the autozoom feature.

Figure 7-9 Map Range Indicator

Identifying Aviation Map Data

The following aviation data is displayed on the Navigation Map Page:

Airport Symbols:

- Non-towered airports (purple in color).
- Towered airports (blue in color).
- Non-serviced airports (displayed as solid circle icons). See Appendix F for symbology definitions.
- Serviced airports (displayed as circles with protruding tick marks pointing to the top, bottom, left, and right portions of the screen).

Classification:

- Unclassified airports (displayed with a question mark "?" character centered within the airport symbol).
- Restricted airports (displayed with the letter "R" centered within the airport symbol).
- Hard surface public airports (displayed with the airports longest runway oriented according to the direction in which it runs centered within the airport symbol).
- Heliports (displayed with the letter "H" centered within the heliport symbol).
- Soft surface public airports (displayed with a hollow circle in the center of the airport symbol).

Airspace:

The Navigation Map Page displays airspace as one of the following colors:

- **Blue**:
  ICAO control area
  Class B, Alert area
  Caution area, Danger area, Prohibited area
  Restricted area, Training area
  Unknown area, Warning area
  Terminal Zone Airspace (ATZ), Class D
- **Purple**:
  Class C
  ICAO terminal control area
  Terminal radar service area (TRSA)
  Mode C area
  Military operations area (MOA)
  Mode C
  Class A
  Class E

Line Style:

The Navigation Map Page displays airspace as one of the following line styles:

- **Solid line**:
  Class C
  ICAO control area
  ICAO terminal control area
  Class B, Terminal radar service area
  Mode C, Class A
- **Dashed line**:
  Mode C tower area
  Class D, Class E
- **Consecutive parallel lines forming a boundary defining the airspace**:
  Military operations area (MOA)
  Warning area, Alert area, Caution area
  Danger area, Prohibited area
  Restricted area, Training area
  Unknown area, Terminal Zone Airspace (ATZ)

***NOTE**: See Appendix F for a complete description of the aviation map symbology used on the Navigation Map Page.*

Decluttering the Map

The Navigation Map Page can be quickly decluttered by repeatedly pressing the **DCLTR** softkey until the desired detail is displayed. The declutter level label is displayed above the **DCLTR** softkey. Note that during an instrument approach, automatic decluttering takes place. Table 7.2.1 lists the features that are turned off at each declutter level.

***NOTE**: Some of the map features are automatically removed at certain zoom ranges due to the map setup configuration for each map item.*

***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 and Obstacles		Small City	Intersections	SUA Group 4
Map Borders		----------	SUA Group 0	Runway Labels
Bearing Line		Freeways	SUA Group 1	
Lightning Strike data (when Stormscope 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	Obstacles	
		Major Political Boundaries		

Table 7-1 Map Declutter Levels

Map Panning

Map panning moves the map beyond its current limits without adjusting the map range. When the panning function is selected by pushing in the joystick, a panning arrow flashes on the map display. A window also appears at the top of the map display showing the latitude/longitude position of the pointer, the bearing and distance to the pointer from the aircraft's present position, and the elevation of the land at the position of the pointer. When the panning arrow crosses an airspace boundary, the boundary is highlighted and airspace information is displayed at the top of the display. The information includes the name and class of airspace, the ceiling in feet expressed in Mean Seal Level (MSL), and the floor in feet MSL.

***NOTE**: The airspace boundary stays highlighted for approximately four seconds before returning to normal shading.*

To pan the map:

1. Push in the **joystick** to display the panning arrow.
2. Move the **joystick** in the general direction of the desired destination to place the panning arrow at the destination location. When the panning arrow is placed on an object, the name of the object is highlighted (even if the name wasn't originally displayed on the map). This feature applies to everything displayed on the map except route lines. When any map feature or object is selected on the map display, features or objects are displayed in the box located at the top of the display. From here, the pilot can designate the waypoint as the Direct-to destination. When the panning arrow crosses an airspace boundary, the boundary is highlighted and airspace information is displayed at the top of the display.
3. To remove the panning arrow and return to the present position, push in the **joystick**.

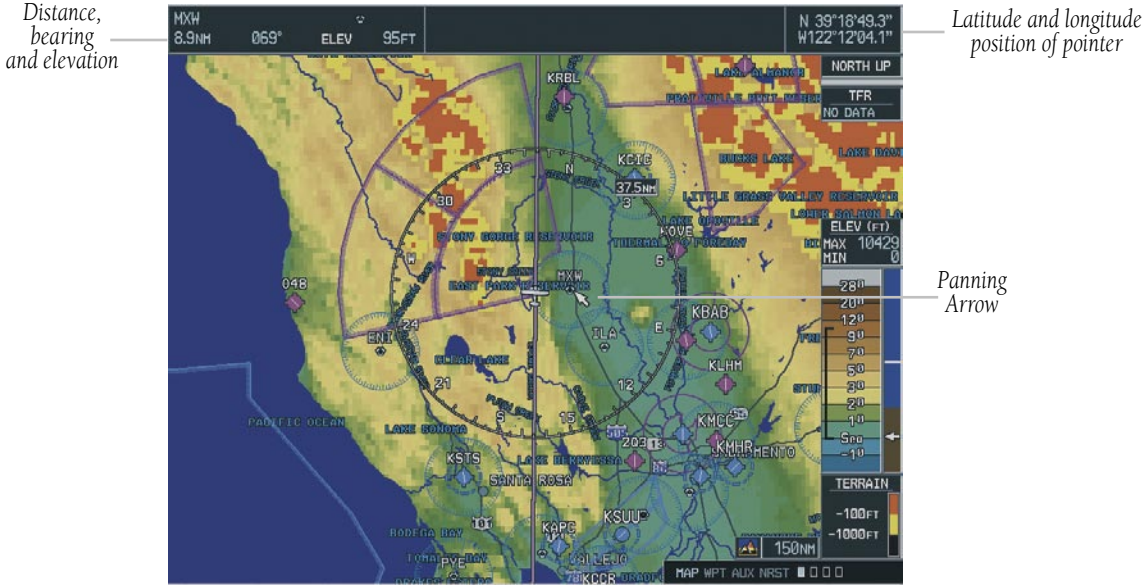

Figure 7-10 Map Panning

Displaying Topographic Data on the Navigation Map Page

The Navigation Map Page displays various shades of topography land colors representing the rise and fall of land elevation similar to aviation sectional charts. The Navigation Map Page can display a topographic scale representing various key points of terrain elevation colors with their associated elevation value labeled.

To display topographic data on the Navigation Map Page:

1. Press the **MAP** softkey.
2. Press the **TOPO** softkey. Topo data can also be displayed on the Navigation Map Page by using the 'On/Off' topo data map setup feature. See the Navigation Map Page setup menu section.

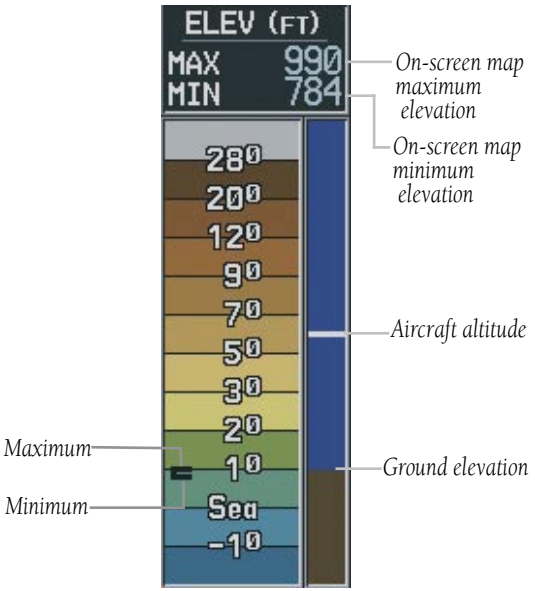

Figure 7-11 Topography Range

***NOTE:** Press the* **TOPO** *softkey again to remove topo data from the Navigation Map Page. When topo data is removed from the page, the Jeppesen Nav data is presented on a black background.*

Displaying Terrain and Obstacles on the Navigation Map Page

Terrain and Obstacles can be displayed on the Navigation Map Page by pressing the **TERRAIN** softkey. Terrain symbology (mountain icons) appear next to the map range in the bottom right corner of the page indicating the presence of terrain data on the map. See the Terrain Proximity Page section for a terrain color interpretation chart.

To display terrain and obstacle data on the Navigation Map Page:

1. Press the **MAP** softkey.
2. Press the **TERRAIN** softkey. Press the **TERRAIN** softkey again to remove terrain data from the Navigation Map Page.

Displaying Traffic on the Navigation Map Page

Pressing the **TRAFFIC** softkey displays Traffic Information Service (TIS) traffic on the Navigation Map Page. TIS is a ground-based service providing relative location of all ATCRBS Mode-A and Mode-C transponder equipped aircraft within a specified service volume.

The TIS ground sensor uses real time track reports to generate traffic notification. Surveillance data includes all transponder-equipped aircraft within the coverage volume. The G1000 displays up to eight traffic targets within a 7.5 nautical mile radius, from 3,000 feet below to 3,500 feet above the requesting aircraft. See Appendix E for a full description of TIS. A traffic symbol appears next to the map range in the bottom right corner of the display indicating the presence of traffic data on the map.

To display traffic on the Navigation Map Page:

1. Press the **MAP** softkey.
2. Press the **TRAFFIC** softkey. Press the **TRAFFIC** softkey again to remove traffic from the Navigation Map Page.

***NOTE:** Traffic and terrain data can also be displayed by using the 'On/Off' Navigation Map Page option. See the Navigation Map Page setup section for details.*

MFD Data Bar

The MFD Navigation Status Window displays four, user-configurable fields which can display the following data:

- Bearing to next waypoint (BRG)
- Distance to next waypoint (DIS)
- Desired track to next waypoint (DTK)
- En-route safe altitude (ESA)
- Estimated Time of Arrival (ETA)
- Estimated Time Enroute (ETE)
- Ground Speed (GS)
- Maximum Safe Altitude (MSA)
- Track angle error (TKE)
- Track angle (TRK)
- Vertical speed required (VSR)
- Cross track error (XTK)
- Currently selected MFD page title

Figure 7-12 MFD Data Bar (default)

NOTE: *Instructions on changing a data field on the MFD Data Bar is given in the System Setup Section.*

Navigation Map Page Options Menu

The Navigation Map Page can be customized using options listed in the Navigation Map Page menu. To display the menu, press the **MENU** key (with the Navigation Map Page displayed). Two options are available: Map Setup, and Measure Bearing/Distance.

Map Setup

The first option is 'Map Setup' which is used to configure the Navigation Map Page including map orientation, land data enable/disable, Jeppesen data enable/disable, automatic zoom, airspace boundaries, and text size.

Map Group Options

Figure 7-13 Map Group Setup Options

Orientation

There are four map orientation selections: North up, Track up, DTK up, and HDG up.

- North up fixes the top of the map to a north heading.
- Track up adjusts the top of the map display to the current ground track.
- Desired Track Up (DTK up) fixes the top of the map display to the desired course.
- Heading Up (HDG up) fixes the top of the map display to the current aircraft heading.

***NOTE**: The Navigation Map Page orientation default setting is 'North Up'.*

To change the map orientation:

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.
3. Turn the **small FMS** knob to select the 'Map' group and press the **ENT** key.
4. Turn the **large FMS** knob to highlight the 'ORIENTATION' field.
5. Turn the **small FMS** knob to select the desired orientation and press the **ENT** key.
6. Press the **FMS** knob to return to the Navigation Map Page.

Auto Zoom

The automatic zoom feature automatically adjusts the map range from 2000 nm through each lower range, stopping at 1.5 nm as the aircraft approaches the destination waypoint.

To enable/disable automatic zoom:

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.
3. Turn the **small FMS** knob to select the 'Map' group and press the **ENT** key.
4. Turn the **large FMS** knob to highlight the 'AUTO ZOOM' field.
5. Turn the **small FMS** knob to select 'On' or 'Off' and press the **ENT** key.
6. Press the **FMS** knob to return to the Navigation Map Page.

Land Data

The Navigation Map Page can display background land data (roads, lakes, borders, etc). The background land data can also be removed from the display (turned off).

To enable/disable land data:

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.
3. Turn the **small FMS** knob to select the 'Map' group and press the **ENT** key.
4. Turn the **large FMS** knob to highlight the 'LAND DATA' field.
5. Turn the **small FMS** knob to select 'On' or 'Off.' and press the **ENT** key.
6. Press the **FMS** knob to return to the Navigation Map Page.

Track Vector

The Navigation Map Page can display a track vector as a dashed cyan line segment with an arrowhead attached to the end, extended to a predicted location in 60 seconds along the current aircraft track. The track vector is useful in minimizing track angle error.

To enable/disable the track vector:

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.
3. Turn the **small FMS** knob to select the 'Map' group and press the **ENT** key.
4. Turn the **large FMS** knob to highlight the 'TRACK VECTOR' field.
5. Turn the **small FMS** knob to select 'On' or 'Off'. Press the **ENT** key to accept the selected option.
6. Press the **FMS** knob to return to the Navigation Map Page.

Wind Vector

The wind vector box is displayed in the upper right corner of the Navigation Map Page and displays wind direction and speed (in knots). Wind direction is indicated by a 360 degree pointing arrow.

To enable/disable the wind vector box:

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.
3. Turn the **small FMS** knob to select the 'Map' group and press the **ENT** key.
4. Turn the **large FMS** knob to highlight the 'WIND VECTOR' field.
5. Turn the **small FMS** knob to select 'On' or 'Off'. Press the **ENT** key to accept the selected option.
6. Press the **FMS** knob to return to the Navigation Map Page.

Nav Range Ring

The Nav range ring shows the direction of travel (ground track) on a rotating compass card. The range of the Nav compass is determined by the map range, 125 feet (500 feet map range) to 500 nm (2000 nm map range).

To enable/disable the Nav range ring:

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.
3. Turn the **small FMS** knob to select the 'Map' group and press the **ENT** key.
4. Turn the **large FMS** knob to highlight the 'NAV RANGE RING' field.
5. Turn the **small FMS** knob to select 'On' or 'Off'. Press the **ENT** key to accept the selected option.
6. Press the **FMS** knob to return to the Navigation Map Page.

Topo Data

Topographic data can be enabled or disabled on the Navigation Map Page using the 'TOPO DATA' setting. The topo data range is the maximum map range that topo data is displayed.

To enable/disable topo data and to select a topo data range:

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.
3. Turn the **small FMS** knob to select the 'Map' group and press the **ENT** key.
4. Turn the **large FMS** knob to highlight the 'TOPO DATA' field.
5. Turn the **small FMS** knob to select 'On' or 'Off'.
6. Press the **ENT** key to accept the selected option. The flashing cursor highlights the range field. TOPO ranges are from Off to 2000 nm.
7. To change the TOPO range setting, turn the **small FMS** knob to display the range list.
8. Turn the **small FMS** knob to select the desired range and press the **ENT** key.
9. Press the **FMS** knob to return to the Navigation Map Page.

***NOTE**: When topographic data is removed from the Navigation Map Page, all cartographic data is automatically removed and the Jeppesen Nav data is presented on a black background.*

Topo Range

The topo range setting enables or disables the topography range box located in the lower right corner of the Navigation Map Page.

To enable/disable the topo range box:

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.
3. Turn the **small FMS** knob to select the 'Map' group and press the **ENT** key.
4. Turn the **large FMS** knob to highlight the 'TOPO Range' field.
5. Turn the **small FMS** knob to select 'On' or 'Off'.
6. Press the **ENT** key to accept the selected option.
7. Press the **FMS** knob to return to the Navigation Map Page.

Terrain Data

Terrain data can be enabled or disabled on the Navigation Map Page using the 'TERRAIN DATA' setting. A data range can also be selected. The data range is the maximum map range that terrain data is displayed.

To enable/disable terrain data and to select a terrain data range:

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.
3. Turn the **small FMS** knob to select the 'Map' group and press the **ENT** key.
4. Turn the **large FMS** knob to highlight the 'TERRAIN DATA' field.
5. Turn the **small FMS** knob to select 'On' or 'Off'.
6. Press the **ENT** key to accept the selected option. The flashing cursor highlights the range field. TERRAIN ranges are from Off to 2000 nm.
7. To change the TERRAIN range setting, turn the **small FMS** knob to display the range list.
8. Turn the **small FMS** knob to select the desired range and press the **ENT** key.
9. Press the **FMS** knob to return to the Navigation Map Page.

Obstacle Data

Obstacle data can be enabled or disabled on the Navigation Map Page using the 'OBSTACLE DATA' setting. A data range can also be selected. The data range is the maximum map range that terrain data is displayed.

To enable/disable obstacle data and to select a terrain data range:

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.
3. Turn the **small FMS** knob to select the 'Map' group and press the **ENT** key.
4. Turn the **large FMS** knob to highlight the 'OBSTACLE DATA' field.
5. Turn the **small FMS** knob to select 'On' or 'Off'.
6. Press the **ENT** key to accept the selected option. The flashing cursor highlights the range field. OBSTACLE ranges are from Off to 50 nm.
7. To change the OBSTACLE range setting, turn the **small FMS** knob to display the range list.
8. Turn the **small FMS** knob to select the desired range and press the **ENT** key.
9. Press the **FMS** knob to return to the Navigation Map Page

Fuel Range Ring (Fuel RNG) (RSV)

The Navigation Map Page can display a fuel range ring which shows the flight distance that the aircraft has remaining. A dashed green circle indicates the transition range to reserve fuel. A solid green circle indicates the range of all fuel, including the reserve fuel. If only reserve fuel remains, the range is indicated by a solid yellow circle.

To enable/disable the fuel range ring and to select a fuel range time:

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.
3. Turn the **small FMS** knob to select the 'Map' group and press the **ENT** key.
4. Turn the **large FMS** knob to highlight the 'FUEL RNG (RSV)' field.
5. Turn the **small FMS** knob to select 'On' or 'Off'.
6. Press the **ENT** key to accept the selected option. The flashing cursor highlights the fuel reserve time field. The time indicated is the time the aircraft can fly with remaining fuel on board.
7. To change the reserve fuel time, turn either the **FMS** knob to enter a time (00:00 to 23:59; hours:minutes). The default setting is 00:45 minutes. Press the **ENT** key.
8. Press the **FMS** knob to return to the Navigation Map Page.

Traffic Group

The display of traffic information on the Navigation Map Page closely resembles TCAS display symbology. Traffic is only displayed on the Navigation Map Page if aircraft heading data is available. If heading is not available, traffic advisories are displayed as non-bearing banners on the Navigation Map Page.

Figure 7-14 Traffic Group Options

To enable/disable traffic data on the Navigation Map Page:

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
3. Turn the **small FMS** knob to select the 'Traffic' group. Press the **ENT** key. The cursor flashes on the 'TRAFFIC' field.
4. Turn the **small FMS** knob to select 'On' or 'Off'.
5. Press the **ENT** key to accept the selected option.
6. Press the **FMS** knob to return to the Navigation Map Page.

The 'Traffic' mode selects which traffic is displayed (all traffic, traffic and proximity advisories, or traffic advisories only). The traffic symbol is the symbol used to depict the type of traffic:

- Traffic Advisories (TA) – Yellow
- Proximity Advisories (PA) – White
- Other – White

Proximity Advisories (PAs) are displayed as solid white Cessnas. PAs are defined as traffic within the 4.0 nm range, within ± 1200 ft. of altitude separation, and are not traffic advisories (TAs).

To select a traffic mode:

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.
3. Turn the **small FMS** knob to select the 'Traffic' group Press the **ENT** key. The cursor flashes on the 'TRAFFIC' field.
4. Turn the **large FMS** knob to highlight the 'TRAFFIC MODE' field.
5. Turn the **small FMS** knob to select the desired option.
6. Press the **ENT** key to accept the selected option.
7. Press the **FMS** knob to return to the Navigation Map Page.

To select a traffic symbol zoom range:

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
3. Turn the **small FMS** knob to select the 'Traffic' group. Press the **ENT** key. The cursor flashes on the 'TRAFFIC' field.
4. Turn the **large FMS** knob to highlight the 'TRAFFIC SMBL' field. Traffic symbol zoom ranges are from Off to 300 nm.
5. Turn the **small FMS** knob to select the desired option.
6. Press the **ENT** key to accept the selected option.
7. Press the **FMS** knob to return to the Navigation Map Page.

The traffic label displays the altitude separation above or below the symbol and the vertical speed sense arrow to the right of the symbol.

To select a traffic label zoom range:

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
3. Turn the **small FMS** knob to select the 'Traffic' group. Press the **ENT** key. The cursor flashes on the 'TRAFFIC' field.
4. Turn the **large FMS** knob to highlight the 'TRAFFIC LBL' field. Traffic label zoom ranges are from Off to 300 nm.
5. Turn the **small FMS** knob to select the desired option.
6. Press the **ENT** key to accept the selected option.
7. Press the **FMS** knob to return to the Navigation Map Page.

Aviation Group Options

• Active Flight Plan (ACTIVE FPL)- the active flight plan zoom range sets the maximum range at which the active flight plan magenta line is displayed on the display (off - 2000 nm).

• Active Flight Plan Waypoint (ACTIVE FPL WPT)- the active flight plan waypoint label size sets the size at which the active flight plan names appear on the display (none, small, medium, and large). The zoom range sets the maximum range at which active flight plan waypoints appear on the display (off - 2000 nm).

• Large, Medium, and Small Airports (LARGE APT, MEDIUM APT, SMALL APT) - The airport label size sets the size at which the large, medium, or small airport names size appear on the display. The zoom range sets the maximum range at which the airports appear on the display:

- Large: off - 500 nm
- Medium: off - 300 nm
- Small: off - 100 nm

• Intersection, Non-Directional Beacon, and VOR Waypoints (INT WAYPOINT, NDB WAYPOINT, VOR WAYPOINT) - The INT, NDB, and VOR label size sets the maximum range at which the navaids names appear on the display. The zoom range sets the maximum range at which the navaids appear on the display:

- INT: off - 30 nm
- NDB: off - 30 nm
- VOR: off - 300 nm

• Airspace Boundaries (CLASS B/TMA, CLASS C/TCA, and CLASS D) - The airspace zoom range sets the maximum range at which the three classes of airspace appear on the display. The zoom range sets the maximum range at which the airspace boundaries appear on the display:

- CLASS B: off - 500 nm
- CLASS C: off - 500 nm
- CLASS D: off - 300 nm

• "Other" Airspace Boundaries (RESTRICTED, MOA (Military), OTHER AIRSPACE, nad TFR (temporary flight restrictions)- the other airspace boundary zoom range sets the maximum range at which restricted, MOA, and other (training, caution, danger, warning and alert areas) airspace boundaries are displayed

- RESTRICTED: off - 500 nm
- MOA (MILITARY): off - 500 nm
- OTHER AIRSPACE: off - 500 nm
- TFR; (only present when GDL 69 is installed): off - 2000 nm

Figure 7-15 Aviation Group Options

To select an aviation group item range:

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.
3. Turn the **small FMS** knob to select the 'Aviation' group. Press the **ENT** key. The cursor flashes on the 'ACTIVE FPL' field.
4. Turn the **large FMS** knob to select the desired option.
5. Turn the **small FMS** knob to select the desired range.
6. Press the **ENT** key to accept the selected option.
7. Press the **FMS** knob to return to the Navigation Map Page.

To select an aviation group item text size:

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.
3. Turn the **small FMS** knob to select the 'Aviation' group. Press the **ENT** key. The cursor flashes on the 'ACTIVE FPL' field.
4. Turn the **large FMS** knob to select the desired option.
5. Turn the **small FMS** knob to select the desired text size.
6. Press the **ENT** key to accept the selected text size.
7. Press the **FMS** knob to return to the Navigation Map Page.

Land Group Options

• Latitude/Longitude (LAT/LON) - the LAT/LON label size sets the size at which latitude/longitude labels appear on the display (none, small, medium, and large). The zoom range sets the maximum range at which LAT/LON waypoints appear on the display (off - 2000 nm).

• Highways, Roads, and Railroads (FREEWAY, LOCAL HWY, LOCAL ROAD, RAILROAD) - The highway and road zoom range sets the maximum range at which highways, roads, and railroads appear on the display:

- FREEWAY: off - 800 nm
- NATIONAL HWY: off - 80 nm
- LOCAL HWY: off - 30 nm
- LOCAL ROAD: off - 15 nm
- RAILROAD: off - 30 nm

• Cities and Towns (LARGE CITY, MEDIUM CITY, SMALL CITY) - The cities and town label size sets the maximum range at which city and town names appear on the display. The zoom range sets the maximum range at which cities and towns appear on the display:

- LARGE CITY (approximate populations greater than 200,000): off - 1500 nm
- MEDIUM CITY (approximate populations greater than 50,000): off - 200 nm
- SMALL CITY (approximate populations greater than 5,000): off - 50 nm

• States and Provinces, Rivers and Lakes, and User Waypoints (STATE/PROV, RIVER/LAKE, USER WAYPOINT) - the label range sets the maximum range at which the three categories appear on the display. The zoom range sets the maximum range at which the three categories appear on the display:

- STATE/PROV: off - 1500 nm
- RIVER/LAKE off - 500 nm
- USER WAYPOINT: off - 300 nm

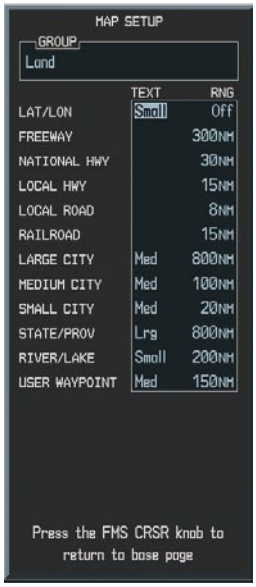

Figure 7-16 Land Group Options

To select a land group item range:

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.
3. Turn the **small FMS** knob to select the 'Land' group. Press the **ENT** key. The cursor flashes on the 'LAT/LON' field.
4. Turn the **large FMS** knob to select the desired option.
5. Turn the **small FMS** knob to select the desired range. Press the **ENT** key to accept the selected option.
6. Press the **FMS** knob to return to the Navigation Map Page.

To select a land group item text size:

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.
3. Turn the **small FMS** knob to select the 'Land' group. Press the **ENT** key. The cursor flashes on the 'LAT/LON' field.
4. Turn the **large FMS** knob to select the desired option.
5. Turn the **small FMS** knob to select the desired text size. Press the **ENT** key to accept the selected option
6. Press the **FMS** knob to return to the Navigation Map Page.

Measure Bearing/Distance

The second map setup option is 'Measure Bearing/Distance' which provides a quick and easy method for determining the bearing and distance between any two points on the Navigation Map Page.

***NOTE:** Pressing the **ENT** key at any location with the 'Measure' option enabled allows bearing and distance from the newly selected position to be acquired.*

To measure bearing and distance between two points:

1. Press the **MENU** key (with the Navigation Map Page displayed).
2. Turn the **small FMS** knob to highlight the 'Measure Bearing/Distance' field and press the **ENT** key. An on-screen reference pointer is displayed on the map display at the aircraft's present position.
3. Move the **joystick** to place the reference pointer at the desired location. The bearing and distance is displayed at the top of the map display. Elevation at the current position is also displayed.
4. To exit the Measure Bearing/Distance option, push in the **joystick** or select 'Stop Measuring' from the page menu options.

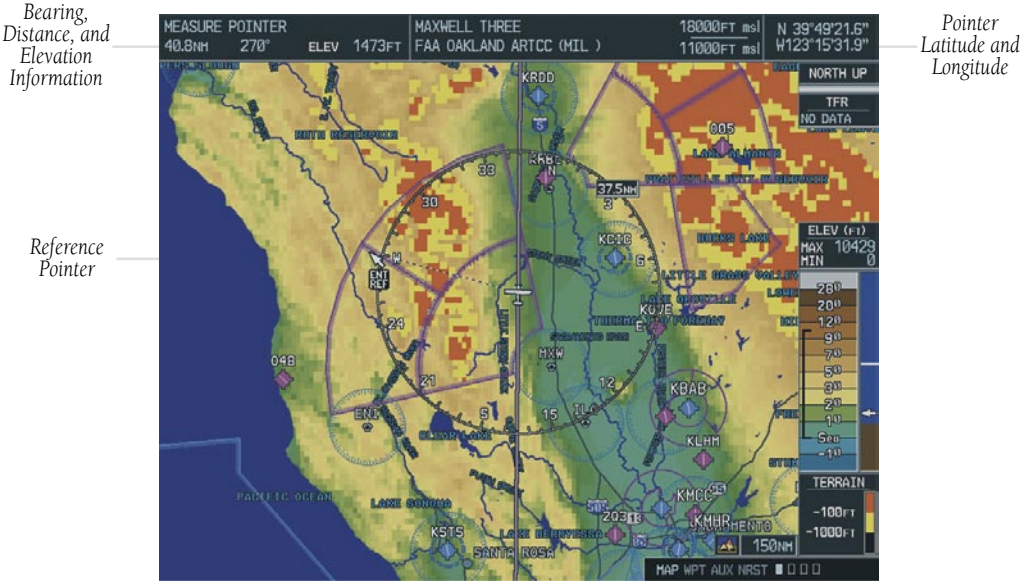

Figure 7-17 Measuring Bearing and Distance

7.3 TRAFFIC MAP PAGE

The Traffic Map Page is the second page in the Map Group and displays the following information:

- Current aircraft location, surrounding Traffic Information System (TIS) traffic, and range marking rings.
- The current traffic mode (OPERATE, STANDBY).
- A traffic alert message (FAILED, DATA FAILED, NO DATA, UNAVAILABLE)
- Traffic display banner (AGE 00:, TRFC COAST, TA OFF Range, TRFC RMVD, TRFC FAIL, NO TRFC DATA, TRFC UNAVAIL, TRAFFIC)

***CAUTION**: Use of the Traffic Map to maneuver the airplane to avoid traffic is prohibited. The Traffic Information System (TIS) is intended for advisory use only. TIS is intended only to help the pilot to visually locate traffic. It is the responsibility of the pilot to see and maneuver to avoid traffic.*

To select the Traffic Map Page:

1. Select the MAP group of pages. Turn the **small FMS** knob to the right to select the Traffic Map Page.

Figure 7-18 Traffic Map Page

TIS SYMBOLOGY

TIS traffic is displayed on the Traffic Map Page according to TCAS symbology. A Traffic Advisory (TA) symbol is displayed as a solid yellow circle (or half circle on the outer range ring if the traffic is outside the range of the dedicated traffic page). All other traffic is displayed as a solid or hollow white diamond. Altitude deviation from the user's aircraft altitude is displayed above the target symbol if they are above own aircraft altitude, and below the symbol if they are below own aircraft altitude. Altitude trend is displayed as an up arrow (+500 ft/min), down arrow (-500 ft/min), or no symbol if less than 500 ft/min rate in either direction. Other symbols:

- Other Traffic – this symbol represents traffic detected within the selected display range that does not generate a TA.
- Traffic Advisory (TA) – this symbol is generated when traffic meets the advisory criteria described previously.
- Traffic Ground Track is indicated on the Traffic Map Page by a "target track vector". The track vector line is projected from the traffic advisory symbol and is drawn at any angle necessary to represent the current track of the traffic advisory data.

NOTE: *Traffic Information Service (TIS) is not available in all areas.*

NOTE: *See Appendix F for traffic symbol descriptions.*

TRAFFIC MAP PAGE OPERATIONS

Power-Up Test

The TIS interface performs an automatic test during power-up. If the system passes the power-up test, the standby screen is displayed on the Traffic Map Page. If the system passes the power-up test, and the aircraft is airborne, traffic is displayed on the Traffic Page in the operating mode.

If the system fails the power up test, the 'NO DATA', 'DATA FAILED', or 'FAILED' message is displayed. Contact your Cessna service center or Garmin dealer for corrective action if the 'DATA FAILED', or 'FAILED' message is displayed. The 'FAILED' message indicates the GTX 33 transponder has failed. The 'DATA FAILED' message indicates data is being received from the GTX 33 but a failure was detected in the data stream. The 'NO DATA' message indicates that data is not being received from the GTX 33.

Changing the Map Range

To change the map range:

1. Turn the **joystick** clockwise to zoom out, or turn the **joystick** counter-clockwise to zoom in. Map ranges are 2 nm, 6 nm, and 12 nm.

NOTE: *Traffic Advisory System (TAS) data and Traffic Information System (TIS) data are mutually exclusive. If TAS is configured (optional) its traffic data is used. If TIS is configured, its traffic data is displayed.*

Operating Mode

Once the aircraft is airborne (determined by system configuration at the time of installation) the system switches from standby mode to operating mode. The G1000 displays 'TIS OPERATING' in the upper left hand corner of the display and begins to display traffic on the Traffic or Map Page. ***The TIS Traffic Advisory (TA) should alert the crew to use additional vigilance to identify the intruding aircraft. Any time the traffic symbol becomes a yellow circle or a voice warning is announced, conduct a visual search for the intruder. Maintain visual contact to ensure safe operation.***

Once the aircraft is on the ground (determined by system configuration at the time of installation) the system switches from operating mode to standby mode. The Traffic Map Page displays 'TIS STANDBY'.

- STANDBY – when the Traffic Map Page displays 'TIS STANDBY' in the status box located in the upper left corner of the Traffic Map Page, the TIS system is in standby mode and cannot display traffic data.
- OPERATE – when the Traffic Map Page displays 'TIS OPERATING' in the status box located in the left corner of the Traffic Map Page, the TIS system is in operational mode and available to display traffic on the Traffic or Map Page.

The pilot can switch between the STANDBY and OPERATE modes to manually override automatic operation using the page menu or softkeys.

To switch between operating modes:

1. Press the **STANDBY** or **OPERATE** softkey to switch between modes. 'TIS STANDBY' or 'TIS OPERATING' is displayed in the status box located in the upper left corner of the Traffic Map Page OR:
2. Press the **MENU** key. The page menu is displayed with 'Standby Mode' or 'Operate Mode' highlighted. Press the **ENT** key on the desired selection.

TIS Audio Alert

A TIS audio alert is generated whenever the number of TAs on the Traffic Map Page display increases from one scan to the next. The limiting to TAs only reduces the amount of "nuisance" alerting due to proximate aircraft. For example, when the first TA is displayed, the pilot is alerted audibly. So long as a single TA aircraft remains on the TIS display, no further audio alert is generated. If a second (or more) TA aircraft appear on the display, a new audio alert is sounded. If the number of TAs on the TIS display decreases and then increases, a new audio alert is sounded. The TIS audio alert is also generated whenever TIS service becomes unavailable. The volume of the audio alert (including the choice between a male or female voice) is configured during installation. The following TIS audio alerts are available:

- "Traffic" - TIS traffic alert is received.
- "Traffic Not Available" - TIS service is not available or out of range.

TIS Traffic Status

The MFD indicates the following TIS traffic status to the pilot.

Traffic Banner

- AGE - if traffic data is not refreshed within 6 seconds, an age indicator (i.e., 'AGE 00:06') is displayed in the lower left corner of the display (when displaying traffic). After another 6 seconds, if data is still not received, the traffic is removed from the display. The pilot should be aware that the quality of displayed traffic is reduced in this condition.
- TRFC COAST - the 'TRFC COAST' (traffic coasting) banner located above the AGE timer indicates that displayed traffic is held even though the data is stale. The pilot should be aware that the quality of displayed traffic is reduced in this condition.
- TRFC RMVD - the 'TRFC RMVD' banner indicates that traffic has been removed from the display due to the age of the data being too old to "coast" (for the time period of 12-60 seconds from the last receipt of a TIS message). The pilot should be aware that traffic may be present but not shown.
- TA OFF - the 'TA OFF' scale banner displayed in the lower left corner of the display indicates that a traffic advisory is outside the selected display range. The traffic advisory off range banner is removed when the traffic advisory is within the selected display range.
- TRAFFIC - on the PFD, when the system receives a traffic advisory a flashing 'TRAFFIC' alert is displayed in the upper left hand portion of the display. The PFD inset map also automatically displays traffic data.

7.4 TERRAIN PROXIMITY PAGE

CAUTION: *Use of Terrain Proximity information for primary terrain avoidance is prohibited. The Terrain Proximity Map is intended only to enhance situational awareness. It is the pilot's responsibility to provide terrain avoidance at all times.*

The Terrain Proximity Page displays the following:

- Current aircraft location
- Range marking rings (25 nm, 25/50 nm, 50/100 nm, and 100/200 nm)
- Heading Box (North Up, Track Up, DTK Up, HDG Up). Heading on the Terrain Proximity Page displays 'HDG Up' map data unless there is no valid heading
- Terrain
- Terrain Range - Indicates the terrain elevation in colors relative to the aircraft altitude (Figure 7.4.2)
- Obstacles

NOTE*: Terrain data is not displayed when the aircraft latitude is greater than 75 degrees north or 60 degrees south.*

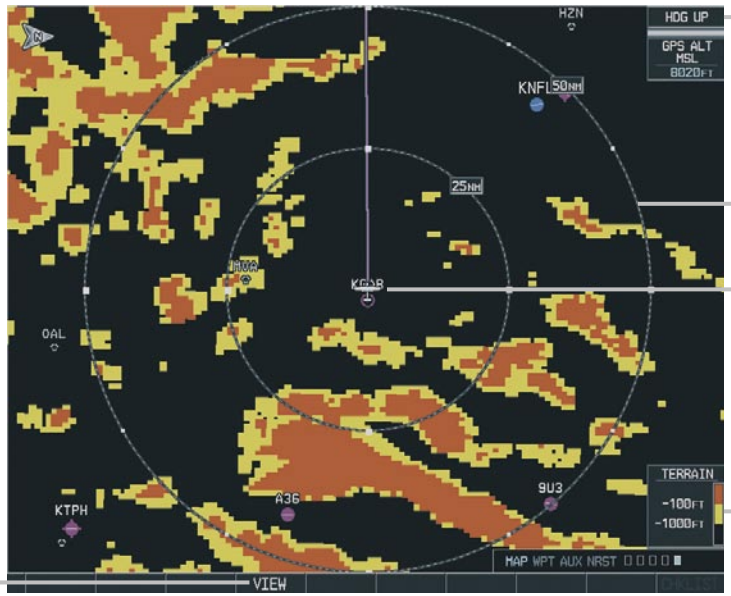

Figure 7-19 Terrain Proximity Page

TERRAIN PROXIMITY PAGE OPERATIONS

There are two terrain/obstacle viewing options available (relative to the position of the aircraft), a radar-like ARC (120°) display and a 360° default display.

To change the viewing mode between 360° and ARC:

1. Select the Terrain Proximity Page
2. Press the **VIEW** softkey. Press the **ARC** softkey.
3. To return to the 360 degree viewing display press the **360** softkey OR:
4. Press the **MENU** key. The page menu is displayed with 'View Arc' or 'View 360°' highlighted. Press the **ENT** key on the desired selection.

To change the map range on the Terrain Proximity Page:

1. Turn the **joystick** clockwise zoom out or turn the **joystick** counter-clockwise zoom in. Map ranges are 25 nm, 25/50 nm, 50/100 nm, and 100/200 nm.

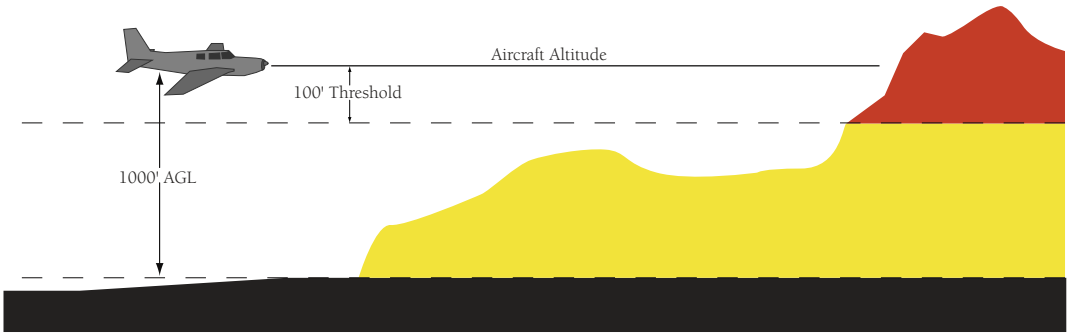

Figure 7-20 Terrain Scale

DISPLAYING OBSTACLE DATA

The Terrain Proximity Page displays obstacle data with heights greater than 200 feet Above Ground Level (AGL) located at their geographical position location throughout the world. Obstacles are displayed in three levels. The G1000 will adjust colors on the Terrain Proximity Page automatically as the aircraft altitude changes. The display color patterns are as follows:

- SAFE
- CAUTION
- WARNING

GRAY-Safe

Obstacle data is displayed in gray when the obstacle height (MSL) is greater than 1000 feet below the current aircraft altitude.

YELLOW-Caution

Obstacle data is displayed in yellow when the obstacle height is 100 feet below MSL the current aircraft altitude to 1000 feet below the current aircraft altitude.

RED-Critical

Obstacle data is displayed in red when the obstacle height is at or above 100 feet Mean Sea Level (MSL) below the current aircraft altitude.

Obstacle Shapes

Obstacle shapes and defining criteria are found in Appendix F.

NAVIGATION MAP DISPLAY CONDITIONS

The Map Setup Page Menu has 'OBSTACLE' and 'TERRAIN feature On/Off options. The Terrain Proximity Page displays or does not display obstacles on the Navigation Map Page based on the selection of each as summarized in the table below:

TERRAIN FEATURE	OBSTACLE FEATURE	TERRAIN PROXIMITY PAGE
OFF	OFF	NO OBSTACLES DISPLAYED
OFF	ON	SAFE, CAUTION, AND WARNING OBSTACLES DISPLAYED
ON	OFF	CAUTION AND WARNING OBSTACLES DISPLAYED
ON	ON	SAFE, CAUTION, AND WARNING OBSTACLES DISPLAYED

***Note**: Obstacles are only displayed at certain map zoom ranges, on certain map fields, and will only be displayed if an obstacle database is loaded on the SD card.*

***Note**: The table above is only for the Navigation Map Page. The Terrain Proximity Page always shows ONLY caution and warning obstacles.*

7.5 TERRAIN AWARENESS & WARNING SYSTEM (TAWS) DISPLAY (OPTIONAL)

NOTE: *Terrain data is not displayed when the aircraft latitude is greater than 75 degrees north or 60 degrees south.*

NOTE: *TAWS operation is only available when the G1000 is configured for a TAWS-B installation.*

DISPLAYING TERRAIN ON THE TAWS PAGE

1. Turn the **large FMS** knob to select the Map Page Group.
2. Turn the **small FMS** knob to select the TAWS Page, whichever is configured.
3. If desired, press the **VIEW** softkey to access the **ARC** and **360** softkeys. When the **ARC** softkey is pressed, a radar-like 120° view is displayed. Press the **360** softkey to return to the 360° default display.
4. Rotate the **JOYSTICK** clockwise to display a larger area or rotate counter-clockwise to display a smaller area.

Figure 7-21 TAWS Page (360° View)

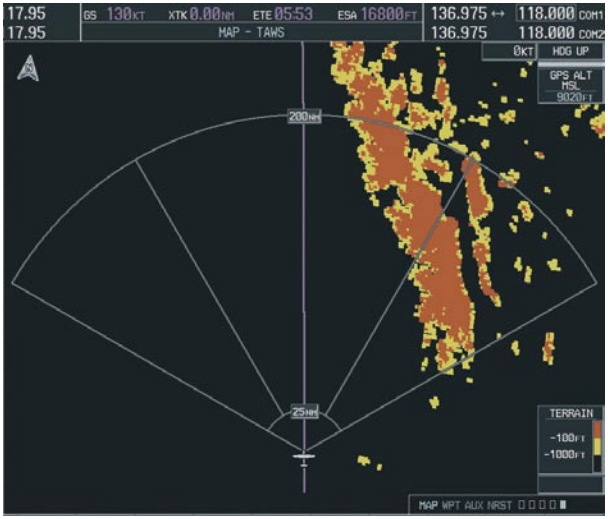

Figure 7-22 TAWS Page (ARC View)

Enable/Disable Aviation Data

1. While the TAWS Page is displayed, press the **MENU** key.
2. Turn the **small FMS** knob to select "Show (or Hide) Aviation Data".
3 Press the **ENT** key.

Figure 7-23 TAWS Page Menu

Color	Terrain/Obstacle Location	Alert Level	Suggested Pilot Response
Red	Terrain/Obstacle is within 100' or above aircraft altitude.	WARNING	Initiate climb and/or turn away from terrain/obstacle.
Yellow	Terrain/Obstacle is within 1000' of aircraft altitude.	CAUTION	Be aware of surroundings. Be prepared to take action.
Black	Terrain/Obstacle is more than 1000' below aircraft altitude.	NO DANGER	No action required.

Table 7-2 TAWS Color Definitions

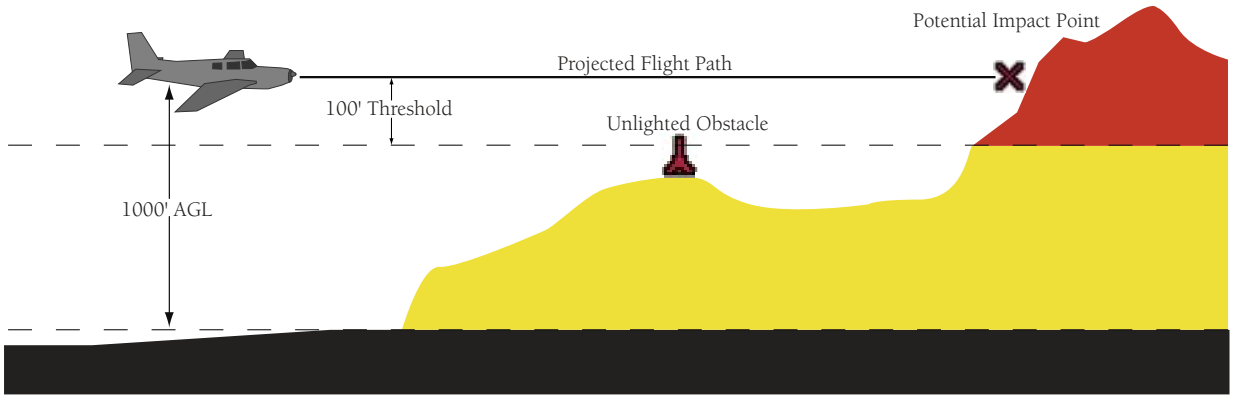

Figure 7-24 TAWS Terrain/Obstacle Locations

TAWS Inhibit

Flying VFR into an area where unique terrain exists could cause the system to annunciate a nuisance alert. When TAWS is inhibited, only FLTA and PDA alerts are disabled.

To Inhibit TAWS:

1. While the TAWS Page is displayed, press the **MENU** key.
2. Turn the **small FMS** knob to select'Inhibit TAWS'.
3. Press the **ENT** key.

To Enable TAWS:

1. While the TAWS Page is displayed, press the **MENU** key.
2. Turn the **small FMS** knob to select 'Enable TAWS'.
3. Press the **ENT** key.

Manual System Test

A system test is automatically performed at power-up. After sucessful completion of the test, "***TAWS System Test, OK***" will be heard.

The system test may also be initiated manually, but only when the aircraft is on the ground. To manually verify proper operation of the aural and visual annunciations of the system, perform the following steps.

1. While the TAWS Page is displayed, press the **MENU** key.
2. Turn the **small FMS** knob to select 'Test TAWS'.
3 Press the **ENT** key. During the test 'TAWS TEST' is displayed in the center of the TAWS Page.

   When all is in working order, "TAWS System Test, OK" will be heard.

Forward Looking Terrain Avoidance (FLTA)

The Forward Looking Terrain Avoidance alert is composed of two sub-functions:

Reduced Required Terrain Clearance (RTC) and Reduced Required Obstacle Clearance (ROC)

This provides alerts when the aircraft flight path is above terrain and/or obstacles, yet is projected to come within minimum clearance values outlined in the following table. When an RTC or ROC alert is issued, a potential impact point is displayed on the TAWS Page as a yellow or red 'X'.

Imminent Terrain Impact (ITI) and Imminent Obstacle Impact (IOI)

This provides alerts when the current aircraft altitude is below the elevation of terrain in the aircraft's projected path and the vertical flight path is calculated to come within minimum clearence values outlined in the following table. ITI and IOI alerts are accompanied by a potential impact point displayed on the TAWS Page as a yellow or red 'X'.

Phase of Flight	Level Flight	Descending
Enroute	700 ft.	500 ft.
Terminal	350 ft.	300 ft.
Approach	150 ft.	100 ft.
Departure	100 ft.	100 ft.

During the final approach phase of flight, RTC/ROC/ITI/IOI alerts are automatically inhibited when the aircraft is below 200 feet AGL while within 0.5 nm of the approach runway or is below 125 feet AGL while within 1 nm of the runway.

Premature Descent Alert (PDA)

A Premature Descent Alert is issued when the system detects that the aircraft is significantly below the normal approach path to a runway. The PDA alert mode functions only during descent to land. There are three different scenarios to consider with PDA:

- No Approach Loaded - PDA alerting begins when the aircraft is within 15 nm of the destination airport and ends when the aircraft is either 0.5 nm from the runway threshold OR is at an altitude of 125 feet
- AGL while within 1 nm of the threshold. During the final descent, algorithms will set a threshold for alerting based on speed, distance, and other parameters.
- Non-Precision Approach Loaded - PDA alerting begins when the FAF is the active waypoint AND the aircraft is within 15 nm of the destination airport. Again, algorithms are used to set a threshold for alerting based upon various parameters. PDA alerting ends at 0.5 nm from the runway threshold OR at an altitude of 125 feet AGL while within 1 nm of the threshold.
- ILS Approach Loaded—PDA alerting begins when the FAF is the active waypoint AND the aircraft is within 15 nm of the destination airport. Prior to reaching the FAF, a PDA alert will be issued if the aircraft descends 200 feet below the FAF altitude. Once the aircraft intercepts the glideslope, PDA will alert the pilot if the aircraft descends 0.7 degrees below the glideslope. PDA alerting ends 0.5 nm from the runway threshold OR at an altitude of 125 feet AGL while within 1 nm of the threshold.

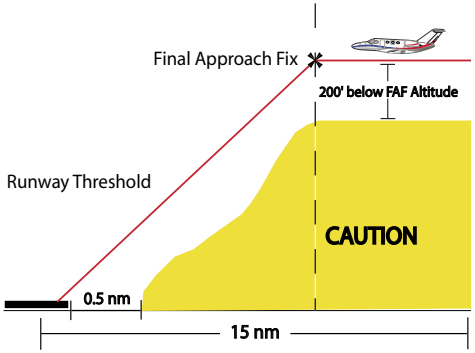

Figure 7-25 Non-Precision Approach PDA Alert Threshold

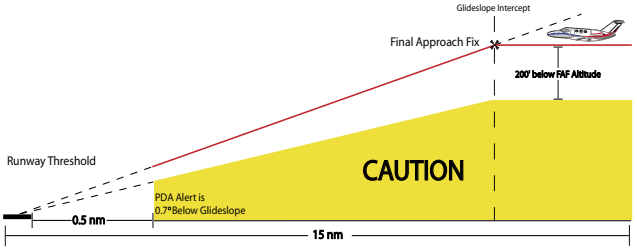

Figure 7-26 ILS Approach PDA Alert Threshold

Excessive Descent Rate Alert (EDR)

The purpose of the Excessive Descent Rate alert is to provide suitable alerts when the aircraft is determined to be closing (descending) upon terrain at an excessive speed. Figure 7-27 displays the correlation between height above terrain and descent rate, resulting in the two EDR alerts. EDR alerts have two levels of severity, caution (sink rate) and warning (pull-up).

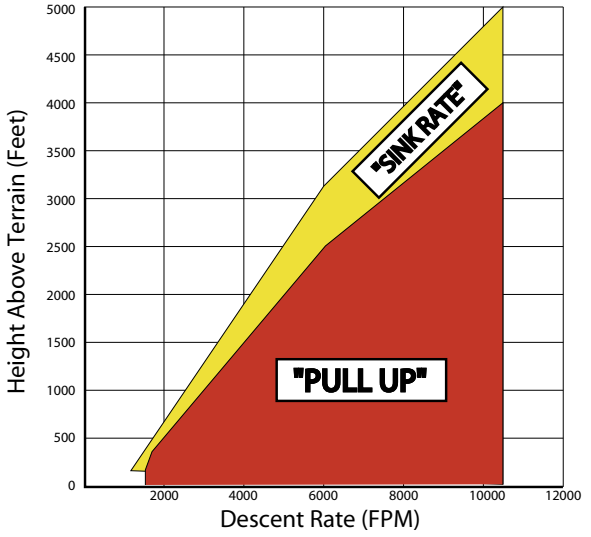

Figure 7-27 Excessive Descent Rate

Negative Climb Rate After Takeoff Alert (NCR)

The purpose of the Negative Climb Rate After Takeoff alert is to provide suitable alerts to the pilot when the system determines that the aircraft is losing altitude (closing upon terrain) after takeoff. The aural message "***Don't Sink***" is given for NCR alerts, accompanied by an annunciation and a pop-up terrain alert on the display.

NCR is only activated during the departure phase of flight under the following conditions:

A) height above the terrain is less than 700 feet
B) the aircraft is less than 2 nm from the departure airport
C) heading change from the departure heading is less than 110 degrees.

"Five-Hundred" Aural Alert

The purpose of the aural alert message "Five-hundred" is to provide an advisory alert to the aircrew that the aircraft is five-hundred feet above terrain. When the aircraft descends within 500 feet of terrain, the aural message "***Five-hundred***" is heard. There are no display annunciations or pop-up alerts that accompany the aural message.

This function is enabled when the aircraft's height above the terrain is more than 675 feet. It is disabled when the aircraft's height above the terrain becomes less than 500 feet.

Displaying Terrain and Obstacles on the Navigation Map

1. With the Navigation Map displayed, press the **MAP** softkey.
2. Press the **TERRAIN** softkey. Terrain and obstacle proximity will now be displayed on the map.

Unlighted Obstacle (Height is less than 1000' AGL)	Lighted Obstacle (Height is less than 1000' AGL)	Unlighted Obstacle (Height is greater than 1000' AGL)	Lighted Obstacle (Height is greater than 1000' AGL)	Potential Impact Points
				

Figure 7-28 TAWS Symbols

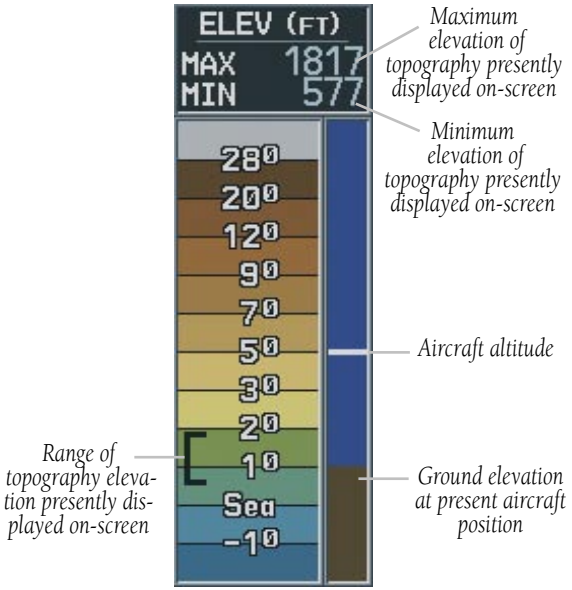

Figure 7-29 Topography Scale

Pop-up Alerts

When a terrain or obstacle alert is issued, a pop-up window is displayed on the MFD with the appropriate alert.

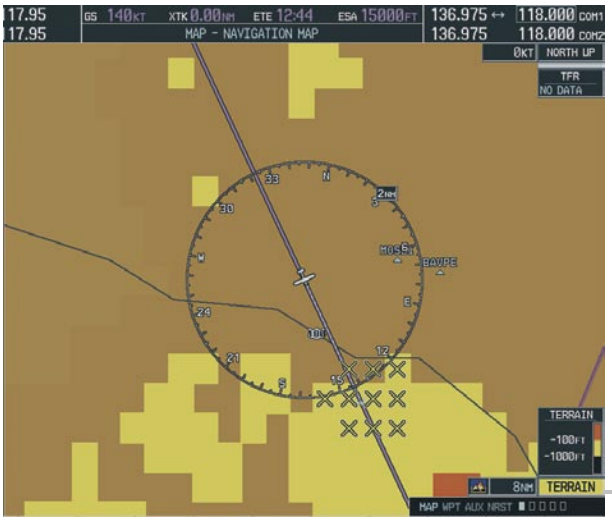

Figure 7-30 Alert Pop-Up

Press the **ENT** key to display the TAWS Page, or press the **CLR** key to remain on the existing page.

TAWS Alerts Summary

Table 7-3 shows the possible TAWS alert types with corresponding annunciations and aural messages.

Alert Type	PFD/MFD TAWS Page Annunciation	MFD Map Page Pop-Up Alert	Aural Message
Excessive Descent Rate Warning (EDR)	PULL UP	PULL-UP	"Pull Up"
Reduced Required Terrain Clearance Warning (RTC)	PULL UP	TERRAIN - PULL-UP or TERRAIN AHEAD - PULL-UP	"Terrain, Terrain; Pull Up, Pull Up" or "Terrain Ahead, Pull Up; Terrain Ahead, Pull Up"
Imminent Terrain Impact Warning (ITI)	PULL UP	TERRAIN AHEAD - PULL-UP or TERRAIN - PULL-UP	Terrain Ahead, Pull Up; Terrain Ahead, Pull Up" or "Terrain, Terrain; Pull Up, Pull Up"
Reduced Required Obstacle Clearance Warning (ROC)	PULL UP	OBSTACLE - PULL-UP or OBSTACLE AHEAD - PULL-UP	"Obstacle, Obstacle; Pull Up, Pull Up" or "Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up"
Imminent Obstacle Impact Warning (IOI)	PULL UP	OBSTACLE AHEAD - PULL-UP or OBSTACLE - PULL-UP	"Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up" or "Obstacle, Obstacle; Pull Up, Pull Up"
Reduced Required Terrain Clearance Caution (RTC)	TERRAIN	CAUTION - TERRAIN or TERRAIN AHEAD	"Caution, Terrain; Caution, Terrain" or "Terrain Ahead; Terrain Ahead"
Imminent Terrain Impact Caution (ITI)	TERRAIN	TERRAIN AHEAD or CAUTION - TERRAIN	"Terrain Ahead; Terrain Ahead" or "Caution, Terrain; Caution, Terrain"
Reduced Required Obstacle Clearance Caution (ROC)	TERRAIN	CAUTION - OBSTACLE or OBSTACLE AHEAD	"Caution, Obstacle; Caution, Obstacle" or "Obstacle Ahead; Obstacle Ahead"
Imminent Obstacle Impact Caution (IOI)	TERRAIN	OBSTACLE AHEAD or CAUTION - OBSTACLE	"Obstacle Ahead; Obstacle Ahead" or "Caution, Obstacle; Caution, Obstacle"
Premature Descent Alert Caution (PDA)	TERRAIN	TOO LOW - TERRAIN	"Too Low, Terrain"
Altitude Callout "500"	None	None	"Five-Hundred"
Excessive Descent Rate Caution (EDR)	TERRAIN	SINK RATE	"Sink Rate"
Negative Climb Rate Caution (NCR)	TERRAIN	DON'T SINK or TOO LOW - TERRAIN	"Don't Sink" or "Too Low, Terrain"

Table 7-3 TAWS Alert Summary

The following system status annunciations may also be issued.

Alert Type	PFD/MFD TAWS Page Annunciation	MFD Pop-Up Alert	Aural Message
TAWS System Test Fail	TAWS FAIL	None	"TAWS System Failure"
TAWS Alerting is disabled	TAWS INHB	None	None
No GPS position or excessively degraded GPS signal	TAWS N/A	None	"TAWS Not Available"
System Test in progress	TAWS TEST	None	None
System Test pass	None	None	"TAWS System Test OK"

Table 7-4 TAWS Status Summary

7.6 DIRECT-TO NAVIGATION

The "Direct-to" function provides a quick method of setting a course to a destination waypoint. Once a Direct-to is activated, the G1000 establishes a point-to-point course line from the present position to the selected Direct-to destination. If the course change is greater than 30 degrees, a course extension is offset from the present position to allow a standard rate turn to intercept the Direct-to course line. Note that the CDI (HSI) needle will not be immediately centered in this case. Direct-to course guidance is provided until the Direct-to is cancelled or replaced by a new destination, and the navigation data is displayed on the Navigation Map Page

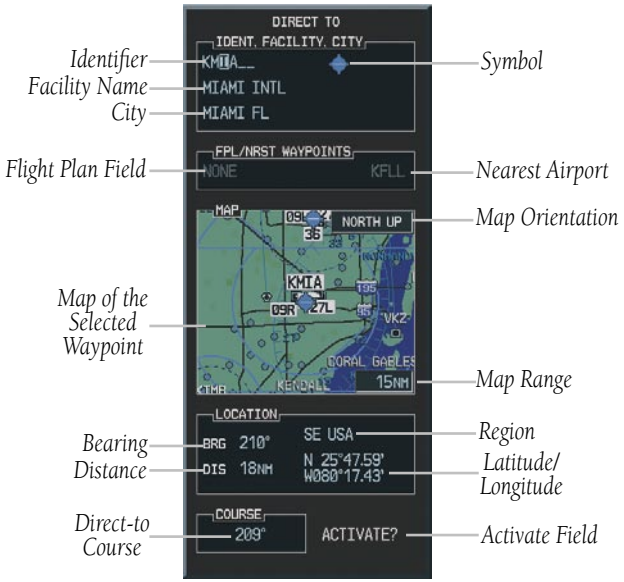

Figure 7-31 Direct-to Page

To select a Direct-to destination:

1. Press the **Direct-to** key. The Direct-to page is displayed 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, VOR, NDB, intersection or user waypoint, as long as it is in the database or stored in memory as a user waypoint. Turn the **large FMS** knob to the right to move the cursor to the next character position.
3. Repeat steps 2 and 3 to spell out the rest of the waypoint identifier.
4. Press the **ENT** key to confirm the identifier. The 'Activate?' field is highlighted.
5. Press the **ENT** key to activate a Direct-to course to the selected destination.

If navigating to a waypoint and the aircraft moves off course, the Direct-to feature can be used to re-center the CDI (HSI) needle and proceed to the same waypoint.

To re-center the CDI (HSI) needle to the same destination waypoint:

1. Press the **Direct-to** key, followed by pressing the **ENT** key twice. NOTE: If navigating an approach with the missed approach point (MAP) as the current destination, re-centering the CDI (HSI) needle with the **Direct-to** key cancels the approach.

DIRECT-TO NAVIGATION OPERATIONS

Selecting a Direct-to Waypoint

In addition to selecting a Direct-to waypoint using an identifier, a Direct-to waypoint can be selected in the following ways:

- by facility or city name
- from the active flight plan
- from the nearest airports list
- from a waypoint field, waypoint page, or map highlight shortcut

Selecting a Direct-to Destination by Facility or City Name

In addition to selecting a destination by identifier, the Direct-to Page also allows the selection of airports, VORs and NDBs by facility or city name. If duplicate entries exist for the entered facility or city name, additional entries can be viewed by continuing to turn the **small FMS** knob during the selection process.

To select a Direct-to destination by facility name or city:

1. Press the **Direct-to** key. The Direct-to Page is displayed with the waypoint identifier field highlighted.
2. Turn the **large FMS** knob to highlight the facility or city name field.
3. Turn the **small and large FMS** knob to enter the facility or city location of the desired waypoint.

***NOTE**: the "Spell N Find" feature selects the first entry in the database based on the characters that have been 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. The **small FMS** knob can be used to scroll backwards if the desired waypoint was passed up.
5. Press the **ENT** key to confirm the selected waypoint, and **ENT** again to activate a Direct-to.

Selecting a Direct-to Destination from the Active Flight Plan

Any waypoint contained in the flight plan may be selected as a Direct-to destination from the Direct-to Waypoint Page when navigating an active flight plan.

Figure 7-32 Flight Plan Waypoint Direct-to

To select a Direct-to destination from the active flight plan:

1. Press the **Direct-to** key. The Direct-to Waypoint Page is displayed with the waypoint identifier field highlighted.
2. Turn the **large FMS** knob to highlight the flight plan 'FPL' field.
3. Turn the **small FMS** knob to display a window showing all waypoints in the active flight plan.
4. Continue turning the **small FMS** knob to scroll through the list and highlight the desired waypoint.
5. Press the **ENT** key to confirm the selected waypoint, and **ENT** again to activate a Direct-to.

Selecting the Nearest Airport as a Direct-to Destination

The Direct-to Page always displays the nearest airports (from the present position) on the NRST field.

To select a nearby airport as a Direct-to destination:

1. Press the **Direct-to** key. The Direct-to Page is displayed with the destination field highlighted.
2. Turn the **large FMS** knob to highlight the nearest airport field.
3. Turn the **small FMS** knob to display a window showing up to ten nearby airports.
4. Continue turning the **small FMS** knob to scroll through the list and highlight the desired airport.
5. Press the **ENT** key to confirm the selected waypoint, and **ENT** again to activate a Direct-to.

Shortcuts

Shortcuts are available when using the **Direct-to** key, allowing the pilot to bypass the use of the **FMS** knobs. Any time a waypoint field is highlighted and then the **Direct-to** key is pressed, the highlighted waypoint will be the direct-to waypoint.

The following are "candidates" for Direct-to waypoints:

- The highlighted waypoint when map panning with the MFD map panning pointer.
- The highlighted waypoint identifier field on any page.
- The airport waypoint page airport when on the airport information, arrival, departure, or approach pages.
- The waypoint displayed on the VOR waypoint page.
- The waypoint displayed on the NDB waypoint page.
- The waypoint displayed on the intersection waypoint page.
- The waypoint displayed on the user waypoint page.

Figure 7-33 Nearest Airport Direct-to

Canceling Direct-to Navigation

Once a Direct-to is activated, the G1000 provides navigation guidance to the selected destination until the Direct-to is either replaced with a new Direct-to or flight plan, or cancelled, or if the unit is turned off.

To cancel a Direct-to:

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

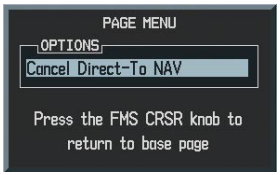

Figure 7-34 Canceling Direct-to Navigation

Specifying a Course to a Waypoint

During a Direct-to, the G1000 sets a direct great circle course to the selected destination. The course to the destination, using the course field on the Direct-to Page can be manually defined.

To manually define the Direct-to course:

1. Press the **Direct-to** key.
2. Turn the **small and large FMS** knobs to select the destination waypoint.
3. Press the **ENT** key to confirm the selected waypoint, then turn the **large FMS** knob to highlight the course field.
4. Turn the **small and large FMS** knobs to select the desired course and press the **ENT** key.
5. Press the **ENT** key again to begin navigation using the selected destination and course.

Figure 7-35 Manual Course Direct-to

7.7 FLIGHT PLANS

The G1000 can create up to 99 different flight plans with up to 31 waypoints in each flight plan. The flight plan (FPL) page group consists of three pages:

- Active Flight Plan
- Flight Plan Catalog
- Vertical Navigation

The Flight Plan Pages are used to create, edit and copy flight plans. The Vertical Navigation Page is used to create a three-dimensional profile which guides the aircraft to a final (target) altitude at a specified location.

ACTIVE FLIGHT PLAN PAGE

The Active Flight Plan Page provides information and editing functions for the flight plan currently in use for navigation. Once a Direct-to or flight plan has been activated, the Active Flight Plan Page shows the following:

- Each waypoint for the flight plan (or a single waypoint for a Direct-to), along with the desired track (DTK) and distance of each leg (DIS).
- Active leg information with enroute safe altitude (ESA) for the specified leg.
- Active FPL information with enroute safe altitude (ESA)
- Flight plan information showing remaining leg and remaining total distance, and enroute safe altitude for the entire route.

The data fields are user-selectable and can be changed to display the following:

- Cumulative Distance (CUM)
- Distance (DIS)
- Desired Track (DTK)
- Enroute Safe Altitude (ESA)
- Estimated Time of Arrival (ETA)
- Estimated Time Enroute (ETE)

ACTIVE FLIGHT PLAN PAGE OPTIONS

The following options are available for the Flight Plan Page:

- Activate Leg
- Store Flight Plan
- Invert Flight Plan
- Delete Flight Plan
- Load Departure
- Load Arrival
- Load Approach
- Remove Arrival
- Remove Departure
- Remove Approach
- Closest Point of FPL
- Change Fields
- Restore Defaults

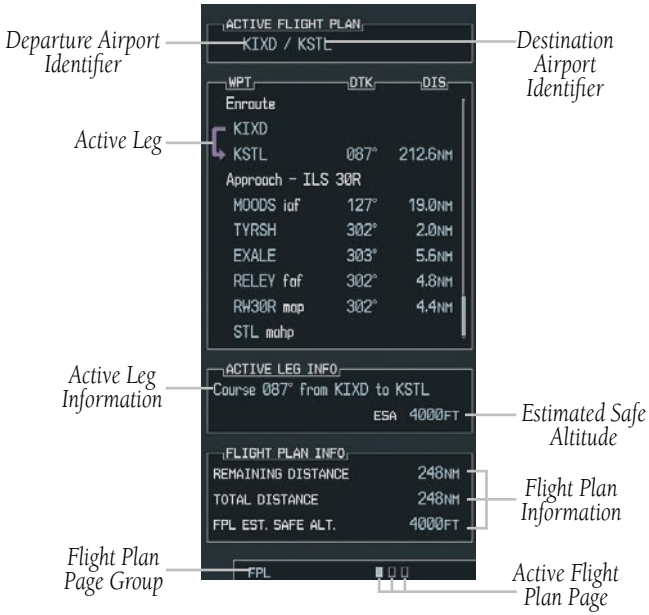

Figure 7-36 Active Flight Plan Page

Figure 7-37 New Flight Plan

To edit a flight plan:

1. Press the **FPL** key and turn the **small FMS** knob to display the Flight Plan Catalog Page.
2. Press the **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 the new waypoint is to be added. (If an existing waypoint is highlighted, the new waypoint is placed directly in front of this waypoint.) Turn 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 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. To cancel, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.
6. Once all changes have been made, press the **FMS** knob to return to the Flight Plan Catalog Page.

Activate Leg

Activate Leg selects the highlighted leg as the "active leg" (the flight plan leg which is currently used for navigation guidance).

To activate a flight plan along a specific leg:

1. From the Active Flight Plan Page, press the **FMS** knob to activate the cursor and turn the **large FMS** knob to highlight the desired destination waypoint.
2. Press the **MENU** key, select the 'Activate Leg' option from the page menu and press the **ENT** key.
3. A confirmation window is displayed. With 'Activate' highlighted, press the **ENT** key.

NOTE: The leg can also be activated by pressing the **ACT LEG** *softkey.*

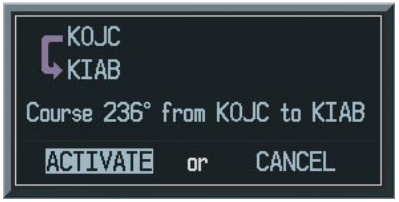

Figure 7-38 Activate Flight Plan Leg Confirmation

Store Flight Plan

Whenever an approach, departure or arrival is loaded into the active flight plan, a set of approach, departure or arrival waypoints is inserted into the flight plan along with a header line describing the instrument procedure the pilot selected. The original enroute portion of the flight plan remains active (unless an instrument procedure is activated) which may be done when the procedure is loaded or at a later time. Flight plans can also be stored with an approach, departure or arrival. The active flight plan is erased when the system is turned off and overwritten when another flight plan is activated.

When storing flight plans with an approach, departure or arrival, the G1000 uses the waypoint information from the current database to define the waypoints. If the database is changed or updated, the G1000 automatically updates the information if the procedure has not been modified. If an approach, departure or arrival procedure is no longer available, the procedure is deleted from the flight plan and an alert is displayed.

To store an existing flight plan:

1. From the Flight Plan Page, press the **FMS** knob to activate the cursor.
2. Turn the **large FMS** knob to highlight the desired flight plan and press the **MENU** key to display the Flight Plan Page options.
3. Turn the **large FMS** knob to highlight 'Store Flight Plan' and press the **ENT** key. The flight plan is stored in the next available position in the flight plan list on the Flight Plan Catalog Page.
4. With 'OK' highlighted, press the **ENT** key to store the flight plan.

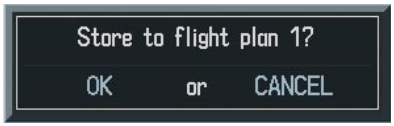

Figure 7-39 Store Flight Plan Confirmation

Invert Flight Plan

'Invert Fight Plan' reverses the active flight plan. After traveling along a flight plan, the route can be reversed for navigation guidance back to the original departure point.

To invert and (activate) an existing flight plan:

1. From the Flight Plan Page, press the **FMS** knob to activate the cursor.
2. Turn the **large FMS** knob to highlight the desired flight plan and press the **MENU** key to display the Flight Plan Page options.
3. Turn the **large FMS** knob to highlight 'Invert Flight Plan' and press the **ENT** key. The original flight plan remains intact in its flight plan catalog storage location.
4. With 'OK' highlighted, press the **ENT** key to invert the flight plan.

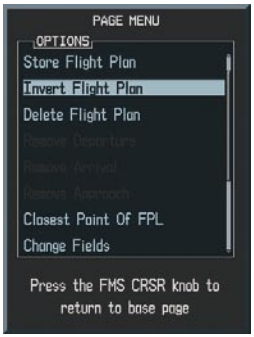

Figure 7-40 Invert Flight Plan

Figure 7-41 Invert Flight Plan Confirmation

Delete a Waypoint

To delete a waypoint from an existing flight plan:

1. Press the **FPL** key and turn the **small FMS** knob to display the Flight Plan Catalog Page.
2. Press the **FMS** knob to activate the cursor.
3. Turn the **large FMS** knob to highlight the desired flight plan and press the **ENT** key.
4. Turn the **large FMS** knob to select the waypoint to delete and press the **CLR** key to display a 'REMOVE WAYPOINT' confirmation window.
5. With 'OK' highlighted, press the **ENT** key to remove the waypoint. To cancel the delete request, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.
6. Once all changes have been made, press the **FMS** knob to return to the Flight Plan Page.

Figure 7-42 Remove Waypoint Confirmation

Load a Departure

'Load Departure' allows a published departure procedure for the departure airport to be loaded into a flight plan. It also replaces the current departure with a new selection. When using a Direct-to, the G1000 uses the nearest airport as a reference when displaying available departures. A departure can also loaded using the **PROC** key or by pressing the **LD DP** softkey.

Figure 7-43 Loading Departure Options

To select a departure procedure for the departure airport:

1. From the Active Flight Plan Page, press the **MENU** key to display the Active Flight Plan Page options.
2. Highlight 'Load Departure' from the list and press the **ENT** key.
3. A window is displayed listing the available departures for the departure airport. Turn the **FMS** knob to select the desired departure and press the **ENT** key.
4. A window may appear listing runways for the departure. Turn the **FMS** knob to select the desired runway and press the **ENT** key. This window is not displayed for every departure.
5. A second window is displayed listing available transitions for the departure. Turn the **FMS** knob to highlight the desired transition waypoint and press the **ENT** key.
6. With 'LOAD' highlighted, press the **ENT** key. The departure flight plan is displayed as part of the overall flight plan and is placed in front of the enroute flight plan.

Load an Arrival

'Load Arrival' allows a published standard terminal arrival route (STAR) for the destination airport to be loaded into a flight plan. It also replaces the current arrival with a new selection. An arrival can also be loaded using the **PROC** key or by pressing the **LD STAR** softkey.

To select an arrival for a Direct-to or flight plan destination airport:

1. From the Active Flight Plan Page, press the **MENU** key to display the Active Flight Plan Page options.
2. Highlight the 'Load Arrival' option and press the **ENT** key.
3. A window is displayed listing the available arrivals for the destination airport. Turn the **FMS** knob to select the desired arrival and press the **ENT** key.
4. A second window is displayed listing available transitions for the arrival. Turn the **FMS** knob to highlight the desired transition waypoint and press the **ENT** key.
5. A third window is displayed listing available arrival runways. Turn the **FMS** knob to highlight the desired runway and press the **ENT** key.
6. With 'LOAD' highlighted, press the **ENT** key. The arrival flight plan is displayed as part of the overall flight plan and is placed after the enroute flight plan.

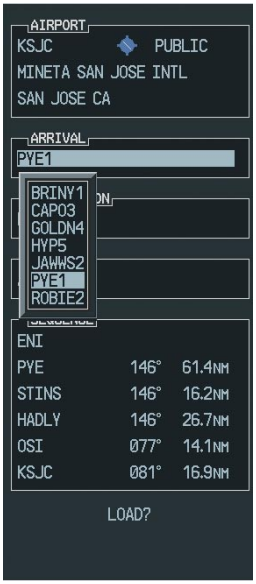

Figure 7-44 Selecting an Arrival

Load an Approach

'Load Approach' allows for the selection of a published instrument approach for the destination airport. It also replaces the current approach with a new selection. In many cases, it is more convenient to select approaches using the **PROC** key, or by pressing the **LD APR** softkey.

To select an approach for a Direct-to or flight plan destination airport:

1. From the Active Flight Plan Page, press the **MENU** key to display the Active Flight Plan Page options.
2. Highlight the 'Load Approach' option and press the **ENT** key.
3. A window is displayed listing the available approaches for the destination airport. Turn the **FMS** knob to highlight the desired approach and press the **ENT** key.
4. A second window is displayed listing available transitions for the approach. Turn the **FMS** knob to highlight the desired transition waypoint and press the **ENT** key. (The vectors option assumes the pilot will receive vectors to the final course segment of the approach and will provide navigation guidance to intercept this final course.)
5. Turn the **large FMS** knob to highlight 'Load? or Activate?' and press the **ENT** key. 'Load' adds the approach to the flight plan without immediately using the approach for navigation guidance.

This allows for the original flight plan to continue navigating until cleared for the approach, but keeps the approach available for quick activation when needed. 'Activate' adds the approach to the flight plan and begins navigating the approach course.

Figure 7-45 Flight Plan with Loaded Approach

Remove a Departure, Arrival, or Approach

- 'Remove Departure' deletes the current DP from the active flight plan.
- 'Remove Arrival' deletes the current STAR from the active flight plan.
- 'Remove Approach' deletes the currently selected approach from the active flight plan.

To remove an approach, arrival or departure from the active flight plan:

1. From the Active Flight Plan Page, press the **MENU** key to display the Active Flight Plan Page options.
2. Select the 'Remove Approach', 'Remove Arrival' or 'Remove Departure' option and press the **ENT** key.
3. A confirmation window is displayed listing the procedure the pilot is about to remove. With 'OK' highlighted, press the **ENT** key. To cancel the remove request, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.

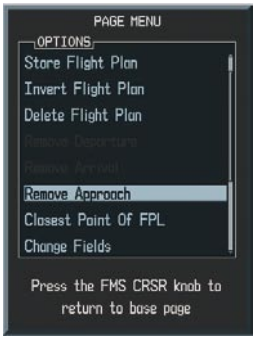

Figure 7-46 Removing an Approach

Closest Point of Flight Plan Feature

'Closest Point of FPL' calculates the bearing and closest distance at which a flight plan passes from a reference waypoint. It can also be used to create a new user waypoint along the flight plan at the location closest to a chosen reference waypoint.

To determine the closest point along the active flight plan to a selected waypoint:

1. From the Active Flight Plan Page, press the **MENU** key to display the Active Flight Plan Page options.
2. Select the 'Closest Point of FPL' option from the Active Flight Plan Page options and press the **ENT** key.
3. A window is displayed with the reference waypoint field highlighted. Turn the **small and large FMS** knobs to enter the identifier of the reference waypoint and press the **ENT** key.
4. The G1000 displays the location, lat/lon, bearing (BRG), and distance (DIST) to the closest point along the flight plan from the selected reference waypoint. To create a user waypoint at this location and add it to the flight plan, highlight 'LOAD' and press the **ENT** key. The name for the new user waypoint is derived from the identifier of the reference waypoint.

Change Fields

'Change Fields' allows for the default fields of DTK (distance) and DIS (distance) to be changed to one of the following:

- CUM (cumulative distance)
- DIS (distance)
- DTK (desired track)
- ESA (estimated safe altitude)
- ETA (estimated time of arrival)
- ETE (estimated time enroute)

To change either the DTK or the DIS field:

1. With the Active Flight Plan Page displayed, press the **MENU** key to display the Active Flight Plan Page options window.
2. Turn the **large FMS** knob to highlight 'Change Fields' and press the **ENT** key.
3. Turn the **large FMS** knob to highlight the 'DIS' or the 'DTK' field.
4. Turn the **FMS** knob to display a list of options.
5. Turn the **FMS** knob to select the desired item and press the **ENT** key. Press the **FMS** knob to remove the cursor.

Restore Defaults

Restore Defaults returns the 'DTK' and 'DIS' fields to 'DTK' and 'DIS'.

To restore the DTK and DIS fields on the Active Flight Plan Page:

1. With the Active Flight Plan Page displayed, press the **MENU** key to display the Active Flight Plan Page options window.
2. Turn the **large FMS** knob to highlight 'Restore Defaults' and press the **ENT** key.

Shortcuts

A number of shortcuts are available to save time when using the Active Flight Plan Page. These shortcuts speed the process of removing approaches, departures and arrivals, and aid in selecting a specific flight plan leg for navigation guidance.

On the preceding page, options to remove approaches, departures and arrivals were introduced. This process may also be completed using the **CLR** key, as described below.

To remove an approach, departure or arrival using the CLR key:

1. With the Active Flight Plan Page displayed, press the **small FMS** knob to activate the cursor.
2. Turn the **large FMS** knob to highlight the title for the approach, departure or arrival you wish to delete. Titles appear in white directly above the procedure's waypoints.
3. Press the **CLR** key to display a confirmation window. With 'OK' highlighted, press the **ENT** key to remove the selected procedure.

This same process may also be used to remove individual waypoints from the active flight plan.

To remove a waypoint using the CLR key:

1. With the Active Flight Plan Page displayed, press the **small FMS** knob to activate the cursor.
2. Turn the **large FMS** knob to highlight the identifier for the waypoint you wish to delete.
3. Press the **CLR** key to display a confirmation window.
4. With "OK" highlighted, press ENT to remove the selected waypoint.

FLIGHT PLAN CATALOG PAGE

The Flight Plan Catalog Page is the second flight planning page and provides flight planning information and editing capability. Once a Direct-to or flight plan has been activated, the Active Flight Plan catalog Page displays the following:

- Number of flight plans in memory.
- Flight Plan List.
- Flight Plan information box containing departure, destination, total distance, and estimated safe altitude information.

To display the Flight Plan Catalog Page:

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

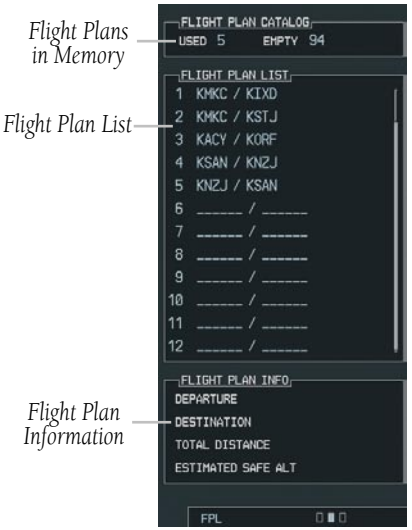

Figure 7-47 Flight Plan Catalog Page

FLIGHT PLAN CATALOG PAGE OPERATIONS

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

- Activate a Flight Plan
- Stop Navigating a Flight Plan
- Invert and Activate a FPL
- Create a New Flight Plan
- Copy a Flight Plan
- Delete a Flight Plan
- Delete All Flight Plans
- Sort Flight Plans by Comment
- Flight Plan Catalog Page Options
- Edit a Flight Plan

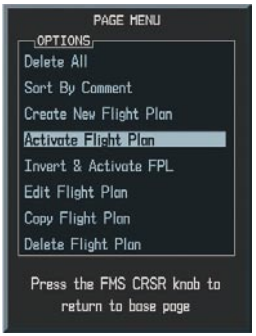

Figure 7-48 Flight Plan Catalog Page Options

Activate a Flight Plan

Once a flight plan is defined using the Flight Plan Catalog Page it can be activated for navigation. Activating the flight plan overwrites any previous information at that location.

To activate (begin to navigate) an existing flight plan:

1. Press the **FPL** key and turn the **small FMS** knob to display the Flight Plan Catalog Page.
2. Press the **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 Page options.
4. Turn the **large FMS** knob to highlight 'Activate Flight Plan' and press the **ENT** key.
5. An 'Activate stored flight plan?' confirmation window is displayed. With OK highlighted, press the **ENT** key to activate the flight plan. To cancel the flight plan activation, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.

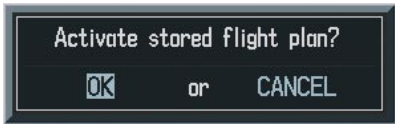

Figure 7-49 Activate Stored Flight Plan Confirmation

Stop Navigating a Flight Plan

To stop navigating a flight plan:

1. Press the **FPL** key and turn the **small FMS** knob to display the Flight Plan Catalog Page.
2. Press the **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 Page options.
4. Turn the **FMS** knob to highlight 'Delete Flight Plan' and press the **ENT** key. A 'Delete Flight Plan' confirmation window is displayed. With 'OK' highlighted, press the **ENT** key to delete the flight plan. To cancel the flight plan deletion, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.

Invert and Activate a Flight Plan

'Invert & Activate FPL' allows the active flight plan to be inverted and activated for navigation.

To invert and activate a flight plan:

1. Press the **FPL** key and turn the **small FMS** knob to display the Flight Plan Catalog Page.
2. Press the **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 Page options.
4. Turn the **FMS** knob to highlight 'Invert & Activate FPL' and press the **ENT** key.
5. An 'Invert and activate stored flight plan?' confirmation window is displayed. With 'OK' highlighted, press the **ENT** key to invert and activate the flight plan. To cancel the operation, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.

Create a New Flight Plan

'Create New Flight Plan' creates a new flight plan.

To create a new flight plan:

1. Press the **FPL** key and turn the **small FMS** knob to display the Flight Plan Catalog Page.
2. Press the **MENU** key to display the Flight Plan Catalog Page options.
3. Turn the **large FMS** knob to highlight 'Create New Flight Plan' and press the **ENT** key.
4. A blank flight plan page is displayed for the first empty storage location. Turn the **small and large FMS** knobs to enter the identifier of the departure waypoint and press the **ENT** key.
5. Repeat step number 4 to enter the identifier for each additional flight plan waypoint.
6. Once all waypoints have been entered, press the **FMS** knob to return to the Flight Plan Catalog Page.

Copy a Flight Plan

'Copy Flight Plan' copies the active flight plan to a Flight Plan Catalog location. The copy function is useful for duplicating the active flight plan before making changes.

To copy a flight plan to another flight plan catalog location:

1. From the Flight Plan Catalog press the **FMS** knob to activate the cursor, turn the **large FMS** knob to highlight the flight plan the pilot wishes to copy, then press the **MENU** key to display the Flight Plan Catalog Options.
2. Turn the **large FMS** knob to highlight 'Copy Flight Plan' and press the **ENT** key.
3. A 'Copy to flight plan?' confirmation window is displayed. With 'OK' highlighted, press the **ENT** key to copy the flight plan. To cancel, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key

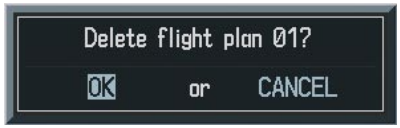

Figure 7-50 Delete Flight Plan Confirmation

Delete a Flight Plan

'Delete Flight Plan' removes all waypoints from the active flight plan. (Deleting a flight plan does not delete the waypoints contained in the flight plan from the database or user waypoint memory.) Once the pilot is finished with a flight plan, it can easily be deleted from the Flight Plan Catalog Page or the Active Flight Plan Page.

To delete a flight plan from the Active Flight Plan Page:

1. From the Active Flight Plan Page, press the **MENU** key to display the Active Flight Plan options window.
2. Turn the **large FMS** knob to highlight 'Delete Flight Plan' and press the **ENT** key.
3. A 'Delete all waypoints in flight plan?' confirmation window is displayed. With 'OK' highlighted, press the **ENT** key to delete the active flight plan. To cancel, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.

To delete a flight plan from the Flight Plan Catalog Page:

1. From the Flight Plan Catalog Page, press the **FMS** knob to activate the cursor, turn the **large FMS** knob to highlight the flight plan to delete.
2. Press the **MENU** key to display the Flight Plan Catalog options.
3. Turn the **large FMS** knob to highlight 'Delete Flight Plan' and press the **ENT** key.
4. A 'Delete flight plan?' confirmation window is displayed. With 'OK' highlighted, press the **ENT** key to delete the flight plan. To cancel, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.

Delete All Flight Plans

'Delete All' removes all flight plans from memory at one time.

To delete all flight plans:

1. From the Flight Plan Catalog Page, press the **MENU** key to display the Flight Plan Catalog Page options.
2. Turn the **large FMS** knob to highlight 'Delete All' and press the **ENT** key. A 'Delete all flight plans?' confirmation window is displayed. With 'OK' highlighted, press the **ENT** key to delete all flight plans. To cancel, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.

Sort By Comment/Number

'Sort List By Number/Sort List by Comment' selects between a Flight Plan Catalog Page sorted numerically by the flight plan number or sorted alphanumerically based upon the comment assigned to each flight plan. When one option is selected, the other option is displayed on the Flight Plan Catalog options window.

To sort the catalog listing by number or comment:

1. From the Flight Plan Catalog Page, press the **MENU** key to display the Flight Plan Catalog Page options.
2. Turn the **large FMS** knob to highlight 'Sort List By Number' or 'Sort List By Comment' and press the **ENT** key. This will change flight plan ordering.
3. A 'Proceed?' confirmation window is displayed. With OK highlighted, press the **ENT** key to change flight plan ordering. To cancel, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.

To edit a flight plan:

1. Press the **FPL** key and turn the **small FMS** knob to display the Flight Plan Catalog Page.
2. Press the **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 the new waypoint is to be added. (If an existing waypoint is highlighted, the new waypoint is placed directly in front of this waypoint.) Turn 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 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. To cancel, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.
6. Once all changes have been made, press the **FMS** knob to return to the Flight Plan Catalog Page.

Graphical Flight Planning Feature

The graphical flight planning feature is activated using the Navigation Map Page and the Active Flight Plan Page.

To create a Point-n-Shoot flight plan:

1. Push the **Joystick** to turn the map cursor on.
2. Select the Active Flight Plan Page and press the **FMS** knob to highlight the list of waypoints. Waypoints are inserted ABOVE the highlighted row if the cursor is on. Waypoints are inserted at the END of the flight plan if the cursor is off.
3. To insert waypoints, use the map cursor to point at the desired waypoint (it will become visually enhanced when it is properly pointed to), and press the **LD WPT** softkey. Existing user waypoints are inserted in the same manner.
4. If the selected waypoint is not a Jeppesen waypoint (Airport or Navaid) or user waypoint, the G1000 creates a user waypoint (beginning with 'USR000') at the point and inserts it into the flight plan.
5. The pilot can also create and insert a user waypoint by pointing at a blank spot on the nav map and pressing 'LD WPT'. This creates a user waypoint at the map cursor and inserts it into the flight plan.

VERTICAL NAVIGATION (VNAV) PAGE

The Vertical Navigation Page allows the creation of a three-dimensional profile which guides the aircraft from it's present position and altitude to a final (target) altitude at a specified location. This is helpful when you would like to descend to a certain altitude near an airport or climb to an altitude before reaching a route or Direct-to waypoint. Once the profile is defined, message alerts and additional data on the Navigation Map Page keep the pilot informed of progress.

NOTE: *An active flight plan or Direct-to must be entered in order to utilize VNAV.*

NOTE: *To display terrain or topo data on the Vertical Navigation Map Page, press the* **MAP** *softkey. Press the* **TOPO, TERRAIN, or LTNG** *softkey. Press the* same *softkey to remove the displayed data from the Vertical Navigation Page.*

To create a vertical navigation profile:

1. Select the Vertical Navigation Page.
2. Press the **FMS** knob to activate the cursor.

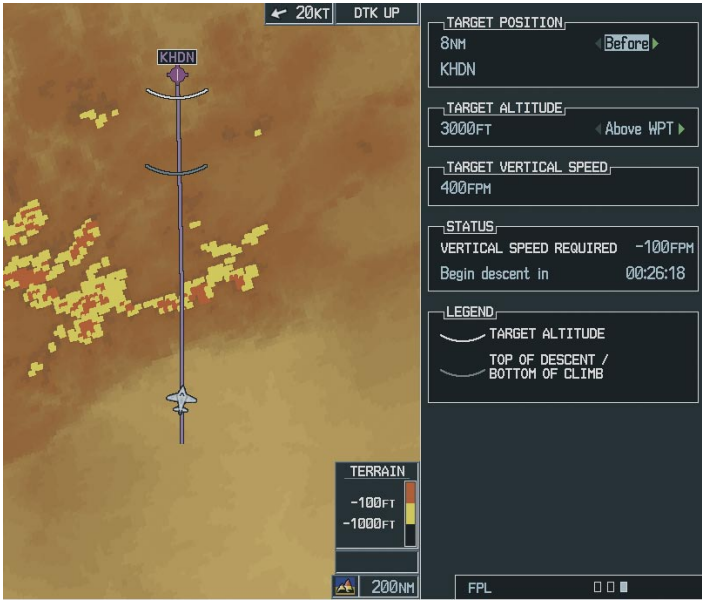

Figure 7-51 Vertical Navigation (VNAV) Page

3. With the 'TARGET ALTITUDE' field highlighted, turn the **small and large FMS** knobs to select the target altitude and press the **ENT** key.
4. Turn the **small FMS** knob to select 'Above Wpt' (AGL) or 'MSL', and press the **ENT** key. 'Above Wpt' uses the altitude of a destination airport. 'MSL' lets you set a specific target altitude for any waypoint category: airport, VOR, NDB, intersection or user waypoint.
5. Turn the **small and large FMS** knobs to select a distance from the target reference waypoint and press the **ENT** key. If the target altitude should occur at the target reference waypoint, enter a distance of zero.
6. Turn the **small FMS** knob to select 'Before' or 'After', and press the **ENT** key. This setting designates whether the offset distance defines a point before you reach the target reference waypoint or after you reach the waypoint.
7. When using a flight plan, the target reference waypoint itself can be specified from the waypoints contained in the flight plan. By default, the last waypoint in the flight plan is selected. To select a different waypoint, turn the **small FMS** knob to select the desired waypoint and press the **ENT** key.
8. The default profile utilizes a 400 foot-per-minute descent rate. To change the rate, turn the **large FMS** knob to highlight the 'Target Vertical Speed' field and use the small and **large FMS** knobs to enter a new rate. Press the **ENT** key when finished.

With the profile set, the vertical speed required (VSR) is displayed. Expect the following to occur when using the vertical navigation feature:

At one minute prior to reaching the initial descent point, the message 'APPR VPROF - Approaching VNAV Profile' is displayed as a PFD alert. The descent (or climb) angle also locks to prevent changes in speed from altering the profile. If selected, the vertical speed required (VSR) readout on the default NAV and map pages shows the desired vertical speed to maintain the proper descent (or climb) angle. At 500 feet above (or below, for a climb) the target altitude, an 'APPR TRG ALT' - Approaching Target Altitude" message is provided. The VSR readout on the Navigation Map Page is blanked out at this point.

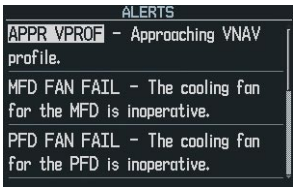

Figure 7-52 Approaching VNAV Profile Message (PFD)

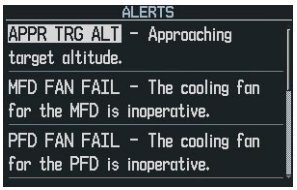

Figure 7-53 Approaching Target Altitude Message (PFD)

VNAV Page Menu Options

The VNAV messages are not enabled until the 'VNAV Messages On?' option is enabled from the VNAV Page Menu Options. To display the page menu, press the **MENU** key (with the VNAV Page displayed). The VNAV Page Options Menu also allows the pilot to restore VNAV page defaults.

7.8 PROCEDURES

ARRIVALS AND DEPARTURES

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

Figure 7-54 Procedures Page

To select a departure:

1. Press the **PROC** key to display the Procedures Page. Turn the **large FMS** knob to highlight 'Select Departure' and press the **ENT** key.
2. The 'Departure Loading' page is displayed with the list of departure options for the departure airport. Turn the **FMS** knobs to enter the desired departure. Press the **ENT** key.
3. '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. Turn the **large FMS** knob to highlight 'Select Arrival' and press the **ENT** key.
2. The procedures page is displayed. Turn the **small and large FMS** knobs to enter the desired arrival.
3. The cursor moves to the 'TRANSITION' 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.

***NOTE**: Vector departures are not part of the aviation database.*

***NOTE:** The approach vectors option assumes the pilot will receive vectors to the final course segment of the approach and will provide navigation guidance on the final approach segment and extension only.*

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 424 leg types that have associated waypoint fixes. The G1000 uses the following leg types as part of the Jeppesen database (each of these legs is displayed on the active flight plan):

- 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

The G1000 does not support the following legs:

- 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 pilot is responsible for determining database currency for approaches.*

SELECTING APPROACHES

In order to select an approach, there must be an active flight plan or direct-to which terminates at an airport with a published approach.

To select an approach:

1. Press the **PROC** key to display the Procedures Page. Turn the **large FMS** knob to highlight 'Select Approach' and press the **ENT** key. The approach procedure window appears.
2. Turn the **FMS** knob to select the desired approach and press the **ENT** key. The transition window appears.

NOTE: *The approach vectors option assumes the pilot will receive vectors to the final course segment of the approach and will provide navigation guidance on the final approach segment and extension only.*

3. Turn the **FMS** knob to select the desired transition and press the **ENT** key. 'LOAD?' is now highlighted. Press the **ENT** key. Activate the approach once the approach clearance is received.

NOTE: *'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 7-55 Activating an Approach Procedure

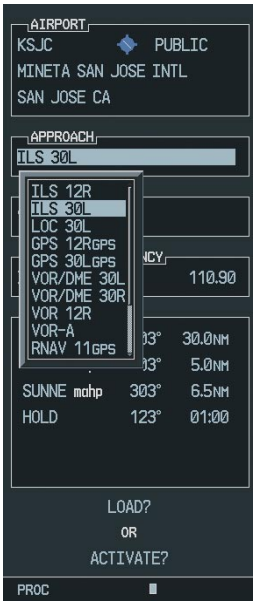

Figure 7-56 Selecting an Approach Procedure

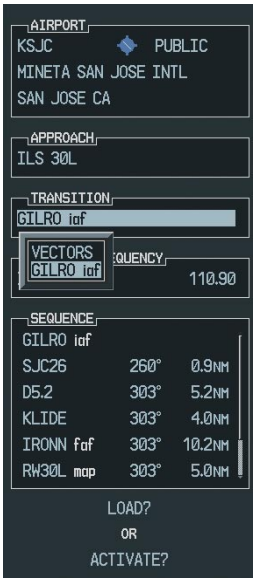

Figure 7-57 Selecting an Approach Transition

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.

A selected approach can be activated or loaded. 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 Approach'.
3. Press the **ENT** key.

***CAUTION**: The G1000 is designed to only complement printed approach plates and vastly improve situational awareness throughout the approach. The approach must be flown as it appears on the approach chart.*

***NOTE**: Specific GPS approach examples are given in the G1000 Cessna Pilot's Guide Training Material. They can be used in conjunction with the G1000 PC training simulator software for practice in learning what types of approaches the G1000 supports.*

7.9 WAYPOINT PAGE GROUP

The Waypoint Page Group (WPT) provides information for thousands of airports, VORs, NDBs, intersections, runways, frequencies and procedures. In addition, a user waypoint information page displays information for up to 1,000 user-created waypoints. The Waypoint Group consists of the following pages:

- Airport Information Page (INFO)
- Departure Information Page (DP)
- Arrival Information Page (STAR)
- Approach Information Page (APR)
- Intersection Information Page
- NDB Information Page
- VOR Information Page
- User Waypoint Information Page

Page Selection

The Airport Information Page can be selected by pressing the **INFO** softkey or by the procedure given below. The Departure, Arrival, and Approach pages must be selected from the Airport Information Page using their corresponding softkeys (DP, STAR, APR). To select any remaining page:

1. From any page, press and hold the **CLR** key to select the Navigation Map Page.
2. Turn the **large FMS** knob to select the 'WPT' page group. 'WPT' appears in the page group icon located in the lower right corner of the display. Turn the **small FMS** knob to select the desired 'WPT' page.

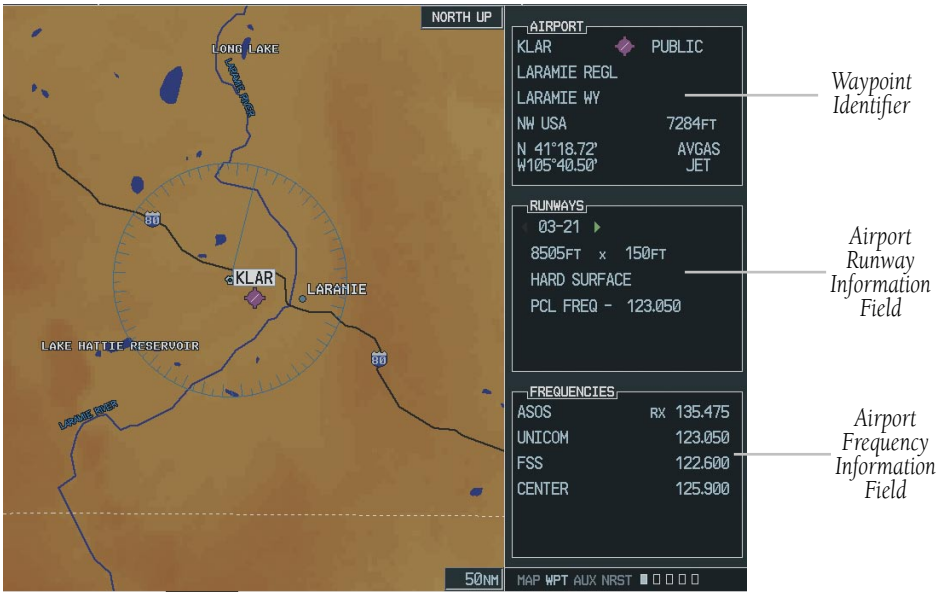

Figure 7-58 Airport Information Page

AIRPORT INFORMATION PAGE (INFO)

The Airport Information page shows the following detailed information for the selected airport:

- Airport Information
- Runways
- Frequencies

Airport Information Page Operations

To enter a waypoint identifier:

1. Select the desired 'WPT' page and press the **FMS** knob to activate the cursor.
2. Turn the **small FMS** knob to select the first character of the waypoint's identifier.
3. Turn the **large FMS** knob to select the next character field.
4. Turn the **small FMS** knob to select the desired character.
5. Repeat steps 3 and 4 until the identifier is selected, then press the **ENT** key.
6. To remove the flashing cursor, press the **FMS** knob.

Airports may be selected by identifier, facility name or city location.

To enter a waypoint facility name or city location:

1. Select the Airport Information Page.
2. Press the **FMS** knob to activate the cursor.
3. Turn the **large FMS** knob to select the facility name or location (city) field.
4. Turn the **small FMS** knob to select the desired character.
5. Turn the **large FMS** knob to select the next character field.
6. Repeat steps 4 and 5 until the facility name or location is selected, then press the **ENT** key.
7. To remove the flashing cursor, press the **FMS** knob.

Once the identifier, facility name or location is entered, the airport information page displays information for the selected airport. As you enter an identifier, facility name or location, the "SpellNFind"™ feature scrolls through the database, displaying those waypoints matching the characters you have entered to that point. If duplicate entries exist for the entered facility name or location, additional entries may be viewed by continuing to turn the **small FMS** knob during the selection process. If duplicate entries exist for an entered identifier, a duplicate waypoint page is displayed once you select the identifier (by pressing the **ENT** key).

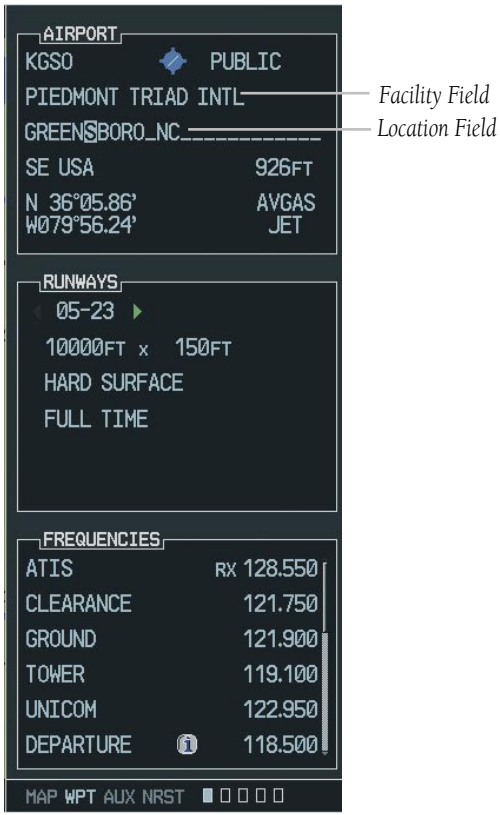

Figure 7-59 Waypoint Facility or City Location

To select a facility name or city location, where duplicate entries exist:

1. Select the desired facility name or location.
2. As you spell the facility name or location, using the **small and large FMS** knobs, the SpellNFind feature selects the first entry in the database based upon the characters you have entered up to that point.
3. Continue turning the **small FMS** knob to scroll through any additional database listings for the selected facility name or location. You can scroll backwards with the **small FMS** knob if you scroll past the desired facility name or location.
4. Press the **ENT** key to select the desired facility name or location.
5. To remove the flashing cursor, press the **FMS** knob.

To select a waypoint identifier from a list of duplicates:

1. Select the desired airport or navaid identifier.
2. A duplicate waypoints window is displayed. Turn the **large FMS** knob to select the desired waypoint and press the **ENT** key.
3. To remove the flashing cursor, press the **FMS** knob.

Airport Runway Information Field

The Airport Runway Information field displays runway designations, length, surface type and lighting for the selected airport. A map image of the runway layout and surrounding area is also displayed on the Airport Runway Information Page. The map image range is displayed in the lower left corner and is adjustable using the joystick. For airports with multiple runways, information for each runway is available.

To display information for each additional runway:

1. Press the **FMS** knob to activate the cursor.
2. Turn the **large FMS** knob to place the cursor on the Runway designation field.
3. Turn the **small FMS** knob to display the next runways for the selected airport.
4. Continue turning the **small FMS** knob to select the desired runway.
5. To remove the flashing cursor, press the **FMS** knob.

Rotate the joystick counterclockwise to select a lower range and rotate it clockwise to select a higher range.

The following descriptions and abbreviations are used on the Airport Runway Information field:

- Type – Usage type: Public, Military or Private
- Surface – Runway surface types include: Hard, Turf, Sealed, Gravel, Dirt, Soft, Unknown or Water
- Lighting – Runway lighting types include: No Lights, Part Time, Full Time, Unknown or Frequency (for pilot-controlled lighting)

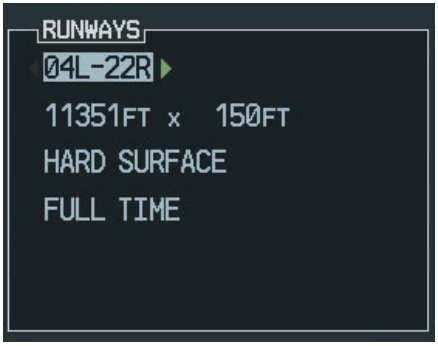

Figure 7-60 Runway Information Field

AIRPORT FREQUENCY INFORMATION FIELD

The Airport Frequency Information Field displays radio frequencies and frequency types for the selected airport, as well as sector and altitude restrictions (where applicable). If the selected airport has a localizer-based approach, the localizer frequency is also listed on the Airport Frequency Information Field. The Airport Frequency Information Field may be used to quickly select and tune a COM or NAV frequency.

To scroll through the frequency list and tune to a desired frequency on the list:

1. Press the **FMS** knob to activate the cursor.
2. Turn the **FMS** knob to scroll through the list, placing the cursor on the desired frequency. If there are more frequencies in the list than can be displayed on the screen, a scroll bar along the right-hand side of the screen indicates where you are within the list.
3. Press the **ENT** key to place the selected frequency in the standby field of the 'COM' or 'NAV' window.
4. To remove the flashing cursor, press the **FMS** knob.

Some listed frequencies may include designations for limited usage, as follows:

- 'TX' – transmit only RX - receive only
- 'PT' – part time frequency
- 'i' – additional information exists, press the **ENT** key

If a listed frequency has sector or altitude restrictions, the frequency is preceded by an info designation.

To view usage restrictions for a frequency:

1. Turn the **FMS** knob to place the cursor on the info designated frequency.
2. Press the **ENT** key to display the restriction information.
3. To return to the Airport Frequency field, press the **ENT** key.

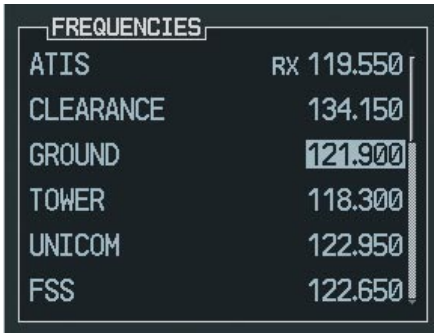

Figure 7-61 Frequency Information Field

Airport Frequency Descriptions

The Airport Frequency Information field uses the following descriptions and abbreviations:

- Frequency — Communication frequencies which may include restrictions:
- Approach
- Arrival
- Class B
- Class C
- CAT
- Departure
- TMA
- Terminal
- TRSA

Communication frequencies without restrictions:

- ATIS
- ASOS
- AWOS
- Center
- Clearance
- Gate
- Control
- Ground
- Helicopter
- Multicom
- Pre-taxi
- Radar
- Ramp
- Other
- Tower
- Unicom

Navigation Frequencies:

- ILS
- LOC

AIRPORT INFORMATION PAGE OPTIONS

The following Airport Information Page options are available by pressing the **MENU** key (with the Airport Information Page displayed):

- Load Approach
- View Departure Airport
- View Destination Airport
- View Recent Airport List
- View Info
- View Departure
- View Arrival
- View Approach

To select an option:

1. Press the **MENU** key while on the Airport Information Page.
2. Turn the **FMS** knob to select the desired option.
3. Press the **ENT** key to perform the selected option operation.

Figure 7-62 Airport Information Page Menu

DEPARTURE INFORMATION PAGE (DP)

The Departure Information Page shows the available Departure Procedures (DPs; also referred to as SIDs) for the selected airport. Where multiple runways or transitions are associated with the departure procedure, that information can also be displayed. A map image provides a layout diagram for each departure, runway and transition. To display the Departure Information Page press the **DP** softkey.

To scroll through the available departures:

1. Press the **FMS** knob to activate the cursor.
2. Turn the **large FMS** knob to place the cursor on the Departure procedure name field.
3. Turn the **FMS** knob to display a window of available departures for the selected airport. Continue turning the **small FMS** knob to select the desired departure.
4. Press the **ENT** key. The cursor moves to the runway field.
5. Turn the **small FMS** knob to display a window of available runways. Continue turning the **small FMS** knob to select the desired runway.
6. Press the **ENT** key. The cursor moves to the Transitions field.
7. Turn the **small FMS** knob to display a window of available transitions. Continue turning the **FMS** knob to select the desired transition.
8. Press the **ENT** key. To remove the flashing cursor, press the **FMS** knob.

__NOTE__: 'ALL' may appear in the runway field, indicating the departure procedure applies to all runways. For airports with parallel runways, 'B' may appear at the end of the runway designation to indicate the departure procedure applies to both runways.

A departure can be loaded from the Departure Information Page.

To load a departure procedure from the Departure Information Page:

1. Select the desired departure, runway and transition using the steps described previously.
2. Press **MENU** to display the Airport Departure Page Options.
3. Turn the **FMS** knob to highlight 'Load Departure' and press the **ENT** key.
4. The Active Flight Plan Page is displayed. Press the **FPL** key to return to the Airport Departure Information Page.

Figure 7-63 Departure Page Menu

ARRIVAL INFORMATION PAGE (STAR)

The Arrival Information Page shows the available Standard Terminal Arrival (STAR) procedures for the selected airport. Where multiple transitions or runways are associated with the arrival procedure, that information may also be displayed. A map image provides a layout diagram for each arrival, transition and runway. To display the Airport Arrival Information Page press the **STAR** softkey.

To scroll through the available arrivals:

1. Press the **FMS** knob to activate the cursor.
2. Turn the **large FMS** knob to place the cursor on the 'ARRIVAL' procedure name field.
3. Turn the **small FMS** knob to display a window of available arrivals for the selected airport. Continue turning the **FMS** knob to select the desired arrival.
4. Press the **ENT** key. The cursor moves to the 'TRANSITION' field.
5. Turn the **small FMS** knob to display a window of available transitions. Continue turning the **FMS** knob to select the desired transition.
6. Press the **ENT** key. The cursor moves to the runway field.
7. Turn the **small FMS** knob to display a window of available runways. Continue turning the **FMS** knob to select the desired runway.
8. Press the **ENT** key. To remove the flashing cursor, press the **FMS** knob.

***NOTE**: 'ALL' may appear in the runway field, indicating the arrival procedure applies to all runways. For airports with parallel runways, 'B' may appear at the end of the runway designation to indicate the arrival procedure applies to both runways.*

Figure 7-64 Arrival Page Menu

An arrival can be loaded from the Arrival Information Page.

To load an arrival procedure from the Arrival Information Page:

1. Select the desired arrival, transition and runway using the steps described previously.
2. Press **MENU** to display the Arrival Information Page Options.
3. Turn the **large FMS** knob to highlight 'Load Arrival' and press the **ENT** key.
4. The Active Flight Plan Page is displayed. Press **FPL** to return to the Airport Arrival information Page.

Loading an arrival procedure into the active flight plan does NOT automatically alter the active flight plan leg or Direct-to navigation. Once loaded, the arrival is simply placed at the end of the flight plan. To manually transition to a loaded arrival, see the procedure below (an alternative method would be to remove the first occurrence of the destination airport identifier).

To manually transition to a loaded arrival procedure:

1. From the Active Flight Plan Page, press the **FMS** knob to activate the cursor and scroll down through the list of loaded arrival waypoints.
2. When the desired loaded arrival waypoint is highlighted, press the **Direct-to** key, then press **ENT** to highlight the 'Activate' prompt (note that any loaded arrival waypoint may be selected).
3. Press **ENT** again to confirm activate

APPROACH INFORMATION PAGE

The Approach Information page shows the available approach procedures for a selected airport. Where multiple initial approach fixes (IAFs) and feeder routes are available, that information may also be displayed. A map image provides a layout diagram for each approach and transition. To display the Airport Approach Information Page press the **APR** softkey.

To scroll through the available approaches and transitions:

1. Press the **FMS** knob to activate the cursor.
2. Turn the **large FMS** knob to place the cursor on the 'APPROACH' procedure name field.
3. Turn the **small FMS** knob to display a window of available approaches for the selected airport. Continue turning the **FMS** knob to select the desired approach.
4. Press the **ENT** key. The cursor moves to the transitions (TRANS) field.
5. Turn the **small FMS** knob to display a window of available transitions. Continue turning the **FMS** knob to select the desired transition or select 'VECTORS' for guidance only along the final course segment of the approach. Press the **ENT** key. NOTE: the cursor moves through the remaining fields but they are not selectable.
6. To remove the flashing cursor, press the **FMS** knob.

***NOTE**: 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 do not have this designation, meaning the GPS receiver may be used for supplemental navigation guidance only. VOR approaches, for example, must be flown by tuning the NAV receiver to the proper frequency and coupling the NAV receiver to the HSI located on the PFD.*

An approach can be loaded from the Airport Information Page.

To load an approach from the Airport Approach Information Page:

1. Select the desired approach and transition.
2. Press **MENU** to display the Approach Information Page Options.
3. Turn the **large FMS** knob to highlight 'Load Approach' and press the **ENT** key.
4. The Active Flight Plan Page is displayed. Press the **FPL** key to return to the Airport Information Approach Page.
5. 'Load and Activate Approach' allows you to load the selected approach into the active flight plan and activate navigation guidance to the approach transition.

***NOTE**: To load and activate an approach from the Approach Information page, follow the steps above, but select 'Load and Activate' in step #3.*

Figure 7-65 Approach Page Menu

INTERSECTION INFORMATION PAGE

The Intersection Information Page displays the following information for a selected intersection:

- Map of surrounding area
- Intersection Identifier and Symbol
- Name
- General location
- Latitude/longitude (degrees/minutes or degrees/minutes/seconds), MGRS or UTM/UPS
- Nearest VOR/VORTAC/VOR/DME (identifier, symbol, bearing, distance)

***NOTE**: The VOR displayed on the Intersection Information Page is the nearest VOR, not necessarily the VOR used to define the intersection.*

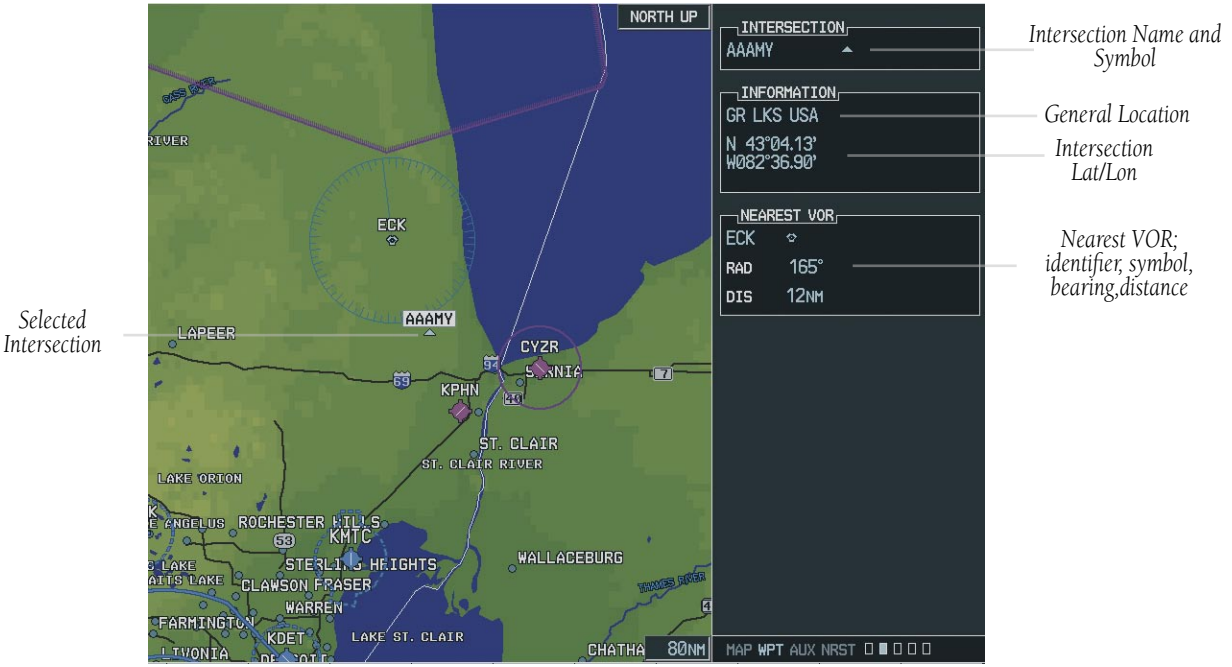

Figure 7-66 Intersection Information Page

Intersection Information Page Operations

To change the map range, turn the joystick to the left to select a lower range, turn it to the right to select a higher range. NOTE: Intersections can only be selected by identifier.

To select the Intersection Information Page:

1. From any page, press and momentarily hold **CLR** to select the Navigation Map Page. You may skip this step if you are already viewing any of the Map Group pages.
2. Turn the **large FMS** knob to select the 'WPT' page group. 'WPT' is displayed in the page group icon located in the lower right corner of the display.
3. Turn the **small FMS** knob to select the Intersection Information Page.

To select an Intersection by using an Identifier:

1. With the Intersection Information Page displayed, press the **FMS** knob to activate the cursor.
2. Turn the **small and large FMS** knobs to enter a name for the identifier and press the **ENT** key.
3. Press the **FMS** knob to remove the flashing cursor.

NDB INFORMATION PAGE

The NDB Information Page displays the following information for a selected Non-directional beacon:

- Map of surrounding area
- NDB Identifier and Symbol
- Name
- Closest city
- General location
- Latitude/longitude (degrees/minutes or degrees/minutes/seconds), MGRS or UTM/UPS
- Magnetic Variation in degrees
- Frequency in kilohertz (kHz)
- Nearest airport (identifier, symbol, bearing, distance)

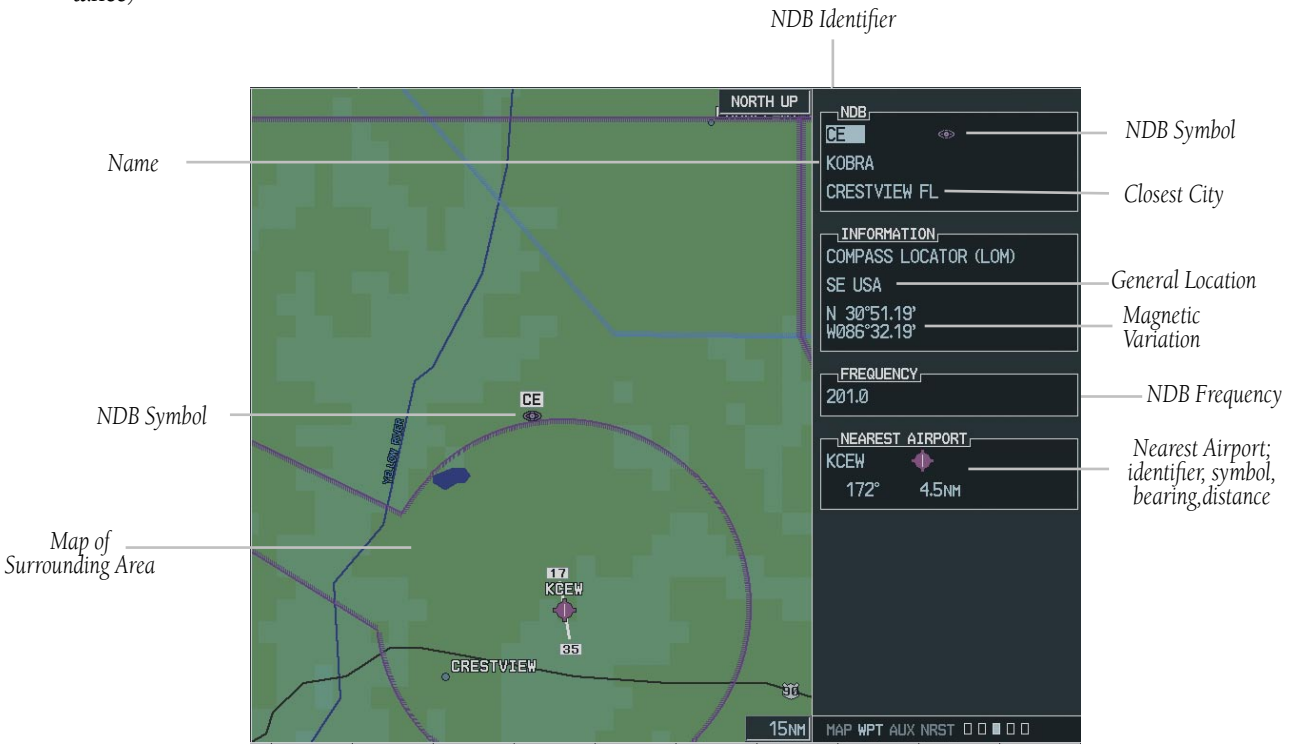

Figure 7-67 NDB Information Page

NDB Information Page Operations

The NDB Information Page allows the following operations:

- NDB selection by identifier
- NDB selection by name
- NDB selection by closest city

To change the map range, turn the joystick to the left to select a lower range, turn it to the right to select a higher range.

To select the NDB Information Page:

1. From any page, press and hold the **CLR** key to select the Navigation Map Page. You may skip this step if you are already viewing any of the Map Group pages.
2. Turn the **large FMS** knob to select the 'WPT' page group. 'WPT' is displayed in the page group icon located in the lower right corner of the display.
3. Turn the **small FMS** knob to select the NDB Information Page.

To select a NDB by using an Identifier:

1. With the NDB Information Page displayed, press the **FMS** knob to activate the cursor.
2. Turn the **small and large FMS** knobs to enter a name for the identifier and press the **ENT** key.
3. Press the **FMS** knob to remove the flashing cursor.

To select a NDB by using a Name:

1. With the NDB Information Page displayed, press the **FMS** knob to activate the cursor.
2. Turn the **large FMS** knobs to highlight the name field
3. Turn the **large and small FMS** knobs to enter a name and press the **ENT** key.
4. Press the **FMS** knob to remove the flashing cursor.

To select a NDB by using the closest city:

1. With the NDB Information Page displayed, press the **FMS** knob to activate the cursor.
2. Turn the **large FMS** knobs to highlight the closest city field
3. Turn the **large and small FMS** knobs to enter a city and press the **ENT** key.
4. Press the **FMS** knob to remove the flashing cursor.

NDB Information Page Options

The following NDB Information Page Options are available by pressing the **MENU** key (with the NDB Information Page displayed):

- 'View Recent NDB List' which allows you to view the most recent NDB list.

To view the most recent NDB list:

1. Select the NDB Information Page and press **MENU** to display the NDB Information Page Options. 'View Recent NDB List' is highlighted.
2. Press the **ENT** key. Turn the **small FMS** knob to select an NDB from the list and press the **ENTER** key. The selected NDB is now the active user NDB.

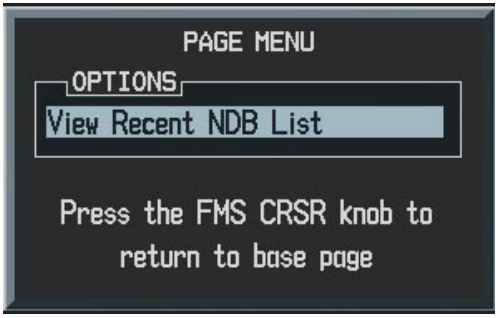

Figure 7-68 NDB Page Menu

VOR INFORMATION PAGE

The VOR Information Page displays the following information for a selected VOR:

- Map of surrounding area
- Identifier and Symbol
- Name
- Closest city
- General location
- Latitude/longitude (degrees/minutes or degrees/minutes/seconds), MGRS or UTM/UPS
- Magnetic Variation in degrees
- Frequency in megahertz (MHz)
- Nearest airport (identifier, symbol, bearing, distance)

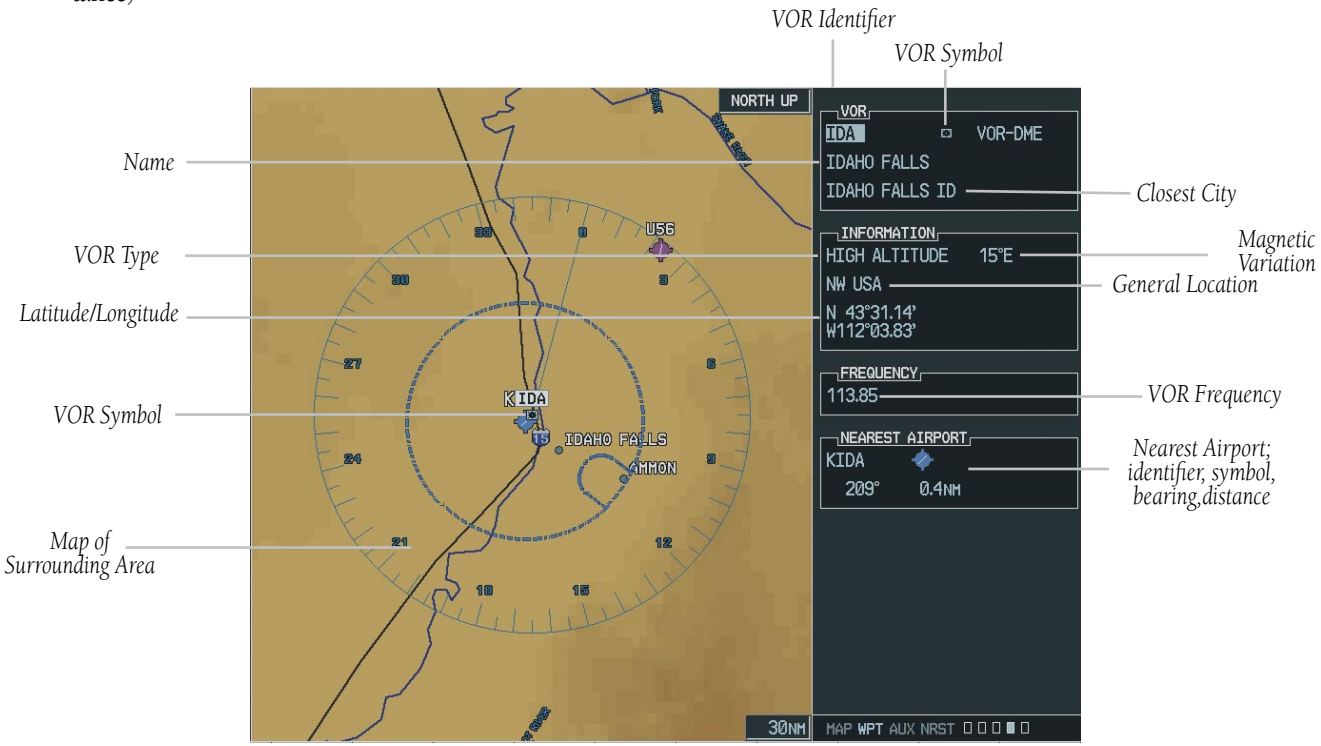

Figure 7-69 VOR Information Page

VOR Information Page Operations

The VOR information page allows the following operations:

- VOR selection by identifier
- VOR selection by name
- VOR selection by closest city

The map range is adjustable by rotating the joystick. To change the map range, rotate the joystick counter-clockwise to select a lower range and rotate it clockwise to select a higher range.

To select the VOR Information Page:

1. From any page, press and hold the **CLR** key to select the Navigation Map Page. You may skip this step if you are already viewing any of the Map Group pages.
2. Turn the **large FMS** knob to select the 'WPT' page group. 'WPT' is displayed in the page group icon located in the lower right corner of the display.
3. Turn the **small FMS** knob to select the VOR Information Page.

To select a VOR by using an Identifier:

1. With the VOR Information Page displayed, press the **FMS** knob to activate the cursor.
2. Turn the **small and large FMS** knobs to enter a name for the identifier and press the **ENT** key.
3. Press the **FMS** knob to remove the flashing cursor.

To select a VOR by using a Name:

1. With the VOR Information Page displayed, press the **FMS** knob to activate the cursor.
2. Turn the **large FMS** knobs to highlight the name field.
3. Turn the **large and small FMS** knobs to enter a name and press the **ENT** key.
4. Press the **FMS** knob to remove the flashing cursor.

To select a VOR by using the closest city:

1. With the VOR Information Page displayed, press the **FMS** knob to activate the cursor.
2. Turn the **large FMS** knobs to highlight the closest city field
3. Turn the **large and small FMS** knobs to enter a city and press the **ENT** key.
4. Press the **FMS** knob to remove the flashing cursor.

VOR Information Page Options

The following VOR Information Page Options are available by pressing the **MENU** key (with the VOR Information Page displayed):

- 'View Recent VOR List' which allows you to view the most recent VOR list.

To view the most recent VOR list:

1. Select the VOR Information Page and press **MENU** to display the VOR Information Page Options. 'View Recent VOR List is highlighted'.
2. Press the **ENT** key. Turn the **small FMS** knob to select a VOR from the list and press the **ENT** key. The selected VOR is now the active user VOR.

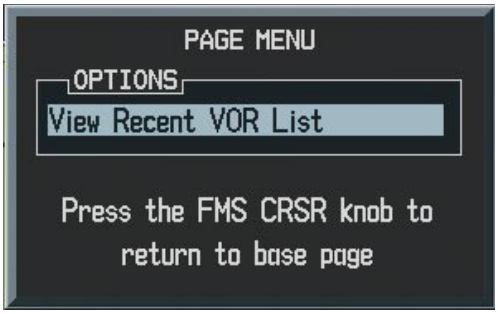

Figure 7-70 VOR Page Menu

USER WAYPOINT INFORMATION PAGE

The G1000 allows the storage of up to 1,000 user-defined waypoints. The User Waypoint Information Page displays the waypoint name (up to six characters long), identifier and radial from two reference waypoints, distance from one reference waypoint, along with the user waypoints latitude/longitude position.

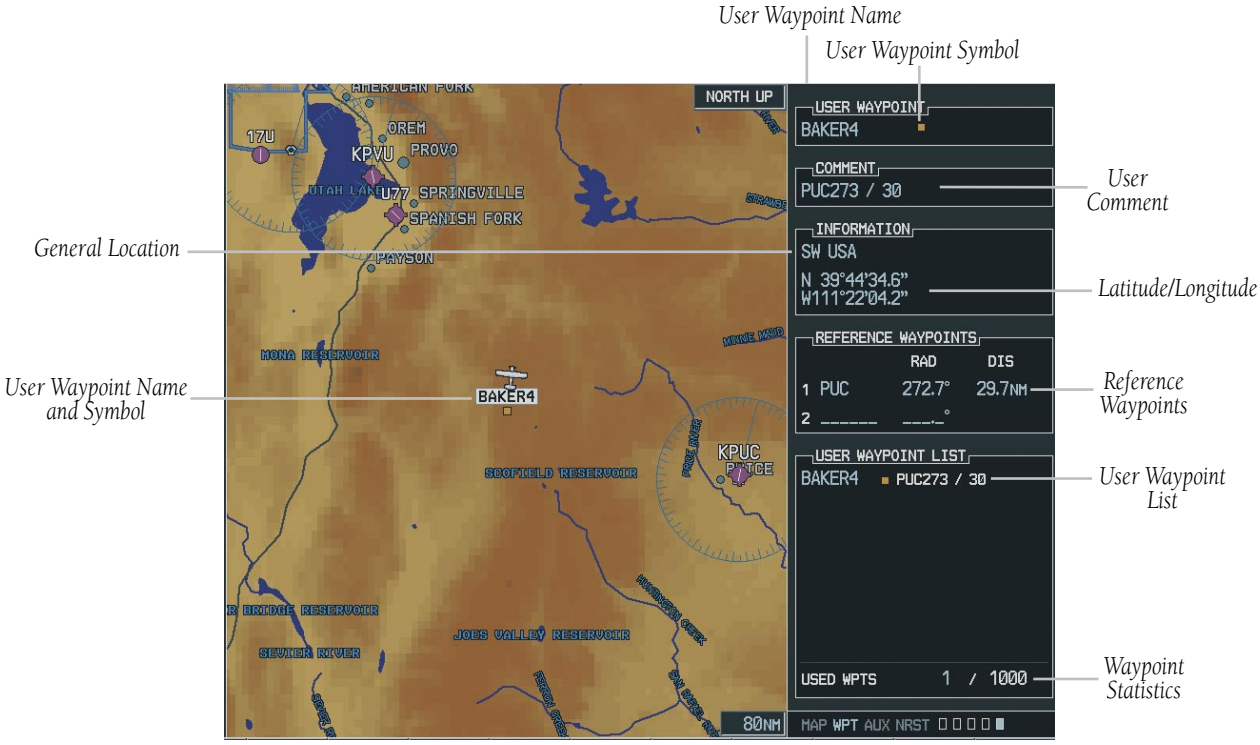

Figure 7-71 User WPT Information Page

The following data is displayed on the User Waypoint Information Page:

- Map of surrounding area
- Identifier
- Comment
- General location
- Latitude/longitude
- A reference waypoint with identifier, radial, and distance
- A second reference waypoint with identifier and radial
- A list of all user waypoints
- Statistics of the number of user waypoint slots used and available

To select the User Waypoint Information Page:

1. From any page, press and hold the **CLR** key to select the Navigation Map Page.
2. Turn the **large FMS** knob to select the 'WPT' page group. 'WPT' is displayed in the page group icon located in the lower right corner of the display.
3. Turn the **small FMS** knob to select the User Waypoint Information Page.

User Waypoint Information Page Operations

The following operations can be performed from the User Waypoint Information Page:

- Creating user waypoints (by current location, entered latitude/longitude position, reference waypoint specifications, or map pointer location).
- Modifying user waypoint information (by comment, latitude/longitude position, or reference waypoint information)
- Renaming user waypoints
- Deleting user waypoints

CREATING USER WAYPOINTS

User waypoints may be created from the User Waypoint Information Page or the Navigation Map Page. To create a new user waypoint from the User Waypoint Information Page, enter its name (identifier) and position, or reference another waypoint by radial and distance.

To create a new user waypoint by entering its latitude/longitude position:

1. With the User Waypoint Information Page displayed, press the **FMS** knob to activate the cursor.
2. Turn the **small and large FMS** knobs to enter a name for the new waypoint and press the **ENT** key. The message 'Are you sure you want to create the new user waypoint' is displayed. Press 'YES' to create the new waypoint. The present position is displayed in the information box. The comment in the comment box is auto-generated based on the reference waypoint usage. If the waypoint was defined with two reference waypoints, then this comment would be generated based on the radials (i.e. OJC354 / ICT057).
3. Turn the **large FMS** knob to highlight the position field in the information box.
4. Turn the **small and large FMS** knobs to enter the position coordinates for the new waypoint.
5. Press the **ENT** key to accept the selected position.
6. Press the **FMS** knob to remove the flashing cursor.

***NOTE**: The number of waypoints that are stored in memory (USED WPTS) is shown at the bottom of the User Waypoint Information Page.*

To create a new user waypoint by referencing an existing waypoint:

1. With the User Waypoint Information Page displayed, press the **FMS** knob to activate the cursor.
2. Turn the **small and large FMS** knobs to enter a name for the new waypoint and press the **ENT** key. The message 'Are you sure you want to create the new user waypoint' is displayed. Press 'YES' to create the new waypoint. The first reference waypoint (REFERENCE WAYPOINT) field is highlighted.
3. Turn the **small and large FMS** knobs to enter the identifier of the reference waypoint. The reference waypoint can be an airport, VOR, NDB, intersection or another user waypoint. Press **ENT** to accept the selected identifier.
4. The cursor moves to the radial (RAD) field. Turn the **small and large FMS** knobs to enter the radial from the reference waypoint to the new user waypoint. Press the **ENT** key to accept the selected radial.
5. The cursor moves to the distance (DIS) field. Turn the **small and large FMS** knobs to enter the distance from the reference waypoint to the new user waypoint. Press the **ENT** key to accept the selected distance.
6. Press the **FMS** knob to remove the flashing cursor.

Creating User Waypoints from the Navigation Map Page

The Navigation Map Page and panning target pointer provide a quick means of saving your present position as a user-defined waypoint.

To capture and save your present position as a user waypoint:

1. With the Navigation Map Page displayed, push the **joystick** to activate the panning function. The target pointer is displayed at your present position.
2. Press the **ENT** key to capture the pointers position and display the User Waypoint Information Page (only true when the pointer is not currently highlighting a waypoint).
3. Turn the **small and large FMS** knobs to select a waypoint name.
4. Press the **ENT** key to accept the selected name. The first reference waypoint field is highlighted.
5. Turn the **small and large FMS** knobs to enter the identifier of the reference waypoint. The reference waypoint can be an airport, VOR, NDB, intersection or another user waypoint. Press the **ENT** key to accept the selected identifier.
6. The cursor moves to the radial (RAD) field. Turn the **small and large FMS** knobs to enter the radial from the reference waypoint to the new user waypoint. Press the **ENT** key to accept the selected radial.
7. The cursor moves to the distance (DIS) field. Turn the **small and large FMS** knobs to enter the distance from the reference waypoint to the new user waypoint. Press the **ENT** key to accept the selected distance.
8. Press the **FMS** knob to remove the flashing cursor.

MODIFYING USER WAYPOINTS

To modify an existing waypoint, select that waypoint on the User Waypoint Information Page and enter the new position information directly over the old information.

To modify a user waypoint by changing its latitude/longitude position:

1. With the User Waypoint Information Page displayed, press the **FMS** knob to activate the cursor.
2. Turn the **small and large FMS** knobs to enter a name for the new waypoint and press the **ENT** key. The message 'Are you sure you want to create the new user waypoint' is displayed. Press 'YES' to create the new waypoint. The first reference waypoint (REFERENCE WAYPOINT) field is highlighted.
3. Turn the **large FMS** knob to highlight the position field in the Information Box.
4. Turn the **small and large FMS** knobs to enter the new position coordinates and press the **ENT** key to accept the selected position.
5. Press the **FMS** knob to remove the flashing cursor.

To modify a user waypoint by changing reference waypoint information:

1. With the User Waypoint Information Page displayed, press the **FMS** knob to activate the cursor.
2. Turn the **small and large FMS** knobs to enter a name for the new waypoint and press the **ENT** key. The message 'Are you sure you want to create the new user waypoint' is displayed. Press 'YES' to create the new waypoint. The first reference waypoint (REFERENCE WAYPOINT) field is highlighted if you want to change the reference waypoint. Otherwise, continue turning the **large FMS** knob to highlight the radial (RAD) or distance (DIS) field, as desired.
3. Turn the **small and large FMS** knobs to change the identifier — if desired — of the reference waypoint. The reference waypoint can be an airport, VOR, NDB, intersection or another user waypoint. Press the **ENT** key to accept the selected identifier.
4. The cursor moves to the radial (RAD) field. Use the **small and large FMS** knobs to change the radial from the reference waypoint, if desired. Press **ENT** to accept the selected radial.
5. The cursor moves to the distance (DIS) field. Turn the **small and large FMS** knobs to change the distance from the reference waypoint to the new user waypoint, if desired. Press the **ENT** key to accept the selected distance.
6. Press the **FMS** knob to remove the flashing cursor.

USER WAYPOINT INFORMATION PAGE OPTIONS

The following User Waypoint Information Page Options are available by pressing the **MENU** key (with the User Waypoint Information Page displayed):

- Delete All User Waypoints
- View Recent User WPT List
- Use Present Position
- Auto Comment
- Create New user Waypoint
- Delete User Waypoint
- Rename User Waypoint

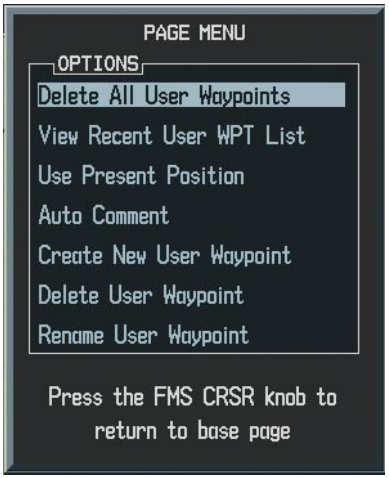

Figure 7-72 User WPT Page Menu

'Delete All User Waypoints' allows you to delete all user waypoints from memory.

To delete all user waypoints:

1. Select the User Waypoint Information Page and press **MENU** to display the User Waypoint Information Page Options.
2. Turn the **large FMS** knob to select 'Delete All User Waypoints' and press the **ENT** key. A confirmation windows is displayed. Press the **ENT** key to accept 'YES' or turn the **large FMS** knob to highlight 'NO' and press the **ENT** key.

'View Recent User WPT List' allows you to view the most recent user waypoint list.

To view the most recent user waypoint list:

1. Select the User Waypoint Information Page and press **MENU** to display the User Waypoint Information Page Options.
2. Turn the **large FMS** knob to select 'View Recent User WPT List' and press the **ENT** key. Turn the **small FMS** knob to select a waypoint from the list and press the **ENT** key. The selected waypoint is now the active user waypoint.

Use 'Present Position' when selected will move the currently selected user waypoint to the present position of the aircraft.

***NOTE:** The user waypoint is set to the airplane's position at the time when this option was selected.*

To move the currently selected user waypoint to the present position of the aircraft:

1. Select the User Waypoint Information Page and press the **MENU** key to display the User Waypoint Information Page options.
2. Turn the **large FMS** knob to select 'Use Present Position' and press the **ENT** key.
3. Highlight the position and press the **ENT** key.

'Auto Comment' when selected will overwrite the currently selected user waypoints comment with an automatically generated comment. The auto comment is in the same format as comments that are generated for user waypoints that have not specified a unique user waypoint comment. The auto comment can be one of three styles:

- REF1BRG1 / DIS1 - if the user waypoint position is defined by a reference 1 waypoint radial and distance (this is generally the default case, but the default case could also be the BLANK (c) case if there are no reference waypoints near the user waypoints position)
- REF1BRG1 / REF2BRG2 - if the user waypoint position is defined by a reference 1 waypoint radial and a reference 2 waypoint radial
- BLANK - if no reference waypoints are near the user waypoints position

To overwrite the currently selected user waypoints comment with an automatically generated comment:

1. Select the desired waypoint on the User Waypoint Information Page and press **MENU** to display the User Waypoint Information Page options.
2. Turn the **large FMS** knob to select 'Auto Comment' and press the **ENT** key.

Create New Waypoint allows the pilot to create a new user waypoint.

To create a new waypoint:

1. From the User Waypoint Information Page, press the **MENU** key to display the User Waypoint Information Page Options or press the **NEW** softkey.
2. Turn the **large FMS** knob to highlight Create New Waypoint and press the **ENT** key.
3. Turn the **small and large FMS** knobs to enter a name for the new waypoint and press the **ENT** key. The message 'Are you sure you want to create the new user waypoint' is displayed. Press 'YES' to create the new waypoint. The present position is displayed in the information box. The first reference waypoint field is highlighted
4. Turn the **small and large FMS** knobs to enter the identifier of the reference waypoint. The reference waypoint can be an airport, VOR, NDB, intersection or another user waypoint. Press the **ENT** key to accept the selected identifier.
5. The cursor moves to the radial (RAD) field. Turn the **small and large FMS** knobs to enter the radial from the reference waypoint to the new user waypoint. Press the **ENT** key to accept the selected radial.
6. Press the **FMS** knob to remove the flashing cursor.

Delete User Waypoint allows the pilot to delete a user waypoint.

To delete a user waypoint:

1. Select the User Waypoint Information Page and press **MENU** to display the User Waypoint Information Page Options or press the **DELETE** softkey.
2. Turn the **large FMS** knob to select 'Delete User Waypoint' and press the **ENT** key. The message 'Would you like to delete the user waypoint' is displayed. Press 'YES' to delete the waypoint.

Rename User Waypoint allows the pilot to rename a user waypoint.

To rename a user waypoint:

1. Select the User Waypoint Information Page and press **MENU** to display the User Waypoint Information Page Options or press the **RENAME** softkey.
2. Turn the **large FMS** knob to select 'Rename User Waypoint' and press the **ENT** key. The user waypoint field is highlighted. Turn the **small and large FMS** knobs to rename the user waypoint. Press the **ENT** key.
3. The message 'Would you like to rename the user waypoint' is displayed. Press 'YES' to rename the new user waypoint.

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7.10 AUXILIARY PAGE GROUP

The Auxiliary Page Group (AUX) provides detailed trip planning information, satellite status, RAIM prediction, system settings, LRU status and database information.

The AUX Group page names are as follows:

- Trip Planning
- Utility
- GPS Status
- System Setup
- System Status

To quickly select an Aux page:

1. From any page, press and hold the **CLR** key to select the Navigation Map Page.
2. Turn the **large FMS** knob to select the 'AUX' page group.
3. Turn the **small FMS** knob to select the desired AUX Page.

TRIP PLANNING PAGE

The Trip Planning Page calculates trip statistics, fuel statistics, and other statistics for a specified Direct-to, point-to-point, or flight plan based on automatic or manual input of data.

Figure 7-73 Trip Planning Page

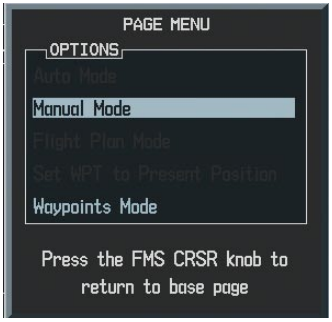

Figure 7-74 Trip Planning Page Menu

Trip Planning

Trip planning allows you to view desired track (DTK), distance (DIS), estimated time enroute (ETE), estimated time of arrival (ETA), and enroute safe altitude (ESA) for a Direct-to, point-to-point between two specified waypoints, or for any programmed flight plan. This option also displays the sunrise/sunset times for your destination waypoint (for the selected departure date).

To perform trip planning operations:

1. Select the AUX-TRIP PLANNING page.
2. The current page mode is displayed at the top of the page: 'AUTOMATIC' or 'MANUAL'. To change the page mode, press the **AUTO** or **MANUAL** softkey.
3. For Direct-to planning, press the **WPTS** softkey and verify that the from waypoint field indicates P.POS (present position). If necessary, go to the Page Menu and select 'Set WPT to Present Position' to display P.POS. Press the **ENT** key and the flashing cursor moves to the 'to' waypoint field. Turn the **small and large FMS** knobs to enter the identifier of the 'to' waypoint and press the **ENT** key to accept the waypoint. OR,
4. For point-to-point planning, turn the **small and large FMS** knobs to enter the identifier of the from waypoint. Once the waypoints identifier is entered, press the **ENT** key to accept the waypoint. The flashing cursor moves to the 'to' waypoint. Again, turn the **small and large FMS** knobs to enter the identifier of the 'to' waypoint and press the **ENT** key to accept the waypoint. OR,
5. For flight plan leg planning, press the **FPL** softkey and turn the **small FMS** knob to select the desired flight plan (already stored in memory), by number. Turn the **large FMS** knob to highlight the 'LEG' field and turn the **small FMS** knob to select the desired leg of the flight plan, or select 'CUM' to apply trip planning calculations to the entire flight plan.
6. Turn the **large FMS** knob to highlight the departure time (DEP TIME) field.
7. Turn the **small and large FMS** knobs to enter the departure time. Press the **ENT** key when finished. (Departure time may be entered in local or UTC time, depending upon unit settings).

With all variables entered, the following information is provided (not available at all times):

- DTK — Desired track, or desired course
- DIS — Distance
- ETE — Estimated time en route
- ESA — En-route safe altitude
- ETA — Estimated time of arrival
- Sunrise/Sunset times at the destination

Fuel Planning

Using fuel flow (FF) and/or fuel totalizer data, the AUX trip planning page displays current fuel conditions along the active Direct-to or flight plan. You may also manually enter fuel flow, ground speed (GS) and fuel on board figures for planning purposes. Fuel planning figures can be displayed for the currently active flight plan and Direct-to, or point-to-point navigation between two specified waypoints and for any stored flight plan.

To perform fuel planning operations:

1. Select the AUX-TRIP PLANNING page.
2. The current page mode is displayed at the top of the page: 'AUTOMATIC' or 'MANUAL'. To change the page mode, press the **AUTO** or **MANUAL** softkey.
3. For Direct-to planning, press the **WPTS** softkey and verify that the from waypoint field indicates P.POS (present position). Press the **ENT** key and the flashing cursor moves to the 'to' waypoint field. Turn the **small and large FMS** knobs to enter the identifier of the 'to' waypoint and press the **ENT** key to accept the waypoint. OR,
4. For point-to-point fuel planning, turn the **small and large FMS** knobs to enter the identifier of the 'from' waypoint. Once the waypoints identifier is entered, press the **ENT** key to accept the waypoint. The flashing cursor moves to the to waypoint. Again, turn the **small and large FMS** knobs to enter the identifier of the 'to' waypoint and press the **ENT** key to accept the waypoint. OR,
5. For flight plan leg fuel planning, press the **FPL** softkey and turn the **small FMS** knob to select the desired flight plan (already stored in memory), by number. Turn the **large FMS** knob to highlight the 'LEG' field and turn the **small FMS** knob to select the desired leg of the flight plan, or select 'CUM' to apply fuel planning calculations to the entire flight plan.
6. Turn the **small and large FMS** knobs to enter the fuel flow. Press the **ENT** key when finished. Note that in automatic page mode, fuel flow is provided by the system.
7. The flashing cursor moves to the fuel on board field. Turn the **small and large FMS** knobs to modify the fuel on board. Press the **ENT** key when finished. Note that in automatic mode this is provided by the system.
8. The flashing cursor moves to the calibrated airspeed field. Turn the **small and large FMS** knobs to enter an calibrated airspeed. Press the **ENT** key when finished.

With all variables entered, the following information is provided (all of the items are not available at all times):

- Efficiency
- Total Endurance
- Remaining Fuel
- Remaining Endurance
- Fuel Required
- Total Range

Other Statistics

To calculate Density Altitude and True Airspeed

1. Select 'MANUAL' page mode by pressing the **Manual** softkey.
2. Turn the **large FMS** knob to select the 'IND ALTITUDE' field. Turn the **small and large FMS** knobs to enter the altitude indicated on your altimeter. Press the **ENT** key when finished.
3. The flashing cursor moves to the 'PRESSURE' field. Turn the **small and large FMS** knobs to enter the barometric pressure (altimeter setting). Press the **ENT** key when finished.
4. The flashing cursor moves to the total air temperature ('TAT') field. 'TAT' is the temperature, including the compressibility error heating of speed, read on the outside air temperature gauge located in the lower left corner of the PFD. Turn the **small and large FMS** knobs to enter the temperature. Press the **ENT** key when finished.

Utility Page

The Utility Page displays timers, trip statistics, and scheduler information for flight planning purposes.

Figure 7-75 Utility Page

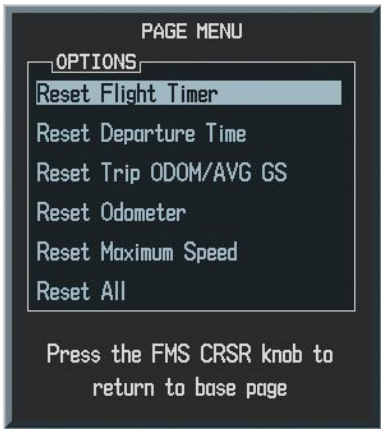

Figure 7-76 Utility Page Menu

Utility Page Operations

To set the generic timer direction (up, down):

1. Select the AUX UTILITY Page.
2. Press the **FMS** knob. The 'GENERIC' timer field is highlighted.
3. Turn the **small FMS** knob to display the 'UP/DOWN' window.
4. Turn the **FMS** knob to select 'UP' or 'DOWN' and press the **ENT** key.

To start, stop, or reset the generic timer:

1. Select the AUX UTILITY Page.
2. Press the **FMS** knob. Turn the **large FMS** knob to select the 'START?' Field.
3. Press the **ENT** key to start, stop, or reset the timer.

To set the generic timer value:

1. Select the AUX UTILITY Page.
2. Press the **FMS** knob. Turn the **large FMS** knob to select the time field (hh/mm/ss).
3. Turn the **small and large FMS** knobs to set the desired time and press the **ENT** key.

To set the flight timer starting criteria (ground speed more then 30 knots, power on):

1. Select the AUX UTILITY Page.
2. Press the **FMS** knob. Turn the **large FMS** knob to select the 'FLIGHT' field.
3. Turn the **small FMS** knob to display the selection window.
4. Turn the **FMS** knob to select either PWR-ON or GS>30KT and press the **ENT** key.

To set the departure timer starting criteria (ground speed more then 30 knots, power on):

1. Select the AUX UTILITY Page.
2. Press the **FMS** knob. Turn the **large FMS** knob to select the 'DEPARTURE TIME' field.
3. Turn the **small FMS** knob to display the selection window.
4. Turn the **FMS** knob to select either PWR-ON or GS>30KT and press the **ENT** key.

To reset the flight timer:

1. Select the AUX UTILITY Page.
2. Press the **MENU** key. Turn the **FMS** knob to select 'Reset Flight Timer'.
3. Press the **ENT** key.

To reset the departure timer:

1. Select the AUX UTILITY Page.
2. Press the **MENU** key. Turn the **FMS** knob to select 'Reset Departure Time'.
3. Press the **ENT** key.

Trip Statistics

To reset trip statistics readouts:

1. Press the **MENU** key to display an options window with the following reset options:
   - Reset Trip ODOM/AVG GS – Resets trip average ground speed readout and odometer
   - Reset Odometer – Resets odometer readout only
   - Reset Maximum Speed – Resets maximum speed readout only
   - Reset All – Resets all trip statistics readouts
2. Turn the **FMS** knob to select the desired reset option and press the **ENT** key.

Scheduler

The scheduler feature displays reminder messages (such as "Change oil", "Switch fuel tanks", "Overhaul", etc.). One-time, periodic, and event-based messages are allowed. One-time messages appear once the timer expires and reappear each time the G1000 is powered on, until the message is deleted. Periodic messages automatically reset to the original timer value, once the message is displayed. Event-based messages do not use a timer, but rather a specific date and time.

- Name
- Type (event, one time, periodic)
- Date
- Time
- REM (remainder)

To enter a name:

1. Select the AUX UTILITY Page.
2. Press the **FMS** knob. Turn the **large FMS** knob to select the flight scheduler name field.
3. Turn the **FMS** knobs to enter the desired name and press the **ENT** key.

To enter a type (event, one time, periodic)

1. Select the AUX UTILITY Page.
2. Press the **FMS** knob. Turn the **large FMS** knob to select the scheduler type field.
3. Turn the **small FMS** knob to display the options list. Turn the **FMS** knobs to select the desired type and press the **ENT** key.

To enter a time:

1. Select the AUX Utility Page.
2. Press the **FMS** knob. Turn the **large FMS** knob to select the scheduler time field.
3. Turn the **small and large FMS** knobs to enter the desired time and press the **ENT** key.

To enter a date:

1. Select the AUX Utility Page.
2. Press the **FMS** knob. Turn the **large FMS** knob to select the scheduler date field.
3. Turn the **small and large FMS** knobs to enter the desired date and press the **ENT** key.

GPS STATUS PAGE

The GPS Status Page provides a visual reference of GPS receiver functions:

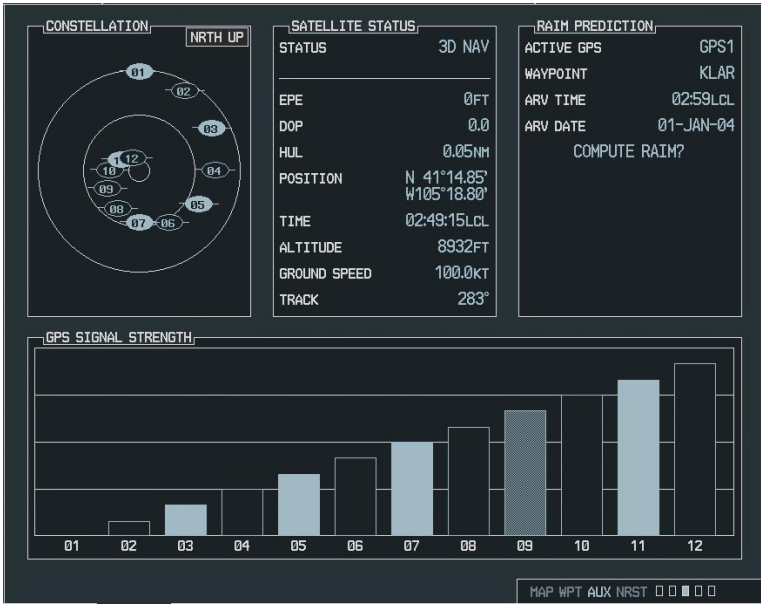

Figure 7-77 GPS Status Page

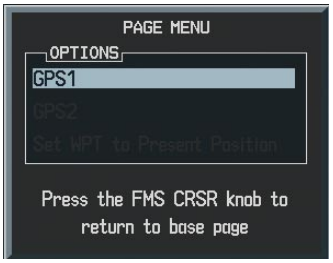

Figure 7-78 GPS Status Page Menu

Satellite Status Page

- Satellite constellation displaying the following for each satellite being tracked:
  - Azimuth
  - Elevation
  - PRN number
  - Tracking status
- A receiver tracking status display that displays the following GPS sub-system status situations:
  - '2D NAV', when only 2-dimensional position is available
  - '3D NAV', when 3-dimensional position is available
- Estimated position error
- Dilution of precision
- Horizontal uncertainty level
- GPS calculated position
- GPS calculated time of day
- GPS calculated altitude
- Ground Speed
- Track

The sky view display at the top left corner of the page shows the satellites currently in view as well as their respective positions. The outer circle of the sky view represents the horizon (with north at the top of the circle); the inner circle represents 45° above the horizon and the center point shows the position directly overhead. Each satellite has a 30-second data transmission that must be collected (hollow signal strength bar) before the satellite may be used for navigation (solid signal strength bar). Once the GPS receiver has determined your position, the G1000 indicates your position, altitude, track and ground speed. The GPS receiver status field also displays the following messages under the appropriate conditions:

- Acquiring Sat - The GPS receiver is acquiring satellites for navigation. In this mode, the receiver uses satellite orbital data (collected continuously from the satellites) and last known position to determine the satellites that should be in view.
- 2D Navigation - The GPS receiver is in 2D navigation mode.
- 3D Navigation - The GPS receiver is in 3D navigation mode and computes altitude using satellite data.

The Satellite Status Page also indicates the accuracy of the position fix, using Estimated Position Error (EPE) and Dilution of Precision (DOP) figures. DOP measures satellite geometry quality (i.e., number of satellites received and where they are relative to each other) on a range from 0.0 to 9.9. The lowest numbers are the best accuracy and the highest numbers are the worst. EPE uses DOP and other factors to calculate a horizontal position error, in feet or meters.

RAIM Prediction

"RAIM" is an acronym for Receiver Autonomous Integrity Monitoring, a GPS receiver function that performs a consistency check on all tracked satellites. RAIM ensures that the available satellite geometry will allow the receiver to calculate a position within a specified protection limit (2.0 nautical miles for oceanic and en route, 1.0 NM for terminal and 0.3 NM for non-precision approaches). During oceanic, en-route, and terminal phases of flight, RAIM is available nearly 100% of the time.

Because of the tighter protection limit on approaches, there may be times when RAIM is not available. The G1000 automatically monitors RAIM and warns you with an alert message when it is not available. If RAIM is not available when crossing the FAF, the pilot must fly the missed approach procedure.

The RAIM prediction function also indicates whether RAIM will be available for a specified date and time. If RAIM is not predicted to be available for the final approach course, the approach does not become active — as indicated by an "Approach is not active" message, and a "RAIM not available from FAF to MAP" message.

To predict RAIM availability:

1. Select the GPS Status Page.
2. Press the **FMS** knob. Turn the **small and large FMS** knobs to select the 'WAYPOINT' field.
3. Turn the **small FMS** knob to display the Waypoint Information Page.
4. Turn the **small and large FMS** knobs to enter the desired waypoint. Press the **ENT** key to accept.
5. Turn the **small and large FMS** knobs to enter an arrival time and press the **ENT** key.
6. Turn the **small and large FMS** knob to enter an arrival date.
7. The cursor highlights the 'COMPUTE RAIM' field. Press the **ENT** key to compute RAIM. The following options are displayed:
   - 'COMPUTE RAIM?' if RAIM has not been computed for the current waypoint, time, and date combination
   - 'COMPUTING AVAILABILITY' if the RAIM calculation is in progress
   - 'RAIM AVAILABLE' if RAIM is predicted to be available for the given combination of waypoint, time, and date
   - 'RAIM NOT AVAILABLE' if RAIM is predicted to be unavailable for the given combination of waypoint, time, and date

***NOTE**: RAIM computations predict satellite coverage within +/- 15 minutes of the specified arrival date and time.*

Figure 7-79 RAIM

GPS Signal Strength

The Satellite Status Page can be helpful in troubleshooting weak (or missing) signal levels due to poor satellite coverage or installation problems. Refer to this page occasionally to monitor GPS receiver performance and establish a normal pattern for system operation. Should problems occur at a later date, it may be helpful to have an established baseline from which to compare.

As the GPS receiver locks onto satellites, a signal strength bar is displayed for each satellite in view, with the appropriate satellite number (01-32) underneath each bar. The progress of satellite acquisition is shown in three stages:

- No signal strength bars - the receiver is looking for the satellites indicated.
- Hollow signal strength bars - the receiver has found the satellites and is collecting data.
- Solid signal strength bars - the receiver has collected the necessary data and the satellites are ready for use.
- Checkered signal strength bars - the receiver has excluded the satellite (FDE).

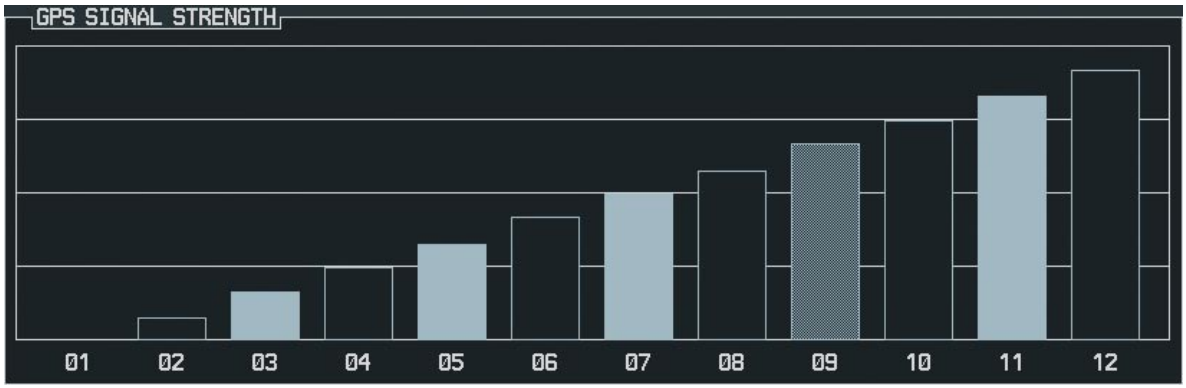

Figure 7-80 GPS Signal Strength

To select the GPS receiver for which data is displayed:

1. Select the GPS Status Page.
2. Press the **GPS1** softkey for the display of information pertaining to GPS1 or press the **GPS2** softkey for the display of information pertaining to GPS2.

SYSTEM SETUP PAGE

The System Setup Page is the fourth AUX Page and provides access (via a list of menu options) to manage the following system parameters:

- Local or UTC time display
- Units of measure settings (display units)
- Position Formats
- Map Datums
- Airspace Alerts
- Arrival Alert
- Audio Alerts
- MFD Data Bar Fields
- GPS CDI Range Adjustments
- COM Transceiver Channel Spacing.
- Nearest Airport Parameters

Date/Time

The Date/Time box provides settings for time format (local or UTC; 12- or 24-hour) and time offset. The time offset is used to define current local time. UTC (also called "GMT" or "Zulu") date and time are calculated directly from the GPS satellites signals and cannot be changed. If you prefer to use local time, simply designate the offset by adding or subtracting the correct number of hours.

Figure 7-81 System Setup Page

The Date/Time section of the System Setup page displays the following data:

- The current date
- The current time
- The current time format (local 12hr, local 24hr, UTC)
- The current time offset

To set the system time format:

1. Select the System Setup Page.
2. Press the **FMS** knob momentarily, to activate the flashing cursor.
3. Turn the **large FMS** knob to highlight the 'TIME FORMAT' field in the Date/Time box.
4. Turn the **FMS** knob to select the desired system time format (local 12hr, local 24hr, UTC). Press the **ENT** key.

To set the current time offset:

1. Select the System Setup Page.
2. Press the **FMS** knob momentarily, to activate the flashing cursor.
3. Turn the **large FMS** knob to highlight the 'TIME OFFSET' field in the Date/Time box.
4. Turn the **small and large FMS** knobs to select the time offset. Press the **ENT** key.

Display Units

The Display Units section of the System Setup Page allows you to configure the displayed data to standard or metric units of measure. The Display Units section also provides two magnetic variation (heading) options: True and Auto. If 'Auto' is selected, all track, course and heading information is corrected to the computed magnetic variation. The "True" setting references all information to true north.

The Display Units section of the System Setup Page displays the following data:

- Nav Angle
- Magnetic variation
- Distance and speed units
- Altitude and vertical speed units
- Barometric pressure units
- Temperature units
- Fuel and fuel flow units
- Position

The aviation database contains over 100 map datums to adjust your position reading, making it conform to specific paper charts. The default datum setting is WGS 84. If you are using a chart based on another datum, you should set the G1000 to use the same datum. Using a map datum that does not match the charts you are using can result in significant differences in position information. If you are using the paper charts for reference only, the G1000 still provides correct navigation guidance to the waypoints contained in the database, regardless of the datum selected.

The Display Units section of the System Setup Page allows the following operations:

- To select a Nav Angle (auto, true)
- To select Distance and speed units (metric or nautical)
- To select Altitude and vertical speed units (feet, meters)
- To select Barometric pressure units (inches of mercury, hectopascals)
- To select Temperature units (Celsius, Fahrenheit)
- To select Fuel and fuel flow units (gallons, imperial gallons, kilograms, liters, pounds)
- To select position

To change a Display Units setting:

1. Select the System Setup Page.
2. Press the **FMS** knob momentarily, to activate the flashing cursor.
3. Turn the **large FMS** knob to highlight the desired 'DISPLAY UNITS' field.
4. Turn the **small FMS** knob to display the options list for the selected item.
5. Turn the **FMS** knob to highlight the new selection.
6. Press the **ENT** key.

Map Datums

The Map Datum section of the System Setup Page allows selection of map datums to be used by the G1000 from a list of datums available in the current aviation database (See Appendix D for a list of available map datums). NOTE: Per TSO C129a, the WGS-84 map datum should be used in the United States. For use outside the U.S., select the geodetic datum required by that country.

To select a Map Datum:

1. Select the System Setup Page.
2. Press the **FMS** knob momentarily, to activate the flashing cursor.
3. Turn the **large FMS** knob to highlight the desired 'MAP DATUM' field.
4. Turn the **small FMS** knob to display the Map Datum list.
5. Turn the **FMS** knob to highlight the new datum.
6. Press the **ENT** key.

Airspace Alerts

The Airspace Alerts fields allow the pilot to turn the controlled/special-use airspace message alerts on or off. This does not affect the alerts listed on the Nearest Airspaces Page or the airspace boundaries depicted on the Navigation Map Page. It simply turns on/off the warning provided when the aircraft is approaching or near an airspace. An altitude buffer is also provided which "expands" the vertical range above or below an airspace. For example, if the buffer is set at 500 feet, and you are more than 500 feet above or below an airspace, you will not be notified with an alert message; if you are less than 500 feet above or below an airspace and projected to enter it, you will be notified with an alert message. The default setting is 200 feet.

The Airspace Alerts section of the System Setup Page displays the following information:

- Class B TMA airspace alert setting
- Class C TCA airspace alert setting
- Class D
- Restricted airspace alert setting
- MOA
- Other airspace alert settings
- Altitude buffer distance setting

The Airspace Alerts section of the System Setup Page allows for the following operations:

- Selecting class B TMA airspace alert setting (on, off)
- Selecting class C TCA airspace alert setting (on, off)
- Class D (on, off)
- Selecting restricted airspace alert setting (on, off)
- Selecting MOA (on, off)
- Other airspace alert settings (on, off)
- Selecting altitude buffer distance setting

To turn an Airspace Alert on or off:

1. Select the System Setup Page.
2. Press the **FMS** knob momentarily, to activate the flashing cursor.
3. Turn the **large FMS** knob to highlight the desired 'AIRSPACE ALERTS' field.
4. Turn the **small FMS** knob to display the options list.
5. Turn the **FMS** knob to select 'YES' or 'NO' and press the **ENT** key.

To change the altitude buffer distance setting:

1. Select the System Setup Page.
2. Press the **FMS** knob momentarily, to activate the flashing cursor.
3. Turn the **large FMS** knob to highlight the 'ALTITUDE BUFFER' field.
4. Turn the **small and large FMS** knobs to select an altitude buffer value and press the **ENT** key.

Arrival Alerts

An arrival alert, provided on the System Setup Page, can be set to notify you with a message when you have reached a user-defined distance to the final destination (the direct-to waypoint or the last waypoint in a flight plan). Once you have reached the set distance (up to 99.9 units), an "Arrival at [waypoint]"message is displayed on the PFD Navigation Status Bar.

The Arrival Alert section of the System Setup Page displays the following information:

- Arrival alert setting
- Trigger distance for arrival alerts

The Arrival Alerts section of the System Setup Page allows the following operations:

- Enabling and disabling of arrival alert
- Setting trigger distance for arrival alerts

To enable/disable an Arrival Alert:

1. Select the System Setup Page.
2. Press the **FMS** knob momentarily, to activate the flashing cursor.
3. Turn the **large FMS** knob to select the ARRIVAL ALERT On/Off field.
4. Turn the **small FMS** knob to display the options list.
5. Turn the **FMS** knob to select the desired option and press the **ENT** key.

To change the Arrival Alert trigger distance setting:

1. Select the System Setup Page.
2. Press the **FMS** knob momentarily, to activate the flashing cursor.
3. Turn the **large FMS** knob to highlight the desired ARRIVAL ALERT distance field.
4. Turn the **small and large FMS** knobs to enter a trigger distance and press the **ENT** key.

Audio Alerts

The Audio Alert section of the System Setup Page gives you the option of selecting a male or female voice for audio alerts.

To change the audio alert voice:

1. Select the System Setup Page.
2. Press the **FMS** knob momentarily, to activate the flashing cursor.
3. Turn the **large FMS** knob to highlight the desired 'VOICE' field in the 'AUDIO ALERT' box.
4. Turn the **small FMS** knob to display the options list for the voice.
5. Turn the **FMS** knob to highlight male or female.
6. Press the **ENT** key.

MFD Data Bar Fields

The MFD Nav Data Bar Fields section of the System Setup Page displays the current configuration of the Nav data (MFD) bar fields. The Nav Data Bar Fields section of the System Setup Page allows you to configure the four Nav data bar fields to the following values:

- Bearing (BRG)
- Distance (DIS)
- Desired Track (DTK)
- En Route Safe Altitude (ESA)
- Estimated Time of Arrival (ETA)
- Estimated Time En Route (ETE)
- Ground Speed (GS)
- Minimum Safe Altitude (MSA)
- Track Angle Error (TKE)
- Track (TRK)
- Vertical Speed Required (VSR)
- Crosstrack Error (XTK)

The default settings are:

- Field 1: Ground speed (GS)
- Field 2: Distance to next waypoint (DIS)
- Field 3: Estimated Time enroute (ETE)
- Field 4: Enroute Safe Altitude (ESA)

To change an MFD Data Bar Field:

1. Select the System Setup Page.
2. Press the **FMS** knob momentarily, to activate the flashing cursor.
3. Turn the **large FMS** knob to highlight the desired MFD data bar field.
4. Turn the **small FMS** knob to display the options list.
5. Turn the **FMS** knob to highlight the new selection.
6. Press the **ENT** key.

GPS CDI

The CDI section of the System Setup Page allows you to define the range for the on-screen course deviation indicator. The range values represent full range deflection for the CDI to either side. The default setting is 'AUTO'. At this setting, the CDI range is set to 5.0 nautical miles during the "en-route" phase of flight. Within 30 nm of your destination airport, the CDI range gradually ramps down to 1.0 nm (terminal area). Likewise, leaving your departure airport the CDI range is set to 1.0 nm and gradually ramps UP to 5 nm beyond 30 nm (from the departure airport). During approach operations the CDI range gradually ramps down even further, to 0.3 nm. This transition normally occurs within 2.0 nm of the final approach fix (FAF).

If a lower CDI range setting is selected (i.e., 1.0 or 0.3 nm), the higher range settings are not selected during ANY phase of flight. For example, if 1.0 nm is selected, the G1000 uses this for en-route and terminal phases and ramp down to 0.3 nm during an approach. Note that the Receiver Autonomous Integrity Monitoring (RAIM) protection limits listed below follow the selected CDI range, and corresponding flight phases.

The CDI Section of the System Setup page displays the following data:

- Selected CDI range (auto, 5 nm, 1 nm, 0.3 nm)
- The current system CDI range (5 nm, 1 nm, 0.3 nm)
- The ILS CDI capture mode setting (auto, manual)

The CDI Section of the System Setup page allows the following operations:

- Setting the selected CDI range (auto, 5 nm, 1 nm, 0.3 nm)
- Setting the ILS CDI capture mode (auto, manual)

To change the CDI range:

1. Select the System Setup Page.
2. Press the **FMS** knob momentarily, to activate the flashing cursor.
3. Turn the **large FMS** knob to highlight the 'SELECTED' field in the GPS CDI box.
4. Turn the **small FMS** knob to display the options list.
5. Turn the **FMS** knob to select the desired value and press the **ENT** key.

To change the ILS CDI capture setting:

1. Select the System Setup Page.
2. Press the **FMS** knob momentarily, to activate the flashing cursor.
3. Turn the **large FMS** knob to highlight the 'ILS CDI CAPTURE' field in the GPS CDI box.
4. Turn the **FMS** knob to select the desired value and press the **ENT** key.

COM Configuration

COM Configuration allows you to select 8.33 kHz or 25.0 kHz COM frequency channel spacing.

***NOTE**: 8.33 kHz VHF communication frequency channel spacing is not approved for use in the United States. Select the 25.0 kHz channel spacing option for use in the United States.*

To change COM channel spacing:

1. Select the System Setup Page.
2. Press the **FMS** knob momentarily, to activate the flashing cursor.
3. Turn the **large FMS** knob to highlight the 'CHANNEL SPACING' field.
4. Turn the **FMS** knob to select the desired spacing and press the **ENT** key.

Nearest APT

Nearest Airport defines the minimum runway length and surface type used when determining the nine nearest airports to display on the Nearest Airport Page. A minimum runway length and/or surface type can be entered to prevent airports with small runways, or runways that are not of appropriate surface, from being displayed. The default settings are '0 feet (or meters)' for runway length and "any" for runway surface type. The Nearest Airport section of the System Setup page displays the following data:

- Nearest airport surface matching criteria (any, hard only, hard/soft, water)
- Nearest airport minimum length matching criteria

To select Nearest airport surface matching criteria (any, hard only, hard/soft, water):

1. Select the System Setup Page.
2. Press the **FMS** knob momentarily, to activate the flashing cursor.
3. Turn the **large FMS** knob to highlight 'RNWY SURFACE' field in the 'NEAREST APT' box.
4. Turn the **small FMS** knob to display the options list for the selected item.
5. Turn the **FMS** knob to highlight the new selection (any, hard only, hard/soft, water). Press the **ENT** key.

To select Nearest airport minimum runway length matching criteria:

1. Select the System Setup Page.
2. Press the **FMS** knob momentarily, to activate the flashing cursor.
3. Turn the **large FMS** knob to highlight 'MIN LENGTH' field in the 'NEAREST APT' box.
4. Turn the **small FMS** knob to display the length field.
5. Turn the **small and large FMS** knobs to enter a runway length (zero to 99,999 feet).
6. Press the **ENT** key.

SYSTEM STATUS PAGE

The System Status Page displays the status and software version numbers for all detected system LRUs. Pertinent information of all databases in the system is also displayed. Active LRUs are indicated by a green check mark and failed LRUs are indicated by a red X. The Pilot should note the failed LRU and inform a Cessna service center or Garmin dealer.

Figure 7-82 System Status Page

7.11 NEAREST PAGE GROUP

The nearest (NRST) page group is the fourth page group which consists of the following pages:

- Nearest Airports
- Nearest Intersections
- Nearest NDB
- Nearest VOR
- Nearest User WPTS
- Nearest Frequencies
- Nearest Airspaces

To quickly select a NRST page:

1. From any page, press and hold the **CLR** key to select the Navigation Map Page.
2. Turn the **large FMS** knob to select the NRST page group. 'NRST' is displayed in the page group icon located in the lower right corner of the display.
3. Turn the **small FMS** knob to select the desired NRST Page.

Not all 25 nearest airports, VORs, NDBs, intersections or user waypoints can be displayed on the corresponding NRST page at one time. The Nearest Airports Page displays detailed information for five nearest airports, with a scroll bar along the right-hand side of the page indicating the part of the list that is currently being viewed. The Nearest Airspaces Page displays detailed information for up to three special use or controlled airspace alerts. The NRST pages for VORs, NDBs, intersections, and user waypoints display nine waypoints at a time. The flashing cursor and **large FMS** knob are used to scroll and view the rest of the waypoints or airspaces in the list.

To scroll through the list of nearest airports, VORs, NDBs, intersections, user waypoints or airspaces:

1. Select the desired NRST page using the steps outlined above.
2. Press the **FMS** knob to activate the cursor.
3. Turn the **large FMS** knob to scroll through the list. The scroll bar along the right-hand side of the page indicates the part of the list that is currently being viewed.
4. Press the **FMS** knob to remove the flashing cursor.

NAVIGATING TO A NEAREST WAYPOINT

The NRST pages can be used in conjunction with the Direct-to function to quickly set a course to a nearby facility. This feature can be a real time saver compared to retrieving information from the database using the WPT pages. More importantly, it instantly provides navigation to the nearest airport in case of an in-flight emergency.

To select a nearby airport, VOR, NDB, intersection or user waypoint as a Direct-to destination:

1. Use the flashing cursor to scroll through a NRST page list and highlight the desired nearest waypoint.
2. Press the **Direct-to** key to display the Direct-to Page.
3. Press the **ENT** key to accept the selected waypoints identifier and press the **ENT** key a second time (with 'Activate?' highlighted) to begin navigating to the selected waypoint.

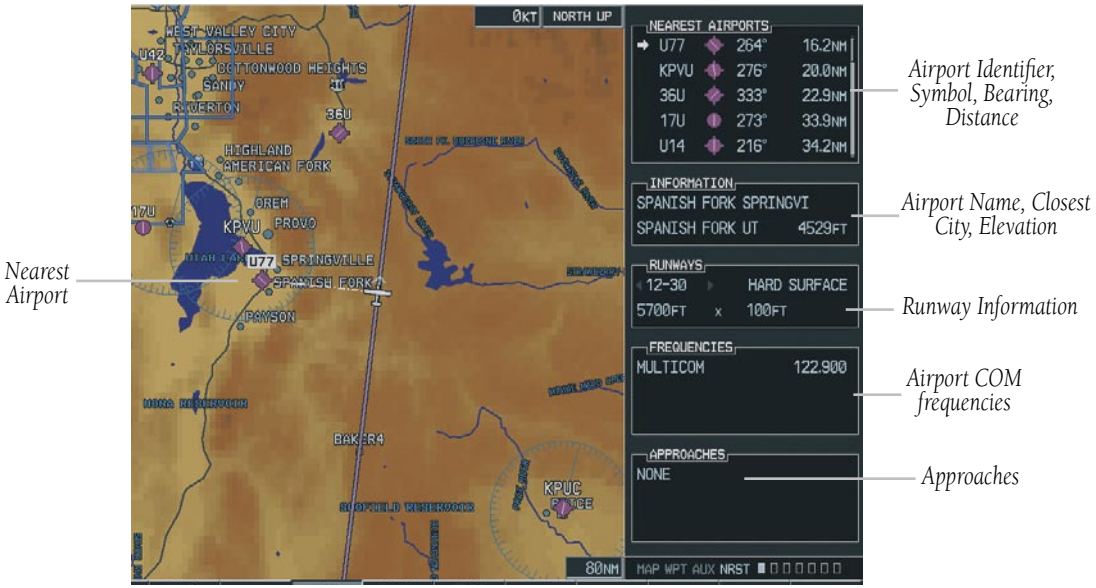

Figure 7-83 Nearest Airports Page

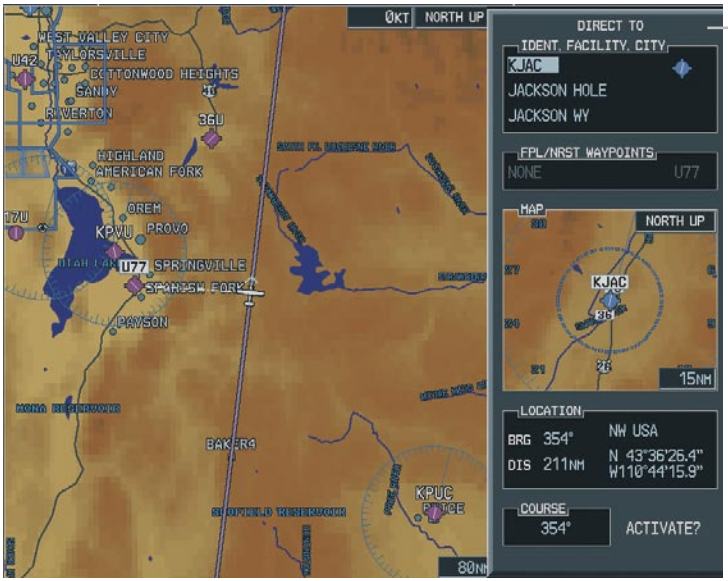

Figure 7-84 Direct-to from Nearest Airports Page

Nearest Airports Page

The Nearest Airports Page displays the following information for a selected airport:

- Map of surrounding area
- Airport Identifier, Symbol, Bearing, Distance (up to 25 airports within 200 nm of current position)
- Name
- Closest city
- Elevation
- Runway information
- Airport COM frequencies
- Approaches

To select the Nearest Airports Page:

1. From any page, press and hold the **CLR** key to select the Navigation Map Page.
2. Turn the **large FMS** knob to select the NRST page group. 'NRST' is displayed in the page group icon located in the lower right corner of the display.
3. Turn the **small FMS** knob to select the Nearest Airports Page.

To select a nearest airport from the Nearest Airports Page:

1. Press the **APT** softkey located at the bottom of the display. The first airport in the nearest airports list is highlighted.
2. Turn the **large FMS** knob to highlight the desired airport. The remaining information on the Nearest Airports Page pertains to the selected airport.

To select a runway from the Nearest Airports Page:

1. Press the **RNWY** softkey located at the bottom of the display.
2. Turn the **small FMS** knob to select the desired runway.

Figure 7-85 APT, RNWY, FREQ, and APR Softkeys

The Nearest Airports Page can be used to quickly tune the COM transceiver to a nearby airport. The selected frequency is placed in the standby field of the COM window and activated using the COM Frequency Toggle Key.

To quickly tune the COM transceiver to a nearby airport frequency:

1. Press the **FREQ** softkey located at the bottom of the display.
2. Turn the **FMS** knob to select the desired frequency.
3. Press the **ENT** key. The selected frequency is placed in the standby frequency tuning box.
4. Press the **Com Frequency Toggle** key to place the frequency in the active field.

To select and load an approach from the Nearest Airports Page:

1. Select the desired nearest airport.
2. Press the **APR** softkey located at the bottom of the display. The 'LD APR' (load approach) softkey becomes available.
3. Turn the **FMS** knob to select the desired approach. Press the **LD APR** softkey.
4. The Approach Loading Page is displayed with the transitions field highlighted. Turn the **FMS** knob to select the desired transition.
5. Press the **ENT** key. The 'LOAD?' field is highlighted. Press the **ENT** key to load the approach.
6. Turn the **large FMS** knob to highlight the 'ACTIVATE' field. Press the **ENT** key to activate the approach. 'Load' adds the approach to the flight plan without immediately using the approach for navigation guidance. This allows for the original flight plan to continue navigating until cleared for the approach, but keeps the approach available for quick activation when needed. 'Activate' adds the approach to the flight plan and begins navigating the approach course.

***NOTE**: If the approach is not approved for GPS, a 'NOT APPROVED FOR GPS' messages is displayed with 'YES' highlighted. Press the* **ENT** *key to acknowledge the message. Turn the* **large FMS** *knob to select 'NO' and press the* **ENT** *key to return to the Approach Loading Page*

NEAREST INTERSECTIONS PAGE

The Nearest Intersections Page displays the following information for a selected intersection:

- Map of surrounding area
- Intersection identifier, Symbol, Bearing, Distance (within 200 nm of current position)
- Lat/Lon (latitiude/longitude)
- Reference VOR Information consisting of:
  - VOR Name
  - Symbol
  - Frequency
  - Bearing
  - Distance

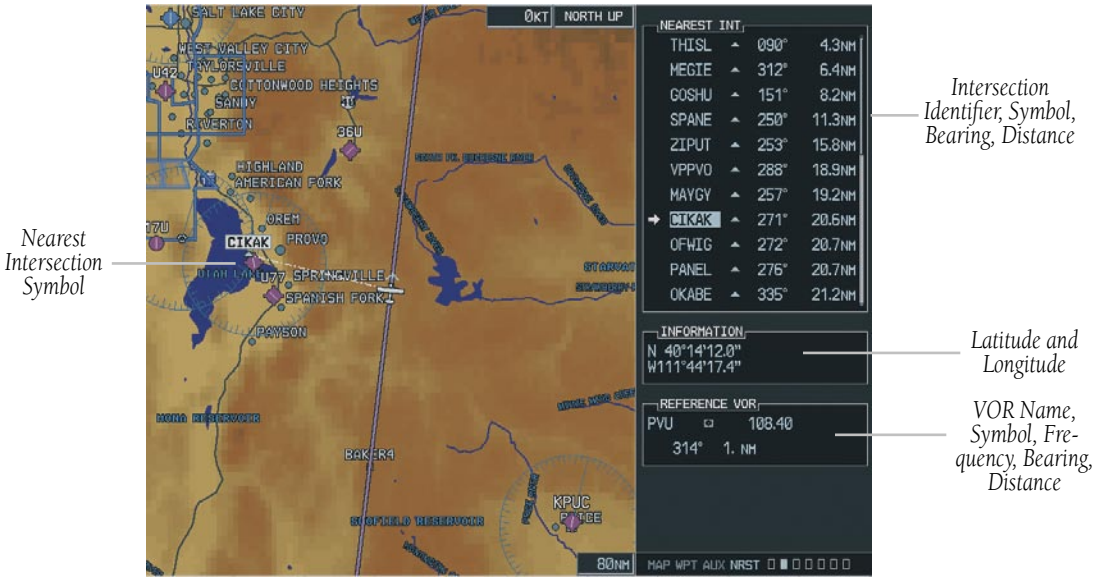

Figure 7-86 Nearest Intersections Page

To select the Nearest Intersections Page:

1. From any page, press and hold the **CLR** key to select the Navigation Map Page.
2. Turn the **large FMS** knob to select the NRST page group. 'NRST' is displayed in the page group icon located in the lower right corner of the display.
3. Turn the **small FMS** knob to select the Nearest Intersections Page.

To select a nearest intersection from the Nearest Intersections Page:

1. Press the **FMS** knob to activate the cursor.
2. Turn the **FMS** knob and press the **ENT** key to select the desired intersection. The remaining information on the Nearest intersection Page pertains to the selected intersection

NEAREST NDB PAGE

The Nearest NDB Page displays the following information for a selected NDB:

- Map of surrounding area
- NDB Identifier, Symbol, Bearing, Distance (within 200 nm of current position)
- NDB Name
- Latitude/longitude (degrees/minutes or degrees/minutes/seconds)
- Frequency

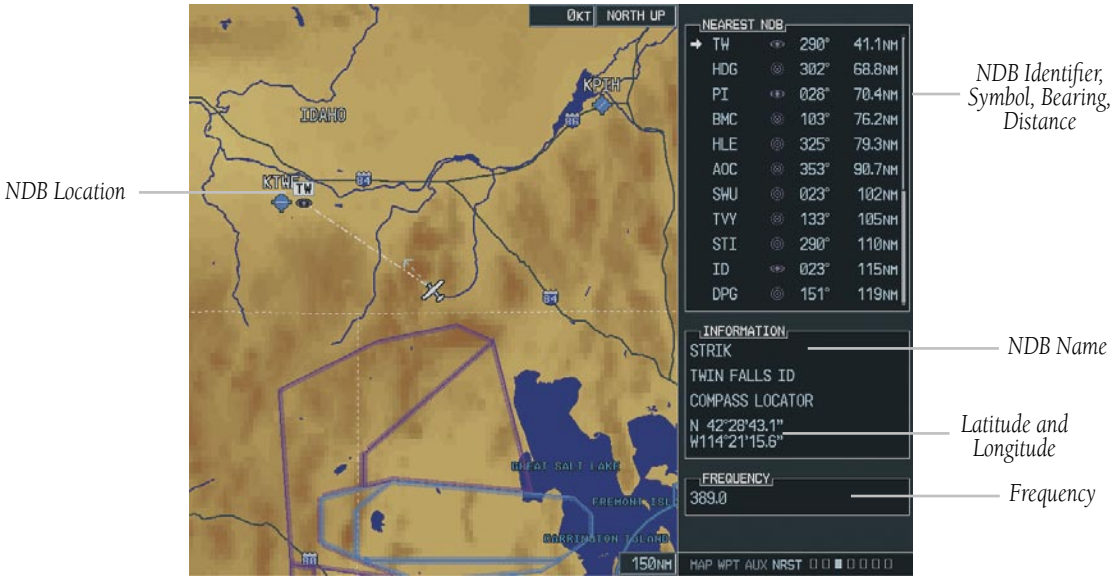

Figure 7-87 Nearest NDB Page

To select the Nearest NDB Page:

1. From any page, press and hold the **CLR** key to select the Navigation Map Page.
2. Turn the **large FMS** knob to select the NRST page group. 'NRST' is displayed in the page group icon located in the lower right corner of the display.
3. Turn the **small FMS** knob to select the Nearest NDB Page.

To select an NDB from the Nearest NDB Page:

1. Press the **FMS** knob to activate the cursor.
2. Turn the **FMS** knob and press the **ENT** key to select the desired NDB. The remaining information on the Nearest NDB Page pertains to the selected NDB.

NEAREST VOR PAGE

The VOR Information Page displays the following information for a selected VOR:

- Map of surrounding area
- Identifier, Symbol, Bearing, Distance
- Name
- Closest city
- VOR Type
- Latitude/longitude (degrees/minutes or degrees/minutes/seconds)
- Magnetic Variation in degrees
- Frequency in megahertz (MHz)

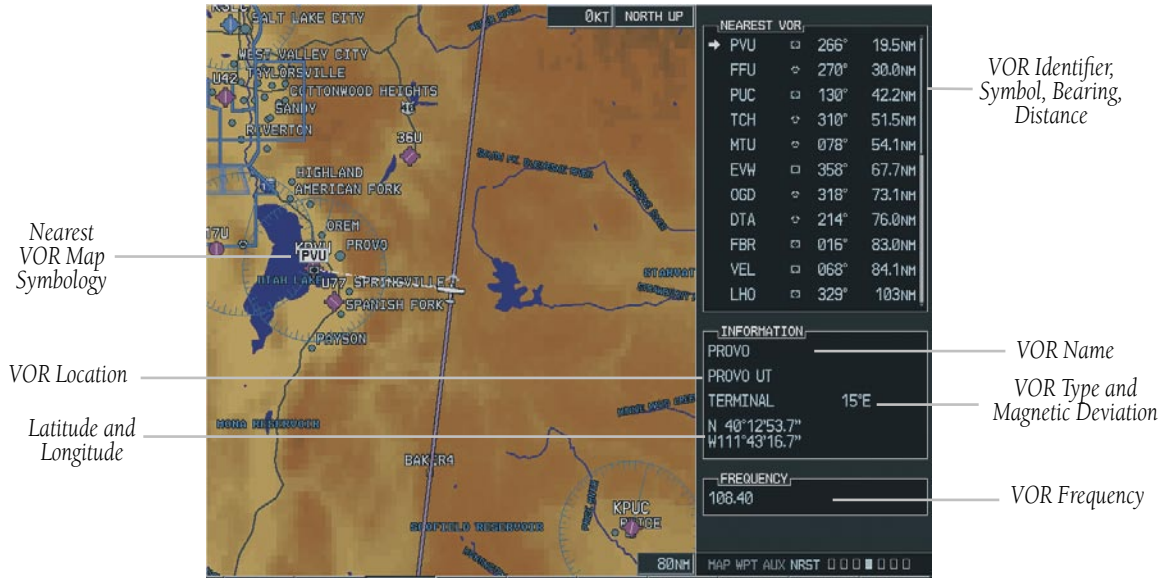

Figure 7-88 Nearest VOR Page

To select the Nearest VOR Page:

1. From any page, press and hold the **CLR** key to select the Navigation Map Page.
2. Turn the **large FMS** knob to select the NRST page group. 'NRST' is displayed in the page group icon located in the lower right corner of the display.
3. Turn the **small FMS** knob to select the Nearest VOR Page.

To select a nearest VOR from the Nearest VOR Page:

1. Select the Nearest VOR Page. There are two methods that can be used to select a VOR:

- Method 1: Press the **VOR** softkey and turn the **FMS** knob, or press the **ENT** key to select a VOR.
- Method 2: Press the **MENU** key. Select the Select VOR Window option and press the **ENT** key. Turn the **FMS** knob to select a VOR.

The remaining information on the Nearest VOR Page pertains to the selected VOR.

To select and load a VOR frequency from the Nearest VOR Page:

1. Select the Nearest VOR Page. There are two methods that can be used to select and load a VOR frequency:

- Method 1: Press the **FREQ** softkey to highlight the VOR frequency for the selected VOR. Press the **ENT** key. The selected VOR frequency is placed in the NAV standby frequency field.
- Method 2: Press the **MENU** key. Select the Select Frequency Window option and press the **ENT** key. Press the **ENT** key again when the frequency field is highlighted to place the selected VOR frequency in the NAV standby field.

NEAREST USER WAYPOINT PAGE

The Nearest User Waypoint Page displays the following information for a selected User Waypoint:

- Map of surrounding area
- Identifier
- Symbol
- Bearing and Distance
- Latitude/longitude
- A reference waypoint with identifier, bearing, and distance
- Waypoint Comment
- A second reference waypoint with identifier and bearing

To select the Nearest User Waypoint Page:

1. From any page, press and hold the **CLR** key to select the Navigation Map Page.
2. Turn the **large FMS** knob to select the NRST page group. 'NRST' is displayed in the page group icon located in the lower right corner of the display.
3. Turn the **small FMS** knob to select the Nearest User Waypoint Page.

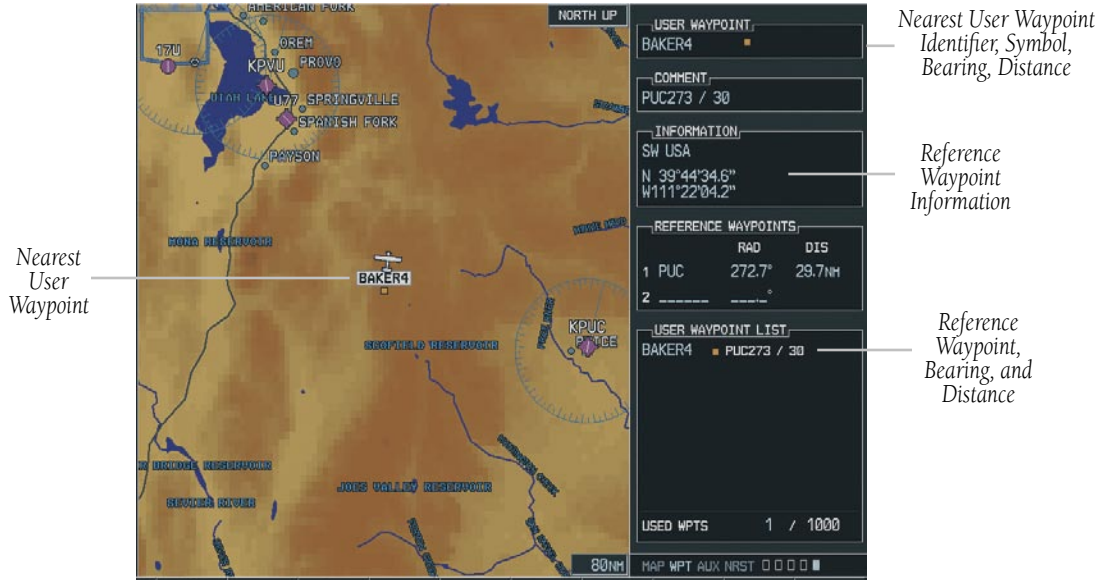

Figure 7-89 Nearest User Waypoints Page

To select a Nearest User Waypoint from the Nearest User Waypoint Page:

1. Select the Nearest User Waypoint Page.
2. Press the **FMS** knob and turn the **FMS** knob and press the **ENT** key to select a Nearest User Waypoint.
3. The remaining information on the Nearest User Waypoint Page pertains to the selected Nearest User Waypoint.

NEAREST FREQUENCIES PAGE

The Nearest Frequencies Page displays the facility name, bearing to and distance to the five nearest ARTCC and FSS points of communication (within 200 nautical miles of the present position). For each ARTCC and FSS listed, the Nearest Frequencies Page also indicates the frequency and may be used to quickly tune the COM transceiver to the facility frequency. The selected frequency is placed in the standby field of the COM window and activated using the COM Frequency Toggle key. In addition to the ARTCC and FSS information, the Nearest Frequencies Page includes the weather frequencies for the selected ARTCC or FSS.

To select the Nearest Frequencies Page:

1. From any page, press and hold the **CLR** key to select the Navigation Map Page.
2. Turn the **large FMS** knob to select the NRST page group. NRST is displayed in the page group icon located in the lower right corner of the display.
3. Turn the **small FMS** knob to select the Nearest Frequencies Page.

To select a Nearest ARTCC from the Nearest Frequencies Page:

1. Select the Nearest Frequencies Page.
2. Press the **ARTCC** softkey and turn the **small FMS** knob to select a Nearest ARTCC.

To select and load the Nearest ARTCC Frequency from the Nearest Frequencies Page:

1. Select the Nearest Frequencies Page.
2. Press the **ARTCC** softkey and turn the **large FMS** knob to select the center frequency. Press the **ENT** key to load the center frequency into the COM frequency standby field.

To select a Nearest FSS from the Nearest Frequencies Page:

1. Select the Nearest Frequencies Page.
2. Press the **FSS** softkey and turn the **small FMS** knob to select a Nearest FSS.

To select and load the Nearest FSS Frequency from the Nearest Frequencies Page:

1. Select the Nearest Frequencies Page.
2. Press the **FSS** softkey and turn the **large FMS** knob to select the 'FSS' frequency field. Press the **ENT** key to load the 'FSS' frequency into the 'COM' frequency standby field.

To select and load the Nearest Weather Frequency from the Nearest Frequencies Page:

1. Select the Nearest Frequencies Page.
2. Press the **WX** softkey and turn the **FMS** knob to select a Weather Frequency. Press the **ENT** key to load the weather frequency into the 'COM' frequency standby field.

NEAREST AIRSPACES PAGE

The Nearest Airspaces Page displays the following information for a maximum of 20 controlled or special use airspaces:

- Map of surrounding area
- Airspace Alerts Box displaying Airspace Name, Status, and Time to Entry
- Airspace and Agency
- Vertical Limits (floor/ceiling)
- Airspace Frequencies

To select the Nearest Airspaces Page:

1. From any page, press and hold the **CLR** key to select the Navigation Map Page.
2. Turn the **large FMS** knob to select the 'NRST' page group. 'NRST' is displayed in the page group icon located in the lower right corner of the display.
3. Turn the **small FMS** knob to select the Nearest Airspaces Page.

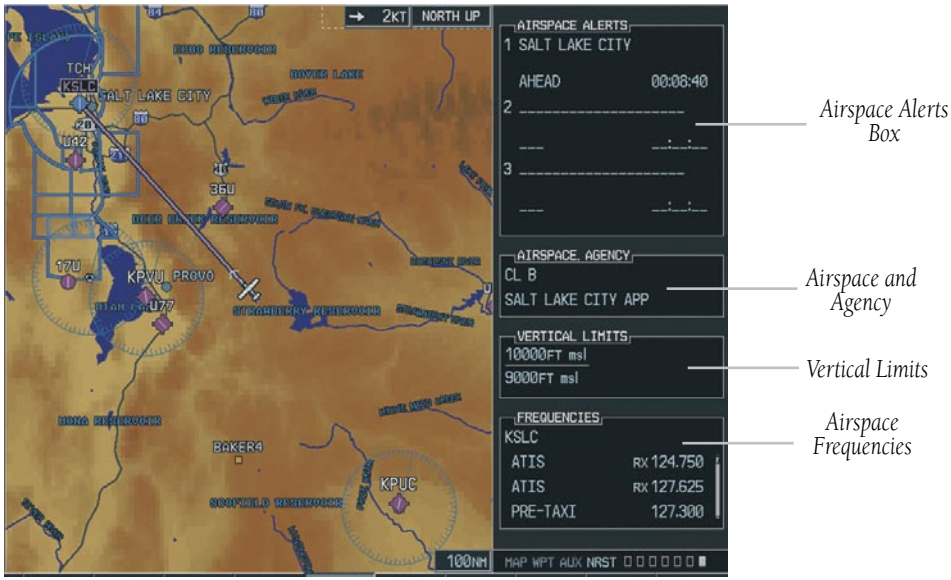

Figure 7-90 Nearest Airspaces Page

Airspace Alerts Box

The Airspace Alerts Box displays the Airspace Name, Status, and Time to Entry. The status and time to entry (if applicable) is based on the following conditions:

- If the projected course will take the aircraft inside an airspace within the next ten minutes, the status field shows the airspace as 'Ahead'.
- If the aircraft is within two nautical miles of an airspace and the current course will take the aircraft inside, the status field shows the airspace as 'Ahead < 2 nm'.
- If the aircraft is within two nautical miles of an airspace and the current course will not take the aircraft inside, the status field shows 'Within 2 nm'.
- If the aircraft has entered an airspace, the status field shows 'Inside'.

***NOTE** The airspace alerts are based on three-dimensional data (latitude, longitude and altitude) to avoid nuisance alerts. The alert boundaries for controlled airspace are also sectored to provide complete information on any nearby airspace. Once the described conditions exists, the status and time of entry is shown if the airspace alert messages are enabled on the System Setup Page (Auxiliary Page Group).*

By selecting any airspace name listed on the Nearest Airspaces Page, additional details are provided — including controlling agency, communication frequencies and floor/ceiling limits.

To view additional details for an airspace listed on the Nearest Airspaces Page:

1. Select the Nearest Airspace Page.
2. Press the **FMS** knob to activate the cursor.
3. Turn the **large FMS** knob to scroll through the list, highlighting the desired airspace.
4. Press the **ALERTS** softkey and turn the **FMS** knob to select the desired airspace.
5. The remaining information on the Nearest Airspaces Page pertains to the selected airspace name.
6. Press the **FMS** knob to remove the flashing cursor.

To view and quickly load the frequency for a controlling agency:

1. Select the Nearest Airspaces Page.
2. Press the **FREQ** softkey and turn the **FMS** knob to select the desired frequency. Press the **ENT** key to load the frequency into the 'COM' frequency standby field

Airspaces

The Nearest Airspaces Page displays – and airspace messages are provided for the following airspace types:

- Alert
- Caution
- Class B
- Class C
- TCA
- Danger
- MOA
- Prohibited
- Restricted
- TMA
- Training
- TRSA
- Unspecified
- Warning

The Nearest Airspaces Page also displays the floor and ceiling limits of the airspace. The following are examples of what may appear as vertical limits for an airspace:

- 5,000 ft. msl (5,000 feet mean sea level)
- 5,000 ft. agl (5,000 feet above ground level)
- MSL (at mean sea level)
- Notam (see Notice to Airmen)
- Unknown
- Unlimited
- See Chart
- Surface

All airspace messages, except for prohibited areas, may be turned on or off from the System Setup Page in the Auxiliary Page Group. An altitude buffer is also provided on the System Setup Page to provide an extra margin of safety above/below the published limits.

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GARMIN

G1000™

Optional Equipment

8.1 INTRODUCTION

The G1000 provides the display and control interface for the following optional hazard awareness and audio entertainment systems for the Cessna Nav III aircraft:

- L-3 STORMSCOPE® WX-500 Series II Weather Mapping Sensor
- Honeywell® KTA870 TAS
- GDL 69/69A XM® Radio System

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

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

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

This document is divided into four sections: 8.1 - Introduction, 8.2 - WX-500 Stormscope, 8.3 - KTA 870, and 8.4 - Garmin GDL 69/69A.

8.2 WX-500 STORMSCOPE

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

DISPLAYING STORMSCOPE LIGHTNING DATA ON THE NAVIGATION MAP PAGE

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

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

The Navigation Map Page (Figure 8-1) displays cell or strike data using the yellow lightning strike symbology shown in Table 8-1.

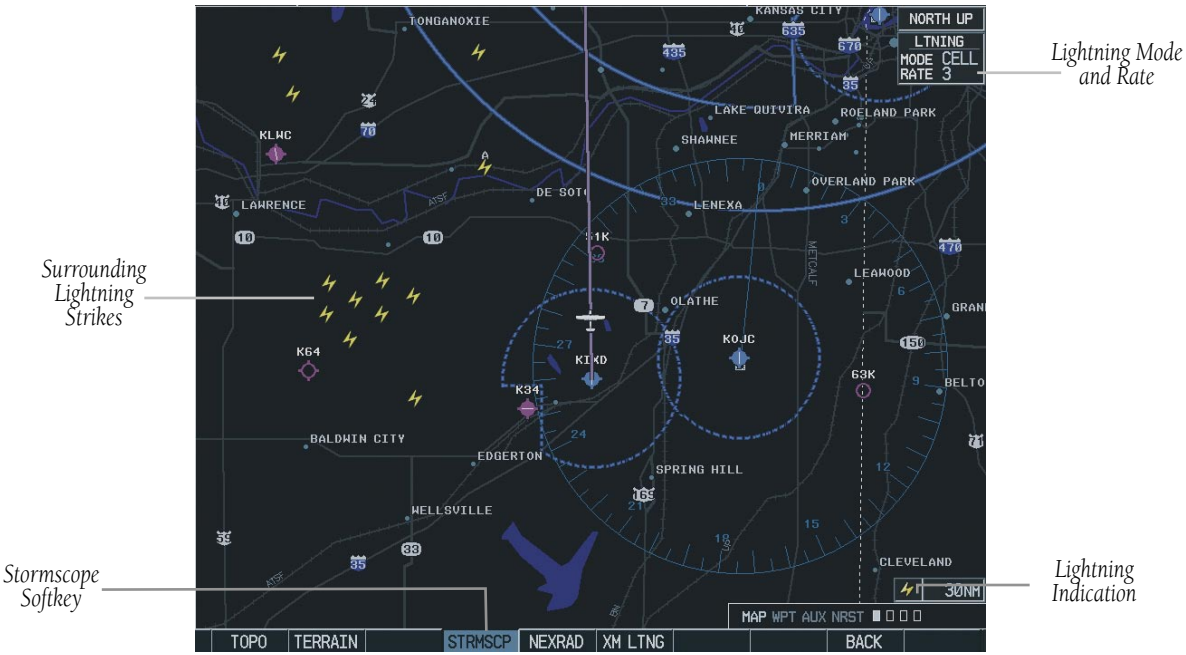


Figure 8-1 Navigation Map Page Displaying Stormscope Lightning Data

To display Stormscope Lightning Data on the Navigation Map Page:

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

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

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

Stormscope Lightning Data Display Range

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

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.

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

Table 8-1 Lightning Age and Symbols

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 8-2).*

Figure 8-2 Lightning Display Range Annunciation

Customized Display

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

To display the Weather Group Options:

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

To turn Stormscope Lightning Data on or off:

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

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

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

To select a Stormscope lightning symbol zoom range:

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

Clearing Stormscope Lightning Data Using the Navigation Map Page Options Menu

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

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

To remove Stormscope lightning data from the Navigation Map Page:

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

STORMSCOPE PAGE

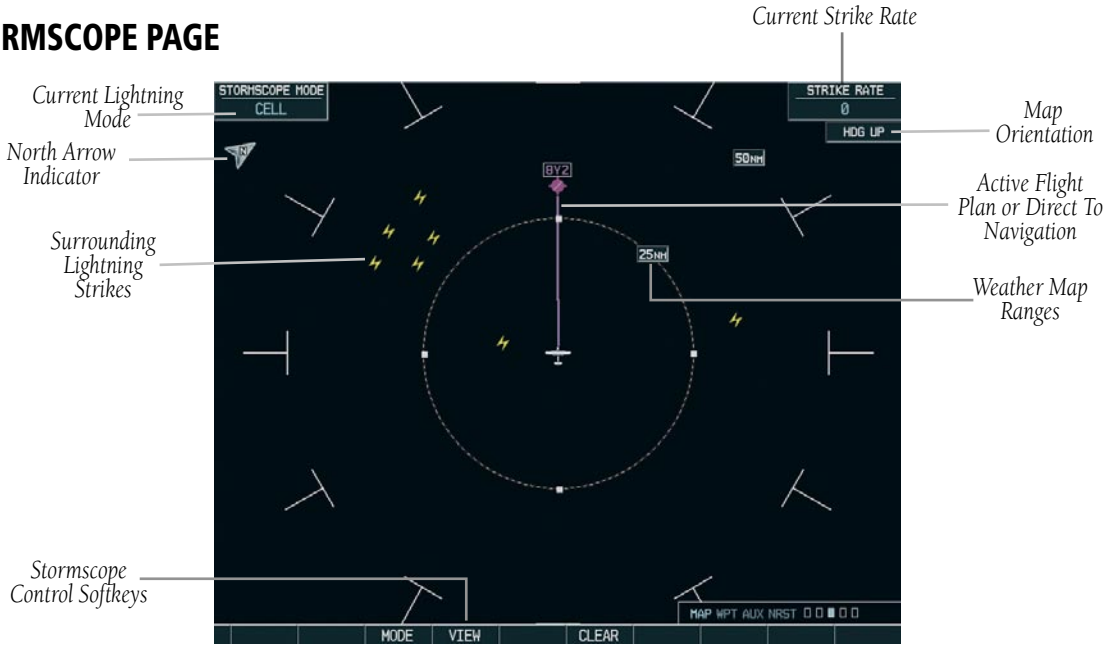


Figure 8-3 Stormscope Page

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

To select the Stormscope Page:

1. Turn the **large FMS** knob until the Map Page group is selected.
2. Turn the **small FMS** knob until the Stormscope Page is selected (Figure 8-3).

Stormscope Page Operations

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

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

To change the display range:

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

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

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

OR:

3. Press the **MENU** key. The page menu is displayed with 'Strike Mode' or 'Cell Mode' highlighted (Figure 8-4). Press the **ENT** key on the desired selection.

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

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

OR:

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

To clear Stormscope lightning data from the display:

1. Press the **CLEAR** softkey to remove all Stormscope lightning data from the display

OR: Press the **MENU** key (Figure 8-5). Select 'Clear Lightning Data' and press the **ENT** key.

Figure 8-4 Weather Group Map Setup Menu

Figure 8-5 Navigation Map Page Options Menu

8.3 TRAFFIC ADVISORY SYSTEM

The G1000 provides an optional display interface for the Bendix King KTA870 Traffic Advisory System.

NOTE: *This document assumes the user has experience operating the G1000 Multi Function Display and is familiar with the KTA870 Pilot's Guide.*

NOTE: *This section describes the G1000 for TAS only. The G1000 Multi Function Display document describes the standard TIS interface.*

DISPLAYING AND CONFIGURING TAS TRAFFIC ON THE NAVIGATION MAP PAGE

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

To display TAS traffic on the Navigation Map Page:

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

To configure TAS traffic on the Navigation Map Page:

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

Traffic mode allows the pilot to choose which traffic is displayed (all traffic, traffic and proximity advisories, or traffic advisories only).

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

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

TRAFFIC MAP PAGE

Figure 8-6 Traffic Map Page

The Traffic Map Page (Figure 8-6) controls the source of TAS traffic data on the Navigation Map Page. ***NOTE: When the G1000 is configured for TAS, the system only receives TAS traffic. Otherwise, if TAS is not configured, the system provides TIS traffic data.***

To select the Traffic Map Page:

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

FAILURE RESPONSE

Errors indicated by a FAILED screen prevent continued use of the KTA 870 interface. See the KTA 870 Pilot's Guide for detailed information on Failure Response.

DESCRIPTION OF TRAFFIC ADVISORY CRITERIA

For a description of Traffic Advisory System criteria and display interpretation refer to the KTA 870 Pilot's Guide.

USER-INITIATED TEST

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

To perform a user-initiated test:

1. Press the **TEST** softkey or use the menu to select 'Test Mode'. Self-test is best accomplished with the range set to 2 and 6 nm, and will last approximately 8 seconds. The following is displayed when a user-initiated test is performed:
   - A Traffic Advisory (yellow circle) appears at 9 o'clock, range of 2 miles, 200 feet below and climbing.
   - Proximity Traffic (solid white diamond) appears at 1 o'clock, range 3.6 miles, 1000 feet below, descending.
   - Non-Threat traffic (open white diamond) appears at 11 o'clock, range of 3.6. miles, flying level 1000 feet above.

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

TAS VOICE ANNOUNCEMENTS

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

To begin tracking intruder aircraft:

Press the **OPERATE** softkey.

SWITCHING BETWEEN STANDBY AND VARIOUS OPERATING MODES

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

To switch into Operating Mode from Standby Mode:

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

To switch into Standby Mode from the Traffic Page:

Press the **STANDBY** softkey.

ALTITUDE DISPLAY MODE

To change the Altitude Display Mode:

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

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

TRAFFIC MAP PAGE DISPLAY RANGE

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

To change the display range on the Traffic Page:

1. Turn the **RNG** knob to zoom through the following range options:

- Bendix/King KTA 870—2 nm, 2 and 6 nm, 6 and 12 nm, 12 and 24 nm, and 24 and 40 nm.

8.4 XM WEATHER AND XM RADIO

INTRODUCTION

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

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

XM WEATHER

XM weather information is displayed on the following MFD Maps and Pages:

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

XM 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. Radar coverage is always displayed with NEXRAD data.*

Complete weather products include the following:

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

Displaying XM Weather Products on the Navigation Map Page

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

NOTE: *XM Weather products are not displayed at zoom scales less than 10 nm.*

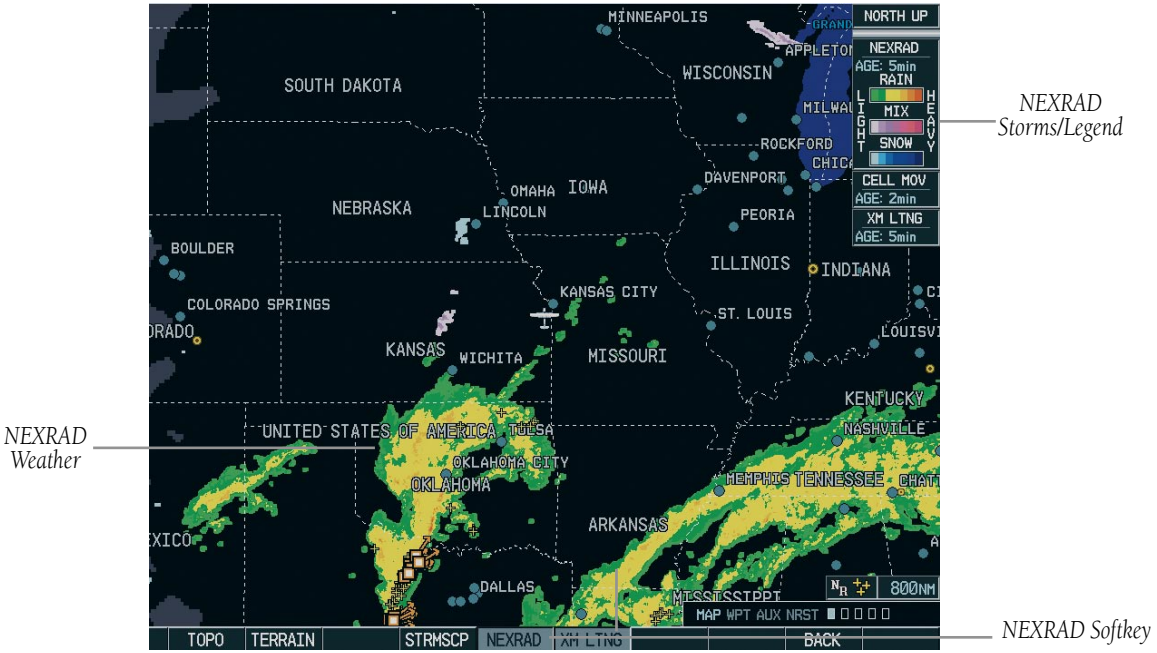


Figure 8-7 Navigation Map Page Displaying NEXRAD Weather

Navigation Map Page Weather Control Softkeys

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

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

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

To display weather data on the Navigation Map Page:

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

Navigation Map Setup Options

The user can customize the display of XM weather on the Navigation Map Page by using the Map Setup Weather Group Options Menu (Figure 8-8). The following options are available:

- NEXRAD DATA - Turns the display of NEXRAD data and radar coverage on or off and selects the desired display range.
- XM LTNG - Turns the display of XM Lightning on or off and selects the desired display range.
- CELL MOVEMENT - Turns the display of storm cell movement on or off. The Cell Movement option is only shown when NEXRAD is turned on.

Figure 8-8 Map Setup Options

NOTE: *In Figure 8-8, the Stormscope menu options are only shown when the Stormscope unit is installed. Stormscope is not an XM Weather Product.*

To customize the Navigation Map Page:

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

Displaying Weather Data on the Nearest Pages

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

Displaying METAR and TAF information on the Airport Information Page

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

NOTE: *METAR is the Aviation Routine Weather Report and is generally standard around the world. The temperatures are given in Celsius degrees. The atmospheric pressure however is reported in hecto pascals everywhere, but the US where the atmospheric pressure is reported in inches of mercury. For aviation purposes the standard temperature and atmospheric pressure are 59° F (15°C) and 28.92 in. Hg (1013.2 hPa).*

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

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

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

Displaying Weather Data on the AUX - Trip Planning Page Map

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

Displaying Weather Data on the Flight Plan Page Maps

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

Displaying Weather on the Weather Data Link Page

The Weather Data Link Page displays all available weather products (Figure 8-9). 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.

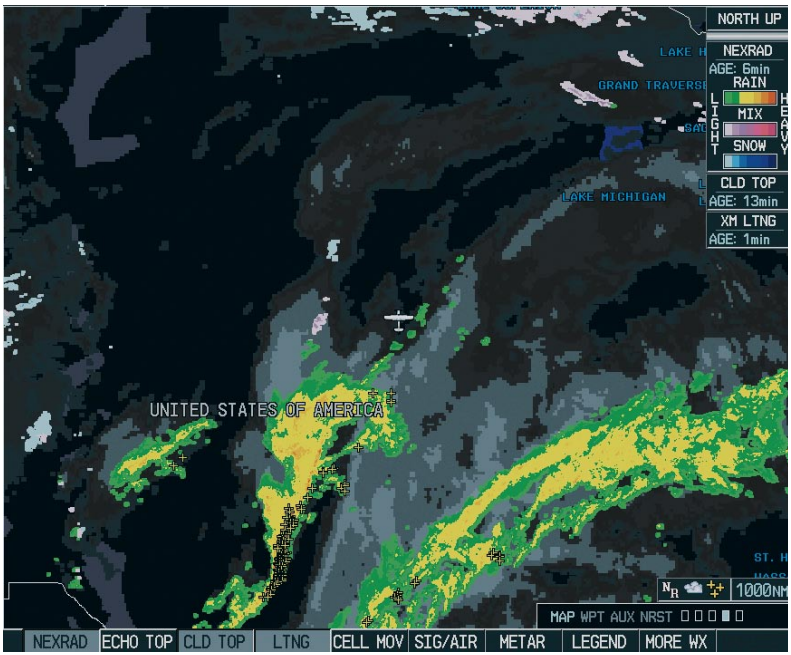


Figure 8-9 Weather Data Link Page

Weather Data Link Page Softkeys

The following softkeys perform the XM 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

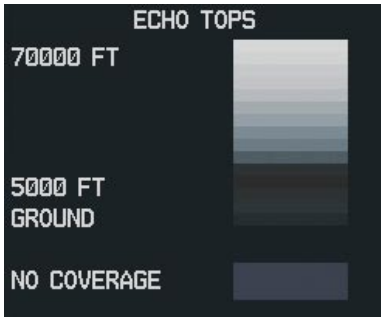
Certain limitations exist regarding the NEXRAD radar displays. Some, but not all, are listed here for the user's awareness:

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



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

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

CLD TOP – press the **CLD TOP** softkey to show the cloud top altitude determined from satellite imagery. Refer to the legend for a description of the CLOUD TOPS color coding. The update rate is every 15 minutes.

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

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

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

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

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

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

When enabled, the following AIRMETs can be displayed:

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

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

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

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

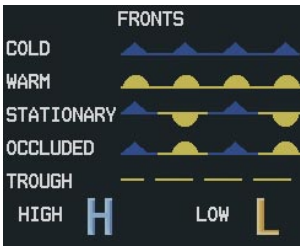
To view the available legends:

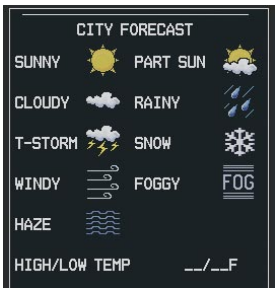
1. Press the **LEGEND** softkey to display the available legends.
2. Turn either the small or large **FMS** knob to scroll through the legends if more are available than fit in the window.
3. To return to the previous page and remove the legend window, press the **LEGEND**, **ENT, CLR** key, or the **FMS** knob. OR:
4. On the Weather Data Link Page, press the LEGEND softkey which displays the Page Menu Options. Turn either the large or small FMS knob to select 'Weather Legend' and press the **ENT** key.

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

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

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





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

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

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

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

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

Weather Data Link Page Setup

The pilot can customize the display of XM Weather data on the Weather Data Link Page using the Weather Page Options Menu (Figure 8-9).

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

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

Map Panning Information-Weather Data Link Page

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

To display information for selected weather products:

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

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

WEATHER PRODUCT SYMBOLS

Figure 8-10 shows the symbol for each weather product (read from left to right) . When a weather product is active, the product symbol is displayed in the lower right of the screen.

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

Figure 8-10 Weather Product Symbols

Weather Product Age (Table 8-2)

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	90
TAFs	60
Clouds Tops	60

Table 8-2 Weather Product Age

XM DIGITAL AUDIO ENTERTAINMENT

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

XM Information Page

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

To select the XM Information Page (Figure 8-11):

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.

NOTE: *The DONE softkey on the AUX - XM INFORMATION page is used to save the GDL 69(A) activation data when the XM services are initially set up. It is not used during normal operation of the GDL 69(A), but it should have no adverse effects if inadvertently selected during flight. Refer to the GDL 69/69A XM Satellite Radio Activation Instructions (190-00355-04, Rev E or later) for further information.*

Figure 8-11 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 Window

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

XM RADIO PAGE

The XM Radio Page provides information and control of the audio entertainment features of the XM Satellite Radio. See Figure 8-12

Figure 8-12 XM Radio Page

XM Radio Softkeys

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

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

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

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

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

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

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

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

Active Channel

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

Channels

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

To step through channels one at a time:

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

To select a channel directly:

1. While on the XM Radio Page, press the **CHNL** softkey.
2. Press the **DIR CH** softkey. The channel number in the Active Channel window will be highlighted.
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.

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 8-13 Categories List

To select a category:

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

Volume

The Volume 'control' (Figure 8-14) 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 8-14 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.

Automatic Muting

XM Radio audio will be automatically muted when the aircraft groundspeed exceeds approximately 30 kts ***and*** the airspeed is less than approximately 80 kts. The audio must be manually unmuted once the aircraft is outside the applicable speed range.

Presets

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

To set a preset channel number:

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

To select a preset channel number:

1. While on the Radio page, press the **PRESETS** softkey.

2. Press the numbered softkeys **(PS1 - PS15)** on the bottom of the screen to directly select the desired preset channel. Press **MORE**, if necessary.

GDL 69 TROUBLESHOOTING

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

First, ensure that the owner/operator of the aircraft in which the GDL 69/69A is installed has subscribed to XM Radio, and that it has been activated. Perform a quick check of the circuit breakers to ensure the GDL 69/69A has power applied. If a failure still exists, review the messages listed in Table 8-3. The advisory messages may provide insight to a possible failure.

For troubleshooting purposes, the Status, Serial Number, and Software Version numbers for the GDL 69/69A are displayed in the LRU Information Window on the System Status Page (Figure 8-15).

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 8-15 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, or the GDL 69(A) has not received activation status from the satellite.

Table 8-3 Troubleshooting Messages

GARMIN

G1000™

Annunciations and Alerts

9.1 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.

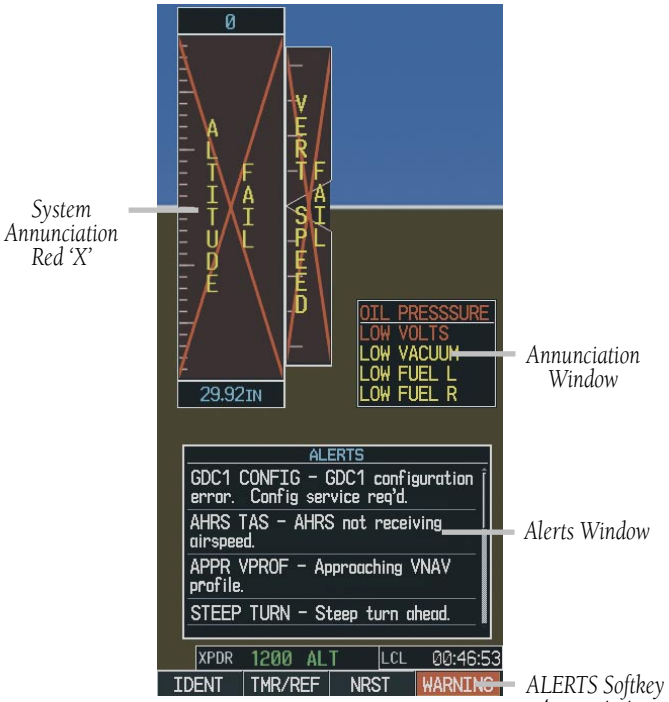


Figure 9-1 G1000 Alerting System

9.2 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 annunciated in the Annunciation Window and is accompanied by a continuous aural tone. Text appearing in the Annunciation Window is RED. A warning alert is also accompanied by a flashing **WARNING** softkey annunciation, as shown in Figure 9-2. 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 annunciated in the Annunciation Window and is accompanied by a single aural tone. Text appearing in the Annunciation Window is YELLOW. A caution alert is also accompanied by a flashing **CAUTION** softkey annunciation, as shown in Figure 9-3. 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 9-4. 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 9-2 WARNING Softkey Annunciation

Figure 9-3 CAUTION Softkey Annunciation

Figure 9-4 ADVISORY Softkey Annunciation

9.3 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.

WARNING Alerts

Annunciation Window Text	Audio Alert
OIL PRESSURE	Continuous Aural Tone
LOW VOLTS	Continuous Aural Tone*
HIGH VOLTS	Continuous Aural Tone
CO LVL HIGH	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

9.4 CO GUARDIAN MESSAGES

Alerts Window Message	Comments
CO DET SRVC – The carbon monoxide detector needs service.	There is a problem within the CO Guardian that requires services.
CO DET FAIL – The carbon monoxide detector is inoperative.	Loss of communication between the G1000 and the CO Guardian.

9.5 TAWS ALERTS

The following table shows the possible TAWS alert types with corresponding annunciations and aural messages.

Alert Type	PFD/MFD TAWS Page Annunciation	MFD Pop-Up Alert	Aural Message
Excessive Descent Rate Warning (EDR)	PULL UP	PULL-UP	"Pull Up"
Reduced Required Terrain Clearance Warning (RTC)	PULL UP	TERRAIN - PULL-UP or TERRAIN AHEAD - PULL-UP	"Terrain, Terrain; Pull Up, Pull Up" or "Terrain Ahead, Pull Up; Terrain Ahead, Pull Up"
Imminent Terrain Impact Warning (ITI)	PULL UP	TERRAIN AHEAD - PULL-UP or TERRAIN - PULL-UP	Terrain Ahead, Pull Up; Terrain Ahead, Pull Up" or "Terrain, Terrain; Pull Up, Pull Up"
Reduced Required Obstacle Clearance Warning (ROC)	PULL UP	OBSTACLE - PULL-UP or OBSTACLE AHEAD - PULL-UP	"Obstacle, Obstacle; Pull Up, Pull Up" or "Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up"
Imminent Obstacle Impact Warning (IOI)	PULL UP	OBSTACLE AHEAD - PULL-UP or OBSTACLE - PULL-UP	"Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up" or "Obstacle, Obstacle; Pull Up, Pull Up"
Reduced Required Terrain Clearance Caution (RTC)	TERRAIN	CAUTION - TERRAIN or TERRAIN AHEAD	"Caution, Terrain; Caution, Terrain" or "Terrain Ahead; Terrain Ahead"
Imminent Terrain Impact Caution (ITI)	TERRAIN	TERRAIN AHEAD or CAUTION - TERRAIN	"Terrain Ahead; Terrain Ahead" or "Caution, Terrain; Caution, Terrain"
Reduced Required Obstacle Clearance Caution (ROC)	TERRAIN	CAUTION - OBSTACLE or OBSTACLE AHEAD	"Caution, Obstacle; Caution, Obstacle" or "Obstacle Ahead; Obstacle Ahead"
Imminent Obstacle Impact Caution (IOI)	TERRAIN	OBSTACLE AHEAD or CAUTION - OBSTACLE	"Obstacle Ahead; Obstacle Ahead" or "Caution, Obstacle; Caution, Obstacle"
Premature Descent Alert Caution (PDA)	TERRAIN	TOO LOW - TERRAIN	"Too Low, Terrain"
Altitude Callout "500"	None	None	"Five-Hundred"
Excessive Descent Rate Caution (EDR)	TERRAIN	SINK RATE	"Sink Rate"
Negative Climb Rate Caution (NCR)	TERRAIN	DON'T SINK or TOO LOW - TERRAIN	"Don't Sink" or "Too Low, Terrain"

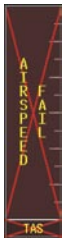
The following system status annunciations may also be issued.

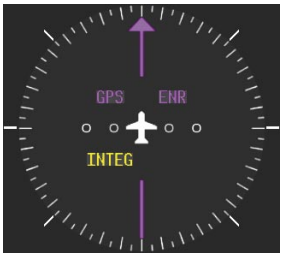
Alert Type	PFD/MFD TAWS Page Annunciation	MFD Pop-Up Alert	Aural Message
TAWS System Test Fail	TAWS FAIL	None	"TAWS System Failure"
TAWS Alerting is disabled	TAWS INHB	None	None
No GPS position or excessively degraded GPS signal	TAWS N/A	None	"TAWS Not Available"
System Test in progress	TAWS TEST	None	None
System Test pass	None	None	"TAWS System Test OK"

9.6 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 following figure illustrates all possible flags and the responsible LRUs.

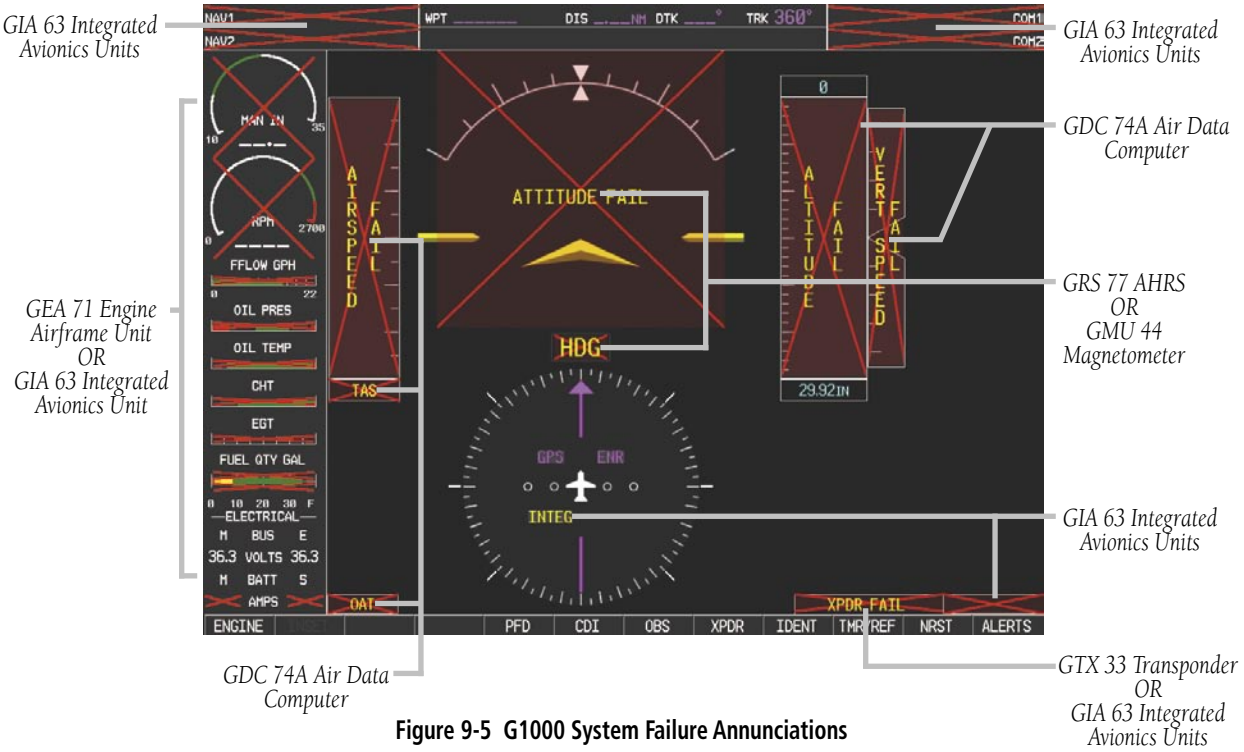


Figure 9-5 G1000 System Failure Annunciations

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.*

9.7 G1000 SYSTEM MESSAGE ADVISORIES

This section describes various G1000 system message advisories. Some messages are issued due to an LRU or an LRU function failure and are normally accompanied by a corresponding red 'X' annunciation.

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.	
CNFG MODULE – PFD1 configuration module is inoperative.	The PFD configuration module backup memory has failed. The G1000 system should be serviced.

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.
DB MISMATCH – Basemap database version mismatch. Xtalk is off.	The PFD and MFD have different basemap database versions installed. Crossfill is off. Install correct basemap database version in both displays.
DB MISMATCH – Terrain database version mismatch. Xtalk is off.	The PFD and MFD have different terrain database versions installed. Crossfill is off. Install correct terrain database version in both displays.
DB MISMATCH – Terrain database type mismatch. Xtalk is off.	The PFD and MFD have different terrain database types installed. Crossfill is off. Install correct terrain database type in both displays.
DB MISMATCH – Obstacle database version mismatch. Xtalk is off	The PFD and MFD have different obstacle database versions installed. Crossfill is off. Install correct obstacle database version in both displays.
DB MISMATCH – Airport Terrain database mismatch. Xtalk is off	The PFD and MFD have different airport terrrain databases installed. Crossfill is off. Install correct airport terrain database 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 1 using backup data path.	The #1 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.	The GIA1 and/or GIA2 configuration settings do not match backup configuration memory. The G1000 system should be serviced.
GIA2 CONFIG – GIA2 configuration error. Config service req'd.	
GIA1 COOLING – GIA1 temperature too low.	The GIA1 and/or GIA2 temperature is too low to operate correctly. Allow units to warm up to operating temperature.
GIA2 COOLING – GIA2 temperature too low.	
GIA1 COOLING – GIA1 over temperature.	The GIA1 and/or GIA2 temperature is too high. If problem persists, the G1000 system should be serviced.
GIA2 COOLING – GIA2 over temperature.	
GIA1 SERVICE – GIA1 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.
GIA2 SERVICE – GIA2 needs service. Return the unit for repair.	

GIA 63 Message Advisories (Cont.)

Alerts Window Message	Comments
MANIFEST – GIA1 software mismatch. Communication halted.	The GIA1 and/or GIA 2 has incorrect software installed. The G1000 system should be serviced.
MANIFEST – GIA2 software mismatch. Communication halted.	
COM1 TEMP – COM1 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.
COM2 TEMP – COM2 over temp. Reducing transmitter power.	
COM1 SERVICE – COM1 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.
COM2 SERVICE – COM2 needs service. Return unit for repair.	
COM1 PTT – COM1 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. If the problem persists, the G1000 system should be serviced.
COM2 PTT – COM2 push-to-talk key is stuck.	
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.	

GIA 63 Message Advisories (Cont.)

Alerts Window Message	Comments
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 RMT XFR – 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 RMT XFR – NAV2 remote transfer key is stuck.	
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 – XPDR1 using backup data path.	The #1 transponder is using a backup communications path. The G1000 system should be serviced when possible.

GRS 77 Message Advisories

Alerts Window Message	Comments
AHRS1 TAS – AHRS1 not receiving airspeed.	The #1 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.
AHRS1 GPS – AHRS1 using backup GPS source.	The #1 AHRS is using the backup GPS path. Primary GPS path has failed. The G1000 system should be serviced when possible.
AHRS1 GPS – AHRS1 not receiving any GPS information.	The #1 AHRS is not receiving any or any useful GPS information. Check AFMS limitations. The G1000 system should be serviced.
AHRS1 GPS – AHRS1 not receiving backup GPS information.	The #1 AHRS is not receiving backup GPS information. The G1000 system should be serviced.
AHRS1 GPS – AHRS1 operating exclusively in no-GPS mode.	The #1 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 – AHRS1 using backup data path.	The #1 AHRS is using a backup communications data path. The G1000 system should be serviced when possible.
AHRS1 SRVC – AHRS1 Magnetic-field model needs update.	The #1 AHRS earth magnetic field model is out of date. Update magnetic field model when practical.
GEO LIMITS – AHRS1 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 – AHRS1 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 – ADC1 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 waypoint. 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. Remove the waypoint from the flight plan if it no longer exists in any database, OR 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 approach 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.
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.

Miscellaneous Message Advisories (Cont.)

Alerts Window Message	Comments
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.
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.

Miscellaneous Message Advisories (Cont.)

Alerts Window Message	Comments
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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Appendices

SD CARD USE

The G1000 system uses Secure Digital (SD) cards to load and store various types of data. For basic flight operations, SD cards are required for terrain database storage as well as aviation database updates.

AVIATION DATABASE

Jeppesen aviation databases are released every 28 days, and are provided directly to the pilot by Jeppesen. Updates must be loaded to both the MFD and PFD using an aviation database update SD card provided by Jeppesen. The card reader downloads the aviation database files and stores them in the PFD and MFD internal memory.

NOTE: *The display downloads the aviation database and stores it internally. The aviation database SD card is not required to remain in the display after the update.*

To update the Jeppesen aviation database:

1. With the G1000 system OFF, insert the aviation database update SD card into the top card slot of the PFD (Label of SD card facing left).
2. Turn the G1000 system ON. The following prompt is displayed on the upper left corner of the PFD:

```
DO YOU WANT TO UPDATE THE AVIATION DATABASE?
PRESS CLR FOR NO AND ENT FOR YES
YOU HAVE 30 SECONDS BEFORE NO IS RETURNED
```

3. Press the **ENT** key to confirm the database updated. The following prompt is displayed:

```
DO YOU WANT TO UPDATE THE AVIATION DATABASE?
PRESS CLR FOR NO AND ENT FOR YES
YOU HAVE 30 SECONDS BEFORE NO IS RETURNED
UPDATING AVIATION DATABASE
.
UPDATED 1 FILES SUCCESSFULLY!
```

4. After the update completes, the PFD starts in normal mode. Remove the aviation database update SD card from the PFD.
5. Turn the G1000 system OFF.
6. Repeat steps 1 through 4 for the MFD. The MFD and PFD aviation databases are now updated.
7. Verify that the correct update cycle is loaded during startup of the MFD.

TERRAIN AND OBSTACLE DATABASES

NOTE: *The data contained in the terrain and obstacle databases comes from government agencies. Garmin accurately processes and cross-validates the data, but cannot guarantee the accuracy and completeness of the data.*

NOTE: *Obstacles 200' and higher are included in the obstacle database. It is very important to note that not all obstacles are necessarily charted and therefore may not be contained in the obstacle database.*

G1000 topography, terrain, and obstacle data is stored on a Supplemental Data Card provided by Garmin. The obstacle database update cycle is every 56 days. The terrain database is updated less often, and on an irregular basis. Since these databases are not stored internally in the MFD or PFD, Supplemental Data Cards containing identical database versions must be kept in both displays to retain terrain and obstacle data. A Supplemental Data Card should be inserted into the bottom card slot of the PFD and MFD.

NOTE: *If the Supplemental Data Card is removed from the display, the* ***TOPO*** *and* ***TERRAIN*** *softkeys are not functional and are grayed out on the MFD Map Page.*

The obstacle and terrain database updates can be obtained by following the instructions detailing in the 'Aviation Databases' section of the Garmin website (www.garmin.com). Once the updated files have been downloaded from the website, a PC equipped with an appropriate SD card reader is used to unpack and program the new databases onto the existing Supplemental Data Cards. Equipment required to perform the update is as follows:

- Windows-compatible PC computer (Windows 2000 or XP recommended).
- SanDisk SD Card Reader, P/Ns SDDR-93 or SDDR-99 or equivalent card reader.
- Updated database obtained from the Garmin website.
- Existing 010-00330-41 Supplemental Database SD Cards from both PFD and MFD.

After the data has been copied to both data cards, perform the following steps:

1. Insert one card in the bottom card slot of the MFD and one in the bottom card slot of the PFD.
2. Apply power to the G1000 system. View the MFD Power-up Page. Check that the Terrain and Obstacle databases are initialized and displayed on the scrolling window of the Power-up Page as shown in the following figure:
3. Acknowledge the Power-up Page agreement by pressing the **ENT** key or the rightmost softkey. At the MAP – NAVIGATION MAP page, press the **MAP** softkey and check to make sure that the **TOPO** and **TERRAIN** softkeys are functional (not grayed out).
4. Power down the G1000.

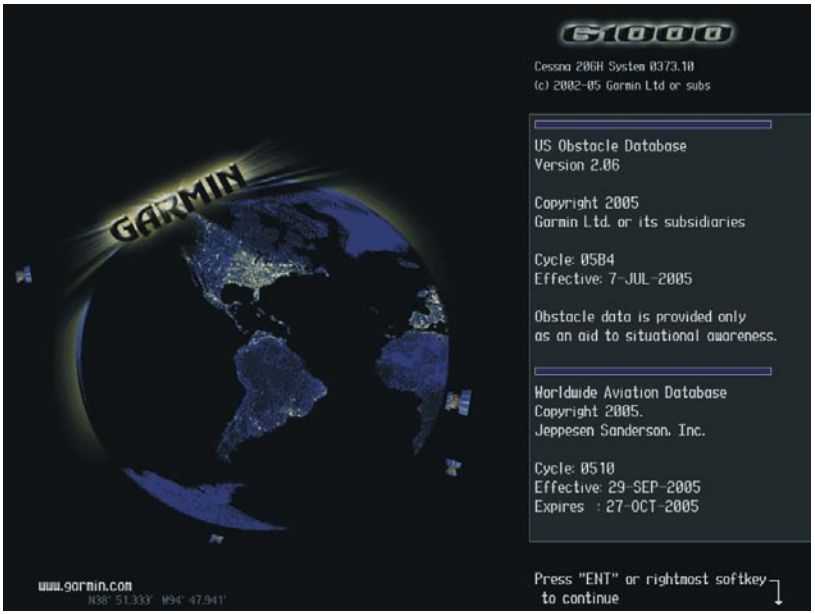

Figure A-1 MFD Power-up Screen

Abbreviation or Acronym	Definition
ADF	Automatic Direction Finder
AF	Arc to fix
AFM	Aircraft Flight Manual
AFMS	Aircraft Flight Manual Supplement
AGL	Above Ground Level
AHRS	Attitude and Heading Reference System
AIM	Airman's Information Manual
AIRMET	Airman's Meteorological Information
ALT	Altitude
AMPS	Amperes
ANNUNC	Annunciation
APPR	Approach
APR	Approach
APT	Airport
ARINC	Aeronautical Radio Incorporated
ARSPC	Airspace
ARTCC	Air Route Traffic Control Center
ARV	Arrival
AS	Airspeed
ASB	Aviation Support Branch
ATC	Air Traffic Control
ATCRBS	ATC Radar Beacon System
AUTOSEQ	Automatic Sequence
AUX	Auxiliary
B ALT	Barometric Altitude
BARO	Barometer
BKSP	Backspace
BRG	Bearing
C	Celsius
CA	Course to Altitude
CALC	Calculator
CD	Course to DME distance
CDI	Course Deviation Indicator
CDU	Control Display Unit
CF	Course to Fix
CHT	Cylinder Head Temperature
CHKLIST	Checklist
CHNL	Channel
CI	Course to Intercept
CLD	Cloud
CLR	Clear
COM	Communication Radio
CONFIG	Configuration
COPLT	Co-pilot
CR	Course to Radial
CRG	Cockpit Reference Guide
CRNT	Current
CRS	Course
CRSR	Cursor

Abbreviation or Acronym	Definition
CTRL	Control
CVR	Cockpit Voice Recorder
CVRG	Coverage
CYL	Cylinder
D ALT	Density Altitude
DB	Database
DBASE	Database
DBZ	Decibels 'Z' (Radar Return)
DEC FUEL	Decrease Fuel
DECLTR	Declutter
DEP	Departure
DF	Direct to Fix
DFLT	Default
DFLTS	Defaults
DIS	Distance
DME	Distance Measuring Equipment
DOP	Dilution of Precision
DP	Departure Procedure
DSBL	Disabled
DTK	Desired Track
ECU	Engine Control Unit
EGT	Exhaust Gas Temperature
EIS	Engine Indication System
ELEV	Elevation
EMI	Electromagnetic Interference
ENDUR	Endurance
ENGD	Engaged
ENR	Enroute
ENT	Enter
EPE	Estimated Position Error
ERR	Error
ESA	Enroute Safe Altitude
ETA	Estimated Time of Arrival
ETE	Estimated Time Enroute
EXPIRD	Expired
FA	Course From Fix to Altitude
FAA	Federal Aviation Administration
FAF	Final Approach Fix
FAIL	Failure
FC	Course From Fix to Distance
FCC	Federal Communication Commission
FCST	Forecast
FD	Course From Fix to DME Distance, Flight Director
FFLOW	Fuel Flow
FIS-B	Flight Information Services-Broadcast
FISDL	Flight Information Service Data Link
FM	Course From Fix to Manual Termination

Abbreviation or Acronym	Definition
FMS	Flight Management System
FOB	Fuel On Board
FPL	Flight Plan
FPM	Feet Per Minute
FREQ	Frequency
FRZ	Freezing
FSS	Flight Service Station
ft	Foot/feet
G/S	Glideslope
GAL	Gallon(s)
GDC	Garmin Air Data Computer
GDU	Garmin Display Unit
GEA	Garmin Engine/Airframe Unit
GIA	Garmin Integrated Avionics Unit
GL	Gallon(s)
GMU	Garmin Magnetometer Unit
GND	Ground
GPH	Gallons per Hour
GPS	Global Positioning System
GRS	Garmin Reference System
GS	Ground Speed
GTX	Garmin Transponder
HA	Hold Terminating at Altitude
HDG	Heading
HF	Hold Terminating at Fix
Hg	Mercury
HI	High
HI SENS	High Sensitivity
HM	Hold with Manual Termination
hPa	Hectopascal
HR	Hour
HSI	Horizontal Situation Indicator
HUL	Horizontal Uncertainty Level
Hz	Hertz
I	Inner Marker
IAF	Initial Approach Fix
IAT	Indicated Air Temperature
IAU	Integrated Avionics Unit
ICAO	International Civil Aviation Organization
ICS	Intercom System
ID	Identification/Morse Code Identifier
IDENT, IDNT	Identification
IF	Initial Fix
IFR	Instrument Flight Rules
IG	Imperial Gallon
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
INACTV	Inactive

Abbreviation or Acronym	Definition
INC FUEL	Increase Fuel
IND	Indicated
INT	Intersection(s)
IrDA, IRDA	Infrared Data Association
KEYSTK	Key Stuck
KG	Kilogram
KHz	Kilohertz
KM	Kilometer
KT	Knot
L	Left
LAT	Latitude
LBL	Label
LB	Pound
LCD	Liquid Crystal Display
LCL	Local
LED	Light Emitting Diode
LIFR	Low Instrument Flight Rules
LO	Low
LOC	Localizer
LON	Longitude
LRU	Line Replacement Unit
LTNG	Lightning
LVL	Level
M	Middle Marker
MAG VAR	Magnetic Variation
MAHP	Missed Approach Hold Point
MAN IN	Manifold Pressure (inches Hg)
MAN SQ	Manual Squelch
MAP	Missed Approach Point
MASQ	Master Avionics Squelch
MAX	Maximum
METAR	Meteorological Aviation Routine
MFD	Multi Function Display
MGRS	Military Grid Reference System
MIC	Microphone
MIN	Minimum
MKR	Marker Beacon
MOA	Military Operations Area
MOV	Movement
MPM	Meters Per Minute
MSA	Minimum Safe Altitude
MSL	Mean Sea Level
MT	Meter
mV	Millivolt(s)
MVFR	Marginal Visual Flight Rules
NAV	Navigation
NAVAID	NAVigation AID

Abbreviation or Acronym	Definition
NDB	Non-directional Beacon
Nexrad	Next Generation Radar
nm	Nautical Mile(s)
NRST	Nearest
O	Outer Marker
OAT	Outside Air Temperature
OBS	Omni Bearing Selector
P ALT	Pressure Altitude
PA	Passenger Address
PASS	Passenger(s)
PFD	Primary Flight Display
PI	Procedure Turn to Course Intercept
POSN	Position
P. POS	Present Position
PRES	Pressure
PRESS	Pressure
PROC	Procedure(s)
PSI	Pounds per Square Inch
PT	Procedure Turn
PTCH	Pitch
PTT	Push-to-Talk
PWR	Power
QTY	Quantity
R	Right
RAD	Radial
RAIM	Receiver Autonomous Integrity Monitoring
REF, REFS	References
REM	Remaining (fuel remaining above Reserve)
REQ	Required
RES	Reserve (fuel reserve entered by pilot)
RF	Constant Radius Turn to Fix
RMI	Radio Magnetic Indicator
RNG	Range
RNWY	Runway
RPM	Revolutions per Minute
RST FUEL	Reset Fuel
RSV	Reserve
RVRSNRY	Reversionary
RX	Receive
SA	Selective Availability
SAT	Static Air Temperature
SCIT	Storm Cell Identification and Tracking
SD	Secure Digital
SEC	Second(s)
SEL	Select
SFC	Surface
SIAP	Standard Instrument Approach Procedures
SID	Standard Instrument Departure
SIGMET	Significant Meteorological Information
Sim	Simulator
SLCT	Select
SLP/SKD	Slip/skid
SMBL	Symbol
SPD	Speed
SPI	Special Position Identification
SPKR	Speaker
SQ	Squelch
STAR	Standard Terminal Arrival Route
STATS	Statistics
STBY	Standby
STD	Standard
SUA	Special Use Airspace
SUSP	Suspend
SW	Software
SYS	System
T HDG	True Heading
TAS	True Airspeed
TAF	Terminal Aerodrome Forecast
TAT	Total Air Temperature
TCA	Terminal Control Area
TCAS	Traffic Collision Avoidance System
TEL	Telephone
TEMP	Temperature
TERM	Terminal
TF	Track Between Two Fixes
TFR	Temporary Flight Restriction
TIS	Traffic Information System
TKE	Track Angle Error
TMA	Terminal Maneuvering Area
TRG	Target
TRK	Track
TRUNC	Truncated
TX	Transmit
UNAVAIL	Unavailable
USR	User
UTC	Coordinated Universal Time
UTM/UPS	Universal Transverse Mercator / Universal Polar Stereographic Grid
V	Airspeed/Velocity
Vne	Never-exceed Speed
Vr	Rotate Speed
Vx	Best Angle of Climb Speed
Vy	Best Rate of Climb speed
VA	Heading Vector to Altitude

Abbreviation or Acronym	Definition
VD	Heading Vector to DME Distance
VERT	Vertical
VFR	Visual Flight Rules
VHF	Very High Frequency
VI	Heading Vector to Intercept
VLOC	VOR/Localizer Receiver
VM	Heading Vector to Manual Termination
VMC	Visual Meteorological Conditions
VNAV	Vertical Navigation
VOL	Volume
VOR	VHF Omnidirectional Range
VPROF	VNAV Profile
VR	Heading Vector to Radial
VS	Vertical Speed
Vspeed	Airspeed
WAAS	Wide Area Augmentation System
WGS-84	World Geodetic System - 1984
WPT	Waypoint(s)
WPTS	Waypoints
WW	World Wide
WX	Weather
XFER	Transfer
XPDR	Transponder
XTALK	Cross-talk
XTK	Cross-track

Navigation Term	Definition
Bearing	The compass direction from your present position to a destination waypoint.
Calibrated Airpseed	Indicated airspeed corrected for installation and instrument errors.
Course	The line between two points to be followed by the aircraft.
Course to Steer	The recommended direction to steer in order to reduce course error or stay on course. Provides the most efficient heading to get back to the desired course and proceed along your flight plan.
Crosstrack Error	The distance the aircraft is off a desired course in either direction, left or right.
Cumulative Distance	The total of all legs in a flight plan. The 'great circle' distance from your present position to a destination waypoint.
Dillution of Precision	A measure of GPS satellite geometry quality on a scale of one to ten (lower numbers equal better geometry, where higher numbers equal poorer geometry)
Desired Track	The desired course between the active "from" and "to" waypoints.
Efficiency	A measure of fuel consumption, expressed in distance per unit of fuel.
Endurance	Flight endurance, or total possible flight time based on available fuel on board.
Enroute Safe Altitude	The recommended minimum altitude within ten miles left or right of the desired course on an active flight plan or direct-to.
Estimated Position Error	A measure of horizontal GPS position error derrived by satellite geometry conditions and other factors.
Estimated Time of Arrival	The estimated time at which the aircraft should reach the destination waypoint, based upon current speed and track.
Estimated Time Enroute	The estimeated time it takes to reach the destination waypoint from the present position, based upon current groundspeed.
Fuel Flow	The fuel flow rate, expressed in units of fuel per hour.
Fuel On Board	The total amount of usable fuel on board the aircraft.
Groundspeed	The velocity that the aircraft is travelling relative to a ground position.
Heading	The direction an aircraft is pointed, based upon indications from a magnetic compass or a properly set directional gyro.
Indicated	Information provided by properly calibrated and set instrumentation on the aircraft panel.
Leg	The portion of a flight plan between two waypoints.
Left Over Fuel On Board	The amount of fuel remaining on board after the completion of one or more legs of a flight plan or direct-to.
Left Over Fuel Reserve	The amount of flight time remaining, based on the amount of fuel on board after the completion of one or more legs of a flight plan or direct-to, and a known consumption rate.
Minimum Safe Altitude	Uses Grid Minimum Off-Route Altitudes (Grid MORAs) to determine a safe altitude within ten miles of the aircraft present position. Grid MORAs are one degree latitude by one degree longitude in size. The Grid MORA clears the highest elevation reference point in the grid by 1000 feet for all areas of the grid.
Track	The direction of aircraft movement relative to a ground position. Also referred to as 'Ground Track'.
Track Angle Error	The angle difference between the desired track and your current track.
Vertical Speed Required	The vertical speed necessary to descend/climb from a current position and altitude to a defined target position and altitude, based upon current groundspeed.

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QUESTIONS & ANSWERS

This Appendix answers common questions regarding G1000 system operational capabilities. If a particular subject is not covered in this Appendix, the index may be used to find the appropriate section in this manual. If a sufficient answer is still not found, an authorized Garmin dealer or contact Garmin directly (see Copyright page). Garmin is dedicated to supporting its products and customers.

What is RAIM and how does it affect approach operations?

RAIM is an acronym for Receiver Autonomous Integrity Monitoring. RAIM is a GPS receiver function that performs the following functions:

- Monitors and verifies integrity and geometry of tracked GPS satellites.
- Eliminates a corrupt satellite from the navigation solution.
- Notifies the pilot when satellite conditions do not provide the necessary coverage to support a certain phase of flight.
- Predicts satellite coverage of a destination area to determine whether the number of available satellites is sufficient to satisfy requirements.

For RAIM to work correctly, the GPS receiver must track at least five (5) satellites. A minimum of six (6) satellites is required to allow RAIM to eliminate a single corrupt satellite from the navigation solution.

RAIM ensures that satellite geometry allows for a navigation solution calculation within a specified protection limit (2.0 nm for oceanic and en route, 1.0 nm for terminal, and 0.3 nm for non-precision approaches). The G1000 system monitors RAIM and issues an alert message when RAIM is not available (see Annunciation and Alerts Pilot's Guide). Without RAIM, GPS position accuracy cannot be monitored. If RAIM is not available when crossing the FAF, the pilot must fly the missed approach procedure.

NOTE: *If RAIM is not predicted to be available for the final approach course, the approach does not become active, as indicated by the "RAIM not available from FAF to MAP" message and the INTEG annunciation flagging.*

Why are there not any approaches available for a flight plan?

Approaches are available for the final destination airport in a flight plan or as a direct-to (keep in mind that some VOR/VORTAC identifiers are similar to airport identifiers). If a destination airport does not have a published approach, the G1000 indicates "NONE" for the available procedures.

What happens when an approach is selected? Can a flight plan with an approach, a departure, or an arrival be stored?

When an approach, departure, or arrival is loaded into the active flight plan, a set of approach, departure, or arrival waypoints is inserted into the flight plan – along with a header line showing the title of the selected instrument procedure. The original enroute portion of the flight plan remains active, unless the instrument procedure is activated. This may be done either when the procedure is loaded, or at a later time.

Flight plans can also be stored with an approach, a departure, or an arrival. Note that the active flight plan is erased when the system is turned off. Also, the active flight plan is overwritten when another flight plan is activated. When storing flight plans with an approach, a departure, or an arrival, the G1000 uses the waypoint infor-

mation from the current database to define the waypoints. If the database is changed or updated, the G1000 system automatically updates the information, provided the procedure has not been modified. Should an approach, departure, or arrival procedure no longer be available, the flight plan becomes locked until the procedure is deleted from the flight plan.

Can "slant Golf" ("/G") be filed using the G1000?

"/G" may be filed for a flight plan. The G1000 system meets the requirements of TSO-C129 Class A1 or A2 installation. Non-precision GPS approaches are not to be flown with an expired database. See the approved Aircraft Flight Manual Supplement (AFMS) as well as the Aeronautical Information Manual (AIM) for more information.

What does the OBS softkey do?

The **OBS** softkey is used to select manual sequencing of waypoints. Activating OBS mode sets the current active-to waypoint as the primary navigation reference and prevents the system from sequencing to the next waypoint in a flight plan. When OBS mode is cancelled, automatic waypoint sequencing is continued, and the G1000 automatically activates the next waypoint in the flight plan once the aircraft has crossed the present active waypoint.

Normal (OBS not activated)

- Automatic sequencing of waypoints
- Manual course change on HSI is not possible
- Always navigates 'TO' the active waypoint
- Must be in this mode for final approach course

OBS

- Manual sequencing - 'holds' on selected waypoint
- Manually select course to waypoint from HSI
- Indicates 'TO' or 'FROM' waypoint
- Cannot be set for final approach course or published holding patterns

When OBS mode is active, the G1000 allows the pilot to set a desired course to/from a waypoint using the **CRS/BARO knob** and HSI (much like a VOR).

One application for the **OBS** softkey is holding patterns. The **OBS** softkey is used to suspend waypoint sequencing and select the desired course along the waypoint side of the hold. For many approach operations, setting and resetting of waypoint sequencing is automatic. Holding patterns that are part of an approach automatically disable waypoint sequencing, then re-enable waypoint sequencing after one time around the holding pattern. To fly the holding pattern a second time, press the **OBS** softkey. An example of this operation is an approach which begins with a holding pattern at the initial approach fix (IAF).

The most common application for using the **OBS** softkey is the missed approach. The G1000 suspends automatic waypoint sequencing (indicated by a "SUSP" annunciation placed on the HSI) when the missed approach point (MAP) is crossed. This prevents the G1000 from automatically sequencing to the missed approach holding point (MAHP). During this time, the **OBS** softkey designation changes to **SUSP**. Pressing the **SUSP** softkey reactivates automatic waypoint sequencing. The **OBS** softkey then resumes its normal functionality.

WARNING: *The G1000 does not provide guidance to the missed approach hold point (MAHP). Always follow published missed approach procedures when flying a missed approach.*

Why does the G1000 not automatically sequence to the next waypoint?

The G1000 only sequences flight plan waypoints when automatic sequencing is enabled (i.e., no "OBS" or "SUSP" annunciation). For automatic sequencing to occur, the aircraft must also cross the "bisector" of the turn being navigated. The bisector is a perpendicular line between two flight plan legs which crosses through the waypoint common to both legs.

How can a waypoint be skipped in an approach, a departure, or an arrival?

The G1000 allows the pilot to manually select any approach, departure, or arrival leg as the active leg of the flight plan. This procedure is performed on the MFD, from the Active Flight Plan Page by highlighting the desired waypoint and pressing the **ACT LEG** softkey, then the **ENT** key to approve the selection. The GPS then provides navigation along the selected flight plan leg.

When does turn anticipation begin?

The G1000 smoothes adjacent leg transitions based upon a normal 15° bank angle (with the ability to roll up to 25°) and provides three pilot cues for turn anticipation:

1) A waypoint alert ("NEXT DTK ###°") flashes on the PFD 10 seconds before the turn point.
2) A flashing turn advisory ("TURN TO ###°") appears on the PFD when the pilot is to begin the turn. The HSI (GPS mode) automatically sequences to the next DTK value.
3) The To/From indicator on the HSI flips momentarily to indicate that the midpoint of the turn has been crossed.

When does the CDI scale change?

When 30 nm from the destination, the G1000 begins a smooth CDI scale transition from 5.0 nm (en-route mode) to 1.0 nm (terminal mode). When 2 nm from the FAF during an active approach, the CDI scale transitions to 0.3 nm (approach mode). When executing a missed approach, the CDI can be returned to the 1.0 nm scale by pressing the **SUSP** softkey. The CDI is also set to 1.0 nm (terminal mode) within 30 nm of the departure airport.

Why does the HSI not respond like a VOR when OBS mode is active?

Unlike a VOR, the CDI scale used on GPS equipment is based on the cross-track distance to the desired course, not on angular relationship to the destination. Therefore, the CDI deflection on the GPS is constant regardless of the distance to the destination and does not become less sensitive when further away from the destination.

What is the correct missed approach procedure? How is the missed approach holding point selected?

To comply with TSO specifications, the G1000 does not automatically sequence past the MAP. The first waypoint in the missed approach procedure becomes the active waypoint when the **SUSP** softkey is pressed AFTER crossing the MAP. All published missed approach procedures must be followed, as indicated on the approach plate.

To execute the missed approach procedure prior to the MAP (not recommended), select the Active Flight Plan Page and use the **ACT LEG** softkey to activate the missed approach portion of the procedure.

After a missed approach, how can the same approach be re-selected? How can a new approach be activated?

After flying the missed approach procedure, the pilot may reactivate the same approach for another attempt from the Procedures Page. Once the clearance is given for another attempt, activate the approach from the Procedures Page by highlighting "Activate Approach?", then pressing the **ENT** key. The G1000 provides navigation along the desired course to the waypoint and rejoins the approach in sequence from that point on.

To activate a new approach for the same airport, select the new procedure from the Procedures Page. To view the Procedures Page, press the **PROC** key and rotate the large **FMS** knob to highlight "Select Approach?". Select the desired approach from the list shown and press the **ENT** key. Select the desired transition, then activate the approach using the **ENT** key.

To activate a new approach to a different airport, press the **Direct-to** key and select the desired airport using the **small** and **large FMS** knobs. Press the **ENT** key to accept the selected airport, then follow the steps in the preceding paragraph to select an approach for the new airport.

NOTE: *Do not attempt to reactivate the current approach prior to crossing the missed approach point (MAP). If an attempt to do so is made, an alert message "Are you sure you want to discontinue the current approach?" appears. The G1000 directs you back to the transition waypoint and does NOT take into consideration any missed approach procedures, if the current approach is reactivated.*

G1000 MAP DATUMS

The G1000 system supports the following map datums.

WARNING: *WGS 84 is the default datum and should be used in all situations except when another datum is specifically required for safe navigation. Pilots using map datums other than WGS 84 do so at their own risk.*

ADINDAN	Ethiopia, Mali, Senegal, Sudan
AFGOOYE	Somalia
AIN El ABD 1970	Bahrain Island, Saudi Arabia
ANNA 1 ASTRO 1965	Cocos Islands
ARC 1950	Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, Zimbabwe
ARC 1960	Kenya, Tanzania
ASCENSION IS 1958	Ascension Island
ASTRO B4 SOROL ATOLL	Tern Island
ASTRO BEACON "E"	Iwo Jima Island
ASTRO DOS 71/4	St. Helena Island
ASTRONOMIC STN 1952	Marcus Island
AUSTRALIAN GEOD 1966	Australia, Tasmania Island
AUSTRALIAN GEOD 1984	Australia, Tasmania Island
AUSTRIA NS	Austria
BELGIUM 1950	Belgium
BELLEVUE (IGN)	Efate and Erromango Islands
BERMUDA 1957	Bermuda Islands
BOGATA OBSERVATORY	Colombia
BUKIT RIMPAH	Indonesia
CAMP AREA ASTRO	Antarctica
CAMPO INCHAUSPE	Argentina
CANTON ASTRO 1966	Phoenix Islans
CAPE	South Africa
CAPE CANAVERAL	Florida, Bahama Islands
CARTHAGE	Tunisia
CH-1903	Switzerland
CHATHAM 1971	Chatham Island (New Zealand)
CHUA ASTRO	Paraguay
CORREGO ALEGRE	Brazil
DANISH GI 1934	Denmark
DJAKARTA (BATAVIA)	Sumatra Island (Indonesia)
DOS 1968	Gizo Island (New Georgia Islands)
EASTER ISLAND 1967	Easter Island
EUROPEAN 1950	Austria, Belgium, Denmark, Finland, France, Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland
EUROPEAN 1979	Austria, Finland, Netherlands, Norway, Spain, Sweden, Switzerland
FINLAND HAYFORD 1910	Finland
G. SEGARA	Borneo
GANDAJIKA BASE	Republic of Maldives
GEODETIC DATUM 1949	New Zealand
GGRS 87	Greece
GUAM 1963	Guam Island
GUX 1 ASTRO	Guadalcanal Island
HERAT NORTH	Afghanistan
HJORSEY 1955	Iceland
HONG KONG 1963	Hong Kong
HU-TZU SHAN	Taiwan
INDIAN BNGLDSH NEPAL	Bangladesh, India, Nepal
INDIAN MEAN VALUE	India
INDIAN THAILAND VIETN	Thailand, Vietnam
INDONESIA 74	Indonesia
IRELAND 1965	Ireland
ISTS 073 ASTRO 1969	Diego Garcia
JOHNSTON ISLAND 1961	Johnston Island
KANDAWALA	Sri Lanka
KERGUELEN ISLAND	Kerguelen Island
KERTAU 1948	West Malaysia
L.C. 5 ASTRO	Cayman Brac Island
LIBERIA 1964	Liberia
LUZON MEAN VALUE	Philippines
LUZON MINDANAO IS	Mindanao Island
LUZON PHILIPPINES	Philippines (excluding Mindanao Isl.)
MAHE 1971	Mahe Island
MARCO ASTRO	Salvage Islands
MASSAWA	Eritrea (Ethiopia)
MERCHICH	Morocco
MIDWAY ASTRO 1961	Midway Island
MINNA	Nigeria
NAD27 ALASKA	North American 1927 – Alaska
NAD27 BAHAMAS	North American 1927 – Bahamas
NAD27 CANADA	North American 1927 – Canada
NAD27 CANAL ZONE	North American 1927 – Canal Zone

G1000 MAP DATUMS (CONT.)

NAD27 CARIBBEAN	North American 1927 – Caribbean: Barbados, Caicos Islands, Cuba, Dominican Republic, Cayman Islands, Jamaica, Leeward and Turks Islands
NAD27 CENTRAL AMERICA	North American 1927 – Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua
NAD27 CONUS	North American 1927 – Continental United States
NAD27 CUBA	North American 1927 – Cuba
NAD27 GREENLAND	North American 1927 – Greenland (Hayes Peninsula)
NAD27 MEXICO	North American 1927 – Mexico
NAD27 SAN SALVADOR IS	North American 1927 – San Salvador Island
NAD83	North American 1983 – Alaska, Canada, Central America, CONUS, Mexico
NAHRWAN MASIRAH IS	Masirah Island (Oman)
NAHRWAN SAUDI ARABIA	Saudi Arabia
NAHRWAN UNITD ARAB E	United Arab Emirates
NAPARIMA BWI	Trinidad and Tobago
NETHERLAND TRIAG '21	Netherlands
NOU TRIAG FRANCE	France
NOU TRIAG LUXEMBOURG	Luxembourg
OBSERVATORIO 1966	Corvo and Flores Islands (Azores)
OLD EGYPTIAN	Egypt
OLD HAWAIIAN KAUAI	Kauai
OLD HAWAIIAN MAUI	Maui
OLD HAWAIIAN MEAN	Mean Value
OLD HAWAIIAN OAHU	Oahu
OMAN	Oman
ORD SRV GRT BRITAIN	England, Isle of Man, Scotland, Shetland Islands, Wales
PICO DE LAS NIEVAS	Canary Islands
PITCAIRN ASTRO 1967	Pitcairn Island
PORTUGUESE 1973	Portugal
POTSDAM	Germany
PROV SO AMERICA '56	Bolivia, Chile, Colombia, Ecuador, Guyana, Peru, Venezuala
PROV SO CHILEAN 1963	South Chile
PUERTO RICO	Puerto Rico and Virgin Islands
QATAR NATIONAL	Qatar
QORNOQ	South Greenland
REUNION	Mascarene Island
ROME 1940	Sardinia Island
RT 90	Sweden
SANTO (DOS)	Espirito Santo Island
SAO BRAZ	Sao Miguel, Santa Maria Islands (Azores)
SAPPER HILL 1943	East Falkland Island
SCHWARZECK	Namibia
SOUTH AMERICAN 1969	Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Venezuela
SOUTH ASIAN	Singapore
SOUTHEAST BASE	Porto Santo and Madeira Islands
SOUTHWEST BASE	Faial, Graciosa, Pico, Sao Jorge and Terceira Islands
TANANARIVE OBSV 1925	Madagascar
TIMBALAI 1948	Brunei and East Malaysia (Sarawak and Sabah)
TOKYO	Japan, Korea, Okinawa
TRISTAN ASTRO 1968	Tristan da Cunha
VITI LEVU 1916	Viti Levu Island, Fiji Islands
WAKE-ENIWETOK 1960	Marshal Islands
WGS 72	World Geodetic System 1972
WGS 84	World Geodetic System 1984
YACARE	Uruguay
ZANDERIJ	Surinam

GENERAL TIS INFORMATION

INTRODUCTION

The Traffic Information Service (TIS) provides traffic advisory information in the cockpit of non-TCAS equipped aircraft. TIS is a ground-based service providing relative location of all ATCRBS Mode-A and Mode-C transponder equipped aircraft within a specified service volume. The TIS ground sensor uses real time track reports to generate traffic notification. The G1000 system displays TIS traffic information on the Traffic Map Page of the MFD. TIS information may be displayed for overlay on the default map page on the MFD, as well as on the PFD map inset. Surveillance data includes all transponder-equipped aircraft within the coverage volume. The G1000 system displays up to eight traffic targets within a 7.5 nautical mile radius, from 3,000 feet below, to 3,500 feet above the requesting aircraft.

NOTE: *Aircraft without an operating transponder are invisible to TIS.*

TIS VS. TCAS

The main difference between TIS and TCAS is the source of surveillance data. TCAS uses an airborne interrogator with a half-second update rate, while TIS utilizes the terminal Mode-S ground interrogator and accompanying data link to provide a five-second update rate. TIS and TCAS both have similar ranges.

TIS LIMITATIONS

This section describes basic TIS limitations and is not comprehensive. The pilot should review the TIS Limitations section of the Aeronautical Information Manual (AIM), Section 1-2-5.

NOTE: *TIS is NOT intended to be used as a collision avoidance system and does not relieve the pilot of the responsibility to "see and avoid" other aircraft. TIS shall not be used for avoidance maneuvers during IMC or when there is no visual contact with the intruder aircraft.*

TIS is intended only to assist in visual acquisition of other aircraft in VMC conditions. No recommended avoidance maneuvers are given, nor authorized, as a direct result of a TIS intruder display or TIS advisory.

While TIS is a useful aid to visual traffic avoidance, system limitations must be fully understood to ensure proper use. Many limitations are inherent in secondary radar surveillance. Information provided by TIS is neither better nor more accurate than the information used by ATC.

TIS relies on surveillance of the Mode-S radar system, which is a "secondary surveillance" radar system similar to that used by ATCRBS. TIS operation may be intermittent during turns or other maneuvering. TIS is dependent on two-way, line-of-sight communications between the aircraft and the Mode-S radar antenna. Whenever the structure of the aircraft comes between the transponder antenna and the ground-based radar antenna, the signal may be temporarily interrupted. Other limitations and anomalies associated with TIS are described in the AIM, Section 1-2-5.

WARNING: *Garmin is not responsible for Mode S geographical coverage. Operation of the ground stations is the responsibility of the FAA. Refer to the AIM for a Terminal Mode S radar site map.*

***NOTE:** TIS is unavailable at low altitudes in many areas of the United States. This is often the case in mountainous regions.*

TIS information is collected during a single radar sweep. Collected information is then sent through the Mode S uplink on the next radar sweep. Because of this, the surveillance information is approximately five seconds old. TIS ground station tracking software uses prediction algorithms to compensate for this delay. These algorithms uses track history data to calculate expected intruder positions consistent with the time of display. Occasionally, aircraft maneuvering may cause variations in this calculation and create slight errors on the Traffic Map Page. Errors affect relative bearing information and target track vector. This can cause a delay in the displayed intruder information. However, intruder distance and altitude typically remain relatively accurate and may be used to assist in spotting traffic.

The following errors are common examples:

- When the client or intruder aircraft maneuvers excessively or abruptly, the tracking algorithm may report incorrect horizontal position until the maneuvering aircraft stabilizes.
- When a rapidly closing intruder is on a course that intercepts the client aircraft course at a shallow angle (either overtaking or head-on), and either aircraft abruptly changes course within 0.25 nautical miles, TIS may display the intruder aircraft on the incorrect side of the client aircraft.

These are rare occurrences and are typically resolved within a few radar sweeps once the client/intruder aircraft course stabilizes.

Pilots using TIS can provide valuable assistance in the correction of malfunctions by reporting their observations of undesirable performance. Reporters should identify the time of observation, location, type and identity of the aircraft, and describe the condition observed. Reports should also include the type of transponder and transponder software version as well. Since TIS performance is monitored by maintenance personnel, not ATC, malfunctions should be reported in the following ways:

- By telephone to the nearest Flight Service Station (FSS) facility.
- By FAA Form 8000-7, Safety Improvement Report (Postage-paid card can be obtained at FAA FSSs, General Aviation District Offices, Flight Standards District Offices, and General Aviation Fixed Base Operators).

MAP SYMBOLS

AIRPORT

Item	Symbol
Unknown Airport	
Non-towered, Non-serviced Airport	
Towered, Non-serviced Airport	
Non-towered, Serviced Airport	
Towered, Serviced Airport	
Restricted (Private) Airport	
Heliport	

NAVAIDS

Item	Symbol
Intersection	
LOM (compass locator at outer marker)	
NDB (Non-directional Radio Beacon)	
VOR	
VOR/DME	
VOR/ILS	
VORTAC	
TACAN	

BASEMAP

Item	Symbol
Interstate Highway – 2-digit drawn inside	
Interstate Highway – 3-digit drawn inside	
State Highway – 2-digit drawn inside	
State Highway – 3-digit drawn inside	
State Highway – 4-digit drawn inside	
State Highway – 5-digit drawn inside	
US Highway – 2-digit drawn inside	
US Highway – 3-digit drawn inside	
National Highway – 2-digit drawn inside	
National Highway – 3-digit drawn inside	
National Highway – 4-digit drawn inside	
National Highway – 5-digit drawn inside	
Small City or Town	
Medium City	
Large City	

TRAFFIC

Item	Symbol
Traffic	
Proximate Traffic	
Traffic Advisory, Out of Range	
Traffic Advisory	

LIGHTNING STRIKE

Item	Symbol
Lightning Strike – Age is 0-6 Seconds	
Lightning Strike – Age is 6-20 Seconds	
Lightning Strike – Age is 20-60 Seconds	
Lightning Strike – Age is 60-120 Seconds	

IMPACT POINTS (TAWS ONLY)

Item	Symbol
Potential impact point at present direction and altitude	
Imminent impact point at present direction and altitude	

MISCELLANEOUS

Item	Symbol
ARTCC Frequency or FSS Frequency	
Default Map Cursor	
Elevation Pointer Cursor	
Measuring Cursor	
Overzoom Indicator (map toolbar)	
Terrain Proximity Enabled (map toolbar)	
Traffic Enabled (map toolbar)	
User Waypoint	
Wind Vector	

LINE SYMBOLS

Item	Symbol
ICAO Control Area Class B Airspace	
Mode C Tower Area	
Warning Area Alert Area Caution Area Danger Area Prohibited Area Restricted Area Training Area Unknown Area	
Class C Terminal Radar Service Area Mode C Area	
Military Operations Area (MOA)	
State or Province Border	
International Border	
Road	
Railroad	
Lattitude/Longitude	

OBSTACLE DATABASE

Obstacle Color	Indication
RED	WARNING: Obstacle height is at or above 100 ft below the current aircraft altitude.
YELLOW	CAUTION: Obstacle height is between 100 ft and 1000 ft below the current aircraft altitude.
GRAY	SAFE: Obstacle height is lower than 1000 ft below the current aircraft altitude.

Unlighted Obstacle (Height is less than 1000 ft AGL)	Lighted Obstacle (Height is less than 1000 ft AGL)	Unlighted Obstacle (Height is greater than 1000 ft AGL)	Lighted Obstacle (Height is greater than 1000 ft AGL)
			

TERRAIN COLOR CHART

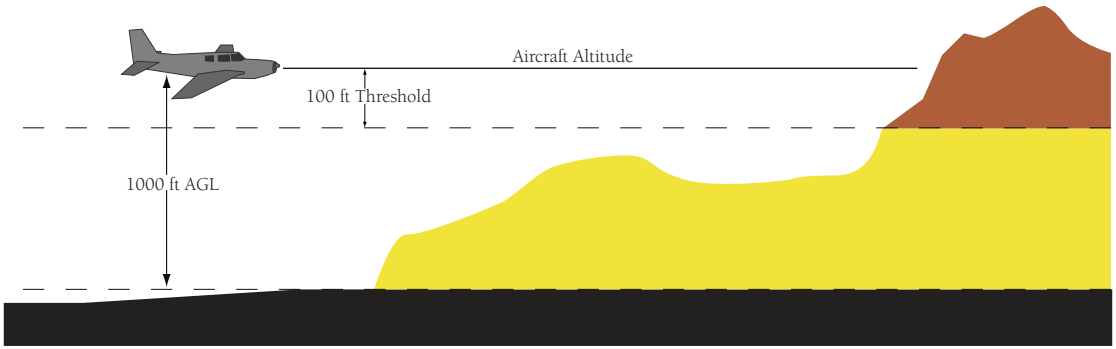

Figure F.1 Terrain Color Chart

G1000 SYSTEM SPECIFICATIONS

GDU 1040 MFD & PFD

Physical Specifications

Height:	7.70 inches (19.56 cm)
Width:	11.80 inches (29.97 cm)
Depth:	3.55 inches (9.02 cm)
Weight:	6.6 lb (2.99 kg)
Voltage Range:	9 – 33 Vdc
Display:	10.4-inch diagonal XGA 1024 x 768 pixels 262,144 colors

Environmental Specifications

Temperature Range:	-40º C to +55º C
Humidity:	95% non-condensing
Altitude Range:	-1,500 feet to 55,000 feet

GMA 1347 AUDIO PANEL

Physical Specifications

Bezel Height:	7.70 inches (19.56 cm)
Width:	1.3 inches (3.4 cm)
Depth:	7.79 inches (19.70 cm)
Weight:	1.7 lb (0.8 kg)
Voltage Range:	11 – 33 Vdc

Environmental Specifications

Temperature Range:	-20º C to +70º C
Humidity:	95% non-condensing
Altitude Range:	-1,500 feet to 55,000 feet

GIA 63 INTEGRATED AVIONICS UNITS

Physical Specifications

Height:	7.26 inches (18.44 cm)
Width:	3.83 inches (9.73 cm)
Depth:	9.73 inches (24.71 cm)
Weight:	4.9 lb (2.22 kg)
Voltage Range:	22 – 33 Vdc

Environmental Specifications

Temperature Range:	-40º C to +65º C
Altitude Range:	-1,500 feet to 55,000 feet

GPS Specifications

Receiver:	12 parallel channel PhaseTrac12™
Acquisition Time:	15 seconds (warm) 45 seconds (cold)
Update Rate:	Once per second, continuous
Accuracy:	Position – 49 feet (15 meters) Velocity – 0.1 knot RMS steady state
Dynamics:	1,000 knots maximum velocity 6g maximum acceleration

VHF COM Performance

Channels:	760 (25 kHz spacing) or 2280 (8.33 kHz spacing)
Frequency Range:	118.000 MHz to 136.975 MHz
Transmit Power:	16 watts

VHF NAV Performance

VOR Frequency Range:	108.00 MHz to 117.95 MHz
G/S Frequency Range:	329.15 MHz to 335.00 MHz
LOC Frequency Range:	108.10 MHz to 111.95 MHz

GDC 74A AIR DATA COMPUTER

Physical Specifications

Height:	3.23 inches (8.20 cm)
Width:	3.05 inches (7.75 cm)
Length:	6.45 inches (16.38 cm)
Weight:	1.69 lb (0.77 kg)
Voltage Range:	10 – 33 Vdc

Air Data Specifications

Pressure Altitude Range:	-1,400 feet to 50,000 feet
Vertical Speed Range:	-20,000 fpm to +20,000 fpm
Airspeed Range:	450 knots
Airspeed Mach Range:	<1.00 Mach
Total Air Temperature Range:	-85º C to +85º C

GTX 33 MODE S TRANSPONDER

Physical Specifications

Height:	6.30 inches (16.0 cm)
Width:	1.72 inches (4.4 cm)
Depth:	11.05 inches (28.1 cm)
Weight:	3.0 lb (1.36 kg)
Voltage Range:	11 – 33 Vdc

Environmental Specifications

Temperature Range:	-45º C to +70º C
Altitude Range:	-1,500 feet to 55,000 feet

GEA 71 ENGINE/AIRFRAME UNIT

Physical Specifications

Height:	6.30 inches (16.0 cm)
Width:	1.23 inches (3.12 cm)
Depth:	8.73 inches (22.17 cm)
Weight:	1.75 lb (0.712 kg)
Voltage Range:	9 – 33 Vdc

Environmental Specifications

Temperature Range:	-55º C to +70º C
Altitude Range:	-1,500 feet to 55,000 feet

GDL 69/69A WEATHER DATA LINK

Physical Specifications

Height:	6.15 inches (15.62 cm)
Width:	1.05 inches (2.66 cm)
Depth:	7.20 inches (18.26 cm)
Weight (GDL 69A):	1.86 lb (0.84 kg)
Voltage Range:	9 – 33 Vdc

Environmental Specifications

Temperature Range:	-20º C to +55º C
Altitude Range:	-1,500 feet to 55,000 feet

GRS 77 AHRS

Physical Specifications

Height:	3.25 inches (8.36 cm)
Width:	3.75 inches (9.53 cm)
Length:	8.5 inches (21.59 cm)
Weight:	2.40 lb (1.08 kg)
Voltage Range:	10 – 33 Vdc

Environmental Specifications

Temperature Range:	-55º C to +70º C
Altitude Range:	-1,500 feet to 55,000 feet

AHRS Performance

Bank/Pitch Error:	±1.25º within 30º roll, left or right and 15º pitch, nose up or down
Maneuvers Range:	360º pitch and roll
Rotation Rate:	±200º per second
Heading:	±2º straight and level flight

Initialization Limitations

For successful in-flight initialization of the GRS 77, the following attitude limitations must be met:

Primary AHRS operation:	±20º bank and ±5º pitch
Reversion AHRS operation:	±10º bank and ±5º pitch

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GARMIN

G1000™

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