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# G1000™

*Pilot's Guide*

*for the Diamond DA40*

| Part Number | Change Summary |
|---|---|
| 190-00592-00 (Rev. A) | Reformatted for single part number (all previous part numbers incorporated into this part number)<br>Added optional fuel pressure indicator information |

| Record of Revisions | | | |
|---|---|---|---|
| **Revision** | **Date of Revision** | **Revision Page Range** | **Description** |
| A | 11/10/05 | i  through I-6 | Initial release. |

This manual reflects the operation of System Software version 0369.09 or later for the DA40, DA40F and System Software version 0370.13 or later for the DA40D. Some differences in operation may be observed when comparing the information in this manual to earlier or later software versions.

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

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

**WARNING:** *The Garmin G1000, as installed in Diamond DA40, DA40F and DA40D 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 Aeronautical 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 and the G1000 Flight Manual Supplement. Thoroughly practice basic operation prior to actual use. During flight operations, carefully compare indications from the G1000 to all available navigation sources, including the information from other NAVAIDs, visual sightings, charts, etc. For safety purposes, always resolve any discrepancies before continuing navigation.*

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

**CAUTION:** *The GDU 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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# G1000™

*System Overview*

# 1.1 SYSTEM DESCRIPTION

This section provides an overview of the G1000 Integrated Cockpit System as installed in the Diamond DA40 aircraft.

The G1000 uses the following Line Replaceable Units (LRUs):

- GDU 1040 Primary Flight Display (PFD)
- GDU 1040 Multi Function Display (MFD)
- GIA 63 Integrated Avionics Units (IAU) - 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 Panel 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 are modular, which greatly eases troubleshooting and maintenance of the G1000 System. A top-level G1000 block diagram is given in Figure 1-1. Additional/optional equipment are shown in Figure 1-2.

> **NOTE:** Refer to the Appendices for G1000 LRU specifications.

# 1.2 LRU DESCRIPTIONS

- **GDU 1040 –** The GDU 1040s have 10.4-inch LCD displays with 1024 x 768 resolution. The left display is configured as a PFD and the right display is configured as a MFD. Both displays link and are used to show 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 with an Ethernet connection to a GIA 63 Integrated Avionics Unit.



- **GMA 1347 –** The GMA 1347 integrates NAV/COM digital audio, intercom, and marker beacon controls. The Audio Panel also provides manual control of display reversionary mode (using the red **DISPLAY BACKUP** button; see 1.7 System Operation) and is installed between the MFD and the PFD. The Audio Panel communicates with both IAUs using an RS-232 digital interface.

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

- **GRS 77 –** The GRS 77 is an Attitude and Heading Reference System (AHRS) that provides aircraft attitude, heading, and vertical acceleration information to the G1000. The unit contains advanced sensors, accelerometers, and rate sensors and also uses inputs from the Air Data Computer and Magnetometer and GPS signals from the IAUs. AHRS operation is discussed in 1.7 System Operation.

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

- **GDC 74A –** The GDC 74A Air Data Computer (ADC) processes information received from the pitot-static system and the outside air temperature (OAT) sensor. The ADC provides pressure altitude, airspeed, vertical speed, and OAT information to the G1000 System and communicates with the IAUs, displays, and AHRS through an ARINC 429 digital interface.
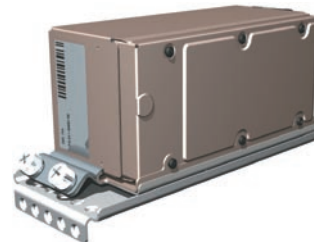
- **GEA 71 –** The GEA 71 receives and processes signals from the engine and airframe sensors. Sensor types include engine temperature and pressure sensors as well as fuel measurement and pressure sensors. The Engine/Airframe Unit communicates with both IAUs using an RS-485 digital interface.

- **GTX 33 –** The GTX 33 is a solid-state, Mode S transponder that provides Modes A, C, and S operation. The transponder is controlled through the PFD and communicates with both IAUs 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 MFD and PFD Inset Map. The Data Link also provides digital audio entertainment. The Data Link communicates with the MFD using the High-Speed Data Bus.

  A subscription to XM Satellite Radio service is required for Data Link operation.
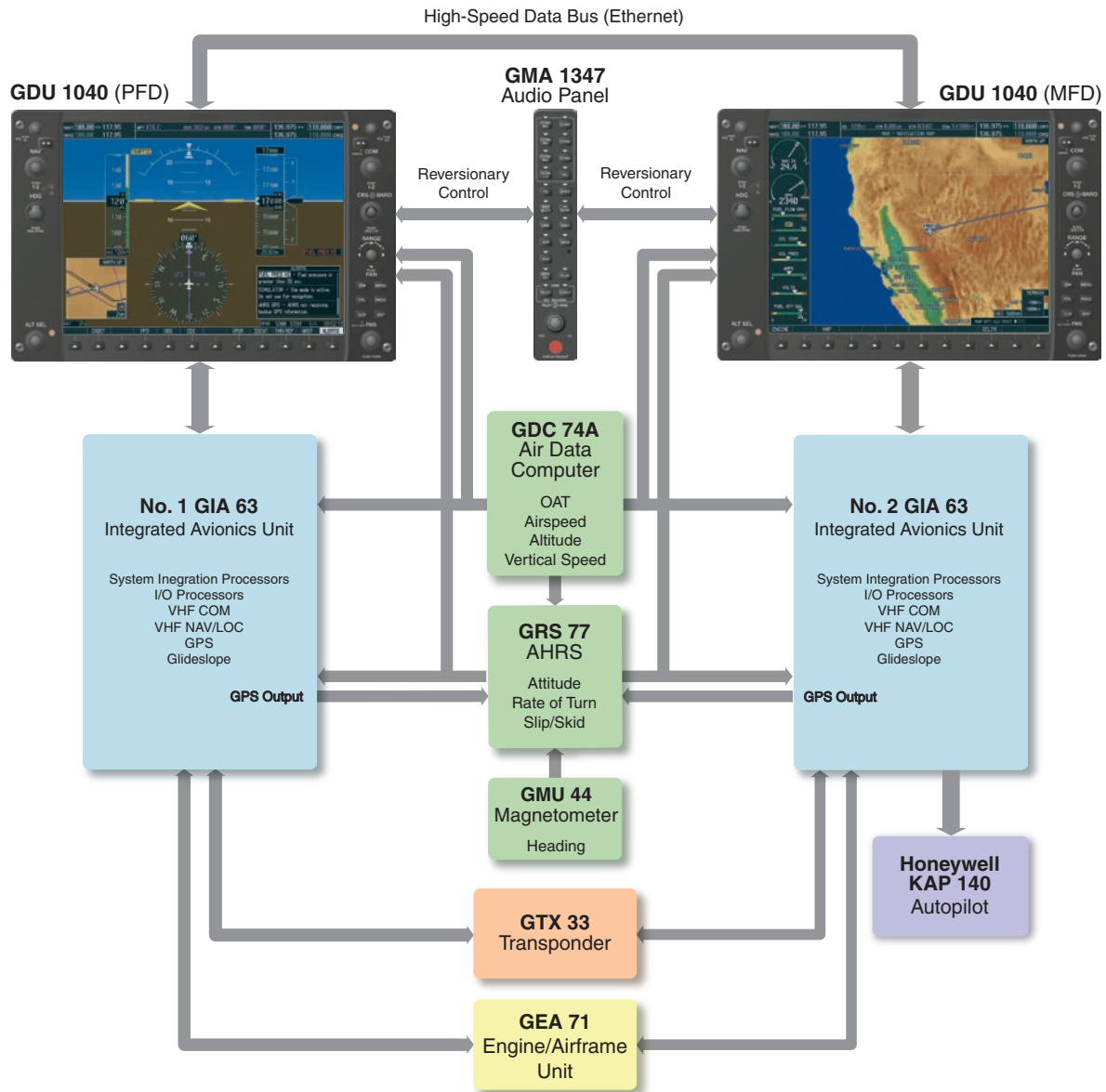
**Figure 1-1  Basic G1000 System**

High-Speed Data Bus (Ethernet)

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

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

**GDL 69/69A
Data Link**
Real-time Weather and
Digital Audio Entertainment
(subscription-based service)

**L3
Stormscope**
Lightning Strike and
Thunderstorm Detection
(optional)

**Becker
RA 3502-(1)**
ADF Receiver
(optional)

**Honeywell
KN 63**
DME
(optional)

**Figure 1-2  G1000 Optional Features**

*NOTE: For information on optional equipment shown in the above figure, consult the applicable optional interface user's guide.  This document assumes that the reader is already familiar with the operation of this additional equipment.*

# 1.3 PFD/MFD CONTROLS
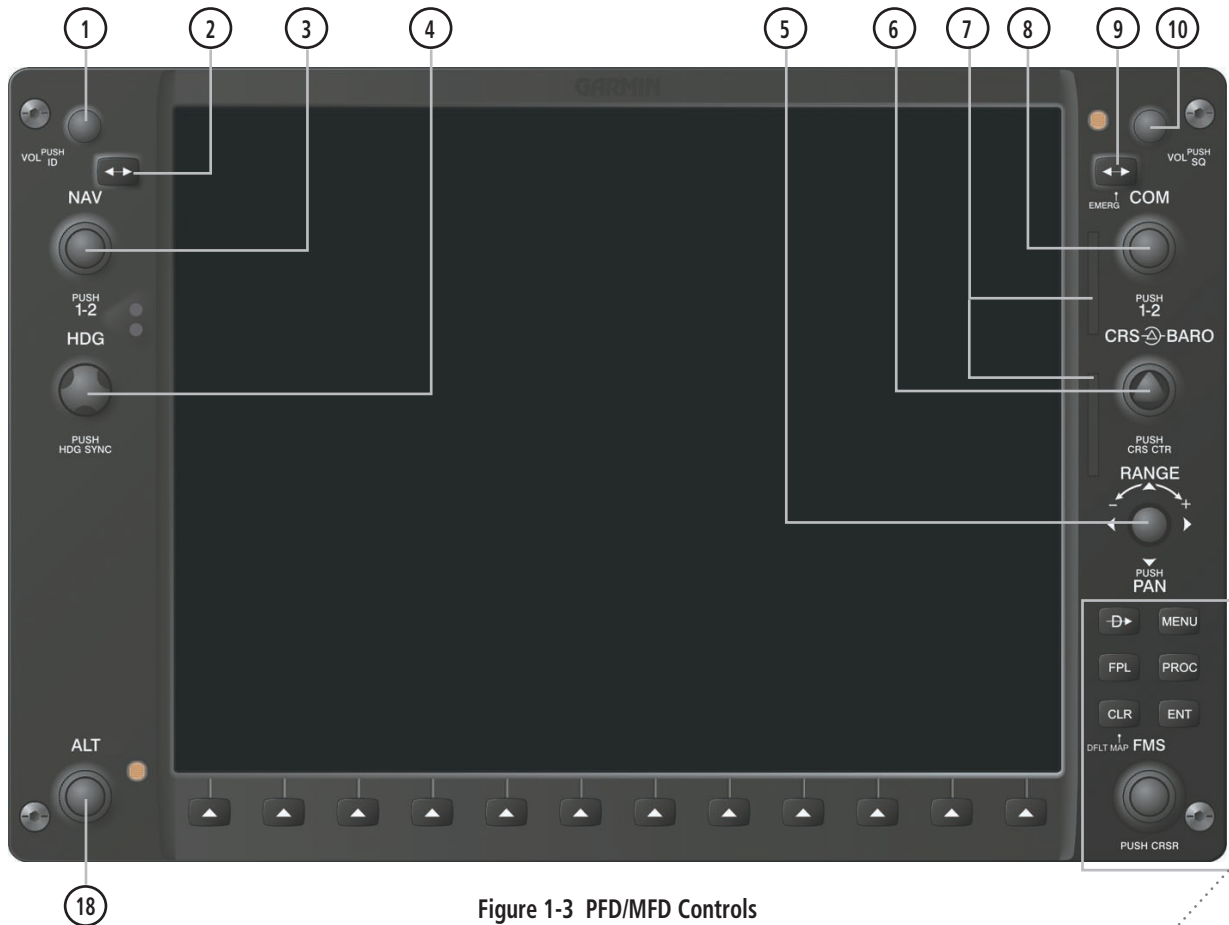


**Figure 1-3 PFD/MFD Controls**

| | |
|---|---|
| ① NAV VOL/ID Knob | ⑩ COM VOL/SQ Knob |
| ② NAV Frequency Transfer Key | ⑪ Direct-to Key |
| ③ NAV Knob | ⑫ Flight Plan Key |
| ④ Heading Knob | ⑬ Clear Key |
| ⑤ Range Joystick | ⑭ Flight Management System Knob |
| ⑥ Course/Baro Knob | ⑮ Menu Key |
| ⑦ SD Card Slots | ⑯ Procedure Key |
| ⑧ COM Knob | ⑰ Enter Key |
| ⑨ COM Frequency Transfer Key | ⑱ Altitude Knob |
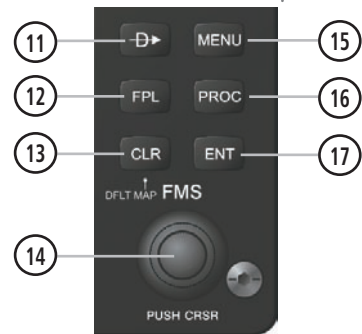
The G1000 controls and keys have been designed to simplify the operation of the system and to minimize workload as well as the time required to access sophisticated functionality. The following list provides an overview of the primary function(s) of the keys and knobs located on the display bezel.

**(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 Transfer Key –** Transfers 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.

> **NOTE:** *The selected COM (displayed in green) is controlled by the COM MIC key on the Audio Panel.*

> **NOTE:** *The Audio Panel controls are described in the CNS & Audio Panel section.*

**(4) HDG (Heading) Knob –** Use to manually select a heading

When this knob is pressed, a window displaying a digital heading momentarily appears to the left of the heading indicator and the heading bug synchronizes with the compass lubber line.

**(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.

**(8) Dual COM Knob –** Tunes the MHz (**large knob**) and kHz (**small knob**) standby frequencies for the COM transceiver

Pressing the knob toggles the tuning cursor (cyan box) between the COM1 and COM2 fields.

**(9) COM Frequency Transfer Key –** Transfers 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.

**(10) 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.

**(11) Direct-to Key ( ⊡ ) –** Allows the user to enter a destination waypoint and establish a direct course to the selected destination (specified by identifier, chosen from the active route, or taken from the map cursor position)

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

(13) **CLR Key (DFLT MAP)** – Erases information, cancels an entry, or removes page menus

To immediately display the Navigation Map Page, press and hold the **CLR** key (MFD only).

(14) **Dual FMS (Flight Management System) Knobs** – 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 a combination of 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 of information that is too long for the display screen, a scroll bar appears along the right side of the display to indicate the availability of additional items within the selected category.  Press the **FMS/PUSH CRSR knob** to activate the cursor and turn the **large** knob to scroll through the list.

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

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

(16) **PROC Key** – Selects approaches, departures and arrivals from the flight plan

When using a flight plan, 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.

(17) **ENT Key** – Accepts a menu selection or data entry

This key is used to approve an operation or to complete data entry.  It is also used to confirm selections and information entries.

(18) **Dual ALT (Altitude Select) Knob** – Sets the Selected Altitude in the box above the Altimeter

The **large** knob selects the thousands, while the **small** knob selects the hundreds.

# 1.4  SECURE DIGITAL CARDS

> *NOTE: Refer to the Appendices for instructions on updating the aviation database.*

The GDU 1040 data card slots (see (7) on Figure 1-3) use Secure Digital (SD) cards.  SD cards are used for aviation database updates and terrain database storage.

### To install an SD card:

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:

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

## 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 on the PFD at power-up.  All system annunciations should clear within the first minute of power-up.  The Audio Panel also annunciates all bezel lights briefly upon power-up.

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

> **NOTE:** Refer to the approved Airplane Flight Manual Supplement (AFMS) for specific procedures concerning avionics power application and emergency power supply operation.

> **NOTE:** Refer to the Annunciations and Alerts section for more information regarding system annunciations and alerts.

> **NOTE:** Refer to the Appendices for AHRS initialization bank angle limitations.
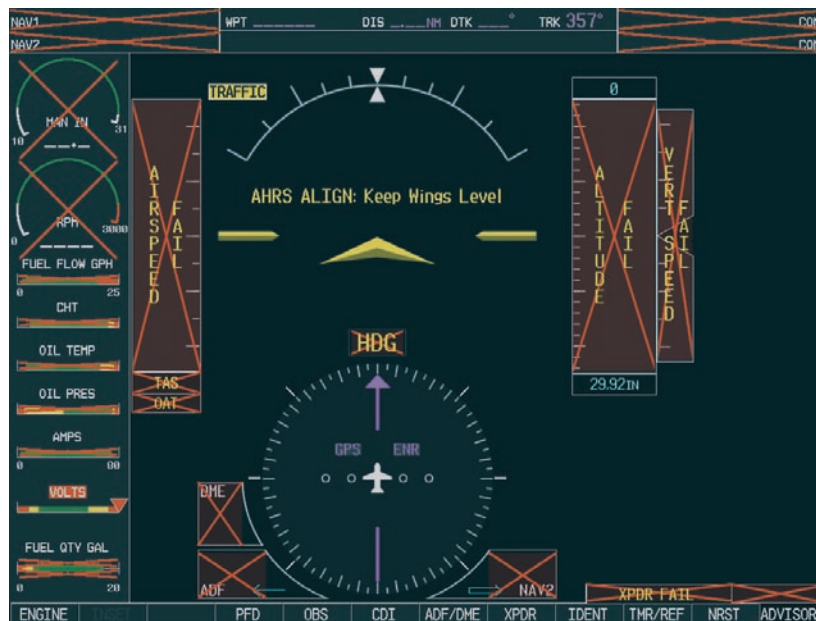


**Figure 1-4  PFD Initialization**

When the MFD powers up, the MFD Power-up page displays the following data:

- 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 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

> ✓ *NOTE: Refer to the Primary Flight Display section for instructions on manually adjusting the 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.  PFD, MFD, and Audio Panel bezel/key lighting are normally controlled directly by the existing instrument panel dimmer bus.

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

# 1.7  SYSTEM OPERATION

## NORMAL OPERATION

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

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



**Figure 1-6  G1000 Normal Operation**

## 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.  Figure 1-7 shows an example of G1000 reversionary mode where the PFD has failed.

If a display fails, the appropriate GIA 63-GDU 1040 Ethernet interface is cut off.  Thus, the IAU 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 IAU are flagged as invalid on the remaining display.  The system reverts to backup paths for the AHRS, ADC, Engine/Airframe Unit, and transponder, 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 section for further information regarding these and other system alerts.*

If the system fails to detect a display problem, reversionary mode may be manually activated by pressing the Audio Panel's red **DISPLAY BACKUP** button.  Pressing this button again deactivates reversionary mode.



**Figure 1-7  G1000 Reversionary Mode (Failed PFD)**

## AHRS MODES OF OPERATION

The GRS 77 Attitude and Heading Reference System (AHRS) performs attitude, heading, and vertical acceleration calculations for the G1000 System utilizing GPS, Magnetometer, and air data in addition to information from its internal sensors.  Attitude and heading information are updated on the PFD while the AHRS receives appropriate combinations of information from the external sensor inputs (see Figure 1-8).

Loss of GPS, Magnetometer, or air data inputs is communicated to the pilot by message advisory alerts. Any failure of the internal AHRS inertial sensors results in loss of attitude and heading information (as indicated by red 'X" flags over the corresponding flight instruments on the PFD).

> ✓ *NOTE: Refer to the Annunciations and Alerts section for specific AHRS alert information.*

### GPS Input Failure

Two GPS inputs are provided to the AHRS.  If GPS information from one of the inputs fails, the AHRS uses the remaining GPS input and an alert message is issued to inform the pilot.  If both GPS inputs fail, the AHRS can continue to provide attitude and heading information to the PFD as long as Magnetometer and airspeed data are available and valid.

### Magnetometer Failure

If the Magnetometer input fails, the AHRS continues to output valid attitude information; however, the heading output on the PFD is flagged as invalid with a red 'X'.

### Air Data Input Failure

Failure of the air data input has no effect on the AHRS output while AHRS is receiving valid GPS information. Invalid/unavailable airspeed data in addition to GPS failure results in loss of all attitude and heading information.



**Figure 1-8  AHRS Operation**
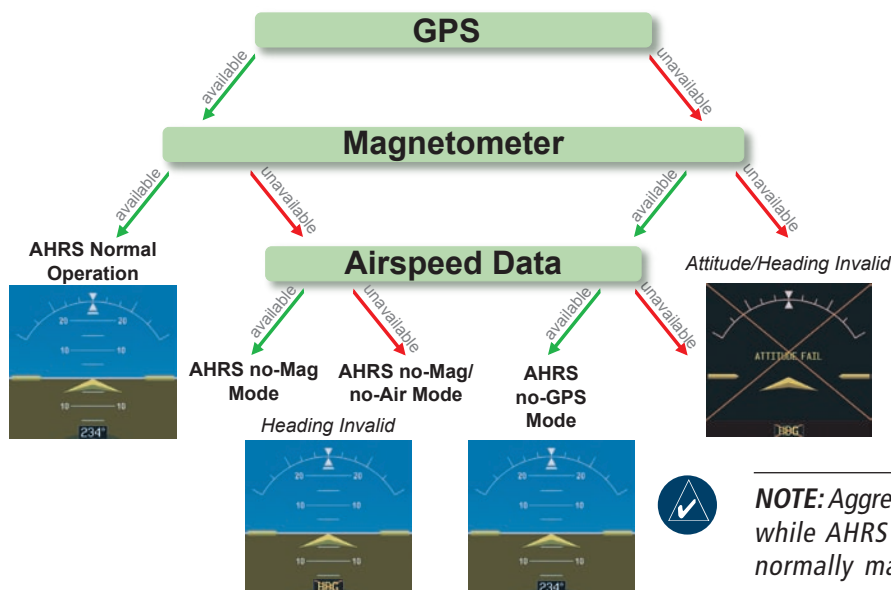
> ✓ *NOTE: Aggressive maneuvering while AHRS is not operating normally may degrade AHRS accuracy.*

# 1.8  CHECKLISTS (OPTIONAL)

The G1000 MFD is able to display electronic checklists customized for the Diamond DA40.  The G1000 accesses the checklists from an SD card inserted into the bezel slot (see Figure 1-3).  Pressing the **CHKLIST** softkey allows access to all checklists.   Pressing the **EXIT** softkey exits the Checklist pages and displays the page last viewed.

If the SD card contains a valid checklist file, the Power-up Page displays both the aircraft make and model to which the checklist applies (DA40, DIAMOND AIRCRAFT INDUSTRIES) and copyright information.

If the SD card contains an invalid checklist file or no checklist, the Checklist Page displays 'INVALID CHECKLIST' or 'CHECKLIST NOT PRESENT'.

> **NOTE:** Checklists cannot be edited from within the system.  Refer to the Garmin Aviation Checklist Editor (ACE) User's Guide for information on creating and editing checklists.

The Checklist Page displays the following data:

- Selected checklist group
- Selected checklist title
- Selected checklist text, including:
    - Plain text
    - Notes
    - Cautions
    - Warnings
    - Challenge/Response pairs
    - Challenges with no responses
    - Check state of each checkable item
    - Checklist complete indicator



GROUP NORMAL OPERATING PROCEDURES
CHECKLIST 2. BEFORE ENGINE START
☐ Pre-flight inspection. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .complete
☐ Rudder pedals. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . adjusted and locked
☐ Passengers. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . instructed
☐ Safety harnesses. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . all on and fastened
☐ Doors. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . closed and locked
☐ Parking brake. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .set
☐ Flight controls. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . free movement
☐ Trim wheel. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . T/O
☐ Throttle. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .IDLE
☐ Mixture. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . LEAN
☐ RPM lever. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .HIGH RPM
☐ Friction throttle quadrant. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . adjusted
☐ Alternate air. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . CLOSED
☐ Alternate Static Valve (if installed). . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . CLOSED
☐ Avionics master switch. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .OFF
☐ Essential Bus switch (if installed). . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . OFF

GO TO NEXT CHECKLIST?

**Figure 1-9  Sample Checklist**

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# G1000™

*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 Diamond DA40, DA40F, and DA40D 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 "six-pack" of instruments 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:

- Flight Instruments (2.4)
  – Airspeed Indicator with True Airspeed Box
  – Attitude and Slip/Skid Indicators
  – Altimeter with Selected Altitude and Barometric Setting Boxes
  – Vertical Deviation/Glideslope Indicator
  – Marker Beacon Annunciations
  – Vertical Speed Indicator
  – Horizontal Situation Indicator
    - Turn Rate Indicator
    - Bearing Pointers and Information Windows
    - DME Information Window
    - Radio Tuning Window (ADF/DME)
    - Navigation Source
- Communication, Navigation, and Surveillance (CNS) Information (2.5)
  – Communication (COM) Frequency Window
  – Navigation (NAV) Frequency Window
  – Navigation Status Bar
  – Transponder Status Bar
- Supplemental Flight Data (2.6)
  – Outside Air Temperature Box
  – System Time Box
  – Inset Map
  – Auxiliary Windows
    - Timer/References Window
    - Nearest Airports Window
    - Direct-to Window
    - Flight Plan Window
    - Procedures Window
- Alerts and Annunciations (2.8)
  – Alerts Window
  – Annunciation Window
  – Terrain Awareness and Warning System (TAWS) Alert Annunciations
  – Traffic Annunciation

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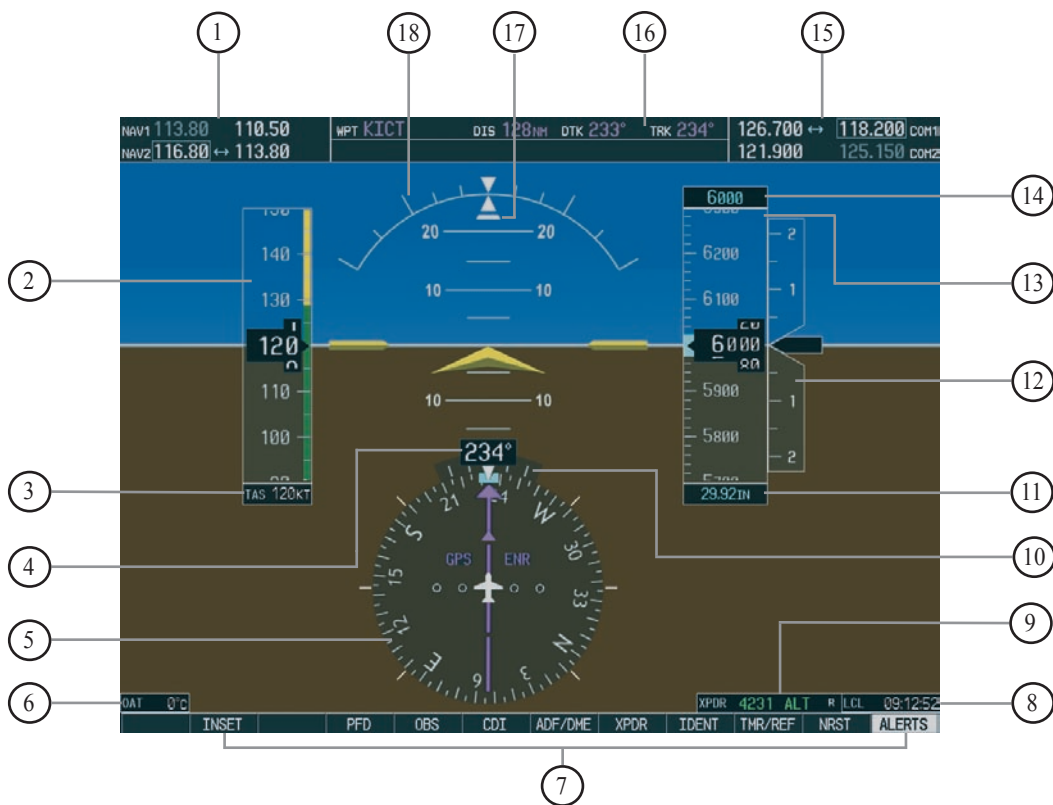
| | | | |
|---|---|---|---|
| 1 | NAV Frequency Window | 10 | Turn Rate Indicator |
| 2 | Airspeed Indicator | 11 | Barometric Setting Box |
| 3 | True Airspeed Box | 12 | Vertical Speed Indicator |
| 4 | Heading Box | 13 | Altimeter |
| 5 | Horizontal Situation Indicator | 14 | Altitude Reference Box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

**Figure 2-2  Additional PFD Information**

| | | | |
|---|---|---|---|
| ① | Traffic Annunciation | ⑦ | Auxiliary Window (Radio Tuning Window) |
| ② | Selected Heading Box | ⑧ | Selected Course Box |
| ③ | Inset Map | ⑨ | Annunciation Window |
| ④ | BRG1 Information Window | ⑩ | Vertical Speed Pointer |
| ⑤ | DME Information Window | ⑪ | Vertical Deviation/Glideslope Indicator |
| ⑥ | BRG2 Information Window | ⑫ | Marker Beacon Annunciation |

# 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 the 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 the backlighting automatically with reference to the amount of light in the cockpit
- **Manual** – Allows the pilot to manually adjust the backlighting

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

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:

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.

<div align="center">

*On*             *Off*

360 HSI     ARC HSI

</div>

**Figure 2-4  Softkey Operation**

The PFD softkeys listed provide control over flight management functions, including GPS, NAV, terrain, traffic, and weather (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 in 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 (e.g., coastlines, terrain, rivers, lakes) 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 waypoint frequency

    *OFF* – Removes BRG1 Information Window

    **360 HSI** – Displays 360° compass rose HSI

    **ARC HSI** – Displays 140° viewable arc HSI

    **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 waypoint frequency

    *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

- **ADF/DME** (optional; may appear as **ADF**, **DME**, or **ADF/DME** depending on the installation) **–** Displays ADF/DME Radio 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 (transponder does not reply to any interrogations
  - *ON –* Selects Mode A (transponder replies to interrogations)
  - *ALT –* Selects Mode C - altitude reporting mode (transponder replies to identification and altitude interrogations)
  - *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
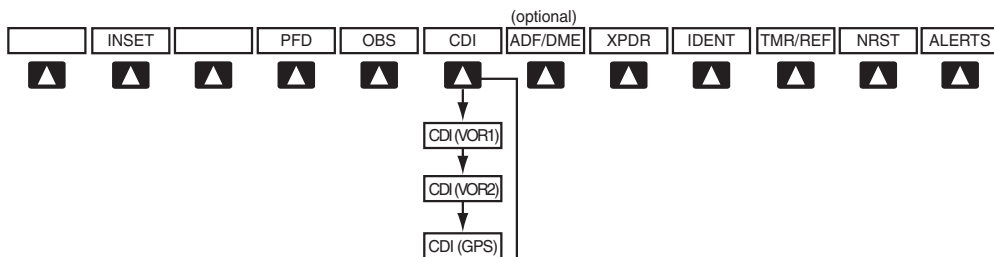
**Figure 2-5  Top-Level PFD Softkeys**
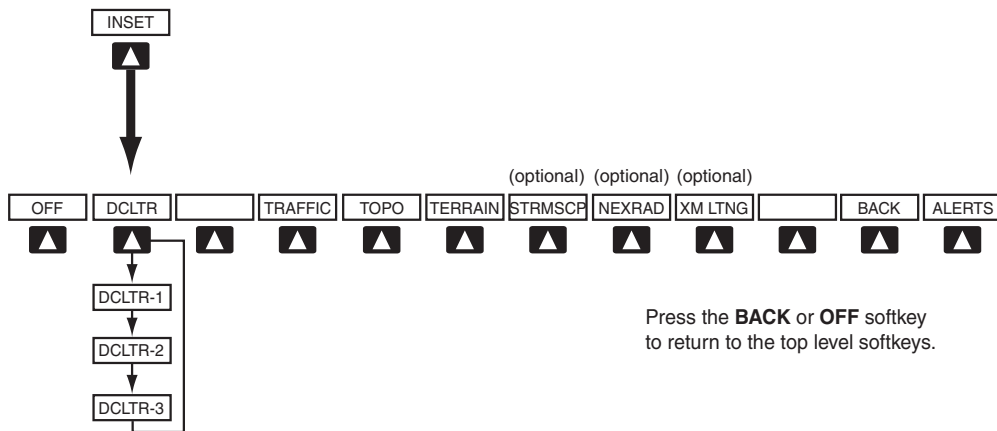


**Figure 2-6  INSET Softkeys**
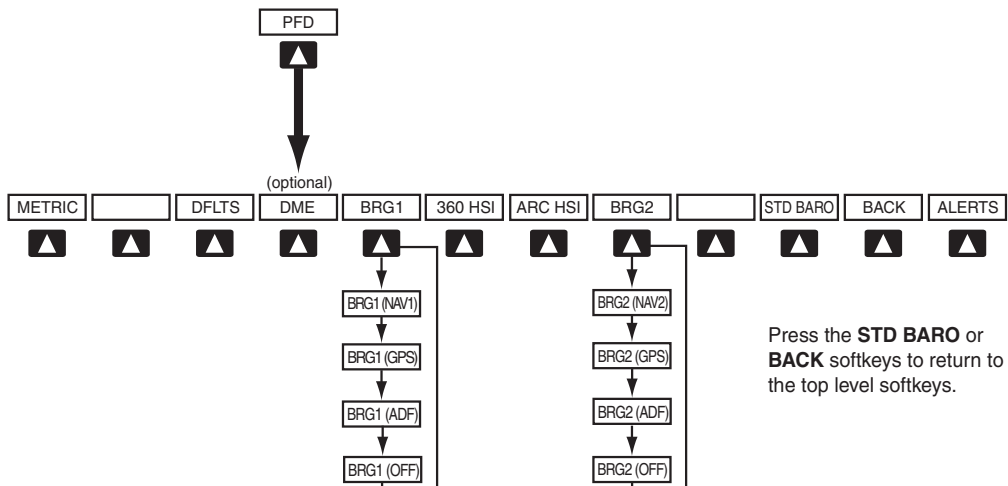
**Figure 2-7  PFD Configuration Softkeys**
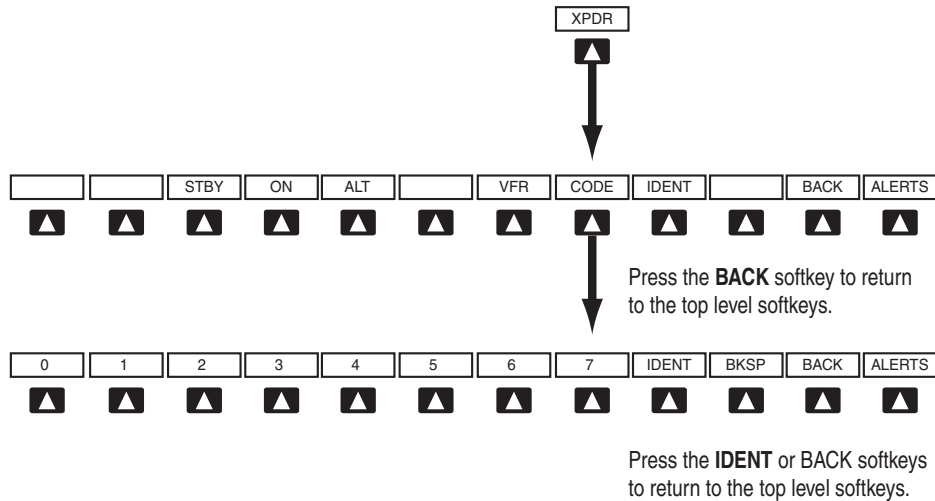


**Figure 2-8  XPDR Softkeys**

# 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 any 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 Supplement (AFMS) for speed criteria.

### Airspeed Trend Vector

The Airspeed Trend Vector is a vertical, magenta line extending up or down on the airspeed scale, located right of the color-coded speed range strip. The end of the trend vector displays approximately what airspeed will be reached in six seconds if the current rate of acceleration or deceleration 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 on the References window. When active (ON), the Vspeeds are displayed at their respective locations to the right of the airspeed scale (refer to the Auxiliary Windows portion of this Flight Instruments section to set and display Vspeeds).

### True Airspeed Box

The True Airspeed box is located below the Airspeed indicator and displays the true airspeed in knots.
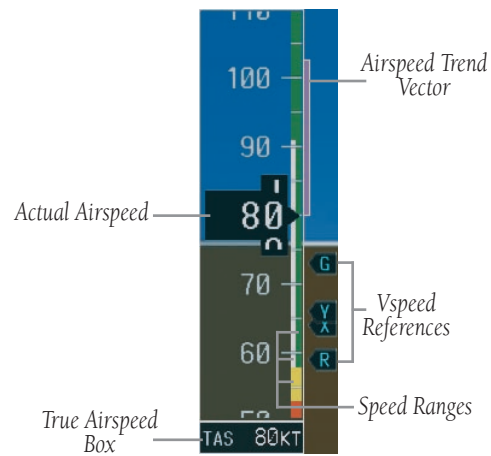


**Figure 2-9  Airspeed Indicator**
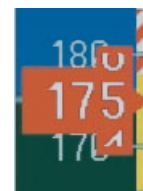


**Figure 2-10  Red Pointer at $V_{NE}$**

**Garmin G1000 Pilot's Guide for the Diamond DA40**

## ATTITUDE INDICATOR

The attitude information is displayed over a virtual blue sky and a 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.
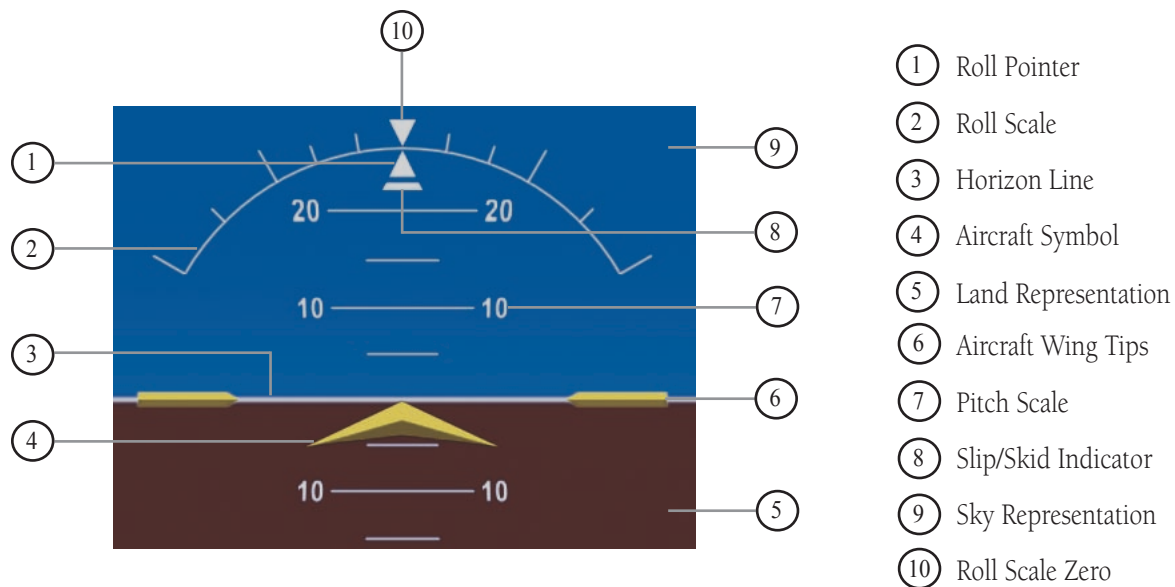


**Figure 2-11  Attitude Indicator**

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

## Pitch Indication

Major pitch marks and numeric labels at 10, 20, 30, 40, 50, 60, 70 and 80 degrees are shown above and below the horizon line. Minor pitch marks at 5, 15 and 25 degrees above the horizon line and 5, 15, 25, 35 and 45 degrees below the horizon line are shown. The horizon line is part of the pitch scale. Red extreme pitch warning chevrons pointing toward the horizon are displayed starting at 50 degrees above and 30 degrees below the horizon line (refer to the figures on the next page).



*Nose High*            *Nose Low*
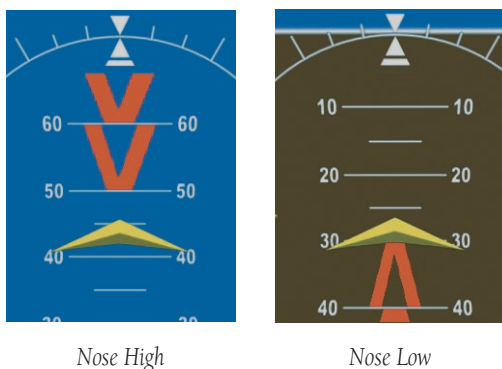
**Figure 2-12  Pitch Attitude Warnings**

## Roll Indication

Major tick marks at 30 and 60 degrees and minor tick marks at 10, 20 and 45 degrees are shown to the left and right on the roll scale. The inverted white triangle indicates 0 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 resides 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 when compared to a traditional Slip/Skid indicator.
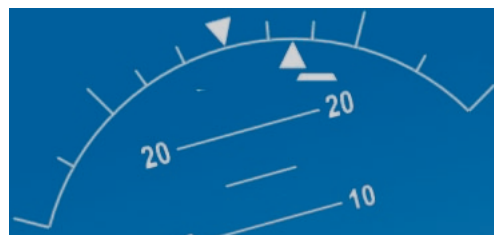


**Figure 2-13  Roll and Slip/Skid Indication**

## 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 Select Bug
- Altitude Trend Vector
- Selected Altitude box
- Barometric Setting Box
- Altitude Alerting function
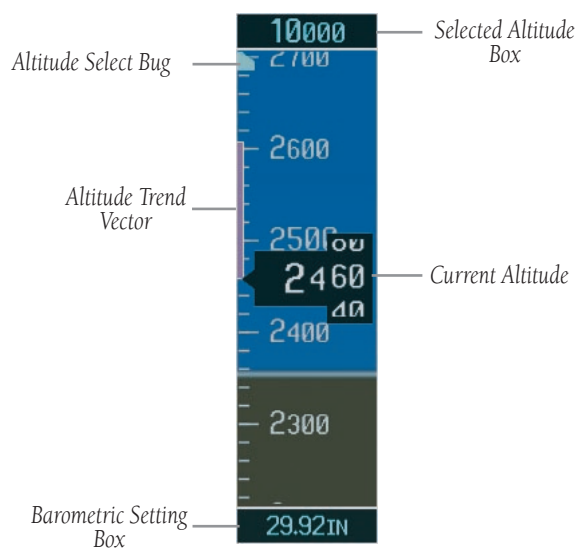


**Figure 2-14  Altimeter**

### 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 Select Bug

The Altitude Select Bug is displayed at the Selected Altitude or the edge of the tape (whichever is closer to the current altitude) to provide increased altitude awareness. This altitude also appears in the Selected Altitude Box above the Altimeter.

#### To set the Selected Altitude bug:

Turn the **ALT** knobs to set the Selected Altitude bug. The **small ALT** knob sets the hundreds and the **large ALT** knob sets the thousands.

### Altitude Trend Vector

The 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.

### Selected Altitude Box

The Selected Altitude box is located above the Altimeter and displays, in feet, the altitude selected by turning the **ALT** knobs. The metric value, when selected, is displayed on top of the Selected Altitude box.

### 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.

## Altitude Alerting

The altitude Alerting function provides the pilot with a visual alert when approaching the Selected Altitude. This function is independent of the flight control system. Visual annunciations appear in the Selected Altitude box. The Altitude Alerting function is reset whenever the Selected Altitude is adjusted.

The Selected Altitude Box flashes for five seconds, reversing color to black text on a cyan background when the aircraft reaches 1000 feet from the Selected Altitude. At 200 feet from the Selected Altitude, color reversal to normal occurs along with an aural tone.

After capturing the Selected Altitude, the Altitude Alerting feature alerts the pilot whenever deviations of ±200 ft from the Selected Altitude occur. The Selected Altitude Box flashes yellow text on a black background for five seconds to indicate the deviation.



*Within 1000 ft*

*Within 200 ft*

*Deviation of ±200 ft*
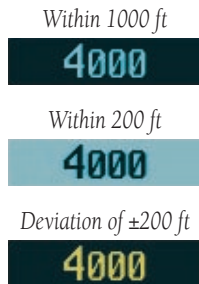
**Figure 2-15  Altitude Alerting Visual Annunciations**

## Metric Display

Selected and current altitude can be displayed in meters in addition to English units. 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 2-16  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 Selected Altitude 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).
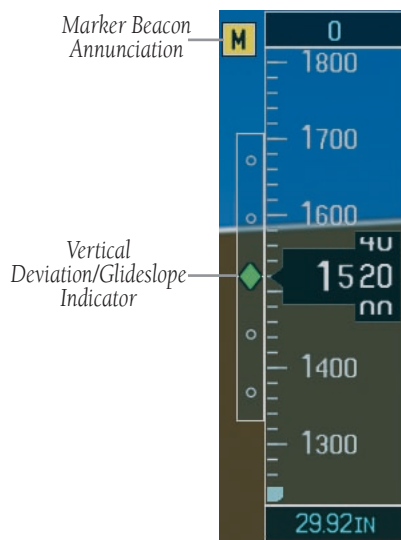


**Figure 2-17  Marker Beacon and Vertical Deviation**

## VERTICAL SPEED INDICATOR

The Vertical Speed Indicator displays the aircraft vertical speed with numeric labels and tick marks at 1,000 ft and 2,000 ft 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 is greater than 2,000 feet per minute, the pointer appears at the top edge of the non-moving tape and the number of feet per minute appears inside the pointer. If the rate of descent is greater than 2,000 feet per minute, 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 is greater than 100 fpm.*
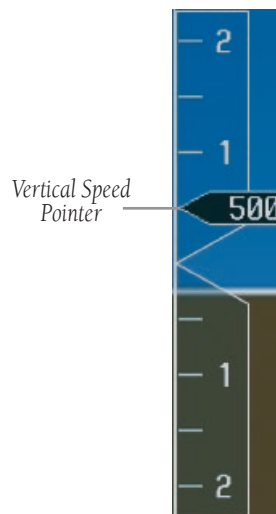


**Figure 2-18  Vertical Speed Indicator**

# 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 at 5 degree intervals. The HSI is displayed in a heading-up orientation. The HSI is available in two formats (360° compass rose and 140° arc). The HSI displays the following information:

- Heading indication
- Turn Rate Indicator
- Course Deviation Indicator
- Bearing pointers and information windows (360° HSI only)
- DME Information Window
- Navigation source

## HSI Display Format

The HSI compass can be displayed as a 360° rose or a 140° arc by pressing the **PFD** softkey, followed by the **360 HSI**, or the **ARC HSI** softkey.

### 360° HSI

The 360° HSI contains a course deviation indicator (CDI), with a course pointer arrow, the TO/FROM arrow, a sliding deviation bar and scale. The course pointer is a single line arrow (GPS, VOR1 and LOC1) or a 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.
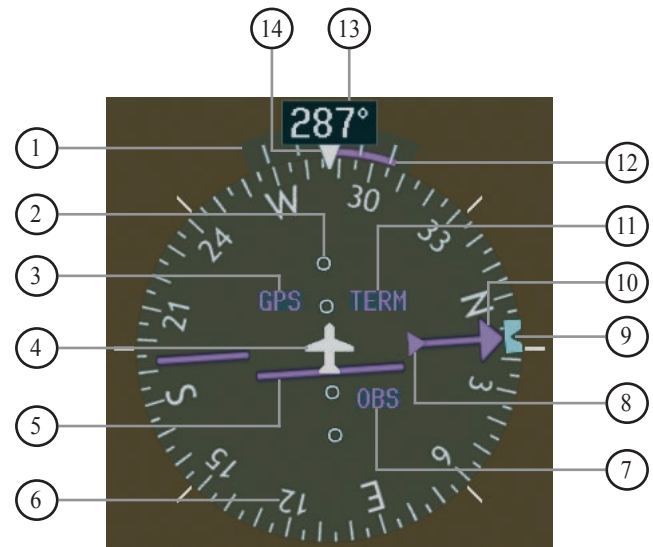


1   Turn Rate Indicator
2   Lateral Deviation Scale
3   Navigation Source
4   Aircraft Symbol
5   Course Deviation Indicator
6   Rotating Compass Rose
7   OBS Mode
8   TO/FROM Indicator
9   Heading Bug
10   Course Pointer
11   Flight Phase
12   Turn Rate and Heading Trend Vector
13   Heading
14   Lubber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

**Figure 2-19   360° Horizontal Situation Indicator**

### Arc HSI

> ✓ **NOTE:** *When the Arc HSI is displayed the BRG1 and BRG2 Information Windows and pointers are disabled.*

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

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

- GPS, OBS, VOR – Arrowhead
- Localizer – Diamond

*Lateral Deviation Scale*　　*Course Deviation and TO/FROM Indicator*
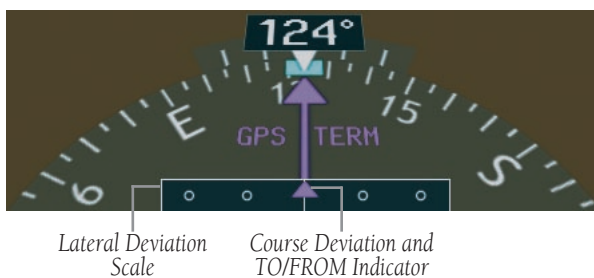
**Figure 2-20  Arc HSI**

### Heading Indication

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

**Figure 2-21  Current Heading**

When the pilot selects a heading by rotating the **HDG** knob, a digital reading appears for three (3) seconds in a box to the left of the lubber line, next to the HSI.
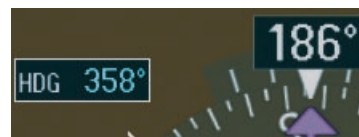
**Figure 2-22  Selected Heading Box**

When the pilot selects a course by rotating the **CRS** knob, a digital reading appears for three (3) seconds in a box to the right of the lubber line, next to the HSI.
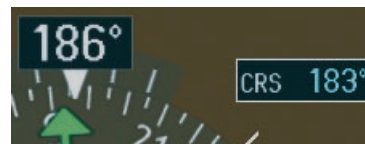
**Figure 2-23  Selected Course Box**

> ✓ **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.



*Half-Standard Turn Rate Tick Mark*
*Standard Turn Rate Tick Mark*
*Turn Rate Trend Vector (rate > 4 deg/sec)*
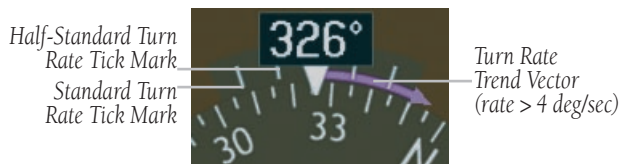
**Figure 2-24  Turn Rate Indicator and Trend Vector**

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.



*Turn Rate Trend Vector (standard rate)*
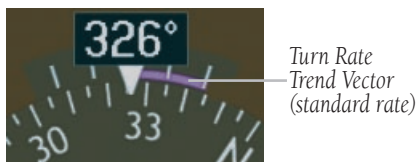
**Figure 2-25  Standard-Rate Turn Indication**

## Course Deviation Indicator

The Course Deviation Indicator (CDI) moves left or right from 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 upon 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 from the MFD (refer to the Multi Function Display section).



**Figure 2-26  Arc CDI and Compass Rose 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. The Bearing 1 (BRG1) Information Window is displayed to the lower left of the HSI and includes the bearing source (NAV1 or GPS), a pointer icon, frequency (NAV1), and distance to the bearing source. The Bearing 2 (BRG2) Information Window is displayed to the lower right of the HSI and includes the bearing source (NAV2 or GPS), a pointer icon, frequency (NAV2), and distance to the bearing source.

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

If the NAV radio is the bearing source and is tuned to an ILS frequency, the bearing pointer is removed from the HSI and the frequency is replaced with "ILS". If the NAV radio is not receiving the tuned VOR station, the bearing pointer is removed from the HSI and the frequency 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.
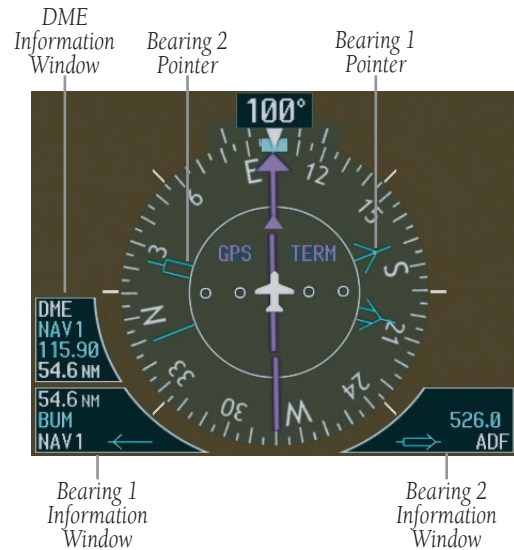


**Figure 2-27  HSI with Bearing Information**
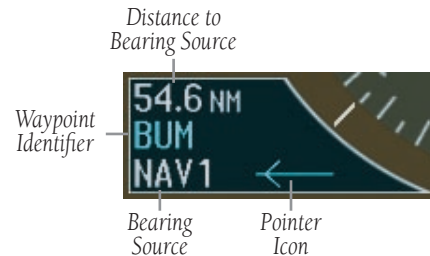


**Figure 2-28 BRG1 Information Window**
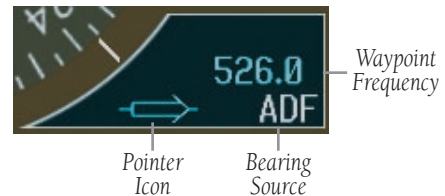


**Figure 2-29  BRG2 Information Window**

## DME Radio (optional)

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

The pilot may select from three DME tuning modes:

- **NAV1** – 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 2-30  DME Information Window**

## ADF Radio (optional)

The ADF radio is a Becker RA3502 (1) remote mounted ADF radio receiver that operates in the frequency range 190.0 to 1799.5 kHz in 0.5 kHz increments.

The ADF bearing source is selected by pressing the **PFD** softkey, then by pressing the **BRG1** or **BRG2** softkey (as desired) until ADF is displayed.

The audio volume for the ADF is displayed and adjusted from the Radio Tuning window. The ADF radio has three tuning modes as described below:

- **ANT** (antenna) mode – Parks the ADF pointer at the three-o'clock position on the HSI
  The Morse code can also be identified.

- **BFO** (beat frequency oscillator) mode – Provides an audible tone detected through the receiver when a frequency is tuned in
  No Morse code is heard.

- **ADF** mode – The ADF bearing pointer should point to the station
  The Morse code can also be identified.



**Figure 2-31  ADF Selected in BRG2 Information Window**

## Radio Tuning Window (optional)

> **NOTE:** The Radio Tuning window is only available if the DME and/or ADF radios are installed.

The Radio Tuning window is displayed by pressing the **ADF/DME** (**ADF**, **DME**, or **ADF/DME** depending on the installation) softkey. This window provides display and control of single or dual ADF and DME radio(s). Depending on the installation, the Radio Tuning window may be titled ADF Tuning, DME Tuning, or ADF/DME Tuning.

There are two ADF frequency fields, active (green) and standby (white).
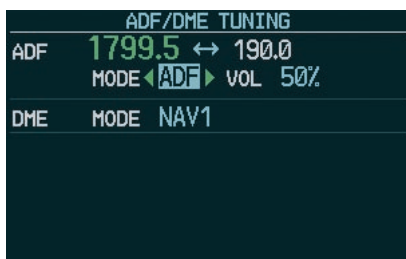


**Figure 2-32  Radio Tuning Window**

### To edit the standby ADF frequency:

1.  From the Radio Tuning window with the standby ADF frequency highlighted, turn the **small FMS** knob to place the cursor on the first digit.

2.  Turn the **FMS** knobs to enter the desired frequency and press the **ENT** key. The standby frequency is now highlighted.

3.  Press the **ENT** key again to transfer the standby frequency to the active frequency field.

The **ENT** key is used to transfer the ADF standby and active frequency whenever the cursor is highlighting a standby frequency.

Any time the cursor is on the ADF standby frequency, and the standby frequency is not in "edit" mode, the "ENT TO TRANSFER" message is displayed at the bottom of the Radio Tuning window to assist the pilot in performing the transfer.

### To change the ADF mode:

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

2.  Turn the **small FMS** knob in the direction of the green arrow(s) to select the desired mode of operation.

### To change the ADF volume:

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

2.  Turn the **small FMS** knob to the left to decrease the volume. Turn the **small FMS** knob to the right to increase the volume.

### 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 2-33  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 passing the waypoint.  When OBS is disabled, the GPS returns to normal operation, with automatic sequencing of waypoints.  OBS mode also allows the pilot to set the desired course TO/FROM a waypoint.

Color indicates the current navigation source: magenta (for GPS) or green (for VOR and LOC).  As the pilot 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.
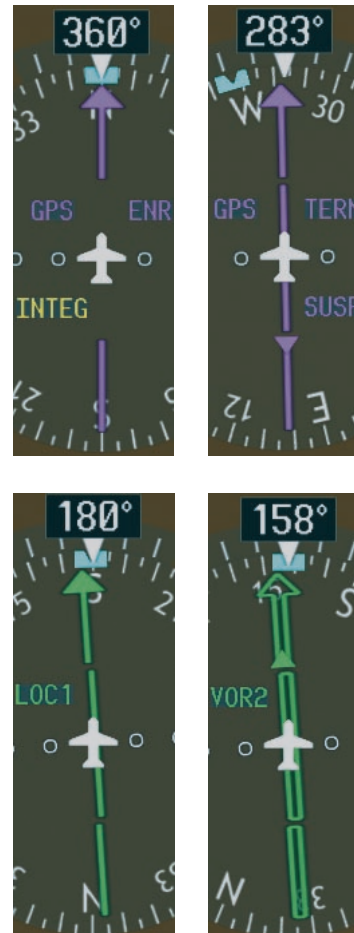


**Figure 2-34  GPS INTEG, GPS SUSP, LOC1 and VOR2**

## 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 NAV/COM section.*

### 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 NAV/COM section.*



**Figure 2-35  Communication Frequency Window**
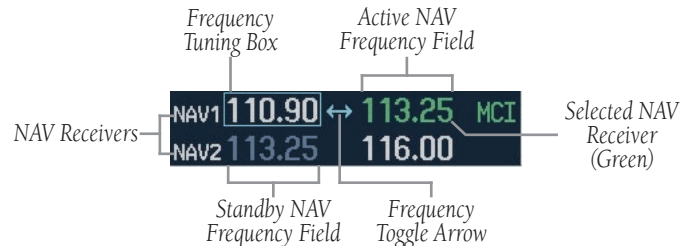


**Figure 2-36  Navigation Frequency Window**

## 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.*

*Next Waypoint*  *Distance to Next Waypoint*  *Desired Track To Next Waypoint*  *Current Track*

WPT KTUS            DIS 93.9NM  DTK 134°     TRK 134°

WPT RW27 map        DIS 0.07NM  DTK 271°     TRK 271°
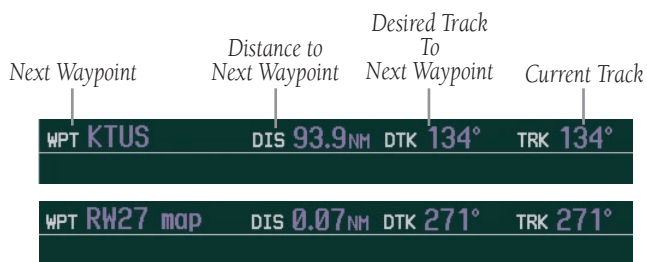
**Figure 2-37  Navigation Status Bar Information Examples**

NEXT DTK 356°

HOLD DIRECT

ARRIVING AT WAYPOINT
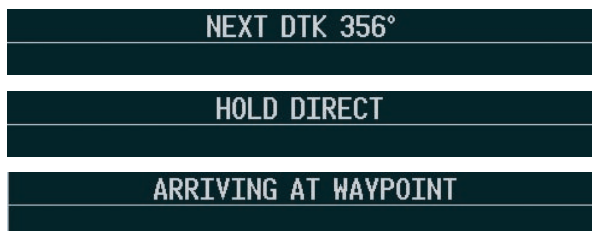
**Figure 2-38  Navigation Status Bar Messages**

## TRANSPONDER (XPDR) STATUS BAR

✓ *NOTE: Refer to the Transponder section for information regarding transponder operation.*

The Transponder (XPDR) Status Bar is located in the lower right corner and displays the transponder code, reply symbol, and mode of operation.

XPDR  1200  ALT        R

**Figure 2-39  Transponder Status Bar**

Transponder code selection is performed with eight softkeys (**0**-**7**) providing 4,096 active identification codes. Pressing one of these softkeys begins the code selection sequence. The new code is activated five seconds after the fourth digit is entered. The **BKSP** softkey removes one digit at a time until the status bar is empty. The VFR softkey can be used to enter the pre-programmed VFR code (1200 in the USA only) selected in G1000 configuration mode.

✓ *NOTE: Refer to ICAO standards for VFR codes in other countries.*

Pressing the **IDENT** softkey activates the Special Position Identification (SPI) pulse for 18 seconds, identifying the transponder return on the ATC screen.

## 2.6  SUPPLEMENTAL FLIGHT DATA

### OUTSIDE AIR TEMPERATURE BOX

The outside air temperature (OAT) is displayed in °C with the "OAT" label.  °F can be displayed using the AUX System Setup Page on the MFD (refer to the Multi Function Display section).



**Figure 2-40  Outside Air Temperature Box**

### SYSTEM TIME BOX

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



**Figure 2-41  System Time Box**

### 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 NAV Compass

④ Traffic Icon and Scale

⑤ Map Range

⑥ Terrain Icon

⑦ Active Navigation Route

⑧ Track Vector

⑨ Map Orientation

**Figure 2-42  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 Pilot's Guide for more detail.

**To enable/disable traffic data:**

1.  Press the **INSET** softkey.

2.  Press the **TRAFFIC** softkey to display Traffic Information Service (TIS) traffic.  Traffic symbology appears next to the aircraft icon and at the bottom right corner of the map.

3.  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:** *If a second TA appears or if the number of TAs displayed decreases then increases, new audio and visual alerts are generated.*

> **NOTE:** *Refer to the Appendix for more details about Traffic Information Service (TIS).*

### To enable/disable topo data:

1.   Press the **INSET** softkey.
2.   Press the **TOPO** softkey to display topographic land colors, which represent the rise and fall of land elevation.
3.   Press the **TOPO** softkey again to remove topo 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 at the lower right corner of the map, showing that terrain is selected.

   **Red** (warning) – Land elevation is within 100 ft of the aircraft current altitude or above.

   **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 Optional Equipment section for more details about weather options.*

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

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

## 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.
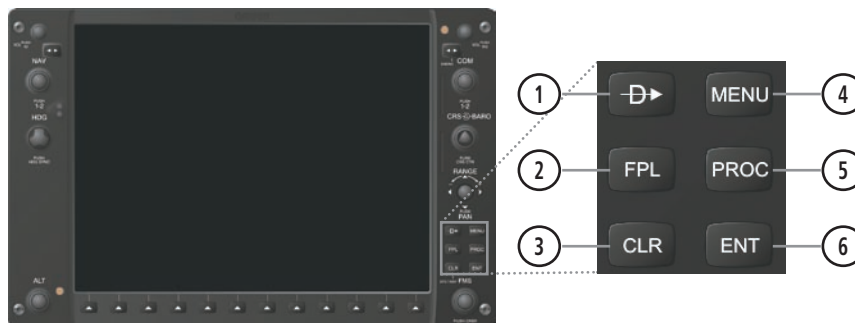


**Figure 2-43  PFD Auxiliary Window Keys**

## 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.



*No Options with NRST Window Displayed*

*Options with FPL Window Displayed*
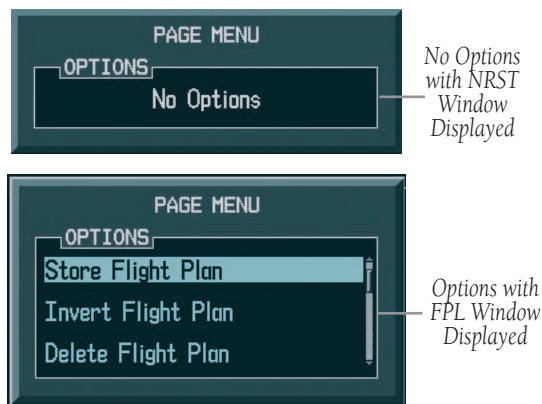
**Figure 2-44  Page Menu Examples**

### 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 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. The Generic Timer and Vspeed references are set using this window.



**Figure 2-45  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 (hh/mm/ss).

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.
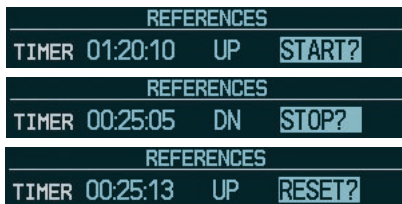
**Figure 2-46  Timer Status Prompts**

### Flight ID

Flight status automatic reporting of aircraft identification (ID) is transmitted by the 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 in the Timer/References Window each time the G1000 is powered on.

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

### To enter or change the Flight ID:

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

2.  Turn the **FMS** knobs to enter the desired flight ID. Press the **ENT** key to update the flight ID.
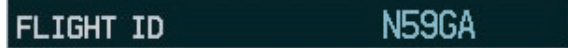
**Figure 2-47  Flight ID Field**

### 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 bugs 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 select 'All References ON' or 'All References OFF', then press 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 communication frequency
- Length of longest hard surface runway (or soft surface, if no hard surface runway exists)
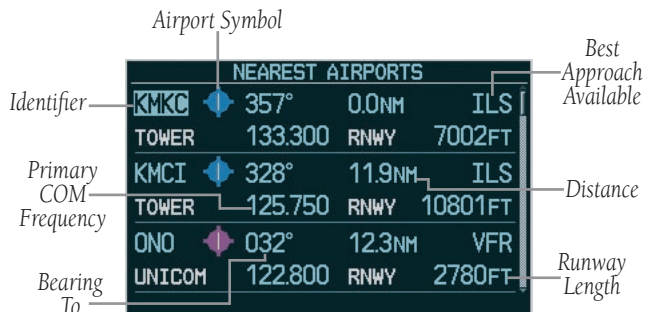


**Figure 2-48  Nearest Airports Window**

**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 2-49  Airport Information Window**

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

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 placed in the tuning box.

## Direct-to Window

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



**Figure 2-  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 several ways:

- By specifying the identifier, waypoint location, or facility name
- From a list of waypoints in the active flight plan
- 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" (e.g., KMCI).  If the airport identifier is alpha-numeric, simply enter the three-digit identifier (e.g., 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 (line to the right of the identifier), or the facility (line directly below the identifier) field.

2.	Turn the **FMS** knobs to enter the city (line to the right of the identifier field), or the facility (line 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 flight plan navigation along the closest leg.
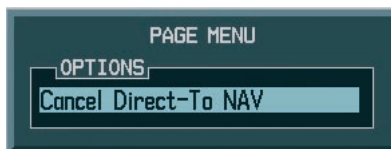


**Figure 2-51  Cancel Direct-To NAV**

## 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/disabled by pressing the **FPL** key.



**Figure 2-52  Flight Plan Window**

Flight plans can be created, edited and activated from the PFD. The G1000 allows for the creation of 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 the active leg (magenta line and arrow)
- Flight plan waypoints, including airport identifiers
- Leg distance
- Leg desired track

The following options are available for the Flight Plan Window:

- Create New Flight Plan
- 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 each.

#### 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 active 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.
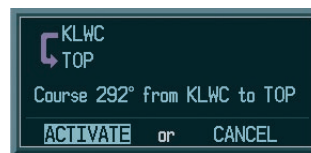


**Figure 2-53  Activate Leg Confirmation Window**

### 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 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.
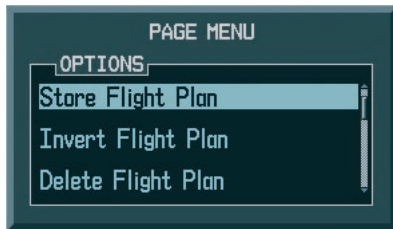
**Figure 2-54  Page Options Menu**

### Invert Flight Plan

Invert Flight Plan 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.
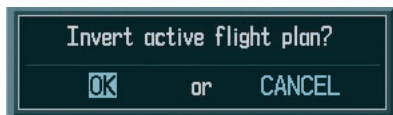
**Figure 2-55  Invert Flight Plan Confirmation Window**

### 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.
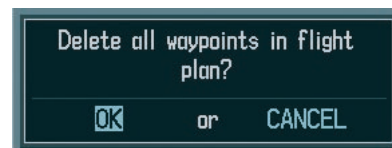
**Figure 2--56  Delete Flight Plan Confirmation Window**

### 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 when displaying available departures.

![checkmark] *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.
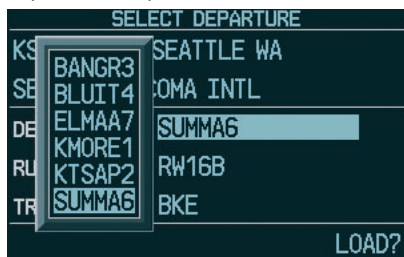


**Figure 2-57  Departure**

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.
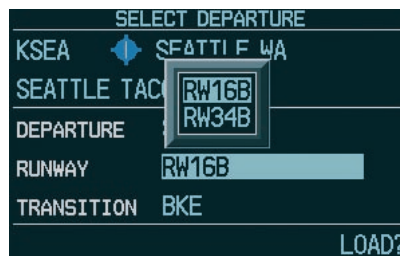


**Figure 2-58  Departure Runway**

![checkmark] *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.*

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



**Figure 2-59  Departure Transition**

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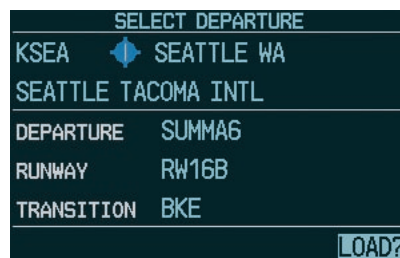


**Figure 2-60 Select Departure Window**

### 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 the 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.
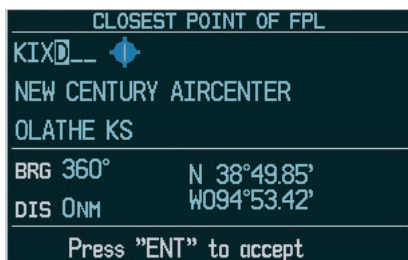


**Figure 2-61  Closest Point of FPL Window**

### 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 2-62  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 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.  Press the **small FMS** knob to remove the cursor.

### Restore Defaults

Restore Defaults returns 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 and 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
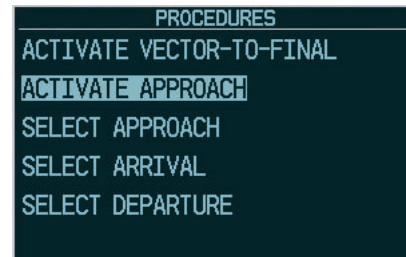


**Figure 2-63  Procedures Window**

### 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 2-64  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.
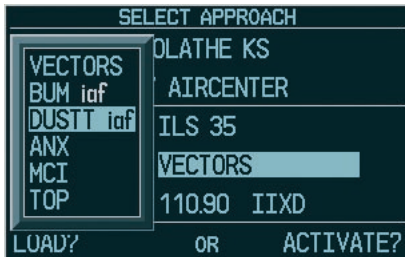


**Figure 2-65  Approach Transition**

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 2-66  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.
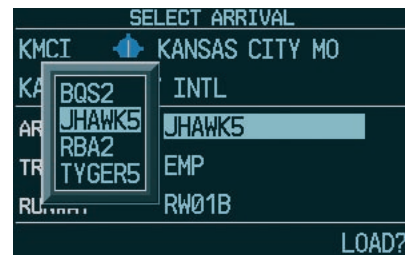


**Figure 2-67  Arrival**

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.
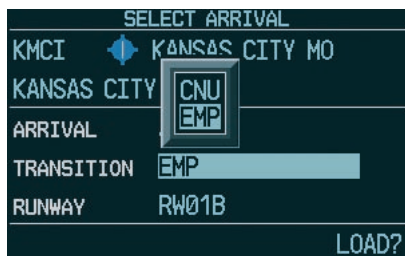


**Figure 2-68 Arrival Transition**

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.*
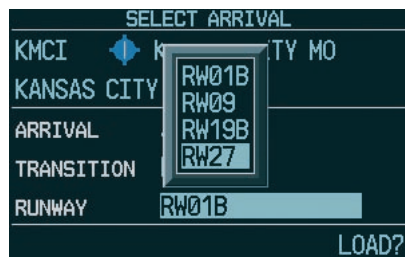


**Figure 2-69 Arrival Runway**

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.*
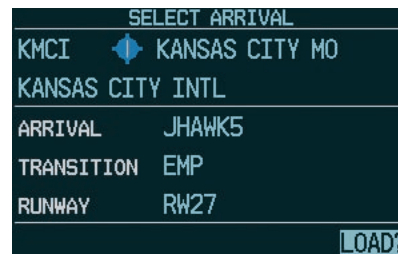


**Figure 2-70 Select Arrival Window**

### 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 from ATC 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 a reversionary (backup) mode based on automatic fault monitoring and detection internal switching.  Reversionary mode can also be activated by manually pressing a dedicated **DISPLAY BACKUP** button at the bottom of the Audio Panel (refer to 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 2-71  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.*
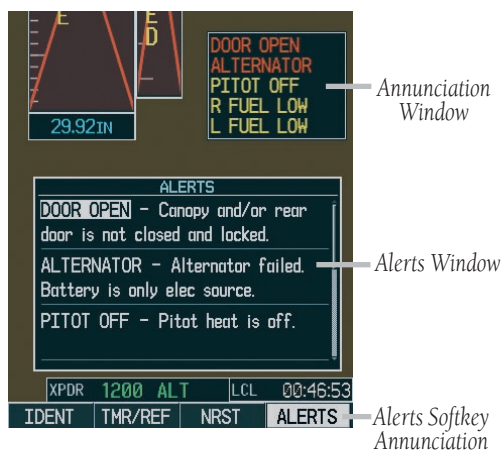


**Figure 2-72  G1000 Alerting System**

## 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 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 an alert and opens the Alerts Window.

## ANNUNCIATION WINDOW

The Annunciation window appears to the right of the Vertical Speed Indicator when a **WARNING** or **CAUTION** alert is issued.  Warning alerts are displayed in red and caution alerts are displayed in yellow.  When new alerts appear, they are displayed with a separate white line at the top of the Annunciation window, regardless of priority.  Once they are 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.



**Figure 2-73  Alerts Softkey Annunciations**

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).

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).

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).

## TRAFFIC ANNUNCIATION

**NOTE:** Refer to the Appendix for more details about Traffic Information Service (TIS).

The G1000 system displays Traffic Information Service (TIS) 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 (see Figure 2-2) for five seconds and remains displayed until no TAs are detected in the area



**Figure 2-74  Traffic Annunciation**

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

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**Garmin G1000 Pilot's Guide for the Diamond DA40**

# G1000™

*NAVICOM*

# 3.1  NAV/COM INTRODUCTION

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 ADF/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 box
- Frequency Transfer Arrows
- Radio status indications
- Controls

*NOTE: Information on the optional ADF and DME radios as well as the ADF/DME Tuning window is presented later in this document.*



**Figure 3-1  G1000 VHF 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.
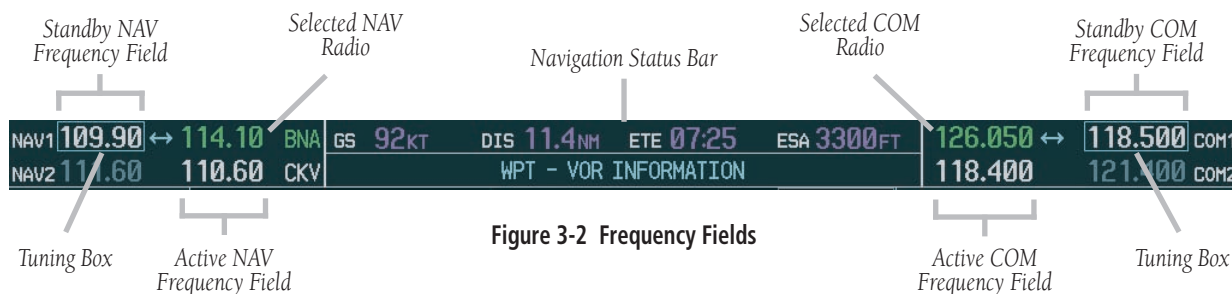


**Figure 3-2  Frequency Fields**

## 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.

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



VOL/PUSH ID Knob          VOL/PUSH SQ Knob

Frequency Transfer Keys

Dual NAV Knob          Dual COM Knob

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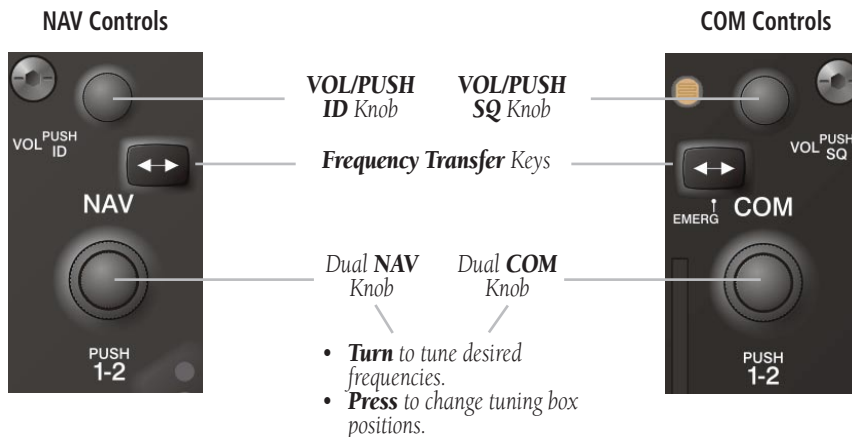
**Figure 3-3  NAV/COM Controls**

## 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 or gray.

- The standby frequency appearing in the tuning box is white.

- The other standby frequency is gray.



*Frequency Transfer Arrow*       *Tuning Box*

**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.
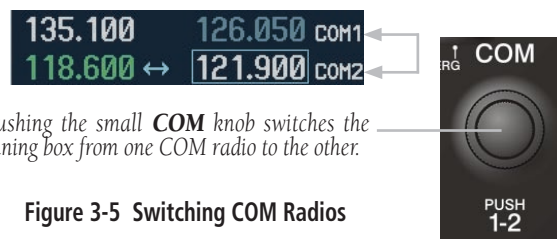


*Pushing the small **COM** knob switches the tuning box from one COM radio to the other.*

**Figure 3-5  Switching COM Radios**
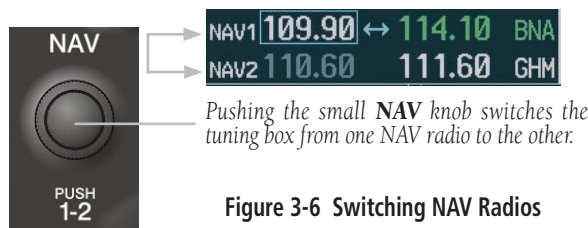


*Pushing the small **NAV** knob switches the tuning box from one NAV radio to the other.*

**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.
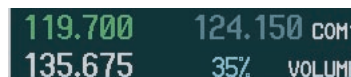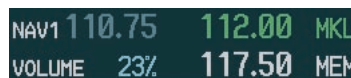


**Figure 3-9  COM and NAV Volume Levels**

## 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 transfers 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.



*Pressing the **COM Frequency Transfer** key transfers the COM frequencies.*



*Pressing the **NAV Frequency Transfer** key transfers the NAV frequencies.*

**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 using the **COM MIC** keys on the audio panel.  When the **COM MIC** key is annunciated, the corresponding active COM frequency is displayed in green in the COM Frequency window.



*Top portion of the audio panel*

*COM radio selection is performed via the audio panel.*
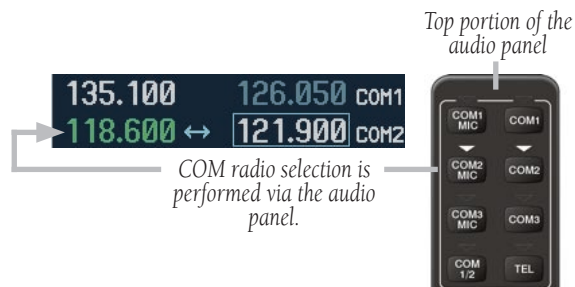
**Figure 3-12  Selecting a COM Radio**

> **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).
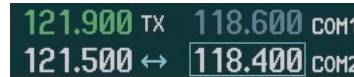


*Press for two seconds to load 121.5 MHz.*

**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.
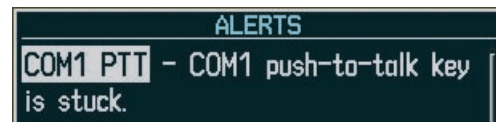


**Figure 3-15  Stuck Microphone Alert**

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.



*NAV2 radio is selected on the audio panel.  The Morse code identifier for the GHM VOR can be heard.*

*NAV section of the audio panel*
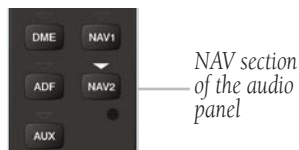
**Figure 3-16  Morse Code Identifier Audio**

## 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.*



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



**Figure 3-17  Selecting a NAV Radio**

# 3.4  OPTIONAL RADIOS

## OVERVIEW

Optionally, the G1000 system can support up to two (2) remotely-mounted Becker RA 3502 ADF receivers and up to two (2) remotely-mounted Honeywell KN 63 DME transceivers.

- The Becker RA 3502 ADF receiver operates in the 190.0 kHz to 1799.5 kHz frequency band with 0.5 kHz channel spacing.

- The Honeywell KN 63 is a 200-channel, 100-watt, all-solid-state digital DME transceiver that provides distance information to the G1000 system.

## ADF/DME TUNING WINDOW

Tuning of the ADF and DME radios is performed via the ADF/DME Tuning window.  The ADF/DME Tuning window is an Auxiliary window that is located to the right of the HSI on the PFD.  Pressing the **ADF/DME** softkey transfers the ADF/DME Tuning window ON and OFF.

> ✓ *NOTE: Depending upon the nature of the optional NAV radios installed, the Radio Tuning window is entitled either 'ADF TUNING', 'DME TUNING', or 'ADF/DME TUNING', and its associated softkey is entitled either 'ADF', 'DME', or 'ADF/DME', respectively.*

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

The following information is displayed in the ADF/DME Tuning window:

- Active and standby ADF frequencies
- ADF receiver mode
- ADF receiver volume
- DME tuning mode



*Active ADF Frequency*    *Standby ADF Frequency*

*ADF Mode*    *ADF Volume*

*DME Mode*
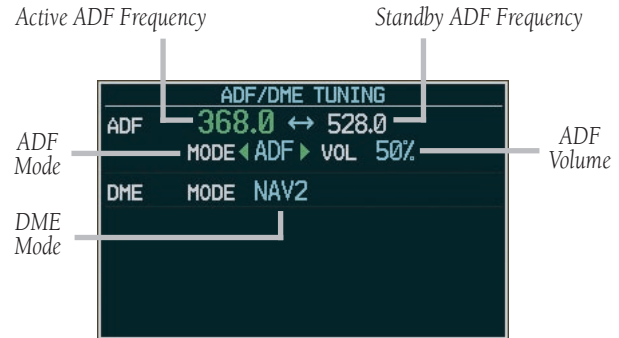
**Figure 3-18  ADF/DME Tuning Window**

Turning the **large FMS** knob moves the selection cursor through the various editable fields (i.e., standby ADF frequency, ADF receiver mode, ADF radio volume and DME tuning mode), while pressing the **FMS** knob activates/deactivates the selection cursor in the ADF/DME Tuning window.

> ✓ *NOTE: When the ADF/DME Tuning window is turned on (i.e., displayed), the selection cursor is automatically activated in the window and is displayed over the standby ADF frequency field.*

## Tuning and Transferring ADF Frequencies

ADF frequencies in the 190.0 kHz to 1799.5 kHz frequency range can be entered in the standby ADF frequency field of the ADF/DME Tuning window, using both the dual **FMS** knob and the **ENT** key.

### To enter an ADF frequency in the standby field:

1. Turn the **large FMS** knob to place the selection cursor over the standby ADF frequency field.

2. Turn the **small FMS** knob both to initiate data entry and to change each digit, and turn the **large FMS** knob to move the cursor to the next or previous character position.

3. Press the **ENT** key to validate data entry for the standby frequency.

*Turn the small FMS knob both to activate data entry mode for the standby ADF frequency field and to change each digit.*

*Press the ENT key to validate the standby ADF frequency entered.*

*Turn the large FMS knob to move the cursor to the next or previous character position.*
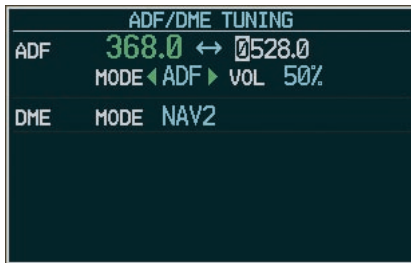
**Figure 3-19 Entering ADF Standby Frequencies**

**NOTE:** *The active ADF frequency field cannot be edited directly.*

**NOTE:** *Pressing the CLR key while in data entry mode (i.e., before having validated a standby frequency being entered) causes the system to cancel the current data entry for this field and revert back to the previously entered standby ADF frequency.*

**NOTE:** *The G1000 system does not support tuning of the 2182.0 kHz ADF emergency frequency.*

### To transfer the active and standby ADF frequencies:

1. Turn the **large FMS** knob to place the selection cursor over the standby ADF frequency field.

2. Press the **ENT** key.
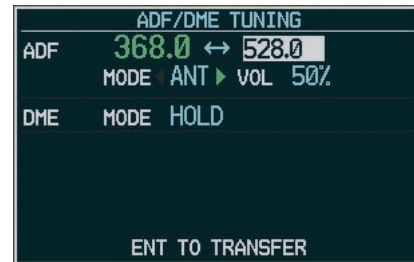
**Figure 3-20 Transferring ADF Frequencies**

**NOTE:** *Pressing the CLR key when the selection cursor is flashing over the standby ADF frequency field clears the existing standby frequency, replaces it with '0000.0' and puts the cursor in data entry mode for this field.*

## Selecting the ADF Receiver Mode

The following modes can be selected:

- **ANT** (antenna) – The ADF bearing pointer is deflected on the HSI by approximately 90 degrees relative to the aircraft heading. In this mode, the NDB Morse code identifier can only be heard if the **ADF** key is selected on the audio panel.

- **ADF** – The ADF bearing pointer moves to point in the direction of the NDB station. In this mode, the NDB Morse code identifier can only be heard if the **ADF** key is selected on the audio panel.

- **BFO** (Beat Frequency Oscillator) – Provides an audible tone when a frequency is tuned. This mode allows for the audio identification of the interrupted carrier beacon stations that are used in various parts of the world. In this mode, the NDB Morse code identifier can only be heard if the **ADF** key is selected on the audio panel.

### To select an ADF receiver mode:

1. Turn the **large FMS** knob to place the selection cursor over the ADF mode field.
2. Turn the **small FMS** knob to select the desired ADF receiver mode.
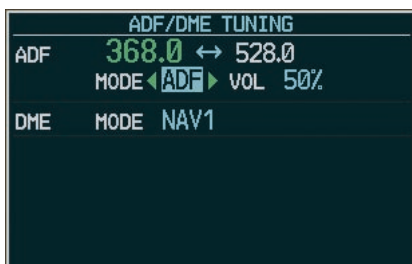


**Figure 3-21  Selecting ADF Receiver Mode**

## Adjusting ADF Receiver Volume

ADF receiver volume level can be adjusted on the ADF/DME Tuning window from 0 to 100% of available volume in increments of one percentage point.

### To adjust ADF receiver volume:

1. Turn the **large FMS** knob to place the selection cursor over the ADF volume field.
2. Turn the **small FMS** knob to adjust volume as desired.
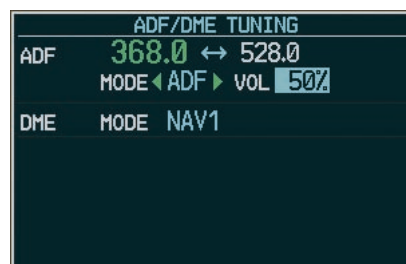


**Figure 3-22  Adjusting ADF Receiver Volume**

> *NOTE: By default, ADF receiver volume level is set to 50% of available volume.*

## Selecting the DME Transceiver Tuning Mode

The following DME transceiver tuning modes can be selected:

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

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

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

### To select a DME transceiver tuning mode:

1. Turn the **large FMS** knob to place the selection cursor over the DME tuning mode field.

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

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

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

*NOTE: Please refer to the Primary Flight Display section for information on the DME Information window.*



**Figure 3-23  Selecting DME Tuning Mode**

# 3.5  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.*

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



*Turn the **FMS** knob to scroll through a list of frequencies.*
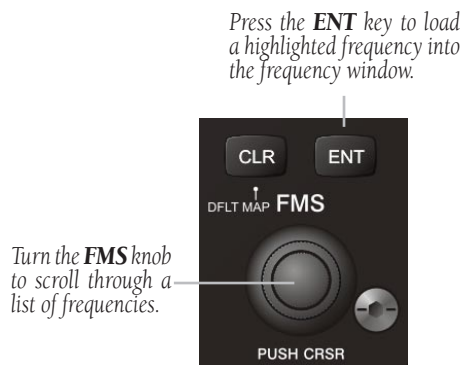
**Figure 3-24  Loading Frequencies**

## 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.



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

**Figure 3-25  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 3-26  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 3-27  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 3-28  WPT – Airport Information Page (APR)**

**Garmin G1000 Pilot's Guide for the Diamond DA40**

## WPT – VOR Information Page

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

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

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

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

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

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



**Figure 3-29  WPT – VOR Information Page**

## NRST – Nearest Airports Page

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

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

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

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

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

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

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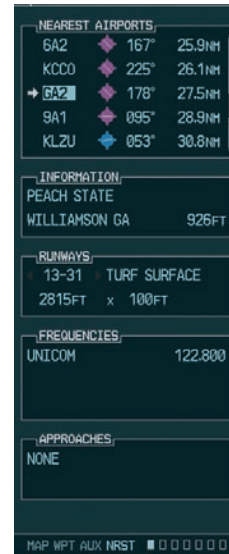


**Figure 3-30  NRST – Nearest Airport Page**

### NRST – Nearest VOR Page

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

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

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

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

3. Press the **FREQ** softkey to activate the selection cursor in the Frequency box and press the **ENT** key to load the frequency into the tuning box of the NAV Frequency window.
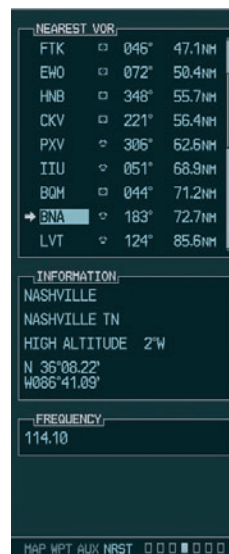


**Figure 3-31  NRST – Nearest VOR Page**

### NRST – Nearest Frequencies Page

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

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

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

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

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

✓ *NOTE: The Nearest ARTCC box contains a numbered list of ARTCC names as well as associated bearing and distance information.*

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

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

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

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

✓ *NOTE: The Nearest FSS box contains a numbered list of FSS names as well as associated bearing and distance information.*

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

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

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

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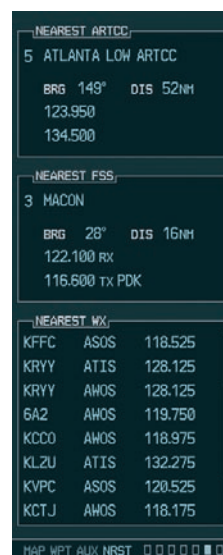


**Figure 3-32  NRST – Nearest Frequencies Page**

## AUTO-TUNING UPON APPROACH ACTIVATION (NAV FREQUENCIES)

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

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

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

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

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

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

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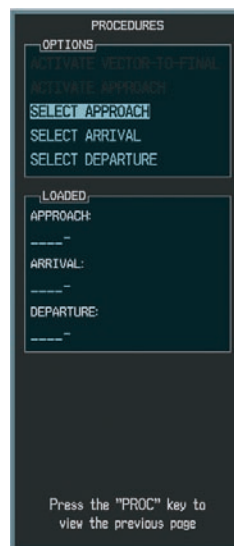


**Figure 3-33  Selecting an Approach**
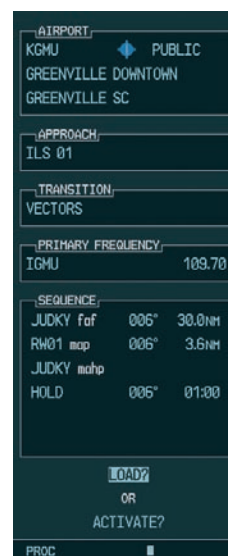


**Figure 3-34  Loading an Approach**

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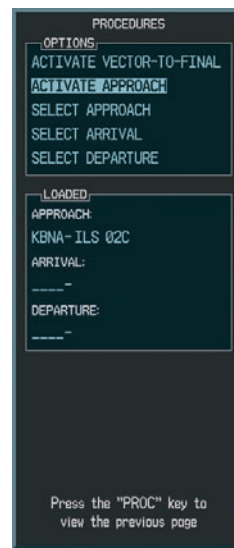


**Figure 3-35  Activating an Approach**

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

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# 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 section provides a description of 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*
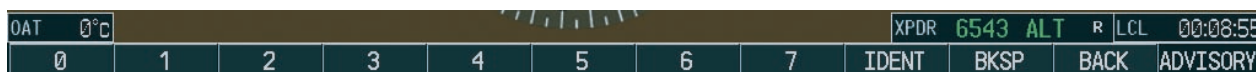


**Figure 4-3 Code Selection Softkeys**

## 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.
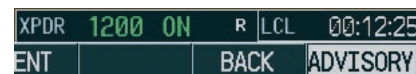
**Figure 4-6  ON Mode**

### 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.

| XPDR | 6543 ALT | LCL | 00:05:52 |
|------|----------|-----|----------|
| ENT | TMR/REF | NRST | ADVISORY |
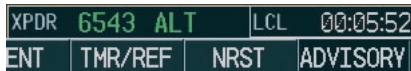
**Figure 4-7  Altitude Mode**

### Reply Status

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

| XPDR | 6543 ALT | R LCL | 00:05:52 |
|------|----------|-------|----------|
| ENT | TMR/REF | NRST | ADVISORY |
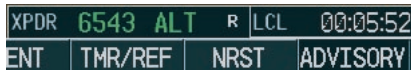
**Figure 4-8  Reply Indication**

## 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.

| XPDR | 645 ALT | LCL | 00:14:18 |
|------|---------|-----|----------|
| ENT | BKSP | BACK | ADVISORY |
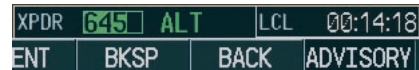
**Figure 4-9  Entering a Code**

*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.
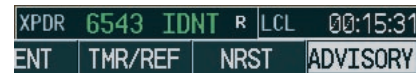


**Figure 4-10 IDENT Indication**

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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# 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. 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 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**

The Diamond DA40 is not factory-equipped with COM3 MIC, COM3, or TEL capability.  Pressing the **COM3 MIC**, **COM3**, or **TEL** key does not illuminate the corresponding annunciator light.

## 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 any of the passenger positions, any other passenger using a stereo headset hears audio in the left ear only, unless their headset has a mono/stereo switch that is set to mono.

The Diamond DA40 is equipped with four stereo headset jacks (for the pilot, copilot and two passengers).

## UNMUTED/UNSWITCHED INPUTS

The audio panel provides four 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

## AUDIO 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**)
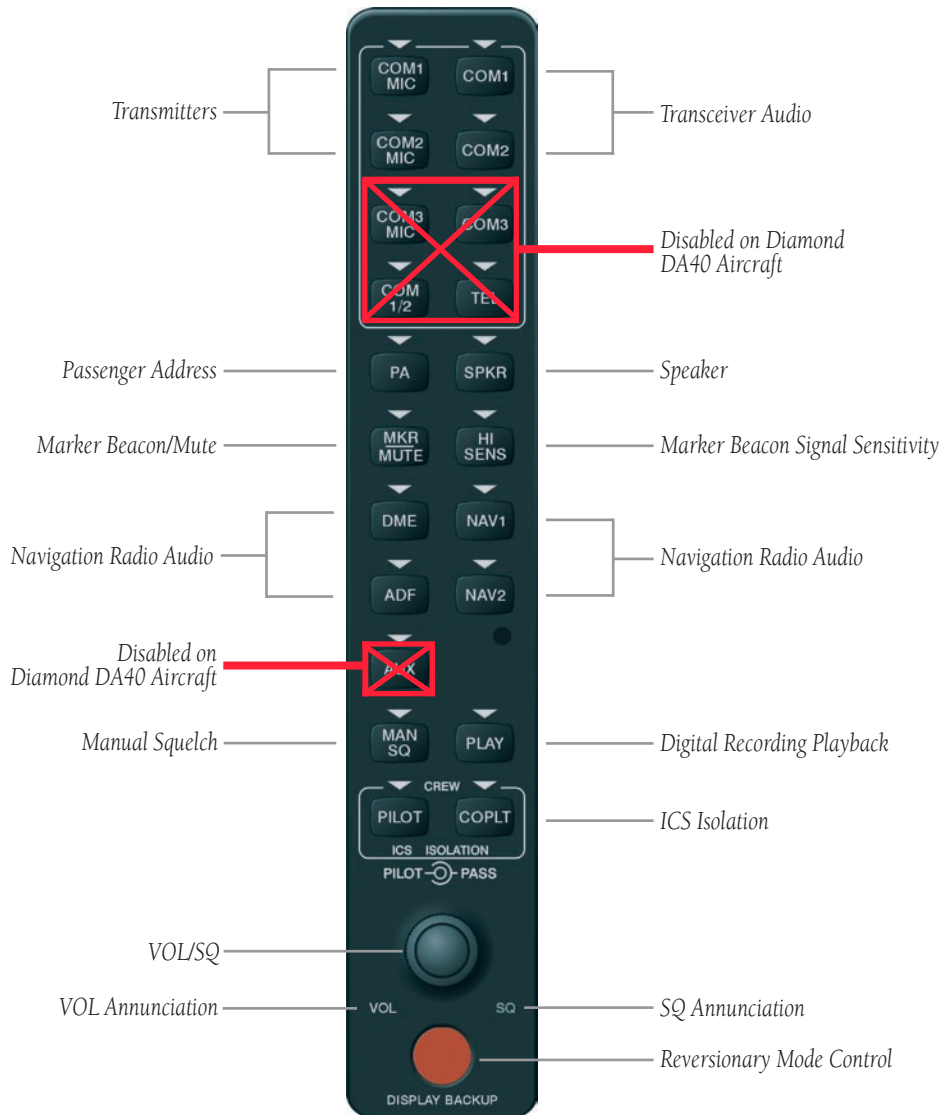
**Figure 5-1  Audio Panel Controls**

# 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, settings are restored to the ones in use before the unit was last turned off.

### 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).  Annunciators do not illuminate on a disabled function.

## LIGHTING

Key annunciators and backlighting are controlled automatically by the PFD.

## TRANSCEIVER KEYS

The following four 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.



*Annunciator*

*Disabled on Diamond DA40 Aircraft*
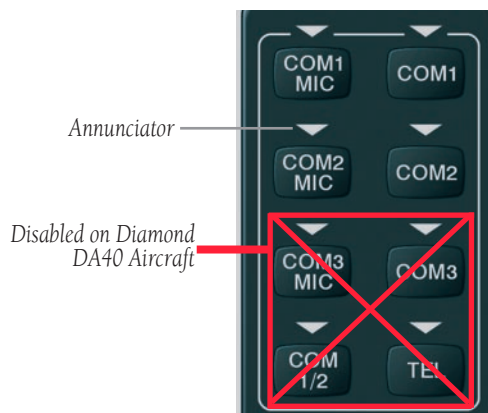
**Figure 5-2  Transceiver Keys**

### 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 con-trolled by the COM volume controls located on both the PFD and MFD (see the NAV/COM sec-tion).*

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

## 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 speaker.

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 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 cen-ter 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.

The receiver detects the three 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 annun-ciator 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 volume level can be adjusted 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**

## NAVIGATION RADIOS

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

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 Radios**

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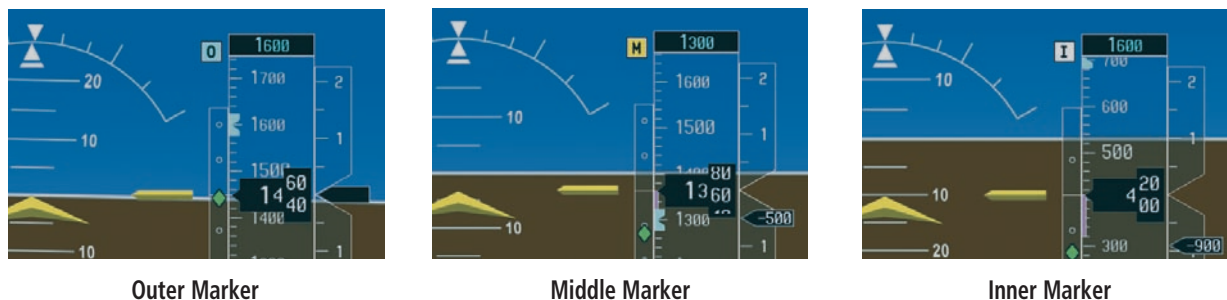
| Outer Marker | Middle Marker | Inner Marker |

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

## INTERCOM SYSTEM (ICS) ISOLATION

The intercom system (ICS) provides four isolation modes: ALL, PILOT, COPILOT, and CREW.  The desired mode can be selected or deselected using the **PILOT** and **COPLT** keys.  The four possible ICS isolation states are summarized in Table 5-2.

### 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.
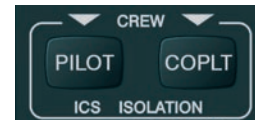


**Figure 5-6  ICS Isolation Keys**

| Mode | PILOT KEY ANNUNCIATOR | COPLT KEY ANNUNCIATOR | Pilot Hears | Copilot Hears | Passenger Hears |
|------|-----------------------|-----------------------|-------------|---------------|-----------------|
| **ALL** | OFF | OFF | Selected radios, pilot, copilot, passengers | Selected radios, pilot, copilot, passengers | Selected radios, pilot, copilot, passengers |
| **PILOT** | ON | OFF | Selected radios, pilot | Copilot, passengers | Copilot, passengers |
| **COPILOT** | OFF | ON | Selected radios, pilot, passengers | Copilot | Selected radios, pilot, passengers |
| **CREW** | ON | ON | Selected radios, pilot, copilot | Selected radios, pilot, copilot | Passengers |

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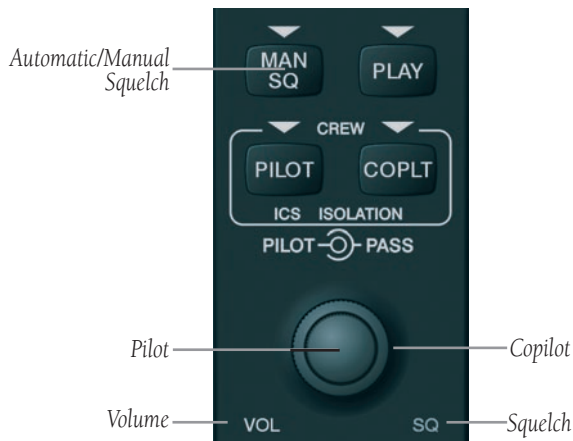


**Figure 5-7  Volume/Squelch Control**

### 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 level.

## 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.

## 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.

## 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.
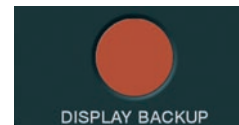


**Figure 5-9  Reversionary Mode Button**

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# G1000™

*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 of the DA40, DA40F, and DA40D contains three distinct pages, which are accessed by the **ENGINE** softkey:

### DA40 and DA40F

- **Engine Page –** This is the default page; it 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.

### DA40D

- **Engine Page –** This is the default page; it displays all critical engine, fuel, and electrical information.
- **System Page –** This page displays electrical, additional engine, and oil indicators.
- **Fuel Page –** This page displays numeric readouts for the fuel indicators and fuel calculations.

## EIS INDICATORS

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

### Round Dial Gauges

The gauges are color-coded and have white pointers.  Digital readouts appear beneath the gauges and do not change color.  The gauges are located at the top of each page.

### Horizontal Bar Indicators

These indicators are color-coded and have triangular pointers.  The pointers appear in white, representing areas of normal operation.  The pointer color changes to yellow or red upon exceeding areas of normal operation.  The green band is indicative of normal operations.

### Bar Graphs (Lean Page Only)

Each bar graph is numbered and represents a cylinder.  The graphs appear white (when a cylinder is selected that graph changes to cyan), representing areas of normal operation.  The color changes to yellow or red upon exceeding areas of normal operation.

### 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.

# 6.2  DA40 & DA40F

## ENGINE PAGE

Beneath the gauges are horizontal bar indicators for fuel flow, cylinder head temperature (CHT), oil temperature, oil pressure, alternator amperage, bus voltage and fuel quantity.

## Manifold Pressure Gauge (DA40)

The Manifold Pressure gauge displays the engine power in inches of mercury (in Hg).

- **White** (bottom of arc) – Below normal operating range.
- **Green** – Normal operating range.
- **White** (top of arc) – Above normal operating range.

## Tachometer

The Tachometer displays propeller speed in revolutions per minute (RPM).

- **White** – Below normal flight operating range.
- **Green** – Normal flight operating range.
- **Red** – Propeller overspeed.

## Fuel Flow GPH Indicator

The Fuel Flow indicator displays current fuel flow in gallons per hour (GPH).  The Fuel Flow indicator ranges from 0 to 25.

- **Green** – Normal fuel flow.
- **Red** – Abnormal fuel flow.

## CHT Indicator

The CHT (Cylinder Head Temperature) indicator displays the temperature of the hottest cylinder in degrees Fahrenheit.  The number of the hottest cylinder appears in the triangular pointer.

- **Green** – Normal
- **Yellow** – Caution
- **Red** – Warning

## Oil Temperature Indicator

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

- **Green** – Normal
- **Yellow** – Caution
- **Red** – Warning

## Oil Pressure Indicator

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

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

## Ammeter

The Ammeter displays the alternator load in amperes.  The Ammeter ranges from 0 to 80.  The green band is indicative of normal operation.

## Voltmeter

The Voltmeter displays the primary bus voltage.

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

## Fuel Qty GAL Indicator

The Fuel Quantity indicator displays the quantity of fuel in the tanks, in gallons.  Two (2) triangular pointers labeled L (left) and R (right) indicate the number of gallons in each fuel tank.

- **Green** – Normal
- **Yellow** – Caution
- **Red** – Warning

### Standard Tanks

The indicator ranges from 0 to 20 with tick marks at 5, 10, and 15 gallons.  The Fuel Quantity Indicator only displays to 17 gallons per side when full.

### Long Range Tanks (Optional)

The indicator ranges from 0 to 25 with tick marks at 5, 10, 15, and 20 gallons.  The Fuel Quantity Indicator only displays to 24 gallons per side when full.

## Fuel Pressure Indicator (Option, DA40 only)

This optional indicator is located between the Fuel Flow and CHT Indicators and shows the fuel pressure in pounds per square inch (psi).

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

**Figure 6-1  Fuel Pressure Indicator
(Showing Warning)**

*Manifold Pressure Gauge*

*Tachometer*

*Fuel Flow Indicator*

*Cylinder Head Temperature Indicator*

*Oil Temperature and Pressure Indicators*

*Ammeter*

*Voltmeter*

*Fuel Quantity Indicator*

DA40          DA40F
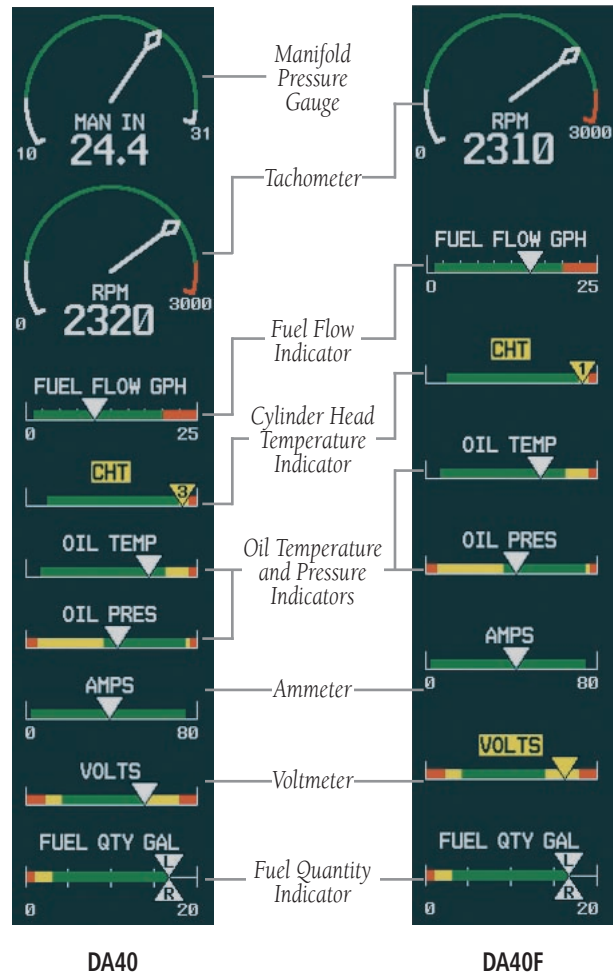
**Figure 6-2  Engine Page**

## LEAN PAGE

The Lean Page is accessed by pressing the **LEAN** softkey. A digital readout for fuel flow resides below the tachometer. Beneath the fuel flow indication are bar graphs and numeric readouts for exhaust gas temperature (EGT), temperature deviation from peak and cylinder head temperature (CHT) in degrees Fahrenheit. By default, the numeric readouts of the EGT and CHT are associated with the hottest cylinder and are graphically indicated in cyan (light blue). Color coding for the EGT and CHT bar graphs is listed below:

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

### Cylinder Select

The **CYL SLCT** softkey can be utilized to obtain information about a particular cylinder. The **CYL SLCT** softkey becomes disabled when:

- a particular cylinder turns yellow (caution) or red (warning)
- the temperature decreases and returns to normal, which is indicated by white on the bar graph
- the **ASSIST** softkey is pressed

The **CYL SLCT** softkey is available by pressing the **LEAN** softkey.

#### To monitor the desired cylinder(s):

From the Lean Page, press the **CYL SLCT** softkey to cycle through each cylinder and view the EGT and CHT.

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

### Assist

The **ASSIST** softkey can be utilized to assist in the leaning process. When a cylinder peaks, its peak is represented by a hollow bar on the EGT bar graph. The EGT readout for the peaked cylinder, indicated in cyan (light blue), appears directly beneath the bar graph. The system automatically switches to the first peak obtained and displays the temperature deviation from peak in degrees Fahrenheit below the EGT readout.

The **ASSIST** softkey is available by pressing the **LEAN** softkey.

#### To select the Assist function:

From the Lean Page, press the **ASSIST** softkey to identify the peak.

Manifold Pressure Gauge

Tachometer

Fuel Flow Indicator

Hollow Bar Representing Peak

Exhaust Gas Temperature Bar Graph (with readout for selected cylinder)

Temperature Deviation from Peak

Cylinder Head Temperature Bar Graph (with readout for selected cylinder)

DA40                              DA40F
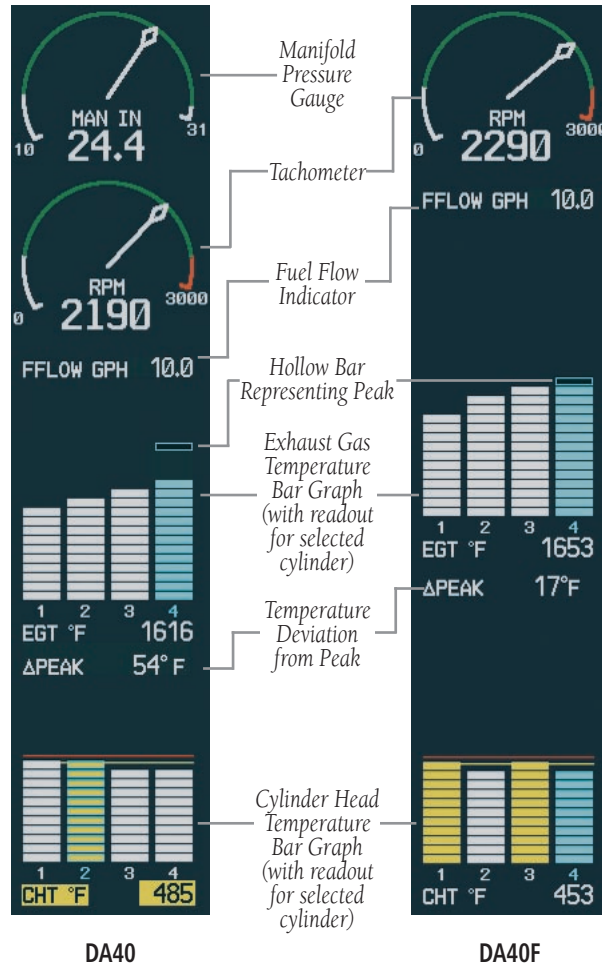
**Figure 6-3  Lean Page**

## SYSTEM PAGE

The System Page is accessed by pressing the **SYSTEM** softkey.  The readouts on this page are separated into two categories: System and Fuel Calculation.  The System readouts include oil temperature and pressure, voltage, amperes, fuel flow, and optional fuel pressure (DA40 only; see Figure 6-4).



FPRES PSI  40.0
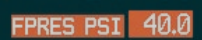
**Figure 6-4  Fuel Pressure Readout (Showing Warning)**

The Fuel Calculation portion of the System Page is based on the fuel flow totalizer and displays:

- **GAL REM –** Current fuel remaining in gallons as set by the pilot and adjusted for fuel burn since last set
- **GAL USED –** Quantity of fuel used in gallons
- **ENDUR –** Flight time remaining with fuel onboard (HH:MM when more than an hour remains)
- **RANGE NM –** Aircraft range in nautical miles

*FUEL calculations do not use the aircraft fuel quantity indicators and are calculated from the last time the fuel was reset.*

If desired, the pilot can utilize the **DEC FUEL, INC FUEL,** and **RST FUEL** softkeys from the System Page to adjust the amount of fuel remaining for totalizer calculations:

- **DEC FUEL –** Decreases totalizer-based fuel quantity remaining in one-gallon increments
- **INC FUEL –** Increases totalizer-based fuel quantity remaining in one-gallon increments
- **RST FUEL –** Resets totalizer-based fuel quantity remaining relative to the aircraft fuel capacity and the GAL USED display to zero.

**To decrease/increase fuel totalizer quantity:**

From the System Page, press the **DEC FUEL/ INC FUEL** softkey to obtain the desired number of gallons remaining.

**To reset the fuel totalizer:**

From the System Page, press the **RST FUEL** softkey.  This also resets the GAL USED to zero.

Located at the bottom of the page is a numeric readout for total time in service, displayed in hours:

- **TTL TIME IN SVC –** Displays the total flight hours and is activated when the aircraft becomes airborne

*NOTE: Refer to the Aircraft Flight Manual Supplement (AFMS) for limitations.*
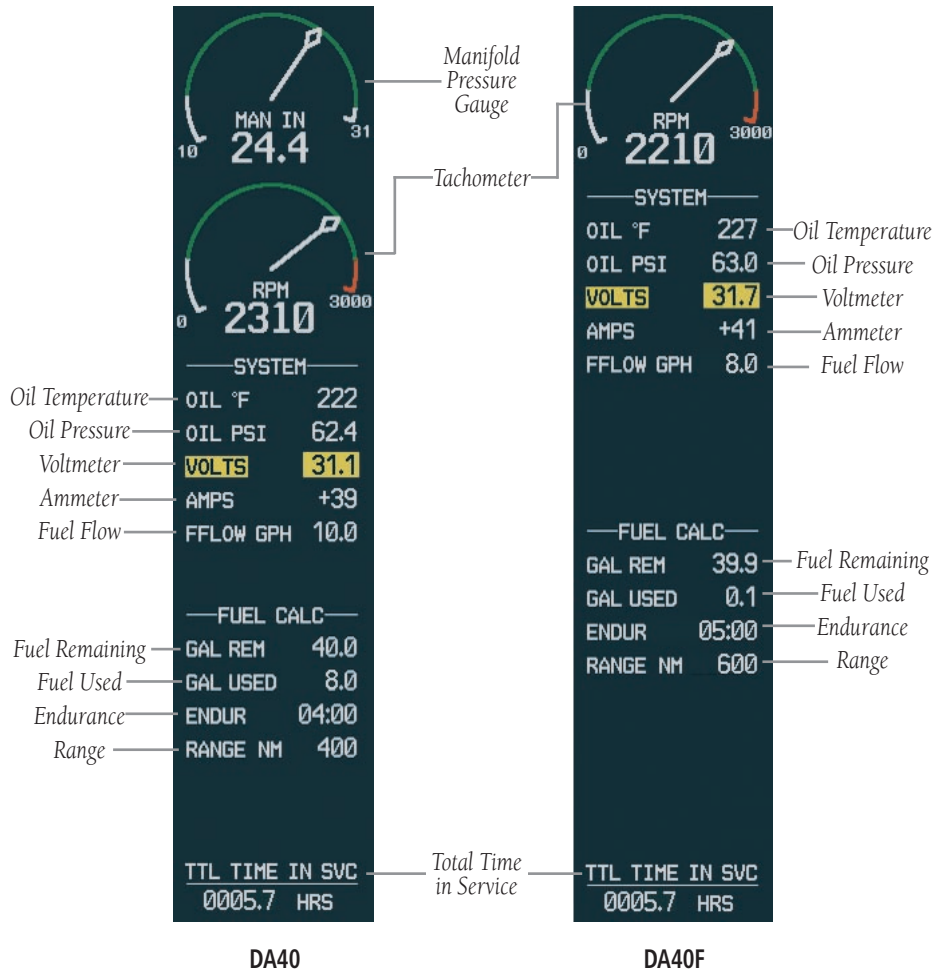
**Figure 6-5  System Page**

# 6.3 DA40D

## ENGINE PAGE

Atop all three pages are two round dial gauges for engine load and revolutions per minute (RPM). Beneath those gauges is a digital readout for fuel flow. Below the fuel flow readout are horizontal bar indicators for oil temperature, oil pressure, coolant temperature, fuel temperature and fuel quantity.

### Engine Load Indicator

The Engine Load indicator displays the current engine load as a percentage. Numeric labels and tick marks are shown at intervals of 20 percent. The scale ranges from 0 to 100 percent. There is one green color band on the Engine Load indicator.

### Tachometer

The Tachometer displays propeller speed in revolutions per minute (RPM). The scale ranges from 0 to 3,000 RPM with numeric labels and tick marks shown at intervals of 600 RPM.

The Tachometer indications follow propeller speed information provided by the FADEC. The overspeed warning is a visual annunciation which consists of the tachometer digital reading and units flashing white text on a red background then red text on a white background.

- **White** – Below normal operating range.
- **Green** – Normal operating range.
- **Yellow** – Caution range.
- **Red** – Indicates engine overspeed.

## Fuel Flow GPH Indicator

The Fuel Flow indicator is a digital readout which displays current fuel flow in gallons per hour (GPH) and has no color bands.

### Oil Temperature Indicator

The Oil Temperature indicator displays the engine oil temperature.

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

### Oil Pressure Indicator

The Oil Pressure indicator displays the engine oil pressure.

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

### Coolant Temperature Indicator

The Coolant Temperature indicator displays the temperature of the engine coolant.

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

### Fuel Temperature Indicator

The Fuel Temperature indicator displays the fuel temperature.

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

## Fuel Quantity Indicator

The Fuel Quantity indicator displays the quantity of fuel in the tanks, in gallons. The indicator ranges from 0 to 15 with tick marks at 0, 5, 10 and 15 gallons.

- **Green –** Normal
- **Red –** Warning

> *NOTE: The Fuel Quantity Indicator displays 14 gallons per side when full.*

> *NOTE: Pilots should refer to the Aircraft Flight Manual Supplement (AFMS) for limitations.*



*Engine Load Indicator*

*Tachometer*

*Fuel Flow Indicator*

*Oil Temperature Indicator*

*Oil Pressure Indicator*

*Coolant Temperature Indicator*

*Fuel Temperature Indicator*

*Fuel Quantity Indicator*
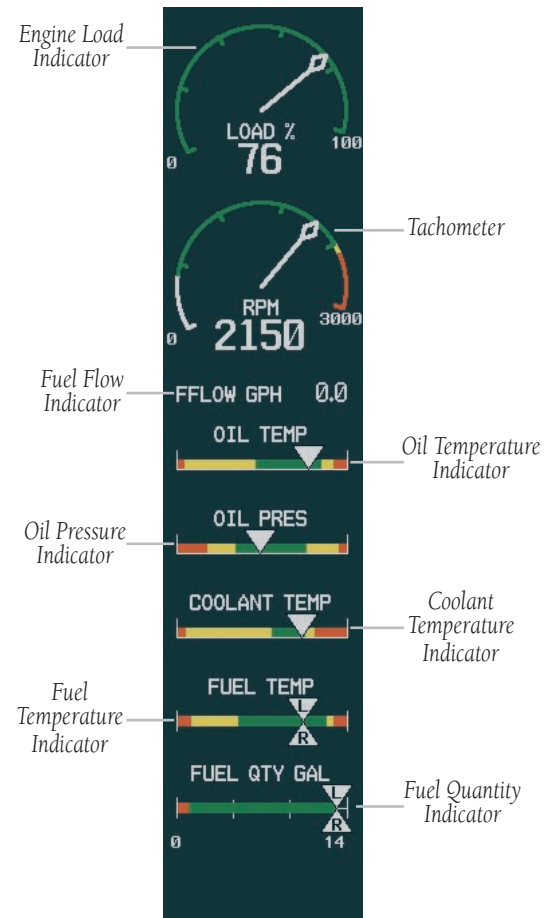
**Figure 6-6  Engine Page (DA40D)**

## SYSTEM PAGE

The System Page is accessible by pressing the **SYSTEM** softkey. The indications for this page are separated into three categories: Electrical, Engine and Oil. Beneath the tachometer are horizontal bar indicators for the voltmeter, ammeter and gearbox temperature, followed by a digital readout for coolant temperature, oil temperature and oil pressure.

- **Electrical** – Voltmeter & Ammeter
- **Engine** – Gearbox & Coolant Temperature
- **Oil** – Temperature & Pressure

### Voltmeter

The Voltmeter displays the primary bus voltage for each side.

- **Green** – Normal
- **Yellow** – Caution (Low and High)
- **Red** – Warning (Minimum and Maximum)

### Ammeter

The Ammeter displays each alternator load in amperes. The ammeter ranges from 0 to 120.

- **Green** – Normal
- **Yellow** – Caution
- **Red** – Warning

### Gearbox Temperature Indicator

The Gearbox Temperature indicator displays the temperature of each gearbox in degrees Celsius.

- **Green** – Normal
- **Yellow** – Caution
- **Red** – Warning

> ✓ *NOTE: Pilots should refer to the Aircraft Flight Manual Supplement (AFMS) for limitations.*
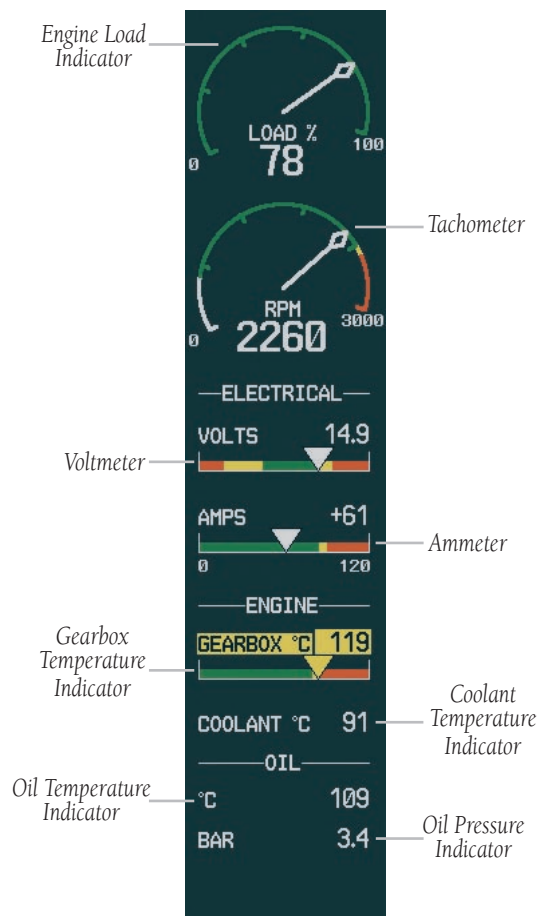


**Figure 6-7  System Page (DA40D)**

## FUEL PAGE

The Fuel Page is accessible by pressing the **FUEL** soft-key.  All readouts for this page are digital and are separated into two categories: Fuel and Fuel Calculations.  Beneath the tachometer are readouts for the fuel flow, fuel quantity and fuel temperature.

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

- **GAL REM –** Current fuel remaining in gallons as set by the pilot and adjusted for fuel burn since last set.
- **GAL USED –** Quantity of fuel used in gallons.
- **ENDUR –** Flight time remaining with fuel onboard (HH:MM when more than an hour remains).
- **RANGE NM –** Aircraft range in nautical miles.

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

If desired, the pilot can utilize the **DEC FUEL, INC FUEL** and **RST FUEL** softkeys to adjust the amount of fuel remaining for totalizer calculations.

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

- **DEC FUEL –** Decreases totalizer based fuel quantity remaining in one-gallon increments
- **INC FUEL –** Increases totalizer based fuel quantity remaining in one-gallon increments
- **RST FUEL –** Resets totalizer-based fuel quantity remaining relative to the aircraft fuel capacity and sets the GAL USED display to zero

**To decrease/increase fuel totalizer quantity:**

From the System Page, press the **DEC FUEL**/ **INC FUEL**softkey to obtain the desired number of gallons remaining.

**To reset the fuel totalizer:**

From the System Page, press the **RST FUEL** soft-key.  This also resets the GAL USED to zero.
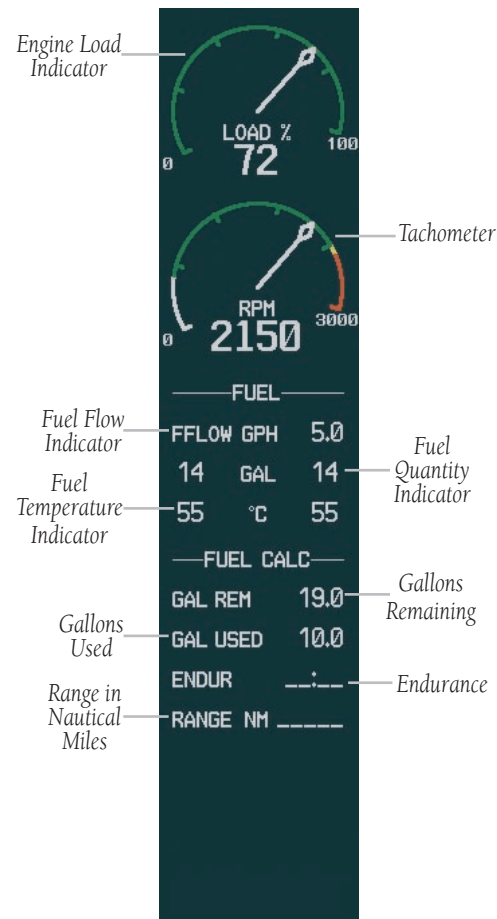


**Figure 6-8  FUEL Page (DA40D)**

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# G1000™

*Multi Function Display*

# 7.1  INTRODUCTION

This section of the Pilot's Guide describes the Multi Function Display (MFD) as installed in Diamond DA40, DA40F, and DA40D aircraft.

## DESCRIPTION

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

> ✓ *NOTE:  All information pertaining to optional equipment is contained in the Optional Equipment section.  This document only describes the baseline (standard) MFD configuration installed in the DA40, DA40F, and DA40D.*

## MFD POWER-UP

MFD power up is part of the system power up procedure.  See the System Overview for details.

### Splash Screen Information

The MFD Splash Screen 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 are subject to change and may not reflect the most current G1000 system software.*

## MFD BACKLIGHTING

See the Primary Flight Display section for instructions on adjusting MFD backlighting.



**Figure 7-1  MFD Splash Screen**

## 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 7-3 shows an MFD flowchart identifying what functions are available via the softkey labels.

The MFD softkeys perform the following functions:

**ENGINE –** Makes available the **LEAN** or **FUEL** and **SYSTEM** softkeys which in turn access the Lean Page and the System Page, respectively (see the EIS section for more information)

**MAP –** Enables the following softkeys:

> **TRAFFIC –** Displays/removes Mode S Traffic on the Navigation Map
>
> **TOPO –** Displays/removes topographic information on the Navigation Map
>
> **TERRAIN –** Displays/removes terrain information on the Navigation Map
>
> **BACK –** Displays the ENGINE and MAP top level softkeys

**DCLTR (declutter) –** Removes map information in three levels

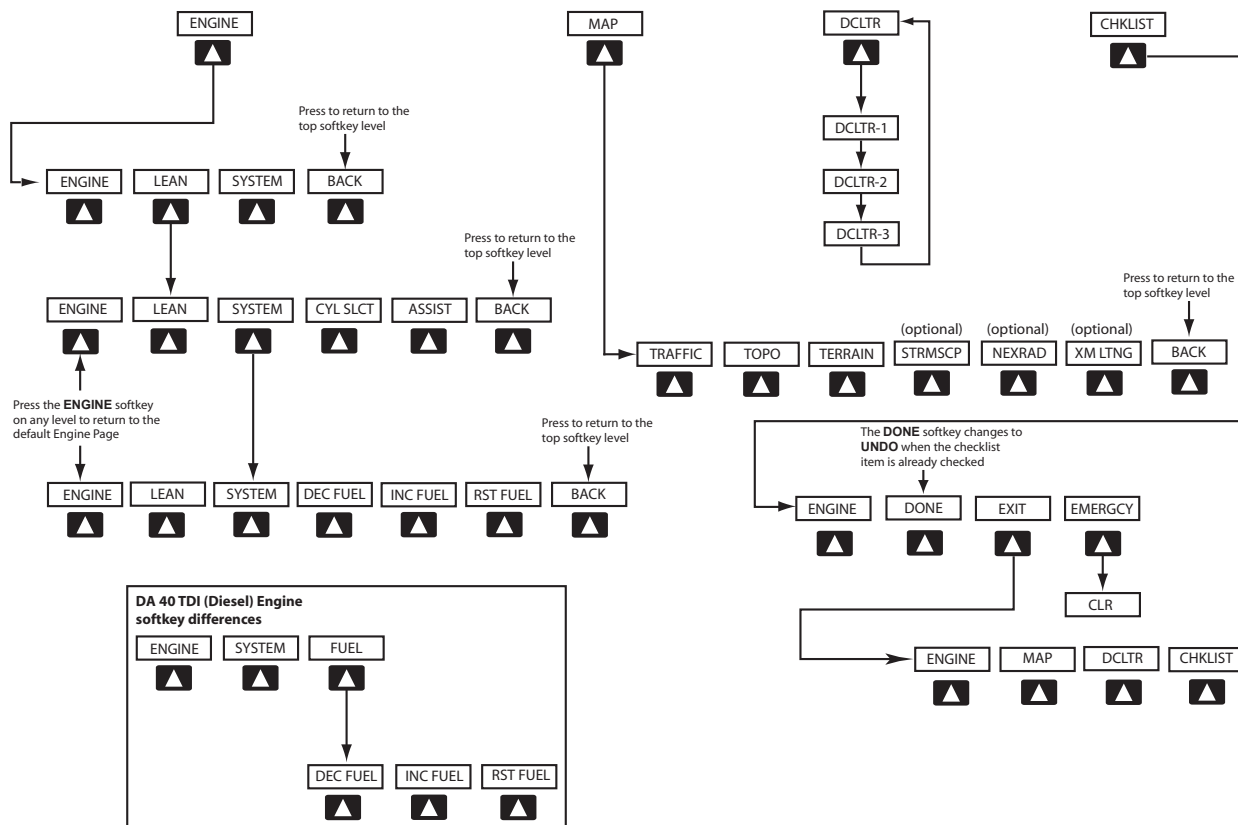**CHKLIST (checklist) –** Displays the Checklist Page



**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 Diamond Information 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.  Modifications or updates to the checklists are coordinated through the aircraft manufacturer.  The user cannot edit the checklists.*

### Displaying the Checklist Page

The Splash Screen displays the current checklist file that is installed. 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:

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 **large or small FMS** knob to select the desired checklist and press the **ENT** key.

### Selecting a Checklist Item

1. 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.
2. To select a checklist item that is highlighted, press the **ENT** or **DONE** 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.

> ✓ *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.

*Checklist Group*

*Checklist Number*

*Checklist Page Softkeys*

*Checklist Page Indicator*

*Emergency Softkey*

GROUP EMERGENCY PROCEDURES
CHECKLIST 1. ENGINE PROBLEMS ON GROUND

☑ Throttle.........................................................IDLE
☐ Brokes.....................................................as required
☐ Engine...........................................switch off, if considered necessary
   CAUTION: If the oil pressure is below the green sector, the engine must be switched off immediately.
        WARNING: If the problem cannot be cleared, the airplane must not be flown.

GO TO NEXT CHECKLIST?

✓LST    ■

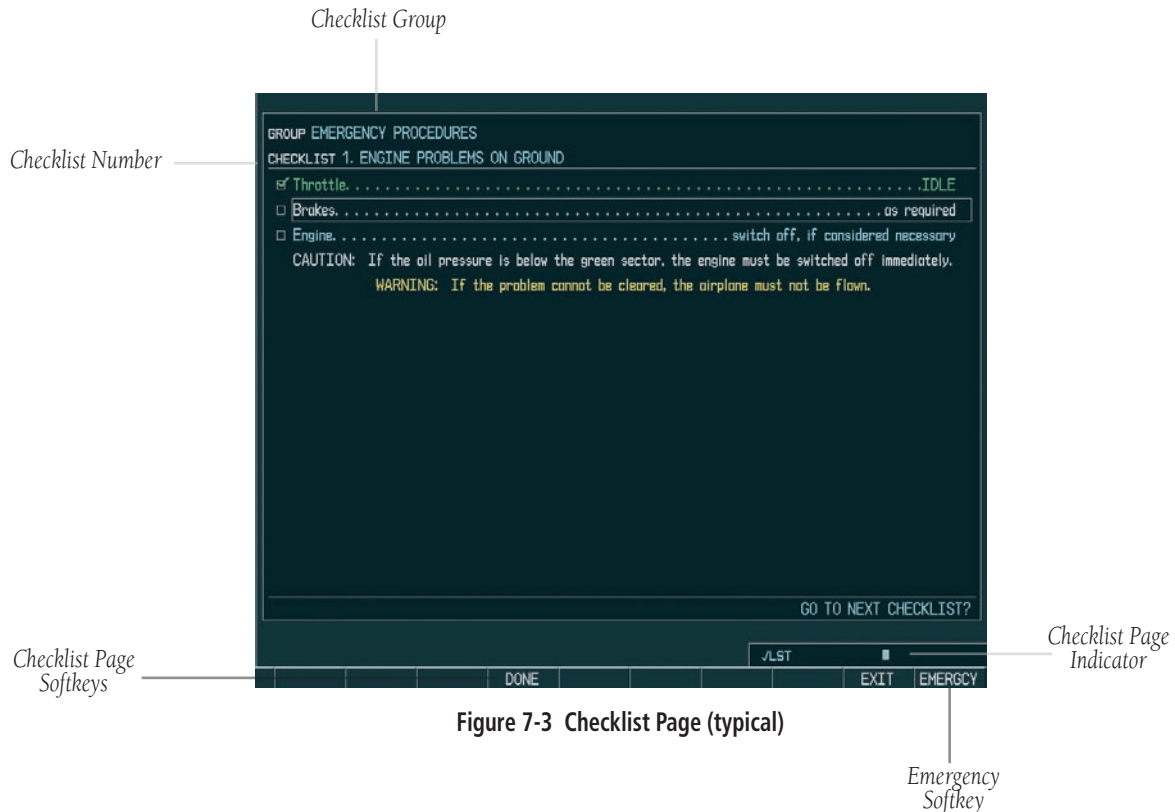DONE                          EXIT  EMERGCY

**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
  Terrain Proximity Page
- **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:**

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

*Active Page group is highlighted*     *Currently selected page is highlighted*

**MAP** WPT AUX NRST ■ ☐ ☐
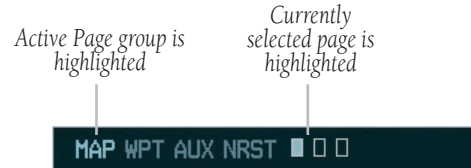
**Figure 7-4  Page Group Window**

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

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.

*Page Group*     *Active Page Title*

MAP – NAVIGATION MAP

**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 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.*
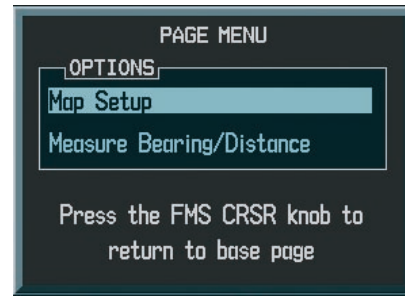
**Figure 7-6 Menu with Options**
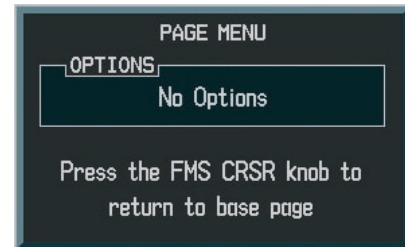
**Figure 7-7 Menu with No Options**

# 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 Display
- Obstacle Display
- 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



**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.
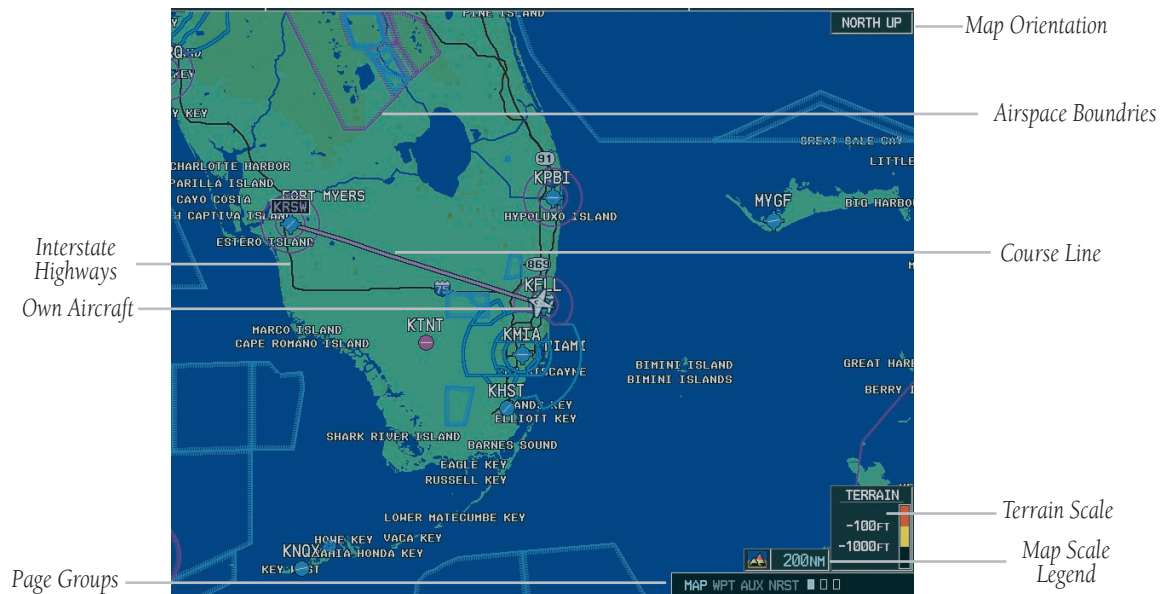
2.  Turn the **small FMS** knob to select the Navigation Map Page. The page group name and page title is displayed below the navigation status bar; MAP – NAVIGATION MAP. In addition to turning the **large and small FMS** knobs, the Navigation Map Page can be selected from any page by pressing and momentarily 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 document 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 for instructions on enabling/disabling the autozoom feature.



*Map Range Indicator*

**Figure 7-9  Map Range**

### 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 7-1 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 Proximity data | | 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.  Push in and 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**.

*Distance, bearing and elevation*

*Latitude and longitude position of pointer*

*Panning Arrow*



**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.
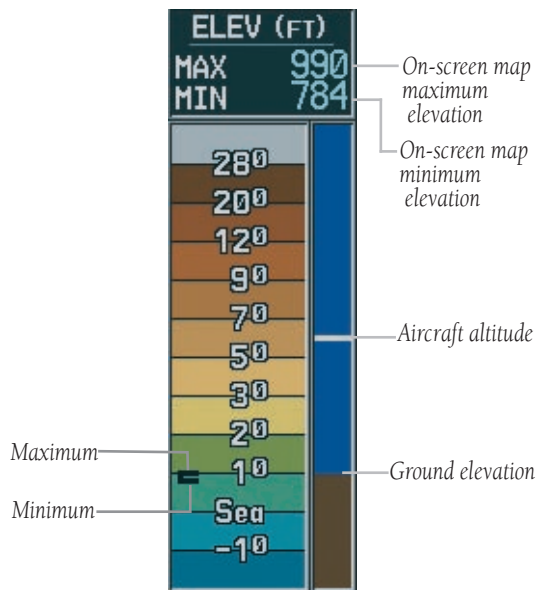


*On-screen map maximum elevation*

*On-screen map minimum elevation*

*Aircraft altitude*

*Maximum*

*Minimum*

*Ground elevation*

**Figure 7-11 Topography Range**

### 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.

> **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 Information on the Navigation Map Page

Terrain data 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 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)
- Enroute 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)
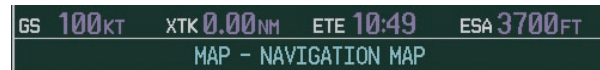- Currently selected MFD page title



GS 100KT    XTK 0.00NM    ETE 10:49    ESA 3700FT
MAP – NAVIGATION MAP

**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 config-ure the Navigation Map Page including map orientation, land data enable/disable, Jeppesen data enable/disable, automatic zoom, airspace boundaries, and text size.
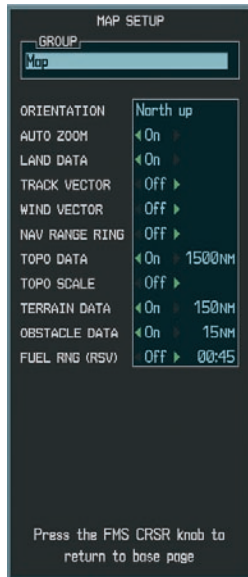
## Map Group Options



**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 head-ing.
- 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 **large or small 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 diamonds.  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

**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.



**Figure 7-15  Aviation Group Options**

### 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.

*Bearing, Distance, and Elevation Information*

*Pointer Latitude and Longitude*

*Reference Pointer*

**Figure 7-17  Measuring Bearing and Distance**

**Garmin G1000 Pilot's Guide for the Diamond DA40**

## 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:**

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



*Traffic Mode*
*Map Range*
*Traffic, Out of Range*
*Own Aircraft*
*Proximate, Known Altitude*
*Traffic*
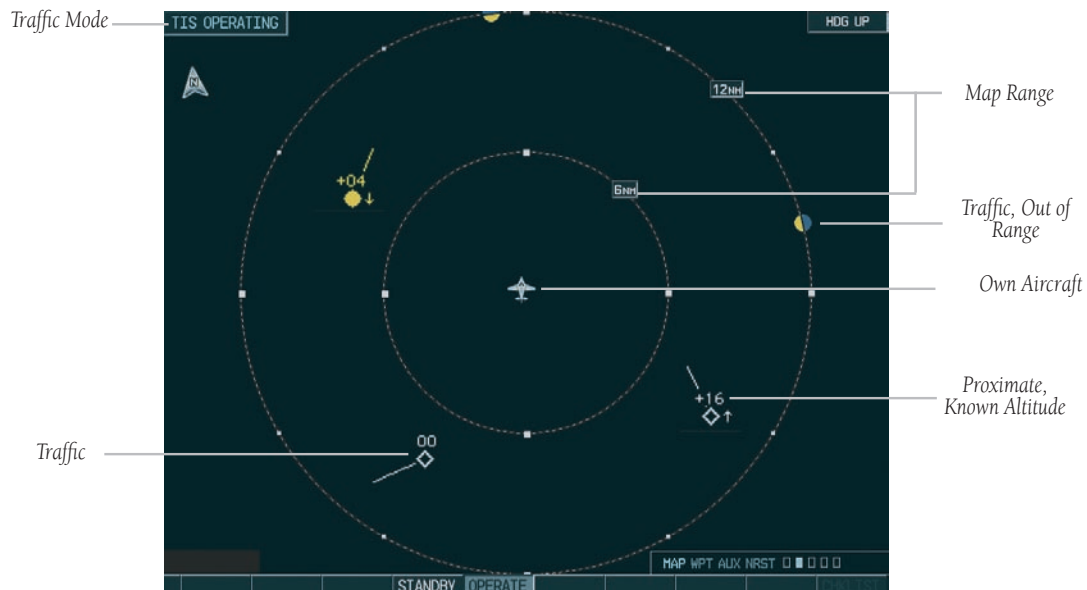
**Figure 7-18  Traffic Map Page**

## 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 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 Diamond 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 'OPERATE' 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 'STANDBY'.

- STANDBY – when the Traffic Map Page displays '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 'OPERATE' 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 (STBY) and operate (ON) modes of operation to manually override automatic operation using the page menu or softkeys.

### To switch between operating modes:

1. Press the **MODE** softkey.

2. Press the **STBY** or **ON** softkey to switch between modes. 'STANDBY' or 'OPERATE' is displayed in the status box located in the upper left corner of the Traffic Map Page OR:

3. 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 informa-tion 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 7-20)
- Obstacles

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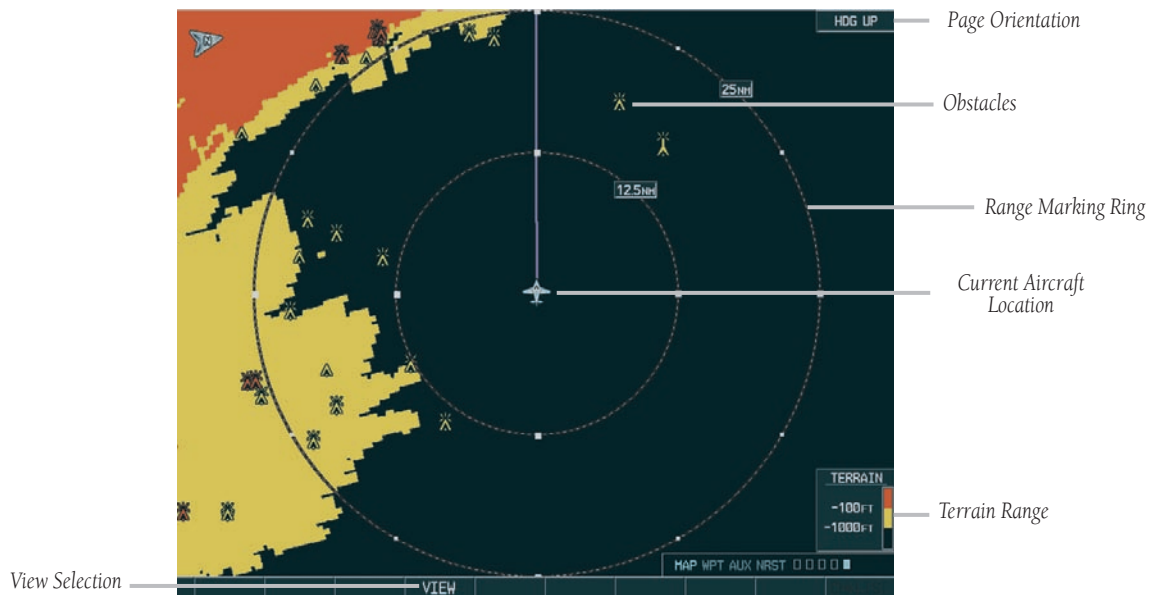


**Figure 7-19  Terrain Proximity Page**

## 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:

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.
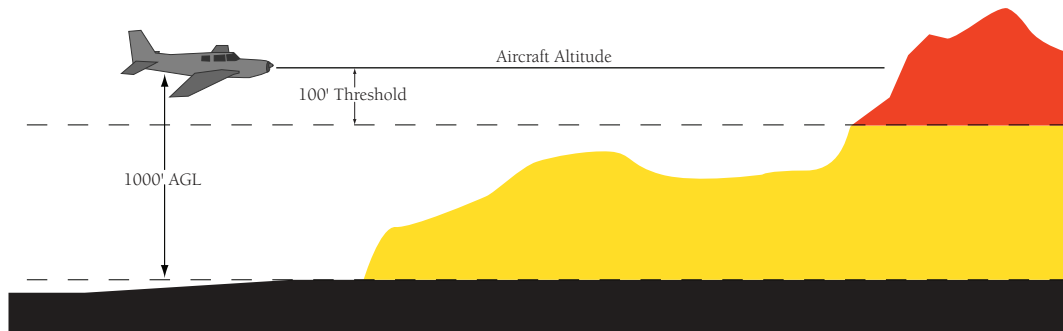


**Figure 7-20  Terrain Scale**

## 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  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
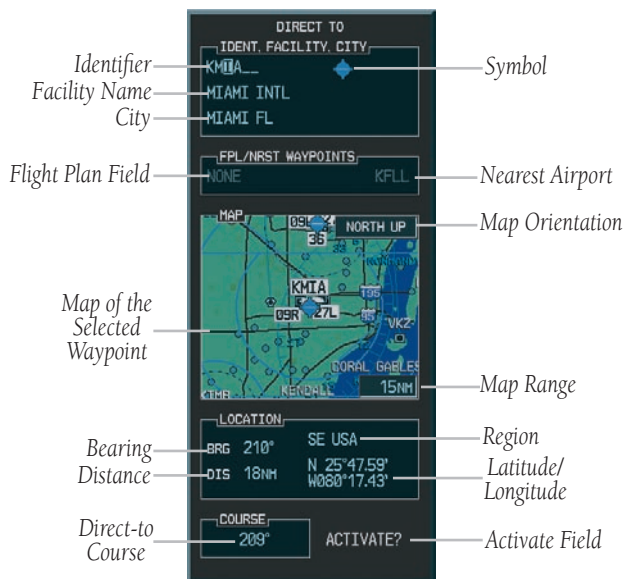


**Figure 7-21  Direct-to Page**

**To select a Direct-to destination:**

1.  Press the **Direct-to** key. The Direct-to page is displayed with the destination field high-lighted.

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:**

Press the **Direct-to** key, followed by press-ing 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 7-22  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 nine 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 again to activate a Direct-to.



**Figure 7-23  Nearest Airport Direct-to**

### Shortcuts

Shortcuts are available when using the **Direct-to** key, allowing the pilot to bypass the use of the **small** and **large 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.

## 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.

## 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 7-24  Canceling Direct-to Navigation**
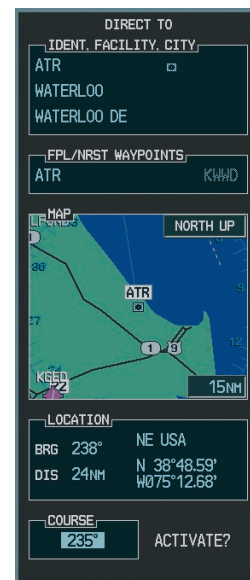


**Figure 7-25  Manual Course Direct-to**

# 7.6  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)
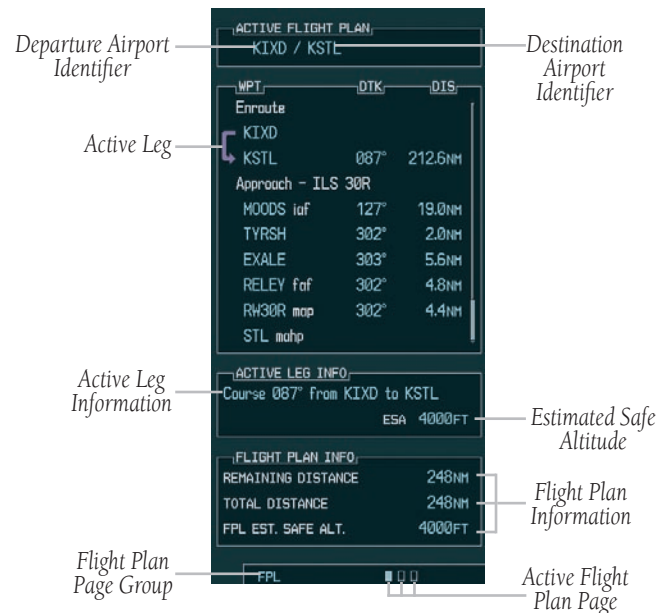


**Figure 7-26  Active Flight Plan Page**

## 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

### 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 appears 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.
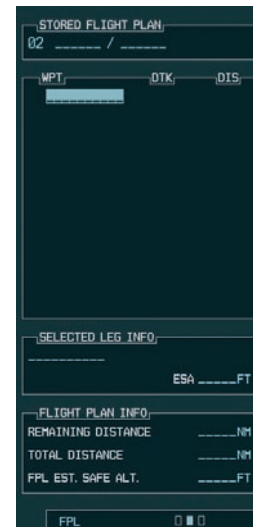


**Figure 7-27  New Flight Plan**

### 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.*
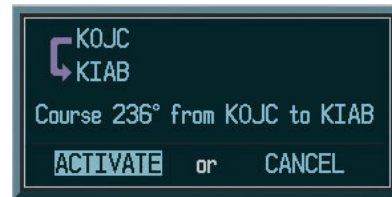
**Figure 7-28  Activate Flight Plan Leg Confirmation**

### 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.
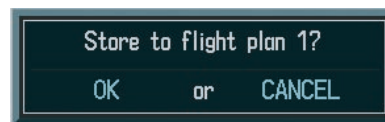
**Figure 7-29  Store Flight Plan Confirmation**
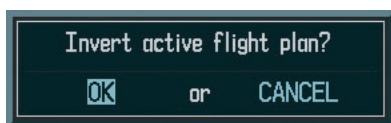
## Invert Flight Plan

'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.

## 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 7-30  Invert Flight Plan**



**Figure 7-31  Invert Flight Plan Confirmation**
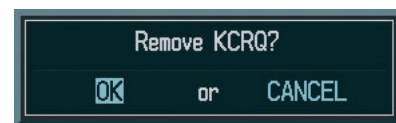


**Figure 7-32  Remove Waypoint Confirmation**

### 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.
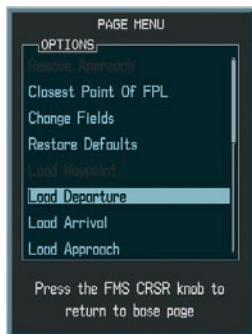


**Figure 7-33  Loading Departure Options**

### 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 either the **small or large FMS** knob to select the desired departure and press the **ENT** key.

4. A window may appear listing runways for the departure. Turn the **small or large 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 either the **small or large 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.
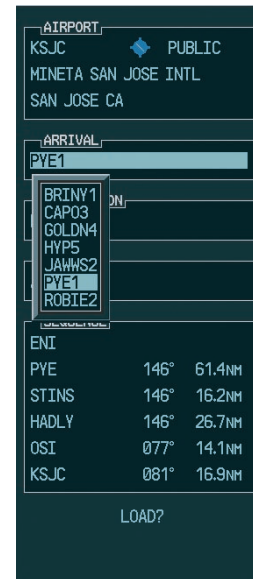
## Load an Arrival

'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 either the **small or large 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 either the **small or large FMS** knob to highlight the desired transition waypoint and press the **ENT** key.

5. A third window is displayed listing available arrival runways. Turn either the **small or large 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 7-34  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 either the **small or large 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 either the **small or large 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 7-35  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.
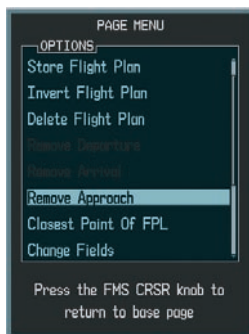


**Figure 7-36  Removing an Approach**

### 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 either the **small or large FMS** knob to display a list of options.

5. Turn either the **small or large 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:

Press the **FPL** key and turn the **small FMS** knob to display the 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

*Flight Plans in Memory*

*Flight Plan List*

*Flight Plan Information*
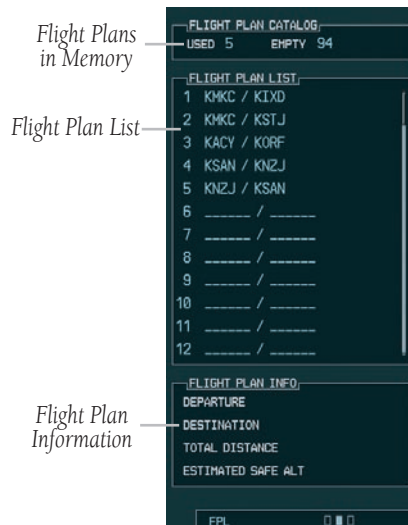
**Figure 7-37  Flight Plan Catalog Page**
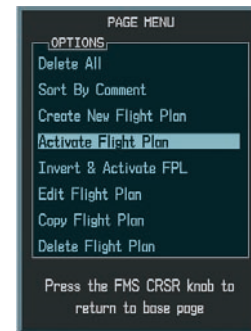
**Figure 7-38  Flight Plan Catalog Page Options**

## 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.

## 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 either the **small or large 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.



**Figure 7-39  Activate Stored Flight Plan Confirmation**

## 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 either the **small or large 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 inverts 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
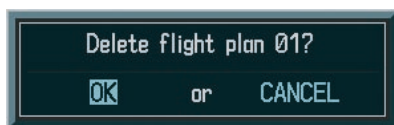


**Figure 7-40  Delete Flight Plan Confirmation**

## 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.

## Point-n-Shoot Flight Plan Creation Feature

The "Point-n-Shoot" flight plan creation 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 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: VNAV has no effect on KAP140 Autopilot operation.*

> *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.
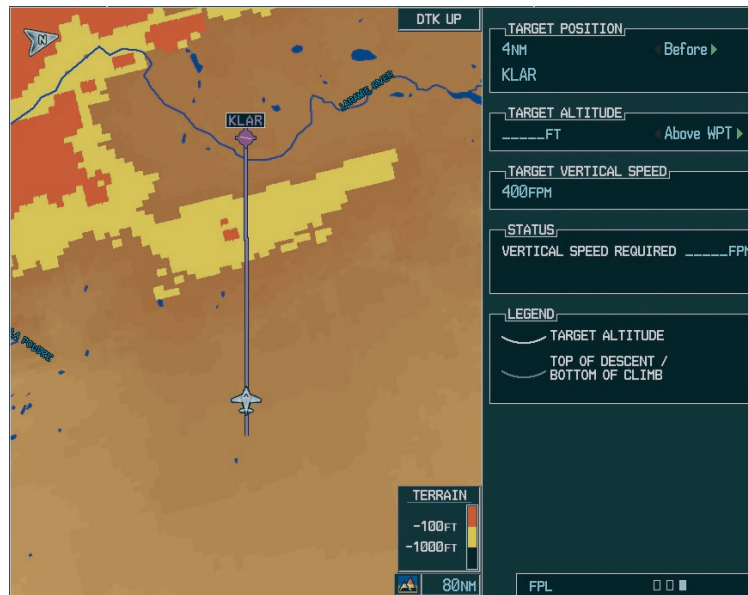


**Figure 7-41  Vertical Navigation (VNAV) Page**

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.
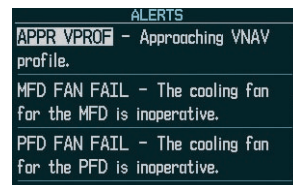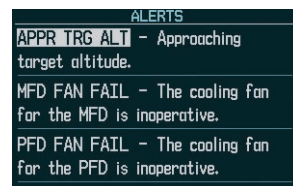


**Figure 7-42  Approaching VNAV Profile Message (PFD)**



**Figure 7-43  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.

# 7.7 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 7-44  Procedures Page**

> ✓ **NOTE:** Pilots should be familiar with section 1-1-20 of the Aeronautical Information Manual (AIM) regarding the use of GPS.

### 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 either the **small or large 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:

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

Each of these legs is displayed on the active flight plan. The 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.*
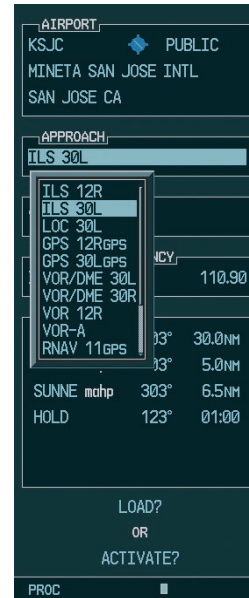


**Figure 7-45 Selecting an Approach Procedure**
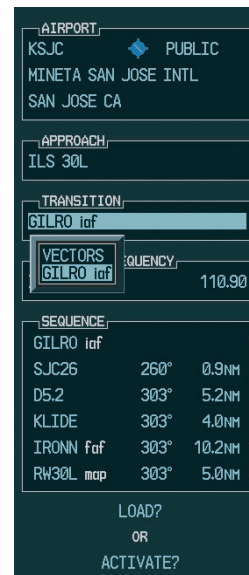


**Figure 7-46 Selecting an Approach Transition**

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.*

LOAD?
OR
ACTIVATE?
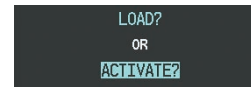
**Figure 7-47  Activating an Approach Procedure**

✓ *NOTE: Specific GPS approach examples are given in the G1000 Diamond Pilot'sTraining Guide. They cane be used in conjunction with the G1000 PC training simulator software for practice in learning what types of approaches the G1000 supports.*

## 7.8  WAYPOINT PAGE GROUP

The Waypoint Page Group (WPT) provides information for the thousands of airports, VORs, NDBs, intersections, runways, frequencies and procedures stored on the SD card.  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.
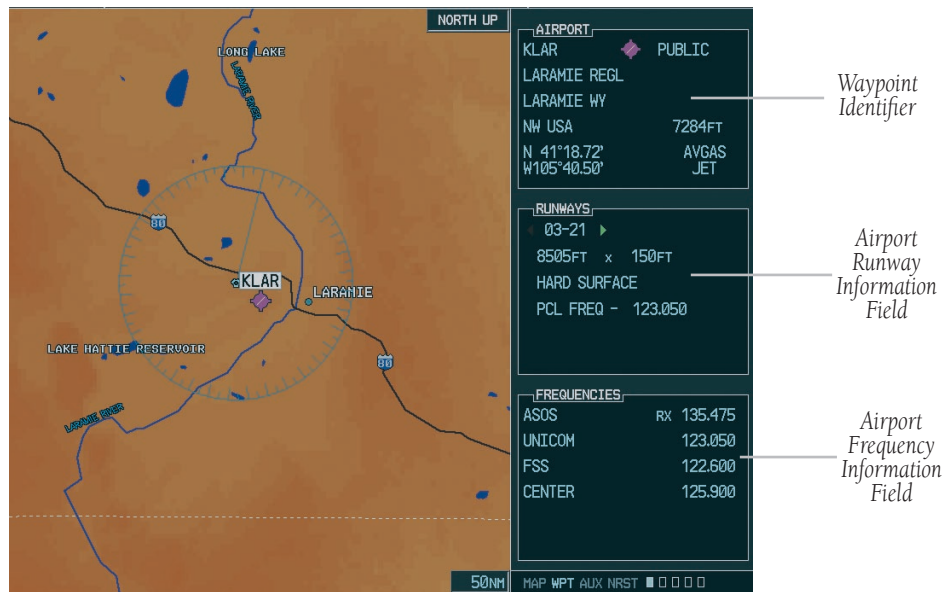


**Figure 7-48  Airport Information Page**

## 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).

```
┌AIRPORT┐
KGSO          ◆   PUBLIC
PIEDMONT TRIAD INTL──────── Facility Field
GREENSBORO_NC─────────────  Location Field
SE USA                926FT
N 36°05.86'           AVGAS
W079°56.24'             JET

┌RUNWAYS┐
  ◄ 05-23 ►

  10000FT x  150FT
  HARD SURFACE
  FULL TIME




┌FREQUENCIES┐
ATIS        RX 128.550
CLEARANCE      121.750
GROUND         121.900
TOWER          119.100
UNICOM         122.950
DEPARTURE   ⓘ  118.500

MAP WPT AUX NRST ■ □ □ □ □ □
```

**Figure 7-49   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)
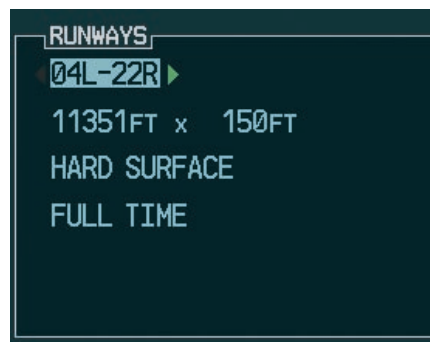


**Figure 7-50   Runway Information Field**

## 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 **small or large 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.
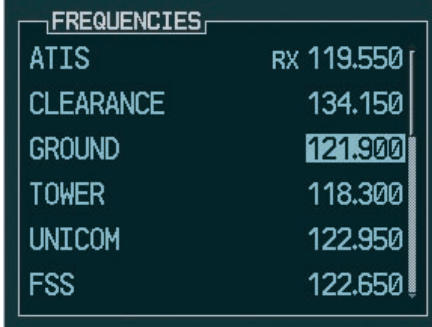
Some listed frequencies may include designations for limited usage, as follows:

- '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 **small or large 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 7-51   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.
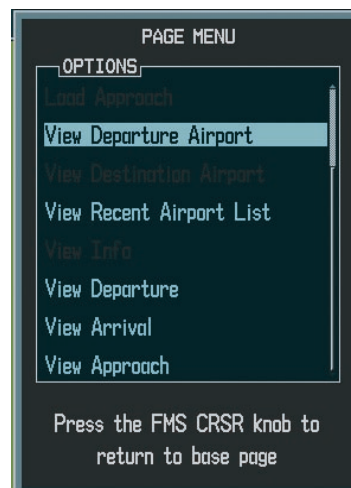


**Figure 7-52  Airport Information Page Menu**

## 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 **small or large 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 **small or large 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 **small or large 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 7-53  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 **small or large 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 **small or large 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 **small or large** 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 7-54  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 **small or large 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 **small or large 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.*
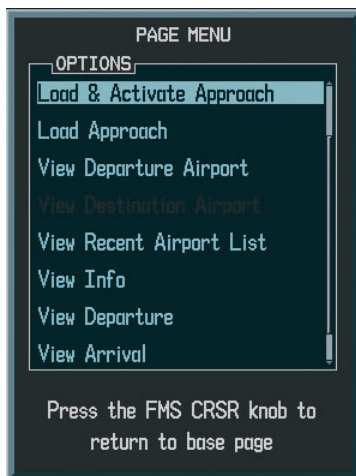
An approach can be loaded from the Airport Information Page.

### 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' 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 7-55  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.*
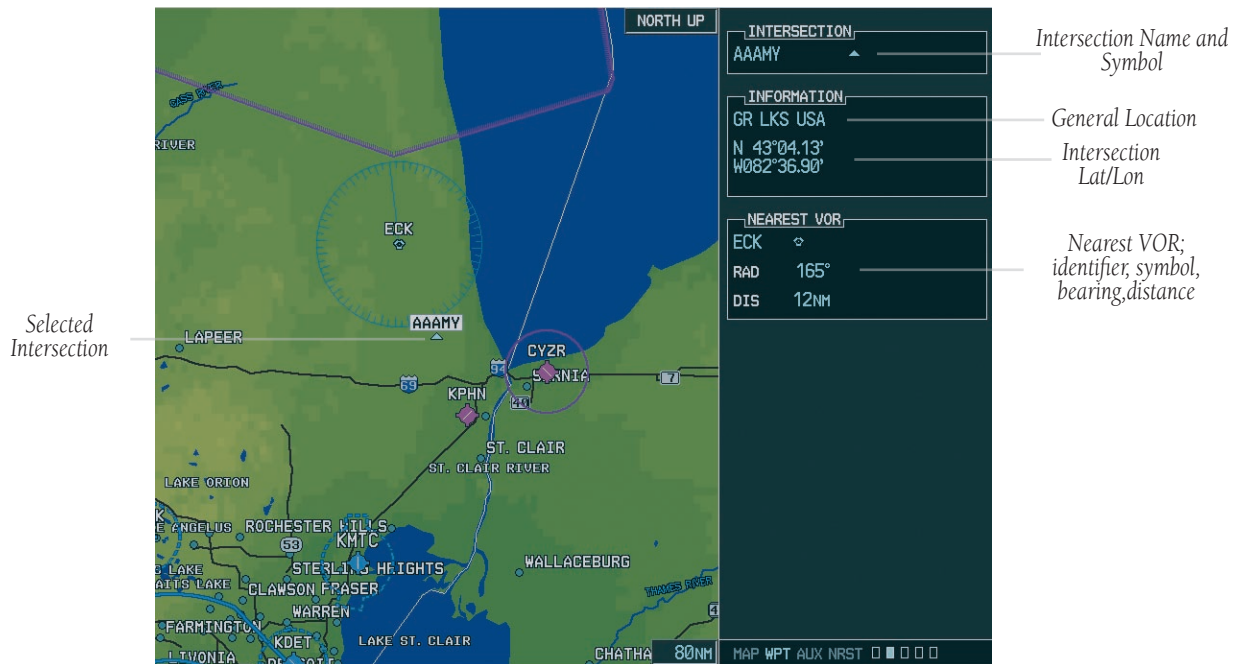


**Figure 7-56  Intersection Information Page**

### 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)

## 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.
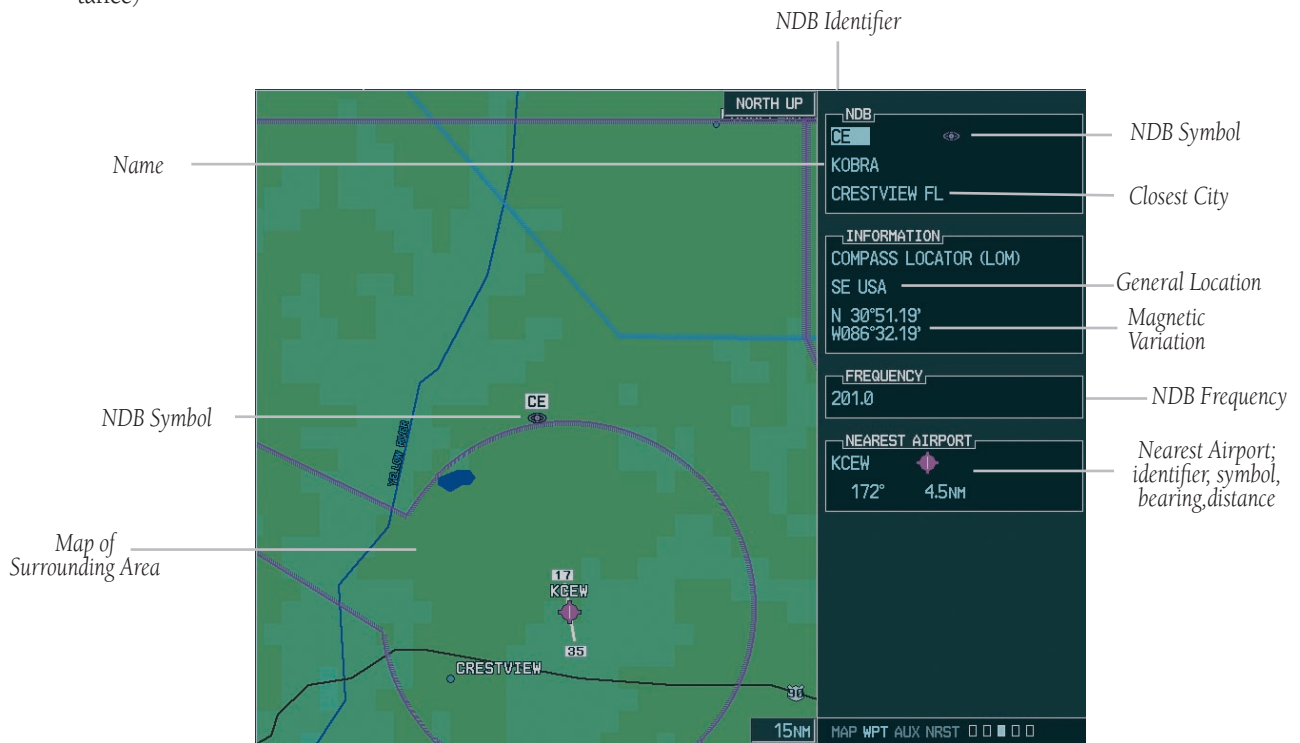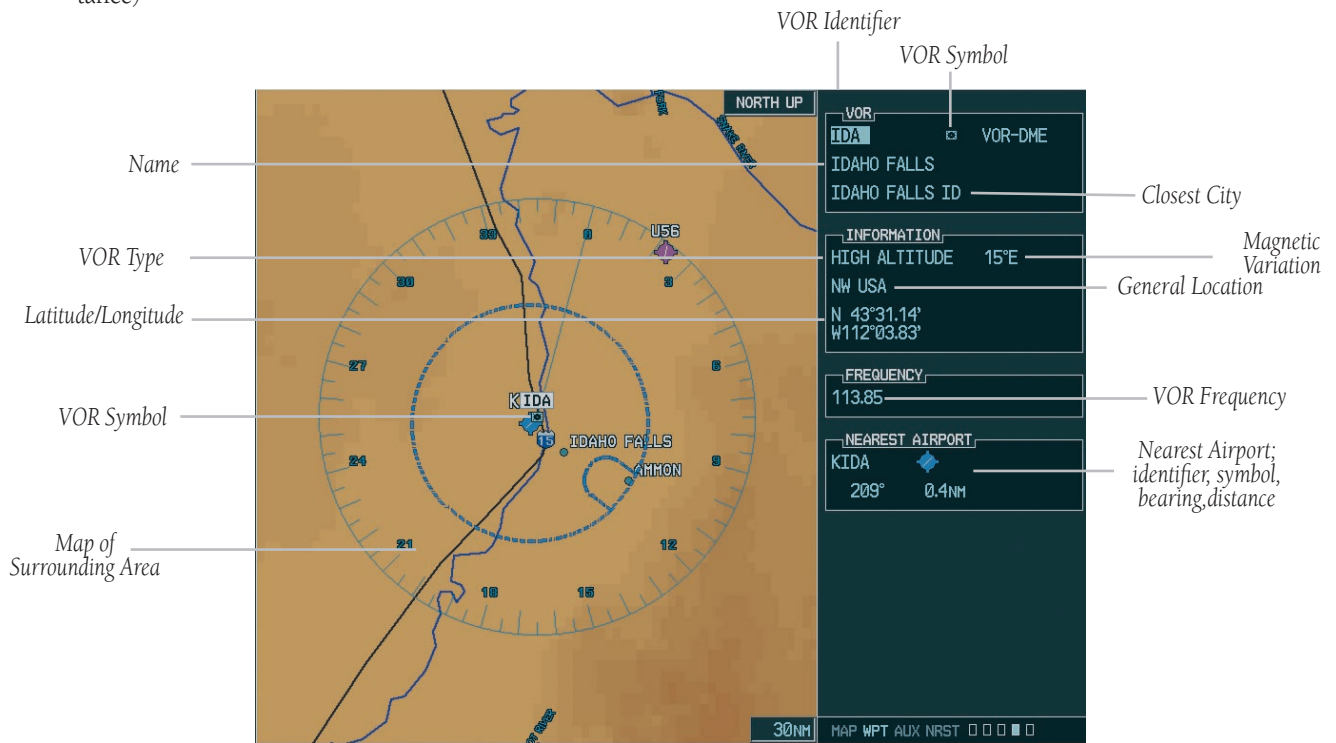


**Figure 7-57  NDB Information Page**

**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.
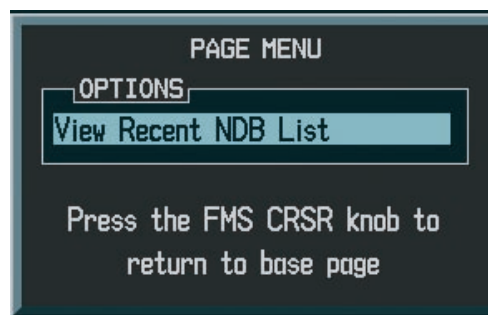


**Figure 7-58  NDB Page Menu**

# 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)

## 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 counterclockwise to select a lower range and rotate it clockwise to select a higher range.



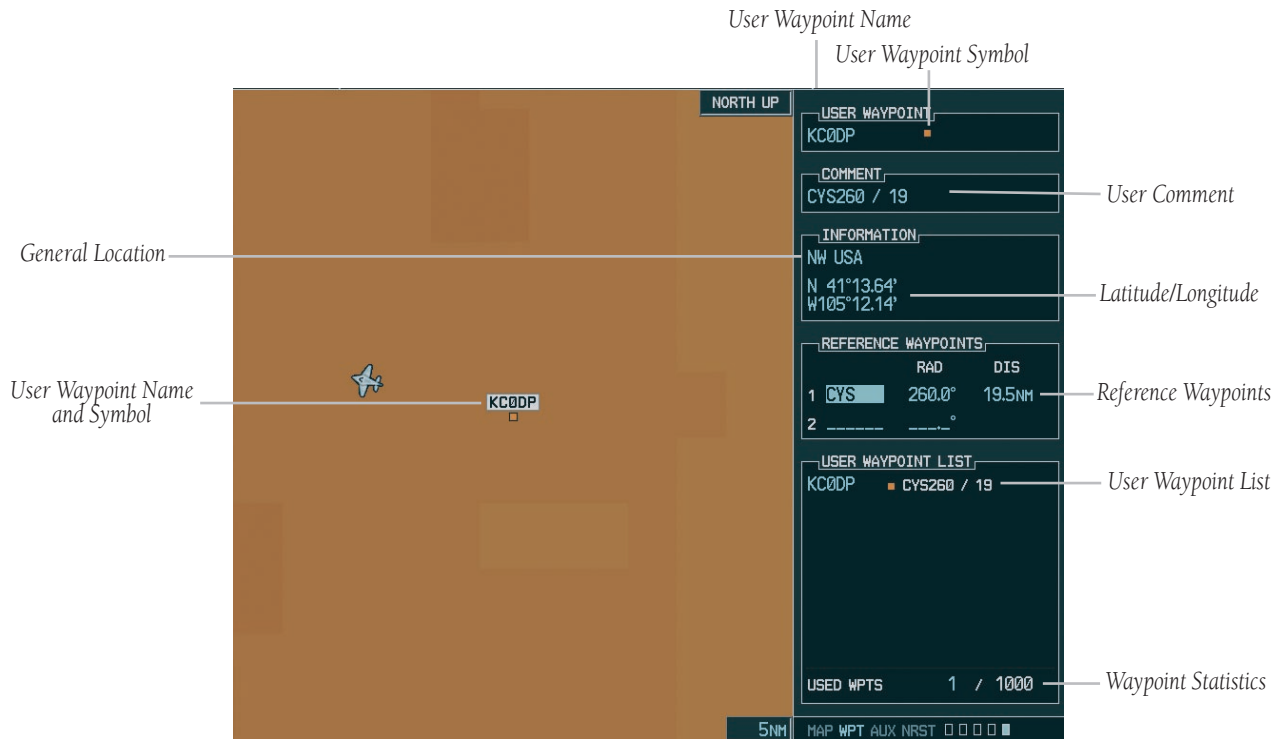**Figure 7-59  VOR Information Page**

### 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.
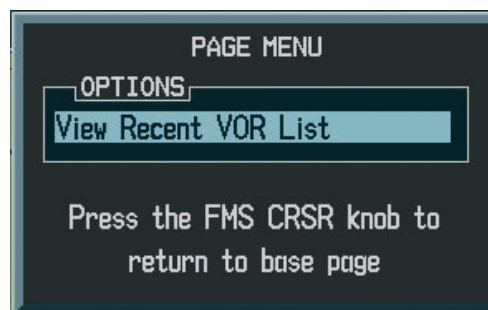


**Figure 7-60  VOR Page Menu**

## 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.

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



**Figure 7-61  User WPT Information Page**

**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 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
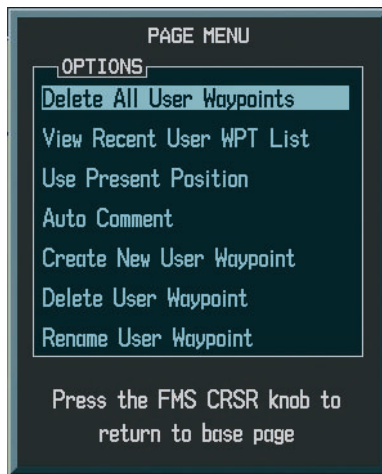


**Figure 7-62  User WPT Page Menu**

'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.

## 7.9 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.
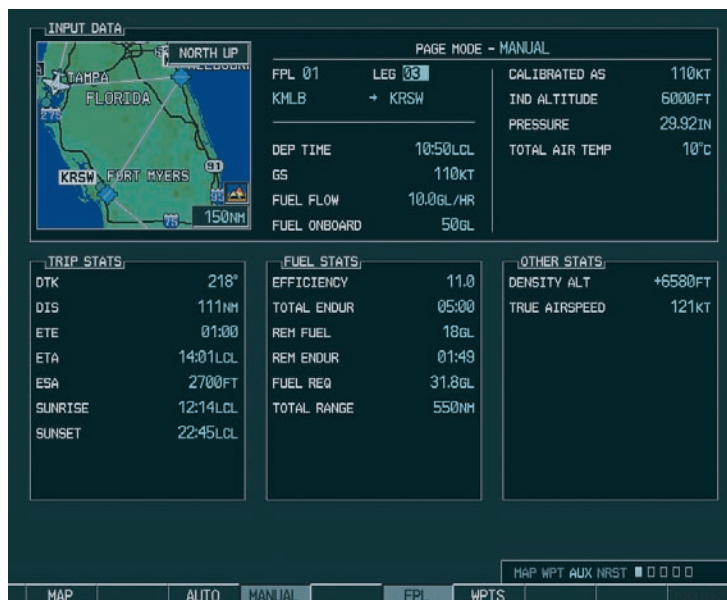


**Figure 7-63  Trip Planning Page**

## 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.
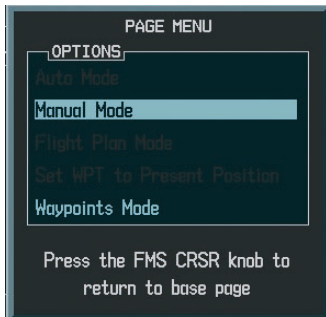


**Figure 7-64  Trip Planning Page Menu**

### 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 enroute
- ESA – Enroute 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.
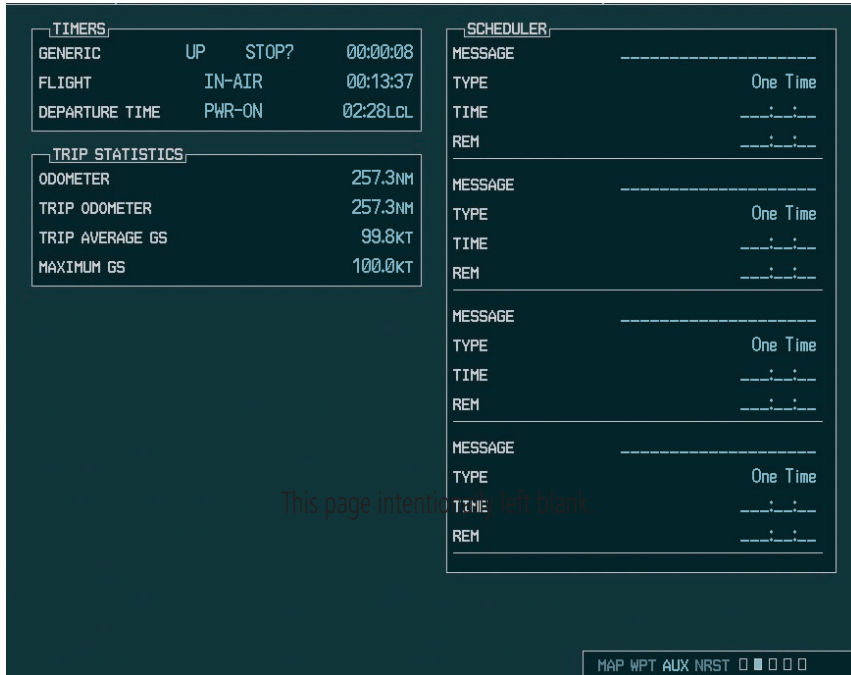


**Figure 7-65  Utility Page**
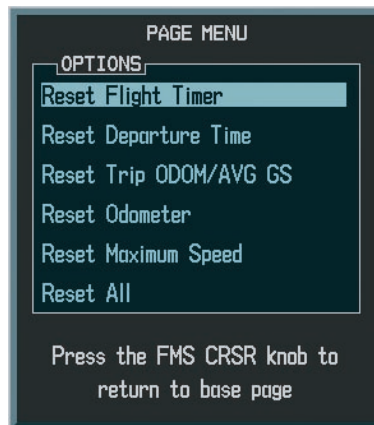


**Figure 7-66  Utility Page Menu**

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## 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 **small or large 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 **small or large 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 **small or large 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 either the **small or large 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 either the **small or large 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 either the **small or large 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 **small or large 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 **small or large 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:
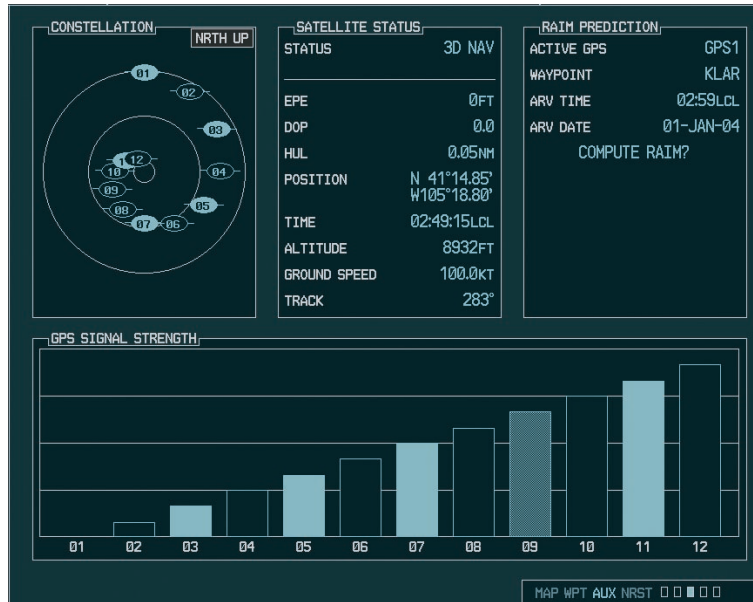


**Figure 7-67  GPS Status Page**
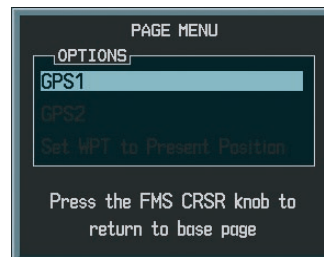


**Figure 7-68  GPS Status Page Menu**

## 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 enroute, 1.0 NM for terminal and 0.3 NM for non-precision approaches). During oceanic, enroute, 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.*
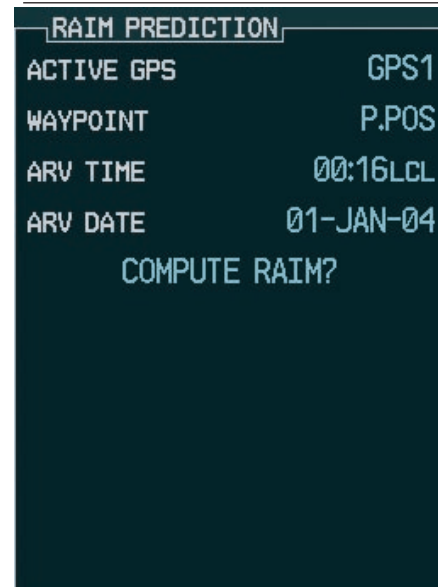


**Figure 7-69  RAIM**

## 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).

**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.
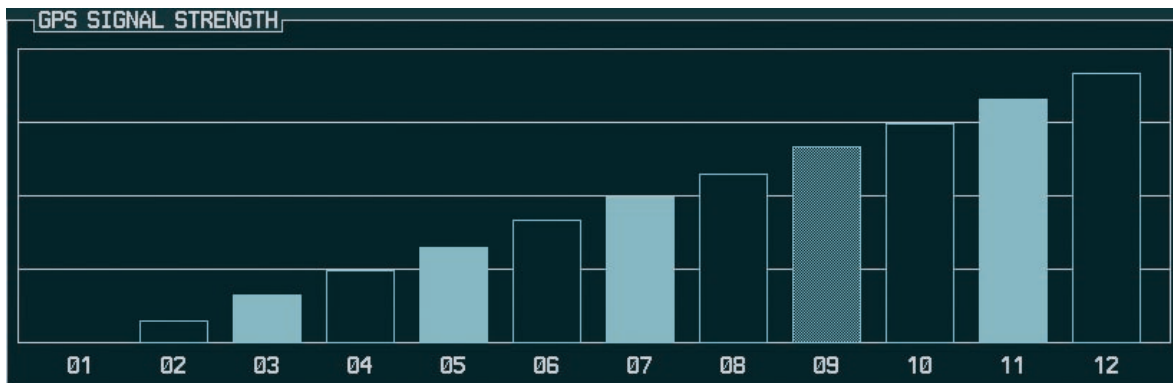


**Figure 7-70  GPS Signal Strength**

## 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



**Figure 7-71  System Setup Page**

## Pilot Profiles

The Pilot Profile section of the System Setup Page allows the pilot to select, create, delete, and rename up to a total of 25 profiles. Profiles can be created based on Garmin Factory Defaults, Default Profile Settings, Current System Settings, and Custom Profile Settings.

The Pilot Profile section of the system setup page displays the following data:

- The current active profile
- Number of profiles slots used
- Number of profile slots available

### Selecting the Active Profile

#### To select an active profile:

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 ACTIVE field in the Pilot Profile box.
4. Turn the **small FMS** knob to display the pilot profile list.
5. Turn the **small or large FMS** knobs to highlight the desired pilot profile.
6. Press the **ENT** key. The G1000 loads and displays the system settings for the selected profile.

> ✓ *NOTE: Pilot profile names cannot start with a blank as the first letter in the name*

### Creating a Profile

#### To create a Profile:

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 CREATE field in the Pilot Profile box.
4. Press the **ENT** key.
5. Turn the **small and large FMS** knobs to enter a profile name. Up to 16 letters and numbers can be used.
6. Once the profile name is entered, press the **ENT** key.
7. The cursor moves to the CURRENT SETTINGS field. If you want the new pilot profile based on the current system settings press the **ENT** key.
8. If you want the new pilot profile to be based on other settings, turn the **small FMS** knob to display the settings list.
9. Turn the **small or large FMS** knobs to highlight the desired settings and press the **ENT** key.
10. The cursor moves to the CREATE field. Press the **ENT** key to create a profile. To cancel the profile, turn the **large FMS** knob to highlight the CANCEL field and press the **ENT** key. To create and activate the profile turn the **large FMS** knob to highlight the CREATE & ACTIVATE field and press the **ENT** key.

### Deleting a Profile

#### To delete a profile:

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 DELETE field in the Pilot Profile box.

4. Press the **ENT** key.

5. Turn the **small or large FMS** knobs to select the profile you want to delete and press the **ENT** key.

6. Turn the **large FMS** knob to select DELETE and press the **ENT** key. You also have the option of canceling the delete request by highlighting CANCEL and pressing the **ENT** key.

### Renaming a Profile

#### To rename a profile:

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 RENAME field in the Pilot Profile box. Press the **ENT** key.

4. Turn the **small or large FMS** knobs to select the profile you want to rename. Press the **ENT** key.

5. Turn the **small and large FMS** knobs to enter the new profile name. Press the **ENT** key.

6. Turn the **large FMS** knob to select RENAME and press the **ENT** key. You also have the option of canceling the renaming request by highlighting CANCEL and pressing the **ENT** key.

### 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.

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 **small or large 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

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 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 **small or large 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 **small or large 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 **small or large 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 Alerts section of the System Setup Page displays the arrival alert setting and trigger distance for arrival alerts. The following operations are allowed from the Arrival Alerts section of the System Setup Page:

- 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 **small or large 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 **small or large 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)
- Enroute Safe Altitude (ESA)
- Estimated Time of Arrival (ETA)
- Estimated Time Enroute (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 **small or large FMS** knobs 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 "enroute" 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 enroute 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 **small or large 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 **small or large 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 **small or large 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 **small or large 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 Diamond service center or Garmin dealer.
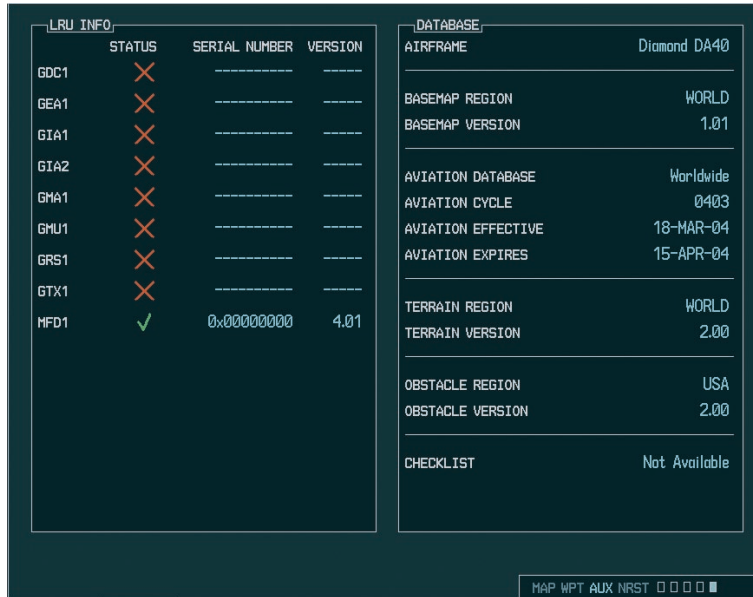


**Figure 7-72  System Status Page**

# 7.10  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

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 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.

**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.
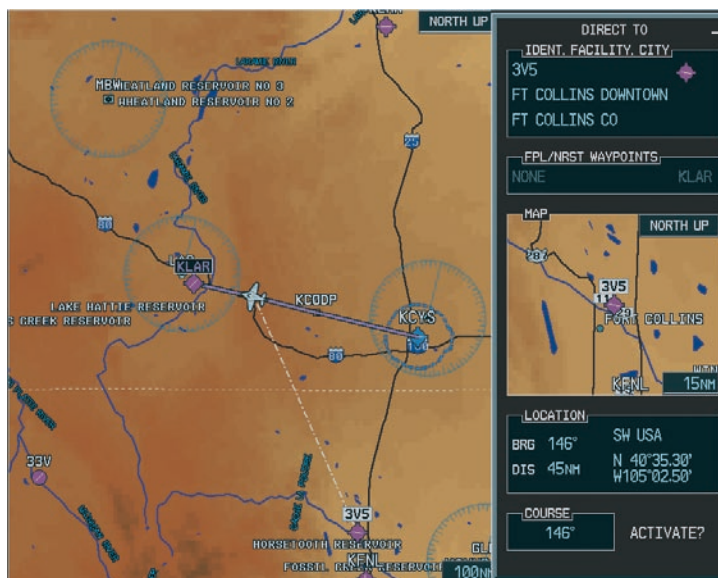


*Direct To Page*

**Figure 7-73  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.



*Airport Identifier, Symbol, Bearing, Distance*

*Airport Name, Closest City, Elevation*

*Runway Information*

*Airport COM frequencies*

*Approaches*
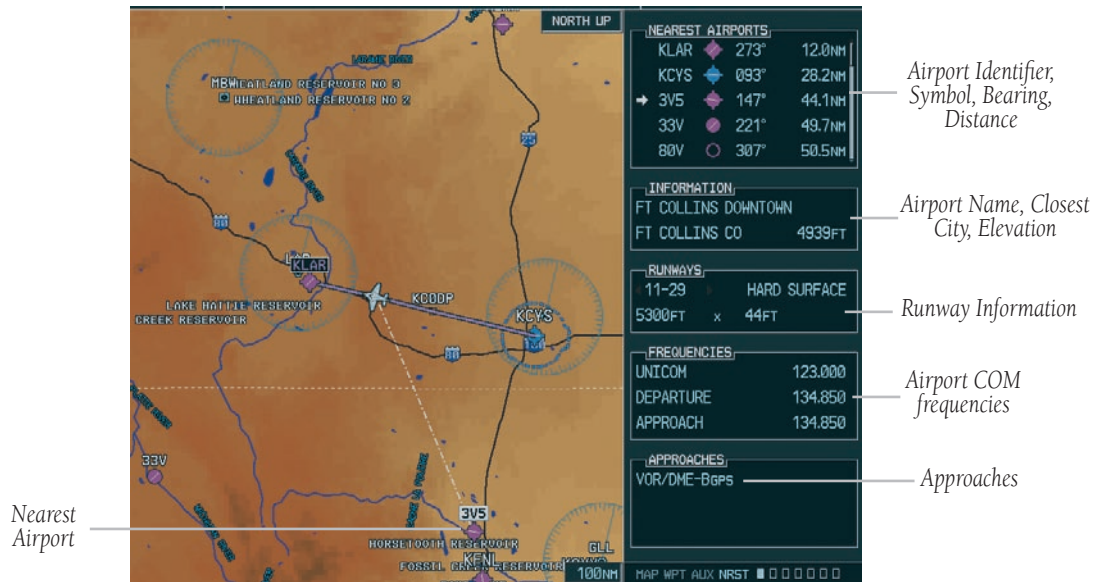
*Nearest Airport*

**Figure 7-74  Nearest Airports Page**



| ENGINE | MAP | APT | RNWY | | APR | | CHKLIST |

**Figure 7-75  APT, RNWY, FREQ, and APR Softkeys**

**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.

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 either the **small or large 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 either the **small or large 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 either the **small or large 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

**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 either the **small or large 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
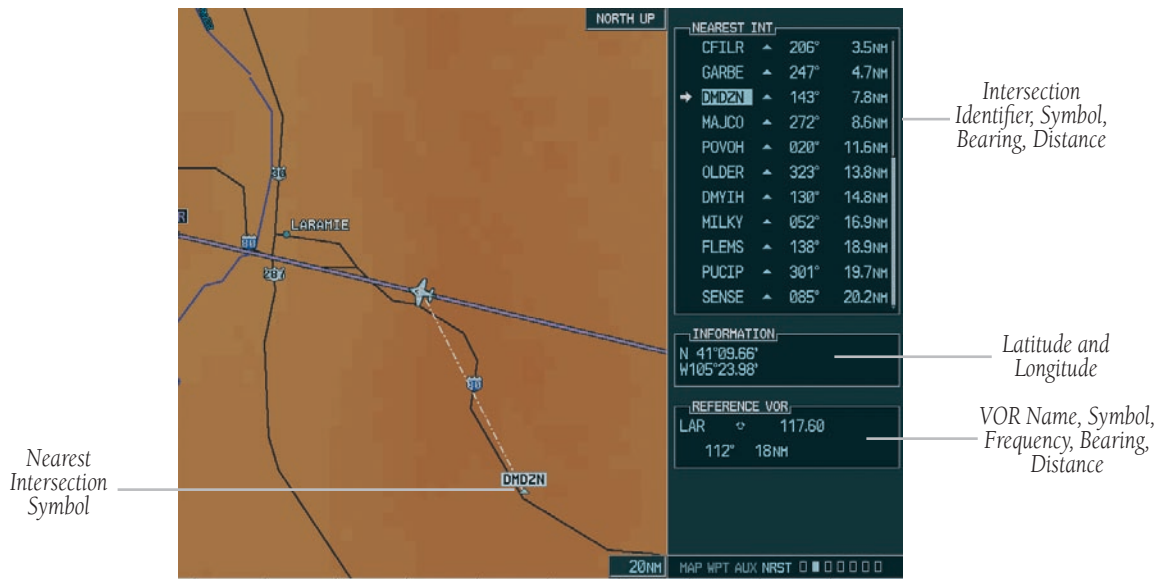


**Figure 7-76  Nearest Intersections Page**

## 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

**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 either the **small or large 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.
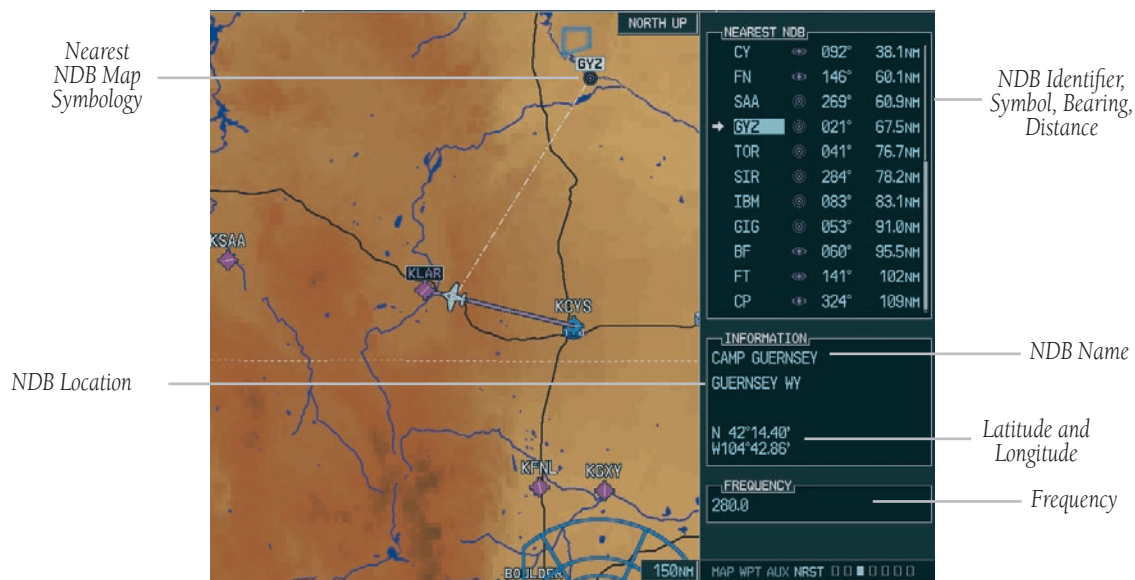


**Figure 7-77  Nearest NDB Page**

## 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)

**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.
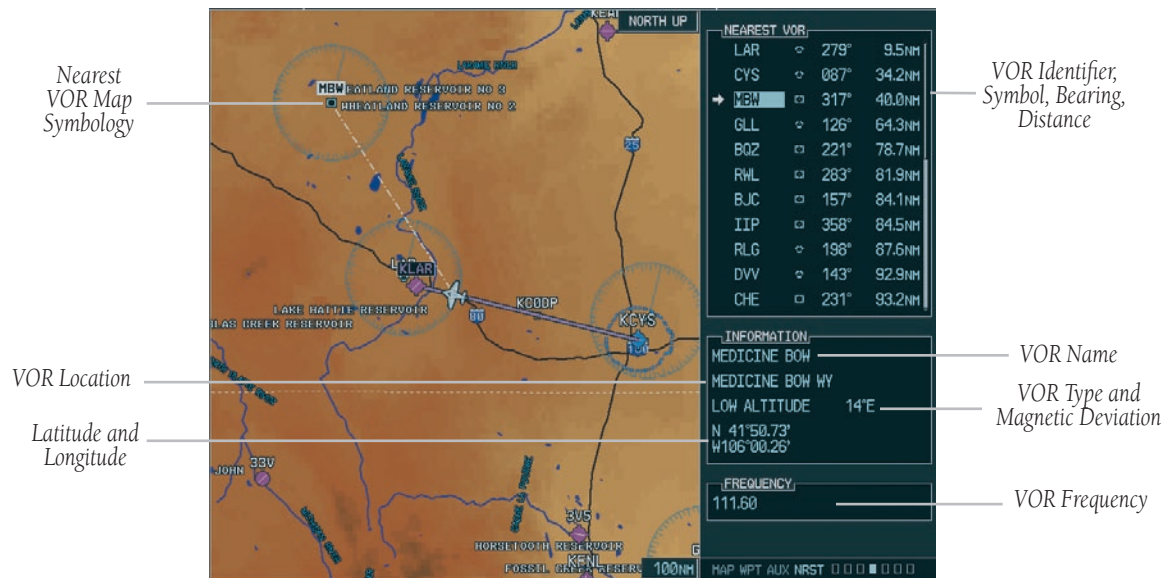


**Figure 7-78  Nearest VOR Page**

**To select a nearest VOR from the Nearest VOR Page:**

1.  Select the Nearest VOR Page.

2.  Press the **VOR** softkey and turn either the **small or large FMS** knob, or press the **ENT** key to select a VOR.

    OR

    Press the **MENU** key. Select the Select VOR Window option and press the **ENT** key. Turn either the **small or large 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.

2.  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.

    OR

    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.

**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 either the **small or large 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.



**Figure 7-79  Nearest User Waypoints Page**

## 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 either the **large or small 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.
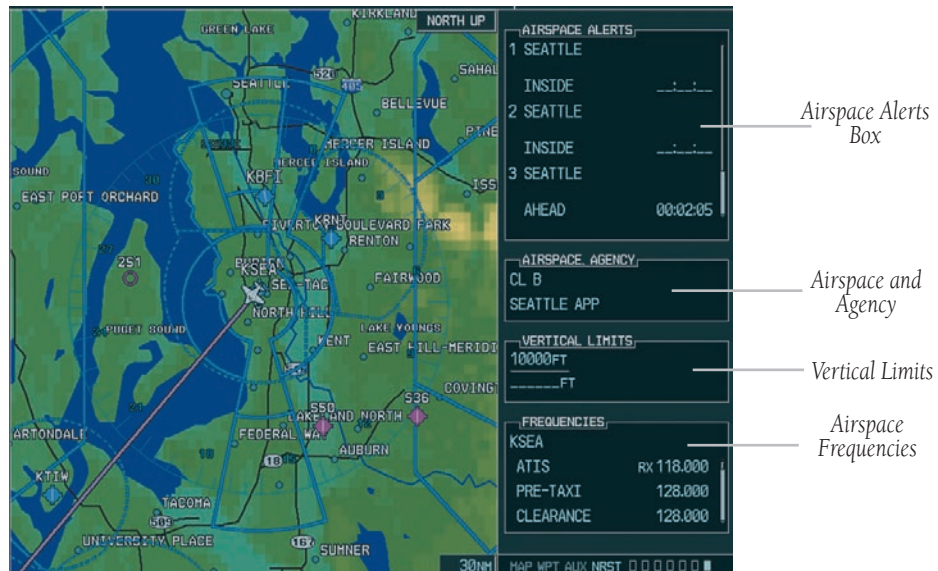


**Figure 7-80  Nearest Airspaces Page**

## 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: 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 either the **small or large 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 either the **small or large FMS** knob to select the desired frequency. Press the **ENT** key to load the frequency into the 'COM' frequency standby field

## Airspaces

The following airspace types are displayed on the Nearest Airspaces Page along with messages in the Airspace Alerts Box:

- 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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# G1000™

*Optional Equipment*

# 8.1  INTRODUCTION

✔ **NOTE:** *Not all optional equipment is available on each airframe.  Refer to the approved Aircraft Flight Manual Supplement (AFMS) for more information.*

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

- L-3 STORMSCOPE® WX-500 Series II Weather Mapping Sensor
- L-3 SKYWATCH®/SKYWATCH® HP Traffic Advisory System (Model SKY497 or SKY899)
- Honeywell® KTA 870 TAS/KMH 880 Multi-Hazard Awareness System
- Ryan TCAD 9900B and 9900BX
- GDL 69/69A Data Link

⚠ **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:** *This section assumes the user has experience operating the G1000 MFD and is also familiar with the applicable optional equipment User's Guide.*

# 8.2 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:** *Stormscope must receive valid heading information for Stormscope lightning data to be displayed on the G1000.*

> **NOTE:** *If the 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 aircraft.*

The Navigation Map Page (Figure 8-1) displays cell or strike data using the yellow lightning strike symbology shown in Table 8-1.

| Lightning Age | Symbol |
|---|---|
| Strike is less than 6 seconds old | ⚡ |
| Strike is between 6 and 60 seconds old | ⚡ |
| Strike is between 1 and 2 minutes old | ✚ |
| Strike is between 2 and 3 minutes old | ✛ |

**Table 8-1  Lightning Age and Symbols**
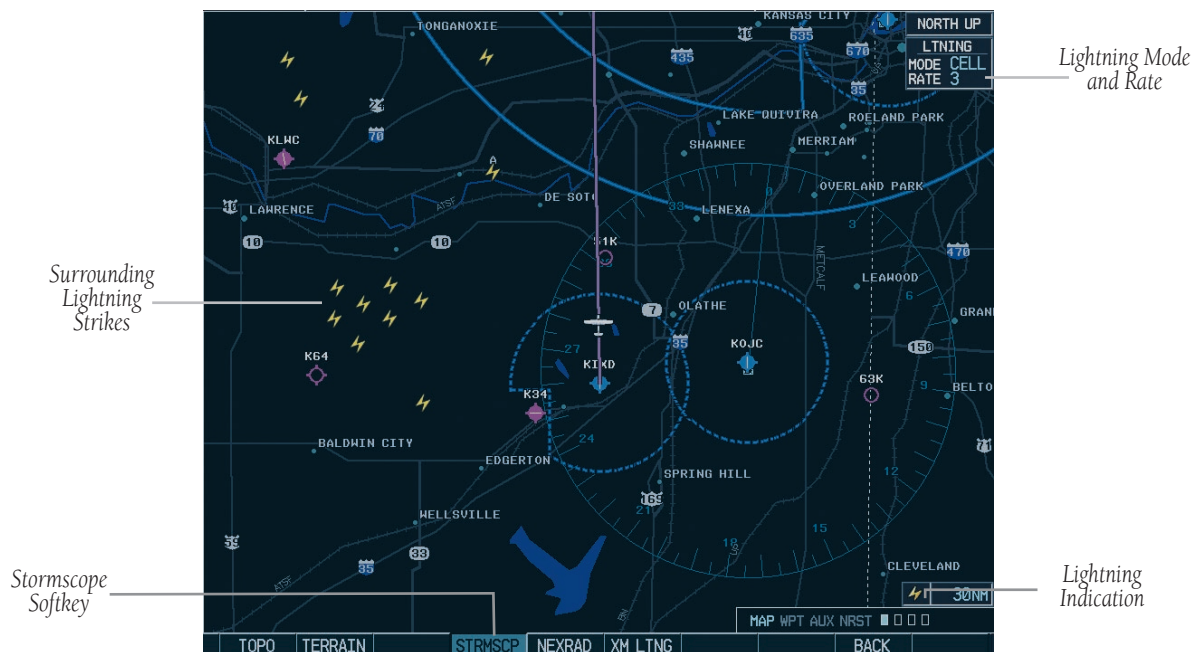


**Figure 8-1  Navigation Map Page Displaying Stormscope Lightning Data**

#### To display Stormscope Lightning Data on the Navigation Map Page:

1.  Press the **MAP** softkey.
2.  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 on the Navigation Map Page at up to 2000 nm zoom range (north up). **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 the aircraft (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.

> **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).
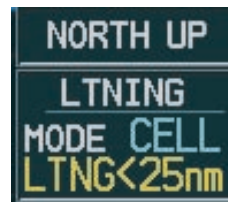


**Figure 8-2  Lightning Display Range Annunciation**

### 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 (Figure 8-3).
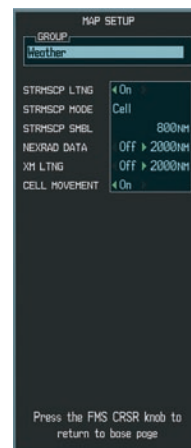


**Figure 8-3  Weather Group Map Setup Menu**

**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/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 and

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' (Figure 8-4).
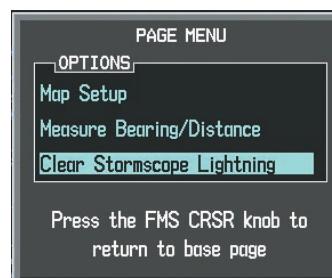


**Figure 8-4  Navigation Map Page Options Menu**

**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.

⚠️ *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.*

## STORMSCOPE PAGE

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

### To select the Stormscope Page:

1. Turn the **large FMS** knob until the Map Page group is selected.

2. Turn the **small FMS** knob until the Stormscope Page is selected (Figure 8-5).

### Stormscope Page Operations

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

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

### To change the display range:

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



**Figure 8-5  Stormscope Page**

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

1. Select the Stormscope Page.

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

OR:

3. Press the **MENU** key. The page menu is displayed with 'Strike Mode' or 'Cell Mode' highlighted (Figure 8-6). Press the **ENT** key on the desired selection.
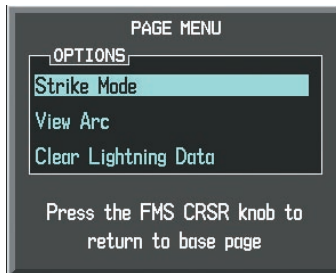


**Figure 8-6 Stormscope Page Options Menu**

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

1. Select the Stormscope Page.

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

OR:

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

**To clear Stormscope lightning data from the display:**

1. Press the **CLEAR** softkey to remove all Stormscope lightning data from the display

OR: Press the **MENU** key. Select 'Clear Lightning Data' and press the **ENT** key.

# 8.3 TRAFFIC ADVISORY SYSTEMS

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

✓ *NOTE: This section describes the G1000 for TAS only. The Multi Function Display section describes the standard TIS interface.*

## INTRODUCTION

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

- L-3 SKYWATCH Traffic Advisory System (Model SKY497)
- L-3 SKYWATCH HP Traffic Advisory System (Model SKY899)
- Honeywell KTA 870 TAS/KMH 880 Multi-Hazard Awareness System
- Ryan 9900B and 9900BX TAS Systems

### Displaying and Configuring TAS Traffic on the Navigation Map Page

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

#### To display TAS traffic on the Navigation Map Page:

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

### To configure TAS traffic on the Navigation Map Page:

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

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

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

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

## Traffic Map Page (Figure 8-7)

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

### To select the Traffic Map Page:

1. Turn the **large FMS** knob until the Map Page group is selected.

2. Turn the **small FMS** knob until the Traffic Map page is selected.

## Monitoring Traffic

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

### Failure Response

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

### Description of Traffic Advisory Criteria

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



**Figure 8-7  Traffic Map Page**

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

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

### Power-up Self-Test

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

1.  If the SKYWATCH passes the power-up test and is on the ground, the Standby Screen is displayed.

2.  If the SKYWATCH passes the power-up test and your aircraft is airborne, the Traffic Map Page is displayed on the last map range used display range and in the unrestricted altitude display mode.

3.  If the SKYWATCH continues to fail, refer to the failure response section in the SKYWATCH Pilot's Guide on actions to take.

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

### To begin tracking intruder aircraft:

Press the **OPERATE** softkey.

### Switching Between Standby and Various Operating Modes

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

### To switch into Operating Mode from Standby Mode:

1.  Press the **OPERATE** softkey or menu 'Operating Mode'.

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

### To switch into Standby Mode from the Traffic Page:

Press the **STANDBY** softkey.

### Altitude Display Mode

### To change the Altitude Display Mode:

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

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

### Traffic Map Page Display Range

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

#### To change the display range on the Traffic Page:

Turn the **RNG** knob to zoom through the following range options:

• SKYWATCH (SKY 497)—2 nm, 2 and 6 nm, 6 and 12 nm.

• SKYWATCH HP (SKY 899)—2 nm, 2 and 6 nm, 6 and 12 nm, 12 and 24 nm.

### Skywatch Voice Announcements

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

## HONEYWELL KTA 870/KMH 880

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

### User-Initiated Test

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

#### To perform a user-initiated test:

Press the **TEST** softkey or use the menu to select 'Test Mode'. Self-test is best accomplished with the range set to 2 and 6 nm, and will last approximately 8 seconds. The following is displayed when a user-initiated test is performed:

• A Traffic Advisory (yellow circle) appears at 9 o'clock, range of 2 miles, 200 feet below and climbing.

• Proximity Traffic (solid white diamond) appears at 1 o'clock, range 3.6 miles, 1000 feet below, descending.

• Non-Threat traffic (open white diamond) appears at 11 o'clock, range of 3.6. miles, flying level 1000 feet above.

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

### KTA 870/KMH 880 Voice Announcements

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

#### To begin tracking intruder aircraft:

Press the **OPERATE** softkey.

### Switching Between Standby and Various Operating Modes

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

#### To switch into Operating Mode from Standby Mode:

1. Press the **OPERATE** softkey or menu 'Operating Mode'.

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

**To switch into Standby Mode from the Traffic Page:**

> Press the **STANDBY** softkey.

### Altitude Display Mode

#### To change the Altitude Display Mode:

> 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 (UN-REST) having a range of maximum specified by the KTA 870/KMH 880 Pilot's Guide.  Refer to the KTA 870/KMH 880 Pilot's Guide for information regarding altitude display ranges.  Note that confirmation is not required. The mode is changed immediately when selected.

### Traffic Map Page Display Range

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

#### To change the display range on the Traffic Page:

> Turn the **RNG** knob to zoom through the following range options:
>
> • Honeywell KTA 870/KMH 880—2 nm, 2 and 6 nm, 6 and 12 nm, 12 and 24 nm, and 24 and 40 nm.

## RYAN 9900B/BX

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



**Figure 8-8  Traffic Map Page (KTA 870 Test Mode)**

# 8.4  GDL 69/69A

## 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 initi-ate XM satellite radio subscription for the GDL 69/69A.*

## GDL 69/69A WEATHER

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

- Navigation Map Page (NEXRAD and XM Lightning only)
- Weather Data Link Page (complete GDL 69/69A 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 section 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 (Figure 8-9)

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

## 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 –** Press to display 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 –** Press to display 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.



*NEXRAD Storms/Legend*

*NEXRAD Weather*

*NEXRAD Softkey*
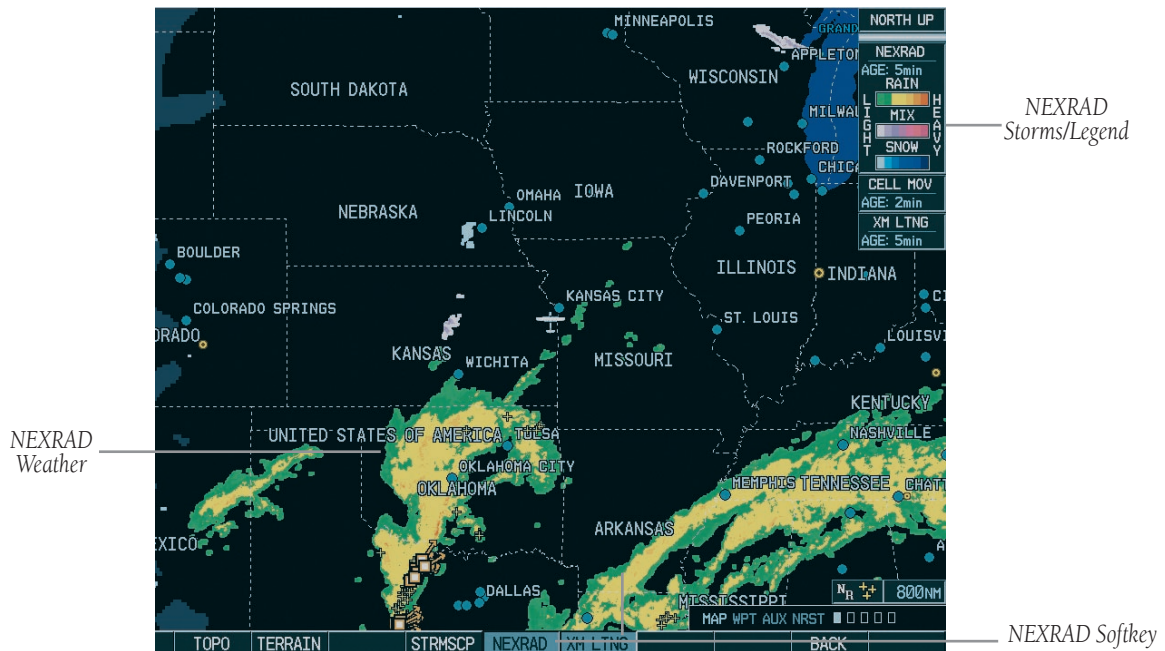
**Figure 8-9  Navigation Map Page Displaying NEXRAD Weather**

### Navigation Map Setup Options (Figure 8-10)

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

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

- XM LTNG - Turns the display of XM Lightning on or off and selects the desired display range.

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



**Figure 8-10  Map Setup Options**

> NOTE: In Figure 8-10, the Stormscope menu options are only shown when the Stormscope unit is installed. Stormscope is not a GDL 69/69A Weather Product.

### To customize the Navigation Map Page:

1. Press the **Menu** key on the Navigation Map Page.

2. Select 'Map Setup' and press the **ENT** key.

3. Turn the **small FMS** knob to display the group selection window. Turn the **small FMS** knob to select the 'Weather Group' and press the **ENT** key.

4. While the Map Setup menu is displayed, turn the **large FMS** knob to highlight and move between the product selections. When an item is highlighted, turn the **small FMS** knob to select the desired option and press the **ENT** key.

### Displaying Weather Data on the Nearest Pages

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

### Displaying METAR and TAF information on the Airport Information Page

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

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

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

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

1. Turn the **large FMS** knob to select the WPT Page Group.

2. Turn the **small FMS** knob to select the Airport Information Page.

3. Press the **WX** softkey to display METAR and TAF text (METAR and TAF information is updated every 12 minutes).

### Displaying Weather Data on the AUX - Trip Planning Page Map

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

### Displaying Weather Data on the Flight Plan Page Maps

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

### Displaying Weather on the Weather Data Link Page (Figure 8-11)

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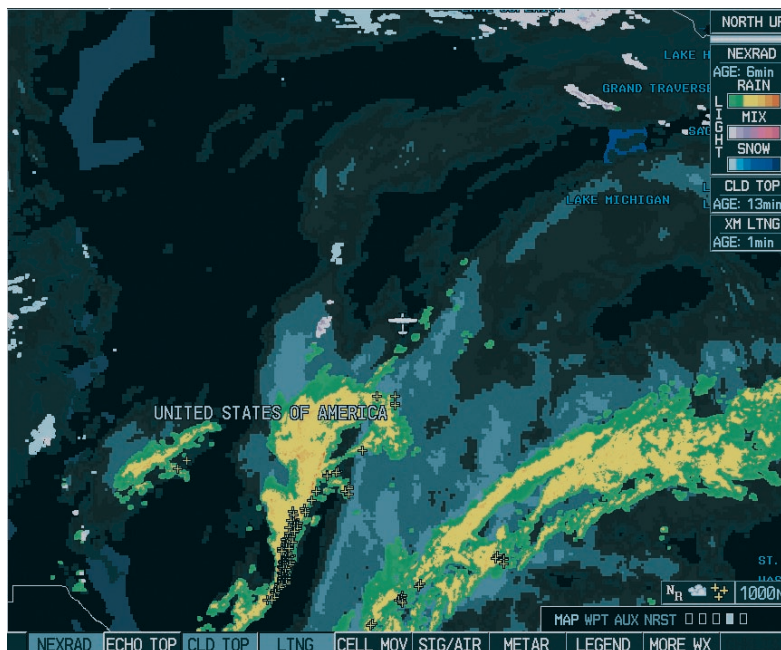


**Figure 8-11  Weather Data Link Page**

### 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.

## Weather Data Link Page Softkeys

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

**NEXRAD –** Press 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 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.

ECHO TOPS
70000 FT
5000 FT
GROUND
NO COVERAGE
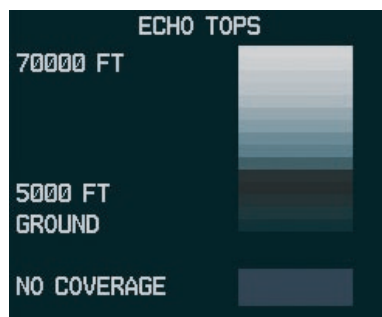
✓ *NOTE: Cloud Tops and Echo Tops use the same color scaling to represent altitude. Turning on both products at the same time is not allowed.*

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 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.

CLOUD TOPS
70000 FT
0 FT
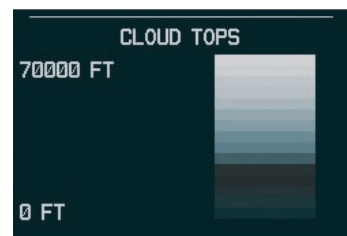
**LTNG –** Press to show the location of cloud-to-ground lightning strikes. The update rate is every five minutes.

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

LIGHTNING
STRIKE        +
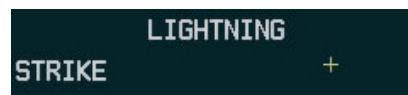
**CELL MOV –** Press to show the storm cells identified by the ground-based system. The movement is depicted by an arrow. The update rate is every 12 minutes.

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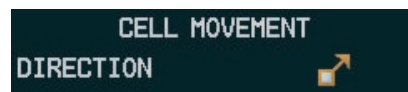
**SIG/AIR –** Press to show SIGMET and AIRMET information to advise the pilot of potentially hazardous weather. The advisory covers an area of at least 3,000 square miles at any one time. The update rate is every 12 minutes.

*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 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 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 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 –** Press for Surface Analysis to show 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.
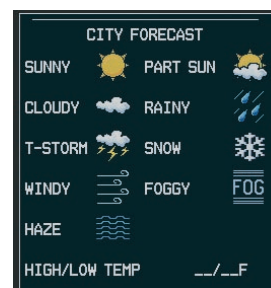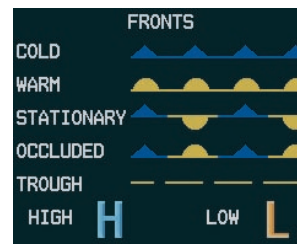




**FRZ LVL –** Press to display contour lines for freezing levels.  The update rate is every 12 minutes.

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

```
                WINDS ALOFT
0 KNOTS                        .
5 KNOTS OR LESS               ⌐
10 KNOTS OR LESS              ⌐|
50 KNOTS OR LESS              ⬊
```
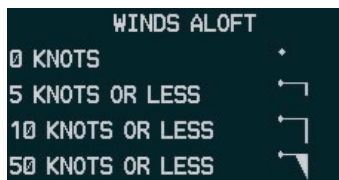
**COUNTY –** Press to provide specific public awareness and protection weather warnings for Tornado, Severe Thunderstorm, and Flood conditions provided by the National Weather Service (NWS). Refer to the Legend for a description of the county warning icon. The update rate is every 5 minutes.

```
            COUNTY WARNINGS
SEVERE THUNDERSTORM    ⚡
TORNADO                🌀
FLOOD                  〰
```

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

```
            CYCLONE
WARNING              🌀
```
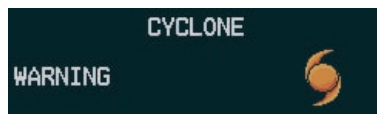
## Weather Data Link Page Setup

The pilot can customize the display of XM Weather data on the Weather Data Link Page (Figure 8-9) using the Weather Page Options Menu.

### 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

When a weather product is active, the product symbol is displayed in the lower right of the screen.  Figure 8-12 shows the symbol for each weather product (read from left to right):

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

*Echo Top (Cloud Top and Echo Top Mutually Exclusive)*

**Figure 8-12  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; '_ _/_ _ /_ _:_ _'.

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

**Table 8-2  Advisory Messages**

## GDL 69/69A – XM DIGITAL AUDIO ENTERTAINMENT

Digital audio entertainment is available through the XM Satellite Radio Service using the GDL 69/69A. 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 8-13):

1. Turn the **large FMS** knob to select the Auxiliary Page Group.

2. Turn the **small FMS** knob to select the Aux - XM Page. Radio and Info softkeys are displayed.

3. Press the **INFO** softkey to show the XM Information Page where information about the XM Satellite Radio feature is displayed.

4. Press the **RADIO** softkey to show the XM Radio Page where the audio entertainment is controlled.
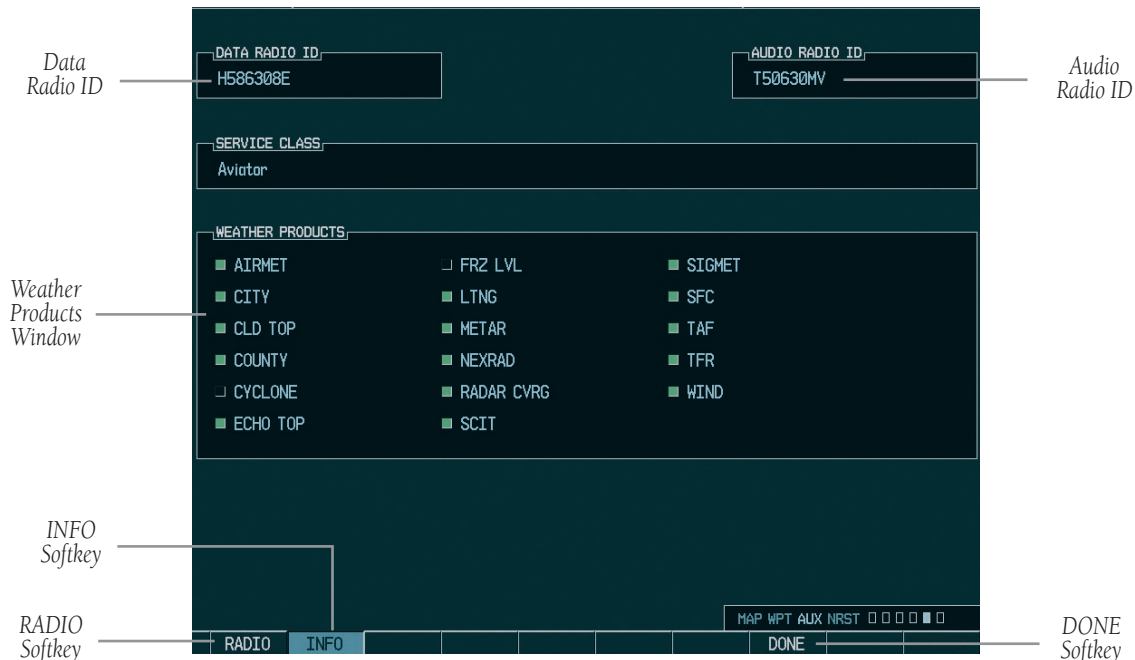


**Figure 8-13  XM Information Page**

### Data and Audio Radio ID

Each GDL 69/69A 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 (Figure 8-14) provides information and control of the audio entertainment features of the XM Satellite Radio.

### XM Radio Softkeys

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

**RADIO** – Accesses XM Satellite Radio audio functions

**INFO** – Shows XM Information, such as Radio IDs, Service Class, and Weather Products

**DONE** – Used during the activation process

**CHNL** – Allows selection of radio channels

**CATGRY** – Allows selection of radio categories

**VOL** – Adjusts audio volume or mutes audio

**PRESETS** – Accesses preset channels (**PS1** - **PS15**) or sets a new preset (**SET**)



**Figure 8-14  XM Radio Page**

### Active Channel

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

### Channels

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

**To step through channels one at a time:**

1. While on the XM Radio page, press the **CHNL** softkey. The user can also push the **FMS** knob to highlight the channel list and turn the **large FMS** knob to scroll through the channels.

2. Press the **CH +** softkey to go up through the list in the Channel window or move down the list with the **CH –** softkey.

**To select a channel directly:**

1. While on the XM Radio Page, press the **CHNL** softkey.

2. Press the **DIR CH** softkey. The channel number in the Active Channel window will be highlighted (Figure 8-14).

3. Press the numbered softkeys located on the bottom of the display to directly select the desired channel number.

4. Press the **ENT** key to activate the selected channel.

### 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 8-15 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 8-15). 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 8-16) 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 8-16  Volume Control**

### To adjust the volume:

1. With the XM Radio Page displayed, press the **VOL** softkey.

2. Press the **VOL –** softkey to reduce volume or press the **VOL +** softkey to increase volume. (Once the **VOL** softkey is pressed, the volume can also be adjusted using the **small FMS** knob).  Pressing the **MUTE** softkey toggles the muting of the radio audio volume.

## Presets

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

### To set a preset channel number:

1. On the Radio Page while listening to the Active Channel that you want to assign as a preset, press **PRESETS**.

2. Press the **SET** softkey.

3. Press the preset key (PS1 - PS15) to assign to the active channel. Press the **MORE** softkey if necessary.

### To select a preset channel number:

1. While on the Radio page, press the **PRESETS** softkey.

2. Press the numbered softkeys **(PS1 - PS15)** on the bottom of the screen to directly select the desired preset channel. Press **MORE**, if necessary.

## GDL 69/69A 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.

| 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 8-3  Weather Product Age**

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 8-17).



**Figure 8-17  LRU Information Window**

### 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.

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# G1000™

*Annunciations and Alerts*

# 9.1 INTRODUCTION

> *NOTE: The Aircraft Flight Manual Supplement (AFMS) takes precedence over any conflicting information found in this document.*

The G1000 Alerting System conveys alerts to the pilot using the following:

- **Annunciation Window**: The Annunciation window displays abbreviated annunciation text. Text is colored based on alert levels described in the Alert Level 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 in the annunciations window simultaneously. A white horizontal line separates the annunciations that are acknowledged from the 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 Annunciations**: 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 press-

ing the softkey annunciation, the pilot acknowledges awareness of the alert. If alerts are still present, the **ALERTS** label is displayed in reverse 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 a window 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 9.2 Alert Level Definitions for more information.
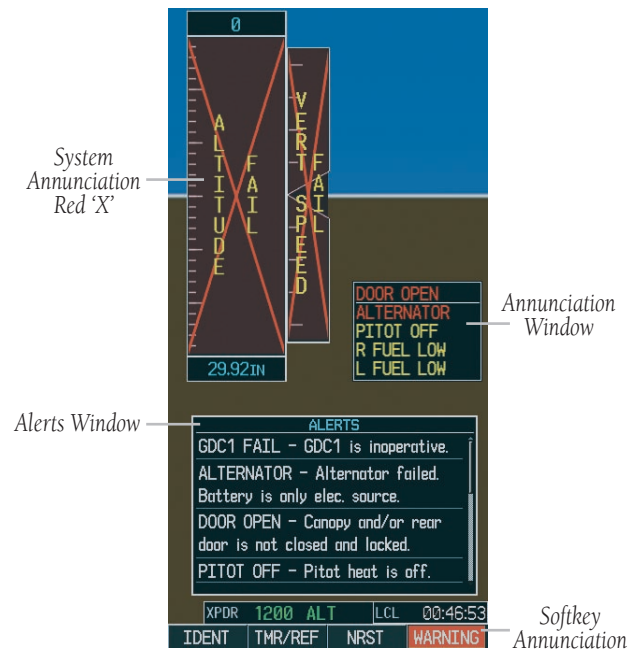


**Figure 9-1  G1000 Alerting System**

# 9.2  ALERT LEVEL DEFINITIONS

The G1000 Alerting System, as installed in the Diamond DA40, DA40F and DA40D models, uses four alert levels:

- **WARNING:**  This level of alert requires immediate pilot attention.  A warning alert is accompanied by an annunciation in the Annunciation window along with a continuous aural tone.  Warning alert text is RED.  A warning alert is also accompanied by a flashing **WARNING** softkey annunciation.  Pressing the **WARNING** softkey acknowledges the presence of the warning alert and stops the aural tone.  Pressing the **ALERTS** softkey displays the related alert message in the Alerts window.

- **CAUTION:**  This level of alert indicates the existence of abnormal conditions on the aircraft that may require pilot intervention.  A caution alert is accompanied by an annunciation in the Annunciation window along with a single aural tone.  Caution alert text is YELLOW.  A caution alert is also accompanied by a flashing **CAUTION** softkey annunciation.  Pressing the **CAUTION** softkey acknowledges the presence of the caution alert.  Pressing the **ALERTS** softkey displays the related alert message in the Alerts window.

- **ANNUNCIATION ADVISORY:**  This level of alert provides general information to the pilot.  An annunciation advisory alert is accompanied by an annunciation in the Annunciation window.  Annunciation advisory alert text is WHITE.  An annunciation advisory alert is also accompanied by a flashing **ADVISORY** softkey annunciation.  Pressing the **ADVISORY** softkey acknowledges the presence of the message advisory alert and displays the alert message in the Alerts window.

- **MESSAGE ADVISORY:**  Message advisory alerts are different from annunciation advisory alerts in that they do not appear in the Annunciation window.  A message advisory alert is only accompanied by a flashing **ADVISORY** softkey annunciation.  The majority of G1000 alerts are message advisories and are listed in the G1000 System Message Advisories section.

**Figure 9-2  Alerts Softkey Annunciations**

## 9.3  DA40 & DA40F
## AIRCRAFT ALERTS

The following alerts are configured specifically for the Diamond DA40 & DA40F.  See the Aircraft Flight Manual Supplement (AFMS) for recommended pilot actions.

### WARNING Alerts

| Annunciation Window Text | Alerts Window Message | Audio Alert |
|---|---|---|
| OIL PRES LO | Oil pressure is below 25 psi. | Continuous Aural Tone |
| FUEL PRES LO * | Fuel pressure is below 14 psi. | Continuous Aural Tone |
| FUEL PRES HI * | Fuel pressure is greater than 35 psi. | Continuous Aural Tone |
| ALTERNATOR | Alternator failed.  Battery is only electrical source. | Continuous Aural Tone |
| STARTER ENGD | Starter is engaged. | Continuous Aural Tone |
| DOOR OPEN | Canopy and/or rear door is not closed and locked. | Continuous Aural Tone |
| TRIM FAIL | Autopilot automatic trim is inoperative. | Continuous Aural Tone |

\* Values differ for the DA40F; refer to the Aircraft Flight Manual Supplement (AFMS) for more information.

### CAUTION Alerts

| Annunciation Window Text | Alerts Window Message | Audio Alert |
|---|---|---|
| L FUEL LOW | Left fuel quantity is less than 3 gallons. | Single Aural Tone |
| R FUEL LOW | Right fuel quantity is less than 3 gallons. | Single Aural Tone |
| LOW VOLTS | On-board voltage is below 24 V. | Single Aural Tone |
| PITOT FAIL | Pitot heat is inoperative. | Single Aural Tone |
| PITOT OFF | Pitot heat is off. | Single Aural Tone |

## Message Advisory Alerts

| Alerts Window Message | Audio Alert |
|---|---|
| **PFD FAN FAIL** – The cooling fan for the PFD is inoperative. | None |
| **MFD FAN FAIL** – The cooling fan for the MFD is inoperative. | None |
| **GIA FAN FAIL** – The cooling fan for the GIAs is inoperative. | None |

## Voice Alerts

The following voice alerts can be configured for 'Male' or 'Female' gender by using the AUX System Setup Page on the MFD.

**NOTE:** Voice alerts are provided to the G1000 by the GIA 63 #1.  Should this unit fail, audio and voice alerts are no longer available.

| 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. |

## 9.4  DA40D
## AIRCRAFT ALERTS

The following alerts are configured specifically for the Diamond DA40D. See the Aircraft Flight Manual Supplement (AFMS) for recommended pilot actions.

**WARNING Alerts**

| Annunciation Window Text | Alerts Window Message | Audio Alert |
|---|---|---|
| ENG TEMP | Engine coolant temp is >105 deg C. | Continuous Aural Tone |
| OIL TEMP | Engine oil temp is greater than 140 deg C. | |
| OIL PRES | Engine oil pressure is less than 1.2 bar. | |
| GBOX TEMP | Engine gearbox temp is >120 deg C. | |
| ALTN AMPS | Engine alternator output is >90 amps. | |
| ALTN FAIL | Engine alternator has failed. | |
| STARTER | Engine starter is engaged. | |
| L / R FUEL TEMP | Left/right fuel temp is greater than 75 deg C. | |
| DOOR OPEN | Front, rear, or baggage door is not closed. | |
| AP TRIM FAIL | Autopilot automatic trim is inoperative. | No Tone |

**CAUTION Alerts**

| Annunciation Window Text | Alerts Window Message | Audio Alert |
|---|---|---|
| ECU A FAIL | Engine ECU A has failed. | Single Aural Tone |
| ECU B FAIL | Engine ECU B has failed. | |
| FUEL LOW | Left fuel quantity is low. | |
| VOLTS LOW | Bus voltage is less than 12.6 volts. | |
| COOL LVL | Engine coolant level is low. | |
| PITOT FAIL | Pitot heat has failed. | |
| PITOT HT OFF | Pitot heat is off. | |

## Annunciation Advisory Alerts

| Annunciation Window Text | Alerts Window Message | Audio Alert |
|---|---|---|
| GLOW ON | Engine glow plug active. | No Tone |
| FUEL XFER | Fuel transfer in progress. | No Tone |

## Message Advisory Alerts

| Alerts Window Message | Audio Alert |
|---|---|
| **PFD FAN FAIL** – The cooling fan for the PFD is inoperative. | |
| **MFD FAN FAIL** – The cooling fan for the MFD is inoperative. | No Tone |
| **GIA FAN FAIL** – The cooling fan for the GIAs is inoperative. | |

## Voice Alerts

The following voice alerts can be configured for 'Male' or 'Female' gender by using the Aux System Setup Page on the MFD.

*NOTE: Voice alerts are provided to the G1000 by the GIA 63 #1. Should this unit fail, audio and voice alerts will no longer be available.*
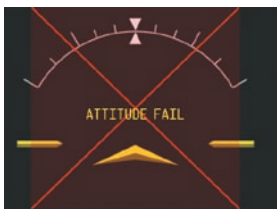
| Voice Alert | Alert Trigger |
|---|---|
| "Traffic" | Played when a Traffic Advisory (TA) is issued. |
| "Traffic Not Available" | Played when the traffic system fails or cannot communicate. |

## 9.5  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 Supplement (AFMS) 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.  If any window continues 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. |
|  | Display system is not receiving valid OAT information from the air data computer. |
|  | Display system is not receiving valid true airspeed information from the air data computer. |
|  | GPS information is either not present or is invalid for navigation use. Note that the AHRS utilizes GPS inputs during normal operation.  AHRS operation may be degraded if GPS signals are not present (see the AFMS). |
|  | Display system is not receiving valid transponder information. |
| Other Various Red "X" Indications | A red 'X' through any other display field (such as engine instrumentation fields) indicates that the field is not receiving valid data. |

A red 'X' may be the result of an LRU or an LRU function failure. The figure presented below illustrates all possible flags and the responsible LRUs.

GIA 63 Integrated Avionics Units

GIA 63 Integrated Avionics Units

GDC 74A Air Data Computer

GRS 77 AHRS or GMU 44 Magnetometer

GEA 71 Engine Airframe Unit, GIA 63 Integrated Avionics Unit, or ECU

GIA 63 Integrated Avionics Units

GDC 74A Air Data Computer

GIA 63s or ADF/DME Source

GTX 33 Transponder or GIA 63 Integrated Avionics Units
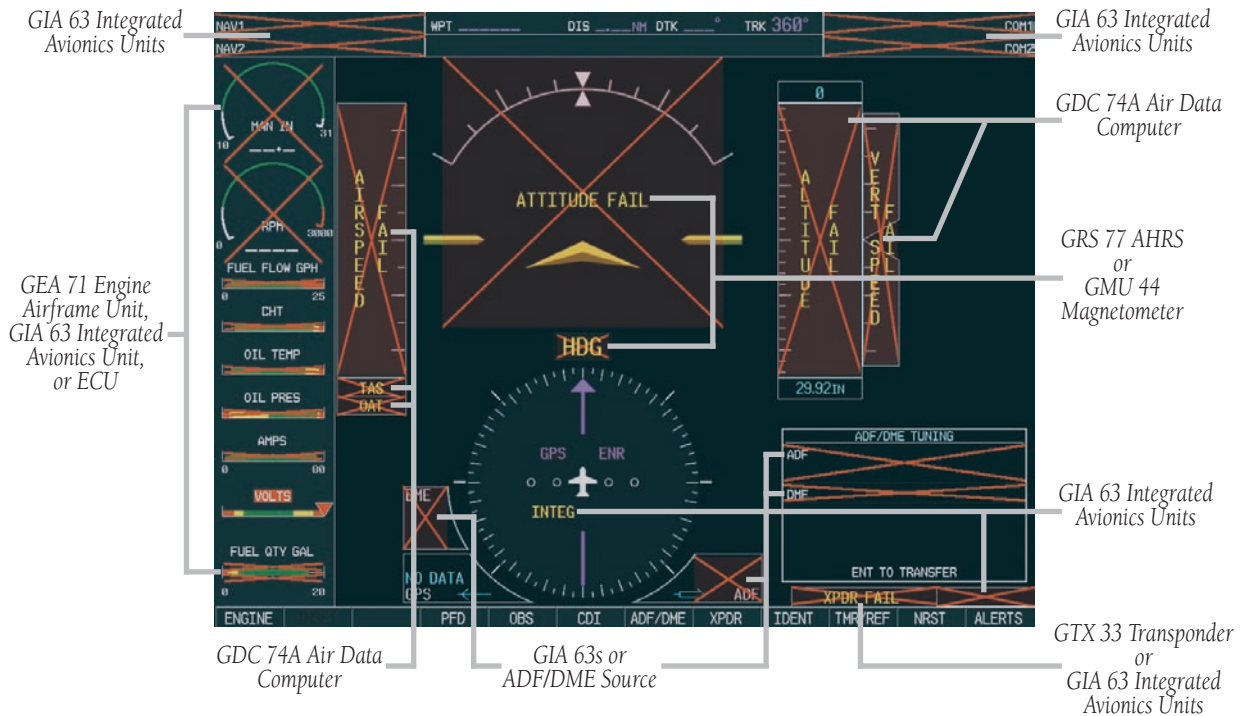
**Figure 9-3  G1000 System Failure Annunciations**

## 9.6 G1000 SYSTEM MESSAGE ADVISORIES

This section describes various G1000 system message advisories. Certain messages are issued due to an LRU or LRU function failure. Such messages are normally accompanied by a corresponding red 'X' annunciation as shown previously in the G1000 System Annunciations section.

> **NOTE**: This section provides information regarding G1000 message advisories that may be displayed by the system. Knowledge of the aircraft, systems, flight conditions, and other existing operational priorities must be considered when responding to a message. Always use sound pilot judgment. The Aircraft Flight Manual Supplement (AFMS) takes precedence over any conflicting guidance found in this section.

### MFD & PFD Message Advisories

| Message | Comments |
| --- | --- |
| **DATA LOST** – Pilot stored data was lost. Recheck settings. | The pilot profile data was lost. System reverts to default pilot profile and settings. The pilot may re-configure 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. | 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. | |

## MFD & PFD Message Advisories (Cont.)

| Message | Comments |
|---|---|
| **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.  If the problem persists, the G1000 system should be serviced. |
| **MFD1 "KEY" KEYSTK** – key is stuck. | |
| **CNFG MODULE** – PFD1 configuration module is inoperative. | The PFD1 configuration module backup memory has failed.  Have the G1000 system 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 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. |

## GMA 1347 Message Advisories

| Alerts Window Message | Comments |
|---|---|
| **GMA1 FAIL** – GMA1 is inoperative. | The audio panel self-test has detected a failure.  The audio panel is unavailable.  The G1000 system should be serviced. |
| **GMA1 CONFIG** – GMA1 configuration error.  Config service req'd. | The audio panel configuration settings do not match backup configuration memory.  The G1000 system should be serviced. |
| **MANIFEST** – GMA1 software mismatch.  Communication halted. | The audio panel has incorrect software installed.  The G1000 system should be serviced. |
| **GMA1 SERVICE** – GMA1 needs service.  Return unit for repair. | The audio panel self-test has detected a problem in the unit.  Certain audio functions may still be available and the audio panel may still be usable.  The G1000 system should be serviced when possible. |
| **BACKUP PATH** – Audio panel using backup data path. | The audio panel is using a backup communication path.  The G1000 system should be serviced when possible. |

## GIA 63 Message Advisories

| Alerts Window Message | Comments |
|---|---|
| **GIA1 CONFIG** – GIA1 configuration error.  Config service req'd. | 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 is operating 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 (PTT) 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 RMTXFR** – NAV1 remote transfer key is stuck. | The remote NAV1 and/or NAV2 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. |
| **NAV2 RMTXFR** – NAV2 remote transfer key is stuck. | |

## GIA 63 Message Advisories (Cont.)

| Alerts Window Message | Comments |
|---|---|
| **G/S1 FAIL** – G/S1 is inoperative. | A failure has been detected in glideslope receiver 1 and/or receiver 2. The G1000 system should be serviced. |
| **G/S2 FAIL** – G/S2 is inoperative. | |
| **G/S1 SERVICE** – G/S1 needs service. Return unit for repair. | A failure has been detected in glideslope receiver 1 and/or receiver 2. The receiver may still be available. The G1000 system should be serviced when possible. |
| **G/S2 SERVICE** – G/S2 needs service. Return unit for repair. | |

## GEA 71 Message Advisories

| Alerts Window Message | Comments |
|---|---|
| **GEA1 CONFIG** – GEA1 configuration error. Config service req'd. | The GEA 71 configuration settings do not match those of the 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 the backup configuration memory.  The G1000 system should be serviced. |
| **MANIFEST** – GTX1 software mismatch. Communication halted. | The transponder has incorrect software installed.  The G1000 system should be serviced. |
| **BACKUP PATH** – Transponder using backup data path. | The transponder is using a backup communication path.  The G1000 system should be serviced when possible. |

## GRS 77 Message Advisories

| Alerts Window Message | Comments |
| --- | --- |
| **AHRS TAS** – AHRS not receiving airspeed. | The AHRS is not receiving true airspeed from the air data computer. The AHRS relies on GPS information to augment the lack of airspeed.  The G1000 system should be serviced. |
| **AHRS GPS** – AHRS using backup GPS source. | The AHRS is using the backup GPS path.  Primary GPS path has failed.  The G1000 system should be serviced when possible. |
| **AHRS GPS** – AHRS not receiving any GPS information. | The AHRS is not receiving any GPS information and not operating in its normal mode. The G1000 system should be serviced. |
| **AHRS GPS** – AHRS not receiving backup GPS information. | The AHRS is not receiving backup GPS information.  The G1000 system should be serviced. |
| **AHRS GPS** – AHRS operating exclusively in no-GPS mode. | The AHRS is operating exclusively in no-GPS mode.  The G1000 system should be serviced. |
| **MANIFEST** – GRS1 software mismatch. Communication halted. | The AHRS has incorrect software installed.  The G1000 system should be serviced. |
| **BACKUP PATH** – AHRS using backup data path. | The AHRS is using a backup communication data path.  The G1000 system should be serviced when possible. |
| **AHRS SERVICE** – AHRS Magnetic-field model needs update. | The AHRS earth magnetic field model is out of date.  Update magnetic field model when practical. |
| **GEO LIMITS** – Too far North/South, no magnetic compass. | The aircraft is outside geographical limits for approved AHRS operation.  Heading is flagged as invalid. |

### GMU 44 Message Advisories

| Alerts Window Message | Comments |
|---|---|
| **HDG FAULT** – A magnetometer fault has occurred. | A fault has occurred in the GMU 44.  Heading is flagged as invalid.  The AHRS uses GPS for backup mode operation.  The G1000 system should be serviced. |
| **MANIFEST** – GMU1 software mismatch.  Communication halted. | The GMU 44 has incorrect software installed.  The G1000 system should be serviced. |

### 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 the backup configuration memory.  The G1000 system should be serviced. |
| **MANIFEST** – GDC1 software mismatch.  Communication halted. | The GDC 74A has incorrect software installed.  The G1000 system should be serviced. |
| **BACKUP PATH** – Airdata using backup data path. | The GDC 74A is using a backup communication 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 detected that a stored flight plan waypoint was 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 flight plan user waypoints that are deleted.<br>Remove the waypoint from the flight plan if it no longer exists in any database, OR<br>update the waypoint name/identifier to reflect the new information. |
| **FPL WPT MOVE** – Flight plan waypoint moved. | The system has detected that a waypoint coordinate has changed due to a new aviation database update.  Verify that stored flight plans contain correct waypoint locations. |
| **TIMER EXPIRD** – Timer has expired. | The system notifies the pilot that the timer has expired. |
| **DB CHANGE** – Database changed.  Verify user modified procedures. | This occurs when a stored flight plan contains procedures that have been manually edited.   This alert is issued only after an aviation database update.  Verify that the user-modified procedures in stored flight plans are correct and up to date. |
| **FPL TRUNC** – Flight plan has been truncated. | This occurs when a newly installed aviation database eliminates an obsolete 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. |

## Miscellaneous Message Advisories (Cont.)

| Alerts Window Message | Comments |
|---|---|
| **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 waypoints. Remove locked waypoints 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. | Aircraft is inside airspace. |
| **ARSPC AHEAD** – Airspace ahead less than 10 minutes. | Airspace is ahead of aircraft. Aircraft will penetrate airspace within 10 minutes. |
| **ARSPC NEAR** – Airspace near and ahead. | Special use airspace is near and ahead of the aircraft position. |
| **ARSPC NEAR** – Airspace near – less than 2 nm. | Special use airspace is within 2 nm of the aircraft position. |
| **LEG UNSMOOTH** – Flight plan leg will not be smooth. | The approaching flight plan waypoints are too close to make smooth turns. Prepare for steep turns ahead and expect noticeable course deviations. |
| **APPR INACTV** – Approach is not active. | The loaded approach is not active. Activate approach when required. |
| **SLCT FREQ** – Select appropriate frequency for approach. | Load the approach frequency for the appropriate NAV receiver. Select the correct frequency for the approach. |
| **SLCT NAV** – Select NAV on CDI for approach. | 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 data path. | Stormscope is using the backup communication path. The G1000 system should be serviced when possible. |

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# GARMIN.

# G1000™

*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 | Abbreviation or Acronym | Definition |
|---|---|---|---|
| FMS | Flight Management System | INC FUEL | Increase Fuel |
| FOB | Fuel On Board | IND | Indicated |
| FPL | Flight Plan | INT | Intersection(s) |
| FPM | Feet Per Minute | IrDA, IRDA | Infrared Data Association |
| FREQ | Frequency | | |
| FRZ | Freezing | KEYSTK | Key Stuck |
| FSS | Flight Service Station | KG | Kilogram |
| ft | Foot/feet | KHz | Kilohertz |
| | | KM | Kilometer |
| G/S | Glideslope | KT | Knot |
| GAL | Gallon(s) | | |
| GDC | Garmin Air Data Computer | L | Left |
| GDU | Garmin Display Unit | LAT | Latitude |
| GEA | Garmin Engine/Airframe Unit | LBL | Label |
| GIA | Garmin Integrated Avionics Unit | LB | Pound |
| GL | Gallon(s) | LCD | Liquid Crystal Display |
| GMU | Garmin Magnetometer Unit | LCL | Local |
| GND | Ground | LED | Light Emitting Diode |
| GPH | Gallons per Hour | LIFR | Low Instrument Flight Rules |
| GPS | Global Positioning System | LO | Low |
| GRS | Garmin Reference System | LOC | Localizer |
| GS | Ground Speed | LON | Longitude |
| GTX | Garmin Transponder | LRU | Line Replacement Unit |
| | | LTNG | Lightning |
| HA | Hold Terminating at Altitude | LVL | Level |
| HDG | Heading | | |
| HF | Hold Terminating at Fix | M | Middle Marker |
| Hg | Mercury | MAG VAR | Magnetic Variation |
| HI | High | MAHP | Missed Approach Hold Point |
| HI SENS | High Sensitivity | MAN IN | Manifold Pressure (inches Hg) |
| HM | Hold with Manual Termination | MAN SQ | Manual Squelch |
| hPa | Hectopascal | MAP | Missed Approach Point |
| HR | Hour | MASQ | Master Avionics Squelch |
| HSI | Horizontal Situation Indicator | MAX | Maximum |
| HUL | Horizontal Uncertainty Level | METAR | Meteorological Aviation Routine |
| Hz | Hertz | MFD | Multi Function Display |
| | | MGRS | Military Grid Reference System |
| I | Inner Marker | MIC | Microphone |
| IAF | Initial Approach Fix | MIN | Minimum |
| IAT | Indicated Air Temperature | MKR | Marker Beacon |
| IAU | Integrated Avionics Unit | MOA | Military Operations Area |
| ICAO | International Civil Aviation Organization | MOV | Movement |
| ICS | Intercom System | MPM | Meters Per Minute |
| ID | Identification/Morse Code Identifier | MSA | Minimum Safe Altitude |
| IDENT, IDNT | Identification | MSL | Mean Sea Level |
| IF | Initial Fix | MT | Meter |
| IFR | Instrument Flight Rules | mV | Millivolt(s) |
| IG | Imperial Gallon | MVFR | Marginal Visual Flight Rules |
| ILS | Instrument Landing System | | |
| IMC | Instrument Meteorological Conditions | NAV | Navigation |
| INACTV | Inactive | 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 |

| Abbreviation or Acronym | Definition |
|---|---|
| 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 Airspeed | 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 | The total of all legs in a flight plan. |
| Distance | 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 posi-tion, 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. |

| Navigation Term | Definition |
| --- | --- |
| 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 | |

## 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 | |

## IMPACT POINTS (TAWS ONLY)

| Item | Symbol |
|------|--------|
| Potential impact point at present direction and altitude | |
| Imminent impact point at present direction and altitude | |

## LINE SYMBOLS

| Item | Symbol |
|---|---|
| ICAO Control Area<br>Class B Airspace | |
| Mode C Tower Area | |
| Warning Area<br>Alert Area<br>Caution Area<br>Danger Area<br>Prohibited Area<br>Restricted Area<br>Training Area<br>Unknown Area | |
| Class C<br>Terminal Radar Service Area<br>Mode C Area | |
| Military Operations Area (MOA) | |
| State or Province Border | ST/PRV BORDER |
| International Border | INTL 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
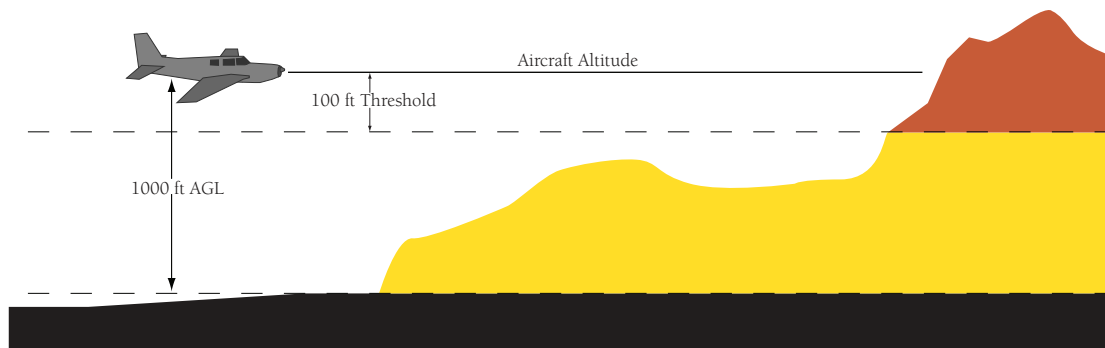


**Figure F.1  Terrain Color Chart**

# 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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# G1000™

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