GARMIN

G1000™

cockpit reference guide
for the Diamond DA42

This manual reflects the operation of System Software version 0370.07 or later. Some differences in operation may be observed when comparing the information in this manual to earlier or later software versions.

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190-00406-01 (Rev. A)	Added DME capability Added BRG1/BRG2 pointers Changed Airspeed Trend Vector Changed Altitude Trend Vector Added Checklist capability Added Flight ID capability

Revision	Date of Revision	Affected Pages	Description
A	12/10/04	i – 118	Initial Release
B	1/19/05	Back Cover, i-ii	Updated to new software revision number

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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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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.

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 DA42 aircraft, has a very high degree of functional integrity. However, the pilot must recognize that providing monitoring and/or self-test capability for all conceivable system failures is not practical. Although unlikely, it may be possible for erroneous operation to occur without a fault indication shown by the G1000. It is thus the responsibility of the pilot to detect such an occurrence by means of cross-checking with all redundant or correlated information available in the cockpit.*

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

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

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 A database information packet is included in the G1000 package.* ***Pilots using an outdated database do so entirely at their own risk****.*

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

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

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

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

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

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

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

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

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

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SECTION 1: INTRODUCTION

Garmin® International Inc., a unit of Garmin Ltd. introduces the G1000 Integrated Cockpit System for the Diamond DA42 aircraft. The G1000 includes the following Line Replaceable Units (LRUs):

- GDU 1040 Primary Flight Display (PFD)
- GDU 1040 Multi Function Display (MFD)
- GIA 63 Integrated Avionics Units (2)
- GEA 71 Engine/Airframe Unit
- GDC 74A Air Data Computer (ADC)
- GRS 77 Attitude & Heading Reference System (AHRS)
- GMU 44 Magnetometer
- GMA 1347 Audio System with integrated Marker Beacon Receiver
- GTX 32 Modes A/C or GTX 33 Mode S Transponder

1.1 PURPOSE AND SCOPE

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

- G1000 Primary Flight Display Pilot's Guide
- G1000 VHF NAV/COM Pilot's Guide
- G1000 Transponder Pilot's Guide
- G1000 GMA 1347 Audio Panel Pilot's Guide and Supplement
- G1000 Engine Indication System Pilot's Guide
- G1000 Multi Function Display Pilot's Guide

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

***NOTE:** The pilot should read and thoroughly understand the Diamond DA42 Aircraft Flight Manual (AFM) for limitations, procedures and operational information not contained in this Cockpit Reference Guide, The Diamond DA42 Aircraft Flight Manual always takes precedence over the information found in this guide.*

1.2 PFD/MFD CONTROLS

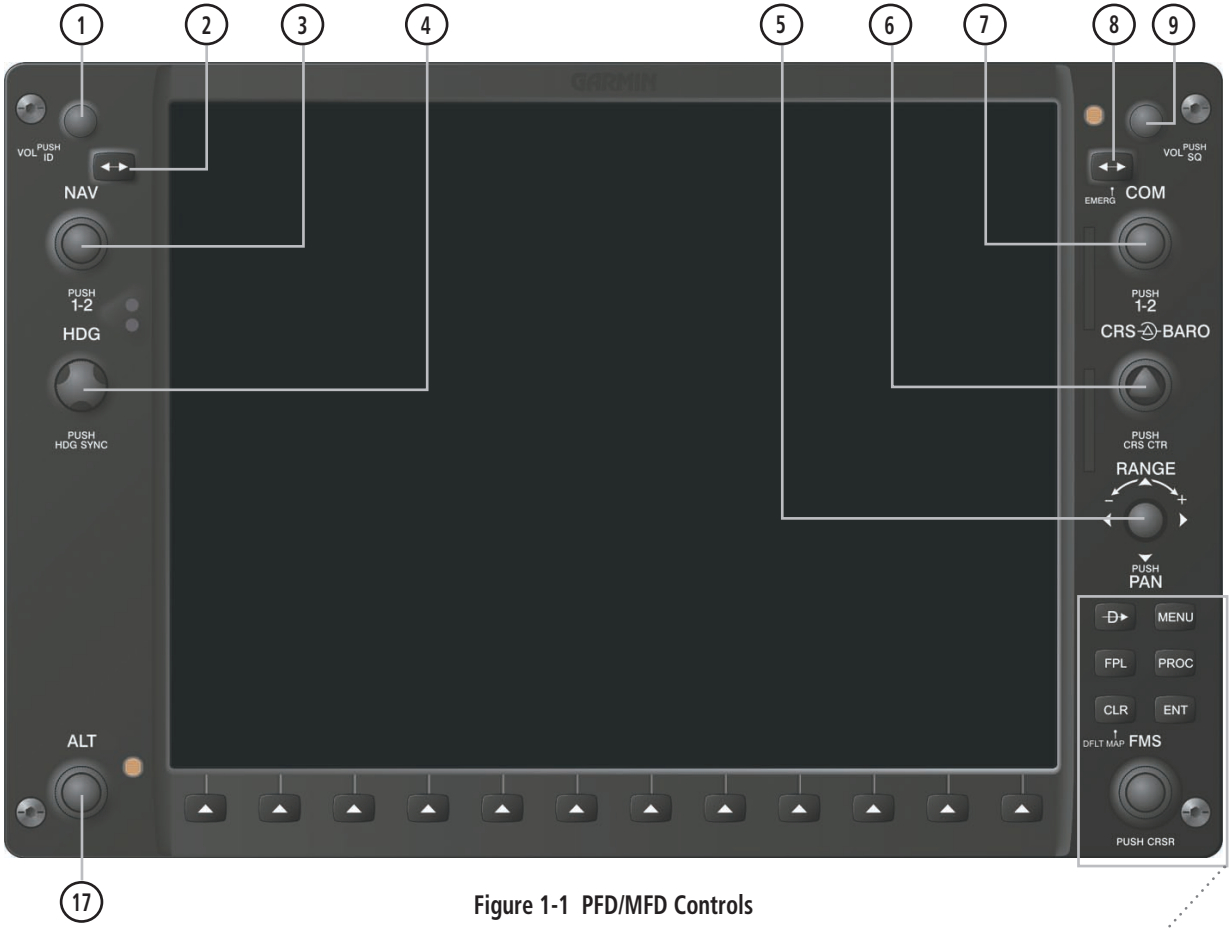
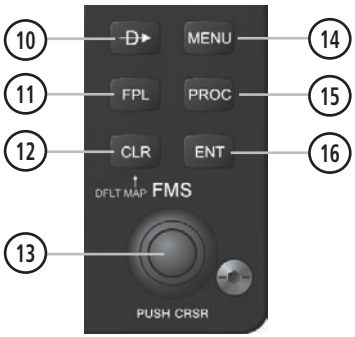


Figure 1-1 PFD/MFD Controls



1. NAV VOL/ID Knob
2. NAV Frequency Toggle Key
3. NAV Knob
4. Heading Knob
5. Range Joystick
6. Course/Baro Knob
7. COM Knob
8. COM Frequency Toggle Key
9. COM VOL/SQ Knob
10. Direct-to Key
11. Flight Plan Key
12. Clear Key
13. Flight Management System Knob
14. Menu Key
15. Procedure Key
16. Enter Key
17. Altitude Knob

The G1000 controls and keys have been designed to simplify operations and minimize workload and time to access sophisticated functionality. The following provides an overview of the primary function(s) for each key and control.

- **(1) NAV VOL/ID Knob –** Controls the NAV audio level. Press to toggle the Morse code identifier ON and OFF. Volume level is shown in the field as a percentage.
- **(2) NAV Frequency Toggle Key –** Toggles the standby and active NAV frequencies.
- **(3) Dual NAV Knob –** Tunes the MHz (large knob) and kHz (small knob) standby frequencies for the NAV receiver. Press to toggle the tuning cursor (cyan box) between the NAV1 and NAV2 fields.
- **(4) Heading Knob –** Manually selects a heading. When 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.
- **(7) 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.
- **(8) COM Frequency Toggle Key –** Toggles the standby and active COM frequencies. Pressing and holding this key for two seconds automatically tunes the emergency frequency (121.5 MHz) in the active frequency field.
- **(9) COM VOL/SQ Knob –** Controls COM audio level. Pressing this knob turns the COM automatic squelch ON and OFF. Audio volume level is shown in the field as a percentage.
- **(10) Direct-to Key () –** Allows the user to enter a destination waypoint and establish a direct course to the selected destination (specified by identifier, chosen from the active route, or taken from the map cursor position).
- **(11) FPL Key –** Displays the active Flight Plan Page for creating and editing the active flight plan or for accessing stored flight plans.
- **(12) CLR Key (DFLT MAP) –** Erases information, cancels an entry, or removes page menus. To immediately display the Navigation Map Page, press and hold **CLR** (MFD only).
- **(13) Dual FMS Knobs –** Used to select the page to be viewed (only on the MFD). The **large FMS** knob selects a page group (MAP, WPT, AUX, NRST) while the **small FMS** knob selects a specific page within the page group. Pressing the **small FMS** 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 FMS** knobs. The **large FMS** knob is used to move the cursor on the page, while the **small FMS** 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 FMS** knob to scroll through the list.
- **(14) MENU Key –** Displays a context-sensitive list of options. This options list allows the user to access additional features or to make setting changes that relate to certain pages.

- **(15) PROC Key –** Selects approaches, departures and arrivals from the flight plan. 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.
- **(16) ENT Key –** Accepts a menu selection or data entry. This key is used to approve an operation or complete data entry. It is also used to confirm selections and information entries.
- **(17) Dual Altitude Reference Knob –** Sets the reference altitude in the window located above the Altimeter. The **large ALT** knob selects the thousands, while the **small ALT** knob selects the hundreds.

***NOTE:** The selected (green) COM is controlled by the mic select on the audio control panel (GMA 1347).*

1.3 SECURE DIGITAL CARDS

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

To install an SD card:

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

To remove an SD card:

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

***NOTE:** See the Appendix of the Pilot's Guide for more information on SD card usage.*

1.4 SYSTEM POWER-UP

When the power is applied to the G1000 system, note that the PFD initially powers up in reversionary mode. While the system begins to initialize, test annunciations are displayed to the pilot at power up, as shown in Figure 1-2. All system annunciations should clear within one minute of power up. The GMA 1347 also annunciates all bezel lights briefly upon power up.

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

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.

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

1.5 POWER-UP PAGE

The Power-up Page displays general information such as software version and database versions to the pilot upon power-up of the G1000 system. The Power-up Page displays the following data, shown in a scrolling list:

- Product name.
- System software version number.
- Copyright string.
- Company name.
- Company web page.
- Company latitude and longitude location.
- Checklist filename and copyright information or text indicating that no checklist file is present.
- Land database name, version, copyright information, and warning information if land database is present; otherwise, if no land database is present, text indicating that no land database is present.
- Terrain database name, version, copyright information, and warning information if terrain database is present; otherwise, if no terrain database is present, text indicating that no terrain database is present.
- Aviation database name, version, effective dates, and copyright information if aviation database is present; otherwise, if no aviation database is present, text indicating that no aviation database is present.
- If the aviation database is out of date, then the pilot shall be forced to view text that states the aviation database is out of date.
- If the airframe allows pilot created pilot profiles then the active profile is displayed.
- Obstacle database name, version, copyright information, and warning information if obstacle database is present; otherwise, if no obstacle database is present, text indicating that no obstacle database is present.

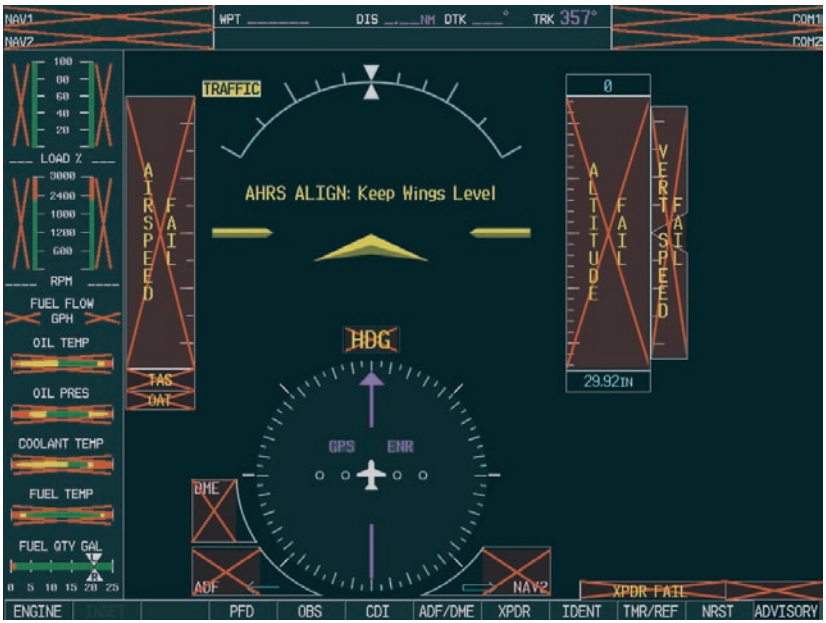


Figure 1-2 PFD Initialization Display

1.6 INITIAL OPERATIONS

The pilot can change the active profile (see the Multi Function Display Pilot's Guide for details).

When the Power-up Page list has been reviewed for currency (to ensure that no databases have expired), the pilot is prompted to continue. The current database information (which is loaded in the system) is displayed (valid operating dates, cycle number and database type indicated).

Press the **ENT** key **(or the right most softkey)** to acknowledge the list information and proceed to the Navigation Map Page. When the system has acquired a sufficient number of satellites to determine a position, the aircraft symbol appears showing your present position.

1.7 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 GMA 1347 bezel/key lighting is normally controlled directly by the existing instrument panel dimmer bus.

If desired, the PFD and MFD display backlights may be adjusted manually. PFD, MFD, and GMA 1347 bezel/key brightness can also be adjusted manually as well. GMA 1347 bezel/key brightness is directly tied to the MFD bezel/key adjustment. Refer to the G1000 Primary Flight Display Pilot's Guide for instructions on how to manually adjust the backlighting.

1.8 REVERSIONARY MODE

In normal operating mode, the PFD displays graphical flight instrumentation in place of traditional gyro instruments. Attitude, heading, airspeed, altitude, and vertical speed are all shown on one display. The MFD shows a full-color moving map with navigation information. Both displays offer control over COM and NAV frequency selectors, as well as heading, course/baro and altitude reference functions. On the left of the MFD display, an Engine Indication System (EIS) cluster shows graphical depictions of engine and airframe instrumentation. Figure 1-3 gives an example of the G1000 system in normal mode.

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

Reversionary display mode can also be manually activated by the pilot, if the system fails to detect a display problem. The reversionary mode is activated manually by pressing the red Display Backup button on the bottom of the GMA 1347. Pressing the red Display Backup button again deactivates reversionary mode.

Should a failure occur in either display, the G1000 automatically enters reversionary mode. Figure 1-4 shows an example where the PFD fails. In reversionary mode, critical flight instrumentation is combined with engine instrumentation on the remaining display. Minimal navigation capability is also available on the reversionary mode display.

Figure 1-3 G1000 Normal Mode

Figure 1-4 G1000 Reversionary Mode: Failed PFD

1.9 WORKING WITH MENUS

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

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

There may be more options than can be displayed; therefore the pilot may have to turn the **FMS** knob to scroll through the list to identify them. In all cases, once the menu appears, turn the **FMS** knob to highlight an item and press the **ENT** key. The pilot may press the **CLR** key to remove the menu and cancel the operation. Pressing the **FMS** knob also removes the displayed menu.

NOTE: *Pressing the softkeys does not display a menu or submenu.*

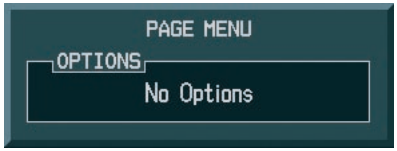


Figure 1-5 PFD Menu – No Options with NRST Window Displayed

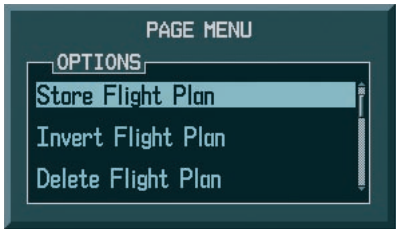


Figure 1-6 PFD Menu – Options with FPL Window Displayed

SECTION 2: PRIMARY FLIGHT DISPLAY

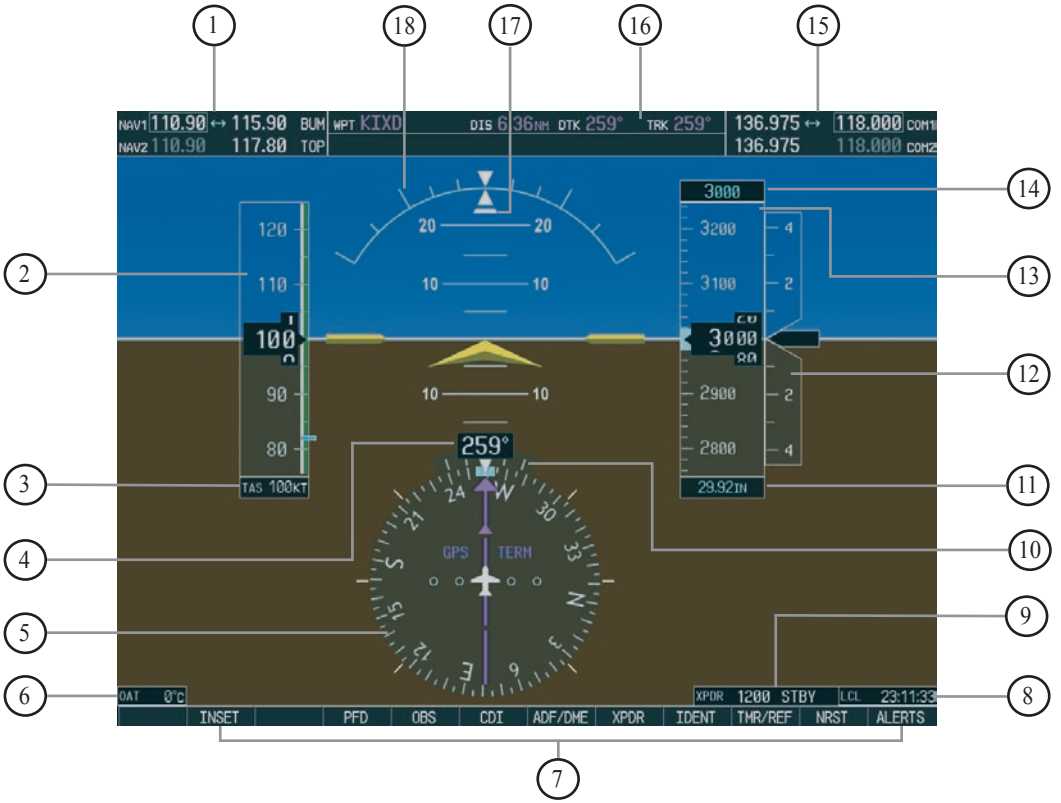
This Cockpit Reference Guide describes the basic features of the Primary Flight Display (PFD) on the G1000 Integrated Cockpit System installed on the Diamond DA42 aircraft. The system consists of two 10.4 inch color flat panel displays. During normal operation, the left display is configured as a Primary Flight Display. **See the PFD Pilot's Guide for PFD descriptions and operating procedures not covered in this Cockpit Reference Guide.**

The PFD provides increased situational awareness by replacing the traditional "six pack" of instruments in the pilot's panel with a easy to scan display that provides a large horizon, airspeed, attitude, altitude, vertical speed, navigation, communication, annunciation, terrain, traffic and lightning information. The PFD will also control the operation of the transponder, selecting NAV/COM frequencies and audio volume and many navigation features. The operation of these features are explained in other supporting pilot's guide documentation.

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

The PFD displays the following:

- Navigation Frequency Window
- Navigation Status Bar
- Communication Frequency Window
- Airspeed Indicator
- True Airspeed Box
- Attitude Indicator
- Slip/Skid Indicator
- Horizontal Situation Indicator
- Turn Rate Indicator
- Bearing Pointers
- DME Information Window
- BRG1 Information Window
- BRG2 Information Window
- Radio Tuning Window (ADF/DME)
- Altimeter
- Altitude Reference Box
- Barometric Setting Box
- Vertical Deviation/Glideslope Indicator
- Marker Beacon Receiver Annunciations
- Vertical Speed Indicator
- Alerts Window
- Annunciation Window
- System Time Box
- Transponder Status Bar
- Outside Air Temperature Box
- Inset Map
- Direct-to Window
- Flight Plan Window
- Procedures Window
- Timer/References Window
- Nearest Airports Window



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

Figure 2-1 Default PFD Information

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

Figure 2-2 Additional PFD Information

2.1 BACKLIGHTING

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

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

*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.*

To manually adjust 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 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.

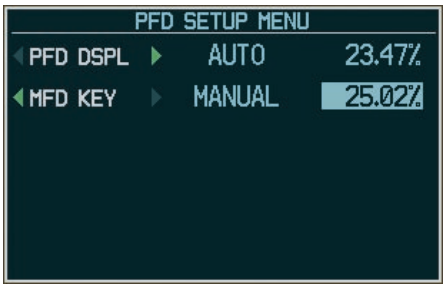


Figure 2-3 PFD Setup Menu

2.2 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 changes to white text on black background. The **CDI**, **IDENT**, **ADF/DME**, **TMR/REF**, **NRST** and **ALERTS** softkeys change momentarily to black text on gray background and automatically switch back to white text on black background.

Figure 2-4 Softkey ON

Figure 2-5 Softkey OFF

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

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

OFF – Press to remove the Inset Map

DCLTR (3) – Press momentarily to select the desired amount of map detail. The declutter level appears adjacent to the **DCLTR** softkey.

- No declutter: All map features are visible
- 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 – Press to display TIS traffic on the map.

TOPO – Press to display topographical data (i.e., coastlines, terrain, rivers, lakes, etc.) and elevation scale on the inset map.

TERRAIN – Press to display terrain information on the inset map.

LTNG (optional) – Press to display the lightning data on the inset map (within a 200 nm radius of the aircraft).

BACK – Press to return to the previous level softkey configuration.

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

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

DFLTS – Press to reset default settings on the PFD.

DME – Press to display the DME information window which displays actual DME distance.

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

- *NAV1* – Displays NAV1 waypoint frequency or identifier and GPS-derived distance information in the BRG1 information window.
- *GPS* – Displays GPS waypoint identifier and GPS-derived distance information in the BRG1 information window.
- ADF – Displays ADF waypoint frequency in the BRG1 information window.
- *OFF* – Removes the BRG1 information window.

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

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

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

- *NAV2* – Displays NAV2 waypoint frequency or identifier and GPS-derived distance information in the BRG2 information window.
- *GPS* – Displays GPS waypoint identifier and GPS-derived distance information in the BRG2 information window.
- ADF – Displays ADF waypoint frequency in the BRG2 information window.
- *OFF* – Removes the BRG2 information window.

STD BARO – Press to set the barometric pressure to 29.92 inches of mercury (1013 hPa by pressing the **METRIC** softkey).

BACK – Press to return to the previous level softkeys.

CDI – Press to change navigation mode on the CDI between GPS NAV1 and NAV2.

ADF/DME – Press to display the ADF/DME Tuning window.

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

XPDR – Press to display the transponder mode selection softkeys.

STBY – Press to select standby mode.

ON – Press to select mode A.

ALT – Press to select altitude reporting mode.

VFR – Press to automatically squawk 1200 (only in the U.S.A., refer to ICAO standards for VFR codes in other countries).

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

0 through 7 – Press numbers to enter code.

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

BKSP – Press to remove numbers entered one at a time.

BACK – Press to return to the previous level softkeys.

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

BACK – Press to return to the previous level softkeys.

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

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

NRST – Press to display the Nearest Airports window.

ALERTS – Press to display the Alerts window.

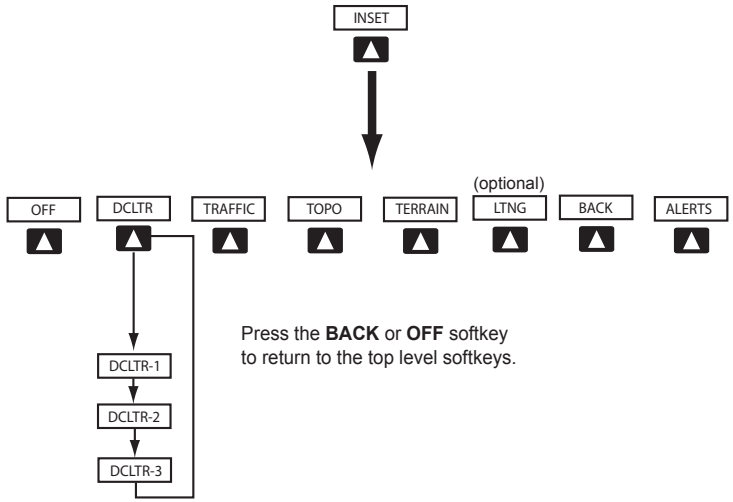


Figure 2-6 PFD Softkey Flow Chart – 1

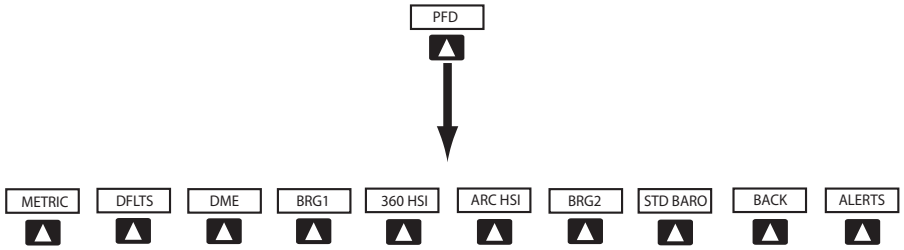


Figure 2-7 PFD Softkey Flow Chart – 2

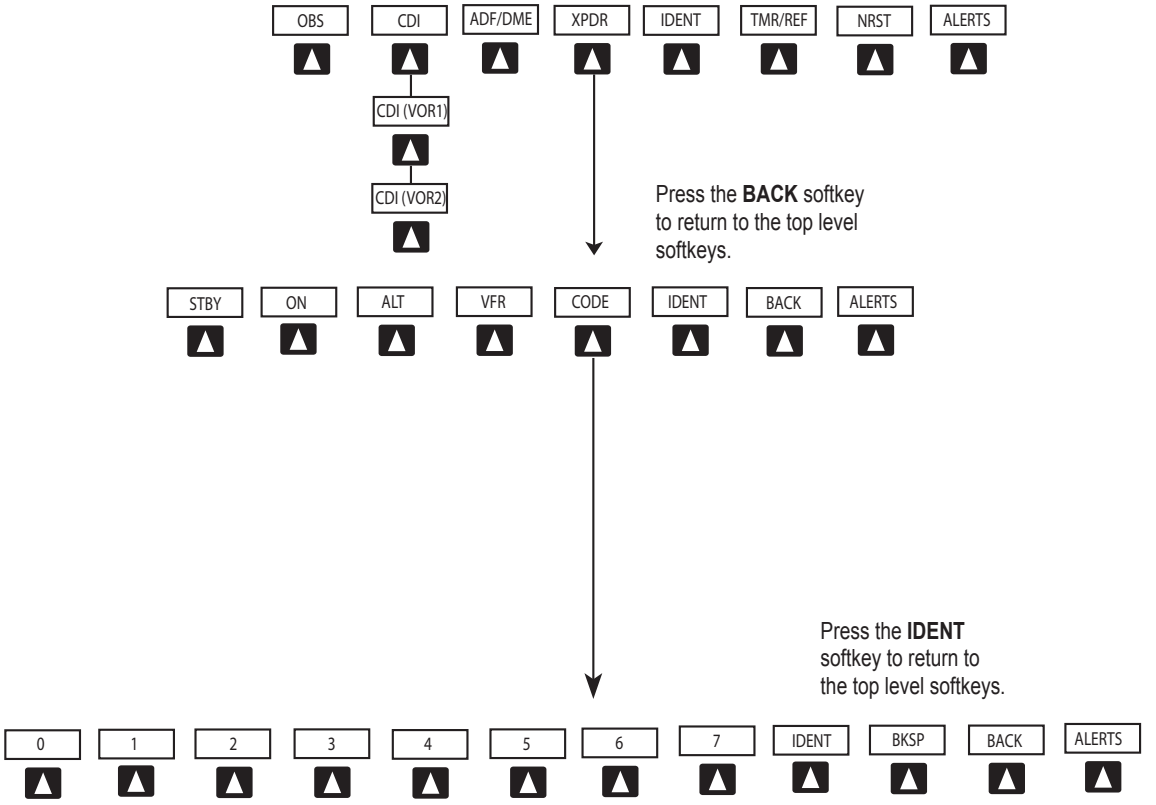


Figure 2-8 PFD Softkey Flow Chart – 3

2.3 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 50 knots of airspeed viewable at one time. The actual airspeed is displayed inside the black pointer. The pointer remains black until reaching never exceed speed (Vne), 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 (Vne). A red range is also present for low speed awareness. Refer to the Aircraft Flight Manual (AFM) for speed criteria.

Airspeed Trend Vector

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

Vspeed References

Vspeeds are set using the **TMR/REF** softkey. Glide, Vr, Vx, Vy, Vle and Vlo 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 section in this Pilot's Guide 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.

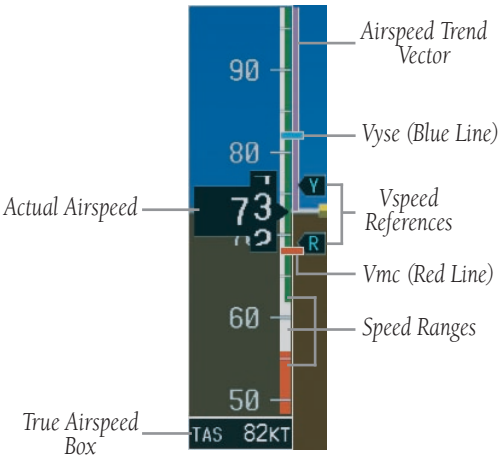


Figure 2-9 Airspeed Indicator

Figure 2-10 Red Pointer at Vne

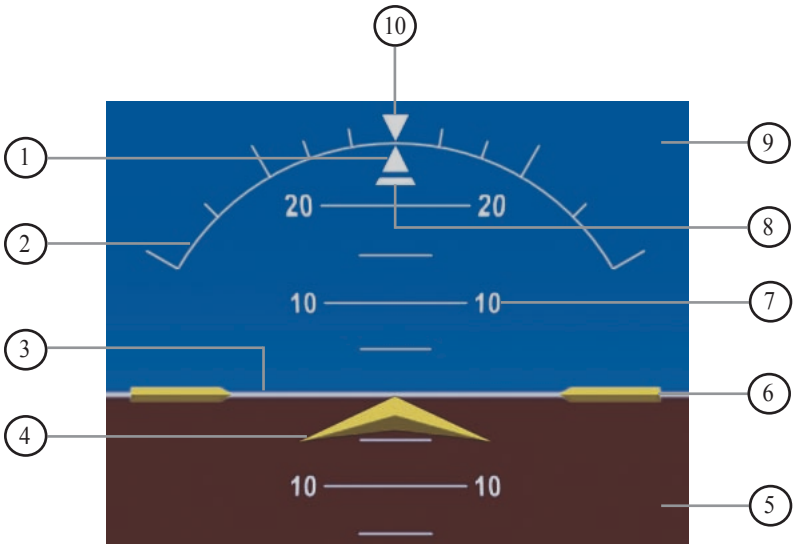
Attitude Indicator

The attitude information displays over a virtual blue sky and brown ground with a white horizon line. The aircraft wing tips are represented by two yellow bars on the horizon line. The yellow inverted "V" represents the aircraft. The Attitude indicator displays the following information:

- Pitch indication
- Roll indication
- Slip/Skid indication

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).



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

Figure 2-11 Attitude Indicator

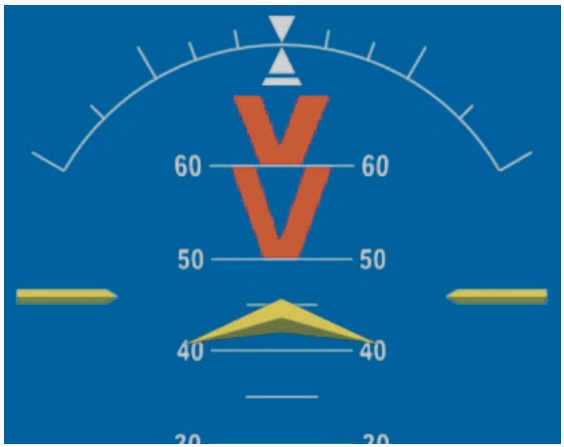


Figure 2-12 Attitude Indicator (Nose High)

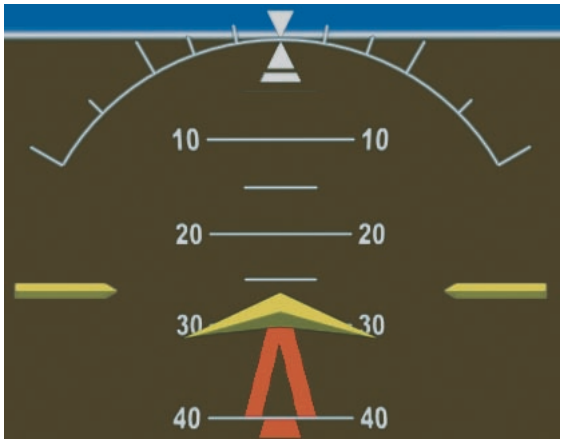


Figure 2-13 Attitude Indicator (Nose Low)

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.

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

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.

Altimeter

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

- Altitude values
- Altitude reference bug
- Altitude trend vector
- Altitude reference box
- Barometric setting box
- Altitude alerter
- Metric display

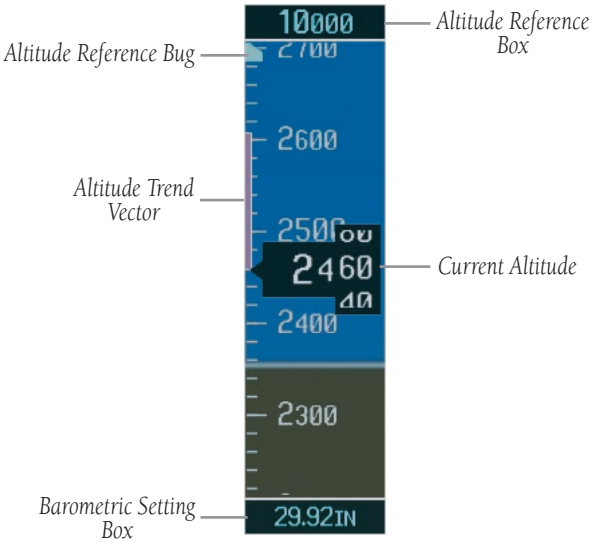


Figure 2-14 Altimeter

Altitude Values

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

Altitude Reference Bug

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

To set the altitude reference bug:

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

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 the altitude will be in 6 seconds if the current rate of vertical speed is maintained. The trend vector is absent if altitude remains constant or if any data needed to calculate it is not available due to a system failure.

Altitude Reference Box

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

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

Barometric Setting Box

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

To select barometric pressure:

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

Altitude Alerting

The altitude alerter provides the pilot with a visual alert when approaching the reference altitude. Although flight control systems use the same reference altitude box as the altitude alerter, the altitude alerter is not coupled to a flight control system and can function without one. The visual annunciations appear in the altitude reference box. Anytime the reference altitude is changed, the altitude alerter is reset.

There is an altitude band set at +/- 1,000 ft of the reference altitude and a deviation band set at +/- 200 ft of the reference altitude. When the pilot climbs or descends to the reference altitude, the reference altitude flashes cyan text on a black background for 5 seconds then changes to black text on a cyan background as the aircraft passes through +/- 1,000 ft of the reference altitude.

When the aircraft passes within +/- 200 ft of the reference altitude, the reference altitude flashes cyan text on a black background indicating that the aircraft is within the deviation band. Each time the pilot flies outside the deviation band (+/- 200 ft of the reference altitude), the reference altitude flashes yellow text on a black background for 5 seconds.

Figure 2-15 Colors Associated with the Altitude Alerter

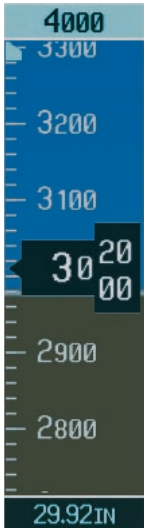


Figure 2-16 Altimeter within 1,000 ft of Reference Altitude

Figure 2-17 Altimeter within 200 ft of Reference Altitude

Metric Display

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

To display altitude in meters and barometric pressure in hectopascals:

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

Figure 2-18 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 your vertical deviation indication, just like a glideslope needle on a conventional indicator.

Marker Beacon Annunciations

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

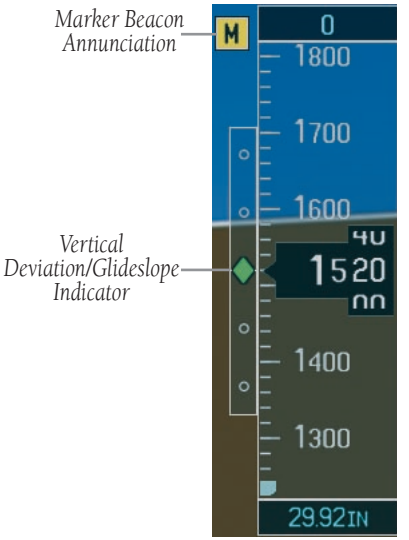


Figure 2-19 Marker Beacon and Vertical Deviation

Vertical Speed Indicator

The Vertical Speed Indicator displays the aircraft's vertical speed with numeric labels and tick marks at 2,000 ft and 4,000 ft in each direction on the non-moving tape. Minor tick marks are at intervals of 1,000 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 4,000 feet per minute the pointer will appear at the top edge of the non-moving tape and the number of feet per minute will appear inside the pointer. If the rate of descent is greater than 4,000 feet per minute a negative sign is displayed in the pointer (-4,000) for negative (down) vertical speed and the pointer will appear at the bottom edge of the non-moving tape.

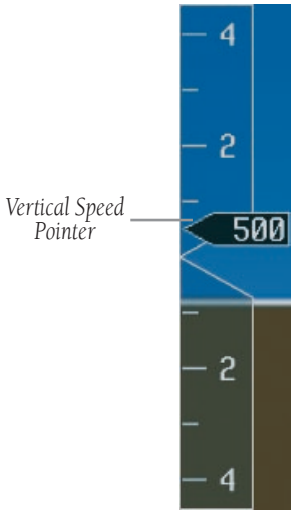


Figure 2-20 Vertical Speed Indicator

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

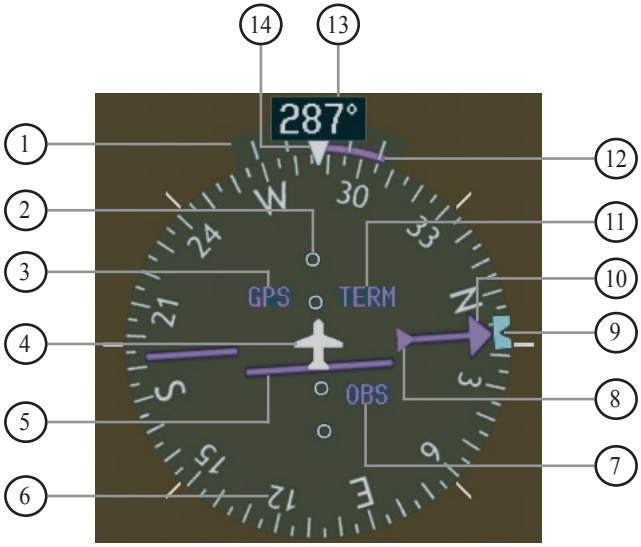
Horizontal Situation Indicator

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 for every 5 degrees. The HSI is displayed in a heading up orientation. The HSI compass can be displayed as a 360° rose or 140° arc by pressing the **PFD** softkey, followed by the **360 HSI** or the **ARC HSI** softkey. The HSI displays the following information:

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

360° HSI

The 360° HSI contains a course deviation indicator (CDI), with a course pointer arrow, TO/FROM arrow, a sliding deviation bar and scale. The course pointer is a single line arrow (GPS, VOR1 and LOC1) or double line arrow (VOR2 and LOC2), which points in the direction of the set course. The TO/FROM arrow rotates with the course pointer and is displayed when the active NAVAID is received.



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 2-21 Horizontal Situation Indicator

ARC HSI

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

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

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

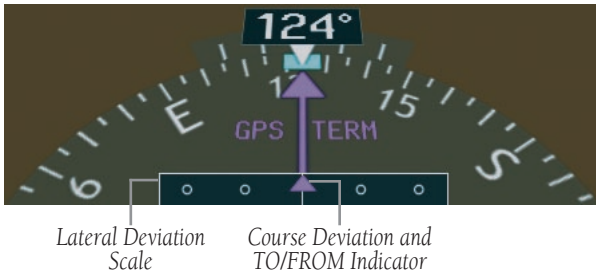


Figure 2-22 ARC HSI

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

Heading Indication

A digital reading of the current magnetic heading appears on top of the HSI. A rotatable heading bug on the compass rose and arc marks the desired heading. When the pilot selects a heading, a digital reading will appear for 3 seconds in a box left of the lubber line, next to the HSI.

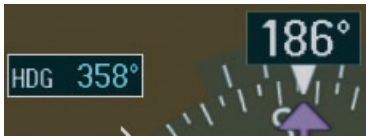


Figure 2-23 Selected Heading Box

When the pilot selects a course, a digital reading will appear for 3 seconds in a box right of the lubber line, next to the HSI.

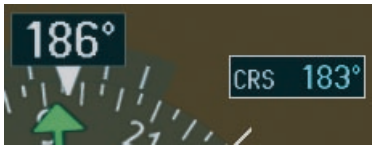


Figure 2-24 Selected Course Box

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

Turn Rate Indicator

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

Figure 2-25 Turn Rate Indicator and Trend Vector

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 angular limits exactly the same 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 (enroute 5.0 nm, terminal area 1.0 nm or approach 0.3 nm). The desired GPS scale settings may be selected manually from the MFD (refer to the MFD Pilot's Guide).

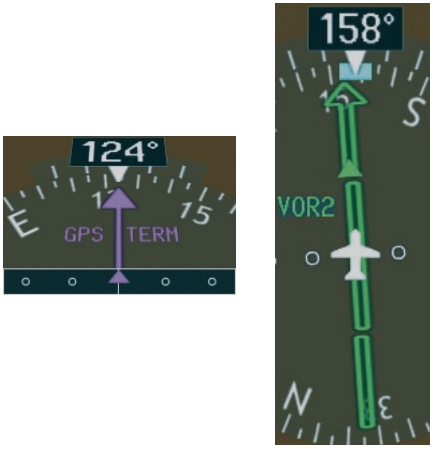


Figure 2-26 Arc CDI and Compass Rose CDI

Bearing Pointers and Information Windows

There are two bearing pointers available and one or two can be displayed on the HSI. Pressing the **PFD** softkey provides access to the **BRG1** and **BRG2** softkeys. BRG1 pointer is a single cyan (light blue) line with an open arrowhead at the end. BRG2 pointer is a double cyan (light blue) line with an open arrowhead at the end. When one or more bearing pointers are enabled (but not necessarily visible if no data is available), a white ring is presented 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. BRG1 information window is displayed to the lower left of the HSI and includes the bearing source (GPS, NAV1 or ADF), and its frequency, a pointer icon, and the GPS-derived, great-circle distance (NAV1 and GPS) to the bearing source. BRG2 information window is displayed to the lower right of the HSI and includes the bearing source (GPS, NAV2 or ADF), and its frequency, a pointer icon, and the GPS-derived, great-circle distance (NAV2 and GPS) to the bearing source.

If GPS is the bearing source, the active waypoint identifier is displayed in lieu of a frequency. If no active waypoint is selected, the bearing pointer is removed from the HSI and "NO DATA" is displayed in the information window.

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

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

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

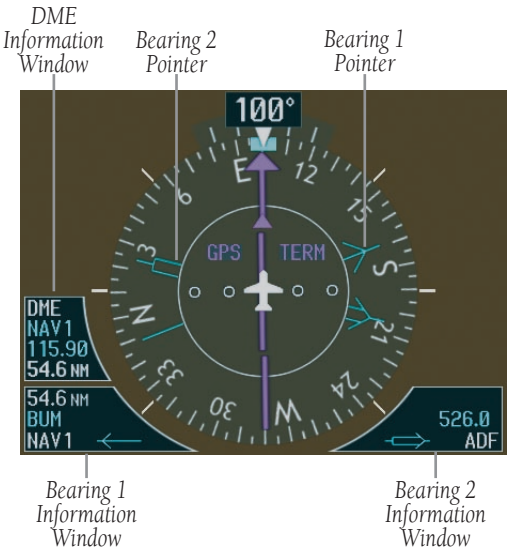


Figure 2-27 HSI with Bearing Information

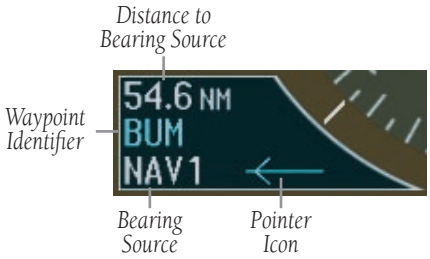


Figure 2-28 BRG1 Information Window

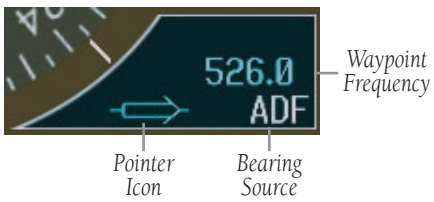


Figure 2-29 BRG2 Information Window

DME Radio

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

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

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

The pilot may select from three DME tuning modes:

- **NAV1** – DME is co-tuned with NAV1
- **NAV2** – DME is co-tuned with NAV2
- **HOLD** – Holds the last selected NAV radio frequency.

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

NOTE: DME radio installation is optional.

Figure 2-30 DME Information Window

ADF Radio

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

The ADF bearing source is selected by pressing the **PFD** softkey, then pressing the **BRG1** and/or **BRG2** softkey 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. The Morse code can also be identified.
- **ADF** mode – The ADF bearing pointer should point to the station. The Morse code can also be identified.

NOTE: ADF radio installation is optional.

Figure 2-31 ADF Selected in BRG2 Information Window

Radio Tuning Window

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 radios. Depending on the installation, the Radio Tuning window may be entitled ADF Tuning, DME Tuning, or ADF/DME Tuning.

There are two ADF frequency fields: the active field (green) on the left and the standby field (cyan) on the right.

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

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.

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

NOTE: *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

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 your 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. A yellow 'INTEG' and 'WARN' may appear on the HSI when the following occurs:

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

To change 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.

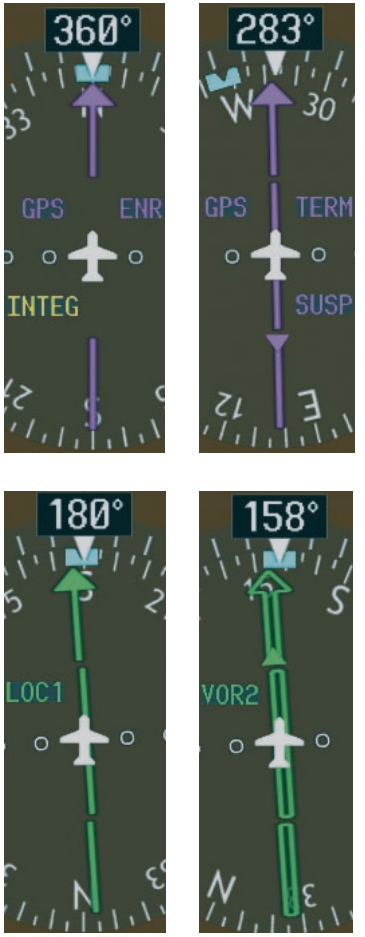


Figure 2-34 GPS INTEG, GPS SUSP, LOC1 and VOR2

2.4 COMMUNICATION, NAVIGATION & SURVEILLANCE

Communication Frequency Window

The Communication Frequency window provides the control and display of dual VHF radio communication transceivers (COM1 and COM2). The Communication 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 Communication Frequency window are located in the VHF NAV/COM Pilot's Guide.*

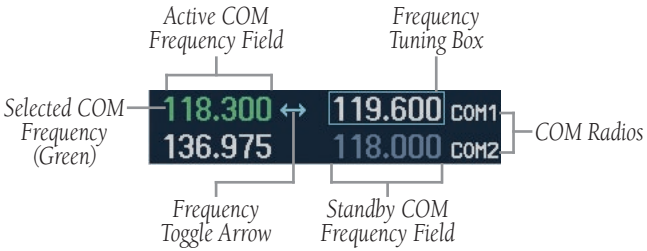


Figure 2-35 Communication Frequency Window

Navigation Frequency Window

The Navigation Frequency window provides the control and display of dual VOR/ILS receivers (NAV1 and NAV2). The Navigation 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 Navigation Frequency window are located in the VHF NAV/COM Pilot's Guide.*

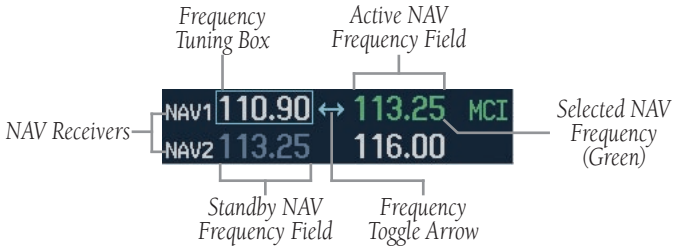


Figure 2-36 Navigation Frequency Window

Navigation Status Bar

The Navigation Status bar resides at the top of the PFD and displays valuable information while flying a route. The following information is displayed:

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

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

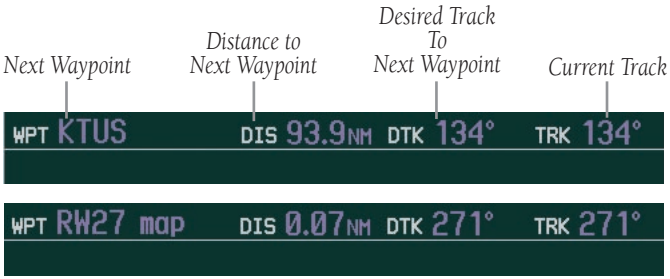


Figure 2-37 Navigation Status Bar

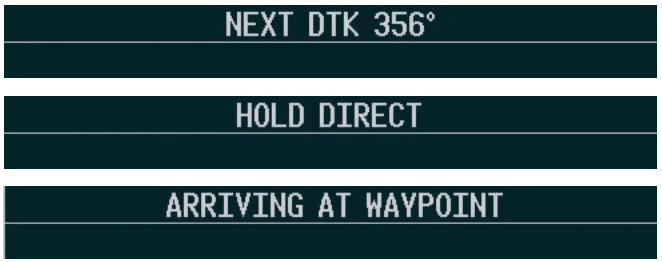


Figure 2-38 Navigation Status Bar Message

Transponder Status Bar

The Transponder Status bar displays the transponder code, reply symbol, and mode of operation. TIS (Traffic Information System) surveillance data up-linked by Air Traffic Control (ATC) radar through the GTX33 Mode S Transponder appears on the Inset Map (PFD), Navigation and Traffic Map Pages on the MFD (refer to the MFD Pilot's Guide). If the transponder is configured with Automated Airborne Determination, normal operation begins when lift off is sensed. When the aircraft is on the ground, the window automatically displays "GND". The transponder does not respond to ATCRBS interrogations when GND is annunciated. If a delay time is set in Configuration Mode, the transponder waits a specified length of time after landing before changing to GND mode.

Transponder Operation

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

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

Transponder Code Selection

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

Figure 2-39 Transponder Status Bar

2.5 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 the Introduction Section). In reversionary mode, the 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).

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

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

Figure 2-40 PFD Reversionary Mode

2.6 ALERTS AND ANNUNCIATIONS

Alerts Window

Alerts appear in the Alerts window in the lower right corner of the PFD. The term "Alerts" is an all encompassing term in that it includes advisories, cautions and warnings. This window allows system alerts to be displayed simultaneously. The Alerts window is enabled and disabled by pressing the **ALERTS** softkey.

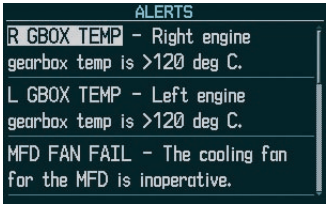


Figure 2-41 Alerts Window

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 red and caution alerts are yellow.

Figure 2-42 Annunciation Window

NOTE: *Alerts and Annunciations that appear on the PFD are described in the Appendix of this manual and in the Annunciations and Alerts Pilot's Guide.*

NOTE: *For a detailed description of all annunciations and alerts please refer to the Annunciations and Alerts Pilot's Guide.*

SECTION 3: AUDIO PANEL

The GMA 1347 Audio Panel features the following three (3) major groups of keys in descending order, as shown in Figure 3-1:

- Communication keys
- Navigation keys
- Intercom keys

Each key is labeled with a white inscription in its center, indicating the name of the associated channel. The triangular key annunciator lights are white when illuminated and point to the corresponding keys.

The dual knob located at the bottom of the unit controls volume as well as squelch threshold levels. The small knob adjusts the volume/squelch level associated with the pilot channel, while the large knob adjusts the volume/squelch level associated with the copilot/passenger channels. The red button situated below the dual volume/squelch knob controls reversionary (backup) mode selection.

NOTE: *A complete audio panel description with full operating procedures is presented in the Audio Panel Pilot's Guide.*

NOTE: *Refer to the Audio Panel Pilot's Guide Supplement for the Diamond DA42 for additional information regarding the GMA 1347 as installed in the Diamond DA42.*

3.1 AUDIO PANEL CONTROLS

- Transceiver audio selector keys (**COM1**, **COM2**) COM3 unavailable
- Transmitter (audio/mic) selection keys (**COM1 MIC**, **COM2 MIC**) COM3 MIC unavailable
- Split COM key (**COM 1/2**)
- Dedicated telephone interface key (unavailable) (**TEL**)
- Passenger address key (**PA**)
- Speaker key (**SPKR**)
- Marker beacon receiver audio select/mute key (**MKR/MUTE**)
- Marker beacon receiver high sensitivity key (**HI SENS**)
- Aircraft radio audio selector keys (**NAV1**, **NAV2**, **ADF**, **DME**, **AUX**) AUX unavailable
- Intercom manual squelch mode key (**MAN SQ**)
- Digital recording playback key (**PLAY**)
- Intercom system (ICS) isolation mode keys (**PILOT**, **COPLT**)
- Volume/squelch knob (**VOL/SQ**)
- Reversionary mode button (**DISPLAY BACKUP**)

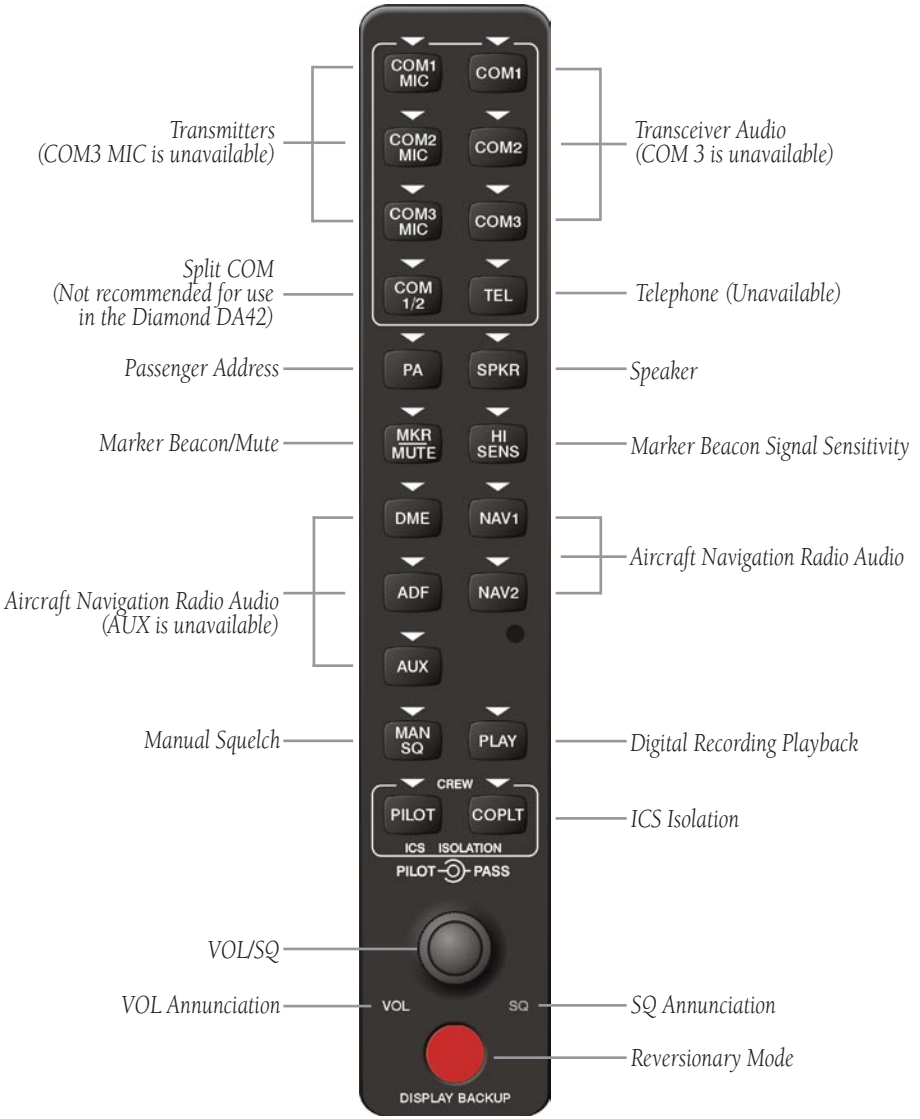


Figure 3-1 Audio Panel Controls

3.2 AUDIO PANEL OPERATION

Microphones

The GMA 1347 features five (5) different microphone channeling modes:

- COM1 MIC
- COM2 MIC
- COM 1/2 (Split COM)
- PA
- COM 1/2 and PA (Split COM and PA)

NOTE: *A push-to-talk (PTT) switch must be pressed to open the selected output channel.*

NOTE*: On the Diamond DA42, if COM3 MIC, COM3 or TEL is disabled on the GMA Configuration Page of the PFD, pressing the* ***COM3 MIC****,* ***COM3****, or* ***TEL*** *key, respectively, does not illuminate the corresponding annunciator light.*

Each audio panel can accept up to four (4) microphone inputs, thus allowing for a two-person crew and up to two (2) passenger intercom stations in the aircraft.

Mono/Stereo Headsets

The DA42 is equipped with four (4) stereo headset jacks (pilot, copilot and two (2) passengers).

NOTE: *The use of stereo headsets is highly recommended. However, if monaural headsets are plugged into stereo jacks that do not each have a switch installed, the unit will not be damaged.*

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

In Configuration mode, headset audio level can be adjusted above or below a nominal value for: UNSWITCHED 1, UNSWITCHED 2, UNSWITCHED 3 and ALTITUDE WARNING. Please consult a Garmin-authorized service center for additional information.

Unmuted/Unswitched Inputs

The unit provides four (4) unmuted/unswitched inputs that are always presented to the headsets or speakers connected to the panel. These inputs are the following aural warnings:

- ALT warning
- UNSWITCHED 1
- UNSWITCHED 2
- UNSWITCHED 3

NOTE*: The use of split COM (****COM1/2*** *key) is not recommended in the Diamond DA42 aircraft.*

ON/OFF Operation

See the Introduction Section of this manual for Audio Panel power on/off information.

Power-up Settings

Upon power-up, the unit undergoes a self-test during which all panel annunciator lights illuminate for approximately two (2) seconds. Once the self-test is completed, the settings are restored to the settings that were current before the unit was last powered off. For example, if the **COM1 MIC**, **COM1**, **COM2**, **SPKR**, **NAV1**, **NAV2**, **MKR/MUTE**, **HI SENS**, and **MAN SQ** keys were selected when the unit was last powered off, these keys will be automatically re-selected when the unit is powered back on.

Fail-safe Mode

In the event of an audio panel failure, the unit switches to fail-safe mode. In fail-safe mode, fail-safe audio is directed to the pilot's headset (left channel only). Fail-safe mode bypasses the GMA 1347 circuits, with the exception of the relay that switches the pilot's MIC and the pilot's headset directly to COM1.

Selecting and Deselecting Keys

Selecting Keys

For all keys with the exception of the **MKR/MUTE** and **PLAY** keys, pressing a key activates the corresponding channel and illuminates the associated triangular annunciator light.

Deselecting Keys

For all keys with the exception of the **COM MIC**, **MKR/MUTE** and **PLAY** keys, pressing the key again deactivates the corresponding channel and turns off the associated annunciator light.

NOTE: *Operational details on the **COM MIC**, **MKR/MUTE** and **PLAY** keys as well as the **DISPLAY BACKUP** button are provided later in this section.*

Lighting

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

NOTE: *When a key is active during normal operations, its corresponding annunciator LED is lit.*

Transceiver Keys

As illustrated below, the following eight (8) transceiver keys appear at the top of the GMA 1347 front panel: **COM1 MIC**, **COM2 MIC**, **COM3 MIC**, **COM 1/2**, **COM1**, **COM2**, **COM3**, and **TEL**. COM audio can be selected by either pressing the desired COM key or by pressing the corresponding COM MIC key. The Diamond DA42 is not factory-equipped with COM3 MIC, COM3 and TEL capability.

NOTE: *A PTT switch must be pressed to allow all microphone transmissions.*

Figure 3-2 Transceivers

Pressing a COM MIC Key

Pressing **COM1 MIC**, **COM2 MIC**, or **COM3 MIC** selects the corresponding radio as the active microphone source (i.e., as the primary COM radio) and highlights the corresponding COM frequency in green in the active frequency field of the PFD and MFD.

Only one microphone source can be selected at a time. Thus, if **COM1 MIC** is pressed when **COM2 MIC** is already selected, **COM2 MIC** is automatically deactivated and the **COM2 MIC** annunciator light is turned off. The corresponding audio selection key (in this case, **COM1**) becomes automatically selected if it is not already selected at the time.

Pressing a COM Key

Pressing **COM1**, **COM2**, or **COM3** selects the corresponding radio as the active audio source. Each audio source can be selected independently by pressing **COM1**, **COM2**, or **COM3**. If selected in this manner, the audio source remains selected independently of the active microphone source selection. The active COM audio is always heard through the headsets, and any combination of audio sources can be selected simultaneously.

During COM signal reception, a white **RX inscription** appears next to the corresponding COM frequency on both the PFD and the MFD for the duration of the reception.

Keying a Microphone

When a microphone is keyed, the active transceiver MIC key annunciator blinks approximately once per second to indicate that the transmission is active, and a white **TX inscription** appears next to the corresponding COM frequency on both the PFD and the MFD for the duration of the transmission.

When no further aircraft radio activity is detected by the unit, the amount of ambient background noise from the radios is further reduced by the MASQ™ (Master Avionics Squelch) circuit (information on MASQ™ is presented later in this manual).

NOTE: *Audio level of the selected COM radio(s) is controlled by the COM radio volume control located on both the PFD and MFD (see G1000 VHF NAV/COM Pilot's Guide for more information).*

COM Swap

The GMA 1347 allows for the use of a remotely mounted switch to alternately transfer the active microphone between COM1 MIC and COM2 MIC. The COM swap switch is typically mounted on the yoke or control stick. If COM1 MIC is the active microphone (i.e., both **COM1 MIC** and **COM1** keys are annunciated), pressing the COM swap switch transfers the active microphone from COM1 MIC to COM2 MIC (i.e., both **COM1 MIC** and **COM1** keys become deselected, and **COM2 MIC** and **COM2** keys become annunciated). Pressing the switch has no effect if COM3 is the active transceiver or if COM 1/2 (split COM) is activated.

Please consult a Garmin-authorized service center for details on the remote COM swap option.

Split COM

Pressing the **COM 1/2** key toggles the state of the split COM function. During split COM operation, the **COM1**, **COM1 MIC**, **COM2** and **COM2 MIC** keys are annunciated and thus active.

When the **COM 1/2** key is selected, COM1 becomes dedicated solely to the pilot for MIC/audio, while COM2 becomes dedicated to the copilot for MIC/audio. The **COM1 MIC** annunciator blinks when the pilot's microphone is keyed. The **COM2 MIC** annunciator blinks when the copilot's microphone is keyed.

In this mode, both the pilot and the copilot can simultaneously transmit over separate radios. Note that, while the pilot can still monitor COM3, NAV1, NAV2, DME, ADF, AUX and MKR audio as selected, the copilot is only able to monitor/hear COM2.

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

NOTE: *Split COM performance varies significantly across installations and is affected by both the distance between the antennas and the separation of the tuned frequencies. In small aircraft particularly, receiver sensitivity is typically reduced and squelch breaks are affected. Each installation should be individually examined to determine the expected performance of split COM.*

NOTE: *The use of split COM (COM 1/2 key) is not recommended in Diamond DA42 aircraft.*

PA Function

The passenger address function is provided via the **PA** key. Push-to-talk (PTT) must be used to deliver PA announcements.

NOTE: *PA volume is adjustable in Configuration mode.*

Split COM and PA

When in split COM mode (**COM 1/2** activated), the copilot can make PA announcements while the pilot continues to use COM1 independently. When the **PA** key is pressed after the split COM mode is activated, the copilot's microphone is output over the cabin speaker when keyed. Pressing the **PA** key again returns the copilot to normal split COM operation.

***NOTE: Only the copilot** can make PA announcements when in split COM and PA mode.*

Speaker Output

Pressing the **SPKR** key selects the aircraft radios to be output to the cabin speaker. Pressing the **SPKR** key again deselects the speaker mode. When **SPKR** is selected, any and all of the following radios can be heard over the cabin speaker: COM1, COM2, COM3, NAV1, NAV2, DME, ADF, and AUX.

Speaker output is muted when the PTT switch is keyed. All of the unswitched/unmuted radio inputs can be heard over the speaker. In Configuration mode, speaker audio level is adjustable above and below a nominal value. Please consult a Garmin-authorized service center for details.

Figure 3-3 Split COM, PA and Speaker

Marker Beacon Receiver

Description and Operation

The GMA 1347 provides a marker beacon receiver to be used as part of an ILS approach. In addition to the normal marker beacon receiver functions, the GMA 1347 provides an **audio muting capability**. The marker beacon receiver is always "ON" and receives at 75 MHz.

The receiver detects three (3) tones associated with the **outer**, **middle** and **inner** approach markers, respectively, and illuminates the appropriate marker beacon indicator lights located to the left of the Altimeter on the PFD. The outer marker signal frequency is 400 Hz, and a blue light indicates its reception. The middle marker signal frequency is 1,300 Hz, and an amber light indicates its reception. The inner marker signal frequency is 3,000 Hz, and a white light indicates its reception.

When the **MKR/MUTE** key is selected, the corresponding annunciator light becomes illuminated and the audio signal can be heard over the headsets.

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 corresponding annunciator light. The audio returns when the next (different) marker signal is received. If the **MKR/MUTE** key is pressed while the marker beacon audio is muted, the marker audio becomes deactivated and the **MKR/MUTE** annunciator light is turned off.

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

The marker beacon audio level is aligned at the factory to produce its rated audio output. Audio output level is also adjustable in Configuration mode. Please consult a Garmin-authorized service center for details.

NOTE: *The unit provides output for driving external marker beacon lamps and it provides a middle marker sense output for use with an autopilot.*

Marker Beacon Signal Augmentation

The **HI SENS** key can be pressed to augment marker beacon signal reception sensitivity. The HI SENS function is typically used either over airway markers or to receive an earlier indication of a nearing outer marker during an approach.

The middle marker sense indicator provides input to the autopilot.

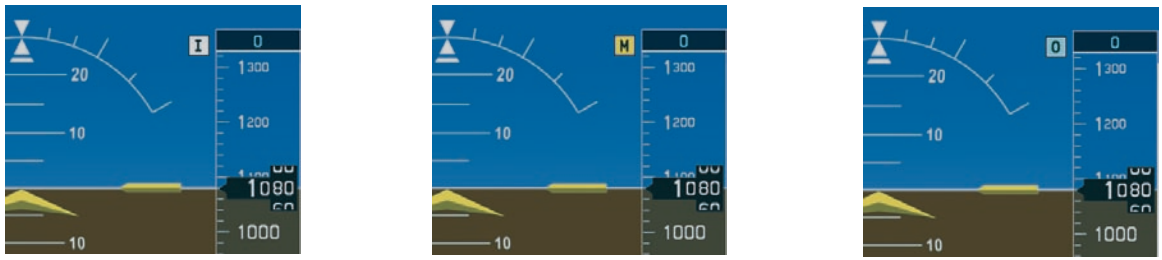
The lamp and audio keying of the marker beacon receiver are summarized in Table 3-1.

Figure 3-4 Marker Beacon

NOTE: *The marker beacon signal sensitivity threshold can be set in Configuration mode. Please consult a Garmin-authorized service center for details.*

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

Table 3-1 Marker Beacon Signal Characteristics



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

Figure 3-5 Marker Beacon Signal Indicator Lights on the PFD

Aircraft Radio Inputs

Pressing **DME**, **ADF**, **AUX**, **NAV1**, or **NAV2** selects the corresponding audio source and activates the annunciator. Pressing the selected audio source key again deselects this audio source. Selected aircraft audio can be heard over the appropriate headset and over the speakers if **SPKR** is selected. Note that all aircraft radio keys can be selected concurrently. The AUX radio is not supported on this G1000 system configuration for Diamond DA42 aircraft.

In Configuration mode, the DME, ADF and AUX channels may be disabled. Please consult a Garmin-authorized service center for details.

Figure 3-6 Aircraft Radios

When no further aircraft radio activity is detected by the unit, the amount of ambient background noise from the radios is further reduced by the Master Avionics Squelch (MASQ™) circuit.

Intercom System (ICS) Isolation

The intercom system (ICS) provides four (4) isolation modes: **ALL**, **PILOT**, **COPILOT**, and **CREW**. The desired mode can be selected or deselected using the **PILOT** and **COPLT** keys. Keyed ICS operation is not available on the Diamond DA42.

PILOT Mode

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

COPILOT Mode

COPILOT mode is selected when only the **COPLT** key is annunciated. In COPILOT mode, the copilot is isolated from everyone, whereas the pilot and passengers can hear the selected radios and communicate with each other. In this mode, the pilot can hear MUSIC 1, while the passengers can hear MUSIC 2. The transitions between the possible ICS isolation states are summarized in the table below.

Figure 3-7 ICS Isolation

CREW Mode

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

ALL Mode

ALL mode is selected when neither the **PILOT** nor the **COPLT** key is annunciated. In ALL mode, everyone hears the selected radios and is able to communicate with everyone else. In this mode, both the pilot and copilot can hear MUSIC 1, whereas the passengers can hear MUSIC 2.

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

Table 3-2 ICS Isolation Mode Transitions

The following table summarizes the ICS operation for the four (4) ICS isolation modes supported by the unit.

ICS Isolation Mode	Pilot Hears	Copilot Hears	Passenger Hears
PILOT (PILOT LED Lit)	Selected radios; pilot	Copilot; passengers; MUSIC 1	Copilot; passengers; MUSIC 2
COPILOT (COPLT LED Lit)	Selected radios; pilot; passengers; MUSIC 1	Copilot	Selected radios; pilot; passengers; MUSIC 2
CREW (Both LEDs Lit)	Selected radios; pilot; copilot	Selected radios; pilot; copilot	Passengers; MUSIC 2
ALL (Both LEDs OFF)	Selected radios; pilot; copilot; passengers; MUSIC 1	Selected radios; pilot; copilot; passengers; MUSIC 1	Selected radios; pilot; copilot; passengers; MUSIC 2

Table 3-3 ICS Operation Modes

Volume/Squelch Control

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

***NOTE:** When the **MAN SQ** key is deselected (i.e., auto-squelch is active), pressing the **VOL/SQ** knob has no effect on the VOL/SQ selection state of the unit and **VOL** is automatically annunciated.*

When transitioning from auto to manual squelch, the unit "recalls" the previous VOL/SQ selection and sets the state of the unit accordingly.

NOTE: *The volume and squelch controls for the COM and NAV radios are located on the PFD and MFD bezels (please refer to the G1000 VHF NAV/COM Pilot's Guide for details).*

Intercom Volume Control

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

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

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

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

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

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

Intercom Squelch Threshold Control

Each microphone input has an automatic squelch threshold. Manual squelch override as well as keyed ICS operation (the latter to be used in noisier cockpit environments) is also available.

Manual squelch threshold adjustments can be performed via the **VOL/SQ** knob when the **MAN SQ** key is annunciated and the **SQ** annunciation is lit. The small **VOL/SQ** knob controls pilot squelch threshold adjustments, while the large **VOL/SQ** knob controls copilot/passenger squelch threshold adjustments. Turning either knob clockwise increases the squelch threshold level. Conversely, turning either knob counterclockwise decreases the squelch threshold level.

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

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

1. Press the **MAN SQ** key and perform one of the following steps:

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

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

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

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

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

Reversionary Mode

Pressing the red **DISPLAY BACKUP** button located at the bottom of the audio panel selects the **reversionary** (backup) mode for all displays. Reversionary mode is a mode of operation in which both the PFD and MFD are identically configured to display all of the important flight parameters in the event of display failure. See the Introduction Section of this manual for complete details.

Figure 3-8 Reversionary Mode

SECTION 4: MULTI FUNCTION DISPLAY

4.1 INTRODUCTION

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

4.2 MFD DESCRIPTION

The display portion of the G1000 Integrated Cockpit System in the Diamond DA42 installation consists of two 10.4 inch liquid crystal displays (LCDs). During normal operation, the right display is configured as the Multi Function Display (MFD).

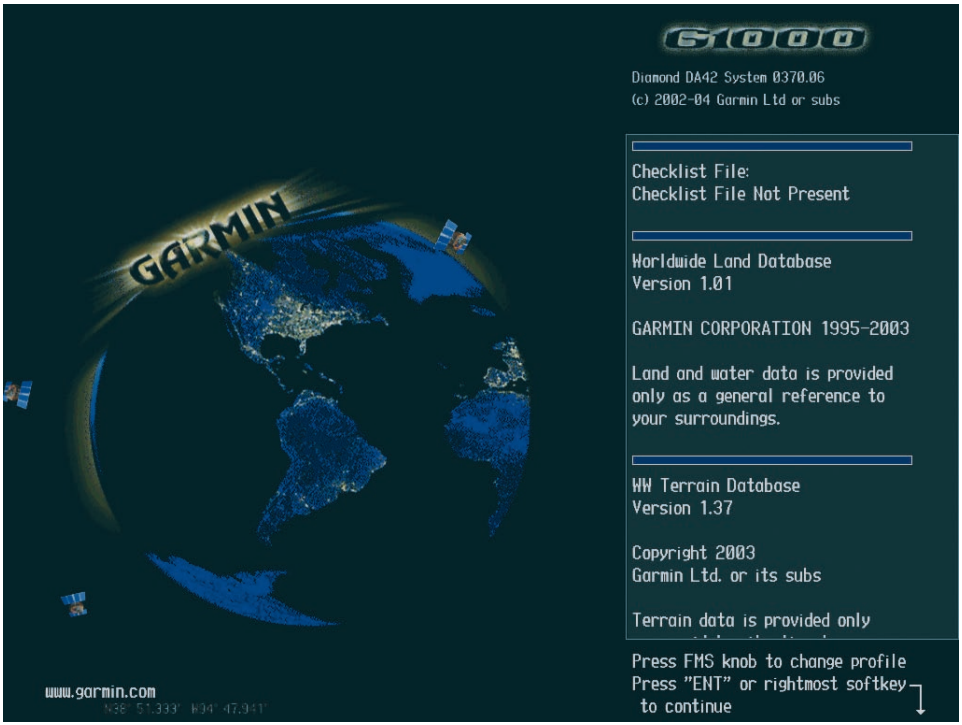


Figure 4-1 MFD Power-up Page

4.3 MFD POWER-UP

See Section 1 for MFD power up information.

To acknowledge the Power-Up Page information and proceed to the Navigation Map Page press the **ENT** key or the right most softkey twice.

4.4 BACKLIGHTING

See the PFD Section for instructions on adjusting the backlighting.

4.5 MFD SOFTKEYS

The MFD softkeys are located below the display glass and provide control over flight management functions which includes GPS and NAV management, engine and airframe monitoring, terrain, weather, and traffic. Figure 4-1 shows an MFD flowchart identifying what functions are available via the softkey labels.

The MFD softkeys perform the following functions:

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

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

- **TRAFFIC –** pressing the **TRAFFIC** softkey displays/removes Traffic on the Navigation Map.
- **TOPO –** pressing the **TOPO** softkey displays or removes topographic information on the Navigation Map.
- **TERRAIN –** pressing the **TERRAIN** softkey displays/removes terrain and obstacle data on the Navigation Map.
- **LTNG (optional with WX-500 installation) –** Press to display lightning data on the Navigation Map Page (within a 200 nm radius of the aircraft).
- **BACK –** pressing the **BACK** softkey displays the ENGINE and MAP top level softkeys.

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

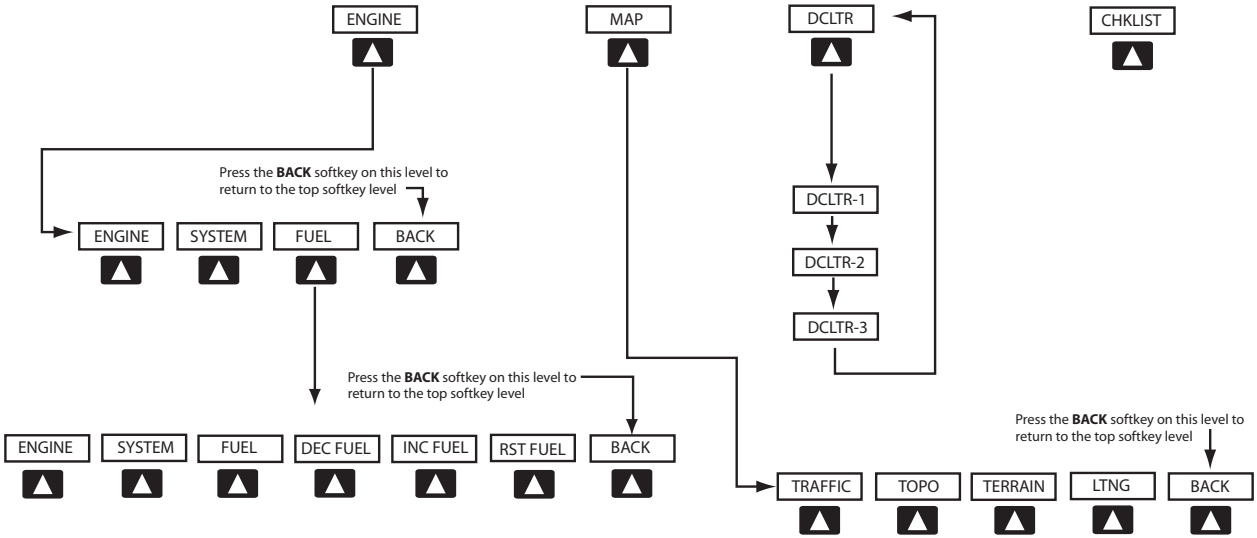


Figure 4-2 MFD Softkeys

4.6 ENGINE INDICATION SYSTEM

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

The EIS contains three distinct pages, which are accessed by the **ENGINE** softkey:

- Engine (default)
- System
- Fuel

Engine Page

This is the default page, which displays all critical engine and fuel indicators. Atop this page as well as the other pages are color-coded vertical bar indicators with white pointers and numeric readouts for engine load and tachometer. Beneath those indicators is a numeric readout for fuel flow. Below the fuel flow indicators are color-coded horizontal bar indicators with two white triangle pointers labeled L (left) and R (right), indicating oil temperature, oil pressure, coolant temperature, fuel temperature and fuel quantity. The pointer on the horizontal bar indicators appears in white, which represents acceptable areas of operation. The pointer color changes to yellow or red upon exceeding areas of normal operation. The green band is indicative of normal areas of operation.

Engine Load Indicator

The Engine Load indicator displays the current engine load as a percentage on a vertical bar gauge. 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.

- **Green –** Normal operating range.
- **Red –** Indicates engine overspeed.

Fuel Flow GPH Indicator

The Fuel Flow indicator is a digital gauge 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
- **Red –** Warning

Oil Pressure Indicator

The Oil Pressure indicator displays the engine oil pressure.

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

Coolant Temperature Indicator

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

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

Fuel Temperature Indicator

The Fuel Temperature indicator displays the fuel temperature.

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

Fuel Quantity Indicator

The Fuel Quantity indicator displays the quantity of fuel in the tanks in gallons. The indicator ranges from 0 to 25 with tick marks at 5, 10, 15 and 20 gallons.

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

NOTE: *The Fuel Quantity Indicator displays 25 gallons per side when full.*

NOTE: *The System and Fuel pages are described in detail in the Engine Indication System Pilot's Guide.*

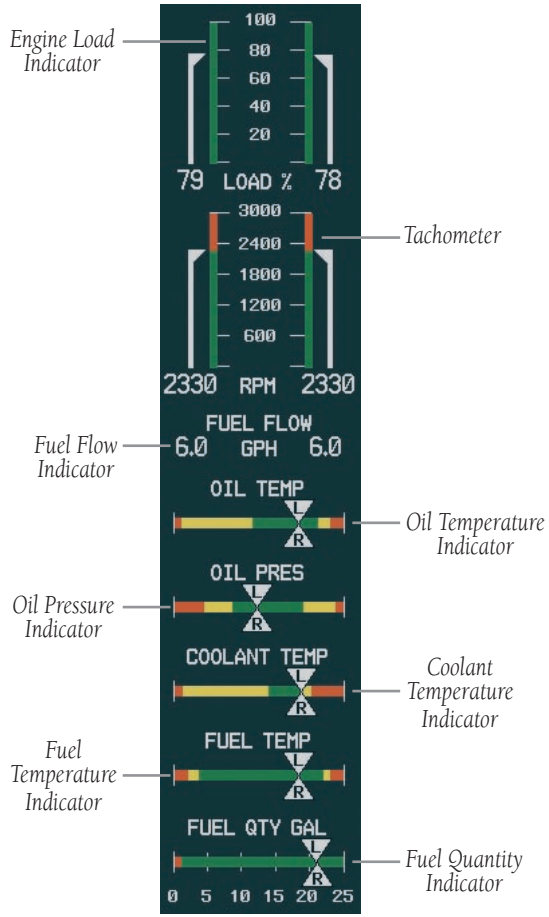


Figure 4-3 ENGINE Page

4.7 MFD PAGE GROUPS

The MFD displays GPS/Navigation flight information in the following page groups:

- **Map** (MAP):
  - Navigation Map Page
  - Traffic Map Page
  - Weather Map Page (optional with WX-500 installation)
  - 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
  - Nearest Airspaces Page

To select a specific page group:

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

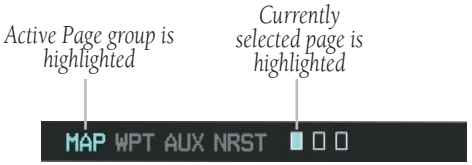


Figure 4-4 Page Group Window (without Weather Map Page)

To select a different page within the group:

1. Turn the **small 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 screens available within that group (indicated by rectangle icons) and the placement of the current page within that group (indicated by a solid cyan rectangle icon). The page group and active page title window are displayed above the map display.

Figure 4-5 Page Title Window

4.8 WORKING WITH MENUS

Much of the operation of the G1000 is accomplished using a menu interface. The G1000 has a bezel-mounted dedicated menu key that, when pressed, displays a context-sensitive list of options. This 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 no options are available 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 knobs. Practice with them to become efficient at entering data. This will greatly reduce the amount time spent operating the MFD in flight.*

To scroll through a list, turn the **FMS** knob. 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.

NOTE: *Pressing the softkeys does not display a menu or submenu.*

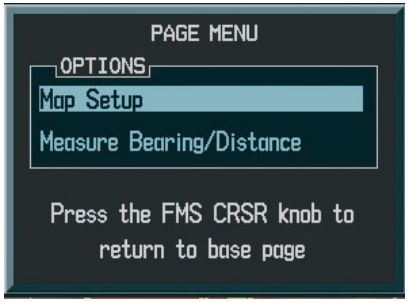


Figure 4-6 Menu with Options

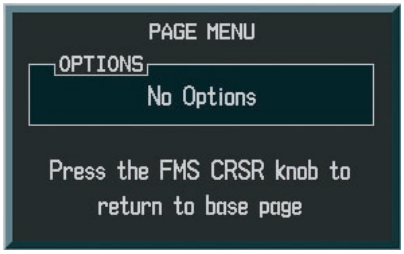


Figure 4-7 Menu with No Options

4.9 NAVIGATION MAP PAGE

The Navigation Map Page provides an extensive array of GPS/navigation/mapping capability. Key features include:

- 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
- Lightning Display (optional with WX-500 installation)
- 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

The Appendix in the Pilot's Guide lists all of the display features provided by the Navigation Map Page.

***WARNING**: The Navigation Map page display should be used only for situational awareness and not for navigation. Any map display indication should be cross-checked with approved navigation sources.*

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'.

***NOTE**: In addition to being accepted via the* **FMS** *knobs, the Navigation Map Page can be selected from any page by pressing and holding the* **CLR** *(DFLT MAP) key.*

4.10 NAVIGATION MAP PAGE OPERATIONS

The following Navigation Map Page operations can be performed:

- Changing the Map Orientation
- Clearing Lightning Data (optional)
- 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
- Displaying Lighting Data on the Navigation Map Page (optional)
- Displaying Obstacles
- MFD Navigation Status Window
- Navigation Map Page Options Menu

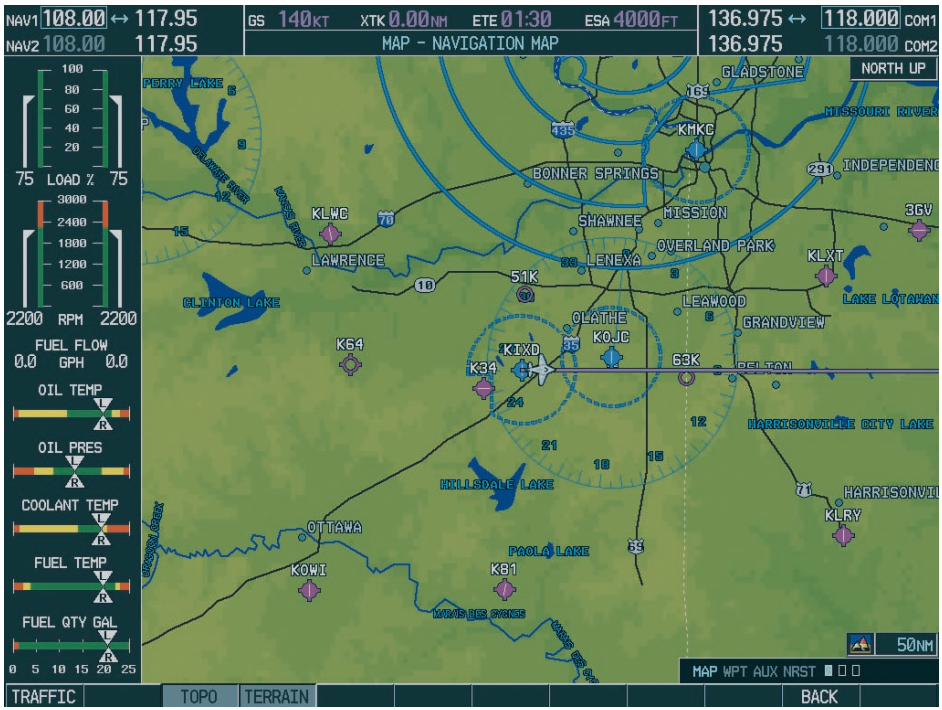


Figure 4-8 Navigation Map Page

Changing the Map Orientation

See the Navigation Map Page Menu section for instructions on how to change the map orientation.

Clearing Lightning Data (Optional)

See the Navigation Map Page Menu section for instructions on how to clear lightning data from the map display

NOTE: A list of available map datums is given in the Appendix of the Pilot's Guide.

Selecting a Map Range

The Navigation Map Page can be set to 28 different range settings from 500 feet to 2,000 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.

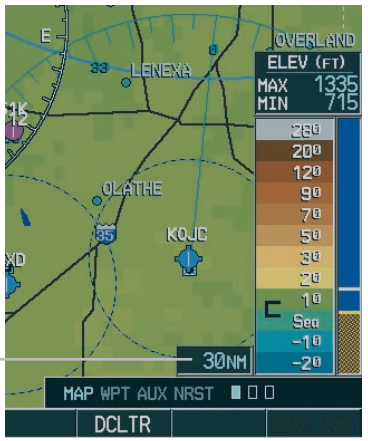


Figure 4-9 Navigation Map Range

Using the Auto Zoom Feature

The auto zoom feature automatically adjusts the map from an enroute range of 2,000 nm through each lower range, stopping at a range of 1.5 nm as the aircraft approaches the destination waypoint. See the Navigation Map Page Menu section for instructions on enabling/disabling the auto zoom feature.

Identifying Aviation Map Data

See the Appendix of the Pilot's Guide and the MFD Pilot's Guide for a complete description of the 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 depicted. The declutter level label appears above the **DCLTR** softkey. Table 8.2.1 lists the map 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.

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**.

Figure 4-10 Navigation Map Panning

Displaying Topographic Data on the Navigation Map Page

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

To display topographic data on the Navigation Map Page:

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

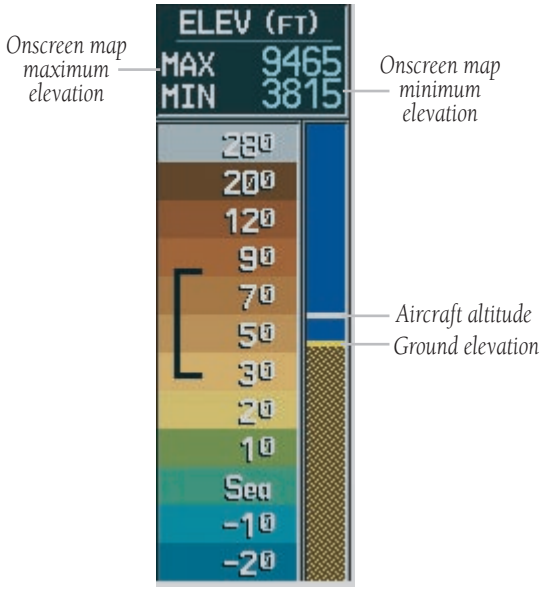


Figure 4-11 Topography Scale

Displaying Terrain Data 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.

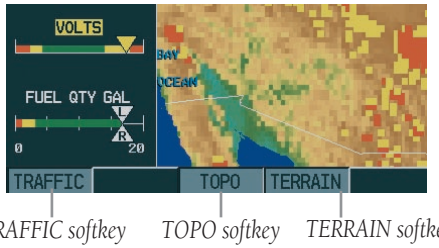


Figure 4-12 TRAFFIC, TOPO and TERRAIN Softkeys

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 the Appendix of the Pilot's Guide 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 Multi Function Display Pilot's Guide for details.*

Displaying Lightning Data on the Navigation Map Page (Optional)

Pressing the **LTNG** softkey after pressing the **MAP** softkey displays WX-500 Stormscope data on the Navigation Map Page within a maximum of 200 nm radius of the aircraft. The Navigation Map Page displays cell or strike information using yellow lightning strike symbology. This added capability improves situational awareness, which makes it much easier for the pilot to relate storm activity to airports, NAVAIDs, obstacles and other ground references.

To display lightning data on the Navigation Map Page:

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

Figure 4-13 MAP and LTNG Softkeys

In normal operation, the current 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.

The strike data display phases are:

1. Lightning Symbol (latest strikes; less than one minute; a black guard band is placed around the strike symbol during the first six seconds of display)
2. Large Plus '+' sign (more than one minute old)
3. Small Plus '+' sign (more than two minutes old)
4. Strike Data is no longer displayed (after three minutes)

Lightning Data Display Range

Lightning data can be displayed up to 800 nm zoom range, but the data only goes out as far as the Stormscope can report (200 nm). The 500 nm zoom range will display all lightning data. Ranges greater than 500 nm do not display any further Stormscope data.

MFD Navigation Status Window

The MFD Navigation Status Window displays four, user-configurable fields which can show 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

Figure 4-14 MFD Navigation Status Window

***NOTE**: Instructions on changing a data field on the MFD Navigation Status window are given in the Multi Function Display Pilot's Guide.*

Navigation Map Page Menu

The Navigation Map Page can be customized using three page menu options: 'Map Setup', 'Measure Bearing/Distance', and 'Clear Lightning Data'. To display the page menu, press the **MENU** key (with the Navigation Map Page displayed).

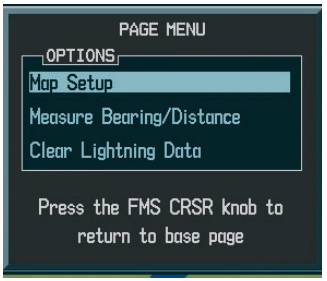


Figure 4-15 Navigation Map Page Menu Options

First Option: 'MAP SETUP'

The first option is 'MAP SETUP'. There are five "groups" available under the 'MAP SETUP' option: Map, Weather, Traffic, Aviation, and Land. All of these groups are discussed in detail in the Multi Function Display Pilot's Guide.

Map Group

There are eleven options in the Map Group:

- Orientation
- Auto Zoom
- Land Data
- Track Vector
- Wind Vector
- NAV Range Ring
- Topo Data
- Topo Range
- Terrain Data
- Obstacle Data
- Fuel Range Ring

Orientation

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

- North up fixes the top of the map to a north heading (default map setting).
- Track up adjusts the top of the map display to the current track heading.
- 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.

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 'Map Setup'.
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.

NOTE: *All other map group options are discussed in detail in the Multi Function Display Pilot's Guide.*

4.11 TRAFFIC MAP PAGE

The Traffic Map Page 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 SCALE, TRFC RMVD, TRFC FAIL, NO TRFC DATA, TRFC UNAVAIL, TRAFFIC).

To select the Traffic Map Page:

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

***CAUTION**: TIS warns the pilot with voice and visual traffic advisories whenever it predicts an intruder to be a threat. The pilot should not start evasive maneuvers using information from the Traffic Map Page display or a traffic advisory only. The display and advisories are intended only to assist in visually locating the traffic and lack the resolution and coordination ability necessary for evasive maneuvering. The pilot should attempt to visually acquire the intruder aircraft and maintain/attain a safe separation in accordance with the regulatory requirements and good operating practice. If the pilot cannot acquire the aircraft, ATC should be contacted for guidance in avoiding the intruder aircraft. Based on the above procedures, minor adjustments to the vertical flight path consistent with air traffic requirements are not considered evasive maneuvers. See the Appendix in the Pilot's guide for detailed TIS information.*

Figure 4-16 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 the Appendix in the Pilot's Guide for traffic symbol descriptions.*

4.12 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 Piper 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.

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.

***NOTE:** 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.

2a. 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

2b. 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.

4.13 WEATHER MAP PAGE (OPTIONAL)

The G1000 provides an optional display interface for the L-3 Stormscope® WX-500 Series II Weather Mapping Sensor. The WX-500 is a passive weather avoidance system that detects electrical discharges associated with thunderstorms within a 200 nm radius of the aircraft. The Stormscope measures relative bearing and distance of thunderstorm related electrical activity and displays the information on the Weather Map Page.

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

The Weather Map Page displays the following information:

- Map showing surrounding lightning strikes (in strike or cell mode), current aircraft location, and range marking rings, in 360° mode or 120° mode.
- Current lightning mode.
- Current strike rate.
- Wind vector.
- Heading direction.
- Current weather data status, or none if no problems with weather data are detected
- Map orientation.
- North arrow indicator, when in "track-up" mode.
- Active Flight Plan or Direct-to Navigation.

Figure 4-17 Weather Map Page

***NOTE**: The WX-500 has to be receiving valid heading information in order for lightning data to be displayed.*

Weather Display Information

For weather display interpretation, the examples in the WX-500 User's Guide are designed to help the pilot relate the cell or strike patterns shown on the Weather Map Page to the size and location of thunderstorms that may be near the aircraft.

4.14 WEATHER MAP PAGE OPERATIONS

The following Weather Map Page operations can be performed using softkeys or page menu options:

- Changing lightning mode between cell and strike
- Changing viewing mode between 360° and 120° ARC.
- Clearing lightning data.

To change lightning mode between cell and strike:

1. Select the Weather Map 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 Weather Map Page OR:
3. Press the **MENU** key. The page menu is displayed with 'Strike Mode' or 'Cell Mode' highlighted. Press the **ENT** key on the desired selection.

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

1. Select the Weather Map Page.
2. Press the **VIEW** softkey. The **360** and **ARC** softkeys are displayed. Press the **360** softkey to display a 360˚ viewing are or press the **ARC** softkey to display a 120˚ viewing area OR:
3. Press the **MENU** key. The page menu is displayed with 'View Arc' or 'View 360' highlighted. Press the **ENT** key on the desired selection.

To clear display lightning data from the display:

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

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

***NOTE**: An active flight plan or Direct-to is displayed on the Weather Map Page if one is available and is within the display range.*

4.15 TERRAIN PROXIMITY PAGE

CAUTION: *Terrain and obstacle data are provided only as an aid to situational awareness. No aural messages or textual annunciations are displayed to the pilot during flight operations regarding the presence of terrain or obstacles.*

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.

4.16 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 from 360° to ARC:

1. Select the Terrain Proximity Page
2. Press the **VIEW** softkey. Press the **ARC** softkey.

To return to the 360 degree viewing display press the 360 softkey:

1. Press the **MENU** key. The page menu is displayed with 'View Arc' or 'View 360º' highlighted. Press the **ENT** key on the desired selection.

To change the map range on the Terrain Proximity Page:

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

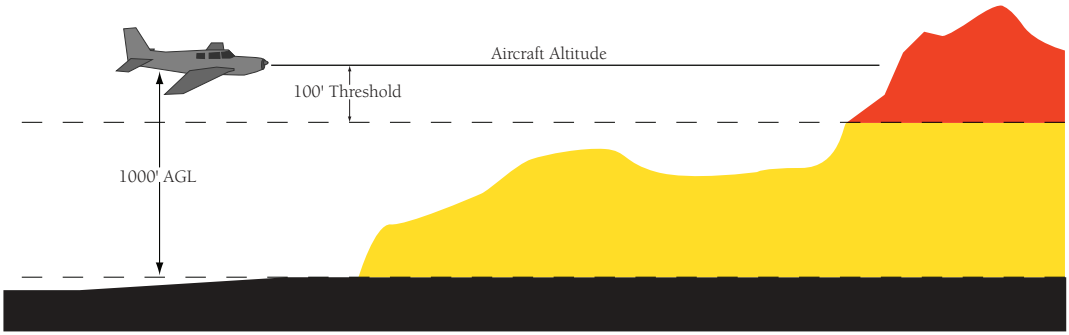


Figure 4-18 Terrain Scale

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 1,000 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 the Appendix in the Pilot's Guide.

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, 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 ONLY shows caution and warning obstacles.*

4.17 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 4-19 Direct-to Page

To select a direct-to destination:

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

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

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

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

4.18 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 **FMS** knobs to enter the facility or city location of the desired waypoint.

***NOTE**: The G1000s 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 4-20 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 a 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 appears 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. Continue turning the **small FMS** knob to scroll through the list and highlight the desired airport.
4. Press the **ENT** key to confirm the selected waypoint, and **ENT** again to activate direct-to.

Figure 4-21 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

When Direct-to is activated, 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 **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 **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.

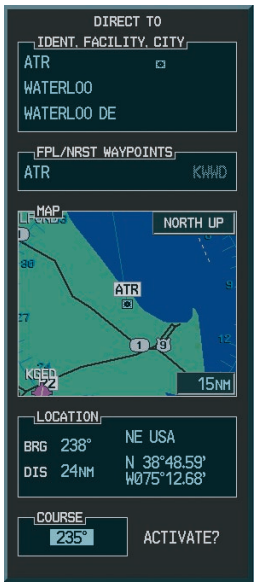


Figure 4-22 Manual Course Direct-to

4.19 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.

4.20 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)

4.21 ACTIVE FLIGHT PLAN PAGE OPERATIONS

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 4-23 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.

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 4-24 Remove Waypoint Confirmation

Remove 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.

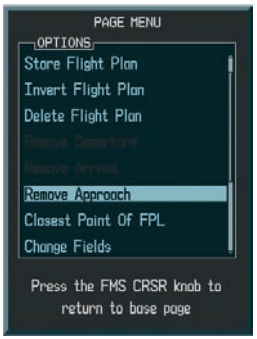


Figure 4-25 Removing an Approach

4.22 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 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 enroute safe altitude information.

To display the Flight Plan Catalog Page:

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

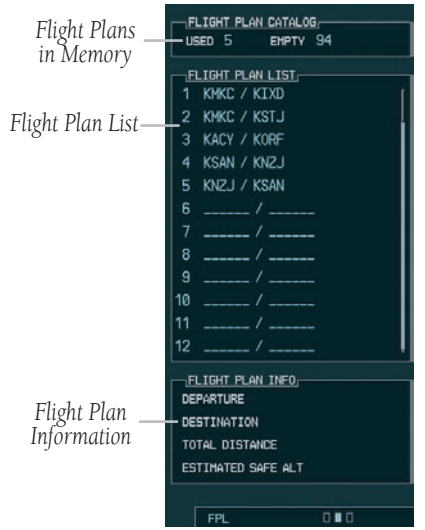


Figure 4-26 Flight Plan Catalog Page

4.23 FLIGHT PLAN CATALOG PAGE OPERATIONS

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

- Activate a Flight Plan
- Stop Navigating a Flight Plan
- Invert and Activate a FPL
- Create a New Flight Plan
- Copy a Flight Plan
- Delete a Flight Plan
- Delete All Flight Plans
- Sort Flight Plans by Comment
- Flight Plan Catalog Page Options
- Edit a Flight Plan

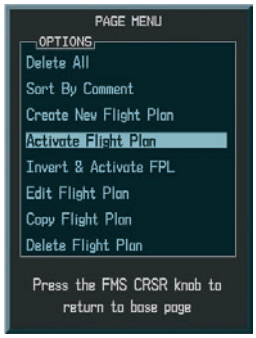


Figure 4-27 Flight Plan Catalog Page Options

Activate a Flight Plan

Once a flight plan is defined using the Flight Plan Catalog Page it can be activated for navigation. Activating the flight plan overwrites any previous information at that location.

To activate (begin to navigate) an existing flight plan:

1. Press the **FPL** key and turn the **small FMS** knob to display the Flight Plan Catalog Page.
2. Press the **FMS** knob to activate the cursor.
3. Turn the **large FMS** knob to highlight the desired flight plan and press the **MENU** key to display the Flight Plan Catalog Page options.
4. Turn the **large FMS** knob to highlight 'Activate Flight Plan' and press the **ENT** key.
5. An 'Activate stored flight plan?' confirmation window is displayed. With OK highlighted, press the **ENT** key to activate the flight plan. To cancel the flight plan activation, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.

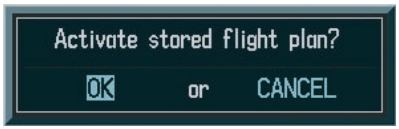


Figure 4-28 Activate Stored Flight Plan Confirmation

Stop Navigating a Flight Plan

To stop navigating a flight plan:

1. Press the **FPL** key and turn the **small FMS** knob to display the Flight Plan Catalog Page.
2. Press the **FMS** knob to activate the cursor.
3. Turn the **large FMS** knob to highlight the desired flight plan and press the **MENU** key to display the Flight Plan Catalog Page options.
4. Turn either the **FMS** knob to highlight 'Delete Flight Plan' and press the **ENT** key. A 'Delete Flight Plan' confirmation window is displayed. With 'OK' highlighted, press the **ENT** key to delete the flight plan. To cancel the flight plan deletion, turn the **large FMS** knob to highlight 'CANCEL' and press the **ENT** key.

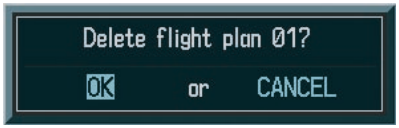


Figure 4-29 Delete Flight Plan Confirmation

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 **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.

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.

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

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.

1. Push in 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 will be inserted ABOVE the highlighted row if the cursor is on. Waypoints will be 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.

4.24 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. The Procedures Page is displayed by pressing the **PROC** key.

Figure 4-30 Procedures Page

NOTE: *Pilots should be familiar with the Aeronautical Information Manual (AIM) regarding the use of GPS.*

To select a departure:

1. Press the **PROC** key. Turn the **large FMS** knob to highlight 'Select Departure' and press the **ENT** key. The departure procedure window appears.
2. Turn the **FMS** knob to select the desired departure and press the **ENT** key. The transition window appears.
3. Turn the **FMS** knob to select the desired transition and press the ENT key. 'LOAD?' is highlighted. Press the **ENT** key.

NOTE*: Vector departures are not part of the aviation database.*

To select an arrival:

1. Press the **PROC** key. Turn the large **FMS** knob to highlight 'Select Arrival' and press the **ENT** key. The arrival procedure window appears.
2. Turn the **FMS** knob to enter the desired arrival 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 highlighted. Press the **ENT** key. Review the flight plan for accuracy. If the destination is listed twice, remove the first one if the arrival is filed as part of the flight plan. If the arrival is received enroute, highlight the first point of the arrival, press direct-to, and enter when the clearance is received. Sequencing is automatic thereafter.

4.25 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.*

NOTE: *The approach charts shown in this section are not drawn to range and are not to be used for navigation.*

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?' adds 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: *An approach may also be loaded by pressing the* **APR** *softkey.*

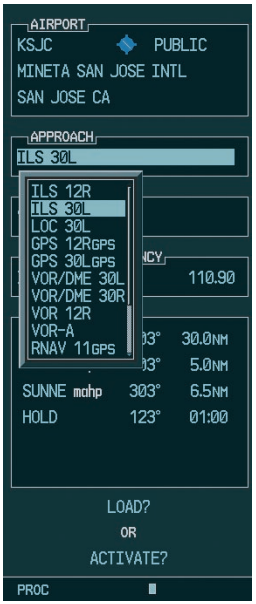


Figure 4-31 Selecting an Approach Procedure

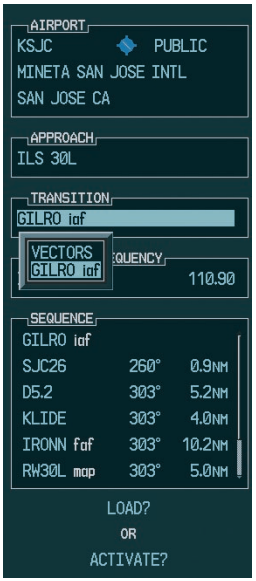


Figure 4-32 Selecting an Approach Transition

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.

Figure 4-33 Activating an Approach Procedure

***CAUTION**: The G1000 is designed to complement the printed approach charts and vastly improve situational awareness throughout the approach. The approach must be flown as it appears on the approach chart.*

***NOTE**: The GPS approach examples given in the next section are not to be used for navigation. They are to be used in conjunction with the G1000 PC training simulator software for practice in learning what types of approaches the G1000 supports.*

4.26 GPS APPROACH EXAMPLES

No Procedure Turn

An approach where there is no procedure turn required to get established on the inbound course to the FAF is our example. GPS RWY 12 is used to show how the G1000 sequences through an approach and what type of annunciation and range factor changes can be expected (the G1000 automatically sequences through all legs of an approach without pilot input other than to activate the approach and to sequence past the missed approach point). This example is based upon and active flight plan from KFLG (Flagstaff, AZ Pulliam Airport) to KPRC (Prescott, AZ Love Airport).

1. Select KPRC as the destination, via the **Direct-to** key or as the last waypoint in a flight plan.
2. Press the **PROC** key and select the GPS RWY 12 approach. From the transitions window, select IRODY as the IAF (select 'LOAD?').
3. Within 30 nm of the destination, the G1000 switches from enroute mode to terminal mode. The switch to terminal mode is accompanied by a gradual CDI scale transition from 5.0 to 1.0 nm full scale deflection.
4. Prior to reaching the IAF (IRODY), the approach sequence should be reviewed. Press the **FPL** key to display the Active Flight Plan Page. Press the **FMS** knob and turn the **large FMS** knob to review each segment of the approach. When finished press the **FPL** key again to return to the previous page.
5. As the pilot approaches the IAF (IRODY), a waypoint message 'NEXT DTK 204°' appears in the navigation status bar on the PFD. As the distance to the IAF approaches zero, the message is replaced by a turn advisory 'TURN TO 204°'.
6. As the pilot approaches the IAP (OKAPY), a waypoint message 'NEXT DTK 124°' appears. As the distance approaches zero the message is replaced by a turn advisory 'TURN TO 124°'.
7. Within 15 nm from the FAF (MULHU), the G1000 switches from terminal mode to approach mode. CDI scaling begins rounding down from 1.0 to 0.3 nm full scale deflection.
8. Upon crossing the FAF 'NEXT DTK 124°' appears and the destination sequences to the MAP (RW12map, the runway threshold). Keeping the needle centered, fly toward the MAP, observing the altitude minimums dictated by the approach plate.
9. As the pilot approaches the MAP, a waypoint message 'ARRIVING AT WAYPOINT' appears.
10. Upon crossing the MAP, 'SUSP' appears on the HSI and directly above the **SUSP** softkey, indicating that automatic sequencing of approach waypoints is suspended at the MAP. A 'FROM' indication is displayed on the CDI, but course guidance along the final approach course continues. If a missed approach is required, use the **SUSP** softkey to initiate the missed approach sequence.

***NOTE**: When the message 'RAIM is not available' appears in the Alerts Window on the PFD a missed approach must be executed. Refer to section 1-1-20 in the Aeronautical Information Manual (AIM) for information regarding RAIM.*

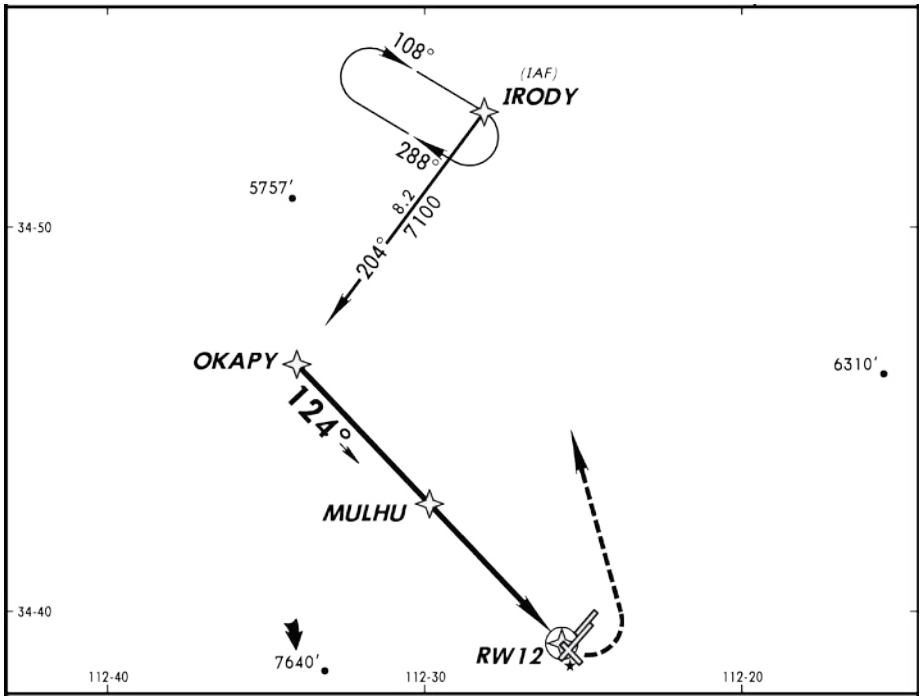


Figure 4-34 Approach with No Procedure Turn

Flying the Missed Approach

As you pass the MAP, and the runway is not in view, a missed approach must be performed. The G1000 continues to give guidance along an extension of the final course segment (FAF to MAP) until you manually initiate the missed approach procedure.

1. Upon crossing the MAP, a waypoint message 'ARRIVING AT WAYPOINT' appears in the navigation status bar on the PFD. 'SUSP' appears on the HSI and directly above the **OBS** softkey, indicating that automatic sequencing of approach waypoints is suspended. A 'FROM' indication is displayed on the CDI, however course guidance along the final approach course continues. Use the **SUSP** softkey to initiate the missed approach sequence. Be sure to follow the published procedure. If a runway heading is prescribed by ATC the pilot must not press the **SUSP** softkey until they are ready to turn. Press the **CDI** softkey to resume GPS navigation.
2. Press the **SUSP** softkey. The missed approach holding point (IRODY) is automatically offered as the destination waypoint.
3. Follow the missed approach procedures, as dictated by the approach chart. The G1000 gives guidance to the holding point.
4. A message appears in the navigation status bar on the PFD recommending entry procedures for the holding pattern 'HOLD PARALLEL'.
5. The G1000 provides course guidance only on the inbound side of the holding pattern. When leaving the holding pattern to re-fly the approach, press the **PROC** key to 'Select Approach?' or 'Activate Approach?' (or add a new destination to the flight plan).

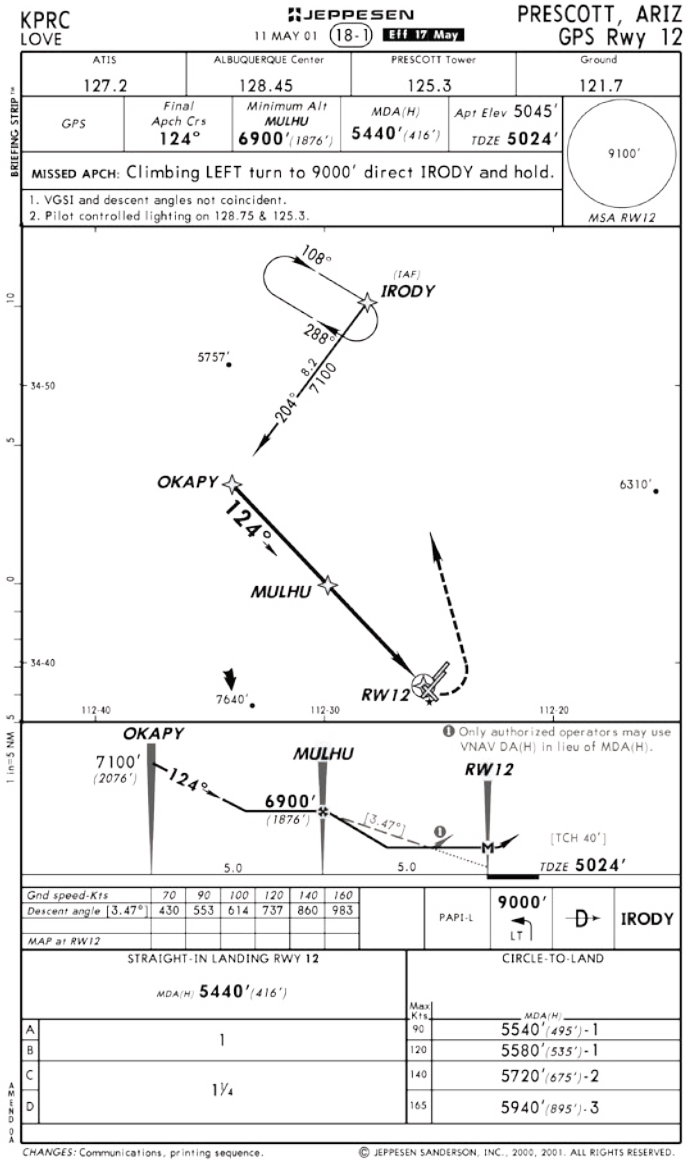


Figure 4-35 Flying the Missed Approach

Flying the Procedure Turn

The procedure turn portion of the approach is stored as one of the legs of the approach. For this reason the G1000 requires no special operations from the pilot (other than flying the procedure turn itself) beyond what is required for any other type of approach. This example is based upon a flight from KILG (Wilmington, DE New Castle County) to KMIV (Millville, NJ Municipal). The approach into KMIV will be NDB or GPS RWY 14 with the RNB transition.

1. Select KMIV as the destination.
2. Press the **PROC** key and select the NDB or GPS RWY 14 approach. From the transitions window select RNB as the IAF. Load the procedure.
3. When cleared for the approach, press the **PROC** key and select 'ACTIVATE APPROACH?'.
4. Within 30 nm of the destination, the G1000 switches from enroute mode to terminal mode. The switch to terminal mode is accompanied by a gradual scale transition from 5.0 to 1.0 nm, full scale deflection.
5. Prior to reaching the IAF (RNB), you may wish to review the approach sequence. Press the **FPL** key to display the Active Flight Plan Page. Press the **FMS** knob and turn the **large FMS** knob to review each segment of the approach. When finished, press the **FPL** key again to return to the previous page.
6. As the pilot approaches the IAF (RNB), a waypoint message 'NEXT DTK 327°' appears in the navigation status bar on the PFD. As the distance approaches zero the message is replaced by a turn advisory 'TURN TO 327°'.
7. Fly the outbound course keeping the CDI needle centered.
8. After flying approximately one minute past the IAF, the message 'START PROC TURN' appears.
9. Turn left to a heading of 282° to initiate the procedure turn. No guidance through the procedure turn is given. The procedure turn is displayed in magenta indicating the active leg. The CDI needle starts moving to the right.
10. After approximately one minute, make a 180° right turn to a heading of 102° to intercept the inbound course. The G1000 sequences to the inbound leg to the FAF, the CDI needle swings to the opposite side to provide proper sensing along the final course segment and 'NEXT DTK 147°' appears in the navigation status bar on the PFD.
11. As the CDI needle starts to center, make a right turn to 147° to intercept the final approach course.
12. Within 15 nm from the FAF (RNB), the G1000 switches from terminal mode to approach mode. CDI scaling begins rounding down from 1.0 to 0.3 nm, full scale deflection.
13. Upon crossing the FAF, the message 'NEXT DTK 147°' appears and the destination sequences to the MAP (RW14map, the runway threshold). Keeping the CDI needle centered, fly toward the MAP, observing the altitude minimums dictated by the approach chart.

14. As the pilot approaches the MAP, a waypoint message 'ARRIVING AT WAYPOINT' appears.
15. Upon crossing the MAP, 'SUSP' appears on the HSI and directly above the SUSP softkey, indicating that automatic sequencing of approach waypoints is suspended. A 'FROM' indication is displayed in the CDI, but course guidance along the final approach course continues. If a missed approach is required, use the **SUSP** softkey to initiate the missed approach sequence.

***NOTE**: Once the pilot crosses the FAF, the final course segment is displayed in magenta and a dashed line extends the course beyond the missed approach point. The dashed line is provided for situational awareness only and should NOT be used for navigation. Please follow the published missed approach procedures.*

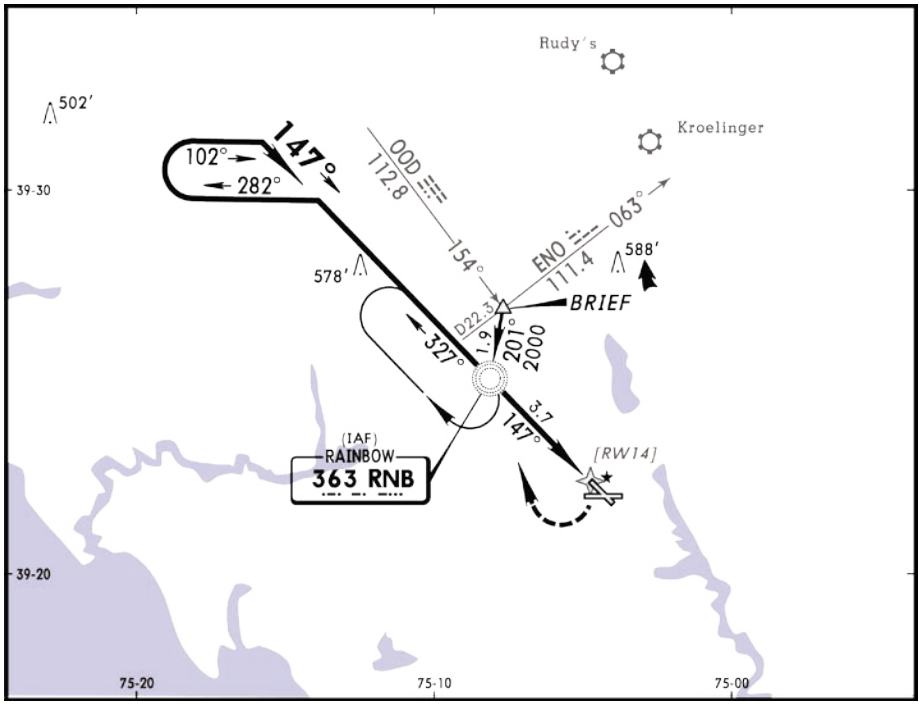


Figure 4-36 Flying the Procedure Turn

Flying the DME ARC

The GPS overlay for a DME arc approach uses additional Jeppesen provided waypoints to define the arc. When cleared for a DME arc approach, you may do either of the following to intercept the arc:

- Proceed direct to the IAF.
- Follow ATC vectors, which allow you to intercept the arc at any point along the arc.

This example is based upon a flight from KSAF (Santa Fe, NM Municipal) to KFMN (Farmington, NM Four Corners Regional). The VOR DME RWY 7 approach is selected along with "HIDOX" as the IAF.

1. Select KFMN as your destination.
2. Press the **PROC** key and select the 'VOR DMW RWY 7' approach. From the transitions window, select "HIDOX" as the IAF. Load the procedure.
3. Within 30 nm of KFMN, the G1000 switches from enroute mode to terminal mode. The CDI scale gradually transitions from 5.0 to 1.0 nm, full scale deflection.
4. Activated the approach when cleared by ATC.
5. As the pilot approaches the IAF (HIDOX), a waypoint message 'NEXT DTK 206°' appears in the navigation status bar on the PFD. As the distance to the IAF approaches zero, the message is replaced by a turn advisory 'TURN TO 206°'.
6. Follow the arc, keeping the CDI needle centered.
7. The next point in the approach is an intermediate fix "WILDE". As you approach "WILDE" a waypoint message 'NEXT DTK 072°' appears. As the distance to this fix approaches zero the message is replaced by a turn advisory 'TURN TO 072°'. Initiate a standard rate turn to this course heading.
8. Within 15 nm from the FAF (PINTO), the G1000 switches from terminal mode to approach mode. CDI scaling begins rounding down from 1.0 to 0.3 nm, full scale deflection.
9. As the pilot approaches the FAF, a waypoint message 'NEXT DTK 072°' appears. Make any adjustments necessary for the final course segment (FAF to MAP).
10. Upon crossing the FAF, the destination sequences to the MAP (RW07map, the runway threshold). Keeping the CDI needle centered, fly toward the MAP, observing the altitude minimums dictated by the approach plate.
11. As the pilot approaches the MAP, a waypoint message 'ARRIVING AT WAYPOINT' appears.
12. Upon crossing the MAP, 'SUSP' appears on the HSI and directly above the **SUSP** softkey, indicating that automatic sequencing of approach waypoints is suspended. A 'FROM' indication is displayed on the CDI, however course guidance along the final approach course continues. If a missed approach is required, use the **SUSP** softkey to initiate the missed approach.

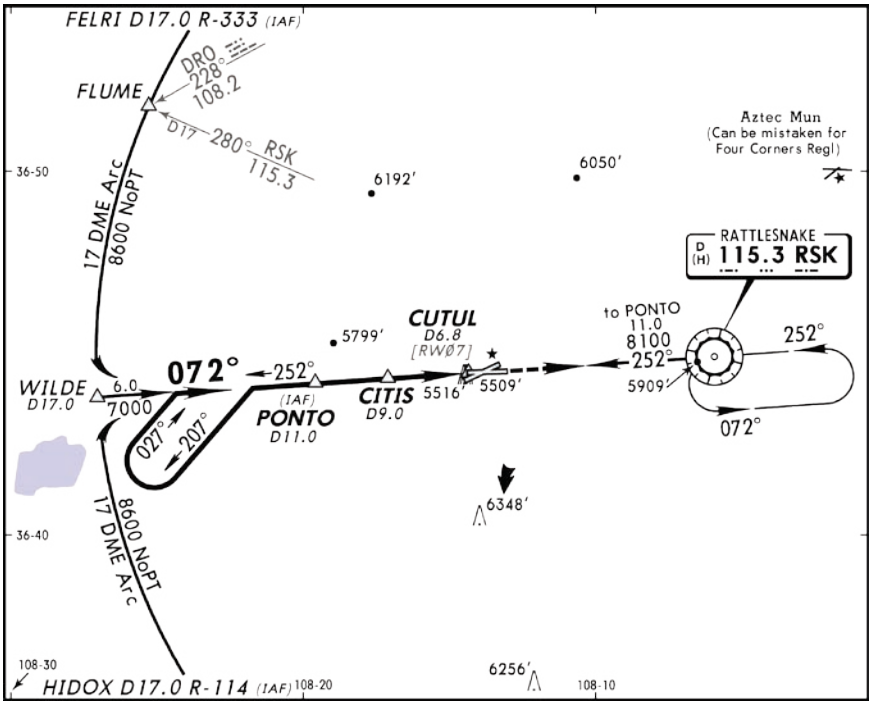


Figure 4-37 Flying the DME Arc and Vectors to the DME Arc

Flying a Holding Pattern

This example is based upon a missed approach from KSOP (Moore County, NC). Now you've decided to divert to KIGX (Chapel Hill, NC) instead. You select the RNAV (GPS) RWY 9 approach into KIGX. The RNAV (GPS) RWY 9 approach begins with a holding pattern at the IAF, FIKKA.

1. From the Active Flight Plan Page highlight KIGX and press the **Direct-to** key, then press the **ENT** key twice.
2. Press the **PROC** key and select the RNAV (GPS) RWY 9 approach.
3. From the transitions window, select FIKKA as the IAF, then 'Hold at FIKKA?' appears. Select Yes or No and press the **ENT** key. Choose 'ACTIVATE?', this loads and activates the approach.
4. Upon activating the approach, the Active Flight Plan Page appears. Review the approach sequence by pressing the **small FMS** knob and turning the **large FMS** knob to review each segment of the approach.
5. Within 30 nm of the airport, the G1000 switches from enroute mode to terminal mode. The CDI scale transitions from 5.0 to 1.0 nm, full scale deflection.
6. Prior to crossing FIKKA, a message 'HOLD DIRECT' appears in the navigation status bar on the PFD to suggest the proper holding pattern entry.
7. Fly the holding pattern (the holding pattern is displayed in magenta, indicating the active leg).
8. Upon crossing the IAF, 'SUSP' appears on the HSI and directly above the **OBS** softkey indicating that automatic sequencing of approach waypoints is suspended. As the pilot makes the turn inbound, 'SUSP' is cancelled and the G1000 returns to automatic sequencing.
9. As the pilot approaches FIKKA from within the holding pattern, a waypoint message (NEXT DTK 090°) appears.
10. Within 15 nm from the FAF, the G1000 switches from terminal mode to approach mode. CDI scaling begins rounding down from 1.0 to 0.3 nm, full scale deflection.
11. As the pilot approaches the FAF, a waypoint message (NEXT DTK 090°) appears. Make any course adjustments necessary for the final course segment (FAF to MAP).
12. Upon crossing the FAF, the destination sequences to the MAP (RW09map, the runway threshold). Keeping the needle centered fly toward the MAP, observing the altitude minimums dictated by the approach chart.

***NOTE**: When viewing the Navigation Map Page, the final course segment is displayed in magenta (the active leg of the flight plan always appears in magenta) and a dashed line extends the course beyond the MAP. Do NOT follow this extended course. Instead, follow the published missed approach procedures.*

13. As the pilot approaches the MAP, a waypoint message 'ARRIVING AT WAYPOINT' appears.

14. Upon crossing the MAP, 'SUSP' appears on the HSI and directly above the **SUSP** softkey, indicating that automatic sequencing of approach waypoints is suspended at the MAP. A 'FROM' indication is displayed on the CDI, however course guidance along the final approach course continues. If a missed approach is required, use the **SUSP** softkey to initiate the missed approach sequence.

***NOTE**: Remember not to press the **OBS** softkey until ready to make the turn.*

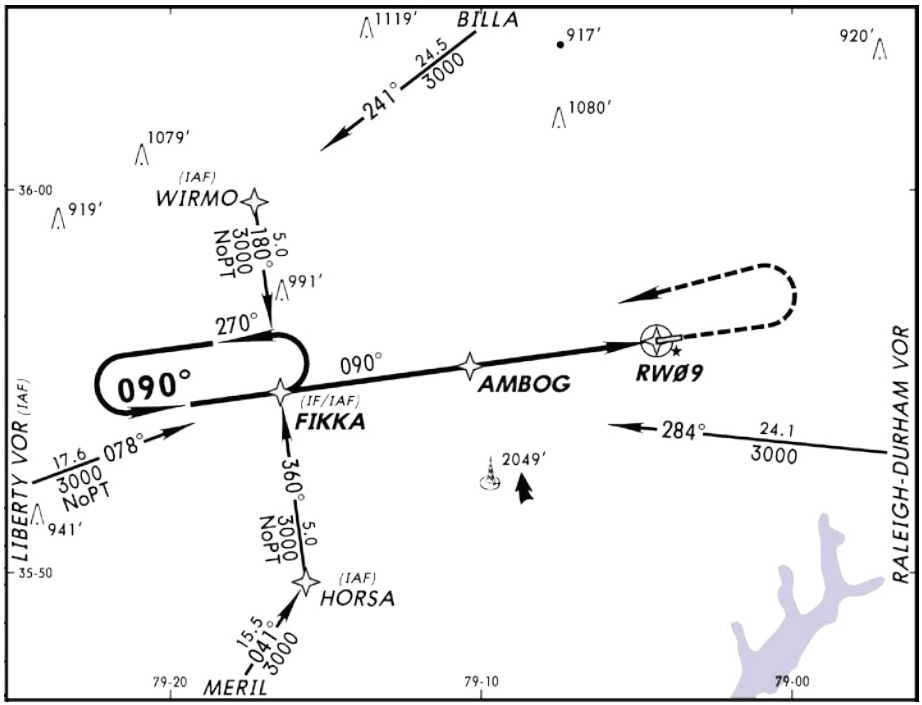


Figure 4-38 Flying a Holding Pattern

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A.1 INTRODUCTION

NOTE: The Aircraft Flight Manual (AFM) takes precedence over any conflicting information found in the Annunciations and Alerts Pilot's Guide.

The G1000 Alerting System conveys alerts to the pilot using a combination of the following items:

- **Annunciation Window**: The Annunciation window displays abbreviated annunciation text. Text is colored based on alert levels described in the Annunciations and Alerts Pilot's Guide. The Annunciation window is located to the right of the Altitude and Vertical Speed windows on the display. As many as 12 DA42 annunciations are able to be displayed in the annunciations window simultaneously. A white horizontal line separates annunciations that are acknowledged from annunciations that are not yet acknowledged. Higher priority annunciations are displayed towards the top of the window. Lower priority annunciations are displayed towards the bottom of the window.
- **Alerts Window:** The Alerts window displays alert text messages. Up to 64 prioritized alert text messages can be displayed in the Alerts window. Pressing the **ALERTS** softkey displays the Alerts window. Pressing the **ALERTS** softkey a second time removes the Alerts window from the display. When the alerts window is displayed, the pilot can use the **large FMS** knob to scroll through the alert message list.
- **Softkey Annunciation**: During certain alerts, the **ALERTS** softkey may appear as a flashing annunciation to accompany an alert. The **ALERTS** softkey assumes a new label consistent with alert level (WARNING, CAUTION, or ADVISORY). By pressing the softkey, the pilot acknowledges awareness of the alert. The softkey then returns to the previous **ALERTS** label. The pilot can press the **ALERTS** softkey a second time to view alert text messages.
- **System Annunciations**: Typically, a large red 'X' appears in windows when a failure is detected in the LRU providing the information to the window. See the Annunciations and Alerts Pilot's Guide for more information.
- **Audio Alerting System**: The G1000 system issues audio alert tones when specific system conditions are met. See the Alert Level Definitions section for more information.

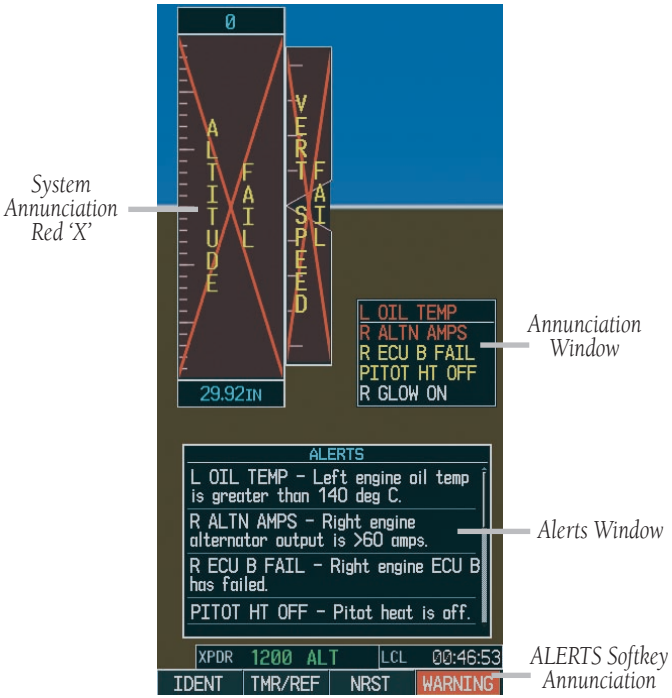


Figure A-1 G1000 Alerting System

A.2 ALERT LEVEL DEFINITIONS

The G1000 Alerting System uses four alert levels, as installed in the Diamond DA42:

- **WARNING:** This level of alert requires immediate pilot attention. This alert is accompanied by an annunciation in the Annunciation window. Text appearing in the Annunciation window is RED. The warning alert is also accompanied by a flashing **WARNING** softkey, as shown in Figure A-2. Pressing the **WARNING** softkey acknowledges the presence of the alert and stops the aural tone. An alert text message is then displayed in the Alerts window.
- **CAUTION:** This level of alert indicates the existence of abnormal conditions on the aircraft that may require pilot intervention. This alert is accompanied by an annunciation in the Annunciation window. Caution alert text appearing in the Annunciation window is YELLOW. A caution alert is also accompanied by a flashing **CAUTION** softkey, as shown in Figure A-3. Pressing the **CAUTION** softkey acknowledges the presence of the alert and displays the alert text message.

There are two ADVISORY alert levels. Advisory alerts provide general information to the pilot regarding various aspects of the system.

- **ANNUNCIATION ADVISORY:** This alert is accompanied by an annunciation in the Annunciation window. Annunciation window text for this alert is WHITE. This alert is also accompanied by a flashing **ADVISORY** softkey, as shown in Figure A-4. Pressing the **ADVISORY** softkey acknowledges the presence of the alert and displays the alert text message in the Alerts window.
- **MESSAGE ADVISORY**: This alert does not issue an annunciation in the Annunciation window. The flashing **ADVISORY** softkey is all that is displayed. Pressing the **ADVISORY** softkey acknowledges the presence of the alert and displays the alert text message in the Alerts window. All G1000 system alerts listed in the Annunciations and Alerts Pilot's Guide are categorized as Message Advisories.

Figure A-2 WARNING Softkey Annunciation

Figure A-3 CAUTION Softkey Annunciation

Figure A-4 ADVISORY Softkey Annunciation

A.3 DA42 AIRCRAFT ALERTS

The following alerts are configured specifically for the Diamond DA42. See the Aircraft Flight Manual (AFM) for recommended pilot actions.

WARNING Alerts

Annunciation Window Text	Alerts Window Message	Audio Alert
L / R ENG TEMP	Left/right engine coolant temp is >105 deg C.	Continuous Aural Tone
L / R OIL TEMP	Left/right engine oil temp is greater than 140 deg C.	
L / R OIL PRES	Left/right engine oil pressure is less than 1.2 bar.	
L / R GBOX TEMP	Left/right engine gearbox temp is >120 deg C.	
L / R ALTN AMPS	Left/right engine alternator output is >60 amps.	
L / R STARTER	Left/right 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
L / R ECU A FAIL	Left/right engine ECU A has failed.	Single Aural Tone
L / R ECU B FAIL	Left/right engine ECU B has failed.	
L / R FUEL LOW	Left/right engine main tank fuel quantity is low.	
L / R ALTN FAIL	Left/right engine alternator has failed.	
L / R VOLTS LOW	Left/right bus voltage is less than 25 volts.	
L / R ENG FIRE	Left/right engine fire detected.	
L / R COOL LVL	Left/right engine coolant level is low.	
PITOT FAIL	Pitot heat has failed.	
PITOT HT OFF	Pitot heat is off.	
STAL HT FAIL	Stall warning heat has failed.	
STAL HT OFF	Stall warning heat is off.	
L / R XFER FAIL	Left/right auxiliary fuel transfer has failed.	

Annunciation Window Text	Alerts Window Message	Audio Alert
DEICE LVL LO	De-icing fluid level is low.	Single Aural Tone
DEIC PRES HI	De-icing pressure is high.	
DEIC PRES LO	De-icing pressure is low.	
STICK LIMIT	Stick limiting system has failed.	

Annunciation Advisory Alerts

Annunciation Window Text	Alerts Window Message	Audio Alert
L / R GLOW ON	Left/right engine glow plug active.	No Tone
L / R FUEL XFER	Left/right fuel transfer from aux to main in progress.	

Message Advisory Alerts

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

Voice Alert	Alert Trigger
"Traffic"	Played when a Traffic Advisory (TA) is issued.
"Traffic Not Available"	Played when the traffic system fails or cannot communicate.

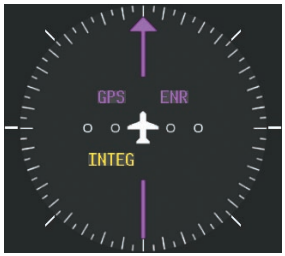
NOTE: *Voice alerts are provided to the G1000 by the GIA 63 #1. Should this unit fail, audio and voice alerts will no longer be available.*

A.4 G1000 SYSTEM ANNUNCIATIONS

When an LRU or an LRU function fails, a large red 'X' is typically displayed on windows associated with the failed data. The following Section describes various system annunciations. Refer to the Aircraft Flight Manual (AFM) 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 1 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 air data computer.
	Display is not receiving altitude input from the air data computer.

System Annunciation	Comment
	Display is not receiving vertical speed input from the air data computer.
	Display is not receiving valid heading input from AHRS.
	Display is not receiving valid OAT information from air data computer.
	Display is not receiving valid true airspeed information from air data computer.
	GPS information is either not present or is invalid for navigation use. Note that AHRS utilizes GPS inputs during normal operation. AHRS operation may be degraded if GPS signals are not present (see AFMS).
	Display 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.

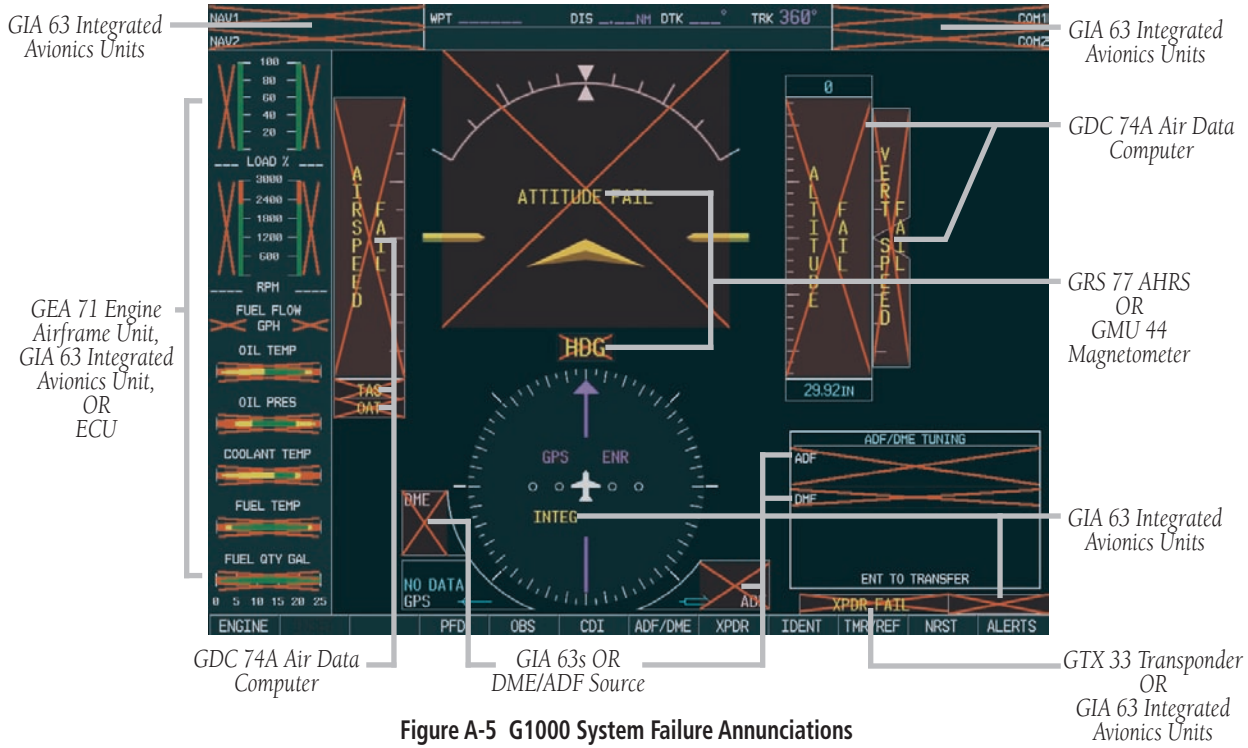


Figure A-5 G1000 System Failure Annunciations

A.5 G1000 SYSTEM MESSAGE ADVISORIES

This section describes various G1000 system message advisories. Certain messages are issued due to an LRU or LRU function failure. Such messages are normally accompanied by a corresponding red 'X' annunciation as shown in Section A.4 of this Appendix.

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

MFD & PFD Message Advisories

Message	Comments
DATA LOST – Pilot stored data was lost. Recheck settings.	The pilot profile data was lost. System reverts to default pilot profile and settings. The pilot may 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. Have the G1000 system serviced.
PFD1 SERVICE – PFD1 needs service. Return unit for repair.	The PFD and/or MFD self-test has detected a problem. Have the G1000 system 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. Have the G1000 system 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. Have the G1000 system serviced.
MANIFEST – PFD1 software mismatch. Communication halted.	The PFD and/or MFD has incorrect software installed. Have the G1000 system 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, have the G1000 system serviced.
MFD1 COOLING – MFD1 has poor cooling. Reducing power usage.	
PFD1 "KEY" KEYSTK – key is stuck.	A key is stuck on the PFD and/or MFD bezel. Attempt to free the stuck key by pressing it several times. Have the G1000 system serviced, if the problem persists.
MFD1 "KEY" KEYSTK – key is stuck.	

Database Message Advisories

Alerts Window Message	Comments
MFD1 DB ERR – MFD1 aviation database error exists.	The MFD and/or PFD detected a failure in the aviation database. Attempt to reload the aviation database. If problem persists, have the G1000 system 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, have the G1000 system serviced.
PFD1 DB ERR – PFD1 terrain database error exists.	
DB MISMATCH – Aviation database version mismatch. Xtalk is off.	The PFD and MFD have different aviation database versions installed. Crossfill is off. Install correct aviation database version in both displays.
DB MISMATCH – Aviation database type mismatch. Xtalk is off.	The PFD and MFD have different aviation database types installed (Americas, European, etc). Crossfill is off. Install correct aviation database type in both displays.

GMA 1347 Message Advisories

Alerts Window Message	Comments
GMA1 FAIL – GMA1 is inoperative.	The audio panel self-test has detected a failure. The audio panel is unavailable. Have the G1000 system serviced.
GMA1 CONFIG – GMA1 configuration error. Config service req'd.	The audio panel configuration settings do not match backup configuration memory. Have the G1000 system serviced.
MANIFEST – GMA1 software mismatch. Communication halted.	The audio panel has incorrect software installed. Have the G1000 system 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. Have the G1000 system serviced when possible.
BACKUP PATH – Audio panel using backup data path.	The audio panel is using a backup communication path. Have the G1000 system 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. Have the G1000 system 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, have the G1000 system 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. Have the G1000 system serviced.
GIA2 SERVICE – GIA2 needs service. Return the unit for repair.	
MANIFEST – GIA1 software mismatch. Communication halted.	The GIA1 and/or GIA 2 has incorrect software installed. Have the G1000 system serviced.
MANIFEST – GIA2 software mismatch. Communication halted.	
COM1 TEMP – COM1 over temp. Reducing transmitter power.	The system has detected an over temperature condition in COM1 and/or COM2. The transmitter will operate at reduced power. If the problem persists, the G1000 system should be serviced.
COM2 TEMP – COM2 over temp. Reducing transmitter power.	
COM1 SERVICE – COM1 needs service. Return unit for repair.	The system has detected a failure in COM1 and/or COM2. COM1 and/or COM2 may still be usable. Have the G1000 system serviced when possible.
COM2 SERVICE – COM2 needs service. Return unit for repair.	
COM1 PTT – COM1 push-to-talk key is stuck.	The COM1 and/or COM2 external push-to-talk switch is stuck in the enable (or "pressed") position. Press the PTT switch again to cycle its operation. If the problem persists, have the G1000 system serviced.
COM2 PTT – COM2 push-to-talk key is stuck.	

GIA 63 Message Advisories (Cont.)

Alerts Window Message	Comments
COM1 RMT XFR – COM1 remote transfer key is stuck.	The COM1 and/or COM2 transfer switch is stuck in the enabled (or "pressed") position. Press the transfer switch again to cycle its operation. If the problem persists, have the G1000 system 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. Have the G1000 system serviced.
GPS2 FAIL – GPS2 is inoperative.	
GPS1 SERVICE – GPS1 needs service. Return unit for repair.	A failure has been detected in the GPS1 and/or GPS2 receiver. The receiver may still be available. Have the G1000 system 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. Have the G1000 system serviced.
NAV2 SERVICE – NAV2 needs service. Return unit for repair.	
NAV1 RMTXFR – NAV1 remote transfer key is stuck.	The remote NAV1 and/or NAV2 transfer switch is stuck in the enabled (or "pressed") state. Press the transfer switch again to cycle its operation. If the problem persists, have the G1000 system 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. Have the G1000 system 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. Have the G1000 system serviced when possible.
G/S2 SERVICE – G/S2 needs service. Return unit for repair.	

GEA 71 Message Advisories

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

GTX 33 Message Advisories

Alerts Window Message	Comments
XPDR1 CONFIG – XPDR1 config error. Config service req'd.	Transponder configuration settings do not match those of backup configuration memory. Have the G1000 system serviced.
MANIFEST – GTX1 software mismatch. Communication halted.	The transponder has incorrect software installed. Have the G1000 system serviced.
BACKUP PATH – Transponder using backup data path.	The transponder is using a backup communications path. Have the G1000 system 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. Have the G1000 system serviced.
AHRS GPS – AHRS using backup GPS source.	The AHRS is using the backup GPS path. Primary GPS path has failed. Have the G1000 system 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. Have the G1000 system 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. Have the G1000 system serviced.
BACKUP PATH – AHRS using backup data path.	The AHRS is using a backup communications data path. Have the G1000 system 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 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 invalid. AHRS uses GPS for backup mode operation. Have the G1000 system serviced.
MANIFEST – GMU1 software mismatch. Communication halted.	The GMU 44 has incorrect software installed. Have the G1000 system serviced.

GDC 74A Message Advisories

Alerts Window Message	Comments
GDC1 CONFIG – GDC1 configuration error. Config service req'd.	GDC 74A configuration settings do not match those of backup configuration memory. Have the G1000 system serviced.
MANIFEST – GDC1 software mismatch. Communication halted.	The GDC 74A has incorrect software installed. Have the G1000 system serviced.
BACKUP PATH – Airdata using backup data path.	The GDC 74A is using a backup communications data path. Have the G1000 system serviced when possible.

Miscellaneous Message Advisories

Alerts Window Message	Comments
FPL WPT LOCK – Flight plan waypoint is locked.	Upon power-up, the G1000 system detects that a stored flight plan waypoint is locked. This occurs when an aviation database update eliminates an obsolete waypoint. The flight plan cannot find the specified waypoint and flags this message. This can also occur with user waypoints that exist in a flight plan that are deleted. Remove the waypoint from the flight plan if it no longer exists in any database, OR update the waypoint name/identifier to reflect the new information.
FPL WPT MOVE – Flight plan waypoint moved.	The system has detected that a waypoint coordinate has changed due to a new aviation database update. Verify that stored flight plans contain correct waypoint locations.
TIMER EXPIRD – Timer has expired.	The system notifies the pilot that the timer has expired.
DB CHANGE – Database changed. Verify user modified procedures.	This occurs when a stored flight plan contains procedures that have been manually edited. This alert is issued only after a aviation database update. Verify that the user modified procedures in stored flight plans are correct and up to date.
FPL TRUNC – Flight plan has been truncated.	This occurs when a newly installed aviation database eliminates an obsolete approach or arrival used by a stored flight plan. The obsolete procedure is removed from the flight plan. Update flight plan with current arrival or approach.
APPR VPROF – Approaching VNAV profile.	Aircraft is approaching VNAV profile. Prepare to climb or descend to meet VNAV profile.

Miscellaneous Message Advisories (Cont.)

Alerts Window Message	Comments
APPR TRG ALT – Approaching target altitude.	Aircraft is approaching target altitude. Prepare to level aircraft.
LOCKED FPL – Cannot navigate locked flight plan.	This occurs when the pilot attempts to activate a stored flight plan that contains locked waypoint. Remove locked waypoint from flight plan. Update flight plan with current waypoint.
WPT ARRIVAL – Arriving at waypoint -[xxxx]	Arriving at waypoint [xxxx] where xxxx is the waypoint name.
STEEP TURN – Steep turn ahead.	A steep turn is 15 seconds ahead. Prepare to turn.
INSIDE ARSPC – Inside airspace.	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.	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 system notifies the pilot that the loaded approach is not active. Activate approach when required.
SLCT AUTOSEQ – Select auto sequence mode.	The system notifies the pilot to select auto-sequence mode. Press the OBS softkey to deactivate the OBS mode.
SLCT FREQ – Select appropriate frequency for approach.	The system notifies the pilot to load the approach frequency for the appropriate NAV receiver. Select the correct frequency for the approach.
SLCT NAV – Select NAV on CDI for approach.	The system notifies the pilot to set the CDI to the correct NAV receiver. Set the CDI to the correct NAV receiver.
NO WGS84 WPT – Non WGS 84 waypoint for navigation -[xxxx]	The selected waypoint [xxxx] does not use the WGS 84 datum. Cross-check position with alternate navigation sources.
TRAFFIC FAIL – Traffic device has failed.	The traffic information system TIS has failed. Have the G1000 system serviced.
STRMSCP FAIL – Stormscope has failed.	The Stormscope has failed. Have the G1000 system 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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