# GARMIN

# G1000® NXi

## Pilot's Guide

*Cessna Nav III*

This manual reflects the operation of System Software version 2501.00 or later for Cessna 172R, 172S, 182T, J182T, T182T, 206H, and T206H aircraft. Some differences in operation may be observed when comparing the information in this manual to earlier or later software versions.

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

**Garmin International, Inc.**
1200 East 151st Street
Olathe, Kansas 66062, U.S.A.
Tel: 913.397.8200
Fax: 913.397.8282
Aircraft On Ground (AOG) Hotline: 913.397.0836
Aviation Dealer Technical Support: 888.606.5482

**Garmin (Europe) Ltd.**
Liberty House, Hounsdown Business Park
Southampton, Hampshire SO40 9LR U.K.
Tel: +44 (0) 238 052 4000
Fax: +44 (0) 238 052 4004
Aviation Support: +44 (0) 370 850 1243

**Garmin AT, Inc.**
2345 Turner Road SE
Salem, OR 97302, U.S.A.
Tel: 503.581.8101
Fax 503.364.2138

**Garmin Corporation**
No. 68, Zhangshu 2nd Road
Xizhi District, New Taipei City, Taiwan
Tel: 34-93-357-2608
Fax: 34-93-429-4484

Website Address: www.garmin.com

AC-U-KWIK and its related organizations (hereafter collectively "AC-U-KWIK Organizations") expressly disclaim all warranties with respect to the AC-U-KWIK information included in this data, express or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. The information is provided "as is" and AC-U-KWIK Organizations do not warrant or make any representations regarding its accuracy, reliability, or otherwise. Licensee agrees not to sue AC-U-KWIK Organizations and, to the maximum extent allowed by law, to release and hold harmless AC-U-KWIK Organizations from any cause of action, claims or losses related to any actual or alleged inaccuracies in the information arising out of Garmin's use of the information in the datasets. Some jurisdictions do not allow the limitation or exclusion of implied warranties or liability for incidental or consequential damages so the above limitations or exclusions may not apply to licensee.

**WARNING:** Do not use terrain avoidance displays as the sole source of information for maintaining separation from terrain and obstacles.  Garmin obtains terrain and obstacle data from third party sources and cannot independently verify the accuracy of the information.

**WARNING:** Always refer to current aeronautical charts and NOTAMs for verification of displayed aeronautical information.  Displayed aeronautical data may not incorporate the latest NOTAM information.

**WARNING:** Do not use geometric altitude for compliance with air traffic control altitude requirements. The primary barometric altimeter must be used for compliance with all air traffic control altitude regulations, requirements, instructions, and clearances.

**WARNING:** Do not use basemap information (land and water data) as the sole means of navigation. Basemap data is intended only to supplement other approved navigation data sources and should be considered only an aid to enhance situational awareness.

**WARNING:** Do not rely solely upon the display of traffic information to accurately depict all of the traffic within range of the aircraft.  Due to lack of equipment, poor signal reception, and/or inaccurate information from aircraft or ground stations, traffic may be present that is not represented on the display.

**WARNING:** Do not use data link weather  information for maneuvering in, near, or around areas of hazardous weather.  Information contained within data link weather products may not accurately depict current weather conditions.

**WARNING:** Do not use the indicated data link weather product age to determine the age of the weather information shown by the data link weather product.  Due to time delays inherent in gathering and processing weather data for data link transmission, the weather information shown by the data link weather product may be older than the indicated weather product age.

**WARNING:** The displayed minimum safe altitude (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:** Always obtain qualified instruction prior to operational use of this equipment.

**WARNING:** Do not use a QFE altimeter setting with this system.  System functions will not operate properly with a QFE altimeter setting.  Use only a QNH altimeter setting for height above mean sea level, or the standard pressure setting, as applicable.

**WARNING:** *Do not use GPS to navigate to any active waypoint identified as a 'NON WGS84 WPT' by a system message. 'NON WGS84 WPT' waypoints are derived from an unknown map reference datum that may be incompatible with the map reference datum used by GPS (known as WGS84) and may be positioned in error as displayed.*

**WARNING:** *When using the autopilot to fly an approach with vertical guidance, the autopilot will not level the aircraft at the MDA/DH even if the MDA/DH is set in the altitude preselect.*

**CAUTION:** *Do not clean display surfaces with abrasive cloths or cleaners containing ammonia. They will harm the anti-reflective coating.*

**CAUTION:** *Repairs should only be made by an authorized Garmin service center. Unauthorized repairs or modifications could void both the warranty and affect the airworthiness of the aircraft.*

**NOTE:** *Do not rely solely upon data link services to provide Temporary Flight Restriction (TFR) information. Always confirm TFR information through official sources such as Flight Service Stations or Air Traffic Control.*

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

**NOTE:** *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 system use GPS as a precision electronic NAVigation AID (NAVAID). Therefore, as with all NAVAIDs, information presented by the system can be misused or misinterpreted and, therefore, become unsafe.*

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

**NOTE:** *Interference from GPS repeaters operating inside nearby hangars can cause an intermittent loss of attitude and heading displays while the aircraft is on the ground. Moving the aircraft more than 100 yards away from the source of the interference should alleviate the condition.*

**NOTE:** *Use of polarized eyewear may cause the flight displays to appear dim or blank.*

**NOTE:** *This product, its packaging, and its components contain chemicals known to the State of California to cause cancer, birth defects, or reproductive harm. This notice is being provided in accordance with California's Proposition 65. If you have any questions or would like additional information, please refer to our web site at www.garmin.com/prop65.*

*NOTE: Operating the system in the vicinity of metal buildings, metal structures, or electromagnetic fields can cause sensor differences that may result in nuisance miscompare annunciations during start up, shut down, or while taxiing. If one or more of the sensed values are unavailable, the annunciation indicates no comparison is possible.*

*NOTE: The system responds to a terminal procedure based on data coded within that procedure in the Navigation Database. Differences in system operation may be observed among similar types of procedures due to differences in the Navigation Database coding specific to each procedure.*

*NOTE: The FAA has asked Garmin to remind pilots who fly with Garmin database-dependent avionics of the following:*

*• It is the pilot's responsibility to remain familiar with all FAA regulatory and advisory guidance and information related to the use of databases in the National Airspace System.*

*• Garmin equipment will only recognize and use databases that are obtained from Garmin or Jeppesen. Databases obtained from Garmin or Jeppesen that have a Type 2 Letter of Authorization (LOA) from the FAA are assured compliance with all data quality requirements (DQRs). A copy of the Type 2 LOA is available for each applicable database and can be viewed at http://fly.garmin.com by selecting 'Aviation Database Declarations.'*

*• Use of a current Garmin or Jeppesen database in your Garmin equipment is required for compliance with established FAA regulatory guidance, but does not constitute authorization to fly any and all terminal procedures that may be presented by the system. It is the pilot's responsibility to operate in accordance with established POHs and regulatory guidance or limitations as applicable to the pilot, the aircraft, and installed equipment.*

*NOTE: The pilot/operator must review and be familiar with Garmin's database exclusion list as discussed in SAIB CE-14-04 to determine what data may be incomplete. The database exclusion list can be viewed at www.flygarmin.com by selecting 'Database Exclusions List.'*

*NOTE: The pilot/operator must have access to Garmin and Jeppesen database alerts and consider their impact on the intended aircraft operation. The database alerts can be viewed at www.flygarmin.com by selecting 'Aviation Database Alerts.'*

*NOTE: If the pilot/operator wants or needs to adjust the database, contact Garmin Product Support.*

*NOTE: Garmin requests the flight crew report any observed discrepancies related to database information. These discrepancies could come in the form of an incorrect procedure; incorrectly identified terrain, obstacles and fixes; or any other displayed item used for navigation or communication in the air or on the ground. Go to FlyGarmin.com and select 'Aviation Data Error Report'.*

*NOTE: The system supports approval of AC 120-76C Hardware Class 3, Software Type B Electronic Flight Bag (EFB) electronic aeronautical chart applications. Possible additional requirements may make a secondary source (traditional paper or additional electronic display) necessary onboard the aircraft. If the secondary source is a Portable Electronic Device (PED), its use must be consistent with guidance in AC 120-76C.*

| Record of Revisions | | | | |
|---|---|---|---|---|
| Part Number | Revision | Date | Page Range | Description |
| 190-02177-00 | A | 01/06/2017 | i - I-6 | Production release with GDU software version 20.05. |

BLANK PAGE

# SECTION 1  SYSTEM OVERVIEW

## 1.1  SYSTEM DESCRIPTION

This section provides an overview of the G1000 NXi Integrated Avionics System as installed in the Cessna Nav III.  The system presents flight instrumentation, position, navigation, communication, and identification information to the pilot through large-format displays.

The optional Flight Stream 510 device provides a Bluetooth**®** connection between the system and a mobile device.  GPS, ADAHRS/AHRS, ADS-B, traffic, SiriusXM audio, and weather data can then be shared with the mobile device, and flight plans can be transferred to or from the mobile device. Also, database updates may also be performed using the Flight Stream 510 WiFi link.

### LINE REPLACEABLE UNITS (LRU)

The system consists of the following Line Replaceable Units (LRUs):

- **GDU 1050** (1) – The GDU 1050 is configured as a Primary Flight Display (PFD).  The display communicates with the MFD and with the #1 GIA 63W Integrated Avionics Unit through a High-Speed Data Bus (HSDB) Ethernet connection.

- **GDU 1054** (1) – The GDU 1054 is configured as an MFD.  The display communicates with the PFD and with the #2 GIA 63W Integrated Avionics Unit through a High-Speed Data Bus (HSDB) Ethernet connection.

- **GIA 63W** (2) – Functions as the main communication hub, linking all LRUs with the PFD and MFD.  Each GIA 63W contains a GPS SBAS receiver, VHF COM/NAV/GS receivers, a flight director (FD) and system integration microprocessors.  Each GIA 63W is paired with the PFD and MFD via HSDB connection.  The GIA 63Ws are not paired together and do not communicate with each other directly.

- **GSU 75** (1) – Processes data from the pitot/static system as well as the OAT probe to provide pressure altitude, airspeed, vertical speed and OAT information to the system.  This unit also provides aircraft attitude and heading information via ARINC 429 to the PFD, MFD, and GIA 63W.  The GSU 75 contains advanced sensors (including accelerometers and rate sensors) and interfaces with the GMU 44 to obtain magnetic field information, and with the GIA 63W to obtain GPS information.  ADAHRS/AHRS modes of operation are discussed later in this document.

- **GDC 72 / 74A** (1) (Optional) – Processes data from the pitot/static system as well as the OAT probe.  This unit provides pressure altitude, airspeed, vertical speed and OAT information to the system, and it communicates with the GIA 63Ws, the displays, and the GRS 77/79, using an ARINC 429 digital interface (it also interfaces directly with the GTP 59).  The GDC 74A is designed to operate in Reduced Vertical Separation Minimum (RVSM) airspace.

- **GRS 77 / 79** (1) (Optional) – Provides aircraft attitude and heading information via ARINC 429 to both displays and both GIA 63Ws.  The GRS 77/79 contains advanced sensors (including accelerometers and rate sensors) and interfaces with the GMU 44 to obtain magnetic field information, with the GDC 74A to obtain air data, and with both GIA 63/63Ws to obtain GPS information.  AHRS modes of operation are discussed later in this document.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

- **GEA 71** (1) – Receives and processes signals from the engine and airframe sensors. This unit communicates with both GIA 63Ws using an RS-485 digital interface.

- **GMU 44** (1) – Measures local magnetic field. Data is sent to the GRS unit for processing to determine aircraft magnetic heading. The GMU 44 receives power directly from the GRS unit and communicates with the GRS unit using an RS-485 digital interface.

- **GMA 1347** (1) – Integrates NAV/COM digital audio, intercom system and marker beacon controls. This unit also enables the manual control of the display reversionary mode (red **DISPLAY BACKUP** button) and communicates with the #1 GIA 63(W), using an RS-232 digital interface.

- **GTX 335R/345R/33ES** (1) – Solid-state transponder that provides Mode A, C, S capability. The optional GTX 345R also provides ADS-B In/Out. The transponder can be controlled from the PFD. The transponder communicates with the both GIA 63Ws through an RS-232 digital interface.

- **GSA 81** (3), and **GSM 86** (3) – The GSA 81 servos are used for the automatic control of roll, pitch, and pitch trim. These units interface with each GIA 63W.

  The GSM 86 servo gearbox is responsible for transferring the output torque of the GSA 81 servo actuator to the mechanical flight-control surface linkage.

- **GDL 69A / GDL 69A SXM** (1) (Optional) – A satellite radio receiver that provides data link weather information to the MFD (and, indirectly, to the PFD maps) as well as digital audio entertainment. The GDL 69A SXM communicates with the MFD via HSDB connection. Subscriptions to the SiriusXM Weather or SiriusXM Satellite Radio services are required to enable the GDL 69A SXM capability.

- **GTS 800** (Optional) – The GTS 800 Traffic Advisory System (TAS) uses active interrogations of Mode S and Mode C transponders to provide Traffic Advisories to the pilot independent of the air traffic control system.

Figure 1-1 shows interactions between the LRUs. Additional/optional equipment are also shown in Figure 1-1. The system is capable of interfacing with the following optional equipment:

- **GDL 69A / GDL 69A SXM** Data Link Receiver
- **GTS 800** Traffic Advisory System
- L3 Stormscope Lightning Strike and Thunderstorm Detection
- KN 63 DME
- KR 87 ADF Receiver
- KTA 870 Traffic Avoidance System
- CO Guardian Carbon Monoxide Detection
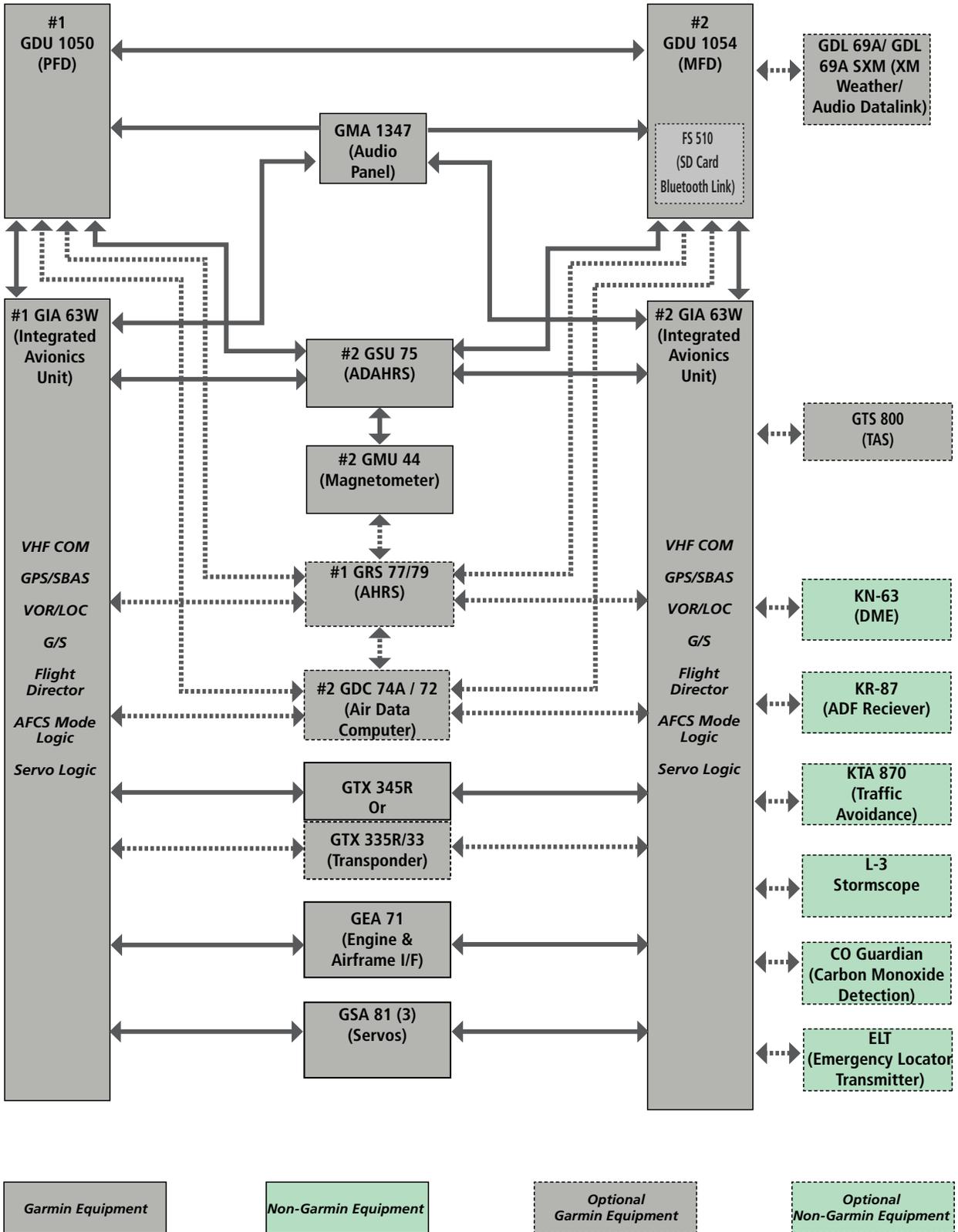
**Figure 1-1  System (LRU Configuration)**

> **NOTE:** *For information on non-Garmin equipment, consult the applicable optional interface user's guide. This document assumes that the reader is already familiar with the operation of this additional equipment.*

# 1.2 SYSTEM CONTROLS

**NOTE:** *The Audio Panel (GMA 1347) is described in the CNS & Audio Panel section.*

The system controls are located on the PFD and MFD bezels and audio panel. The controls for the PFD and MFD are discussed within the following pages of this section.

## PFD/MFD CONTROLS
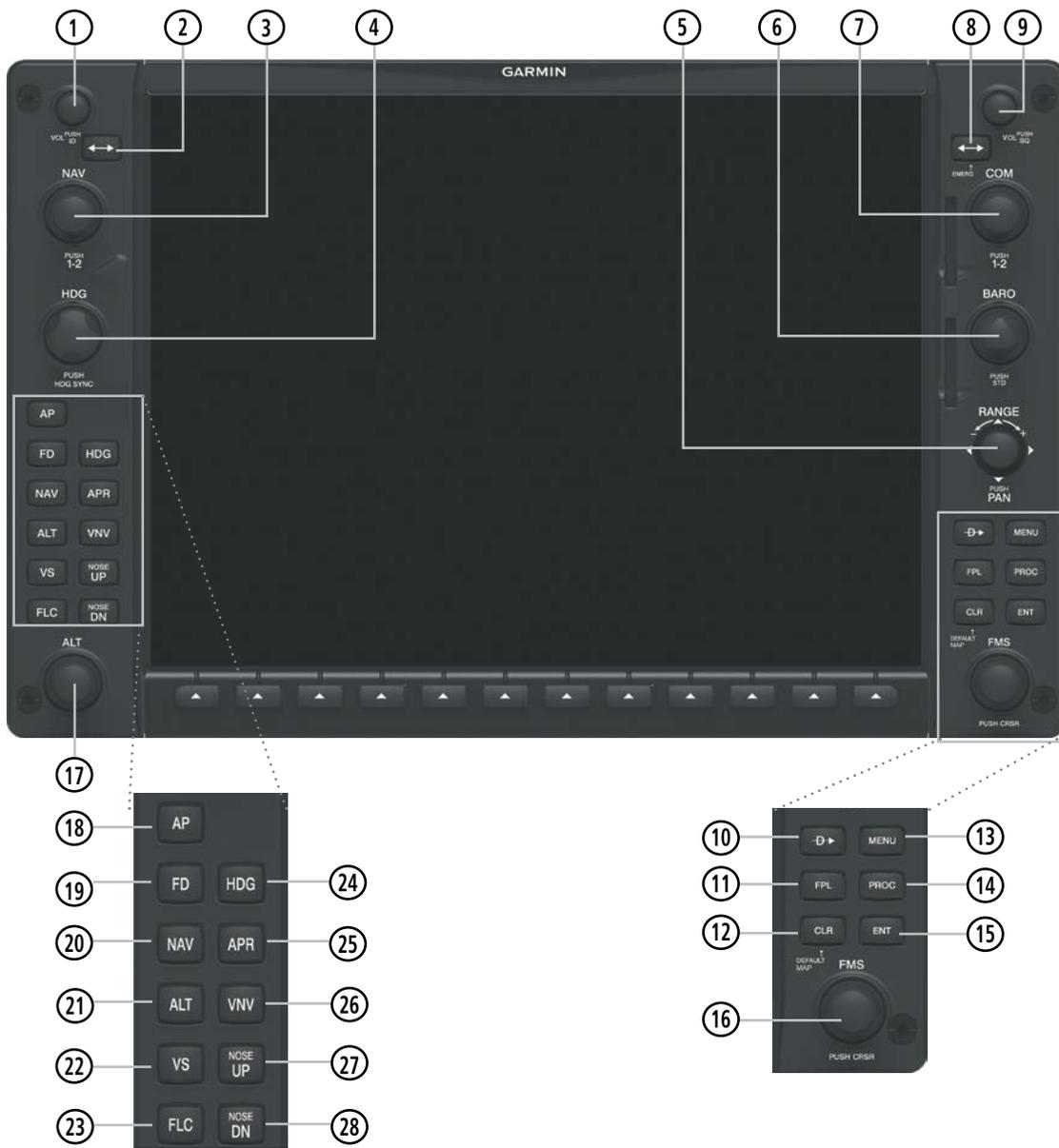


Only with Garmin AFCS

**Figure 1-2  PFD/MFD Controls**

| | | |
|---|---|---|
| ① | **NAV VOL/ID Knob** | Turn to control NAV audio volume (shown in the NAV Frequency Box as a percentage) Press to toggle Morse code identifier audio ON/OFF |
| ② | **NAV Frequency Transfer Key** | Transfers the standby and active NAV frequencies |
| ③ | **NAV Knob** | Turn to tune NAV receiver standby frequencies (large knob for MHz; small for kHz) Press to toggle cyan tuning box between NAV1 and NAV2 |
| ④ | **\*Heading Knob** | Turn to manually select a heading.  When operating in Heading Select mode, this knob provides the heading reference to the flight director. Press to display a digital heading momentarily to the left of the HSI and synchronize the Selected Heading to the current heading |
| ⑤ | **Joystick** | Turn to change map range Press to activate Map Pointer for map panning |
| ⑥ | **CRS/BARO Knob** | Turn large knob for altimeter barometric pressure setting Turn the small knob to set the pilot-selected course on the HSI when the VOR1, VOR2, or OBS/SUSP mode is selected.  Pressing this knob centers the CDI on the currently selected VOR.  The pilot-selected course provides course reference to the pilot-side flight director when operating in Navigation and Approach modes. Press to re-center the CDI and return course pointer directly TO bearing of active waypoint/ station |
| ⑦ | **COM Knob** | Turn to tune COM transceiver standby frequencies (large knob for MHz; small for kHz) Press to toggle cyan tuning box between COM1 and COM2 The selected COM (green) is controlled with the **COM MIC** Key (Audio Panel). |
| ⑧ | **COM Frequency Transfer Key (EMERG)** | Transfers the standby and active COM frequencies Press and hold two seconds to tune the emergency frequency (121.5 MHz) automatically into the active frequency field |
| ⑨ | **COM VOL/SQ Knob** | Turn to control COM audio volume level (shown as a percentage in the COM Frequency Box) Press to turn the COM automatic squelch ON/OFF |
| ⑩ | **Direct-to Key ( D▸ )** | Activates the direct-to function and 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) |
| ⑪ | **FPL Key** | Displays flight plan information |
| ⑫ | **CLR Key (DFLT MAP)** | Erases information, cancels entries, or removes menus Press and hold to display the MFD Navigation Map Page (MFD only). |
| ⑬ | **MENU Key** | Displays a context-sensitive list of options for accessing additional features or making setting changes |
| ⑭ | **PROC Key** | Gives access to IFR departure procedures (DPs), arrival procedures (STARs), and approach procedures (IAPs) for a flight plan or selected airport |
| ⑮ | **ENT Key** | Validates/confirms menu selection or data entry |

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

GARMIN.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

| (16) | **FMS Knob**<br>**(Flight Management System Knob)** | Press to turn the selection cursor ON/OFF.<br>***Data Entry:*** With cursor ON, turn to enter data in the highlighted field (large knob moves cursor location; small knob selects character for highlighted cursor location)<br>***Scrolling:*** When a list of information is too long for the window/box, a scroll bar appears, indicating more items to view.  With cursor ON, turn large knob to scroll through the list.<br>***Page Selection***: Turn knob on MFD to select the page to view (large knob selects a page group; small knob selects a specific page from the group) |
| --- | --- | --- |
| (17) | ***ALT Knob** | Sets the selected altitude in the Selected Altitude Box (the large knob selects the thousands, the small knob selects the hundreds).  In addition to providing the standard system altitude alerter function, selected altitude provides an altitude setting for the Altitude Capture/Hold mode of the AFCS |
| (18) | ****AP Key** | Engages/disengages the Autopilot and Flight Director in the default vertical and lateral modes. |
| (19) | ****FD Key** | Activates/deactivates the Flight Director only.  Pressing the **FD** key turns on the Flight Director in the default vertical and lateral modes.  Pressing the **FD** key again deactivates the Flight Director and removes the command bars, unless the Autopilot is engaged.  If the Autopilot is engaged, the **FD** key is disabled. |
| (20) | ****NAV Key** | Selects/deselects the Navigation mode. |
| (21) | ****ALT Key** | Selects/deselects the Altitude Hold mode. |
| (22) | ****VS Key** | Selects/deselects the Vertical Speed mode. |
| (23) | ****FLC Key** | Selects/deselects the Flight Level Change mode. |
| (24) | ****HDG Key** | Selects/deselects the Heading Select mode. |
| (25) | ****APR Key** | Selects/deselects the Approach mode. |
| (26) | ****VNV Key**<br>**(if equipped)** | Selects/deselects Vertical Navigation mode |
| (27) | ****NOSE UP Key** | Controls the active pitch reference for the Pitch Hold, Vertical Speed, and Flight Level Change modes. |
| (28) | ****NOSE DN Key** | Controls the active pitch reference for the Pitch Hold, Vertical Speed, and Flight Level Change modes. |

**\*This Key only appears on the MFD.**
**\*\*This Key only appears on the MFD with Garmin AFCS option.**

## SECURE DIGITAL CARDS

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

> **NOTE:** *Ensure that the system is powered off before inserting the SD card.*

The GDU 1050/1054 data card slots use Secure Digital (SD) cards and are located on the top right portion of the display bezels. Each display bezel is equipped with two SD card slots. SD cards are used for aviation database and system software updates as well as terrain database storage. Also, flight plans may be imported or exported from an SD card in the MFD.

### Installing and removing an SD card

Insert the SD card in the SD card slot, pushing the card in until the spring latch engages. The front of the card should remain flush with the face of the display bezel. To remove, gently press on the SD card to release the spring latch and eject the card.
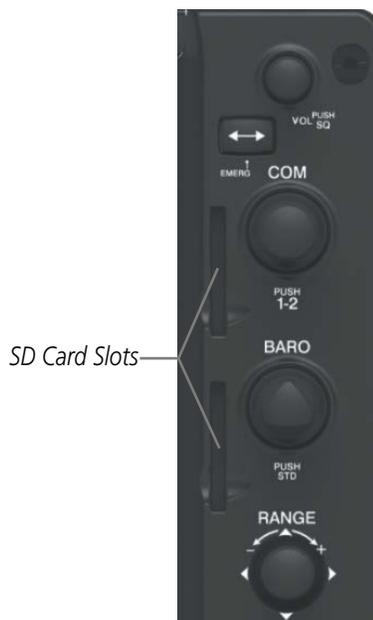


SD Card Slots

**Figure 1-3  PFD/MFD Display Bezel SD Card Slots**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

# 1.3  SYSTEM OPERATION

This section discusses powering up the system, normal and reversionary display operation, system status, ADAHRS/AHRS modes of operation,  and GPS receiver operation.

## SYSTEM POWER-UP

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

> **NOTE:** *See the Appendices for additional information regarding system-specific  annunciations and alerts.*

> **NOTE:** *See the Pilot's Operating Handbook (POH) for specific procedures concerning avionics power application and emergency power supply operation.*

The system is integrated with the aircraft electrical system and receives power directly from electrical busses. The 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.

When powering up the system, test annunciations are displayed and key annunciator lights also become momentarily illuminated on the audio panel and the display bezels.  On the PFD, the ADAHRS/AHRS begins to initialize and displays 'ADAHRS/DG ALIGN: Remain Stationary'.  All system annunciations should disappear typically within one minute of power-up.

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

- System version
- Land database name and version
- Safe Taxi database name and effective dates
- Terrain database name and version
- Obstacle database name and effective dates
- Navigation database name and effective dates
- Airport Directory name and effective dates
- FliteCharts/ChartView database information
- Copyright

Current database information includes the valid operating dates, cycle number and database type.  When this information has been reviewed for currency (to ensure that no databases have expired), the pilot is prompted to continue.  Pressing the **ENT** Key acknowledges this information and displays the Navigation Map Page on the MFD.

## NORMAL OPERATION

> **NOTE:** *In normal operating mode, backlighting can only be adjusted from the PFD (see Section 1.5). In reversionary mode, it can be adjusted from the remaining display.*

In normal operating mode, the PFD presents graphical flight instrumentation (attitude, heading, airspeed, altitude, vertical speed), replacing the traditional flight instrument cluster (see the Flight Instruments Section for more information). The MFD normally displays a full-color moving map with navigation information (see the Flight Management Section), while the left portion of the MFD is dedicated to the Engine Indication System (see the EIS Section). Both displays offer control for COM and NAV frequency selection.



**Figure 1-4  System Normal Operation**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## REVERSIONARY MODE

> **NOTE:** The system alerts the pilot when backup paths are utilized by the LRUs.  Refer to the Appendices for further information regarding system-specific alerts.

In the event of a display failure, the system can be manually switched to reversionary (backup) mode (all remaining displays enter reversionary mode).  In reversionary mode, all important flight information is presented on the remaining display(s) in the same format as in normal operating mode.

If a display fails, the appropriate IAU-display Ethernet interface is cut off.  Thus, the IAU can no longer communicate with the remaining display (refer to Figure 1-5), and the NAV and COM functions provided to the failed display by the IAU are flagged as invalid on the remaining display.  The system reverts to backup paths for the ADAHRS/AHRS, ADC, Engine/Airframe Unit, and Transponder, as required.  The change to backup paths is completely automated for all LRUs and no pilot action is required.

Reversionary mode may be manually activated by pressing the Audio Panel's red **DISPLAY BACKUP** Button. Pressing this button again deactivates reversionary mode.

*NAV1 and COM1 Flagged Invalid (provided by the failed PFD)*



**DISPLAY BACKUP** *Button*
*Manually Activates/Deactivates Reversionary Mode on All Displays*

**Figure 1-5  Reversionary Mode (Failed PFD)**

## SYSTEM ANNUNCIATIONS

> **NOTE:** *Upon power-up, certain windows remain invalid as system equipment begins to initialize. All windows should be operational within one minute of power-up. If any window continues to remain flagged, the system should be serviced by a Garmin-authorized repair facility.*

When an LRU or an LRU function fails, a large red 'X' is typically displayed on windows associated with the failed data (refer to Table 1-1 for all possible flags and the responsible LRUs). Refer to the Pilot's Operating Handbook (POH) for additional information regarding pilot responses to these annunciations.

The status of detected LRUs can be checked on the Aux - System Status Page. Active LRUs are indicated by green check marks; failed by red or amber 'X's. Failed LRUs should be noted and a service center or Garmin-authorized dealer informed.

**Viewing LRU information:**

1) Use the **FMS** Knob to select the Aux - System Status Page.

2) To place the cursor in the 'LRU Info' Box,

   Press the **LRU** Softkey.

   **Or**:

   a) Press the **MENU** Key.

   b) With 'Select LRU Window' highlighted, press the **ENT** Key.

3) Use the **FMS** Knob to scroll through the box to view LRU status information.

> **NOTE:** *Refer to the POH for additional information regarding pilot responses to these annunciations.*

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

| System Annunciation | Comment | System Annunciation | Comment |
|---|---|---|---|
| AHRS ALIGN: Keep Wings Level | Air Data, Attitude and Heading Reference System is aligning. |  | Display system is not receiving vertical speed input from the air data computer. |
|  | Display system is not receiving attitude information from the ADAHRS/AHRS. |  | Display system is not receiving valid heading input from the ADAHRS/AHRS or magnetometer. |
| CALIBRATE AHRS/MAG | Air Data, Attitude, and Heading calibration incomplete or configuration module failure. |  | Display system is not receiving altitude input from the air data computer. |
| GPS LOI | GPS information is either not present or is invalid for navigation use.  Note that ADAHRS/AHRS utilizes GPS inputs during normal operation.  ADAHRS/AHRS operation may be degraded if GPS signals are not present (see POH). | OAT  | Display system is not receiving valid OAT information from the air data computer. |
| | | XPDR FAIL | Display system is not receiving valid transponder information. |
|  | Display system is not receiving airspeed input from the air data computer. | 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. |

**Table 1-1  System Annunciations**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## SYSTEM STATUS

The System Status Page displays the status and software version numbers for all detected system LRUs. Pertinent information on all system databases is also displayed. Active LRUs are indicated by green check marks and failed LRUs are indicated by red "X"s. Failed LRUs should be noted and a service center or Garmin dealer informed.



**Figure 1-6  Example System Status Page**

The **LRU** and **ARFRM** Softkeys on the System Status Page select the applicable list (LRU Information or Airframe window) through which the **FMS** Knob can be used to scroll information within the selected window.

Pressing the **MFD1 DB** Softkey (label annunciator turns green indicting the softkey is selected) places the cursor in the database window. Use the **FMS** Knob to scroll through database information for the MFD. Pressing the softkey again will change the softkey label to **PFD1 DB**. PFD 1 database information is now displayed in the database window. Pressing the softkey a third time will change the softkey label back to **MFD1 DB**. MFD database information is displayed again in the database window.

The **ANN Test** Softkey, when selected, causes an annunciation test tone to be played.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## ADAHRS OPERATION

In addition to using internal sensors, the GSU 75 ADAHRS uses GPS information, magnetic field data and air data to assist in attitude/heading calculations. In normal mode, the ADAHRS relies upon GPS and magnetic field measurements. If either of these external measurements is unavailable or invalid, the ADAHRS uses air data information for attitude determination. Eight ADAHRS modes of operation are available (see Table 1-1) and depend upon the combination of available sensor inputs. Loss of air data, GPS, or magnetometer sensor inputs is communicated to the pilot by system messages.

> **NOTE:** *Refer to the Appendices for specific AHRS and ADC system message information.*

> **NOTE:** *Aggressive maneuvering while the ADAHRS is not operating normally can degrade ADAHRS accuracy.*

| ADAHRS Mode | GPS Data Available | Magnetometer Data Available | Air Data Available | Condition | Attitude Indicator |
|---|---|---|---|---|---|
| ADAHRS Normal | Yes | Yes | Yes | Valid Pitch/Roll/ Heading. | |
| ADAHRS no-Air Data | Yes | Yes | No | | |
| ADAHRS no-GPS | No | Yes | Yes | | |
| ADAHRS no-GPS/ no-Mag | No | No | Yes | Valid Pitch/Roll. Heading will coast-on-gyros until it becomes invalid. | |
| ADAHRS no-Mag Data | Yes | No | Yes | Valid Pitch/Roll. Invalid Heading. | |
| ADAHRS no-Mag/ no-Air Data | Yes | No | No | | |
| ADAHRS coast-on-gyros until invalid | No | Yes | No | Invalid Pitch/Roll/ Heading. | |
| ADAHRS no-Mag/ coast-on-gyros until invalid | No | No | No | | |

**Table 1-2 ADAHRS Operation**

## AHRS OPERATION

✓ **NOTE:** *Refer to the Appendices for specific AHRS alert information.*

✓ **NOTE:** *Aggressive maneuvering while AHRS is not operating normally may degrade AHRS accuracy.*

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

The AHRS corrects for shifts and variations in the Earth's magnetic field by applying the Magnetic Field Variation Database. The Magnetic Field Variation Database is derived from the International Geomagnetic Reference Field (IGRF). The IGRF is a mathematical model that describes the Earth's main magnetic field and its annual rate of change. The database is updated approximately every 5 years. See the Appendices for information on updating the Magnetic Field Variation Database. The system will prompt you on startup when an update is available. Failure to update this database could lead to erroneous heading information being displayed to the pilot.
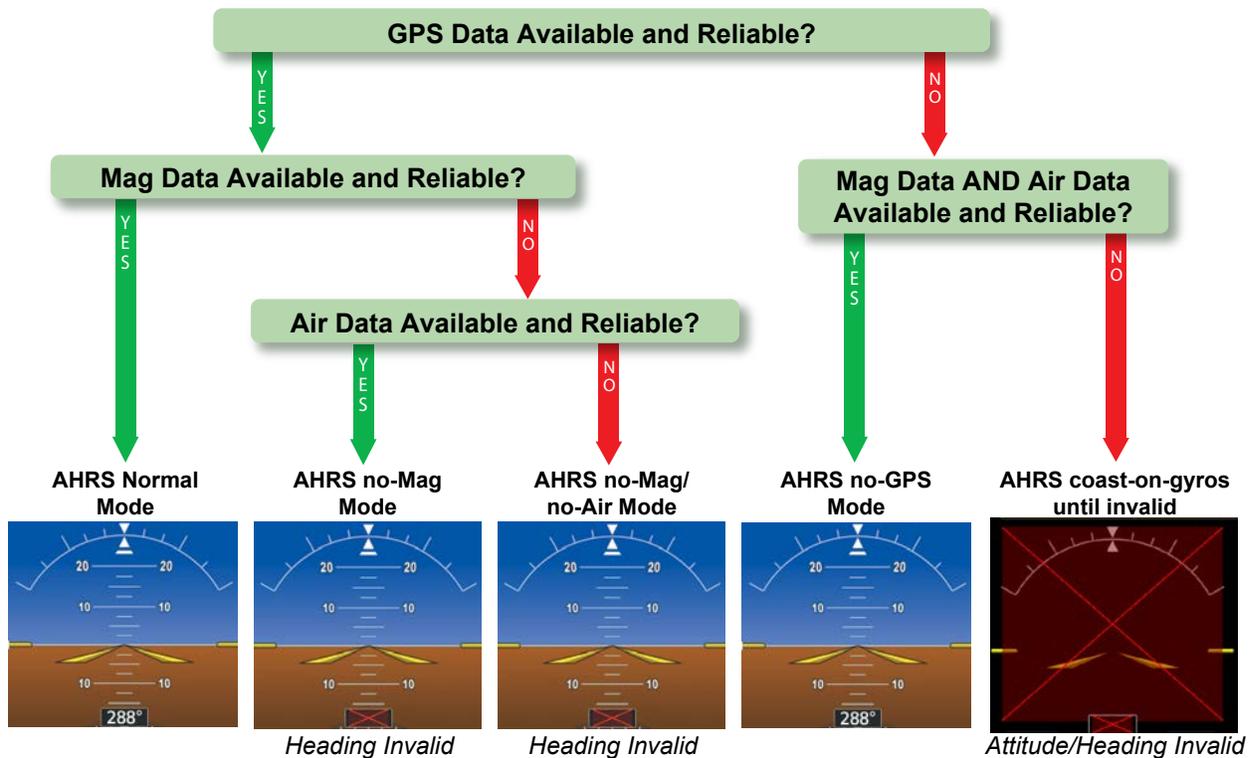


**Figure 1-7  AHRS Operation**

GARMIN.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## GPS INPUT FAILURE

**NOTE:** *In-flight initialization of ADAHRS/AHRS, when operating without any valid source of GPS data and at true air speed values greater than approximately 200 knots, is not guaranteed. Under these rare conditions, it is possible for in-flight ADAHRS/AHRS initialization to take an indefinite amount of time which would result in an extended period of time where valid ADAHRS/AHRS outputs are unavailable.*

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

### AIR DATA INPUT FAILURE

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

### MAGNETOMETER FAILURE

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

## GPS RECEIVER OPERATION

Each GIA 63W Integrated Avionics Unit (IAU) contains a GPS receiver. Information collected by the specified receiver (GPS1 for the #1 IAU or GPS2 for the #2 IAU) may be viewed on the Aux - GPS Status Page.

These GPS sensor annunciations are most often seen after system power-up when one GPS receiver has acquired satellites before the other, or one of the GPS receivers has not yet acquired a SBAS signal. While the aircraft is on the ground, the SBAS signal may be blocked by obstructions causing one GPS receiver to have difficulty acquiring a good signal. Also, while airborne, turning the aircraft may result in one of the GPS receivers temporarily losing the SBAS signal.

If the sensor annunciation persists, check for a system failure message in the Messages Window on the PFD. If no failure message exists, check the GPS Status Page and compare the information for GPS1 and GPS2. Discrepancies may indicate a problem.
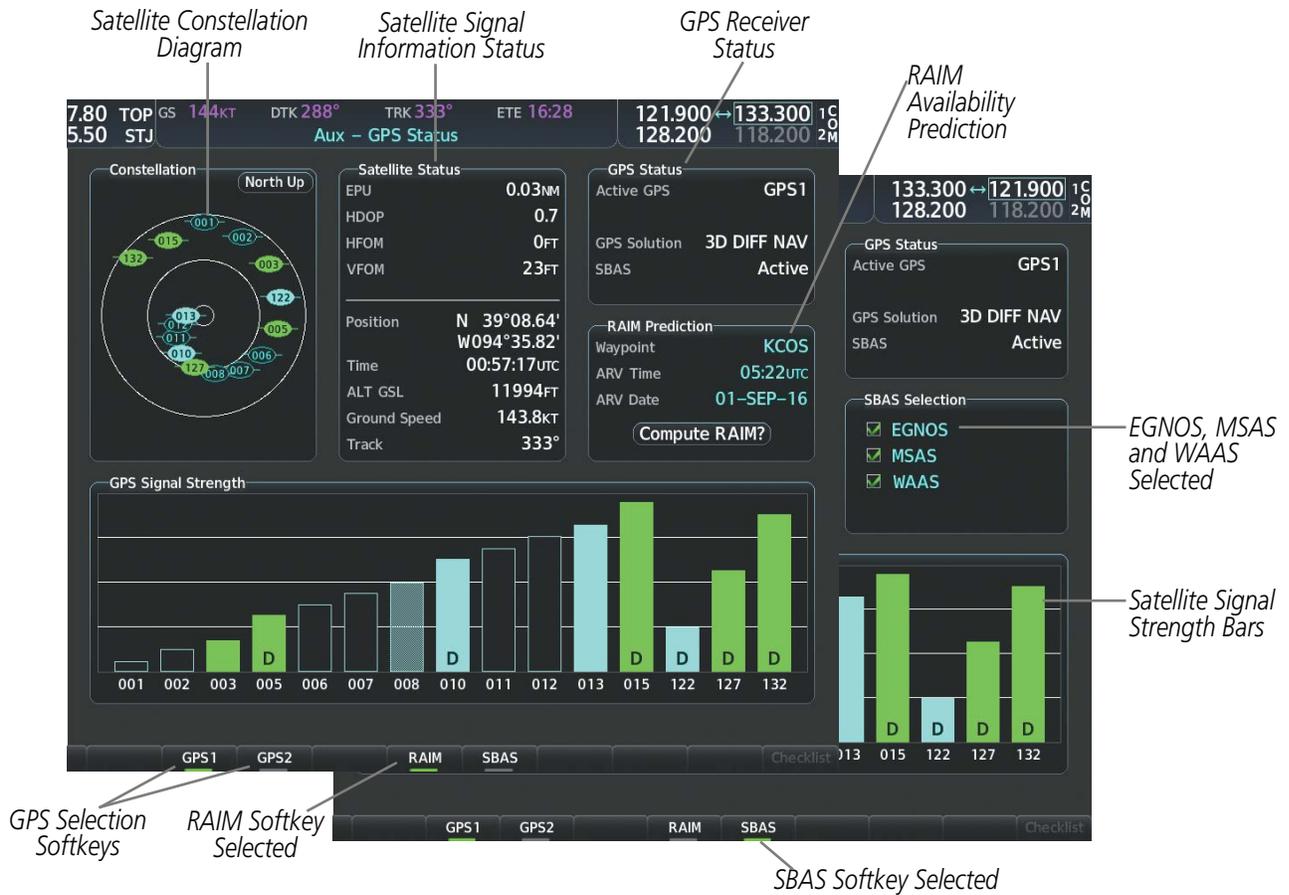
**Figure 1-8  GPS Status Page (RAIM or SBAS Selected)**

The GPS Status Page provides the following information:

• Constellation

Satellites currently in view are shown at their respective positions on a sky view diagram.  The sky view is always in a north-up orientation, with the outer circle representing the horizon, the inner circle representing 45° above the horizon, and the center point showing the position directly overhead.

Each satellite is represented by an oval containing the Pseudo-random noise (PRN) number (i.e., satellite identification number).  Satellites whose signals are currently being used are represented by solid ovals.

• Satellite Status

This box provides information regarding signal status. The accuracy of the aircraft's GPS fix is calculated using Estimated Position Uncertainty (EPU), Dilution of Precision (DOP), and horizontal and vertical figures of merit (HFOM and VFOM). EPU is the radius of a circle centered on an estimated horizontal position in which actual position has 95% probability of laying. EPU is a statistical error indication and not an actual error measurement.

DOP measures satellite geometry quality (i.e., number of satellites received and where they are relative to each other) on a range from 0.0 to 9.9, with lower numbers denoting better accuracy. HFOM and VFOM, measures of horizontal and vertical position uncertainty, are the current 95% confidence horizontal and vertical accuracy values reported by the GPS receiver.

The current calculated GPS position, time, altitude, ground speed, and track for the aircraft are displayed below the satellite signal accuracy measurements.

• GPS Status

The GPS solution type (ACQUIRING, 2D NAV, 2D DIFF NAV, 3D NAV, 3D DIFF NAV) for the active GPS receiver (GPS1 or GPS2) is shown in the upper right of the GPS Status Page. When the receiver is in the process of acquiring enough satellite signals for navigation, the receiver uses satellite orbital data (collected continuously from the satellites) and last known position to determine the satellites that should be in view. 'Acquiring' is indicated as the solution until a sufficient number of satellites have been acquired for computing a solution.

When the receiver is in the process of acquiring a 3D differential GPS solution, 3D NAV is indicated as the solution until the 3D differential fix has finished acquisition. SBAS (Satellite-Based Augmentation System) indicates 'Inactive'. When acquisition is complete, the solution status indicates 3D DIFF NAV and SBAS indicates 'Active'.

**Viewing GPS receiver status information:**

1) Use the large **FMS** Knob to select the Auxiliary Page Group (see Section 1.4 for information on navigating MFD page groups).

2) Use the small **FMS** Knob to select GPS Status Page.

**Selecting the GPS receiver for which data may be reviewed:**

1) Use the **FMS** Knob to select the Aux - GPS Status Page.

2) To change the selected GPS receiver:

Press the desired **GPS** Softkey.

**Or**:

a) Press the **MENU** Key.

b) Use the **FMS** Knob to highlight the receiver which is not selected and press the **ENT** Key.

• RAIM (Receiver Autonomous Integrity Monitoring) Prediction (**RAIM** Softkey is selected)

In most cases performing a RAIM prediction is not necessary. However, in some cases, the selected approach may be outside the SBAS coverage area and it may be necessary to perform a RAIM prediction for the intended approach.

Receiver Autonomous Integrity Monitoring (RAIM) is a GPS receiver function that performs a consistency check on all tracked satellites. RAIM ensures that the available satellite geometry allows the receiver to calculate a position within a specified RAIM protection limit (2.0 nautical miles for oceanic and enroute, 1.0 nm for terminal, and 0.3 nm for non-precision approaches). During oceanic, enroute, and terminal phases of flight, RAIM is available nearly 100% of the time.

The RAIM prediction function also indicates whether RAIM is available at a specified date and time. RAIM computations predict satellite coverage within ±15 min of the specified arrival date and time.

Because of the tighter protection limit on approaches, there may be times when RAIM is not available. The system automatically monitors RAIM and warns with an alert message when it is not available. If RAIM is not predicted to be available for the final approach course, the approach does not become active, as indicated by the messages "Approach is not active" and "RAIM not available from FAF to MAP". If RAIM is not available when crossing the FAF, the missed approach procedure must be flown.

**Predicting RAIM availability at a selected waypoint:**

1) Select the GPS Status Page.

2) If necessary, press the **RAIM** Softkey.

3) Press the **FMS** Knob. The 'Waypoint' field is highlighted.

4) Turn the small **FMS** Knob to display the Waypoint Information Window.

5) Enter the desired waypoint:

   Use the **FMS** Knob to enter the desired waypoint by identifier, facility, or city name and press the **ENT** Key.

   **Or**:

   a) Turn the small **FMS** Knob counter-clockwise to display a list of flight plan waypoints (the FPL list is populated only when navigating a flight plan).

   b) Turn the small **FMS** Knob clockwise to display the Flight Plan, Nearest, Recent, or User waypoints, if required.

   c) Turn the large **FMS** Knob clockwise to select the desired waypoint. The system automatically fills in the identifier, facility, and city fields with the information for the selected waypoint.

   d) Press the **ENT** Key to accept the waypoint entry.

6) Use the **FMS** Knob to enter an arrival time and press the **ENT** Key.

7) Use the **FMS** Knob to enter an arrival date and press the **ENT** Key.

8) With the cursor highlighting 'Compute RAIM?', press the **ENT** Key. Once RAIM availability is computed, one of the following is displayed:

   • 'Compute RAIM?'—RAIM has not been computed for the current waypoint, time, and date combination

   • 'Computing Availability'—RAIM calculation in progress

   • 'RAIM Available'—RAIM is predicted to be available for the specified waypoint, time, and date

   • 'RAIM not Available'—RAIM is predicted to be unavailable for the specified waypoint, time, and date

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Predicting RAIM availability at present position**

1) Select the GPS Status Page.

2) If necessary, press the **RAIM** Softkey.

3) Press the **FMS** Knob. The 'Waypoint' field is highlighted.

4) Press the **MENU** Key.

5) With 'Set WPT to Present Position' highlighted, press the **ENT** Key.

6) Press the **ENT** Key to accept the waypoint entry.

7) Use the **FMS** Knob to enter an arrival time and press the **ENT** Key.

8) Use the **FMS** Knob to enter an arrival date and press the **ENT** Key.

9) With the cursor highlighting 'Compute RAIM?', press the **ENT** Key. Once RAIM availability is computed, one of the following is displayed:

   • 'Compute RAIM?'—RAIM has not been computed for the current waypoint, time, and date combination

   • 'Computing Availability'—RAIM calculation in progress

   • 'RAIM Available'—RAIM is predicted to be available for the specified waypoint, time, and date

   • 'RAIM not Available'—RAIM is predicted to be unavailable for the specified waypoint, time, and date

**SBAS Selection (SBAS Softkey is selected)**

In certain situations, such as when the aircraft is outside or on the fringe of the SBAS coverage area, it may be desirable to disable EGNOS, WAAS or MSAS (although it is not recommended). When disabled, the SBAS field in the GPS Status box indicates Disabled. There may be a small delay for the GPS Status box to be updated upon WAAS and MSAS enabling/disabling.

**Disabling SBAS**

1) Select the GPS Status Page.

2) If necessary, press the **SBAS** Softkey.

3) Press the **FMS** Knob, and turn the large FMS Knob to highlight 'EGNOS', 'MSAS' or 'WAAS'.

4) Press the **ENT** Key to uncheck the box.

5) Press the **FMS** Knob to remove the cursor.

• GPS Satellite Signal Strengths

The GPS Status Page can be helpful in troubleshooting weak (or missing) signal levels due to poor satellite coverage or installation problems. As the GPS receiver locks onto satellites, a signal strength bar is displayed for each satellite in view, with the appropriate satellite PRN number (01-32 or 120-138 for WAAS) below each bar. The progress of satellite acquisition is shown in three stages, as indicated by signal bar appearance:

- No bar—Receiver is looking for the indicated satellite
- Hollow bar—Receiver has found the satellite and is collecting data
- Light Cyan bar—Receiver has collected the necessary data and the satellite signal can be used
- Green bar—Satellite is being used for the GPS solution
- Checkered bar—Receiver has excluded the satellite (Fault Detection and Exclusion)
- "D" indication—Denotes the satellite is being used as part of the differential computations

Each satellite has a 30-second data transmission that must be collected (signal strength bar is hollow) before the satellite may be used for navigation (signal strength bar becomes solid).

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

# 1.4  ACCESSING SYSTEM FUNCTIONALITY

## SOFTKEY FUNCTION

Selection softkeys are located along the bottom of the displays.  The softkeys shown depend on the softkey level previously selected.  The bezel keys below the softkey labels can be used to press the appropriate softkey.  There are three types of softkeys.  One selects a simple on/off state, indicated by an annunciator on the softkey label displayed as green (on) or gray (off).  The next type of softkey selects among several options, indicated by the softkey label changing (with the exception of the Map Range keys) to reflect the name of the chosen option.  The last type of softkey, when pressed displays another set of softkeys available for the selected function.  Also, these softkeys revert to the previous level after 45 seconds of inactivity.  When a softkey function is disabled, the softkey label is subdued (dimmed)



**Figure 1-9  Softkeys (First-Level PFD Configuration)**

## PFD SOFTKEYS

The PFD softkeys provide control over the PFD display and some flight management functions, including GPS, NAV, terrain, traffic, and weather (optional).  Each softkey sublevel has a **Back** Softkey which can be pressed to return to the previous level.  If messages remain after acknowledgement, the **Alerts** Softkey is black on white.  The **Alerts** Softkey is visible in all softkey levels.  For the top level softkeys and the transponder (XPDR) levels, the **Ident** Softkey remains visible.

The following table describes PFD Softkey functions. Softkeys which display another set of softkeys are indicated in the table by showing the given set as an increased level. For example, the Map/HSI softkey is shown in the Level 1 collum. When pressed, the **Map/HSI** softkey will display another set of softkeys and these softkeys are explained in the Level 2 collum. If a softkey on Level 2 provides yet another set of softkey functions, those new available softkeys are then explained in the Level 3 column, etc.

| Level 1 | Level 2 | Level 3 | Level 4 | Description |
|---------|---------|---------|---------|-------------|
| Map/HSI | | | | Displays the PFD Map display settings softkeys. |
| | Layout | | | Displays the PFD Map selection softkeys. |
| | | Map Off | | Removes the PFD map from display (Inset or Traffic). |
| | | Inset Map | | Displays the Inset Map. |
| | | HSI Map | | Displays the HSI Map. |
| | | TFC Map | | Replaces the PFD Map with a dedicated traffic display. |
| | | Wx LGND | | Displays/removes the name of the selected data link weather provider (SiriusXM) and the weather product icon and age box (for enabled weather products). |
| | Detail | | | Selects desired amount of map detail:<br>**All** (No Declutter): All map features visible<br>**Detail 3**: Declutters land data<br>**Detail 2**: Declutters land and SUA data<br>**Detail 1**: Removes everything except for the active flight plan |
| | Traffic | | | Displays traffic information on PFD Map. |
| | Topo | | | Displays topographical data (e.g., coastlines, terrain, rivers, lakes) and elevation scale on PFD Map. |
| | Rel Ter | | | Displays relative terrain information on the PFD Map. |
| | NEXRAD | | | Displays XM NEXRAD weather and coverage on PFD Map (subscription optional). |
| | METAR | | | Displays METAR information on Inset Map (subscription optional). |
| | Lightning | | | Adds/removes the display of SiriusXM lightning information on PFD Map. |
| | | LTNG Off | | Disables lightning function on PFD Map. The softkey annunciator is green when the lightning function is off. |
| | | Datalink | | Selects the data link weather source for the PFD Map. |
| | | STRMSCP | | Adds or removes the display of Stormscope information on the PFD Map. The softkey annunciator is green when the function is on. When the function is off, the annunciator is gray (optional). |
| TFC Map | | | | Replaces the PFD Map with a dedicated traffic display. |
| PFD Opt | | | | Displays second-level softkeys for additional PFD options. |
| | SVT | | | Displays additional SVT overlay softkeys. |
| | | Pathways | | Displays Pathway Boxes on the Synthetic Vision Display. |
| | | Terrain | | Enables synthetic terrain depiction. |
| | | HDG LBL | | Displays compass heading along the Zero-Pitch line. |
| | | APT Sign | | Displays position markers for airports within approximately 15 nm of the current aircraft position. Airport identifiers are displayed when the airport is within approximately 9 nm. |
| | Wind | | | Displays the wind option softkeys. |
| | | Off | | Wind information not displayed. |
| | | Option 1 | | Headwind/Tailwind and crosswind components. |

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

| Level 1 | Level 2 | Level 3 | Level 4 | Description |
|---|---|---|---|---|
| | | Option 2 | | Wind direction arrow and speed. |
| | | Option 3 | | Wind direction arrow with direction and speed. |
| | DME | | | Displays DME Information Window (optional). |
| | Bearing 1 | | | Cycles the Bearing 1 Information Window through NAV1, NAV2, GPS/waypoint identifier and GPS-derived distance information, ADF/frequency, and Off. |
| | Bearing 2 | | | Cycles the Bearing 2 Information Window through NAV1, NAV2, GPS/waypoint identifier and GPS-derived distance information, ADF/frequency, and Off. |
| | ALT Units | | | Displays softkeys to select altitude unit parameters. |
| | | Meters | | When enabled, displays altimeter in meters. |
| | | IN | | Press to display the BARO setting as inches of mercury. |
| | | HPA | | Press to display the BARO setting as hectopacals. |
| | STD Baro | | | Sets barometric pressure to 29.92 in Hg (1013 hPa if metric units are selected). |
| OBS | | | | Selects OBS mode on the CDI when navigating by GPS (only available with active leg). When OBS is on, the softkey annunciator is green. |
| CDI | | | | Cycles through FMS, NAV1, and NAV2 navigation modes on the CDI. |
| DME | | | | Displays the DME Tuning Window, allowing tuning and selection of the DME (optional). |
| XPDR | | | | Displays the transponder selection softkeys. |
| | Standby | | | Selects transponder Standby Mode (transponder does not reply to any interrogations). |
| | On | | | Activates transponder (transponder replies to identification interrogations). |
| | ALT | | | Altitude Reporting Mode (transponder replies to identification and altitude interrogations). |
| | VFR | | | Automatically enters the VFR code (1200 in the U.S.A. only). |
| | Code | | | Displays transponder code selection softkeys 0-7. |
| | | 0 - 7 | | Use numbers to enter code. |
| | | Ident | | Activates the Special Position Identification (SPI) pulse for 18 seconds, identifying the transponder return on the ATC screen. |
| | | BKSP | | Removes numbers entered, one at a time. |
| | Ident | | | Activates the Special Position Identification (SPI) pulse for 18 seconds, identifying the transponder return on the ATC screen. |
| Ident | | | | Activates the Special Position Identification (SPI) pulse for 18 seconds, identifying the transponder return on the ATC screen. |
| Tmr/Ref | | | | Displays Timer/References Window. |
| Nearest | | | | Displays Nearest Airports Window. |

**Table 1-3  PFD Softkeys**

## MFD SOFTKEYS

The MFD softkeys provide control over flight management functions, including GPS, NAV, terrain, traffic, and weather (optional).  There are many softkey functions available on the MFD depending on the page group and screen selected.

The following table provides an example of the MFD Softkey functions accessed from the Navigation Map screen.  Further information concerning softkeys providing more navigation and  flight planning functions may be found in the Flight Management Section.  Terrain, traffic, and weather softkey descriptions may be found in the Hazard Avoidance section.  Further description of optional equipment and corresponding softkey functions may be found in the Additional Features Section.

| Level 1 | Level 2 | Level 3 | Description |
|---------|---------|---------|-------------|
| **Engine** | | | Displays EIS - Engine Page and second-level engine softkeys; select again to exit page (see the EIS Section for more information). |
| | **Engine** | | Displays second-level softkeys for additional EIS configuration. |
| | **Lean** | | Displays default EIS display. |
| | | **CYL SLCT** | Displays EIS lean display. |
| | | **Assist** | Allows selection of engine cylinder to view additional information. |
| | **System** | | Enables/disables leaning assist mode. |
| | | **RST Fuel** | Resets calculated fuel remaining to default and resets fuel used to zero. |
| | | **GAL REM** | Press to display the fuel totalizer softkeys |
| | | **-10 GAL** | Press to decrease remaining fuel quantity in 10-gallon increments. |
| | | **-1 GAL** | Press to decrease remaining fuel quantity in 1-gallon increments. |
| | | **+1 GAL** | Press to increase remaining fuel quantity in 1-gallon increments. |
| | | **+10 GAL** | Press to increase remaining fuel quantity in 10-gallon increments. |
| | | **35 GAL** | Sets remaining fuel to 35 gallons. |
| | | **53 GAL** | Sets remaining fuel to 53 gallons. |
| **Map Opt** | | | Displays system oil pressure and temperature, fuel calculations, and electrical system information. |
| | **Traffic** | | Displays traffic information on Navigation Map Page. |
| | **Inset** | | Displays inset window second level softkeys. |
| | | **Off** | Removes VSD inset from Navigation Map Page. |
| | | **VSD** | Displays VSD profile information of terrain/obstacles along the current track, vertical track vector, and selected altitude. <br> **Auto**: Automatically displays either VSD profile information for active flight plan information or along current track with no active flight plan. <br> **FPL**: Displays VSD profile information for active flight plan. <br> **TRK**: Displays VSD profile information along current track. |

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

| Level 1 | Level 2 | Level 3 | Description |
|---|---|---|---|
| | TER | | Displays terrain on the map; cycles through the following:<br>**Off**: No terrain information shown on MFD Map.<br>**Topo**: Displays topographical data (e.g., coastlines, terrain, rivers, lakes) and elevation scale on MFD Map.<br>**REL**: Displays relative terrain information on the MFD Map. |
| | AWY | | Displays airways on the map; cycles through the following:<br>**Off**: No airways are displayed.<br>**On**: All airways are displayed.<br>**LO**: Only low altitude airways are displayed.<br>**HI**: Only high altitude airways are displayed. |
| | STRMSCP | | Displays Stormscope information on Navigation Map (optional). |
| | NEXRAD | | Displays XM NEXRAD weather and coverage on Navigation Map Page (optional). |
| | XM LTNG | | Displays XM lightning information on Navigation Map Page (optional). |
| | METAR | | Displays METAR information on Inset Map (subscription optional). |
| | Legend | | Displays legends for the displayed XM Weather products (optional). |
| Detail | | | Selects desired amount of map detail; cycles through the following levels:<br>**Detail All**: All map features visible.<br>**Detail-3**: Declutters land data.<br>**Detail-2**: Declutters land and SUA data.<br>**Detail-1**: Removes everything except for the active flight plan. |
| Charts | | | When available, displays optional airport and terminal procedure charts. |
| | CHRT Opt | | Displays chart display settings softkeys (if available). |
| | Show Map | | Displays the WPT–Airport Information page. |
| | Info | | Pressing the **Info 1** or **Info 2** Softkey returns to the airport diagram when the view is on a different chart. |
| | DP | | Displays departure procedure chart. |
| | STAR | | Displays standard terminal arrival procedure chart. |
| | APR | | Displays approach procedure chart. |
| | WX | | Displays weather information. |
| | NOTAM | | Displays NOTAM information for selected airport, when available. |
| Checklist | | | When available, displays optional checklists |

**Table 1-4  MFD Navigation Map Page Softkeys**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## MENUS

The system has a **MENU** Key that, when pressed, displays a context-sensitive list of options. This options list allows the user to access additional features or make settings changes which specifically relate to the currently displayed window/page. There is no all-encompassing menu. Some menus provide access to additional submenus that are used to view, edit, select, and review options. Menus display 'No Options' when there are no options for the window/page selected. The main controls used in association with all window/page group operations are described in Section 1.2. Softkey selection does not display menus or submenus.

### Navigating the Page Menu Window

1) Press the **MENU** Key to display the Page Menu Window.

2) Turn the **FMS** Knob to scroll through a list of available options (a scroll bar appears to the right of the window when the option list is longer than the window).

3) Press the **ENT** Key to select the desired option.

4) The **CLR** Key may be pressed to remove the menu and cancel the operation. Pressing the **FMS** Knob also removes the displayed menu.
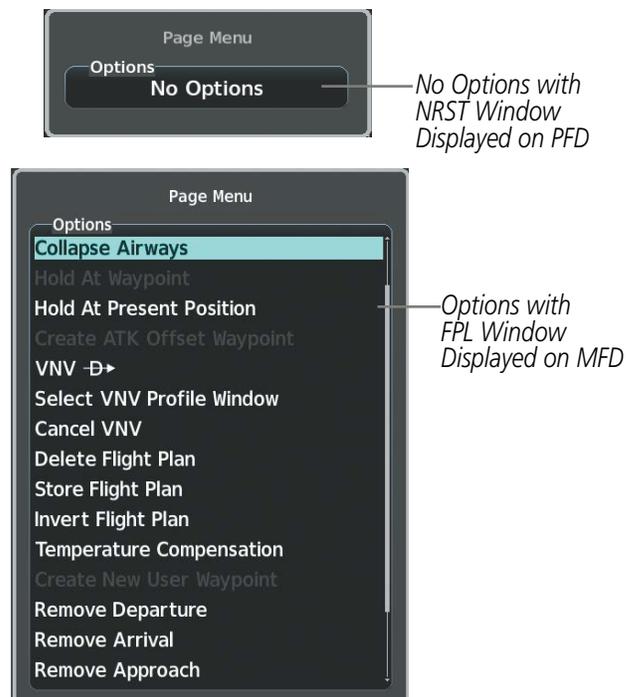


**Figure 1-10 Page Menu Examples**

**SYSTEM OVERVIEW**

**GARMIN.**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## MFD PAGE GROUPS

> **NOTE:** *Refer to other supporting sections in this Pilot's Guide for details on specific pages.*

Information on the MFD is presented on pages grouped according to function. The page group and active page title are displayed in the upper center of the screen, below the Navigation Data Bar. In the bottom right corner of the screen, a page group window is displayed by turning either **FMS** Knob. The page group tabs are displayed along the bottom of the window. The page titles are displayed in a list above the page group tabs. The current page group and current page within the group are shown in cyan. For some of these pages (Airport/Procedures/Weather Information, XM, Procedure Loading), the active title of the page changes while the page name in the list remains the same.
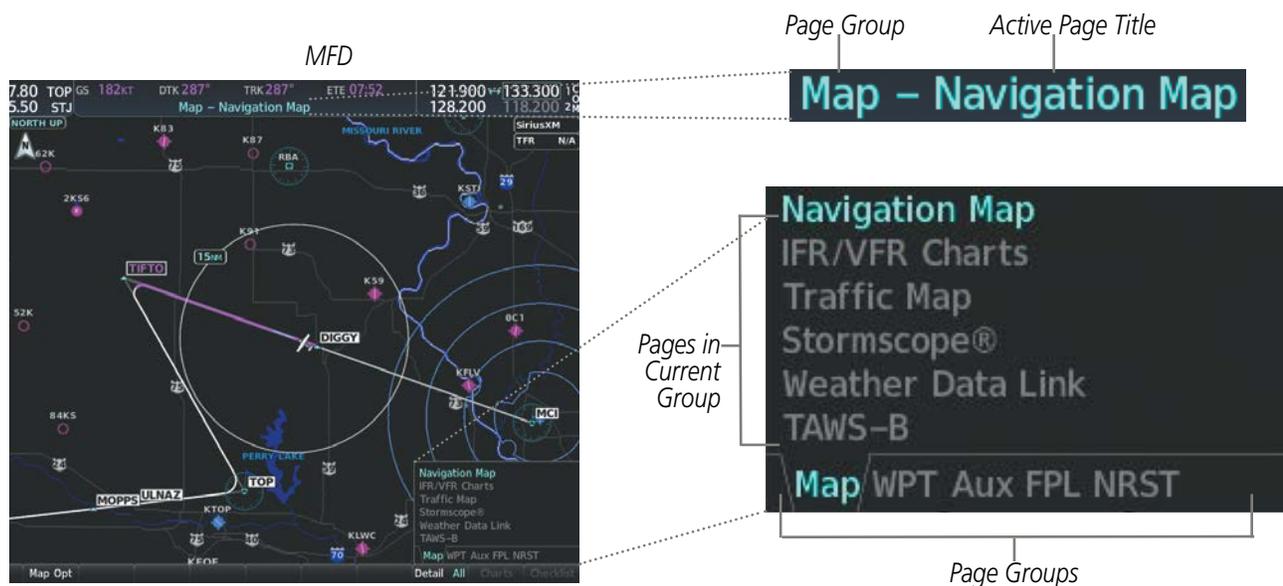


**Figure 1-11  Page Title and Page Groups**

The main page groups are navigated using the **FMS** Knob; specific pages within each group can vary depending on the configuration of optional equipment.

### Selecting a page using the FMS Knob:

1) Turn the large **FMS** Knob to display the list of page groups; continue turning the large **FMS** Knob until the desired page group is selected

2) Turn the small **FMS** Knob to display the desired page within a specific page group.

There are also several pages (Airport Information/Procedures/Weather Information and XM pages) selected first from within a main page group with the **FMS** Knob, then with the appropriate softkey at the bottom of the page (or from the page menu). In this case, the page remains set to the selected page until a different page softkey is pressed, even if a different page group is selected.

| Page Group | Pages within Page Group |
|---|---|
| MAP (Map Page Group) | • Navigation Map<br><br>• IFR/VFR Charts<br><br>• Traffic Map<br><br>• Stormscope (optional)<br><br>• Weather Data Link (*service optional*)<br><br>• Terrain Proximity / TAWS/ Terrain SVT |
| WPT (Waypoint Page Group) | • Airport/Procedures/Weather Information Pages<br><br>  - Airport Information (Info **1** Softkey)<br><br>  - Airport Directory Information (Info **2** Softkey)<br><br>  - Departure Information (**DP** Softkey)<br><br>  - Arrival Information (**STAR** Softkey)<br><br>  - Approach Information (**APR** Softkey)<br><br>  - Weather Information (*optional*) (**WX** Softkey)<br><br>• Intersection Information<br><br>• NDB Information<br><br>• VOR Information<br><br>• VRP Information<br><br>• User Waypoint Information |
| Aux (Auxiliary Page Group) | • Trip Planning<br><br>• Utility<br><br>• GPS Status<br><br>• System Setup 1/2<br><br>• XM Radio Pages<br><br>  - XM Information (**Info** Softkey)<br><br>  - XM Radio (**Radio** Softkey)<br><br>• System Status<br><br>• Video (optional)<br><br>• ADS-B Status<br><br>• Connext Setup<br><br>• Databases |

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

| Page Group | Pages within Page Group |
|---|---|
| FPL (Flight Plan Page Group) | • Active Flight Plan<br>  - Wide View, Narrow View (**View** Softkey)<br>• Flight Plan Catalog<br>  - Stored Flight Plan (via **New** Softkey)<br>• SurfaceWatch Setup (optional) |
| NRST (Nearest Page Group) | • Nearest Airports<br>• Nearest Intersections<br>• Nearest NDB<br>• Nearest VOR<br>• Nearest VRP<br>• Nearest User WPTS<br>• Nearest Frequencies<br>• Nearest Airspaces |

**Table 1-5  Page Group and Pages**

## PROCEDURE PAGES (PROC)

The Procedure Pages may be accessed at any time on the MFD by pressing the **PROC** Key.  A menu is initialized, and when a departure, approach, or arrival is selected, the appropriate Procedure Loading Page is opened.  Turning the **FMS** Knob does not scroll through the Procedure pages

- Departure Loading
- Arrival Loading
- Approach Loading

## SYSTEM SETTINGS

System settings are managed from the System Setup Pages.  The System Setup pages allow management of the fields shown in cyan text may be edited for following system parameters:

- Time display format (local or UTC )

- Displayed measurement units

- Barometric Transition Alert
  (see the Flight Instruments Section)

- Airspace alerts
  (see the Flight Management Section)

- Arrival alert

- SurfaceWatch Alerts (optional)
    (see the Additional Features Section)

- Flight Director Format
  (Single Cue Only - can not edit)
    (see the Flight Instruments Section)

- MFD Data Bar (Navigation Data Bar) fields
  (see the Flight Management Section)

- GPS Course Deviation Indicator (CDI) range
  (see the Flight Instruments Section)

- COM transceiver channel spacing
  (see the Audio Panel and CNS Section)

- Displayed nearest airports
  (see the Flight Management Section)

- Page Navigation

- Audio Voice Format

**Restoring system setup defaults:**

1) Select the Aux - System **Setup 1** or **2** Page.

2) Press the **Defaults** Softkey; or press the **MENU** Key, highlight 'Restore Page Defaults', and press the **ENT** Key. The message 'Restore Setup X Page Defaults?' is displayed.

3) With 'OK' highlighted, press the **ENT** Key.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

Configure System Time

Change Display Unit Settings

Fields shown in Cyan may be edited

Configure arrival alert settings
- Enable / disable alert
- Set arrival alert trigger distance

Restore System Defaults

Change audio alert voice setting

Change settings for Page Group Navigation
- FMS knob clicks to change page group
- Page Group Window seconds until timeout

Select System Setup Page
- Setup 1
- Setup 2

**Figure 1-12  System Setup 1/2 Pages**

## DATE/TIME

The system obtains the current Universal Coordinated Time (UTC) date and time directly from the GPS satellite signals (shown on the Aux - GPS Status Page).  System time (displayed in the lower right corner of the PFD) can be displayed in three formats: local 12-hr, local 24-hr, or UTC.  Local time is set by adding/subtracting an offset (hours:minutes) to/from UTC.
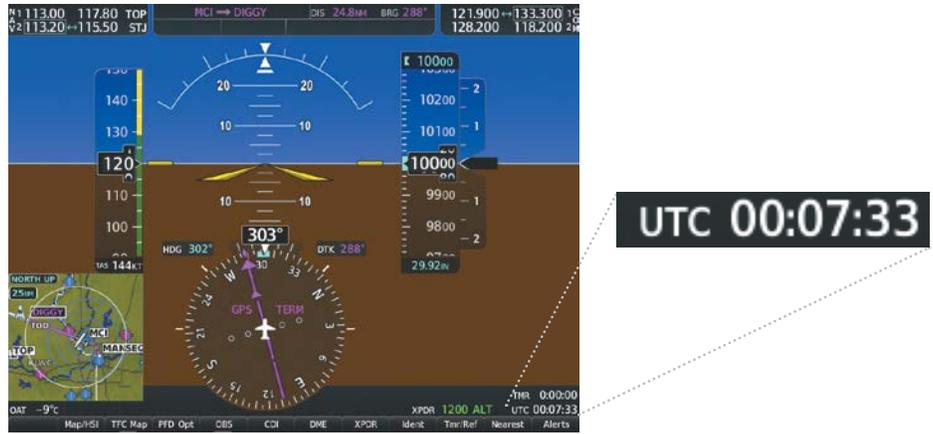
**Figure 1-13  System Time (UTC Format)**

**Configuring the system time:**

1) Select the Aux - System **Setup 1** Page.

2) Press the **FMS** Knob to activate the cursor.

3) Turn the large **FMS** Knob to highlight the 'Time Format' field.

4) Turn the small **FMS** Knob to select the desired format and press the **ENT** Key to confirm selection.  If local time format is selected, the 'Time Offset' field is highlighted.

5) If necessary, use the **FMS** Knob to enter the desired time offset (±HH:MM) and press the **ENT** Key to confirm selection.



**Figure 1-14  Date/Time Settings (System Setup 1 Page)**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## DISPLAY UNITS

Units in which various quantities are displayed on the system screens are listed on the System Setup Page. The Navigation Angle reference, the Temperature units, and the Position units can be set from here.

| Category | Settings | Affected Quantities | Exceptions |
|---|---|---|---|
| Navigation Angle | Magnetic (North)*<br>True (North) | Heading<br>Course<br>Bearing<br>Track<br>Desired Track<br>Wind direction (Trip Planning Page) | |
| Distance and Speed | Metric<br>Nautical* | Crosstrack error (HSI)<br>Bearing distances (information windows)<br>DME distance (information window)<br>Flight plan distances<br>Map ranges<br>DIS, GS, TAS, XTK fields (Navigation Data Bar)<br>All distances on MFD<br>Altitude buffer distance (System Setup)<br>Arrival Alert trigger distance (System Setup)<br>All speeds on MFD | Airspeed Indicator<br>True Airspeed (PFD)<br>Wind speed vector<br>Map range (Traffic Page, Terrain Proximity/TAWS Page)<br>CDI scaling (System Setup)<br>Fuel range calculation (EIS) |
| Altitude and Vertical Speed | Feet*<br>Meters | All altitudes on MFD<br>All elevations on MFD | Altimeter<br>Vertical Speed Indicator<br>VNV altitudes (Active Flight Plan) |
| Temperature | Celsius*<br>Fahrenheit | All temperatures on PFD<br>Total Air Temperature (Trip Planning Page) | Engine Indication System (EIS) |
| Fuel and Fuel Flow*** | Pounds | Fuel parameters (Trip Planning Page) | Engine Indication System (EIS) |
| Weight** | Pounds*<br>Kilograms | N/A | N/A |
| Position | HDDD°MM.MM'*<br>HDDD°MM'SS.S"<br>MGRS 1m<br>MGRS 10m | All positions | N/A |

   \* *Default setting*
 \*\* *Contact a Garmin-authorized service center to change this setting*
\*\*\* *Not configurable*

**Table 1-6  Display Units Settings (System Setup Page)**

### Changing a display unit setting:

**1)** While on the System **Setup 1** Page, press the **FMS** Knob momentarily to activate the flashing cursor.

**2)** Turn the large **FMS** Knob to highlight the desired field in the Display Units Box.

**3)** Turn the small **FMS** Knob to select the desired units.

**4)** Press the **ENT** Key.  Press the **CLR** Key to cancel the action without changing the units.

## ARRIVAL ALERTS

The Arrival Alert Box on the System Setup 1 Page allows the Alerts Window arrival alerts to be turned 'On/Off' and the alert trigger distance (up to 99.9 units) set for alerts in the Alerts Window and the PFD Navigation Status Box. An arrival alert can be set to notify the pilot with a message upon reaching a user-specified distance from the final destination (the direct-to waypoint or the last waypoint in a flight plan). When Arrival Alerts is set to 'On', and the set distance is reached, an "Arrival at waypoint" message is displayed in the PFD Navigation Status Box, and a "WPT ARRIVAL - Arriving at waypoint - [xxxx]" is displayed in the Alerts Window. When Arrival Alerts is set to 'Off', only the PFD Navigation Status Box message "Arriving at waypoint" is displayed, and it is displayed when the time to the final destination is approximately ten seconds.



**Figure 1-15  Arrival Alert Settings (System Setup 1 Page)**

### Enabling/disabling the Alerts Window arrival alert:

1) Use the **FMS** Knob to select the Aux - System **Setup 1** Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FM**S Knob to select the 'On/Off' field in the Arrival Alert Box.

4) Turn the small **FMS** Knob clockwise to turn the airspace alert On or counterclockwise to turn the alert Off.

### Changing the arrival alert trigger distance:

1) Use the **FMS** Knob to select the Aux - System **Setup 1** Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the distance field in the Arrival Alert Box.

4) Use the **FMS** Knob to enter a trigger distance and press the **ENT** Key.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## PAGE NAVIGATION

The large **FMS** Knob displays the Page Group Tabs and navigates through the tabs. The small **FMS** Knob navigates through the pages listed within a specific group. The number of clicks it takes to display the Page Group Tabs and change to the next tab can be controlled from the Page Navigation box on the Aux - System **Setup 2** Page.

Off – Displays the Page Group Window with one click of either **FMS** Knob.

On – Displays the Page Group Window and navigates to the next page group with one click of either **FMS** Knob.

The pilot can select, from the Aux - System **Setup 2** Page, the amount of time the Page Group Window is displayed (in the lower right corner of the MFD). The timeout can range from two to ten seconds.

### Selecting page navigation settings:

1) Use the **FMS** Knob to select the Aux - System **Setup 2** Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the 'Change On 1st Click' field in the Page Navigation Box.

4) Turn the small **FMS** Knob to select 'Off' or 'On'.

5) Turn the large **FMS** Knob to highlight the 'Timeout Seconds' field in the Page Navigation Box.

6) Turn the small **FMS** Knob to select the desired number of seconds

7) Press the **FMS** Knob momentarily to remove the flashing cursor.

## AUDIO ALERTS

The Audio Box on the System Setup 2 Page allows the audio alert voice setting (male or female).

### Changing the audio alert voice:

1) Use the **FMS** Knob to select the Aux - System **Setup 2** Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the voice field in the Audio Box.

4) Use the **FMS** Knob to select the desired voice setting and press the **ENT** Key.

## SYSTEM UTILITIES

For flight planning purposes, timers, trip statistics, and a scheduler feature are provided on the Aux - Utility Page. The timers available include a stopwatch-like generic timer, a total time in flight timer, and a record of the time of departure. Trip statistics—odometer, trip odometer, and average trip and maximum groundspeeds—are displayed from the time of the last reset.



**Figure 1-16  Utility Page**

### TIMERS

The system timers available on the Aux- Utility Page include:

• Stopwatch-like generic timers

• Total-time-in-flight timer

• Time since departure

The generic timer can be set to count up or down from a specified time (HH:MM:SS). When the countdown on the timer reaches zero the digits begin to count up from zero. If the timer is reset before reaching zero on a countdown, the digits are reset to the initial value. If the timer is counting up when reset, the digits return to zero.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Setting the generic timer:**

**1)** Use the **FMS** Knob to select the Aux - Utility Page.

**2)** Press the **FMS** Knob momentarily to activate the flashing cursor.

**3)** Turn the small **FMS** Knob to select the timer counting direction (Up/Dn) and press the **ENT** Key.

**4)** If a desired starting time is desired:

    **a)** Use the large **FMS** Knob to highlight the HH:MM:SS field.

    **b)** Use the **FMS** Knob to enter the desired time and press the **ENT** Key.

**5)** Turn the large **FMS** Knob to highlight 'Start?' and press the **ENT** Key to start the timer.  The field changes to 'Stop?'.

**6)** To stop the timer, press the **ENT** Key with 'Stop?' highlighted.  The field changes to 'Reset?'.

**7)** To reset the timer, press the **ENT** Key with 'Reset?' highlighted.  The field changes back to 'Start?' and the digits are reset.

   The flight timer can be set to count up from zero starting at system power-up or from the time that the aircraft lifts off; the timer can also be reset to zero at any time.

**Setting the flight timer starting criterion:**

**1)** Use the **FMS** Knob to select the Aux - Utility Page.

**2)** Press the **FMS** Knob momentarily to activate the flashing cursor.

**3)** Turn the large **FMS** Knob to highlight the field next to the flight timer.

**4)** Turn the small **FMS** Knob to select the starting criterion (Pwr-On or In-Air) and press the **ENT** Key.

**Resetting the flight timer:**

**1)** Use the **FMS** Knob to select the Aux - Utility Page.

**2)** Press the **MENU** Key.

**3)** With 'Reset Flight Timer' highlighted, press the **ENT** Key.

The system records the time at which departure occurs, depending on whether the pilot prefers the time to be recorded from system power-up or from aircraft lift off. The displayed departure time can also be reset to display the current time at the point of reset. The format in which the time is displayed is controlled from the System Setup Page.

**Setting the departure timer starting criterion:**

1) Use the **FMS** Knob to select the Aux - Utility Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the field next to the departure time.

4) Turn the small **FMS** Knob to select the starting criterion (Pwr-On or In-Air) and press the **ENT** Key.

**Resetting the departure time:**

1) Use the **FMS** Knob to select the Aux - Utility Page.

2) Press the **MENU** Key.

3) Use the **FMS** Knob to highlight 'Reset Departure Time' and press the **ENT** Key.

## TRIP STATISTICS

The odometer and trip odometer record the total mileage traveled from the last reset; these odometers can be reset independently. Resetting the trip odometer also resets the average trip groundspeed. Maximum groundspeed for the period of time since the last reset is also displayed.

**Resetting trip statistics readouts:**

1) Use the **FMS** Knob to select the Aux - Utility Page.

2) Press the **MENU** Key. The following reset options for trip statistics are displayed:

   • Reset Trip ODOM/AVG GS—Resets trip average ground speed readout and odometer

   • Reset Odometer—Resets odometer readout only

   • Reset Maximum Speed—Resets maximum speed readout only

   • Reset All—Resets flight timer, departure timer, odometers, and groundspeed readouts

3) Use the **FMS** Knob to highlight the desired reset option and press the **ENT** Key. The selected parameters are reset to zero and begin to display data from the point of reset.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**GARMIN.**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## SCHEDULER

The system's Scheduler feature can be used to enter and display reminder messages (e.g., "Change oil", "Switch fuel tanks", "Overhaul") in the Alerts Window on the PFD. Messages can be set to display based on a specific date and time (event), once the message timer reaches zero (one-time; default setting), or recurrently whenever the message timer reaches zero (periodic). Message timers set to periodic alerting automatically reset to the original timer value once the message is displayed. When power is cycled, messages are retained until deleted, and message timer countdown is restarted.

**Entering a scheduler message:**

1) Select the Aux - Utility Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the first empty scheduler message naming field.

4) Use the **FMS** Knob to enter the message text to be displayed in the Alerts Window and press the **ENT** Key.

5) Press the **ENT** Key again or use the large **FMS** Knob to move the cursor to the field next to 'Type'.

6) Turn the small **FMS** Knob to select set the message alert type:

  • Event—Message issued at the specified date/time

  • One-time—Message issued when the message timer reaches zero (default setting)

  • Periodic—Message issued each time the message timer reaches zero

7) Press the **ENT** Key again or use the large **FMS** Knob to move the cursor to the next field.

8) For periodic and one-time message, use the **FMS** Knob to enter the timer value (HHH:MM:SS) from which to countdown and press the **ENT** Key.

9) For event-based messages:

  a) Use the **FMS** Knob to enter the desired date (DD-MMM-YYY) and press the **ENT** Key.

  b) Press the **ENT** Key again or use the large **FMS** Knob to move the cursor to the next field.

  c) Use the **FMS** Knob to enter the desired time (HH:MM) and press the **ENT** Key.

10) Press the **ENT** Key again or use the large **FMS** Knob to move the cursor to enter the next message.

**Deleting a scheduler message:**

1) Select the Aux - Utility Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the name field of the scheduler message to be deleted.

4) Press the **CLR** Key to clear the message text.  If the **CLR** Key is pressed again, the message is restored.

5) Press the **ENT** Key to confirm message deletion.

Scheduler messages appear in the Alerts Window on the PFD and cause the **Alerts** Softkey label to change to a flashing 'Message' label.  Pressing the **Message** Softkey opens the Alerts Window and acknowledges the scheduler message.  The softkey reverts to the 'Alerts' label.  Pressing the **Alerts** Softkey again removes the Alerts Window from the display and the scheduler message is deleted from the message queue.
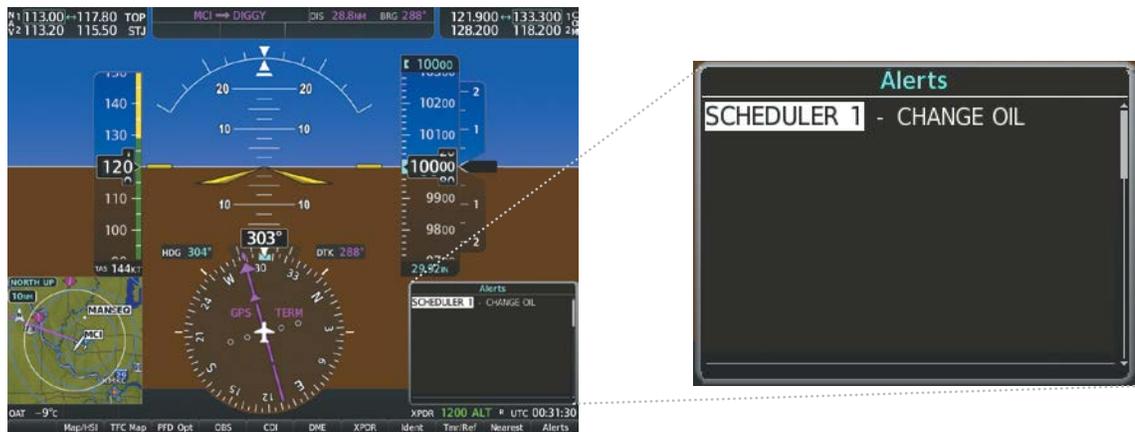


**Figure 1-17  PFD Alerts Window**

**GARMIN.**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

# 1.5  DISPLAY BACKLIGHTING

The PFD and MFD display backlighting, the PFD and MFD bezel, and the Audio Panel keys can be adjusted manually in one of two ways:

- Using the individual dimmer bus control for the desired display, or

- Using the PFD Setup Menu and the following procedures.  In normal operating mode, backlighting can only be adjusted from the PFD.  In reversionary mode, adjustments can be made from any remaining displays.

**Adjusting display backlighting:**

1) Press the PFD **MENU** Key to display the PFD Setup Menu.  'Auto' is now highlighted next to 'PFD Display'.  If desired, turn the large **FMS** Knob to select 'Auto' next to 'MFD Display'.

2) Turn the small **FMS** Knob to select 'Manual' and press the **ENT** Key.  The intensity value is now highlighted.

3) Use the **FMS** Knob to enter the desired backlighting then press the **ENT** Key.

4) To remove the menu, press the **CLR** or **MENU** Key.

**Adjusting key backlighting:**

1) Press the PFD **MENU** Key to display the PFD Setup Menu.  'Auto' is now highlighted next to 'PFD Display'.

2) Turn the large **FMS** Knob to highlight 'PFD Display' or 'MFD Display', as desired.

3) Turn the small **FMS** Knob in the direction of the green arrowhead to display 'PFD Key' or 'MFD Key'.

4) Turn the large **FMS** Knob to highlight 'AUTO'.

5) Turn the small **FMS** Knob to select 'Manual' and press the **ENT** Key.  The intensity value is now highlighted.

6) Use the **FMS** Knob to enter the desired backlighting and press the **ENT** Key.

7) To remove the menu, press the **CLR** or **MENU** Key.

**Figure 1-18  PFD Setup Menu**

# SECTION 2  FLIGHT INSTRUMENTS

> **NOTE:** *The Automatic Flight Control System (AFCS) provides additional readouts and bugs on selected flight instruments.  Refer to the AFCS Section for details on these bugs and readouts, as they appear on the display during certain AFCS flight director modes.*

The system includes an easy-to-scan Primary Flight Display (PFD) that features a large horizon, airspeed, attitude, altitude, vertical speed, and course deviation information.  In addition to the flight instruments, navigation, communication, terrain, traffic, and weather information are also presented on the PFD and explained in other sections of this Pilot's Guide.

The following flight instruments and supplemental flight data are displayed on the PFD:

- Airspeed Indicator, showing
  - Indicated Airspeed
  - True Airspeed
  - Airspeed awareness ranges
  - Vspeed reference bugs
- Attitude Indicator with slip/skid indication
- Altimeter, showing
  - Trend vector
  - Barometric setting
  - Selected altitude
- Vertical Deviation, Glideslope, and Glidepath Indicators
- Vertical Speed Indicator (VSI)
- Vertical Navigation (VNV) indications
- Outside air temperature (OAT)

- Horizontal Situation Indicator, showing
  - Turn Rate Indicator
  - Bearing pointers and information windows
  - Navigation source
  - Course Deviation Indicator (CDI)
  - DME Information Window (optional)
- DME Tuning Window
- Transponder Mode, Code, and Ident/Reply
- References Window, showing
  - Generic timer
  - Vspeed values
  - Barometric or temperature compensated minimum descent altitude (MDA) or decision height (DH)
- Wind data

The PFD also displays various alerts and annunciations.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Figure 2-1  Primary Flight Display (Default)**
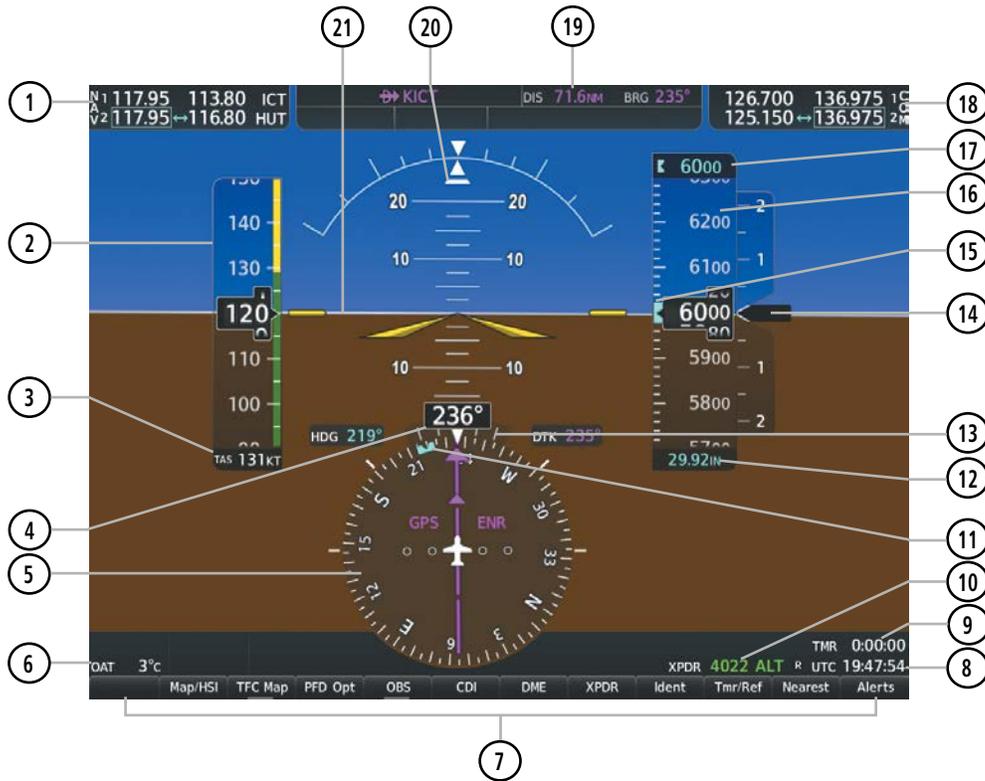
| | | | |
|---|---|---|---|
| 1 | NAV Frequency Box | 12 | Barometric Altimeter Setting |
| 2 | Airspeed Indicator | 13 | Turn Rate Indicator |
| 3 | True Airspeed | 14 | Vertical Speed Indicator (VSI) |
| 4 | Current Heading | 15 | Selected Altitude Bug |
| 5 | Horizontal Situation Indicator (HSI) | 16 | Altimeter |
| 6 | Outside Air Temperature (OAT) | 17 | Selected Altitude |
| 7 | Softkeys | 18 | COM Frequency Box |
| 8 | System Time | 19 | Navigation Status Box |
| 9 | Generic Timer | 20 | Slip/Skid Indicator |
| 10 | Transponder Data Box | 21 | Attitude Indicator |
| 11 | Selected Heading Bug | | |

1. Selected Heading
2. Wind Data Box
3. Inset Map
4. Bearing Information Windows
5. Minimum Descent Altitude/ Decision Height
6. Flight Plan Window
7. Desired Track
8. Required Vertical Speed Indicator
9. Vertical Deviation Indication
10. VNV Target Altitude

**Figure 2-2  Additional PFD Information**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## 2.1 FLIGHT INSTRUMENTS

### AIRSPEED INDICATOR

> **NOTE:** *Refer to the Pilot's Operating Handbook (POH) for airspeed criteria and Vspeed values.*

The Airspeed Indicator displays airspeed on a moving tape rolling number gauge. The numeric labels and major tick marks on the moving tape are shown at intervals of 10 knots. The minor tick marks on the moving tape are shown at intervals of 5 knots. Speed indication starts at 20 knots, with 60 knots of airspeed viewable at any time. The indicated airspeed is displayed inside the black pointer. The pointer remains black until reaching never exceed speed ($V_{NE}$), then it becomes red. The true airspeed is displayed in knots below the Airspeed Indicator.
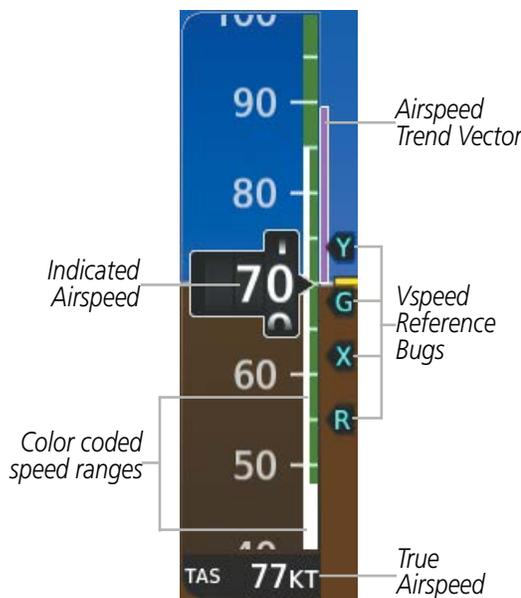


**Figure 2-3  Airspeed Indicator**



**Figure 2-4  Red Pointer Showing Airspeed Above $V_{NE}$**

A color-coded (solid red, white, green, amber) speed range strip is located on the moving tape. The colors denote solid red low speed awareness range, a flaps operating range, normal operating range, caution range, and never-exceed speed ($V_{NE}$). Speeds above the never-exceed speed ($V_{NE}$), appear in the high speed warning range, represented on the airspeed tape by red/white "barber pole" coloration. The Airspeed Trend Vector is a vertical magenta line that appears to the right of the color-coded speed range strip when airspeed is either accelerating or decelerating. One end of the magenta line is anchored to the tip of the airspeed pointer while the other end moves continuously up or down corresponding to the rate of acceleration or deceleration. For any constant rate of acceleration or deceleration, the moving end of the line shows approximately what the indicated airspeed value will be in six seconds. If the trend vector crosses $V_{NE}$, the number in the indicated airspeed pointer changes to amber. The trend vector is absent if the speed remains constant or if any data needed to calculate airspeed is not available due to a system failure.

Black reference bugs with cyan letters appear along the right side of the airspeed scale denote GLIDE, $V_R$, $V_X$, and $V_Y$. The pilot can enable/disable the display of these bugs, as well as change their values. When the indicated airspeed is below 20 knots, enabled Vspeeds Reference Bugs and their numeric values appear in a list at the bottom of the airspeed tape, ordered from highest to lowest.



**Figure 2-5  VSpeed References**

| | Vspeed | Bug |
|---|---|---|
| | GLIDE | G |
| | $V_R$ | R |
| | $V_x$ | X |
| | $V_y$ | Y |

**Table 2-1  Vspeed Bug Labels**

**Enabling/disabling or modifying individual Vspeed Reference Bugs:**

1) Press the **Tmr/Ref** Softkey.

2) Turn the large **FMS** Knob to highlight the desired Vspeed value.

3) Use the small **FMS** Knob to change the Vspeed in 1-kt increments (when a speed has been changed from a default value, an asterisk appears next to the speed).

4) Press the **ENT** Key or turn the large **FMS** Knob to highlight the On/Off field

5) Turn the small **FMS** Knob clockwise to On or counterclockwise to Off.

6) To remove the window, press the **CLR** Key or the **Tmr/Ref** Softkey.



*References Window*
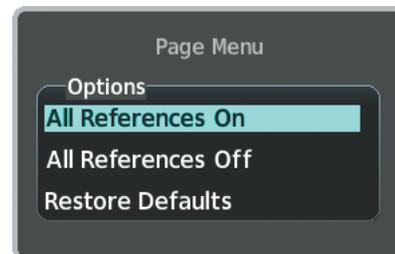


*References Window Menu*

**Figure 2-6  References Window and Menu**

The pilot can also enable/disable all Vspeed Reference Bugs as a group.

**Enabling/disabling Vspeed Reference Bugs as a group or restoring all default settings:**

1) Press the **Tmr/Ref** Softkey.

2) Press the **MENU** Key.

3) Turn the **FMS** Knob to scroll as needed to highlight 'All References On', 'All References Off' or 'Restore Defaults'.

4) Press the **ENT** Key.

5) To remove the References Window, press the **CLR** Key or the **Tmr/Ref** Softkey.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## ATTITUDE INDICATOR

Attitude information is displayed over a virtual blue sky and brown ground with a white horizon line. The Attitude Indicator displays the pitch, roll, and slip/skid information.



1 Roll Pointer
2 Roll Scale
3 Horizon Line
4 Aircraft Symbol
5 Land Representation
6 Pitch Scale
7 Slip/Skid Indicator
8 Sky Representation
9 Roll Scale Zero
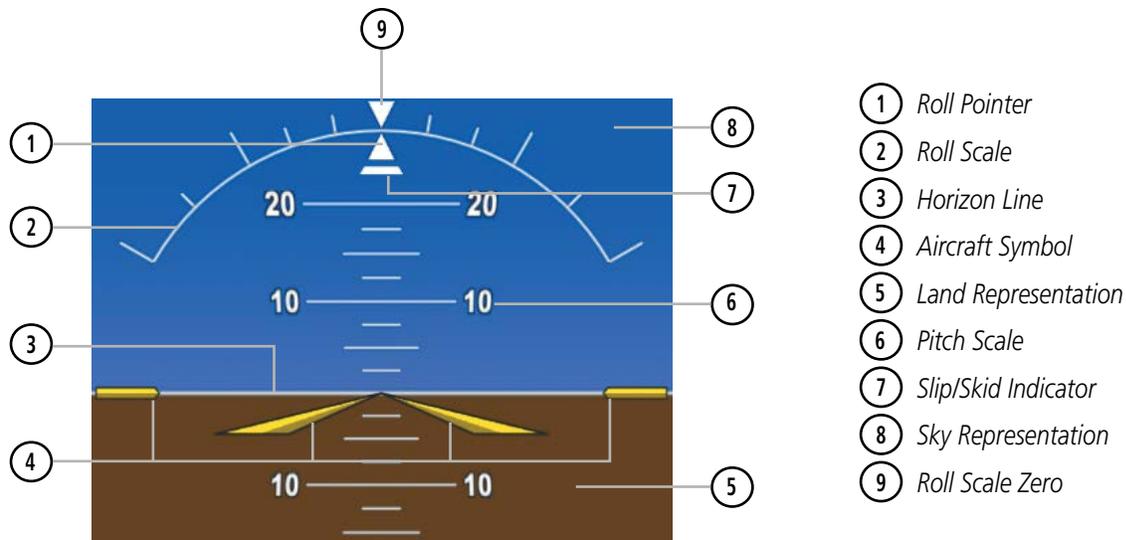
**Figure 2-7  Attitude Indicator**

The horizon line is part of the pitch scale. Above and below the horizon line, major pitch marks and numeric labels are shown for every 10°, up to 90°. Minor pitch marks are shown for intervening 5° increments, up to 25° below and 45° above the horizon line. Between 20° below to 20° above the horizon line, minor pitch marks occur every 2.5°. When the optional Garmin Synthetic Vision System (Garmin SVT™) is activated, the pitch scale is reduced to 10° up and 7.5° down; refer to the Additional Features section for more information about Synthetic Vision.

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

The Slip/Skid Indicator is the bar beneath the roll pointer. The indicator bar moves with the roll pointer and moves laterally away from the pointer to indicate uncoordinated flight. Slip (inside the turn) or skid (outside the turn) is indicated by the location of the bar relative to the pointer.



**Figure 2-8  Slip/Skid Indication**

## ALTIMETER

The Altimeter displays 600 feet of barometric altitude values at a time on a moving tape rolling number gauge. Numeric labels and major tick marks are shown at intervals of 100 feet. Minor tick marks are at intervals of 20 feet. The indicated altitude is displayed inside the black pointer.

The Selected Altitude is displayed above the Altimeter in the box indicated by a selection bug symbol. A bug corresponding to this altitude is shown on the tape. If the Selected Altitude exceeds the range shown on the tape, the bug appears at the upper or lower edge of the tape. When the metric value is selected it is displayed in a separate box below the Selected Altitude.

A magenta Altitude Trend Vector extends up or down the left of the altitude tape, with the end resting at the approximate altitude to be reached in six seconds at the current vertical speed. The trend vector is not shown if altitude remains constant or if data needed for calculation is not available due to a system failure.

### Setting the Selected Altitude:

Turn the **ALT** Knob to set the Selected Altitude. Turn the large knob for 1000-ft increments, small knob for 100-ft increments. If set to Metric mode, the large knob adjusts the Selected Altitude in 500-meter increments; the small knob adjusts the Selected Altitude in 50-meter increments..

If a Minimum Descent Altitude/Decision Height (MDA/DH) value has been set, this altitude is also available for the Selected Altitude while turning the **ALT** Knob.
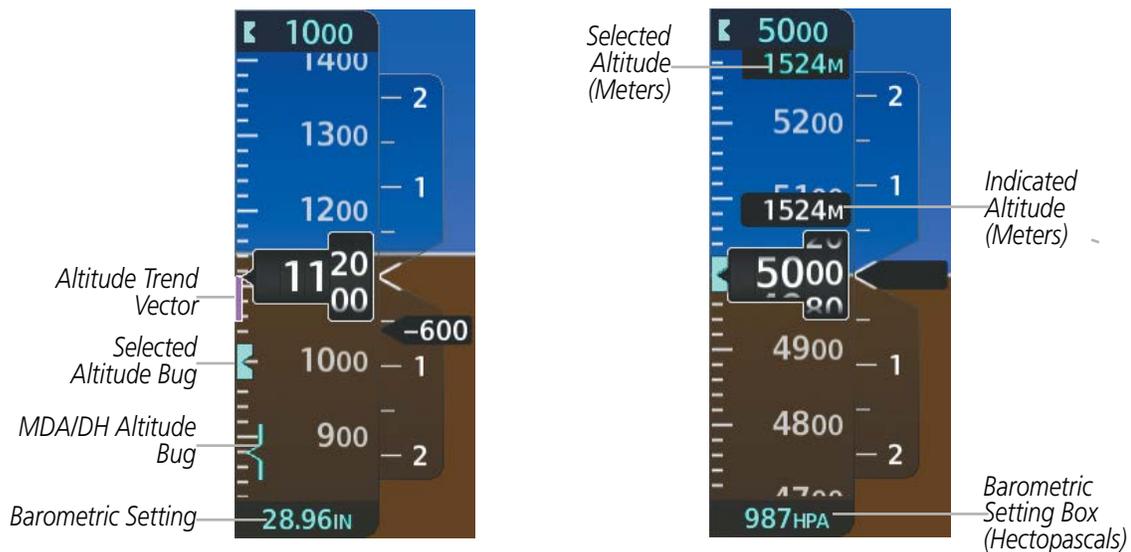


**Figure 2-9 Altimeter**

Altitudes can also be displayed in meters as an overlay. Note that the altitude tape does not change scale.

### Displaying the metric altitude overlay:

1) Press the **PFD Opt** Softkey to display the second-level softkeys.

2) Press the **ALT Units** Softkey.

3) Press the **Meters** Softkey to turn on metric altitude readouts.

4) Press the **Back** Softkey twice to return to the top-level softkeys.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

The barometric pressure setting is displayed below the Altimeter in inches of mercury (in Hg) or hectopascals (hPa) when metric units are selected. Adjusting the altimeter barometric pressure setting creates discontinuities in VNV vertical deviation, moving the descent path. For large adjustments, it may take several minutes for the aircraft to re-establish on the descent patch. If the change is made while nearing a waypoint with a VNV Target Altitude, the aircraft may not re-establish on the descent path in time to meet the vertical constraint.

> ⚠ **WARNING:** *Do not use a QFE altimeter setting with this system. System functions will not operate properly with a QFE altimeter setting. Use only a QHN altimeter setting for the height above mean sea level, or the standard pressure setting, as applicable.*

**Selecting the altimeter barometric pressure setting:**

Turn the **BARO** Knob to select the desired setting.

**Selecting standard barometric pressure (29.92 in Hg):**

1) Press the **PFD Opt** Softkey to display the second-level softkeys.

2) Press the **STD Baro** Softkey.

3) Press the **Back** Softkey to return to the top-level softkeys.

**STD BARO**

**Figure 2-10  Standard Barometric Setting**

**Changing altimeter barometric pressure setting units:**

1) Press the **PFD Opt** Softkey to display the second-level softkeys.

2) Press the **ALT Units** Softkey.

3) Press the **IN** Softkey to display the barometric pressure setting in inches of mercury (in Hg).

   **Or:**

   Press the **HPA** Softkey to display the barometric pressure setting in hectopascals (hPa).

4) Press the **Back** Softkey twice to return to the top-level softkeys.

The Baro Transition Alerts flash the barometric pressure setting to remind the pilot to change the barometric pressure setting to or from standard. Two alerts are available. The altitude Baro Transition Alert occurs when climbing through the transition altitude beginning at 200 feet below this altitude. The flight level Baro Transition Alert occurs when descending through the transition flight level beginning at 200 feet above this flight level. The barometric pressure setting stops flashing after the pilot changes the barometric pressure setting. The pilot can enable/disable either Baro Transition Alerts, and choose the altitude or flight level used to trigger the alerts.

**Setting the Baro Transition Alerts:**

1) Use the **FMS** Knob to select the Aux - System Setup 1 Page on the MFD.

2) Press the **FMS** Knob to activate the cursor.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

3) To enable/disable the Baro Transition Alert based on altitude, turn the large **FMS** Knob to highlight the 'On' or 'Off' field for the BARO Transition Alert Altitude in the BARO Transition Alert Box.

4) If desired, turn the small **FMS** Knob to set the BARO Transition Alert Altitude On or Off.

5) Turn the large **FMS** Knob to highlight the Altitude field.

6) Use the **FMS** Knobs to change the altitude and press the **ENT** Key to accept or press the **CLR** Key to return to the previous altitude selection.

7) Turn the large **FMS** Knob to highlight the 'On' or 'Off' field for the BARO Transition Alert Level.

8) If desired, turn the small **FMS** Knob to set the BARO Transition Alert Flight Level On or Off.

9) Turn the large **FMS** Knob to highlight the Flight Level field.

10) Use the **FMS** Knobs to change the Flight Level for the alert and press the **ENT** Key to accept or press the **CLR** Key to return to the previous altitude selection.

11) Push the **FMS** Knob to deactivate the cursor.

## VERTICAL SPEED INDICATOR (VSI)

> **NOTE:** The Glidepath Indicator is only available on GPS approaches supporting SBAS vertical guidance when SBAS is available.

The Vertical Speed Indicator (VSI; Figure 2-11) displays the aircraft vertical speed on a fixed scale with labels at 1000 and 2000 fpm and minor tick marks every 500 fpm. Digits appear in the pointer when the climb or descent rate is greater than 100 fpm. If the rate of ascent/descent exceeds 2000 fpm, the pointer appears at the edge of the tape and the rate appears inside the pointer.

A magenta chevron is displayed on the VSI to indicate the Required Vertical Speed for reaching a VNV target altitude once the "TOD [Top of Descent] within 1 minute" alert has generated.

## VERTICAL DEVIATION

When Vertical Navigation (VNV) is being used (Figure 2-11), the Vertical Deviation Indicator (VDI) appears to the left of the altimeter and is displayed with a magenta 'V' at the top of the scale and a magenta chevron indicating the baro-VNAV vertical deviation. The VDI appears in conjunction with the "TOD within 1 minute" alert. The VDI is removed from the display if vertical deviation becomes invalid. See the Flight Management Section for details on VNV features, and refer to Section 2.3, Supplemental Flight Data, for more information about VNV indications on the PFD.

The Glideslope Indicator (Figure 2-12) appears to the left of the Altimeter whenever an ILS frequency is tuned in the active NAV field and the selected course and heading are within 107°. A green diamond acts as the Glideslope Indicator, like a glideslope needle on a conventional indicator. If a localizer frequency is tuned and there is no glideslope, "NO GS" is displayed in place of the diamond.
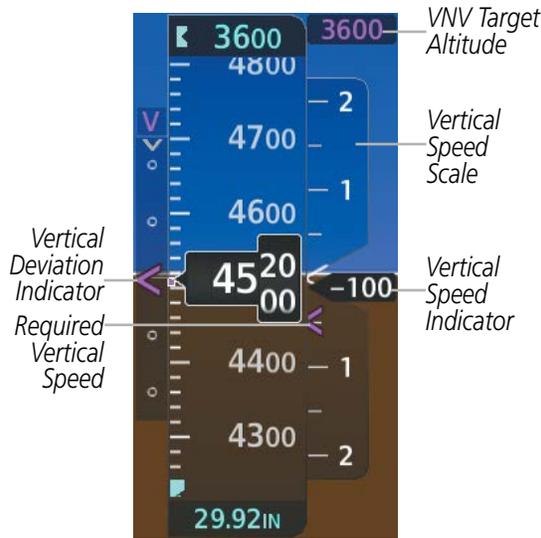
**Figure 2-11 Vertical Speed and Deviation Indicator (VSI and VDI)**
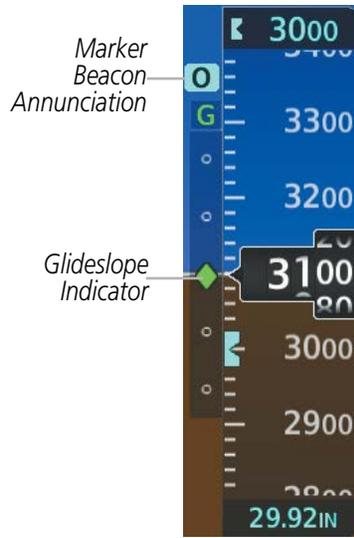


**Figure 2-12 Glideslope Indicator**

The Glidepath Indicator is a vertical deviation scale for GPS approach service levels supporting SBAS vertical guidance (LNAV+V, L/VNAV, LPV, LP+V) or advisory vertical guidance (LNAV+V, LP+V, Visual). The Glidepath Indicator, a magenta diamond (Figure 2-13) appears on the display as soon as the Final Approach Fix (FAF) becomes the active waypoint, and GPS is the selected navigation source. Full-scale deflection (two dots) is angular with upper and lower limits. The upper limit is +/-492 feet (150 meters) and lower limit depends on approach service level as follows:

- LNAV/VNAV, LNAV+V, LP+V, Visual is +/- 148 feet (45 meters).

- LPV is +/- 49 feet (15 meters).

A hollow gray diamond represents a preview of the glidepath indicator. This is shown while inbound to the FAF waypoint, but before the FAF waypoint is the next active waypoint. The preview is also shown when the AFCS is coupled to the Vertical Path Tracking Mode (VPTH) while inbound to the FAF waypoint, until the AFCS captures the glidepath; refer to the AFCS section for more information about Vertical Path Tracking Mode.

The hollow gray preview diamond changes to a solid magenta diamond to indicate the glidepath indicator is active.

If the approach downgrades past the final approach fix (FAF), "NO GP" is displayed in place of the diamond.



**Figure 2-13 Glidepath Indicator**

**Garmin G1000 NXi Pilot's Guide for the Cessna Nav III**
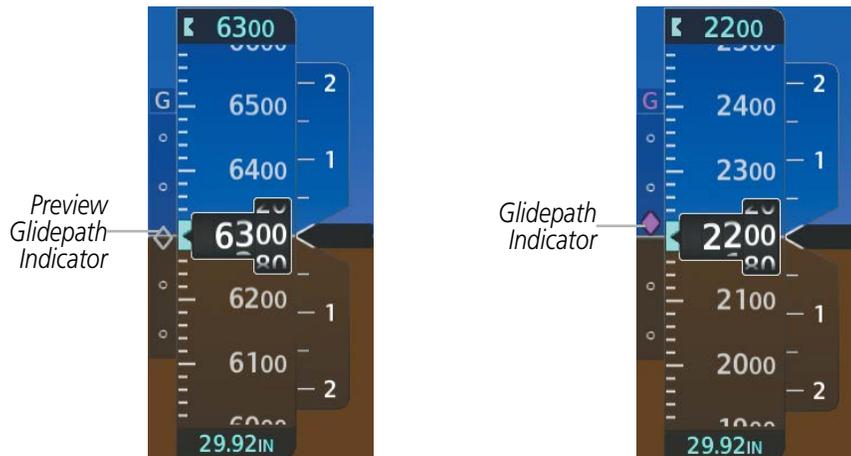
## HORIZONTAL SITUATION INDICATOR (HSI)

The Horizontal Situation Indicator (HSI) displays a rotating compass card in a heading-up orientation. Letters indicate the cardinal points with numeric labels every 30°. Major tick marks are at 10° intervals and minor tick marks are at 5° intervals. A digital reading of the current heading appears on top of the HSI, and the current track is represented on the HSI by a magenta diamond. The HSI also presents turn rate, course deviation, bearing, and navigation source information.

The HSI contains a Course Deviation Indicator (CDI), with a Course Pointer, To/From Indicator, and a sliding deviation bar and scale. The course pointer is a single line arrow (GPS, VOR1, and LOC1) or a double line arrow (VOR2 and LOC2) which points in the direction of the set course. The To/From arrow rotates with the course pointer and is displayed when the active NAVAID is received.



| | | | |
|---|---|---|---|
| 1 | Current Track Indicator | 9 | Lateral Deviation Scale |
| 2 | Selected Heading Bug | 10 | Flight Phase |
| 3 | Course Deviation Indicator (CDI) | 11 | Course Pointer |
| 4 | Navigation Source | 12 | Selected Course |
| 5 | Aircraft Symbol | 13 | Lubber Line |
| 6 | To/From Indicator | 14 | Current Heading |
| 7 | Rotating Compass Card | 15 | Turn Rate and Heading Trend Vector |
| 8 | OBS Mode Active | 16 | Selected Heading |
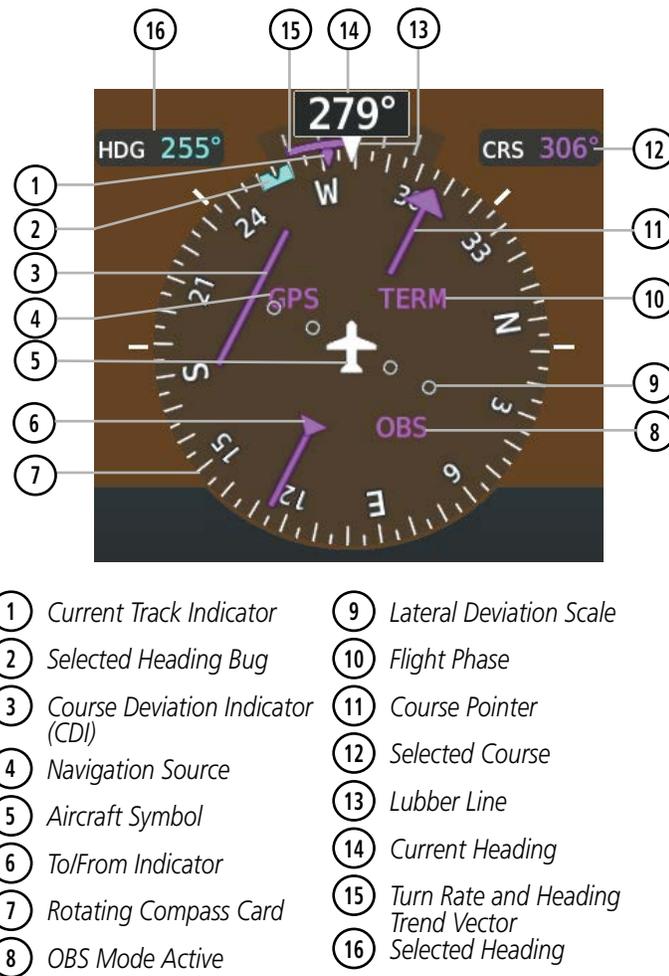
**Figure 2-14  Horizontal Situation Indicator**

A digital reading of the current heading appears on top of the HSI. A magenta diamond on the HSI represents the current track over the ground the aircraft is flying. To the upper left of the HSI, the Selected Heading is shown in cyan, which corresponds to the cyan heading bug on the compass rose. The Desired Track (DTK) is shown in magenta to the upper right of the HSI when the selected navigation source is GPS and OBS Mode

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**FLIGHT INSTRUMENTS**

**GARMIN**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

is not active. The Selected Course (CRS) is shown to the upper right of the HSI when the selected navigation source is VOR or LOC and in magenta when the selected navigation source is GPS with OBS Mode active.

**Adjusting the Selected Heading:**

Turn the **HDG** Knob to set the Selected Heading.

Press the **HDG** Knob to synchronize the bug to the current heading.

**Adjusting the Selected Course:**

Turn the **CRS** Knob to set the Selected Course.

Press the **CRS** Knob to re-center the CDI and return the course pointer to the bearing of the active waypoint or navigation station.



*Current Track Indicator*

*Selected Heading*

*Current Heading*

*Selected Course*

*Selected Heading Bug*

**Figure 2-15 Heading and Course Indications**

Navigation angles (track, heading, course, bearing) are corrected to the computed magnetic variation (Mag Var) or referenced to true north (T), set on the Aux - System Setup 1 Page. When an approach referenced to true north has been loaded into the flight plan, the system generates an alert to change the navigation angle setting to True at the appropriate time.



**Figure 2-16 Heading and Course Indications (True)**

**Changing the navigation angle true/magnetic setting:**

1) Use the **FMS** Knob to select the Aux - System Setup 1 Page on the MFD.

2) Press the **FMS** Knob to activate the cursor.

3) Turn the large **FMS** Knob to highlight NAV Angle setting in the Display Units box.

4) Turn the small **FMS** Knob to highlight the desired setting and press the **ENT** Key.

• Magnetic - Angles corrected to the computed magnetic variation (Mag Var)

• True - References angles to true north (T)

## TURN RATE INDICATOR

The Turn Rate Indicator is located directly above the rotating compass card. Tick marks to the left and right of the lubber line denote half-standard and standard turn rates. A magenta Turn Rate Trend Vector shows the current turn rate. The end of the trend vector gives the heading predicted in six seconds, based on the present turn rate. A standard-rate turn is shown on the indicator by the trend vector stopping at the standard turn

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

rate tick mark, corresponding to a predicted heading of 18° from the current heading.  At rates greater than 4 deg/sec, an arrowhead appears at the end of the magenta trend vector and the prediction is no longer valid.



**Figure 2-17  Turn Rate Indicator and Trend Vector**

## BEARING POINTERS AND INFORMATION WINDOWS

Two bearing pointers and associated information can be displayed on the HSI for NAV and GPS sources by pressing the **PFD Opt** Softkey then either the **Bearing 1** or **Bearing 2** Softkey.  The bearing pointers are cyan and are single-line (BRG1) or double-line (BRG2).  A pointer symbol is shown in the information window to indicate the navigation source.  The bearing pointers never override the CDI and are visually separated from the CDI by a white ring.  Bearing pointers may be selected but not necessarily visible due to data unavailability.
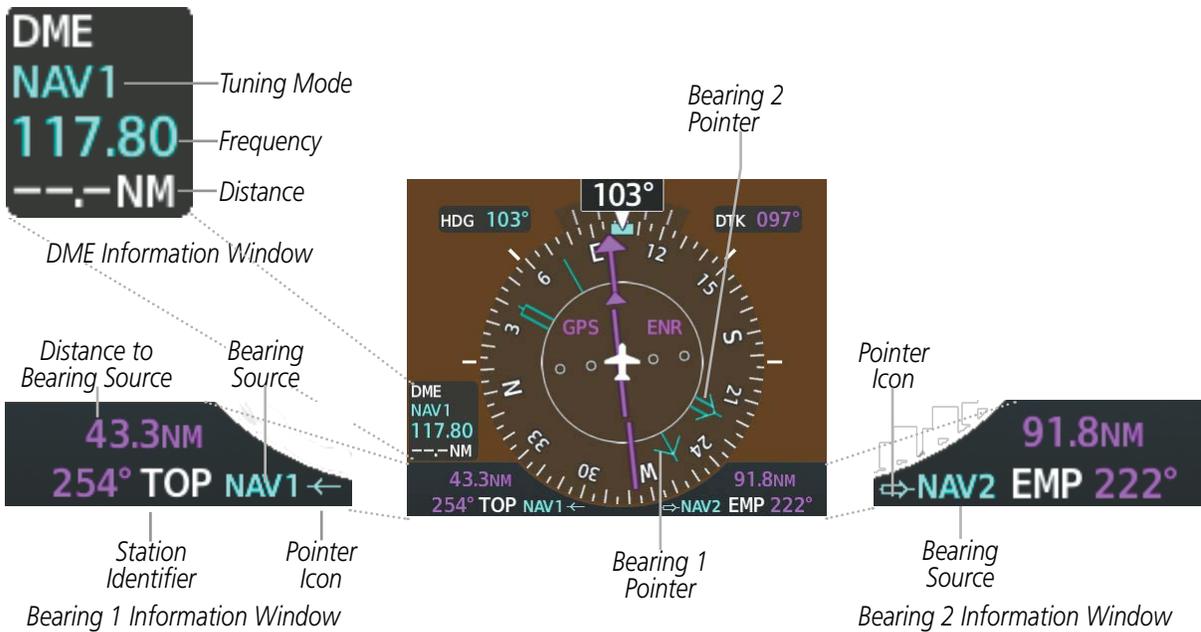


**Figure 2-18  HSI with Bearing and DME Information**

When a bearing pointer is displayed, the associated information window is also displayed.  The Bearing Information windows are displayed below the HSI and give the following information:

- Bearing source (NAV, GPS, ADF)
- Pointer icon (BRG1 = single line, BRG2 = double line)
- Station/waypoint identifier (NAV, GPS)
- GPS-derived great circle distance to bearing source
- Frequency (NAV)

When the NAV radio is tuned to an ILS frequency the bearing source and the bearing pointer is removed from the HSI. When NAV1 or NAV2 is the selected bearing source, the frequency is replaced by the station identifier when the station is within range. If GPS is the bearing source, the active waypoint identifier is displayed instead of a frequency.

The bearing pointer is removed from the HSI and dashes are displayed in the information window if the NAV radio is not receiving a VOR station or if GPS is the bearing source and an active waypoint is not selected.

### Selecting bearing display and changing sources:

1) Press the **PFD Opt** Softkey.

2) Press either **Bearing 1** or **Bearing 2** Softkey to display the desired bearing pointer and information window with the NAV 1 source.

3) Press the bearing softkey again to display the bearing pointer with the NAV 2 source.

4) Press the bearing softkey again to display the bearing pointer with GPS as the source.

5) Press the bearing softkey again to display the bearing pointer with the optional ADF as the source.

6) To remove the bearing pointer and information window, press either **Bearing 1** or **Bearing 2** Softkey again.

## DME INFORMATION WINDOW

> **NOTE:** DME radio installation is optional.

The DME Information Window is displayed above the Bearing 1 Information Window and shows the DME label, tuning mode (NAV1, NAV2, or HOLD), frequency, and distance. When a signal is invalid, the distance is replaced by "–.– – NM". Refer to the Audio Panel and CNS Section for information on tuning the radios.

### Displaying the DME Information Window:

1) Press the **PFD Opt** Softkey.

2) Press the **DME** Softkey to display the DME Information Window above the Bearing 1 Information Window.

3) To remove the DME Information Window, press the **DME** Softkey again.

## COURSE DEVIATION INDICATOR (CDI)

The Course Deviation Indicator (CDI) moves left or right from the course pointer along a lateral deviation scale to display aircraft position relative to the course. If the course deviation data is not valid, the CDI is not displayed.



**Figure 2-19  Course Deviation Indicator**

The CDI can display two sources of navigation, GPS or VOR/LOC. The color indicates the current navigation source, magenta for GPS and green for VOR and LOC. The full scale limits for the CDI are defined by an GPS-derived distance when coupled to the GPS. If the CDI exceeds the maximum deviation on the scale (two dots) while navigating with GPS, the crosstrack error (XTK) is displayed below the white aircraft symbol. When navigating using a VOR or localizer (LOC), the CDI uses the same angular deviation as a mechanical CDI.



**Figure 2-20  Navigation Sources**

### Changing 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.
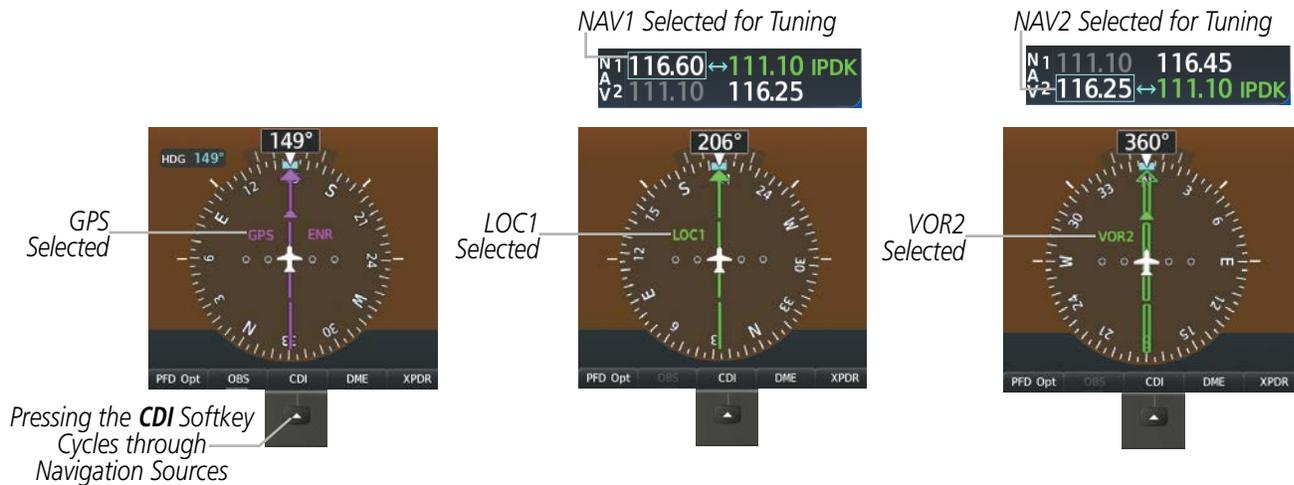


**Figure 2-21  Selecting a Navigation Source**

**FLIGHT INSTRUMENTS**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**GARMIN.**

The system automatically changes from GPS to LOC navigation source and changes the CDI scaling accordingly when all of the following occur:

- A localizer or ILS approach has been loaded into the active flight plan
- The final approach fix (FAF) is the active leg, the FAF is less than 15 nm away, and the aircraft is moving toward the FAF
- A valid localizer frequency has been tuned
- The GPS CDI deviation is less than 1.2 times full-scale deflection

GPS steering guidance is still provided after the CDI automatically changes to LOC until LOC capture, up to the Final Approach Fix (FAF) for an ILS approach, or until GPS information becomes invalid. Activating a Vector-to-Final (VTF) also causes the CDI to switch to LOC navigation source. GPS steering guidance is not provided after the change.

On some ILS approaches where the glideslope intercept point is at or in close proximity to the fix prior to the FAF (see Figure 2-22), it is possible to be above the glideslope when the navigation source automatically changes from GPS to LOC. The probability of this occurring varies based on air temperature.
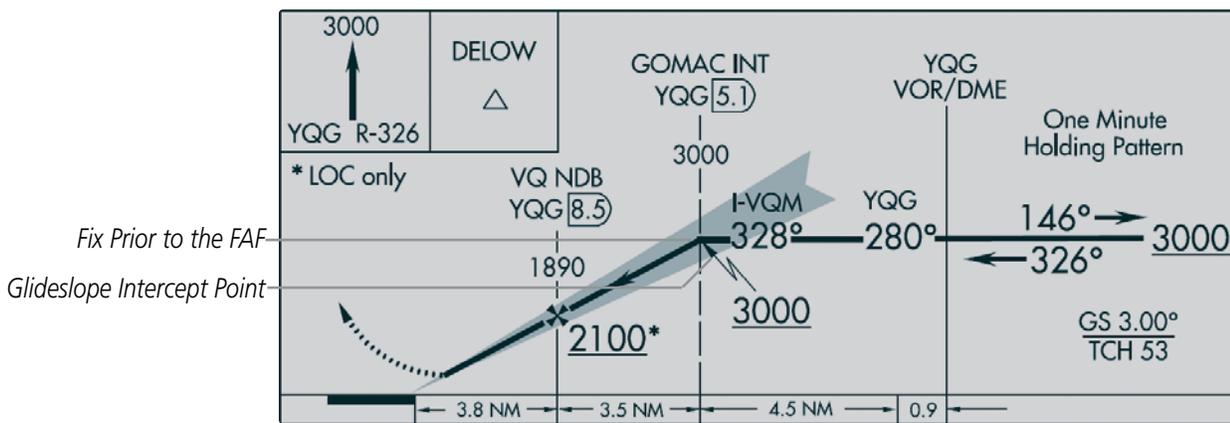


**Figure 2-22  ILS Approach with Glideslope Intercept Point at Fix Prior to the FAF**

## GPS CDI SCALING

When GPS is the selected navigation source, the flight plan legs are sequenced automatically and annunciations appear on the HSI for the flight phase. Flight phase annunciations are normally shown in magenta, but when cautionary conditions exist the color changes to amber. If the current leg in the flight plan is a heading leg, HDG LEG is annunciated in magenta beneath the aircraft symbol.

The current GPS CDI scale setting is displayed as System CDI on the Aux - System Setup 1 Page and the full-scale deflection setting may also be selected (2.0 nm, 1.0 nm, 0.3 nm, or Auto) from this page. If the selected scaling is smaller than the automatic setting for enroute and terminal phases, the CDI is scaled accordingly and the selected setting is displayed rather than the flight phase annunciation.

**Changing the selected GPS CDI setting:**

1) Use the **FMS** Knob to select the Aux - System Setup 1 Page on the MFD.

2) Press the **FMS** Knob to activate the cursor.

3) Turn the large **FMS** Knob to highlight the Format Allowed selection in the GPS CDI box.

4) Turn the small **FMS** Knob to highlight the desired setting and press the **ENT** Key.

5) To cancel the selection, press the **FMS** Knob or the **CLR** Key.

When set to Auto (default), the GPS CDI scale automatically adjusts to the desired limits based upon the current phase of flight (Figure 2-23, Table 2-2).
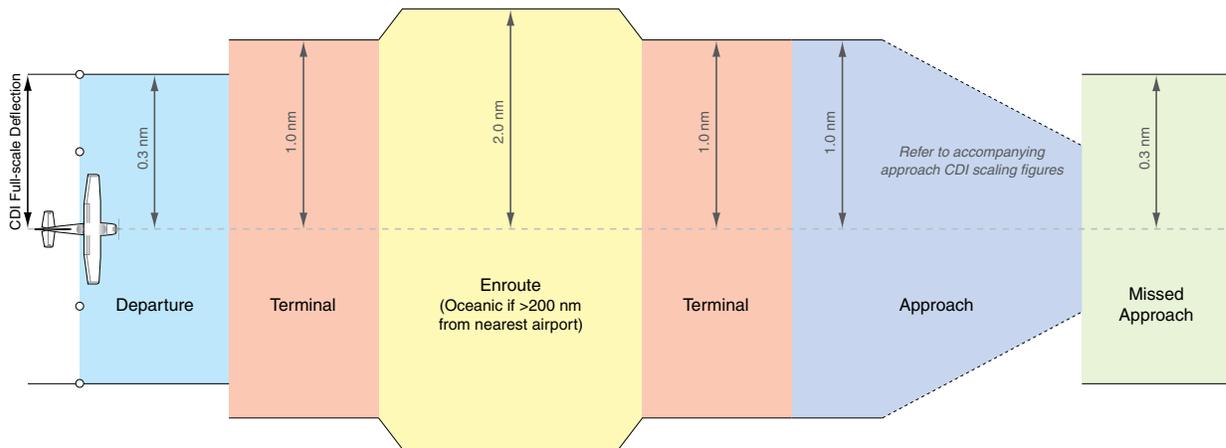


**Figure 2-23  Automatic CDI Scaling**

- Once a departure procedure is activated, the CDI is scaled for ***departure*** (0.3 nm).

- The system switches from departure to ***terminal*** CDI scaling (1.0 nm) under the following conditions:

  - The next leg in the departure procedure is not aligned with the departure runway

  - The next leg in the departure procedure is not a CA, CD, CF, CI, CR, DF, FA, FC, FD, FM, IF, or TF (see Glossary for leg type definitions)

  - After any leg in the departure procedure that is not a CA or FA

- At 30 nm from the departure airport, the ***enroute*** phase of flight is automatically entered and CDI scaling changes to 2.0 nm over a distance of 1.0 nm, except under the following conditions:

  - When navigating with an active departure procedure, the flight phase and CDI scale does not change until the aircraft arrives at the last departure waypoint (if more than 30 nm from the departure airport) or the leg after the last departure waypoint has been activated or a direct-to waypoint is activated.

- If after completing the departure procedure the nearest airport is more than 200 nm away from the aircraft and the approach procedure has not yet commenced, the CDI is scaled for ***oceanic*** flight (2.0 nm).

- Within 31 nm of the destination airport (***terminal*** area), the CDI scale gradually decreases from 2.0 nm to 1.0 nm over a distance of 1.0 nm, except under the following conditions:

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

- Upon reaching the first waypoint of an arrival route that is more than 31 nm from the destination airport, the flight phase changes to terminal and the CDI scale begins to decrease from 2.0 nm to 1.0 nm over a distance of 1.0 nm.

• During ***approach***, the CDI scale decreases even further (Figures 2-26 and 2-27). This transition normally occurs within 2.0 nm of the final approach fix (FAF). The CDI changes to approach scaling automatically once the approach procedure is activated or if Vectors-To-Final (VTF) are selected.

- If the active waypoint is the FAF, the ground track and the bearing to the FAF must be within 45° of the final approach segment course.

- If the active waypoint is part of the missed approach procedure, the active leg and the preceding missed approach legs must be aligned with the final approach segment course and the aircraft must not have passed the turn initiation point.
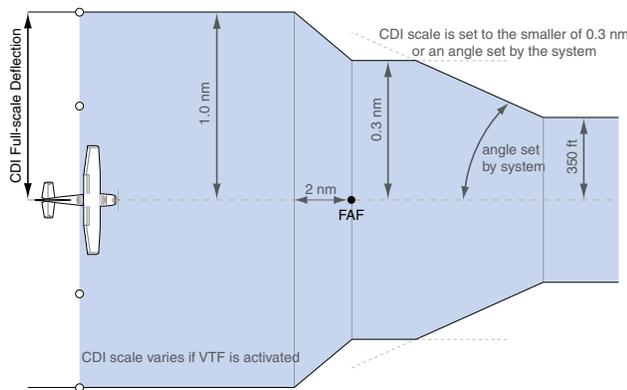


**Figure 2-24  Typical LNAV, LNAV+V, and Visual Approach CDI Scaling**
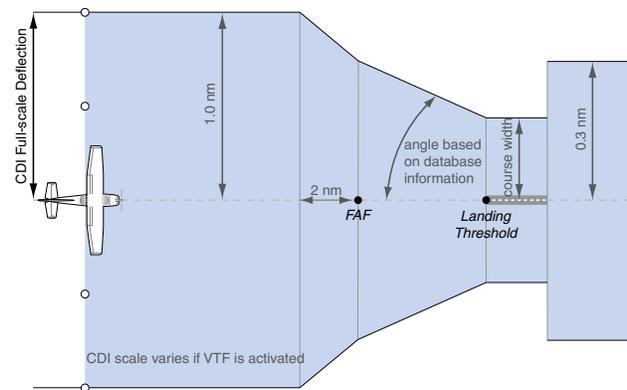


**Figure 2-25  Typical LNAV/VNAV, LPV, LP+V, and LP Approach CDI Scaling**

• When a ***missed approach*** is activated, the CDI scale changes to 0.3 nm.

• The system automatically switches back to ***terminal*** mode under the following conditions:

- The next leg in the missed approach procedure is not aligned with the final approach path

- The next leg in the missed approach procedure is not a CA, CD, CF, CI, CR, DF, FA, FC, FD, FM, IF, or TF

- After any leg in the missed approach procedure that is not a CA or FA

| Flight Phase | Annunciation* | Automatic CDI Full-scale Deflection |
|---|---|---|
| Departure | DPRT | 0.3 nm |
| Terminal | TERM | 1.0 nm |
| Enroute | ENR | 2.0 nm |
| Oceanic | OCN | 2.0 nm |
| Approach (Non-precision) | LNAV | 1.0 nm decreasing to 350 feet depending on variables (Figure 2-24) |
| Approach (Non-precision with Advisory Vertical Guidance) | LNAV + V | |
| Approach (Non-precision with Advisory Vertical Guidance) | VISUAL | |
| Approach (LNAV/VNAV) | L/VNAV | 1.0 nm decreasing to a specified course width, then 0.3 nm, depending on variables (Figure 2-25) |
| Approach (LPV) | LPV | |
| Approach (Non-precision with Advisory Vertical Guidance) | LP+V | |
| Approach (LP) | LP | |
| Missed Approach | MAPR | 0.3 nm |

*\* Flight phase annunciations are normally shown in magenta, but when cautionary conditions exist the color changes to amber.*

**Table 2-2  Automatic GPS CDI Scaling**

## OBS MODE

> **NOTE:** *VNV is inhibited while automatic waypoint sequencing has been suspended.*

Enabling Omni-bearing Selector (OBS) Mode suspends the automatic sequencing of waypoints in a GPS flight plan (GPS must be the selected navigation source), but retains the current Active-to waypoint as the navigation reference even after passing the waypoint. OBS is annunciated to the lower right of the aircraft symbol when OBS Mode is selected.

While OBS Mode is enabled, a course line is drawn through the Active-to waypoint on the moving map. If desired, the course to/from the waypoint can now be adjusted. When OBS Mode is disabled, the GPS flight plan returns to normal operation, with automatic sequencing of waypoints, following the course set in OBS Mode. The flight plan on the moving map retains the modified course line.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

*GPS Selected*

*Extended Course Line*

*OBS Mode Enabled*

*Pressing the **OBS** Softkey Enables OBS Mode*

*Pressing the **OBS** Softkey Again Disables OBS Mode*
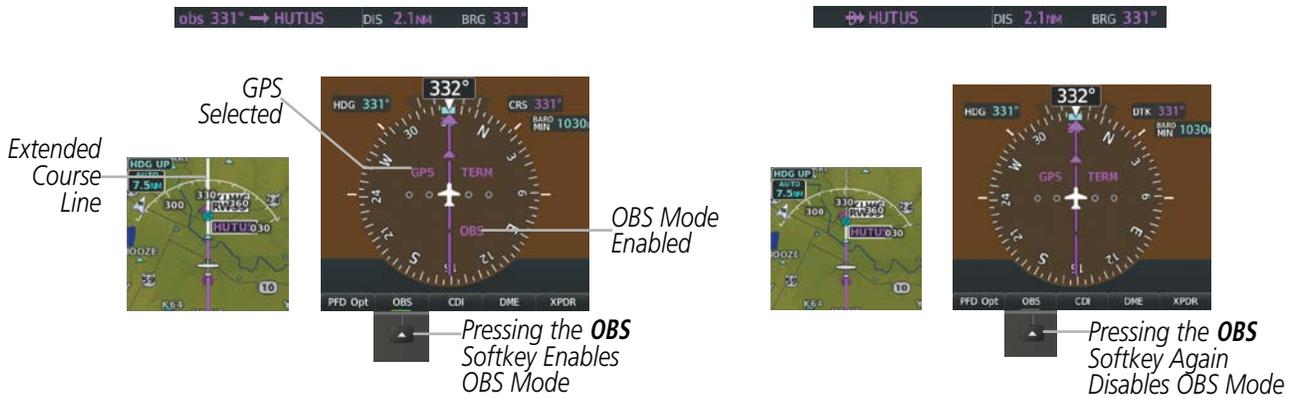
**Figure 2-26   Omni-bearing Selector (OBS) Mode**

### Enabling/disabling OBS Mode while navigating a GPS flight plan:

1) Press the **OBS** Softkey to select OBS Mode.

2) Turn the **CRS** Knob to select the desired course to/from the waypoint.  Press the **CRS** Knob to synchronize the Selected Course with the bearing to the next waypoint.

3) Press the **OBS** Softkey again to return to automatic waypoint sequencing.

   As the aircraft crosses the missed approach point (MAP), automatic approach waypoint sequencing is suspended.  SUSP appears on the HSI to the lower right of the aircraft symbol.  The **OBS** Softkey becomes the **SUSP** Softkey with its annunciator green to indicate the suspension is active as shown in Figure 2-27.  Pressing the **SUSP** Softkey deactivates the suspension and resumes automatic sequencing of approach waypoints, and the **SUSP** Softkey becomes the **OBS** Softkey.



*SUSP Softkey*

*SUSP Annunciation*
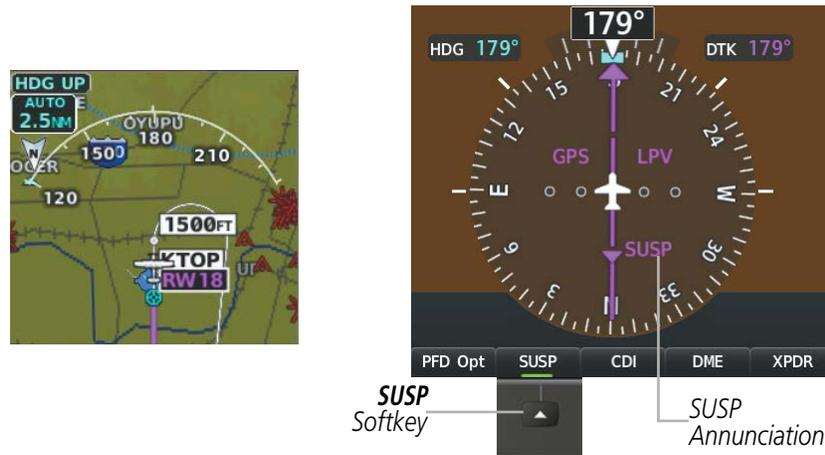
**Figure 2-27  Suspending Automatic Waypoint Sequencing**

**FLIGHT INSTRUMENTS**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## 2.2 SUPPLEMENTAL FLIGHT DATA

In addition to the flight instruments, the PFD also displays various supplemental information, including temperature, wind data, and Vertical Navigation (VNV) indications.

### TEMPERATURE DISPLAY

The Outside Air Temperature (OAT) is displayed in the lower left corner of the PFD. It may be shown in degrees Celsius (°C) or Fahrenheit (°F), depending on the selected temperature units on the Aux - System Setup 1 Page.



**Figure 2-28  Outside Air Temperature**

### WIND DATA

Wind direction and speed in knots can be displayed relative to the aircraft in a window to the upper left of the HSI. When the window is selected for display, but wind information is invalid or unavailable, the window displays NO WIND DATA. Wind data can be displayed in three different ways.



**Figure 2-29  Wind Data**

**Displaying wind data:**

1) Press the **PFD Opt** Softkey.

2) Press the **Wind** Softkey to display wind data to the left of the HSI.

3)  Press one of the numbered **Option** softkeys to change how wind data is displayed:

   • **Option 1**: Headwind/tailwind and crosswind arrows with numeric speed components

   • **Option 2**: Wind direction arrow and speed

   • **Option 3**: Wind direction arrow with numeric direction and speed

4)  To remove the window, press the **Off** Softkey.

## GENERIC TIMER

The generic timer can be accessed via softkeys on the PFD and allows for quick access for timing functions (either counting up or down) for the pilot.

1)  Press the **Tmr/Ref** Softkey.

2)  Turn the large **FMS** Knob to select the timer field (HH:MM:SS).

3)  Use the **FMS** Knob to enter the desired time.

4)  Press the **ENT** Key.  The Up/Dn field is now highlighted.

5)  Turn the small **FMS** Knob to display the Up/Dn Window.

6)  Turn the small **FMS** Knob to select 'Up' or 'Dn'.

7)  Press the **ENT** Key.  'Start?' is now highlighted.

8)  Press the **ENT** Key to start the timer.  The field changes to 'Stop?'.  If the timer is counting down, it will start counting up after reaching zero.

9)  To stop the timer, press the **ENT** Key with 'Stop?' highlighted.  The field changes to 'Reset?'.

10) To reset the timer, press the **ENT** Key with 'Reset?' highlighted.  The field changes back to 'Start?' and the digits are reset.

11) To remove the window, press the **CLR** Key or the **Tmr/Ref** Softkey.

## VERTICAL NAVIGATION (VNV) INDICATIONS

When a VNV flight plan has been activated, VNV indications (VNV Target Altitude, RVSI, VDI) appear on the PFD in conjunction with the "TOD within 1 minute" message and "Vertical track" voice alert.  See the Flight Management and AFCS sections for details on VNV features.  VNV indications are removed from the PFD according to the criteria listed in the table.

**Figure 2-30 Vertical Navigation Indications (PFD)**

| Criteria | VNV Indication Removed | | |
|---|---|---|---|
| | Required Vertical Speed (RVSI) | Vertical Deviation (VDI) | VNV Target Altitude* |
| Aircraft > 1 min before the next TOD due to flight plan change | X | X | X |
| VNV cancelled (**Cncl VNV** Softkey pressed on MFD) | X | X | X |
| Distance to active waypoint cannot be computed due to unsupported flight plan leg type (see Flight Management Section) | X | X | X |
| Aircraft > 250 feet below active VNV Target Altitude | X | X | X |
| Current crosstrack or track angle error has exceeded limit | X | X | X |
| Active altitude-constrained waypoint can not be reached within maximum allowed flight path angle and vertical speed | X | X | |

**Table 2-3 VNV Indication Removal Criteria**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## 2.3  PFD ANNUNCIATIONS AND ALERTING FUNCTIONS

The following annunciations and alerting functions pertaining to flight instruments are displayed on the PFD. Refer to Appendix A for more information on alerts and annunciations.

### MARKER BEACON ANNUNCIATIONS

Marker Beacon Annunciations are displayed on the PFD to the left of the Altimeter.  The outer marker (O) reception is indicated in cyan, middle (M) in amber, and inner (I) in white.  Refer to the Audio Panel and CNS Section for more information on Marker Beacon Annunciations.
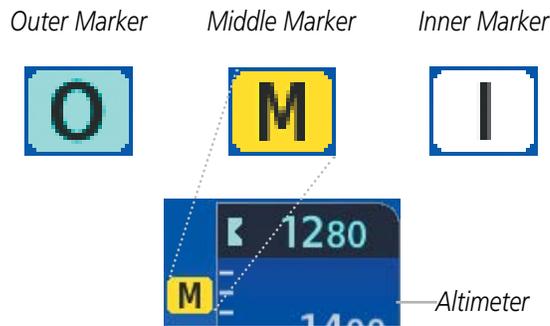


**Figure 2-31  Marker Beacon Annunciations**

### ALTITUDE ALERTING

Altitude Alerting provides the pilot with a visual alert when approaching the Selected Altitude.  Whenever the Selected Altitude is changed, the Altitude Alerter is reset.  The following occur when approaching the Selected Altitude:

- Upon passing through 1000 feet of the Selected Altitude, the Selected Altitude changes to black text on a cyan background and flashes for five seconds.

- When the aircraft passes within 200 feet of the Selected Altitude an aural tone is heard.  The Selected Altitude changes to cyan text on a black background and flashes for five seconds.

- After reaching the Selected Altitude, if the pilot flies outside the deviation band (±200 feet of the Selected Altitude) an aural tone is heard.  The Selected Altitude changes to amber text on a black background and flashes for five seconds.



**Figure 2-32  Altitude Alerting Visual Annunciations**

## LOW ALTITUDE ANNUNCIATION

**NOTE:** *The Low Altitude Annunciation requires SBAS. Terrain alerts from Terrain-SVS or TAWS-B systems will appear instead of the Low Altitude Annunciation when these systems are operating and not inhibited.*

When the Final Approach Fix (FAF) is the active waypoint in a GPS SBAS approach using vertical guidance, a Low Altitude Annunciation may appear if the current aircraft altitude is at least 164 feet below the prescribed altitude at the FAF. A black-on-amber LOW ALT annunciation appears to the right of the roll scale, flashes for several seconds, then remains displayed until the condition is resolved.

**LOW ALT**

**Figure 2-33  Low Altitude Annunciation**

## MINIMUM DESCENT ALTITUDE/DECISION HEIGHT ALERTING

For altitude awareness, a barometric Minimum Descent Altitude (MDA) or Decision Height (DH) can be set in the References Window and is reset if the current approach is deleted, another approach is loaded, or the system power is operated off then on. When active, the altitude setting is displayed to the bottom left of the Altimeter. Once the altitude is within the range of the tape, a bug appears at the selected altitude on the Altimeter. The following visual annunciations occur when approaching the MDA/DH:

• When the aircraft altitude descends to within 2500 feet of the MDA/DH setting, the BARO MIN or COMP MIN box appears with the altitude in cyan text. The bug appears on the altitude tape in cyan (or magenta for COMP MIN) once in range.

• When the aircraft passes through 100 feet of the MDA/DH, the bug and text become white.

• Once the aircraft reaches MDA/DH, the bug and text become amber and a "Minimums. Minimums," voice alert occurs.

*Within 2500 ft*  *Within 100 ft*  *Altitude Reached*

Barometric Minimum Bug

Selected Altitude Bug

Barometric Minimum Box
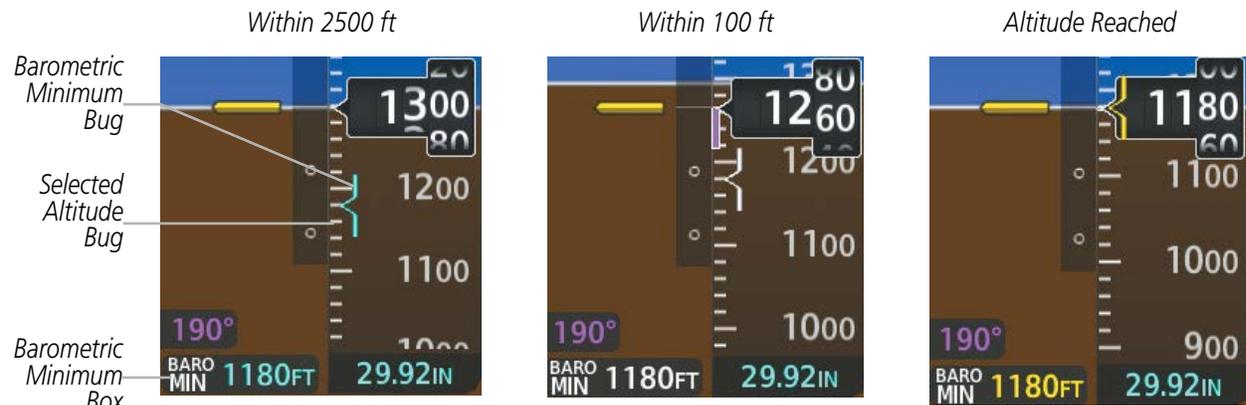
**Figure 2-34  Barometric MDA/DH Alerting Visual Annunciations**

Alerting is inhibited while the aircraft is on the ground and until the aircraft reaches 150 feet above the MDA. If the aircraft proceeds to climb after having reached the MDA, once it reaches 50 feet above the MDA, alerting is disabled. The function is reset when a new approach is activated, or on the next avionics power cycle.

**Setting the Minimum Descent Altitude/Decision Height and bug:**

1) Press the **Tmr/Ref** Softkey.

2) Turn the large **FMS** Knob to highlight the MINS field.

3) Turn the small **FMS** Knob to select BARO or TEMP COMP.  OFF is selected by default.  Press the **ENT** Key or turn the large **FMS** Knob to highlight the next field.

4) Use the small **FMS** Knob to enter the desired altitude (from zero to 16,000 feet).

5) If TEMP COMP was selected, press the **ENT** Key or turn the large **FMS** Knob to highlight the next field and then enter the temperature (-59°C to 59°C)

6) To remove the window, press the **CLR** Key or the **Tmr/Ref** Softkey.

**Figure 2-35  BARO and TEMP COMP MDA/DH**

## 2.4 ABNORMAL OPERATIONS

### ABNORMAL GPS CONDITIONS

The annunciations listed in Table 2-4 can appear on the HSI when abnormal GPS conditions occur (Figure 2-36).  Refer to the Flight Management Section for more information on Dead Reckoning Mode.

| Annunciation | Location | Description |
|---|---|---|
| GPS LOI | Right of HSI | Loss of Integrity Monitoring–GPS integrity is insufficient for the current phase of flight |
| GPS INTEG OK | Right of HSI | Integrity OK–GPS integrity has been restored to within normal limits (annunciation displayed for 5 seconds) |
| DR | Lower left of aircraft symbol | Dead Reckoning–System is using projected position rather than GPS position to compute navigation data and sequence active flight plan waypoints |

**Table 2-4  Abnormal GPS Conditions Annunciated on HSI**



**Figure 2-36  Example HSI Annunciations**

In Dead Reckoning Mode the CDI is removed from the display when GPS is the selected navigation source.  The following items on the PFD are then shown in amber:

• Current Track Bug

• Wind Data

• Ground Speed

• Distances in the Bearing Information Windows

• GPS bearing pointers

• Desired track (DTK)

These items should be verified when operating in Dead Reckoning Mode as they become increasingly inaccurate over time.

## UNUSUAL ATTITUDES

When the aircraft enters an unusual pitch attitude, red chevrons pointing toward the horizon warn of extreme pitch. The chevrons are displayed on the Attitude Indicator, starting at 50° above and 30° below the horizon line.

*Nose High*                                    *Nose Low*
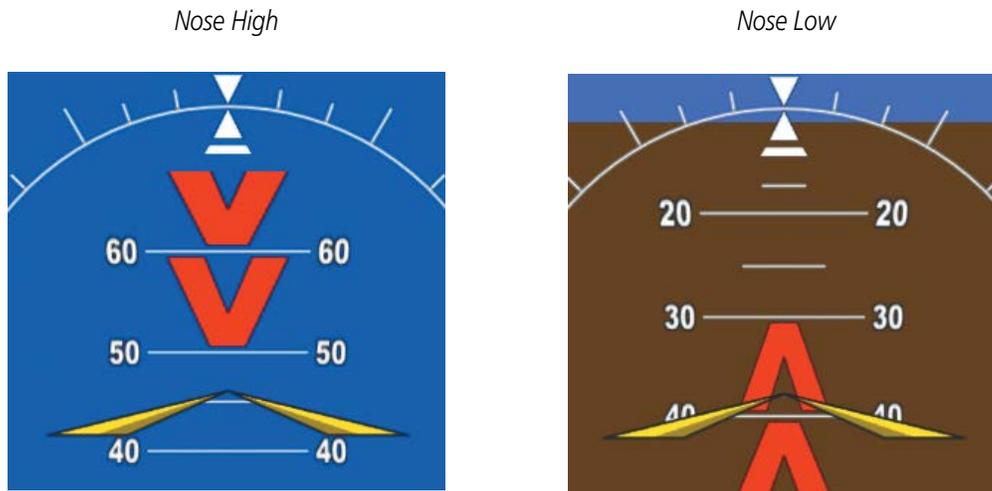


**Figure 2-37  Pitch Attitude Warnings**

If pitch exceeds +30°/-20° or bank exceeds 65°, some information displayed on the PFD is removed. The Altimeter and Airspeed, Attitude, Vertical Speed, and Horizontal Situation indicators remain on the display and the Bearing Information, Alerts, and Annunciation windows can be displayed during such situations. The following information is removed from each PFD and their softkeys are disabled when the aircraft experiences unusual attitudes:

- Traffic Annunciations
- AFCS Annunciations
- PFD Inset Map
- Outside Air Temperature (OAT)
- ISA temperature deviation
- Wind data
- Selected Heading readout
- Selected Course readout
- Transponder Status Box

- System Time
- PFD Setup Menu
- Windows displayed in the lower right corner of the PFD:
  – References Window
  – Nearest Airports
  – Flight Plan
  – Alerts
  – Procedures

- Minimum Descent Altitude/ Decision Height readout
- Vertical Deviation, Glideslope, and Glidepath Indicators
- Altimeter Barometric Setting
- Selected Altitude
- VNV Target Altitude
- True Airspeed

# SECTION 3 ENGINE INDICATION SYSTEM

> **NOTE:** *Refer to the Pilot's Operating Handbook (POH) for limitations.*

The System offers improved flight operations and reduces crew workload by automatically monitoring critical system parameters and providing system alerts during all phases of flight. The Engine Indication System (EIS) displays electrical, fuel, and engine information on the left side of the Multi Function Display (MFD). EIS information can also be fully expanded to an entire page by pressing the **Engine** Softkey.



**Figure 3-1 MFD with EIS display**

Green bands on the instruments indicate normal ranges of operation; amber and red bands indicate caution and warning, respectively. White or uncolored bands indicate areas outside of normal operation not yet in the caution or warning ranges. When unsafe operating conditions occur, the corresponding displays flash to indicate cautions and warnings. If sensory data to an instrument becomes invalid or unavailable, a red "X" is displayed across the instrument.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## 3.1 ENGINE DISPLAY



Engine Display        Engine System Display
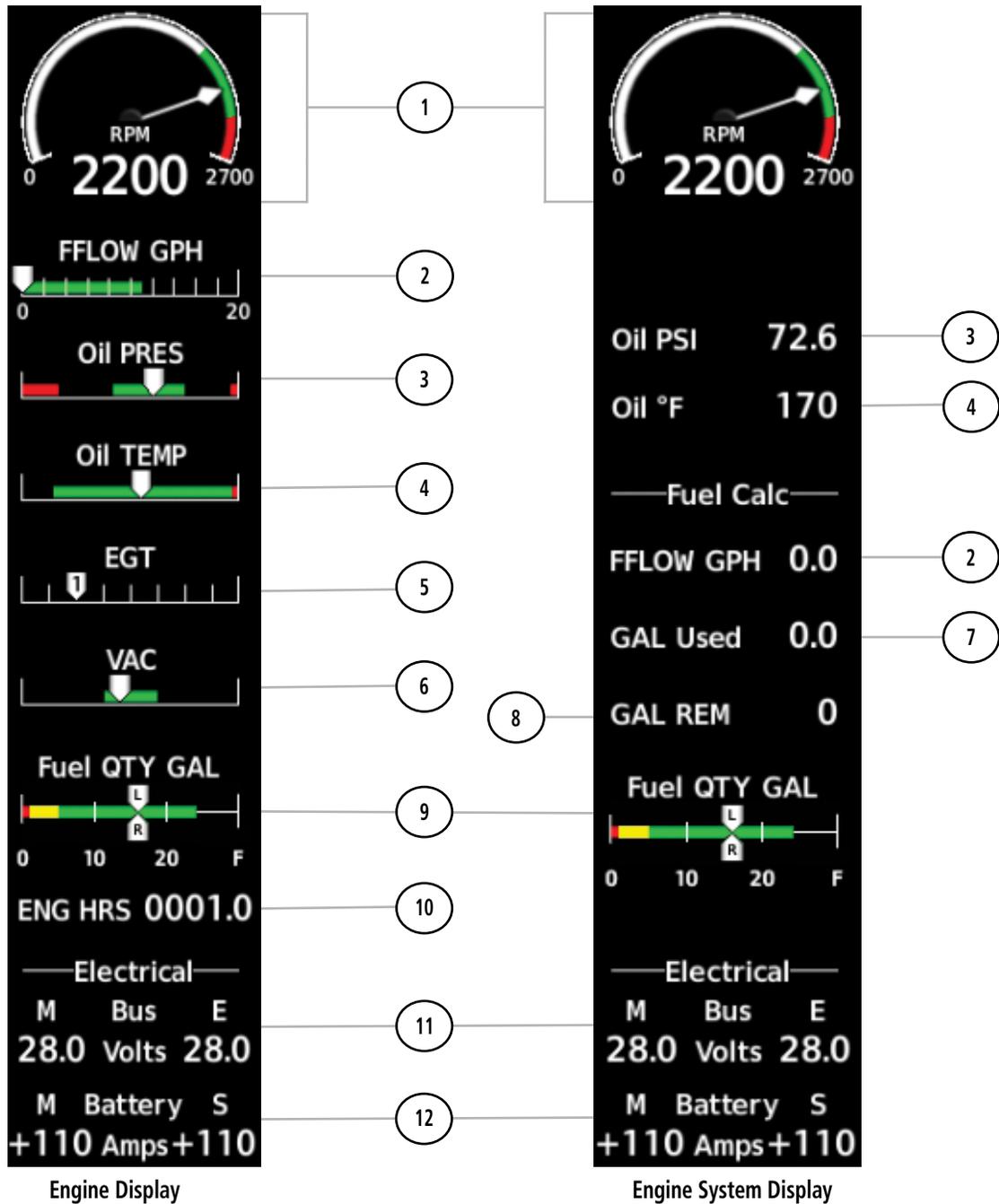
**Figure 3-2 Model 172R**

| | | |
|---|---|---|
| ① | **Tachometer Indicator (RPM)** | Displays engine tachometer in revolutions per minute (RPM) |
| ② | **Fuel Flow Indicator (FFLOW GPH)** | Displays fuel flow in gallons per hour (gph) |
| ③ | **Oil Pressure Indicator (OIL PSI)** | Displays oil pressure in pounds per square inch (psi) |
| ④ | **Oil Temperature Indicator (OIL °F)** | Displays oil temperature in degrees Fahrenheit (°F) |
| ⑤ | **Exhaust Gas Temperature Indicator (EGT)** | Displays exhaust gas temperature in degrees Fahrenheit (°F) |
| ⑥ | **Vacuum Pressure Indicator (VAC)** | Displays standby vacuum pump pressure) |
| ⑦ | **Calculated Fuel Used (GAL Used)** | Displays fuel used in gallons, based on fuel flow |
| ⑧ | **Calculated Fuel Remaining (GAL REM)** | Displays the totalizer-based fuel remaining in gallons |
| ⑨ | **Fuel Quantity Indicator (Fuel QTY GAL)** | Displays the amount of fuel in gallons (gal) for each side of a standard fuel tank |
| ⑩ | **Engine Hour Indicator (ENG HRS)** | Displays a numeric readout for the time in hours (hrs) the engine has been in service |
| ⑪ | **Voltmeter (M, S Bus Volts)** | Displays the main and essential bus voltages |
| ⑫ | **Ammeter (M, S Battery Amps)** | Displays the main and standby battery load in amperes |

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

Engine Display                    Engine System Display

**Figure 3-3  Model 172S**

① **Tachometer Indicator (RPM)** — Displays engine tachometer in revolutions per minute (RPM)

② **Fuel Flow Indicator (FFLOW GPH)** — Displays fuel flow in gallons per hour (gph)

③ **Oil Pressure Indicator (OIL PSI)** — Displays oil pressure in pounds per square inch (psi)

④ **Oil Temperature Indicator (OIL °F)** — Displays oil temperature in degrees Fahrenheit (°F)

⑤ **Exhaust Gas Temperature Indicator (EGT)** — Displays exhaust gas temperature in degrees Fahrenheit (°F)

⑥ **Vacuum Pressure Indicator (VAC)** — Displays standby vacuum pump pressure)

⑦ **Calculated Fuel Used (GAL Used)** — Displays fuel used in gallons, based on fuel flow

⑧ **Calculated Fuel Remaining (GAL REM)** — Displays the totalizer-based fuel remaining in gallons

⑨ **Fuel Quantity Indicator (Fuel QTY GAL)** — Displays the amount of fuel in gallons (gal) for each side of a standard fuel tank

⑩ **Engine Hour Indicator (ENG HRS)** — Displays a numeric readout for the time in hours (hrs) the engine has been in service

⑪ **Voltmeter (M, S Bus Volts)** — Displays the main and essential bus voltages

⑫ **Ammeter (M, S Battery Amps)** — Displays the main and standby battery load in amperes

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Engine Display**

**Engine System Display**

**Figure 3-4  Model 182T**

(1) **Manifold Pressure Indicator (IN HG)**   Displays engine manifold pressure inches of mercury (IN HG)

(2) **Tachometer Indicator (RPM)**   Displays engine tachometer in revolutions per minute (RPM)

(3) **Fuel Flow Indicator (FFLOW GPH)**   Displays fuel flow in gallons per hour (gph)

(4) **Oil Pressure Indicator (OIL PSI)**   Displays oil pressure in pounds per square inch (psi)

(5) **Oil Temperature Indicator (OIL °C)**   Displays oil temperature in degrees Celsius (°C)

(6) **Engine Hour Indicator (ENG HRS)**   Displays a numeric readout for the time in hours (hrs) the engine has been in service

(7) **Vacuum Pressure Indicator (VAC)**   Displays standby vacuum pump pressure)

(8) **Cylinder Head Temperature Indicator (CHT)**   Displays cylinder head temperature in degrees Celsius (°C)

(9) **Calculated Fuel Remaining (GAL REM)**   Displays the totalizer-based fuel remaining in gallons

(10) **Calculated Fuel Used (GAL Used)**   Displays fuel used in gallons, based on fuel flow

(11) **Exhaust Gas Temperature Indicator (EGT)**   Displays exhaust gas temperature in degrees Fahrenheit (°F)

(12) **Fuel Quantity Indicator (Fuel QTY GAL)**   Displays the amount of fuel in gallons (gal) for each side of a standard fuel tank.

(13) **Voltmeter (M, S Bus Volts)**   Displays the main and essential bus voltages

(14) **Ammeter (M, S Battery Amps)**   Displays the main and standby battery load in amperes

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Engine Display**

**Engine System Display**

**Figure 3-5  Model T182T**

① **Manifold Pressure Indicator (IN HG)**     Displays engine manifold pressure inches of mercury (IN HG)

② **Tachometer Indicator (RPM)**     Displays engine tachometer in revolutions per minute (RPM)

③ **Fuel Flow Indicator (FFLOW GPH)**     Displays fuel flow in gallons per hour (gph)

④ **Oil Pressure Indicator (OIL PSI)**     Displays oil pressure in pounds per square inch (psi)

⑤ **Oil Temperature Indicator (OIL °C)**     Displays oil temperature in degrees Celsius (°C)

⑥ **Engine Hour Indicator (ENG HRS)**     Displays a numeric readout for the time in hours (hrs) the engine has been in service

⑦ **Vacuum Pressure Indicator (VAC)**     Displays standby vacuum pump pressure)

⑧ **Cylinder Head Temperature Indicator (CHT)**     Displays cylinder head temperature in degrees Celsius (°C)

⑨ **Calculated Fuel Remaining (GAL REM)**     Displays the totalizer-based fuel remaining in gallons

⑩ **Calculated Fuel Used (GAL Used)**     Displays fuel used in gallons, based on fuel flow

⑪ **Turbine Inlet Temperature Indicator (TIT)**     Displays turbine inlet temperature in degrees Fahrenheit (°F)

⑫ **Fuel Quantity Indicator (Fuel QTY GAL)**     Displays the amount of fuel in gallons (gal) for each side of a standard fuel tank.

⑬ **Voltmeter (M, S Bus Volts)**     Displays the main and essential bus voltages

⑭ **Ammeter (M, S Battery Amps)**     Displays the main and standby battery load in amperes

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

GARMIN.

**Engine Display**

**Engine System Display**

**Figure 3-6  Model 206H**

① **Manifold Pressure Indicator (IN HG)** — Displays engine manifold pressure inches of mercury (IN HG)

② **Tachometer Indicator (RPM)** — Displays engine tachometer in revolutions per minute (RPM)

③ **Fuel Flow Indicator (FFLOW GPH)** — Displays fuel flow in gallons per hour (gph)

④ **Oil Pressure Indicator (OIL PSI)** — Displays oil pressure in pounds per square inch (psi)

⑤ **Oil Temperature Indicator (OIL °C)** — Displays oil temperature in degrees Celsius (°C)

⑥ **Engine Hour Indicator (ENG HRS)** — Displays a numeric readout for the time in hours (hrs) the engine has been in service

⑦ **Vacuum Pressure Indicator (VAC)** — Displays standby vacuum pump pressure)

⑧ **Cylinder Head Temperature Indicator (CHT)** — Displays cylinder head temperature in degrees Celsius (°C)

⑨ **Calculated Fuel Remaining (GAL REM)** — Displays the totalizer-based fuel remaining in gallons

⑩ **Calculated Fuel Used (GAL Used)** — Displays fuel used in gallons, based on fuel flow

⑪ **Exhaust Gas Temperature Indicator (EGT)** — Displays exhaust gas temperature in degrees Fahrenheit (°F)

⑫ **Fuel Quantity Indicator (Fuel QTY GAL)** — Displays the amount of fuel in gallons (gal) for each side of a standard fuel tank.

⑬ **Voltmeter (M, S Bus Volts)** — Displays the main and essential bus voltages

⑭ **Ammeter (M, S Battery Amps)** — Displays the main and standby battery load in amperes

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Engine Display**                    **Engine System Display**

**Figure 3-7  Model T206H**

① **Manifold Pressure Indicator (IN HG)** — Displays engine manifold pressure inches of mercury (IN HG)

② **Tachometer Indicator (RPM)** — Displays engine tachometer in revolutions per minute (RPM)

③ **Fuel Flow Indicator (FFLOW GPH)** — Displays fuel flow in gallons per hour (gph)

④ **Oil Pressure Indicator (OIL PSI)** — Displays oil pressure in pounds per square inch (psi)

⑤ **Oil Temperature Indicator (OIL °C)** — Displays oil temperature in degrees Celsius (°C)

⑥ **Engine Hour Indicator (ENG HRS)** — Displays a numeric readout for the time in hours (hrs) the engine has been in service

⑦ **Vacuum Pressure Indicator (VAC)** — Displays standby vacuum pump pressure)

⑧ **Cylinder Head Temperature Indicator (CHT)** — Displays cylinder head temperature in degrees Celsius (°C)

⑨ **Calculated Fuel Remaining (GAL REM)** — Displays the totalizer-based fuel remaining in gallons

⑩ **Calculated Fuel Used (GAL Used)** — Displays fuel used in gallons, based on fuel flow

⑪ **Turbine Inlet Temperature Indicator (TIT)** — Displays turbine inlet temperature in degrees Fahrenheit (°F)

⑫ **Fuel Quantity Indicator (Fuel QTY GAL)** — Displays the amount of fuel in gallons (gal) for each side of a standard fuel tank.

⑬ **Voltmeter (M, S Bus Volts)** — Displays the main and essential bus voltages

⑭ **Ammeter (M, S Battery Amps)** — Displays the main and standby battery load in amperes

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## ENGINE PAGE

The EIS - Engine Page displays all engine, fuel, electrical, and fuel calculation information.  To access this page, press the **Engine** Softkey. Refer to Table 3-1 for Engine Page softkey functions.

| Level 1 | Level 2 | Level 2 | Description |
|---------|---------|---------|-------------|
| **Engine** | | | Displays EIS - Engine Page and second-level engine softkeys; press again to exit page |
| | **Lean** | | Resets displayed fuel remaining to tabs and fuel used to zero |
| | | **CYL SLCT** | Selects the engine cylinder to monitor during leaning operations |
| | | **Assist** | Displays peak temperature maker above cylinder |
| | **System** | | |
| | | **RST Fuel** | Resets gallons of fuel remaining to zero (0). |
| | | **GAL REM** | Sets gallons of fuel remaining |

**Table 3-1 Engine Page Softkeys**



**Figure 3-8  Engine Page**

**ENGINE INDICATION SYSTEM**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## ELECTRICAL
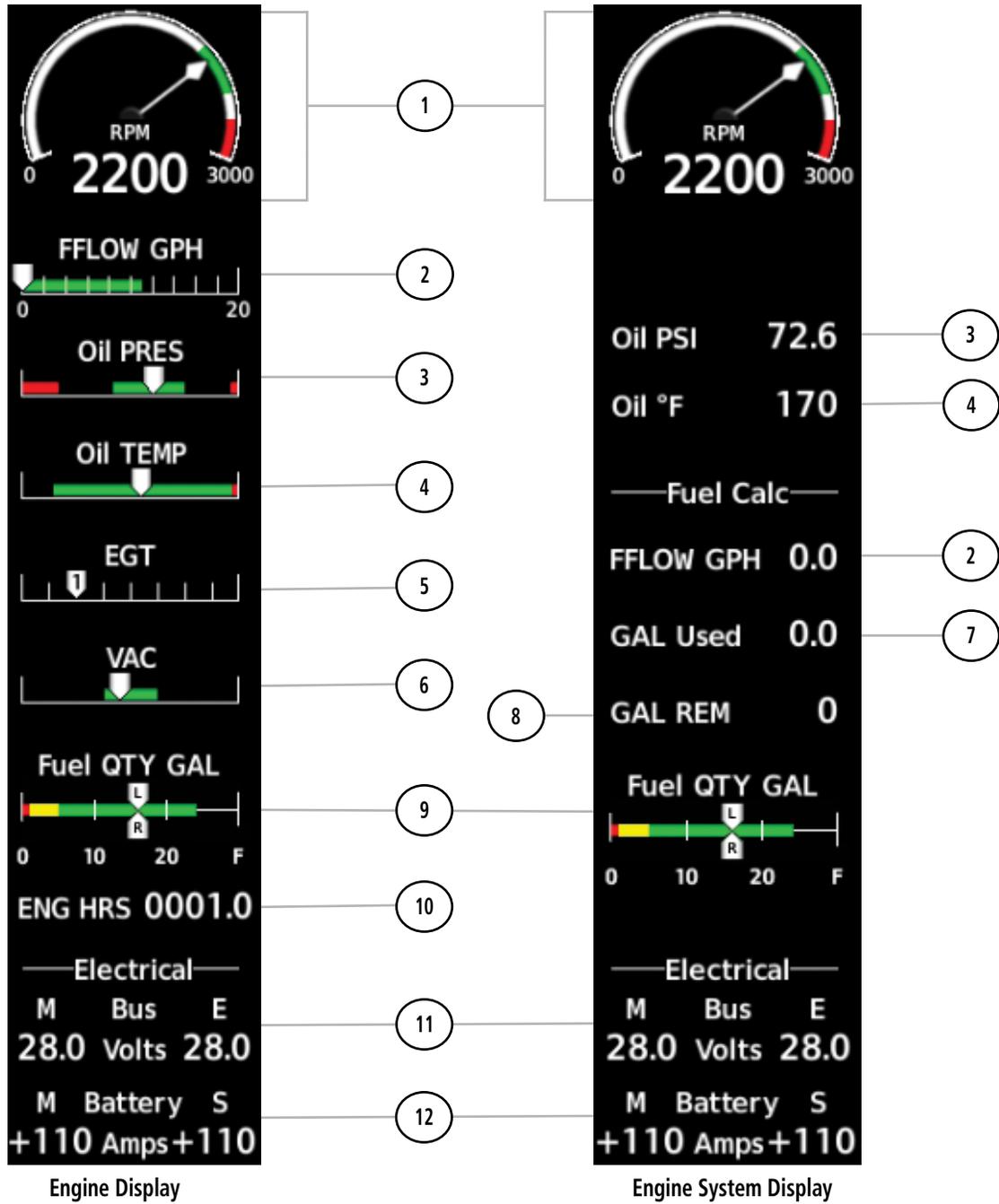
Current for the battery (Battery Amps) and bus voltage (Bus Volts) are displayed in numerical digits and are located on the Engine System Page.



*Bus Voltmeter*

*Battery Ammeter*
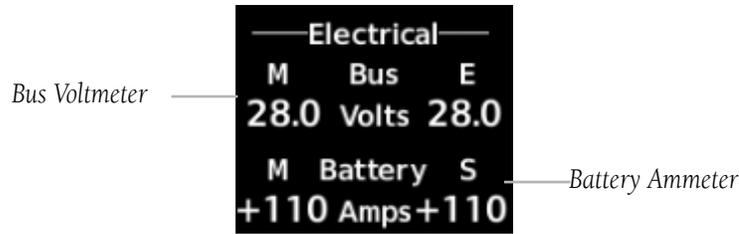
**Figure 3-9  Electrical Group**

## TURBINE INLET TEMPERATURE

Turbine Inlet Temperature (TIT) horizontal bar indicators is displayed on the main Engine Page and on the Engine Lean page. The Engine Lean page also displays the numerical temperature in degrees of Fahrenheit (°F).



*TIT Numerical Indicator*

*TIT Horizontal Bar Indicator*

**Figure 3-10  Turbine Inlet Temperature**

## EXHAUST GAS TEMPERATURE

Exhaust Gas Temperature (EGT) readout for the selected cylinder is displayed on the Engine Lean Page.  The temperature readout is displayed in degrees of Fahrenheit (°F).



*Cylinder Selected In Cyan*
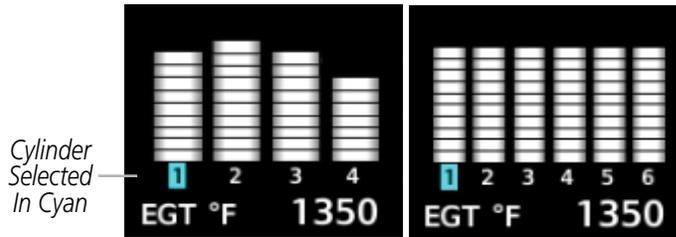
**Figure 3-11  Exhaust Gas Temperatures (Normal)**

## CYLINDER HEAD TEMPERATURE

Cylinder Head Temperature (CHT) readout is shown near the bottom Engine Lean Page.



*Cylinder Head Temperatures in Cyan*

**Figure 3-12  Cylinder Head Temperatures (CHT)**

## LEAN ENGINE PAGE



*Exhaust Gas Temperature Peak*

*Lean of Peak Indicator*
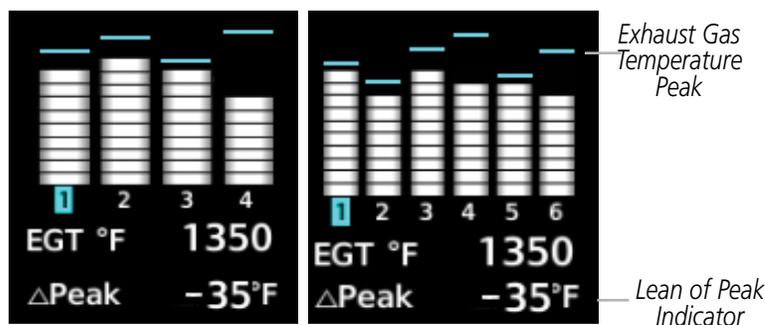
**Figure 3-13  Exhaust Gas Temperatures (Lean Assist)**

### Accessing the EIS Lean Display:

**1)** On the MFD, press the **Engine** Softkey.

**2)** Press the **Lean** softkey.

From the Lean Page, the **CYL SLCT** and **Assist** Softkeys can be utilized to obtain information about specific cylinders on both the EGT and CHT graphs.  Pressing the **CYL SLCT** Softkey cycles through the cylinders; the selected cylinder number is displayed in cyan.  The **CYL SLCT** Softkey is disabled during warning or caution conditions or when the **Assist** Softkey is pressed.

### Monitoring the desired cylinder's EGT and CHT:

From the Lean Page, press the **CYL SLCT** Softkey to cycle through each cylinder and view its EGT and CHT.  The selected cylinder is shown in cyan.

When the **Assist** Softkey is selected, the system initially highlights and selects the cylinder number with the hottest EGT and displays its temperature below the EGT bar graph.  A readout showing the difference between peak (ΔPEAK) and the current temperature for the selected cylinder is displayed the EGT numerical temperature indication.

As the mixture is leaned, a cyan line will appear above each cylinder to indicate EGT peak. Refer to the POH for the recommended mixture adjustment procedures.

Monitoring of the cylinder continues until the **Assist** Softkey is pressed again which disables lean assist and removes the peak lines from the bar graph and the temperature deviation from peak (ΔPEAK).  The system then returns to seeking the hottest cylinder.

## FUEL CALCULATIONS

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

Fuel used (GAL Used) and range (in nautical miles) are calculated based on the displayed fuel remaining (GAL REM) and the fuel flow totalizer.  The calculated range also takes into account the aircraft's heading and the wind direction and speed.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

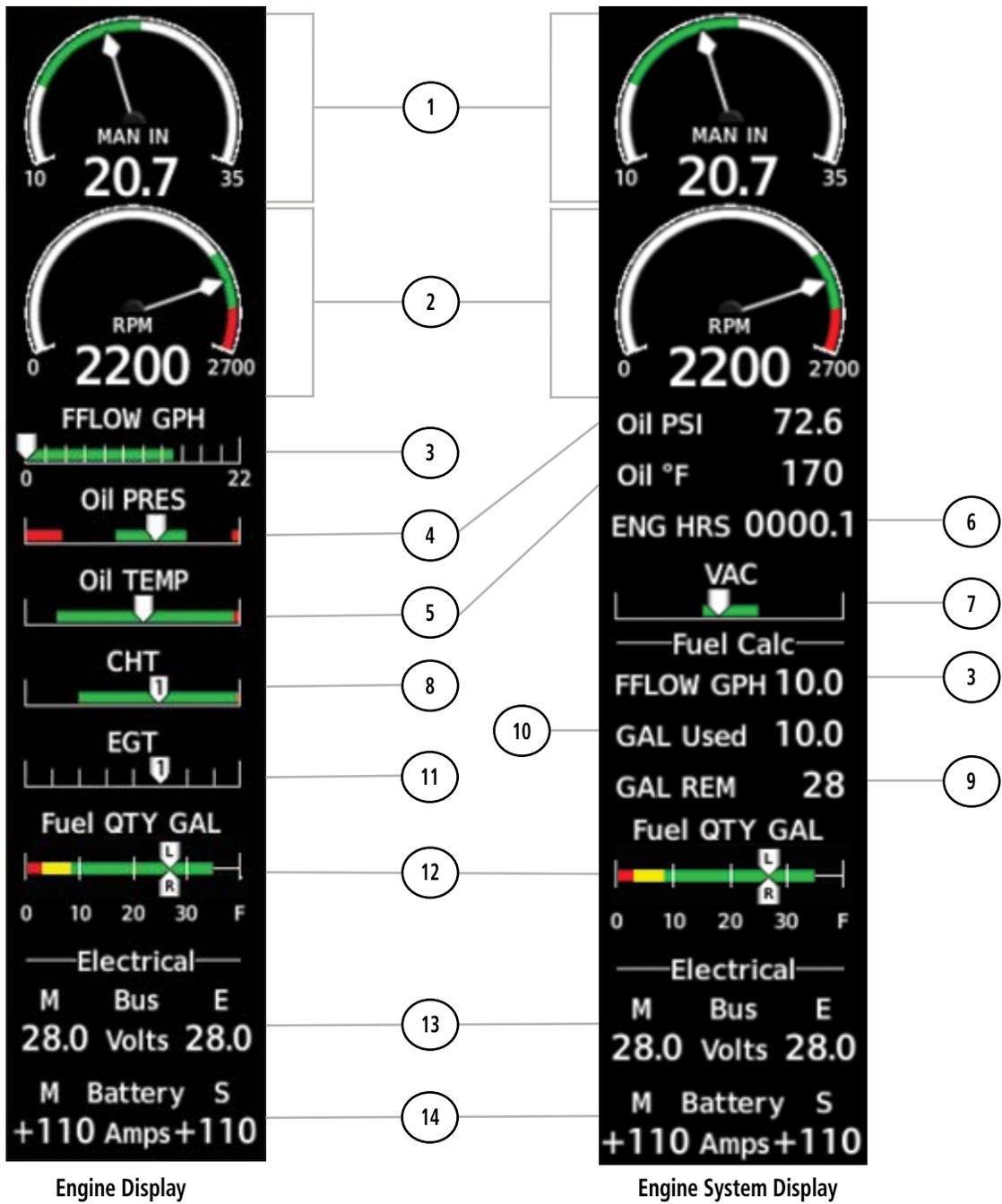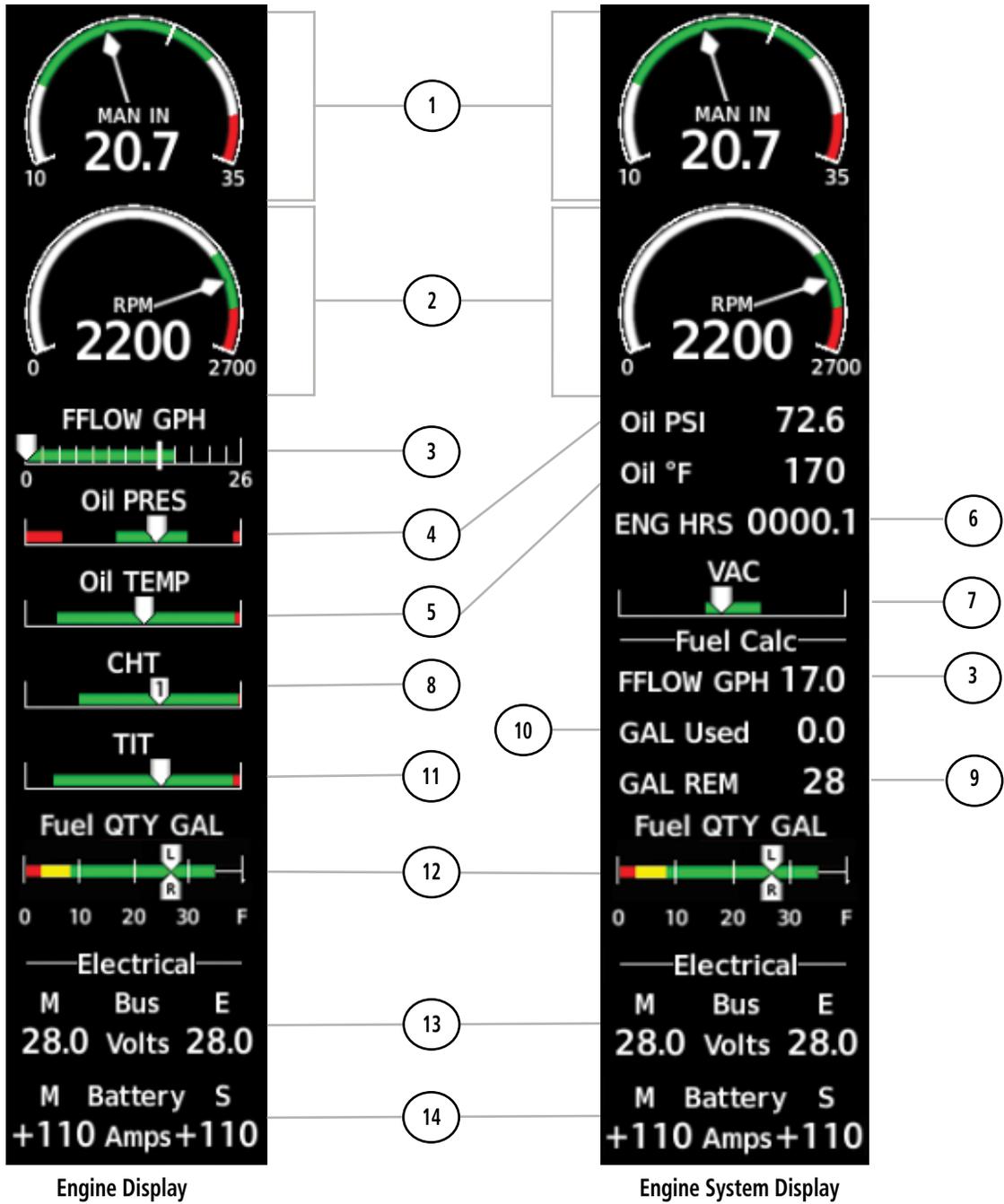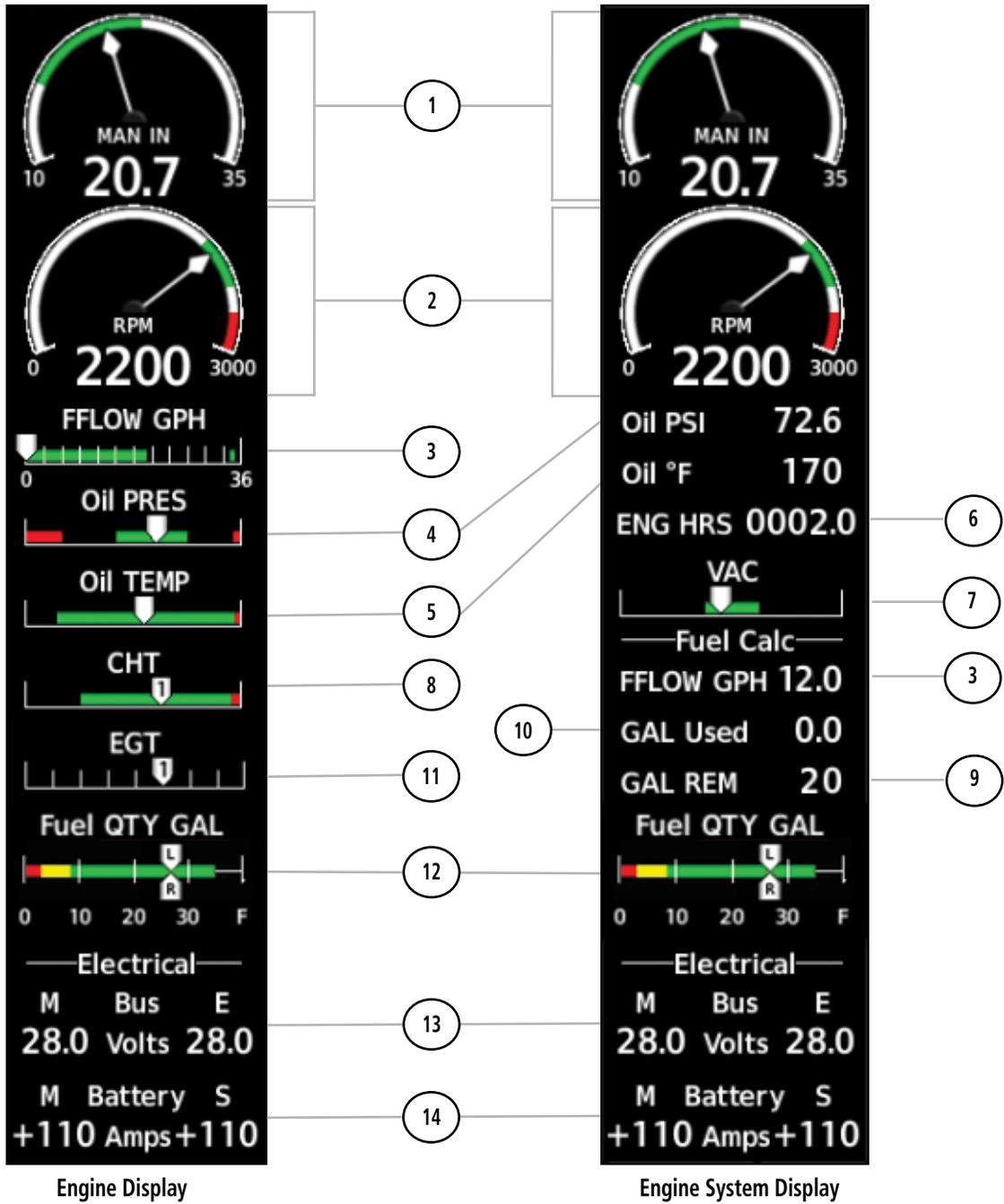**Adjusting the fuel totalizer quantity:**

1)  On the MFD, press the **Engine** Softkey.

2)  Press the **System** softkey.

3)  Press the **GAL REM** softkey.

    Select the softkey that best describes the current fuel load desired Once selected, press the **BACK** softkey.

**Resetting the fuel totalizer:**

On the Engine System Page, press the **RST Fuel** Softkey; this resets displayed fuel remaining (GAL REM) to the maximum fuel capacity for the aircraft and fuel used to zero.
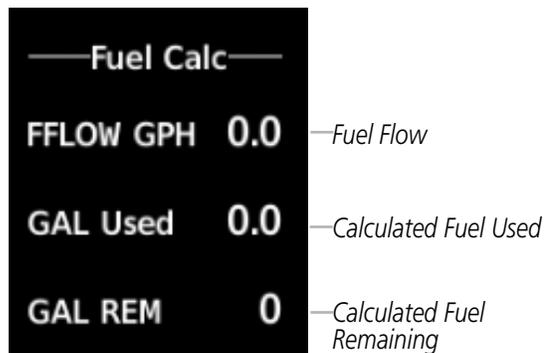


**Figure 3-14  Fuel Calculations Group**

A map feature related to the EIS Fuel Calculations is the Fuel Range Ring, which graphically illustrates the aircraft's remaining range based on heading, groundspeed, and wind direction and speed.  The solid green circle represents the range until all the remaining fuel is depleted.  The dashed green circle indicates the aircraft range until only reserve fuel remains.  Once on reserve fuel, the range is indicated by a solid amber circle.

The Fuel Range Ring shifts position in relation to the aircraft according to wind effects.  For example, more fuel is required for flying into a headwind, and the aircraft's decreased range in that direction is indicated by the Fuel Range Ring shifting toward the tail of the Aircraft Symbol.

The amount of reserve fuel (only for purposes of the Fuel Range Ring) is set on the Navigation Map Page Setup Menu in terms of remaining flight time.  When enabled the Fuel Range Ring appears on the Navigation Map Page, the Weather Data Link Page, and PFD Inset Map.

**Enabling/disabling the Fuel Range Ring and selecting a reserve fuel time:**

1)  Display the Navigation Map Page (press and hold the **CLR** Key for 2 seconds to quickly select this map).

2)  Press the **MENU** Key.

3)  Highlight 'Map Settings' and press the **ENT** Key.  The Map Settings Menu is displayed.

4)  Use the small **FMS** Knob to select the 'Map' group and press the **ENT** Key.

5)  Highlight the 'Fuel Range (RSV)' field.

6)  Turn the small **FMS** Knob to select 'On' or 'Off'.

7)  Turn the large **FMS** Knob to highlight the reserve fuel time, how long the aircraft can fly after reaching the reserve fuel.

**8)** Enter the desired reserve fuel time (00:00 to 23:59; hours:minutes) and press the **ENT** Key.

**9)** Press the **FMS** Knob to return to the Navigation Map Page.

### OIL PRESSURE AND TEMPERATURE GAUGES

Engine oil pressure and temperature are shown along horizontal bar indicators on the MFD, and are shown in numerical digit readouts when Engine System is displayed. Oil pressure is shown in pounds per square inch (psi) and temperature in degrees of Fahrenheit (°F).. If the oil pressure pointer enters the amber band, a caution is issued. If the oil pressure or oil temperature pointers enter the red band, a warning is issued.
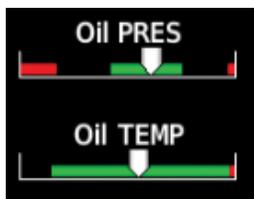


**Figure 3-15  Engine Displayed Oil Pressure and Temperature Gauges Displayed on MFD**
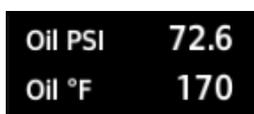


**Figure 3-16  Engine System Displayed Oil Pressure and Temperature Gauges**

### FUEL QUANTITY

The fuel display shows the fuel quantity in each tank in gallons (gal). Fuel quantity for each tank is normally shown along a horizontal bar indicator. A caution or warning is issued for low fuel quantity.
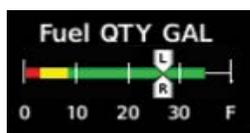


**Figure 3-17  Fuel Display**

# 3.2 EIS DISPLAY (REVERSIONARY MODE)

In the event of a PFD or MFD display failure, the display(s) operating in Reversionary Mode are configured to present PFD symbology together with the EIS Display (refer to the System Overview for information about display reversionary mode).

The Engine Display, in reversionary mode, is identical to the normal EIS Display on the MFD.

*EIS Display*



**Figure 3-18  Reversionary Mode (EIS Shown)**

BLANK PAGE

# SECTION 4  AUDIO PANEL AND CNS

## 4.1  OVERVIEW

The Communication/Navigation/Surveillance (CNS) system includes the Audio Panels, communication radios, navigation radios, and Mode S transponders.  The System Overview Section provides a block diagram description of the Audio Panels and CNS system interconnection.

CNS operation in the Cessna Nav III is performed by the following Line Replaceable Units (LRUs):

- Primary Flight Display (PFD)
- Multi Function Display (MFD)
- Integrated Avionics Unit (2)
- Audio Panel
- Mode S Transponder

The MFD/PFD controls are used to tune the communication transceivers and navigation radios.

The Audio Panel provides the traditional audio selector functions of microphone and receiver audio selection.  The Audio Panel includes an intercom system (ICS) between the pilot, copilot, and passengers, a marker beacon receiver, and a COM clearance recorder.  Ambient noise from the aircraft radios is reduced by a feature called Master Avionics Squelch (MASQ).  When no audio is detected, MASQ processing further reduces the amount of background noise from the radios.

The Mode S transponder is controlled with softkeys and the **FMS** Knob located on the Primary Flight Display (PFD).  The Transponder Data Box is located to the left of the System Time Box.  The data box displays the active four-digit code, mode, and reply status.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**GARMIN.**

# PFD CONTROLS AND FREQUENCY DISPLAY



**Figure 4-1  PFD Controls, NAV/COM Frequency Tuning Boxes, and DME Tuning Window**

(1) **NAV VOL/ID Knob** – Controls NAV audio volume level.  Press to turn the Morse code identifier audio on and off.  Volume level is shown in the NAV frequency field as a percentage.

(2) **NAV Frequency Transfer Key** – Transfers the standby and active NAV frequencies.

(3) **NAV Knob** – Tunes the standby frequencies for the NAV receiver (large knob for MHz; small knob for kHz).  Press to move the frequency selected for tuning (light blue numbers) and the Frequency Transfer Arrow between NAV1 and NAV2.

(4) **NAV Frequency Box** – Displays NAV standby and active frequency fields, volume, and station ID.  The frequency of the NAV radio selected for navigation is displayed in green.

(5) **COM Frequency Box** – Displays COM standby and active frequency fields and volume.  The selected and decoded COM transceiver frequency is displayed in green.

(6) **COM Knob** – Tunes the standby frequencies for the COM transceiver (large knob for MHz; small knob for kHz).  Press to move the frequency selected for tuning (light blue numbers) and the Frequency Transfer Arrow between COM1 and COM2.

(7) **COM Frequency Transfer Key** – Transfers the standby and active COM frequencies.  Press and hold this key for two seconds to tune the emergency frequency (121.500 MHz) automatically into the active frequency field.

(8) **COM VOL/SQ Knob** – Controls COM audio volume level.  Press to turn the COM automatic squelch on and off.  Volume level is shown in the COM frequency field as a percentage.

(9) **DME Tuning Window** – Displays DME frequency pairing mode.  Display by selecting the **DME** Softkey.

(10) **ENT Key** – Validates or confirms DME pairing mode and Auto-tune selection.

(11) **FMS Knob** – Flight Management System Knob, used to enter transponder codes, select DME modes, and Auto-tune entries when DME Tuning Window or NRST Window is present.  Press the **FMS** Knob to turn the selection cursor on and off.  The large knob moves the cursor in the window.  The small knob selects individual characters for the highlighted cursor location.

(12) **Transponder Data Box** – Indicates the selected transponder code, operating mode, reply, and ident status for the applicable transponder.

(13) **DME Softkey** – Displays the DME Tuning Window.

## AUDIO PANEL CONTROLS
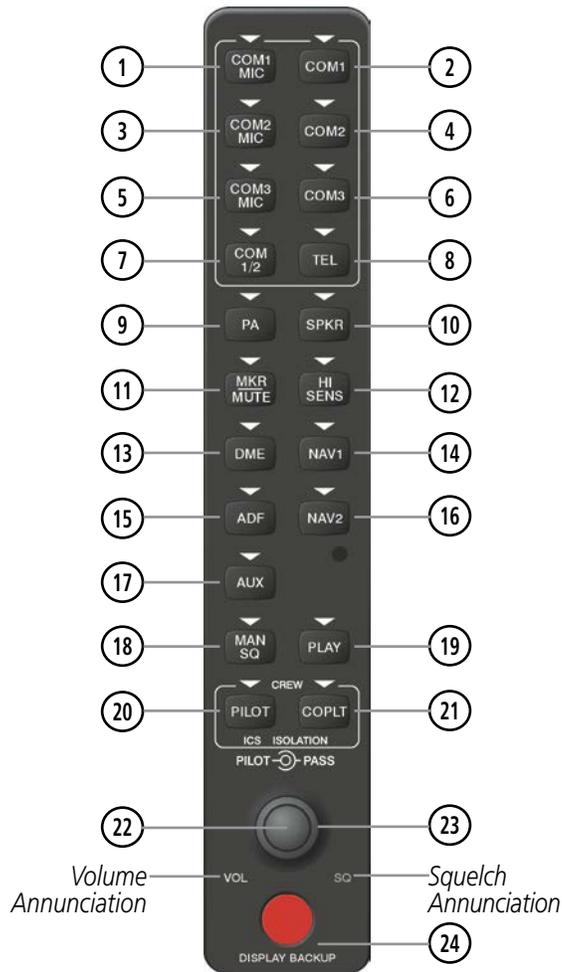


**Figure 4-2  Audio Panel Controls**

Volume Annunciation

Squelch Annunciation

> **NOTE:** When a key is selected, a triangular annunciator above the key is illuminated.

1. **COM1 MIC** – Selects the #1 transmitter for transmitting.  COM1 receive is simultaneously selected when this key is pressed allowing received audio from the #1 COM receiver to be heard.  COM2 receive can be added by pressing the **COM2** Key.

2. **COM1** – When selected, audio from the #1 COM receiver can be heard.

3. **COM2 MIC** – Selects the #2 transmitter for transmitting.  COM2 receive is simultaneously selected when this key is pressed allowing received audio from the #2 COM receiver to be heard.  COM1 receive can be added by pressing the **COM1** Key.

4. **COM2** – When selected, audio from the #2 COM receiver can be heard.

5. **COM3 MIC** – Not used in Cessna Nav III aircraft.

Sidebar: SYSTEM OVERVIEW, FLIGHT INSTRUMENTS, EIS, AUDIO PANEL & CNS, FLIGHT MANAGEMENT, HAZARD AVOIDANCE, AFCS, ADDITIONAL FEATURES, APPENDICES, INDEX

(6) **COM3** – Not used in Cessna Nav III aircraft.

(7) **COM 1/2** – Split COM Key. Allows simultaneous transmission on COM1 and COM2 by the pilot and copilot.

(8) **TEL** – Not used in Cessna Nav III aircraft.

(9) **PA** – Selects the passenger address system. The selected COM transmitter is deselected when the PA Key is pressed. [182T, (T)182T, (J)182T, 206H, and (T)206H only.]

(10) **SPKR** – Selects and deselects the cabin speaker. COM and NAV receiver audio can be heard on the speaker.

(11) **MKR/MUTE** – Selects marker beacon receiver audio. Mutes the currently received marker beacon receiver audio. Unmutes automatically when new marker beacon audio is received. Also, stops play of recorded COM audio.

(12) **HI SENS** – Press to increase marker beacon receiver sensitivity. Press again to return to low sensitivity.

(13) **DME** – Turns optional DME audio on or off.

(14) **NAV1** – When selected, audio from the #1 NAV receiver can be heard.

(15) **ADF** – Turns optional ADF receiver audio on or off.

(16) **NAV2** – When selected, audio from the #2 NAV receiver can be heard.

(17) **AUX** – Not used in Cessna Nav III aircraft.

(18) **MAN SQ** – Enables manual squelch for the intercom. When the intercom is active, press the **PILOT** Knob to illuminate the squelch annunciation. Turn the **PILOT/PASS** Knobs to adjust squelch.

(19) **PLAY** – Press once to play the last recorded COM audio. Press again while audio is playing and the previous block of recorded audio is played. Each subsequent press plays each previously recorded block. Pressing the **MKR/MUTE** Key during play of a memory block stops play.

(20) **PILOT** – Selects and deselects the pilot intercom isolation.

(21) **COPLT** – Selects and deselects the copilot intercom isolation.

(22) **PILOT Knob** – Press to switch between volume and squelch control as indicated by illumination of VOL or SQ. Turn to adjust intercom volume or squelch. The **MAN SQ** Key must be selected to allow squelch adjustment.

(23) **PASS Knob** – Turn to adjust Copilot/Passenger intercom volume or squelch. The **MAN SQ** Key must be selected to allow squelch adjustment.

(24) **DISPLAY BACKUP Button** – Manually selects Reversionary Mode.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## 4.2 COM OPERATION

### COM TUNING BOXES



**Figure 4-3  COM Tuning Box Indications**

> **NOTE:** When turning on the system for use, the system remembers the last frequencies used and the active COM transceiver state prior to shutdown.

1 **Active Field** – The COM Frequency Box is composed of four fields; the two active frequencies are on the left.  An active COM frequency is displayed in green and indicates that the COM transceiver is selected on the Audio Panel (**COM1 MIC** or **COM2 MIC** Key).  Both active COM frequencies appearing in white indicate that no COM radio is selected for transmitting (**PA** Key is selected on the Audio Panel).

2 **Frequency Transfer Arrow** – Moves between the upper and lower radio frequency fields with the Frequency Tuning Box.  Indicates which COM transceiver is selected for frequency transfer between the Standby and Active fields.

3 **Standby Field** – The COM Frequency Box is composed of four fields; the two standby frequencies are on the right.  Frequencies in the standby field are displayed in either white or gray.  The standby frequency in the tuning box is white.  The other standby frequency is gray.

4 **Frequency Tuning Box** – Moves between the upper and lower radio frequency fields with the Frequency Transfer Arrow.  Indicates which COM transceiver is to be tuned in the Standby Field.

5 **Automatic Squelch Indication** – Indicates that Automatic Squelch is disabled.  Automatic Squelch quiets unwanted static noise when no audio signal is received, while still providing good sensitivity to weak COM signals.  When Automatic Squelch is disabled, COM audio reception is always on.  Continuous static noise is heard over the headsets and speaker, if selected.

**AUDIO PANEL AND CNS**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

(6) **Transmit and Receive Indications** – During COM transmission, a white TX appears by the active COM frequency replacing the Frequency Transfer Arrow.  During COM signal reception, a white RX appears by the active COM frequency replacing the Frequency Transfer Arrow.

(7) **Frequency Spacing** – The COM radios can tune either 25-kHz spacing (118.000 to 136.975 MHz) or 8.33-kHz spacing (118.000 to 136.990 MHz) for 760-channel or 3040-channel configuration.  When 8.33-kHz channel spacing is selected, all of the 25-kHz channel spacing frequencies are also available in the complete 3040-channel list.

(8) **Com Volume** – COM radio volume level can be adjusted from 0 to 100% using the **VOL/SQ** Knob.  Turning the knob clockwise increases volume, turning the knob counterclockwise decreases volume.  When adjusting volume, the level is displayed in place of the standby frequencies.  Volume level indication remains for two seconds after the change.

## COM TRANSCEIVER MANUAL TUNING

The COM frequency controls and frequency boxes are on the right side of each PFD.

### Manually tuning a COM frequency:

1) Turn the **COM** Knob to tune the desired frequency (large knob for MHz; small knob for kHz).

2) Press the **Frequency Transfer** Key to transfer the frequency to the active field.

3) Adjust the volume level with the COM **VOL/SQ** Knob.

4) Press the COM **VOL/SQ** Knob to turn automatic squelch on and off.

## AUTO-TUNING THE COM FREQUENCY

COM frequencies can be automatically tuned from the following:

- Nearest Airports Window (PFD)
- WPT – Airport Information Page
- NRST – Nearest Airports Page
- NRST – Nearest Frequencies Page (ARTCC, FSS, WX)
- NRST – Nearest Airspaces Page

### AUTO-TUNING FROM THE PFD

COM frequencies for the nearest airports can be automatically tuned from the Nearest Airports Window on the PFD.  When the desired frequency is entered, it becomes a standby frequency.  Pressing the **Frequency Transfer** Key places this frequency into the COM Active Frequency Field.

**Auto-tuning a COM frequency for a nearby airport from the PFD:**

1) Select the **Nearest** Softkey on the PFD to open the Nearest Airports Window. A list of 25 nearest airport identifiers and COM frequencies is displayed.

2) Turn the **FMS** Knob to scroll through the list and highlight the desired COM frequency.

3) Press the **ENT** Key to load the COM frequency into the COM Standby Frequency Field.

4) Press the Frequency Transfer Key to transfer the frequency to the COM Active Frequency Field.



*Select the **Nearest** Softkey to Open the Nearest Airports Window*

**Figure 4-4  Nearest Airports Window (PFD)**

## AUTO-TUNING FROM THE MFD

Frequencies can be automatically loaded into the COM Frequency Box from pages in the NRST or WPT page group by highlighting the frequency and pressing the **ENT** Key.

**Auto-tuning a COM frequency from the WPT and NRST Pages:**

1) From any page that the COM frequency can be auto-tuned, activate the cursor by pressing the **FMS** Knob or selecting the appropriate softkey.

2) Turn the **FMS** Knob to place the cursor on the desired COM frequency.

3) Press the **ENT** Key to load the COM frequency into the standby field of the selected COM radio.

4) Press the Frequency Transfer Key on either PFD to transfer the frequency to the COM Active Frequency Field.

**Or**:

1) Press the **MENU** Key to display the page menu.

2) Turn the large **FMS** Knob to scroll through the menu options.

3) Press the **ENT** Key to place the cursor on the desired selection.

4) Scroll through the frequency selections with the **FMS** Knob or the **ENT** Key.

5) Press the **ENT** Key to load the COM frequency into the standby field of the selected COM radio.

6) Press the Frequency Transfer Key to transfer the frequency to the COM Active Frequency Field.



*Nearest Airports Menu*        *Nearest Frequencies Menu*        *Nearest Airspaces Menu*
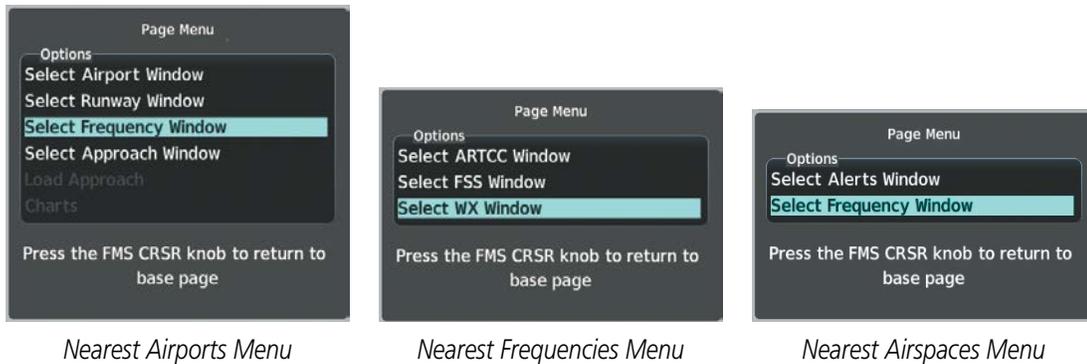
**Figure 4-5  Nearest Pages Menus**

On the WPT - Airport Information Page, the cursor can be placed on the frequency field by pressing the **FMS** Knob and scrolling through the list.  The frequency is transferred to the COM Standby Field with the **ENT** Key.



*Selected Airport Identifier and Information*

*Runway Information*

*Press **ENT** Key to load frequency into PFD1 COM Standby Field. Cursor then advances to the next frequency.*

*Select **INFO 1** Softkey for AIRPORT, RUNWAYS, and FREQUENCIES Windows*

**Figure 4-6  WPT – Airport Information Page**

**GARMIN.**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

COM frequencies can also be auto-tuned from the NRST – Nearest Airspaces, NRST – Nearest Frequencies, and NRST – Nearest Airports Pages on the MFD in a similar manner using the appropriate softkeys or **MENU** Key, the **FMS** Knob, and the **ENT** Key.

## FREQUENCY SPACING

The COM radios can tune either 25-kHz spacing (118.000 to 136.975 MHz) or 8.33-kHz spacing (118.000 to 136.990 MHz) for 760-channel or 3040-channel configuration. When 8.33-kHz channel spacing is selected, all of the 25-kHz channel spacing frequencies are also available in the complete 3040-channel list.

COM channel spacing is set on the System Setup 1 Page of the Aux Page Group.

### Changing COM frequency channel spacing:

1) Select the Aux – System Setup 1 Page.

2) Press the **FMS** Knob to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the Channel Spacing Field in the COM Configuration Box.

4) Turn the small **FMS** Knob to select the desired channel spacing.

5) Press the **ENT** Key to complete the channel spacing selection.

While the COM CONFIG Window is selected, the softkeys are blank.



**Figure 4-7  Aux – System Setup 1 Page**

**AUDIO PANEL AND CNS**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## 4.3 NAV OPERATION

### NAV TUNING BOXES



**Figure 4-8  NAV Tuning Box Indications**

1. **Standby Fields** – The NAV Frequency Box is composed of four fields; the two standby frequencies are on the left.  Frequencies in the standby field are displayed in either white or gray.  The standby frequency in the tuning box is white.  The other standby frequency is gray.

2. **Frequency Transfer Arrow** – Moves between the upper and lower radio frequency fields with the Frequency Tuning Box.  Indicates which NAV transceiver is selected for frequency transfer between the Standby and Active fields.

3. **Active Fields** – The NAV Frequency Box is composed of four fields; the two active frequencies are on the right.  An active NAV frequency is displayed in green.  The active NAV radio is selected by pressing the **CDI** softkey on the PFD.  Both active NAV frequencies appearing in white indicate that no NAV radio is selected.

4. **NAV Tuning Box** – Moves between the upper and lower radio standby frequency fields with the Frequency Transfer Arrow.  Indicates which NAV transceiver is to be tuned in the Standby Field.  Moving the Frequency Tuning Box is accomplished by pressing the **NAV** knob on the PFD.

5. **VOR/LOC Morse Code Audio Indication** – When the Morse code Identifier audio is on for a NAV radio, a white ID replaces the **Frequency Transfer Arrow** to the left of the active NAV frequency.  In order to listen to either station identifier, press the **NAV1** or **NAV2** Key on the Audio Panel.  Pressing the **VOL/ID** Knob turns on/off the Morse code audio only in the radio with the NAV Tuning Box.  To turn on/off both NAV IDs, transfer the NAV Tuning Box between NAV1 and NAV2 by pressing the small **NAV** Knob and pressing the **VOL/ID** Knob again to turn the Morse code off in the other radio.

6. **Decoded Morse Code Station Identifier** – The NAV Frequency Box displays the decoded Morse Code station identifier that is received from the navigation source.  Audio verification of the selected station identifier is still required, and can be accomplished by selecting the corresponding NAV radio on the audio panel and pressing the **NAV VOL/ID** Knob.

(7) **NAV VOLUME** – NAV radio volume level can be adjusted from 0 to 100% using the **VOL/SQ** Knob. Turning the knob clockwise increases volume, turning the knob counterclockwise decreases volume. When adjusting volume, the level is displayed in place of the standby frequencies. Volume level indication remains for two seconds after the change.

## NAV RADIO SELECTION AND ACTIVATION

The NAV Frequency Box is composed of four fields; two standby fields and two active fields. The active frequencies are on the right side and the standby frequencies are on the left.

A NAV radio is selected for navigation by selecting the **CDI** Softkey located on the PFD. The active NAV frequency selected for navigation is displayed in green. Selecting the **CDI** Softkey once selects NAV1 as the navigation radio. Selecting the **CDI** Softkey a second time selects NAV2 as the navigation radio. Selecting the **CDI** Softkey a third time activates GPS mode. Selecting the **CDI** Softkey again cycles back to NAV1.

While cycling through the **CDI** Softkey selections, the selected NAV standby frequency is selected for tuning, the Frequency Transfer Arrow is placed in the selected NAV Frequency Field, and the active NAV frequency color changes to green.

The three navigation modes that can be cycled through are:

• VOR1 (or LOC1) – If NAV1 is selected, a green single line arrow (not shown) labeled either VOR1 or LOC1 is displayed on the HSI and the active NAV1 frequency is displayed in green.

• VOR2 (or LOC2) – If NAV2 is selected, a green double line arrow (shown) labeled either VOR2 or LOC2 is displayed on the HSI and the active NAV2 frequency is displayed in green.

• GPS – If GPS Mode is selected, a magenta single line arrow (not shown) appears on the HSI and neither NAV radio is selected. Both active NAV frequencies are then displayed in white and the previously selected NAV standby frequency remains selected for tuning.

See the Flight Instruments Section for selecting the DME and Bearing Information windows and using VOR or ADF as the source for the bearing pointer.

The NAV Frequency Box displays the decoded Morse Code station identifier that is received from the navigation source. Audio verification of the selected station identifier is still required, and can be accomplished by selecting the corresponding NAV radio on the audio panel and pressing the **NAV VOL/ID** Knob.

NAV radios are selected for listening by pressing the corresponding keys on the Audio Panel. Pressing the **NAV1**, **NAV2**, **ADF**, or **DME** Key selects and deselects the navigation radio source. Selected audio can be heard over the headset and the speakers (if selected). All radios can be selected individually or simultaneously.

## NAV RECEIVER MANUAL TUNING

The NAV frequency controls and frequency boxes are on the left side of the PFD.

### Manually tuning a NAV frequency:

1) Turn the **NAV** Knob to tune the desired frequency in the NAV Tuning Box.

2) Press the **Frequency Transfer** Key to transfer the frequency to the NAV Active Frequency Field.

3) Adjust the volume level with the NAV **VOL/ID** Knob.

4) Press the NAV **VOL/ID** Knob to turn the Morse code identifier audio on and off.

AUDIO PANEL AND CNS

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## AUTO-TUNING A NAV FREQUENCY FROM THE MFD

NAV frequencies can be selected and loaded from the following MFD pages:

- WPT – Airport Information
- WPT – VOR Information
- NRST – Nearest Airports
- NRST – Nearest VOR
- NRST – Nearest Frequencies (FSS, WX)
- NRST – Nearest Airspaces

The MFD provides auto-tuning of NAV frequencies from waypoint and nearest pages. During enroute navigation, the NAV frequency is entered automatically into the NAV standby frequency field. During approach activation the NAV frequency is entered automatically into the NAV active frequency field.

Frequencies can be automatically loaded into the NAV Frequency Box from pages in the NRST or WPT page group by highlighting the frequency and pressing the **ENT** Key.

**Auto-tuning a NAV frequency from the WPT and NRST Pages:**

1) From any page that the NAV frequency can be auto-tuned, activate the cursor by pressing the **FMS** Knob or the appropriate softkey.

2) Turn the **FMS** Knob to place the cursor on the desired NAV identifier or NAV frequency.

3) On the Nearest VOR and Nearest Airports pages, press the **FREQ** Softkey to place the cursor on the NAV frequency.

4) Press the **ENT** Key to load the NAV frequency into the standby field of the selected NAV radio.

5) Press the **Frequency Transfer** Key to transfer the frequency to the NAV Active Frequency Field.
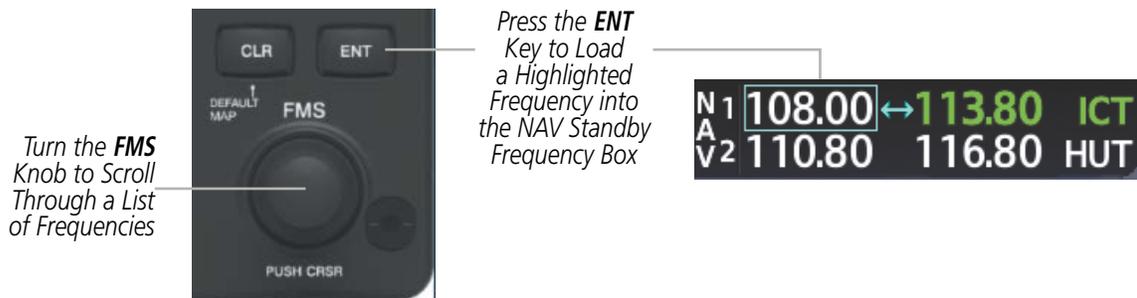


**Figure 4-9  NAV Frequency Auto-Tuning from the MFD**

**Or**:

1) When on the NRST pages, press the **MENU** Key on the MFD control unit to display the page menu.

2) Turn the large **FMS** Knob to scroll through the menu options.

3) Press the **ENT** Key to place the cursor in the desired window.

4) Scroll through the frequency selections with the **FMS** Knob or the **ENT** Key.

5) Press the **ENT** Key to load the NAV frequency into the standby field of the selected NAV radio.

6) Press the Frequency Transfer Key to transfer the frequency to the NAV Active Frequency Field.

Nearest Airports Menu  Nearest VOR Menu  Nearest Frequencies Menu  Nearest Airspaces Menu
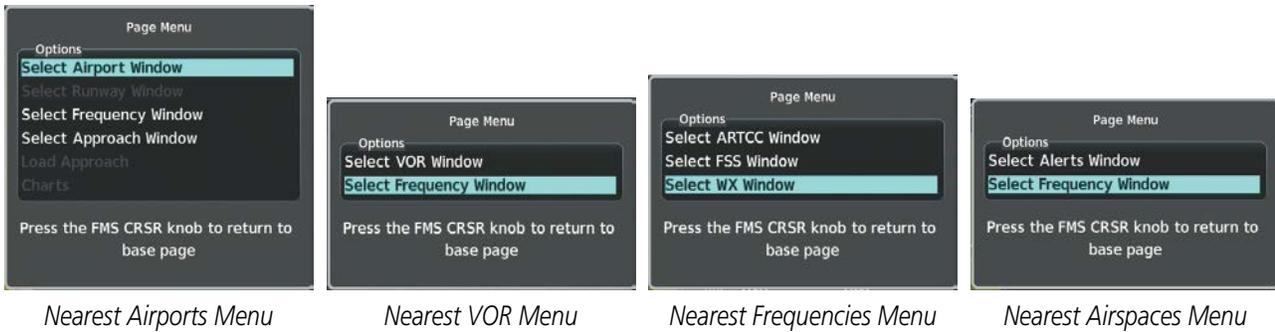
**Figure 4-10  Nearest Pages Menus**

In the example shown, the VOR list is selected with the **VOR** Softkey or from the page menu.  The **FMS** Knob or **ENT** Key is used to scroll through the list.  The cursor is placed on the frequency with the **FREQ** Softkey and loaded into the NAV Tuning Box with the **ENT** Key.



*Select the **VOR** Softkey to Place the Cursor on the VOR Identifier*

*Select the **FREQ** Softkey to Place the Cursor on the VOR Frequency*

*Press the **ENT** Key to Load the Frequency into the NAV Standby Field.*

**Figure 4-11  Loading the NAV Frequency from the NRST – Nearest VOR Page**

While enroute, NAV frequencies can also be auto-tuned from the NRST – Nearest Airports, WPT – Airport Information, WPT – VOR Information, and NRST – Nearest Frequencies Pages on the MFD in a similar manner using the appropriate softkeys or **MENU** Key, the **FMS** Knob, and the **ENT** Key.

## AUTO-TUNING NAV FREQUENCIES ON APPROACH ACTIVATION

> ✓ **NOTE:** *The primary NAV frequency is auto-tuned upon loading a VOR or ILS/Localizer approach.*

> ✓ **NOTE:** *When an ILS/LOC approach has been activated in GPS Mode, the system switches to NAV Mode as the final approach course is intercepted (within 15 nm of the FAF). See the Flight Management Section for details.*

NAV frequencies are automatically loaded into the NAV Frequency field on approach activation on the PFD.

When loading or activating a VOR or ILS/LOC approach, the approach frequency is automatically transferred to a NAV frequency field as follows:

- If the current CDI navigation source is GPS, the approach frequency is transferred to the NAV1 or NAV2 active frequency fields. The frequency that was previously in the NAV1 or NAV2 active frequency fields are transferred to standby.

- If the current CDI navigation source is GPS, and if the approach frequency is already loaded into the NAV1 or NAV2 standby frequency field, the standby frequency is transferred to active.

- If the current CDI navigation source is NAV1 or NAV2, the approach frequency is transferred to the standby frequency fields of the selected CDI NAV radio.

## MARKER BEACON RECEIVER

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

The marker beacon receiver is used as part of an ILS. The marker beacon receiver is always on and detects any marker beacon signals within the reception range of the aircraft.

The receiver detects the three marker tones – outer, middle, and inner – and provides the marker beacon annunciations located to the left of the Altimeter on the PFD.



**Figure 4-12 Marker Beacon Keys**

The Audio Panels provide three different states of marker beacon operation; On, Muted, and Deselected. Pressing the **MKR/MUTE** Key selects and deselects marker beacon audio. The key annunciator indicates when marker beacon audio is selected.

During marker beacon audio reception, pressing the **MKR/MUTE** Key mutes the audio but does not affect the marker annunciations. The marker tone is silenced, then waits for the next marker tone. The **MKR/MUTE** Key Annunciator is illuminated, indicating audio muting. The audio returns when the next marker beacon signal is received. If the **MKR/MUTE** Key is pressed during signal reception (O, M, I indication) while marker beacon audio is muted, the audio is deselected and the **MKR/MUTE** Key Annunciator is extinguished.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

Pressing the **HI SENS** Key switches between high and low marker beacon receiver sensitivity. The HI SENS function (annunciator illuminated) is used to provide an earlier indication when nearing a marker during an approach. The LO SENS function (annunciator extinguished) results in a narrower marker dwell while over a station.

## DME TUNING

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

The G1000 NXi System tunes the optional DME transceiver. The UHF DME frequency is tuned by pairing with a VHF NAV frequency. DME frequency pairing is automatic and only the VHF NAV frequency is shown.

The DME Tuning Window is located to the right of the HSI in the lower right corner of the PFD. The DME transceiver is tuned by selecting NAV1, NAV2, or HOLD in the DME Tuning Window. Pressing the **DME** Softkey switches the DME Tuning Window on and off.



**Figure 4-13  DME Tuning Window**

The following DME transceiver pairing can be selected:

- NAV1 – Pairs the DME frequency from the selected NAV1 frequency.
- NAV2 – Pairs the DME frequency from the selected NAV2 frequency.
- HOLD – When in the HOLD position, the DME frequency remains paired with the last selected NAV frequency.

### Selecting DME transceiver pairing:

1) Press the **DME** Softkey to display the DME Tuning Window.

2) Turn the small **FMS** Knob to select the DME tuning mode.

3) Press the **ENT** Key to complete the selection.

Pressing the **CLR** Key or **FMS** Knob while in the process of DME pairing cancels the tuning entry and reverts back to the previously selected DME tuning state. Pressing the **FMS** Knob activates/deactivates the cursor in the DME Tuning Window.

See the Flight Instruments Section for displaying the DME information window.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

# 4.4 MODE S TRANSPONDER

The Mode S Transponder provides Mode A, Mode C, and Mode S interrogation and reply capabilities. Selective addressing or Mode Select (Mode S) capability includes the following features:

- Level-2 reply data link capability (used to exchange information between aircraft and ATC facilities)

- Surveillance identifier capability

- Flight ID (Flight Identification) reporting – The Mode S Transponder reports aircraft identification as either the aircraft registration or a unique Flight ID.

- Altitude reporting

- Airborne status determination

- Transponder capability reporting

- Mode S Enhanced Surveillance (EHS) requirements

- Acquisition squitter – Acquisition squitter, or short squitter, is the transponder 24-bit identification address. The transmission is sent periodically, regardless of the presence of interrogations. The purpose of acquisition squitter is to enable Mode S ground stations and aircraft equipped with a Traffic Avoidance System (TAS) to recognize the presence of Mode S-equipped aircraft for selective interrogation.

- Extended squitter – The extended squitter is transmitted periodically and contains information such as altitude (barometric and GPS), GPS position, and aircraft identification. The purpose of extended squitter is to provide aircraft position and identification to ADS-B Ground-Based Transceivers (GBTs) and other aircraft.

The Hazard Avoidance Section provides more details on traffic avoidance systems.

## TRANSPONDER CONTROLS

Transponder function is displayed on three levels of softkeys on the PFD: Top-level, Mode Selection, and Code Selection. When the top-level **XPDR** Softkey is selected, the Mode Selection softkeys appear: **Standby**, **On**, **ALT**, **VFR**, **Code**, **Ident**, **Back**.

When the **Code** Softkey is selected, the number softkeys appear: **0**, **1**, **2**, **3**, **4**, **5**, **6**, **7**, **Ident**, **BKSP**, **Back**. The digits 8 and 9 are not used for code entry. Selecting the numbered softkeys in sequence enters the transponder code. If an error is made, selecting the **BKSP** Softkey moves the code selection cursor to the previous digit. Selecting the **BKSP** Softkey again moves the cursor to the next previous digit.

Selecting the **Back** Softkey during code selection reverts to the Mode Selection Softkeys. Selecting the **Back** Softkey during mode selection reverts to the top-level softkeys.

The code can also be entered with the **FMS** Knob on either PFD. Code entry must be completed with either the softkeys or the **FMS** Knob, but not a combination of both.

Selecting the **Ident** Softkey while in Mode or Code Selection initiates the ident function and reverts to the top-level softkeys.

After 45 seconds of transponder control inactivity, the system reverts back to the top-level softkeys.
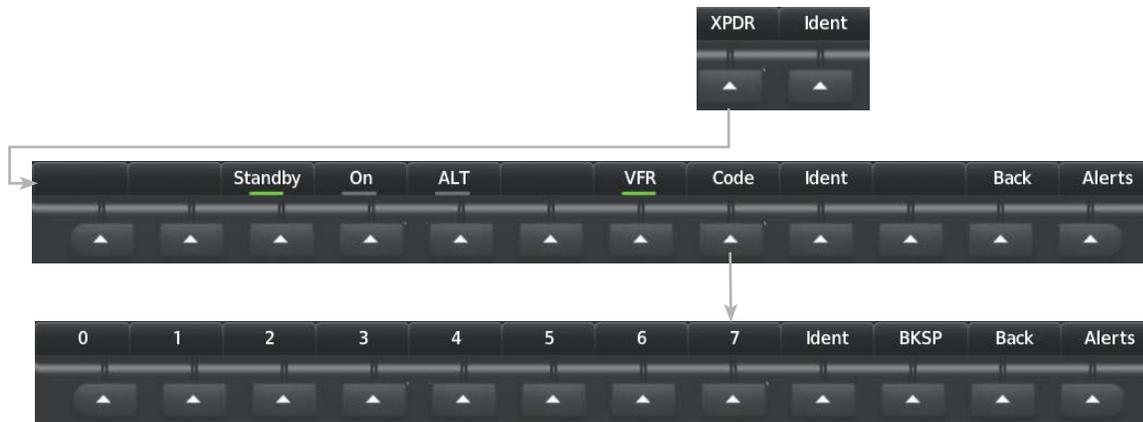
**Figure 4-14  XPDR Softkeys  (PFD)**

## TRANSPONDER MODE SELECTION

Mode selection can be automatic (Altitude Mode) or manual (Standby, ON, and Altitude Modes).  The **Standby**, **On**, and **ALT** Softkeys can be accessed by selecting the **XPDR** Softkey.

### Selecting a transponder mode:

1) Select the **XPDR** Softkey to display the Transponder Mode Selection Softkeys.

2) Select the desired softkey to activate the transponder mode.

## STANDBY MODE (MANUAL)

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

Standby Mode can be selected at any time by pressing the **Standby** Softkey.  In Standby, the transponder is powered and new codes can be entered, but no replies or squitters are transmitted.  When Standby is selected, a white STBY indication and transponder code appear in the mode field of the Transponder Data Box.



*STBY Mode (White Code Number and Mode)*
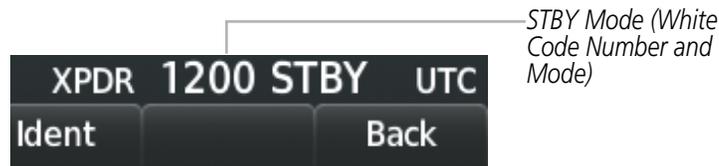
**Figure 4-15  Standby Mode**

## MANUAL ON MODE

ON Mode can be selected at any time by pressing the **On** Softkey.  ON Mode generates Mode A and Mode S replies as well as transmission of acquisition and extended squitters, including ADS-B out.  Mode S replies will not include altitude information.  Mode C altitude reporting is inhibited.

**AUDIO PANEL AND CNS**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

The On indication and transponder code in the Transponder Data Box will appear green while airborne and white while on the ground.

*On Mode*
*(No Altitude Reporting)*

| XPDR | 6543 On | UTC |
|---|---|---|
| Ident | Tmr/Ref | Nearest |

| XPDR | 6543 On | ᴿ UTC |
|---|---|---|
| Ident | Tmr/Ref | Nearest |

*On-Ground (White Indication)*      *Airborne (Green Indication)*
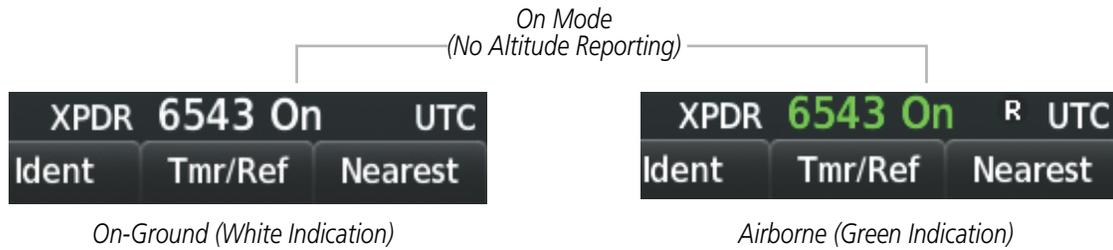
**Figure 4-16  On Mode**

## ALTITUDE MODE (AUTOMATIC OR MANUAL)

The white Altitude Reporting Mode is normally selected automatically when the aircraft is on the ground. White Altitude Mode may also be selected manually by pressing the **ALT** Softkey while on the ground.  White Altitude Mode generates Mode S replies to discrete interrogations as well as transmission of acquisition and extended squitters, including ADS-B out.  Mode A, Mode C, and Mode S all-call replies are inhibited.

If Altitude Mode is selected while on the ground, a white ALT indication and transponder code appear in the mode field of the Transponder Data Box.

*On-Ground ALT Mode*
*(Mode C Altitude*
*Reporting Inhibited)*

| XPDR | 6543 ALT | UTC |
|---|---|---|
| Ident | Tmr/Ref | Nearest |
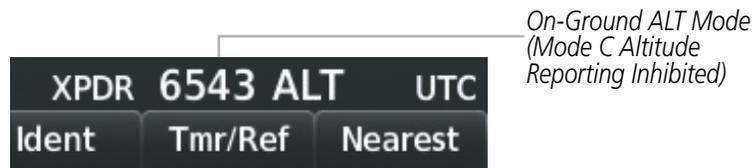
**Figure 4-17  Altitude Mode**

The green Altitude Mode is automatically selected when the aircraft becomes airborne.  Green Altitude Mode may also be selected manually by pressing the **ALT** Softkey while airborne.  Green Altitude Mode generates Mode A, Mode C, and Mode S replies as well as transmissions of acquisition and extended squitters including ADS-B out.

If Altitude Mode is selected while airborne, a green ALT indication and transponder code appear in the mode field of the Transponder Data Box, and all transponder replies requesting altitude information are provided with pressure altitude information.

*Airborne ALT Mode*
*(Mode C Altitude*
*Reporting)*

| XPDR | 6543 ALT | ᴿ UTC |
|---|---|---|
| Ident | Tmr/Ref | Nearest |

**Figure 4-18  Altitude Mode**

## REPLY STATUS

When the transponder sends replies to interrogations, a white R indication appears momentarily in the reply status field of the Transponder Data Box.

*Reply to Interrogation*

XPDR 6543 ALT R UTC
Ident    Tmr/Ref    Nearest

**Figure 4-19  Reply Indication**

## VFR CODE

The VFR code can be entered either manually or by selecting the **XPDR** Softkey, then the **VFR** Softkey. When the **VFR** Softkey is selected, the pre-programmed VFR code is automatically displayed in the code field of the Transponder Data Box.  Selecting the **VFR** Softkey again restores the previous identification code.

The pre-programmed VFR Code is set at the factory to 1200.  If a VFR code change is required, contact a Garmin-authorized service center for configuration.

*VFR Code*

XPDR 1200 ALT R UTC
Ident    Tmr/Ref    Nearest

**Figure 4-20  VFR Code**

## IDENT FUNCTION

> **NOTE:** *In Standby Mode, the **Ident** Softkey is inoperative.*

Selecting the **Ident** Softkey sends a distinct identity indication to Air Traffic Control (ATC).  The indication distinguishes the identing transponder from all the others on the air traffic controller's screen.  The **Ident** Softkey appears on all levels of transponder softkeys.  When the **Ident** Softkey is selected, a green Ident indication is displayed in the mode field of the Transponder Data Box for a duration of 18 seconds.

After the **Ident** Softkey is selected while in Mode or Code Selection, the system reverts to the top-level softkeys.

**AUDIO PANEL AND CNS**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

*IDNT Indication*

*Select the* **Ident** *Softkey to Initiate the ID Function*
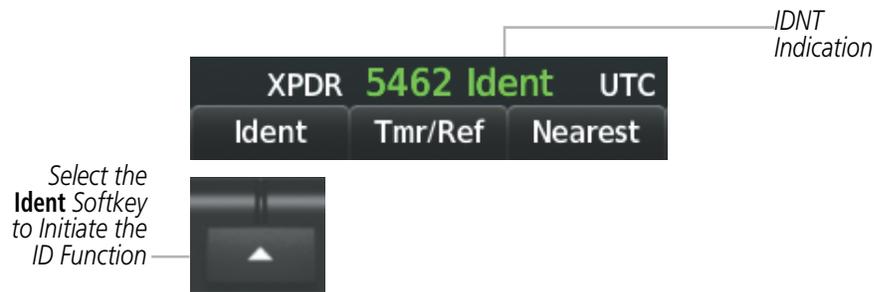
**Figure 4-21  Ident Softkey and Indication**

## FLIGHT ID REPORTING

> ✓ **NOTE:** *If the Flight ID is required but the system is not configured for it, contact a Garmin-authorized service center for configuration.*

When the Flight ID must be entered before flight operation, the identifier is placed in the Timer/References Window on the PFD.  The Flight ID is not to exceed seven characters.  No space is needed when entering Flight ID.  When a Flight ID contains a space, the system automatically removes it upon completion of Flight ID entry.

**Entering a Flight ID:**

1) Press the **Tmr/Ref** Softkey to display the Timer/References Window.

2) Press the **FMS** Knob to activate the selection cursor, if not already activated.

3) Turn the large **FMS** Knob to scroll down to the Flight ID.

4) Turn the small **FMS** Knob to enter the desired Flight ID.

5) Press the **ENT** Key to complete Flight ID entry.

If an error is made during Flight ID entry, pressing the **CLR** Key returns to the original Flight ID entry.  While entering a Flight ID, turning the **FMS** Knob counterclockwise moves the cursor back one space for each detent of rotation.  If an incorrect Flight ID is discovered after the unit begins operation, reenter the correct Flight ID using the same procedure.

# 4.5  ADDITIONAL AUDIO PANEL FUNCTIONS

## POWER-UP

The Audio Panels perform a self-test during power-up.  During the self-test all Audio Panel annunciator lights illuminate for approximately two seconds.  Once the self-test is completed, most of the settings are restored to those  in use before the unit was last turned off.  The exceptions are the speaker and intercom, which are always selected during power up.

## MONO/STEREO HEADSETS

Stereo headsets are recommended for use in this aircraft.

Using a monaural headset in a stereo jack shorts the right headset channel output to ground.  While this does not damage the Audio Panel, a person listening on a monaural headset hears only the left channel in both ears.  If a monaural headset is used at one of the passenger positions, any other passenger using a stereo headset hears audio in the left ear only.

## SPEAKER

All of the radios can be heard over the cabin speaker.  Pressing the **SPKR** Key selects and deselects the cabin speaker.  Speaker audio is muted when the PTT is pressed.  Certain aural alerts and warnings (autopilot, traffic, altitude) are always heard on the speaker, even when the speaker is not selected.

The speaker volume is adjustable within a nominal range.  Contact a Garmin-authorized service center for volume adjustment.

## INTERCOM

The Audio Panel includes a six-position intercom system (ICS) and two stereo music inputs for the pilot, copilot and up to four passengers.  The intercom provides Pilot and Copilot isolation from the passengers and aircraft radios.

| PILOT KEY Annunciator | COPLT KEY Annunciator | Pilot Hears | Copilot Hears | Passenger Hears |
|---|---|---|---|---|
| OFF | OFF | Selected radios, aural alerts, pilot, copilot, passengers, MUSIC INPUT #1 | Selected radios, aural alerts, pilot, copilot, passengers, MUSIC INPUT #1 | Selected radios, aural alerts, pilot, copilot, passengers, MUSIC INPUT #2 |
| ON | OFF | Selected radios, aural alerts, pilot | Copilot, passengers, MUSIC INPUT #1 | Copilot, passengers, MUSIC INPUT #2 |
| OFF | ON | Selected radios, aural alerts, pilot; passengers, MUSIC INPUT #1 | Copilot | Selected radios, aural alerts, pilot, passengers, MUSIC INPUT #2 |
| ON | ON | Selected radios, aural alerts, pilot, copilot | Selected radios, aural alerts, pilot, copilot | Passengers; MUSIC INPUT #2 |

**Table 4-1  ICS Isolation Modes**

Pilot isolation is selected when the PILOT Annunciator is illuminated.  During Pilot isolation, the pilot can hear the selected radios and aural alerts and warnings.  The copilot and passengers can communicate with each other.  The copilot is isolated from aural alerts and warnings.

Copilot isolation is selected when the COPLT Annunciator is illuminated.  The copilot is isolated from the selected radios, aural alerts and warnings, and everyone else.  The pilot and passengers can hear the selected radios, aural alerts, and communicate with each other.

When both the PILOT and COPLT Annunciators are illuminated, the pilot and copilot can hear the selected radios, aural alerts, and communicate with each other.  The passengers are isolated from the pilot and copilot but can communicate with each other.

When both the PILOT and COPLT Annunciators are extinguished, everyone hears the selected radios, aural alerts, and is able to communicate with everyone else.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**GARMIN.**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## INTERCOM VOLUME AND SQUELCH

The **PILOT/PASS** Knob controls volume or manual squelch adjustment for the pilot and copilot/passenger. The small knob controls the pilot volume and squelch. The large knob controls the copilot/passenger volume and squelch. The VOL and SQ annunciations at the bottom of the unit indicate which function the knob is controlling. Pressing the **PILOT/PASS** Knob switches between volume and squelch control as indicated by the VOL or SQ annunciation being illuminated.

The **MAN SQ** Key allows either automatic or manual control of the squelch setting.

- When the MAN SQ Annunciator is extinguished (Automatic Squelch is on), the **PILOT/PASS** Knob controls only the volume (pressing the **PILOT/PASS** Knob has no effect on the VOL/SQ selection).

- When the MAN SQ Annunciator is illuminated (Manual Squelch), the **PILOT/PASS** Knob controls either volume or squelch (selected by pressing the **PILOT/PASS** Knob and indicated by the VOL or SQ annunciation).

## SPLIT COM

> **NOTE:** Split COM performance is affected by the distance between the COM antennas and the separation of the tuned frequencies. If the selected COM1 and COM2 frequencies are too close together, interference may be heard during transmission on the other radio.

During Split COM operation, both the pilot and the copilot can transmit simultaneously over separate radios. The pilot can still monitor NAV1, NAV2, ADF, DME, and MKR Audio as selected, but the copilot is only able to monitor COM2.

Pressing the **COM 1/2** Key selects Split COM operation. The COM 1/2 Annunciator is illuminated indicating Split COM operation. COM1 and COM2 frequencies are displayed in green indicating that both transceivers are active. Split COM operation is cancelled by pressing the **COM 1/2** Key again, at which time the annunciator is extinguished.

When Split COM operation is selected, COM1 is used by the pilot and COM2 is used by the copilot. The COM1 MIC Annunciator flashes when the pilot's microphone PTT is pressed. The COM2 MIC Annunciator flashes when the copilot's microphone PTT is pressed.

## CLEARANCE RECORDER AND PLAYER

> **NOTE:** Pressing the play key on the pilot's Audio Panel plays recorded audio to the Pilot. Pressing the play key on the Copilot's Audio Panel plays recorded audio to the Copilot.

The Audio Panel contains a digital clearance recorder that continually records up to 2.5 minutes of the selected COM radio signal. Recorded COM audio is stored in separate memory blocks. Once 2.5 minutes of recording time have been reached, the recorder begins recording over the stored memory blocks, starting from the oldest block.

The **PLAY** Key controls the play function. The PLAY annunciator remains lit to indicate when play is in progress. The PLAY annunciator turns off after playback is finished.

Pressing the **PLAY** Key once plays the latest recorded memory block and then returns to normal operation. Pressing the **PLAY** Key again during play of a memory block stops play. If a COM input signal is detected during play of a recorded memory block, play is halted.

Pressing the **PLAY** Key twice within one-half second while audio is playing plays the previous block of recorded audio. Each subsequent two presses of the **PLAY** Key within one-half second backtracks through the recorded memory blocks to reach and play any recorded block.

Powering off the unit automatically clears all recorded blocks.

## ENTERTAINMENT INPUTS

**NOTE:** *MUSIC INPUT #1 and MUSIC INPUT #2 cannot be completely turned off. Audio level for MUSIC INPUT #1 and MUSIC INPUT #2 can be adjusted by a Garmin-authorized service center.*

The Audio Panel provides two stereo auxiliary entertainment inputs: MUSIC INPUT #1 and MUSIC INPUT #2. These inputs are compatible with popular portable entertainment devices such as MP3 players, cell phones, and tablets. Two 3.5-mm stereo phone jacks are installed in convenient locations for audio connection. The headphone outputs of the entertainment devices are plugged into the MUSIC INPUT #1 or MUSIC INPUT #2 jacks.

The current ICS state of isolation affects the distribution of the entertainment input MUSIC INPUT #1.

### MUSIC INPUT #1

MUSIC INPUT #1 can be heard by the pilot and copilot when both the PILOT and the COPLT Annunciators are extinguished. MUSIC INPUT #1 can also be heard by the pilot when the COPLT Annunciator is illuminated and by the copilot when the PILOT Annunciator is illuminated.

#### MUSIC INPUT #1 MUTING

MUSIC INPUT #1 muting occurs when aircraft radio or marker beacon activity is heard. MUSIC INPUT #1 is always soft muted when an interruption occurs from these sources. Soft muting is the gradual return of MUSIC INPUT #1 to its original volume level. The time required for MUSIC INPUT #1 volume to return to normal is between one-half and four seconds.

#### MUSIC INPUT #1 MUTING ENABLE/DISABLE

Pressing and holding the **MKR/MUTE** Key for three seconds switches MUSIC INPUT #1 muting on and off. When switching, either one or two beeps are heard; one beep indicates that music muting is enabled, two beeps indicate music muting is disabled. MUSIC INPUT #1 muting is reset (enabled) during power up.

### MUSIC INPUT #2

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

### SIRIUSXM RADIO ENTERTAINMENT

SiriusXM Radio audio from the Data Link Receiver may be heard by the pilot and passengers simultaneously (optional: requires subscription to the SiriusXM Radio Service). Refer to the Additional Features Section for more details on the Data Link Receiver.

Connecting a stereo input to either MUSIC INPUT #1 or MUSIC INPUT #2 jacks removes the SiriusXM Radio Audio from that input. For example, if passengers prefer their own music while the pilot listens to the SiriusXM Radio, the entertainment audio should be connected to the MUSIC INPUT #2 jack.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

# 4.6 AUDIO PANELS PREFLIGHT PROCEDURE

> **NOTE:** *If the pilot and/or copilot are using headsets that have a high/low switch or volume control knob, verify that the switch is in the high position and the volume control on the headsets are at maximum volume setting. On single-pilot flights, verify that all other headsets are not connected to avoid excess noise in the audio system.*

> **NOTE:** *When the **MAN SQ** Key is pressed, the ICS squelch can be set manually by the pilot and copilot. If manual squelch is set to full open (SQ annunciated and the knobs turned counterclockwise) background noise is heard in the ICS system as well as during COM transmissions.*

After powering up the System, the following steps aid in maximizing the use of the Audio Panel as well as prevent pilot and copilot induced issues. These preflight procedures should be performed each time a pilot boards the aircraft to ensure awareness of all audio levels in the Audio Panel and radios.

**Setting the Audio Panel during preflight:**

1) Verify that the PILOT and COPLT Annunciators are extinguished.

2) Verify manual squelch is set to full open.

3) Turn the **PILOT/PASS** Knobs clockwise two full turns. This sets the intercom level to max volume (least amount of attenuation).

4) Adjust radio volume levels (COM, NAV) to a suitable level.

5) Adjust the **PILOT/PASS** Knob volume to the desired intercom level.

6) Reset squelch to automatic, or adjust to the appropriate level manually.

Once this procedure has been completed, the pilot and copilot can change settings, keeping in mind the notes above.

## 4.7 ABNORMAL OPERATION

Abnormal operation of the system includes equipment failures of the system components and failure of associated equipment, including switches and external devices.

### STUCK MICROPHONE

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

The **COM1 MIC** or **COM2 MIC** Key Annunciator on the Audio Panel flashes as long as the PTT Key remains stuck.

### COM TUNING FAILURE

In case of a COM system tuning failure, the emergency frequency (121.500 MHz) is automatically tuned in the radio in which the tuning failure occurred. Depending on the failure mode, a red X may appear on the frequency display.

### AUDIO PANEL FAIL-SAFE OPERATION

If there is a failure of the Audio Panel, a fail-safe circuit connects the pilot's headset and microphone directly to the COM1 transceiver. Audio is not available on the speaker during Fail-safe operation.

### REVERSIONARY MODE

The red **DISPLAY BACKUP** Button selects the Reversionary Mode. See the System Overview Section for more information on Reversionary Mode.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

BLANK PAGE

# SECTION 5  FLIGHT MANAGEMENT

## 5.1  INTRODUCTION

The system is an integrated flight, engine, communication, navigation and surveillance system.  This section of the Pilot's Guide explains flight management using the system.

The most prominent part of the system are the two full color displays: one Primary Flight Display (PFD) and a Multi Function Display (MFD). The information to successfully navigate the aircraft using the GPS sensors is displayed on the PFD and the MFD. Detailed descriptions of GPS navigation functions are discussed later in this section.

A brief description of the GPS navigation data on the PFD and MFD follows.

Navigation mode indicates which sensor is providing the course data (e.g., GPS, VOR) and the flight plan phase (e.g., Departure (DPRT), Terminal (TERM), Enroute (ENR), Oceanic (OCN), RNAV Approach (LNAV, LNAV+V, L/VNAV, LP, LP+V, LPV), or Missed Approach (MAPR)).  L/VNAV, LP, LP+V, and LPV approach service levels are only available with SBAS.

The Inset Map is a small version of the Navigation Map and can be displayed in the lower left corner of the PFD. When the system is in reversionary mode, the Inset Map is displayed in the lower right corner.  The Inset Map is displayed by pressing the **Map/HSI** Softkey, pressing the **Layout** Softkey, then pressing the **Inset Map** Softkey. Pressing the **Map Off** Softkey removes the Inset Map.

The Navigation Map displays aviation data (e.g., airports, VORs, airways, airspaces), geographic data (e.g., cities, lakes, highways, borders), topographic data (map shading indicating elevation), and hazard data (e.g., traffic, terrain, weather). The amount of displayed data for the Inset Map can be reduced by pressing the **Map/ HSI** Softkey on the PFD, then pressing the **Detail** Softkey. The amount of displayed data for the Navigation Map can be reduced by pressing the **Detail** Softkey on the MFD.  The Navigation Map can be oriented three different ways: North Up (NORTH UP), Track Up (TRK UP), or Heading Up (HDG UP).

An aircraft icon is placed on the Navigation Map at the location corresponding to the calculated present position. The aircraft position and the flight plan legs are accurately based on GPS calculations. The basemap upon which these are placed are from a source with less resolution, therefore the relative position of the aircraft to map features is not exact.  The leg of the active flight plan currently being flown is shown as a magenta line on the navigation map.  The other legs are shown in white.

There are 28 different map ranges available, from 250 feet to 1000 nm.   Range is indicated in the upper left quadrant of the range ring shown around the aircraft icon.  This indicated range is the range from the aircraft icon to the range ring, and roughly half the range to the top edge of the displayed map.  To change the map range on any map, turn the **Joystick** counter-clockwise to zoom in ( -, decreasing), or clockwise to zoom out (+, increasing).

The Direct-to Window, the Flight Plan Window, the Procedures Window, and the Nearest Airports Window can be displayed in the lower right corner of the PFD.  Details of these windows are discussed in detail later in the section.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

*Navigation Status Box*

*Current Track Indicator*

*Navigation Mode*

*Inset Map*

*Location of:*
*- Direct To Window*
*- Flight Plan Window*
*- Procedures Window*
*- Nearest Airports Window*
*- References Window*

**Figure 5-1   GPS Navigation Information on the PFD (Inset Map)**



*Navigation Data Bar*

*Map Orientation*

*Navigation Map*
*- Aviation Data*
*- Geographic Data*
*- Topographic Data*
*- Hazard Data*

*Aircraft Icon at Present Position*

*Navigation Page Title*

*Map Range*

*Active Flight Plan Leg*
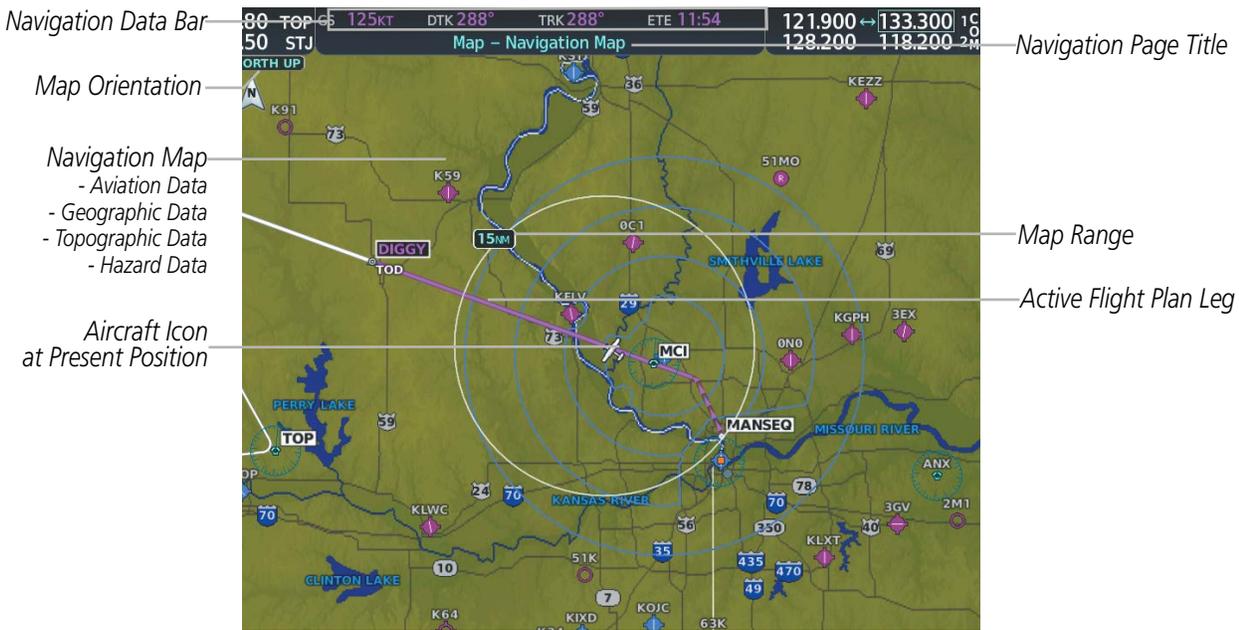
**Figure 5-2   GPS Navigation Information on the MFD Navigation Page**

## NAVIGATION STATUS BOX AND DATA BAR

The Navigation Status Box located at the top of the PFD contains two fields displaying the following information:



**Figure 5-3  PFD Navigation Status Box**

- Active flight plan leg (e.g., 'D-> KICT' or 'KIXD -> KCOS') **or** flight plan annunciations (e.g., 'Turn right to 021° in 8 seconds')

- Distance (DIS) and Bearing (BRG) to the next waypoint **or** flight plan annunciations (e.g., 'TOD within 1 minute')

**FLIGHT MANAGEMENT**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

The symbols used in the PFD status bar are:

| Symbol | Description | Symbol | Description |
|--------|-------------|--------|-------------|
| ⮕ | Active Leg | ⬭ | Left Holding Pattern |
| ⮕ | Direct-to | vtf | Vector to Final |
| ⤴ | Right Procedure Turn | ↷ | Right DME Arc/Radius to Fix Leg |
| ⤵ | Left Procedure Turn | ↶ | Left DME Arc/Radius to Fix Leg |
| ⬭ | Right Holding Pattern | | |

The Navigation Data Bar located at the top of the MFD contains four data fields, each displaying one of the following items:

| | | | |
|--------|-------------|--------|-------------|
| **BRG** | Bearing | **FOB** | Fuel on Board |
| **DEST** | Destination Airport Identifier | **FOD** | Fuel over Destination |
| **DIS** | Distance | **GS** | Ground Speed |
| **DTG** | Distance to Go | **MSA** | Minimum Safe Altitude |
| **DTK** | Desired Track | **TAS** | True Airspeed |
| **END** | Endurance | **TKE** | Track Angle Error |
| **ESA** | Enroute Safe Altitude | **TRK** | Track |
| **ETA** | Estimated Time of Arrival | **VSR** | Vertical Speed Required |
| **ETE** | Estimated Time Enroute | **XTK** | Cross-Track Error |
| **FLT** | Flight Timer | | |

GS 125KT    DTK 288°    TRK 288°    ETE 11:54

**Figure 5-4  MFD Navigation Data Bar**

The navigation information displayed in the four data fields can be selected on the MFD Data Bar Fields Box on the Aux-System Setup 1 Page.  The default selections (in order left to right) are GS, DTK, TRK, and ETE.

### Changing a field in the MFD Navigation Data Bar:

1) Select the Aux - System **Setup 1** Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the desired field number in the MFD Data Bar Fields Box.

4) Turn the small **FMS** Knob to display and scroll through the data options list to select the desired data.

5) Press the **ENT** Key.  Selecting the **Defaults** Softkey returns all fields to the default setting.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

# 5.2 USING MAP DISPLAYS

Map displays are used extensively in the system to provide situational awareness in flight. Most system maps can display the following information:

- Airports, NAVAIDs, airspaces, airways, land data (highways, cities, lakes, rivers, borders, etc.) with names
- Map range
- Wind direction and speed
- Map orientation
- Icons for enabled map features
- Aircraft icon (representing present position)
- Obstacle data
- Topography scale

- Map Pointer information (distance and bearing to pointer, location of pointer, name, and other pertinent information)
- Fuel range ring
- Flight plan legs
- User waypoints
- Track vector
- Terrain
- Topography data

The information in this section applies to the following maps unless otherwise noted:

| | |
|---|---|
| All Map Group Pages (Map) | Flight Plan Pages (FPL) |
| All Waypoint Group Pages (WPT) | Direct-to Window |
| Aux - Trip Planning | PFD Inset Map |
| All Nearest Group Pages (NRST) | Procedure Loading Pages |

## MAP ORIENTATION

Maps are shown in one of three different orientation options, allowing flexibility in determining aircraft position relative to other items on the map (north up) or for determining where map items are relative to where the aircraft is going (track up or heading up). The map orientation is shown in the upper left corner of the map.



**Figure 5-5  Map Orientation**

- North up (North up) aligns the top of the map display to north (default setting).
- Track up (Track up) aligns the top of the map display to the current ground track.
- Heading up (HDG up) aligns the top of the map display to the current aircraft heading.

FLIGHT MANAGEMENT

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**NOTE:** *When panning or reviewing active flight plan legs in a non-North Up orientation, the map does not show the map orientation nor the wind direction and speed.*

**NOTE:** *Map orientation can only be changed on the Navigation Map Page. Any other displays that show navigation data reflect the orientation selected for the Navigation Map Page.*

**Changing the Navigation Map orientation:**

1) With the Navigation Map Page displayed, press the **MENU** Key. The cursor flashes on the 'Map Settings' option.



*Map Settings Selection*
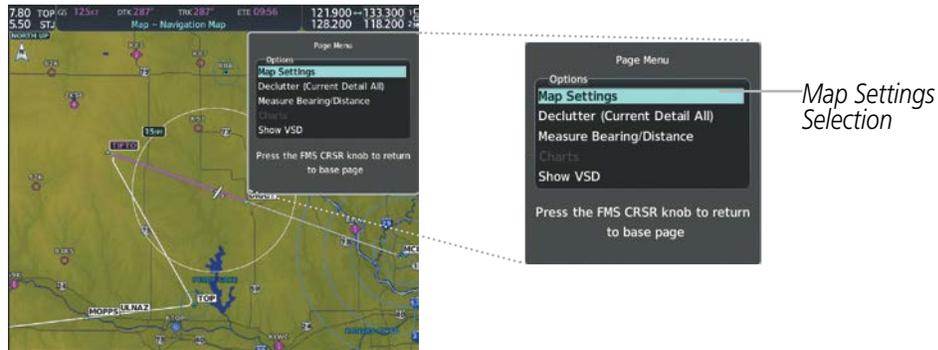
**Figure 5-6  Navigation Map Page Menu Window**

2) Press the **ENT** Key to display the Map Settings Window.

3) Turn the large **FMS** Knob, or press the **ENT** Key once, to select the 'Orientation' field.



*Map Group Selection*

*Orientation Field*

*North Up Above Field*
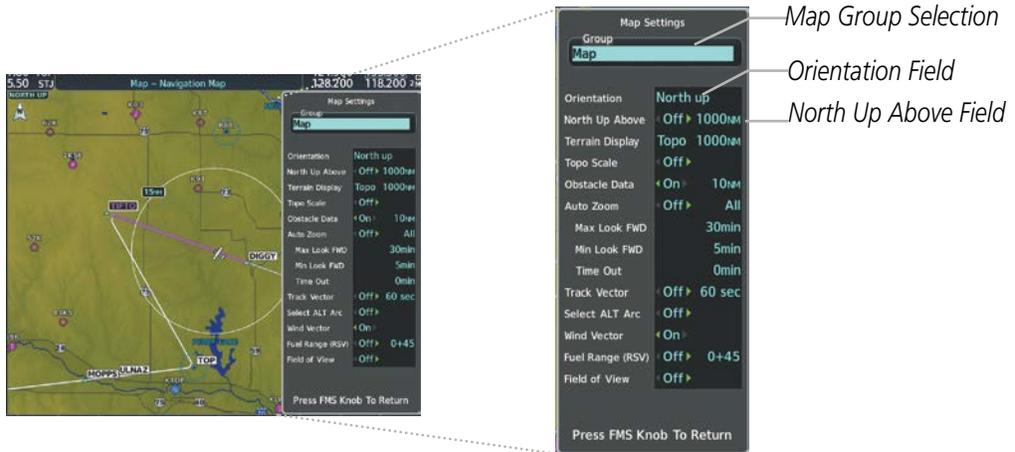
**Figure 5-7  Map Settings Menu Window - Map Group**

4) Turn the small **FMS** Knob to select the desired orientation.

5) Press the **ENT** Key to select the new orientation.

6) Press the **FMS** Knob to return to the base page.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

The map can be configured to switch automatically to a north up orientation when the map range reaches a minimum range.

**Enabling/disabling Auto North Up and selecting the minimum switching range:**

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Settings' option.

2) Press the **ENT** Key. The Map Settings Menu is displayed.

3) Select the 'Map' group.

4) Press the **ENT** Key.

5) Highlight the 'North Up Above' field.

6) Select 'On' or 'Off' using the small **FMS** Knob.

7) Press the **ENT** Key to accept the selected option. The flashing cursor highlights the range field.

8) Use the small **FMS** Knob to select the desired range.

9) Press the **ENT** Key to accept the selected option.

10) Press the **FMS** Knob to return to the Navigation Map Page.

## MAP RANGE

There are 28 different map ranges available, from 250 feet to 1000 nm. Range is indicated in the upper left quadrant of the range ring shown around the aircraft icon. This indicated range is the range from the aircraft icon to the range ring, and roughly half the range to the top edge of the displayed map. When the map range is decreased to a point that exceeds the capability of the system to accurately represent the map, a magnifying glass icon is shown to the left of the map range. To change the map range turn the **Joystick** counter-clockwise to decrease the range, or clockwise to increase the range.



**Figure 5-8  Map Range**

## AUTO ZOOM

Auto zoom allows the system to change the map display range to the smallest range clearly showing the active waypoint. Auto zoom can be overridden by adjusting the range with the Joystick, and remains until the active waypoint changes, a terrain or traffic alert occurs, the aircraft takes off, or the manual override times out (timer set on Map Settings Window). Auto zoom is suspended while the map pointer is active.

If a terrain caution or warning occurs, all navigation maps automatically adjust to the smallest map range clearly showing the potential impact areas. If a new traffic advisory alert occurs, any map page capable of displaying traffic advisory alerts automatically adjusts to the smallest map range clearly showing the traffic advisory. When terrain or traffic alerts clear, the map returns to the previous auto zoom range based on the active waypoint.

The auto zoom function can be turned on or off independently for the PFD and MFD. Control of the ranges at which the auto zoom occurs is done by setting the minimum and maximum 'look forward' times (set on the Map Settings Window for the Map Group). These settings determine the minimum and maximum distance to display based upon the aircraft's ground speed.

- Waypoints that are long distances apart cause the map range to increase to a point where many details on the map are decluttered. If this is not acceptable, lower the maximum look ahead time to a value that limits the auto zoom to an acceptable range.

- Waypoints that are very short distances apart cause the map range to decrease to a point where situational awareness may not be what is desired. Increase the minimum look ahead time to a value that limits the auto zoom to a minimum range that provides acceptable situational awareness.

- Flight plans that have a combination of long and short legs cause the range to increase and decrease as waypoints sequence. To avoid this, auto zoom can be disabled or the maximum/minimum times can be adjusted.

- The 'time out' time (configurable on the Map Settings Page for the Map Group) determines how long auto zoom is overridden by a manual adjustment of the range knob. At the expiration of this time, the auto zoom range is restored. Setting the 'time out' value to zero causes the manual override to never time out.

- When the maximum 'look forward' time is set to zero, the upper limit becomes the maximum range available (2000 nm).

- When the minimum 'look forward' time is set to zero, the lower limit becomes 1.5 nm.

**Configuring automatic zoom:**

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Settings' option.

2) Press the **ENT** Key. The Map Settings Menu is displayed.

3) Select the 'Map' group.

4) Press the **ENT** Key.

5) Highlight the 'Auto Zoom' on/off field, and select 'Off' or 'On' using the small **FMS** Knob.

6) Press the **ENT** Key to accept the selected option. The flashing cursor highlights the 'Auto Zoom' display selection field.

7) Select 'MFD', 'PFD', or 'All' using the small **FMS** Knob.

8) Press the **ENT** Key to accept the selected option. The flashing cursor highlights the 'Max Look FWD' field. Times are from zero to 999 minutes.

9) Use the **FMS** Knobs to set the time. Press the **ENT** Key.

10) Repeat step 9 for 'Min Look FWD' (zero to 99 minutes) and 'Time Out' (zero to 99 minutes).

11) Press the **FMS** Knob to return to the Navigation Map Page.

## MAP PANNING

Map panning allows the pilot to:

- View parts of the map outside the displayed range without adjusting the map range
- Highlight and select locations on the map
- Review information for a selected airport, NAVAID or user waypoint
- Designate locations for use in flight planning
- View airspace and airway information

When the panning function is selected by pushing the **Joystick**, the Map Pointer 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.

**Panning the map:**

1) Push the **Joystick** to display the Map Pointer.

2) Move the **Joystick** to move the Map Pointer around the map.

3) Push the **Joystick** to remove the Map Pointer and recenter the map on the aircraft's current position.

> **NOTE:** The map is normally centered on the aircraft's position. If the map has been panned and there has been no pointer movement for about 60 seconds, the map reverts back to centered on the aircraft position and the flashing pointer is removed.



**Figure 5-9  Navigation Map - Map Pointer Activated**

When the Map Pointer is placed on an object, the name of the object is highlighted (even if the name was not originally displayed on the map). When any map feature or object is selected on the map display, pertinent information is displayed.



*Information about Point of Interest*

*Map Pointer on POI*

**Figure 5-10 Navigation Map - Map Pointer on Point of Interest**

When the Map Pointer crosses an airspace boundary, the boundary is highlighted and airspace information is shown. The information includes the name and class of airspace, the ceiling in feet above Mean Sea Level (MSL), and the floor in feet MSL.

### Reviewing information for an airport, NAVAID, or user waypoint:

1) Place the Map Pointer on a waypoint.

2) Press the **ENT** Key to display the Waypoint Information Page for the selected waypoint.

3) Select the **Go Back** Softkey, the **CLR** Key, or the **ENT** Key to exit the Waypoint Information Page and return to the Navigation Map showing the selected waypoint.

### Viewing airspace information for a special-use or controlled airspace:

1) Place the Map Pointer on the boundary of an airspace.

2) Push the **Joystick** to remove the Map Pointer and center the map on the aircraft.

**Or**:

1) Place the Map Pointer on an open area within the boundaries of an airspace.

2) Press the **ENT** Key to display an options menu.

3) 'Review Airspaces' should already be highlighted, if not select it. Press the **ENT** Key to display the Airspace Information Page for the selected airspace.

4) Press the **CLR** or **ENT** Key to exit the Airspace Information Page.

**FLIGHT MANAGEMENT**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## MEASURING BEARING AND DISTANCE

Distance and bearing from the aircraft's present position to any point on the viewable navigation map may be calculated using the 'Measure Bearing and Distance' selection from Navigation Map page menu. The bearing and distance tool displays a dashed Measurement Line and a Measure Pointer to aid in graphically identifying points with which to measure. Lat/Long, distance and elevation data for the Measure Pointer is provided in a window at the top of the navigation map.

**Measuring bearing and distance between any two points:**

1) Press the **MENU** Key (with the Navigation Map Page displayed).

2) Highlight the 'Measure Bearing/Distance' field.

3) Press the **ENT** Key. A Measure Pointer is displayed on the map at the aircraft's present position.

4) Move the **Joystick** to place the reference pointer at the desired location. The bearing and distance are displayed at the top of the map. Elevation at the current pointer position is also displayed. Pressing the **ENT** Key changes the starting point for measuring.

5) To exit the Measure Bearing/Distance option, push the **Joystick**; or select 'Stop Measuring' from the Page Menu and press the **ENT** Key.



Measurement Information

Pointer Lat/Long

Measurement Line

**Figure 5-11  Navigation Map - Measuring Bearing and Distance**

## TOPOGRAPHY

All navigation maps can display various shades of topography colors representing land elevation, similar to aviation sectional charts. Topographic data can be displayed or removed as described in the following procedures. Topographic data can also be displayed on the selectable profile map at the bottom of the Navigation Map Page.



**TOPO Off**                                                          **TOPO On**
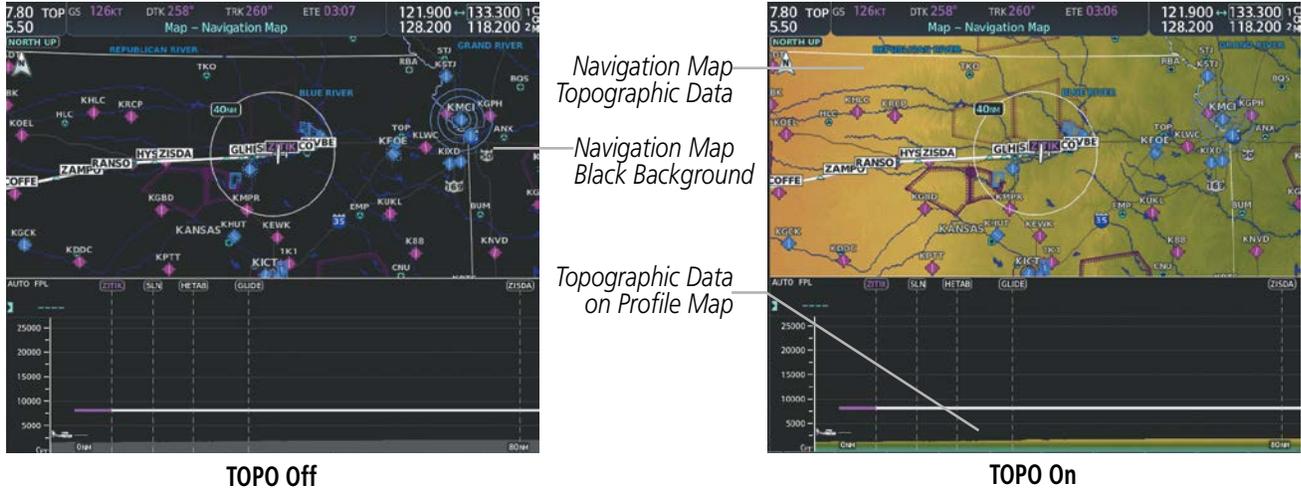
**Figure 5-12  Navigation Map - Topographic Data**

**Displaying/removing topographic data on all MFD pages displaying navigation maps:**

1) Select the **Map Opt** Softkey.

2) Select the **TER** Softkey until 'Topo' is shown on the softkey to display topographic data.

3) Select the **TER** Softkey until 'Off' is shown on the softkey to remove topographic data from the navigation map. When topographic data is removed from the page, all navigation data is presented on a black background.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Displaying/removing topographic data on the PFD Inset Map:**

**1)** Select the **Map/HSI** Softkey .

**2)** Select the **Topo** Softkey.

**3)** Select the **Topo** Softkey again to remove topographic data from the PFD Inset Map. When topographic data is removed from the PFD Map, all navigation data is presented on a black background.


*Absolute Terrain On*

*Terrain Off*
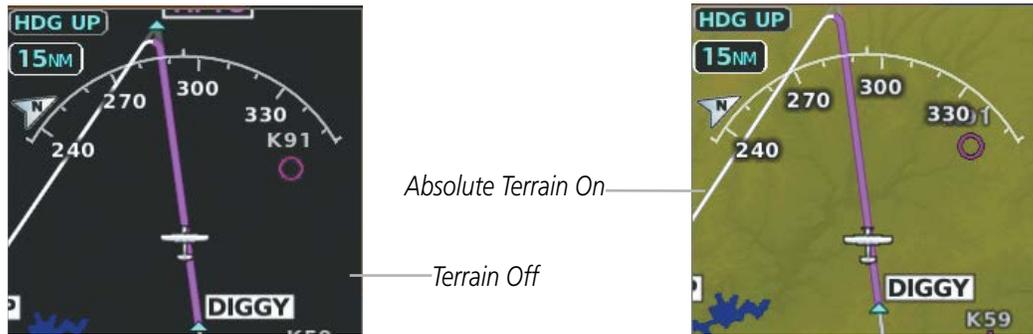
**Figure 5-13  PFD Inset Map - Absolute Terrain Data**

**Displaying/removing topographic data using the Navigation Map Page Menu:**

**1)** Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Settings' option.

**2)** Press the **ENT** Key. The Map Settings Menu is displayed.

**3)** Select the 'Map' group.

**4)** Press the **ENT** Key.

**5)** Highlight the 'Terrain Display' field.

**6)** Select 'Topo' or 'Off'.

**7)** Press the **FMS** Knob to return to the Navigation Map Page.

The topographic data range is the maximum map range on which topographic data is displayed.

✓ **NOTE:** *Since the PFD Inset Map is much smaller than the MFD navigation maps, items are removed on the PFD Inset Map two range levels smaller than the range selected in the Map Settings pages (e.g., a setting of 100 nm removes the item at ranges above 100 nm on MFD navigation maps, while the PFD Inset Map removes the same item at 50 nm).*

**Selecting a topographical data range (Terrain Display):**

**1)** Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Settings' option.

**2)** Press the **ENT** Key. The Map Settings Menu is displayed.

**3)** Select the 'Map' group.

**4)** Press the **ENT** Key.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

5) Highlight the 'Terrain Display' range field.  Ranges are from 1 nm to 1000 nm.

6) To change the Terrain Display range setting, turn the small **FMS** Knob to display the range list.

7) Select the desired range using the small **FMS** Knob.

8) Press the **ENT** Key.

9) Press the **FMS** Knob to return to the Navigation Map Page.

In addition, the Navigation Map can display a topographic scale (located in the lower right hand side of the map) showing a scale of the terrain elevation and minimum/maximum displayed elevations.



*Maximum Displayed Elevation*

*Minimum Displayed Elevation*
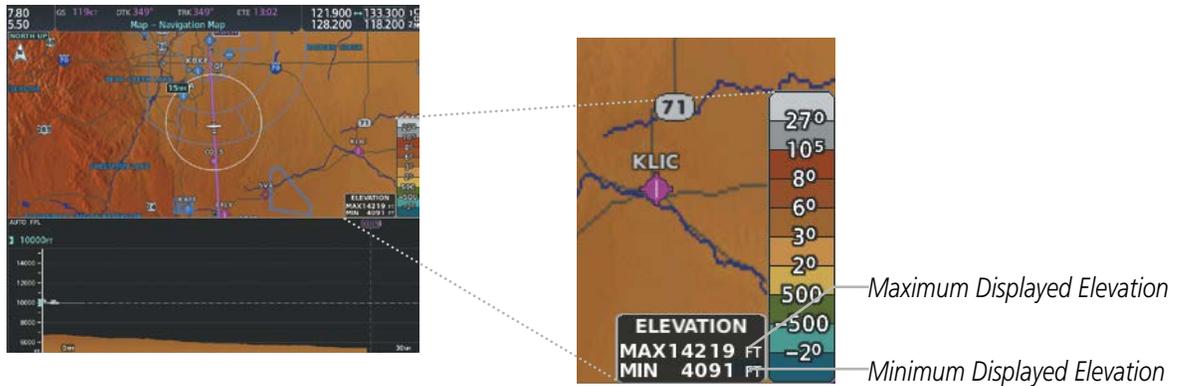
**Figure 5-14  Navigation Map - TOPO SCALE**

**Displaying/removing the topographic scale (Topo Scale):**

1) Press the **MENU** Key with the Navigation Map Page displayed.  The cursor flashes on the 'Map Settings' option.

2) Press the **ENT** Key.  The Map Settings Menu is displayed.

3) Select the 'Map' group and select the **ENT** Key.

4) Highlight the 'Topo Scale' field.

5) Select 'On' or 'Off'.

6) Press the **FMS** Knob to return to the Navigation Map Page.

## MAP SYMBOLS

This section discusses the types of land and aviation symbols that can be displayed. Each listed type of symbol can be turned on or off, and the maximum range to display each symbol can be set. The decluttering of the symbols from the map using the **Detail** Softkey is also discussed.

### LAND SYMBOLS

The following items are configured on the land menu:

| Land Symbols | Symbol | Default Range (nm) | Maximum Range (nm) |
|---|---|---|---|
| User Waypoint | 🟧 | 25 | 40 |
| Highways and Roads | | | |
| Interstate Highway (Freeway) | | 50 | 400 |
| International Highway (Freeway) | | 50 | 400 |
| US Highway (National Highway) | | 15 | 150 |
| State Highway (Local Highway) | | 2.5 | 100 |
| Local Road (Local Road) | N/A | 4 | 25 |
| Railroads (RAILROAD) | UP | 7.5 | 25 |
| Large City (> 200,000) | | 100 | 1000 |
| Medium City (> 50,000) | | 50 | 400 |
| Small City (> 5,000) | | 25 | 100 |
| State/Province | | 400 | 1000 |
| River/Lake | | 75 | 100 |
| Latitude/Longitude (LAT/LON) | N 39°10.00' | 1 | 1000 |

**Table 5-1  Land Symbol Information**

## AVIATION SYMBOLS

The following items are configured on the aviation menu:

| Aviation Symbols | Symbol | Default Range (nm) | Maximum Range (nm) |
|---|---|---|---|
| Large Airport (Longest Runway ≥ 8100 ft) |  | 100 | 1000 |
| Medium Airport (8100 ft > Longest Runway ≥ 5000 ft) | | 50 | 400 |
| Small Airport (Longest Runway < 5000 ft) (Medium Airport if it has a tower frequency) | | 25 | 150 |
| Taxiways (SafeTaxi) | See Additional Features | 1.5 | 5 |
| Runway Extension |  | 7.5 | 150 |
| Missed Approach Preview On/Off (Missed APR) | N/A | N/A | N/A |
| Intersection (INT) |  | 25 | 40 |
| Non-directional Beacon (NDB) |  | 25 | 50 |
| VOR |  | 50 | 250 |
| VOR Compass Rose On/Off | N/A | N/A | N/A |
| Visual Reporting Point (VRP) |  | 25 | 1000 |
| Temporary Flight Restriction (TFR) |  | 250 | 1000 |
| VNAV Constraints |  | 1000 | 1000 |

**Table 5-2  Aviation Symbol Information**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## AIRSPACE SYMBOLS

The following items are configured on the airspace menu:

| Airspace Symbols | Symbol | Default Range (nm) | Maximum Range (nm) |
|---|---|---|---|
| Smart Airspace On/Off | N/A | N/A | N/A |
| Airspace Altitude Labels (Airspace ALT LBL) On/Off | N/A | N/A | N/A |
| Class B Airspace Altitude Label (ceiling/floor) | 80 / 30 | N/A | N/A |
| Class C Airspace Altitude Label (ceiling/floor) | 53 / SFC | N/A | N/A |
| Class D Airspace Altitude Label (ceiling) | 36 | N/A | N/A |
| Class B Airspace/TMA (CLASS B/TMA) | | 50 | 150 |
| Class C Airspace/TCA (CLASS C/TCA) | | 100 | 100 |
| Class D Airspace (CLASS D) | | 75 | 100 |
| Restricted Area (RESTRICTED) | | 50 | 100 |
| Military Operations Area [MOA(MILITARY)] | | 50 | 250 |
| Other/Air Defense Interdiction Zone (OTHER/ADIZ) | | 50 | 250 |

**Table 5-3  Airspace Symbol Information**

### SYMBOL SETUP

All navigation maps can display land, aviation and airspace symbols.  Symbol types (e.g. runway extensions, railroads) can be removed individually.  The range sets the maximum range at which items appear on the display. For example, enabling "Runway Extension" displays a dashed line on the map extending from each runway of an airport in the flight plan when the range is set at or below the value of the map settings option.

**Setting up the 'Land', 'Aviation' or 'Airspace' group items:**

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Settings' option.

2) Press the **ENT** Key. The Map Settings Menu is displayed.

3) Turn the small **FMS** Knob to select the desired group.

4) Press the **ENT** Key. The cursor flashes on the first field.

5) Turn the large **FMS** Knob to select the desired option.

6) Turn the small **FMS** Knob to select the desired setting (e.g. On/Off or maximum range).

7) Press the **ENT** Key to accept the selected option and move the cursor to the next item.

8) Repeat steps 5-7 as necessary.

9) Press the **FMS** Knob to return to the Navigation Map Page.

## MAP DECLUTTER

The declutter feature allows the pilot to progressively step through four levels of removing map information. The declutter level is displayed in the **Detail** Softkey and next to the Declutter Menu Option.

**Decluttering the map:**

Select the **Detail** Softkey with the Navigation Map Page displayed. The current declutter level is shown. With each softkey selection, another level of map information is removed.

**Or**:

1) Press the **MENU** Key with the Navigation Map Page displayed.

2) Select 'Declutter'. The current declutter level is shown.

3) Press the **ENT** Key.

**Decluttering the PFD Inset Map:**

1) Press the **Map/HSI** Softkey.

2) Select the **Detail** Softkey. The current declutter level is shown. With each selection, another level of map information is removed.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

Table 5-4 lists the items that are decluttered at each map detail level. The 'X' represents map items decluttered for each level of detail.

| Item | Detail 3 | Detail 2 | Detail 1 |
|---|---|---|---|
| Data Link Radar Precipitation | | | X |
| Data Link Lightning | | | X |
| Graphical METARs | | | X |
| Airports | | | X |
| Safe Taxi | | | X |
| Runway Labels | | | X |
| TFRs | | | X |
| Restricted | | | X |
| MOA (Military) | | | X |
| User Waypoints | | X | X |
| Latitude/Longitude Grid | | X | X |
| NAVAIDs (does not declutter if used to define airway) | | X | X |
| Intersections (does not declutter if used to define airway) | | X | X |
| Class B Airspaces/TMA | | X | X |
| Class C Airspaces/TCA | | X | X |
| Class D Airspaces | | X | X |
| Other Airspaces/ADIZ | | X | X |
| Obstacles | | X | X |
| Cities | X | X | X |
| Roads | X | X | X |
| Railroads | X | X | X |
| State/Province Boundaries | X | X | X |

**Table 5-4 Navigation Map Items Decluttered for each Detail Level**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## AIRWAYS

This airways discussion is based upon the North American airway structure. The airway structure in places other than North America vary by location, etc. and are not discussed in this book. Low Altitude Airways (Victor Airways or T-Routes) start 1,200 feet above ground level (AGL) and extend up to 18,000 feet mean sea level (MSL). Low Altitude Airways are designated with a "V" or a "T" before the airway number.

High Altitude Airways (Jet Routes or Q-Routes) start at 18,000 feet MSL and extend upward to 45,000 feet MSL. High Altitude Airways are designated with a "J" or a "Q" before the airway number.

Low Altitude Airways are drawn in gray (the same shade used for roads). High Altitude Airways are drawn in green. When both types of airways are displayed, High Altitude Airways are drawn on top of Low Altitude Airways.

When airways are selected for display on the map, the airway waypoints (VORs, NDBs and Intersections) are also displayed.
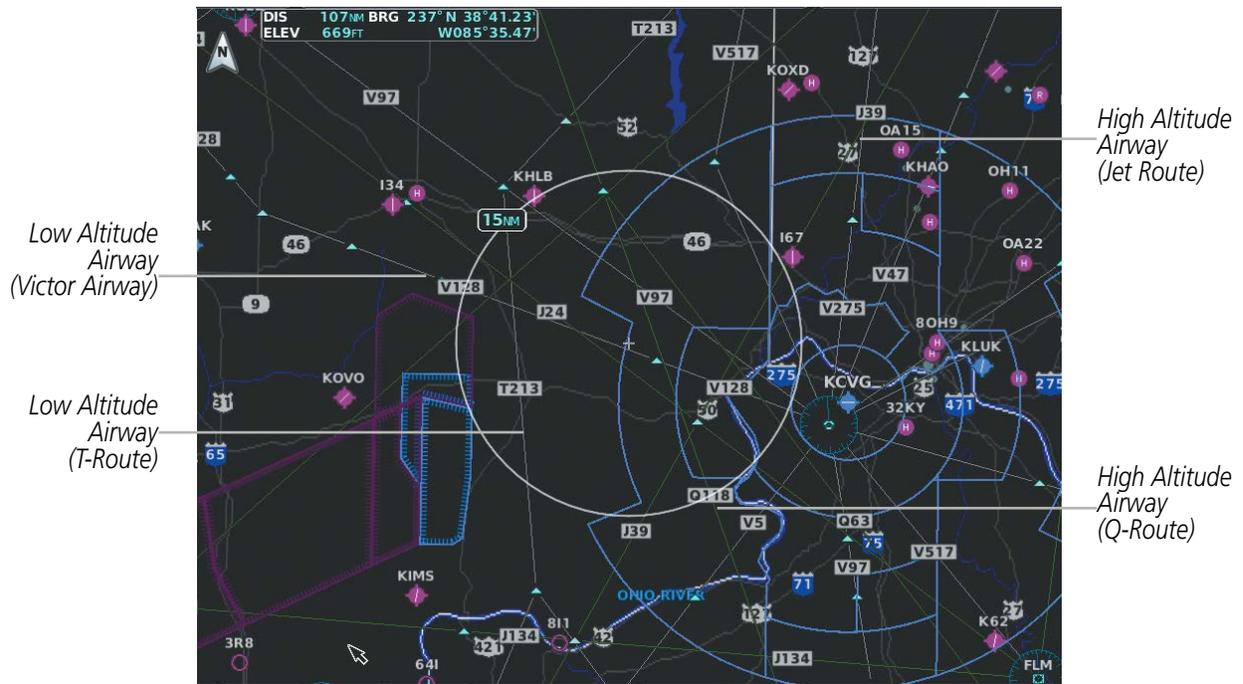


**Figure 5-15  Airways on MFD Navigation Page**

Airways may be displayed on the map at the pilot's discretion using either a combination of **AWY** Softkey selections, or menu selections using the **MENU** Key from the Navigation Map Page. The Airway range can also be programmed to only display Airways on the MFD when the map range is at or below a specific number.

**Displaying/removing airways:**

1) Select the **Map Opt** Softkey.

2) Select the **AWY** Softkey. Both High and Low Altitude Airways are displayed (AWY On).

3) Select the softkey again to display Low Altitude Airways only (AWY LO).

4) Select the softkey again to display High Altitude Airways only (AWY HI).

5) Select the softkey again to remove High Altitude Airways. No airways are displayed (AWY Off).

   **Or:**

1) Press the **MENU** Key with the Navigation Map Page displayed.  The cursor flashes on the 'Map Settings' option.

2) Press the **ENT** Key.  The Map Settings Menu is displayed.

3) Turn the small **FMS** Knob to select the 'Airways' group, and press the **ENT** Key.

4) Turn the large **FMS** Knob to highlight the desired ALT Airways 'On/Off' field.

5) Turn the **FMS** Knob to select 'Off' or 'On'.

6) Press the **FMS** Knob to return to the Navigation Map Page.

The airway range is the maximum map range on which airways are displayed.

**Selecting an airway range (Low ALT Airways or High ALT Airways):**

1) Press the **MENU** Key with the Navigation Map Page displayed.  The cursor flashes on the 'Map Settings' option.

2) Press the **ENT** Key.  The Map Settings Menu is displayed.

3) Turn the small **FMS** Knob to select the 'Airways' group, and press the **ENT** Key.

4) Highlight the 'Low ALT Airways' or 'High ALT Airways' range field.

5) To change the range setting, turn the small **FMS** Knob to display the range list.

6) Select the desired range using the small **FMS** Knob.

7) Press the **ENT** Key.

8) Press the **FMS** Knob to return to the Navigation Map Page.

The following items are configured on the airways menu:

| Airways Symbols | Symbol | Default Range (nm) | Maximum Range (nm) |
|---|---|---|---|
| Low Altitude Airways (V Routes and T Routes) |  | 50 | 100 |
| High Altitude Airways (J Routes and Q Routes) |  | 50 | 100 |

**Table 5-5  Airways Symbol Information**

## ADDITIONAL NAVIGATION MAP ITEMS

Navigation maps can display some additional items. These items (e.g. selected altitude intercept arc, track vector, wind vector, fuel range ring, and SVT field of view) can be displayed/removed individually.

**Setting up additional 'Map' group items:**

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Settings' option.

2) Press the **ENT** Key. The Map Settings Menu is displayed.

3) Turn the small **FMS** Knob to select the 'Map' group.

4) Press the **ENT** Key. The cursor flashes on the first field.

5) Turn the large **FMS** Knob to select the desired option.

6) Turn the small **FMS** Knob to select 'On' or 'Off'.

   **Or**:

   If it is a data field, use the **FMS** Knob to select the range or time value.

7) Press the **ENT** Key to accept the selected option and move the cursor to the next item.

8) Repeat steps 5-7 as necessary.

9) Press the **FMS** Knob to return to the Navigation Map Page.

## SELECTED ALTITUDE INTERCEPT ARC

The map can display the location along the current track where the aircraft will intercept the selected altitude. The location will be shown as a cyan arc when the aircraft is actually climbing or descending.



*Selected Altitude Intercept Arc*

**Figure 5-16  Navigation Map - Range to Altitude Arc**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## TRACK VECTOR

The Navigation Map can display a track vector that  is useful in minimizing track angle error.  The track vector is a solid cyan line segment extended to a predicted location.  The track vector look-ahead time is selectable (30 sec, 60 sec (default), 2 min, 5 min, 10 min, 20 min) and determines the length of the track vector. The track vector shows up to 90 degrees of a turn for the 30 and 60 second time settings.  It is always a straight line for the 2 min, 5 min, 10 min and 20 min settings.
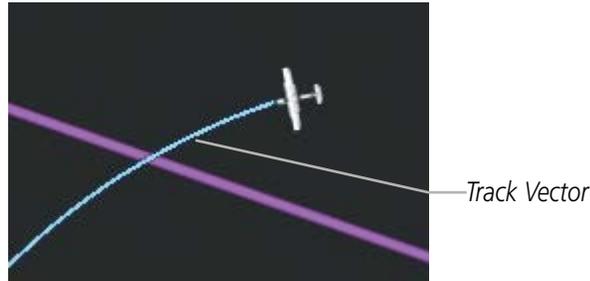


*Track Vector*

**Figure 5-17  Navigation Map -Track Vector**

## WIND VECTOR

The map displays a wind vector arrow in the upper right-hand portion of the screen.  Wind vector information is displayed as a white arrow pointing in the direction in which the wind is moving for wind speeds greater than or equal to 1 kt.



*Wind Direction* — *Wind Speed*

**Figure 5-18  Navigation Map - Wind Vector**

**NOTE:** *The wind vector is not displayed until the aircraft is moving. It is not displayed on the Waypoint Information pages.*

## FUEL RANGE RING

The map can display a fuel range ring which shows the remaining flight distance. A dashed green circle indicates the selected range to reserve fuel. A solid green circle indicates the total endurance range. If only reserve fuel remains, the range is indicated by a solid amber circle.



*Time to Reserve Fuel*
*Range to Reserve Fuel*
*Total Endurance Range*

**Figure 5-19  Navigation Map - Fuel Range Ring**

## FIELD OF VIEW (SVT)

The map can display the boundaries of the PFD Synthetic Vision Technology (SVT) lateral field of view. The field of view is shown as two dashed lines forming a V shape in front of the aircraft symbol on the map. This is only available if SVT is installed on the aircraft.



*Lateral Field of View Boundaries*
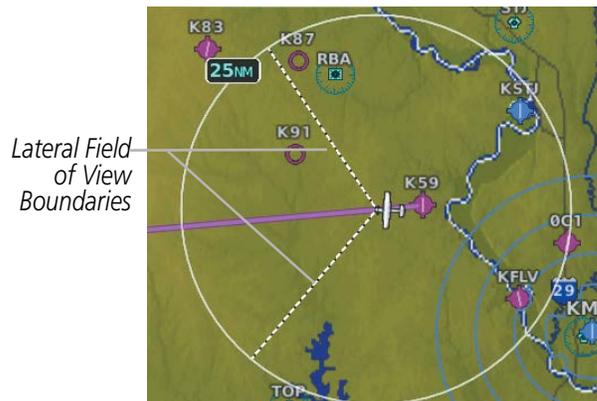
**Figure 5-20  Navigation Map - Field of View**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM
OVERVIEW

FLIGHT
INSTRUMENTS

EIS

AUDIO PANEL
& CNS

FLIGHT
MANAGEMENT

HAZARD
AVOIDANCE

AFCS

ADDITIONAL
FEATURES

APPENDICES

INDEX

## IFR/VFR CHARTS

The system can display GPS navigation information on a VFR chart, a low altitude IFR chart, or a high altitude IFR chart. The information overlaid on the IFR/VFR Charts is selected and setup on the Navigation Map, but the IFR/VFR charts will not display some of the selected items. Only the following items will be overlaid on the chart:

- Map Pointer (distance and bearing to pointer, location of pointer, name, and other pertinent information)
- Map Range (17 range choices from 1 nm to 150 nm)
- Map Orientation (always North Up for IFR/VFR Charts)
- Aircraft Icon (representing present position)
- Wind Direction and Speed
- Icons for enabled map features (Traffic only)
- Flight Plan Legs
- Track Vector
- Runway Extension
- Missed Approach Preview
- Intersections (only as part of active flight plan)
- Visual Reporting Points
- VNAV Constraints
- Selected Altitude Intercept Arc



**Figure 5-21  GPS Navigation Information on the VFR Chart**

Navigation Status Box

Navigation Page Title

Map Orientation

IFR Low Altitude Chart

Map Range

Active Flight Plan Leg

Aircraft Icon at Present Position

**Figure 5-22  GPS Navigation Information on the IFR Low Altitude Chart**

Navigation Status Box

Navigation Page Title

Map Orientation

IFR High Altitude Chart

Map Range

Active Flight Plan Leg

Aircraft Icon at Present Position
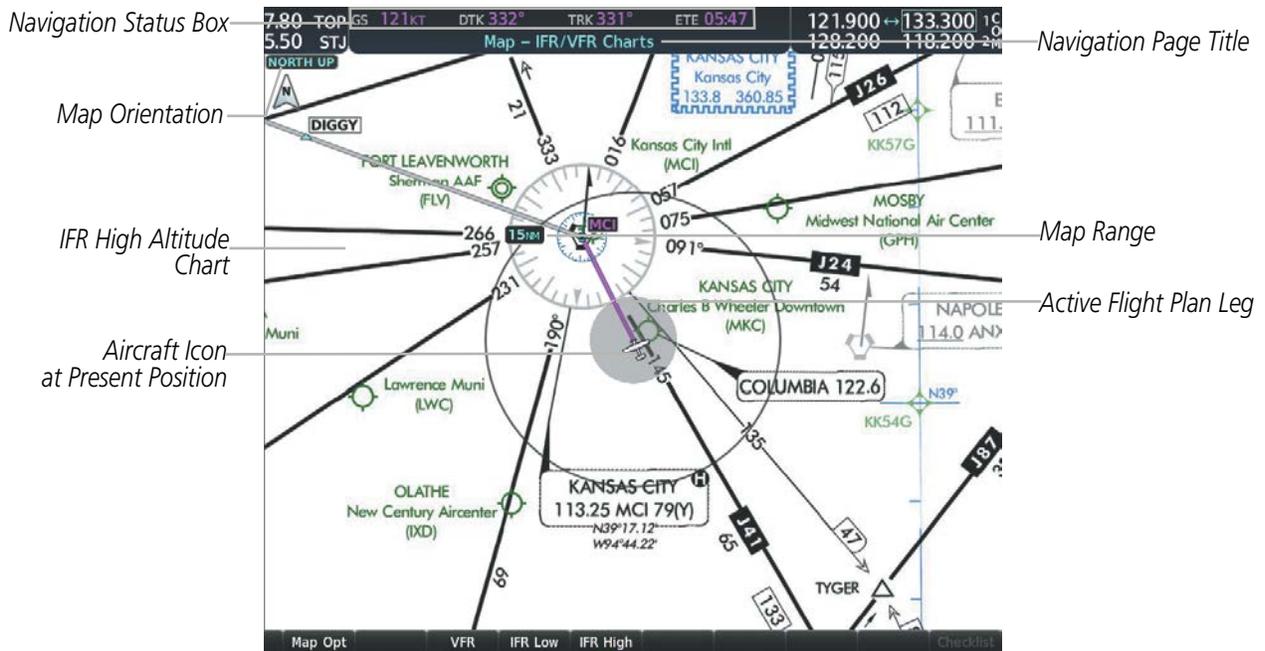
**Figure 5-23  GPS Navigation Information on the IFR High Altitude Chart**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

Map panning on the IFR/VFR Charts works the same as on the Navigation Map. Map range selected on either the Navigation Map or the IFR/VFR Charts applies to both. However, if the range selected on the Navigation Map it is not a valid chart range, the chart is shown with a range of 7.5 nm.

**Modifying the chart settings:**

1) Press the **MENU** Key with the IFR Low / IFR High Chart displayed. The cursor flashes on the 'Settings' option.

2) Press the **ENT** Key. The cursor flashes on the 'Color Scheme' setting.

3) Turn the small **FMS** Knob to select 'Day', 'Auto', or 'Night'. The IFR Chart display changes to reflect the setting.

4) If 'Auto' was selected, turn the large **FMS** Knob to select the backlight threshold field (sets value for automatic day/night switching).

**Selecting the chart to display:**

1) Press the **MENU** Key with the IFR/VFR Charts Page displayed.

2) Turn the **FMS** Knob to highlight the 'Display VFR' field, the 'Display IFR Low' field, or the 'Display IFR High' field.

3) Press the **ENT** Key. The selected chart is displayed.

## 5.3 WAYPOINTS

Waypoints are predetermined geographical positions (internal database) or pilot-entered positions, and are used for all phases of flight planning and navigation.

Communication and navigation frequencies can be tuned "automatically" from various Waypoint Information (WPT) pages, Nearest (NRST) pages, and the Nearest Airports Window (on PFD). This auto-tuning feature simplifies frequency entry over manual tuning. Refer to the Audio Panel and CNS section for details on auto-tuning.

Waypoints can be selected by entering the ICAO identifier, entering the name of the facility, or by entering the city name. See the System Overview section for detailed instructions on entering data in the system. As a waypoint identifier, facility name, or location is entered, the Spell'N'Find feature scrolls through the database, displaying those waypoints matching the characters which have been entered to that point. A direct-to navigation leg to the selected waypoint can be initiated by pressing the **Direct-to** Key on any of the waypoint pages.



**Figure 5-24  Waypoint Information Window**

If duplicate entries exist for the entered facility name or location, additional entries may be viewed by continuing to turn the small **FMS** Knob during the selection process.  If duplicate entries exist for an identifier, a Duplicate Waypoints Window is displayed when the **ENT** Key is pressed.

Identifier with Duplicates

Duplicate Waypoints

Duplicate Message

**Figure 5-25  Waypoint Information Window - Duplicate Identifier**

## AIRPORTS

✔ **NOTE:**  'North Up' orientation on the Airport Information Page cannot be changed; the pilot needs to be aware of proper orientation if the Navigation Map orientation is different from the Airport Information Page Map.

The Airport Information Page is the first page in WPT group and allows the pilot to view airport information, load frequencies (COM, NAV, and lighting), review runways, and review instrument procedures that may be involved in the flight plan. See the Audio Panel and CNS Section for more information on loading frequencies (auto-tuning). After engine startup, the Airport Information Page defaults to the airport where the aircraft is located. After a flight plan has been loaded, it defaults to the destination airport.  On a flight plan with multiple airports, it defaults to the airport which is the current active waypoint.

In addition to displaying a map of the currently selected airport and surrounding area, the Airport Information Page displays airport information in three boxes labeled 'Airport', 'Runways', and 'Frequencies'. For airports with multiple runways, information for each runway is available. This information is viewed on the Airport Information Page by pressing the **Info** softkey until **1** is displayed.

*Navigation Map Showing Selected Airport*

*Airport/Runway Diagram*

*Airport Information*
*- ID/Facility/City*
*- Usage Type/Region*
*- Lat/Long/Elev*
*- Fuel Available*
*- Time Zone (UTC Offset)*

*Runway Information*
*- Designation*
*- Length/Width/Surface*
*- Lighting Available*

*COM/NAV Freq. Info.*
*- Identification*
*- Frequency*
*- Availability*
*- Additional Information*

**Figure 5-26  Airport Information Page**

The following descriptions and abbreviations are used on the Airport Information Page:

- Usage type: Public, Military, Private, or Heliport

- Runway surface type: Hard, Turf, Sealed, Gravel, Dirt, Soft, Unknown, or Water

- Runway lighting type: No Lights, Part Time, Full Time, Unknown, or PCL Freq (for pilot-controlled lighting)

- COM Availability: TX (transmit only), RX (receive only), PT (part time), i (additional information available)

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Figure 5-27  Airport Directory Page Example**

The airport directory information is viewed on the Airport Directory Page by pressing the **Info** Softkey until **2** is displayed.  The following are types of airport directory information shown (if available) on the Airport Directory Page:

- **Airport**:  Identifier, Site Number, Name, City, State
- **Phones**:  Phone/Fax Numbers
- **Hours**:  Facility Hours, Light Hours, Tower Hours,  Beacon Hours
- **Location**: Sectional, Magnetic Variation
- **Frequencies**: Type/Frequency
- **Transportation**:  Ground Transportation Type Available
- **Approach**:  Approach Facility Name, Frequency, Frequency Parameter

- **Traffic Pattern Altitudes (TPA)**:  Aircraft Class/Altitude
- **Weather**:  Service Type, Frequency, Phone Number
- **Flight Service Station (FSS)**: FSS Name, Phone Numbers
- **Instrument Approaches**: Published Approach, Freq.
- **NAVAIDS**:  Type, Identifier, Frequency, Radial, Distance
- **Noise**:  Noise Abatement Procedures
- **Charts**:  Low Altitude Chart Number

- **Runway**:  Headings, Length, Width, Obstructions, Surface
- **Obstructions**: General Airport Obstructions
- **Special Operations at Airport**
- **Services Available**: Category, Specific Service
- **Notes**:  Airport Notes
- **Pilot Controlled Lighting**: High/Med/Low Clicks/Second
- **FBO**:  Type, Frequencies, Services, Fees, Fuel, Credit Cards, Phone/Fax Numbers

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Selecting an airport for review by identifier, facility name, or location:**

1) From the Airport Information Page, press the **FMS** Knob.

2) Use the **FMS** Knobs and enter an identifier, facility name, or location.

3) Press the **ENT** Key.

4) Press the **FMS** Knob to remove the cursor.

**Selecting a runway:**

1) With the Airport Information Page **1** displayed, press the **FMS** Knob to activate the cursor.

2) Turn the large **FMS** Knob to place the cursor in the 'Runways' Box, on the runway designator.

3) Turn the small **FMS** Knob to display the desired runway (if more than one) for the selected airport.

4) To remove the flashing cursor, press the **FMS** Knob.

**Viewing a destination airport:**

From the Airport Information Page press the **MENU** Key. Select 'View Destination Airport'. The Destination Airport is displayed.

The Airport Frequencies Box uses the descriptions and abbreviations listed in the following table:

| Communication Frequencies | | | Navigation Frequencies |
|---|---|---|---|
| Approach * | Control | Pre-Taxi | ILS |
| Arrival * | CTA * | Radar | LOC |
| ASOS | Departure * | Ramp | |
| ATIS | Gate | Terminal * | |
| AWOS | Ground | TMA * | |
| Center | Helicopter | Tower | |
| Class B * | Multicom | TRSA * | |
| Class C * | Other | Unicom | |
| Clearance | | | |
| * May include Additional Information | | | |

**Table 5-6  Airport Frequency Abbreviations**

A departure, arrival, or approach can be loaded using the softkeys on the Airport Information Page. See the Procedures section for details. METARs or TAFs applicable to the selected airport can be selected for display (see the Hazard Avoidance section for details about weather).

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**FLIGHT MANAGEMENT**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

The system provides a **Nearest** Softkey on the PFD, which gives the pilot quick access to nearest airport information (very useful if an immediate landing is required).  The Nearest Airports Window displays a list of up to 25 of the nearest airports (three entries can be displayed at one time).  If there are more than three they are displayed in a scrollable list.  If there are no nearest airports available, "None Within 200nm" is displayed.

*Bearing/Distance to Airport*

*Airport Identifier/ Type*

*COM Freq. Info.*
*- Identification*
*- Frequency*

*Approach Available*

*Length of Longest Runway*

*Additional Airports (within 200 nm)*

*Nearest Softkey*



**Figure 5-28  Nearest Airports Window on PFD**

**FLIGHT MANAGEMENT**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

Pressing the **ENT** Key while the Nearest Airports Window is shown displays the PFD Airport Information Window for the highlighted airport.  Pressing the **ENT** Key again returns to the Nearest Airports Window with the cursor on the next airport in the list. Continued presses of the **ENT** Key sequences through the information pages for all airports in the Nearest Airports list.

Airport Information
- ID/Type/City
- Facility

Airport Information
- Usage/Time/Elev
- Region

Airport Information
- Lat/Long
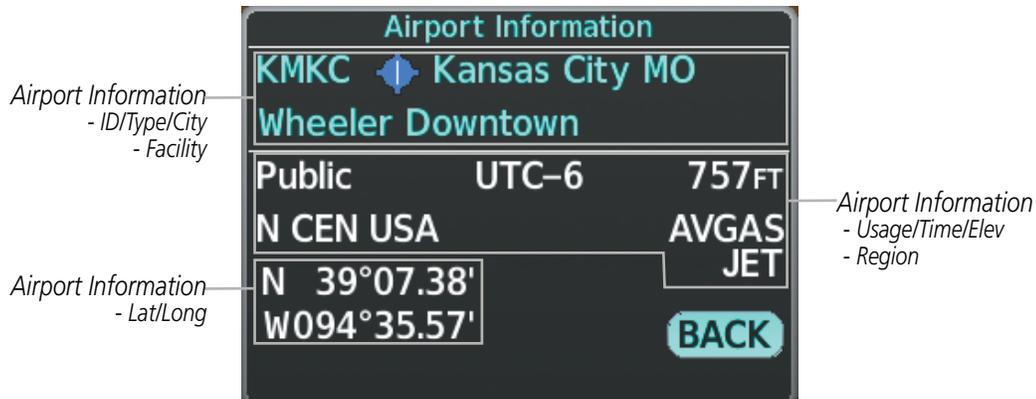
**Figure 5-29  Airport Information Window on PFD**

**Viewing information for a nearest airport on the PFD:**

1) Select the **Nearest** Softkey to display the Nearest Airports Window.

2) Highlight the airport identifier with the **FMS** Knob and press the **ENT** Key to display the Airport Information Window.

3) To return to the Nearest Airports Window press the **ENT** Key (with the cursor on 'BACK') or press the **CLR** Key.  The cursor is now on the next airport in the nearest airports list. (Repeatedly pressing the **ENT** Key moves through the airport list, alternating between the Nearest Airports Window and the Airport Information Window.)

4) Press the **CLR** Key or the **Nearest** Softkey to close the PFD Nearest Airports Window.

**FLIGHT MANAGEMENT**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

The Nearest Airports Page on the MFD is first in the group of NRST pages because of its potential use in the event of an in-flight emergency.  In addition to displaying a map of the currently selected airport and surrounding area, the page displays nearest airport information in five boxes labeled 'Nearest Airports', 'Information',  'Runways', 'Frequencies', and 'Approaches'.

The selected airport is indicated by a white arrow, and a dashed white line is drawn on the navigation map from the aircraft position to the nearest airport.  Up to five nearest airports, one runway, up to three frequencies, and up to four approaches are visible at one time. If there are more than can be shown, each list can be scrolled. If there are no items for display in a boxed area, text indicating that fact is displayed.  The currently selected airport remains in the list until it is unselected.



**Figure 5-30  Nearest Airport Page**

**Viewing information for a nearest airport on the MFD:**

1) Turn the large **FMS** Knob to select the NRST page group.

2) Turn the small **FMS** Knob to select the Nearest Airports Page (it is the first page of the group, so it may already be selected).  If there are no Nearest Airports available, "None Within 200nm" is displayed.

3) Select the **APT** Softkey; or press the **FMS** Knob; or press the **MENU** Key, highlight 'Select Airport Window' and press the **ENT** Key.  The cursor is placed in the 'Nearest Airports' Box.  The first airport in the nearest airports list is highlighted.

4) Turn the **FMS** Knob to highlight the desired airport.  (Pressing the **ENT** Key also moves to the next airport.)

5) Press the **FMS** Knob to remove the flashing cursor.

**Viewing runway information for a specific airport:**

1) With the Nearest Airports Page displayed, select the **RNWY** Softkey; or press the **MENU** Key, highlight 'Select Runway Window'; and press the **ENT** Key. The cursor is placed in the 'Runways' Box.

2) Turn the small **FMS** Knob to select the desired runway.

3) Press the **FMS** Knob to remove the flashing cursor.

See the Audio Panel and CNS Section for frequency selection and the Procedures section for approaches.

The Nearest Airports Box on the System Setup Page defines the minimum runway length and surface type used when determining the 25 nearest airports to display on the MFD Nearest Airports Page. A minimum runway length and/or surface type can be entered to prevent airports with small runways or runways that are not appropriately surfaced from being displayed. Default settings are 3000 feet (or meters) for runway length and "Hard Only" for runway surface type.

**Selecting nearest airport surface and minimum runway length matching criteria:**

1) Use the **FMS** Knob to select the System **Setup** 1 Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the runway surface field in the Nearest Airport Box.

4) Turn the small **FMS** Knob to select the desired runway option (Any, Hard Only, Hard/Soft, Water).

5) Press the **ENT** Key. The cursor moves to the minimum length field in the Nearest Airport Box.

6) Use the **FMS** Knob to enter the minimum runway length (zero to 25,000 feet) and press the **ENT** Key.

7) Press the **FMS** Knob to remove the flashing cursor.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**FLIGHT MANAGEMENT**

**GARMIN.**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## INTERSECTIONS

**NOTE:** *The VOR displayed on the Intersection Information Page is the nearest VOR, not necessarily the VOR used to define the intersection.*

The Intersection Information Page is used to view information about intersections.  In addition to displaying a map of the currently selected intersection and surrounding area, the Intersection Information Page displays intersection information in three boxes labeled 'Intersection', 'Information', and 'Nearest VOR'.



*Navigation Map Showing Selected Intersection*

*Selected Intersection*

*Intersection Identifier*

*Intersection Info*
*- Region*
*- Lat/Long*

*Nearest VOR Info*
*- Identifier/Type (symbol)*
*- Radial to VOR*
*- Distance to VOR*

**Figure 5-31  Intersection Information Page**

**Selecting an intersection:**

1) With the Intersection Information Page displayed, enter an identifier in the Intersection Box.

2) Press the **ENT** Key.

3) Press the **FMS** Knob to remove the flashing cursor.

    **Or**:

1) With the Nearest Intersections Page displayed, press the **FMS** Knob.

2) Press the **ENT** Key or turn either **FMS** Knob to select an identifier in the Nearest Intersection Box.

3) Press the **FMS** Knob to remove the flashing cursor.

The Nearest Intersections Page can be used to quickly find an intersection close to the flight path. In addition to displaying a map of the surrounding area, the page displays information for up to 25 nearest intersections in three boxes labeled 'Nearest INT', 'Information', and 'Reference VOR'.

The selected intersection is indicated by a white arrow. Up to 12 intersections are visible at a time. If there are more than can be shown, the list can be scrolled. If there are no items for display, text indicating that fact is displayed.

> **NOTE:** *The list only includes waypoints that are within 200 nm.*



*Navigation Map Showing Nearest Intersection*

*Nearest Intersection*

*Intersection Information*
- *Identifier/Symbol*
- *Bearing/Distance to intersection from aircraft position*

*Intersection Lat/Long*

*Reference VOR Info*
- *Identifier/Type (symbol)*
- *VOR Frequency*
- *Bearing/Distance to VOR*

**Figure 5-32  Nearest Intersections Page**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## NDBs

The NDB Information Page is used to view information about NDBs. In addition to displaying a map of the currently selected NDB and surrounding area, the page displays NDB information in four boxes labeled 'NDB', 'Information', 'Frequency', and 'Nearest Airport'.



**Figure 5-33  NDB Information Page**

> ✓ **NOTE:** *Compass locator (LOM, LMM): a low power, low or medium frequency radio beacon installed in conjunction with the instrument landing system. When LOM is used, the locator is at the Outer Marker; when LMM is used, the locator is at the Middle Marker.*

**Selecting an NDB:**

1) With the NDB Information Page displayed, enter an identifier, the name of the NDB, or the city in which it's located in the NDB Box.

2) Press the **ENT** Key.

3) Press the **FMS** Knob to remove the flashing cursor.

   **Or**:

1) With the Nearest NDB Page displayed, press the **FMS** Knob.

2) Press the **ENT** Key or turn either **FMS** Knob to select an identifier in the Nearest NDB Box.

3) Press the **FMS** Knob to remove the flashing cursor.

**FLIGHT MANAGEMENT**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

The Nearest NDB Page can be used to quickly find a NDB close to the flight path. In addition to displaying a map of the surrounding area, the page displays information for up to 25 nearest NDBs in three boxes labeled 'Nearest NDB', 'Information', and 'Frequency'.

A white arrow before the NDB identifier indicates the selected NDB. Up to 12 NDBs are visible at a time. If there are more than can be shown, each list can be scrolled. The list only includes waypoints that are within 200nm. If there are no NDBs in the list, text indicating that there are no nearest NDBs is displayed. If there are no nearest NDBs in the list, the information and frequency fields are dashed.

Navigation Map Showing Selected NDB

Nearest NDB

NDB Identifier/Symbol
- Bearing/Distance to NDB from aircraft position

NDB Information
- Facility Name/City
- Type
- Lat/Long

NDB Frequency

**Figure 5-34  Nearest NDB Page**

**FLIGHT MANAGEMENT**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

GARMIN.

## VORs

The VOR Information Page can be used to view information about VOR and ILS navigation signals, or to quickly auto-tune a VOR or ILS frequency. Localizer information cannot be viewed on the VOR Information Page. If a VOR station is combined with a TACAN station it is listed as a VORTAC on the VOR Information Page and if it includes only DME, it is displayed as VOR-DME.

In addition to displaying a map of the currently selected VOR and surrounding area, the VOR Information Page displays VOR information in four boxes labeled 'VOR', 'Information', 'Frequency', and 'Nearest Airport'.



Navigation Map Showing Selected VOR

Selected VOR

VOR Identifier/Type
- Facility Name
- Nearest City

VOR Information
- Class/Magnetic Variation
- Region
- Lat/Long

VOR Frequency

Nearest Airport Info
- Identifier/Type (symbol)
- Bearing/Distance to Airport

**Figure 5-35  VOR Information Page**

The VOR classes used in the VOR information box are:  Low Altitude, High Altitude, and Terminal.

**Selecting a VOR:**

1) With the VOR Information Page displayed, enter an identifier, the name of the VOR, or the city in which it's located in the VOR Box.

2) Press the **ENT** Key.

3) Press the **FMS** Knob to remove the flashing cursor.

**Or**:

FLIGHT MANAGEMENT

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**1)** With the Nearest VOR Page displayed, press the **FMS** Knob or press the **VOR** Softkey.

**2)** Press the **ENT** Key or turn either **FMS** Knob to select an identifier in the Nearest VOR Box.

**3)** Press the **FMS** Knob to remove the flashing cursor.

**Or**:

**1)** With the Nearest VOR Page displayed, press the **MENU** Key.

**2)** Highlight 'Select VOR Window', and press the **ENT** Key.

**3)** Press the **ENT** Key or turn either **FMS** Knob to select an identifier in the Nearest VOR Box.

**4)** Press the **FMS** Knob to remove the flashing cursor.

The Nearest VOR Page can be used to quickly find a VOR station close to the aircraft. Also, a NAV frequency from a selected VOR station can be loaded from the Nearest VOR Page. In addition to displaying a map of the surrounding area, the Nearest VOR Page displays information for up to 25 nearest VOR stations in three boxes labeled 'Nearest VOR', 'Information', and 'Frequency'. The list only includes waypoints that are within 200 nm.

A white arrow before the VOR identifier indicates the selected VOR. Up to 12 VORs are visible at a time. If there are more than can be shown, each list can be scrolled. If there are no VORs in the list, text indicating that there are no nearest VORs is displayed. If there are no nearest VORs in the list, the information is dashed.



**Figure 5-36 Nearest VOR Page**

**GARMIN.**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## VRPs

The VRP Information Page is used to view information about visual reporting points (VRPs).  In addition to displaying a map of the currently selected VRP and surrounding area, the VRP Information Page displays VRP information in two boxes labeled 'VRP' and 'Information".



*Navigation Map Showing Selected VRP*

*Selected VRP*

*VRP Identifier/Symbol*
*- VRP Name*

*VRP Information*
*- Country*
*- Bearing/Distance to VRP*
*  from aircraft position*
*- Lat/Long*

**Figure 5-37  VRP Information Page**

**Selecting a VRP:**

1)  With the VRP Information Page displayed, enter the identifier or the name of the VRP in the VRP Box.

2)  Press the **ENT** Key.

3)  Press the **FMS** Knob to remove the flashing cursor.

   **Or**:

1)  With the Nearest VRP Page displayed, press the **FMS** Knob.

2)  Press the **ENT** Key or turn either **FMS** Knob to select an identifier in the Nearest VRP Box.

3)  Press the **FMS** Knob to remove the flashing cursor.

**FLIGHT MANAGEMENT**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

The Nearest VRP Page can be used to quickly find a VRP close to the aircraft. In addition to displaying a map of the surrounding area, the Nearest VRP Page displays information for up to 25 nearest VRPs in two boxes labeled 'Nearest VRP' and 'Information'. The list only includes VRPs that are within 200 nm.

A white arrow before the VRP identifier indicates the selected VRP. Up to 12 VRPs are visible at a time. If there are more than can be shown, the list can be scrolled. If there are no VRPs in the list, text indicating that there are no nearest VRPs is displayed. If there are no nearest VRPs in the list, the information is dashed.



*Navigation Map Showing Nearest VRP*

*Nearest VRP*

*VRP Identifier/Symbol*
 *- Bearing/Distance to VRP from aircraft position*

*VRP Information*
 *- VRP Name*
 *- Country*
 *- Lat/Long*

**Figure 5-38  Nearest VRP Page**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## USER WAYPOINTS

The system can create and store up to 1,000 user-defined waypoints.  User waypoints can be created from any map page (except PFD Inset Map, Aux-Trip Planning Page, or Procedure Pages) by selecting a position on the map using the **Joystick**, or from the User Waypoint Information Page by referencing a bearing/distance from an existing waypoint, bearings from two existing waypoints, or a latitude and longitude.  Once a waypoint has been created, it can be renamed, deleted, or moved.  Temporary user waypoints are erased upon system power down.



**Figure 5-39  User Waypoint Information Page**

**Selecting a User Waypoint:**

1) With the User Waypoint Information Page displayed, enter the name of the User Waypoint, or scroll to the desired waypoint in the User Waypoint List using the large **FMS** Knob.

2) Press the **ENT** Key.

3) Press the **FMS** Knob to remove the flashing cursor.

   **Or**:

1) With the Nearest User Waypoints Page displayed, press the **FMS** Knob.

2) Press the **ENT** Key or turn either **FMS** Knob to select an identifier in the Nearest User Box.
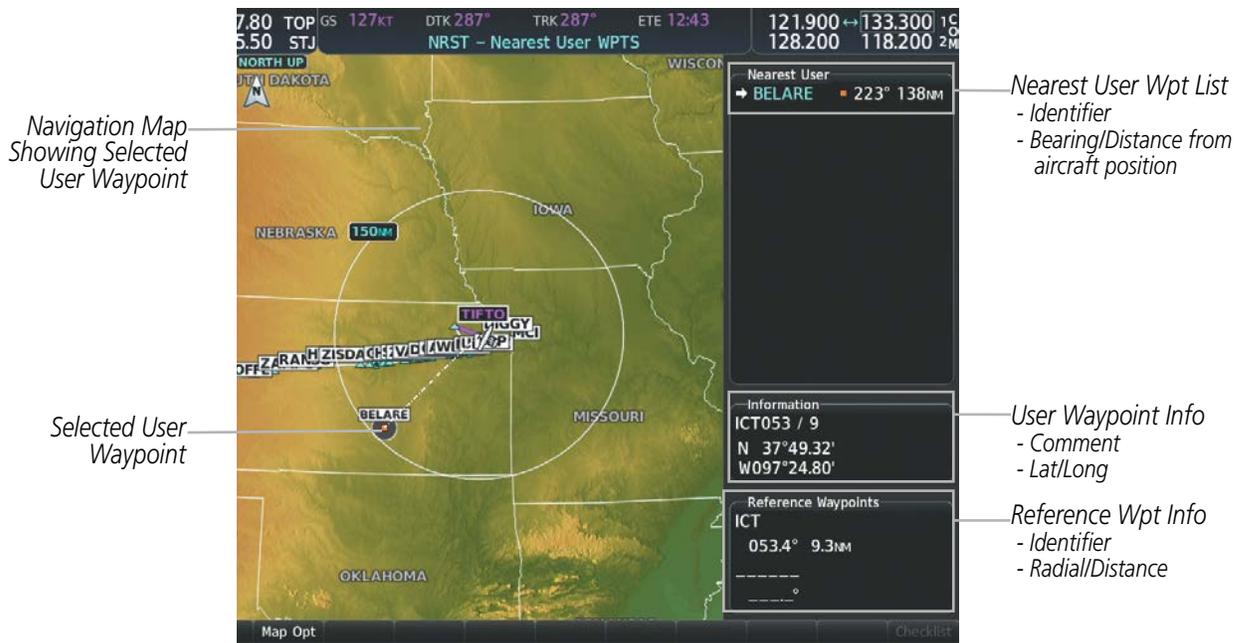
3) Press the **FMS** Knob to remove the flashing cursor.

**FLIGHT MANAGEMENT**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

*Navigation Map Showing Selected User Waypoint*

*Nearest User Wpt List*
*- Identifier*
*- Bearing/Distance from aircraft position*

*Selected User Waypoint*

*User Waypoint Info*
*- Comment*
*- Lat/Long*

*Reference Wpt Info*
*- Identifier*
*- Radial/Distance*

**Figure 5-40  Nearest User Waypoint Page**

## CREATING USER WAYPOINTS

User waypoints can be created from the User Waypoint Information Page in the following ways:

**Creating user waypoints from the User Waypoint Information Page:**

1) Select the **New** Softkey, **or** press the **MENU** Key and select 'Create New User Waypoint'.

2) Enter a user waypoint name (up to six characters).

3) Press the **ENT** Key.  The current aircraft position is the default location of the new waypoint.

4) If desired, define the type and location of the waypoint in one of the following ways:

Select "RAD/RAD" using the small **FMS** Knob, press the **ENT** Key, and enter the two reference waypoint identifiers and radials into the Reference Waypoints window using the **FMS** Knobs.

**Or**:

Select "RAD/DIS" using the small **FMS** Knob, press the **ENT** Key, and enter the reference waypoint identifier, the radial, and the distance into the Reference Waypoints window using the **FMS** Knobs.

**Or**:

Select "LAT/LON" using the small **FMS** Knob, press the **ENT** Key, and enter the latitude and longitude into the Information window using the **FMS** Knobs.

5) Press the **ENT** Key to accept the new waypoint.

6) If desired, change the storage method of the waypoint to temporary by moving the cursor to "Temporary" and selecting the **ENT** Key to check the box.

7) Press the **FMS** Knob to remove the flashing cursor.

**Or**:

1) Press the **FMS** Knob to activate the cursor.

2) Enter a user waypoint name (up to six characters).

3) Press the **ENT** Key. The message 'Are you sure you want to create the new User Waypoint AAAAAA?' is displayed.

4) With 'YES' highlighted, press the **ENT** Key.

5) If desired, define the type and location of the waypoint in one of the following ways:

   Select "RAD/RAD" using the small **FMS** Knob, press the **ENT** Key, and enter the two reference waypoint identifiers and radials into the Reference Waypoints window using the **FMS** Knobs.

   **Or**:

   Select "RAD/DIS" using the small **FMS** Knob, press the **ENT** Key, and enter the reference waypoint identifier, the radial, and the distance into the Reference Waypoints window using the **FMS** Knobs.

   **Or**:

   Select "LAT/LON" using the small **FMS** Knob, press the **ENT** Key, and enter the latitude and longitude into the Information window using the **FMS** Knobs.

6) Press the **ENT** Key to accept the new waypoint.

7) If desired, change the storage method of the waypoint to temporary by moving the cursor to "Temporary" and selecting the **ENT** Key to check the box.

8) Press the **FMS** Knob to remove the flashing cursor.

**Creating user waypoints from map pages:**

1) Push the **Joystick** to activate the panning function and pan to the map location of the desired user waypoint.

2) Press the **ENT** Key. The User Waypoint Information Page is displayed with the captured position.

**NOTE:** *If the pointer has highlighted a map database feature, one of three things happens upon pressing the* **ENT** *Key: 1) information about the selected feature is displayed instead of initiating a new waypoint, 2) a menu pops up allowing a choice between 'Review Airspaces' or 'Create User Waypoint', or 3) a new waypoint is initiated with the default name being the selected map item.*

3) Enter a user waypoint name (up to six characters).

4) Press the **ENT** Key to accept the selected name. The first reference waypoint box is highlighted.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**5)** If desired, define the type and location of the waypoint in one of the following ways:

Select "RAD/RAD" using the small **FMS** Knob, press the **ENT** Key, and enter the two reference waypoint identifiers and radials into the Reference Waypoints window using the **FMS** Knobs.

**Or**:

Select "RAD/DIS" using the small **FMS** Knob, press the **ENT** Key, and enter the reference waypoint identifier, the radial, and the distance into the Reference Waypoints window using the **FMS** Knobs.

**Or**:

Select "LAT/LON" using the small **FMS** Knob, press the **ENT** Key, and enter the latitude and longitude into the Information window using the **FMS** Knobs.

**6)** Press the **ENT** Key to accept the new waypoint.

**7)** If desired, change the storage method of the waypoint to temporary by moving the cursor to "Temporary" and selecting the **ENT** Key to check or uncheck the box.

**8)** Press the **FMS** Knob to remove the flashing cursor.

**9)** Press the **Go Back** Softkey to return to the map page.

## EDITING USER WAYPOINTS

**Editing a user waypoint comment or location:**

**1)** With the User Waypoint Information Page displayed, press the **FMS** Knob to activate the cursor.

**2)** Select a user waypoint in the User Waypoint List, if required, and press the **ENT** Key.

**3)** Move the cursor to the desired field.

**4)** Turn the small **FMS** Knob to make any changes.

**5)** Press the **ENT** Key to accept the changes.

**6)** Press the **FMS** Knob to remove the flashing cursor.

**Renaming user waypoints:**

1) Highlight a user waypoint in the User Waypoint List. Select the **Rename** Softkey, or press the **MENU** Key and select 'Rename User Waypoint'.

2) Enter a new name.

3) Press the **ENT** Key. The message 'Do you want to rename the user waypoint AAAAAA to BBBBBB?' is displayed.

4) With 'YES' highlighted, press the **ENT** Key.

5) Press the **FMS** Knob to remove the flashing cursor.

**Changing the location of an existing waypoint to the aircraft present position:**

1) Enter a waypoint name or select the waypoint in the User Waypoint List, then press the **ENT** Key.

2) Press the **MENU** Key.

3) Select 'Use Present Position'.

4) Press the **ENT** Key. The new waypoint's location is saved.

5) Press the **FMS** Knob to remove the flashing cursor.

A system generated comment for a user waypoint incorporates the reference waypoint identifier, bearing, and distance. If a system generated comment has been edited, a new comment can be generated.

**Resetting the comment field to the system generated comment:**

1) Enter a waypoint name or select the waypoint in the User Waypoint List, then press the **ENT** Key.

2) Press the **MENU** Key.

3) Select 'Auto Comment'.

4) Press the **ENT** Key. The generated comment is based on the reference point used to define the waypoint.

The default type of user waypoint (normal or temporary) can be changed using the user waypoint information page menu. Temporary user waypoints are automatically deleted upon the next power cycle.

**Changing the user waypoint storage duration default setting:**

1) With the User Waypoint Information Page displayed, press the **MENU** Key.

2) Move the cursor to select 'Waypoint Setup', and press the **ENT** Key.

3) Select 'Normal' or 'Temporary' as desired, and press the **ENT** Key.

4) Press the **FMS** Knob to remove the flashing cursor and return to the User Waypoint Information Page.

## DELETING USER WAYPOINTS

**Deleting a single user waypoint:**

1) Highlight a User Waypoint in the User Waypoint List, or enter a waypoint in the User Waypoint field.

2) Select the **Delete** Softkey or press the **CLR** Key.  'YES' is highlighted in the confirmation window.

3) Press the **ENT** Key.

4) Press the **FMS** Knob to remove the flashing cursor.

   **Or**:

1) Highlight a User Waypoint in the User Waypoint List, or enter a waypoint in the User Waypoint field.

2) Press the **MENU** Key.

3) Select 'Delete User Waypoint'.

4) Press the **ENT** Key twice to confirm the selection.

5) Press the **FMS** Knob to remove the flashing cursor.

---

**NOTE:** *The option to 'Delete All User Waypoints' is not available while the aircraft is in flight.*

---

**Deleting all user waypoints:**

1) Highlight a User Waypoint in the User Waypoint List.

2) Press the **MENU** Key.

3) Select 'Delete All User Waypoints.'

4) Press the **ENT** Key twice to confirm the selection.

5) Press the **FMS** Knob to remove the flashing cursor.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

# 5.4 AIRSPACES

The system can display the following types of airspaces: Class B/TMA, Class C/TCA, Class D, Restricted, MOA (Military), Other Airspace, Air Defense Identification Zone (ADIZ), and Temporary Flight Restriction (TFR).
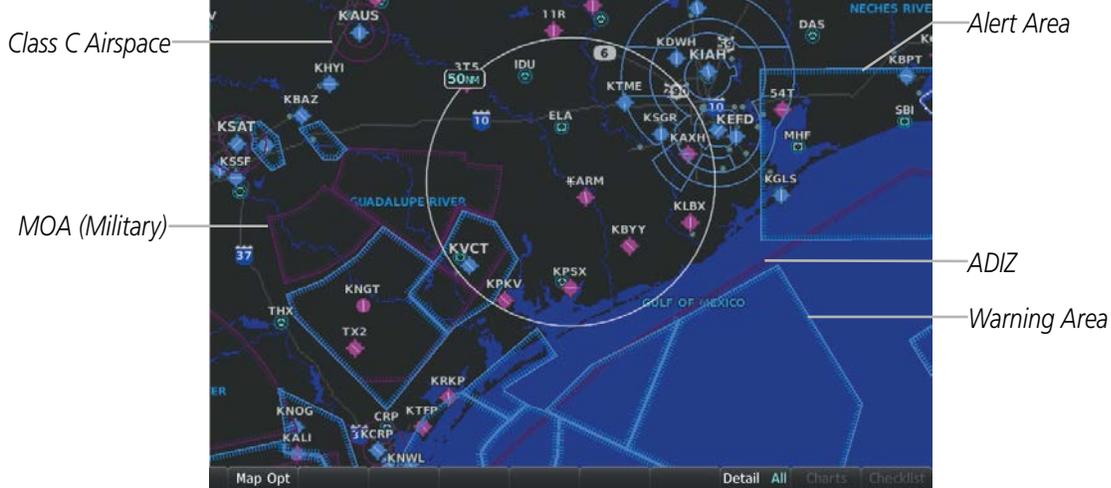


**Figure 5-41 Airspaces**

**FLIGHT MANAGEMENT**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

The Nearest Airspaces Page, Airspace Alerts Window, and Airspace Alerts on the PFD provide additional information about airspaces and the location of the aircraft in relationship to them.

The Airspace Alerts Box allows the pilot to turn the controlled/special-use airspace message alerts on or off. This does not affect the alerts listed on the Nearest Airspaces Page or the airspace boundaries depicted on the Navigation Map Page. It simply turns on/off the warning provided when the aircraft is approaching or near an airspace.

An altitude buffer is also provided which "expands" the vertical range above or below an airspace. For example, if the buffer is set at 500 feet, and the aircraft is more than 500 feet above/below an airspace, an alert message is not generated, but if the aircraft is less than 500 feet above/below an airspace and projected to enter it, the pilot is notified with an alert message. The default setting for the altitude buffer is 200 feet.

### Changing the altitude buffer distance setting:

1) Use the **FMS** Knob to select the Aux - System **Setup 1** Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the altitude buffer field in the Airspace Alerts Box.

4) Use the **FMS** Knob to enter an altitude buffer value and press the **ENT** Key.

5) Press the **FMS** Knob to remove the flashing cursor.

### Turning an airspace alert on or off:

1) Use the **FMS** Knob to select the Aux - System **Setup 1** Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the desired field in the Airspace Alerts Box.

4) Turn the small **FMS** Knob clockwise to turn the airspace alert On or counterclockwise to turn the alert Off.

5) Press the **FMS** Knob to remove the flashing cursor.

Map ranges for the airspace boundaries are selected from the Airspace Group in the Map Settings Menu. See Table 5-3 for the default and maximum ranges for each type of airspace and the symbol used to define the airspace area.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

The Nearest Airspaces Page can be used to quickly find airspaces close to the flight path. In addition, a selected frequency associated with the airspace can be loaded from the Nearest Airspaces Page. In addition to displaying a map of airspace boundaries and surrounding area, the Nearest Airspaces Page displays airspace information in four boxes labeled 'Airspace Alerts', 'Airspace Agency', 'Vertical Limits', and 'Frequencies'.



**Figure 5-42  Nearest Airspaces Page**

Airspace alerts and associated frequencies are shown in scrollable lists on the Nearest Airspaces Page. The **Alerts** and **FREQ** softkeys place the cursor in the respective list. The **FREQ** Softkey is enabled only if one or more frequencies exist for a selected airspace.

**Selecting and viewing an airspace alert with its associated information:**

1) Select the Nearest Airspaces Page.

2) Select the **Alerts** Softkey; or press the **FMS** Knob; or press the **MENU** Key, highlight 'Select Alerts Window', and press the **ENT** Key. The cursor is placed in the 'Airspace Alerts' Box.

3) Select the desired airspace.

4) Press the **FMS** Knob to remove the flashing cursor.

Pressing the PFD **Alerts** Softkey displays the Alerts window on the PFD. The following airspace alerts are displayed in the alerts window:

| Message | Comments |
|---|---|
| **INSIDE ARSPC** – Inside airspace. | The aircraft is inside the airspace. |
| **ARSPC AHEAD** – Airspace ahead – less than 10 minutes. | Special use airspace is ahead of aircraft. The aircraft penetrates the airspace within 10 minutes. |
| **ARSPC NEAR** – Airspace near and ahead. | Special use airspace is near and ahead of the aircraft position. |
| **ARSPC NEAR** – Airspace near – less than 2 nm. | Special use airspace is within 2 nm of the aircraft position. |

**Table 5-7  PFD Airspace Alert Messages**

The Smart Airspace function de-emphasizes airspaces above or below the current aircraft altitude.  The function does not require the aircraft present position or flight path to enter the lateral boundaries of the airspace.  If the current aircraft altitude is within 1100 feet of the vertical boundaries of the airspace, the airspace boundary is shown normally.  If the current aircraft altitude is not within 1100 feet of the vertical boundaries of the airspace, the airspace boundary is shown subdued.



Smart Airspace Off                                          Smart Airspace On

**Figure 5-43  Smart Airspace**

**Turning smart airspace on or off:**

1)  Use the **FMS** Knob to select the Navigation Map Page.

2)  Press the **MENU** Key, and press the **ENT** Key.  The cursor is placed in the 'Group' Box.

3)  Turn the small **FMS** Knob to highlight the 'Airspace' in the 'Group' Box and press the **ENT** Key.

4)  Turn the large **FMS** Knob to highlight the 'Smart Airspace' field in the Aviation Map Setup Window.

5)  Turn the small **FMS** Knob clockwise to turn smart airspace 'On' or counterclockwise to turn smart airspace 'Off'.

6)  Press the **FMS** Knob to remove the flashing cursor.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## 5.5 DIRECT-TO-NAVIGATION

The Direct-to method of navigation, initiated by pressing the **Direct-to** Key on either the MFD Controller or the PFD, is quicker to use than a flight plan when the desire is to navigate to a single point such as a nearby airport.

Once a direct-to is activated, the system establishes a point-to-point course line from the present position to the selected direct-to destination. Course guidance is provided until the direct-to is replaced with a new direct-to or flight plan, or cancelled.

A vertical navigation (VNV) direct-to creates a descent path (and provides guidance to stay on the path) from the current altitude to a selected altitude at the direct-to waypoint. Vertical navigation is based on barometric altitudes, not on GPS altitude, and is used for cruise and descent phases of flight.

The Direct-to Window allows selection and activation of direct-to navigation. The Direct-to Window displays selected direct-to waypoint data on the PFD and the MFD.



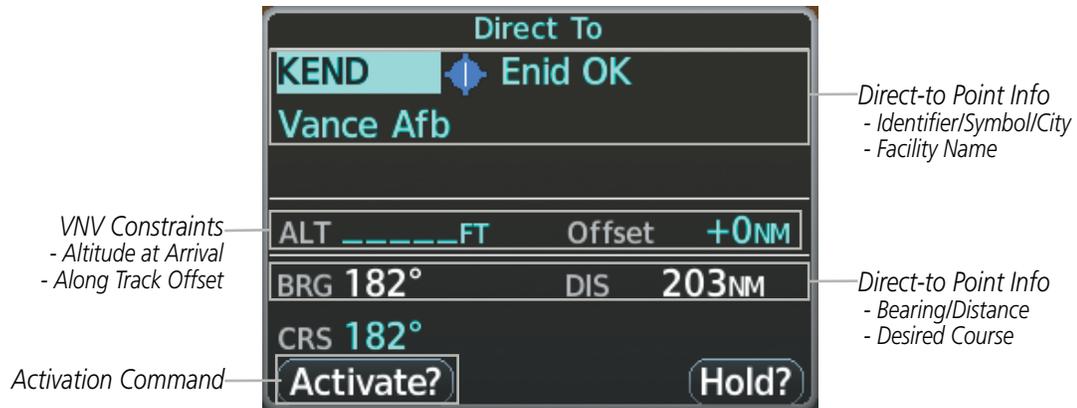**Figure 5-44  Direct-to Window - MFD**

*Direct-to Point Info*
*- Identifier/Symbol/City*
*- Facility Name*

*VNV Constraints*
*- Altitude at Arrival*
*- Along Track Offset*

*Direct-to Point Info*
*- Bearing/Distance*
*- Desired Course*

*Activation Command*

**Figure 5-45  Direct-to Window - PFD**

Any waypoint can be entered as a direct-to destination from the Direct-to Window.

**Entering a waypoint identifier, facility name, or city as a direct-to destination:**

1) Press the **Direct-to** Key.  The Direct-to Window is displayed (with the active flight plan waypoint as the default selection or a blank waypoint field if no flight plan is active).

2) Turn the small **FMS** Knob clockwise to begin entering a waypoint identifier (turning it counter-clockwise brings up the waypoint selection submenu - press the **CLR** Key to remove it), or turn the large **FMS** Knob to select the facility name, or city field and turn the small **FMS** Knob to begin entering a facility name or city.  If duplicate entries exist for the entered facility or city name, additional entries can be viewed by turning the small **FMS** Knob during the selection process.

3) Press the **ENT** Key.  The 'Activate?' field is highlighted.

4) Press the **ENT** Key to activate the direct-to.

Any waypoint contained in the active flight plan can be selected as a direct-to waypoint from the Direct-to Window, the Active Flight Plan Page, or the Active Flight Plan Window.



*Waypoint Submenu*
*- Flight Plan Waypoints*
*- Nearest Airports*
*- Recent Waypoints*
*- User Waypoints*

**Figure 5-46  Waypoint Submenu**

**Selecting an active flight plan waypoint as a direct-to destination:**

1) While navigating an active flight plan, press the **Direct-to** Key. The Direct-to Window is displayed with the active flight plan waypoint as the default selection.

2) Turn the small **FMS** Knob counter-clockwise to display a list of flight plan waypoints (the FPL list is populated only when navigating a flight plan).

3) Select the desired waypoint.

4) Press the **ENT** Key. The cursor is now displayed on 'Activate?'.

5) Press the **ENT** Key again to activate the direct-to.

   **Or**:

1) Select the Active Flight Plan Page on the MFD, or the Active Flight Plan Window on the PFD.

2) Select the desired waypoint.

3) Press the **Direct-to** Key.

4) Press the **ENT** Key. The cursor is now displayed on 'Activate?'.

5) Press the **ENT** Key again to activate the direct-to.

Any Nearest, Recent or User waypoint can be selected as a direct-to destination in the Direct-to Window.

**Selecting a Nearest, Recent or User waypoint as a direct-to destination:**

1) Press the **Direct-to** Key. The Direct-to Window is displayed (with the active flight plan destination as the default selection or a blank destination if no flight plan is active).

2) Turn the small **FMS** Knob counter-clockwise to display a list of flight plan waypoints (the FPL list is populated only when navigating a flight plan).

3) Turn the small **FMS** Knob clockwise to display the Nearest, Recent or User waypoints.

4) Turn the large **FMS** Knob clockwise to select the desired waypoint.

5) Press the **ENT** Key. The cursor is now displayed on 'Activate?'.

6) Press the **ENT** Key again to activate the direct-to.

The Direct-to Window can be displayed from any page and allows selection and activation of direct-to navigation. If the direct-to is initiated from any page except the WPT pages, the default waypoint is the active flight plan waypoint (if a flight plan is active) or a blank waypoint field. Direct-to requests on any WPT page defaults to the displayed waypoint.

**Selecting any waypoint as a direct-to destination:**

1) Select the page or window containing the desired waypoint type and select the desired waypoint.

2) Press the **Direct-to** Key to display the Direct-to Window with the selected waypoint as the direct-to destination.

3) Press the **ENT** Key. The cursor is now displayed on 'Activate?'.

4) Press **ENT** again to activate the direct-to.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Selecting a nearby airport as a direct-to destination:**

1)  Select the **Nearest** Softkey on the PFD; or turn the **FMS** Knob to display the Nearest Airports Page and press the **FMS** Knob.

2)  Select the desired airport (the nearest one is already selected).

3)  Press the **Direct-to** Key.

4)  Press the **ENT** Key. The cursor is now displayed on 'Activate?'.

5)  Press the **ENT** Key again to activate the direct-to.

Direct-to destinations may also be selected by using the pointer on the navigation map pages. If no airport, NAVAID, or user waypoint exists at the desired location, a temporary waypoint named 'MAPWPT' is automatically created at the location of the map arrow.

**Selecting a waypoint as a direct-to destination using the pointer:**

1)  From a navigation map page, push the **Joystick** to display the pointer.

2)  Move the **Joystick** to place the pointer at the desired destination location.

3)  If the pointer is placed on an existing airport, NAVAID, or user waypoint, the waypoint name is highlighted.

4)  Press the **Direct-to** Key to display the Direct-to Window with the selected point entered as the direct-to destination.

5)  Press the **ENT** Key. The cursor is now displayed on 'Activate?'.

6)  Press the **ENT** Key again to activate the direct-to.

**Cancelling a Direct-to:**

1)  Press the **Direct-to** Key to display the Direct-to Window.

2)  Press the **MENU** Key.

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

When navigating a direct-to, the system sets a direct great circle course to the selected destination. The course to a destination can also be manually selected using the course field ('Course') on the Direct-to Window.

**Selecting a manual direct-to course:**

1)  Press the **Direct-to** Key. The Direct-to Window is displayed with the destination field highlighted.

2)  Highlight the course field.

3)  Enter the desired course.

4)  Press the **ENT** Key. The cursor is now displayed on 'Activate?'.

5)  Press the **ENT** Key again to activate the direct-to.

**Reselecting the direct course from the current position:**

1)  Press the **Direct-to** Key. The Direct-to Window is displayed with the destination field highlighted.

2)  Press the **ENT** Key. The cursor is now displayed on 'Activate?'.

3)  Press the **ENT** Key again to activate the direct-to.

A direct-to with altitude constraints creates a descent path (and provides guidance to stay on the path) from the aircraft's current altitude to the altitude of the direct-to waypoint. The altitude is reached at the waypoint, or at the specified distance along the flight path if an offset distance has been entered. All VNV altitudes prior to the direct-to destination are removed from the active flight plan upon successful activation of a direct-to destination that is part of the active flight plan. All VNV altitudes following the direct-to waypoint are retained. See the section on Vertical Navigation for more information regarding the use and purpose of VNV altitudes and offset distances.

**Entering a VNV altitude and along-track offset for the waypoint:**

1)  Press the **Direct-to** Key to display the Direct-to Window.

2)  Turn the large **FMS** Knob to place the cursor over the 'VNV' altitude field.

3)  Enter the desired altitude.

4)  Press the **ENT** Key to accept the altitude constraint.

5)  If the selected waypoint is an airport, an additional choice is displayed. Turn the small **FMS** Knob to choose 'MSL' or 'AGL'.

6)  Press the **ENT** Key. The cursor is now flashing in the VNV offset distance field.

7)  Enter the desired along-track distance before the waypoint.

8)  Press the **ENT** Key. The 'Activate?' field is highlighted.

9)  Press the **ENT** Key to activate.

**Removing a VNV altitude constraint:**

1)  Press the **Direct-to** Key to display the Direct-to Window.

2)  Press the **MENU** Key.

3)  With 'Clear Vertical Constraints' highlighted, press the **ENT** Key.

**FLIGHT MANAGEMENT**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## 5.6 FLIGHT PLANNING

Flight planning on the system consists of building a flight plan by entering waypoints one at a time, adding waypoints along airways, and inserting departures, airways, arrivals, or approaches as needed. The system allows flight planning information to be entered from either the MFD or PFD. The flight plan is displayed on maps using different line widths, colors, and types, based on the type of leg and the segment of the flight plan currently being flown (departure, enroute, arrival, approach, or missed approach).

| Flight Plan Leg Type | Symbol |
|---|---|
| Active Course Leg* | |
| Active Heading Leg* | |
| Active Roll Steering Path*† | |
| Course Leg in the current flight segment | |
| Course Leg not in the current flight segment | |
| Heading Leg | |
| Roll Steering Path † | |
| Future Roll Steering Path ‡ | |
| Turn Anticipation Arc | |
| * The active leg or path is the one currently being flown, and is shown in magenta.  † A roll steering path is a computed transition between two disconnected legs.  ‡ A roll steering path in the flight plan that is beyond the next leg appears as a future roll steering path. When a future roll steering path becomes the next leg in the flight plan, it appears as a roll steering path. | |

**Table 5-8  Flight Plan Leg Symbols**

Up to 99 flight plans with up to 100 waypoints each can be created and stored in memory. One flight plan can be activated at a time and becomes the active flight plan. The active flight plan is erased when the system is turned off and overwritten when another flight plan is activated. When storing flight plans with an approach, departure, or arrival, the system uses the waypoint information from the current database to define the waypoints. If the database is changed or updated, the system automatically updates the information if the procedure has not been modified. If an approach, departure, or arrival procedure is no longer available, the procedure is deleted from the affected stored flight plan(s), and an alert is displayed (see Miscellaneous Messages in Appendix A) advising that one or more stored flight plans need to be edited.

Whenever an approach, departure, or arrival procedure is loaded into the active flight plan, a set of approach, departure, or arrival waypoints is inserted into the flight plan along with a header line describing the instrument procedure the pilot selected.  The original enroute portion of the flight plan remains active (unless an instrument procedure is activated) when the procedure is loaded.

When the database is updated, the airways need to be reloaded also.  Each airway segment is reloaded from the database given the entry waypoint, the airway identifier and the exit waypoint.  This reloads the sequence of waypoints between the entry and exit waypoints (the sequence may change when the database is updated).  The update of an airway can fail during this process.  If that happens, the airway waypoints are changed to regular (non-airway) flight plan waypoints, and an alert is displayed (see Miscellaneous Messages in Appendix A).

The following could cause the airway update to fail:

• Airway identifier, entry waypoint or exit waypoint not found in the new database.

• Airway entry/exit waypoint is not an acceptable waypoint for the airway – either the waypoint is no longer on the airway, or there is a new directional restriction that prevents it being used.

• Loading the new airway sequence would exceed the capacity of the flight plan.

## FLIGHT PLAN CREATION

There are three methods to create or modify a flight plan:

• Active Flight Plan Page on the MFD (create/modify the active flight plan)

• Active Flight Plan Window on the PFD (create/modify the active flight plan)

• Flight Plan Catalog Page on the MFD (create/modify a stored flight plan)



**Figure 5-47  Active Flight Plan Page**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Figure 5-48  Active Flight Plan Window on PFD**

*Active Flight Plan Comment*

*Active Flight Plan Leg*

*Active Flight Plan Waypoint List*
 *- Waypoint ID*
 *- Desired Track to Waypoint*
 *- Distance to Waypoint*
 *- Airway Identifier*



**Figure 5-49  Flight Plan Catalog Page**

*Catalog Contents*
 *- # Used*
 *- # Empty*

*Flight Plan List*
 *- Comment*

*Selected Flight Plan Map*

*Selected FPL Info*
 *- Departure Waypoint*
 *- Destination Waypoint*
 *- Total Flight Plan Distance*
 *- Enroute Safe Altitude*

The active flight plan is listed on the Active Flight Plan Page on the MFD, and in the Active Flight Plan Window on the PFD. It is the flight plan to which the system is currently providing guidance, and is shown on the navigation maps. Stored flight plans are listed on the Flight Plan Catalog Page, and are available for activation (becomes the active flight plan).

> **NOTE:** *The system supports AFCS lateral guidance for all leg types (using NAV or FMS APR mode). The system does not support course deviation for any heading leg types (VA, VD, VI, VM, or VR).*

**Creating an active flight plan:**

1) Press the **FPL** Key. Press the small **FMS** Knob to activate the cursor (only on MFD).

2) Select the departure airport and runway.

   a) Highlight the departure airport identifier using the FMS Knob

   b) Use the FMS Knob or the waypoint submenu to enter the identifier, facility, or city name of the departure waypoint.

   c) Press the **ENT** Key. The Set Runway Window is displayed with the Runway field highlighted.

   d) Turn the small FMS Knob to select the runway, and press the **ENT** Key.

   e) Press the **ENT** Key again to add the departure airport/runway to the flight plan.

3) Repeat step number 2 for the destination airport and runway.

4) Select the enroute waypoints.

   a) Highlight the location to insert the waypoint using the FMS Knob (If the enroute header is selected, the new waypoint is placed following the header. If an enroute waypoint or the dashes are selected, the new waypoint will be placed ahead of the selected item).

   b) Use the FMS Knob or the waypoint submenu to enter the identifier, facility, or city name of the waypoint. The active flight plan is modified as each waypoint is entered.

5) Repeat step number 4 to enter each additional enroute waypoint.

6) When all waypoints have been entered, press the **FMS** Knob to remove the cursor (if required).

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Creating a stored flight plan:**

1) From the MFD, press the **FPL** Key.

2) Turn the small **FMS** Knob clockwise to display the Flight Plan Catalog Page.

3) Select the **New** Softkey; or press the **MENU** Key, highlight 'Create New Flight Plan', and press the **ENT** Key to display a blank flight plan for the first empty storage location.

4) Select the origin airport and runway.

   a) Highlight the origin airport identifier using the **FMS** Knob.

   b) Use the **FMS** Knob or the waypoint submenu to enter the identifier, facility, or city name of the origin waypoint.

   c)  Press the **ENT** Key.  The Set Runway Window is displayed with the Runway field highlighted.

   d) Turn the small **FMS** Knob to select the runway, and press the **ENT** Key.

   e) Press the **ENT** Key again to add the origin airport/runway to the flight plan.

5) Repeat step number 4 for the destination airport and runway.

6) Select the enroute waypoints.

   a) Highlight the location to insert the waypoint using the **FMS** Knob (If the enroute header is selected, the new waypoint is placed following the header.  If an enroute waypoint or the dashes are selected, the new waypoint will be placed ahead of the selected item.)

   b) Use the **FMS** Knob or the waypoint submenu to enter the identifier, facility, or city name of the waypoint.

   c) Press the **ENT** Key.  The stored flight plan is modified as each waypoint is entered.

7) Repeat step number 6 to enter each additional enroute waypoint.

8) When all waypoints have been entered, press the **FMS** Knob to remove the cursor.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## FLIGHT PLAN IMPORT/EXPORT

Flight plans can be imported from an SD Card or exported to an SD Card from the Stored Flight Plan Page.

### Importing a Flight Plan from an SD Card:

1) Insert the SD card containing the flight plan in the top card slot on the MFD.

2) Press the **FPL** Key to display the Active Flight Plan Page on the MFD.

3) Turn the small **FMS** Knob to select the Flight Plan Catalog Page.

4) Press the **FMS** Knob to activate the cursor.

5) Turn either **FMS** Knob to highlight an empty or existing flight plan.

6) Press the **Import** Softkey; or press the **MENU** Key, select "Import Flight Plan", and press the **ENT** Key.

   If an empty slot is selected, a list of the available flight plans on the SD card will be displayed.

   **Or**:

   If an existing flight plan is selected, an "Overwrite existing flight plan? OK or CANCEL" prompt is displayed. Press the **ENT** Key to choose to overwrite the selected flight plan and see the list of available flight plans on the SD card. If overwriting the existing flight plan is not desired, select "CANCEL" using the **FMS** Knob, press the **ENT** Key, select another flight plan slot, and press the **Import** Softkey again.

7) Turn the small **FMS** Knob to highlight the desired flight plan for importing.

8) Press the **ENT** Key to initiate the import.

9) Press the **ENT** Key again to confirm the import.

> **NOTE:** *If the imported flight plan contains a waypoint with a name that duplicates the name of a waypoint already stored on the system, the system compares the coordinates of the imported waypoint with those of the existing waypoint. If the coordinates are different, the imported waypoint is automatically renamed by adding characters to the end of the name.*

### Exporting a Flight Plan to an SD Card:

1) Insert the SD card into the top card slot on the MFD.

2) Press the **FPL** Key to display the Active Flight Plan Page on the MFD.

3) Turn the small **FMS** Knob to select the Flight Plan Catalog Page.

4) Press the **FMS** Knob to activate the cursor.

5) Turn the large **FMS** Knob to highlight the flight plan to be exported.

6) Press the **Export** Softkey; or press the **MENU** Key, select "Export Flight Plan".

7) If desired, change the name for the exported file by turning the large **FMS** Knob to the left to highlight the name, then use the small and large **FMS** knobs to enter the new name, and press the **ENT** Key.

8) Press the **ENT** Key to initiate the export.

9) Press the **ENT** Key to confirm the export.

> **NOTE:** *The exported flight plan will not contain any procedures or airways.*

**FLIGHT MANAGEMENT**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

Flight plans can be transferred to or from a mobile device via the Flight Stream 510 Bluetooth wireless connection. Transfer of a flight plan to a mobile device is controlled by the mobile device.

**Previewing a pending flight plan transfer from a wireless connection:**

1) When a flight plan transfer has been initiated from a mobile device, a Pending Flight Plan pop-up alert appears in the lower right corner of the MFD, and an Connext annunciation appears to the right of the MFD page name.

2) Press the **ENT** Key to display the Preview Flight Plan Page on the MFD.

   **Or**:

   Select the **Preview** Softkey to display the Preview Flight Plan Page on the MFD.

   **Or**:

   a) Press the **MENU** Key,

   b) Turn the **FMS** Knob to highlight 'Preview Flight Plan'.

   c) Press the **ENT** Key to display the Preview Flight Plan Page on the MFD.

**Ignoring a pending flight plan transfer from a wireless connection:**

1) When a flight plan transfer has been initiated from a mobile device, a Pending Flight Plan pop-up alert appears in the lower right corner of the MFD, and an Connext annunciation appears to the right of the MFD page name.

2) Press the **CLR** Key to remove the pop-up alert and ignore the pending flight plan. The pending flight plan will still be available on the Flight Plan Catalog page.

   **Or**:

   Select the **Ignore** Softkey to remove the pop-up alert and ignore the pending flight plan. The pending flight plan will still be available on the Flight Plan Catalog page.
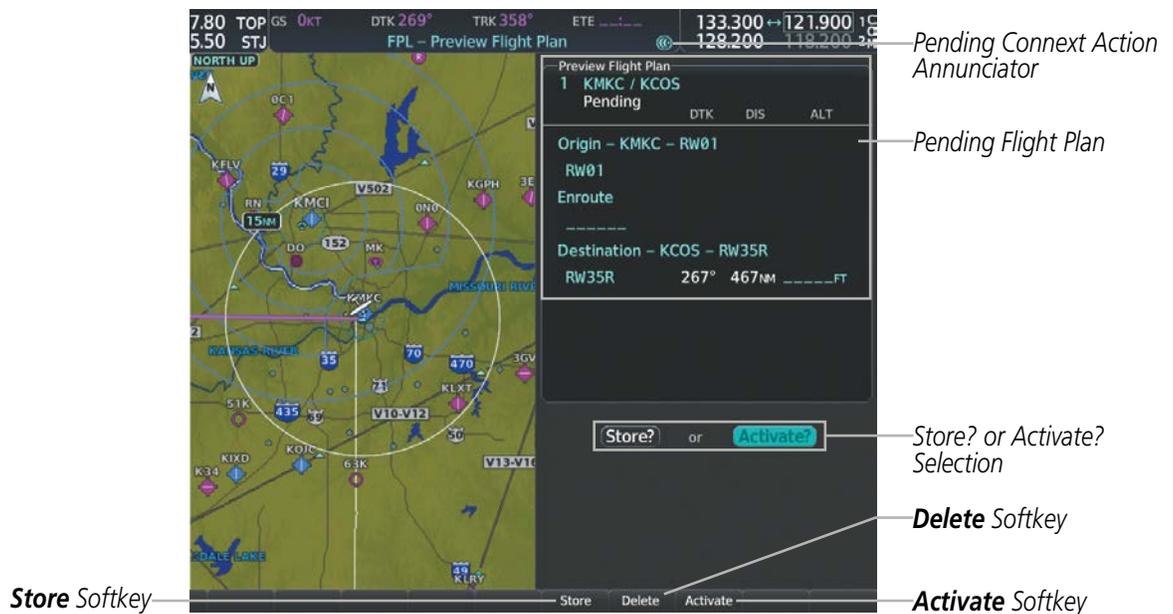


**Figure 5-50  Preview Flight Plan Page**

*Pending Connext Action Annunciator*

*Pending Flight Plan*

*Store? or Activate? Selection*

***Delete** Softkey*

***Store** Softkey*

***Activate** Softkey*

*Pending Connext Action Annunciator*

*Pending Flight Plan*

*Pending Flight Plan Pop-Up Alert*

*Ignore Softkey*

*Preview Softkey*

**Figure 5-51  Pending Flight Plan Transfer**

**Storing a pending flight plan:**

1) Press the **FPL** Key.

2) Turn the small **FMS** Knob to display the Flight Plan Catalog Page.

3) Press the **FMS** Knob to activate the cursor, and

4) Turn the **FMS** Knob to highlight the pending flight plan.

5) Press the **ENT** Key to display the Preview Flight Plan Page on the MFD.

6) Select the **Store** Softkey to store the flight plan.  The pending flight plan is stored and the pending annunciation is removed.

**Or**:

a) Press the **FMS** Knob to activate the cursor.

b) Turn the **FMS** Knob to highlight 'Store?'.

c) Press the **ENT** Key to store the flight plan.  The pending flight plan is stored and the pending annunciation is removed.

**Or**:

a) Press the **MENU** Key,

b) Turn the **FMS** Knob to highlight 'Store Flight Plan'.

c) Press the **ENT** Key to store the flight plan.  The pending flight plan is stored and the pending annunciation is removed.

**FLIGHT MANAGEMENT**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Activating a pending 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, and turn the **FMS** Knob to highlight the pending flight plan.

3) Press the **ENT** Key to display the Preview Flight Plan Page on the MFD.

4) Select the **Activate** Softkey.  The 'Activate Flight Plan?' window is displayed.

   **Or**:

   a) Press the **FMS** Knob to activate the cursor.

   b) Turn the **FMS** Knob to highlight 'Activate?'.

   c) Press the **ENT** Key.  The 'Activate Flight Plan?' window is displayed.

   **Or**:

   a) Press the **MENU** Key.

   b) Turn the **FMS** Knob to highlight 'Activate Flight Plan'.

   c) Press the **ENT** Key.  The 'Activate Flight Plan?' window is displayed.

5) With 'OK' highlighted, press the **ENT** Key to activate the pending flight plan.  The pending flight plan becomes the active flight plan and is removed from the Flight Plan Catalog Page.  To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

**Deleting a pending flight plan:**

1) Press the **FPL** Key.

2) Turn the small **FMS** Knob to display the Flight Plan Catalog Page.

3) Press the **FMS** Knob to activate the cursor.

4) Turn the **FMS** Knob to highlight the desired pending flight plan.

5) Select the **Delete** Softkey.  The 'Delete Flight Plan XX?' window is displayed.

   **Or**:

   Press the **CLR** Key.  The 'Delete Flight Plan XX?' window is displayed.

   **Or**:

   a) Press the **MENU** Key.

   b) Turn the **FMS** Knob to highlight 'Delete Flight Plan'.

   c) Press the **ENT** Key.  The 'Delete Flight Plan XX?' window is displayed.

6) With 'OK' highlighted, press the **ENT** Key to delete the pending flight plan.  The pending flight plan is removed from the Flight Plan Catalog Page.  To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

**Deleting all pending flight plans:**

1) Press the **FPL** Key.

2) Turn the small **FMS** Knob to display the Flight Plan Catalog Page.

3) Press the **MENU** Key.

4) Turn the **FMS** Knob to highlight 'Delete All Pending'.

5) Press the **ENT** Key.  A 'Delete all pending flight plans?' confirmation window is displayed.

6)  With 'OK' highlighted, press the **ENT** Key to delete all pending flight plans.  To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

## FLIGHT PLAN IMPORT/EXPORT MESSAGES

Under certain conditions, some messages may appear in conjunction with others.

| Flight Plan Import/Export Results | Description |
|---|---|
| 'Flight plan successfully imported.' | A flight plan file stored on the SD card was successfully imported as a stored flight plan. |
| 'File contained user waypoints only.  User waypoints imported successfully.  No stored flight plan data was modified.' | The file stored on the SD card did not contain a flight plan, only user waypoints.  These waypoints have been saved to the system user waypoints.  No flight plans stored in the system have been modified. |
| 'No flight plan files found to import.' | The SD card contains no flight plan data. |
| 'Flight plan import failed.' | Flight plan data was not successfully imported from the SD card. |
| 'Flight plan partially imported.' | Some flight plan waypoints were successfully imported from the SD card, however others had errors and were not imported.  A partial stored flight plan now exists in the system. |
| 'File contained user waypoints only.' | The file stored on the SD card did not contain a flight plan, only user waypoints.  One or more of these waypoints did not import successfully. |
| 'Too many points.  Flight plan truncated.' | The flight plan on the SD card contains more waypoints than the system can support.  The flight plan was imported with as many waypoints as possible. |
| 'Some waypoints not loaded.  Waypoints locked.' | The flight plan on the SD card contains one or more waypoints that the system cannot find in the navigation database.  The flight plan has been imported, but must be edited within the system before it can be activated for use. |
| 'User waypoint database full.  Not all loaded.' | The flight plan file on the SD card contains user waypoints.  The quantity of stored user waypoints has exceeded system capacity, therefore not all the user waypoints on the SD card have been imported.  Any flight plan user waypoints that were not imported are locked in the flight plan.  The flight plan must be edited within the system before it can be activated for use. |
| 'One or more user waypoints renamed.' | One or more imported user waypoints were renamed when imported due to naming conflicts with waypoints already existing in the system. |
| 'Flight plan successfully exported.' | The stored flight plan was successfully exported to the SD card. |
| 'Flight plan export failed.' | The stored flight plan was not successfully exported to the SD card.  The SD card may not have sufficient available memory or the card may have been removed prematurely. |

**Table 5-9  Flight Plan Import/Export Messages**

## ADDING WAYPOINTS TO AN EXISTING FLIGHT PLAN

Waypoints can be added to the active flight plan or any stored flight plan. Choose the flight plan, select the desired point of insertion, enter the waypoint, and it is added in front of the selected waypoint. Flight plans are limited to 100 waypoints (including waypoints within airways and procedures). If the number of waypoints in the flight plan exceeds 100, the message "Flight plan is full. Remove unnecessary waypoints." appears and the new waypoint(s) are not added to the flight plan.



*Stored Flight Plan Selected*
*- Memory Slot*
*- Comment*
*- Procedure Identifier*
*- Waypoint Identifier*
*- Airway Identifier*
*- Desired Track to Waypoint*
*- Distance to Waypoint*
*- Waypoint Altitude Constraint*

**Figure 5-52  Stored Flight Plan Page**

**Adding a waypoint to a stored flight plan:**

1) On the Flight Plan Catalog Page, press the **FMS** Knob to activate the cursor.

2) Highlight the desired flight plan.

3) Select the **Edit** Softkey; or press the **ENT** Key, turn the large **FMS** Knob clockwise to select "EDIT" and press the **ENT** Key. The Stored Flight Plan Page is displayed.

4) Select the point in the flight plan to add the new waypoint. The new waypoint is placed directly in front of the highlighted waypoint.

5) Turn the small **FMS** Knob to display the Waypoint Information Window. (Turning it clockwise displays a blank Waypoint Information Window, turning it counter-clockwise displays the Waypoint Information Window with a waypoint selection submenu allowing selection of active flight plan, nearest, recent, user, or airway waypoints).

6) Enter the identifier, facility, or city name of the waypoint or select a waypoint from the submenu of waypoints and press the **ENT** Key. The new waypoint now exists in the flight plan.

**NOTE:**  *If the identifier entered in the Waypoint Information Window has duplicates, a Duplicate Waypoint Window is displayed. Use the FMS Knob to select the correct waypoint.*

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Adding a waypoint to the active flight plan:**

1) Press the **FPL** Key.

2) Press the **FMS** Knob to activate the cursor (not required on the PFD).

3) Select the point in the flight plan to add the new waypoint. The new waypoint is placed prior to the highlighted waypoint.

4) Turn the small **FMS** Knob to display the Waypoint Information Window. (Turning it clockwise displays a blank Waypoint Information Window, turning it counter-clockwise displays the Waypoint Information Window with a waypoint selection submenu allowing selection of active flight plan, nearest, recent, user, or airway waypoints).

5) Enter the identifier, facility, or city name of the waypoint or select a waypoint from the submenu of waypoints and press the **ENT** Key. The active flight plan is modified as each waypoint is entered.

**Creating and adding user waypoints to the active flight plan:**

1) Push the **Joystick** to activate the panning function on the Active Flight Plan Page and pan to the map location of the desired user waypoint.

2) Select the **LD WPT** Softkey; or press the **MENU** Key, select 'Load Waypoint', and press the **ENT** Key. The user waypoint is created with a name of USRxxx (using the next available in sequence) and is added to the active flight plan.

## ADDING AIRWAYS TO A FLIGHT PLAN

Airways can be added to the active flight plan or any stored flight plan. Choose a flight plan (add the desired airway entry point if not already in the flight plan), select the waypoint after the desired airway entry point, select the airway, and it is added in front of the selected waypoint. An airway can only be loaded if there is a waypoint in the flight plan that is part of the desired airway and is not part of an arrival or approach procedure. The system also anticipates the desired airway and exit point based on loaded flight plan waypoints.



**Figure 5-53 Select Airway Page - Selecting Airway**

**Adding an airway to a flight plan:**

1) Press the **FPL** Key.

2) Press the **FMS** Knob to activate the cursor (not required on the PFD).

3) Turn the large **FMS** Knob to highlight the waypoint after the desired airway entry point. If this waypoint is not a valid airway entry point, a valid entry point should be entered at this time.

4) Turn the small **FMS** Knob one click clockwise and select the **LD AIRWY** Softkey on the MFD, or press the **MENU** Key and select "Load Airway" on the PFD. The Select Airway Page is displayed. The **LD AIRWY** Softkey or the "Load Airway" menu item is available only when a valid airway entry waypoint has been chosen (the waypoint ahead of the cursor position).

5) Turn the **FMS** Knob to select the desired airway from the list, and press the **ENT** Key. Low altitude airways are shown first in the list, followed by "all" altitude airways, and then high altitude airways.

6) Turn the **FMS** Knob to select the desired airway exit point from the list, and press the **ENT** Key. 'Load?' is highlighted.

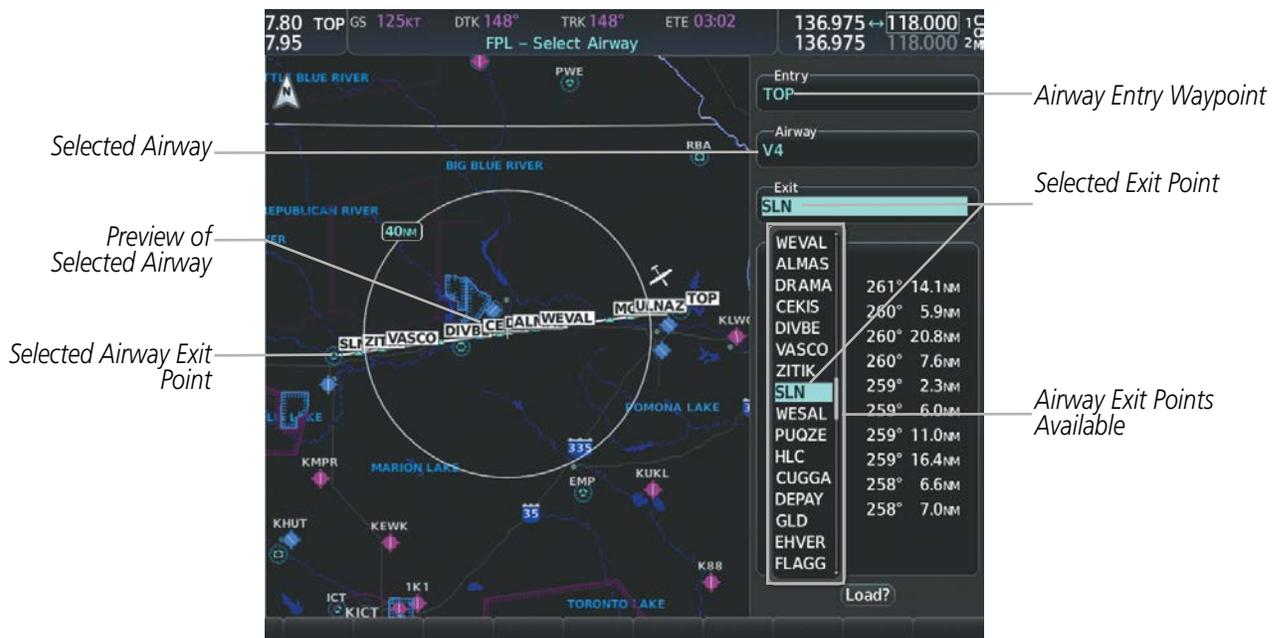7) Press the **ENT** Key. The system returns to editing the flight plan with the new airway inserted.



**Figure 5-54  Select Airway Page - Selecting Exit Point**

## RESTRICTIONS ON ADDING AIRWAYS

Some airways have directional restrictions on all or part of the route. Airway "A2" in Europe has a directional restriction over the whole route such that it can be flown only one direction. For example, airway "UR975" in North Africa has more complicated directional restrictions within the list of airway waypoints. That is, each waypoint may have its own conditional route in relation to another waypoint.

In the US, airways that are "one-way" for specified hours of operation are not uncommon. These airways are always bidirectional in the system database.

The system only allows correct airway sequences to be inserted. If the pilot subsequently inverts the flight plan, the system inverts the airway waypoint sequence and removes the airway header.

## ADDING PROCEDURES TO A STORED FLIGHT PLAN

The system allows the pilot to insert pre-defined instrument procedures from the navigation database into a flight plan. The procedures are designed to facilitate routing of traffic leaving an airport (departure), arriving at an airport (arrival), and landing at an airport (approach). See the procedures section for more details.
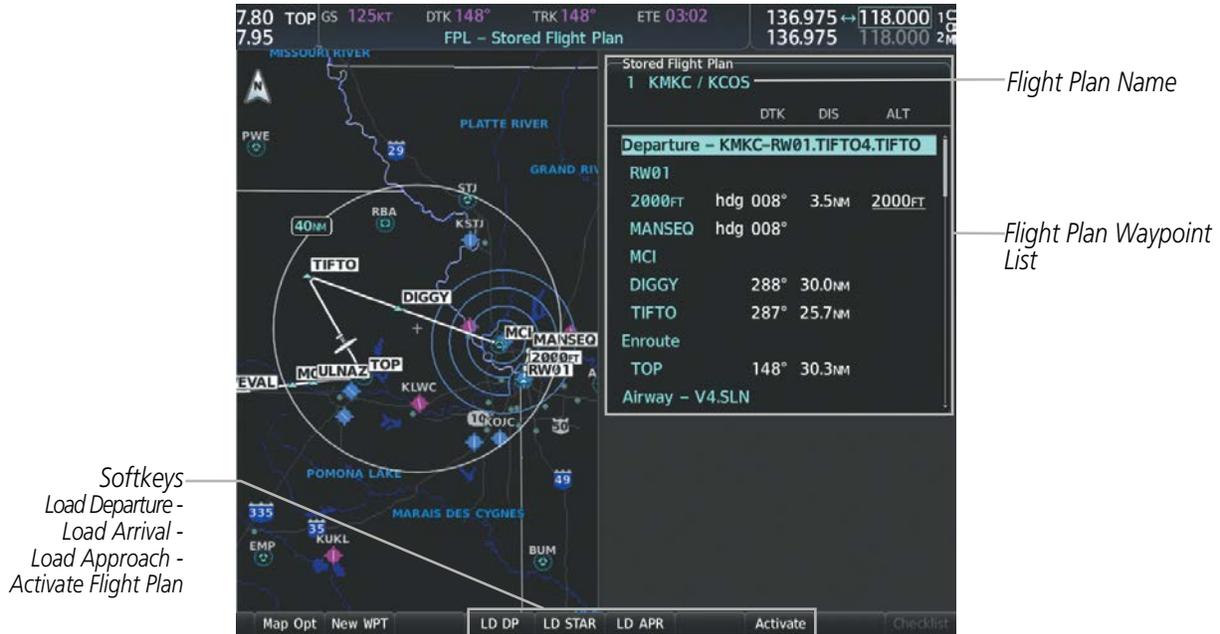


**Figure 5-55  Stored Flight Plan Page**

## DEPARTURE (DP)

A Departure Procedure (DP) is loaded at the departure airport in the flight plan. Only one departure can be loaded at a time in a flight plan. The route is defined by selection of a departure, the transition waypoints, and a runway.



**Figure 5-56  Departure Loading Page - Selecting the Departure**

**Loading a departure procedure into a stored flight plan:**

1) Select a stored flight plan from the Flight Plan Catalog Page.

2) Select the **Edit** Softkey; or press the **MENU** Key, select 'Edit Flight Plan', and press the **ENT** Key. The Stored Flight Plan Page is displayed.

3) Select the **LD DP** Softkey; or press the **MENU** Key, select "Load Departure", and press the **ENT** Key. The Departure Loading Page is displayed.

4) Select a departure. Press the **ENT** Key.

5) Select a runway served by the selected departure, if required. Press the **ENT** Key.

6) Select a transition for the selected departure. Press the **ENT** Key.

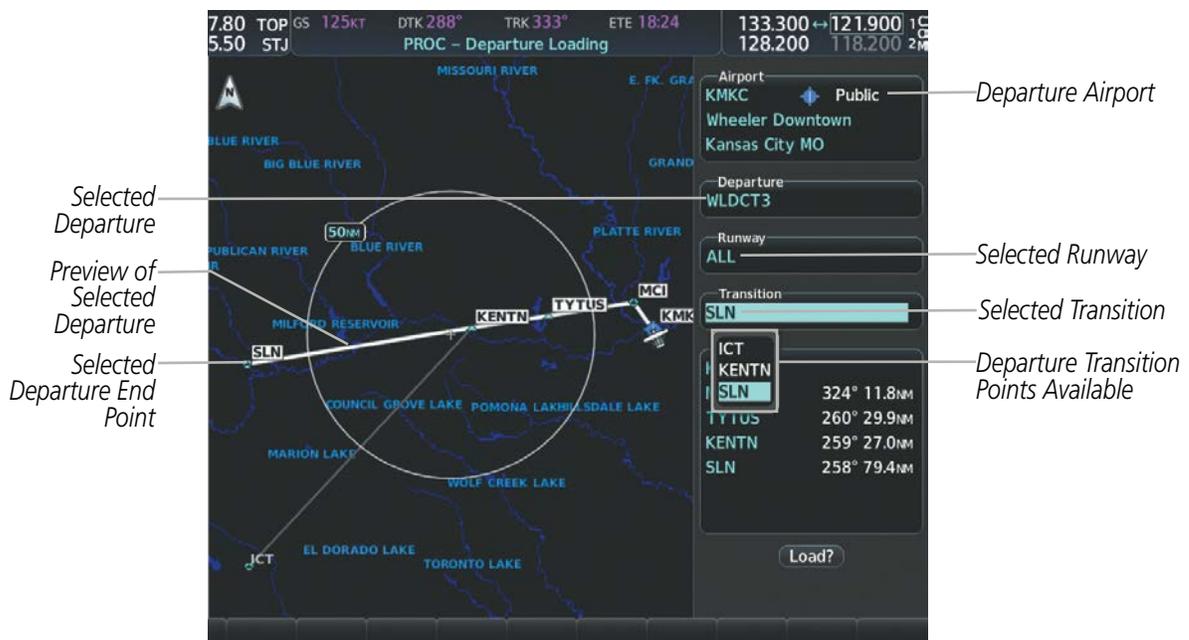7) Press the **ENT** Key to load the selected departure procedure.



**Figure 5-57  Departure Loading Page - Selecting Transition**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## ARRIVAL (STAR)

A Standard Terminal Arrival (STAR) is loaded at the destination airport in the flight plan. Only one arrival can be loaded at a time in a flight plan. The route is defined by selection of an arrival, the transition waypoints, and a runway.



**Figure 5-58  Arrival Loading Page - Selecting the Arrival**

**Loading an arrival procedure into a stored flight plan:**

1)  Select a stored flight plan from the Flight Plan Catalog Page.

2)  Select the **Edit** Softkey; or press the **MENU** Key, select 'Edit Flight Plan', and press the **ENT** Key.  The Stored Flight Plan Page is displayed.

3)  Select the **LD STAR** Softkey; or press the **MENU** Key, select "Load Arrival", and press the **ENT** Key.  The Arrival Loading Page is displayed.

4)  Select an arrival.  Press the **ENT** Key.

5)  Select a transition for the selected arrival.  Press the **ENT** Key.

6)  Select a runway served by the selected arrival, if required.  Press the **ENT** Key.

7)  Press the **ENT** Key to load the selected arrival procedure.

**FLIGHT MANAGEMENT**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

*Destination Airport*

*Selected Arrival*

*Selected Transition*

*Transitions Available with DBRY3*

*Preview of Selected Arrival*

*Arrival Waypoint Sequence*

**Figure 5-59  Arrival Loading Page - Selecting the Transition**

## APPROACH (APR)

An Approach Procedure (APR) can be loaded at any airport that has an approach available. Only one approach can be loaded at a time in a flight plan. The route for a selected approach is defined by designating transition waypoints.



*Destination Airport*

*Selected Approach*

*Approaches Available at KCOS*

*Preview of Selected Approach*

**Figure 5-60  Approach Loading Page - Selecting the Approach**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Loading an approach procedure into a stored flight plan:**

1) Select a stored flight plan from the Flight Plan Catalog Page.

2) Press the **Edit** Softkey; or press the **MENU** Key, select 'Edit Flight Plan', and press the **ENT** Key.  The Stored Flight Plan Page is displayed.

3) Press the **LD APR** Softkey; or press the **MENU** Key, select "Load Approach", and press the **ENT** Key.  The Approach Loading Page is displayed.

4) Select the airport and approach:

   a) Use the **FMS** Knob to select an airport and press the **ENT** Key.

   b) Select an approach from the list and press the **ENT** Key.

   **Or**:

   a) If necessary, push the **FMS** Knob to exit the approach list, and use the large **FMS** Knob to move the cursor to the Approach Channel field.

   b) Use the **FMS** Knob to enter the approach channel number, and press the **ENT** Key to accept the approach channel number.  The airport and approach are selected.

5) Select a transition for the selected approach.  Press the **ENT** Key.

6) Press the **ENT** Key to load the selected approach procedure.



**Figure 5-61  Approach Loading Page - Selecting the Transition**

## FLIGHT PLAN STORAGE

The system can store up to 99 flight plans, numbered 1 through 99. The active flight plan is erased when the system is powered off or when another flight plan is activated. Details about each stored flight plan can be viewed on the Flight Plan Catalog Page and on the Stored Flight Plan Page.

**Viewing information about a stored flight plan:**

1) Press the **FPL** Key on the MFD to display the Active Flight Plan Page.

2) Turn the small **FMS** Knob clockwise one click to display the Flight Plan Catalog Page.

3) Press the **FMS** Knob to activate the cursor and turn the **FMS** Knob to highlight the desired flight plan.

4) The Flight Plan Information is displayed showing departure, destination, total distance, and enroute safe altitude information for the selected Flight Plan.

5) Select the **Edit** Softkey to open the Stored Flight Plan Page and view the waypoints in the flight plan.

6) Press the **FMS** Knob to exit the Stored Flight Plan Page.



*Preview of Selected Flight Plan*

*Flight Plan Name (Comment)*

*Selected Flight Plan*

*Stored Flight Plan Info*
 - *Departure Airport*
 - *Destination Airport*
 - *Total Flight Plan Distance*
 - *Enroute Safe Altitude*

*Stored FPL Editing Softkeys*

**Figure 5-62  Stored Flight Plan Information**

**Storing an active flight plan from the Active Flight Plan Page or the Active Flight Plan Window:**

1) Press the **MENU** Key.

2) Highlight 'Store Flight Plan'.

3) Press the **ENT** Key.

4) With 'OK' highlighted, press the **ENT** Key. The flight plan is stored in the next available position in the flight plan list on the Flight Plan Catalog Page.

## ACTIVATE A FLIGHT PLAN

Activating a stored flight plan erases the active flight plan and replaces it with the flight plan being activated. Inverting a stored flight plan reverses the waypoint order, erases the active flight plan, and replaces it with the flight plan being activated (the stored flight plan is not changed).

**Activating a stored flight plan on the MFD:**

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, and turn the **FMS** Knob to highlight the desired flight plan.

3) Select the **Activate** Softkey; or press the **ENT** Key twice; or press the **MENU** Key, highlight 'Activate Flight Plan', and press the **ENT** Key. The 'activate stored flight plan?' window is displayed.

4) With 'OK' highlighted, press the **ENT** Key. To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

**Inverting and activating a stored flight plan on the MFD:**

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, and turn the **FMS** Knob to highlight the desired flight plan.

3) Select the **Invert** Softkey; or press the **MENU** Key, highlight 'Invert & Activate FPL?', and press the **ENT** Key. The 'Invert and activate stored flight plan?' window is displayed.

4) With 'OK' highlighted, press the **ENT** Key. To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

## COPY A FLIGHT PLAN

The system allows copying a flight plan into a new flight plan memory slot, allowing editing, etc., without affecting the original flight plan. This can be used to duplicate an existing stored flight plan for use in creating a modified version of the original stored flight plan.

**Copying a stored flight plan on the MFD:**

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, and turn the **FMS** Knob to highlight the desired flight plan.

3) Select the **Copy** Softkey; or press the **MENU** Key, highlight 'Copy Flight Plan', and press the **ENT** Key. The 'Copy to flight plan XX?' window is displayed.

4) With 'OK' highlighted, press the **ENT** Key to copy the flight plan. To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

## DELETE A STORED FLIGHT PLAN

Individual or all stored flight plans can be deleted from the system memory.

**Deleting a stored 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, and turn the **FMS** Knob to highlight the desired flight plan.

3) Select the **Delete** Softkey; press the **CLR** Key; or press the **MENU** Key, highlight 'Delete Flight Plan', and press the **ENT** Key. The 'Delete flight plan XX?' window is displayed.

4) With 'OK' highlighted, press the **ENT** Key to delete the flight plan. To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

> **NOTE:** *The option to delete all stored flight plans is not available while the aircraft is in flight.*

**Deleting all stored flight plans:**

1) Press the **FPL** Key and turn the small **FMS** Knob to display the Flight Plan Catalog Page.

2) Press the **MENU** Key.

3) Highlight 'Delete All' and press the **ENT** Key. A 'Delete all flight plans?' confirmation window is displayed.

4) With 'OK' highlighted, press the **ENT** Key to delete all flight plans. To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

## FLIGHT PLAN EDITING

The active flight plan or any stored flight plan can be edited. The edits made to the active flight plan affect navigation as soon as they are entered.

### DELETING THE ACTIVE FLIGHT PLAN

The system allows deleting an active flight plan. Deleting the active flight plan suspends navigation by the system.

**Deleting the active flight plan:**

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **MENU** Key, highlight 'Delete Flight Plan', and press the **ENT** Key. The 'Delete all waypoints in flight plan?' window is displayed.

3) With 'OK' highlighted, press the **ENT** Key to delete the active flight plan. To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**FLIGHT MANAGEMENT**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## DELETING FLIGHT PLAN ITEMS

Individual waypoints, entire airways, and entire procedures can be deleted from a flight plan. Some waypoints in the final approach segment (such as the FAF or MAP) can not be deleted individually. Attempting to delete a waypoint that is not allowed results in a window displaying 'Invalid flight plan modification.'

### Deleting an individual waypoint from the active flight plan:

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **FMS** Knob to activate the cursor (not required on the PFD) and turn the large **FMS** Knob to highlight the waypoint to be deleted.

3) Press the **CLR** Key. The 'Remove XXXXX?' window is displayed.

4) With 'OK' highlighted, press the **ENT** Key. To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

5) Press the **FMS** Knob to remove the flashing cursor.

### Deleting an entire airway from the active flight plan:

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **FMS** Knob to activate the cursor (not required on the PFD) and turn the large **FMS** Knob to highlight the header of the airway to be deleted.

3) Press the **CLR** Key. The 'Remove <airway name> from flight plan?' window is displayed.

4) With 'OK' highlighted, press the **ENT** Key. To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

5) Press the **FMS** Knob to remove the flashing cursor.

### Deleting an entire procedure from the active flight plan:

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **FMS** Knob to activate the cursor (not required on the PFD) and turn the large **FMS** Knob to highlight the header of the procedure to be deleted.

3) Press the **CLR** Key. The 'Remove <procedure name> from flight plan?' window is displayed.

4) With 'OK' highlighted, press the **ENT** Key. To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

5) Press the **FMS** Knob to remove the flashing cursor.

**Or**:

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **MENU** Key to display the Page Menu and turn the **FMS** Knob to highlight 'Remove <procedure>'.

3) Press the **ENT** Key. The 'Remove <procedure name> from flight plan?' window is displayed.

4) With 'OK' highlighted, press the **ENT** Key. To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

**Deleting an individual waypoint from a stored flight plan:**

1) Press the **FPL** Key to display the Active Flight Plan Page.

2) Turn the small **FMS** Knob clockwise one click to display the Flight Plan Catalog Page.

3) Press the **FMS** Knob to activate the cursor and turn the **FMS** Knob to highlight the flight plan to be edited.

4) Select the **Edit** Softkey; or press the **MENU** Key, select 'Edit Flight Plan' and press the **ENT** Key. The Stored Flight Plan Page is displayed.

5) Turn the large **FMS** Knob to highlight the waypoint to be deleted.

6) Press the **CLR** Key. The 'Remove XXXXX?' window is displayed.

7) With 'OK' highlighted, press the **ENT** Key. To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

8) Press the **FMS** Knob to remove the flashing cursor.

**Deleting an entire airway from a stored flight plan:**

1) Press the **FPL** Key to display the Active Flight Plan Page.

2) Turn the small **FMS** Knob clockwise one click to display the Flight Plan Catalog Page.

3) Press the **FMS** Knob to activate the cursor and turn the **FMS** Knob to highlight the flight plan to be edited.

4) Select the **Edit** Softkey; or press the **MENU** Key, select 'Edit Flight Plan' and press the **ENT** Key. The Stored Flight Plan Page is displayed.

5) Turn the large **FMS** Knob to highlight the header of the airway to be deleted.

6) Press the **CLR** Key. The 'Remove <airway name> from flight plan?' window is displayed.

7) With 'OK' highlighted, press the **ENT** Key. To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

8) Press the **FMS** Knob to remove the flashing cursor.

**Deleting an entire procedure from a stored flight plan:**

1) Press the **FPL** Key to display the Active Flight Plan Page.

2) Turn the small **FMS** Knob clockwise one click to display the Flight Plan Catalog Page.

3) Press the **FMS** Knob to activate the cursor and turn the **FMS** Knob to highlight the flight plan to be edited.

4) Select the **EDIT** Softkey; or press the **MENU** Key, select 'Edit Flight Plan' and press the **ENT** Key. The Stored Flight Plan Page is displayed.

5) Turn the large **FMS** Knob to highlight the header of the procedure to be deleted.

6) Press the **CLR** Key. The 'Remove <procedure name> from flight plan?' window is displayed.

7) With 'OK' highlighted, press the **ENT** Key. To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

8) Press the **FMS** Knob to remove the flashing cursor.

**Or:**

1) Press the **FPL** Key to display the Active Flight Plan Page.

2) Turn the small **FMS** Knob clockwise one click to display the Flight Plan Catalog Page.

3) Press the **FMS** Knob to activate the cursor and turn the **FMS** Knob to highlight the flight plan to be edited.

4) Select the **Edit** Softkey; or press the **MENU** Key, select 'Edit Flight Plan' and press the **ENT** Key. The Stored Flight Plan Page is displayed.

5) Press the **MENU** Key to display the Page Menu and turn the **FMS** Knob to highlight 'Remove <procedure>'.

6) Press the **ENT** Key. The 'Remove <procedure name> from flight plan?' window is displayed.

7) With 'OK' highlighted, press the **ENT** Key. To cancel the request, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

8) Press the **FMS** Knob to remove the flashing cursor.

## CHANGING FLIGHT PLAN COMMENTS (NAMES)

The comment field (or name) of each flight plan can be changed to something that is useful for identification and sorting.

### Changing the active flight plan comment:

1) Press the **FPL** Key to display the Active Flight Plan Page.

2) Press the **FMS** Knob to activate the cursor and turn the large **FMS** Knob to highlight the comment field.

3) Use the **FMS** Knobs to edit the comment.

4) Press the **ENT** Key to accept the changes.

5) Press the **FMS** Knob to remove the flashing cursor.

### Changing a stored flight plan comment:

1) Press the **FPL** Key to display the Active Flight Plan Page.

2) Turn the small **FMS** Knob clockwise one click to display the Flight Plan Catalog Page.

3) Press the **FMS** Knob to activate the cursor and turn the **FMS** Knob to highlight the flight plan to be edited.

4) Select the **Edit** Softkey; or press the **MENU** Key, select 'Edit Flight Plan' and press the **ENT** Key. The Stored Flight Plan Page is displayed.

5) Turn the large **FMS** Knob to highlight the comment field.

6) Use the **FMS** Knobs to edit the comment.

7) Press the **ENT** Key to accept the changes.

8) Press the **FMS** Knob to remove the flashing cursor.

FLIGHT MANAGEMENT

SYSTEM OVERVIEW
FLIGHT INSTRUMENTS
EIS
AUDIO PANEL & CNS
FLIGHT MANAGEMENT
HAZARD AVOIDANCE
AFCS
ADDITIONAL FEATURES
APPENDICES
INDEX

## ALONG TRACK OFFSETS

A waypoint having an "along track offset" distance from an existing waypoint can be entered into a flight plan. Along track offset waypoints lie along the path of the existing flight plan, and can be used to make the system reach a specified altitude before or after reaching the specified flight plan waypoint.  Offset distances can be entered from 1 to 999 nm in increments of 1 nm.  Entering a negative offset distance results in an along track offset waypoint inserted before the selected waypoint, whereas entering a positive offset distance results in an along track offset waypoint inserted after the selected waypoint.  Multiple offset waypoints are allowed.

A waypoint must be adjacent to its parent waypoint in the flight plan, so the system limits the along-track distance to less than the length of the leg before or after the selected waypoint.  If the selected waypoint is the active waypoint, the distance is limited to less than the distance to go to the active waypoint.  Assigning an along track offset to a leg with indeterminate length is not permitted.  An along track offset is not allowed at or after the final approach fix of an approach.

An along track offset distance cannot be modified once entered.  If the along track offset distance must be changed, the existing along track offset waypoint must be deleted and a new one created with the new offset distance.



*Along Track Offset Waypoint and Distance*

*Along Track Offset Waypoint and Distance from Flight Plan Waypoint*

**Figure 5-63  Along Track Offset**

#### Entering an along track offset distance:

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **FMS** Knob to activate the cursor (not required on the PFD) and turn the large **FMS** Knob to highlight the waypoint for the along track offset.

3) Select the **ATK OFS** Softkey (MFD only); or press the **MENU** Key, highlight 'Create ATK Offset Waypoint', and press the **ENT** Key.

4) Enter a positive or negative offset distance in the range of +/- 1 to 999 nm (limited by leg distances).

5) Press the **ENT** Key to create the offset waypoint.

6) Press the **FMS** Knob to remove the flashing cursor.

## PARALLEL TRACK

The Parallel Track (PTK) feature allows creation of a parallel course offset of 1 to 50 nm left or right of the current flight plan. When Parallel Track is activated, the course line drawn on the map pages shows the parallel course, and waypoint names have a lower case "p" placed after the identifier.

While flying a parallel track:

- Initiating a direct-to will cancel the parallel track and fly direct-to the selected waypoint.

- Initiating a hold at the present position will cancel the parallel track and fly the holding pattern.

- Initiating a hold at a waypoint will result in the aircraft flying the parallel track until a turn is required to fly to the hold waypoint. If the hold is removed prior to reaching the hold waypoint, the parallel track will be resumed. Once the holding pattern is active, the parallel track will not be resumed upon exiting the hold.

Parallel Track is also cancelled if a course change occurs greater than 120° or the parallel tracks overlap as a result of the course change.

> **NOTE:** Vertical navigation is unavailable while the Parallel Track feature is active.

**Activating parallel track:**

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **MENU** Key, highlight 'Parallel Track', and press the **ENT** Key. The Parallel Track Window is displayed with the 'Direction' field highlighted.

3) Turn the small **FMS** Knob to select 'LEFT' or 'RIGHT' and press the **ENT** Key. The 'Distance' field is highlighted.

4) Turn the small **FMS** Knob to enter a distance from 1-99 nm and press the **ENT** Key. 'Activate Parallel Track' is highlighted.

5) Press the **ENT** Key to activate parallel track. Press the **FMS** Knob or the **CLR** Key to cancel the parallel track activation.
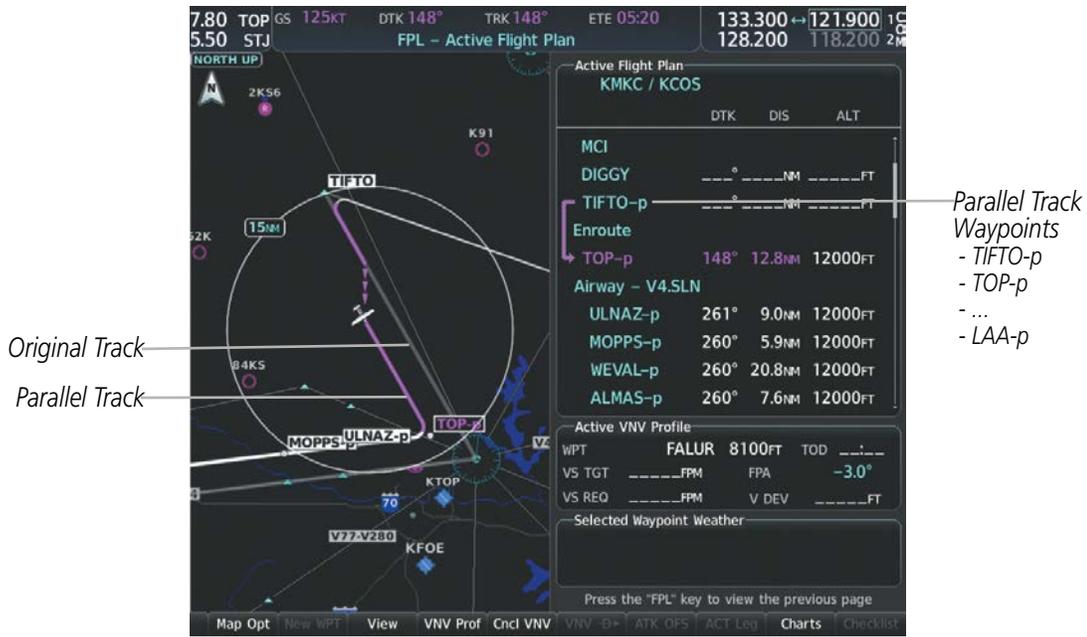


**Figure 5-64  Parallel Track Window**

**Figure 5-65  Parallel Track Active**

If the parallel track proposed by the offset direction and distance is not allowed by the system, the activation prompt is displayed, but disabled.  If an approach leg is active, the status indicates that the system is unable to activate the parallel track with the message 'Parallel Track Unavailable Approach Leg Active'.  If the offset direction and distance results in an unreasonable route geometry (e.g., there is a sharp turn of more than 120 degrees), the status indicates that the system is unable to activate the parallel track because of invalid geometry ('Parallel Track Unavailable Invalid Route Geometry').  If the active leg is not a track between two fixes (TF) or a course to a fix (DF) leg, the status indicates that the system is unable to activate the parallel track because parallel track is not available for the active leg type ('Parallel Track Unavailable Not Allowed for Active Leg').  Parallel track is also unavailable for a leg if there are no legs remaining in the flight plan after the given leg, or OBS mode is active

Parallel track will be cancelled if the active leg changes to a leg where one of the preceding is true.

Activation of parallel track will apply from the current position along the flight plan until a leg that does not meet the criteria for parallel track.  Guidance will be computed to return to the original track at the beginning of that leg.

### Cancelling parallel track:

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **MENU** Key, highlight 'Parallel Track', and press the **ENT** Key.  The Parallel Track Window is displayed with 'Cancel Parallel Track?' highlighted.

3) Press the **ENT** Key.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## ACTIVATING A FLIGHT PLAN LEG

The system allows selection of a highlighted leg as the "active leg" (the flight plan leg which is currently used for navigation guidance).

**Activating a flight plan leg:**

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **FMS** Knob to activate the cursor (not required on the PFD) and turn the large **FMS** Knob to highlight the destination waypoint for the desired leg.

3) Select the **ACT Leg** Softkey (MFD only); or press the **MENU** Key, highlight 'Activate Leg', and press the **ENT** Key. A confirmation window is displayed with 'Activate' highlighted.

4) Press the **ENT** Key to activate the flight plan leg. To cancel, press the **CLR** Key, or highlight 'Cancel' and press the **ENT** Key.

5) Press the **FMS** Knob to remove the flashing cursor.

## INVERTING A FLIGHT PLAN

Any flight plan may be inverted (reversed) for navigation back to the original departure point.

**Inverting the active flight plan:**

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **MENU** Key, highlight 'Invert Flight Plan', and press the **ENT** Key. An 'Invert active flight plan?' confirmation window is displayed.

3) Select 'OK'.

4) Press the **ENT** Key to invert and activate the active flight plan. To cancel, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

## FLIGHT PLAN VIEWS

Information about flight plans can be viewed in more than one way. The active flight plan can be configured to show cumulative distance over the length of the flight plan or the distance for each leg of the flight plan; and the active flight plan can be viewed in a narrow or wide view. In the wide view, additional information is displayed: Fuel Remaining (FUEL REM), Estimated Time Enroute (ETE), Estimated Time of Arrival (ETA), and Bearing to the waypoint (BRG).

**Switching between leg-to-leg waypoint distance and cumulative waypoint distance:**

1) Press the **FPL** Key on the MFD to display the Active Flight Plan Page.

2) Select the **View** Softkey to display the **CUM** and **Leg-Leg** Softkeys.

3) Select the **CUM** Softkey to view cumulative waypoint distance, or select the **Leg-Leg** Softkey to view leg-to-leg waypoint distance.

4) Select the **Back** Softkey to return to the top level active flight plan softkeys.

**Switching between wide and narrow view:**

1) Press the **FPL** Key on the MFD to display the Active Flight Plan Page.

2) Select the **View** Softkey to display the **Wide** and **Narrow** Softkeys.

3) Select the **Wide** Softkey to display the wide view, or select the **Narrow** Softkey to display the narrow view.

4) Select the **Back** Softkey to return to the top level active flight plan softkeys.

## COLLAPSING AIRWAYS

The system allows airways on the active flight plan to be collapsed or expanded from the Stored or Active Flight Plan Page/Window. When airways have been collapsed, it is indicated on the airway heading.

When airways are collapsed, leg-to-leg computed values such as DIS or ETE shown for the exit waypoint reflect the total of all the legs on the airway that have been hidden in the collapsed display. The DTK value is inhibited because it is not usable in this context.

The Active Flight Plan Page always keeps the following three waypoints visible: "From" waypoint, "To" waypoint, and "Next" waypoint. To prevent one or more of these waypoints from being hidden in a collapsed airway segment, the airway segment that contains either the "To" or the "Next" waypoint is automatically expanded. When an airway is loaded, airways are automatically expanded to facilitate flight plan review.
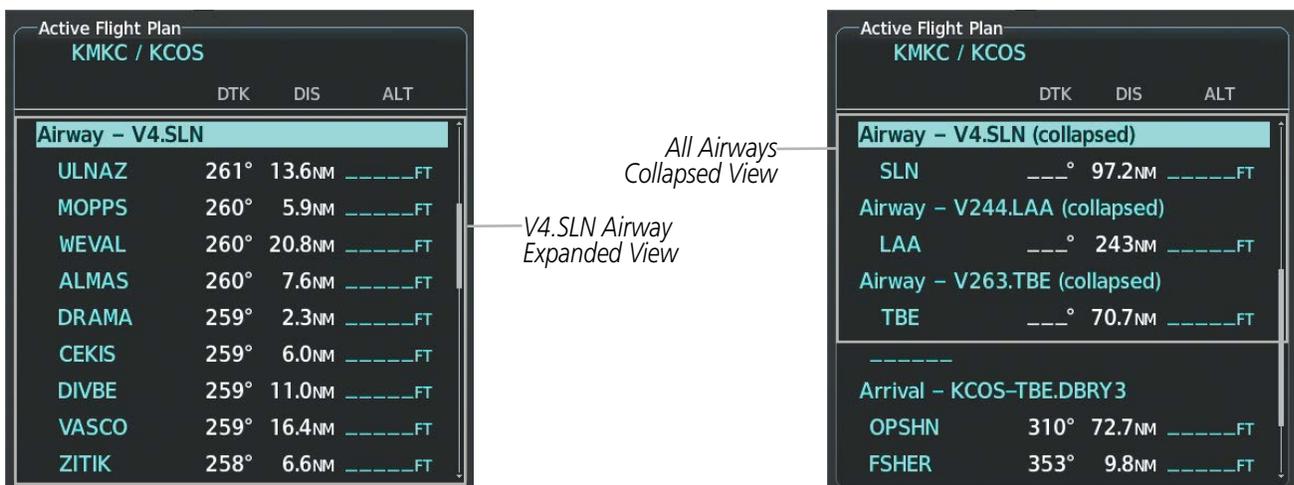


**Figure 5-66  Expanded/Collapsed Airways**

**Collapsing/expanding the airways in the active flight plan:**

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **MENU** Key, highlight 'Collapse Airways' or 'Expand Airways', and press the **ENT** Key. The airways are collapsed/expanded.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## CLOSEST POINT OF FPL

'Closest Point of FPL' calculates the bearing and closest distance at which a flight plan passes a reference waypoint, and creates a new user waypoint along the flight plan at the location closest to a chosen reference waypoint.

**Determining the closest point along the active flight plan to a selected waypoint:**

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **MENU** Key, highlight 'Closest Point Of FPL", and press the **ENT** Key. A window appears with the reference waypoint field highlighted.

3) Enter the identifier of the reference waypoint. The system displays the bearing (BRG) and distance (DIS) to the closest point along the flight plan to the selected reference waypoint and creates a user waypoint at this location. Press the **ENT** Key. The name for the new user waypoint is derived from the identifier of the reference waypoint.

## USER-DEFINED HOLDING PATTERNS

A holding pattern can be defined at any active flight plan waypoint, at the aircraft present position, or at a direct-to waypoint.

**Creating a user-defined hold at an active flight plan waypoint:**

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **FMS** Knob to activate the cursor (not required on the PFD) and turn the large **FMS** Knob to highlight the waypoint for the hold.

3) Press the **MENU** Key, highlight 'Hold At Waypoint', and press the **ENT** Key. The 'Hold at' window appears with the course field highlighted.

4) Use the **FMS** Knobs to edit the entry course, and press the **ENT** Key.

5) Use the small **FMS** Knob to select 'Inbound' or 'Outbound' course direction, and press the **ENT** Key.

6) Use the small **FMS** Knob to select 'Time' or 'Distance' length mode, and press the **ENT** Key.

7) Use the **FMS** Knobs to edit the length, and press the **ENT** Key.

8) Use the small **FMS** Knob to select 'Right' or 'Left' turn direction, and press the **ENT** Key.

9) Use the **FMS** Knobs to edit the Expect Further Clearance Time (EFC Time), and press the **ENT** Key.

10) Press the **ENT** Key while 'Load?' is highlighted to insert the hold into the flight plan.

**Creating a user-defined hold at the aircraft present position:**

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **MENU** Key, highlight 'Hold At Present Position', and press the **ENT** Key. The 'Hold at' window appears with the course field highlighted.

3) If desired, use the **FMS** Knobs to edit the entry course, and press the **ENT** Key.

4) Use the small **FMS** Knob to select 'Inbound' or 'Outbound' course direction, and press the **ENT** Key.

FLIGHT MANAGEMENT

SYSTEM OVERVIEW
FLIGHT INSTRUMENTS
EIS
AUDIO PANEL & CNS
FLIGHT MANAGEMENT
HAZARD AVOIDANCE
AFCS
ADDITIONAL FEATURES
APPENDICES
INDEX

**5)** Use the small **FMS** Knob to select 'Time' or 'Distance' length mode, and press the **ENT** Key.

**6)** Use the **FMS** Knobs to edit the length, and press the **ENT** Key.

**7)** Use the small **FMS** Knob to select 'Right' or 'Left' turn direction, and press the **ENT** Key.

**8)** Use the **FMS** Knobs to edit the Expect Further Clearance Time (EFC Time), and press the **ENT** Key.

**9)** Press the **ENT** Key while 'Activate?' is highlighted to create an Offroute Direct-to hold waypoint at the aircraft present position and activate the hold.

### Creating a user-defined hold at a direct-to waypoint:

**1)** Press a **Direct-to** Key and set up the direct-to waypoint as desired, but select 'Hold?' instead of 'Activate?' when finished (MFD or PFD).

**2)** Use the **FMS** Knobs to edit the entry course, and press the **ENT** Key.

**3)** Use the small **FMS** Knob to select 'Inbound' or 'Outbound' course direction, and press the **ENT** Key.

**4)** Use the small **FMS** Knob to select 'Time' or 'Distance' length mode, and press the **ENT** Key.

**5)** Use the **FMS** Knobs to edit the length, and press the **ENT** Key.

**6)** Use the small **FMS** Knob to select 'Right' or 'Left' turn direction, and press the **ENT** Key.

**7)** Use the **FMS** Knobs to edit the Expect Further Clearance Time (EFC TIME), and press the **ENT** Key.

**8)** Press the **ENT** Key while 'Activate?' is highlighted to activate the direct-to with the user-defined hold defined at the direct-to waypoint. (If the direct-to waypoint is part of the active flight plan, the HOLD is inserted into the active flight plan. If the direct-to waypoint is not part of the active flight plan, an off-route direct-to hold is created.)

### Exiting a user-defined hold inserted into the active flight plan:

Press the **SUSP** Softkey. The system will provide guidance to follow the holding pattern to the inbound course and resume automatic waypoint sequencing.

### Removing a user-defined hold inserted into the active flight plan:

**1)** Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

**2)** Press the **FMS** Knob to activate the cursor (not required on the PFD) and turn the large **FMS** Knob to highlight the HOLD waypoint.

**3)** Press the **CLR** Key. A 'Remove Holding Pattern?' confirmation window is displayed.

**4)** Select 'OK' and press the **ENT** Key. The holding pattern is removed from the active flight plan. Select 'CANCEL' and press the **ENT** Key to cancel the removal of the holding pattern.

### Removing a user-defined hold at an off-route direct-to:

**1)** Press a **Direct To** Key to display the Direct To Window (PFD or MFD).

**2)** Press the **MENU** Key to display the Page Menu with the cursor on the 'Cancel Direct-To NAV' selection.

**3)** Press the **ENT** Key. The holding pattern is removed.

**Figure 5-67 Creating a User Defined Holding Pattern at an Active Flight Plan Waypoint**

**Active Flight Plan**
_KMKC / KCOS

| | DTK | DIS | ALT |
|---|---|---|---|
| RW01 | | | |
| 2000FT | hdg ___° | ____NM | _____FT |
| MANSEQ | hdg ___° | | |
| MCI | | | |
| DIGGY | 288° | 29.8NM | _____FT |
| TIFTO | 287° | 25.7NM | _____FT |
| Enroute | | | |
| TOP | 148° | 30.4NM | _____FT |
| Airway – V4.SLN | | | |
| ULNAZ | 261° | 13.6NM | _____FT |

*Waypoint Selected* → TIFTO

**Direct To**

Ident, Facility, City
TIFTO    ▲ N CEN USA
_____
_____

VNV
_____FT          +0NM

Map
NORTH UP
7.5NM
TIFTO

Location
BRG 288°    DIS 56.8NM

Course
287°

Activate?    Hold?

*Hold At Direct To Waypoint Selection*

**Hold at**

Direction, Course
Hold East of          TIFTO
Course 287°    ◀ Inbound ▶

Leg Time, Distance
Leg   ◀ Time ▶          1:00

Turns
Turn Direction    ◀ Right

Map
1.5NM
TIFTO

Expect Further Clearance
EFC Time          __:__UTC

Activate?

*Hold Entry Course*
*Location of Hold*
*Course Direction (Inbound or Outbound)*
*Leg Length (Time in nm or Distance in minutes)*
*Turn Direction (Right or Left)*
*Leg Length Mode Button (Time or Distance)*
*Map of Hold Location*
*Expect Further Clearance Time*
*Load Hold and Activate Direct To*

**Figure 5-68 Creating a User Defined Holding Pattern at a Direct To Waypoint**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

FLIGHT MANAGEMENT

GARMIN.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

# 5.7  VERTICAL NAVIGATION

> **NOTE:**  *The system supports vertical path guidance and altitude constraints for the following leg types: AF, CD, CF, CI, CR, DF, FC, FD, PI, RF, and TF.  Altitude constraints are not retained in stored flight plans.*

The system Vertical Navigation (VNV) feature provides vertical profile guidance during the enroute and terminal phases of flight.  Guidance based on specified altitudes at waypoints in the active flight plan or to a direct-to waypoint is provided.  It includes vertical path guidance to a descending path, which is provided as a linear deviation from the desired path.  The desired path is defined by a line joining two waypoints with specified altitudes or as a vertical angle from a specified waypoint/altitude.  The vertical waypoints are integrated into the active flight plan.  Both manual and autopilot-coupled guidance are supported.
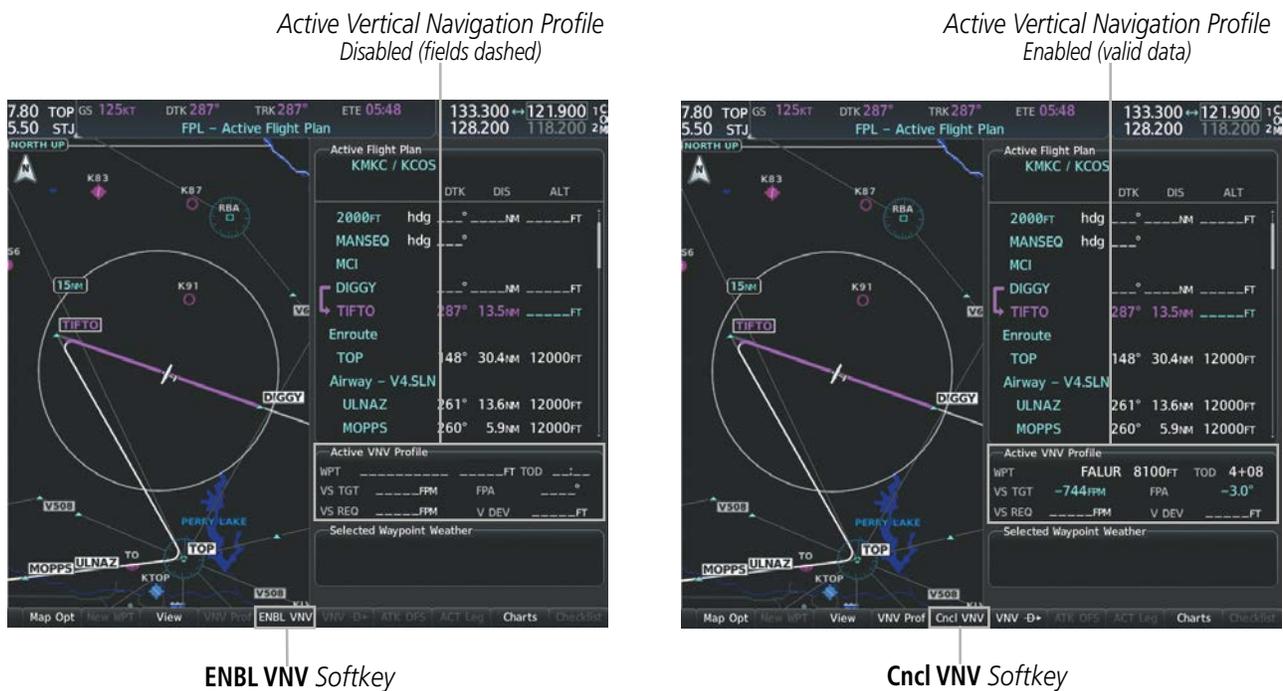


*Active Vertical Navigation Profile*
*Disabled (fields dashed)*

*Active Vertical Navigation Profile*
*Enabled (valid data)*

**ENBL VNV** *Softkey*

**Cncl VNV** *Softkey*

**Figure 5-69  Enabling/Disabling Vertical Navigation**

### Enabling VNV guidance:

1)  Press the **FPL** Key to display the Active Flight Plan Page on the MFD.

2)  Select the **ENBL VNV** Softkey; or press the **MENU** Key, highlight 'Enable VNV', and press the **ENT** Key.  Vertical navigation is enabled, and vertical guidance begins with the waypoint shown in the Active VNV Profile box (defaults first waypoint in the active flight plan with an altitude enabled for vertical navigation (e.g., FALUR)).

### Disabling VNV guidance:

1)  Press the **FPL** Key to display the Active Flight Plan Page on the MFD.

2)  Select the **Cncl VNV** Softkey; or press the **MENU** Key, highlight 'Cancel VNV', and press the **ENT** Key.  Vertical navigation is disabled.

FLIGHT MANAGEMENT

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

Canceling vertical navigation results in vertical deviation (V DEV), vertical speed required (VS REQ), and time to top of descent/bottom of descent (TOD/BOD) going invalid. The Vertical Deviation Indicator (VDI) and Required Vertical Speed Indicator (RVSI) on the PFD are removed, and the V DEV, VS REQ, and TOD items displayed in the Active VNV Profile box are dashed. VNV remains disabled until manually enabled. Vertical guidance in reversionary mode can only be enabled for a direct-to waypoint.

The system allows a vertical navigation direct-to for any waypoint in the active flight plan with an altitude constraint "designated" for vertical guidance. Selecting the **VNV Direct-to** Softkey on the Active Flight Plan Page allows the flight plan to be flown, while vertical guidance based on the altitude constraint at the VNV direct-to waypoint is provided. The altitude change begins immediately and is spread along the flight plan from current position to the vertical direct-to waypoint, not just along the leg for the direct-to waypoint. A direct-to with altitude constraint activated by pressing the **Direct-to** Key also provides vertical guidance, but would bypass flight plan waypoints between the current position in the flight plan and the direct-to waypoint. A top of descent (TOD) point is computed based on the default flight path angle; descent begins once the TOD is reached.

### Activating a vertical navigation direct-to:

1) Press the **FPL** Key to display the Active Flight Plan Page on the MFD.

2) Press the **FMS** Knob to activate the cursor and turn the **FMS** Knob to highlight the desired waypoint.

**NOTE:** The selected waypoint must have a designated altitude constraint (cyan number) to be used. If not, the first waypoint in the flight plan with a designated altitude constraint is selected.

3) Select the **VNV Direct-To** Softkey; or press the **MENU** Key, highlight 'VNV Direct-To', and press the **ENT** Key. An 'Activate vertical Direct-to to: NNNNNFT at XXXXXX?' confirmation window is displayed.

4) Press the **ENT** Key. Vertical guidance begins to the altitude constraint for the selected waypoint.

5) Press the **FMS** Knob to remove the flashing cursor.

The vertical navigation profile can be modified by directly entering a vertical speed target (VS TGT) and/or flight path angle (FPA) in the Active VNV Profile box.

### Modifying the VS TGT and FPA:

1) Press the **FPL** Key to display the Active Flight Plan Page on the MFD.

2) Select the **VNV Prof** Softkey; or press the **MENU** Key, highlight 'Select VNV Profile Window', and press the **ENT** Key. The cursor is now located in the Active VNV Profile box.

3) Turn the **FMS** Knobs as needed to edit the values.

4) Press the **FMS** Knob to remove the flashing cursor.

## ALTITUDE CONSTRAINTS

The system can use altitude constraints associated with lateral waypoints to give guidance for vertical navigation. These altitudes are, depending on the specific instance, manually entered or retrieved from the published altitudes in the navigation database.
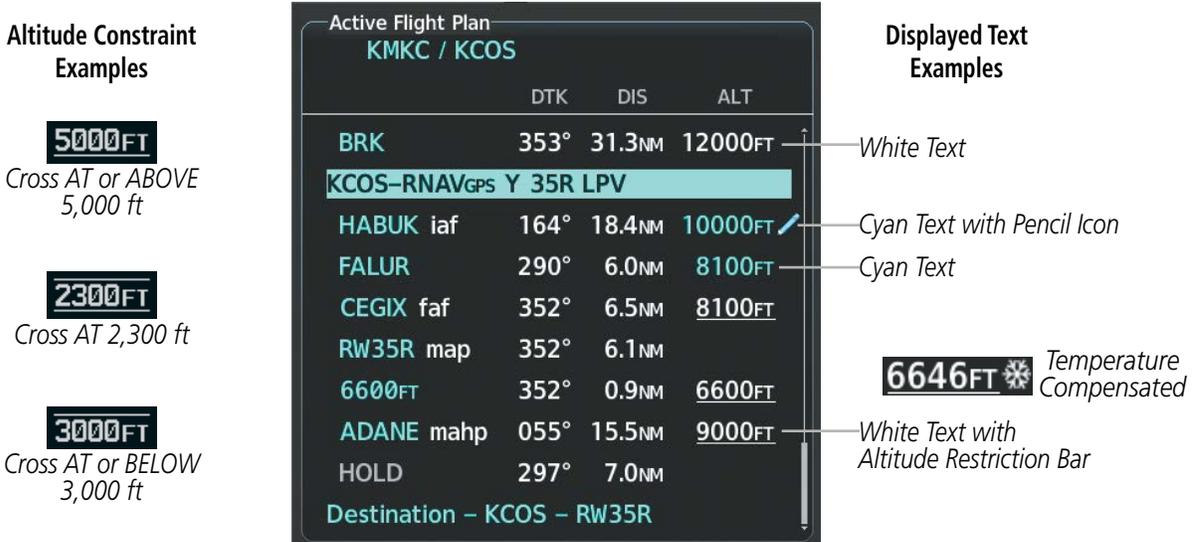
**Altitude Constraint Examples**

**5000FT**
*Cross AT or ABOVE 5,000 ft*

**2300FT**
*Cross AT 2,300 ft*

**3000FT**
*Cross AT or BELOW 3,000 ft*

```
Active Flight Plan
    KMKC / KCOS
                    DTK     DIS      ALT
BRK             353°   31.3NM   12000FT
KCOS–RNAVGPS Y 35R LPV
HABUK  iaf      164°   18.4NM   10000FT
FALUR           290°    6.0NM    8100FT
CEGIX  faf      352°    6.5NM    8100FT
RW35R map       352°    6.1NM
6600FT          352°    0.9NM    6600FT
ADANE mahp      055°   15.5NM    9000FT
HOLD            297°    7.0NM
Destination – KCOS – RW35R
```

**Displayed Text Examples**

*White Text*

*Cyan Text with Pencil Icon*

*Cyan Text*

**6646FT** ❄ *Temperature Compensated*

*White Text with Altitude Restriction Bar*

**Figure 5-70 Waypoint Altitude Constraints**

| White Text | Cyan Text |
|---|---|
| **5000FT** | **5000FT** |
| Altitude calculated by the system estimating the altitude of the aircraft as it passes over the navigation point. No white line above or below to indicate a potential constraint. | Altitude is designated for use in determining vertical guidance. A pencil icon indicates manual designation or manual data entry. |
| **5000FT** | **5000FT** |
| Altitude retrieved from the navigation database. White line above or below indicates the type of constraint, as shown in the preceding figure. These altitudes are provided as a reference, and are not designated to be used in determining vertical guidance. | The system cannot use this altitude in determining vertical guidance because of an invalid constraint condition. |

**Table 5-10 Altitude Constraint Color Coding**

Altitudes associated with arrival and approach procedures are "auto-designated". This means the system automatically uses the altitudes loaded with the arrival or approach for giving vertical speed and deviation guidance. Note that these altitudes are displayed as cyan text up to, but not including, the FAF. The FAF is always a "reference only" altitude and cannot be designated, unless the selected approach does not provide vertical guidance. In this case, the FAF altitude can be designated.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

Altitudes that have been designated for use in vertical guidance can be "un-designated" using the **CLR** Key. The altitude is now displayed only as a reference. It is not used to give vertical guidance. Other displayed altitudes may change due to re-calculations or be rendered invalid as a result of manually changing an altitude to a non-designated altitude.

**Designating a waypoint altitude to be used for vertical guidance:**

1) Press the **FPL** Key to display the Active Flight Plan Page on the MFD.

2) Press the **FMS** Knob, and turn to highlight the desired waypoint altitude.

3) Turn the small **FMS** Knob to enter editing mode.

4) Press the **ENT** Key. The altitude is now shown in cyan, indicating it is usable for vertical guidance.

**Designating a procedure waypoint altitude to be used for vertical guidance:**

1) Press the **FPL** Key to display the Active Flight Plan Page on the MFD.

2) Press the **FMS** Knob, and highlight the desired waypoint altitude. Turn the small **FMS** Knob to enter editing mode. .

3) Press the **ENT** Key. The altitude is now shown in cyan, indicating it is usable for vertical guidance.

Altitude constraints are displayed and entered in feet mean sea level (MSL) values to the nearest hundred. An altitude constraint in feet above ground level (AGL) format is supported for airports. When a database altitude restriction is displayed, the system allows entry of a different altitude when creating a waypoint, effectively overriding the database restriction (only before the FAF). When a database altitude restriction of type "AT or ABOVE" or "AT or BELOW" is activated, the system uses the "AT" portion of the restriction to define the vertical profile.

An altitude constraint is invalid if:

• Meeting the constraint requires the aircraft to climb

• Meeting the constraint requires the maximum flight path angle or maximum vertical speed to be exceeded

• The altitude constraint results in a TOD behind the aircraft present position

• The constraint is within a leg type for which altitude constraints are not supported

• The altitude constraint is added to the FAF of an approach that provides vertical guidance (i.e., ILS or GPS SBAS approach)

• The altitude constraint is added to a waypoint past the FAF

**Entering/modifying an altitude constraint:**

1) Press the **FPL** Key to display the Active Flight Plan Page on the MFD.

2) Press the **FMS** Knob, and turn to highlight the desired waypoint altitude constraint.

3) Enter an altitude constraint value using the **FMS** Knobs. To enter altitudes as a flight level, turn the small **FMS** Knob counter-clockwise past zero or clockwise past 9 on the first character, and the system automatically changes to show units of Flight Level. Turn the large **FMS** Knob clockwise to highlight the first zero and enter the three digit flight level.

4) Press the **ENT** Key to accept the altitude constraint; if the selected waypoint is an airport, an additional choice is displayed. Turn the small **FMS** Knob to choose 'MSL' or 'AGL', and press the **ENT** Key to accept the altitude.

**FLIGHT MANAGEMENT**

**GARMIN.**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

Altitude constraints can be modified or deleted after having been added to the flight plan. In the event an altitude constraint is deleted and the navigation database contains an altitude restriction for the lateral waypoint, the system displays the altitude restriction from the database provided no predicted altitude can be provided. The system also provides a way to reinstate a published altitude constraint that has been edited.

**Deleting an altitude constraint provided by the navigation database:**

1) Press the **FPL** Key to display the Active Flight Plan Page on the MFD.

2) Press the **FMS** Knob, and turn to highlight the desired waypoint altitude constraint.

3) Press the **CLR** Key. A 'Remove VNV altitude?' confirmation window is displayed.

4) Select 'OK' and press the **ENT** Key.

**Deleting an altitude constraint that has been manually entered:**

1) Press the **FPL** Key to display the Active Flight Plan Page on the MFD.

2) Press the **FMS** Knob, and turn to highlight the desired waypoint altitude constraint.

3) Press the **CLR** Key. A 'Remove or Revert to published VNV altitude of nnnnnFT?' confirmation window is displayed.

4) Select 'REMOVE' and press the **ENT** Key. The manually entered altitude is deleted (it is replaced by a system calculated altitude, if available).

**Reverting a manually entered altitude constraint back to the navigation database value:**

1) Press the **FPL** Key to display the Active Flight Plan Page on the MFD.

2) Press the **FMS** Knob, and turn to highlight the desired waypoint altitude constraint.

3) Press the **CLR** Key. A 'Remove or Revert to published VNV altitude of nnnnnFT?' confirmation window is displayed.

4) Select 'REVERT' and press the **ENT** Key. The altitude is changed to the navigation database value.

5) Press the **FMS** Knob to remove the flashing cursor.

**Modifying a system calculated altitude constraint:**

1) Press the **FPL** Key to display the Active Flight Plan Page on the MFD.

2) Press the **FMS** Knob, and turn to highlight the desired waypoint altitude constraint.

3) Press the **CLR** Key. An 'Edit or Revert to published VNV altitude of nnnnnFT?' confirmation window is displayed.

4) Select 'EDIT' and press the **ENT** Key.

5) Edit the value using the **FMS** Knobs, and press the **ENT** Key.

6) Press the **FMS** Knob to remove the flashing cursor.

## 5.8 PROCEDURES

The system can access the whole range of instrument procedures available. Departures (DPs), arrivals (STARs), and non-precision and precision approaches (APRs) are stored within the database and can be loaded using any Procedures **(PROC)** Key.

The selected procedure for the departure or arrival airport is added to the active flight plan. No waypoints are required to be in the active flight plan to load procedures; however, if the origin and destination airport are already loaded, the procedure loading window defaults to the appropriate airport, saving some time selecting the correct airport on the Procedure Loading Page. Whenever an approach is selected, the choice to either "load" or "activate" is given. "Loading" adds the approach to the end of the flight plan without immediately using it for navigation guidance. This allows continued navigation via the intermediate waypoints in the original flight plan, but keeps the procedure available on the Active Flight Plan Page for quick activation when needed. "Activating" also adds the procedure to the end of the flight plan but immediately begins to provide guidance to the first waypoint in the approach.

The system adds terminal procedures to the flight plan based on leg types coded within that procedure in the navigation database. If the terminal procedure in the flight plan contains an identifier like '6368FT', that indicates a leg that terminates when the specified altitude (6,368 feet) has been exceeded. A heading leg in the flight plan displays 'hdg' preceding the DTK (e.g. 'hdg 008°'). A flight plan leg requiring the pilot to manually initiate sequencing to the next leg displays 'MANSEQ' as the identifier.



**Figure 5-71  Procedure Leg Identifiers**

**Viewing available procedures at an airport:**

1) From the Airport Information Page (first page in the WPT group):

   Select the **DP** Softkey. The Departure Information Page is displayed, defaulting to the airport displayed on the Airport information Page.

   **Or**.

   Select the **STAR** Softkey. The Arrival Information Page is displayed, defaulting to the airport displayed on the Airport information Page.

   **Or**.

   Select the **APR** Softkey. The Approach Information Page is displayed, defaulting to the airport displayed on the Airport information Page.

2) To select another airport, press the **FMS** Knob to activate the cursor, enter an identifier/facility name/city, and press the **ENT** Key.

3) Turn the large **FMS** Knob to highlight the procedure. The procedure is previewed on the map.

4) Turn the small **FMS** Knob to view the available procedures. Press the **ENT** Key to select the procedure. The cursor moves to the next box (runway or transition). The procedure is previewed on the map.

5) Turn the small **FMS** Knob to view the available runway or transition. Press the **ENT** Key to select the runway or transition. The cursor moves to the next box (if available). The procedure is previewed on the map.

6) Turn the small **FMS** Knob to view the available runway or transition. Press the **ENT** Key to select the runway or transition. The cursor moves to the Sequence box or the Minimums box. The procedure is previewed on the map.

7) Press the **Info 1** Softkey or the **Info 2** Softkey to return to the Airport Information Page.

**Loading a procedure into the active flight plan from the <Procedure> Information Page:**

1) From the Airport Information Page (first page in the WPT group):

    Select the **DP** Softkey.  The Departure Information Page is displayed, defaulting to the airport displayed on the Airport information Page.

    **Or**.

    Select the **STAR** Softkey.  The Arrival Information Page is displayed, defaulting to the airport displayed on the Airport information Page.

    **Or**.

    Select the **APR** Softkey.  The Approach Information Page is displayed, defaulting to the airport displayed on the Airport information Page.

2) To select another airport, press the **FMS** Knob to activate the cursor, enter an identifier/facility name/city, and press the **ENT** Key.

3) Select a different procedure, if desired.

    a) Turn the large **FMS** Knob to highlight the procedure.  The procedure is previewed on the map.

    b) Turn the small **FMS** Knob to view the available procedures.  Press the **ENT** Key to select the procedure.  The cursor moves to the next box (runway or transition).  The procedure is previewed on the map.

    c) Turn the small **FMS** Knob to view the available runway or transition.  Press the **ENT** Key to select the runway or transition.  The cursor moves to the next box (if available).  The procedure is previewed on the map.

    d) Turn the small **FMS** Knob to view the available transitions. Press the **ENT** Key to select the transition.  The cursor moves to the Sequence box or the Minimums box.  The procedure is previewed on the map.

4) Press the **MENU** Key to display the <Procedure> Information Page Menu.

5) Turn the **FMS** Knob to highlight 'Load <procedure>'.

6) Press the **ENT** Key to load the procedure into the active flight plan.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## DEPARTURES

A Departure Procedure (DP) is loaded at the departure airport in the flight plan. Only one departure can be loaded at a time in a flight plan. If a departure is loaded when another departure is already in the active flight plan, the new departure replaces the previous departure. The route is defined by selection of a departure, the transition waypoints, and a runway.

### LOADING A DEPARTURE INTO THE ACTIVE FLIGHT PLAN

**Loading a departure into the active flight plan using the PROC Key:**

1) Press the **PROC** Key. The Procedures Window is displayed.

2) Highlight 'Select Departure'.

3) Press the **ENT** Key. The Departure Loading Page is displayed.

4) Use the **FMS** Knob to select an airport, if necessary, and press the **ENT** Key.

5) Select a departure from the list and press the **ENT** Key.

6) Select a runway (if required) and press the **ENT** Key.

7) Select a transition (if required) and press the **ENT** Key. 'Load?' is highlighted.
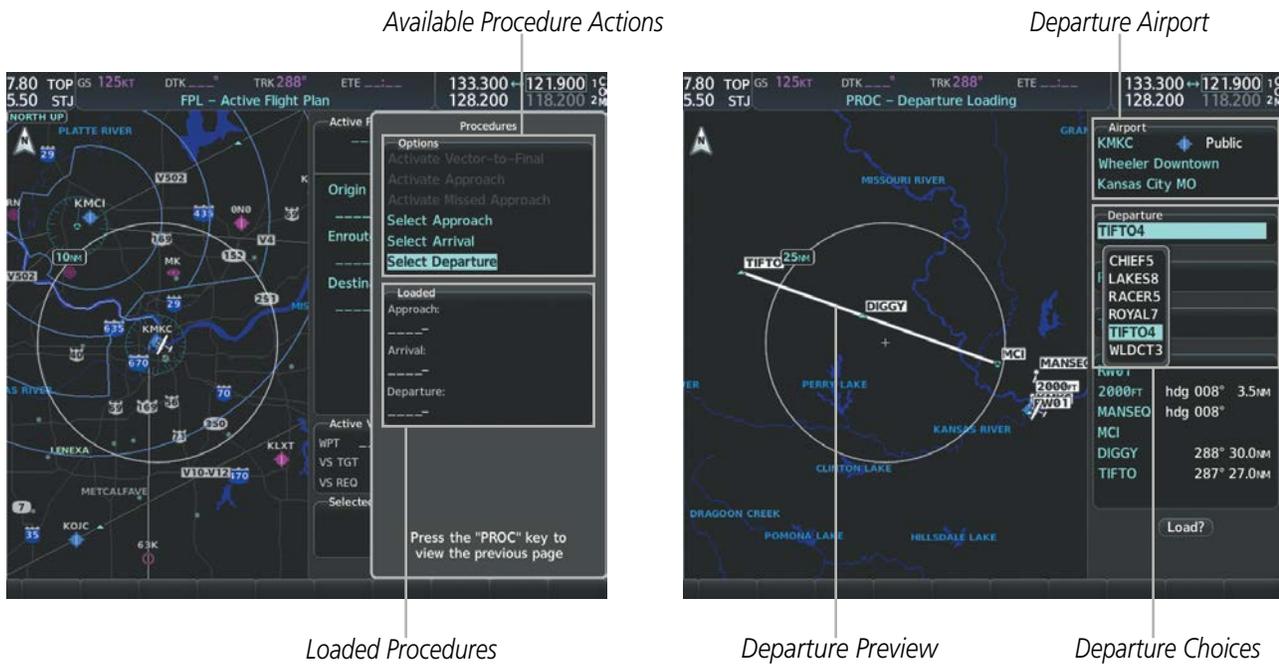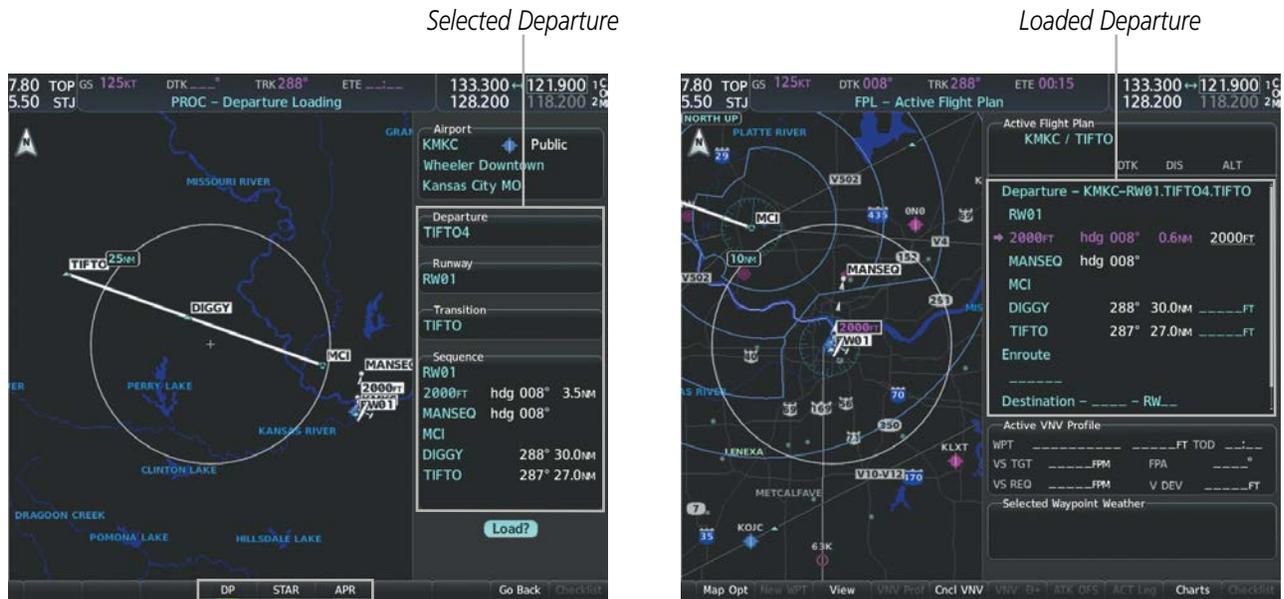
8) Press the **ENT** Key to load the departure procedure.



Available Procedure Actions     Departure Airport

Loaded Procedures     Departure Preview     Departure Choices

**Figure 5-72  Departure Selection**

*Selected Departure*                                    *Loaded Departure*



*Procedure Loading Page Selection Softkeys*

**Figure 5-73  Departure Loading**

## REMOVING A DEPARTURE FROM THE ACTIVE FLIGHT PLAN

When plans change while flying IFR, departures can be easily removed from the Active Flight Plan.

**Removing a departure procedure from the active flight plan:**

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **MENU** Key, and highlight 'Remove Departure'.

3) Press the **ENT** Key.  A confirmation window is displayed listing the departure procedure.

4) With 'OK' highlighted, press the **ENT** Key.  To cancel the removal request, highlight 'CANCEL' and press the **ENT** Key.

**Or**:

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **FMS** Knob, and turn to highlight the departure header in the active flight plan.

3) Press the **CLR** Key.  A confirmation window is displayed listing the departure procedure.

4) With 'OK' highlighted, press the **ENT** Key.  To cancel the removal request, highlight 'CANCEL' and press the **ENT** Key.

5) Press the **FMS** Knob to remove the flashing cursor.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## ARRIVALS

A Standard Terminal Arrival (STAR) can be loaded at any airport that has one available. Only one arrival can be loaded at a time in a flight plan.  If an arrival is loaded when another arrival is already in the active flight plan, the new arrival replaces the previous arrival.  The route is defined by selection of an arrival, the transition waypoints, and a runway.

### LOADING AN ARRIVAL INTO THE ACTIVE FLIGHT PLAN

**Loading an arrival into the active flight plan using the PROC Key:**

1) Press the **PROC** Key.  The Procedures Window is displayed.

2) Highlight 'Select Arrival'.

3) Press the **ENT** Key.  The Arrival Loading Page is displayed.

4) Use the **FMS** Knob to select an airport, if necessary, and press the **ENT** Key.

5) Select an arrival from the list and press the **ENT** Key.

6) Select a transition (if required) and press the **ENT** Key.

7) Select a runway (if required) and press the **ENT** Key. 'Load?' is highlighted.
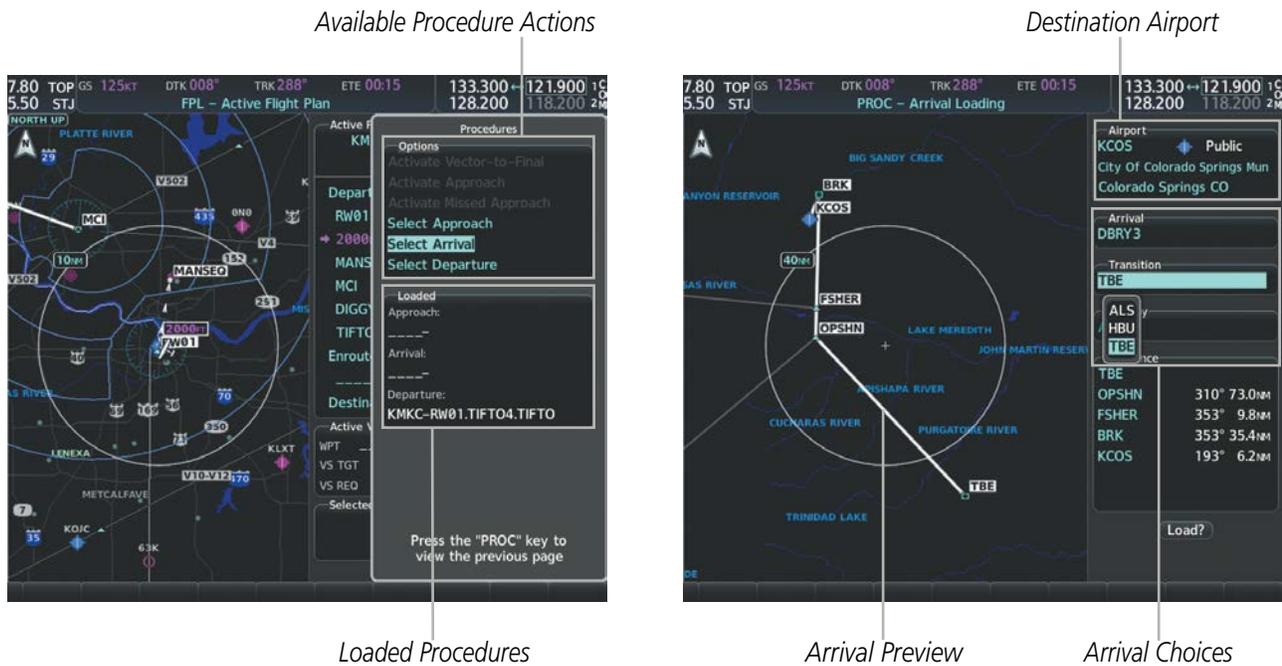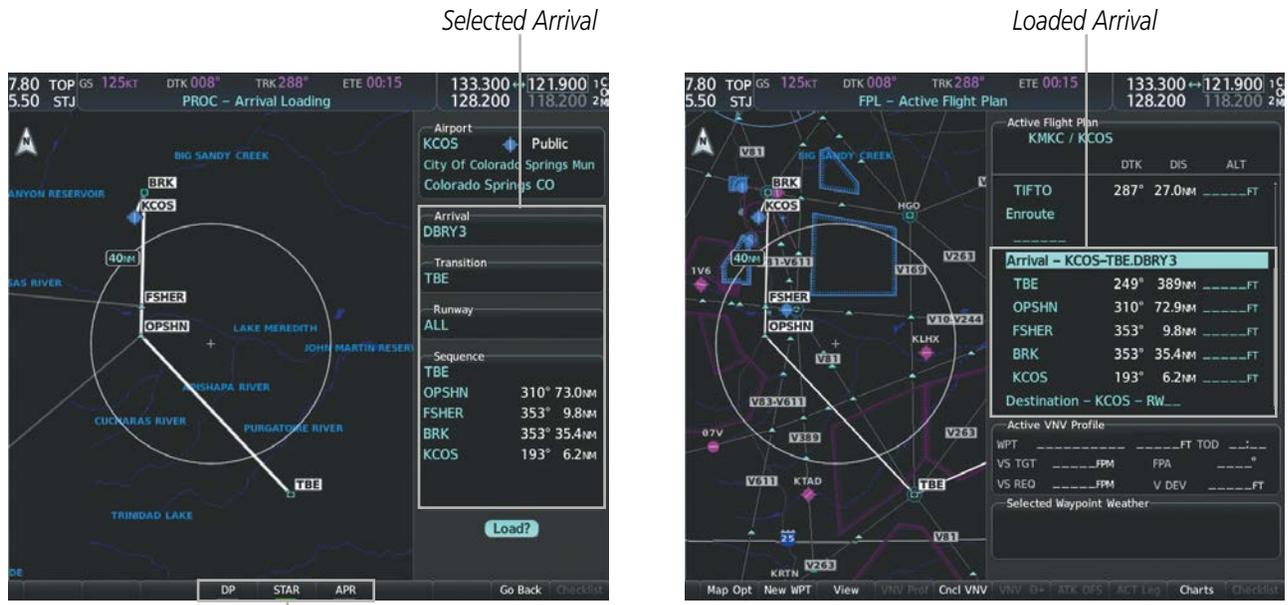
8) Press the **ENT** Key to load the arrival procedure.



*Available Procedure Actions*      *Destination Airport*

*Loaded Procedures*      *Arrival Preview*      *Arrival Choices*

**Figure 5-74  Arrival Selection**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

*Selected Arrival*     *Loaded Arrival*



*Procedure Loading Page Selection Softkeys*

**Figure 5-75  Arrival Loading**

## REMOVING AN ARRIVAL FROM THE ACTIVE FLIGHT PLAN

When plans change while flying IFR, arrivals can be easily removed from the Active Flight Plan.

**Removing an arrival from the active flight plan:**

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **MENU** Key, and highlight 'Remove Arrival'.

3) Press the **ENT** Key.  A confirmation window is displayed listing the arrival procedure.

4) With 'OK' highlighted, press the **ENT** Key.  To cancel the removal request, highlight 'CANCEL' and press the **ENT** Key.

   **Or**:

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **FMS** Knob, and turn to highlight the arrival header in the active flight plan.

3) Press the **CLR** Key.  A confirmation window is displayed listing the arrival procedure.

4) With 'OK' highlighted, press the **ENT** Key.  To cancel the removal request, highlight 'CANCEL' and press the **ENT** Key.

5) Press the **FMS** Knob to remove the flashing cursor.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## APPROACHES

**NOTE:** *If certain GPS parameters (SBAS, RAIM, etc.) are not available, some published approach procedures for the desired airport may not be displayed in the list of available approaches.*

An Approach Procedure (APR) can be loaded at any airport that has one available, and provides guidance for non-precision and precision approaches to airports with published instrument approach procedures. Only one approach can be loaded at a time in a flight plan. If an approach is loaded when another approach is already in the active flight plan, the new approach replaces the previous approach. The route is defined by selection of an approach and the transition waypoints.

Whenever an approach is selected, the choice to either "Load" or "Load and Activate" is given ("Load and Activate" is only available for the active flight plan). "Loading" adds the approach to the end of the flight plan without immediately using it for navigation guidance. This allows continued navigation via the intermediate waypoints in the original flight plan, but keeps the procedure available for quick activation when needed. "Activating" also adds the procedure to the end of the flight plan but immediately begins to provide guidance to the first waypoint in the approach.

When selecting an approach, a "GPS" designation to the right of the procedure name indicates the procedure can be flown using the GPS receiver. Some procedures do not have this designation, meaning the GPS receiver can be used for supplemental navigation guidance only. If the GPS receiver cannot be used for primary guidance, the appropriate navigation receiver must be used 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.

The SBAS GPS allows for flying LNAV, LNAV+V, LNAV/VNAV, LP, LP+V, and LPV approach service levels according to the published chart. LNAV+V is an LNAV with advisory vertical guidance provided for assistance in maintaining a constant vertical glidepath similar to an ILS glideslope on approach. This guidance is displayed on the system PFD in the same location as the ILS glideslope using a magenta diamond. In all cases where LNAV+V is indicated by the system during an approach, LNAV minima are used. The active approach service level is annunciated on the HSI as shown in the following table:

| HSI Annunciation | Description | Example on HSI |
|---|---|---|
| LNAV | RNAV GPS approach using published LNAV minima |  |
| LNAV+V | RNAV GPS approach using published LNAV minima. Advisory vertical guidance is provided | |
| L/VNAV (available only if SBAS available) | RNAV GPS approach using published LNAV/VNAV minima (downgrades to LNAV if SBAS unavailable) | |
| LP (available only if SBAS available) | RNAV GPS approach using published LP minima (downgrades to LNAV if SBAS unavailable) | |
| LP+V (available only if SBAS available) | RNAV GPS approach using published LP minima. Advisory vertical guidance is provided (downgrades to LNAV if SBAS unavailable) | **Approach Service Level** - LNAV, LNAV+V, L/VNAV, LP, LP+V, LPV |
| LPV (available only if SBAS available) | RNAV GPS approach using published LPV minima (downgrades to LNAV if SBAS unavailable) | |

**Table 5-11  Approach Service Levels**

FLIGHT MANAGEMENT

SYSTEM OVERVIEW
FLIGHT INSTRUMENTS
EIS
AUDIO PANEL & CNS
FLIGHT MANAGEMENT
HAZARD AVOIDANCE
AFCS
ADDITIONAL FEATURES
APPENDICES
INDEX

## LOADING AN APPROACH INTO THE ACTIVE FLIGHT PLAN

**Loading an approach into the active flight plan using the PROC Key:**

1) Press the **PROC** Key.  The Procedures Window is displayed.

2) Highlight 'Select Approach', and press the **ENT** Key.  The Approach Loading Page is displayed.

3) Select the airport and approach:

   a) Use the **FMS** Knob to select an airport, if necessary, and press the **ENT** Key.

   b) Select an approach from the list and press the **ENT** Key.

   **Or**:

   a) If necessary, push the **FMS** Knob to exit the approach list, and use the large **FMS** Knob to move the cursor to the Approach Channel field.

   b) Use the **FMS** Knob to enter the approach channel number, and press the **ENT** Key to accept the approach channel number.  The airport and approach are selected.

4) Select a transition (if required) and press the **ENT** Key.

5) Minimums

   a) To set 'Minimums', turn the small **FMS** Knob to select 'BARO' or 'TEMP COMP', and press the **ENT** Key. Turn the small **FMS** Knob to select the altitude, and press the **ENT** Key.

   b) If 'TEMP COMP' was selected, the cursor moves to the temperature field.  Turn the small **FMS** Knob to select the temperature, and press the **ENT** Key.

   **Or**:

   To skip setting minimums, press the **ENT** Key.

6) Press the **ENT** Key with 'Load?' highlighted to load the approach procedure; or turn the large **FMS** Knob to highlight 'Activate' and press the **ENT** Key to load and activate the approach procedure.

*NOTE:  When GPS is not approved for the selected final approach course, the message 'NOT APPROVED FOR GPS' is displayed.  GPS provides guidance to the approach, but the HSI must to be switched to a NAV receiver to fly the final course of the approach.*

*Available Procedure Actions*

*Destination Airport*



*Loaded Procedures*

*Approach Preview*

*Approach Choices*

**Figure 5-76  Approach Selection**

*Selected Approach*

*Loaded Approach*



*Procedure Loading Page Selection Softkeys*

*LOAD or ACTIVATE? Annunciation*

**Figure 5-77  Approach Loading**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

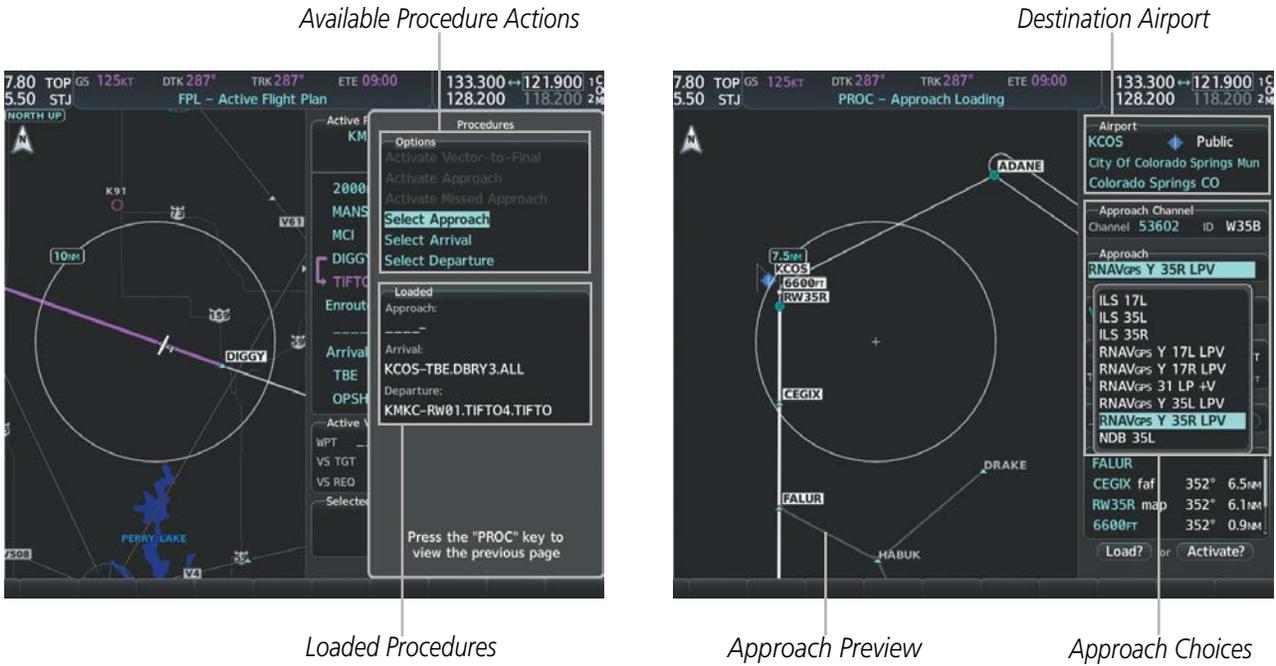HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Loading an approach into the active flight plan from the Nearest Airport Page:**

1) Select the Nearest Airports Page.

2) Press the **FMS** Knob, then turn the large **FMS** Knob to highlight the desired nearest airport. The airport is previewed on the map.

3) Press the **APR** Softkey; or press the **MENU** Key, highlight 'Select Approach Window', and press the **ENT** Key.

4) Turn the **FMS** Knob to highlight the desired approach.

5) Press the **LD APR** Softkey; or press the **MENU** Key, highlight 'Load Approach', and press the **ENT** Key. The Approach Loading Page is displayed with the transitions field highlighted.

6) Turn the **FMS** Knob to highlight the desired transition, and press the **ENT** Key.

7) Minimums

   a) To set 'Minimums', turn the small **FMS** Knob to select 'BARO' or 'TEMP COMP', and press the **ENT** Key. Turn the small **FMS** Knob to select the altitude, and press the **ENT** Key.

   b) If 'TEMP COMP' was selected, the cursor moves to the temperature field. Turn the small **FMS** Knob to select the temperature, and press the **ENT** Key.

   **Or**:

   To skip setting minimums, press the **ENT** Key. The 'LOAD?' field is highlighted.

8) Press the **ENT** Key with 'LOAD?' highlighted to load the approach procedure; or turn the large **FMS** Knob to highlight 'ACTIVATE' and press the **ENT** Key to load and activate the approach procedure. The system continues navigating the current flight plan until the approach is activated. When GPS is not approved for the selected final approach course, the message 'NOT APPROVED FOR GPS' is displayed. GPS provides guidance to the approach, but the HSI must to be switched to a NAV receiver to fly the final course of the approach.

## ACTIVATING AN APPROACH

A previously loaded approach can be activated from the Procedures Window.

**Activating a previously loaded approach:**

1) Press the **PROC** Key. The Procedures Window is displayed with 'Activate Approach' highlighted.

2) Press the **ENT** Key to activate the approach.

In many cases, it may be easiest to "load" the full approach while still some distance away, enroute to the destination airport. Later, if vectored to final, use the steps below to select 'Activate Vector-To-Final' — which makes the inbound course to the FAF waypoint active.

**Activating a previously loaded approach with vectors to final:**

1) Press the **PROC** Key to display the Procedures Window.

2) Highlight 'Activate Vector-to-Final' and press the **ENT** Key.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

**Loading and activating an approach using the MENU Key:**

1) From the Approach Loading Page, press the **MENU** Key. The page menu is displayed with 'Load & Activate Approach' highlighted.

2) Press the **ENT** Key. When GPS is not approved for the selected final approach course, the message 'NOT APPROVED FOR GPS' is displayed. GPS provides guidance to the approach, but the HSI must to be switched to a NAV receiver to fly the final course of the approach.

## REMOVING AN APPROACH FROM THE ACTIVE FLIGHT PLAN

When plans change while flying IFR, approaches can be easily removed from the Active Flight Plan.

**Removing an approach from the active flight plan:**

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **MENU** Key, and highlight 'Remove Approach'.

3) Press the **ENT** Key. A confirmation window is displayed listing the approach procedure.

4) With 'OK' highlighted, press the **ENT** Key. To cancel the removal, highlight 'CANCEL' and press the **ENT** Key.

**Or**:

1) Press the **FPL** Key to display the Active Flight Plan Page (MFD) or the Active Flight Plan Window (PFD).

2) Press the **FMS** Knob, and turn to highlight the approach header in the active flight plan.

3) Press the **CLR** Key. A confirmation window is displayed listing the approach procedure.

4) With 'OK' highlighted, press the **ENT** Key. To cancel the removal, highlight 'CANCEL' and press the **ENT** Key.

5) Press the **FMS** Knob to remove the flashing cursor.

## MISSED APPROACH

**Activating a missed approach in the active flight plan:**

1) Press the **PROC** Key.

2) Turn the **FMS** Knob to highlight 'Activate Missed Approach'.

3) Press the **ENT** Key. The aircraft automatically sequences to the MAHP.

**Or**:

Fly past the MAP, and press the **SUSP** Softkey on the PFD.

**Or**:

Press the Go-Around Button.

FLIGHT MANAGEMENT

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

In this missed approach procedure, the altitude immediately following the MAP (in this case '6600FT') is not part of the published procedure. It is simply a Course to Altitude (CA) leg which guides the aircraft along the runway centerline until the altitude required to safely make the first turn toward the MAHP is exceeded. This altitude is provided by the navigation database, and may be below, equal to, or above the published minimums for this approach. In this case, if the aircraft altitude is below the specified altitude (6,600 feet) after crossing the MAP, a direct-to is established to provide a course on runway heading until an altitude of 6,600 feet is reached. After reaching 6,600 feet, a direct-to is established to the published MAHP (in this case ADANE). If the aircraft altitude is above the specified altitude after crossing the MAP, a direct-to is established to the published fix (ADANE) to begin the missed approach procedure.

| Active Flight Plan KMKC / KCOS | DTK | DIS | ALT |
|---|---|---|---|
| BRK | 353° | 31.3NM | _____FT |
| KCOS–RNAVGPS Y 35R LPV | | | |
| HABUK iaf | 164° | 18.4NM | _____FT |
| FALUR | 290° | 6.0NM | 8100FT |
| CEGIX faf | 352° | 6.5NM | 8100FT |
| RW35R map | 352° | 6.1NM | |
| Course to Altitude Leg — 6600FT | 352° | 0.9NM | 6600FT |
| ADANE mahp | 055° | 15.5NM | 9000FT |
| HOLD | 297° | 7.0NM | |
| Destination – KCOS – RW35R | | | |

**Figure 5-78  Course to Altitude**

In some missed approach procedures this Course to Altitude leg may be part of the published procedure. For example, a procedure may dictate a climb to 5,500 feet, then turn left and proceed to the Missed Approach Hold Point (MAHP). In this case, the altitude would appear in the list of waypoints as '5500FT'. Again, if the aircraft altitude is lower than the prescribed altitude, a direct-to is established on a Course to Altitude leg when the missed approach procedure is activated.

## VISUAL APPROACH

The system provides a visual approach feature.  Unlike instrument approaches, visual approaches are not defined in the navigation database and do not follow a precise prescribed path. Instead, the system calculates the lateral and vertical path for the chosen runway and creates visual approach waypoints based on runway position and course as specified in the navigation database.

Each visual approach will have two transitions, the straight in transition (STRAIGHT) and the Vectors-to-Final transition (VECTORS).  The visual approach waypoints (fixes) consist of the initial fix (STRGHT), the final approach fix (FINAL), and the missed approach point (RWxx). A 3 degree glide path is calculated from the missed approach point up to each waypoint along the extended straight-in path.

For visual approaches, the pilot is responsible for avoiding terrain, obstacles and traffic. Therefore, when a visual approach is selected, the message "Obstacle clearance is not provided for visual approaches" is displayed on the approach selection page and must be acknowledged before the visual approach is loaded into the flight plan.

> **Loading and Activating a visual approach using the PROC Key:**
>
> 1) Press the **PROC** Key.  The Procedures Window is displayed.
>
> 2) Highlight 'Select Approach', and press the **ENT** Key.  The Approach Loading Page is displayed.
>
> 3) Select the airport and approach:
>
>    a) Use the **FMS** Knob to select an airport, if necessary, and press the **ENT** Key.
>
>    b) Select a visual approach from the list and press the **ENT** Key.
>
> 4) Select a transition and press the **ENT** Key.
>
> 5) Minimums
>
>    a) To set 'Minimums', turn the small **FMS** Knob to select 'BARO' or 'TEMP COMP', and press the **ENT** Key. Turn the small **FMS** Knob to select the altitude, and press the **ENT** Key.
>
>    b) If 'TEMP COMP' was selected, the cursor moves to the temperature field.  Turn the small **FMS** Knob to select the temperature, and press the **ENT** Key.
>
>    **Or**:
>
>    To skip setting minimums, press the **ENT** Key.
>
> 6) Press the **ENT** Key with 'Load?' highlighted to load the approach procedure ('Load' is only available if there is no previous approach already loaded in flight plan); or turn the large **FMS** Knob to highlight 'Activate' and press the **ENT** Key to load and activate the approach procedure.
>
> 7) The message 'Obstacle clearance is not provided for visual approaches' is displayed. Press **ENT** to continue.
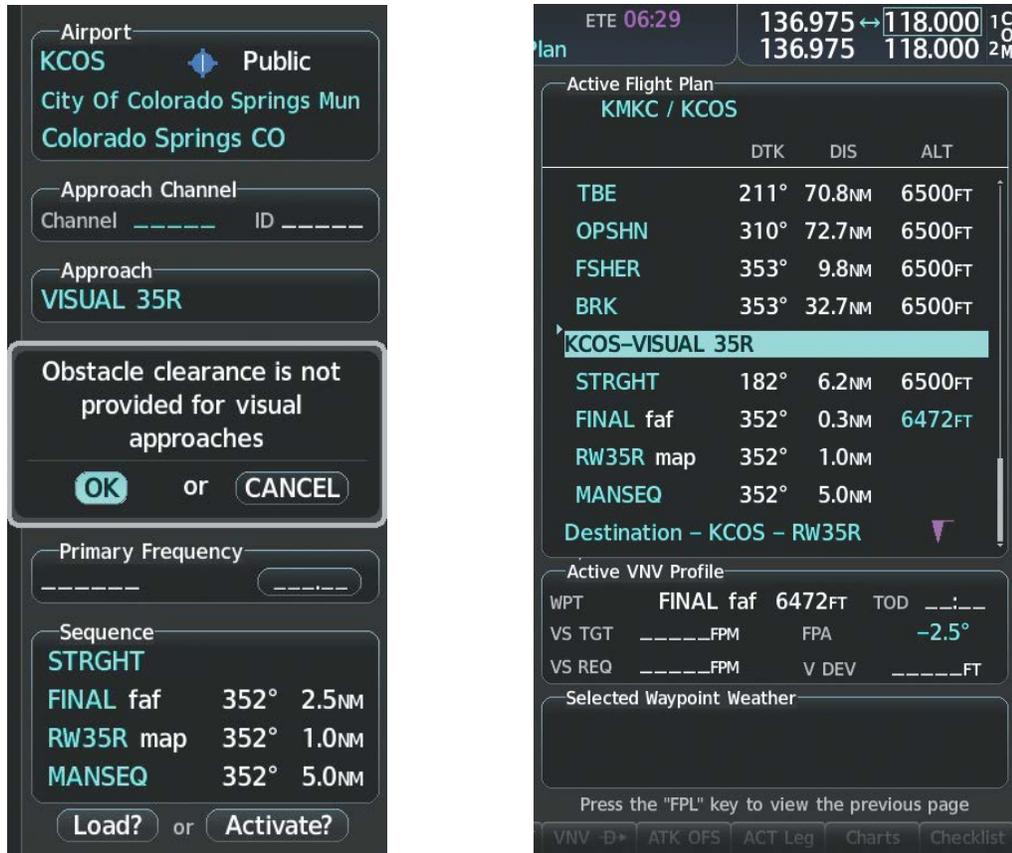
**Figure 5-79  Loading Visual Approach**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## TEMPERATURE COMPENSATED ALTITUDE

If desired, the system can compensate the loaded approach altitudes based on a pilot-supplied temperature at the destination. For example, if the pilot enters a destination temperature of -40° C, the system increases the approach altitudes accordingly. A temperature compensated altitude is displayed in slanted text.

**Activating temperature compensated altitude:**

1) From the Active Flight Plan Page, press the **MENU** Key. The Page Menu is displayed.

2) Turn the **FMS** Knob to highlight 'Temperature Compensation'.

3) Press the **ENT** Key. The Temperature Compensation Window is displayed.

4) Use the small **FMS** Knob to select the temperature at the <airport>. The compensated altitude is computed as the temperature is selected.

> **NOTE:** The temperature at the destination can be entered in the Temperature Compensation Window on the MFD, or in the References Window on the PFD. There is only one compensation temperature for the system, therefore, changing the temperature will affect both the loaded approach altitudes and the minimums. Refer to the Flight Instruments section for information about applying temperature compensation to the MDA/DH.

5) Press the **ENT** Key. 'Activate Compensation?' is highlighted.

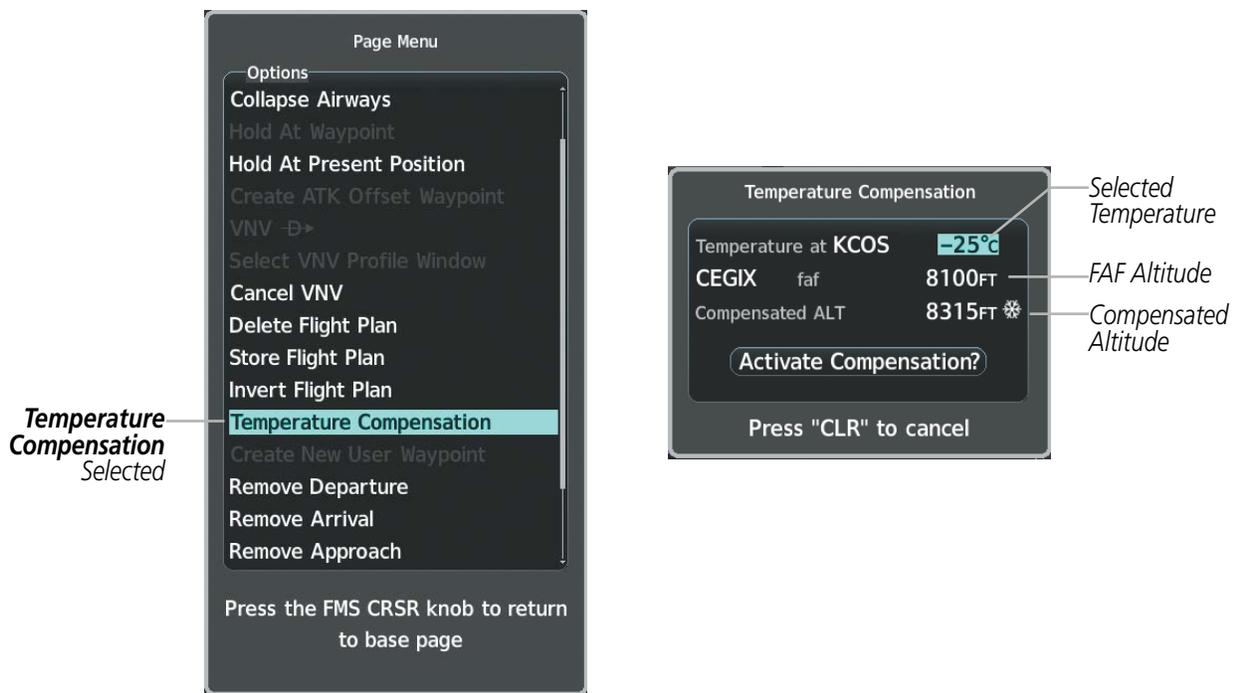6) Press the **ENT** Key. The compensated altitudes for the approach are shown in the flight plan.



**Figure 5-80 Temperature Compensation**

FLIGHT MANAGEMENT

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX



**Figure 5-81 Temperature Compensation in the Active Flight Plan**

**Cancelling temperature compensated altitude:**

1) From the Active Flight Plan Page, press the **MENU** Key. The Page Menu is displayed.

2) Turn the **FMS** Knob to highlight 'Temperature Compensation'.

3) Press the **ENT** Key. The Temperature Compensation Window is displayed.

4) Press the **ENT** Key. 'Cancel Compensation?' is highlighted.

5) Press the **ENT** Key. The temperature compensated altitude at the FAF is cancelled.

> **NOTE:** Activating/cancelling temperature compensation for the loaded approach altitudes does not select/deselect temperature compensated minimums (MDA/DH), nor does selecting/deselecting temperature compensated minimums activate/cancel temperature compensated approach altitudes.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## 5.9  TRIP PLANNING

The system allows the pilot to view trip planning information, fuel information, and other information for a specified flight plan or flight plan leg based on automatic data, or based on manually entered data.  Weight planning is also available, based on manually entered fuel data and the active flight plan (to estimate remaining fuel).

### TRIP PLANNING

All of the input of data needed for calculation and viewing of the statistics is done on the Trip Planning Page located in the Aux Page Group.



**Figure 5-82  Trip Planning Page**

The trip planning inputs are based on sensor inputs (automatic page mode) or on pilot inputs (manual page mode).  Some additional explanation of the sources for some of the inputs is as follows:

- Departure Time -  This defaults to the current time in automatic page mode.  The computations are from the aircraft present position, so the aircraft is always just departing.

- Calibrated Airspeed -  The primary source is from the air data system, and the secondary source of information is GPS ground speed.

- Indicated Altitude - The primary source is the barometric altitude, and the secondary source of information is GPS altitude.

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

## TRIP STATISTICS

The trip statistics are calculated based on the selected starting and ending waypoints and the trip planning inputs.

In flight plan mode (FPL) with a stored flight plan selected (NN), and the entire flight plan (CUM) selected, the waypoints are the starting and ending waypoints of the selected flight plan.

In flight plan mode (FPL) with a stored flight plan selected (NN), and a specific leg (NN) selected, the waypoints are the endpoints of the selected leg.

In flight plan mode (FPL) with the active flight plan selected (00), and the remaining flight plan (REM) selected, the 'from' waypoint is the present position of the aircraft and the 'to' waypoint is the endpoint of the active flight plan.

In flight plan mode (FPL) with the active flight plan selected (00), and a specific leg (NN) selected, the 'from' waypoint is the current aircraft position and the 'to' waypoint is the endpoint of the selected leg.

In waypoint (WPTs) mode these are manually selected waypoints (if there is an active flight plan, these default to the endpoints of the active leg).

Some of the calculated trip statistics are dashed when the selected leg of the active flight plan has already been flown.

- Desired Track - Desired Track is shown as nnn° and is the desired track between the selected waypoints. It is dashed unless only a single leg is selected.

- Distance - The distance is shown in tenths of units up to 99.9, and in whole units up to 9999.

- Estimated time enroute (ETE) - ETE is shown as hours:minutes until less than an hour, then it is shown as minutes:seconds.

- Estimated time of arrival (ETA) - ETA is shown as hours:minutes and is the local time at the destination.

  - If in waypoint mode then the ETA is the ETE added to the departure time.

  - If a flight plan other than the active flight plan is selected it shows the ETA by adding to the departure time all of the ETEs of the legs up to and including the selected leg. If the entire flight plan is selected, then the ETA is calculated as if the last leg of the flight plan was selected.

  - If the active flight plan is selected, the ETA reflects the current position of the aircraft and the current leg being flown. The ETA is calculated by adding to the current time the ETEs of the current leg up to and including the selected leg. If the entire flight plan is selected, then the ETA is calculated as if the last leg of the flight plan was selected.

- Enroute safe altitude (ESA) - The ESA is shown as nnnnnFT

- Destination sunrise and sunset times (SUNRISE, SUNSET) - These times are shown as hours:minutes of the time at the destination.

## FUEL STATISTICS

The fuel statistics are calculated based on the selected starting and ending waypoints and the trip planning inputs. Some of the calculated trip statistics are dashed when the selected leg of the active flight plan has already been flown.

- Fuel efficiency (Efficiency) - This value is calculated by dividing the current ground speed by the current fuel flow.

- Time of fuel endurance (Total Endurance) - This time is shown as hours:minutes. This value is obtained by dividing the amount of fuel on board by the current fuel flow.

- Fuel on board upon reaching end of selected leg (Remaining Fuel) - This value is calculated by taking the amount of fuel onboard and subtracting the fuel required to reach the end of the selected leg.

- Fuel endurance remaining at end of selected leg (Remaining Endurance) - This value is calculated by taking the time of fuel endurance and subtracting the estimated time enroute to the end of the selected leg.

- Fuel required for trip (Fuel Required) - This value is calculated by multiplying the time to go by the fuel flow.

- Total range at entered fuel flow (Total Range) - This value is calculated by multiplying the time of fuel endurance by the ground speed.

## OTHER STATISTICS

These statistics are calculated based on the system sensor inputs or the manual trip planning inputs.

- Density Altitude
- True Airspeed

The pilot may select Automatic or Manual page mode, and flight plan (FPL) or waypoint (WPTs) mode. In automatic page mode, only the FPL, LEG, or waypoint IDs are editable (based on FPL/WPTs selection).

Selected Flight Plan NN -
00 is Active FPL
01-99 are Stored FPLs

FPL 00    LEG REM
KMKC    →  KCOS

Selected Leg(s)
Stored Flight Plan
- CUM: Beginning to End of FPL
- NN: Beginning to End of Selected Leg
Active Flight Plan
- REM: Pres. Pos. to End of FPL
- NN: Pres. Pos. to End of Selected Leg

Starting and Ending Waypoint of
Selected Flight Plan Segment

**Figure 5-83  Trip Planning Page - Flight Plan Mode**

Selected Flight Plan
Not Available

FPL 00    LEG REM
TOP    →  HYS

Selected Leg(s)
Not Available

Selected Starting and Ending Waypoints

**Figure 5-84  Trip Planning Page - Waypoint Mode**

**Selecting automatic or manual page mode:**

Press the **Auto** Softkey or the **Manual** Softkey; or press the **MENU** Key, highlight 'Auto Mode' or 'Manual Mode', and press the **ENT** Key.

**Selecting flight plan or waypoint mode:**

Press the **FPL** Softkey or the **WPTs** Softkey; or press the **MENU** Key, highlight 'Flight Plan Mode' or 'Waypoints Mode', and press the **ENT** Key.

**Selecting a flight plan and leg for trip statistics:**

1) Press the **FMS** Knob to activate the cursor in the flight plan number field.

2) Turn the small **FMS** Knob to select the desired flight plan number.

3) Turn the large **FMS** Knob to highlight 'CUM' or 'REM'. The statistics for each leg can be viewed by turning the small **FMS** Knob to select the desired leg. The Inset Map also displays the selected data.

**Selecting waypoints for waypoint mode:**

1) Select the **WPTs** Softkey; or press the **MENU** Key, highlight 'Waypoints Mode', and press the **ENT** Key. The cursor is positioned in the waypoint field directly below the FPL field.

2) Turn the **FMS** knobs to select the desired waypoint (or select from the Page Menu 'Set WPT to Present Position' if that is what is desired), and press the **ENT** Key. The cursor moves to the second waypoint field.

3) Turn the **FMS** knobs to select the desired waypoint, and press the **ENT** Key. The statistics for the selected leg are displayed.

In manual page mode, the other eight trip input data fields must be entered by the pilot, in addition to flight plan and leg selection.

**Entering manual data for trip statistics calculations:**

1) Select the **Manual** Softkey or select 'Manual Mode' from the Page Menu, and press the **ENT** Key. The cursor may now be positioned in any field in the top right two boxes.

2) Turn the **FMS** Knobs to move the cursor onto the Departure Time field and enter the desired value. Press the **ENT** Key. The statistics are calculated using the new value and the cursor moves to the next entry field. Repeat until all desired values have been entered.

## 5.10  ABNORMAL OPERATION

✓ **NOTE:** *The Inset Map is removed from the PFD any time aircraft pitch is greater than +30° or less than –20°, or when a 65° bank angle is reached.*

This section discusses the Dead Reckoning mode of operation and the subsequent indications.

✓ **NOTE:** *Dead Reckoning Mode only functions in Enroute (ENR) or Oceanic (OCN) phase of flight. In all other phases, an invalid GPS solution produces a "NO GPS POSITION" annunciation on the map and the system stops using GPS.*

While in Enroute or Oceanic phase of flight, if the system detects an invalid GPS solution or is unable to calculate a GPS position, the system automatically reverts to Dead Reckoning (DR) Mode. In DR Mode, the system uses its last-known position combined with continuously updated airspeed and heading data (when available) to calculate and display the aircraft's current estimated position.

It is important to note that estimated navigation data supplied by the system in DR Mode may become increasingly unreliable and must not be used as a sole means of navigation. If while in DR Mode airspeed and/or heading data is also lost or not available, the DR function may not be capable of accurately tracking estimated position and, consequently, the system may display a path that is different than the actual movement of the aircraft. Estimated position information displayed by the system through DR while there is no heading and/or airspeed data available should not be used for navigation.

DR Mode is inherently less accurate than the standard GPS/SBAS Mode due to the lack of satellite measurements needed to determine a position. Changes in wind speed and/or wind direction compound the relative inaccuracy of DR Mode. Because of this degraded accuracy, other navigation equipment must be relied upon for position awareness until GPS-derived position data is restored.

DR Mode is indicated on the system by the appearance of the letters 'DR' superimposed in amber over the 'own aircraft' symbol as shown in Figure 5-84.  In addition, 'DR' is prominently displayed in amber on the HSI slightly below and to the left of the aircraft symbol on the CDI as shown in Figure 5-84.  The CDI deviation bar remains, but is removed from the display after 20 minutes in DR Mode.  The autopilot will remain coupled in DR mode as long as the deviation info is available (20 min.)  Lastly, but at the same time, a 'GPS NAV LOST' alert message appears on the PFD.  Normal navigation using GPS/SBAS source data resumes automatically once a valid GPS solution is restored.

As a result of operating in DR Mode, all GPS-derived data is computed based upon an estimated position and is displayed as amber text on the display to denote degraded navigation source information as shown in Figure 5-84.

Also, while the system is in DR Mode, some terrain functions are not available. Additionally, the accuracy of all nearest information (airports, airspaces, and waypoints) is questionable. Finally, airspace alerts continue to function, but with degraded accuracy.
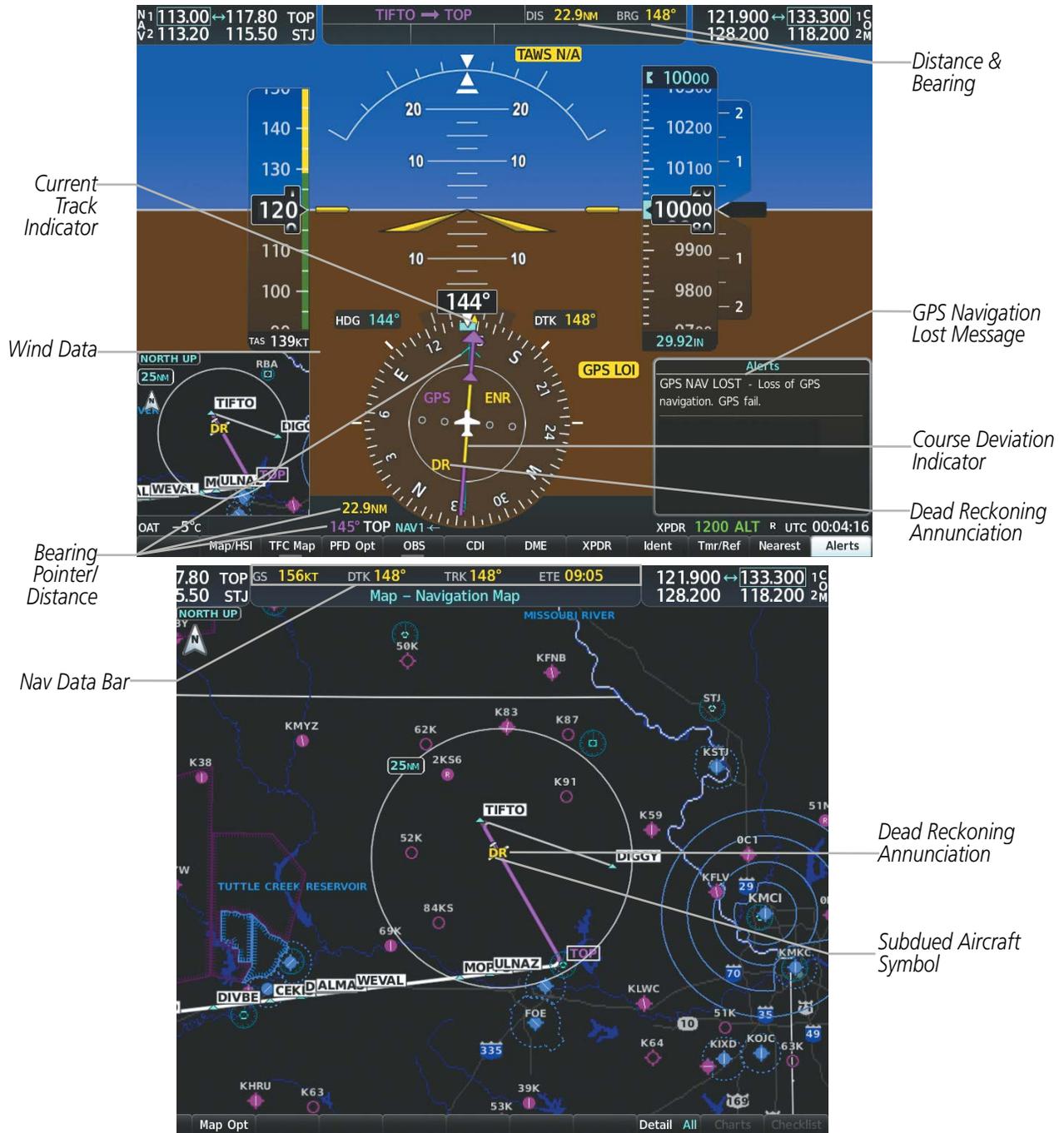
GARMIN.

Current Track Indicator

Wind Data

Bearing Pointer/ Distance

Nav Data Bar

Distance & Bearing

GPS Navigation Lost Message

Course Deviation Indicator

Dead Reckoning Annunciation

Dead Reckoning Annunciation

Subdued Aircraft Symbol

**Figure 5-85  Dead Reckoning Mode - GPS Derived Data Shown in Amber**

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX

BLANK PAGE

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

EIS

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AFCS

ADDITIONAL FEATURES

APPENDICES

INDEX