GARMIN®

G950®

Integrated Avionics System
Pilot's Guide



Pilatus PC-6

SYSTEM OVERVIEW

FLIGHT INSTRUMENTS

ENGINE INDICATION SYSTEM

AUDIO PANEL & CNS

FLIGHT MANAGEMENT

HAZARD AVOIDANCE

AUTOMATIC FLIGHT CONTROL SYSTEM

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This manual reflects the operation of System Software version 0935.06 or later. Some differences in operation may be observed when comparing the information in this manual to earlier or later software versions.

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

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

WARNING: *The altitude calculated by G950 GPS receivers is geometric height above Mean Sea Level and could vary significantly from the altitude displayed by pressure altimeters, such as the GDC 74 Air Data Computer, or other altimeters in aircraft. GPS altitude should never be used for vertical navigation. Always use pressure altitude displayed by the G950 PFD or other pressure altimeters in aircraft.*

WARNING: *Do not use outdated database information. Databases used in the G950 system must be updated regularly in order to ensure that the information remains current. Pilots using any outdated database do so entirely at their own risk.*

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

WARNING: *Do not rely solely upon the display of traffic information for collision avoidance maneuvering. The traffic display does not provide collision avoidance resolution advisories and does not under any circumstances or conditions relieve the pilot's responsibility to see and avoid other aircraft.*

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 rely on information from a lightning detection system display as the sole basis for hazardous weather avoidance. Range limitations and interference may cause the system to display inaccurate or incomplete information. Refer to documentation from the lightning detection system manufacturer for detailed information about the system.*

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: *For safety reasons, G950 operational procedures must be learned on the ground.*

WARNING: *The Garmin system, as installed in this aircraft, has a very high degree of functional integrity. However, the pilot must recognize that providing monitoring and/or self-test capability for all conceivable system failures is not practical.*

WARNING: *The United States government operates the Global Positioning System and is solely responsible for its accuracy and maintenance. The GPS system is subject to changes which could affect the accuracy and performance of all GPS equipment. Portions of the Garmin G950 utilize GPS as a precision electronic NAVigation AID (NAVAID). Therefore, as with all NAVAIDs, information presented by the G950 can be misused or misinterpreted and, therefore, become unsafe.*

WARNING: *To reduce the risk of unsafe operation, carefully review and understand all aspects of the G950 Pilot's Guide documentation and the G950 Integrated Avionics System in the Airplane Flight Manual. Thoroughly practice basic operation prior to actual use. During flight operations, carefully compare indications from the G950 to all available navigation sources, including the information from other NAVAIDs, visual sightings, charts, etc. For safety purposes, always resolve any discrepancies before continuing navigation.*

WARNING: *Do not use the system to attempt to penetrate a thunderstorm. The illustrations in this guide are only examples. Both the FAA Advisory Circular, Subject: Thunderstorms, and the Aeronautical Information Manual (AIM) recommend avoiding any thunderstorm identified as severe of giving intense radar echo by at least 20 miles.*

WARNING: *Lamp(s) inside this product may contain mercury (HG) and must be recycled or disposed of according to local, state, or federal laws. For more information, refer to our website at www.garmin.com/aboutGarmin/environment/disposal.jsp.*

WARNING: *Because of variation in the earth's magnetic field, operating the system within the following areas could result in loss of reliable attitude and heading indications. North of 72° North latitude at all longitudes; South of 70° South latitude at all longitudes; North of 65° North latitude between longitude 75° W and 120° W. (Northern Canada); North of 70° North latitude between longitude 70° W and 128° W. (Northern Canada); North of 70° North latitude between longitude 85° E and 114° E. (Northern Russia); South of 55° South latitude between longitude 120° E and 165° E. (Region south of Australia and New Zealand)*

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.*

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

CAUTION: *The Garmin G950 does not contain any user-serviceable parts. Repairs should only be made by an authorized Garmin service center. Unauthorized repairs or modifications could void both the warranty and the pilot's authority to operate this device under FAA/FCC regulations.*

NOTE: *When using Stormscope, there are several atmospheric phenomena in addition to nearby thunderstorms that can cause isolated discharge points in the strike display mode. However, clusters of two or more discharge points in the strike display mode do indicate thunderstorm activity if these points reappear after the screen has been cleared.*

NOTE: *All visual depictions contained within this document, including screen images of the G950 panel and displays, are subject to change and may not reflect the most current G950 system and aviation databases. Depictions of equipment may differ slightly from the actual equipment.*

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

NOTE: *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: *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 are assured compliance with all data quality requirements (DQRs) by virtue of a Type 2 Letter of Authorization (LOA) from the FAA. A copy of the Type 2 LOA is available for each database and can be viewed at http://fly.garmin.com by selecting 'Type 2 LOA Status.'*
- *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 AFM(S) 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 to coordinate the revised DQRs.*

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 'Report An Aviation Data Error Report.'*

Record of Revisions				
Part Number	**Revision**	**Date**	**Page Range**	**Description**
190-00870-00	A	12/1/09	i – I-6	Initial release for 9.15 software.
190-00870-00	B	6/11/10	i – I-6	Revised to add the following optional functionality: • TAWS-B • KTA 870 • WX 500
190-00870-01	A	1/12/12	i – I-6	Initial release for 12.01 software. Added the following functionality to the PG • Profile Display • SVS, Terrain SVS • Aux Video • FliteCharts • Chartview • Checklists • SiriusXM Radio • XM WX Satellite Weather
190-00870-02	A	10/20/14	i – I-6	Initial release for 14.02 software Added AC-U-KWIK Airport Directory Added User Defined Holding Patterns Added Landing Field Elevation enty Added temperature compensated altitude Added import/export of Pilot Profiles Added LP and LP+V approach service levels Added Auto North Up Updated System Message Advisories Updated Warnings, Cautions, and Notes Updated database loading procedures Removed SiriusXM Weather and SiriusXM Satellite Radio Added other GDU 14.02 parameters

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SECTION 1 SYSTEM OVERVIEW

The G950 Integrated Flight Deck System presents flight instrumentation, position, navigation, communication, and identification information to the pilot using flat-panel color displays. The system is distributed across the following Line Replaceable Units (LRUs):

- **GDU 1040** Primary Flight Display (PFD)
- **GDU 1040** Multi Function Display (MFD)
- **GMA 347** Audio Panel with Integrated Marker Beacon Receiver
- **GIA 63W** Integrated Avionics Units (IAU)
- **GDC 74A** Air Data Computer (ADC)
- **GTX 33** Mode S Transponder
- **GRS 77** Attitude and Heading Reference System (AHRS)
- **GMU 44** Magnetometer

Figure 1-1 shows interactions between the LRUs. Additional/optional equipment are shown in Figure 1-2. The G950 is capable of interfacing with the following optional equipment:

- **GTX 33 ES** Mode S Transponder
- **GWX 68/70** Weather Radar
- **S-TEC 55X** Autopilot
- **KTA 870** Traffic System
- **WX 500** Lightning Detection System

1.1 LINE REPLACEABLE UNITS

- **GDU 1040** (2) – The left-hand GDU is configured as a Primary Flight Display (PFD) and the right-hand GDU as a Multi Function Display (MFD). Both feature 10.4-inch LCD screens with 1024 x 768 resolution. The displays communicate with each other through a High-Speed Data Bus (HSDB) Ethernet connection. Each display is also paired with an Ethernet connection to an IAU.



- **GMA 347** (1) – The Audio Panel integrates navigation/communication radio (NAV/COM) digital audio, intercom, and marker beacon controls, and is installed between the displays. This unit communicates with both IAUs using an RS-232 digital interface.



- **GIA 63W** (2) – The Integrated Avionics Units (IAU) function as the main communication hubs, linking all LRUs with the on-side display. Each IAU contains a GPS SBAS receiver, VHF COM/NAV/GS receivers, and system integration microprocessors, and is paired with the on-side display via HSDB connection. The IAUs are not paired together and do not communicate with each other directly.



- **GDC 74A** (1) – The Air Data Computer (ADC) processes data from the pitot/static system and outside air temperature (OAT) sensor. The ADC provides pressure altitude, airspeed, vertical speed, and OAT information to the G950 System, and it communicates with the primary IAU, displays, and AHRS using an ARINC 429 digital interface.



- **GEA 71** (1) – (optional) The Engine Airframe Unit receives and processes signals from the engine and airframe sensors. This unit communicates with both IAUs using an RS-485 digital interface.



- **GTX 33** (1) – The solid-state Transponder provides Modes A, C, and S capability and communicates with both IAUs through an RS-232 digital interface.



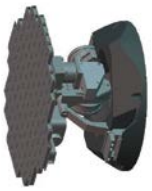
- **GRS 77** (1) – The Attitude and Heading Reference System (AHRS) provides aircraft attitude and heading information via ARINC 429 to both PFDs and the primary IAU. The AHRS contains advanced sensors (including accelerometers and rate sensors) and interfaces with the Magnetometer to obtain magnetic field information, with the ADC to obtain air data, and with both IAUs to obtain GPS information. AHRS operation is discussed in Section 1.4, System Operation.



- **GMU 44** (1) – The Magnetometer measures local magnetic field and sends data to the AHRS for processing to determine aircraft magnetic heading. This unit receives power directly from the AHRS and communicates with it via an RS-485 digital interface.



- **GWX 68** (1) – (optional) Provides airborne weather and ground mapped radar data to the MFD, through the GDL 69A, via HSDB connection.



- **GDL 69/69A** (1) (if installed) – A SiriusXM satellite radio receiver that provides real-time weather information to the MFD (and, indirectly, to the inset map of the PFD) as well as digital audio entertainment. The GDL 69A communicates with the MFD via HSDB connection. A subscription to the SiriusXM Satellite Radio service is required to enable the GDL 69A audio entertainment capability.



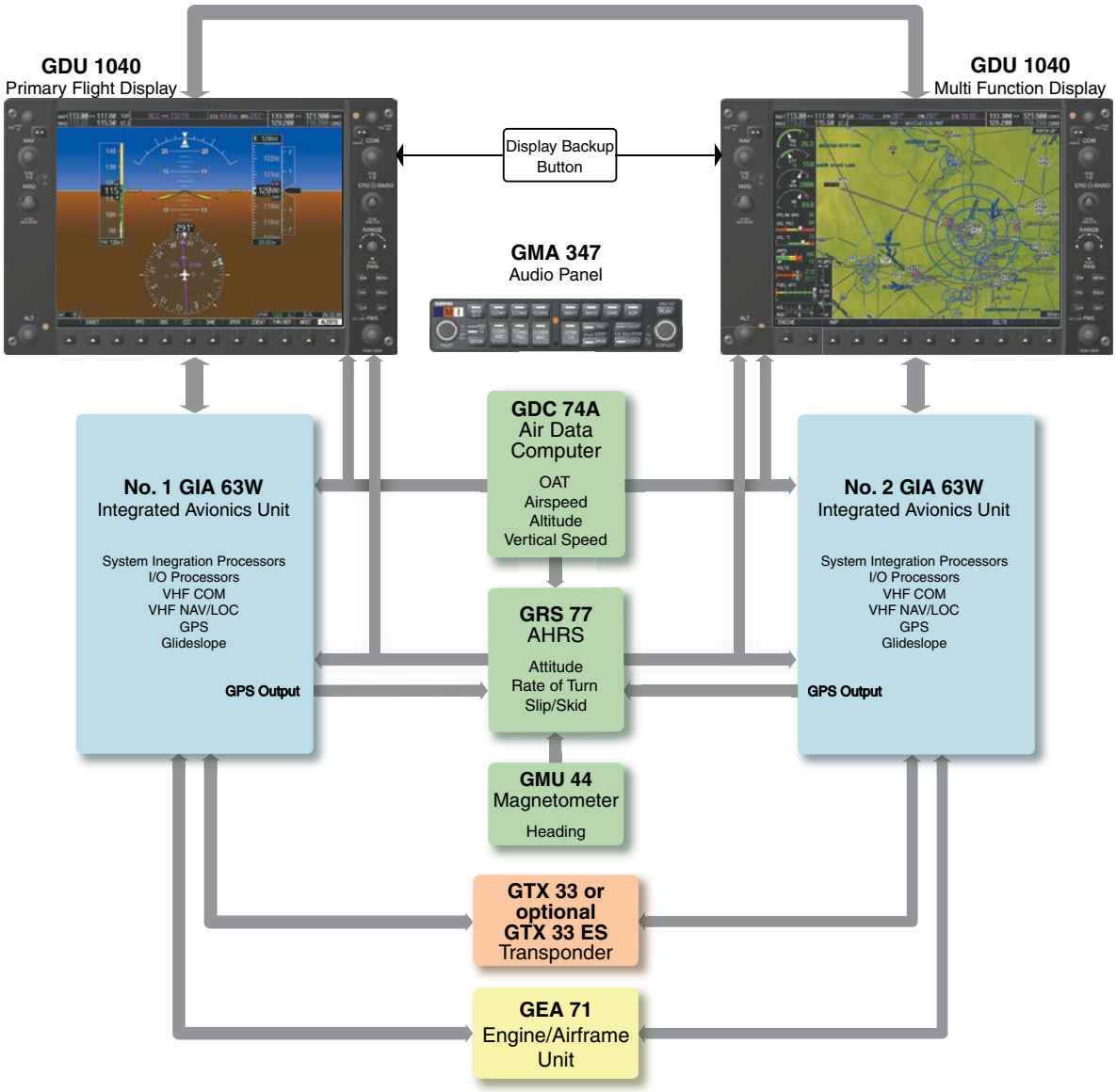


Figure 1-1 Basic G950 Block Diagram

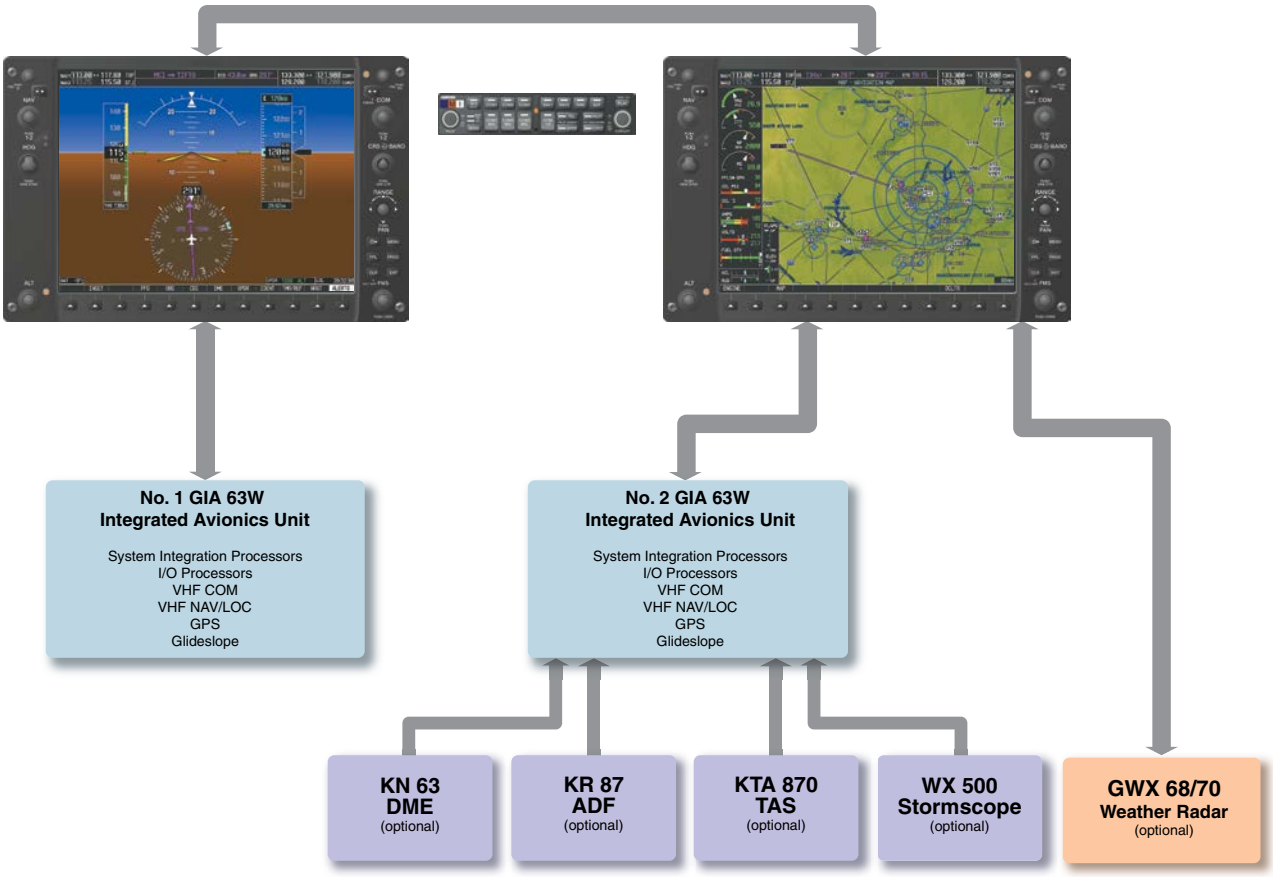


Figure 1-2 G950 With Optional/Additional Equipment

NOTE: *For information on non-Garmin optional/additional equipment shown in Figure 1-2, 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 SECURE DIGITAL (SD) CARDS

NOTE: *Ensure the G950 System is powered off before inserting an SD card.*

NOTE: *Refer to Appendix B for instructions on updating the aviation database.*

The PFD and MFD data card slots use Secure Digital (SD) cards and are located on the upper right side 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.

Installing an SD card:

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

2) To eject the card, gently press on the SD card to release the spring latch.



Figure 1-3 Display Bezel SD Card Slots

1.3 SYSTEM POWER-UP

NOTE: *Refer to Appendix A for system-specific annunciations and alerts.*

The G950 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.

During system initialization, test annunciations are displayed, as shown in Figure 1-4. All system annunciations should disappear typically within the first minute of power-up. Upon power-up, key annunciator lights also become momentarily illuminated on the Audio Panel, the MFD Control Unit, and the display bezels.

On the PFD, the AHRS begins to initialize and displays "AHRS ALIGN: Keep Wings Level". The AHRS should display valid attitude and heading fields typically within the first minute of power-up. The AHRS can align itself both while taxiing in a straight line and during level flight.

When the MFD powers up, the Power-up screen (Figure 1-5) displays the following information:

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

Current database information includes 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 (or right-most softkey) acknowledges this information, and the Navigation Map Page is displayed upon pressing the key a second time. When the system has acquired a sufficient number of satellites to determine a position, the aircraft's current position is shown on the Navigation Map Page.

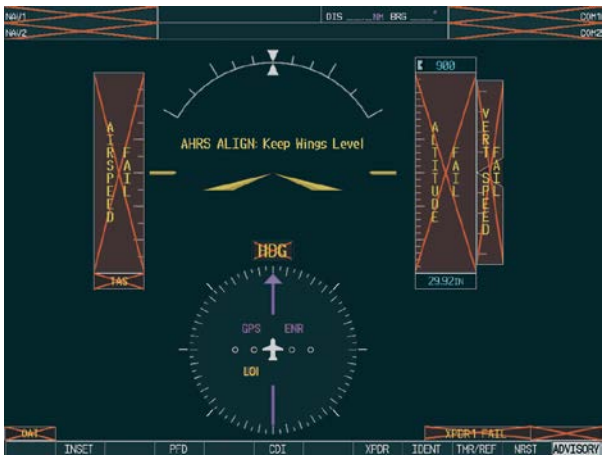


Figure 1-4 PFD Initialization

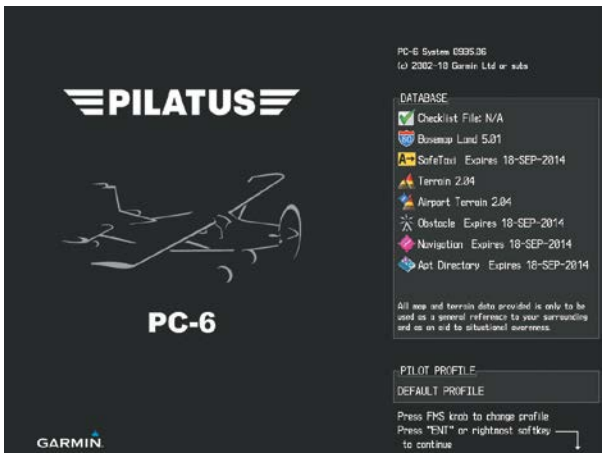


Figure 1-5 Example MFD Power-up Screen

1.4 SYSTEM OPERATION

NOTE: *The G950 system alerts the pilot when backup paths are utilized by the LRUs. Refer to the Appendices for further information regarding system-specific alerts.*

The displays are connected together via a single Ethernet bus for high-speed communication. As shown in Figure 1-1, each IAU is connected to the on-side display. This section discusses normal and reversionary G950 display operation, AHRS modes, GPS receiver operation, and G950 System Annunciations.

DISPLAY OPERATION

NOTE: *In normal operating mode, backlighting can only be adjusted from the PFD (see Section 1.7). In reversionary mode, it can be adjusted from the remaining display(s).*

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 1-6 G950 System Normal Operation

In the event of a display failure, the G950 System automatically switches to reversionary (backup) mode. In reversionary mode, all important flight information is presented on the remaining display(s) in the same format as in normal operating mode.

- **PFD failure –** MFD enters reversionary mode.
- **MFD failure –** PFD enters reversionary 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 1-1), and the NAV and COM functions provided to the failed display by the IAU are flagged as invalid on the remaining display. The system reverts to backup paths for the AHRS, ADC, Engine/Airframe Unit, and Transponder, as required. The change to backup paths is completely automated for all LRUs and no pilot action is required.

If the system fails to detect a display problem, reversionary mode may be manually activated by pressing the display backup button installed in the cockpit. Pressing this button again deactivates reversionary mode.



Figure 1-7 G950 Reversionary Mode (Failed PFD)

G950 SYSTEM ANNUNCIATIONS

When an LRU or an LRU function fails, a large red 'X' is typically displayed over the instrument experiencing failed data (Figure 1-8 displays all possible flags and responsible LRUs). Upon G950 power-up, certain instruments remain invalid as equipment begins to initialize. All instruments should be operational within one minute of power-up. If any instrument remains flagged, the G950 should be serviced by a Garmin-authorized repair facility.

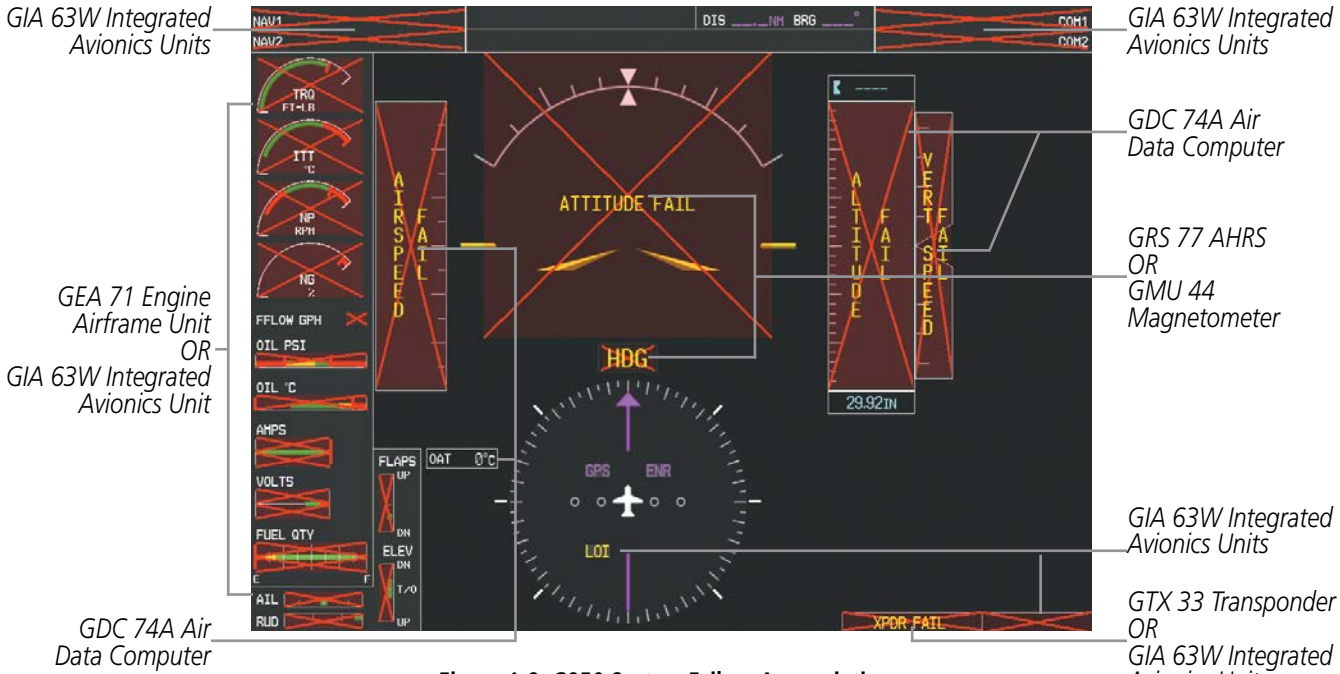


Figure 1-8 G950 System Failure Annunciations

SYSTEM STATUS

The System Status Page displays the statuses, serial numbers, and software version numbers for all detected system LRUs. Active LRUs are indicated by green check marks; failed, by red '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,

a) 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.

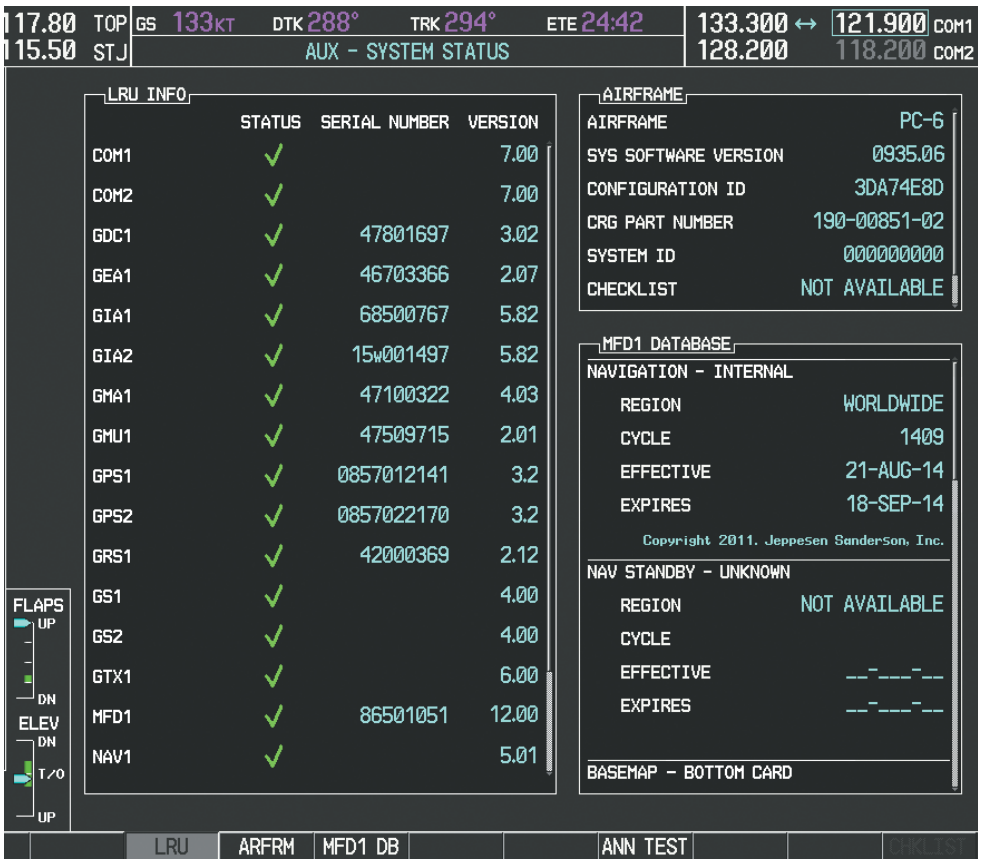


Figure 1-9 Example System Status Page

Pertinent information on all system databases is also displayed on this page. Refer to the Appendices and Additional Features sections for more information about databases.

Viewing database information:

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

2) To place the cursor in the 'Database' Box,

a) Press the **DBASE** Softkey.

Or:

a) Press the **MENU** Key.

b) Highlight 'Select Dbase Window' and press the **ENT** Key.

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

The G950 uses aural tones to convey the priority of airframe-specific alerts. The alerting system's annunciation tone may be tested from the System Status Page. Refer to the Appendices for airframe-specific alerts.

Testing the system annunciation tone:

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

2) Press the **ANN TEST** Softkey.

Or:

a) Press the **MENU** Key.

b) Highlight 'Enable Annunciator Test Mode' and press the **ENT** Key.

AHRS OPERATION

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

In addition to using internal sensors, the GRS 77 AHRS uses GPS information, magnetic field data and air data to assist in attitude/heading calculations. In normal mode, the AHRS relies upon GPS and magnetic field measurements. If either of these external measurements is unavailable or invalid, the AHRS uses air data information for attitude determination. Four AHRS modes of operation are available (see Figure 1-14) 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 (GRS 77) 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.

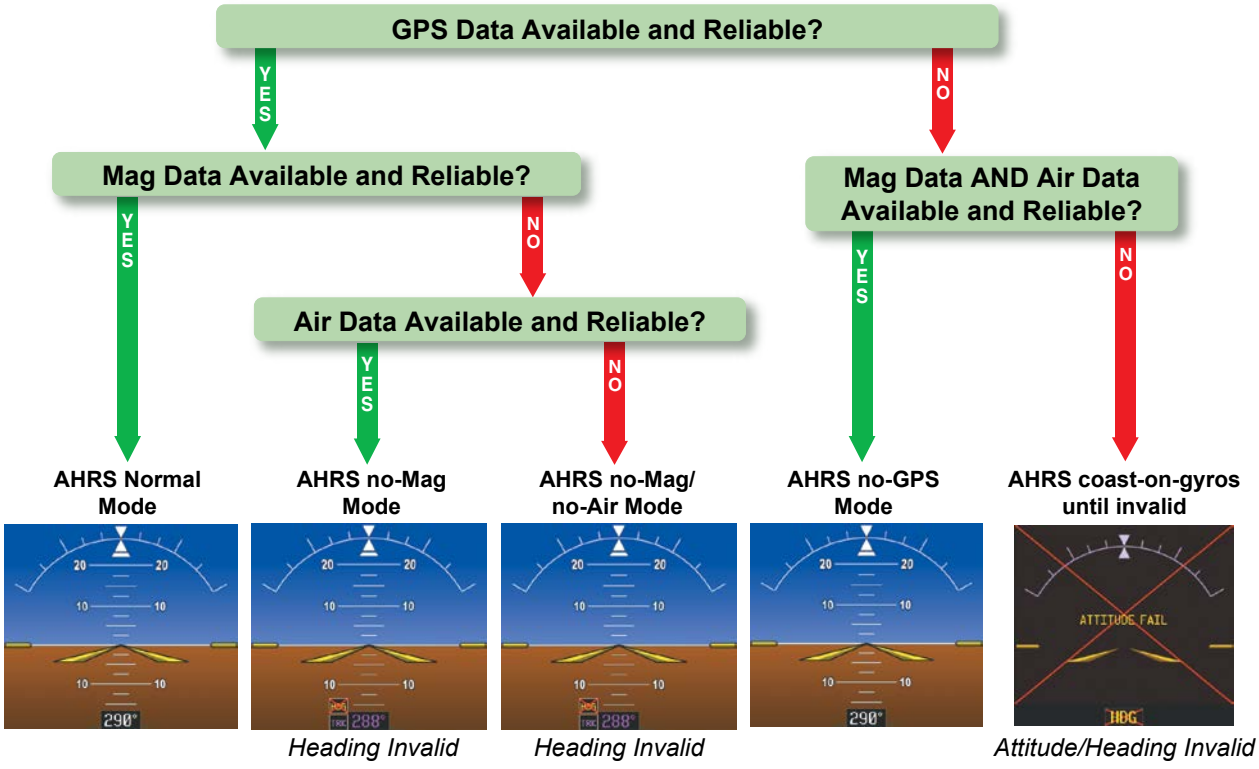


Figure 1-10 AHRS Operation

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

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

If the magnetometer input fails, the AHRS continues to output valid attitude information. If GPS-based track information is available while magnetometer input has failed, the HSI displays the ground track instead of heading using HSI Track Mode. In this mode, a magenta 'TRK' annunciation and track readout appear on the HSI. In addition, a yellow 'HDG' annunciation with a red X appear above the 'TRK' annunciation to indicate the HSI is displaying track instead of heading.

If both the heading and track are unavailable, the HSI displays a yellow 'HDG' annunciation with a red X over the heading readout box. The system also removes directional numbers and letters from the HSI.



HSI Track Mode (Heading Unavailable, Track Available)



Heading and Track Unavailable

Figure 1-11 Heading Failure Displays on the HSI

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

GPS RECEIVER OPERATION

Each Integrated Avionics Unit (IAU) contains a GPS receiver. Internal system checking is performed to ensure both GPS receivers are providing accurate data to the PFD. When both GPS receivers are providing accurate data, the GPS receiver producing the better solution is used by the system. 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.

Viewing GPS receiver status information:

1) Use the large **FMS** Knob on the MFD to select the Auxiliary Page Group (see Section 1.6 for information on navigating MFD page groups).
2) Use the small **FMS** Knob to select GPS Status Page (third page in the AUX Page Group).
3) 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.

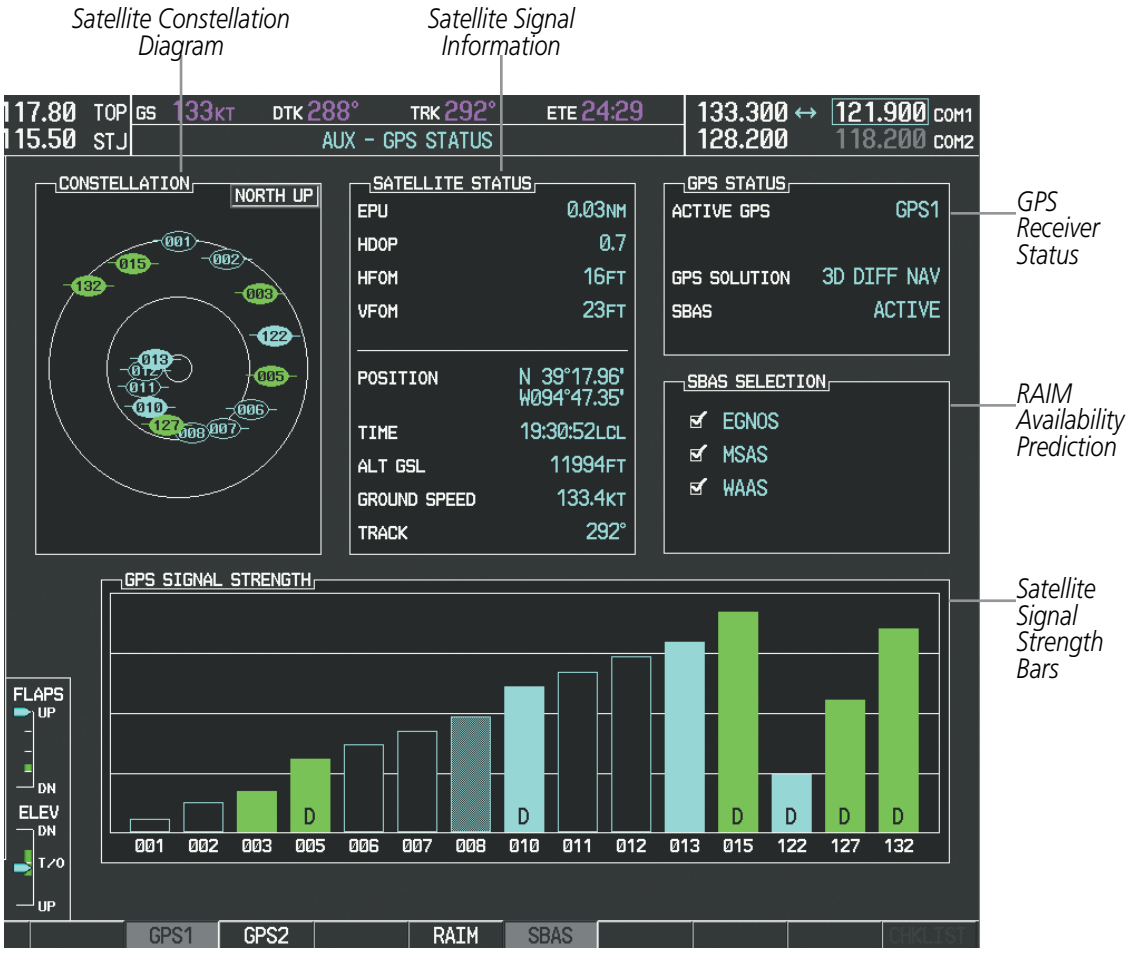


Figure 1-11 GPS Status Page

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 an 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 no failure message exists, check the GPS Status Page and compare the information for GPS1 and GPS2. Discrepancies may indicate a problem.

GPS RECEIVER 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. Satellite-Based Augmentation System (SBAS) status should be indicated as INACTIVE at this point. When acquisition is complete, the solution status changes to 3D DIFF NAV and SBAS becomes active.

- SBAS Selection (**SBAS** Softkey is pressed)

  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, MSAS or WAAS (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 EGNOS, MSAS or WAAS enabling/disabling.

Disabling SBAS

1) Select the GPS Status Page.
2) If necessary, press the **SBAS** Softkey.
3) Press the **FMS** Knob to activate the cursor.
4) Turn either FMS Knob to select 'EGNOS' or 'MSAS' or 'WAAS', as necessary.
5) Press the **ENT** Key to uncheck the box.
6) Repeat steps 4 & 5 as necessary, then press the **FMS** Knob to remove the cursor.

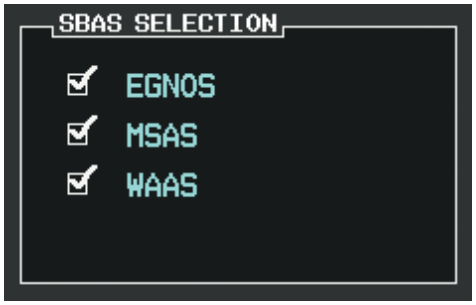


Figure 1-12 Enable/Disable SBAS

RAIM PREDICTION

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. In most cases performing 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.

Because of the tighter protection limit on approaches, there may be times when RAIM is not available. The G950 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". If RAIM is not available when crossing the FAF, the missed approach procedure must be flown.

Predicting RAIM availability:

1) Select the GPS Status Page.

2) 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:

a) Use the **FMS** Knob to enter the desired waypoint by identifier, facility, or city name and press the **ENT** Key. Refer to Section 1.7 for instructions on entering alphanumeric data into the G950.

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 NRST, RECENT, or AIRWAY waypoints, if required.

c) Turn the large **FMS** Knob clockwise to select the desired waypoint. The G950 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) Enter an arrival time and press the **ENT** Key.

7) 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

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

SATELLITE INFORMATION

Satellites currently in view are shown at their respective positions on a satellite constellation diagram. This sky view is always oriented north-up, 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.

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
- 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).

Using the current satellite signal information, they system calculates the aircraft's GPS position, time, altitude, ground speed, and track for the aircraft (displayed below the satellite signal accuracy measurements for reference). The following quantities denote the accuracy of the aircraft's GPS fix:

- Estimated Position Uncertainty (EPU)—A statistical error indication; the radius of a circle centered on an estimated horizontal position in which actual position has 95% probability of lying
- Horizontal Dilution of Precision (HDOP)—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
- Horizontal and Vertical Figures of Merit (HFOM and VFOM)—Measures of horizontal and vertical position uncertainty; the current 95% confidence horizontal and vertical accuracy values reported by the GPS receiver

1.5 G950 CONTROLS

The G950 controls have been designed to simplify operation of the system and minimize workload and the time required to access sophisticated functionality. Controls are located on the PFD and MFD bezels, MFD Control Unit, and Audio Panel. PFD and MFD controls and softkeys are discussed in this section. Audio Panel controls are described in the Audio Panel and CNS section; see the Audio Panel and CNS Section for more information about NAV/COM controls.

PFD/MFD CONTROLS

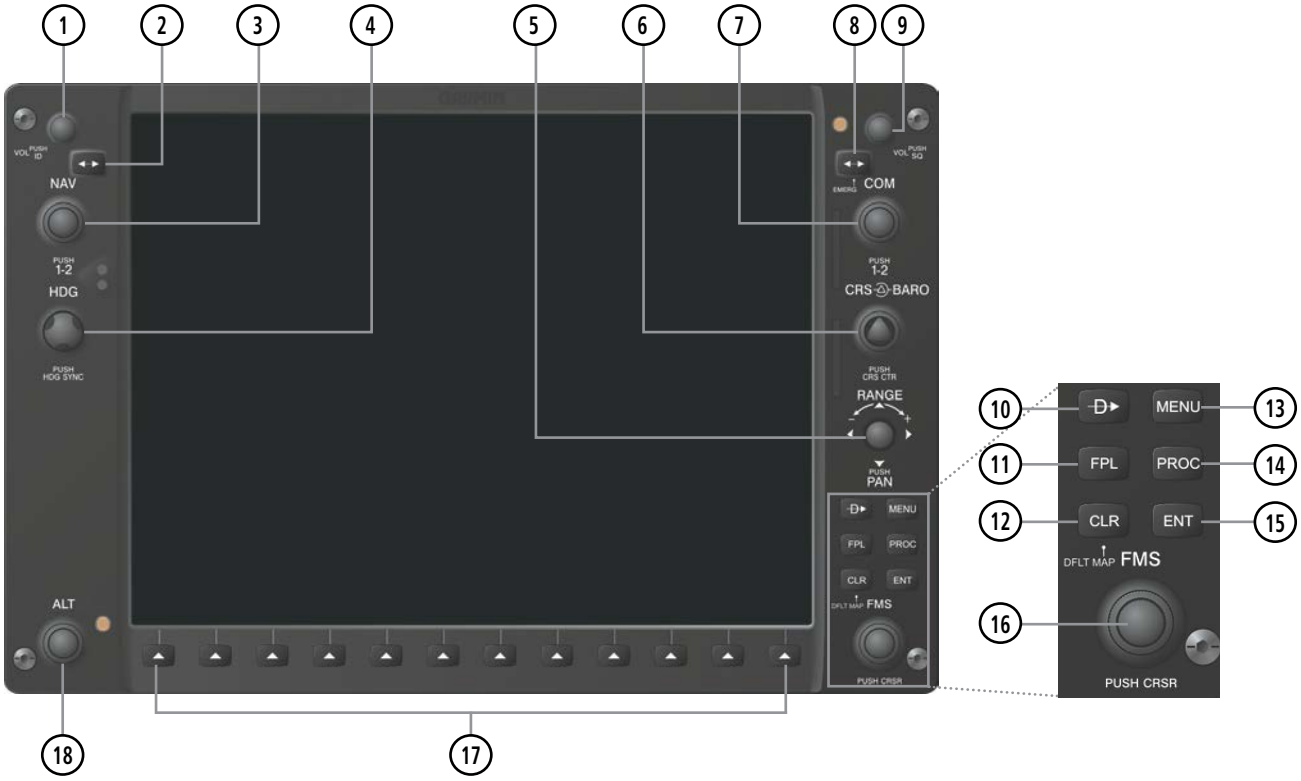


Figure 1-13 PFD/MFD Controls

(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 Press to display a digital heading momentarily to the left of the HSI and synchronize the Selected Heading to the and current heading

(5) **Joystick**	Turn to change map range Press to activate Map Pointer for map panning Moves the Quick Select Box or cursor on the Active Flight Plan Page on the MFD when joystick is moved left, right, up, or down.
(6) **CRS/BARO Knob**	Turn large knob for altimeter barometric pressure setting Turn small knob to adjust course (only when HSI is in VOR or OBS Mode) 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 2 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
(16) **FMS Knob (Flight Management System Knob)**	Press to turn the selection cursor ON/OFF. ***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) ***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. ***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) **Softkey Selection Keys**	Press to select softkey shown above the bezel key on the PFD/MFD display
(18) **ALT Knob**	Sets the Selected Altitude, shown above the Altimeter (the large knob selects the thousands, the small knob selects the hundreds)

The **NAV**, **CRS/BARO**, **COM**, **FMS**, and **ALT** knobs are concentric dual knobs, each having small (inner) and large (outer) control portion. When a portion of the knob is not specified in the text, either may be used.

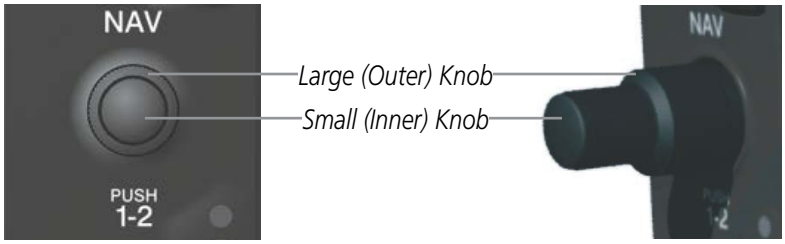


Figure 1-14 Dual Concentric Knob

SOFTKEY FUNCTION

The softkeys are located along the bottoms of the displays. The softkeys shown depend on the softkey level or page being displayed. The bezel keys below the softkeys can be used to select the appropriate softkey. When a softkey is selected, its color changes to black text on gray background and remains this way until it is turned off, at which time it reverts to white text on black background. When a softkey function is disabled, the softkey label is subdued (dimmed).

Softkeys revert to the previous level after 45 seconds of inactivity.



Figure 1-15 Softkeys (Third-Level PFD Configuration)

PFD SOFTKEYS

The **CDI**, **IDENT**, **TMR/REF**, **NRST**, and **ALERTS** softkeys undergo a momentary change to black text on gray background and automatically switch back to white text on black background when selected.

The PFD softkeys provide control over flight management functions, including GPS, NAV, terrain, traffic, and lightning (optional). Each softkey sublevel has a **BACK** Softkey which can be selected to return to the previous level. The **ALERTS** Softkey is visible at all softkey levels (label changes if messages are issued).

INSET			Displays Inset Map in PFD lower left corner
	OFF		Removes Inset Map
	DCLTR (3)		Selects desired amount of map detail; cycles through declutter levels: DCLTR (No Declutter): All map features visible DCLTR-1: Declutters land data DCLTR-2: Declutters land and SUA data DCLTR-3: Removes everything except for the active flight plan
	TRAFFIC		Displays traffic information on Inset Map TRAFFIC: No Traffic displayed on Inset Map TRFC-1: Traffic displayed on Inset Map TRFC-2: Traffic Only display shown
	TOPO		Displays topographical data (e.g., coastlines, terrain, rivers, lakes) and elevation scale on Inset Map
	TERRAIN		Displays terrain information on Inset Map
	STRMSCP		Displays Stormscope information on Inset Map (if installed)
PFD			Displays second-level softkeys for additional PFD configurations
	SYN VIS		Displays the softkeys for enabling or disabling Synthetic Vision features
		PATHWAY	Displays rectangular boxes representing the horizontal and vertical flight path of the active flight plan
		SYN TERR	Enables synthetic terrain depiction
		HRZN HDG	Displays compass heading along the Zero-Pitch line
		APTSIGNS	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.
	DFLTS		Resets PFD to default settings, including changing units to standard
	WIND		Displays softkeys to select wind data parameters
		OPTN 1	Displays headwind/tailwind and crosswind arrows with numeric speed components
		OPTN 2	Displays wind direction arrow with numeric speed
		OPTN 3	Displays wind direction arrow with numeric headwind/tailwind and cross-wind speed components
		OFF	Information not displayed
	DME		Displays DME Information Window
	BRG1		Cycles the Bearing 1 Information Window through NAV1 or GPS waypoint identifier and GPS-derived distance information, and ADF/frequency.

	HSI FRMT	Displays the softkeys for selecting the two HSI formats
	360 HSI	Displays HSI as a 360° compass rose
	ARC HSI	Displays HSI as a 140° viewable arc
	BRG2	Cycles the Bearing 2 Information Window through NAV2 or GPS waypoint identifier and GPS-derived distance information, and ADF/frequency.
	ALT UNIT	Displays softkeys for setting the altimeter and BARO settings to metric units
	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)
CDI		Cycles through GPS, VOR1, and VOR2 navigation modes on the CDI
DME		Displays the DME Tuning Window, allowing tuning and selection of the DME (optional)
XPDR		Displays transponder mode selection softkeys
	STBY	Selects standby mode (transponder does not reply to any interrogations)
	ON	Selects Mode A (transponder replies to interrogations)
	ALT	Selects Mode C – altitude reporting mode (transponder replies to identification and altitude interrogations)
	GND	Manually selects Ground Mode, the transponder does not allow Mode A and Mode C replies, but it does permit acquisition squitter and replies to discretely addressed Mode S interrogations
	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
	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
TMR/REF		Displays Timer/References Window
NRST		Displays Nearest Airports Window
ALERTS		Displays Alerts Window

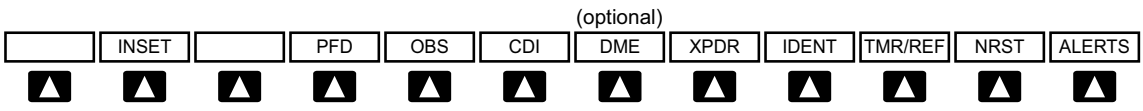


Figure 1-16 Top Level PFD Softkeys

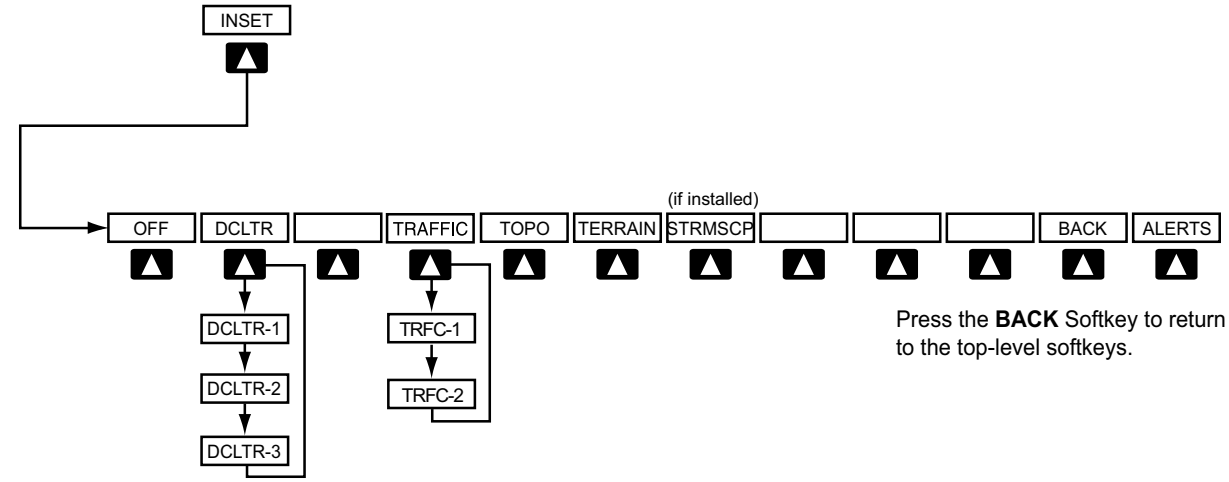


Figure 1-17 INSET Softkeys

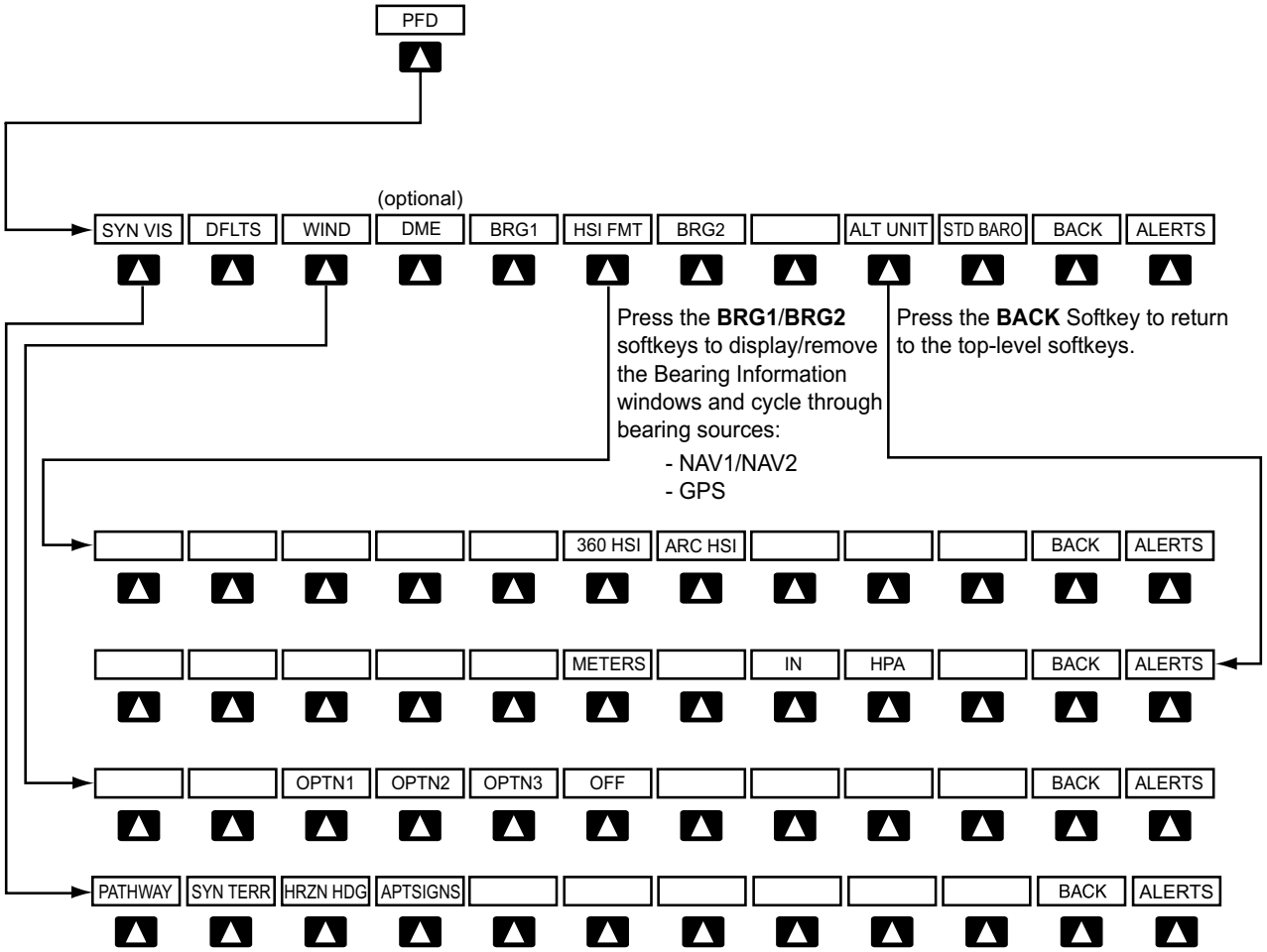


Figure 1-18 PFD Configuration Softkeys

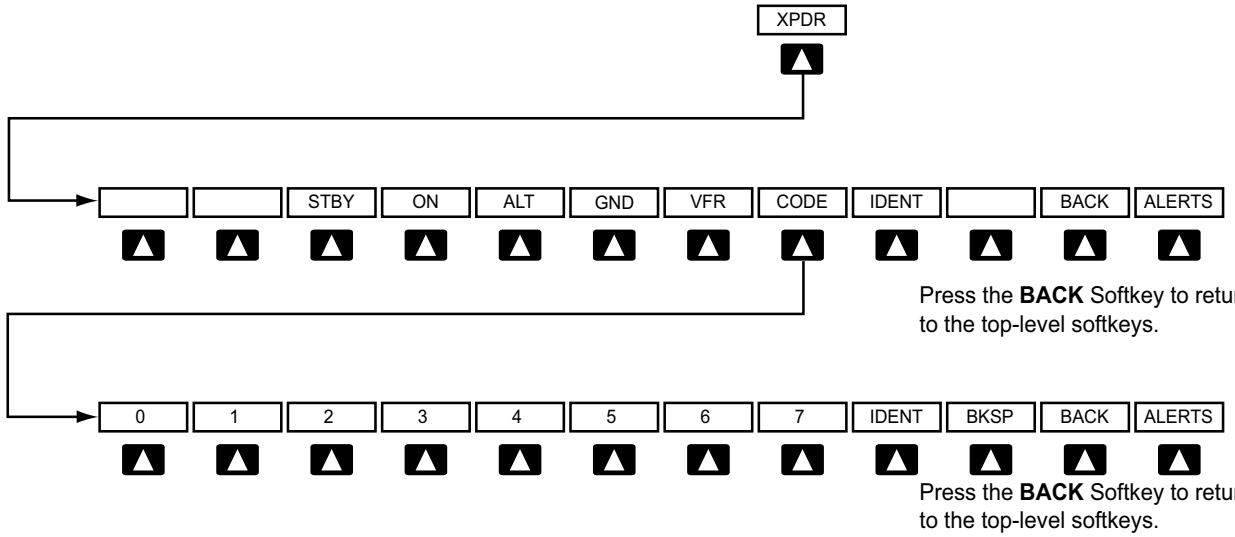


Figure 1-19 XPDR Softkeys

MFD SOFTKEYS

MFD softkeys vary depending on the page selected. EIS and Navigation Map Page (default MFD page) softkeys are described here.

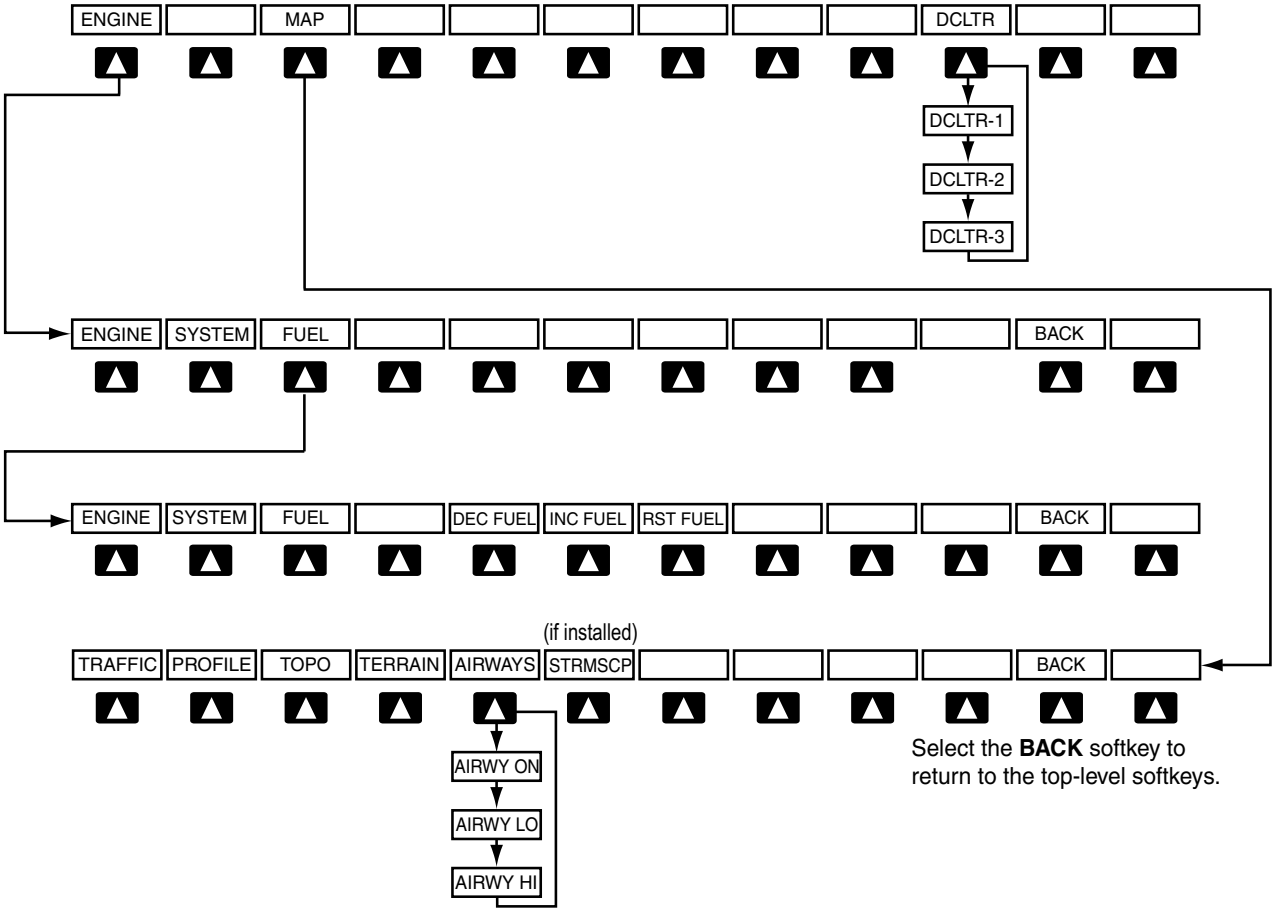


Figure 1-20 MFD Softkeys (EIS, Navigation Map Page, and Checklist)

ENGINE		Displays second-level engine softkeys
	ENGINE	Displays engine data in EIS Strip (see the Engine Instruments section)
	SYSTEM	Displays system data in EIS Strip (see the Engine Instruments section)
	FUEL	Displays fuel data in EIS Strip and displays fuel system softkeys (see the Engine Instruments section)
	DEC FUEL	Decreases displayed fuel remaining in 1-gal increments
	INC FUEL	Increases displayed fuel remaining in 1-gal increments
	RST FUEL	Resets displayed fuel remaining to maximum fuel capacity for aircraft and fuel used to zero
	BACK	Returns to top-level softkeys
MAP		Enables second-level Navigation Map Page softkeys
	TRAFFIC	Displays/removes traffic information on Navigation Map Page
	PROFILE	Displays profile view on Navigation Map Page
	TOPO	Displays/removes topographical data (e.g., coastlines, terrain, rivers, lakes) on Navigation Map Page
	TERRAIN	Displays/removes terrain information on Navigation Map Page
	AIRWAYS	Selects the desired display of Airways; cycles through: AIRWY ON: All Airways displayed AIRWY LO: Low Altitude (Victor) Airways displayed AIRWY HI: High Altitude Airways (Jetways) displayed AIRWAYS: Airways are not displayed
	STRMSCP	Displays Stormscope information on Navigation Map (optional)
	BACK	Returns to top-level softkeys
DCLTR (3)		Selects desired amount of map detail; cycles through declutter levels: DCLTR (No Declutter): All map features visible DCLTR-1: Removes land data DCLTR-2: Removes land and SUA data DCLTR-3: Removes everything except the active flight plan

1.6 ACCESSING G950 FUNCTIONALITY

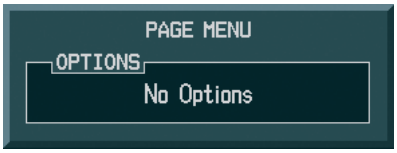
MENUS

The G950 has a dedicated **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 1.5, G950 Controls.

Navigating a menu:

1) Press the **MENU** Key to display the menu.
2) Turn the **FMS** Knob to scroll through a list of available options (a scroll bar always appears to the right of the window/box when the option list is longer than the window/box).
3) Press the **ENT** Key to select the desired option.
4) Press the **CLR** Key or the **FMS** Knob to remove the menu and cancel the operation.

No Options for NRST Window



Options for FPL Window



Figure 1-21 Page Menu Examples

DATA ENTRY

The method for directly entering alphanumeric data (e.g., Flight ID, waypoint identifiers, barometric minimum descent altitude) into the G950 is by using the **FMS** Knob corresponding to the display (PFD, MFD).

In some instances, such as when entering an identifier, the G950 tries to predict the desired identifier based on the characters being entered. In this case, if the desired identifier appears, use the **ENT** Key to confirm the entry without entering the rest of the identifier manually. This can save the pilot from entering all the characters of the identifier.

Besides character-by-character data entry, the system also provides a shortcut for entering waypoint identifiers. When the cursor is on a field awaiting entry of a waypoint identifier, turning the small **FMS** Knob counter-clockwise accesses five different lists of waypoint identifiers for quick selection: flight plan (FPL), nearest (NRST), recently-entered (RECENT), user-defined (USER), and airway (AIRWAY)(AIRWAY available when active leg is part of an airway). The G950 automatically fills in the identifier, facility, and city fields with the information for the selected waypoint.

Using the FMS Knob to enter data:

1) If needed, press the **FMS** Knob to activate the cursor.

2) Use the large **FMS** Knob to highlight the desired field.

3) Begin entering data.

a) To quickly enter a waypoint identifier, turn the small **FMS** Knob counter-clockwise to display a list of waypoints in the active flight plan (list is titled FPL). If desired, turn the small **FMS** Knob clockwise to scroll through lists of other waypoints (NRST, USER, AIRWAY, RECENT).

b) Turn the large **FMS** Knob to highlight the desired waypoint from the list and press the **ENT** Key.

Or:

a) Turn the small **FMS** Knob to select a character for the first placeholder.

Turning the knob clockwise scrolls through the alphabet (where appropriate) toward the letter Z, starting at K, and the digits zero through nine. Afterwards, turning the knob counter-clockwise scrolls in the opposite direction.

b) Use the large **FMS** Knob to move the cursor to the next placeholder in the field.

c) Repeat, using the small **FMS** Knob to select a character and the large **FMS** Knob to move the cursor, until the field is complete.

d) Press the **ENT** Key to confirm entry.

7) Press the **FMS** Knob or **CLR** Key to cancel data entry (the field reverts back to its previous information).

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 which are grouped according to function. The page group and active page title are displayed in the upper center of the screen, below the Navigation Status Box. In the bottom right corner of the screen, the page group tabs are displayed along the bottom Number of pages available in the group are displayed in a list above the page groups. The current page group and current page within the group are shown in cyan. For some of these pages (Airport/Procedures/Weather Information, Procedure Loading), the active title of the page changes while the page name in the list remains the same.

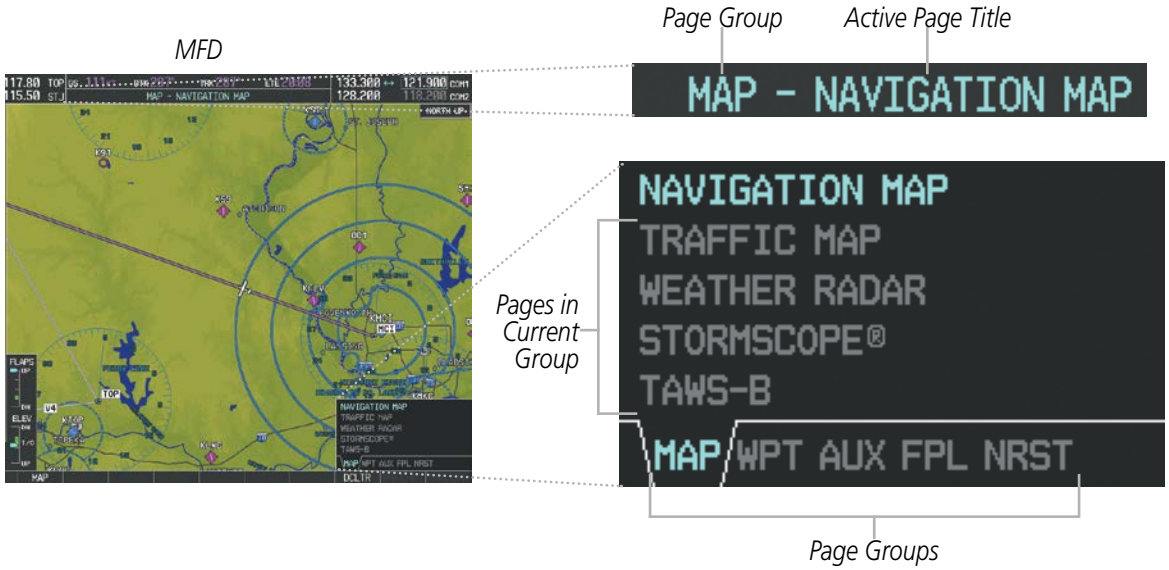


Figure 1-22 Page Title and Page Groups

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/Procedures/Weather Information pages) which are selected first from within a main page group with the **FMS** Knob, then with the appropriate softkey at the bottom of the page. In this case, the page remains set to the selected page until a different page softkey is selected, even if a different page group is selected.

- **Map Page Group (MAP)**

  Navigation Map

  Traffic Map

  Weather Radar (optional)

  Stormscope (optional)

  Terrain Map

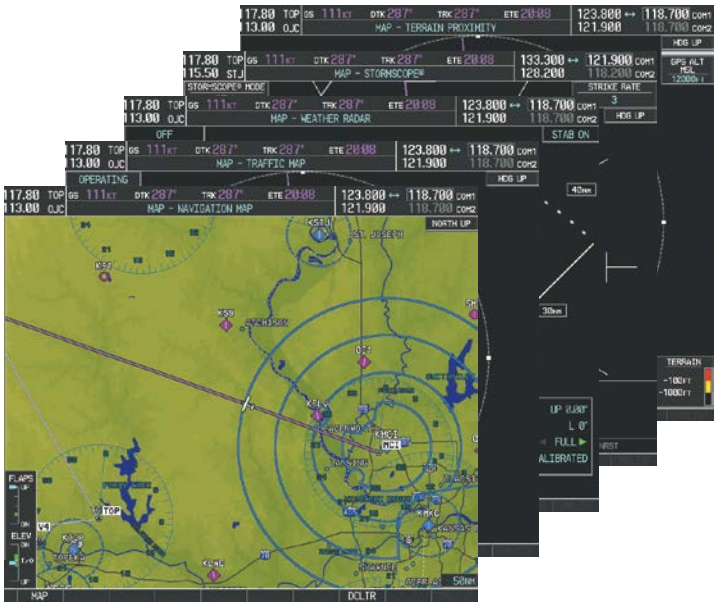


Figure 1-23 Map Pages

Waypoint Pages (WPT)

Airport/Procedures Information Pages

- Airport Information (**INFO-1** Softkey)
- Airport Directory Information (**INFO-2** Softkey)
- Departure Information (**DP** Softkey)
- Arrival Information (**STAR** Softkey)
- Approach Information (**APR** Softkey)

Intersection Information

NDB Information

VOR Information

User Waypoint Information



Figure 1-24 Waypoint Pages

- **Auxiliary Page Group (AUX)**
  - Trip Planning
  - Utility
  - GPS Status
  - System Setup
  - System Status
  - Video



Figure 1-25 Auxiliary Pages

Maintenance data is continuously recorded by the Central Maintenance Computer (CMC). At the discretion of the Aircraft Manufacturer, this data may be displayed on an OEM DIAGNOSTICS Page accessible from within the AUX Page Group.

- **Nearest Page Group (NRST)**
  - Nearest Airports
  - Nearest Intersections
  - Nearest NDB
  - Nearest VOR
  - Nearest User Waypoints
  - Nearest Frequencies
  - Nearest Airspaces



Figure 1-26 Nearest Pages

In addition to the main page groups accessed exclusively using the **FMS** Knob, there are pages for flight planning (FPL) and loading procedures (PROC) which are accessed by key. In some instances, softkeys may be used to access the Procedure Loading pages.

The Flight Plan pages are accessed using the **FPL** Key on the MFD. Main pages within this group are selected by turning the small **FMS** Knob.

- **Flight Plan Page Group (FPL)**

  Active Flight Plan

  Flight Plan Catalog

  - Stored Flight Plan (**NEW** Softkey)

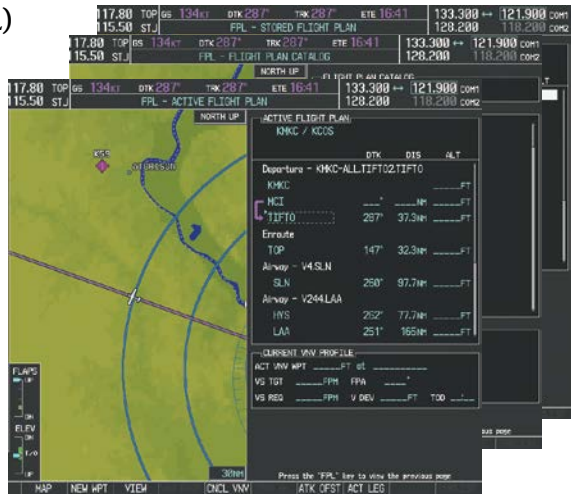


Figure 1-27 Flight Plan Pages

The Procedure Loading 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. These pages can also be accessed from the Stored Flight Plan page using the LD softkeys. Turning the **FMS** Knob does not scroll through the Procedure Loading pages.

- **Procedure Loading Page Group (PROC)**

  Departure Loading

  Arrival Loading

  Approach Loading



Figure 1-28 Procedure Loading Pages

Information on optional electronic checklist pages is offered later in this section. Checklist pages may be accessed from any page on the MFD using the **CHKLIST** Softkey.

SYSTEM SETTINGS

The System Setup Page allows management of the 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
- Audio alert voice
- MFD Data Bar (Navigation Status Box) 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)

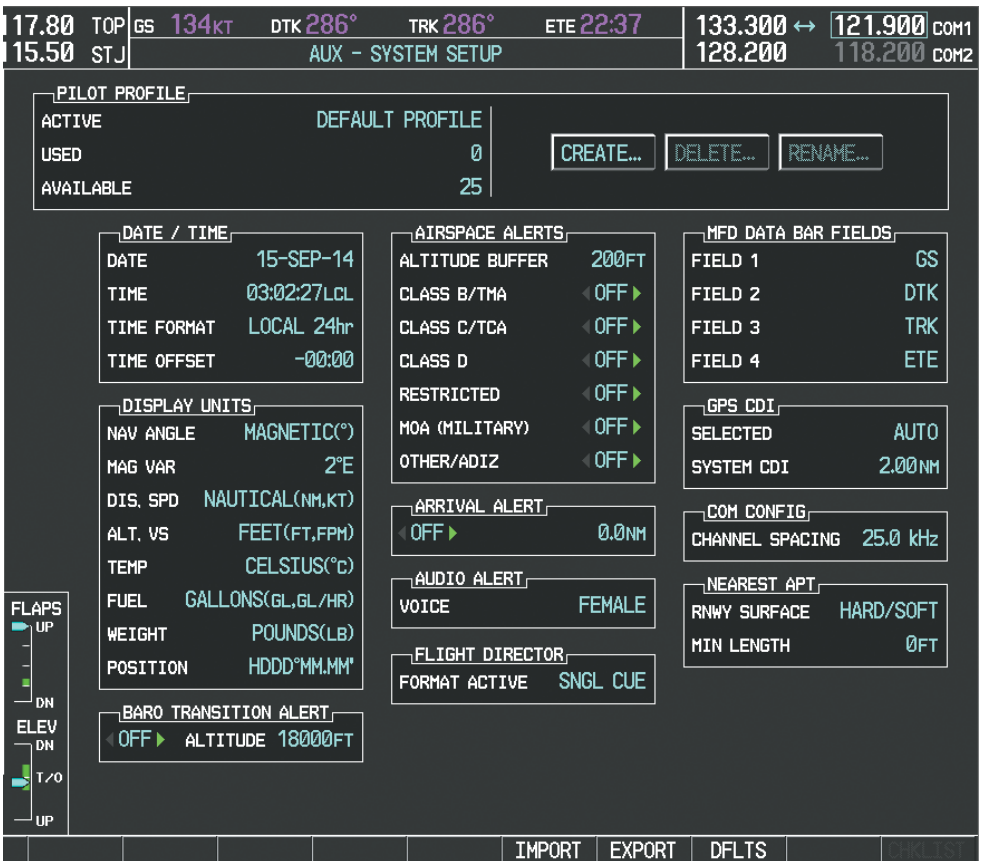


Figure 1-29 System Setup Page

Restoring system setup defaults:

1) Use the **FMS** Knob to select the AUX - System Setup Page.
2) Press the **DFLTS** Softkey.

Or:

1) Use the **FMS** Knob to select the AUX - System Setup Page.
2) Press the **MENU** Key.
3) Highlight 'Restore Defaults' and press the **ENT** Key.

PILOT PROFILES

System settings may be saved under a pilot profile. When the system is powered on, the last selected pilot profile is shown on the MFD Power-up Splash Screen. The G950 can store up to 25 profiles; the currently active profile, the amount of memory used, and the amount of memory available are shown at the top of the System Setup Page in the box labeled 'Pilot Profile'. From here, pilot profiles may be created, selected, renamed, or deleted.

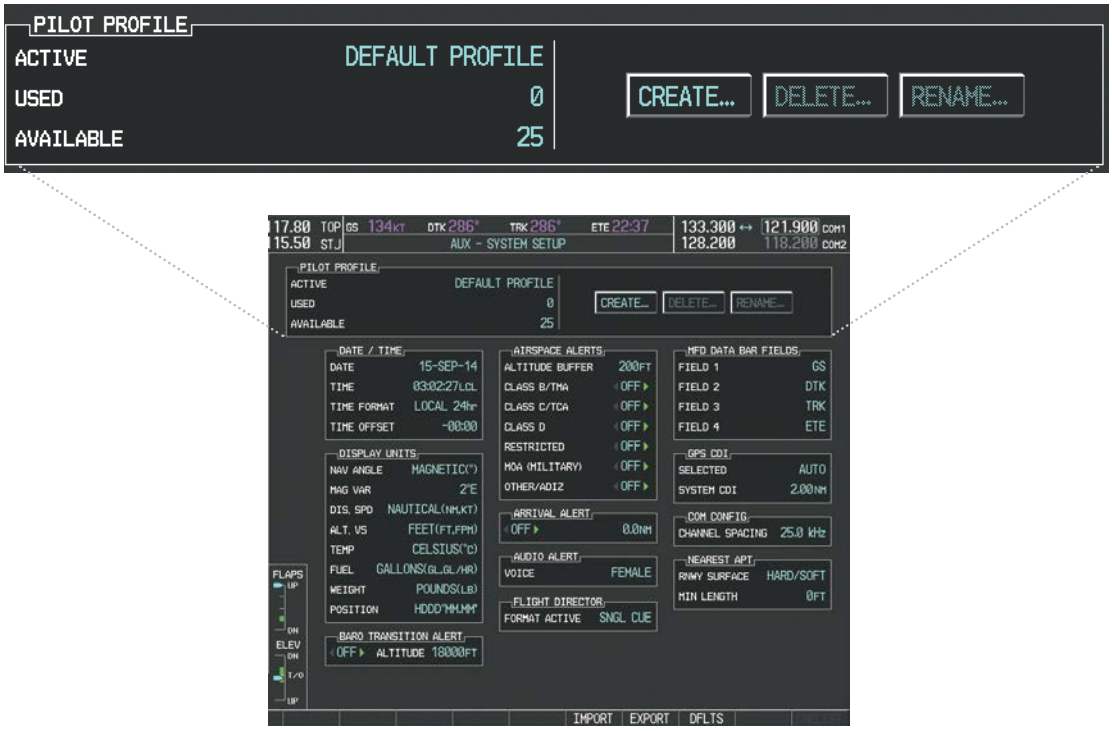


Figure 1-31 Display Unit Settings (System Setup Page)

Creating a profile:

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 'CREATE' in the Pilot Profile Box.
4) Press the **ENT** Key. A 'Create Profile' window is displayed.
5) Use the **FMS** Knob to enter a profile name up to 16 characters long and press the **ENT** Key. Pilot profile names cannot begin with a blank as the first letter.
6) In the next field, use the small **FMS** Knob to select the desired settings upon which to base the new profile. Profiles can be created based on Garmin factory defaults, default profile settings (initially based on Garmin factory defaults unless edited by the pilot), or current system settings.

7) Press the **ENT** Key.

8) With 'CREATE' highlighted, press the **ENT** Key to create the profile

Or:

Use the large **FMS** Knob to select 'CREATE and ACTIVATE' and press the **ENT** Key to activate the new profile.

9) To cancel the process, select 'CANCEL' with the large FMS Knob and press the **ENT** Key.

Selecting an active profile:

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 active profile field in the Pilot Profile Box.
4) Turn the small **FMS** Knob to display the pilot profile list and highlight the desired profile.
5) Press the **ENT** Key. The G950 loads and displays the system settings for the selected profile.

Renaming a profile:

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 'RENAME' in the Pilot Profile Box.
4) Press the **ENT** Key.
5) In the 'Rename Profile' window, turn the **FMS** Knob to select the profile to rename.
6) Press the **ENT** Key.
7) Use the **FMS** Knob to enter a new profile name up to 16 characters long and press the **ENT** Key.
8) With 'RENAME' highlighted, press the **ENT** Key.
9) To cancel the process, use the large **FMS** Knob to select 'CANCEL' and press the **ENT** Key.

Deleting a profile:

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 'DELETE' in the Pilot Profile Box.
4) Press the **ENT** Key.
5) In the 'Delete Profile' window, turn the **FMS** Knob to select the profile to delete.
6) Press the **ENT** Key.
7) With 'DELETE' highlighted, press the **ENT** Key.
8) To cancel the process, use the large **FMS** Knob to select 'CANCEL' and press the **ENT** Key.

If an SD card is inserted into the top slot of the MFD, pilot profiles may imported from the SD card into the system, or exported from the system to the SD card.

Because system settings may vary from one airframe to another, always verify system settings from an imported profile are consistent with the desired settings.

Importing a profile from an SD card:

1) Insert an SD card containing the pilot profile(s) into the top card slot on the MFD.

2) Turn the **FMS** Knob to select the AUX - System Setup 1 Page.

3) Select the **IMPORT** Softkey.

Or:

a) Press the **MENU** Key.

b) Turn the **FMS** Knob to highlight 'Import Pilot Profile' and press the **ENT** Key.

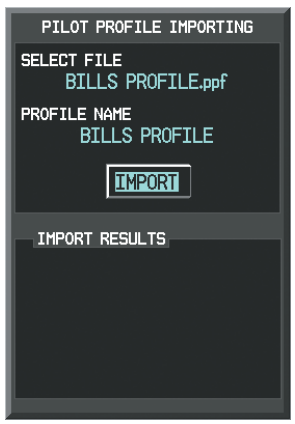
4) The system displays the Pilot Profile Importing window with 'IMPORT' highlighted. To change the selected profile to be imported from the SD card (shown as 'SELECT FILE'), turn the large FMS Knob to highlight the profile file name, then turn the small **FMS** Knob to highlight a profile from the list, and press the **ENT** Key.

5) If desired, the profile name to be used after profile has been imported can be changed by turning the **FMS** Knob to highlight the 'PROFILE NAME' field, then use the large and small **FMS** Knobs to enter the name, and press the **ENT** Key. Imported profile names cannot begin with a blank space or be named 'DEFAULT', 'GARMIN DEFAULTS' or 'DEFAULT SETTINGS'.

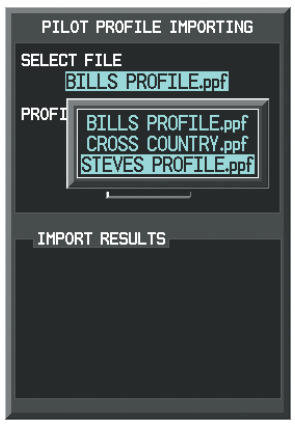
6) With 'IMPORT' highlighted, press the **ENT** Key.

7) If the imported profile name is the same as an existing profile on the system, the system displays an 'Overwrite existing file? OK or CANCEL' prompt. Press the **ENT** Key to replace profile on the system with the profile imported from the SD card, or turn the **FMS** Knob to highlight 'CANCEL' and press the **ENT** Key to return to the Pilot Profile Importing window.

8) If successful, the system displays 'Pilot profile import succeeded.' in the IMPORT RESULTS window below. With 'OK' highlighted, press the **ENT** or **CLR** Keys or press the **FMS** Knob to return to the AUX - System Setup 1 Page. The imported profile becomes the active profile.



Pilot Profile Importing and Import Results Window



Pilot Profiles Available for Import from SD Card ('STEVE'S PROFILE' Selected)



Import Successful

Figure 1-32 Pilot Profile Import (AUX - System Setup 1 Page)

Exporting a profile to an SD card:

1) Insert the SD card for storing the Pilot Profile into the top card slot on the MFD.

2) Turn the **FMS** Knob to select the AUX - System Setup 1 Page.

3) If necessary, activate the desired pilot profile to export. Only the currently active Pilot Profile can be exported.

4) Select the **EXPORT** Softkey. The system displays the Pilot Profile Exporting window.

Or:

a) Press the **MENU** Key.

b) Turn the **FMS** Knob to highlight 'Export Pilot Profile' and press the **ENT** Key.

5) To export the pilot profile using the current supplied name, press the **ENT** Key with 'EXPORT' highlighted. To change the profile file name turn the large **FMS** Knob to highlight the 'SELECT FILE' field, then enter the new name with the large and small FMS Knobs, then press the **ENT** Key. Then press the **ENT** Key with 'EXPORT' highlighted.

6) If the profile name to be exported is the same as an existing profile file name on the SD card, the system displays an 'Overwrite existing file? OK or CANCEL' prompt. Press the **ENT** Key to replace the profile on the SD card with the profile to be exported, or turn the FMS Knob to highlight 'CANCEL' and press the **ENT** Key to return to the Pilot Profile Exporting window without exporting the profile.

7) If successful, the EXPORT RESULTS window displays 'Pilot profile export succeeded.' With 'OK' highlighted, press the **ENT** or **CLR** Keys, or press the **FMS** Knob to return to the AUX - System Setup 1 Page.



Pilot Profile Exporting Window, Enter a Name to Use for Exported Profile



Export Successful

Figure 1-33 Pilot Profile Export on the AUX - System Setup 1 Page

DATE/TIME

The system time is displayed in the lower right corner of the PFD. Time and date format (local 12-hr, local 24-hr, or UTC) are modified on the System Setup Page. Universal Coordinated Time (UTC; also called Greenwich Mean Time (GMT) or Zulu) date and time are calculated directly from the GPS satellites signals and cannot be changed. An offset is provided to add or subtract the desired amount of time (hours:minutes) from UTC to define current local time.

Configuring the system time:

1) Use the **FMS** Knob to select the AUX - System Setup 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. The 'Time Offset' field is highlighted (for local time formats).
5) Use the **FMS** Knob to enter the desired time offset (±HH:MM) and press the **ENT** Key to confirm selection.

DISPLAY UNITS

Units in which various quantities are displayed on the G950 screens can be changed on the System Setup Page.

Changing a display units setting:

1) Use the **FMS** Knob to select the AUX - System Setup Page on the MFD.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight the desired field in the 'Display Units' box.
4) Turn the small **FMS** Knob to select from a list of measurement units and press the **ENT** Key when the desired unit is highlighted.

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

* *Default setting*
** *Contact a Garmin-authorized service center to change this setting*

Table 1-1 Display Units Settings (System Status Page)

AIRSPACE ALERTS

The Airspace Alert feature provides a message alert when the aircraft is approaching or near a controlled or special-use airspace. The altitude buffer setting increases the range above or below an airspace for which an alert is generated; the default value is 200 feet. Alerts for the following airspaces can be turned on/off from the System Setup Page:

- Class B/TMA
- Class C/TCA
- Class D
- Restricted
- MOA (Military)
- Other airspaces

Turning Airspace Alerts off does not affect the alerts listed on the Nearest Airspaces Page or the airspace boundaries depicted on the Navigation Map Page.

Turning an airspace alert on or off:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the desired 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.

Changing the altitude buffer distance setting:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the altitude buffer field in the 'Airspace Alerts' Box.
4) Enter an altitude buffer value and press the **ENT** Key.

ARRIVAL ALERTS

The Arrival Alert Box on the System Setup 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.

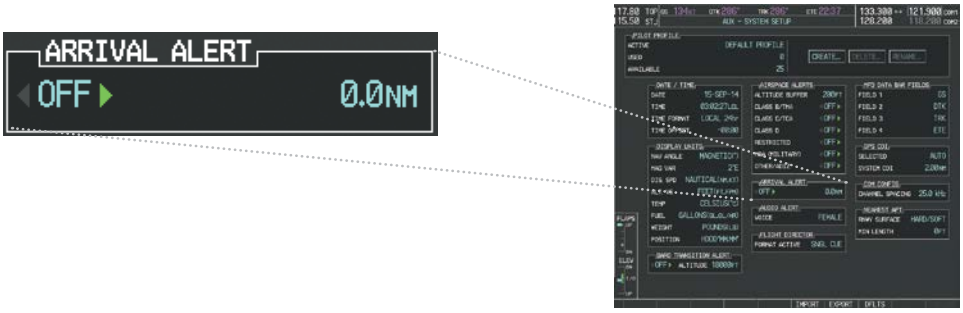


Figure 1-30 Arrival Alert Settings (System Setup Page)

Enabling/disabling the Alerts Window arrival alert:

1) Use the **FMS** Knob to select the AUX - System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** 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 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.

AUDIO ALERTS

The gender of the voice used to announce audio alerts may be set to male or female on the System Setup Page. See the Appendices for voice alerts.

Changing the audio alert voice:

1) Use the **FMS** Knob to select the AUX - System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the voice in the Audio Alert Box.
4) Turn the small **FMS** Knob to display and highlight the desired voice and press the **ENT** Key.

GPS CDI

The GPS CDI Box on the System Setup Page allows the pilot to define the scale for the Course Deviation Indicator (CDI) when GPS is the selected navigation source and also displays the current system value for the CDI scale. The range values represent full scale deflection for the CDI to either side. The default setting is 'Auto' (refer to the CDI description in the Flight Instruments Section for information on CDI scaling).

If a lower CDI scale setting is selected (i.e., 1.0 or 0.3 nm), the higher scale settings are not selected during any phase of flight. Note that the Receiver Autonomous Integrity Monitoring (RAIM) protection limits follow the selected CDI scale and corresponding flight phase.

Changing the selected GPS CDI setting:

1) Use the **FMS** Knob to select the AUX - System Setup Page on the MFD.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight 'Selected' in the 'GPS CDI' box.
4) Turn the small **FMS** Knob to highlight the desired setting (2 nm, 1 nm, 0.3 nm, Auto) and press the **ENT** Key.

COM CONFIGURATION

The COM Configuration Box on the System Setup Page allows the pilot to select 8.33 kHz or 25.0 kHz COM frequency channel spacing.

Changing COM channel spacing:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the channel spacing field in the COM Configuration Box.
4) Turn the small **FMS** Knob to select the desired spacing and press the **ENT** Key.

NEAREST AIRPORTS

The Nearest Airports Box on the System Setup Page defines the minimum runway length and surface type used when determining the nine 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 of appropriate surface from being displayed. Default settings are 0 feet (or meters) for runway length and "any" for runway surface type.

Selecting nearest airport surface matching criteria (any, hard only, hard/soft, water):

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the runway surface field in the Nearest Airports Box.
4) Turn the small **FMS** Knob to select the desired runway option (any, hard only, hard/soft, water) and press the **ENT** Key.

Selecting nearest airport minimum runway length matching criteria:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the minimum length field in the Nearest Airport Box.
4) Enter the minimum runway length (zero to 99,999 feet) 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. A scheduler feature is also provided so the pilot can enter reminder messages to be displayed at specified intervals in the Alerts Window on the PFD (see Figure 1-32).



Figure 1-31 Utility Page

TIMERS

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 are zeroed.

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 G950 records the time at which departure occurs, measured from system power-up or 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.

SCHEDULER

The scheduler feature can be used to enter and display reminder messages (e.g., "Change oil", "Switch fuel tanks", "Overhaul"). 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) 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 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) Use the **FMS** Knob to select the AUX - Utility Page.

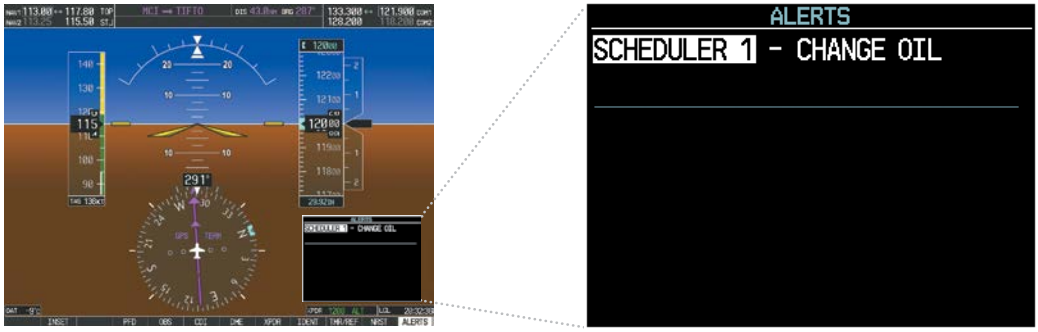
2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the 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 'ADVISORY'. Selecting the **ADVISORY** Softkey opens the Alerts Window and acknowledges the scheduler message. The softkey reverts to the 'ALERTS' label and when pressed, the Alerts Window is removed from the display and the scheduler message is deleted from the message list.



PFD

Figure 1-32 PFD Alerts Window

1.7 DISPLAY BACKLIGHTING

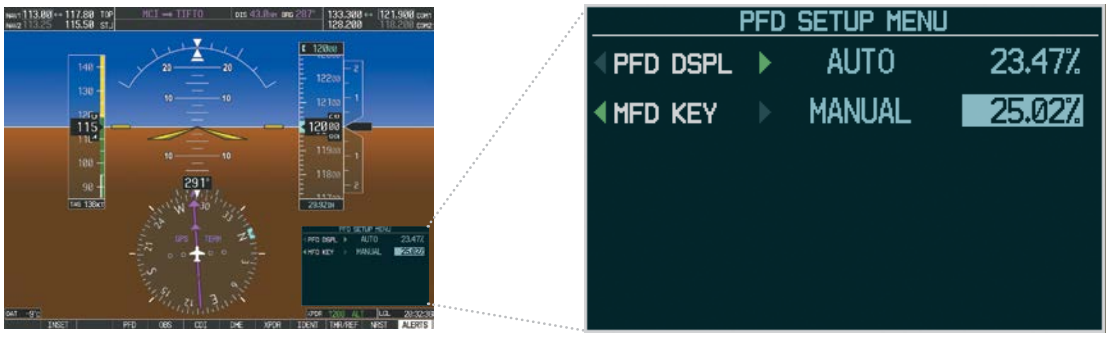
Backlighting of the PFD and MFD, and Audio Panel keys can be adjusted automatically or manually. The automatic setting (default) uses photocells to adjust for ambient lighting conditions. Photocell calibration curves are pre-configured to optimize display appearance through a broad range of cockpit lighting conditions. In normal display mode, backlighting can only be adjusted from the PFD. In Reversionary Mode, it can be adjusted from the remaining display(s).

Adjusting display backlighting manually:

1) Press the PFD **MENU** Key to display the PFD Setup Menu. 'AUTO' is now highlighted next to 'PFD DSPL'. No other window can be displayed on the PFD while the PFD Setup Menu is displayed. Pressing the **MENU** Key while any other PFD window is displayed does not display the PFD Setup Menu.
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) Turn the large **FMS** Knob to highlight 'AUTO' next to 'MFD DSPL' and repeat steps 2-4.
5) To remove the menu, press the **CLR** or **MENU** Key.

Adjusting key backlighting manually:

1) Press the PFD **MENU** Key to display the PFD Setup Menu. 'AUTO' is now highlighted next to 'PFD DSPL'.
2) Turn the large **FMS** Knob to highlight 'PFD DSPL'.
3) Turn the small **FMS** Knob in the direction of the green arrowhead to display 'PFD 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) Turn the large **FMS** Knob to highlight 'MFD DSPL'.
8) Turn the small **FMS** Knob in the direction of the green arrowhead to display 'MFD KEY' and repeat steps 4-7.
9) To remove the menu, press the **CLR** or **MENU** Key.



PFD

Figure 1-33 PFD Setup Menu

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SECTION 2 FLIGHT INSTRUMENTS

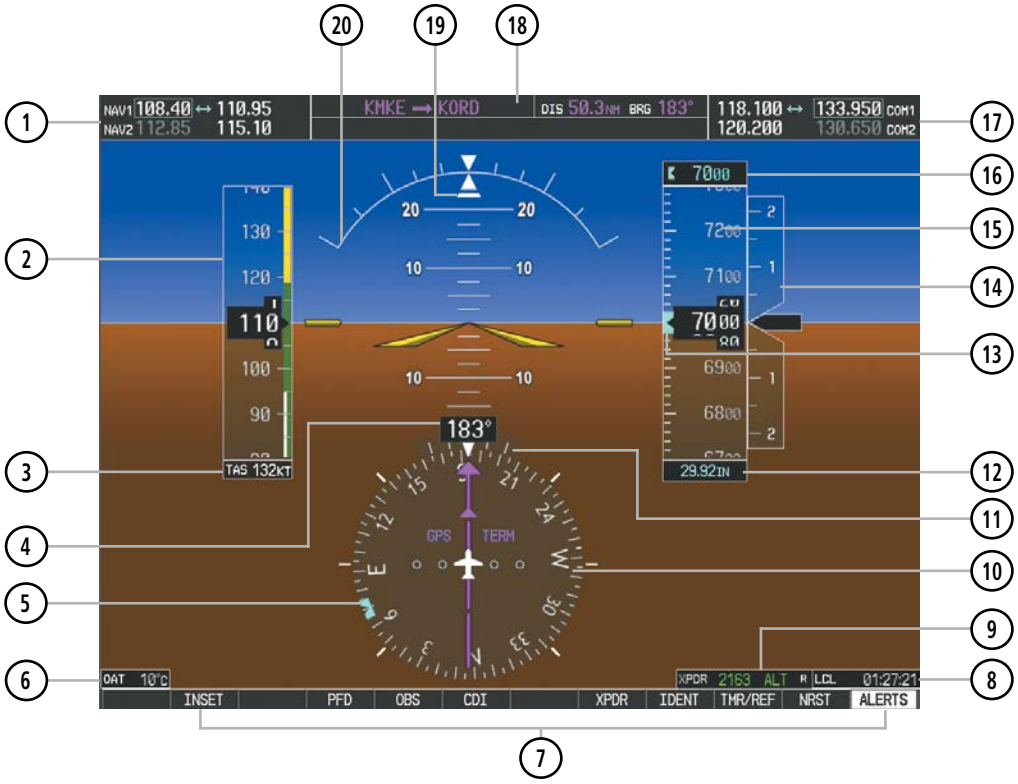
WARNING: *In the event that the airspeed, attitude, altitude, or heading indications become unusable, refer to the backup instruments.*

Increased situational awareness is provided by replacing the traditional instruments on the panel with 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
  - True airspeed
  - Airspeed awareness ranges
  - Trend vector
  - Reference
- Attitude Indicator with slip/skid indication
- Altimeter, showing
  - Trend vector
  - Barometric setting
  - Selected Altitude
- Vertical Deviation, Glideslope, and Glidepath Indicators
- Vertical Speed Indicator (VSI)
- Horizontal Situation Indicator, showing
  - Heading and course indications
  - Turn Rate Indicator
  - Navigation source
  - Course Deviation Indicator (CDI)
  - Bearing pointers and information windows
- Outside Air Temperature (OAT)
- References Window, showing
  - Generic timer
  - Vspeed values and bugs
  - Barometric minimum descent altitude (MDA; or decision height, DH)
- System time
- Wind data
- Vertical Navigation indications

The PFD also displays various alerts and annunciations.



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

Figure 2-1 Primary Flight Display (Default)



1. *Traffic Annunciation*
2. *Selected Heading*
3. *Wind Data*
4. *Inset Map*
5. *DME Information Window*
6. *Bearing Information Windows*
7. *Minimum Descent Altitude/Decision Height*
8. *Flight Plan Window*
9. *Annunciation Window*
10. *Selected Course*
11. *Vertical Speed Required*
12. *Vertical Deviation Indicator (VDI)*
13. *Current VNV Target Altitude*
14. *Terrain Annunciation*

Figure 2-2 Primary Flight Display (Additional Information)

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

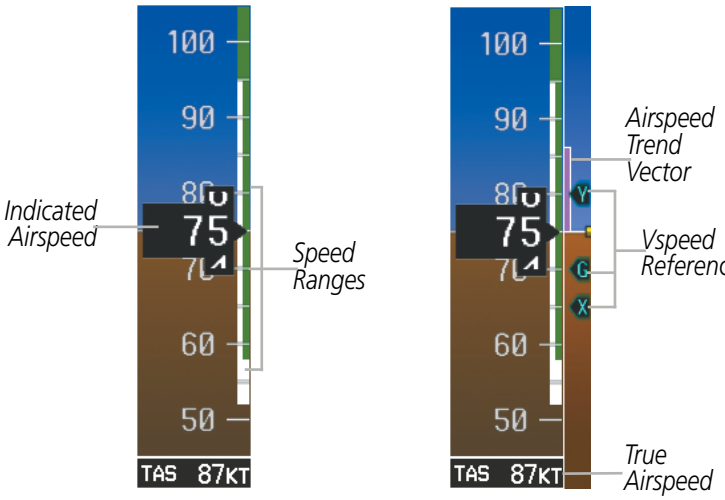


Figure 2-3 Airspeed Indicator

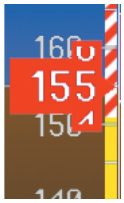


Figure 2-4 Red Pointer Showing Overspeed

A color-coded (red, white, green, yellow, and red/white 'barber pole") speed range strip is located on the moving tape. The colors denote flaps operating range, normal operating range, caution range, and never-exceed speed (V_{NE}). A red range is also present for low speed awareness.

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 text of the actual airspeed readout changes to yellow. 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.

Vspeeds (Glide, V_X, and V_Y,) can be changed and their bugs enabled/disabled from the References Window (Figure 2-5). When enabled (on), the Vspeed bugs appear at their respective locations to the right of the airspeed scale.

Changing Vspeed values and enabling/disabling Vspeed bugs:

1) Select the **TMR/REF** Softkey.
2) Turn the large **FMS** Knob to highlight the desired Vspeed.
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 select the **TMR/REF** Softkey.



Figure 2-5 References Window

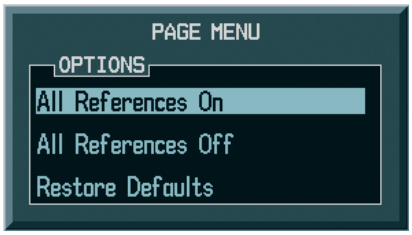


Figure 2-6 Timer/References Menu

Enabling/disabling all Vspeed bugs together:

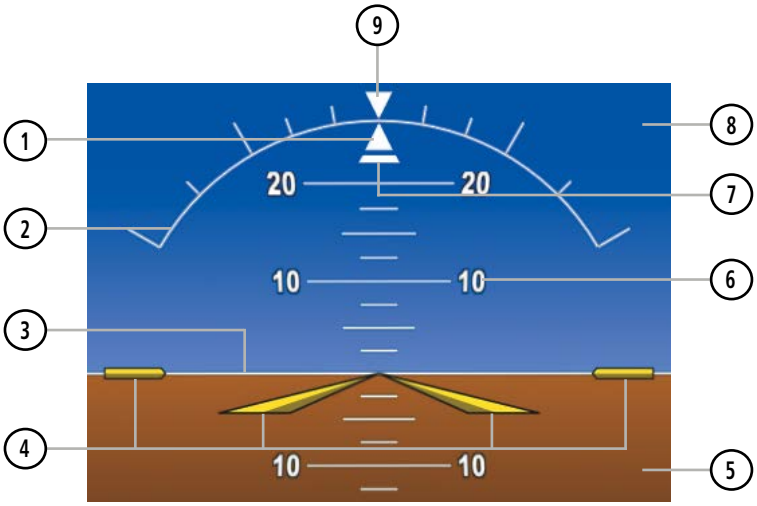
1) Select the **TMR/REF** Softkey.
2) Press the **MENU** Key.
3) To view all Vspeed bugs, highlight 'All References On' and press the **ENT** Key (Figure 2-6).
4) To remove all Vspeed bugs, turn the **FMS** Knob to highlight 'All References Off' and press the **ENT** Key.

Restoring all Vspeed defaults:

1) Select the **TMR/REF** Softkey.
2) Press the **MENU** Key.
3) Turn the **FMS** Knob to highlight 'Restore Defaults' and press the **ENT** Key.

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 (indicated by the yellow symbolic aircraft on the pitch scale), 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 80˚. 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˚. If the optional Garmin Synthetic Vision Technology (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 SVT.

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 moves with the roll pointer and moves laterally away from the pointer to indicate lateral acceleration Slip/skid is indicated by the location of the bar relative to the pointer. One bar displacement is equal to one ball displacement on a traditional Slip/Skid Indicator.



Figure 2-8 Slip/Skid Indication

ALTIMETER

The Altimeter displays 600 feet of barometric altitude values at a time on a rolling number gauge using a moving tape. 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 in 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 corresponding edge of the tape. The metric value, when selected, is displayed in a separate box above the Selected Altitude.

A magenta Altitude Trend Vector extends up or down the left of the altitude tape, the end resting at the approximate altitude to be reached in 6 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 (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) has been set, this altitude is also available for the Selected Altitude.

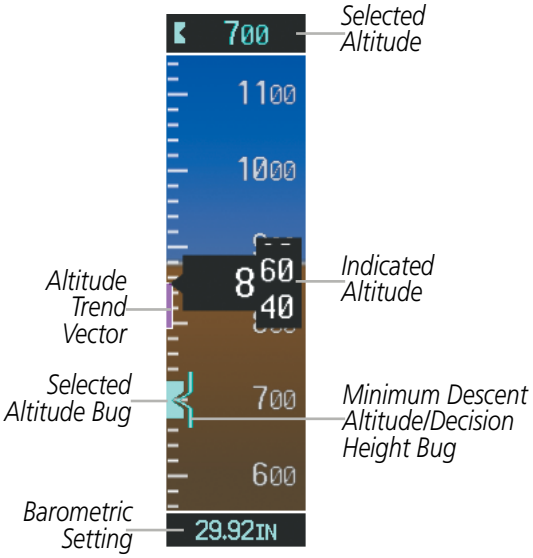


Figure 2-9 Altimeter

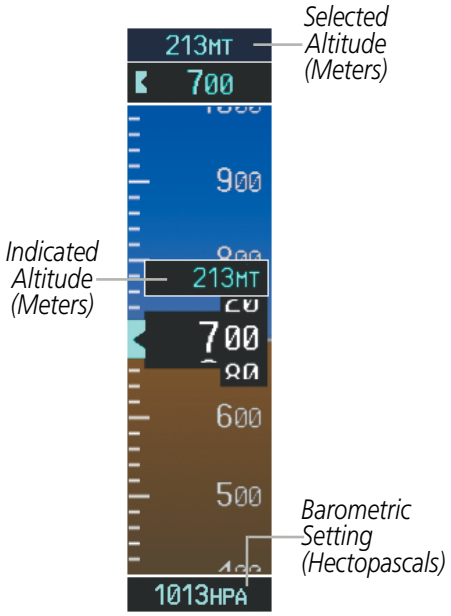


Figure 2-10 Altimeter (Metric Units)

Selected and current altitudes can also be displayed in meters (readouts displayed above the normal readouts in feet; Figure 2-10). Note that the altitude tape does not change scale.

Displaying altitude in meters:

1) Select the **PFD** Softkey to display the second-level softkeys.
2) Select the **ALT UNIT** Softkey.
3) Select the **METERS** Softkey to turn on metric altitude readouts.
4) Select the **BACK** Softkey to return to the top-level softkeys.

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 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 path. 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.

Selecting the altimeter barometric pressure setting:

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

Selecting standard barometric pressure (29.92 in Hg):

1) Select the **PFD** Softkey to display the second-level softkeys.
2) Select the **STD BARO** Softkey; STD BARO is displayed in barometric setting box.



Figure 2-11 Standard Barometric Altimeter Setting

Changing altimeter barometric pressure setting units:

1) Select the **PFD** Softkey to display the second-level softkeys.
2) Select the **ALT UNIT** Softkey.
3) Select the **IN** Softkey to display the barometric pressure setting in inches of mercury (in Hg).

   Or, select the **HPA** Softkey to display the barometric pressure setting in hectopascals (hPa; see Figure 2-10).
4) Select the **BACK** Softkey to return to the top-level softkeys.

A Baro Transition Alert is provided to notify the pilot to change the barometric pressure setting when crossing the baro transition altitude. If the aircraft is at least 500 feet below the transition altitude and then climbs through this altitude and the **STD BARO** Softkey has not been pressed, the barometric pressure setting flashes in cyan until the pressure setting is changed. If the aircraft is at least 500 feet above the transition altitude and then descends through this altitude and the barometric pressure setting has not been changed from STD BARO, the setting flashes in cyan until it is changed (Figure 2-12).

Setting the Baro Transition Alert:

1) Use the **FMS** Knob to select the AUX - System Setup Page.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight 'OFF or ON' in the 'BARO TRANSITION ALERT' box.
4) Turn the small **FMS** Knob to turn the alert OFF or ON and press the **ENT** Key.
5) With the altitude field highlighted, turn the small **FMS** Knob to select the desired altitude and press the **ENT** Key.
6) To cancel the selection, press the **FMS** Knob.



Pressure setting flashes during climb above transition altitude if the STD BARO Softkey has not been pressed.



Pressure setting flashes during descent below transition altitude to indicate setting has not been changed from STD BARO.

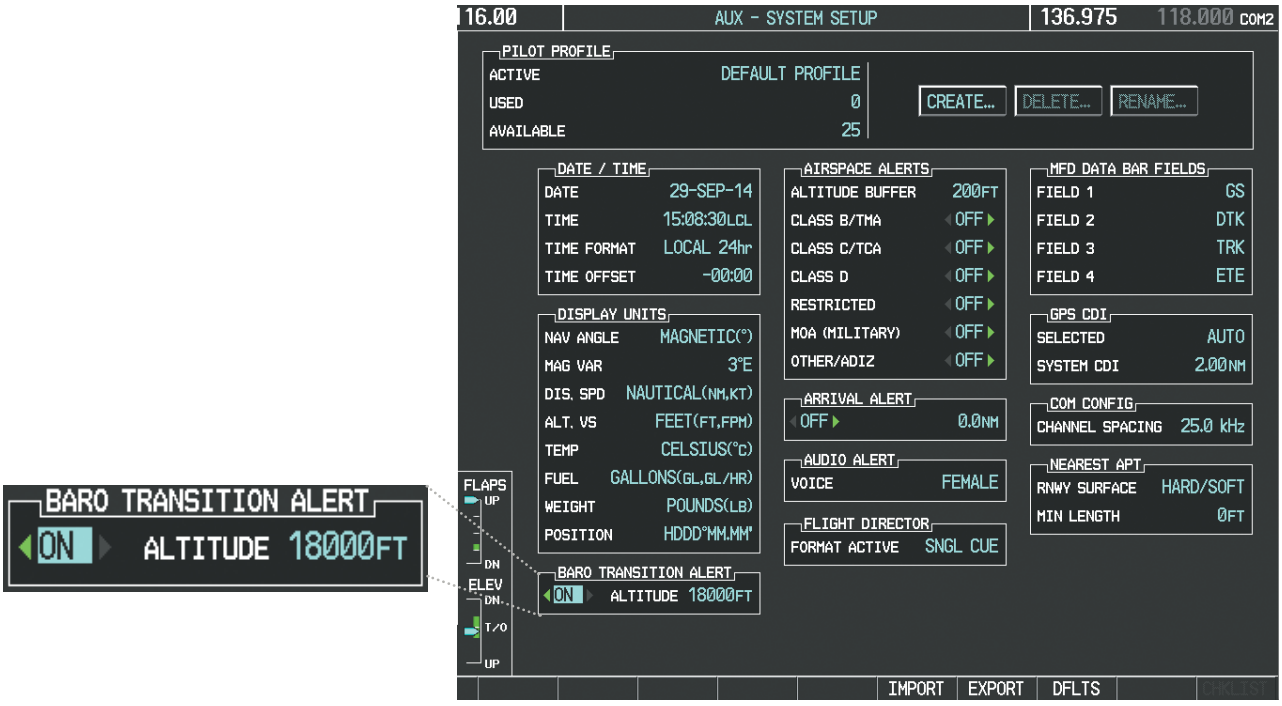


Figure 2-12 Baro Transition Alert (AUX - System Setup Page)

VERTICAL SPEED INDICATOR (VSI)

The Vertical Speed Indicator (VSI, Figure 2-13) displays the aircraft vertical speed using a non-moving tape labeled at 1000 and 2000 fpm with minor tick marks every 500 fpm. The current vertical speed is displayed in the pointer along the tape. 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 corresponding edge of the tape and the rate appears inside the pointer.

A magenta chevron bug is displayed as the Required Vertical Speed Indication (RVSI; Figure 2-13) for reaching a VNV Target Altitude once the "TOD [Top of Descent] within 1 minute" alert has been generated. Refer to Section 2.2, Supplemental Flight Data, for more information about VNV indications on the PFD.

VERTICAL DEVIATION

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

The Vertical Deviation Indicator (VDI; Figure 2-13) is a magenta chevron indicating the baro-VNV vertical deviation when Vertical Navigation (VNV) is being used. 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 2.2, Supplemental Flight Data, for more information about VNV indications on the PFD.

The Glideslope Indicator (Figure 2-14) appears to the left of the Altimeter whenever an ILS frequency is tuned in the active NAV field. 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.

The glidepath is analogous to the glideslope for GPS approach service levels supporting SBAS vertical guidance (LNAV+V, LNAV/VNAV, LP, LPV, LP+V). When an approach of one of these service levels is loaded into the flight plan and GPS is the selected navigation source, the Glidepath Indicator (Figure 2-15) appears as a magenta diamond when the aircraft reaches a point prior to the FAF. If the approach service level changes past the final approach fix (FAF), "NO GP" is displayed in place of the diamond.

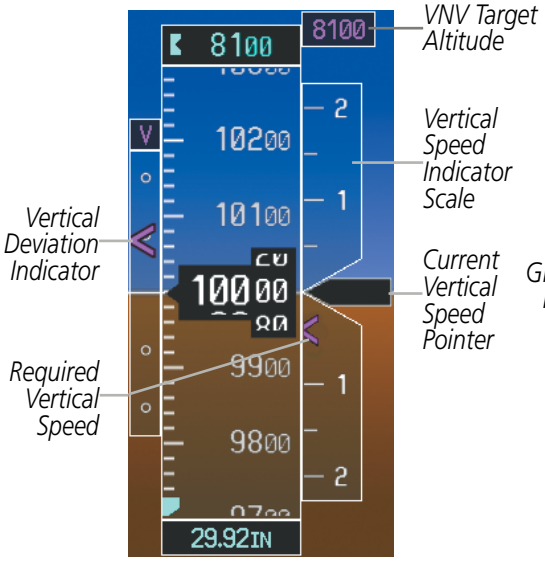


Figure 2-13 Vertical Speed and Deviation Indicator (VSI and VDI)

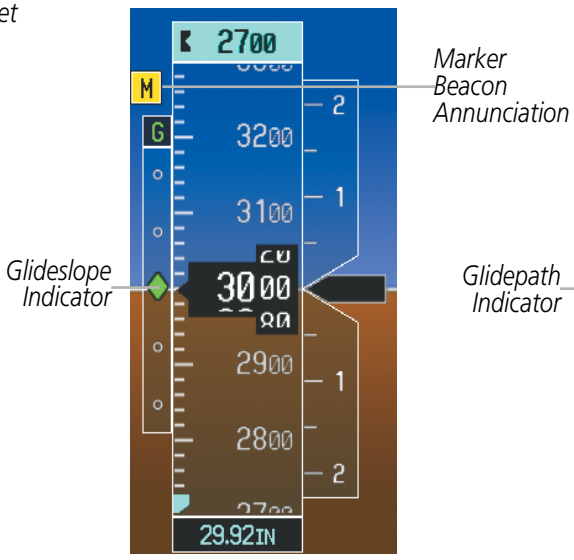


Figure 2-14 Glideslope Indicator

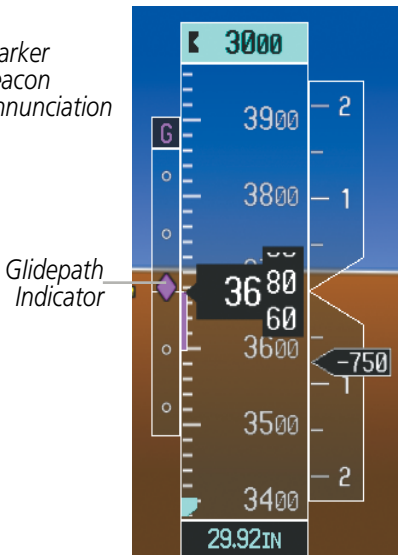


Figure 2-15 Glidepath Indicator

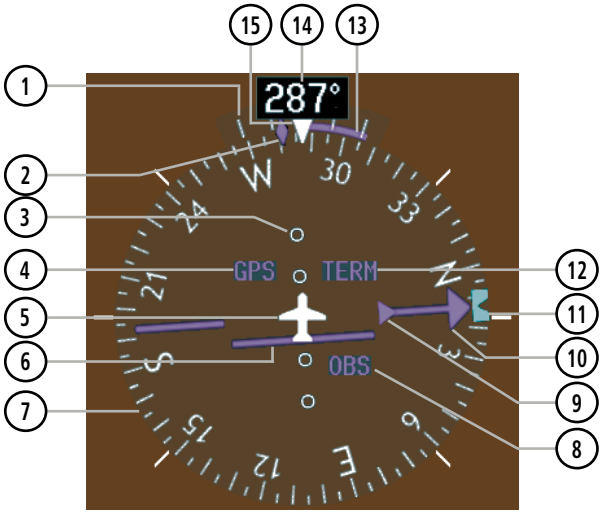
HORIZONTAL SITUATION INDICATOR (HSI)

The Horizontal Situation Indicator (HSI) displays a rotating compass card in a heading-up orientation. Letters indicate the cardinal points and numeric labels occur every 30°. Major tick marks are at 10° intervals and minor tick marks 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 and is available in two formats (360° compass rose and 140° arc).

Changing the HSI display format:

1) Select the **PFD** Softkey.
2) Select the **HSI FRMT** Softkey.
3) Select the **360 HSI** or **ARC HSI** Softkey.

The 360° 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. *Turn Rate Indicator*
2. *Current Track Indicator*
3. *Lateral Deviation Scale*
4. *Navigation Source*
5. *Aircraft Symbol*
6. *Course Deviation Indicator (CDI)*
7. *Rotating Compass Rose*
8. *OBS Mode Active*
9. *To/From Indicator*
10. *Course Pointer*
11. *Selected Heading Bug*
12. *Flight Phase*
13. *Turn Rate/Heading Trend Vector*
14. *Current Heading*
15. *Lubber Line*

Figure 2-16 Horizontal Situation Indicator (HSI)

The Arc HSI is a 140° expanded section of the compass rose. The Arc HSI contains a Course Pointer, To/From Indicator, a sliding deviation indicator (the To/From and deviation indicators are combined), and a deviation scale. Upon station passage, the To/From Indicator flips and points to the tail of the aircraft, just like a conventional To/From flag. Depending on the navigation source, the CDI on the Arc HSI can appear in two different ways: an arrowhead (GPS, VOR, OBS) or a diamond (LOC).

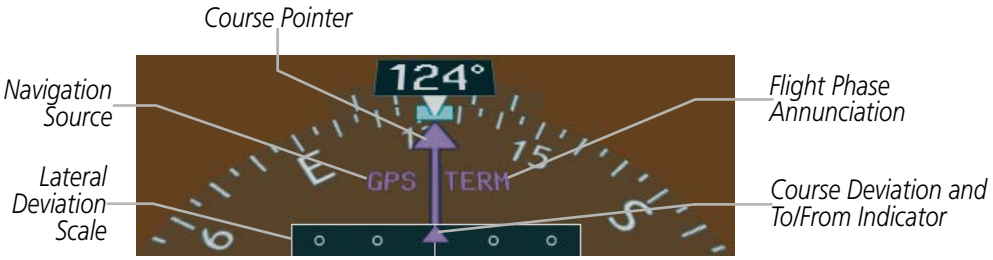


Figure 2-17 Arc HSI

The Selected Heading is shown to the upper left of the HSI for 3 seconds after being adjusted The cyan bug on the compass rose corresponds to the Selected Heading. While the HSI is displayed as an arc, if the Selected Heading Bug is adjusted off the shown portion of the compass rose, the digital reading displayed.

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.

The Selected Course is shown to the upper right of the HSI for 3 seconds after being adjusted. While the HSI is displayed as an arc, the Selected Course is displayed whenever the Course Pointer is not within the 140° currently shown.

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 (see OBS Mode for adjusting a GPS course).

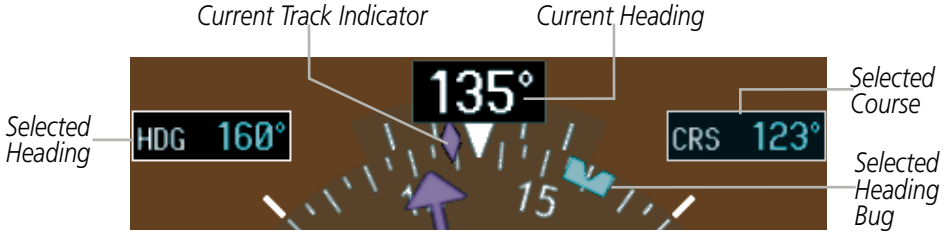


Figure 2-18 Heading and Course Indications

Navigation angles (track, heading, course, bearing) are corrected to the computed magnetic variation ('Mag Var') or referenced to true north (denoted 'T'), set on the AUX - System Setup Page. When an approach referenced to true north has been loaded into the flight plan, the system generates a message to change the navigation angle setting to 'True' at the appropriate time.



Figure 2-19 Heading and Course Indications (True)

Changing the navigation angle setting:

1) Use the **FMS** Knob to select the AUX - System Setup Page on the MFD.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight 'Nav Angle' in the 'Display Units' box.
4) Turn the small **FMS** Knob to highlight the desired setting and press the **ENT** Key.
   - TRUE - References angles to true north (denoted with 'T')
   - MAGNETIC - Angles corrected to the computed magnetic variation ('Mag Var')

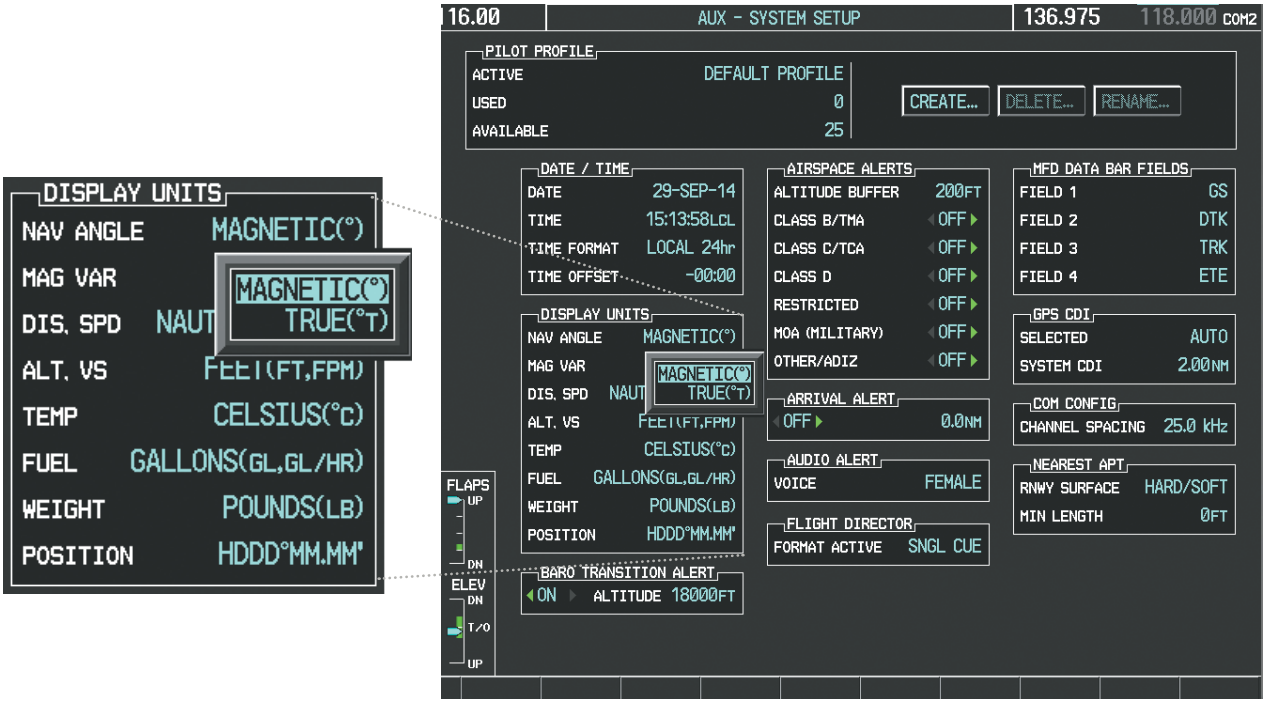


Figure 2-20 Navigation Angle Settings (AUX - System Setup Page)

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 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 2-21 Turn Rate Indicator and Trend Vector

BEARING INFORMATION

NOTE: *When the Arc HSI is displayed, the Bearing Information windows and pointers are disabled.*

Two bearing pointers and associated information can be displayed on the HSI for NAV, GPS and sources. The pointers are cyan and are single- (BRG1) or double-lined (BRG2); an icon is shown in the respective information window to indicate the pointer type. The bearing pointers never override the CDI and are visually separated from the CDI by a white ring (shown when bearing pointers are selected but not necessarily visible due to data unavailability).

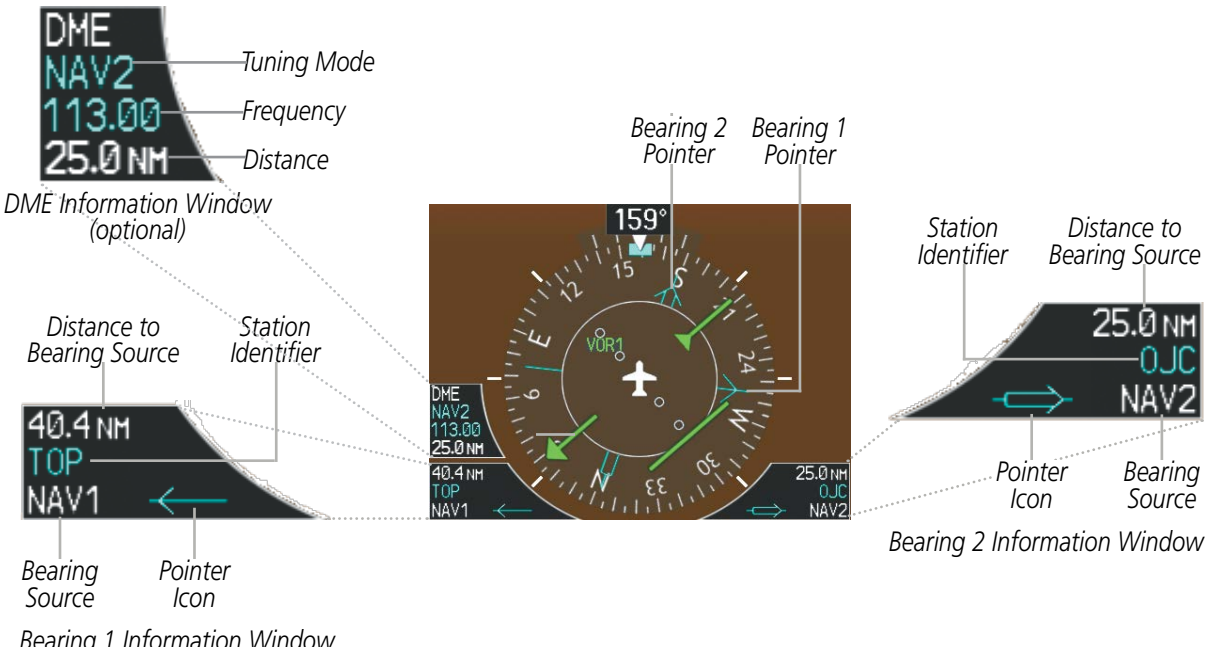


Figure 2-22 HSI with Bearing and DME Information

When a bearing pointer is displayed, its associated information window is also displayed. The Bearing Information windows (Figure 2-22) are displayed to the lower sides of the HSI and show:

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

If the NAV radio is the bearing source and is tuned to an ILS frequency (refer to the Audio Panel and CNS Section for information on tuning the radios), the bearing pointer is removed from the HSI and the frequency is replaced with "ILS". 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 in lieu of a frequency.

The bearing pointer is removed from the HSI and "NO DATA" is displayed in the information window if:

- The NAV radio is not receiving the tuned VOR station
- GPS is the bearing source and an active waypoint is not selected

Selecting bearing display and changing sources:

1) Select the **PFD** Softkey.
2) Select a **BRG** Softkey to display the desired bearing pointer and information window with a NAV source.
3) Select the **BRG** Softkey again to change the bearing source to GPS.
4) Press the **BRG** Softkey a third time to change the bearing source to ADF (note: ADF radio installation is optional).
5) To remove the bearing pointer and information window, select the **BRG** Softkey again.

DME INFORMATION WINDOW

NOTE: *DME radio installation is optional.*

The DME Information Window (Figure 2-22) is displayed above the BRG1 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** Softkey.
2) Press the **DME** Softkey to display the DME Information Window above the BRG1 Information Window.
3) To remove the DME Information Window, press the **DME** Softkey again.

COURSE DEVIATION INDICATOR (CDI)

NOTE: *If a heading change of greater than 105˚ with respect to the course is made, the CDI on the Arc HSI switches to the opposite side of the deviation scale and displays reverse sensing.*

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.

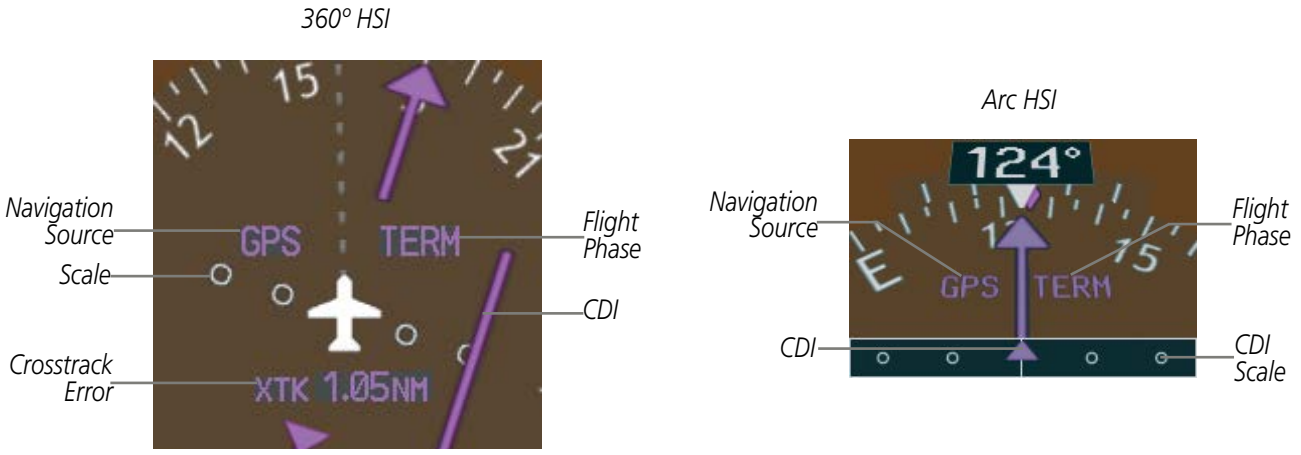


Figure 2-23 Course Deviation Indicator

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



Figure 2-24 Navigation Sources

Changing navigation sources:

1) Select 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) Select 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) Select the **CDI** Softkey a third time to return to GPS.

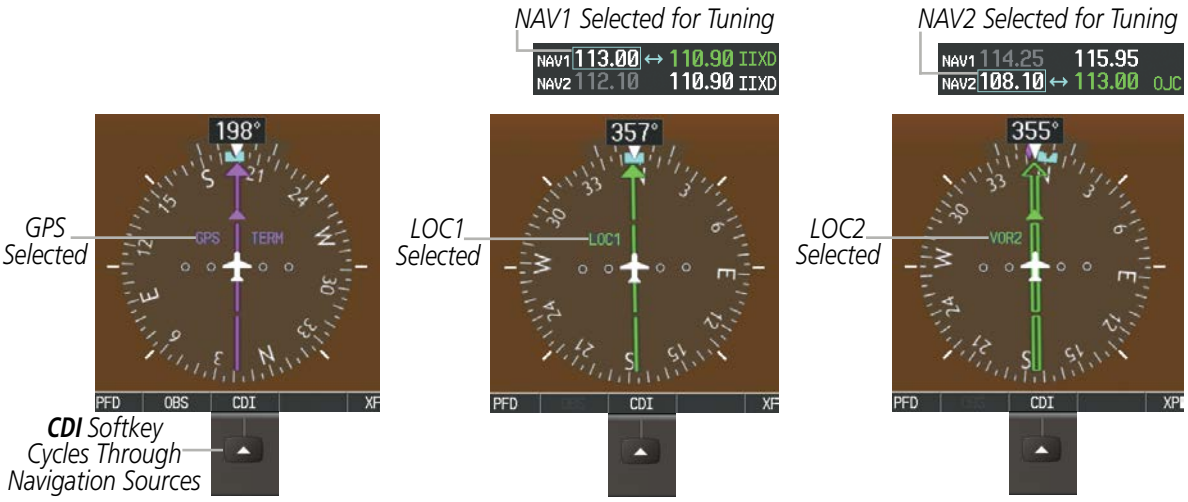


Figure 2-25 Selecting a Navigation Source

The system automatically switches 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 switches 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; see the Flight Management Section) also causes the CDI to switch to LOC navigation source; GPS steering guidance is not provided after this switch.

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 yellow. 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 Page and the full-scale deflection setting may also be changed (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 be displayed rather than the flight phase annunciation.

Changing the selected GPS CDI setting:

1) Use the **FMS** Knob to select the AUX - System Setup Page on the MFD.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight the 'SELECTED' field 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.

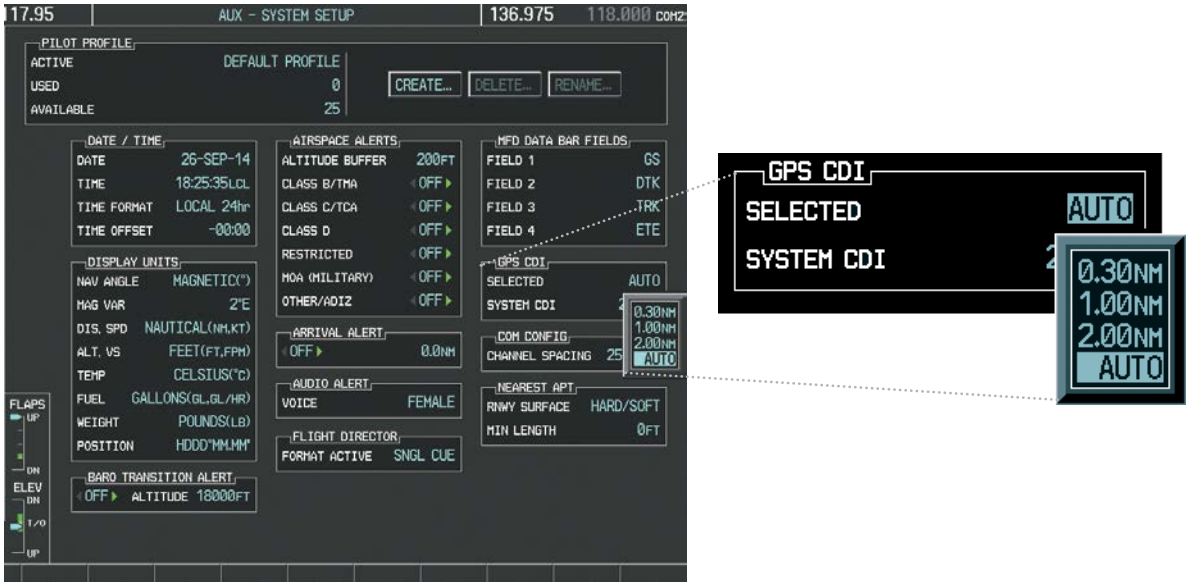


Figure 2-26 GPS CDI Settings (AUX - System Setup Page)

When set to 'Auto' (default), the GPS CDI scale automatically adjusts to the desired limits based upon the current phase of flight (Figure 2-27, Table 2-1).

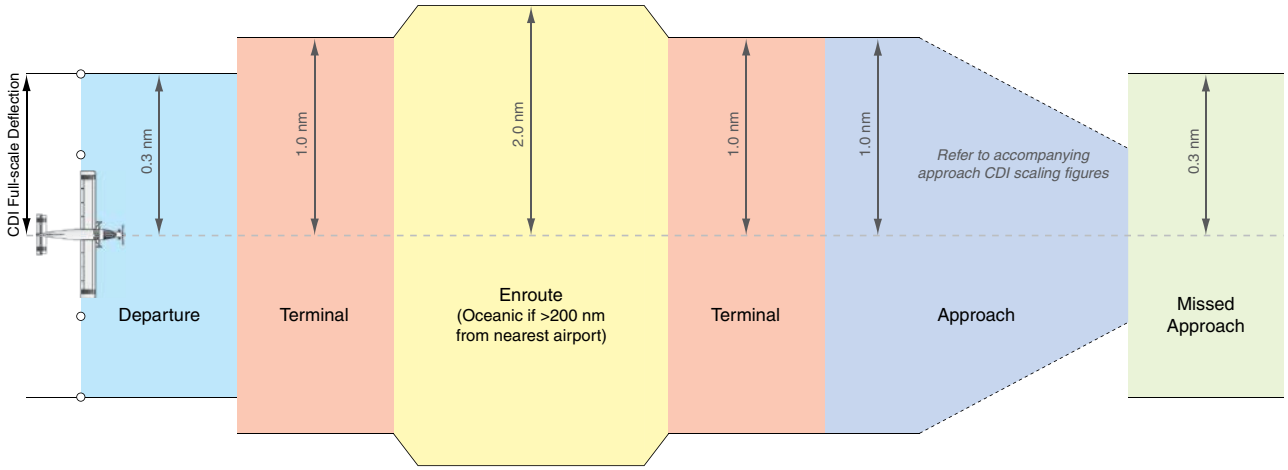


Figure 2-27 Automatic CDI Scaling

- When a departure procedure is active, 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 procedure is not aligned with the departure runway
  - The next leg in the departure procedure is not 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 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 will 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 ramps down from 2.0 nm to 1.0 nm over a distance of 1.0 nm; except under the following conditions:
  - 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 transition down from 2.0 nm to 1.0 nm over a distance of 1.0 nm.
- During ***approach***, the CDI scale ramps down even further (see Figures 2-28 and 2-29). This transition normally occurs within 2.0 nm of the final approach fix (FAF). The CDI switches to approach scaling automatically once the approach procedure is activated or if Vector-to-Final (VTF) is 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 preceding missed approach legs must be aligned with the final approach segment course and the aircraft must not have passed the turn initiation point.

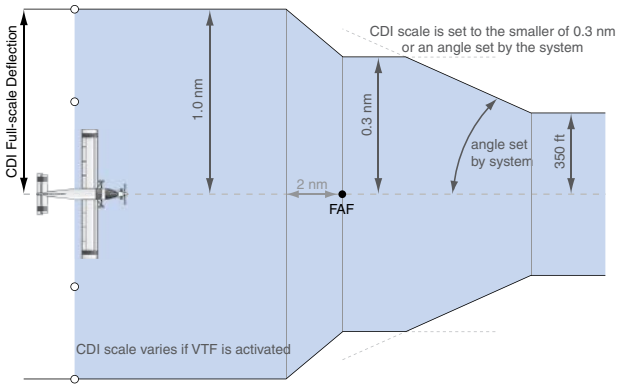


Figure 2-28 Typical LNAV and LNAV+V Approach Service Level CDI Scaling

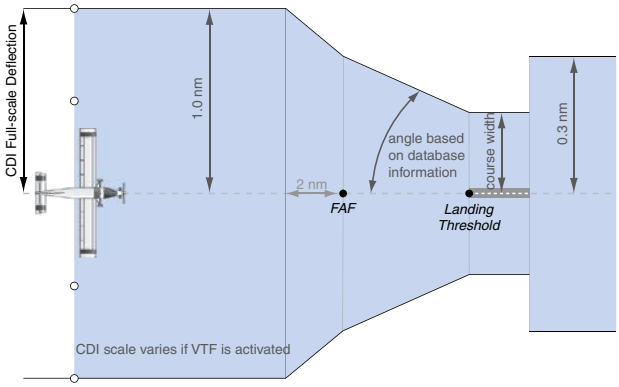


Figure 2-29 Typical LNAV/VNAV, LP, LPV, and LP+V Approach Service Level CDI Scaling

- When a ***missed approach*** is activated, the CDI scale changes to 0.3 nm.
- The system automatically switches back to ***terminal*** scaling 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 CA, CD, CF, CI, CR, DF, FA, FC, FD, FM, IF, or TF
  - After any leg in the missed approach procedure that is not 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 LNAV LNAV+V	 LNAV LNAV+V	1.0 nm decreasing to 350 feet depending on variables (see Figure 2-28)
Approach LNAV/VNAV LPV LP LP+V	 L/VNAV LPV LP LP+V	1.0 nm decreasing to a specified course width, then 0.3 nm, depending on variables (see Figure 2-29)
Missed Approach	MAPR	0.3 nm

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

Table 2-1 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 path on the moving map retains the modified course line.

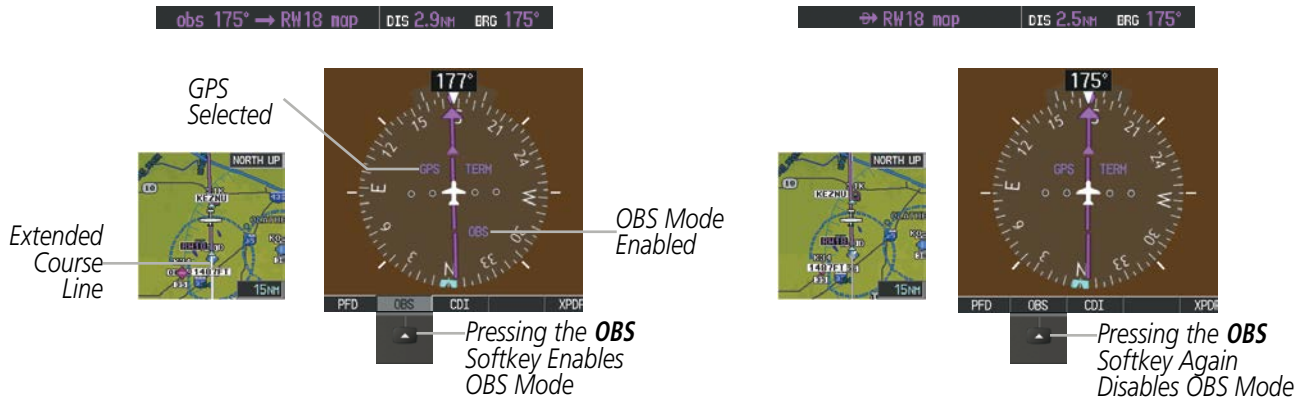


Figure 2-30 Omni-bearing Selector (OBS) Mode

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

1) Select 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) Select 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 at the lower right of the aircraft symbol. The **OBS** Softkey label changes to indicate the suspension is active as shown in Figure 2-31. Pressing the **SUSP** Softkey deactivates the suspension and resumes automatic sequencing of approach waypoints.

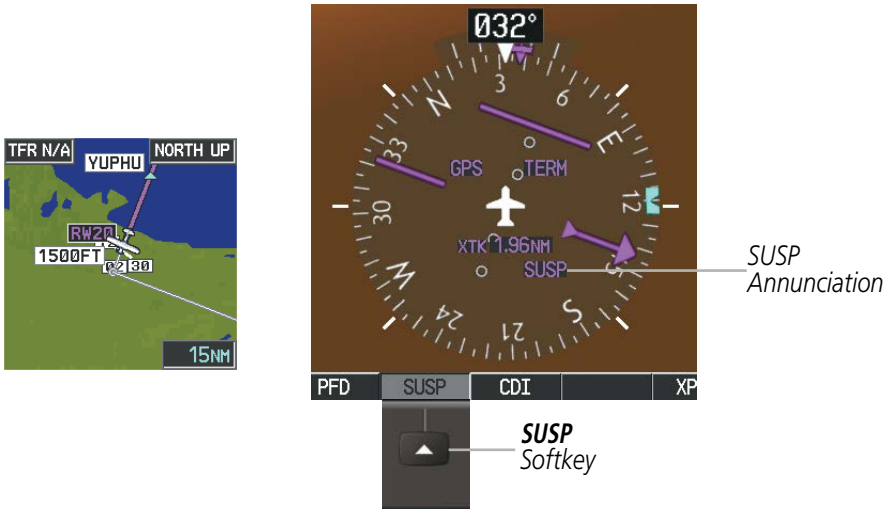


Figure 2-31 Suspending Automatic Waypoint Sequencing

2.2 SUPPLEMENTAL FLIGHT DATA

NOTE: *Selecting the **DFLTS** Softkey (a second-level PFD softkey) turns off metric Altimeter display, the Inset Map, and wind data display.*

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

OUTSIDE AIR TEMPERATURE

The Outside Air Temperature (OAT) is displayed in degrees Celsius (°C) in the lower left of the PFD under normal display conditions. During reversionary display conditions the OAT is displayed to the right of the flap indicator.

Normal Display



Reversionary Mode with EIS



Figure 2-32 Outside Air Temperature

WIND DATA

Wind direction and speed (relative to the aircraft) in knots can be displayed 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 shows "NO WIND DATA". Wind data can be displayed in three different ways:

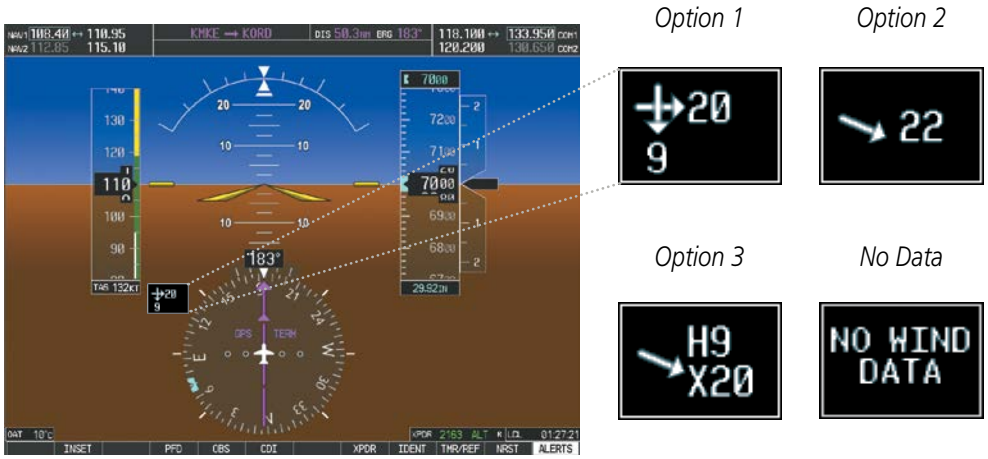


Figure 2-33 Wind Data

Displaying wind data:

1) Select the **PFD** Softkey.
2) Select the **WIND** Softkey to display wind option Softkeys.
3) Select one of the **OPTN** softkeys to change how wind data is displayed:
   - **OPTN 1**: Head and crosswind components
   - **OPTN 2**: Total wind direction and speed
   - **OPTN 3**: Total wind direction with head and crosswind speed components
4) To remove the window, select the **OFF** 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 Section for details on VNV features. VNV indications are removed from the PFD according to the criteria listed in Table 2-2.



Figure 2-34 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 selected 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 2-2 VNV Indication Removal Criteria

2.3 PFD ANNUNCIATIONS AND ALERTING FUNCTIONS

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

SYSTEM ALERTING

Messages appear in the Alerts Window (in the lower right corner of the PFD; Figure 2-35) when a warning, caution, advisory alert, or G950 message advisory occurs. System alert messages are provided for aware of G950 system problems or status and may not require pilot action. The Alerts Window allows system alerts to be displayed simultaneously. The **FMS** Knob can be used to scroll through the alert messages. The Alerts Window is enabled/disabled by selecting the **ALERTS** Softkey. If the window is already open when a new message is generated, selecting the **ALERTS** Softkey to acknowledge the message causes it to turn gray.

The **ALERTS** Softkey label changes to display the appropriate annunciation when an alert is issued. The annunciation flashes and the appropriate aural alert sounds until acknowledged by pressing the softkey. The softkey then reverts to the **ALERTS** Softkey label, and when selected again opens the Alerts Window to display a descriptive message of the alert.

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

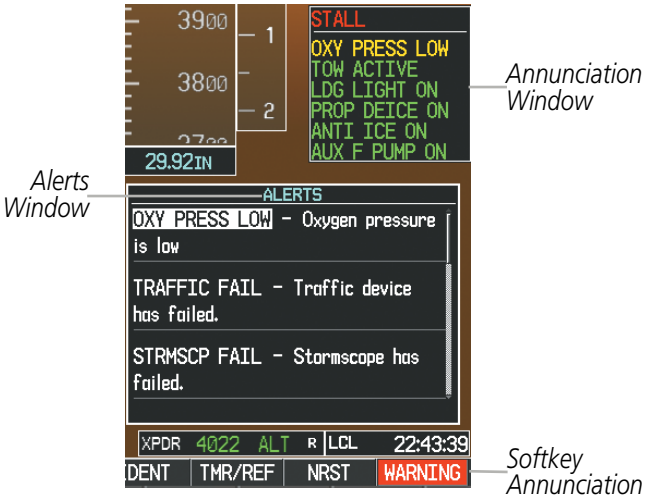


Figure 2-35 G950 Alerting System

MARKER BEACON ANNUNCIATIONS

Marker Beacon Annunciations are displayed on the PFD to the left of the Selected Altitude. Outer marker reception is indicated in blue, middle in yellow, and inner in white. Refer to the Audio Panel and CNS Section for more information on Marker Beacon Annunciations.

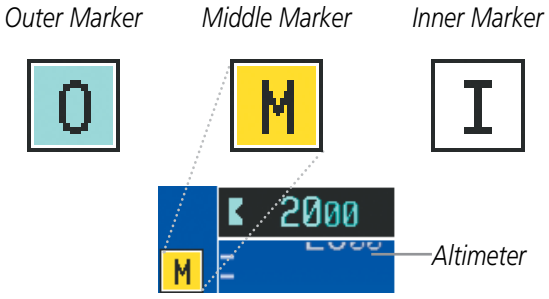


Figure 2-36 Marker Beacon Annunciations

TRAFFIC ANNUNCIATION

The G950 System displays traffic symbolically on the PFD Inset Map, the Navigation Map Page (MFD), and various other MFD page maps. Refer to the Hazard Avoidance Section and Appendix E for more details about the traffic displays. When a traffic advisory (TA) is detected, the following automatically occur:

- The PFD Inset Map is enabled and displays traffic
- A flashing black-on-yellow 'TRAFFIC' annunciation (Figure 2-37) appears to the top left of the Attitude Indicator for five seconds and remains displayed until no TAs are detected in the area
- A single "Traffic" voice alert is generated, unless an optional Traffic Advisory System (TAS) is installed (refer to the applicable TAS documentation for alerts generated by TAS equipment)

  If additional TAs appear, new voice and visual alerts are generated.

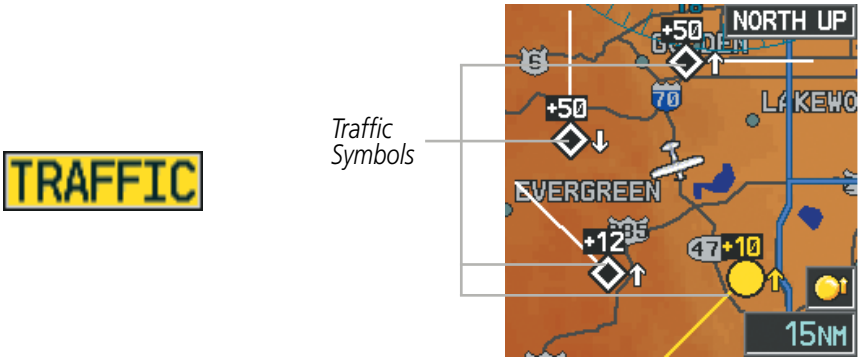


Figure 2-37 Traffic Annunciation and Inset Map with Traffic Displayed

TERRAIN ANNUNCIATIONS

Optional Terrain Awareness and Warning System (TAWS) and Terrain-SVS annunciations appear on the PFD at the top left of the Altimeter. Refer to the Hazard Avoidance Section and Appendix A for information on terrain system annunciations.

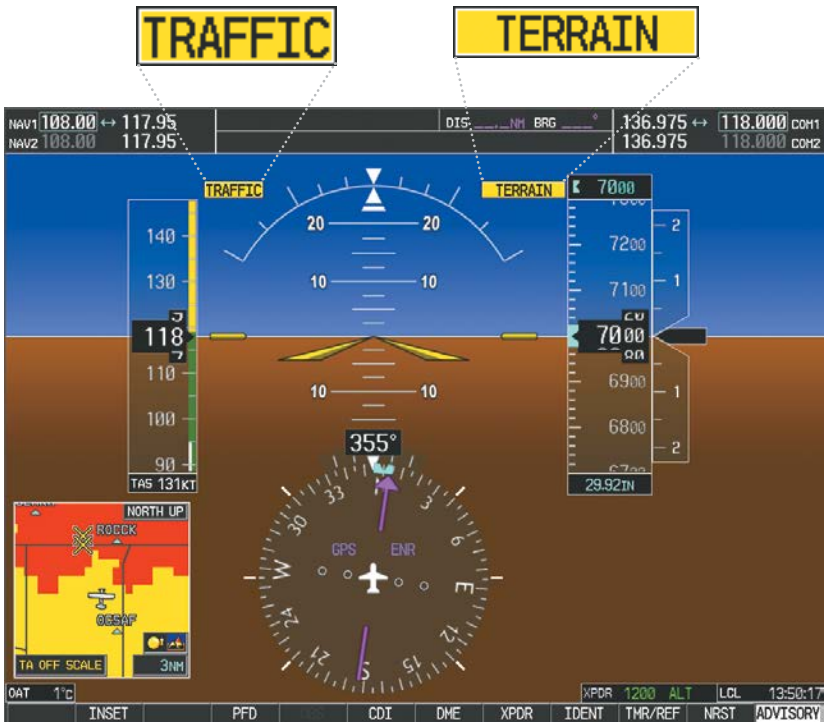


Figure 2-38 Traffic and TAWS Annunciations

ALTITUDE ALERTING

The Altitude Alerting function provides audio and visual alerts when the aircraft is approaching the Selected Altitude. Whenever the Selected Altitude is changed, the Altitude Alerter is reset. The Altitude Alerter is independent of the installed AFCS. The following occur when approaching the Selected Altitude:

- Upon passing through 1000 feet of the Selected Altitude, the Selected Altitude (shown above the Altimeter) changes to black text on a cyan background, flashes for 5 seconds, and an aural tone is generated.
- When the aircraft passes within 200 ft of the Selected Altitude, the Selected Altitude changes to cyan text on a black background and flashes for five seconds, and an audio tone is generated.
- After reaching the Selected Altitude, if the aircraft flies outside the deviation band (±200 feet of the Selected Altitude), the Selected Altitude changes to yellow text on a black background, flashes for five seconds, and an audio tone is generated.



Figure 2-39 Altitude Alerting Visual Annunciations

LOW ALTITUDE ANNUNCIATION

NOTE: *A Low Altitude Annunciation is available only when SBAS is available. If either the optional Terrain-SVS or TAWS-B systems are installed, this annunciation is not applicable unless the installed terrain system is inhibited, has failed, or is unavailable.*

When the Final Approach Fix (FAF) is the active waypoint in a RNAV GPS 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-yellow 'LOW ALT' annunciation appears to the top left of the Altimeter, flashes for several seconds, then remains displayed until the condition is resolved.

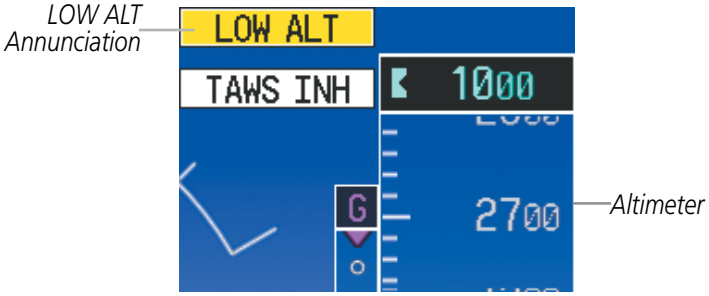


Figure 2-40 Low Altitude on GPS SBAS Approach

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.

If desired, the system can also compensate this altitude 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 displayed MDA/DH accordingly.

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 reference 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, a box labeled 'BARO MIN' or 'COMP MIN' (based on the selected altitude source) appears with the altitude in cyan text (or magenta for TEMP COMP). The bug appears in cyan (or magenta for TEMP COMP) on the altitude tape at the corresponding altitude 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 yellow and the voice alert, "Minimums. Minimums", is heard.

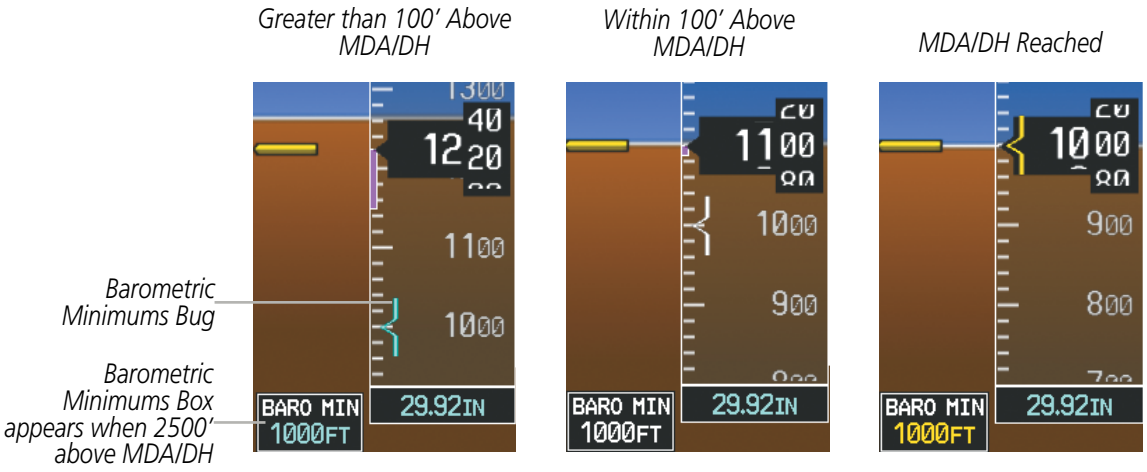


Figure 2-41 Barometric MDA/DH Alerting Visual Annunciations

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 the power is cycled or a new approach is activated.

Setting the barometric minimum descent altitude and bug:

1) Press the **TMR/REF** Softkey.
2) Turn the large **FMS** Knob to highlight the Minimums field.
3) Turn the small **FMS** Knob to select the barometric (BARO) or temperature compensated (TEMP COMP) barometric altitude. 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 (BARO or TEMP COMP from zero to 16,000 feet). If TEMP COMP is selected, a field for entering the temperature at the destination will appear. Press the **ENT** Key or turn the large **FMS** Knob to highlight this field, and use the small **FMS** Knob to enter the temperature (from -59° C to +59° C.) The system increases or decreases the displayed MDA/DH altitude based on this temperature.
5) To remove the window, press the **CLR** Key or press the **TMR/REF** Softkey.



Figure 2-42 BARO and TEMP COMP MDA/DH

NOTE: *The temperature at the destination can be entered in the References Window on the PFD, or Temperature Compensation Window on the MFD. 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 Management section for information about applying temperature compensation to approach altitudes.*

2.4 ABNORMAL OPERATIONS

ABNORMAL GPS CONDITIONS

The annunciations listed in Table 2-3 can appear on the HSI when abnormal GPS conditions occur; see Figure 2-43 for examples. Refer to the Flight Management Section for more information on Dead Reckoning Mode.

Annunciation	Location	Description
LOI	Lower left of aircraft symbol	Loss of Integrity Monitoring–GPS integrity is insufficient for the current phase of flight
INTEG OK	Lower left of aircraft symbol	Integrity OK–GPS integrity has been restored to within normal limits (annunciation displayed for 5 seconds)
DR	Upper right 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 2-3 Abnormal GPS Conditions Annunciated on HSI



Figure 2-43 Example HSI Annunciations

Dead Reckoning Mode causes the CDI to be removed from the display (when GPS is the selected navigation source) and the following items on the PFD to be shown in yellow:

- Current Track Indicator
- Wind Data
- Ground Speed
- Distances in the Bearing Information windows
- GPS bearing pointers

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

HEADING FAILURE MODES

If the system is unable to determine the aircraft heading, but GPS-based track information is available, the HSI displays the ground track instead of heading using HSI Track Mode. In this mode, a magenta 'TRK' annunciation and track readout appear on the HSI. In addition, a yellow 'HDG' annunciation with a red X appear above the 'TRK' annunciation to indicate the HSI is displaying track instead of heading.

If both the heading and track are unavailable, the HSI displays a yellow 'HDG' annunciation with a red X over the heading readout box. The system also removes directional numbers and letters from the HSI.



HSI Track Mode (Heading Unavailable, Track Available)



Heading and Track Unavailable

Figure 2-44 Heading Failure Displays on the HSI

UNUSUAL ATTITUDES

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

Nose High



Nose Low

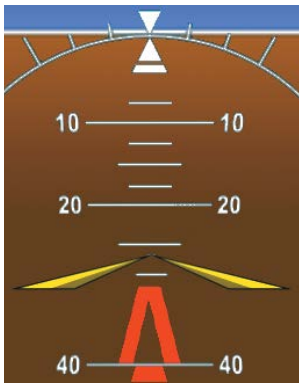


Figure 2-45 Pitch Attitude Warnings

If pitch exceeds +30°/-30° 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 the PFD (and corresponding softkeys are disabled) when the aircraft experiences unusual attitudes:

- Traffic Annunciations
- Flight director Command Bars
- Inset Map
- Outside air temperature (OAT)
- DME Information Window
- 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:
  - Timer/References
  - Nearest Airports
  - Flight Plan
  - Messages
  - Procedures
  - ADF/DME Tuning
- Minimum Descent Altitude/ Decision Height readout
- Vertical Deviation, Glideslope, and Glidepath Indicators
- Altimeter Barometric Setting
- Selected Altitude
- VNV Target Altitude

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SECTION 3 ENGINE INDICATION SYSTEM

The G950® Engine Indication System (EIS) displays critical engine, electrical, fuel, and other system parameters on the left side of the MFD during normal operations (Figure 3-1).



Figure 3-1 Multi Function Display (Normal Operations)

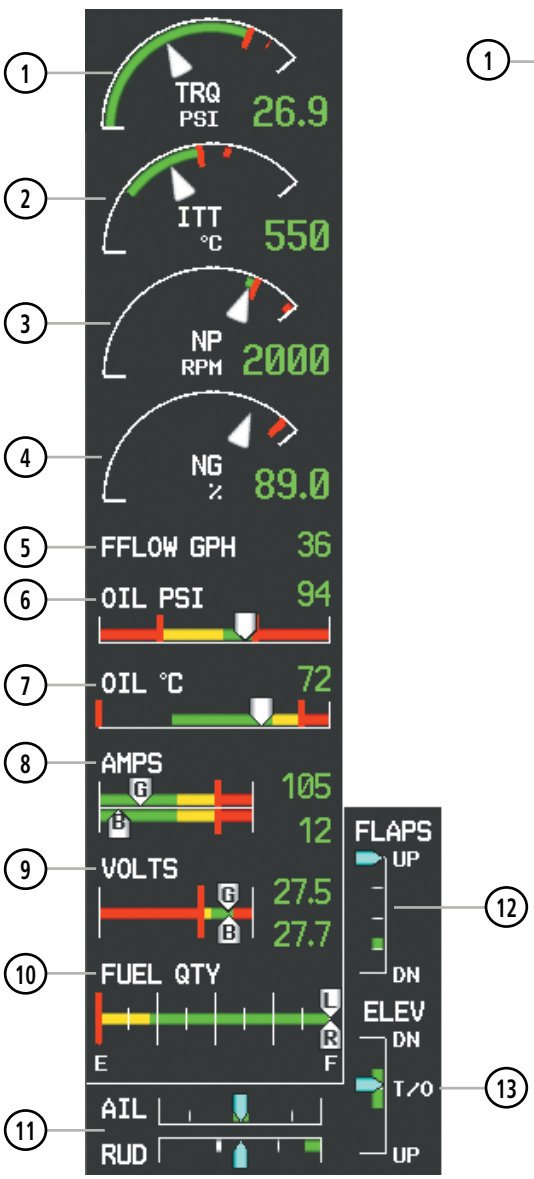
Green bands on the instruments indicate normal ranges of operation; yellow and red bands indicate caution and warning, respectively. When unsafe operating conditions occur, the corresponding readouts flash to indicate cautions and warnings. If sensory data to an instrument becomes invalid or unavailable, a red "X" is displayed across the instrument.

3.1 ENGINE DISPLAY

The Engine Display is shown by default. If another EIS display is currently shown, the Engine Display may be selected by pressing the **ENGINE** or **BACK** Softkey. At the top of all three EIS displays, the Torque, Interstage Turbine Temperature (ITT), Propeller Speed, and Gas Generator Speed gauges are present. Trim and flap indications are also shown on all EIS displays.

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

(1) **Torque Gauge (TRQ PSI)**	Displays engine torque in pounds/square inch (lb/in^2)
(2) **Interstage Turbine Temperature Gauge (ITT °C)**	Displays Interstage Turbine Temperature (ITT) in degrees Celsius (°C) When the engine is not running, 'OFF' is annunciated above the ITT readout; this changes to 'STRT' upon engine start. No annunciation is shown when the engine is running normally (see Figure 3-3).
(3) **Propeller Speed Gauge (NP RPM)**	Displays propeller speed in revolutions per minute (rpm)
(4) **Gas Generator Speed Gauge (NG %)**	Displays gas generator speed as a percentage
(5) **Fuel Flow (FFLOW GPH)**	Displays current fuel flow in gallons per hour (gph)
(6) **Oil Pressure Indicator (OIL PSI)**	Displays engine oil pressure in pounds per square inch (psi)
(7) **Oil Temperature Indicator (OIL °C)**	Displays engine oil temperature in °C
(8) **Ammeter (AMPS)**	Displays DC current in amperes (amps) for the generator (G) and the Battery (B); Alternate Power (A) is not used.
(9) **Voltmeter (VOLTS)**	Displays DC bus voltages for GEN and BAT buses.
(10) **Fuel Quantity Indicator (FUEL QTY)**	Displays quantities of fuel in gallons in the main left (L) and right (R) tanks
(11) **Aileron and Rudder Trim Bars (AIL, RUD)**	Aileron and rudder trim are indicated with pointers along slide bars; the green bars indicate takeoff trim positions
(12) **Flap Position Indicator (FLAPS)**	Flap deflection is indicated with a pointer along a slide bar; takeoff flap position is indicated with a green bar
(13) **Elevator Trim Bar (ELEV)**	Elevator trim is indicated with a pointer along a slide bar; takeoff trim position is indicated with a green bar and T/O label





Floatplane Option

Figure 3-2 Engine Display

Engine Start *Normal* *Engine Off*

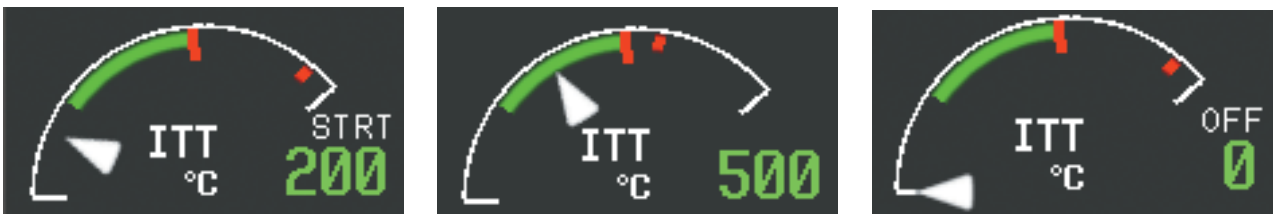


Figure 3-3 Interstage Turbine Temperature Gauge Status Annunciations

3.2 SYSTEM DISPLAY

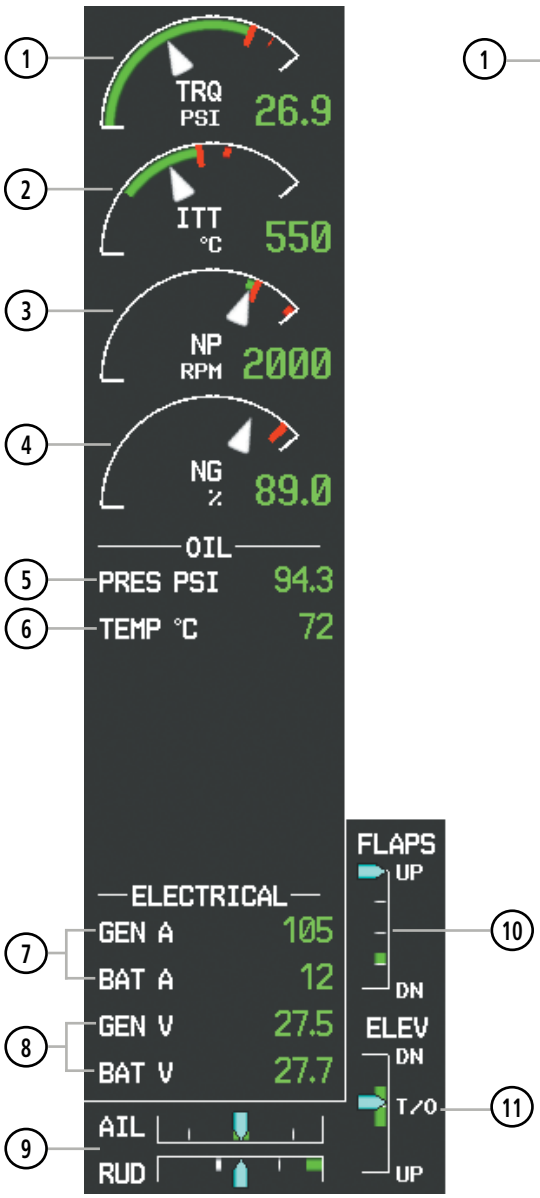
NOTE: *Refer to the Pilot's Operating Handbook (POH) for limitations.*

The System Display (Figure 3-4) is accessed by pressing the **SYSTEM** Softkey. The instruments presented here, in addition to the gauges and trim slide bars, are presented into two categories: Oil (pressure and temperature) and Electrical (currents and voltages).

Accessing the EIS System Display:

1) Press the **ENGINE** Softkey.
2) Press the **SYSTEM** Softkey.
3) To return to the default Engine Display, press the **ENGINE** or **BACK** Softkey.

(1) **Torque Gauge (TRQ PSI)**	Displays engine torque in pounds/square inch (lb/in^2)
(2) **Interstage Turbine Temperature Gauge (ITT °C)**	Displays Interstage Turbine Temperature (ITT) in degrees Celsius (°C) When the engine is not running, 'OFF' is annunciated above the ITT readout; this changes to 'STRT' upon engine start. No annunciation is shown when the engine is running normally
(3) **Propeller Speed Gauge (NP RPM)**	Displays propeller speed in revolutions per minute (rpm)
(4) **Generator Speed Gauge (NG %)**	Displays gas generator speed as a percentage
(5) **Oil Pressure (PRES PSI)**	Displays engine oil pressure in pounds per square inch (psi)
(6) **Oil Temperature (TEMP °C)**	Displays engine oil temperature in °C
(7) **Ammeter (GEN A, BAT A)**	Displays DC current in amperes (A) for the generator (GEN); Alternate Power (ALT) is not used
(8) **Voltmeter (GEN V, BAT V)**	Displays DC bus voltages
(9) **Aileron and Rudder Trim Bars (AIL, RUD)**	Aileron and rudder trim are indicated with pointers along slide bars; the green bars indicate takeoff trim positions
(10) **Flap Position Indicator (FLAPS)**	Flap deflection is indicated with a pointer along a slide bar; takeoff flap position is indicated with a green bar
(11) **Elevator Trim Bar (ELEV)**	Elevator trim is indicated with a pointer along a slide bar; takeoff trim position is indicated with a green bar and T/O label





Floatplane Option

Figure 3-4 System Display

3.3 FUEL DISPLAY

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

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

The Fuel Display (Figure 3-5) is accessed by pressing the **FUEL** Softkey. Besides the gauges and trim slide bars, all indications on this display are digital readouts, separated into three categories: Oil (pressure and temperature), Fuel (flow, pressure, and quantities), and Fuel Calculations (fuel remaining and used, endurance, and range).

Accessing the EIS Fuel Display:

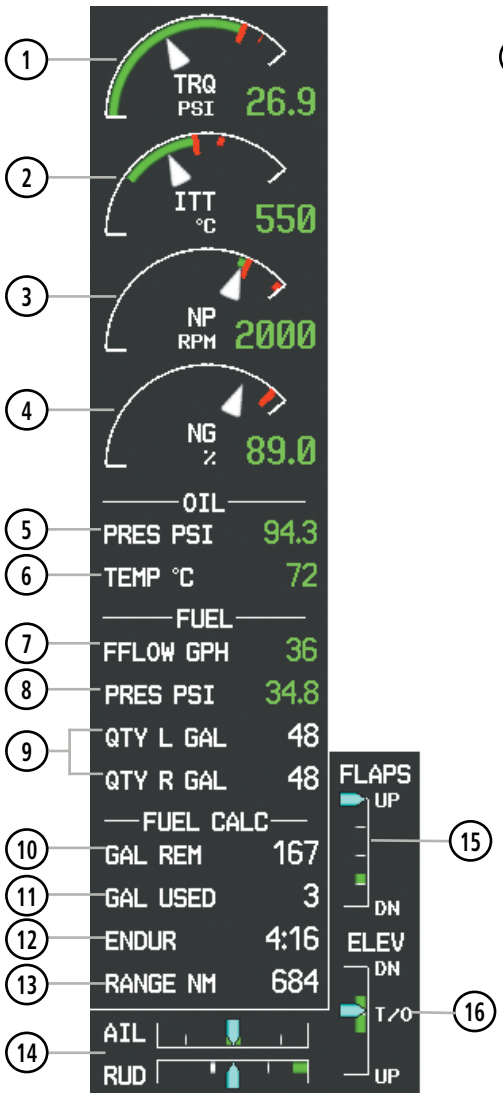
1) Press the **ENGINE** Softkey.
2) Press the **FUEL** Softkey.
3) To return to the default Engine Display, press the **ENGINE** or **BACK** Softkey.

Fuel calculations are based on the fuel flow totalizer and the displayed fuel remaining (GAL REM), adjusted by the pilot using the following softkeys:

- **DEC FUEL** – Decreases totalizer-based fuel remaining in 1-gal increments
- **INC FUEL** – Increases totalizer-based fuel remaining in 1-gal increments
- **RST FUEL** – Resets totalizer-based fuel remaining to 170-gal and the displayed fuel used (GAL USED) to zero

(1) **Torque Gauge (TRQ PSI)**	Displays engine torque in pounds/square inch (lb/in^2)
(2) **Interstage Turbine Temperature Gauge (ITT °C)**	Displays Interstage Turbine Temperature (ITT) in degrees Celsius (°C). When the engine is not running, 'OFF' is annunciated above the ITT readout; this changes to 'STRT' upon engine start. No annunciation is shown when the engine is running normally.
(3) **Propeller Speed Gauge (NP RPM)**	Displays propeller speed in revolutions per minute (rpm)
(4) **Generator Speed Gauge (NG %)**	Displays gas generator speed as a percentage
(5) **Oil Pressure (PRES PSI)**	Displays engine oil pressure in pounds per square inch (psi)
(6) **Oil Temperature (TEMP °C)**	Displays engine oil temperature in °C
(7) **Fuel Flow (FFLOW GPH)**	Displays current fuel flow in gallons per hour (gph)
(8) **Fuel Pressure (PRES PSI)**	Displays current fuel pressure in psi
(9) **Fuel Quantities (QTY L/R GAL)**	Displays quantities of fuel in gallons in the left (L) and right (R) tanks

(10) **Set Fuel Remaining (GAL REM)**	Displays current fuel remaining in gallons as set by the pilot and adjusted for fuel burn since last set
(11) **Calculated Fuel Used (GAL USED)**	Displays quantity of fuel used in gallons based on fuel flow since last reset
(12) **Calculated Endurance (ENDUR)**	Displays flight time remaining in hours:minutes (HH:MM) based on the calculated fuel remaining
(13) **Calculated Range (RANGE NM)**	Displays aircraft range in nautical miles (nm) based on the calculated fuel remaining, the aircraft's heading, and the wind direction and speed
(14) **Aileron and Rudder Trim Bars (AIL, RUD)**	Aileron and rudder trim are indicated with pointers along slide bars; the green bars indicate takeoff trim positions
(15) **Flap Position Indicator (FLAPS)**	Flap deflection is indicated with a pointer along a slide bar; takeoff flap position is indicated with a green bar
(16) **Elevator Trim Bar (ELEV)**	Elevator trim is indicated with a pointer along a slide bar; takeoff trim position is indicated with a green bar and T/O label





Floatplane Option

Figure 3-5 Fuel Display

3.4 EIS DISPLAY IN REVERSIONARY MODE

In reversionary mode, the remaining display is re-configured to present PFD symbology together with the EIS Display (refer to the System Overview for information about display Reversionary Mode). When the G950® displays enter reversionary mode, the EIS is separated into Engine, System, and Fuel displays. The displays are identical to the displays in normal mode.

EIS Display



Figure 3-6 Reversionary Mode

=

EIS SOFTKEYS

The Engine Display is shown by default. To return to the Engine Display from the System or Fuel Display, select the **ENGINE** or **BACK** Softkey.

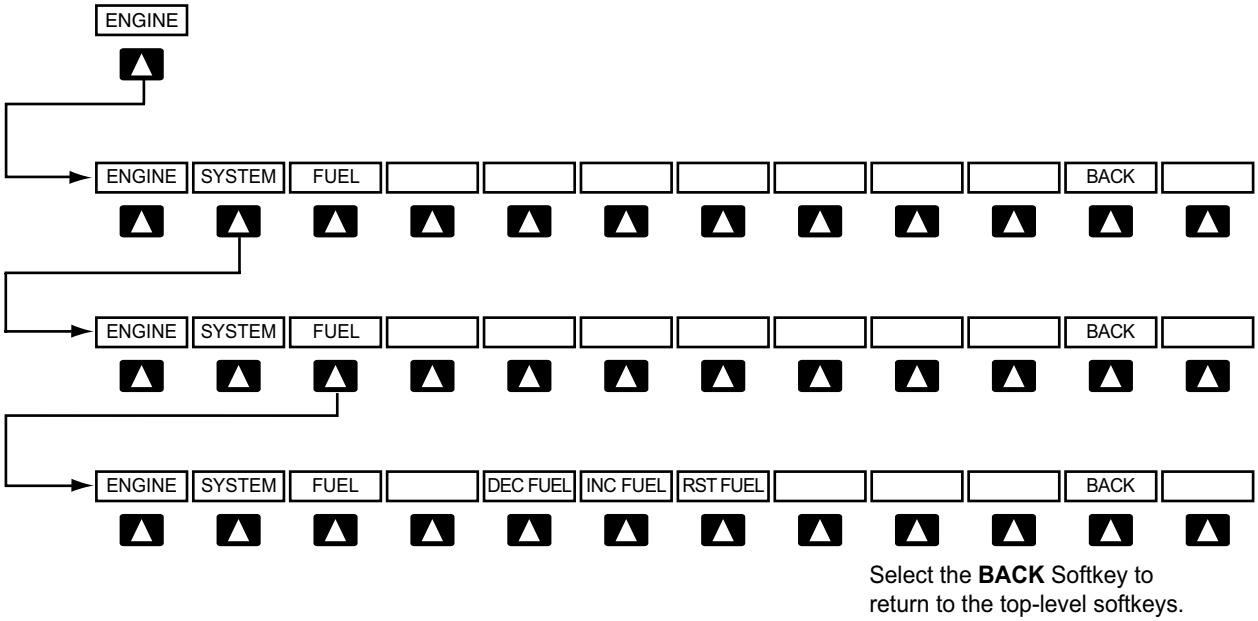


Figure 3-7 EIS Softkeys (Reversionary Mode)

- **ENGINE** — Displays second-level engine softkeys
- **SYSTEM** — Displays the EIS System Display
- **FUEL** — Displays the EIS Fuel Display

DEC FUEL — Decreases displayed fuel remaining in 1-gal increments

INC FUEL — Increases displayed fuel remaining in 1-gal increments

RST FUEL — Resets displayed fuel remaining to 170-gal and fuel used to zero

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SECTION 4 AUDIO PANEL AND CNS

4.1 OVERVIEW

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

CNS operation in the G950 is performed by the following Line Replaceable Units (LRUs):

- Primary Flight Display (PFD)
- Multifunction 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 system, 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 a reply status (Figure 4-1).

PFD CONTROLS AND FREQUENCY DISPLAY



Figure 4-1 PFD Controls, NAV/COM Frequency Tuning Boxes, and NRST 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 tuning box (cyan box) and 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 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 tuning box (cyan box) and 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. **Nearest Airports Window –** Display by pressing **NRST** Softkey.
10. **ENT Key –** Validates or confirms an Auto-tune selection.
11. **FMS Knob –** Flight Management System Knob, used to enter transponder codes and Auto-tune entries when 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.

GMA 347 AUDIO PANEL CONTROLS

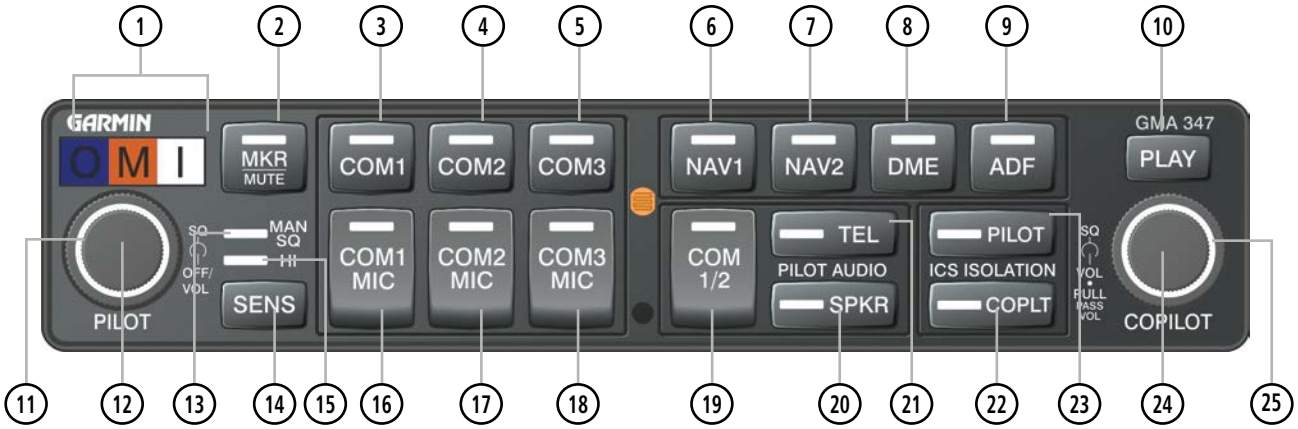


Figure 4-2 GMA 347 Audio Panel Controls

NOTE: *When a key is selected, an annunciator in the key is illuminated.*

1. **Marker Beacon Annunciators** – Each annunciator lights independently when flying over the associated marker beacon station.
2. **MKR/MUTE** – Selects marker beacon receiver audio. Mutes the currently received marker beacon receiver audio. Unmutes automatically when new marker beacon audio is received. Enables Music Mute feature. Also, stops play of recorded COM audio.
3. **COM1** – When selected, audio from the #1 COM receiver can be heard.
4. **COM2** – When selected, audio from the #2 COM receiver can be heard.
5. **COM3** – Reserved for optional COM radio.
6. **NAV1** – When selected, audio from the #1 NAV receiver can be heard.
7. **NAV2** – When selected, audio from the #2 NAV receiver can be heard.
8. **DME** – Turns optional DME audio on or off.
9. **ADF** – Turns optional ADF receiver audio on or off.
10. **PLAY** – Press once to play the last recorded COM audio. Press again while audio is playing and the previous block of recorded audio will be played. Each subsequent press plays each previously recorded block. Pressing the **MKR/MUTE** Key during play of a memory block stops play.
11. **PILOT Squelch** – Turn to adjust Pilot's squelch. The Pilots volume knob must be pressed to allow manual squelch adjustment.

(12) **PILOT Volume** – Turn the left (Pilot) volume knob to control pilot's intercom volume and the ON and OFF function. (Full CCW detent is OFF) Press to switch between manual and automatic squelch control as indicated by illumination of the MAN SQ annunciator.

(13) **MAN SQ** – Manual Squelch annunciator. When lit, pilot and copilot squelch knobs control manual squelch.

(14) **SENS** – Press to increase marker beacon receiver sensitivity as indicated by illumination of the HI SENS annunciator. Press again to return to low sensitivity and extinguish the HI SENS annunciator.

(15) **HI SENS Annunciator** – Indicates marker beacon receiver sensitivity, high sensitivity when illuminated, low sensitivity when extinguished.

(16) **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.

(17) **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.

(18) **COM3 MIC** – Reserved for optional COM radio.

(19) **COM 1/2** – Split COM operation key. When selected, the pilot uses the COM 1 transceiver and the copilot uses COM 2.

(20) **SPKR** – Selects and deselects the cabin speaker. COM and NAV receiver audio can be heard on the speaker. Press and hold for 2 seconds for Passenger Address (PA). The **SPKR** key flashes during PA.

(21) **TEL** – Selects and deselects telephone audio.

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

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

(24) **COPILOT/PASS Volume** – Turn to adjust Copilot/Passenger intercom volume or squelch. Pulling the right volume knob controls passenger volume, pushing in controls Copilot volume.

(25) **COPILOT/PASS Squelch** – Copilot and passenger share the squelch knob.

4.2 COM OPERATION

COM TRANSCEIVER SELECTION AND ACTIVATION

NOTE: *During PA Mode, the COM MIC Annunciator is extinguished and the COM active frequency color changes to white, indicating that neither COM transmitter is active.*

NOTE: *When turning on the G950 for use, the system remembers the last frequencies used and the active COM transceiver state prior to shutdown.*

The COM Frequency Box is composed of four fields; the two active frequencies are on the left side and the two standby frequencies are on the right. The COM transceiver is selected for transmitting by pressing the **COM MIC** Keys on the Audio Panel. During reception of audio from the COM radio selected for transmission, audio from the other COM radio is muted.

An active COM frequency displayed in green 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).

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.

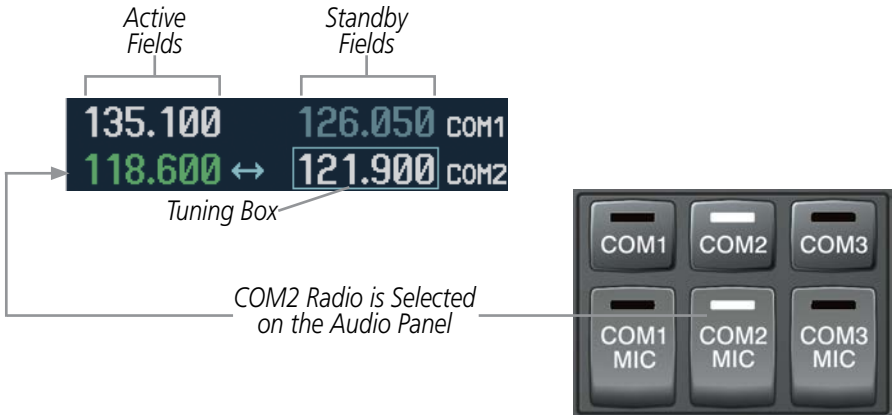


Figure 4-3 Selecting a COM Radio for Transmit

COM3 is reserved for an optional COM radio.

TRANSMIT/RECEIVE INDICATIONS

During COM transmission, a white TX appears by the active COM frequency replacing the Frequency Transfer Arrow. On the Audio Panel, when the active COM is transmitting, the active transceiver **COM MIC** Key Annunciator flashes approximately once per second.

During COM signal reception, a white RX appears by the active COM frequency replacing the Frequency Transfer Arrow.

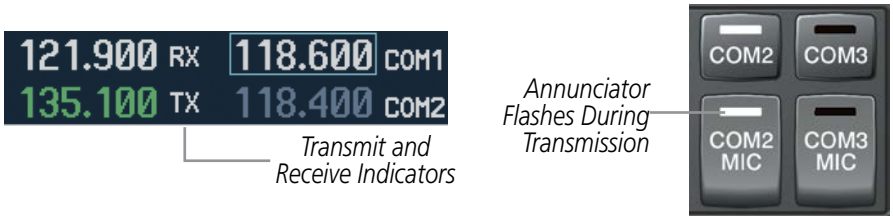


Figure 4-4 COM Radio Transmit and Receive Indications

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 in the COM Tuning Box (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.



Figure 4-5 COM Frequency Tuning

SELECTING THE RADIO TO BE TUNED

Press the small **COM** Knob to transfer the frequency tuning box and Frequency Transfer Arrow between the upper and lower radio frequency fields.

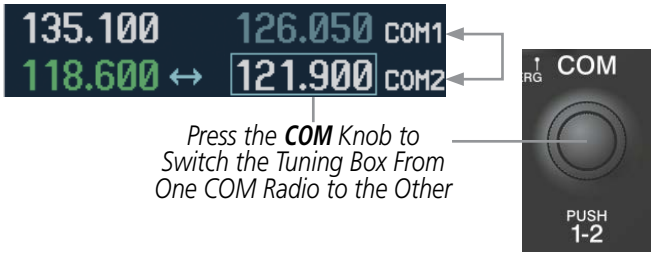


Figure 4-6 Switching COM Tuning Boxes

QUICK-TUNING AND ACTIVATING 121.500 MHZ

Pressing and holding the COM **Frequency Transfer** Key for two seconds automatically loads the emergency COM frequency (121.500 MHz) in the active field of the COM radio selected for tuning (the one with the transfer arrow). In the example shown, pressing the Audio Panel **COM2 MIC** Key activates the transceiver.

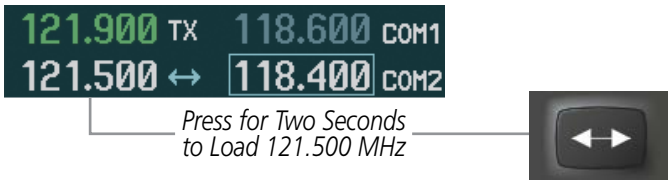


Figure 4-7 Quickly Tuning 121.500 MHz

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) Press the **NRST** 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 Tuning Box.
4) Press the **Frequency Transfer** Key to transfer the frequency to the COM Active Frequency Field.



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

Figure 4-8 Nearest Airports Window

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 (Figures 4-10, 4-11, and 4-12).

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 (Figure 4-11).
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 to transfer the frequency to the COM Active Frequency Field.

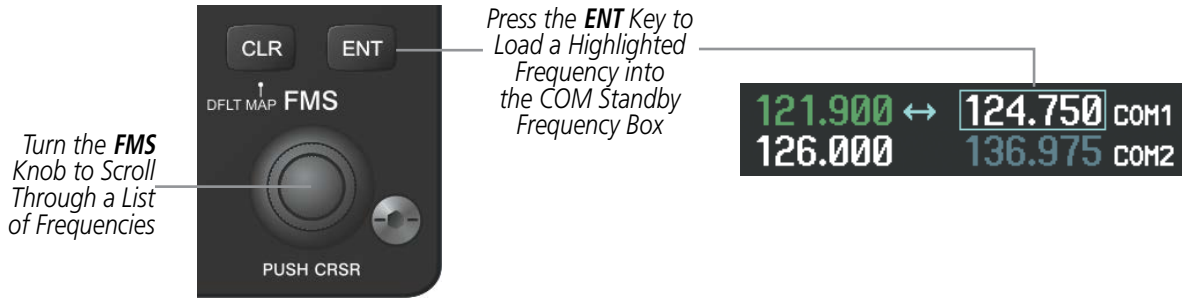
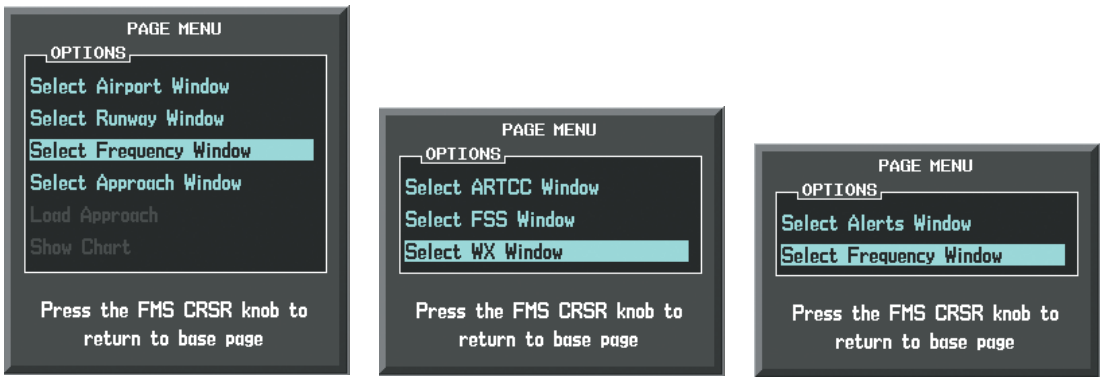


Figure 4-9 Frequency Auto-Tuning from the MFD

Or:

1) On the Nearest Airports, Frequencies, or Airspaces page, 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.
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 4-10 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.



Figure 4-11 WPT – Airport Information Page

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.



Figure 4-12 NRST – Nearest Airspaces, NRST – Nearest Airports, and NRST – Nearest Frequencies Pages

FREQUENCY SPACING

The G950 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 Page of the AUX Page Group.



8.33-kHz Channel Spacing

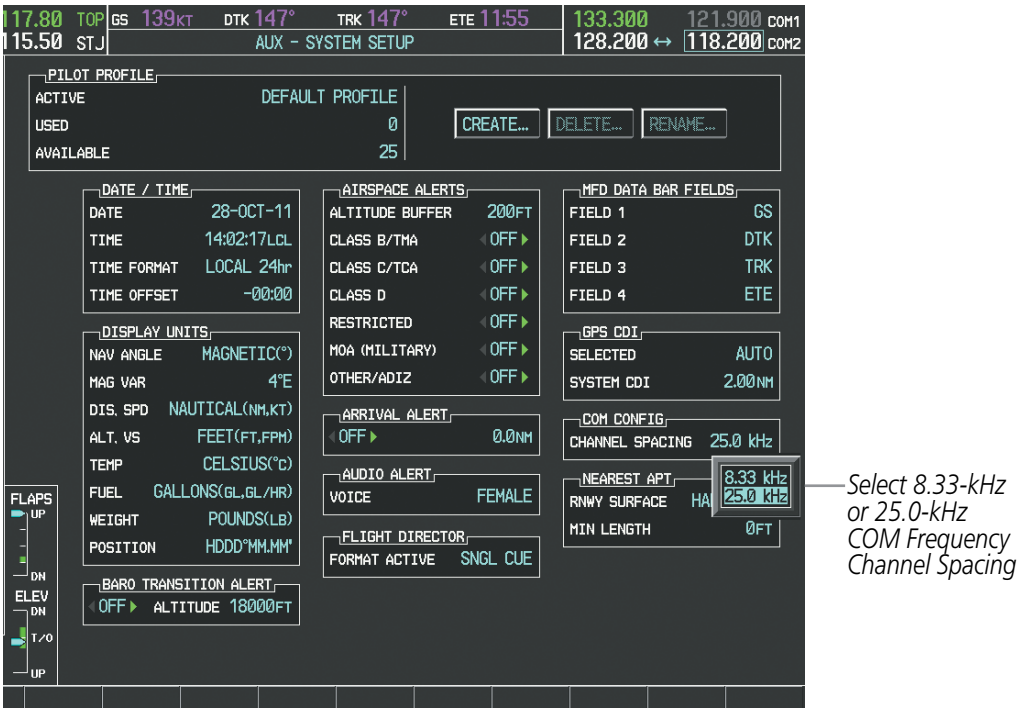
25-kHz Channel Spacing

Figure 4-13 COM Channel Spacing

Changing COM frequency channel spacing:

1) Select the AUX – System Setup 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 G950 softkeys are blank.



Select 8.33-kHz or 25.0-kHz COM Frequency Channel Spacing

Figure 4-14 AUX – System Setup Page

AUTOMATIC SQUELCH

Automatic Squelch quiets unwanted static noise when no audio signal is received, while still providing good sensitivity to weak COM signals. To disable Automatic Squelch, press the **VOL/SQ** Knob. When Automatic Squelch is disabled, COM audio reception is always on. Continuous static noise is heard over the headsets and speaker, if selected. Pressing the **VOL/SQ** Knob again enables Automatic Squelch.

When Automatic Squelch is disabled, a white SQ appears next to the COM frequency.



Figure 4-15 Overriding Automatic Squelch

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.

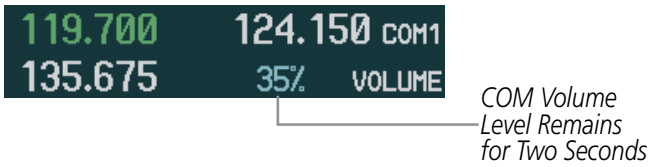


Figure 4-16 COM Volume Level

4.3 NAV OPERATION

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

While cycling through the **CDI** Softkey selections, the NAV Tuning Box and the Frequency Transfer Arrow are placed in the active 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.

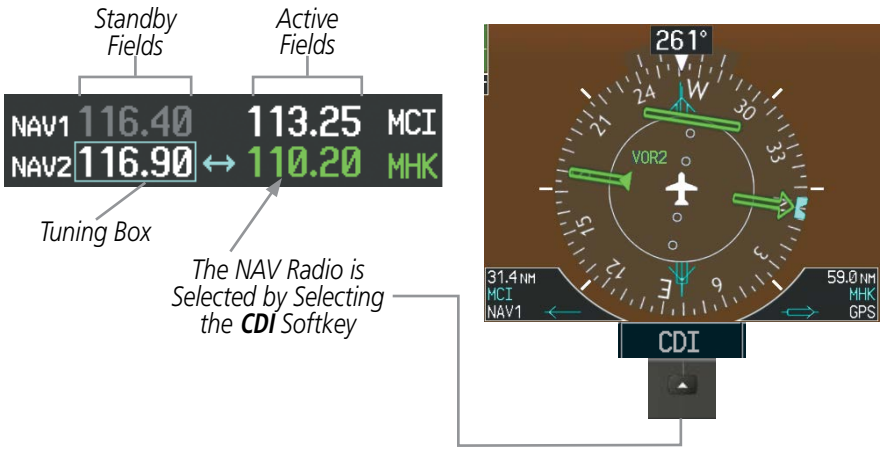


Figure 4-17 Selecting a NAV Radio for Navigation

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

NAV radios are selected for listening by pressing the corresponding keys on the Audio Panel. Pressing the **NAV1**, **NAV2**, **DME**, or **ADF** 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.



Figure 4-18 Selecting a NAV Radio Receiver

NAV RECEIVER MANUAL TUNING

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

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.

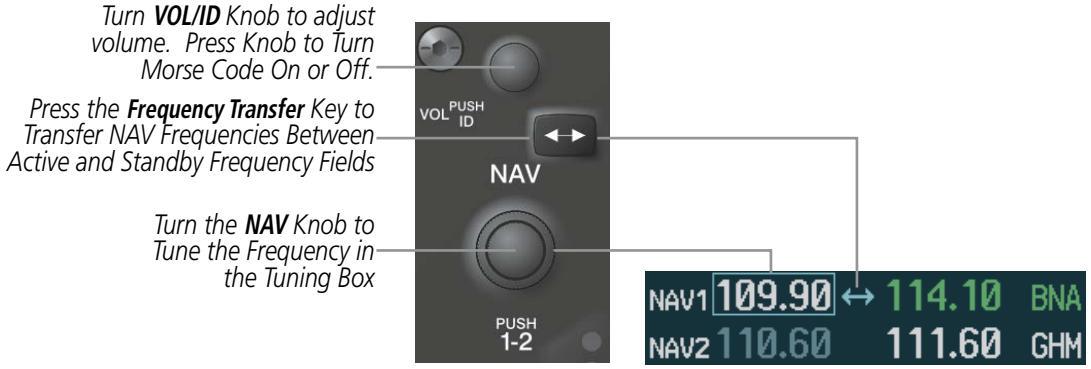


Figure 4-19 NAV Frequency Tuning

SELECTING THE RADIO TO BE TUNED

Press the small **NAV** Knob to transfer the frequency tuning box and Frequency Transfer Arrow between the upper and lower radio frequency fields.

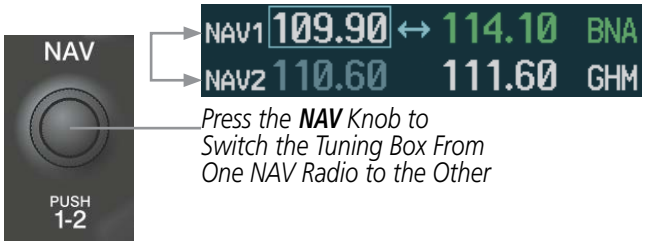


Figure 4-20 Switching NAV Tuning Boxes

VOR/LOC ID

When the Morse code Identifier audio is on for a NAV radio, a white ID appears to the left of the active NAV frequency.

In the example shown, in order to listen to either station identifier, press the **NAV1** or **NAV2** Key on the Audio Panel. Pressing the **VOL/ID** Knob turns off the Morse code audio only in the radio with the NAV Tuning Box. To turn off both NAV IDs, transfer the NAV Tuning Box between NAV1 and NAV2 with the small **NAV** Knob and press the **VOL/ID** Knob again to turn the Morse code off in the other radio.

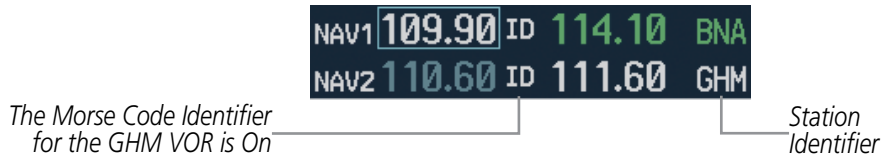


Figure 4-21 NAV Radio ID Indication

VOLUME

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

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

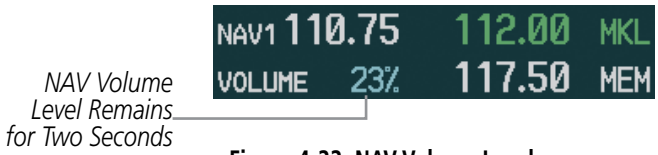


Figure 4-22 NAV Volume Levels

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 (Figures 4-23, 4-24, and 4-25).

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 selecting 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, select the **FREQ** Softkey to place the cursor on the NAV frequency (Figure 4-25).
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.

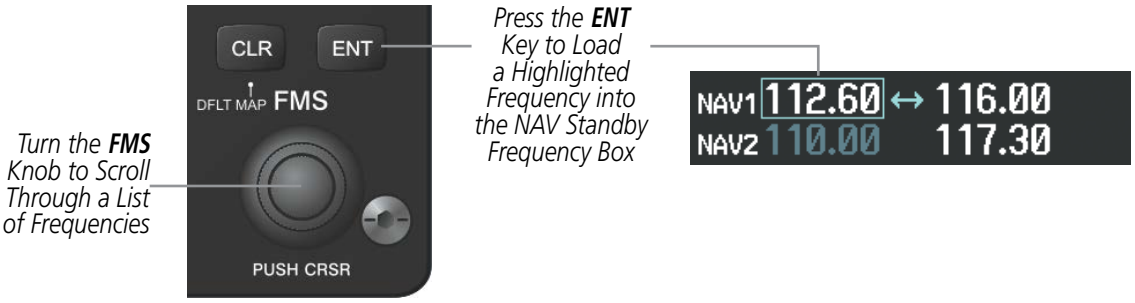
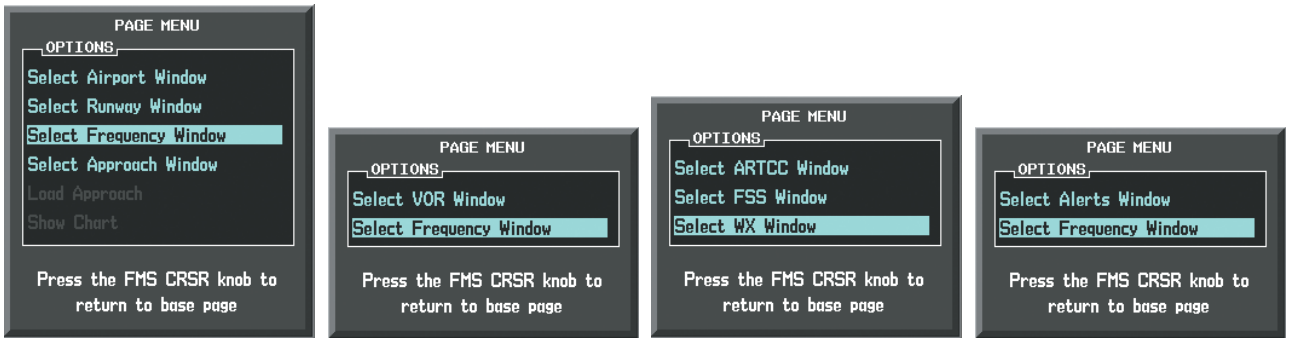


Figure 4-23 NAV Frequency Auto-Tuning from the MFD

Or:

1) When on the NRST pages, 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 in the desired window.
4) Scroll through the frequency selections with the **FMS** Knob.
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 4-24 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.



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

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

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

Figure 4-25 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.



Figure 4-26 NRST – Nearest Frequencies, WPT – VOR Information, WPT – Airport Information, and NRST – Nearest Airports Pages

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 Box on approach activation.

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 the 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.

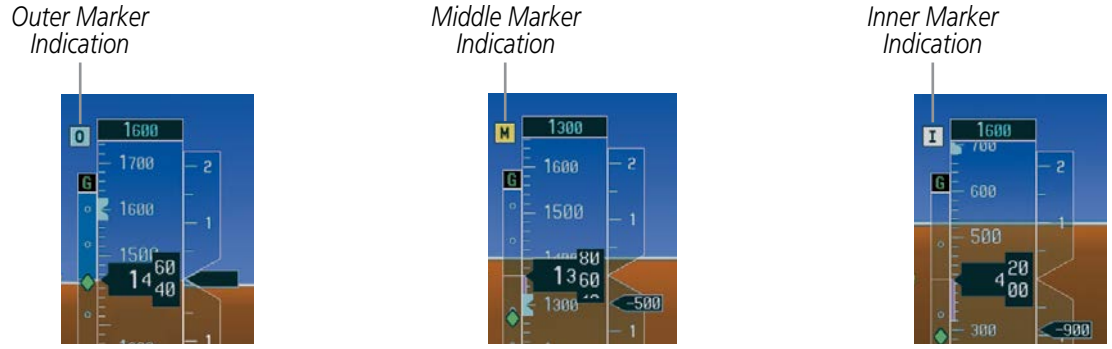


Figure 4-27 Marker Beacon Annunciations on the PFD



Figure 4-28 Marker Beacon Keys

The Audio Panel provides 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 (Figure 4-27). 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.

Pressing the **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.

4.4 GTX 33 MODE S TRANSPONDER

The GTX 33 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 – If equipped with an 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: **STBY**, **ON**, **ALT**, **VFR**, **GND**, **CODE**, **IDENT**, **ADSB-TX** (optional), and **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.

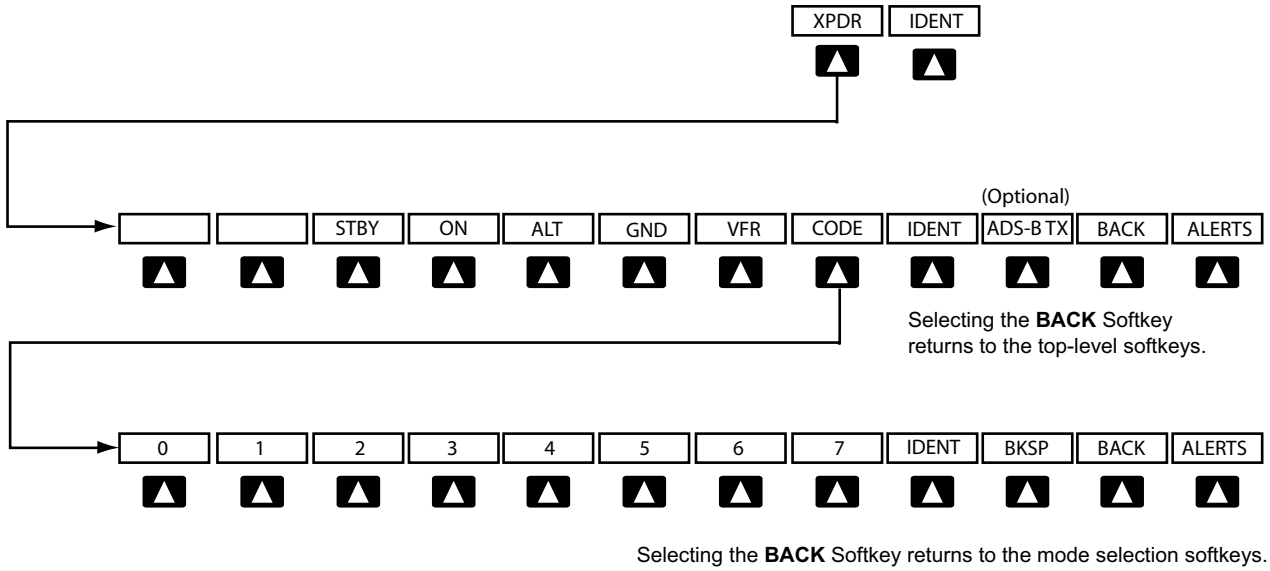


Figure 4-29 Transponder Softkeys (PFD)

TRANSPONDER MODE SELECTION

Mode selection can be automatic (Ground and Altitude Modes) or manual (Standby, ON, and Altitude Modes). The **STBY**, **ON**, and **ALT** Softkeys can be accessed by 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.

GROUND MODE

Ground Mode is normally selected automatically when the aircraft is on the ground. The transponder powers up in the last mode it was in when shut down. Ground Mode can be overridden by pressing any one of the Mode Selection Softkeys. A green GND indication and transponder code appear in the mode field of the Transponder Data Box. Ground Mode generates Mode S replies to discrete interrogations as well as transmission of acquisition squitter and extended squitter, including ADS-B out (if equipped). Mode A, Mode C, and Mode S all-call replies are inhibited.

When Standby Mode has been selected on the ground, the transponder can be returned to Ground Mode by pressing the **GND** Softkey.



Figure 4-30 Ground Mode

STANDBY MODE (MANUAL)

NOTE: *In Standby Mode, the IDENT function is inoperative.*

Standby Mode can be selected at any time by pressing the **STBY** 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. In all other modes, these fields appear in green.

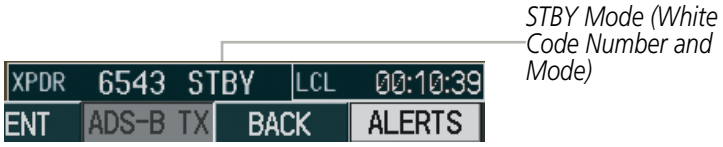


Figure 4-31 Standby Mode

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 (if equipped). Mode C altitude reporting is inhibited. In ON Mode, a green ON indication and transponder code appear in the mode field of the Transponder Data Box.

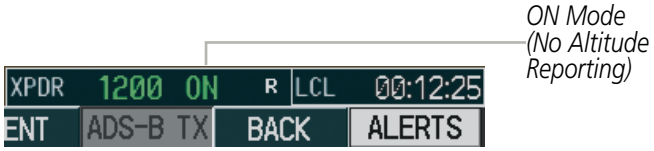


Figure 4-32 ON Mode

ALTITUDE MODE (AUTOMATIC OR MANUAL)

Altitude Mode is automatically selected when the aircraft becomes airborne. Altitude Mode may also be selected manually by pressing the **ALT** Softkey. 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 equipped).

If Altitude Mode is selected, 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.

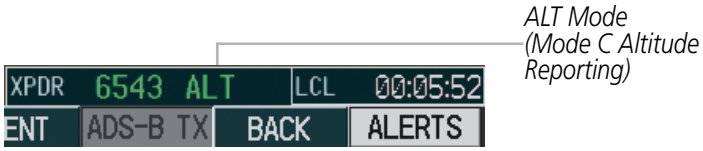


Figure 4-33 Altitude Mode

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.



Figure 4-34 Reply Indication

ENTERING A TRANSPONDER CODE

Entering a transponder code with softkeys:

1) Press the **XPDR** Softkey to display the Transponder Mode Selection Softkeys.
2) Press the **CODE** Softkey to display the Transponder Code Selection Softkeys, for digit entry.
3) Press the digit softkeys to enter the code in the code field. When entering the code, the next softkey in sequence must be pressed within 10 seconds, or the entry is cancelled and restored to the previous code. Pressing the **BKSP** Softkey moves the code selection cursor to the previous digit. Five seconds after the fourth digit has been entered, the transponder code becomes active.

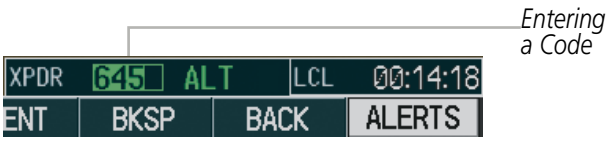


Figure 4-35 Entering a Code

Entering a transponder code with the PFD FMS Knob:

1) Press the **XPDR** and the **CODE** Softkeys as in the previous procedure to enable code entry.
2) Turn the small **FMS** Knob on the PFD to enter the first two code digits.
3) Turn the large **FMS** Knob to move the cursor to the next code field.
4) Enter the last two code digits with the small **FMS** Knob.
5) Press the **ENT** Key to complete code digit entry.

Pressing the **CLR** Key or small **FMS** Knob before code entry is complete cancels code entry and restores the previous code. Waiting for 10 seconds after code entry is finished activates the code automatically.

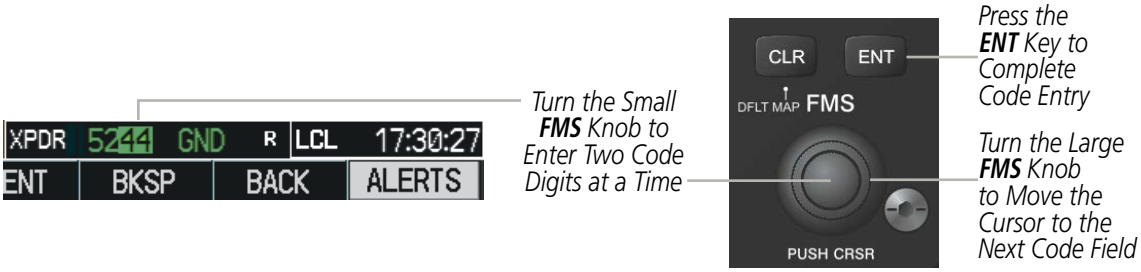


Figure 4-36 Entering a Code with the FMS Knob

VFR CODE

The VFR code can be entered either manually or by pressing the **XPDR** Softkey, then the **VFR** Softkey. When the **VFR** Softkey is pressed, the pre-programmed VFR code is automatically displayed in the code field of the Transponder Data Box. Pressing 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.

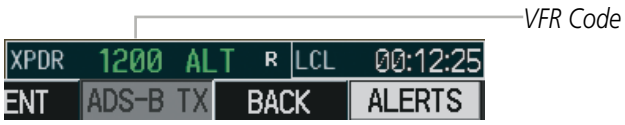


Figure 4-37 VFR Code

IDENT FUNCTION

NOTE: *In Standby Mode, the **IDENT** Softkey is inoperative.*

Pressing the **IDENT** Softkey sends an ID indication to Air Traffic Control (ATC). The ID return distinguishes one transponder from all the others on the air traffic controller's radar screen. The **IDENT** Softkey appears on all levels of transponder softkeys. When the **IDENT** Softkey is pressed, a green IDNT indication is displayed in the mode field of the Transponder Data Box for a duration of 18 seconds.

After the **IDENT** Softkey is pressed while in Mode or Code Selection, the system reverts to the top-level softkeys.

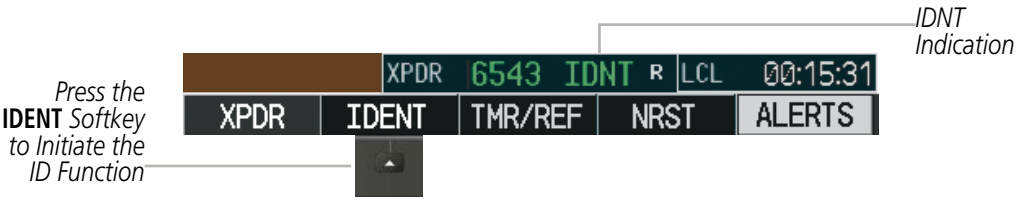


Figure 4-38 IDENT Softkey and Indication

ADS-B TX

If equipped with a GTX 33 with an extended squitter, the transmission of extended squitters containing ADS-B out information is enabled/disabled by pressing the **ADS-B TX** Softkey. ADS-B transimssion defaults to enabled at each power cycle. Do not disable ADS-B transmission unless requested by ATC.

Even with the ADS-B TX enabled, transmission of extended squitters containing ADS-B out information will vary based on the current mode of the transponder.

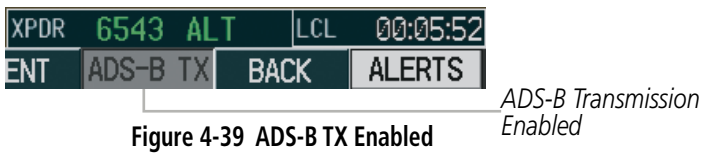


Figure 4-39 ADS-B TX Enabled

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.

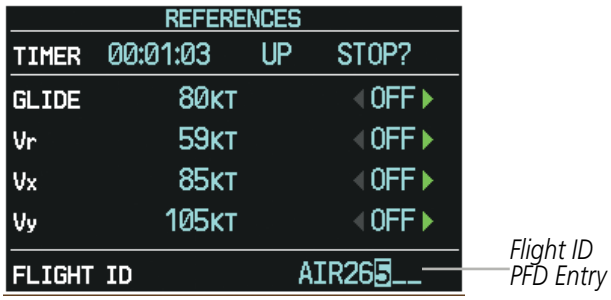


Figure 4-40 Timer/References Window, Entering Flight ID

4.5 ADDITIONAL AUDIO PANEL FUNCTIONS

POWER-UP

The Audio Panel performs 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.

MONO/STEREO HEADSETS

Stereo headsets are recommended for use with the G950.

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 (if installed). 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.



Figure 4-41 Speaker Key

INTERCOM

The Audio Panel includes a four-position intercom system (ICS) and two stereo music inputs for the pilot, copilot and up to two passengers. The intercom provides Pilot and Copilot isolation from the passengers and aircraft radios.



Figure 4-42 Intercom Controls

PILOT KEY Annunciator	COPLT KEY Annunciator	TEL KEY Annunciator	Pilot Hears	Copilot Hears	Passenger Hears	Input to Phone
OFF	OFF	OFF	Selected radios, aural alerts, pilot, copilot, passengers, music1	Selected radios, aural alerts, pilot, copilot, passengers, music1	Selected radios, aural alerts, pilot, copilot, passengers, music2	None
OFF	OFF	ON	Selected radios, aural alerts, pilot, copilot, passengers, music1, TEL audio	Selected radios, aural alerts, pilot, copilot, passengers, music1, TEL audio	Selected radios, aural alerts, pilot, copilot, passengers, music2, TEL audio	Pilot, copilot, passengers
ON	OFF	OFF	Selected radios, aural alerts, pilot	Copilot, passengers, music1, TEL audio	Copilot, passengers, music2, TEL audio	Copilot, passengers
ON	OFF	ON	Selected radios, aural alerts, pilot, TEL audio	Copilot, passengers, music1	Copilot, passengers, music2	Pilot
OFF	ON	OFF	Selected radios, aural alerts, pilot; passengers, music1	Copilot, TEL audio	Selected radios, aural alerts, pilot, passengers, music2	Copilot
OFF	ON	ON	Selected radios, aural alerts, pilot; passengers, music1, TEL audio	Copilot	Selected radios, aural alerts, pilot, passengers, music2, TEL audio	Pilot, passengers
ON	ON	OFF	Selected radios, aural alerts, pilot, copilot	Selected radios, aural alerts, pilot, copilot	Passengers, music2, TEL audio	Passengers
ON	ON	ON	Selected radios, aural alerts, pilot, copilot, TEL audio	Selected radios, aural alerts, pilot, copilot, TEL audio	Passengers, music2	Pilot, copilot

Table 4-1 ICS Isolation Modes & Telephone Distribution

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.

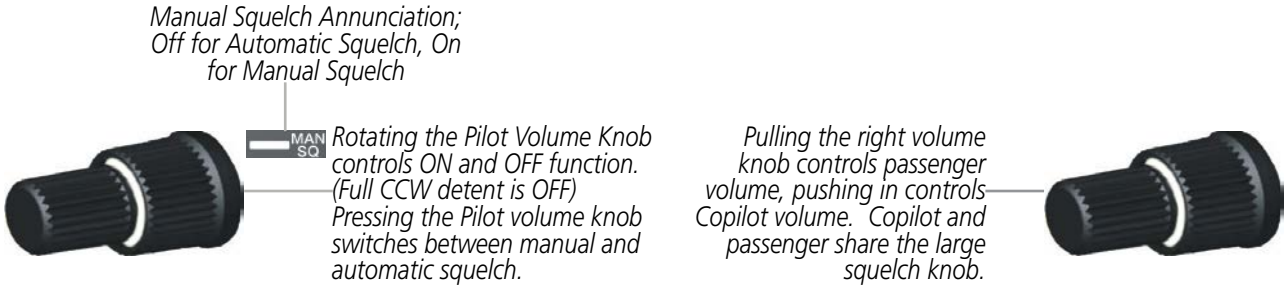
When both the PILOT and COPLT Annunciators are extinguished, everyone hears the selected radios, aural alerts, and is able to communicate with everyone else.

INTERCOM VOLUME AND SQUELCH

Two volume controls, one for the pilot and a combined copilot/passenger control, set intercom audio level.

Each microphone input has an automatic squelch threshold. Manual squelch is available by pressing the Pilot side **VOL/SQ** knob. When the MAN SQ annunciation is lit the large squelch knobs control pilot and copilot/passenger squelch threshold. Turning either knob clockwise increases the squelch threshold level. Turning either knob counterclockwise decreases the squelch threshold level.

When the MAN SQ annunciation is not lit, squelch is automatic and the large squelch knobs have no function.



Pilot Volume, On/Off, and Manual Squelch **Copilot/Passenger Volume and Manual Squelch**

Figure 4-43 Intercom Volume and Squelch Controls

PASSENGER ADDRESS (PA) SYSTEM

A passenger address system is available for delivering voice messages over the cabin speaker. Press and hold the **SPKR** Key for two seconds to activate the passenger address. The **SPKR** Key Annunciator flashes about once per second when the passenger address is active. A Push-to-Talk (PTT) must be pressed to deliver PA announcements.

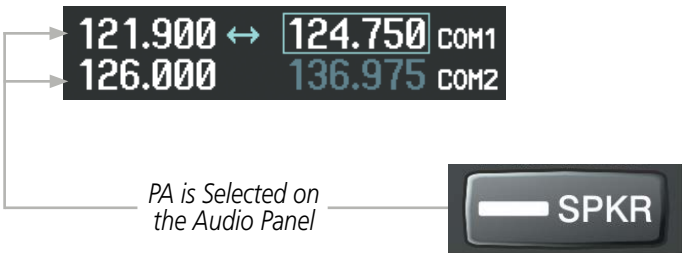


Figure 4-44 SPKR Key Selected for PA Announcements

CLEARANCE RECORDER AND PLAYER

The Audio Panel contains a digital clearance recorder that 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. Pressing the **PLAY** Key once plays the latest recorded memory block. Pressing the **PLAY** Key while audio is playing begins playing the previously recorded memory block. Each subsequent press of the **PLAY** Key selects the previously recorded memory block.

Pressing the **MKR/MUTE** Key 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.

Powering off the unit automatically clears all recorded blocks.



Figure 4-45 Play Key

SPLIT COM OPERATION

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.



Figure 4-46 Split COM Operation

ENTERTAINMENT INPUTS

NOTE: *Music1 and Music2 audio cannot be completely turned off. Audio level for the crew and passengers can be adjusted by a Garmin-authorized service center.*

The Audio Panel provides two stereo auxiliary entertainment inputs: Music1 and Music2. The pilot and copilot hear Music1 and the passengers hear Music2. These inputs are compatible with popular portable entertainment devices such as MP3 players. Two 3.5-mm stereo phone jacks can be installed in convenient locations for audio connection. The headphone outputs of the entertainment devices are plugged into the Music1 or Music2 jacks.

The current ICS state of isolation affects the distribution of the entertainment input (see Table 4-1).

CREW MUSIC

Crew music (Music1) can be heard by the pilot and copilot when both the PILOT and the COPLT ICS Annunciators are extinguished. Crew music can also be heard by the pilot when the COPLT Annunciator is illuminated and by the copilot when the PILOT Annunciator is illuminated.

Music Muting

Crew music muting occurs when aircraft radio or marker beacon activity is heard. Crew music is always soft muted when an interruption occurs from these sources. Soft muting is the gradual return of music to its original volume level. The time required for music volume to return to normal is between one-half and four seconds.

Music Muting Enable/Disable

Pressing and holding the **MKR/MUTE** Key for three seconds switches crew music 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. Crew music muting is reset (enabled) during power up.

PASSENGER MUSIC

Passenger music (Music2) can be heard only by the passengers and is never muted.

MULTIFUNCTION CONTROLS

The Pilot side volume knob controls the ON and OFF function, the pilot's intercom volume plus manual and automatic squelch. When pressed, manual squelch is selected and the MAN SQ LED is ON indicating that squelch is adjusted manually. When pressed again the MAN SQ LED turns OFF and squelch is automatic.

The Copilot side volume knob controls the Copilot and passenger intercom volume level. Pulling the right volume knob controls passenger volume, pushing in controls Copilot volume.



Pilot Volume, On/Off, and Manual Squelch



Copilot/Passenger Volume and Manual Squelch

Figure 4-47 Intercom Volume and Squelch Controls

The **MKR/MUTE** key selects marker audio and silences the marker signal. It also turns On/Off Music Muting, plus cancels the COM clearance recorder audio playback.



Figure 4-48 Marker/Mute Key

The **SPKR** key turns the cabin speaker ON and OFF. Pressing and holding for 2 seconds selects PA mode. The **SPKR** key annunciator blinks when PA is active.



Figure 4-49 Speaker Key

4.6 AUDIO PANEL 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 is activated, 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 avionics System, the following steps will 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 insure awareness of all audio levels in the Audio Panel and radios.

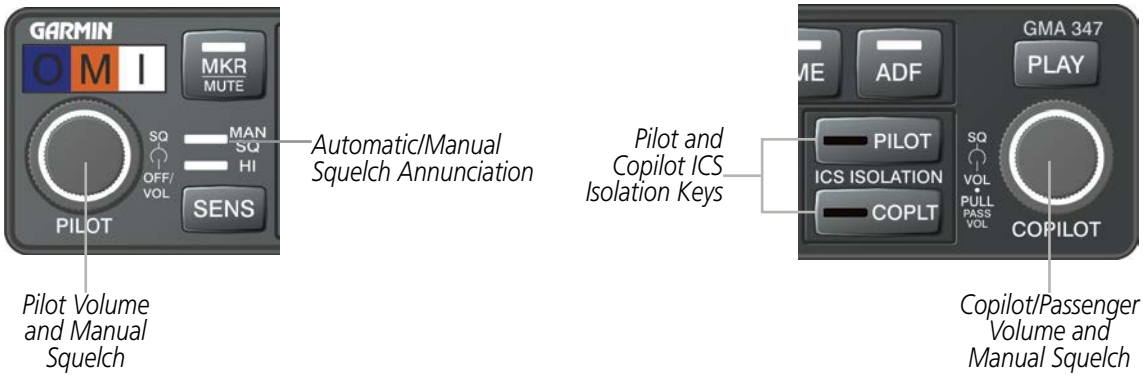


Figure 4-50 Audio Panel Preflight Controls

Setting the Audio Panel during preflight:

1) Verify that the PILOT and COPLT Annunciators are extinguished.
2) Verify that manual squelch is set to full open.
3) Turn the **PILOT** Knob and **COPILOT** Knob fully clockwise. This will set the headset intercom audio level to max volume (least amount of attenuation).
4) Adjust radio volume levels (COM, NAV, etc.) to a suitable level.
5) Adjust the **PILOT** Knob and **COPILOT** 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 G950 includes equipment failures of the G950 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 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.



Figure 4-51 Stuck Microphone Alert

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.



Figure 4-52 COM Tuning Failure

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 will not be available on the speaker.

PFD FAILURE (REVERSIONARY MODE)

The display backup button installed in the cockpit selects the Reversionary Mode. See the System Overview Section for more information on Reversionary Mode.

SECTION 5 FLIGHT MANAGEMENT

5.1 INTRODUCTION

The G950 is an integrated flight, engine, communication, navigation and surveillance system. This section of the Pilot's Guide explains flight management using the G950.

The most prominent part of the G950 are the 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. See examples in the Figure 5-1 and Figure 5-2. Detailed descriptions of flight management 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 service level (LNAV, LNAV+V, L/VNAV, LP, LP+V, or LPV), or Missed Approach (MAPR))

The Inset Map is a small version of the MFD 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 **INSET** Softkey. Pressing the **INSET** Softkey again, then pressing the **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 can be reduced by pressing the **DCLTR** Softkey. The Navigation Map can be oriented four different ways: North Up (NORTH UP), Track Up (TRK UP), Desired Track Up (DTK 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 500 feet to 2000 nm. The current range is indicated in the lower right corner of the map and represents the top-to-bottom distance covered by the 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.



Figure 5-1 GPS Navigation Information on the PFD

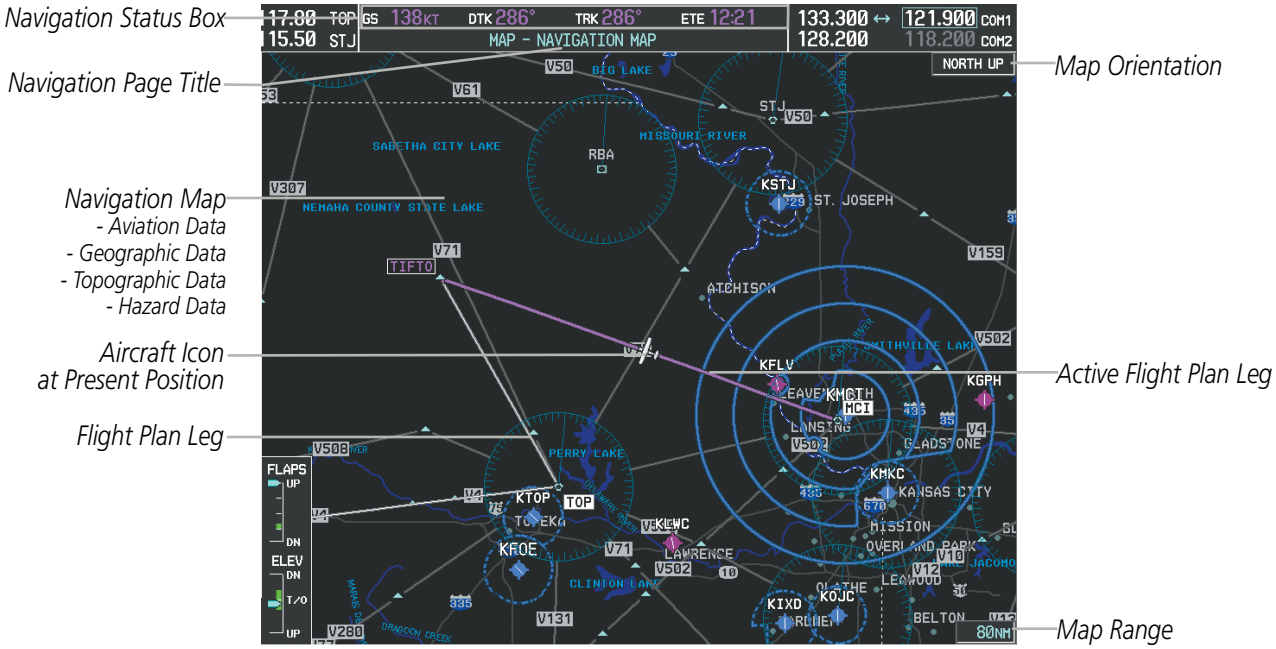


Figure 5-2 GPS Navigation Information on the MFD Navigation Page

NAVIGATION STATUS BOX

The Navigation Status Box located at the top of the PFD contains two fields displaying the following information:



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')

The symbols used in the PFD status bar are:

Symbol	Description	Symbol	Description
	Active Leg		Left Holding Pattern
	Direct-to		Vector to Final
	Right Procedure Turn		Right DME Arc
	Left Procedure Turn		Left DME Arc
	Right Holding Pattern		

The Navigation Status Box located at the top of the MFD contains four data fields, each displaying one of the following items:

- Bearing (BRG)
- Distance (DIS)
- Desired Track (DTK)
- Endurance (END)
- Enroute Safe Altitude (ESA)
- Estimated Time of Arrival (ETA)
- Estimated Time Enroute (ETE)
- Fuel on Board (FOB)
- Fuel over Destination (FOD)
- Ground Speed (GS)
- Minimum Safe Altitude (MSA)
- True Air Speed (TAS)
- Track Angle Error (TKE)
- Track (TRK)
- Vertical Speed Required (VSR)
- Crosstrack Error (XTK)



MFD Navigation Status Box

The navigation information displayed in the four data fields can be selected on the MFD Data Bar Fields Box on the AUX - System Setup Page. The default selections (in order left to right) are GS, DTK, TRK, and ETE.

Changing a field in the MFD Navigation Status Box:

1) Select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the desired field number in the MFD Data Bar Fields Box.
4) Turn the small **FMS** Knob to display and scroll through the data options list.
5) Select the desired data.
6) Press the **ENT** Key. Pressing the **DFLTS** Softkey returns any field to its default setting.

5.2 USING MAP DISPLAYS

Map displays are used extensively in the G950 to provide situational awareness in flight. Most G950 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)
- Nav range ring
- Fuel range ring
- Map Pointer information (distance and bearing to pointer, location of pointer, name, and other pertinent information)
- Flight plan legs
- User waypoints
- Track vector
- Topography scale
- Topography data
- Obstacle data

The information in this section applies to the following maps unless otherwise noted:

- All Map Group Pages (MAP)
- All Waypoint Group Pages (WPT)
- AUX - Trip Planning
- All Nearest Group Pages (NRST)
- Flight Plan Pages (FPL)
- Direct-to Window
- PFD Inset Map
- Procedure Loading Pages

MAP ORIENTATION

Maps are shown in one of four 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, desired track up, or heading up). The map orientation is shown in the upper right corner of the map.

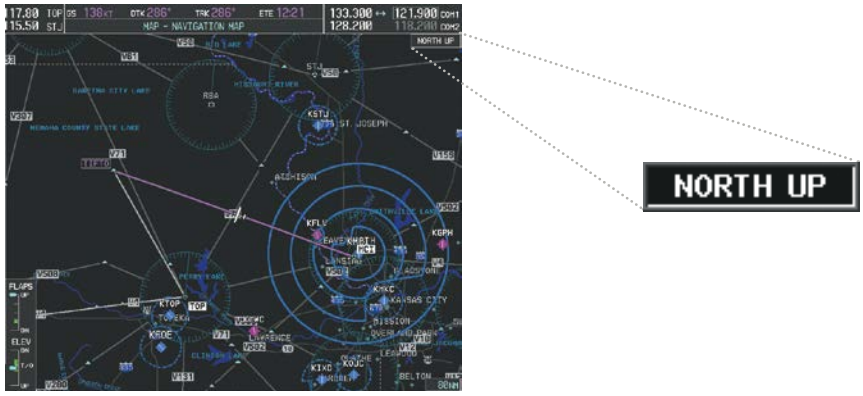


Figure 5-3 Map Orientation

- North up (NORTH UP) aligns the top of the map display to north (default setting).
- Track up (TRK UP) aligns the top of the map display to the current ground track.
- Desired track up (DTK UP) aligns the top of the map display to the desired course.
- Heading up (HDG UP) aligns the top of the map display to the current aircraft heading.

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 Setup' option.



Figure 5-4 Navigation Map Page Menu Window

2) Press the **ENT** Key to display the Map Setup Window.

3) Turn the large **FMS** Knob, or press the **ENT** Key once, to select the 'ORIENTATION' field.

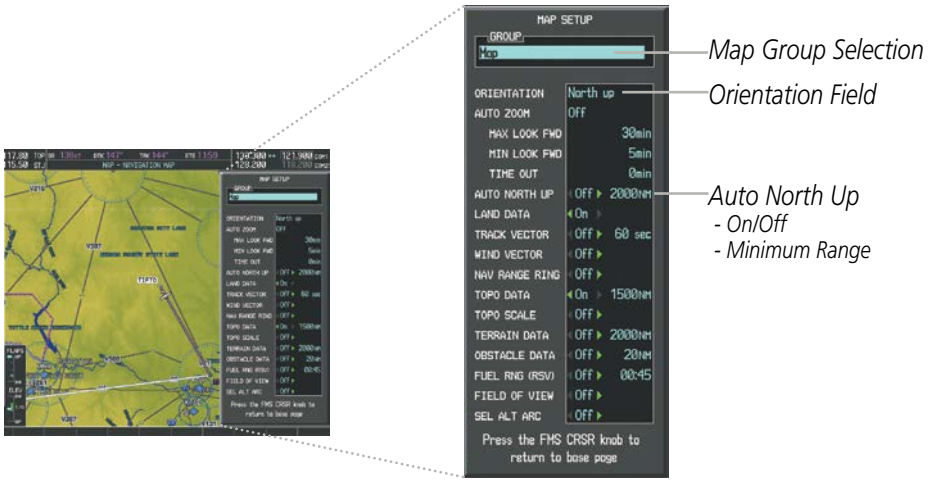


Figure 5-5 Map Setup Menu Window - Map Group

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.

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 Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group.
4) Press the **ENT** Key.
5) Highlight the 'AUTO NORTH UP' 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 500 feet to 2000 nm. The current range is indicated in the lower right corner of the map and represents the top-to-bottom distance covered by the map. When the map range is decreased to a point that exceeds the capability of the G950 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.

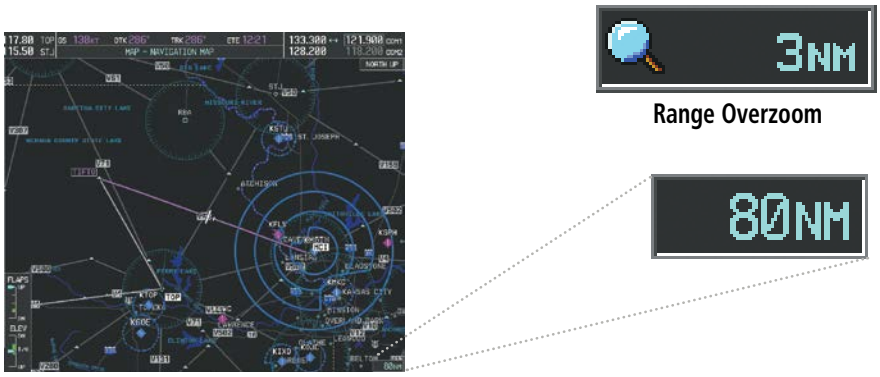


Figure 5-6 Map Range

AUTO ZOOM

Auto zoom allows the G950 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 Setup Window).

If a terrain caution or warning occurs, all navigation maps automatically adjust to the smallest map range clearly showing the potential impact points. If a new traffic advisory alert occurs, any map 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 navigation maps return 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(s) 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 Setup 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 Setup 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.

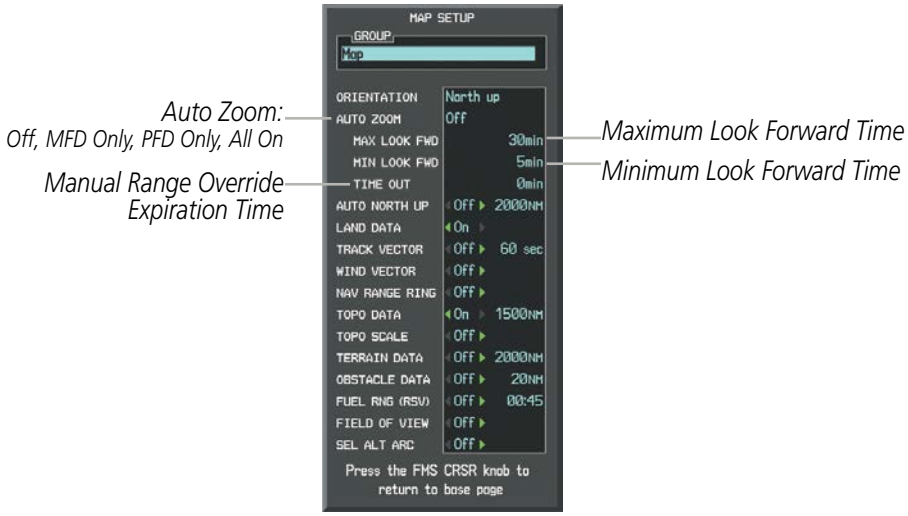


Figure 5-7 Map Setup Menu Window - Map Group, Auto Zoom

Configuring automatic zoom:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group.

4) Press the **ENT** Key.

5) Highlight the 'AUTO ZOOM' field.

6) Select 'Off', 'MFD Only', 'PFD Only', or 'ALL On'.

7) 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.

8) Use the **FMS** Knobs to set the time. Press the **ENT** Key.

9) Repeat step 8 for 'MIN LOOK FWD' (zero to 99 minutes) and 'MAX LOOK FWD' (zero to 999 minutes).

10) 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 pressing 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.



Figure 5-8 Navigation Map - Map Pointer Activated

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.*

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.

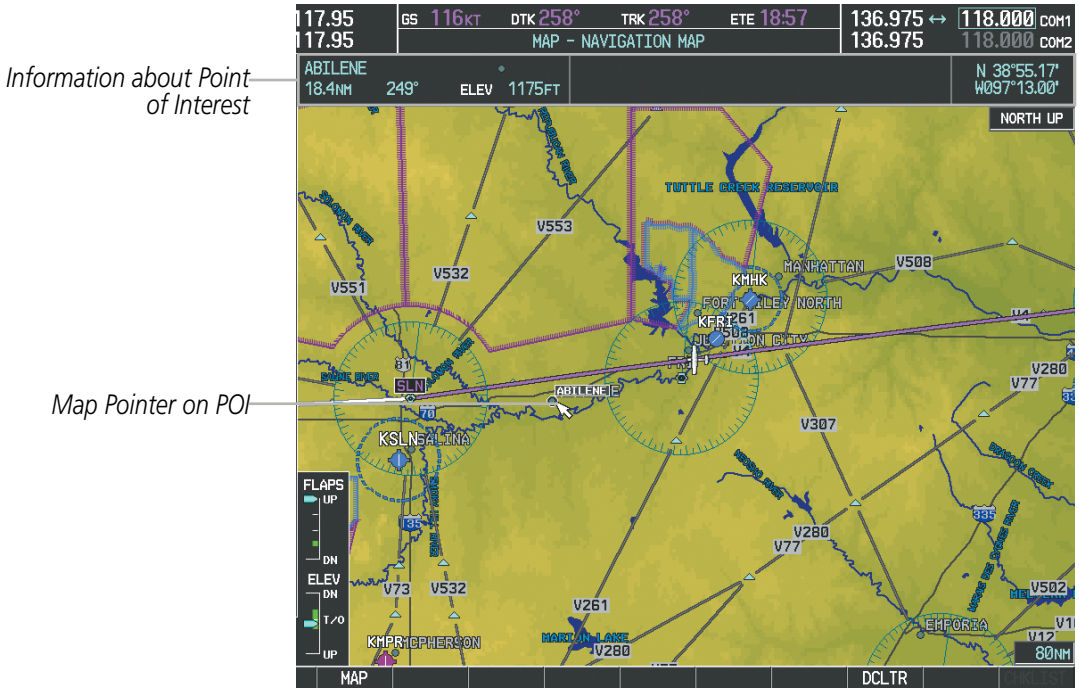


Figure 5-9 Navigation Map - Map Pointer on Point of Interest

When the Map Pointer crosses an airspace boundary, the boundary is highlighted and airspace information is shown at the top of the display. The information includes the name and class of airspace, the ceiling in feet above Mean Sea Level (MSL), and the floor in feet MSL.

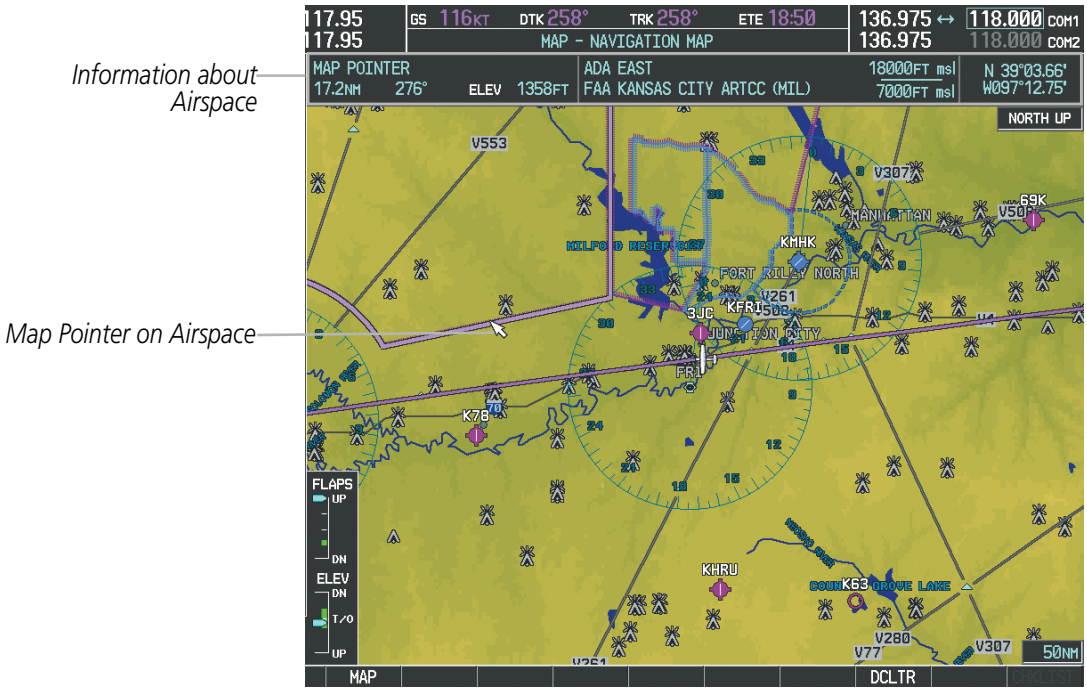


Figure 5-10 Navigation Map - Map Pointer on Airspace

Panning the map:

1) Press the **Joystick** to display the Map Pointer.
2) Move the **Joystick** to move the Map Pointer around the map.
3) Press the **Joystick** to remove the Map Pointer and recenter the map on the aircraft's current position.

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) Press 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.



Figure 5-11 Navigation Map - Information Window - NAVAID

Viewing airspace information for a special-use or controlled airspace:

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 Airspace?' 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.

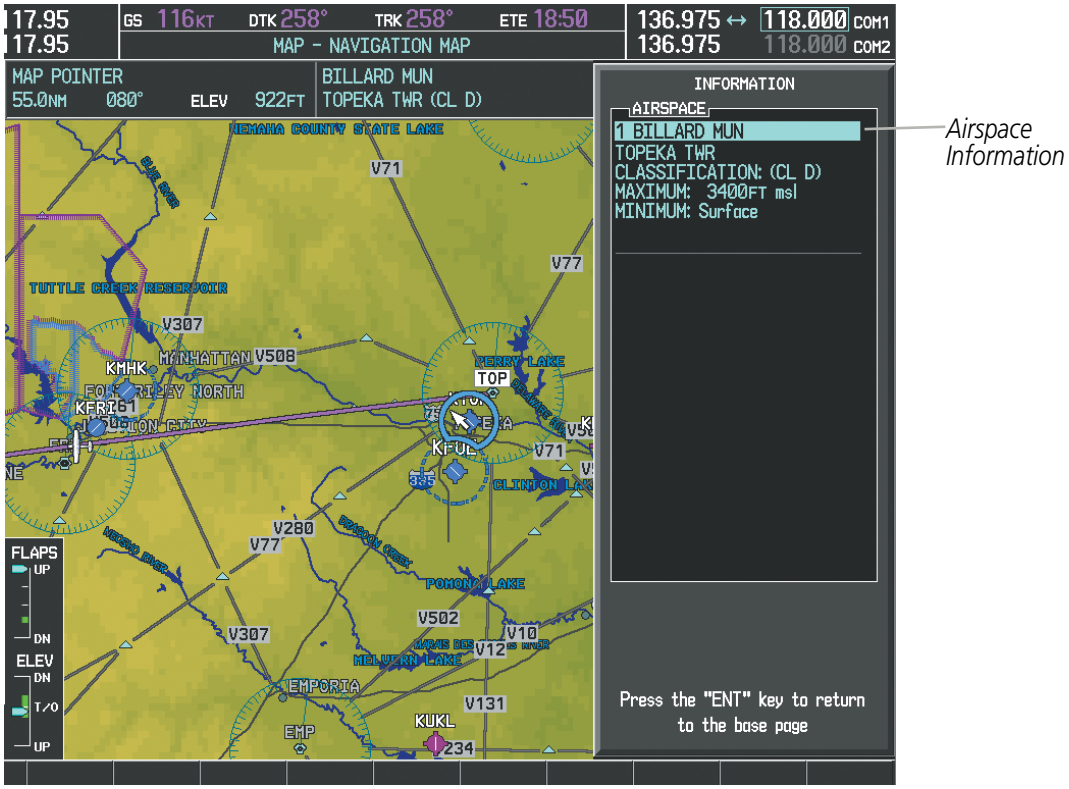


Figure 5-12 Navigation Map - Information Window - Airspace

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, press the **Joystick**; or select 'Stop Measuring' from the Page Menu and press the **ENT** Key.

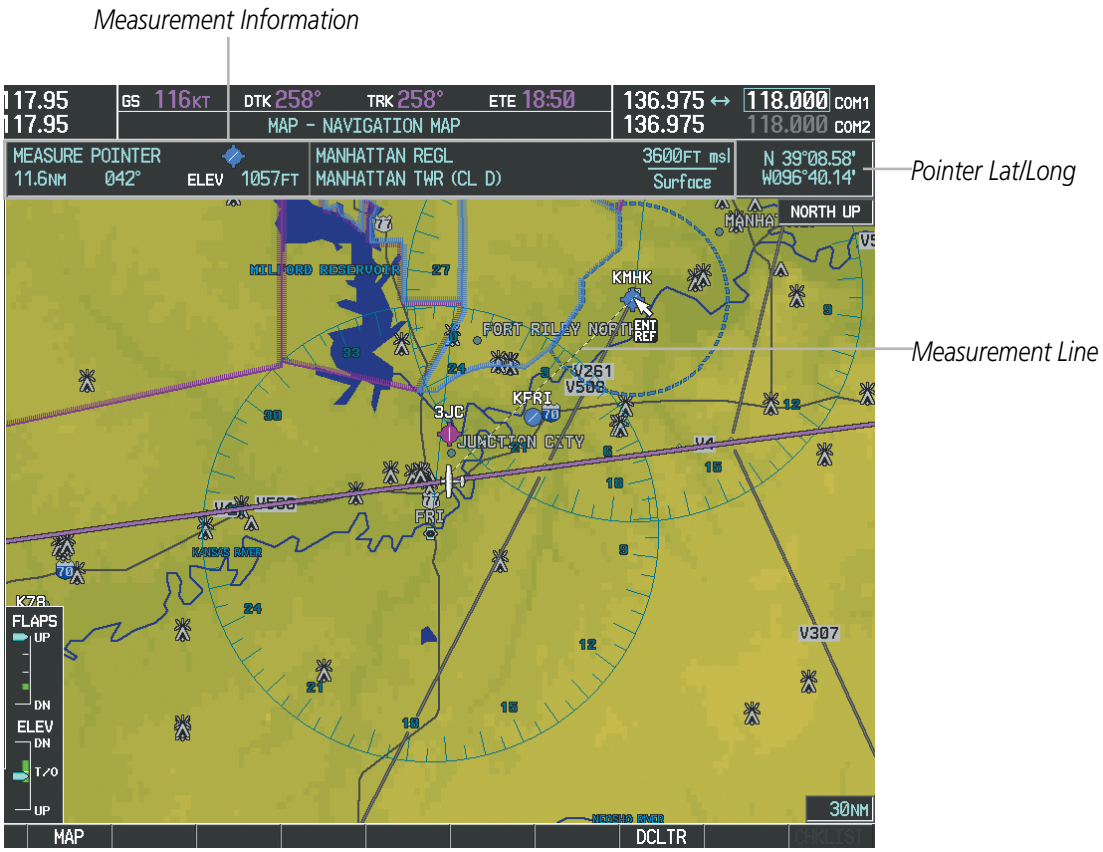


Figure 5-13 Navigation Map - Measuring Bearing and Distance

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.

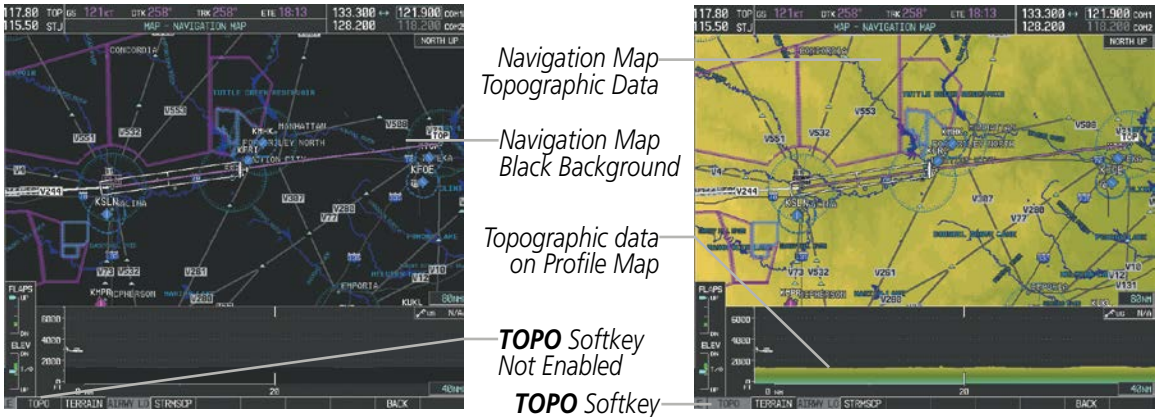


Figure 5-14 Navigation Map - Topographic Data

Displaying/removing topographic data on all pages displaying navigation maps:

1) Press the **MAP** Softkey (the **INSET** Softkey for the PFD Inset Map).
2) Press the **TOPO** Softkey.
3) Press the **TOPO** Softkey again 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.

Displaying/removing topographic data (TOPO DATA) using the Navigation Map Page Menu:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group.
4) Press the **ENT** Key.
5) Highlight the 'TOPO DATA' field.
6) Select 'On' or 'Off'.
7) Press the **FMS** Knob to return to the Navigation Map Page.

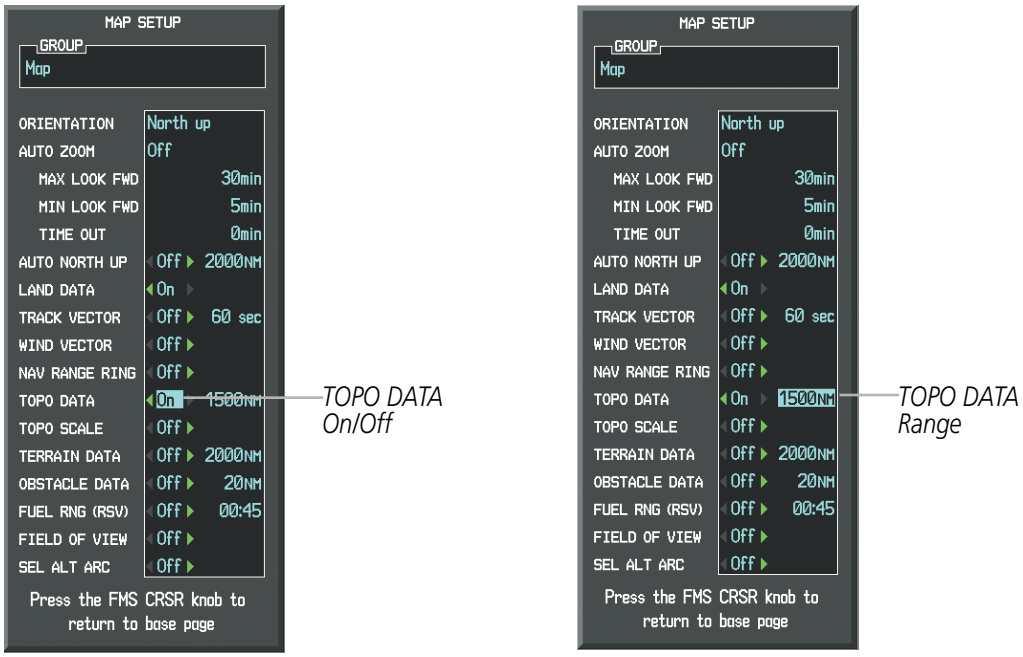


Figure 5-15 Navigation Map Setup Menu - TOPO DATA Setup

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 Setup 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 (TOPO DATA):

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group.
4) Press the **ENT** Key.
5) Highlight the 'TOPO DATA' range field. TOPO ranges are from 500 ft to 2000 nm.
6) To change the TOPO 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 current elevation values.

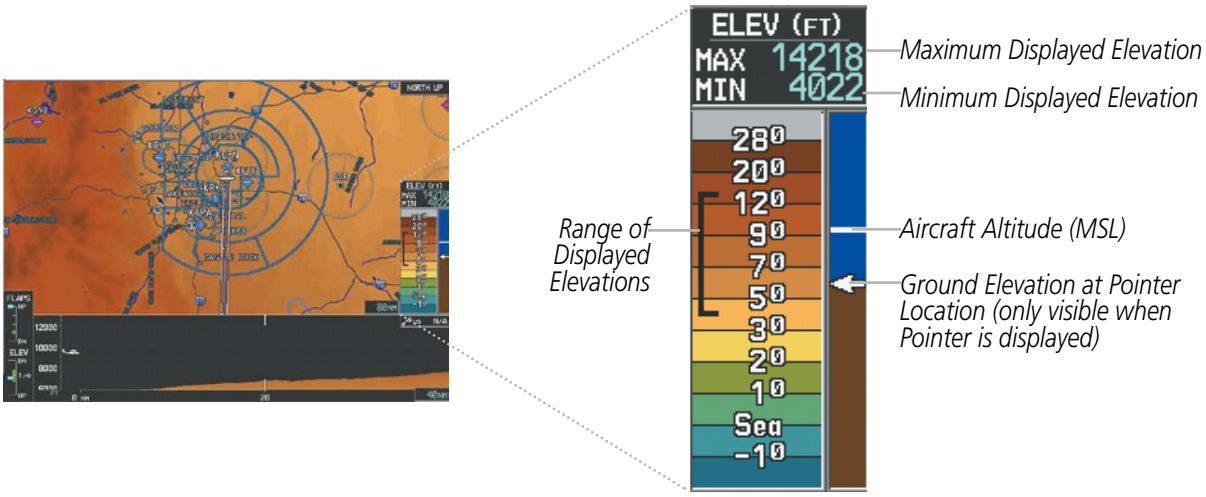


Figure 5-16 Navigation Map - TOPO SCALE

Displaying/removing the topographic scale (TOPO SCALE):

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group and press 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.

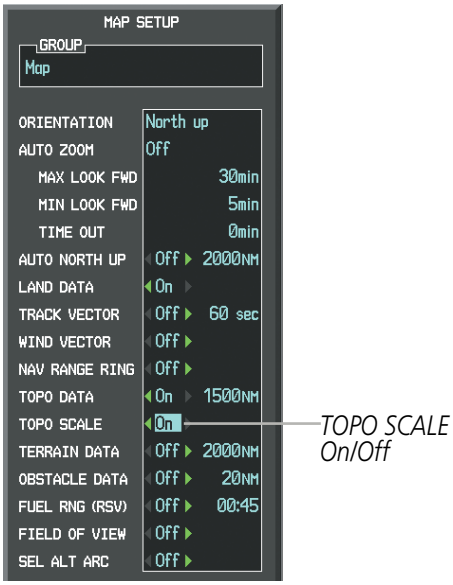


Figure 5-17 Navigation Map Setup Menu - TOPO SCALE Setup

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 **DCLTR** Softkey is also discussed.

LAND SYMBOLS

The following items are configured on the land menu:

Land Symbols *(Text label size can be None, Small, Medium (Med), or Large (Lrg)*	**Symbol**	**Default Range (nm)**	**Maximum Range (nm)**
Latitude/Longitude (LAT/LON)		Off	2000
Highways and Roads			
Interstate Highway (FREEWAY)		300	800
International Highway (FREEWAY)		300	800
US Highway (NATIONAL HWY)		30	80
State Highway (LOCAL HWY)		15	30
Local Road (LOCAL ROAD)	N/A	8	15
Railroads (RAILROAD)		15	30
LARGE CITY (> 200,000)		800	1500
MEDIUM CITY (> 50,000)		100	200
SMALL CITY (> 5,000)		20	50
States and Provinces (STATE/PROV)		800	1500
Rivers and Lakes (RIVER/LAKE)		200	500
USER WAYPOINT		150	300

Table 5-1 Land Symbol Information

AVIATION SYMBOLS

The following items are configured on the aviation menu:

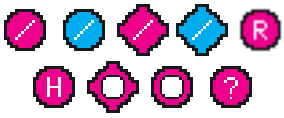
Aviation Symbols *(Text label size can be None, Small, Medium (Med), or Large (Lrg)*	**Symbol**	**Default Range (nm)**	**Maximum Range (nm)**
Active Flight Plan Leg (ACTIVE FPL)		2000	2000
Non-active Flight Plan Leg (ACTIVE FPL)		2000	2000
Active Flight Plan Waypoint (ACTIVE FPL WPT)	See Airports, NAVAIDs	2000	2000
Large Airports (LARGE APT) (Longest Runway ≥ 8100 ft)		250	500
Medium Airports (MEDIUM APT) (8100 ft > Longest Runway ≥ 5000 ft)		150	300
Small Airports (SMALL APT) (Longest Runway < 5000 ft) (Medium Airport if it has a tower frequency)		50	100
Taxiways (SAFETAXI)	See Additional Features	3	20
Runway Extension (RWY EXTENSION)	N/A	Off	100
Intersection (INT WAYPOINT)		15	30
Non-directional Beacon (NDB WAYPOINT)		15	30
VOR (VOR WAYPOINT)		150	300
Class B Airspace/TMA (CLASS B/TMA)		200	500
Class C Airspace/TCA (CLASS C/TCA)		200	500
Class D Airspace (CLASS D)		150	300
Restricted Area (RESTRICTED)		200	500
Military Operations Area [MOA(MILITARY)]		200	500
Other/Air Defense Interdiction Zone (OTHER/ADIZ)		200	500
Temporary Flight Restriction (TFR)		500	2000

Table 5-2 Aviation Symbol Information

SYMBOL SETUP

All pages with maps can display land symbols (roads, lakes, borders, etc). Land symbols can be removed totally (turned off).

Displaying/removing all land symbols:

1) Press the **MENU** Key with the Navigation Map Page displayed. The Page Menu is displayed and the cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Group Menu is displayed and the cursor flashes on the 'Map' option.
3) Highlight the 'LAND DATA' field.
4) Select 'On' or 'Off.'
5) Press the **FMS** Knob to return to the Navigation Map Page.

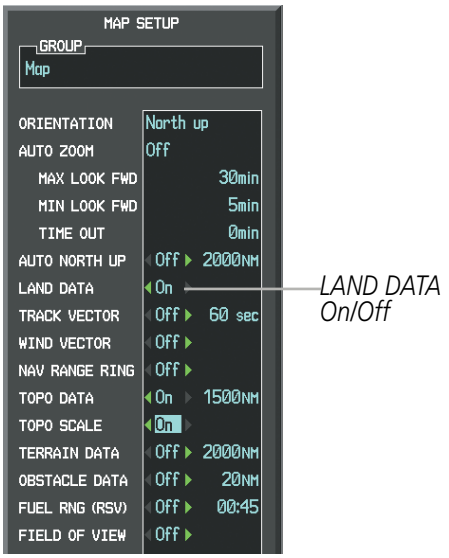


Figure 5-18 Navigation Map Setup Menu - LAND DATA Setup

The label size (TEXT) sets the size at which labels appear on the display (none, small, medium, and large). The range (RNG) sets the maximum range at which items appear on the display.

Selecting a 'Land' or 'Aviation' group item text size and range:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Land' or 'Aviation' group.
4) Press the **ENT** Key. The cursor flashes on the first field.
5) Select the desired land option.
6) Select the desired text size.
7) Press the **ENT** Key to accept the selected size.

8) Select the desired range.

9) Press the **ENT** Key to accept the selected range.

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

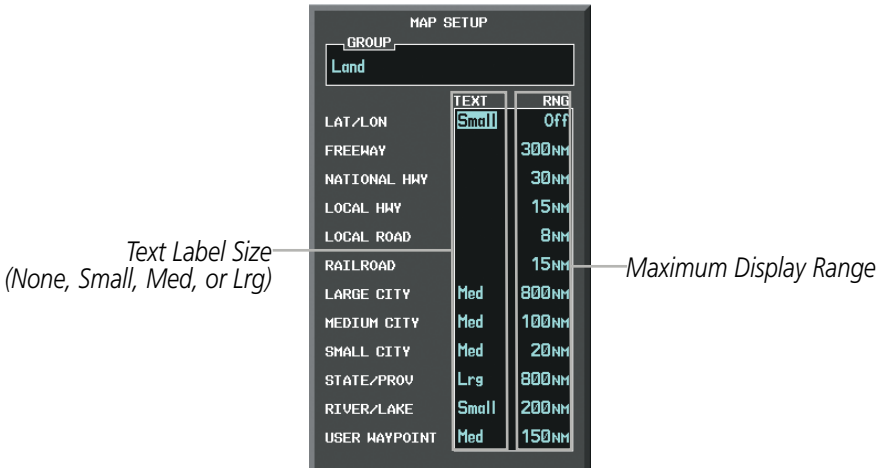


Figure 5-19 Navigation Map Setup Menu - LAND GROUP Setup

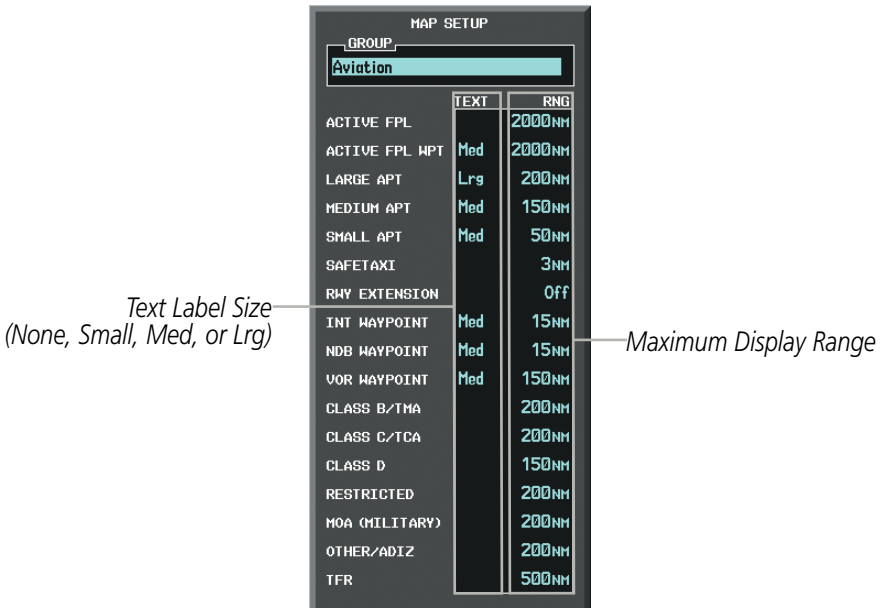
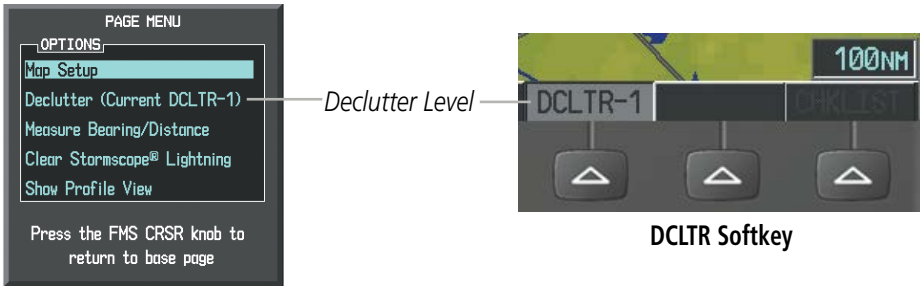


Figure 5-20 Navigation Map Setup Menu - AVIATION GROUP Setup

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 Setup 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).*

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 **DCLTR** Softkey and next to the Declutter Menu Option.



Navigation Map Page Menu

DCLTR Softkey

Figure 5-21 Navigation Map - Declutter Level Indications

Decluttering the map:

Press the **DCLTR** 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 **INSET** Softkey.
2) Press the **DCLTR** Softkey. The current declutter level is shown. With each selection, another level of map information is removed.

Table 5-3 lists the items that are decluttered at each map detail level. The 'X' represents map items decluttered for each level of detail.

Item	Declutter-1	Declutter-2	Declutter-3
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 5-3 Navigation Map Items Decluttered for each Detail Level

AIRWAYS

Low Altitude Airways (or Victor Airways) primarily serve smaller piston-engine, propeller-driven airplanes on shorter routes and at lower altitudes. Airways are eight nautical miles wide and start 1,200 feet above ground level (AGL) and extend up to but not including 18,000 feet mean sea level (MSL). Low Altitude Airways are designated with a "V" before the airway number (hence the name "Victor Airways") since they run primarily between VORs.

High Altitude Airways (or Jet Routes) primarily serve airliners, jets, turboprops, and turbocharged piston aircraft operating above 18,000 feet MSL. Jet Routes start at 18,000 feet MSL and extend upward to 45,000 feet MSL (altitudes above 18,000 feet are called "flight levels" and are described as FL450 for 45,000 feet MSL). Jet Routes are designated with a "J" before the route 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 5-22 Airways on MFD Navigation Page

Airways may be displayed on the map at the pilot's discretion using either a combination of **AIRWAY** Softkey presses, 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) Press the **MAP** Softkey.
2) Press the **AIRWAYS** Softkey. Both High and Low Altitude Airways are displayed.
3) Press the **s**oftkey again to display Low Altitude Airways only.
4) Press the **s**oftkey again to display High Altitude Airways only.
5) Press the **s**oftkey again to remove High Altitude Airways. No airways are displayed.

Or:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Turn the small **FMS** Knob to select the 'Airways' group, and press the **ENT** Key.
4) Turn the large **FMS** Knob to highlight the 'AIRWAYS' field.
5) Turn the **FMS** Knob to select 'Off', 'All', 'LO Only', or 'HI Only', and press the **ENT** Key.
6) Press the **FMS** Knob to return to the Navigation Map Page.

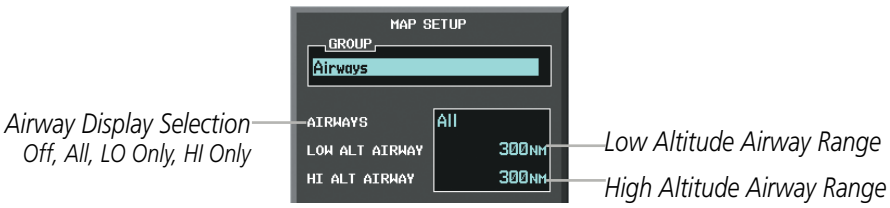


Figure 5-23 Navigation Map Setup Menu - AIRWAYS Setup

The airway range is the maximum map range on which airways are displayed.

Selecting an airway range (LOW ALT AIRWAY or HI ALT AIRWAY):

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Turn the small **FMS** Knob to select the 'Airways' group.
4) Press the **ENT** Key.
5) Highlight the 'LOW ALT AIRWAY' or 'HI ALT AIRWAY' range field.
6) To change the 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.

The following range items are configurable on the airways menu:

Airway Type	Symbol	Default Range (nm)	Maximum Range (nm)
Low Altitude Airway (LOW ALT AIRWAY)		200	500
High Altitude Airway (HI ALT AIRWAY)		300	500

Table 5-4 Airway Range Information

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.

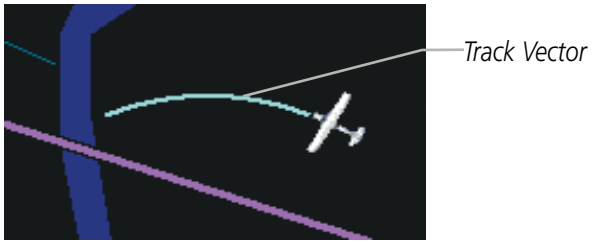


Figure 5-24 Navigation Map -Track Vector

Displaying/removing the track vector:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group.
4) Press the **ENT** Key.
5) Highlight the 'TRACK VECTOR' field.
6) Select 'On' or 'Off'. Press the **ENT** Key to accept the selected option. The flashing cursor highlights the look ahead time field. Use the **FMS** Knob to select the desired time. Press the **ENT** Key.
7) Press the **FMS** Knob to return to the Navigation Map Page.

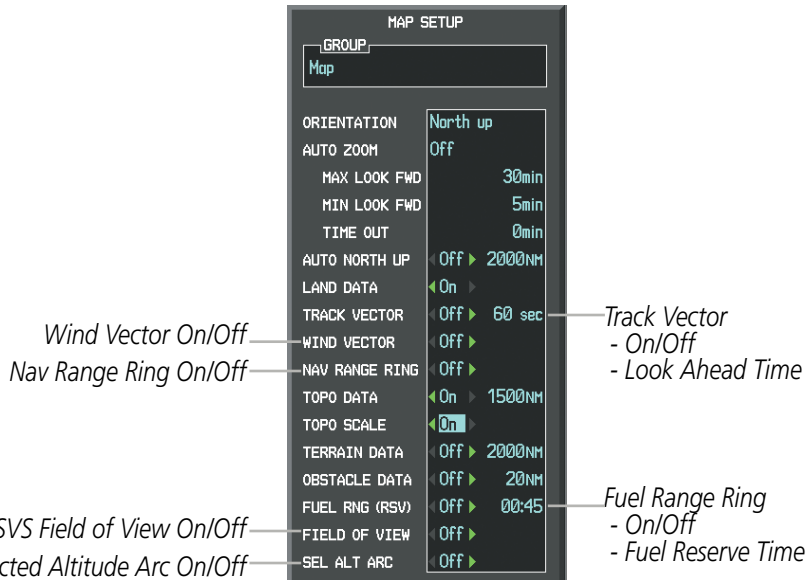


Figure 5-25 Navigation Map Setup Menu - WIND VECTOR On/Off, NAV RANGE RING On/Off, FIELD OF VIEW On/Off, SEL ALT ARC On/Off, TRACK VECTOR Setup, FUEL RNG (RSV) Setup

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.



Figure 5-26 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.*

Displaying/removing the wind vector:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group.
4) Press the **ENT** Key.
5) Highlight the 'WIND VECTOR' field.
6) Select 'On' or 'Off'.
7) Press the **FMS** Knob to return to the Navigation Map Page.

NAV RANGE RING

The Nav Range Ring shows the direction of travel (ground track) on a rotating compass card. The range is determined by the map range. The range is 1/4 of the map range (e.g., 37.5 nm on a 150 nm map).

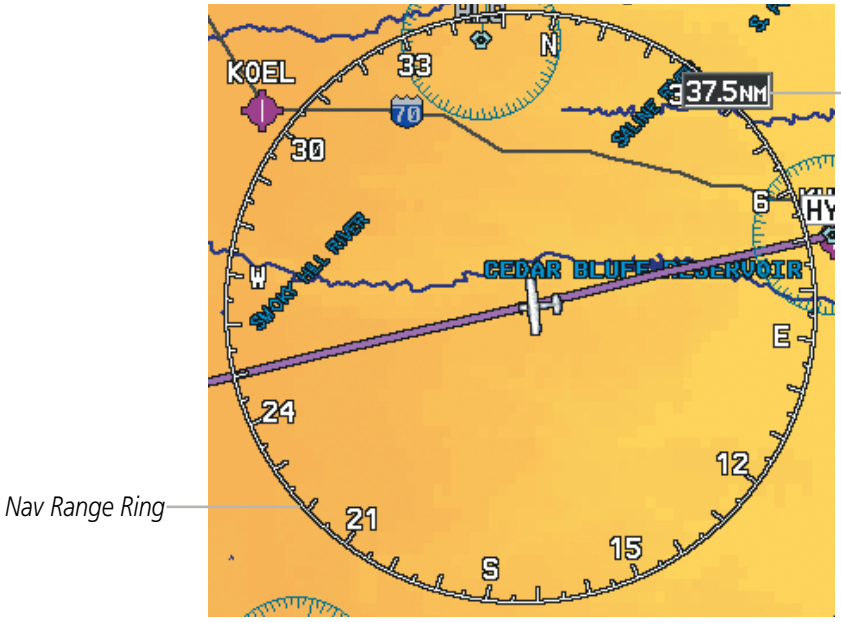


Figure 5-27 Navigation Map - Nav Range Ring

NOTE: *The Nav Range Ring is not displayed on the Waypoint Information pages, Nearest pages, or Direct-to Window map.*

Displaying/removing the Nav Range Ring:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group.
4) Press the **ENT** Key.
5) Highlight the 'NAV RANGE RING' field.
6) Select 'On' or 'Off'.
7) Press the **FMS** Knob to return to the Navigation Map Page.

NOTE: *The Nav Range Ring is referenced to either magnetic or true north, based on the selection on the AUX - System Setup Page.*

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 yellow circle.

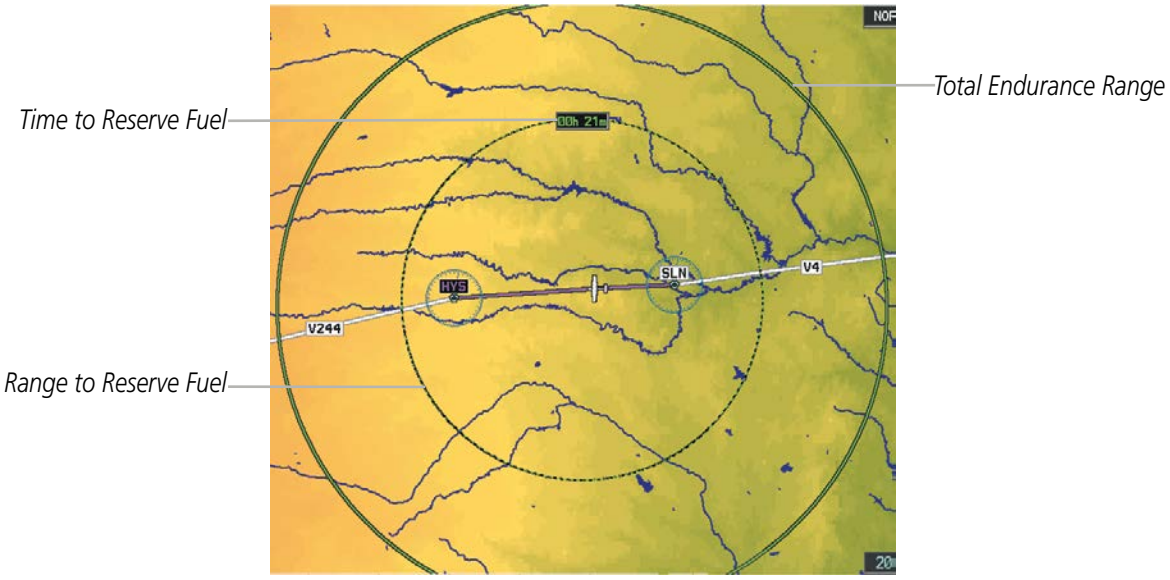


Figure 5-28 Navigation Map - Fuel Range Ring

Displaying/removing the fuel range ring and selecting a fuel range time:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group.
4) Press the **ENT** Key.
5) Highlight the 'FUEL RNG (RSV)' field.
6) Select 'On' or 'Off'.
7) Highlight the fuel reserve time field. This time should be set to the amount of flight time equal to the amount of fuel reserve desired.
8) To change the reserve fuel time, enter a time (00:00 to 23:59; hours:minutes). The default setting is 00:45 minutes.
9) Press the **ENT** Key.
10) Press the **FMS** Knob to return to the Navigation Map Page.

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.

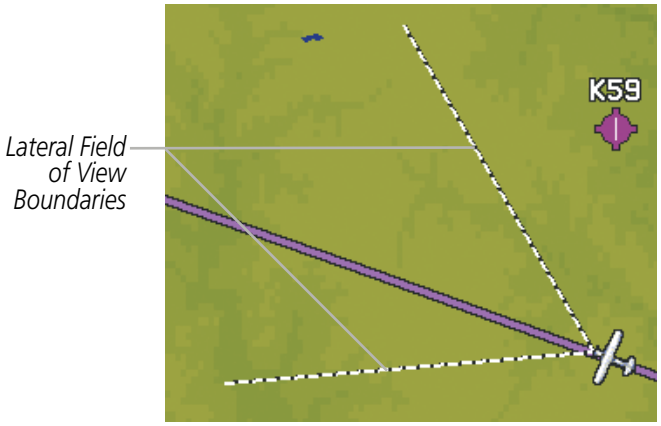


Figure 5-29 Navigation Map - Field of View

Displaying/removing the field of view:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group.
4) Press the **ENT** Key.
5) Highlight the 'FIELD OF VIEW' field.
6) Select 'On' or 'Off'.
7) 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 actuallly climbing or descending.

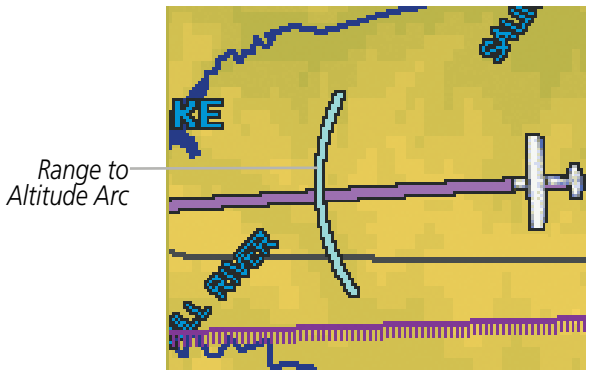


Figure 5-30 Navigation Map - Range to Altitude Arc

Displaying/removing the selected altitude intercept arc:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group.
4) Press the **ENT** Key.
5) Highlight the 'SEL ALT ARC' field.
6) Select 'On' or 'Off'.
7) Press the FMS Knob to return to the Navigation Map Page.

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 CNS and Audio Panel 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 G950. As a waypoint identifier, facility name, or location is entered, the G950's 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.

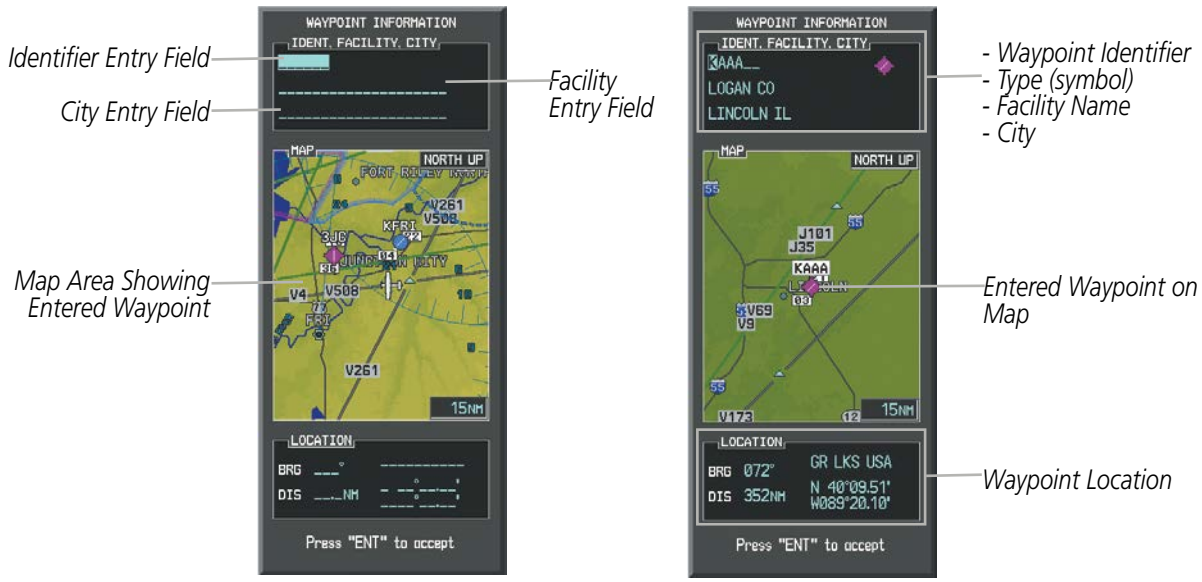


Figure 5-31 Waypoint Information Window

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.



Figure 5-32 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 **INFO-1** is displayed.

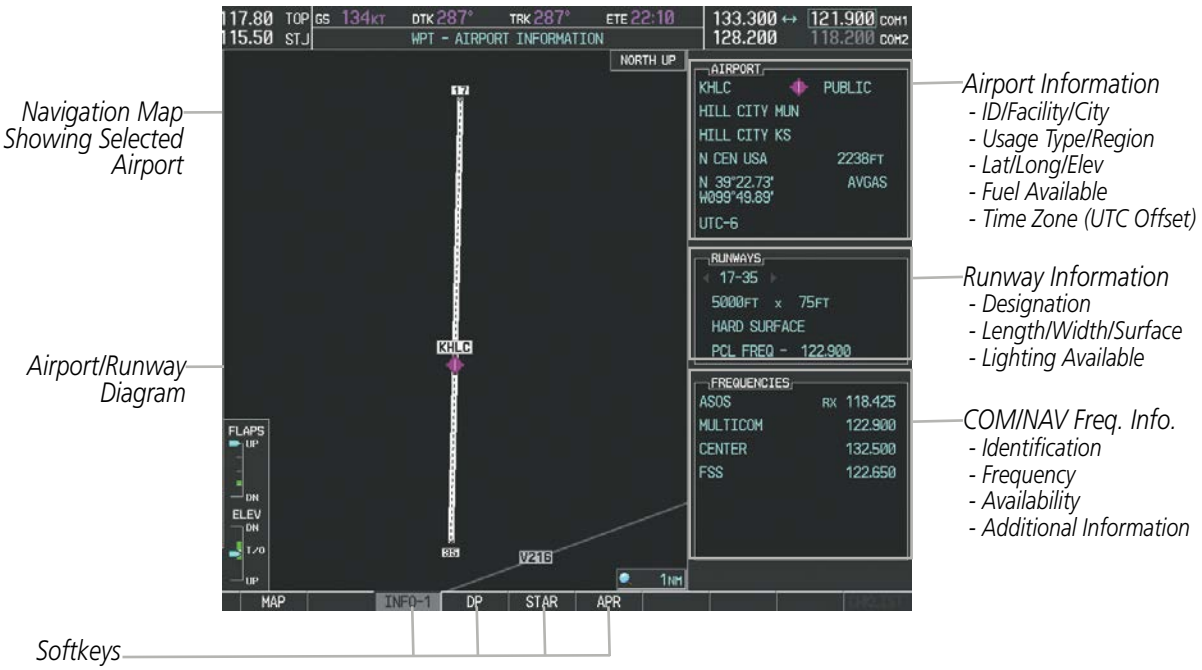


Figure 5-33 Airport Information Page

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)

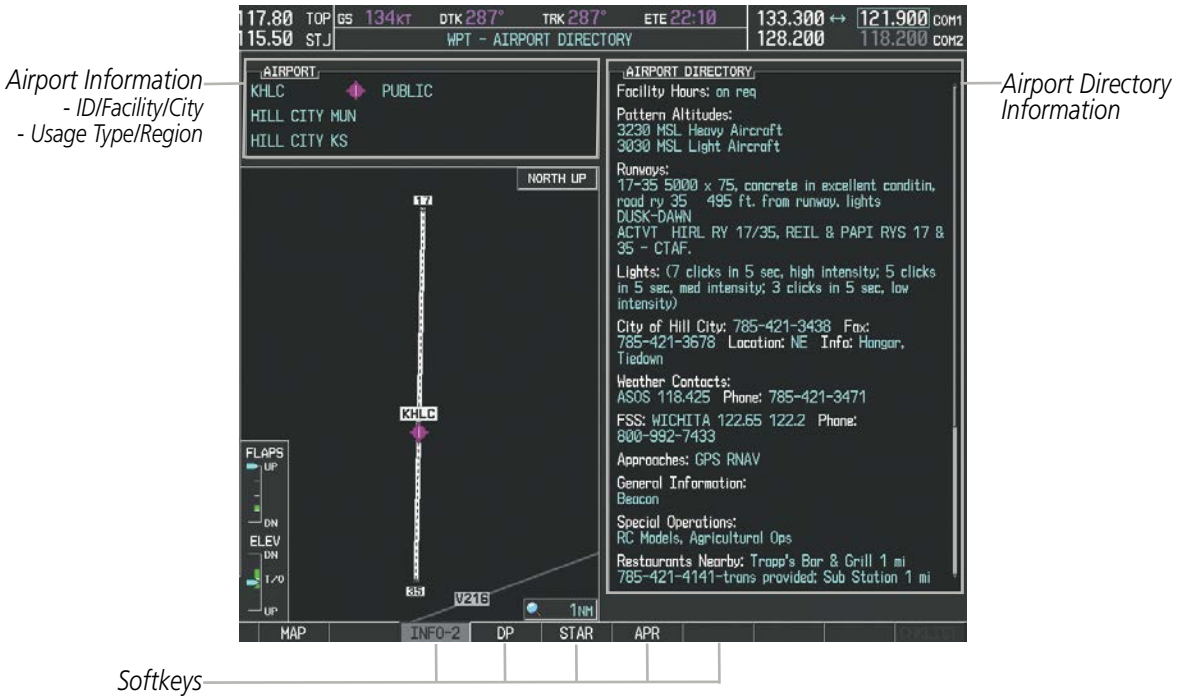


Figure 5-34 Airport Directory Page Example

The airport directory information is viewed on the Airport Directory Page by pressing the INFO softkey until **INFO-2** is displayed. The following are types of airport directory informantion 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

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 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.

View 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 5-5 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.

The G950 provides a **NRST** Softkey on the PFD, which gives the pilot quick access to nearest airport information (very useful if an immediate need to land is required). The Nearest Airports Window displays a list of the 25 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.

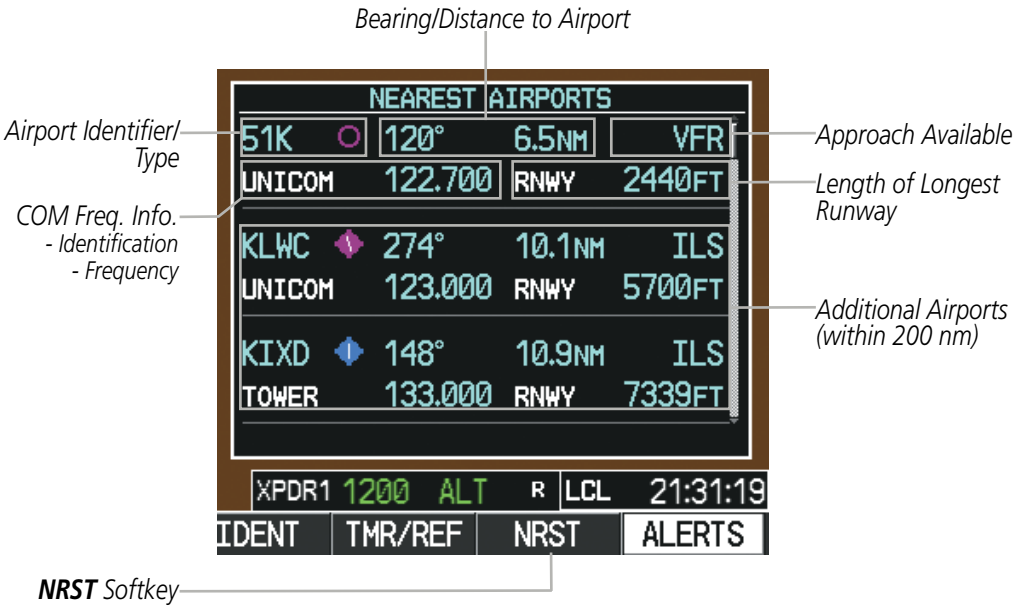


Figure 5-35 Nearest Airports Window on PFD

Pressing the **ENT** Key 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.

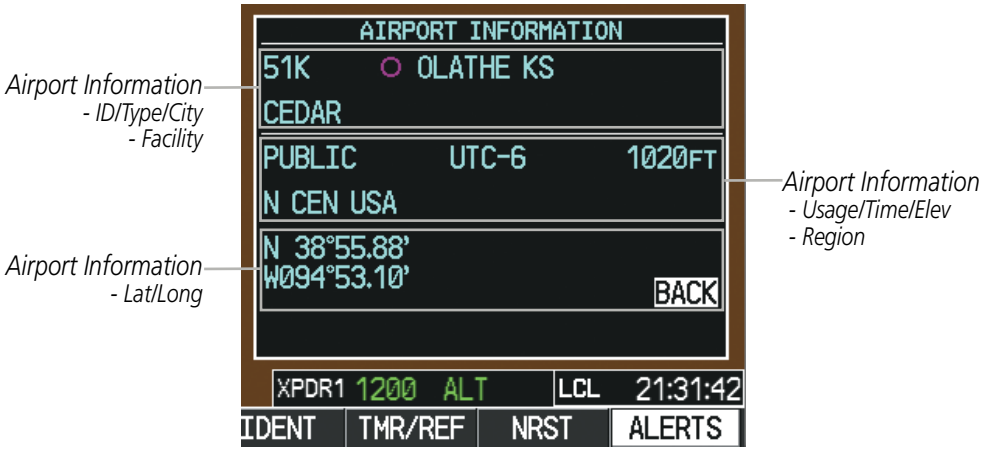


Figure 5-36 Airport Information Window on PFD

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 three 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.

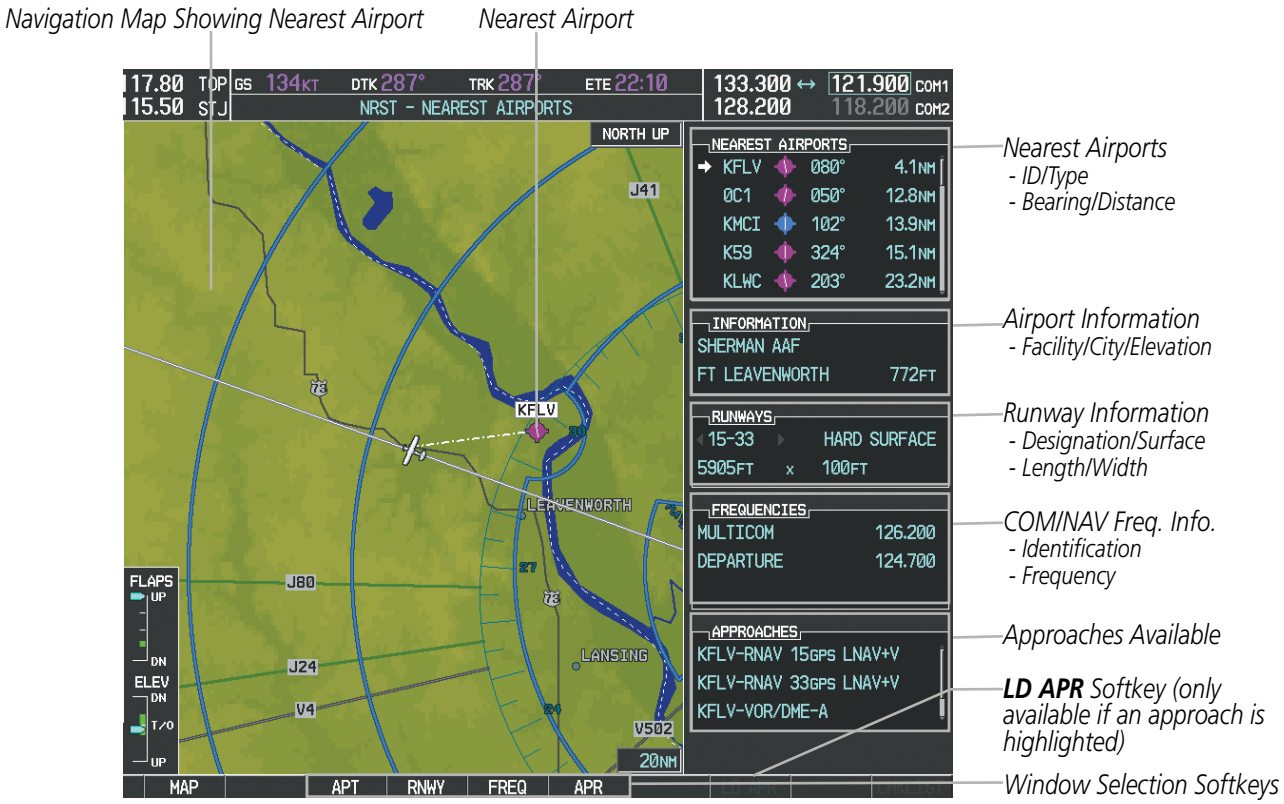


Figure 5-37 Nearest Airport Page

Viewing information for a nearest airport on the PFD:

1) Press the **NRST** Softkey to display the Nearest Airports Window. Press the **FMS** Knob to activate the cursor.
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 **NRST** Softkey to close the PFD Nearest Airports Window.

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 200 NM" is displayed.
3) Press 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, press 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 0 feet (or meters) for runway length and "HARD/SOFT" for runway surface type.

Selecting nearest airport surface matching criteria:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the runway surface field in the Nearest Airports Box.
4) Turn the small **FMS** Knob to select the desired runway option (ANY, HARD ONLY, HARD/SOFT, WATER).
5) Press the **ENT** Key.
6) Press the **FMS** Knob to remove the flashing cursor.

Selecting nearest airport minimum runway length matching criteria:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the minimum length field in the Nearest Airport Box.
4) Use the **FMS** Knob to enter the minimum runway length (zero to 25,000 feet) and press the **ENT** Key.
5) Press the **FMS** Knob to remove the flashing cursor.

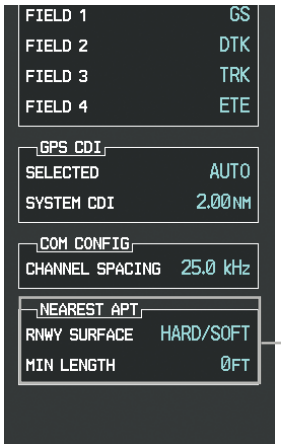


Figure 5-38 System Setup Page - Nearest Airport Selection Criteria

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'.

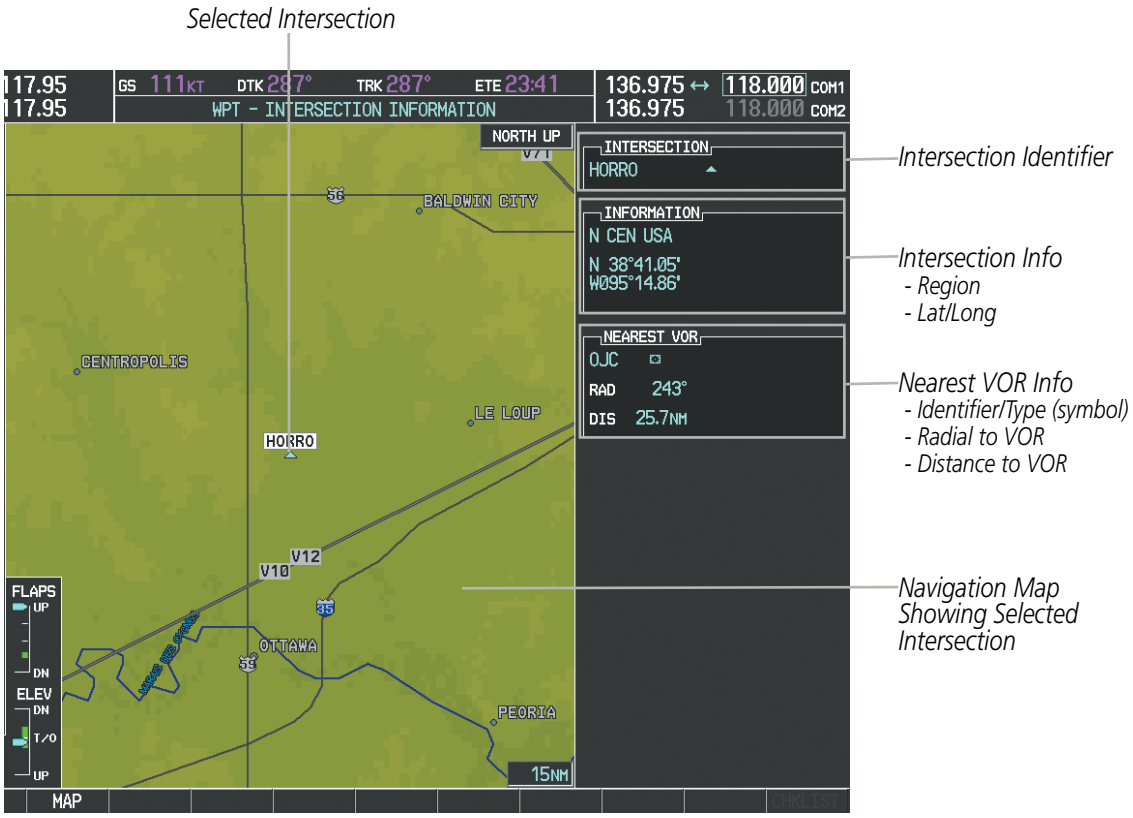


Figure 5-39 Intersection Information Page

Select 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 eleven 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.*

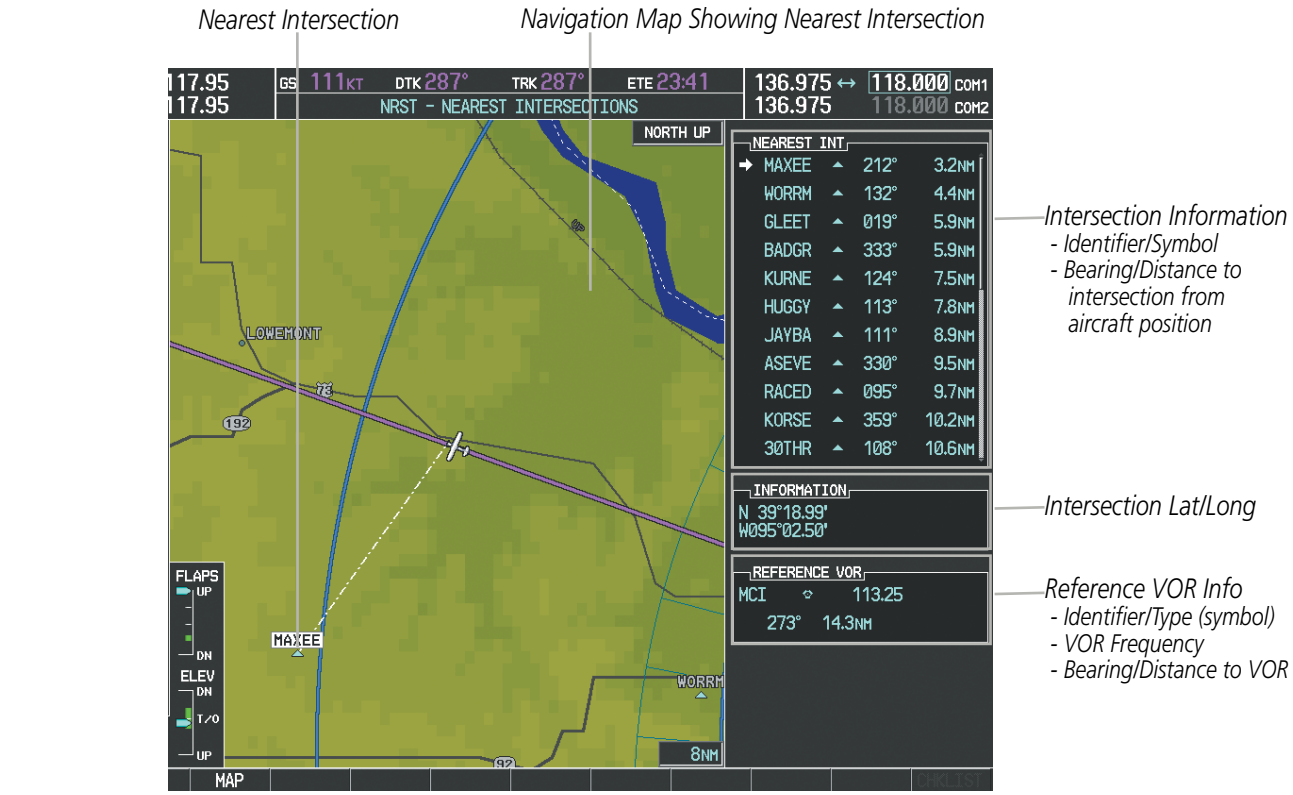


Figure 5-40 Nearest Intersections Page

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.

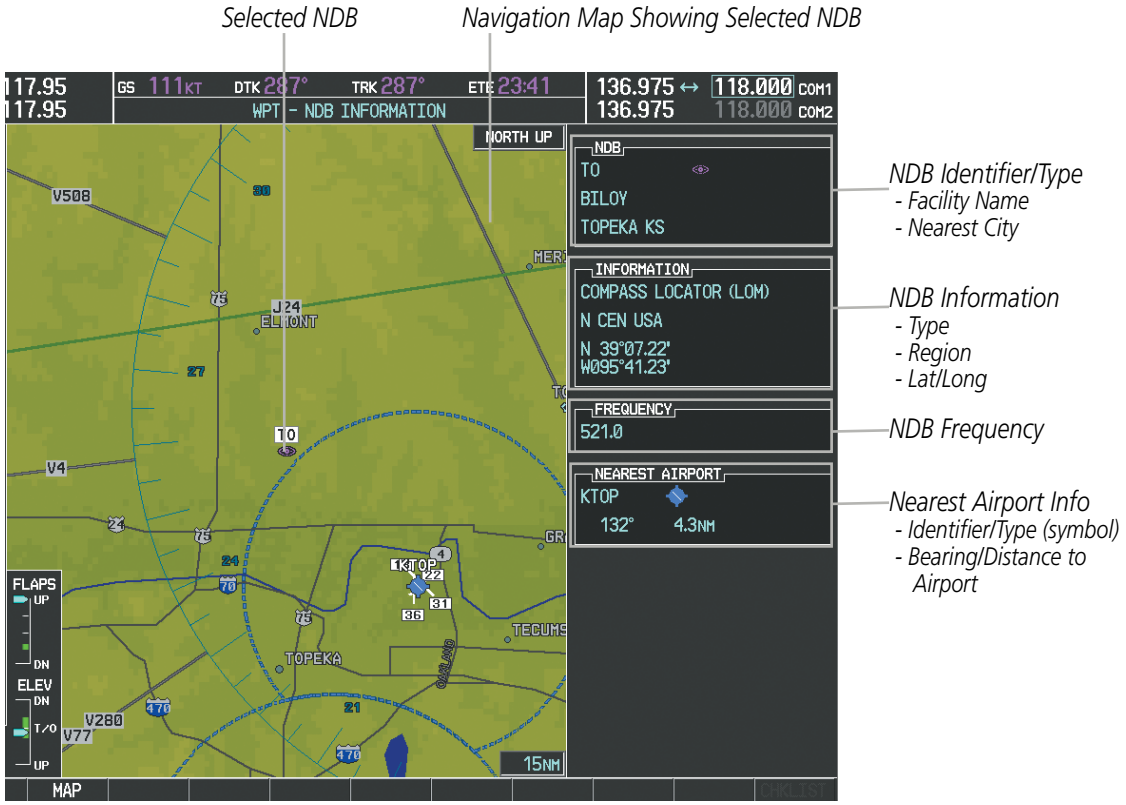


Figure 5-41 NDB Information Page

NOTE: *Compass locator (LOM): 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.*

Select 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.

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 eleven 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.

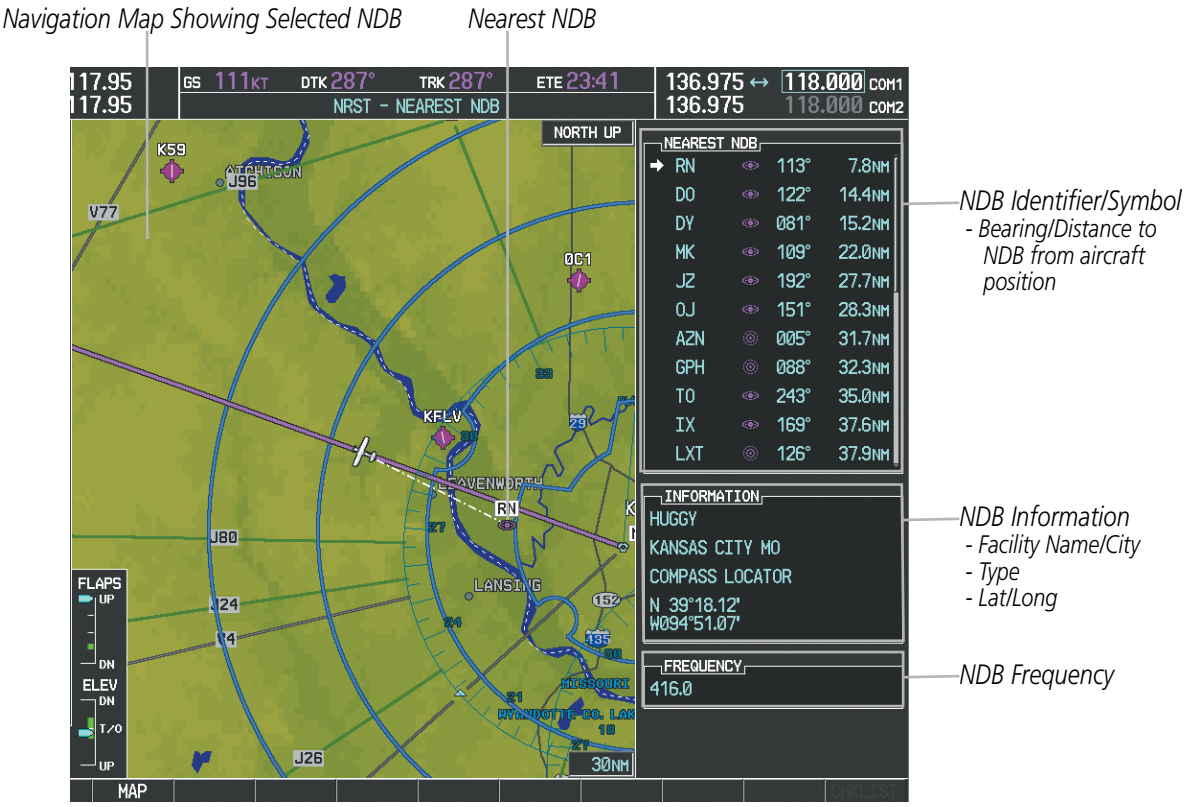


Figure 5-42 Nearest NDB Page

VORs

The VOR Information Page can be used to view information about VOR and ILS signals (since ILS signals can be received on a NAV receiver), 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's 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'.

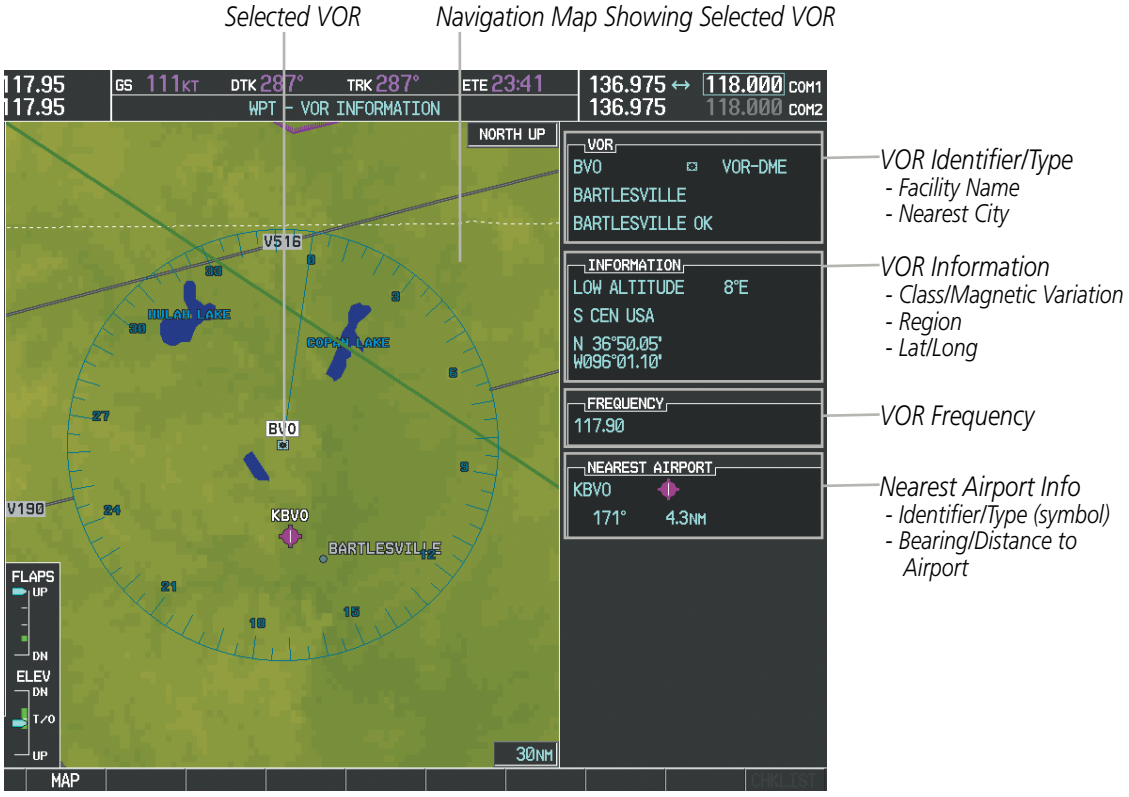


Figure 5-43 VOR Information Page

The VOR classes used in the VOR information box are: LOW ALTITUDE, HIGH ALTITUDE, and TERMINAL

Select 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:

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 eleven 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.

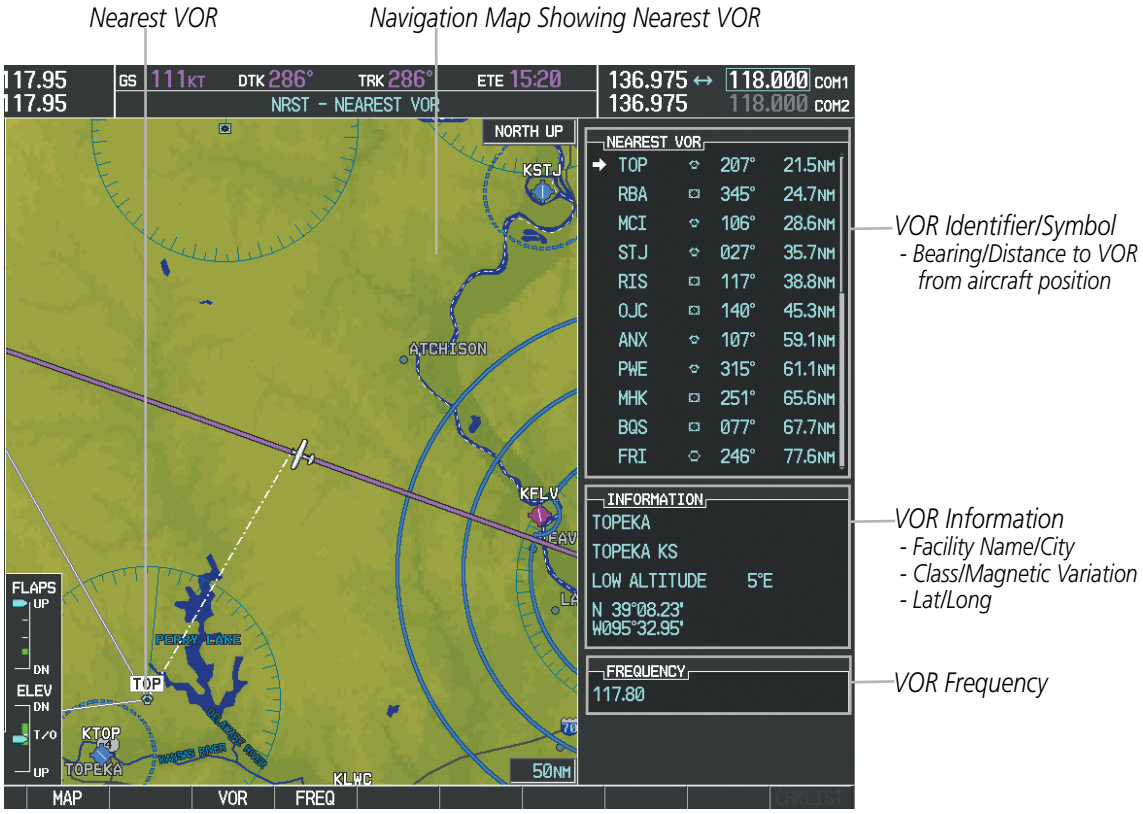


Figure 5-44 Nearest VOR Page

USER WAYPOINTS

The G950 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 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 5-45 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 Waypoint Page displayed, press the **FMS** Knob
2) Press the **ENT** Key or turn either **FMS** Knob to select an identifier in the Nearest USR Box.
3) Press the FMS Knob to remove the flashing cursor.

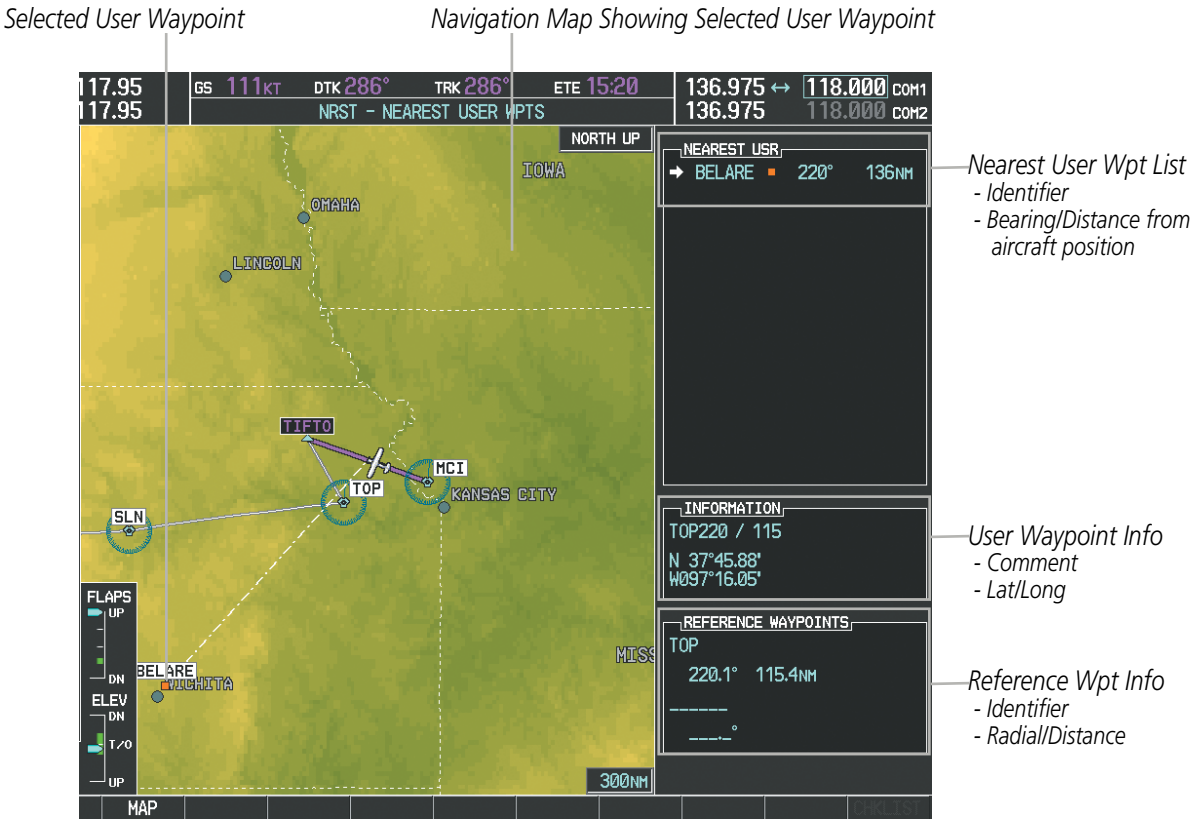


Figure 5-46 Nearest User Waypoint Page

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) Press 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:

   a) 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:

   b) 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:

   c) 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" or "NORMAL" by moving the cursor to "TEMPORARY" and pressing the **ENT** Key to check or uncheck 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:

a) 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:

b) 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:

c) 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" or "NORMAL" by moving the cursor to "TEMPORARY" and pressing the **ENT** Key to check or uncheck the box.

8) Press the **FMS** Knob to remove the flashing cursor.

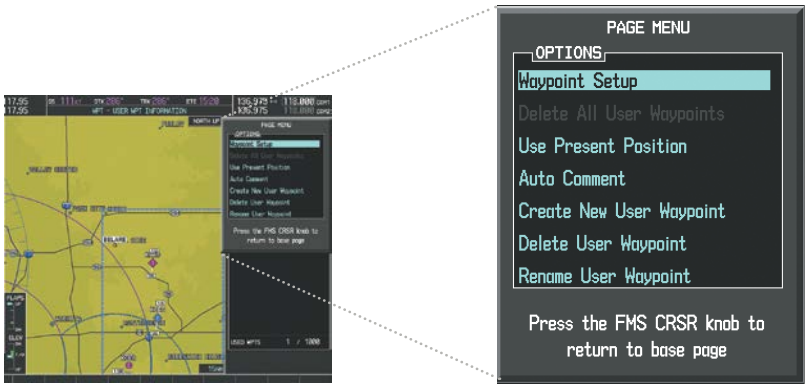


Figure 5-47 User Waypoint Information Page Menu

Creating user waypoints from map pages:

1) Press 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.
5) If desired, define the type and location of the waypoint in one of the following ways:

   a) 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:

   b) 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:

   c) 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" or "NORMAL" by moving the cursor to "TEMPORARY" and pressing 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) Move the cursor to the desired field.
3) Turn the small **FMS** Knob to make any changes.
4) Press the **ENT** Key to accept the changes.
5) Press the **FMS** Knob to remove the flashing cursor.

Renaming user waypoints:

1) Highlight a user waypoint in the User Waypoint List. Press 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 twice. 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) Press 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.

5.4 AIRSPACES

The G950 can display the following types of airspaces: Class B/TMA, Class C/TCA, Class D, Restricted, MOA (Military), Other Airspace, Air Defense Interdiction Zone (ADIZ), and Temporary Flight Restriction (TFR).

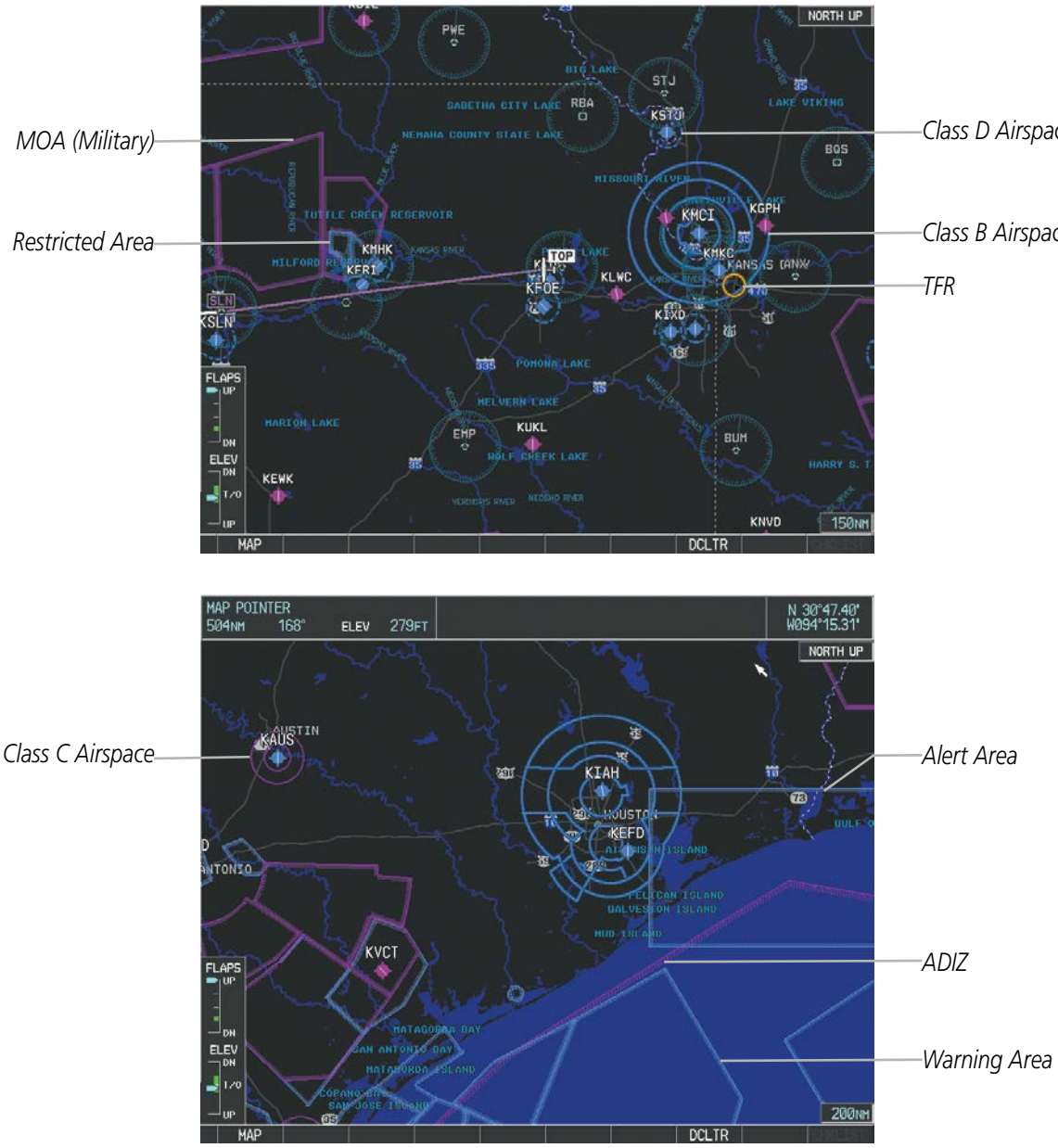


Figure 5-48 Airspaces

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 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 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.

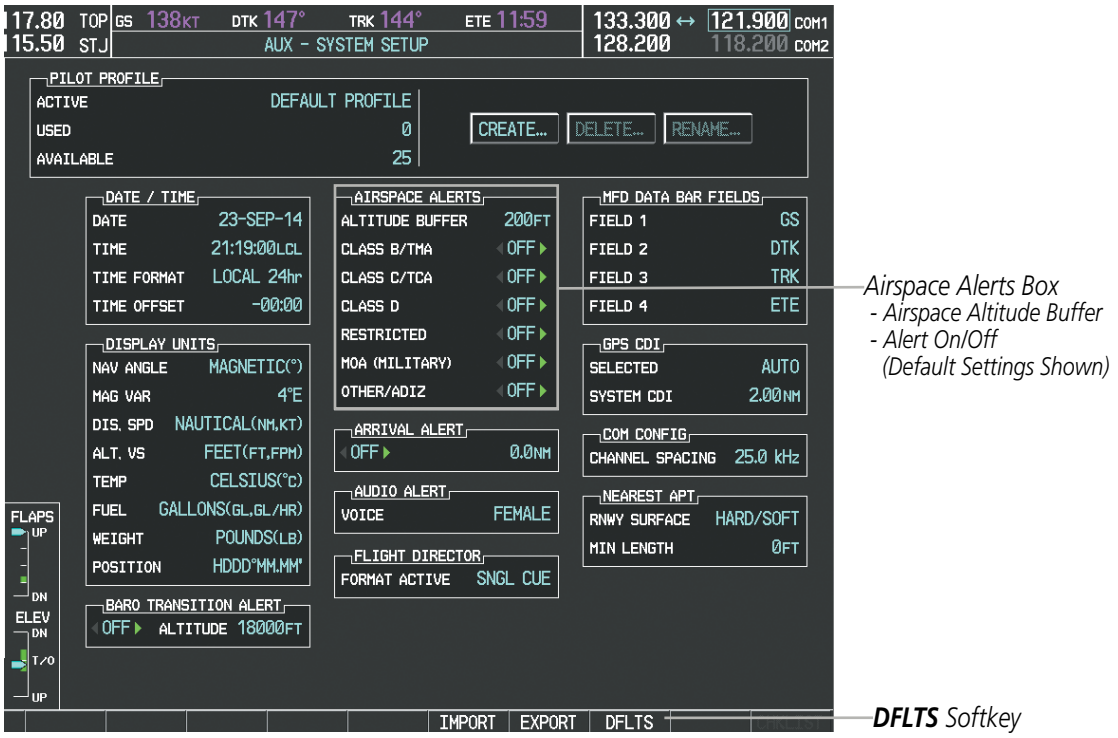


Figure 5-49 System Setup Page - Airspace Alerts

Map ranges for the airspace boundaries are selected from the Aviation Group in the Map Setup Menu: See Table 5-2 for the default and maximum ranges for each type of airspace and the symbol used to define the airspace area.

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'.

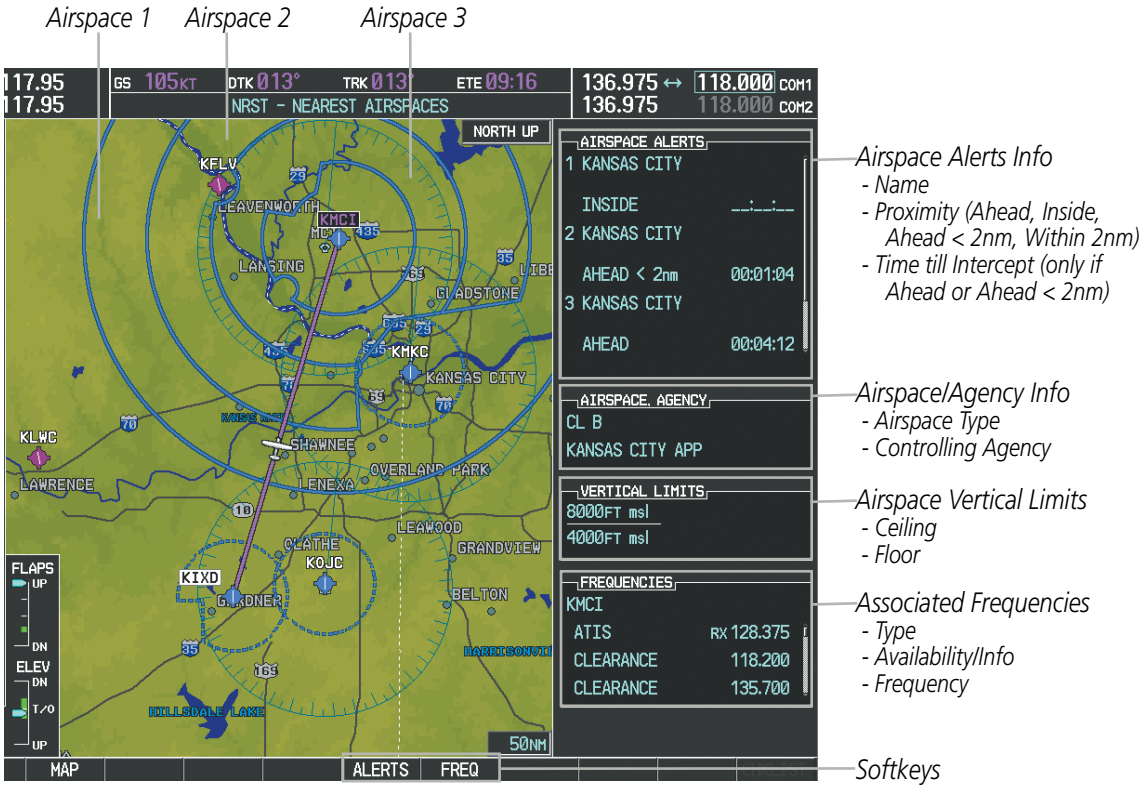


Figure 5-50 Nearest Airspaces Page

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 Airspace Page.
2) Press 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 message window on the PFD. The following airspace alerts are displayed in the message 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 5-6 PFD Airspace Alert Messages

5.5 DIRECT-TO-NAVIGATION

The Direct-to method of navigation, initiated by pressing the **Direct-to** Key on either the MFD or 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 G950 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.

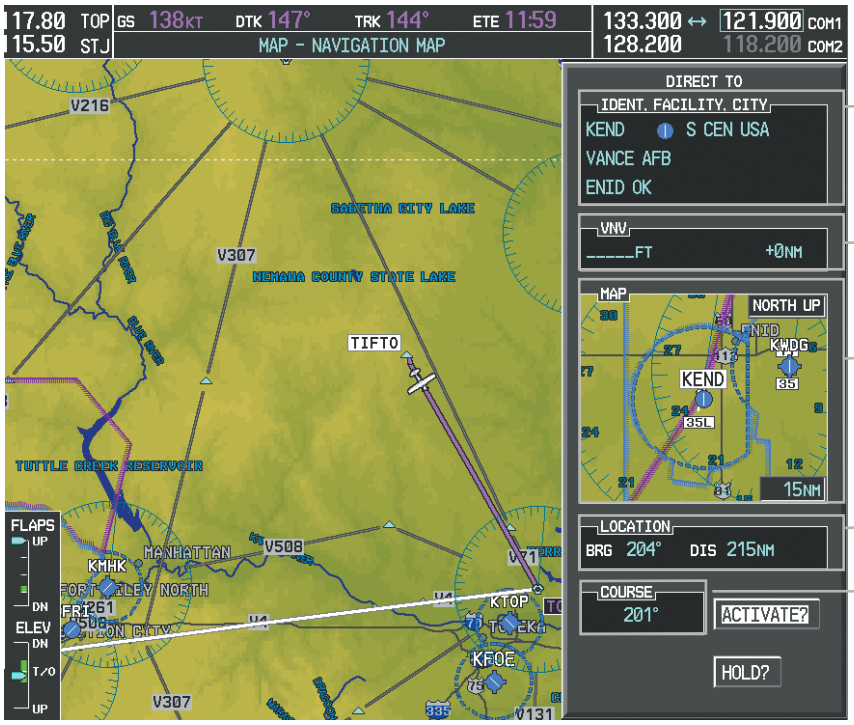


Figure 5-51 Direct-to Window - MFD



Figure 5-52 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 wayoint 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.



Figure 5-53 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 NRST, RECENT, USER, or AIRWAY waypoints can be selected as a direct-to destination in the Direct-to Window.

Selecting a NRST, RECENT, USER, or AIRWAY 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 FPL waypoints (the FPL list is populated only when navigating a flight plan, and the AIRWAY list is available only when the active leg is part of an airway).
3) Turn the small **FMS** Knob clockwise to display the NRST, RECENT, USER, or AIRWAY 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.

Selecting a nearby airport as a direct-to destination:

1) Press the **NRST** Softkey on the PFD; or turn the **FMS** Knob to display the Nearest Airports Page.
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, press 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 G950 resumes navigating the flight plan along the closest leg.



Page Menu
- Cancel Direct-To Navigation

Figure 5-54 Direct-to Window - Cancelling Direct-to Navigation

When navigating a direct-to, the G950 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 the direct-to. 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. The option to select MSL or AGL is now displayed.
5) Turn the small **FMS** Knob to select '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.



Page Menu
- Clear Vertical Navigation Constraints

Figure 5-55 Direct-to Window - Clearing Vertical Constraints

5.6 FLIGHT PLANNING

Flight planning on the G950 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 G950 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).

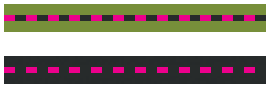
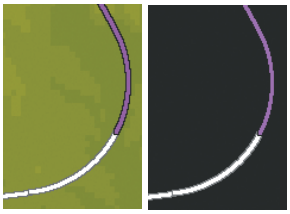
Flight Plan Leg Type	Symbol
Active non-heading Leg (TOPO On) Active non-heading Leg (TOPO Off)	
Active heading Leg (TOPO On) Active heading Leg (TOPO Off)	
Non-heading Leg in the current flight segment (TOPO On) Non-heading Leg in the current flight segment (TOPO Off)	
Heading Leg not in the current flight segment (TOPO On) Heading Leg not in the current flight segment (TOPO Off)	
Non-heading Leg not in the current flight segment (TOPO On) Non-heading Leg not in the current flight segment (TOPO Off)	
Turn Anticipation Arc (TOPO On/TOPO Off)	

Table 5-7 Flight Plan Leg Symbols

Up to 99 flight plans with up to 99 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 G950 uses the waypoint information from the current database to define the waypoints. If the database is changed or updated, the G950 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 re-loads 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)

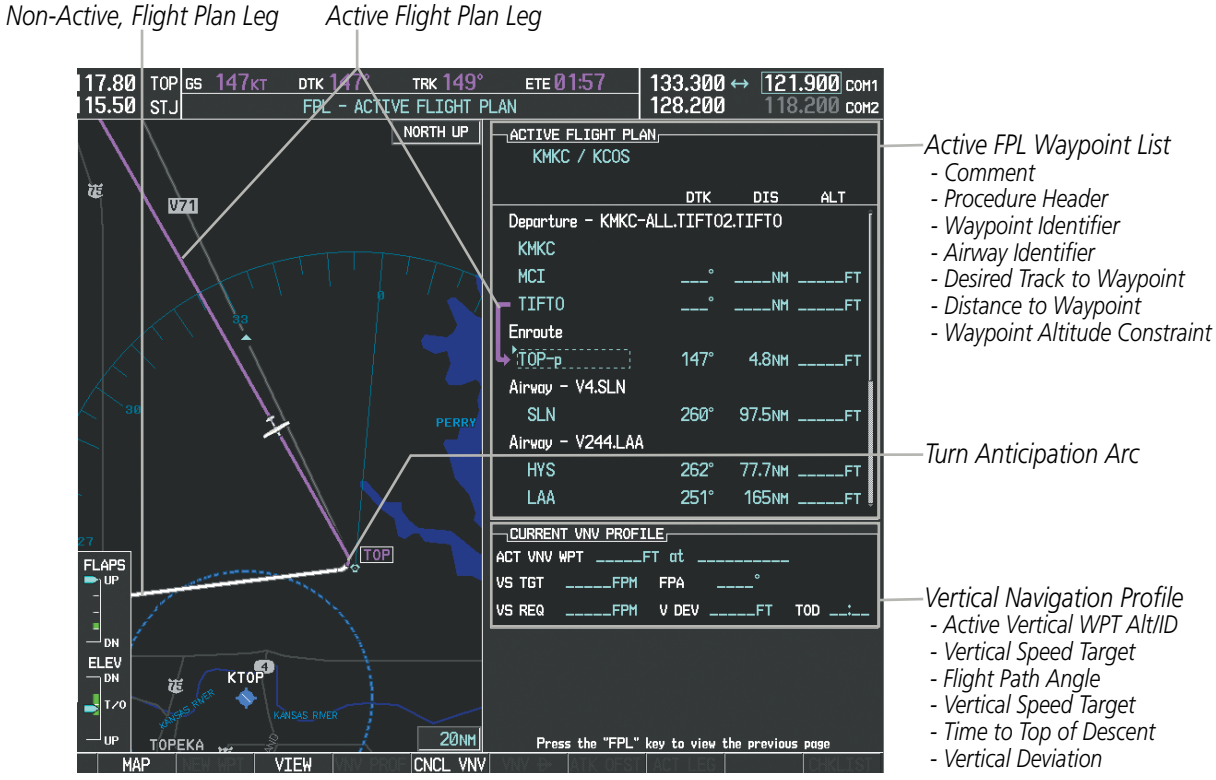


Figure 5-56 Active Flight Plan Page

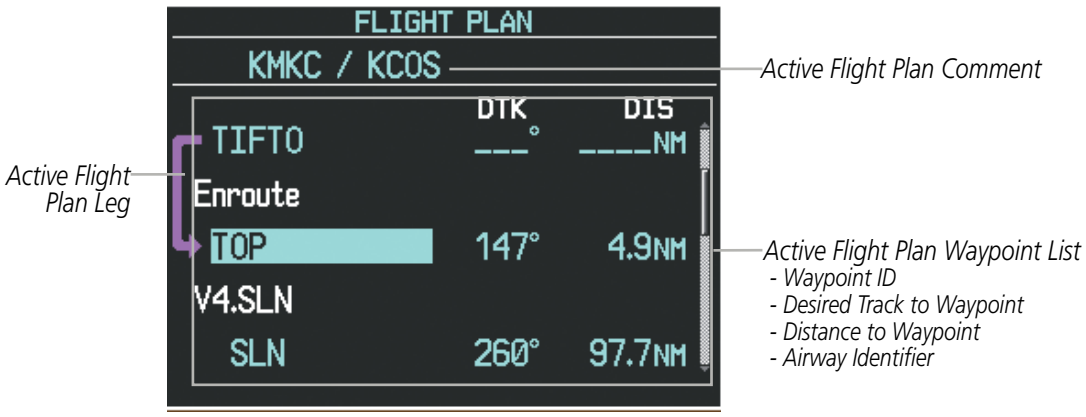


Figure 5-57 Active Flight Plan Window on PFD

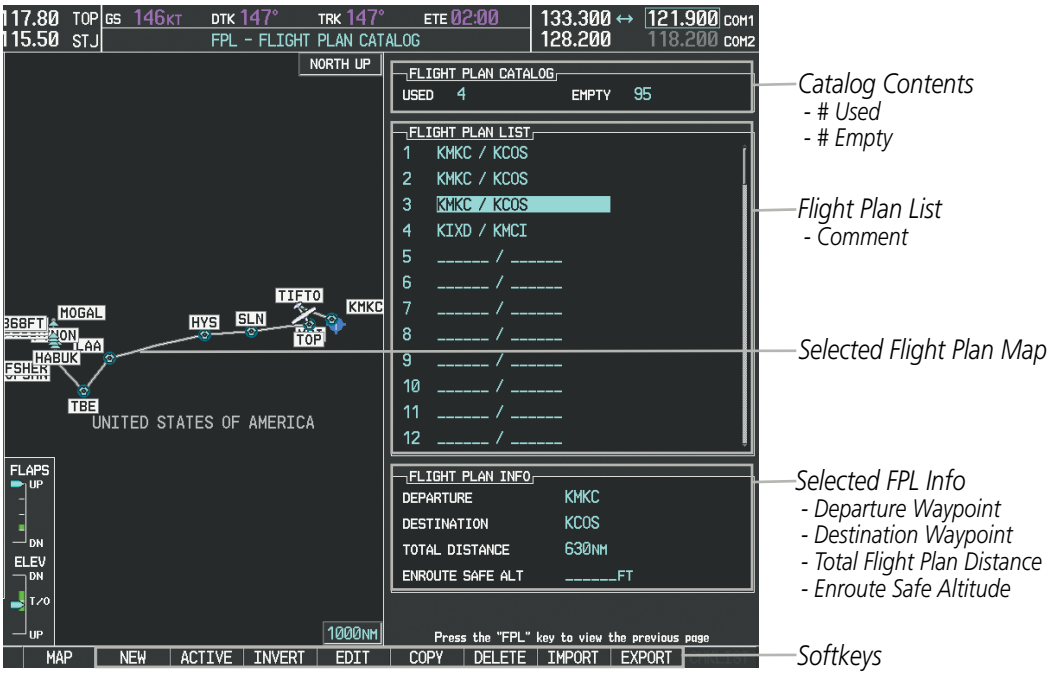


Figure 5-58 Flight Plan Catalog Page

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 G950 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 APPR 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.
2) Press the **FMS** Knob to activate the cursor (only on MFD).
3) 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, or airway waypoints).
4) Enter the identifier, facility, or city name of the departure 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.
5) Repeat step numbers 3 and 4 to enter each additional flight plan waypoint.
6) When all waypoints have been entered, press the **FMS** Knob to remove the cursor.

Creating a stored flight plan:

1) Press the **FPL** Key.
2) Turn the small **FMS** Knob clockwise to display the Flight Plan Catalog Page.
3) Press 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) 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, or airway waypoints).
5) Enter the identifier, facility, or city name of the departure waypoint or select a waypoint from the submenu of waypoints and press the **ENT** Key.
6) Repeat step numbers 4 and 5 to enter each additional flight plan waypoint.
7) When all waypoints have been entered, press the **FMS** Knob to return to the Flight Plan Catalog Page. The new flight plan is now in the list.

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 on the Control Unit 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.

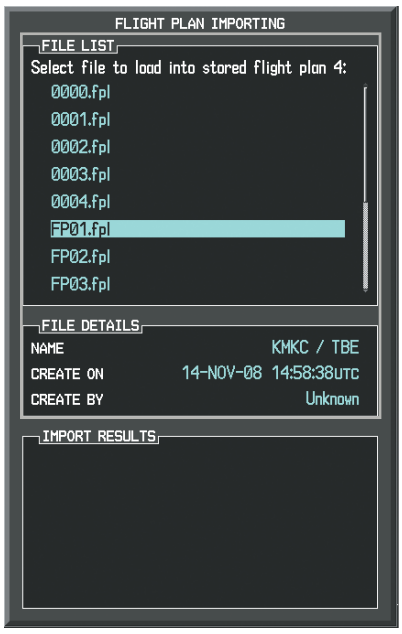
   If an empty slot is selected, a list of the available flight plans on the SD card will be displayed.

   Or:

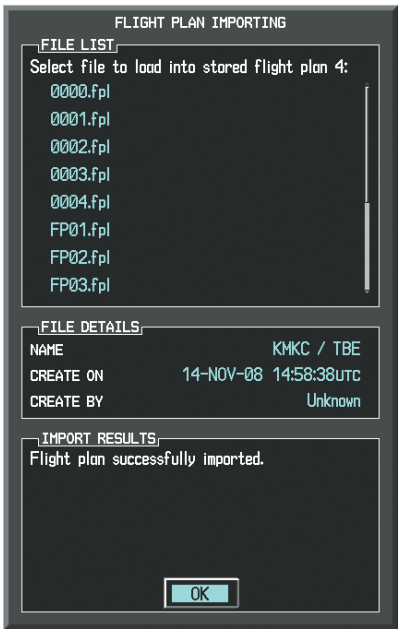
   If an existing flight plan is selected, an "Overwrite existing flight plan? OK or CANCEL" prompt is displayed. Press the **ENT** Key to choose to overwrite the selected flight plan and see the list of available flight plans on the SD card. If overwriting the existing flight plan is not desired, select "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.



Import/Export Softkeys



List of Flight Plans to Import & Details for the Selected File



Import Successful

Figure 5-59 Flight Plan 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 on the Control Unit 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.

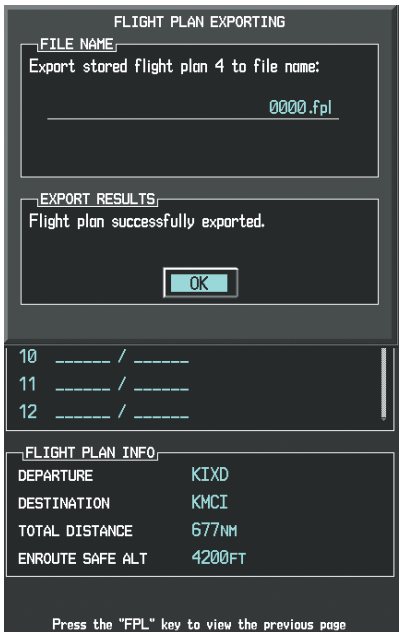
NOTE: *The exported flight plan will not contain any procedures or airways.*



Import/Export Softkeys



Stored Flight Plan to be Exported & Exported Flight Plan Name



Export Successful

Figure 5-60 Flight Plan Export

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 99 waypoints (including waypoints within airways and procedures). If the number of waypoints in the flight plan exceeds 99, the message "Flight plan is full. Remove unnecessary waypoints." appears and the new waypoint(s) are not added to the flight plan.

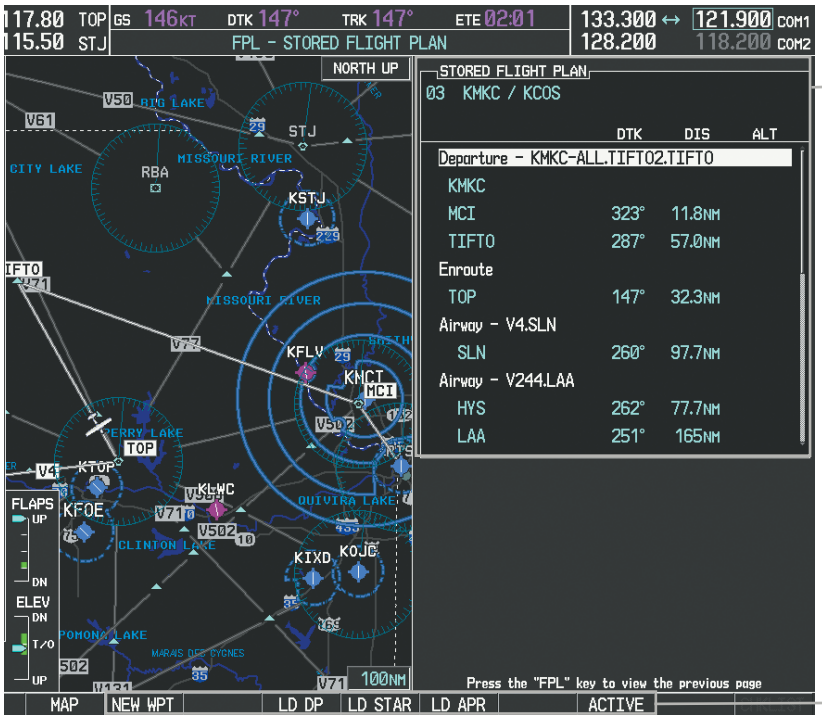


Figure 5-61 Stored Flight Plan Page

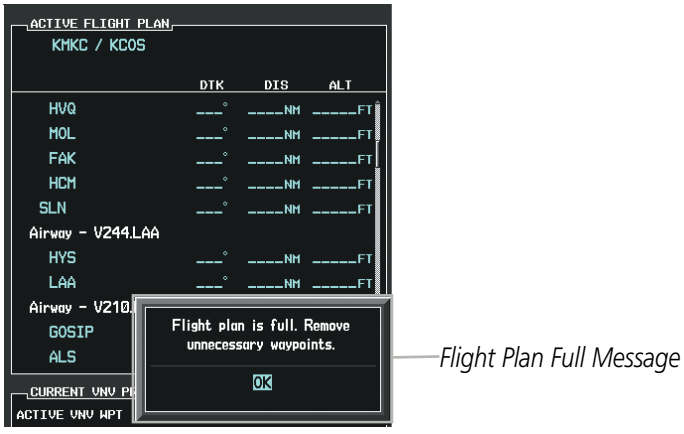


Figure 5-62 Active Flight Plan Page - FPL Full

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) Press 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.*

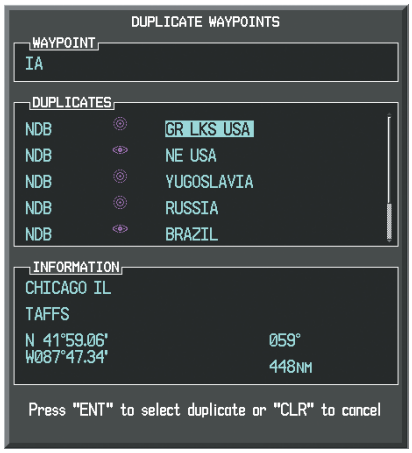


Figure 5-63 Duplicate Waypoints Window

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 before which to add the new waypoint. The new waypoint is placed directly in front of 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, or airway waypoints).
5) Enter the identifier, facility, or city name of the departure 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) Press 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) Press 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 end of 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 G950 also anticipates the desired airway and exit point based on loaded flight plan waypoints.



Figure 5-64 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, or press the **MENU** Key and select "Load Airway". 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.

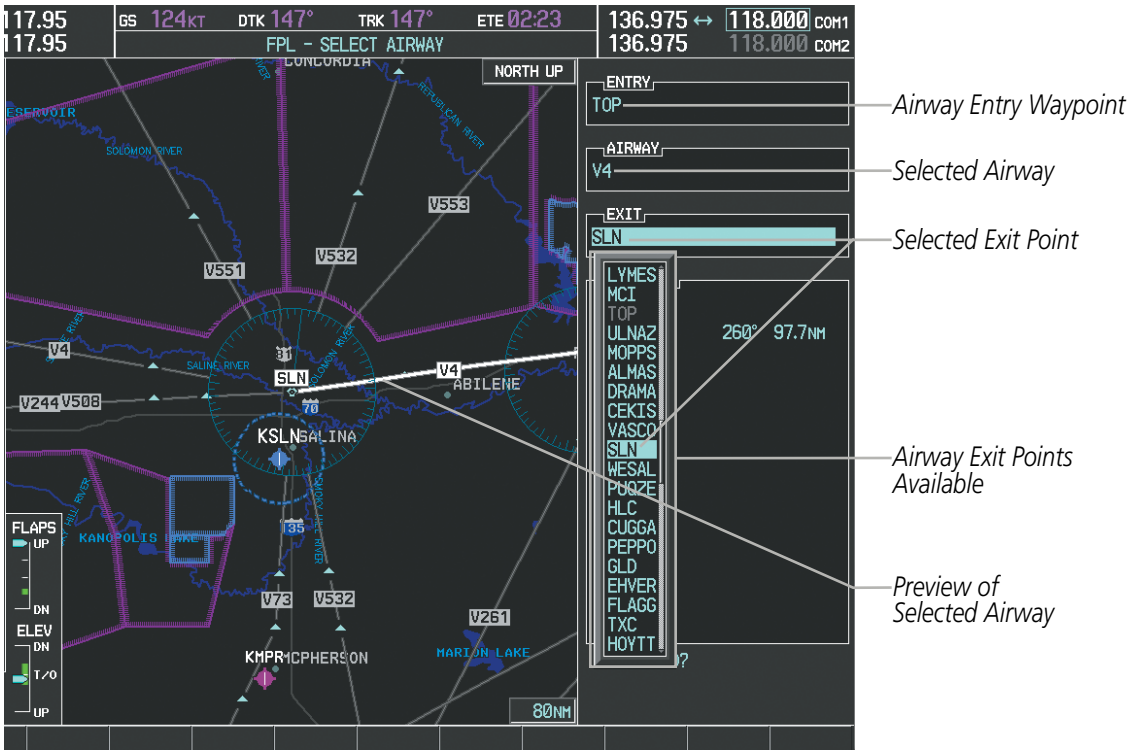


Figure 5-65 Select Airway Page - Selecting Exit Point

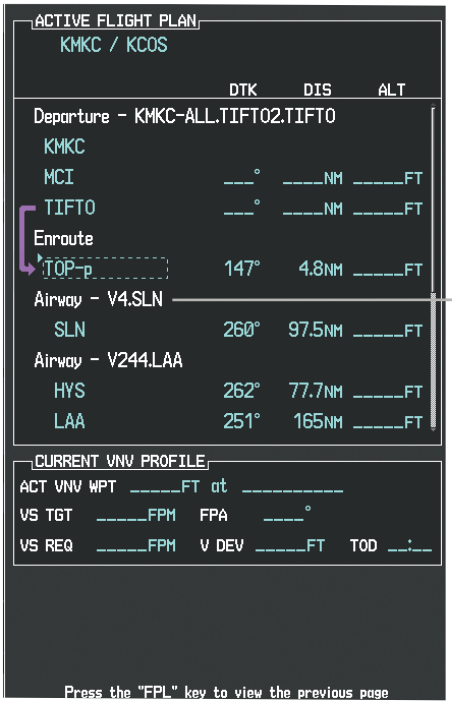


Figure 5-66 Active Flight Plan Page - Airway Inserted

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 in the direction MTD-ABB-BNE-DEVAL.

Airway "UR975" in North Africa has more complicated directional restrictions within the list of airway waypoints AMANO, VAKOR, LIBRO, NELDA, DIRKA, GZO, KOSET, and SARKI:

- Starting from AMANO, the airway can be flown only to LIBRO.
- Starting from SARKI, the airway can be flown only to LIBRO.
- Between NELDA and GZO, the airway can be flown in either direction.

In the US, airways that are "one-way" for specified hours of operation are not uncommon. These airways are always bidirectional in the G950 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 G950 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.

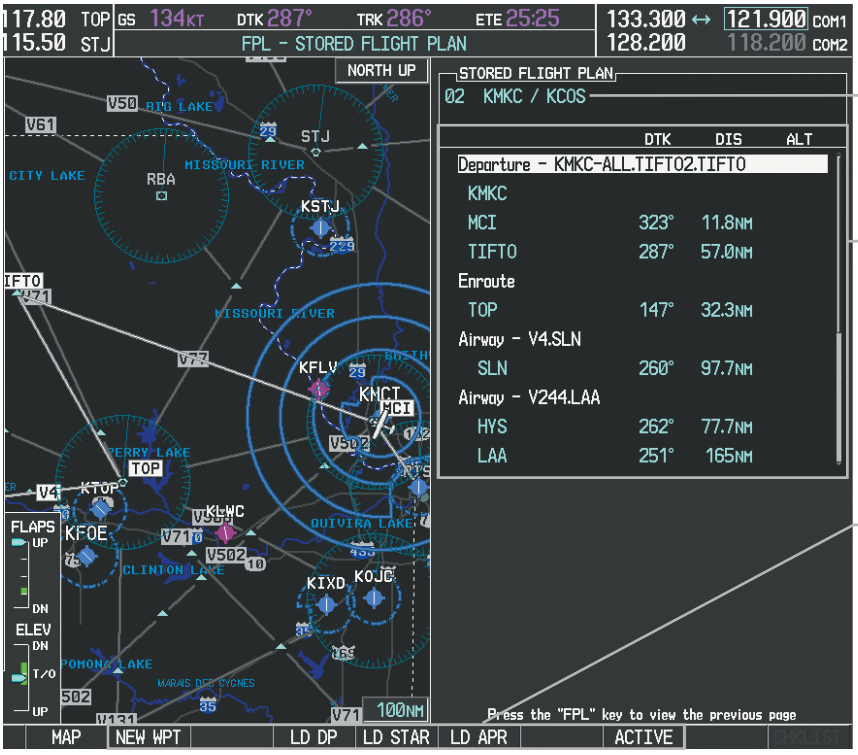


Figure 5-67 Stored Flight Plan Page

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.

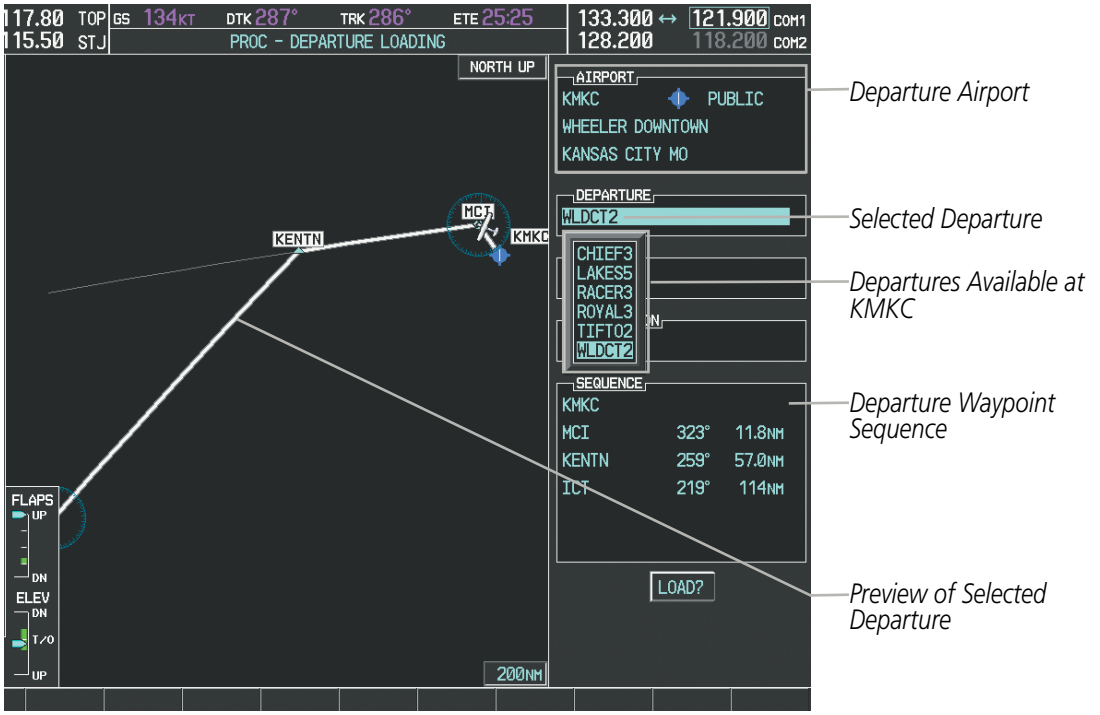


Figure 5-68 Departure Loading Page - Selecting the Departure

Loading a departure procedure into a stored flight plan:

1) Select a stored flight plan from the Flight Plan Catalog Page.
2) 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 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 transition for the selected departure. Press the **ENT** Key.
6) Select a runway served by the selected departure, if required. Press the **ENT** Key.
7) Press the **ENT** Key to load the selected departure procedure.

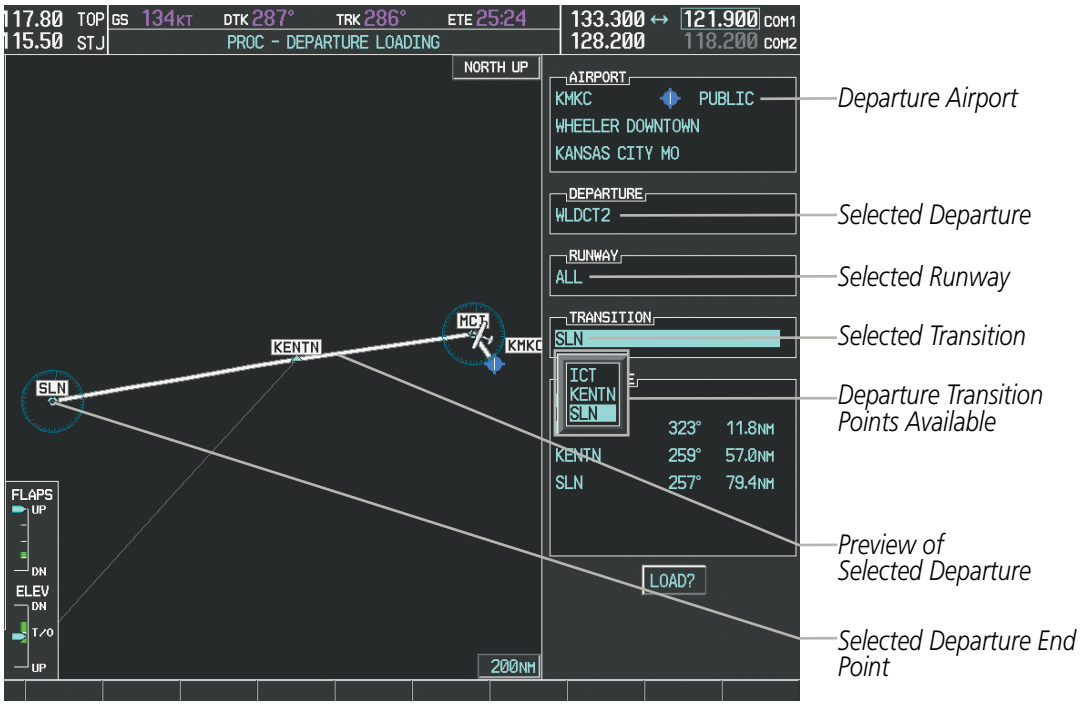


Figure 5-69 Departure Loading Page - Selecting Transition

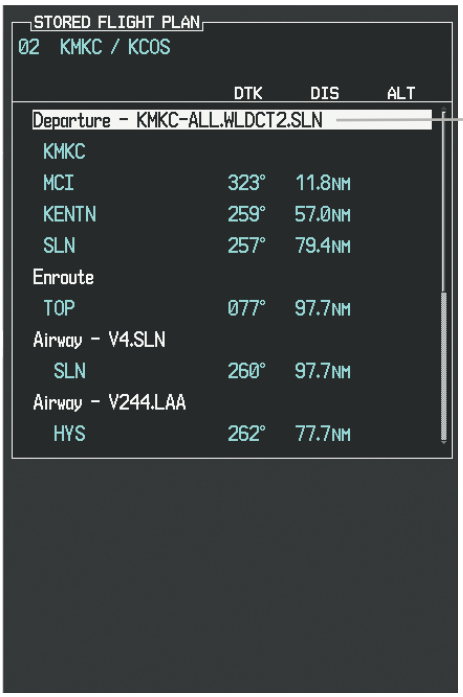


Figure 5-70 Stored Flight Plan Page - Departure Inserted

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.

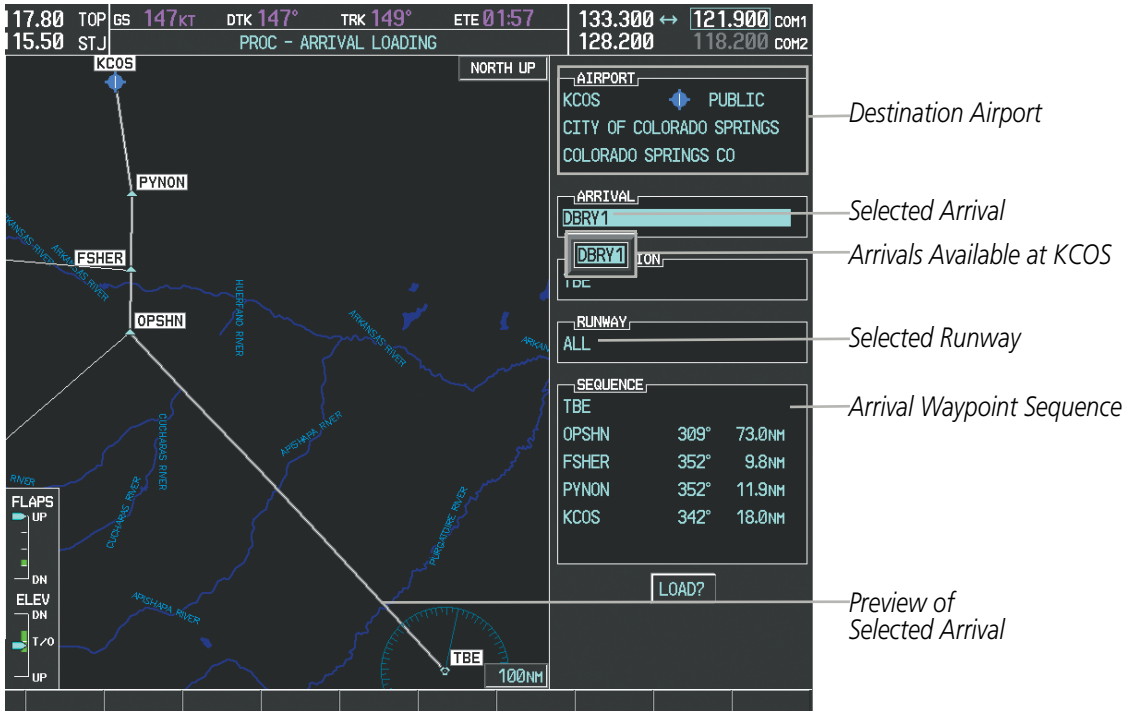


Figure 5-71 Arrival Loading Page - Selecting the Arrival

Loading an arrival procedure into a stored flight plan:

1) Select a stored flight plan from the Flight Plan Catalog Page.
2) 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 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.

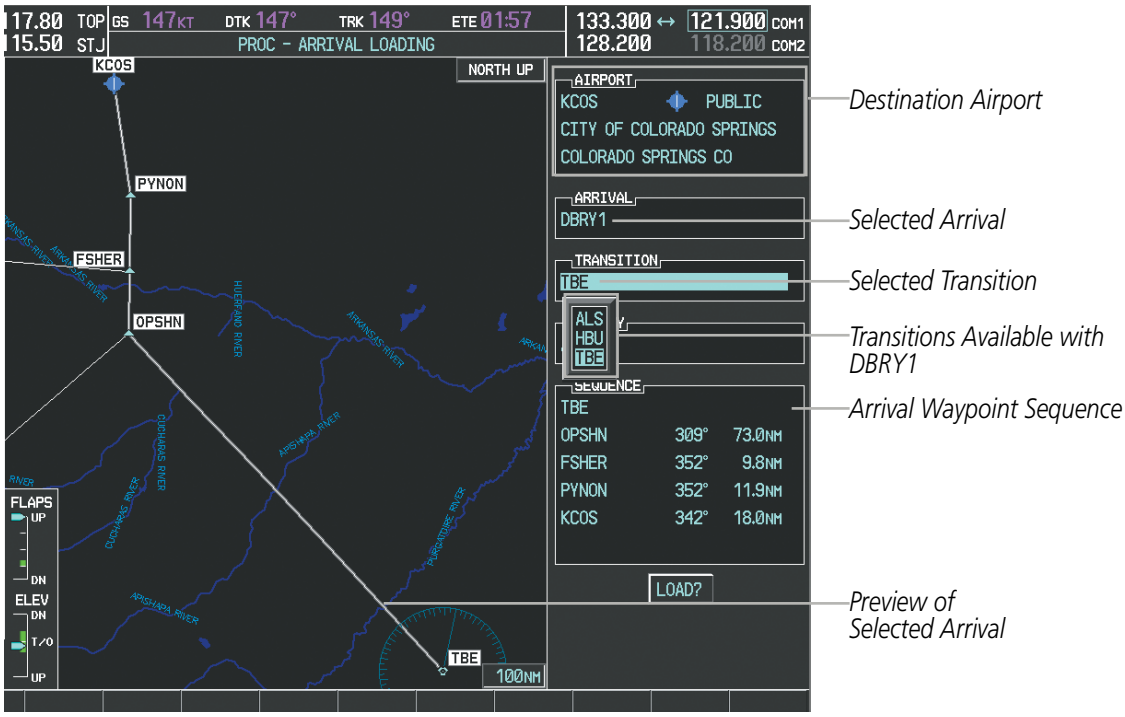


Figure 5-72 Arrival Loading Page - Selecting the Transition

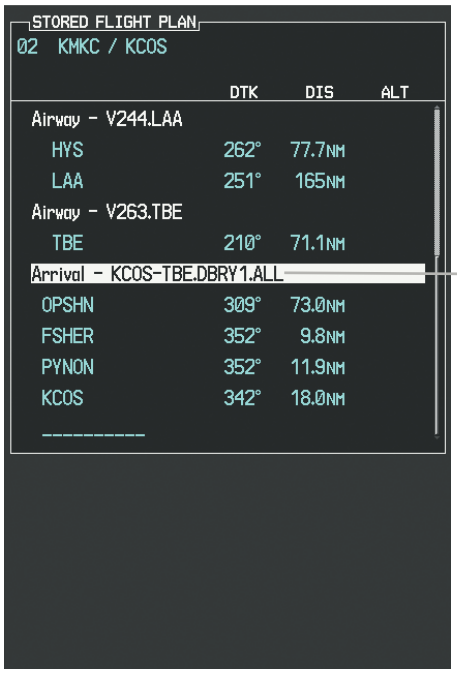


Figure 5-73 Stored Flight Plan Page - Arrival Inserted

APPROACH (APPR)

An Approach Procedure (APPR) 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.

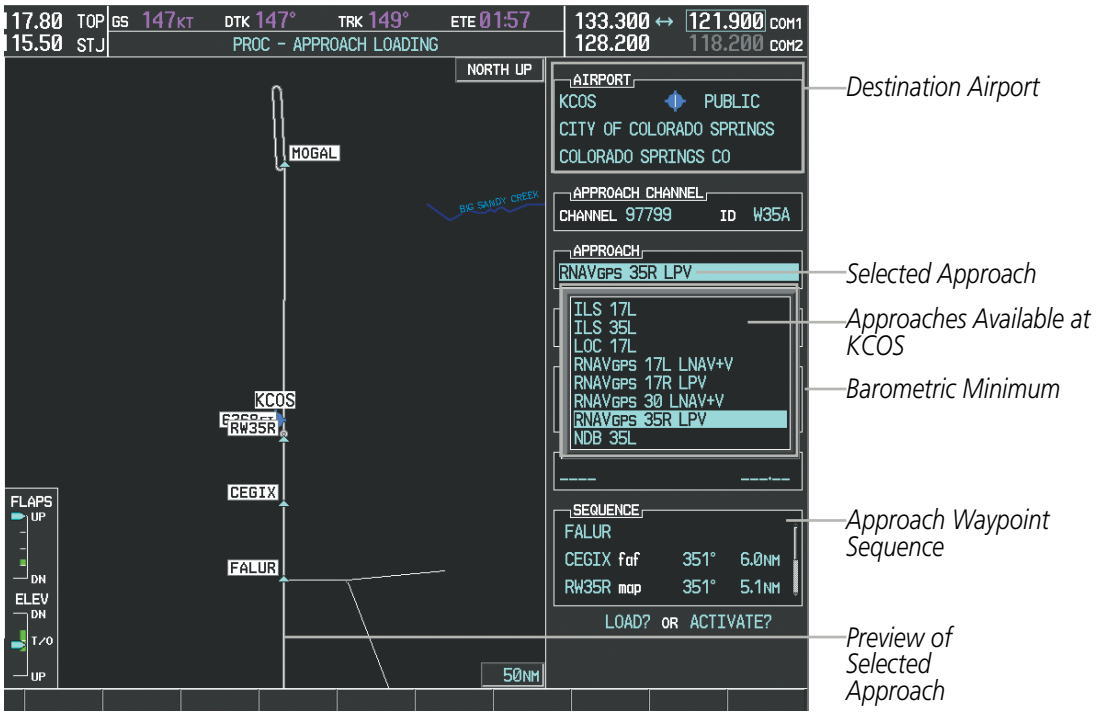


Figure 5-74 Approach Loading Page - Selecting the Approach

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.

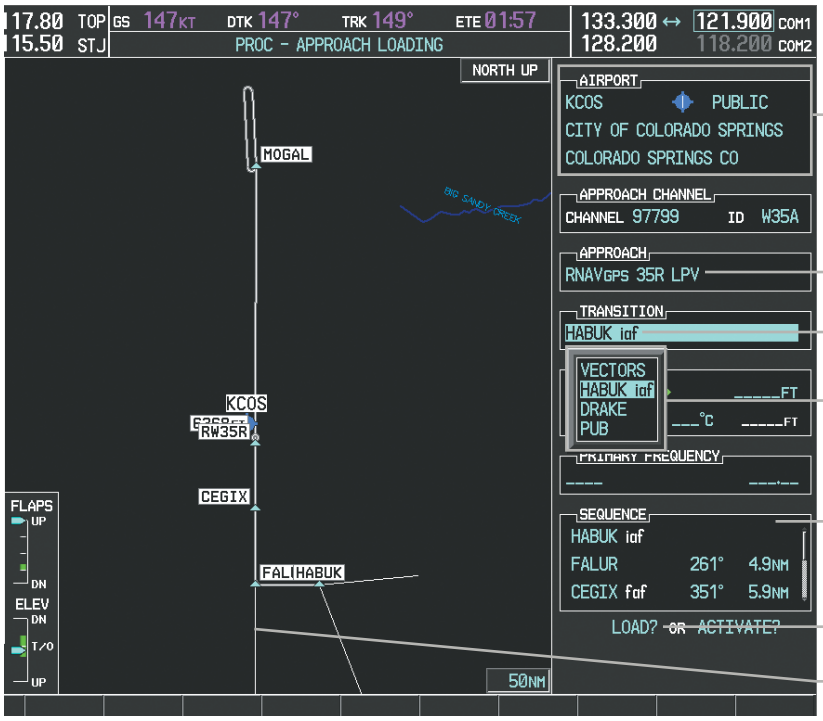


Figure 5-75 Approach Loading Page - Selecting the Transition

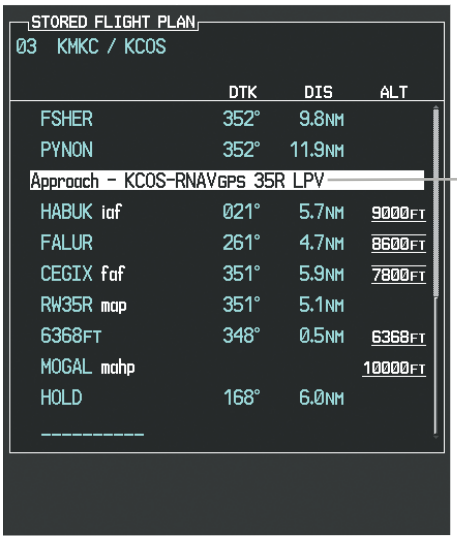


Figure 5-76 Stored Flight Plan Page - Approach Inserted

FLIGHT PLAN STORAGE

The G950 can store up to 99 flight plans, numbered 1 through 99. The active flight plan is erased when the G950 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) Press 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.

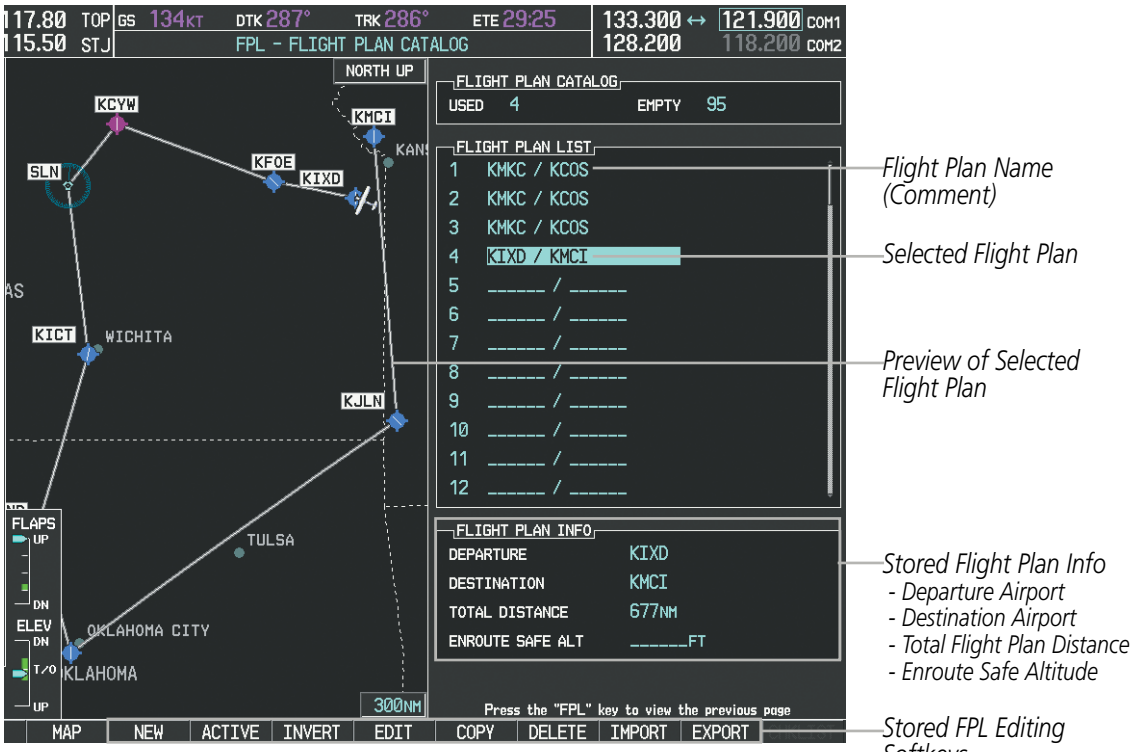


Figure 5-77 Stored Flight Plan Information

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 and activates it.

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) Press the **ACTIVE** Softkey; 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) Press 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 G950 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) Press 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 G950 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) Press 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 G950 allows deletion of an active flight plan. Deleting the active flight plan suspends navigation by the G950.

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.

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.

Or:

Use the Joystick to place the Quick Select Box on the waypoint to be deleted (MFD only).

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 white header of the airway to be deleted.

   Or:

   Use the Joystick to place the Quick Select Box on the white header of the airway to be deleted (MFD only).

3) Press the **CLR** Key. The 'Remove <airway name>?' 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 white header of the procedure to be deleted.

   Or:

   Use the Joystick to place the Quick Select Box on the white header of the procedure to be deleted (MFD only).

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) 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.
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) 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.
5) Turn the large **FMS** Knob to highlight the white header of the airway to be deleted.
6) Press the **CLR** Key. The 'Remove <airway name>?' 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) 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.
5) Turn the large **FMS** Knob to highlight the white 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) 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.
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) 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.
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.

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.

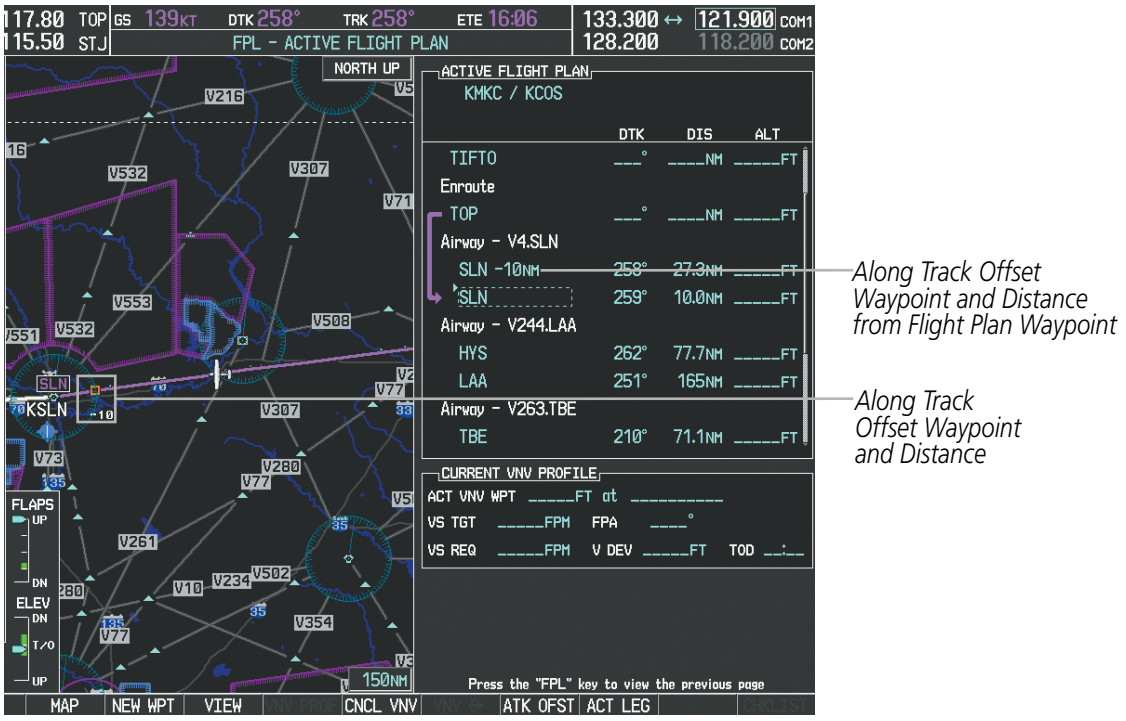


Figure 5-78 Along Track Offset

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) Press the **ATK OFST** 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.

Using direct-to, loading an approach, a holding pattern, or editing and activating the flight plan automatically cancels Parallel Track. 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.*

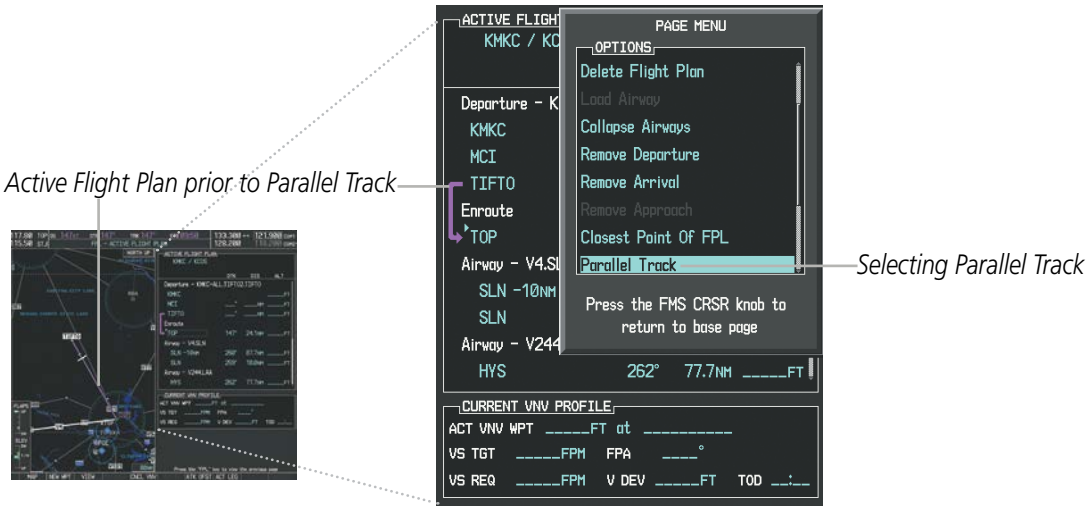


Figure 5-79 Active Flight Plan Window - Selecting Parallel Track

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.

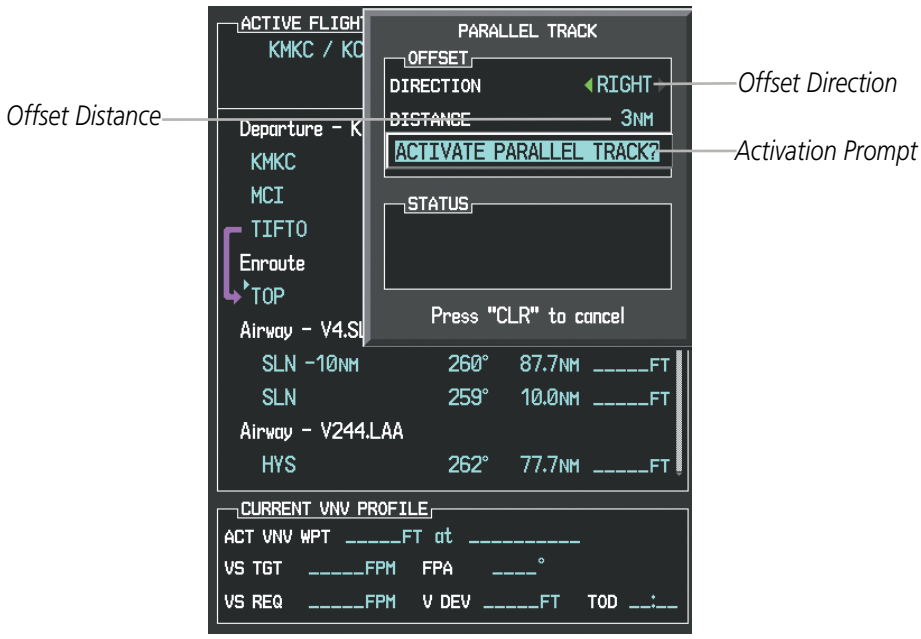


Figure 5-80 Parallel Track Window

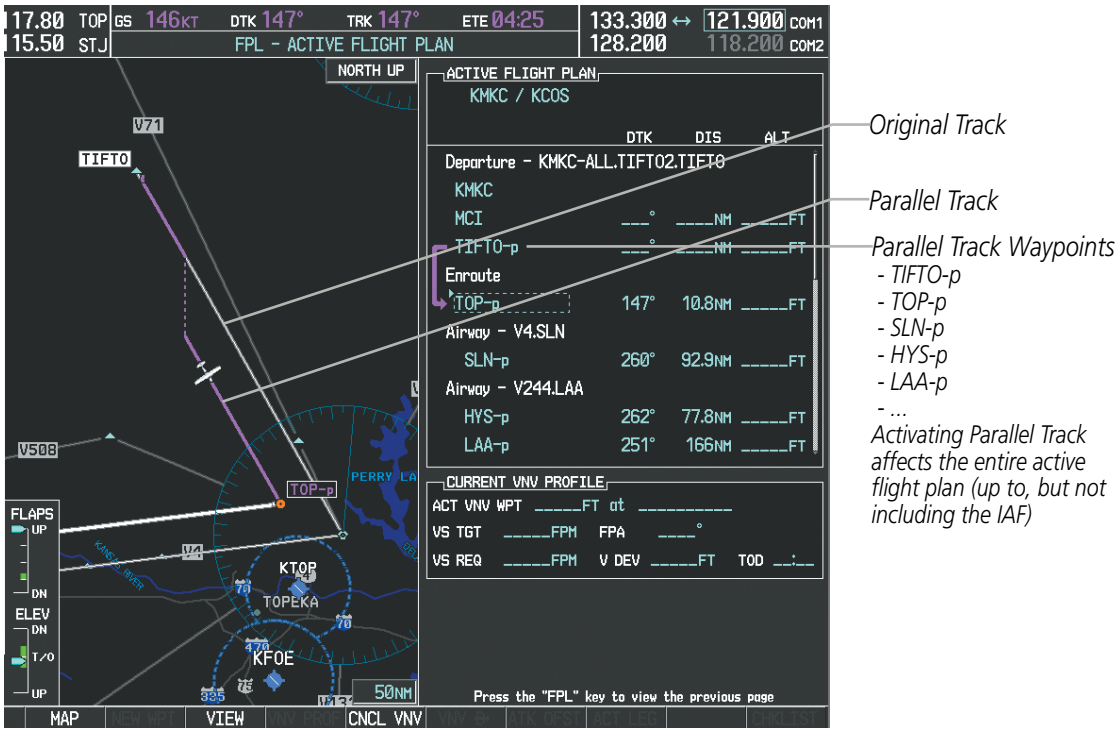


Figure 5-81 Parallel Track Active

If the parallel track proposed by the offset direction and distance is not allowed by the system, the activation prompt is displayed, but disabled. Parallel Track cannot be activated if a course is set using direct-to or if the active leg is the first leg of the departure procedure. Attempting to activate parallel track with these conditions results in the message 'Parallel Track Unavailable Invalid Route Geometry'. 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 the status indicates that the system is unable to activate the parallel track because of invalid geometry.

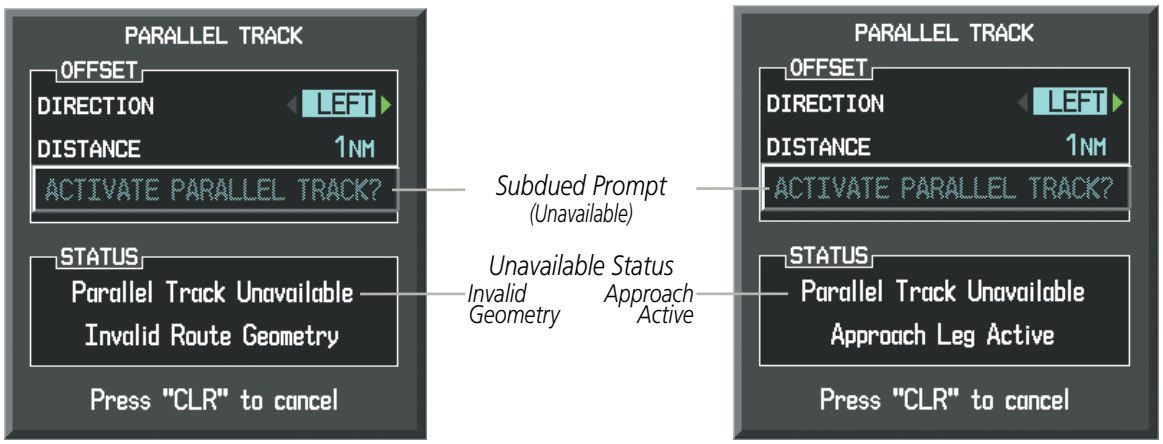


Figure 5-82 Parallel Track Unavailable

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.

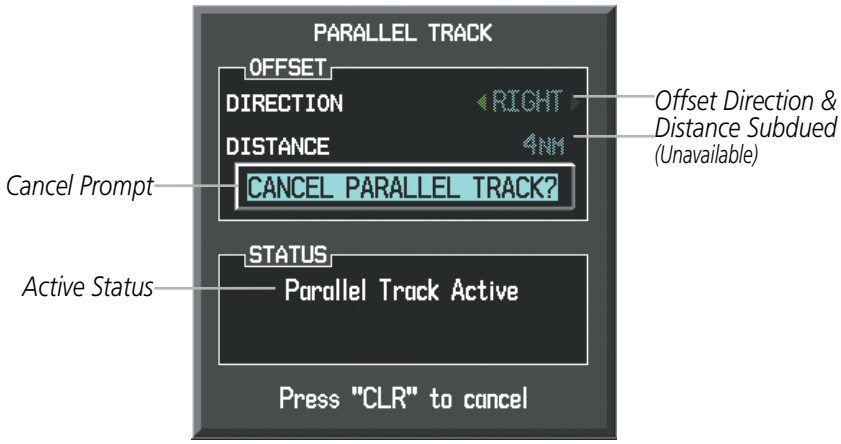


Figure 5-83 Cancelling Parallel Track

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.

ACTIVATING A FLIGHT PLAN LEG

The G950 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.

   Or:

   Use the Joystick to place the Quick Select Box on the destination waypoint for the desired leg.
3) Press 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.

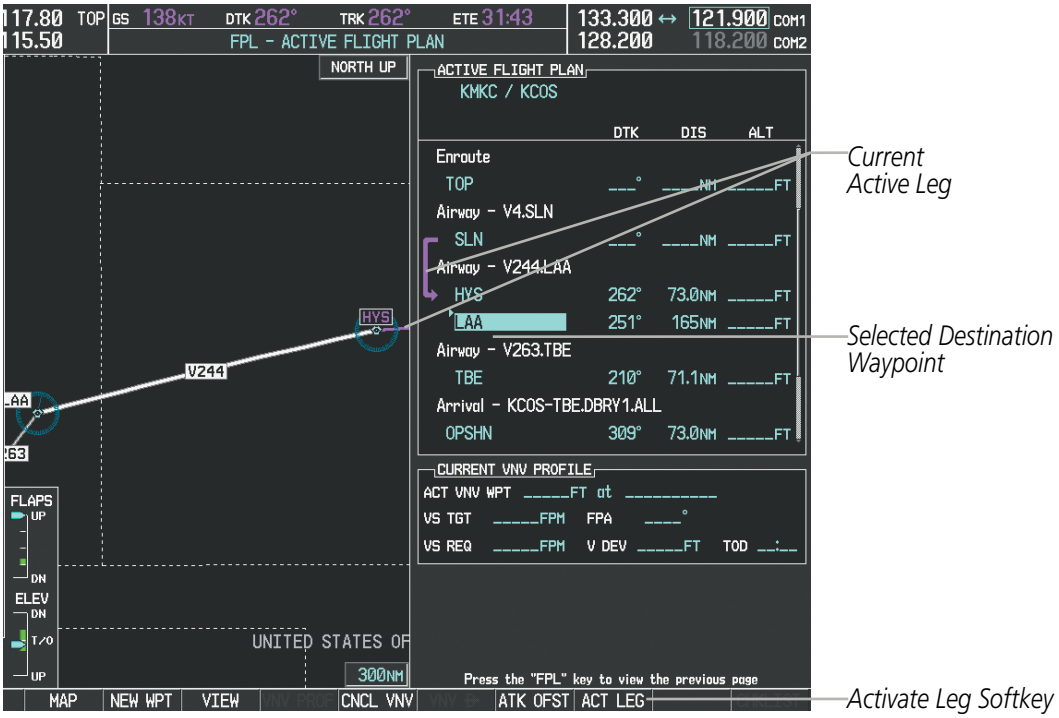


Figure 5-84 Active Flight Plan Page - Selecting the Leg Destination Waypoint

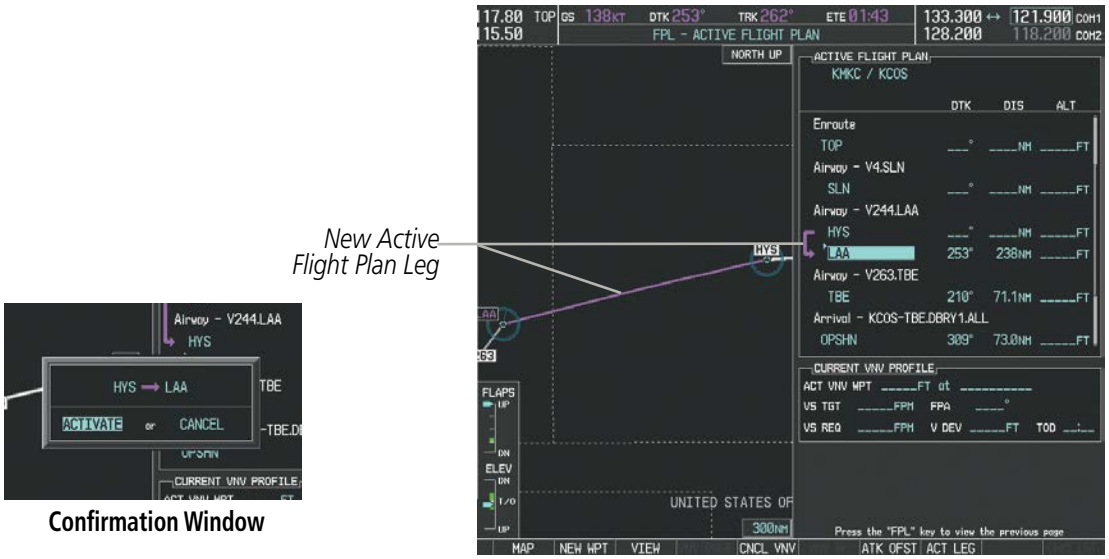


Figure 5-85 Active Flight Plan Page - New Active Leg

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.

Inverting and activating 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 flight plan to be inverted.
4) Press the **INVERT** Softkey; or press the **MENU** Key, select 'Invert & Activate Flight Plan' and press the **ENT** Key. An 'Invert and activate stored flight plan?' confirmation window is displayed.
5) Select 'OK'.
6) Press the **ENT** Key to invert and activate the stored flight plan. To cancel, press the **CLR** Key, or highlight 'CANCEL' and press the **ENT** Key.

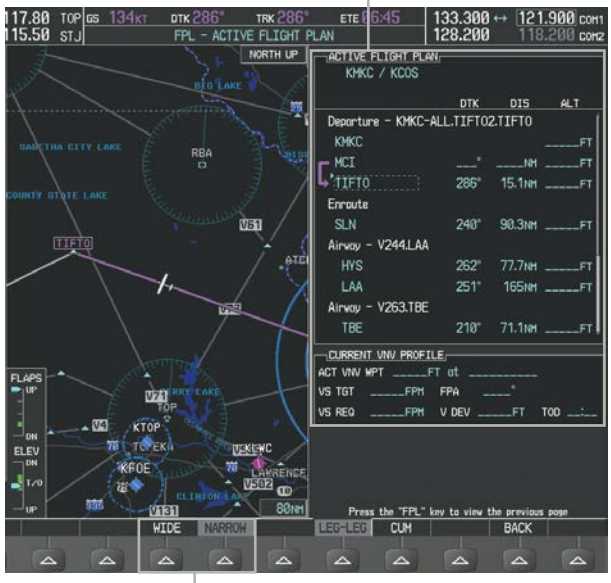
FLIGHT PLAN VIEWS

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) Press the **VIEW** Softkey to display the **CUM** and **LEG-LEG** Softkeys.
3) Press the **CUM** Softkey to view cumulative waypoint distance, or press the **LEG-LEG** Softkey to view leg-to-leg waypoint distance.
4) Press the **BACK** Softkey to return to the top level active flight plan softkeys.

Active Flight Plan Leg to Leg Distance



Active Flight Plan Cumulative Distance



WIDE *Softkey,* **NARROW** *Softkey*

LEG-LEG *Softkey,* **CUM** *Softkey*

Figure 5-86 Active Flight Plan - Leg to Leg vs. Cumulative Distance

Switching between wide and narrow view:

1) Press the **FPL** Key on the MFD to display the Active Flight Plan Page.
2) Press the **VIEW** Softkey to display the **WIDE** and **NARROW** Softkeys.
3) Press the **WIDE** Softkey to display the wide view, or press the **NARROW** Softkey to display the narrow view.
4) Press the **BACK** Softkey to return to the top level active flight plan softkeys.



Figure 5-87 Active Flight Plan - Wide vs. Narrow View

COLLAPSING AIRWAYS

The G950 allows airways on the active flight plan to be collapsed or expanded from the 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 reflects 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 the "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.

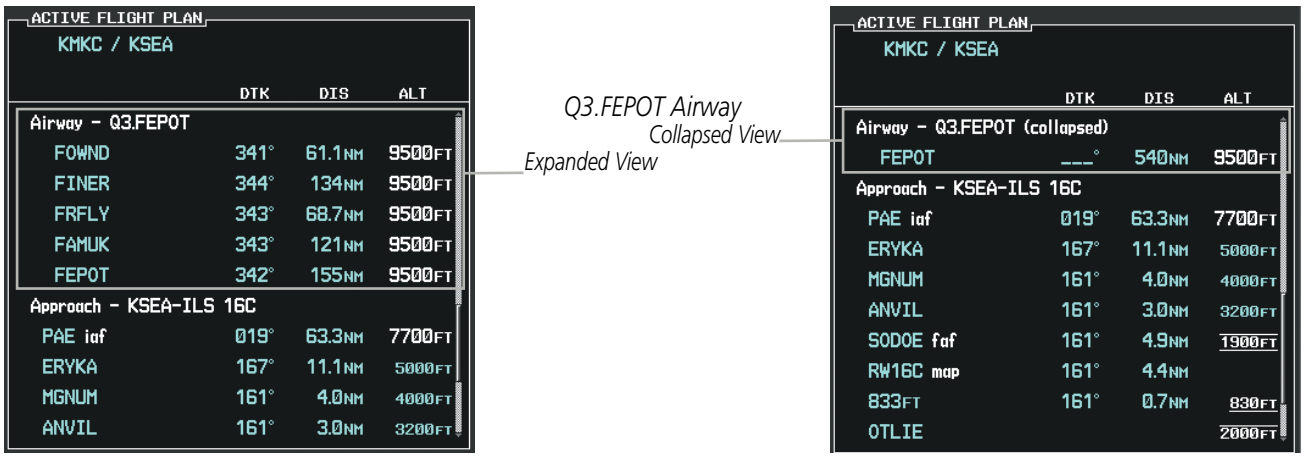


Figure 5-88 Expanded/Collapsed Airways

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.

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 and press the **ENT** Key. The G950 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. 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.

   Or:

   Use the Joystick to place the Quick Select Box on 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 'DIST' 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.

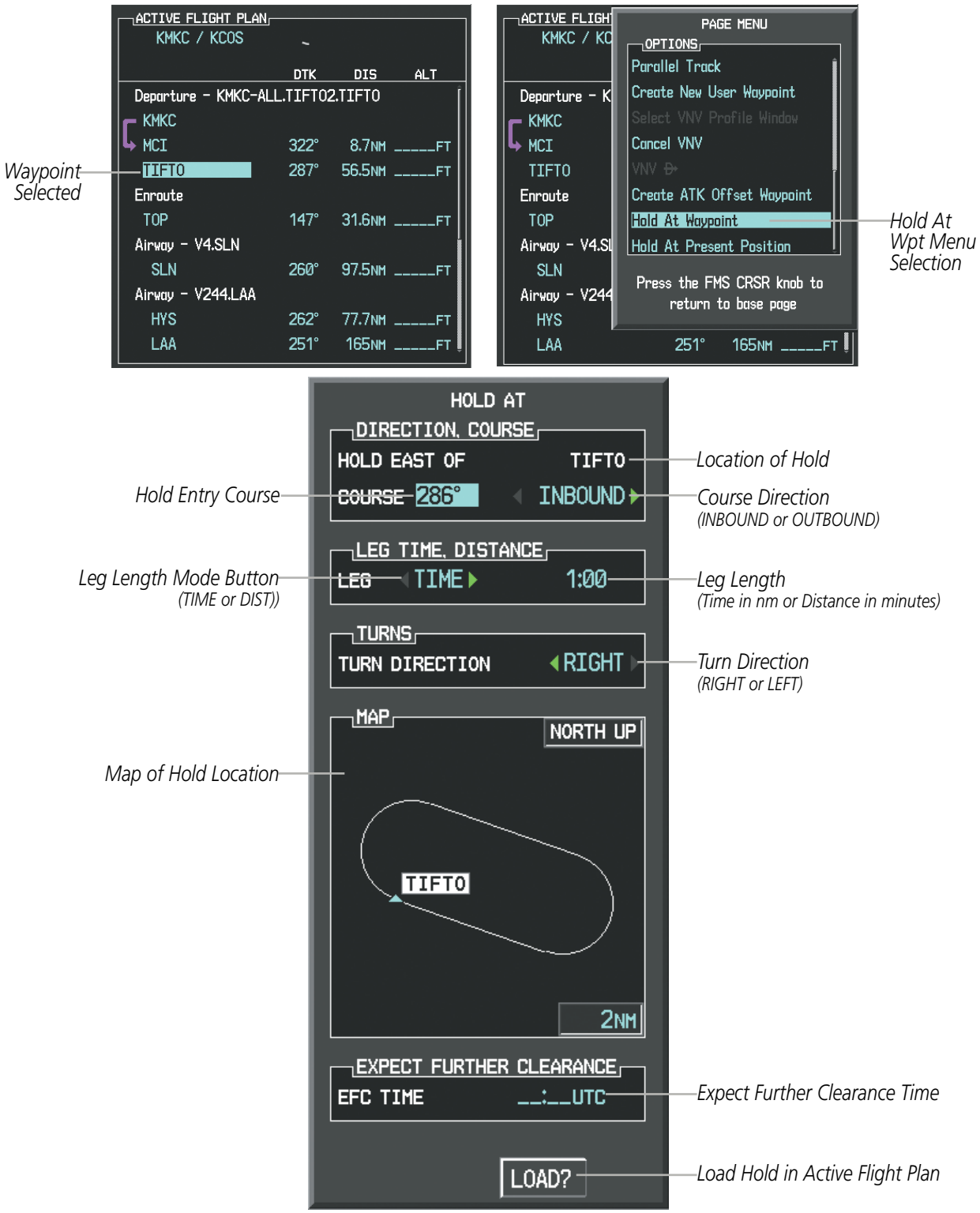


Figure 5-89 Creating a User Defined Holding Pattern at an Active Flight Plan Waypoint

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.
5) Use the small **FMS** Knob to select 'TIME' or 'DIST' 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 'DIST' 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 wayoint 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.

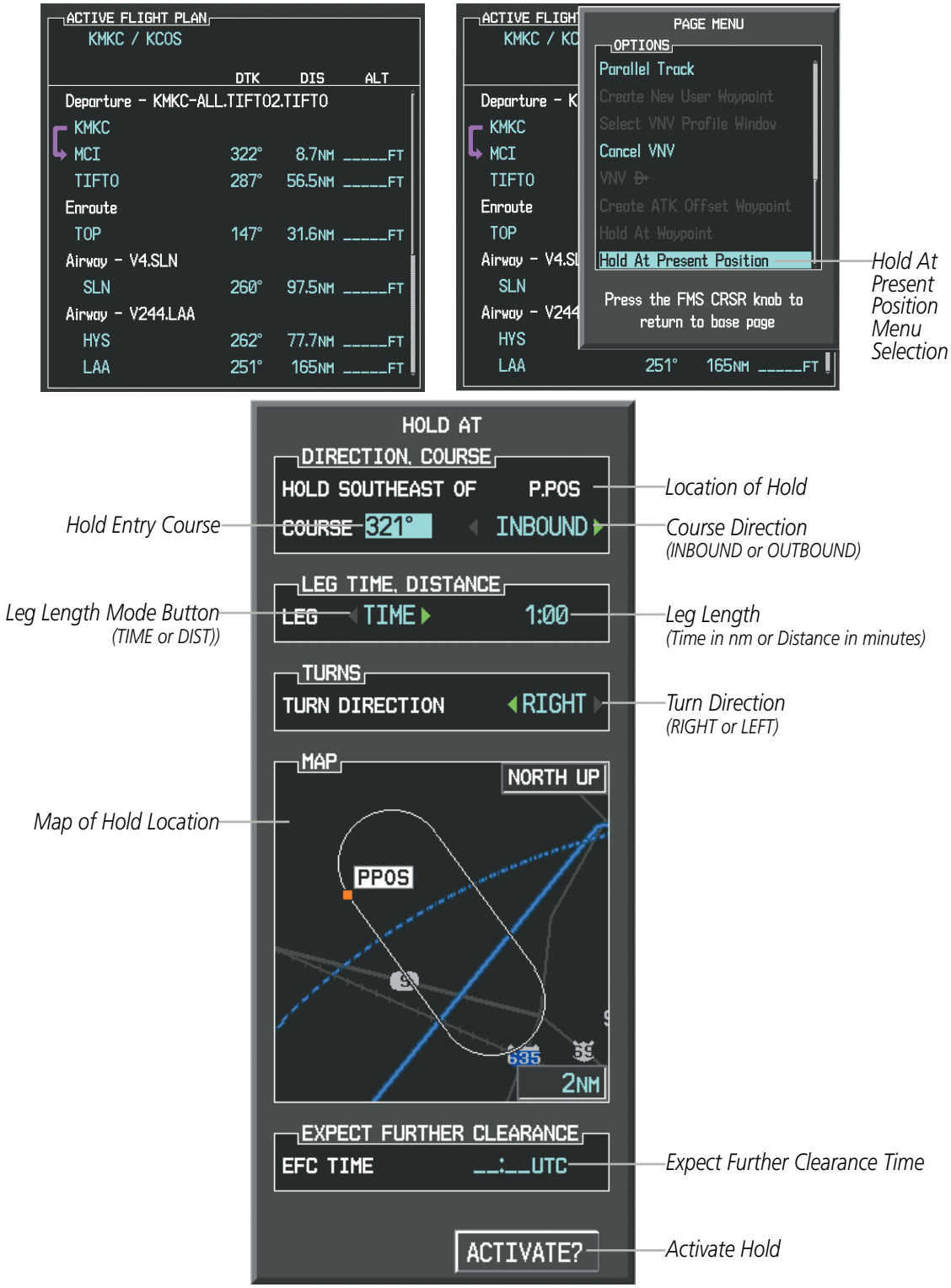


Figure 5-90 Creating a User Defined Holding Pattern at the Aircraft Present Position

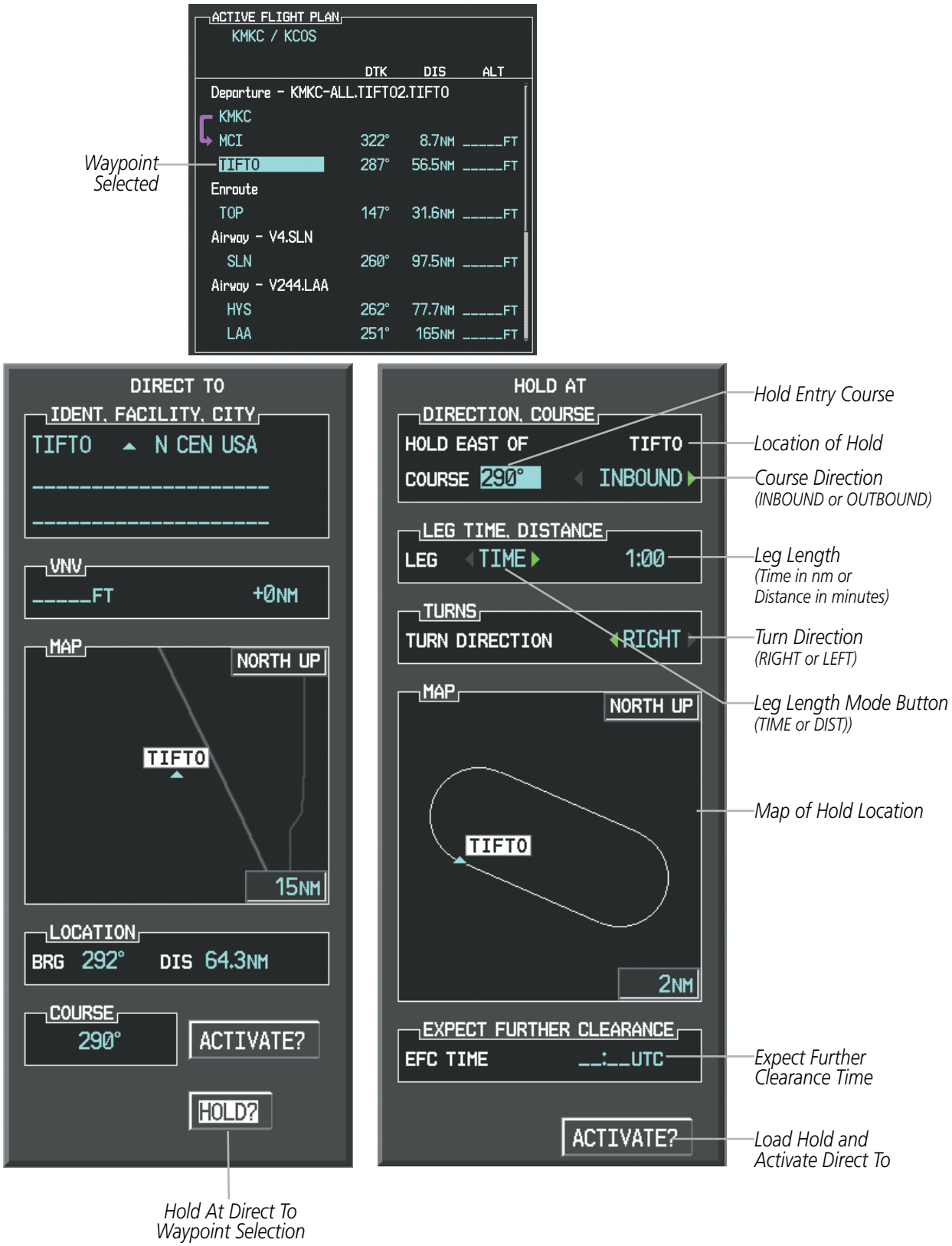


Figure 5-91 Creating a User Defined Holding Pattern at a Direct To Waypoint

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 G950 system Vertical Navigation (VNV) feature provides vertical profile guidance during the enroute and teminal 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.

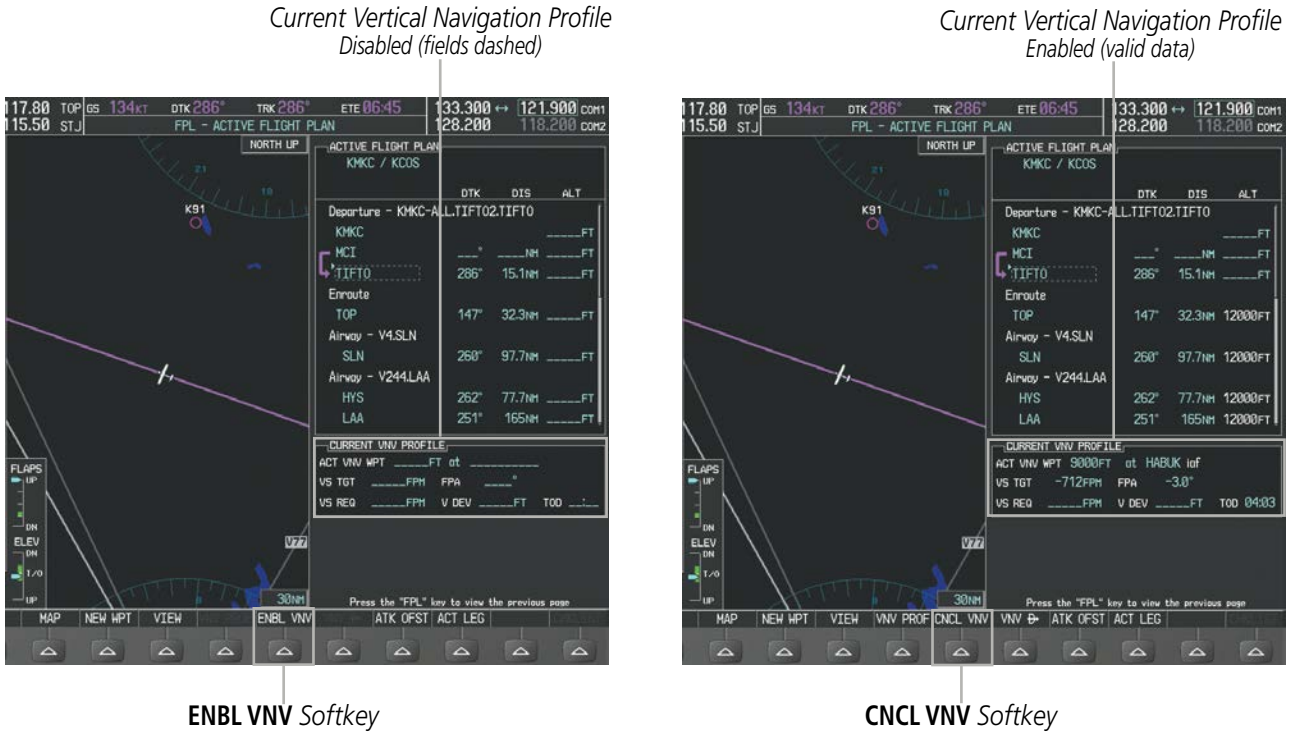


Figure 5-92 Enabling/Disabling Vertical Navigation

Enabling VNV guidance:

1) Press the **FPL** Key to display the Active Flight Plan Page on the MFD.
2) Press 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 CURRENT VNV PROFILE box (defaults first waypoint in the active flight plan with an altitude enabled for vertical navigation (e.g., HABUK)).

Disabling VNV guidance:

1) Press the **FPL** Key to display the Active Flight Plan Page on the MFD.
2) Press the **CNCL VNV** Softkey; or press the **MENU** Key, highlight 'Cancel VNV', and press the **ENT** Key. Vertical navigation is disabled.

Canceling vertical navigation results in vertical deviation (V DEV), vertical speed required (VS REQ), and time to top of descent/bottom of descent (TIME TO TOD/BOD) going invalid. The Vertical Deviation Indicator (VDI) and Required Vertical Speed Indication (RVSI) on the PFD are removed, and the V DEV, VS REQ, and TIME TO TOD items displayed in the CURRENT 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 G950 allows a vertical navigation direct-to to any waypoint in the active flight plan with an altitude constraint "designated" for vertical guidance. Pressing 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.

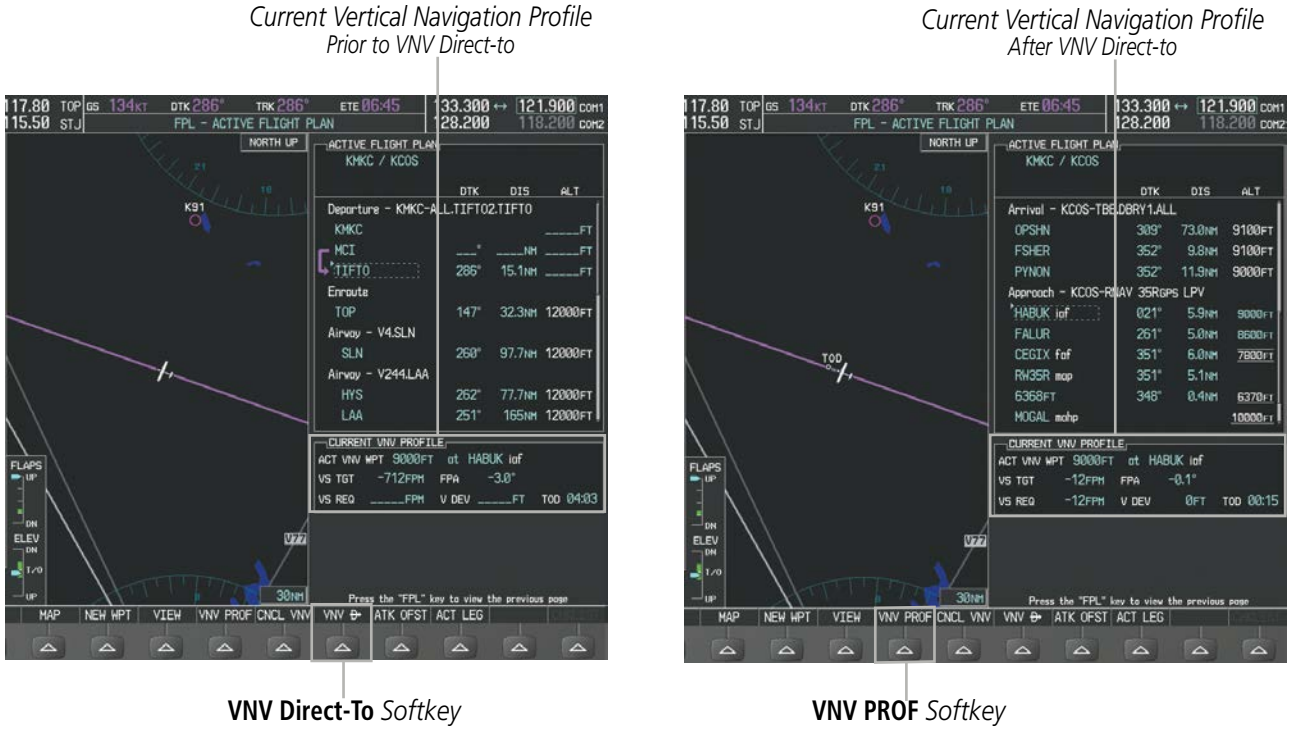


Figure 5-93 Vertical Navigation Direct-To

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.

   Or:

   Use the **Joystick** to place the Quick Select Box on 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) Press 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 CURRENT 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) Press 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 CURRENT 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 G950 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. The navigation database only contains altitudes for procedures that call for "Cross at" altitudes. If the procedure states "Expect to cross at," then the altitude is not in the database. In this case the altitude may be entered manually.

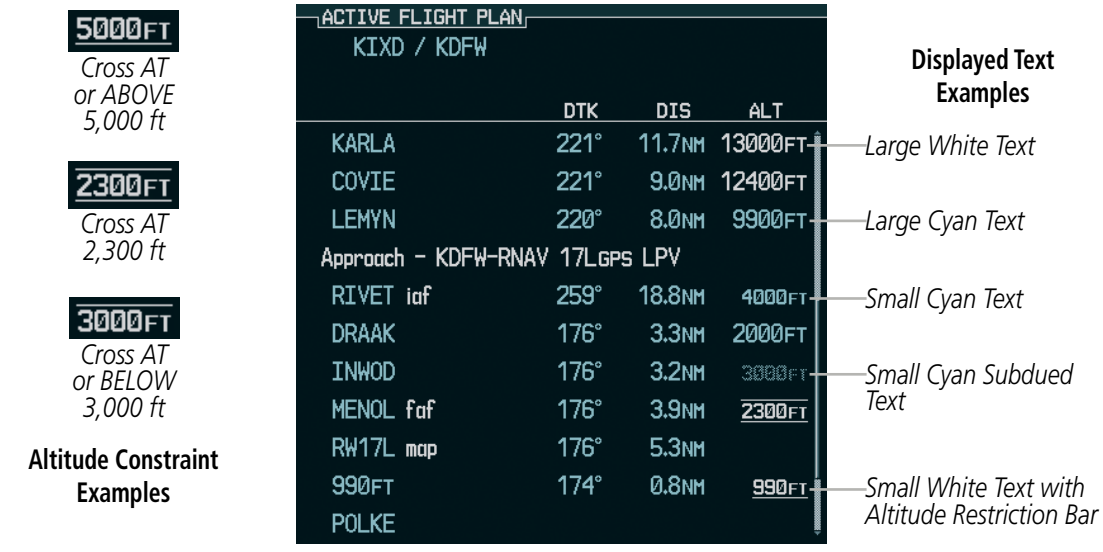


Figure 5-94 Waypoint Altitude Constraints

	White Text	Cyan Text	Cyan Subdued Text
Large Text	Altitude calculated by the system estimating the altitude of the aircraft as it passes over the navigation point. This altitude is provided as a reference and is not designated to be used in determining vertical speed and deviation guidance.	Altitude has been entered manually. Altitude is designated for use in giving vertical speed and deviation guidance. Altitude does not match the published altitude in navigation database or no published altitude exists.	The system cannot use this altitude in determining vertical speed and deviation guidance because of an invalid constraint condition
Small Text	Altitude is not designated to be used in determining vertical speed and deviation guidance. Altitude has been retrieved from the navigation database and is provided as a reference.	Altitude is designated for use in giving vertical speed and deviation guidance. Altitude has been retrieved from the navigation database or has been entered manually and matches a published altitude in the navigation database.	The system cannot use this altitude in determining vertical speed and deviation guidance because of an invalid constraint condition

Table 5-8 Altitude Constraint Size and Color Coding

Altitudes associated with approach procedures are "auto-designated". This means the system automatically uses the altitudes loaded with the 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.

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.

   Or:

   Use the **Joystick** to place the Quick Select Box on the desired waypoint altitude (MFD only).
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 turn to highlight the desired waypoint altitude.
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 G950 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/modifiying 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.

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 G950 displays the altitude restriction from the database provided no predicted altitude can be provided. The G950 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.

   Or:

   Use the **Joystick** to place the Quick Select Box on the desired waypoint altitude constraint (MFD only).
3) Press the **CLR** Key. A 'Remove VNV altitude constraint?' 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.

   Or:

   Use the **Joystick** to place the Quick Select Box on the desired waypoint altitude constraint (MFD only)
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.

   Or:

   Use the **Joystick** to place the Quick Select Box on the desired waypoint altitude constraint (MFD only).
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.

   Or:

   Use the **Joystick** to place the Quick Select Box on the desired waypoint altitude constraint (MFD only).
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 G950 can access the whole range of instrument procedures available. Departures (DPs), arrivals (STARs), and non-precision and precision approaches (APPRs) are stored within the database and can be loaded using the 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 departure and arrival 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 (6368 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 intitiate sequencing to the next leg displays 'MANSEQ' as the identifier.

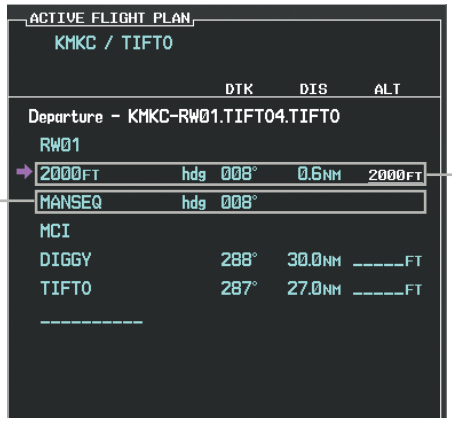


Figure 5-95 Procedure Leg Identifiers

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) Select a departure from the list and press the **ENT** Key.
5) Select a runway (if required) and press the **ENT** Key.
6) Select a transition (if required) and press the **ENT** Key. 'LOAD?' is highlighted.
7) Press the **ENT** Key to load the departure procedure.

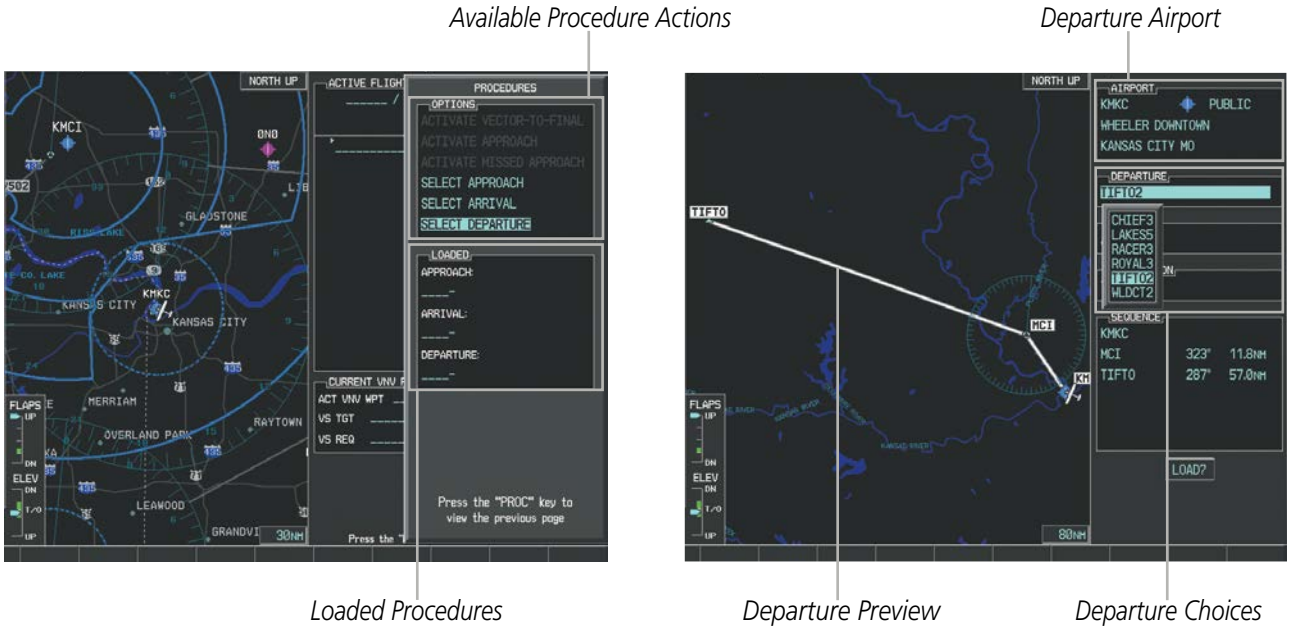


Figure 5-96 Departure Selection

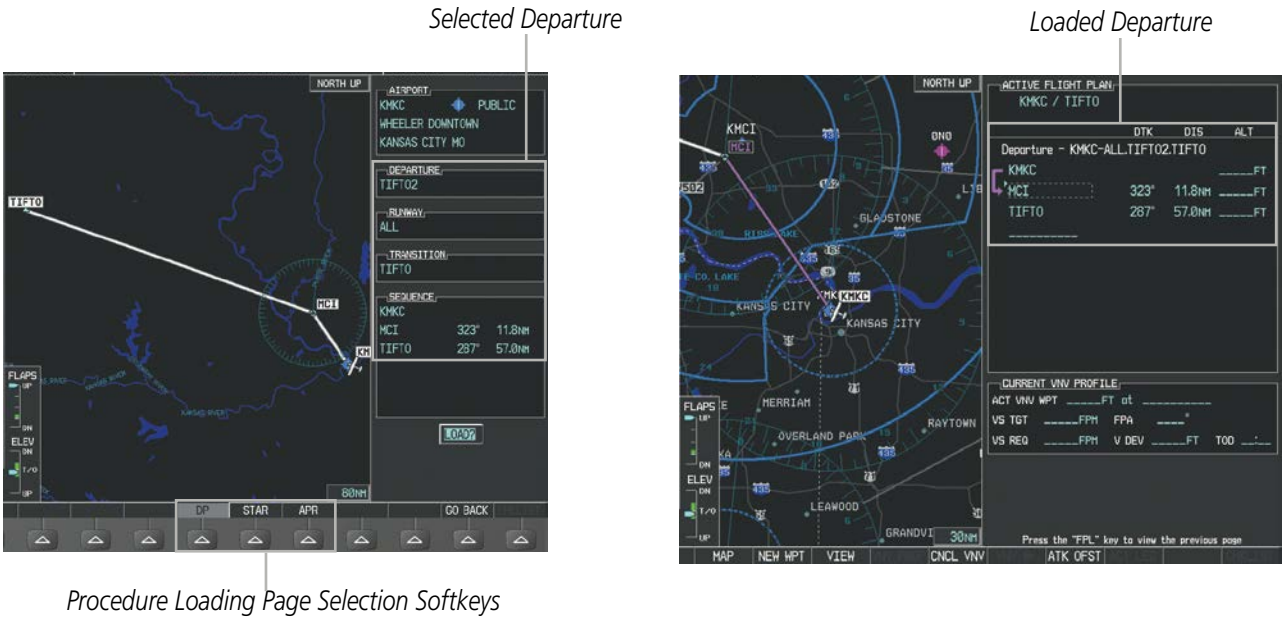


Figure 5-97 Departure Loading

Viewing available departures at an airport:

1) From the Airport Information Page (first page in the WPT group), press the **DP** Softkey. The Departure 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) Press the **FMS** Knob, then turn the large **FMS** Knob to highlight the Departure. The departure is previewed on the map.
4) Turn the small **FMS** Knob to view the available departures. Press the **ENT** Key to select the departure. The cursor moves to the Runway box. The departure is previewed on the map.
5) Turn the small **FMS** Knob to view the available runways. Press the **ENT** Key to select the runway. The cursor moves to the Transition box. The departure is previewed on the map.
6) 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. The departure 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 departure into the active flight plan from the Departure Information Page:

1) From the Airport Information Page (first page in the WPT group), press the **DP** Softkey. The Departure 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 departure, if desired.
   a) Turn the large **FMS** Knob to highlight the Departure. The departure is previewed on the map.
   b) Turn the small **FMS** Knob to view the available departures. Press the **ENT** Key to select the departure. The cursor moves to the Runway box. The departure is previewed on the map.
   c) Turn the small **FMS** Knob to view the available runways. Press the **ENT** Key to select the runway. The cursor moves to the Transition box (only if there are available transitions). The departure 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. The departure is previewed on the map.
4) Press the **MENU** Key to display the Departure Information Page Menu.
5) Turn the **FMS** Knob to highlight 'Load Departure'.
6) Press the **ENT** Key to load the departure procedure into the active flight plan.

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 **FMS** Knob, and turn to highlight the departure header in the active flight plan.

   Or:

   Use the **Joystick** to place the Quick Select Box on the departure header (MFD only).
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.

   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 active flight plan page menu.
3) Turn the **FMS** Knob to highlight 'Remove Departure'.
4) Press the **ENT** Key. A confirmation window is displayed listing the departure procedure.
5) With 'OK' highlighted, press the **ENT** Key. To cancel the removal request, highlight 'CANCEL' and press the **ENT** Key.

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) 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.

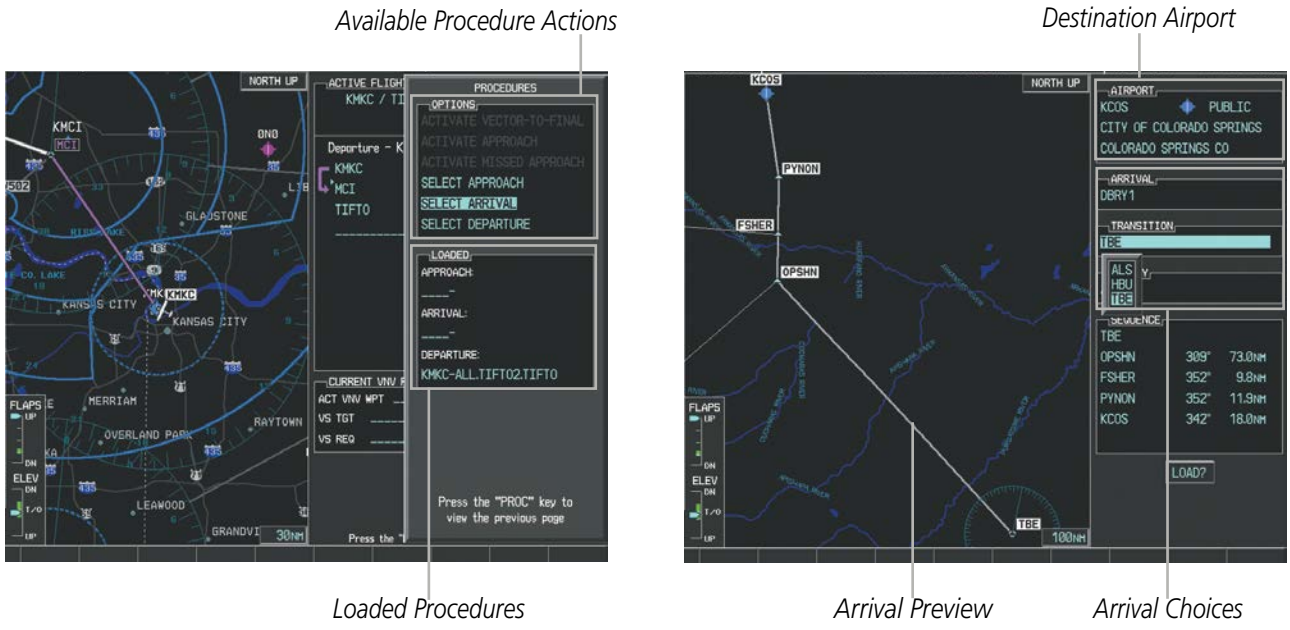


Figure 5-98 Arrival Selection

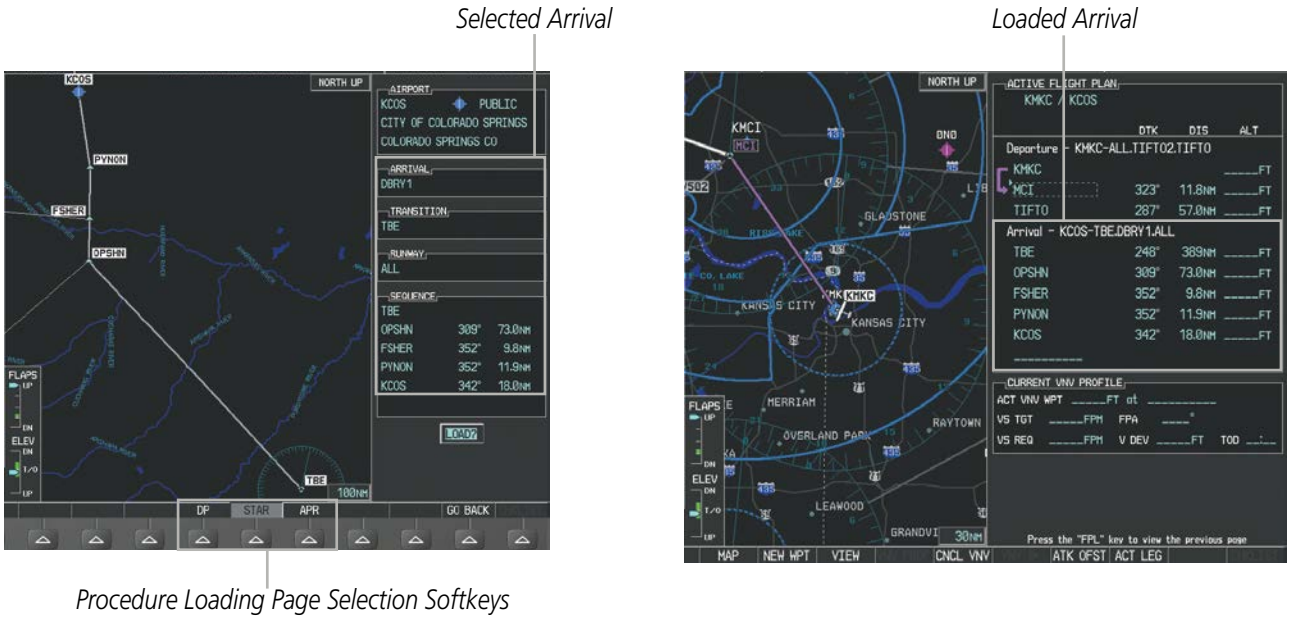


Figure 5-99 Arrival Loading

Viewing available arrivals at an airport:

1) From the Airport Information Page (first page in the WPT group), select the **STAR** Softkey. The Arrival 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) Press the **FMS** Knob, then turn the large **FMS** Knob to highlight the Arrival. The arrival is previewed on the map.
4) Turn the small **FMS** Knob to view the available arrivals. Press the **ENT** Key to select the arrival. The cursor moves to the Transition box. The arrival is previewed on the map.
5) Turn the small **FMS** Knob to view the available transitions. Press the **ENT** Key to select the transition. The cursor moves to the Runway box. The arrival is previewed on the map.
6) Turn the small **FMS** Knob to view the available runways. Press the **ENT** Key to select the runway. The cursor moves to the Sequence box. The arrival is previewed on the map.
7) Press the **INFO** Softkey to return to the Airport Information Page.

Loading an arrival into the active flight plan from the Arrival Information Page:

1) From the Airport Information Page (first page in the WPT group), press the **STAR** Softkey. The Arrival 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 arrival, if desired.
   a) Turn the large **FMS** Knob to highlight the arrival. The arrival is previewed on the map.
   b) Turn the small **FMS** Knob to view the available arrivals. Press the **ENT** Key to select the arrival. The cursor moves to the Transition box (only if there are available transitions). The arrival is previewed on the map.
   c) Turn the small **FMS** Knob to view the available transitions. Press the **ENT** Key to select the transition. The cursor moves to the Runway box. The arrival is previewed on the map.
   d) Turn the small **FMS** Knob to view the available runways. Press the **ENT** Key to select the runway. The cursor moves to the Sequence box. The arrival is previewed on the map.
4) Press the **MENU** Key to display the Arrival Information Page Menu.
5) Turn the **FMS** Knob to highlight 'Load Arrival'.
6) Press the **ENT** Key to load the arrival procedure into the active flight plan.

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 **FMS** Knob, and turn to highlight the arrival header in the active flight plan.

   Or:

   Use the Joystick to place the Quick Select Box on the arrival header (MFD only).
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.

   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, 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.

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 (APPR) 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 "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.

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 G950 SBAS GPS allows for flying LNAV, LNAV+V, LNAV/VNAV, LP, LP+V and LPV approach service levels according to the published chart. The '+V' designation adds advisory vertical guidance 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. 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)	
LPV (available only if SBAS available)	RNAV GPS approach using published LPV minima	

Table 5-9 Approach Types

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 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:

a) 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.*

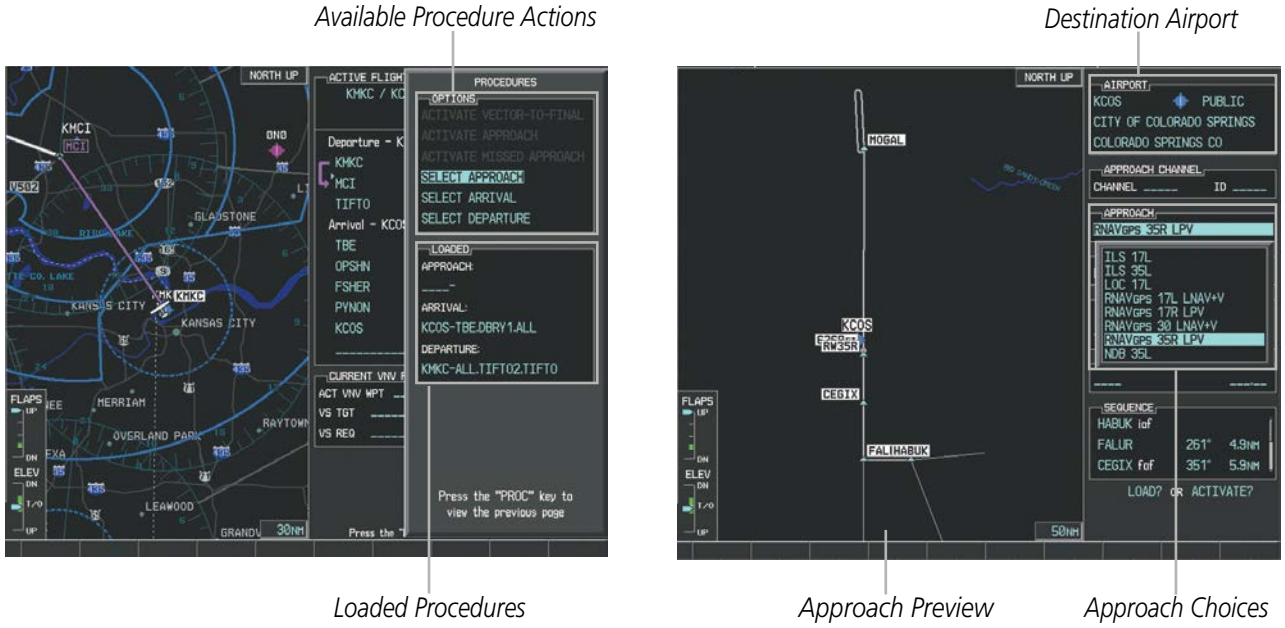


Figure 5-100 Approach Selection



Figure 5-101 Approach Loading

Viewing available approaches at an airport:

1) From the Airport Information Page (first page in the WPT group), press 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) Press the **FMS** Knob, then turn the large **FMS** Knob to highlight the Approach. The approach is previewed on the map.
4) Turn the small **FMS** Knob to view the available approaches. Press the **ENT** Key to select the approach. The cursor moves to the Transition box. The approach is previewed on the map.
5) Turn the small **FMS** Knob to view the available transitions. Press the **ENT** Key to select the transition. The cursor moves to the Minimums box. The approach is previewed on the map.
6) Turn the small **FMS** Knob to select minimums on or off. Press the **ENT** Key.
   a) When minimums are selected on, the cursor moves to the minimum altitude field . Use the small **FMS** Knob to select the altitude. Press the **ENT** Key.
   b) If temperature compensated minimums was selected, the cursor moves to the temperature field. Use the small **FMS** Knob to select the temperature. Press the **ENT** Key. The cursor moves to the Sequence box. The approach is previewed on the map.

   Or:

   a) When minimums are selected off, the cursor moves to the Sequence box. The approach is previewed on the map.
7) Press the **INFO-1** or the **INFO-2** Softkey to return to the Airport Information Page.

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:

a) 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 above 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.

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 **FMS** Knob, and turn to highlight the approach header in the active flight plan.

Or:

Use the **Joystick** to place the Quick Select Box on the approach header (MFD only)..

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.

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, 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.

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:

   Press the Go-Around Button.

In this missed approach procedure, the altitude immediately following the MAP (in this case '6368FT') 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 (6,368 feet) after crossing the MAP, a direct-to is established to provide a course on runway heading until an altitude of 6,368 feet is reached. After reaching 6,368 feet, a direct-to is established to the published MAHP (in this case MOGAL). If the aircraft altitude is above the specified altitude after crossing the MAP, a direct-to is established to the published fix (MOGAL) to begin the missed approach procedure..

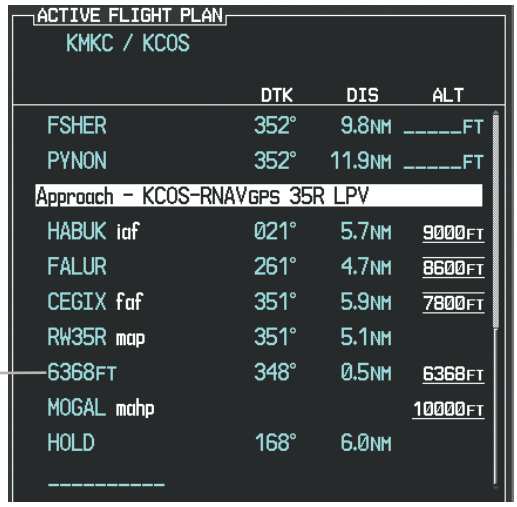


Figure 5-102 Course to Altitude

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.

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.

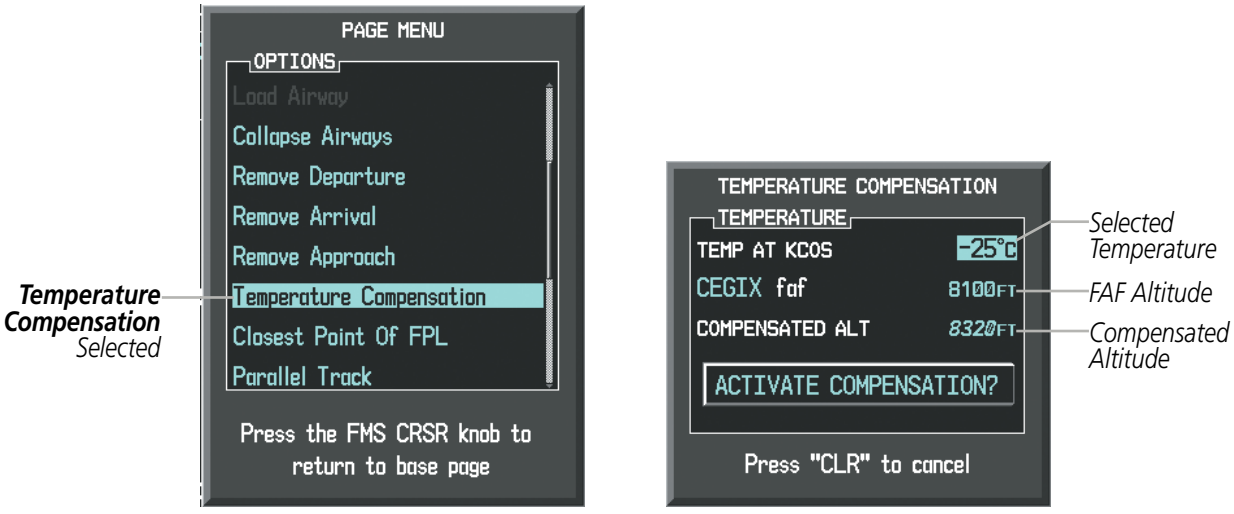


Figure 5-103 Temperature Compensation

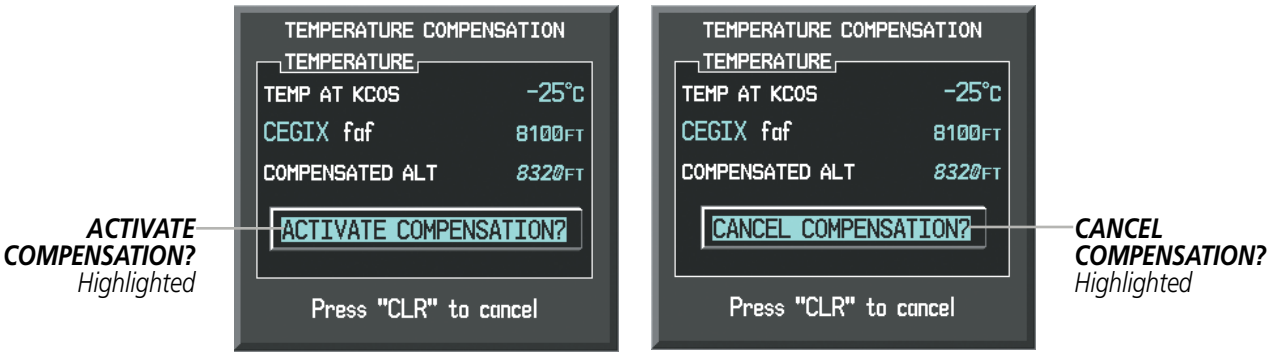


Figure 5-104 Activating/Cancelling Temperature Compensation

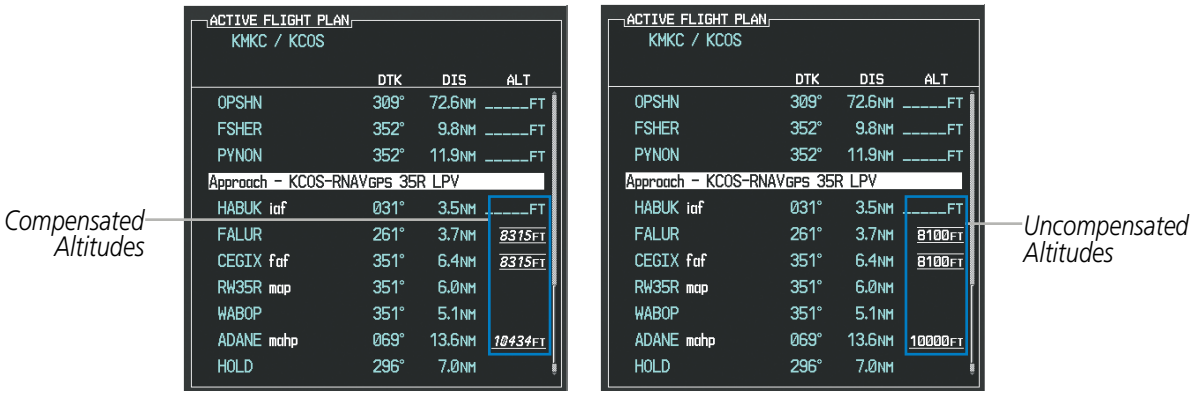


Figure 5-105 Temperature Compensation in the Active Flight Plan

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.*

5.9 TRIP PLANNING

The G950 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 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.

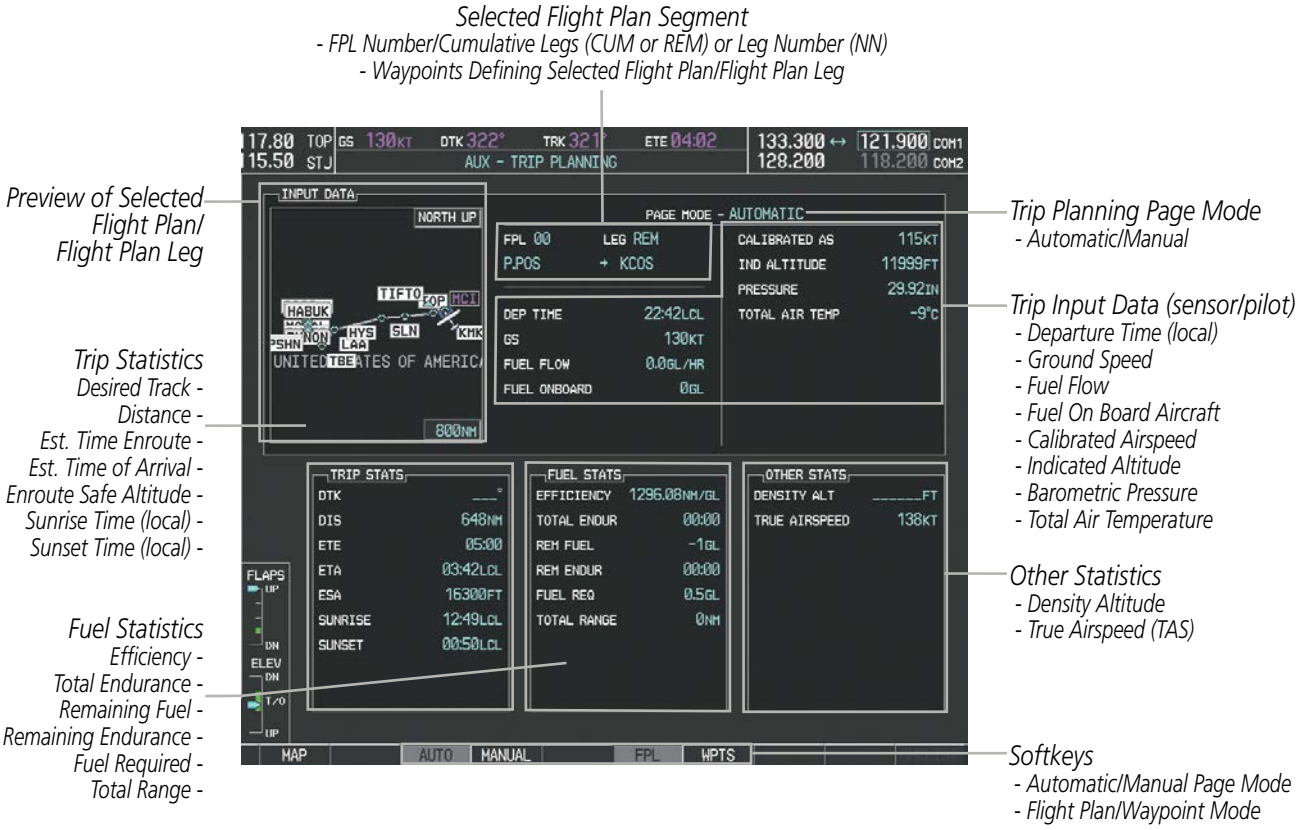


Figure 5-106 Trip Planning Page

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 (DEP 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 (CALIBRATED AS) - The primary source is from the air data system, and the secondary source of information is GPS ground speed.
- Indicated altitude (IND ALTITUDE) - The primary source is the barometric altitude, and the secondary source of information is GPS altitude.

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 (DTK) - DTK is shown as nnn° and is the desired track between the selected waypoints. It is dashed unless only a single leg is selected.
- Distance (DIS) - 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 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 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 and are the local 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 ENDUR) - 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 (REM 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 (REM ENDUR) - 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 REQ) - 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 (DENSITY ALT)
- True airspeed (TRUE AIRSPEED)

The pilot may select automatic (AUTO) or manual (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).

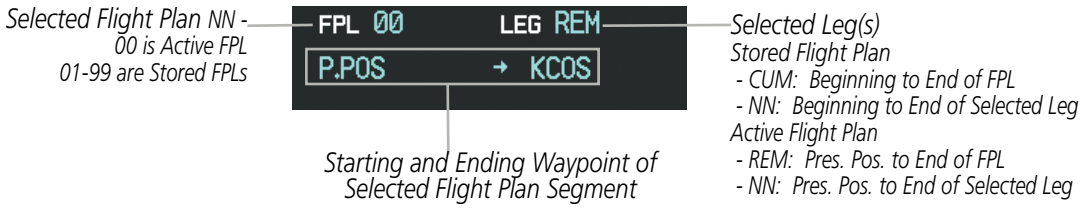


Figure 5-107 Trip Planning Page - Flight Plan Mode

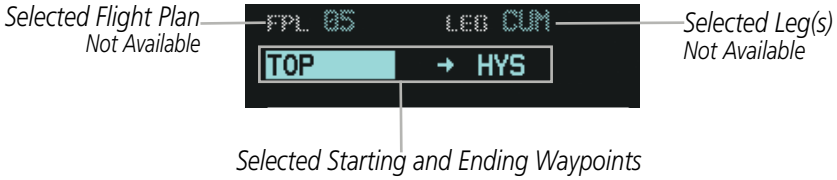


Figure 5-108 Trip Planning Page - Waypoint Mode

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) Press 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) Press 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 DEP 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 RAIM PREDICTION

RAIM (Receiver Autonomous Integrity Monitoring) 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 nm for oceanic, 2.0 nm for 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. RAIM prediction must be initiated manually if there is concern over SBAS coverage at the destination or some other reason that compromises navigation precision. If RAIM is not predicted to be available for the final approach course, the approach does not become active. If RAIM is not available when crossing the FAF, the missed approach procedure must be flown.

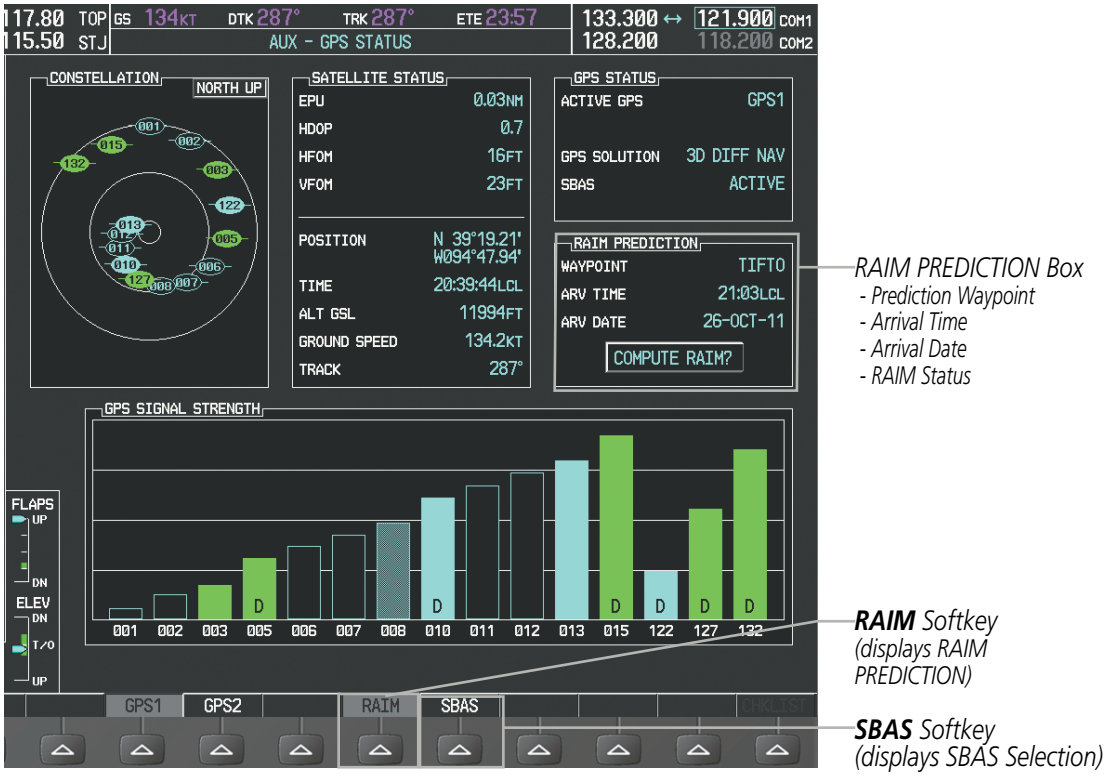


Figure 5-109 RAIM Prediction

Predicting RAIM availability at a selected waypoint:

1) Select the AUX-GPS Status Page.
2) Press the **FMS** Knob. The RAIM Prediction 'WAYPOINT' field is highlighted.
3) 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)

4) Enter the identifier, facility, or city name of the departure waypoint; or select a waypoint from the submenu of waypoints and press the **ENT** Key to accept the waypoint entry.

5) Turn the FMS Knobs to enter an arrival time and press the **ENT** Key.

6) Turn the FMS Knobs to enter an arrival date and press the **ENT** Key.

7) Press the **ENT** Key with 'COMPUTE RAIM?' highlighted to begin the computation.

Predicting RAIM availability at the aircraft present position:

1) Select the AUX-GPS Status Page.

2) Press the **FMS** Knob. The RAIM Prediction 'WAYPOINT' field is highlighted.

3) Press the **MENU** Key, highlight 'Set WPT to Present Position', and press the **ENT** Key.

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

5) Turn the FMS Knobs to enter an arrival time and press the **ENT** Key.

6) Turn the FMS Knobs to enter an arrival date and press the **ENT** Key.

7) Press the **ENT** Key with 'COMPUTE RAIM?' highlighted to begin the computation.

Status of the RAIM computation for the selected waypoint, time, and date is displayed at the bottom of the RAIM PREDICTION Box as follows:

- 'COMPUTE RAIM?' - RAIM has not been computed.
- 'COMPUTING AVAILABILITY' - RAIM calculation is in progress.
- 'RAIM AVAILABLE' - RAIM is predicted to be available.
- 'RAIM NOT AVAILABLE' - RAIM is predicted to be unavailable.

The Satellite Based Augmentation System (SBAS) provides increased navigation accuracy when available. SBAS can be enabled or disabled manually on the GPS Status Page.

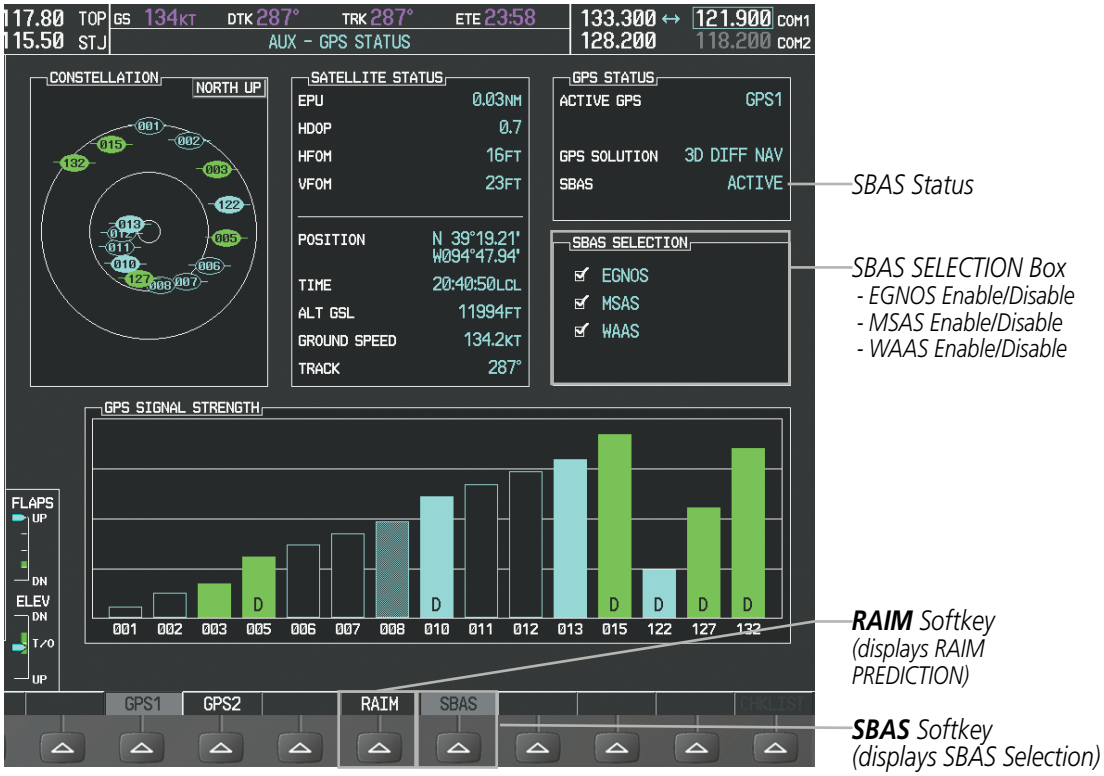


Figure 5-110 SBAS Display - Active

Enabling/Disabling SBAS:

1) Select the AUX-GPS Status Page.
2) 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 disable SBAS. Press the **ENT** Key again to enable SBAS.

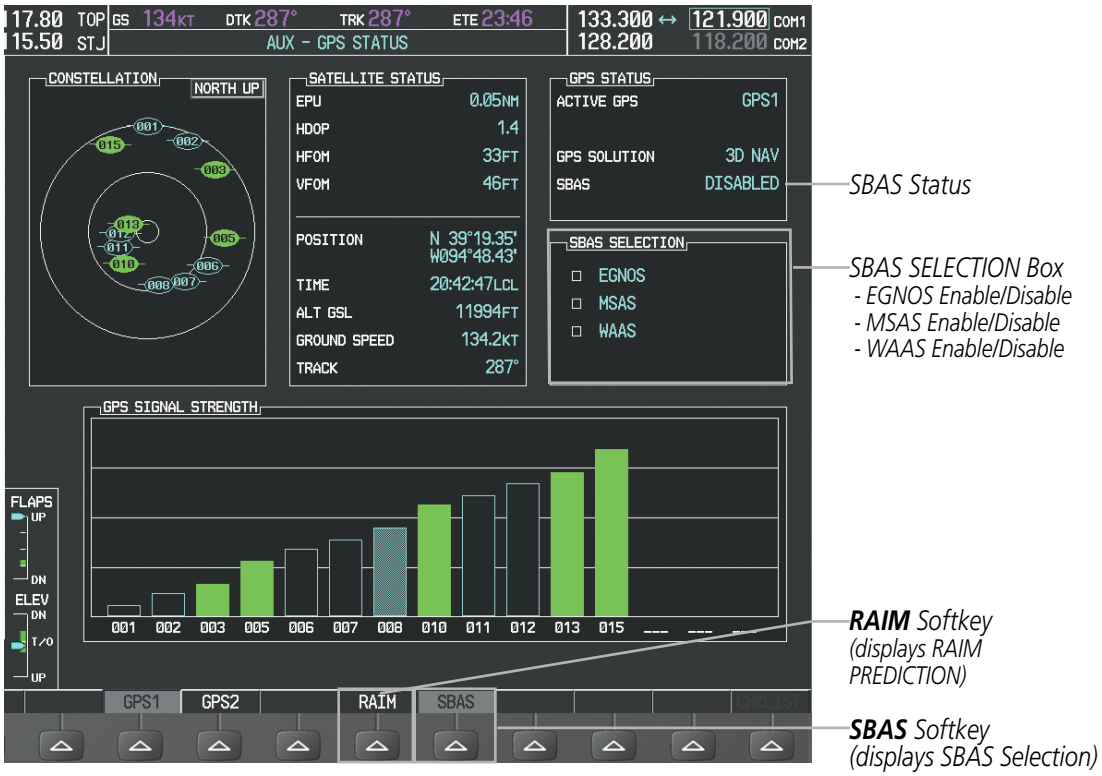


Figure 5-111 SBAS Display - Active

5.11 NAVIGATING A FLIGHT PLAN

The following discussion is an example of navigating a flight plan with the SBAS capable GPS system while the G950 provides vertical guidance through descents. A lateral flight plan (LNAV) would be navigated in much the same way, but would not include vertical guidance when the final approach course is active.

NOTE: *The following example flight plan is for instructional purposes only. All database information depicted should be considered not current.*

The example is a flight plan from KMKC to KCOS filed using the TIFTO2 departure, various Victor Airways, and the DBRY1 arrival with the transition at TBE. The flight plan includes an enroute altitude of 12,000 feet, an LPV (WAAS) approach selected for runway 35R, and a missed approach executed at the Missed Approach Point (MAP). A few enroute changes are demonstrated.

1) Prior to departure, the TIFTO2 departure, the airways, and the DBRY1 arrival at KCOS are loaded. See the Procedures section for loading departures and arrivals. Note the magenta arrow in Figure 5-112 indicating the active departure leg.

After takeoff, ATC assigns a heading of 240°.

2) Figure 5-112 shows the aircraft on the assigned heading of 240°. 'TERM' (Terminal) is the current CDI flight phase displayed on the HSI indicating 1.0 nm CDI scaling.



Figure 5-112 Assigned Heading of 240°

3) ATC now assigns routing to join V4. A heading of 290° is assigned to intercept V4. The aircraft turns to heading 290° as seen in Figure 5-113.

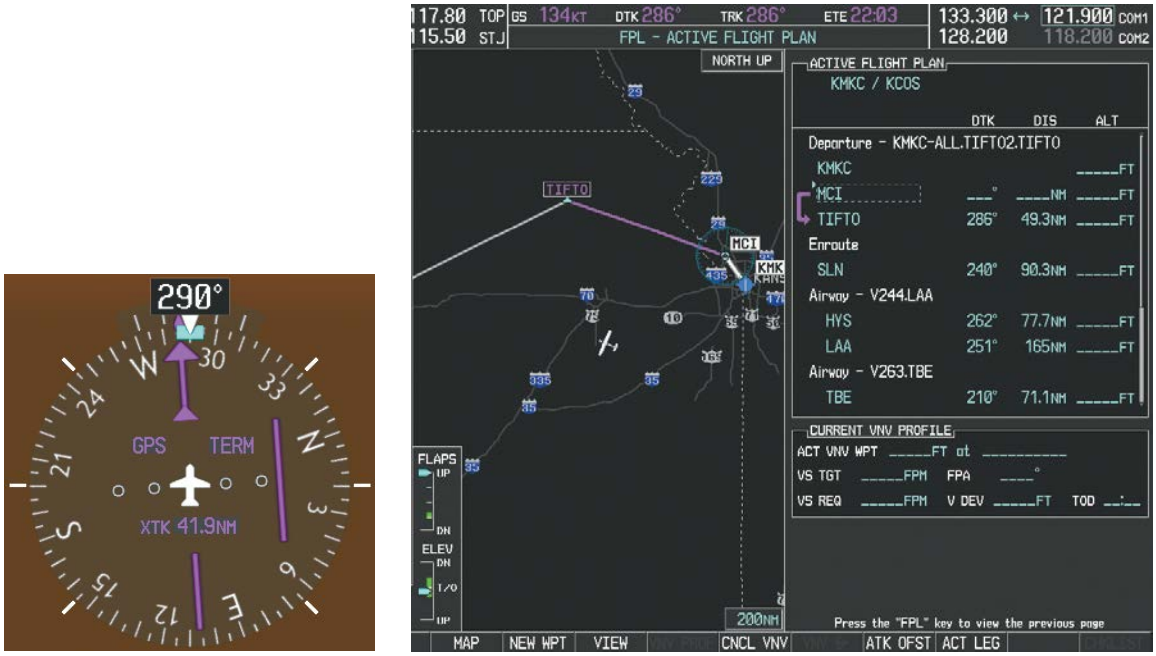


Figure 5-113 Assigned Heading of 290°

4) Enter V4 into the flight plan.

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

b) The desired entry point for V4 (TOP) must be entered. Turn the large **FMS** Knob to highlight the desired flight plan insertion point (SLN) as shown in Figure 5-114. When the V4 entry point (TOP) is inserted, it is placed immediately above the highlighted waypoint (SLN).

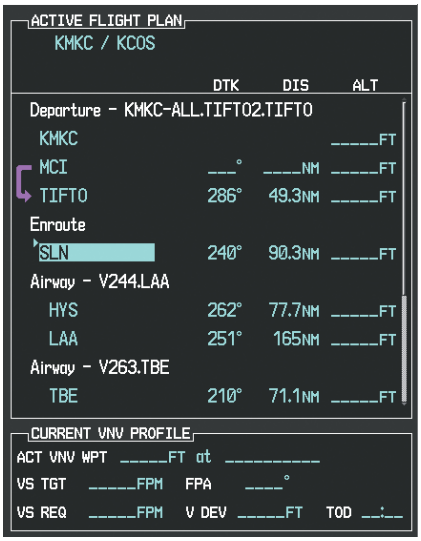


Figure 5-114 Begin Adding V4 to the Flight Plan

c) Turn the small **FMS** Knob to display the Waypoint Information Window. Enter the desired entry point for V4, Topeka VOR (TOP), as shown in Figure 5-115.



Figure 5-115 Entering V4 Entry Point

d) Press the **ENT** Key. TOP is inserted into the flight plan as in Figure 5-116.

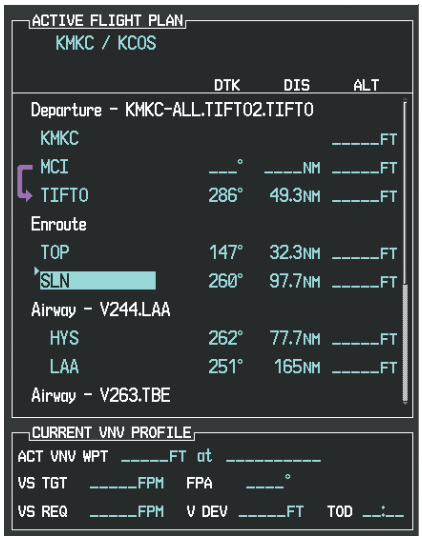


Figure 5-116 TOP Inserted into the Flight Plan

e) With SLN still highlighted as in Figure 5-116, turn the small **FMS** Knob clockwise. The Waypoint Information Page is displayed and the **LD AIRWY** Softkey is now available.

f) Press the **LD AIRWY** Softkey to display the list of available airways for TOP as seen in Figure 5-117.



Figure 5-117 List of Available Airways for TOP

g) Turn either **FMS** Knob to highlight V4 in the list as seen in Figure 5-117.

h) Press the **ENT** Key. The list of available exits for V4 is now displayed as in Figure 5-118.



Figure 5-118 List of Available Exits for V4

i) If necessary, turn either **FMS** Knob to select the desired exit. In this case Salina VOR (SLN) is selected as in Figure 5-118.

j) Press the **ENT** Key. The selected airway and exit are displayed, and the prompt "LOAD?" highlighted as in Figure 5-119.

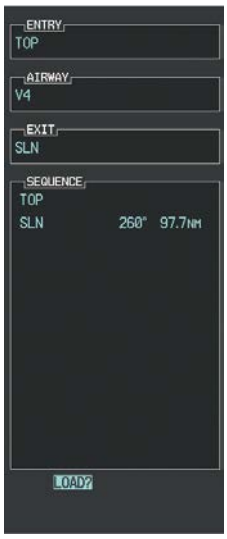


Figure 5-119 Ready to Load V4

k) Press the **ENT** Key.

l) V4 is now loaded into the flight plan as shown in Figure 5-120.

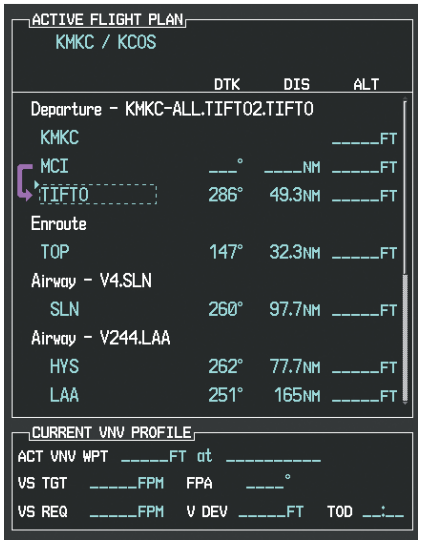


Figure 5-120 V4 is Loaded in the Flight Plan

5) Making V4 the active leg of the flight plan.

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

b) Turn the large **FMS** Knob to highlight SLN. The TO waypoint of the leg is selected in order to activate the leg.

c) Press the **ACT LEG** Softkey. The confirmation window is now displayed as in Figure 5-121. Note the TOP to SLN leg is actually part of V4.



Figure 5-121 Comfirm Active Leg

d) Verify the displayed leg is the desired leg and press the **ENT** Key. Note in Figure 5-122, the magenta arrow in the flight plan window and magenta line on the map indicating V4 is now the active flight plan leg. Note the phase of flight remained in Terminal (TERM) mode up to this point because a departure leg was active. Since a leg after the departure is now active, the current CDI flight phase is ENR (Enroute) and CDI scaling has changed to 2.0 nm.

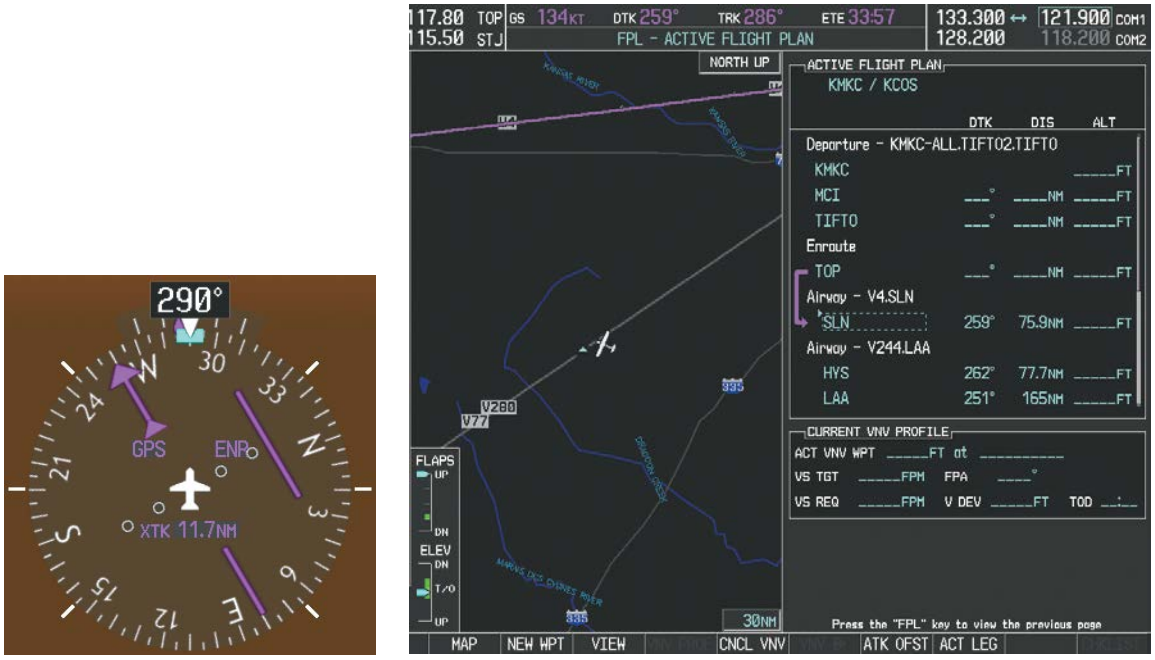


Figure 5-122 V4 Now Active Leg

6) The aircraft continues on heading 290°. When crosstrack distance is less than 2.0 nm, the XTK disappears from the HSI and the CDI is positioned on the last dot indicating a 2.0 nm distance from the centerline of the next course.

7) As the CDI approaches center, the aircraft turns onto the active leg as seen in Figure 5-123.

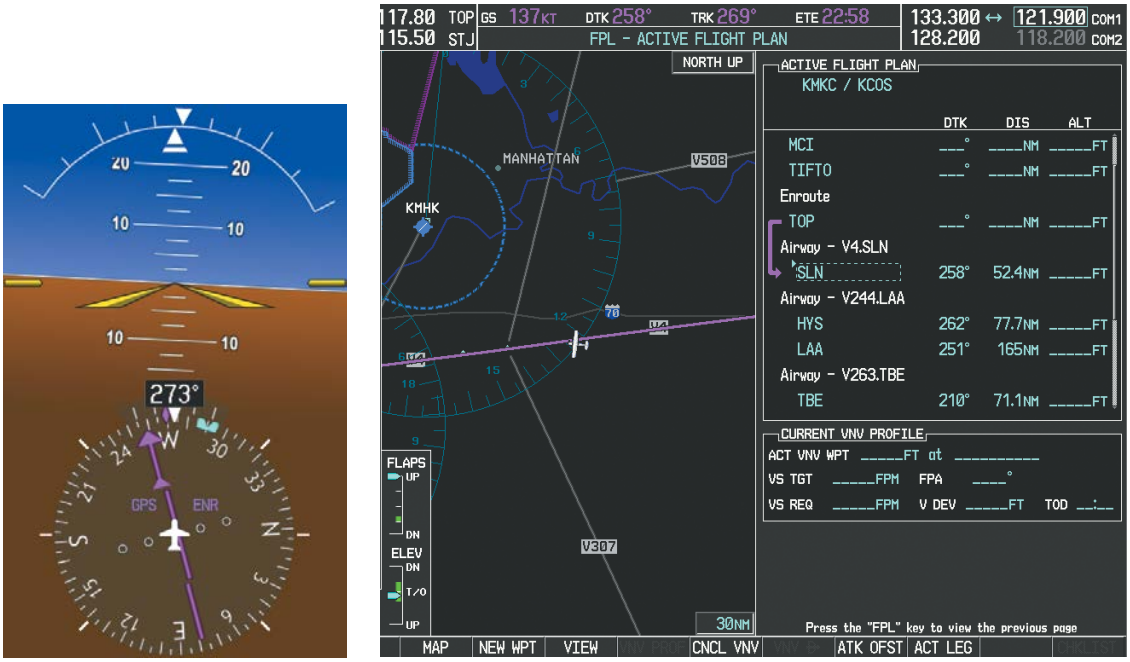


Figure 5-123 Turn on to Active Leg

8) At SLN, Victor Airway 244 (V244) is intercepted. Turn prompts are displayed in the PFD Navigation Status Box as seen in Figure 5-124.

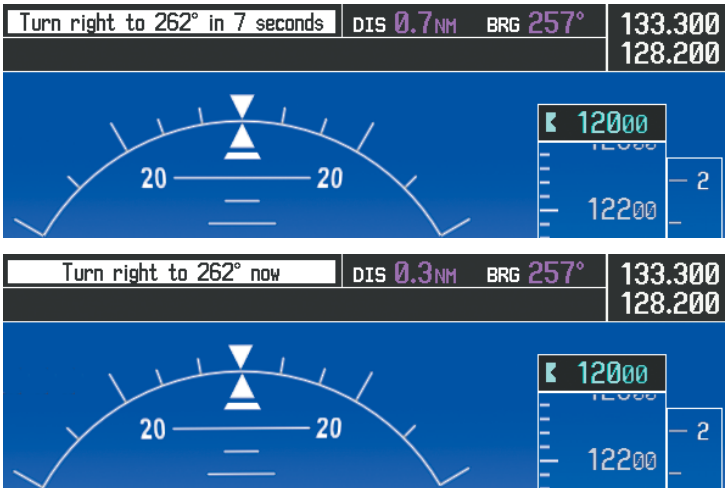


Figure 5-124 Turn to Intercept V244

9) As seen in Figure 5-125, V244 is now the active flight plan leg.

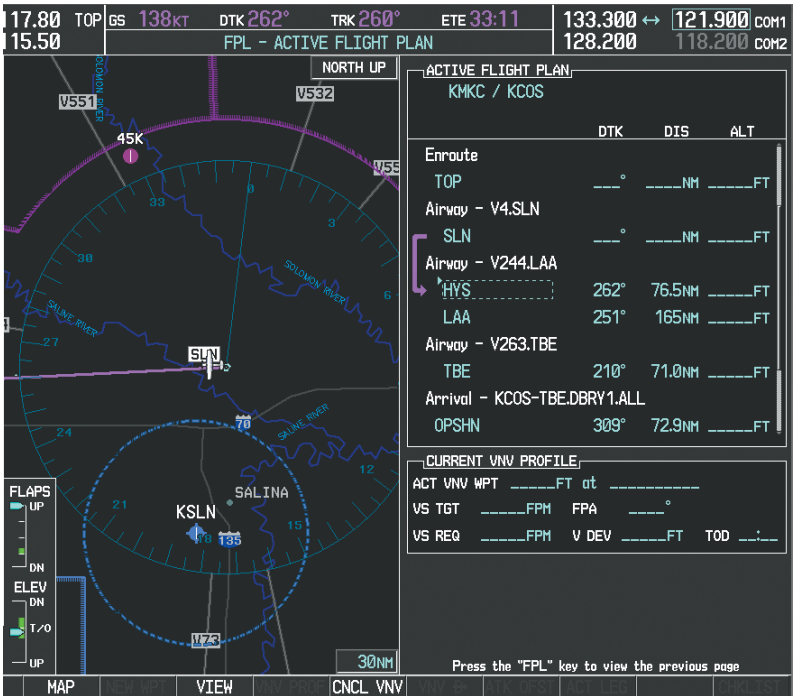


Figure 5-125 V244 Now Active Leg

10) At Lamar VOR (LAA) V263 is intercepted. See Figure 5-126.



Figure 5-126 HYS to LAA Leg Active

11) ATC grants clearance to proceed direct to the OPSHN intersection to begin the arrival procedure. ATC advises to expect an altitude of 10,000 feet at OPSHN.

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

b) Turn the large **FMS** Knob to select OPSHN in the flight plan list.

c) Press the **Direct-to (D▸)** Key. The Direct-to Window is now displayed as shown in Figure 5-127.

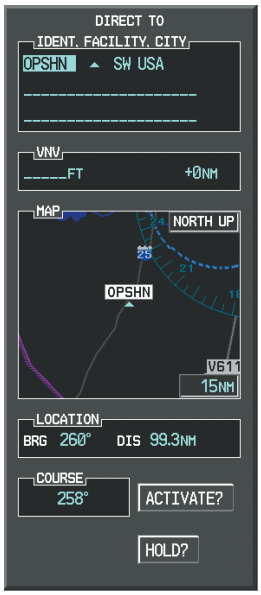


Figure 5-127 Direct To OPSHN

d) Turn the large **FMS** Knob to place the cursor in the VNV altitude field as shown in Figure 5-128.

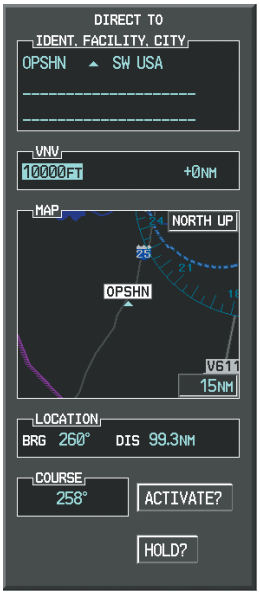


Figure 5-128 Enter VNV Altitude

e) An altitude of 10,000 feet is entered as requested by ATC.

f) Press the **ENT** Key. The cursor is now displayed in the VNV offset field as shown in Figure 5-129.



Figure 5-129 Enter VNV Offset Distance

g) Enter the offset, or distance from the waypoint at which to reach the selected altitude. In this case, three miles prior to OPSHN is entered. In other words, the G950 gives vertical guidance so the aircraft arrives at an altitude of 10,000 feet three miles prior to OPSHN.

h) Press the **ENT** Key twice to activate the direct-to. Note, in Figure 5-130, the magenta arrow indicating the direct-to OPSHN after the offset waypoint for OPSHN. The preceding offset waypoint indicates the offset distance and altitude that were previously entered. The remaining waypoints in the loaded arrival procedure have no database specified altitudes, therefore, dashes are displayed. Keep the CDI centered and maintain a track along the magenta line to OPSHN.

Note the Direct-to waypoint is within the loaded arrival procedure, therefore, phase of flight scaling for the CDI changes to Terminal Mode and is annunciated by displaying 'TERM' on the HSI.

NOTE: *If the loaded arrival procedure has waypoints with altitude constraints retrieved from the database that will be used as is, the altitude must be manually accepted by placing the cursor over the desired altitude, then pressing the ENT Key. The altitude is now displayed as cyan meaning it will be used by the system to determine vertical speed and deviation guidance.*



Figure 5-130 Direct-to Active

12) The aircraft is proceeding to OPSHN. The expected approach is the RNAV LPV approach to runway 35R, so it is selected.

a) Press the **PROC** Key to display the Procedures Window.

b) 'SELECT APPROACH' should be highlighted as shown in Figure 5-131.

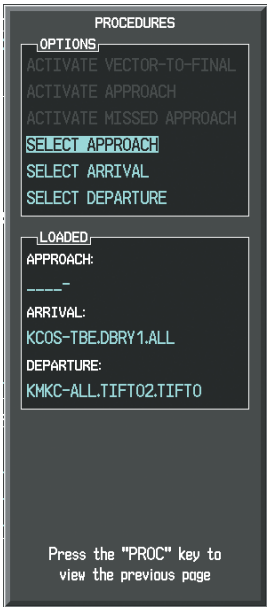


Figure 5-131 Procedures Window

c) Press the **ENT** Key. A list of available approaches for the destination airport is displayed as in Figure 5-132.



Figure 5-132 List of Available Approaches

d) Turn either **FMS** Knob to select the LPV approach for 35R as shown in Figure 5-132.

e) Press the **ENT** Key. A list of available transitions for the selected approach is displayed as in Figure 5-133.



Figure 5-133 List of Available Transitions

f) Turn either **FMS** Knob to select the desired transition. In this case, the Initial Approach Fix (IAF) at HABUK is used.

g) Press the **ENT** Key.

h) Barometric Minimums (Figure 5-134)

To set 'MINIMUMS', turn the small **FMS** Knob to select 'BARO', and press the **ENT** Key. Turn the small **FMS** Knob to select the altitude, and press the **ENT** Key.

Or:

To skip setting minimums, press the **ENT** Key.

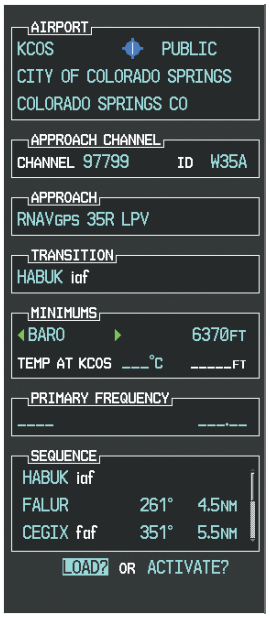


Figure 5-134 Barometric Minimums Set

i) With 'LOAD?' highlighted, again press the **ENT** Key. The selected approach is added to the flight plan as seen in Figure 5-135.



Figure 5-135 Loaded Approach

13) Note the altitude constraints associated with each of the approach waypoints as seen in Figure 5-136. These altitudes are loaded from the database and are displayed as cyan text, indicating these values are "designated" for use in computing vertical deviation guidance.

Note: To no longer use the displayed altitude for calculating vertical deviation guidance, perform the following:

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

b) Turn the small **FMS** Knob to highlight the desired altitude.

c) Press the **CLR** Key.

d) Press the **FMS** Knob to deactivate the cursor.

After making the altitude "non-designated", it is displayed as white text.

Altitude constraint values associated with the Final Approach Fix (FAF) and waypoints beyond the FAF cannot be designated for vertical guidance. These altitude values are always displayed as white text, as in Figure 5-136. Vertical guidance from the FAF and on to the Missed Approach Point (MAP) is given using the SBAS GPS altitude source, therefore, the displayed altitude values are for reference only.

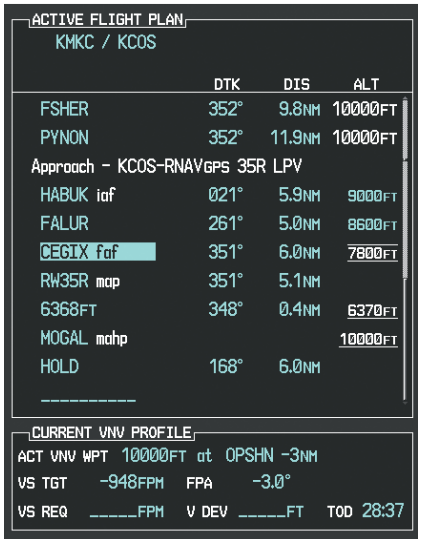


Figure 5-136 Vertical Guidance is Active to the FAF

14) As the aircraft approaches OPSHN, it may be desirable to adjust the speed, or steepness of the upcoming descent. The default Flight Path Angle (FPA) is -3.0 degrees and a required vertical speed is computed to maintain the -3.0 FPA. To change the vertical flight path, perform the following steps.

a) Press the **VNV PROF** Softkey to place the cursor in the target vertical speed field (VS TGT) as shown in Figure 5-137.

b) At this point, the descent vertical speed can be selected, or the FPA can be selected. Turn the large **FMS** Knob to select the desired selection field, then turn the small **FMS** Knob to enter the desired value.

Note the information now displayed in the 'CURRENT VNV PROFILE' box. Also, note the offset waypoint (orange box) and gray circle are now displayed on the map. The gray circle marks the Top of Descent (TOD). In this example, vertical guidance is provided at the TOD that results in a -3.0 degree FPA descent to an altitude of 10,000 feet upon reaching the offset waypoint.



Figure 5-137 Adjusting the Descent

c) Press the **ENT** Key.

15) As seen in Figure 5-138, the aircraft is approaching TOD. Note the target vertical speed required to reach the selected altitude. The Vertical Deviation Indicator (VDI) and the Required Vertical Speed Indicator (RVSI) are now displayed on the PFD as shown in Figure 5-139. When the aircraft is within one minute of the TOD, it is annunciated as shown in Figure 5-139, and an aural alert 'Vertical track' will be heard.



Figure 5-138 Approaching Top of Descent (TOD)

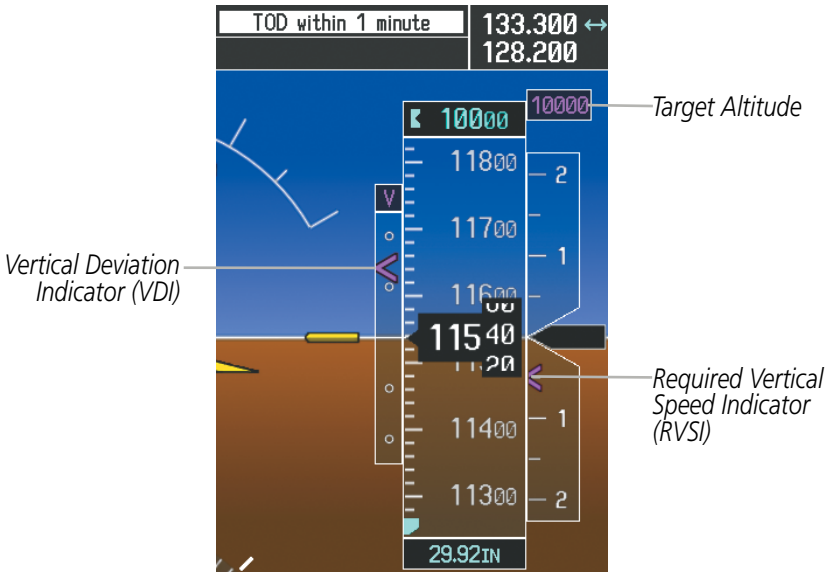


Figure 5-139 VDI & RVSI Upon Reaching Top of Descent (TOD)

16) Upon reaching TOD, a descent vertical speed is established which places the VSI pointer in line with the RVSI as shown in Figure 5-140.

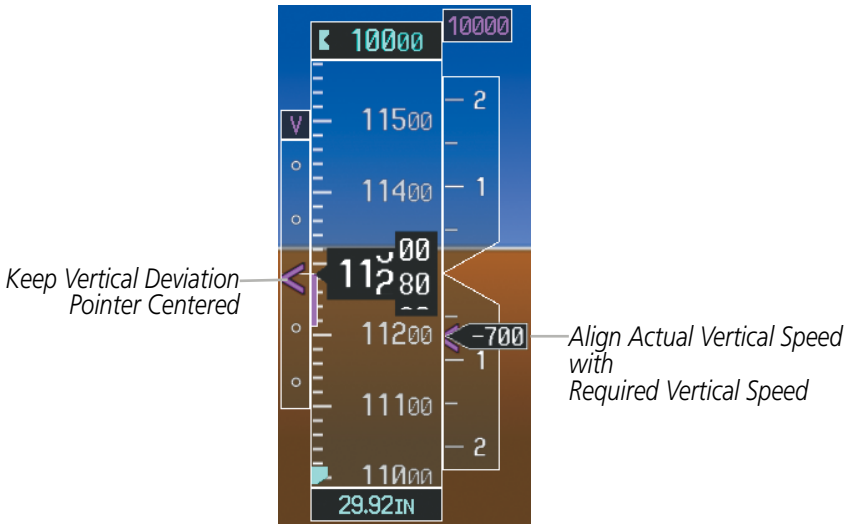


Figure 5-140 VDI & RVSI Showing Correctly Established Descent

17) When the aircraft is one minute from the bottom of descent (BOD) it is annunciated as shown in Figure 5-141. Upon reaching the offset waypoint for OPSHN, the aircraft is at 10,000 feet.

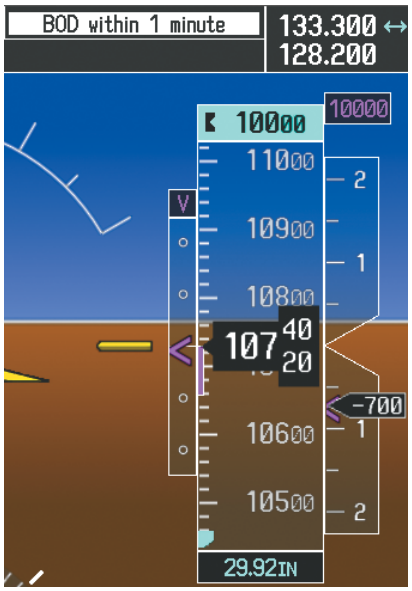


Figure 5-141 Approaching Bottom of Descent (BOD) at OPSHN Offset Waypoint

18) The aircraft is approaching OPSHN. The upcoming turn and next heading are annunciated at the top left of the PFD as seen in Figure 5-142. Initiate the turn and maneuver the aircraft on a track through the turn radius to intercept the magenta line for the OPSHN to FSHER leg and center the CDI.



Figure 5-142 Turn to intercept OPSHN to FSHER Leg

19) After passing OPSHN, the next leg of the arrival turns magenta as shown in Figure 5-143. The magenta arrow in the flight plan list now indicates the OPSHN to FSHER leg of the arrival procedure is now active.



Figure 5-143 Tracking the OPSHN to FSHER Leg

20) The flight continues through the arrival procedure to PYNON (see Figure 5-144). At a point 31 nm from the destination airport, the phase of flight scaling for the CDI changes to Terminal Mode and is annunciated by displaying 'TERM' on the HSI.

A descent to HABUK is in the next leg. Note the TOD point on the map. Annunciations for the upcoming turn and descent, as well as the VDI and RVSI, appear on the PFD as the flight progresses.

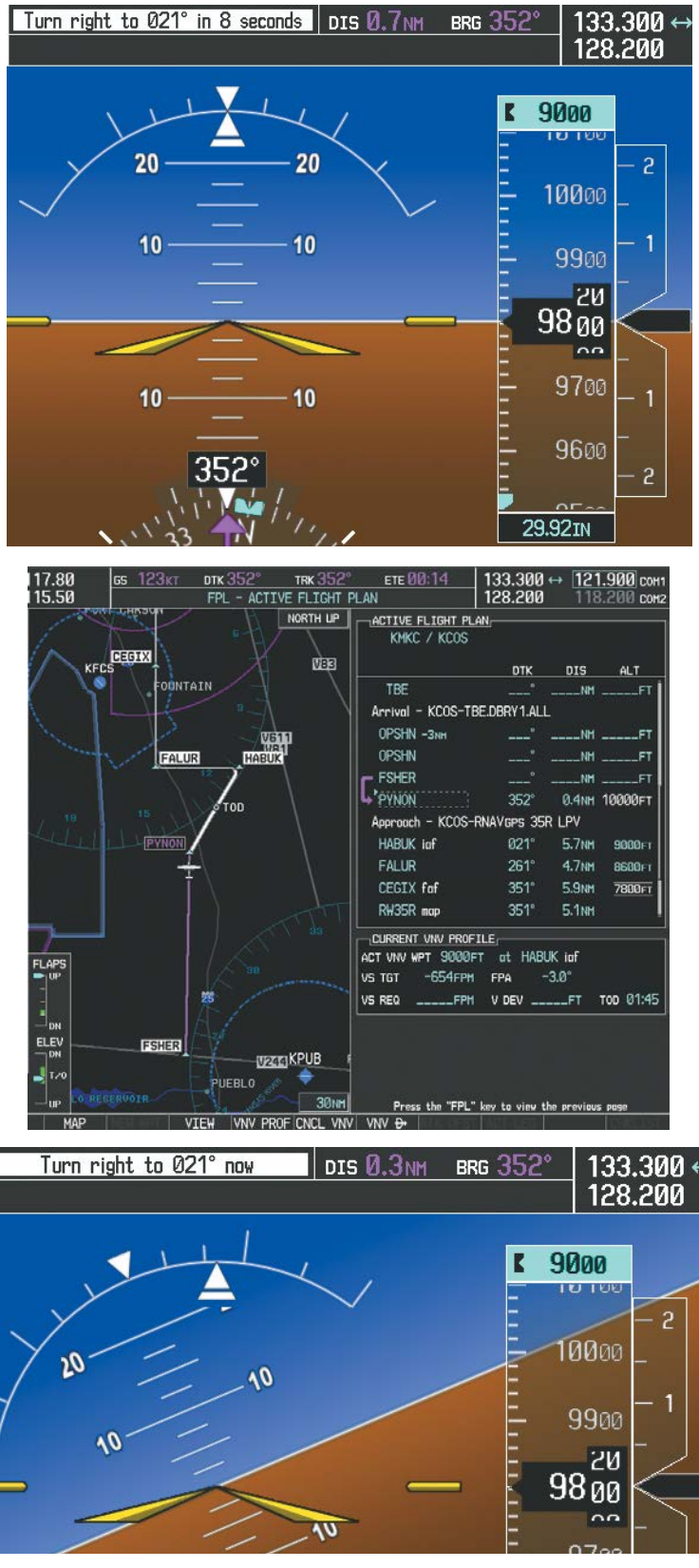


Figure 5-144 Approaching PYNON

21) Upon passing PYNON the approach procedure automatically becomes active. The approach may be activated at any point to proceed directly to the IAF. In this example, the aircraft has progressed through the final waypoint of the arrival and the flight plan has automatically sequenced to the IAF as the active leg, activating the approach procedure (see Figure 5-145).



Figure 5-145 Approach is Now Active

Note: To manually activate the approach procedure, perform the following steps:

a) Press the **PROC** Key.

b) Turn the large **FMS** Knob to highlight 'ACTIVATE APPROACH' as shown in Figure 5-146.

c) Press the **ENT** Key to activate the approach.

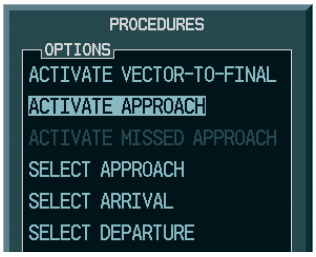


Figure 5-146 Manually Activate Approach

22) The IAF is the next waypoint. At the TOD, establish a descent vertical speed as previously discussed in Step 16. The aircraft altitude is 9,000 feet upon reaching HABUK.

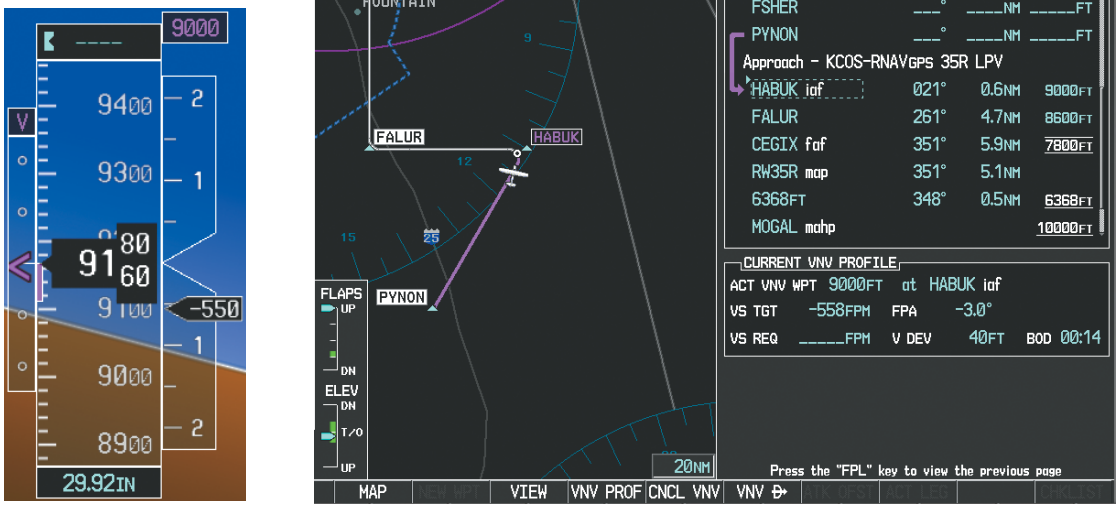


Figure 5-147 Descending Turn to the Initial Approach Fix (IAF)

23) After crossing FALUR the next waypoint is the FAF. The flight phase changes to LPV on the HSI indicating the current phase of flight is in Approach Mode and the approach type is LPV. CDI scaling changes accordingly and is used much like a localizer when flying an ILS approach. The RVSI is no longer displayed and the VDI changes to the Glidepath Indicator (as shown in Figure 5-148) when the final approach course becomes active.



Figure 5-148 Descending to the FAF

The descent continues through the FAF (CEGIX) using the Glidepath Indicator, as one would use a glideslope indicator, to obtain an altitude "AT" 7,800 feet at the FAF. Note the altitude restriction lines over and under (At) the altitude in the 'ALT' field in Figure 5-148.

24) After crossing CEGIX, the aircraft continues following the glidepath to maintain the descent to "AT or ABOVE" 6,370 feet at the Missed Approach Point (MAP) (RW35R) as seen in Figure 5-149.



Figure 5-149 Descending to the Missed Approach Point

In this missed approach procedure, the altitude immediately following the MAP (in this case '6368FT') 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 Jeppesen, 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 (6,368 feet) after crossing the MAP, a direct-to is established to provide a course on runway heading until an altitude of 6,368 feet is reached. After reaching 6,368 feet, a direct-to is established to the published MAHP (in this case MOGAL). If the aircraft altitude is above the specified altitude after crossing the MAP, a direct-to is established to the published fix (MOGAL) to begin the missed approach procedure.

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.

25) Upon reaching the MAP, it is decided to execute a missed approach. Automatic waypoint sequencing is suspended past the MAP. Press the **SUSP** Softkey on the PFD to resume automatic waypoint sequencing through the missed approach procedure.

A direct-to is initiated to MOGAL, which is the Missed Approach Hold Point (MAHP) as seen in Figure 5-150. The aircraft is climbing to 10,000 feet. The CDI flight phase now changes from LPV to MAPR as seen on the HSI.

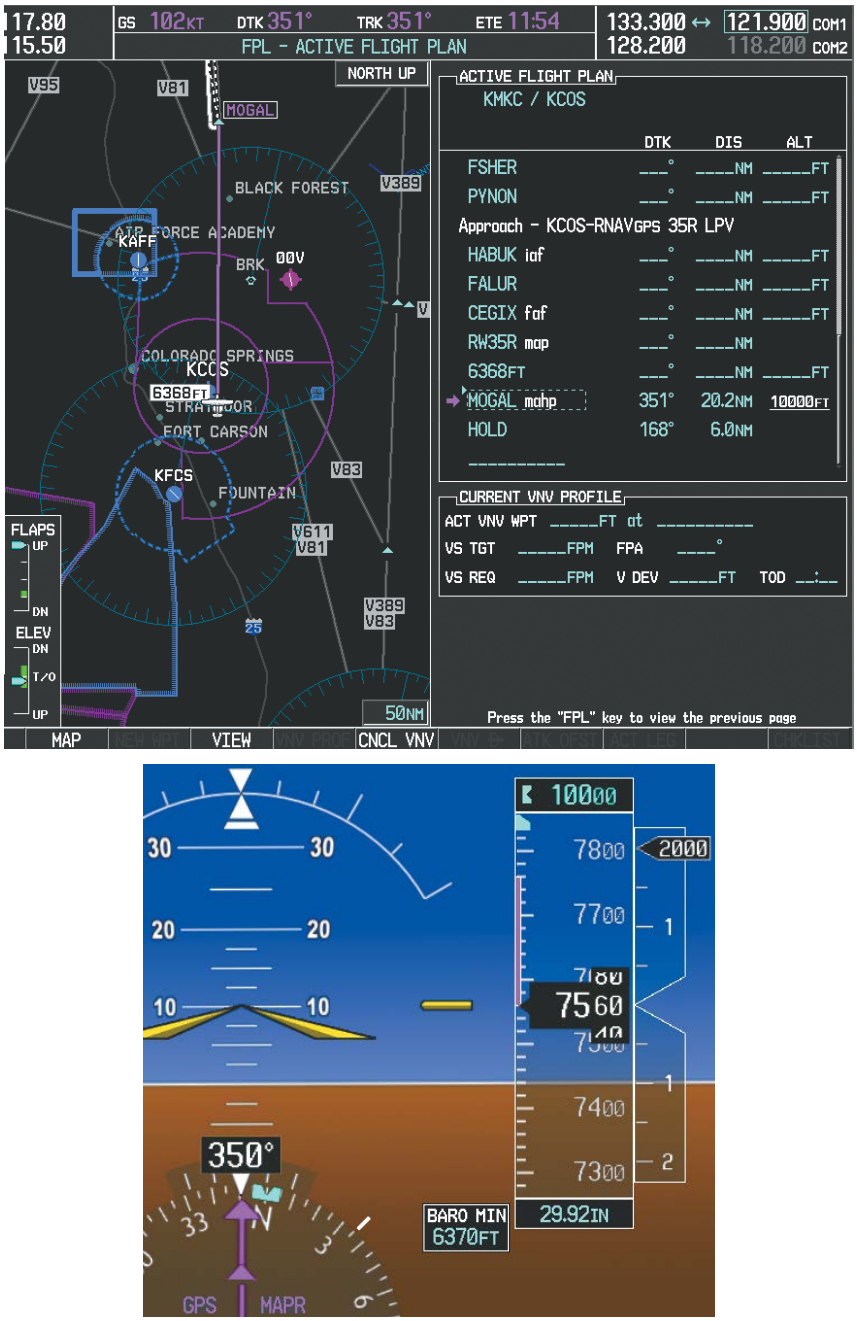


Figure 5-150 Missed Approach Active

26) The aircraft continues climbing to "AT or ABOVE" 10,000 feet at MOGAL. A holding pattern is established at the MAHP (MOGAL) as shown in Figure 5-151.



Figure 5-151 Establishing the Holding Pattern

27) The aircraft maintains 10,000 feet while following the magenta line through the hold as in Figure 5-152.



Figure 5-152 Hold Established

5.12 ABNORMAL OPERATION

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 G950 stops using GPS.*

While in Enroute or Oceanic phase of flight, if the G950 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 G950 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 G950 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 G950 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 G950 by the appearance of the letters 'DR' superimposed in yellow over the 'own aircraft' symbol as shown in Figure 5-153. In addition, 'DR' is prominently displayed in yellow on the HSI slightly above and to the right of the aircraft symbol on the CDI as shown in Figure 5-153. Also, the CDI deviation bar is removed from the display. 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 yellow text on the display to denote degraded navigation source information as shown in Figure 5-153.

Also, while the G950 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.

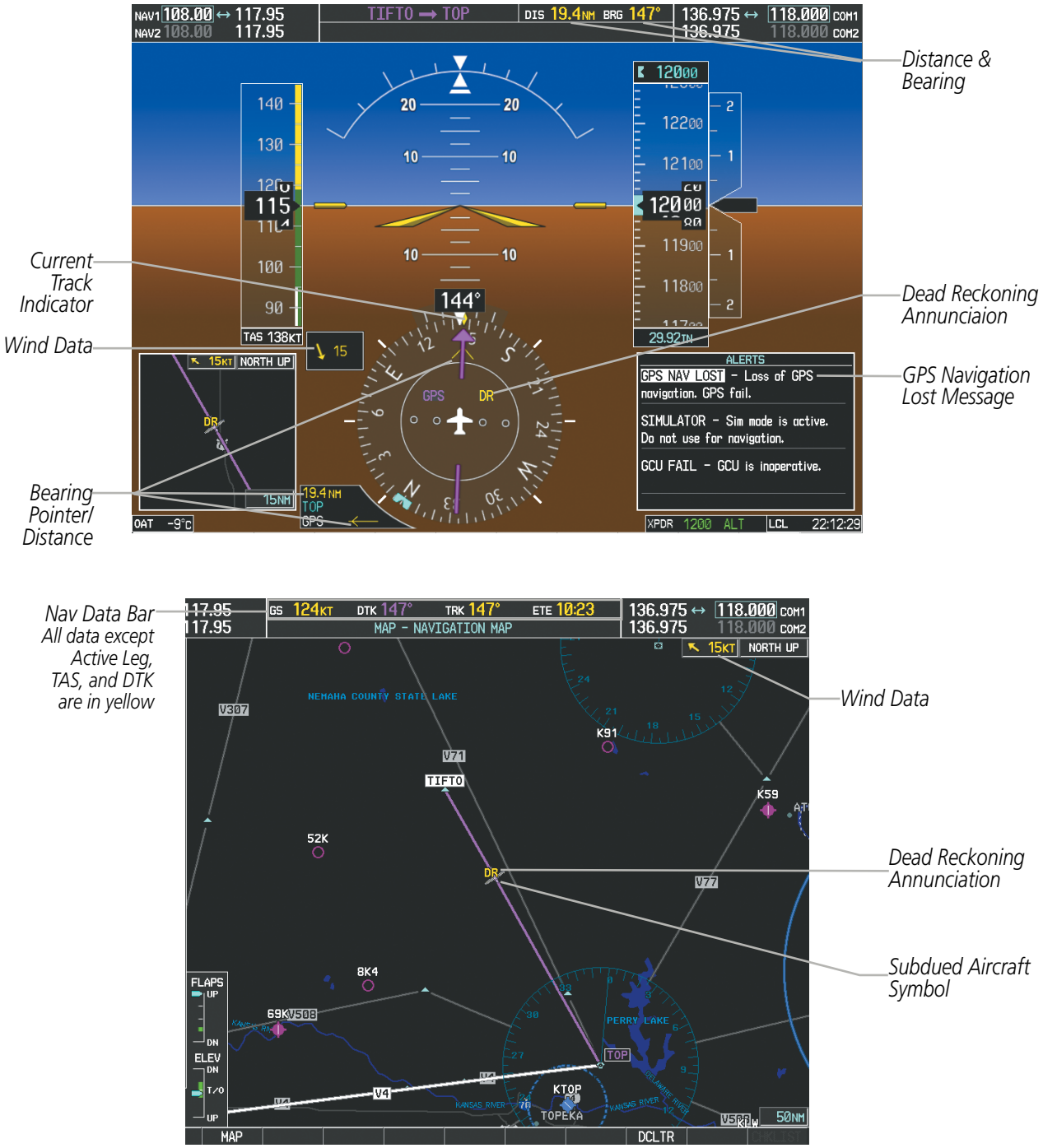


Figure 5-153 Dead Reckoning Mode - GPS Derived Data Shown in Yellow

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.*

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SECTION 6 HAZARD AVOIDANCE

Hazard avoidance features available for the G950 are designed to aid situational awareness and provide advisory information with regard to potential hazards to flight safety associated with weather, terrain, and air traffic.

Weather

- GWX 68/70 Airborne Color Weather Radar (Optional)
- L-3 STORMSCOPE® WX-500 Lightning Detection System (Optional)

Terrain Avoidance

- Terrain Proximity
- Terrain-SVS (Included with Garmin SVT option)
- Terrain Awareness and Warning System - Class B (TAWS-B) (Optional)

Traffic

- Traffic Information Service (TIS)
- Honeywell KTA 870 Traffic Advisory System (TAS) (Optional)

6.1 AIRBORNE COLOR WEATHER RADAR

SYSTEM DESCRIPTION

The optional Garmin GWX 68 Airborne Color Weather Radar is a four-color digital pulsed radar with 6.5 kilowatts of output power. The optional Garmin GWX 70 Airborne Color Weather Radar is a solid-state pulsed radar with forty watts of output power. The radar combines excellent range and adjustable scanning profiles with a high-definition target display. The pulse width for the GWX 68 is four microseconds (µs) on all ranges except the 2.5 nm range. The GWX 68 uses a one µs pulse width at this range to reduce the targets smearing together on the display for better target definition at close range. The GWX 70 has an effective pulse length of 27.31 microseconds (µs), and the system optimizes the pulse length to maximize resolution at each range setting.

The Pilatus PC-6 uses a 10-inch phased array antenna that is fully stabilized to accommodate 30º of pitch and roll.

To focus radar scanning on specific areas, Sector Scanning offers pilot-adjustable horizontal scan angles of 20º, 40º, 60º, or 90º. A vertical scanning function helps to analyze storm tops, gradients, and cell buildup activity at various altitudes.

Radar features include:

- Extended Sensitivity Time Constant (STC) logic that automatically correlates distance of the return echo with intensity, so cells do not suddenly appear to get larger as they get closer.
- WATCH® (Weather ATtenuated Color Highlight) helps identify possible shadowing effects of short-range cell activity, identifying areas where radar return signals are weakened or attenuated by intense precipitation (or large areas of lesser precipitation) and may not fully reflect the weather behind a storm.
- Weather Alert that looks ahead for intense cell activity in the 80-320 nm range, even if these ranges are not being monitored.

PRINCIPLES OF PULSED AIRBORNE WEATHER RADAR

The term RADAR is an acronym for RAdio Detecting And Ranging. Pulsed radar locates targets by transmitting a microwave pulse beam that, upon encountering a target, is reflected back to the radar receiver as a return echo. The microwave pulses are focused and radiated by the antenna, with the most intense energy in the center of the beam and decreasing intensity near the edge. The same antenna is used for both transmitting and receiving. The returned signal is then processed and displayed on the MFD.

Radar detection is a two-way process that requires 12.36 µs for the transmitted microwave pulses to travel out and back for each nautical mile of target range. It takes 123.6 µs for a transmitted pulse to make the round trip if a target is ten nautical miles away.

Airborne weather radar should be used to avoid severe weather, not for penetrating severe weather. The decision to fly into an area of radar targets depends on target intensity, spacing between the targets, aircraft capabilities, and pilot experience. Pulse type weather radar detects only precipitation, not clouds or turbulence. The display may indicate clear areas between intense returns, but this does not necessarily mean it is safe to fly between them. Only Doppler radar can detect turbulence.

Airborne weather radar has other capabilities beyond weather detection. It also has the ability to detect and provide distance to cities, mountains, coastlines, rivers, lakes, and oceans.

NEXRAD AND AIRBORNE WEATHER RADAR

Both Airborne Weather Radar and NEXRAD measure weather reflectivity in decibels (dB). A decibel is a logarithmic expression of the ratio of two quantities. Airborne Weather Radar measures the ratio of power against the gain of the antenna, while NEXRAD measures the energy reflected back to the radar, or the radar reflectivity ratio.

Both systems use colors to identify the different echo intensities, but the colors are not interchangeable. Airborne color radar values used by Garmin Airborne Color Weather Radar should not be confused with NEXRAD radar values.

ANTENNA BEAM ILLUMINATION

The radar beam is much like the beam of a spotlight. The further the beam travels, the wider it becomes. The radar is only capable of seeing what is inside the boundaries of the beam. The figure below depicts a radar beam's characteristics. The figure illustrates vertical dimensions of the radar beam, although the same holds true for the horizontal dimensions. In other words, the beam is as wide as it is tall. Note that it is possible to miss areas of precipitation on the radar display because of the antenna tilt setting. With the antenna tilt set to zero in this illustration, the beam overshoots the precipitation at 15 nautical miles.

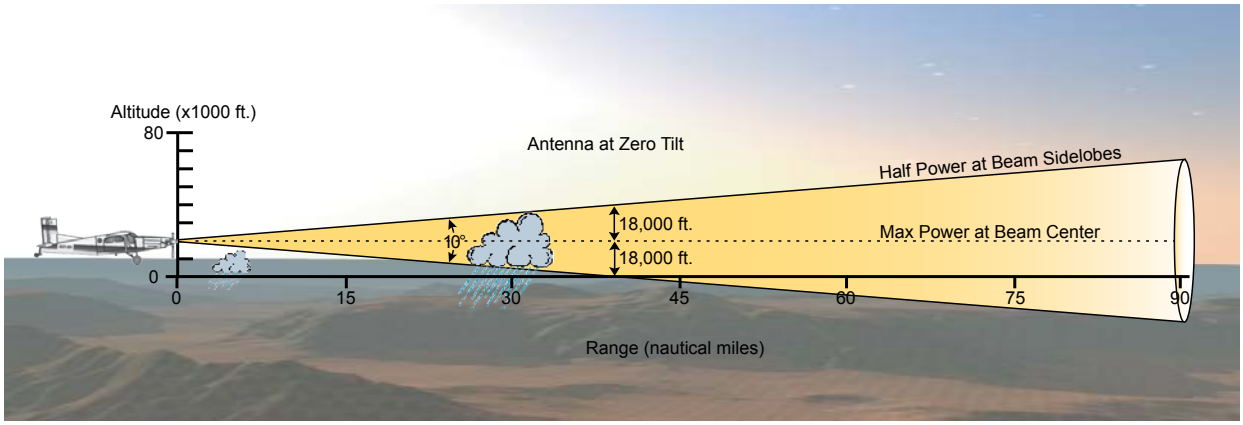


Figure 6-1 Radar Beam from a 10 inch Antenna

The curvature of the earth can also be a factor in missing areas of precipitation, especially at range settings of 150 nautical miles or more. Here the beam overshoots the precipitation at less than 320 nautical miles.

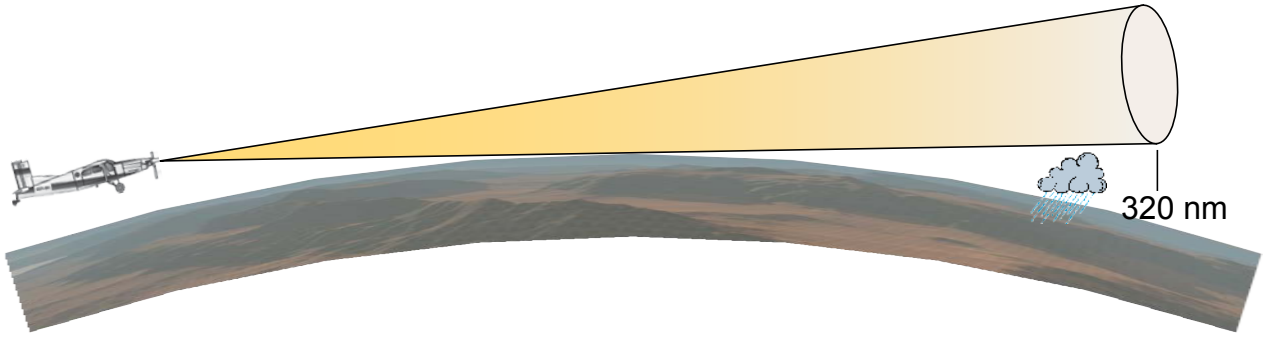


Figure 6-2 Radar Beam in Relation to the Curvature of the Earth

RADAR SIGNAL ATTENUATION

The phenomenon of radar signal attenuation affects the operation of weather radar. When the radar signal is transmitted, it is progressively absorbed and scattered, making the signal weaker. This weakening, or attenuation, is caused by two primary sources, distance and precipitation.

Attenuation because of distance is due to the fact that the radar energy leaving the antenna is inversely proportional to the square of the distance. The reflected radar energy from a target 40 miles away that fills the radar beam is one fourth the energy reflected from an equivalent target 20 miles away. This would appear to the operator that the storm is gaining intensity as the aircraft gets closer. Internal signal processing within the radar system compensates for much of this distance attenuation.

Attenuation due to precipitation is not as predictable as distance attenuation. It is also more intense. As the radar signal passes through moisture, a portion of the radar energy is reflected back to the antenna. However, much of the energy is absorbed. If precipitation is very heavy, or covers a large area, the signal may not reach completely through the area of precipitation. The weather radar system cannot distinguish between an attenuated signal and an area of no precipitation. If the signal has been fully attenuated, the radar displays a radar shadow. This appears as an end to the precipitation when, in fact, the heavy rain may extend much further. A cell containing heavy precipitation may block another cell located behind the first, preventing it from being displayed on the radar. Never fly into these shadowed areas and never assume that all of the heavy precipitation is being displayed unless another cell or a ground target can be seen beyond the heavy cell. The WATCH® feature of the weather radar system can help in identifying these shadowed areas. Areas in question appear as shadowed or gray on the radar display. Proper use of the antenna tilt control can also help detect radar shadows.

Attenuation can also be due to poor maintenance or degradation of the radome. Even the smallest amount of wear and scratching, pitting, and pinholes on the radome surface can cause damage and system inefficiency.

RADAR SIGNAL REFLECTIVITY

Precipitation

Precipitation or objects more dense than water, such as the surface of the earth or solid structures, are detected by the weather radar. The weather radar does not detect clouds, thunderstorms, or turbulence directly. It detects precipitation associated with clouds, thunderstorms, and turbulence. The best radar signal reflectors are raindrops, wet snow, or wet hail. The larger the raindrop, the better the reflectivity. The size of the precipitation droplet is the most important factor in radar reflectivity. Because large drops in a small concentrated area are characteristic of a severe thunderstorm, the radar displays the storm as a strong return. Ice crystals, dry snow, and dry hail have low levels of reflectivity as shown in the illustration, and often not displayed by the radar. Additionally, a cloud that contains only small raindrops, such as fog or drizzle, does not reflect enough radar energy to produce a measurable target return.

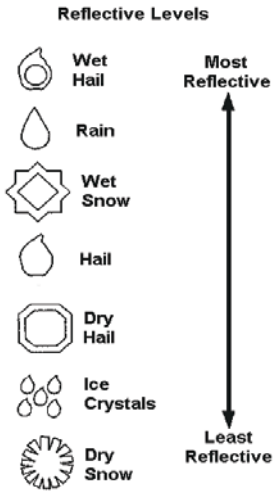


Figure 6-3 Precipitation Type and Reflectivity

Ground Returns

The intensity of ground target returns depends upon the angle at which the radar beam strikes the ground target (Angle of Incidence) and the reflective properties of that target. The gain can be adjusted so shorelines, rivers, lakes, and cities are well-defined. Increasing the gain too much causes the display to fill in between targets, thus obscuring some landmarks.

Cities normally provide a strong return signal. While large buildings and structures provide good returns, small buildings can be shadowed from the radar beam by the taller buildings. As the aircraft approaches and shorter ranges are selected, details become more noticeable as the highly reflective regular lines and edges of the city become more defined.

Bodies of water such as lakes, rivers, and oceans are not good reflectors and normally do not provide good returns. The energy is reflected in a forward scatter angle with inadequate energy being returned. They can appear as dark areas on the display. However, rough or choppy water is a better reflector and provides stronger returns from the downwind sides of the waves.

Mountains also provide strong return signals to the antenna, but also block the areas behind. However, over mountainous terrain, the radar beam can be reflected back and forth in the mountain passes or off canyon walls, using up all or most of the radar energy. In this case, no return signal is received from this area, causing the display to show a dark spot which could indicate a pass where no pass exists.

Angle of Incidence

The angle at which the radar beam strikes the target is called the Angle of Incidence. The figure illustrates the incident angle ('A'). This directly affects the detectable range, the area of illumination, and the intensity of the displayed target returns. A large incident angle gives the radar system a smaller detectable range and lower display intensity due to minimized reflection of the radar energy.

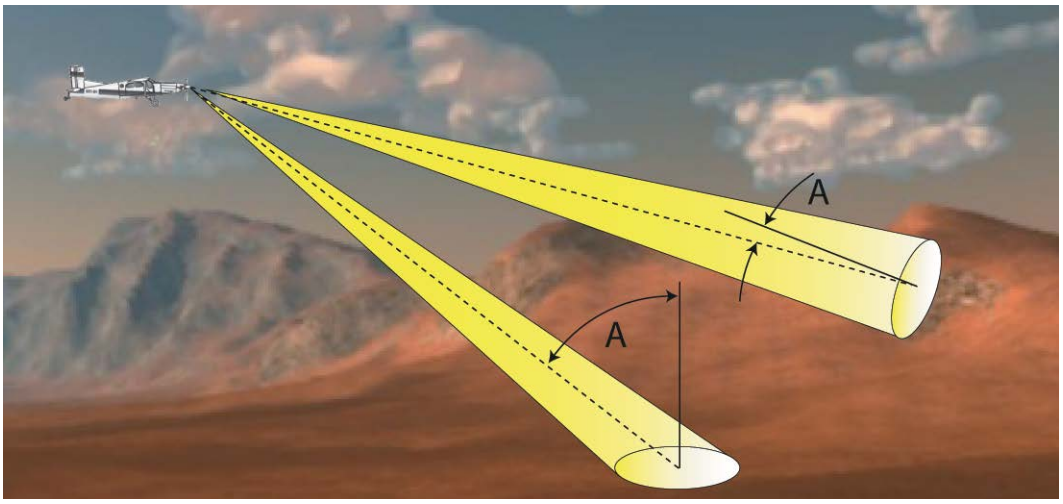


Figure 6-4 Angle of Incidence

A smaller incident angle gives the radar a larger detectable range of operation and the target display shows a higher intensity. Since more radar energy is reflected back to the antenna with a low incident angle, the resulting detectable range is increased for mountainous terrain.

SAFE OPERATING DISTANCE

The following information establishes a minimum safe distance from the antenna for personnel near operating weather radar. The minimum safe distance is based on the FCC's exposure limit at 9.3 to 9.5 GHz for general population/uncontrolled environments, which is 1 mW/cm2. See Advisory Circular 20-68B for more information on safe distance determination.

MAXIMUM PERMISSIBLE EXPOSURE LEVEL (MPEL)

The zone in which the radiation level exceeds the US Government standard of 1 mW/cm2 is the semicircular area of at least 9.16 feet from the 10-inch antenna. All personnel must remain outside of this zone. With a scanning or rotating beam, the averaged power density at the MPEL boundary is significantly reduced.

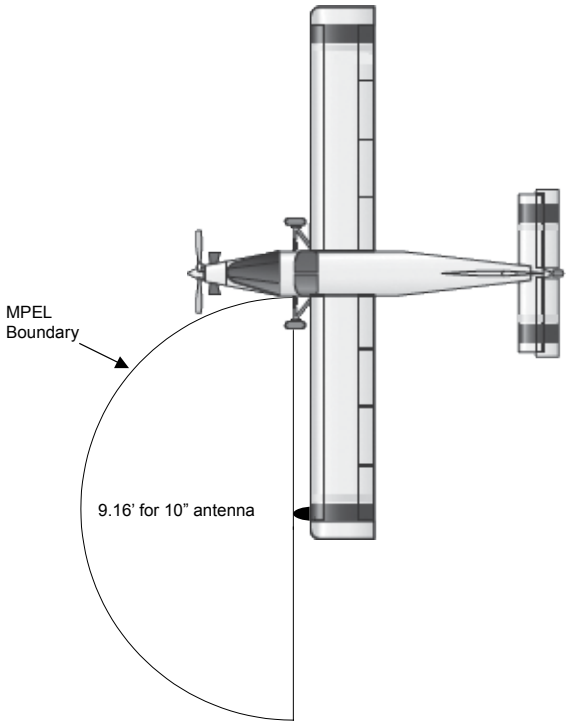


Figure 6-5 MPEL Boundary

BASIC ANTENNA TILT SETUP

The following discussion is a simple method for setting up the weather radar antenna tilt for most situations. It is not to be considered an all encompassing setup that works in all situations, but this method does provide good overall parameters for the monitoring of threats. Ultimately, it is desired to have the antenna tilted so that the bottom of the radar beam is four degrees below parallel with the ground. The following example explains one way of achieving this.

With the aircraft flying level, adjust the antenna tilt so ground returns are displayed at a distance that equals the aircraft's current altitude (AGL) divided by 1,000. For example, if the aircraft is at 14,000 feet, adjust the tilt so the front edge of ground returns are displayed at 14 nautical miles. Note this antenna tilt angle setting. Now, raise the antenna tilt six degrees above this setting. The bottom of the radar beam is now angled down 4º from parallel with the ground.

PRACTICAL APPLICATION USING THE BASIC TILT SETUP

With the antenna tilt set as previously described, any displayed target return should be scrutinized when flying at altitudes between 2,000 and 30,000 feet AGL. If the displayed target advances on the screen to within five nautical miles of the aircraft, avoid it. This may be either weather or ground returns that are 2,000 feet or less below the aircraft. Raising the antenna tilt four degrees can help separate ground returns from weather returns in relatively flat terrain. This places the bottom of the radar beam parallel with the ground. Return the antenna tilt to the previous setting after a few sweeps.

If the aircraft is above 29,000 feet, be cautious of any target return that gets to within 30 nautical miles. This is likely a thunderstorm that has a top high enough that the aircraft cannot fly over it safely.

If the aircraft altitude is 15,000 feet or lower, setting the displayed range to 60 miles may be more helpful. Closely monitor anything that enters the display.

Also, after setting up the antenna tilt angle as described previously, ground returns can be monitored for possible threats. The relationship between antenna tilt angle, altitude, and distance is one degree of tilt equals 100 feet of altitude for every one nautical mile.

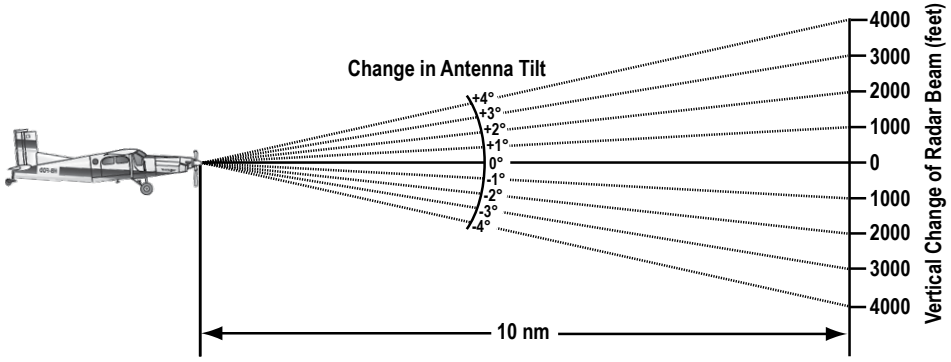


Figure 6-6 Vertical Change in Radar Beam per Nautical Mile

Therefore, with the antenna tilt set so that the bottom of the beam is four degrees below parallel with the ground, a target return at 10 nm is approximately 4,000 feet below the aircraft; at 20 nm, 8,000 feet; at 50 nm, 20,000 feet. In other words, at this tilt setting, a ground return (such as a mountain peak) being displayed at 10 nm would have a maximum distance below the aircraft of 4,000 feet. If that ground target return moves to five nm, maximum distance below the aircraft is 2,000 feet.

This setup provides a good starting point for practical use of the weather radar. There are many other factors to consider in order to become proficient at using weather radar in all situations.

WEATHER MAPPING AND INTERPRETATION

WEATHER DISPLAY INTERPRETATION

When evaluating various target returns on the weather radar display, the colors denote precipitation intensity and rates shown in the Table 6-1.

Weather Mode Color	Intensity	Approximate Precipitation Rate (in/hr.)
Black	< 23 dBZ	< .01.
Green	23 dBZ to < 32 dBZ	.01 - 0.1.
Yellow	32 dBZ to < 41 dBZ	0.1 - 0.5
Red	41 dBZ to < 50 dBZ	0.5 - 2
Magenta	50 dBZ and greater	> 2

Table 6-1 Precipitation Intensity Levels

THUNDERSTORMS

Updrafts and downdrafts in thunderstorms carry water through the cloud. The more severe the drafts, the greater the number and size of the precipitation droplets. With this in mind, the following interpretations can be made from what is displayed on the weather radar. Avoid these areas by an extra wide margin.

- In areas where the displayed target intensity is red or magenta (indicating large amounts of precipitation), the turbulence is considered severe.
- Areas that show steep color gradients (intense color changes) over thin bands or short distances suggest irregular rainfall rate and strong turbulence.
- Areas that show red or magenta are associated with hail or turbulence, as well as heavy precipitation. Vertical scanning and antenna tilt management may be necessary to identify areas of maximum intensity.

Along squall lines (multiple cells or clusters of cells in a line) individual cells may be in different stages of development. Areas between closely spaced, intense targets may contain developing clouds not having enough moisture to produce a return. However, these areas could have strong updrafts or downdrafts. Targets showing wide areas of green are generally precipitation without severe turbulence.

Irregularities in the target return may also indicate turbulence, appearing as hooks, fingers, or scalloped edges. These irregularities may be present in green areas with no yellow, red, or magenta areas and should be treated as highly dangerous areas. Avoid these areas as if they are red or magenta.

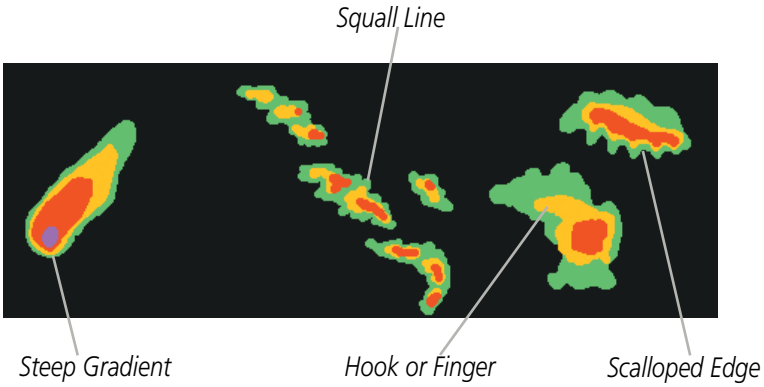


Figure 6-7 Cell Irregularities

Thunderstorm development is rapid. A course may become blocked within a short time. When displaying shorter ranges, periodically select a longer range to see if problems are developing further out. That can help prevent getting trapped in a blind alley or an area that is closed at one end by convective weather.

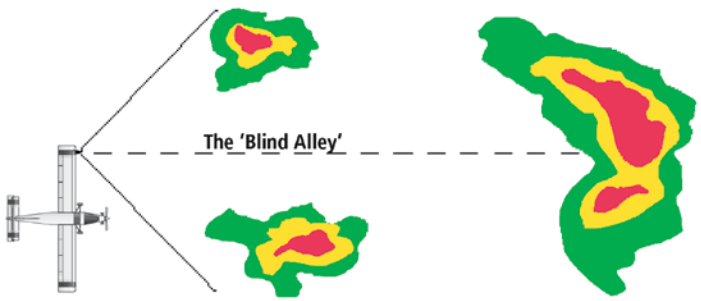
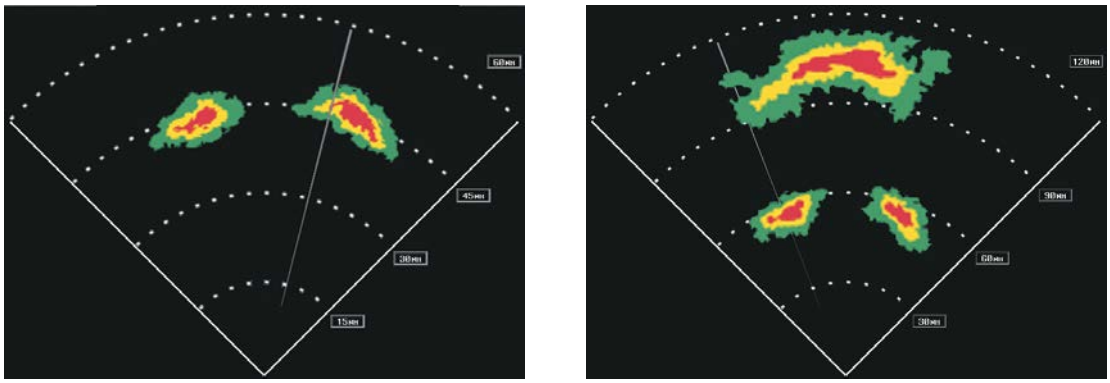


Figure 6-8 The Blind Alley - Horizontal Scan

In areas of multiple heavy cells, use the Vertical Scan feature along with antenna tilt management to examine the areas. Remember to avoid shadowed areas behind targets.



The Blind Alley at Close Range *The Large Storm Behind*

Figure 6-9 The Blind Alley

Tornadoes

There are no conclusive radar target return characteristics which identify a tornado. However, tornadoes may be present if the following characteristics are observed:

- A narrow, finger-like portion extends and in a short time curls into a hook and closes on itself.
- A hook, which may be in the general shape of the numeral 6 (or 9 in the southern hemisphere), especially if bright and projecting from the southwest quadrant (northeast quadrant in the southern hemisphere) of a major thunderstorm.
- V-shaped notches.
- Doughnut shapes.

These shapes do not always indicate tornadoes, and tornado returns are not limited to these characteristics. Confirmed radar observations of tornadoes most often have not shown shapes different from those of a normal thunderstorm display.

Hail

Hail results from updrafts carrying water high enough to freeze. Therefore, the higher the top of a thunderstorm, the greater the probability that it contains hail. Vertically scanning the target return can give the radar top of a thunderstorm that contains hail. Radar top is the top of a storm cell as detected by radar. It is not the actual top, or true top of the storm. The actual top of a storm cell is seen with the eyes in clear air and may be much higher than the radar top. The actual top does not indicate the top of the hazardous area.

Hail can fall below the minimum reflectivity threshold for radar detection. It can have a film of water on its surface, making its reflective characteristics similar to a very large water droplet. Because of this film of water, and because hail stones usually are larger than water droplets, thunderstorms with large amounts of wet hail return stronger signals than those with rain. Some hail shafts are extremely narrow (100 yards

or less) and make poor radar targets. In the upper regions of a cell where ice particles are dry (no liquid coating), target returns are less intense.

Hail shafts are associated with the same radar target return characteristics as tornados. U-shaped cloud edges three to seven miles across can also indicate hail. These target returns appear quite suddenly along any edge of the cell outline. They also change in intensity and shape in a matter of seconds, making vigilant monitoring essential.

OPERATION IN WEATHER MODE

WARNING: *Begin transmitting only when it is safe to do so. When transmitting while the aircraft is on the ground, no personnel or objects should be within 9.16 feet of the antenna.*

CAUTION: *In Standby mode, the antenna is parked at the center line. It is always a good idea to put the radar in Standby mode before taxiing the aircraft to prevent the antenna from bouncing on the bottom stop and possibly causing damage to the radar assembly.*

When the weather radar system is in the Weather or Ground Map mode, the system automatically switches to Standby mode on landing.

In Reversionary mode, the weather radar system automatically switches to Standby mode. The system remains in Standby mode until both displays are restored. In Reversionary mode, the weather radar system cannot be controlled.

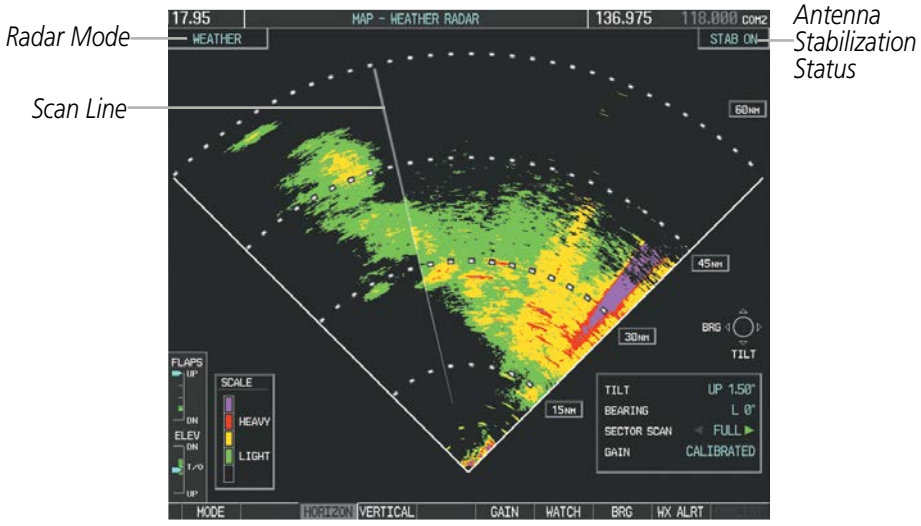


Figure 6-10 Horizontal Scan Display

Displaying weather on the Weather Radar Page:

1) Select the Weather Radar Page in the Map Page Group with the **FMS** Knob.
2) Press the **MODE** Softkey.
3) While on the ground, press the **STANDBY** Softkey. For the GWX 68 only, a one-minute warm-up period is initiated (countdown is displayed on the screen). After the warm-up is complete, the radar enters the Standby Mode. This warm-up period is not applicable to the GWX 70.

   a) Press the **WEATHER** Softkey. A confirmation window is displayed.

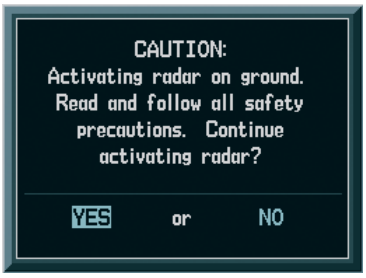


Figure 6-11 Confirming Activating Radar

   b) Turn the small **FMS** Knob to highlight **YES** and press the **ENT** Key to continue radar activation.

   Or:

   If the aircraft is airborne, press the **WEATHER** Softkey. For the GWX 68 only, a one-minute warm-up period is initiated (countdown is displayed on the screen). After the warm-up is complete, the radar begins transmitting.

4) Turn the **Joystick** to select the desired map range.
5) The horizontal scan is initially displayed (Figure 6-10). If desired, press the **VERTICAL** Softkey to change to vertical scanning.

Vertically scanning a storm cell:

NOTE: *Vertical scanning of a storm cell should be done with the aircraft wings level to avoid constant adjustment of the Bearing Line.*

1) While in the Horizontal Scan view, press the **BRG** Softkey. This places the cursor in the BEARING field and displays the Bearing Line.

   If the Bearing Line is not displayed, press the **MENU** Key and turn the large **FMS** Knob to select Show Bearing Line. Press the **ENT** Key.

2) Press the **ENT** Key.
3) Turn the small **FMS** Knob to place the Bearing Line on the desired storm cell or other area to be vertically scanned.

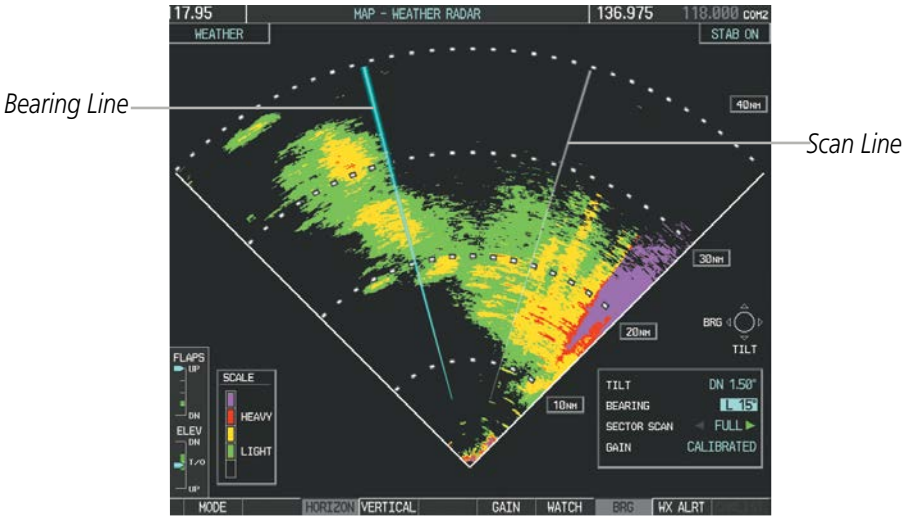


Figure 6-12 Bearing Line on Horizontal Scan

4) Press the **VERTICAL** Softkey. A vertical slice of the selected area is displayed (Figure 6-13).
5) The small **FMS** Knob may be used to move the scanned slice a few degrees right or left.
6) Turn the **Joystick** to adjust the range.
7) Press the **FMS** Knob to remove the cursor.
8) To select a new area to be vertically scanned, press the **HORIZON** Softkey to return to the Horizontal Scan view and repeat the previous steps.

The **Joystick** can also be used to adjust bearing from left to right.

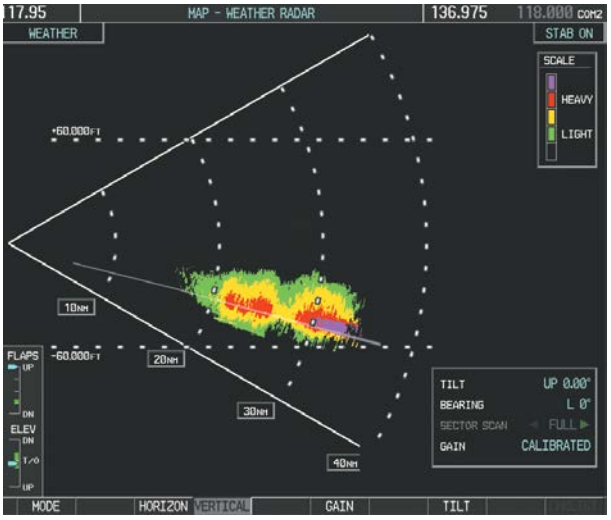


Figure 6-13 Vertical Scan Display

Adjusting Antenna Tilt Angle:

In order to make an accurate interpretation of a storm cell, the radar beam should be pointed at the wet part of the weather cell to record the proper rainfall intensity (color level). The ideal aiming point is just below the freezing level of the storm. The best way to find this point is to use the Vertical Scan feature. The antenna tilt angle can be centered on the strongest return area in the vertical scan to get a more accurate view of the coverage and intensity of the target in the horizontal scan.

Adjusting antenna tilt on the Horizontal Scan display:

1) Press the **FMS** Knob to activate the cursor in the TILT field.
2) Turn the small **FMS** Knob to select the desired antenna tilt angle.
3) Press the **FMS** Knob to remove the cursor.

The **Joystick** can also be used to adjust tilt up and down.

Adjusting antenna tilt on the Vertical Scan display:

1) Press the **TILT** Softkey to activate the cursor in the TILT field and display the Tilt Line.

   If the Tilt Line is not displayed, press the **MENU** Key and turn the large **FMS** Knob to select Show Tilt Line. Press the **ENT** Key.
2) Turn the small **FMS** Knob to adjust the antenna tilt angle. The selected tilt angle is implemented when Horizontal Scan is again selected.

The **Joystick** can also be used to adjust tilt.

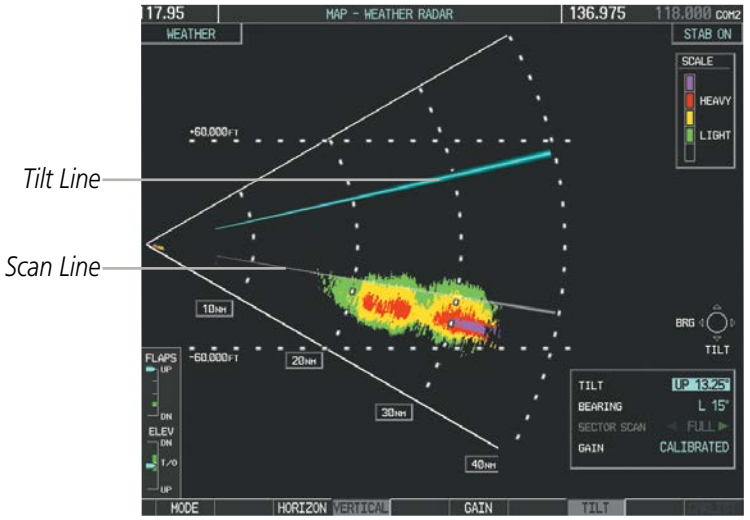
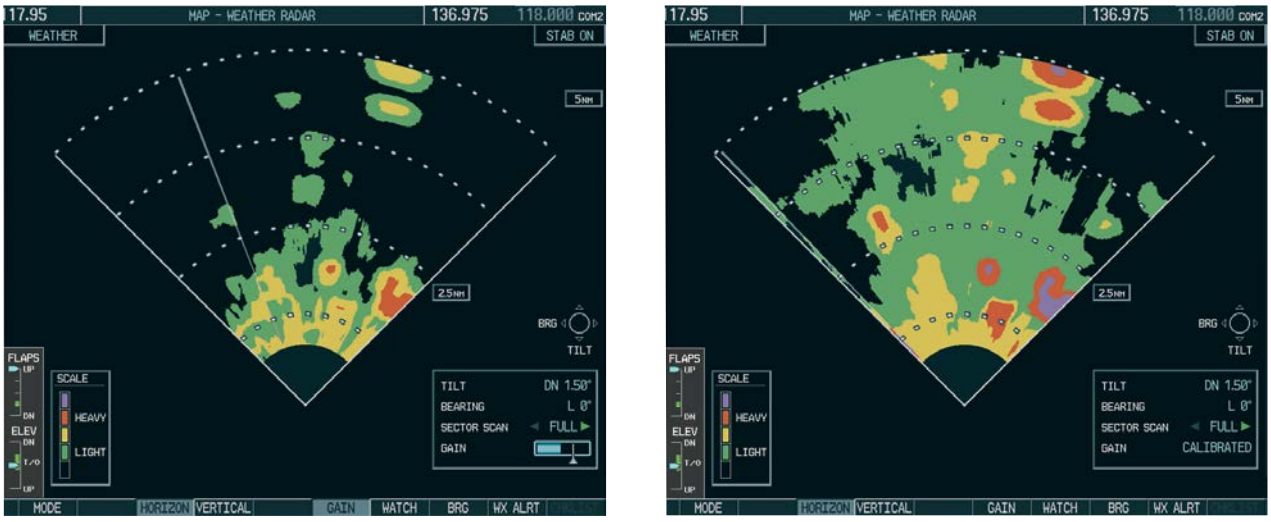


Figure 6-14 Adjusting Tilt on Vertical Scan Display

Adjusting Gain:

WARNING: *Changing the gain in weather mode causes precipitation intensity to be displayed as a color not representative of the true intensity. Remember to return the gain setting to Calibrated for viewing the actual intensity of precipitation.*

1) Press the **GAIN** Softkey to activate the cursor in the GAIN field.
2) Turn the small **FMS** Knob to adjust the gain for the desirable level. The gain setting is visible in the GAIN field as a movable horizontal bar in a flashing box. The line pointer is a reference depicting the calibrated position.
3) Press the **FMS** Knob to remove the cursor.
4) Press the **GAIN** Softkey again to recalibrate the gain. CALIBRATED is displayed in the GAIN field.



Manual Gain Set Below Calibrated

Calibrated Gain

Figure 6-15 Gain Calibration

Sector Scan

1) While in horizontal scan mode, press the **BRG** Softkey to display the Bearing Line and place the cursor in the BEARING field. If the Bearing Line is not displayed, press the **MENU** Key and turn the large **FMS** Knob to select Show Bearing Line.
2) Press the **ENT** Key.

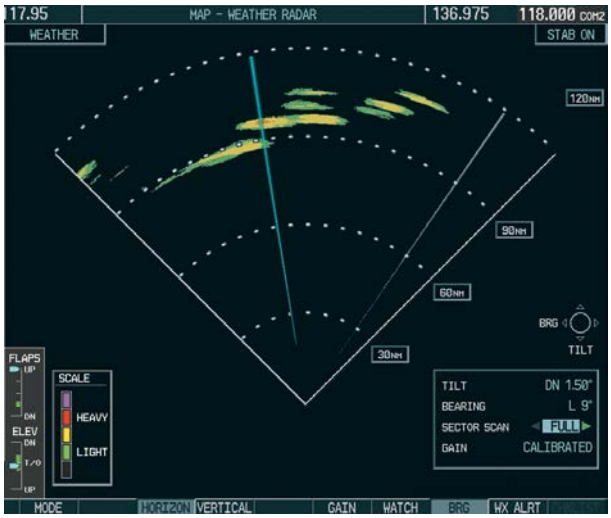


Figure 6-16 Selecting Sector Scan Position

3) Turn the small **FMS** Knob to place the Bearing Line in the desired position. The location of the Bearing Line becomes the center point of the Sector Scan.
4) Turn the large **FMS** Knob to place the cursor in the SECTOR SCAN field.
5) Turn the small **FMS** Knob to select FULL, 60˚, 40˚, or 20˚ scan.
6) If desired, readjust the Bearing Line as discussed previously to change the center of the Sector Scan.
7) Press the **BRG** Softkey again to remove the Bearing Line and cursor. The bearing reference resets to 0º.

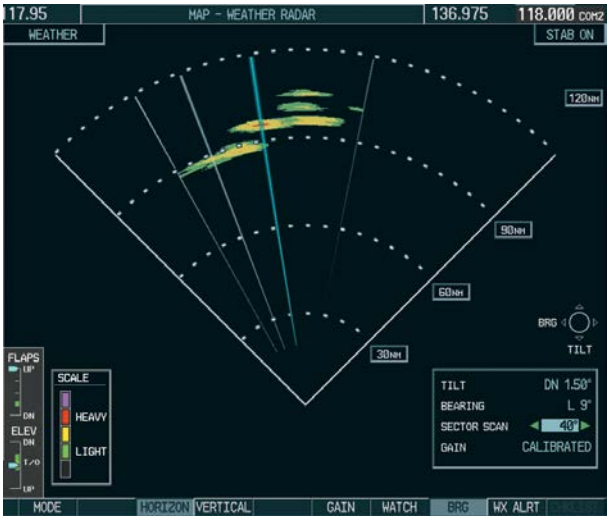


Figure 6-17 40˚ Sector Scan

Antenna Stabilization

When radar stabilization is active, the radar tilt is corrected for pitch and roll, and therefore is kept steady with respect to an earth fixed reference. The commanded tilt angle is kept constant with respect to the earth. When the stabilization is disabled, corrections are no longer made for pitch and roll, and the radar tilt angle is kept constant with respect to the aircraft reference system.

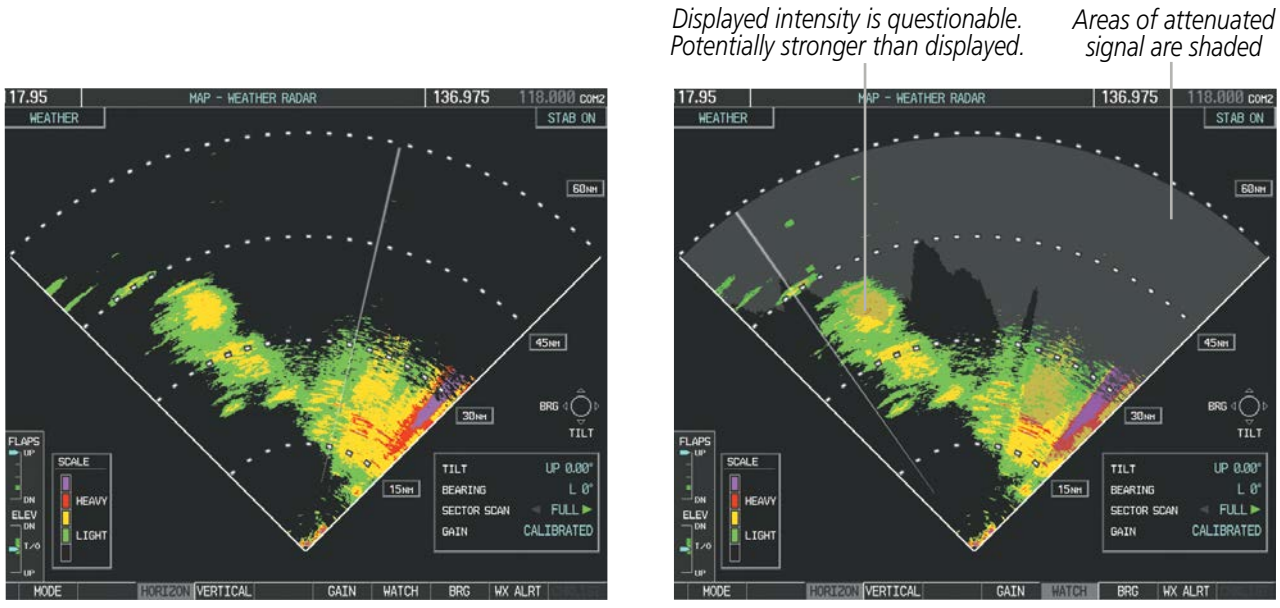
Enabling/disabling antenna stabilization:

1) Press the **MODE** Softkey.
2) Press the **STAB ON** Softkey to activate antenna stabilization or press the **STAB OFF** Softkey to deactivate. The current stabilization condition is shown in the upper right of the weather radar display.

WATCH® (Weather Attenuated Color Highlight)

WATCH® identifies deceptively strong or unknown intensity parts of a storm. While in horizontal scan mode, this feature can be used as a tool to determine areas of possible inaccuracies in displayed intensity due to weakening of the radar energy. This weakening is known as attenuation. The radar energy weakens as it passes through areas of intense precipitation, large areas of lesser precipitation, and distance. Issues with the radome also attenuates the radar energy. All these factors have an effect on the return intensity. The more energy that dissipates, the lesser the displayed intensity of the return. Accuracy of the displayed intensity of returns located in the shaded areas are suspect. Make maneuvering decisions with this information in mind. Proper antenna tilt management should still be employed to determine the extent of attenuation in a shaded area.

To activate or deactivate the WATCH® feature, press the **WATCH** Softkey.



Horizontal Scan Without WATCH®

Horizontal Scan With WATCH®

Figure 6-18 Horizontal Scan Without and With WATCH®

Weather Alert

The Weather Alert feature indicates the presence of heavy precipitation between the ranges of 80 and 320 nm regardless of the currently displayed range. Weather Alert targets appear as red bands along the outer range ring at the approximate azimuth of the detected returns.

If a Weather Alert Target is detected within ±10° of the aircraft heading, a textual alert is displayed on the PFD in the Alerts Window.

If the antenna tilt is adjusted too low, a weather alert can be generated by ground returns. To avoid unwanted weather alerts, deselect the **WX ALRT** Softkey..

Weather Alerts Targets

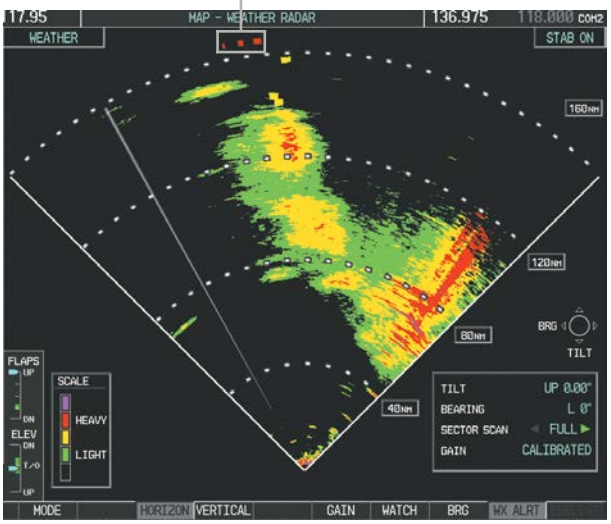


Figure 6-19 Weather Alert Indications

To enable or disable Weather Alerts on the PFD, press the **WX ALRT** Softkey. Activating and deactivating enables or inhibits the alert on the PFD, and does not affect the display of the Weather Alert Targets on the Weather Radar Page.

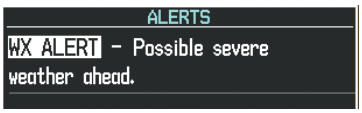


Figure 6-20 Weather Alert on PFD

GROUND MAPPING AND INTERPRETATION

A secondary use of the weather radar system is for the presentation of terrain. This can be a useful tool for verifying aircraft position. A picture of the ground is represented much like a topographical map that can be used as a supplement to the navigation map on the MFD.

Ground Map mode uses a different gain range than Weather mode. Different colors are also used to represent the intensity levels. The displayed intensity of ground target returns are defined in Table 6-5. Use of the **GAIN** and **TILT** controls help improve contrast so that specific ground targets can be recognized more easily.

As previously discussed, the type and orientation of the target in relation to the aircraft affects the intensity displayed.

When the weather radar system is in either the Weather or Ground Map mode, the system automatically switches to Standby mode upon landing.

Ground Map Mode Color	Intensity
Black	0 dB
Cyan	> 0 dB to < 9 dB
Yellow	9 dB to < 18 dB
Magenta	18 dB to < 27 dB
Blue	27 dB and greater

Table 6-2 Ground Target Return Intensity Levels

Operation in Ground Map Mode

1) Press the **MODE** Softkey.
2) Press the **GROUND** Softkey to place the radar in Ground Map mode.
3) Press the **BACK** Softkey.
4) Press the **FMS** Knob to activate the cursor.
5) Turn the large **FMS** Knob to place the cursor in the TILT field.
6) Adjust the antenna tilt angle by turning the small **FMS** Knob to display ground returns at the desired distance.
7) Press the **FMS** Knob to remove the cursor.

WEATHER RADAR OVERLAY ON THE NAVIGATION MAP PAGE

The Map - Weather Radar Page is the principal map page for viewing airborne weather radar information. Weather radar information may also be shown as an overlay on the Navigation Map Page on the MFD as an additional reference.

When the airborne weather radar overlay is enabled, a weather radar information box appears in the upper-right corner of the Navigation Map Page. It indicates the selected weather mode, radar bearing, and antenna tilt angle. The overlay is capable of showing radar information while the radar is in horizontal scan mode. If the radar is operating in vertical scan mode while the overlay is enabled, the system indicates 'N/A' in the information box to indicate the airborne weather radar overlay is not available until the horizontal scan mode is selected on the Weather Radar Page.

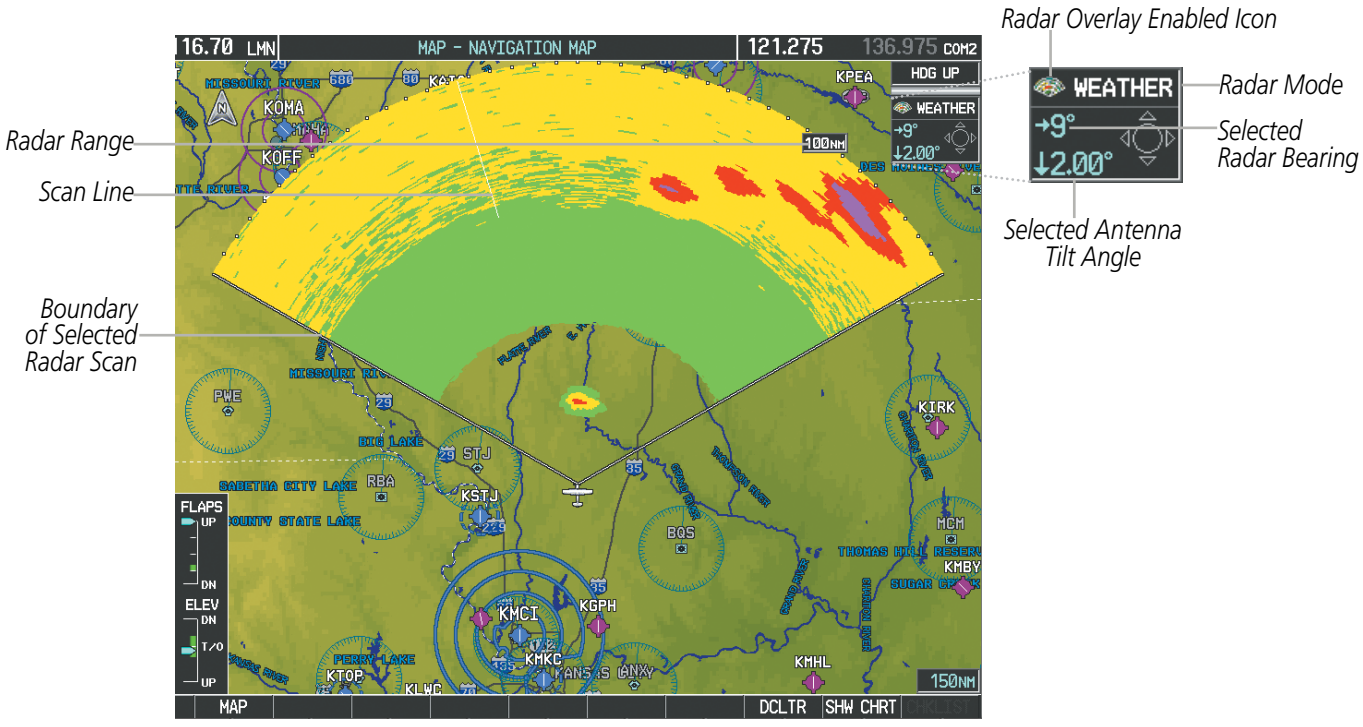


Figure 6-21 Airborne Weather Radar Overlay on the Navigation Map Page

Enabling/Disabling Airborne Weather Radar Overlay on the Navigation Map Page:

1) Select the Navigation Map Page.
2) Press the **MAP** Softkey.
3) Press the **WX RADAR** Softkey.

Or:

1) On the Navigation Map Page, press the **MENU** Key.
2) With 'Map Setup' highlighted, press the **ENT** Key.
3) Turn the small **FMS** Knob to select the 'Weather' group, then press the **ENT** Key.
4) Turn the large **FMS** Knob to scroll through the product selections and highlight the WX RADAR overlay selection ('On' or 'Off'). Turn the small **FMS** knob to highlight the desired selection.
5) To remove the menu, press the **FMS** Knob or **CLR** Key.

Weather radar controls on the Navigation Map Page are limited to adjustment of the radar range, bearing, and antenna tilt angle. The airborne weather radar overlay is viewable at Navigation Map Ranges between five and 800 nautical miles (ten to 1,500 kilometers). At map ranges beyond these limits, the system removes the weather radar information from the map. Adjusting the range on the Navigation Map Page simultaneously adjusts the range of the weather radar proportionally. This radar range is annunciated on the range arc that appears when the overlay is enabled and a radar scan is active. When the radar range is adjusted on the Navigation Map Page, system synchronizes the same range to the Weather Radar Page.

The radar bearing is adjustable in one degree increments on the Navigation Map Page by pushing the **Joystick** left or right when the overlay is enabled. A left or right arrow next to the bearing readout indicates the direction of the selected bearing. The cyan radar bearing line is only viewable on the Weather Radar Page. While the bearing line is not shown on the Navigation Map Page, adjusting the bearing on the Navigation Map Page while Sector Scan is enabled centers the radar scan on the selected bearing, and the radar scan boundaries adjust accordingly on the Navigation Map Page.

Radar antenna tilt angle is adjustable in 0.25 degree increments on the Navigation Map Page. Push the **Joystick** up to adjust the antenna tilt angle downward. Push the **Joystick** down to adjust the antenna tilt angle upward. An up or down arrow next to the antenna tilt angle setting indicates the direction of the antenna tilt angle.

The weather radar overlay uses the same colors as those shown on the Weather Radar Page to indicate the intensity of radar returns. However, the display of gray WATCH radar attenuation and red weather alert target bands is exclusive to the Weather Radar Page. Because terrain information uses similar colors, enabling the airborne weather radar overlay on the Navigation Map Page disables the display of terrain information for this page.

SYSTEM STATUS

The radar mode is annunciated in the upper left corner of the Weather Radar Page. Additional information may be displayed in the center of the Weather Radar Page as a banner annunciation.

Radar Mode	Radar Mode Annunciation Box†	Center Banner Annunciation
Standby	STANDBY	STANDBY
Standby (During Warm-Up)	STANDBY	WARM-UP XX (XX indicates number of seconds remaining in warm-up)
Weather	WEATHER	None
Ground Mapping	GROUND MAPPING	None
Off	OFF	OFF
Radar Failed*	FAIL	RADAR FAIL

† *Annunciations in this column appear in white text in the Weather Radar Mode box on the Navigation Map Page.*
** See Table 6-5 for additional failure annunciations*

Table 6-3 Radar Modes on the Weather Radar Page

The system displays the status of the radar antenna stabilization feature in the upper right corner of the Weather Radar Page.

Radar Antenna Stabilization Status	Description
STAB ON	Antenna stabilization is selected on.
STAB OFF	Antenna stabilization is selected off.
STAB INOP	The radar is not receiving pitch and roll information. The antenna stabilization feature is inoperative.

Table 6-4 Antenna Stabilization Annunciations on the Weather Radar Page

If the unit fails, an annunciation as to the cause of the failure is shown as a banner in the center of the Weather Radar Page.

Weather Radar Page Center Banner Annunciation	Description
BAD CONFIG	The radar configuration is invalid. The radar should be serviced.
RDR FAULT	The radar unit is reporting a fault. The radar should be serviced.
RADAR FAIL	The system is not receiving valid data from the radar unit. The system should be serviced.

Table 6-5 Abnormal Radar Status Annunciations on the Weather Radar Page

6.2 STORMSCOPE LIGHTNING

WARNING: *Do not rely on information from the lightning detection system display as the sole basis for hazardous weather avoidance. Range limitations and interference may cause the system to display inaccurate or incomplete information. Refer to documentation from the lightning detection system manufacturer for detailed information about the system.*

The following pages can display Stormscope data:

- Stormscope Page
- Navigation Map
- AUX - Video Page
- AUX - Trip Planning Page
- Nearest Pages

The Stormscope Page is the principal map page for viewing Stormscope lightning information. To display Stormscope data on the Navigation Map, AUX - Trip Planning Page, or any of the Nearest Pages, press the **MAP** Softkey, then press the **STRMSCP** Softkey. These pages can also display cell or strike data using the yellow lightning strike symbology shown in Table 6-6.

Lightning Age	Symbol
Strike is less than 6 seconds old	
Strike is between 6 and 60 seconds old	
Strike is between 1 and 2 minutes old	
Strike is between 2 and 3 minutes old	

Table 6-6 Lightning Age and Symbols

SETTING UP STORMSCOPE ON THE NAVIGATION MAP

Setting up Stormscope options on the Navigation Map:

1) On the Navigation Map Page, press the **MENU** Key.
2) With 'Map Setup' selected (Figure 6-22), press the **ENT** Key.
3) Turn the small **FMS** Knob to display the group selection window. Turn the small **FMS** Knob to select 'Weather'), and press the **ENT** Key.
4) Turn the large **FMS** Knob to highlight and move between the product selections.
5) When an item is highlighted, turn the small **FMS** Knob to select the option.
6) Press the **ENT** Key.
7) Press the **FMS** Knob to return to the Navigation Map Page (Figure 6-24).

The following options are available (Figure 6-23):

- **STRMSCP LTNG** – Turns the display of Stormscope data on or off.
- **STRMSCP MODE** – Selects the CELL or STRIKE mode of lightning activity. Cell mode identifies clusters or cells of electrical activity. Strike mode indicates the approximate location of lightning strikes.
- **STRMSCP SMBL** – Selects the range at which Stormscope data displays. Stormscope data is removed when a map range greater than the STRMSCP SMBL value is selected.

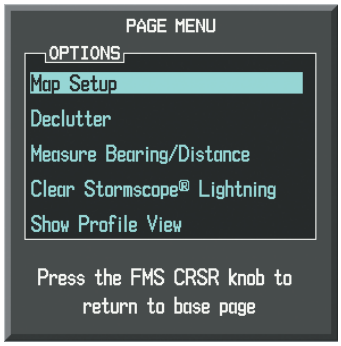


Figure 6-22 Page Menu



Figure 6-23 Map Setup Menu

CELL AND STRIKE MODE ON THE NAVIGATION MAP

On the Navigation Map, cell mode identifies cells of lightning activity (Figure 6-24). Stormscope identifies clusters of electrical activity that indicate cells. Strike mode indicates the approximate location of lightning strikes.

Selecting the 'cell' or 'strike' mode on the Navigation Map:

1) Press the **MENU** Key.
2) With 'Map Setup' selected, press the **ENT** Key.
3) Select the 'Weather' group.
4) Press the **ENT** Key. The cursor flashes on 'STRMSCP LTNG'.
5) Turn the **large FMS** Knob to select 'STRMSCP MODE'.
6) Turn the **small FMS** Knob to change between 'CELL' and 'STRIKE' options. When an item is selected, press the **ENT** Key.
7) Press the **FMS** knob to return to the Navigation Map Page.



Figure 6-24 Navigation Map Page with Stormscope Lightning Data

If heading input is lost, strikes and/or cells must be cleared manually after the execution of each turn (Figure 6-25). This is to ensure that the strike and/or cell positions are depicted accurately in relation to the nose of the aircraft.

Manually clearing Stormscope data on the Navigation Map:

1) Press the **MENU** Key.
2) Select 'Clear Stormscope® Lightning'.
3) Press the **ENT** Key.

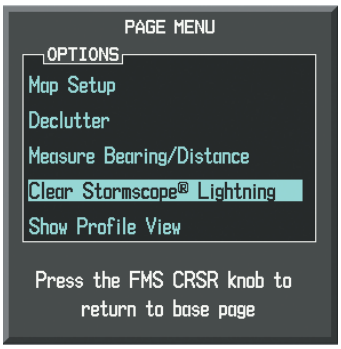


Figure 6-25 Navigation Map Page Options Menu

ZOOM RANGE ON THE NAVIGATION MAP

Stormscope lightning data can be displayed up to 800 nm zoom range (in North up mode) on the Navigation Map Page. **However, in the track up mode at the 500 nm range, a portion of Stormscope lightning data can be behind the aircraft and therefore not visible on the Navigation Map**. Since the range for Stormscope data is 400 nm diameter total (200 nm in front and 200 nm behind), the 500 nm range in North up mode shows all the data.

At a map range of less than 25 nm, Stormscope lightning data is not displayed, but can still be present.

The maximum zoom range can also be set on the Navigation Map. Note that Stormscope data above the selected maximum zoom range is decluttered.

Selecting a Stormscope range on the Navigation Map:

1) Press the **MENU** Key.
2) Select 'MAP SETUP'.
3) Select the 'Weather' group.
4) Press the **ENT** Key.
5) Turn the **large FMS** Knob to select 'STRMSCP SMBL'.
6) Turn the **small FMS** Knob to select the maximum display range.
7) Press the **ENT** Key.
8) Press the **FMS** Knob to return to the Navigation Map Page.

To change the display range on the Navigation Map Page, turn the **Joystick** clockwise to zoom out or counter-clockwise to zoom in.

SELECTING THE STORMSCOPE PAGE

The Map - Stormscope Page is the principal map page for viewing Stormscope lightning information. Stormscope lightning data can be displayed at the ranges of 25 nm, 50 nm, 100 nm, and 200 nm.

Adjusting the Stormscope Map Range:

1) Turn the large **FMS** Knob to select the Map Page Group.
2) Turn the small **FMS** Knob to select the Stormscope Page.
3) To change the map range, turn the **Joystick** clockwise to zoom out or counter-clockwise to zoom in.

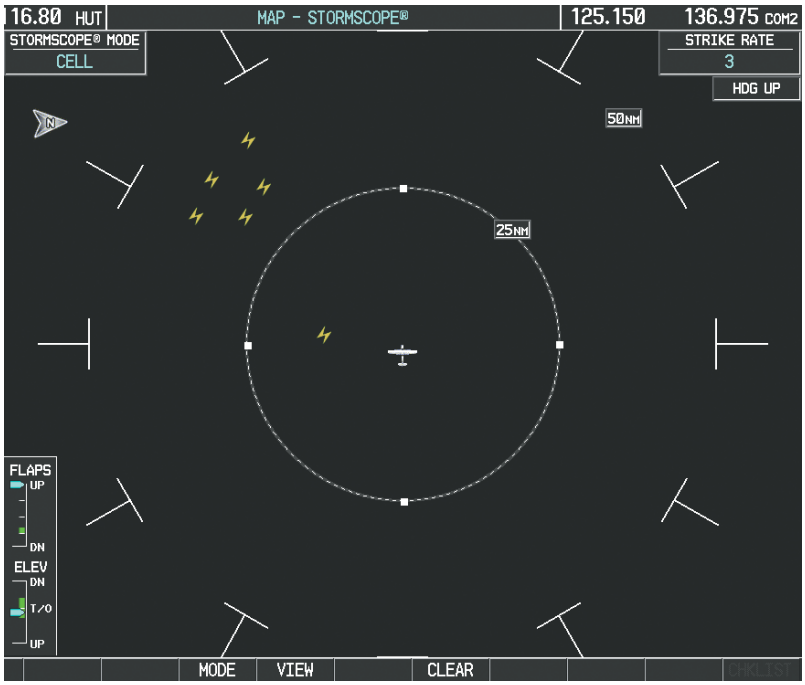


Figure 6-26 Stormscope Page

Changing between 'cell' and 'strike' mode on the Stormscope Page:

1) Select the Stormscope Page.
2) Press the **MODE** Softkey. The **CELL** and **STRIKE** softkeys are displayed.
3) Press the **CELL** Softkey to display 'CELL' data or press the **STRIKE** Softkey to display 'STRIKE' data. 'CELL' or 'STRIKE' is displayed in the mode box in the upper left corner of the Stormscope Page.
4) Press the **BACK** Softkey to return to the main Stormscope page.

Changing the viewing mode between 360˚ and 120˚ on the Stormscope Page:

1) Select the Stormscope Page.
2) Press the **VIEW** Softkey. The **360** and **ARC** softkeys are displayed. Press the **360** Softkey to display a 360˚ viewing area or press the **ARC** Softkey to display a 120˚ viewing area.
3) Press the **BACK** Softkey to return to the main Stormscope page.

6.3 TERRAIN PROXIMITY

WARNING: *Do not use Terrain Proximity information for primary terrain avoidance. Terrain Proximity is intended only to enhance situational awareness.*

NOTE: *Terrain data is not displayed when the aircraft is outside of the installed terrain database coverage area.*

NOTE: *Terrain Proximity is disabled when either the Terrain-SVS or TAWS-B options are installed.*

G950 Terrain Proximity is a terrain awareness system that does not comply with TSO-C151b certification standards. It increases situational awareness and aids in reducing controlled flight into terrain (CFIT). Do not confuse Terrain Proximity with the optional Terrain Awareness and Warning System - Class B (TAWS-B). TAWS-B is more sophisticated and robust, and it is TSO-C151b certified. Terrain Proximity does not provide warning annunciations or voice alerts. It only provides color indications on map displays when terrain and obstacles are within a certain altitude threshold from the aircraft. Although the terrain and obstacle color map displays are the same, TAWS-B uses more sophisticated algorithms to assess aircraft distance from terrain and obstacles.

Terrain Proximity requires the following components to operate properly:

- Valid 3-D GPS position
- Valid terrain/obstacle database

Terrain Proximity displays altitudes of terrain and obstructions relative to the aircraft position and altitude with reference to a database that may contain inaccuracies. Terrain and obstructions are shown only if they are in the database. Terrain and obstacle information should be used as an aid to situational awareness. They should never be used to navigate or maneuver around terrain.

Note that all obstructions may not be available in the terrain and obstacle database. No terrain and obstacle information is shown without a valid 3-D GPS position.

The G950 GPS receiver provides the horizontal position and altitude. GPS altitude is derived from satellite position. GPS altitude is then converted to the height above geodetic sea level (GSL), which is the height above mean sea level calculated geometrically. GSL altitude is used to determine terrain and obstacle proximity. GSL altitude accuracy is affected by satellite geometry, but is not subject to variations in pressure and temperature that normally affect pressure altitude sensors. GSL altitude does not require local altimeter settings to determine MSL altitude. It is a widely-used MSL altitude source.

Terrain and obstacle databases are referenced to MSL. Using the GPS position and altitude, the Terrain Proximity feature portrays a 2-D picture of the surrounding terrain and obstacles relative to the position and altitude of the aircraft. GPS position and GSL altitude are used to calculate and predict the aircraft's flight path in relation to the surrounding terrain and obstacles. In this way, the pilot can view predicted dangerous terrain and obstacle conditions.

DISPLAYING TERRAIN PROXIMITY DATA

The symbols and colors in Figure 6-27 and Table 6-7 are used to represent obstacles and aircraft altitude when the Terrain Proximity Page is selected for display. Terrain Proximity uses black, yellow, and red to represent terrain information relative to aircraft altitude. The color of each obstacle is associated with the altitude of the aircraft.

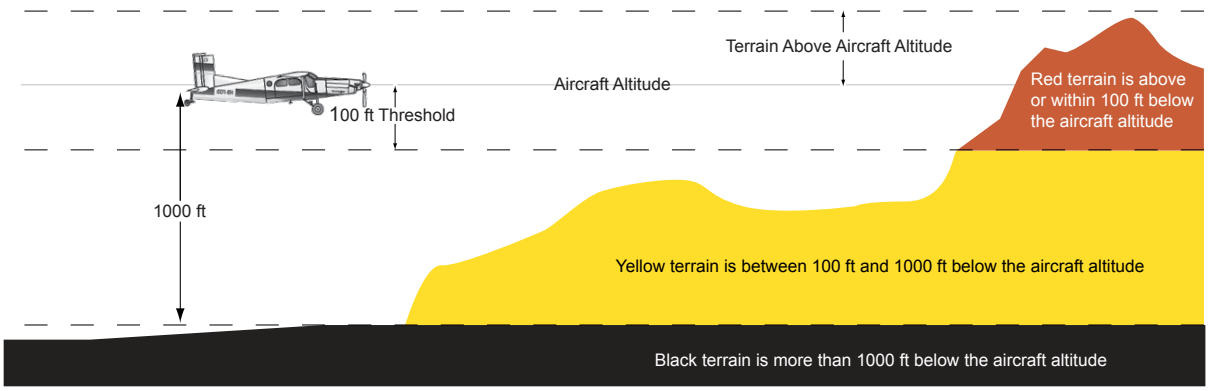


Figure 6-27 Terrain Altitude/Color Correlation for Terrain Proximity

Unlighted Obstacle		Lighted Obstacle		Obstacle Location
< 1000' AGL	> 1000' AGL	< 1000' AGL	> 1000' AGL	
				Red obstacle is above or within 100 ft below the aircraft altitude
				Yellow obstacle is between 100 ft and 1000 ft below the aircraft altitude

Table 6-7 Terrain Proximity Terrain/Obstacle Colors and Symbology

Terrain and obstacle information can be displayed on the following pages:

- PFD Inset Map
- Navigation Map Page
- Terrain Proximity Page
- Trip Planning Page
- Flight Plan Page
- AUX - Video Page

Displaying terrain and obstacle information (maps other than the Terrain Proximity Page):

1) Press the **MAP** Softkey (for the PFD Inset Map, press the **INSET** Softkey).
2) Press the **TERRAIN** Softkey to display terrain and obstacle data.

The Map - Terrain Proximity Page is the principal map page for viewing Terrain Proximity information. When Terrain Proximity is selected on maps other than the Terrain Proximity Page, an icon to indicate the feature is enabled for display and a legend for Terrain Proximity colors are shown (Figure 6-31).

The Navigation Map Page Setup Menu provides a means in addition to the softkey for enabling/disabling display of terrain and obstacles. The setup menu also controls the map range settings above which terrain and obstacle data are decluttered from the display. If a map range larger than the map range setting is selected, the data is removed from the map.

Terrain data can be selected for display independently of obstacle data; however, obstacles recognized by Terrain Proximity as yellow or red are shown when terrain is selected for display and the map range is within the setting limit.

Maps besides the Terrain Proximity Page use settings based on those selected for the Navigation Map Page. The maximum display ranges for obstacles on each map are dependent on the range setting made for the

Navigation Map. If the maximum range for obstacle display on the Navigation Map is adjusted to below 20 nm, the highest obstacle display range settings on the other applicable maps are also adjusted proportionally.

Customizing terrain and obstacle display on the Navigation Map Page:

1) Select the Navigation Map Page.
2) Press the **MENU** Key.
3) With 'Map Setup' highlighted, press the **ENT** Key (Figure 6-28).
4) Turn the small **FMS** Knob to select the 'Map' Group and press the **ENT** Key (Figure 6-29).
5) Turn the large **FMS** Knob or press the **ENT** Key to scroll through product selections (Figure 6-30).
   - TERRAIN DATA – Turns the display of terrain data on or off and sets maximum range at which terrain is shown
   - OBSTACLE DATA – Turns the display of obstacle data on or off and sets maximum range at which obstacles are shown
6) Turn the small **FMS** Knob to scroll through options for each product (ON/OFF, range settings).
7) Press the **ENT** Key to select an option.
8) Press the **FMS** Knob or **CLR** Key to return to the Navigation Map Page with the changed settings.

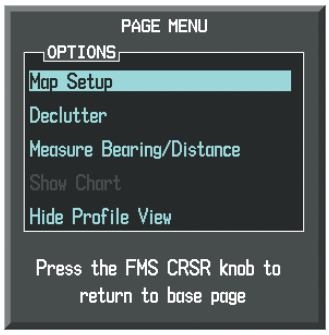


Figure 6-28 Navigation Map Page Menu



Figure 6-29 Navigation Map Page Setup Menu

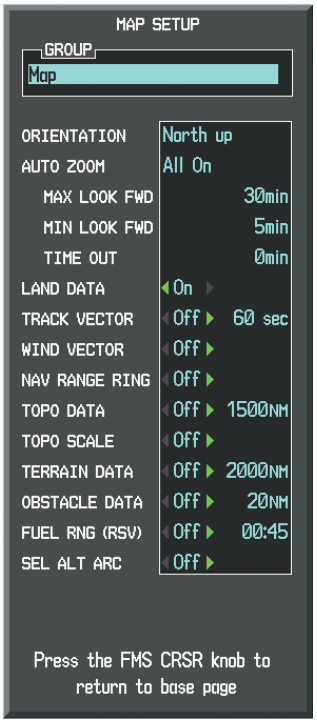


Figure 6-30 Navigation Map Page Setup Menu, Map Group

Additional information about obstacles can be displayed by panning over the display on the map. The map panning feature is enabled by pressing the **Joystick**. The map range is adjusted by turning the **Joystick**. If the map range is adjusted while panning is enabled, the map is re-centered on the Map Pointer.

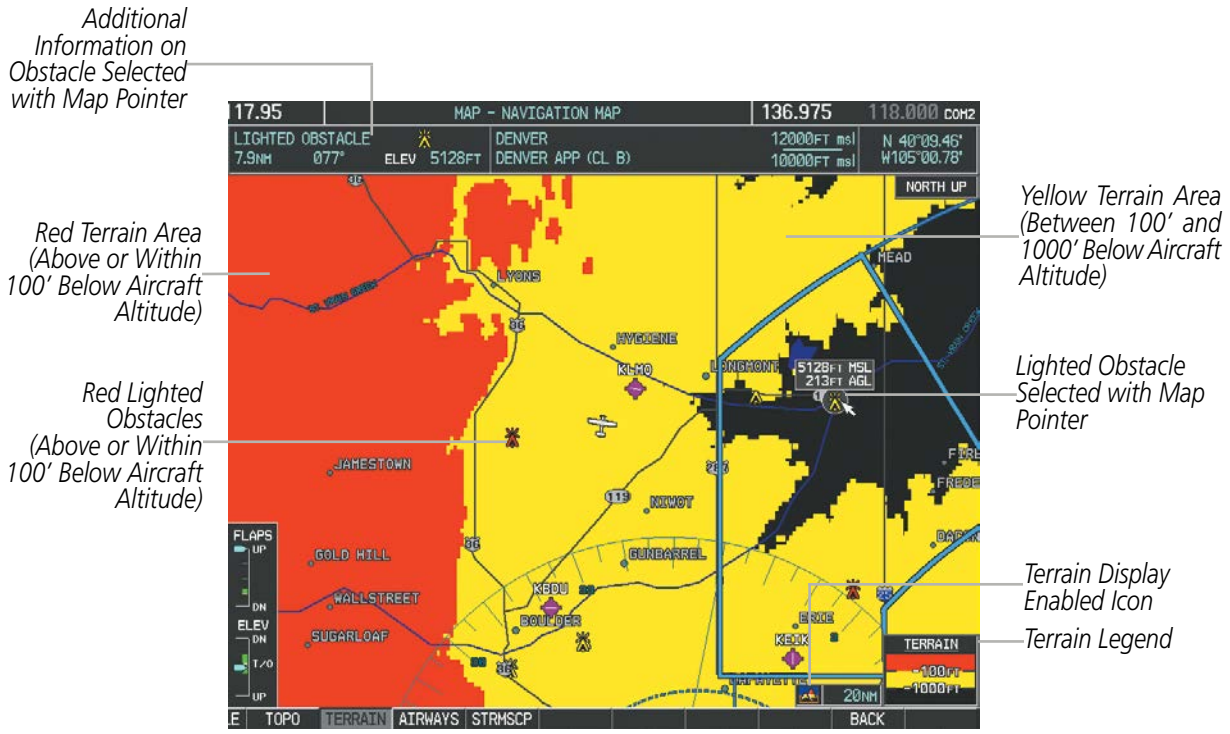


Figure 6-31 Terrain Information on the Navigation Map Page

TERRAIN PROXIMITY PAGE

The Terrain Proximity Page is specialized to show terrain and obstacle data in relation to the aircraft's current altitude, without clutter from the basemap. Aviation data (airports, VORs, and other NAVAIDs) can be displayed for reference.

Aircraft orientation on this map is always heading up unless there is no valid heading. Two views are available relative to the position of the aircraft: the 360° default display and the radar-like ARC (120°) display. Map range is adjustable with the **Joystick** from 1 to 200 nm, as indicated by the map range rings (or arcs).

Displaying the Terrain Proximity Page:

1) Turn the large **FMS** Knob to select the Map Page Group.

2) Turn the small **FMS** Knob to select the Terrain Proximity Page.

3) To change the view,

a) Press the **VIEW** Softkey.

b) Press the **360** or **ARC** Softkey to select the desired view.

Or:

a) Press the **MENU** Key.

b) Select 'View Arc' or 'View 360°' (choice dependent on current state) and press the **ENT** Key to change the view.

Showing/hiding aviation information on the Terrain Proximity Page:

1) Press the **MENU** Key.
2) Select 'Show Aviation Data' or 'Hide Aviation Data' (choice dependent on current state) and press the **ENT** Key.

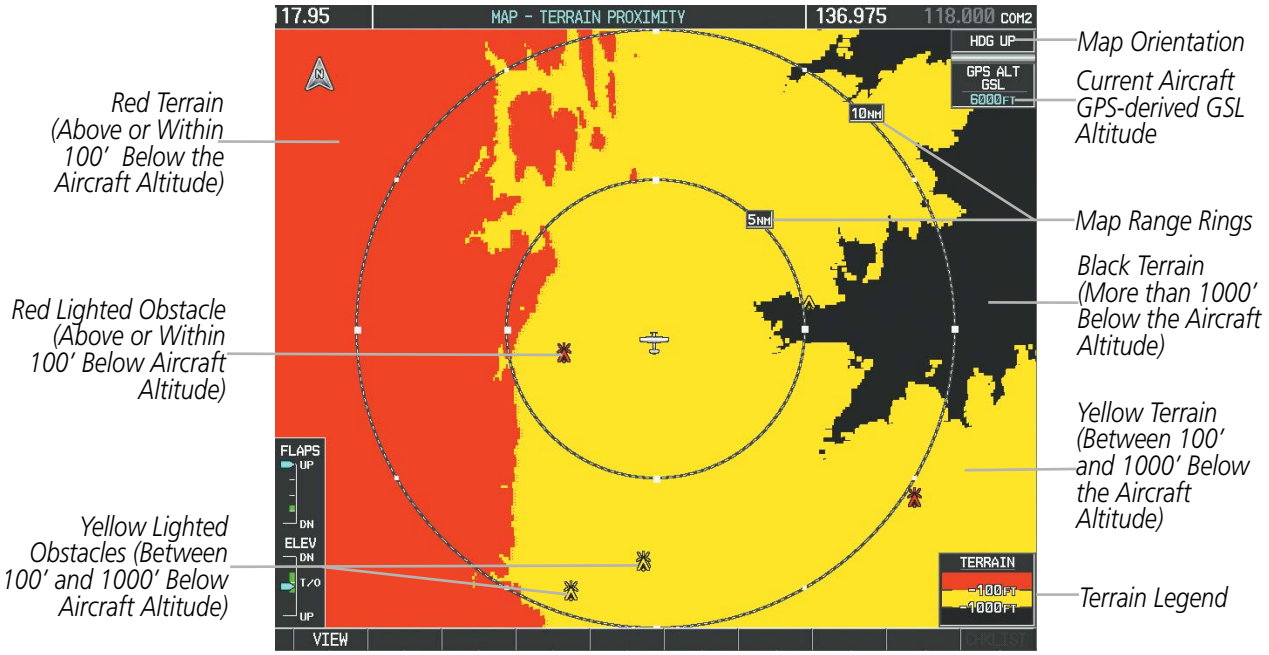


Figure 6-32 Terrain Proximity Page

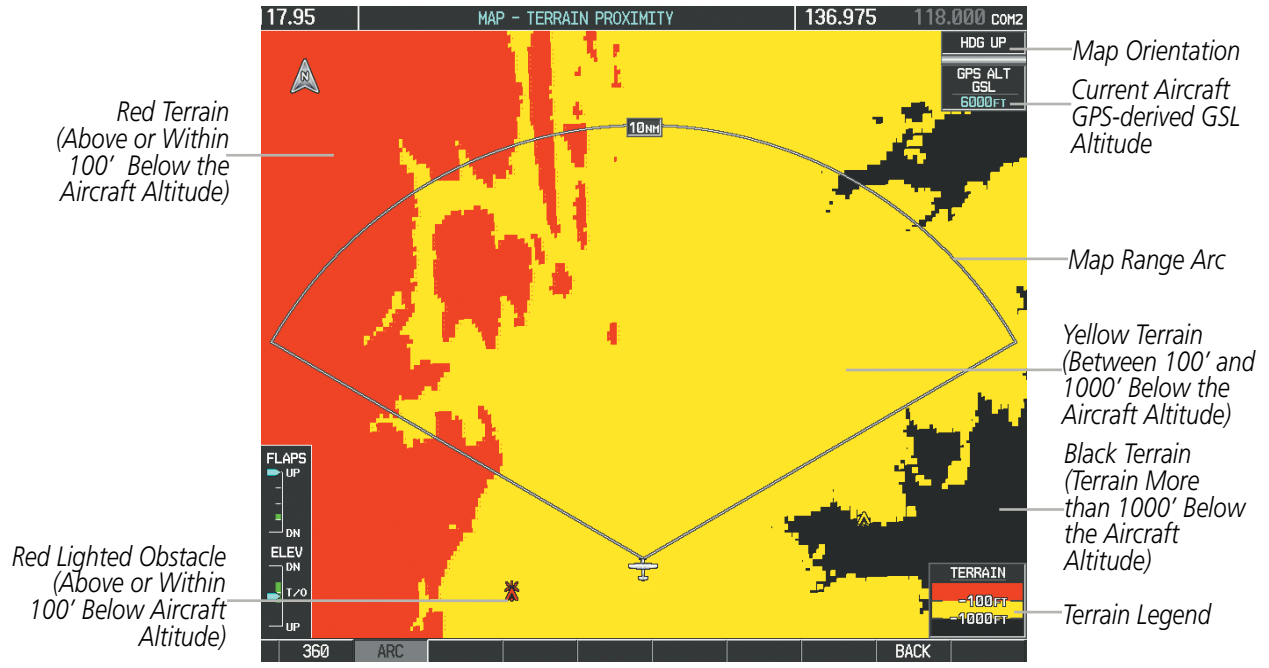


Figure 6-33 Terrain Proximity Page (ARC View)

6.4 PROFILE VIEW TERRAIN

WARNING: *Do not use Profile View Terrain data for primary terrain avoidance. Profile View Terrain is intended only to enhance situational awareness.*

NOTE: *Terrain data is not displayed when the aircraft is outside of the installed terrain database coverage area.*

The G950 offers a Profile View of terrain and obstacles relative to the aircraft's current flight path and altitude on the Navigation Map Page of the MFD. Profile View does not provide terrain or obstacle caution or warning annunciations or voice alerts, nor does it display potential impact points inside the Profile View. The colors and symbols used to represent terrain and obstacles are the same as those used in Terrain Proximity discussed previously.

Accessing Profile View:

1) Select the Navigation Map Page.
2) Press the **MAP** Softkey.
3) Press the **PROFILE** Softkey to enable or disable Profile View.

Or:

1) Press the **MENU** Key.
2) Select 'Show Profile View' or 'Hide Profile View' (choice dependent on current state) and press the **ENT** Key.

Enabling/Disabling Profile View Terrain on the Navigation Map (when Profile View is enabled):

1) Select the Navigation Map Page.
2) Press the **MAP** Softkey.
3) Press the **TERRAIN** Softkey.

PROFILE VIEW DISPLAY

When the Profile View is enabled, it is displayed in a window below the Navigation Map. Altitude is shown along a vertical scale, with an aircraft icon positioned at the current altitude. Distance is represented horizontally along the bottom of the Profile View, and increases from left (present position) to right.

When the Navigation Map range is adjusted with the **Joystick**, the horizontal distance of the Profile View is adjusted proportionately to be 1/2 of the Navigation Map range distance down to one nm, at which point Profile View is no longer available ('PROFILE NOT AVAILABLE' is displayed). When Navigation Map range is adjusted to remove altitude-correlated colored terrain data (as shown in the Terrain Legend) or obstacles from the Navigation Map, these items are also removed from the Profile View; only an outline of the terrain will be displayed in black in the Profile View window. Refer to the Terrain Proximity, Terrain-SVS, or TAWS-B discussions for more information about displaying terrain or obstacles on the Navigation Map Page.

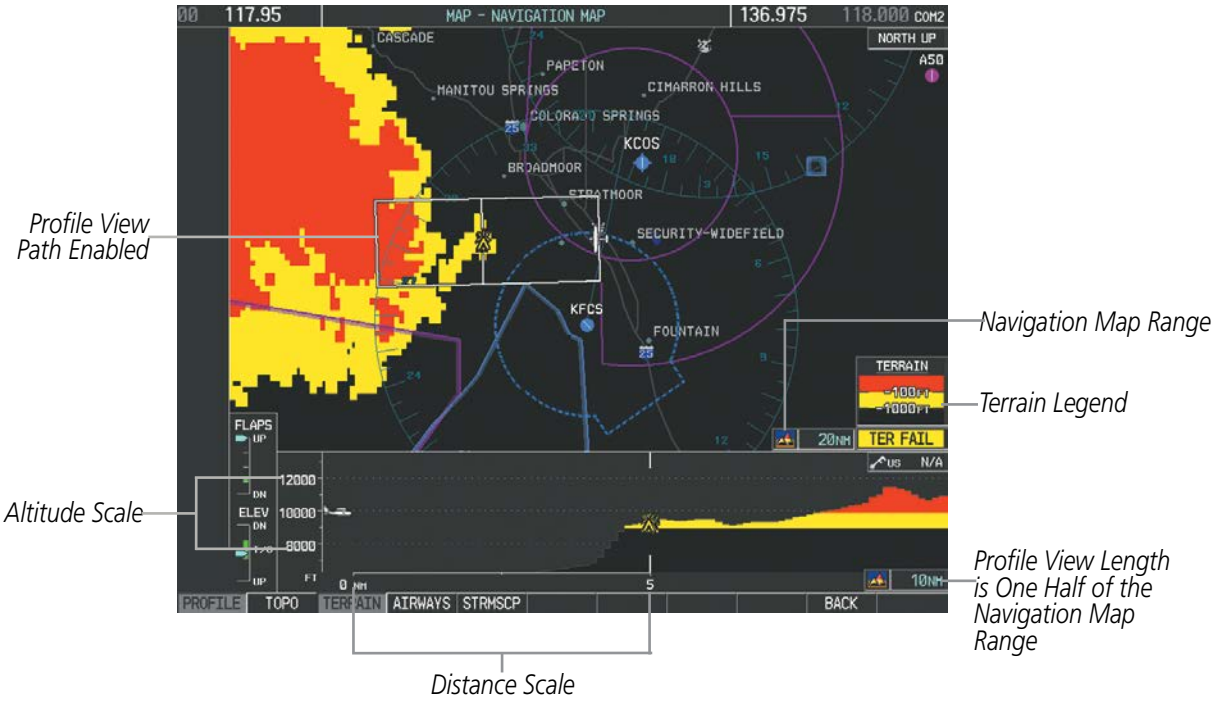


Figure 6-34 Profile View on Navigation Map with Terrain Display Enabled

The Profile View is based on the current aircraft track (or heading if track is unavailable) and shows the *highest* known terrain or obstacles within a predetermined width from the present aircraft position to the end of the profile range. The width of the Profile View (Table 6-8) is determined by the phase of flight, as annunciated on the HSI. Refer to the Flight Instruments section for more information about flight phases.

Flight Phase	Total Profile View Width
Approach	0.6 nm
Departure	0.6 nm
Terminal	2.0 nm
Enroute	4.0 nm
Oceanic	4.0 nm

Table 6-8 Profile View Width

PROFILE PATH

The Profile Path displays the horizontal and lateral boundaries of the Profile View. The path is shown as a white rectangle on the Navigation Map Page (Figure 6-34) and is only available when Profile View is enabled. White range markers both edges of the Profile Path rectangle match the range markers along the distance scale inside the Profile View display window whenever the profile range is at least four nm (or 7.5 km if configured for metric units).

The Profile Path rectangle may be configured on or off, and the Navigation Map range at which the Profile Path is removed from map display can be changed.

Customizing the Profile Path display on the Navigation Map Page:

1) Select the Navigation Map Page.
2) Press the **MENU** Key.
3) With 'Map Setup' highlighted, press the **ENT** Key (Figure 6-35).
4) Turn the small **FMS** Knob to select the 'Profile' Group and press the **ENT** Key (Figure 6-36).
5) Turn the large **FMS** Knob or press the **ENT** Key to scroll through product selections (Figure 6-37).
   - PROFILE PATH – Turns the display of the Profile Path on or off and sets maximum map range at which the Profile Path is shown
6) Turn the small **FMS** Knob to scroll through options (ON/OFF, range settings).
7) Press the **ENT** Key to select an option.
8) Press the **FMS** Knob or **CLR** Key to return to the Navigation Map Page with the changed settings.

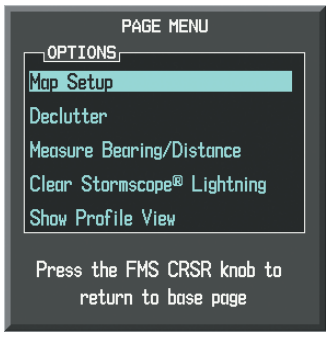


Figure 6-35 Navigation Map Page Menu



Figure 6-36 Navigation Map Page Setup Menu

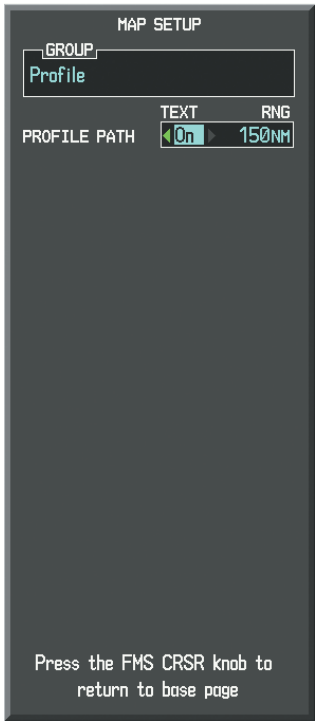


Figure 6-37 Navigation Map Page Setup Menu, Profile Group

6.5 TERRAIN-SVS

WARNING: *Do not use Terrain-SVS information for primary terrain avoidance. Terrain-SVS is intended only to enhance situational awareness.*

NOTE: *Terrain data is not displayed when the aircraft is outside of the installed terrain database coverage area.*

NOTE: *Terrain-SVS is included with the optional Synthetic Vision Technology system (SVT). The TAWS-B option will take precedence over Terrain-SVS when TAWS-B is also installed.*

Terrain-SVS is a terrain awareness system included with the Garmin Synthetic Vision Technology System (SVT). SVT functionality is offered as an optional enhancement. The optional Terrain Awareness and Warning System - Class B (TAWS-B) or standard Terrain-SVS is integrated within SVT to provide visual annunciations and voice alerts to indicate the presence of threatening terrain relevant to the projected flight path. For detailed information regarding SVT, refer to the Additional Features section of this Pilot's Guide.

Terrain-SVS does not comply with TSO-C151b certification standards. It increases situational awareness and aids in reducing controlled flight into terrain (CFIT). Do not confuse Terrain-SVS with TAWS-B. TAWS-B is more sophisticated and robust, and it is TSO-C151b certified. Although the terrain and obstacle color map displays are the same, TAWS-B uses more sophisticated algorithms to assess aircraft distance from terrain and obstacles.

Terrain-SVS does not provide the following:

- Premature Descent Alerting (PDA)
- Excessive Descent Rate (EDR)
- Negative Climb Rate (NCR)
- 500 Foot Voice Callout alert (VCO)

Terrain-SVS requires the following components to operate properly:

- Valid 3-D GPS position
- Valid terrain/airport terrain/obstacle database

Terrain-SVS displays altitudes of terrain and obstructions relative to the aircraft position and altitude with reference to a database that may contain inaccuracies. Terrain and obstructions are shown only if they are in the database. Terrain and obstacle information should be used as an aid to situational awareness. They should never be used to navigate or maneuver around terrain.

Note that all obstructions may not be available in the terrain and obstacle database. No terrain and obstacle information is shown without a valid 3-D GPS position.

The G950 GPS receiver provides the horizontal position and altitude. GPS altitude is derived from satellite position. GPS altitude is then converted to the height above geodetic sea level (GSL), which is the height above mean sea level calculated geometrically. GSL altitude is used to determine terrain and obstacle proximity. GSL altitude accuracy is affected by satellite geometry, but is not subject to variations in pressure and temperature that normally affect pressure altitude sensors. GSL altitude does not require local altimeter settings to determine MSL altitude. It is a widely-used MSL altitude source.

Terrain and obstacle databases are referenced to GSL. Using the GPS position and altitude, the Terrain-SVS feature portrays a 3-D picture of the surrounding terrain and obstacles relative to the position and altitude of the aircraft. GPS position and GSL altitude are used to calculate and predict the aircraft's flight path in relation to the surrounding terrain and obstacles. In this way, the pilot can view predicted dangerous terrain and obstacle conditions.

DISPLAYING TERRAIN-SVS DATA

Terrain-SVS uses yellow (caution) and red (warning) to depict terrain and obstacles (with heights greater than 200 feet above ground level, AGL) alerts relative to aircraft altitude. Colors are adjusted automatically as the aircraft altitude changes. The colors and symbols in Figure 6-38 and Tables 6-12 and 6-13 are used to represent terrain, obstacles, and potential impact points.

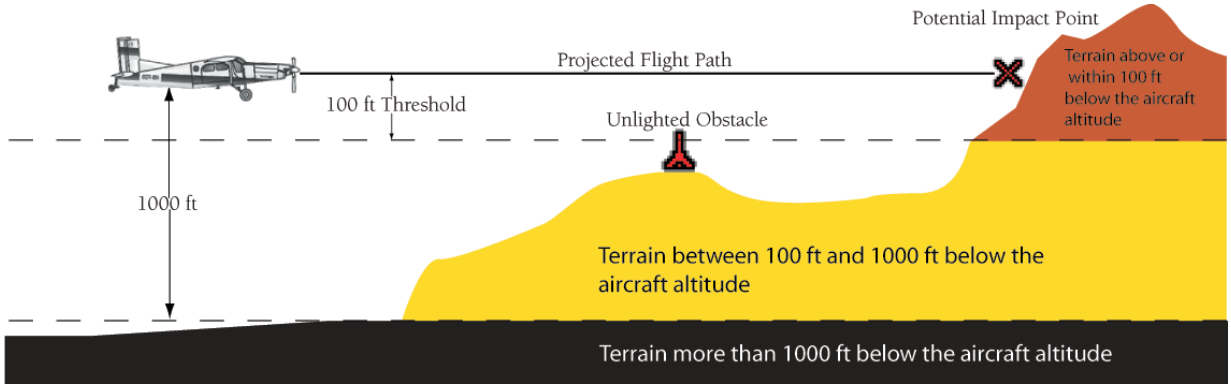


Figure 6-38 Terrain Altitude/Color Correlation for Terrain-SVS

Unlighted Obstacle		Lighted Obstacle		Obstacle Location
< 1000' AGL	> 1000' AGL	< 1000' AGL	> 1000' AGL	
				Red obstacle is above or within 100 ft below the aircraft altitude
				Yellow obstacle is between 100 ft and 1000 ft below the aircraft altitude

Table 6-9 Terrain-SVS Obstacle Colors and Symbology

Potential Impact Point Symbol	Alert Type	Example Annunciation
	Warning	TERRAIN
	Caution	TERRAIN

Table 6-10 Terrain-SVS Potential Impact Point Symbols with Alert Types

Terrain-SVS information can be displayed on the following maps:

- PFD Inset Map
- Navigation Map Page
- Terrain-SVS Page
- Trip Planning Page
- Flight Plan Pages
- AUX - Video Page

Displaying terrain and obstacle information (maps other than the Terrain-SVS Page):

1) Press the **MAP** Softkey (for the PFD Inset Map, press the **INSET** Softkey).
2) Press the **TERRAIN** Softkey to display terrain and obstacle data.

The Map - Terrain-SVS Page is the principal map page for viewing Terrain-SVS information. When Terrain-SVS is selected on maps other than the Terrain-SVS Page, a terrain icon is shown to indicate the feature is enabled for display.

The Navigation Map Page Setup Menu provides a means in addition to the softkeys for enabling/disabling the display of terrain and obstacles. The setup menu also controls the map range settings above which terrain and obstacle data are decluttered from the display. If a map range larger than the map range setting is selected, the data is removed from the map. For terrain data, the enable/disable function applies only to the MFD, while the range setting also affects the PFD Inset Map.

Terrain data can be selected for display independently of obstacle data; however, obstacles for which warnings and cautions are issued are shown when terrain is selected for display and the map range is within the setting limit.

Maps besides the Terrain-SVS Page use settings based on those selected for the Navigation Map Page. The maximum display ranges for obstacles on each map are dependent on the range setting made for the Navigation Map. If the maximum range for obstacle display on the Navigation Map is adjusted to below 20 nm, the highest obstacle display range settings on the other applicable maps are also adjusted proportionally.

Customizing terrain and obstacle display on the Navigation Map Page:

1) Select the Navigation Map Page.
2) Press the **MENU** Key.
3) With 'Map Setup' highlighted, press the **ENT** Key (Figure 6-39).
4) Turn the small **FMS** Knob to select the 'Map' Group and press the **ENT** Key (Figure 6-40).
5) Turn the large **FMS** Knob or press the **ENT** Key to scroll through product selections (Figure 6-41).
   - TERRAIN DATA – Turns the display of terrain data on or off and sets maximum range at which terrain is shown
   - OBSTACLE DATA – Turns the display of obstacle data on or off and sets maximum range at which obstacles are shown
6) Turn the small **FMS** Knob to scroll through options for each product (ON/OFF, range settings).
7) Press the **ENT** Key to select an option.
8) Press the **FMS** Knob or **CLR** Key to return to the Navigation Map Page with the changed settings.

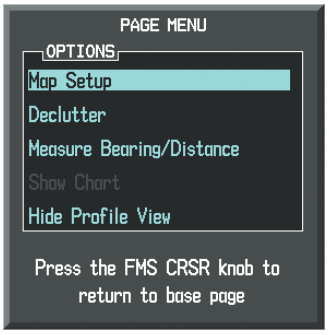


Figure 6-39 Navigation Map Page Menu



Figure 6-40 Navigation Map Page Setup Menu

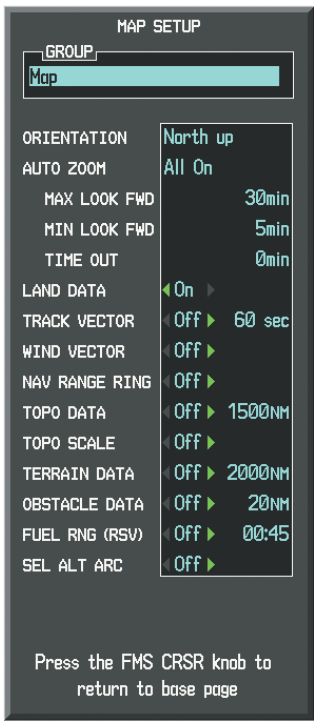


Figure 6-41 Navigation Map Page Setup Menu, Map Group

TERRAIN-SVS PAGE

The Terrain-SVS Page is specialized to show terrain, obstacle, and potential impact point data in relation to the aircraft's current altitude, without clutter from the basemap. Aviation data (airports, VORs, and other NAVAIDs) can be displayed for reference. If an obstacle and the projected flight path of the aircraft intersect, the display automatically zooms in to the closest potential point of impact on the Terrain-SVS Page.

Aircraft orientation on this map is always heading up unless there is no valid heading. Two views are available relative to the position of the aircraft: the 360° default display and the radar-like ARC (120°) display. Map range is adjustable with the **Joystick** from 1 to 200 nm, as indicated by the map range rings (or arcs).

Displaying the Terrain-SVS Page:

1) Turn the large **FMS** Knob to select the Map Page Group.
2) Turn the small **FMS** Knob to select the Terrain-SVS Page.

Changing the Terrain-SVS Page view:

1) Press the **VIEW** Softkey.
2) Press the **360** or **ARC** Softkey to select the desired view.

Or:

1) Press the **MENU** Key.
2) Select 'View Arc' or 'View 360°' (choice dependent on current state) and press the **ENT** Key to change the view

Showing/hiding aviation information on the Terrain-SVS Page:

1) Press the **MENU** Key.
2) Select 'Show Aviation Data' or 'Hide Aviation Data' (choice dependent on current state) and press the **ENT** Key.

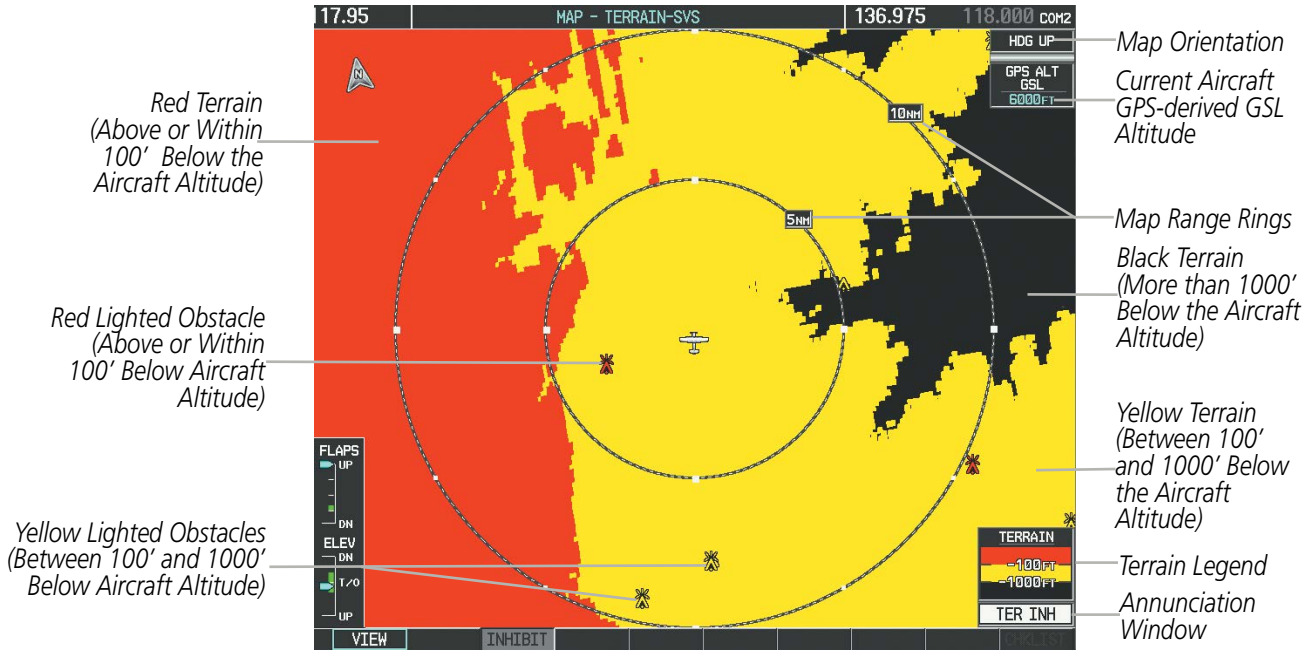


Figure 6-42 Terrain-SVS Page

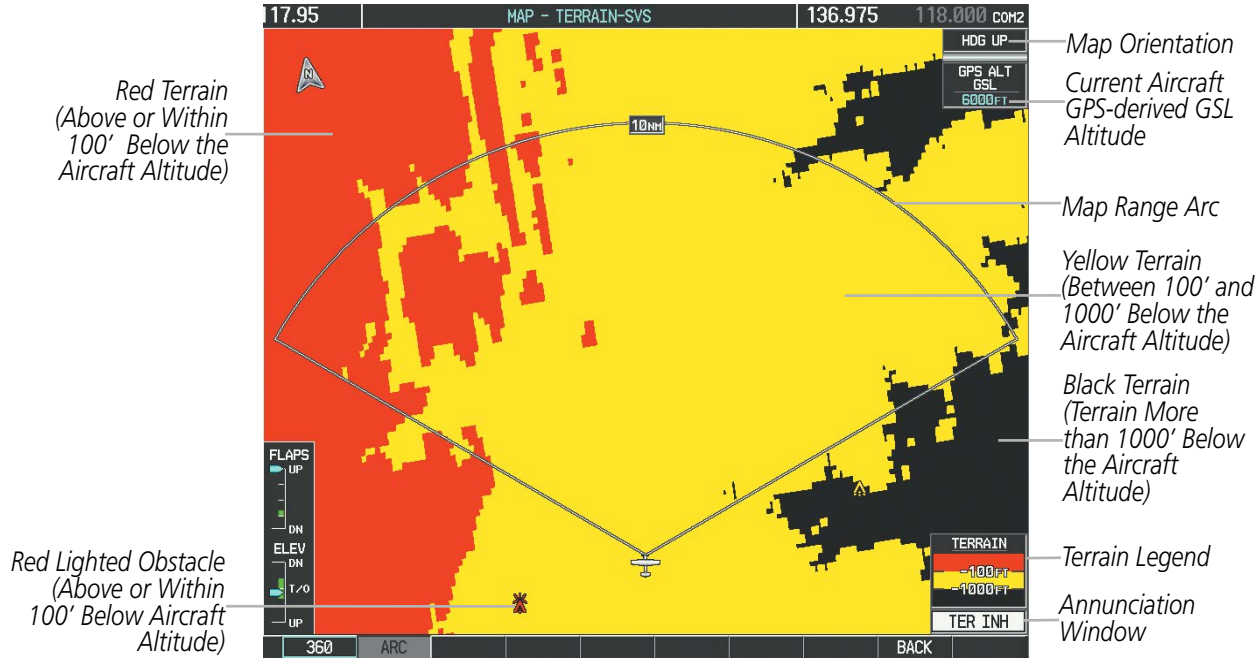


Figure 6-43 Terrain-SVS Page (ARC View)

TERRAIN-SVS ALERTS

Alerts are issued when flight conditions meet parameters that are set within Terrain-SVS software algorithms. Terrain-SVS alerts typically employ a CAUTION or a WARNING alert severity level, or both. When an alert is issued, visual annunciations are displayed with voice alerts. Table 6-11 shows Terrain-SVS alert types with corresponding annunciations and voice alerts.

When an alert is issued, annunciations appear on the PFD and MFD. The Terrain-SVS Alert Annunciation is shown to the upper left of the Altimeter on the PFD and below the Terrain Legend on the MFD. If the Terrain-SVS Page is not displayed at the time, a pop-up alert appears on the MFD. To acknowledge the pop-up alert:

- Press the **CLR** Key (returns to the currently viewed page), or
- Press the **ENT** Key (accesses the Terrain-SVS Page)

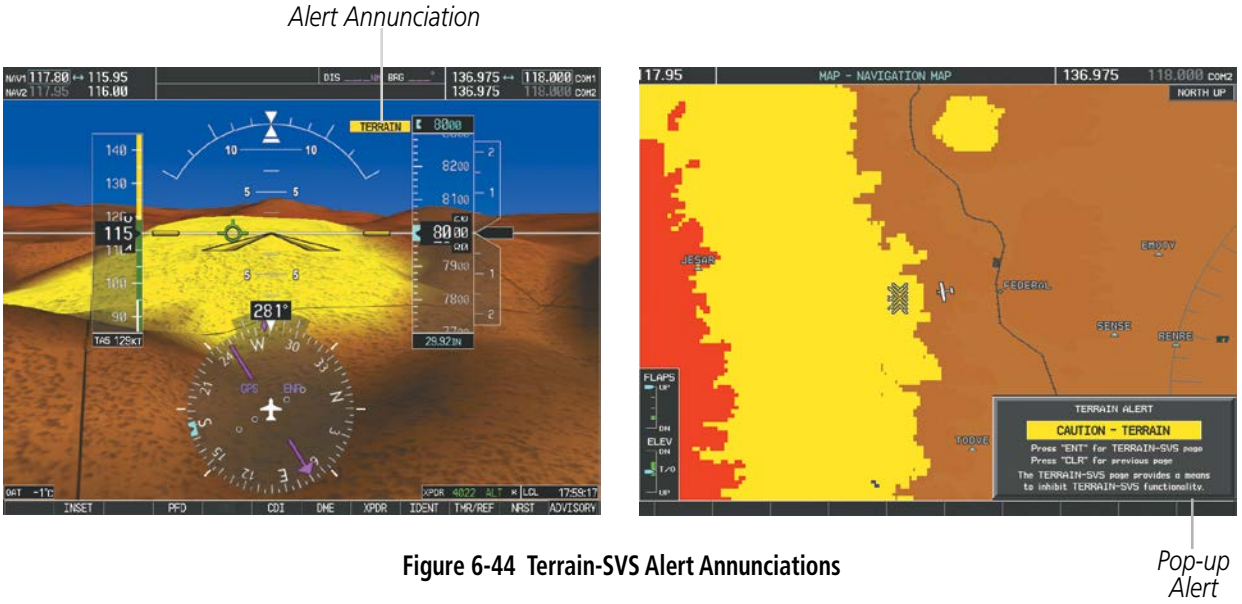


Figure 6-44 Terrain-SVS Alert Annunciations

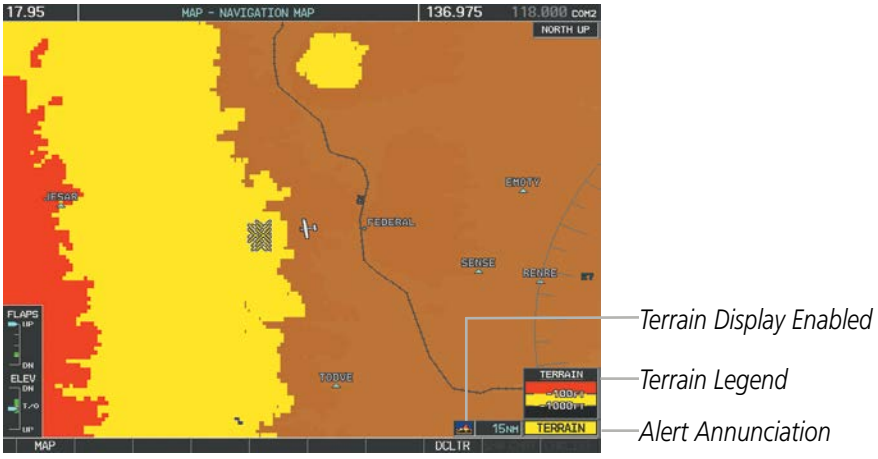


Figure 6-45 Navigation Map Page (After Terrain-SVS Pop-up Alert Acknowledgment)

Alert Type	PFD/MFD* Alert Annunciation	MFD Pop-Up Alert (except Terrain-SVS Page)	Voice Alert
Reduced Required Terrain Clearance Warning (RTC)	TERRAIN	WARNING - TERRAIN	"Warning; Terrain, Terrain"
Imminent Terrain Impact Warning (ITI)	TERRAIN	WARNING - TERRAIN	"Warning; Terrain, Terrain"
Reduced Required Obstacle Clearance Warning (ROC)	TERRAIN	WARNING - OBSTACLE	"Warning; Obstacle, Obstacle"
Imminent Obstacle Impact Warning (IOI)	TERRAIN	WARNING - OBSTACLE	"Warning; Obstacle, Obstacle"
Reduced Required Terrain Clearance Caution (RTC)	TERRAIN	CAUTION - TERRAIN	"Caution; Terrain, Terrain"
Imminent Terrain Impact Caution (ITI)	TERRAIN	CAUTION - TERRAIN	"Caution; Terrain, Terrain"
Reduced Required Obstacle Clearance Caution (ROC)	TERRAIN	CAUTION - OBSTACLE	"Caution; Obstacle, Obstacle"
Imminent Obstacle Impact Caution (IOI)	TERRAIN	CAUTION - OBSTACLE	"Caution; Obstacle, Obstacle"

** Annunciation is displayed on the MFD when terrain display is enabled.*

Table 6-11 Terrain-SVS Alerts Summary

FORWARD LOOKING TERRAIN AVOIDANCE

The Forward Looking Terrain Avoidance (FLTA) feature of Terrain-SVS compares the aircraft's projected flight path with known terrain and obstacles in their respective databases and issues alerts as either a caution or a warning:

Reduced Required Terrain Clearance (RTC) and **Reduced Required Obstacle Clearance (ROC)** alerts are issued when the aircraft flight path is above terrain, yet is projected to come within the minimum clearance values in Figure 6-46. When an RTC alert is issued, a potential impact point is displayed on the Terrain-SVS Page.

Imminent Terrain Impact (ITI) and **Imminent Obstacle Impact (IOI)** alerts are issued when the aircraft is below the elevation of a terrain or obstacle cell in the aircraft's projected path. ITI and IOI alerts are accompanied by a potential impact point displayed on the Terrain-SVS Page. The alert is annunciated when the projected vertical flight path is calculated to come within minimum clearance altitudes in Figure 6-46.

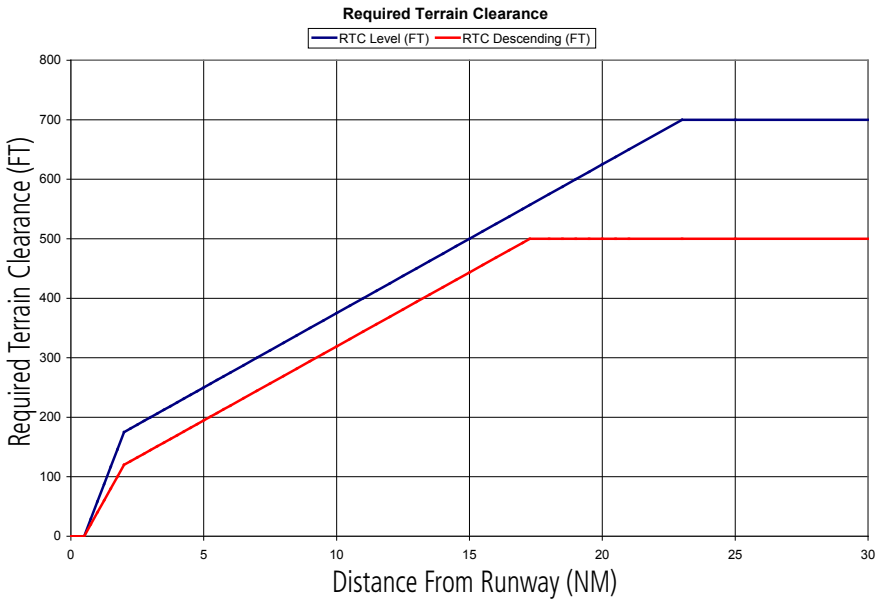


Figure 6-46 FLTA Alert Minimum Terrain and Obstacle Clearance Values

FLTA alerts are automatically inhibited when the aircraft is less than 200 feet above the destination runway elevation while within 0.5 nm of the approach runway or the aircraft is between runway ends. When Terrain-SVS alerts are inhibited, the annunciation 'TER INH' is shown on the PFD and in the MFD terrain annunciation window.

FLTA alerts may also be manually inhibited. Use discretion when inhibiting FLTA alerts, as they should be enabled where appropriate.

TER INH

Figure 6-47 Terrain-SVS Alerting Disabled (Terrain-SVS Inhibited) Annunciation

Inhibiting/enabling Terrain-SVS alerting:

1) Select the Terrain-SVS Page.
2) Press the **INHIBIT** Softkey to inhibit or enable Terrain-SVS (choice dependent on current state).

Or:

1) Select the Terrain-SVS Page.
2) Press the **MENU** Key.
3) Select 'Inhibit Terrain-SVS' or 'Enable Terrain-SVS' (choice dependent on current state) and press the **ENT** Key.

If Terrain-SVS alerts are inhibited when the Final Approach Fix is the active waypoint in a GPS SBAS approach, a 'LOW ALT' annunciation may appear on the PFD next to the Altimeter if the current aircraft altitude is at least 164 feet below the prescribed altitude at the Final Approach Fix. See the Flight Instruments Section for details.

SYSTEM STATUS

During power-up, Terrain-SVS conducts a self-test of its visual annunciations and voice alerts. A voice alert is issued at test completion.

Terrain-SVS continually monitors several system-critical items such as database validity, hardware status, and GPS status. If the terrain/obstacle database is not available, the voice alert ***"Terrain System Failure"*** is generated along with the 'TER FAIL' alert annunciation.

Terrain-SVS requires a 3-D GPS navigation solution along with specific vertical accuracy minimums. Should the navigation solution become degraded or if the aircraft is out of the database coverage area, the annunciation 'TER N/A' is generated in the annunciation window and on the Terrain-SVS Page. The voice alert ***"Terrain System Not Available"*** is generated. When sufficient GPS signal is returns and the aircraft is within the database coverage area, the voice alert "***Terrain System Available***" is generated.

Alert Type	PFD/MFD† Alert Annunciation	Terrain-SVS Page Center Banner Annunciation	Voice Alert
System Test in Progress	TER TEST	TERRAIN TEST	None
System Test Pass	None	None	"Terrain System Test OK"
Terrain Alerting Inhibited	TER INH	None	None
No GPS position	TER N/A	NO GPS POSITION	"Terrain System Not Available"*
Excessively degraded GPS signal; or Out of database coverage area	TER N/A	None	"Terrain System Not Available"*
Terrain System Test Fail; Terrain or Obstacle database unavailable or invalid; Invalid software configuration; or System audio fault	TER FAIL	TERRAIN FAIL	"Terrain System Failure"
MFD Terrain or Obstacle database unavailable or invalid, and Terrain-SVS operating with PFD Terrain or Obstacle databases	None	TERRAIN DATABASE FAILURE	None

† *Annunciation is shown on Terrain-SVS Page and the Navigation Map Page when Terrain is enabled.*
* *"Terrain System Available" will be heard when sufficient GPS signal is received, or Terrain database coverage area re-entered.*

Table 6-12 Terrain-SVS System Status Annunciations

6.6 TAWS-B

WARNING: *Do not use TAWS information for primary terrain avoidance. TAWS is intended only to enhance situational awareness.*

NOTE: *Terrain data is not displayed when the aircraft is outside of the installed terrain database coverage area.*

NOTE: *The data contained in the TAWS databases comes from government agencies. Garmin accurately processes and cross-validates the data but cannot guarantee the accuracy and completeness of the data.*

TAWS-B (Terrain Awareness and Warning System - Class B) is used to increase situational awareness and aid in reducing controlled flight into terrain (CFIT). TAWS provides visual annunciations and voice alerts when terrain and obstacles are within the given altitude threshold from the aircraft. The displayed alerts and warnings are advisory in nature only.

TAWS-B satisfies TSO-C151b Class B requirements for certification.

TAWS-B requires the following to operate properly:

- A valid terrain/obstacle/airport terrain database
- A valid 3-D GPS position solution

TAWS-B uses terrain and obstacle information supplied by government sources. Terrain information is based on terrain elevation information in a database that may contain inaccuracies. Individual obstructions may be shown if available in the database. The data undergoes verification by Garmin to confirm accuracy of the content, per TSO-C151b. However, the displayed information should never be understood as being all-inclusive and data may be inaccurate.

TAWS-B uses information provided from the GPS receiver to provide a horizontal position and altitude. GPS altitude is derived from satellite measurements. GPS altitude is then converted to the height above geodetic sea level (GSL), which is the height above mean sea level (MSL) calculated geometrically. GSL altitude is used to determine TAWS-B alerts. GSL altitude accuracy is affected by satellite geometry, but is not subject to variations in pressure and temperature that normally affect pressure altitude sensors. GSL altitude does not require local altimeter settings to determine MSL altitude. It is a widely-used MSL altitude source. Therefore, GSL altitude provides a highly accurate and reliable MSL altitude source to calculate terrain and obstacle alerts.

The terrain and obstacle databases used by TAWS-B are referenced to MSL. Using the GPS position and GSL altitude, TAWS-B displays a 2-D picture of the surrounding terrain and obstacles relative to the position and altitude of the aircraft. Furthermore, the GPS position and GSL altitude are used to calculate and "predict" the aircraft's flight path in relation to the surrounding terrain and obstacles. In this manner, TAWS-B can provide advanced alerts of predicted dangerous terrain conditions.

Baro-corrected altitude (or indicated altitude) is derived by adjusting the altimeter setting for local atmospheric conditions. The most accurate baro-corrected altitude can be achieved by frequently updating the altimeter setting to the nearest reporting station along the flight path. However, because actual atmospheric conditions seldom match the standard conditions defined by the International Standard Atmosphere (ISA) model (where pressure, temperature, and lapse rates have fixed values), it is common for the baro-corrected altitude (as read

from the altimeter) to differ from the GSL altitude. This variation results in the aircraft's GSL altitude differing from the baro-corrected altitude.

DISPLAYING TAWS-B DATA

TAWS-B uses yellow (caution) and red (warning) to depict terrain and obstacles (with heights greater than 200 feet above ground level, AGL) alerts relative to aircraft altitude. Colors are adjusted automatically as the aircraft altitude changes. The colors and symbols in the figure and tables below are used to represent terrain, obstacles, and potential impact points.

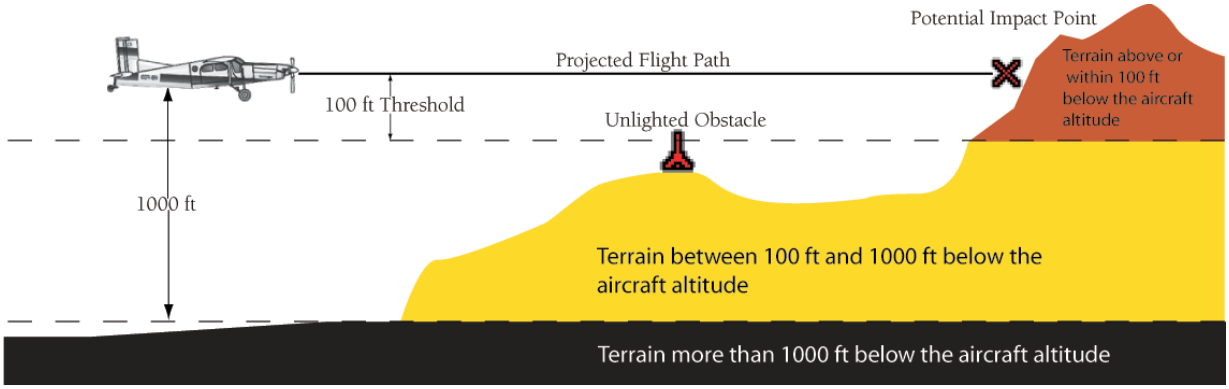


Figure 6-48 Terrain Altitude/Color Correlation for TAWS-B

Unlighted Obstacle		Lighted Obstacle		Obstacle Location
< 1000' AGL	> 1000' AGL	< 1000' AGL	> 1000' AGL	
				Red obstacle is above or within 100 ft below the aircraft altitude
				Yellow obstacle is between 100 ft and 1000 ft below the aircraft altitude

Table 6-13 TAWS-B Obstacle Colors and Symbology

Potential Impact Point Symbol	Alert Type	Example Annunciation
	Warning	PULL UP
	Caution	TERRAIN

Table 6-14 TAWS-B Potential Impact Point Symbols with Alert Types

TAWS-B information can be displayed on the following maps:

- PFD Inset Map
- Navigation Map Page
- TAWS-B Page
- Trip Planning Page
- Flight Plan Pages
- AUX - Video Page

Displaying terrain and obstacle information (maps other than the TAWS-B Page):

1) Press the **MAP** Softkey (for the PFD Inset Map, press the **INSET** Softkey).
2) Press the **TERRAIN** Softkey to display terrain and obstacle data.

The Map - TAWS-B Page is the principal map page for viewing TAWS-B information. When TAWS-B is selected on maps other than the TAWS-B Page, an icon is shown to indicate that the feature is enabled for display. A legend for TAWS-B terrain colors will accompany the icon on the Navigation Map Page (Figure 6-49) and the Flight Plan Pages. The icon is always shown on the TAWS-B Page.

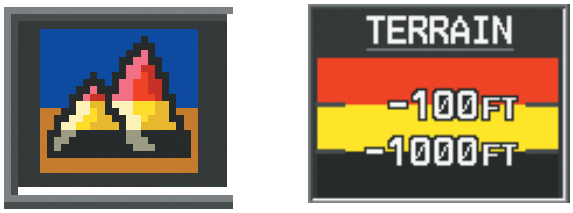


Figure 6-49 TAWS-B Icon and Legend

The Navigation Map Page Setup Menu provides a means in addition to the softkeys for enabling/disabling the display of terrain and obstacles. The setup menu also controls the map range settings above which terrain and obstacle data are decluttered from the display. If a map range larger than the map range setting is selected, the data is removed from the map. For terrain data, the enable/disable function applies only to the MFD, while the range setting also affects the PFD Inset Map.

Terrain data can be selected for display independently of obstacle data; however, obstacles for which warnings and cautions are issued are shown when terrain is selected for display and the map range is within the setting limit.

Maps besides the TAWS-B Page use settings based on those selected for the Navigation Map Page. The maximum display ranges for obstacles on each map are dependent on the range setting made for the Navigation Map. If the maximum range for obstacle display on the Navigation Map is adjusted to below 20 nm, the highest obstacle display range settings on the other applicable maps are also adjusted proportionally.

Customizing terrain and obstacle display on the Navigation Map Page:

1) Select the Navigation Map Page.
2) Press the **MENU** Key.
3) With 'Map Setup' highlighted, press the **ENT** Key (Figure 6-50).
4) Turn the small **FMS** Knob to select the 'Map' Group and press the **ENT** Key (Figure 6-51).
5) Turn the large **FMS** Knob or press the **ENT** Key to scroll through product selections (Figure 6-52).
   - TERRAIN DATA – Turns the display of terrain data on or off and sets maximum range at which terrain is shown
   - OBSTACLE DATA – Turns the display of obstacle data on or off and sets maximum range at which obstacles are shown
6) Turn the small **FMS** Knob to scroll through options for each product (ON/OFF, range settings).
7) Press the **ENT** Key to select an option.
8) Press the **FMS** Knob or **CLR** Key to return to the Navigation Map Page with the changed settings.

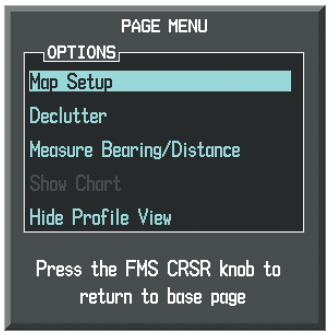


Figure 6-50 Navigation Map Page Menu



Figure 6-51 Navigation Map Page Setup Menu

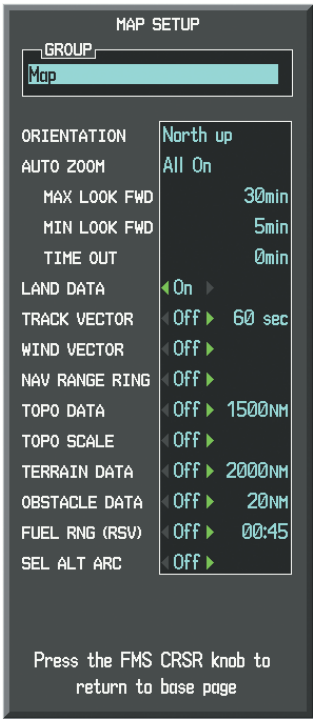


Figure 6-52 Navigation Map Page Setup Menu, Map Group

TAWS-B PAGE

The TAWS-B Page is specialized to show terrain, obstacle, and potential impact point data in relation to the aircraft's current altitude, without clutter from the basemap. Aviation data (airports, VORs, and other NAVAIDs) can be displayed for reference. If an obstacle and the projected flight path of the aircraft intersect, the display automatically zooms in to the closest potential point of impact on the TAWS-B Page.

Aircraft orientation on this map is always heading up unless there is no valid heading. Two views are available relative to the position of the aircraft: the 360° default display and the radar-like ARC (120°) display. Map range is adjustable with the **Joystick** from 1 to 200 nm, as indicated by the map range rings (or arcs).

Displaying the TAWS-B Page:

1) Turn the large **FMS** Knob to select the Map Page Group.
2) Turn the small **FMS** Knob to select TAWS-B Page.

Changing the TAWS-B Page view:

1) Press the **VIEW** Softkey.
2) Press the **360** or **ARC** Softkey to select the desired view.

Or:

1) Press the **MENU** Key.
2) Select 'View Arc' or 'View 360°' (choice dependent on current state) and press the **ENT** Key to change the view

Showing/hiding aviation information on the TAWS-B Page:

1) Press the **MENU** Key.
2) Select 'Show Aviation Data' or 'Hide Aviation Data' (choice dependent on current state) and press the **ENT** Key.

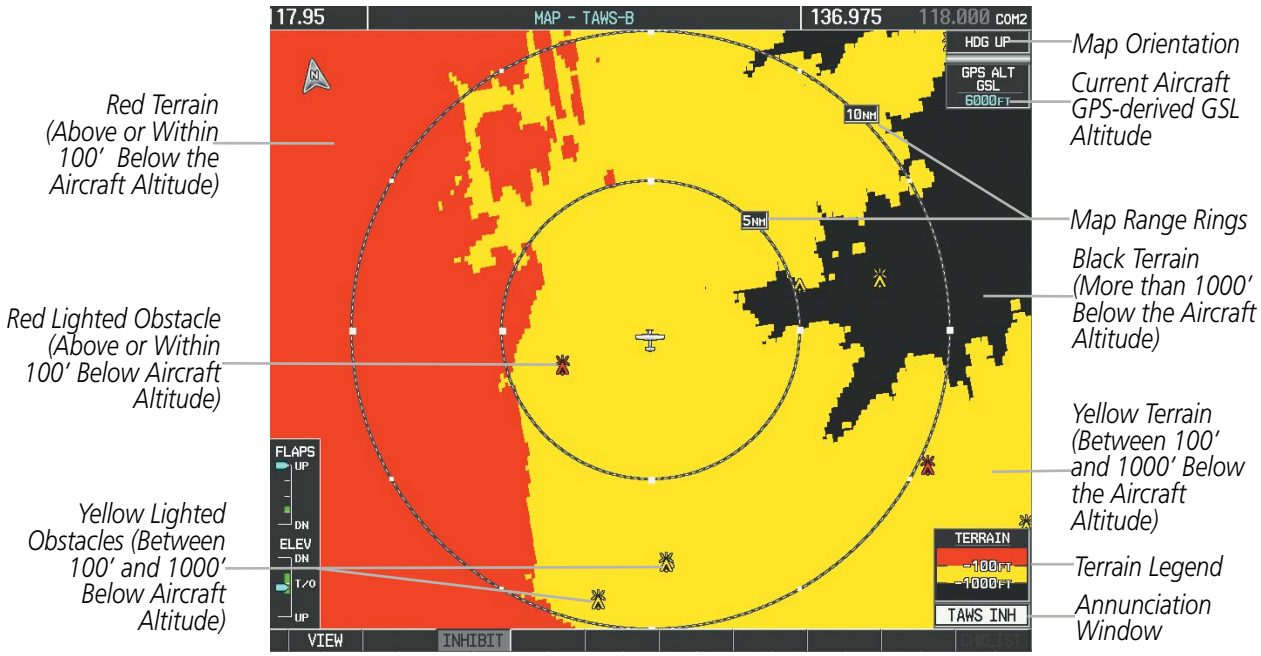


Figure 6-53 TAWS-B Page

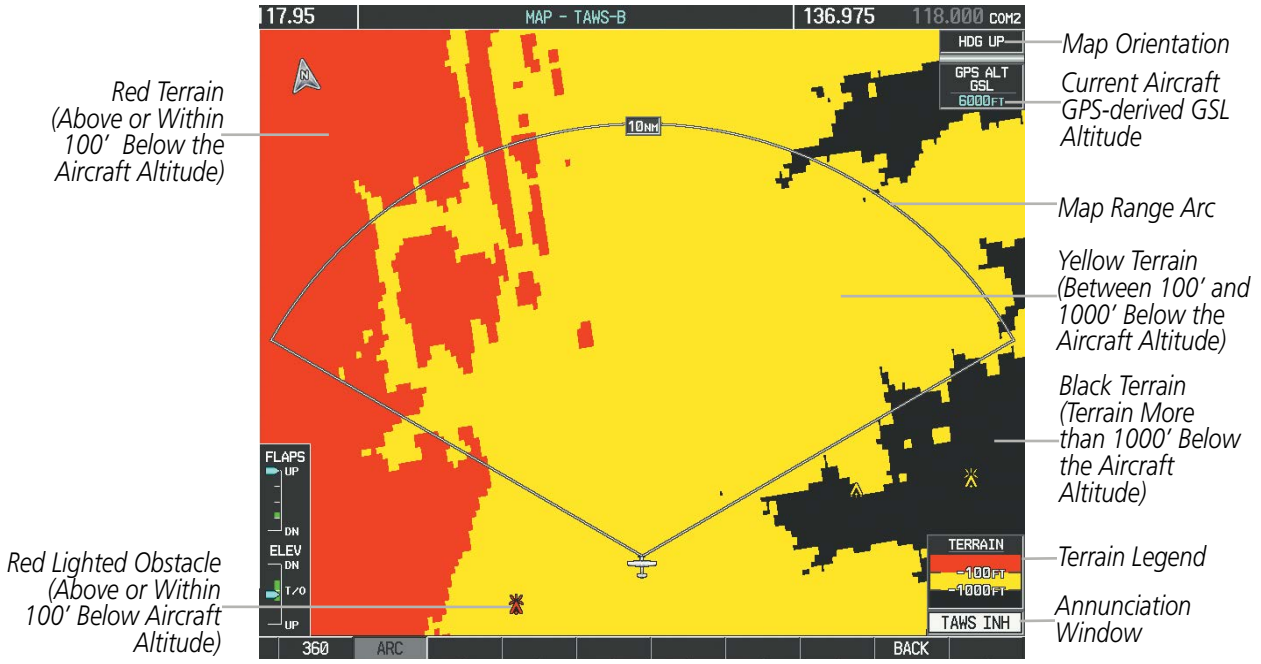


Figure 6-54 TAWS-B Page (ARC View)

TAWS-B ALERTS

Alerts are issued when flight conditions meet parameters that are set within TAWS-B software algorithms. TAWS-B alerts typically employ a CAUTION or a WARNING alert severity level, or both. When an alert is issued, visual annunciations are displayed with voice alerts. Table 6-15 shows TAWS-B alert types with corresponding annunciations and voice alerts.

When an alert is issued, annunciations appear on the PFD and MFD. The TAWS-B Alert Annunciation is shown to the upper left of the Altimeter on the PFD and below the Terrain Legend on the MFD. If the TAWS-B Page is not displayed at the time, a pop-up alert appears on the MFD. To acknowledge the pop-up alert:

- Press the **CLR** Key (returns to the currently viewed page), or
- Press the **ENT** Key (accesses the TAWS-B Page)



Figure 6-55 TAWS-B PFD Alert Annunciation

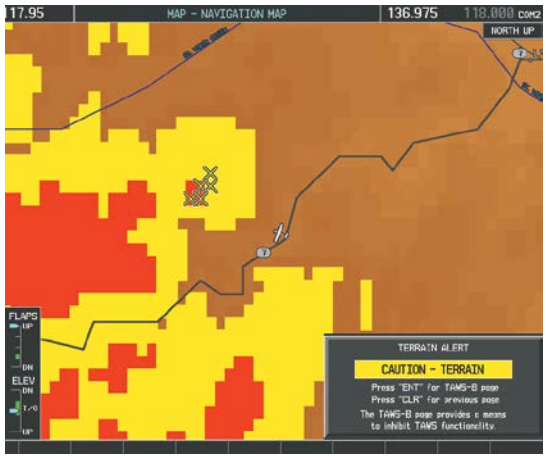


Figure 6-56 Navigation Map Page
TAWS-B Pop-up Alert

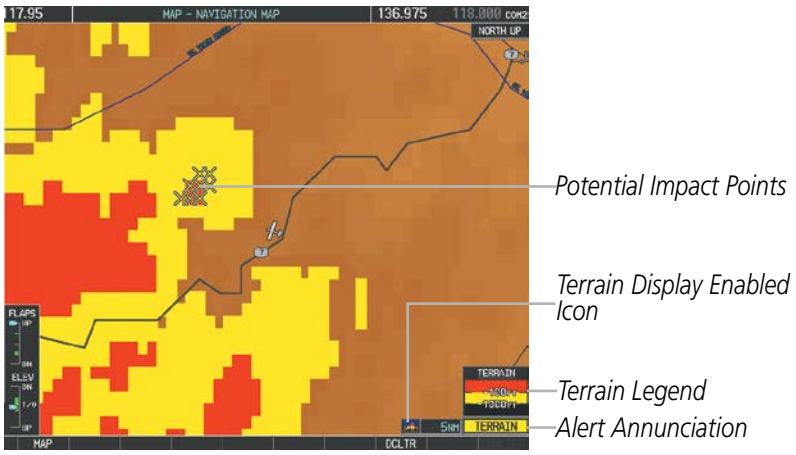


Figure 6-57 Navigation Map Page
(After TAWS-B Pop-up Alert Acknowledgment)

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

** Alerts with multiple messages are configurable at installation and are installation-dependent. Alerts for the default configuration when more than one option is available are indicated with asterisks.*
*** Annunciation is displayed on the MFD when terrain display is enabled.*

Table 6-15 TAWS-B Alerts Summary

EXCESSIVE DESCENT RATE ALERT

The purpose of the **Excessive Descent Rate (EDR)** alert is to provide suitable notification when the aircraft is determined to be closing (descending) upon terrain at an excessive speed. Figure 6-58 shows the parameters for the alert as defined by TSO-C151b.

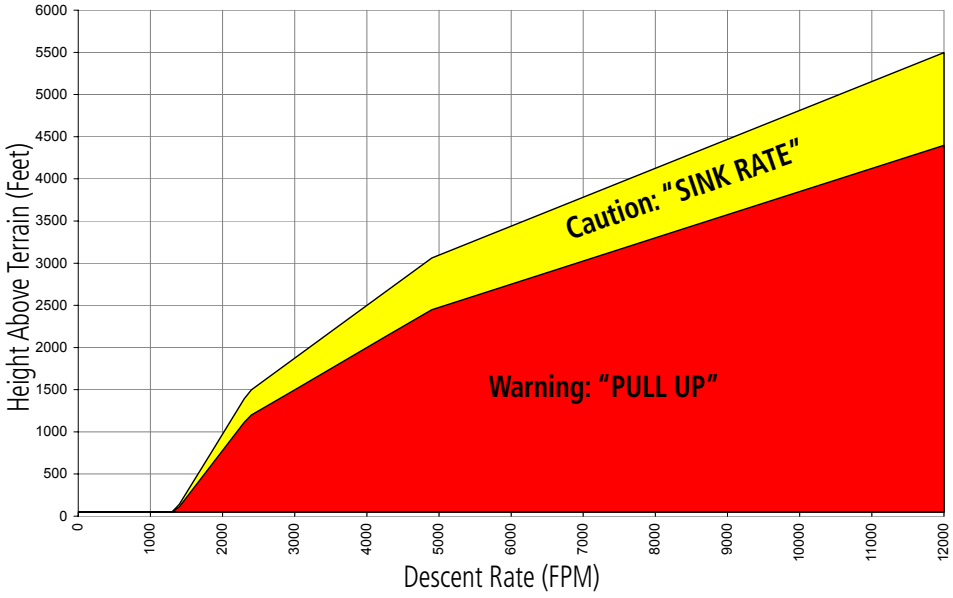


Figure 6-58 Excessive Descent Rate Alert Criteria

FORWARD LOOKING TERRAIN AVOIDANCE

The Forward Looking Terrain Avoidance (FLTA) feature of TAWS-B compares the aircraft's projected flight path with known terrain and obstacles in their respective databases and issues alerts as either a caution or a warning:

Reduced Required Terrain Clearance (RTC) and **Reduced Required Obstacle Clearance (ROC)** alerts are issued when the aircraft flight path is above terrain, yet is projected to come within the minimum clearance values in Figure 6-59. When an RTC alert is issued, a potential impact point is displayed on the TAWS-B Page.

Imminent Terrain Impact (ITI) and **Imminent Obstacle Impact (IOI)** alerts are issued when the aircraft is below the elevation of a terrain or obstacle cell in the aircraft's projected path. ITI and IOI alerts are accompanied by a potential impact point displayed on the TAWS-B Page. The alert is annunciated when the projected vertical flight path is calculated to come within minimum clearance altitudes in Figure 6-59.

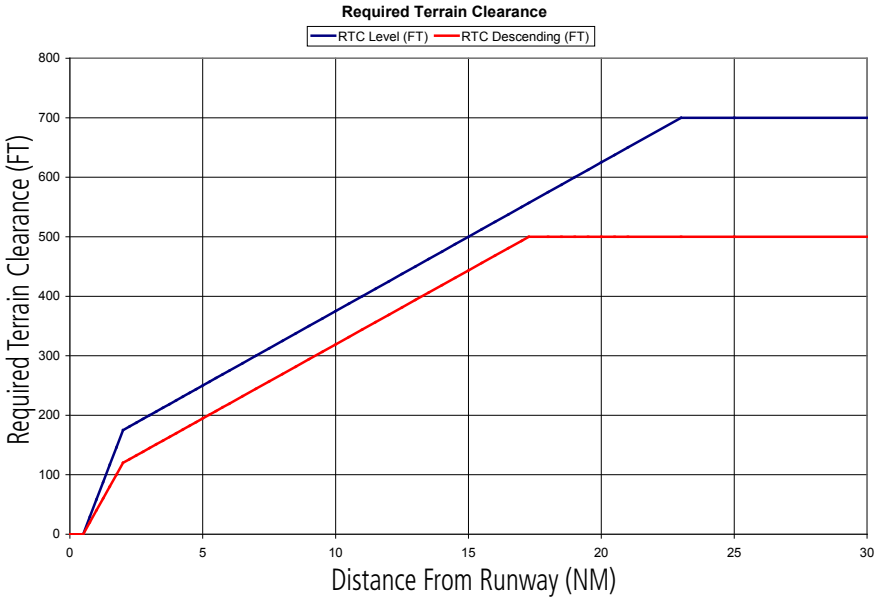


Figure 6-59 FLTA Alert Minimum Terrain and Obstacle Clearance Values

FLTA alerts are automatically inhibited when the aircraft is less than 200 feet above the destination runway elevation while within 0.5 nm of the approach runway or the aircraft is between runway ends.

PREMATURE DESCENT ALERTING

A **Premature Descent Alert (PDA)** is issued when the system detects that the aircraft is significantly below the normal approach path to a runway (Figure 6-60).

PDA alerting begins when the aircraft is below 700 feet AGL within 15 nm of the destination airport and ends when the aircraft is 0.5 nm from the runway threshold.

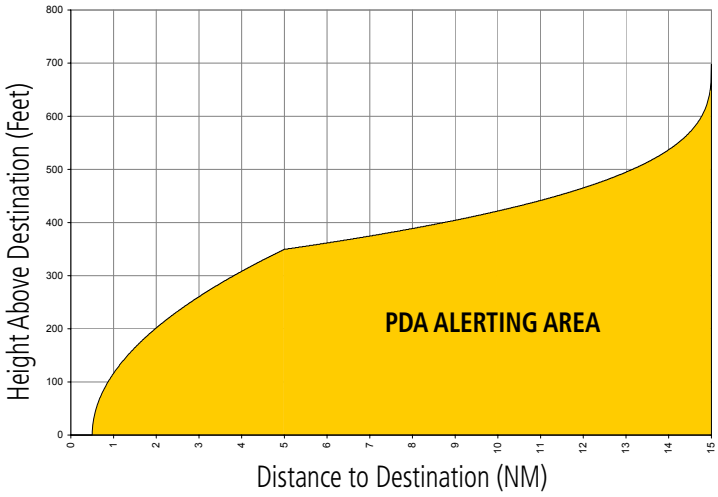


Figure 6-60 PDA Alerting Threshold

PDA and FLTA visual annunciations and voice alerts can be manually inhibited. Discretion should be used when inhibiting TAWS-B, and the system should be enabled when appropriate. When TAWS-B is inhibited, the annunciation 'TAWS INH' is shown on the PFD and MFD (Figure 6-61).



Figure 6-61 TAWS-B Alerting Disabled (TAWS-B Inhibited) Annunciation

Inhibiting/enabling TAWS-B alerting:

1) Select the TAWS-B Page.

2) Press the **INHIBIT** Softkey to inhibit or enable TAWS (choice dependent on current state).

Or:

a) Press the **MENU** Key.

b) Select 'Inhibit TAWS' or 'Enable TAWS' (choice dependent on current state) and press the **ENT** Key.

If TAWS-B alerts are inhibited when the Final Approach Fix is the active waypoint in a GPS SBAS approach, a 'LOW ALT' annunciation may appear on the PFD next to the Altimeter if the current aircraft altitude is at least 164 feet below the prescribed altitude at the Final Approach Fix. See the Flight Instruments Section for details.

FIVE-HUNDRED VOICE ALERT

The purpose of the ***"Five-hundred"*** voice alert is to provide an advisory alert of when the aircraft descends to within 500 feet above the terrain or runway threshold. When the aircraft is within five nautical miles of an airport, the ***"Five Hundred"*** voice alert is based on the nearest runway threshold elevation. When the aircraft is more than five nautical miles of the nearest airport, the ***"Five Hundred"*** voice alert is based on the height above terrain (as determined by the GPS altitude and Terrain Database).

There are no display annunciations or pop-up alerts that accompany this voice alert.

NEGATIVE CLIMB RATE AFTER TAKEOFF ALERT (NCR)

The **Negative Climb Rate (NCR) After Takeoff** alert (also referred to as "Altitude Loss After Takeoff") provides alerts when the system determines the aircraft is losing altitude (closing upon terrain) after takeoff. The voice alert ***"Don't Sink"*** is given for NCR alerts, accompanied by an annunciation and a pop-up terrain alert on the display. NCR alerting is only active when departing from an airport and when the following conditions are met:

- Height above the terrain is less than 700 feet
- Distance from the departure airport is 2 nm or less
- Heading change from the departure heading is less than 110 degrees

Figures 6-62 and 6-63 shows the NCR alerting parameters as defined by TSO-C151b.

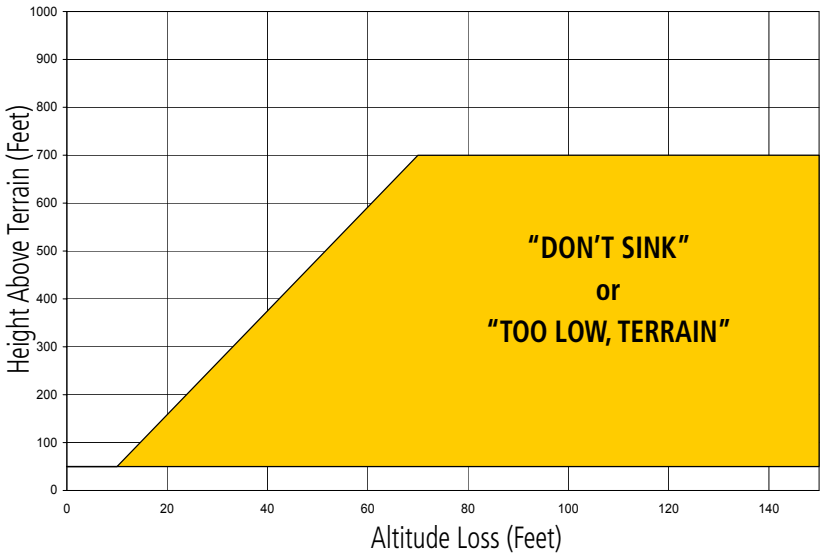


Figure 6-62 Negative Climb Rate (NCR) Altitude Loss

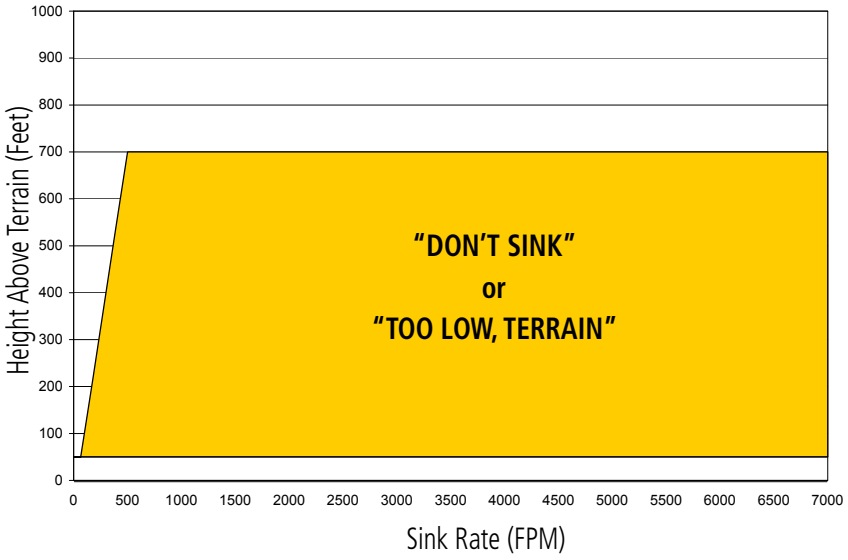


Figure 6-63 Negative Climb Rate (NCR) Sink Rate

SYSTEM STATUS

During power-up, TAWS-B conducts a self-test of its alerting capabilities. The system test can also be manually initiated. A voice alert is issued at test completion. TAWS-B System Testing is disabled when ground speed exceeds 30 knots.

Manually testing the TAWS-B System:

1) Select the TAWS-B Page.
2) Press the **MENU** Key (Figure 6-64).
3) Select 'Test TAWS System' and press the **ENT** Key to confirm the selection.

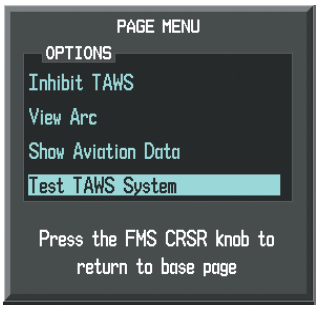


Figure 6-64 TAWS-B Page Menu

TAWS-B continually monitors several system-critical items such as database validity, hardware status, and GPS status. If the terrain/obstacle database is not available, the voice alert ***"TAWS System Failure"*** is generated along with the 'TAWS FAIL' alert annunciation.

TAWS-B requires a 3-D GPS navigation solution along with specific vertical accuracy minimums. Should the navigation solution become degraded or if the aircraft is out of the database coverage area, the annunciation 'TAWS N/A' is generated in the annunciation window and on the TAWS-B Page. The voice alert ***"TAWS Not Available"*** is generated.

Alert Type	PFD/MFD* Alert Annunciation	TAWS-B Page Center Banner Annunciation	Voice Alert
System Test in progress	TAWS TEST	TAWS TEST	None
System Test pass	None	None	"TAWS System Test Test OK"
TAWS-B Alerting Inhibited	TAWS INH	None	None
No GPS position	TAWS N/A	NO GPS POSITION	"TAWS Not Available"
Excessively degraded GPS signal; or Out of database coverage area	TAWS N/A	None	"TAWS Not Available"
TAWS-B System Test Fail; Terrain or Obstacle database unavailable or invalid; Invalid software configuration; or System audio fault	TAWS FAIL	TAWS FAIL	"TAWS System Failure"
MFD Terrain or Obstacle database unavailable or invalid, and TAWS operating with PFD Terrain or Obstacle databases.	None	TERRAIN DATABASE FAILURE	None

† *Annunciation is shown on TAWS-B Page and the Navigation Map Page when Terrain is enabled.*
* *"TAWS Available" will be heard when sufficient GPS signal is received, or Terrain database coverage area re-entered.*

Table 6-16 TAWS-B System Status Annunciations

6.7 TRAFFIC INFORMATION SERVICE (TIS)

WARNING: *The Traffic Information Service (TIS) is intended for advisory use only. TIS is intended to help the pilot locate traffic visually. It is the responsibility of the pilot to see and maneuver to avoid traffic.*

NOTE: *TIS is available only when the aircraft is within the service volume of a TIS-capable terminal radar site. Aircraft without an operating transponder are invisible to both Traffic Advisory Systems (TAS) and TIS. Aircraft without altitude reporting capability are shown without altitude separation data or climb descent indication.*

NOTE: *TIS is disabled if a Traffic Advisory System (TAS) is installed.*

Traffic Information Service (TIS) is designed to help in detection and avoidance of other aircraft. TIS uses the Mode S transponder for the traffic data link. TIS receives traffic information from ground stations, and is updated every 5 seconds. The G950 displays up to eight traffic targets within a 7.5-nm radius, from 3000 feet below to 3500 feet above the requesting aircraft. Traffic is displayed using the symbology shown in Table 6-17.

TIS Symbol	Description
	Non-Threat Traffic
	Traffic Advisory (TA)
	Traffic Advisory Off Scale

Table 6-17 TIS Traffic Symbols

Traffic Advisories (TA) alert the crew to intruding aircraft. When traffic meets the advisory criteria for the TA, a solid yellow circle symbol is generated. A TA which is detected but is outside the range of the map on which traffic is displayed are indicated with a message in the lower left corner of the map.

TIS also provides a vector line showing the direction in which the traffic is moving, to the nearest 45°. Traffic information for which TIS is unable to determine the bearing (non-bearing traffic) is displayed in the center of the Traffic Map Page (Figure 6-65) or in a banner at the lower left corner of maps other than the Traffic Map Page on which traffic can be displayed.

The altitude difference between the requesting aircraft and other intruder aircraft is displayed above/below the traffic symbol in hundreds of feet. If the other aircraft is above the requesting aircraft, the altitude separation appears above the traffic symbol; if below, the altitude separation appears below. Altitude trend is displayed as an up/down arrow (for speeds greater than 500 fpm in either direction) to the right of the target symbol. Traffic symbols for aircraft without altitude reporting capability appear without altitude separation or climb/descent information.

DISPLAYING TRAFFIC DATA

Traffic information can be displayed on the following maps (when TIS is operating):

- PFD Inset Map
- Navigation Map Page
- Traffic Map Page
- Trip Planning Page
- Nearest Pages
- Active Flight Plan Page

Displaying traffic information (maps other than the Traffic Map Page):

1) Press the **MAP** Softkey.
2) Press the **TRAFFIC** Softkey.

The Map - Traffic Map Page is the principal map page for viewing TIS traffic information. When traffic is selected on maps other than the Traffic Map Page, an icon is shown to indicate the feature is enabled for display (Figure 6-65 and Table 6-19).



Figure 6-65 TIS Traffic on the Navigation Map Page

The Navigation Map Page Setup Menu provides a means in addition to the softkey for enabling/disabling display of traffic. The setup menu also controls the map range settings above which traffic data (symbols and labels) are decluttered from the display. If a map range larger than the map range setting is selected, the data is removed from the map. Maps besides the Traffic Map Page use settings based on those selected for the Navigation Map Page.

Displaying traffic information (PFD Inset Map):

1) Press the **INSET** Softkey.
2) Press the **TRAFFIC** Softkey to display traffic data on the inset map (TRFC-1).
3) Press the softkey again to display the traffic-only inset (TRFC-2).
4) Press the softkey again to remove traffic data.

Customizing traffic display on the Navigation Map Page:

1) Select the Navigation Map Page.
2) Press the **MENU** Key.
3) With 'Map Setup' highlighted, press the **ENT** Key (Figure 6-66).
4) Turn the small **FMS** Knob to select the 'Traffic' Group and press the **ENT** Key (Figure 6-67).
5) Turn the large **FMS** Knob or press the **ENT** Key to scroll through product selections (Figure 6-68).
   - TRAFFIC – Turns the display of traffic data on or off
   - TRAFFIC MODE – Selects the traffic mode for display; select from:
     - All Traffic - Displays all traffic
     - TA ONLY - Displays Traffic Alerts only
   - TRAFFIC SMBL – Selects the maximum range at which traffic symbols are shown
   - TRAFFIC LBL – Selects the maximum range at which traffic labels are shown (with the option to turn off)
6) Turn the small **FMS** Knob to scroll through options for each product (ON/OFF, range settings, etc.).
7) Press the **ENT** Key to select an option.
8) Press the **FMS** Knob or **CLR** Key to return to the Navigation Map Page with the changed settings.

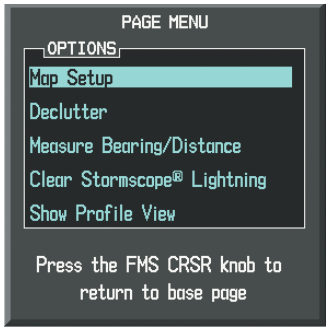


Figure 6-66 Navigation Map Page Menu



Figure 6-67 Navigation Map Page Setup Menu

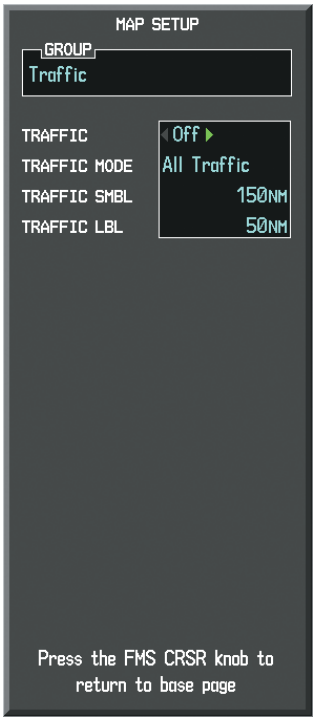


Figure 6-68 Navigation Map Page Setup Menu, Traffic Group

TRAFFIC MAP PAGE

The Traffic Map Page is specialized to show surrounding TIS traffic data in relation to the aircraft's current position and altitude, without clutter from the basemap. Aircraft orientation on this map is always heading up unless there is no valid heading. Map range is adjustable with the **Joystick** from 2 to 12 nm, as indicated by the map range rings.

The traffic mode is annunciated in the upper left corner of the Traffic Map Page. When the aircraft is on the ground, TIS automatically enters Standby Mode. Once the aircraft is airborne, TIS switches from Standby to Operating Mode and the G950 begins to display traffic information. Refer to the System Status discussion for more information.

Displaying traffic on the Traffic Map Page:

1) Turn the large **FMS** Knob to select the Map Page Group.

2) Turn the small **FMS** Knob to select the Traffic Map Page.

3) Confirm TIS is in Operating Mode:

Press the **OPERATE** Softkey to begin displaying traffic.

Or:

a) Press the **MENU** Key.

b) Select 'Operate Mode' (shown if TIS is in Standby Mode) and press the **ENT** Key.

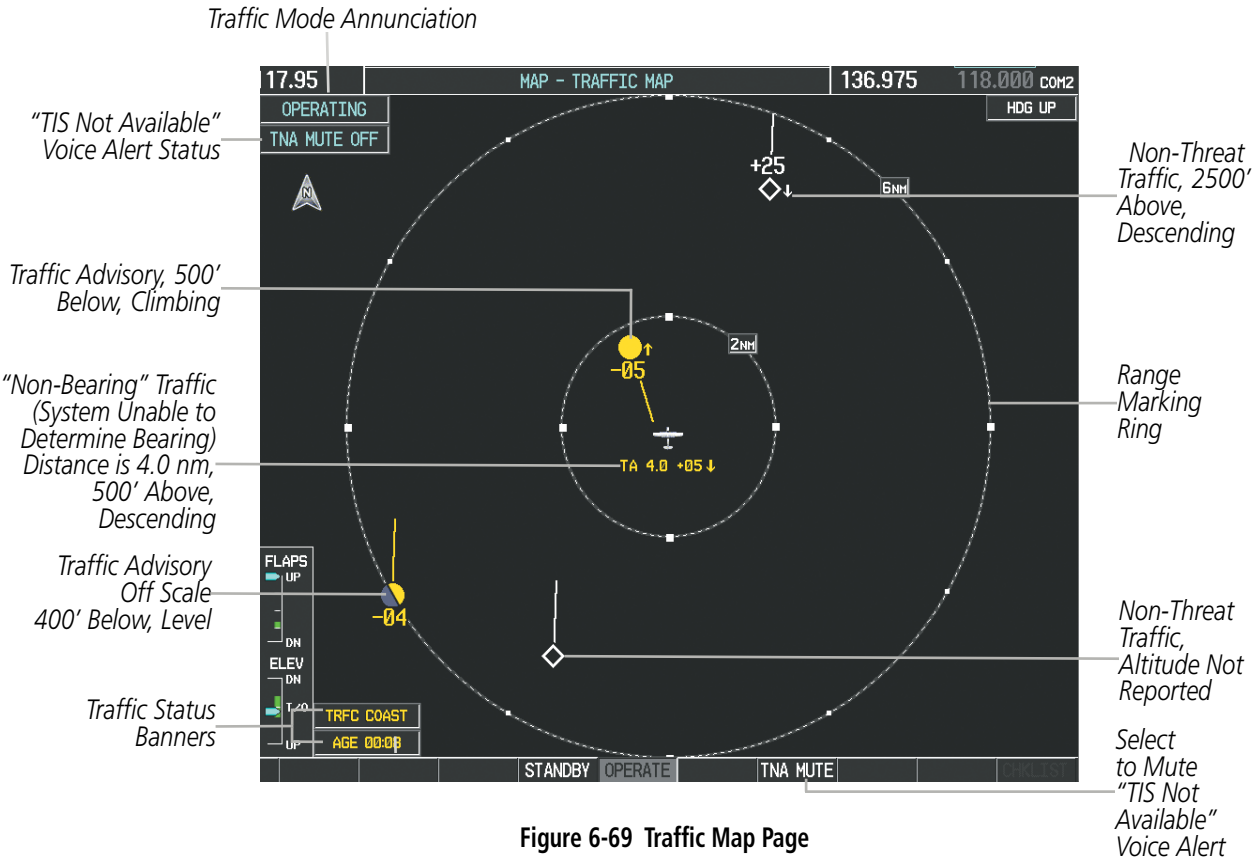


Figure 6-69 Traffic Map Page

TIS ALERTS

When the number of TAs on the Traffic Map Page increases from one scan to the next, the following occur:

- A single ***"Traffic"*** voice alert is generated.
- A 'TRAFFIC' Annunciation appears to the top left of the Attitude Indicator on the PFD, flashing for 5 seconds and remaining displayed until no TAs are detected in the area.
- The PFD Inset Map is automatically displayed with traffic.

To reduce the number of nuisance alerts due to proximate aircraft, the ***"Traffic"*** voice alert is generated only when the number of TAs increases. For example, when the first TA is displayed, a voice and visual annunciation are generated. As long as a single TA remains on the display, no additional voice alerts are generated. If a second TA appears on the display or if the number of TAs initially decreases and then subsequently increases, another voice alert is generated.



Figure 6-70 Traffic Annunciation (PFD)

A ***"TIS Not Available"*** (TNA) voice alert is generated when the TIS service becomes unavailable or is out of range. TIS may be unavailable in the radar coverage area due to the following:

- Radar site TIS Mode S sensor is not operational or is out of service
- Traffic or requesting aircraft is beyond the maximum range of the TIS-capable Mode S radar site.
- Traffic or requesting aircraft is above the radar site in the cone of silence and out of range of an adjacent site.
- Traffic or requesting aircraft is below radar coverage. In flat terrain, the coverage extends from about 3000 feet upward at 55 miles. Terrain and obstacles around the radar site can further decrease radar coverage in all directions.
- Traffic does not have an operating transponder.

The ***"TIS Not Available"*** (TNA) voice alert can be manually muted to reduce nuisance alerting. TNA muting status is shown in the upper left corner of the Traffic Map Page.

Muting the "TIS Not Available" voice alert:

1) Select the Traffic Map Page.

2) Press the **TNA MUTE** Softkey. The status is displayed in the upper left corner of the Traffic Map Page.

Or:

a) Press the **MENU** Key.

b) Select "'Not Available" Mute On' (shown if TNA muting is currently off) and press the **ENT** Key.

SYSTEM STATUS

The G950 performs an automatic test of TIS during power-up. If TIS passes the test, TIS enters Standby Mode (on the ground) or Operating Mode (in the air). If TIS fails the power up test, an annunciation is shown in the center of the Traffic Map Page.

Traffic Map Page Center Banner Annunciation	Description
NO DATA	Data is not being received from the transponder*
DATA FAILED	Data is being received from the transponder, but a failure is detected in the data stream*
FAILED	The transponder has failed*
UNAVAILABLE	TIS is unavailable or out of range

** Contact a service center or Garmin dealer for corrective action*

Table 6-18 TIS Failure Annunciations

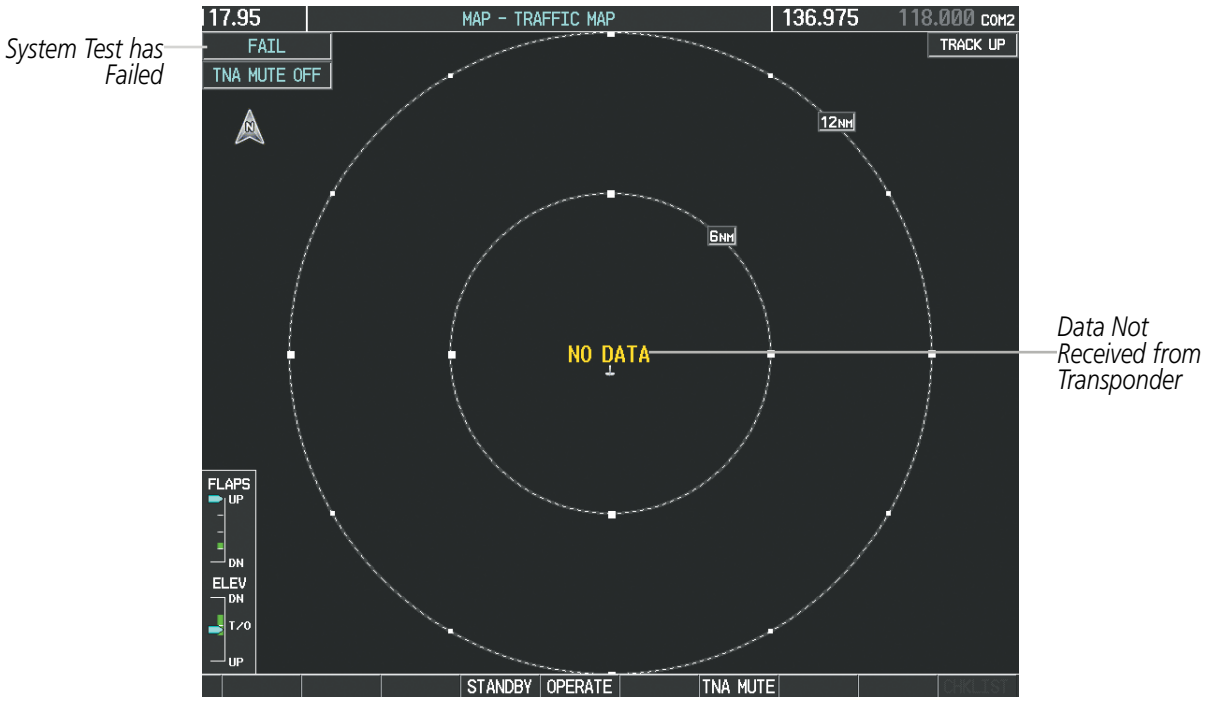


Figure 6-71 TIS Power-up Test Failure

The traffic mode is annunciated in the upper left corner of the Traffic Map Page. When the aircraft is on the ground, TIS automatically enters Standby Mode. If traffic is selected for display on another map while Standby Mode is selected, the traffic display enabled icon is crossed out (also the case whenever TIS has failed). Once the aircraft is airborne, TIS switches to Operating Mode and traffic information is displayed. The mode can be changed manually using softkeys or the page menu.

Mode	Traffic Mode Annunciation (Traffic Map Page)	Traffic Display Status Icon (Other Maps)
TIS Operating	OPERATING	
TIS Standby	STANDBY (also shown in white in center of page)	
TIS Failed*	FAIL	

** See Table 6-20 for additional failure annunciations*

Table 6-19 TIS Modes

Switching between TIS modes:

1) Select the Traffic Map Page.

2) Press the **STANDBY** or **OPERATE** Softkey to switch between modes. The mode is displayed in the upper left corner of the Traffic Map Page.

Or:

a) Press the **MENU** Key.

b) Select 'Operate Mode' or 'Standby Mode' (choice dependent on current state) and press the **ENT** Key.

The annunciations to indicate the status of traffic information appear in a banner at the lower left corner of maps on which traffic can be displayed (Table 6-20).

Traffic Status Banner Annunciation	Description
TA OFF SCALE	A Traffic Advisory is outside the selected display range* Annunciation is removed when traffic comes within the selected display range
TA X.X ± XX ↕	System cannot determine bearing of Traffic Advisory** Annunciation indicates distance in nm, altitude separation in hundreds of feet, and altitude trend arrow (climbing/descending)
AGE MM:SS	Appears if traffic data is not refreshed within 6 seconds If after another 6 seconds data is not received, traffic is removed from the display The quality of displayed traffic information is reduced as the age increases
TRFC COAST	The displayed data is not current (6 to 12 seconds since last message) The quality of displayed traffic information is reduced when this message is displayed
TRFC RMVD	Traffic is removed because it is too old for coasting (12 to 60 seconds since last message) Traffic may exist within the selected display range, but it is not displayed
TRFC FAIL	Traffic data has failed
NO TRFC DATA	Traffic has not been detected
TRFC UNAVAIL	The traffic service is unavailable or out of range

**Shown as symbol on Traffic Map Page*
***Shown in center of Traffic Map Page*

Table 6-20 TIS Traffic Status Annunciations

6.8 TRAFFIC ADVISORY SYSTEM (TAS)

NOTE: *TIS is disabled when a Traffic Advisory System (TAS) is installed.*

NOTE: *Refer to the Honeywell KTA 870 Pilot's Guide for a detailed discussion of the KTA 870 TAS.*

TAS SYMBOLOGY

The optional Traffic Advisory System (TAS) is designed to help in detection and avoidance of other aircraft. TAS uses an on-board interrogator-processor and the Mode S transponder for the air-to-air traffic data link. Traffic is displayed using the symbols shown in Table 6-21.

TAS Symbol	Description
	Non-Threat Traffic
	Proximity Advisory (PA)
	Traffic Advisory (TA)
	Traffic Advisory Off Scale

Table 6-21 TAS Symbol Description

A Non-threat Advisory, shown as an open white diamond, indicates that an intruding aircraft is at greater than ±1200 feet relative altitude or the distance is beyond 5 nm.

A Proximity Advisory indicates that the intruding aircraft is within ±1200 feet and is within 5 nm range, but is still not considered a threat.

A Traffic Advisory (TA) alerts the crew to a potentially hazardous intruding aircraft. Closing rate, distance, an4450cnd vertical separation meet TA criteria. A Traffic Advisory that is beyond the selected display range is indicated by a half TA symbol at the edge of the screen at the relative bearing of the intruder.

OPERATION

The KTA 870 must be in Operating Mode for traffic to be displayed. The unit starts in Operating Mode upon power-up.

Pressing the **STANDBY** Softkey forces the unit into Standby Mode. Pressing the **NORMAL** Softkey allows the KTA 870 to switch from Standby Mode to Operating Mode as necessary.

Switching from operating mode to standby mode:

On the Traffic Page, press the **STANDBY** Softkey

Or:

1) Press the **MENU** Key and turn the small **FMS** knob to select Standby Mode.
2) Press the **ENT** Key.

Switching from standby mode to operating mode:

On the Traffic Page, press the **NORMAL** Softkey

Or:

1) Press the **MENU** Key and turn the small **FMS** knob to select Normal Mode.
2) Press the **ENT** Key. The KTA 870 switches from Standby Mode to Operating Mode as necessary.

System Self Test

1) Set the range to 2/6 nm to display full traffic test pattern.
2) Press the **TEST** Softkey.
3) Self test takes approximately eight seconds to complete. When completed successfully, traffic symbols are displayed and a voice alert "TAS System Test OK" is heard. In the event that the system test fails, the system reverts to Standby Mode and a voice alert "TAS System Test Fail" is heard.

DISPLAYING TRAFFIC DATA

Traffic information can be displayed on the following maps when the KTA 870 unit is operating:

- PFD Inset Map
- Navigation Map Page
- Traffic Map Page
- Trip Planning Page
- Nearest Pages
- Active Flight Plan Page
- AUX-Video Page

Traffic information is also displayed on the PFD when the Synthetic Vision System (SVS) option is installed and enabled. See the Additional Features Section for details.

Displaying traffic on the Traffic Map Page:

1) Use the large **FMS** Knob to select the Map Page Group.
2) Use the small **FMS** Knob to select the Traffic Map Page.
3) Press the **NORMAL** Softkey to begin displaying traffic. OPERATING is displayed in the Traffic mode field.
4) Press the **ALT MODE** Softkey to change the altitude volume.
5) Press the **STANDBY** Softkey to place the system in the Standby mode. STANDBY is displayed in the Traffic mode field.
6) Turn the **Joystick** clockwise to display a larger area or counter-clockwise to display a smaller area.

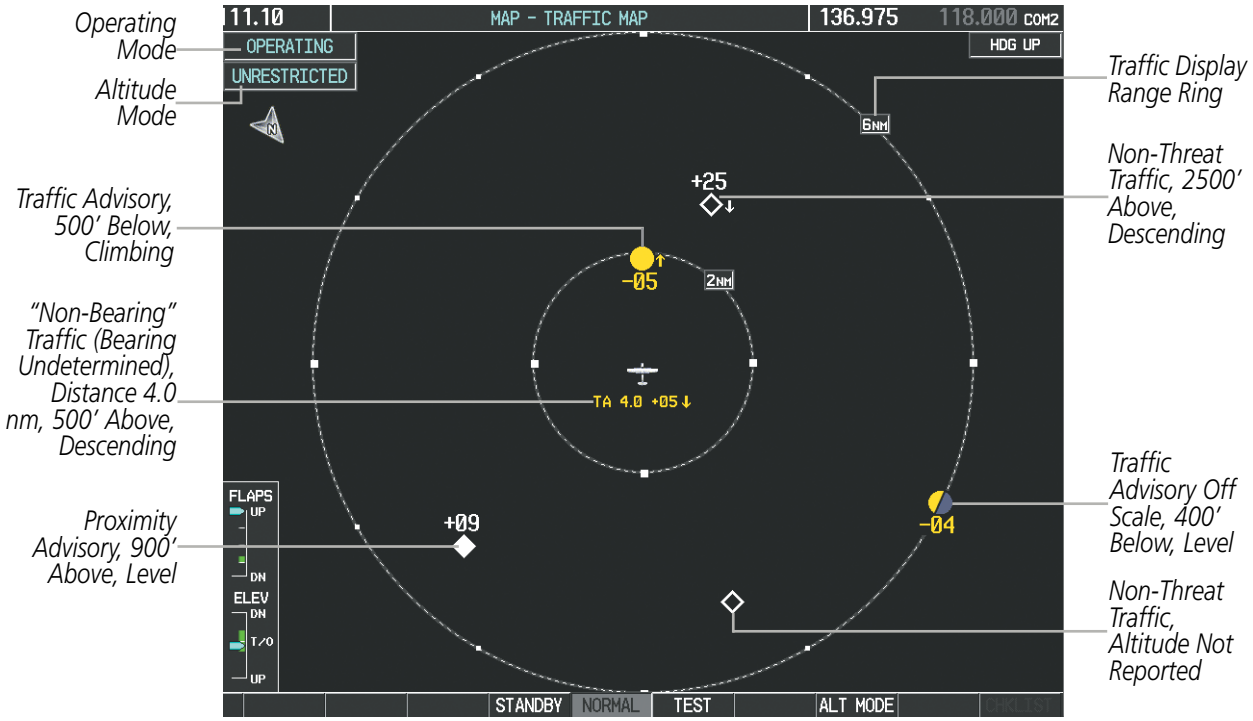


Figure 6-72 Traffic Map Page

The Traffic Map Page shows surrounding TAS traffic data in relation to the aircraft's current position and altitude, without basemap clutter. It is the principal map page for viewing TAS traffic information. Aircraft orientation is always heading up unless there is no valid heading. Map range is adjustable with the **Joystick** from 2 to 40 nm, as indicated by the map range rings.

The traffic mode and altitude display mode are annunciated in the upper left corner.

Displaying traffic information (maps other than the Traffic Map Page):

1) Press the **MAP** Softkey.
2) Press the **TRAFFIC** Softkey. Traffic is now displayed on the map.

When traffic is selected on maps other than the Traffic Map Page, a traffic icon is shown to indicate TAS is enabled for display (Figure 6-73 and Table 6-22).

Displaying traffic on the Navigation Map

1) Ensure that the TAS system is operating. With the Navigation Map displayed, press the **MAP** Softkey.
2) Press the **TRAFFIC** Softkey. Traffic is now displayed on the map as shown in the figure.

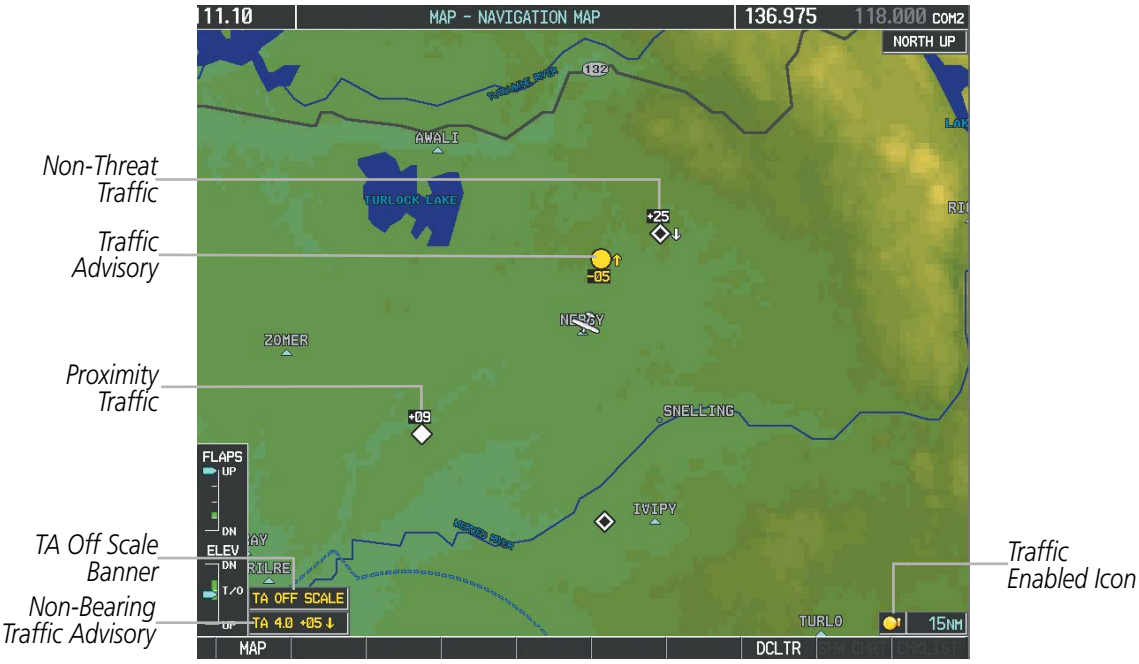


Figure 6-73 TAS Traffic on Navigation Map

Displaying traffic information (PFD Inset Map):

1) Press the **INSET** Softkey.
2) Press the **TRAFFIC** Softkey to display traffic data on the inset map (TRFC-1).
3) Press the softkey again to display the traffic-only inset (TRFC-2).
4) Press the softkey again to remove traffic data.

The Navigation Map Page Setup Menu also controls the display of traffic. The setup menu controls the map range settings. Traffic data symbols and labels can be decluttered from the display. If a map range larger than the map range setting is selected, the data is removed from the map. Maps besides the Traffic Map Page use settings based on those selected for the Navigation Map Page.

ALTITUDE DISPLAY

The Pilot can select the volume of airspace in which traffic is displayed. Traffic Advisories (TAs) outside of these limits will still be shown. Refer to the KTA 870 Pilot's Guide for specific display thresholds.

Changing the altitude display mode:

1) On the Traffic Page, press the **ALT MODE** Softkey.
2) Press one of the following Softkeys:
   - **BELOW**
   - **NORMAL**
   - **ABOVE**
   - **UNREST** (unrestricted)
3) To return to the Traffic Page, press the **BACK** Softkey.

Or:

1) Press the **MENU** Key.
2) Turn the small **FMS** Knob to select one of the following:
   - BELOW
   - NORMAL
   - ABOVE
   - UNREST (unrestricted)
3) Press the **ENT** Softkey.

TRAFFIC MAP PAGE DISPLAY RANGE

The display range on the Traffic Map Page can be changed at any time. Map range is adjustable with the **Joystick** from 2 to 40 nm, as indicated by the map range rings.

Changing the display range on the Traffic Page:

1) Turn the **Joystick**.
2) The following range options are available:
   - 2 nm
   - 2 and 6 nm
   - 6 and 12 nm
   - 12 and 24 nm
   - 24 and 40 nm

Customizing the traffic display on the Navigation Map Page:

1) Select the Navigation Map Page.
2) Press the **MENU** Key.
3) With Map Setup highlighted, press the **ENT** Key (Figure 6-74).
4) Turn the small **FMS** Knob to select the Traffic Group and press the **ENT** Key (Figure 6-75).
5) Turn the large **FMS** Knob or press the **ENT** Key to scroll through the selections (Figure 6-76).
   - TRAFFIC – Turns the display of traffic data on or off
   - TRAFFIC MODE – Selects the traffic mode for display; select from:
     - All Traffic - Displays all traffic
     - TA/PA - Displays Traffic Alerts and Proximity Advisories
     - TA ONLY - Displays Traffic Alerts only
   - TRAFFIC SMBL – Selects the maximum range at which traffic symbols are shown
   - TRAFFIC LBL – Selects the maximum range at which traffic labels are shown with the option to turn off
6) Turn the small **FMS** Knob to scroll through options (ON/OFF, range settings, etc.).
7) Press the **ENT** Key to select an option.
8) Press the **FMS** Knob or **CLR** Key to return to the Navigation Map Page.

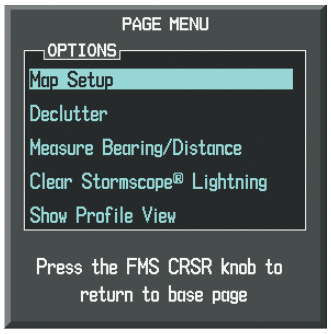


Figure 6-74 Navigation Map Page Menu



Figure 6-75 Navigation Map Page Setup Menu

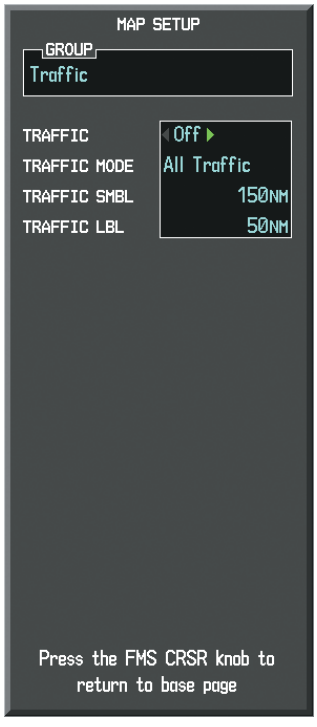


Figure 6-76 Navigation Map Page Setup Menu, Traffic Group

TAS ALERTS

NOTE: *Refer to the KTA 870 documentation for information on alerts generated by the TAS equipment.*

When the number of TAs on the Traffic Map Page increases from one scan to the next, the following occur:

- A ***"Traffic, Traffic"*** voice alert is generated when the first TA is displayed.
- A TRAFFIC Annunciation appears at the top right of the airspeed on the PFD, flashing for 5 seconds and remains displayed until no TAs are detected in the area.
- The PFD Inset Map is automatically displayed with TA traffic.
- A single ***"Traffic"*** voice alert is generated when the number of TAs increases while a previous TA remains active.



Figure 6-77 Traffic Annunciation (PFD)

SYSTEM STATUS

The traffic mode is annunciated in the upper left corner of the Traffic Map Page.

Mode	Traffic Mode Annunciation (Traffic Map Page)	Traffic Display Status Icon (Other Maps)
TAS Self-test Initiated	**TEST** (also shown in white in center of page)	
TAS Operating	**OPERATING**	
TAS Standby	**STANDBY** (also shown in white in center of page)	
TAS Failed*	**FAIL**	

** See Table 6-23 for additional failure annunciations*

Table 6-22 TAS Modes

If the unit fails, an annunciation as to the cause of the failure is shown in the center of the Traffic Map Page.

Traffic Map Page Annunciation	Description
NO DATA	Data is not being received from the TAS unit
DATA FAILED	Data is being received from the TAS unit, but the unit is self-reporting a failure
FAILED	Incorrect data format received from the TAS unit

Table 6-23 TAS Failure Annunciations

The annunciations to indicate the status of traffic information appear in a banner at the lower left corner of maps on which traffic can be displayed.

Traffic Status Banner Annunciation	Description
TA OFF SCALE	A Traffic Advisory is outside the selected display range* Annunciation is removed when traffic comes within the selected display range
TA X.X ± XX ↕	System cannot determine bearing of Traffic Advisory** Annunciation indicates distance in nm, altitude separation in hundreds of feet, and altitude trend arrow (climbing/descending)
TRFC FAIL	TAS unit has failed (unit is self-reporting a failure or sending incorrectly formatted data)
NO TRFC DATA	Data is not being received from the TAS unit

**Shown as symbol on Traffic Map Page*
***Shown in center of Traffic Map Page*

Table 6-24 TAS Traffic Status Annunciations

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SECTION 7 AUTOMATIC FLIGHT CONTROL SYSTEM

NOTE: *Refer to the Aircraft Flight Manual (AFM) for the installed autopilot.*

7.1 S-TEC FIFTY FIVE X AUTOPILOT (OPTIONAL)

FLIGHT DIRECTOR MODE ANNUNCIATION

NOTE: *Only the additional "FD' mode annunciation that may appear in the G950 AFCS Status Box is discussed below. This mode annunciation is not analogous to both the G950 and the S-TEC Fifty Five X. Refer to the approved S-TEC Fifty Five X Pilot's Operating Handbook (POH) for comprehensive list of annunciations and operating instructions.*

In addition to the redundant status/mode annunciations and/or visual representations that are simultaneously displayed on both the G950 (AFCS Status Box and/or PFD) and the S-TEC Fifty Five X (Autopilot Display and/or Remote Annunciator Display), the G950 displays an additional mode annunciation of 'FD' when the Flight Director Mode is engaged.



Figure 7-1 Flight Director Mode Engaged (G950 AFCS Status Box)

ALTITUDE PRESELECT

The **ALT** Knob on the PFD is used to enter the selected altitude, which is provided to the STEC Fifty Five X autopilot. Refer to the STEC Fifty Five X User's Manual for details on the altitude preselect function.

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SECTION 8 ADDITIONAL FEATURES

Additional features of the system include the following:

- Synthetic Vision Technology (SVT)(if installed)
- SafeTaxi® diagrams
- ChartView and FliteCharts® electronic charts (if installed)
- Airport Directory
- Auxiliary Video (if installed)
- Scheduler
- Electronic Checklists (if installed)
- Flight Data Logging

The Synthetic Vision Technology (SVT), when installed, provides a three-dimensional forward view of terrain features on the PFD. SVT imagery shows the pilot's view of relevant features in relation to the aircraft attitude, as well as the flight path pertaining to the active flight plan.

SafeTaxi diagrams provide detailed taxiway, runway, and ramp information at more than 700 airports in the United States. By decreasing range on an airport that has a SafeTaxi diagram available, a close up view of the airport layout can be seen.

The ChartView and FliteCharts, when installed, provide on-board electronic terminal procedures charts. Electronic charts offer the convenience of rapid access to essential information. Either ChartView or FliteCharts may be configured in the system, but not both.

The AOPA and optional AC-U-KWIK Airport Directories offer detailed information for a selected airport, such as available services, hours of operation, and lodging options. Either the AOPA or AC-U-KWIK database may be installed, but not both simultaneously.

The G950 system provides a control and display interface to a video system, when installed.

The Scheduler feature can be used to enter and display short term or long term reminder messages such as Switch fuel tanks, Change oil, or Altimeter-Transponder Check in the Messages Window on the PFD.

Checklists, when installed, help to quickly find the proper procedure on the ground or during flight.

The Flight Data Logging feature automatically stores critical flight and engine data on an SD data card. Approximately 1,000 flight hours can be recorded for each 1GB of available space on the card.

8.1 SYNTHETIC VISION TECHNOLOGY (SVT)

NOTE: *SVT requires a terrain database that has a resolution of nine arc-seconds.*

WARNING: *Use appropriate primary systems for navigation, and for terrain, obstacle, and traffic avoidance. SVT is intended as an aid to situational awareness only and may not provide either the accuracy or reliability upon which to solely base decisions and/or plan maneuvers to avoid terrain, obstacles, or traffic.*

The optional Synthetic Vision Technology (SVT) is a visual enhancement to the G950 Integrated Flight Deck. SVT depicts a forward-looking attitude display of the topography immediately in front of the aircraft. The field of view is 30 degrees to the left and 35 degrees to the right. SVT information is shown on the Primary Flight Display (PFD), or on the Multifunction Display (MFD) in Reversionary Mode (Figure 8-84). The depicted imagery is derived from the aircraft attitude, heading, GPS three-dimensional position, and a nine arc-second database of terrain, obstacles, and other relevant features. The terrain data resolution of nine arc-seconds, meaning that the terrain elevation contours are stored in squares measuring nine arc-seconds on each side, is required for the operation of SVT. Loss of any of the required data, including temporary loss of the GPS signal, will cause SVT to be disabled until the required data is restored.

The SVT terrain display shows land contours (colors are consistent with those of the topographical map display), large water features, towers, and other obstacles over 200' AGL that are included in the obstacle database. Cultural features on the ground such as roads, highways, railroad tracks, cities, and state boundaries are not displayed even if those features are found on the MFD map. The terrain display also includes a north–south east–west grid with lines oriented with true north and spaced at one arc-minute intervals to assist in orientation relative to the terrain.

The optional Terrain Awareness and Warning System (TAWS) or standard Terrain-SVS is integrated within SVT to provide visual and auditory alerts to indicate the presence of terrain and obstacle threats relevant to the projected flight path. Terrain alerts are displayed in red and yellow shading on the PFD.

The terrain display is intended for situational awareness only. It may not provide the accuracy or fidelity on which to base decisions and plan maneuvers to avoid terrain or obstacles. Navigation must not be predicated solely upon the use of the Terrain–SVT or TAWS terrain or obstacle data displayed by the SVT.

The following SVT enhancements appear on the PFD:

- Pathways
- Flight Path Marker
- Horizon Heading Marks
- Traffic Display
- Airport Signs
- Runway Display
- Terrain Alerting
- Obstacle Alerting



Figure 8-1 Synthetic Vision Imagery

SVT OPERATION

SVT is activated from the PFD using the softkeys located along the bottom edge of the display. Pressing the softkeys turns the related function on or off. When SVT is enabled, the pitch ladder increments are reduced to 10 degrees up and 7.5 degrees down.

SVT functions are displayed on three levels of softkeys. The **PFD** Softkey leads into the PFD function Softkeys, including synthetic vision. Pressing the **SYN VIS** Softkey displays the SVT feature softkeys. The softkeys are labeled **PATHWAY**, **SYN TERR**, **HRZN HDG**, and **APTSIGNS**. The **BACK** Softkey returns to the previous level of softkeys. Synthetic Terrain must be active before any other SVT feature may be activated.

HRZN HDG, **APTSIGNS**, and **PATHWAY** Softkeys are only available when the **SYN TERR** Softkey is activated (gray with black characters). After activating the **SYN TERR** Softkey, the **HRZN HDG**, **APTSIGNS**, and **PATHWAY** softkeys may be activated in any combination to display desired features. When system power is cycled, the last selected state (on or off) of the **SYN TERR, HRZN HDG**, **APTSIGNS**, and **PATHWAY** softkeys is remembered by the system.

- **PATHWAY** Softkey enables display of rectangular boxes that represent course guidance.
- **SYN TERR** Softkey enables synthetic terrain depiction.
- **HRZN HDG** Softkey enables horizon heading marks and digits.
- **APTSIGNS** Softkey enables airport signposts.

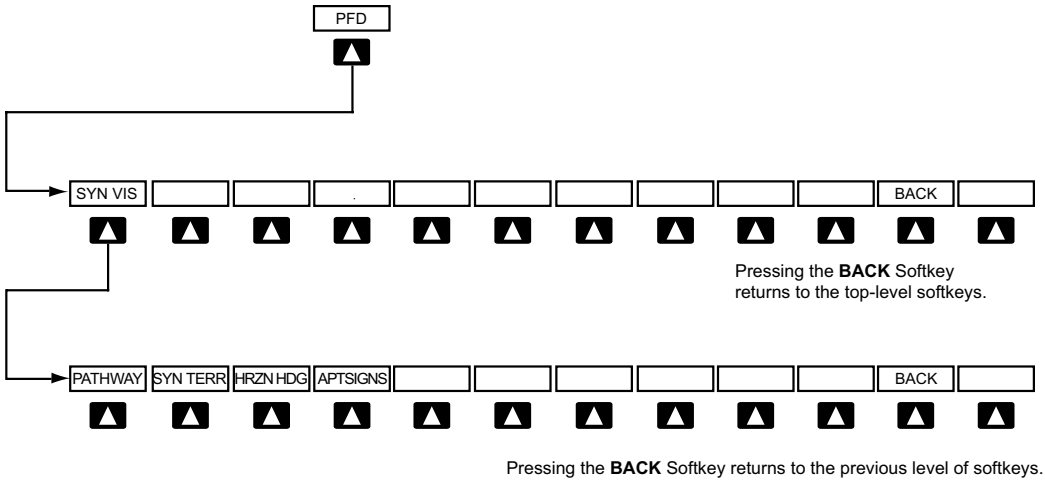


Figure 8-2 SVT Softkeys

Activating and deactivating SVT:

1) Press the **PFD** Softkey.
2) Press the **SYN VIS** Softkey.
3) Press the **SYN TERR** Softkey. The SVT display will cycle on or off with the **SYN TERR** Softkey.

Activating and deactivating Pathways:

1) Press the **PFD** Softkey.
2) Press the **SYN VIS** Softkey.
3) Press the **PATHWAY** Softkey. The Pathway feature will cycle on or off with the **PATHWAY** Softkey.

Activating and deactivating Horizon Headings:

1) Press the **PFD** Softkey.
2) Press the **SYN VIS** Softkey.
3) Press the **HRZN HDG** Softkey. The horizon heading display will cycle on or off with the **HRZN HDG** Softkey.

Activating and deactivating Airport Signs:

1) Press the **PFD** Softkey.
2) Press the **SYN VIS** Softkey.
3) Press the **APTSIGNS** Softkey. Display of airport signs will cycle on or off with the **APTSIGNS** Softkey.

SVT FEATURES



Figure 8-3 SVT on the Primary Flight Display

NOTE: *Pathways and terrain features are not a substitute for standard course and altitude deviation information provided by the altimeter, CDI, and VDI.*

PATHWAYS

Pathways provide a three-dimensional perspective view of the selected route of flight shown as colored rectangular boxes representing the horizontal and vertical flight path of the active flight plan. The box size represents 700 feet wide by 200 feet tall during enroute, oceanic, and terminal flight phases. During an approach, the box width is 700 feet or one half full scale deviation on the HSI, whichever is less. The height is 200 feet or one half full scale deviation on the VDI, whichever is less. The altitude at which the pathway boxes are displayed is determined by the selected altitude during climb, cruise, and when the active leg is the final approach course prior to intercepting the glidepath/glideslope. During a descent (except while on the approach glidepath/glideslope), the pathway boxes are displayed at the selected altitude, or the VNAV altitude programmed for the active leg in the flight plan, or the published altitude constraint, whichever is higher (Figure 8-4). Just prior to intercepting the glidepath/glideslope, the pathway boxes are displayed on the glidepath/glideslope, or the selected altitude, whichever is lower.

The color of the rectangular boxes may be magenta, green, or white depending on the route of flight and navigation source selected. The active GPS or GPS overlay flight plan leg is represented by magenta boxes that correspond to the Magenta CDI. A localizer course is represented by green boxes that correspond to a green CDI.

An inactive leg of an active flight plan is represented by white boxes corresponding to a white line drawn on the Inset map or MFD map indicating an inactive leg.

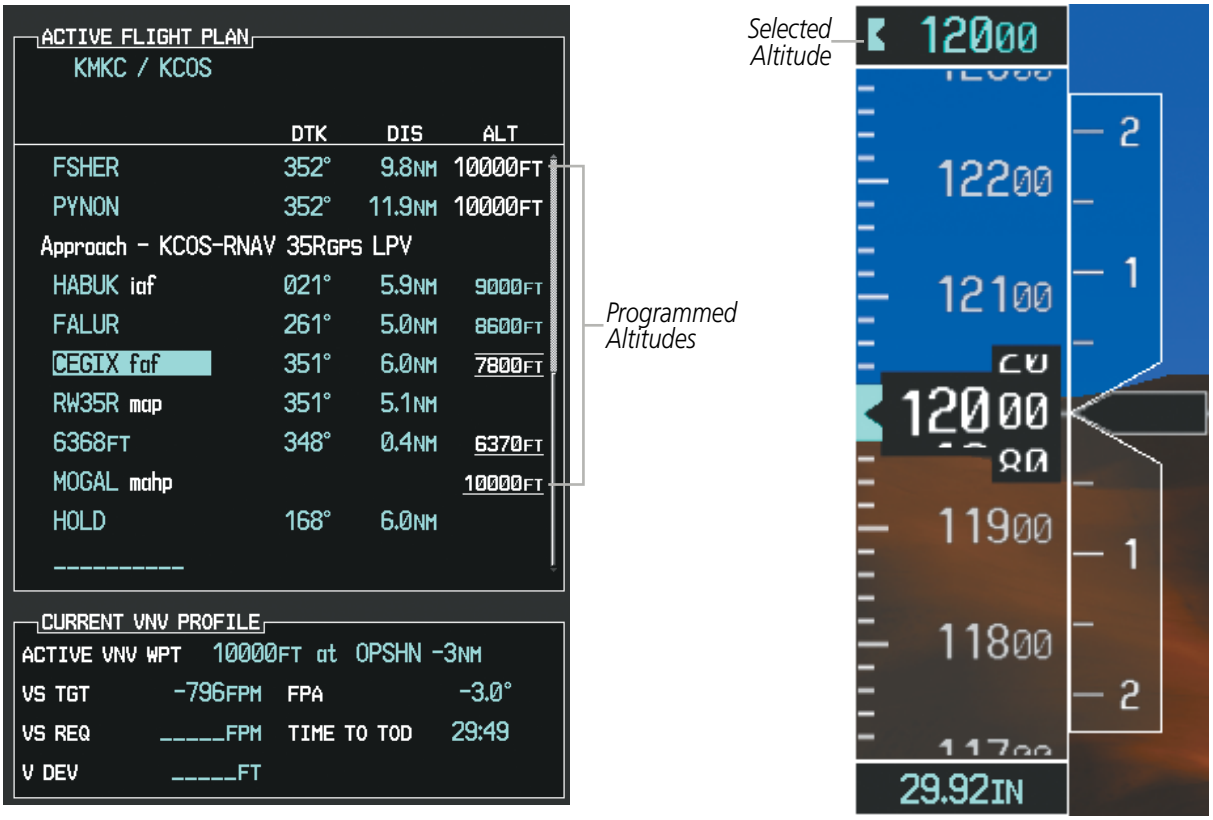


Figure 8-4 Programmed and Selected Altitude

Pathways provide supplemental glidepath/glideslope information on an active ILS, LPV, LNAV/VNAV, and some LNAV approaches. Pathways are intended as an aid to situational awareness and should not be used independent of the CDI, VDI, glide path indicator, and glide slope indicator. They are removed from the display when the selected navigation information is not available. Pathways are not displayed beyond the active leg when leg sequencing is suspended and are not displayed on any portion of the flight plan leg that would lead to intercepting a leg in the wrong direction.

Departure and Enroute

Prior to intercepting an active flight plan leg, pathways are displayed as a series of boxes with pointers at each corner that point in the direction of the active waypoint. Pathways are not displayed for the first leg of the flight plan if that segment is a Heading-to-Altitude leg. The first segment displaying pathways is the first active GPS leg or active leg with a GPS overlay. If this leg of the flight plan route is outside the SVT field of view, pathways will not be visible until the aircraft has turned toward this leg. While approaching the center of the active leg and prescribed altitude, the number of pathway boxes decreases to a minimum of four.

Climb profiles cannot be displayed due to the variables associated with aircraft performance. Flight plan legs requiring a climb are indicated by pathways displayed at a level above the aircraft at the altitude selected or programmed.

Descent and Approach

Pathways are shown descending only for a programmed descent (Figures 8-5, 8-6). When the flight plan includes programmed descent segments, pathways are displayed along the descent path provided that the selected altitude is lower than the programmed altitude.

When an approach providing vertical guidance is activated, Pathways are shown level at the selected altitude up to the point along the final approach course where the altitude intercepts the extended vertical descent path, glidepath, or glideslope. From the vertical path descent, glidepath, or glideslope intercept point, the pathways are shown inbound to the Missed Approach Point (MAP) along the published lateral and vertical descent path, or at the selected altitude, whichever is lower.

During an ILS approach, the initial approach segment is displayed in magenta at the segment altitudes if GPS is selected as the navigation source on the CDI. When switching to localizer inbound with LOC selected as the navigation source on the CDI, pathways are displayed in green along the localizer and glide slope.

VOR, LOC BC, and ADF approach segments that are approved to be flown using GPS are displayed in magenta boxes. Segments that are flown using other than GPS or ILS, such as heading legs or VOR final approach courses are not displayed.

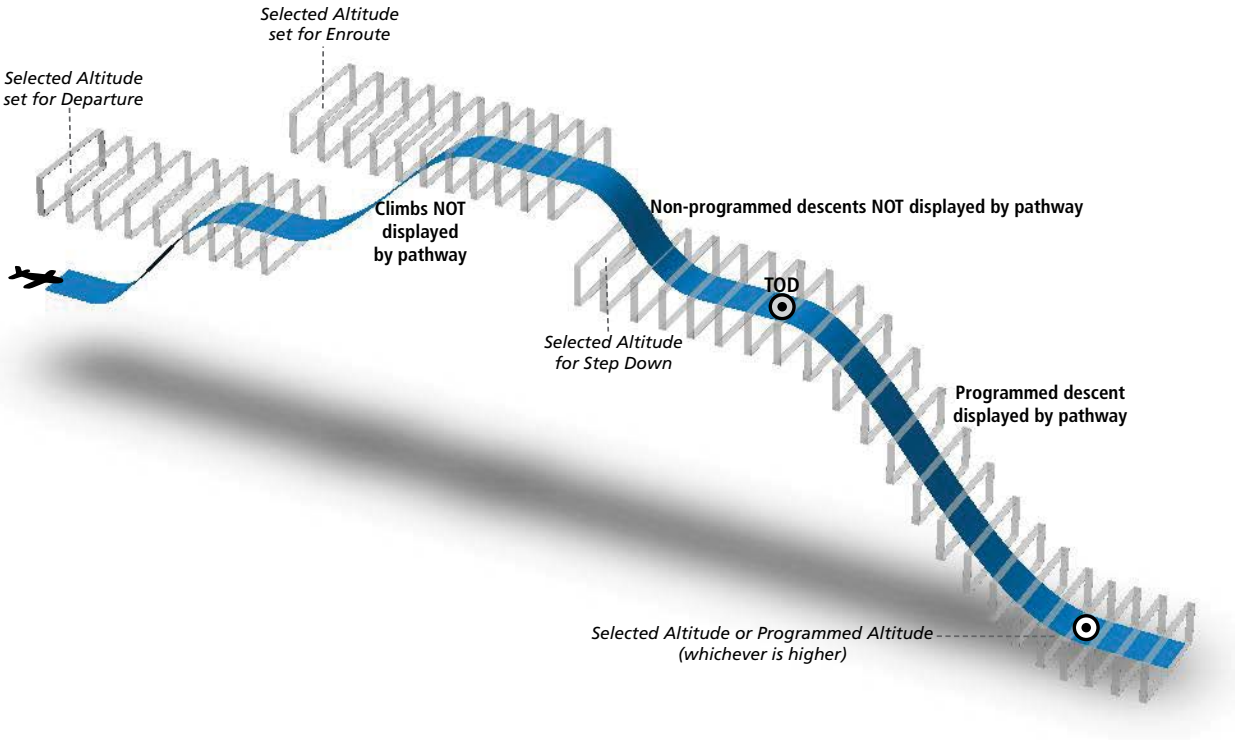


Figure 8-5 SVT Pathways, Enroute and Descent

Missed Approach

Upon activating the missed approach, pathways lead to the Missed Approach Holding Point (MAHP) and are displayed as a level path at the published altitude for the MAHP, or the selected altitude, whichever is the highest. If the initial missed approach leg is a Course-to-Altitude (CA) leg, the pathways boxes will be displayed level at the altitude published for the MAHP. If the initial missed approach leg is defined by a course using other than GPS, pathways are not displayed for that segment. In this case, the pathways displayed for the next leg may be outside the field of view and will be visible when the aircraft has turned in the direction of that leg.

Pathways are displayed along each segment including the path required to track course reversals that are part of a procedure, such as holding patterns. Pathways boxes will not indicate a turn to a MAHP unless a defined geographical waypoint exists between the MAP and MAHP.

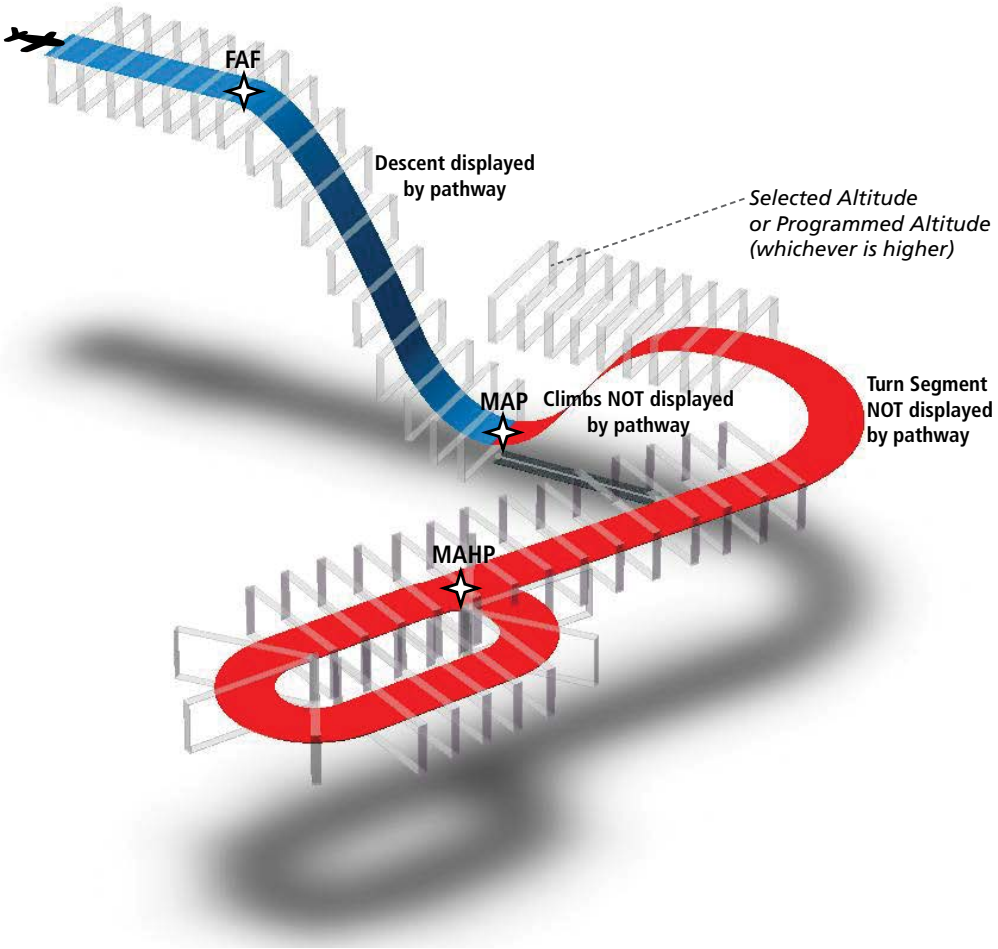


Figure 8-6 SVT Pathways, Approach, Missed Approach, and Holding

FLIGHT PATH MARKER

The Flight Path Marker (FPM), also known as a Velocity Vector, is displayed on the PFD at groundspeeds above 30 knots. The FPM depicts the approximate projected path of the aircraft accounting for wind speed and direction relative to the three-dimensional terrain display.

The FPM is always available when the Synthetic Terrain feature is in operation. The FPM represents the direction of the flight path as it relates to the terrain and obstacles on the display, while the airplane symbol represents the aircraft heading.

The FPM works in conjunction with the Pathways feature to assist the pilot in maintaining desired altitudes and direction when navigating a flight plan. When on course and altitude the FPM is aligned inside the pathway boxes as shown (Figure 8-7).

The FPM may also be used to identify a possible conflict with the aircraft flight path and distant terrain or obstacles. Displayed terrain or obstacles in the aircraft's flight path extending above the FPM could indicate a potential conflict, even before an alert is issued by TAWS. However, decisions regarding terrain and/or obstacle avoidance should not be made using only the FPM.



Figure 8-7 Flight Path Marker and Pathways

ZERO PITCH LINE

The Zero Pitch Line is drawn completely across the display and represents the horizon when the terrain horizon is difficult to distinguish from other terrain being displayed. It may not align with the terrain horizon, particularly when the terrain is mountainous or when the aircraft is flown at high altitudes.

HORIZON HEADING

The Horizon Heading is synchronized with the HSI and shows approximately 60 degrees of compass heading in 30-degree increments on the Zero Pitch Line. Horizon Heading tick marks and digits appearing on the zero pitch line are not visible behind either the airspeed or altitude display. Horizon Heading is used for general heading awareness, and is activated and deactivated by pressing the **HRZN HDG** Softkey.

TRAFFIC

***WARNING:** Intruder aircraft at or below 500 ft. AGL may not appear on the SVT display or may appear as a partial symbol.*

Traffic symbols are displayed in their approximate locations as determined by the related traffic systems. Traffic symbols are displayed in three dimensions, appearing larger as they are getting closer, and smaller when they are further away. Traffic symbols and coloring are consistent with that used for traffic displayed in the Inset map or MFD traffic page. If the traffic altitude is unknown, the traffic will not be displayed on the SVT display. For more details refer to the traffic system discussion in the Hazard Avoidance section.

AIRPORT SIGNS

Airport Signs provide a visual representation of airport location and identification on the synthetic terrain display. When activated, the signs appear on the display when the aircraft is approximately 15 nm from an airport and disappear at approximately 4.5 nm. Airport signs are shown without the identifier until the aircraft is approximately eight nautical miles from the airport. Airport signs are not shown behind the airspeed or altitude display. Airport signs are activated and deactivated by pressing the **APTSIGNS** Softkey.



Figure 8-8 Airport Signs

RUNWAYS

WARNING: *Do not use SVT runway depiction as the sole means for determining the proximity of the aircraft to the runway or for maintaining the proper approach path angle during landing.*

NOTE: *Not all airports have runways with endpoint data in the database, therefore, these runways are not displayed.*

Runway data provides improved awareness of runway location with respect to the surrounding terrain. All runway thresholds are depicted at their respective elevations as defined in the database. In some situations, where threshold elevations differ significantly, crossing runways may appear to be layered. As runways are displayed, those within 45 degrees of the aircraft heading are outlined in white. Other runways will be outlined in gray. When an approach for a specific runway is active, that runway will appear brighter and be outlined with a white box, regardless of the runway orientation as related to aircraft heading. As the aircraft gets closer to the runway, more detail such as runway numbers and centerlines will be displayed.



Figure 8-9 Runways

TERRAIN-SVS AND TAWS ALERTING

Terrain alerting on the synthetic terrain display is triggered by Forward-looking Terrain Avoidance (FLTA) alerts, and corresponds to the red and yellow X symbols on the Inset Map and MFD map displays. For more detailed information regarding Terrain-SVS and TAWS, refer to the Hazard Avoidance Section.

In some instances, a terrain or obstacle alert may be issued with no conflict shading displayed on the synthetic terrain. In these cases, the conflict is outside the SVT field of view to the left or right of the aircraft.

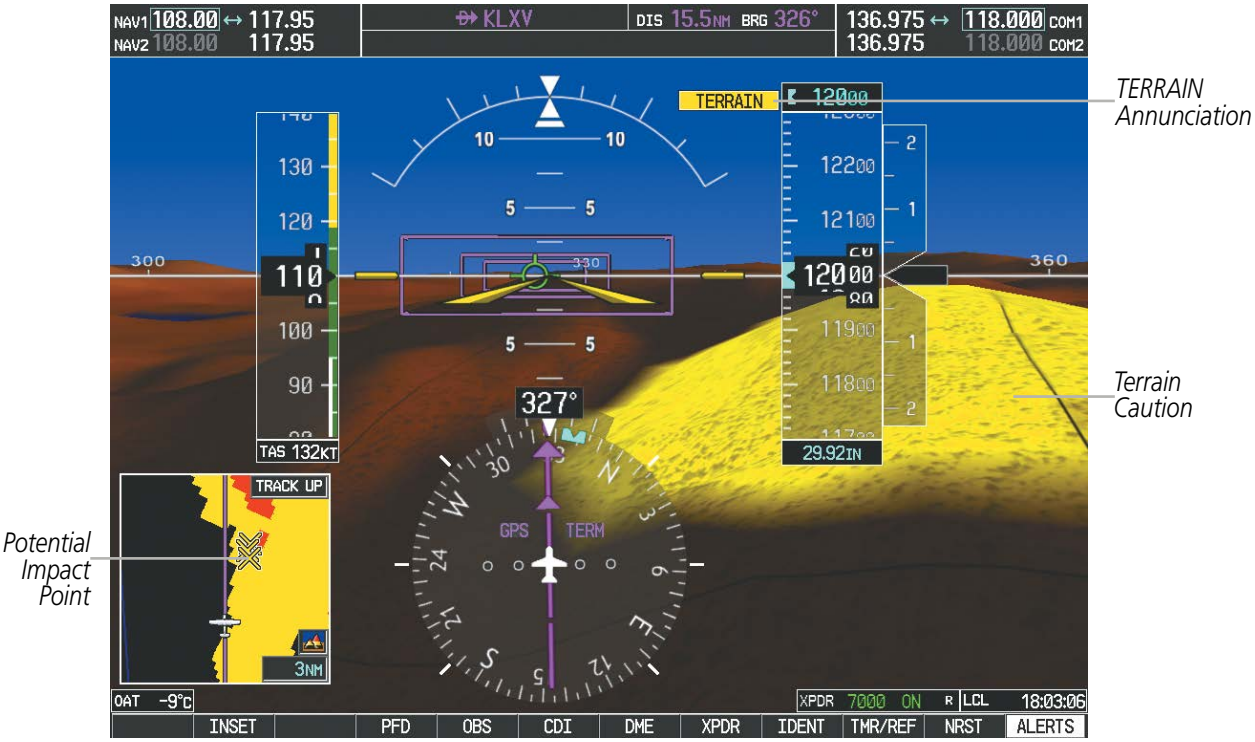


Figure 8-10 Terrain Alert

Obstacles are represented on the synthetic terrain display by standard two-dimensional tower symbols found on the Inset map and MFD maps and charts. Obstacle symbols appear in the perspective view with relative height above terrain and distance from the aircraft. Unlike the Inset map and MFD moving map display, obstacles on the synthetic terrain display do not change colors to warn of potential conflict with the aircraft's flight path until the obstacle is associated with an actual FLTA alert. Obstacles greater than 1000 feet below the aircraft altitude are not shown. Obstacles are shown behind the airspeed and altitude displays.



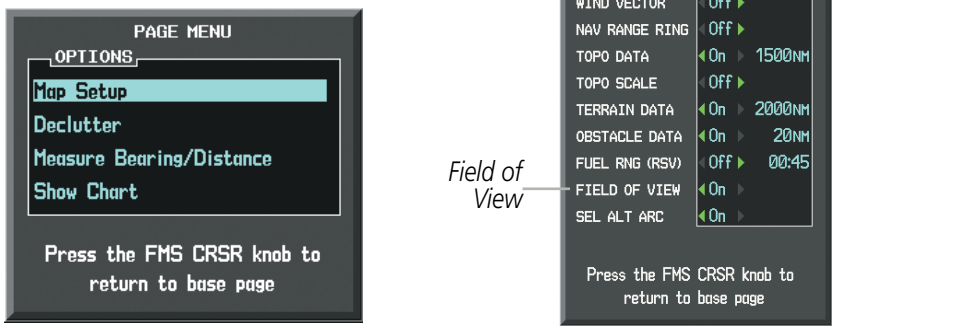
Figure 8-11 Obstacle Alert

FIELD OF VIEW

The PFD field of view can be represented on the MFD Navigation Map Page. Two dashed lines forming a V-shape in front of the aircraft symbol on the map, represent the forward viewing area shown on the PFD.

Displaying field of view:

1) While viewing the Navigation Map Page, press the **MENU** Key to display the PAGE MENU.
2) Turn the large **FMS** Knob to highlight Map Setup and press the **ENT** Key.



Navigation Map Page OPTIONS Menu

Map Setup Menu, Map Group, Field of View Option

Figure 8-12 Option Menus

3) Turn the **FMS** Knob to select the Map Group and press the **ENT** Key.
4) Turn the large **FMS** Knob to scroll through the Aviation Group options to FIELD OF VIEW.
5) Turn the small **FMS** Knob to select On or Off.
6) Press the **FMS** Knob to return to the Navigation Map Page.

The following figure compares the PFD forward looking depiction with the MFD plan view and FIELD OF VIEW turned on.



SVT View on the PFD

Field of View on the MFD

Figure 8-13 PFD and MFD Field of View Comparison

8.2 SAFETAXI

SafeTaxi is an enhanced feature that gives greater map detail when viewing airports at close range. The maximum map ranges for enhanced detail are pilot configurable. When viewing at ranges close enough to show the airport detail, the map reveals taxiways with identifying letters/numbers, airport Hot Spots, and airport landmarks including ramps, buildings, control towers, and other prominent features. Resolution is greater at lower map ranges. When the MFD display is within the SafeTaxi ranges, the airplane symbol on the airport provides enhanced position awareness.

Designated Hot Spots are recognized at airports with many intersecting taxiways and runways, and/or complex ramp areas. Airport Hot Spots are outlined to caution pilots of areas on an airport surface where positional awareness confusion or runway incursions happen most often. Hot Spots are defined with a magenta circle or outline around the region of possible confusion.

Any map page that displays the navigation view can also show the SafeTaxi airport layout within the maximum configured range. The following is a list of pages where the SafeTaxi feature can be seen:

- Navigation Map Page
- Inset Map (PFD)
- Airport Information Page
- Intersection Information Page
- NDB Information Page
- VOR Information Page
- User Waypoint Information Page
- Trip Planning Page
- Nearest Pages
- Active and Stored Flight Plan Pages

During ground operations the aircraft's position is displayed in reference to taxiways, runways, and airport features. In the example shown, the aircraft is on taxiway Bravo approaching the High Alert Intersection boundary on KSFO airport. Airport Hot Spots are outlined in magenta. When panning over the airport, features such as runway holding lines and taxiways are shown at the cursor.

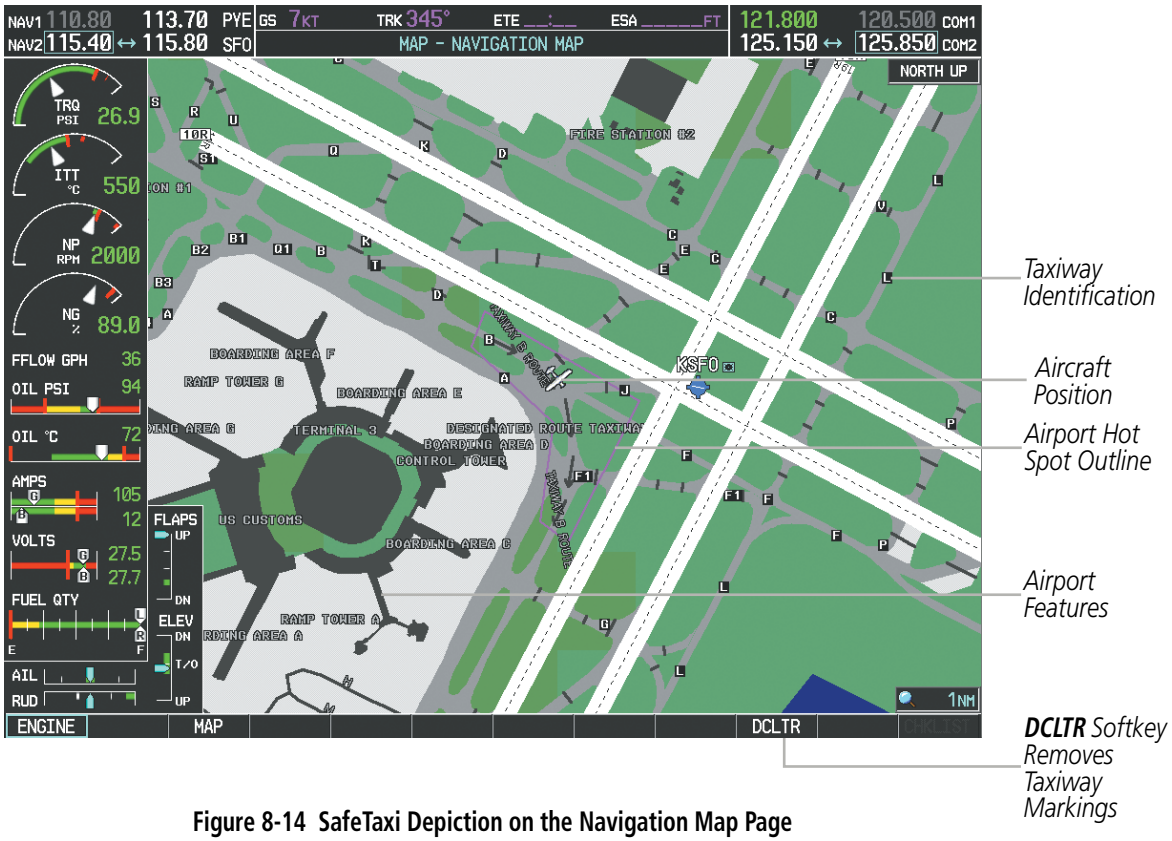


Figure 8-14 SafeTaxi Depiction on the Navigation Map Page

The **DCLTR** Softkey (declutter) label advances to DCLTR-1, DCLTR -2, and DCLTR-3 each time the softkey is pressed for easy recognition of decluttering level. Pressing the **DCLTR** Softkey removes the taxiway markings and airport feature labels. Pressing the **DCLTR-1** Softkey removes VOR station ID, the VOR symbol, and intersection names if within the airport plan view. Pressing the **DCLTR-2** Softkey removes the airport runway layout, unless the airport in view is part of an active route structure. Pressing the **DCLTR-3** Softkey cycles back to the original map detail. Refer to Map Declutter Levels in the Flight Management Section.

Configuring SafeTaxi range:

1) While viewing the Navigation Map Page, press the **MENU** Key to display the PAGE MENU.
2) Turn the large **FMS** Knob to highlight the Map Setup Menu Option and press the **ENT** Key.

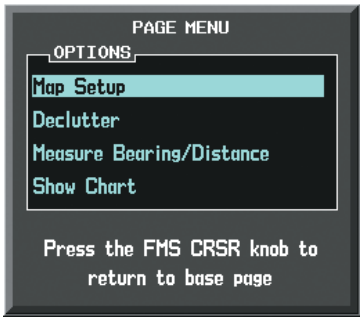


Figure 8-15 Navigation Map PAGE MENU, Map Setup Option

3) Turn the **FMS** Knob to select the Aviation Group and press the **ENT** Key.
4) Turn the large **FMS** Knob to scroll through the Aviation Group options to SAFETAXI.
5) Turn the small **FMS** Knob to display the range of distances.
6) Turn either **FMS** Knob to select the desired distance for maximum SafeTaxi display range.
7) Press the **ENT** Key to complete the selection.
8) Press the **FMS** Knob to return to the Navigation Map Page.

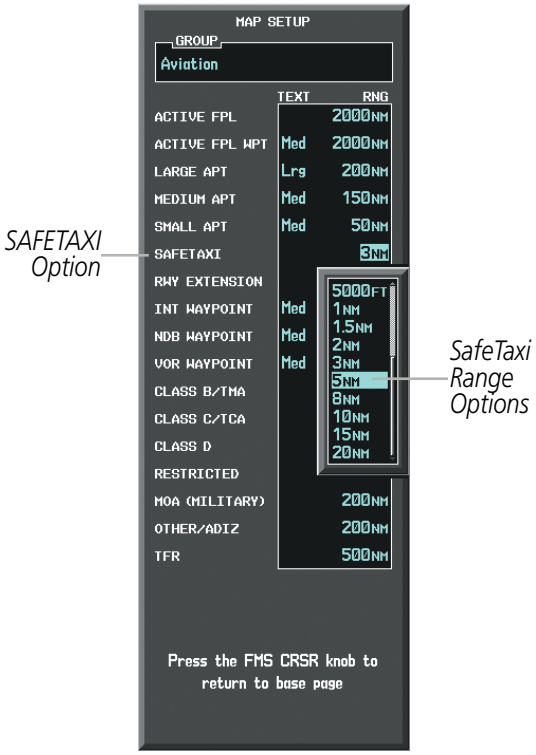


Figure 8-16 MAP SETUP Menu, Aviation Group, SAFETAXI Range Options

SAFETAXI DATABASE CYCLE NUMBER AND REVISION

SafeTaxi database is revised every 56 days. SafeTaxi is always available for use after the expiration date. When turning on the system, the Power-up Page indicates whether the databases are current, out of date, or not available.

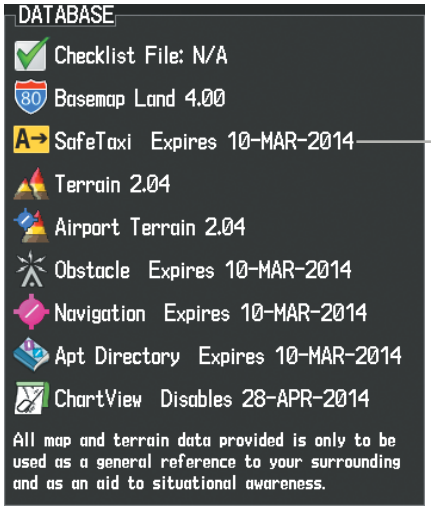


Figure 8-17 Power-up Page, SafeTaxi Database

Power-up Page Display	Definition
SafeTaxi Expires 10-MAR-2014	Normal operation. SafeTaxi database is valid and within current cycle.
SafeTaxi Expires 10-MAR-2014	SafeTaxi database has expired.
SafeTaxi: N/A	Database card contains no SafeTaxi data.

Table 8-1 SafeTaxi Annunciation Definitions

The SafeTaxi Region, Version, Cycle, Effective date and Expires date of the database cycle can also be found on the AUX - System Status page, as seen in Figure 8-18.

Press the **MFD1 DB** Softkey to place the cursor in the DATABASE window. Scroll through the listed information by turning the **FMS** Knob or pressing the **ENT** Key until the SafeTaxi database information is shown.

The SafeTaxi database cycle number shown in the figure, 14S1, is deciphered as follows:

14 – Indicates the year 2014

S – Indicates the data is for SafeTaxi

1 – Indicates the first issue of the SafeTaxi database for the year

The SafeTaxi EFFECTIVE date 13–JAN–14 is the beginning date for the current database cycle. SafeTaxi EXPIRES date 10–MAR–14 is the revision date for the next database cycle.

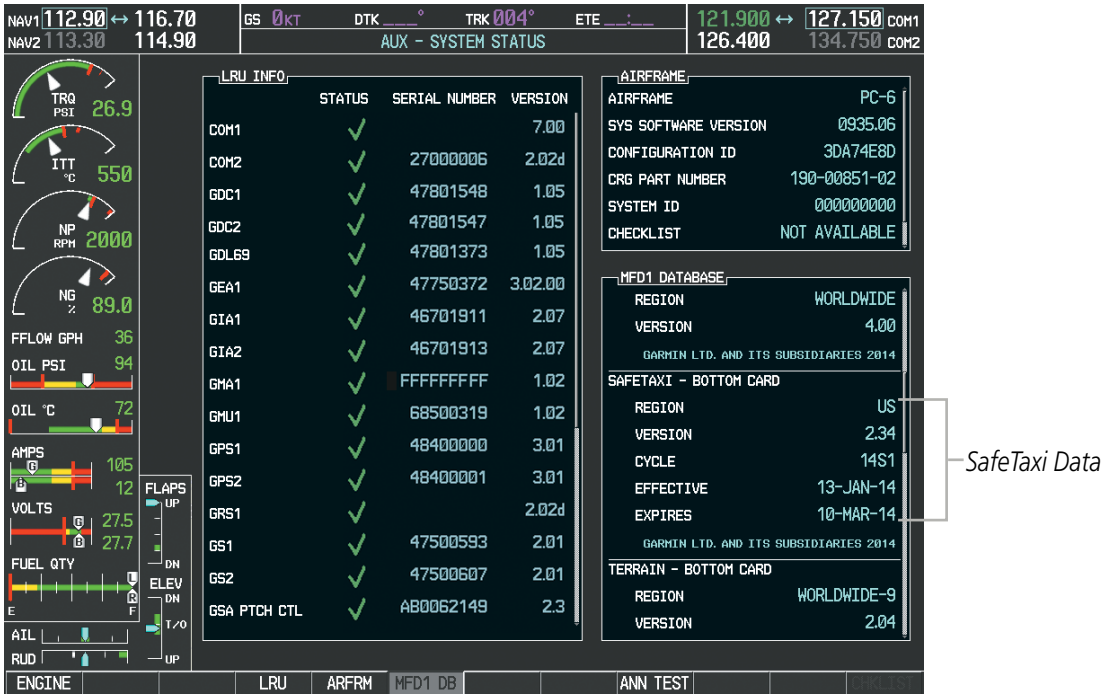


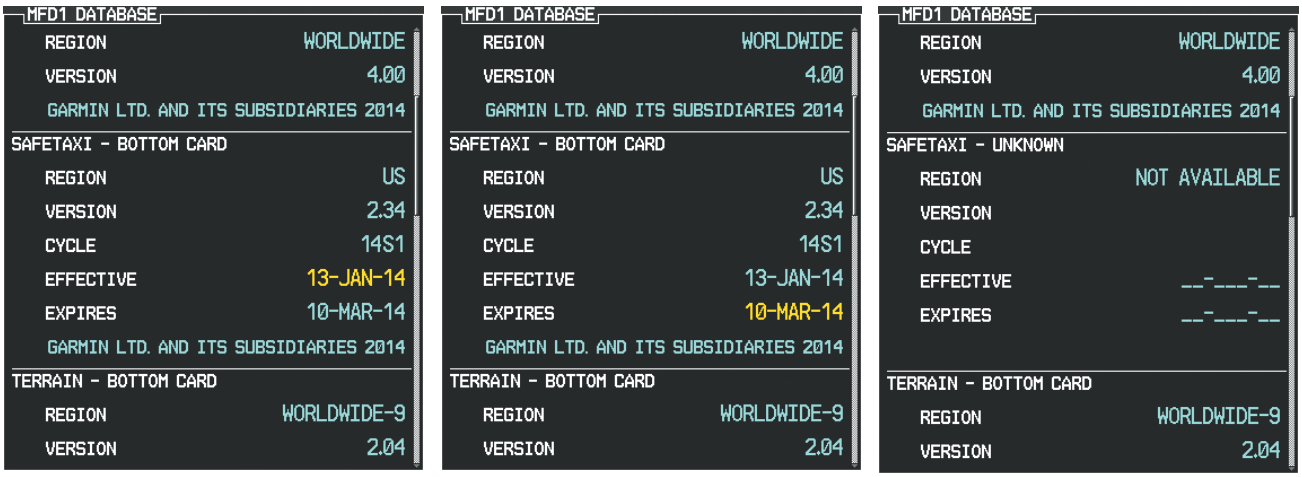
Figure 8-18 AUX – System Status Page, SafeTaxi Current Information

SafeTaxi information appears in cyan and yellow text. The EFFECTIVE date appears in cyan when data is current and in yellow when the current date is before the effective date. The EXPIRES date appears in cyan when data is current and in yellow when expired (Figures 8-18 and 8-19). NOT AVAILABLE appears in cyan in the REGION field if SafeTaxi data is not available on the database card (Figure 8-19). An expired SafeTaxi database is not disabled and will continue to function indefinitely.

Press the **MFD1 DB** Softkey a second time. The softkey label will change to **PFD1 DB**. The DATABASE window will now be displaying database information for PFD1. As before, scroll through the listed information by turning the **FMS** Knob or pressing the **ENT** Key until the SafeTaxi database information is shown.

Refer to Updating Garmin Databases in Appendix B for instructions on revising the SafeTaxi database.

Figure 8-19 illustrates possible SafeTaxi database conditions that may appear on the AUX - System Status Page. The EFFECTIVE date is the beginning date for this database cycle. If the present date is before the effective date, the EFFECTIVE date appears in yellow and the EXPIRES date appears in cyan. The EXPIRES date is the revision date for the next database cycle. NOT AVAILABLE indicates that SafeTaxi is not available on the database card or no database card is inserted.



Current Date is before Effective Date *SafeTaxi Database has Expired* *SafeTaxi Database Not Installed*

Figure 8-19 AUX – System Status Page, SafeTaxi Database Status

8.3 CHARTVIEW

ChartView resembles the paper version of Jeppesen terminal procedures charts. The charts are displayed in full color with high-resolution. The MFD depiction shows the aircraft position on the moving map in the planview of approach charts and on airport diagrams. Airport Hot Spots are outlined in magenta.

The geo-referenced aircraft position is indicated by an aircraft symbol displayed on the chart when the current position is within the boundaries of the chart. Inset boxes (Figure 8-20) are not considered within the chart boundaries. Therefore, when the aircraft symbol reaches a chart boundary line, or inset box, the aircraft symbol is removed from the display.

Figure 8-20 shows examples of off-scale areas, indicated by the grey shading. Note, the grey shading is for illustrative purposes only and will not appear on the published chart or MFD display. These off-scale areas appear on the chart to convey supplemental information. However, the depicted geographical position of this information, as it relates to the chart planview, is not the actual geographic position. Therefore, when the aircraft symbol appears within one of these areas, the aircraft position indicated is relative to the chart planview, not to the off-scale area.

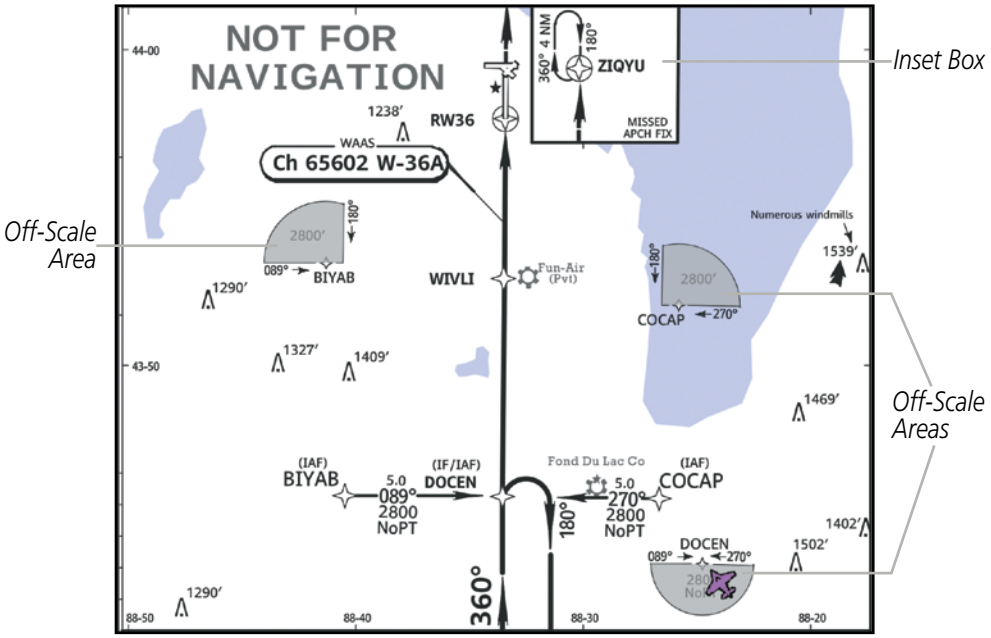


Figure 8-20 Sample Chart Indicating Off-Scale Areas

NOTE: *Do not maneuver the aircraft based solely upon the geo-referenced aircraft symbol.*

The ChartView database subscription is available from Jeppesen, Inc. Available data includes:

- Arrivals (STAR)
- Departure Procedures (DP)
- Approaches
- Airport Diagrams
- NOTAMs

CHARTVIEW SOFTKEYS

ChartView functions are displayed on three levels of softkeys. While on the Navigation Map Page, Nearest Airports Page, or Flight Plan Page, pressing the **SHW CHRT** Softkey displays the available terminal chart and advances to the chart selection level of softkeys: **CHRT OPT**, **CHRT**, **INFO-1**, **DP**, **STAR**, **APR**, **WX**, **NOTAM**, and **GO BACK**. The chart selection softkeys shown below appear on the Airport Information Page.

Pressing the **GO BACK** Softkey reverts to the top level softkeys and previous page.

Pressing the **CHRT OPT** Softkey advances to the next level of softkeys: **ALL**, **HEADER**, **PLAN**, **PROFILE**, **MINIMUMS**, **FIT WDTH**, **FULL SCN**, and **BACK**.

While viewing the **CHRT OPT** Softkeys, after 45 seconds of softkey inactivity, the system reverts to the chart selection softkeys.

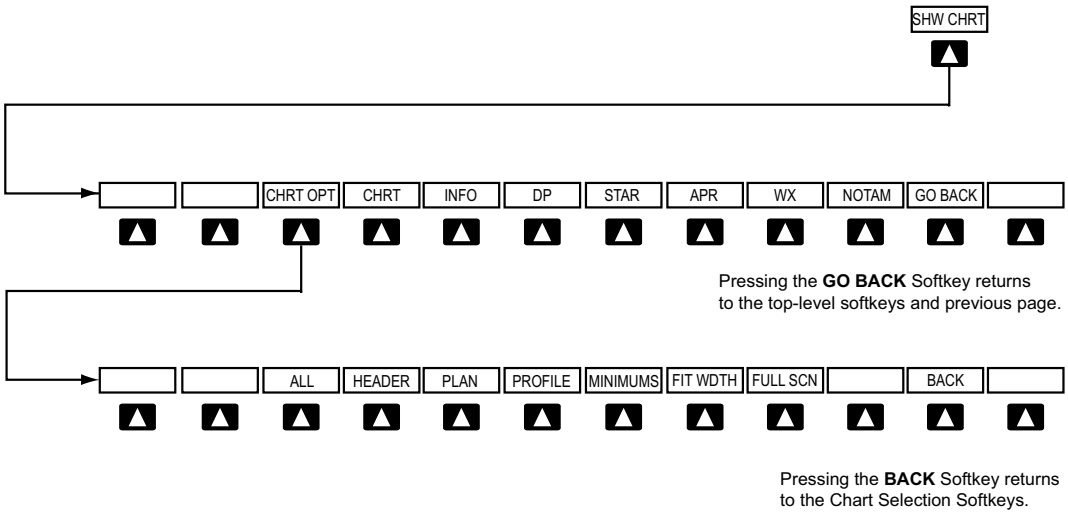


Figure 8-21 ChartView SHW CHRT, Chart Selection, and Chart Option Softkeys

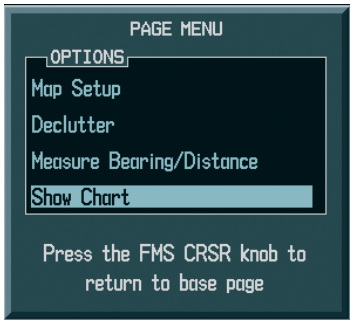
TERMINAL PROCEDURES CHARTS

Selecting Terminal Procedures Charts:

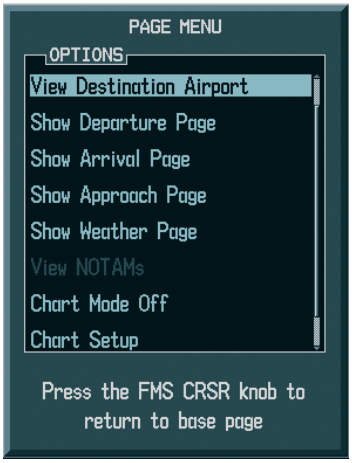
While viewing the Navigation Map Page, Nearest Airport Page, or Flight Plan Page, press the **SHW CHRT** Softkey.

Or:

1) Press the **MENU** Key to display the PAGE MENU.
2) Turn the large **FMS** Knob to scroll through the OPTIONS Menu to Show Chart.
3) Press the **ENT** Key to display the chart.



Navigation Map Page OPTIONS Menu



Waypoint Airport Information Page OPTIONS Menu

Figure 8-22 Option Menus

When no terminal procedure chart is available for the nearest airport or the selected airport, the banner CHART NOT AVAILABLE appears on the screen. The CHART NOT AVAILABLE banner does not refer to the Jeppesen subscription, but rather the availability of a particular airport chart selection or procedure for a selected airport.



Figure 8-23 Chart Not Available Banner

If there is a problem in rendering the data (such as a data error or a failure of an individual chart), the banner UNABLE TO DISPLAY CHART is then displayed.



Figure 8-24 Unable To Display Chart Banner

When a chart is not available by pressing the **SHW CHRT** Softkey or selecting a Page Menu Option, charts may be obtained for other airports from the WPT Pages or Flight Plan Pages.

If a chart is available for the destination airport, or the airport selected in the active flight plan, the chart appears on the screen. When no flight plan is active, or when not flying to a direct-to destination, pressing the **SHW CHRT** Softkey displays the chart for the nearest airport, if available.

The chart shown is one associated with the WPT – Airport Information page. Usually this is the airport runway diagram. Where no runway diagram exists, but Take Off Minimums or Alternate Minimums are available, that page appears. If Airport Information pages are unavailable, the Approach Chart for the airport is shown.

Selecting a chart:

1) While viewing the Navigation Map Page, Flight Plan Page, or Nearest Airports Page, press the **SHW CHRT** Softkey. The airport diagram or approach chart is displayed on the Airport Information Page.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to select either the Airport Identifier Box or the Approach Box. (Press the **APR** Softkey if the Approach Box is not currently shown).
4) Turn the small and large **FMS** Knob to enter the desired airport identifier.
5) Press the **ENT** Key to complete the airport selection.
6) Turn the large **FMS** Knob to select the Approach Box.
7) Turn the small **FMS** Knob to show the approach chart selection choices.
8) Turn either **FMS** Knob to scroll through the available charts.
9) Press the **ENT** Key to complete the chart selection.

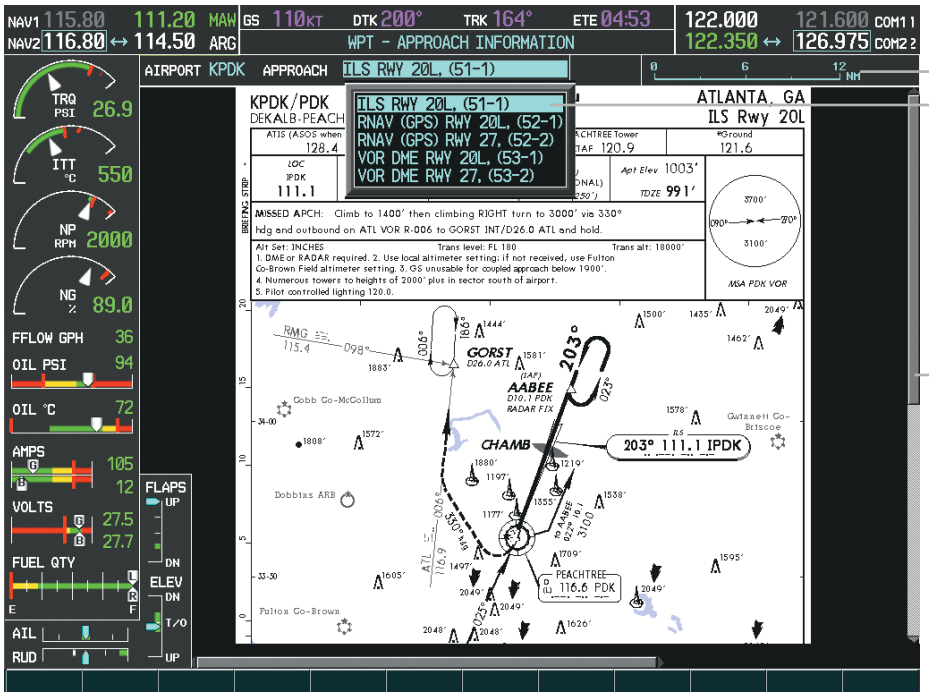


Figure 8-25 Approach Information Page, Chart Selection

While the APPROACH Box is selected using the **FMS** Knob, the G950 softkeys are blank. Once the desired chart is selected, the chart scale can be changed and the chart page can be scrolled using the **Joystick**. Pressing the **Joystick** centers the chart on the screen.

The aircraft symbol is shown on the chart only if the chart is to scale and the aircraft position is within the boundaries of the chart. The aircraft symbol is not displayed when the Aircraft Not Shown Icon appears (Figure 8-29). If the Chart Scale Box displays a banner NOT TO SCALE, the aircraft symbol is not shown. The Aircraft Not Shown Icon may appear at certain times, even if the chart is displayed to scale.

Pressing the **CHRT** Softkey switches between the ChartView diagram and the associated map in the WPT page group. In the example shown, the **CHRT** Softkey switches between the Colorado Springs, CO (KCOS) Airport Diagram and the navigation map on the WPT – Airport Information page.

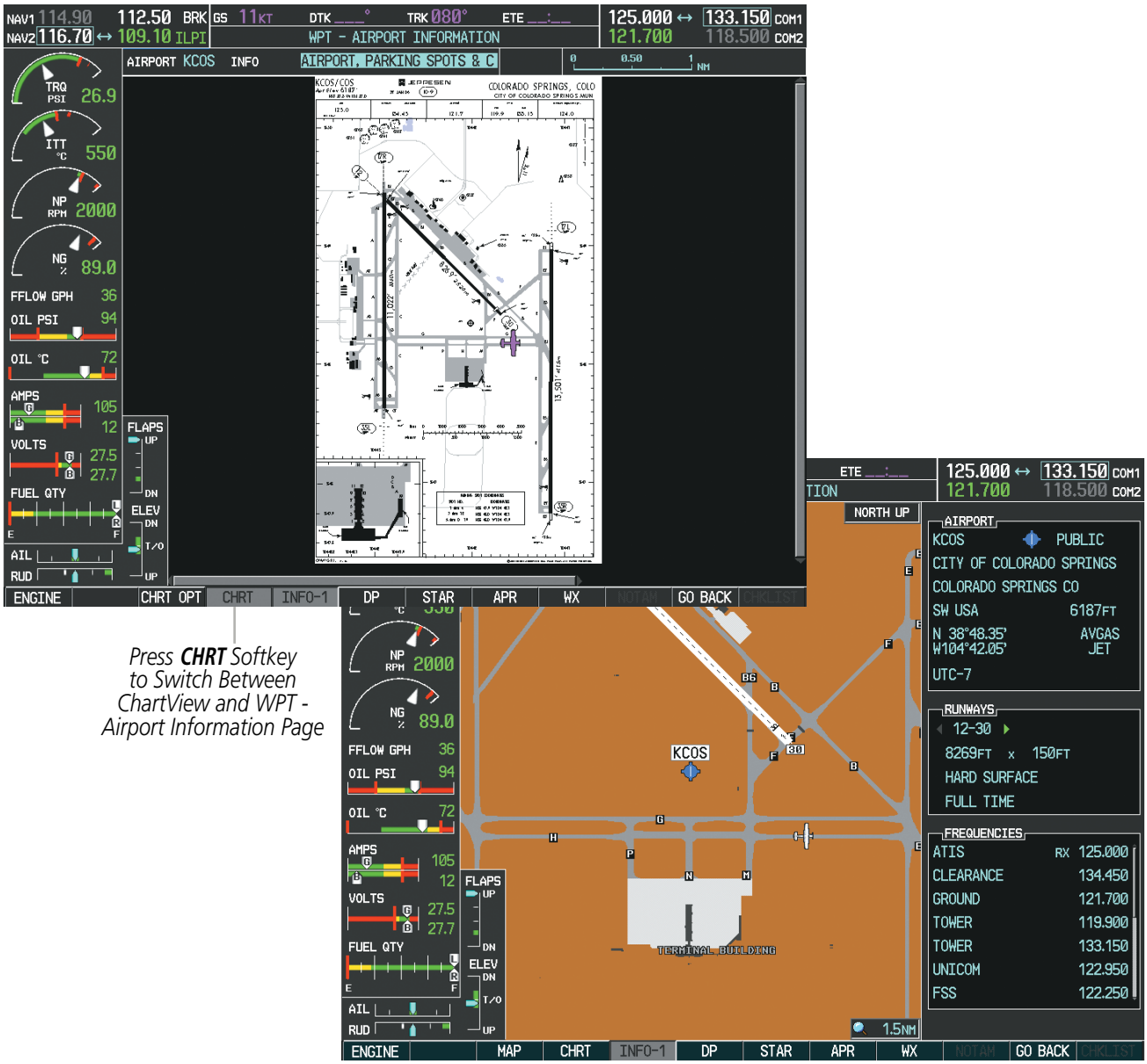


Figure 8-26 CHRT Softkey, Airport Information Page

Pressing the **INFO-1** or **INFO-2** Softkey returns to the airport diagram chart when the view is on a terminal procedure chart. If the displayed chart is the airport diagram chart, pressing the **INFO-1** or **INFO-2** Softkey returns to the Airport Information Page.

The aircraft position is shown in magenta on the ChartView diagrams when the location of the aircraft is within the chart boundaries. In the example shown, the aircraft is turning onto Taxiway Romeo on the Charlotte, NC (KCLT) airport.

Another source for additional airport information is from the INFO Box above the chart for certain airports. This information source is not related to the **INFO-1** or **INFO-2** Softkey. When the INFO Box is selected using the **FMS** Knob, the G950 softkeys are blank. The Charlotte, NC airport has five additional charts offering information; the Airport Diagram, Take-off Minimums, Class B Airspace, Airline Parking Gate Coordinates, and Airline Parking Gate Location. (The numbers in parentheses after the chart name are Jeppesen designators.)



Figure 8-27 Airport Information Page, INFO View, Full Screen Width

In the example shown in Figure 8-27, the Class B Chart is selected. Pressing the **ENT** Key displays the Charlotte Class B Airspace Chart (Figure 8-28).

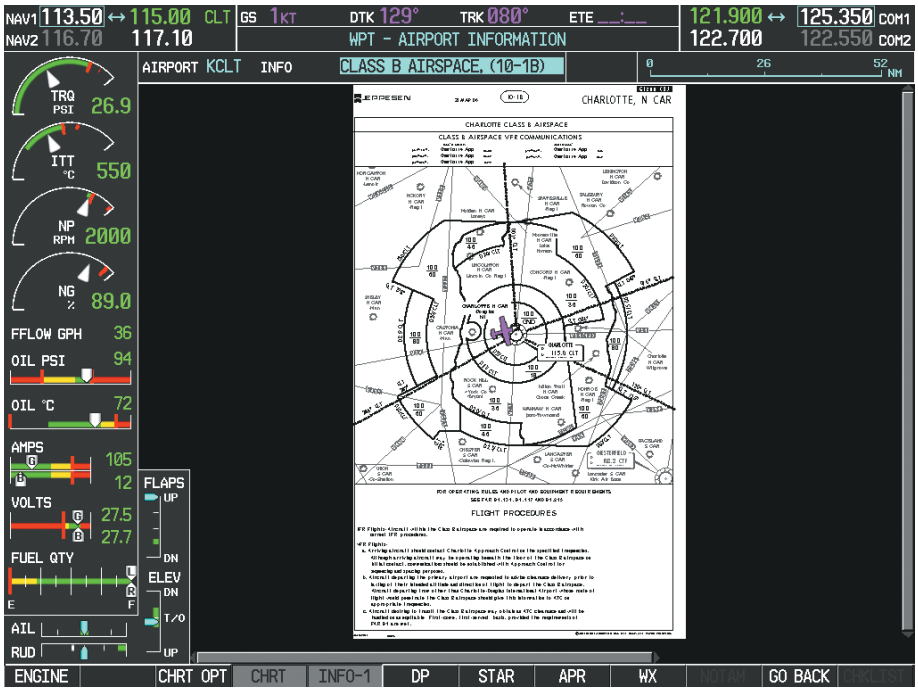


Figure 8-28 Airport Information Page, Class B Chart Selected from INFO View

Pressing the **DP** Softkey displays the Departure Procedure Chart if available.

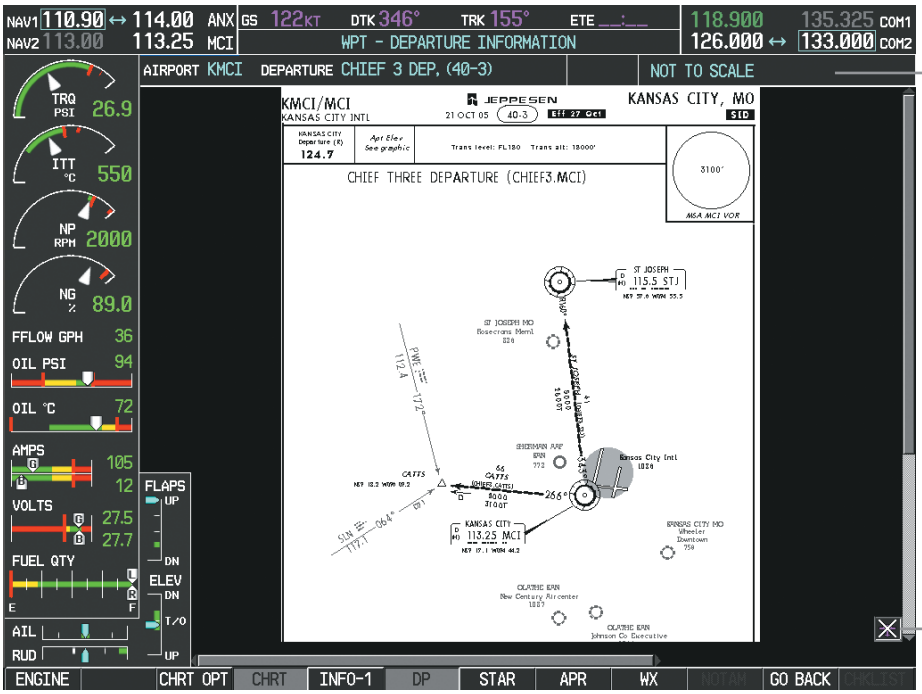


Figure 8-29 Departure Information Page

Pressing the **STAR** Softkey displays the Standard Terminal Arrival Chart if available.

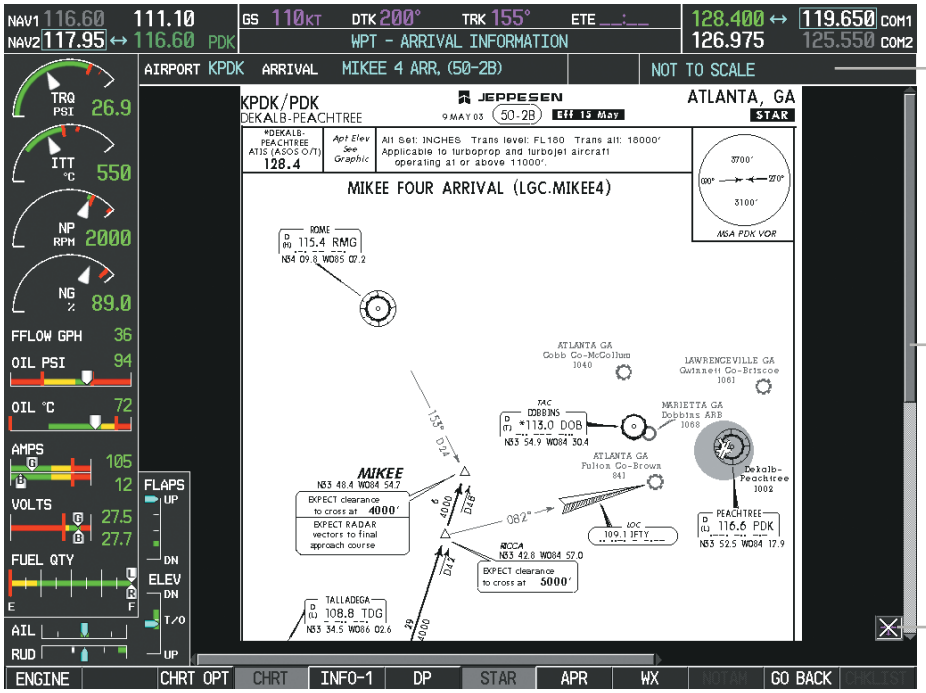


Figure 8-30 Arrival Information Page

Pressing the **APR** Softkey displays the approach chart for the airport if available.

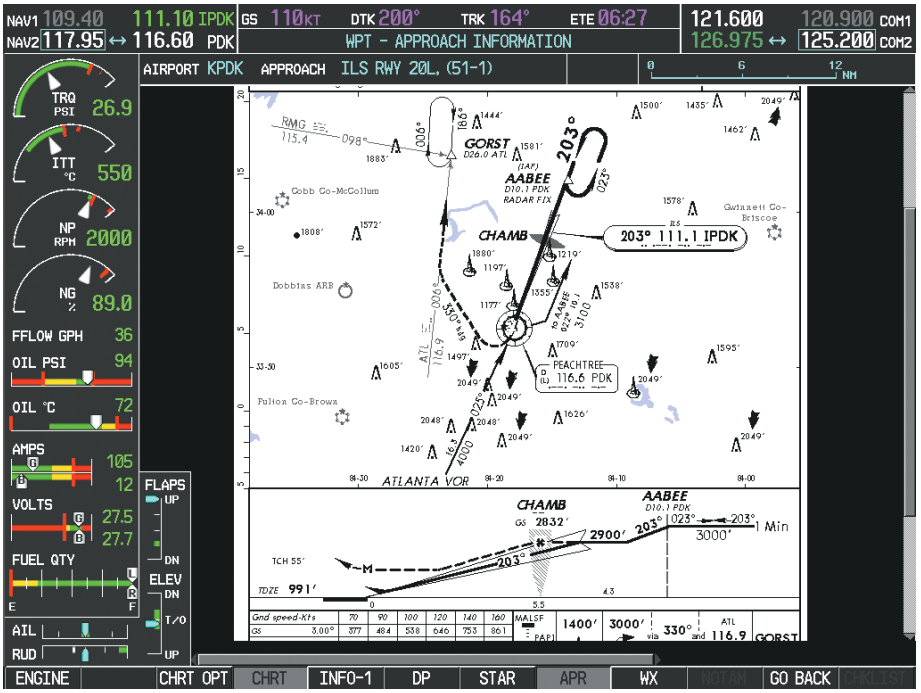


Figure 8-31 Approach Information Page

Pressing the **WX** Softkey shows the airport weather frequency information, and includes weather data such as METAR and TAF from the XM Data Link Receiver, when available. Weather information is available only when an XM Data Link Receiver is installed and the XM WX Satellite Weather subscription is current.

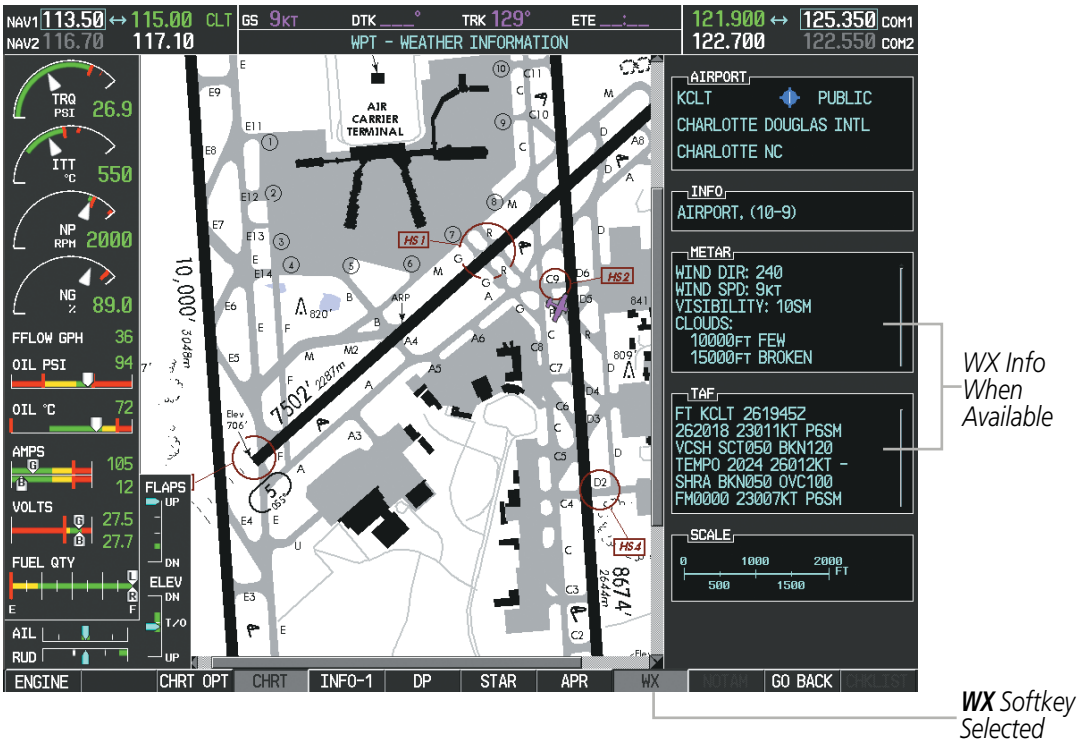


Figure 8-32 Weather Information Page

NOTE: *A subdued softkey label indicates the function is disabled.*

Recent NOTAMS applicable to the current ChartView cycle are included in the ChartView database. Pressing the **NOTAM** Softkey shows the local NOTAM information for selected airports, when available. When NOTAMS are not available, the **NOTAM** Softkey label appears subdued and is disabled as shown in Figure 8-32. The **NOTAM** Softkey may appear on the Airport Information Page and all of the chart page selections.

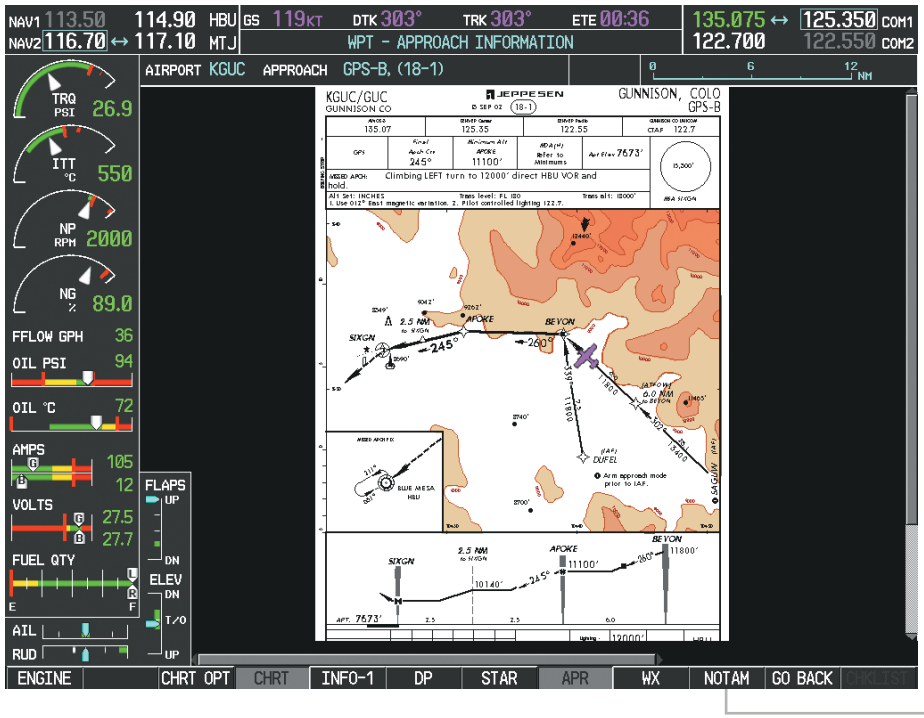


Figure 8-33 NOTAM Softkey Highlighted

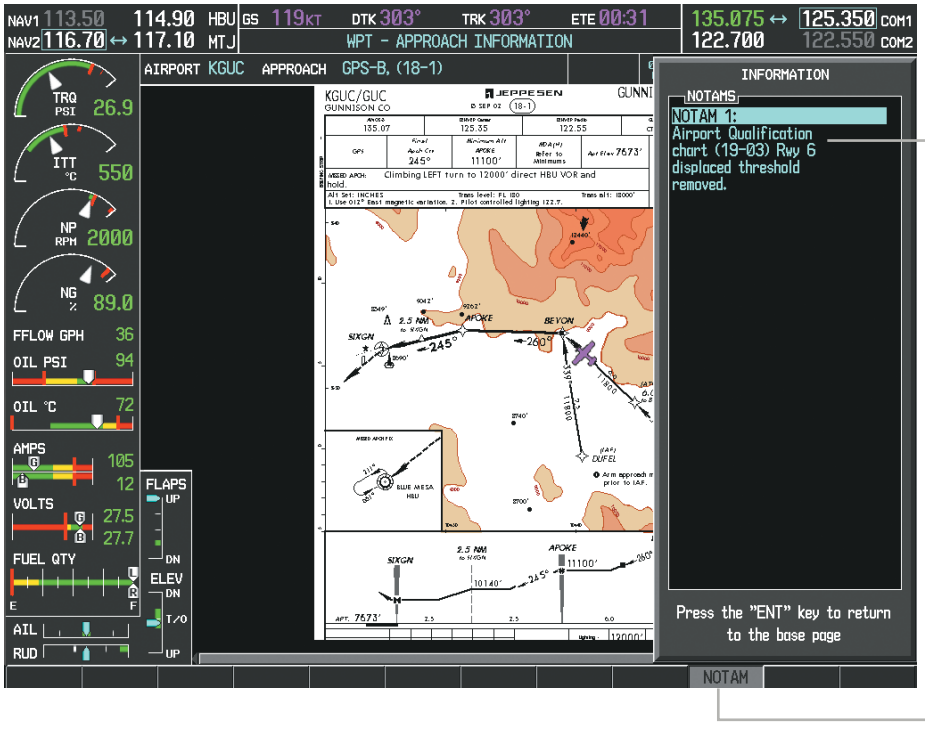


Figure 8-34 Airport Information Page, Local NOTAMs

Pressing the **NOTAM** Softkey again removes the NOTAMS information.

Pressing the **GO BACK** Softkey reverts to the previous page (Navigation Map Page, Nearest Pages, or Flight Plan Page).

CHART OPTIONS

Pressing the **CHRT OPT** Softkey displays the next level of softkeys, the chart options level (Figure 8-21).

Pressing the **ALL** Softkey shows the complete approach chart on the screen.

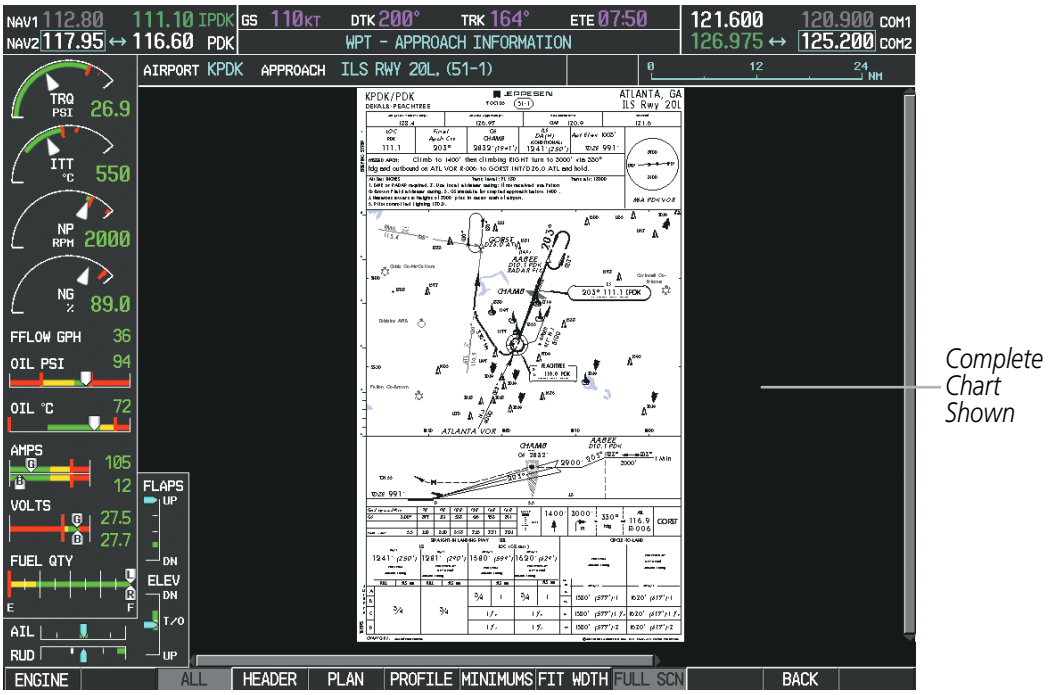


Figure 8-35 Approach Information Page, ALL View

Pressing the **HEADER** Softkey shows the header view (approach chart briefing strip) on the screen.

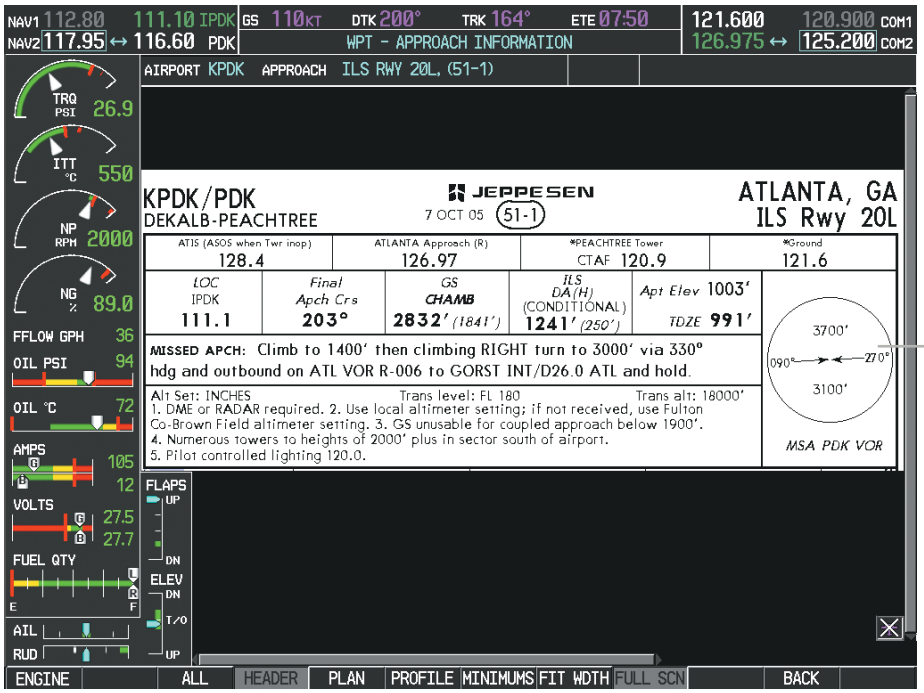


Figure 8-36 Approach Information Page, Header View

Pressing the **PLAN** Softkey shows the approach chart two dimensional plan view.

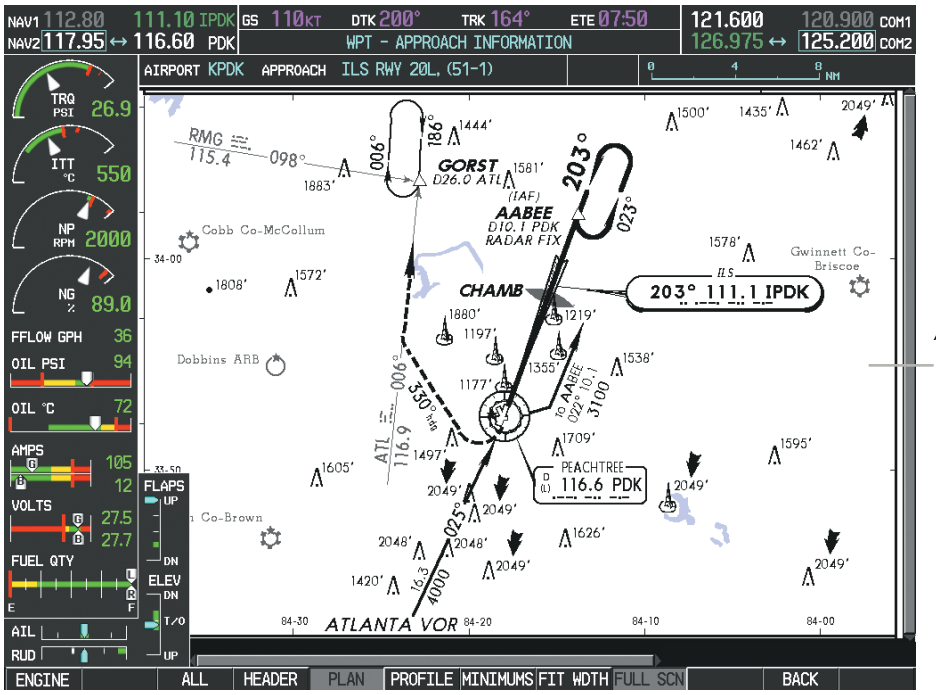
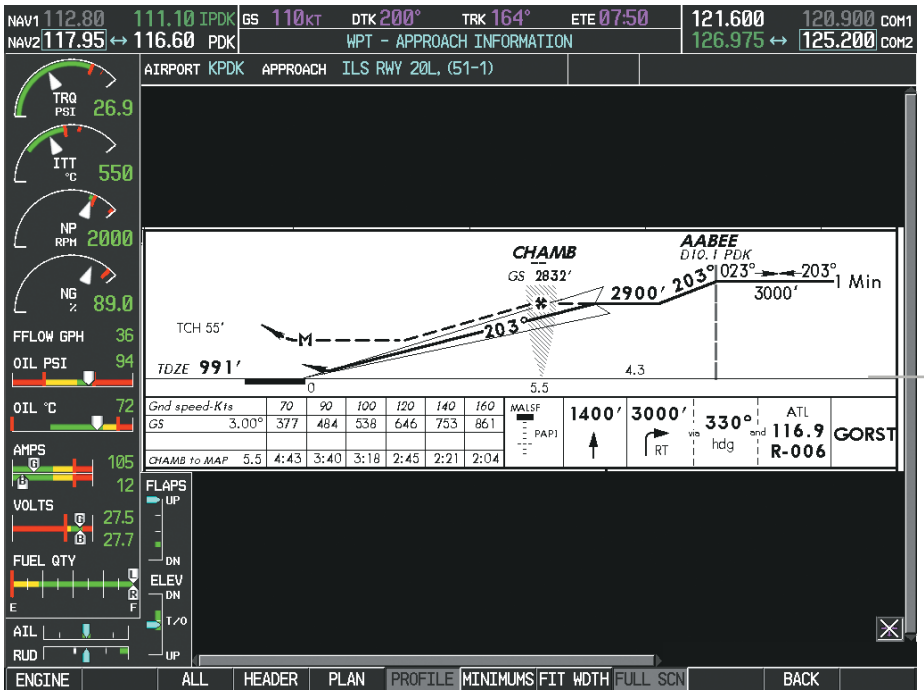


Figure 8-37 Approach Information Page, Plan View

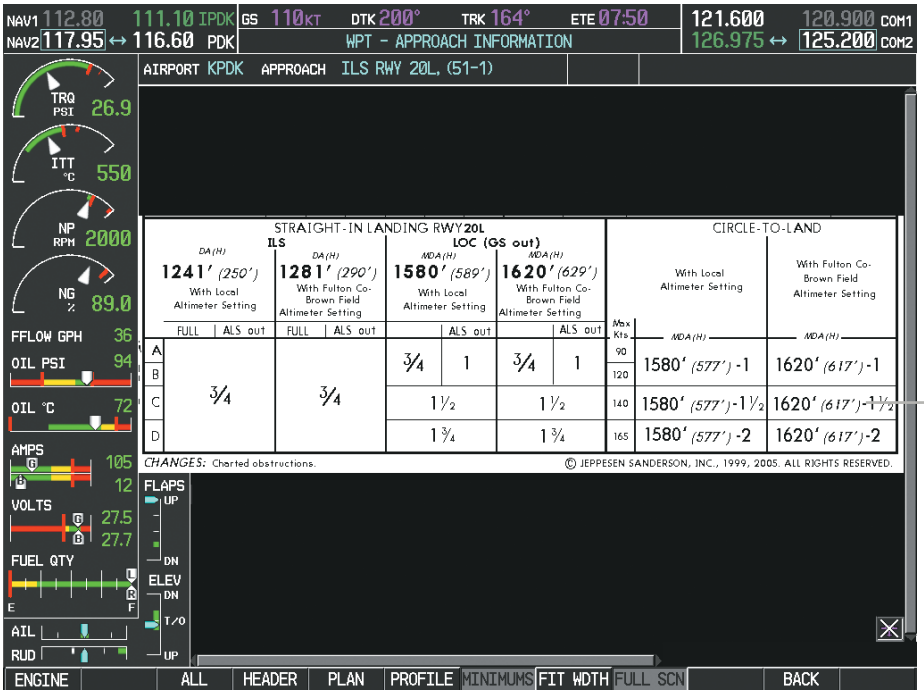
Pressing the **PROFILE** Softkey displays the approach chart descent profile strip.



Approach Chart Descent Profile Strip

Figure 8-38 Approach Information Page, Profile View, Full Screen Width

Pressing the **MINIMUMS** Softkey displays the minimum descent altitude/visibility strip at the bottom of the approach chart.



Minimum Descent Altitude/ Visibility Strip

Figure 8-39 Approach Information Page, Minimums View, Full Screen Width

If the chart scale has been adjusted to view a small area of the chart, pressing the **FIT WIDTH** Softkey changes the chart size to fit the available screen width.



Figure 8-40 Airport Information Page, FIT WDTH Softkey Pressed

Pressing the **FULL SCN** Softkey alternates between removing and replacing the data window to the right.

Selecting Additional Information:

1) While viewing the Airport Taxi Diagram, press the **FULL SCN** Softkey to display the information windows (AIRPORT, INFO).
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight the AIRPORT, INFO, RUNWAYS, or FREQUENCIES Box (INFO Box shown).
4) Turn the small **FMS** Knob to select the INFO Box choices. If multiple choices are available, scroll to the desired choice with the large **FMS** Knob and press the **ENT** Key to complete the selection.
5) Press the **FMS** Knob again to deactivate the cursor.

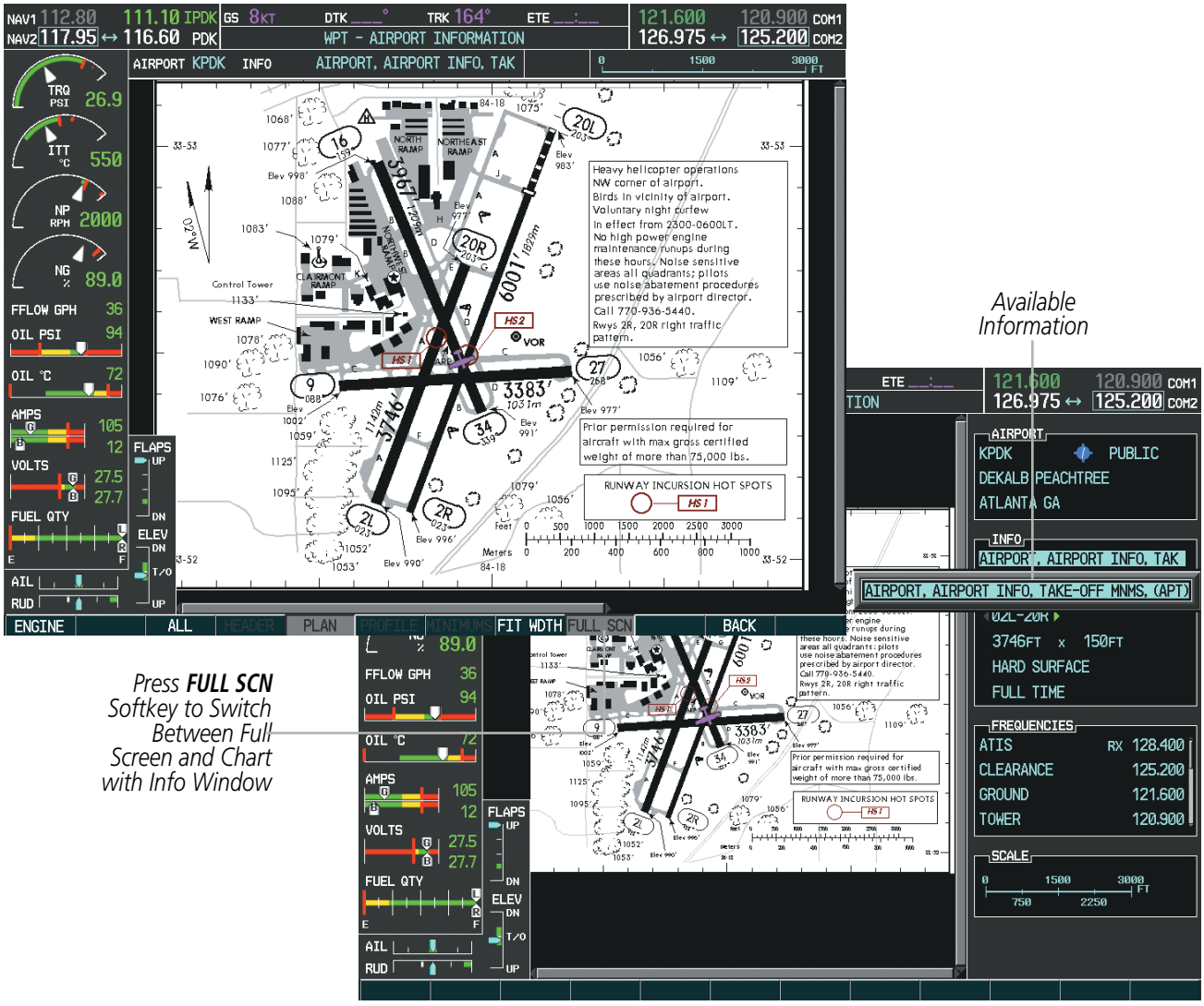


Figure 8-41 Airport Information Page, Full Screen and Info Window

Pressing the **BACK** Softkey, or waiting for 45 seconds reverts to the chart selection softkeys.

The full screen view can also be selected by using the page menu option.

Selecting full screen On or Off:

1) While viewing a terminal chart press the **MENU** Key to display the Page Menu OPTIONS.
2) Turn the large **FMS** Knob to highlight the Chart Setup Menu Option and press the **ENT** Key.
3) Turn the large **FMS** Knob to move between the FULL SCREEN and COLOR SCHEME Options.
4) Turn the small **FMS** Knob to choose between the On and Off Full Screen Options.

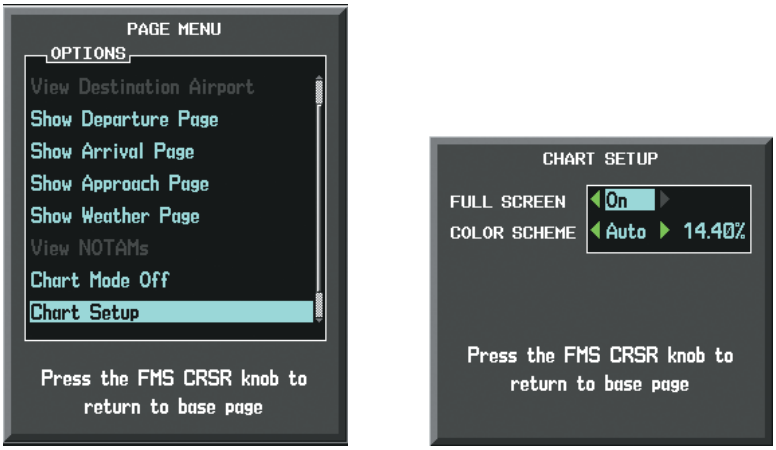


Chart Setup Option *Full Screen On/Off Selection*

Figure 8-42 Page Menus

DAY/NIGHT VIEW

ChartView can be displayed on a white or black background for day or night viewing. The Day View offers a better presentation in a bright environment. The Night View gives a better presentation for viewing in a dark environment. When the CHART SETUP Box is selected the G950 softkeys are blank.

Selecting Day, Night, or Automatic View:

1) While viewing a terminal chart press the **MENU** Key to display the Page Menu OPTIONS.
2) Turn the large **FMS** Knob to highlight the Chart Setup Menu Option and press the **ENT** Key.

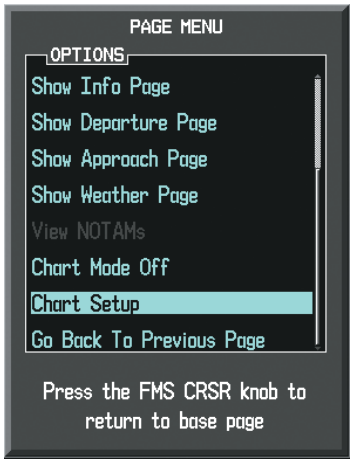


Figure 8-43 Waypoint Information Page, OPTIONS Menu

3) Turn the large **FMS** Knob to move to the COLOR SCHEME Option (Figure 8-44).
4) Turn the small **FMS** Knob to choose between Day, Auto, and Night Options.
5) If Auto Mode is selected, turn the large **FMS** Knob to select the percentage field. Use the small **FMS** Knob to change the percentage value. The percentage value is the day/night crossover point based on the percentage of backlighting intensity. For example, if the value is set to 15%, the day/night display changes when the display backlight reaches 15% of full brightness.

   The display must be changed in order for the new setting to become active. This may be accomplished by selecting another page or changing the display range.
6) Press the **FMS** Knob when finished to remove the Chart Setup Menu.

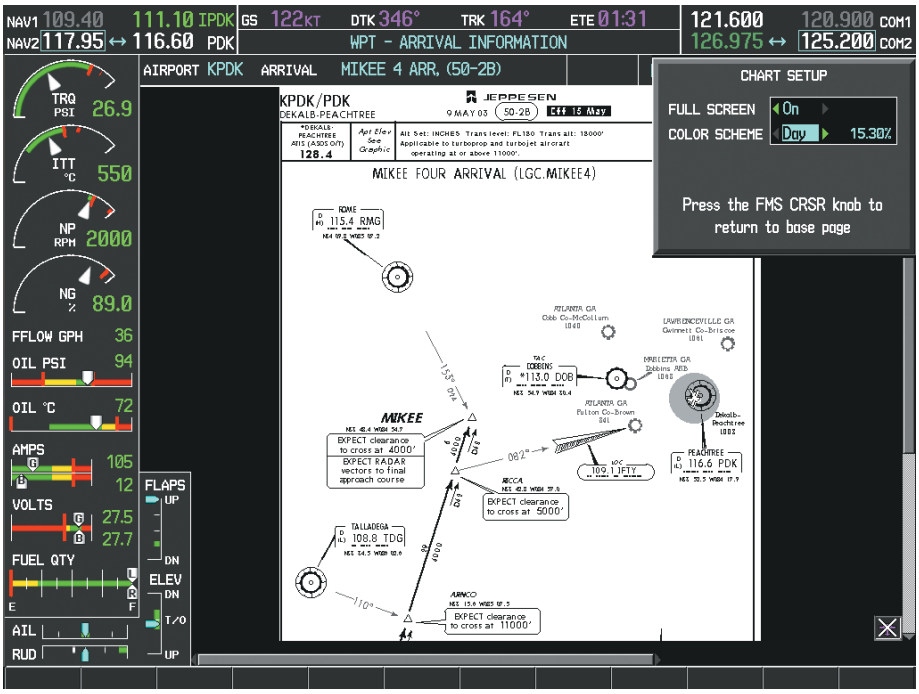


Figure 8-44 Arrival Information Page, Day View

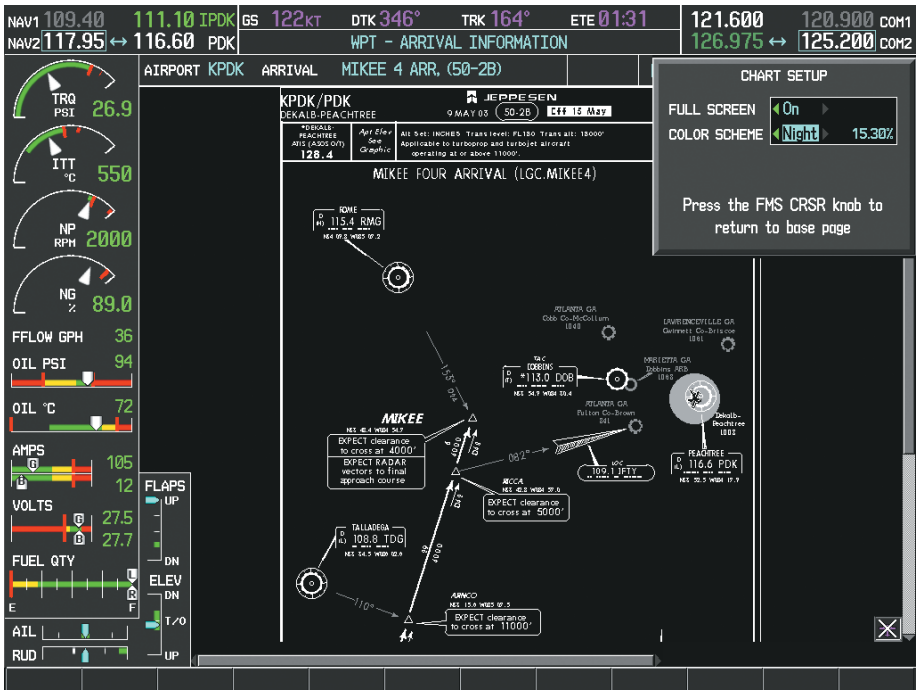


Figure 8-45 Arrival Information Page, Night View

CHARTVIEW CYCLE NUMBER AND EXPIRATION DATE

ChartView database is revised every 14 days. Charts are still viewable during a period that extends from the cycle expiration date to the disables date. ChartView is disabled 70 days after the expiration date and is no longer available for viewing. When turning on the system, the Power-up Page displays the current status of the ChartView database. See the table below for the various ChartView Power-up Page displays and the definition of each.

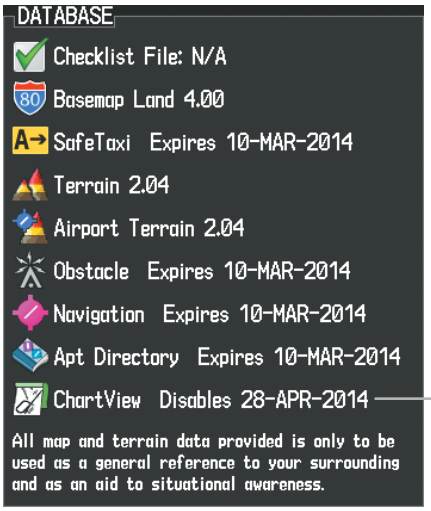


Figure 8-46 Power-up Page, ChartView Database

Power-up Page Display	Definition
	Blank Line. system is not configured for ChartView. Contact a Garmin-authorized service center for configuration.
Chart Data: N/A	System is configured for ChartView but no chart database is installed. Contact Jeppesen for a ChartView database.
ChartView Disables 28-APR-2014	Normal operation. ChartView database is valid and within current cycle.
Chart data update available.	ChartView database is within 1 week after expiration date. A new cycle is available for update.
Chart data is out of date!	ChartView database is beyond 1 week after expiration date, but still within the 70 day viewing period.
Chart data is disabled.	ChartView database has timed out. Database is beyond 70 days after expiration date. ChartView database is no longer available for viewing.
Verify chart database cycle.	System time is not available. GPS satellite data is unknown or the system has not yet locked onto satellites. Check database cycle number for effectivity.
Verifying Chart data	System is verifying chart database when new cycle is installed for the first time.
Chart Data is Corrupt!	After verifying, chart database is found to be corrupt. ChartView is not available.

Table 8-2 ChartView Power-up Page Annunciations and Definitions

The ChartView time critical information can also be found on the AUX - System Status page. The database CYCLE number, EXPIRES, and DISABLES dates of the ChartView subscription appear in either cyan or yellow text. When the ChartView EXPIRES date is reached, ChartView becomes inoperative 70 days later. This is shown as the DISABLES date. When the DISABLES date is reached, charts are no longer available for viewing. The **SHW CHRT** Softkey label then appears subdued and is disabled until a revised issue of ChartView is installed.

NOTE: *A subdued softkey label indicates the function is disabled.*

Press the **MFD1 DB** Softkey to place the cursor in the DATABASE window. Scroll through the listed information by turning the **FMS** Knob or pressing the **ENT** Key until the ChartView database information is shown.

The ChartView database cycle number shown in the figure, 1403, is deciphered as follows:

14 – Indicates the year 2014

03 – Indicates the third issue of the ChartView database for the year

The EXPIRES date 17–FEB–14 is the date that this database should be replaced with the next issue.

The DISABLES date 28–APR–14 is the date that this database becomes inoperative.

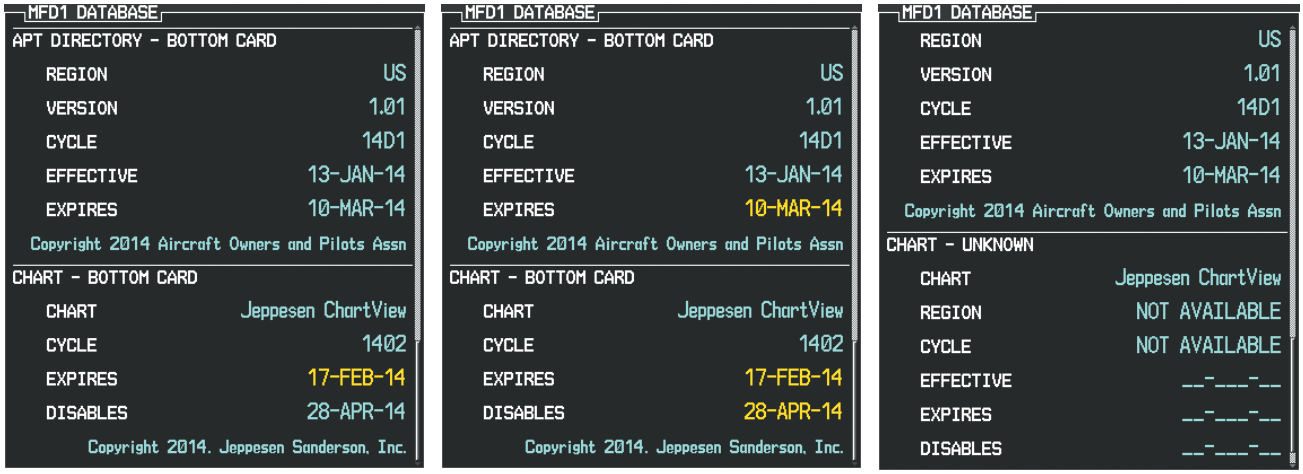


Figure 8-47 AUX – System Status Page, ChartView Current and Available

The ChartView database is provided directly from Jeppesen. Refer to Updating Jeppesen Databases in Appendix B for instructions on revising the ChartView database.

The ChartView database is obtained directly from Jeppesen. Refer to Updating Jeppesen Databases in Appendix B for instructions on revising the ChartView database.

Other possible AUX - System Status page conditions are shown in Figure 8-48. The EXPIRES date, in yellow, is the revision date for the next database cycle. The DISABLES date, in yellow, is the date that this database cycle is no longer viewable. CYCLE NOT AVAILABLE in cyan, indicates no ChartView data is available on the database card or no database card is inserted.



ChartView has Expired, but is not Disabled *ChartView Database is Disabled* *ChartView Database is Not Available*

Figure 8-48 AUX – System Status Page, ChartView Database Status

8.4 FLITECHARTS

FliteCharts resemble the paper version of AeroNav Services terminal procedures charts. The charts are displayed with high-resolution and in color for applicable charts.

The geo-referenced aircraft position is indicated by an aircraft symbol displayed on the chart when the current position is within the boundaries of the chart. An aircraft symbol may be displayed within an off-scale area depicted on some charts.

Figure 8-49 shows examples of off-scale areas, indicated by the grey shading. Note, these areas are not shaded on the published chart. These off-scale areas appear on the chart to convey supplemental information. However, the depicted geographical position of this information, as it relates to the chart planview, is not the actual geographic position. Therefore, when the aircraft symbol appears within one of these areas, the aircraft position indicated is relative to the chart planview, not to the off-scale area.

The FliteCharts database subscription is available from Garmin. Available data includes:

- Arrivals (STAR)
- Departure Procedures (DP)
- Approaches
- Airport Diagrams

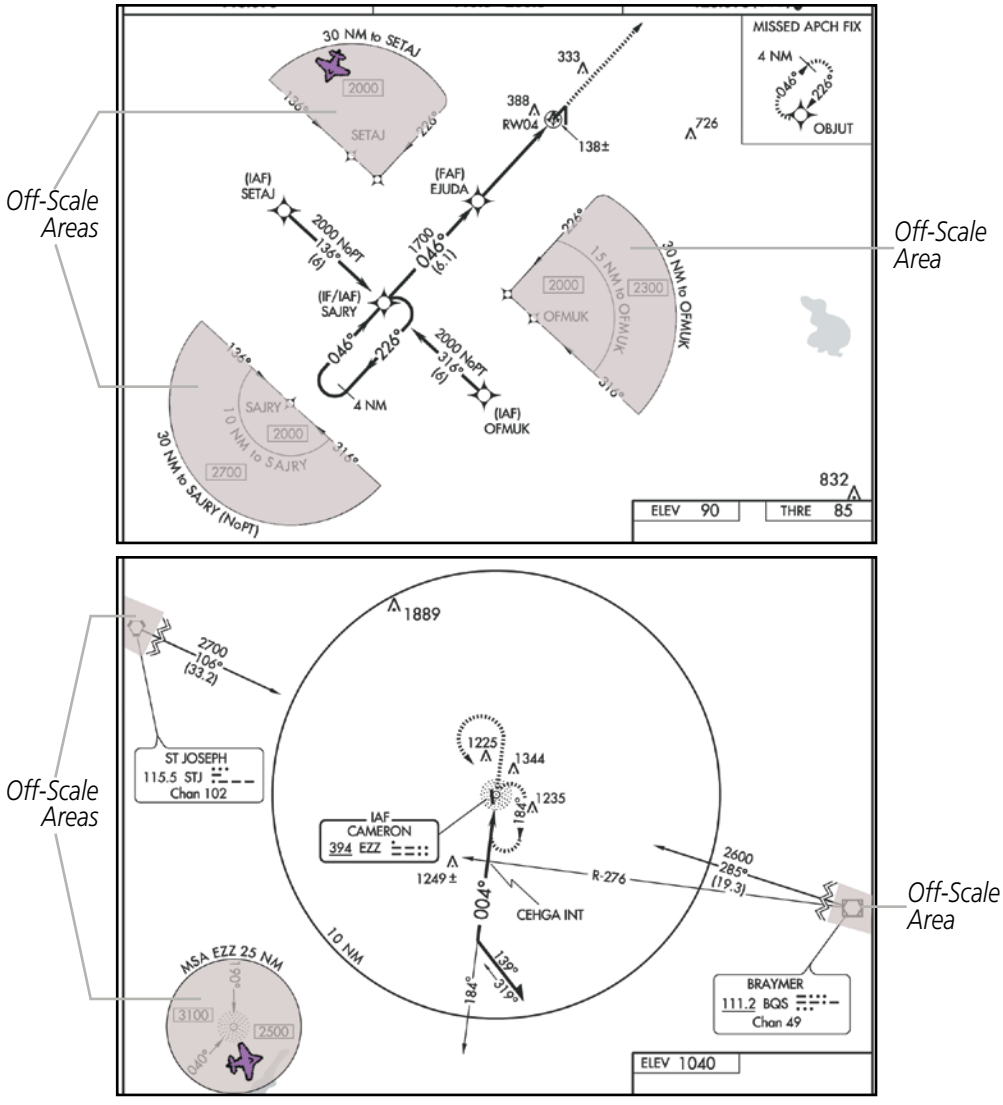


Figure 8-49 Sample Chart Indicating Off-Scale Areas

NOTE: *Do not maneuver the aircraft based solely upon the geo-referenced aircraft symbol.*

FLITECHARTS SOFTKEYS

FliteCharts functions are displayed on three levels of softkeys. While on the Navigation Map Page, Nearest Airports Page, or Flight Plan Page, pressing the **SHW CHRT** Softkey displays the available terminal chart and advances to the chart selection level of softkeys: **CHRT OPT**, **CHRT**, **INFO-1**, **DP**, **STAR**, **APR**, **WX**, and **GO BACK**. The chart selection softkeys appear on the Airport Information Page.

Pressing the **GO BACK** Softkey reverts to the top level softkeys and previous page.

Pressing the **CHRT OPT** Softkey displays the available terminal chart and advances to the next level of softkeys: **ALL**, **FIT WDTH**, **FULL SCN**, and **BACK**.

While viewing the **CHRT OPT** Softkeys, after 45 seconds of softkey inactivity, the system reverts to the chart selection softkeys.

NOTAMs are not available with FliteCharts. The NOTAM Softkey label appears subdued and is disabled.

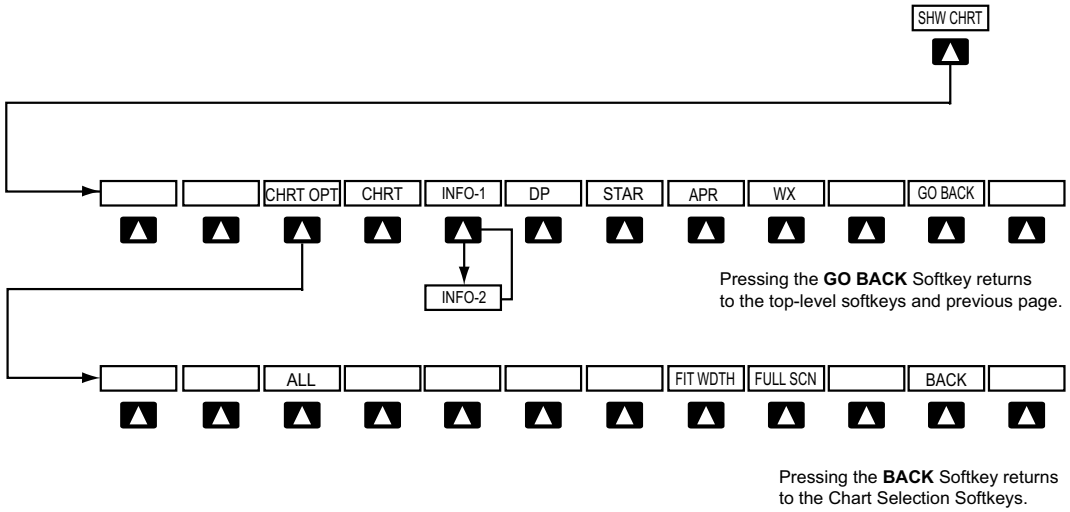


Figure 8-50 FliteCharts SHW CHRT, Chart Selection, and Chart Option Softkeys

TERMINAL PROCEDURES CHARTS

Selecting Terminal Procedures Charts:

While viewing the Navigation Map Page, Nearest Airport Page, or Flight Plan Page, press the **SHW CHRT** Softkey.

Or:

1) Press the **MENU** Key to display the PAGE MENU.
2) Turn the large **FMS** Knob to scroll through the OPTIONS Menu to Show Chart.
3) Press the **ENT** Key to display the chart.



Navigation Map Page OPTIONS Menu *Waypoint Airport Information Page OPTIONS Menu*

Figure 8-51 Option Menus

When no terminal procedure chart is available, the banner CHART NOT AVAILABLE appears on the screen. The CHART NOT AVAILABLE banner does not refer to the FliteCharts subscription, but rather the availability of a particular airport chart selection or procedure for a selected airport.



Figure 8-52 Chart Not Available Banner

If there is a problem in rendering the data (such as a data error or a failure of an individual chart), the banner UNABLE TO DISPLAY CHART is then displayed.



Figure 8-53 Unable To Display Chart Banner

When a chart is not available by pressing the **SHW CHRT** Softkey or selecting a Page Menu Option, charts may be obtained for other airports from the WPT Pages or Flight Plan Pages.

If a chart is available for the destination airport, or the airport selected in the active flight plan, the chart appears on the screen. When no flight plan is active, or when not flying to a direct-to destination, pressing the **SHW CHRT** Softkey displays the chart for the nearest airport, if available.

The chart shown is one associated with the WPT – Airport Information page. Usually this is the airport runway diagram. Where no runway diagram exists, but Take Off Minimums or Alternate Minimums are available, that page appears. If Airport Information pages are unavailable, the Approach Chart for the airport is shown.

Selecting a chart:

1) While viewing the Navigation Map Page, Flight Plan Page, or Nearest Airports Page, press the **SHW CHRT** Softkey. The airport diagram or approach chart is displayed on the Airport Information Page.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to select either the Airport Identifier Box or the Approach Box. (Press the **APR** Softkey if the Approach Box is not currently shown).
4) Turn the small and large **FMS** Knob to enter the desired airport identifier.
5) Press the **ENT** Key to complete the airport selection.
6) Turn the large **FMS** Knob to select the Approach Box.
7) Turn the small **FMS** Knob to show the approach chart selection choices.
8) Turn either **FMS** Knob to scroll through the available charts.
9) Press the **ENT** Key to complete the chart selection.

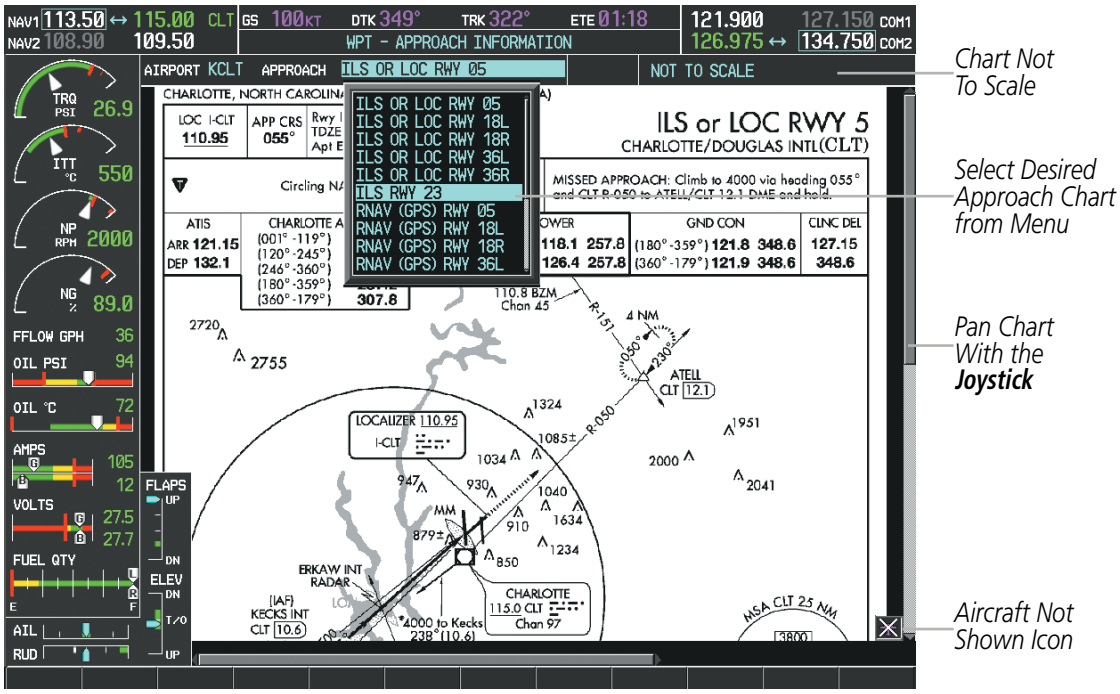


Figure 8-54 Approach Information Page, Chart Selection

While the APPROACH Box is selected using the **FMS** Knob, the G950 softkeys are blank. Once the desired chart is selected, the chart scale can be changed and the chart can be panned using the **Joystick**. Pressing the **Joystick** centers the chart on the screen.

The aircraft symbol is not shown on FliteCharts. The Chart Scale Box displays a banner NOT TO SCALE, and the Aircraft Not Shown Icon is displayed in the lower right corner of the screen.

Pressing the **CHRT** Softkey alternates between the FliteCharts diagram and the associated map in the WPT page group. In the example shown, the **CHRT** Softkey switches between the Charlotte, NC (KCLT) Airport Diagram and the navigation map on the WPT – Airport Information page.

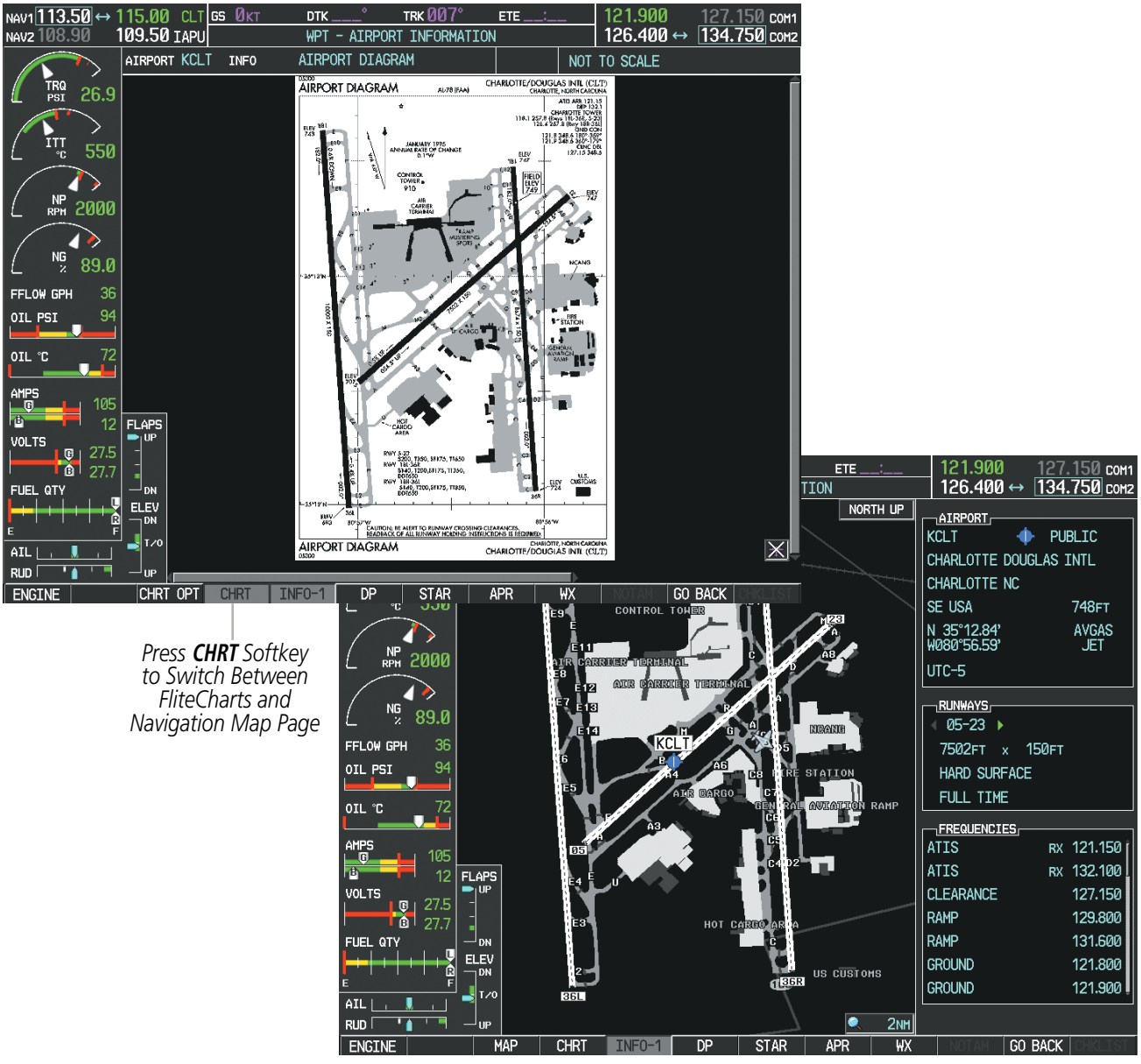


Figure 8-55 CHRT Softkey, Airport Information Page

Pressing the **INFO-1** or **INFO-2** Softkey returns to the airport diagram when the view is on a different chart. If the displayed chart is the airport diagram, the **INFO-1** or **INFO-2** Softkey has no effect.

Another source for additional airport information is from the INFO Box above the chart (Figure 8-54) or to the right of the chart (Figure 8-56) for certain airports. This information source is not related to the **INFO-1** or **INFO-2** Softkey. When the INFO Box is selected using the **FMS** Knob, the G950 softkeys are blank. The Charlotte, NC airport has three additional charts offering information; the Airport Diagram, Alternate Minimums, and Take-off Minimums.

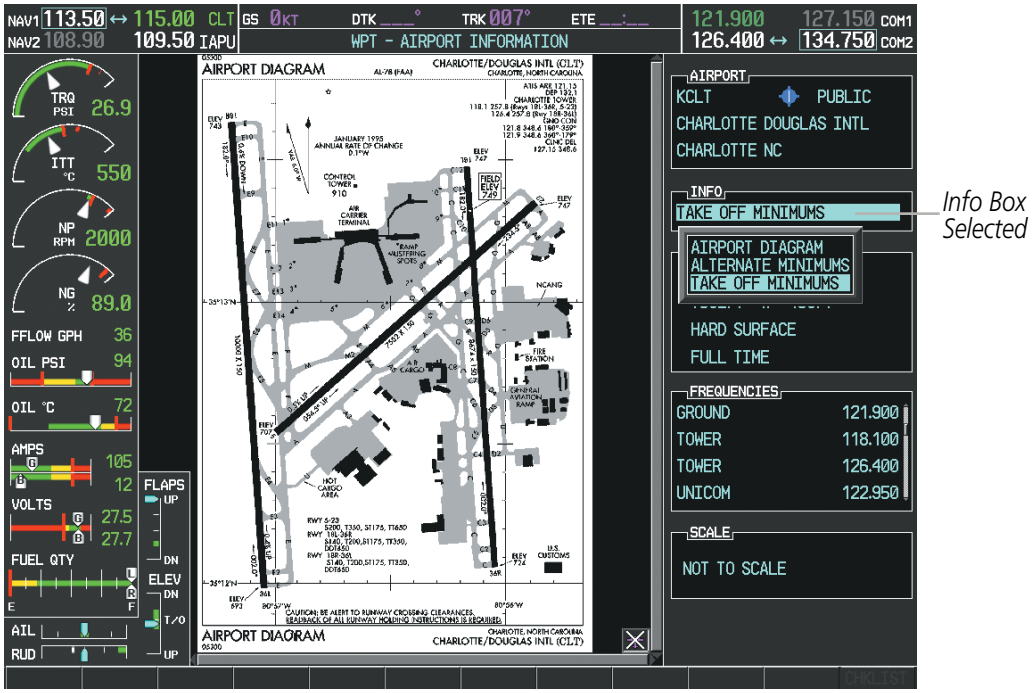


Figure 8-56 Airport Information Page, INFO View with Airport Information

In the example shown in Figure 8-56, TAKE OFF MINIMUMS is selected. Pressing the **ENT** Key displays the Take-off Minimums and Departure Procedures Chart (Figure 8-57).



Figure 8-57 Airport Information Page, TAKE OFF MINIMUMS Selected from INFO View

Pressing the **DP** Softkey displays the Departure Procedure Chart if available.

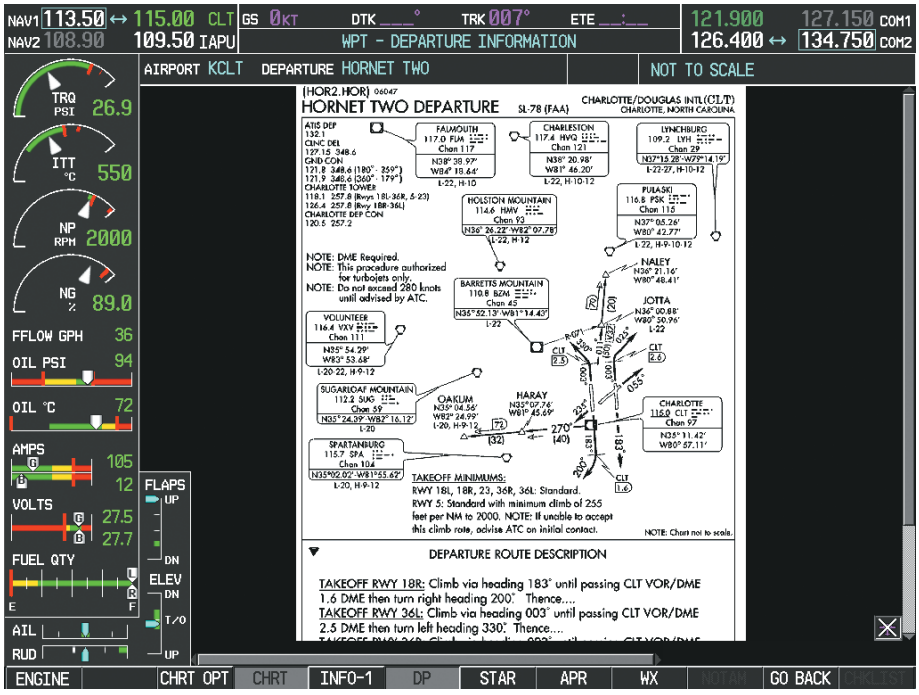


Figure 8-58 Departure Information Page

Pressing the **STAR** Softkey displays the Standard Terminal Arrival Chart if available.

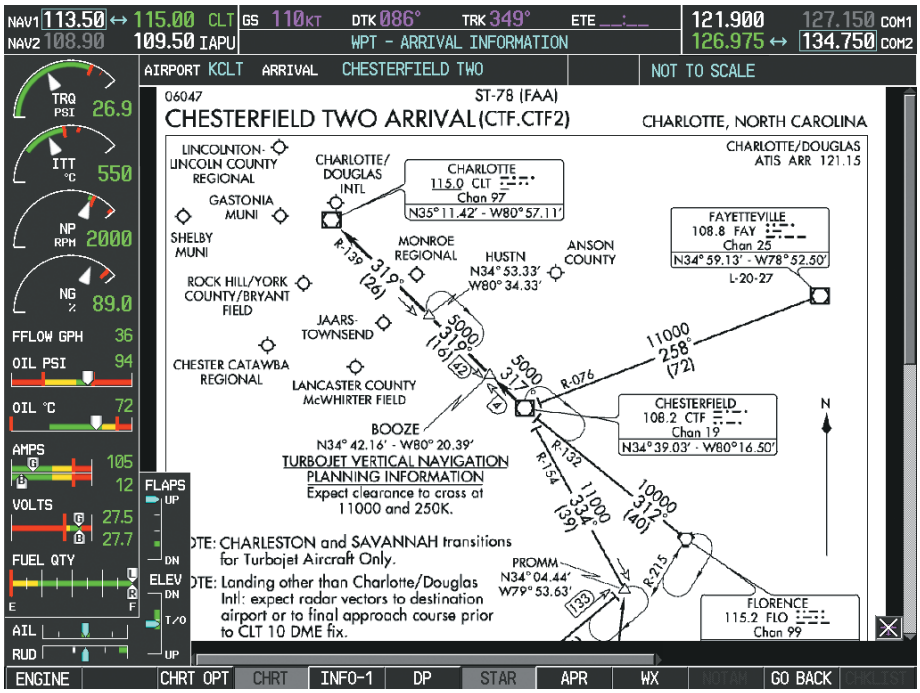


Figure 8-59 Arrival Information Page

Pressing the **APR** Softkey displays the approach chart for the airport if available.

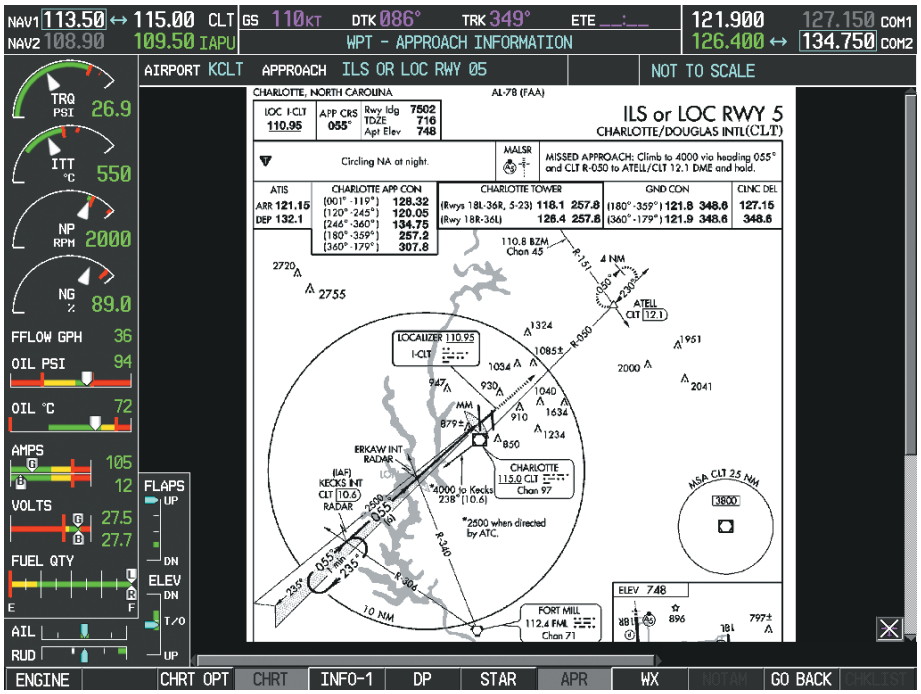


Figure 8-60 Approach Information Page

Pressing the **WX** Softkey shows the airport weather frequency information, when available, and includes weather data such as METAR and TAF from the XM Data Link Receiver. Weather information is available only when an XM Data Link Receiver is installed and the XM WX Satellite Weather subscription is current.

Selecting Additional Information:

1) While viewing the Airport Taxi Diagram, press the **WX** Softkey to display the information windows (AIRPORT, INFO).
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight the INFO Box.
4) Turn the small **FMS** Knob to select the INFO Box choices. When the INFO Box is selected the G950 softkeys are blank. If multiple choices are available, scroll to the desired choice with the large **FMS** Knob and press the **ENT** Key to complete the selection.
5) Press the **FMS** Knob again to deactivate the cursor.

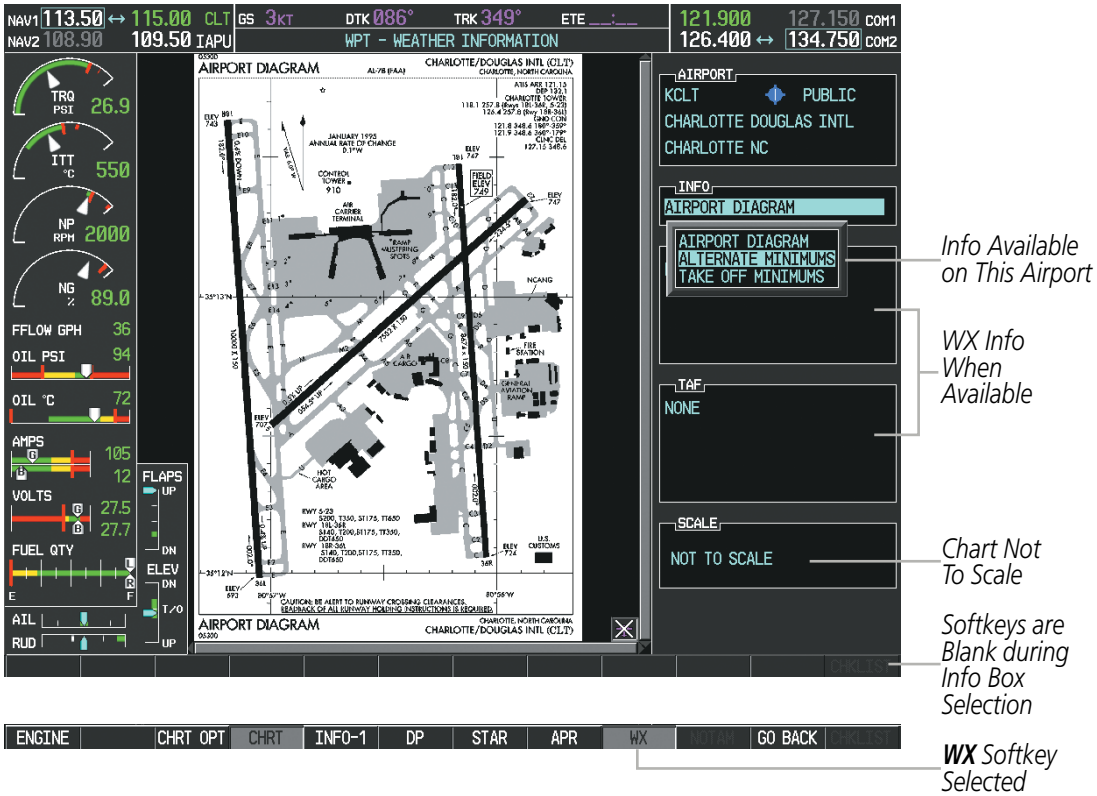


Figure 8-61 Weather Information Page, WX Softkey Selected

Pressing the **GO BACK** Softkey reverts to the previous page (Navigation Map Page or Flight Plan Page).

CHART OPTIONS

Pressing the **CHRT OPT** Softkey displays the next level of softkeys, the chart options level (Figure 8-50).

Pressing the **ALL** Softkey shows the complete chart on the screen.

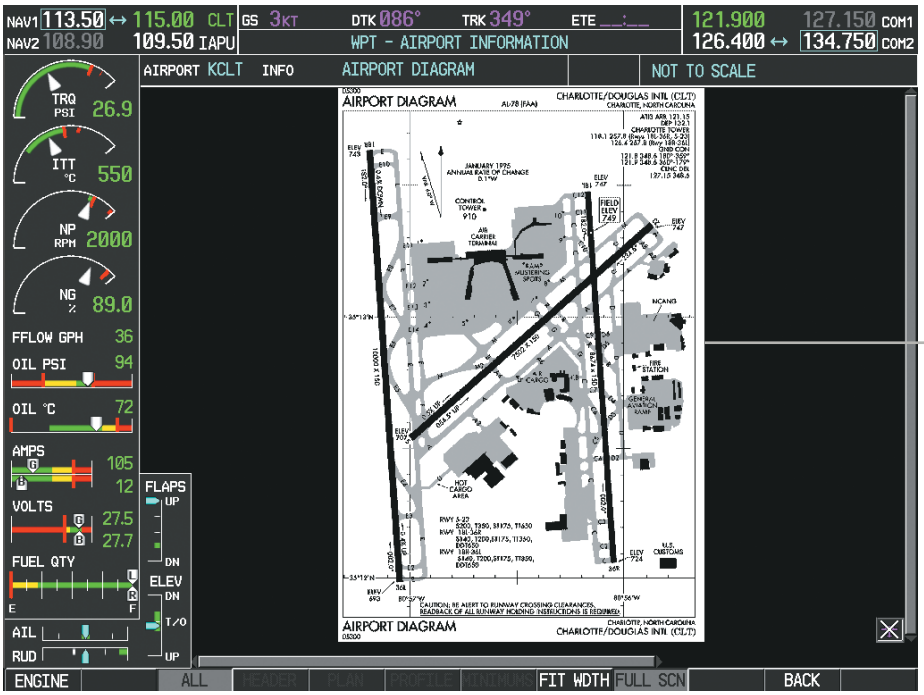
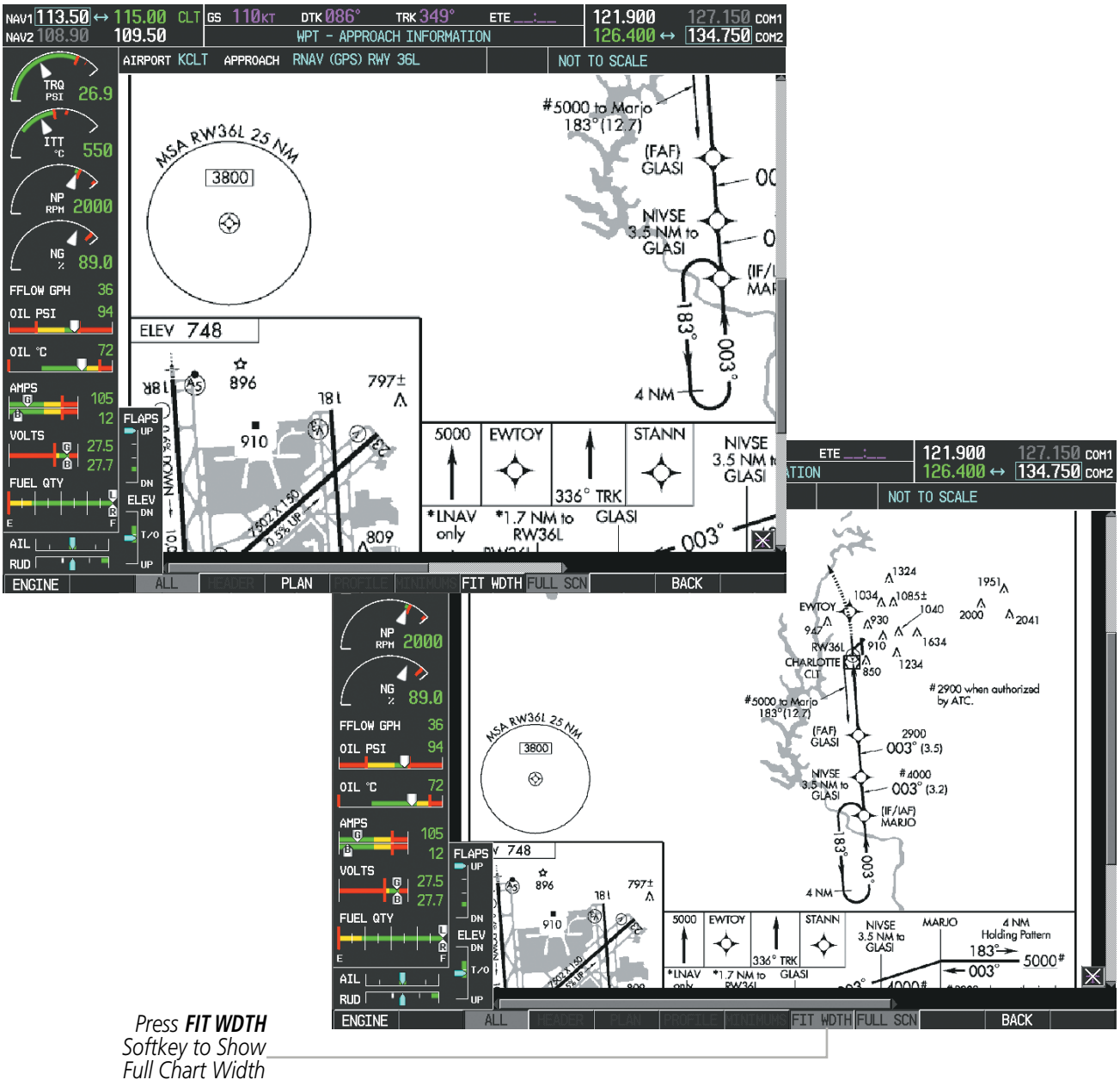


Figure 8-62 Airport Information Page, ALL View Selected

Pressing the **FIT WIDTH** Softkey fits the width of the chart in the display viewing area. In the example shown, the chart at close range is replaced with the full width chart.



*Press **FIT WDTH** Softkey to Show Full Chart Width*

Figure 8-63 Approach Information Page, FIT WDTH Softkey Selected

Pressing the **FULL SCN** Softkey alternates between removing and replacing the data window to the right.



Figure 8-64 Airport Information Page, Full Screen and Info Window

Pressing the **BACK** Softkey, or waiting for 45 seconds reverts to the chart selection softkeys.

The full screen view can also be selected by using the page menu option.

Selecting full screen On or Off:

1) While viewing a terminal chart press the **MENU** Key to display the Page Menu OPTIONS.
2) Turn the large **FMS** Knob to highlight the Chart Setup Menu Option and press the **ENT** Key.
3) Turn the large **FMS** Knob to move between the FULL SCREEN and COLOR SCHEME Options.
4) Turn the small **FMS** Knob to choose between the On and Off Full Screen Options.

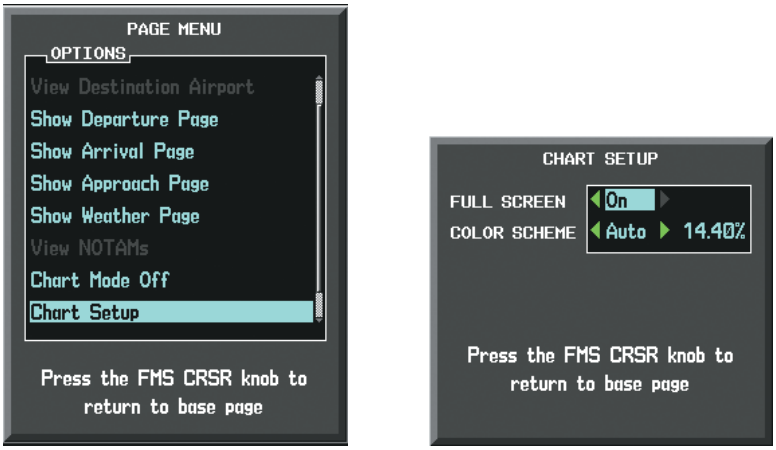


Chart Setup Option *Full Screen On/Off Selection*

Figure 8-65 Page Menus

DAY/NIGHT VIEW

FliteCharts can be displayed on a white or black background for day or night viewing. The Day View offers a better presentation in a bright environment. The Night View gives a better presentation for viewing in a dark environment. When the CHART SETUP Box is selected the G950 softkeys are blank.

Selecting Day, Night, or Automatic View:

1) While viewing a terminal chart press the **MENU** Key to display the Page Menu OPTIONS.
2) Turn the large **FMS** Knob to highlight the Chart Setup Menu Option and press the **ENT** Key.

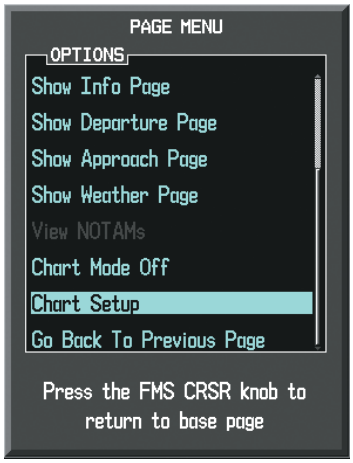


Figure 8-66 Waypoint Information Page, OPTIONS Menu

3) Turn the large **FMS** Knob to move to the COLOR SCHEME Option (Figure 8-67).
4) Turn the small **FMS** Knob to choose between Day, Auto, and Night Options.
5) If Auto Mode is selected, turn the large **FMS** Knob to select the percentage field. Use the small **FMS** Knob to change the percentage value. The percentage value is the day/night crossover point based on the percentage of backlighting intensity. For example, if the value is set to 15%, the day/night display changes when the display backlight reaches 15% of full brightness.

   The display must be changed in order for the new setting to become active. This may be accomplished by selecting another page or changing the display range.
6) Press the **FMS** Knob when finished to remove the Chart Setup Menu.

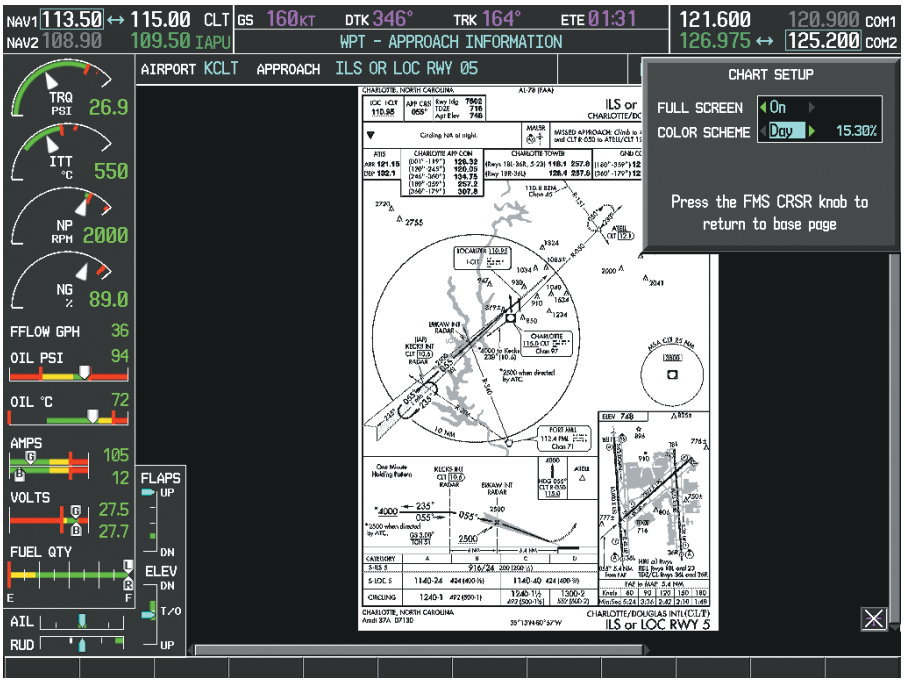


Figure 8-67 Approach Information Page, Day View

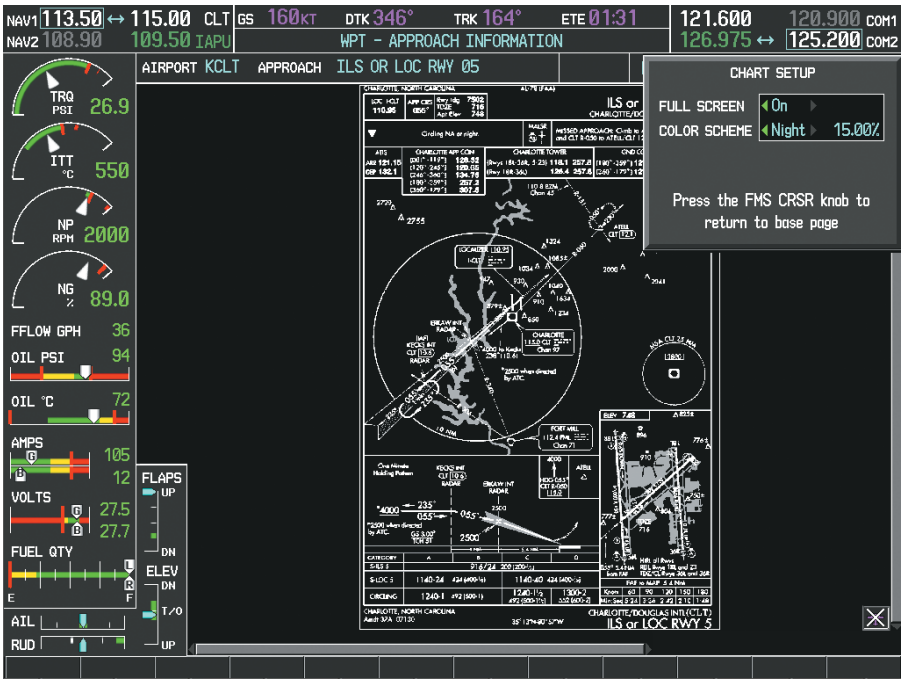


Figure 8-68 Approach Information Page, Night View

FLITECHARTS CYCLE NUMBER AND EXPIRATION DATE

FliteCharts data is revised every 28 days. Charts are still viewable during a period that extends from the cycle expiration date to the disables date. FliteCharts is disabled 180 days after the expiration date and are no longer available for viewing upon reaching the disables date. When turning on the system, the Power-up Page displays the current status of the FliteCharts database. See the table below for the various FliteCharts Power-up Page displays and the definition of each.

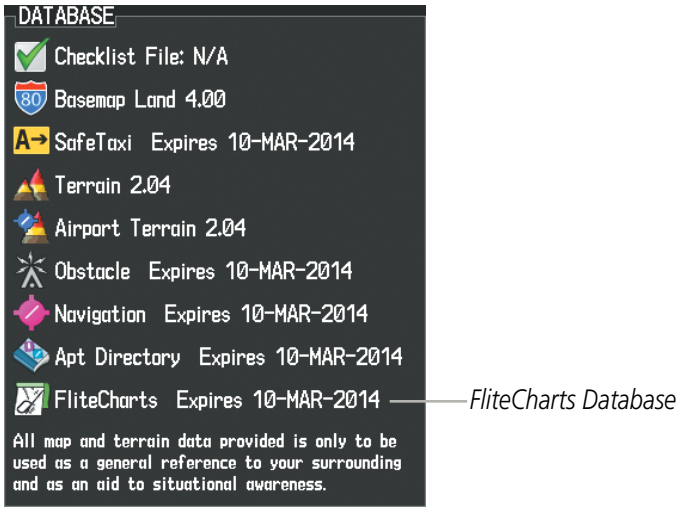


Figure 8-69 Power-up Page, FliteCharts Database

Power-up Page Display	Definition
	Blank Line. system is not configured for FliteCharts. Contact a Garmin-authorized service center for configuration.
Chart Data: N/A	System is configured for FliteCharts but no chart database is installed. Refer to Updating Garmin Databases in Appendix B for the FliteCharts database
FliteCharts Expires 10-MAR-2014	Normal operation. FliteCharts database is valid and within current cycle.
Chart data is out of date!	FliteCharts database is beyond the expiration date, but still within the 180 day viewing period.
Chart data is disabled.	FliteCharts database has timed out. Database is beyond 180 days after expiration date. FliteCharts database is no longer available for viewing.

Table 8-3 FliteCharts Power-up Page Annunciations and Definitions

Other possible AUX - System Status page conditions are shown in Figure 8-70. 'FliteCharts Expires' plus a date in white, indicates the chart database is current. 'Chart data is out of date!' in yellow, indicates charts are still viewable, but approaching the disable date.

When the 180 day grace period has expired, 'Chart data is disabled.' in yellow indicates that the FliteCharts database has expired and is no longer viewable. 'Chart Data: N/A' appears in white if no FliteCharts data is available on the database card or no database card is inserted.

FliteCharts time critical information can also be found on the AUX - System Status page. The FliteCharts database REGION, CYCLE number, EFFECTIVE, EXPIRES, and DISABLES dates of the subscription appear in either cyan or yellow text. Dates shown in cyan are current data. Dates shown in yellow indicate the data is not within the current subscription period.

FliteCharts becomes inoperative 180 days after the FliteCharts EXPIRES date is reached, and is no longer available for viewing. This date is shown as the DISABLES date. After the disable date the **SHW CHRT** Softkey label appears subdued and is unavailable until a revised issue of FliteCharts is installed.

NOTE: *A subdued softkey label indicates the function is disabled.*

Press the **MFD1 DB** Softkey to place the cursor in the DATABASE window. Scroll through the listed information by turning the **FMS** Knob or pressing the **ENT** Key until the FliteCharts database information is shown.

The FliteCharts database cycle number shown in the figure, 1402, is deciphered as follows:

14 – Indicates the year 2014

02 – Indicates the second issue of the FliteCharts database for the year

The FliteCharts EFFECTIVE date 10–FEB–14 is the first date that this database is current.

The FliteCharts EXPIRES date 10–MAR–14 is the last date that this database is current.

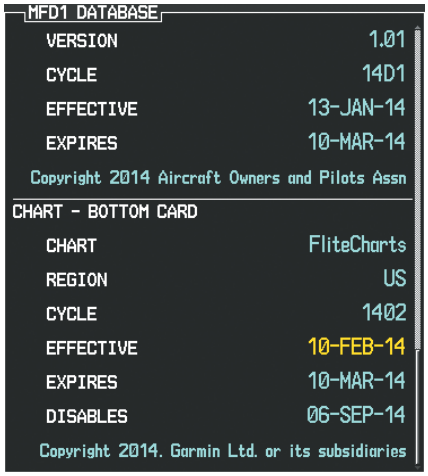
The DISABLES date 06–SEP–14 is the date that this database becomes inoperative.



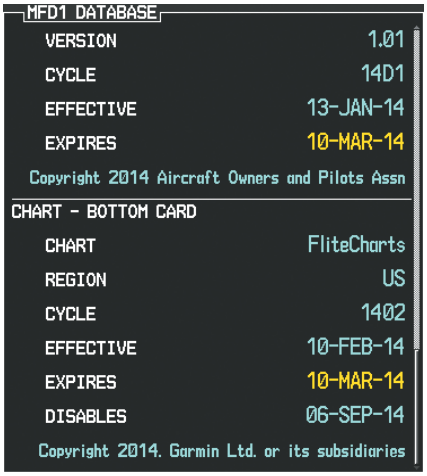
Figure 8-70 AUX – System Status Page, FliteCharts Current and Available

The FliteCharts database is provided from Garmin. Refer to Updating Garmin Databases in Appendix B for instructions on revising the FliteCharts database.

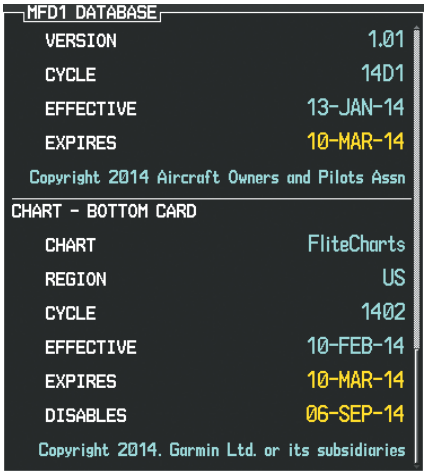
The other four possible AUX - System Status page conditions are shown here. The EFFECTIVE date, in yellow, indicates the current date preceeds the date the FliteCharts database becomes effective. The EXPIRES date, in yellow, is the revision date for the next database cycle. The DISABLES date, in yellow, is the date that this database cycle is no longer viewable. NOT AVAILABLE in cyan, indicate the FliteCharts database is not available on the database card or no database card is inserted.



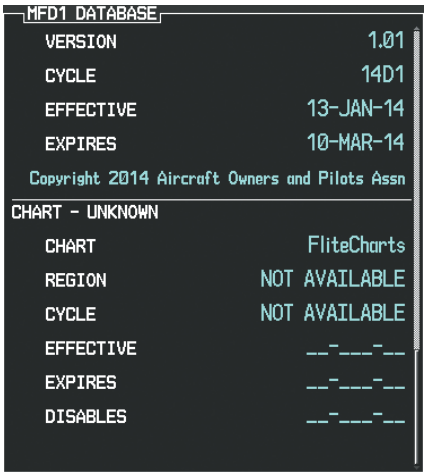
Current Date is Before Effective Date



FliteCharts Expired, but is not Disabled



FliteCharts Database is Disabled



FliteCharts Database is Not Available

Figure 8-71 AUX – System Status Page, FliteCharts Datbase Status

8.5 AIRPORT DIRECTORY

The Aircraft Owners and Pilots Association (AOPA) and optional AC-U-KWIK Airport Directory databases offer detailed information regarding services, hours of operation, lodging options, and more. This information is viewed on the Airport Information Page by pressing the INFO Softkey until **INFO-2** is displayed as shown in Figure 8-72.

Both Airport Directories are available for downloading at flygarmin.com. However, copy only one of the databases to the Supplemental Data Card. The system cannot recognize both databases simultaneously.

Selecting the Airport Directory Page:

1) Turn the large **FMS** Knob to select the 'WPT' page group.
2) Turn the small **FMS** Knob to select the AIRPORT INFORMATION Page. Initially, information for the airport closest to the aircraft's present position is displayed.
3) If necessary, press the INFO softkey until **INFO-2** is displayed.

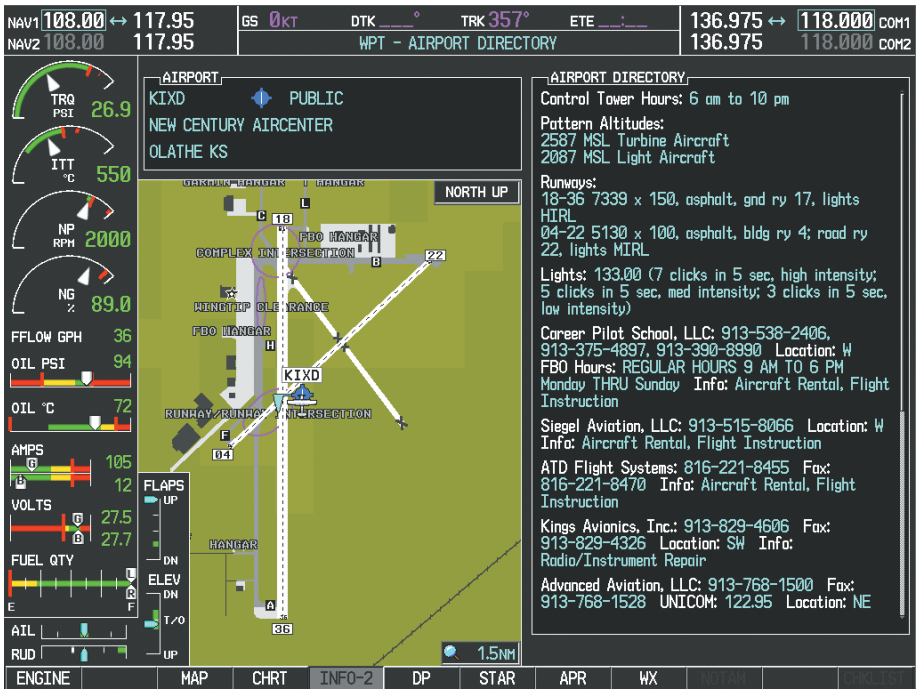


Figure 8-72 AOPA Information on the Airport Information Page

AIRPORT DIRECTORY DATABASE CYCLE NUMBER AND REVISION

The Airport Directory databases are revised every 56 days and offered on a subscription basis. Check fly.garmin.com for the current database. The Airport Directory is always available for use after the expiration date. When turning on the system, the Power-up Page indicates whether the databases are current, out of date, or not available.

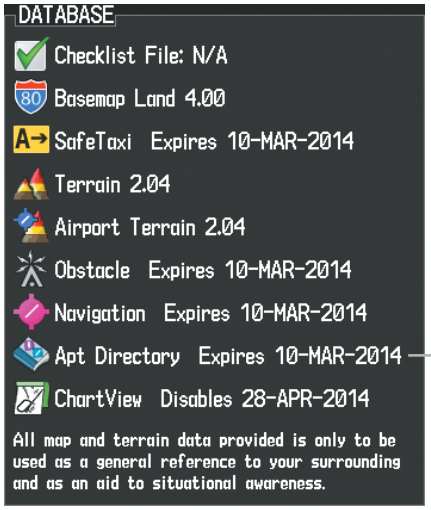


Figure 8-73 Power-up Page, Airport Directory Database

Power-up Page Display	Definition
Apt Directory Expires 10-MAR-2014	Normal operation. Airport Directory database is valid and within current cycle.
Apt Directory Expires 10-MAR-2014	Airport Directory database has expired.
Apt Directory N/A	Database card contains no Airport Directory data.

Table 8-4 Airport Directory Annunciation Definitions

The Airport Directory Region, Version, Cycle, Effective date and Expires date of the database cycle can also be found on the AUX - System Status page, as seen in Figure 8-74.

Press the **MFD1 DB** Softkey to place the cursor in the DATABASE window. Scroll through the listed information by turning the **FMS** Knob or pressing the **ENT** Key until the Airport Directory database information is shown.

The Airport Directory database cycle number shown in the figure, 14D1, is deciphered as follows:

14 – Indicates the year 2014

D – Indicates the data is for Airport Directory

1 – Indicates the first issue of the Airport Directory database for the year

The Airport Directory EFFECTIVE date 13–JAN–14 is the beginning date for the current database cycle. The Airport Directory EXPIRES date 10–MAR–14 is the revision date for the next database cycle.

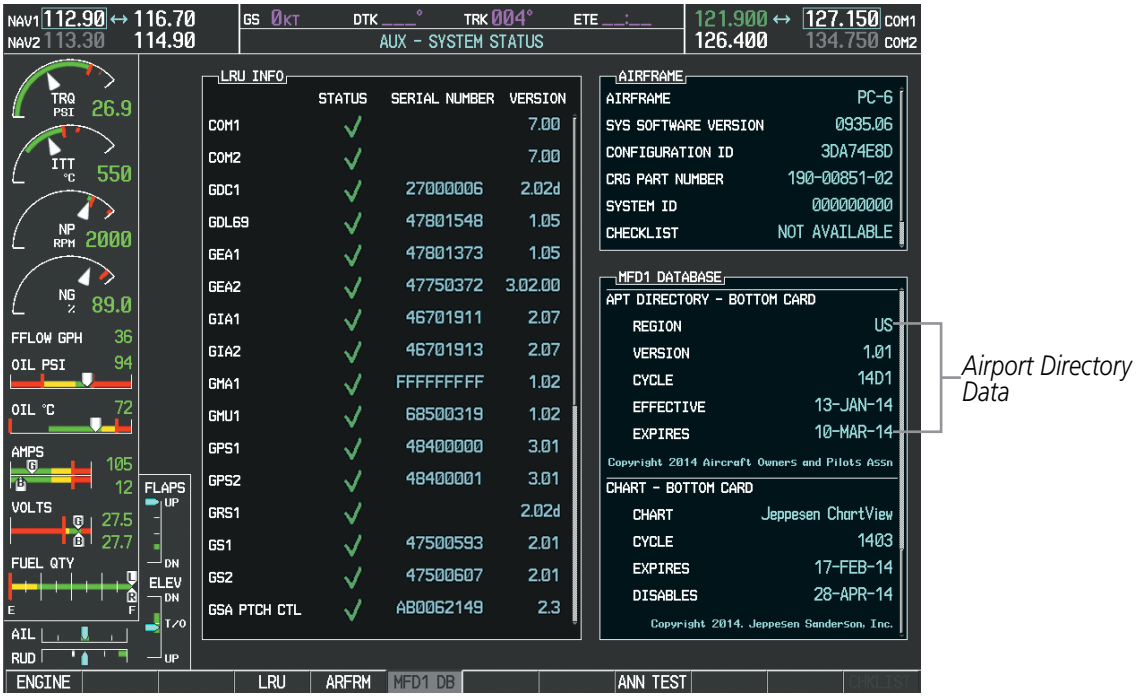


Figure 8-74 AUX – System Status Page, Airport Directory Current Information

Airport Directory information appears in cyan and yellow text. The EFFECTIVE date appears in cyan when data is current and in yellow when the current date is before the effective date. The EXPIRES date appears in cyan when data is current and in yellow when expired (Table 8-4). NOT AVAILABLE appears in cyan in the REGION field if Airport Directory data is not available on the database card. An expired Airport Directory database is not disabled and will continue to function indefinitely.

8.6 AUXILIARY VIDEO (OPTIONAL)

The G950 system provides a control and display interface to an optional auxiliary video system. The system can display video for up to two inputs.

There are four modes of operation of the auxiliary video display: Full-Screen, Full-Screen with Digital Zoom, Split-Screen with Map, and Split-Screen with Map and Digital Zoom.

Displaying auxiliary video:

1) Turn the large **FMS** Knob to select the AUX page group.
2) Turn the small **FMS** Knob to select VIDEO and display the AUX-VIDEO Page.

The video display softkeys shown below appear on the AUX - VIDEO Page.

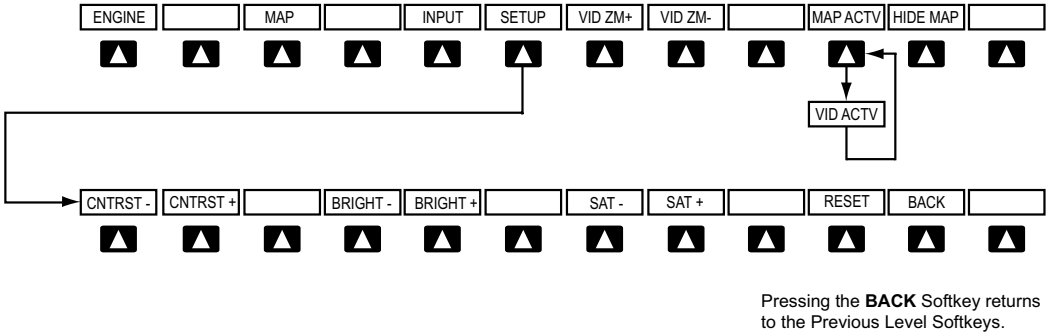


Figure 8-75 Video Display Softkeys

Control of the AUX - VIDEO Page can also be accessed through the Page Menu.



Figure 8-76 AUX - VIDEO Page Menu

Selecting video menu options:

1) While viewing the AUX - VIDEO Page press the **MENU** Key to display the Page Menu OPTIONS.
2) Turn the large **FMS** Knob to highlight the desired video adjustment option and press the **ENT** Key.

Once the **ENT** key is pressed on any option, the page menu closes and returns to the AUX - VIDEO Page.

VIDEO SETUP

Video brightness, contrast, and saturation may be adjusted be selecting the setup function. While viewing the setup function softkeys, after 45 seconds of softkey inactivity, the system reverts to the AUX - VIDEO Page softkeys.

Adjusting the video settings:

1) With the AUX-VIDEO Page displayed, press the **SETUP** Softkey.
2) Press the **BRIGHT -** or **BRIGHT +**, to adjust display brightness in five percent increments from 0 to 100%.
3) Press the **CNTRST-** or **CNTRST +**, to adjust display contrast in five percent increments from 0 to 100%.
4) Press the **SAT -** or **SAT +**, to adjust display saturationin five percent increments from 0 to 100%.
5) If desired, return the display to the default settings by pressing the **RESET** Softkey.
6) Press the **BACK** Softkey to return to the previous softkey level.

DISPLAY SELECTION

Pressing the **HIDE MAP** Softkey removes the map and displays video on the full screen. The softkey label changes to grey with black characters. Pressing the **HIDE MAP** Softkey again restores the map view and the small video image. The softkey label returns to white characters on a black background.

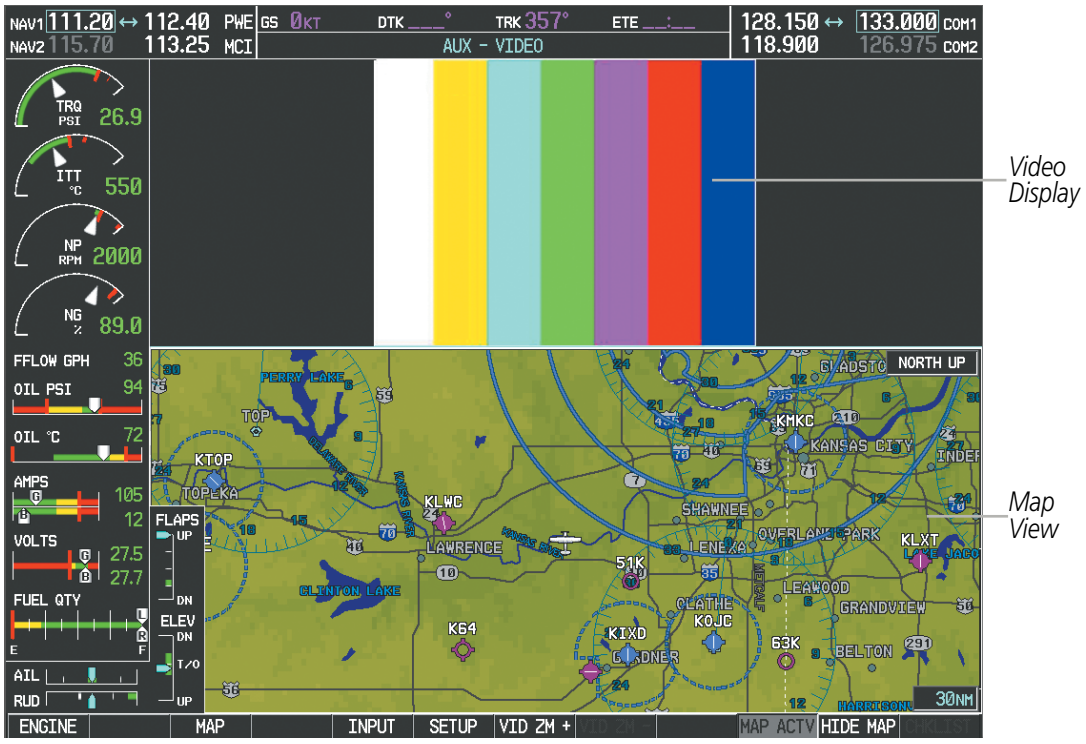


Figure 8-77 AUX - Video Split-Screen



Figure 8-78 Full Screen Video Display

INPUT SELECTION

While on the AUX - VIDEO Page, press the **INPUT** Softkey to select the EVS or AUX video source.

ZOOM/RANGE

Pressing the **VID ZM +** or **VID ZM -** Softkeys increases or decreases video display magnification between 1x and 10x.

The **RANGE** Knob can be used to increase or decrease the range setting on the map display or zoom in and out on the video display. While in the Split-Screen mode, pressing the **MAP ACTV** or **VID ACTV** Softkey determines which display the **RANGE** Knob adjusts. Pressing the softkey to display MAP ACTV allows the **RANGE** Knob to control the range setting of the map display. Pressing the softkey to display VID ACTV allows the **RANGE** Knob to control the zoom setting of the video display.

When zooming in on the video display, a Zoom Window will appear in the upper right of the display. A box within this window indicates the portion of the display currently being viewed. The currently displayed portion of the full display may be adjusted by using Joystick.

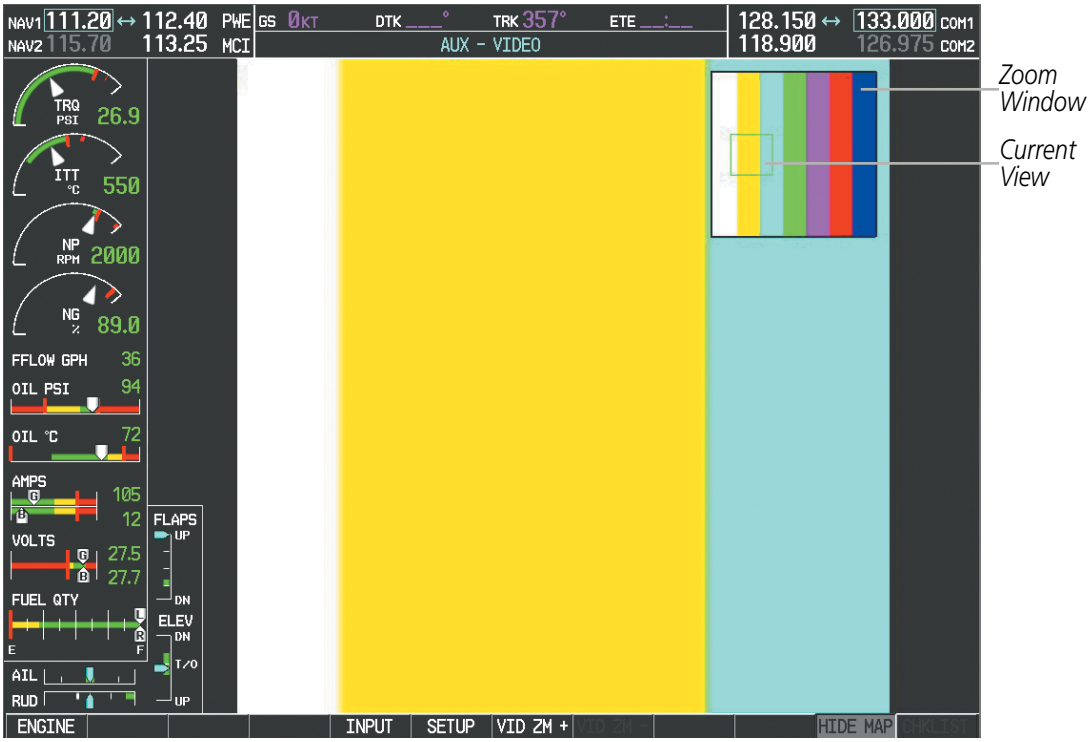


Figure 8-79 Zoom Window

8.7 SCHEDULER

The Scheduler feature can be used to enter and display reminder messages (e.g., Change oil, Switch fuel tanks, or Altimeter-Transponder Check) 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, all messages are retained until deleted, and message timer countdown is resumed.

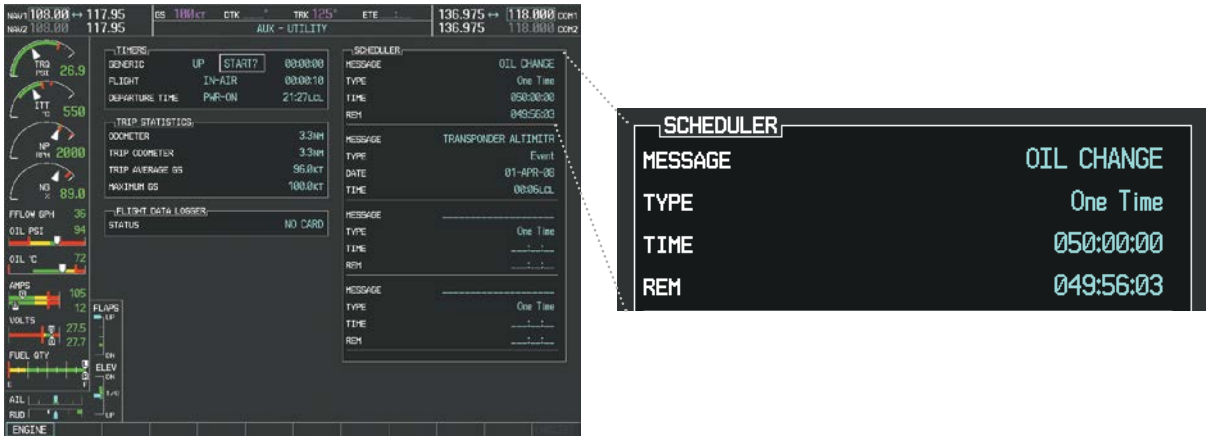


Figure 8-80 Scheduler (Utility Page)

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 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 (HH: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-MM-YY) 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 while the message line is cleared to clear the message time.

Scheduler messages appear in the Alerts Window on the PFD. When a scheduler message is waiting, the **ALERTS** Softkey label changes to ADVISORY. Pressing the **ADVISORY** Softkey opens the Alerts Window and acknowledges the scheduler message. The softkey label reverts to ALERTS when pressed, the Alerts Window is removed from the display, and the scheduler message is deleted from the message queue.



Figure 8-81 PFD Alerts Window

8.8 ELECTRONIC CHECKLISTS

NOTE: *Garmin is not responsible for the content of checklists. Checklists are created by the aircraft manufacturer. Modifications or updates to the checklists are coordinated through the aircraft manufacturer. The user cannot edit these checklists.*

The checklist functions, when installed, are displayed on two levels of softkeys that are available on any MFD page.

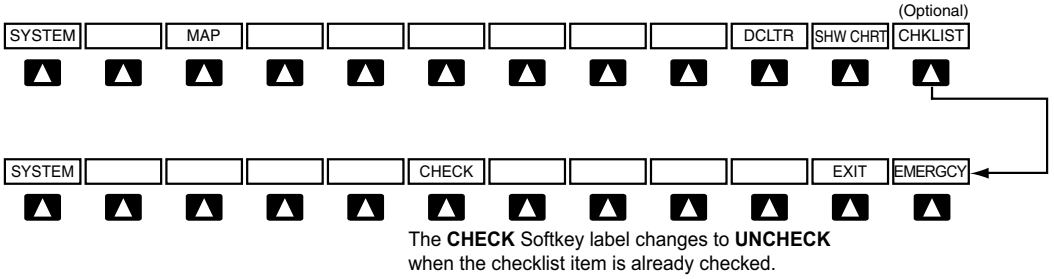


Figure 8-82 Checklist Softkeys

The system accesses the checklists from an SD card inserted into the bezel slot. If the SD card contains an invalid checklist file or no checklist, the Power-up Page messages display 'Checklist File: Invalid' or 'Checklist File: N/A' (not available) and the **CHKLIST** Softkey is not available.

Accessing and navigating checklists:

1) From any page on the MFD, press the **CHKLIST** Softkey or turn the large **FMS** Knob to select the Checklist Page.
2) Turn the large **FMS** Knob to select the 'GROUP' field.
3) Turn the small **FMS** Knob to select the desired procedure and press the **ENT** Key.
4) Turn the large **FMS** Knob to select the 'CHECKLIST' field.
5) Turn the **FMS** Knob to select the desired checklist and press the **ENT** Key. The selected checklist item is indicated with white text surrounded by a white box.
6) Press the **ENT** Key or **CHECK** Softkey to check the selected checklist item. The line item turns green and a checkmark is placed in the associated box. The next line item is automatically selected for checking.

   Either **FMS** Knob can be used to scroll through the checklist and select the desired checklist item.

   Press the **CLR** Key or **UNCHECK** Softkey to remove a check mark from an item.
7) When all checklist items have been checked, '*Checklist Finished*' is displayed in green text at the bottom left of the checklist window. If all items in the checklist have not be checked, '*CHECKLIST NOT FINISHED*' will be displayed in yellow text.\
8) Press the **ENT** Key. 'GO TO NEXT CHECKLIST?' will be highlighted by the cursor.
9) Press the **ENT** Key to advance to the next checklist.
10) Press the **EXIT** Softkey to exit the Checklist Page and return to the page last viewed.

Accessing emergency procedures:

1) From any page on the MFD, press the **CHKLIST** Softkey or turn the large **FMS** Knob to select the Checklist Page.
2) Press the **EMERGCY** Softkey.
3) Turn the **FMS** Knob to select the desired emergency checklist and press the **ENT** Key.
4) Press the **ENT** Key or **CHECK** Softkey to check the selected emergency checklist item. The line item turns green and a checkmark is placed in the box next to it. The next line item is automatically highlighted for checking.

   Either **FMS** Knob can be used to scroll through the checklist and select the desired checklist item.

   Press the **CLR** Key or **UNCHECK** Softkey to remove a check mark from an item.
5) When all checklist items have been checked, '*Checklist Finished*' is displayed in green text at the bottom left of the checklist window. If all items in the checklist have not be checked, '*CHECKLIST NOT FINISHED*' will be displayed in yellow text.\
6) Press the **ENT** Key. 'GO TO NEXT CHECKLIST?' will be highlighted by the cursor.
7) Press the **ENT** Key to advance to the next checklist.
8) Press the **RETURN** Softkey to return to the previous checklist.
9) Press the **EXIT** Softkey to exit the Checklist Page and return to the page last viewed.

8.9 FLIGHT DATA LOGGING

NOTE: *Some aircraft installations may not provide all aircraft/engine data capable of being logged by the system.*

The Flight Data Logging feature will automatically store critical flight and engine data on an SD data card (up to 16GB) inserted into the top card slot of the MFD. Approximately 1,000 flight hours can be recorded for each 1GB of available space on the card.

Data is written to the SD card once each second while the MFD is powered on. All flight data logged on a specific date is stored in a file named in a format which includes the date, time, and nearest airport identifier. The file is created automatically each time the G950 system is powered on, provided an SD card has been inserted.

The status of the Flight Data Logging feature can be viewed on the AUX-UTILITY Page. If no SD card has been inserted, "NO CARD" is displayed. When data is being written to the SD card, "LOGGING DATA" is displayed.

The .csv file may be viewed with Microsoft Excel® or other spreadsheet applications.

The following is a list of data parameters the G950 system is capable of logging for the Pilatus PC-6 aircraft.

- Date
- Time
- GPS altitude (MSL)
- GPS altitude (WGS84 datum)
- Baro-Corrected altitude (feet)
- Baro Correction (in/Hg)
- Indicated airspeed (kts)
- Vertical speed (fpm)
- GPS vertical speed (fpm)
- OAT (degrees C)
- True airspeed (knots)
- Pitch Attitude Angle (degrees)
- Roll Attitude Angle (degrees)
- Lateral and Vertical G Force (g)
- Ground Speed (kts)
- Ground Track (degrees magnetic)
- Latitude (degrees; geodetic; +North)
- Longitude (degrees; geodetic; +East)
- Magnetic Heading (degrees)
- HSI source
- Selected course
- Com1/Com2 frequency
- Nav1/Nav2 frequency
- CDI deflection
- VDI/GP/GS deflection
- Wind Direction (degrees)
- Wind Speed (knots)
- Active Waypoint Identifier
- Distance to next waypoint (nm)
- Bearing to next waypoint (degrees)
- Magnetic variation (degrees)
- Autopilot On/Off
- GPS fix
- GPS horizontal alert limit
- GPS vertical alert limit
- SBAS GPS horizontal protection level
- SBAS GPS vertical protection level
- Fuel Qty (right & left)(gals)
- Fuel Flow (gph)
- Oil Pressure (psi)
- Oil Temperature (deg. F)
- ITT (deg. F)
- Torque
- NP
- NG

The file containing the recorded data will appear in the format shown in Figure 8-83. This file can be imported into most computer spreadsheet applications.

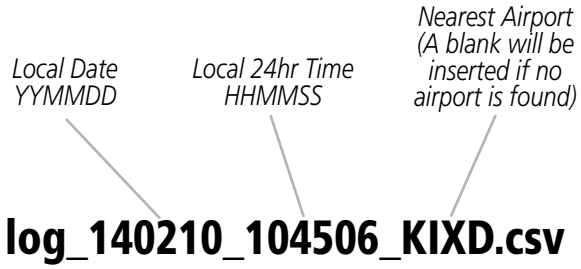


Figure 8-83 Log File Format

Data logging status can be monitored on the AUX-UTILITY Page.

8.10 ABNORMAL OPERATION

SVT TROUBLESHOOTING

SVT is intended to be used with traditional attitude, heading, obstacle, terrain, and traffic inputs. SVT is disabled when valid attitude or heading data is not available for the display. In case of invalid SVT data, the PFD display reverts to the standard blue-over-brown attitude display.

SVT becomes disabled without the following data resources:

- Attitude data
- Heading data
- GPS position data
- 9 Arc-second Terrain data
- Obstacle data
- Terrain avoidance function is not available, in test mode, or failed
- The position of the aircraft exceeds the range of the terrain database.

REVERSIONARY MODE

SVT can be displayed on the Multifunction Display (MFD) in Reversionary Mode. If it is enabled when switching to Reversionary Mode, SVT will take up to 30 seconds to be displayed. The standard, non-SVT PFD display will be shown in the interim.



Figure 8-84 SVT Reversionary Mode

UNUSUAL ATTITUDES

Unusual attitudes are displayed with red chevrons overlaid on the display indicating the direction to fly to correct the unusual attitude condition. The display shows either a brown or blue colored bar at the top or bottom of the screen to represent earth or sky. This is intended to prevent losing sight of the horizon during extreme pitch attitudes.

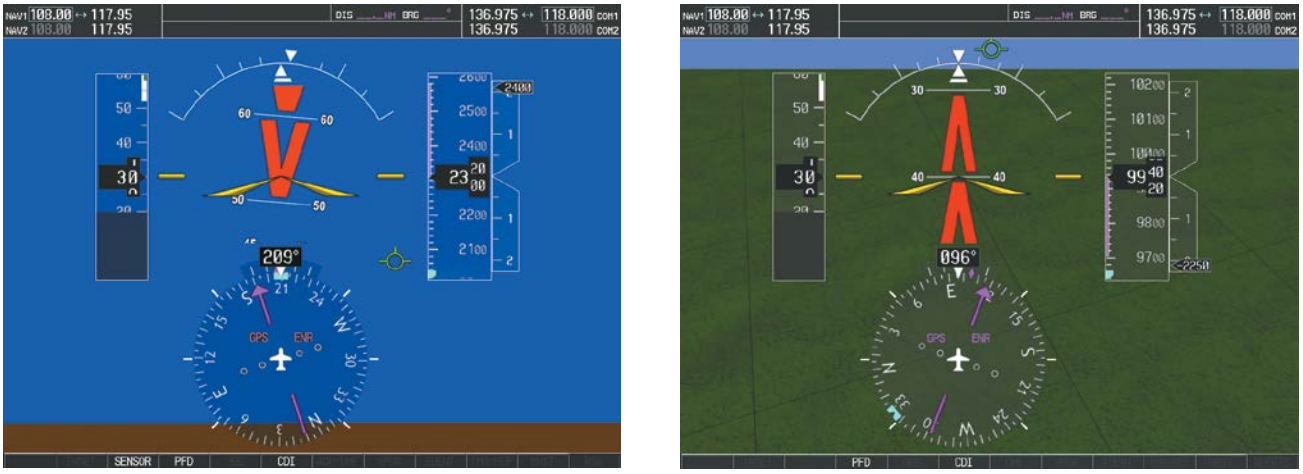


Figure 8-85 Unusual Attitude Display

The blue colored bar is also displayed when terrain gradient is great enough to completely fill the display.



Figure 8-86 Blue Sky Bar with Full Display Terrain

BLANK PAGE

ANNUNCIATIONS AND ALERTS

NOTE: The PC-6 aircraft Pilot's Operating Handbook (POH) supersedes information found in this document.

The G950 Alerting System conveys alerts using the following:

- **Annunciation Window:** The Annunciation Window displays abbreviated annunciation text. Text color is based on alert levels described in the following section. The Annunciation Window is located to the right of the Altimeter and Vertical Speed Indicator. All aircraft annunciations can be displayed simultaneously in the Annunciation Window. A white horizontal line separates annunciations that are acknowledged from annunciations that are not yet acknowledged. Higher priority annunciations are displayed towards the top of the window.
- **Alerts Window:** The Alerts Window displays text messages for up to 64 prioritized alert messages. Pressing the **ALERTS** Softkey displays the Alerts Window. Pressing the **ALERTS** Softkey a second time removes the Alerts Window from the display. When the Alerts Window is displayed, the **FMS** Knob can be used to scroll through the alert message list.
- **Softkey Annunciation:** During certain alerts, the **ALERTS** Softkey may appear as a flashing annunciation to accompany an alert. The **ALERTS** Softkey assumes a new label consistent with the alert level (WARNING, CAUTION, or ADVISORY). By pressing the softkey when flashing an annunciation, the alert is acknowledged. The softkey label then returns to **ALERTS**. If alerts are still present, the **ALERTS** label is displayed in white with black text. Pressing the **ALERTS** Softkey a second time views the alert text messages.
- **System Annunciations:** Typically, a large red 'X' appears over instruments whose information is supplied by a failed Line Replaceable Unit (LRU). See the G950 System Annunciations Section for more information.

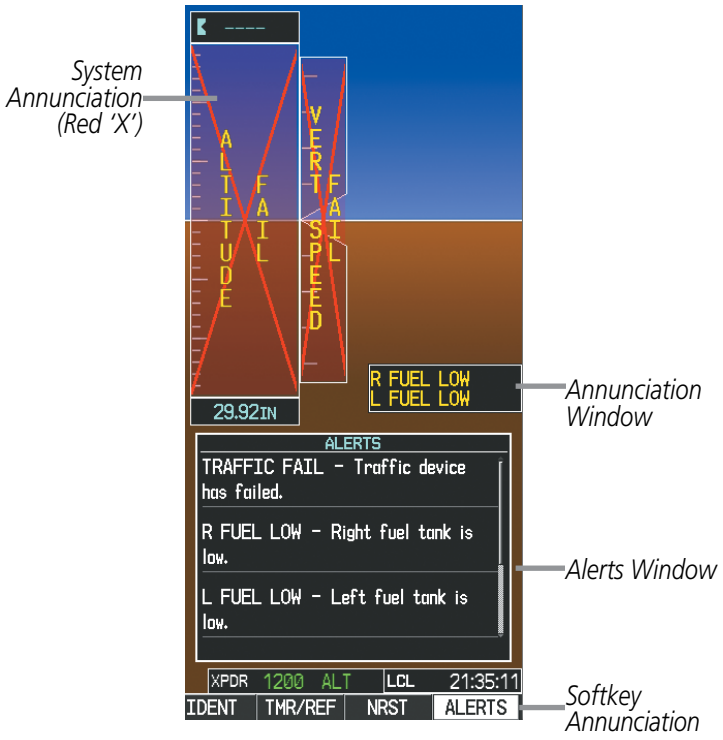


Figure A-1 G950 Alerting System

- **Audio Alerting System:** The G950 System issues audio alert tones when specific system conditions are met. See the Alert Level Definitions Section for more information. Should the #1 GIA 63W fail, audio and voice alerts are not generated. The annunciation tone may be tested from the AUX - System Status Page.

Testing the system annunciation tone:

1) Use the **FMS** Knob to select the AUX - System Status Page.
2) Press the **ANN TEST** Softkey.

Or:

a) Press the **MENU** Key.

b) Highlight 'Enable Annunciator Test Mode' and press the **ENT** Key.



Figure A-2 System Status Page, Annunciation Tone Testing

ALERT LEVEL DEFINITIONS

The G950 Alerting System uses four alert levels.

- **WARNING:** This level of alert requires immediate attention.

Warning alert text is shown in red in the Annunciation Window and is accompanied by a continuous chime and a flashing **WARNING** Softkey annunciation (see Figure A-3). Pressing the **WARNING** Softkey acknowledges the presence of the warning alert and stops the aural chime.

Warning voice alerts repeat continuously until acknowledged by pressing the **WARNING** Softkey.

- **CAUTION:** This level of alert indicates the existence of abnormal conditions on the aircraft that may require intervention.

Caution alert text is shown in yellow in the Annunciation Window and is accompanied by a single chime and a flashing **CAUTION** Softkey annunciation (see Figure A-3). Pressing the **CAUTION** Softkey acknowledges the presence of the caution alert.

Caution voice alerts repeat three times or until acknowledged by pressing the **CAUTION** Softkey.

- **ANNUNCIATION OR MESSAGE ADVISORY:** This level of alert provides general information.

Annunciation alert text is shown in white in the Annunciation Window; no aural tone is generated. An annunciation alert is accompanied by a flashing **ADVISORY** Softkey annunciation (see Figure A-3). Pressing the **ADVISORY** Softkey acknowledges the presence of the annunciation alert.

Message advisory alerts do not issue annunciations in the Annunciation Window. Instead, message advisory alerts only issue a flashing **ADVISORY** Softkey annunciation (see Figure A-3). Pressing the **ADVISORY** Softkey acknowledges the presence of the message advisory alert and displays the alert text message in the Alerts Window.

Message advisory voice alerts generated when the message advisory is issued do not repeat.



Figure A-3 Softkey Annunciation (ALERTS Softkey Labels)

- S**AFE OPERATING ANNUNCIATIONS:** This level of alert provides general information about conditions which are safe for operation.

Safe operating annunciation alert text is shown in green in the Annunciation Window; no aural tone is generated. It is accompanied by a flashing **ADVISORY** Softkey annunciation (see Figure A-3). Pressing the **ADVISORY** Softkey acknowledges the presence of the alert.

AIRCRAFT ALERTS

The following alerts are configured specifically for the the PC-6 aircraft. See the Pilot's Operating Handbook (POH) for information regarding pilot responses.

WARNING ALERTS

Annunciation Window Text	Alerts Window Message	Audio Alert
BATT LOW VOLT	Low voltage on the battery bus.	Repeating Tone
GEN LOW VOLT	Low voltage on the generator bus.	
PROP LOW PITCH	Prop low pitch condition exists.	
STALL	Aircraft stall condition exists.	"Stall" (repeating)
TRIM	Trim not in take-off configuration.	"Trim" (repeating)

CAUTION ALERTS

Annunciation Window Text	Alerts Window Message	Audio Alert
BATT HOT	Battery temp monitor mantenance.	Single Chime
BATT HOT	Battery temp outside normal op limits.	
BATT LIMIT	Electrical load reduction recommended.	
CHIP DETECT	Engine oil contamination detected.	
F FILTER BLOCK	Fuel filter is blocked.	
FUEL PRESS LOW	Fuel pressure is low.	
GEN FAIL	Generator has failed.	
L FUEL FLOW	Left external fuel transfer pump inactive.	
R FUEL FLOW	Right external fuel transfer pump inactive.	
L FUEL LOW	Left fuel tank is low.	
R FUEL LOW	Right fuel tank is low.	
OXY PRESS LOW	Oxygen pressure is low.	

SAFE OPERATING ANNUNCIATIONS

Annunciation Window Text	Alerts Window Message	Audio Alert
AUX F PUMP ON	Auxiliary fuel pump is active.	None
ANTI ICE ON	Anti ice system on.	
BATT DISCHARGE	Alternate power source/Battery in use.	
EXT POWER ON	Aircraft using external power.	
LDG LIGHT ON	Landing light is on.	
L F PUMP ON	Left external fuel transfer pump is active.	
R F PUMP ON	Right external fuel transfer pump is active.	
PROP DEICE ON	Prop deice is on.	
TOW ACTIVE	Tow cable attached.	

MESSAGE ADVISORY ALERTS

Alerts Window Message	Audio Alert
PFD FAN FAIL – The cooling fan for the PFD is inoperative.	None
MFD FAN FAIL – The cooling fan for the MFD is inoperative.	None

G950 SYSTEM ANNUNCIATIONS

NOTE: *Upon power-up, certain windows remain invalid as G950 equipment begins to initialize. All windows should be operational within one minute of power-up. If any window continues to remain flagged, the G950 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 Figure A-4 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.

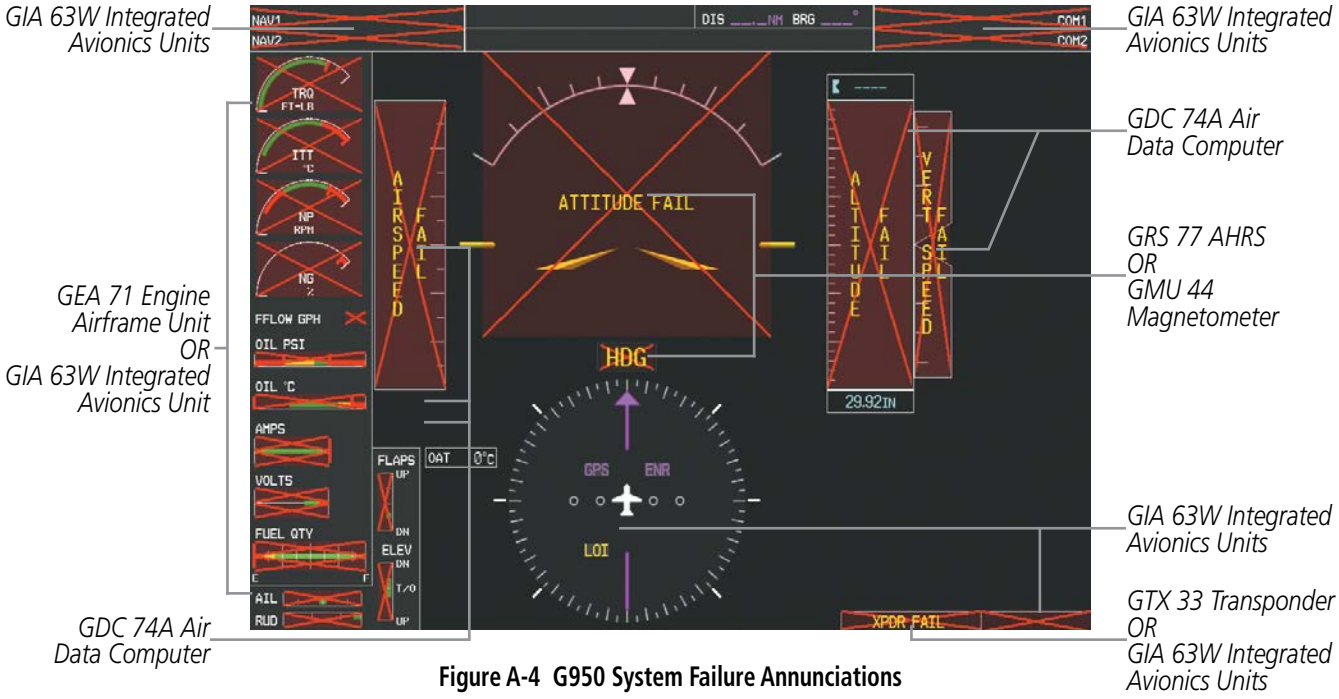


Figure A-4 G950 System Failure Annunciations

The status of detected LRUs can be checked on the AUX - System Status Page (Figure A-2). Active LRUs are indicated by green check marks; failed, by red '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,

a) 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.

System Annunciation	Comment
	Attitude and Heading Reference System is aligning.
	Display system is not receiving attitude information from the AHRS.
	AHRS calibration incomplete or configuration module failure.
	This annunciation is only seen when the autopilot is engaged. The annunciation indicates an AHRS monitor has detected an abnormal flight parameter, possibly caused by strong turbulence. In this case, the situation should correct itself within a few seconds. If there is an actual failure, a red "X" soon appears over the Attitude Indicator.
	GPS information is either not present or is invalid for navigation use. Note that AHRS utilizes GPS inputs during normal operation. AHRS operation may be degraded if GPS signals are not present (see POH).
	Display system is not receiving airspeed input from air data computer.

System Annunciation	Comment
	Display system is not receiving vertical speed input from the air data computer.
	Display system is not receiving altitude input from the air data computer.
	Display system is not receiving valid heading input from AHRS.
	System is not receiving valid heading input from GMU, but is receiving GPS-derived track information.
	Display system is not receiving valid true airspeed information from air data computer.
	Display system is not receiving valid OAT information from air data computer.
	Display system is not receiving valid transponder information.
	Different versions of GDU software are installed in the PFD and MFD. This can also indicate different versions of the navigation database installed in the PFD and MFD. A cross-talk error between the PFD and MFD will also cause this annunciation.
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 A-1 G950 System Annunciations

G950 SYSTEM MESSAGE ADVISORIES

This section describes various G950 system message advisories. Certain messages are issued due to an LRU or an LRU function failure. Such messages are normally accompanied by a corresponding red 'X' annunciation as shown previously in the G950 System Annunciation section.

NOTE: *This Section provides information regarding G950 message advisories that may be displayed by the system. Knowledge of the aircraft, systems, flight conditions, and other existing operational priorities must be considered when responding to a message. Always use sound pilot judgment. The Pilot's Operating Handbook (POH) takes precedence over any conflicting guidance found in this section.*

MFD & PFD MESSAGE ADVISORIES

Message	Comments
DATA LOST – Pilot stored data was lost. Recheck settings.	The pilot profile data was lost. System reverts to default pilot profile and settings. The pilot may reconfigure the MFD & PFD with preferred settings, if desired.
XTALK ERROR – A flight display crosstalk error has occurred.	The MFD and PFD are not communicating with each other. The G950 system should be serviced.
PFD1 SERVICE – PFD1 needs service. Return unit for repair.	The PFD and/or MFD self-test has detected a problem. The G950 system should be serviced.
MFD1 SERVICE – MFD1 needs service. Return unit for repair.	
MANIFEST – PFD1 software mismatch. Communication halted.	The PFD and/or MFD has incorrect software installed. The G950 system should be serviced.
MANIFEST – MFD1 software mismatch. Communication halted.	
PFD1 CONFIG – PFD1 configuration error. Config service req'd.	The PFD configuration settings do not match backup configuration memory. The G950 system should be serviced.
MFD1 CONFIG – MFD1 configuration error. Config service req'd.	The MFD configuration settings do not match backup configuration memory. The G950 system should be serviced.
SW MISMATCH – GDU software version mismatch. Xtalk is off.	The MFD and PFD have different software versions installed. The G950 system should be serviced.
PFD1 COOLING – PFD1 has poor cooling. Reducing power usage.	The PFD and/or MFD is overheating and is reducing power consumption by dimming the display. If problem persists, the G950 system should be serviced.
MFD1 COOLING – MFD1 has poor cooling. Reducing power usage.	
PFD1 KEYSTK – PFD1 [keyname] Key is stuck.	A key is stuck on the PFD and/or MFD bezel. Attempt to free the stuck key by pressing it several times. The G950 system should be serviced if the problem persists.
MFD1 KEYSTK – MFD [keyname] Key is stuck.	
CNFG MODULE – PFD1 configuration module is inoperative.	The PFD1 configuration module backup memory has failed. The G950 system should be serviced.
PFD1 VOLTAGE – PFD1 has low voltage. Reducing power usage.	The PFD1 voltage is low. The G950 system should be serviced.
MFD1 VOLTAGE – MFD1 has low voltage. Reducing power usage.	The MFD voltage is low. The G950 system should be serviced.

DATABASE MESSAGE ADVISORIES

Message	Comments
MFD1 DB ERR – MFD1 navigation database error exists.	The MFD and/or PFD detected a failure in the navigation database. Attempt to reload the navigation database. If problem persists, the system should be serviced.
PFD1 DB ERR – PFD1 navigation database error exists.	
MFD1 DB ERR – MFD1 basemap database error exists.	The MFD and/or PFD detected a failure in the basemap database.
PFD1 DB ERR – PFD1 basemap database error exists.	
MFD1 DB ERR – MFD1 terrain database error exists.	The MFD and/or PFD detected a failure in the terrain database. Ensure that the terrain card is properly inserted in display. Replace terrain card. If problem persists, the system should be serviced.
PFD1 DB ERR – PFD1 terrain database error exists.	
MFD1 DB ERR – MFD1 terrain database missing.	The terrain database is present on another LRU, but is missing on the specified LRU.
PFD1 DB ERR – PFD1 terrain database missing.	
MFD1 DB ERR – MFD1 obstacle database error exists.	The MFD and/or PFD detected a failure in the obstacle database. Ensure that the data card is properly inserted. Replace data card. If problem persists, the system should be serviced.
PFD1 DB ERR – PFD1 obstacle database error exists.	
MFD1 DB ERR – MFD1 obstacle database missing.	The obstacle database is present on another LRU, but is missing on the specified LRU.
PFD1 DB ERR – PFD1 obstacle database missing.	
MFD1 DB ERR – MFD1 airport terrain database error exists.	The MFD and/or PFD detected a failure in the airport terrain database. Ensure that the data card is properly inserted. Replace data card. If problem persists, the system should be serviced.
PFD1 DB ERR – PFD1 airport terrain database error exists.	
MFD1 DB ERR – MFD1 airport terrain database missing.	The airport terrain database is present on another LRU, but is missing on the specified LRU.
PFD1 DB ERR – PFD1 airport terrain database missing.	
MFD1 DB ERR – MFD1 Safe Taxi database error exists.	The MFD and/or PFD detected a failure in the Safe Taxi database. Ensure that the data card is properly inserted. Replace data card. If problem persists, the system should be serviced.
PFD1 DB ERR – PFD1 Safe Taxi database error exists.	
MFD1 DB ERR – MFD1 Airport Directory database error exists.	The MFD detected a failure in the Airport Directory database. Ensure that the data card is properly inserted. Replace data card. If problem persists, the system should be serviced.

Message	Comments
MFD1 DB ERR – MFD1 multiple database errors exists.	The MFD and/or PFD detected a failure in more than one database. If problem persists, the system should be serviced.
PFD1 DB ERR – PFD1 multiple database errors exists.	
DB MISMATCH – Navigation database mismatch. Xtalk is off.	The PFD and MFD have different navigation database versions or regions installed. Crossfill is off. Check the AUX-SYSTEM STATUS Page to determine versions or regions. Also, check the AUX-SYSTEM STATUS Page for a database synchronization function not completed. After synchronization is complete, power must be turned off, then on.
DB MISMATCH – Standby Navigation database mismatch.	The PFD and MFD have different standby navigation database versions or regions installed. Check the AUX-SYSTEM STATUS Page to determine versions or regions. Also, check the AUX-SYSTEM STATUS Page for a database synchronization function not completed. After synchronization is complete, power must be turned off, then on.
DB MISMATCH – Terrain database mismatch.	The PFD and MFD have different terrain database versions or regions installed. Check the AUX-SYSTEM STATUS Page to determine versions or regions. Also, check the AUX-SYSTEM STATUS Page for a database synchronization function not completed. After synchronization is complete, power must be turned off, then on.
DB MISMATCH – Obstacle database mismatch.	The PFD and MFD have different obstacle database versions or regions installed. Check the AUX-SYSTEM STATUS Page to determine versions or regions. Also, check the AUX-SYSTEM STATUS Page for a database synchronization function not completed. After synchronization is complete, power must be turned off, then on.
DB MISMATCH – Airport Terrain database mismatch.	The PFD and MFD have different airport terrain database versions or regions installed. Check the AUX-SYSTEM STATUS Page to determine versions or regions. Also, check the AUX-SYSTEM STATUS Page for a database synchronization function not completed. After synchronization is complete, power must be turned off, then on.
NAV DB UPDATED – Active navigation database updated.	System has updated the active navigation database from the standby navigation database.
TERRAIN DSP – [PFD1 or MFD1] Terrain awareness display unavailable.	One of the terrain, airport terrain, or obstacle databases required for TAWS in the PFD or MFD is missing or invalid.

GMA 347 MESSAGE ADVISORIES

Message	Comments
GMA1 FAIL – GMA1 is inoperative.	The audio panel self-test has detected a failure. The audio panel is unavailable. The G950 system should be serviced.
GMA1 CONFIG – GMA1 configuration error. Config service req'd.	The audio panel configuration settings do not match backup configuration memory. The G950 system should be serviced.
MANIFEST – GMA1 software mismatch. Communication halted.	The audio panel has incorrect software installed. The G950 system should be serviced.
GMA1 SERVICE – GMA1 needs service. Return unit for repair.	The audio panel self-test has detected a problem in the unit. Certain audio functions may still be available, and the audio panel may still be usable. The G950 system should be serviced when possible.

GIA 63W MESSAGE ADVISORIES

Message	Comments
GIA1 CONFIG – GIA1 config error. Config service req'd.	The GIA1 and/or GIA2 configuration settings do not match backup configuration memory. The system should be serviced.
GIA2 CONFIG – GIA2 config error. Config service req'd.	
GIA1 CONFIG – GIA1 audio config error. Config service req'd.	The GIA1 and/or GIA2 have an error in the audio configuration. The system should be serviced.
GIA2 CONFIG – GIA2 audio config error. Config service req'd.	
GIA1 COOLING – GIA1 temperature too low.	The GIA1 and/or GIA2 temperature is too low to operate correctly. Allow units to warm up to operating temperature.
GIA2 COOLING – GIA2 temperature too low.	
GIA1 COOLING – GIA1 over temperature.	The GIA1 and/or GIA2 temperature is too high. If problem persists, the system should be serviced.
GIA2 COOLING – GIA2 over temperature.	
GIA1 SERVICE – GIA1 needs service. Return the unit for repair.	The GIA1 and/or GIA2 self-test has detected a problem in the unit. The system should be serviced.
GIA2 SERVICE – GIA2 needs service. Return the unit for repair.	
HW MISMATCH – GIA hardware mismatch. GIA1 communication halted.	A GIA mismatch has been detected, where only one is SBAS capable.
HW MISMATCH – GIA hardware mismatch. GIA2 communication halted.	
MANIFEST – GIA1 software mismatch, communication halted.	The GIA1 and/or GIA 2 has incorrect software installed. The system should be serviced.
MANIFEST – GIA2 software mismatch, communication halted.	
COM1 TEMP – COM1 over temp. Reducing transmitter power.	The system has detected an over temperature condition in COM1 and/or COM2. The transmitter operates at reduced power. If the problem persists, the system should be serviced.
COM2 TEMP – COM2 over temp. Reducing transmitter power.	
COM1 SERVICE – COM1 needs service. Return unit for repair.	The system has detected a failure in COM1 and/or COM2. COM1 and/or COM2 may still be usable. The system should be serviced when possible.
COM2 SERVICE – COM2 needs service. Return unit for repair.	
COM1 PTT – COM1 push-to-talk key is stuck.	The COM1 and/or COM2 external push-to-talk switch is stuck in the enable (or "pressed") position. Press the PTT switch again to cycle its operation. If the problem persists, the system should be serviced.
COM2 PTT – COM2 push-to-talk key is stuck.	

Message	Comments
COM1 RMT XFR – COM1 remote transfer key is stuck.	The COM1 and/or COM2 transfer switch is stuck in the enabled (or "pressed") position. Press the transfer switch again to cycle its operation. If the problem persists, the system should be serviced.
COM2 RMT XFR – COM2 remote transfer key is stuck.	
COM1 CONFIG – COM1 config error. Config service req'd.	The COM1 and/or COM2 configuration settings do not match backup configuration memory. The G950 system should be serviced.
COM2 CONFIG – COM2 config error. Config service req'd.	
LOI – GPS integrity lost. Crosscheck with other NAVS.	GPS integrity is insufficient for the current phase of flight.
GPS NAV LOST – Loss of GPS navigation. Insufficient satellites.	Loss of GPS navigation due to insufficient satellites.
GPS NAV LOST – Loss of GPS navigation. Position error.	Loss of GPS navigation due to position error.
GPS NAV LOST – Loss of GPS navigation. GPS fail.	Loss of GPS navigation due to GPS failure.
ABORT APR – Loss of GPS navigation. Abort approach.	Abort approach due to loss of GPS navigation.
APR DWNGRADE – Approach downgraded.	Vertical guidance generated by SBAS is unavailable, use LNAV only minimums.
TRUE APR – True north approach. Change HDG refereence to TRUE.	Displayed after passing the first waypoint of a true north approach when the nav angle is set to 'AUTO'.
GPS1 SERVICE – GPS1 needs service. Return unit for repair.	A failure has been detected in the GPS1 and/or GPS2 receiver. The receiver may still be available. The system should be serviced.
GPS2 SERVICE – GPS2 needs service. Return unit for repair.	
NAV1 SERVICE – NAV1 needs service. Return unit for repair.	A failure has been detected in the NAV1 and/or NAV2 receiver. The receiver may still be available. The system should be serviced.
NAV2 SERVICE – NAV2 needs service. Return unit for repair.	
NAV1 RMT XFR – NAV1 remote transfer key is stuck.	The remote NAV1 and/or NAV2 transfer switch is stuck in the enabled (or "pressed") state. Press the transfer switch again to cycle its operation. If the problem persists, the system should be serviced.
NAV2 RMT XFR – NAV2 remote transfer key is stuck.	
G/S1 FAIL – G/S1 is inoperative.	A failure has been detected in glideslope receiver 1 and/or receiver 2. The system should be serviced.
G/S2 FAIL – G/S2 is inoperative.	
G/S1 SERVICE – G/S1 needs service. Return unit for repair.	A failure has been detected in glideslope receiver 1 and/or receiver 2. The receiver may still be available. The system should be serviced when possible.
G/S2 SERVICE – G/S2 needs service. Return unit for repair.	

GEA 71 MESSAGE ADVISORIES

Message	Comments
GEA1 CONFIG – GEA1 config error. Config service req'd.	The GEA1 configuration settings do not match those of backup configuration memory. The G950 system should be serviced.
MANIFEST – GEA1 software mismatch, communication halted.	The #1 GEA 71 has incorrect software installed. The G950 system should be serviced.

GTX 33/GTX 33 ES (OPTIONAL) MESSAGE ADVISORIES

Message	Comments
XPDR1 CONFIG – XPDR1 config error. Config service req'd.	The transponder configuration settings do not match those of backup configuration memory. The G950 system should be serviced.
MANIFEST – GTX1 software mismatch, communication halted.	The transponder has incorrect software installed. The G950 system should be serviced.
XPDR1 SRVC – XPDR1 needs service. Return unit for repair.	The #1 transponder should be serviced when possible.
XPDR1 FAIL – XPDR1 is inoperative.	There is no communication with the #1 transponder.

GRS 77 MESSAGE ADVISORIES

Message	Comments
AHRS1 TAS – AHRS1 not receiving airspeed.	The #1 AHRS is not receiving true airspeed from the air data computer. The AHRS relies on GPS information to augment the lack of airspeed. The G950 system should be serviced.
AHRS1 GPS – AHRS1 using backup GPS source.	The #1 AHRS is using the backup GPS path. Primary GPS path has failed. The G950 system should be serviced when possible.
AHRS1 GPS – AHRS1 not receiving any GPS information.	The #1 AHRS is not receiving any or any useful GPS information. Check AFMS limitations. The G950 system should be serviced.
AHRS1 GPS – AHRS1 not receiving backup GPS information.	The #1 AHRS is not receiving backup GPS information. The G950 system should be serviced.
AHRS1 GPS – AHRS1 operating exclusively in no-GPS mode.	The #1 AHRS is operating exclusively in no-GPS mode. The G950 system should be serviced.
AHRS1 SRVC – AHRS1 Magnetic-field model needs update.	The #1 AHRS earth magnetic field model is out of date. Update magnetic field model when practical.
GEO LIMITS – AHRS1 too far North/ South, no magnetic compass.	The aircraft is outside geographical limits for approved AHRS operation. Heading is flagged as invalid.
MANIFEST – GRS1 software mismatch, communication halted.	The #1 AHRS has incorrect software installed. The G950 system should be serviced.

GMU 44 MESSAGE ADVISORIES

Message	Comments
HDG FAULT – AHRS1 magnetometer fault has occurred.	A fault has occurred in the #1 GMU 44. Heading is flagged as invalid. The AHRS uses GPS for backup mode operation. The G950 system should be serviced.
MANIFEST – GMU1 software mismatch, communication halted.	The GMU 44 has incorrect software installed. The G950 system should be serviced.

GDC 74A MESSAGE ADVISORIES

Message	Comments
ADC1 ALT EC – ADC1 altitude error correction is unavailable.	GDC1 is reporting that the altitude error correction is unavailable.
ADC1 AS EC – ADC1 airspeed error correction is unavailable.	GDC1 is reporting that the airspeed error correction is unavailable.
MANIFEST – GDC1 software mismatch, communication halted.	The GDC 74A has incorrect software installed. The G950 system should be serviced.

GTS 870 TRAFFIC ADVISORY SYSTEM (IF INSTALLED)

Message Advisory	Comments
GTS CONFIG – GTS Config error. Config service req'd.	The GTS and GDU have different copies of the GTS configuration, or the Mode S address is invalid. The system should be serviced.
MANIFEST – GTS software mismatch, communication halted.	The GTS has incorrect software installed. The system should be serviced.

GWX 68/70 MESSAGE ADVISORIES (OPTIONAL)

Message	Comments
GWX CONFIG – GWX config error. Config service req'd.	GWX 68/70 configuration settings do not match those of the GDU configuration. The G950 system should be serviced.
GWX FAIL – GWX is inoperative.	The GDU is not recieving status packet from the GWX 68/70 or the GWX 68/70 is reporting a fault. The GWX 68/70 radar system should be serviced.
GWX SERVICE – Needs service. Return unit for repair.	A failure has been detected in the GWX 68/70. The GWX 68/70 may still be usable.
WX ALERT – Possible severe weather ahead.	The GWX 68/70 indicates severe weather within ±10 degrees of the aircraft heading at a range of 80 to 320 nm.
MANIFEST – GWX software mismatch, communication halted.	The GWX 68/70 has incorrect software installed. The G950 system should be serviced.

MISCELLANEOUS MESSAGE ADVISORIES

Message	Comments
FPL WPT LOCK – Flight plan waypoint is locked.	Upon power-up, the system detects that a stored flight plan waypoint is locked. This occurs when an navigation database update eliminates an obsolete waypoint. The flight plan cannot find the specified waypoint and flags this message. This can also occur with user waypoints in a flight plan that is deleted. Remove the waypoint from the flight plan if it no longer exists in any database, Or Update the waypoint name/identifier to reflect the new information.

Message	Comments
FPL WPT MOVE – Flight plan waypoint moved.	The system has detected that a waypoint coordinate has changed due to a new navigation database update. Verify that stored flight plans contain correct waypoint locations.
TIMER EXPIRD – Timer has expired.	The system notifies the pilot that the timer has expired.
DB CHANGE – Database changed. Verify user modified procedures.	This occurs when a stored flight plan contains an airway that is no longer consistent with the navigation database. This alert is issued only after an navigation database update. Verify that the user-modified procedures in stored flight plans are correct and up to date.
DB CHANGE – Database changed. Verify stored airways.	This occurs when a stored flight plan contains an airway that is no longer consistent with the navigation database. This alert is issued only after an navigation database update. Verify use of airways in stored flight plans and reload airways as needed.
FPL TRUNC – Flight plan has been truncated.	This occurs when a newly installed navigation database eliminates an obsolete approach or arrival used by a stored flight plan. The obsolete procedure is removed from the flight plan. Update flight plan with current arrival or approach.
LOCKED FPL – Cannot navigate locked flight plan.	This occurs when the pilot attempts to activate a stored flight plan that contains locked waypoint. Remove locked waypoint from flight plan. Update flight plan with current waypoint.
WPT ARRIVAL – Arriving at waypoint -[xxxx]	Arriving at waypoint [xxxx], where [xxxx] is the waypoint name.
STEEP TURN – Steep turn ahead.	A steep turn is 15 seconds ahead. Prepare to turn.
INSIDE ARSPC – Inside airspace.	The aircraft is inside the airspace.
ARSPC AHEAD – Airspace ahead less than 10 minutes.	Special use airspace is ahead of aircraft. The aircraft will penetrate the airspace within 10 minutes.
ARSPC NEAR – Airspace near and ahead.	Special use airspace is near and ahead of the aircraft position.
ARSPC NEAR – Airspace near – less than 2 nm.	Special use airspace is within 2 nm of the aircraft position.
APPR INACTV – Approach is not active.	The system notifies the pilot that the loaded approach is not active. Activate approach when required.
SLCT FREQ – Select appropriate frequency for approach.	The system notifies the pilot to load the approach frequency for the appropriate NAV receiver. Select the correct frequency for the approach.
SLCT NAV – Select NAV on CDI for approach.	The system notifies the pilot to set the CDI to the correct NAV receiver. Set the CDI to the correct NAV receiver.
PTK FAIL – Parallel track unavailable: bad geometry.	Bad parallel track geometry.
PTK FAIL – Parallel track unavailable: invalid leg type.	Invalid leg type for parallel offset.
PTK FAIL – Parallel track unavailable: past IAF.	IAF waypoint for parallel offset has been passed.

Message	Comments
UNABLE V WPT – Can't reach current vertical waypoint.	The current vertical waypoint can not be reached within the maximum flight path angle and vertical speed constraints. The system automatically transitions to the next vertical waypoint.
VNV – Unavailable. Unsupported leg type in flight plan.	The lateral flight plan contains a procedure turn, vector, or other unsupported leg type prior to the active vertical waypoint. This prevents vertical guidance to the active vertical waypoint.
VNV – Unavailable. Excessive crosstrack error.	The current crosstrack exceeds the limit, causing vertical deviation to go invalid.
VNV – Unavailable. Excessive track angle error.	The current track angle error exceeds the limit, causing the vertical deviation to go invalid.
VNV – Unavailable. Parallel course selected.	A parallel course has been selected, causing the vertical deviation to go invalid.
NON WGS84 WPT – Do not use GPS navigation to [xxxx].	The position of the selected waypoint [xxxx] is not calculated based on the WGS84 map reference datum and may be positioned in error as displayed. Do not use GPS to navigate to the selected non-WGS84 waypoint.
TRAFFIC FAIL – Traffic device has failed.	The system is no longer receiving data from the traffic system. The traffic device should be serviced.
FAILED PATH – A data path has failed.	A data path connected to the GDU or the GIA 63/W has failed.
MAG VAR WARN – Large magnetic variance. Verify all course angles.	The GDU's internal model cannot determine the exact magnetic variance for geographic locations near the magnetic poles. Displayed magnetic course angles may differ from the actual magnetic heading by more than 2°.
SCHEDULER [#] – <message>.	Message criteria entered by the user.
CHECK CRS – Database course for LOC1 / [LOC ID] is [CRS]°.	Selected course for LOC1 differs from published localizer course by more than 10 degrees.
CHECK CRS – Database course for LOC2 / [LOC ID] is [CRS]°.	Selected course for LOC2 differs from published localizer course by more than 10 degrees.
[PFD1, or MFD1] CARD 1 REM – Card 1 was removed. Reinsert card.	The SD card was removed from the top card slot of the PFD or MFD. The SD card needs to be reinserted.
[PFD1, or MFD1] CARD 2 REM – Card 2 was removed. Reinsert card.	The SD card was removed from the bottom card slot of the PFD or MFD. The SD card needs to be reinserted.
[PFD1, or MFD1] CARD 1 ERR – Card 1 is invalid.	The SD card in the top card slot of the PFD or MFD contains invalid data.
[PFD1, or MFD1] CARD 2 ERR – Card 2 is invalid.	The SD card in the bottom card slot of the specified PFD or MFD contains invalid data.

FLIGHT PLAN IMPORT/EXPORT MESSAGES

In some circumstances, 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.

PILOT PROFILE IMPORT/EXPORT MESSAGES

Pilot Profile Import/Export Results	Description
'No pilot profile plan files found to import.'	Displayed if the SD card does not have one or more valid pilot profile filenames.
'Overwrite existing profile?'	Displayed if the profile name matches the name of existing profile.
'Profile name invalid. Enter a different profile name.'	Displayed if the profile name is invalid.
'All available pilot profiles in use. Delete a profile before importing another.'	Displayed if the maximum number for pilot profiles has been reached.
'Pilot profile import failed.'	Displayed if the importing operation fails for any other reason.
'Pilot profile import succeeded.'	Displayed if the importing operation succeeds.
'Overwrite existing file?'	Displayed if the filename matches the name of an existing file on the SD card.
'Pilot profile export failed.'	Displayed if the export operation fails.
'Pilot profile export succeeded.'	Displayed if the export operation succeeds.

TERRAIN-SVT ALERTS

Alert Type	PFD/MFD* Alert Annunciation	MFD Pop-Up Alert (except Terrain-SVT Page	Aural Message
Reduced Required Terrain Clearance Warning (RTC)	TERRAIN	WARNING TERRAIN	"Warning; Terrain, Terrain"
Imminent Terrain Impact Warning (ITI)	TERRAIN	WARNING TERRAIN	"Warning; Terrain, Terrain"
Reduced Required Obstacle Clearance Warning (ROC)	TERRAIN	WARNING OBSTACLE	"Warning; Obstacle, Obstacle"
Imminent Obstacle Impact Warning (IOI)	TERRAIN	WARNING OBSTACLE	"Warning; Obstacle, Obstacle"
Reduced Required Terrain Clearance Caution (RTC)	TERRAIN	CAUTION-TERRAIN	"Caution; Terrain, Terrain"
Imminent Terrain Impact Caution (ITI)	TERRAIN	CAUTION-TERRAIN	"Caution; Terrain, Terrain"
Reduced Required Obstacle Clearance Caution (ROC)	TERRAIN	CAUTION-OBSTACLE	"Caution; Obstacle, Obstacle"
Imminent Obstacle Impact Caution (IOI)	TERRAIN	CAUTION-OBSTACLE	"Caution; Obstacle, Obstacle"

* *Annunciation is shown on the Terrain-SVT Page and the Navigation Map Page when Terrain is enabled.*

TERRAIN-SVT SYSTEM STATUS ANNUNCIATIONS

Alert Type	PFD/MFD* Alert Annunciation	Terrain-SVS Page Center Banner Annunciation	Aural Message
System Test in progress	TER TEST	TERRAIN TEST	None
System Test pass	None	None	"Terrain System Test OK"
Terrain Alerting Inhibited	TER INH	None	None
No GPS position	TER N/A	NO GPS POSITION	"Terrain System Not Available"†
Excessively degraded GPS signal; or Out of database coverage area	TER N/A	None	"Terrain System Not Available"†
Terrain System Test Fail; Terrain or Obstacle database unavailable or invalid; Invalid software configuration; or System audio fault	TER FAIL	TERRAIN FAIL	"Terrain System Failure"
MFD Terrain or Obstacle database unavailable or invalid, Terrain-SVT operating with PFD Terrain or Obstacle databases	None	TERRAIN DATABASE FAILURE	None

* *Annunciation is shown on the Terrain-SVT Page and the Navigation Map Page when Terrain is enabled.*

† *"Terrain System Available" (in-flight only) when sufficient GPS signal received, or terrain database coverage re-entered.*

TAWS-B ALERTS

Annunciations appear on the PFD and the MFD. Pop-up alerts appear only on the MFD.

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

* *Annunciation is shown on the TAWS-B Page and the Navigation Map Page when Terrain is enabled.*

TAWS-B SYSTEM STATUS ANNUNCIATIONS

Alert Type	PFD/MFD* Alert Annunciation	TAWS-B Page Center Banner Annunciation	Aural Message
System Test in progress	TAWS TEST	TAWS TEST	None
System Test pass	None	None	"TAWS System Test OK"
TAWS-B FLTA Alerting Inhibited	TAWS INH	None	None
No GPS position	TAWS N/A	NO GPS POSITION	"TAWS Not Available"†
Excessively degraded GPS signal; or Out of database coverage area	TAWS N/A	None	"TAWS Not Available"†
TAWS-B System Test Fail; Terrain or Obstacle database unavailable or invalid; Invalid software configuration; or System audio fault	TAWS FAIL	TAWS FAIL	"TAWS System Failure"
MFD Terrain or Obstacle database unavailable or invalid, TAWS-B operating with PFD Terrain or Obstacle databases	None	TERRAIN DATABASE FAILURE	None

** Annunciation is shown on the TAWS-B Page and the Navigation Map Page when Terrain is enabled.*

† *"TAWS Available" (in-flight only) when sufficient GPS signal received, or terrain database coverage re-entered.*

VOICE ALERTS

Voice alerts are provided to the G950 by the #1 GIA 63W; should this unit fail, audio and voice alerts are not generated.

Voice Alert	Alert Trigger
"Minimums, minimums"	Aircraft is transitioning through the minimum descent altitude/decision height (MDA/DH)
"Vertical track"	Aircraft is one minute from Top of Descent (issued only when vertical navigation is enabled)
"TIS Not Available"	TIS system has failed or cannot communicate
"TAS System Test OK"	Played when the optional KTA 870 passes a pilot-initiated self test.
"TAS System Test Fail"	Played when the optional KTA 870 fails a pilot-initiated self test.
"Traffic"	Traffic Advisory (TA) issued by the TIS system. Also when additional TAs are issued by the optional KTA 870 system.
"Traffic, Traffic"	Played when a Traffic Advisory (TA) is issued with the optional KTA 870 TAS system. Additional TAs

Table A-2 Voice Alerts

The gender of the voice used to announce audio alerts may be set to male or female on the System Setup Page. See the Appendices for voice alerts.

Changing the audio alert voice:

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

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

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

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

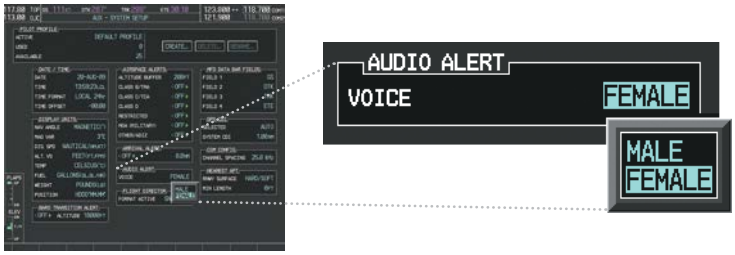


Figure A-5 System Setup Page, Alert Voice Settings

DATABASE MANAGEMENT

CAUTION: *Never disconnect power to the system when loading a database. Power interuption during the database loading process could result in maintenance being required to reboot the system.*

The system uses Secure Digital (SD) cards to load and store various types of data. For basic flight operations, SD cards are required for database storage as well as navigation databasw updates. Not all SD cards are compatible with the system. Use only SD cards supplied by Garmin or the aircraft manufacturer.

CAUTION: *When downloading updates to the Navigation Database, copy the data to an SD card other than a Garmin Supplemental Data Card. Otherwise, data corruption can occur.*

NOTE: *When loading database updates, the 'DB Mismatch' message will be displayed until database synchronization is complete, followed by turning system power off, then on. Synchronization can be monitored on the AUX-SYSTEM STATUS Page.*

NOTE: *Loading a database in the system prior to its effective date will result in the expiration date on the power-up screen and the effective date on the AUX-System Status Page being displayed in yellow.*

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 are assured compliance with all data quality requirements (DQRs) by virtue of a Type 2 Letter of Authorization (LOA) from the FAA. A copy of the Type 2 LOA is available for each database and can be viewed at http://fly.garmin.com by selecting 'Type 2 LOA Status.'*
- *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 AFM(S) 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 to coordinate the revised DQRs.*

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 'Report An Aviation Data Error Report.'*

NAVIGATION DATABASES

The navigation database is updated on a 28-day cycle. The navigation database must be installed from the Jeppesen or user supplied SD data card. Contact Jeppesen (www.jeppesen.com) for subscription and update information.

NOTE: *After the navigation database is installed, the card may be removed.*

Updating the active navigation database (not using the Dual Navigation Database or Automatic Database Synchronization Features):

1) With the system OFF, insert the SD card containing the new navigation database version into the top card slot of the display (PFD or MFD) to be updated (label of SD card facing left).
2) Turn the system ON. A prompt similar to the following is displayed in the upper left corner of the display:

```
DO YOU WANT TO UPDATE THE STANDBY NAVIGATION DATABASE ON THE BOTTOM CARD?
THE STANDBY DATABASE WILL BE ACTIVATED UPON THE FIRST ON-GROUND POWER CYCLE ON OR
AFTER 00:00 SYSTEM TIME ON THE EFFECTIVE DATE.
            FROM            TO
REGION:     WORLDWIDE       WORLDWIDE
CYCLE:      0904            0905
EFFECTIVE:  09-APR-2009     07-MAY-2009
EXPIRES:    07-MAY-2009     04-JUN-2009

NO WILL BE ASSUMED IN 21 SECONDS.
```

Figure B-1 Standby Navigation Database Prompt

3) Press the **NO** Softkey to proceed to loading the active database.
4) A prompt similar to the following is displayed, press the **YES** Softkey to update the active navigation database.

```
DO YOU WANT TO UPDATE THE ACTIVE NAVIGATION DATABASE?
SELECTING YES WILL OVERWRITE THE ACTIVE NAVIGATION DATABASE.
            FROM            TO
REGION:     WORLDWIDE       WORLDWIDE
CYCLE:      0904            0905
EFFECTIVE:  09-APR-2009     07-MAY-2009
EXPIRES:    07-MAY-2009     04-JUN-2009

NO WILL BE ASSUMED IN 8 SECONDS.
UPDATING THE ACTIVE NAVIGATION DATABASE, PLEASE WAIT.
.
UPDATED 1 FILES SUCCESSFULLY!
PRESS ANY KEY TO CONTINUE.
CONTINUING IN 8 SECONDS.
```

Figure B-2 Database Update Confirmation

5) After the update completes, the display starts in normal mode. Do not remove power while the display is starting.

6) Turn the system OFF and remove the SD card from the top card slot.

7) Repeat steps 1 through 6 for the other display (PFD or MFD). Remove the SD card when finished.

8) Apply power to the system and press the **ENT** Key to acknowledge the startup screen.

9) Turn the large **FMS** Knob to select the AUX Page group on the MFD.

10) Turn the small **FMS** Knob to select the System Status Page.

11) Press the Display Database Selection Softkey to show active navigation database information for each display (**MFD1 DB**, **PFD1 DB**). Verify the correct active navigation database cycle information is shown for each display.

DUAL NAVIGATION DATABASE FEATURE

The dual navigation database feature allows each display to store an upcoming navigation database on the bottom SD card so that the system can automatically load it to replace the active database when the new database becomes effective (the next cycle becomes available seven days prior to its effective date).

If a navigation database loader card is inserted into the top SD card slot of a display, and an SD card is in the bottom slot, the system will prompt the user (upon on-ground power up) as to whether the database should be stored on the bottom SD card as the standby database. If the user responds affirmatively, the system will copy the navigation database from the top SD card to the bottom SD card. As long as the bottom SD card remains in the card slot, this standby navigation database will be available for the system to use as the active database as soon as it becomes effective.

The system checks the active and standby databases upon (on-ground only) power-up. If the standby database is current and the active database is out of date, the display will upload the standby database into the active internal database location. Uploading the standby database to the active location takes approximately 45-55 seconds. The pilot is alerted that the update is complete by a system alert message, 'NAV DB UPDATED'.

In some situations, such as an overnight flight in which departure date is prior to the effective date of the standby database and arrival date is after the effective date, it may be desired to force the loaded standby database into active service earlier than the system would otherwise make the change. This can be accomplished by selecting the **STBY DB** Softkey on the AUX-System Status Page. Turn system power off, then on to complete the database change.

Loading a standby navigation database:

1) With the system OFF, insert the SD card containing the new navigation database version into the top card slot of the MFD.

2) Verify that an SD card is inserted in the bottom slot of the PFD and the MFD.

3) Turn the system ON. A prompt similar to the following is displayed.

```
DO YOU WANT TO UPDATE THE STANDBY NAVIGATION DATABASE ON THE BOTTOM CARD?
THE STANDBY DATABASE WILL BE ACTIVATED UPON THE FIRST ON-GROUND POWER CYCLE ON OR
AFTER 00:00 SYSTEM TIME ON THE EFFECTIVE DATE.
            FROM            TO
REGION:     WORLDWIDE       WORLDWIDE
CYCLE:      0904            0905
EFFECTIVE:  09-APR-2009     07-MAY-2009
EXPIRES:    07-MAY-2009     04-JUN-2009

NO WILL BE ASSUMED IN 21 SECONDS.
```

Figure B-3 Standby Navigation Database Prompt

4) Press the **YES** Softkey. The navigation database is copied to the SD card in the bottom card slot of the MFD.

5) After the navigation database files are copied to the bottom SD card, the display will appear as shown in Figure B-4.

```
INITIALIZING SYSTEM

DO YOU WANT TO UPDATE THE STANDBY NAVIGATION DATABASE ON THE BOTTOM CARD?
THE STANDBY DATABASE WILL BE ACTIVATED UPON THE FIRST ON-GROUND POWER CYCLE ON OR
AFTER 00:00 SYSTEM TIME ON THE EFFECTIVE DATE.
            FROM            TO
REGION:     WORLDWIDE       WORLDWIDE
CYCLE:      1009            1012
EFFECTIVE:  26-AUG-2010     18-NOV-2010
EXPIRES:    23-SEP-2010     16-DEC-2010

NO WILL BE ASSUMED IN 18 SECONDS.
UPDATING STANDBY NAVIGATION DATABASE, PLEASE WAIT.
.
UPDATED STANDBY NAVIGATION DATABASE SUCCESSFULLY.
PRESS ANY KEY TO CONTINUE.
CONTINUING IN 9 SECONDS.
```

Figure B-4 Standby Navigation Database Update Complete

6) As instructed on the display, press any key to continue. The display will now appear as shown in Figure B-5.

```
DATABASE NAVIGATION WILL BE VERIFIED BEFORE USE.
DATABASE STANDBY NAV WILL BE VERIFIED BEFORE USE.
PRESS ANY KEY TO CONTINUE.
CONTINUING IN 6 SECONDS.
```

Figure B-5 Navigation Database Verification Prompt

7) Press any key to continue. The display will now appear as shown in Figure B-6.

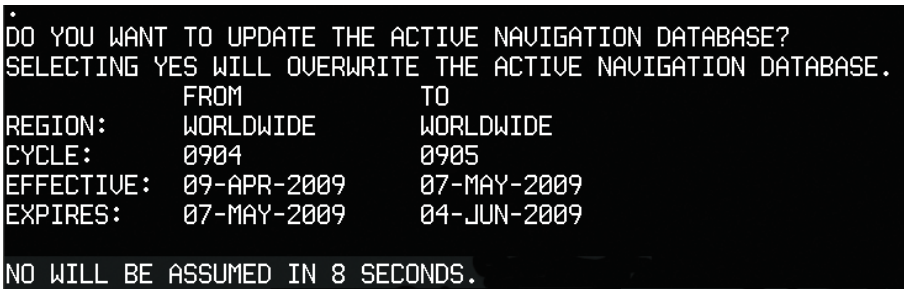


Figure B-6 Active Navigation Database Prompt

8) Press the **NO** Softkey. The display now starts in normal mode. Since the database effective date is not yet valid, it should not be loaded as the active database. The display now starts in normal mode. Do not remove power while the display is starting.

9) Press the **ENT** Key to acknowledge the startup screen.

10) Turn the large **FMS** Knob to select the AUX Page group on the MFD.

11) Turn the small **FMS** Knob to select the System Status Page.

12) The new database is copied to the SD card in the bottom card slot of the PFD. Progress can be monitored in the SYNC STATUS field. When copying is finished, 'Complete' is displayed.

13) Turn system power OFF.

14) Remove the SD card from the top card slot of the MFD.

15) Turn system power ON.

16) Press the **ENT** Key to acknowledge the startup screen.

17) Turn the large **FMS** Knob to select the AUX Page group on the MFD.

18) Turn the small **FMS** Knob to select the System Status Page.

19) Press the Display Database Selection Softkey to show standby navigation database information for each display (**MFD1 DB**, **PFD1 DB**). Verify the correct standby navigation database cycle information is shown for each display.

NOTE: *The system compares the active databases on the PFD and the MFD, and displays a system alert message 'DB Mismatch' if they are not identical. Similarly, if the standby databases on the PFD and the MFD are not identical, the system will display a 'DB Mismatch' alert for the standby navigation databases.*

GARMIN DATABASES

The following databases are stored on Supplemental Data Cards provided by Garmin:

- Expanded basemap
- Terrain
- Airport Terrain
- SafeTaxi
- Airport Directory
- Obstacle

After subscribing to the desired database product, these database products will be downloaded and ultimately stored on two Supplemental Data Cards. Each Supplemental Data Card resides in the bottom card of each display as shown in Figure B-7. These cards must not be removed except to update the databases stored on each card.

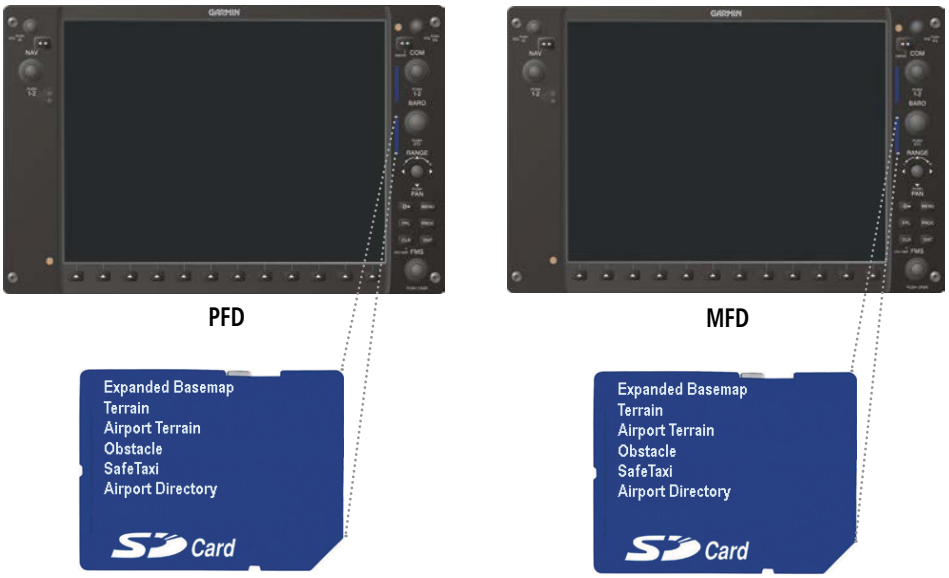


Figure B-7 Correct Database Locations

Since these databases are not stored internally in the displays, a Supplemental Data Card containing identical database versions must be kept in each display unit.

The basemap database contains data for the topography and land features, such as rivers, lakes, and towns. It is updated only periodically, with no set schedule. There is no expiration date.

The terrain database contains the terrain mapping data. These databases are updated periodically and have no expiration date.

The obstacle database contains data for obstacles, such as towers, that pose a potential hazard to aircraft. Obstacles 200 feet and higher are included in the obstacle database. It is very important to note that not all obstacles are necessarily charted and therefore may not be contained in the obstacle database. This database is updated on a 56-day cycle.

NOTE: *The data contained in the terrain and obstacle databases comes from government agencies. Garmin accurately processes and cross-validates the data, but cannot guarantee the accuracy and completeness of the data.*

The AOPA or AC-U-KWIK Airport Directory provides data on airports and heliports throughout the U.S. or worldwide, respectively. The AOPA Directory offers detailed information for over 5,300 U. S. airports, along with the names and phone numbers of thousands of FBOs. These databases are updated every 56 days. The AC-U-KWIK Directory offers detailed information for more than 8,000 airports with runways longer than 3,000 feet worldwide.

The SafeTaxi database contains detailed airport diagrams for selected airports. These diagrams aid in following ground control instructions by accurately displaying the aircraft position on the map in relation to taxiways, ramps, runways, terminals, and services. This database is updated on a 56-day cycle.

AUTOMATIC DATABASE SYNCHRONIZATION FEATURE

The automatic database synchronization feature automatically transfers the database from a single SD database card to the SD cards on the PFD and the MFD to ensure that all databases are synchronized throughout the system. After power-up, the system compares all copies of each applicable database. If similar databases do not match, the most recent valid database is automatically copied to each card in the system that does not already contain that database.

The following databases are checked and synchronized: Basemap, Safetaxi, Airport Terrain, Obstacle, Airport Directory (AOPA or AC-U-KWIK), and Terrain. This feature applies only to databases that are stored on the SD card that resides in the bottom slot of each display. This feature does not apply to the navigation database which is stored internally in each display. The typical procedure would be to download new databases to the MFD card, then synchronize the data to the PFD.

NOTE: The 9-arc second terrain database may take as long as 100 minutes to synchronize using this method. Therefore the user may want to transfer the data using a PC, or connect the system to a ground power source while performing the database synchronization.

The synchronization progress may be monitored on the AUX-System Status Page in the Sync Status section of the Database Window (Figure B-8). This section shows the synchronization status of each applicable database, including the percent complete, time remaining, and to which displays the databases are being copied. When the synchronization is complete, the status is listed as 'Complete', followed by the displays to which the databases were copied. This sub-section is only present when a sync is occurring or has occurred on the current power-up.

An indication of 'Complete' still requires a power cycle before the synchronized databases will be used by the system.

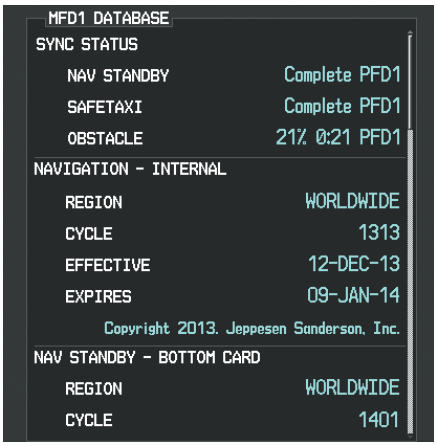


Figure B-8 AUX-System Status Page, Database Window

The Display Database Softkey (Figure B-11) is used to place the cursor in the Database Window. Upon first press of the Display Database Softkey, the softkey will change to a selected state (black text on gray background) and the cursor will appear in the Database Window. At this point the user can scroll through all databases in the Database Window to view status information. If the Display Database Softkey is pressed repeatedly, the softkey will switch between the PFD and MFD. Database status information in the Database Window will reflect the database of the selected display. After a successful sync and restart, verify that the proper databases are now in use on the AUX–System Status Page (Figure B-8).

If an error occurs during the synchronization, an error message will be displayed, followed by the affected display in the Sync Status section of the Database Window (Figure B-9). If a synchronization completes on one display, but an error occurs on another, the error message will be displayed with the affected diaplay listed after it. When an error message (Table B-1) is displayed, the problem must be corrected before the synchronization can be completed. A power cycle is required to restart synchronization when 'Card Full' or 'Err' is shown.

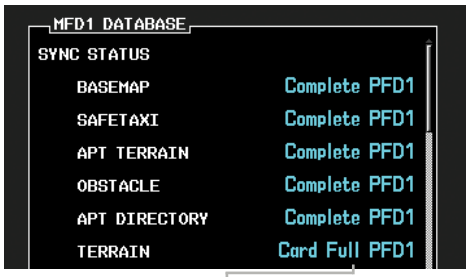


Figure B-9 Synchronization Error Message

Error Message	Description
Canceled	Database synchronization has been canceled by removing the bottom SD card in display being updated
Card Full	SD card does not contain sufficient memory
Err	Displayed for all other errors that may cause the synchronization process to be halted
Timeout	System timed-out prior to the database transfer completing

Table B-1 Database Synchronization Error Messages

UPDATING GARMIN DATABASES

The Garmin database updates can be obtained by following the instructions detailed in the 'Aviation Databases' section of the Garmin website (fly.garmin.com). Once the updated files have been downloaded from the website, a PC equipped with an appropriate SD card reader is used to unpack and program the new databases onto an existing Supplemental Data Card. Equipment required to perform the update is as follows:

- Windows-compatible PC computer (running Windows XP, Vista, or Windows 7)
- SD Card Reader: SanDisk SDDR-93, SanDisk SDDR-99, Verbatim #96504, or equivalent
- Updated database obtained from the Garmin website
- Existing Supplemental Database SD Cards (010-00330-4A, -4B, -4C, -4D, -4E, or -4F) from the PFD and MFD

In some cases it may be necessary to obtain an unlock code from Garmin in order to make the database product functional. It may also be necessary to have the system configured by a Garmin authorized service facility in order to use some database features.

Updating Basemap, SafeTaxi, Airport Terrain, Obstacle, and Airport Directory Databases

These databases may be copied to one Supplemental Data Card, then automatically synchronized to other card in the system:

1) With system power OFF, remove the MFD database card from the bottom card slot of the MFD.
2) Update the basemap, SafeTaxi, airport terrain, obstacle and/or airport directory databases on the MFD card.
3) Insert the MFD database card into the bottom card slot of the MFD.
4) Apply power to the system, check that the databases are initialized and displayed on the power-up screen (Figure B-10). If a 'Verifying' message is seen, wait for the system to finish loading before proceeding to step 5.

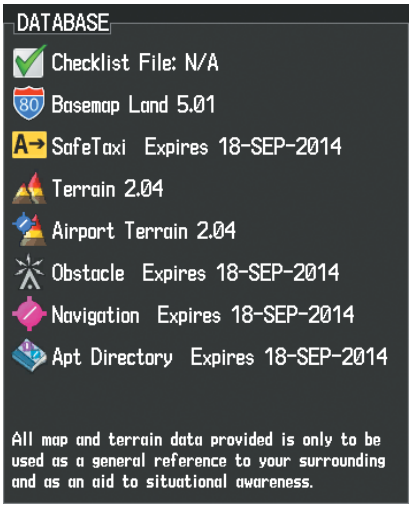


Figure B-10 Database Information on the Power-up Screen

5) Acknowledge the Power-up Page agreement by pressing the **ENT** Key or the right most softkey.

6) Turn the large **FMS** Knob to select the AUX Page group on the MFD.

7) Turn the small **FMS** Knob to select the System Status Page.

8) Monitor the Sync Status in the Database Window. Wait for all databases to complete synching, indicated by 'Complete' being displayed as seen in Figure B-9.

9) Remove and reapply power to the system.

10) Turn the large **FMS** Knob to select the AUX Page group on the MFD.

11) Turn the small **FMS** Knob to select the System Status Page.

12) Press the Display Database Selection Softkey to show database information for each display (**MFD1 DB**, **PFD1 DB**). Verify the correct database cycle information is shown for each database for each display.



Figure B-11 Display Database Softkey

Updating Terrain, FliteCharts, and ChartView Databases

1) With system power OFF, remove the Supplemental Data Card from the bottom card slot of the MFD and PFD.

2) Copy the updated terrain database to each of the Supplemental Data Cards. Copy the updated FliteCharts or ChartView database to one Supplemental Data Card.

3) Insert the updated Supplemental Data Cards into the bottom card slot of the MFD and PFD. The Supplemental Data Card containing the FliteCharts or ChartView database is inserted in the MFD.

4) Apply power to the system, check that the databases are initialized and displayed on the power-up screen (Figure B-10). A 'Verifying' message may be seen. If this message is present, wait for the system to finish loading before proceeding to step 5.

5) Acknowledge the Power-up Page agreement by pressing the **ENT** Key or the right-most softkey.

6) Turn the large **FMS** Knob to select the AUX Page group on the MFD.

7) Turn the small **FMS** Knob to select the System Status Page.

8) Press the Display Database Selection Softkey to show database information for each display (**MFD1 DB**, **PFD1 DB**). Verify the correct database cycle information is shown for each database for each display.

9) Remove power from the system.

MAGNETIC FIELD VARIATION DATABASE UPDATE

A copy of the current magnetic field variation database (MV DB) is included with the navigation database. At startup, the system compares this version of the MV DB with that presently being used by the AHRS. If the system determines the MV DB needs to be updated, a prompt is displayed on the Navigation Map Page, as shown in Figure B-12.

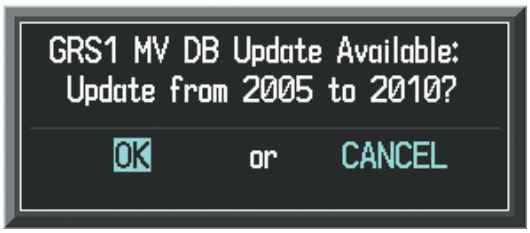


Figure B-12 GRS1 Magnetic Field Variation Database Update Prompt

Loading the magnetic field variation database update:

1) With 'OK' highlighted, as seen in Figure B-12, press the **ENT** Key on the MFD. A progress monitor is displayed as shown in Figure B-13. When the upload is complete, the system is ready for use.

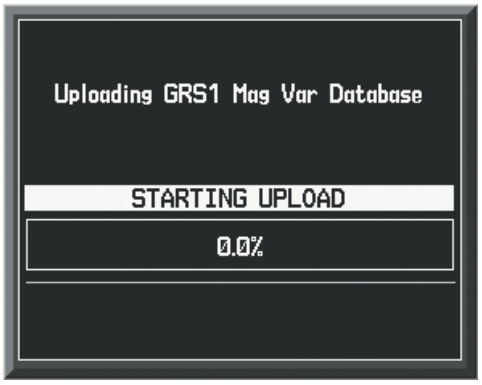


Figure B-13 Uploading Database to GRS1

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GARMIN AVIATION GLOSSARY

ACC	Accuracy
ACT, ACTV	Active, Activate, Altitude Compensated Tilt
ADC	Air Data Computer
ADF	Automatic Direction Finder
ADI	Attitude Direction Indicator
ADIZ	Air Defense Identification Zone
ADS-B	Automatic Dependent Surveillance-Broadcast
AF	Arc to Fix Leg
AFCS	Automatic Flight Control System
AFM	Airplane Flight Manual
AFMS	Airplane Flight Manual Supplement
AFRM	Airframe
AGL	Above Ground Level
AHRS	Attitude and Heading Reference System
AIM	Aeronautical Information Manual
AIRMET	Airman's Meteorological Information
AIRREP	Air Reports
ALRT	Alert
ALT	Altitude
ALT, ALTN	Alternator
ALTS	Selected Altitude Capture Mode
ALTV	VNAV Altitude Capture Mode
AMPS	Amperes
ANNUNC	Annunciation
ANT	Antenna
AOA	Angle of Attack
AOG	Aircraft On Ground
AOPA	Aircraft Owners and Pilots Association
AP	Autopilot
AP DISC	Autopilot Disconnect
APPR, APR	Approach
APT	Airport, Aerodrome
APTSIGNS	Airport Signs
ARINC	Aeronautical Radio Incorporated
ARSPC	Airspace
ARTCC	Air Route Traffic Control Center
ARV	Arrival
AS	Airspeed
ASB	Aviation Support Branch
ASOS	Automated Surface Observing System
ATC	Air Traffic Control
ATCRBS	ATC Radar Beacon System
ATIS	Automatic Terminal Information Service
ATK	Along Track
AUTOSEQ	Automatic Sequence
AUX	Auxiliary
AVG	Average
AWOS	Automated Weather Observing System
B	Both Runways
B ALT	Barometric Altitude
BARO	Barometer, Barometric
BATT	Battery
BC	Backcourse
Bearing	The compass direction from the present position to a destination waypoint.
BFO	Beat Frequency Oscillator
BKSP	Backspace
BRG	Bearing
°C	Degrees Celsius
C	Center Runway
CA	Course to Altitude Leg
CAL	Calibrated
CALC	Calculator
Calibrated Airspeed	Indicated airspeed corrected for installation and instrument errors.
CAS	Crew Alerting System
CD	Course to DME Distance Leg
CDI	Course Deviation Indicator
CDU	Control Display Unit
CF	Course to Fix Leg
CH, CHNL	Channel

CHT	Cylinder Head Temperature
CHKLIST	Checklist
CI	Course to Intercept Leg
CLD	Cloud
CLR	Clear
CM	Centimeter
CN	Canada
CNS	Communication, Navigation, & Surveillance
CO	Carbon Monoxide
COM	Communication Radio
CONFIG	Configuration
COOL	Coolant
COPLT	Copilot
Course	The line between two points to be followed by the aircraft.
Course to Steer	The recommended direction to steer in order to reduce course error or stay on course. Provides the most efficient heading to get back to the desired course and proceed along the flight plan.
CPDLC	Controller Pilot Datalink Communications
CPL	Couple
CR	Course to Radial Leg
CRG	Cockpit Reference Guide
CRNT	Current
Crosstrack Error	The distance the aircraft is off a desired course in either direction, left or right.
CRS	Course, Course to Steer
CRSR	Cursor
CSC	Current Speed Control
CTA	Control Area
CTR	Center
CTRL	Control
Cumulative, CUM	The total of all legs in a flight plan.
CVR	Cockpit Voice Recorder
CVRG	Coverage
CWS	Control Wheel Steering
CYL	Cylinder
D ALT	Density Altitude
DB, DBASE	Database
dBZ	Decibels 'Z' (Radar Return)
DCLTR, DECLTR	Declutter
DEC FUEL	Decrease Fuel
DEG	Degree
DEIC, DEICE	De-icing
DEP	Departure
Desired Track	The desired course between the active "from" and "to" waypoints.
DEST	Destination
DEV	Deviation
DF	Direct to Fix Leg
DFLT	Default
DG	Directional Gyro
DGRD	Degrade
DH	Decision Height
Dilution of Precision	A measure of GPS satellite geometry quality on a scale of one to ten (lower numbers equal better geometry, where higher numbers equal poorer geometry).
DIR	Direction
DIS	Distance
Distance	The 'great circle' distance from the present position to a destination waypoint.
DME	Distance Measuring Equipment
DN	Down
DOP	Dilution of Precision
DP	Departure Procedure
DPRT	Departure
DR	Dead Reckoning
DSBL	Disabled
DTK	Desired Track
E	Empty, East
ECU	Engine Control Unit
Efficiency	A measure of fuel consumption, expressed in distance per unit of fuel.
EGNOS	European Geostationary Navigation Overlay Service

EGT	Exhaust Gas Temperature
EIS	Engine Indication System
ELEV	Elevation, Elevator
EMER, EMERG, EMERGCY	Emergency
EMI	Electromagnetic Interference
END, ENDUR	Endurance
Endurance	Flight endurance, or total possible flight time based on available fuel on board.
ENG	Engine
ENGD	Engaged
ENR	Enroute
Enroute Safe Altitude	The recommended minimum altitude within ten miles left or right of the desired course on an active flight plan or direct-to.
ENT	Enter
EPE	Estimated Position Error
EPU	Estimated Position Uncertainty
ERR	Error
ESA	Enroute Safe Altitude
ESP	Electronic Stability and Protection
Estimated Position Error	A measure of horizontal GPS position error derived by satellite geometry conditions and other factors.
Estimated Time of Arrival	The estimated time at which the aircraft should reach the destination waypoint, based upon current speed and track.
Estimated Time Enroute	The estimated time it takes to reach the destination waypoint from the present position, based upon current groundspeed.
ETA	Estimated Time of Arrival
ETE	Estimated Time Enroute
EXPIRD	Expired
°F	Degrees Fahrenheit
FA	Course From Fix to Altitude Leg
FAA	Federal Aviation Administration
FAF	Final Approach Fix
FAIL	Failure
FC	Course From Fix to Distance Leg
FCC	Federal Communication Commission
FCST	Forecast
FD	Flight Director, Course From Fix to DME Distance Leg
FDE	Fault Detection and Exclusion
FF, FFLOW	Fuel Flow
FIS-B	Flight Information Services-Broadcast
FISDL	Flight Information Service Data Link
FL	Flight Level
FLC	Flight Level Change
FM	Course From Fix to Manual Termination Leg
FMS	Flight Management System
FOB	Fuel On Board
FOD	Fuel Over Destination
FPA	Flight Path Angle
FPL	Flight Plan
FPM	Feet Per Minute, Flight Path Marker
FREQ	Frequency
FRMT	Format
FRZ	Freezing
FSS	Flight Service Station
FT	foot/feet
Fuel Flow	The fuel flow rate, expressed in units of fuel per hour.
Fuel On Board	The total amount of usable fuel on board the aircraft.
FWD	Forward
G/S	Glideslope
GA	Go-Around
GAL, GL	Gallon(s)
GBOX	Gearbox
GCS	Ground Clutter Suppression
GDC	Garmin Air Data Computer
GDU	Garmin Display Unit
GEA	Garmin Engine/Airframe Unit
GEO	Geographic
GFC	Garmin Flight Control
GIA	Garmin Integrated Avionics Unit

GMA	Garmin Audio Panel System
GMC	Garmin Mode Controller
GMT	Greenwich Mean Time
GMU	Garmin Magnetometer Unit
GND	Ground
GPH	Gallons per Hour
GPN	Garmin Part Number
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
Grid MORA	Grid Minimum Off-Route Altitude; One degree latitude by one degree longitude in size and clears the highest elevation reference point in the grid by 1,000 feet for all areas of the grid or 2,000 feet for mountainous
Groundspeed	The velocity that the aircraft is travelling relative to a ground position.
Ground Track	See Track
GRS	Garmin Reference System
GS	Ground Speed, Glideslope
GSA	Garmin Servo Adapter
GSL	Geodetic Sea Level
GTS	Garmin Traffic System
GTX	Garmin Transponder
GWX	Garmin Weather Radar
HA	Hold Terminating at Altitude Leg
HDG	Heading
HDOP	Horizontal Dilution of Precision
Heading	The direction an aircraft is pointed, based upon indications from a magnetic compass or a properly set directional gyro.
HF	High Frequency, Hold Terminating at Fix Leg
HFOM	Horizontal Figure of Merit
Hg	Mercury
HI	High
HI SENS	High Sensitivity
HM	Hold with Manual Termination Leg
Horizontal Figure of Merit	A measure of the uncertainty in the aircraft's horizontal position.
hPa	Hectopascal
HPL	Horizontal Protection Level
HR	Hour
HRZN HDG	Horizon Heading
HSDB	High-Speed Data Bus
HSI	Horizontal Situation Indicator
HT	heat
HUL	Horizontal Uncertainty Level
Hz	Hertz (cycles per second)
I	Inner Marker
IAF	Initial Approach Fix
IAS	Indicated Air Speed
IAT	Indicated Air Temperature
IAU	Integrated Avionics Unit
ICAO	International Civil Aviation Organization
ICS	Intercom System
ID	Identification/Morse Code Identifier
IDENT, IDNT	Identification
IF	Initial Fix
IFR	Instrument Flight Rules
IG	Imperial Gallon
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
IN	Inch
INACTV	Inactive
INC FUEL	Increase Fuel
IND	Indicator, Indicated
Indicated	Information provided by properly calibrated and set instrumentation on the aircraft panel.
INFO	Information
IN Hg	Inches of Mercury
INT	Intersection(s)
INTEG	Integrity (RAIM unavailable)
IrDA, IRDA	Infrared Data Association
ISA	International Standard Atmosphere
ITT	Interstage Turbine Temperature, Inter-Turbine Temperature

KEYSTK	Key Stuck
KG	Kilogram
kHz	Kilohertz
KM	Kilometer
KT	Knot
L	Left, Left Runway
LAT	Latitude
LBL	Label
LB	Pound
LCD	Liquid Crystal Display
LCL	Local
LED	Light Emitting Diode
Left Over Fuel On Board	The amount of fuel remaining on board after the completion of one or more legs of a flight plan or direct-to.
Left Over Fuel Reserve	The amount of flight time remaining, based on the amount of fuel on board after the completion of one or more legs of a flight plan or direct-to, and a known consumption rate.
Leg	The portion of a flight plan between two waypoints.
LGND	Legend
LIFR	Low Instrument Flight Rules
LNAV	Lateral Navigation
LO	Low
LOC	Localizer
LOI	Loss of Integrity (GPS)
LON	Longitude
LPV	Localizer Performance with Vertical Guidance
LRU	Line Replaceable Unit
LT	Left
LTNG	Lightning
LVL	Level
M	Meter, Middle Marker
M_{MO} (V_{MO})	Maximum Speed
Mach Number	Mach number is the ratio of the true airspeed to the speed of sound.
MAG	Magnetic
MAG VAR	Magnetic Variation
MAHP	Missed Approach Hold Point
MAN IN	Manifold Pressure (inches Hg)
MAN SQ	Manual Squelch
MAP	Missed Approach Point
MASQ	Master Avionics Squelch
MAX	Maximum
MAXSPD	Maximum Speed (overspeed)
MDA	Barometric Minimum Descent Altitude
MEPT	Manual Electric Pitch Trim
MET	Manual Electric Trim
METAR	Aviation Routine Weather Report
MFD	Multi Function Display
MFW	Multi Function Window
MGRS	Military Grid Reference System
MHz	Megahertz
MIC	Microphone
MIN	Minimum
Minimum Safe Altitude	Uses Grid MORAs to determine a safe altitude within ten miles of the aircraft present position.
MKR	Marker Beacon
MOA	Military Operations Area
MON	Monitor
MOV	Movement
MORA	Minimum Off-Route Altitude
MPEL	Maximum Permissible Exposure Level
MPM	Meters per Minute
MSA	Minimum Safe Altitude
MSAS	Multi-functional Satellite Augmentation System
MSG	Message
MSL	Mean Sea Level
MT, M	Meter
mV	Millivolt(s)
MVFR	Marginal Visual Flight Rules
N	North
NAV	Navigation
NAVAID	Navigation Aid

NDB	Non-Directional Beacon
NEXRAD	Next Generation Radar
NM	Nautical Mile(s)
NoPT	No Procedure Turn Required (procedure shall not be executed without ATC clearance)
NOTAM	Notice To Airman
NRST	Nearest
O	Outer Marker
OAT	Outside Air Temperature
OBS	Omni Bearing Selector
OFST	Offset
OXY	Oxygen
P ALT	Pressure Altitude
PA	Passenger Address, Proximity Advisory
PASS	Passenger(s)
PC	Personal Computer
PFD	Primary Flight Display
PI	Procedure Turn to Course Intercept Leg
PIREP	Pilot Report
PIT, PTCH	Pitch
POH	Pilot's Operating Handbook
POHS	Pilot's Operating Handbook Supplement
POS, POSN	Position
PPH	Pounds per Hour
PPM	Parts per Million
P. POS	Present Position
PRES, PRESS	Pressure
PROC	Procedure(s), Procedure Turn
PROP	Propeller
PROX	Proximity
PSI	Pounds per Square Inch
PT	Procedure Turn
PTK	Parallel Track
PTT	Push-to-Talk
PWR	Power
QTY	Quantity
R	Right, Right Runway
RA	Resolution Advisory, Radio Altimeter
RAD	Radial
RA, RAD ALT	Radio Altimeter
RAIM	Receiver Autonomous Integrity Monitoring
RAM	Random Access Memory
RAT	Return Air Temperature
RCVR	Receiver
REF	Reference
REM	Remaining (fuel remaining), Reminder
REQ	Required
RES	Reserve (fuel reserve entered by pilot)
REV	Reverse, Revision, Revise
RF	Radio Frequency, Constant Radius Turn to Fix Leg
RMI	Radio Magnetic Indicator
RMT	Remote
RNAV	Area Navigation
RNG	Range
RNP	Required Navigation Performance
RNWY, RWY	Runway
ROL	Roll
ROM	Read Only Memory
RPM	Revolutions Per Minute
RST FUEL	Reset Fuel
RSV	Reserve (fuel reserve entered by pilot)
RT	Right
RVRSNRY	Reversionary
RX	Receive
S	South
SA	Selective Availability
SAT	Static Air Temperature
SBAS	Satellite-Based Augmentation System
SCIT	Storm Cell Identification and Tracking
SD	Secure Digital
SEC	Second(s)
SEL, SLCT	Select
SENS	Sense

SFC	Surface
SIAP	Standard Instrument Approach Procedures
SID	Standard Instrument Departure
SIG/AIR	SIGMET/AIRMET
SIGMET	Significant Meteorological Information
SIM	Simulator
SLD	Supercooled Large Droplet
SLP/SKD	Slip/Skid
SMBL	Symbol
SPC	Space
SPD	Speed
SPI	Special Position Identification
SPKR	Speaker
SQ	Squelch
SRVC, SVC	Service
STAB	Stabilization
STAL	Stall
STAR	Standard Terminal Arrival Route
STATS	Statistics
STBY	Standby
STD	Standard
STRMSCP	Stormscope
SUA	Special Use Airspace
SUSP	Suspend
SVT, SYN VIS	Synthetic Vision Technology
SW	Software
SYNC	Synchronize
SYN TERR	Synthetic Terrain
SYN VIS	Synthetic Vision
SYS	System
T	TRUE
TA	Traffic Advisory
TACAN	Tactical Air Navigation System
TAF	Terminal Aerodrome Forecast
TAS	True Airspeed, Traffic Advisory System
TAT	Total Air Temperature
TAWS	Terrain Awareness and Warning System
TCA	Terminal Control Area
TCAS	Traffic Alert Collision Avoidance System
TEL	Telephone
TEMP	Temperature
TERM	Terminal
TF	Track Between Two Fixes Leg
TFR	Temporary Flight Restriction
TGT	Target
T HDG	True Heading
TIS	Traffic Information Service
TIT	Turbine Inlet Temperature
TKE	Track Angle Error
TMA	Terminal Maneuvering Area
TMR/REF	Timer/Reference
TOC	Top of Climb
TOD	Top of Descent
TOGA, TO/GA	Take-Off, Go-Around
TOPO	Topographic
TOT	Total
Track	Direction of aircraft movement relative to a ground position; also 'Ground Track'.
Track Angle Error	The angle difference between the desired track and the current track.
TRK	Track
TRSA	Terminal Radar Service Area
TRUNC	Truncated
TTL	Total
TURB	Turbulence
TURN	Procedure Turn
TX	Transmit
UNAVAIL	Unavailable
US	United States
USR	User
UTC	Coordinated Universal Time
UTM/UPS	Universal Transverse Mercator/ Universal Polar Stereographic Grid
V, Vspeed	Velocity (airspeed)
V_{LE}	Maximum landing gear extended speed
V_{LO}	Maximum landing gear operating speed

V_{MC}	Minimum Control Speed
V_{MO} (M_{MO})	Maximum Speed
V_{NE}	Never-Exceed Speed
V_R	Rotate Speed
V_X	Best Angle of Climb Speed
V_Y	Best Rate of Climb Speed
V_{YSE}	Best Single-Engine Rate of Climb Speed
V	Volts
V DEV	Vertical Deviation
VA	Heading Vector to Altitude Leg
VAC	Volts Alternating Current
VAPP	VOR Approach
VAR	Variation
VD	Heading Vector to DME Distance Leg
VDC	Volts Direct Current
VERT	Vertical
Vertical Figure of Merit	A measure of the uncertainty in the aircraft's vertical position.
Vertical Speed Required	The vertical speed necessary to descend/climb from a current position and altitude to a defined target position and altitude, based upon current groundspeed.
VFOM	Vertical Figure of Merit
VFR	Visual Flight Rules
VHF	Very High Frequency
VI	Heading Vector to Intercept Leg
VLOC	VOR/Localizer Receiver
VM	Heading Vector to Manual Termination Leg
VMC	Visual Meteorological Conditions
VNAV, VNV	Vertical Navigation
VOL	Volume
VOR	VHF Omnidirectional Range
VORTAC	VHF Omnidirectional Range Station and Tactical Air Navigation
VPATH, VPTH	Vertical Path
VPL	Vertical Protection Level
VPROF	VNAV Profile, Vertical Profile
VR	Heading Vector to Radial Leg
VS	Vertical Speed
VSI	Vertical Speed Indicator
VSR, VS REQ	Vertical Speed Required
VTF	Vector to Final
W	Watt(s), West
WAAS	Wide Area Augmentation System
WARN	Warning
WATCH	Weather Attenuated Color Highlight
WGS-84	World Geodetic System - 1984
WPT	Waypoint(s)
WT	Weight
WW	World Wide
WX	Weather
XFER, XFR	Transfer
XM LTNG	SiriusXM Lightning
XPDR	Transponder
XTALK	Cross-Talk
XTK	Cross-Track
YD	Yaw Damper

FREQUENTLY ASKED QUESTIONS

If a particular aspect of G950 operational capability is not addressed by these commonly asked questions or in the index, contact Garmin (see the copyright page or back cover for contact information) or a Garmin-authorized dealer. Garmin is dedicated to supporting its products and customers.

What is SBAS?

The Satellite Based Augmentation System (SBAS) uses a system of ground stations to correct any GPS signal errors. These ground stations correct for errors caused by ionospheric disturbances, timing, and satellite orbit errors. It also provides vital integrity information regarding the health of each GPS satellite. The signal correction is then broadcast through geostationary satellites. This correction information can then be received by any SBAS-enabled GPS receiver.

SBAS is designed to provide the additional accuracy, availability, and integrity necessary to enable users to rely on GPS for all phases of flight.

There are several SBAS systems serving different parts of the world. The Wide Area Augmentation System (WAAS) is currently available in the United States, including Alaska and Hawaii. The European Geostationary Navigation Overlay Service (EGNOS) offers coverage of Europe, parts of the Middle East, and parts of northern Africa. The Multi-functional Satellite Augmentation System (MSAS) covers mainly Japan.

How does SBAS affect approach operations?

Both LNAV/VNAV and LPV approaches use the accuracy of SBAS to include vertical (glide path) guidance capability. The additional accuracy and vertical guidance capability allows improved instrument approaches to an expanded number of airports throughout the U.S.

The implementation of RNAV LP and LPV approaches further improves precision approach capabilities. RNAV LPV approaches are designed to make full use of the improved GPS signal from the SBAS. This approach combines localizer precision lateral guidance with vertical guidance similar to the typical Instrument Landing System (ILS). RNAV LPV approaches allow lower approach minimums

What is RAIM and how does it affect approach operations?

RAIM is an acronym for Receiver Autonomous Integrity Monitoring. RAIM is a GPS receiver function that performs the following functions:

- Monitors and verifies integrity and geometry of tracked GPS satellites
- Notifies the pilot when satellite conditions do not provide the necessary coverage to support a certain phase of flight
- Predicts satellite coverage of a destination area to determine whether the number of available satellites is sufficient to satisfy requirements

NOTE: *If RAIM is not predicted to be available for the final approach course, the approach does not become active, as indicated by the "RAIM not available from FAF to MAP" message and the LOI annunciation flagging on the HSI.*

For RAIM to work correctly, the GPS receiver must track at least five satellites. A minimum of six satellites is required to allow RAIM to eliminate a single corrupt satellite from the navigation solution.

RAIM ensures that satellite geometry allows for a navigation solution calculation within a specified protection limit (2.0 nm for oceanic and en route, 1.0 nm for terminal, and 0.3 nm for non-precision approaches). The G950 System monitors RAIM and issues an alert message when RAIM is not available (see Appendix A). Without RAIM, GPS position accuracy cannot be monitored. If RAIM is not available when crossing the FAF, the pilot must fly the missed approach procedure.

What is GSL altitude?

GSL (Geodetic Sea Level) altitude is the height above Mean Sea Level (MSL), as calculated geometrically, generally using a global positioning system (GPS) as the primary data source. The calculated result may or may not include a barometric component, but the primary source is geometric.

Why might there be no approaches available for a flight plan?

Approaches are available for the final destination airport in a flight plan or as a direct-to (keep in mind that some VOR/VORTAC identifiers are similar to airport identifiers). If a destination airport does not have a published approach, the G950 indicates "NONE" for the available procedures.

What happens when an approach is selected? Can a flight plan with an approach, a departure, or an arrival be stored?

When an approach, departure, or arrival is loaded into the active flight plan, a set of approach, departure, or arrival waypoints is inserted into the flight plan, along with a header line showing the title of the selected instrument procedure. The original enroute portion of the flight plan remains active, unless the instrument procedure is activated. This may be done either when the procedure is loaded or at a later time.

Flight plans can also be stored with an approach, a departure, or an arrival. Note the most recent active flight plan is restored when the system is turned on, if the aircraft position is the same as the origin airport in the most recent active flight plan. Also, the active flight plan is overwritten when another flight plan is activated. When storing flight plans with an approach, a departure, or an arrival, the 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, provided the procedure has not been modified. Should an approach, departure, or arrival procedure no longer be available, the flight plan becomes locked until the procedure is deleted from the flight plan.

Can "slant Golf" ("/G") be filed using the G950?

"/G" may be filed for a flight plan. The G950 system meets the requirements of TSO-C145a Class 3 or TSO-C145c Class 3, and ETSO C145 Class 3 installations. GPS approaches are not to be flown with an expired database. See the approved AFM as well as the Aeronautical Information Manual (AIM) for more information.

What does the OBS Softkey do?

The **OBS** Softkey is used to select manual sequencing of waypoints. Activating OBS mode sets the current active-to waypoint as the primary navigation reference and prevents the system from sequencing to the next waypoint in a flight plan. When OBS mode is cancelled, automatic waypoint sequencing is continued, and the G950 automatically activates the next waypoint in the flight plan once the aircraft has crossed the present active waypoint.

Normal (OBS not activated)	OBS
• Automatic sequencing of waypoints	• Manual sequencing - 'holds' on selected waypoint
• Manual course change on HSI not possible	• Manually select course to waypoint from HSI
• Always navigates 'TO' the active waypoint	• Indicates 'TO' or 'FROM' waypoint
• Must be in this mode for final approach course	• Cannot be set for final approach course or published holding patterns

When OBS mode is active, the G950 allows the pilot to set a desired course to/from a waypoint using the **CRS/BARO** Knob and HSI (much like a VOR).

The most common application for using the **OBS** Softkey is the missed approach. The G950 suspends automatic waypoint sequencing (indicated by a 'SUSP' annunciation placed on the HSI) when the missed approach point (MAP) is crossed. This prevents the G950 from automatically sequencing to the missed approach holding point (MAHP). During this time, the **OBS** Softkey designation changes to **SUSP**. Selecting the **SUSP** Softkey reactivates automatic waypoint sequencing. The **OBS** Softkey then resumes its normal functionality.

Why might the G950 not automatically sequence to the next waypoint?

The G950 only sequences flight plan waypoints when automatic sequencing is enabled (i.e., no 'OBS' or 'SUSP' annunciation on the HSI). For automatic sequencing to occur, the aircraft must also cross the *bisector* of the turn being navigated. The bisector is a line passing through the waypoint common to two flight plan legs at an equal angle from each leg.

How can a waypoint be skipped in an approach, a departure, or an arrival?

The G950 allows the pilot to manually select any approach, departure, or arrival leg as the active leg of the flight plan. This procedure is performed on the MFD from the Active Flight Plan Page by highlighting the desired waypoint and selecting the **ACT LEG** Softkey then the **ENT** Key to approve the selection. The GPS then provides navigation along the selected flight plan leg.

When does turn anticipation begin?

The G950 smooths adjacent leg transitions based on a normal 15° bank angle (with the ability to roll up to 30°) and provides three pilot cues for turn anticipation:

- A waypoint alert ('Next DTK ###° in # seconds' or 'Next HDG ###° in # seconds') appears on the PFD 10 seconds before the turn point and flashes as it counts down to zero.
- A flashing turn advisory ('Turn [right/left] to ###° in # seconds') appears on the PFD 10 seconds before the turn and flashes as it counts down to zero. 'Turn [right/left] to ###° now' or 'Next [DTK/HDG] to ###° now' is displayed when the pilot is to begin the turn and the HSI (GPS mode) automatically sequences to the next DTK or HDG value.
- The To/From indicator on the HSI flips momentarily to indicate that the midpoint of the turn has been crossed.

When does the CDI scale change?

Once a departure is activated, the G950 Course Deviation Indicator (CDI) full scale deflection is set to 0.3 nm. The CDI scale changes to 1.0 nm (terminal mode) then ramps up to 2.0 nm (enroute mode) at 30 nm from the departure airport. When 31 nm from the destination, the CDI scale smoothly transition from 2.0 nm back to 1.0 nm (terminal mode). At 2.0 nm before the FAF during an active approach, the CDI scale transitions down further based on the service level of the active approach (LNAV, LNAV/VNAV, LP, and LPV). When a missed approach is activated, the CDI is set to 0.3 nm. See the Flight Instruments Section for more details on CDI scaling.

Why does the HSI not respond like a VOR when OBS mode is active?

Unlike a VOR, the CDI scale used on GPS equipment is based on the crosstrack distance to the desired course, not on the angular relationship to the destination. Therefore, the CDI deflection on the GPS is constant regardless of the distance to the destination and does not become less sensitive when further away from the destination.

What is the correct missed approach procedure? How is the missed approach holding point selected?

To comply with TSO specifications, the G950 does not automatically sequence past the MAP. The first waypoint in the missed approach procedure becomes the active waypoint when the **SUSP** Softkey is selected *after* crossing the MAP. All published missed approach procedures must be followed, as indicated on the approach plate.

To execute the missed approach procedure prior to the MAP (not recommended), select the Active Flight Plan Page and use the **ACT LEG** Softkey to activate the missed approach portion of the procedure.

After a missed approach, how can the same approach be re-selected? How can a new approach be activated?

NOTE: *Do not attempt to reactivate the current approach prior to crossing the missed approach point (MAP). If an attempt to do so is made, an alert message "Are you sure you want to discontinue the current approach?" appears. The G950 directs the pilot back to the transition waypoint and does not take into consideration any missed approach procedures, if the current approach is reactivated.*

After flying the missed approach procedure, the pilot may reactivate the same approach for another attempt by pressing the **PROC** Key. Once the clearance is given for another attempt, activate the approach by highlighting 'ACTIVATE APPROACH' using the large **FMS** Knob and pressing the **ENT** Key. The G950 provides navigation along the desired course to the waypoint and rejoins the approach in sequence from that point.

To activate a new approach for the same airport, select the new procedure by pressing the **PROC** Key. Choose 'SELECT APPROACH', select the desired approach from the list shown, and press the **ENT** Key. Select the desired transition, then activate the approach using the **ENT** Key.

To activate a new approach to a different airport, press the **Direct-to** Key and select the desired airport using the **FMS** Knobs. Press the **ENT** Key to accept the selected airport, then follow the steps in the preceding paragraph to select an approach for the new airport.

GENERAL TIS INFORMATION

INTRODUCTION

NOTE: *Aircraft without an operating transponder are invisible to TIS.*

The Traffic Information Service (TIS) provides traffic advisory information to non-TAS/TCAS-equipped aircraft. TIS is a ground-based service providing the relative locations of all ATCRBS Mode-A and Mode-C transponder equipped aircraft within a specified service volume. The TIS ground sensor uses real-time track reports to generate traffic notification. The G950 System displays TIS traffic information on the Traffic Map Page of the MFD. TIS information may also be displayed for overlay on the MFD Navigation Map Page, as well as on the PFD Inset Map. Surveillance data includes all transponder-equipped aircraft within the coverage volume. The G950 System displays up to eight traffic targets within a 7.5 nm radius, from 3,000 feet below, to 3,500 feet above the requesting aircraft.

TIS VS. TAS/TCAS

The main difference between the Traffic Information System (TIS) and Traffic Advisory (TAS) or Traffic Collision Avoidance Systems (TCAS) is the source of surveillance data. TAS/TCAS uses an airborne interrogator with a half-second update rate, while TIS utilizes the terminal Mode-S ground interrogator and accompanying data link to provide a five-second update rate. TIS and TAS/TCAS have similar ranges.

TIS LIMITATIONS

NOTE: *TIS is not intended to be used as a collision avoidance system and does not relieve the pilot of the responsibility to "see and avoid" other aircraft. TIS shall not be used for avoidance maneuvers during instrument meteorological conditions (IMC) or when there is no visual contact with the intruder aircraft.*

NOTE: *Refer to the TIS Limitations section of the Aeronautical Information Manual (AIM) for a more comprehensive explanation.*

TIS relies on surveillance of the Mode-S radar system, which is a "secondary surveillance" radar system similar to that used by ATCRBS. Many limitations are inherent in secondary radar surveillance. Information provided by TIS is neither better nor more accurate than the information used by ATC. TIS is intended only to assist in visual acquisition of other aircraft in visual meteorological conditions (VMC). While TIS is a useful aid for visual traffic avoidance, system limitations must be considered to ensure proper use. No recommended avoidance maneuvers are given, nor authorized, as a direct result of a TIS intruder display or TIS advisory.

- TIS operation may be intermittent during turns or other maneuvering.
- TIS is dependent on two-way, line-of-sight communications between the aircraft and the Mode-S radar antenna. Whenever the structure of the aircraft comes between the transponder antenna and the ground-based radar antenna, the signal may be temporarily interrupted.
- Other limitations and anomalies associated with TIS are described in the AIM.

WARNING: *Garmin is not responsible for Mode S geographical coverage. Operation of the ground stations is the responsibility of the FAA. Refer to the AIM for a Terminal Mode S radar site map.*

NOTE: *TIS is unavailable at low altitudes in many areas of the United States. This is often the case in mountainous regions.*

TIS information is collected during a single radar sweep. Collected information is then sent through the Mode S uplink on the next radar sweep. Because of this, the surveillance information is approximately five seconds old. TIS ground station tracking software uses prediction algorithms to compensate for this delay. These algorithms use track history data to calculate expected intruder positions consistent with the time of display. Occasionally, aircraft maneuvering may cause variations in this calculation and create slight errors on the Traffic Map Page. Errors affect relative bearing information and target track vector. This can cause a delay in the displayed intruder information. However, intruder distance and altitude typically remain relatively accurate and may be used to assist in spotting traffic.

The following errors are common examples:

- When the client or intruder aircraft maneuvers excessively or abruptly, the tracking algorithm may report incorrect horizontal position until the maneuvering aircraft stabilizes.
- When a rapidly closing intruder is on a course that intercepts the client aircraft course at a shallow angle (either overtaking or head-on) and either aircraft abruptly changes course within 0.25 nm, TIS may display the intruder aircraft on the incorrect side of the client aircraft.

These are rare occurrences and are typically resolved within a few radar sweeps once the client/intruder aircraft course stabilizes.

Pilots using TIS can provide valuable assistance in the correction of malfunctions by reporting observations of undesirable performance. Reports should identify the time of observation, location, type, and identity of the aircraft, and describe the condition observed. Reports should also include the type of transponder and transponder software version. Since TIS performance is monitored by maintenance personnel, not ATC, malfunctions should be reported in the following ways:

- By telephone to the nearest Flight Service Station (FSS) facility
- By FAA Form 8000-7, Safety Improvement Report (postage-paid card can be obtained at FAA FSSs, General Aviation District Offices, Flight Standards District Offices, and General Aviation Fixed Base Operators)

MAP SYMBOLS

AIRPORTS

Item	Symbol
Unknown Airport	
Non-towered, Non-serviced Airport	
Towered, Non-serviced Airport	
Non-towered, Serviced Airport	
Towered, Serviced Airport	
Restricted (Private) Airport	
Heliport	

NAVAIDS

Item	Symbol
Intersection	
LOM (compass locator at outer marker)	
NDB (non-directional radio beacon)	
VOR	
VOR/DME	
VOR/ILS	
VORTAC	
TACAN	

BASEMAP

Item	Symbol
Interstate Highway	
State Highway	
US Highway	
National Highway	
City	
State/Province Border	
International Border	
Road	
Railroad	
Latitude/Longitude	

AIRSPACE BOUNDARIES

Item	Symbol
ICAO Control Area Class B Airspace	
Mode C Tower Area	
Warning Area — Prohibited Area Alert Area — Restricted Area Caution Area — Training Area Danger Area — Unknown Area	
Class C Terminal Radar Service Area Mode C Area	
Military Operations Area (MOA)	

HAZARD AVOIDANCE FEATURES

Feature	Symbol
Terrain Proximity display enabled	
Traffic display enabled	
Loss of hazard avoidance feature (a white X is shown over the symbol to indicate not available; e.g., traffic symbol)	

TRAFFIC

Item	Symbol
Non-threat Traffic	
Proximity Advisory	
Traffic Advisory, Out of Range	
Traffic Advisory	

MISCELLANEOUS

Item	Symbol
ARTCC Frequency or FSS Frequency	
Map Pointer (when panning)	
Elevation Pointer (on Topography Scale when panning)	
Measuring Pointer	
Wind Vector	
Overzoom Indicator	
User Waypoint	
Vertical Navigation Along Track Waypoint	
Parallel Track Waypoint	
Unanchored Flight Path Waypoint	
Top of Descent (TOD)	
Bottom of Descent (BOD)	
Navigating using Dead Reckoning	

OBSTACLE DATABASE

Unlighted Obstacle		Lighted Obstacle		Obstacle Location
< 1000' AGL	> 1000' AGL	< 1000' AGL	> 1000' AGL	
				Red obstacle is above or within 100 ft below the aircraft altitude
				Yellow obstacle is between 100 ft and 1000 ft below the aircraft altitude
				Gray obstacle is more than 1000 ft below aircraft altitude

Table G-1 Obstacle Colors

TERRAIN AVOIDANCE COLORS AND SYMBOLS

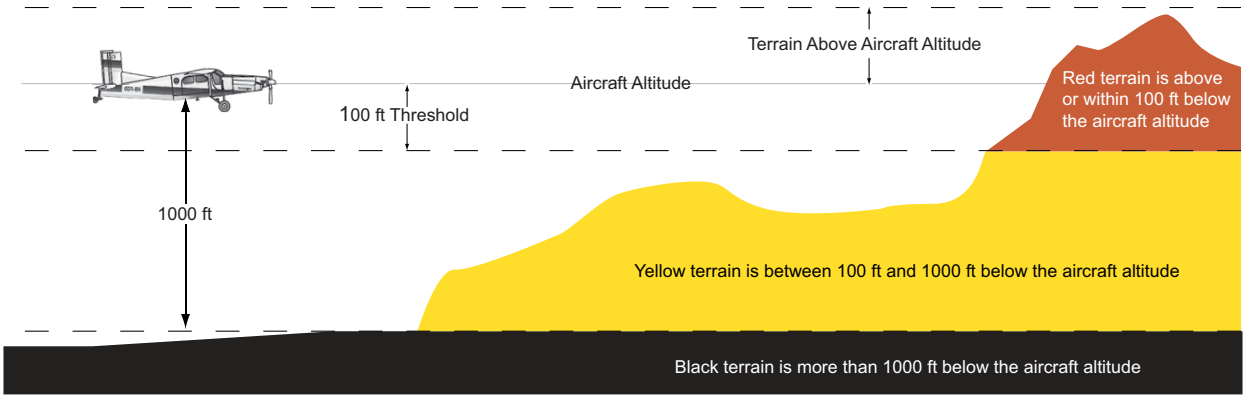


Figure F-1 Terrain Altitude/Color Correlation

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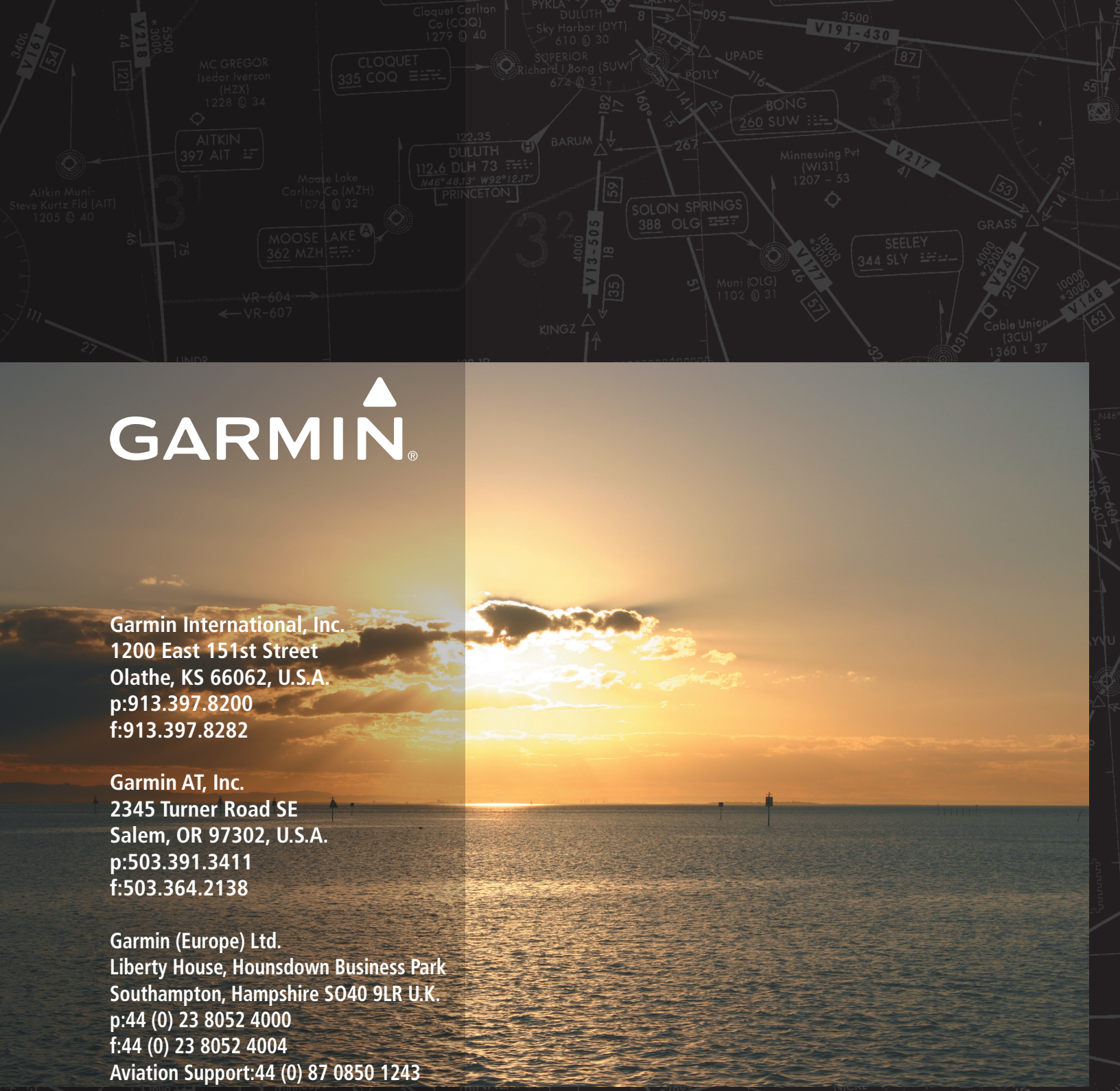
X

XM weather/radio ---------- 4

Z

Zoom
  Auto ---------- 138

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