AVIDYNE

IFD540 FMS/GPS/NAV/COM
PILOT GUIDE

Pg Chg	Pg Chg	Pg Chg	Pg Chg	Pg Chg	Pg Chg	Pg Chg
Cover...0	1-30…..0	2-31….0	3-26 …..0	4-27…..0	5-13…..0	6-26 ….0
Page #..0	1-31…..0	2-32 …..0	3-27 …..0	4-28…..0	5-14…..0	6-27 …..0
TOC-1...0	1-32…..0	2-33…..0	3-28…..0	4-29…..0	5-15…..0	6-28 …..0
TOC-2..0	2-1…….0	2-34…..0	3-29…..0	4-30…..0	5-16…..0	6-29 …..0
1-1……0	2-2….0	2-35…..0	3-30…..0	4-31…..0	5-17…..0	6-30 ….0
1-2…….0	2-3….0	2-36…..0	3-31…..0	4-32…..0	5-18……0	6-31 …..0
1-3…….0	2-4…….0	2-37……0	3-32…..0	4-33…..0	5-19……0	6-32 …..0
1-4…….0	2-5……0	2-38……0	4-1……0	4-34…..0	5-20……0	6-33 …..0
1-5…....0	2-6……0	3-1…….0	4-2…….0	4-35…..0	6-1…….0	6-34……0
1-6……0	2-7……0	3-2…….0	4-3…….0	4-36…..0	6-2…....0	6-35……0
1-7……0	2-8……0	3-3…….0	4-4…….0	4-37…..0	6-3…....0	6-36……0
1-8……0	2-9……0	3-4…….0	4-5…….0	4-38….0	6-4…....0	6-37…...0
1-9……0	2-10…..0	3-5…….0	4-6…….0	4-39…..0	6-5…....0	6-38…...0
1-10….0	2-11…..0	3-6…….0	4-7…,…0	4-40…..0	6-6…….0.	6-39……0
1-11…..0	2-12…..0	3-7…….0	4-8……0	4-41 ….0	6-7…....0	Indx-1...0
1-12…..0	2-13…..0	3-8…….0	4-9……0	4-42 …..0	6-8…....0	Indx-2…0
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1-14…..0	2-15…..0	3-10…..0	4-11…..0	4-44 …..0	6-10….0	Indx-4…0
1-15…..0	2-16….0	3-11…..0	4-12…..0	4-45 …..0	6-11…..0	IBC…....0
1-16…..0	2-17….0	3-12…..0	4-13….0	4-46…..0	6-12….0	OBC.…0
1-17…..0	2-18….0	3-13…. 0	4-14….0	4-47…..0	6-13…..0	
1-18…..0	2-19….0	3-14…..0	4-15….0	5-1…….0	6-14…..0	
1-19…..0	2-20…..0	3-15…..0	4-16….0	5-2…….0	6-15…..0	
1-20….0	2-21…..0	3-16…..0	4-17….0	5-3…….0	6-16…..0	
1-21….0	2-22…..0	3-17…..0	4-18….0	5-4…….0	6-17…..0	
1-22….0	2-23…..0	3-18…..0	4-19…..0	5-5……0	6-18…..0	
1-23….0	2-24….0	3-19…..0	4-20…..0	5-6…….0	6-19…..0	
1-24….0	2-25….0	3-20…..0	4-21…..0	5-7…….0	6-20…..0	
1-25….0	2-26… 0	3-21….0	4-22….0	5-8…….0	6-21…..0	
1-26….0	2-27….0	3-22…..0	4-23….0	5-9…….0	6-22…..0	
1-27 …..0	2-28….0	3-23 …..0	4-24….0	5-10…..0	6-23…..0	
1-28 …..0	2-29….0	3-24 …..0	4-25….0	5-11…..0	6-24…..0	
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1 System Overview

This manual assumes that the pilot is appropriately licensed, is proficient in operation of the aircraft and its equipment, and is in compliance with all Federal Aviation Regulations (FARs).

All images contained in this manual are for reference use only, and are subject to change.

Avidyne strongly recommends that pilots use the IFD540 system only under VFR conditions until completely familiar with its operation and use.

Boxed areas marked as **NOTE** within this manual identify certain situations or areas of operation having heightened safety implications. While it is important for the operator to be familiar with all of the information in the manual, it is essential to the safe use of the IFD540 that pilots give careful attention to the material contained within these **NOTE**s.

In order to avoid a diversion of attention from the task of safely taxiing, pilots should avoid performing the described cockpit tasks while the aircraft is in motion on the ground. It remains the pilot's duty to monitor the IFD for proper function upon activation and during use.

Internal IFD540 data logs and the storage devices that record and store data are property of Avidyne.

IFD540 Integrated Flight Display

INTENDED FUNCTION

The Avidyne IFD540 is a GPS-nav-com radio whose primary function is to conduct nav-com tuning and communication, and serve as the principal navigation sensor/system for all IFR VHF (“VLOC”) and GPS-based navigation and instrument flying (enroute and approach), provided it is either installed in the “primary field of view” or is connected to an external CDI/HSI indicator that is installed in the “primary field of view” as well as a remote source selection annunciator.

Supplemental functions include serving as a moving-map flight management system (FMS), and electronic charts and checklists along with a number or timer and calculator types of utilities.

FUNCTIONAL OVERVIEW

The Avidyne IFD540 Integrated Flight Display (IFD) system supports the following functions:

- Flight Management System (FMS)
- WAAS and non-WAAS GPS Navigation
- VHF Radio Nav/Com (16W and 10W variants)
- Moving Map
- Terrain Awareness and Forward Looking Terrain Alerting
- Weather Datalink and Lightning sensor depictions
- Traffic
- Electronic Approach Plates
- Electronic Checklists
- Data Logging
- Caution Advisory System (CAS)
- Utilities (e.g. Schedulers, Timers, Calculators)
- Multi-touch Touch screen Control
- Multiple IFD Operations

COOL FEATURE

Multi-Touch Touch Screen Control
The IFD supports multi-touch touch screen technology meaning that features such as two-fingered pinch zoom for range changing on maps and charts is fully enabled.

The system has been designed for single-pilot IFR operation and features a **Page and Tab** user interface.

Most functions revolve around the three **Page Function Keys** that appear across the bottom edge of the bezel. Each of the three functional pages has associated tabs, which contain related data, often in different views. These functions and tabs are covered in detail throughout this reference manual.

BASIC CONCEPTS

PAGE FUNCTION KEYS

The 3 buttons along the bottom of the IFD bezel are called Page Function Keys. Each key is labeled by function:

- FMS (Flight Management System)
- MAP (Moving Map)
- AUX (System Pages)

Each page has a number of associated **tabs**. Each Page Function key has a left and right rocker nature to it. Select the page of interest by pressing the middle of the Page Function Key and navigate through the available tabs by pressing the left or right side of the Page Function Key. Continual pressing of one side of the function key will automatically step through the tabs.

Page Function Keys and Tabs

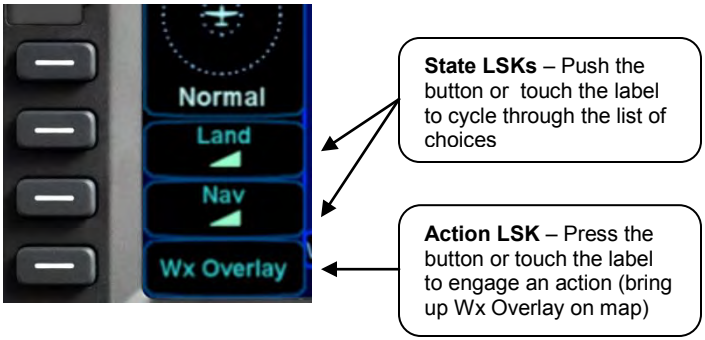
LINE SELECT KEYS

Line Select Keys, typically abbreviated to **LSK** in this manual, are the buttons found along the left vertical side of the bezel. These are different from Page Function Keys in that they also have a label, just inside the bezel adjacent to the physical LSK which indicates the function of the LSK. Pressing the LSK or touching the LSK label on the display either performs the labeled action or changes the state. For the cases where there is a list of selectable options, browse the list by pressing the LSK.

LSK Types

- **State LSKs** – Green button title in the first row and a white state display in the second row indicates a list of choices. Traverse the list in one direction by pressing the line select key or in the other direction by touching the label.
- **Action LSKs** – Pressing the LSK or display label enables the action indicated on the label.

LSK Types



RIGHT KNOB LABELING

The bottom right IFD knob is a modal knob in that its function is context dependent and is “soft-labeled” on the display. As a general rule, the inner and outer rings of the dual concentric knob perform the same function – it’s just that the inner ring is “fine” control and the outer ring is “coarse” control of that function. The symbol used to represent the right knob is a ring with a center dot.

Right Knob Label Scheme

In the example above, the outer ring scrolls through a list in a coarse manner and the inner ring scrolls through the same list stopping at each minor field along the way. Pushing the knob generates a drop-down menu.

COLOR PHILOSOPHY

There are a few generalities with the use of color that are consistent across the IFD as described in the table below:

IFD Feature/Function	Color
Page Function Keys	Green – Active; White – Available but not currently active. Note: AUX can also be Red, Yellow or Cyan if there is an active alert as described later in this manual.
FMS “Fly To” Data (e.g. active leg of flight plan, To Waypoint datablock)	Magenta
Active Nav Data (e.g. Active Com freq, Active Nav freq, Active Nav Source mode)	Green
Line Select Key Labels	Light Green
Line Select Key States	White

GENERAL IFD OPERATIONS

The IFD540 Integrated Flight Display (IFD) is a touch screen GPS-Nav-Com that has been designed to be both a retrofit GPS-Nav-Com or a clean install GPS-Nav-Com. As a retrofit installation, the unit was designed to be plug-and-play compatible with a Garmin 530/W unit.

BEZEL LAYOUT

Starting in the top left corner and working counter-clockwise around the bezel, the IFD540 has:

- Power/Volume/Squelch knob;

- Frequency (Active ◄► Standby) Swap dedicated button;
- USB port for database updates, datalog downloads, software updates and powering USB devices in-flight;
- Four (4) Line Select Keys (LSKs) that are page dependent with soft key labels adjacent to each;
- Dual Concentric Rotary Knob as a means of manually tuning Com and Nav frequencies;
- Three (3) Page Function keys along the bottom (FMS, MAP, AUX);
- Mechanical Cam Latch control for tray installation;
- Dual Concentric Rotary Knob that is page dependent;
- Six (6) Dedicated Function Keys consisting of:
    - Direct-To (“-D->”)
    - Procedure (“PROC”)
    - Nearest (“NRST”)
    - Frequency List (“FREQ)
    - Enter (“ENTR”)
    - Clear (“CLR”)
- Ambient Light Sensor;
- CDI Nav Source knob.

POWER CONTROL

The IFD is regulated by a pair of circuit breakers. There is also a power control on the top left corner of the unit but the IFD will automatically start when the aircraft bus power is applied. The power button can be used to turn the unit off (press and hold and watch 5 second count down expire) or to turn the unit back on if it had been manually turned off.

Manual Power Down

After power application, the bezel keys backlighting will be turned on. Several seconds later, the IFD display will begin to have indications.

BRIGHTNESS CONTROLS

Each IFD has brightness controls to control both the bezel and the display brightness. The user can access individual controls to allow for either manual control of brightness, automatic control of brightness in response to the cockpit dimming controls/rheostats or automatic control of brightness in response to the ambient light sensor that is embedded in the bezel. The controls for all are on the AUX page using the ***User Options*** LSK of the ***Setup*** tab.

Brightness Controls

If the IFD540 appears “inoperative” or non-responsive from a lighting perspective, check the aircraft instrument lighting rheostat to ensure it is not set to a night position.

START-UP SEQUENCE

The startup sequence of the IFD is as follows:

- A splash screen will be displayed during system initialization and will be automatically removed when the IFD is initialized. The Page Function keys (e.g. FMS, MAP, AUX) will not be lit up while the splash screen is present;
- An agreement of the limitation of your legal rights must be made via the bezel “ENTR” button. **Note:** For the duration that the agreement page is displayed, the IFD is activating the signals that connect with a remote annunciator panel as well out outputting self-test data to external devices. Use that condition as a lamp test and external signal check;
- A software version and database currency page is displayed IF there any expired databases. Avidyne does not recommend operating with expired databases but the system will allow operation by pressing the “Proceed” followed by the “Confirm” LSKs;
- If there is a fuel flow system connected to the IFD, then the IFD will automatically transition to the Fuel Management Page. If the fuel flow system does not provide fuel totalizer data, you will need to input the fuel on board and press the “ENTR” key. If the fuel flow system does provide fuel totalizer data, confirm the total is correct and press the “ENTR” key.

  If there is no fuel flow system connected, then the unit progresses directly to the FMS page and FPL tab, in principle ready for a flight plan to be loaded or verified;
- The IFD is now ready for normal use.

The agreement page, database expiration and fuel management entries are all skipped if the unit is powered on in-flight.

NOTE

Some Data May Be Delayed at Startup
Some data such as fuel flow and fuel totalizer may experience a 5-10 second delay during post start initialization. For those aircraft configured with fuel totalizers, this may result in some fuel display changes on the Fuel Mgmt tab during that period including prompting the pilot to enter in initial fuel. That should resolve itself within a few seconds. Another example concerns the FMS nav database initialization. In this case, the message “Please wait – System Initializing” may be displayed on the FPL tab for 10-30 seconds. Additionally, if the unit has been exposed to extreme cold prior to start, it may take a warm up period to achieve standard performance.

TIPS AND TECHNIQUES

Manual Check of Database Dates
Even if the databases are all current, you can still view the date/status of each database from the AUX page, Database Status display as described in Section 4 of this manual.

TIPS AND TECHNIQUES

“GPS No Position” Message Possible at Startup
If the GPS alignment takes an unusually long time (e.g more than 2 minutes) to acquire an initial position fix, the “GPS No Position” advisory message will be displayed. This message will automatically clear itself when a fix is acquired. If the message does not remove itself by the time you are ready to taxi, it is a clear indication that your system has not determined its initial position and action may be required on your part.

DATABASE CURRENCY STATES

The following table describes the various database currency states that may be observed at startup:

Database Status	Message	Color
In Effect	Valid Thru <Month, Day, Year >	Light Green
Has Expired	Expired <Month, Day, Year>	Yellow
Not Yet Effective	Effective <Month, Day, Year>	Yellow
Charts Issue Date Between 14 and 21 Days Old (i.e. up to a week out of date)	Update Available <Next Cycle Date>	Light Green
Charts Issue Date Older Than 21 Days (i.e. more than a week out of date)	Update Required <Date of Expiration>	Yellow
Invalid	<Type> Database Invalid	Yellow

NOTE

Use of Not Yet Effective Data

If attempting to use not-yet-effective data (e.g. charts or nav), it is the responsibility of the pilot in command to verify there are no differences between the current data and the not-yet-effective data before it is permissible to use the not-yet-effective data.

PAGE LAYOUT AND FORMATS

The left column (radio frequencies and context-sensitive line select keys), top data strip and nav source knob indication, and bottom edge set of page tabs are always displayed on every page.

Page Layout

Use a combination of the page function keys (FMS, MAP, AUX) and the associated tabs, to change the contents of the rest of the display.

Each page has a number of associated tabs. Each Page Function key has a left and right rocker nature to it. Select the page of interest by pressing the middle of the Page Function key and

navigate through the available tabs by pressing the left or right side of the Page Function key. The desired tab can also be touched to directly jump to that tab. The last tab selected on any given page is retained in memory and will be displayed when you return to that page.

COOL FEATURE

Split Pages

The split pages where extra data can be displayed along the right edge can be handy pages in all phases of flight.

Some pages can display a data strip along the right edge of the display. The FPL tab and NRST tab on the FMS page and the Map tab on the MAP page are prime examples. In the cases where this is available, a labeled side tab is displayed. That extra data strip can be pulled out for display or pushed back in for hiding by using any of the following methods:

- Touch the **side tab** (shown in gray boxes below);
- Use a left or right swiping motion on the tab as required to pull it out or push it back;
- Press and momentarily hold the left or right side of the Page Function key as required to uncover or hide the extra data strip.

Map-Data Split ***Map-FPL Split*** ***Map-NRST Split***

COM-NAV

The VHF radio consists of a Com radio that covers the frequency band from 118.0 MHz to 136.990 MHz and a Nav radio that covers the frequency band from 108.0 MHz to 117.95 MHz. Both 25 kHz and 8.33 kHz spacing is supported. The radio can be configured as a 16 watt or 10 watt transmitter at the factory prior to shipping.

Display

The active com frequency (the frequency that the radio will transmit on when the Push-To-Talk button is pressed) is displayed in green and the standbys (there can be more than one standby frequency) are displayed in white.

Display of the frequencies can be formatted in several ways via the “User Options” and “Datablock Setup” LSKs of the SETUP tab on the AUX page (see the Datablock Setup description in Section 4 for more details). The default display format is two com frequencies (active and #1 standby) above two nav frequencies (active and #1 standby). A custom display format can be set up to display the active com and up to four standby com frequencies.

The frequency that will be swapped into the active frequency when the bezel Frequency Swap button is pressed is called the “# 1 Standby”. For example, in the case where the user has set up 4 com slots to be displayed, any one of slots 2, 3 or 4 can be selected to be the “#1 Standby” simply by touching the slot. In every case, the “#1 Standby” slot is visually indicated by a cyan outline.

COOL FEATURE

Multiple Standby Frequencies

The com (or nav) frequencies can be formatted to act as a type of quick directory when set up ahead of time. This can be handy in local area operations when just a few standard frequencies are expected to be used for a flight – for example ATIS, Ground, and Tower frequencies can be entered in three com slots for quick swapping into the active channel. Touch the frequency slot that you want to be the #1 Standby at any given time and then when the bezel Frequency Swap button is pressed, that slot is what is swapped with the Active channel.

Multiple Frequency Formats

COOL FEATURE

Decoded Agency Identifier
The agency (e.g. Clearance Delivery, Ground, Tower, Approach, etc) for the Active and each displayed Standby com frequency are displayed in each com frequency slot. This is a handy reminder of the agency to which you have tuned in each slot. Similarly, if the frequency displayed is a nav frequency, then the Morse code decoded identifier will be displayed and will stay displayed for as long as the IFD can decode the Morse code, which serves as a usable means to Tune-Identify-Monitor.

If a slot is receiving a voice transmission, a “RX” indication will be displayed along the right edge of the given com slot.

When the active frequency is transmitting, a “TX” indication will be displayed along the right edge of the Active com slot.

Tuning

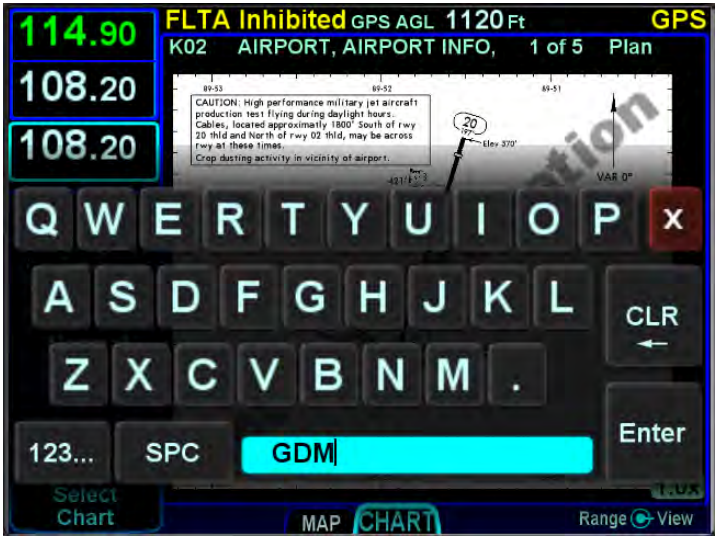
Tuning can be accomplished through several methods. Whichever frequency slot has been selected as the #1 Standby can be manually tuned by twisting the bottom left knob on the bezel. The outer ring changes the digits to the left of the decimal point and the inner ring changes the digits to the right of the decimal point. The slot being tuned this way is highlighted in reverse video as depicted in the 126.000 example below.

Manual Com/Nav Tuning Reverse Video Depiction

A second way to manually tune a frequency is to touch the Active or Standby frequency slot and when a virtual keyboard is displayed, type the desired frequency into the numeric keypad and press the Enter (“Enter” on the virtual keypad or “ENTR” on the bezel) button. The numeric keypad will time out and be removed after 10 seconds of inactivity.

Another way to manually tune a frequency (only useful for tuning VOR Nav frequencies) is to type the identifier of the desired frequency (e.g. “GDM” for the Gardner VOR) via the alphanumeric virtual keypad. An automatic, geographic-based prediction algorithm (“geofill”) is running such that the most likely VOR station is filled in based on your geographic position.

Manual Entry of VOR Identifier



A more automated way to tune a com frequency is to press the “FREQ” button along the right edge of the bezel. This will present a list of likely frequencies and that list can be scrolled via an up/down motion with touch or via twisting the right hand knob. If touch was used, double tap on the row that you want to put into the #1 Standby. If the knob was used to scroll through the list, push the knob in to put the frequency into the #1 Standby slot.

Frequencies can also be nominated to be put into the #1 Standby from other pages on the IFD540 such as the INFO or NRST Tab on the FMS page.

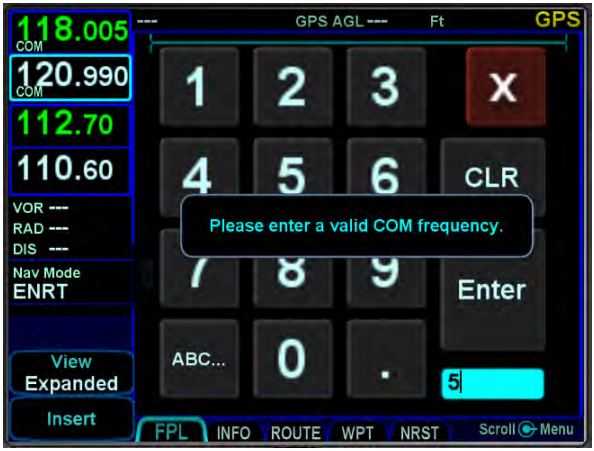
Switching Between Com and Nav

To access the Nav frequencies for display or editing, push in the lower left knob to toggle between Com frequencies and Nav frequencies. The displayed set of frequencies will always time out back to com frequencies following 20 seconds of inactivity on the Nav frequency display.

Invalid Frequency Entry Attempt

Attempting to type an invalid frequency (e.g. typing a nav freq in a com slot) will produce a temporary error message indicating the mistake. This message is unavailable in dual IFD installations that have Keyboard Convenience mode (described later) turned on.

Notification of Invalid Frequency Entry Attempt



COOL FEATURE

Shortcuts to Com Tuning

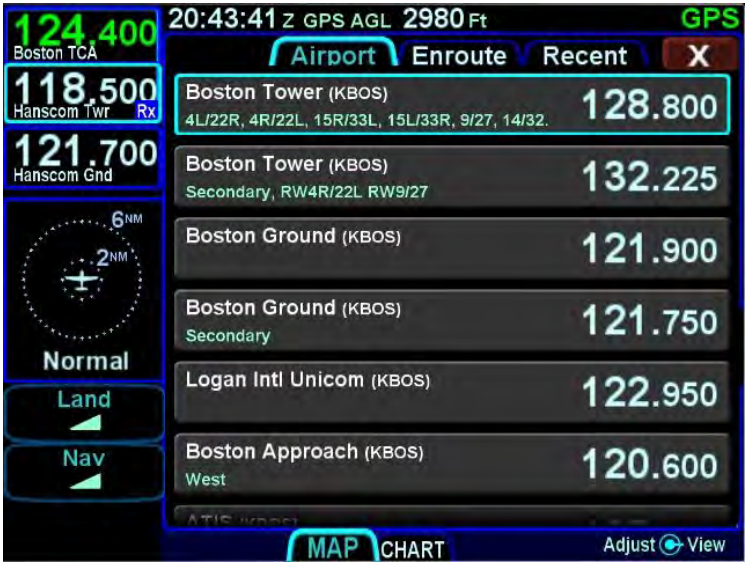
Shortcuts are provided to aid speed and ease of manually entering a com frequency in the IFD. For example, there is no need to type the leading “1” for frequencies, the decimal point, trailing zeros or the thousandth digit. For 121.700, type “217” and press Enter.

Frequency List

The “FREQ” function key along the right edge of the bezel has three tabs along the top edge of the page:

- ***Airport*** – the most logical com frequencies (e.g. ATIS, ASOS, AWOS, CTAF, Tower, Ground, Clearance Delivery, etc) associated with the origin airport and then when airborne and more than 5nm from the origin, the destination airport;
- ***Enroute*** – the most likely enroute ARTCC and other enroute com frequencies (e.g. FSS) for the current geographic position;
- ***Recent*** – a running list of the com frequencies that had been selected for the Active frequency slot within a given power cycle.

Freq List Page



Each additional press of the “FREQ” function key will cycle to the next top tab. The top tabs can also be touched to activate that specific list. The tabs only populate when there is a GPS position.

When a desired frequency has been located in the list, it can be placed into the #1 Standby slot by either double tapping it via touch or pushing the bottom right dual concentric push knob.

Emergency Com Frequency

121.5 kHz can be quickly put into the Active com slot by pressing and holding the bezel frequency swap button for approximately 3 seconds.

Stuck Mic

If the IFD determines that there is a stuck mic situation (defined as 30 seconds or more of continuous transmission), a “Stuck Mic” CAS message (Blue Advisory message) will be displayed.

Remote Tuning Control and Frequency Swapping

The IFD supports a host of remote tuning and frequency swapping capability.

A “Com Presets” LSK will be present on the AUDIO tab of the AUX page and up to 16 com frequencies can be preset. Some aircraft installations will also include a dedicated Remote Tuning control (e.g. dedicated button on the yoke) which will step through the list of preset com frequencies loading each into the #1 Standby slot. Each time that control is activated, the display will pop up a dialog box next to the #1 Standby slot indicating which item in the preset com list has been selected. In addition, a cyan arrowhead will be displayed next to the currently selected frequency on the Com Preset page.

Another capability that can be added during installation is a remote com frequency swapping function that, when activated, performs the same action as pressing the bezel Frequency Swap button. In this case, your hands do not need to leave the controls to command a frequency swap. Typical installations that support this feature include a dedicated Frequency Swap control (e.g. dedicated button on the yoke). Pressing and holding the dedicated Frequency Swap control button for approximately 3 seconds will insert 121.5 kHz into the Active com slot.

Other remote tuning and frequency swapping capability is present when dedicated third-party radio control display units are wired into the aircraft. Usually in these cases, when the radio control display unit is active, the Active and #1 Standby frequencies are only displayed on that external control display unit and not on the IFD, even though the actual radio is still housed inside the IFD.

DIRECT-TO OPERATIONS

A dedicated Direct-To function key is located along the right edge of the IFD bezel. Pressing that button from any page will display a green Direct-To dialog box that will be pre-populated with a logical waypoint.

Direct-To Dialog and Confirmation Dialog Boxes

If that pre-populated waypoint is the desired waypoint, press the “ENTR” function key along the right edge of the bezel twice (Direct-To, Enter, Enter) or touch the Activate dialog box that pops up on the display to accept.

If a different waypoint is desired, there are a number of ways in which the proper waypoint can be entered in that Direct-To dialog box:

- Twist the outer ring of the bottom right IFD knob to scroll up/down through a flight plan list that re-populates the waypoint in the dialog box from the active FMS flight plan (Note that the Missed Approach must be activated to use this technique for points in the published missed approach).

When the desired waypoint is displayed, press the knob in to accept;

- Touch the waypoint field in the pop-up green Direct-To dialog box to generate a virtual keyboard and type in the desired waypoint name. When the desired waypoint is displayed, press Enter on the keypad or bezel to accept;

- Twist the inner ring of the lower right IFD knob while the pop-up green Direct-To dialog box is displayed to go into edit mode. The inner ring changes the character and the outer ring changes the cursor position in the waypoint name field. It may not be necessary to fill in all letters of the waypoint name since they will auto-fill. When the desired waypoint is displayed, press Enter on the keypad or bezel to accept.

FUNCTION KEYS

In addition to the Direct-To and Frequency List function keys that have already been described, the IFD has a Nearest (“NRST”) function key and an Enter (“ENTR”) function key and a Clear (“CLR”) function key that perform the following functions:

- **Nearest** – Simultaneously jumps to a Nearest page (if not already there) and presents a list of the nearest airports to your present position. Each additional press of the “NRST” function key changes the nearest list to another category as defined in the list below:
    - Nearest Airports
    - Nearest Airports to Destination
    - Nearest VORs
    - Nearest NDBs
    - Nearest Intersections
    - Nearest ARTCCs
    - Nearest FSS
    - Nearest Airspace
    - Nearest User Waypoints

- **Procedure** – The “PROC” function key acts as a shortcut for attaching a published arrival or approach procedure to a waypoint in your flight plan. It can be used at any time. The first press of the function key results in the IFD displaying the FPL tab of the FMS page with the Approach field of the next destination after the active leg highlighted in reverse video and a drop down list of available published approaches listed.

Pressing it a 2nd time will step the reverse video over the Arrival field and present a drop down box of available published arrivals. Each subsequent press of the “PROC” key will step through all following destination airfield approaches and arrivals in the flight plan and wrap back around to the top of the flight plan. When the drop down box appears over the intended data field, twist the bottom right IFD knob to scroll up or down the list until the desired procedure is highlighted and then push the knob in to add that procedure to the flight plan. If there is no flight plan, pressing the “PROC” key will present the FPL tab with an insert cursor at the top of the page but will not present any procedures.

- **Enter** – The use can vary slightly depending on the scenario, but “ENTR” is always related to the Enter/Accept/Confirm use;
- **Clear** – The use can vary slightly depending on the scenario, but ”CLR” is always related to Clear/Backspace/CAS Message Clear use.

TOUCH SCREEN

The IFD uses a capacitive touch screen technology that allows multi-touch operation (e.g. two-fingered pinch zoom). Many types of gloves can be used during touch screen operations.

The IFD employs a “hybrid touch” design in that virtually every interaction can be accomplished either through bezel controls or touch. This allows for flexibility in operational use. Some features or functions naturally lend themselves to being easier to accomplish through touch (e.g. map panning) and some are naturally easier to do via physical bezel controls (e.g. changing pages or using dedicated functions like the Freq List). We have found that individual usage patterns tend to emerge and personal preference has a strong influence as well. Perhaps most importantly, hybrid touch is useful during turbulent or bumpy flight conditions where it is often very difficult to precisely and reliably touch the desired point on the display. Having a physical bezel control provides an “anchor point or control” to hold on to and exercise the intended action.

TIPS AND TECHNIQUES

User Control to Turn Touch Off
The “User Options” LSK on the SETUP tab of the AUX page provides a touch screen on/off selection capability. This can come in handy in excessively bumpy flight conditions when even attempting to use physical bezel controls can result in inadvertent touching of the screen and potentially causing unintentional display changes. The on/off setting will persist across power cycles.

Touch zone targets have been intentionally oversized wherever possible to aid in accurate touch screen behavior.

As noted above, virtually every feature or function of the IFD can be accomplished either by touch or by physical bezel control. The following table identifies the exceptions to that rule:

Bezel-only Control Input Functions	Touch screen-only Control Input Functions
Selecting page function keys (e.g. changing the “major” pages of FMS, MAP, AUX)	Map panning
Power on/off	Graphical Flight Planning (“Rubber banding”)
Changing the Primary Nav Source	Calling up a map page info box
Starting the Frequency List	Selecting a #2 or #3 standby frequency for swapping into the active frequency slot
Frequency Swap	---

When editing data (e.g. FMS waypoint data or nav/com frequencies) using touch, virtual keyboards are displayed on the IFD. There are two formats – a numeric keyboard and an alpha keyboard with a means to switch back and forth between formats.

Virtual Alpha Keyboard

Virtual Numeric Keyboard

Each keyboard has a scratchpad in the lower right corner. The scratchpad is a free text field for data entry with some data entry validity logic applied to the data that is trying to be entered. For example, when trying to type in an invalid frequency, the com tuning application will immediately sense that entry to be invalid and present an alert box stating the entry is invalid.

Invalid Keyboard Entry Alert

TIPS AND TECHNIQUES

Optimal Touch Performance
To maximize touch performance, the more surface area of a finger that can make contact with the glass, the better. Try to avoid using just fingernail contact or just the tip of a finger. Increased pressure on the glass by your finger should not have any positive effect. Many types of gloves will work (see "Use of Gloves" section in the back of this manual), but performance will likely be degraded.

DUAL IFD OPERATONS

Some installations may involve two IFDs (e.g. IFD540-IFD540, IFD540-IFD440, IFD440-IFD440) that can work in a more integrated fashion.

Method of Data Share (Dual IFD Operations)

Dual IFDs will be connected via the Byteflight digital Databus. While any of the com ports can be configured for the dual IFD "CrossSync" communication, it is generally recommended that Com 3 be used to stay consistent with the vast majority of fielded GNS530/430 systems that the IFD will be replacing. In those cases, Com 3 is already wired for box-to-box communication and that connection is used for dual IFD connections with no further work.

Keyboard Convenience Mode (Dual IFD Operations)

When Keyboard Convenience mode is enabled via the "User Options" LSK of the SETUP tab on the AUX page, the second IFD will automatically present a virtual keyboard when the other IFD is in a mode where data is being entered or edited. In other words, if Keyboard Convenience mode is turned on, a virtual keyboard will be displayed on the "other" IFD at all the same times as if the aircraft were configured for a single IFD and a keyboard is displayed on that unit.

Shared Data (Dual IFD Operations)

The following list of data will be shared between two IFDs if properly configured for data sharing:

- Enables the integration of the Caution Alerting System (CAS) to allow a single acknowledgement of any of the Global messages to be removed from both units by acknowledging them on either unit;
- Enables flight plan synchronization, including modification of the flight plan to be reflected on both IFDs (this does allow for flight plan/procedure preview on the second IFD);
- Enables stored routes to be synchronized across both IFDs (this does allow for route preview on the second IFD);
- Enables fuel planning (e.g. initial fuel entry) to be synchronized across both IFDs;
- Enables user waypoints to be synchronized across both IFDs;
- Enables sensor settings and data (traffic, datalink, lightning, air data, etc) to be shared across both IFDs.

NOTE

Full Data Sharing Requires Consistent WAAS
For complete data sharing between dual IFDs, both units will need to have the same WAAS antenna configuration – either both are WAAS or both are non-WAAS. If one IFD is set up with a WAAS antenna and one is set up with a non-WAAS antenna, then the FMS-related data (flight plans, waypoints, routes) will not be shared between IFDs.

Independent Data (Dual IFD Operations)

The following list of data will never be shared between two IFDs no matter how they are configured:

- IFD page and tab selection;
- Map view, range, declutter, and overlay settings;
- Chart extent box depiction on map;
- Nav Source selection;
- Com/Nav settings (e.g. 8.33 vs 25 kHz spacing);
- Com/Nav frequency selections (therefore no cross-side tuning or display);
- Nav deviation data (therefore no navigation miscompare alerts are provided);
- Local CAS alerts;
- Datablock configuration;
- Chart displayed;
- Electronic Checklists data and state;
- Calculators and Utilities data.

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NOTE

Data Sharing Tolerates Inconsistent Databases
While Avidyne strongly recommends the databases on each IFD be kept up-to-date and on the same cycle, data sharing between IFDs as defined above in “Data Sharing (Dual IFD Operations)” is not disabled when different data cycles are present on the two IFDs.

TIPS AND TECHNIQUES

Maximize Your Map Configurations
Because you can individually configure each IFD Map overlay, a common technique is to set up one IFD map overlay to display Datalink weather and the other to display sensor (e.g. Lightning) weather. Similarly, you can display METAR flags on one IFD and winds aloft on the 2nd IFD. Likewise, you can display FLTA and TA on one IFD and turn them off on the other IFD.

Avidyne would love to hear from you about your dual IFD techniques at www.avidynelive.com; post them in the IFD540/440 Touch Screen GPS/NAV/COM section.

WAAS VS NON-WAAS OPERATIONS

The IFD supports both WAAS and non-WAAS operations. In each case, the IFD is still considered a "/G" system for flight plan filing purposes.

When configured to be connected to an approved WAAS antenna at installation, the IFD serves as a fully-certified WAAS GPS navigator. Published WAAS procedures will be available and presented in the various drop-down list choices in the FMS and WAAS glideslopes will be displayed, when appropriate.

When configured to be connected to a non-WAAS antenna or a non-approved WAAS antenna at installation, the IFD will not provide any WAAS functionality. For example, WAAS approaches such as LPVs will not be presented as an available choice within the FMS.

For dual IFD installations in which one IFD is WAAS capable and the other IFD is non-WAAS capable (a perfectly acceptable combination under the STC), there are some limitations on the nature of data sharing between the IFDs. In this case, FMS-related data is not shared between the IFDs (e.g. flight plans, stored routes and user waypoints).

INTERACTION WITH EXTERNAL DEVICES

Each IFD is capable of communicating with several hundred third-party devices. Reference the Installation Manual for a complete list of devices supported and any hardware/software baseline restrictions or view the supported device list at http://www.avidyne.com/products/ifd540/ifd-interfaces.asp

As a condition for certification, the IFD is approved for integration with all equipment the GNS 530 is approved for, plus the IFD is approved for integration with additional equipment beyond those authorized for use with the GNS system.

BEFORE TAKEOFF TECHNIQUES

Set up the flight plan per your plans or the assigned ATC IFR clearance. If multiple pilots share the airplane, be sure to check User Options and datablock selections to ensure set up for your personal preferences.

Avidyne recommends creating and using the Checklist utility and including a Before Takeoff checklist that meets your personal needs.

TIPS AND TECHNIEQUES

Avoid The Use of Polarized Sunglasses
Avidyne recommends avoiding using polarized sunglasses when using the IFD due to likely washing out of colors and apparent dimming.

2 FMS Pages

The Flight Management System (FMS) pages are where flight plans are created, modified, stored and deleted. Ground operations are the ideal time to enter the intended flight plan into the FMS.

FPL (FLIGHT PLAN) TAB

FMS BASIC CONCEPTS

For properly configured dual IFD installations, enter your plan into only one of the IFDs and the data is automatically shared between them.

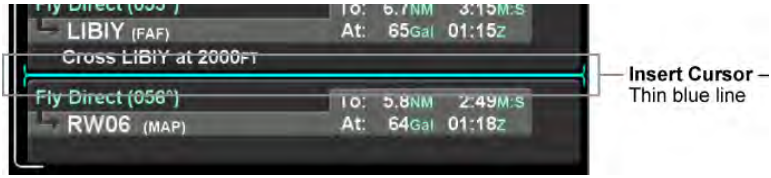
Each leg of a flight plan has its own color-coded background designed to make the overall flight plan easier to read at a glance. Each flight plan can consist of up to 128 legs.

The origin and all airport waypoints are depicted with a blue background. The active leg of the flight plan is always depicted with a magenta background. All other legs of a flight plan are depicted with a gray background.

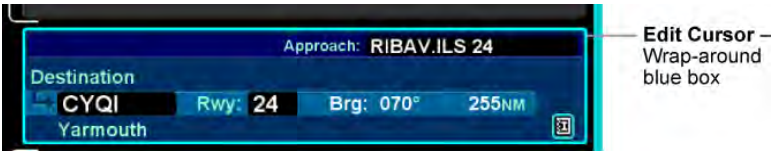
Flight Plan Detail

There are two types of cursors – an insert cursor and an edit cursor. Rotate the “FMS” knob in the lower right corner of the IFD to see the visual difference. The insert cursor will appear as a thin blue horizontal line that appears between flight plan legs. This allows you to insert new legs. The edit cursor appears as a wrap-around blue box that encircles the entire leg and allows you to edit an existing leg.

Insert Cursor



Edit Cursor



Individual fields within a leg can be edited by rotating the bottom right inner IFD knob that highlights each editable field within the flight plan. When the desired field is highlighted with reverse video, push the knob to get into edit mode. Turn the knob to edit the value or type via the keyboard, then push the knob again to exit edit mode.

Using a combination of the push and rotation actions of the knob, along with the dropdown boxes (explained below), an entire flight plan can be entered within seconds.

CREATING A NEW FLIGHT PLAN

The first time the “Flight Plan” tab of the FMS page is accessed following power-on, an empty flight plan page is presented with the origin waypoint pre-populated. The origin will be the closest airport to the current GPS position, or the airport from the previous power down if GPS position has not locked on yet.

In almost every case, your hand can stay on the bottom right IFD knob. Through a combination of pushes and turns, you can enter the entire flight plan.

Flight Plan and Scroll Bar

COOL FEATURE

Geofill™ is a geographic-based prediction algorithm that significantly reduces the number of pilot actions for entering waypoints. Usually after the first character entry, the system uses existing characters to determine the closest, and most likely, waypoint based on your geographic position or existing flight plan.

If a flight plan has more legs than can be displayed on a single page, a scroll bar is presented along the right edge of the flight plan. It indicates where the viewable window is with respect to the entire flight plan as well as where the active leg in the flight plan is. In the image above, the magenta vertical rectangle in the scroll bar indicates the active leg is just below the origin. There are a number of flight plan legs out of sight below the bottom of the display.

COOL FEATURE

Airways and Flight Plan Creation

The FMS can use published airways in its database to quickly build long flight plans with few keystrokes. When a flight plan waypoint is a valid airway entry or exit point, the list of available airways is presented in a drop down box. The list is quickly scrolled to the desired exit point and then all intermediate intersections along that airway are automatically populated into the flight plan.

The pictures below are an example of the airway drop down box that is displayed when building a flight plan and then the exit point choices once the airway is chosen. Use the bottom right IFD knob to scroll the list for the desired airway and exit point off the airway. The exit list is presented in the order by which the intersections will be reached, not in alphabetical order.

Airway Drop Down Box

Airway Exit Points

TIPS AND TECHNIQUES

Expanding and Compacting the Flight Plan The “Flight Plan” tab of the FMS page provides a means to show every leg of the flight plan (“Expanded”) or an abbreviated version of the flight plan (“Compact”) via the “View” LSK. The compact view hides all intermediate legs of an airway between the entry and exit point. It also hides intermediate legs of published departures, arrivals and approaches such as step down fixes. The active procedure or airway is always expanded.

SELECTING A DEPARTURE

If a published departure exists for the origin/departure airfield, then a drop down list of available departure procedures can be displayed by using the inner ring of the bottom right IFD knob to highlight the departure procedure window for that origin/departure airfield and pushing in that knob.

Departure Procedure Drop Down List

TIPS AND TECHNIQUES

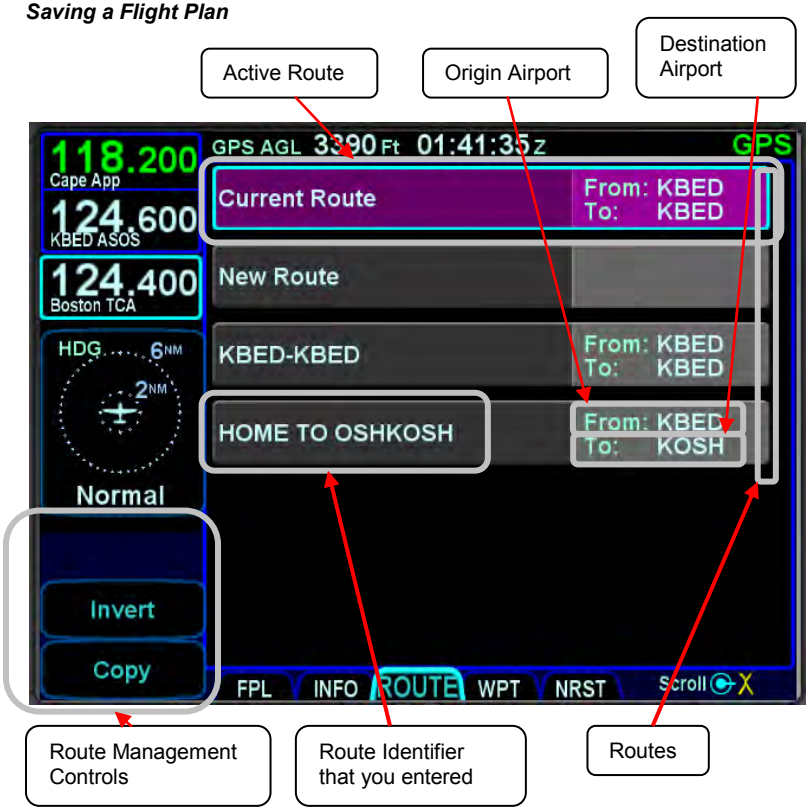
Vector Standard Instrument Departure (SID)
Vector (or Radar) SIDs are not likely to be part of the list of available departures in the FMS dropdown. This is due to the nature of the data encoding from the supplier. They are however likely to be present in the list of available charts for the departure field. Vector (or Radar) SIDs are typically straight out departures on assigned headings.

SAVING/NAMING A FLIGHT PLAN

From the Route tab of the FMS page, the current route, labeled Current Route, will be highlighted in magenta. If a valid origin and destination have been created in the flight plan (e.g. “KBED – CYQI”), the title will include these.

To edit the name of a flight plan, use the outer ring of the bottom right bezel knob. Scroll up or down the route list until the desired flight plan is highlighted by a surround cursor. By pushing the knob, the selected route will load and the route name field will be shown in reverse video. Touch the reverse highlighted name field or push the bottom right IFD knob to generate a virtual keyboard with which to type the desired name. To accept the new route name press either the “ENTR” bezel key or the Enter button on the keyboard.

Saving a Flight Plan



ACTIVATING A FLIGHT PLAN

While you always have the option to manually activate the flight plan via a LSK on the Flight Plan tab, the created plan on the Flight Plan tab will automatically activate on takeoff roll when a threshold groundspeed is achieved (which is approximately 40 knots). If you built the flight plan on the “Route” tab, then you will need to manually activate it via the “Activate Route” LSK on the left side of the display.

COPYING A FLIGHT PLAN

From the “Route” tab of the “FMS” page, first select the route you wish to copy via the bottom right-hand knob or by touching the desired route, then press the “Copy” LSK on the left side of the bezel. This will present the route name in reverse video. You can either retain the pre-filled name or type a new one via the keyboard. Follow by pressing “Enter”. Now use the knob to scroll up or down the flight plan and edit it as required. If no editing is required, you have successfully saved or copied a flight plan.

INVERTING A FLIGHT PLAN

From the “Route” tab of the “FMS” page, use the bottom right knob on the IFD to scroll up or down the list of routes to the desired flight plan or touch the desired route to invert. Press the “Invert” LSK. This automatically inverts the flight plan and leaves the route name field highlighted in reverse video, allowing you type a new flight plan name, if desired.

PREVIEW FLIGHT PLANS

The flight plans (and procedures) can be previewed as they are being built while on the FMS page, using the FPL tab with the map partially exposed (Map-FPL split page as defined in Section 1 of this manual). As a flight plan is being built from that page, the map will automatically resize to continue to display the entire flight plan. Similarly, if a procedure is being added to a flight plan, the procedure selected from the dropdown list and the selected transition are drawn in real time on the automatically re-sizing map for visual confirmation of the choice.

Previewing a Flight Plan While Building It

While in this mode, a temporary “FMS Preview - Waypoint”, “FMS Preview - Airway”, or “FMS Preview – Approach” message is displayed at the top of the page.

MODIFYING A FLIGHT PLAN

You can modify an existing flight plan in the FMS or create a new route while you are flying an existing one without affecting the existing active route. Several of the more common tasks are described below.

INSERTING A WAYPOINT

From the FPL tab, use the bottom right knob on the IFD to scroll up or down the flight plan until the insert cursor is positioned where the new waypoint is to be inserted. At that point, push the knob to generate a drop-down box from the cursor position. Scroll up and down in that drop down box until you find the option you seek. Press the knob again on the desired option. If it involves typing in a waypoint identifier, start typing on the virtual keyboard that is displayed. Geofill™ will typically find the correct waypoint by the 2nd character.

TIPS AND TECHNIQUES

Back-to-Back Duplicate Waypoints Restriction
The FMS will not permit entering back-to-back duplicate waypoints. A duplicate waypoint can be inserted elsewhere in the active flight plan (e.g. “above” the active approach or as a dummy waypoint “below” the published missed approach waypoints.) if this becomes operationally required during a flight scenario.

DELETING A WAYPOINT

From the FPL tab, use the bottom right knob on the IFD to scroll up and down the flight plan until the edit cursor surrounds the waypoint to be deleted. Press the “CLR” button on the right side of the bezel to delete the waypoint. Continue pressing the “CLR” button and it will walk up the flight plan deleting earlier waypoints as you go. Waypoints can also be deleted by touching the waypoint to be deleted and then selecting the L4 “Delete Waypoint” LSK.

EDITING A WAYPOINT

From the FPL tab, the bottom right knob on the IFD can be used to edit an existing waypoint. Using the knob, scroll up or down the flight plan until an edit cursor surrounds the waypoint to be modified. Use the inner ring of that knob to highlight one of the editable fields with reverse video. Pushing the knob provides a drop down box from which the changes can be made. Alternatively, touching the field to be edited will display a virtual keyboard which can be used to enter the desired data/changes.

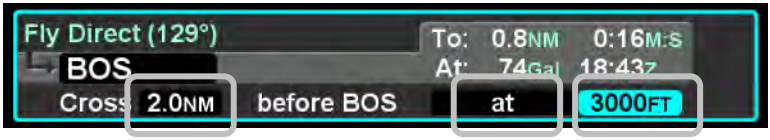
ADDING A VERTICAL CONSTRAINT

On virtually every waypoint, you can elect to assign a vertical constraint (e.g. cross the waypoint at or above a specific altitude, be at a specific altitude a specified distance prior to the waypoint, etc). This is accomplished by ensuring an edit cursor surrounds the waypoint of interest to select the waypoint and then either use the bottom right inner knob or touch the desired field to highlight one of the vertical constraint fields of the flight plan leg. Push the knob and enter the desired value or double tap the field to display a virtual keypad. This can be accomplished at any time on the ground or in-air.

Vertical Constraint Choices

Cross	Type	Altitude
Number field (selecting distance in NM from waypoint for crossing constraint)	At Or Below; At; At or Above.	Altitude field (selecting the target altitude). Minimum allowable value is 100'.

Vertical Constraint Fields



The default value for the crossing distance is 5.0nm for airports and 0.0nm for all other waypoints.

The only waypoints that do not permit vertical constraints are:

- Origin
- Destination, if it has an approach selected
- Missed Approach Point
- Altitude Terminated Legs

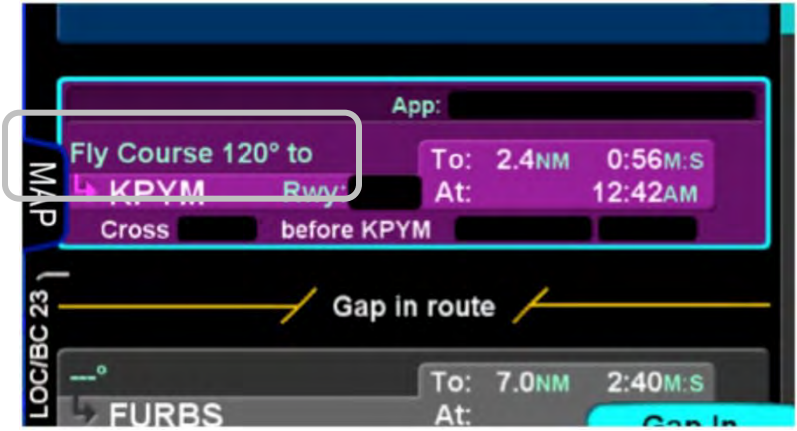
ENTERING AND INTERCEPTING A RADIAL

FMS Method

The FMS Course function will allow the pilot to navigate “To” or “From” the active waypoint while OBS is selected as the nav source. Push the Nav Source knob in to make OBS the active nav mode and then adjust the FMS (OBS) course using the external course adjust knob (i.e. course set knob on a CDI or HSI or EFIS). If there is no installed external course setting device, then twist the IFD nav source knob to adjust the FMS Course value.

FMS Course mode makes the current waypoint act like a VOR. Select the desired radial to fly inbound or outbound. Adjusting the course to or from the active waypoint will be reflected by the To/From flag as in a traditional HSI. The course deviation indicator will be presented in relation to the selected course.

As the FMS course is adjusted via the external course set knob (or the IFD nav source knob if no external device is installed), the active leg on the FPL tab will change to “Fly Course xxx°” as shown in the image below.



The FMS Course function will always be armed (i.e. it will always intercept the flight plan) in a To intercept. If the airplane is in a From course, it will intercept only if the dialed course trajectory intercepts the flight plan. If the dialed course does not intercept the flight plan, the airplane will fly that course indefinitely.

The FMS Course function will be exited when the airplane intercepts the active waypoint in a To intercept or when intercepting a downpath leg in the From case. Pressing the nav source knob while the FMS course function is active will also cancel the FMS Course mode and return to GPS as the active nav source mode. The FMS Course will remain active if a From course is dialed and the airplane does not intercept the FPL.

VLOC Method

If the Nav Source knob is set to VLOC as the active nav mode and a VOR station is tuned and received, then use the external course knob on the CDI/HSI/EFIS/etc to set the desired inbound or outbound radial as required.

DELETING A FLIGHT PLAN

Select the “Routes” tab of the FMS page. Use the bottom right IFD knob to scroll to the desired flight plan in the list or touch the flight plan to highlight the route. Press the “CLR” button on the bezel and a green confirm dialog box pops up. Press “Enter” or “Cancel” LSKs or use the bezel “ENTR” or “CLR” buttons to finish the deletion.

CREATING A HOLDING PATTERN

A hold can be put on any waypoint that has a fix terminated leg – waypoints that terminate with a lat or lon position such as navaids, enroute waypoints, user waypoints, airports, etc. Legs that terminate at an altitude, DME distance, radial crossings, etc. do not support attaching a hold.

Use the edit cursor on the flight plan to select the waypoint of interest, then push the bottom right IFD knob or touch the desired location to display a drop down list of options. Near the top of that list, you will see “Hold at <waypoint name>”. Scroll to highlight that drop down list entry and push the knob again. You have just added a holding leg, populated with standard hold data.

Alternatively, use an insert cursor by positioning it where you want to insert a hold in your flight plan. Push in the bottom right IFD knob or touch the position on the glass. Note that a hold is available via the drop down list. Scroll up or down the dropdown list as required and push the bottom right knob or touch the hold

option in the list to insert a hold flight plan leg.

DELETING A HOLDING PATTERN

To delete a holding pattern in your flight plan, use the bottom right IFD to scroll as required to create an edit cursor surrounding the holding leg, or touch the hold leg to be deleted then press the “Delete Hold” LSK.

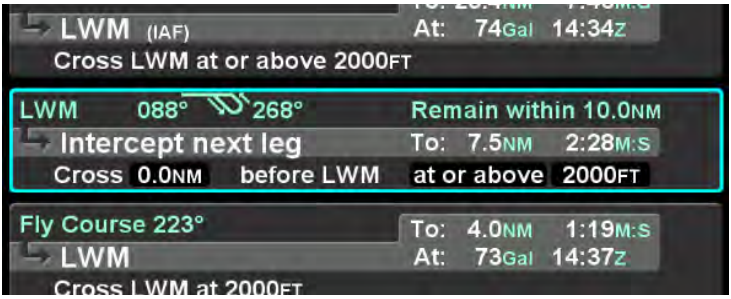
EDITING A HOLDING PATTERN

Position an edit cursor around the holding leg of interest in your flight plan. Use the inner ring of the bottom right IFD knob or touch the field to be edited to highlight the desired field (e.g. turn direction, leg length, leg units, inbound leg course) and make your edit. Any changes made will immediately be applied.

COOL FEATURE

Graphical Flight Plan Leg A graphical representation of each leg of a flight plan may be displayed within the FPL leg as shown in the image below. This is especially useful for procedure turns and holding patterns.

Procedure Turn with Course Reversal



FLIGHT PLAN SEQUENCING

The FMS assumes that the pilot will fly the flight plan as defined. If that does not occur, legs may not sequence as expected. Therefore, to manually sequence the desired leg, select it by either using the bottom right IFD knob or touch it and press the "Activate Leg" LSK followed by accepting the confirm dialog box when it is displayed. Doing so will turn that leg magenta, confirming that it is now the active leg.

TIPS AND TECHNIQUES

Impending Turn Notification
If flying the defined flight plan, the IFD will provide a message about an impending turn that includes the upcoming desired track (DTK) and a 10 second (30 second if the required turn is more than 120 degrees) count down.

COOL FEATURE

Automatic VOR Tuning
The FMS will automatically tune the next down-path VOR in the active flight plan into the primary nav frequency slot.

TIPS AND TECHNIQUES

Times to Turn Off Automatic VOR Tuning
Sometimes it is desirable to turn off the Automatic VOR tuning feature via the "Auto-VLOC Tuning" selection in User Options on one of the IFDs in a dual IFD installation. An example of when this might be desirable is if you want to depict a crossing radial on IFD #2 for reference before crossing a VOR.

LATERAL OFFSETS

The system supports a capability to create and fly a lateral offset from your flight plan. From the “FPL” tab of the FMS page, press the “Offset Route” LSK and use the right-hand knob on the IFD to dial in the desired offset. Use the outer ring for coarse control (1 nm increments) and the inner ring for fine control (0.1 nm increments). Rotate the knob left for left offsets and right for right offsets. Once the intended offset has been entered, press the “Confirm Right/Left x.x NM” LSK. At that point, the original LSK will indicate “Offset Route Right/Left X.X NM”. To delete a lateral offset, press the “Delete Offset” LSK. The maximum offset that can be dialed in is 20 NM. Lateral offsets are not available when in OBS mode. Lateral offsets are unaffected by graphical route planning (“rubber banding”) operations.

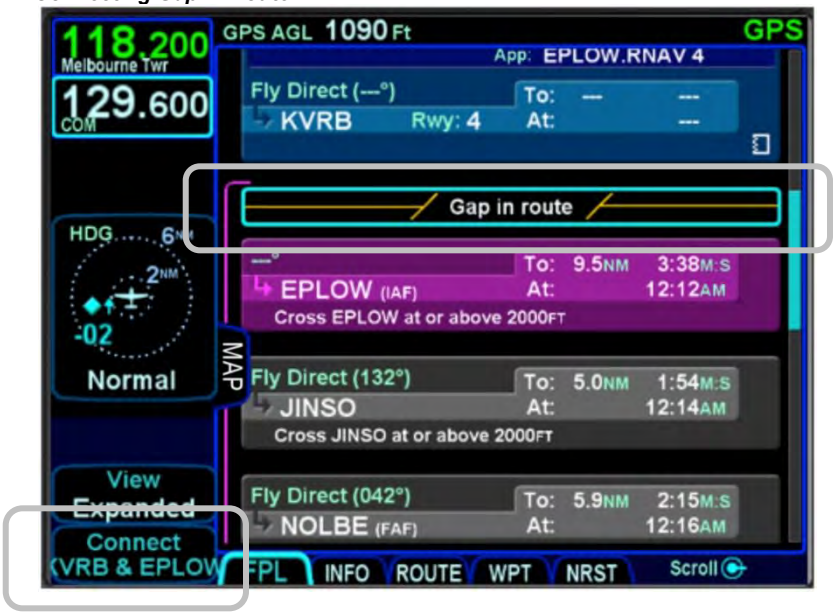
Lateral Offset Map Depiction

GAPS OR DISCONTINUITIES IN FLIGHT PLANS

A “Gap In Route” will appear within the flight plan when there is a discontinuity between legs. A discontinuity occurs when the FMS cannot compute the guidance to the next leg due to an invalid leg type combination based on preset guidance rules. The objective is to inform the pilot that the Gap must be manually closed if you wish to sequence to the next waypoint. Otherwise, the leg before the Gap will not be sequenced and guidance will not be provided

to the next waypoint. If desired, close the gap by placing the cursor on it using the bottom right IFD knob or by touching it. Press the “CLR” bezel key or the L4 LSK on the FPL tab, “Connect <wpt1> & <wpt2>”. Closing a Gap connects the waypoint prior to the Gap with the waypoint that follows by a direct (straight) leg.

Connecting Gap in Route



Avidyne recommends that you input the arrival and approach for the destination airfield and alternates into the FMS flight plan. Selecting a published arrival and/or approach will automatically load the procedure including all altitude constraints into the FMS.

Take advantage of the system to stay ahead of the airplane by using the wind vector datablock selection (a constant calculation of estimated wind direction and speed) for arrival planning, and the electronic checklists and various map views.

ENROUTE DESCENTS

A green circular top of descent (TOD) marker and label is drawn on the map when flying “on-path” along the FMS flight plan, giving a clear visual cue when it is appropriate to begin the enroute descent. It is based on the vertical constraint associated with a down-path waypoint.

To generate the TOD feature:

- There must be an altitude constraint defined on at least one down-path waypoint at least 50’ below present altitude;
- There must be a valid GPS MSL Altitude or Baro Altitude;
- The aircraft is less than 2nm from the active leg centerline;
- Aircraft course is within 45 degrees of Desired Track (DTK).

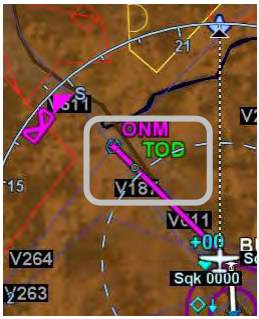
The TOD function is not available on any waypoint of an approach past the Final Approach Fix (FAF), or in holds, or procedures turns.

The FMS uses a default of 500 feet per minute descent rate (or as edited in the “Preferred Descent Rate” field on the FMS Setup page).

There is an associated tone (sounds like a door bell) and CAS countdown message 10 seconds prior to reaching the TOD point.

The “TOD” label may be auto-decluttered from the map depending on map range and feature density. The TOD depiction and CAS message are removed from the map immediately after passing the TOD point.

Top of Descent (TOD) Marker



COOL FEATURE

Enter Approaches for Multiple "Destinations"
The FMS will allow multiple airfields or destinations to be built into the flight plan. Each can have the published approach and missed approach as part of the plan. This is useful in pre-building your primary destination with a missed approach, expected alternate and its published approach. Similarly, a training flight with multiple intended approaches and locations can all be created in a single flight plan, before takeoff.

TIPS AND TECHNIQUES

Check Altitude Too Low CAS Message
The IFD contains a yellow caution CAS message that is active whenever an approach has been activated and the aircraft altitude is below the Final Approach Fix (FAF) published altitude.

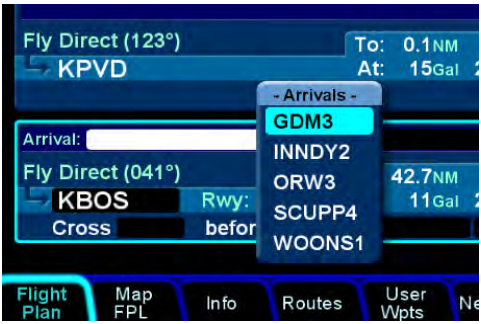
If your flight plan contains consecutive approaches and you activate the next approach during climb out from the previous approach and prior to reaching the next approach's FAF altitude, this "Check Altitude Too Low" message may be displayed.

ENTERING AN ARRIVAL AND APPROACH

From the FPL tab, use the bottom right knob on the IFD to scroll up or down the flight plan as required until the edit cursor surrounds the waypoint from which a published arrival and/or approach is to be inputted. Twist the inner knob until either the arrival or approach fields are highlighted. Push the knob to generate a dropdown list from which to select the desired arrival and/or approach, including Vectors-To-Final (VTF). As soon as one is selected, the arrival or approach field displays the name of the selected procedure and new legs are automatically added to the flight plan. If a runway is entered before an arrival is entered

and the runway does not belong to the arrival, the arrival is not accepted in the flight plan. A labeled white vertical line then brackets the procedure in the flight plan as another visual cue that the procedure is part of the flight plan.

Adding an Arrival

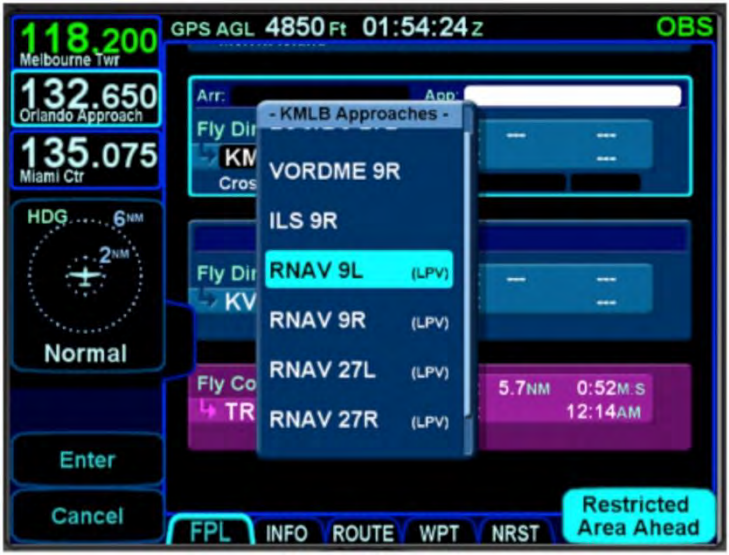


TIPS AND TECHNIQUES

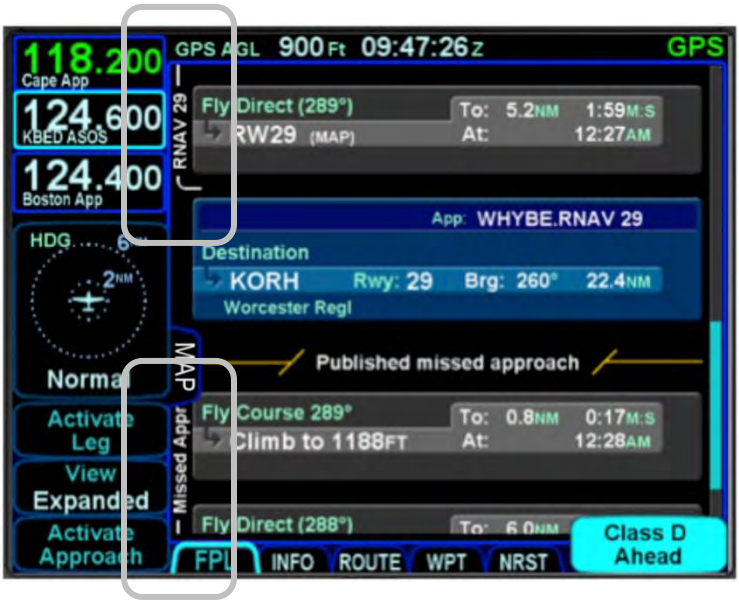
FMS Preview

A FMS Preview mode is available on the FPL tab (split Map-FPL view) of the FMS page. As soon as changes start to be made to the FMS flight plan while on that tab, real-time overlays of the edited procedure, hold pattern, waypoint or airway are presented on the map in cyan. There may be a few-second delay when drawing the edited route as the system determines the optimum map range for display. This feature provides a graphical preview of the edited route before it is officially part of the flight plan, to aid in flight planning. It can be used on the ground or in-flight and is additionally identified by an annunciation on the map part of the tab, “FMS Preview - <type field being edited>”.

Approaches Dropdown Box



Procedures Brackets



COOL FEATURE

PROC button The “PROC” function key on the bezel acts as a shortcut for attaching a published arrival or approach procedure to a waypoint in your flight plan. It can be used at any time. The first press of the function key results in the IFD displaying the “FPL” tab (Map-FPL view) of the FMS page with the Approach field of the next destination after the active leg highlighted in reverse video and a drop down box of available published approaches listed. Pressing it a 2nd time will step the reverse video over the Arrival field and present a drop down box of available published arrivals. Each subsequent press of the “PROC” key will step through all following destination airfields approaches and arrivals in the flight plan and wrap back around to the top of the flight plan. When you have the drop down box over the intended field, use either the bottom right knob on the IFD or touch the list to scroll up or down the list until the desired procedure is selected, then push that knob in to add that procedure to the flight plan.

If there is no flight plan, then pressing the “PROC” function key will present the “FPL” tab on the IFD with an insert cursor at the top of the page but will not present any procedures.

TIPS AND TECHNIQUES

Changing Selected Approach Type on Final
If a VHF-based approach has been activated and then is replaced with a new GPS-based approach prior to activating the missed approach, it may be necessary to manually change the nav source mode (e.g. manually change VLOC to GPS if switching from an ILS to a RNAV).

ACTIVATING A LEG

To activate a different leg of the flight plan from the FPL tab, either use the bottom right IFD knob or touch the desired leg to highlight it and then select the “Activate Leg” L2 LSK.

Activating a Leg

USE OF THE MAP-FPL SPLIT PAGE

While it can be useful in many phases of flight and scenarios, the split page is especially helpful during arrivals.

Map-FPL Split Page

A green chart extent box is separately drawn on the map and represents the geographic boundaries of an instrument approach plate associated with a FMS destination. When the ownship symbol crosses the boundary of the chart extent box, this is a good time to switch over to the Chart tab on the MAP page.

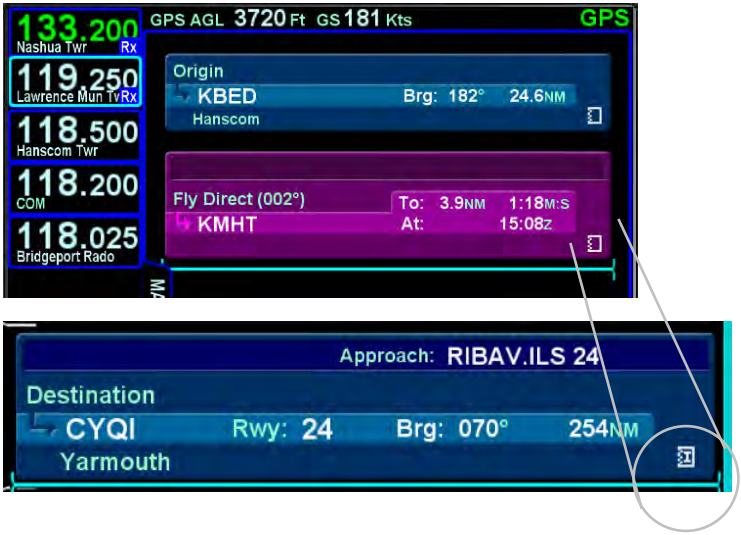
Chart Extent Box

The Map-FPL split tab on the FMS page presents the moving map on the left and the FMS flight plan in a thin strip on the right. This can be most useful to instantly correlate your flight plan with the graphical depiction on the map. This aids in error reduction and helps visually see options for diverts, weather avoidance, etc.

COOL FEATURE

Hot Links to Charts in Flight Plan Whenever a flight plan leg (blue airfield legs) has at least one published approach associated with it, a chart icon is presented on the right edge of the flight plan leg. If there is a published precision approach, the icon will also contain an "I". By using the right-hand knob on the IFD, scroll through the flight plan elements until the chart icon is highlighted in reverse video. If, at that time, the knob is pushed in, the IFD will display either the specific chart for that associated procedure or the directory of possible procedures for that airfield.

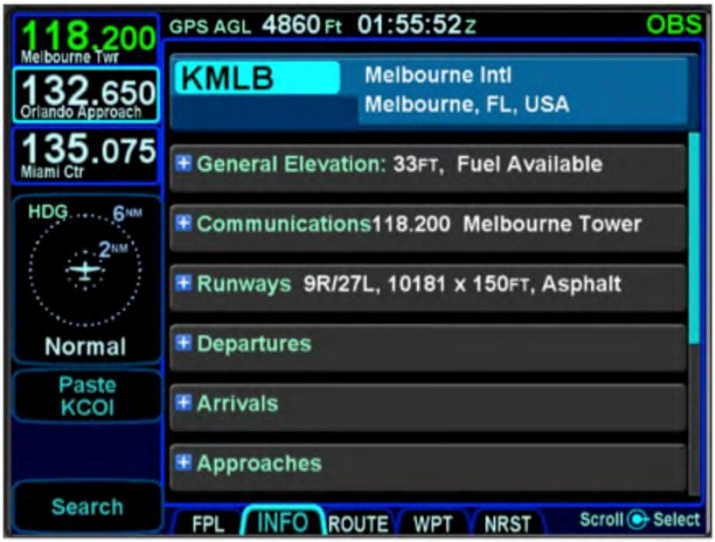
Hot Links to Charts



INFO TAB

The INFO tab of the FMS page provides additional information about airports, navaids, and waypoints.

Info Tab



The facility (airport, navaid, waypoint) to which the information applies will stay locked to the top of the page; the identifier field is an editable field. To edit the identifier, either use the bottom right IFD knob (inner ring or outer ring) as required to highlight the identifier field and push in to get into edit mode and present a virtual keyboard, or, touch the field to present a virtual keyboard. There is also a Paste LSK along the left edge of the IFD that will nominate the currently active leg of the flight plan or the flight plan leg that is highlighted by a wrap-around edit cursor.

A search function, accessible via the Search LSK is also available to help find the name of the facility for which more information is desired.

If a nav frequency is associated with the facility displayed, then it will be displayed in that same top block with the facility identifier and can be nominated into the #1 standby nav slot by either touching the frequency or by using the bottom right IFD knob to highlight the frequency field and push the knob to nominate it into the standby slot.

Depending on the type of facility being displayed, there are up to 7 category fields of information associated with the facility that can be expanded (via the + symbol) or compacted (via the – symbol) for additional details:

- **General** – describes the facility (e.g. “Public Towered Airport”), provides a thumbnail map of the facility (the orientation and range of the thumbnail map cannot be adjusted), provides coordinates, elevation and magnetic variation data, provides sunrise/sunset, provides density altitude or access to a calculator to compute it, provides fuel information, if applicable;
- **Communications** – provides a list of frequencies associated with the facility. Any one on the list can be nominated into the #1 standby slot by either touching it (first touch will highlight the field if necessary, second touch nominates it into the #1 standby) or by using the bottom right IFD knob to highlight the desired frequency and then push the knob to nominate it into the #1 standby slot;
- **Runways** – identifies the known runways at the airport to include orientation, length and width, and a thumbnail map of the runways. When an individual runway row has been selected via touch or the bottom right IFD knob, it can further expand to provide surface type, coordinates of the endpoints, runway bearing and elevation and the graphical depiction will show lighting;
- **Departures** – identifies the published departures associated with the airport and when an individual row has been selected via touch or the bottom right IFD knob, it can further expand to provide a thumbnail map depiction of the departure;
- **Arrivals** - identifies the published arrivals associated with the airport and when an individual row has been selected via touch or the bottom right IFD knob, it can further expand to provide a thumbnail map depiction of the arrival;
- **Approaches** - identifies the published approaches associated with the airport including any identifier and nav frequency, and when an individual row

has been selected via touch or the bottom right IFD knob, it can further expand to provide a thumbnail map depiction of the approach. If the nav frequency is selected by touch or by using the bottom right IFD knob, it can be nominated (copied) into the #1 standby slot;

- **Weather** – provides four additional rows of data if known: METAR, TAF, Winds Aloft, and Temps Aloft. Selecting any of the additional rows via touch or the bottom right IFD knob will display additional sub-category data.

Four Additional Rows of Weather Data on Info Tab

NOTE

Map Switches

Switching between the thumbnail map on the INFO tab and the main map on the MAP tab may result in a 1-2 second delay as the new map re-sizes.

ROUTE TAB

The ROUTE tab is where flight plans or routes are stored within the system. Up to 128 routes can be stored for later use, which is useful for frequently traveled routes. A stored route must first be "activated" via the "Activate Route" LSK, which makes it the active flight plan and displays the flight plan (FPL) tab.

Routes Tab

As indicated in the above image, each stored route will have its own row with the route name on the left and the origin and destination waypoints identified on the right side of the row.

The Route tab has provisions to:

- Create a new route;
- Name a route;
- Copy a route;
- Invert a route;
- Activate a route;
- Delete a route.

CREATING A NEW ROUTE

In addition to using the FPL tab, a new flight plan route can be created via the ROUTE tab. Use the bottom right IFD knob to highlight the “New Route” row and then press the knob or touch the “New Route” row to highlight, it then touch a 2nd time to start creating a new route.

The route name field will be highlighted and a route name can be created by either pushing in the bottom right IFD knob or by touching the route name field to generate a keyboard. The keyboard can be used or twist the bottom right IFD knob to start creating a new route name. When the naming is complete, press the “Enter” button on the keyboard or push the bottom right IFD knob again to accept the new route name.

As soon as the route name is completed, an insert cursor will be presented and any of the previously described methods for creating a flight plan can be used.

After a flight plan is entered, use the “Back to Route List” LSK to return to the directory of stored routes or press any other Page Function key to move on to other tasks.

NAMING A ROUTE

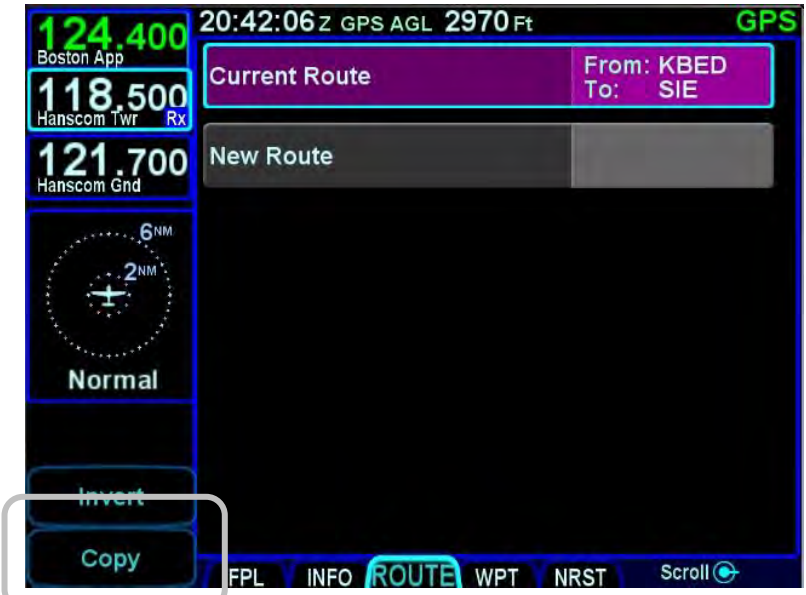
An existing stored route can be renamed (or a new route named for the first time) by highlighting the desired route from the ROUTE tab, either by touching it twice or by using the bottom right IFD knob to select it (twist the knob as required to highlight the row and push the knob to put into edit mode).

Once the route is selected, the route name field will be displayed with reverse video highlighting. Touching that highlighted route name field or pushing in the bottom right IFD knob will begin the route name editing. The desired route name can either be typed into the virtual keyboard or entered by twisting and pushing the bottom right IFD knob. When the desired name is complete, press the “Enter” button on the keyboard or press in the IFD knob to exit the naming edit mode.

COPYING A ROUTE

To copy an existing route for later use or modification, highlight the desired route from the ROUTE tab by either touching the row or using the bottom right IFD knob. Once the desired route to be copied is highlighted, press the “Copy” LSK along the left edge of the display.

Copy Route LSK

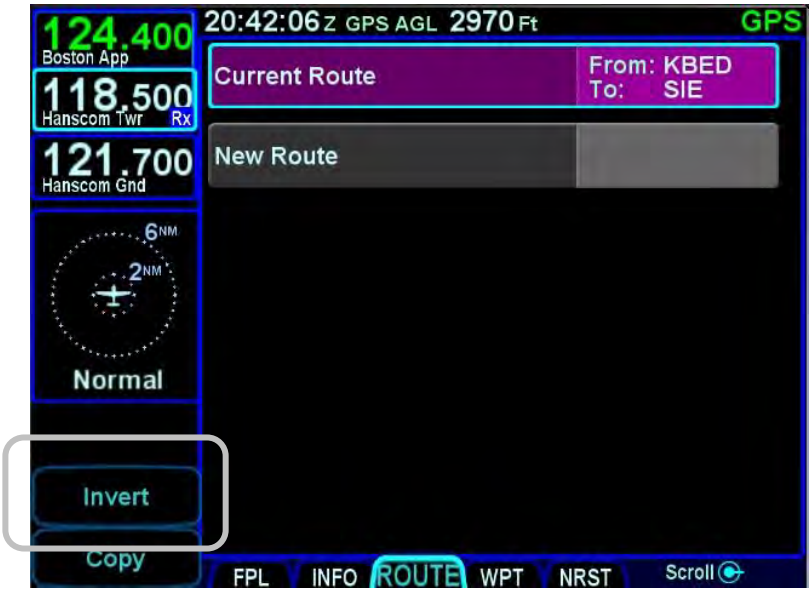


This will present a copy of the original route that can then be edited as required.

INVERTING A ROUTE

To invert an existing route for later use or modification, highlight the desired route from the ROUTE tab by either touching the row or using the bottom right IFD knob. Once the desired route to be copied is highlighted, press the “Invert” LSK along the left edge of the display.

Invert Route LSK

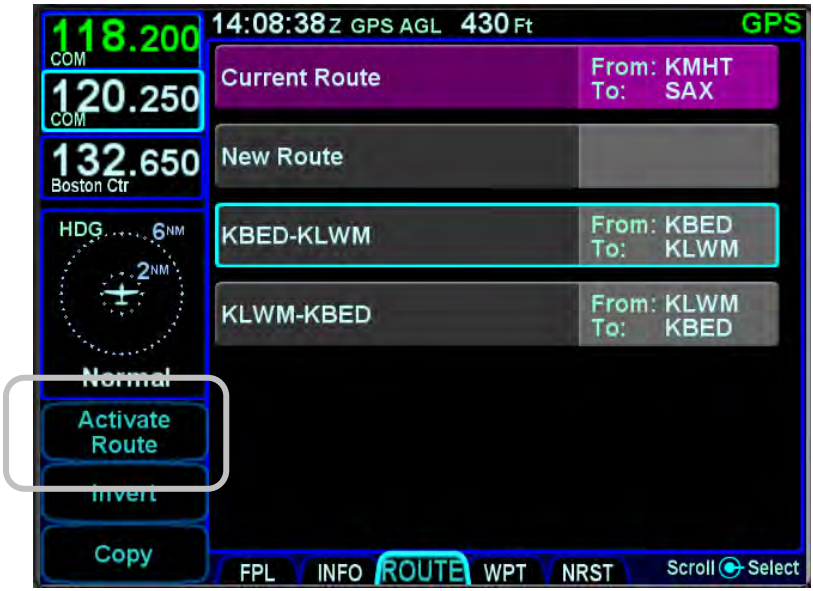


This will create an inverted copy of the original route that can then be edited as required.

ACTIVATING A ROUTE

To activate an existing route from the stored routes list, highlight the desired route from the ROUTE tab by either touching the row or using the bottom right IFD knob. Once the desired route to be activated is highlighted, press the “Activate Route” LSK along the left edge of the display.

Activate Route LSK



This will display the now active route in the FPL tab.

DELETING A ROUTE

To delete an existing route from the stored routes list, highlight the desired route from the ROUTE tab by either touching the row or using the bottom right IFD knob. Once the desired route to be deleted is highlighted, press the “CLR” function key along the right edge of the display. A confirmation dialog box will then be displayed (“Delete <name of flight plan>”) that can be confirmed by either touching the dialog box or pressing the “ENTR” function key along the right edge of the display.

WPT (USER WAYPOINTS) TAB

The WPT tab will list all user waypoints in the IFD. Up to 600 user waypoints can be stored and accessed on this page.

User Waypoints Tab

CREATING A USER WAYPOINT

There are 4 methods of creating a user waypoint from the “WPT” tab of the FMS page:

- **Present Position** – Press the “PPOS” LSK to create a waypoint with your current position. No further action is required.
- **Enter Lat/Lon** – Press the “New” LSK then press the “Format” LSK until the “Lat/Lon” option appears and enter in your desired coordinates either by touching the coordinate field and then using the virtual keyboard or by using a combination of twists and pushes of the bottom right IFD knob to enter the coordinates. Press the “Enter” LSK to save that new waypoint.
- **Enter Radial/Radial (an intersection of two radials)** – Press the “New” LSK then press the “Format” LSK as required to select the “Rad/Rad”

option and enter in your desired navaids and radials either by touching the target field and then using the virtual keyboard or by using a combination of twists and pushes of the bottom right IFD knob to enter the data. Press the “Enter” LSK to save that new waypoint.

- **Enter Place/Bearing/Distance** – Press the “New” LSK then press the “Format” LSK as required to select the “Rad/Dist” option and enter in your desired place/bearing/distance either by touching the target field and then using the virtual keyboard or by using a combination of twists and pushes of the bottom right IFD knob to enter the data. Press the “Enter” LSK to create and save that new waypoint.

NAMING A USER WAYPOINT

Each user waypoint can be assigned a 5 character identifier that can be used in the FMS anywhere a nav database waypoint can be used. You can elect to use the automatically assigned 5 character identifier (format is “WP###”) or re-name that as desired. A longer description can also be attached to each user waypoint using the “Name” field. In each case, those names can be entered by either touching the specific field and using the virtual keyboard or by using a combination of twists and pushes of the bottom right IFD knob.

DELETING A USER WAYPOINT

There are two methods to delete an existing user waypoint. Either highlight the waypoint to be deleted and press the “CLR” button on the bezel, and then the “ENTR” button when the green confirm dialog box is displayed, or, use the “Delete Waypoint” LSK along the left edge of the display and then use the “ENTR” button when the green confirm dialog box is displayed (or touch the green box).

DESIGNATING A USER WAYPOINT AS AN AIRFIELD

To designate a user waypoint as an airfield, the waypoint must be manually named using the following format
“AIRPORT XXXXXFT” where XXXX is the field’s elevation.

NRST (NEAREST) TAB

The Nearest page has two display formats – full page Nearest and a split Map-Nearest combination. Switching between the two formats is accomplished by “opening” or “closing” the side tab when on the Nearest page.

Full Nearest Tab

Split Nearest Tab

The “Nearest” LSK along the left edge can be used to cycle through the various nearest types. Choices include:

- Nearest Airports
- Nearest Airports to Destination
- Nearest VORs
- Nearest NDBs
- Nearest Intersections
- Nearest ARTCCs
- Nearest FSS
- Nearest Airspace
- Nearest User Waypoints

When using the split Map-Nearest view, the row that is highlighted in the Nearest list will also be highlighted in cyan on the map.

For those rows that contain a frequency, touching the frequency, or using the bottom right IFD knob to highlight it and then pushing the knob will nominate the frequency into the #1 standby slot.

For those rows that contain a lower case blue info “i” symbol in the middle of the row, touching the info “i” or using the bottom right IFD knob to highlight it and then pushing the knob will jump the page to the INFO tab with that facility information displayed.

For those rows that contain a chart icon on the right side, touching the chart icon or using the bottom right IFD knob to highlight it and then pushing the knob will jump the page to the CHART tab on the MAP page with the Chart directory for that airfield displayed.

Each Nearest type list can be scrolled either via touch (use a vertical swipe of the finger) or via the bottom right IFD knob.

If the highlighted item is an airport, pressing the Direct-To function key on the bezel will display the Direct-To green dialog box with the highlighted airport pre-populated as the Direct-To location.

As described in Section 1 of the manual, pressing the NRST function key will bring up the Nearest tab in the split Map-Nearest view.

Each subsequent push of the “NRST” function key will step to the next nearest data type.

If the Nearest page is left for 60 seconds or more and then is returned to, the Nearest Airports selection will be the active nearest data type no matter what the last nearest data type may have been. For example, if the Nearest VORs selection was the most recent display of nearest data, and then the pilot selects a map page for more than 60 seconds, when the Nearest tab is next selected, Nearest Airports data is now displayed and not Nearest VORs.

TIPS AND TECHNIQUES

Emergency Return to Departure Airfield
If on departure leg and an emergency return to the departure airfield is deemed necessary, the recommended technique is to press the –D-> button on the bezel, twist the bottom right IFD knob counter-clockwise to pre-fill the departure airfield and press ENTR, ENTR to make that the active waypoint. Then press the PROC key to produce a dropdown list of approaches and select the desired one. To quickly get the tower frequency of that airfield, press the NRST button on the bezel, confirm the departure airfield is the highlighted row and press the bottom right IFD knob to nominate that frequency into the #1 standby slot for swapping.

NOTE

Nearest Lists Capped at 100nm
Most Nearest lists will only display entries that are within 100nm of the current aircraft position.

3 Map Pages

This section covers the Map page tabs including the map and chart display modes and controls, terrain awareness and alerting, and weather datalink.

MAP TAB

The map has several formats and views. There is both a full map depiction as well as a datablock map depiction. In both cases, you have the ability to control the map feature density as well as the various overlays, all via the LSKs along the left edge of the display.

The active FMS flight plan is always overlaid on the map as are any traffic depictions.

COOL FEATURE

Next Leg Depiction on Map
While the current leg of the active flight plan is always depicted in magenta on all moving maps, we've added an indication of the next leg using alternating magenta and white stripes. This "candy cane" indication can come in handy during such circumstances as teardrop entries into a hold pattern. It gives you a clear indication of what the system will do next. All future legs beyond the next leg will be depicted in white.

MAP CONTROLS

Turning the bottom right IFD knob (inner or outer ring) or using "pinch zoom" touch gestures will result in a map range change.

Map range choices extend from 2 nm up to 1000 nm. Current map range is indicated on the outer map range ring at approximately the 1:30 position and as noted above, the map range can be adjusted by either twisting the bottom right IFD knob or by using a two-fingered pinching gesture on the touch

screen. The depicted current range numeric is replaced by “Min” and “Max” for two seconds before timing back out to the actual range number when at the two range extremes.

Pressing the knob cycles through the various map views. The map view selected is indicated at the top of the map next to the heading box. No indication means Heading Up. All other options are labeled next to that heading box. Depending on the installation, map view options can be:

- Heading Up <u>or</u> Track Up (360°)
- Heading Up <u>or</u> Track Up (240° arc view)
- North Up (360°)

Heading vs. Track selection is made from the “Map Orientation” selection on the User Options – SETUP tab of the AUX page.

North Up can be either Magnetic North or True North depending on the “Bearing Reference” selection on the User Options – SETUP tab of the AUX page.

North-Up, 360 View Example

Track-Up, Arc View Example

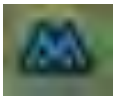
TIPS AND TECHNIQUES

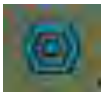
Map Content Control

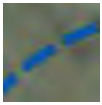
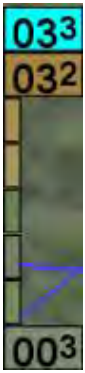
Map features displayed are highly dependent on a combination of the map view, map range, map declutter settings, and user setup choices. For example, if the flight plan concludes at an airfield, the airfield identifier may be automatically decluttered in favor of the waypoint identifier that represents the airfield from the flight plan. In this example, both identifiers can be made visible by ranging in the map to under 4nm.

OTHER MAP FEATURES

The table below defines other map features.

Map Symbol	Item	Description
	Desired Track	Solid triangle on inside edge of map compass rose
	Heading Select (“Heading Bug”)	For those installations where the IFD is receiving heading select (aka heading “bug”) data, a hollow heading bug is displayed for reference on the inside edge of the map compass rose
	Projected track line	Dashed line indicating actual track. Connects ownship symbol with compass rose.
	Single Low Obstacle	200’ AGL up to 1000’ AGL
	Grouping of low obstacles	2 or more low obstacles (200’ AGL up to 1000’ AGL) within 1 nm of each other

Map Symbol	Item	Description
	Single high obstacle	1000’ AGL or higher
	Grouping of high obstacles	2 or more high obstacles (1000’ AGL or higher) within 1 nm of each other
	Towered airport, hard Towered airport, soft Towered airport, water	If runway orientation known, they are also depicted on the airfield symbol
	Non-towered airport, hard Non-towered airport, soft Non-towered airport, water	If runway orientation known, they are also depicted on the airfield symbol
	NDB	All NDBs in nav database
	VOR	All VORs in nav database
	Intersection	All intersections in nav database

Map Symbol	Item	Description
	Flight plan, course waypoints	Each waypoint in flight plan
	Interstate highway	All interstate highways in the database
	Class B	Each boundary of Class B airspace
	Class C	Each boundary of Class C airspace
	Tower Zone (estimated Class D)	Tower zone boundary if known, otherwise 5nm ring estimating Class D boundary
	Victor or Jet Airways	All Victor and/or Jet airways
	Terrain scale	Indicates highest and lowest limits of the terrain in displayed area. Legend colors in between these numerics represent terrain elevations. Blue obstacle clearance number shows the top of the highest obstacle, when greater than the highest displayed terrain.

COOL FEATURE

Fuel Range Ring

The green fuel range ring depicted on the map provides a visual indication of the max range of the aircraft, allowing a 45-minute reserve. Winds are indirectly taken into account. The calculation uses groundspeed to compute the size of the circle and is based on the value of the fuel totalizer. The dashed green circle indicates the total maximum range without using the reserve. A wider solid green circle indicates the extra range the reserve fuel should provide. The circle turns yellow indicating that only reserve fuel remains. The rings are always displayed and cannot be turned off.

The indications depicted are for a maximum fuel range, calculated with reference to the current groundspeed and the remaining fuel as indicated by the fuel totalizer. Changes in power settings or winds aloft or inaccurate fuel totalizer data will alter your range and endurance depiction. There will be no fuel range rings depicted if the IFD is not connected to a fuel flow system. An inaccurate manual entry of initial fuel will result in an inaccurate fuel range ring depiction.

DECLUTTERING THE MAP

Two LSKs along the left edge of the display allow for separate control of the information density of the land-based (“Land”) map features (e.g. terrain, political boundaries, rivers, lakes, oceans, roads, etc.) and the navigational-based (“Nav”) map features (e.g. airspace, Victor and Jet airways, airports, obstacles, navaids, etc.).

Use the “Land” and/or “Nav” LSK to select the preferred level of feature density. The level specified remains consistent across all map pages on the display on which it was set.

Map Declutter Controls

MAP PANNING

Panning the map is accomplished by dragging a finger along the display in the direction of desired panning. When panning away from the ownship depiction, a cross-hair cursor is displayed and a readout of the bearing and distance from present position to the cross-hair cursor position is displayed next to the cross-hair cursor.

The map will snap back to being centered on the present-position ownship depiction after 20 seconds of panning inactivity or if a quick double-tap on the touch-screen is made.

NOTE

Map Panning Limited Geographic Boundaries
Due to map projection limitations, map panning is limited to +/- 45 degrees of longitude and +/- 30 degrees of latitude from present position.

NOTE

Map Panning Only Via Touch
Map panning can only be accomplished via touch screen use. There is no physical bezel control to support map panning.

GRAPHICAL FLIGHT PLANNING (“RUBBER BANDING”)

A flight plan can be altered graphically by touching the desired leg or the desired waypoint on the map depiction, placing your finger on the leg for approximately 2 seconds until the leg turns cyan, and then, without lifting your finger off the display, dragging your finger to the desired location. When you lift your finger off the display, a dialog box is presented on the display for you to choose/confirm the new waypoint being created.

If the new fix is in close proximity to a facility or facilities in the on-board navigation database, then both the fix and the nearby facility or facilities will appear in the dialog box list.

Rubber Banding Dialog Box

If the intended new waypoint is not listed in the dialog box to your satisfaction, press the bezel “CLR” button to clear and restart as required.

As soon as a fix from the presented list is selected, a new waypoint is inserted in the FPL flight plan list and uses a default waypoint naming mechanism (“RBxxx” where “RB” stands for Rubber Banding). This can easily be seen if the IFD were on the FPL tab of the FMS page and using the split Map-FPL view.

TIPS AND TECHNIQUES

Optimal Rubber Banding
If you don’t see the desired leg turn cyan within 2 seconds of placement of your finger on the location, try slightly adjusting the placement of the finger that is being used to designate a leg for rubber banding. Move your finger slightly in a direction perpendicular to the leg. Note that the active leg (the magenta one) of a flight plan cannot be rubber-banded.

Rubber banding is a handy feature to quickly alter a flight plan around airspace or a weather buildup while staying on the map.

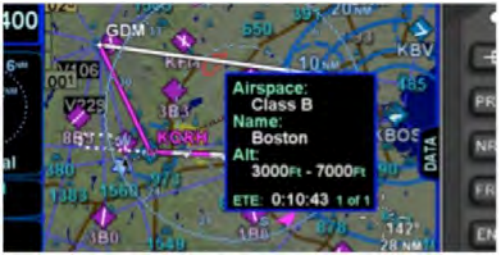
NOTE

Rubber Banding Only Via Touch
Rubber banding can only be accomplished via touch screen controls. There is no physical bezel control to support the feature.

MAP INFORMATION POP-UP BOXES

There are “hot spots” all over the map and include every depicted navaid, airport and airspace including TFRs. Touching one of these “hot spots” will generate an informational pop-up box that contains relevant information about that hot spot. These boxes will time out in 20 seconds and can also be dismissed by tapping somewhere else on the display. A few examples are depicted in the images below. Note that in every case, there is a page count in the bottom right corner of each pop-up box. For those boxes that indicate more than one page (e.g. VOR co-located with an airfield), touching the pop-up box switches between the various pages of the pop-up box.

Map Popup Info Boxes



For those hotspots that are an airport and typically have METAR data associated with them, a METAR page can be appended to the map info popup boxes as shown in the middle example image above.

TIPS AND TECHNIQUES

METAR page on Map Popup Pages Delayed
If the airfield being touched to generate the map info popup box is not in your active flight plan or nearest list, there will be approximately a 1 second delay before the METAR page will created. This can be avoided by dwelling your finger on the airfield of interest for approximately 1 second or touch the airfield a second time to give the system time to generate the METAR map info popup page.

NOTE

Map Pop-Up Boxes Only Via Touch
Map pop-up boxes can only be accomplished via touch screen use. There is no physical bezel control to support the feature.

DATALINK WEATHER OVERLAYS AND OPERATIONS

The optional broadcast weather datalink is a transmission to your aircraft via one of a number of possible weather datalink systems. Datalink requires a fixed monthly subscription and the receiver receives weather data continuously. You can control display of the received data on the various moving map pages.

The datalink systems provide US, Canadian, Mexican, and Caribbean METARS and TAFs and US, Canadian and Puerto Rican RADAR as well as other information such as winds aloft, TFRs, lightning, etc. Product availability depends on the level of subscription chosen. See the IFD product details page on http://www.avidyne.com/products/ifd540/ifd-weather.asp for a complete list of supported weather products.

NOTE

Datalink Data Accuracy
Avidyne does not control, review, or edit the information made available by the datalink products, and is therefore not responsible for the accuracy or timeliness of that information.

NOTE

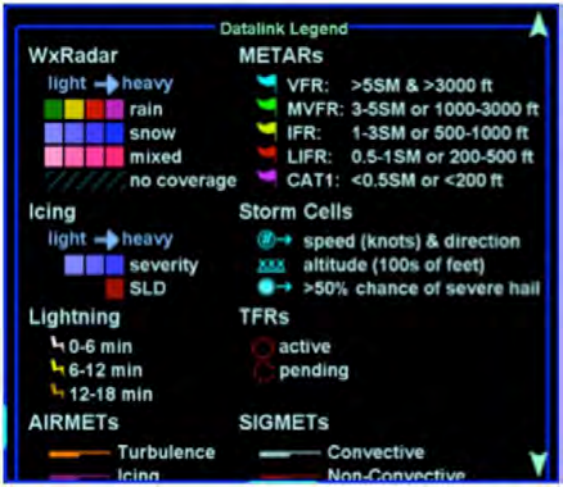
Datalink Data Intended to Aid Decision Making
Weather Datalink information is meant to aid pilot planning and near-term decisions focused on avoiding areas of inclement weather that are beyond visual range or where poor visibility precludes visual acquisition of inclement weather. The system is not designed for use for weather penetration and storm cell circumvention. The system lacks sufficient resolution and updating necessary for tactical maneuvering.

DATALINK RADAR

The Datalink radar is a composite image depicting precipitation as seen by multiple ground-based weather radar sites. The image is color-coded to show intensity levels and precipitation types and is overlaid on top of any other map features, including terrain alerting.

Datalink Precipitation Example

Weather Data Legend



At large map ranges beyond 250nm from the aircraft, small areas of high-intensity RADAR returns may not be displayed; instead, larger areas of surrounding lower-intensity RADAR returns will be shown.

Diagonal stripes show the Datalink radar data coverage area. In normal operation the boundary follows the outline of the Continental United States (CONUS). If, however, Datalink radar is unavailable in a particular area for any reason, hatched lines appear in that area. In the mountains and off the coast, hatched lines may represent no coverage below 10,000 feet. If there are radar returns in that region above 10,000 feet, the returns will be displayed as “islands of precipitation” surrounded by the hatched lines.

No Datalink Coverage Area Hatched Lines

The “Wx Overlay” LSK on the map page brings up a control page on which the layer combinations can be turned on or off.

Wx Overlay Selection

The options vary with the installed datalink device and subscription level.

The Wx Overlay page is segmented into groupings of products. One selection per grouping can be made and products selected are indicated by a green lamp. The table below represents the possible set of products available. Products that are not available due to the device type or subscription level will not be displayed as selectable choices.

Weather Product Grouping Title/Category	Possible Selections Within the Grouping
Weather Layers	US Wx Radar PR Wx Radar (Puerto Rico) CN Wx Radar (Canada) Storm Cells Icing Winds Aloft
Airport Reports	METARs
Weather Reports	AIR/SIGMETs
Lightning	Datalink Sensor – Strike Sensor – Cell Sensor – Clear Strikes

Selections can be made by either touching the desired product or by using the bottom right IFD knob.

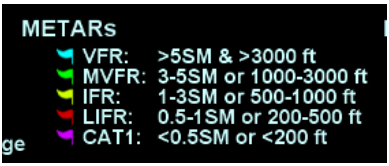
Note that when there is an on-board lightning sensor selected (Avidyne TWX670 Tactical Weather System or L3 WX500 Stormscope), the “Lightning” grouping will also include a “Clear Strikes” function key.

Use the bottom right IFD knob to adjust altitude slices for icing and wind products. Note that the IFD knob will only adjust the weather product slice if the product is being displayed and is valid; otherwise it still controls the map range and view.

Choices may include “METARS”, “AIR/SIGMETS”:

- **METARs** – These are available in both text and graphical formats and represent recent surface weather observations. Text METARs are presented on the “Info” tab of the “FMS” page. The graphical METARs are color-coded flag symbols that summarize a recent surface weather observation and can appear as overlays on the Map and embedded in the flight plan on the Flight Plan tabs and Nearest tabs. These flags allow an overview of general weather conditions in an area.

Graphical METAR Legend

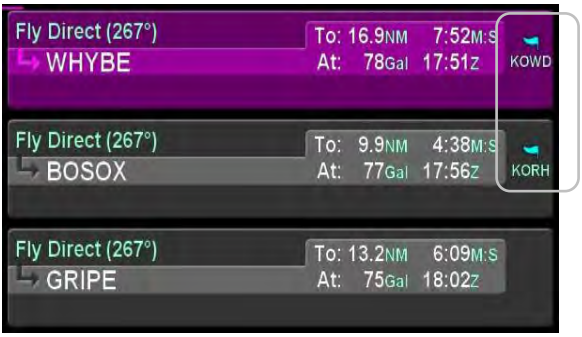


- **AIRMETs and SIGMETs** (US only) – These are areas where the National Weather Service has issued advisories for various types of hazardous weather. They are depicted on the Map page along with an abbreviated description of the hazard, such as “ICE” (icing), “MTN” (mountain obscuration), or “IFR” (instrument flight conditions).

AIRMETs and SIGMETs Detail

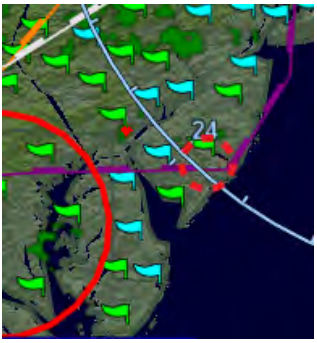
COOL FEATURE

METAR Flags in Flight Plan The right edge of each leg in a flight plan presents a METAR flag for the closest reporting station, if the station is different from the previous leg's station. The station for which the METAR flag applies is decoded immediately beneath the flag and may not be exactly the same location as the leg itself.



TFRS

Active and Pending TFRs



TFR data is also transmitted via Broadcast Datalink. Two types of TFRs are depicted – active and pending. Active TFRs are depicted as solid red lines and Pending TFRs are depicted as dashed red lines, which become solid when the TFR transition time rolls from pending to active. TFR data cannot be turned off.

INDICATIONS OF DATA AGE

The multiple products transmitted as part of the Broadcast Datalink service can arrive at different intervals. Two indicators at the bottom corners of each map provide an easy-to-use indication of data age. If a Datalink Icing product was selected for display via the “Wx Overlay” key, the RADAR age is replaced by the age of the icing altitude data currently being displayed; the icing altitude slice currently displayed is shown in the bottom right corner

NOTE

Datalink Data Position
The in-cockpit RADAR display depicts where the weather WAS, not where it IS. The age indicator does not show the age of the actual weather conditions but rather the age of the mosaic image. The actual weather conditions could be up to 15 to 20 minutes OLDER than the age indicated on the display. Pilots should consider this potential delay when using in-cockpit RADAR capabilities, as the movement and/or intensification of weather could adversely affect safety of flight.

Data Age: RADAR and Icing

TERRAIN

Both Terrain Awareness (TA) and Forward Looking Terrain Alerting (FLTA) are meant to serve as an aid to situational awareness. They are intended to provide terrain and obstacle awareness in the proximity of your aircraft. They are not meant to be the sole means of terrain or obstacle avoidance.

Both TA and FLTA use a GPS-based MSL altitude and a 9 arc-sec terrain database (WGS-84) to display a two dimensional scene representing an “exocentric” look-down-from-above view. The database is loaded on the IFD prior to shipping from the factory, and is capable of being updated in the same manner as other onboard databases, if necessary.

Both TA and FLTA compute height above terrain via GPS inputs and are not a radio altimeter (RADALT).

TERRAIN AWARENESS (TA)

TA is for general situational awareness purposes and consists of hatched terrain on any map page. TA will <u>not</u> generate a CAS message or aural alert.

Terrain Awareness (TA)

TA can be triggered by either terrain or database obstacles (e.g. towers > 200’ AGL tall buildings, etc). Any terrain that is within a 10nm radius of aircraft position and between 100’ below aircraft altitude and 1000’ below aircraft altitude will generate yellow hatched indications on the map pages. Any terrain that is within a 10nm radius of the aircraft position and is 100’ below aircraft to anything above aircraft altitude will generate red hatched indications on the map pages.

Any obstacle in the database within a 5nm radius of the aircraft position and whose top is within 2000’ vertically (above or below) of the aircraft altitude will generate a cyan (blue) threat bubble over the obstacle on the map pages. Obstacles inside a 3nm radius of the aircraft position and whose top is between 100’ below aircraft altitude and 1000’ below aircraft altitude will generate a yellow threat bubble over the obstacle. Obstacles inside a 1.5nm radius of the aircraft position and whose top is between 100’ below aircraft to anything above aircraft altitude will generate a red threat bubble over the obstacle.

TA can be turned off via the “User Options” LSK of the SETUP tab on the AUX page. When turned off, there is no terrain TA display on the map pages for the individual IFD.

A rectangular suppression area exists for all runways in the FMS database and user waypoints that have been designated to be an airfield (see User Waypoints section earlier in this manual). Terrain inside this suppression area will not generate any TA indication. Dimensions of the TA runway suppression area are 0.25 nm laterally and 0.5 nm off each runway end. Airports with no known runway orientation use a 1nm circular suppression area. Obstacle threat bubbles can still appear inside the suppression area.

Runway Suppression Area Depiction

FORWARD LOOKING TERRAIN ALERTING (FLTA)

FLTA alerting is triggered by either a projected imminent impact with terrain or obstacle **or** reduced terrain and obstacle clearance. Projected imminent impact with terrain occurs when the aircraft flight path is projected to intersect with terrain up to 3.0nm (yellow caution) or up to 1.5nm (red warning) in front of the aircraft flight path. By way of reference, this means an aircraft traveling at 180 knots of ground speed will have 60 seconds of notice for a caution and 30 seconds for a warning. Reduced terrain or obstacle clearance occurs when the aircraft flight path is not projected to impact the terrain but the projected clearance between the aircraft flight path and nearby terrain or obstacles falls below a designated safe vertical distance. The reduced terrain and obstacle clearance distance varies with phase of flight and aircraft dynamics per TAWS TSO C-151b but generally ranges from 300' to 1000'.

Either terrain or obstacles can trigger FLTA alerts and they are distinguished via the CAS messaging and aural alerting. The difference between FLTA warnings and cautions is exclusively based on distance-to-go to projected impact points or reduced clearance areas.

The projected imminent impact location or the projected reduced terrain and obstacle clearance area is depicted on the maps with a solid yellow (caution) or red (warning) "flashlight" elliptical depiction. Depending on aircraft dynamics, it may be possible for a solid red FLTA "flashlight" projected terrain impact point to appear on top of a larger hatched yellow TA depiction.

FLTA Depiction

Each unique FLTA alert will generate a new Master Caution lamp illumination (flashing yellow or red “AUX” Page Function key), a new CAS message, a new aural alert, and display the elliptical solid yellow/red coloration on the maps.

Each unique FLTA alert can be acknowledged by touching the CAS message or pressing the “CLR” function key on the right edge of the IFD which turns off the Master Caution lamp flashing, the CAS message and the aural alert. The FLTA acknowledgment does not turn off the solid red or yellow coloration on the maps.

It is possible to have multiple terrain and obstacle FLTA caution and warning conditions at the same time. However, the CAS visual alerts and associated aural alerting will only honor the highest priority alert. The priority order is Terrain Warning, Obstacle Warning, Terrain Caution, Obstacle Caution.

FLTA aural alerts repeat every 6 seconds for the duration of the alert condition or until acknowledged/muted by the pilot.

There is a rectangular suppression area for all runways in the FMS database. Terrain and obstacles inside this suppression area will not generate any FLTA alerts. Dimensions of the FLTA runway suppression area are 2.0 nm laterally and 4.0 nm off each runway end when runway orientations are known or a circle with a radius of 1 nm centered on the Airfield Reference Point (ARP) when the on-board databases do not know the runway orientations. Note that for airfields with multiple runways, this may have the effect of looking like several irregular shapes around the airfield. If the aircraft position or the aircraft flight path projected impact point is anywhere within that runway suppression area, no FLTA alert will be generated. Obstacle threat bubbles can still appear inside the suppression area.

FLTA alerts are inhibited if any of the following conditions are met:

- FLTA is manually turned off via the pilot-accessible “User Options” LSK on the “SETUP” tab of the AUX page (generates a “FLTA OFF” top datablock strip message);
- The ownship position is inside the rectangular (or circular, in the case of no known runway orientation) FLTA Inhibit

zone depicted on the 2D map (generates a “FLTA INHIBITED” top datablock strip message);

- The projected ground impact point along the current ground track intersects the terrain inside that FLTA Inhibit rectangle/circle (generates a “FLTA INHIBITED” top datablock strip message);
- The Reduced Terrain Clearance (RTC) violation is projected to happen inside that FLTA Inhibit rectangle/circle (generates a “FLTA INHIBITED” top datablock strip message).

FLTA Inhibited and Off Messages

Should a FLTA alert be generated, there are several courses of action that can be taken and the specific scenario will dictate the optimum avoidance maneuver. For example, sometimes the best course of action is to immediately add power and climb, yet sometimes the best course of action may be a small heading change, especially in the case of a single obstacle off the nose. The pilot in command must assess the specific circumstances presented and take action to avoid flight into terrain.

TRAFFIC DISPLAY

When integrated with an optional traffic system (e.g. TAS, TIS, TCAS), the IFD will display traffic information for transponder-equipped aircraft and provide aural and visual alerting for traffic considered a threat.

The following symbols for TAS systems are displayed both on the map (all views) and in the traffic thumbnail:

Traffic Symbol	Definition
	Traffic Alert (TA) [shown with TIS intruder track]. Traffic that is within the alert zone defined by the traffic sensor.
	Proximate Traffic [shown without TIS intruder track]. Traffic that is not within an alert zone, but is close to your position.
	Other Traffic [shown with TIS intruder track]. Traffic that is detected by the traffic sensor, but determined not to be a current threat.

Additional information is displayed adjacent to the traffic symbol to indicate relative altitude and vertical trend.

Additional Traffic Information

For Mode-S equipped aircraft, the aircraft ID (e.g. tail number, call sign, etc) may also be displayed adjacent to the traffic symbol.

Traffic Advisories (TA) will also generate a CAS message and depending on the type of traffic system installed, some type of aural alert.

Most installations will ensure the traffic system is in Standby or Ground mode on the ground and will automatically toggle to one of the enroute altitude modes per the table below.

Traffic Altitude Mode	Relative Altitude Window
Below	-9900’ to 2700’
Normal	-2700’ to 2700’
Above	-2700’ to 9900’
Unrestricted	All known traffic

NOTE

Traffic Mode and Range Changes

The traffic sensor mode changes are automatic based on phase of flight. If however, a manual mode change is desired, it can only be accomplished when the traffic thumbnail is displayed and is accomplished by either pressing the L1 LSK or touching the lower 1/3 of the traffic thumbnail.

The only means to change the traffic thumbnail display range is accomplished by touching the upper 2/3 of the traffic thumbnail.

CHART TAB

The CHART tab on the MAP page is capable of displaying geo-referenced Jeppesen departure/arrival/approach charts and airfield diagrams. Geo-referenced charts refers to the ability to overlay an ownship symbol representing aircraft present position in the correct orientation and position on the chart diagrams as well as overlaying the active FMS flight plan on the chart.

Geo-referenced Charts with Flight Plan and Ownship Overlay

Global coverage is provided but the exact set of charts supported on any individual IFD is dependent on the level of subscription held by the aircraft owner/operator.

<u>Directory List</u>

Press the “Select Chart” LSK to start searching for a specific airfield and chart. If an airfield is in the active flight plan, then a “Paste <airfield name> LSK will be presented along with a “Select Airport” LSK option. Pressing the “Select Airport” LSK will put a cursor in the airport edit field that can then be altered using the bottom right IFD knob or by touch on a virtual keyboard.

The Charts Selection page presents a list of available charts. Use the right-hand knob on the IFD to select the desired approach from the presented list and push the knob in, or touch the desired approach in the list, to select and display the chart.

NOTE

Inclusion of RNP Approach Choices
RNP approaches may be included in the list of available charts and can be selected for viewing but they cannot be selected in the FMS, and the IFD system is not authorized for RNP operations.

Chart Extent Box

A green chart extent box is drawn separately on the map and represents the geographic boundaries of an instrument approach plate associated with a FMS destination. When the ownship symbol crosses the boundary of the chart extent box, this is a good time to switch over to the CHART tab.

Close Up of Chart Extent Box

Hot Links to Charts

Hot links to the charts directory or individual charts exist in several locations throughout the IFD including the FPL tab, INFO tab and NRST tab of the FMS page.

COOL FEATURE

Hot Links to Charts in Flight Plan Whenever a flight plan leg (blue airfield legs) has at least one published approach associated with it, a chart icon is presented on the right edge of the flight plan leg. If there is a published precision approach, the icon will also contain an "I". By using touch or the bottom right IFD knob, scroll through the flight plan elements until the chart icon is highlighted in reverse video. If, at that time, the knob is pushed in, the IFD will display either the specific chart for that associated procedure or the directory of possible procedures for that airfield.

Hot Links to Charts

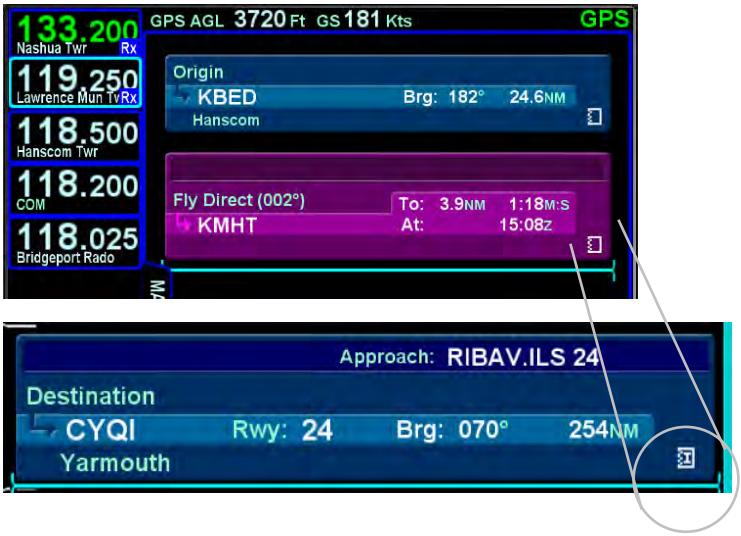


Chart Views

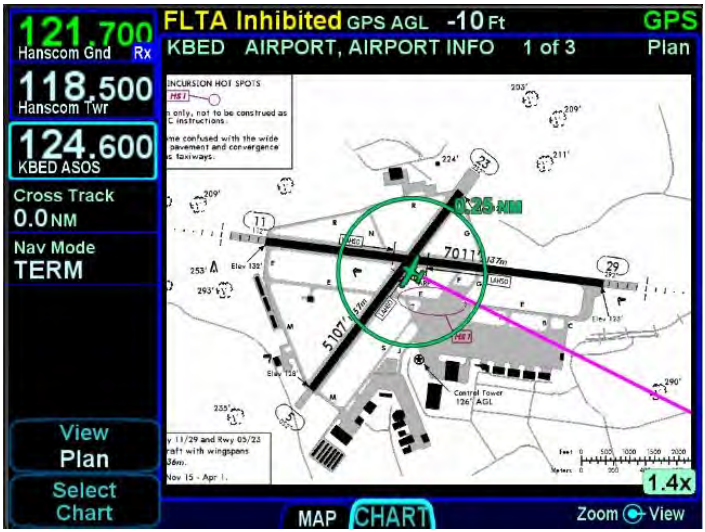
If the currently displayed chart is not the desired one, use the “Select Chart” LSK to jump back to the Directory List where the desired airport/chart can be selected.

Once a chart is displayed, the left-hand LSKs provide means to alter the view or presentation of the chart. A “Chart” LSK is provided to select Airport or Procedure type charts. The “View” LSK provides a set of views to choose from based on which option was selected in the “Chart” LSK. For example, if Procedure was picked, then one of five chart views can be selected (Plan, Header, Profile, Minimums, All). If Airport was picked, then a slightly different set of chart views could be selected (Plan, Header, Runways, Departure, All) The chart can be zoomed in/out as desired by using the right-hand knob on the IFD or via a pinch-zoom touch method.

Taxi Charts

If a published procedure was used via the Charts tab for the landing airport, the display chart will automatically switch over to the airfield diagram during post-landing roll out. Your ownship position on the airfield diagram chart will be displayed as an aid in surface navigation.

Taxi Chart



The charts can be pinch-zoomed and panned or knob zoomed to see close ups of the airfield diagram.

If you did not select or use a published approach via Charts, the local airfield diagram can still be accessed. Select “CHART” tab of the MAP page and then use the left-hand LSKs to select the desired airfield diagram.

Lighting

Some pilots prefer to use the Charts pages in the daytime lighting scheme at all times and some prefer the nighttime lighting scheme. In order to provide that flexibility, a separate “Chart Day/Night Mode” option (Auto, Day, Night) has been provided on the User Options LSK of the Setup tab on the AUX page. “Day” will always provide a bright white background for readability. “Night” will always turn the bright white backlighting off. “Auto” will use the additional “Chart Auto Mode” selection (Sensor, DimBus) on the User Options LSK of the Setup tab on the AUX page to control the definition of Auto.

Water Marking/Expired Data

Charts that have been expired for 60 or more days will still be displayed and readable indefinitely but a watermark “Not for Navigation” will be depicted on each chart. Expired charts will not display the flight plan overlay.

Updating Charts

Procedures for updating Charts are described in Section 6 of this manual.

4 Aux Pages

This section covers the system pages including audio controls, various utilities, setup options, system status and the alert message center.

AUDIO TAB

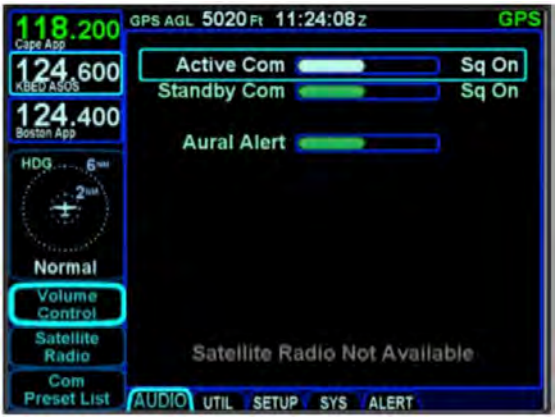
The AUDIO tab provides control and display of all system audio-related features such as radio volume, squelch settings, satellite radio channel tuning and com presets.

Audio Tab Controls

VOLUME CONTROL

Each subsystem for which the IFD has an ability to control volume (and squelch and ID on/off) is displayed as a separate line item when the “Volume Control” LSK is active.

Volume Control



The bottom right IFD knob controls row selection, volume adjust, and squelch or ID on/off control or in some cases (e.g. Satellite audio) mute on/off. Twisting the outer ring will highlight an individual row. Twisting the inner ring will adjust the volume as indicated by the green volume bar. Pushing that knob will toggle squelch on/off if applicable or ID on/off if applicable or mute on/off if applicable (1-2 second delay possible).

TIPS AND TECHNIQUES

Adjusting Traffic Volume Plays Chime
As the volume bar for the traffic alerts is adjusted, the IFD will play a double chime that represents the new volume level selected.

SATELLITE RADIO TUNING

When a compatible audio-capable satellite radio system is installed, a “Satellite Radio” LSK is displayed along the left edge of the display.

Satellite Radio Selection and Favorites

The page is divided into three parts. The left side of the page is a full channel list of all available satellite radio channels. The right side of the page is a numbered list titled “Favorites” and represents the satellite radio channels that have been programmed into a preset list for faster access. The bottom of the page contains a datablock indicating the artist, song, channel name and number, audio signal strength and a Quick Go To link to enter in a desired satellite audio channel.

To load a channel into the Favorites list, scroll the available channel list in the left column either via touch scroll or twisting the bottom right IFD knob counter-clockwise (either ring) until the desired channel is highlighted and press the “ENTR” key on the bezel to push that channel into the next available Favorites list slot.

To delete a channel from a Favorites slot, highlight the desired Favorites slot to remove the channel via touch or using the bottom right IFD knob. Then, with the Favorites slot highlighted, press the “CLR” button on the bezel.

To use the Favorites preset list, double tap the desired preset slot or push the bottom right IFD knob to highlight the desired row and push the knob to select it or press the “ENTR” bezel key to select it. This will immediately make that channel the active satellite radio channel.

In lieu of using the Favorites preset list, just scroll the full channel list in the left column either using touch or the bottom right IFD knob (either ring) to highlight the desired channel and then touch a 2nd time (double tap) or push in the bottom right IFD knob to immediately make that channel the active satellite radio channel.

Finally, the “Go To” field in the bottom right corner of the page can be used to select a satellite radio channel as the active channel. Highlight the field by touching it or using the bottom right IFD knob to highlight and then activate the button by touching it a second time. Another way to accomplish this is to push in the bottom right IFD knob to bring up a key pad and type or knob in the desired channel number.

COM PRESETS

The “Com Preset List” LSK can be used to nominate one of up to 16 selected preset frequencies into the #1 Standby com radio slot. If the aircraft has been wired to provide a cockpit control (e.g. dedicated com preset button on the yoke), then loading the preset frequencies into the #1 Standby can be done from any page by using that cockpit control.

Com Presets Page

To load a com frequency into a com preset slot, first put the page into edit mode by selecting the “Edit” box in the top right corner by either touching it or using the bottom right IFD knob to highlight and push the knob in. The box will turn dark blue to indicate the page is in edit mode.

Once in edit mode, select the desired slot for the preset frequency by either touching it or by using the bottom right IFD knob. Once that slot has been highlighted, either touch it a 2nd time to generate a numeric keypad and type in the desired frequency (must type in full frequency including the decimal point, “121.7”) or use a combination of twists and pushes of the bottom right IFD knob to enter the desired frequency.

When you have finished loading frequencies into the preset slots, exit the edit mode by either touching the “Edit” box again or using the bottom right IFD knob to highlight it then push the knob in.

To nominate a frequency from the com preset list into the #1 Standby slot, make sure it is highlighted by either touching it or using the bottom right IFD knob. Then either touch it a second time or push in the IFD knob.

For aircraft with the cockpit control installed (e.g. dedicated com preset button on the yoke), any time it is activated, it will briefly display a small dialog box next to the #1 Standby slot indicating which preset slot is used.

#1 Standby Slot

If the com preset page happened to be displayed at the time the cockpit control was activated, a small arrow will indicate which preset is used.

Com Preset Arrow

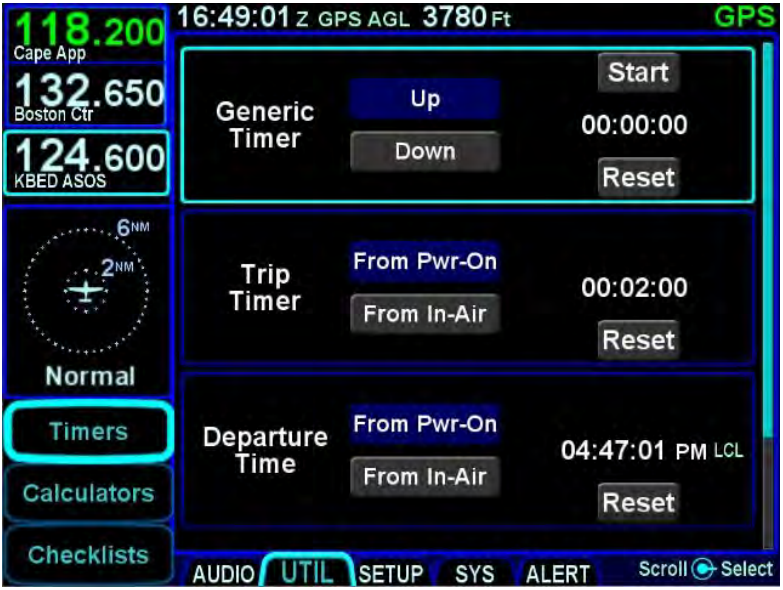
Each subsequent actuation of the cockpit control will step to the next non-blank entry in the com preset list.

UTILITIES TAB

TIMERS

For those timers that can expire, a cyan advisory Caution Advisory System message will be displayed and will stay active even across power cycles until the timer is manually reset.

Standard Timers



<u>Generic Timer</u>

The “Generic Timer” can be used for a variety of purposes. Controls exist for count-up and count-down versions of timers (the active selection will be displayed in a blue background) along with a Start/Stop and Reset. When the count-down option has been selected, then the clock value can also be set by using the bottom right IFD knob to select the clock field and edit the starting value or by touching the desired location on the display.

The generic timer values will reset after a power cycle (the timer is not continued from the previous power cycle).

Trip Timer

The “Trip Timer” provides an option to start from either IFD power on or from take-off (the active selection will be displayed in a blue background), along with a Reset capability.

This timer will automatically reset with each power cycle or take-off, depending on which selection was made.

Departure Time

The “Departure Time” provides an option to start from either IFD power on or from take-off (the active selection will be displayed in a blue background) and indicates the clock time (Zulu or Local) associated with the active blue selection.

The selection of Zulu or Local is automatic and dependent on the “Time Format” choice made on the “User Options” LSK of the SETUP tab on the AUX page.

Custom Timer

Up to 10 custom timers can be created by inserting a new timer below the Departure Time slot.

Twist the bottom right IFD knob to create an insert cursor at the bottom of the current timers list and push in the knob to create the new custom timer.

Typical uses include creating timers for 50hr and 100hr inspections, Annual inspections, Bi-annual air data system checks, BFRs, etc.

The user may choose from three types: an event-based timer, a 1-time event timer, or a periodic timer. Depending on which type was selected (indicated by a blue background), different types of date and time entries can be made and for the periodic selection, a count-down of remaining time is also displayed.

The custom timer can be named by selecting the title field using the bottom right IFD knob and pushing it in to get into edit mode. Then twist the inner and outer rings as required to create a custom name for the timer. When finished naming the timer, push the IFD knob to exit the edit mode.

2 Custom Timer Examples

Custom timers have a default name of “Event” with an accompanying “Event” CAS message at expiration. If the custom timer name were manually set to a blank, then the CAS message will be “Timer”.

TIPS AND TECHNIQUES

Separate “Switch Tank” Alert

A specific Switch Tanks alert can be created via the “User Options” LSK on the SETUP tab as described later in this manual.

CALCULATORS

Several calculators are included in the system and all can be accessed via the “Calculators” LSK on the UTIL tab of the AUX page.

TIPS AND TECHNIQUES

Pre-Populated Data Fields

Many data fields in the various IFD calculators will be populated automatically with sensor data in green if it is available, or can be manually edited/entered by the pilot. The DEST field will be populated with the last airport in the active flight plan, not necessarily the last waypoint in that flight plan. Non-airport waypoints are not permitted in the DEST field.

If a pre-populated field had been manually altered, the sensor supplied data can be restored by pressing the CLR button on the bezel.

Air Data Calculator

The air data calculator includes data fields for altitude, calibrated air speed, heading, total air temperature and barometric setting and will produce a wind computation.

Air Data Calculator

Fuel Planner

The fuel planner includes fields for the type, origin, destination, ground speed, fuel on board, and fuel flow, and will produce a computed fuel at destination value.

The “Type” field choices are “Present Position” or “Point-to-Point”.

Fuel Planning Calculator

Trip Planner

The trip planner includes fields for type, destination, ground speed, departure time and departure date and will produce values for desired track, distance, ETE, ETA, sunrise and sunset, and enroute safe altitude (ESA) - defined as 1000’ above the maximum elevation of terrain (but <u>not</u> obstacles) within a rectangular grid that measures 10 miles on each side of the centerline of the leg and extends between the origin and destination that was entered into the calculator.

The “Type” field choices are “Present Position” or “Point-to-Point”. If Point-to-Point was selected, then there is also a field for origin.

Trip Planner Calculator

RAIM Prediction

The GPS RAIM (Receiver Autonomous Integrity Monitoring) Prediction calculator includes fields for destination, arrival time and arrival date and will produce a RAIM status value for the destination location.

RAIM Prediction Calculator

Trip Statistics

The trip statistics calculator computes an odometer setting, maximum ground speed and average ground speed value, providing options to reset each computation individually or a master reset to reset all.

The trip statistics will continue to compute each data field across power cycles and until manually reset. The “Reset All” selection will prompt a confirm dialog box that must be used to reset all.

Trip Statistics Calculator

ELECTRONIC CHECKLIST

Up to 9 custom checklists can be created and stored in the IFD via the “Checklist” LSK of the UTIL tab, each with up 30 steps. Each step can be up to 30 characters long.

Creating a Checklist

The first step is to create a checklist directory (list of named checklists to be created). From the “Checklist” LSK, put the system into checklist edit mode by highlighting the “Edit” box in the top right corner of the page, either by touching it or using the bottom right IFD knob to highlight the box. The edit box will be displayed with a blue background and presents a numbered blank row when it is in edit mode.

When the system is put into checklist edit mode, the light blue wraparound cursor needs to be manually placed on the next available line in the checklist directory by touching the line or using the bottom right IFD knob. Then touch the row in the directory list a second time or push the bottom right IFD knob to generate a keypad for checklist naming.

Creating a Checklist Directory

When you have finished naming the new checklist, press the “Enter” button on the keypad or push the right IFD knob. Repeat

this process for naming new checklists until all desired checklist names are created.

When all done naming checklists, press the “Edit” box again to get out of Edit mode (background of Edit box should now be gray).

The second step is to create the checklist content. To create the checklist content, select the checklist title that is to be filled out from the directory list. First put the system back into checklist edit mode by touching the “Edit” box again or using the bottom right IFD knob to select it and then pushing the knob. This will produce an empty grey checklist step item.

Touch or use the bottom right IFD knob to select the step to be created or edited and this will put a bright blue outline around the step. Touch the highlighted row a second time or push in the bottom right IFD knob to generate a keypad. Type the desired text (Note: there is no ability to manually generate upper case characters) and then press the “Enter” button to accept. This will generate another empty grey checklist step item below and repeat the process as required. When done creating all the desired checklist steps, press the “Edit” button in the top right corner again to exit edit mode.

Creating/Editing a Checklist

Editing a Checklist

To edit an existing checklist, touch or use the bottom right IFD knob to select the “Edit” button, putting the system in edit mode. This automatically creates a new step at the end of the checklist – if that’s what you want, then just start typing on the keyboard. If instead, an existing step is to be edited, then select the checklist step to be edited by touching it or using the outer ring of the IFD knob. Touch the step a second time or push the IFD knob to generate a keyboard, press the CLR button (keyboard or bezel) as required to clear characters and then re-type as required. To insert a missing/extra step, type the step as desired as the last step of an existing checklist and then twist the inner ring of the bottom right IFD knob to insert the step in the desired location. When done with editing the existing checklist, touch/select the “Edit” button again to exit edit mode.

Press the “CLR” button on the bezel to return to the checklist directory.

Selecting a Checklist

From the checklist directory, highlight the desired checklist by either touching it or using the bottom right IFD knob and then either touch the checklist title a second time or push in the IFD knob to select it.

The selected checklist will then be displayed with the checklist title along the top strip.

Using a Checklist

When a checklist is selected for use, the first step will be highlighted by a bright blue wrap-around highlight. Either touching a highlighted step or pushing in the IFD knob will toggle that step to bright green and a green checkmark will appear along the right edge, indicating that checklist step has been accomplished.

Until all steps have been designated as accomplished, the bottom left edge of the checklist box will display “Checklist Not Completed”. As soon as all steps have been designated as accomplished, that text strip along the bottom edge will change to “Checklist Complete”.

Completed Checklist

If a step inadvertently has been checked off as accomplished, it can be unchecked by selecting the step (touch it or use the bottom right IFD knob) and then touching it a second time or pushing the IFD knob to remove the checkmark. This will also toggle the “Checklist Complete” text back to “Checklist Not Completed”.

TIPS AND TECHNIQUES

Backup Your Checklists

For a variety of reasons including copying onto other IFDs, restoring post-service events, etc., Avidyne highly recommends backing up and storing electronic checklists by downloading checklists onto USB fobs. Procedures are supplied later in this manual.

SETUP TAB

DATABLOCK SETUP

Setting up datablocks can be done by either selecting some preset configurations, individually customizing the slots (except for the two dedicated COM slots in the top left corner) or a combination of both.

Selecting preset datablock configurations is accomplished using the “Datablock” LSK on the SETUP tab of the AUX page and selecting “Presets” as the option. This produces a page with a choice of several presets.

Datablock Presets

Use either the outer or the inner ring (both work) of the bottom right IFD knob to select the desired choice from the options list.

Datablock Preset Selection	Content
Factory Default	Displays two COM frequencies above two NAV frequencies above the Decoded VLOC IDENT block above the Nav Mode along the left side. Displays GPS AGL Altitude along the top strip. Displays To Waypoint Information above Nearest Airport above Destination Direct Information above Minimum Safe Altitude above Ground Speed above GPS CDI along the right side.
Left Block Default	Displays two COM frequencies above two NAV frequencies above the Decoded VLOC IDENT block above the Nav Mode along the left side. Top strip and right side datablocks are fully customizable.
Traffic (if installed)	Displays the traffic thumbnail adjacent to the top LSK along the left side and provides a datablock slot above the traffic thumbnail to be configured as the user wishes.
Custom	Permits all datablock slots except the top left two dedicated COM slots to be configured as desired.

Setting up customizable datablocks is accomplished using the “Datablock” LSK on the SETUP tab of the AUX page and selecting “Setup” as the option.

Once on the Datablock Setup page, use the bottom right IFD knob in the following manner:

Outer Ring	Selects the desired page location (middle of top strip in the example below)
Inner Ring	Selects the data item from the list (GPS AGL Altitude in the example below)

Datablock Setup

Any change made on this page is immediately accepted with no special “save” step required. Datablocks can be inserted along the upper left edge of the display, along the top edge of the display and along the entire right edge of the display.

As you twist the outer ring of the bottom right IFD knob while on the Datablock Setup page, you will notice a blue filled box that will jump from one datablock slot to the next.

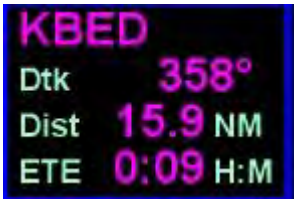
The center of the page will display the datablock options list for that given slot. Those items that are displayed in bright green text can be selected for the given slot. Those items that are displayed in subdued grey text are not selectable for that slot – the typical reason is that there is not enough space for the item given the content above and/or below the slot.

Restoring factory defaults is accomplished by pressing the bottom right IFD knob and then accepting the Confirm dialog box.

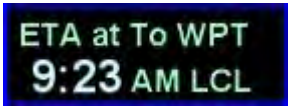
Potential datablock selections are listed below (factory defaults identified by asterisks). The format of many of the blocks changes if they are selected to be displayed along the top datastrip.

Datablock Item Title and Image	Content
Primary Com/VLOC (Note: This selection is permanently greyed out and is not actually selectable)	Defines the position of the top two datablocks along the left side. These are permanently dedicated to Com/VLOC control and display.
VLOC Radio	Provides a means to display the Active and #1 Standby Nav frequencies in slots 3 and 4 (2 lines)
Com/Nav Standby #2	Provides a means to display a 3rd com or nav frequency (2nd standby slot) (2 lines) Only available on left side datablocks Note: If this field is currently in datablock edit mode as indicated by a blue background, then com/nav tuning

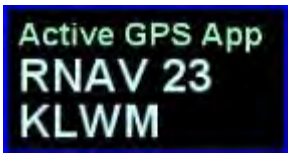
Datablock Item Title and Image	Content
	is disabled
Com/Nav Standby #3 	Provides a means to display a 4th com or nav frequency (3rd standby slot) (2 lines) Only available on left side datablocks Note: If this field is currently in datablock edit mode as indicated by a blue background, then com/nav tuning is disabled
Com/Nav Standby #4 	Provides a means to display a 5th com or nav frequency (4th standby slot) (2 lines) Only available on left side datablocks Note: If this field is currently in datablock edit mode as indicated by a blue background, then com/nav tuning is disabled
Traffic Thumbnail 	A thumbnail depiction of the traffic sensor output. The range rings can be adjusted by touching the upper 2/3 of the block and the mode (e.g. Normal, Above, Below, etc) can be toggled by either using the adjacent bezel LSK or by touching the lower 1/3 of the block. This datablock can only be displayed in one location along the left edge of the display. Only available on left side datablocks

Datablock Item Title and Image	Content
To Waypoint Information*  	To waypoint identifier, desired track to current waypoint along flight plan route, distance to current waypoint from present position, estimated remaining fuel at the current waypoint (if a fuel flow system is connected), and estimated time enroute to the current waypoint in HH:MM. The data will be displayed in magenta. (4 or 5 lines depending on whether a fuel flow system is connected)
Next Waypoint Information 	Next waypoint identifier (the next leg of the flight plan, not the current leg), desired track to next waypoint along flight plan route, flight plan leg distance for the next waypoint, estimated remaining fuel at the next waypoint (if a fuel flow system is connected), and estimated time enroute of the next leg in HH:MM. (4 or 5 lines depending on whether a fuel flow system is connected)

Datablock Item Title and Image	Content
Dest. Along Track Info. 	Destination identifier, total distance to destination along the remaining flight plan legs, estimated fuel at destination (if fuel flow installed) and estimated time enroute to the destination in HH:MM format (Z or LCL units dependent on User Options page selection).(3 or 4 lines)
Destination Direct Info* 	Destination identifier, bearing to destination from present position and distance (in NM) to destination from present position. (3 lines)
Destination Waypoint 	Title and destination identifier. (1 line)
Direct Distance to Dest. 	Destination identifier and straight line distance in NM to the destination from present position. (2 lines)

Datablock Item Title and Image	Content
ETA at Destination 	Title and estimated time of arrival at the “Destination” waypoint in HH:MM format. Units (Z or LCL) dependent on format selection in User Options page. (2 lines)
ETA at To Waypoint  	Title and estimated time of arrival at the “To” waypoint in HH:MM format. Units (Z or LCL) dependent on format selection in User Options page. (2 lines)
Destination ETE 	Title and estimated time enroute (along flight planned route) to the “Destination” waypoint in HH:MM format. (2 lines)
To Waypoint ETE 	Title and estimated time enroute to the “To” waypoint in HH:MM format. (2 lines)
GPS CDI** 	Current track, desired track for active flight plan leg and visual depiction of deviation. (3 lines)

Datablock Item Title and Image	Content
Track Angle Error (TKE) 	Title and track angle error (error in degrees between desired track and actual track) and an arrow indicating direction to fly to correct the error. (2 lines)
Desired Track 	Title and desired track for active flight plan leg. (1 line)
Cross Track Distance 	Title and cross track deviation in NM from current flight plan leg. (2 lines)
Next Desired Track 	Title and desired track for the next flight plan leg (not the active flight plan leg). (1 line)
Vertical Speed Required 	Title and vertical speed required (units dependent on selection in User Options page) to make next down-path altitude constraint. (1 line)

Datablock Item Title and Image	Content
Navigation Mode* 	Title and IFD navigation mode (e.g. OCN, ENRT, TERM, APPR) including the GPS Nav mode (e.g. LPV, LNAV/VNAV, LNAV+V, LNAV). (2 lines)
Active GPS Approach  	Title, approach identifier, airfield. (3 lines)
Decoded VLOC IDENT* 	For VORs: Navaid identifier, navaid radial currently on, distance to navaid. (3 lines) For ILS/Localizers: Localizer identifier, airport, runway. (3 lines)
Nearest Airport* 	Nearest airport identifier, bearing to airport from ownship, distance to airport from ownship. (3 lines)

Datablock Item Title and Image	Content
Aircraft Position 	Latitude and Longitude (format is dependent on selection in User Options page). (2 lines)
GPS AGL Altitude* 	Title and computed GPS-based AGL altitude. (2 lines)
Minimum Safe Altitude* 	Title and Min Safe Altitude (defined as 1000’ above the highest terrain or obstacle in a 10nm rectangle around ownship position). (2 lines)
Ground Speed** 	Title and Ground speed. (1 line)
Ground Track 	Title and Ground Track. (1 line)
Wind Vector 	Title, wind speed and direction, and an arrow indicating direction of the wind relative to the nose of the airplane. Populates in air. Displays as “Calm” when 5 knots or less. (3 lines)

Datablock Item Title and Image	Content
OAT 	Title and OAT. (1 line)
Local Time 	Title and HH:MM:SS format. (2 lines)
UTC Time* 	Zulu Time HH:MM:SS format. (1 line)
Flight Timer 	Title and HH:MM format flight timer. (2 lines). This automatically starts and is based on the system in-air determination.
Number of Alerts 	Title and # of active red warnings, yellow cautions and cyan advisories that the IFD is aware of. (2 lines)
Fuel Amount Remaining* 	Title and total fuel remaining (units dependent on unit type selection made in User Options list) as sent by the aircraft fuel flow system, if available. (2 lines) It is not presented as an option if the IFD isn't configured to communicate with an external fuel flow system.

Datablock Item Title and Image	Content
Fuel Time Remaining* Fuel Time Rmng 8:00 H:M	Title and estimated fuel time remaining in HH:MM based on input from the aircraft fuel flow system. (2 lines) This item will not be presented as an option if the IFD is not configured to communicate with an external fuel flow system.
Fuel Flow Fuel Flow 14.3 Gal/Hr	Title and fuel flow (units dependent on unit type selection made in User Options list) as sent by the aircraft fuel flow system. For twin engine aircraft, this is the summed total. (2 lines) This item will not be presented as an option if the IFD is not configured to communicate with an external fuel flow system.
Fuel Used Fuel Used 5.6 Gal	Title and estimated fuel used (units dependent on unit type selection made in User Options list) as sent by the aircraft fuel flow system, if available. For twin engine aircraft, this is the summed total. (2 lines) This item will not be presented as an option if the IFD is not configured to communicate with an external fuel flow system.
Fuel Economy Fuel Econ 7.5 NM/Gal	Title and estimated fuel economy (e.g. nm/gal) based on input from the on-board fuel flow system. (2 lines) This item will not be presented as an option if the IFD is not configured to communicate with an external fuel flow

Datablock Item Title and Image	Content
	system.
*** Blank ***	Single blank line. (1 line)

NOTE

Forward Looking Terrain Alerting (FLTA) Inhibit Overwrites Top Strip Selection
If any of “FLTA Inhibited”, “FLTA Off”, and “FLTA Not Avail” states are active, they will overwrite any datablock selection on the left side of the top strip.

Items that are factory defaults are identified in the table above with an asterisk. If no fuel flow system is connected to the IFD, the two fuel related factory default elements are replaced by the double asterisked items. To restore factory defaults to the datablock selections, press the bottom right IFD knob while on the Datablock Setup page and then accept the green Confirm dialog box that gets displayed or use the Presets selection in the “Datablock” LSK.

TIPS AND TECHNIQUES

Selecting Desired Datablocks
If a desired datablock selection is greyed out in the selection box, that means there isn’t currently enough room to put it in the desired location. One technique is to delete datablocks below the desired location in order to make room. Each new datablock selection will push older ones below it “down the stack”.

MAP SETUP

The level of detail and the choice of displaying elements on the map may be controlled from the AUX page by choosing the SETUP tab and the “Setup Map” LSK.

Map Setup

The Airport Filters section provides a location to specify the runway length, runway surface, airport tower status, and type of fuel available. Airports that meet these various filter definitions will be displayed on the moving map.

The Map General section provides a means to turn the map compass rose on/off and to command the map declutter algorithm as to whether to use the altitude filter. This is also the place to select one of the pre-defined map detail defaults (VFR, IFR, Factory, Custom). Restoring factory defaults is accomplished by pressing the bottom right IFD knob and then accepting the Confirm dialog box.

The Map Detail section provides a location to define the level of map detail. Options include element labels on the map, selecting a range and an altitude beyond which the element is no longer displayed, and defining the declutter priority levels.

FMS SETUP

This is a page where some of the calculations of the FMS can be altered for aircraft or operational tailoring. Options include:

- Descent rate editing
- Modifying the airspace alerts
- Controlled airspace
- TFRs
- Special Use Airspace (SUA)
- Modifying the list of selectable procedures for the FMS drop down boxes
- Airways
- Arrivals
- Departures
- Approaches
- WAAS display channel #

Restoring factory defaults is accomplished by pressing the bottom right IFD knob and then accepting the Confirm dialog box.

FMS Setup

USER OPTIONS

A number of user options are available for setup on the “User Options” LSK of the SETUP tab on the AUX page.

The outer ring of the bottom right IFD knob is used to select a given row and twisting the inner ring of that knob will cycle through the options.

User Options

Restoring factory defaults is accomplished by pressing the bottom right IFD knob and then accepting the Confirm dialog box.

The user options are (default selection indicated by asterisk):

User Option Item Title	Description
Touch Screen	On* - all touch screen controls are enabled; Off – all touch screen controls are disabled.

User Option Item Title	Description
Bezel Mode	Auto* - the bezel backlighting will rely on the ambient light sensor in the bezel until a low threshold is reached, at which time it uses the dimming bus; DimBus – the bezel backlighting will only be responsive to the cockpit dimming bus control; User Control – the bezel backlighting is completely controlled by you using the bottom right IFD knob.
Bezel Backlight	A brightness bar that represents the bezel brightness setting when User Control is selected. This item has no default value.
Display Mode	Auto* - the LCD display backlighting will rely on the ambient light sensor in the bezel until a low threshold is reached, at which time it uses the dimming bus; DimBus – the LCD display backlighting will only be responsive to the cockpit dimming bus control; User Control – the LCD display backlighting is completely controlled by you using the bottom right IFD knob.

User Option Item Title	Description
Display Backlight	A brightness bar that represents the LCD display brightness setting when User Control is selected. This item has no default value.
Chart Day/Night Mode	Day - Charts are displayed with a bright white background; Night – Charts are displayed with the bright white background turned off; Auto* – Uses the selection in the Chart Auto Mode field to automatically determine whether the system is using Day mode or Night mode for chart depiction.
Chart Auto Mode	Sensor* - uses the ambient light sensor embedded in the bezel to determine if the Chart page will use day or night lighting schemes when the “Auto” selection was made on the Chart Day/Night Mode user option; DimBus – uses only the cockpit dimming bus setting to determine if the Chart page will use day or night lighting schemes when the “Auto” selection was made on the Chart Day/Night Mode user option.
Switch Tanks Alert	Never* – No “Switch Tanks”

User Option Item Title	Description
	CAS message will be issued; 15 min – “Switch Tanks” CAS message issued every 15 min; 30 min - ”Switch Tanks” CAS message issued every 30 min; 45 min – “Switch Tanks” CAS message issued every 45 min; 60 min – “Switch Tanks” CAS message issued every 60 min.
Time Format	UTC – displays all times in the system in zulu time format; 12 Hr* - displays all times in the system in am/pm time format; 24 Hr – displays all times in the system in “military” 24 hour time format. Note: The 12 Hr and 24 Hr selections are intended to be used if local time is the overall desired time format.
UTC	Just a display of current UTC for reference
Local Time Offset	HH:MM – push in bottom right IFD knob to put into edit mode then twist the inner ring to change in 15 minute increments and then push knob again to exit edit mode. Note: Local time is a user specified offset from UTC

User Option Item Title	Description
	rather than an automatically calculated offset based on current location. This should be manually readjusted if crossing time zones.
Current Time	Just a display of current local time for reference.
Keyboard Convenience	On – When dual IFD equipped, the other IFD will present a keyboard on which edits can be made to the original IFD; Off* - The other IFD will not present a keyboard when an edit is attempted on the original IFD.
Map Orientation	Heading-Up* - the map will be displayed in heading up orientation if heading is available; Track-Up – the map will be displayed in track up orientation Note: Even though Heading-Up is the default selection, if there is no heading source, then the default reverts to Track-Up. Potential heading sources include digital heading from an ARINC420 source (e.g. EFIS), WX500, serial 232 heading source and the IFD is provisioned to accept analog synchro heading input.

User Option Item Title	Description
Com Frequencies Spacing	25 kHz* - Com tuning will use 25 kHz spacing; 8.33 kHz – Com tuning will use 8.33 kHz channel spacing.
Advisory Glideslope	On* - Will transmit a glideslope deviation signal for display on external indicators (e.g. HSI, EFIS) for approaches that don't have a published glideslope associated with them (e.g. LNAV + V); Off – Will not transmit glideslope deviation data for approaches that don't have a published glideslope associated with them.
Auto-VLOC Tuning	On* - Enables the automatic tuning of the active nav frequency slot to follow the governing navaid in the flight plan. For example, if the next FMS flight plan leg is a VOR, this will automatically tune the VOR frequency into the active nav slot; Off – Disables the automatic tuning of the active nav frequency into the active nav slot.
GPS → VLOC Capture	Auto* - Allows the GPS → VLOC state for nav source and an automatic transition to VLOC if the capture criteria are

User Option Item Title	Description
	met; Manual – Never displays the GPS → VLOC nav source option and no automatic nav source switching will occur.
FLTA	On* - Forward Looking Terrain Alerting function enabled; Off – Forward Looking Terrain Alerting function disabled. Note that in dual IFD installations, both units will need to be set to Off to disable the function.
Terrain Awareness (TA)	On* - Terrain Awareness function enabled; Off – Terrain Awareness function disabled.
Terrain Caution Aural	Caution, Terrain; Caution, Terrain* - When selected, that is the aural alert issued during FLTA caution conditions; Terrain Ahead; Terrain Ahead - When selected, that is the aural alert issued during FLTA caution conditions.
Terrain Warning Aural	Terrain, Pull Up; Terrain, Pull Up* - When selected, that is the aural alert issued during FLTA warning conditions; Terrain, Terrain; Pull Up, Pull Up - When selected, that is the

User Option Item Title	Description
	aural alert issued during FLTA warning conditions.
FLTA Exclusion Areas	On* - Turns the FLTA Exclusion area on resulting in hatched white polygons around airfields and no FLTA alerts when inside the exclusion areas; Off – Turns the FLTA Exclusion area off resulting FLTA alerts even in the proximity of airfields.
Top of Descent (TOD) Aural	On* - Enables TOD aural alert chime; Off – Disables TOD aural alert chime.
Bearing Reference	Magnetic* - Sets map orientation and all datablock information to magnetic reference; True – Sets map orientation and all datablock information to true reference. By selecting True, the map orientation will display in True North when “North Up” view selected on the map page.
Distance/Speed Units	nm/knots* - distance units will be displayed in nautical miles and speed units will be displayed in knots; km/kph – distance units will be

User Option Item Title	Description
	displayed in kilometers and speed units will be displayed in kilometers/hour; sm/mph – distance units will be displayed in statute miles and speed units will be displayed in miles/hour.
Altitude/Vert. Speed Units	ft/fpm* - altitude units will be displayed in feet and vertical speed units will be displayed in feet/min; m/mpm – altitude units will be displayed in meters and vertical speed units will be displayed in meters/min; m/mps – altitude units will be displayed in meters and vertical speed units will be displayed in meters/sec.
Pressure Units	InHg* - pressure units will be displayed in Inches Mercury; mbar – pressure units will be displayed in millibars; hPa – pressure units will be displayed in hectopascals.
Temperature Units	Fahrenheit* - temperature units will be displayed in degrees F; Celsius – temperature units will be displayed in degrees C.
Fuel Units	Gal* - fuel units will be

User Option Item Title	Description
	displayed in gallons; Lit – fuel units will be displayed in liters; Imp Gal – fuel units will be displayed in Imperial Gallons.
Position Units	ddd°mm’ss’’* - position units will be displayed in degrees-minutes-seconds; ddd°mm.mm – position units will be displayed in degrees-minutes-hundredths of minutes; UTM – position units will be displayed in Universal Transverse Mercator; MGRS – position units will be displayed in Military Grid Reference System.

SYSTEM TAB

The “SYS” (System) tab provides access to various system status pages, a means to enter initial fuel (if configured with a recognized fuel flow system) and a means to access IFD data logs, update IFD software and update IFD databases.

FUEL MANAGEMENT

The “Fuel Mgmt” LSK will be displayed if the IFD has been configured to communicate with an installed aircraft fuel flow system.

Fuel Management Dialog Box

When properly configured and selected via the LSK, a fuel dialog box will be displayed, on which the current fuel value can be entered. In addition, the various fuel related datablock selections will be available as described earlier in this section.

Depending on the capability of the fuel sensor installed, some fields may be editable (e.g. initial fuel setting, fuel added, etc).

When this “Fuel Mgmt” LSK selection is available, the FMS will also populate its data fields with projected fuel states at all downpath flight plan legs, as appropriate.

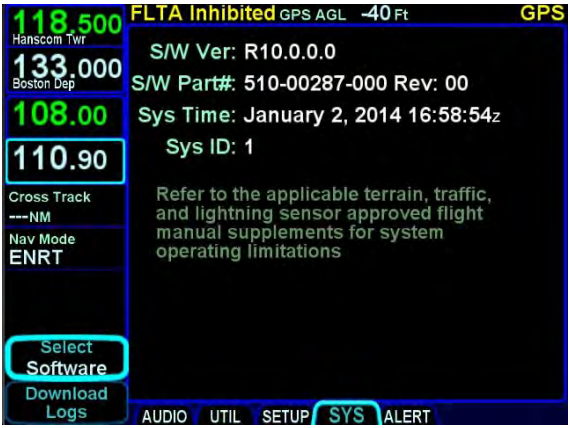
SYSTEM STATUS

The “Select” LSK is a multiple state LSK that provides access to software status page, weather datalink status page (if datalink is installed and properly configured), GPS status page, and the IFD databases status page. Pushing the adjacent bezel key or touching the label soft key will cycle through the various status pages.

Software Status Page

The “Software” selection will present the top level software part number information and some system-level parameters which can be useful during service calls and IFD feature descriptions.

Software Status Page



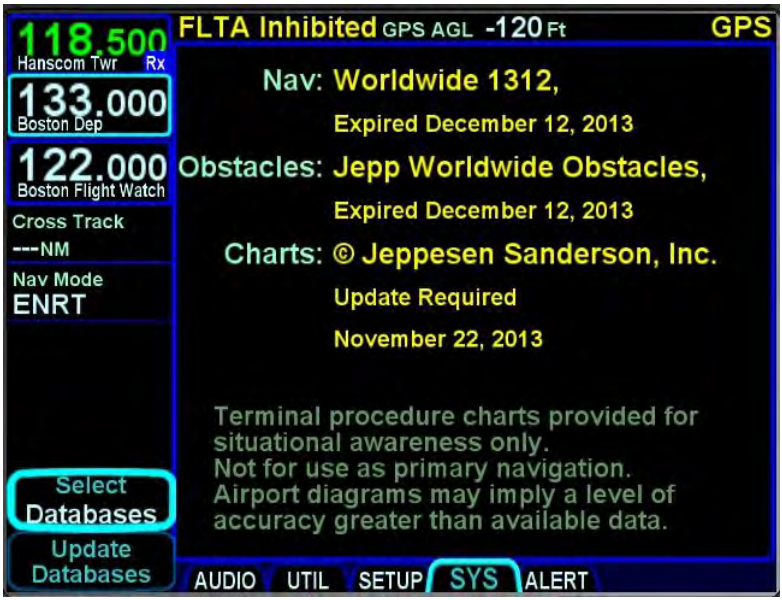
When the “Software” selection is made on the “System” LSK of the SYS tab, a “Download Logs” LSK is also displayed. Pressing that LSK will put the IFD into Maintenance Mode where the datalogs can be downloaded (see Datalogs Download section later in this manual for instructions).

NOTE
Data Downloads and Updates Procedures for downloading IFD data logs and for updating IFD databases and software are covered later in this manual.

Database Status Page

The “Databases” selection on the “Select” LSK of the SYS tab will display the currently loaded version of the Nav data, Obstacles data and Charts data and will indicate valid date ranges or if/when a given data base is expired.

Database Status Page



NOTE

Database Currency
It is critical that you update the data regularly and that you ensure the databases are current prior to conducting flight operations.

Pressing the “Update Databases” LSK will put the IFD into Maintenance Mode where the databases can be uploaded to the IFD (see Data Updates section later in this manual for instructions).

GPS Status Page

The “GPS” selection will provide a number of GPS status parameters, including the GPS navigation state and GPS derived current altitude as well as the active GPS approach (if appropriate), and a graphical depiction of the satellite vehicles (SV) being tracked by the IFD GPS receiver.

GPS Status Page

NOTE

Global SBAS Support
Wide area/regional satellite based augmentation system (SBAS) support provided by the IFD include WAAS (Continental US, Alaska, Canada and most of Central America), EGNOS (most of Europe and North Africa), MSAS (Japan) and GAGNAN (India). These are regional augmentations of the GPS satellite constellation and should not be interpreted as meaning the IFD is compatible with other GNSS constellation systems such as Galileo (Europe), GLONASS (Russia), or Compass (China).

The GPS navigation states possible are:

GPS Navigation State	Operational Meaning
Self Test	System performing self test. This is the initial state value but happens so quickly it is rarely observed.
Init	System is initializing – this state is also very quick and is rarely observed.
Search	Satellite acquisition mode.
Basic Nav	System has acquired enough satellites to conduct basic navigation but without integrity.
FDE Nav	System has acquired enough satellites to conduct navigation with fault detection and exclusion integrity.
SBAS Nav	System is capable of navigation with satellite-based augmentation (e.g. the WAAS platform in the US).
Fault	System has detected an internal fault and does not have a satellite navigation solution. This may require a manual power cycle of the IFD to restore a GPS lock.

The graphical bars represent the relative signal strength of each individual SV as well as the SV identification number. SV numbers above 100 represent the WAAS satellites. It typically requires three WAAS satellites before full WAAS functionality can be realized.

Datalink Status Page

The “Datalink” selection will be available if the IFD has been properly configured to integrate with a compatible on-board satellite weather/audio system (see the IFD product page on www.avidyne.com for a list of currently supported systems).

This page has two distinct sections – the upper part displays the various weather products supported by the datalink system and subscription level with their age and receipt status; the lower part is a legend that defines the various symbols used in the datalink data depictions on the maps. Note that forecast products (e.g. winds aloft) display the forecast time, not the data receipt age. Dashed data is not authorized for that subscription level and “Not Rcvd” data has not been received.

Datalink Status Page

5 Navigation

GENERAL

The IFD is an IFR certified FMS-GPS-Nav-Com that has been specifically designed to support single-pilot IFR operations.

> **NOTE**
>
> **CDI is GPS-based CDI**
> The CDI datablock that can be optionally displayed on the IFD is a GPS-based CDI and never a VHF-based CDI.

LEVELS OF INTEGRATION

The IFD is designed for both retrofit and clean installations, meaning that it can have different capabilities depending on the nature of the aircraft integration as described in the table below.

Integration Category	Description	IFD Functionality
No external nav indicator	There is no form of external CDI, HSI, or EFIS in the airplane and therefore, no external course input available to the IFD.	VFR operations only. No way to externally set course. All course setting is conducted on the IFD (e.g. –D->, push OBS and twist nav source knob, auto-nominate a course by selecting

Integration Category	Description	IFD Functionality
		a procedure, etc). Nav source modes available: GPS, VLOC, GPS → VLOC, OBS, OBS → VLOC.
Basic electro-mechanical nav indicator	There is at least one external CDI or HSI in the airplane and the IFD has access to the course data from it.	Set the course on the external unit and the IFD will display that value. No auto-slew capability of the course on the IFD. The nav source knob is basically just a toggle button to toggle between the available states. Nav source modes available: GPS, VLOC, GPS → VLOC, OBS, OBS → VLOC.
“Non-cooperative” electronics (e.g. G500/600, Aspen EFD1000, Dynon Skyview, EFIS	The IFD can receive course input from this external device(s). The IFD can send	The nav source knob is basically just a mode change knob to toggle between the

Integration Category	Description	IFD Functionality
40/50, etc.)	commands to set course (e.g. “auto-slew”) on those external device(s).	available states. Nav source modes available: GPS, VLOC, GPS → VLOC, OBS, OBS → VLOC.
“Cooperative” electronics (e.g. Avidyne EXP5000)	The “cooperative” system is even more capable than the IFD and therefore is the primary navigation control device. All nav source selection and course setting is performed on the external device. The IFD becomes a “slave” to the external device.	Course values will display on the IFD but are set on the external device(s). Nav source modes available: None (the nav source knob will appear to be non-functional).

NOTE

Manual Sequencing May Be Required
In Electro-mechanical installations where the IFD does not have an altitude input, a CAS message prompting the pilot to manually sequence legs of the flight plan will be presented on Heading-to-Altitude leg types (e.g. some missed approach legs). Since the IFD does not know altitude in this case, it does not know when to sequence to the next leg. Failure to manually sequence to the next leg will result in the IFD maintaining the leg heading indefinitely.

NAV SOURCE KNOB

The top right IFD knob is the dedicated IFD Navigation (Nav) Source knob. Think of the nav source knob as a channel selector to choose which Nav source the pilot wants depicted on the moving map. The chosen source will also be sent to other on-board systems like an EFIS (e.g. Aspen PFD) and in-turn, the autopilot, as well as driving any conventional CDI or RMI or HSI indicator. VLOC and GPS course and deviation data may all be coming into the IFD continuously but the channel selector acts as a filter to determine which one gets used in the nav solution and displayed on the IFD. The nav source knob must typically be twisted to select the desired state. The selected nav mode indication will flash for several seconds before taking effect; thereby giving you time to visually confirm the desired state.

Nav Source Knob State Indication

As described earlier in this section, multiple levels of aircraft system integration are possible, and will affect the possible states of the Nav Source knob. The table below describes all possible nav source states:

Nav Source State	Description
GPS	GPS is the active state, and all external deviation data being transmitted by the IFD is in reference to the active GPS leg. Note that if no GPS leg is active or if no GPS lock, the nav mode will be displayed in yellow.
GPS → VLOC	GPS is the active state, and VLOC is armed. If the GPS flight plan contains a VHF-based procedure or leg (e.g. localizer final), then the nav mode will automatically transition from GPS to VLOC when the capture criteria have been met. While GPS is active, all external deviation data being transmitted by the IFD is in reference to the active GPS leg. That transitions to VHF deviation data when the switch to VLOC is made.
VLOC	VLOC is the active state, and all external deviation data being transmitted by the IFD is in reference to the active VHF-based leg (e.g. Inbound VOR course, localizer deviation, etc). Note that if no VHF data is being received (e.g. out of range, improperly tuned nav radio, etc), the nav mode will be displayed in yellow.
OBS	OBS becomes the active state and deviation data being transmitted by the IFD is reactive to the external course setting knob (or the Nav Source knob if no external course control is present) for the inbound/outbound course. Note that this state is accessed by pushing in the Nav Source knob, and then it takes the place of pure **GPS** mode as described earlier in this table.

Nav Source State	Description
OBS → VLOC	OBS becomes the active state and VLOC is the armed state. Deviation data being transmitted by the IFD is reactive to the external course setting knob (or the Nav Source knob if no external course control is present) for the inbound/outbound course. Note that this state is accessed by pushing in the Nav Source knob and then it takes the place of **GPS → VLOC** mode as described earlier in this table.

NOTE

Aircraft Integration
The Nav Source modes available in your airplane will be dependent on the level of integration with other on-board systems. Avidyne strongly recommends practice operations in VMC conditions before any use in IMC, to understand the level of integration between the IFD and the other on-board systems and therefore the Nav Source modes available.

The nav source knob is labeled “CDI” above the knob and is designed to allow you to toggle the CDI and system nav source between the active and armed states defined above.

OBS MODE

“PUSH OBS” is the label underneath the knob and is active when you can put the system in To/From course setting mode for a waypoint. There is no need for “suspend” functionality in the IFD paradigm – the IFD will continue sequencing to the next waypoint and exit OBS mode at that time.

NOTE

GPS and OBS
If GPS or OBS are not the active Nav state (annunciated in green), then pushing the Nav Source knob will have no effect. When one of them is the active Nav state, pushing the Nav Source knob will toggle between the two states.

NOTE

OBS Can Not Be Activated Inside the FAF
OBS is prevented from being selected on a published approach when inside the Final Approach Fix (FAF).

NOTE

OBS Behavior in Dual IFD Operations
For those installations that include dual IFDs t hat are separately wired to two different nav indicators, the #2 IFD will automatically switch into OBS mode when #1 IFD Nav Source has been put into OBS **and** the #2 nav indicator will flag invalid. This is because the FMS stays sync’d between the two IFDs. The #2 IFD will display the selected course as set by the #1 nav indicator on the map page.

The depiction on the map when in OBS mode depends on whether the system determines if the airplane is in TO or FROM orientation.

In OBS TO (defined as the when the difference between the selected OBS course and the aircraft course to the fix is < 90°), the map will display only the magenta leg to be flown to the fix. There is no white leg depiction for the outbound leg because the assumed intent is to fly to the fix and automatically sequence legs as normal from there.

OBS TO Depiction

In OBS FROM (defined as the difference between the selected OBS course and the aircraft course to the fix is ≥ 90°), the system will activate the reciprocal course away from the station with guidance away FROM the fix. The previously active TO leg will change to white and remain in pivot. The assumption here is that you will want to fly the leg on the 180° plane between the aircraft and the fix. If the TO leg is within this plane, you will fly to the station. If you swing the TO leg to the opposite plane, the FROM leg would now be in the 180° plane between you and the fix, and that is the leg to fly – away from the station

OBS FROM Depiction

TIPS AND TECHNIQUES

OBS "Final"

OBS mode can be used to create a user-defined course into a waypoint/fix or an airfield. Once in OBS mode, use the external course knob to set the desired inbound course to the fix or airfield. All guidance, including that sent to an autopilot, will now be with respect to that user-defined course.

VOR COURSE DEPICTION

When the Nav Source on the IFD is VLOC and the IFD is tuned to a VOR station, the IFD will display the in-bound and out-bound radials as dialed in by the OBS/Course knob on the external indicator, if that external device is capable of transmitting course. The radial lines will be displayed once the VOR station is decoded and will be 50 nm long.

The line will be green for the in-bound course/radial to the VOR when the aircraft position is on the near side of the perpendicular course (“To” geometry) and the out-bound course/radial will be white.

The line will be green for the out-bound course/radial to the VOR when the aircraft position is on the far side of the perpendicular course (“From” geometry) and the in-bound course/radial will be white.

VOR Course Depiction

ARMED VS ENGAGED/ACTIVE INDICATIONS

The active IFD nav mode is displayed in green along the right edge of the top data strip. The armed IFD nav mode, if there is one, is displayed in blue along that same top strip. When there is an armed state, the nav source is depicted per the image below.

Nav Source Mode Armed and Engaged Depiction

As the armed mode is captured, the previously active nav mode lamp will extinguish and the previously armed state will turn green and begin to flash. The flashing should last approximately 5 seconds and the nav mode will not actually change until the flashing stops and the indication becomes a solid lamp.

To trigger the transition from armed to active, all of the following capture criteria must be met:

- The tuned frequency in the nav radio matches that of the approach navaid;
- The Morse code decoded by the tuned nav radio matches the identifier of the approach navaid;
- The aircraft track is within 15 degrees of the final approach course;
- The course to the active waypoint is within 45 degrees of the final approach course;
- The radio deviations are at most 50% of full scale for 5 consecutive seconds;
- The active leg is part of the approach up to and including the final approach fix.

FMS HOOKS

There are shortcuts to accomplish typical FMS actions on the FPL tab of the FMS page. The L4 LSK will present the most appropriate selection from the table below based on the flight state or scenario at the moment. Pressing the LSK or the soft key label adjacent to the LSK will accomplish the action.

L4 LSK Label	Comments
Activate Approach	Displayed if either the next downpath approach in the flight plan is preceded by a discontinuity (gap in flight plan) and the aircraft is within 40 nm of the FAF OR the next leg of the flight plan is the first leg of a published approach and there is a discontinuity or a Vectors-To-Final arrival selected.
Retry Approach	Displayed when the active leg of the flight plan is part of a published missed approach and you were conducting a Vectors-To-Final approach. Selecting this option will activate the first leg of the VTF approach (i.e. the leg into the FAF). This option will not be displayed if you were conducting a full published approach.
Enable Missed	Displayed when the next leg of the flight plan is the first leg of a published missed approach. Typically this occurs immediately after the FAF. Pressing the LSK will activate the published missed approach for that approach if it is in the flight plan. Not pressing the button prior to reaching the MAP results in guidance outbound from the MAP using the same course as the final approach course.
Continue/Exit Hold	Displayed when the active leg of the flight plan is a hold and is not the last leg of the route. Pressing the LSK will either command the FMS to continue the hold or exit it.
Skip Hold	Displayed when the aircraft is within 5 nm of the FAF and the next leg is a database procedure hold. Pressing the LSK will sequence the active leg past the hold without entering it when the aircraft reaches the FAF. The leg after the hold will become active.
Sequence Leg	Displayed when there is no altitude source and the active leg terminates at an altitude. Pressing the LSK upon reaching the altitude is required to sequence to the next leg.
Enable A/P Approach	Displayed for specific autopilots (e.g. KAP140, KFC225) when the FMS determines it is time for the autopilot to be in Approach mode but does not have any control or knowledge of the actual autopilot state. This case is just a prompt, and no pilot action must be taken on the IFD.

APPROACH PROCEDURES

Ensure the approach has been entered into the FMS flight plan, and that it is currently active in the IFD.

Automatic mode switching (e.g. GPS → VLOC transition) including automatically setting the inbound course, will occur if the capture criteria defined above are met and the primary nav frequency can be auto-identified. If auto tuning has not been enabled on the setup pages, or a station cannot be identified, automatic mode switching will not occur.

TIPS AND TECHNIQUES

Exception to Automatic Nav Mode Switching
If VLOC mode had been previously manually selected to be the nav mode (e.g. cross-tuning a VOR) and then an approach is activated in the flight plan that would have normally resulted in a GPS → VLOC nav mode indication, the nav mode will NOT toggle to GPS → VLOC. Instead, it will stay at VLOC since it is assumed the pilot intended to keep using the previous function. Likewise, the approach nav frequency will be inserted into the #1 standby nav frequency slot but not the active nav frequency position. Both the nav mode transition and the swapping of the nav frequencies will have to be manually performed by the pilot.

With the proper inbound course set, including on localizer or ILS approaches where the course pointer is just for reference, the course and glide slope deviation data will be transmitted as appropriate from the IFD for display on compatible cockpit third-party devices such as CDIs, HSIs, EFISs, etc. In the ILS/Localizer case, the CDI deflection will be driven by the localizer signal itself, regardless of the course setting.

NOTE

Displayed Inbound Course
Due to mathematical rounding, it is possible that course being sent to an EFIS for digital display may be 1 degree off from the published approach chart.

PRECISION APPROACHES

On ILS/LOC approaches with a Vectors-to-Final transition, the IFD will automatically toggle the nav mode to VLOC on intercepting the localizer. Lateral and vertical deviation data will be transmitted by the IFD for use by any integrated autopilot and external indicators. Conversely, the IFD will toggle the nav source from VLOC back to GPS when going missed at the Missed Approach Point.

Precision WAAS approaches are flown with the nav source knob set to GPS.

NON-PRECISION APPROACHES

As with the case in precision approaches, as long as the published approach is entered into the FMS as part of the active flight plan, the inbound course and all switching between GPS and VLOC (if appropriate) is done automatically.

DME arc legs and approaches are supported by the system.

BACK COURSE APPROACHES

This system is designed to fully support flying back course localizer approaches. To perform a back course approach, ensure the Nav Source is VLOC and the front course value is set via the Course Set knob on the external course input device (e.g. CDI, HSI, EFIS, etc.).

If the published back course approach is entered into the FMS, the IFD nav source will automatically toggle from “GPS → VLOC” to “VLOC” when all transition criteria have been met outside the FAF and it will automatically tune the localizer frequency into the active nav channel. The Nav Mode datablock should display the localizer IFD, landing airfield ID and the front course runway ID.

When integrated with an EFIS (e.g. Avidyne PFD, Aspen PFD, etc), the front course may need to be manually entered and then “Back Course” should be displayed on the EFIS.

As soon as the system determines that it is established on the back course localizer, the IFD will transmit deviation data such that the external indicators (CDI, HSI, EFIS, etc) will display correct sensing (i.e. **not** reverse sensing), if the front course is the set course.

WAAS APPROACHES

LPV (RNAV) approaches are the preferred approach for the IFD, if available. The IFD is configured at the time of installation for whether it is a WAAS-capable unit or a non-WAAS-capable unit. If non-WAAS, the following procedures do not apply.

When GPS has been selected as the nav source, and one of the RNAV/GPS approach types with vertical guidance (LPV, L/VNAV, LNAV+V) is selected in the FMS, the IFD will transmit horizontal and vertical deviation for use by any integrated external display device.

There are several types of WAAS approaches. The FMS will automatically select the best available approach based on current GPS integrity and will indicate the selection in the Nav Mode datablock field.

TIPS AND TECHNIQUES

Nav Mode Datablock
The Nav Mode datablock as defined in the Datablock definitions table in Section 4 of this manual will indicate the current navigation mode (e.g. OCN, ENRT, TERM, APPR, LPV, LNAV/VNAV, LNAV+V, LNAV, etc). It is a default datablock and is an excellent means to know GPS integrity and mode.

The pilot must monitor the IFD throughout the approach and use charted minimums appropriate to the approach type. If an approach type is not indicated by the time the final approach fix

(FAF) is reached, ***do not descend*** – the conditions required to fly the approach have not been met and you must fly the missed approach procedure.

WAAS approach types in the Nav Mode datablock include:

LNAV (Lateral Navigation)
Provides lateral (horizontal) guidance only, with standard GPS precision of 0.3 NM full-scale deflection. This is essentially the same as a non-WAAS GPS approach. It is flown as any other non-precision approach – observing step down restrictions, descend to MDA, fly at MDA altitude to the MAP; and execute the missed approach procedure if appropriate. Since there is no vertical guidance associated with this type of approach, the IFD will not transmit any vertical deviation information. The Nav Mode datablock will display “LNAV” for the approach type.
LNAV + V (Lateral Navigation with Vertical Information)
This mode provides the same lateral navigation as LNAV, but also typically presents an ILS GS-like presentation on the external deviation indicator. The GPS draws a 3-D picture of the approach based on crossing the FAF at the depicted altitude. Then it follows a glidepath from the published approach, which is typically a 3 degree angle to the touchdown zone. This type of approach remains a non-precision approach and does not consider any step-down limitations. The Nav Mode datablock will display “LNAV+V” for the approach type.
LNAV/VNAV (Lateral Navigation with Vertical Navigation)
In this mode, the GPS provides lateral navigation, providing more accurate guidance than regular LNAV but easier to follow indications than a localizer. The vertical navigation is driven by GPS signals. LNAV/VNAV approaches are operationally different from LNAV+V in that the glide path is protected from obstructions but attention still must be applied to step down fixes. Also, the minimum altitude presented is a decision altitude/height (DA/DH)

– DA being what is on the altimeter, and DH being the height of the DA above the touchdown zone elevation. This is not a MDA, thus, fly it just as though it were an ILS approach: follow the glide slope all the way to the DA before initiating a missed approach, if appropriate. The Nav Mode datablock will display “LNAV/VNAV” for the approach type.
LPV (Localizer Precision with Vertical Guidance)
The lateral guidance is significantly more precise than LNAV, and equivalent to that of a localizer. Vertical guidance is provided to minimums as low as 200’ AGL above the touchdown zone. Lateral tolerance starts out at 0.3 NM full-scale (slightly tighter than a localizer at the FAF), transitioning to 350 feet either side at the runway threshold (slightly looser than a localizer). The steering remains linear all the way without the difficult to follow swings of a VHF localizer. The vertical guidance is precise and has a DA/DH (shown as “DA(H)” on approach charts) rather than a MDA. The Nav Mode datablock will display “LPV” for the approach type.
LP (Localizer Performance)
These approaches have localizer performance but no vertical guidance associated with them. Use the published “LP” minimums. The Nav Mode datablock will display “LP” for the approach type.

COOL FEATURE

FPL L4 LSK Think of the L4 LSK on the IFD as your “hook” into the FMS. The button changes functionality based on the phase of flight or instrument procedure you are on. This is described in more detail in the FMS Hooks subsection of the Navigation section of this manual.

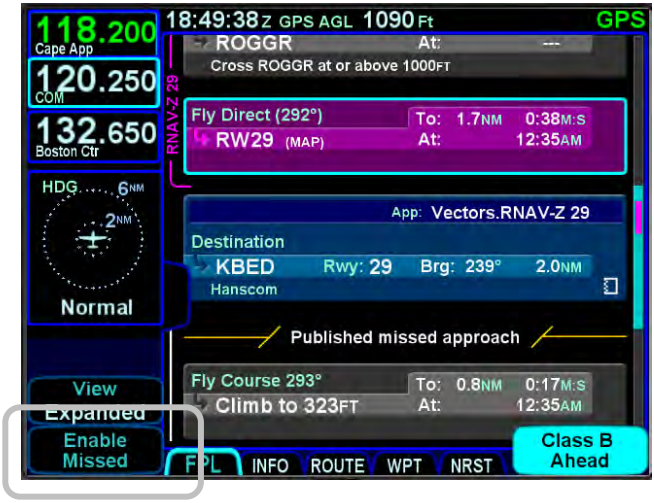
MISSED APPROACH

The simplest and safest way to properly fly a published missed approach is to ensure it is part of the active flight plan. It can be activated anytime inside the FAF by pressing the L4 LSK on IFD FPL tab that is labeled “Enable Missed”. This label changes to “Activate Missed” when crossing the Missed Approach Point (MAP) if it hadn’t been pressed prior to the MAP.

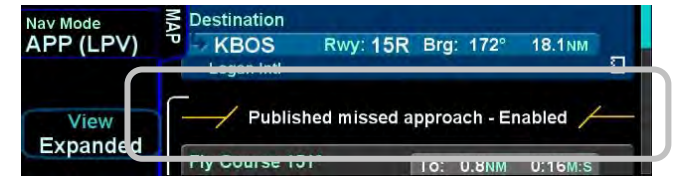
The following sequence of images show the map depiction of the published missed approach procedure before it has been enabled, followed by an image showing the “Enable Missed” LSK on the FPL tab, and then finally the map depiction of the now enabled published missed approach procedure.

Depiction of Published Missed Approach Procedure

Enable Missed LSK



Flight Plan Depiction of an Enabled Missed Approach



Enabled Published Missed Approach Procedure

Prior to going missed approach, apply go-around power, ensure the aircraft is trimmed for the power setting, establish a climb attitude and consider using the autopilot to smoothly execute the assigned climb-out or published missed approach procedures.

RETRY APPROACH

If you had been flying a Vectors-To-Final (VTF) approach, and the active leg of the flight plan is part of a published missed approach, the L2 LSK displays “Retry Approach”. Pressing the L2 LSK will put the same VTF approach in the FMS flight plan with the inbound leg to the FAF active.

NOTE

Activating Missed Approach Past MAP
If the missed approach was activated after the Missed Approach Point (MAP), the first non-altitude terminated leg of the published missed approach procedure will become the active leg, regardless of where the airplane is geographically.

NOTE

Autopilot Integration
Autopilot integration and capability can vary widely. Avidyne strongly recommends flying practice approaches in VMC conditions to understand the level of integration between the IFD and the autopilot before any flight in IMC conditions. For example, many roll-steering capable autopilots will terminate the roll steering capability when approach mode is selected on the autopilot. As another example, some autopilots such as the KAP-140 and the KFC 225 do not support automatic switching to VLOC; switching the nav mode and entering the in-bound course must be manual operations with those autopilots.

6 General

CAUTION ADVISORY SYSTEM (CAS) / ALERTS

See the individual aircraft Pilot Operating Handbook (POH) Supplement for any limitations with respect to IFD operations.

A caution-warning alerting system (CAS) has been included in this system. There are three levels of message alerting:

- **Warnings** – Immediate action should be performed
- **Cautions** – Immediate attention should be applied
- **Advisories** – A change in system state that you should be aware of

MASTER CAUTION LAMPS

A “Master Caution” system has been created where any active Warnings will trigger a red “AUX” lamp along the bottom edge of the bezel and any active Cautions will trigger an amber (yellow) “AUX” lamp along the bottom edge of the bezel. Likewise, any active Advisories will trigger a cyan (blue) “AUX” lamp along the bottom edge of the bezel. Each time a new Warning or Caution or Advisory condition exists, the AUX lamp will flash the appropriate color until either it is acknowledged by the pilot or the condition goes away. The AUX lamp will stay lit with the color that represents the highest level of alert for Warnings and Cautions. If the AUX page is already the current page, then the AUX lamp stays green and the ALERT tab will follow the coloring behavior just described. Note that if there is an active alert in the system and a new one of a lower color priority level also becomes active, the AUX/ALERT tab color will not change (e.g. a new cyan advisory will not cause the tab color to change from yellow to cyan).

For those aircraft that have a remote annunciator panel installed, the IFD will trigger a “MSG” lamp or its equivalent on the remote annunciator unit for each new CAS alert.

In all cases, basic airmanship should be exercised and fundamentals utilized such as maintain aircraft control, analyze the situation, and take proper action.

WARNING-CAUTION-ADVISORY MESSAGE BAR

A message bar is provided on every IFD to alert the pilot to what the CAS message is/are. Advisories are displayed on a cyan (blue) background in the lower right corner of each IFD. Warnings are displayed on red background in the lower right corner of each IFD. Likewise, Cautions are displayed on an amber background in the lower right corner of each IFD. Red warnings will always display on top of amber cautions and amber cautions will always display on top of cyan advisories.

Warning Message

Pressing the “CLR” bezel key or touching the message bar on the display will acknowledge the message but will not do anything else.

After all active messages have been acknowledged, a reminder in the form of the colored “AUX” lamp is left lit.

In dual IFD installations, there is a concept of global vs. local CAS messages. Global messages stay synched across all IFDs and will be displayed on all IFDs and can be acknowledged on any IFD to dismiss the message on all IFDs. Local messages only apply to the IFD on which it is displayed and can only be acknowledged on the individual IFD. The table of system CAS messages that appears later in this section indicates global messages via an asterisk.

ALERTS TAB

The ALERTS tab keeps a running tally of all active alerts, grouping them by level. This tab can also be manually selected at any time via the page and tab structure along the bottom edge of each IFD.

Systems Alerts Tab

Entries in the tables below that are global alerts in dual IFD installations are indicated by an asterisk in the Short Text column.

EXCEEDANCES | WARNINGS RED

Short Text	Long Text	Comments
Terrain Pull-Up*	Terrain Pull-Up	The FLTA algorithm has detected an imminent ground collision - Initiate an immediate recovery maneuver.
Warning Obstacle*	Warning Obstacle	The FLTA algorithm has detected an imminent obstacle collision - Initiate an immediate recovery maneuver.
Unit Overtemp – Unit Unreliable	Unit Overtemp: <internal component name> Unit reliability in question – Get IFD serviced	One or more of the internal components has exceeded its maximum design temperature and reliability cannot be ensured until the unit is tested by the Avidyne Service Center. Contact the Avidyne Service Center or a local dealer for service. This message will be present on every subsequent power cycle until reset by the Avidyne Service Center.
Low Volts – off in <countdown from 60> sec	Low Volts – IFD powers down in <countdown from 60> sec	Main supply voltage has fallen below 9 VDC. Contact a local dealer for service.

EXCEEDANCES | CAUTIONS YELLOW

Short Text	Long Text	Comments
Caution Terrain*	Caution Terrain	The FLTA algorithm is predicting a likely ground collision within approximately 60 seconds – initiate a proper recovery maneuver.
Caution Obstacle*	Caution Obstacle	The FLTA algorithm is predicting a likely obstacle collision with approximately 60 seconds – initiate a proper recovery maneuver.
GPS Integrity Lost	GPS Integrity Lost – Crosscheck Nav	This is alerting about imminent exceedence of horizontal fault detection limits or protection levels. Crosscheck the nav solution and determine the best course of action but if on an approach, a Missed Approach is recommended.
GPS Fault Dead Reckoning	Position updated via dead reckoning	The system will use the last known position and groundspeed (and heading if available) to estimate the aircraft position following loss of GPS for up to 5 minutes. Since Dead Reckoning assumes no directional or groundspeed change, it will not be reliable even during those first 5 minutes if either or both of these factors have changed.
GPS Fault No Position	No position available	The navigation solution cannot compute a position, typically after dead reckoning has expired. Transition to alternative navigation sources.

Short Text	Long Text	Comments
Configuration Error	Configuration Error – IFD Requires Service	The configuration of the IFD or the devices to which it is communicating with has changed or experienced an error. Contact the Avidyne Service Center or a local dealer for service.
LPV Unavailable Use L/VNAV DA	GPS integrity is insufficient for LPV Approach	Transition to a non-LPV approach and the appropriate minima.
LPV Unavailable Use LNAV MDA	GPS integrity is insufficient for LPV Approach	Transition to a non-LPV approach and the appropriate minima.
LP Unavailable Use LNAV MDA	GPS integrity is insufficient for LP Approach	Transition to a non-LP approach and the appropriate minima.
L/VNAV Unavail. Use LNAV MDA	GPS integrity is insufficient for L/VNAV Approach	Transition to a non-L/VNAV approach and the appropriate minima.
VNAV Lost Use LNAV MDA	Excessive XTK or Low GPS Integrity for Vertical Guidance	Transition to LNAV minima.
Check Altitude Too Low	Aircraft is below the glide slope altitude at FAF	Correct aircraft altitude as required to safely conduct the approach or initiate a climb to a published safe altitude and abort the approach.
Traffic Sensor Fault*	No communication with traffic sensor (local) OR Traffic sensor has failed (global)	Contact a local dealer for service.
Traffic <Low | High> <Bearing in clock direction> <Distance in NM>*	Traffic [Brg (e.g. 1:00)] [dist (e.g. 2 NM)] [alt (e.g. 200 ft)]	Traffic advisories – establish visual contact with conflicting traffic in order to facilitate avoidance maneuvers as necessary.
Traffic <Low | High> <Distance in NM>*	Traffic <Distance in NM> <Signed relative altitude in feet> FT	Traffic advisories with no bearing information – establish visual contact with conflicting traffic in order to facilitate avoidance maneuvers as necessary.

Short Text	Long Text	Comments
Traffic <Bearing in clock direction> <distance in NM>*	Traffic <bearing in clock direction> <distance in NM>	Traffic advisories with no relative altitude information establish visual contact with conflicting traffic in order to facilitate avoidance maneuvers as necessary.
Traffic <distance in NM>*	Traffic <distance in NM>	Traffic advisories with no relative altitude information and no bearing – establish visual contact with conflicting traffic in order to facilitate avoidance maneuvers as necessary.
COM TX Fault	Transmitter Fault, No TX Ability	Transition to a backup VHF com radio (if available) or initiate lost communication procedures. Contact the Avidyne Service Center or a dealer for service.
COM Stuck TX	Stuck Mic Timeout, Transmitter Disabled	Requires 35 seconds of continuous transmission. Verify the PTT is stuck and contact a dealer for service as required.
No Comm with VHF	No communication with the VHF radio	Transition to a backup VHF com radio (if available) or initiate lost communication procedures. Contact the Avidyne Service Center or a dealer for service.
Unit Overtemp – Check cooling	Unit Overtemp: <internal component identification>	One or more of the internal components has exceeded 80°C. Contact the Avidyne Service Center or a dealer for service – consider adding a source of cooling and/or improving air flow in/around the IFD.

Short Text	Long Text	Comments
Low Volts	Backlight reduced to 25%	Main supply voltage has fallen to approximately 11VDC. Check the aircraft alternators are on and functional. Consider load shedding the power bus that is powering the IFD.
Manual Sequence Req'd	Altitude invalid – leg will not auto sequence	In basic E-M aircraft where the IFD does not have altitude input, this message will appear when the FMS active leg is a Heading→Altitude leg. In this case, the FMS flight plan will need to be manually sequenced to the next leg. Failure to do so will keep the FMS flying the heading indefinitely.

EXCEEDANCES | ADVISORIES CYAN

Short Text	Long Text	Comments
Switch Tanks*	Switch Tanks	The time between the advisory is set on the User Options page.
Datalink Receiver Fault*	Broadcast Datalink receiver failure	Weather Datalink will be unavailable.
Datalink [Product Name] Stale*	Broadcast [Product Name] age is greater than [x] minutes	"Stale" periods vary with weather product. See the IFD product page on www.avidyne.com for detailed Datalink product information.
Datalink Data Not Recvd*	No: [Product Names]	Timeout periods vary with weather product. See the IFD product page on www.avidyne.com for detailed Datalink product information.
TFR Ahead*	TFR Ahead	When enabled on the FMS setup page and the aircraft current position, altitude, ground speed, ground track and vertical speed will intercept a TFR within 5 minutes (+/- 30 seconds).
Set course to xxx°	Selected course / DTK mismatch	Displayed when the selected course on the external course pointer is more than 10 degrees off of desired track and the aircraft course is within 3 degrees of desired track. Adjust the course knob as directed. Only displayed in GPS mode.

Short Text	Long Text	Comments
Route Not Loaded	Route Not Loaded	Displayed when the selected route could not be loaded because it is corrupted or there is an internal error. If the problem persists across a power cycle of the IFD, contact the Avidyne Service Center for service.
Route Not Stored	Route Not Stored	Displayed if the route cannot be internally stored due to an internal error. If the problem persists across a power cycle of the IFD, contact the Avidyne Service Center for service.
Intercept Too Sharp*	Must Intercept Within 45° of Final Approach Course	Displayed when a Direct-To is initiated to the FAF and the resulting intercept angle at the FAF is greater than 45 degrees.
Gap in Route Ahead*	Gap in Route Ahead	Displayed when the ETA to a flight plan discontinuity is 3 minutes.
Lateral Offset End Ahead*	Approaching End of Flight Plan Lateral Offset	Displayed when the ETA to the end of a lateral offset is 60 seconds.
Exiting Hold At Fix*	Exiting Hold At Fix	Displayed when the hold is armed for exit and hold is set to sequence at the hold fix.
Exiting Hold At Intercept*	Exiting Hold At Intercept	Displayed when an active HF leg (an automatically terminating hold at the first pass of the hold fix) is armed for exit and set to sequence at the completion of the inbound turn.
GPS Overlay Not Authorized*	Approach Not Authorized for GPS	Either change the nav source or select a different approach.

Short Text	Long Text	Comments
Next Leg [Leg Course] In <xx> s*	Next Leg [Leg Course]	Displayed when there is 10 +/- 1 seconds until the start of a turn up to 120 degrees OR 30 +/- seconds until the start of a turn of more than 120 degrees.
Begin Descent in [Time to Top of descent in seconds] seconds*	Approaching Top Of Descent	Displayed when there is 10 +/- 1 seconds until the crossing of the top of descent point. This message is accompanied by an aural TOD chime.
Begin Descent Now*	Sequenced Top of Descent	Displayed when the time to reach the top of descent point is zero.
Check Navaid Identifier	Decoded navaid Identifier did not match approach navaid	Displayed when the active approach is based on a localizer or a VOR and that approach is not authorized for GPS overlay, the aircraft course is within 45 degrees of the final approach course, the course to the active waypoint is within 45 degrees of the final approach course, the distance to the final approach fix (FAF) from the current position is less than 4 NM, the frequency tuned by the nav radio matches the frequency of the approach navaid and the identifier decoded by the nav radio does not match the identifier of the approach navaid.
Lightning Sensor Error*	Lightning sensor recoverable fault: [fault codes]	An internal warning condition within the lightning sensor has occurred and it may clear itself or clear after a power cycle of the lightning sensor.

Short Text	Long Text	Comments
Lightning Sensor Fault*	No communication with lightning sensor (local) OR Lightning sensor fatal fault: [fault codes]. Try cycling lightning sensor power (global) OR No lightning sensor data: [Heading fault | GPS fault] (global)	Recommend cycling power to the lightning sensor. If the problem persists, contact a local dealer for service.
Lightning Sensor Fault*	No communication with lightning sensor (local) OR No lightning sensor data: [Horz antenna | Vert antenna | Sense antenna | Sensor fault | Stuck mic | Antenna config | Heading Fault | GPS Fault] (global) OR Lightning sensor recoverable fault: [codes] (global)	If the problem persists, contact a local dealer for service.
Traffic Sensor Fault*	Traffic sensor failed to start self test OR Traffic sensor altitude unavailable	If the problem persists, contact a local dealer for service.
COM Stuck Mic	Stuck mic timeout, Release PTT	Displayed after approximately 25 seconds of continuous transmission.
<Application> Function Lost	<Application> function is not responding	Displayed if an application (e.g. Datalink, lightning sensor, traffic, etc) monitored by the IFD stops reporting a status message. If the problem persists, contact a local dealer for service.
CrossSync Fault	Attempting to re-establish CrossSync	Displayed when dual IFDs have been installed and configured to share data between the units but there is no communication between the IFDs, or one IFD is turned off. Contact the Avidyne Service Center or a local dealer for service.

Short Text	Long Text	Comments
Timer Expired	Timer Expired	Displayed when the generic countdown timer has expired.
<Title of Expired Timer>	<Title of Expired Timer> Expired	Displayed when one of the custom scheduler/timers has expired. The message will persist until the scheduler/timer has been manually reset.
IFD Fan Failure	IFD Requires Service	Contact a local dealer for service.
Config Mismatch	Configuration mismatch, restart IFD when possible	Displayed when CrossSync is enabled in dual IFD installations and a configuration with external devices has changed on one of the IFDs since the last power cycle. This prompts a restart to allow automatic reconfiguration of the IFDs so that sensor information can be shared.
Class [A | B | C | D] Ahead*	[Airspace name][Lower Altitude Limit] - [Upper Altitude Limit] FT	When enabled on the FMS Setup page and the aircraft current position, altitude, ground speed, ground track and vertical speed will intercept a controlled airspace within 5 minutes (+/- 30 seconds).
Controlled Airspace Ahead*	[Airspace name][Lower Altitude Limit] - [Upper Altitude Limit] FT	When enabled on the FMS Setup page and the aircraft current position, altitude, ground speed, ground track and vertical speed will intercept a controlled airspace within 5 minutes (+/- 30 seconds).

Short Text	Long Text	Comments
[Prohibited | Restricted | Warning | Alert | Caution | Danger] Area Ahead*	[Airspace name][Lower Altitude Limit] - [Upper Altitude Limit] FT	When enabled on the FMS Setup page and the aircraft current position, altitude, ground speed, ground track and vertical speed will intercept the listed airspace within 5 minutes (+/- 30 seconds).
[MOA | ADIZ] Ahead*	[Airspace name][Lower Altitude Limit] - [Upper Altitude Limit] FT	When enabled on the FMS Setup page and the aircraft current position, altitude, ground speed, ground track and vertical speed will intercept the identified airspace within 5 minutes (+/- 30 seconds).
Nav Database Invalid	An Error Occurred While Loading the Nav Database	Consider cycling power to the IFD and if the problem persists, contact the Avidyne Service Center or a local dealer for service.
New TFR Data Ignored*	Datalink TFRs reception failure	This is displayed when the number of TFR records exceeds 105. The most likely potential for this to occur is during an excessively active fire season in the mountain west of North America. Refer to non-datalink sources for TFR data.

Short Text	Long Text	Comments
Service Required	IFD On-board battery requires replacement	There is an on-board battery used for maintaining system time during power-off periods that is designed to last up to 10 years. When this message is displayed, the battery is no longer maintaining system time and that will result in degraded IFD performance such as Datalink and GPS acquisition. Contact the Avidyne Service Center for service.
Checklist Error	IFD Requires Service	Contact an Avidyne Service Center for service.
Lightning Sensor Config	Lightning sensor antenna config set to: <Bottom or Top>	This message is principally for installers and is only present on the first power cycle after configuring the IFD for a WX500.
GAD 42 Needs Service	GAD 42 Needs Service	Contact an Avidyne Service Center for service.
429 Data Not Rcvd	No 429 from input: < port numbers as displayed in Mx Mode separated by commas >	Contact an Avidyne Service Center for service.
Enable A/P APR	Use the bottom LSK on the FPL tab before A/P APR	For some autopilots, this is the prompt to the pilot to select Approach mode on the autopilot – in these cases, the IFD cannot control, nor has knowledge of the autopilot mode.
Hold Course xxx°	Hold Course xxx°	Displayed when the next leg is a hold and the entry is direct. It appears 10 seconds prior to reaching the hold fix where xxx = the hold course.
Teardrop Entry	Teardrop Entry	Displayed when the next leg is a hold and the entry is a teardrop.

		It appears 30 seconds prior to reaching the hold fix.
Parallel Entry	Parallel Entry	Displayed when the next leg is a hold and the entry is a parallel., It appears 30 seconds prior to reaching the hold fix.

NIGHT OPERATIONS

There are several controls to assist selection of the proper and usable brightness level for night operations.

IFD DISPLAY BRIGHTNESS

Each IFD individually controls its own display brightness through a set of available options (Manual Control, Dimming Bus Control, Use Ambient Light Sensor) on the User Options LSK of the SETUP tab on the AUX page. The choice of which option to use is one of personal preference and/or optimal choice for the specific airplane but Avidyne recommends using the dimming bus control for cockpit lighting consistency. Displays can never be dimmed to be completely off. The lowest dimmable setting may appear to be off during daylight conditions but is actually set for a proper low setting in a dark environment after your eyes have fully dark adapted.

IFD BEZEL BRIGHTNESS

Each IFD individually controls the bezel brightness (backlighting of knobs and buttons) through a set of available options (Manual Control, Dimming Bus Control, Use Ambient Light Sensor) on the User Options LSK of the SETUP tab on the AUX page. The choice of which option to use is one of personal preference and/or optimal choice for the specific airplane but Avidyne recommends using the dimming bus control for cockpit lighting consistency. Bezel lighting can never be dimmed to be completely off. The lowest dimmable setting may appear to be off during daylight conditions but is actually set for a proper low setting in a dark environment after your eyes have fully dark adapted.

CHARTS LIGHTING SCHEME

Some pilots prefer to use the Charts pages in the daytime lighting scheme at all times and some prefer the nighttime lighting scheme. In order to provide that flexibility, a separate Chart Day/Night Mode selection is provided on the User Options LSK of the SETUP tab on the AUX page. “Day” will always provide a bright white background for readability. “Night” will always turn the bright white backlighting off.

DISPLAY OF TERRAIN ON MAP

The display of terrain on the moving maps is not affected by the Day/Night lighting controls. For those pilots who prefer to remove the display of terrain from the map during night operations, use the “Land” part of the map declutter LSK to deselect terrain from being displayed.

NOTE

Chart Data Reliance
Always refer to current aeronautical charts for appropriate terrain and obstacle information. Do not rely on the Avidyne Integrated Flight Display System as your sole source of obstacle and terrain avoidance information.

SYSTEM FAILURES

> **NOTE**
>
> **Good Airmanship**
> In all cases, basic airmanship should be exercised and fundamentals utilized such as: maintain aircraft control, analyze the situation, and take proper action.

POWER DISTRIBUTION

Each IFD draws a total of 2 amps in nominal operation and up to 4 amps under peak conditions for 28V aircraft. This rises to 4 and 8 amps respectively for 14V aircraft. The system is designed to operate without degradation on a single power bus, including single functioning alternator.

Each IFD is controlled by a pair of circuit breakers which need to be pulled out to remove power to an IFD, or the top left IFD knob can be pushed and held to power the unit down (recommended method).

LOSS OF IFD

Failure Indication:

The simplest method of determining that a loss of an IFD has occurred is a loss of both the bezel backlighting and the display going black.

Functionality Lost:

When the failure of an IFD is indicated by loss of both the bezel backlighting and the display going black, this is a total loss of function for this unit: There will be no VHF, GPS, ADS-B position output, deviation output, etc. In a dual IFD system, loss of an IFD may also result in loss of some sensor data on the remaining IFD if that sensor data was only wired to the failed IFD and therefore cannot be shared with the remaining IFD.

Recommended Pilot Actions:

- Switch to back up radios and navigators;
- Consider cycling power on the affected IFD via the top left power knob.
- After the flight, notify an Avidyne Service Center or Avidyne Customer Support to coordinate for a repair action.

LOSS OF DISPLAY

Failure Indication:

The first indication that an IFD has experienced a loss of the display (LCD) is the appearance of a black display but the bezel backlighting is still present. Assuming the cockpit dimming control/rheostat hasn't been activated to the dimmest setting and the display has actually failed, the easiest indication that just the display has failed is a continued backlighting of the BRT/DIM rocker key on the bezel and possibly some other bezel keys.

Functionality Lost:

All the basic functionality is intact (e.g. VHF com and nav radios, FMS navigation and deviation output, etc.) but is not visible.

Recommended Pilot Actions:

- Check the cockpit dimming control/rheostat to ensure it is not in the "night" position;
- Use other cockpit displays (e.g. CDI, HSI, etc) for crosschecking deviation and position;
- Consider cycling power on the affected IFD via the top left power knob;
- After the flight, notify an Avidyne Service Center or Avidyne Customer Support to coordinate for a repair action.

LOSS OF BEZEL CONTROLS

Failure Indication:

All knobs and buttons are non-functional and not respondent to use.

Functionality Lost:

There will be no ability to change major pages (“FMS”, “MAP”, “AUX”) nor any ability to change the nav source or swap frequencies between the active and standby frequencies.

Recommended Pilot Action:

- Use touch screen controls to perform all other functions that are still available;
- Consider cycling power on the affected IFD via the top left power knob;
- After the flight, notify an Avidyne Service Center or Avidyne Customer Support to coordinate for a repair action.

LOSS OF TOUCHSCREEN CONTROL

Failure Indication:

All touch screen inputs are ignored.

Functionality Lost:

There will be no ability to pan the map, perform graphical flight planning (“rubber banding”), call up a map popup info box, or select a #2 or #3 standby frequency for swapping into the active frequency slot.

Recommended Pilot Action:

- Use bezel controls to perform all other functions that are still available;

- Verify that touch screen control is not turned off on the User Options – SETUP tab of the AUX page;
- Consider cycling power on the affected IFD via the top left power knob;
- After the flight, notify an Avidyne Service Center or Avidyne Customer Support to coordinate for a repair action.

LOSS OF GPS (DEAD RECKONING)

Failure Indication:

A “Dead Reckoning” yellow CAS Caution message is issued and the map will display “Dead Reckoning” along the top left edge of the map.

Functionality Lost:

Following loss of GPS navigation, Dead Reckoning (DR) provides limited navigation capability for up to 5 minutes. The IFD will use speed and last known position at the time of GPS loss along with any heading data it may have to provide an estimate of aircraft position. At the end of that 5 minute period, if GPS lock has not been reacquired, the system will transition to No GPS and provide the appropriate CAS message and remove the ownship symbol from the moving map.

All GPS-based navigation should remain unaffected during DR mode, albeit with less accuracy and LPV approaches will be terminated due to loss of integrity so higher minimums for the less accurate GPS-based approaches will need to be used.

Recommended Pilot Action:

- Use other means of navigation if possible;
- Plan on higher-minimum GPS RNAV approaches if in the terminal area;
- After the flight, notify an Avidyne Service Center or Avidyne Customer Support to coordinate for a repair action.

Other system anomalies (e.g. loss of VHF, etc) are indicated to the pilot in the form of a CAS message. In all of those cases, be cognizant of possible increased workload situations and, if the condition persists across a power cycle, notify an Avidyne Service Center or Avidyne Customer Support to coordinate for a repair action.

FCC RF EXPOSURE REQUIREMENTS

As a transmitting device, the FCC has mandated the following caution:

CAUTION

FCC RF Exposure Requirements
This transmitter must be restricted to work related operations in a Controlled RF exposure environment. All qualified end-users of this device must have the knowledge to control their exposure conditions and/or duration, and the exposure conditions and/or duration of their passengers and bystanders, to comply with the General Population / Uncontrolled MPE limit and requirements.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 0.71m (2.33 ft) from all persons.

SUBSCRIPTIONS

Nav, Obstacle and Chart data are supplied by Jeppesen via JSUM subscriptions. Refer to the Jeppesen product website for the various geographic and bundling options available.

For those aircraft equipped with external weather and music satellite radio systems, subscriptions are managed via that data provider.

DATA UPDATES

Periodic updates to your nav data, charts data, and obstacle data are all made through the USB port on the front of each IFD. Updates must be performed in accordance with FAR Part 43, Appendix A.

NOTE

Updates Only Permitted On Ground
Entry into data update mode is only permitted on the ground. No means will be provided (e.g. LSK access) to access this mode if the IFD determines it is in-air.

NOTE

Database Currency
It is critical that you update the data regularly and that you ensure the databases are current prior to conducting flight operations.

The table below summarizes the databases update periods:

Database	Update Cycle	Comments & Source
Chart Data	14 days	Expiration watermark displayed after 14 days indefinitely until data updated (Jeppesen)
Nav Data	28 days	Airport, airway, navaid, airspace, and FMS data (Jeppesen)
Obstacle Data	56 days	Displayed on map and used for TA and FLTA functions (Jeppesen)
Terrain Data	As required	Displayed on map and used for TA and FLTA functions (Jeppesen). The IFD is shipped from the factory with this database already loaded and updates are anticipated to be a rare occurrence.

In the event the terrain data ever needs updating, this is also performed through the front panel USB port.

Use one of the formatted fobs supplied by Avidyne (marked by the Avidyne logo printed on one side). In the event you no longer have those available, either call Avidyne for a replacement fob (a nominal fee will be charged) or purchase a replacement through other means. Acceptable alternative USB drives are FAT32 format, between 1-16 GB, and manufactured by WINTEC filemate (http://www.wintecind.com/features/FileMate/USBFlashDrives.html).

To perform a data update, ensure the data to be updated is placed onto one of the acceptable USB fobs. Carefully insert the USB fob into the IFD USB slot while power is turned off. When the IFD is powered up, select the “Setup” tab of the SYS page and then pick the “Update Databases” LSK.

Update Databases LSK

You will be prompted to “Confirm” or “Cancel”. Assuming you selected “Confirm”, you should see a dialog box presented in the middle of the screen and all uploadable files on that fob will be individually listed and check marks may be visible next to each file name.

Confirm and Cancel LSKs

Use the “Select All”, “Un-select All” LSKs and the IFD knob as required to ensure check marks are associated with all the desired files to upload to the IFD. Now press the “Proceed” LSK to begin the file upload.

LSK Options on System Update Page

TIPS AND TECHNIQUES

Select Only Desired Files For Upload

If you keep reusing the same fob for database uploads, be sure to either delete all out-of-date or non-desired files or, take care in selecting/de-selecting files from the IFD display list. Not doing so may extend data upload times considerably by uploading unintended files.

A progress bar will be presented to help provide an idea of how much longer the upload will take.

Progress Bar

Typical upload times are:

- Worldwide Obstacles (1.5 MB) – 5 sec
- Eastern US Charts (100 MB) – 3min
- US Charts (180 MB) – 5 ½ min
- Worldwide Charts (430 MB) – 13 min
- US Nav Data (8 MB) – 3 ½ min
- Europe Nav Data (10 MB) – 2 ½ min
- Australian Nav Data (1.5 MB) – 30 sec
- Worldwide Nav Data (15 MB) – 7 Min

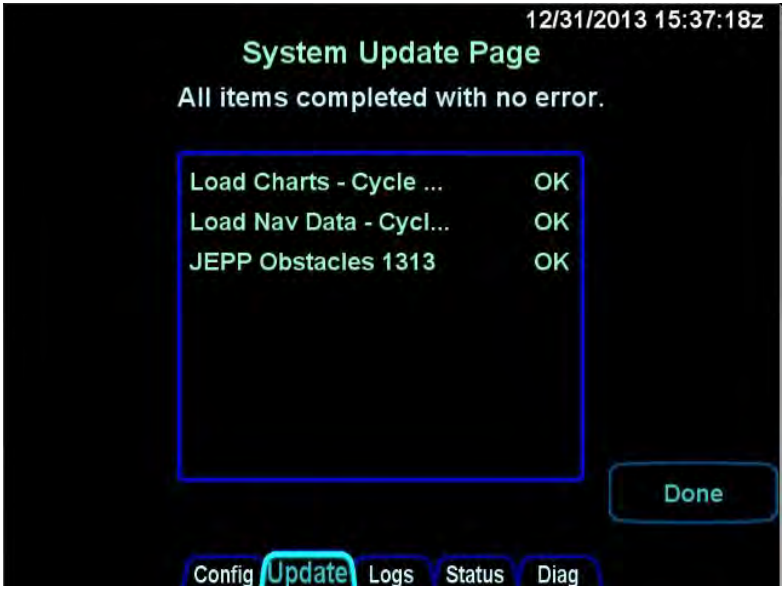
NOTE

Each IFD Requires Separate Upload
In multiple IFD installations, the database uploads must be performed individually for each IFD to be updated.

Due to some of the upload durations, Avidyne recommends creating a fob for each IFD to be updated so that the updates can happen in parallel and not stacked serially, thereby extending the overall time to accomplish a full update.

A clear indication is presented when the data uploads have been completed. Likewise, if the USB fob was removed prior to finishing the data upload, an error message will be presented and the entire process will need to be manually restarted once the fob is reinserted in the IFD.

Upload Complete Indications



When you are finished press the “Done” LSK, which will restart the IFD into flight mode. Remove the USB fob and perform a normal start up. It is highly recommended to verify the data was

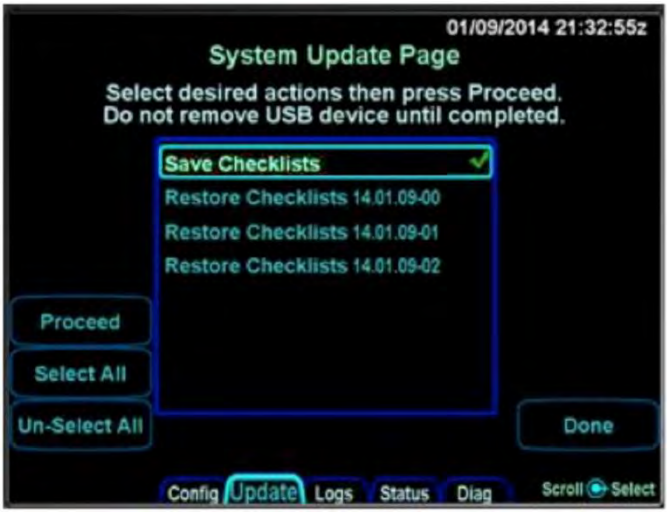
updated from the “Setup” LSK of the SYSTEM tab on the AUX page.

If an IFD is in normal operating mode (not maintenance mode), the presence of a USB fob is ignored and these pages cannot be accessed.

CHECKLIST BACKUP/RESTORATION PROCEDURE

Use the following procedure to store and reload user checklists. The original checklists must be generated on an IFD per the instructions described in Section 4 of this manual and then they can be reloaded onto any IFD or multiple IFDs via this procedure.

Checklist Save and Restore Options



SAVING ELECTRONIC CHECKLISTS

Ensure a properly formatted fob is installed in the IFD.

Enter Maintenance Mode via the data download method described in the next section.

From the Update tab, ensure just the “Save Checklists” option has a checkmark and then press the “Proceed” LSK option.

When the download is complete (should take a matter of seconds), store the fob and/or the files on the fob somewhere secure.

RELOADING PREVIOUSLY STORED CHECKLISTS

Ensure the fob containing the previously stored electronic checklists is installed in the IFD.

Enter Maintenance Mode via the data download method described in the next section.

From the Update tab, ensure just the dated checklist file of interest (“Restore Checklists YY.MM.DD-##”) has a checkmark and then press the “Proceed” LSK option.

When the upload is complete (should take a matter of seconds), exit Maintenance Mode via pressing the “Done” LSK and then select the UTIL option of the SYS tab on the AUX page to verify the checklists are present.

The possible states that can displayed during checklist save and restore operations are:

Save or Restore State	Indication
Not selected	-X-
Selected but hasn’t started yet	Pending …
Save or Restore underway	Active …
Save or Restore passed over	Skipped …
Completed with no error	OK
Completed with error	ERR

DATALOGS DOWNLOAD

Extensive datalogging is performed automatically on all IFDs. These datalogs can be accessed post-flight and used for a number of purposes.

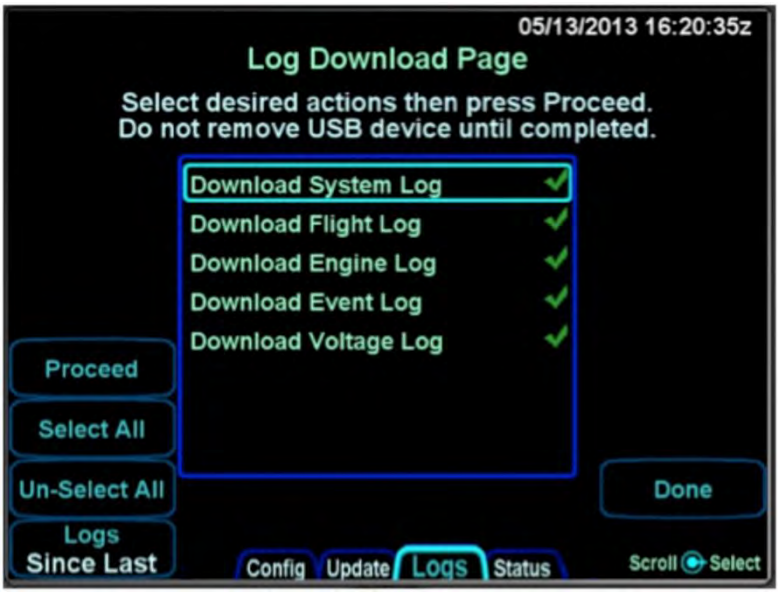
> **NOTE**
>
> **Datalogs Usable But Avidyne Property**
> The contents of the data logs and the storage devices that record and store data remain the property of Avidyne. However, you are free to download and use the data for your own training and safety improvement purposes.

There are six types of datalogs employed in the IFDs:

- **System Log** – This log provides a record of the navigation state. From this log, you can re-create many aspects of the FMS output and IFD state. It logs at a rate of approximately 1Hz;
- **Flight Log** – This log provides a detailed record of your aircraft state as measured by the various IFD sensors. It logs at a rate of approximately 5Hz;
- **Engine Log** – This log provides details on fuel flow system data (if configured). It logs at a rate of approximately ¼ Hz;
- **Event Log** – This log contains miscellaneous data such as all alerts, keystrokes, system status and error messages, etc. It is designed to be a diagnostics log for Avidyne Service Center technicians and not expected to be used by owners/operators. It logs at an on-condition rate;
- **Voltage Log** – This log contains internal diagnostic data such as the voltages and currents on sub-system boards, temperatures and internal fan status. It logs at a rate of approximately 1Hz;.
- **Configuration Log** – This log contains various system settings, states, and cals at power down.

The “Download Logs” LSK is presented when “Software” is selected on the SYS tab and the system is not in-air. When the “Download Logs” LSK is pressed, a pair of Confirm/Cancel LSKs are presented. Selecting Confirm will launch the Maintenance Mode of the IFD540. From Maintenance Mode, press the right side of the AUX page function key to select the “Logs” tab. Ensure a USB fob is inserted in the IFD front bezel USB port and then use a combination of the left side LSKs and the bottom right IFD knob to select the desired combination of logs and type of action to perform.

Datalogs Download Page (Maintenance Mode)



Pressing the “Proceed” LSK will immediately start downloading all logs listed in the center of the page with green check marks adjacent to them. If only a subset of the logs are to be downloaded, use the “Un-Select All” LSK to deselect all logs and then use the bottom right IFD knob to highlight the desired log and push in to generate a green check mark.

The “Logs” LSK on that Maintenance Mode page provides two options for downloading this data via dedicated LSKs. The first option (“Full”) allows a download of **all** data logs onto the USB

fob. The second option (“Since Last”) downloads the data logged **since the last time a download** was completed. Since the logs contain a large amount of data, the second option will be a quicker option in almost every case.

Download times are highly dependent on the number and types of logs being downloaded and the length of time since the last download. Times can range from a few seconds to more than 15 minutes. The more often logs are downloaded, the shorter the download times will be.

In order to provide an indication of download progress, a progress bar will be presented with both a symbolic aircraft indicating download in progress and a % complete estimate. The files to be downloaded can have one of several states – “OK”, “In progress…”, “Pending”, “Skipped”, “Active”, “Failed”.

When downloaded to the USB fob, the data logs will be saved in .csv files. This can be imported into newer versions of Microsoft Excel in a table format. The data can then be plotted or analyzed by several third-party tools. Note that files can easily contain 50MB or more of data.

Data included in the files are as follows:

System Log

Date/Time stamp	GPSS state
Power On	OBS value
OAT, if available	Desired track
Localizer deviation	Nav frequency
Glideslope deviation	Course select value, if known
Ground speed	Nav type
Ground track	VOR course
Crosstrack deviation	GPS altitude
Vertical deviation	Distance to active waypoint
Display mode	FMS course
Nav mode	Active waypoint information
GPS parameters	FLTA Status
Magnetic Variation	

Flight Log

Date/Time stamp	Indicated airspeed, if available
Power on	True airspeed, if available
Turn rate, if available	Vertical speed, if available
Pressure altitude, if available	Lat/Lon

Engine Log

Date/Time stamp	Fuel Remaining (gal)
Power on	Fuel Time Remaining (min)
Fuel Flow (gal/hr)	Fuel Economy (nm/gal)
Fuel Used (gal)	

Voltage Log

This log contains more than 50 voltages and temperatures of each individual component. It is designed to be a diagnostics log for Avidyne Service Center technicians only.

Event Log

This log contains miscellaneous data such as all alerts, keystrokes, system status and error messages, etc. It is a diagnostics log for Avidyne Service Center technicians only.

Configuration Log *(Number of parameters in parenthesis)*

Local Unit Port Configurations (47)	Cross-side Port Configurations (47)
GPS Antenna (x)	System Configuration – SW versions, part numbers, chassis ID (145)
Dimming Settings (23)	Aircraft Tail Number (1)
Chart State – validity dates, identifier (6)	Datablock selections (32)
User Options selections (33)	FMS Setup settings (38)
Map Setup settings (80)	Map Declutter selections (58)
System Time Since Power On (1)	Frequency List values (80)
Com Preset values (16)	Com-Nav Audio States (21)
GDL69 Settings (2)	VHF Com Values (5)
VHF Nav Values (5)	Lightning Sensor Configuration (4)
OBS Cal Bias data (2)	

Press the “Done” LSK after completing all downloads.

SOFTWARE UPDATES

With very few exceptions, all software inside the IFDs is capable of being updated via the USB connections as well. This means the IFD does not need to be returned to the factory for any future software updates. This updating, however, requires that an authorized Avidyne Service Center perform the updates because of FAA conformity requirements. This is not a service that an individual owner is typically allowed to perform.

HIGH TEMPERATURE OPERATIONS

Like all GPS-NAV-COMs, the IFD tends to generate a lot of heat. There is extensive internal temperature monitoring on all of the electrical components, and alerts in the form of CAS messages if the internal temperature gets too high. Part of the temperature mitigation design is that the metal bezel is intentionally designed to radiate heat away from the internal components and out of the unit. This can have the effect of a bezel that may be warm to the touch. This is considered normal. Note that the rubber bezel buttons will not conduct this heat and should not be warm. This condition will be more noticeable on hot days or during long ground runs. The IFD does not require external or forced cooling air but is designed to accept cool air intake in those installations where excessive heat is generated by surrounding avionics or there is significant blockage of air flow behind the panel.

CHARGING FROM THE USB

The USB port on the front of the IFD bezel is a USB v1.1 compatible USB port and can be used as a “high power” charger as well.

Most devices are “low power” devices and they will fully charge from the IFD bezel USB port. Some devices are “high power” devices and need up to 2.1amps of power – these devices can also be charged from the IFD USB port. The iPad is a good example of a “high power” device and the IFD supports charging.

COOL FEATURE

Charge Devices From the IFD USB Port
Most USB devices can be charged directly from the USB port on the front bezel of each IFD while on the ground or in flight. This can be very handy if using a tablet or other mobile device in-flight – the device can continue to be used without excessively draining the battery and may even have extra charge added in the process.

PLUG AND PLAY DETAILS

The IFD is a “plug and play” replacement of the following equipment:

Garmin Product ID	Plug & Play Software Baseline	Comments
530 530W 530AW	4.01 (Main)	No HTAWS enablement. This corresponds to Rev C of the 190-00357-08 Garmin Install Manual.

The following table represents the complete list of unsupported 530/530W functionality in the IFD:

Unsupported 530 Functionality	Comments
Manual entry of fuel flow	Fuel totalizer data and computed fuel at waypoints/destinations are only supported in installations that integrate a fuel flow system. In no cases can you manually enter fuel flow in the IFD.
TAWS/HTAWS	TSO C-151b TAWS is a future capability.
Demo Mode	Demo mode is not supported on the IFD. The accompanying IFD tablet training application should be used as the demo device.

NOTE

TAWS Audio Output Wiring to Audio Panel
To take full advantage of FLTA and other IFD aural alerting, ensure the audio output signals are wired to the audio panel. For 530 replacement installations, if TAWS audio output was already wired to the audio panel, then no further action will be required. If the TAWS audio output was not already wired to the audio panel, then that wiring will need to be added during time of IFD installation.

CLEANING THE DISPLAY

If the IFD screen should become dirty due to fingerprints or dust, clean the screen using the following materials and methods:

A clean, soft lint-free cloth such as 3M Ultra-Brite Cloth #2011 or similar;

A cleaning solution composed of de-ionized water or reagent-grade acetone or other liquid solvents such as isopropyl alcohol (IPA). Use caution, as it may be flammable. Always apply the cleaning solution directly on the cloth. Never spray cleaner directly on the screen.

Acetone is very good at dissolving grease, but it dries very quickly and always should be handled with acetone-impenetrable gloves. In general, isopropyl alcohol is a safe and effective cleaner. Methanol and most acidic solutions can be toxic or damaging to glass coatings if misused.

Excessive or unnecessary cleaning should be avoided to prevent damage to the coated optical filter surfaces. Never allow excess amounts of cleaning agents to dry if they have formed into pools, streaks or droplets to help avoid spotting of the glass surface.

The use of any third-party screen protector, especially those that adhere directly to the IFD display glass, is not endorsed by Avidyne due to the touch-screen nature of the display and may void the warranty for any display related issue.

USE OF GLOVES

Many types of gloves can be used with the IFD touch screen display. The key parameter for the effectiveness of a glove with touch screen is the distance between the finger and the glass and to a lesser extent, the type of material separating the skin from the glass. The thinner the glove or the more compatible the material (e.g. leather, fine cotton, etc), the greater the likelihood of success will be. Likewise, the more surface area that comes in contact with the glass, the greater the success may be. Each glove must be qualified for compatibility with the display and those glove calibration procedures (specific to the glove and the pilot combination) are immediately below. If all test steps are marked as a “Pass” then the glove/pilot combination is considered to be a qualified pair.

IFD Glove Qualification Procedure

Pilot Name		
Description of Glove		
Test Step	Circle	one
Touch the standby frequency window and verify a virtual keyboard is displayed.	Pass	Fail
Type 121.7, press the "ENTER" button on the virtual keyboard and confirm 121.700 is the displayed frequency in the #1 Standby Com window.	Pass	Fail
Press each of the page tabs displayed on the present page and verify the IFD changes to the selected tab.	Pass	Fail
With the FMS FPL tab displayed, use touch to type in a typical flight plan and verify that all entries were recognized.	Pass	Fail
With the Map page and tab displayed, attempt to pan the map.	Pass	Fail
With the Map page and tab displayed, attempt to pinch zoom (in or out) the map to produce a range change.	Pass	Fail
With the Map page and tab displayed, attempt to graphically flight plan ("rubber band") and verify the intended change was made.	Pass	Fail
Press the "Freq" function key on the bezel and then double tap a frequency from the list to place it into the #1 standby slot.	Pass	Fail

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Website There is a dedicated website that provides more information on this product at http://www.ifd540.com

FAQs http://www.avidyne.com/landing/ifd540/faq.asp

Service Hotline A hotline has been established to service questions or issues regarding Avidyne products. The U.S. Toll Free number is 1-888-723-7592. International toll free numbers are listed at http://www.avidyne.com/contact/intphones.asp

Email Customer/product support issues can be emailed as well

Europe – support@avidyneeurope.com

Australia & Asia – support@avidyneaustralasia.com

Everywhere else should email techsupport@avidyne.com

When calling or emailing for product-related help, please have the following information available, if able:

- Customer Name/Account Information
- Aircraft tail number, IFD540 serial number, and software versions.
- A good description of the problem or question.

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