



**IFD550 SVS/FMS/GPS/NAV/COM**

**IFD540 FMS/GPS/NAV/COM**

**IFD545 SVS/FMS/GPS**

**IFD510 FMS/GPS**

## **Pilot's Guide**



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## IFD5XX Series Pilot's Guide

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Note: This document is also applicable to Bendix/King models.  
The table below shows the IFD model and the corresponding  
Bendix/King model:

IFD Model	Bendix/King Model
IFD550	AERONAV 910
IFD540	AERONAV 900
IFD545	AERONAV 905
IFD510	AERONAV 880

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## Revision History

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# 1 System Overview

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

Avidyne strongly recommends that pilots use the IFD 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 IFD that pilots give careful attention to the material contained within these NOTES.

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

**INTENDED FUNCTION**

This manual describes the operation of the Avidyne IFD5xx series avionics. Not all capabilities described herein are applicable to every model in the series. The IFD540 is the basis for capabilities described in the manual. Differences from the IFD540 are specifically identified throughout the manual. The main feature differences are highlighted in the following table.

Model	Features
IFD550	SVS/FMS/GPS/NAV/COM
IFD540	FMS/GPS/NAV/COM
IFD545	SVS/FMS/GPS
IFD510	FMS/GPS

**IFD540**

The Avidyne IFD540 is a GPS, VHF Communication, and VHF Navigation transceiver whose primary function is to conduct VHF communication and navigation, and to serve as the primary navigation system for VFR and IFR VHF and GPS navigation and instrument flying, provided it is connected to an external navigation source selection annunciator and a CDI/HSI indicator that is installed in the required field of view.

**IFD540 Integrated Flight Display**

Supplemental IFD functions include a moving-map, flight management system (FMS), electronic charts, checklists, and a number of timer and calculator types of utilities. Optional IFD functions include control and display of remote transponders, weather radar, and external video. The system includes terrain alerting as well as an option for TAWS (or HTAWS).

**IFD510**

The Avidyne IFD510 differs from the IFD540 in that there is no internal VHF transceiver. Its primary function is to conduct GPS navigation, provided it is connected to an external navigation source selection annunciator and CDI/HSI indicator that are installed in the required field of view. The IFD510 cannot be used to execute terminal area procedures that rely on VHF navigation. The IFD510 bezel differs physically from the IFD540 in that the radio controls along the left side of the bezel are absent, the navigation source selection knob is replaced by an OBS button, and the volume knob is replaced by a single-function power on/off button.

*IFD510 Integrated Flight Display*



**IFD550**

The Avidyne IFD550 is a GPS, VHF Communication, and VHF Navigation transceiver whose primary function is to conduct VHF communication and navigation, and to serve as the primary navigation system for VFR and IFR VHF and GPS navigation and instrument flying, provided it is connected to an external navigation source selection annunciator and a CDI/HSI indicator that is installed in the required field of view.

*IFD550 Integrated Flight Display*

The IFD550 also provides a synthetic terrain/vision image to enhance the pilot's awareness of their spatial position relative to the terrain, obstacles and known traffic. Pitch, roll, and skid/slip indicators also aid in attitude awareness. If the system is receiving a heading input, then heading and rate of turn will be displayed for additional aircraft state awareness. The attitude sensing and depiction of the IFD550 provides a non-required secondary indicator in addition to the required attitude instruments installed in the aircraft.

**NOTE****Synthetic Vision Terrain Awareness**

The synthetic vision display may not match the terrain perfectly, but the display provides a reasonable representation of the terrain in a manner that does not misrepresent the threat posed by the terrain. While possibly resolution or field-of-view limited, the display still adequately portrays the terrain for terrain awareness.

**NOTE****Synthetic Vision is Not for Terrain Avoidance**

The synthetic vision display may not be used as the principal means for terrain avoidance. Synthetic Vision may not provide the depth/distance cues necessary for terrain avoidance and should always be used in conjunction with other flight and navigation information for terrain avoidance as well as visual verification outside of the cockpit when conditions permit.

**IFD545**

The Avidyne IFD545 differs from the IFD550 in that there is no internal VHF transceiver. Its primary function is to conduct GPS navigation, provided it is connected to an external navigation source selection annunciator and a CDI/HSI indicator that is installed in the required field of view. The IFD545 cannot be used to execute terminal area procedures that rely on VHF navigation. The IFD545 bezel differs physically from the IFD550 in that the radio controls along the left side of the bezel are absent, the navigation source selection knob is replaced by an OBS button, and the volume knob is replaced by a single-function on/off button.



**IFD545 Integrated Flight Display**

The IFD545 also provides a synthetic terrain image to enhance the pilot's awareness of their spatial position relative to the terrain, obstacles and known traffic. Pitch, roll, and skid/slip indicators also aid in attitude awareness. If the system is receiving a heading input, then heading and rate of turn will be displayed for additional aircraft state awareness. The attitude sensing and depiction of the IFD545 provides a non-required secondary indicator in addition to the required attitude instruments installed in the aircraft.

## FUNCTIONAL OVERVIEW

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

- Flight Management System (FMS)
- SBAS and non-SBAS GPS Navigation
- VHF Communication and Navigation (16W and 10W variants) <sup>1</sup>
- Synthetic Vision (SVS) <sup>2</sup>
- Attitude display <sup>2</sup>
- Moving map, including synthetic vision view
- Terrain Awareness
- Forward Looking Terrain Alerting (FLTA)
- Terrain Awareness Warning System (TAWS/HTAWS) [optional]
- Display of datalink weather
- ADS-B position and display
- Lightning sensor display
- Onboard weather radar display [optional]
- Video input [optional]
- Traffic display
- Electronic approach plates
- Electronic checklists
- Data logging
- Crew Alerting System (CAS)
- Utilities (e.g. Schedulers, Timers, Calculators)
- Multi-touch touch screen control
- Multiple IFD operations
- Remote transponder control and display
- Wi-Fi and **Bluetooth®** communication

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<sup>1</sup> Not applicable to the IFD510 and IFD545

<sup>2</sup> Applicable to the IFD550 and IFD545 only

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

Most functions revolve around the page keys that appear across the bottom edge of the bezel. Each of the pages has associated tabs, which contain related data, often in different views. These functions and tabs are covered in detail throughout this document.

**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. The IFD is not compatible with other GNSS constellation systems such as Galileo (Europe), GLONASS (Russia), or Compass (China).





**NOTE**

The TAWS and HTAWS functions provided by the IFD are compliant with TSO-C151d and TSO-C194, respectively.

## BASIC CONCEPTS

### PAGE KEYS

The buttons along the bottom of the IFD bezel are called “page keys”. Each key is labeled by function:

	Synthetic Vision System
	Flight Management System
	Moving Map
	System Pages

Each page has a number of associated tabs. Each page key has a left and right rocker control to it.

Select the page of interest by pressing either side of the page key and navigate through the available tabs by pressing the left or right side, in the direction of the desired tab.



#### Page Keys (IFD540 and IFD510)



#### Page Keys (IFD550 and IFD545)



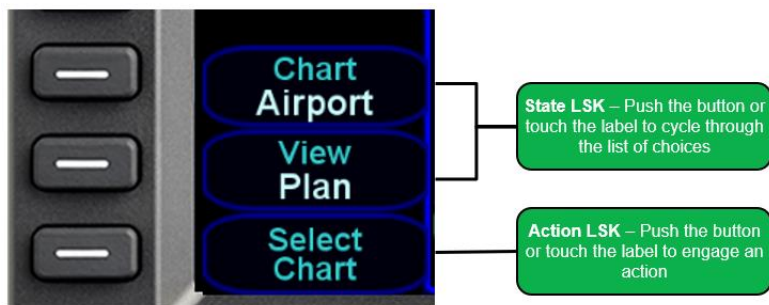
### LINE SELECT KEYS

Line Select Keys (LSK), are the buttons found along the left side of the bezel. They are labeled on the screen, just inside the bezel adjacent to the physical button, indicating the function of the LSK. An LSK can either represent an action or a state.

A **State LSK** is identified by a title on the first row, shown in light blue-green, and the current state on the second row shown in white. The title reflects the system function or setting to be affected, and the state shows the current state of that setting. Pressing the LSK or touching the label will change to the next state.

An **Action LSK** is identified by a phrase shown in blue-green. The phrase is usually in verb-subject form, but there are exceptions when the verb is omitted (e.g. "Timers"). Pressing the LSK or touching the label will cause the system to perform the specified action.

### LSK Types



### RIGHT KNOB LABELING



The dual-concentric knob located on the lower right corner of the bezel is context-sensitive. The knob label, located in the lower right corner of the display, indicates the function of the knobs and the knob button on the left and right side, respectively.

The symbol used to represent the knob button is a ring with a center dot.







### Right Knob Label Scheme



The outer knob scrolls through a list in a coarse manner and the inner knob 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 Keys 	Green
The AUX key can also be Red, Yellow, or Cyan if there is an active alert as described in this manual. 	Red
	Yellow
	Cyan
FMS "Fly to" Data (e.g. active leg of flight plan, To waypoint datablock) 	Magenta
Active Navigation Data (e.g. Active Com Frequency, Active Navigation frequency, Active Navigation Source Mode) 	Green
Line Select Key Labels 	Light Blue-Green
Line Select Key States 	White

**TIPS AND TECHNIQUES****Avoid The Use of Polarized Sunglasses**

Avidyne recommends avoiding the use of polarized sunglasses when using the IFD due to likely washing out of colors and apparent dimming.

## GENERAL IFD OPERATIONS

### IFD540 & IFD550 BEZEL LAYOUT

The IFD540 and IFD550 have the same bezel layout except that the IFD540 does not have the extra page key labeled "SVS" to the left of the FMS key.



- |  |                                  |
|--|----------------------------------|
| <b>1</b> Volume/Power/<br>Squelch Knob | <b>10</b> Context Sensitive Knob |
| <b>2</b> Frequency Swap                | <b>11</b> Clear Selection Key    |
| <b>3</b> USB Port                      | <b>12</b> Enter Function Key     |
| <b>4</b> Line Select Keys              | <b>13</b> Frequency Function Key |
| <b>5</b> Com/Nav Tuning Knob           | <b>14</b> Nearest Function Key   |
| <b>6</b> SVS Function Key              | <b>15</b> Procedure Function Key |
| <b>7</b> FMS Function Key              | <b>16</b> Direct To Function Key |
| <b>8</b> MAP Function Key              | <b>17</b> Ambient Light Sensor   |
| <b>9</b> AUX Function Key              | <b>18</b> CDI Nav Source Knob    |



## IFD510 & IFD545 BEZEL LAYOUT

The IFD510 and IFD545 have the same bezel layout except that the IFD545 has one extra page key labeled "SVS" to the left of the FMS key.



- |                          |                           |
|--------------------------|---------------------------|
| 1 Power Button           | 8 Clear Selection Key     |
| 2 USB Port               | 9 Enter Function Key      |
| 3 Line Select Keys       | 10 Nearest Function Key   |
| 4 FMS Page Function Key  | 11 Procedure Function Key |
| 5 MAP Page Function Key  | 12 Direct To Function Key |
| 6 AUX Page Function Key  | 13 Ambient Light Sensor   |
| 7 Context Sensitive Knob | 14 GPS OBS Button         |

## POWER CONTROL

The IFD is typically powered by two circuit breakers; one for the VHF transceiver, and one for the remainder of the unit. The IFD will automatically start when the aircraft bus power is applied. It will take several seconds for the IFD to complete the power-up process.

The power button or knob can be used to turn the unit off and to turn the unit back on again. To turn the unit off, press and hold the button. A five second countdown will be displayed. At the end of the countdown, the unit will be powered off.

Briefly pressing and then releasing the power button or knob will present an option to enable or disable Network and Bluetooth connectivity.

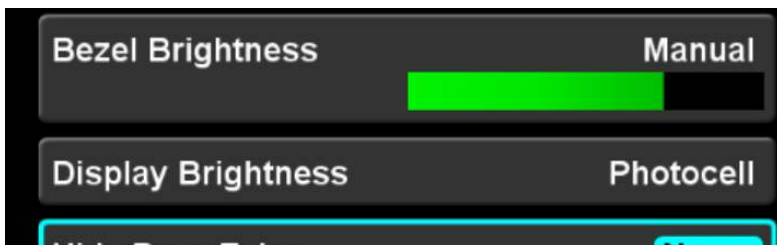
### *Manual Power Down*



## BRIGHTNESS CONTROLS

Each IFD has brightness controls to control both the bezel and the display brightness. Using the controls on the Setup Page, the user can specify whether brightness is controlled manually, using cockpit dimming controls, or using ambient light sensor (photocell) that is embedded in the bezel.

### *Brightness Controls*



Depending on how the installer configured the brightness controls at time of installation, the “Photocell” setting will typically revert to the dimming bus setting in low ambient light conditions.

If the IFD appears to be inoperative or non-responsive from a lighting perspective, check the aircraft instrument lighting control to ensure it is not set to a low brightness setting.

## START-UP SEQUENCE

The startup sequence of the IFD is as follows:

- An Avidyne logo will be displayed during system initialization and will be automatically removed when the IFD is initialized. The bezel keys will not be illuminated while the Avidyne logo is present.
- An acknowledgement of the limitation of your legal rights must be made via the bezel “ENTR” button. While the acknowledgement page is displayed, the IFD is activating the signals that connect with a remote annunciator panel as well as outputting self-test data to external devices, to be used as a lamp test and external signal check. The table below defines the outputs transmitted during this time.

Parameter	Self-test Value
Course Deviation	Half-scale left deviation, TO indication, flag stowed
Glideslope/Vertical Deviation	Half-scale up deviation, flag stowed
Annunciators	All on
Bearing to Waypoint (RMI)	135°
Selected Course (OBS)	150° when interfaced to an HSI with course pointer
Desired Track	150°
Distance To Go	10.0 NM
Time To Go	4 minutes
Active Waypoint	“AVDYN”
Groundspeed	150 knots
Present Position	N39°04.05', W094°53.86'

Parameter	Self-test Value
Waypoint Alert	Active
Phase of Flight	Enroute
Message Alert	Active
GPS Integrity	Invalid
Roll Steering (if applicable)	Flight Director commands 0° bank (level flight) for 5 seconds; commands increasing right bank at 1°/second for 5 seconds; commands 5° right bank for 5 seconds; commands decreasing right bank at 1°/second for 5 seconds, until command is 0° bank again. This cycle repeats continuously.

- If there is a third party weather or traffic sensor connected to the IFD, a vendor mandated disclaimer page may be presented advising the pilot it is their responsibility to see and avoid traffic and determine weather conditions. There is no pilot action that must be performed on this page and it will automatically be removed after several seconds.
- A software version and database currency page is displayed ***only if*** there are 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 the IFD has been configured to interface with a fuel flow system, the IFD will automatically transition to the Fuel Management Page. If the fuel flow system is not capable of reporting the amount of fuel remaining (i.e. does not have a totalizer), the amount of fuel on board should be entered. If the fuel flow system does provide fuel remaining, this page provides the opportunity to verify that the total is accurate and make corrections if necessary.

If there is no fuel flow system connected, the IFD

progresses directly to the FMS page and FPL tab, ready for a flight plan to be entered.

The acknowledgement page, database expiration, and fuel management entries are not displayed if the unit is powered on in-flight.

#### NOTE

##### **Some Data May Be Delayed At Startup**

The fuel flow and fuel totalizer may experience a 5-10 second delay during initialization. For those aircraft configured with fuel totalizers, this may result in some fuel display changes on the Fuel Management page during that period including prompting the pilot to enter initial fuel. This should resolve itself within a few seconds.

The FMS navigation database initialization message "Loading nav database..." may be displayed on any of the FMS tabs for 10-30 seconds.

If the GPS 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 position fix is acquired.

The networking interfaces may experience a delay during initialization before becoming functional. The Bluetooth and Wi-Fi icons in the upper right corner of the display will turn green when the interfaces are ready for use.

If an IFD550 or IFD545 unit has been exposed to extreme cold prior to start, it may take a warm up period to achieve standard performance.

## 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 <Expiration Date>	Yellow
Invalid	<Type> Database Invalid	Yellow

If electing to use data that is not yet effective (e.g. charts or nav), it is the responsibility of the pilot to determine what updates have been made and understand the impact those changes may have on the flight.

When the database information is not displayed, it can be accessed from the AUX page Database Status display as described in Section 5 (page 5-92).

## PAGE LAYOUT AND FORMATS

The context-sensitive line select keys, top datablocks and navigation source indication, and bottom edge set of page tabs are always displayed on every page. The IFD540 and IFD550 will also show radio frequencies in the upper left corner. The display can show one active frequency and multiple standby frequencies. For the IFD510 and IFD545, that area can be configured to show other datablocks just like those on the right side of the page.

### Page Layout (IFD540 Shown)



Each page has a number of associated tabs. To select a tab using the page key, press the left or right side of the key to move left or right, respectively, through the tabs until the desired tab is selected. To select a tab using the touchscreen, just touch the desired tab. When switching pages, the last tab selected on a page will be displayed when you return to that page.

### Split Page Layout

Several pages can be split to display the map in the center and datablocks or the flight plan along the right edge of the display. In the cases where this is available, a sideways tab indicates what



will be displayed if the tab is selected, as shown in the illustration below. The tabs that can be split are as follows:

- MAP page (MAP & TAWS tabs) – map in the center, datablocks on the right
- SVS page<sup>1</sup> – SVS in the center, datablocks on the right
- FMS page (FPL tab) – map in the center, abbreviated flight plan on the right
- FMS page (NRST tab) – map in the center, abbreviated nearest list on the right

The datablocks can be shown or hidden using any of the following methods:

- Touching the side tab
- Using a left or right swiping motion on the side tab
- Pressing and holding the left or right side of the page key until the datablocks are shown or hidden

#### **MAP – DATA/FPL/NRST Split**



<sup>1</sup> Applicable to the IFD550 and IFD 545 only.

## COM-NAV<sup>1</sup>

The VHF communications transceiver covers the frequency band from 118.0 MHz to 136.990 MHz and the VHF navigation receiver covers the frequency band from 108.0 MHz to 117.95 MHz. Both 25 kHz and 8.33 kHz spacing are supported. The IFD comes standard with a 10 watt transmitter with an option to upgrade to a 16 watt transmitter.

## Display

The active com frequency is the frequency that the radio will transmit on when the Push-To-Talk button is pressed. A standby frequency is a frequency that will become the active com frequency when the bezel Frequency Swap button is pressed. The active frequency is displayed in green and standby frequencies are displayed in white. The number of available standby frequencies is configurable using the Setup Page. The default display format is two com frequencies (active and standby) above two nav frequencies (active and standby).

The frequency that will be swapped into the active frequency when the bezel Frequency Swap button is pressed is called the Selected Standby Frequency. Any one of the displayed standby frequencies can be designated as the Selected Standby Frequency simply by touching the frequency. The Selected Standby Frequency is surrounded by a cyan outline.

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<sup>1</sup> Not applicable to the IFD510 and IFD545

## TIPS AND TECHNIQUES

**Multiple Standby Frequencies**

The com frequencies can be set up into a quick directory prior to a flight. This can be useful in local area operations when just a few standard frequencies are expected to be used. 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 Selected Standby frequency and then when the bezel Frequency Swap button is pressed, that frequency becomes the Active frequency.

**Multiple Frequency Formats**

The facility type (e.g. Ground, Tower, Approach) and call sign for the Active and each displayed Standby com frequency are displayed in each com frequency slot. If the frequency displayed

is a navigation frequency, the identifier decoded from Morse code will be displayed, which serves as a means to Tune-Identify-Monitor.

If a frequency is receiving a voice transmission, "RX" will be shown along the right edge of the frequency display. When the active frequency is transmitting, "TX" will be shown along the right edge of the active frequency display.

**NOTE**

Stations such as ATIS, ASOS, and AWOS that are expected to be transmitting continuously will cause the "RX" indication to be displayed continuously. If "RX" is displayed when the tuned station is not expected to be continuously transmitting and background noise is continuously audible, press the upper left knob to enable squelch.

**COOL FEATURE****Monitor Standby Com**

The IFD will send the first standby communications frequency audio to the audio panel for monitoring. This permits the pilot to monitor a second communications channel (e.g. ATIS) while still connected to the active communications channel. Not all audio panels support this capability. However the Avidyne AMX240 and several other third party panels do offer this feature.

## Switching Tuning Controls

The lower left knob is used to switch between display and control of communications radios, navigation radios, and a remote transponder (if equipped). To cycle between devices, push the lower left knob until the desired device is selected and then tune as needed. Following 20 seconds of inactivity, the system will revert to control and display of communications radios.

### ***Cycling between Com, Nav, and Transponder Display***

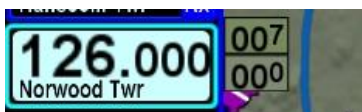


## **Tuning**

Radio tuning can be accomplished through several methods. Regardless of method, it's always the Standby that is tuned and then that frequency is swapped into the Active by pressing the bezel Frequency Swap button.

The Standby can be manually tuned by rotating the lower left knob on the bezel. The outer knob changes the digits to the left of the decimal point and the inner knob changes the digits to the right of the decimal point. The slot being tuned is highlighted as shown below.

### ***Manual Com/Nav Tuning Highlighting***



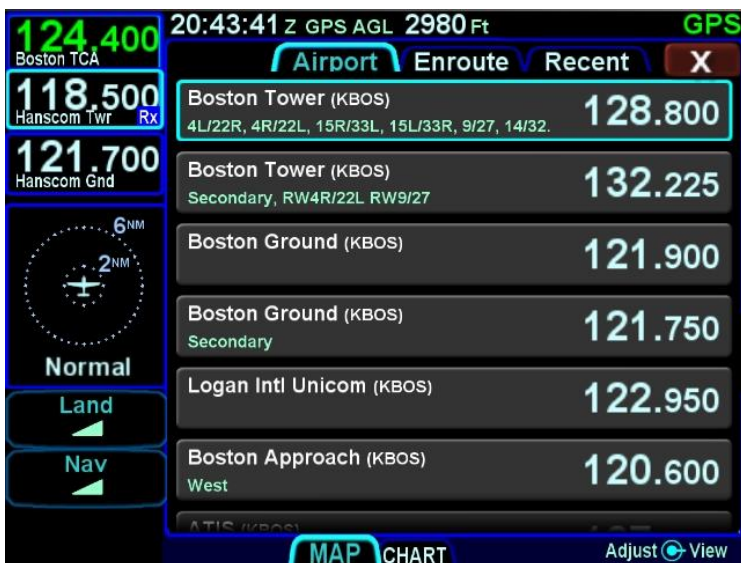
The Standby frequency can also be tuned by touching the block on the display. When using this method, a virtual keyboard is displayed. Enter the desired frequency into the numeric keypad and press ENTR (either on the virtual keypad or on the bezel). The virtual keyboard will be dismissed after ten seconds of inactivity.

The navigation radio may be tuned to a VOR using the identifier of the VOR (e.g. "GDM" for the Gardner VOR). Touch the nav radio block to display a virtual keyboard, and then enter the identifier. 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***Frequency List**

A more automated way to tune the communications radio is to use the frequency list. The frequency list is displayed by pressing the “FREQ” key along the right edge of the bezel. It 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) associated with either the origin airport or destination airport (when airborne and more than 5nm from the origin airport)
- **Enroute** – frequencies associated with airports, ARTCC, and FSS within 40nm of the aircraft
- **Recent** – a running list of the most recent 10 com frequencies that had been selected for the Active frequency (persists across power cycles).

**Frequency List Page**

The selected tab can be changed by pressing the **FREQ** bezel button or by touching the desired tab. The airport and enroute tabs only populate when there is a GPS position.

The list under each tab can be scrolled by swiping up or down on the touchscreen or by rotating the right inner knob. To move the cursor to the desired frequency, turn the right inner knob or touch the frequency. To tune the Standby to the frequency surrounded by the cursor, either touch the frequency or press the right knob.

The frequency list will be dismissed after ten seconds of inactivity.

The Standby can also be tuned from other pages on the IFD such as the **INFO** or **NRST** Tab on the **FMS** page.

**Invalid Frequency Entry Attempt**

Attempting to type an invalid com or nav frequency will produce a temporary error message indicating the error. This message is unavailable in dual IFD installations that have Keyboard Convenience mode 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.

**Emergency Com Frequency**

121.5 MHz can be quickly put into the active com slot by pressing and holding the bezel frequency swap button for approximately three seconds. The frequency that had been active is swapped into the standby.

**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 will be displayed and the transmitter will be disabled until the stuck mic condition is resolved. If this occurs, it may be advisable to check the state and condition of the push to talk switch on the microphone(s) in use.

## Alternate Tuning Controls

The IFD has the capability to receive external inputs for tuning preset frequencies and swapping the selected standby frequency into the active frequency slot. These inputs are typically driven by dedicated buttons installed on the stick/yoke, allowing for radio control while the pilot's hands remain on the controls. The inputs/buttons are as follows:

- Next frequency
- Previous frequency
- Swap frequency

The IFD contains a list of up to 16 user-configurable preset communications frequencies (see page 5-6). When the “next frequency” or “previous frequency” button is activated, the next or previous defined frequency in the list, respectively, will be placed into the standby slot and a small dialog box will be presented indicating the number of the preset list item that is now showing.

### *Standby tuned from Com Preset List*



The swap frequency button performs the same action as pressing the Frequency Swap button on the bezel, including holding it down to tune the emergency frequency.

## Remote IFD Tuning

In some dual IFD installations, it is desirable to allow one IFD to tune the radio of the other IFD. This feature can be enabled from the Setup Page (see page 5-67), but is available only in a dual installation when cross sync is enabled.

When enabled, the remote IFD tuning feature introduces the other IFD Com and Nav radios into the cycle accessed by pressing the lower left knob. The IFD1 radios will be identified as COM1 and NAV1, whereas the IFD2 radios will be identified as COM2 and NAV2. So, instead of the normal Com-Nav-Transponder cycle described on page 1-26, the knob will cycle among Com1-Nav1-Com2-Nav2-Transponder.

Also when remote tuning is enabled, the facility displayed under the frequency will be preceded by the radio being shown (e.g. COM1, NAV2). When frequencies from the remote IFD are being shown, the active frequency and the first part of the facility line will be displayed in yellow.

#### ***Remote Com Radio Display***



### **Third Party Radio Control Display Units**

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 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.

## TRANSPONDER CONTROL AND DISPLAY

If the IFD has been configured to communicate with a remote transponder, then the IFD will provide display and control of both transponder mode and code.

### Transponder Display

The transponder mode and code is displayed in a datablock that can be configured to be displayed along the right and top sides of the display.

A round "R" reply indication will light up in the transponder datablock area whenever the transponder is in an active Reply state.

If the IFD is unable to communicate with the remote transponder, an associated CAS message is displayed and the transponder datablocks may be replaced with a red-X.

#### Typical Transponder Datablock Locations



### Transponder Control

The preferred method of controlling the transponder is using a keyboard. Touch a transponder datablock to show the keyboard. If the datablock contains an "Ident" soft LSK, touch anywhere in the datablock except the soft LSK.

### ***Transponder Keyboard***



### ***Transponder Code Entry***

To enter a transponder code using a keyboard, touch a transponder mode/code datablock to display a transponder keyboard, and then enter the code. The new code is set after the fourth digit is entered. If an incorrect digit is entered, press the CLR button as required to backspace through the code. If the code entry is started, three seconds of inactivity will cause the keyboard to be dismissed and the original code will be restored.

Transponder code can also be entered using the lower left knob. First, press the knob until the transponder tuning data is displayed in the upper left corner of the display. Then turn the knob until the desired code is shown. The outer knob adjusts the first two digits and the inner knob adjusts the second two digits. During entry, the code will be highlighted. The new code will be set once the highlighting is removed.<sup>1</sup>

### ***Transponder Mode***

To change the transponder mode, touch the key with the desired mode

- **ALT** - The transponder will respond to all interrogations.

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<sup>1</sup> Not applicable to the IFD545 and IFD510

- **ON** - The transponder will respond to all interrogations, but altitude reporting is suppressed.
- **GND** - The transponder will respond to Mode S ground interrogations from surface movement radar. This mode is only available in installations that send a ground/air discrete signal to transponder.
- **SBY** - The transponder is on, but will not reply to any interrogations.

Some aircraft installations include a ground/air state input, such as a gear squat switch or discrete input from an IFD. In those installations, the IFD will automatically select GND on landing or while taxiing and will automatically select ALT when airborne. Pilot selectable states will be limited to ALT-ON-SBY when in-air and GND-SBY when on-ground.

When airborne, the transponder should always be set to ALT unless otherwise directed by Air Traffic Control.

### ***VFR***

To quickly set the regional VFR code, press the VFR key. To return to the previous code, press the VFR key again.

The regional VFR code can be set using the Setup Page (see page 5-73).

### ***IDENT***

To perform an IDENT function, press the IDENT key. The "Ident" in transponder datablocks will be highlighted in green while the transponder is transmitting the Ident pulse.

If a transponder datablock contains an "Ident" soft LSK, touching the soft LSK will activate the transponder IDENT function.

### ***Keyboard Dismissal***

The keyboard will be dismissed through one of several methods:

- Touching one of the Mode soft keys
- Touching the IDENT soft key
- Touching the red-X in the top right corner of the keyboard
- Ten seconds of inactivity

## DIRECT-TO OPERATIONS

A dedicated Direct-To 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 GeoFill™ waypoint.

### *Direct-To Dialog and Confirmation Dialog Boxes*



If that pre-populated waypoint is the desired waypoint, press the “ENTR” 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:

- Turn the bottom right outer knob to populate the dialog box by scrolling through the waypoints in the flight plan. This technique will only include waypoints within a missed approach if the missed approach is enabled.

When the desired waypoint is displayed, press the knob button or ENTR key to accept.

- Touch the waypoint field in the dialog box to generate a virtual keyboard and then use the keyboard to enter the desired waypoint identifier. It may not be necessary to enter every character, since the field is managed by Geofill. When the desired waypoint is displayed, press the knob button, the ENTR key, or "Enter" on the keypad to accept.
- Turn the bottom right inner knob to start editing the identifier. Use the inner knob to change characters and the outer knob to change cursor position. It may not be necessary to enter every character, since the field is managed by Geofill. When the desired waypoint is displayed, press the knob button or the ENTR key to accept.

## FUNCTION KEYS

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

- **NRST** – 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” 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
- **PROC** – The “PROC” key acts as a shortcut for attaching a published departure, arrival, or approach procedure to a waypoint in your flight plan. It can be used at any time. The first press of the 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 and a drop down list of available published approaches listed.





Pressing it a second time will move the highlighting to 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 to the origin. When the drop down box appears over the intended data field, turn the bottom right 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.

- **ENTR** – The use can vary slightly depending on the scenario, but "ENTR" is always related to the Enter/Accept/Confirm use.
- **CLR** – 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 frequency list). 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

#### **Turn off the touch screen**

The Setup Page provides an option to disable the touch screen. 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.

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 keys (e.g. changing the “major” pages of FMS, MAP, AUX)	Map panning
Power on/off	Graphical Flight Planning (“Rubber banding”)
Changing the Primary Navigation 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	Changing remote transponder mode

When editing data (e.g. FMS waypoint data, chart identifiers) using touch, virtual keyboards are displayed on the IFD. There are several virtual keyboard layouts, including a numeric keypad, to support the needs of the various entry fields throughout the system.

**Virtual Alpha Keyboard****Virtual Numeric Keyboard**

Each keyboard has an associated scratchpad which shows the entry in progress. In most cases, the scratchpad content is formatted to include characters that may not have been entered.

For instance, during a distance entry of "123", the scratchpad may contain "123.0 NM".

#### TIPS AND TECHNIQUES

##### **Optimal Touch Performance**

The touchscreen works best when the area being touched is maximized. Avoid using just fingernail contact or just the tip of a finger. Increased pressure on the glass by your finger will not have any effect. Many types of gloves will work, but performance will likely be degraded (see "Use of Gloves" section on page 7-13).

## OPERATIONS WITH WIRELESS DEVICES

The IFD is capable of connecting to external devices over both Bluetooth and Wi-Fi networks.

### Startup behavior

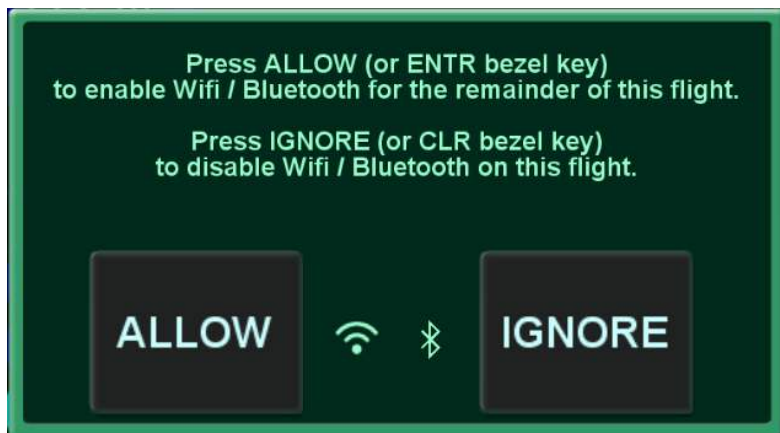
When the IFD powers up, the IFD will attempt to configure the Wi-Fi and Bluetooth interfaces just as they were when the IFD was last powered down. The IFD may take up to 40 seconds to establish the connections.

### Quick Disconnect / Reconnect

The IFD provides a quick method for disconnecting the Wi-Fi and Bluetooth interfaces. This is useful if there ever becomes a concern that a wireless device is interfering with the proper functioning of the IFD.

In order to quickly disconnect the Wi-Fi and Bluetooth interfaces, press and hold the power button in the top left corner of the IFD until the countdown starts, then release the button. At that point, a large green dialog box will appear showing two options – Accept and Ignore, as shown below.

#### *Wi-Fi / Bluetooth Enable/Disable Confirmation Dialog*



To disconnect Wi-Fi and Bluetooth interfaces, either touch "Ignore" or press the CLR button. From that point on, the IFD will not connect with devices over those two interfaces.

If the Wi-Fi and Bluetooth interfaces are already disconnected, the same technique can be used to reconnect them. Rather than selecting “Ignore”, either touch “Allow” or press the ENTR button. At that point, the IFD will go through the same reconnection process as it does upon power up.

## Bluetooth Connection

The IFD can be paired with a Bluetooth keyboard (See page 7-41 for pairing instructions).. The Bluetooth keyboard can be used for data entry just as the touchscreen keyboard is used. Additional keys on the Bluetooth keyboard provide an alternative to the dedicated knobs and buttons located on the IFD bezel.

The light bulb key turns on backlighting for the keyboard. The vertical two-headed arrow key is primary/standby frequency swap<sup>1</sup>. The Avidyne logo key is a space bar. The up/down arrow keys can be used for page navigation in the same way the bottom right inner and outer knobs on the IFD can navigate through page fields. Repeated presses of the FMS, MAP, AUX, and SVS keys will cause the next tab on the page to be displayed.

### Avidyne Bluetooth Keyboard



The Bluetooth keyboard must be paired with the IFD before use. See page 7-41 for pairing instructions.

<sup>1</sup> Not applicable to the IFD545 and IFD510

## Wi-Fi Connection

The IFD is capable of supporting Wi-Fi operations. Current supported functionality includes connectivity with third party applications running on Wi-Fi capable devices including:

- Flight plan data streaming from the IFD to a third party application
- Approach and transition data streaming from the IFD to a third party application to allow automatic approach chart selection and display on the third party application
- Traffic data streaming from the IFD to a third party application for display on the third party application
- Weather data streaming from the IFD to a third party application for display on the third party application
- Traffic and weather data streaming from portable ADS-B devices for display on the IFD
- Flight plan route data transmitted by a third party application to the IFD for inclusion in the stored routes list
- Fully interactive copy of the IFD hosted on a mobile device (e.g. "IFD100")

The Wi-Fi system can be configured as a client on an external network (e.g. using a Stratus®) or to host its own Local Area Network (LAN) with a DHCP server. See page 5-28 for instructions on configuring the Wi-Fi system.

On IFD power up, if the IFD was connected to an external network at last power down and the IFD is unable to reconnect to that network, the IFD will continue to attempt connection to the next most recently known network. If none of those connection attempts are successful, the IFD will select the LAN (hotspot).

### TIPS AND TECHNIQUES

#### **Dual IFD Installations Should Only Use One Wi-Fi**

For reliable Wi-Fi operations, Avidyne recommends turning off Wi-Fi on one of the IFDs (see the Setup Page).



## Bluetooth / Wi-Fi Status Indications

Bluetooth and Wi-Fi icons will be displayed at the top right corner of the display, just left of the nav mode, when the respective function has been enabled.

The Wi-Fi and Bluetooth icons will change color depending on connection status.

- Icons will not appear when the user option is set to off.
- Icons will appear gray when Wi-Fi/Bluetooth is on, networking is allowed, but the network is not ready for use.
- Icons will appear green when Wi-Fi / Bluetooth is on, networking is allowed, and the network is connected / ready for use.

If the user has disconnected Wi-Fi / Bluetooth, the gray logos are depicted with a slash through them indicating they are not connected due to being actively disabled by the user.

### *Bluetooth and Wi-Fi Status Icons*



## DUAL IFD OPERATIONS

Some installations may involve two IFDs that can work in a more integrated fashion.

### Keyboard Convenience Mode

When a field requires an alphanumeric data entry, the IFD can present a virtual keyboard in order to enter the value. When “Keyboard Convenience” mode is enabled via the Setup Page and an entry is initiated on one IFD, the virtual keyboard will be displayed on the other IFD. This feature allows the entry to be made without having the virtual keyboard obscure the field being entered.

### Shared Data

Configuring two IFDs for data sharing using “CrossSync” enables the following data sharing capabilities:

- Integration of the Crew 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
- 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). This requires identical nav databases to be loaded on each IFD
- Sharing of stored routes between IFDs
- Synchronization of fuel planning (e.g. initial fuel entry) between IFDs
- Synchronization of user waypoints between IFDs
- Sharing of sensor settings and data (traffic, datalink, lightning, air data, etc.) between IFDs.
- Synchronization of key user settings

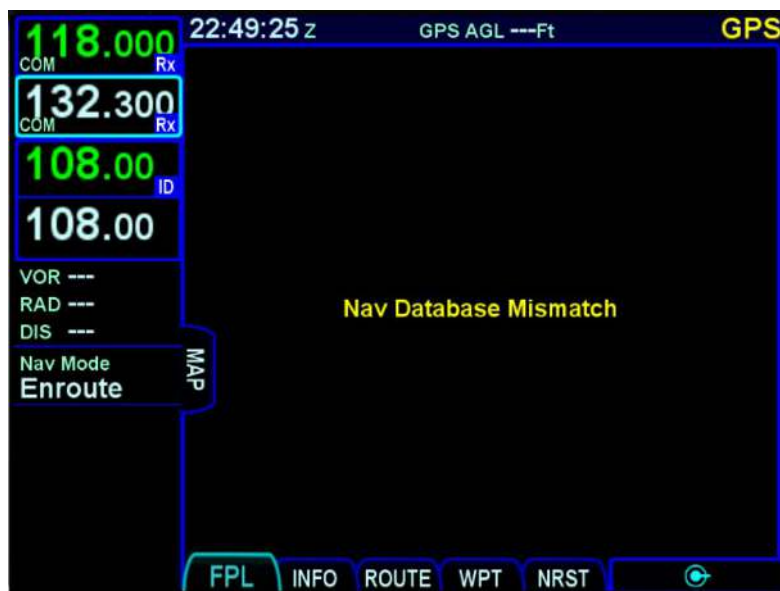
To have full data sharing between dual panel-mount IFDs, the following requirements must be satisfied:

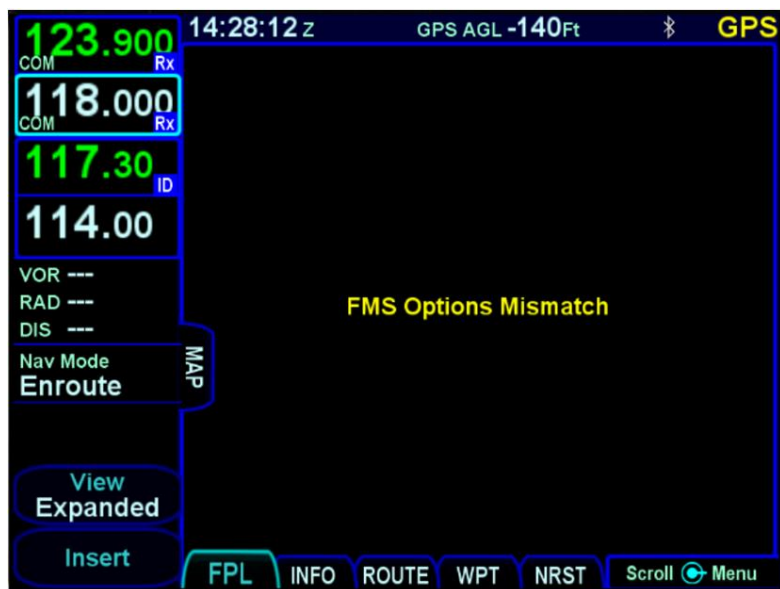
- One IFD must be configured as chassis ID 1 and the other as chassis ID 2

- CrossSync must be turned on in both IFDs (this is a maintenance mode setting)
- Both IFDs must have the same SBAS antenna configuration
- Both IFDs must have the same navigation database
- Both IFDs must have the same software version
- Both IFDs must have the same setting for whether RF Legs are enabled

At startup, the IFDs negotiate to determine which will be the master FMS. Once a master has been chosen, the other IFD compares information with the master. If the navigation database, software version, or configuration options (RF Legs and WAAS antenna type) do not match the master, the FMS in that IFD is disabled and each FMS page will show a corresponding message as illustrated below.

***Nav database mismatch message***



**Software version mismatch message****Configuration options mismatch message**

If the IFDs have mismatched software versions, sensor and control data (e.g. weather, traffic, fuel, volumes, keyboard convenience mode, etc.) will not be shared between the IFDs.

Dissimilar weather data sources (e.g. GDL-69 data on one IFD and SkyTrax200 data on the other IFD) will not be shared between IFDs. In this case, each IFD will display its own weather data.

Likewise, dissimilar traffic data sources (e.g. TAS600 data on one IFD and SkyTrax200 data on the other IFD) will not be shared between IFDs.

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. However, flight plans will not be shared.

### **Independent Data**

The following list of data will never be shared between two IFDs:

- IFD page and tab selection
- Map view, range, declutter, and overlay settings
- Chart extent box depiction on map
- Navigation Source selection
- Com/Nav settings (e.g. 8.33 vs. 25 kHz spacing)<sup>1</sup>
- Navigation 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
- User Profiles

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<sup>1</sup> Not applicable to the IFD510 and IFD545

## SBAS VS NON-SBAS OPERATIONS

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

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

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

For dual IFD installations in which one IFD is SBAS capable and the other IFD is non-SBAS capable, 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).

## 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 the Setup page for your personal preferences.

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

## 2 SVS Subsystem <sup>1</sup>

The Synthetic Vision System (SVS or SynVis) subsystem consists of a single page to aid in the pilot's awareness of their spatial position relative to the terrain.

SVS uses a GPS-based MSL altitude and a 9 arc-sec terrain database to display a 3D scene representing an "egocentric" out-the-window view. The SynVis scene can display:

- Total Velocity Vector (TVV) / Flight Path Marker (FPM)
- Airport flags
- Runway depictions
- 3D terrain
- 3D traffic
- 3D obstacles
- Large bodies of water (oceans, lakes, major rivers)

The SVS page displays attitude indications that overlay the background depiction and allows for a pilot-selectable horizontal field of view ranging from 20 degrees to 120 degrees with a 45 degree default.

SVS computes height above terrain via GPS inputs and is not a radio altimeter (RADALT).

Terrain Awareness and Forward Looking Terrain Alerting (FLTA) alerts are provided via terrain coloration, Caution-Warning Alerting System (CAS) alerts, and aural alerts.

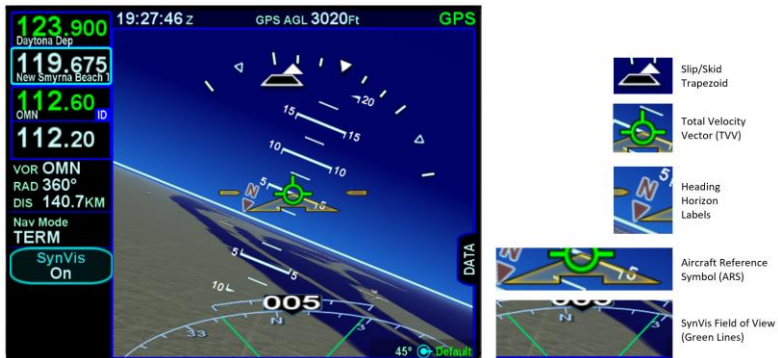
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<sup>1</sup> Applicable to the IFD550 and IFD545 only

## SYNTHETIC VISION PAGE

If the IFD is receiving valid heading data, the circular green Total Velocity Vector (TVV)/Flight Path Marker (FPM) will be present in the display. The TVV/FPM indicates where the aircraft is actually going as compared to the yellow triangular Aircraft Reference Symbol (ARS) which indicates where the aircraft is pointing.

### Synthetic Vision Page



The SynVis field of view adjustment can be made by either pinch zoom gestures on the touchscreen display or by turning either of the bottom right knobs.

The current field of view setting is displayed momentarily in the knob label when a new value is set. Pressing the knob will immediately restore the display to the default field of view value. Leaving the field of view at the higher or lower zoom levels for extended periods should be avoided due to potential visual cue confusion (e.g. things may be much closer or further than they appear).

The zero pitch line or horizon line is a full-width indication of the horizon. Placing the TVV/FPM on that line will result in level (no altitude change) flight. Terrain above the aircraft's altitude will appear above that line, and conversely, terrain below the aircraft's altitude will appear below that line. Placing the TVV/FPM above the terrain means that the airplane will clear the terrain and vice versa.



The presentation of the page is controlled using the SynVis LSK: When set to "Off", a traditional blue over brown Attitude Indicator (AI) is presented.

### SynVis Off



When set to "On", the synthetic vision image is presented.



When set to “FPL”, the synthetic vision image is presented along with the active and next legs in the flight plan. The depiction of the flight plan is placed 1000 feet below aircraft altitude. This means that it will not be visible when flying under 1000 feet AGL during takeoff, enroute and approach phases, nor will it be visible during ground operations or may appear to go underground when descending or when low over variable terrain. No other legs are overlayed in order to keep the display decluttered. The active waypoint is depicted using a magenta flag containing the waypoint identifier.

#### **SynVis with Waypoint Flag**



#### **NOTE**

##### **SynVis Unavailable During GPS Acquisition**

SynVis depictions will not be available until the GPS has reached SBAS or FDE state.

There are no autopilot mode display or control capabilities.

The 3D traffic uses the same symbology as that in the traffic thumbnails and map overlays but the traffic depictions in the SynVis scene attempt to indicate relative threat level by size and symbol and are depicted at the relative altitude and bearing as received from the traffic sensor, consistent with the SynVis field of view. As traffic draws nearer to your ownship position, it grows in size in the SynVis scene. Traffic outside of 10nm will not be shown. However, if the traffic is a "Proximate Alert" (PA) or "Traffic Alert" (TA), it will be shown.

### 3D Traffic Symbology in SynVis Scene

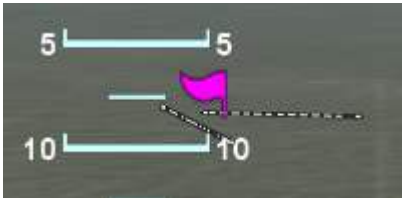


The TVV will grow in size when it is behind the deviation indicators or heading digital readout bubbles in order to stay viewable.



Any airfield that is in the FMS database and in the SynVis field of view will be depicted in the SynVis scene with a METAR flag. If the IFD has not received a valid METAR for that airport, the flag will be colored gray. Otherwise the flag will be colored to represent ceiling and visibility (see Datalink Status section on page 5-96 for color legend).

### ***Airport Flags***



Any runway that is part of the active flight plan will be further outlined in magenta.

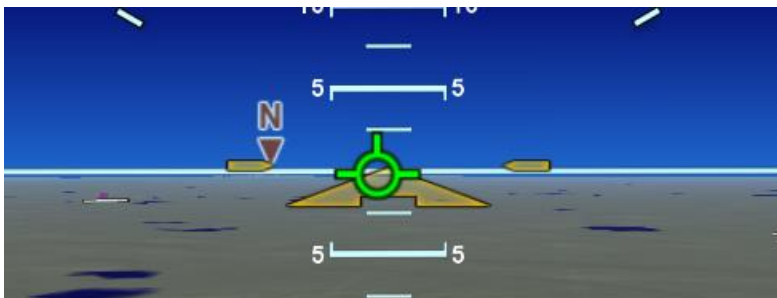
Provided aircraft position is close enough, runway layout, runway number and centerline markings will be visible.

### ***SynVis Runway Depiction***



The Setup Page provides a means to control whether cardinal heading marks are shown along the horizon line.

### Heading Horizon Marks



The Setup Page also provides a means to control whether the Horizontal Deviation Indicator (HDI) is always visible or shown only for approaches.

**HDI while enroute (“Always On”)**

## SYNTHETIC VISION WITH DATABLOCKS

The default SynVis view shows radio controls, datablocks, and LSKs on the left and the entire right side of the display shows the SynVis scene. However, SynVis can be configured to show datablocks in a narrow area on the right side of the display. When configured to show datablocks, the datablocks overlay the terrain and the SynVis view is re-centered in the available space.

To show the datablocks, touch the "Data" tab on the right side of the display. Holding the left side of the SVS button will also cause the datablocks to appear. To hide the datablocks, either touch the "Data" tab to the left of the datablocks, or hold the right side of the SVS button until they slide back off of the display.

The datablocks to be shown are configurable as described in the Setup Page section, page 5-36. This is the same set of datablocks that can be shown on the Map page.

### SynVis with Datablocks





## SYNTHETIC VISION OBSTACLES

Obstacles will be depicted in the SynVis scene out to 12nm. Standard high, low and grouping symbology is used to depict obstacles.

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 SynVis scene.

### *Blue Obstacle Threat Bubbles*



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 on the SynVis scene and the map pages.

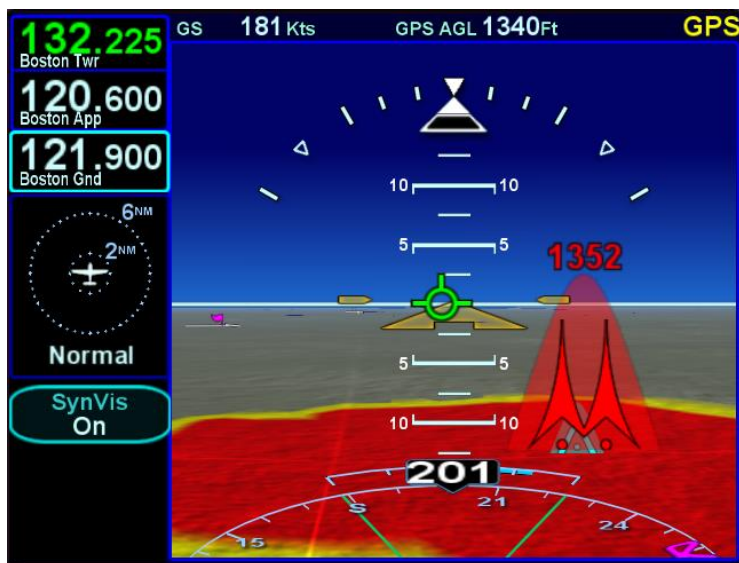
#### ***Yellow Obstacle Threat Bubble***





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 on the SynVis scene and the map pages.

#### **Red Obstacle Threat Bubble**



Yellow or red highlighted obstacles on the SynVis scene will also display the MSL altitude of the obstacle top.

Depiction of non-threat obstacles in the SynVis scene is governed in part by the Setup Page selections for the map. If obstacle filtering is disabled on the Setup Page, then all obstacles within 12nm will be displayed in the SynVis scene. If obstacle filtering is enabled, then the system will display the greater of 2000' or the selected altitude filtering number. For example, if 500', 1000' or 1500' were selected on the Setup Page for low obstacle altitude filtering, the system will depict all obstacles within 2000' vertical feet of the aircraft out to 12nm in the SynVis scene.

**NOTE**

When both obstacles and terrain are potential threats, it is possible that the display will show both yellow and red. However, the CAS message will be clear regarding the most imminent threat (e.g. Warning **Obstacle** vs. Warning **Terrain**).

## SYNTHETIC VISION TERRAIN AWARENESS

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 SynVis scene and 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 SynVis scene and the map pages.

Synthetic Vision terrain awareness can be triggered by either terrain or obstacles.

### SVS with Terrain Awareness

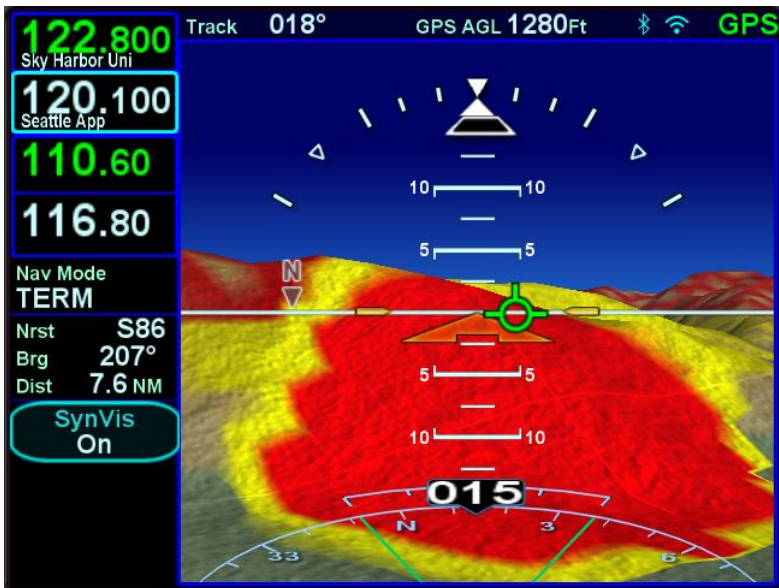


## SVS FORWARD LOOKING TERRAIN AVOIDANCE (FLTA)

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 TVV/FPM 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. 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 TVV/FPM 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 projected imminent impact location or the projected reduced terrain and obstacle clearance area is depicted on the SynVis scene and 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 terrain awareness depiction.

### SVS with Active FLTA Alerts



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 reduced terrain and obstacle clearance distance varies with phase of flight and aircraft dynamics but generally ranges from 300' to 1000'.

SynVis terrain awareness indications do not produce CAS messages or aural alerts but SynVis FLTA alerts do.

## FLYING APPROACHES WITH SYNTHETIC VISION

As noted above, if a flight plan is active in the FMS, it will be depicted in the SynVis scene, presuming it falls within the current SynVis field of view.

The lateral deviation Horizontal Deviation Indicator (HDI) and vertical deviation Vertical Deviation Indicator (VDI) will be automatically displayed and the arrowhead pointers indicate the direction and distance from desired glide path and glide slope. In the example below, the aircraft is virtually right on glide path but is displaced above the glide slope so the corrective action is to increase the descent rate toward the arrowhead to get centered back up on glide slope.

A stable glide slope flight should also put the TVV/FPM at approximately  $-3^\circ$  and placed on the approach end of the runway depiction.

If the published missed approach has not been set up to automatically arm, the bottom LSK will present the manual arming option.

### *Approach with "Enable Missed" LSK*



**TIPS AND TECHNIQUES****Adjustable Field of View on Final Approach**

Use the zoom feature on the SynVis display during instrument approaches to get a close-in look of the landing runway. Leaving the field of view at the higher or lower zoom levels for extended periods should be avoided due to potential visual cue confusion (e.g. things may be much closer or further than they appear).

If the IFD is configured to automatically enable the missed approach procedure in the FMS or it has been manually enabled inside the FAF, then the first leg of the published missed will be displayed in the alternating magenta/white depiction and the Enable Missed LSK will be removed. Since the SynVis scene will only depict the active and next legs to prevent excessive clutter, the follow-on missed approach legs are not depicted but are still visible on the 2D map page/view.

**Enabled Missed Approach**

The selected runway in the FMS flight plan is highlighted with a magenta outline when SynVis is set to “On” or “FPL”. The runway identifier flag is “planted” at the runway threshold, if known, or airport reference point if not. The SynVis LSK should be selected to FPL while flying an approach in order to see flight plan legs and waypoint signposts. If an airfield METAR flag is shown, it will be located at the airport reference point.

### **SynVis Runway Depiction**





As on the FMS pages, the bottom LSK will toggle to “Retry Approach” when the published missed is active.

***Retry Approach Option While On Missed Approach***



Deviations are indicated by both the SynVis scene depiction and the horizontal and vertical deviation indicators. In the image below, the airplane is centered on the final approach course and is well above glideslope. A pegged deviation indicator is displayed in yellow.

#### ***Deviation Indicators***



Many published missed approaches contain a hold pattern. The IFD FMS will enter the hold as published and remain in the hold indefinitely until commanded to exit the hold via the bottom LSK.

***Established in Hold with Option to Exit***



Once the “Exit Hold” LSK has been selected, the IFD FMS will exit the hold at the published fix.

***Exit Hold Has Been Commanded***



## SVS PAGE VARIATIONS

If there is no valid heading input to the IFD, the TVV/FPM is removed from the SynVis scene and the directional indication is labeled “TRK” indicating GPS track as the source.

### *SynVis with no Heading Input*



At extreme pitch/flight path angles, both positive and negative, the horizon line will detach from the terrain (or traditional blue/brown AI) such that there will always be a strip of blue/sky or brown/ground visible to aid in initiating unusual attitude recoveries.

High/low pitch chevrons are displayed in those extreme pitch/flight path angle situations and point toward the horizon.

**Extreme Attitude Depiction**



The following failure conditions result in an automatic transition from the SynVis display to the traditional attitude indicator:

- Loss of GPS position or track
- Inability to convert GPS altitude to MSL altitude
- Loss of pitch or roll data
- Invalid or frozen terrain database data
- Movement beyond the latitude limits of SynVis (valid within the range 60°S latitude to 75°N latitude)

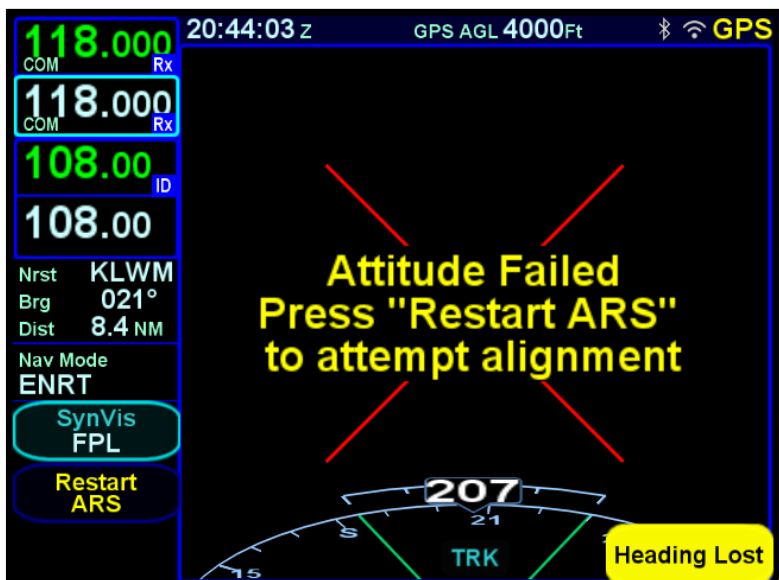
The SynVis scene will be automatically restored if/when that failure condition is eliminated.

#### OPERATIONAL LIMITS OF THE ARS

Exceeding the operational limits of the ARS, below, may result in a temporary loss of attitude display:

- Body Pitch & Roll rates up to 105°/sec
- Body Yaw rates up to 70°/sec
- Acceleration up to 4.5Gs
- Static and dynamic attitude performance to +/-60° for Pitch and Roll

The IFD550/545 ARS is aided by the GPS data that it receives. In the event that the unit loses GPS integrity, the ARS performance will be degraded.

**ARS Lost**

If the ARS data (mark pitch, roll and heading) becomes invalid, the ARS page will display a red "X". Once the aircraft has returned to straight and level flight, press the "Restart ARS" LSK and maintain straight and level flight for at least 30 seconds.



## 3 FMS Subsystem

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.

The FMS Page has five tabs, as shown below,



The FPL tab is used to manage the flight plan. The flight plan contains the sequence of legs to which the FMS will provide guidance. The FMS expects the pilot to fly the legs as defined in the flight plan.

The INFO tab provides a means to show information about aviation facilities contained in the navigation database.

The ROUTE tab provides a means for managing stored routes. Stored routes can be created, modified, and deleted. A stored route can be activated, making it the plan to which guidance is provided.

The WPT tab provides a means to create, modify, and delete user defined waypoints.

The NRST tab provides a means to display facilities that are nearest to the aircraft: Airports, VORs, NDBs, Intersections, ARTCCs, FSS, User Waypoints, and Airspaces. This page may be particularly useful during emergencies.

## FPL (FLIGHT PLAN) TAB

### FMS BASIC CONCEPTS

#### FMS-Centric Calculations

All FMS deviation data, most datablock data, time to go calculations, and fuel calculations are based on the assumption that the pilot intends to fly the flight plan as created.

#### Flight Plan Rows

The flight plan is presented as a series of rows. Depending upon the view, a row can represent a single leg or an entire procedure in the flight plan. A flight plan can consist of up to 128 legs.

Each row is laid out based on a “via-to” concept. The path to be taken is the “via” and is displayed in the upper left portion of the row. The terminus of the leg is the “to” and is displayed below and slightly to the right of the “via”. Data such as ETA and fuel remaining are displayed to the right of the “to” field.

Each row in the flight plan is color-coded to aid in identifying important features at a glance. Overriding all other colors, the active leg is always depicted with a magenta background. Inactive legs that terminate at an airport are depicted with a blue background. All other inactive legs are depicted with a gray background.

#### Flight Plan Coloring

Origin

KMLB

Melbourne Intl

Brg: 008° 0.0NM

Fly Direct (081°)

MLB

Cross before MLB

To: 0.6NM 0:16M:S

At: 50Gal 4:19PM

Fly Direct (170°)

VALKA

To: 11.7NM 4:50M:S

At: 49Gal 4:24PM

Blue

- Origin
- Airports

Magenta

- Active leg

Gray

- All other legs

## Flight Plan Views

The view of the flight plan can be adjusted to meet user preferences or mission requirements. Three controls are available to alter the view:

- “View” LSK
- Mini Flight Plan Format
- Split view tab

### View LSK

The View LSK controls the content of flight plan rows. When the full flight plan page is displayed, the View LSK can be set to either “Expanded” or “Compact”.

Typically, the view is set to “Expanded”, which causes each row in the flight plan to represent a leg in the flight plan. This view is useful to track progress during the flight.

#### Expanded Flight Plan View

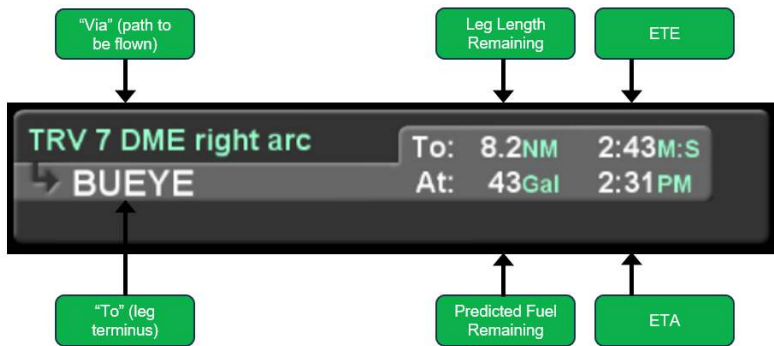


In expanded view, displayed to the right of the “to” field is a set of statistics for the leg, arranged in two lines. The first line contains

the distance and time remaining on that leg (i.e. the remaining leg length and the ETE). The second line contains predicted fuel remaining (if equipped) and time (i.e. ETA) when the aircraft reaches the end of the leg.

The ETE fields in the flight plan legs are shown in hours and minutes until the time is under 10 minutes, at which point it becomes minutes and seconds.

**Flight Plan Leg Display (Expanded View)**



In expanded view, when a set of legs are part of a departure, arrival, approach, or airway, a bracket with the name of the procedure will be displayed along the left side of the legs. When one of those legs is active, the procedure bracket will be colored magenta. Otherwise, it will be colored white.

**Procedure Brackets**

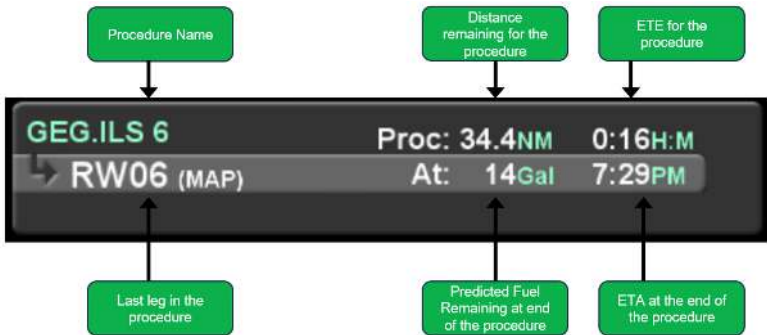
In the "Compact" view, when the flight plan is inactive, each row represents a procedure in the flight plan. Therefore, airways, departures, arrivals, and approaches all take up only a single row. When the flight plan is active, however, the procedure that contains the active leg is always expanded. The compact view is useful for viewing flight plans in a format that more closely resembles a clearance.

Compact Flight Plan View



When a row represents an entire procedure, the layout is similar to that of a leg, but the “via” field contains the name of the procedure and the statistics are cumulative, covering all legs in the procedure.

Flight Plan Leg Display (Compact View)



### Mini Flight Plan Format

“Mini Flight Plan Format” can be selected using the Setup Page. When that option is “On”, the flight plan rows are displayed in a vertically shortened format, allowing for more rows to be displayed on the screen at one time. Because of the reduced row height, the “via” and “to” fields are shown side-by-side and the via is abbreviated. Also, only the “To” statistics are displayed.

However, even when Mini Flight Plan Format is “On”, the leg surrounded by the cursor is shown in the normal format, as if Mini Flight Plan Format were off.

#### Mini Flight Plan Format “On”



### Split View

The “Map” tab, shown to the left side of the flight plan, can be used to split the screen so that both the map and the flight plan can be seen at once. In order to enable split view, either touch the Map tab or press and hold the right side of the FMS button. Once split view is active, the full FPL page can be restored by again touching the tab (which is now labeled “FPL”) or by pressing and holding the left side of the FMS button.

Because of the reduced width available for displaying flight plan rows, the format of each row is changed to show minimal information and many of the editing facilities are inhibited.

#### ***Split View Active***



The split view is useful when entering flight plans because a preview of the pending modification will be shown (see “Previewing Flight Plans” on page 3-13).

It is also useful for reviewing the flight plan leg-by-leg. When the split view is active, the View LSK has a third option named “Cursor”. When that view is selected, the map side of the display will be centered on the terminating point of the leg surrounded by the cursor. As a reminder of the “Cursor” view being active, the legend “Cursor Centered” will be displayed near the top of the map. By moving the cursor through the flight plan and having an appropriate zoom level, an overview of the flight plan can be performed.

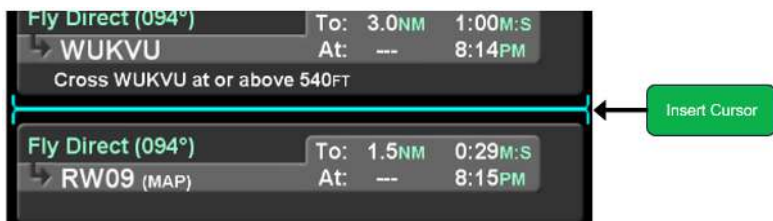


**Cursor View Active****Flight Plan Cursors**

There are three types of cursors – an insert cursor, an edit cursor, and a field cursor.

**Insert Cursor**

An insert cursor appears as a thin cyan horizontal line that appears between flight plan rows. This cursor allows you to insert new legs and procedures at that position.



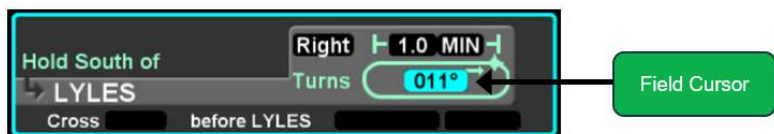
## Edit Cursor

An edit cursor appears as a cyan box surrounding the entire row and allows you to perform operations on that row.



## Field Cursor

A field cursor appears as a filled cyan box within a row.



## Moving the cursor

Cursor movement can be controlled by the inner and outer knobs located at the bottom right side of the IFD. Rotation of the outer knob will move the cursor through the flight plan between insert and edit cursors for each row. Think of this as "coarse" control for moving quickly through the flight plan. Rotation of the inner knob will also move the cursor between insert and edit cursors, but also stop at each editable field. Think of this as "fine" control.

Cursor movement can also be controlled using the touchscreen. Touching between rows will move the insert cursor to that position. Touching a row that is not already surrounded by the edit cursor will move the edit cursor to that position. Touching a field within a row that is surrounded by the cursor will move the field cursor to that position.

## Flight plan editing

Throughout the FMS Subsystem section of this document, the word "select" is used to describe the initiation of an operation based on the cursor position. Unless otherwise specified, the

field indicated (or “highlighted”) by the cursor can be selected by pressing the inner knob, touching the cursor, or pressing the ENTR button. The typical sequence of events to initiate an edit is to move the cursor to the desired position, then select the cursor.

Selecting the insert cursor will usually cause a dropdown to appear, though there are cases where a field edit will be immediately started. There are also several fields in the FMS that are edited using dropdowns (vs. entering a value). Whenever a dropdown is shown, editing is accomplished by moving the cursor to the desired item and then selecting it.

When a field contains an editable value, selecting the field using the inner knob will put the field into edit mode, allowing the value to be entered using the knobs. Selecting a field using the touch screen will cause a virtual keyboard to appear. At that point, either the keyboard or the knobs can be used to enter the value.

To “complete” an edit, press the right knob button, touch the ENTR key on the virtual keyboard, press the ENTR button on the right side of the IFD, or press the “Enter” LSK.

By turning and pressing only the bottom right knob, it is possible to enter an entire flight plan very quickly without ever removing your hand from the knob.

## CREATING A NEW FLIGHT PLAN

When the IFD powers up on the ground, the flight plan is automatically populated with an origin. 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. If the selected origin airport is not appropriate, it can be changed to a different airport or deleted, as necessary.

**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 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 below, the magenta vertical rectangle in the scroll bar indicates that the active leg is just below the top of the screen. The cyan part of the scroll bar indicates that there is at least one leg out of view above and a number of legs out of view below.

***Flight Plan and Scroll Bar***

## PREVIEWING FLIGHT PLANS

Using the split view, flight plan modifications can be previewed as they are being modified on the FMS page. As a flight plan is being built on the right side of the page, the map will automatically resize attempting to show the entire modification being made. Those changes are shown on the map using a cyan color. There may be a short delay in drawing the legs as the system determines the optimum map range for display. This feature provides a graphical preview of the edited route before it becomes part of the flight plan to aid in situational awareness. The preview feature is available whether modifications are being made on the ground or airborne. While a preview is being displayed, a temporary annunciation will be shown on the map describing the modification in progress. Examples of those annunciations are "Preview - Waypoint", "Preview - Airway", or "Preview - Approach".

### *Previewing a Flight Plan While Building It*



## SELECTING A DEPARTURE

If a published departure exists for the origin airport, a "Departure" field will be displayed at the bottom of the row. Select the

departure field to display a dropdown containing available departures for the origin airport.

When a departure is selected from the initial dropdown, a sequence of dropdowns may be presented to allow the selection of an enroute transition and a runway transition. The structure of the departure and the presence of a selected runway will impact whether a specific dropdown is presented.

The FMS processes enroute transitions first. If the departure has more than one published enroute transition, the FMS will present a dropdown showing those transitions and a transition must be selected. If the departure has only one published enroute transition, the FMS will automatically select that one and no dropdown for enroute transitions will be presented. There are departures that have no published enroute transitions. In those cases, this entire step is skipped.

If a departure has at least one enroute transition and the departure has a common segment after runway transitions from which all enroute transitions are started, the dropdown menu will contain an option for "None". Selecting "None" will cause the departure to terminate at the end of the common segment.

Vector (or Radar) SIDs are not 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.

**Departures Dropdown**

123.900 15:55:59 z GPS  
Albuquerque App  
118.000  
KABQ ATIS  
132.800  
Albuquerque Ctr

Dtk  
TkDist NM  
At Gal  
ETE H:M

Nav Mode  
ENRT

MAP

Enter  
Cancel

Origin  
KABQ Rwy: Brg: 266° 30.1NM  
Albuquerque Intl Sunport  
Departure:

- KABQ Departures -  
DOCKK3  
FYSTA3  
GRZZZ3  
JEMEZ3  
LARGO3  
MNZNO3

Scroll Select

**Departure Enroute Transition Dropdown**

123.900 15:56:36 z GPS  
Albuquerque App  
118.000  
KABQ ATIS  
132.800  
Albuquerque Ctr

Dtk  
TkDist NM  
At Gal  
ETE H:M

Nav Mode  
ENRT

MAP

Enter  
Cancel

Origin  
KABQ Rwy: Brg: 266° 30.1NM  
Albuquerque Intl Sunport  
Departure: MNZNO3.-----

- MNZNO3 Transitions -  
None  
CME  
LAMSE  
MOLVE  
ONM  
SJN  
TXO

Scroll Select

Once the enroute transition has been selected, the FMS will process runway transitions. There are departures that do not have published runway transitions. For those cases, the rest of this process is skipped and the selected procedure and enroute transition are inserted into the flight plan. Otherwise, the FMS proceeds differently based on whether the airport has a selected runway.

If the airport has a selected runway and that runway is applicable to the selected departure, then the FMS will choose the runway transition corresponding to the selected runway and the procedure is inserted into the flight plan without further pilot action. However, if the airport does not have a selected runway or if the selected runway is not applicable to the departure, then a runway transition must be selected. If the departure has only one published runway transition, the FMS will automatically select that one and then insert the procedure into the flight plan. If there is more than one published transition, the FMS will present a dropdown menu showing all of the runway transitions and the pilot will select the desired transition. Once that selection has been made, the procedure and all selected transitions will be inserted into the flight plan.

#### ***Departure Runway Transition Dropdown***





If the inserted departure had a selected runway transition and either the airport had no selected runway or the selected runway was not applicable to the departure, then the FMS will set the runway for the airport based on the runway transition that was selected. There are cases where a runway transition applies to all runways at the airport or to a set of parallel runways. In those cases, if there was no selected runway for the airport, the FMS will select the first runway (numerically) that is applicable.

## INSERTING A WAYPOINT

To insert a waypoint into the flight plan, turn the right outer knob until an insert cursor is positioned where the new waypoint is to be inserted. Note that a waypoint can generally be inserted anywhere in the flight plan except for within terminal area procedures (i.e. departures, arrivals, and approaches). Press the knob button to generate a dropdown. If the cursor is in a position where a waypoint can be inserted, "Waypoint" will be shown as the first entry in the dropdown. Generally, the cursor will be at the "Waypoint" selection to start. Select "Waypoint" and enter the waypoint identifier. Geofill™ will typically find the correct waypoint by the second character entered.

### COOL FEATURE

When an insert cursor is displayed at a position where a waypoint can be inserted, pressing a letter on a Bluetooth keyboard will immediately start a waypoint identifier entry with that letter.

**COOL FEATURE**

If you are on another FMS page and the cursor is around an identifier that can be used as a waypoint, a quick way to enter that identifier into the flight plan is provided by the "Paste" LSK. Go directly to the FPL page, start the waypoint entry using the knob and the Paste LSK will appear at the topmost LSK. The LSK is also available when using the virtual keyboard, but the LSK is obscured on the screen by the keyboard.

**INSERTING AN AIRWAY**

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.

To insert an airway into the flight plan, move the cursor to a position after the leg where the airway will be joined. It will be an insert cursor. Press the right knob button to bring up the dropdown menu containing the options available after that leg. Scroll the cursor down through the list until the desired airway name is selected. Note that airways are always at the bottom of the list.

Once the desired airway is selected, press the right knob button or touch the selected airway and a list of exit points will appear in a secondary dropdown. The list of exit points is presented in the order along the airway, not in alphabetical order. Select the desired exit point to insert the airway into the flight plan.

## Airway Dropdown



## Airway Exit Points



## 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 “Delete Waypoint” LSK.

### NOTE

Not all waypoints within a published procedure are allowed to be deleted. Generally, legs that are surrounded by other legs that terminate at a fix can be deleted. Legs on a final approach cannot be deleted unless they are designated as step-down fixes.

## EDITING A WAYPOINT

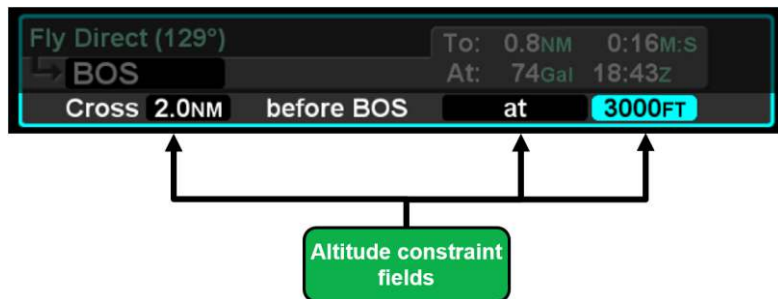
From the FPL tab, the bottom right knob on the IFD can be used to edit an existing waypoint. Using the knob, scroll up or down the flight plan until an edit cursor surrounds the waypoint to be modified. Use the inner knob to highlight one of the editable fields with reverse video. Pushing the knob provides 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 ALTITUDE CONSTRAINTS

Most legs allow for the entry of an altitude constraint (e.g. cross the waypoint at or above a specific altitude). Non-window constraints are defined by the kind of constraint, the altitude, and a “cross” distance prior to the waypoint at which the constraint is to be met. Window constraints are defined only by the two altitudes, meaning that the constraint applies at the waypoint (no distance prior field). Altitude constraints are depicted on the map.

**Altitude Constraint Fields**

Cross	Kind	Altitude
Numeric field representing the distance prior to the waypoint that the constraint is to be achieved	At Or Below At At or Above Between ("window")	Numeric field representing the target altitude. Minimum allowable value is 100 feet. Window constraints have an upper and lower altitude field.

**Altitude 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 altitude constraints are:

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

Altitude constraints are used to drive enroute VNAV functions (see page 6-31).

## DIRECT-TO

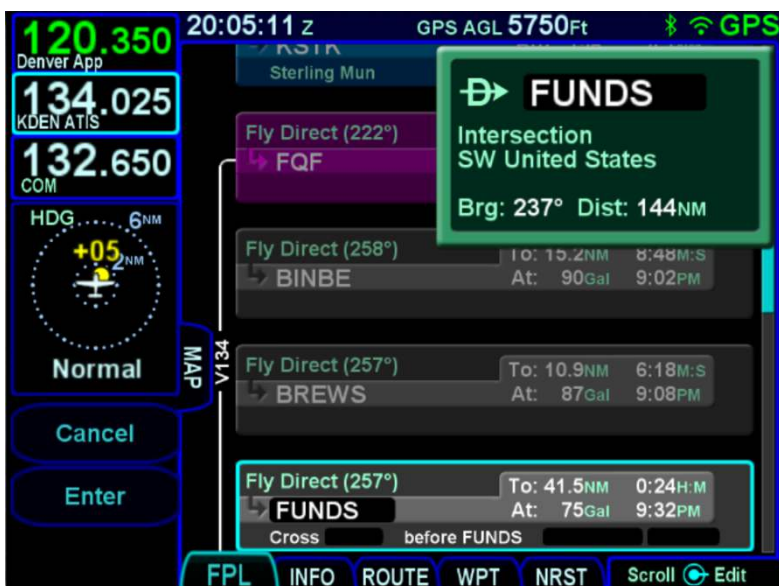
"Direct To" clearances are sometimes issued to waypoints that are not currently in the flight plan, but often are issued as shortcuts to waypoints that have already been planned. The FMS seamlessly handles both of those situations using the Direct-To key to perform either an "offpath direct-to" or an "onpath direct-to", respectively. Whether a direct-to is onpath or offpath is determined by the FMS. However, it is important for the pilot to recognize the difference because the effect on the flight plan differs.

### Selecting the direct-to waypoint

In either case, the process is started by pressing the dedicated Direct-To key on the IFD bezel. At that point, a green dialog box appears and is populated with a waypoint identifier, determined as follows:

- If the currently displayed page is an FMS page specifically denoting an eligible fix\*, the identifier of the fix
- If the currently displayed page is not an FMS page or it does not specifically denote an eligible fix\*, and the flight plan has at least one leg, the identifier associated with the leg surrounded by the cursor on the FPL page
- The identifier of the closest airport

\* an eligible fix is an Airport, VOR, NDB, Intersection, or User Waypoint.

**Direct-To Dialog Box**

At this point, if desired, the waypoint identifier can be changed using several methods:

- **Manual touch** - Touch the identifier field in the dialog box to manually change the identifier. Use the virtual keyboard to directly enter the identifier.
- **Manual knob** - Turn or push the right inner knob. A cursor will appear in the field. Turn the inner knob to change characters and turn the outer knob to change cursor position.
- **Scrolling** - Turn the right outer knob. With each click of the knob, the cursor will be populated with the next or previous item in the list being shown (e.g. the flight plan, the nearest list).
- **Map selection** – this method is only available on the split Map/FMS page. Once the Direct-to key has been pressed and the dialog box is displayed, touching a fix on the map causes the dialog box to be populated with the identifier of the fix.

Once the desired waypoint identifier has been entered, accept the entry to display a confirmation dialog saying "Activate Direct To" and the selected identifier. Touch the dialog box, press ENTR, or press the Enter LSK to confirm the operation. Press CLR or the Cancel LSK to abort the operation.

#### Direct-To Confirmation



#### Determining Offpath or OnPath

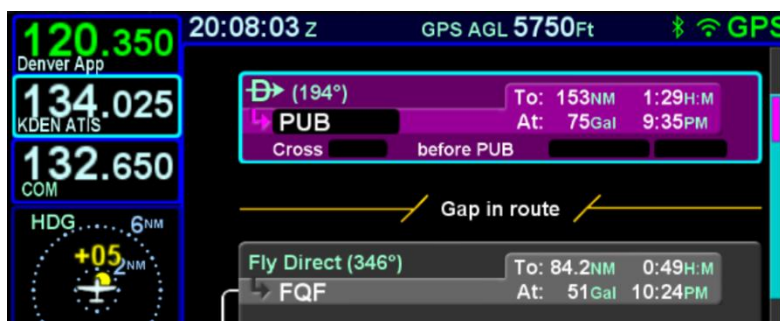
When the direct-to identifier is selected by scrolling through the flight plan, the direct-to will always be considered onpath. Otherwise, the FMS looks through the flight plan starting with the active leg and continuing downpath for a leg with a matching identifier. Note that legs in a missed approach are considered only if the missed approach is enabled. If a matching leg is found, then the direct-to is considered onpath. If no matching leg is found, then the direct-to is considered offpath. Note that because only legs downpath of the active leg are considered, entering the identifier of a leg **before** the active leg will cause the direct-to to be offpath.



## Offpath Direct-To

An offpath direct-to causes a new leg to be inserted into the flight plan immediately prior to the active leg and that new leg is followed immediately by a discontinuity (gap in route). This is done because the FMS only knows that the direct-to is an interruption of the currently active leg by proceeding direct to the new waypoint. The FMS does not know the pilot's intent after the direct-to, so it places the discontinuity afterward. Once the direct-to is active, the pilot should adjust the downpath flight plan to reflect the remainder of the clearance. That may be as simple as removing the discontinuity or it may include deleting and inserting other legs.

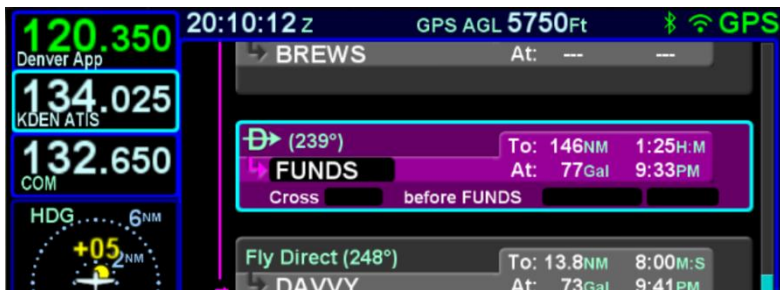
### *Offpath Direct-To (gap inserted)*



When the active leg is part of an arrival or an approach and an offpath direct-to is performed, the direct-to will be inserted after the end of the missed approach or after the destination if there is no associated missed approach. When the active leg is part of a departure and an offpath direct-to is performed, the direct-to will be inserted after the last leg of the departure.

## Onpath Direct-To

An onpath direct-to causes the specified leg to become active, but the path is temporarily changed to be direct from the aircraft position at the time the direct-to was initiated. No discontinuity is inserted. The FMS assumes that the direct-to was just a shortcut and that the intent is to resume guidance along the existing flight plan once the end of the direct-to leg is reached.

**Onpath Direct-To (no gap)****COOL FEATURE**

If the aircraft course is not aligned with the course to the direct-to waypoint, the FMS will generate a curved path to turn the aircraft on course. That curved path will be depicted on the map.

**ENTERING AND INTERCEPTING A RADIAL****FMS Method**

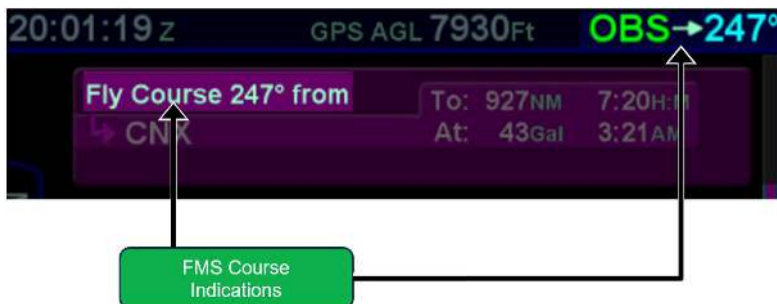
The FMS Course function will allow the pilot to navigate “To” or “From” the active waypoint while OBS is selected as the nav source. Press the Nav Source knob to make OBS the active nav mode and then adjust the FMS (OBS) course using the external course adjust knob (i.e. course set knob on a CDI or HSI or EFIS). If there is no installed external course setting device, then turn the IFD nav source knob to adjust the FMS Course value. For IFDs without a nav source knob (e.g. IFD510) the course can be adjusted by turning the inner knob, but **only on a page under the Map subsystem**.

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, the course will be shown in the upper right corner of the IFD (as part of the nav source), and the

active leg on the FPL tab will change to “Fly Course xxx°”, as illustrated below.

#### **FMS Course (OBS)**



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<sup>1</sup>**

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 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

<sup>1</sup> Not applicable to the IFD510 and IFD545

“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/lon position such as nav aids, enroute waypoints, user waypoints, airports, etc. Legs that terminate at an altitude, DME distance, radial crossings, etc. do not support attaching a hold. Hold fixes are always fly-over waypoints and not fly-by waypoints.

To insert a hold, use the knob or touch to place the insert cursor immediately after the leg containing the planned hold fix. Touch the cursor or push the knob to display a dropdown list of options, which will include “Hold at <waypoint name>” near the top of the list. Scroll as necessary to highlight that drop down list entry and push the knob again to add the hold.

### TIPS AND TECHNIQUES

#### Using Holding Patterns

The holding pattern leg has a field for the inbound course to the hold fix, which is specified in degrees. If the clearance is in the form of “Hold <direction> of <fix>”, the inbound course will be the reciprocal of that direction. For example, if ATC issues a “Hold east of <fix>”, a hold course of 270° should be entered in the hold leg.

The nav database may contain multiple published holding patterns for a given fix (e.g. enroute hold, high altitude hold, low altitude hold, SID hold, STAR hold, etc). The FMS will use a standard hold pattern when there is no defined published hold. For those fixes that have multiple published holds associated with them, a dropdown menu will be presented showing the various hold patterns, thereby allowing you to choose the desired or assigned hold pattern (course, turn direction, and leg length/time).

Once a published hold has been inserted, when the FMS cursor is on one of the hold parameters, the bottom LSK will display “Standard Hold”. Pressing that LSK will change the parameters

to be standard (right turns, 1 min legs, and an inbound course matching the course of the leg before the hold). If any of the parameters are different from what is published, the LSK will display "Hold As Published". Pressing the LSK will restore the original parameters. Note that this only applies to holds that are inserted versus holds that are defined as a leg in a terminal area procedure, the most common case being a course reversal on an approach. For those holds, there is no "Standard Hold" LSK since it is unlikely this would be a desired course of action. If, however, a hold parameter is manually changed, the "Hold As Published" LSK will appear.

### EDITING A HOLDING PATTERN

Once a Hold has been selected or created, it can be edited by turning the right outer knob to scroll until an edit cursor surrounds the hold, or by touching the hold to be edited. Turn the right inner knob or touch the field to be edited to highlight the desired field (e.g. turn direction, leg length, leg units, inbound leg course). Press the right knob button or touch the selected field to start making the edit.

### DELETING A HOLDING PATTERN

To delete a holding pattern in your flight plan, turn the right knob to scroll until an edit cursor surrounds the hold, or touch the hold to be deleted then press the "Delete Hold" LSK or the CLR button.

To aid in situational awareness, holding patterns are shown in the flight plan with a graphical representation, as illustrated below.

#### *Holding Pattern Leg in Flight Plan*



*Holding Pattern on Map*



## CIRCULAR ORBITS

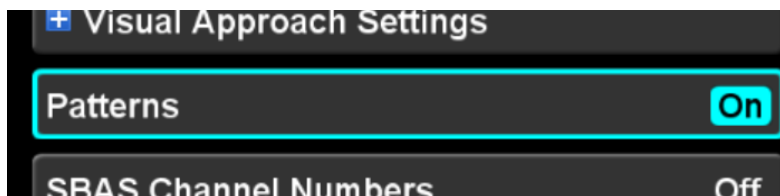
If the SAR option is enabled, then circular orbits can be added to the plan.

### *Circular Orbit Depiction on Map*



The Circular Orbit function can be enabled on the Setup Page by setting the "Patterns" field to "On".

### *Circular Orbit Pattern Selection on Setup Page*



Once on, the leg type is selected just like all other leg types but is only available after a leg that is not part of a terminal procedure. Select the "Orbit <waypoint>" option in the standard FMS insert cursor drop down list.

**Circular Orbit Dropdown Selection**

The orbit radius can range from 0.5nm to 100nm. The FMS will not actually fly to the orbit fix and instead, will fly to the point where the leg to the fix intercepts the orbit.



**Orbit Row in Flight Plan**

If the orbit radius is larger than the distance from the aircraft to the orbit fix, the aircraft will intercept the orbit on the extended radial between the orbit fix and the aircraft. Just like a traditional holding pattern, there is no insert cursor between a fix and a subsequent orbit. The only way to get out of an orbit is to command a Direct-To or activate a different leg. The orbit size can be changed while it is active but no path to reacquire the orbit is depicted on the map.

## ACTIVATING A FLIGHT PLAN

When a flight plan is entered on the ground, the flight plan will be inactive and no guidance will be provided. To activate the flight plan, press the "Activate Route" LSK. If the flight plan is not activated and the aircraft reaches a threshold groundspeed of approximately 40 knots, the IFD will automatically activate the flight plan.

## 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 knob or touching it and then 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.

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 count down (30 seconds if the required turn is more than 120 degrees).

The IFD is capable of generating an aural alert as waypoints are sequenced. The aural alert can be enabled or disabled using the Setup Page (see page 5-26)

## AUTOMATIC VOR TUNING<sup>1</sup>

"Auto-VLOC Tuning" can be selected from the Setup page. When enabled, the FMS will automatically tune the next down-path VOR in the active flight plan into the primary nav frequency.

It may be desirable to turn off this feature on one of the IFDs in a dual installation to allow depiction of a crossing radial for reference before crossing a VOR. Also, when navigating using airways, it may be desirable to turn off this feature in order to check navigation using off-airway VORs.

## LATERAL OFFSETS

The system supports the capability to create and fly a lateral offset from your flight plan. From the "FPL" tab of the FMS page

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<sup>1</sup> Not applicable to the IFD510 and IFD545

with the cursor above or around the active leg, press the "Offset Route" LSK and use the right-hand knob on the IFD to dial in the desired offset. Use the outer knob to change the value in 1 nm increments and the inner knob for 0.1 nm increments. Turn 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***



## **FLIGHT PLAN DISCONTINUITIES**

A discontinuity indicates that the FMS cannot provide guidance to the leg following the discontinuity. If a discontinuity exists in the flight plan and the FMS reaches the end of the leg preceding the discontinuity, the FMS will not sequence the leg and will provide guidance outbound along the same course until some overt action is taken to change the active leg. Several kinds of discontinuities exist, each discussed in the following sections.

### **Gap In Route**

A "Gap In Route" discontinuity is typically caused by the entry of an approach when the preceding leg does not terminate at the

same waypoint as the first waypoint in the approach. This is because the FMS does not assume that it is safe to proceed directly from the last enroute waypoint to the first point on the approach. If the pilot has confirmed that a direct path is safe (and desired), then the right course of action is to manually close the gap. This can be accomplished by moving the cursor to the gap and pressing CLR or the bottom LSK, which will be labeled as "Connect" with the two waypoint identifiers. In this case, closing the gap will insert a direct leg from the last enroute waypoint to the first approach waypoint.

If the pilot determines that the direct path is not appropriate, it may be necessary to leave the gap in place and fly vectors until it is safe to proceed and then activate a leg or direct-to the next waypoint.

### Connecting Gap in Route



There are, however, other conditions which will cause "Gap In Route" discontinuities. If a route modification results in two consecutive waypoints with the same identifier, but the two waypoints have incompatible altitude constraints, then a gap will be inserted. In this case, one of the two altitude constraints must be removed. At that point, the FMS will remove the gap. In some

cases, the two waypoints with the same identifier will be combined, leaving a single instance in the flight plan. However, at the start of an arrival or an approach, the FMS will not combine the two waypoints. This allows flexibility in flight planning because additional legs can then be inserted prior to the arrival/approach if necessary. If no other waypoints are inserted and the aircraft arrives at the common waypoint (with the gap removed), the FMS will recognize that the two waypoints are the same and sequence both of them, thus activating the subsequent leg.

### **Vectors To Final**

A Vectors To Final (VTF) discontinuity always precedes an approach that has been selected with the "Vectors" transition and cannot be removed. See page 3-41 for further discussion of vectors to final operation.

### **Visual Approach**

A Visual Approach discontinuity always precedes a visual approach and cannot be removed. See page 3-44 for further discussion of visual approaches.

### **Missed Approach**

A Missed Approach discontinuity always precedes the first leg of a missed approach. If the missed approach is enabled, then the discontinuity contains the word "Enabled" and acts as a visual cue in the flight plan, but is ignored by the FMS. If the missed approach is disabled, then the FMS treats it like a gap and will provide guidance outbound from the missed approach point (MAP) rather than providing guidance to the legs in the missed approach.

### **FAF Intercept Too Sharp**

A FAF Intercept Too Sharp discontinuity will appear after the FAF when the pilot commands the FMS to go direct-to the FAF and the difference between the inbound course to the FAF and the final approach course exceeds 45 degrees. ATC should never provide such a clearance, but if that situation arises, the pilot will have to manually activate the leg after the FAF while approaching the FAF in order to continue FMS guidance on the approach.

Extra caution should be taken to ensure that a stabilized approach can be conducted.

## 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. The rules for determining the TOD are described in the enroute VNAV section (see page 6-32). These rules are applicable even if enroute VNAV is disabled.

There is an associated CAS countdown message 10 seconds prior to reaching the TOD point. When the IFD is wired to the audio panel, an associated two tone chime is also generated.

The “TOD” label may be 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***



## RANGE TO ALTITUDE

A small green arc will be drawn on the map that depicts the geographic point where, at the current vertical speed, the aircraft will reach the altitude target. The altitude target is any crossing restriction on a waypoint that is either manually entered or a part of a procedure. It will be removed from the map when current aircraft altitude is within 150 feet of the target altitude.

### *Range to Altitude Indication*





## ENTERING AN ARRIVAL AND APPROACH

To enter an arrival or an approach, use the right inner and outer knob to move the cursor to a point where the procedure should be inserted. Arrivals can be inserted using an insert cursor immediately above the destination airport or immediately above an approach associated with that airport. An arrival can also be inserted using the right inner knob to select the "Arr" field on the destination airport leg. Approaches can be inserted using an insert cursor immediately above the destination airport or using the right inner knob to select the "App" field on the destination airport leg. Once the cursor is in the desired position, press the right knob button to start inserting the procedure using a dropdown. If the insert cursor is positioned above the airport, the dropdown may contain more items than just arrivals and approaches. The examples below use destination field method for clarity. After pressing the knob, the FMS will present a dropdown from which to select the desired procedure. The process for using the dropdowns to select the arrival and/or approach and any enroute and runway transitions is the same as the process for selecting a departure.

### *Arrivals Dropdown*



When an approach is being entered, Vectors-To-Final (VTF) will be presented in the dropdown containing approach transitions. Since approaches do not have defined runway transitions, no runway transition dropdown will be presented when entering an approach.

#### ***Approach Transitions Dropdown***



After having selected the procedure, including related transitions, the legs will be inserted into the flight plan and the corresponding destination airport field will contain the name of the procedure that was just inserted.

**COOL FEATURE****PROC button**

The PROC 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 key results in the IFD displaying the FPL tab (Map-FPL view) of the FMS page with the cursor on the Approach field of the next destination after the active leg and a dropdown containing the available published approaches. Pressing PROC a second time will move the cursor to the Arrival field and present a dropdown 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 to the origin. When the dropdown is presented for the intended field, use either the right knob button or touch to scroll the list until the desired procedure is selected, then push the right knob button to add that procedure to the flight plan.

If there is no flight plan, then pressing the PROC 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<sup>1</sup>**

If a VHF approach has been activated and then is replaced with a new GPS 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 an RNAV).

**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.

**NOTE****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.

**VISUAL APPROACHES**

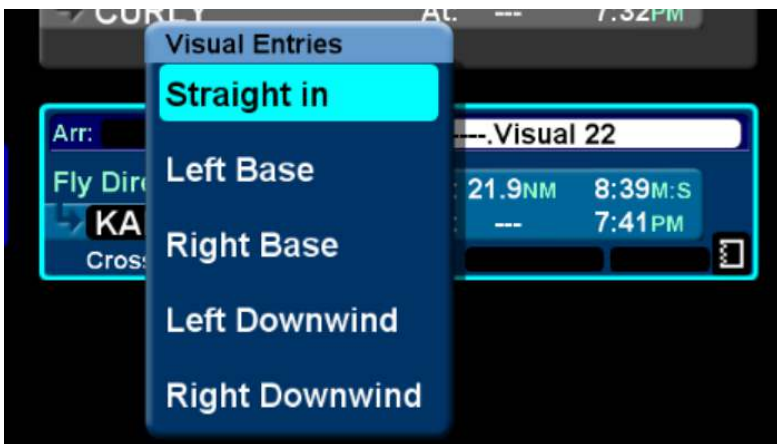
Visual approaches are presented in the dropdown menu below all instrument approaches, one for each runway, as illustrated below.

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<sup>1</sup> Not applicable to the IFD510 and IFD545

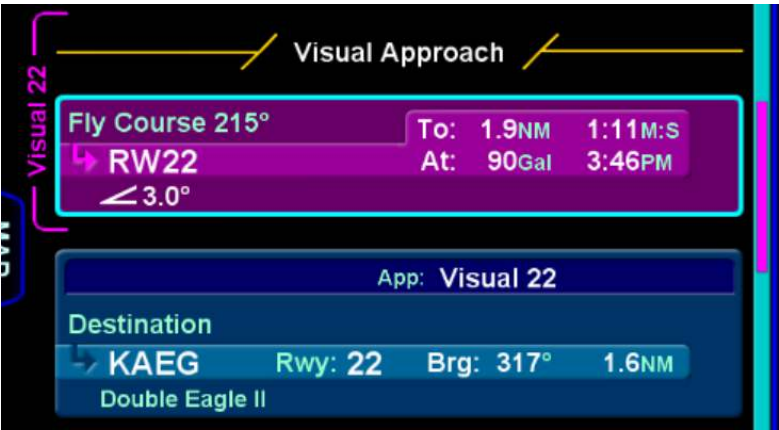
**Visual approach selection**

Once a visual approach has been selected, the familiar transition dropdown will appear. The dropdown contains selections for a straight-in approach and for base and downwind pattern entries using both left and right turns, as illustrated below.

**Visual approach entries dropdown**

A visual approach consists of a single flight plan leg aligned with the runway heading terminating at the runway threshold. Altitude constraints cannot be entered on the visual approach leg. The area typically used to display altitude constraints is instead used to show the glideslope angle associated with the visual approach.

*Visual approach in the flight plan*



Selection of a base or downwind entry adds no additional legs to the flight plan. However, to aid in situational awareness, the entry is shown on the map using dashed lines that intercept the final approach leg, as shown below:

*Visual approach depiction (left downwind to runway 22)*



When flying a visual approach, lateral deviations are provided to the final approach course. Advisory vertical deviations are also provided once the aircraft track is at most 90 degrees to the final approach course. Therefore, on a downwind entry the VDI will remain flagged until the aircraft completes the turn to base. Vertical deviations will be provided until the aircraft is within 0.1 nautical miles of the runway threshold.

Visual approaches are activated exactly like instrument approaches. However, the LSK legend will show “Activate Visual” rather than “Activate Approach”, providing a further reminder that a visual approach is in use.

## Configuring Visual Approaches

Several user configurable settings are available on the Setup page to control the appearance and behavior of visual approaches (see page 5-56). The settings can be used to adjust for user preferences or aircraft performance.

- Pattern width – distance between the runway and a downwind leg
- Final length – distance from the runway threshold at which a base leg intercepts the final approach course
- Glideslope – the descent angle of the final approach

Additionally, there is a setting to enable or disable visual approaches. When set to disabled, visual approaches will no longer be presented in dropdown menus.

### IMPORTANT NOTE

Once a visual approach has been inserted into the flight plan, it retains the settings that were in effect when it was inserted. To change the final length, pattern width, or glideslope of the approach in the flight plan, the settings must be changed on the Setup page, and then the approach must be reinserted into the flight plan.

## ACTIVATING A LEG

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

### Activating a Leg



## DELETING AN APPROACH

To delete an approach, use the lower right knob until the approach field associated with the airport is highlighted or touch the field. Once the approach field is highlighted, press the CLR button or the “Delete Approach” LSK to delete the approach. If the approach is not active, another option is to use compact view. Use the lower right knob or touch to place the edit cursor around the approach, then press the CLR button or the “Delete Approach” LSK.

To replace an approach, use the same technique to highlight the approach field and then push the lower right knob or touch the field to select the new approach. There is no need to delete the existing approach prior to replacing it with a new one.



The same techniques described above for deleting or replacing approaches are also used to delete or replace departures and arrivals.

## USE OF THE MAP FPL SPLIT PAGE

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. While it can be useful in many phases of flight and scenarios, the split page is especially helpful during arrivals. This can be useful to instantly correlate your flight plan with the graphical depiction on the map. This aids in error reduction and helps identify options for diversions, weather avoidance, etc.

**Map-FPL Split Page**

## CHART ACCESS

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*

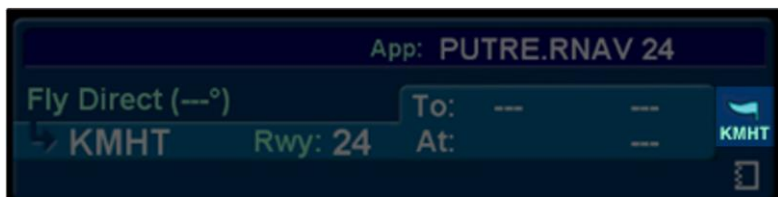


## LINK TO CHARTS IN FLIGHT PLAN

When the blue airfield leg of a flight plan has at least one published approach associated with it, a chart icon is presented on the right edge of the flight plan leg. By using the right-hand knob on the IFD, scroll through the flight plan elements until the chart icon is highlighted. If 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.

**Link to Charts****METAR FLAGS IN FLIGHT PLAN**

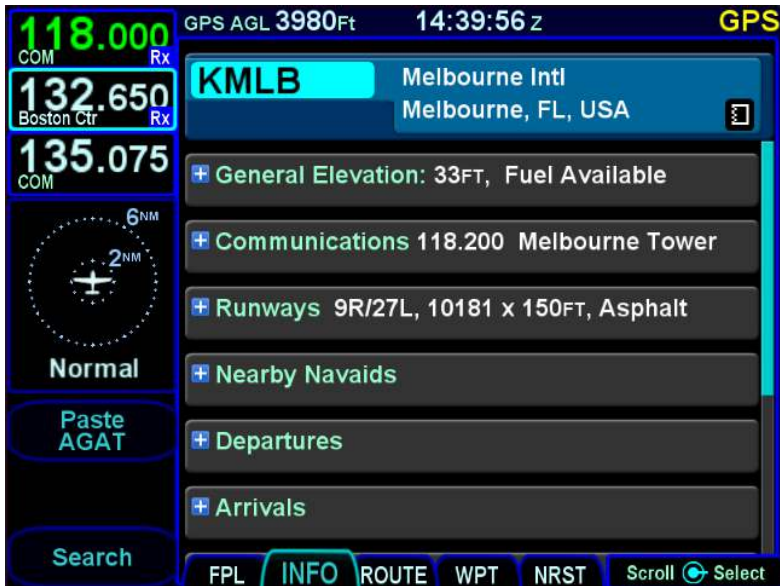
When a weather datalink device is installed in the airplane and providing METAR data to the IFD, colored METAR flags will be included in the flight plan leg depiction along the right edge. This is designed to give you a quick weather reference for the waypoint and/or its vicinity. The exact station to which that METAR applies is provided via the flag label and may be different than the actual waypoint identifier.

**METAR Flag**

## INFO TAB

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

### Info Tab



The facility (airport, nav aid, waypoint) to which the information applies will always be displayed at the top of the page, and the identifier is an editable field. To edit the identifier, use the bottom right knob to move the cursor to the identifier field and the select the field. If the Info tab was accessed directly from a page where the cursor surrounded an applicable facility identifier, a Paste LSK will appear (e.g. NRST VORs). Pressing the Paste LSK will immediately change the contents of the identifier field. A search function, accessible via the Search LSK is also available to help find the identifier 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. The frequency can be copied into the standby nav slot by either

touching the frequency or by using the bottom right knob to highlight the frequency field and pushing the knob.<sup>1</sup>

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 VHF frequency in the list can be copied into the standby slot by either touching it (first touch will highlight the field if necessary, second touch copies it into the standby) or by using the bottom right knob to highlight the desired frequency and then pushing the knob<sup>1</sup>.
- **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 knob, it can further expand to provide surface type, coordinates of the endpoints, runway bearing and elevation and the graphical depiction will show lighting.
- **Nearby Nav aids** – When the info page fix is an airport, this panel is present and contains nav aids within 40nm of the airport, up to a maximum of 10 nav aids. Each nav aid row displays the nav aid identifier, distance from the Info fix, cardinal direction from the Info fix, and nav aid frequency. Possible nav aids are VOR, VORTAC, TACAN, VOR/DME, DME and NDBs that are not marker beacons. If the nav aid has a VHF frequency, the cursor will go to that field and the nav radio can be tuned by touch or using the bottom right knob.<sup>1</sup> The nav aid identifier is also a field and if selected with the cursor,

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<sup>1</sup> Not applicable to the IFD510 and IFD545

changes the Info page to show information for that navaid.

- **Departures** – Identifies the published departures associated with the airport and when an individual row has been selected via touch or the bottom right 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 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 knob, it can further expand to provide a thumbnail map depiction of the approach. The nav frequency can be copied into the standby nav slot by touch or by using the bottom right knob<sup>1</sup>.
- **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 knob will display additional sub-category data. Wind and temp data will represent data from the nearest known point within approximately 30nm.

#### 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.

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<sup>1</sup> Not applicable to the IFD510 and IFD545

## Weather Data on Info Tab

**123.750** Spokane App Rx  
**122.000** Seattle Flight Watch  
**123.950** Seattle Ctr

20:12:58 Z GPS AGL 13250 Ft **GPS**

**KSEA** Seattle-Tacoma Intl  
 Seattle, WA, USA **KSEA**

**Approaches**

**Weather**

METAR - KSEA 171953Z 13008KT 1/8SM  
 R16L/4500VP6000FT BR OVC004 05/03  
 A3019

TAF - 70 minutes ago

Winds Aloft - Not Available

Temps Aloft - Not Available

**Search**

FPL **INFO** ROUTE WPT NRST Scroll Select

## Info Tab Nearby Nav aids

**118.000** COM Rx GS 159 Kts Trk 078° **GPS**  
**118.000** COM Rx  
**109.30** ID  
**113.20**

**KSRR** Sierra Blanca Regl  
 Ruidoso, NM, USA

**Runways** 6/24, 8120 x 100FT, Asphalt

**Nearby Nav aids**

CEP	6.5NM NE	278KHz
BWS	45.4NM SW	109.60
HMN	46.2NM SW	114.50

**Departures**

**Approaches**

**Search**

Scroll Select



## ROUTE TAB

In the IFD, a "route" is a sequence of legs defining a path that the FMS uses to guide the aircraft. The flight plan is sometimes referred to as the "active route" or "current route". The Routes tab provides a means to define and manage a set of "stored routes" that can be retrieved for later use as the flight plan. A stored route is entered once, then "activated" to copy it into the flight plan, which is useful when the same route is flown frequently. Each IFD has the capacity to store up to 100 stored routes.

### Route Tab



As shown above, the set of stored routes is represented by a list and each row in the list represents a stored route. Each row shows the name, origin, and destination of the stored route.

The route labeled "Current Route" at the top of the list is a representation of the flight plan. If the flight plan is active, the row is colored magenta. Otherwise, it is colored gray. The Current Route row provides a means to create a stored route from the flight plan by either copying or inverting. However, this row is not



used to edit the flight plan. All flight plan editing is performed using the FPL tab.

A cyan cursor surrounds the row in the stored routes list on which operations are to be performed. This row is termed the "selected route". The cursor is moved by rotating the right outer knob or by touching a row that is not already selected. If the outer knob is rotated quickly in the clockwise direction, the cursor jumps to the last row in the list. Quick rotation in the counter-clockwise direction causes the cursor to jump to the first row in the list.

On the row representing the selected route, icons indicate the operations that can be performed, as follows:



Create a new route by copying the selected route



Create a new route by inverting the selected route



Delete the selected route



Share the selected route with other IFDs

If an icon is not displayed, then that operation is not allowed. For instance, if the stored route list is full, copy and invert icons are not displayed since there is no room to create another stored route.

The inner knob moves a field cursor through the icons on the selected route. The touch screen can also be used to directly select an icon. With an icon selected, pressing the right inner knob or touching the selected icon causes the corresponding operation to be performed.

## EDITING A STORED ROUTE

Whether a new route is being created or an existing route is being edited, editing is performed using a page that is similar to the FPL tab. The route entry page operates in the same manner as the FPL tab with respect to knobs, touch, insert cursor, edit cursor, etc. However, some of the LSKs are different on the route entry

page since there are some operations that cannot be performed on the route entry page (e.g. activate leg).

The route entry page always shows a header containing the name of the route. To manually change the name of the route, touch the name or use the knob to move the cursor to that field. Then, touch the field again or press the right inner knob and then enter the name. If a route name is not manually entered, the IFD will generate the name in the form "<origin> to <destination>" based on the content of the entered route.

#### Route Name Field



To remove a manually entered route name, move the cursor to the route name field and press the "CLR" button. At that point, the IFD will generate a name as specified above.

Once the stored route has been completely entered, press the "Back To Route List" LSK to save the stored route and return to the stored route list with the cursor surrounding the route that was just saved.

While editing stored routes, it is possible to enter altitude constraints on legs just like on the FPL tab. However, when a

stored route is saved, only those altitude constraints that have been manually entered on direct legs are retained. Constraints that have been entered or changed on published procedures, for instance, are not retained.

## CREATING A NEW STORED ROUTE

To create a new, empty stored route, select the "New" LSK. This LSK is not presented if the stored route list is full. When the LSK is selected, the route entry page is displayed and the route name is set to "NEW". The route entry page can then be used to enter the route.

### *New Stored Route*



## EDITING AN EXISTING STORED ROUTE

To edit an existing stored route, use the right knob or the touchscreen to move the cursor so that it surrounds the entire row for the route and no icons are selected. At that point, press the right inner knob or touch the route name to display the route entry page, which is then used to edit the route.

## COPYING A STORED ROUTE

To copy an existing route, move the cursor to the copy icon and then either press the right inner knob or touch the copy icon. The selected route is copied to a new route and the route entry page is displayed showing that new route. If the "Current Route" row was selected, the flight plan (from the FPL tab) is copied.

For existing stored routes, the name of the new route is the same as the original route, so it is recommended that the route name be changed to distinguish the original from the copy. For the current route, the name of the new route is generated based on the content of the route.

## INVERTING A STORED ROUTE

When a route is inverted, the order of the waypoints from origin to destination is reversed. However, departures, arrivals, approaches, and holds are removed.

To invert a route, move the cursor to the invert icon and then either press the right inner knob or touch the invert icon. The selected route is inverted, copied to a new route, and the route entry page is displayed showing that new route. The route name will reflect the contents of the inverted route. If the "Current Route" row was selected, the flight plan (from the FPL tab) is inverted.

## DELETING A STORED ROUTE

To delete a stored route, either press the CLR key or move the cursor to the delete icon and touch the icon or push the right inner knob. At that point, a confirmation prompt shows the name of the route that is about to be deleted. To delete the route, press ENTR, press the "Enter" LSK, or touch the confirmation message. To cancel the delete operation, press either the CLR key or the "Cancel" LSK.

When the delete operation is performed on the "Current Route" row, the IFD switches to the FPL tab and clears the flight plan.

To delete ALL stored routes, press and hold the CLR key for at least one second, causing a green confirmation box to appear saying "DELETE ALL ROUTES". When the confirmation box appears, press ENTR, press the "Enter" LSK, or touch the

confirmation box to delete all stored routes. To cancel the operation, press either the CLR key or the "Cancel" LSK.

## SHARING A STORED ROUTE

Stored routes are saved locally on an IFD. Therefore, in a dual-IFD installation, a stored route created on one IFD is not accessible on the other IFD. Further, if an IFD100 is connected to an IFD, stored routes on IFDs are not accessible by the IFD100 and vice versa. It is possible, however, to create a stored route on one IFD and then "share" it with the other IFD and a connected IFD100. To share a stored route, move the cursor to the share icon using either touch or the inner knob. Then press the right inner knob or touch the share icon. Once the sharing process has completed, the route will be available on the other IFD (and the IFD100, if it is connected).

When a stored route has been shared, a copy of that stored route exists on each device. Changes made to the copy exist only on the device used to make those changes. If the desire is to have changes propagated to every instance of that route, the updated route must again be shared.

When a route that has been shared by one IFD is received by another IFD and the receiving IFD does not already contain that route, then the receiving IFD stores the route and displays an advisory indicating that the route has been received.

**Stored Route Received / Stored**

If the receiving IFD already contains the route, the receiving IFD holds the received route in a “pending” state and displays an advisory indicating the same. To store the route, switch to the ROUTE tab and press ENTR, press the Enter LSK, or touch the green confirmation box. To discard the received route and leave the existing route unchanged, press the CLR key or the Cancel LSK.

**Stored Route Received / Pending**

If another route is shared while the IFD has a pending stored route, the receiving IFD displays an advisory indicating that the most recent shared route was rejected. No other stored route operations can be performed until the pending stored route is either overwritten or discarded.

**Stored Route Received / Rejected**

If a route is shared but the stored route list on the receiving IFD is full, the IFD displays the advisory indicating that the shared route was rejected.

**ACTIVATING A STORED ROUTE**

When a stored route is “activated”, it is copied into the flight plan and the IFD starts providing guidance to it. To activate a stored route, use the right knob or the touchscreen to move the cursor to the route to be activated. Then press the “Activate Route” LSK.

If the flight plan is empty, then no further action is required. If the flight plan is not empty, the IFD displays a green confirmation box saying “Activate” followed by the name of the selected route. To activate the route press ENTR, press the “Enter” LSK, or touch the confirmation box. To cancel the route activation, press either the CLR key or the “Cancel” LSK.

In either case, the IFD briefly displays “Loading Stored Route” and then displays the FPL tab with the selected stored route having been activated.



## SORTING THE STORED ROUTE LIST

The order in which the stored route list is sorted can be changed using the “Sort by” LSK. Several options are available, each of which can be selected by successive presses of the LSK. Regardless of the selected sort order, the Current Route row is always displayed first in the list. The options are as follows:

Sort by	Resulting sort order
Origin	The list is sorted in ascending order alpha-numerically (0-9, A-Z) by the origin identifier.
Destination	The list is sorted in ascending order alpha-numerically (0-9, A-Z) by the destination identifier.
Age	The list is sorted in ascending order by age such that the most recently created stored route is at the top of the list.
Name	The list is sorted in ascending order alpha-numerically (0-9, A-Z) by the route name. If the name starts with a symbol (e.g. period or space), then those routes will appear at the top of the list.

## WPT (USER WAYPOINTS) TAB

The WPT tab displays all user waypoints in the IFD. Up to 500 user waypoints can be stored and accessed on this page.

### User Waypoints Tab



## CREATING A USER WAYPOINT

There are several methods of creating a user waypoint:

- **Enter Lat/Lon** – Press the “New” LSK then press the “Format” LSK until the “Lat/Lon” option appears. Enter the waypoint coordinates and then press the “Enter” LSK to save the waypoint.
- **Enter Radial/Distance** – Press the “New” LSK then press the “Format” LSK until the “Rad/Dist” option appears. Enter the fix, radial, and distance. Then, press the “Enter” LSK to save the waypoint.
- **Enter Radial/Radial (an intersection of two radials)** – Press the “New” LSK then press the “Format” LSK until the “Rad/Rad” option appears. Enter the fixes and radials. Then press the “Enter” LSK to save the waypoint.

- **Present Position** – Press the “PPOS” LSK to create a waypoint at the current aircraft position. No further action is required.

**COOL FEATURE**

User waypoints can be uploaded to the IFD from a CSV file and downloaded to a CSV file from the IFD using Maintenance Mode. See “Transferring User Waypoints” on page 7-41 for details.

Some external EFIS systems (e.g. Bendix King EFS 40/50, Collins Pro Line 21, etc.) can create and send user waypoints to the IFD. When the waypoint data is received from the external EFIS, the IFD switches to the WPT tab.

**NAMING A USER WAYPOINT**

Each user waypoint can be assigned an identifier that can be used in the FMS anywhere a nav database waypoint can be used. You can elect to use the automatically assigned identifier (format is “WP####”) or rename it. A longer description can be attached to each user waypoint using the “Name” field.

**DELETING A USER WAYPOINT**

To delete a user waypoint, move the cursor to highlight the waypoint and then press either the CLR key or the “Delete Waypoint” LSK. When the green confirmation box appears, press the ENTR button, press the “Enter” LSK, or touch the confirmation box. To cancel the operation, press either the CLR key or the “Cancel” LSK.

To delete all user waypoints, press and hold the CLR button for at least one second. When the green confirmation box appears, press the ENTR button, press the “Enter” LSK, or touch the confirmation box. To cancel the operation, press either the CLR key or the “Cancel” LSK.

Waypoints that are being used in the flight plan or in a stored route that is being edited cannot be deleted.

## DESIGNATING A USER WAYPOINT AS AN AIRFIELD

To designate a user waypoint as an airfield, the waypoint must be manually named using the format "AIRPORT XXXXFT" where XXXX is the field's elevation and note that the space is critical in naming the point.

### *User Waypoint Airfield Naming Example*



When used in a flight plan, the user-defined airport will display as an airfield with no known runway orientation.

*User Waypoint Airfield Depiction on Map*



## NRST (NEAREST) TAB

The Nearest page primarily shows lists of navigational facilities and features that are in the vicinity of the aircraft.


### Full Page 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 (out to 200nm from ownship)
- Nearest FSS
- Nearest Airspace
- Nearest User Waypoints

Each row on the nearest page represents a facility of the selected type. For those rows that contain a frequency, touching the frequency or using the bottom right knob to highlight it and then pushing the knob will transfer the frequency into the standby slot<sup>1</sup>.

Some rows contain an  icon to indicate that more information about the facility is available on the Info tab. To quickly access the Info tab, either touch the icon or rotate the inner knob to move the cursor to surround the icon. Then touch or push the knob to display the Info tab for the specified facility.

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

For airports that have a METAR associated with them, a colored METAR flag will be displayed on the right side.

The Nearest lists can be scrolled either via touch (use a vertical swipe gesture) or via rotation of the bottom right knob.

If the highlighted item is an airport, navaid, intersection, or user waypoint, pressing the Direct-To key on the bezel will display the Direct-To green dialog box with the selected facility pre-populated as the Direct-To location.

#### NOTE

##### **Nearest Lists Capped at 100nm**

Most Nearest lists will only display entries that are within 100nm of the current aircraft position. ARTCCs use 200nm.

## SPLIT MAP-NEAREST TAB

The nearest page can be configured to show the nearest list side-by-side with a map ("split" view). In the split view, the nearest information is abbreviated.

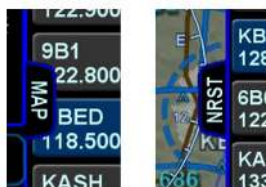
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<sup>1</sup> Not applicable to the IFD510 and IFD545

**Split Map-Nearest Tab**

When using the split view, the facility associated with the row that is highlighted in the Nearest list will also be highlighted with a cyan circle on the map (see KLWM in the split page view above)

To switch from the full nearest page to the split view, touch the “MAP” side tab. To switch from the split view to the full nearest page, touch the “NRST” side tab. Switching can also be accomplished by pressing and holding the FMS function key.

**NEAREST PAGE ACCESS**

Like other FMS page tabs, the Nearest page can be accessed by touching the tab on the bottom of the display or by pressing the FMS function key. Additionally, however, pressing the NRST key from any other page will immediately cause the Nearest page to



be displayed in split view. When the Nearest page is already displayed, each subsequent push of the “NRST” key will cycle to the next nearest data type, just as like the Nearest LSK does.

After the Nearest page has **not** been displayed for 60 seconds, the next time the Nearest page is displayed, the nearest type will be reset to Nearest Airports. For example, if the Nearest page is showing Nearest VORs and then the pilot selects a map page for more than 60 seconds, the next time the Nearest page is displayed, it will be displaying Nearest Airports rather than Nearest VORs.

#### TIPS AND TECHNIQUES

##### **Emergency Return to Departure Airfield**

If the aircraft is on a departure leg and an emergency return to the departure airfield is deemed necessary, the recommended technique is to press the NRST button, verify that the departure airport is highlighted, then press the –D-> button followed by ENTR, ENTR to make that the active waypoint. Then press the PROC key to produce a dropdown list of approaches and make the desired selection. To quickly get the tower frequency of that airfield, press the NRST button again. You can then press the bottom right knob to transfer that frequency into the standby slot for swapping.<sup>1</sup>

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<sup>1</sup> Not applicable to the IFD510 and IFD545

Intentionally Left Blank

## 4 Map Subsystem

The map subsystem contains several pages as shown below.



The SVS tab shows an exocentric synthetic vision view around the aircraft. If TAWS is enabled, this tab will be named TAWS.

The MAP tab shows a plan view representation of the environment around the aircraft, much like a sectional chart. The map can be panned away from the aircraft.

The CHART tab is used to manage the display of electronic charts.

The optional VIDEO tab is used to display images from an external video source.

The optional RADAR tab is used to show the returns from a weather radar and provides radar controls.

## 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 knob 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 turning the bottom right 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 or Track Up (360°)
- Heading Up or Track Up (240° arc view)
- North Up (360°)

Heading vs. Track selection is made from the “Map Orientation” selection on the Setup Page.

**North-Up, 360 View Example**



North Up can be either Magnetic North or True North depending on the “Bearing Reference” selection on the Setup Page.

*Track-Up, Arc View Example***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.

**HEADING VS. TRACK DEPICTIONS**

In configurations in which aircraft heading information is unavailable, the map display will orient the aircraft ownship symbol and other map data to the aircraft ground track.

**HEADING/TRACK DIGITAL DISPLAY SETUP**

The Setup Page provides a means to remove the heading/track digital readout box from the top of the map. This is intended to provide a method to increase usable map space, especially on dual IFD installations where cleaner maps are desired.

## MAP ORIENTATION WITHOUT GPS




The map orientation will auto-switch from track-up orientation to north-up orientation when GPS is lost. Pilots who leave the map orientation in track-up during shutdown may notice the map will start up in north-up until a GPS position fix is available, at which time the map will auto-switch to track-up.






## TERRAIN RESOLUTION

The IFD uses either 3 or 9 arc-second terrain data for the map. There are, however, some locations where the terrain database fills in missing terrain cell data and the map terrain will visually appear to be a lower resolution background in those locales.








## OTHER MAP FEATURES





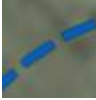



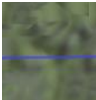
The table below defines other map features.




Map Symbol	Item	Description
	Desired Track	Solid magenta triangle on inside edge of map compass rose
	Heading Pointer	Blue pointer on each side of the compass rose denotes the aircraft heading
	Heading Select ("Heading Bug")	For those installations where the IFD is receiving heading select (aka heading "bug") data, a hollow magenta heading bug is displayed for reference on the inside edge of the map compass rose

Map Symbol	Item	Description
	Projected track line	Dashed white line indicating actual track. Connects ownship symbol with compass rose.
	Single Low Obstacle	200' AGL up to 1000' AGL (blue)
	Grouping of low obstacles	2 or more low obstacles (200' AGL up to 1000' AGL) within 1 nm of each other (blue)
	Single high obstacle	1000' AGL or higher (blue)
	Grouping of high obstacles	2 or more high obstacles (1000' AGL or higher) within 1 nm of each other (blue)



Map Symbol	Item	Description
	Towered airport, hard  Towered airport, soft  Towered airport, water	If runway orientation is known, they are also depicted on the airfield symbol (blue with white runway)
	Non-towered airport, hard  Non-towered airport, soft  Non-towered airport, water	If runway orientation is known, they are also depicted on the airfield symbol (magenta)
	NDB	
	VOR	
	Intersection	
	User Waypoint	
	Flight plan waypoint	White, four-pointed star regardless of the kind of facility (e.g. a star will appear rather than a VOR symbol)

Map Symbol	Item	Description
	Interstate highway	Solid brown line
	Class A Airspace Boundary	Thin, solid red line
	Class B Airspace Boundary	Solid blue line
	Class C Airspace Boundary	Solid magenta line
	Class D Airspace Boundary	Dashed blue line
	Radio Mandatory Zone	Dotted blue line
	Transponder Mandatory Zone	Dash-dot gray line
	Mode C Area	Thin, solid magenta line
	Airway	Thin, solid blue-gray line

Map Symbol	Item	Description
	Power Line	Tower symbol(s) and thin, white solid lines
	Terrain scale	Indicates highest and lowest limits of the terrain in displayed area in hundreds of feet. Legend colors in between these values represent terrain elevations. Blue obstacle clearance number shows the top of the highest obstacle, when greater than the highest displayed terrain.
	Ownship symbol	Representation of present position. Icon selection is made in Maintenance Mode (the two shown to the left are just examples)

**COOL FEATURE****Optional Airspace Aural Alerting**

If selected on the Setup page, an aural alert "Airspace Ahead" will be issued when an imminent airspace penetration is anticipated. This is designed to happen approximately 5 minutes ( $\pm 30$  sec) prior to the projected airspace penetration. The aural alert will repeat every 10 seconds until the condition is removed or the associated CAS message is acknowledged.

**TIPS AND TECHNIQUES**

When flying in unfamiliar airspace, especially when operating under VFR, it may be advisable to turn on airspace aural alerting. In familiar airspace or when operating under IFR, it may be preferable to turn it off to preclude what may be considered nuisance alerting.

**FUEL RANGE RINGS**

When the IFD is interfaced with a functioning fuel flow system, fuel range rings will be displayed on the map. The fuel range rings depict the range of the aircraft given the current fuel quantity remaining and fuel flow. Current winds are taken into account since the range calculation uses ground speed. The range ring calculation is performed assuming a 45 minute fuel reserve for fixed wing aircraft and a 20 minute reserve for helicopters. Fuel range rings will be displayed only when the aircraft ground speed is above 50 knots.

A dashed green fuel range ring shows the maximum range of the aircraft while still retaining the reserves. In other words, when the aircraft reaches the dashed green line, only reserve fuel is left.

If there is fuel remaining in excess of the reserve, the maximum range of the aircraft is shown using a solid yellow ring beyond the extent of the dashed green ring. When the total remaining fuel quantity is less than the reserve, single ring is presented using an alternating red/yellow dashed style.

The fuel range rings are always displayed and cannot be turned off, though they can be hidden at low map ranges because of decluttering. Changes in power settings, changes in winds aloft, and remaining fuel quantity will alter the range depiction. Inaccurate manual entry of initial fuel quantity will result in an inaccurate fuel range ring depiction.

**Fuel range rings with remaining reserves****Fuel range rings with less than reserve remaining**

## DECLUTTERING THE MAP

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

Use the “Land” and “Nav” LSKs to select the preferred level of feature density. The selected levels remain consistent across all maps shown on the IFD.

### *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.

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

Map panning can only be accomplished using the touch screen.

## 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.

This is a handy feature when it is necessary to quickly alter a flight plan around airspace or a weather buildup while staying on the map.

When you lift your finger off the display, a dropdown is presented containing a new waypoint, named “RB” followed by three digits, at that position. If the new waypoint is in close proximity to facilities in the on-board navigation database, then both the waypoint and the nearby facilities will appear in the dropdown.

### *Rubber Banding Dropdown*



When a dropdown selection is made, the selected waypoint is inserted into the flight plan. Using the split MAP-FPL view allows the changes to the flight plan to be observed while rubber banding.



Rubber banding can only be accomplished via touch screen controls and is only available on the Map tab, including the split Map-FPL view.

#### TIPS AND TECHNIQUES

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 any leg can be rubber-banded including the active leg (the magenta one) unless the leg is part of a published instrument procedure.

## ALTITUDE CONSTRAINTS ON MAP

Any waypoint that has an altitude constraint defined for it in the flight plan, including all published procedures, will display a graphical indication of the altitude constraint on the map. The types of altitude constraints are:

- **At or Below** (line above altitude)
- **At** (lines above and below altitude)
- **At or Above** (line below altitude)
- **Between** (lines above and below altitudes)

### *Example Depictions of Altitude Constraints*

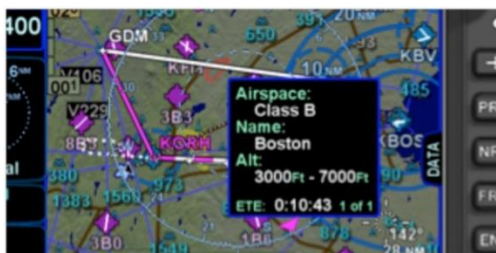
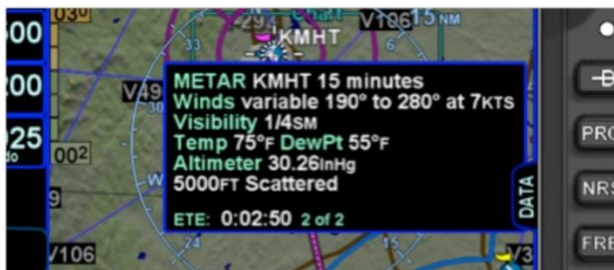


The altitude constraint depiction will also appear at the proper geographic position. For example, if an altitude constraint were defined to be 5nm prior to a waypoint like it is for KGDM in the image above, the graphical representation of the altitude constraint on the map will be positioned 5nm prior to the waypoint, instead of at the actual waypoint.

## 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.

If the airfield being touched is not in your active flight plan or nearest list, there will be approximately a 1 second delay before the METAR will be displayed. This can be avoided by keeping 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 popup.

## CREATING A USER WAYPOINT

User waypoints are typically created and managed using the FPL WPT tab. However, a user waypoint can also be created by touching the map, under the following conditions:

- The touch is held for approximately one second
- The touch position is not in the vicinity of an existing airport, navaid, or user waypoint. The vicinity varies with map range, so it is possible to define waypoints close to airports, for example, by selecting a lower map range.
- The user waypoints map layer must be on
- The map nav detail setting and range must be such that the user waypoints layer will be displayed

Once the user waypoint has been created, an orange triangle symbol will be displayed. If the map layer is configured to show labels, the waypoint identifier will also be shown.

### *User Waypoint Created by Touching the Map*



## DATALINK WEATHER OVERLAYS AND OPERATIONS

Several broadcast datalink weather receivers can be interfaced to the IFD. Some datalink services require a monthly subscription (e.g. Sirius/XM), while others are free (e.g. SkyTrax200). In either case, the weather data is received continuously.

The following tables show the set of weather products associated with different types of receivers. For each product, the tables show:

- Short Name – the product name that is shown on the Datalink Status Page and in alerts. If none is defined, then the short name is the same as the product name.
- Late Time – if the IFD does not receive the product within this time after power up, the IFD will indicate that the product is “overdue”.
- Stale Time – if the elapsed time since the IFD has received the product exceeds this time, the IFD will indicate that the product is “stale”.

### **ADS-B Receiver (e.g. SkyTrax200)**

Product	Short Name	Late (minutes)	Stale (minutes)
Regional Radar	Rgnl WxRadar	15	75
ConUS Radar	US WxRadar	30	75
METARs		15	20
TAFs		20	40
AIRMETs		15	20
SIGMETs		15	20
TFRs		40	40
Lightning		15	75
Icing		30	105
Cloud Tops		30	105

Product	Short Name	Late (minutes)	Stale (minutes)
Winds & Temps		20	40
Turbulence		30	105

**XMD-076**

Product	Short Name	Late (minutes)	Stale (minutes)
Radar US	US WxRadar	15	75
Radar Canadian	CA WxRadar	15	75
METARs		15	75
TAFs		15	90
AIRMETs		15	90
SIGMETs		15	90
TFRs		45	90
Lightning		15	18

**GDL-69**

Product	Short Name	Late (minutes)	Stale (minutes)
Radar US	US WxRadar	15	75
Radar Canadian	CA WxRadar	15	75
Radar Puerto Rican	PR WxRadar	15	75
Radar Coverage US	US Radar Coverage	15	75

Product	Short Name	Late (minutes)	Stale (minutes)
Radar Coverage Canadian	CA Radar Coverage	15	75
METARs US	US METARs	15	75
METARs Canadian	CA METARs	15	75
TAFs US	US TAFs	15	90
TAFs Canadian	CA TAFs	15	90
AIRMETs		15	90
SIGMETs		15	90
TFRs		45	90
Lightning		15	18
Icing		45	120
Storm Cells	Storms	15	20
Winds		45	120

**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.

**NOTE****Weather Source Selection**

An IFD can only display weather data from one source (e.g. SkyTrax200, GDL-69), which is assigned at time of installation.

For dual IFD installations, two different weather sources can be used, but only one source can be connected to each IFD.

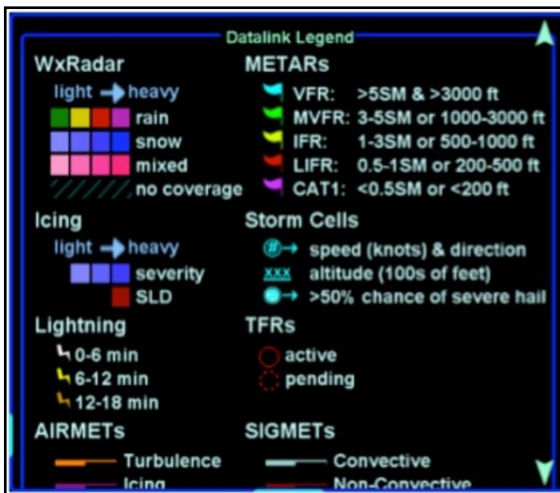
## DATALINK RADAR

Datalink radar is a composite image depicting precipitation as seen by multiple ground weather radar sites. The image is color-coded to FAA definitions 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 depict the boundary of available weather radar and also areas of no-coverage. 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, diagonal stripes 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.

ADS-B (“FIS-B”) radar data coverage areas can be very irregular shaped areas – the geometry is dependent on how many transmission sites are in view and how much data has been received by the on-board receiver.

#### **No Datalink Coverage Area Hatched Lines**



CONUS weather radar data appears noticeably coarser than subscription datalink service data and ADS-B Regional data. This is due to the lower resolution of the source data.

Like ADS-B radar, ADS-B lightning has a defined coverage area. However, whereas the ADS-B radar coverage is shown by highlighting those areas that are **not** covered, the coverage area for ADS-B lightning is shown by highlighting the area that **is** covered. The coverage area for which lightning data has been received is depicted using a “shadow”, as illustrated below. The shadow consists of a transparent, gray region on all Land declutter settings. This allows for quick distinction between two coverage areas when simultaneously displaying radar and lightning overlays.

#### **ADS-B Lightning Coverage Area Shadow**



## WEATHER OVERLAYS ON MAP

The “Wx Overlay” LSK on the map page brings up a control page on which the layers can be turned on or off. The options vary with the installed datalink device and subscription level.

### Wx Overlay Selection



The Wx Overlay page is segmented into groupings of products. Products selected for overlay are indicated by a green lamp. Note that the products in the “Weather Layers” group are mutually exclusive. 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	Datalink radar Storm Cells Icing (incl. SLD and Probability) Winds Aloft Cloud Tops Turbulence Onboard Radar
Airport Reports	METARs
Weather Reports	AIR/SIGMETs
Lightning	Datalink lightning Sensor – Strike Sensor – Cell Sensor – Clear Strikes

Selections can be made by either touching the desired product or by using the bottom right 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” key. A WX-500 Lightning sensor test is only available in maintenance mode.

Use the bottom right knob to adjust altitude slices for icing, winds, and turbulence. Note that the 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.

**Graphical METAR Legend**

METARs	
	VFR: >5SM & >3000 ft
	MVFR: 3-5SM or 1000-3000 ft
	IFR: 1-3SM or 500-1000 ft
	LIFR: 0.5-1SM or 200-500 ft
	CAT1: <0.5SM or <200 ft

- **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 MAP Page****TEMPORARY FLIGHT RESTRICTION (TFR)**

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.



**Active and Pending TFRs****INDICATIONS OF DATA AGE**

The multiple products transmitted as part of the broadcast datalink service can arrive at different intervals. The age of the current overlay data is shown in the lower left corner of the map. 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 and the icing altitude slice currently displayed is shown in the bottom right corner.

**Data Age: RADAR and Icing**

It is important to remember that 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.



It is also important to remember that ADS-B winds and temperatures aloft depicted are only displayed as a 6 hour forecast. It is strongly recommended for the pilot to obtain the latest information through other approved sources for their operation. The 12 and 24 winds aloft forecast will need to be obtained via other approved sources.

## WEATHER RADAR SELECTION FOR MAP OVERLAY

Support for digital weather radar is an optional capability for the IFD. When this option has been activated on an IFD, and the IFD is provided with valid heading data, radar data can also be a selectable overlay on the moving map.

### *Onboard Radar Selection on Wx Overlay*



**Onboard Weather Radar Overlay on Map****TIPS AND TECHNIQUES****Use of Onboard Weather Radar Overlay**

There are no controls on the MAP tab for the onboard weather radar other than turning that layer on or off. Non-essential map content can be removed from the display by decluttering – leaving the map and flight plan displayed along with the onboard weather data.

Control for onboard weather radar is available on the RADAR tab.

**Dec cluttered Map with Onboard Weather Radar Overlay****TRAFFIC DISPLAY**

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

Traffic data will always be displayed as an overlay on the map and can also be selected as a datablock option on the left or right side of the display. The aircraft position is at the center of traffic symbology and, therefore, is the horizontal reference point for traffic.




**NOTE****Heading vs. Track Depictions**

In configurations in which aircraft heading information is unavailable, the map display will orient the aircraft ownship symbol and other map data to the aircraft ground track and continue to display intruder aircraft oriented to heading.

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

### **Basic Traffic Symbols**

Unless otherwise noted, all traffic sensors can generate basic non-directional traffic symbols

Symbol	Definition
	Traffic Advisory (TA)  Traffic which meets the alert criteria for the traffic sensor (solid yellow circle)
	Proximate Traffic (PA)  Traffic which does not meet the alert criteria but is "close" to the aircraft (within 6nm and 1200ft). (solid cyan diamond)
	Other Traffic  Traffic that is detected by the traffic sensor, but determined not to be a current threat. (hollow cyan diamond)

### **CAUTION**




#### **No TA from Uncertified Devices**

When the IFD is configured to receive ADS-B traffic over Wi-Fi, it assumes that the transmitting device is uncertified. As a result, the IFD will display traffic targets as PA rather than TA. Pilots should exercise caution when a PA target is presented from a Wi-Fi source.

### **ADS-B Directional Traffic Symbols**



ADS-B traffic sensors can display directional versions of the basic traffic symbols when track or heading information is available. The symbol is oriented to reflect the target's track. If speed information is



also available, a one minute Horizontal Velocity Vector (HVV) barb is shown on the map display of traffic.

Symbol	Definition
	ADS-B Traffic Advisory (TA)  Traffic which meets the alert criteria for the traffic sensor (solid yellow arrowhead surrounded by a ring).
	ADS-B Proximate Traffic (PA)  Traffic which does not meet the alert criteria but is "close" to the aircraft (within 6nm and 1200ft). (solid cyan arrowhead)
	ADS-B Other Traffic  Traffic that is detected by the traffic sensor, but determined not to be a current threat. (hollow cyan arrowhead)

#### **ADS-B Ground Traffic Symbols**

ADS-B traffic sensors can also show ground targets. No additional traffic information (e.g. altitude, vertical trend) is shown with these targets. If track or heading is available, the directional version of the symbol will be presented.

Symbol	Definition
	On-ground traffic (non-directional)  Traffic reporting an on-ground state (hollow brown diamond).
	Ground vehicle (non-directional)  Traffic identifying as a ground vehicle (hollow brown rectangle with four wheels)

Symbol	Definition
	On-ground traffic (directional)  Traffic reporting an on-ground state (hollow brown arrowhead).
	Ground vehicle (directional)  Traffic identifying as a ground vehicle (hollow pointed brown rectangle with four wheels)

Additional information is displayed adjacent to the traffic symbol to indicate relative altitude, in hundreds of feet, and vertical trend.

#### ***Additional Traffic Information***



The Aircraft ID (tail number, call sign, or squawk code) may also be displayed adjacent to the traffic symbol on the Map display when it is available from the traffic sensor.

#### ***Aircraft ID Depiction***



### **TIS-A Directional Traffic Symbols**

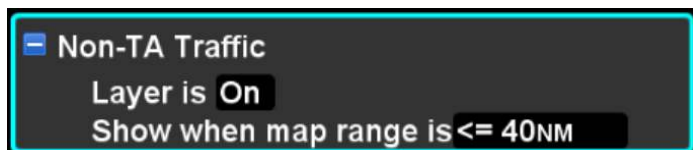
TIS-A Directional Traffic symbols are identical to the Basic Symbols for TA, PA, and Other traffic except that a 45° cardinal track pointer is added to the symbol pointing in the direction of travel. TIS-A track

lines only show direction, they do not convey any speed information about the sensed traffic's speed.

### Non-TA Traffic Range Filter

TA and PA traffic is always displayed on the map. To avoid clutter at wide map zoom ranges, the "Non-TA Traffic" map layer, which contains "other" and "ground" traffic, can be turned off using the Setup page (see page 5-59). When the layer is on, the display range below which traffic is displayed is configurable.

#### Setup Page Non-TA Traffic Layer Item



### Traffic Thumbnail Datablock

For space reasons, the Traffic Thumbnail datablock does not show the traffic ID or ADS-B HVV barbs. TAs which are beyond the range of the traffic thumbnail will display as a half symbol at the edge of the thumbnail's outer range ring. The traffic thumbnail is always displayed with the ownship heading up (HDG) for TAS and TCAS sensors. For ADS-B and TIS-B, the traffic thumbnail may be displayed as track-up (TRK) if heading is not available.

**TAS Traffic**



**ADS-B Traffic**



**Traffic Thumbnails**



Traffic Advisories (TA) will generate a CAS message. Depending upon the type of traffic system installed, an aural alert may also be generated.

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

To change the display range on the traffic thumbnail, touch the area showing the range rings, roughly the upper two-thirds of the thumbnail.

### TIS-A Specific Information

TIS-A capable transponders are supported by the IFD including map depictions of the TIS track lines. These track “barbs” are only reported and indicated to 45° cardinal increments (e.g. 0°, 45°, 90°, 135°, etc.) and roughly point in the sensed traffic direction. TIS-A track lines do not convey any speed information about the sensed traffic.

#### *TIS-A Track Pointer*



Since TIS-A traffic data is re-radiated data from FAA ground stations, there are a few additional possible states of the data beyond normal operating state. The non-normal TIS-A status will be displayed in the traffic thumbnail and as CAS messages and include:



TIS-A Traffic Thumbnail Status	Definition
"Coasting"	TIS traffic communications have ceased for more than 6 seconds but less than 12 seconds
"Removed"	TIS-A traffic communications have ceased for more than 12 seconds
"Unavailable"	No TIS-A ground station is available or communications have ceased for more than 60 seconds

#### *TIS-A Coasting Indication*



### ADS-B Specific Information

ADS-B traffic can come from several sources depending upon the equipment installed aboard the aircraft, equipment installed on target aircraft, and proximity to ADS-B ground stations. ADS-B, ADS-R, and TIS-B traffic can all coexist within the ADS-B data stream.

When an ADS-B traffic sensor is installed, the traffic thumbnail can show status as follows:

ADS-B Traffic Thumbnail Status	Definition
"Track Degraded"	The angular placement of intruders in the traffic thumbnail is not necessarily within 5 degrees of the nose. This indication is normal on the ground in aircraft without a heading source.

ADS-B Traffic Thumbnail Status	Definition
"Pos Degraded"	The ownship GPS position accuracy (HFOM, VFOM) is worse than the normal limits for accurate placement of intruders. This indication is normal on the ground until a good GPS signal is acquired.
"ADS-B Degraded"	Indicates the receiver has not yet gotten a good enough GPS lock to update its internal clock or there is a problem with the ADS-B receiver's GPS position.
"Maint Required"	This message is sent by the ADS-B receiver. If displayed, consult the ADS-B receiver manual.
"No TIS-B"	<p>Indicates the ground is not providing TIS-B or ADS-R services to your aircraft. The primary causes of this are:</p> <ul style="list-style-type: none"> <li>• The aircraft is not in range of a ground station.</li> <li>• The aircraft is not providing qualifying ADS-B Out information.</li> <li>• The ADS-B In device is not configured for the correct tail number.</li> </ul> <p>This indication is common and normal at low altitudes, but if you never get TIS-B service while in a known service area and at sufficient altitude (above 1500ft in most of CONUS), it likely means there is a misconfiguration of your ADS-B Out or ADS-B In device.</p>

If an individual intruder displays "DGRD" in yellow in the traffic thumbnail, then that intruder is reporting its own GPS position accuracy (HFOM, VFOM) as outside normal operating limits.

## TRAFFIC SENSOR CONTROL

Traffic sensor mode changes are automatic based on phase of flight. However, the mode can be changed manually by touching the mode shown in the lower third of the traffic thumbnail. Repeated touches will cycle through all available modes. If the thumbnail is displayed on the left side of the IFD, adjacent to the top LSK, then the LSK can also be used to cycle through the modes.

When the installed traffic sensor is a Skywatch and the aircraft is not airborne, "Standby" mode is included in the cycle of selectable modes. When the standby mode is selected, the thumbnail can be used to command the Skywatch to perform a self-test. The thumbnail will show the message "Touch for Self-Test" within the range rings. To initiate the self test, touch the message. During the self-test, the thumbnail will show the message "Self-Test In Progress", as illustrated below.

### *Skywatch Self Test*



## MULTIPLE TRAFFIC SENSORS

If more than one type of traffic sensor is present in the aircraft, proper configuration is important.

For a single IFD installation, only a single traffic sensor will be used by the IFD. The priority is SkyTrax200 (RS232) Capstone, TAS6XX/TCAD, ARINC429 ADS-B Sensors, Skywatch, Other ARINC429 traffic sensor. Traffic from a lower priority source will not be displayed unless the higher priority source is switched off or has failed. Avidyne recommends connecting only one traffic sensor to the IFD.

For dual IFD installations, Avidyne recommends connecting only one traffic source per IFD.


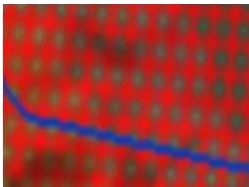
## TERRAIN AWARENESS

Terrain Awareness is a graphical representation of aircraft height above surrounding terrain and obstacles, shown as colored overlays on the map. It is for general situational awareness purposes and is not intended to be the sole means of terrain or obstacle avoidance. Terrain Awareness is often abbreviated as “TA”, but that is avoided in this document in order to prevent confusion with the same acronym being used for “Traffic Alert”. Terrain Awareness is based on GPS altitude, not baro corrected or radar altitude, and will not generate a CAS message or aural alert.

### *Terrain Awareness*






Terrain Awareness coloring can be triggered by terrain within a 10nm radius of the aircraft and is displayed as follows, depending upon the installation:

Fixed Wing Installation	Helicopter Installation	Displayed As
Terrain between 100 and 1000 feet below aircraft altitude	Terrain between 100 and 500 feet below aircraft altitude	
Terrain less than 100 feet below aircraft altitude, including terrain above aircraft altitude	Terrain less than 100 feet below aircraft altitude, including terrain above aircraft altitude	

When the aircraft is more than 3000 feet above any surrounding terrain (1500 feet for helicopters), Terrain Awareness is turned off automatically.

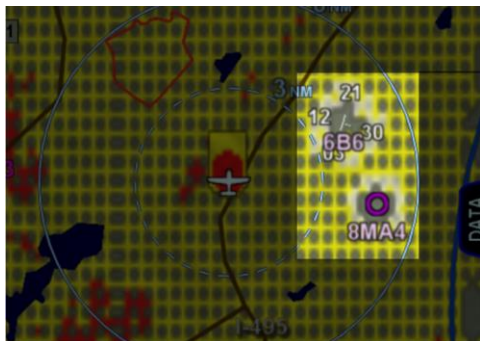
Terrain Awareness coloring can also be triggered by obstacles as follows:

Fixed Wing Installation	Helicopter Installation	Displayed As
Obstacles between 1000 and 2000 feet below aircraft altitude	Obstacles between 500 and 2000 feet below aircraft altitude	
Obstacles between 100 and 1000 feet below aircraft altitude	Obstacles between 100 and 500 feet below aircraft altitude	
Obstacles less than 100 feet below aircraft altitude, including above aircraft altitude	Obstacles less than 100 feet below aircraft altitude, including above aircraft altitude	

Terrain Awareness coloring is inhibited in an area immediately surrounding airports to allow for enhanced visual distinction of those

facilities. If the orientation of runways at the airport can be determined, then the inhibited area will be based on the outlines of the runways. Otherwise, coloring will be inhibited in a circular area around the airport, including airports that have been designated as an airfield (see page 3-68).

#### ***Inhibited Terrain Awareness Coloring***



Terrain Awareness coloring can be turned off via the Setup Page (see page 5-69), but that setting will not affect Terrain Awareness for obstacles, which cannot be turned off.

#### **NOTE**

##### **Chart Data Reliance**

Always refer to current aeronautical charts for appropriate terrain and obstacle information. Do not rely on the IFD as your sole source of obstacle and terrain avoidance information.

## FORWARD LOOKING TERRAIN AVOIDANCE (FLTA)

The IFD comes standard with the “F500” option enabled. When that option is enabled, the IFD will perform a Forward Looking Terrain Avoidance (FLTA) function. FLTA is based on GPS altitude, not baro corrected or radar altitude.

The FLTA function evaluates the aircraft trajectory to determine areas of conflict with terrain or obstacles. Depending upon proximity to the aircraft, FLTA classifies conflict areas as “caution” or “warning”, with warning representing the more immediate threat.

When FLTA has identified a conflict warning or caution area, the IFD will issue a CAS warning or caution message for the most imminent threat based on whether the conflict is with terrain or with an obstacle. An aural alert will accompany the CAS message, based on the Setup Page selection (see page 5-70).

On the map, FLTA caution and warning areas are depicted as solid yellow and red regions, respectively, as illustrated in the figure below.

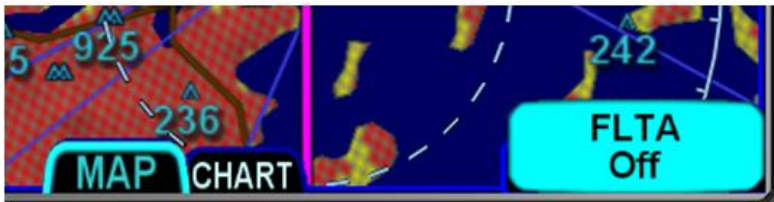
**FLTA Depiction (solid red and solid yellow)**



The area immediately surrounding an airport is considered an FLTA “exclusion area”. If the aircraft position or an FLTA conflict area is anywhere within that exclusion area, the IFD will not generate the typical FLTA caution or warning alerts. At an airport with no known runways, the airport exclusion area is a 1nm radius circle surrounding the airport reference point. For each known runway at an airport, an exclusion area extends 1nm past each end and 0.75nm on each side of the centerline. Therefore, at an airport with multiple runways, the airport exclusion area comprises the exclusion area for every runway. Airport exclusion areas appear graphically as a white pattern but are subject to inhibited terrain awareness coloring (see the figure titled “Inhibited Terrain Awareness Coloring” on page 4-44 for an illustration).

If FLTA is turned off (via the Setup Page, TAWS Page, or external discrete), the IFD will issue a CAS advisory message of “FLTA Off”.

#### ***FLTA Off Message***



Should an 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 must assess the specific circumstances presented and take appropriate action.

If the aircraft is equipped with TAWS/EGPWS equipment, the IFD will be configured with the “external TAWS” option enabled. In order to prevent conflicting information in such a configuration, all IFD FLTA functionality is turned off (including the “FLTA Off” CAS message).

#### **ALTITUDE CALLOUT**

When an IFD is configured with the F500, TAWS, or HTAWS options enabled, an aural alert can be played anytime the aircraft descends



through one of several defined AGL altitudes. The AGL altitude is calculated by comparing GPS MSL altitude with elevation of either the destination runway threshold, if applicable, or the terrain directly beneath the aircraft. Alerts exist at 1000', 500', 400', 300', 200', and 100' AGL. The callout for each altitude can be enabled or disabled using Maintenance Mode, although when the IFD has the TAWS option enabled, the 500' callout cannot be disabled.

These callouts are intended for use during approach to landing. Therefore, they are not suppressed in FLTA exclusion area, but will not play while there is an active FLTA caution or warning. The enabled callouts, as a set, can be turned on or off using the Setup Page.

## TAWS

When the Terrain Awareness and Warning System (TAWS) option is enabled and the HELO option is not enabled (see page 5-90), the IFD provides a TAWS-B function. TAWS-B does not require any external equipment, is always running in the background, and does not have a dedicated display page. In addition to the previously described Terrain Awareness features, TAWS-B contains the following sub-functions:

- **Premature Descent Alert (PDA)** – This function is designed to alert when the aircraft is hazardingly below the normal approach path for the nearest runway at either the origin or destination airport.
- **Excessive Rates of Descent (EDR)** – This function is designed to alert when the aircraft is experiencing excessive rates of descent given the current AGL altitude. The alert can be generated during any phase of flight.
- **Negative Climb Rate (NCR) or Altitude Loss After Takeoff/Go-Around** – This function is designed to alert when the aircraft develops a negative climb rate immediately after takeoff or go-around or when an altitude loss is detected in that phase.

TAWS-B has several associated aural alerts. With the exception of altitude callouts, the aural alerts are associated with CAS messages (see page 7-55). The priority of TAWS-B alerts is illustrated below, prioritized from highest to lowest.

Function	CAS Alert	Aural Alert
EDR	Pull Up	Pull Up, Pull Up
FLTA	Terrain Pull Up	Per Setup Option (see page 5-70)
FLTA	Warning Obstacle	Warning, Obstacle
FLTA	Caution Terrain	Per Setup Option (see page 5-70)
FLTA	Caution Obstacle	Caution, Obstacle

Function	CAS Alert	Aural Alert
PDA	Too Low, Terrain	Too Low Terrain
Altitude Callout	n/a	Five Hundred (others per configuration and setup option)
EDR	Sink Rate	Sink Rate
NCR	Don't Sink	Don't Sink

## ALERT MANEUVERING

### Terrain Alert Caution Maneuver

When a terrain alert caution occurs, verify the aircraft flight path and correct it, if required. If in doubt, perform a climb until the caution alert ceases.

### Terrain Alert Warning Maneuver

When a terrain alert warning occurs, immediately initiate and continue a climb that will provide maximum terrain clearance, or any similar approved vertical terrain escape maneuver, until all alerts cease. Only vertical maneuvers are recommended, unless operating in visual meteorological conditions (VMC) and/or the pilot determines, based on all available information, that turning in addition to the vertical escape maneuver is the safest course of action.

#### NOTE

##### **Do Not Use TAWS For Navigation**

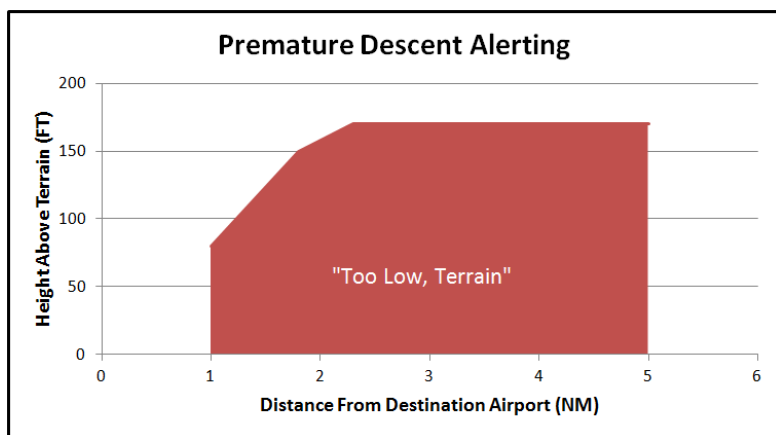
The TAWS terrain display is intended to serve as a situational awareness tool only. It may not provide the accuracy and/or fidelity on which to solely base decisions and plan maneuvers to avoid terrain or obstacles.

## PREMATURE DESCENT ALERT (PDA)

The PDA function is operational only in the vicinity of the origin or the destination airport contained in the FMS flight plan. Specifically, considering all of the runways at the origin and destination airports, the aircraft must be between 1 and 5 nautical miles from the runway nearest to its position.

Using the threshold elevation of the nearest runway and the current aircraft altitude, the PDA function determines whether the aircraft is hazardingly below the normal approach path for that runway, based on the criteria in the table below.

Range from nearest runway	AGL Altitude Range in Which a PDA Caution Alert is Generated
1 – 1.8 NM	80 to 150 feet (Linear)
1.8 – 2.3 NM	150 to 170 feet (Linear)
2.3 – 5 NM	170 feet



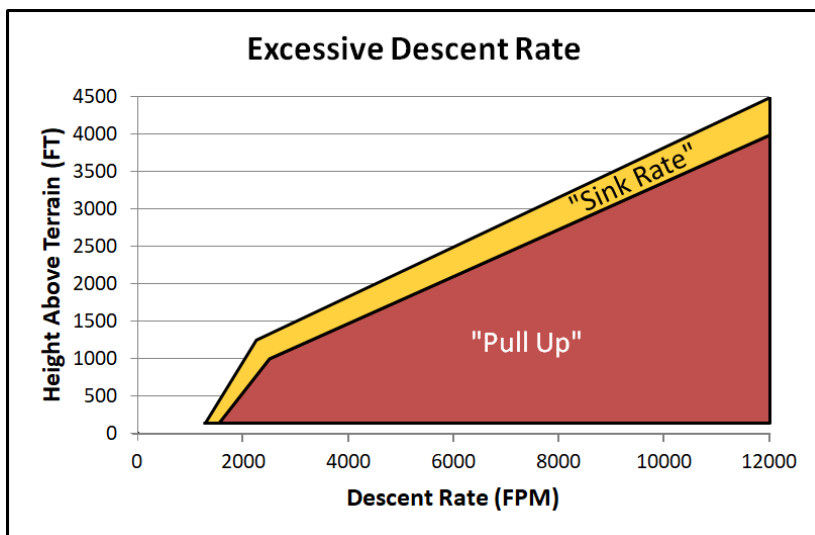
If a PDA alert has been triggered, a CAS message and aural alert "Too Low Terrain" will be issued and repeat every 6 seconds until it is acknowledged or the condition is no longer valid. For the condition to no longer be valid, the aircraft must clear the alerting altitude by 100 feet. So, for example, if the aircraft is 4 NM away from the

airport and descended to 150 feet AGL, a climb to 270 feet AGL must be completed to clear the condition.

### EXCESSIVE DESCENT RATE (EDR)

The EDR function monitors for excessive rates of descent and is always active, not just in the vicinity of an airport. There is a caution area for high rates of descent and a warning area for even higher rates of descent. The figure below depicts the yellow caution area in which a "Sink Rate" aural alert and associated yellow caution CAS message is issued and then a red warning area in which a "Pull Up" aural alert and associated red warning CAS message is issued.

The EDR aural alerts will repeat every 6 seconds until either the message is acknowledged or the condition is no longer valid.



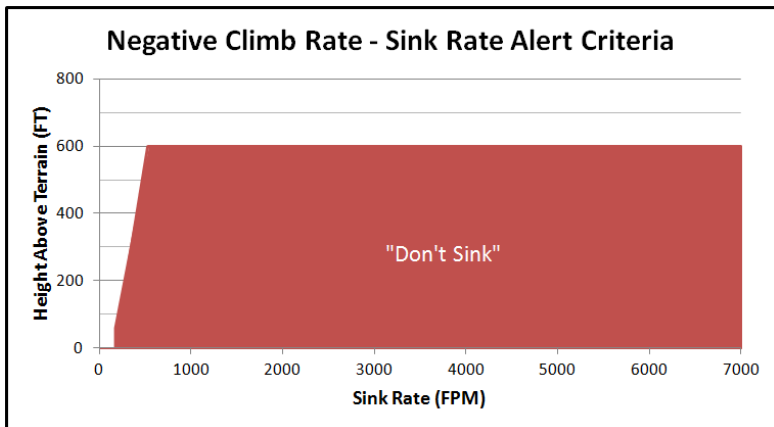
The "Pull Up" warning will provide up to 24 seconds of protection, while the "Sink Rate" caution will provide up to 33 seconds of protection, based on aircraft altitude. Aircraft vertical speed and current terrain elevation below the aircraft are used to compute the alerting altitude thresholds. As a result, these protection times may be shorter in rising terrain or when the aircraft's rate of descent is increasing.

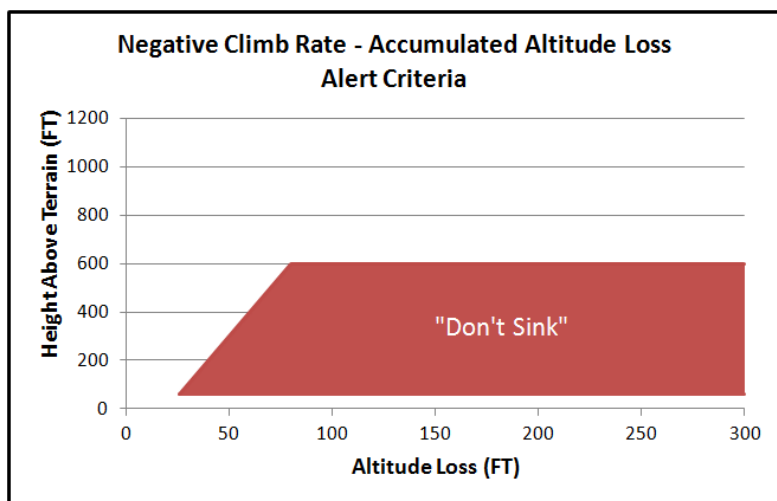
The EDR “Sink Rate” alert can trigger as low as -1250 fpm, while the “Pull Up” alert can trigger as low as -1500 fpm. EDR “Pull Up” warnings are the highest priority of all TAWS alerts, even higher than FLTA warnings.

#### NEGATIVE CLIMB RATE / ALTITUDE LOST AFTER TAKEOFF

The NCR function monitors for a negative climb rate (NCR) or excessive altitude lost after takeoff/go-around. NCR is enabled only between 50 and 600 feet AGL.

When enabled, this function triggers a “Don’t Sink” CAS message with an associated aural message if there is excessive negative vertical speed or if there is excessive altitude loss (approximately 10% of altitude). The alerts will clear if the CAS message is acknowledged, the aircraft AGL altitude increases past the previous highest value, or the aircraft reaches 600 feet AGL.





## TAWS INHIBIT CONTROL

The FLTA and PDA functions of TAWS can be inhibited by several means including the Setup Page, an external switch, and the TAWS page. Inhibiting these two functions can be useful in some scenarios like VFR flight in an area of significant terrain, VFR low altitude flight, and during operations at airfields that are not in the nav database or to user waypoints that have been designated as an airport.

## TAWS SELF-TEST

TAWS self-test is conducted automatically at power up. While the self-test is running, external TAWS related annunciators are illuminated and the TAWS page will show "TAWS Self-Test In Progress". Whether the self-test passed or failed will be annunciated using an aural message.

If TAWS had passed self-test and then fails at some point later in the power cycle, a chime alert sound is issued along with a CAS message.

## DEGRADED OR NO TAWS CONDITIONS

TAWS is degraded or not available when any of the following conditions exists:

- GPS is unavailable or in Dead Reckoning mode.

- GPS position accuracy is excessively low.
- Terrain database is invalid or not available.
- Obstacle database is invalid or not available.
- Nav database is invalid or not available.
- Aircraft is on the ground.
- The system is configured for an external TAWS system.
- The TAWS option is not enabled.



## HELICOPTER TAWS (HTAWS)

When both the TAWS and HELO options are enabled (see page 5-90), the IFD provides an HTAWS function. HTAWS includes only FLTA and Altitude Callout functions.

When an HTAWS warning condition is active, the associated aural alert cannot be muted.

HTAWS has a “reduced protection” (RP) mode that reduces the protection limits in order to prevent nuisance alerts. The lower protection limits cause the IFD to generate alerts as late as possible, while still meeting the regulatory requirements.

When HTAWS is enabled, and HTAWS is in an other than fully functional state, the HTAWS status overlays the upper left position in the data strip, as illustrated below.

### HTAWS Status Annunciation



The status is displayed on a background indicating the severity of the condition; red for warnings, yellow for cautions, and cyan for

advisories. The following table describes the possible annunciations that can be displayed.

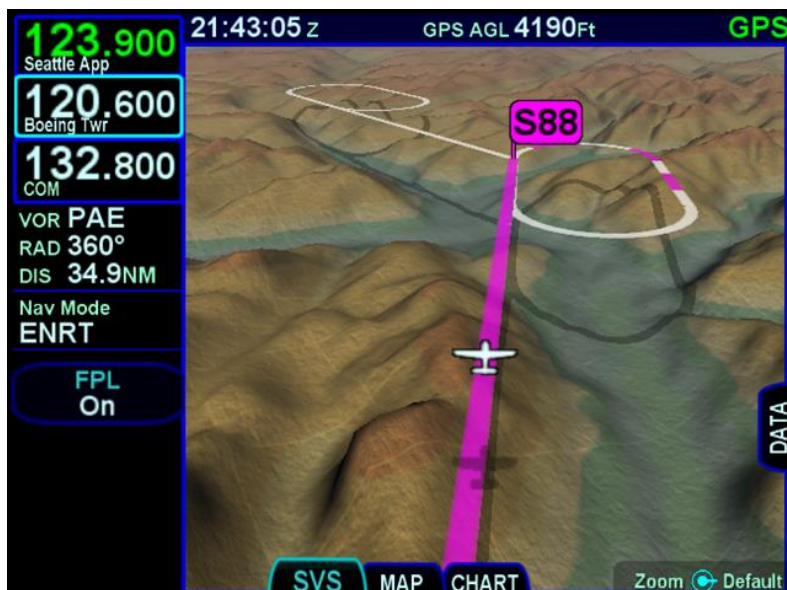
Annunciation	Condition
<b>TERRAIN</b>	FLTA imminent ground threat
<b>OBSTACLE</b>	FLTA imminent obstacle threat
<b>TERRAIN</b>	FLTA likely ground threat
<b>OBSTACLE</b>	FLTA likely obstacle threat
<b>TAWS N/A</b>	HTAWS failure due to invalid GPS position/velocity
<b>TAWS TEST</b>	HTAWS self-test is in progress
<b>TAWS INHB</b>	HTAWS is turned off, aircraft is hovering, aircraft is within an FLTA exclusion area, or aircraft is on ground
<b>RP MODE</b>	HTAWS is in reduced protection mode

## SYNTHETIC VISION (SVS) / TAWS TAB

The leftmost tab on the MAP page provides a view of the aircraft and flight plan from a position above and behind the aircraft known as an “exocentric” view. When the TAWS option is enabled, this tab will be titled “TAWS”. When the TAWS option is not enabled, this tab will be titled “SVS”. The exocentric view is not available until the GPS has reached the SBAS or FDE state.

The exocentric view shows both the aircraft symbol and its shadow, which represents the aircraft position over the ground. The view originates from a point above and behind the aircraft. To adjust the position of that origination point, turn the bottom right knob, causing the view to “zoom” in or out. Pushing the knob restores the default zoom value.

*Map SVS - Zoomed out with Active Flight Plan and Waypoint*

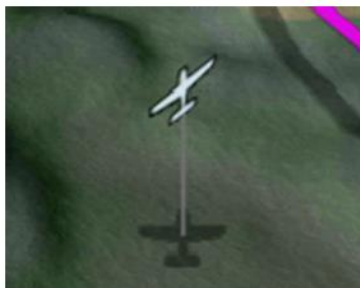


Any traffic in the scene will cast a shadow on the ground to help with judging distance and relative closure rate.

Subtle grid lines, spaced every nautical mile, are drawn on the terrain for additional speed, distance, and depth cues.

Aircraft bank and pitch is also graphically represented as can be seen in the figure below<sup>1</sup>. The ownship symbol will show a bank and pitch but the ground shadow does not.

***Bank Depiction***



***Pitch Depiction***



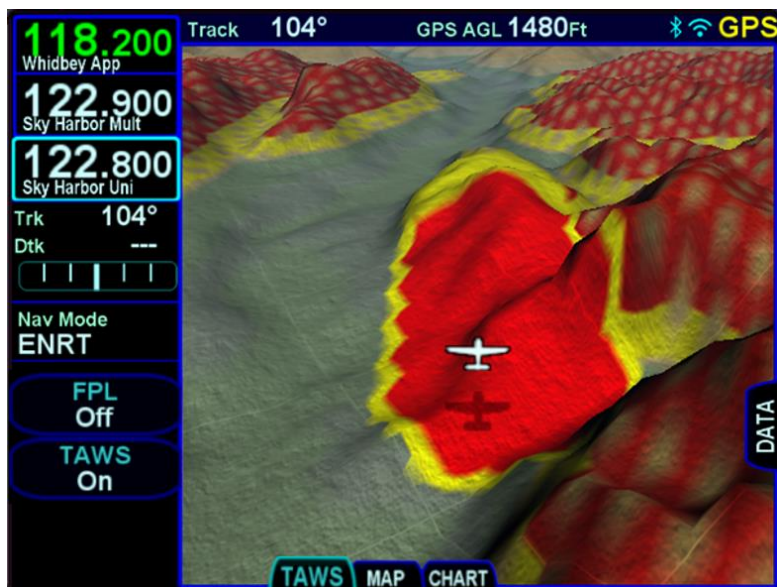
Just like in the 2D map, the hatched red and yellow Terrain Awareness coloring can be displayed in the exocentric view and is controllable using the same setting in the Setup page. For those units with the FLTA active, the solid red warning and yellow caution areas are drawn in real-time on the map.

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<sup>1</sup> IFD 545 and IFD 550 only

Datablocks can be displayed while viewing Map SVS. To show the datablocks, either touch the "DATA" tab on the right side of the display or hold the left side of the MAP button. To hide the datablocks, either touch the "DATA" tab, or hold the right side of the MAP button.

### Map SVS – Terrain Awareness and FLTA Coloring



### FLIGHT PLAN DISPLAY

The display of the flight plan on the Map SVS view is controlled by an LSK titled "FPL".

When the FPL selection is "Off", the flight plan legs will not be overlaid on the Map SVS view.

When the FPL selection is "On", the FMS flight plan will be overlaid on the Map SVS view. The flight plan legs are displayed approximately 300 meters below the aircraft altitude and will also cast a conformal shadow across the terrain immediately below the flight plan. Any part of a flight plan leg that would be drawn below ground level, will not be shown. As a result, the flight plan may appear to go underground when descending or over variable terrain.

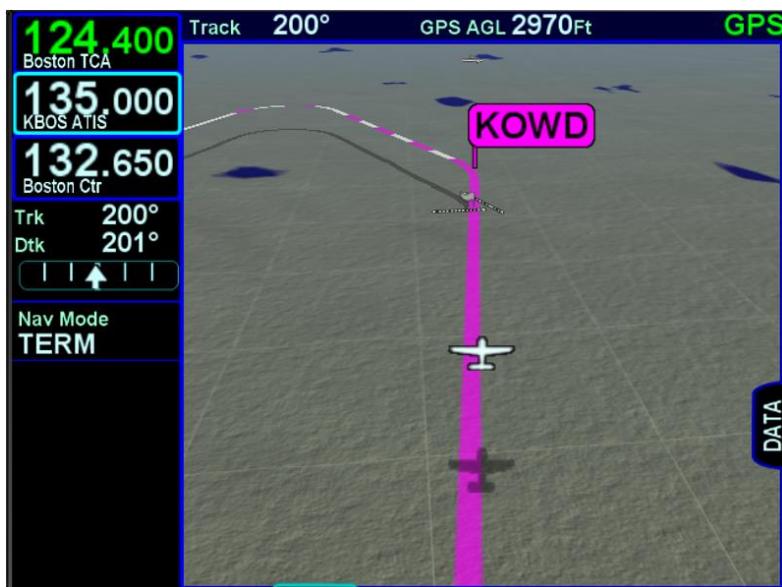
When the FPL selection is “Shadow”, only the conformal shadow will be shown.

Flight plan legs are depicted using the same styles as on the 2D map view. That is, the active leg is depicted in solid magenta, the next leg is shown in alternating magenta/white stripes (“candy stripe”), downpath legs are depicted in white, and inactive missed approach legs are shown in dashed white.

The waypoint is displayed as a magenta flag pole. Downpath waypoints are not depicted in order to reduce map clutter. Fly-over waypoints typically depict the flight plan flying right through/over the waypoint whereas fly-by waypoints can turn inside the waypoint.

Airports and obstacles are also depicted on the SVS view.

**Map SVS - Curved Flight Path with Next Leg Depiction**



**Map SVS - Fly By Waypoint Depiction****Map SVS - Missed Approach (Not Activated)**



*Map SVS - Close in of Landing Runway*



*Map SVS - Missed Approach Enabled*

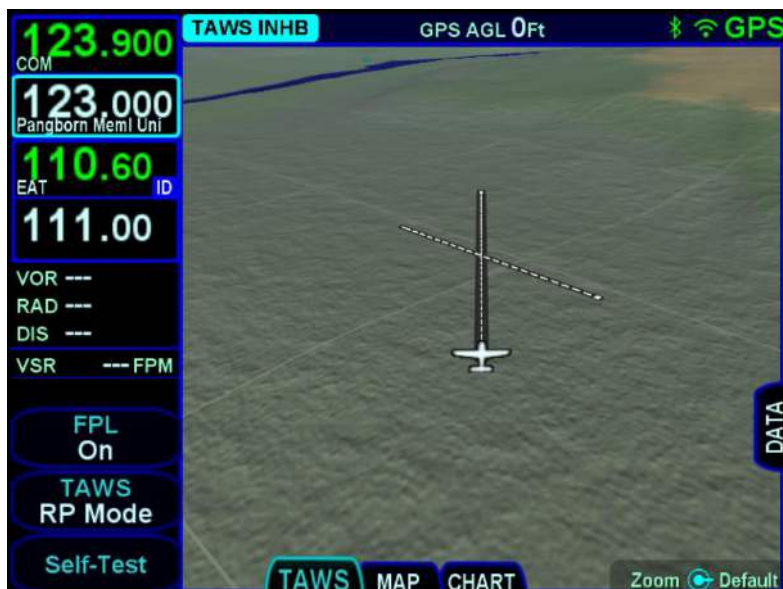




## TAWS CONTROL

When either TAWS or HTAWS is enabled and TAWS self-test is not in progress, an LSK is shown on the page in order to control TAWS/HTAWS capability.

### Map TAWS Tab with LSKs



When configured for TAWS (i.e. fixed-wing), the LSK provides two selections:

- **On** – the full TAWS-B capability is enabled, including FLTA, Altitude Callouts, EDR, PDA, and NCR (see page 4-48)
- **FLTA Off** – the FLTA and PDA functions are disabled, but EDR and NCR remain enabled

When configured for HTAWS, the LSK provides three selections:

- **On** – the full HTAWS capability is enabled
- **RP Mode** – the HTAWS function is operating in “reduced protection” mode, where protection limits are reduced to prevent nuisance alerts.

- **FLTA Off** – the FLTA function is disabled (which effectively disables the terrain alerting function)

Note that regardless of the LSK selection, the altitude callouts function remains enabled (subject to configuration and setup options).

## SELF-TEST

When the TAWS option is enabled (TAWS-B or HTAWS), and the aircraft is not airborne, a “Self-Test” LSK is shown on the page. Press the LSK to manually initiate the same self-test procedure that is performed on power up (see page 4-53). While the self-test is in-progress, the Map SVS view will show the message “TAWS Self-Test In Progress”.

## 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.

## DIRECTORY LIST

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 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.

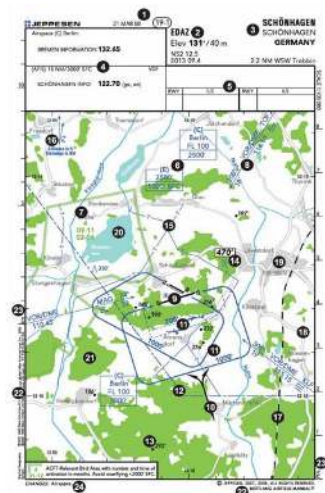
### NOTE

RNP AR (authorization required) approaches may be included in the list of available charts and can be selected for viewing but they cannot be selected in the FMS. The IFD system is not authorized for RNP AR operations.

## EUROPEAN VISUAL APPROACH, LANDING AND AREA CHARTS

European VFR charts (formerly referred to as “Bottlang Charts”) are also available as an optional JDM download package (requires Release 10.2.0.0 or later). If they are part of your Chart subscription package, then they will appear in the directory list with the term “VFR” in the chart title.

### Sample VFR Area Chart



English	Deutsch
1 Revision date and Chart Index	Berichtigungsdatum und Karten-Ordnungsnummer
2 NAC Location Indicator, AGL ELEV in feet and Meters, AGL coordinates	Flugplatzkennung, Flugplatzhöhe in Fuß und Meter, Koordinaten
3 Location/Airportname, Country	Orts-/Flugplatzname, Land
4 Communications	Flugfunk
5 ILS information (if available)	ILS Informationen (wenn vorhanden)
6 Controlled Airspace with vertical limits	Kontrollierter Luftraum mit Ober- und Untergrenze
7 Aircraft-Relevant Bird Area	Luftfahrrelevante Vogelvorkommen
8 Direction arrow (with type of radio navigational facility, frequency, identification, Morse code and distance/direction from the radio navigational facility to the aerodrome)	Richtungszeiger (mit Art der Funknavigationsanlage, Frequenz, Kennung, Morsecode, Richtung und Entfernung von der Funknavigationsanlage zum Flugplatz)
9 Airport	Flugplatz
10 VFR Approach and Departure Route	VFR An- und Abflugstrecke
11 Traffic circuits (for Aeroplanes, ULM and Gliders)	Platzrunden (für Motorflugzeuge, ULM und Segelflugzeuge)
12 Sector boundary of airspace (C) (see above)	Sektorgrenze des Luftraumes (C) (siehe oben)
13 Nature Highlight with Elevation (eMSL)	Höhenausweis mit Höhenangabe (in Fuß/MSL)
14 Highest Elevation depicted on the chart (lighted Obstacle with Elevation of top in feet/MSL)	Höchste gezeigte Erhebung auf der Karte (beleuchtetes Hindernis mit Spitzenhöhe in Fuß/MSL)
15 High Tension Line	Hochspannungsleitung
16 Variation	Orientierungswinkel
17 Railroad	Eisenbahnlinie
18 Road	Straße
19 Built-up Area	Bebautes Gebiet
20 Lake	See
21 Forest	Wald
22 Copyright Notes	Copyright Hinweis
23 Scale/Scalebars (NM, km)	Maßstab/Maßstabsbalken
24 Changes note (revisions incorporated)	Fingerteilte Änderungen

## CHART EXTENT BOX

A blue-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.

**FPL TAB:** When the airfield flight plan leg has at least one published approach associated with it, a chart icon is presented on the right edge of the flight plan leg. By using touch or the bottom right knob, scroll through the flight plan elements until the chart icon is highlighted, then push the knob in. The IFD will display either the specific chart for that associated procedure or the directory of possible procedures for that airfield.

**INFO TAB:** When the INFO tab shows an airfield at the top and that airfield has at least one published approach associated with it, a chart icon is presented on the right edge of that airport datablock. By using touch or the bottom right knob, scroll through the flight plan elements until the chart icon is highlighted, then push the knob in. The IFD will display either the specific chart for that associated procedure or the directory of possible procedures for that airfield.

**NRST TAB:** When the NRST tab displays airports that have at least one published approach associated with it, a chart icon is presented on the right edge of those airports datablocks. By using touch or the bottom right knob, scroll through the flight plan elements until the chart icon is highlighted, then push the knob 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.

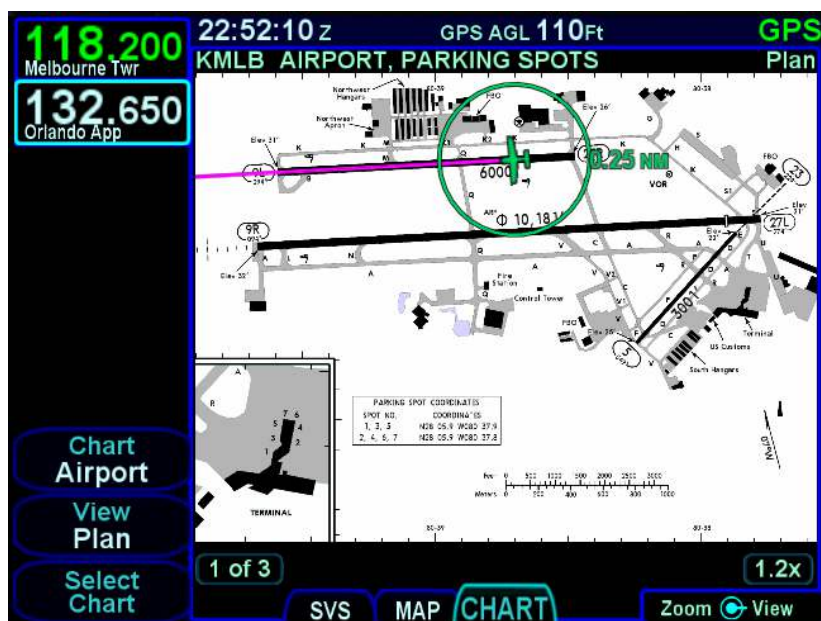
Once a chart is displayed, the left-hand LSKs provide means to alter the view or presentation of the chart. A “Chart” LSK is provided to select Airport or Procedure type charts. The “View” LSK provides a set of views to choose from based on which option was selected in the “Chart” LSK. For example, if “Procedure” was picked, then one of five chart views can be selected (Plan, Header, Profile, Minimums, All). If Airport was selected, then a slightly different set of chart

views could be selected (Plan, Header, Runways, Departure, All). The chart can be zoomed in and out, as desired, by using the right-hand knob on the IFD or via a pinch-zoom touch method.

## TAXI CHARTS/AIRPORT DIAGRAMS

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.

### Airport Diagram



The charts can be pinch-zoomed and panned or knob zoomed to see close ups of the airfield diagram. When the chart is zoomed and not being manually panned, the chart will be centered on the aircraft.

If you did not select or use a published approach via Charts, the local airfield diagram can still be accessed. Select the "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 “Chart Day/Night Mode” setting is provided on the Setup 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” setting to define the method of determining day or night.

*Chart in Night Mode*



## WATERMARKING / 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. The flight plan will not be overlaid on expired charts.

### Expired Chart - Watermark



## DISABLING CHARTS

Charts can be disabled using the Main System Config page in Maintenance Mode. This is useful when the charts subscription has expired and there is no desire to renew. If charts are not disabled in this situation, then the IFD will present a message on every power cycle warning of expired data.

## UPDATING CHARTS

Procedures for updating Charts are described on page 7-26.

## RADAR TAB

Support for digital weather radars is an optional capability for the IFD. When this option has been activated on an IFD, a dedicated “RADAR” tab is present on the MAP page. If the IFD has access to heading data, radar data can be a selectable overlay on the moving map. The RADAR tab is designed to replace an existing radar indicator.

Radar is intended to serve as a severe weather avoidance tool only. Do not use the IFD radar depiction to penetrate severe weather, thunderstorms, cells, or lines of cells.

Operation of the radar function varies depending on the model of the installed radar. Make sure you are familiar with the functionality and operation of the radar system installed on your aircraft. See the user's guide for your radar system for details.

The radar mode is controlled by a line select key along the left side labeled “Radar”. Pressing the LSK or touching the label will generate a drop down containing the available modes. Turn the bottom right knob to scroll through the list or touch the desired mode in the list to select it.

### *Radar Mode Control*



The possible modes are:

- **Test** – initiates a radar self-test function that is monitored by the IFD. The test function is confirmed by the presence of the test annunciation and the green, yellow, red, and magenta test pattern display. During self-test, all of the functions of the R/T are exercised with the exception of the magnetron tube. No microwave energy is emitted in the test function.
- **Standby** – places the radar in an energized but inactive state. The system always powers up in this mode. In Standby, the moving scan indicator and radar echo returns are not present and the antenna is placed in the desired park position.
- **On** – turns the radar on for normal operation. The moving scan indicator and radar echoes are visible and the system is radiating microwave energy.
- **Gnd Map** – orients the radar to ground features.

The IFD will automatically switch the radar to Standby when the groundspeed falls below 20 knots.

When Radar is “On”, the controllable functions are:

- **Range** – Use the bottom right outer knob to control the displayed range scale. With dual IFD installations, if radar is an overlay currently displayed on one IFD map and the RADAR tab is displayed on the second IFD, if the map range on the overlay page is changed, the radar page range will change on the second IFD. Conversely, if the radar range is changed on the second IFD, the map range will NOT change on the first IFD.
- **Tilt** – Use the bottom right inner knob to control the tilt angle and direction of the radar antenna: U for up via right turns, D for down via left turns with the amount of antenna tilt in 0.25° increments, using decimal notation.
- **Azimuth** – Push the bottom right knob to toggle between Tilt and Azimuth control and then turn that knob to adjust the azimuth or bearing line. The azimuth/bearing line is controlled in increments of 1° and the relative bearing is displayed in degrees relative to aircraft heading (if known)

where left has a “-” indicator in front of the relative azimuth. It will also control the radar’s “yaw” or lateral position of the dish, when in vertical profile mode.

## RADAR STABILIZATION

The “Stabilization” LSK is an on/off toggle of the radar’s gyro stabilization.

### TIPS AND TECHNIQUES

#### **Pre-Takeoff Check**

As part of your pre-takeoff check, check for proper operation of your installed radar. While at a safe distance from ground personnel and other aircraft, briefly turn the radar on and tilt the antenna below zero degrees. If the radar is working properly this will produce ground reflections and verify the correct operation of the transmitter/receiver and antenna tilt functions.

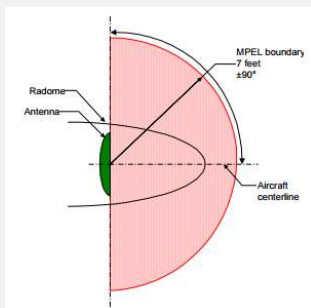
**WARNING – RADAR ENERGY IS POTENTIALLY HAZARDOUS**

Aircraft weather radar is specifically designed to emit a concentrated beam of microwave energy at potentially hazardous power levels. These hazards include the possibility of injury to ground personnel, ignition of flammable materials, including fuel, and damage to sensitive electronic devices. The pilot is responsible for management of the radar system.

The FAA has published an Advisory Circular, AC 20-68B, Recommended Radiation Safety Precautions for Airborne Weather Radar, with basic guidelines for safe radar operation.

U.S. Government standards for human exposure to microwave radiation permit a maximum level of 10mW per square centimeter. When the radar is operating, this level may be exceeded within the area indicated in the figure below. According to information published by the radar manufacturer, strict observance of this boundary when the radar is operating should provide adequate protection.

Exposure of ground personnel or other aircraft occupants to microwave energy emitted at positions within the MPEL boundary depicted below may be hazardous. Be aware that the MPEL boundary is determined with respect to the antenna, not the radome or any other aircraft structure. The MPEL boundary shown below applies only to units specifically approved for use with the IFD. The MPEL boundary shown below does not guarantee protection against ignition of flammable materials or damage to sensitive electronic equipment exposed to microwave energy from your radar.

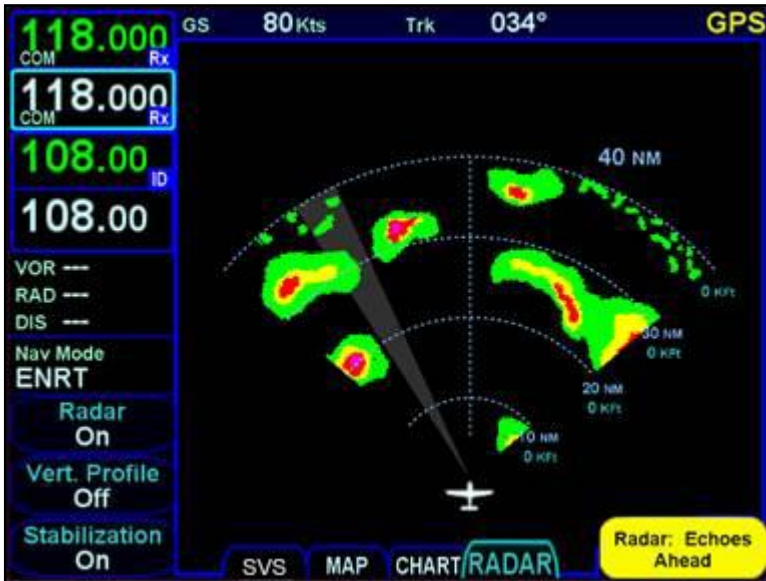


## RADAR DISPLAY

The current position of the scan is shown by a gray radial arc, representing the width of the radar beam.

The beam altitude numbers display the relative altitude in thousands of feet ("Kft") of the center of the radar beam compared to the aircraft's altitude at the distance shown on the range rings.

### *Radar in Operation*

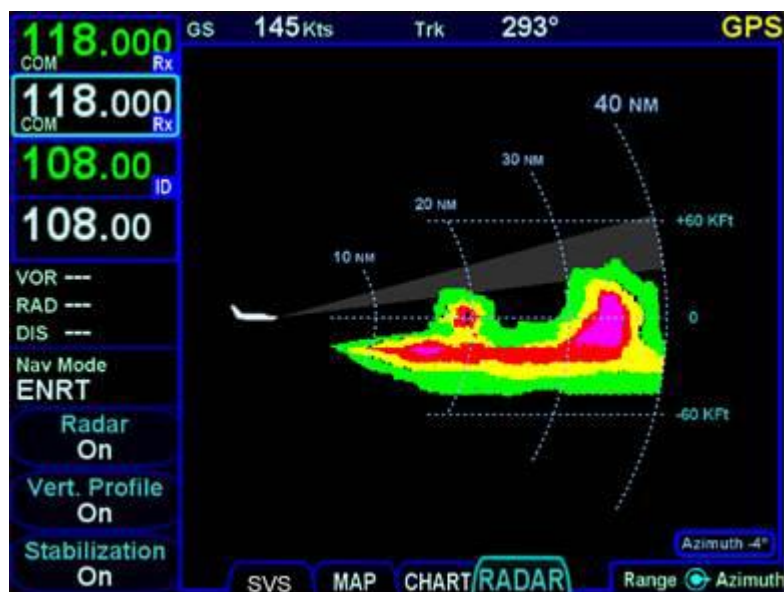


## VERTICAL PROFILE MODE

Vertical Profile mode allows you to view approaching weather as a slice of the vertical plane instead of the conventional horizontal forward view.

Switching between horizontal forward view and vertical profile view is accomplished by toggling the "Vert Profile" LSK on/off.

Vertical profile display contains the same functions and modes as shown on the horizontal forward view. Dual IFDs stay synched in radar view – if one is changed to vertical, the other will follow.

**Vertical Profile Radar View****TARGET ALERTING**

Some radar systems (e.g. RDR 2000) can be configured at installation to include the Target Alert feature. This feature alerts the pilot to the presence of a significant weather cell that exists beyond the currently selected range.

For this mode to be active the “On” mode must be selected and Vertical Profile must not be selected.

The criteria for a Target Alert is for the cell to be at least red intensity, within  $\pm 10^\circ$  of aircraft heading, a minimum size of 2 NM in range and 2 degrees in azimuth, and within the range of 80 to 240 NM.

When a Target Alert is issued, two red arcs, separated by a black arc will be displayed at the top of the display centered on the aircraft heading (see the following figure). Target Alert is applied to each scan independent of the other when the radar is alternating scans.

Target Alert Depiction on Radar Tab





## VIDEO TAB

Support for 4x3 aspect ratio RS-170 formatted video display is an optional capability for the IFD. When this option has been activated on an IFD, a dedicated "VIDEO" tab is present on the MAP page.

Most Enhanced Vision System (EVS) devices supply an infrared RS-170 signal and RS-170 electro-optical signal which can be displayed in gray scale or color on the IFD.

### *Video Display on the IFD*



The video image can be pinch zoomed using two-finger touch pinching gestures on the glass and finger panned. The pinch zooming range is 1x to 5x magnification.

Video brightness can be adjusted by turning the bottom right outer knob. Video contrast can be adjusted by turning the bottom right inner knob. Pressing the bottom right knob restores default values for contrast, brightness, zoom and positioning.

Intentionally Left Blank

## 5 Aux Subsystem

The Aux subsystem contains several tabs, as shown below, to control various utilities, system setup, and the alert message center.



The AUDIO tab provides control and display of all system audio-related features.

The UTIL tab provides access to several timers, calculators, and checklists.

The SETUP tab provides options to allow the user to set preferences in the display and control of the system.

The SYS tab provides the means to review the status of software, databases, GPS, and datalink.

The ALERT tab shows details of active cautions, warnings, and advisories.

## AUDIO TAB

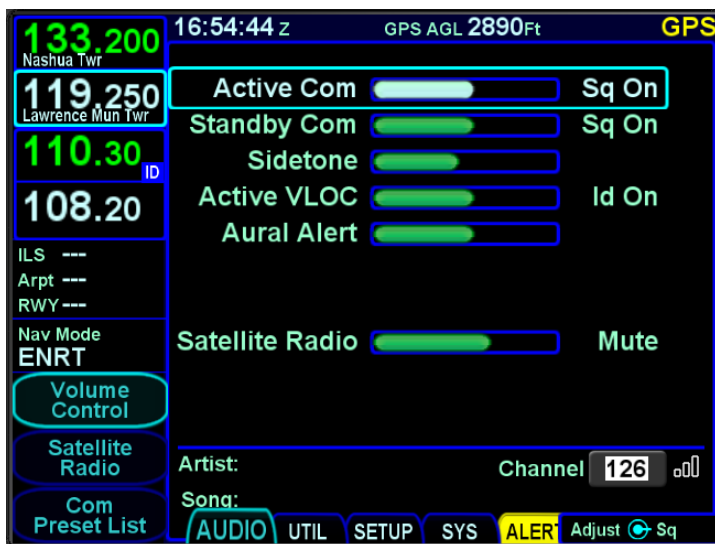
The AUDIO tab provides control and display of all system audio-related features such as radio volume, squelch settings, satellite radio channel tuning and com presets.

### 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.

The bottom right knob controls row selection, volume, squelch, ID on/off. If configured for satellite radio, the knob also provides mute control. To select one of the volume controls, turn the outer knob. To adjust the volume, turn the inner knob. To toggle squelch<sup>1</sup>, ID, or mute (as applicable) push the knob button (a 1-2 second delay is possible).

#### Volume Control (IFD540 Shown)



Touch control can also be used to make all those adjustments (e.g. selecting a row by touching, changing a volume level by

<sup>1</sup> Not applicable to the IFD510 and IFD545

touch dragging the bar, turning squelch on/off by tapping the correct area on the display, etc.).

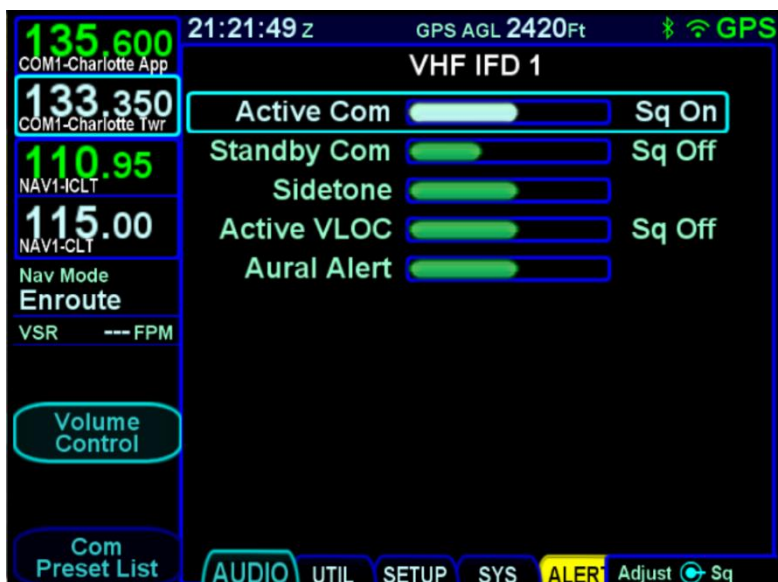
#### TIPS AND TECHNIQUES

##### Adjusting Volume Plays Audio Test Aural

As the volume bar for the traffic alerts is adjusted, the IFD will play a double chime that represents the new volume level selected. As the volume bar for the other aural alerts is adjusted, the IFD will play an aural that represents the new volume level also.

If Remote IFD Tuning is On (see page 5-67), the Audio tab will be displayed with the identifier of the radio that will be affected by the controls shown as a title at the top of the screen, as illustrated below. If the IFD being controlled is the remote IFD, the title will be displayed in yellow.

#### Volume Control with Remote IFD Tuning turned On



## SATELLITE RADIO TUNING

When a compatible 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 turning either bottom right knob counter-clockwise 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 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 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 knob to highlight the desired channel and then touch a second time (double tap) or push in the bottom right 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 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 knob to bring up a key pad and type or knob in the desired channel number.

All of these controls/edits can also be done via touch.

In aircraft with multiple dissimilar devices capable of tuning satellite radio stations and adjusting volumes (e.g. G500 & IFD), a condition can occur where commands are ignored if they are made on both devices. Avidyne strongly recommends making satellite radio channel selections and volume adjustment on only one of the devices.

## COM PRESETS<sup>1</sup>

Accessed by pressing the “Com Preset List” the Com Presets Page displays a list of preset frequencies. Com presets provide a means to quickly tune often used frequencies.

### Com Presets Page



### Editing a Preset Frequency

Preset frequencies can only be changed when the page is in edit mode. To put the page in edit mode using the touchscreen, touch the "Edit" box in the top right corner of the display. To put the page in edit mode using the bottom right knob, move the cursor to the "Edit" box and press the knob button. The "Edit" box will appear in dark blue to indicate that the page is in edit mode.

To enter a frequency into a preset, put the page into edit mode and then either touch or turn the bottom right knob to move the cursor to the desired preset. Touch the selected preset or press the knob button to start entering a frequency. If using the virtual keyboard to enter the frequency, note that shorthand frequency

<sup>1</sup> Not applicable to the IFD510 and IFD545



notation cannot be used when entering com presets. Therefore, a complete frequency must be entered (e.g. "121.7" instead of "217"). Press ENTR or the right knob button to complete the entry and take the page out of edit mode.

To remove a preset frequency, put the page into edit mode and then either touch or turn the right knob to move the cursor to the desired preset. Then press the CLR button to clear the frequency and take the page out of edit mode.

### Selecting a Preset Frequency

When the list is not in edit mode, a preset frequency can be copied to the standby slot by touching the desired frequency or by using a dedicated switch in the cockpit (if one was installed).

The IFD supports a dedicated switch that will cycle forward through the com preset list and another switch that will cycle backward through the list. The switches are typically installed on the control yoke or stick.

Each actuation of the switch will copy the next (or previous) frequency in the list to the standby slot and cause the IFD to briefly display a small dialog box indicating which preset frequency was copied.

#### Standby Slot



On the com preset page, a small arrow indicates which preset is tuned.

#### Com Preset Arrow



## UTIL (UTILITIES) TAB

### TIMERS

The timers page provides several predefined timers, but also has provisions for one or more user-defined custom timers.

#### *Standard Timers*



### Generic Timer

The “Generic Timer” can be defined either to count up or to count down. To select the mode, either touch the desired mode or use the right inner knob to move the cursor around the desired mode and then press the knob. The selected direction is displayed with a blue background.

When the timer is defined to count up, the timer can be started by either touching the Start button or by using the right inner knob to select the Start button and then pressing the knob. When the timer has been started, the button will change to “Stop”. Selecting the Stop button will stop the timer but will not reset the time. The Reset button will set the time back to zero, but does not change whether the counter is stopped or started. Therefore, if the counter is started, it will continue counting up from zero.

When the timer is defined to count down, the starting value can be set either by using the bottom right knob to move the cursor to the time field and then pressing the knob, or by touching the time field on the display. The Start and Stop buttons work just like they do for count up timers. The Reset button will reset the time to the most recently defined starting value. When the timer reaches zero, a CAS message saying "Timer Expired" will be issued and the timer will be stopped.

The generic timer is stopped and set to count up from zero after a power cycle.

### **Trip Timer**

The "Trip Timer" can display elapsed trip time either from IFD power on or from take-off (the active selection will be displayed in a blue background).

When showing "From Pwr-On", the timer represents the elapsed time since the IFD was powered up. The timer will count time continuously as long as the IFD is powered up or until it has been reset. Pressing the "Reset" button will reset the timer to zero and then resume counting.

When showing "From Takeoff", the timer represents the elapsed time since the IFD detected that the aircraft went airborne. The timer will count up while the aircraft is airborne, but will stop when the aircraft is on the ground. If the aircraft once again goes airborne, the timer will reset to zero and start counting again. Pressing the "Reset" button will cause the timer to reset to zero, but whether the time starts counting up is dependent upon whether or not the aircraft is airborne.

### **Event Timer**

The "Event Times" is not a running timer, but provides a way to keep track of the time that the IFD was powered on and the time that the aircraft last went airborne. The selected time being viewed is displayed with a blue background. The Reset button causes the selected time to be set to the current time of day. Therefore, the pilot should exercise caution when using the Reset button and remember that the basis has been when looking at the time thereafter.

## Custom Timer

Up to 10 custom timers can be created for various purposes including tracking 50 hour and 100 hour inspections, annual inspections, bi-annual air data system checks, flight reviews, etc.

To create a new timer, either rotate the bottom right knob to the bottom of the list or touch below the last item in the list to cause an insert cursor to appear. Then press the knob button or touch again.

The new timer will have a default name of "Event". To change the name, either rotate the bottom right inner knob or touch the name to select the field. Then, either push knob button or touch the name field to change the name.

A custom "Event" timer can be set to expire at a specific date and time. A custom "One Time" or "Periodic" will expire after a specified number of flight hours. A periodic timer will restart when the timer expires.

When a custom timer expires, the IFD will issue an alert containing the name of the timer. If the name of the timer is blank, the alert will show "Timer". Acknowledging the alert will clear the alert message but will not delete the timer.

To delete a custom timer, rotate the outer bottom right knob or touch the timer block so that the cursor surrounds the entire timer block, then press the CLR key.

Custom timers, along with the time remaining, are retained across power cycles. If a timer has expired and the associated CAS message has not been acknowledged when the IFD is powered down, the CAS message will reappear the next time the IFD is powered on.

## Custom Timer Examples



## CALCULATORS

The IFD contains several calculators that are accessed using the “Calculators” LSK on the UTIL tab of the AUX page.

Many data fields in the various IFD calculators can be populated automatically with sensor data. When a field has been automatically populated, the data will be displayed in green. If a field has not been automatically populated or if it has been overridden by a pilot manual entry, the data will be displayed in white. If a field has been overridden by a manually entry, the automatic population with sensor data can be restored by pressing the CLR button on the bezel.

### Fuel Planner

The fuel planner can be configured for “Point-to-Point” or “Present Pos” operation. In Point-to-Point operation, an origin and destination point must be specified. In Present Pos operation, the calculator uses the aircraft position as the origin and only the destination point must be specified. Other fields include, ground speed, fuel on board, and fuel flow. Given the entries in those fields, the calculator will compute the fuel remaining at the destination and other fuel related information, based on straight line distance between the two points.

When automatically populated, the DEST field will contain the last airport in the active flight plan, not necessarily the last waypoint in the flight plan. Non-airport waypoints are not permitted in the DEST field.

#### *Fuel Planning Calculator*

The screenshot shows the Fuel Planner interface with the following data:

Fuel Planner			
Type	Point-To-Point	ORIG	KBED
DEST	KBED		
GS	182 Kts	Fuel On Board	0.0 Gal
		Fuel Flow	0.0 Gal/Hr
Reqd:	--- Gal	Efficiency:	--- NM/Gal
Fuel at KBED:	--- Gal	Range:	--- NM
	--:-- H:M	Endurance:	--:-- H:M

## Weight Calculator

The weight calculator provides a means to compute current aircraft weight and to predict landing weight. Prior to the flight, the pilot should enter the weight of all passengers and baggage.

The current aircraft weight is computed using the basic empty weight of the aircraft, the weight of all passengers and baggage, and the computed weight of fuel on board from the fuel planning calculator. If the computed current aircraft weight exceeds the maximum takeoff weight, the value will be displayed in yellow.

The predicted aircraft landing weight is computed using the current weight and fuel at the destination calculated by the fuel planning calculator. If the predicted landing weight exceeds the maximum landing weight, the value will be displayed in yellow.

The basic empty weight, maximum takeoff weight, and maximum landing weight are all defined in Maintenance Mode, typically at the time of installation.

If the IFD has been configured for a multi-engine aircraft, the weight calculator will show additional buttons  $V_1$ ,  $V_2$ ,  $V_R$ , and  $V_{REF}$  in the bottom right corner of the calculator tile. While values can be entered into these fields, the IFD does not use those values for any calculations or displays. They are only used for pilot reference.

### Weight Calculator

Weight Calculator			
Passengers	595	Lb	Baggage
			314 Lb
Fuel Flow: 30	Gal/Hr	GS: 135	Kts
		Distance: 40	NM
BEW: 15,000	Lb	$V_1$	70 Kts
Fuel Load: 686	Lb	$V_2$	90 Kts
Current: 16,595	Lb	$V_R$	75 Kts
LW: 16,542	Lb	$V_{Ref}$	73 Kts

## Trip Planner

Like the fuel planner, the trip planner can be configured for Point-to-Point or Present Pos operation. The trip planner includes

fields for type, destination, ground speed, departure date and time. Assuming a straight line from the two points, the trip planner computes desired track, distance, ETE, ETA, sunrise and sunset, and enroute safe altitude (ESA). ESA is defined as 1000' above the maximum elevation of displayed terrain (including obstacles) within a rectangular grid that measures 10 miles on each side of the centerline of the active leg or portion of the active leg that is currently displayed on the Map page.

#### ***Trip Planner Calculator***



Trip Planner	
Type	Point-To-Point
ORIG	KBED
DEST	KMLB
GS	0 Kts
Depart Time	00:00
Depart Date	1 JAN
DTK:	225°
ETA:	00:00:00 z
Distance:	974 nm
Sunrise/Set:	12:14/22:38 z
ETE:	00:00 H:M
ESA:	5317 Ft-msl

#### **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***



Air Data Calculator		
ALT	1,500 Ft	CAS
		170 Kts
HDG	360°	
OAT	55 °F	BARO
		29.92 InHg
TAS:	173 Kts	Density ALT:
		1,145 Ft
Winds:	292° at 44 Kts	Headwind:
		14 Kts

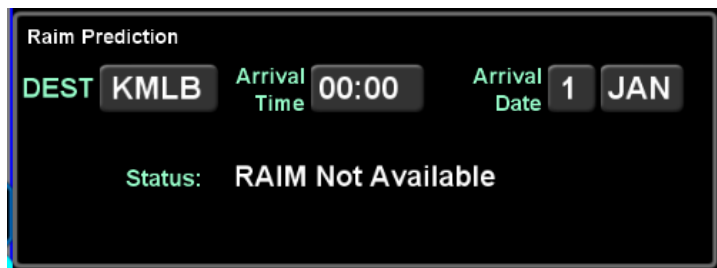
#### **RAIM Prediction**

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*



The RAIM Prediction Calculator screen displays the following information:

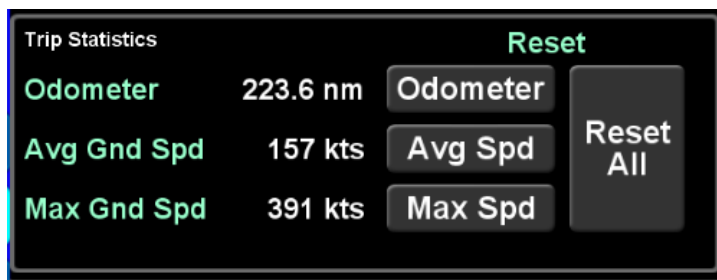
- Raim Prediction** (Title)
- DEST** (Label) **KMLB** (Value)
- Arrival Time** (Label) **00:00** (Value)
- Arrival Date** (Label) **1 JAN** (Value)
- Status:** **RAIM Not Available**

#### **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*



The Trip Statistics Calculator screen displays the following information:

- Trip Statistics** (Title)
- Reset** (Label)
- Odometer** (Label) **223.6 nm** (Value) **Odometer** (Button)
- Avg Gnd Spd** (Label) **157 kts** (Value) **Avg Spd** (Button)
- Max Gnd Spd** (Label) **391 kts** (Value) **Max Spd** (Button)
- Reset All** (Button)

## ELECTRONIC CHECKLIST

If enabled in Maintenance Mode, up to 9 custom checklists can be created and stored in the IFD using the “Checklist” LSK of the UTIL tab, each with up to 50 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 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 knob. Then touch the row in the directory list a second time or push the bottom right 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 knob. Repeat this process for naming new checklists until all desired checklist names are created.

When 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 knob to select it and then pushing the knob. This will produce an empty gray checklist step item.

Touch or use the bottom right 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 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 gray 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 knob to select the “Edit” button, then touch again or push the knob putting the system in edit mode. This automatically creates a new step at the end of the checklist. If the intent was to create a new step, type the details of the step on the keyboard. If instead, an existing step is to be edited, select the step to be edited by touching it or using the inner knob. Touch the step a second time or push the 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 turn the outer knob to insert the step in the desired location. This same method can be used to reorganize a checklist by moving steps up or down. When done 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 knob and then either touch the checklist title a second time or push the knob to select it.

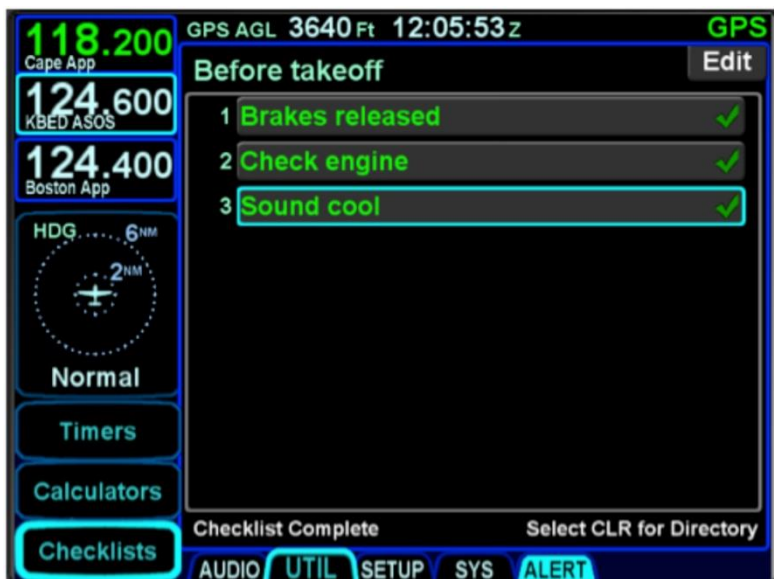
The selected checklist will then be displayed with the checklist title along the top strip.

## 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 the knob will toggle that step to bright green. 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 knob) and then touching it a second time or pushing the knob to remove the checkmark. This will also toggle the "Checklist Complete" text back to "Checklist Not Completed".

### Resetting Checklists

To quickly reset a completed or partially completed checklist, press and hold the bottom right knob while that checklist is open. All green completed checkmarks will be removed for that open checklist.

To quickly reset all completed or partially completed checklists, ensure the checklist directory (list of all checklists) is displayed and then press and hold the bottom right knob to reset the

checklist and remove the gray or green checkmarks for that checklist and jump the cursor down to the next partial or fully completed checklist. At that point, press the knob again to clear the next checklist and jump the cursor to the next one. Repeat the process as needed until all checklists are reset.

#### 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 flash drives. Procedures for backing up and restoring user data can be found on page 7-38.

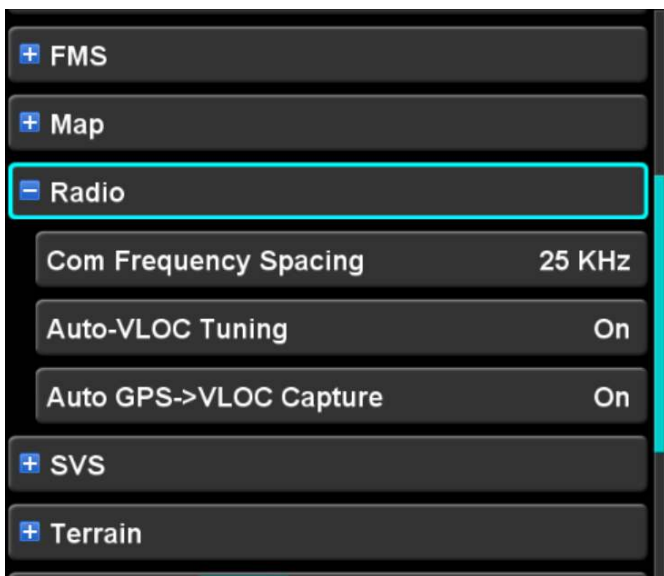
## SETUP TAB

The Setup Tab provides the capability for one or more users to tailor the look and feel of the IFD to best accomplish their mission. Many of the setup options are provided to adjust the format of data that is presented on the IFD (e.g. units of measure, whether page tabs are hidden). Other setup options control the operation of the IFD, including com radio frequency spacing, display brightness, and Wi-Fi connections.

### CATEGORY STRUCTURE

The Setup Tab is organized using a set of categories. Each category can be expanded to reveal settings relevant to that category. Each setting within a category will be indented as a visual indication that it belongs to the category. Some categories contain further sub-categories, which can also be expanded. The result is a hierarchical structure of settings which uses “+” and “-” icons to indicate whether a category is expanded or condensed. In order to limit the page to a manageable number of items, only one category can be displayed at a time. Therefore, when one category is expanded, all other categories at that same level are condensed.

#### *Setup Tab – Single category expanded*



When an item represents a category that can be expanded, a “+” icon will be shown on the left side of the panel. If the category is already expanded, a “-” icon will be shown on the left side. To expand or condense a category, first move the cursor to the category either by touching the item or by rotating the inner or outer knob. Once the cursor is surrounding the desired category, either touch the icon on the left side or push the knob button to expand or condense that category.

## ITEM STRUCTURE

Items representing a setting are shown with the title on the left and the current value of the setting on the right. For those cases, there are several kinds of settings, as follows:

- Enumerated – these are the most common kind of setting and are characterized by a list of choices. For instance, “On”, “Off”, and “Auto”.
- Textual – these settings require the user to enter a textual value. Examples include a User Name and Flight ID.
- Numeric – these settings require the user to enter a numeric value. Examples include the visual approach glide slope and local time offset.

There are other kinds of settings that apply to specialized situations, such as map layers. Those kinds of settings are described in detail in the sections below.

## ITEM EDITING

Rules for editing settings vary based on the kind of item being edited. To initiate editing for any item, turn either the inner or outer knob to the desired item or touch the desired item in order to select it. The selected item is surrounded by a cyan outline.

### **Editing an enumerated setting**

Once selected, editing is initiated by either pushing the right knob button or touching the selected item. At this point, the selection will change from a cyan background to a white background. To change an enumerated setting, turn either the inner or outer knob to change to the next or previous selection, depending on the direction of the knob turn, or touch the item to change to the next selection. Once the desired selection is being shown, push the



knob button or the ENTR button or the Enter LSK to accept. Push the CLR button or the Cancel LSK to abort the edit and return to the original selection.

### **Editing a textual setting**

Once selected, editing is initiated by pushing the right knob button, pushing the ENTR button, or touching the selected item. At this point, the selection will change from a cyan background to a black background with cyan text.

If editing was initiated by pushing the right knob, then the text will be presented with a cyan cursor on the selected character. Turn the inner knob to change characters and turn the outer knob to change the cursor position.

If editing was initiated by touch or if the field was touched at any time while editing was active, a virtual keyboard will appear. Enter the desired text using the virtual keyboard.

The CLR key is used during editing as a backspace key. However, if the value being edited is empty, one more press of the CLR key will cancel the edit. At any time during the edit, pressing the Cancel LSK or pressing the virtual keyboard red-X will also cancel the edit.

Pressing the right knob button, the ENTR button, the ENTR key the virtual keyboard, or the Enter LSK will accept the edited value as the new setting.

### **Editing a numeric setting**

Once selected, editing is initiated by either pushing the right knob button or touching the selected item. At this point, the selection will change from a cyan background to a white background.

Regardless of how editing was initiated, rotating the inner knob will change the numeric value by a “minor” increment. Rotating the outer knob will change the value by a “major” increment. In either case, rotating the knob counter clockwise will decrease the value and rotating the knob clockwise will increase the value.

If editing was initiated by touch or if the field was touched at any time while editing is active, a virtual keyboard will appear. The keyboard is used to enter the desired value. It is possible to enter

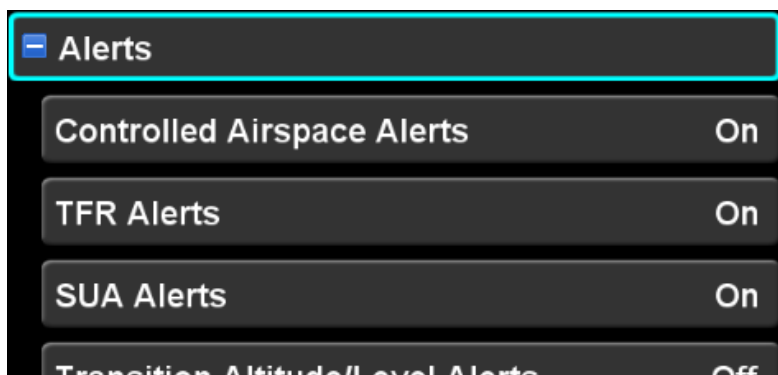
values using the keyboard that are out of bounds for the setting. Therefore, once accepted, the edited value may be adjusted to be a valid value for the setting.

The CLR key is used during editing as a backspace key. However, if the value being edited is empty, one more press of the CLR key will cancel the edit. At any time during the edit, pressing the Cancel LSK or pressing the virtual keyboard red-X will also cancel the edit.

Pressing the right knob button, the ENTR button, the ENTR key the virtual keyboard, or the Enter LSK will accept the edited value as the new setting.

## ALERTS CATEGORY

Items in this category control whether the IFD will issue visual and/or aural alerts for various events.



### Controlled Airspace Alerts

This setting controls whether the IFD will issue an airspace alert when the aircraft is on course to enter controlled airspace within the next five minutes. The factory default setting is "On". Changes to this setting will be propagated to all other cross synced IFDs.

### TFR Alerts

This setting controls whether the IFD will issue an airspace alert when the aircraft is on course to enter Temporary Flight Restriction (TFR) airspace within the next five minutes. The factory default setting is "On". Changes to this setting will be propagated to all other cross synced IFDs.

### SUA Alerts

This setting controls whether the IFD will issue an airspace alert when the aircraft is on course to enter special use airspace (SUA) within the next five minutes. The factory default setting is "On". Changes to this setting will be propagated to all other cross synced IFDs.

### Transition Altitude/Level Alerts

This setting controls whether the IFD will issue an alert as the aircraft approaches the transition altitude and transition level.

See page 6-30 for more information. The factory default setting is “Off”. Changes to this setting will be propagated to all other cross synced IFDs.

### **Switch Tanks Alert**

This setting controls whether the IFD will issue an alert to switch fuel tanks. The setting varies the time interval between alerts. Time intervals of 15, 30, 45, and 60 minutes can be selected, or the alert can be disabled by selecting “Never”. The factory default setting is “Never”. Changes to this setting will be propagated to all other cross synced IFDs.

### **Top of Descent (TOD) Aural**

This setting controls whether the IFD will generate a chime when the aircraft reaches the top of descent point. The factory default setting is “On”. Changes to this setting will be propagated to all other cross synced IFDs.

### **Airspace Aural**

This setting controls whether the IFD will generate an aural message saying “Airspace Ahead” whenever an airspace alert is issued. The factory default setting is “Off”. Changes to this setting will be propagated to all other cross synced IFDs.

### **Waypoint Aural**

This setting controls whether the IFD will generate an aural message as waypoints in the flight plan are sequenced. The factory default setting is “Off”. Changes to this setting will be propagated to all other cross synced IFDs.

If the waypoint being sequenced is the final approach fix, the aural message is “Final Approach”. If the waypoint being sequenced is the missed approach point, the aural message is “Missed Approach”. For all other waypoints, the aural message is “Waypoint”.

### **Altitude Callouts**

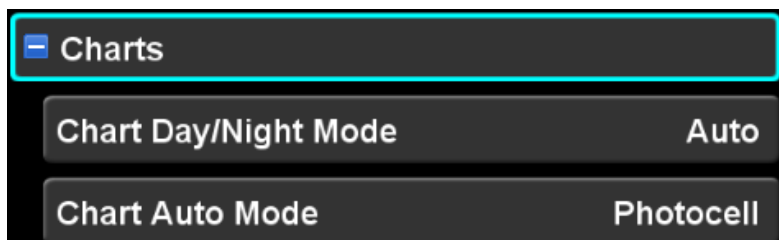
This setting controls whether the IFD will generate aural messages as the aircraft descends through certain AGL altitudes (see page 4-46). The factory default setting is “On”. If the IFD is configured for use with an external TAWS, this setting will not be

shown and the altitude callouts will be inhibited as if the setting was "Off".

## CHARTS CATEGORY

Items in the charts category control the appearance and behavior of the electronic charts shown on the Charts tab of the Map subsystem.

If charts are disabled (through Maintenance Mode), this category and the related settings will not be shown.



### Chart Day/Night Mode

This setting controls the appearance of charts to be compatible with day or night operations. The factory default setting is "Auto".

When the selection is "Day", charts are displayed using black text and graphics on a white background.

When the selection is "Night", charts are displayed using white text and graphics on a black background.

When the selection is "Auto", charts are displayed in "Day" or "Night" mode based on the Chart Auto Mode setting.

### Chart Auto Mode

This setting controls the method that the IFD uses to determine whether the charts should be displayed in "Day" or "Night" mode when the Chart Day/Night setting is "Auto". The factory default setting is "Photocell".

When the selection is "Photocell" and the ambient light sensed by the IFD is below the day threshold, the charts will be displayed in "Night" mode. Otherwise, the charts are displayed in "Day" mode.

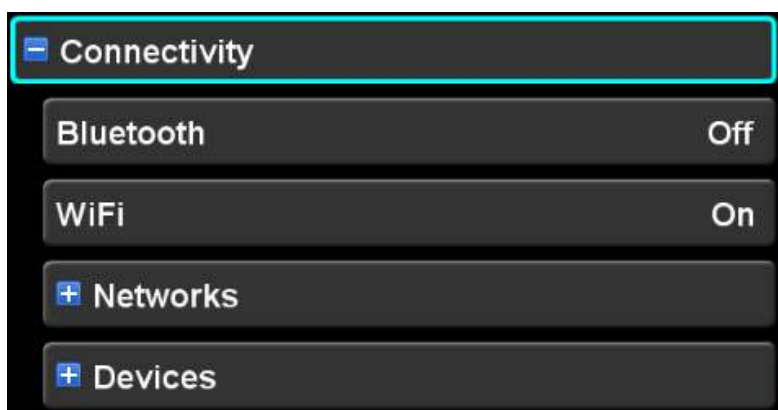
When the selection is “Dimming Bus” and the dimmer is below the day threshold, the charts will be displayed in “Night” mode. Otherwise, charts are displayed in “Day” mode.

## CONNECTIVITY CATEGORY

The items in this category are used to manage the Bluetooth and Wi-Fi capabilities of the IFD. Note that Wi-Fi and Bluetooth are paid options. If those options are not enabled, this category and the related items will not be shown.

When first expanded, the connectivity category will contain high level items as illustrated below.

### *Connectivity category (expanded)*



### **Bluetooth**

When the Bluetooth selection is “On”, the Bluetooth interface is enabled. The factory default setting is “Off”.

### **WiFi**

When the WiFi selection is “On”, the Wi-Fi interface is enabled. The factory default setting is “Off”.

### **Networks subcategory**

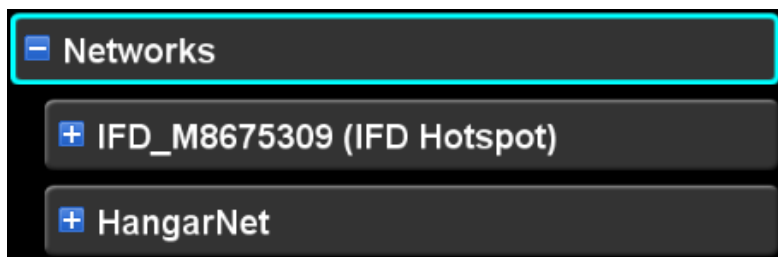
The networks subcategory provides a means to view and select the networks that are available to the IFD. The IFD can create its

own local area network ("Hotspot") or it can connect as a client to an external network.

When the networks subcategory item is expanded, the items in the category each represent a network. Each of those network items can be expanded in order to configure the network.

If the Wi-Fi setup item is set to "Off", then no external networks will be shown. However, the IFD Hotspot item will still be shown, allowing the IFD LAN to be configured prior to enabling Wi-Fi connections.

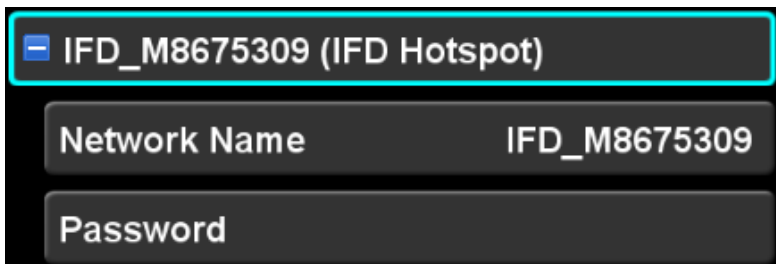
***Networks subcategory (expanded)***



***IFD Local Area Network (LAN) (a.k.a. IFD Hotspot)***

The IFD LAN is always shown as the first Wi-Fi network in the category and is identified by "(IFD Hotspot)" next to the network name. The network name will default to "IFD\_" suffixed with the serial number of the IFD. However, the network name and the password can be changed.

To change the name of the IFD local area network, first expand the item. Once expanded, items for the network name and password will be revealed. The items are edited using normal techniques for editing a textual field.

*IFD LAN Item (expanded)*

IFD\_M8675309 (IFD Hotspot)

Network Name IFD\_M8675309

Password

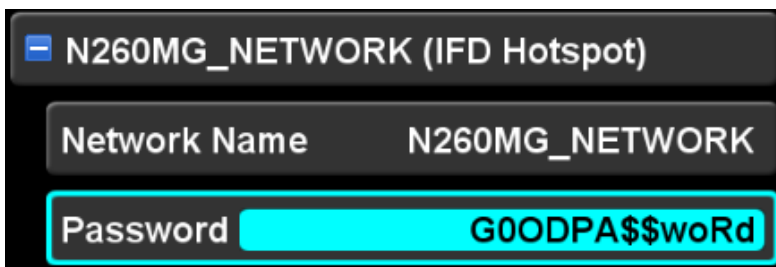
*IFD LAN Network Name Item (selected)*

IFD\_M8675309 (IFD Hotspot)

Network Name IFD\_M8675309

Password

Entry of a new network name will also be reflected on the IFD LAN item (i.e. the header).

*IFD LAN Password Item (selected)*

N260MG\_NETWORK (IFD Hotspot)

Network Name N260MG\_NETWORK

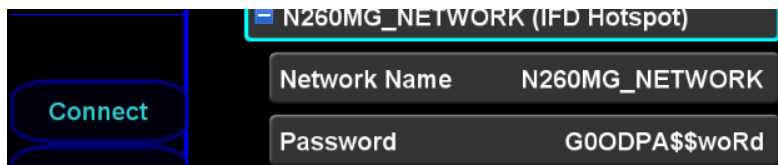
Password G0ODPA\$\$woRd

The IFD enforces the industry recommended minimum password length of 8 characters. As the field is being edited, if less than 8 characters have been entered, the IFD will ignore actions to complete the edit (e.g. **pressing the ENTR button will have no effect**). The edit can be aborted by pressing CLR.



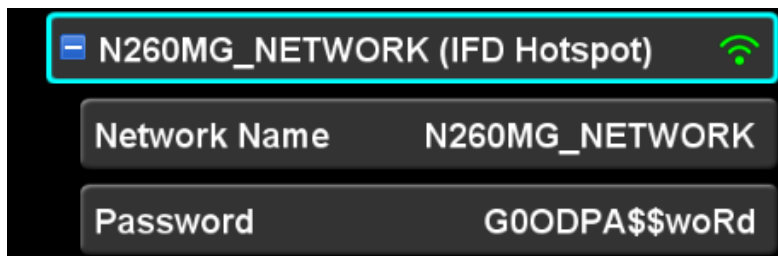
To start the IFD Local Area Network, move the cursor to the network header, the network name, or the password and then press the “Connect” LSK.

***Connect LSK for IFD LAN***



As the IFD is initializing the network, an animated gray Wi-Fi icon will appear on the right side of the network header. When the network is ready for use, the Wi-Fi icon will become solid green and clients will be able to connect to the IFD.

***IFD LAN Ready for Use***

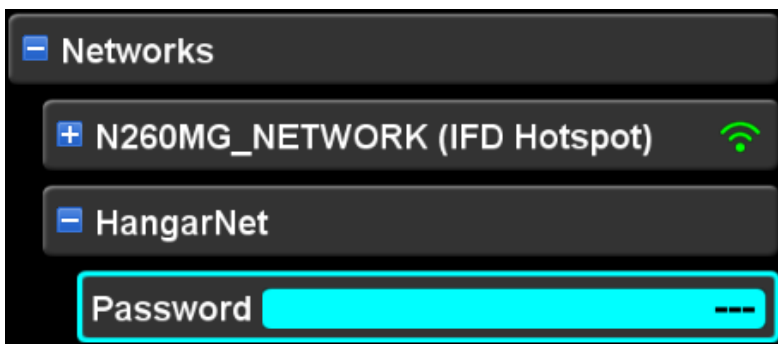


***External Networks***

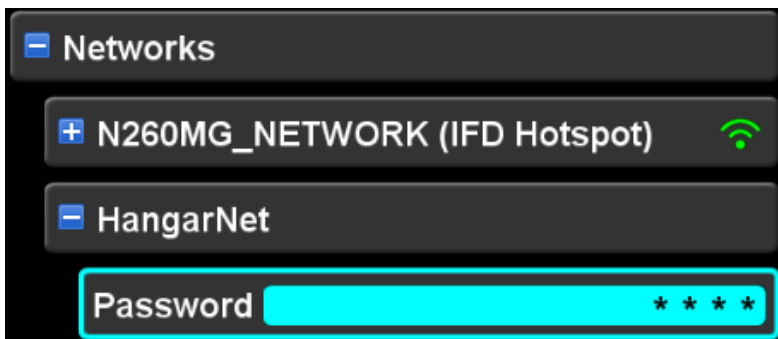
When Wi-Fi is “on”, the IFD will continuously search for accessible external Wi-Fi networks. Each recognized network will be represented by a Wi-Fi network item on the page. The IFD can show up to twenty networks.

If a previously recognized external network has not been detected for five minutes, the IFD will remove that network from the list.

Like the IFD LAN item, the items for each external network can be expanded. However, expanding the item will reveal only a password item associated with the network.

***External Network (expanded, no password entered)***

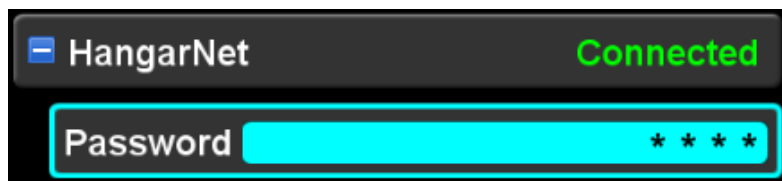
Editing the password for an external network is accomplished using the normal technique for a textual field. If no password has been entered, then the field will show three dashes. While the password is being edited, the characters will be shown. However, as a security measure, once the password has been accepted, the field will be shown as four asterisks.

***External network (expanded, password entered)***

In order to connect to an external network, move the cursor to either the main item or the password item. Then, press the "Connect" LSK. As the IFD is negotiating the connection with the external network, the message "Connecting..." will be shown on the right side of the network item. The IFD will attempt the connection for up to 60 seconds. If the connection is successfully established, the message "Connected" will be shown in green on the right side of the network item. If the connection is unsuccessful, the message "Failed to connect" will be shown in

yellow on the right side of the network item, and that message will continue to be displayed until another network connection attempt is made.

**External network (connected)**



### Devices subcategory

The IFD provides the capability to transfer data to and from Wi-Fi enabled devices. Once a device is connected, it is capable of receiving the data being streamed from the IFD. However, for security purposes, a device must be specifically approved by the pilot in order to enable the IFD to accept data transmitted by the device.

The devices subcategory provides a means to manage the Wi-Fi enabled devices that are recognized by the IFD on the selected network. This subcategory will not be displayed when the Wi-Fi setting is "Off".

Each device that is recognized by the IFD will be represented by a device item shown under the devices subcategory. Each device item shows the name or IP address of the device and the "connection policy" for that device. The connection policy is the means to control whether the IFD will accept data transmitted by the device.

When a new device is recognized by the IFD, a device item will appear under this subcategory, its connection policy will be set to "Blocked", and a "Connect Request" alert will be issued. Communication with the device will be inhibited until the pilot sets the connection policy to something other than "Blocked".

Connection policies are as follows:

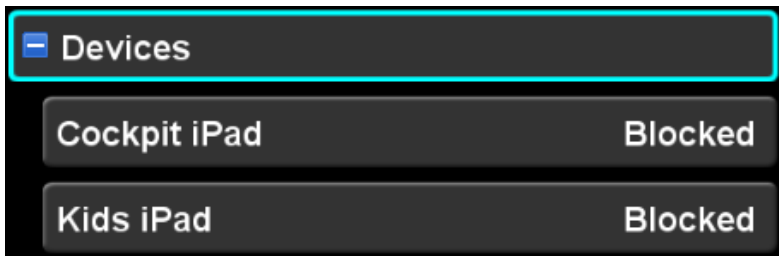
- **Blocked** – a device has made a request to connect to the IFD, but the pilot has not yet taken action to set the connection policy for the device.

- Never – connection attempts by this device will automatically be rejected
- Once – this connection attempt will be accepted, but future connection attempts will require operator action to set the connection policy
- Always – connection attempts by this device will automatically be accepted

The IFD will retain the connection policy for the ten most recently recognized devices. However, only five devices may be connected with the IFD simultaneously.

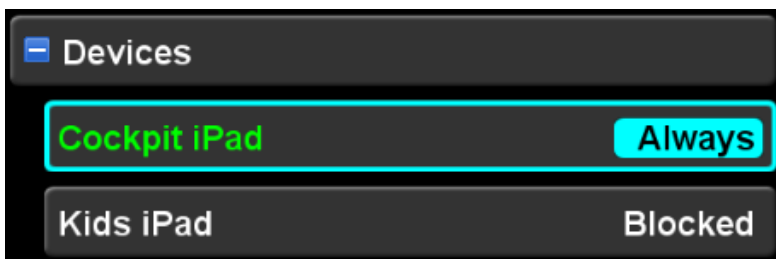
In the example below, two devices have been recognized by the IFD; “Cockpit iPad” and “Kids iPad”. Although the devices have made requests to connect to the IFD, both are blocked from sending data to the IFD until the policy has been changed to either “Always” or “Once”.

#### ***Blocked devices***



When a device is blocked, the pilot must take action to set the communication policy for that device. If the device is trusted and will always be under control of the pilot, setting the connection policy to “Always” is appropriate. If the pilot prefers to specifically determine whether that device should be allowed on every connection attempt, the connection policy should be set to “Once”. If this device is not known to the pilot, the connection policy should be set to “Never”.

If the device is connected and the connection policy is set to “Always” or “Once”, then the device name will be displayed in green.

**Device Connection Policy Set and Device Communicating**

When a device attempts to connect, and the connection policy is either “Once” or “Blocked”, the IFD will present a green informational alert containing the name of the device attempting the connection, as illustrated below:

**Connect request informational alert****ADS-B Over Wi-Fi**

When the ADS-B Over Wi-Fi selection is “On”, the IFD will forward data received from a wired ADS-B In source over the Wi-Fi interface. Most Electronic Flight Bag (EFB) applications will use this data to display weather and/or traffic. Some EFBs can be configured to get ADS-B data over other interfaces (e.g. Bluetooth). In those cases, this setting should be “Off”. The factory default setting is “On”.

The ADS-B Over Wi-Fi setting will only be shown if the IFD is configured to receive data from a wired ADS-B In source.

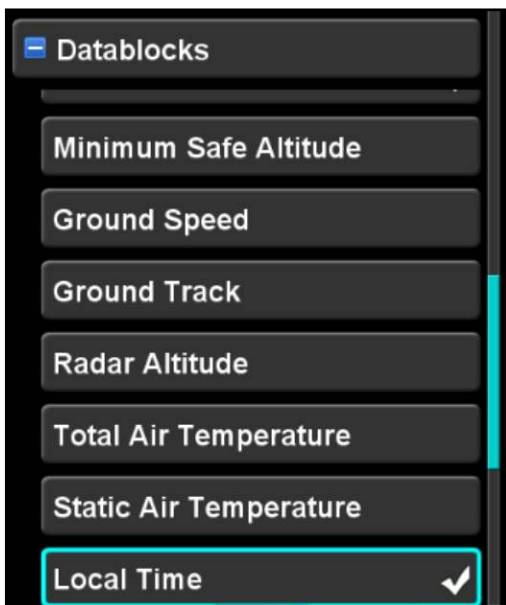
## DATABLOCKS CATEGORY

The IFD defines “datablocks” containing focused data that can be displayed around the edges of the display. Datablocks are meant to be used as full-time displays of desired data that can be observed with a glance. See the figure in the Page Layouts section (page 1-22) for an illustration of datablocks.

The datablocks category is used to select which datablocks are displayed in each datablock “slot” that is available. While the space allocated for the set of datablocks is fixed, the number of datablocks that can be displayed is variable since not every datablock takes up the same amount of space.

When the datablocks category is expanded, the Setup Page cursor is limited such that only datablocks can be selected. **In order to return to normal operation of the Setup Page, the cursor must be returned to the Datablock category item at the top, and the category condensed.** If the datablocks category is expanded and a different page is selected on the IFD, upon return to the Setup Page, the datablocks category will no longer be expanded.

### *Datablocks Category expanded*



Once the datablocks category is expanded, the operation of the right knob is slightly different than the normal Setup Page operation. The outer knob selects the datablock "slot" to be affected. The inner knob selects the datablock that is to be displayed in the selected slot. The selected slot is shown with a blue background (except for the VLOC radio block). The selected datablock is shown with the typical cyan cursor surrounding the item.

#### ***Datablock selected slot and block***



In order to change the datablock selected in a given slot, first turn the outer knob or touch to move the cursor to the desired slot. Then, use the inner knob or touch to select the datablock item to be displayed. Then, press the knob button or touch the datablock again to place it into the selected slot.

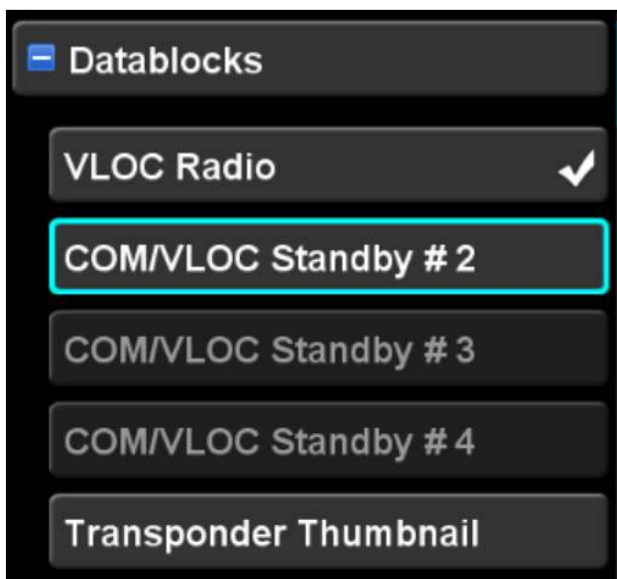
It is possible to select more datablocks for display on the right side than will fit on the screen at one time. The list can be scrolled using the touchscreen to reveal those datablocks that are off the screen.

When a datablock has been selected for display in a slot, a check mark is displayed next to the name of that datablock. It is

possible to select the same datablock for display in more than one slot, so the check mark provides a quick method to identify that situation. The ability to select the same datablock in more than one slot can be useful to organize the displayed datablock groupings by phase of flight, and repeating options. The right side can then be scrolled as necessary to reveal the appropriate set of datablocks for the current phase.




When a given datablock is not allowed to be placed into the selected slot, that row will be presented in a dim color and the datablock will not be selectable either with the knob or by touch.

***Non selectable datablocks (dimmed rows)***










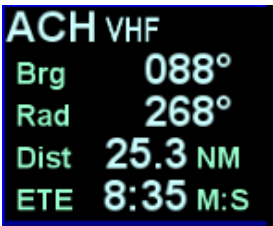



Potential datablock selections are listed below. When selected for a slot at the top of the screen, the format of some datablocks will change to fit in the limited space available.






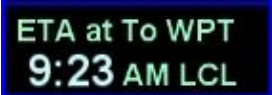
Datablock Item Title and Image	Content
Primary Com/VLOC (Note: This selection is grayed out and is not selectable) <sup>1</sup>	Defines the position of the top two datablocks along the left side. These are permanently dedicated to Com/VLOC control and display.
VLOC Radio <sup>1</sup> 	Provides a means to display the Active and Standby Nav frequencies in slots 3 and 4.  If Remote IFD Tuning is on, the identifier will be preceded by "NAV1" or "NAV2" signifying which radio is being controlled
Com/VLOC Standby #2 <sup>1</sup> 	Provides a means to display a third com or nav frequency (second standby slot)  Available only on the left side
Com/VLOC Standby #3 <sup>1</sup> 	Provides a means to display a fourth com or nav frequency (third standby slot)  Available only on the left side







<sup>1</sup> Not applicable to the IFD510 and IFD545




Datablock Item Title and Image	Content
<p>Com/VLOC Standby #4<sup>1</sup></p> 	<p>Provides a means to display a fifth com or nav frequency (fourth standby slot)</p> <p>Available only on the left side</p>
<p>Traffic Thumbnail</p> 	<p>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 (if on the left side of the IFD) or by touching the lower 1/3 of the block.</p> <p>When on the left side, only available in a fixed location aligned with the top line select key.</p>
<p>Transponder Thumbnail</p> 	<p>Provides a means to display and control the remote transponder mode and code as well as a Reply lamp.</p> <p>The Ident function will be performed by touching the Ident soft key. Touching the mode or code will produce the transponder specific keyboard for data entry.</p>

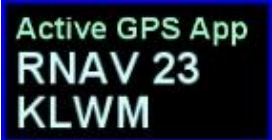


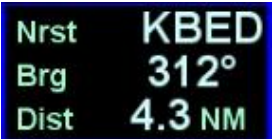

Datablock Item Title and Image	Content
<p>To Waypoint Information</p> 	<p>To waypoint identifier, desired track to current waypoint along flight plan route, distance to current waypoint along the track*, estimated remaining fuel at the current waypoint (if a fuel flow system is connected), and estimated time enroute to the current waypoint. The data will be displayed in magenta. (content varies depending on whether a fuel flow system is connected)</p> <p>* Depending upon the relative geometry of the To waypoint and the aircraft position/direction of flight at the time of waypoint activation, track may not necessarily be a straight line but include a button hook at the beginning.</p>
<p>Next Waypoint Information</p> 	<p>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. (content varies depending on whether a fuel flow system is connected)</p> <p>Note: The data fields will be dashed if there is no flight plan, the active leg is the last leg of the flight plan, or the active leg is followed by discontinuity.</p>

Datablock Item Title and Image	Content
<p>Designated Waypoint</p> 	<p>Designated waypoint identifier, bearing from present position to the designated waypoint, radial from the designated waypoint to present position, straight line distance from present position to the designated waypoint, and estimated time enroute from present position to the designated waypoint.</p> <p>Note: to change the designated waypoint, touch the datablock to display the virtual keyboard. Type in the designated waypoint identifier and press Enter. The designated waypoint will persist across power cycles.</p>
<p>Destination Along Track Info</p>  	<p>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.</p> <p>Format of ETE in all datablocks is HH:MM until the ETE is less than 10 minutes. Then it goes to MM:SS.</p>
<p>Destination Direct Info</p> 	<p>Destination identifier, bearing to destination from present position and distance to destination from present position.</p>

Datablock Item Title and Image	Content
Destination Waypoint  	Destination identifier.
Destination Direct Distance  	Destination identifier and straight line distance to the destination from present position.
To Waypoint Direct Info  	Active (To) waypoint identifier, bearing from present position to active waypoint, straight line distance from present position direct to the active waypoint with no button hook.
To Waypoint Direct Distance  	Active (To) waypoint identifier and straight line distance from present position direct to the waypoint with no button hook.
ETA at Destination  	Estimated time of arrival at the "Destination" waypoint.
To Waypoint ETA  	Estimated time of arrival at the "To" waypoint.







Datablock Item Title and Image	Content
Destination ETE 	Estimated time enroute (along flight planned route) to the “Destination” waypoint.
To Waypoint ETE 	Estimated time enroute to the “To” waypoint.
GPS CDI 	Current track, desired track for active flight plan leg and visual depiction of deviation.  Note that the CDI displayed in this datablock is <b>always</b> based on GPS and is <b>never</b> a VHF CDI.
Track Angle Error 	Track angle error (error in degrees between desired track and actual track) and an arrow indicating direction to fly to correct the error.
Desired Track 	Desired track for active flight plan leg.
Cross Track Distance 	Cross track deviation from current flight plan leg.



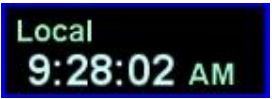
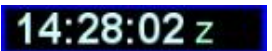



Datablock Item Title and Image	Content
<p>Next Desired Track</p> 	<p>Desired track for the next flight plan leg (not the active flight plan leg).</p>
<p>Vertical Speed Required</p> 	<p>Vertical speed required to make next down-path altitude constraint. All constraints are considered “at” for purposes of this computation.</p>
<p>Navigation Mode</p> 	<p>IFD navigation mode (e.g. OCN, ENRT, TERM, APPR) including the GPS Nav mode (e.g. LPV, LNAV/VNAV, LNAV+V, LNAV, LP).</p>

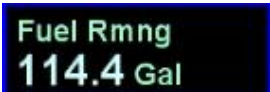
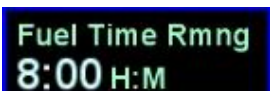
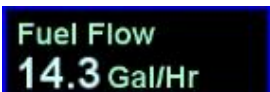


Datablock Item Title and Image	Content
<p>Active GPS Approach</p> 	<p>Approach identifier and airport.</p>
<p>Decoded VLOC Identifier<sup>1</sup></p>  	<p>For VORs:            Navaid identifier, navaid radial currently on, distance to navaid.</p> <p>For ILS/Localizers:            Localizer identifier, airport, runway.</p>
<p>Nearest Airport</p> 	<p>Nearest airport identifier, bearing and distance to the airport.</p>
<p>Aircraft Position</p> 	<p>Aircraft position (ddd°mm'ss" format shown)</p>

<sup>1</sup> Not applicable to the IFD510 and IFD545



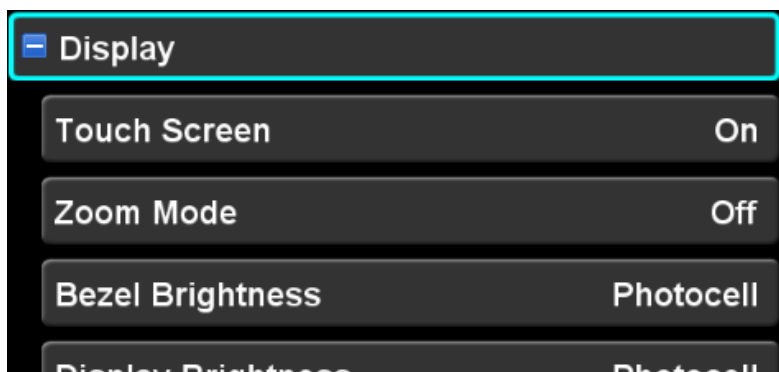
Datablock Item Title and Image	Content
GPS AGL Altitude 	Computed AGL altitude based on GPS altitude.
Minimum Safe Altitude 	Min Safe Altitude (defined as 1000' above the highest terrain or obstacle in a 10nm rectangle around the aircraft position).
Ground Speed 	Ground speed.
Ground Track 	Ground Track.
Wind Vector 	<p>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.</p> <p>Note: Requires TAS and Heading from an external device like an EFIS.</p>
Radar Altitude 	<p>AGL altitude from a radar altimeter.</p> <p>Note: requires radar altimeter input</p>

Datablock Item Title and Image	Content
<p>Total Air Temperature</p> 	<p>Total Air Temperature</p> <p>Note: Requires TAT input from an external device like an EFIS or appropriate fuel flow system.</p>
<p>Static Air Temperature</p> 	<p>Static Air Temperature</p> <p>Note: Requires SAT input from an external device like an EFIS or appropriate fuel flow system.</p>
<p>Local Time</p> 	<p>Local time.</p>
<p>UTC Time</p> 	<p>UTC (Zulu) time</p>
<p>Flight Timer</p> 	<p>This timer automatically starts and is based on the system in-air determination.</p>
<p>Number of Alerts</p> 	<p>Number of active red warnings, yellow cautions, cyan advisories, and green notices.</p>
<p>User Profile</p> 	<p>Currently selected User Profile.</p>

Datablock Item Title and Image	Content
Fuel Amount Remaining  	Total fuel as sent by the aircraft fuel flow system, if available.  Only presented as an option if the IFD is configured to communicate with an external fuel flow system
Fuel Time Remaining  	Estimated fuel time remaining in HH:MM based on input from the aircraft fuel flow system.  Only presented as an option if the IFD is configured to communicate with an external fuel flow system
Fuel Flow  	Fuel flow as sent by the aircraft fuel flow system. For twin engine aircraft, this is the summed total.  Only presented as an option if the IFD is configured to communicate with an external fuel flow system
Fuel Used  	Estimated fuel used as sent by the aircraft fuel flow system, if available. For twin engine aircraft, this is the summed total.  Only presented as an option if the IFD is configured to communicate with an external fuel flow system
Fuel Economy  	Estimated fuel economy (e.g. nm/gal) based on input from the on-board fuel flow system.  Only presented as an option if the IFD is configured to communicate with an external fuel flow system
*** Blank ***	Single blank line.

## DISPLAY CATEGORY

The items in this category control appearance and behavior of the IFD front panel display.



### Touch Screen

This setting controls whether the IFD touch screen is enabled. Virtually all operations on the IFD can be accomplished without the use of the touch screen. There are a few, however, that will be unavailable when the touch screen is disabled (e.g. panning the map, rubber-banding a flight plan). The factory default setting is "On".

### Zoom Mode

This setting controls whether some IFD display components are displayed in a bigger font. This setting primarily affects the datablocks and the LSK legends. The factory default setting is "Off".

### Bezel Brightness

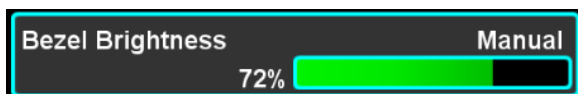
This setting specifies which of three methods are used to control the brightness of the bezel knob and button backlights. The factory default setting is "Photocell". Each of the selections is described below.

- **Dimming Bus** – the brightness is controlled using the aircraft dimming bus control.

- **Photocell** – the brightness is controlled using the ambient light measured by the photocell on the bezel. Brightness is adjusted with no pilot action.
- **Manual** – the brightness is set manually to the selected brightness level. When “Manual” is selected, the Setup Page item expands to reveal a green sliding scale representing the brightness.



Move the cursor to surround the sliding scale by using the right knob or the touch screen controls, then select using the right knob button or the touch screen. When the scale is being edited, the percentage brightness will be shown to the left of the scale.



The scale can be modified by touching the bar, touching and dragging the bar, or by rotating the right knob. Any of the normal controls can be used to complete the edit.

In “Manual” mode, the selected brightness percentage is retained across power cycles. However, at power up, the IFD will always restore the percentage to at least 20%. This is to prevent a very dim display from being interpreted as a display failure.

## Display Brightness

This setting specifies which of three methods are used to control the brightness of the IFD display screen backlights. The factory default setting is “Photocell”.

Operation of the Display Brightness setting is identical to operation of the Bezel Brightness setting. Refer to that section for details.

## Keyboard Convenience

In a dual IFD installation, an edit can be initiated on one IFD and a virtual keyboard will be displayed on the other IFD. This feature is known as “Keyboard Convenience” mode. This setting is used to control whether keyboard convenience mode is enabled. If it is not, then the virtual keyboard will be presented on the same IFD that was used to initiate the edit. The factory default setting is “Off”.

This setting will only be shown when the IFD is configured with cross-sync enabled.

## Hide Page Tabs

This setting controls the amount of time that the page tabs at the bottom of the display are shown. When the current page is changed, the tabs are displayed. If this setting is set to “Never”, the tabs will remain displayed at all times. Otherwise, the tabs will scroll out of view after the selected number of seconds. This feature is useful in order to gain usable space at the bottom of the map and charts pages. The factory default setting is “Never”.

## FMS CATEGORY

The items in this category are used to control the appearance and behavior of the FMS.



## VNAV

Settings under this heading are used to define the method for computing the top-of-descent point, which directly affects the angle used by enroute VNAV (see page 6-31).

### ***Path Basis***

This setting defines whether the top-of-descent point is determined by a specified descent angle or on a descent rate (i.e. vertical speed). The factory default setting is "Descent Angle". Changes to this setting will be propagated to all other cross synced IFDs.

### ***Descent Angle***

This setting defines the angle used to determine the top-of-descent point when the path basis is descent angle. The value can range from 1.0° to 6.0° degrees. The factory default setting is 4.0°. Changes to this setting will be propagated to all other cross synced IFDs.

### ***Descent Rate***

This setting defines the rate of descent used to determine the top-of-descent point when the path basis is descent rate. The minimum and maximum values vary based on the selected Altitude/VS Units setting, but are based on a range of 50 feet per minute to 2000 feet per minute. The factory default setting is 500

feet per minute. Changes to this setting will be propagated to all other cross synced IFDs.

### **Transition Altitude**

This setting defines the altitude above which the vertical position of the aircraft is specified by reference to flight levels. Altitudes above this value on the FMS pages will be displayed as flight levels. The value of this setting will also be used to generate the "Transition Altitude" alert.

The transition altitude setting can be either "manual" or "automatic". Whenever a value is specifically entered, the setting is considered to be in manual mode and the value will be displayed in white.

When the setting is automatic and the origin airport has an associated transition altitude, the FMS will set the transition altitude as specified for the airport. When the transition altitude is automatic, the value will be displayed in green.

To switch from manual mode back to automatic, position the cursor around the transition altitude setting and press the CLR key. At that point, the altitude will be displayed in green, but the value will only change if the origin airport has a specified transition altitude.

The allowable range is from 1,000 feet to 60,000 feet. The factory default setting is 18000 feet, in automatic mode. Changes to this setting will be propagated to all other cross synced IFDs.

### **Transition Level**

This setting defines the altitude below which the vertical position of the aircraft is specified by reference to MSL altitude. The value of this setting will be used to generate the "Transition Level" alert.

The transition level setting can be either "manual" or "automatic". Whenever a value is specifically entered, the setting is considered to be in manual mode and the value will be displayed in white.

When the setting is automatic and the destination airport has an associated transition level, the FMS will set the transition level as



specified for the airport. When the transition level is automatic, the value will be displayed in green.

To switch from manual mode back to automatic, position the cursor around the transition level setting and press the CLR key. At that point, the level will be displayed in green, but the value will only change if the destination airport has a specified transition level.

The allowable range is from FL010 to FL600. The factory default setting is FL180, in automatic mode. Changes to this setting will be propagated to all other cross synced IFDs.

### **High Altitude Airways**

This setting controls whether the FMS will present high altitude airways (e.g. jet airways) in the dropdown menus when a flight plan is being entered. The factory default setting is "On".

### **Low Altitude Airways**

This setting controls whether the FMS will present low altitude airways (e.g. victor airways) in the dropdown menus when a flight plan is being entered. The factory default setting is "On".

### **Arrivals**

This setting controls whether the FMS will present instrument arrival procedures in the dropdown menus when a flight plan is being entered and whether the arrivals field is presented for airports. The factory default setting is "On". Changes to this setting will be propagated to all other cross synced IFDs.

### **Departures**

This setting controls whether the FMS will present instrument departure procedures in the dropdown menus when a flight plan is being entered and whether the departures field is presented for airports. The factory default setting is "On". Changes to this setting will be propagated to all other cross synced IFDs.

### **Approaches**

This setting controls whether the FMS will present instrument approach procedures in the dropdown menus when a flight plan is being entered and whether the approaches field is presented

for airports. The factory default setting is “On”. Changes to this setting will be propagated to all other cross synced IFDs.

## Visual Approaches

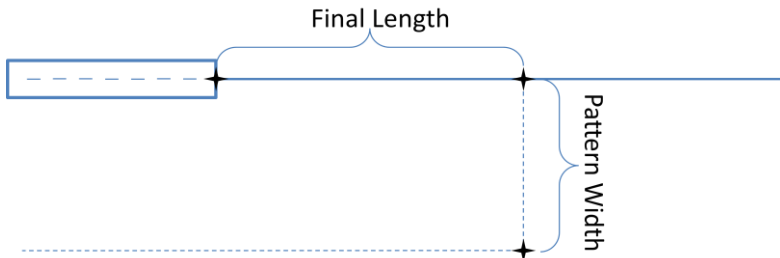
This setting controls whether the FMS will include visual approach procedures in the dropdown menus containing approaches. The factory default setting is “On”. Changes to this setting will be propagated to all other cross synced IFDs.

## Visual Approach Settings

A visual approach primarily consists of a single leg along the final approach course, terminating at the runway threshold. All lateral guidance for the visual approach is based on that leg. Advisory vertical guidance on the visual approach is defined by a glideslope setting within this subcategory.

In order to increase situational awareness, however, a visual approach can be augmented on the map by drawing lines representing a base leg and a downwind leg. The placement of those legs is defined by settings in this subcategory for “final length” and “pattern width”, as illustrated below

### *Visual Approach Settings (Final Length, Pattern Width)*



### *Visual Approach Settings – Final Length*

This setting controls the length of the final approach as depicted on the map when showing a visual approach with either a base or a downwind entry. The factory default setting is 1.0 nautical miles. Changes to this setting will be propagated to all other cross synced IFDs.

### **Visual Approach Settings – Pattern Width**

This setting controls the pattern width of the visual approach (i.e. the length of the base leg) when showing a visual approach with either a base or a downwind entry. The factory default setting is 1.2 nautical miles. Changes to this setting will be propagated to all other cross synced IFDs.

### **Visual Approach Settings – Glideslope**

This setting controls the glideslope used to generate advisory vertical guidance on a visual approach. The factory default setting is 4.0 degrees. Changes to this setting will be propagated to all other cross synced IFDs.

### **Patterns**

This setting controls whether the FMS will include search and rescue patterns in the dropdown menus when a flight plan is being entered. Support for search and rescue patterns is a paid option. This setting will only be shown on the Setup Page when the option is enabled. At this point, the only search and rescue pattern supported is an "Orbit". The factory default setting is "On". Changes to this setting will be propagated to all other cross synced IFDs.

### **SBAS Channel Numbers**

This setting controls whether the FMS will present SBAS channel numbers in the dropdown menus next to SBAS approaches. When this setting is "On", the channel number will be displayed. When this setting is "Off", the level of service will be displayed (e.g. LPV, LNAV, LNAV+V, etc.) The factory default setting is "Off".

### **Advisory Glideslope**

This setting controls whether the FMS will provide advisory vertical guidance on those approaches where it is available. The factory default setting is "On". Changes to this setting will be propagated to all other cross synced IFDs.

### **Mini Flight Plan Format**

This setting controls the appearance of flight plan legs and procedures on the FPL and ROUTE pages. When the setting is

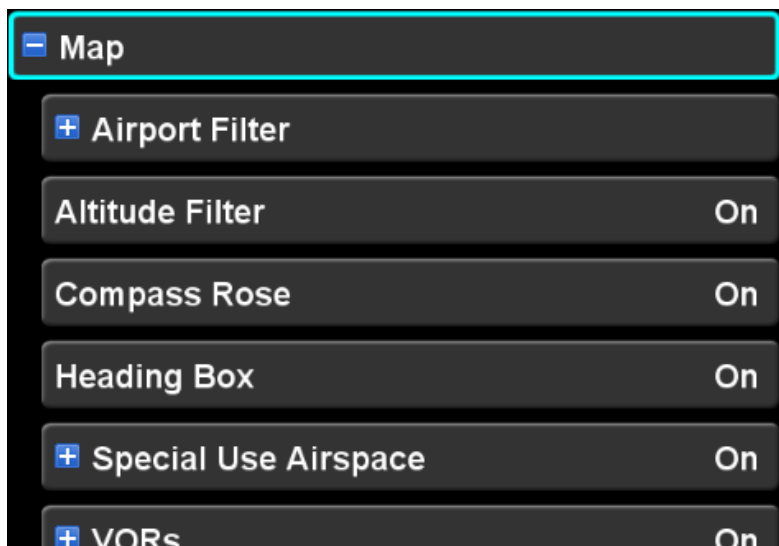
“On”, the flight plan is presented using an abbreviated format that allows more legs to be visible at one time. The factory default setting is “Off”.

### **Auto Enable Missed**

This setting controls whether the missed approach is automatically enabled once the aircraft sequences the final approach fix (FAF). When this setting is “Off”, the missed approach can still be enabled, but that operation must be performed manually in order for guidance to be provided to the missed approach procedure. The factory default setting is “On”. Changes to this setting will be propagated to all other cross synced IFDs.

## MAP CATEGORY

Presentation of the IFD moving map is highly configurable using the settings under this category. Primarily, this category consists of a setup item for each available map layer. Other settings include airport filtering controls and on/off controls for high level features such as the compass rose.



### Map Orientation

This setting controls whether the top of the map is oriented with the aircraft heading or with the aircraft track. The factory default setting is "Heading Up".

On power up, the orientation will be set to Track Up for 30 seconds in order to give the IFD time to determine whether a valid heading source is available.

At any time after the initial 30 seconds, if aircraft heading unavailable, the map orientation will be set to Track Up and this setting will not be shown on the Setup Page. If aircraft heading becomes available, and has remained available for 10 seconds, the setting will again be shown on the Setup Page.

## Airport Filter

Many of the airports in the navigation database may not be suitable for use by a particular aircraft or a particular mission. There may be several reasons that an airport would be unusable including not having a runway with sufficient length and not having suitable fuel available. The airport filter item provides a means to define criteria which must be met in order for an airport to be depicted on the map.

The airport filter item consists of four criteria - tower, fuel, runway surface, and runway length. The criteria are arranged in order and worded such that the filter reads like a sentence, in order to provide clarity about what effect the filter will have.

Only airports that meet **all** of the filter criteria will be displayed on the map.



Each of the settings is edited using the typical controls for enumerated items once the filter item has been expanded.

### ***Tower Filter***

The tower criterion defines whether the filter should accept only towered airports, only non-towered airports, or any airport regardless of whether it is towered. The factory default setting is to accept any airport regardless of whether it is towered.

### ***Fuel Filter***

The fuel criterion defines whether the filter should accept only those airports that have 100L fuel available, only those airports that have Jet-A fuel available, or any airport regardless of whether fuel is available or what type of fuel is available. The

factory default setting is to accept any airport regardless of whether fuel is available or what type of fuel is available.

### ***Runway Surface Filter***

The runway surface criterion defines whether the filter should accept only airports with a runway that has a specific type of surface or any airport regardless of whether a given runway surface is present. Specific surface types are “hard”, “soft”, “water”, and “hard or soft”. The factory default setting is to accept any airport regardless of what runway surface type is available.

### ***Runway Length Filter***

The runway length criterion defines whether the filter should accept only airports with a specified minimum runway length or any airport regardless of runway length. The minimum runway length can be specified as one of several options ranging from 2000 feet to 5000 feet. The factory default setting is to accept any airport regardless of runway length.

### **Altitude Filter**

Several of the map layers have an altitude component defining when items in that layer are to be displayed. This setting controls whether the altitude component is to be considered when determining whether an item is to be displayed. The factory default setting is “On”, thus enabling the use of the altitude component.

### **Compass Rose**

This setting controls whether the compass rose is displayed on the map. The factory default setting is “On”.

### **Heading Box**

This setting controls whether the numeric aircraft heading (or track) is displayed at the top of the map. The factory default setting is “On”.

### **Map Layers**

Each of the map layers is represented by an item with multiple conditions, in a fashion similar to the airport filter. The set of

conditions varies with the layer since not all conditions are applicable to all layers.

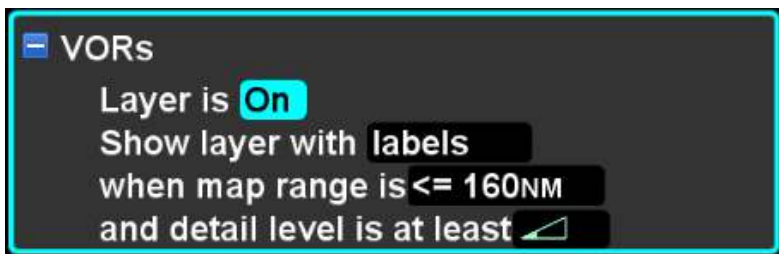
Each layer has an overall on/off setting that controls visibility of the layer. When the layer is condensed, the overall visibility of the layer is shown on the right side of the item.



When the item is expanded and the layer is "On", the set of conditions for that layer are shown. However, if the layer is off, none of the other conditions are shown.



Once the layer is turned "On", the set of conditions applicable to that layer are revealed.



Like the airport filter, the layout and wording of conditions within a map layer is designed to make the set of conditions read like a sentence. The sentence is structured to clearly specify the set of conditions that must be met in order for items in the layer to be shown. Each of the possible criteria are as follows.

### **Labels**

The labels criterion specifies whether items are displayed on the map with an associated label. The label generally contains the identifier of the item being displayed.



**Range**

The range criterion specifies the maximum map range at which items in the layer will be displayed. At or below that range, items will be displayed. Above that range, they will not.

**Detail**

The detail criterion specifies the map detail level at or above which items in the layer will be displayed. The symbol displayed corresponds to the detail level symbol shown on the Nav LSK of the Map page. If the selected nav detail level is at the same level specified in the condition or higher (i.e. more filled in), then the item will be displayed.

**Altitude**

The altitude criterion specifies a related altitude component defining whether an item in the layer is to be displayed. The meaning of the altitude criterion varies based on the layer being processed.

Map layers have several possible default settings either corresponding to the intended mission or “factory” default. See the “Presets” section for a discussion of those default settings.

***Special Use Airspace Layer***

This layer contains several classes of restricted airspace including warning, alert, MOA, caution, danger, and prohibited. It also includes ADIZ airspace.

***VORs Layer***

This layer contains VOR stations, including low altitude, terminal, and high altitude VORs.

***Towered Airports Layer***

This layer contains airports that have a control tower.

***Non-Towered Airports Layer***

This layer contains airports that do not have a control tower.

### ***Class A/B/C Airspace Layer***

Although the title would indicate just three kinds of airspace, this layer contains virtually all classes of controlled airspace except class D and Comm airspace (for which separate layers exist). This includes Terminal Control Areas, Terminal Radar Service Areas, and Military Control Zones, to name a few.

The altitude criterion associated with this layer specifies a number of feet above the airspace ceiling. The airspace will be displayed when the aircraft is less than the specified number of feet above the airspace ceiling.

### ***Class D Airspace***

This layer contains class D airspaces and Air Traffic Zones.

The altitude criterion associated with this layer specifies a number of feet above the airspace ceiling. The airspace will be displayed when the aircraft is less than the specified number of feet above the airspace ceiling.

### ***Comm Airspace***

This layer contains airspaces that are primarily defined to indicate some kind of communication requirement. Specifically, it includes Mode C Areas, Transponder Mandatory Zones, Radio Mandatory Zones, Mandatory Broadcast Zones, and Common Frequency Zones.

The altitude criterion associated with this layer specifies a number of feet above the airspace ceiling. The airspace will be displayed when the aircraft is less than the specified number of feet above the airspace ceiling.

### ***High Obstacles***

This layer contains obstacles that are 1000 feet AGL or higher.

The altitude criterion associated with this layer specifies a number of feet above the obstacle. An obstacle will be displayed when the aircraft is less than the specified number of feet above the obstacle.

***Low Obstacles***

This layer contains obstacles that are less than 1000 feet AGL.

The altitude criterion associated with this layer specifies a number of feet above the obstacle. An obstacle will be displayed when the aircraft is less than the specified number of feet above the obstacle.

***Intersections***

This layer contains intersections that are part of an airway.

***Victor Airways***

This layer contains all airways that are classified as low-level or high-and-low level, regardless of the prefix.

The altitude criterion associated with this layer specifies an MSL altitude. Airways in this layer will be shown when the aircraft is below the specified altitude.

***Jet Airways***

This layer contains all airways that are classified as high-level, regardless of the prefix.

The altitude criterion associated with this layer specifies an MSL altitude. Airways in this layer will be shown when the aircraft is at or above the specified altitude.

***VFR Waypoints***

This layer contains waypoints intended for VFR use.

***User Waypoints***

This layer contains the user waypoints defined on the FMS WPT tab.

***NDBs***

This layer contains non-directional beacons.

***Non-TA Traffic***

This layer contains traffic targets that are not designated to cause a traffic alert (TA). TA targets are always displayed.

***Power Lines***

This layer contains power lines.

The altitude criterion associated with this layer specifies an AGL altitude. Power lines will be shown when the aircraft is below the specified AGL altitude.

***Interstates***

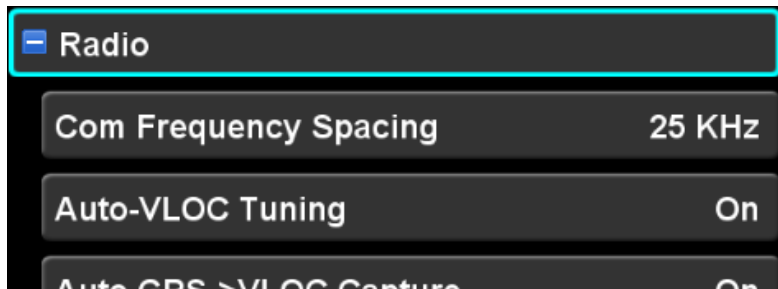
This layer contains major highways.

***Flight Plan Labels***

This setting controls whether labels for flight plan waypoints are displayed on the map. The factory default setting is "On".

## RADIO CATEGORY<sup>1</sup>

Items in this category are used to control operation of the VHF Nav/Com radio. If the IFD does not contain a VHF radio, this category and the related settings will not be shown.



### Com Frequency Spacing

This setting controls whether the com radio uses 25 KHz or 8.33 KHz spacing. The factory default setting is "25 KHz".

### Remote IFD Tuning

This setting controls whether the IFD is capable of tuning the radio on a second IFD. The factory default setting is "Off".

This setting is only available when the IFD is configured with cross-sync enabled.

### Auto-VLOC Tuning

This setting controls whether the IFD will automatically tune the nav radios to the nav aids recommended by the FMS. The factory default setting is "On". Changes to this setting will be propagated to all other cross synced IFDs.

### Auto GPS->VLOC Capture

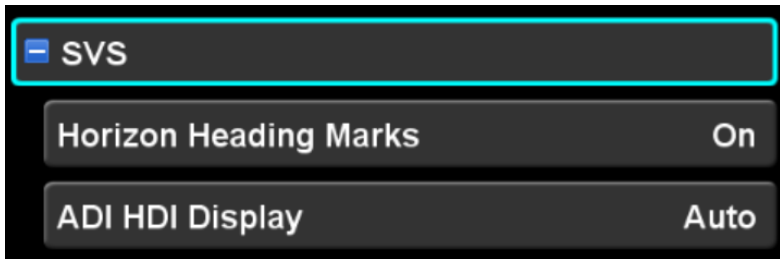
This setting controls whether the IFD will allow the GPS->VLOC state for nav source and automatically transition to VLOC when the capture criteria are met. The factory default setting is "On". Changes to this setting will be propagated to all other cross synced IFDs.

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<sup>1</sup> Not applicable to the IFD510 and IFD545

## SVS CATEGORY<sup>1</sup>

Items in this category control the presentation of the Synthetic Vision System (SVS) display. If the IFD does not have the SVS, this category and the related settings will not be shown.



### Horizon Heading Marks

This setting controls whether the IFD will show heading reference marks along the horizon of the SVS display. The factory default setting is “On”.

### ADI HDI display

This setting controls whether the Horizontal Deviation Indicator (HDI) will always be shown on the SVS display (“Always On”) or only during approaches (“Auto”). The factory default setting is “Auto”.

---

<sup>1</sup> Applicable to the IFD545 and IFD550 only

## TERRAIN CATEGORY

Settings in this category control the behavior of terrain awareness/avoidance functions within the IFD. If the IFD is configured with an external TAWS, this category and all of the related settings will not be shown.



### FLTA

This setting controls whether the Forward Looking Terrain Avoidance (FLTA) function is enabled. The factory default setting is "On".

### Terrain Awareness (TA)

This setting controls whether the Terrain Awareness function is enabled. If the TAWS function is enabled, this setting also enables Premature Descent Alert (PDA). The factory default setting is "On".

In dual IFD installations, both units will need to be set to "Off" to disable this function.

## Terrain Caution Aural

This setting controls the content of the aural message that is generated during FLTA caution conditions, with selections as follows:

- **Caution Terrain** – the aural message will say “Caution, Terrain; Caution, Terrain”.
- **Terrain Ahead** – the aural message will say “Terrain Ahead; Terrain Ahead”.
- 

The factory default setting is “Caution Terrain”.

## Terrain Warning Aural

This setting controls the content of the aural message that is generated during FLTA warning conditions, with selections as follows:

- **Terrain Pull Up** – the aural message will say “Terrain Ahead, Pull Up; Terrain Ahead, Pull Up”.
- **Terrain Terrain** – the aural message will say “Terrain, Terrain; Pull Up, Pull Up”.

The factory default setting is “Terrain Pull Up”.

## FLTA Exclusion Areas

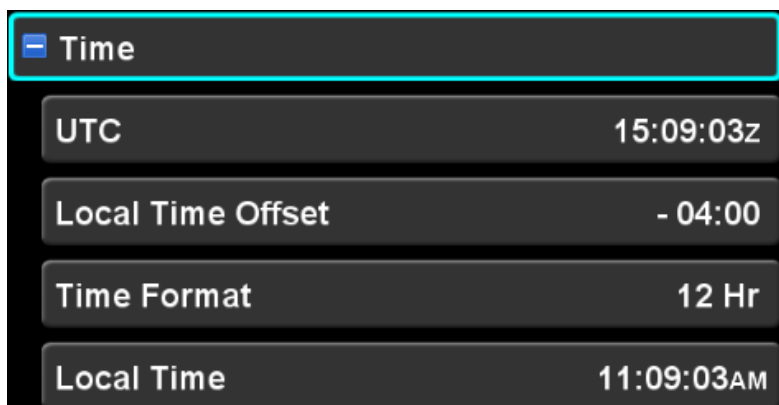
This setting controls whether FLTA Exclusion areas around airfields are enabled. The factory default setting is “Off”.

If the FLTA setting is “Off”, this setting will not be shown.



## TIME CATEGORY

Settings in this category control the presentation of time throughout the system.



Time	
UTC	15:09:03Z
Local Time Offset	- 04:00
Time Format	12 Hr
Local Time	11:09:03AM

### UTC

This item is not actually a setting and the cursor will skip it. It is merely a display of the current UTC time to be used for reference with the other settings.

### Local Time Offset

This setting defines the time difference between UTC and local time. The value ranges from -12 hours to +14 hours, in increments of 15 minutes. The factory default setting is 0:00 (no offset).

### Time Format

This setting controls the display of time throughout the system. Selections are as follows

- **UTC** – time values are displayed as UTC times and will be suffixed with “Z”.
- **12 Hr** – time values are displayed with respect to local time and will be suffixed with “AM” or “PM”.
- **24 Hr** – time values are displayed with respect to local time, ranging from 0:00 to 23:59, and will have no suffix.

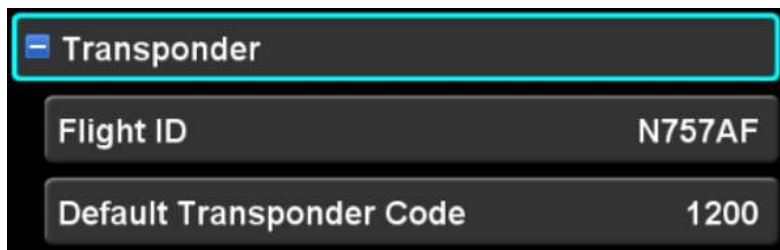
The factory default setting is “12 Hr”.

## **Local Time**

This item is not actually a setting and the cursor will skip it. It is merely a display of the current local time affected by the selected local time offset and time format settings.

## TRANSPONDER CATEGORY

When configured to control a remote transponder, the IFD uses the settings in this category to configure and control the transponder. If the IFD is not configured to control a remote transponder, the category and related settings will not be shown.



### Flight ID

This setting defines the ADS-B flight ID to be transmitted by the transponder. Typically, this is set to the aircraft tail number.

The factory default for this setting is “0000000”. Once a tail number has been defined (using Maintenance Mode), the default for this setting is the tail number.

If the flight ID is edited to be a blank value, the value will be reset to the tail number (or the factory default if no tail number has been defined).

Changes to this setting will be propagated to all other cross synced IFDs.

### Default Transponder Code

This setting defines the transponder code that will be used when the transponder is set to “VFR”. The factory default setting is “1200”. Changes to this setting will be propagated to all other cross synced IFDs.

## UNITS CATEGORY

The settings in this category control the units in which different quantities throughout the system are displayed.

Units	
Bearing Reference	Magnetic
Distance/Speed Units	NM/Kts
Altitude/VS Units	Ft/FPM
Pressure Units	InHg
Temperature Units	Fahrenheit
Fuel Units	Gallons
Position Units	ddd°mm'ss"

### Bearing Reference

This setting defines whether courses and headings are displayed with reference to true north or magnetic north. The factory default setting is magnetic north.

### Distance/Speed Units

This setting defines the units in which distances and speeds are displayed. Options are as follows:

- **NM/Kts** – Nautical miles and knots
- **KM/KPH** – Kilometers and kilometers per hour
- **MI/MPH** – Statute miles and miles per hour

The factory default setting is “NM/Kts”.

## Altitude/VS Units

This setting defines the units in which altitudes and vertical speeds are displayed. Options are as follows:

- **Ft/FPM** – Feet and feet per minute
- **M/MPM** – Meters and meters per minute
- **M/MPS** – Meters and meters per second

The factory default setting is “Ft/FPM”.

## Pressure Units

This setting defines the units in which atmospheric pressure is displayed. Options are as follows:

- **InHg** – Inches of mercury
- **Millibars** – Millibars
- **hPa** – Hectopascals

The factory default setting is “InHg”.

## Temperature Units

This setting defines the units in which temperatures are displayed. Options are as follows:

- **Fahrenheit**
- **Celsius**

The factory default setting is “Fahrenheit”.

## Fuel Units

This setting defines the units in which fuel quantities are displayed. Options are as follows:

- **Gallons**
- **Imperial Gallons**
- **Liters**

- **Pounds**
- **Kilograms**

The factory default setting is "Gallons".

### **Position Units**

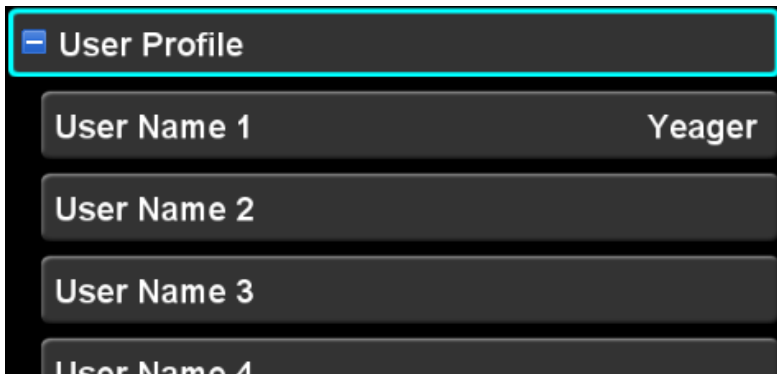
This setting defines format in which geographic positions are displayed. Options are as follows:

- **ddd°mm.mm'** – degrees, minutes, and tenths of minutes
- **ddd°mm'ss"** – degrees, minutes, and seconds
- **UTM** – Universal Transverse Mercator
- **MGRS** – Military Grid Reference System

The factory default setting is ddd°mm'ss".

## USER PROFILE CATEGORY

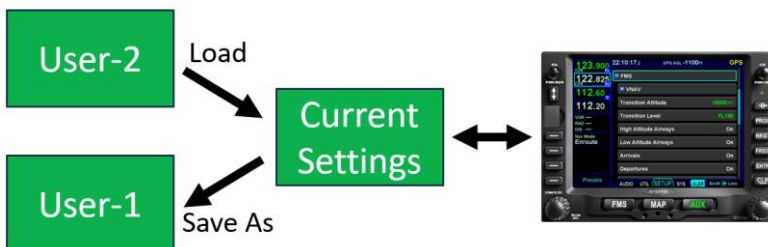
Settings in this category define names for each of the several user profiles. A user profile is a named set of setup options. The IFD is capable of storing up to ten user profiles.



User profiles can be useful in situations where an aircraft is shared among several pilots and each pilot has different preferences for viewing data on and interacting with the IFD. In scenarios where an aircraft is always flown by the same pilot, it may be useful to define a profile for VFR flights and another profile for IFR flights. From the factory, a single user profile named “User-1” is defined.

When changes are made using the setup page, the changes are applied to the “current options”. A user profile can be “loaded”, causing the options in the user profile to replace the current options. The current options can be “saved as”, causing the selected profile to be replaced with the current options. This theory of operation is illustrated in the diagram below:

### *User Profile Management – Theory of Operation*



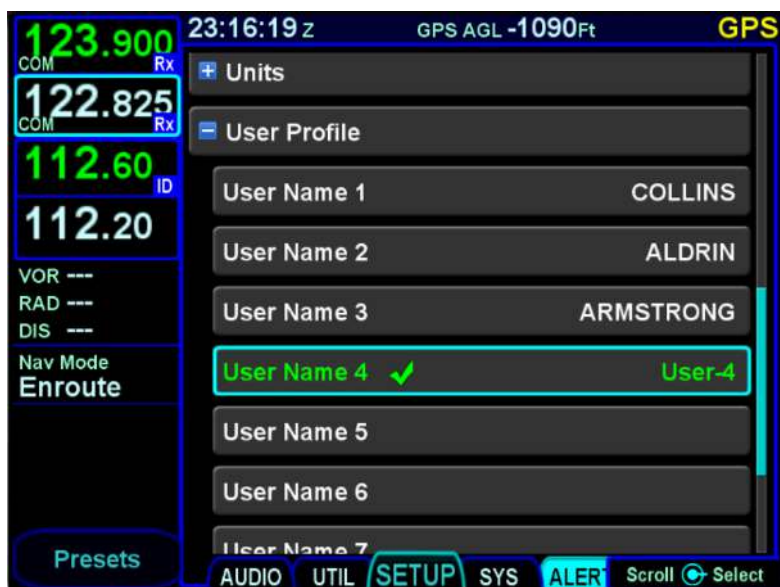
The user profile that is currently being used will be shown in a green color with a checkmark displayed on the row. If the current settings have any differences from that user profile, the profile name will be suffixed by an asterisk. The asterisk is an indication that there are unsaved changes to that user profile. If another user profile is loaded while the asterisk is displayed, those changes will be lost.

#### *User Profile with Unsaved Changes*



To save the current options, use the right knob or touch to select the desired user profile, then press the “Save As” LSK. If the selected user profile was not named prior to the Save As LSK being pressed, the IFD will create a new profile named “User-n”. Once the current settings have been saved, the selected user profile will become the current profile and, therefore, will be shown in green with a checkmark and no asterisk. If the current settings contain no changes from the current profile, the Save As LSK will not be shown.



**Current Settings Saved as User-4**

To load a different user profile into the current settings, rotate the right knob or touch to select the desired user profile, then press the “Load” LSK. If the selected user profile is the same as the currently loaded user profile and there are no unsaved changes to that user profile, the Load LSK will not be shown. Once the user profile has been loaded, the selected user profile will become the current profile and, therefore, will be shown in green with a checkmark and no asterisk.

To rename a user profile, rotate the right knob or touch to select the desired profile. Press the right knob or touch the selected profile to enter the new name. Renaming a user profile does not change any of the settings associated with that profile. To create a new user profile from the current settings, the recommended procedure is to first save the settings (i.e. to “User-n”) and then rename the user profile.

The name of a user profile can be deleted at any time by using the right knob or by using touch to move the cursor to the desired profile and then pressing the CLR key. However, the currently selected user profile cannot be deleted.

At power up, the IFD will first restore the user profile that was selected at the last power down and then restore the current settings from the last power down. As a result, the IFD will have the same settings as it did on power down, including any unsaved changes to the selected profile. The IFD will generate a green notification alert indicating the name of the user profile that was loaded. If there is only one user profile defined, then no notification will be presented.

**NOTE**

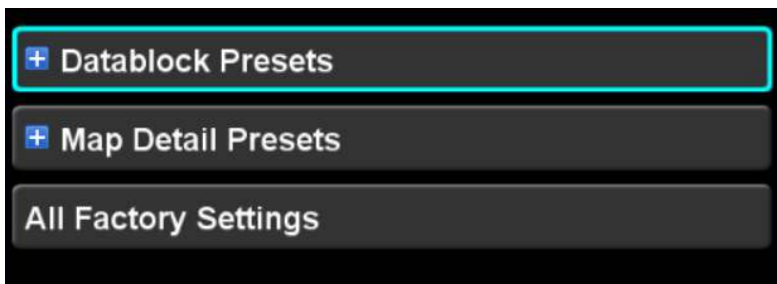
If the display turns dark when loading a new user profile, it is likely that the loaded profile has a very low display brightness setting. Several options are available, including:

- Darken the ambient light so that the screen becomes visible.
- If it's possible to remember the list of user profiles, rotate the right inner knob to select a different user profile and then press the Load button.
- Cycle IFD power. The display will not power up at anything less than 20% when in Manual mode.

## PRESETS

Presets provide a means to configure many IFD settings with one operator action. In order to configure the IFD using a preset, press the "Presets" LSK. The Setup Page will then present a list of possible presets to be selected using the same category/item organization as the main page, as illustrated below.

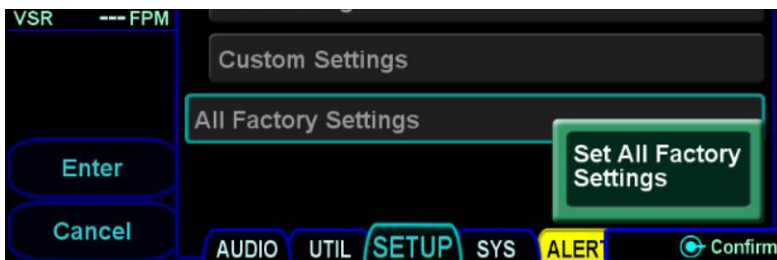
### *Setup Presets*



In the picture above, the "Datablock Presets" and "Map Detail Presets" are categories containing corresponding preset items. "All Factory Settings", however, is a preset item.

To configure the IFD using a preset, move the cursor to surround the desired preset item. Then, press the right knob button, press the ENTR button, or touch the item to select that preset. The IFD will then present a green dialog indicating which preset will be applied.

### *Preset confirmation dialog*



To apply the preset, press the right knob, the ENTR button, or the "Enter" LSK, or touch the green dialog. To abort the preset, press the CLR button or the "Cancel" LSK. Once a preset has been

applied, the list of presets will be dismissed and the normal Setup Page contents will again be displayed.

To return to normal Setup Page operation without applying a preset, press the “Exit” LSK.

#### IMPORTANT NOTE

When a preset is applied, it only affects settings for the currently selected user profile. The user profile name is not affected by applying the preset.

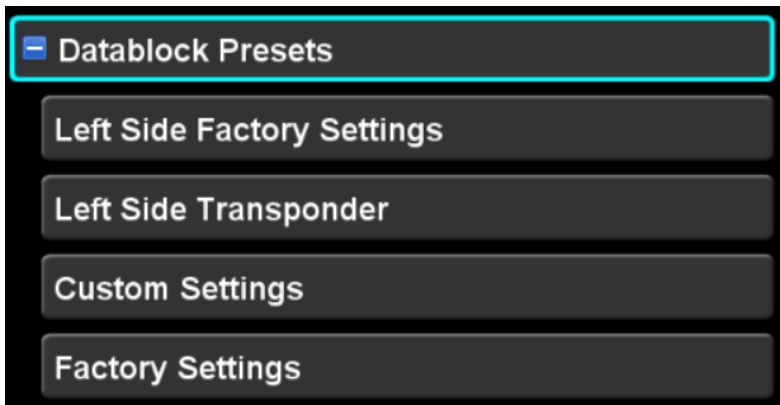
## All Factory Settings

Applying the “All Factory Settings” preset item will cause all of the settings on the Setup Page to be set to factory defaults, except the “User Profile” and any network names and passwords.

## Datablock Presets

Expanding the “Datablock Presets” item reveals several presets that affect only the configuration of datablocks.

### *Datablock presets (expanded)*



### *Left Side Factory Settings*

The “left side factory settings” preset returns only the datablocks on the left side to factory defaults, as follows (from top to bottom):

IFD with radio	IFD without radio
Primary Com/VLOC	To Waypoint Information
VLOC Radio	To Waypoint ETA
Decoded VLOC Identifier	Active Approach
Navigation Mode	Navigation Mode

### ***Left Side Transponder***

The “left side transponder” preset item will only be displayed if the IFD is configured to interface with a transponder. The left side transponder datablocks are as follows (from top to bottom):

IFD with radio	IFD without radio
Primary Com/VLOC	To Waypoint ETA
Com/VLOC Standby #2	Active Approach
Transponder Thumbnail	Transponder Thumbnail

### ***Left Side Traffic***

The “left side traffic” preset item will only be displayed if the IFD is configured to interface with a traffic sensor. The left side traffic datablocks are as follows (from top to bottom):

IFD with radio	IFD without radio
Primary Com/VLOC	To Waypoint ETA
Com/VLOC Standby #2	Active Approach
Traffic Thumbnail	Traffic Thumbnail

## Custom Settings

The “custom settings” preset consists of the complete set of datablock settings that have been most recently modified by the pilot. For instance, say the IFD is factory new and then the pilot changes the upper right datablock. The pilot then applies the “factory settings” preset. If the pilot then comes back to the presets page and then selects “custom preset”, the set of datablocks with the upper right one changed will be displayed. Whenever any single datablock is changed, the custom settings preset is updated.

### IMPORTANT NOTE

When applying factory defaults, it is possible to revert back to the most recent settings by selecting “custom settings”. However, if just one datablock is changed after having applied factory defaults, those settings become the “custom settings”. Therefore, returning to that original set of custom settings is no longer possible.

## Factory Settings

The “factory settings” preset returns the complete set of datablocks back to factory defaults, as follows:

Left Side Datablocks	
IFD with radio	IFD without radio
Primary Com/VLOC	To Waypoint Information
VLOC Radio	To Waypoint ETA
Decoded VLOC Identifier	Active Approach
Navigation Mode	Navigation Mode

Top Strip Datablocks	
IFD with radio	IFD without radio
UTC Time	UTC Time
GPS AGL Altitude	GPS AGL Altitude

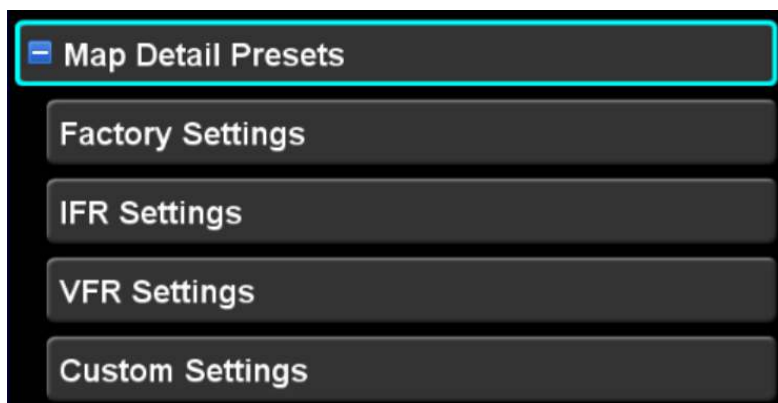
Right Side Datablocks	
IFD with radio	IFD without radio
To Waypoint Information	Next Waypoint Information
Nearest Airport	Nearest Airport
Destination Direct Info	Destination Direct Info
Fuel Amount Remaining*	Fuel Amount Remaining*
Fuel Time Remaining*	Fuel Time Remaining*
Minimum Safe Altitude	Minimum Safe Altitude
Groundspeed	Groundspeed
GPS CDI	GPS CDI
Flight Timer	Flight Timer
Aircraft Position	Aircraft Position
Number of Alerts	Number of Alerts

\* Only presented if the IFD is configured to communicate with an external fuel flow system

## Map Detail Presets

Expanding the “Map Detail Presets” item reveals several presets that affect only the map layers.

### *Map Detail Presets (expanded)*



Note that selecting any of these presets only affects map layers, not the other map settings such as compass rose on/off, airport filter on/off, etc.

### **Factory Settings**

Factory settings for map layers are as follows:

Layer	Visible	Labels	Range	Detail	Alt Filter
SUA	On		160	Hi	
VOR	On	On	160	Low	
Towered Apts	On	On	100	Low	
NonTowered Apts	On	On	80	Med	
Class A/B/C	On		100	Med	> 0
Class D	On		30	Hi	< 2000
High Obstacles	On	On	50	Med	< 1500
Low Obstacles	On	On	40	Hi	< 1500
Intersections	Off	Off	40	Hi	
Victor Airways	On	On	50	Med	< 19000
Jet Airways	Off	On	50	Hi	>= 17000
VFR Waypoints	Off	Off	40	Hi	
NDBs	Off	Off	50	Hi	
Flight Plan		On			
Non-TA Traffic	On		40	n/a	
Power Lines	On		10	n/a	< 1500
Interstates	On	On	100	n/a	

### **IFR Settings**

IFR settings for map layers are the same as factory settings except for the following changes:

Layer	Visible	Labels	Range	Detail	Alt Filter
NonTowered Apts			50		
Low Obstacles			50		
Intersections	On	On	30		
Victor Airways			40		
Jet Airways	On				
NDBs	On	On			
Interstates			30		



## VFR Settings

VFR settings for map layers are the same as factory settings except for the following changes:

Layer	Visible	Labels	Range	Detail	Alt Filter
VOR			100		
Towered Apts			160		
High Obstacles			160		
Low Obstacles			20		
Victor Airways	Off				
VFR Waypoints	On				

## Custom Settings

The “Custom settings” preset item represents the most recent map settings that have been modified by the pilot. Every time a setting is changed manually, the custom settings are updated. Selecting a different preset does not change the custom settings. However, if a different preset is selected and then at least one settings change is made, the custom settings will be updated to reflect the complete set of new settings.

## SYS (SYSTEM) TAB

The “SYS” (System) tab provides access to various system status pages, a means to enter initial fuel (if configured with a 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 interface with an aircraft fuel flow system. When the LSK is pressed, the IFD will display the Fuel Management Page.

The fuel management page shows data being reported by the fuel flow system, as follows.

- **Flow** – the current fuel flow rate
- **Used** – the amount of fuel that has been used during this flight
- **Rmng** – the total usable fuel remaining on board the aircraft
- **Time** – the aircraft endurance based on the total usable fuel remaining and current total fuel flow
- **Econ** – the fuel economy based on total fuel flow and groundspeed

The fuel management page will show either one or two fuel “Flow” and “Used” fields based on whether the IFD is configured for a single-engine or a multi-engine aircraft.

**Fuel Management Page (configured for multi-engine)**

The screenshot shows the Fuel Management Page with the following data and controls:

- Top Bar:** 21:14:46 z, GPS AGL 3020Ft, GPS
- Left Panel:**
  - COM 118.000 Rx
  - COM 118.000 Rx
  - ID 111.15
  - 112.70
  - ILS ---
  - Arpt ---
  - RWY ---
  - Nav Mode Enroute
  - Fuel Mgmt** (highlighted)
  - Status Software
- Main Fuel Section:**
  - Fuel Flow:** 24.6 Gal/Hr, 23.7 Gal/Hr
  - Used:** 1.5 Gal
  - Rmng:** 47.0 Gal
  - Time:** 00:58 H:M
  - Econ:** 3.5 MI/Gal
- Fuel Controls:**
  - Fuel Added:** 50.0 Gal
  - Total:** 50.0 Gal
- Bottom Bar:** AUDIO, UTIL, SETUP, **SYS**, ALERT, Fuel Qty Select

If the fuel flow system is not capable of reporting the amount of fuel remaining (i.e. does not have a totalizer), then the IFD will present two controls allowing the fuel quantity to be manually adjusted.

- **Fuel Added** – use this control to increment the fuel quantity by an amount that was added since the last flight.
- **Total** – use this control to set the total quantity of usable fuel on board.

When one of the controls is used, the value in the other control will be adjusted accordingly. For instance, if the “Total” control field is showing 50.0 gallons and then 30.0 gallons is entered using the “Fuel Added” control, the “Total” control field will be updated to show 80.0 gallons.

## SYSTEM STATUS

The “Status” 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 aircraft is not airborne, the Software Status Page will also show a “Download Logs” LSK. Pressing that LSK will put the IFD into Maintenance Mode where the datalogs can be downloaded (see page 7-34 for instructions).

The software status page also shows which IFD options are enabled. Some of the options are standard, but others require a

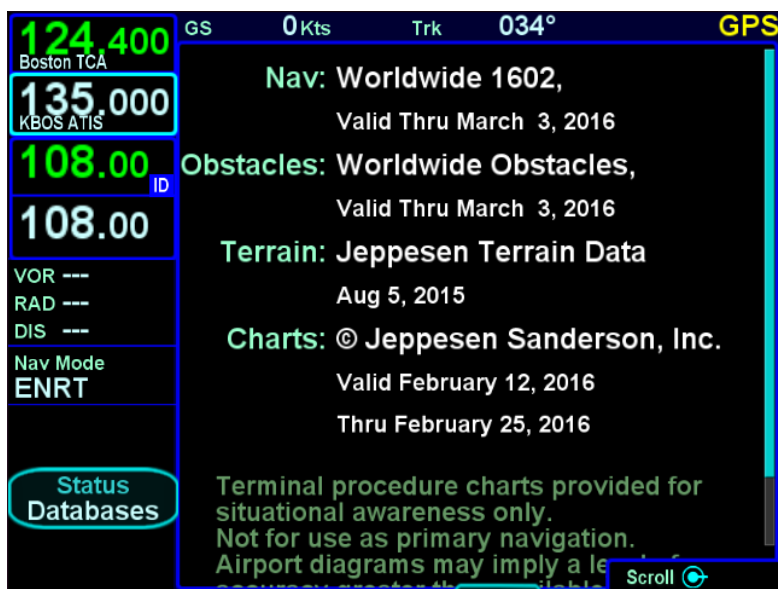
specific enablement. Contact Avidyne sales in order to enable those options.

- **VID** – enable RS-170 external video input, such as that from an infrared camera. Video will be displayed on the VIDEO tab in the Map subsystem. Also requires specific hardware enablement.
- **RDR** – enable digital weather radar display and control functions. Display and control are accomplished using the RADAR tab in the Map subsystem.
- **TAWS** – when not coupled with HELO, this option enables TAWS-B capability.
- **SVS** – standard option on an IFD550 to enable synthetic vision.
- **F500** – standard option to enable FLTA with 500 foot callout.
- **ENET/IO** – standard option to enable Wi-Fi.
- **16W** – enable 16 watt radio. Only available for 28V aircraft.
- **SAR** – enable search and rescue patterns
- **BT** – standard option to enable Bluetooth.
- **HELO** – enable helicopter operations (aircraft symbol, database procedures). When coupled with the TAWS option, the IFD performs HTAWS functions.
- **GLAS** – enable GPS Legacy Avionics Support for business jet class aircraft
- **PORTS** – enables a feature that allows use of a Wi-Fi connected ADS-B input device (e.g. Stratus 3). The feature will only be operational if the IFD is not configured to receive traffic/weather from a wired sensor and the Maintenance Mode option for Capstone portables is enabled.

## Database Status Page

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

### Database Status Page



### NOTE

#### Database Currency

It is critical to update the IFD with current databases prior to conducting flight operations using the IFD.

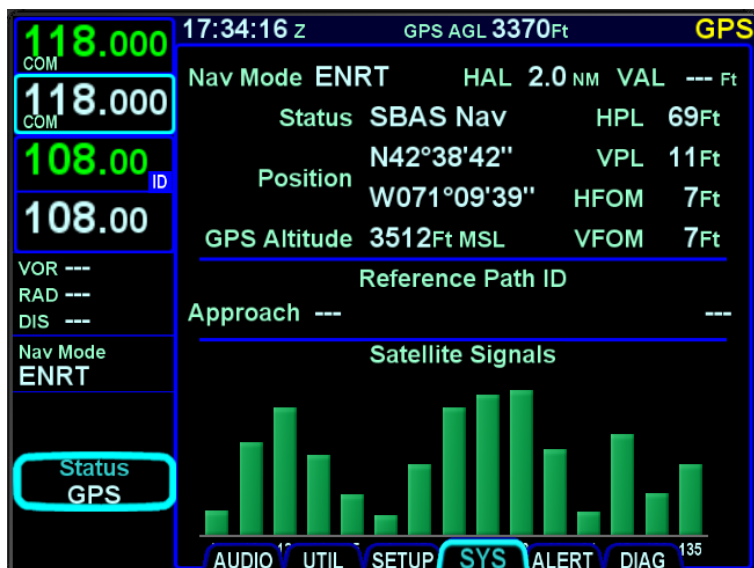
Pressing the “Update Databases” LSK will put the IFD into Maintenance Mode where the databases can be uploaded to the IFD (see page 7-26 for instructions).

## 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 includes 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 is computing a navigation solution with integrity provided using fault detection and exclusion.
SBAS Nav	System is computing a navigation solution with integrity provided by SBAS (e.g. WAAS).
Fault	System has detected an internal fault and does not have a 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 SBAS satellites.

The internal GPS receiver will automatically de-select satellite vehicles from inclusion in the position fix if poor satellite health or maintenance information is available in the satellite data stream. However, there may be times, or geographic locations in the world, where it is desirable to manually de-select a satellite vehicle or series of satellite vehicles from the GPS solution. For example, most locations in Australia can see a US WAAS satellite and a Japanese MSAS satellite, neither of which are used for Australian precision approach flying. In that case, it may be



desirable to de-select those specific satellite vehicles from the GPS position fix algorithm.

Satellite vehicles (SVs) can be manually de-selected via the Maintenance Mode pages. The de-selected SVs persist across power cycles.

## Datalink Status Page

The “Datalink” selection will be available if the IFD has been properly configured to integrate with a compatible on-board datalink weather system.

The upper part of this page shows the weather products supported by the datalink system (and subscription level, if applicable) with their age and receipt status. For each weather product, the status will show one of the following for “age”:

- The numeric age, in minutes, of the weather product. This is typically the elapsed time since the weather product was last received. However, for forecast products (e.g. winds aloft) this is the forecast time.
- “---” (dashes) –the product is not available with the current subscription level
- “Not Xpctd” – the product is not expected to be received. The IFD will not issue an “Overdue” alert for this product
- “Not Rcvd” – the IFD is expecting the product, it has not been received, but the time elapsed since IFD power up has not exceeded the “late” timeout period (see page 4-20).
- “Overdue” – the IFD was expecting the product, but it was not received within the “late” timeout period.

The lower part of the page shows a legend containing the various symbols used in the datalink data depictions on the maps.

**Datalink Status Page****ADS-B Status Pages**

When the IFD is configured to integrate with an ADS-B system that provides FIS-B (weather) service, a series of ADS-B specific pages is presented to allow details of various received products. The ADS-B specific status pages are accessed using the L5 LSK, which is titled "Datalink" with the specific page name shown under the title. Pressing the LSK will cycle through the available ADS-B specific pages.

## ADS-B Stations Page

This page shows the ADS-B stations from which data is being received. For each station in the list, the page shows the station's ID, location, data reception rate, and look-ahead ranges for TFRs, AIRMETs, and SIGMETs. The data reception rate, expressed as a percentage, is a measure of recent activity compared to the maximum activity that has been observed from the station. The look-ahead range is the radius for which a given product is provided from that station.

Each FIS-B station periodically broadcasts a "Current Report List" (CRL) that indicates whether the station is broadcasting TFRs, AIRMETs, and SIGMETs. Using that list, the IFD can determine whether it has received all of the reports that it is supposed to have received. When all of the expected data of a given type has been received, its look-ahead range will be presented in green.

### ADS-B Stations Page

**123.900** COM  
**119.675** COM  
**112.60** ID  
**112.60**

VOR ---  
 RAD ---  
 DIS ---  
 Nav Mode  
**ENRT**

Fuel Mgmt  
 Status Datalink  
**ADS-B Stations**

19:12:27 Z GPS AGL 40Ft **GPS**

Stations				Look Ahead Range		
ID	Location	Reception	TFR	AIRMET	SIGMET	
0	N 40°01'03" W 105°16'46"	100 %	100 NM	375 NM	250 NM	
7	N 27°04'11" W 117°04'11"	100 %	--	250 NM	375 NM	

AUDIO UTIL SETUP **SYS** ALERT [ Scroll ↻]

### ADS-B TFRs Page

The ADS-B TFRs page shows a list of Temporary Flight Restrictions (TFRs) that have been received over FIS-B. Using the right knob or the touchscreen, a cursor can be moved to surround each of the TFRs in the list. Selecting one of the TFRs, either by pressing the right knob button, pressing the ENTR button, or touching the TFR surrounded by the cursor, will cause the ADS-B Product Text page (see page 5-101) to appear, showing the text for the selected TFR.

#### ADS-B TFRs Page



## ADS-B AIRMET/SIGMET Page

The ADS-B AIRMET/SIGMET Page shows a list of AIRMETs and SIGMETs that have been received over FIS-B. Using the right knob or the touchscreen, a cursor can be moved to surround each of the reports in the list. Selecting one of the AIRMETs or SIGMETs, either by pressing the right knob button, pressing the ENTR button, or touching the report surrounded by the cursor, will cause the ADS-B Product Text page (see page 5-101) to appear, showing the text for the selected report.

### ADS-B AIRMET/SIGMET Page

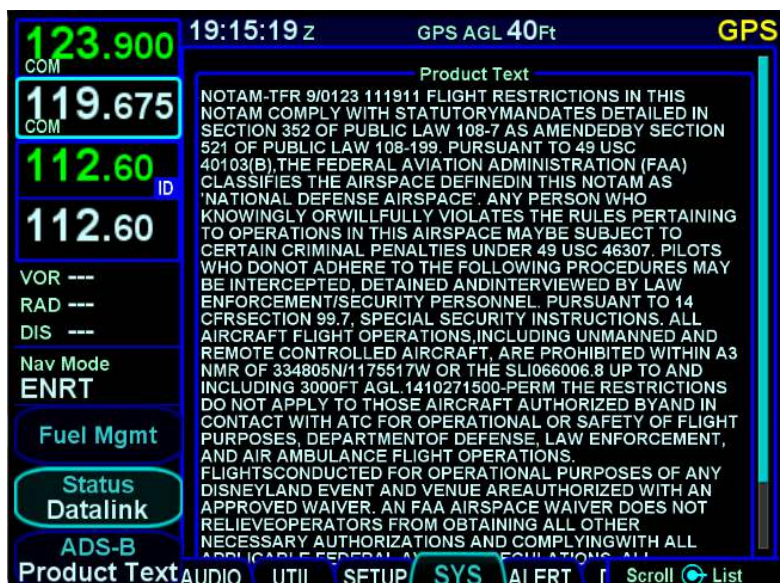


## ADS-B Product Text Page

The ADS-B Product Text page shows the detailed report for TFRs, SIGMETs, and AIRMETs. Unless one of those reports has been selected on either the ADS-B TFRs page or the ADS-B AIRMET/SIGMETs page, this page will not be populated, and will instead show "No Text Selected" at the top of the page. Once one of those reports has been selected, this page will continue to show that report until a different report is selected.

To return to the list page containing the corresponding report, touch the screen, press the right knob button, or press the ENTR button.

### ADS-B Product Text Page



## ADS-B Unavailable Products Page

The ADS-B Unavailable Products Page shows the contents of the FIS-B Product Updates Unavailable Report. That report provides notification to users of outage of individual FIS-B product updates or the entire FIS-B service. If 20 minutes has elapsed since the IFD last received the FIS-B Product Updates Unavailable report, the report will be removed.

### ADS-B Unavailable Products Page

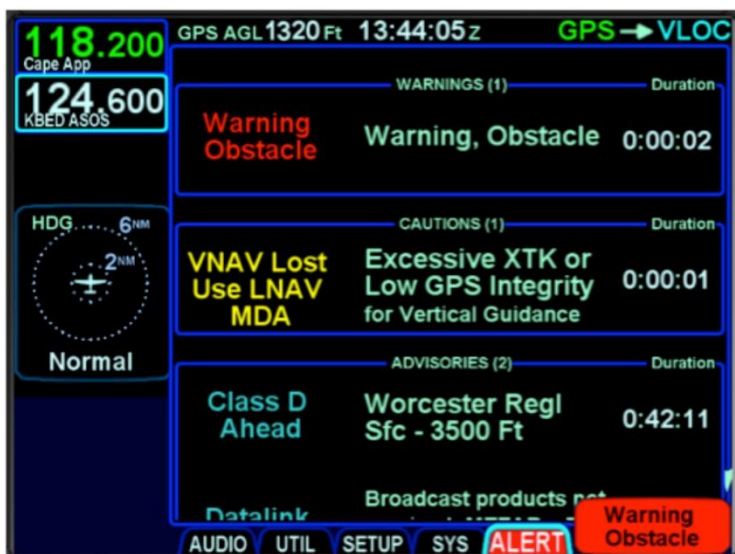




## ALERT TAB

The ALERT tab keeps a running tally of all active alerts, grouping them by level. If there is an active alert in the system, pressing the AUX button will cause the ALERT tab to be displayed rather than the last tab that was selected in the AUX subsystem.

### Systems Alerts Tab



Each section in the page is organized into three columns.

- "Short Text" - A short description of the condition. This text also appears in the message bar.
- "Long Text" - A longer description of what caused the condition. In some cases, there is nothing further to be added, so the long text is the same as the short text.
- Duration - The elapsed time since the alert was first issued.

A complete list of warning, caution, and advisory alerts is given in Section 8 .

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## 6 Navigation

The IFD is an IFR certified GPS that has been specifically designed to support single-pilot IFR operations. When operating under IFR, in all cases, fly your clearance. The IFD's FMS provides features and functions that can make flying your clearance easier, but it is important to remember that doing so is ultimately the pilot's responsibility. Be careful to fully understand how the IFD and your autopilot operate together to fly your chosen lateral and vertical flight path. Beware of using advanced IFD functions such as VNAV if you are not thoroughly familiar with these features, as using them incorrectly may result in your violating your clearance.

In installations where the IFD does not have a baro-altitude input, altitude terminated legs, which may exist in departure and missed approach procedures, will not automatically sequence. Instead, a CAS message "Manual Sequence Req'd" prompting the pilot to manually sequence the leg will be presented. Manual sequencing is accomplished on the FMS FPL page. Failure to manually sequence the leg will result in the IFD maintaining the leg course (or heading) indefinitely and may result in map displays that do not reflect the intent of the procedure.

The IFD has been designed for both retrofit and clean installations, meaning that it can have different capabilities depending on the level of aircraft integration. The various levels of integration are described in the following table.

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.	<p>VFR operations only.</p> <p>No way to externally set course.</p> <p>All course setting is conducted on the IFD (e.g. -D-&gt;, push OBS and turn nav source knob, automatically set a course by selecting a procedure, etc.).<sup>1</sup></p> <p>Nav source modes available:</p> <p>GPS VLOC<sup>1</sup> GPS → VLOC<sup>1</sup> OBS OBS → VLOC<sup>1</sup></p>

<sup>1</sup> Not applicable to the IFD510 and IFD545

Integration Category	Description	IFD Functionality
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.	<p>Set the course on the external unit and the IFD will display that value.</p> <p>No auto-slew capability of the course on the IFD.</p> <p>The nav source knob/button is used only to toggle between the available states.</p> <p>Nav source modes available:</p> <p>GPS VLOC<sup>1</sup> GPS → VLOC<sup>1</sup> OBS OBS → VLOC<sup>1</sup></p>
<p>“Non-cooperative” electronics</p> <p><b>For Example</b> G500/600 Aspen EFD1000 Avidyne EXP5000 Dynon Skyview EFIS 40/50</p>	<p>The IFD can receive course input from this external device(s).</p> <p>The IFD can send commands to set course (e.g. “auto-slew”) on those external device(s).</p>	<p>The nav source knob/button is used only to toggle between the available states.</p> <p>Nav source modes available:</p> <p>GPS VLOC<sup>1</sup> GPS → VLOC<sup>1</sup> OBS OBS → VLOC<sup>1</sup></p>

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<sup>1</sup> Not applicable to the IFD510 and IFD545

Integration Category	Description	IFD Functionality
"Cooperative" electronics	<p>The "cooperative" system is even more capable than the IFD and, therefore, is the primary navigation control device.</p> <p>All nav source selection and course setting is performed on the external device.</p> <p>The IFD becomes a "slave" to the external device.</p>	<p>Course values will display on the IFD but are set on the external device(s).</p> <p>Nav source modes available: None (the nav source knob/button will appear to be non-functional).</p>

## NAV SOURCE KNOB/BUTTON

The IFD540 and IFD550, both have a knob located in the upper right hand corner of the bezel which is the dedicated Navigation (Nav) Source knob. For the IFD510 and IFD545, the knob is replaced by a button labeled "OBS". In the description below, any references to capability requiring a VHF radio are not applicable.

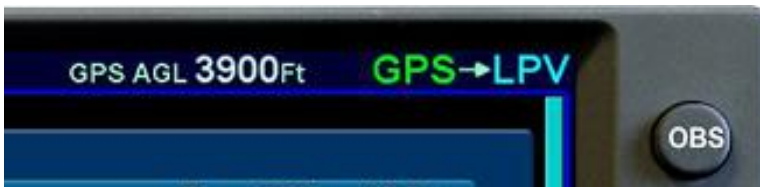
The nav source knob is used to choose which Nav source the pilot wants depicted on the moving map. The chosen source will also be sent to other on-board systems like an EFIS (e.g. Aspen PFD) and in-turn, the autopilot, as well as driving any conventional CDI or RMI or HSI indicator. VLOC and GPS course 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 turned 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 (IFD540 and IFD550)*



The IFD510 and IFD545 nav source button is similar to the nav source knob, except that it toggles only between GPS based navigation to the flight plan and an OBS course to the active waypoint.

### *Nav Source Button Indication (IFD510 and IFD545)*



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 sources:

Nav Source	Description
<b>GPS</b>	<p>GPS is active (green), and all external deviation data being transmitted by the IFD is in reference to the active GPS leg.</p> <p>If no GPS leg is active or if no GPS lock, the nav source will be displayed in yellow.</p>
<b>LPV</b> <b>L/VNAV</b> <b>LP</b> <b>LP+V</b> <b>LNAV</b> <b>LNAV+V</b>	If performing an RNAV approach, "GPS" gets replaced with the approach type when the leg to the FAF becomes active and either the approach is VTF or the course to the FAF is within 45° of the final approach course.
<b>GPS → LPV</b> <b>GPS → L/VNAV</b> <b>GPS → LP</b> <b>GPS → LP+V</b> <b>GPS → LNAV</b> <b>GPS → LNAV+V</b>	Basic GPS is active (green), and the approach type is armed (blue).
<b>Visual</b>	A visual approach is active (green)
<b>GPS → VLOC<sup>1</sup></b>	<p>GPS is active (green), and VLOC is armed (blue).</p> <p>If the flight plan contains a VHF 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.</p>

<sup>1</sup> Not applicable to the IFD510 and IFD545



Nav Source	Description
<b>VLOC<sup>1</sup></b>	VLOC is active (green), and all external deviation data being transmitted by the IFD is in reference to the tuned VHF navaid (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. It will also stay yellow until the nav channel is fully decoded as an indication to manually tune-identify-monitor.
<b>OBS</b>	<p>OBS is active (green) and deviation data being transmitted by the IFD is reactive to the external course setting knob for the inbound/outbound course (or the Nav Source knob if no external course control is present or when a KI-208A or KI-209A is present).</p> <p>This state is accessed by pushing in the Nav Source knob, and then it takes the place of pure <b>GPS</b> mode as described earlier in this table.</p>
<b>OBS → VLOC<sup>1</sup></b>	<p>OBS is active (green) and VLOC is armed (blue). Deviation data being transmitted by the IFD is reactive to the external course setting knob for the inbound/outbound course (or the Nav Source knob if no external course control is present or when a KI-208A or KI-209A is present).</p> <p>Note that this state is accessed by pushing in the Nav Source knob and then it takes the place of <b>GPS → VLOC</b> mode as described earlier in this table.</p>

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<sup>1</sup> Not applicable to the IFD510 and IFD545

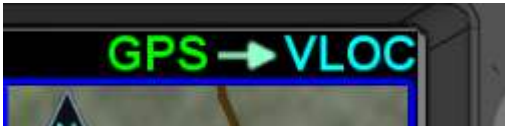
**NOTE****Aircraft Integration**

The nav source available in your airplane will be dependent on the level of integration with other installed systems. Avidyne strongly recommends to practice operations in VMC before any use in IMC, to understand the level of integration between the IFD and the other installed systems.

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.

**ARMED VS ENGAGED/ACTIVE INDICATIONS**

The active IFD nav mode is displayed in the upper right corner of the display. If there is an "armed" IFD nav mode, it will be displayed in cyan, to the right of the active mode, preceded by an arrow. The illustration below shows the system in GPS mode, with VLOC armed<sup>1</sup>.

***Nav Source Mode Armed and Engaged Depiction***

As the armed mode is captured, the previously active nav mode will be removed and the previously armed state will turn green and begin to flash. The mode will flash for approximately five seconds and then turn green. When the green indication stops flashing, the IFD will be in the new nav mode.

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<sup>1</sup> Not applicable to the IFD510 and IFD545

## OBS MODE

“PUSH OBS” is the label underneath the knob (or the button on the IFD510 and IFD545) 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 – the IFD will continue sequencing to the next waypoint and exit OBS mode at that time.

If the active nav mode is neither GPS nor OBS (annunciated in green), pushing the Nav Source knob will have no effect. When either GPS or OBS is active, pushing the Nav Source knob will toggle between the two states.

When OBS is active, the IFD will provide guidance to the selected OBS course. OBS cannot be selected on a published approach inside the Final Approach Fix (FAF). The OBS depiction on the map will vary depending upon whether the system has determined the airplane to be in TO or FROM orientation.

In OBS TO (when the difference between the selected OBS course and the aircraft course to the fix is less than  $90^\circ$ ), 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 (when the difference between the selected OBS course and the aircraft course to the fix is greater than or equal to  $90^\circ$ ), 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  $180^\circ$  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  $180^\circ$  plane between you and the fix, and that is the leg to fly – away from the station.

#### **OBS FROM Depiction**



The OBS mode can be used to create a user-defined course into a waypoint/fix or an airfield. Once in OBS mode, use the 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.

The depiction of the OBS course line on external moving map displays may vary by device. Some external displays may depict the OBS leg and some may not. For example, in IFD software releases prior to Release 10.1.1.0, the Avidyne EX5000, EX500, and EX600 MFDs do not depict the OBS course leg but with

releases 10.1.1.0 and later they depict a 200nm OBS course leg. Changes can take up to 7 seconds to display on the map and east-west legs may show some curvature.

For those installations that include dual IFDs that 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 synchronized between the two IFDs. The #2 IFD will display the selected course as set by the #1 nav indicator on the map page.

## VOR COURSE DEPICTION<sup>1</sup>

When the IFD is receiving selected course from an external indicator, the Nav Source on the IFD is VLOC, and the IFD is tuned to a VOR station, the IFD will display the inbound and outbound radials for the selected course. The radials will be displayed once the VOR station is decoded and will be 50nm long.

When the aircraft is on the near side of the perpendicular course ("To" geometry), the line will be green for the **inbound** radial and white for the outbound radial.

When the aircraft position is on the far side of the perpendicular course ("From" geometry), the line will be green for the **outbound** radial and white for the inbound radial.

If the IFD is configured to "Ignore SEL CRS for VLOC" in Maintenance mode, the selected course will not be depicted on the map.

### VOR Course Depiction



<sup>1</sup> Not applicable to the IFD510 and IFD545

## FMS SHORTCUTS

Some routine FMS actions can be accomplished using shortcuts on the FPL tab of the FMS page. The bottom 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.

LSK Label	Comments
<b>Activate Approach</b>	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 approach is selected.
<b>Retry Approach</b>	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.
<b>Enable/ Activate Missed</b>	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 Missed Approach Point (MAP) results in guidance outbound from the MAP using the same course as the final approach course. The message automatically toggles to Activate Missed when crossing the MAP.
<b>Continue/ Exit Hold</b>	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.



LSK Label	Comments
<b>Skip Hold</b>	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.
<b>Sequence Leg</b>	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.
<b>Enable A/P Approach</b>	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.

The FMS treats the flight plan as a continuous sequence of legs, regardless of whether they are part of a terminal area procedure or are in the enroute structure. If the flight plan contains an IAF and the last waypoint before the approach is the same as the IAF, the flight plan will sequence into the approach with no further pilot action required. If the last waypoint before the approach is not the same as the IAF, a discontinuity will precede the approach. If the gap is not closed and the aircraft reaches the waypoint before the discontinuity, the FMS will continue to provide guidance outbound from the waypoint and the waypoint will not sequence. If the gap is closed, the flight plan will sequence onto the approach with no further action required.

The operation with a VTF approach is slightly different. In this case, the pilot must intervene when it's time to start the approach. There are several options, including activating the leg to the FAF, direct to the leg to the FAF, or the FMS shortcut "Activate Approach", which activates the leg to the FAF.

## COURSE CHANGES AND HOLDS

If the course change at a waypoint is more than  $120^\circ$ , the IFD will issue an alert approximately 30 seconds prior to the turn. For course changes less than  $120^\circ$ , the alert will be issued approximately 10 seconds prior to the turn.

For normal leg transitions, the alert text will be "Next Leg xxx° in x seconds" where xxx is the course and x is the number of seconds left until the turn. When the next leg is a hold, the alert text shows the entry type as either "Teardrop Entry", "Parallel Entry", or "Hold Course xxx°", where xxx is the inbound course of the hold, representing a direct entry.

If the course change at a waypoint is greater than  $135^\circ$ , the FMS will treat the waypoint as a "fly-over" waypoint. If the course change at a waypoint is less than or equal to  $135^\circ$ , the FMS will treat the waypoint as a "fly-by" waypoint meaning lead turns beginning up to a maximum of 2.5nm can be expected.

## AUTO VLOC TUNING<sup>1</sup>

Auto-VLOC tuning is a user setting which enables the automatic tuning of the active nav frequency to the navaid recommended by the FMS. The FMS recommends a navaid based on the content of the flight plan and the navigation database.

If the active leg is part of a VHF based approach, the IFD will auto-tune the navaid that defines the final approach.

If the active leg is not part of a VHF based approach and the navigation database defines a recommended navaid for the active leg, the IFD will auto-tune that navaid. Otherwise, from the active leg, the FMS will look forward and backward through the route for legs with a recommended navaid or that are defined by a navaid. If navaids are found both before and after the active leg, the closest one will be tuned.

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<sup>1</sup> Not applicable to the IFD510 and IFD545

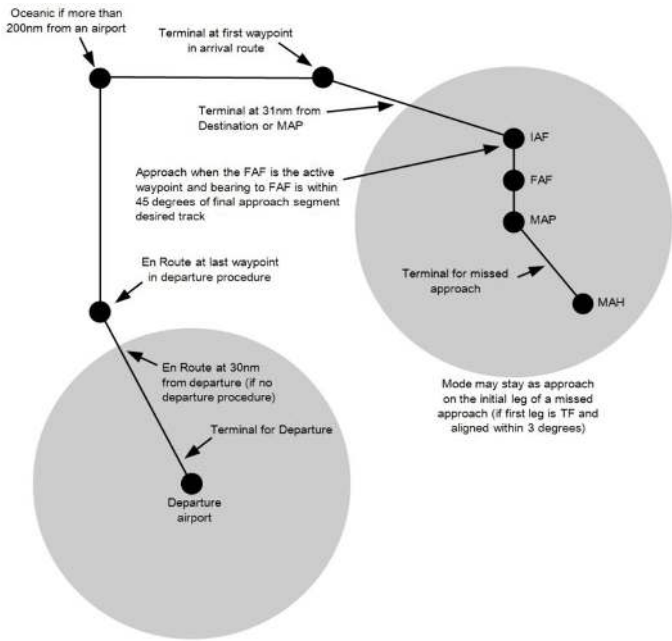
NAVIGATION MODE/CDI SCALE CHANGING

Each navigation mode has an associated CDI scaling associated with it per the table below:

Navigation Mode	CDI Full Scale Value
Oceanic	4.0 NM
Enroute	2.0 NM
Terminal	1.0 NM
Approach	0.3 NM or 2°, whichever is less at the FAF

In order to prevent abrupt changes to CDI deflection (especially important during autopilot-coupled operation), the mode changes and CDI full scale deflection changes are gradual.

Automatic transitioning between the navigation modes occurs in accordance with the following diagram:



## APPROACH PROCEDURES

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

Using the transition dropdown menu in the FMS, an approach can be selected and flown as a full published procedure starting at an IAF or as "Vectors" (i.e. vectors-to-final).

When an IAF is selected, unless the leg preceding the approach ends at the IAF, the approach will be preceded by a discontinuity. If it is appropriate and safe to proceed direct from the last leg before the approach to the IAF, close the gap and the flight plan will sequence onto the approach without further intervention. Otherwise, use either the "Activate Leg", or "Activate Approach" LSKs or the "Direct-To" button to activate a leg on the approach.

When Vectors is selected, the approach is preceded by a discontinuity saying "Vectors To Final – Inactive". That discontinuity cannot be closed, so operator intervention is required. When cleared for the approach, the typical action is to activate the leg to the FAF using one of the following techniques:

- Press the "Activate Approach" LSK.
- Move the cursor to the leg terminating at the FAF and press the "Activate Leg" LSK.
- Move the cursor to the discontinuity and press the "Activate VTF" LSK.

Once a leg in the approach is active, "Inactive" will be removed from the discontinuity.

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

Although the IFD510 and IFD545 have no VHF radio, ILS, LOC and VOR approaches will still be selectable. However, the IFD will provide only GPS overlaid lateral guidance. The unit will provide no vertical guidance on an ILS approach. Any guidance is advisory only as these types of approaches should be flown using the NAV radio and not the IFD.

## AUTOMATIC MODE SWITCHING TO VLOC<sup>1</sup>

When Auto-VLOC Tuning is enabled on the Setup Page (see page 5-67), the IFD will automatically switch the mode from GPS to VLOC and set the inbound course if the following criteria are met for five seconds:

- The active nav mode is GPS
- 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° of the final approach course.
- The course to the active waypoint is within 45° of the final approach course.
- The radio deviations are at most 50% of full scale
- The active leg is part of the approach up to and including the final approach fix.

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, HSI's, EFIS's, etc. In the ILS/Localizer case, the CDI deflection will be driven by the localizer signal itself, regardless of the course setting.

The IFD will toggle the nav source from VLOC back to GPS when executing the missed approach at the Missed Approach Point.

## PRECISION APPROACHES

### **VHF Precision Approaches<sup>2</sup>**

Lateral and vertical deviation data will be transmitted by the IFD for use by any integrated autopilot and external indicators.

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<sup>1</sup> Not applicable to the IFD510 and IFD545

<sup>2</sup> Not applicable to the IFD510 and IFD545

## GPS Precision Approaches

Lateral and vertical deviation data will be transmitted by the IFD for use by any integrated autopilot and external indicators. Except for the IFD510 and IFD545, precision SBAS approaches are flown with the nav source knob set to GPS (which will automatically change to the GPS approach type). For IFD510 and IFD545, precision SBAS approaches are flown when OBS has not been selected using the nav source button.

## 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 is set automatically.

When VOR and GPS inbound courses are not co-aligned, a large CDI deflection may occur when the Nav Source transitions from GPS to VLOC.<sup>2</sup>

Procedure turns and holds-in-lieu-of-procedure-turn, when part of a published procedure, appear as normal legs in the flight plan and therefore have no special or different procedures.

## BACK COURSE APPROACHES<sup>2</sup>

This system is designed to fully support flying back course localizer approaches.

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 ID, landing airfield ID and the front course runway ID.

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

## SBAS APPROACHES

LPV (RNAV) approaches are the preferred approach for the IFD, if available. During installation, a configuration setting determines whether the IFD is SBAS-capable. If the IFD is not capable of SBAS, 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, LP+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 SBAS 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.

The Nav Mode datablock (see page 5-45) indicates the current navigation mode (e.g. Enroute, Terminal, Approach). Instead of showing "Approach", however, the datablock shows the approach type (e.g. LNAV, LPV, LNAV+V).

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.

SBAS approach types shown in the Nav Mode datablock and the nav source indication in the top right corner of the display include:

### **LNAV (Lateral Navigation)**

An LNAV approach provides lateral (horizontal) guidance only, with standard GPS precision of 0.3 NM full-scale deflection. This is essentially the same as a non-SBAS GPS approach. It is flown as any other non-precision approach – observing step down restrictions, descend to MDA, fly at MDA altitude to the missed approach point (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 Advisory Vertical Guidance)**

An LNAV+V approach provides the same lateral navigation as LNAV, but also presents an advisory glideslope deviation for display on the external deviation indicator. Vertical deviations are based on a glidepath angle that is published



with the approach. However, it is the pilot's responsibility to ensure compliance with all published stepdown constraints. This type of approach remains non-precision. The Nav Mode datablock will display "LNAV+V" for the approach type.

### **LNAV/VNAV (Lateral Navigation with Vertical Navigation)**

An LNAV/VNAV approach provides lateral navigation, with 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 an MDA. Fly it as an ILS approach would be flown. Follow the glide slope down to the DA before initiating a missed approach, if appropriate, unless circumstances dictate executing the missed approach prior to reaching the DA (e.g. full scale lateral deflection) In that case, execute the missed approach when necessary. The Nav Mode datablock will display "L/VNAV" for the approach type.

### **LPV (Localizer Precision with Vertical Guidance)**

An LPV approach provides lateral guidance that 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. 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)**

An LP approach has 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.

**LP+V (Localizer Performance with Advisory Vertical Guidance)**

An LP+V approach provides the same lateral navigation as LP, but also presents an advisory glideslope deviation for display on the external deviation indicator. Vertical deviations are based on a glidepath angle that is published with the approach. It is the pilot's responsibility to ensure compliance with all published stepdown constraints. This type of approach is non-precision and uses the published "LP" minimums. The Nav Mode datablock will display "LP+V" for the approach type.

**VECTORS-TO-FINAL (VTF) TRANSITIONS**

VTF transitions in the IFD provide guidance to the extended final approach course.

When assigned a VTF clearance on an SBAS approach (LPV, LP and LNAV/VNAV) with an offset leg into the Final Approach Fix (FAF) where the leg to the FAF is not aligned with the final approach course (i.e. an angled entry to the FAF), the pilot should ask ATC whether those vectors are to extended final or the published offset inbound leg to the FAF.

**If the vectors are to the extended final approach course:** the pilot should select the "Vectors" transition option in the FMS approach dropdown.

**If the vectors are to the published offset leg:** the pilot should activate the inbound leg to the FAF from the FMS FPL tab to ensure the offset leg is accounted for.

**VISUAL APPROACHES**

Visual approaches are non-precision for use in VMC only and are intended to provide enhanced situational awareness. A visual approach is flown the same way as LNAV+V (i.e. including advisory vertical deviations). However, the glideslope angle is controlled by a user setting. Advisory vertical guidance will be provided until the aircraft reaches a point 0.1nm from the runway threshold. During a visual approach, the Nav Mode datablock will display "Visual" for the approach type.

If there are no legs in the flight plan after the destination associated with a visual approach, the visual approach will remain active even after passing the runway threshold. This allows you to stay in a closed traffic pattern and continue to

receive guidance to the final approach course without ever touching the FMS.

## 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 "Enable Missed" LSK on the FPL tab. This LSK changes to "Activate Missed" when crossing the Missed Approach Point (MAP) if it hadn't been pressed prior to the MAP.

Alternatively, the system can be configured to automatically enable the published missed approach for an active procedure by selecting the Auto Enable Missed selection on the Setup page. When this is selected, the system will automatically sequence to the published missed approach when crossing the FAF.

Before the missed approach is enabled, it is drawn on the map using a dotted line style, as illustrated below.

*Disabled Missed Approach on Map*



The Enable Missed LSK is shown on the lower left side of the FMS FPL tab.

#### Enable Missed LSK



Once pressed, the discontinuity preceding the missed approach procedure will display "Published missed approach – Enabled".

#### Enabled Missed Approach in Flight Plan



When the missed approach is enabled, it is drawn on the map using a solid line style, as illustrated below.

#### **Enabled Missed Approach on 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.

## 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, a "Retry Approach" LSK will appear. Pressing that LSK will put the same VTF approach in the FMS flight plan and activate the inbound leg to the FAF.

### NOTE

#### **Autopilot Integration**

Autopilot integration and capability can vary widely. Avidyne strongly recommends flying practice approaches and missed approaches in VMC to understand the level of integration between the IFD and the autopilot before any flight in IMC. 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 inbound course must be manual operations with those autopilots.

In the case of KFC-225 and KAP-140 autopilots, depending on how the IFD was configured, a prompt is provided when GPS is the nav source to enable the approach ("Enable A/P Approach" CAS message displayed which directs a pilot selection along the left side of the FPL tab). At that point, APPR mode can then be selected on the autopilot. This setting will also ignore the GPS→VLOC Capture option on the Setup page.

## TRANSITION ALTITUDES/LEVELS

Transition altitude and transition level alerts can be turned on via the Setup Page. When set to On, an advisory CAS message will be displayed as the transition altitude is being approached from below or when the transition level is approached from above.

If the origin airport has a published transition altitude in the nav database and the transition altitude has not been manually set, the system will automatically set the transition altitude.

If the destination airport has a published transition level in the nav database and the transition level has not been manually set, the system will automatically set the transition level.

If the aircraft is below and then climbs to within 250 feet of the transition altitude, the IFD will issue the "Transition Altitude" alert. Once issued, the alert will not be issued again unless the aircraft has descended more than 500 feet below the transition altitude.

If the aircraft is above and then descends to within 250 feet of the transition level, the IFD will issue the "Transition Level" alert. Once issued, the alert will not be issued again unless the aircraft has climbed more than 500 feet above the transition level.

### *Transition altitude/level alerts*





## ENROUTE VERTICAL NAVIGATION (VNAV)

The IFD is capable of providing vertical navigation during descent operations. Vertical navigation is driven by a “descent path” that is defined by the altitude constraints in the flight plan and a descent angle specified on the Setup page. When enroute VNAV is active, the IFD will provide vertical deviations to the descent path. The enroute VNAV capability must be enabled by the installer after it is determined that the aircraft is equipped to perform the function.

### ALLOWING ENROUTE VNAV

The following conditions must be satisfied in order for enroute VNAV to be allowed:

- Enroute VNAV is enabled by the installer.
- The flight plan has an active leg.
- The aircraft is airborne.
- The IFD is receiving a valid baro corrected altitude.

If enroute VNAV is not allowed, enroute vertical deviations will not be displayed. However, the IFD will still compute the top-of-descent (TOD) point using VNAV descent angle or rate.

### DEFINING THE ENROUTE VNAV ALTITUDE TARGET

Altitude constraints entered into the flight plan define the potential altitude targets for enroute VNAV. The IFD evaluates each successive leg of the flight plan, starting with the active leg, to determine the active enroute VNAV altitude target. If the leg begin evaluated meets any of the following criteria, the IFD stops searching and there is no enroute VNAV altitude target:

- The leg terminates at an altitude.
- The leg is a hold.
- The leg terminates at a FAF.
- The leg is preceded by a discontinuity (except the active leg).

If the leg has an associated altitude constraint whose altitude is lower than the aircraft altitude, the IFD uses that altitude as the

active enroute VNAV altitude target. Note that if the constraint is a window constraint, the lower altitude is used as the target.

## DEFINING THE DESCENT PATH

Enroute VNAV always uses an angle to define the descent path. Using the Setup page, the desired angle can either be set directly or set by specifying a target vertical speed and having the FMS compute the angle.

### *Setup Page Descent Angle Selection*



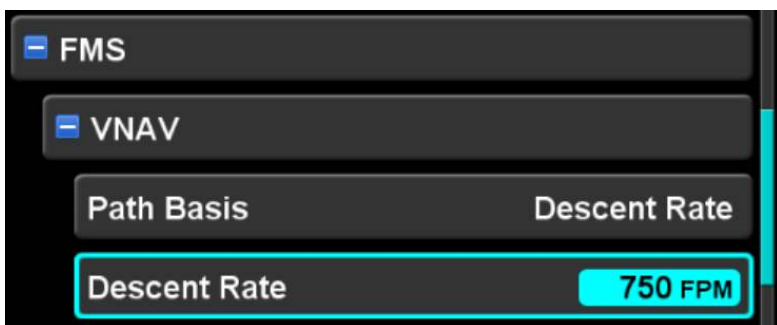
Using the enroute VNAV altitude target and the associated waypoint, the IFD will project that angle along the flight path all the way to the current aircraft altitude. That point is depicted on the map as a green circle labeled "TOD" (top-of-descent). When enroute VNAV is allowed and the aircraft reaches the TOD point, the IFD will automatically commence enroute VNAV.

### *Top Of Descent Marker*



When a target vertical speed is specified, the IFD will compute the TOD point using current groundspeed and the desired descent rate. However, when the aircraft reaches the TOD point and enroute VNAV is allowed, the IFD will compute the angle required to reach the desired altitude, then commence with enroute VNAV using that angle.

**Setup Page: Descent Rate Selection**



## VERTICAL DIRECT-TO

Vertical direct-to provides a means to immediately start a descent to the altitude target associated with a specific flight plan leg. The IFD will compute the descent angle required to reach the selected altitude target and immediately commence enroute VNAV using that angle.

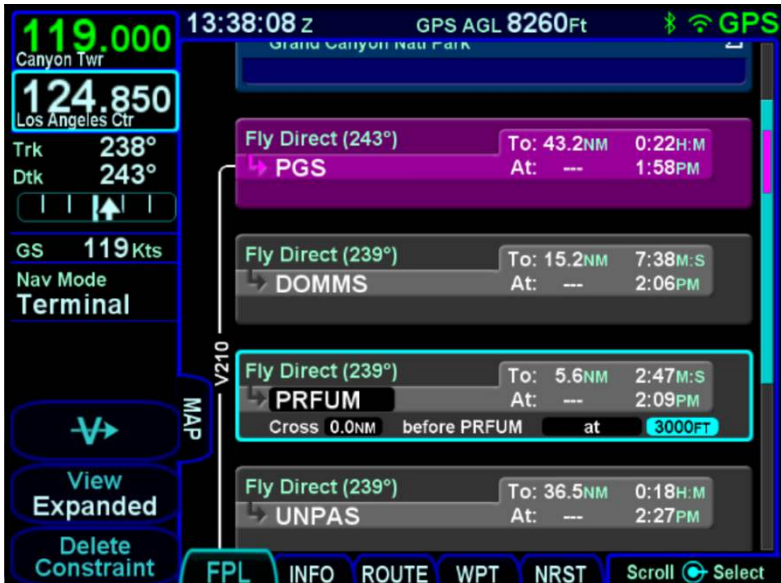
Vertical direct-to is commanded using an LSK on the FMS FPL page. When the cursor is moved onto any of the altitude constraint fields on a leg (offset, kind, or altitude) and vertical direct-to is allowed, then the LSK showing a vertical direct-to symbol will appear.

Vertical direct-to is allowed only under the following conditions:

- Enroute VNAV is allowed.
- No discontinuities exist between the active leg and the selected leg.
- The selected leg does not terminate at or beyond the FAF on an approach.
- The selected leg is not defined by a heading.

- The leg has an associated altitude constraint that is lower than the aircraft altitude.
- Lateral deviation from the active leg is less than 2nm.
- Course deviation from the active leg is less than 45°.
- The IFD is receiving valid baro corrected altitude.

### Vertical Direct-to LSK



### ENROUTE VNAV INDICATIONS

When enroute VNAV is active, the IFD will suffix the navigation mode with “+V”, indicating that associated vertical deviations are being provided.

#### Enroute VNAV Active “+V” Indication



Vertical deviations can be displayed on some external indicators and also on the SVS page.<sup>1</sup> On the SVS page, the VDI is displayed along the right side of the ADI. At the top of the VDI is an indication of whether deviations are being generated as a result of normal enroute VNAV or as a result of a vertical direct-to.

#### Enroute VNAV Active on SVS Page



Vertical deviations will continue to be provided along the descent until the target altitude has been reached. During descent, if the aircraft deviates from the intended flight path by more than 2nm or if the aircraft course deviates by more than 45 degrees from the desired track, enroute VNAV deviations will be flagged until the aircraft resumes flight along the flight plan.

#### CAUTION

It is the pilot's responsibility to configure the aircraft (e.g. reduce power, set trim) to remain within all airspeed limits during the descent.

<sup>1</sup> Applicable to the IFD545 and IFD550 only

## RECOMMENDED ICAO EQUIPMENT CODES

Avidyne recommends the following set of ICAO codes when filing flight plans for aircraft equipped with at least one IFD:

B – LPV

G - GPS

R – PBN Approved

S – VHF, VOR, ILS<sup>1</sup>

Y – VHF w/8.33 kHz spacing<sup>1</sup>

With a PBN string of:

A1 – RNP10 (Oceanic) (may require a LOA)

B2 – RNAV-5 (Enroute)

C2 – RNAV-2 (RNAV Q-Routes and T-Routes over land)

D2 – RNAV-1 (Terminal)

L1 – RNP4 (Oceanic) (may require a LOA)

O2 – RNP1 (Terminal)

S1 – RNP APCH

And if combined with an AXP340 or AXP322 transponder, the surveillance codes are:

E – Mode S, including aircraft ID, pressure altitude, extended squitter

B1 – ADS-B with dedicated 1090 MHz ADS-B Out capability

And if a SkyTrax200 receiver is installed,

U2 – 978 (UAT) In receiver

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<sup>1</sup> Not applicable to the IFD510 and IFD545

## 7 General

This section contains information relevant to managing the overall operation of the IFD, including:

- Handling system failures
- Operations at night
- Operations under hot/cold temperatures
- Operations with high/low power
- Operations using gloves
- Charging from the USB port
- Integration with the IFD100 mobile app
- Regulatory statements

The section also contains information regarding maintenance of the IFD, including:

- Database updates
- Software updates
- Downloading logs
- Pairing a Bluetooth keyboard
- Backup/Restore
- Cleaning the display
- Slide-in Replacement details

## 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.

The recommended method for powering down an IFD is to push and hold the top left knob. Alternately, each IFD is controlled by a pair of circuit breakers which can be pulled out to remove power.

## 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:**

The pilot's plan of action will vary based on the pilot, aircraft configuration, phase of flight and other factors. Taking into account those variations, pilots should consider the following actions:

- Establish safe separation from terrain, traffic and hazardous weather, using ATC assistance as necessary.
- If the affected IFD is in use for primary nav or com, transition to secondary GPS or VHF Nav/Com unit(s), if available.
- Consider cycling power on the affected IFD.
- After the flight, notify an Avidyne Service Center or Avidyne Customer Support to coordinate a repair.

**LOSS OF DISPLAY****Failure Indication:**

One indication of a failed display is that the display appears black while the bezel backlighting is still visible (e.g. the colored mode buttons).

**Functionality Lost:**

Although the basic functionality of the IFD is intact (e.g. VHF com and nav radios, FMS navigation and deviation output, etc.) the ability to control it is lost.

**Recommended Pilot Actions:**

- Attempt to increase the display brightness using the cockpit dimming control.
- Use other cockpit displays (e.g. CDI, HSI, etc.) for crosschecking deviation and position.
- Consider cycling power on the affected IFD.
- After the flight, notify an Avidyne Service Center or Avidyne Customer Support to coordinate a repair.

**LOSS OF BEZEL CONTROLS****Failure Indication:**

All knobs and buttons are unresponsive.

**Functionality Lost:**

There will be no ability to change pages ("FMS", "MAP", "AUX"), change the nav source, or swap frequencies.

**Recommended Pilot Action:**

- Use touch screen controls to perform functions.
- Consider cycling power on the affected IFD.
- After the flight, notify an Avidyne Service Center or Avidyne Customer Support to coordinate a repair.

**LOSS OF TOUCHSCREEN CONTROL****Failure Indication:**

The touch screen is unresponsive.

**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:**

- Verify that touch screen control is not turned off on the Setup page.
- Use bezel controls to perform functions.
- Consider cycling power on the affected IFD.
- After the flight, notify an Avidyne Service Center or Avidyne Customer Support to coordinate a repair.

**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 navigation should remain unaffected during Dead Reckoning, albeit with less accuracy and LPV approaches will be terminated due to loss of integrity so higher minimums for the less accurate GPS approaches will need to be used.

Some safety and alerting functions will be lost if GPS is unavailable including TAWS, FLTA, and altitude callouts.

**Recommended Pilot Action:**

In the event of a GPS position fix loss, the pilot's plan of action will vary based on the pilot, aircraft configuration, phase of flight and other factors. Taking into account those variations, pilots should consider the following actions:

- Establish safe separation from terrain, traffic and hazardous weather, using ATC assistance as necessary.
- If the affected IFD is in use for primary nav or com<sup>1</sup>, transition to secondary GPS or VHF Nav/Com unit(s), if available.
- Transition to aircraft guidance from a secondary receiver, if available.
- Plan on higher-minimum GPS RNAV approaches if in the terminal area.
- If successful with GPS reacquisition, normal use of the affected IFD may be resumed.
- After the flight, notify an Avidyne Service Center or Avidyne Customer Support to coordinate a repair.

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<sup>1</sup> Not applicable to the IFD510 and IFD545

## OTHER ANOMALIES

Other system anomalies are indicated to the pilot in the form of CAS messages. 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.

## SUBSCRIPTIONS

Nav, Obstacle, and Chart data are supplied by Jeppesen. Subscriptions can be tailored by geographic coverage region to suit individual needs. Refer to the Jeppesen product website for more details.

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

## NIGHT OPERATIONS

Several controls are available to configure the IFD for night operations.

### IFD DISPLAY BRIGHTNESS

IFD display brightness is controlled through settings on the Setup page. In a dual IFD installation, brightness of each IFD is controlled separately. 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 adapted to the dark.

### IFD BEZEL BRIGHTNESS

Each IFD can control the bezel brightness (backlighting of knobs and buttons) through settings on the Setup page. 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 adapted to the dark.

### 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, the Setup page provides Chart Day/Night Mode and Chart Auto Mode settings. See page 5-27 for details.

### 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.

## HIGH TEMPERATURE OPERATIONS

Like all similar units, the IFD generates heat, especially when equipped with a transmitting radio. There is internal temperature monitoring on all of the electrical components, and the system generates 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. This condition will be more noticeable on hot days or during long ground runs. Note that the rubber bezel buttons will not conduct this heat and should not be warm. 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 lack of air flow behind the panel.

## COLD TEMPERATURE OPERATIONS

If the IFD had been exposed to very cold temperatures, responsiveness of the display and to touch or bezel input may take longer than normal until the IFD has warmed up.

### **WARNING (IFD550/545 ONLY)**

#### **Extreme Cold Temperatures May Damage Sensors**

There is potential for permanent damage to the attitude sensor in the IFD550/545 if the IFD is exposed to storage temperatures of -40°C or lower.



## LOW POWER OPERATIONS

The following actions are taken as input power is reduced to the IFD:

Input Voltage	IFD Operation Impact
19.9VDC	16W VHF radio output power reduces to 10W. <sup>1</sup>
18VDC	Lose high power (2.1A) USB charging. USB charging reduces to 1A.
12.75VDC	Lose all USB charging.
11.5VDC	Bezel lighting and display lighting maximum values are reduced.
10.9VDC	VHF radio output power reduces to 6W. <sup>1</sup>
10.0VDC	VHF radio output power reduces to 4W. <sup>1</sup>
9VDC	60-second countdown to IFD shutdown begins (countdown message displayed on the IFD).
6VDC – 8 VDC	Internal components power down.

Function is restored by rising above those voltage thresholds by 1VDC for more than 1 second. A rapid decay below 10 VDC to 6-8 VDC will result in a power down prior to the 60-sec countdown being displayed or completed.

### NOTE

16W radio transmission power is only available as an option in 28VDC aircraft.<sup>1</sup>

<sup>1</sup> Not applicable to the IFD510 and IFD545

**HIGH POWER OPERATIONS**

The following actions are taken as input power is increased to the IFD:

Input Voltage	IFD Operation Impact
32.3VDC	VHF radio shuts down to protect itself from over-voltage events. Note that input voltage up to 33VDC will not damage the VHF but it will not function above 32.3VDC. <sup>1</sup>

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<sup>1</sup> Not applicable to the IFD510 and IFD545

## 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. Glove calibration procedures (specific to the glove and the pilot combination) are provided on the following page. 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. <sup>1</sup>	Pass	Fail
Type 121.7, press the "ENTER" button on the virtual keyboard and confirm 121.700 is the displayed frequency in the standby Com window. <sup>1</sup>	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" key on the bezel and then double tap a frequency from the list to place it into the standby slot. <sup>1</sup>	Pass	Fail

<sup>1</sup> Not applicable to the IFD510 and IFD545

## CHARGING FROM THE USB

The USB port on the front of the IFD bezel is a USB v1.1 compatible USB port which can be used as a power source for charging devices.

The capacity of the USB port is dependent upon the installation. For 14V installations, the USB port will function as a low power charging port, delivering up to 1 amp. For 28V installations, the USB port will function as a high power charging port, delivering up to 2.1 amps.

High power devices, such as iPads, can be charged using a low power port. However, in order to continue using the device while it is being charged, the device must be connected to a high power port (therefore, only in a 28V installation).

If a device is plugged into the bezel USB port at IFD startup, the unit will boot into maintenance mode. Therefore, unless the intent is to enter maintenance mode, ensure there are no devices inserted in the bezel USB port at startup. The USB port can be used for charging immediately after IFD initialization.

INTEGRATION WITH THE IFD100 MOBILE APP

The Avidyne IFD100 is an iPad application that can be downloaded from the Apple store. The IFD100 interacts with the IFD(s) as if it were another panel-mounted IFD. Up to two IFD100 apps can be connected to a single IFD at a time over Wi-Fi.

The IFD100 does not have its own VHF radio, but the VHF radio in the IFD can be tuned using from the IFD100 mobile app.<sup>1</sup>

IFD and IFD100 Data Sharing

	IFD	IFD100
Flight Telemetry		
Radios	Standby Nav Only 	
Active Flight Plan		
Stored Routes		 Requires IFD CrossSync
Waypoints		

Also available from the Apple store is the IFD Trainer app. The trainer simulates an IFD, transmitting data over Wi-Fi. Therefore, you can connect the IFD100 to the IFD Trainer for practice or training activities.

Although some iPads may support running both apps, the experience will be more realistic if the trainer and the IFD100 are running on separate iPads, each connected to the same Wi-Fi network.

<sup>1</sup> Not applicable to the IFD510 and IFD545

## DEMO MODE

The IFD can be put into demo mode at any time while on the ground for familiarization purposes. Entry into demo mode is accessed by inserting a USB flash drive with a dummy file called "DEMO" (no file type suffix and no quotes) prior to power application. Power up the IFD with that flash drive inserted and the IFD will boot to the following screen.

### *Demo Mode Splash Screen*

#### **DEMO MODE IS NOT FOR NAVIGATION**

**Simulator is for system familiarization only and is not an approved training tool. Actual system behavior may vary. Press the ENTR button to proceed. Press the CLR button and remove any USB device to return to normal flight mode.**

Pressing the bezel "ENTR" button will proceed into demo mode while pressing "CLR" and removing the USB flash drive will exit demo mode and proceed into normal flight mode.

Demo mode can also be exited by removing the USB flash drive and cycling power to the IFD.

While in demo mode, the IFD will "fly" the active flight plan in the FMS including any altitude constraints that may be part of the flight plan. The starting point of demo mode is whatever location is entered in the flight plan origin and changing the origin location while in demo mode will jump the location to the origin coordinates.

Demo mode will fly a straight line if no flight plan is entered or when reaching the end of the flight plan unless the last leg of the flight plan or missed approach is a hold, in which case the aircraft will stay in the hold indefinitely.

To ensure flight above the terrain in demo mode, enter altitude constraints in the flight plans that are above the terrain along the flight plan.

Once in demo mode, both the Map and Chart will display a “Not For Navigation” watermark.

#### **Demo Mode Watermark**



To return to flight mode, remove the USB flash drive and cycle power to the IFD.

#### **NOTE**

On IFDs equipped with a VHF radio, when the radio is tuned in Demo mode, the IFD will display the frequency entered and the station identifier, but the radio isn't actually tuned to the frequency entered.



## DATA TRANSFER TO/FROM EXTERNAL DEVICES

Data can be transferred to and from the IFD and a number of external devices via several methods (USB, Wi-Fi, Bluetooth).

Data that can be transferred is expected to grow over time but the basic functions are summarized in the table below

Data	Transfer Description	Transmission Method(s)
Present Position	Ownship position is streaming out of the IFD for use by third party device/applications. Outbound from IFD only.	Wi-Fi
Active Flight Plan	The active flight plan, and any real-time modifications to it is streaming out of the IFD for use by third party device/applications. Outbound from IFD only.	Wi-Fi
Stored Routes	Stored flight plan routes are a bi-directional transfer between the IFD and approved third party device/applications. Routes can be created off-board and imported into the IFD, and/or can be created on the IFD and transmitted off-board for third party device/application use.	Wi-Fi
Traffic	Traffic data known by the IFD (TAS sensor, TIS receiver, TIS-B receiver, etc.) is streaming out of the IFD for use by third party device/applications. Outbound from IFD only.	Wi-Fi

Data	Transfer Description	Transmission Method(s)
Weather	<p>ADS-B weather information received by the IFD is streaming out of the IFD for use by third party device/applications.</p> <p>Outbound from IFD only. Note that data from other weather sources will be streamed to the IFD100.</p>	Wi-Fi
User Waypoints	<p>User waypoints are a bi-directional transfer between the IFD and approved third party device/applications.</p> <p>User waypoints can be created off-board and imported into the IFD, and/or can be created on the IFD and transmitted off-board for third party device/application use.</p>	Wi-Fi, USB
Instrument Approach and Transition	<p>Instrument approach and selected transition data is streaming out of the IFD to facilitate automatic chart and transition selection and display ("chart popping") on third party device/applications.</p> <p>Outbound from IFD.</p>	Wi-Fi
Fully interactive IFD	<p>The panel mount IFD has complete bi-directional communication with the IFD100.</p>	Wi-Fi

Data	Transfer Description	Transmission Method(s)
User Data (User settings, user checklists, user waypoints, stored routes)	User data can be stored on a USB flash drive and imported for later use on any IFD.	USB
Data Entry and IFD manipulation	Data can be entered (e.g. frequencies, waypoint names, checklist data, etc.) from a properly paired external Bluetooth keyboard. In addition, bezel controls and other IFD manipulation can be accomplished (e.g. activating keys, page keys, changing map range, volume, etc) via the paired keyboard. Inbound to IFD only.	Bluetooth
Data Logs	Datalogs can be downloaded from an IFD onto a USB flash drive for importing and use on external devices (e.g. PC download, tech support evaluation, etc.). Outbound from IFD only.	USB
Database Updates	On-board databases (e.g. nav, chart, obstacle, terrain) can be uploaded to an IFD from a USB flash drive. Inbound to IFD only.	USB
Software Updates	IFD software updates can be uploaded to an IFD from a flash drive. Inbound to IFD only.	USB

## MAINTENANCE MODE

During normal operation, when power is applied to the IFD it starts up in "Flight Mode". However, there is a separate built-in "Maintenance Mode" that is used for various reasons including changing the configuration of the IFD interfaces, uploading databases, downloading logs, and performing software updates.

Typically, the only reason to enter the maintenance mode is during initial IFD installation and then periodically to update navigation, obstacle, and chart databases. A detailed explanation of the maintenance mode features that are used during IFD installation is given in the IFD installation manual. Features that are reasonably used by the pilot are described elsewhere in this pilot's guide. This section describes only the method for starting maintenance mode and the method to return to flight mode.

Some settings in Maintenance Mode are protected by a personal identification number (PIN). The PIN exists to prevent accidental changes to configuration settings, but it has no effect on the ability to update databases or download logs. **Defining a PIN is not required.** Just skip over that page and settings changes are unrestricted. Once defined, though, the PIN can only be cleared by contacting tech support.

### STARTING MAINTENANCE MODE AT POWER UP

If the IFD is powered off, maintenance mode can be started by inserting a USB flash drive into the USB port located on the front panel of the IFD. Once the flash drive has been inserted, apply power to the IFD and the unit will power up into maintenance mode. If the flash drive is empty, the "Logs" tab will be selected. Otherwise, the "Update" tab will be selected.

### STARTING MAINTENANCE MODE FROM FLIGHT MODE

If the IFD is already powered up in flight mode **and the IFD can determine that the aircraft is on the ground**, maintenance mode can be started using one of two LSKs located on the AUX SYS tab.

#### Download Logs LSK

The Download Logs LSK is intended for use when downloading logs. The IFD logs several parameters and events during normal IFD operation. Those logs are often useful for technical support.

Press the Status LSK until Software is selected. Then press "Download Logs" at the bottom left LSK. The LSKs will change to "Confirm" and "Cancel". Press "Confirm" to switch to maintenance mode. When the system restarts into maintenance mode, the "Logs" tab will be selected.

#### Download Logs LSK



**Confirm/Cancel LSKs****Update Databases LSK**

The Update Databases LSK is intended for use when updating databases. Press the Status LSK until Databases is selected. Then press "Update Databases" at the bottom left LSK. The LSKs will change to "Confirm" and "Cancel". Press "Confirm" to switch to maintenance mode. When the system restarts into maintenance mode, the "Update" tab will be selected.

**Update Databases LSK****EXITING MAINTENANCE MODE**

To return to flight mode from Maintenance Mode, select the Update tab either by touching that tab or by pressing the left side of the AUX button until that tab is selected. The "Done" LSK will be presented on the right side of the display, adjacent to the ENTR button. When the Done button is pressed, either by touchscreen or by the ENTR key, the display will show a countdown. Pressing CLR or Cancel will cause the system to remain in Maintenance Mode. Once the countdown expires, the IFD will reboot back into flight mode.

## DATABASE UPDATES

Periodic updates to nav, chart, obstacle, and terrain databases are made through the USB port on the front of each IFD. Updates must be performed in accordance with 14 CFR Part 43, Appendix A. Data updates require the use of the Maintenance Mode, which is permitted only on the ground.

### 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 database update periods:

Database	Update Cycle	Comments & Source
Chart Data	14 days	Expiration watermark displayed after 14 days indefinitely until data is updated (Jeppesen)
Nav Data	28 days	Airport, airway, navaid, airspace, and FMS data (Jeppesen)
Obstacle Data	56 days	Displayed on map and used for Terrain Awareness and FLTA functions (Jeppesen)
Terrain Data	As required	Displayed on map and used for Terrain Awareness 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.

It is recommended to use one of the formatted flash drives supplied by Avidyne (marked by the Avidyne logo printed on one

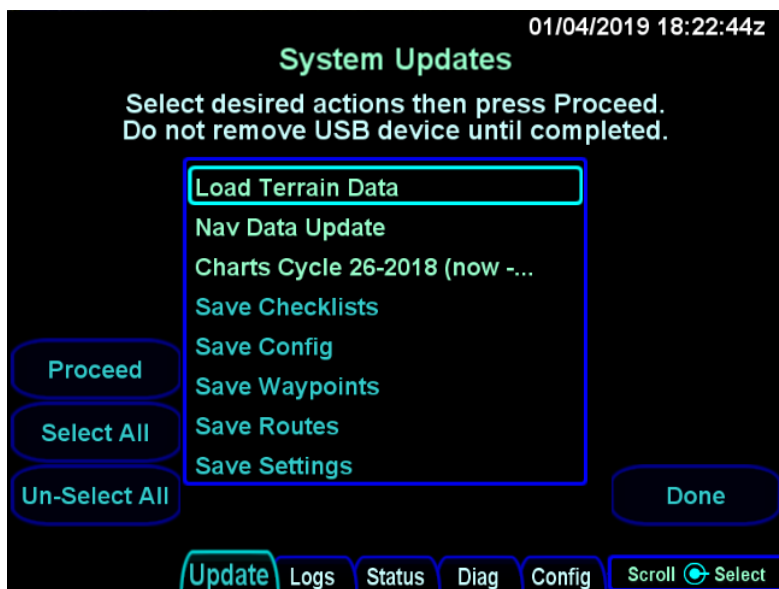


side). However, most USB drives that can be formatted using FAT32 will be acceptable. Replacement flash drives can be purchased directly from Avidyne.

To perform a database update, ensure the data to be updated is placed onto a USB flash drive. To prevent the inadvertent update of old data, Avidyne recommends that all files on the flash drive be deleted before copying new data to it. Insert the flash drive into the USB port on the front of the IFD and then start the IFD. (see Maintenance Mode section on page 7-22).

Maintenance Mode is organized similarly to flight mode using a tabbed interface. Databases are updated using the "Update" tab. If the IFD is powered up in Maintenance Mode or Maintenance Mode is entered using the "Update Databases" LSK, then the Update tab will already be selected.

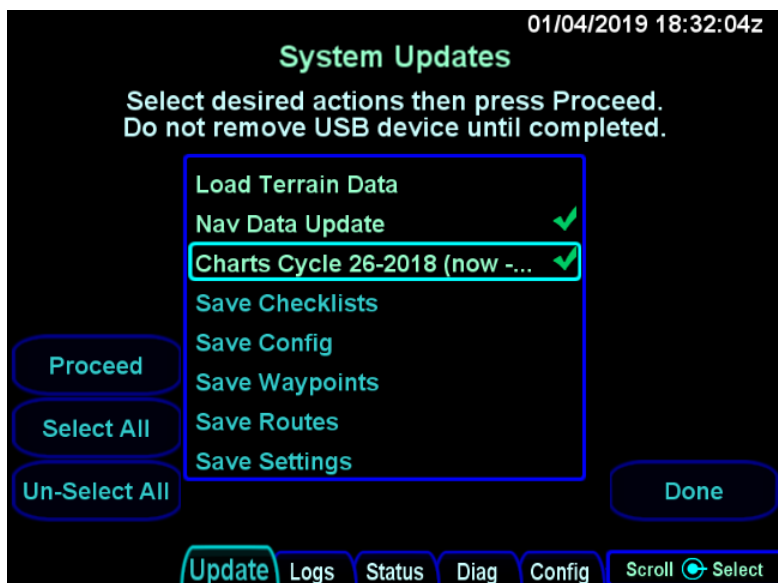
#### *Maintenance mode Update tab*



The Update tab in Maintenance Mode shows a list in the center of the display containing the files on the USB flash drive (and some other options for saving that are not discussed here). Turn the right inner or outer knob to scroll the cursor up and down and then press the knob button to select the item surrounded by the

cursor. The cursor can also be moved by touching items in the list and an item can be selected by touching the item surrounded by the cursor. When an item is selected, a checkmark will appear on the right side of the list. Pressing the right knob button or touching an item when the item surrounded by the cursor is already selected will cause the item to be deselected. All items in the list can be selected or deselected at once by pressing the "Select All" and "Un-Select All" LSKs, respectively.

***Update tab with items selected***



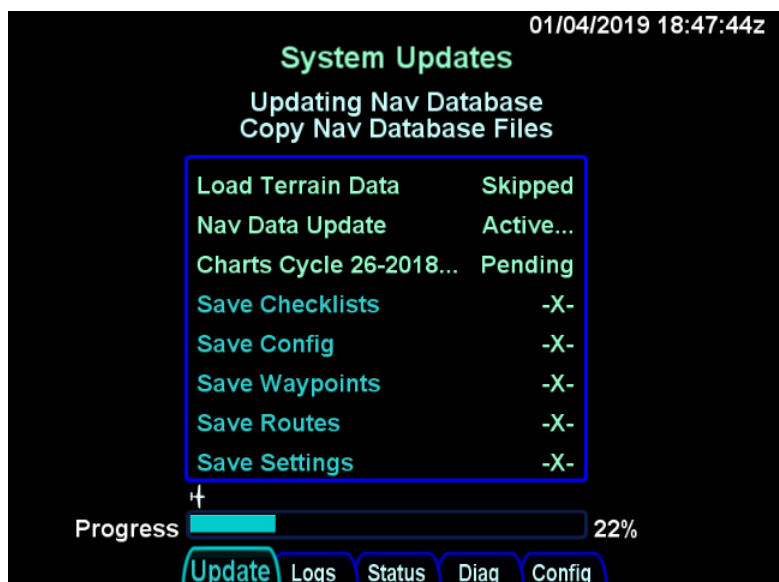
Once the set of items to be loaded has been selected, press the Proceed LSK to start the load.

**CAUTION****Do Not Power Off the IFD During Data Update**

Cycling power to the IFD during a database update may result in a corruption of the memory device that stores the databases. If this happens, a service action may be required to restore the data integrity.

**Use of a ground power unit during database updates is recommended.**

A progress bar will be presented as the loading process proceeds. During the process, various messages may appear and disappear. The progress bar will reset and be updated for each item to be loaded.

*Upload progress bar*

**TIPS AND TECHNIQUES FOR DUAL IFD INSTALLATIONS**

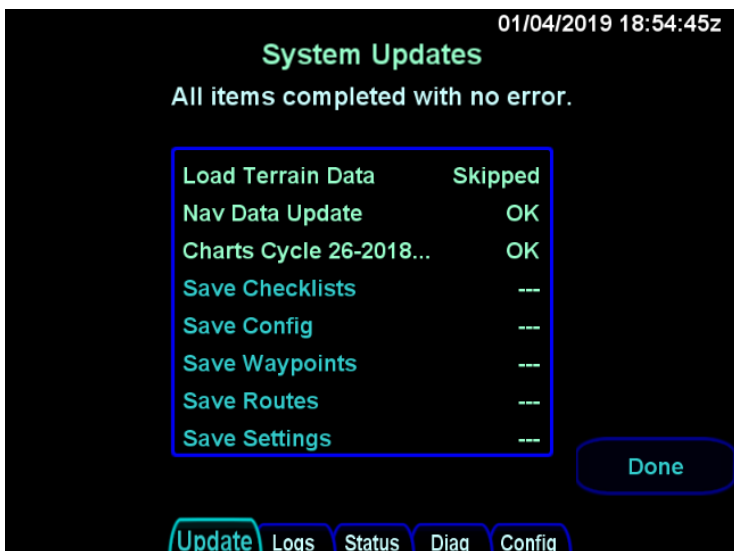
The nav database loaded on each IFD must be the same in order to allow flight plan sharing between IFDs.

Database uploads must be performed individually for each IFD to be updated. Due to the length of time required for some of the uploads, Avidyne recommends creating a separate flash drive for each IFD so that the updates can be done simultaneously. Doing the updates on one unit at a time will extend the overall time to accomplish a full update.

Once the loading process is complete, the list will be shown with the load status of each item in the list. If an item was not selected, the status will be "Skipped". If an item was successfully loaded, the status will be "OK". If an error occurred, the status will be "ERROR". If all items loaded successfully, a message to that effect will be shown above the list. If not, an error message will be displayed above the list.

Note that all of the LSKs along the left side will be removed and that no cursor will be presented. If there is a need to get the cursor and the LSKs back, either remove and reinsert the USB flash drive, or just change tabs by touching the tab or using the AUX button and then go back to the Update tab.

If the load was not successful, attempt the upload again using the error message as a guide or contact Avidyne technical support.

**Upload Complete Indications**

When all loading operations have been completed, press the “Done” LSK to restart the IFD in flight mode. Remove the USB flash drive and store it in a safe place. If the USB flash drive is inadvertently left in the USB port during flight mode, there will be no adverse affect as the USB flash drive is ignored during flight mode.

Once the IFD is back into flight mode, it is highly recommended to verify that the data was updated by going to the AUX-SYS tab, selecting "Databases" with the “Status” LSK, and then checking the identifying characteristics of the databases that were loaded (e.g. name, cycle dates).

**DATABASE ACCURACY AND COMPLETENESS**

Avidyne accurately processes and validates the database data, but cannot guarantee the accuracy and completeness of the data provided by various state sources and their suppliers.

## REPORT OBSERVED DISCREPANCIES

Avidyne requests that any observed database discrepancies get reported. Discrepancies may be in the form of an incorrect procedure, incorrectly identified terrain, obstacles, navigation fixes, or any other displayed item used for navigation or communication in the air or on the ground. Use the Service Hotline defined on the inside back cover.

## SOFTWARE UPDATES

With very few exceptions, all software inside the IFDs is capable of being updated using the USB connection. Avidyne does not require software updates to be performed at Avidyne Service Centers. Any certificated repair station, A&P, or Experimental Aircraft owner with log book signoff authority can perform the update. The person performing the update must follow the procedures in the associated Service Bulletin and then mail/fax/email back in the completed update sheet included with the Service Bulletin to Avidyne.

## DATALOGS DOWNLOAD

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

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 several 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  $\frac{1}{4}$  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.
- **GPS Log** – This log contains extensive internal state data for the GPS.
- **Configuration Log** – This set of .txt files contains various system settings, states, and calibrations at power down.

To download logs, start the IFD in Maintenance Mode (see Maintenance Mode section on page 7-22). Once maintenance



mode has started, press the right side of the AUX page key to select the "Logs" tab. Note that if maintenance mode was started using the "Download Logs" button, the "Logs" tab will already be active. Insert a USB flash drive into the USB port.

**Datalogs Download Page (Maintenance Mode)**



The Logs tab in maintenance mode shows a list in the center of the display containing the list of logs that can be downloaded. Use the right knob on the IFD to scroll the cursor up and down and then use the knob button to select the item surrounded by the cursor to be downloaded. You can also move the cursor by touching items in the list and then touch the item surrounded by the cursor again to select it. When an item is selected, a checkmark will appear on the right side of the list. Pressing the knob button or touching an item when the item surrounded by the cursor is already selected will cause the item to be deselected. All items in the list can be selected or deselected at once using the "Select All" and "Un-Select All" LSKs.

The "Logs" LSK provides two options - "Full" and "Since Last". The "Full" option causes all of the data each selected log to be downloaded. The "Since Last" option causes only that data which has been logged since the last time a download was

completed to be downloaded. Since the logs contain a large amount of data, the second option will be a quicker option in almost every case.

Once the desired set of logs has been selected, press the "Proceed" LSK to start the download process.

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.

A progress bar will be presented as the download proceeds. As the list is processed, each item will show a status of "OK", "In progress...", "Pending", "Skipped", "Active", or "Failed".

Once the download is complete, press the "Done" LSK to exit maintenance mode.

When downloaded to the USB flash drive, the data logs will be saved in .csv files with a unit number prefix (e.g. "1\_" or "2\_"). 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.

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 a diagnostics log for Avidyne Service Center technicians.

## 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.

## GPS Log

This log contains miscellaneous internal GPS state data. It is a diagnostics log for Avidyne Service Center technicians.

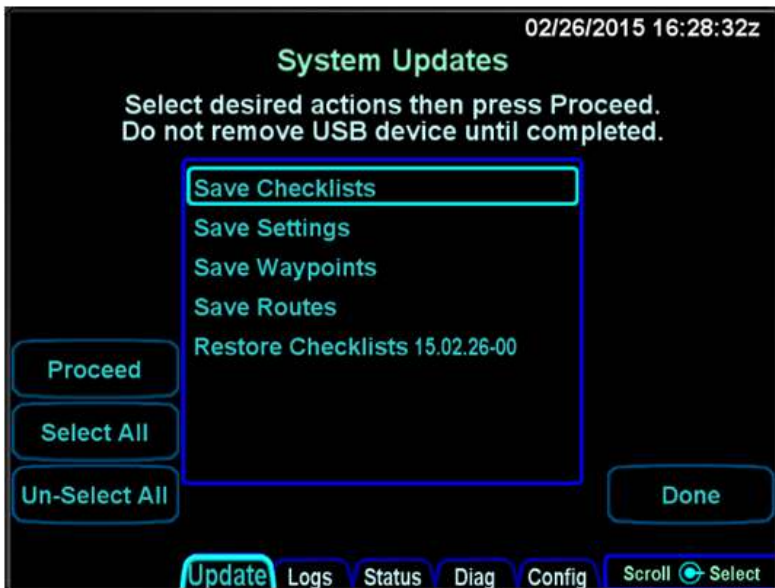
## Configuration Info

Configuration Info consists of a set of text files.

## USER DATA BACKUP/RESTORATION PROCEDURE

Use the following procedure to store and reload user checklists, user settings, waypoints, and routes. The original user data must be generated on an IFD and backed up using this procedure. Then, they can be reloaded onto any IFD or multiple IFDs using this procedure.

### *User Data Save and Restore Options*



### SAVING USER DATA

Ensure a properly formatted flash drive is installed in the IFD.

Start the IFD in maintenance mode (see Maintenance Mode section on page 7-22). From the Update tab, ensure the desired "Save <data type>" option(s) has a checkmark and then press the "Proceed" LSK option.

**TIPS AND TECHNIQUES****Additional Means of Recording Configurations**

Avidyne highly recommends recording your user preferences and configuration settings (including Maintenance Mode “Config” pages) in an alternate form (e.g. smart phone photographs of the page settings) as an additional precaution.

When the download is complete (should take a matter of seconds), store the flash drive and/or the files on the flash drive in a secure location.

**RELOADING PREVIOUSLY STORED USER DATA**

Ensure the flash drive containing the previously stored user data is installed in the IFD.

Start the IFD in maintenance mode (see Maintenance Mode section on page 7-22).

From the Update tab, ensure the dated file(s) of interest (“Restore <data type> 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 appropriate page (e.g. UTIL option of the SYS tab on the AUX page) to verify the restored data is present.

It is possible to import user data from IFD simulators but they must be individually selected for saving onto the flash drive via the simulator.

The possible states that can be displayed during user data 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 State	Indication
Save or Restore passed over	Skipped ...
Completed with no error	OK
Completed with error	ERR

## TRANSFERRING USER WAYPOINTS

User waypoints can be completely edited using the IFD. However, when there are more than just a few of them to manage, it is often easier to manage them offline. Therefore, the IFD provides a mechanism to upload and download the set of user waypoints using a comma separated value (CSV) file. These operations are accomplished using Maintenance Mode.

### UPLOADING USER WAYPOINTS

User waypoints to be uploaded to the IFD must be contained in a file with an extension of ".CSV". The first line of the file must contain "userwpts", followed by a comma, followed by a description of the file contents, as shown in the example below:

```
userwpts, Around home airport
```

Each subsequent line in the file contains a user waypoint, defined as follows, with each field separated by a comma.

- Identifier – this field must contain at least one character and at most 5 characters. Allowable characters are letters A through Z and numerals 0 through 9.
- Name – this field can either be blank or contain at most 20 characters. Allowable characters are letters A through Z, letters a through z, numerals 0 through 9, pound sign, asterisk, dash, period, underscore, and space.
- Latitude – this field must contain a decimal value in the range of -90.0 to 90.0
- Longitude – this field must contain a decimal value in the range of -180.0 to 180.0.

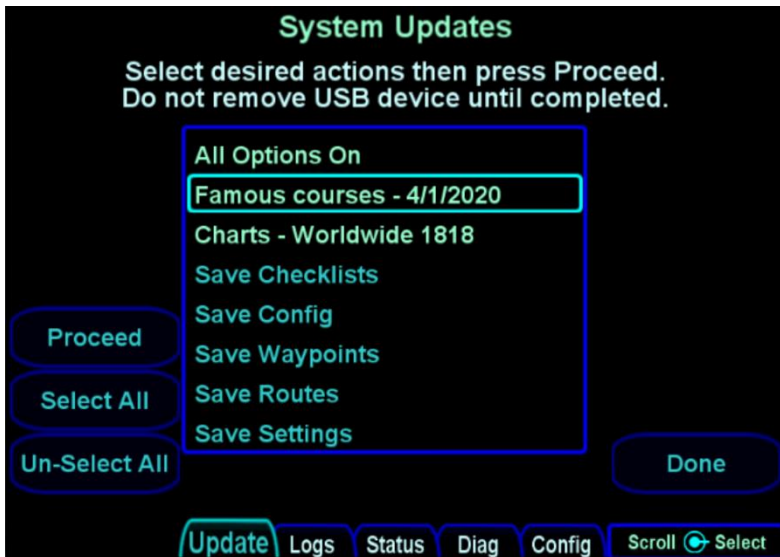
Only the first 500 waypoints in the file will be accepted.

The following is a sample user waypoint file containing 4 waypoints:

```
userwpts, Famous courses - 4/1/2020  
PEBL, Pebble Beach, 36.569407, -121.949466  
STAND, St. Andrews - 1st, 56.343525, -2.802973  
RLMLB, Royal Melbourne G.C., -37.969795, 145.030681  
MSTRS, Augusta National, 33.494563, -82.023049
```

User waypoints are uploaded to the IFD using the same technique as is used for uploading navigation data. CSV files containing user waypoints will be displayed on the System Updates page just like DSF files are. The description on the first line of the CSV file will be shown in the list, as illustrated below for the sample file above.

***System Update tab showing user waypoints file***



When uploading user waypoints from a CSV file, the set of user waypoints in the CSV file will replace the set of user waypoints in the IFD.

The IFD cannot detect inaccurate data in the CSV file. It is the pilot's responsibility to check the accuracy of each user waypoint after loading and before its first use.

## DOWNLOADING USER WAYPOINTS

To save the set of user waypoints currently contained in the IFD, start Maintenance Mode, go to the Update tab, and then select the "Save Waypoints" item. After pressing the Proceed button, the IFD will save the set of waypoints to a file named "SAVEWPTS.CSV". The saved file will have the same format required for uploading user waypoints, and the description on the



first line will contain the date on which the waypoints were downloaded.

**IMPORTANT NOTE**

If the USB flash drive already contains a file named **SAVEDWPTS.CSV** when user waypoints are downloaded, the IFD will overwrite the contents of the file. To prevent data loss, consider transferring the file to a personal computer or renaming the file on the USB flash drive prior to downloading.

## CONFIGURING A BLUETOOTH® KEYBOARD

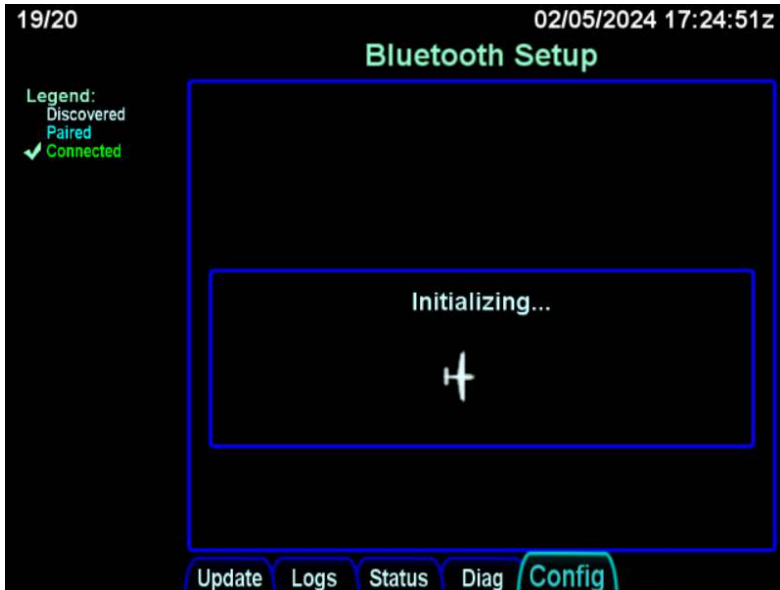
The IFD uses a built-in Bluetooth interface to communicate with a remote keyboard. The keyboard can be used to enter waypoint identifiers, change pages, move the cursor, and tune radios. To use the remote keyboard, it must first be paired with the IFD. Once paired, the keyboard can be used every time the IFD is powered up without going through the pairing process again.

A Bluetooth keyboard can only pair with one device at a time. Therefore, in a dual IFD installation, only one of the IFDs should have its Bluetooth interface turned on. The Bluetooth interface can be turned on or off using the Setup tab (see page 5-28).

### PAIRING THE KEYBOARD

Bluetooth keyboard pairing is accomplished using Maintenance Mode. Start the IFD in maintenance mode (see page 7-22), then select the "Config" tab by either using the AUX button or by touching the tab. Then, turn the right outer knob until the Bluetooth Setup page is displayed.

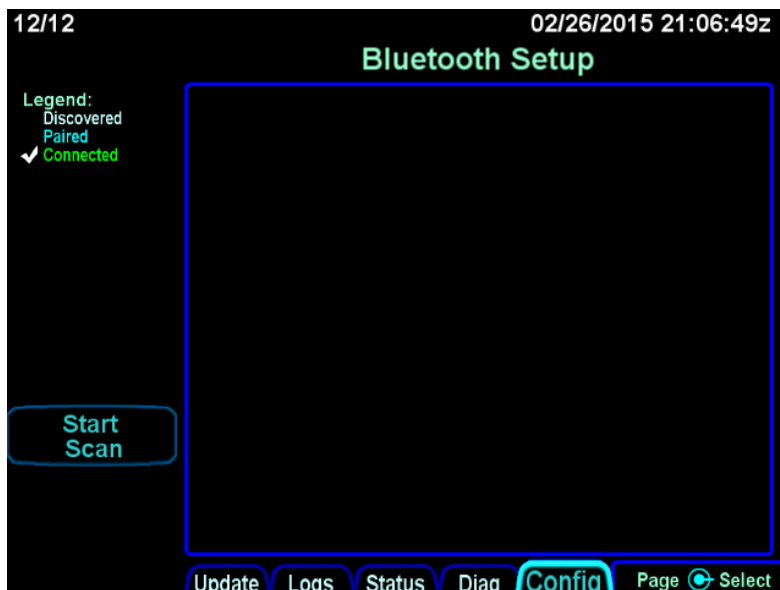
#### *Bluetooth Setup – Initializing*



During the time that the IFD is initializing its Bluetooth interface, the Bluetooth page will appear as shown above with the aircraft symbol moving left to right across the page. The legend in the upper left corner of the page is for reference only. It does not reflect the status of Bluetooth pairing for any device.

Once the Bluetooth interface has been initialized, the Bluetooth Setup page will appear as shown below with a single “Start Scan” LSK.

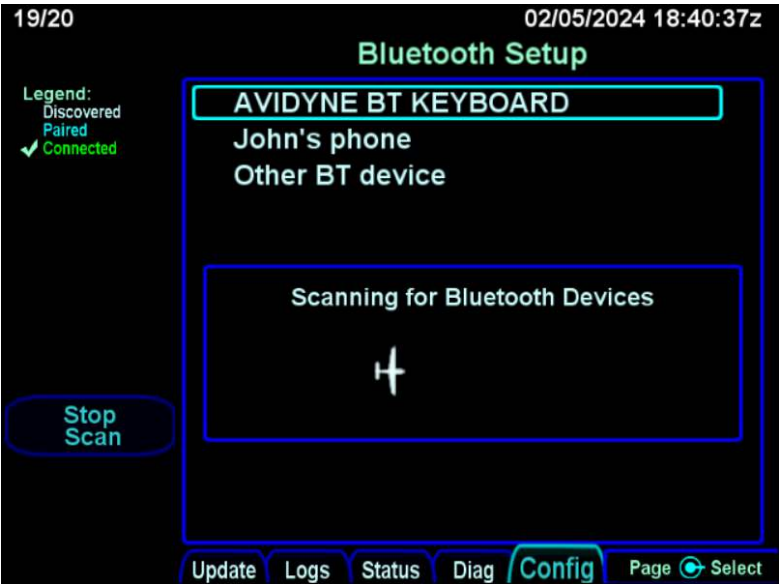
#### ***Bluetooth Setup – Start Scan***



Press the Start Scan LSK to start the process of discovering available Bluetooth devices. Turn the keyboard on using the slide switch on the left side of the keyboard, then press and hold the button on the back of the keyboard. Release the button once the pairing light in the upper left corner of the keyboard starts flashing. On newer keyboards, the button must be held long enough for the light to start flashing rapidly – generally a few seconds.

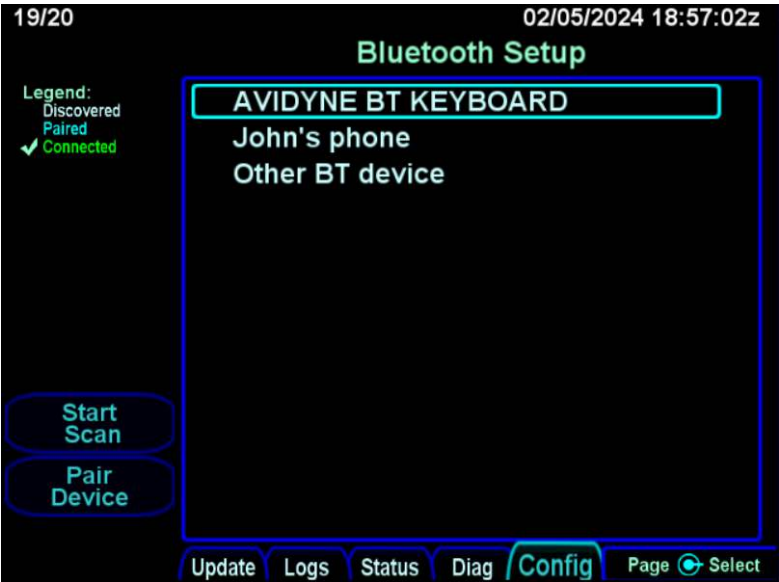
While the IFD is scanning, any devices that are discovered will appear in the list shown in the main part of the page, as illustrated in the next figure.

*Bluetooth Setup – Discovered devices*



When the name of the keyboard appears, press “Stop Scan”.

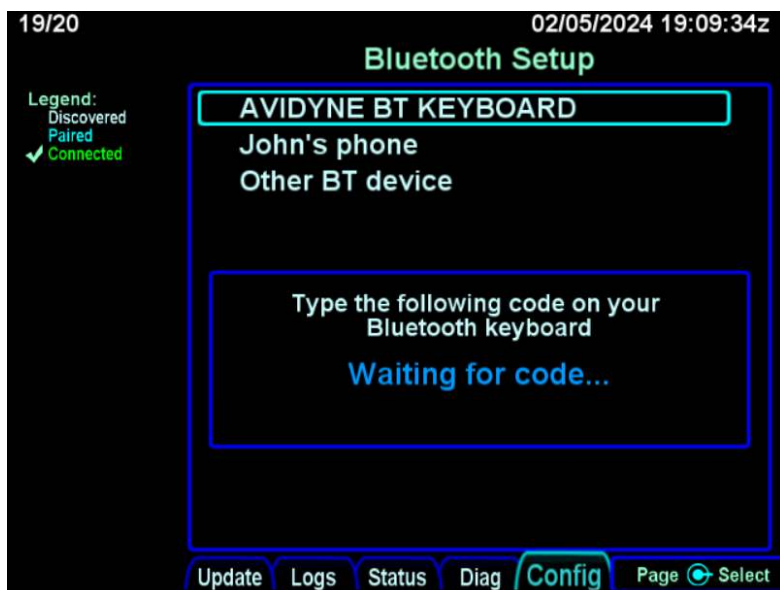
*Bluetooth Setup – Ready for pairing*



Use the right knob so that the cursor surrounds the keyboard device to be paired. Then, press the "Pair Device" LSK. What happens next is dependent on the Bluetooth version used by the keyboard. Early versions of the keyboard require entry of a code for pairing. Later versions do not. The IFD recognizes the kind of keyboard and reacts accordingly.

If a code is required, then pressing the Pair Device LSK causes the IFD to request a code from the keyboard. While the IFD is waiting for the keyboard to return the code, a corresponding message is displayed, as illustrated below.

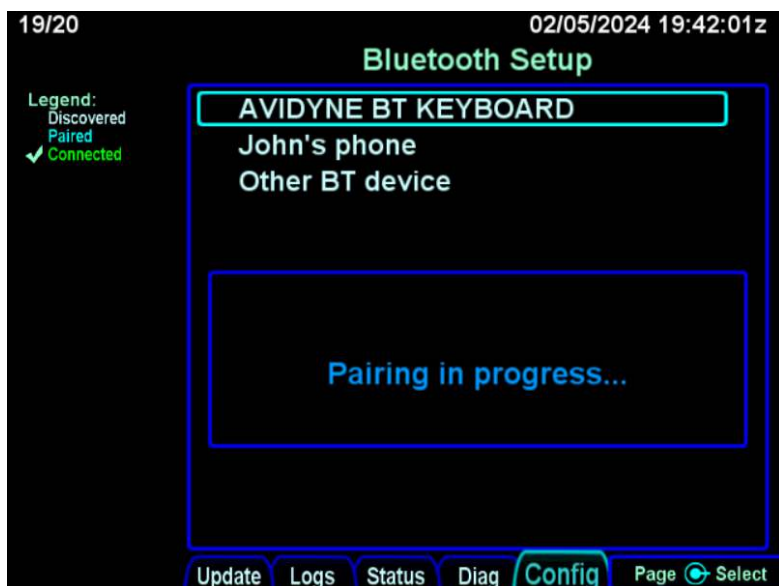
#### **Bluetooth Setup – Waiting for Code**



Once the code is received from the keyboard, it is displayed on the page with instructions as illustrated below. Enter the code using the Bluetooth keyboard and press ENTR.

**Bluetooth Setup - Code**

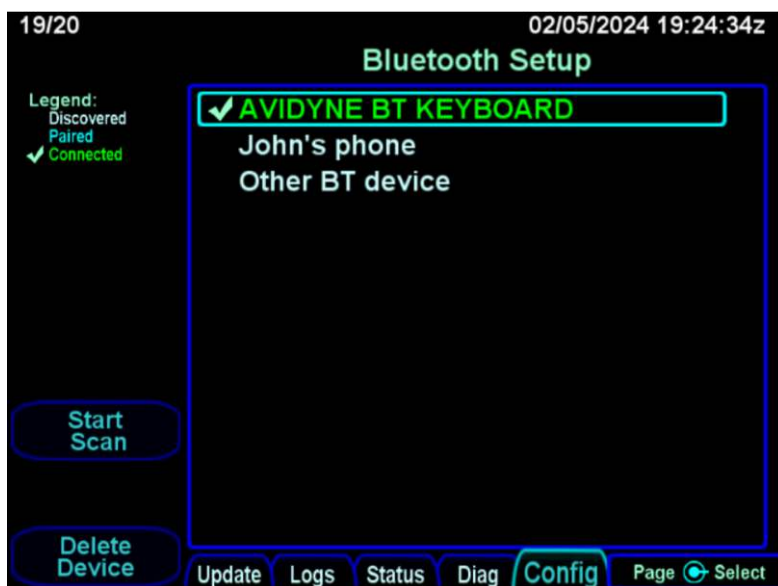
If the keyboard being paired does not require entry of a code, a message saying "Pairing in progress..." will be displayed on the page as illustrated below. No further action is required from the user while the pairing is in progress.

**Bluetooth Setup – Pairing when no code is required**

Regardless of whether a code entry was required, if the pairing process is successful, the selected device is shown in green with a checkmark next to it.

If the device is not shown in green or if the device name disappears from the display, restart the pairing process by pressing the button on the back of the keyboard and restarting the scan. If repeated pairing attempts are unsuccessful, contact Avidyne Technical Support.

After successful pairing, exit Maintenance Mode by pressing the "Done" LSK on the Update tab.

**Bluetooth Setup – Pairing successful****VERIFICATION OF SUCCESSFUL PAIRING**

Start the IFD in flight mode and then go to the Connectivity category on the Setup Page. Ensure that the Bluetooth option is "On" and then verify that the Bluetooth symbol in the upper right corner of the display is green (this may take several seconds).

Test that the pairing was successful by any of several methods, including:

- Press FMS several times on the Bluetooth keyboard. Verify that the FMS page changes with each key press.
- Select the FMS FPL page on the IFD. Repeatedly press the down arrow key on the Bluetooth keyboard until the cursor is at the end of the flight plan (insert cursor). Press a letter on the Bluetooth keyboard and verify that a waypoint entry is initiated.

**TIPS FOR USING THE KEYBOARD**

A solid green light on the keyboard indicates that it is connected. A flashing green light indicates it is trying to pair. A yellow light



indicates that a keystroke is being sent to the IFD. While charging, the battery light turns red and gets dimmer as the charge increases. When fully charged, the battery light is extinguished. Leaving the keyboard plugged in after the charge is complete will decrease the battery life.

If a previously paired keyboard appears to be inoperative, first check that the keyboard is sufficiently charged. If it is, then check that the Bluetooth setting on the Setup page is set to On. If the keyboard is charged, the Bluetooth setting is On, and the keyboard is still inoperative, then attempt to pair the keyboard with the IFD again.

Keyboards can shut down due to inactivity or can be turned off with the switch. Once a keyboard has been paired, it will reconnect to the IFD just by turning on the keyboard or by pressing a key. A momentary press of the pairing button on the back of the keyboard can also cause the keyboard to disconnect and/or reconnect. However, holding the pairing button can cause the pairing with the IFD to be lost. To prevent accidental unpairing, avoid pressing the pairing button once the keyboard has been paired.

A keyboard can only be paired to one device. If it is paired to something other than an IFD, it will have to be paired again with the IFD.

A simple and effective way to physically secure the keyboard in the cockpit is to apply VELCRO® brand hook and loop fastener to the back surface and find somewhere accessible but out-of-the-way for the mating material.

## CLEANING THE DISPLAY

If the IFD screen should become dirty due to fingerprints or dust, clean the screen using a clean, soft lint-free cloth, such as 3M Ultra-Brite Cloth #2011 or similar, and a cleaning solution composed of de-ionized water 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.

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.

## SLIDE-IN REPLACEMENT DETAILS

The IFD is designed as a slide-in replacement of the following equipment:

Avidyne Product	Garmin Product	Garmin SW Baseline	Comments
IFD540	530 530W 530AW 530TAWS	4.01 (Main)	
IFD510	500 500W	4.01 (Main)	

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

Unsupported 500/530 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.

To take full advantage of FLTA and other IFD aural alerting (e.g. TOD chime), ensure the audio output signals are wired to the audio panel. For 500/530 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 with IFD installation.

To take full advantage of the IFD ADS-B compliant position and automatic air-ground transitions, ensure the proper IFD output signals are wired to a compatible transponder.

Discuss integration options with your installer. There are several options that can be added to the system for added capability. There is a dedicated section in the IFD Installation Manual that identifies these options.

## NVIS OPERATION

This section is applicable only to IFDs that have specifically been manufactured to be compatible with the Night Vision Imaging System (NVIS).

An NVIS compatible IFD has all of the same behavior as a non-NVIS IFD except for the bezel and display lighting behavior. An NVIS compatible IFD can be operated in either NVIS mode or "Day" mode, which can only be selected using an external switch. If the installation did not include such a switch, the IFD will power up and remain in NVIS mode.

### NVIS MODE

When NVIS mode is selected, the brightness of the unit will be much lower than normal. This dim setting allows for viewing through standard night vision goggles and occurs across the screen and display.

Display and bezel brightness can be adjusted using the same Setup page controls as a non-NVIS unit (see page 5-50). However, in NVIS mode, bezel keys will dim in conjunction with the display to limit light exposure in NVIS environments.

When in NVIS mode, the display is overshadowed with a green tint which may affect some of the coloring. The bezel backlights, however, will always be green. As a result, the AUX rocker button will not be colored to indicate the priority of an alert as described on page 8-1.

### DAY MODE

When Day mode is selected, the display behaves the same as it does in a non-NVIS unit. However, the bezel lighting operates in the same manner as NVIS mode.

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## 8 Crew Alerting System

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

The IFD includes a Crew Alerting System (CAS). There are four levels of message alerting:

- **Warnings (Red)**  
Immediate action should be performed
- **Cautions (Yellow)**  
Immediate attention should be applied
- **Advisories (Cyan)**  
A change in system state that may require attention
- **Notices (Green)**  
An event occurred that may require attention when it's convenient

### MASTER CAUTION LAMP

A "Master Alert" system has been created where any active caution or warning will cause the bezel "AUX" button to be lit using the color of the highest level alert. Each time a new alert is issued, the AUX button will flash the corresponding color until it is either acknowledged by the pilot or the condition goes away. When there is at least one active alert, the AUX button will stay lit with the color corresponding to the active alert with the highest level. If the AUX page is already the current page, the AUX lamp will stay green and the ALERT tab will be colored according to the alert with the highest level. Note that if there is an active alert and a new alert of a lower priority becomes active, the master indication color will not change (e.g. a new caution will not cause the AUX button or the tab color to change from red to yellow).

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 caution and warning.

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

## ALERT MESSAGE BAR

Alert messages are shown on the lower right corner of the IFD using a background color corresponding to the level of the alert. If more than one unacknowledged alert is active, the most recent, highest level alert will be shown.

### *Warning Message*



Pressing the “CLR” bezel key or touching the message bar on the display will acknowledge the message, causing the message bar for that alert to disappear. Note that acknowledging the message does not eliminate the condition that caused the alert. However, some alert messages are issued in response to an event, and acknowledging the alert effectively clears the condition.

After all active messages have been acknowledged, the AUX lamp will remain illuminated with the color of the message with the highest level.

Alerts are either “global” or “local” in nature. In a single IFD installation, the difference is irrelevant. In a dual IFD installation, however, global alert messages are displayed on all IFDs, whereas local alert messages are displayed only on the issuing IFD. A global message can be acknowledged on any IFD and that will cause the message to disappear on all IFDs. Because a local message is only displayed on one IFD, it must be acknowledged on the same IFD.



The tables below show the warnings, cautions, advisories, and notices that can be issued. Each entry in the table is organized as illustrated in the example below.

<b>Short Text</b>	<b>Long text</b>
* Ψ	Detailed explanation of the conditions that may cause the alert and, in some cases, a recommended action to be taken.

An asterisk (\*) to the left of the detailed explanation indicates that the alert is "global" in a dual IFD installation.

A " Ψ " symbol to the left of the detailed explanation is an indication that the alert will be deleted on acknowledgement.

**WARNINGS****Low Volts Off  
In <x> Sec****Low Volts, IFD powers down in <x> sec**

- \* Main supply voltage has fallen below 9 VDC and the IFD will power down in <x> seconds (counting down from 60). Contact a local dealer for service.

**Pull Up****Excessive Descent Rate**

- \* The TAWS Excessive Descent Rate algorithm has detected a CFIT potential – initiate an immediate recovery maneuver.

**Terrain  
Pull Up****Terrain Pull Up**

- \* The FLTA algorithm has detected an imminent ground collision - Initiate an immediate recovery maneuver

**Unit Overtemp****IFD operation unreliable: <internal component name>**

The listed internal components have exceeded the 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.

**Unit Overtemp****Return IFD for service. Operation unreliable: <n>**

One or more of the internal components has exceeded its maximum design temperature <n> times and reliability cannot be ensured until the unit is tested by the Avidyne Service Center. This message will be present on every subsequent power cycle until reset by the Avidyne Service Center. Contact the Avidyne Service Center or a local dealer for service.

**Warning  
Obstacle****Warning, Obstacle**

- \* The FLTA algorithm has detected an imminent obstacle collision - Initiate an immediate recovery maneuver.

**CAUTIONS****ADS-B Traffic  
Sensor Fault****No communication with traffic sensor**

- \* The IFD is not receiving messages from the ADS-B traffic sensor. Contact a local dealer for service. This message is local if independent traffic sensors are installed.

**ADS-B Traffic  
Sensor Fault****Traffic sensor has failed**

- \* The ADS-B traffic sensor is reporting a failure or the IFD is receiving invalid messages from the sensor. Contact a local dealer for service. This message is local if independent traffic sensors are installed.

**Caution  
Obstacle****Caution, Obstacle**

- \* The FLTA algorithm is predicting a likely obstacle collision with approximately 60 seconds – initiate a proper recovery maneuver.

**Caution  
Terrain****Caution Terrain**

- \* The FLTA algorithm is predicting a likely ground collision within approximately 60 seconds – initiate a proper recovery maneuver.

**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.

<b>COM Stuck TX</b>	<b>Stuck mic timeout, transmitter disabled</b>  Requires 35 seconds of continuous transmission. Verify the PTT is stuck and contact a dealer for service as required. Not applicable to the IFD510 and IFD545.
<b>COM TX Fault</b>	<b>Transmitter Fault, no TX ability</b>  Transition to a backup VHF com radio (if available) or initiate lost communication procedures. Contact the Avidyne Service Center or a dealer for service. Not applicable to the IFD510 and IFD545.
<b>Configuration Error</b>	<b>Configuration Error – IFD Requires Service</b>  The IFD has encountered an internal error while determining the system configuration. Contact the Avidyne Service Center or a local dealer for service.
<b>Don't Sink</b>	<b>Negative climb rate or altitude loss</b>  TAWS NCR algorithm has determined corrective action should be taken immediately.
<b>GPS Fault</b>	<b>GPS Fault</b>  The GPS has stopped providing a navigation solution. If GPS is the only navigation solution source available, then expect degraded IFD operation (e.g. no map, no FMS guidance, etc.)

<b>GPS Integrity Lost</b>	<b>GPS Integrity Lost Crosscheck Nav</b> <p>This alert indicates imminent exceedance of horizontal fault detection limits or protection levels. Crosscheck the nav solution and determine the best course of action. If on an approach, executing a Missed Approach is recommended.</p>
<b>Heading Lost</b>	<b>Using ground track for SVS</b> <p>The IFD had a valid heading source that stopped providing heading. The SVS view is being shown with respect to ground track instead. Applicable to the IFD545 and IFD550 only.</p>
<b>Low Volts</b>	<b>Reduced backlight maximum</b> <p>Main supply voltage has fallen to approximately 11VDC. Check the aircraft alternators/generators are on and functional. Consider load shedding the bus that is powering the IFD.</p>
<b>LP Unavailable</b>	<b>GPS integrity is insufficient for LP Approach</b> <p>No other minima available, abort the approach.</p>
<b>LP Unavailable Use LNAV MDA</b>	<b>GPS integrity is insufficient for LP Approach</b> <p>Transition to a non-LP approach and the appropriate minima.</p>
<b>LPV Unavailable</b>	<b>GPS integrity is insufficient for LPV Approach</b> <p>No other minima available, abort the approach.</p>

<b>LPV Unavailable Use L/VNAV DA</b>	<b>GPS integrity is insufficient for LPV Approach</b>
Transition to a non-LPV approach and the appropriate minima.	
<b>LPV Unavailable Use LNAV MDA</b>	<b>GPS integrity is insufficient for LPV Approach</b>
Transition to a non-LPV approach and the appropriate minima.	
<b>L/VNAV Unavailable</b>	<b>GPS integrity is insufficient for L/VNAV Approach</b>
No other minima available, abort the approach.	
<b>L/VNAV Unavail. Use LNAV MDA</b>	<b>GPS integrity is insufficient for L/VNAV Approach</b>
Transition to a non-L/VNAV approach and the appropriate minima.	
<b>Manual Sequence Req'd</b>	<b>Altitude invalid - leg will not auto sequence</b>
If the IFD does not have baro altitude input, this message will appear when the FMS active leg terminates at an altitude. In this case, the FMS flight plan will need to be manually sequenced to the next leg. Failure to do so will cause the FMS to fly the course/heading indefinitely.	
<b>No ADS-B Position</b>	<b>AXP322 Lost GPS Position Data</b>
ADS-B position data had previously been valid and then transitioned to invalid. Check the ADS-B position source.	

<b>No Comm with VHF</b>	<b>No communication with the VHF radio</b>  Transition to a backup VHF com radio (if available) or initiate lost communication procedures. Contact the Avidyne Service Center or a dealer for service. Not applicable to the IFD510 and IFD545.
<b>No Comm with Xpdr</b>	<b>No Communication with Remote Transponder</b>  No data has been received from the remote transponder for greater than 2 seconds. Contact the Avidyne Service Center if this persists across power cycles.
<b>No Position</b>	<b>No position available</b>  The IFD cannot compute a navigation solution. IFD operation will be degraded (e.g. no map, no FMS guidance, etc.) Transition to alternative navigation sources.
<b>Radar Sensor Fault</b>	<b>No communication with radar sensor</b>  No data has been received from the sensor for at least 2 seconds.
<b>Radar Sensor Fault</b>	<b>Radar data is invalid</b>  The data stream from the radar contains information that should not be used.
<b>Radar Sensor Fault</b>	<b>Sensor mode is &lt;rep&gt;. Selected mode is &lt;sel&gt;</b>  The selected mode <sel> does not match the reported mode <rep>.



<b>Radar Sensor Fault</b>	<b>Radar fault code: &lt;codes&gt;</b>  The sensor is reporting the fault codes that are shown.
<b>Radar: Echoes Ahead</b>	<b>Radar: Heavy Echoes Ahead</b>  Generated when a number of red and/or magenta echoes are present within the area $\pm 22^\circ$ off the nose of the aircraft at the current displayed radar range.
<b>Radar: Target Alert</b>	<b>Radar: Target Alert Detected</b>  Alerts the pilot to the presence of a significant weather cell that exists beyond the currently selected display range.
<b>Sink Rate</b>	<b>Excessive Descent Rate</b>  TAWS has detected a potential for CFIT due to excessive descent rate. Arrest the descent rate and recover the aircraft.
<b>TAWS Fail</b>	<b>Invalid GPS Position/Velocity</b>  The GPS solution is lost or the GPS velocity quality parameters dropped below required accuracy limits. A chime is played if this condition occurs. Contact the Avidyne Service Center if this persists across power cycles.
<b>TAWS System Failure</b>	<b>TAWS Failed Self-Test &lt;reason&gt;</b>  TAWS failed self-test for the <reason> provided and TAWS will be degraded or not available for the duration of this power cycle. Contact the Avidyne Service Center if this persists across power cycles.

<b>TIS Removed</b>	<b>TIS Traffic Removed</b>  TIS traffic communications have ceased for more than 12 seconds.
<b>TIS Unavailable</b>	<b>TIS Traffic Unavailable</b>  No TIS ground station is available or communications have ceased for more than 60 seconds.
<b>Too Low, Terrain</b>	<b>Premature Descent, below glide path</b>  TAWS has determined the aircraft is below glide path.
<b>Traffic Sensor Fault</b>	<b>No communication with traffic sensor</b>  * The IFD is not receiving messages from the traffic sensor. Contact a local dealer for service. This message is local if independent traffic sensors are installed.
<b>Traffic Sensor Fault</b>	<b>Traffic sensor has failed</b>  * The traffic sensor is reporting a failure or the IFD is receiving invalid messages from the sensor. Contact a local dealer for service. This message is local if independent traffic sensors are installed.

**Traffic High  
2:00 3NM****Traffic 2:00 3NM 800FT**

- \* The above alert is just an example. After "Traffic" will be either "Low" or "High", then the bearing in clock direction, then the distance in nautical miles. The long text omits Low/High and instead shows target altitude in feet.

This is a traffic advisory with bearing information. Establish visual contact with conflicting traffic in order to facilitate avoidance maneuvers as necessary.

**Traffic  
Low 4NM****Traffic 4NM -200FT**

- \* The above alert is just an example. After "Traffic" will be either "Low" or "High", then the distance in nautical miles. The long text omits Low/High and instead shows signed relative target altitude in feet.

This is a traffic advisory with no bearing information. Establish visual contact with conflicting traffic in order to facilitate avoidance maneuvers as necessary.

**Traffic  
12:00 3NM****Traffic 12:00 3NM**

- \* The above alert is just an example. After "Traffic" will be the bearing in clock direction, then the distance in nautical miles.

This is a traffic advisory with no relative altitude information. Establish visual contact with conflicting traffic in order to facilitate avoidance maneuvers as necessary.

**Traffic 2NM****Traffic 2NM**

- \* The above alert is just an example. After "Traffic" will be the distance in nautical miles.

This is a traffic advisory with no relative altitude information and no bearing information. Establish visual contact with conflicting traffic in order to facilitate avoidance maneuvers as necessary.

**Unit Overtemp -  
Check Cooling****Unit Overtemp: <component>**

<component> will show the name of the component(s) that have exceeded temperature limits.

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 and around the IFD.

**Xpdr Fault****Transponder Fault**

The remote transponder is reporting a fault other than loss of ADS-B GPS position. Contact the Avidyne Service Center if this persists across power cycles.

## ADVISORIES

<b>ADS-B GPS Position Invalid</b>	<b>ADS-B Traffic Sensor lacks GPS position</b>  <p>The ADS-B sensor is reporting that it does not have a GPS position to support ADS-B Out. If the condition persists, contact a local dealer for service.</p>
<b>ADS-B In Unavailable</b>	<b>NGT9000 ADSB input unavailable</b>  <p>The NGT9000 is reporting that ADS-B In functions have failed or that the ADS-B In functions are unavailable due to not having a GPS position of sufficient quality. If the condition persists, contact a local dealer for service.</p>
<b>ADS-B Out Degraded</b>	<b>ADS-B Out Degraded</b>  <p>The NGT9000 is reporting that the ADS-B Out function is operating in a degraded condition. If the condition persists, contact a local dealer for service.</p>
<b>&lt;Airspace&gt; Ahead</b>	<b>[Airspace name][Lower Altitude Limit] - [Upper Altitude Limit] FT</b>  <p>* The aircraft will intercept an airspace within 5 minutes (<math>\pm 30</math> seconds). This advisory can be enabled or disabled on the Setup Page.</p> <p>&lt;Airspace&gt; will be one of the following:  Class A, Class B, Class C, Class D, Controlled Airspace, Prohibited Area, Restricted Area, Warning Area, Alert Area, Caution Area, Danger Area, MOA, ADIZ</p>

**Begin Descent  
In xx Seconds****Approaching Top Of Descent**

- \* xx is the number of seconds before the top of descent point and counts down from an initial value of 10 seconds. Upon reaching 0, "Now" will be displayed instead of "in 0 seconds". This message is accompanied by an aural TOD chime.

**Checklist  
Error****IFD Requires Service**

Contact the Avidyne Service Center for service.

**Checklist  
Load Fail****Retype checklist(s) to resolve**

- Ψ The IFD was unable to retrieve the checklists. Enter the checklists again. If the problem persists, contact the Avidyne Service Center for service.

**Check Init  
Fuel****Fuel Used reset. Check initial fuel setting**

- Ψ Fuel used reset has been detected from the fuel sensor and the pilot has not set initial fuel at startup.

**Check Nav  
Frequency****Tuned frequency does not match  
approach navaid**

Indicates that 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, and the frequency tuned by the nav radio does not match the frequency of the approach navaid. Not applicable to the IFD510 and IFD545.

**Check Navaid Identifier****Decoded navaid identifier did not match approach navaid**

Indicates that 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. Not applicable to the IFD510 and IFD545.

**COM Stuck Mic****COM stuck mic, release PTT**

25 seconds of continuous transmission have elapsed. Release the push-to-talk button. Not applicable to the IFD510 and IFD545.

**Config Modified****Configuration modified. Please restart IFD when possible.**

CrossSync is enabled in a dual IFD installation and a configuration with external devices has changed on one of the IFDs since the last power cycle. Restart the IFD to allow automatic reconfiguration so that sensor information can be shared.

**Configuration Error****Config not valid for <x> system.**

- Ψ <x> is either “Vantage” or “Quantum”. The IFD has detected that the IFD is configured for use with Vantage or Quantum and the settings are not compatible with that installation. When configured for use with Vantage and/or Quantum, the IFD must have CrossSync enabled and GPS antenna type must be set to WAAS. Use maintenance mode to resolve the configuration issues and then restart the IFD.

**Crosscheck Attitude****Reduced AHRS Accuracy Mode**

The ARS is not being aided by GPS. Crosscheck displayed SVS attitude with other attitude sources. Applicable to the IFD545 and IFD550 only.

**CrossSync Fault****Attempting to re-establish CrossSync**

- Ψ Dual IFDs have been installed and configured to share data between the units, but there is no communication between the IFDs when both units are powered on. Contact the Avidyne Service Center or a local dealer for service.

**Datalink Data Overdue****See Datalink Status Page**

- \* One or more datalink weather products were expected but not received within the timeout period. The Datalink Status Page will show those that are overdue.
- Ψ The tables in the “Datalink Weather Overlays And Operations” section on page 4-20 show the products and their associated “late” timeout periods.



<p><b>Datalink Receiver Fault</b></p>	<p><b>Broadcast datalink receiver failure</b></p> <p>* The IFD has lost communication with the datalink receiver or the receiver is reporting a fault. Datalink weather will be unavailable. If the condition persists, contact a local dealer for service.</p>
<p><b>Datalink &lt;p&gt; Stale</b></p>	<p><b>&lt;p&gt; Age is greater than &lt;x&gt; minutes</b></p> <p>* The datalink product &lt;p&gt; has been received at least once but has not been updated for &lt;x&gt; minutes and is now considered stale.</p> <p>Ψ The tables in the “Datalink Weather Overlays And Operations” section on page 4-20 show the products and their associated “stale” timeout periods.</p>
<p><b>Dead Reckoning</b></p>	<p><b>Position updated using dead reckoning</b></p> <p>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 of these factors change.</p>
<p><b>Enable A/P APR</b></p>	<p><b>Use bottom LSK on FPL tab before A/P APR</b></p> <p>Applicable only when GPS Select is set to “Prompt” in Maintenance Mode. Indicates that the FMS is ready to provide approach guidance for the autopilot. The proper action is to press the “Enable A/P Approach” LSK on the FPL page, then put the autopilot into approach mode.</p>

<b>Exiting Hold At Fix</b>	<b>Exiting Hold At Fix</b>
Ψ	The hold is armed for exit and is set to sequence upon crossing the hold fix.
<b>Exiting Hold At Intercept</b>	<b>Exiting Hold At Intercept</b>
Ψ	The active hold leg (hold in lieu of procedure turn) is armed for exit and set to sequence at the completion of the inbound turn.
<b>FLTA Off</b>	<b>Disabled in Setup Options</b>
Ψ	FLTA has been turned off via the Setup page or via external TERR INHB discrete input.
<b>FLTA Unavailable</b>	<b>Invalid GPS Position/Velocity</b>
Ψ	FLTA is inhibited due to invalid GPS data.
<b>&lt;app&gt; Function Lost</b>	<b>&lt;app&gt; Function is not responding</b>
	The <app> software application (e.g. Datalink) within the IFD has stopped working. If the problem persists, contact a local dealer for service.
<b>GAD 42 Needs Service</b>	<b>GAD 42 Needs Service</b>
	Contact the Avidyne Service Center for service.

<b>Gap In Route Ahead</b>	<b>Gap In Route Ahead</b>
Ψ	The time to an upcoming flight plan discontinuity is 3 minutes.
<b>Hold Course xxx°</b>	<b>Hold Course xxx°</b>
Ψ	The next leg is a hold with a direct entry and there are 10 seconds or less until the aircraft reaches the hold fix. xxx is the holding inbound course.
<b>IFD Fan Failure</b>	<b>IFD Fan Inop</b>
	Contact a local dealer for service.
<b>Intercept Too Sharp</b>	<b>Must Intercept Within 45° of Final Approach Course</b>
*	A Direct-To was initiated to the FAF and the resulting intercept angle at the FAF is greater than 45 degrees.
<b>Lateral Offset End Ahead</b>	<b>Approaching End of Flight Plan Lateral Offset</b>
Ψ	The time to the end of the lateral offset is 60 seconds.
<b>Lightning Sensor Config</b>	<b>Lightning Sensor Antenna: [Bottom   Top]</b>
Ψ	Present only on the first power cycle after configuring the IFD for a WX500. This message is principally for installers.

<b>Lightning Sensor Error</b>	<b>Recoverable fault: &lt;cc&gt;</b>
<p>* 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. &lt;cc&gt; is the fault code(s) from the sensor</p>	
<b>Lightning Sensor Fault</b>	<b>No communication with lightning sensor</b>
<p>Recommend cycling power to the lightning sensor. If the problem persists, contact a local dealer for service.</p>	
<b>Lightning Sensor Fault</b>	<b>Lightning sensor fatal fault: &lt;cc&gt;. Try cycling lightning sensor power.</b>
<p>* &lt;cc&gt; is the fault code(s) from the sensor. Recommend cycling power to the lightning sensor. If the problem persists, contact a local dealer for service.</p>	
<b>Lightning Sensor Fault</b>	<b>No sensor data: &lt;ff&gt;</b>
<p>* &lt;ff&gt; is a description of the fault, specific to the kind of sensor.</p> <p>Recommend cycling power to the lightning sensor. If the problem persists, contact a local dealer for service.</p>	
<b>Lightning Sensor Fault</b>	<b>Lightning sensor recoverable fault: &lt;cc&gt;</b>
<p>* If the problem persists, contact a local dealer for service.</p>	
<b>Nav Database Invalid</b>	<b>An error occurred while loading the nav database</b>
<p>Consider cycling power to the IFD or loading a navigation database. If the problem persists, contact the Avidyne Service Center or a local dealer for service.</p>	

**New TFR  
Data Ignored**
**Datalink TFRs reception failure**

- \* 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.

**Next Leg ccc°  
in xx sec**
**Next Leg ccc°**

- \* ccc is the desired track of the next leg. xx is the number of seconds before the start of the turn and counts down from an initial value. For turns up to 120°, the initial value is 10 seconds. For turns more than 120°, the initial value is 30 seconds. Upon reaching zero, "Now" will be displayed instead of "0 sec".
- Ψ

**No Comm  
<dau>**
**Communication lost <dau>**

- Ψ Communication has been lost with the <dau> (e.g. "Shadin FADC"). Contact the Avidyne Service Center or a local dealer for service.

**Parallel  
Entry**
**Parallel Entry**

- Ψ The next leg is a hold with a parallel entry and there are 10 seconds or less until the aircraft reaches the hold fix.

**Radar  
Sensor Fault**
**Radar fault code: <codes>**

The sensor is reporting one or more non-major fault <codes>.

<b>Route Not Loaded</b>	<b>Incompatible route file</b>  Ψ Another IFD shared a stored route, but the route could not be loaded. Most likely cause is that the shared route contains some feature that doesn't exist in the navigation database on this IFD. If the problem persists, especially on more than one route, contact the Avidyne Service Center for service.
<b>Route Not Loaded</b>	<b>Route Not Loaded</b>  Ψ 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.
<b>Route Not Stored</b>	<b>Route Not Stored</b>  Ψ The route cannot be stored due to an internal error. If the problem persists across a power cycle of the IFD, contact the Avidyne Service Center for service.
<b>Route Shared</b>	<b>Shared &lt;name&gt;</b>  Ψ The stored route named <name> was transmitted.
<b>Route Upload Ready</b>	<b>A route has been received</b>  A stored route has been received from an external source (e.g. Wi-Fi). This message is displayed for 5 seconds and then removed.

**Self-test Fault****NGT9000 self-test fault**

The NGT9000 is reporting that the most recent self test detected a failure in the unit. Contact a local dealer for service.

**Service Required****IFD on board battery requires replacement**

- Ψ The on-board battery used for maintaining system time during power-off periods is no longer performing that function. IFD performance, such as datalink and GPS acquisition, will be degraded. Contact the Avidyne Service Center for service.

**Set course to <x>°****Selected course / DTK mismatch**

The selected course on the external course pointer is more than 10 degrees off of desired track <x> and the aircraft course is within 3 degrees of that desired track. Adjust the course knob as directed. Only displayed in GPS mode.

**Stored Route Pending****<name> received.**

- Ψ Another IFD shared a stored route named <name>, but this IFD already has that route. Navigate to the Stored Route tab and either accept (overwrite) the existing stored route or cancel (discard) the pending route.

**Stored Route Received****<name> stored.**

- Ψ Another IFD shared a stored route named <name> and the route has been stored in the stored route list.

<b>Stored Route Rejected</b>	<b>Stored route is already pending</b>
Ψ	Another IFD shared a stored route, but this IFD has a shared route already pending. Navigate to the Stored Route tab and either accept (overwrite) the existing stored route or cancel (discard) the pending route.
<b>Stored Route Rejected</b>	<b>Stored route list is full</b>
Ψ	Another IFD shared a stored route, but the stored route list in this IFD is full. Delete at least one stored route and then share the route again.
<b>Switch Tanks</b>	<b>Switch fuel tanks</b>
*	The user configurable "switch tanks" timer has expired. The
Ψ	time between advisories is controlled using the Setup page.
<b>Teardrop Entry</b>	<b>Teardrop Entry</b>
Ψ	The next leg is a hold with a teardrop entry and there are 30 seconds or less until the aircraft reaches the hold fix.
<b>TFR Ahead</b>	<b>TFR Ahead</b>
*	The aircraft will enter a TFR within 5 minutes ( $\pm 30$ seconds). This advisory can be enabled or disabled on the Setup Page.
<b>Timer Expired</b>	<b>Timer Expired</b>
Ψ	The generic countdown timer has expired.



**<name>  
Timer**
**<name> Timer Expired**

The <name> custom timer has expired (see page 5-10). This message will persist until the timer has been manually reset.

**TIS Coasting**
**TIS Traffic Coasting**

TIS traffic communications have ceased for more than 6 seconds but less than 12 seconds

**Traffic  
Sensor Fault**
**Traffic sensor failed to start self-test**

\* If the problem persists, contact a local dealer for service.

Ψ

**Traffic  
Sensor Fault**
**Traffic sensor altitude unavailable**

\* If the problem persists, contact a local dealer for service.

Ψ

**Trans Alt  
xxxFT**
**Trans Alt xxxFT**

Ψ The aircraft is climbing through 250 feet below the transition altitude xxx as defined in the Setup Page. The message is displayed for 5 seconds and then removed. It will not be enabled for display again until the aircraft has descended to more than 500 feet below the transition altitude.

<b>Trans Level FLxxx</b>	<b>Trans Level FLxxx</b>
<p>Ψ</p>	<p>The aircraft is descending through 250 feet above the transition level xxx as defined in the Setup Page. The message is displayed for 5 seconds and then removed. It will not be enabled for display again until the aircraft has climbed to more than 500 feet above the transition level.</p>
<b>Unsupported Bluetooth Input</b>	<b>Unsupported Bluetooth Input - &lt;f&gt;</b>
<p>Ψ</p>	<p>Bluetooth keyboard key &lt;f&gt; was pressed but is not functional with the type of IFD being used.</p>
<b>UTC Mismatch</b>	<b>UTC Time Mismatch. Please restart IFD when possible</b>
<p>Ψ</p>	<p>The internal clock does not match the time received from the GPS. Power cycling the IFD will update the time.</p>
<b>VNAV Suspended</b>	<b>Cross track error limit exceeded</b>
	<p>Enroute VNAV is no longer available because the cross track error exceeds 2NM.</p>
<b>VNAV Suspended</b>	<b>Course error limit exceeded</b>
	<p>Enroute VNAV is no longer available because the difference between aircraft course and desired track exceeds 45°</p>
<b>VNAV Terminated</b>	<b>Baro altitude lost</b>
	<p>Enroute VNAV is no longer available because the IFD is not receiving baro corrected altitude.</p>

<b>VNAV Terminated</b>	<b>Unable to meet altitude constraint</b>  Enroute VNAV is no longer available because the descent angle required to meet the next altitude constraint exceeds 6°
<b>Waypoint Upload Ready</b>	<b>A user waypoint has been received</b>  A user waypoint has been received from an external source (e.g. Wi-Fi). This message is displayed for 5 seconds and then removed.
<b>Waypoint Upload Rejected</b>	<b>Waypoint Upload Rejected</b>  Ψ A user waypoint has been received from an external source (e.g. Wi-Fi) but the waypoint was rejected as invalid. Possible causes include a referenced fix that is not found in the IFD database or doesn't match database coordinates.
<b>429 Data Not Rcvd</b>	<b>No 429 from input: &lt;ports&gt;</b>  ARINC-429 data is not being received on the listed ports. <ports> will contain one or more of “#1”, “#2”, and “VHF”. Contact the Avidyne Service Center for service.

Notices

<b>Connect Req &lt;device&gt;</b>	<b>WiFi connect Request from &lt;device&gt;</b>
Ψ	<device> has attempted to connect to the IFD over Wi-Fi. To accept the connection, use the Setup Page to set the connection policy to “Once” or “Always”
<b>Loaded User &lt;name&gt;</b>	<b>Loaded settings for &lt;name&gt;</b>
Ψ	On power up, the IFD loaded the user profile named <name>. If not acknowledged, this notification is deleted after thirty (30) seconds.

## 9 Acronyms

ADI	Attitude Directional Indicator
ADS-B	Automatic Dependent Surveillance – Broadcast
ADS-R	Automatic Dependent Surveillance – Rebroadcast
AGL	Above Ground Level
AHRS	Attitude and Heading Reference System
AI	Attitude Indicator
ARS	Attitude Reference System
ARTCC	Air Route Traffic Control Center
ASOS	Automated Surface Observing System
ATIS	Automatic Terminal Information Service
AWOS	Automated Weather Observing System
CAS	Crew Alerting System
CDI	Course Deviation Indicator
CFIT	Controlled Flight Into Terrain
COM	Communications
CTAF	Common Traffic Advisory Frequency
DHCP	Dynamic Host Control Protocol
DME	Distance Measuring Equipment
DTK	Desired Track
EDR	Excessive Descent Rate
EFIS	Electronic Flight Information System
EGNOS	European Geostationary Navigation Overlay Service
EGPWS	Enhanced Ground Proximity Warning System
ETA	Estimated Time of Arrival
ETE	Estimated Time Enroute
FAF	Final Approach Fix
FDE	Fault Detection and Exclusion
FIS-B	Flight Information Service – Broadcast
FLTA	Forward Looking Terrain Alerting
FMS	Flight Management System
FSS	Flight Service Station
GPS	Global Positioning System
HAL	Horizontal Alert Limit
HDI	Horizontal Deviation Indicator
HSI	Horizontal Situation Indication
HTAWS	Helicopter Terrain Avoidance and Warning System
HVV	Horizontal Velocity Vector
ICAO	International Civil Aviation Organization

IFD	Integrated Flight Display
IFR	Instrument Flight Rules
LAN	Local Area Network
LED	Light Emitting Diode
LNAV	Lateral Navigation
LP	Localizer Precision
LPV	Localizer Precision with Vertical Guidance
LSK	Line Select Key
METAR	Meteorological Aerodrome Report
MFD	Multi-Function Display
MGRS	Military Grid Reference System
MSL	Mean Sea Level
NAS	National Airspace System
NAV	Navigation
NCR	Negative Climb Rate
NDB	Non-Directional Beacon
OBS	Omni Bearing Selector
OSS	Own Ship Symbol
PA	Proximate Alert
PDA	Premature Descent Alert
PFD	Primary Flight Display
PTT	Push To Talk
RADALT	Radar Altimeter/Altitude
RAIM	Receiver Autonomous Integrity Monitoring
RNAV	Area Navigation
RNP	Required Navigation Performance
SAR	Search And Rescue
SAT	Static Air Temperature
SBAS	Satellite Based Augmentation System
SID	Standard Instrument Departure
STAR	Standard Arrival Route
SUA	Special Use Airspace
SVS	Synthetic Vision System
TA	Traffic Alert
TAS	True Airspeed
TAT	Total Air Temperature
TAWS	Terrain Avoidance and Warning System
TCAD	Traffic Collision Avoidance Device
TCAS	Traffic Alert and Collision Avoidance System
TFR	Temporary Flight Restriction
TIS-A	Traffic Information Service (pre TIS-B)

TIS-B	Traffic Information Service - Broadcast
TKE	Track Angle Error
TOD	Top Of Descent
TVV/FPM	Total Velocity Vector / Flight Path Marker
UAT	Universal Access Transceiver
USB	Universal Serial Bus
UTC	Coordinated Universal Time
UTM	Universal Transverse Mercator
VAL	Vertical Alert Limit
VDI	Vertical Deviation Indicator
VFR	Visual Flight Rules
VHF	Very High Frequency
VLOC	VHF / Localizer
VNAV	Vertical Navigation
VOR	VHF Omnidirectional Range
VSR	Vertical Speed Required
VTF	Vectors To Final
WAAS	Wide Area Augmentation System

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# 10 Legal / Regulatory

## **RADIO REGULATORY COMPLIANCE STATEMENTS<sup>1</sup>**

This device complies with Part 15 of the FCC limits for Class B digital devices and Industry Canada license-exempt RSS standard(s). This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference, the user is encouraged to try to correct the interference by relocating the equipment or receiving antenna or by connecting the equipment to a different circuit than the affected equipment. Consult an authorized dealer or other qualified avionics technician for additional help. Operation of this device is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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 0.911m (2.99 ft) from all persons.

---

<sup>1</sup> Not applicable to the IFD510 and IFD545

## DÉCLARATION(S) DE CONFORMITÉ RÉGLEMENTAIRE<sup>1</sup>

Cet appareil est conforme aux limites de l'article 15 de la FCC pour les appareils numériques de classe B et aux normes RSS exemptes-de-licence d'Industrie Canada. Cet équipement génère, utilise et peut émettre une énergie de fréquence radio et, s'il n'est pas installé et utilisé conformément aux instructions, peut causer des interférences nuisibles aux communications radio.

Cependant, rien ne garantit que des interférences ne se produiront pas dans une installation particulière. Si cet équipement provoque des interférences nuisibles, l'utilisateur est encouragé à essayer de corriger les interférences en déplaçant l'équipement ou l'antenne de réception ou en connectant l'équipement à un circuit différent de celui de l'équipement concerné. Consultez un installateur agréé ou un autre technicien en avionique qualifié pour obtenir de l'aide supplémentaire.

L'utilisation de cet appareil est soumise aux conditions suivantes:

- (1) Cet appareil ne doit pas provoquer d'interférences nuisibles et
- (2) cet appareil doit accepter toute interférence reçue, y compris les interférences pouvant entraîner un fonctionnement indésirable.

Cet émetteur doit être limité aux opérations liées au fonctionnement dans un environnement d'exposition RF contrôlé. Tous les utilisateurs qualifiés de cet appareil doivent avoir les connaissances nécessaires pour contrôler leurs conditions d'exposition et / ou leur durée, ainsi que les conditions d'exposition et / ou la durée, pour leurs passagers et passants, afin de se conformer à la limite et les exigences de la population générale / MPE non contrôlée.

L'antenne ou les antennes utilisées pour cet émetteur doivent être installées pour assurer une distance de séparation d'au moins 0,911 m (2.99 pi) de toutes personnes.

---

<sup>1</sup> Ne s'applique pas aux IFD510 et IFD545

## FIS-B WEATHER

FIS-B information may be used for pilot planning decisions focused on updating the pilot's awareness of the dynamic flight environment; including avoiding areas of inclement weather that are beyond visual range and pilot near term decisions where poor visibility precludes visual acquisition of inclement weather. FIS-B weather and NAS status information may be used as follows:

- (a) To promote pilot awareness of ownship location with respect to reported weather, including hazardous meteorological conditions; NAS status indicators to enhance pilot planning decisions; and pilot near-term decision-making.
- (b) To cue the pilot to communicate with Air Traffic Control, Flight Service Station specialist, operator dispatch, or airline operations control center for general and mission critical meteorological information, NAS status conditions, or both.

FIS-B information, including weather information, NOTAMs, and TFR areas, are intended for the sole purpose of assisting in long- and near-term planning and decision making. The system lacks sufficient resolution and updating capability necessary for aerial maneuvering associated with immediate decisions.

In particular, in extreme scenarios, the oldest weather radar data on the display can be up to 15 to 20 minutes older than the display's age indication for that weather radar data. Therefore, do not attempt to use FIS-B weather information to maneuver the aircraft at minimum safe distances from hazardous weather. FIS-B information may be used to support preflight preparation required by regulation. However, depending on the intended operation, FIS-B may not provide all available aeronautical or meteorological information concerning the flight. Regulatory compliant preflight preparation may be accomplished using automated resources or by contacting Flight Service.

FIS-B uplink is an FAA approved source for METAR, TAF, Winds, PIREPs, NEXRAD, AIRMET, SIGMET, and TFR information subject to the range limits for the broadcast of these products. FIS-B uplink is not an FAA approved source for NOTAMs.

## LICENSES

### lwIP Software

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## AVIDYNE PRODUCT TERMS OF USE

Your use of the Avidyne product is conditioned on all the terms and conditions provided with the product sale, including, but not limited to the following:

(1). The warranties provided by Avidyne Corporation for its aviation products are exclusive of and in substitution for any other remedy available under the law. I understand my remedy arising out of or related to use of Avidyne aviation products for the life of the product is limited to the repair or replacement of the product to be determined in Avidyne's sole discretion. I hereby agree to waive, release, disclaim and renounce any other warranties, obligations and liabilities, whether express or implied, including the warranties of merchantability and fitness for a particular purpose, as against Avidyne corporation and its officers, directors, successors, assigns, insurance companies, agents, employees and affiliates (the released parties),

(2). I hereby release Avidyne corporation and the other released parties from any and all liability, loss, injury, damage, costs, claims and/or causes of action, including but not limited to all claims for bodily injuries and property damage arising out of or related to the use of said aviation products and the use of the aircraft in which the product is installed, whether in strict liability or in tort, regardless of how such injury, damage or loss may arise and regardless of whether the injury, damage or loss is occasioned in whole or in part by the negligence, neglect or fault of any one or more of the released parties. Notwithstanding the above, this provision (2) shall not apply if the national transportation safety board determines that a defect in Avidyne's aviation product was the probable cause of the accident or incident. All other provisions of this agreement will remain in full force and effect.

(3). Avidyne corporation and the released parties will have no obligation or liability whatsoever, whether arising in contract (including warranty), tort (whether or not arising from the negligence of Avidyne), strict liability, or otherwise, for any incidental, consequential, general or special damages.

(4). If the national transportation safety board determines that the pilot (the person operating the aircraft equipped with Avidyne aviation products, hereinafter "pilot") was the probable cause of

an accident or incident, and provided the accident or incident occurred while I had an ownership interest in the accident or incident aircraft equipped with the Avidyne aviation products, I will indemnify and hold harmless Avidyne corporation and the released parties from and against all claims referred to in the preceding paragraphs, and pay the costs of defending such claims (including attorney's fees), regardless of whether the alleged injury, damage or loss is occasioned in whole or in part by the negligence, neglect or fault of any one or more of the released parties.

(5). The law of the state of Delaware shall govern the construction and enforcement of this agreement, as well as all aspects of the parties' relationships and any disputes that may arise between them. Any and all disputes or claims that I or my heirs and assigns may assert against Avidyne corporation shall be submitted to binding arbitration before the American arbitration association within the state of Delaware.

(6). The invalidity or unenforceability of any provision of this contract shall not affect the validity or enforceability of any other provision hereof. If any of the covenants or agreements in this contract are determined to be unenforceable, then the parties agree that all other terms are to remain in full force and effect.

(7). This agreement identified as Avidyne waiver, release and indemnification rev03-a supersedes and replaces prior versions of the agreement.

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