



IFD550 SVS/FMS/GPS/NAV/COM

IFD540 FMS/GPS/NAV/COM

IFD545 SVS/FMS/GPS

IFD510 FMS/GPS

Pilot's Guide



Revision History

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TABLE OF CONTENTS

1	System Overview	1-1
	INTENDED FUNCTION	1-2
	IFD540	1-2
	IFD510	1-3
	IFD550	1-4
	IFD545	1-6
	FUNCTIONAL OVERVIEW	1-7
	BASIC CONCEPTS	1-9
	Page Function Keys	1-9
	Line Select Keys	1-9
	Right Knob Labeling	1-10
	Color Philosophy	1-11
	GENERAL IFD OPERATIONS	1-12
	IFD540/IFD550 Bezel Layout	1-12
	IFD510/IFD545 Bezel Layout	1-13
	Power Control	1-15
	Brightness Controls	1-16
	Start-Up Sequence	1-17
	Database Currency States	1-20
	Page Layout and Formats	1-22
	Com-Nav ↑	1-24
	Frequency List ↑	1-31
	Transponder Control and Display	1-33
	Direct-To Operations	1-36
	Function Keys	1-38
	Touch Screen	1-40
	Use of External Keyboard	1-44
	Dual IFD Operations	1-46
	WiFi (Network) Operations	1-50
	WAAS vs Non-WAAS Operations	1-53
	Interaction With External Devices	1-54
	Before Takeoff Techniques	1-55
2	SVS Subsystem	2-1
	SYNTHETIC VISION PAGE	2-2
	Synthetic Vision With Datablocks	2-7
	Synthetic Vision Obstacles	2-8
	Synthetic Vision Terrain Awareness	2-11
	SVS Forward Looking Terrain Alerting (FLTA)	2-12
	Flying Approaches with Synthetic Vision	2-14
	SVS Page Variations	2-21
	Operational Limits of the ARS	2-23

3	FMS Subsystem	3-1
	FPL (FLIGHT PLAN) TAB	3-2
	FMS Basic Concepts	3-2
	Creating a New Flight Plan	3-4
	Previewing Flight Plans	3-6
	Selecting a Departure	3-9
	Inserting A Waypoint	3-12
	Inserting an Airway	3-13
	Deleting A Waypoint	3-15
	Editing A Waypoint	3-16
	Adding Altitude Constraints	3-16
	Entering And Intercepting A Radial	3-17
	Deleting A Flight Plan	3-18
	Creating A Holding Pattern	3-18
	Circular Orbits	3-20
	Deleting A Holding Pattern	3-23
	Editing A Holding Pattern	3-24
	Activating a Flight Plan	3-24
	Flight Plan Sequencing	3-24
	Lateral Offsets	3-25
	Flight Plan Discontinuities (Gaps)	3-27
	Enroute Descents	3-28
	Entering An Arrival and Approach	3-30
	Activating A Leg	3-34
	Use of the Map FPL Split Page	3-35
	Chart Access	3-36
	INFO TAB	3-38
	ROUTE TAB	3-42
	Creating A New Route	3-43
	Editing a Route	3-43
	Naming A Route	3-43
	Copying A Route	3-44
	Inverting A Route	3-46
	Activating A Route	3-47
	Deleting A Route	3-48
	WPT (USER WAYPOINTS) TAB	3-49
	Creating A User Waypoint	3-49
	Naming A User Waypoint	3-50
	Deleting A User Waypoint	3-50
	Designating A User Waypoint As An Airfield	3-50
	NRST (NEAREST) TAB	3-53
4	Map Subsystem	4-1
	MAP TAB	4-2

Map Controls.....	4-2
Other Map Features.....	4-6
Fuel Range RingS.....	4-10
Decluttering The Map.....	4-12
Map Panning.....	4-13
Graphical Flight Planning ("Rubber Banding").....	4-14
Altitude Constraints On Map.....	4-16
Map Information Pop-Up Boxes.....	4-16
Datalink Weather Overlays And Operations.....	4-18
Datalink Radar.....	4-20
Weather Overlays On Map.....	4-22
TFRs.....	4-26
Indications Of Data Age.....	4-27
Weather Radar Selection For Map Overlay.....	4-28
Terrain.....	4-30
TERRAIN AWARENESS (TA).....	4-31
Forward Looking Terrain Alerting (FLTA).....	4-33
500' Callout.....	4-36
TERRAIN ALERTING WARNING SYSTEM (TAWS).....	4-37
Premature Descent Alert (PDA).....	4-39
Excessive Descent Rate (EDR).....	4-41
Negative Climb Rate / Altitude Lost After Takeoff.....	4-42
TAWS Inhibit Control.....	4-43
TAWS Self-Test.....	4-43
Degraded Or No TAWS Conditions.....	4-43
Traffic Display.....	4-44
SYNTHETIC VISION (SVS) TAB.....	4-52
CHART TAB.....	4-59
Directory List.....	4-59
European Visual Approach, Landing And Area Charts.....	4-60
Chart Extent Box.....	4-61
Hot Links To Charts.....	4-62
Chart Views.....	4-63
Taxi Charts/Airport Diagrams.....	4-64
Lighting.....	4-65
Watermarking / Expired Data.....	4-66
Updating Charts.....	4-66
RADAR TAB.....	4-67
VIDEO TAB.....	4-74
5 Aux Subsystem.....	5-1
AUDIO TAB.....	5-2
Volume Control.....	5-2
Satellite Radio Tuning.....	5-4

Com Presets †	5-6
UTIL (UTILITIES) TAB	5-8
Timers	5-8
Calculators	5-11
Electronic Checklist	5-15
SETUP TAB	5-20
Datablock Setup	5-20
Map Setup	5-36
FMS Setup	5-38
User Options	5-39
SYS (SYSTEM) TAB	5-54
Fuel Management	5-54
System Status	5-55
ALERT TAB	5-66
6 Navigation	6-1
NAV SOURCE KNOB/BUTTON	6-4
OBS MODE	6-8
VOR COURSE DEPICTION †	6-12
ARMED VS ENGAGED/ACTIVE INDICATIONS	6-13
FMS HOOKS	6-14
COURSE CHANGES AND HOLDS	6-17
AUTO VLOC TUNING †	6-18
TRANSITION ALTITUDES/LEVELS	6-19
NAVIGATION MODE/CDI SCALE CHANGING	6-21
APPROACH PROCEDURES	6-22
Automatic mode switching †	6-23
Precision Approaches	6-24
Non-Precision Approaches	6-25
Back Course Approaches †	6-25
WAAS Approaches	6-26
MISSED APPROACH	6-30
RETRY APPROACH	6-33
RNP/RNAV OPERATIONS	6-35
RECOMMENDED ICAO EQUIPMENT CODES	6-36
7 General	7-1
CAUTION ADVISORY SYSTEM (CAS) / ALERTS	7-2
Master Caution Lamps	7-2
Warning-Caution-Advisory Message Bar	7-2
SELF TEST OUTPUT	7-26
SYSTEM FAILURES	7-27
Power Distribution	7-27
Loss Of IFD	7-27

Loss Of Display	7-28
Loss Of Bezel Controls	7-29
Loss Of Touchscreen Control	7-29
Loss Of GPS (Dead Reckoning)	7-30
Other Anomalies	7-31
SUBSCRIPTIONS	7-32
NIGHT OPERATIONS	7-33
IFD DISPLAY BRIGHTNESS	7-33
IFD Bezel Brightness	7-33
Charts Lighting Scheme	7-33
Display Of Terrain On Map	7-34
HIGH TEMPERATURE OPERATIONS	7-35
COLD TEMPERATURE OPERATIONS	7-36
LOW POWER OPERATIONS	7-37
HIGH POWER OPERATIONS	7-38
USE OF GLOVES	7-39
CHARGING FROM THE USB	7-41
INTEGRATION WITH THE IFD100 MOBILE APP	7-42
DEMO MODE	7-43
DATA TRANSFER TO/FROM EXTERNAL DEVICES	7-46
REGULATORY COMPLIANCE STATEMENTS	7-50
Radio Regulatory Compliance Statements†	7-50
Déclaration(s) de conformité réglementaire†	7-51
MAINTENANCE MODE	7-52
Starting Maintenance Mode at power up	7-52
Starting Maintenance Mode from Flight Mode	7-52
Exiting Maintenance Mode	7-54
DATABASE UPDATES	7-55
SOFTWARE UPDATES	7-63
DATALOGS DOWNLOAD	7-64
USER DATA BACKUP/RESTORATION PROCEDURE ...	7-69
Saving User Data	7-69
Reloading Previously Stored User Data	7-70
CONFIGURING WIFI	7-72
Defining WIFI network configurations	7-73
selecting a network configuration	7-76
CONFIGURING WIRED ETHERNET	7-78
Configuring as a Network server	7-78
Configuring as a Network client	7-78
Configuring as a client with a static IP	7-78
PAIRING A BLUETOOTH® KEYBOARD	7-79
Verification of successful pairing	7-84
CLEANING THE DISPLAY	7-87

SLIDE-IN REPLACEMENT DETAILS.....7-88

1 System Overview

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

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

Avidyne strongly recommends that pilots use the 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 operation of the IFD5xx series of equipment. 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.

IFD540

The Avidyne IFD540 is a GPS-Nav-Com radio whose primary function is to conduct nav-com-transponder tuning and communication, and serve as the principal navigation sensor/system for all IFR VHF ("VLOC") and GPS-based navigation and instrument flying (enroute and approach), provided it is 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 IFD540 functions include a moving-map, flight management system (FMS), electronic charts, checklists, and a number of timer and calculator types of utilities. It also includes options for control/display of weather radar and display of

external video. The system includes terrain alerting as well as an option for TAWS.

IFD510

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

IFD510 Integrated Flight Display



Supplemental IFD510 functions include a moving-map, flight management system (FMS), electronic charts, checklists, and a number of timer and calculator types of utilities. It also includes options for control/display of weather radar and display of external video. The system includes terrain alerting as well as an option for TAWS.

DOCUMENTATION CONVENTION

Throughout this document, capabilities that are not applicable to the IFD510 are identified using a † symbol.

IFD550

The Avidyne IFD550 is a GPS-Nav-Com radio whose primary function is to conduct nav-com-transponder tuning and communication, and serve as the principal navigation sensor/system for all IFR VHF (“VLOC”) and GPS-based navigation and instrument flying (enroute and approach), provided it is 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

Like the IFD540, supplemental IFD550 functions include a moving map, FMS, charts, checklists, various calculator utilities, and terrain alerting, with options for control/display of weather radar, display of external video, and TAWS.

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. In degraded conditions, the synthetic vision view will be replaced with a traditional blue over brown attitude indication. The attitude sensing and depiction of the IFD550 provides a non-required secondary indicator in addition to the required attitude instrument(s) installed in the aircraft.

DOCUMENTATION CONVENTION

Throughout this document, capabilities that are applicable only to the IFD550 or IFD545 are identified using a ‡ symbol.

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. The display, while possibly resolution or field-of-view limited, 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.

IFD545

The Avidyne IFD545 differs from the IFD550 in that there is no internal VHF nav/com radio. Its primary function is to conduct GPS-based navigation in an IFR environment, 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 radio navigation. The IFD545 bezel differs physically from the IFD550 in that the radio controls along the left side of the bezel are absent, the nav source selection knob is replaced by an OBS button, and the volume knob is replaced by a single-function on/off button.

Supplemental IFD545 functions include a moving-map, flight management system (FMS), electronic charts, checklists, and a number of timer and calculator types of utilities. It also includes options for control/display of weather radar and display of external video. The system includes terrain alerting as well as an option for TAWS.

The IFD545 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. In degraded conditions, the synthetic vision view will be replaced with a traditional blue over brown attitude indication. The attitude sensing and depiction of the IFD545 provides a non-required secondary indicator in addition to the required attitude instrument(s) installed in the aircraft.

DOCUMENTATION CONVENTION

Throughout this document, capabilities that are not applicable to the IFD545 are identified using a † symbol. Also, capabilities that are applicable only to the IFD550 or IFD545 are identified using a ‡ symbol.

FUNCTIONAL OVERVIEW

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

- Flight Management System (FMS)
- WAAS and non-WAAS GPS Navigation
- VHF Radio Nav/Com (16W and 10W variants) †
- Synthetic Vision (SVS) ‡
- Attitude Display ‡
- Moving Map including synthetic vision view
- Terrain Awareness
- Forward Looking Terrain Alerting (FLTA)
- Terrain Alerting Warning System (TAWS) [optional]
- Weather Datalink
- ADS-B position and display
- Lightning sensor depictions
- Weather radar [optional]
- Video input [optional]
- Traffic
- Electronic Approach Plates
- Electronic Checklists
- Data Logging
- Caution Advisory System (CAS)
- Utilities (e.g. Schedulers, Timers, Calculators)
- Multi-touch Touch screen Control
- Multiple IFD Operations
- Remote Transponder Control and Display
- WiFi and Bluetooth® Communication [optional]

COOL FEATURE

Multi-Touch Touch Screen Control

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

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

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

BASIC CONCEPTS

PAGE FUNCTION KEYS

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

- SVS (Synthetic Vision System) ‡
- FMS (Flight Management System)
- MAP (Moving Map)
- AUX (System Pages)

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

Page Function Keys and Tabs (IFD540 and IFD510)



Page Function Keys and Tabs (IFD550 and IFD545)



LINE SELECT KEYS

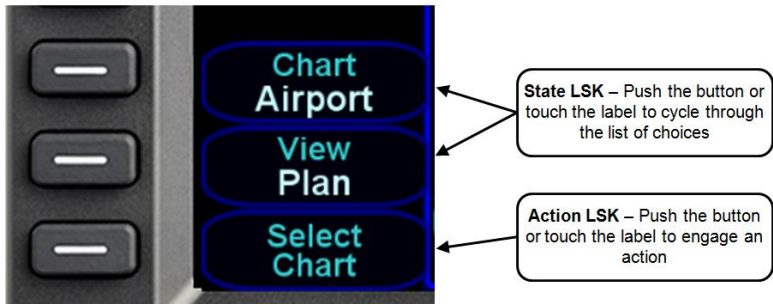
Line Select Keys (LSK), are the buttons found along the left vertical side of the bezel. These are different from Page Function Keys in that they also have a label, just inside the bezel adjacent to the physical button, which indicates the function of the LSK. An LSK can either represent an action or a state.

A **State LSK** is identified by a title on the first row, shown in 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. "User Options"). Pressing the LSK or touching the label will cause the system to perform the specified action.

LSK Types



RIGHT KNOB LABELING

The bottom right IFD knob is context-sensitive. Displayed in the lower right corner of the display, the knob label indicates the function of the knobs and the knob button on the left and right side, respectively. As a general rule, the inner and outer rings of the dual concentric knob perform the same function. Typically, the inner ring is “fine” control and the outer ring is “coarse” control for the function. The symbol used to represent the knob button is a ring with a center dot.

Right Knob Label Scheme



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

COLOR PHILOSOPHY

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

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

GENERAL IFD OPERATIONS

The Integrated Flight Display (IFD) is a touch screen unit that has been designed for compatibility with both retrofit and clean installations. As a retrofit installation, the IFD540 and IFD550 were designed to be slide-in replacements for a Garmin 530/W unit. Similarly, the IFD510 and IFD545 were designed to be slide-in replacements for a Garmin 500/W unit.

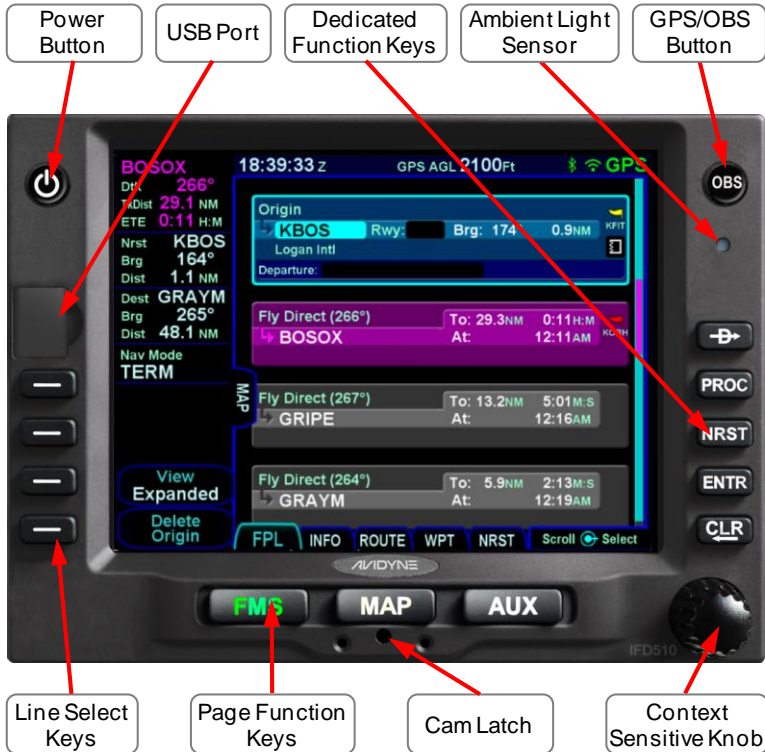
IFD540/IFD550 BEZEL LAYOUT

The IFD540 and IFD550 have the same bezel layout except that the IFD550 has one extra Page Function Key labeled "SVS" to the left of the FMS key.



IFD510/IFD545 BEZEL LAYOUT

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



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

- Power/Volume/Squelch knob †
- Frequency Swap dedicated button †
- USB port for database updates, datalog downloads, software updates and powering USB devices in-flight
- Four (4) Line Select Keys (LSKs) that are page dependent with soft key labels adjacent to each

- Dual Concentric Rotary Knob as a means of manually tuning Com and Nav frequencies †
- Page Function keys along the bottom
- Mechanical Cam Latch control for tray installation
- Dual Concentric Rotary Knob that is page dependent
- Six (6) Dedicated Function Keys consisting of:
 - Direct-To (“-D->”)
 - Procedure (“PROC”)
 - Nearest (“NRST”)
 - Frequency List (“FREQ”)
 - Enter (“ENTR”)
 - Clear (“CLR”)
- Ambient Light Sensor
- CDI Nav Source knob †
- Power button*
- GPS/OBS Button *

* Applicable only to the IFD510 and IFD545

COOL FEATURE

Integrated WiFi/Bluetooth®

The IFD has an integrated WiFi/Bluetooth transceiver located underneath the Avidyne logo on the bottom of the bezel. No additional hardware is required to take advantage of this capability.

POWER CONTROL

The IFD is regulated by a pair of circuit breakers. There is also a power control on the top left corner of the unit but the IFD will automatically start when the aircraft bus power is applied. Upon power application, the IFD display will show an Avidyne logo. It will take several seconds for the IFD to complete the power-up process.

The power button 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.

Manual Power Down



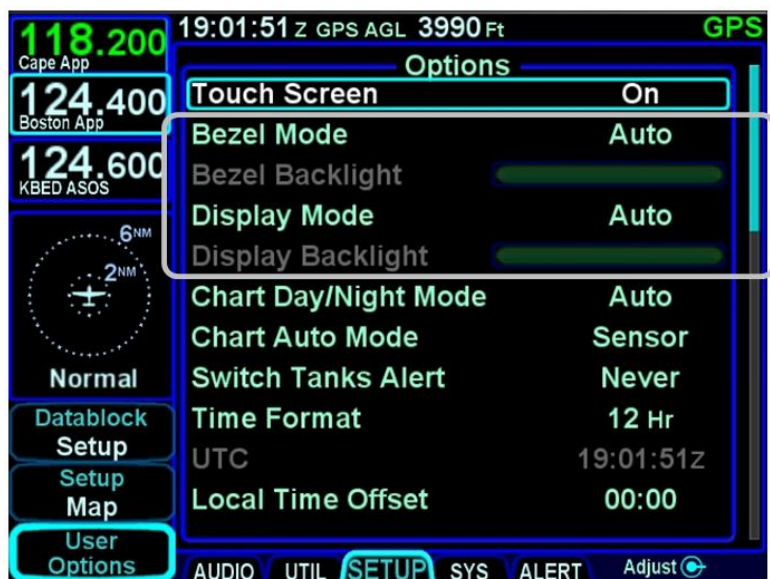
COOL FEATURE

Briefly pressing and then releasing the power button is a convenient way to immediately disable Bluetooth and networking capabilities.

BRIGHTNESS CONTROLS

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

Brightness Controls



Depending on how the installer configured the brightness controls at time of installation, the “Auto” 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 rheostat to ensure it is not set to a night position.

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 splash screen is present.
- An agreement of the limitation of your legal rights must be made via the bezel “ENTR” button. While the agreement 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.
- If there is a third party weather or traffic sensor connected to the IFD, then 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 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 enabled for Bluetooth and WiFi and either of those subsystems have been configured “On” on the User Options page, then the IFD will present an Allow/Ignore page to allow external data receipt via Bluetooth and/or WiFi. Press the Allow button if such input is desired or the Ignore button if no external input is desired. Pressing Ignore will automatically toggle the User Option selections to Off and will remain that way until manually turned back on.
- If there is a fuel flow system connected to the IFD, then the IFD will automatically transition to the Fuel Management Page. If the fuel flow system does not provide fuel totalizer data, you will need to input the fuel on board and press the “ENTR” key. If the fuel flow system does provide fuel totalizer data, confirm the total is correct and press the “ENTR” key.

If there is no fuel flow system connected, then the unit progresses directly to the FMS page and FPL tab, ready for a flight plan to be entered.

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

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

Some data such as fuel flow and fuel totalizer may experience a 5-10 second delay during post start initialization. For those aircraft configured with fuel totalizers, this may result in some fuel display changes on the Fuel Mgmt tab during that period including prompting the pilot to enter in initial fuel. That should resolve itself within a few seconds. Another example concerns the FMS nav database initialization, where the message "Loading nav database..." may be displayed on any of the FMS tabs for 10-30 seconds. Additionally, 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.

TIPS AND TECHNIQUES**"GPS No Position" Message Possible at Startup**

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

TIPS AND TECHNIQUES**Bluetooth/Networking Initialization Period**

The Bluetooth and networking interfaces may experience a 1-2 minute delay during post-start initialization before becoming functional. The icons in the upper right corner of the display will turn green when the interfaces are ready for use.

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

NOTE

Use of Not Yet Effective Data

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

TIPS AND TECHNIQUES**Manual Check of Database Dates**

Even if the databases are all current, you can still view the date/status of each database from the AUX page, Database Status display as described in Section 5 (page 5-56).

PAGE LAYOUT AND FORMATS

The context-sensitive line select keys, top datablocks and nav source knob 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 frequencies to be shown are configurable. 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)



Use a combination of the page function keys and the associated tabs, to change the contents of the rest of the display.

Each page has a number of associated tabs. Each Page Function key has a left and right rocker nature to it. To select a tab using

the page function key, press the left or right side of the key until the desired tab is selected. To select a tab using the touchscreen, just touch the desired tab. The last tab selected on any given page is retained in memory and will be displayed when you return to that page.

Split Page Layout

Some pages can display datablocks along the right edge of the display. The FPL tab and NRST tab on the FMS page and the Map tab on the MAP page are prime examples. In the cases where this is available, a labeled side tab is displayed, as shown surrounded by gray boxes in the illustration below. The right side datablocks can be shown or hidden using any of the following methods:

- Touch the side tab
- Use a left or right swiping motion on the tab
- Press and hold the left or right side of the page function key until the datablocks are shown or hidden

Map-Data Split



Map-FPL Split



Map-NRST Split



COM-NAV †

The VHF radio consists of a Com radio that covers the frequency band from 118.0 MHz to 136.990 MHz and a Nav radio that covers the frequency band from 108.0 MHz to 117.95 MHz. Both 25 kHz and 8.33 kHz spacing is supported. The IFD comes standard with a 10 watt transmitter, but can be configured as a 16 watt transmitter at the factory or in the field as a paid option.

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 a standby is displayed in white. The number of available standby frequencies is configurable.

Display of the frequencies can be formatted in several ways via the “User Options” and “Datablock Setup” LSKs of the SETUP tab on the AUX page (see the Datablock Setup description on page 5-20 for more details). The default display format is two com frequencies (active and #1 standby) above two nav frequencies (active and #1 standby). A custom display format can be set up to display the active com and up to four standby com frequencies.

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

COOL FEATURE**Multiple Standby Frequencies**

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

Multiple Frequency Formats

COOL FEATURE**Decoded Agency Identifier**

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

If a slot is receiving a voice transmission, a “RX” indication will be displayed along the right edge of the given com slot. When the active frequency is transmitting, a “TX” indication will be displayed along the right edge of the Active com slot.

NOTE

Stations such as ATIS, ASOS, AWOS are expected to be transmitting continuously, causing an "RX" indication to be displayed continuously. However, if the "RX" is displayed when the tuned station is not expected to be continuously transmitting and background noise is continuously audible over the aircraft audio system, press the upper left knob to enable squelch.

COOL FEATURE**Monitor Standby Com**

The IFD will send the first standby com frequency audio to the audio panel for audio monitoring. This permits the pilot to monitor a second com channel (e.g. ATIS) while still connected to the active com channel. Not all audio panels can 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 com radios, nav radios, and a remote transponder (if equipped). To switch between controls, push the lower left knob. Subsequent tuning operations will be performed on the displayed transceivers. Following 20 seconds of inactivity, the system will revert to control and display of com radios.

Cycling between Com, Nav, and Transponder Display



Tuning

Radio tuning can be accomplished through several methods. Regardless of method, it's always the #1 Standby that is tuned and then that frequency is swapped into the Active by pressing the bezel Frequency Swap button.

The #1 Standby can be manually tuned by rotating 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 in reverse video as shown below.

Manual Com/Nav Tuning Reverse Video



The #1 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 nav 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, 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



A more automated way to tune a com frequency is to use the frequency list, which is presented when the left knob is turned to start a manual tuning. See the section on page 1-31 regarding operation of the frequency list.

The #1 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 frequency (e.g. typing a nav freq in a com slot) will produce a temporary error message indicating the

mistake. This message is unavailable in dual IFD installations that have Keyboard Convenience mode (described later) turned on.

Notification of Invalid Frequency Entry Attempt



COOL FEATURE

Shortcuts to Com Tuning

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

Emergency Com Frequency

121.5 kHz can be quickly put into the Active com slot by pressing and holding the bezel frequency swap button for approximately three seconds. The frequency that had been Active is swapped into the #1 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 (Blue Advisory message) will be displayed and the transmitter will be disabled until the stuck mic condition is resolved.

Remote Tuning Control and Frequency Swapping

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

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

Another capability that can be added during installation is a remote com frequency swapping function that performs the same action as pressing the bezel Frequency Swap button, including holding it down to tune the emergency frequency. Typically, the remote com frequency function is installed as a dedicated button on the yoke, allowing frequency swapping without removing hands from the controls.

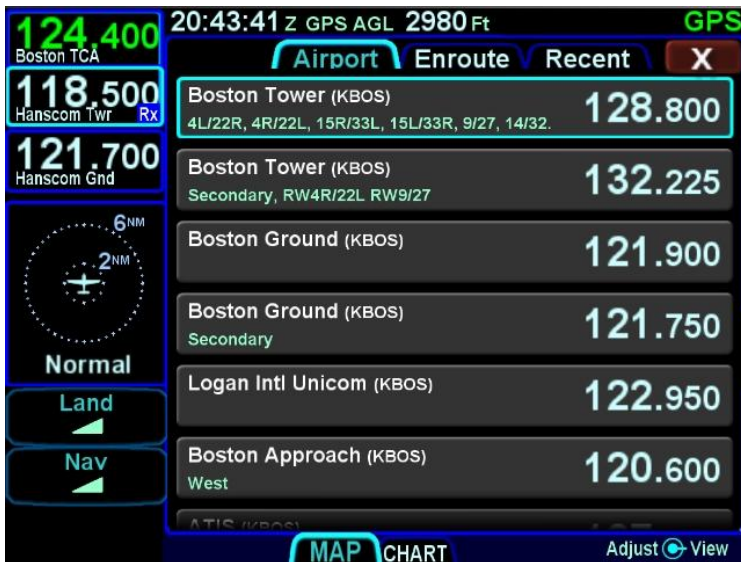
Other remote tuning and frequency swapping capability is present when dedicated third-party radio control display units are wired into the aircraft. Usually in these cases, when the radio control display unit is active, the Active and #1 Standby frequencies are only displayed on that external control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

FREQUENCY LIST †

The frequency list is displayed by pressing the “FREQ” function 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).

Freq 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, rotate 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.

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 data blocks 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 data block to show the keyboard. If the data block contains an "Ident" soft LSK, touch anywhere in the data block except the soft LSK.

Transponder Keyboard**Transponder Code Entry**

To enter a transponder code using a keyboard, touch a transponder mode/code datablocks to display a transponder keyboard, 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 rotate 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. †

Transponder Mode

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

- **ALT** - The transponder will respond to all interrogations
- **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 User Options under AUX-SETUP (see page 5-45).

IDENT

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

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

Direct-To Dialog and Confirmation Dialog Boxes



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

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

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

this technique for points in the published missed approach). When the desired waypoint is displayed, press the knob in to accept;

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

FUNCTION KEYS

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

- **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” function key changes the nearest list to another category as defined in the list below:
 - Nearest Airports
 - Nearest Airports to Destination
 - Nearest VORs
 - Nearest NDBs
 - Nearest Intersections
 - Nearest ARTCCs
 - Nearest FSS
 - Nearest Airspace
 - Nearest User Waypoints
- **PROC** – The “PROC” function key acts as a shortcut for attaching a published arrival or approach procedure to a waypoint in your flight plan. It can be used at any time. The first press of the function key results in the IFD displaying the FPL tab of the FMS page with the Approach field of the next destination after the active leg highlighted in reverse video and a drop down list of available published approaches listed.



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

- **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 Freq List). We have found that individual usage patterns tend to emerge and personal preference has a strong influence as well. Perhaps most importantly, hybrid touch is useful during turbulent or bumpy flight conditions where it is often very difficult to precisely and reliably touch the desired point on the display. Having a physical bezel control provides an “anchor point or control” to hold on to and exercise the intended action.

TIPS AND TECHNIQUES

User Control to Turn Touch Off

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

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

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

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

Virtual Alpha Keyboard



Virtual Numeric Keyboard



Each keyboard has a scratchpad in the lower right corner. The scratchpad is a free text field for data entry with some data entry validity logic applied to the data that is trying to be entered. For example, when trying to enter an invalid frequency, the com

tuning application will immediately sense that entry to be invalid and present an alert box stating the entry is invalid.† Validity logic is not applied on cross-side keyboards in dual IFD installations.

Invalid Keyboard Entry Alert



TIPS AND TECHNIQUES

Optimal Touch Performance

To maximize touch performance, the more surface area of a finger that can make contact with the glass, the better. Try to avoid using just fingernail contact or just the tip of a finger. Increased pressure on the glass by your finger should not have any positive effect. Many types of gloves will work, but performance will likely be degraded. (see “Use of Gloves” section on page 7-39).

USE OF EXTERNAL KEYBOARD

The IFD is capable of taking input from an external, properly paired, Bluetooth keyboard. It is intended to be used in lieu of, or in conjunction with, the IFD touchscreen keyboard. Anywhere and anytime the IFD touchscreen keyboard is used to enter data (e.g. waypoint names, building flight plans, entering frequencies†, etc), the paired external keyboard can be used instead.

COOL FEATURE

Convenient Data Entry

If air is turbulent or touch is turned off, or physical access to the controls is difficult, an external keyboard can be an easier way to enter data on the IFD.

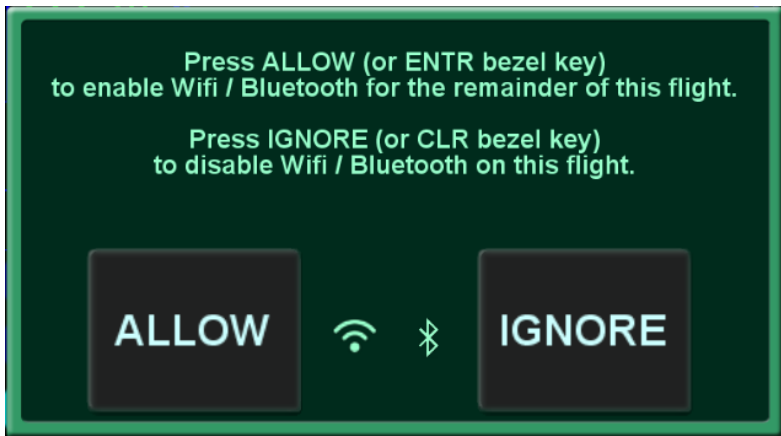
NOTE

Dual IFD Installations Should Only Pair 1 IFD

To avoid issues arising from a keyboard only being able to pair with one device at a time, dual IFD installations should turn off Bluetooth in the User Options page on one IFD.

See page 7-79 for Bluetooth keyboard pairing procedures.

At startup on IFDs with enabled Bluetooth or WiFi, a confirmation page on which either the ALLOW or IGNORE options must be selected.

Bluetooth Keyboard Confirmation Dialog Box

All labeled keys are fully functional. The light bulb key turns on backlighting for the keyboard. The vertical two-headed arrow key is primary/#1 standby swap †. The Avidyne logo key is a space bar. The up/down arrow keys can be used for page navigation in the same way the inner and outer rings of the bottom right IFD knob can navigate through page fields. Repeated presses of the FMS, MAP, AUX keys step through the tabs on those pages.

Avidyne Supplied Bluetooth Keyboard

DUAL IFD OPERATIONS

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

Method of Data Share (Dual IFD Operations)

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

Keyboard Convenience Mode (Dual IFD Operations)

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

Shared Data (Dual IFD Operations)

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

- Enables the integration of the Caution Alerting System (CAS) to allow a single acknowledgement of any of the Global messages to be removed from both units by acknowledging them on either unit
- Enables flight plan synchronization, including modification of the flight plan to be reflected on both IFDs (this does allow for flight plan/procedure preview on the second IFD). This requires identical nav databases to be loaded on each IFD
- Enables stored routes to be synchronized across both IFDs (this does allow for route preview on the second IFD)

- Enables fuel planning (e.g. initial fuel entry) to be synchronized across both IFDs
- Enables user waypoints to be synchronized across both IFDs
- Enables sensor settings and data (traffic, datalink, lightning, air data, etc) to be shared across both IFDs.

NOTE**Full Data Sharing Requires Consistent WAAS**

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

NOTE**Dissimilar Weather & Traffic Data Not Shared**

Dissimilar weather data sources (e.g. GDL-69 data on one IFD and SkyTrax100 data on the other IFD) will not be shared between IFDs. Each IFD will display its own weather data in this case

Likewise, dissimilar traffic data sources (e.g. TAS600 data on one IFD and SkyTrax100 data on the other IFD) will not be shared between IFDs. Each IFD will display its own traffic data in this case.

NOTE**Sensor and Control Data Sharing Requires Consistent Software Versions**

For complete data sharing between dual IFDs, both units will need to have the same main software version. If the IFDs have different software versions, then the sensor and control data (e.g. weather, traffic, fuel, volumes, keyboard convenience mode, etc) will not be shared between the IFDs.

So, in summary, to have full data sharing between dual panel-mount IFDs, the following rules must be satisfied:

- 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 nav database cycle
- Both IFDs must have the same software version

Independent Data (Dual IFD Operations)

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

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

- Chart displayed
- Electronic Checklists data and state
- Calculators and Utilities data

NOTE**Data Sharing Tolerates Inconsistent Databases**

While Avidyne strongly recommends the databases on each IFD be kept up-to-date and on the same cycle, data sharing between IFDs as defined above in “Data Sharing (Dual IFD Operations)” is not disabled when different data cycles are present on the two IFDs. Flight plans do not share in that case but the rest of the data will be shared.

WIFI (NETWORK) OPERATIONS

NOTE**Increasing Functionality**

The supported capability and third party applications supported are expected to grow over time. A list of applications and devices supported can be viewed at <http://www.avidyne.com/products/ifd/wifi-devices.html>

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

- Flight plan data streaming from IFD to third party application
- Approach and transition data streaming from IFD to third party application to allow automatic approach chart selection and display on the third party application
- Traffic data streaming from IFD to third party application for display on the third party application
- Weather data streaming from IFD to third party application for display on the third party application
- Flight plan route data transmitted by the 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")

Bluetooth and WiFi 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 WiFi 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 WiFi/Bluetooth is on, the startup dialog box is accepted and active but not connected.
- Icons will appear green when WiFi/Bluetooth is on, the startup dialog box is accepted and connected.

WiFi and Bluetooth Active, Not Connected Icons



WiFi and Bluetooth Connected Icons



If the user selects “Ignore” or disables the Network or BT via the options page, the gray logos above are depicted with a slash through them indicating they are not connected due to being actively disabled by the user.

The WiFi system can be configured as a client on an existing network (e.g. using a Stratus[®]) or as a Wireless Access Point (WAP) with a DHCP server, thus creating its own network. See “Configuring WiFi” on page 7-72 for instructions on configuring the WiFi on the IFD.

The factory default WiFi Network Configuration is a WAP with SSID of “LIO_WIFI” and a PSK (password) of “abcdef1234”.

TIPS AND TECHNIQUES

Quick Method to Sever WiFi/Bluetooth Link

The power knob/button in the top left corner of the IFD can be used to sever the WiFi and Bluetooth link to the panel IFD. Press and hold the power knob/button down until the countdown box on the display appears and then let go. At that point, the WiFi and Bluetooth links will be turned off and will need a manual action on the User Options page or press the “Accept” button on the dialog box to turn it back on.

WAAS VS NON-WAAS OPERATIONS

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

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

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

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

INTERACTION WITH EXTERNAL DEVICES

Each IFD is capable of communicating with several hundred third-party devices. Reference the Installation Manual for a complete list of devices supported and any hardware/software baseline restrictions or view the supported device list at

<http://www.avidyne.com/products/ifd/compatible-interfaces.html>.

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

TIPS AND TECHNIQUES

Dual IFD Installations Should Only Use One WiFi

For reliable WiFi operations, Avidyne recommends turning off WiFi (Network) from the User Options page on one of the IFDs.

NOTE

Shared Data Between Panel IFD and IFD100

Almost all of the same data sharing rules apply between a panel mounted IFD and the IFD100 application running on a mobile device. Com/Nav tuning however is shared between these two devices.

The IFD100 application is running all the same software that the panel mount IFD is running. When connected via WiFi with a panel mount IFD, it will behave as if it is another panel mount IFD and will share all the data that two panel mount IFDs would share plus Com/Nav tuning, not just the limited amount of data that third party applications may be sharing with the IFDs.

BEFORE TAKEOFF TECHNIQUES

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

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

TIPS AND 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.

2 SVS Subsystem

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 can also show attitude indications that overlay the background depiction.

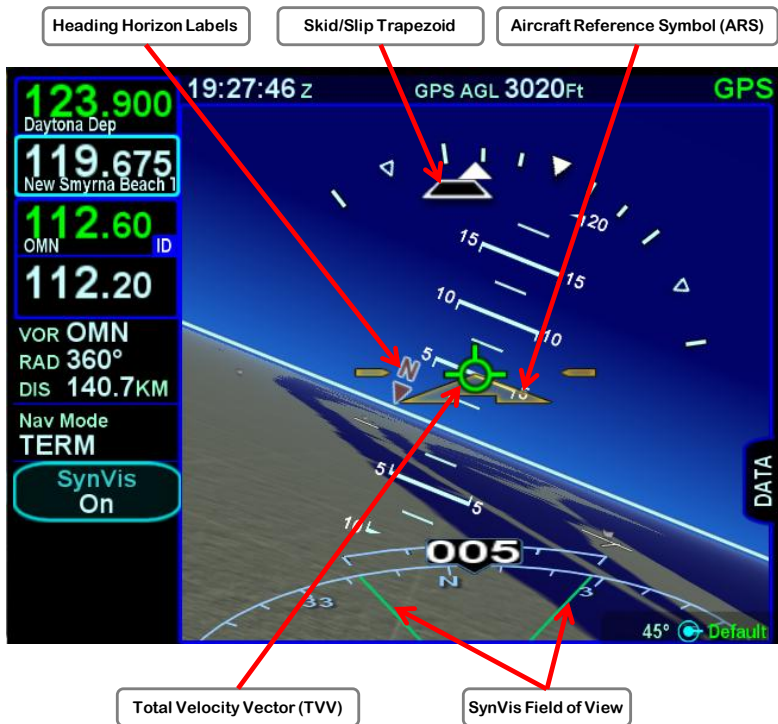
SVS computes height above terrain via GPS inputs and is not a radio altimeter (RADALT).

Terrain Awareness (TA) and Forward Looking Terrain Alerting (FLTA) alerts are provided via terrain coloration, Caution-Warning Alerting System (CAS) alerts, and aural alerts. SynVis also allows for a pilot-selectable horizontal field of view ranging from 20 degrees to 120 degrees with a 45 degree default.

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 twisting either ring of the bottom right bezel. Pushing the bottom right knob will restore the 45° field of view default value.

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 terrain data and 9 arc-second resolution used in creating the synthetic terrain depiction is the same data and resolution used in the FLTA and TAWS calculations for consistency.

The SynVis LSK (L2) is the toggle between the synthetic vision image (“On”) and a traditional blue/brown Attitude Indicator (AI) (“Off”) with a third state to turn the flight plan overlay on/off.

There are no autopilot mode display or control capabilities.

When there is an active flight plan, the active leg is displayed in magenta and the next leg is depicted in alternating magenta and white just as it is on the 2D map. No follow-on legs or waypoints are depicted for declutter purposes. The depiction of the flight plan can be turned on or off in the SynVis scene via the L2 LSK.

The next waypoint will have a waypoint identifier flag displayed.

SynVis with Waypoint Flag



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 display, however, if the traffic is a "Proximity" or "Traffic Alert" it will display.

3D Traffic Symbology in SynVis Scene

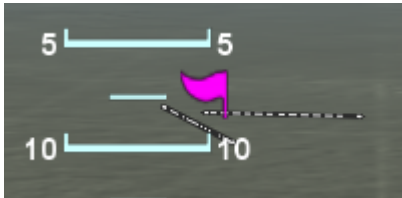


The TVV will grow in size when it is behind the deviation indicators or heading digital readout bubbles in order to stay viewable.



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 looking gray flag until the airfield is within 1.5nm at which time, the flag is removed and the runway outlines should be clearly visible. If the IFD receives a valid METAR, the airfield flag will be color coded to represent the ceiling and visibility, consistent with the map.

Airport Flags



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

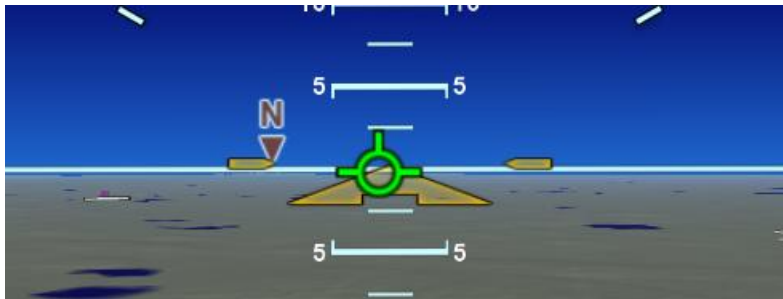
Provided aircraft position is close enough to the runway, runway numerical identification (e.g. "04") will be visible as will centerline markings.

SynVis Runway Depiction



The User Options page provides a means to turn on/off cardinal heading tick marks and labels (e.g. N, NE, E, SE, etc) along the horizon line in the SynVis scene.

Heading Horizon Tick Marks and Labels



The User Options page also provides a means to turn on/off the Horizontal Deviation Indicator (HDI) in the SynVis scene and traditional blue/brown attitude indication view.

HDI Turned 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 Datablock Setup, page 5-20. 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



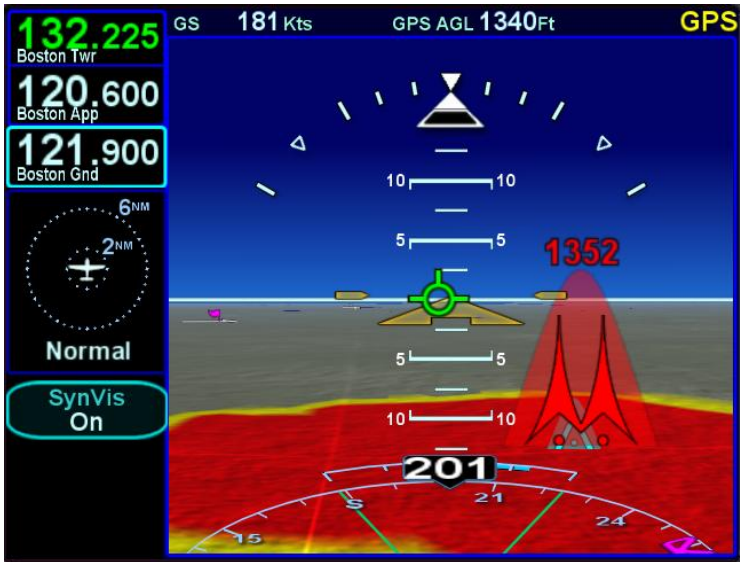
Obstacles inside a 3nm radius of the aircraft position and whose top is between 100' below aircraft altitude and 1000' below aircraft altitude will generate a yellow threat bubble over the obstacle on the SynVis scene and the map pages.

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.

Yellow Obstacle Threat Bubble



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 Map Setup page selections. If obstacle filtering is disabled on the Map 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 Map 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.

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

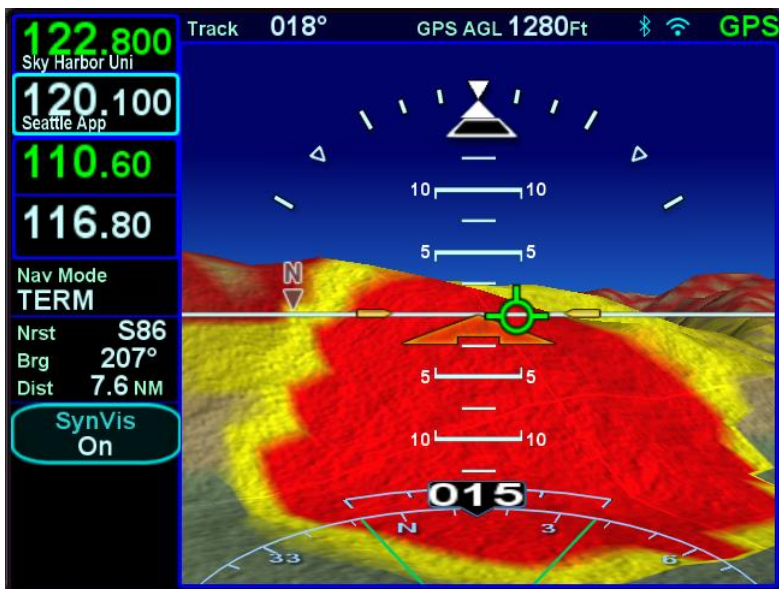


SVS FORWARD LOOKING TERRAIN ALERTING (FLTA)

FLTA alerting is triggered by either a projected imminent impact with terrain or obstacle or reduced terrain and obstacle clearance. Projected imminent impact with terrain occurs when the 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. By way of reference, this means an aircraft traveling at 180 knots of ground speed will have 60 seconds of notice for a caution and 30 seconds for a warning. Reduced terrain or obstacle clearance occurs when the 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 SV-TA 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 per TSO C-151c but generally ranges from 300' to 1000'.

SynVis terrain awareness indications do not product 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° and placed on the approach end of the runway depiction.

If the published missed approach has not been set up to automatically arm, the L4 LSK will present the manual arming option.

Approach with Enable Missed Butler



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

Use the bottom right bezel knob to zoom the SynVis scene in during instrument approaches to get a temporary close-in look of the landing runway. The current field of view setting is displayed in the knob label when something other than 45° and pressing the knob will immediately restore the scene to the default value. Be wary of leaving the field of view at the upper or lower ends of scales for long 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 with 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 active runway in the FMS flight plan is highlighted with a magenta outline drawing the airfield identifier flag is “planted” at the runway threshold, if known, or airport reference point if not.

SynVis Runway Depiction



As on the FMS pages, the L4 LSK will toggle to “Retry Approach” when on the published missed.

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 displaced to the right of final 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 L4 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



If the SynVis scene is turned off, the page reverts to a more traditional blue over brown AI-like look.

SynVis Turned Off



Extreme Attitude Depiction

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 also displayed in those extreme pitch/flight path angle situations and point toward the horizon as well.

The following SynVis-related failure conditions result in an automatic transition from the SynVis scene to the traditional blue/brown AI:

- 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.

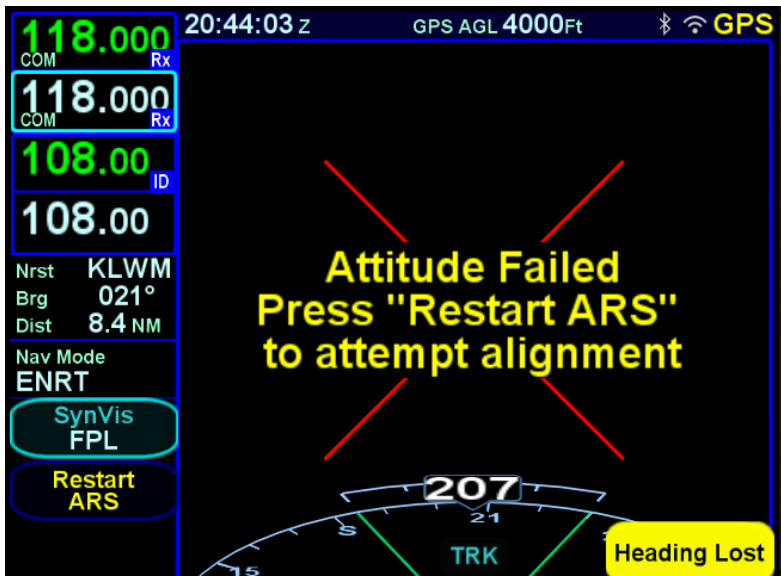
OPERATIONAL LIMITS OF THE ARS

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" button or soft key and maintain straight and level flight for at least 30 seconds.

NOTE

SynVis Depiction Unavailable In GPS Alignment

SynVis depictions will not be available until the GPS has reached SBAS state (SBAS/WAAS configurations), or FDE state (non-SBAS/WAAS configurations).

NOTE

Flight Plan Depictions

The depiction of the flight plan in any SynVis display 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.

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 method for showing information about aviation facilities contained in the navigation database.

The ROUTE tab provides a method for managing stored routes. Stored routes can be created, modified, and deleting using this page. A stored route can also be "activated", which will copy it to the flight plan and activating it, thus making it the plan to which guidance will be provided.

The WPT tab provides a method for managing user defined waypoints. Waypoints can be created using several methods, modified, and deleted.

The NRST tab provides a method to show facilities that are nearest to the aircraft at all times. This page is very useful in order to be prepared for emergencies.

FPL (FLIGHT PLAN) TAB

FMS BASIC CONCEPTS

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

NOTE

FMS Centric Calculations

The FMS presumes the pilot intends to fly the flight plan as created. All deviation data, most data block data and the times to go and fuel calculations are all based on that assumption.

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

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

Flight Plan Detail

The screenshot displays the Flight Plan Detail screen with the following data:

Origin	Brg	Distance
KMLB Melbourne Intl	255°	2.3NM

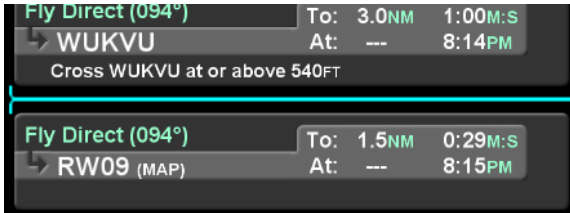
Leg	To	Time	Alt
Fly Direct (081°) MLB Cross before MLB	1.7NM	0:40M:S	80Gal 16:01Z
Fly Direct (169°) VALKA	11.7NM	4:39M:S	79Gal 16:06Z
Fly Direct (169°) VRB	15.0NM	5:58M:S	78Gal 16:12Z
Fly Direct (166°) SMUGS	30.9NM	0:12H:M	74Gal 16:24Z
Fly Direct (166°) MORG	14.8NM	5:53M:S	73Gal 16:30Z

Legend:

- Blue: • Origin, • Airports
- Magenta: Current Leg
- Gray: All other legs

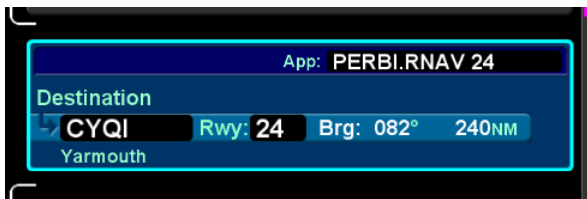
There are three types of cursors – an insert cursor, an edit cursor, and a field cursor. An insert cursor appears as a thin cyan horizontal line that appears between flight plan row. This cursor allows you to insert new legs and procedures at that position. The edit cursor appears as a cyan box surrounding the entire row and allows you to perform operations on that row. A field cursor appears as a filled cyan ("reverse video") box within a row.

Insert Cursor



Insert Cursor –
Thin cyan line

Edit Cursor



Edit Cursor –
Cyan box
surrounding
the row

Moving the cursor

Cursor movement can be controlled by the inner and outer rings of the context sensitive knob 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 cursor position. 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

When the cursor is an insert or a field cursor, an operation can be initiated by pressing the right knob button. Operations can also be initiated using the touchscreen by touching the cursor.

For an insert cursor, initiating an operation will usually cause a dropdown to appear, but in some cases an edit will be immediately started. When a dropdown is shown, the right knob is used to move the cursor through the options. Touching an option will also move the cursor to that option. When the cursor is highlighting the desired option, press the knob button or touch the highlighted option to complete the selection.

For a field cursor, initiating an operation with the knob will put the field into edit mode, allowing a value to be changed or entered using the inner and outer knobs. Initiating the operation by touching will put the field into edit mode **and** cause a virtual keyboard to appear, allowing direct entry of a value. If an operation was initiated using the knob, touching the field while in edit mode will cause the virtual keyboard to appear. The knobs are still functional when the virtual keyboard is shown.

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

TIPS AND TECHNIQUES

ETE Granularity

The ETE fields in the flight plan legs will be in HH:MM format until the time is under 10 minutes, at which point it becomes MM:SS.

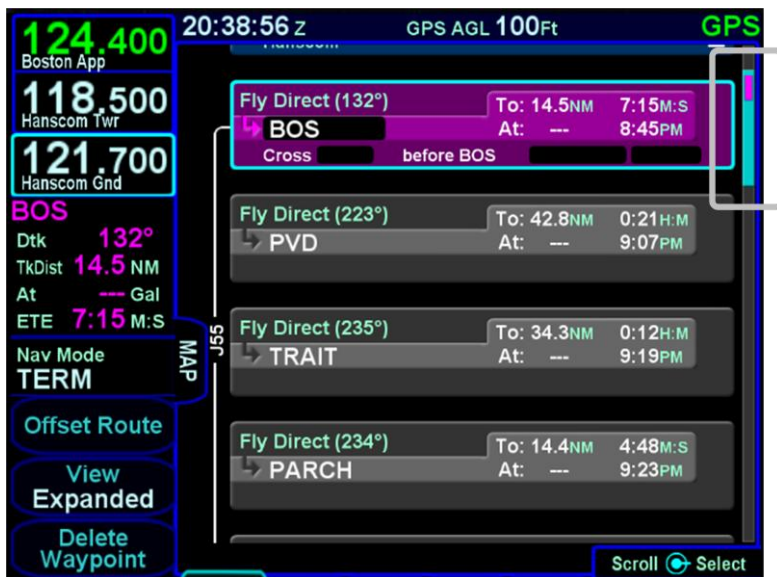
CREATING A NEW FLIGHT PLAN

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

origin is not the point you want to start from, delete the pre-populated origin value via the CLR button and a new Origin/Waypoint dropdown is presented from which a new starting point can be entered. An “origin” must be an airport whereas a “waypoint” can be any database location (e.g. user waypoint, navaid, airport).

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

Flight Plan and Scroll Bar



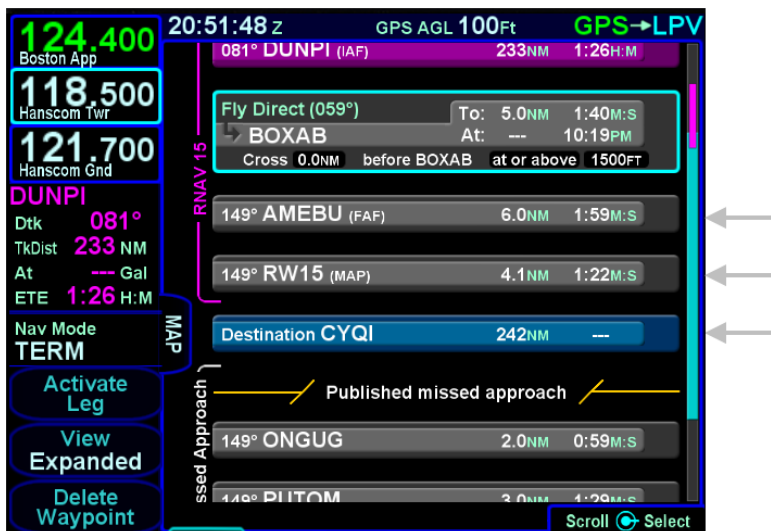
COOL FEATURE

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

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

The flight plan can be displayed using a "mini" format where legs are presented in a single row, allowing more legs to be visible on the display. The mini format is selected on or off using the FMS Setup page on the AUX SETUP tab). The leg is surrounded by the cursor automatically increases its height to the full row format.

Mini Row Leg Format



PREVIEWING FLIGHT PLANS

Flight plan modifications can be previewed as they are being modified on the FMS page, using the FPL tab with the map partially exposed (Map-FPL split page as defined in section 1). 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

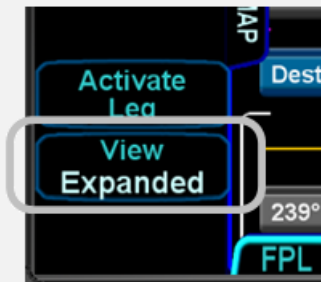
legs as the system determines the optimum map range for display. This feature provides a graphical preview of the edited route before it is officially part of the flight plan to aid in situational awareness. The preview feature is available whether modifications are being made on the ground or airborne. While a preview is being displayed, an temporary annunciation will be shown on the map describing the modification in progress. Examples of those annunciations are "FMS Preview - Waypoint", "FMS Preview - Airway", or "FMS Preview – Approach."

Previewing a Flight Plan While Building It



TIPS AND TECHNIQUES**Flight Plan View**

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

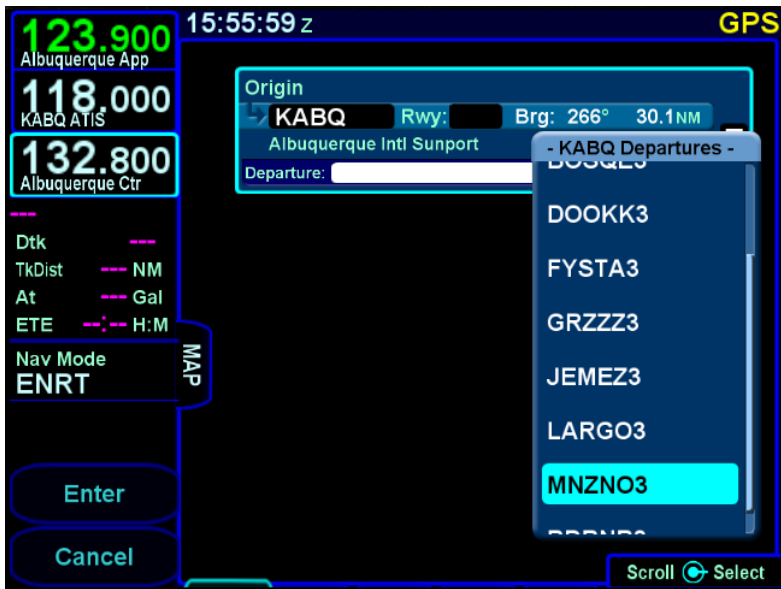
**COOL FEATURE****FMS Cursor Centered View**

One of the Map views available for use on the Map-FPL tab of the FMS page is “FMS Cursor Centered” mode. It is accessed by pressing the “View” LSK along the left edge until the “Cursor” option is displayed and can serve as a good way to conduct initial planning and later review. Once in the view (indicated by the annunciation “FMS Cursor Centered” overlaid on the map), the map is centered on the fix surrounded by the FMS cursor. As the FMS cursor is scrolled up/down the flight plan, the map center point changes. This allows you to see close up details of the downpath flight plan.

SELECTING A DEPARTURE

If a published departure exists for the origin airport, then a dropdown containing available departures can be displayed by rotating the right inner knob to highlight the departure field for the origin airport and then pressing the knob button.

Departures Dropdown



TIPS AND TECHNIQUES

Vector Standard Instrument Departure (SID)

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

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.

Departure Enroute Transition Dropdown

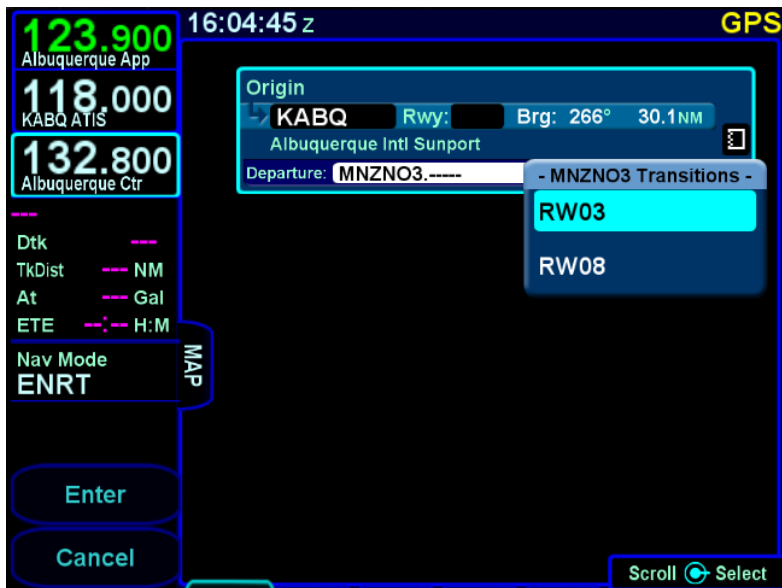
The screenshot displays the IFD500 FMS interface. On the left, a vertical stack of altitude and speed information is shown: 123.900 (Albuquerque App), 118.000 (KABQ ATIS), and 132.800 (Albuquerque Ctr). Below this, flight parameters are listed: Dtk, TkDist (NM), At (Gal), and ETE (H:M). The navigation mode is set to ENRT. At the bottom left are 'Enter' and 'Cancel' buttons. The top center shows the time 15:56:36 z. The top right corner has a 'GPS' indicator. The main display area shows the 'Origin' as KABQ (Albuquerque Intl Sunport) with a heading of 266° and a distance of 30.1 NM. The 'Departure' field is set to MNZNO3. A dropdown menu is open, titled '- MNZNO3 Transitions -', showing a list of transitions: None, CME, LAMSE, MOLVE, ONM, SJN, and TXO. At the bottom right, there is a 'Scroll' button with a circular arrow icon and a 'Select' button.

COOL FEATURE

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.

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, rotate 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 it is legal to insert a waypoint, 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 L2. The LSK is also available when using the virtual keyboard, but the LSK is obscured on the screen by the keyboard.

TIPS AND TECHNIQUES**Back-to-Back Duplicate Waypoints Restriction**

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

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 ring of that knob to highlight one of the editable fields with reverse video. Pushing the knob provides a drop down box from which the changes can be made. Alternatively, touching the field to be edited will display a virtual keyboard which can be used to enter the desired data/changes.

ADDING ALTITUDE CONSTRAINTS

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

Altitude Constraint Types

Cross	Type	Altitude
Number field (selecting distance in NM from waypoint for crossing constraint)	At Or Below At At or Above Window (appears in terminal area procedures only, not enterable)*	Altitude field (selecting the target altitude). Minimum allowable value is 100'

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

ENTERING AND INTERCEPTING A RADIAL

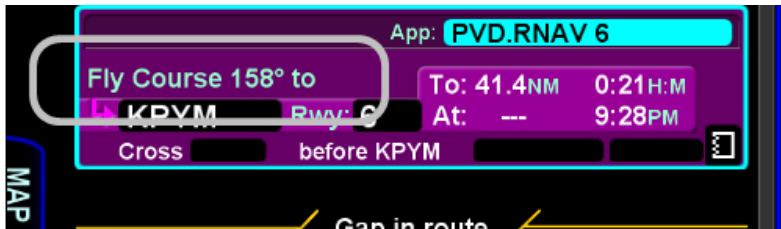
FMS Method

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

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

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

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†

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

DELETING A FLIGHT PLAN

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

CREATING A HOLDING PATTERN

A hold can be put on any waypoint that has a fix terminated leg – waypoints that terminate with a lat/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.

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

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

TIPS AND TECHNIQUES

Using Holding Patterns

The hold pattern leg type has a field for the inbound course to the hold waypoint. The hold pattern turns left or right as specified in the hold pattern at the hold waypoint. For example, if ATC issues a “Hold east of <waypoint>”, 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 L3 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 then display “Hold As Published” and 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’s no “Standard Hold” LSK since it’s unlikely this would be a desired course of action. If however, a hold parameter is manually changed, the “Hold As Published” LSK does appear.

CIRCULAR ORBITS

If the optional Search and Rescue (SAR) / Special Use Mission package is active, then circular orbits can be added to the plan.

Circular Orbit Depiction on Map



The function is activated on the FMS Setup page by setting the "Patterns" field to "On".

Circular Orbit Pattern Selection in FMS Setup

118.000 KABQ ATIS Rx		GS 0 Kts	Trk 350°	GPS
121.900 Albuquerque Gnd Rx		TFR	On	
113.00 ID		SUA	On	
108.00		Procedures		
VOR ---		High Alt Airways	On	
RAD ---		Low Alt Airways	On	
DIS ---		Arrivals	On	
Nav Mode		Departures	On	
ENRT		Approaches	On	
Datablock Setup		Patterns	On	
Setup FMS		Display		
User Options		WAAS Channel Numbers	Off	
		Mini Flight Plan Format	Off	
		Adjust Defaults		

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



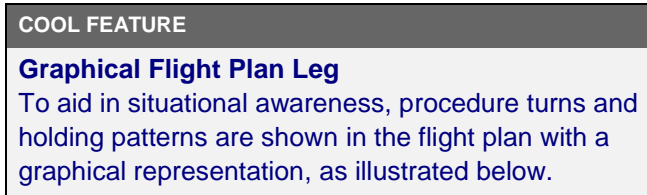
If the orbit radius is larger than the distance from the aircraft to the orbit fix, then the aircraft will intercept the orbit on the extended radial between the orbit fix and the aircraft. Just like a traditional holding pattern, there is no insert cursor between a fix and a subsequent orbit. The only 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.

DELETING A HOLDING PATTERN

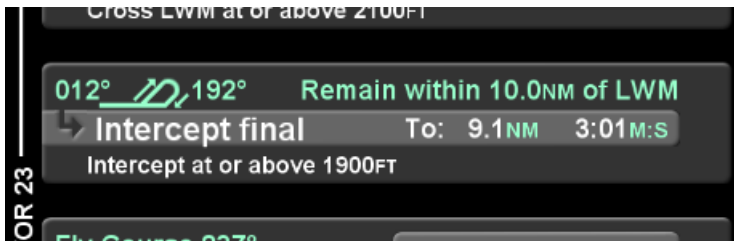
To delete a holding pattern in your flight plan, rotate the right knob to scroll until an edit cursor surrounds the hold, or touch the hold to be deleted then press the “Delete Hold” LSK or the CLR button.

EDITING A HOLDING PATTERN

To edit a holding pattern, rotate the right outer knob to scroll until an edit cursor surrounds the hold, or touch the hold to be edited. Then rotate 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.



Procedure Turn Leg



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. A flight plan that was created by pressing the "Activate Route" LSK for a stored route on the ROUTE tab will be automatically activated.

FLIGHT PLAN SEQUENCING

The FMS assumes that the pilot will fly the flight plan as defined. If that does not occur, legs may not sequence as expected. Therefore, to manually sequence the desired leg, select it by either using the bottom right IFD knob or touch it and press the

“Activate Leg” LSK followed by accepting the confirm dialog box when it is displayed. Doing so will turn that leg magenta, confirming that it is now the active leg.

TIPS AND TECHNIQUES

Impending Turn Notification

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

COOL FEATURE

Automatic VOR Tuning †

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

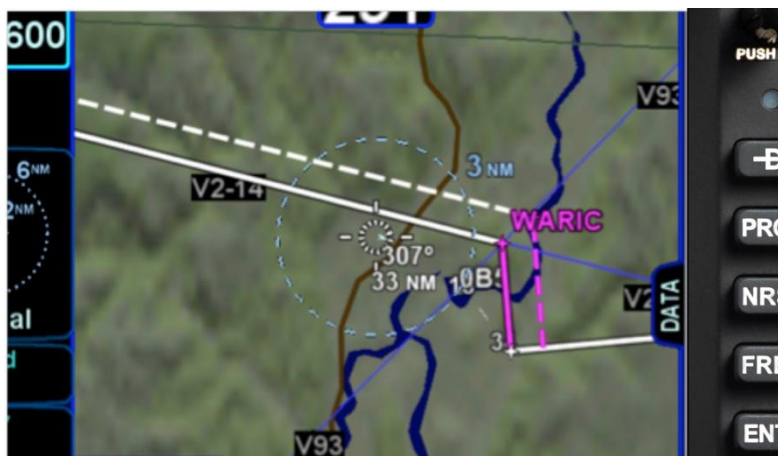
It may desirable to turn off this feature on one of the IFDs in a dual installation to allow depiction of a crossing radial for reference before crossing a VOR. Also when navigating using airways, it may be desirable to turn off this feature in order to check navigation using off-airway VORs.

LATERAL OFFSETS

The system supports a capability to create and fly a lateral offset from your flight plan. From the “FPL” tab of the FMS page, press the “Offset Route” LSK and use the right-hand knob on the IFD to dial in the desired offset. Use the outer ring for coarse control (1 nm increments) and the inner ring for fine control (0.1 nm increments). Rotate the knob left for left offsets and right for right offsets. Once the intended offset has been entered, press the “Confirm Right/Left x.x NM” LSK. At that point, the original LSK will indicate “Offset Route Right/Left X.X NM”. To delete a lateral

offset, press the “Delete Offset” LSK. The maximum offset that can be dialed in is 20 NM. Lateral offsets are not available when in OBS mode. Lateral offsets are unaffected by graphical route planning (“rubber banding”) operations.

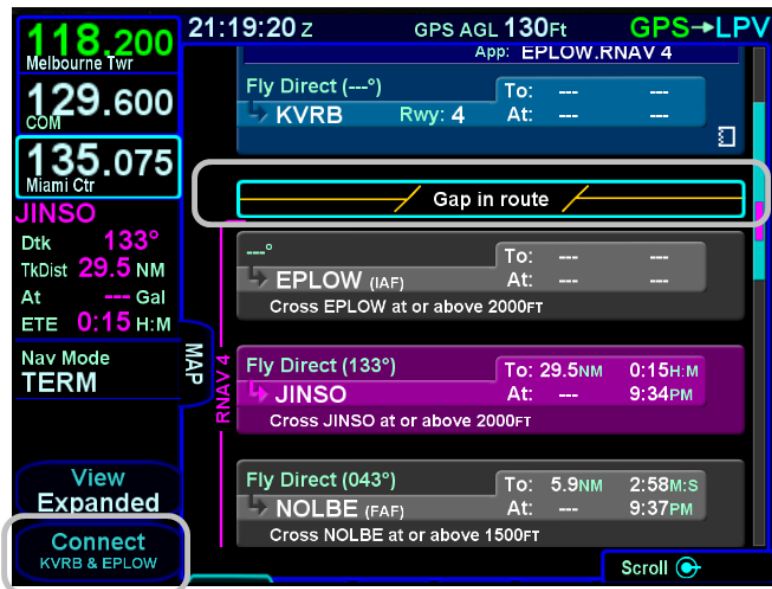
Lateral Offset Map Depiction



FLIGHT PLAN DISCONTINUITIES (GAPS)

A “Gap In Route” will appear within the flight plan when there is a discontinuity between legs. A discontinuity occurs when the FMS cannot compute the guidance to the next leg due to an invalid leg type combination based on preset guidance rules. The objective is to inform the pilot that the Gap must be manually closed if you wish to sequence to the next waypoint. Otherwise, the leg before the Gap will not be sequenced and guidance will not be provided to the next waypoint. If desired, close the gap by placing the cursor on it using the bottom right IFD knob or by touching it. Press the “CLR” bezel key or the L4 LSK on the FPL tab, “Connect <wpt1> & <wpt2>”. Closing a Gap connects the waypoint prior to the Gap with the waypoint that follows by a direct (straight) leg.

Connecting Gap in Route



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

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

ENROUTE DESCENTS

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

To generate the TOD feature:

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

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

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

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

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

Top of Descent (TOD) Marker



COOL FEATURE

Range to Altitude Indication

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.



COOL FEATURE**Enter Approaches for Multiple “Destinations”**

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

TIPS AND TECHNIQUES**Check Altitude Too Low CAS Message**

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

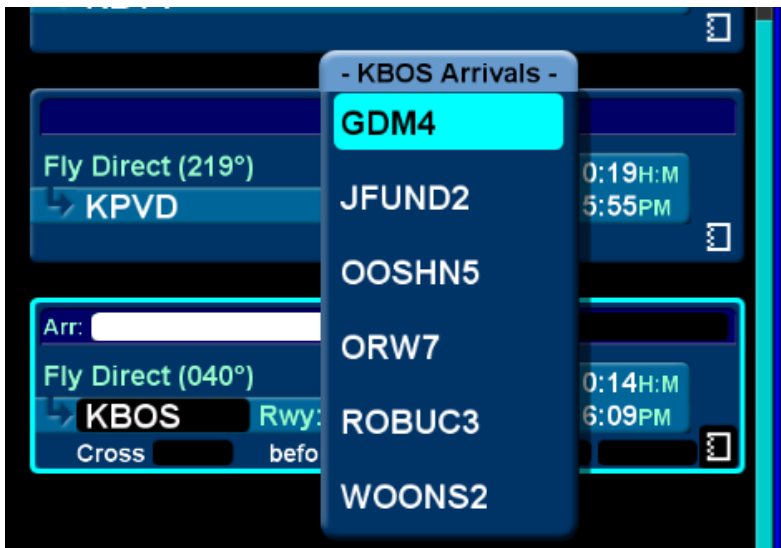
If your flight plan contains consecutive approaches and you activate the next approach during climb out from the previous approach and prior to reaching the next approach's FAF altitude, this “Check Altitude Too Low” message may be displayed.

ENTERING AN ARRIVAL AND APPROACH

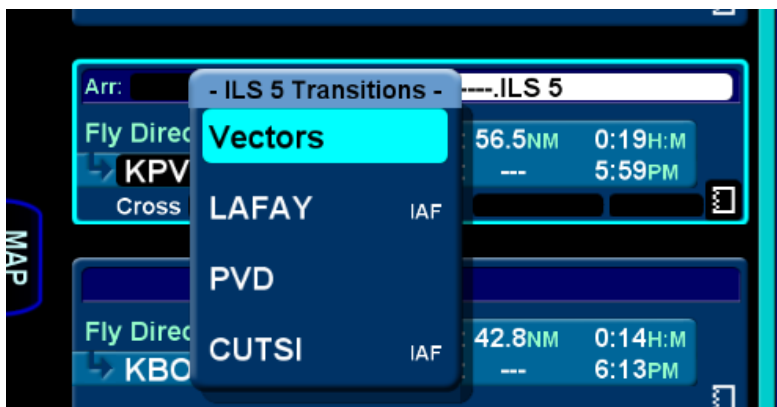
To enter an arrival or an approach, use the right inner and outer knob to move the cursor to a point where the procedure should be inserted. Arrivals can be inserted using an insert cursor immediately above the destination airport or immediately above an approach associated with that airport. An arrival 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 cursor is positioned above the airport (i.e. an Insert Cursor), the dropdown may contain more items than just arrivals and/or 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.

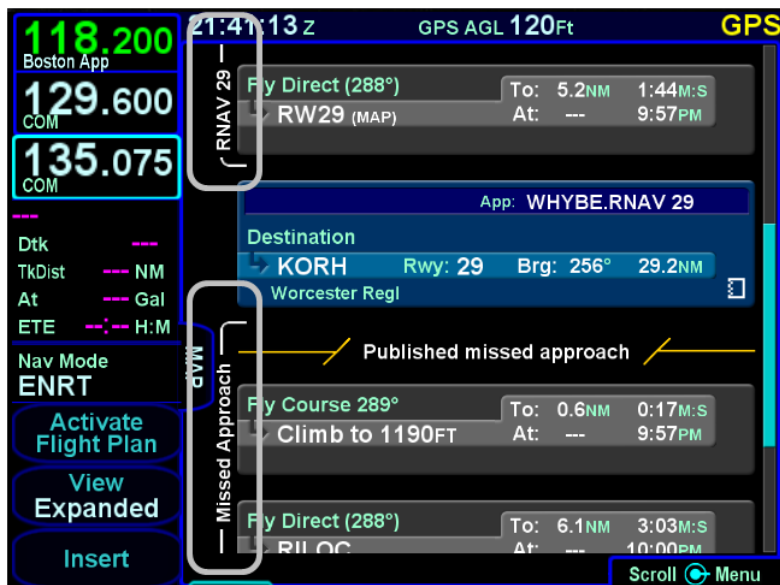
Arrivals Dropdown



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. In expanded view, a white bracket will be presented along the left side of the legs in the procedure, labeled with the name of the procedure.

Procedure Brackets

COOL FEATURE**PROC button**

The PROC function key on the bezel acts as a shortcut for attaching a published arrival or approach procedure to a waypoint in your flight plan. It can be used at any time. The first press of the function key results in the IFD displaying the FPL tab (Map-FPL view) of the FMS page with the 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. 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 function key will present the FPL tab on the IFD with an insert cursor at the top of the page but will not present any procedures.

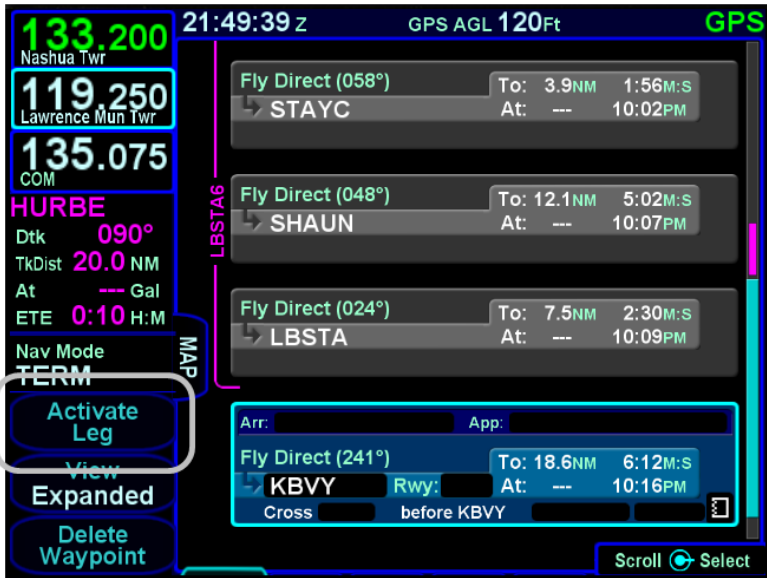
TIPS AND TECHNIQUES**Changing Selected Approach Type on Final †**

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

ACTIVATING A LEG

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

Activating a Leg



TIPS AND TECHNIQUES

Deleting an Approach From Active Flight Plan

One of two techniques is recommended to delete an approach from an active flight plan – if you want to replace the approach with another one for the same airfield, press the PROC key and select a new approach. If you just want to delete the approach altogether, scroll the flight plan to the blue airfield leg, ensure the cyan highlight is on the approach field (“App:”) and press the CLR button.

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 most useful to instantly correlate your flight plan with the graphical depiction on the map. This aids in error reduction and helps visually see options for divers, 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.

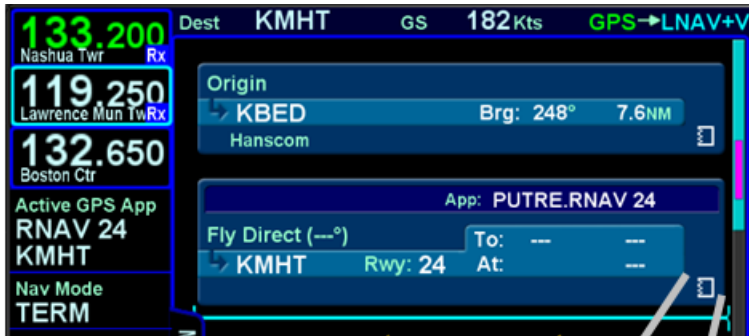
Chart Extent Box



COOL FEATURE

Hot Links to Charts in Flight Plan

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

Hot Links to Charts**COOL FEATURE****METAR Flags in Flight Plan**

When a weather datalink device is installed in the airplane and providing METAR data to the IFD, color 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.



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 stay locked to the top of the page; the identifier field is an editable field. To edit the identifier, either use the bottom right IFD knob (inner ring or outer ring) as required to highlight the identifier field and push in to get into edit mode and present a virtual keyboard, or, touch the field to present a virtual keyboard. There is also a Paste LSK along the left edge of the IFD that will nominate the currently active leg of the flight plan or the flight plan leg that is highlighted by a wrap-around edit cursor or any selected item from the Nearest lists. A search function, accessible via the Search LSK is also available to help find the name of the facility for which more information is desired.

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

knob to highlight the frequency field and push the knob to nominate it into the standby slot. †

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

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

- **Departures** – identifies the published departures associated with the airport and when an individual row has been selected via touch or the bottom right IFD knob, it can further expand to provide a thumbnail map depiction of the departure
- **Arrivals** - identifies the published arrivals associated with the airport and when an individual row has been selected via touch or the bottom right IFD knob, it can further expand to provide a thumbnail map depiction of the arrival
- **Approaches** - identifies the published approaches associated with the airport including any identifier and nav frequency, and when an individual row has been selected via touch or the bottom right IFD knob, it can further expand to provide a thumbnail map depiction of the approach. If the nav frequency is selected by touch or by using the bottom right IFD knob, it can be nominated (copied) into the #1 standby slot **↑**
- **Weather** – provides four additional rows of data if known: METAR, TAF, Winds Aloft, and Temps Aloft. Selecting any of the additional rows via touch or the bottom right IFD knob will display additional sub-category data. 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.

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

ILS ---
 Arpt ---
 RWY ---
 Nav Mode
ENRT

Paste KABQ

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

The ROUTE tab provides mechanisms for managing stored routes in the system. Up to 100 routes can be stored for later use, which is useful for frequently traveled routes. A stored route must first be “activated” via the “Activate Route” LSK, which makes it the active flight plan and displays the flight plan (FPL) tab.

Route Tab



As indicated in the above image, each stored route is represented by a single row with the route name on the left and the "from" and "to" points identified on the right side of the row. Additionally, there are two special purpose rows shown at the top of the list.

The "Current Route" row represents the flight plan being used on the FPL page. This row is provided as a mechanism to allow the copying and inverting of the active flight plan. Note that all active flight plan editing is performed on the FPL page. Therefore, attempting to edit when this row is selected will have no effect.

The "New Route" row represents a new route to be created. Selecting this route will start the process of creating a new stored route.

A cyan cursor surrounds the row in the stored routes list on which operations are to be performed. The cursor can be moved by rotating the right outer or inner knob or by touching a row. When the cursor surrounds a given row, selecting that row by pressing an LSK, pressing the right knob, or touching the same row will perform the corresponding action on that row. For instance, if the cursor surrounds the "New Route" row and then the right knob button is pressed, a new route will be created.

CREATING A NEW ROUTE

A new route can be created via the ROUTE tab by moving the cursor to the "New Route" row and then pressing the right inner knob button or touching the row again.

At that point, an empty flight plan will be shown and the route name field will be highlighted. Entering a route name is optional (see "Naming A Route" on page 3-43). To continue without entering a name, rotate the right outer knob to show the familiar insert cursor.

Use the same methods as described on the FPL page to edit the stored route. When editing is complete, press the "Back To Route List" LSK.

EDITING A ROUTE

To start editing an existing stored route, move the cursor to surround the route to be edited. Then initiate editing by pressing the right knob button or touching the row again.

At that point, the route to be edited will appear. Except for an additional row containing the route name at the top of the screen, the route will appear in the familiar format used on the FPL page. Use the same methods as described on the FPL page to edit the stored route. When editing is complete, press the "Back To Route List" LSK.

NAMING A ROUTE

Whether creating a new route or editing an existing route, a row containing the route name will be shown above the legs of the route. The route name field in this row can be populated by the system or manually entered. If not manually entered, the system will name a route using the identifiers of the first and last legs in the route (generally the origin and destination).

To manually set the route name, move the cursor to the route name field and then press the right knob button or touch the field. Either use the keyboard or rotate the right outer and inner knobs to enter the name. When complete, press the “Enter” button on the keyboard or press the right knob button to accept the new route name.

TIPS AND TECHNIQUES

Saving Altitude Constraints

Prior to Release 10.2.0.0, no manually entered altitude constraints were saved. The database contains altitude constraints for SIDs, STARs, and approaches, and those have always been retrieved from the database when a stored route is loaded.

Starting with Release 10.2.0.0, the system will save manually entered altitude constraints, but only for direct legs. If you’ve manually entered or changed an altitude constraint on a leg within a published procedure (SID, STAR, Approach, or Airway), those changes will not be saved.

COPYING A ROUTE

To make a copy an existing stored route, move the cursor to surround the route to be copied and then press the “Copy” LSK.

A copy of the route will have been created and the route will be presented for editing. Note that the route name remains unchanged, so unless something is edited to cause the route name to be changed, upon return to the route list there will be two routes with the same name.

It is possible to save of the active flight plan by highlighting the "Current Route" row and pressing the "Copy" LSK. Pressing the "Back To Route List" LSK with no changes will effectively save the flight plan into a stored route. At that point, the saved version is like any other stored route.

Copy Route LSK



TIPS AND TECHNIQUES

Route Previewing

Experimentation with routes without altering the active route (e.g. setting up multiple arrival scenarios when still far from destination) can be accomplished by copying the active route on the Route tab, renaming it for clarity, and editing as desired. When ready, activate that newly edited route. In dual IFD installations, use one IFD to view potential changes without affecting the active route.

INVERTING A ROUTE

To make an inverted copy of an existing stored route, move the cursor to surround the route to be inverted and then press the "Invert" LSK.

An inverted copy of the route will have been created and the route will be presented for editing.

It is possible to invert the active flight plan by highlighting the "Current Route" row and pressing the "Invert" LSK. Pressing the "Back To Route List" LSK with no changes will effectively save the inverted flight plan into a stored route. At that point, the saved version is like any other stored route.

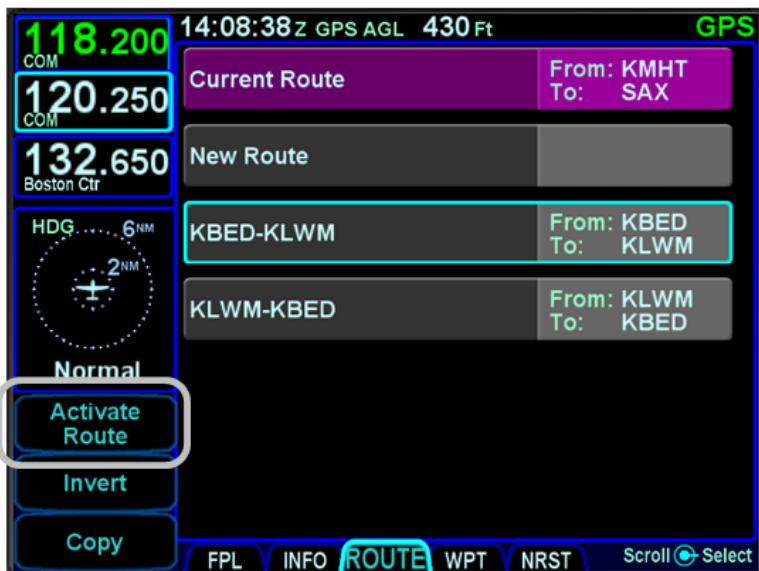
Invert Route LSK



ACTIVATING A ROUTE

When a stored route is activated, a copy of that stored route will replace the flight plan and the aircraft will start providing guidance to it. To activate a stored route, from the stored routes list, highlight the desired route from the ROUTE tab by either touching the row or using the bottom right IFD knob. Once the desired route to be activated is highlighted, press the “Activate Route” LSK along the left edge of the display. The IFD will show the FPL tab with the desired route activated.

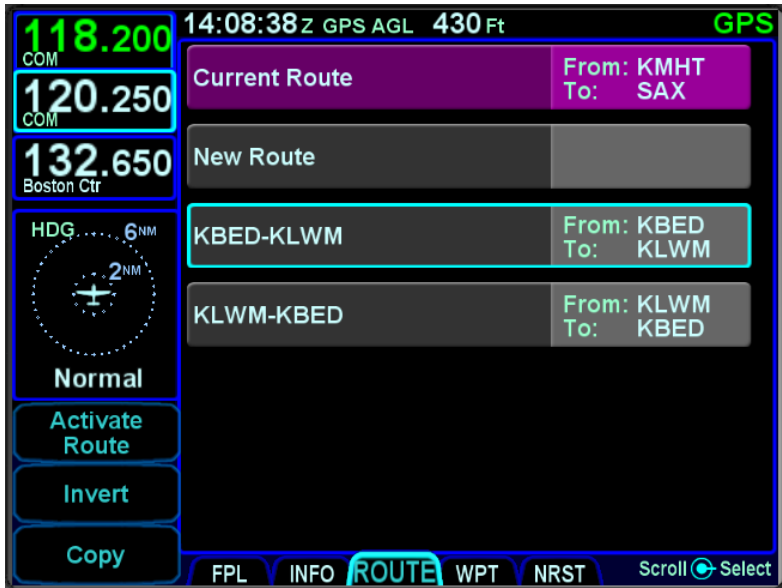
Activate Route LSK



DELETING A ROUTE

To delete a stored route, move the cursor to surround the route to be deleted, then press the CLR function key along the right edge of the display. A confirmation dialog box will then be displayed saying "Delete <name of flight plan>". Confirm the deletion by either touching the dialog box or pressing the "ENTR" function key along the right edge of the display.

Deleting a Route



COOL FEATURE

The flight plan can be deleted by moving the cursor to surround the "Current Route" row, then pressing the CLR key. The IFD will return to an empty FPL page.

WPT (USER WAYPOINTS) TAB

The WPT tab will list 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 4 methods of creating a user waypoint from the “WPT” tab of the FMS page:

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

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

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

Some external EFIS systems (e.g. Bendix King EFS 40/50, Collins Pro Line 21, etc) can also create and send user waypoints to the IFD. When the waypoint data is received from the external EFIS, the IFD will automatically switch to the WPT tab if not already there.

NAMING A USER WAYPOINT

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

DELETING A USER WAYPOINT

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

DESIGNATING A USER WAYPOINT AS AN AIRFIELD

To designate a user waypoint as an airfield, the waypoint must be manually named using the format “AIRPORT XXXXXFT” 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 has two display formats – full page Nearest and a split Map-Nearest combination. Switching between the two formats is accomplished by “opening” or “closing” the side tab when on the Nearest page.

Full Nearest Tab



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

Split Nearest Tab



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

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

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

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

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

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

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

Pressing the NRST function key will bring up the Nearest tab in the split Map-Nearest view. Each subsequent push of the “NRST” function key will step to the next nearest data type.

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

TIPS AND TECHNIQUES

Emergency Return to Departure Airfield

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

NOTE

Nearest Lists Capped at 100nm

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

ARTCCs use 200nm.

4 Map Subsystem

The map subsystem contains several page as shown below.



The SVS tab shows an exocentric synthetic vision view around the aircraft.

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

Map range choices extend from 2 nm up to 1000 nm. Current map range is indicated on the outer map range ring at approximately the 1:30 position and as noted above, the map range can be adjusted by either twisting the bottom right IFD knob or by using a two-fingered pinching gesture on the touch screen. The depicted current range numeric is replaced by "Min" and "Max" for two seconds before timing back out to the actual range number when at the two range extremes.

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

- Heading Up 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 User Options – SETUP tab of the AUX page.

North-Up, 360 View Example



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

Track-Up, Arc View Example



TIPS AND TECHNIQUES

Map Content Control

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

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.

TIPS AND TECHNIQUES**Heading/Track Digital Display Can Be Removed**

A map setup choice 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.

NOTE**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.








NOTE**Terrain Resolution**







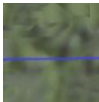
The map uses 9 arc-sec terrain data globally. There are however, some locations where the terrain database fills in missing terrain cell data and the map terrain will visually appear to be a lower resolution background in those locales.

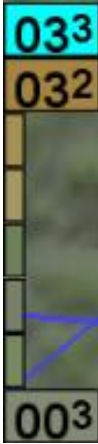
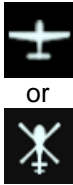

OTHER MAP FEATURES

The table below defines other map features.

Map Symbol	Item	Description
	Desired Track	Solid magenta triangle on inside edge of map compass rose
	Heading 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
	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)

Map Symbol	Item	Description
	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)
	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	All NDBs in nav database (magenta diamond)
	VOR	All VORs in nav database (blue)
	Intersection	All intersections in nav database (gray)

Map Symbol	Item	Description
	Flight plan, course waypoints	Each waypoint in flight plan (white)
	Interstate highway	All interstate highways in the database (solid brown)
	Class A	Each boundary of Class A airspace (solid red line)
	Class B	Each boundary of Class B airspace (solid blue)
	Class C	Each boundary of Class C airspace (solid magenta)
	Class D	Each boundary of Class D airspace (dashed blue)
	Victor or Jet Airways	All Victor and/or Jet airways (solid blue-gray)

Map Symbol	Item	Description
	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.
 or 	Ownship symbol	Representation of present position. Uses fixed wing icon or rotary wing icon depending on selection made in Maintenance Mode.

COOL FEATURE

Optional Airspace Aural Alerting

If selected on the User Options page, an aural alert “Airspace Ahead” will be issued when an imminent airspace penetration is anticipated. This is designed to happen approximately 5 minutes (± 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**Scenarios for Airspace Aural Alerting**

A technique for the use of aural airspace alerting is to turn it on via the Users Options page when flying in non-familiar areas, especially when operating under VFR. Experience has shown that local area flights in familiar airspace or when operating under IFR can result in what may be considered nuisance calls.

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 (from the totalizer) and current 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.

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.

A solid fuel range ring shows the maximum range of the aircraft using all of the current fuel on board. When there is fuel remaining in excess of the reserve, the solid fuel range ring is colored yellow. When the total remaining fuel quantity is less than the reserve, the solid fuel range ring is colored red.

The fuel range rings are always displayed and cannot be turned off. Changes in power settings, changes in winds aloft, and inaccurate fuel totalizer data 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 allow for separate control of the information density of the land-based (“Land”) map features (e.g. terrain, political boundaries, rivers, lakes, oceans, roads, etc.) and the navigational-based (“Nav”) map features (e.g. airspace, Victor and Jet airways, airports, obstacles, nav aids, etc.).

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

Map Declutter Controls



MAP PANNING

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

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

NOTE

Map Panning Limited Geographic Boundaries

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

NOTE

Map Panning Only Via Touch

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

GRAPHICAL FLIGHT PLANNING (“RUBBER BANDING”)

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

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

Rubber Banding Dialog Box



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

As soon as a fix from the presented list is selected, a new waypoint is inserted in the FPL flight plan list and uses a default waypoint naming mechanism (“RBxxx” where “RB” stands for Rubber Banding). This

can easily be seen if the IFD were on the FPL tab of the FMS page and using the split Map-FPL view.

TIPS AND TECHNIQUES

Optimal Rubber Banding

If you don't see the desired leg turn cyan within 2 seconds of placement of your finger on the location, try slightly adjusting the placement of the finger that is being used to designate a leg for rubber banding. Move your finger slightly in a direction perpendicular to the leg. Note that any leg can be rubber-banded including the active leg (the magenta one) unless the leg is part of a published instrument procedure.

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

NOTE

Rubber Banding Only Via Touch

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

NOTE

Rubber Banding Not Functional in SVS View

Rubber banding is not supported in the exocentric synthetic vision view of the flight plan on the SVS tab of the MAP page.

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 three types of altitude constraints are:

- **At or Below** (horizontal line above altitude);
- **At** (horizontal lines above and below altitude);
- **At or Above** (horizontal line below altitude)

Example Depictions of Altitude Constraints



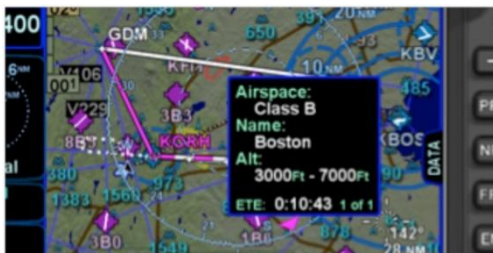
The altitude constraint depiction will also appear at the proper geographic position. For example, if an altitude constraint were defined to be 5nm prior to a waypoint like it is for KGDM in the image above, the graphical representation of the altitude constraint on the map will be positioned 5nm prior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

TIPS AND TECHNIQUES**METAR page on Map Popup Pages Delayed**

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

NOTE**Map Pop-Up Boxes Only Via Touch**

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

DATALINK WEATHER OVERLAYS AND OPERATIONS

The optional broadcast weather datalink is a transmission to your aircraft via one of a number of possible weather datalink systems. Some datalink systems require a fixed monthly subscription (e.g. MLB700, GDL-69, etc) and some datalink systems have no subscription fees (e.g. SkyTrax100) but in both cases, the receiver receives weather data continuously. You can control display of the received data on the various moving map pages.

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

NOTE**Datalink Data Accuracy**

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

NOTE**Datalink Data Intended to Aid Decision Making**

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

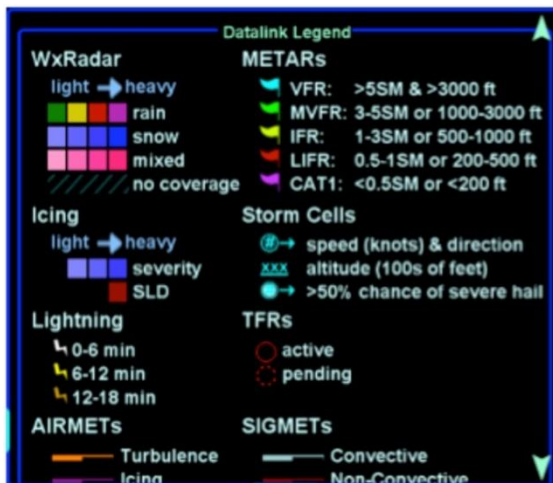
DATALINK RADAR

The Datalink radar is a composite image depicting precipitation as seen by multiple ground-based weather radar sites. The image is color-coded to 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 show the Datalink radar data no coverage area. In normal operation the boundary follows the outline of the Continental United States (CONUS). If, however, Datalink radar is unavailable in a particular area for any reason, hatched lines appear in that area. In the mountains and off the coast, hatched lines may represent no coverage below 10,000 feet. If there are radar returns in that region above 10,000 feet, the returns will be displayed as “islands of precipitation” surrounded by the hatched lines.

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



WEATHER OVERLAYS ON MAP

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

Wx Overlay Selection



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

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

NOTE

ADS-B (FIS-B) US Weather Radar Data is Coarse

When compared to subscription Datalink service data and even ADS-B Regional data, the CONUS weather radar data appears as a noticeably coarser depiction – this is a function of the supplied data.

NOTE**Weather Source Selection**

An individual IFD can only display ADS-B (e.g. “SkyTrax100”) or Sirius/XM (e.g. “GDL-69”, “MLB700”, etc) weather at any given time. The choice to select the source is made at time of installation in the setup pages.

TIPS AND TECHNIQUES**Weather Overlays in Dual IFD Operations**

For those installations with dual IFDs and more than one type of weather source (e.g. GDL-69 and a SkyTrax100) in the aircraft, Avidyne recommends wiring one weather source to one IFD and the other weather source to the second IFD.

TIPS AND TECHNIQUES**Weather Overlays in Single IFD Operations**

For those installations with a single IFD and more than one type of weather source (e.g. GDL-69 and a SkyTrax100) in the aircraft, Avidyne recommends wiring both weather sources to the IFD so that the higher priority weather overlay can display on the IFD and the lower priority weather data can be streamed out of the IFD via WiFi for display on a compatible tablet/wireless device application.

The current display priority is GDL-69, MLB700, AV300/350, SkyTrax100.

Weather Product Grouping Title/Category	Possible Selections Within the Grouping
Weather Layers	Rgnl Wx Rdr (ADS-B only) US Wx Radar (All systems) PR Wx Radar (Puerto Rico) (non-ADS-B) CN Wx Radar (Canada) (non-ADS-B) Other Wx Rdr (ADS-B only) Storm Cells* Icing* Winds Aloft Onboard Radar (optional)
Airport Reports	METARs
Weather Reports	AIR/SIGMETs
Lightning	Datalink* Sensor – Strike Sensor – Cell Sensor – Clear Strikes

* Product not yet displayed if the source is a SkyTrax100

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

Note that when there is an on-board lightning sensor selected (Avidyne TWX670 Tactical Weather System or L3 WX500 Stormscope), the “Lightning” grouping will also include a “Clear Strikes” function key. A WX-500 Lightning sensor test is only available in maintenance mode.

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

Choices may include “METARs”, “AIR/SIGMETs”:

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

flags allow an overview of general weather conditions in an area.

Graphical METAR Legend

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

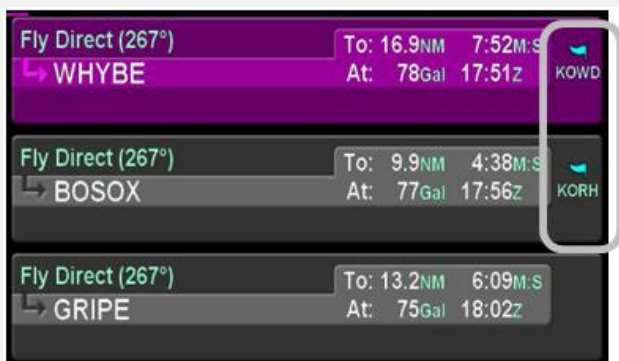
- AIRMETs and SIGMETs** (US only) – These are areas where the National Weather Service has issued advisories for various types of hazardous weather. They are depicted on the Map page along with an abbreviated description of the hazard, such as “ICE” (icing), “MTN” (mountain obscuration), or “IFR” (instrument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

AIRMETs and SIGMETs Detail MAP Page



COOL FEATURE**METAR Flags in Flight Plan**

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

**TFRs**

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

NOTE

Datalink Data Position

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

IMPORTANT NOTE

When connected to an ADS-B Receiver...

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.

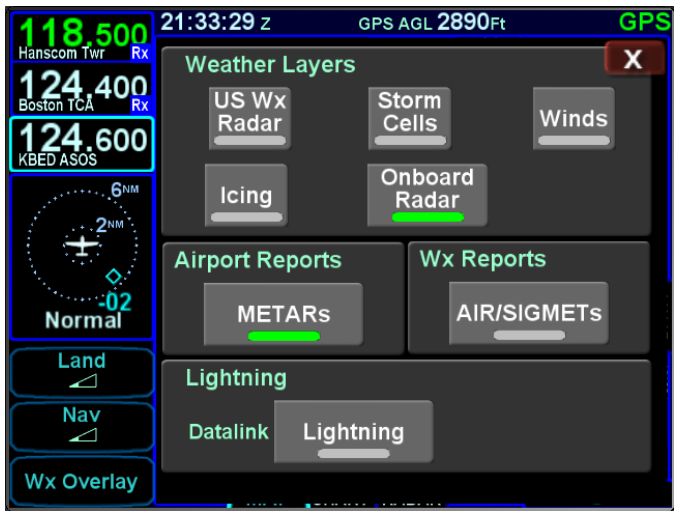
Data Age: RADAR and Icing



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 if the IFD has access to 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

Onboard Weather Radar Overlay Usage

There are no controls of the onboard weather radar from the map page – it is simply an on/off layer. The map can be decluttered to remove non-essential map content but still provide map and flight plan graphical situational awareness and a more typical weather radar depiction at the same time.

Radar control is only available on the dedicated RADAR tab.

Decluttered Map with Onboard Weather Radar Overlay**TERRAIN**

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

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

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

TERRAIN AWARENESS (TA)

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

Terrain Awareness (TA)



TA can be triggered by either terrain or obstacles (e.g. towers > 200' AGL tall buildings, etc). Any terrain that is within a 10nm radius of aircraft position and between 100' (100' for helicopters) below aircraft altitude and 1000' (500' for helicopters) below aircraft altitude will generate yellow hatched indications on the map pages. Any terrain that is within a 10nm radius of the aircraft position and is 100' (50' for helicopters) below aircraft to anything above aircraft altitude will generate red hatched indications on the map pages. TA is automatically turned off when well clear of terrain which is 3000' (1500' for helicopters).

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

over the obstacle. Obstacles inside a 1.5nm radius of the aircraft position and whose top is between 100' below aircraft to anything above aircraft altitude will generate a red threat bubble over the obstacle.

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

A rectangular suppression area exists for all runways in the FMS database and user waypoints that have been designated to be an airfield (see page 3-50). Terrain inside this suppression area will not generate any TA indication. Dimensions of the TA runway suppression area are 0.25 nm laterally and 0.5 nm off each runway end. Airports with no known runway orientation use a 1nm circular suppression area. Obstacle threat bubbles can still appear inside the suppression area.

Runway Suppression Area Depiction



FORWARD LOOKING TERRAIN ALERTING (FLTA)

The FLTA function looks ahead of the airplane projecting the airplane's lateral and vertical flight path and provides suitable alerts if a potential terrain or obstacle threat exists. FLTA alerting is triggered by either a projected imminent impact with terrain or obstacle or reduced terrain and obstacle clearance. Projected imminent impact with terrain occurs when the aircraft flight path is projected to intersect with terrain up to 3.0nm (1.2nm for helicopters) for a yellow caution or up to 1.5nm (0.6nm for helicopters) for a red warning in front of the aircraft flight path. By way of reference, this means an aircraft traveling at 180 knots of ground speed will have 60 seconds of notice for a caution and 30 seconds for a warning. Reduced terrain or obstacle clearance occurs when the aircraft flight path is not projected to impact the terrain but the projected clearance between the aircraft flight path and nearby terrain or obstacles falls below a designated safe vertical distance. The reduced terrain and obstacle clearance distance varies with phase of flight and aircraft dynamics per TAWS TSO C-151c (TSO C-194 for helicopters) but generally ranges from 300' to 1000' (100' to 150' for helicopters).

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.

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

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

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

FLTA Depiction (solid red and solid yellow)



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

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

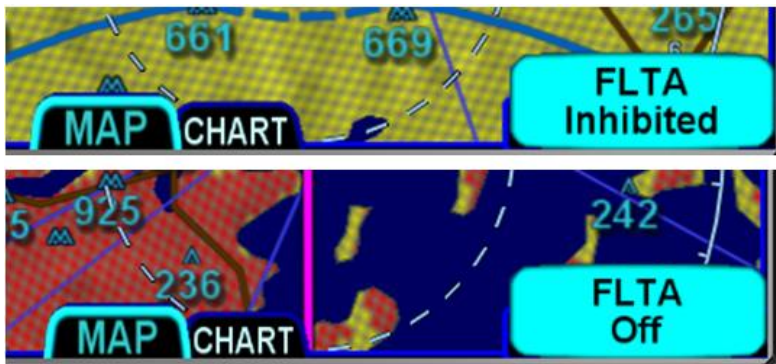
There is a rectangular suppression area for all runways in the nav database. Terrain and obstacles inside this suppression area will not generate any FLTA alerts. Dimensions of the FLTA runway suppression area are 2.0 nm laterally and 4.0 nm off each runway end when runway orientations are known or a circle with a radius of 1 nm centered on the Airfield Reference Point (ARP) when the on-

board databases do not know the runway orientations. Note that for airfields with multiple runways, this may have the effect of looking like several irregular shapes around the airfield. If the aircraft position or the aircraft flight path projected impact point is anywhere within that runway suppression area, no FLTA alert will be generated. Obstacle threat bubbles can still appear inside the suppression area.

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

- FLTA is manually turned off via the pilot-accessible “User Options” LSK on the “SETUP” tab of the AUX page (generates a “FLTA OFF” CAS Advisory message);
- The ownship position is inside the rectangular (or circular, in the case of no known runway orientation) FLTA Inhibit zone depicted on the 2D map (generates a “FLTA INHIBITED” CAS Advisory message);
- The projected ground impact point along the current ground track intersects the terrain inside that FLTA Inhibit rectangle/circle (generates a “FLTA INHIBITED” CAS Advisory message);
- The Reduced Terrain Clearance (RTC) violation is projected to happen inside that FLTA Inhibit rectangle/circle (generates a “FLTA INHIBITED” CAS Advisory message).

FLTA Inhibited and Off Messages



NOTE**FLTA Disabled in External TAWS Equipped Aircraft**

In order to prevent possibly conflicting alerting information, when an external TAWS/EGPWS system is installed in the airplane as determined by the “External TAWS” field selection on the “Main System Config” page at time of installation, all FLTA functionality is turned off, including the “FLTA Off” and “FLTA Inhibited” CAS messages in Release 10.1.1.0 or later.

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 in command must assess the specific circumstances presented and take action to avoid flight into terrain.

500' CALLOUT

A 500' aural alert is played anytime the aircraft descends through 500' AGL as calculated by comparing GPS MSL altitude with terrain database elevation data immediately below the aircraft. This feature is primarily intended to provide situational awareness to the pilot when the airplane is being operated properly per normal procedures. Therefore, it is not suppressed in FLTA exclusion areas, however, it will not play while there is an active FLTA caution or warning.

In aircraft that have this feature enabled, it can be optionally turned on/off via the User Options page.

In TAWS equipped aircraft, this feature is not de-selectable.

TERRAIN ALERTING WARNING SYSTEM (TAWS)

NOTE

IFD TAWS Does Not Hold TSO C-151c

TSO C-151c functionality is all present in the IFD, however, the IFD does not hold the TSO C-151c approval and therefore may not take credit in aircraft where TSO C-151c compliance is required.

The optional TAWS-B functionality does not require any external equipment. For those aircraft equipped with TAWS-B, the function is always running in the background and does not have a dedicated display page. TAWS-B contains the following sub-functions:

- **Forward Looking Terrain Alerting (FLTA)** – includes Reduced Required Terrain Clearance and Imminent Terrain Impact alerts exactly as described above;
- **500' Callout** – exactly as described above;
- **Premature Descent Alert (PDA)** – the PDA function uses the aircraft's current position and flight path information as determined from the FMS/GPS and nav database to determine if the airplane is hazardously below the normal (typically 3 degree) approach path for the nearest runway;
- **Excessive Rates of Descent (EDR)** – this function is designed to alert when excessive rates of descent are being experienced 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.

The aural alerts for the TAWS functions are listed below prioritized from highest to lowest:

Alert Function	Aural Alert
Excessive Rate of Descent Warning	Sink Rate, Pull Up
FLTA Terrain Warning	Terrain, Pull-Up, Terrain, Pull-Up Or Terrain, Terrain, Pull-Up, Pull-Up
FLTA Obstacle Warning	Warning, Obstacle
FLTA Terrain Caution	Caution, Terrain, Caution, Terrain Or Terrain Ahead, Terrain Ahead
FLTA Obstacle Caution	Caution, Obstacle
Premature Descent Alert	Too Low Terrain
500' Altitude Callout	500
Excessive Rate of Descent Caution	Sink Rate
Negative Climb Rate or Altitude Loss After Takeoff	Don't Sink

NOTE**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.

NOTE**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)

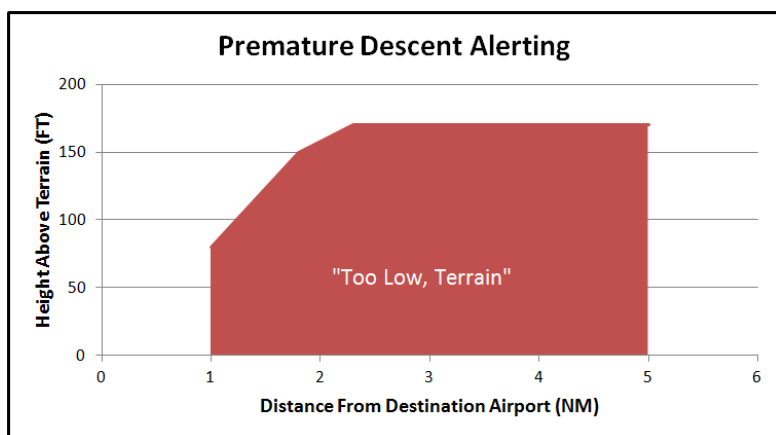
The PDA function is available for all types of instrument approaches, including those approaches that are not aligned within 30 degrees of the runway heading as well as circling approaches and straight-in approaches.

The PDA function uses the aircraft's current position and flight path information as determined from the FMS/GPS and nav database to determine if the airplane is hazardously below the normal (typically 3 degree) approach path for the nearest runway.

PDA is inhibited when inside an FLTA exclusion area and only runs between 1NM and 5NM from the nearest runway or ARP and requires the nav mode to be in Approach mode.

PDA is suppressed during normal VFR operations in the airport area and will only generate alerts in the following range and altitude categories:

Range from nearest runway or ARP	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

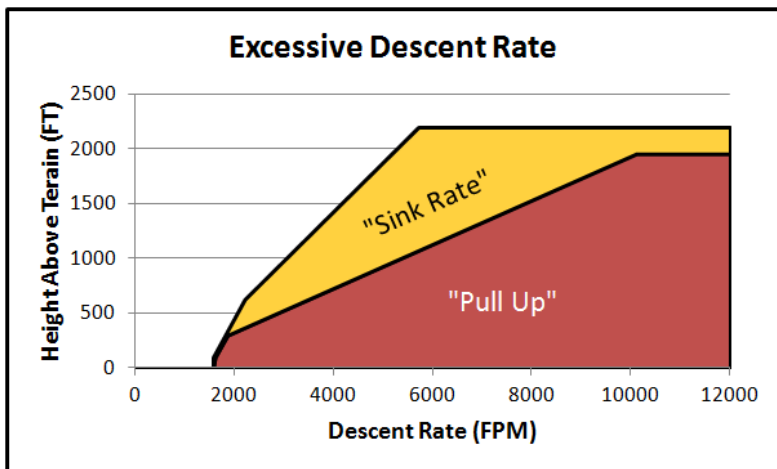


If a PDA alert has been triggered, a CAS message and aural alert “Too Low Terrain” will be issued and repeat every 6 seconds until it is acknowledged or the condition is no longer true. For the condition to no longer be true, the aircraft must clear the alerting altitude by 100 feet. So, for example, if the aircraft is 4 NM away from the airport and descended to 150 feet AGL, a climb to 250 feet AGL must be completed to clear the condition.

EXCESSIVE DESCENT RATE (EDR)

The excessive rate of descent alerts are intended to be always active, even 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 excessive rate of descent aural will continuously repeat every 6 seconds until either the message is acknowledged or the condition is no longer valid.



The "Pull Up" warning will provide between 0 and 12 seconds of warning depending on aircraft altitude at the time. "Sink Rate" cautions add approximately 12% to 33% to those numbers based on aircraft altitude. Aircraft vertical speed and current terrain elevation below the aircraft are used to compute the alerting altitude thresholds.

The Excessive Descent Rate (EDR) alert is triggered at -1600 fpm. "Pull Up" EDR warnings are the most serious/highest priority of all TAWS alerts, even higher than FLTA warnings.

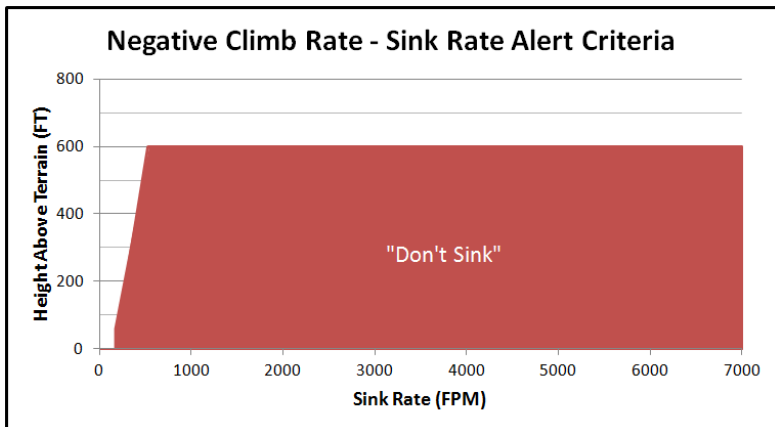
NEGATIVE CLIMB RATE / ALTITUDE LOST AFTER TAKEOFF

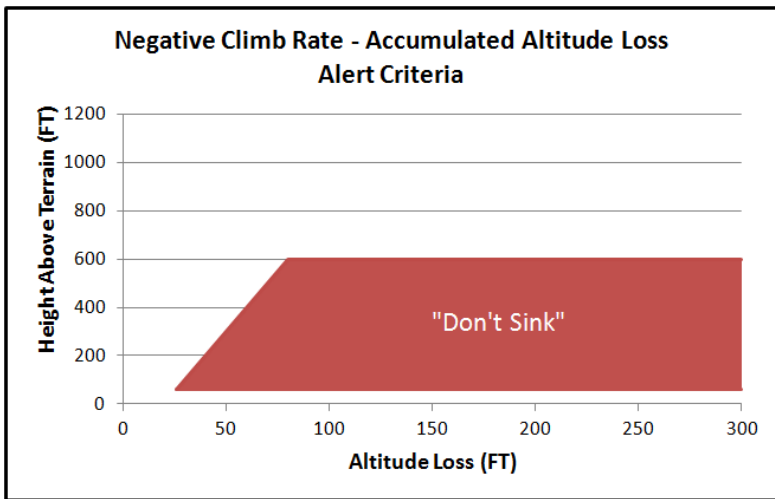
The final function of the TAWS system is the alert for a negative climb rate (NCR) or excessive altitude lost after takeoff/go-around. Takeoff/Go-around state is defined as a 60 foot climb inside the FLTA Exclusion area (i.e. "airport environment") when between 60 and 600 feet AGL.

This function has two algorithms that run whenever the aircraft is in the takeoff/go-around state. The first one is a Negative Climb Rate calculation that alerts if the vertical speed as derived by the FMS/GPS becomes a negative value between -207 fpm and -533 fpm after takeoff/go-around, depending on aircraft altitude. The second algorithm is an Accumulated Altitude Loss calculation that alerts if GPS-derived AGL altitude decreases by 20 feet plus 10% of the highest altitude after takeoff/go-around (e.g. if the aircraft is at 600 feet AGL, it can lose 80 feet down to 520 feet AGL before an alert is triggered).

The alerts will clear if the CAS message is acknowledged or the aircraft AGL altitude increases past the previous highest value or 600 feet.

This function will generate a "Don't Sink" aural alert and associated yellow caution CAS message. NCR is disabled for helicopters.





TAWS INHIBIT CONTROL

The FLTA and PDA functions of TAWS (visual and aural) can be inhibited via pilot control. This comes in handy in some scenarios like VFR flight in an area of significant terrain, VFR low altitude flight and airfields that are not in the nav database or designated as a user waypoint airport.

The manual inhibit control is the FLTA On/Off selection in the User Options page. This on/off control applies to FLTA and PDA simultaneously.

An alternative means to inhibit the TAWS FLTA and PDA functions is via an external switch that can be optionally installed somewhere in the cockpit.

TAWS SELF-TEST

TAWS Self-test is conducted automatically at power up. A passing self-test will produce the aural "TAWS System Test, OK" and a failed self-test will play "TAWS System Failure."

DEGRADED OR NO TAWS CONDITIONS

TAWS is degraded or not available under the following conditions:

- 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 was configured to think an external TAWS system is present
- The option was not enabled



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




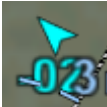

TRAFFIC DISPLAY

When integrated with an optional traffic system (e.g. TAS, TIS, TIS-B, TCAS), the IFD will display traffic information for sensed aircraft and provide aural and 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 center of the traffic symbology represents the horizontal position reference point of the traffic.

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

Traffic Symbol	Definition
	TAS Traffic Alert (TA) Traffic that is within the alert zone defined by the traffic sensor. (yellow circle)
	TAS Proximate Traffic Traffic that is not within an alert zone, but is close to your position. (blue solid diamond)

Traffic Symbol	Definition
	<p>TAS Other Traffic</p> <p>Traffic that is detected by the traffic sensor, but determined not to be a current threat. (hollow blue diamond)</p>
	<p>TIS Traffic Alert (TA)</p> <p>Traffic radiated by a TIS ground station and includes 45° cardinal track pointers when available. (solid blue diamond with blue pointer barb)</p>
	<p>TIS-B (ADS-B, ADS-R) Traffic Alert (TA)</p> <p>Traffic that is within the alert zone defined by the TIS-B traffic receiver and includes an arrow shaped symbol that indicate the target's track. (yellow arrow head inside a yellow circle with a 1 minute pointer barb)</p>
	<p>TIS-B (ADS-B, ADS-R) Proximate Traffic</p> <p>Traffic that is not within an alert zone, but is close to your position. (blue solid arrow head with a 1 minute pointer barb)</p>
	<p>TIS-B (ADS-B, ADS-R) Other Traffic</p> <p>Traffic that is detected by the TIS-B traffic receiver, but determined not to be a current threat. (blue hollow arrow head with a 1 minute pointer barb)</p>

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

Additional Traffic Information



Traffic Thumbnail datablock data is a subset of the map overlay traffic. Trend vector, tail number and TIS track pointers are not displayed in the traffic thumbnail datablock for space reasons. While on the ground, TIS-B equipped aircraft can also display a brown colored vehicle symbol.

TAS Traffic



TIS-B Traffic



Traffic Thumbnails



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

Aircraft ID Depiction



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

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

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

NOTE**Traffic Mode and Range Changes**

The traffic sensor mode changes are automatic based on phase of flight. If however, a manual mode change is desired, it can only be accomplished when the traffic thumbnail is displayed and is accomplished by either pressing the L1 LSK or touching the lower 1/3 of the traffic thumbnail. The only means to change the traffic thumbnail display range is accomplished by touching the upper 2/3 of the traffic thumbnail.



TIS 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 direction of sensed traffic direction.

TIS Track Pointer

Since TIS 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 status states will be displayed in the traffic thumbnail and as CAS messages and include:

TIS Traffic Thumbnail Status	Definition
"Coasting"	TIS traffic communications have ceased for >6 seconds but <12 seconds
"Removed"	TIS traffic communications have ceased for >12 seconds
"Unavailable"	No TIS ground station is available or communications have ceased for >60 seconds

TIS Coasting Indication



TIPS AND TECHNIQUES

Several Types of TIS-B Traffic

TIS-B traffic can come from several sources depending on ownship equipment type, target equipment type and proximity to TIS-B ground stations. ADS-B, ADS-R and TIS traffic can all co-exist within the TIS-B data stream.

TIS 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.
"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"	Indicates the ground is not providing TIS-B or ADS-R services to your aircraft. The primary causes of this are: you are not in range of a ground station, OR, your aircraft is not providing qualifying ADS-B Out information, OR, your ADS-B In device is not configured for the correct tail number. If you never get TIS-B service while in a known service area, it likely means there is a misconfiguration of your ADS-B Out or ADS-B In device.

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.

NOTE

Traffic Source Selection

An individual IFD can only display TIS-B (e.g. “SkyTrax100”) or sensor traffic (e.g. “TAS600”, “Skywatch”, etc) traffic at any given time. The choice to select the source is made at time of installation in the setup pages.

TIPS AND TECHNIQUES

Traffic Overlays in Dual IFD Operations

For those installations with dual IFDs and more than one type of traffic source (e.g. “TAS600” and an TIS-B “SkyTrax100”) in the aircraft, Avidyne recommends wiring one traffic source to one IFD and the other traffic source to the second IFD.

TIPS AND TECHNIQUES

Traffic Overlays in Single IFD Operations

For those installations with a single IFD and more than one type of traffic source (e.g. “TAS600” and an TIS-B “SkyTrax100”) in the aircraft, Avidyne recommends wiring both traffic sources to the IFD so that the higher priority traffic overlay can display on the IFD and the lower priority traffic data can be streamed out of the IFD via WiFi for display on a compatible tablet/wireless device application.

The current display priority is TAS6XX/TCAD, Skywatch, Other ARINC429 Traffic sensor, SkyTrax100.

SYNTHETIC VISION (SVS) TAB

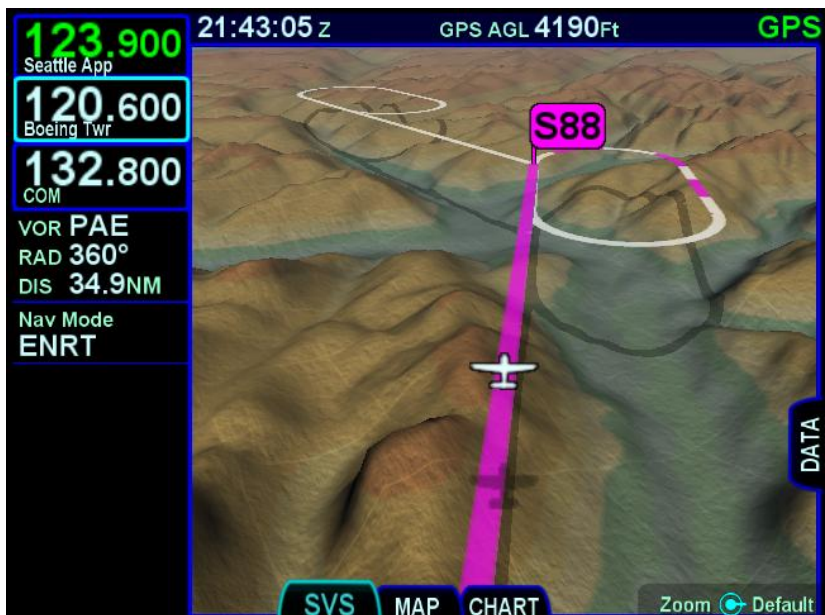
The SVS tab on the MAP page provides a hybrid view of your aircraft and flight plan from a virtual wingman who is flying above and behind your present position. This is an “exocentric” view.

The aircraft ownship symbol is displayed just like the 2D map as well as the shadow it casts on the ground. The ground shadow represents your aircraft position over the ground.

The viewing position of that virtual wingman is directly above and behind the displayed ownship symbol. Twisting either ring of the bottom right knob (outer ring for coarse control, inner ring for fine control) or pinch zooming the display will adjust the perceived distance above and behind the ownship symbol and pushing the knob restores the default zoom value.

If a flight plan is active in the FMS and is within the current field of view, it will be displayed floating over the map at a point approximately 300 meters below ownship altitude. This flight plan will also cast a conformal shadow across the terrain immediately below the flight plan.

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 are drawn on the terrain for additional speed, distance and depth cues. Each grid line is a 1NM x 1NM block.

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

Bank Depiction



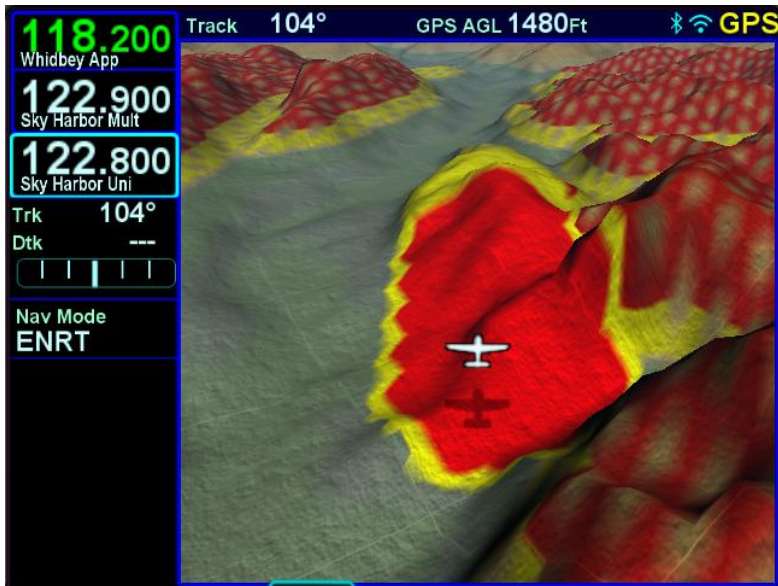
Pitch Depiction



Just like in the 2D map, the hatched red and yellow Terrain Awareness can be displayed in the view (controllable via the same on/off control in User Options) and for those units with the FLTA active, the solid red warning and yellow caution areas are drawn in real-time on the map.

Note that 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.

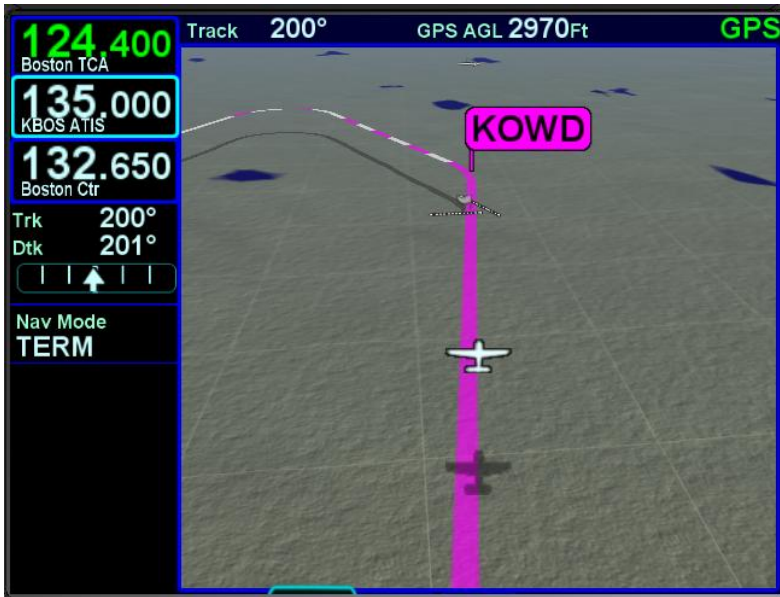
Terrain Awareness and FLTA in Map SVS View



Also like on the 2D map view, the active leg is depicted in solid magenta, the next leg is a candy-striped magenta/white depiction and downstream legs are depicted in white.

The active flight plan waypoint will be displayed as a magenta flag pole and downstream waypoints are not depicted for map clutter reasons. Fly-over waypoints typically depict the flight plan flying right through/over the waypoint whereas Fly-by waypoints can turn inside the waypoint.

Curved Flight Path with Next Leg Depiction



Fly By Waypoint Depiction



Inactive missed approach procedures are depicted as dashed lines, just like on the 2D map and go solid when/if the missed approach procedure has been activated.

Missed Approach (Not Activated) in Map SVS View



Landing airfields are drawn on the map as are any known obstacle database obstructions.

Close in of Landing Runway in Map SVS View



Missed Approach Enabled in Map SVS View



NOTE

Flight Plan Depictions

The depiction of the flight plan in any SynVis display is placed 1000' feet below aircraft altitude. This means that it will not be visible when flying under 1000' AGL during takeoff, enroute and approach phases, nor will it be visible during ground operations and it may appear to go underground when descending or over variable terrain.

NOTE

SynVis Depiction Unavailable In GPS Alignment

SynVis depictions will not be available until the GPS has reached SBAS state (SBAS/WAAS configurations), or FDE state (non-SBAS/WAAS configurations).

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 IFD knob or by touch on a virtual keyboard.

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

NOTE

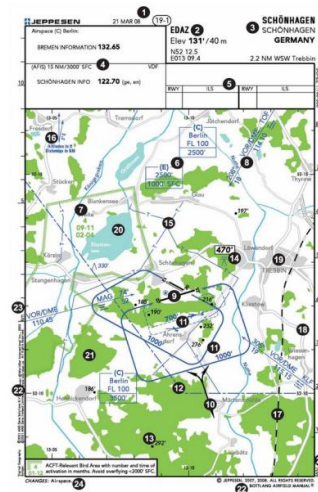
Inclusion of RNP Approach Choices

RNP 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, and 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	Berichtsdatum und Karten-Ordnungsnummer
2 ICAO Location Indicator, Apt ELEV in feet and Meters, Apt 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	Luftfahrtrelevante 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)	Richtungspegel (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)	Sektorgrenzen des Luftraumes (C) (siehe oben)
13 Natural Highpoint with Elevation (ft/MSL)	Höhenpunkt 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 Variation	Ortsmagnetabweichung
16 High Tension Line	Hochspannungsleitung
17 Railway	Eisenbahnstrecke
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)	Eingetragene Änderungen

CHART EXTENT BOX

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

Close Up of Chart Extent Box



HOT LINKS TO CHARTS

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

COOL FEATURE

Hot Links to Charts in Flight Plan

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

Hot Links to Charts

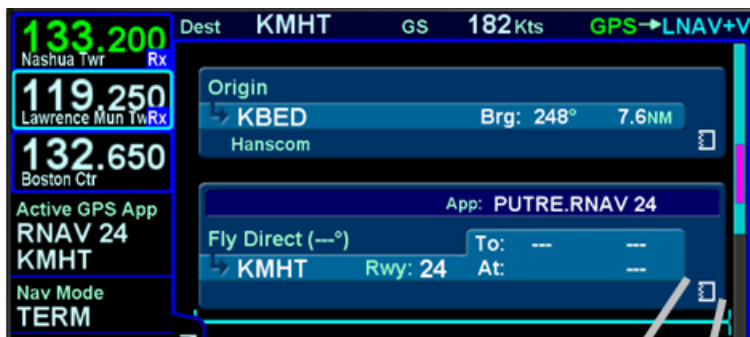


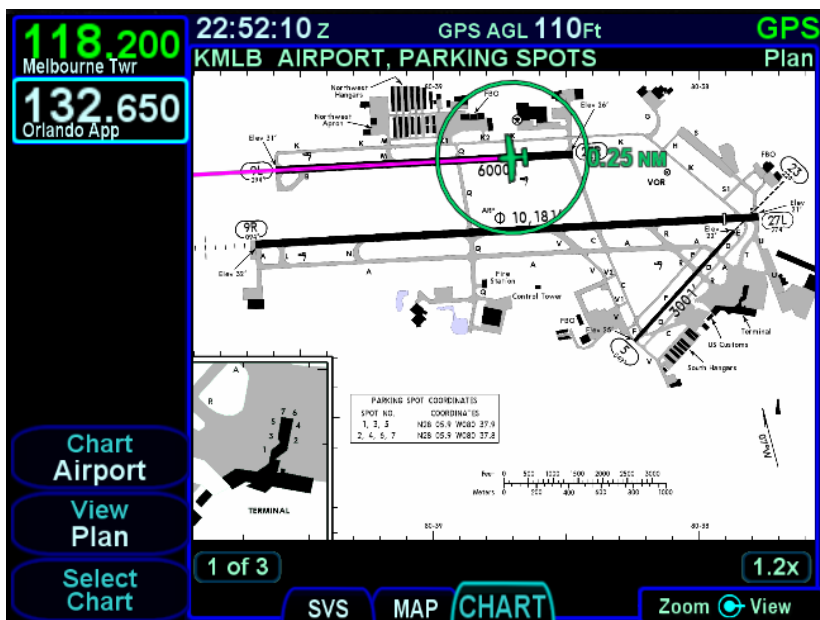
CHART VIEWS

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

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

TAXI CHARTS/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.

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

LIGHTING

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

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



UPDATING CHARTS

Procedures for updating Charts are described on page 7-55.

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, and if the IFD has access to heading data, radar data can also be a selectable overlay on the moving map. The RADAR tab is designed to replace an existing radar indicator.

NOTE

Use of Radar Requires Familiarity

Actual operation of the radar function depends on the particular make and 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 for details.

NOTE

On-Board Radar For Avoidance Only

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.

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.

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 list of the available modes. Twist 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** – when selected, 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 test pattern display. During self-test, all of the circuitry and functions of the R/T are exercised with the exception of the magnetron tube. No microwave energy is emitted in the test function. The display will have a test pattern with the following colors: green, yellow, red, and magenta.
- **Standby** – the system will always power up in this mode. Standby places the radar circuitry in an energized but inactive state. 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 in normal operation. When On, the moving scan indicator and radar echoes are visible and the system is radiating microwave energy.
- **Gnd Map** – when selected, the system will orient the radar to ground features.

TIPS AND TECHNIQUES

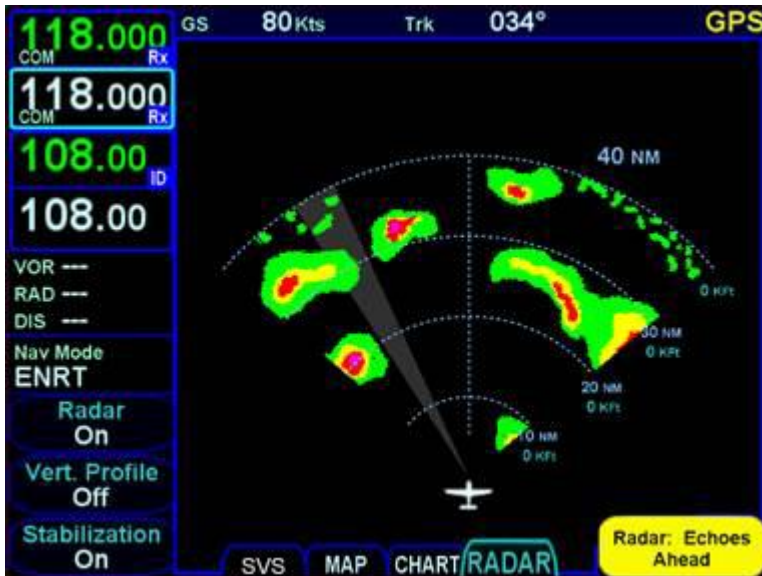
Auto Standby Feature

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

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



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

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

- **Range** – Use the outer ring of the bottom right knob to control the displayed range scale.
- **Tilt** – Use the inner ring of the bottom right knob to control the tilt angle and direction of the radar antenna: U for up via right twists, D for down via left twists 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 twist 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.

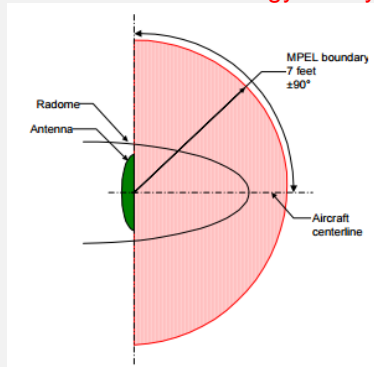
WARNING**Radar Energy is Potentially Hazardous**

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 in command 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 whenever 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.

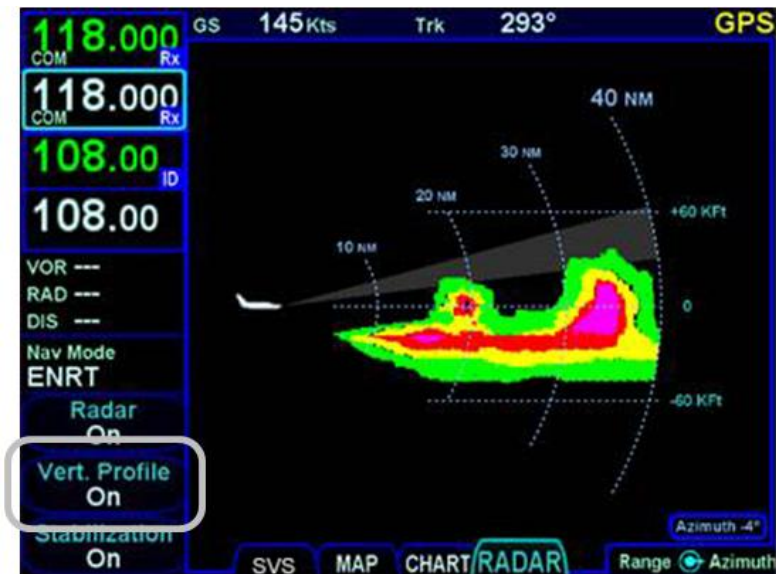


Vertical Profile mode allows you to view approaching weather as a slice of the vertical plane instead of the conventional horizontal forward view.

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



NOTE

Dual IFD Range Changes

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.

Some radar systems (e.g. RDR 2000) can be configured at installation to include the Target Alert feature. The purpose of the feature is to alert the pilot to the presence of a significant weather cell that exists beyond the currently selected range. For this mode to be active, "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 can also 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 twisting the outer ring of the bottom right knob.

Video contrast can be adjusted by twisting the inner ring of the bottom right knob.

Pressing the bottom right knob restores default values for contrast, brightness, zoom and positioning.

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

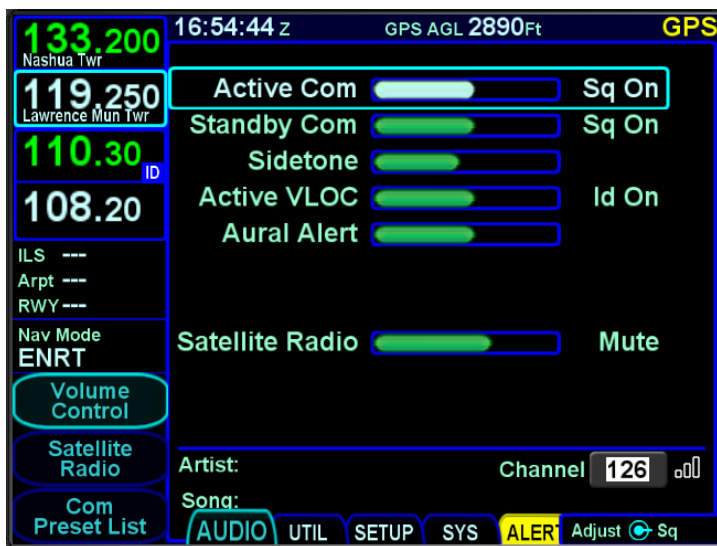
The AUDIO tab provides control and display of all system audio-related features such as radio volume, squelch settings, satellite radio channel tuning and com presets.

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 IFD 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, rotate the outer knob. To adjust the volume, rotate the inner knob. To toggle squelch†, 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 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.

SATELLITE RADIO TUNING

When a compatible audio-capable satellite radio system is installed, a “Satellite Radio” LSK is displayed along the left edge of the display. The MLB700 and AV350 are not supported but the XM version of GDL69A is supported.

Satellite Radio Selection and Favorites



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

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

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

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

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

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

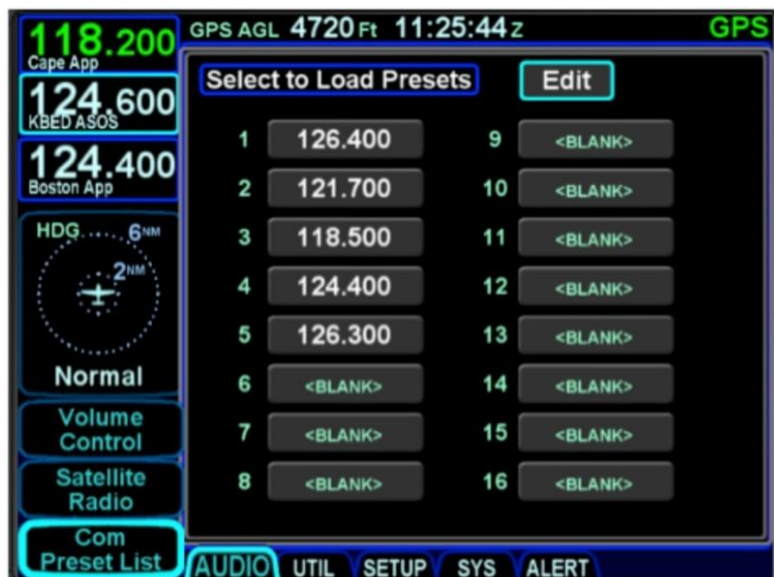
All of these controls/edits can also be done via touch.

NOTE**Competing Control of Audio Channel Tuning**

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 one device and do not mix it up between devices.

COM PRESETS †

The "Com Preset List" LSK can be used to nominate one of up to 16 selected preset frequencies into the #1 Standby com radio slot, typically using a dedicated switch in the cockpit.

Com Presets Page

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 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 rotate the right knob to move the cursor to the desired preset. Touch the selected preset or press the right knob button to start entering a frequency. If using the virtual keyboard to enter the frequency, note that shorthand frequency 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 rotate 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.

The com preset list is primarily designed to work with a cockpit control used to cycle through each entry in the com preset list. The cockpit control is typically implemented as a dedicated com preset switch mounted on the yoke. The IFD actually supports two switches, one that will cycle forward and another that will cycle backward through the list.

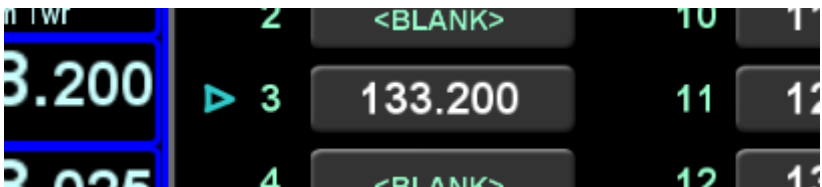
Each actuation of the switch will nominate the next (or previous) frequency in the list to the #1 standby slot and cause the IFD to briefly display a small dialog box next to the #1 Standby slot indicating which preset frequency was nominated. A frequency from the preset list may also be nominated by touching the desired preset or pressing the ENTR button while the page is not in edit mode

#1 Standby Slot



If the com preset page is displayed at the time the cockpit control is activated, a small arrow will indicate which preset is tuned.

Com Preset Arrow



UTIL (UTILITIES) TAB

TIMERS

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

Standard Timers



Generic Timer

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

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

Trip Timer

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

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

Event Timer

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

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

Custom Timer

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

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

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

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

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

Custom Timer Examples



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

TIPS AND TECHNIQUES

Separate “Switch Tank” Alert

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

Acknowledging the custom timer expired CAS message (via touch or pressing the CLR button) will only clear the alert message. Resetting of the timer must be done on the Timers page.

CALCULATORS

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

TIPS AND TECHNIQUES

Pre-Populated Data Fields

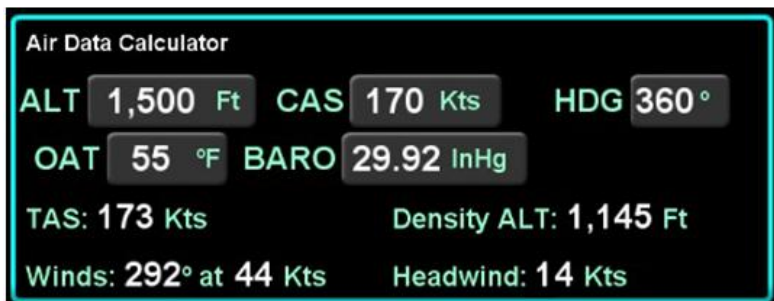
Many data fields in the various IFD calculators will be populated automatically with sensor data in green if it is available, or can be manually edited/entered by the pilot. The DEST field will be populated with the last airport in the active flight plan, not necessarily the last waypoint in that flight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

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

Air Data Calculator

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

Air Data Calculator



Fuel Planner

The fuel planner includes fields for the type, origin (if type is Point to Point), destination, ground speed, fuel on board, and fuel flow, and will produce a computed fuel at destination value (straight line distance between the two points) and other fuel related data.

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

Fuel Planning Calculator

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

Trip Planner

The trip planner includes fields for type, destination, ground speed, departure time (departure time will track current time until takeoff) and departure date and will produce values (straight line connecting start/end) for desired track, distance, ETE, ETA, sunrise and sunset, and enroute safe altitude (ESA) - 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.

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

Trip Planner Calculator

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

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

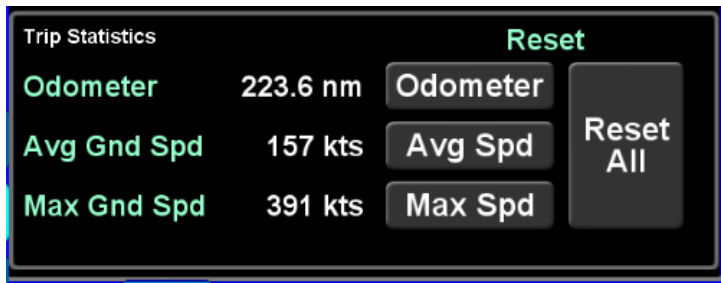
Raim Prediction			
DEST	KMLB	Arrival Time	00:00 Arrival Date 1 JAN
Status:	RAIM Not Available		

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



ELECTRONIC CHECKLIST

If enabled in Maintenance Mode, up to 9 custom checklists can be created and stored in the IFD via 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 IFD knob to highlight the box. The edit box will be displayed with a blue background and presents a numbered blank row when it is in edit mode.

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

Creating a Checklist Directory



When you have finished naming the new checklist, press the “Enter” button on the keypad or push the right IFD knob. Repeat this process for naming new checklists until all desired checklist names are created.

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

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

Touch or use the bottom right IFD knob to select the step to be created or edited and this will put a bright blue outline around the step. Touch the highlighted row a second time or push in the bottom right IFD knob to generate a keypad. Type the desired text (Note: there is no ability to manually generate upper case characters) and then press the “Enter” button to accept. This will generate another empty 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 IFD 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 that’s what you want, then just start typing on the keyboard. If instead, an existing step is to be edited, then select the checklist step to be edited by touching it or using the inner ring of the IFD knob. Touch the step a second time or push the IFD knob to generate a keyboard, press the CLR button (keyboard or bezel) as required to clear characters and then re-type as required. To insert a missing/extra step, type the step as desired as the last step of an existing checklist and then twist the outer ring of the bottom right IFD knob to insert the step in the desired location. When done with editing the existing checklist, touch/select the “Edit” button again to exit edit mode.

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

Selecting a Checklist

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

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

Using a Checklist

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

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

Completed Checklist



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

Resetting Checklists

To quickly reset a completed or partially completed checklist, press and hold the bottom right IFD 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 IFD 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 fobs. Procedures are supplied later in this manual.

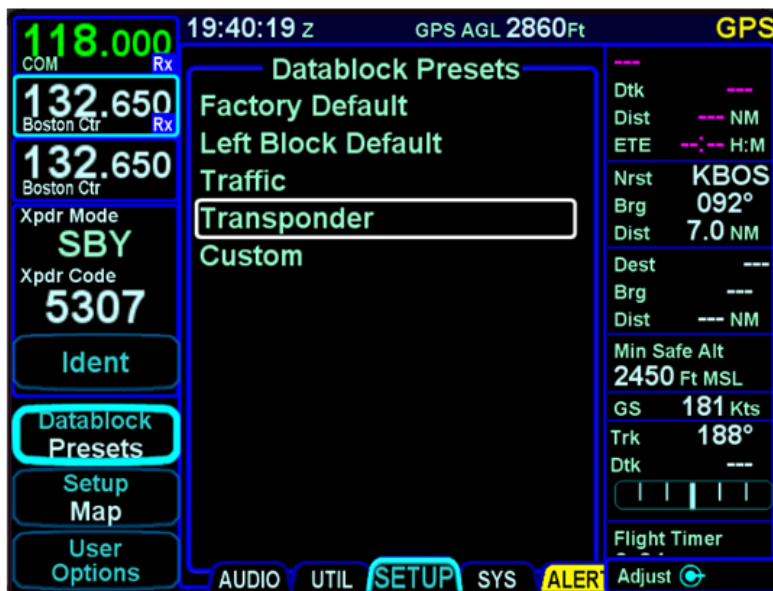
SETUP TAB

DATABLOCK SETUP

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

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

Datablock Presets



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

Datablock Preset Selection	Content
Factory Default	<p>Displays two COM frequencies above two NAV frequencies above the Decoded VLOC IDENT block above the Nav Mode along the left side.</p> <p>Displays GPS AGL Altitude along the top.</p> <p>Displays To Waypoint Information above Nearest Airport above Destination Direct Information above Minimum Safe Altitude above Ground Speed above GPS CDI along the right side.</p>
Left Block Default	<p>Displays two COM frequencies above two NAV frequencies above the Decoded VLOC IDENT block above the Nav Mode along the left side.</p> <p>Top and right side datablocks are fully customizable.</p>
Traffic (if installed)	<p>Displays the traffic thumbnail adjacent to the top LSK along the left side and provides a datablock slot above the traffic thumbnail to be configured as the user wishes.</p>
Transponder (if installed)	<p>Displays the transponder mode/code datablock adjacent to the top LSK along the left side and provides a datablock slot above the transponder box to be configured as the user wishes.</p>

Datablock Preset Selection	Content
Custom	Permits all datablock slots except the top left two dedicated COM slots to be configured as desired.

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

Once on the Datablock Setup page, use the right outer knob to select the desired page location (middle of top strip in the example below), and the inner knob to select the data item from the list (GPS AGL Altitude in the example below).

Datablock Setup



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

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

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

As an alternative to using the bottom right IFD knob to select the slot and the item to go into the slot, the page is touch capable as well. Touching the desired datablock slot will highlight it as it does via the knob method and then touching the item in the center options list will place the touched item in the selected slot.

The datablocks on the right edge of the display are touch scrollable as well meaning many more datablocks can be setup than can be viewed at any given time. Panning your finger up or down the right side datablock list will scroll the list bringing other datablock selections into view.




COOL FEATURE



Scroll Your Datablocks



Since many more datablocks can be selected on the right side than can be viewed at any time, you can set up all possible datablocks you'd like and pan as desired. This can be organized in any fashion including optimizing the displayed datablock groupings by phase of flight and repeating options.


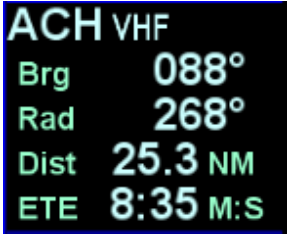
Restoring factory defaults is accomplished by pressing and holding the bottom right IFD knob and then accepting the confirmation dialog box.

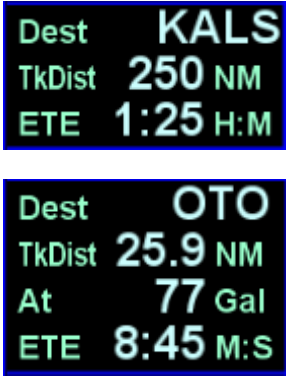



Potential datablock selections are listed below (factory defaults identified by asterisks). The format of many of the blocks changes if they are selected to be displayed in the top datablock area.




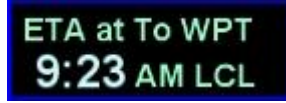


Datablock Item Title and Image	Content
Primary Com/VLOC (Note: This selection is permanently grayed out and is not actually selectable)†	Defines the position of the top two datablocks along the left side. These are permanently dedicated to Com/VLOC control and display.
VLOC Radio† 	Provides a means to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






Datablock Item Title and Image	Content
<p>Com/Nav Standby #4†</p> 	<p>Provides a means to display a 5th com or nav frequency (fourth standby slot) (2 lines)</p> <p>Only available on left side datablocks</p> <p>Note: If this field is currently in datablock edit mode as indicated by a blue background, then com/nav tuning is disabled</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. If selected for display on the left edge of the IFD, it is in a fixed location aligned with the top line select key.</p> <p>It can be placed wherever desired on the right edge of the IFD.</p>



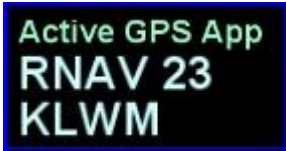


Datablock Item Title and Image	Content
<p>Transponder Status</p> 	<p>Provides a means to display and control the remote transponder mode and code as well as a Reply lamp.</p> <p>The Ident function will be performed by touching the Ident soft key. Touching the mode or code will produce the transponder specific keyboard for data entry.</p> <p>Can be displayed on the left or right sides of the IFD and in an abbreviated form along the top.</p>
<p>To Waypoint Information*</p>  	<p>To waypoint identifier, desired track to current waypoint along flight plan route, distance to current waypoint along the track¹, 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. (4 or 5 lines depending on whether a fuel flow system is connected)</p> <p>¹ 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>

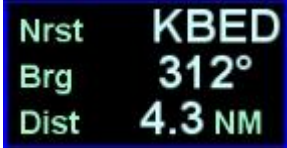





Datablock Item Title and Image	Content
<p>Next Waypoint Information</p> 	<p>Next waypoint identifier (the next leg of the flight plan, not the current leg), desired track to next waypoint along flight plan route, flight plan leg distance for the next waypoint, estimated remaining fuel at the next waypoint (if a fuel flow system is connected), and estimated time enroute of the next leg. (4 or 5 lines 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 when performing a Direct-To, since there is no next waypoint in those cases.</p>
<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. (5 lines)</p> <p>Note: to change the designated waypoint, touch the datablock which generates a keyboard. Type in the designated waypoint identifier and press Enter. The designated waypoint will persist across power cycles.</p>







Datablock Item Title and Image	Content
<p>Dest. 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.(3 or 4 lines)</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. (3 lines)</p>
<p>Destination Waypoint</p> 	<p>Destination identifier. (1 line)</p>
<p>Direct Distance to Dest.</p> 	<p>Destination identifier and straight line distance to the destination from present position. (2 lines)</p>







Datablock Item Title and Image	Content
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. (3 lines)
To Waypoint Direct Dist 	Active (To) waypoint identifier and straight line distance from present position direct to the waypoint with no button hook. (2 lines)
ETA at Destination 	Estimated time of arrival at the “Destination” waypoint in HH:MM format. Units (Z or LCL) dependent on format selection in User Options page. (2 lines on side, 1 line on top)
ETA at To Waypoint 	Estimated time of arrival at the “To” waypoint in HH:MM format. Units (Z or LCL) dependent on format selection in User Options page. (2 lines on side, 1 line on top)
Destination ETE 	Estimated time enroute (along flight planned route) to the “Destination” waypoint. (2 lines on side, 1 line on top).
To Waypoint ETE 	Estimated time enroute to the “To” waypoint. (2 lines on side, 1 line on top)


Datablock Item Title and Image	Content
<p>GPS CDI**</p> 	<p>Current track, desired track for active flight plan leg and visual depiction of deviation. (3 lines)</p> <p>Note that the CDI displayed in this datablock is always based on GPS and is never a VHF CDI.</p>
<p>Track Angle Error (TKE)</p> 	<p>Track angle error (error in degrees between desired track and actual track) and an arrow indicating direction to fly to correct the error. (2 lines)</p>
<p>Desired Track</p> 	<p>Desired track for active flight plan leg. (1 line)</p>
<p>Cross Track Distance</p> 	<p>Cross track deviation from current flight plan leg. (2 lines on side, 1 line on top)</p>
<p>Next Desired Track</p> 	<p>Desired track for the next flight plan leg (not the active flight plan leg). (1 line)</p>

Datablock Item Title and Image	Content
Vertical Speed Required 	Vertical speed required (units dependent on selection in User Options page) to make next down-path altitude constraint. (1 line)
Navigation Mode* 	IFD navigation mode (e.g. OCN, ENRT, TERM, APPR) including the GPS Nav mode (e.g. LPV, LNAV/VNAV, LNAV+V, LNAV, LP). (2 lines)
Active GPS Approach 	Approach identifier and airport. (3 lines)
Decoded VLOC IDENT*†  	For VORs: Navaid identifier, navaid radial currently on, distance to navaid. (3 lines) For ILS/Localizers: Localizer identifier, airport, runway. (3 lines)

Datablock Item Title and Image	Content
<p>Nearest Airport*</p> 	<p>Nearest airport identifier, bearing to airport from ownship, distance to airport from ownship. (3 lines)</p>
<p>Aircraft Position</p> 	<p>Latitude and Longitude (format is dependent on selection in User Options page). (2 lines)</p>
<p>GPS AGL Altitude*</p> 	<p>Computed GPS-based AGL altitude. (2 lines on side, 1 line on top)</p>
<p>Minimum Safe Altitude*</p> 	<p>Min Safe Altitude (defined as 1000' above the highest terrain or obstacle in a 10nm rectangle around ownship position). (2 lines on side, 1 line on top)</p>
<p>Ground Speed**</p> 	<p>Ground speed. (1 line)</p>
<p>Ground Track</p> 	<p>Ground Track. (1 line)</p>

Datablock Item Title and Image	Content
<p>Wind Vector</p> 	<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. (3 lines) Note: Requires TAS and Heading from an external device like an EFIS.</p>
<p>TAT</p> 	<p>Total Air Temperature (1 line) Note: Requires TAT input from an external device like an EFIS or appropriate fuel flow system.</p>
<p>SAT</p> 	<p>Static Air Temperature (1 line) Note: Requires SAT input from an external device like an EFIS or appropriate fuel flow system.</p>
<p>Local Time</p> 	<p>Local time in HH:MM:SS format. (2 lines on side, 1 line on top)</p>
<p>UTC Time*</p> 	<p>Zulu Time in HH:MM:SS format. (1 line)</p>
<p>Flight Timer</p> 	<p>Flight timer in HH:MM format. (2 lines on side, 1 line on top). This automatically starts and is based on the system in-air determination.</p>

Datablock Item Title and Image	Content
Number of Alerts 	Number of active red warnings, yellow cautions and cyan advisories. (2 lines)
User Profile 	Currently selected User Profile. (1 line)
Fuel Amount Remaining*‡ 	Total fuel remaining (units dependent on unit type selection made in User Options list) as sent by the aircraft fuel flow system, if available. (2 lines)
Fuel Time Remaining*‡ 	Estimated fuel time remaining in HH:MM based on input from the aircraft fuel flow system. (2 lines)
Fuel Flow*‡ 	Fuel flow (units dependent on unit type selection made in User Options list) as sent by the aircraft fuel flow system. For twin engine aircraft, this is the summed total. (2 lines)
Fuel Used*‡ 	Estimated fuel used (units dependent on unit type selection made in User Options list) as sent by the aircraft fuel flow system, if available. For twin engine aircraft, this is the summed total. (2 lines)

Datablock Item Title and Image	Content
Fuel Economy† 	Estimated fuel economy (e.g. nm/gal) based on input from the on-board fuel flow system. (2 lines)
*** Blank ***	Single blank line. (1 line)

* Factory default setting

** Factory default if no fuel flow system is connected to the IFD (replacing fuel related factory defaults)

† Only presented as an option if the IFD is configured to communicate with an external fuel flow system

To restore factory defaults to the datablock selections, press the bottom right IFD knob while on the Datablock Setup page and then accept the green Confirm dialog box that gets displayed or use the Presets selection in the “Datablock” LSK.

TIPS AND TECHNIQUES

Selecting Desired Datablocks

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

MAP SETUP

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

Map Setup

The screenshot shows the IFD500 Series Pilot Guide's MAP SETUP screen. The top status bar displays flight data: 133.200 (Nashua Twr Rx), 119.250 (Lawrence Mun TWRx), 132.650 (Boston Ctr), GPS AGL 520Ft, GS 182 Kts, and GPS. The left sidebar contains buttons for 'Datablock Setup', 'Setup Map' (highlighted with a red box), 'User Options', 'Active GPS App', 'Nav Mode', and 'TERM'. The main area is divided into three sections: 'Airport Filter' with settings for Runway Length (Any), Towered Airports (Any), Runway Surface (Any), and Fuel (Any); 'Map General' with settings for Altitude Filter (On), Compass Rose (On), Heading Box (On), and Map Detail Default (Factory); and 'Map Detail' with a table for feature limits and navigation priority. The bottom of the screen shows a row of tabs: AUDIO, UTIL, SETUP (highlighted with a red box), SYS, and ALERT, along with an 'Adjust' button and a 'Defaults' button.

Feature	Limit Show (NM)	Labels	Alt Filter	Nav Priority
SUAs	160			
VORs	160	✓		
Twr Aprts	100	✓		
Non Twr Aprts	80	✓		

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

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

The Map Detail section provides a location to define the level of map detail. Options include element labels on the map, selecting

a range and an altitude beyond which the element is no longer displayed, and defining the declutter priority levels.

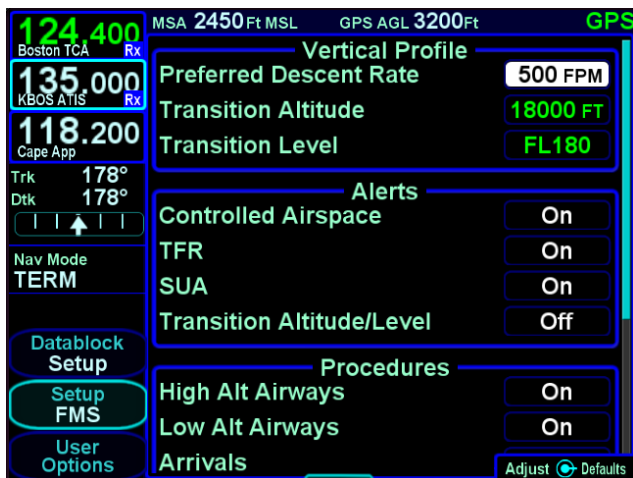
FMS SETUP

This is a page where some of the calculations of the FMS can be altered for aircraft or operational tailoring. Access this page by pressing the “Setup” LSK until “FMS” is shown. Options include:

- Descent rate editing - **keep these the same in dual IFD installations**
- Transition Altitude and Level editing
- Controlled airspace alerts
- TFRs alerts and Special Use Airspace (SUA) alerts
- Modifying list of selectable procedures for the FMS drop down boxes
- Airways
- Arrivals
- Departures
- Approaches
- Enabling Search Patterns/Circular Holds
- WAAS display channel number
- Flight Plan format (single row format vs. multi-row format)

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

FMS Setup



USER OPTIONS

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

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

User Options



Restoring factory defaults is accomplished by pressing the bottom right IFD knob and then accepting the Confirm dialog box. This will reset all the options (except the name) for that user profile only to factory defaults.

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

User Option Item Title	Description
User Profile	<p>Default profiles are named "User-1" through "User-5", but the names can be changed. See page 5-53.</p> <p>User-1 is the default selection</p>
Zoom Mode	<p>Off* - all datablocks, LSKs, and page tabs are displayed using normal size fonts</p> <p>On - datablocks, LSKs, and page tabs are displayed using larger fonts. Note that this selection may cause some datablocks to be removed because they will not fit in the available space.</p>
Touch Screen	<p>On* - all touch screen controls are enabled</p> <p>Off – all touch screen controls are disabled</p>
Bezel Mode	<p>Auto* - the bezel backlighting will rely on the ambient light sensor in the bezel until a low threshold is reached, at which time it uses the dimming bus</p> <p>DimBus – the bezel backlighting will only be responsive to the cockpit dimming bus control</p> <p>User Control – the bezel backlighting is completely controlled by you using the bottom right IFD knob.</p>

User Option Item Title	Description
Bezel Backlight	A brightness bar that represents the bezel brightness setting when User Control is selected. This item has no default value.
Display Mode	<p>Auto* - the LCD display backlighting will rely on the ambient light sensor in the bezel until a low threshold is reached, at which time it uses the dimming bus</p> <p>DimBus – the LCD display backlighting will only be responsive to the cockpit dimming bus control</p> <p>User Control – the LCD display backlighting is completely controlled by you using the bottom right IFD knob.</p>
Display Backlight	A brightness bar that represents the LCD display brightness setting when User Control is selected. This item has no default value.
Chart Day/Night Mode	<p>Day - Charts are displayed with a bright white background</p> <p>Night – Charts are displayed with the bright white background turned off</p> <p>Auto* – Uses the selection in the Chart Auto Mode field to automatically determine whether the system is using Day mode or Night mode for chart depiction</p>

User Option Item Title	Description
Chart Auto Mode	<p>Sensor* - uses the ambient light sensor embedded in the bezel to determine if the Chart page will use day or night lighting schemes when the “Auto” selection was made on the Chart Day/Night Mode user option</p> <p>DimBus – uses only the cockpit dimming bus setting to determine if the Chart page will use day or night lighting schemes when the “Auto” selection was made on the Chart Day/Night Mode user option.</p>
Switch Tanks Alert	<p>Never* – No “Switch Tanks” CAS message will be issued</p> <p>15 min – “Switch Tanks” CAS message issued every 15 min</p> <p>30 min - “Switch Tanks” CAS message issued every 30 min</p> <p>45 min – “Switch Tanks” CAS message issued every 45 min</p> <p>60 min – “Switch Tanks” CAS message issued every 60 min</p>

User Option Item Title	Description
Time Format	<p>UTC – displays all times in the system in zulu time format</p> <p>12 Hr* - displays all times in the system in am/pm time format</p> <p>24 Hr – displays all times in the system in “military” 24 hour time format</p> <p>Note: The 12 Hr and 24 Hr selections are intended to be used if local time is the overall desired time format.</p>
UTC	Just a display of current UTC for reference
Local Time Offset	<p>HH:MM – push in bottom right IFD knob to put into edit mode then twist the inner ring to change in 15 minute increments and then push knob again to exit edit mode</p> <p>Note: Local time is a user specified offset from UTC rather than an automatically calculated offset based on current location. This should be manually readjusted if crossing time zones.</p>
Current Time	Just a display of current local time for reference.

User Option Item Title	Description
Keyboard Convenience	<p>On – When dual IFD equipped, the other IFD will present a keyboard on which edits can be made to the original IFD</p> <p>Off* - The other IFD will not present a keyboard when an edit is attempted on the original IFD.</p>
Bluetooth Ψ	<p>On – When enabled in Maintenance Mode, turns on the Bluetooth transceiver in the IFD.</p> <p>Off* - turns off the Bluetooth transceiver in the IFD.</p>
Networking Ψ	<p>Off* - turns off the WiFi transceiver in the IFD.</p> <p><SSID/Name> – The IFD will use the specified WiFi network configuration (defined in Maintenance Mode - see page 7-72)</p> <p>The following are unauthorized for use (see page 7-78)</p> <p>Remote Wired - The IFD will use the wired ethernet interface as a client.</p> <p>Local Wired - The IFD will use the wired ethernet interface as a DHCP server.</p> <p>Static IP - the IFD will use the wired ethernet interface as a client with the IP address specified in maintenance mode.</p>

User Option Item Title	Description
Aircraft Flight ID	<p>Provides a means to enter in the optional aircraft flight ID for Mode S transponder operations.</p> <p>Push the bottom right IFD knob to put the field into edit mode and twist the inner ring to change the value and twist the outer ring to move to the next digit. Put the cursor on any value (e.g. trailing zeros) you wish to delete and press the bezel CLR button. Push the bottom right knob again to exit edit mode.</p> <p>Note: This selection is only available if the system is configured to communicate with a remote mount Mode S transponder.</p>
Transponder Default Code	<p>Provides a means to enter in a regional default “VFR” transponder code.</p> <p>Push the bottom right IFD knob to put the field into edit mode and twist the inner ring to change the value and twist the outer ring to move to the next digit. Push the bottom right knob again to exit edit mode.</p> <p>Note: This selection is only available if the system is configured to communicate with a remote mount Mode S transponder.</p>

User Option Item Title	Description
Map Orientation	<p>Heading-Up* - the map will be displayed in heading up orientation if heading is available</p> <p>Track-Up – the map will be displayed in track up orientation</p> <p>Note: Even though Heading-Up is the default selection, if there is no heading source, then the default reverts to Track-Up. Potential heading sources include digital heading from an ARINC429 source (e.g. EFIS), WX500, serial 232 heading source and, analog synchro heading input.</p>
Com Frequencies Spacing †	<p>25 kHz* - Com tuning will use 25 kHz spacing</p> <p>8.33 kHz – Com tuning will use 8.33 kHz channel spacing</p>

User Option Item Title	Description
Advisory Glideslope	<p>On* - Will transmit a glideslope deviation signal for display on external indicators (e.g. HSI, EFIS) for approaches that don't have a published <u>glideslope</u> associated with them. Advisory glideslope will be displayed for RNAV approaches, GPS approaches, and approaches that are authorized for a GPS overlay regardless of SBAS. In a non-SBAS environment, if one of those kinds of approaches is selected and it has a published <u>flight path angle</u> in the database, then expect LNAV+V;</p> <p>Off – Will not transmit glideslope deviation data for approaches that don't have a published glideslope associated with them.</p>
Auto-VLOC Tuning †	<p>On* - Enables the automatic tuning of the active nav frequency slot to follow the governing navaid in the flight plan. For example, if the next FMS flight plan leg is a VOR, this will automatically tune the VOR frequency into the active nav slot;</p> <p>Off – Disables the automatic tuning of the active nav frequency into the active nav slot.</p>

User Option Item Title	Description
GPS→VLOC Capture †	<p>Auto* - Allows the GPS→VLOC state for nav source and an automatic transition to VLOC if the capture criteria are met</p> <p>Manual – Never displays the GPS→VLOC nav source option and no automatic nav source switching will occur.</p>
Auto Enable Missed	<p>On* – Automatically activates the published missed approach when crossing the Missed Approach Point (MAP)</p> <p>Off - Will not automatically activate the published missed approach and requires manual activation of the L4 LSK on the FPL tab when inside the FAF.</p>
FLTA Ψ	<p>On* - Forward Looking Terrain Alerting (and Premature Descent Alert, if TAWS equipped) function enabled</p> <p>Off – Forward Looking Terrain Alerting (and Premature Descent Alert, if TAWS equipped) function disabled.</p> <p>Note that in dual IFD installations, both units will need to be set to Off to disable the function.</p>

User Option Item Title	Description
Terrain Awareness (TA)	<p>On* - Terrain Awareness function enabled</p> <p>Off – Terrain Awareness function disabled.</p>
Terrain Caution Aural Ψ	<p>Caution, Terrain; Caution, Terrain* - When selected, that is the aural alert issued during FLTA caution conditions</p> <p>Terrain Ahead; Terrain Ahead - When selected, that is the aural alert issued during FLTA caution conditions.</p>
Terrain Warning Aural Ψ	<p>Terrain, Pull Up; Terrain, Pull Up* - When selected, that is the aural alert issued during FLTA warning conditions</p> <p>Terrain, Terrain; Pull Up, Pull Up - When selected, that is the aural alert issued during FLTA warning conditions.</p>
FLTA Exclusion Areas Ψ	<p>On* - Turns the FLTA Exclusion area on resulting in hatched white polygons around airfields and no FLTA alerts when inside the exclusion areas</p> <p>Off – Turns the FLTA Exclusion area off resulting FLTA alerts even in the proximity of airfields.</p>
Top of Descent (TOD) Aural	<p>On* - Enables TOD aural chime</p> <p>Off – Disables TOD aural chime</p>

User Option Item Title	Description
Airspace Aural	<p>On* - Enables aural alerting of impending airspace (correlates with presence of the Airspace Ahead CAS message)</p> <p>Off – Disables aural alerting of airspace.</p>
500ft Callout Aural Ψ	<p>On* - Enables 500' AGL (based on GPS altitude) aural callout when descending through 500' AGL</p> <p>Off – Disables 500' AGL callout</p>
Bearing Reference	<p>Magnetic* - Sets map orientation and all datablock information to magnetic reference</p> <p>True – Sets map orientation and all datablock information to true reference. By selecting True, the map orientation will display in True North when “North Up” view selected on the map page</p>
Distance/Speed Units	<p>nm/knots* - distance units will be displayed in nautical miles and speed units will be displayed in knots</p> <p>km/kph – distance units will be displayed in kilometers and speed units will be displayed in kilometers/hour</p> <p>sm/mpg – distance units will be displayed in statute miles and speed units will be displayed in miles/hour.</p>

User Option Item Title	Description
Altitude/Vert. Speed Units	<p>ft/fpm* - altitude units will be displayed in feet and vertical speed units will be displayed in feet/min</p> <p>m/mpm – altitude units will be displayed in meters and vertical speed units will be displayed in meters/min</p> <p>m/mps – altitude units will be displayed in meters and vertical speed units will be displayed in meters/sec</p>
Pressure Units	<p>InHg* - pressure units will be displayed in Inches Mercury</p> <p>mbar – pressure units will be displayed in millibars</p> <p>hPa – pressure units will be displayed in hectopascals</p>
Temperature Units	<p>Fahrenheit* - temperature units will be displayed in degrees F</p> <p>Celsius – temperature units will be displayed in degrees C</p>
Fuel Units	<p>Gal* - fuel units will be displayed in gallons</p> <p>Lit – fuel units will be displayed in liters</p> <p>Imp Gal – fuel units will be displayed in Imperial Gallons</p>

User Option Item Title	Description
Position Units	<p>ddd°mm'ss''* - position units will be displayed in degrees-minutes-seconds</p> <p>ddd°mm.mm – position units will be displayed in degrees-minutes-hundredths of minutes</p> <p>UTM – position units will be displayed in Universal Transverse Mercator</p> <p>MGRS – position units will be displayed in Military Grid Reference System.</p>
Hide Page Tabs	<p>Never* - The page tabs will always be present</p> <p>After 2s – the page tabs “sink” down out of view 2 seconds after they were last used</p> <p>After <x>s where x choices are 5, 10 or 15 seconds – the page tabs “sink” down out of view x seconds after they were last used</p>

Ψ - not available if the option is not enabled in the IFD.

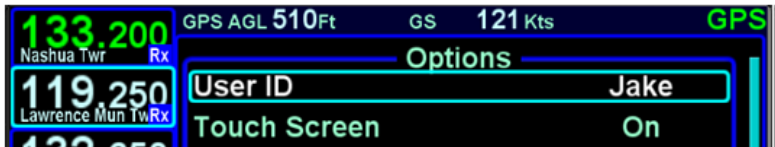
Custom User Settings

5 different custom user definitions can be created which are saved across power cycles. Each custom user definition consists of:

- User Option page selections
- Map settings
- FMS settings
- Datablock selections

To select the desired User ID, rotate the right outer knob to select the “User ID” row on the User Options page from the AUX-Setup tab and then rotate the inner knob to cycle through the different user ID definition sets. No further action is required to select the desired user ID.

Setting/Selecting User ID



Each user ID can be uniquely named, if desired, with a maximum of 11 characters. To create a custom name for a user ID, move the cursor to the User ID row and select the desired ID to be renamed. Then press the right knob button in to generate a keyboard. Type in the desired name (do not use any spaces) and press the ENTR key on the keyboard or on the bezel.

SYS (SYSTEM) TAB

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

FUEL MANAGEMENT

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

Fuel Management Dialog Box



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

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

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

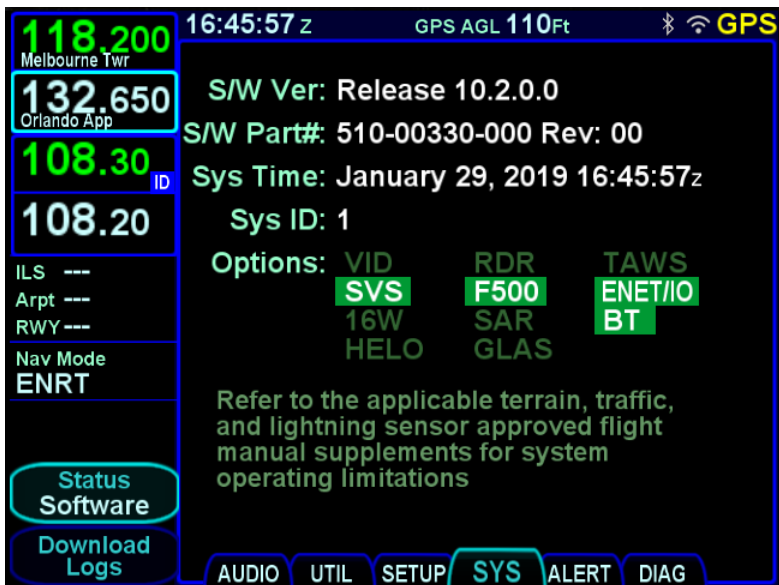
SYSTEM STATUS

The “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 “Software” selection is made on the “Status” LSK of the SYS tab, a “Download Logs” LSK is also displayed. Pressing that LSK will put the IFD into Maintenance Mode where the datalogs can be downloaded (see page 7-64 for instructions).

NOTE

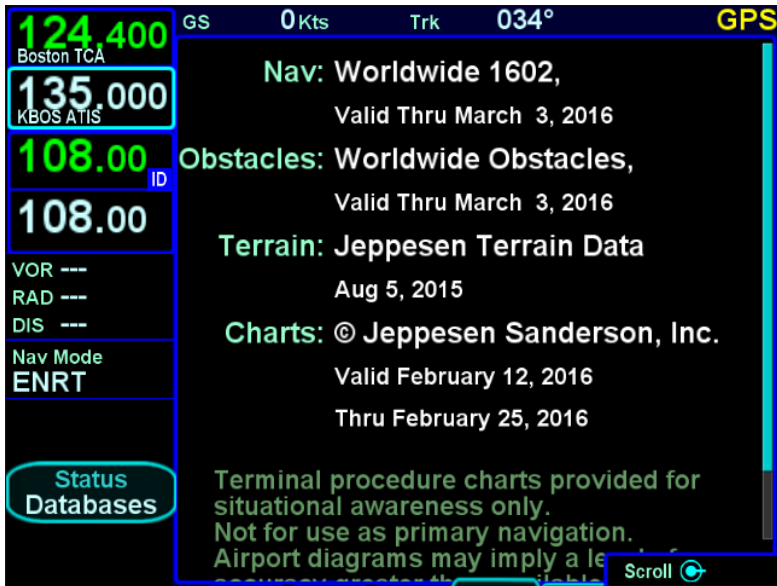
Data Downloads and Updates

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

Database Status Page

The “Databases” selection on the “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 that you update the data regularly and that you ensure the databases are current prior to conducting flight operations.

Pressing the “Update Databases” LSK will put the IFD into Maintenance Mode where the databases can be uploaded to the IFD (see page 7-55 for instructions).

GPS Status Page

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

GPS Status Page



NOTE

Global SBAS Support

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

The GPS navigation states possible are:

GPS Navigation State	Operational Meaning
Self Test	System performing self test. This is the initial state value but happens so quickly it is rarely observed.
Init	System is initializing – this state is also very quick and is rarely observed.
Search	Satellite acquisition mode.
Basic Nav	System has acquired enough satellites to conduct basic navigation but without integrity.
FDE Nav	System has acquired enough satellites to conduct navigation with fault detection and exclusion integrity.
SBAS Nav	System is capable of navigation with satellite-based augmentation (e.g. the WAAS platform in the US).

GPS Navigation State	Operational Meaning
Fault	<p>System has detected an internal fault and does not have a satellite navigation solution.</p> <p>This may require a manual power cycle of the IFD to restore a GPS lock.</p>

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

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 weather system (see the IFD product page at <http://www.avidyne.com/products/ifd/ifd-weather.html> for a list of currently supported systems).

This page has two distinct sections – the upper part displays the various weather products supported by the datalink system and subscription level with their age and receipt status; the lower part

is a legend that defines the various symbols used in the datalink data depictions on the maps. Note that forecast products (e.g. winds aloft) display the forecast time, not the data receipt age. Dashed data is not authorized for that subscription level. A status of "Not Rcvd" indicates that the data has not been received. A status of "None Xpctd" indicates that not only has the data not been received, but also that none was expected to be received.

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 ID and location of each ADS-B station from which data is being received. For each station, the percentage of data that has been received is shown as well as the look ahead range for TFRs, AIRMETs, and SIGMETs from that 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

The screenshot displays the ADS-B Stations page. At the top, the time is 19:12:27 Z, GPS AGL is 40Ft, and GPS is active. The left sidebar contains the following elements:

- Frequency stack: 123.900 (COM), 119.675 (COM), 112.60 (ID), 112.60.
- VOR ---, RAD ---, DIS ---.
- Nav Mode: ENRT.
- Fuel Mgmt button.
- Status Datalink button.
- ADS-B Stations button (highlighted).

The main display area shows a table of stations:

ID	Location	Reception	Look Ahead Range		
			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

The bottom navigation bar includes: AUDIO, UTIL, SETUP, SYS (highlighted), ALERT, and a Scroll button with a circular arrow icon.

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 5-64) to appear, showing the text for the selected TFR.

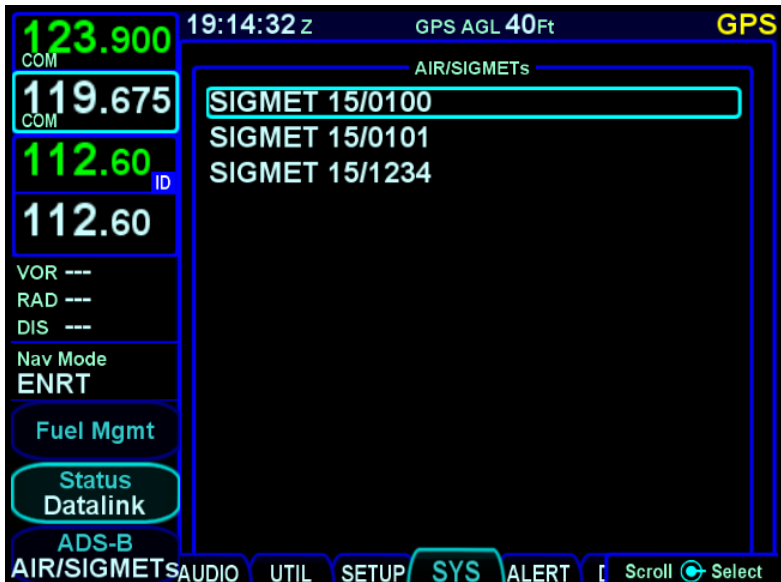
ADS-B TFRs Page



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 5-64) to appear, showing the text for the selected report.

ADS-B AIRMET/SIGMET Page

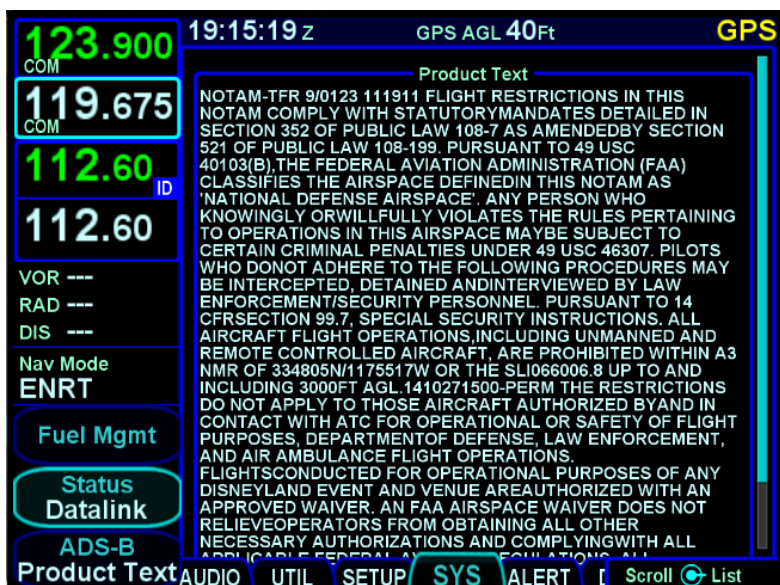


ADS-B Product Text Page

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 7 .

6 Navigation

The IFD is an IFR certified GPS that has been specifically designed to support single-pilot IFR operations. It has been designed for both retrofit and clean installations, meaning that it can have different capabilities depending on the nature of the aircraft integration. The various levels of integration are described in the table below.

Integration Category	Description	IFD Functionality
No external nav indicator	There is no form of external CDI, HSI, or EFIS in the airplane and therefore, no external course input available to the IFD.	<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->, push OBS and twist nav source knob, auto-nominate a course by selecting a procedure, etc). †</p> <p>Nav source modes available:</p> <p>GPS VLOC † GPS → VLOC † OBS OBS → VLOC †</p>

Integration Category	Description	IFD Functionality
<p>Basic electro-mechanical nav indicator</p>	<p>There is at least one external CDI or HSI in the airplane and the IFD has access to the course data from it.</p>	<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 † GPS → VLOC † OBS OBS → VLOC †</p>
<p>“Non-cooperative” electronics</p> <p>For Example 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 † GPS → VLOC † OBS OBS → VLOC †</p>

Integration Category	Description	IFD Functionality
<p>“Cooperative” electronics</p>	<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>

NOTE**Manual Sequencing May Be Required**

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

NAV SOURCE KNOB/BUTTON

For all models except the IFD510, the knob located in the upper right hand corner of the bezel is the dedicated Navigation (Nav) Source knob. For IFD510, the knob is replaced by a button labeled "OBS". In the description below, any references to capability requiring a VHF radio are not applicable.

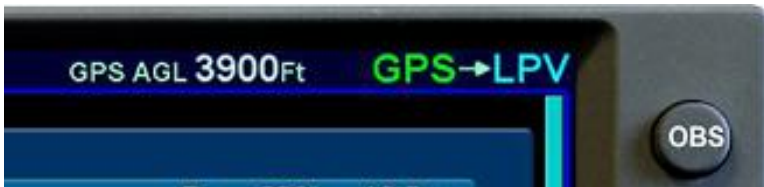
Think of the nav source knob as a channel selector to choose which Nav source the pilot wants depicted on the moving map. The chosen source will also be sent to other on-board systems like an EFIS (e.g. Aspen PFD) and in-turn, the autopilot, as well as driving any conventional CDI or RMI or HSI indicator.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

Nav Source Knob State Indication (except IFD510)



The IFD510 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)



As described earlier in this section, multiple levels of aircraft system integration are possible, and will affect the possible states

of the Nav Source knob. The table below describes all possible nav source states:

Nav Source State	Description
<p>GPS</p> <p>Or...</p> <p>LPV</p> <p>LNAV/VNAV</p> <p>LP+V, LP</p> <p>LNAV</p> <p>LNAV+V</p>	<p>GPS is the active state (green), and all external deviation data being transmitted by the IFD is in reference to the active GPS leg.</p> <p>Note that if no GPS leg is active or if no GPS lock, the nav mode will be displayed in yellow.</p> <p>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.</p>
<p>GPS → LPV</p> <p>Or...</p> <p>LNAV/VNAV</p> <p>LP+V</p> <p>LP</p> <p>LNAV</p> <p>LNAV+V</p>	<p>Basic GPS is the active state (green), and the approach type is armed (blue).</p>
<p>GPS → VLOC†</p>	<p>GPS is the active state (green), and VLOC is armed (blue).</p> <p>If the GPS flight plan contains a VHF-based procedure or leg (e.g. localizer final), then the nav mode will automatically transition from GPS to VLOC when the capture criteria have been met. While GPS is active, all external deviation data being transmitted by the IFD is in reference to the active GPS leg. That transitions to VHF deviation data when the switch to VLOC is made.</p>

Nav Source State	Description
VLOC†	VLOC is the active state (green), and all external deviation data being transmitted by the IFD is in reference to the active VHF-based leg (e.g. Inbound VOR course, localizer deviation, etc). Note that if no VHF data is being received (e.g. out of range, improperly tuned nav radio, etc), the nav mode will be displayed in yellow. It will also stay yellow until the nav channel is fully decoded as an indication to manually tune-identify-monitor.
OBS	OBS becomes the active state (green) and deviation data being transmitted by the IFD is reactive to the external course setting knob (or the Nav Source knob if no external course control is present or when a KI-208A or KI-209A is present) for the inbound/outbound course. Note that this state is accessed by pushing in the Nav Source knob, and then it takes the place of pure GPS mode as described earlier in this table.
OBS → VLOC†	OBS becomes the active state (green) and VLOC is the armed state (blue). Deviation data being transmitted by the IFD is reactive to the external course setting knob (or the Nav Source knob if no external course control is present or when a KI-208A or KI-209A is present) for the inbound/outbound course. Note that this state is accessed by pushing in the Nav Source knob and then it takes the place of GPS → VLOC mode as described earlier in this table.

NOTE**Aircraft Integration**

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

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

OBS MODE

“PUSH OBS” is the label underneath the knob (or the button label in the case of IFD510) and is active when you can put the system in To/From course setting mode for a waypoint. There is no need for “suspend” functionality in the IFD paradigm – the IFD will continue sequencing to the next waypoint and exit OBS mode at that time.

NOTE

GPS and OBS

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

NOTE

OBS Can Not Be Activated Inside the FAF

OBS is prevented from being selected on a published approach when inside the Final Approach Fix (FAF).

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

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

OBS TO Depiction



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

OBS FROM Depiction



TIPS AND TECHNIQUES

OBS “Final”

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

NOTE**OBS Leg Depiction on External Moving Maps**

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 would not depict the OBS course line/leg but do depict a 200nm OBS course line/leg in Release 10.1.1.0 and later. Changes can take up to 7 seconds to display on the map and east-west legs may show some curvature.

NOTE**OBS Behavior in Dual IFD Operations**

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 †

When 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 as dialed in by the OBS/Course knob on the external indicator, if that external device is capable of transmitting course (see the IFD product details page on <http://www.avidyne.com/products/ifd/vor-course-depiction-devices.html>). The radial lines will be displayed once the VOR station is decoded and will be 50nm long.

The line will be green for the **inbound** course/radial to the VOR when the aircraft position is on the near side of the perpendicular course ("To" geometry) and the outbound course/radial will be white.

The line will be green for the **outbound** course/radial to the VOR when the aircraft position is on the far side of the perpendicular course ("From" geometry) and the inbound course/radial will be white.

VOR Course Depiction



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.

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.

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

- The tuned frequency in the nav radio matches that of the approach navaid
- The Morse code decoded by the tuned nav radio matches the identifier of the approach navaid
- The aircraft track is within 15° 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 for 5 consecutive seconds
- The active leg is part of the approach up to and including the final approach fix

FMS HOOKS

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

L4 LSK Label	Comments
Activate Approach	Displayed if either the next downpath approach in the flight plan is preceded by a discontinuity (gap in flight plan) and the aircraft is within 40 nm of the FAF OR the next leg of the flight plan is the first leg of a published approach and there is a discontinuity or a Vectors-To-Final approach is selected.
Retry Approach	Displayed when the active leg of the flight plan is part of a published missed approach and you were conducting a Vectors-To-Final approach. Selecting this option will activate the first leg of the VTF approach (i.e. the leg into the FAF). This option will not be displayed if you were conducting a full published approach.
Enable/ Activate Missed	Displayed when the next leg of the flight plan is the first leg of a published missed approach. Typically this occurs immediately after the FAF. Pressing the LSK will activate the published missed approach for that approach if it is in the flight plan. Not pressing the button prior to reaching the 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.
Continue/ Exit Hold	Displayed when the active leg of the flight plan is a hold and is not the last leg of the route. Pressing the LSK will either command the FMS to continue the hold or exit it.

L4 LSK Label	Comments
Skip Hold	Displayed when the aircraft is within 5 nm of the FAF and the next leg is a database procedure hold. Pressing the LSK will sequence the active leg past the hold without entering it when the aircraft reaches the FAF. The leg after the hold will become active.
Sequence Leg	Displayed when there is no altitude source and the active leg terminates at an altitude. Pressing the LSK upon reaching the altitude is required to sequence to the next leg.
Enable A/P Approach	Displayed for specific autopilots (e.g. KAP140, KFC225) when the FMS determines it is time for the autopilot to be in Approach mode but does not have any control or knowledge of the actual autopilot state. This case is just a prompt, and no pilot action must be taken on the IFD.

TIPS AND TECHNIQUES**FMS Philosophy**

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 you had chosen an IAF and the last waypoint before the approach was the same as the IAF, then the flight plan would naturally sequence right into the approach with no further pilot action required. If the last waypoint before the approach were not the same as the IAF, then a discontinuity would precede the approach. The typical course of action, in that case, is to close the gap and then the flight plan would sequence right onto the approach with no further operator action.

The operation with VTF is slightly different, however. In that case, you really have no choice but to 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 convenient FMS hook L4 LSK that says "Activate Approach". That FMS hook is just a shortcut for activating the leg to the FAF.

COURSE CHANGES AND HOLDS

If the course change at a waypoint is more than 120°, the IFD will issue an alert approximately 30 seconds prior to the turn. For course changes less than 120°, 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, however, the alert text shows the entry type. It will be “Teardrop Entry”, or “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°, then 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°, then 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 †

Auto-VLOC tuning is a user option which enables the automatic tuning of the active nav frequency slot to follow the governing navaid in the flight plan.

If the active leg is part of a VHF-based approach, the FMS will auto-tune the navaid that defines the final approach.

If the active leg is not part of a VHF-based approach, and if the active leg has a recommended navaid in the nav database, the FMS will auto-tune that navaid. Otherwise, from the active leg, the FMS will look backward through the route and forward through the route for legs with a recommended navaid or that are defined by a navaid, in which case, the FMS auto-tunes the one of those two nav aids that is closer to the aircraft.

TRANSITION ALTITUDES/LEVELS

Transition altitude/level alerts can be optionally turned on via the FMS 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.

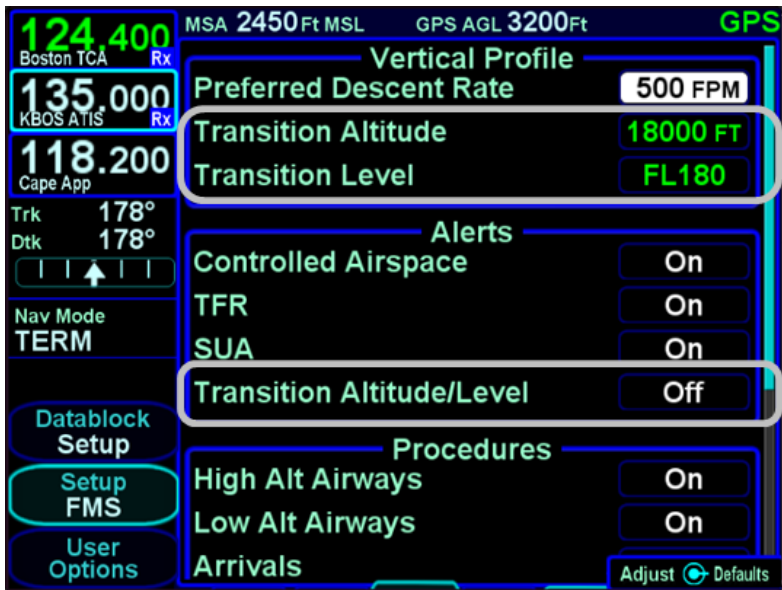
If the destination airport has a published transition level in the nav database and the transition level has not been manually set, the system will automatically set the transition level.

The transition **altitude** can be manually set on the FMS Setup page by twisting the inner ring of the bottom right knob or by typing in a value in the virtual keyboard. Each click of the inner ring adjusts the value by 100 feet and keyboard entries can be made down to the foot. The allowable range is from 1,000 feet to 60,000 feet.

Similarly, the transition **level** can be manually set on the FMS Setup page by twisting the inner ring of the bottom right knob or by typing in a value in the virtual keyboard. Each click of the inner ring adjusts the value by one flight level (i.e. 100 feet). The allowable range is from FL010 to FL600.

When the transition altitude/level has been automatically set by the system, it is displayed in green. If the transition altitude/level has been manually entered, it is displayed in white. When the transition altitude/level has been manually set, pressing the bezel “CLR” button will allow the value to be set by the system, turning it from white to green.

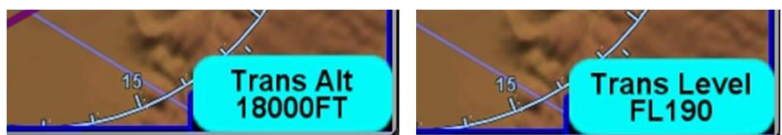
Transition Altitude and Level Setting



The transition altitude advisory CAS message is displayed when the aircraft climbs to within an altitude 250 feet below the transition altitude. Once issued, the alert will not be eligible to be issued again unless the aircraft has descended more than 500 feet below the transition altitude.

Likewise, the transition level advisory CAS message is displayed when the aircraft descends to an altitude 250 feet above the transition level. Once issued, the alert will not be eligible to be issued again unless the aircraft has climbed more than 500 feet above the transition level.

Transition altitude/level alerts



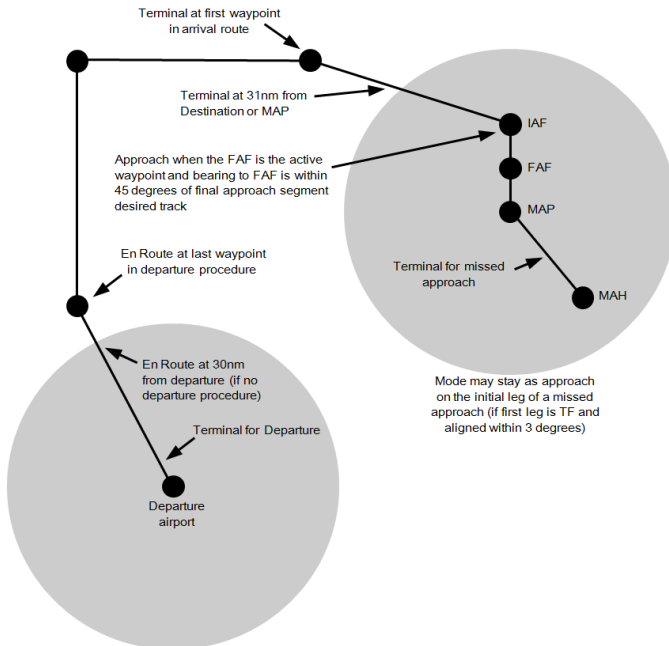
NAVIGATION MODE/CDI SCALE CHANGING

Each navigation mode has an associated CDI scaling associated with it per the table below:

Navigation Mode	CDI Full Scale Value
Enroute	2.0 NM (5.0 NM for non-WAAS)
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.

An approach can be selected and flown as a full published procedure or as a Vectors-to-Final – the choice is made on the Transitions dropdown menu in the FMS. When an approach is selected from the FMS drop down list, the Transition dropdown menu is presented. “Vectors” is the first choice in the list and if it is selected, an “Activate Approach” button is presented in the LSK L4 along the left side of the page. Until the “Activate Approach” button is pressed, “Vectors to Final – Inactive” is displayed just above the FMS leg into the FAF. As soon as the Activate Approach button is pressed, the leg into FAF becomes active (magenta) and “Vectors to Final” is displayed just above that leg.

NOTE

Displayed Inbound Course

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

NOTE FOR THE IFD510/545 ONLY

VHF based Approaches

Although the IFD510 and IFD545 have no VHF radio, ILS, LOC and VOR approaches will still be displayed in the dropdown list of available approaches at your destination. Though the unit will allow the user to select those approaches, it will only give 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 with the NAV radio and not the IFD.

TIPS AND TECHNIQUES**Discontinuities During Approaches**

Before you insert an approach at an airport, the FMS is being told to fly a leg directly to the airport (i.e. the reference point) and the legs on the map reflect that. However, when you insert an approach, the FMS is being told to fly the legs of the approach to the airport (actually to the runway) and not fly a leg to the airport reference point. After the approach has been entered, you'll notice a "discontinuity" before the first leg of the approach. A discontinuity is an indication that the FMS doesn't know how to get from the leg before the discontinuity to the leg after. In other words, there's a gap in the flight plan. The gap can be closed via a number of means to include using the L4 LSK hook, activating a leg of the approach, or Direct-To the leg to the FAF. Verify the system will do as you expect by examining the depiction on the map.

AUTOMATIC MODE SWITCHING †

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

TIPS AND TECHNIQUES**Exception to Automatic Nav Mode Switching**

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

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

PRECISION APPROACHES**VHF Based Precision Approaches †**

On ILS/LOC approaches (Vectors-to-Final transition or the full published procedure), the IFD will automatically toggle the nav mode to VLOC when all of the following conditions have been met for 5 consecutive seconds:

- The next leg or the active leg terminates at the FAF
- The aircraft is on the front side of the approach
- The aircraft course is within 15 degrees of the final approach course
- Cross track deviation is less than half a dot
- The correct station is tuned and identified

Lateral and vertical deviation data will be transmitted by the IFD for use by any integrated autopilot and external indicators. Conversely, the IFD will toggle the nav source from VLOC back to GPS when executing the missed approach at the Missed Approach Point.

GPS Based Precision Approaches

Lateral and vertical deviation data will be transmitted by the IFD for use by any integrated autopilot and external indicators. For all models except IFD510, precision WAAS approaches are flown with the nav source knob set to GPS (which will automatically change to the GPS approach type). For IFD510, precision WAAS 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 done automatically. All switching between GPS and VLOC (if appropriate) is also done automatically.†

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 – just fly them as part of the flight plan.

DME arc legs and approaches are supported by the system.

TIPS AND TECHNIQUES

CDI Deflection During VOR Approaches

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.

BACK COURSE APPROACHES †

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, etc), the front course may need to be manually entered and then “Back Course” should be displayed on the EFIS.

WAAS APPROACHES

LPV (RNAV) approaches are the preferred approach for the IFD, if available. On installation, a configuration setting determines whether the IFD WAAS-capable. If non-WAAS, the following procedures do not apply.

When GPS has been selected as the nav source, and one of the RNAV/GPS approach types with vertical guidance (LPV, L/VNAV, LNAV+V, 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 WAAS approaches. The FMS will automatically select the best available approach based on current GPS integrity and will indicate the selection in the Nav Mode datablock field.

TIPS AND TECHNIQUES

Nav Mode Datablock

The Nav Mode datablock (see page 5-31) will indicate the current navigation mode (e.g. OCN, ENRT, TERM, APPR, LPV, LNAV/VNAV, LNAV+V, LNAV, etc). It is a default datablock and is an excellent means to know GPS integrity and mode.

The pilot must monitor the IFD throughout the approach and use charted minimums appropriate to the approach type. If an approach type is not indicated by the time the final approach fix (FAF) is reached, **do not descend** – the conditions required to fly

the approach have not been met and you must fly the missed approach procedure.

WAAS approach types in the Nav Mode datablock and the nav source indication in the top right corner of the display include:

LNAV (Lateral Navigation)

Provides lateral (horizontal) guidance only, with standard GPS precision of 0.3 NM full-scale deflection. This is essentially the same as a non-WAAS GPS approach. It is flown as any other non-precision approach – observing step down restrictions, descend to MDA, fly at MDA altitude to the 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)

This mode provides the same lateral navigation as LNAV, but also typically presents an ILS GS-like presentation on the external deviation indicator. The GPS draws a 3-D picture of the approach based on crossing the FAF at the depicted altitude. Then it follows a glidepath from the published approach, which is typically a 3 degree angle to the touchdown zone. This type of approach remains a non-precision approach and does not consider any step-down limitations. The Nav Mode datablock will display “LNAV+V” for the approach type.

LNAV/VNAV (Lateral Navigation with Vertical Navigation)

In this mode, the GPS provides lateral navigation, providing more accurate guidance than regular LNAV but easier to follow indications than a localizer. The vertical navigation is driven by GPS signals. LNAV/VNAV approaches are operationally different from LNAV+V in that the glide path is protected from obstructions but attention still must be applied to step down fixes. Also, the minimum altitude presented is a decision altitude/height (DA/DH) – DA being what is on the altimeter, and DH being the height of the DA above the touchdown zone elevation. This is not a MDA, thus, fly it just as though it were an ILS approach: follow the glide slope all the way to the DA before initiating a missed

approach, if appropriate. The Nav Mode datablock will display “LNAV/VNAV” for the approach type.

LPV (Localizer Precision with Vertical Guidance)

The lateral guidance is significantly more precise than LNAV, and equivalent to that of a localizer. Vertical guidance is provided to minimums as low as 200’ AGL above the touchdown zone. Lateral tolerance starts out at 0.3 NM full-scale (slightly tighter than a localizer at the FAF), transitioning to 350 feet either side at the runway threshold. The steering remains linear all the way without the difficult to follow swings of a VHF localizer. The vertical guidance is precise and has a DA/DH (shown as “DA(H)” on approach charts) rather than a MDA. The Nav Mode datablock will display “LPV” for the approach type.

LP (Localizer Performance)

These approaches have localizer performance but no vertical guidance associated with them. Use the published “LP” minimums. The Nav Mode datablock will display “LP” for the approach type.

LP+V (Localizer Performance with Advisory Vertical Guidance)

This mode provides the same lateral navigation as LP, but also presents an advisory glideslope deviation for display on the external deviation indicator. The GPS draws a 3-D picture of the approach based on crossing the FAF at the depicted altitude, which is typically a 3 degree angle to the touchdown zone. This type of approach remains a non-precision approach and does not consider any step-down limitations. Use the published “LP” minimums. The Nav Mode datablock will display “LP+V” for the approach type.

COOL FEATURE

FPL L4 LSK

Think of the L4 LSK on the IFD as your “hook” into the FMS. The button changes functionality based on the phase of flight or instrument procedure you are on. This is described in more detail in the FMS HOOKS section on page 6-14.

CAUTION**VTF Transitions**

VTF transitions in the IFD provide guidance to the extended final approach course.

When assigned a VTF clearance on an SBAS approach (WAAS- or EGNOS-based 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 the ATC controller to clarify if those vectors are to extended final or the published offset inbound leg to the FAF.

In the case where ATC responds with the extended final scenario, Avidyne recommends the pilot select the “Vectors” transition option in the FMS approach dropdown. In the case where ATC responds with the published offset leg scenario, Avidyne recommends the pilot activate the inbound leg to the FAF from the FMS FPL tab to ensure the offset leg is accounted for.

MISSED APPROACH

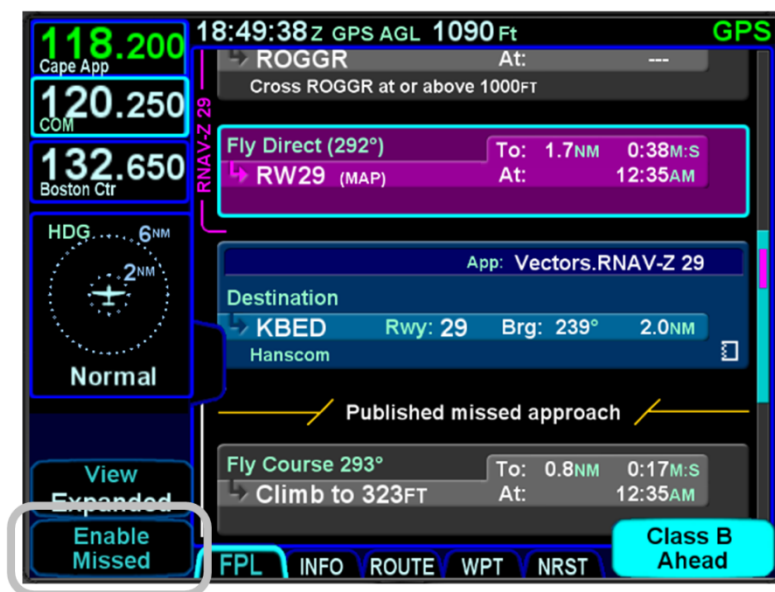
The simplest and safest way to properly fly a published missed approach is to ensure it is part of the active flight plan. It can be activated anytime inside the FAF by pressing the "Enable Missed" (L4) LSK on the FPL tab. This LSK changes to "Activate Missed" when crossing the Missed Approach Point (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 in the User Options page. When this is selected, the system will automatically sequence to the published missed approach when crossing the FAF.

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

Disabled Missed Approach on Map



Enable Missed LSK**Enabled Missed Approach in Flight Plan**

Enabled Missed Approach on Map

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

The Nav Source will automatically toggle back to “GPS” shortly after crossing the MAP, if it weren’t already set to “GPS” unless you had manually switched the Nav Source to “VLOC” prior to being established on final with the localizer tuned and identified – in that case, it will stay in “VLOC” until you manually change it.†

RETRY APPROACH

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

NOTE

Activating Missed Approach Past MAP

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

NOTE**Autopilot Integration**

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

RNP/RNAV OPERATIONS

The IFD complies with the equipment requirements of AC 90-105 and meets the equipment performance and functional requirements to conduct RNP terminal departure and arrival procedures and RNP approach procedures without RF (radius to fix) legs. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.

When installed with an SBAS approved antenna, the IFD provides pilot and automatic flight control guidance for the following operations conducted under instrument flight rules (IFR):

- VOR, LOC, ILS instrument approach procedures (procedures using VHF radio guidance) †
- RNP instrument approach procedures using the following lines of minima:
 - LNAV minima (including when using advisory vertical guidance from the system)
 - LNAV/VNAV minima
 - LPV minima
 - LP minima

when installed with a non-SBAS antenna, the IFD provides pilot and automatic flight control guidance for the following operations conducted under instrument flight rules (IFR):

- VOR, LOC, ILS procedures (procedures using VHF radio guidance) †
- RNP instrument approach procedures using LNAV lines of minima only.

The IFD complies with requirements of AC 90-100A for RNAV1 and RNAV2 operations. In accordance with AC 90-100A, Part 91 (except subpart K) are authorized to fly RNAV1 and RNAV2 procedures.

The IFD complies with the requirements for GPS Class II oceanic and remote navigation (RNP-10) and (RNP-4) without time limitations. A second navigation source may be required for these operations to meet availability requirements.

RECOMMENDED ICAO EQUIPMENT CODES

Avidyne recommends the following set of ICAO codes when filing for aircraft equipped with at least one IFD:

B – LPV

G - GPS

R – PBN Approved

S – VHF, VOR, ILS †

Y – VHF w/8.33 kHz spacing †

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 (RNAV and/or GPS Approaches without RF legs)

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 SkyTrax100 (MLB100) receiver is installed,

U2 – 978 (UAT) In receiver

7 General

In addition to a comprehensive list of alerts that can be generated by the system, 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
- Configuring WiFi and Bluetooth
- Backup/Restore
- Cleaning the display
- Slide-in Replacement details

CAUTION ADVISORY SYSTEM (CAS) / ALERTS

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

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

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

MASTER CAUTION LAMPS

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

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

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

WARNING-CAUTION-ADVISORY MESSAGE BAR

A message bar is provided on every IFD to alert the pilot to what the CAS message is. Advisories are displayed on a cyan (blue)

background in the lower right corner of each IFD. Warnings are displayed on red background in the lower right corner of each IFD. Likewise, Cautions are displayed on an amber background in the lower right corner of each IFD. Red warnings will always display on top of amber cautions and amber cautions will always display on top of cyan advisories.

Warning Message



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

After all active messages have been acknowledged, the AUX lamp will remain illuminated with the color of the highest priority message.

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

The tables below show the warnings, cautions, and advisories that can be issued. Each entry in the table is organized as illustrated in the example below.

Short Text	Long text
* Ψ	Detailed explanation of the conditions that may cause the alert and, in some cases, a recommended action to be taken.

Note that an asterisk to the left of the detailed explanation is an indication that the alert is "global" in a dual IFD installation.

Note that a " Ψ " symbol to the left of the detailed explanation is an indication that the alert will be deleted on acknowledgement.

WARNINGS

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

CAUTIONS

**Caution
Terrain****Caution Terrain**

- * The FLTA algorithm is predicting a likely ground collision within approximately 60 seconds – initiate a proper recovery maneuver.

**Caution
Obstacle****Caution Obstacle**

- * The FLTA algorithm is predicting a likely obstacle collision with approximately 60 seconds – initiate a proper recovery maneuver.

**GPS Integrity
Lost****GPS Integrity Lost – Crosscheck Nav**

This is alerting about imminent exceedance of horizontal fault detection limits or protection levels. Crosscheck the nav solution and determine the best course of action but if on an approach, a Missed Approach is recommended.

**GPS Fault Dead
Reckoning****Position updated via dead reckoning**

The system will use the last known position and groundspeed (and heading if available) to estimate the aircraft position following loss of GPS for up to 5 minutes. Since Dead Reckoning assumes no directional or groundspeed change, it will not be reliable even during those first 5 minutes if either or both of these factors have changed.

**GPS Fault
No Position****No position available**

The navigation solution cannot compute a position, typically after dead reckoning has expired. Transition to alternative navigation sources.

Configuration Error	Configuration Error – IFD Requires Service
The configuration of the IFD or the devices with which it is communicating has changed or experienced an error. Contact the Avidyne Service Center or a local dealer for service.	
LPV Unavailable Use L/VNAV DA	GPS integrity is insufficient for LPV Approach
Transition to a non-LPV approach and the appropriate minima.	
LPV Unavailable Use LNAV MDA	GPS integrity is insufficient for LPV Approach
Transition to a non-LPV approach and the appropriate minima.	
LP Unavailable Use LNAV MDA	GPS integrity is insufficient for LP Approach
Transition to a non-LP approach and the appropriate minima.	
L/VNAV Unavail. Use LNAV MDA	GPS integrity is insufficient for L/VNAV Approach
Transition to a non-L/VNAV approach and the appropriate minima.	
VNAV Lost Use LNAV MDA	Excessive XTK or Low GPS Integrity for Vertical Guidance
Transition to LNAV minima.	

<p>Check Altitude Too Low</p>	<p>Aircraft is below the glide slope altitude at FAF</p>
<p>Correct aircraft altitude as required to safely conduct the approach or initiate a climb to a published safe altitude and abort the approach.</p>	
<p>Traffic Sensor Fault</p>	<p>No communication with traffic sensor</p>
<p>Contact a local dealer for service</p>	
<p>Traffic Sensor Fault</p>	<p>Traffic sensor has failed</p>
<p>* Contact a local dealer for service</p>	
<p>Traffic Low 2:00 3NM</p>	<p>Traffic 2:00 3NM 800FT</p>
<p>* 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.</p> <p>This is a traffic advisory with bearing information. Establish visual contact with conflicting traffic in order to facilitate avoidance maneuvers as necessary.</p>	
<p>Traffic Low 4NM</p>	<p>Traffic 4NM -200FT</p>
<p>* 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.</p> <p>This is a traffic advisory with no bearing information. Establish visual contact with conflicting traffic in order to facilitate avoidance maneuvers as necessary.</p>	

Traffic 12:00 3NM	Traffic 12:00 3NM
*	<p>The above alert is just an example. After "Traffic" will be the bearing in clock direction, then the distance in nautical miles.</p> <p>This is a traffic advisory with no relative altitude information. Establish visual contact with conflicting traffic in order to facilitate avoidance maneuvers as necessary.</p>
Traffic 2NM	Traffic 2NM
*	<p>The above alert is just an example. After "Traffic" will be the distance in nautical miles.</p> <p>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.</p>
COM TX Fault	Transmitter Fault, No TX Ability
†	<p>Transition to a backup VHF com radio (if available) or initiate lost communication procedures. Contact the Avidyne Service Center or a dealer for service.</p>
COM Stuck TX	Stuck Mic Timeout, Transmitter Disabled
†	<p>Requires 35 seconds of continuous transmission. Verify the PTT is stuck and contact a dealer for service as required.</p>
No Comm with VHF	No communication with the VHF radio
†	<p>Transition to a backup VHF com radio (if available) or initiate lost communication procedures. Contact the Avidyne Service Center or a dealer for service.</p>

**Unit Overtemp -
Check Cooling**

Unit Overtemp: <component>

<component> will show the name of the component that has 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.

Low Volts

Backlight reduced to 25%

Main supply voltage has fallen to approximately 11VDC. Check the aircraft alternators are on and functional. Consider load shedding the bus that is powering the IFD.

**Manual
Sequence Req'd**

**Altitude invalid - leg will not auto
sequence**

In basic E-M aircraft where the IFD does not have altitude input, this message will appear when the FMS active leg 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.

**No ADS-B
Position**

AXP322 Lost GPS Position Data

ADS-B position data had previously been valid and then transitioned to invalid. Check the ADS-B position source device.

Xpndr Fault

AXP322 Transponder Fault

Any fault other than loss of ADS-B GPS position. Contact the Avidyne Service Center if this persists across power cycles.

No Comm with Xpdr	No Communication with Remote Transponder <p>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.</p>
Radar: Echos Ahead	Radar: Heavy Echos Ahead <p>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.</p>
Radar: Target Alert	Radar: Target Alert Detected <p>Alerts the pilot to the presence of a significant weather cell that exists beyond the currently selected display range.</p>
Radar Sensor Fault	No Communication with Radar Sensor <p>No data is received from the sensor for at least 2 seconds.</p>
Radar Sensor Fault	Radar Data is Invalid <p>The data stream from the radar contains information that should not be used.</p>
Radar Sensor Fault	Sensor mode is <sel>. Selected mode is <rep> <p>The selected mode <sel> does not match the reported mode <rep>.</p>

Radar Sensor Fault	Radar fault code: <codes>
The sensor is reporting the fault codes that are shown.	
TIS Removed	TIS Traffic Removed
TIS traffic communications have ceased for more than 12 seconds.	
TIS Unavailable	TIS Traffic Unavailable
No TIS ground station is available or communications have ceased for more than 60 seconds.	
Too Low, Terrain	Premature Descent, below glide path
TAWS PDA algorithm has determined the aircraft is below glide path.	
Sink Rate	Excessive Descent Rate
TAWS EDR algorithm has determined a potential CFIT scenario is developing - recover the aircraft.	
Don't Sink	Negative climb rate or altitude loss
TAWS NCR algorithm has determined corrective action should be taken immediately.	

<p>TAWS Fail</p>	<p>Invalid GPS Position/Velocity</p>
<p>The GPS solution is lost or the GPS velocity quality parameters drop below required accuracy limits. A “bing-bong” chime is played if this condition occurs. Contact the Avidyne Service Center if this persists across power cycles.</p>	
<p>TAWS System Failure</p>	<p>TAWS Failed Self-Test <reason></p>
<p>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.</p>	

ADVISORIES

Switch Tanks	Switch Tanks
<p>* Ψ</p>	<p>The user configurable "switch tanks" timer has expired. The time between advisories is set on the User Options page.</p>
Datalink Receiver Fault	Broadcast Datalink receiver failure
<p>*</p>	<p>Weather datalink will be unavailable</p>
Datalink <p> Stale	Broadcast <p> Age is greater than <x> minutes
<p>*</p>	<p>The datalink product <p> has not been received for <x> minutes and is now considered stale. "Stale" periods vary with weather product. See the IFD product page on www.avidyne.com for detailed datalink product information.</p>
Datalink Data Not Rcvd	No <p>
	<p>No <p> products have been received. Timeout periods vary with weather product. See the IFD product page on www.avidyne.com for detailed datalink product information.</p>
TFR Ahead	TFR Ahead
<p>*</p>	<p>The aircraft will intercept a TFR within 5 minutes (±30 seconds). This advisory can be enabled or disabled on the FMS setup page.</p>

Set course to <x>°	Selected course / DTK mismatch
<p>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.</p>	
Route Not Loaded	Route Not Loaded
<p>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.</p>	
Route Not Stored	Route Not Stored
<p>Ψ The route cannot be internally stored due to an internal error. If the problem persists across a power cycle of the IFD, contact the Avidyne Service Center for service.</p>	
Intercept Too Sharp	Must Intercept Within 45° of Final Approach Course
<p>* A Direct-To was initiated to the FAF and the resulting intercept angle at the FAF is greater than 45 degrees.</p>	
Gap in Route Ahead	Gap in Route Ahead
<p>Ψ The time to an upcoming flight plan discontinuity is 3 minutes.</p>	
Lateral Offset End Ahead	Approaching End of Flight Plan Lateral Offset
<p>Ψ The time to the end of the lateral offset is 60 seconds.</p>	

**Exiting Hold
At Fix****Exiting Hold At Fix**

- Ψ The hold is armed for exit and is set to sequence upon crossing the hold fix.

**Exiting Hold
At Intercept****Exiting Hold At Intercept**

- Ψ The active HF leg (hold in lieu of procedure turn) is armed for exit and set to sequence at the completion of the inbound turn.

**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

**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.

**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

**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.

**Lightning
Sensor Error****Lightning sensor recoverable fault: <cc>**

- * 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. <cc> is the fault code(s) from the sensor

**Lightning
Sensor Fault****No communication with lightning sensor**

Recommend cycling power to the lightning sensor. If the problem persists, contact a local dealer for service.

Lightning Sensor Fault	Lightning sensor fatal fault: <cc>. Try cycling lightning sensor power
<p>* <cc> 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>	
Lightning Sensor Fault	No lightning sensor data: <ff>
<p>* <ff> is "Heading fault", "GPS fault", "Horz antenna", "Vert antenna", "Sense antenna", "Sensor fault", "Stuck mic", or "Antenna config".</p> <p>Recommend cycling power to the lightning sensor. If the problem persists, contact a local dealer for service.</p>	
Lightning Sensor Fault	Lightning sensor recoverable fault: <cc>
<p>* If the problem persists, contact a local dealer for service.</p>	
Traffic Sensor Fault	Traffic sensor failed to start self test
<p>* If the problem persists, contact a local dealer for service.</p> <p>Ψ</p>	
Traffic Sensor Fault	Traffic sensor altitude unavailable
<p>* If the problem persists, contact a local dealer for service.</p> <p>Ψ</p>	
COM Stuck Mic	Stuck mic timeout, Release PTT
<p>† 25 seconds of continuous transmission have elapsed</p>	

<app> Function Lost	<app> function is not responding
<p>The <app> application (e.g. Datalink, Lightning Sensor, Traffic, etc.) monitored by the IFD stops reporting a status message. If the problem persists, contact a local dealer for service.</p>	
CrossSync Fault	Attempting to re-establish CrossSync
<p>Ψ Dual IFDs have been installed and configured to share data between the units, but there is no communication between the IFDs. If both units are powered on, contact the Avidyne Service Center or a local dealer for service.</p>	
Timer Expired	Timer Expired
<p>Ψ The generic countdown timer has expired.</p>	
<Custom Timer>	<Custom Timer> Expired
<p>Ψ The <custom timer> has expired. Custom timers can be created using the Aux-Util page. This message will persist until the timer has been manually reset.</p>	
IFD Fan Failure	IFD Requires Service
<p>Contact a local dealer for service.</p>	

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.

<Airspace> Ahead

[Airspace name][Lower Altitude Limit] - [Upper Altitude Limit] FT

* The aircraft will intercept an airspace within 5 minutes (± 30 seconds). This advisory can be enabled or disabled on the FMS setup page.

<Airspace> 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

Nav Database Invalid

An Error Occurred While Loading the Nav Database

Consider cycling power to the IFD and if the problem persists, contact the Avidyne Service Center or a local dealer for service.

New TFR Data Ignored	Datalink TFRs reception failure
*	<p>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.</p>
Service Required	IFD On-board battery requires replacement
Ψ	<p>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.</p>
Checklist Error	IFD Requires Service
Ψ	<p>Contact the Avidyne Service Center for service.</p>
Lightning Sensor Config	Lightning sensor antenna config set to: [Bottom Top]
Ψ	<p>Present only on the first power cycle after configuring the IFD for a WX500. This message is principally for installers.</p>
GAD 42 Needs Service	GAD 42 Needs Service
	<p>Contact the Avidyne Service Center for service.</p>
429 Data Not Rcvd	No 429 from input: <ports>
	<p><ports> as display in maintenance mode separated by commas. Contact the Avidyne Service Center for service.</p>

Enable A/P APR	Use the bottom LSK on the FPL tab before A/P APR
For some autopilots, this is the prompt to the pilot to select Approach mode on the autopilot. In these cases, the IFD has neither control nor knowledge of the autopilot mode.	
Hold Course xxx°	Hold Course xxx°
<p>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.</p>	
Teardrop Entry	Teardrop Entry
<p>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.</p>	
Parallel Entry	Parallel Entry
<p>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.</p>	
FLTA Inhibited	FLTA Inhibited
<p>Ψ Aircraft is currently in, or projected flight path takes the aircraft into an airport-induced FLTA inhibit area.</p>	
FLTA Off	FLTA Off
<p>Ψ FLTA has been turned off via the User Options page or via external TERR INHB discrete input.</p>	

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.
Route Upload Ready	A route has been received
	A stored route has been received from an external source (e.g. WiFi). This message is displayed for 5 seconds and then removed.
Waypoint Upload Ready	A user waypoint has been received
	A user waypoint has been received from an external source (e.g. WiFi). This message is displayed for 5 seconds and then removed.
Waypoint Upload Rejected	Waypoint Upload Rejected
	A user waypoint has been received from an external source (e.g. WiFi) but the waypoint was rejected as invalid. Possible causes includes a referenced fix that is not found in the IFD database or doesn't match database coordinates.
Trans Alt xxxFT	Trans Alt xxxFT
	The aircraft is climbing through 250 feet below the transition altitude xxx as defined in the FMS 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 more than 500 feet below the transition altitude.

Trans Level FLxxx	Trans Level FLxxx The aircraft is descending through 250 feet above the transition level xxx as defined in the FMS 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 more than 500 feet above the transition level.
TIS Coasting	TIS Traffic Coasting TIS traffic communications have ceased for more than 6 seconds but less than 12 seconds
Unsupported Bluetooth Input	Unsupported Bluetooth Input - <f> Bluetooth keyboard key <f> was pressed but is not functional with the type of IFD being used. The message is displayed for 5 seconds and then removed.
Radar Sensor Fault	Radar fault code: <codes> The sensor is reporting the non-major fault codes that are shown.
ADS-R/TIS-B Unavailable	Traffic Information Incomplete The aircraft is not in view of an ADS-B ground station for at least 40 seconds or an ADS-B ground station is in view and is specifically reporting that your ADS-B Out signal is non-compliant. The advisory may be normal when descending out of coverage. If the advisory never clears, the most likely cause is that the ADS-B Out device is misconfigured or the ADS-B In receiver is inoperative or misconfigured. The ADS-R/TIS-B Unavailable message is also displayed on the traffic thumbnail.

**UTC
Mismatch**

**UTC Time Mismatch. Please restart IFD
when possible**

The internal clock does not match the time received from the GPS. Power cycling the IFD will update the time.

SELF TEST OUTPUT

For the duration that the notification of legal rights page is displayed during normal power up on the ground, all remote annunciator lamps are lit up and the system generates a specific set of electrical outputs for the purpose of self-test and troubleshooting. 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'
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.

SYSTEM FAILURES

NOTE

Good Airmanship

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

POWER DISTRIBUTION

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

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

LOSS OF IFD

Failure Indication:

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

Functionality Lost:

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

Recommended Pilot Actions:

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 via the top left power knob/button
- After the flight, notify an Avidyne Service Center or Avidyne Customer Support to coordinate for a repair action

LOSS OF DISPLAY

Failure Indication:

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

Functionality Lost:

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

Recommended Pilot Actions:

- Check the cockpit dimming control/rheostat to ensure it is not in the "night" position
- Use other cockpit displays (e.g. CDI, HSI, etc) for crosschecking deviation and position
- Consider cycling power on the affected IFD via the top left power knob

- After the flight, notify an Avidyne Service Center or Avidyne Customer Support to coordinate for a repair action

LOSS OF BEZEL CONTROLS

Failure Indication:

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

Functionality Lost:

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

Recommended Pilot Action:

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

LOSS OF TOUCHSCREEN CONTROL

Failure Indication:

All touch screen inputs are ignored.

Functionality Lost:

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

Recommended Pilot Action:

- Use bezel controls to perform all other functions that are still available
- Verify that touch screen control is not turned off on the User Options – SETUP tab of the AUX page

- Consider cycling power on the affected IFD via the top left power knob
- After the flight, notify an Avidyne Service Center or Avidyne Customer Support to coordinate for a repair action

LOSS OF GPS (DEAD RECKONING)

Failure Indication:

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

Functionality Lost:

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

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

Some safety and alerting functions will be lost if GPS is unavailable including TAWS, FLTA, and 500' 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†, 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 for a repair action

OTHER ANOMALIES

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

SUBSCRIPTIONS

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

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

NIGHT OPERATIONS

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

IFD DISPLAY BRIGHTNESS

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

IFD BEZEL BRIGHTNESS

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

CHARTS LIGHTING SCHEME

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

DISPLAY OF TERRAIN ON MAP

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

NOTE

Chart Data Reliance

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

HIGH TEMPERATURE OPERATIONS

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

COLD TEMPERATURE OPERATIONS

If the IFD had been exposed to extreme 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)

Very Cold Temperatures May Damage Sensors

There is potential for permanent damage to the attitude producing portion of 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.†
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.†
10.0VDC	VHF radio output power reduces to 4W. †
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 VHF Transmission Power Requires 28VDC
 16W radio transmission power is only available as an option in 28VDC aircraft. †

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.†

USE OF GLOVES

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

IFD Glove Qualification Procedure

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

CHARGING FROM THE USB

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

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

COOL FEATURE

Charge Devices From the IFD USB Port

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

TIPS AND TECHNIQUES

Avoid Use of USB Port at Startup

If a device is plugged into the bezel USB port at IFD startup, the unit will boot into maintenance mode. Unless you are intentionally trying to enter maintenance mode at startup, ensure there are no devices inserted in the bezel USB port at startup. The USB port can be used immediately after IFD initialization.

INTEGRATION WITH THE IFD100 MOBILE APP

The Avidyne IFD100 mobile application is designed to fully interact with the panel-mount IFDs. That is to say, the IFD100 behaves as if it were another panel-mount IFD and all of the data sharing functionality and rules of two panel mount IFDs are in practice.

The IFD100 does not have its own GPS or VHF but all other capabilities and functions of the panel-mount IFD is present. In fact, the VHF (com and nav) of the panel-mount IFD can be tuned/changed/edited from the IFD100 mobile app.†

Up to two IFD100 apps can be connected to a panel-mount IFD at a time over WiFi.

The IFD100 application can be downloaded as a free download from the Apple Store. It does not provide any usable functionality without a WiFi connection to an operating panel-mount IFD.

TIPS AND TECHNIQUES

IFD100 Can Connect to IFD Training App

The IFD training app (separate free download from the Apple Store) is capable of transmitting data over WiFi just like the panel-mount IFD units. Therefore you can use the IFD training app to connect to the IFD100 mobile app for practice or training activities. The only real constraint is that each application will need to be running on separate mobile devices (e.g. iPads) and connected via the same WiFi network.

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 fob with a dummy file called “DEMO” (no file type suffix and no quotes) prior to power application. Power up the IFD with that fob 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 fob will exit demo mode and proceed into normal flight mode.

Demo mode can also be exited by removing the USB fob 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.

TIPS AND TECHNIQUES

Flying Behavior in Demo Mode

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.

TIPS AND TECHNIQUES

Altitude Constraints Retained

Altitude constraints entered into a flight plan will be retained across power cycles in stored routes for direct legs but changes to altitude constraints in terminal area procedures will not be retained in stored routes.

TIPS AND TECHNIQUES

Flight Above Terrain in Demo Mode

To ensure flight above the terrain in demo mode, enter altitude constraint(s) in the flight plan 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 fob and cycle power to the IFD.

TIPS AND TECHNIQUES

Some Elements Simulated in Demo Mode

Some aspects of IFD behavior are completely simulated in demo mode. For example, on models equipped with a VHF radio, the radios can be “tuned” in demo mode which will display the entered frequency and the station identifier but the radio isn’t actually channelized to that entered frequency.

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, WiFi, Bluetooth).

WiFi is the fastest, most capable and most real-time method. A list of the applications and devices supported can be viewed at <http://www.avidyne.com/products/ifd/wifi-devices.html>

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.	WiFi
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.	WiFi
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.	WiFi

Data	Transfer Description	Transmission Method(s)
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.	WiFi
Weather	Weather information known by the IFD (XM Datalink, Sirius Datalink, SXM Datalink, FIS-B receiver, etc) is streaming out of the IFD for use by third party device/applications. Outbound from IFD only.	WiFi
User Waypoints	User waypoints are a bi-directional transfer between the IFD and approved third party device/applications. 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.	WiFi, USB
Instrument Approach and Transition	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. Outbound from IFD.	WiFi

Data	Transfer Description	Transmission Method(s)
Fully interactive IFD	The panel mount IFD has complete bi-directional communication with the IFD100 application hosted on a mobile tablet.	WiFi
User Data (User settings, user checklists, user waypoints, stored routes)	User data can be stored on a USB fob device 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 function 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 fob device for importing and use on external devices (e.g. PC download, tech support evaluation, etc). Outbound from IFD only.	USB

Data	Transfer Description	Transmission Method(s)
Database Updates	On-board databases (e.g. nav, chart, obstacle, terrain) can be uploaded to an IFD from a fob device. Inbound to IFD only.	USB
Software Updates	IFD software updates can be uploaded to an IFD from a fob device. Inbound to IFD only.	USB

REGULATORY COMPLIANCE STATEMENTS

RADIO REGULATORY COMPLIANCE STATEMENTS†

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.

DÉCLARATION(S) DE CONFORMITÉ RÉGLEMENTAIRE†

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.

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 get into 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.

STARTING MAINTENANCE MODE AT POWER UP

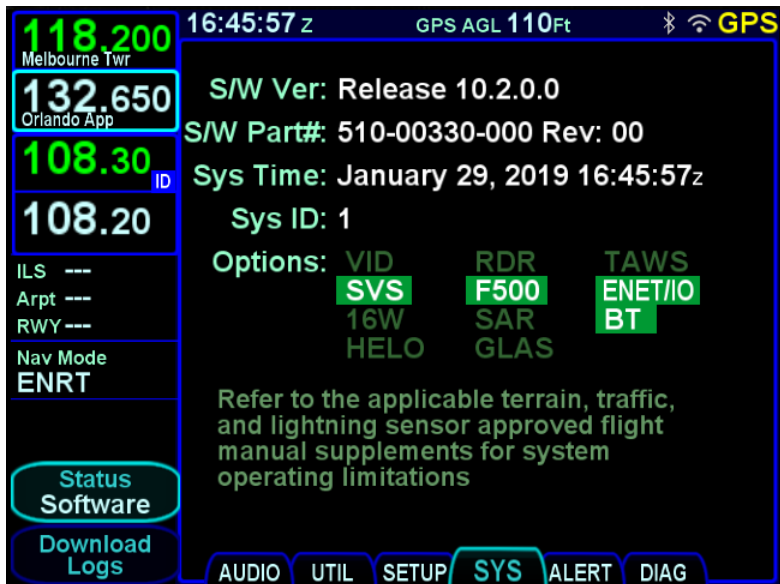
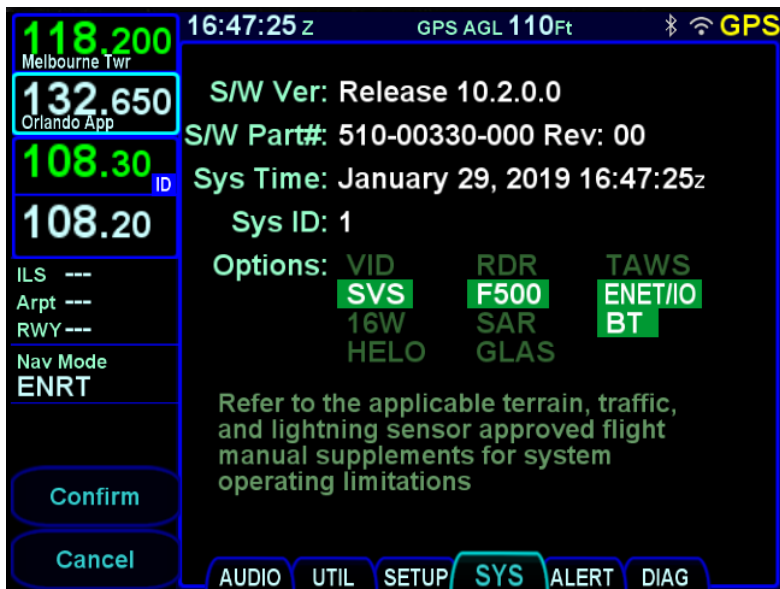
If the IFD is powered off, maintenance mode can be started by inserting a USB fob into the USB port located on the front panel of the IFD. Once the fob has been inserted, apply power to the IFD and the unit will power up into maintenance mode. If the fob is empty, the "Logs" tab will be selected. Otherwise, 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

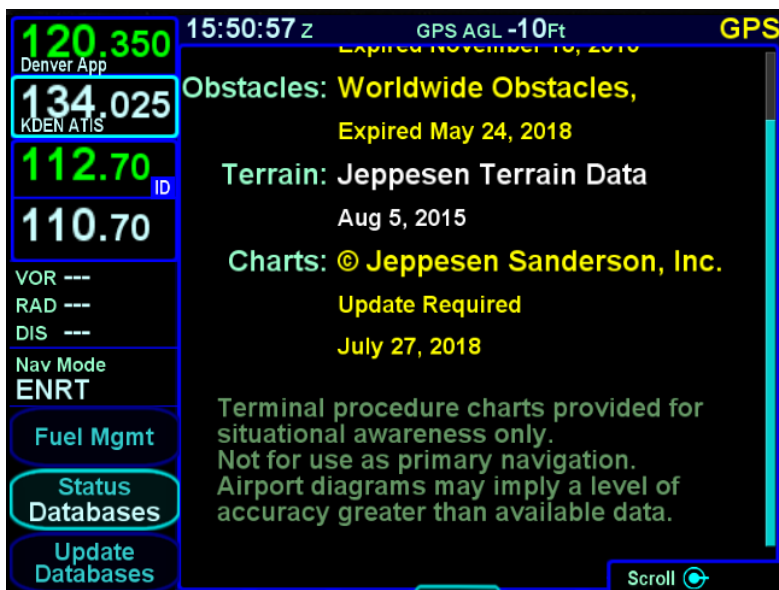
The Download Logs LSK is intended for use when downloading logs. The IFD logs several parameters and events during normal IFD operation. Those logs are often useful for technical support. Press the Status LSK until Software is selected. Then press "Download Logs", which will have appeared by the bottom left LSK (L4). At that point, the LSKs will be changed 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", which will have appeared by the bottom left LSK (L4). At that point, the LSKs will be changed 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. At that point, a "Done" LSK will be presented on the right side of the display, adjacent to the ENRT button. When the Done button is pressed, either by touchscreen or by the ENRT 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 all made through the USB port on the front of each IFD. Updates must be performed in accordance with 14 CFR Part 43, Appendix A. Note that data updates require the use of 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 updated (Jeppesen)
Nav Data	28 days	Airport, airway, navaid, airspace, and FMS data (Jeppesen)
Obstacle Data	56 days	Displayed on map and used for TA and FLTA functions (Jeppesen)
Terrain Data	As required	Displayed on map and used for TA and FLTA functions (Jeppesen). The IFD is shipped from the factory with this database already loaded and updates are anticipated to be a rare occurrence.

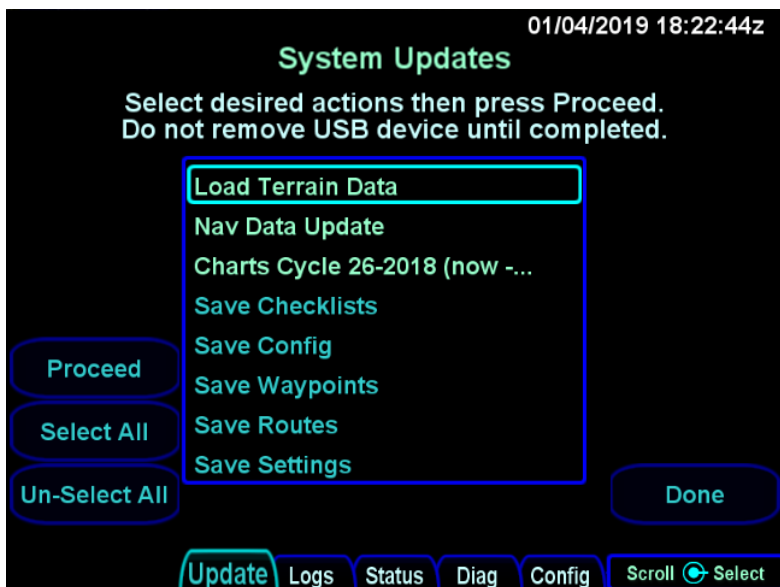
Use one of the formatted fobs supplied by Avidyne (marked by the Avidyne logo printed on one side). In the event you no longer

have those available, either call Avidyne for a replacement fob (a nominal fee will be charged) or purchase a replacement through other means. Acceptable alternative USB drives are FAT32 format, manufactured by WINTEC filemate (<http://www.wintecind.com/features/filemate/usbflashdrives.html>). It is recommended to use drives between 4GB and 16B capacity.

To perform a data update, ensure the data to be updated is placed onto one of the acceptable USB fobs and then start the IFD in maintenance mode (see Maintenance Mode section on page 7-52).

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.

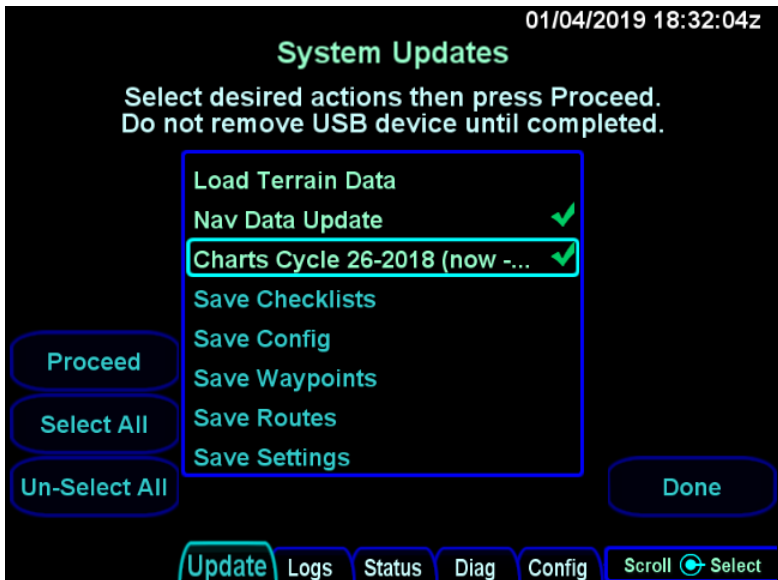
Maintenance mode Update tab



The Update tab in maintenance mode shows a list in the center of the display containing the files on the USB fob (and some other options for saving that are not discussed here). Rotate 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.

TIPS AND TECHNIQUES

Select Only Desired Files For Upload

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

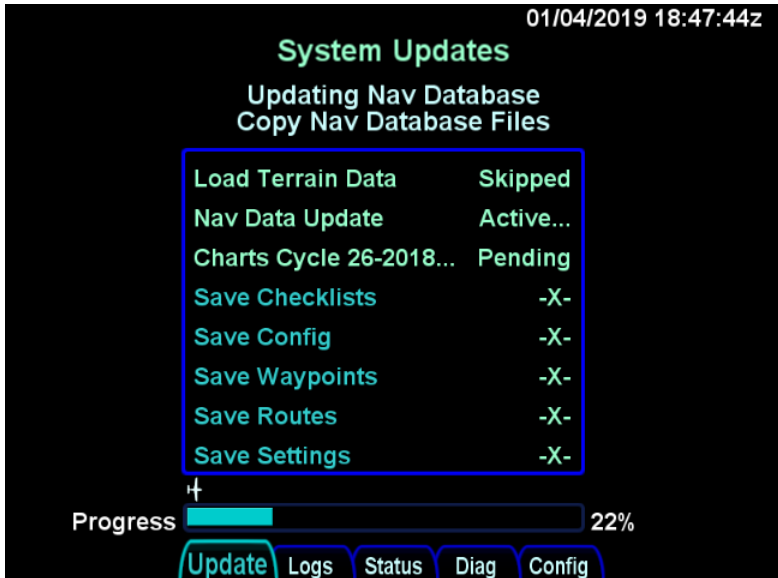
NOTE

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 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



Typical upload times are:

- Worldwide Obstacles (1.5 MB) – 5 sec
- Eastern US Charts (100 MB) – 3min
- US Charts (180 MB) – 5 ½ min
- Worldwide Charts (430 MB) – 13 min
- US Nav Data (8 MB) – 20 sec
- Europe Nav Data (10 MB) – 20-30 sec
- Australian Nav Data (1.5 MB) – 5 sec
- Worldwide Nav Data (15 MB) – 40 sec

NOTE**Each IFD Requires Separate Upload**

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

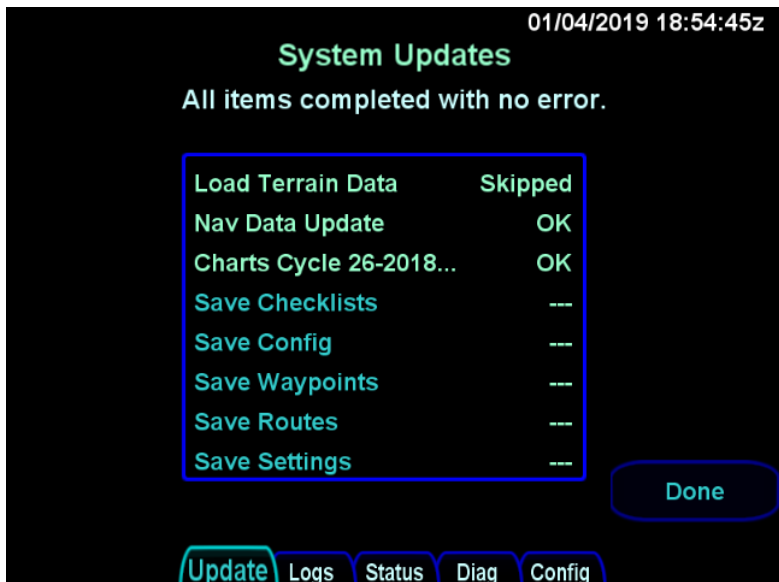
TIPS AND TECHNIQUES

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

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 fob, 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, either try 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 fob and store it in a safe place. If the USB fob is inadvertently left in the USB port during flight mode, there will be no adverse affect as the USB fob 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).

NOTE

Report Observed Discrepancies

Avidyne requests that any observed database discrepancies get reported. These 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.

NOTE

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.

NOTE

Consistent Nav Database Required for Sharing

In dual IFD installations, the nav database loaded on each IFD must be the same in order to allow flight plan sharing between the IFDs.

SOFTWARE UPDATES

With very few exceptions, all software inside the IFDs is capable of being updated via the USB connections as well. This means the IFD does not need to be returned to the factory for any future software updates. The Avidyne position is that any shop that holds a repair station certificate, an A&P, or an Experimental Aircraft owner with log book signoff authority can perform the update. The person performing the update must follow the provided Service Bulletin explicitly and mail/fax/email back in the completed update sheet that is part of the Service Bulletin but Avidyne does not restrict this to just Avidyne Service Centers.

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.

NOTE

Datalogs Usable But Avidyne Property

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

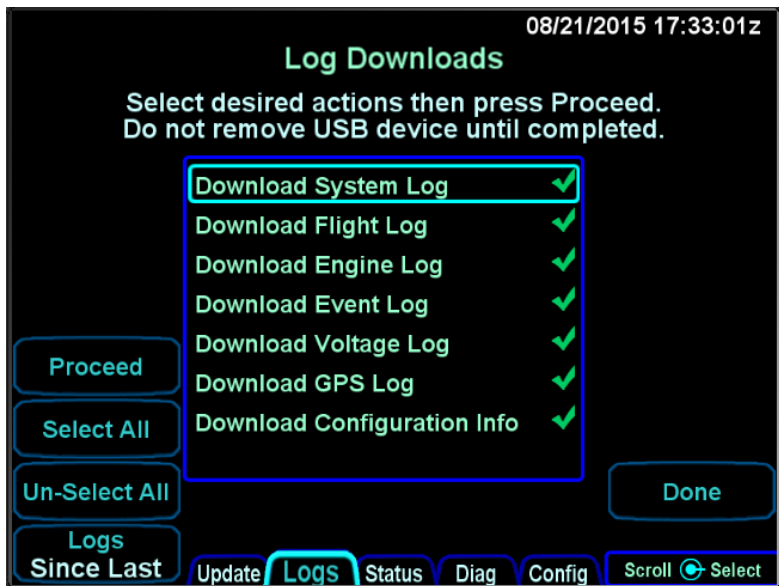
There are seven types of datalogs employed in the IFDs:

- **System Log** – This log provides a record of the navigation state. From this log, you can re-create many aspects of the FMS output and IFD state. It logs at a rate of approximately 1Hz
- **Flight Log** – This log provides a detailed record of your aircraft state as measured by the various IFD sensors. It logs at a rate of approximately 5Hz
- **Engine Log** – This log provides details on fuel flow system data (if configured). It logs at a rate of approximately ¼ Hz
- **Event Log** – This log contains miscellaneous data such as all alerts, keystrokes, system status and error messages, etc. It is designed to be a diagnostics log for Avidyne Service Center technicians and not expected to be used by owners/operators. It logs at an on-condition rate
- **Voltage Log** – This log contains internal diagnostic data such as the voltages and currents on sub-system boards, temperatures and internal fan status. It logs at a rate of approximately 1Hz
- **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 7-52). Once maintenance mode has started, press the right side of the AUX page function 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 fob 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 to download have 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 process 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 fob, 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. Note that files can easily contain 50MB or more of data.

Data included in the files are as follows:

System Log

Date/Time stamp	GPSS state
Power On	OBS value
OAT, if available	Desired track
Localizer deviation	Nav frequency

Glideslope deviation	Course select value, if known
Ground speed	Nav type
Ground track	VOR course
Crosstrack deviation	GPS altitude
Vertical deviation	Distance to active waypoint
Display mode	FMS course
Nav mode	Active waypoint information
GPS parameters	FLTA Status
Magnetic Variation	

Flight Log

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

Engine Log

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

Voltage Log

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

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.

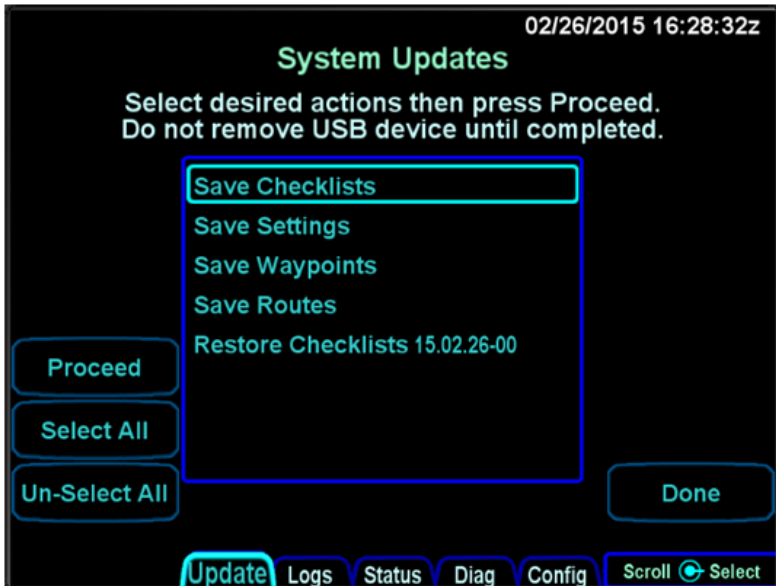
Configuration Log (Number of parameters in parenthesis which are saved in the form of multiple text “.txt” files)

Local Unit Port Configurations (47)	Cross-side Port Configurations (47)
GPS Antenna (x)	System Configuration – SW versions, part numbers, chassis ID (145)
Dimming Settings (23)	Aircraft Tail Number (1)
Chart State – validity dates, identifier (6)	Datablock selections (32)
User Options selections (33)	FMS Setup settings (38)
Map Setup settings (80)	Map Declutter selections (58)
System Time Since Power On (1)	Frequency List values (80)
Com Preset values (16)	Com-Nav Audio States (21)
GDL69 Settings (2)	VHF Com Values (5)
VHF Nav Values (5)	Lightning Sensor Configuration (4)
OBS Cal Bias data (2)	Video Settings (16)
Paid Options (11)	Radar Settings (6)
WiFi Settings (5)	

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 via this procedure.

User Data Save and Restore Options



SAVING USER DATA

Ensure a properly formatted fob is installed in the IFD.

Start the IFD in maintenance mode (see Maintenance Mode section on page 7-52). 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 fob and/or the files on the fob somewhere secure.

RELOADING PREVIOUSLY STORED USER DATA

Ensure the fob containing the previously stored user data is installed in the IFD.

Start the IFD in maintenance mode (see Maintenance Mode section on page 7-52).

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 fob via the simulator.

The possible states that can 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 passed over	Skipped ...
Completed with no error	OK
Completed with error	ERR

CONFIGURING WIFI

The WiFi system inside the IFD is a system that uses.

The IFD has built-in WLAN, 2.4 GHz WiFi capability supporting IEEE 802.11 A, B, G, and N protocols. The IFD WiFi can be configured to function either as a Wireless Access Point (WAP) or as a client to an external network. If the IFD is configured as a WAP, it sets up a local network to which other devices can be connected. If the IFD is configured as a client, it will connect to the external network and communicate with other devices that have also connected to that network. The choice of configuration method depends upon what other equipment is onboard the aircraft. Typically, if you have a unit such as a Stratus[®], the IFD is configured as a client. Otherwise, the IFD is configured as a WAP.

The IFD can have up to four WiFi network configurations defined. The configurations can be any mix of WAP or Client. The network configurations are defined using maintenance mode and then the one to be used is selected on the Setup page in flight mode.

DEFINING WIFI NETWORK CONFIGURATIONS

To define a WiFi network configuration, start the IFD in maintenance mode (see Maintenance Mode section, page 7-52). Select the "Config" tab by either using the AUX button or by touching the tab. Then, rotate the right outer knob until the Network Configuration page is displayed.

Maintenance mode Network Configuration Page

12/13 01/04/2019 22:29:03z

Network Configuration

SSID / Name	PSK	Mode
LIO_WIFI	abcdef1234	Local Wi-Fi
avidyne_secure		Remote Wi-Fi
		Local Wi-Fi
		Local Wi-Fi

Static IP Address to Use: 127 . 0 . 0 . 1

Update
Logs
Status
Diag
Config
Item
Select

Each network configuration is defined by three settings, as follows:

- SSID / Name - the name of the network. For a WAP configuration, this will be the SSID transmitted by the IFD. For a client configuration, this is the SSID of the network to which the IFD will connect.
- PSK - the network password. For a WAP configuration, this will be the password that connecting devices will have to enter in order to join the network. For a client configuration, this is the password for the network to which the IFD will connect.

- Mode - the mode of the configuration. To define a WAP configuration, select "Local Wi-Fi". To define a client configuration, select "Remote Wi-Fi".

To start editing the network configurations, press the right knob button. The first SSID/Name field will be surrounded by a cyan cursor. To move the cursor between fields, rotate the right outer knob.

When finished defining the desired network configurations, exit maintenance mode using the "Done" LSK on the Update tab.

Entering the network SSID/Name and PSK

The SSID/Name and PSK fields are free text fields. Start editing the field either by pressing the right knob button or by rotating the right inner knob. The field will turn green and a small underline-style cursor will appear below the character position that is being edited. Rotate the right inner knob in either direction until the desired character is displayed. Then rotate the right outer knob clockwise to advance the cursor to the next character. Repeat this process until the desired SSID has been entered into the field. Complete the edit by pressing the right knob button. At that point, the cursor will disappear. To continue editing other fields, press the right knob button again to show the cursor.

Network Configuration - entering SSID/Name and PSK

The screenshot shows the 'Network Configuration' screen. At the top left is '12/13' and at the top right is '01/04/2019 22:29:51z'. The title 'Network Configuration' is centered. Below it is a table with three columns: 'SSID / Name', 'PSK', and 'Mode'. The 'SSID / Name' column has two rows: 'LIO_WIFI' (highlighted with a green box) and 'avidyne_secure'. The 'PSK' column has one row: 'abcdef1234'. The 'Mode' column has four rows: 'Local Wi-Fi', 'Remote Wi-Fi', 'Local Wi-Fi', and 'Local Wi-Fi'. Below the table is a row for 'Static IP Address to Use:' with the value '127 . 0 . 0 . 1'. At the bottom are five buttons: 'Update', 'Logs', 'Status', 'Diag', and 'Config' (highlighted with a green box). To the right of these buttons are 'Text' and 'Edit' (with a circular arrow icon).

SSID / Name	PSK	Mode
LIO_WIFI	abcdef1234	Local Wi-Fi
avidyne_secure		Remote Wi-Fi
		Local Wi-Fi
		Local Wi-Fi

Static IP Address to Use: 127 . 0 . 0 . 1

Update Logs Status Diag Config Text Edit

To delete characters from the end of the field, turn the inner knob until a space character is shown.

NOTE

Spaces at the end of the PSK will not be contained in the final PSK. In other words, "PASSWORD<SP><SP>" will present a network PSK of "PASSWORD".

Non empty PSKs must contain at least 8 characters. If there are fewer than 8 characters, the system will fill missing characters with a '?' character.

Empty PSKs are allowed, though not recommended.

Entering the network mode

The mode is a fixed selection field that can contain either "Local Wi-Fi" or "Remote Wi-Fi". To change the selection, rotate the right inner knob. Again, "Local Wi-Fi" should be selected to make the IFD be the network WAP and "Remote Wi-Fi" should be selected to connect the IFD as a client on another network.

TIPS AND TECHNIQUES

If you sometimes connect your IFD100 through a Stratus and other times directly to the IFD, define two WiFi configurations in maintenance mode.

When you want to switch between configurations, you can do that using flight mode only.

SELECTING A NETWORK CONFIGURATION

After one or more WiFi network configurations has been defined in maintenance mode, flight mode is used to select which of those configurations is to be used.

Start the IFD in flight mode. Acknowledge any startup screens, go to the AUX page SETUP tab, and then select the "User Options" LSK. Using the right outer knob, move the cursor to the "Networking" item in the list.

With the cursor around "Networking", use the right inner knob to select the desired SSID/Name. WiFi can be disabled by selecting "Off".

NOTE

When using the inner knob to select a WiFi configuration, options for "Local Wired", "Remote Wired" and "Static IP" may appear. Those options should not be selected as they are not applicable to WiFi operations.

NOTE

When switching between different WiFi configurations, the IFD may take up to 30 seconds to complete the switch.

CONFIGURING WIRED ETHERNET

The IFD has the capability to communicate over a wired ethernet connection. While that capability is described here, **it is neither authorized for general use nor is it covered by an STC.**

CONFIGURING AS A NETWORK SERVER

The IFD can act as a server on a wired network, performing DHCP functions allowing client nodes to connect to it. To configure the IFD as a server on a wired network, only flight mode operations are required.

Restart the IFD in flight mode, select the Aux page SETUP tab, and then select the "User Options" LSK. Using the right outer knob, scroll down to the "Networking" option. Then use the right inner knob to select "Local Wired".

CONFIGURING AS A NETWORK CLIENT

The IFD can connect to an existing network using DHCP. To configure the IFD in this manner, only flight mode operations are required.

Restart the IFD in flight mode, select the Aux page SETUP tab, and then select the "User Options" LSK. Using the right outer knob, scroll down to the "Networking" option. Then use the right inner knob to select "Remote Wired".

CONFIGURING AS A CLIENT WITH A STATIC IP

To configure the IFD with a static IP address on a wired network, start the IFD in maintenance mode. Select the "Config" tab by either using the AUX button or by touching the tab. Then, rotate the right outer knob until the Network Configuration page is displayed. Press the right knob button to enable a cursor, then use the right outer knob to move to the first octet. Rotate the right inner knob to select the desired number. Repeat the outer knob/inner knob process until the correct IP address is shown. Exit maintenance mode using the "Done" LSK on the Update tab.

Restart the IFD in flight mode, select the Aux page SETUP tab, and then select the "User Options" LSK. Using the right outer knob, scroll down to the "Networking" option. Then use the right inner knob to select "Static IP".

PAIRING A BLUETOOTH® KEYBOARD

The IFD has built-in Bluetooth capability that allows pairing with a remote keyboard. The keyboard can be used to easily enter waypoint identifiers, but it can also be used to change pages, move cursor, and tune radios.

As with all Bluetooth devices, a keyboard must be paired with the IFD before use. This pairing only needs to be done once and then that specific keyboard can be used every time the IFD is powered up.

NOTE

Dual IFD Installations Should Only Pair 1 IFD

To avoid issues arising from a keyboard only being able to pair with one device at a time, dual IFD installations should turn off Bluetooth in the User Options page on one IFD.

NOTE

Acceptable Bluetooth Keyboards

Due to certification constraints, only Avidyne supplied Bluetooth keyboards will be functional.

Before attempting to pair a Bluetooth keyboard, ensure the keyboard has adequate charge, then turn it on using the switch on the left side. Then, ensure that the Bluetooth option is turned on in the IFD User Options page (Aux Page - Setup tab).

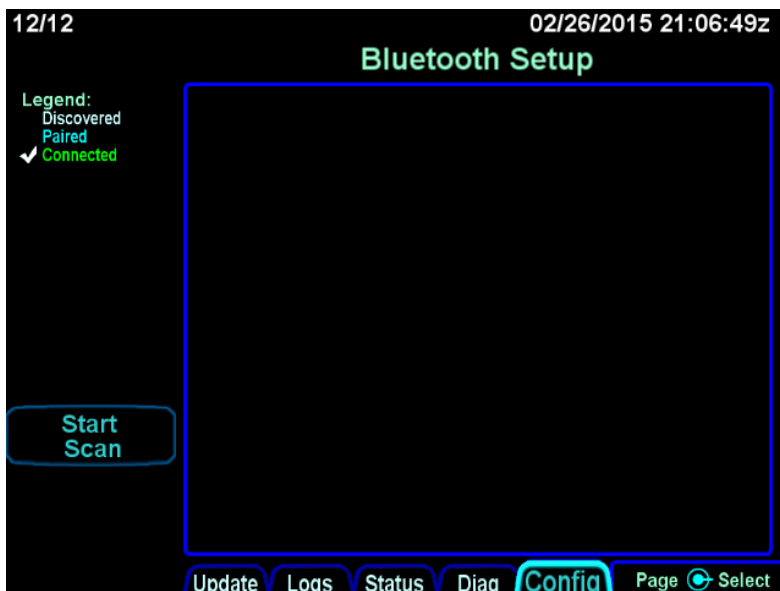
To start the pairing process, start the IFD in maintenance mode (see Maintenance Mode section, page 7-52). Select the "Config" tab by either using the AUX button or by touching the tab. Then, rotate the right outer knob until the Bluetooth Setup page is displayed. Wait until the IFD has been powered on for at least one minute.

Press the button on the back of the keyboard to make it discoverable. Then, press the "Start Scan" LSK on the IFD. After

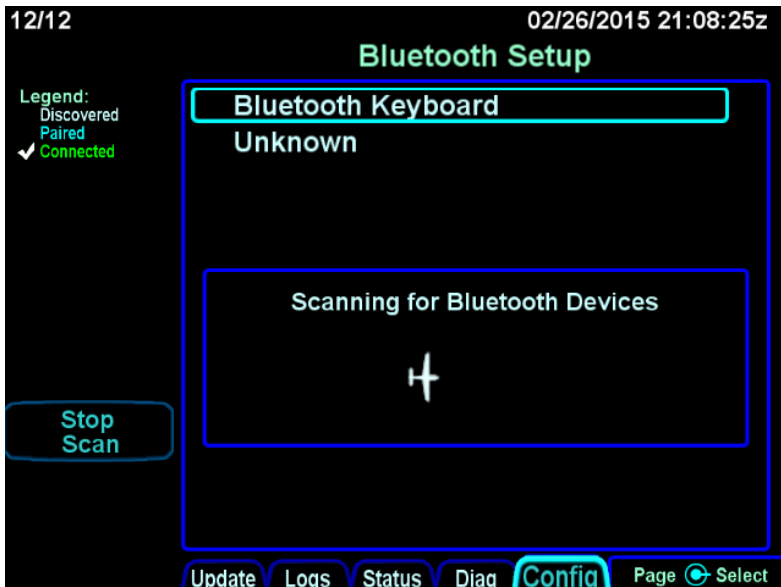
a while, the IFD will discover the keyboard and it will appear on the list of devices shown on the screen. At that point, press the "Stop Scan" LSK.

After "Stop Scan" has been pressed, rotate the right outer knob to move the cursor to the desired device. Press the "Pair Device" LSK and wait for a numeric pairing code to appear.

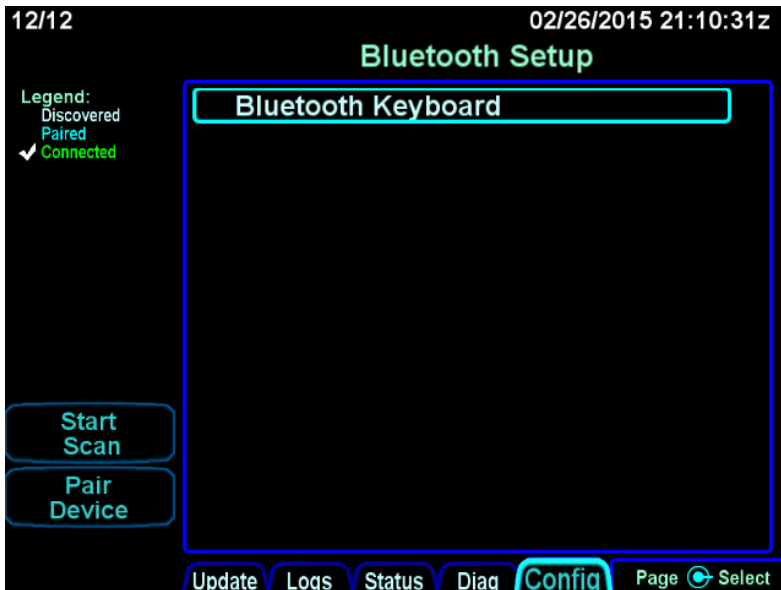
Bluetooth pairing - Start Scan LSK



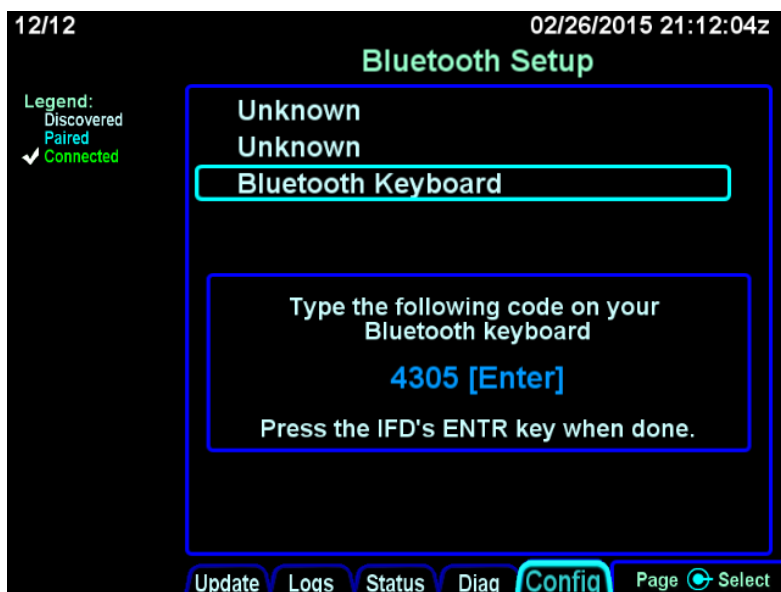
Bluetooth pairing - keyboard discovered



Bluetooth pairing - Pair Device LSK

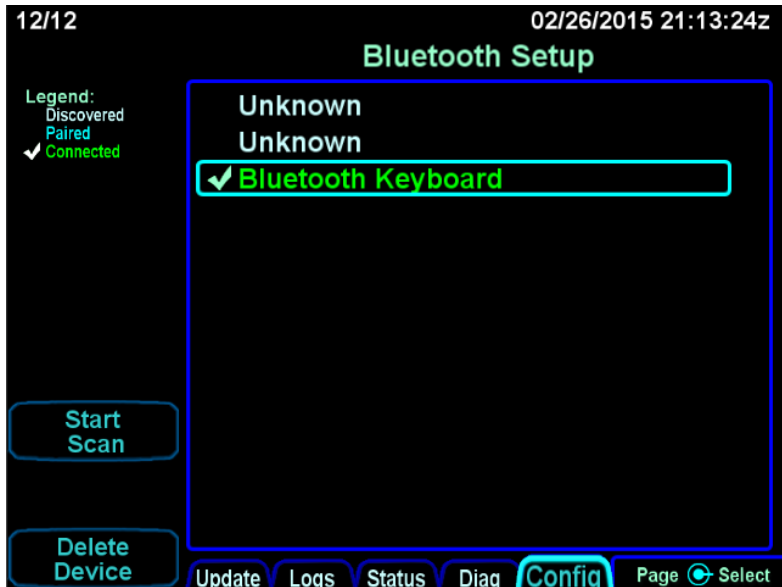


Bluetooth pairing - pairing code



On the keyboard, enter the numeric code followed by the ENTR key. If pairing was successful, the selected device in the list will be shown in green.

Bluetooth pairing - pairing successful



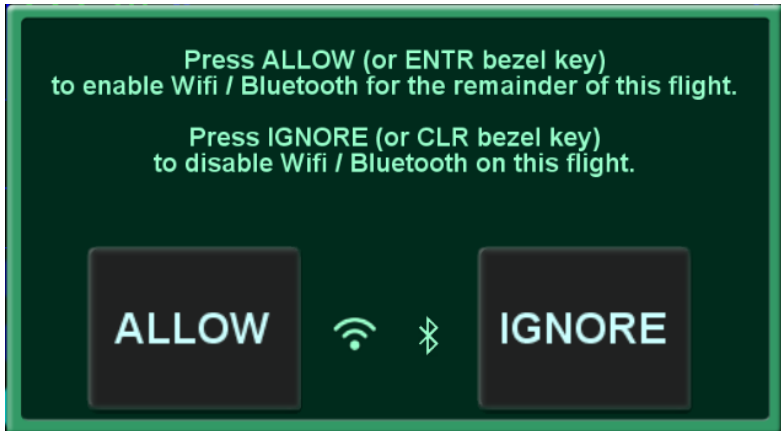
If the device is not shown in green or if the device name disappears from the display, restart the pairing process with pressing the button on the back of the keyboard. If repeated attempts to pair are unsuccessful, contact Avidyne Technical Support.

After successful pairing, exit maintenance mode by pressing the "Done" LSK on the Update tab.

VERIFICATION OF SUCCESSFUL PAIRING

Start the IFD in flight mode. As the IFD is starting in flight mode, a pop-up message will appear asking to confirm that the use of a remote keyboard is authorized. Touch "Allow" or press the ENTR button on the IFD to authorize the use of the keyboard.

Bluetooth / WiFi Confirmation Pop-Up



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.
- Press COM followed by "118.0" on the Bluetooth keyboard. Verify that the com radio is tuned to 118.0†
- 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 AND TECHNIQUES**Common Mistake with Bluetooth Legend**

A common mistake is to interpret the Bluetooth Setup status legend in the top left corner of the Bluetooth Setup page as the actual state of Bluetooth.

TIPS AND TECHNIQUES**“Inoperative” Bluetooth Keyboards**

The most likely reasons why a previously paired keyboard appears non-functional or inoperative is due to lack of charge or the Bluetooth setting on the User Options page is set to Off.

TIPS AND TECHNIQUES**Physically Secure the Keyboard**

A common and effective technique to physically secure the keyboard in the cockpit is to apply Velcro to the back surface and find somewhere accessible but out-of-the-way for the mating Velcro material.

TIPS AND TECHNIQUES**Connect/Disconnect Keyboard Connection**

Pressing the pair key on an already connected keyboard will disconnect it. If this happens, the keyboard will need to be power cycled to reconnect. A paired keyboard normally tries to connect when it is turned on, but will also retry if any key is pressed.

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 specific IFD.

TIPS AND TECHNIQUES

Keyboard Status Indications

A solid green LED lamp indicates the keyboard is connected. A flashing green LED indicates it is trying to pair. A yellow LED is lit every time a keystroke is sent to the IFD. While charging, the red LED turns on and grows dimmer as the charge increase. When fully charged, the red LED is extinguished. Leaving the keyboard plugged in after the charge is complete will decrease the battery life.

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)	No HTAWS enablement. This corresponds to Rev C of the 190-00357-08 Garmin Install Manual.
IFD510	500 500W	4.01 (Main)	No HTAWS enablement. This corresponds to Rev C of the 190-00357-08 Garmin Install Manual.

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

Unsupported 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.
Fixed Wing Terrain Awareness and Warning System – TAWS	TSO C-151c functionality is all present in the IFD however the IFD does not hold the TSO C-151c approval and therefore may not take credit in aircraft where TSO C-151c compliance is required.

Unsupported 500/530 Functionality	Comments
Helicopter Terrain Awareness and Warning System)-HTAWS	TSO C-194 HTAWS is not supported on the IFD.

NOTE**TAWS/Other Audio Output Wiring to Audio Panel**

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.

NOTE**ADS-B and Air/Ground Output Wiring to Transponder**

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.

TIPS AND TECHNIQUES**Multiple Integration Options**

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.

INDEX

A

Abnormal Procedures · 7-27
 Activate Leg · 3-34
 ADS-B Traffic · 4-45
 Advisories · 7-14
 AIRMETs · 4-25
 Alerts · 5-66
 Airspace · 4-9
 Excessive Descent Rate · 4-41
 Transition Altitude/Level · 6-19
 Altitude Constraint · 3-16, 3-44
 On Map · 4-16
 Approach · 3-30
 Back Course · 6-25
 GPS-Based Precision · 6-25
 Non-Precision · 6-25
 Precision · 6-24
 Procedures · 6-22
 VHF Based (Precision) · 6-24
 WAAS · 6-26
 Armed Mode (Navigation) · 6-13
 Arrival · 3-30
 ARS · 2-23
 Audio Tab · 5-2
 Aural Alerts · 5-49
 500 foot callout · 4-36
 Auto VLOC Tuning · 6-18

B

Backlight
 Bezel · 5-41
 Display · 5-41
 Keyboard · 1-45

 Night Operations · 7-33
 Backup/Restore · 7-69
 Before Takeoff · 1-55
 Bezel Layout · 1-12, 1-13
 Bluetooth
 Antenna · 1-14
 Keyboard · 1-19, 1-44
 Pairing · 7-79
 User Option · 5-44
 Bottlang Charts · 4-60
 Brightness
 Bezel · 5-41
 Display · 5-41
 Night Operations · 7-33
 Overview · 1-16
 Video · 4-74

C

Calculators · 5-11
 CAS · 7-2
 Caution/Warning System · 7-2
 Cautions · 7-6
 CDI Scaling · 6-21
 Chart
 Extents · 3-36
 Hot Link · 3-36
 Chart Tab · 4-59
 Checklist · 5-15
 CLR Key · 1-39
 Cold Temperature · 7-36
 Color Philosophy · 1-11
 Com Presets · 5-6
 Course Change · 6-17
 CrossSync · 1-46
 Cursor Centered View · 3-8

D

Data Transfer · 7-46

Database

 Currency · 5-56

 Currency States · 1-20

 Discrepancies · 7-62

 Inconsistency · 1-49

 Nav · 7-55

 Status Page · 5-56

 Terrain · 4-30

 Updates · 7-55

Datalink Status · 5-59

Datalink Weather · 4-18

Datalogs · 7-64

Dead Reckoning · 7-30

Demo Mode · 7-43

Density Altitude · 3-39

Departure · 3-9

 Vector SID · 3-9

Direct To · 1-36

Discontinuities · 3-27

 During Approach · 6-23

E

EGNOS · 5-58

Enable Missed · 2-14, 2-15, 5-48,
6-30

Enhanced Vision System (EVS) · 4-
74

European VFR Charts · 4-60

Excessive Descent Rate · 4-41

Exocentric View · 4-52

F

Field Of View · 2-2, 2-15

FIS-B · 4-21

Flight Plan

 Activating · 3-24

 Approaches · 3-30

 Arrivals · 3-30

 Compact View · 3-8

 Creating · 3-4

 Cursor Centered View · 3-8

 Deleting · 3-18

 Departures · 3-9

 Expanded View · 3-8

 Inverting · 3-46

 Mini Row Format · 3-6

 Preview · 3-6

 Saving · 3-45

 Sequencing · 3-24

FLTA · 4-30

FMS · 3-1

 FPL Page · 3-2

 Info Page · 3-38

 Nearest Page · 3-53

 Routes Page · 3-42

 Waypoints Page · 3-49

FMS Hooks · 6-14

FMS Philosophy · 6-16

Frequency

 Decoding · 1-26

 Emergency · 1-29

 List · 1-31

 Multiple Standby · 1-25

 Remote Tuning · 1-30

 Swap · 1-13, 1-25, 1-30, 1-45

Fuel Management · 5-54

Fuel range rings · 4-10

Function Keys · 1-38

G

Gap In Route · 3-27
 Geofill · 3-5
 GLONASS · 5-58
 Gloves · 7-39
 GPS Status · 5-57
 Graphical Flight Planning · 4-14

H

Heading Horizon Tick Marks · 2-6
 Hide Page Tabs · 5-52
 High Temperature · 7-35
 Holding Pattern
 Creating · 3-18
 Deleting · 3-23
 Editing · 3-24
 Horizontal Dev. Indicator · 2-14
 HSI · 6-1

I

ICAO Flight Plan Codes · 6-36
 IFD100 · 7-42

K

Keyboard
 Bluetooth · 1-44
 Convenience Mode · 1-46, 5-44
 Pairing · 7-79
 Virtual · 1-41

L

Lateral Offset · 3-25
 Line Select Keys · 1-9
 LNAV · 6-27
 LNAV/VNAV · 6-27
 LNAV+V · 6-27
 Local Time Offset · 5-43
 LP · 6-28
 LP+V · 6-28
 LPV · 6-26, 6-28

M

Manual Sequencing · 6-3
 Map
 Decluttering · 4-12
 Panning · 4-13
 Pop-Up · 4-16
 Map Features · 4-6
 Map Pages · 4-1
 Map Tab · 4-2
 Messages · 7-5
 METAR · 4-17
 METAR Flag · 3-37, 3-40, 3-54
 Metric Units · 5-50
 MGRS · 5-52
 Min Safe Altitude (MSA) · 5-32
 Missed Approach · 6-30
 Multiple Destinations · 3-30
 Multi-touch · 1-7

N

Nav Database · 1-18, 3-19, 4-14, 4-44, 5-56, 6-18, 7-20, 7-55
 Nav Mode Switching · 6-23

Nav Source Knob · 6-4
Navigation Modes · 6-21
Negative Climb Rate · 4-42
Night Operations · 7-33
NRST Key · 3-55

O

OBS Mode · 6-8
Obstacles
 Database · 5-56
 Map · 4-31
 Symbology · 4-6
 Synthetic Vision · 2-8
Orbit · 3-20

P

Page Function Keys · 1-9, 1-17
Page Layout · 1-22
Paste Button · 3-13
Pitch Chevrons · 2-22
Power
 Button · 1-15
 Distribution · 7-27
 High · 7-38
 Low · 7-37
 On/Off Control · 1-13
Premature Descent Alert (PDA) · 4-39
PROC Key · 3-33

R

Radar Tab · 4-67
Radial Intercept
 FMS Method · 3-17

VLOC Method · 3-18
Radio
 Com · 1-24
 Monitor · 1-26
 Nav · 1-24
 Satellite · 5-4
 Tuning · 1-27
RAIM · 5-13
Range To Altitude Arc · 3-29
Retry Approach · 6-33
RNAV · 6-26
RNP · 6-35
Route Preview · 3-45
Rubber Banding · 4-14

S

Self Test · 7-26
Setup
 Datablocks · 5-20
 FMS · 5-38
 Map · 5-36
Shared Data · 1-46
SIGMETs · 4-25
Slide-In Replacement · 1-12, 7-88
Software Status Page · 5-55
Software Updates · 7-63
Split Pages · 1-23
 Map-FPL · 3-35
 Map-Nearest · 3-54
Squelch · 1-13
Standby Com · 1-24, 5-6
Start-Up Sequence · 1-17
Stored Route · 3-42
 Activating · 3-47
 Copying · 3-44
 Creating · 3-43
 Deleting · 3-48
 Editing · 3-43

Inverting · 3-46
 Naming · 3-43
 Stuck Mic · 1-30
 Subscriptions · 7-32
 Sunrise/Sunset · 3-39, 5-12
 SYS Tab · 5-54
 System Failures · 7-27
 System Settings · 5-54
 Sythetic Vision · 2-1

T

TA · 4-30
 TAWS-B · 4-37
 Terrain Awareness · 4-30
 TFR · 4-26
 Three Dimesional (3D) Traffic · 2-3
 Timers · 5-8
 TIS-B · 4-45
 TOD · 3-28
 Top Of Descent · 3-28
 Total Velocity Vector (TVV) · 2-2
 Touch Screen
 Cleaning · 7-87
 Enable/Disable · 5-40
 Loss of control · 7-29
 Multi-touch · 1-8, 1-40
 Performance · 1-43
 Use of gloves · 7-39
 Traffic Display · 4-44
 Transition Altitude · 6-19
 Transition Level · 6-19
 Transponder
 Control · 1-33
 Datablock · 5-21, 5-26
 Default Code · 5-45
 Wiring · 7-89

U

USB · 1-13, 7-46, 7-55
 Charging · 7-41
 User Options · 5-39
 User Settings · 5-53
 User Waypoints · 3-49
 As an airfield · 3-50
 Creating · 3-49
 Deleting · 3-50
 Naming · 3-50
 UTM · 5-52

V

Vectors To Final · 6-14, 6-22, 6-29,
 6-33
 Vertical Dev. Indicator · 2-14
 Video Tab · 4-74
 Volume Control · 5-2
 VOR
 Approach · 6-25
 Automatic Tuning · 3-25, 5-47
 Course Depiction · 6-12
 Nearest · 3-53
 VSR · 5-31

W

WAAS Operations · 1-53
 Warnings · 7-5
 Waypoint
 Delete · 3-15
 Edit · 3-16
 Insert · 3-12
 Weather Radar · 4-28
 WiFi · 1-50

Dual Installation · 1-54

On/Off · 5-44

Password · 1-51

Winds · 4-24

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