AF-5000 Pilot's Guide

AF-5000 Series Post Installation Check

⚠️ **CAUTION:** Do not fly the aircraft until the following check list has been completed.

Never Power the system with an automotive battery charger and the aircraft battery disconnected.

Before Power is applied for the First Time

- ✓ **Screen mounted following the installation manual**
- ✓ **ADAHRS mounted**
- ✓ **Screen case has been properly grounded using case screw**
- ✓ **Wiring harness is properly connected to screen**
- ✓ **Verify relay protection diodes are installed on all large aircraft relays (Master, Starter)**
- ✓ **Pitot/Static and AOA plumbing is secured to the correct ADAHRS ports**
- ✓ **Trim Servo indication wires are connected per the installation manual wiring diagram**
- ✓ **Verify Aircraft battery + and – are correct**

Applying Power for the First Time

- ✓ **Turn on aircraft Master Switch power and power on the screens**
- ✓ **Verify the unit powers on**
- ✓ **Configure Advanced SV-Network on PFD EFIS**
  - ○ **[SET] > [CAL] > 2. Advanced SV-Network**
  - ○ **[SCAN] Network**
  - ○ **[UPDT] device software**
- ✓ **Configure your Serial Ports based on devices connected**
- ✓ **Configure your GPS/NAV Settings based on Serial Port selection**
- ✓ **Configure AirData, AHRS and EMS Type in CAL > ADMIN Settings**
- ✓ **Following the installation manual, calibrate the Fuel Tanks**
- ✓ **Following the installation manual, calibrate all trim and flap position sensors**
- ✓ **Set the airspeed V speeds based on your aircraft manufacturers recommendations.**
- ✓ **Set all engine temperatures/limits based on your engine manufacturers recommendations**
- ✓ **Set fuel tank, fuel pressure, fuel pressure, oil temperature, and oil pressure warning parameters**
- ✓ **Verify all GPS and NAV sources are properly communicating with the EFIS.**
- ✓ **Set the clock time-zone offset**

First Engine Start

- ✓ **With relay protection diodes installed, your AFS screen(s) can be turned on before the engine is started.**

- ✓ **After the engine has started, verify oil pressure and temperature. If none is indicated SHUT DOWN the engine. Verify all wiring and consult your local A&P, the engine manufacturer, and/or AFS technical support.**

- ✓ **Verify all engine indications are correct per your engine manufacturers manual**

Before First Flight

- ✓ **Verify you have the latest system software and mapping data (if applicable) - www.Advanced-Flight-Systems.com for latest software and map data.**

- ✓ **Weight & Balance page updated with your aircrafts data**

- ✓ **Checklist pages updated with information from your aircraft manufacturer**

- ✓ **Magnetometer Alignment completed on all screens with an ADAHRS installed**

- ✓ **EFIS AOA Calibration Checklist completed**

- ✓ **Pitot/Static check completed from an authorized FAA Repair Station.**

- ✓ **EFIS and autopilot gains are set per the installation manual**

In-Flight Configuration

- ✓ **Verify airspeed and altitude indicate correctly**

- ✓ **Verify heading indicates correctly using a backup whiskey compass for reference**

- ✓ **Test navigation sources and verify they function properly**

- ✓ **If an autopilot is installed and coupled to the EFIS, check its functions**

After First Flight

- ✓ **Calibrate Fuel Flow K-Factor (See Installation Manual)**

 AOA FLIGHT WARNING:

The EFIS may be shipped with AOA aircraft calibration data pre-installed. If you choose to use this data, you must verify the validity of the data or calibrate the AOA to meet your specifications before using. You must also read and understand the separate AOA manual before using the AOA instrument in flight

LIMITED WARRANTY / AGREEMENT

Advanced Flight Systems Inc. ("AFS") warrants its aircraft monitoring system instrument and system components to be free from defects in materials and workmanship for a period of one year commencing on the date of the first flight of the instrument or one year after the invoice date, whichever comes first. AFS will repair or replace any instrument or system components under the terms of this Warranty provided the item is returned to AFS prepaid.

This Warranty shall not apply to any unit or component that has been repaired or altered by any person other than AFS, or that has been subjected to misuse, abuse, accident, incorrect wiring, or improper or unprofessional installation by any person. THIS WARRANTY DOES NOT COVER ANY REIMBURSEMENT FOR ANYONE'S TIME FOR INSTALLATION, REMOVAL, ASSEMBLY OR REPAIR. AFS reserves the right to determine the reason or cause for warranty repair.

1. This Warranty does not extend to any engine, machine, aircraft, boat, vehicle or any other device to which the AFS monitoring system may be connected, attached, or used with in any way.

2. THE REMEDIES AVAILABLE TO THE PURCHASER ARE LIMITED TO REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE OF THE PRODUCT, AT THE SOLE DISCRETION OF AFS.   CONSEQUENTIAL DAMAGES, SUCH AS DAMAGE TO THE ENGINE OR AIRCRAFT, ARE NOT COVERED, AND ARE EXCLUDED. DAMAGES FOR PHYSICAL INJURY TO PERSON OR PROPERTY ARE NOT COVERED, AND ARE EXCLUDED.

3. AFS is not liable for expenses incurred by the customer or installer due to AFS updates, modifications, improvements, upgrades, changes, notices or alterations to the product.

4. The pilot must understand the operation of this product before flying the aircraft. Do not allow anyone to operate the aircraft that does not understand the operation of the monitoring system. Keep the operating manual in the aircraft at all times.

5. AFS is not responsible for shipping charges or damages incurred during shipment.

6. No one is authorized to assume any other or additional liability for AFS in connection with the sale of AFS products.

7. IF YOU DO NOT AGREE TO ACCEPT THE TERMS OF THIS WARRANTY, YOU MAY RETURN THE PRODUCT FOR A FULL REFUND. IF YOU DO NOT AGREE TO ACCEPT THE TERMS OF THIS WARRANTY, DO NOT INSTALL THE PRODUCT.

8. This warranty is made only to the original purchaser and is not transferable. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES OR OBLIGATIONS, EXPRESS OR IMPLIED, ORAL OR WRITTEN. AFS EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THE PURCHASER AGREES THAT IN NO EVENT SHALL AFS BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING DAMAGES TO THE ENGINE OR AIRCRAFT, LOST PROFITS, LOSS OF USE, OR OTHER ECONOMIC LOSS. EXCEPT AS EXPRESSLY PROVIDED HEREIN, AFS DISCLAIMS ALL OTHER LIABILITY TO THE PURCHASER OR ANY OTHER PERSON IN CONNECTION WITH THE USE OR PERFORMANCE OF AFS' PRODUCTS, INCLUDING BUT NOT LIMITED TO STRICT PRODUCTS LIABILITY IN TORT.

IMPORTANT PRE-INSTALLATION NOTICE

Before installing the monitoring system, READ THE LIMITED WARRANTY / AGREEMENT. There is information in the Limited Warranty / Agreement that may alter your decision to install this product. IF YOU DO NOT ACCEPT THE TERMS OF THE LIMITED WARRANTY / AGREEMENT DO NOT INSTALL THE PRODUCT. The product may be returned for a refund if you do not accept the terms of the Limited Warranty / Agreement.

Before starting the installation, make sure that your planned installation will not interfere with the operation of any controls. The installer should use current aircraft standards and practices to install this product. Refer to AC 43.13-2A, *Acceptable Methods, Techniques, and Practices - Aircraft Alterations* and AC 43.13-1B, *Acceptable Methods, Techniques, and Practices--Aircraft Inspection and Repair*.

Table of Contents

MANUAL REVISION HISTORY

REVISION	DATE	DESCRIPTION
2.0	1/6/2012	Updates
2.1	2/1/2012	Updated Schematics, Software Updates, Map data
2.2	2/2/2012	Audio, GTN650
2.3	2/7/2012	Landing Gear, ARINC Schematics, Rotax Wiring
2.4	4/1/2012	New VFR & IFR Low Chart Format, Serial Schematics
2.5	6/20/2012	Landing Gear Warning, Remote AHRS, GTN650
2.6	8/7/2012	VFR Sectionals, IFR Low, Radio, Transponder, Airplane Icon Vendor Logo
2.7	12/12/2012	Kavlico Pressure Sensors
2.8	3/15/2012	Trig Transponder, Free Flight ADSB, AF-5800
2.9	3/20/13	Radio and Transponder controls, PocketFMS
2.10	7/11/2013	Added P/N: 72102 GPS Module
2.11	8/23/13	CHT/EGT Wiring, Coolant Temp
2.12	8/28/13	GTN650 Interface Trouble Shooting
2.14	9/7/13	Added AFS ADS-B Install , New GTN650 Configuration
2.15	9/20/13	Updated fuel tank calibration procedure, Added Install Info
2.16	10/1/13	Advanced Skyview Network Connections
2.17	11/20/13	Fixed SD card name in data files, Advanced-SV ADAHRS
2.20	1/9/2014	Support for Advanced-SV Network Components
2.21	2/1/2014	Fixed ADAHRS P/N Typo, Updated Example Schematics, MAG
2.22	2/4/2014	Updated Rotax Sensor Connections
3.0	9/12/2014	AF-5400T, Logbook, Touch Interface
3.1	9/30/2014	Formatting Changes, Serial #0 in Electrical Connections
3.2	3/2/2015	New TCW Backup Battery, WiFi
4.0	4/1/2015	Dynon Charts, Dynon Autopilot, AP Touch Menu
15.0	10/20/2017	Updates for V15 Software

INTRODUCTION

Advanced Flight Systems Inc. manufactures different size AF-5000 Series Displays. The AF-5400 and AF-5500 use an 8.4" display. The AF-5600 uses a 10.4" display and the AF-5800 and AF-5700 use a 12.1" display. The AF-5400 fits in the same mounting cut-out as the AF-3500/4500 EFIS making it extremely easy for those wanting to upgrade. Each AF-5000 display can act as a Primary Flight Display (PFD) with Synthetic Vision, an Engine Monitoring System (EMS), and a Moving Map in a variety of customizable screen layouts. Data is sourced from various connected modules and devices. Subsequent sections in this guide address PFD, Engine, and Moving Map functions in more detail.

SV-Network

SkyView modules such as the SV-ADAHRS-20X (provides flight instrument data), SV-EMS-220/221 (provides engine instrument data), SV-ARINC-429 (for communication with IFR GPS/NAV/COM devices), SV-COM-C25/X83 (COM Radio), SV-KNOB-PANEL, SV-AP-PANEL and Autopilot servos use Dynon Avionics' redundant SkyView Network to communicate with AF-5000 displays. The SV-Network is designed to continue to work properly in the event of wiring or module faults by utilizing multiple power pathways and a redundant data network. In fact, The AF-5000 can annunciate wiring issues as they are discovered, often while preserving full system functionality until troubleshooting can be performed on the ground. These alerts are presented in the AF-5000 alerting system, which is described in a later section of this guide.

RS-232 Serial

AF-5000 displays have five RS-232 serial ports for connection to compatible equipment. SkyView modules which use RS-232 serial communications include the SV-GPS-250/2020 GPS receivers, SV-ADSB-472 ADS-B receiver, and SV-XPNDR-261/262 transponders. All serial ports are wired into the AF-5000 Display Harness. All serial ports have configurable baud rates and data formats for use as general purpose inputs and outputs.

USB

AF-5000 displays have two USB ports built into the back of the display. USB ports are used for transferring files (firmware updates and backups, database updates, configuration file uploads and downloads), the optional AFS Wi-Fi Adapter, and optional AFS Video Adapter. These devices must be plugged into the display before power on and remain plugged in for the full flight. Only one USB flash drive is recognized at one time by the AF-5000 display.

SD Card

AF-5000 displays have a SD card slot on the front of the display. SD Cards can be used for transferring files (Logbook Data, firmware updates and backups, map database updates, configuration file uploads and downloads)

USB Flash Drive

Each AF-5000 display ships with a USB flash drive with the high resolution SVN database; however, there is nothing unique about this USB flash drive. Any appropriate size USB flash drive may be used with an AF-5000. A USB flash drive with the high resolution database file must reside in one of the display's USB ports while in operation (the files are not transferred to AF-5000 internal storage). If Procedure Charts, Airport Diagrams and Enroute Charts are used they should also be located on the same USB flash drive.

WARNING

It is possible for any instrument to fail and display inaccurate readings. Therefore, the pilot must be able to recognize an instrument failure and must be proficient in operating the aircraft safely in spite of an instrument failure. Contact the FAA or a local flight instructor if training is desired to be proficient. The ability for this product to detect a problem is directly related to the pilot's ability to program proper limits and the pilot's interpretation and observation skills. The pilot must understand the operation of this product before flying the aircraft. Do not allow anyone to operate the aircraft that does not know the operation of this product. A copy of this manual must be kept in the aircraft at all times.

Displays Are Synchronized

If you have multiple AF-5000 displays in your aircraft, actions such as setting BARO, BUGS, engaging the Autopilot, or acknowledging warnings only need to be performed on one display (or control panel) and that action is synchronized throughout the AF-5000 system. Some settings such as individual screen layout and map range level are deliberately *not* synchronized between multiple AF-5000 displays.

Buttons, Knobs and Touch Interface

User interaction takes place via the two upper side knobs, buttons integrated into the knobs, bottom knob joystick and 18 buttons along the bottom and side of the AF-5000 display's bezel and via touch gestures on the display screen itself.

Data Logging

AF-5000 displays record and store flight information in several datalogs which can be exported for analysis by the owner, and a high-resolution datalog which can is used by Dynon Avionics for troubleshooting.

Synthetic Vision (SVN)

When valid GPS data is available, and a high-resolution terrain database for the appropriate region is loaded, the PFD features integrated Synthetic Vision. Synthetic Vision displays the terrain directly ahead of the aircraft. Terrain is graphically represented in sectional chart color variations which represent topographical elevations and water features. Terrain is textured with a subtle pattern to aid in identifying aircraft movement.

GPS Moving Map and VFR GPS Navigator

AF-5000 features a robust GPS moving map and VFR GPS navigator. Aviation and Obstacle data can be displayed, as well as VFR and IFR enroute charts, procedure charts (plates), and airport diagrams. Go to http://advanced-flight-systems.com to find links to the various sources of aviation / obstacle data and chart data.

Flight Data Modules – SV-ADAHRS-200, SV-ADAHRS-201, and SV-MAG-236

This guide uses SV-ADAHRS-20X to refer to both the SV-ADAHRS-200 and the SV-ADAHRS-201. The SV-ADAHRS-200 and SV-ADAHRS-201 are identical in performance and are designed to work together as a redundant ADAHRS solution.

The primary flight instruments on your AF-5000 PFD are generated using a group of calibrated sensors built into the SV-ADAHRS-20X ADAHRS module. All sensors are solid state – that is, there are no moving parts. These sensors include accelerometers, which measure forces in all three directions; rotational rate sensors, which sense rotation about all three axes; pressure transducers for measuring air data; and magnetometers on all three axes for measuring magnetic heading. Due to the sensitivity of the SV=ADAHRS to magnetic interference, some aircraft installations are better served by mounting the SV-ADAHRS-20X within the specified center of gravity box and installing an SV-MAG-236 Remote Magnetometer well away from any dynamic magnetic interference – and possibly outside the center of gravity box specified for the ADAHRS. If an SV-MAG-236 is installed, *its magnetometer* provides magnetic heading data to the system, and data from the integrated magnetometer(s) in the SV-ADAHRS-20X are disregarded.

Table 2 describes which inputs and sensors are used within the ADAHRS module to generate the different displayed instruments.

	GPS	Pitot	Static	AOA	Magnetometers	Rate Sensors	Accelerometers	OAT	External Magnetometer
Ball							✓		
Altitude			✓						
Airspeed		✓	✓						
AOA		✓		✓					
Turn Rate		✓	✓			✓	✓		
Heading		✓	✓		✓**	✓	✓		✓
Attitude	✓*	✓	✓			✓	✓		
Density Altitude			✓					✓	
TAS		✓	✓					✓	
Winds	✓	✓	✓		✓**			✓	✓
Flight Path Marker	✓		✓		✓**	✓	✓		✓
Synthetic Vision	✓	✓	✓		✓**	✓	✓		✓
Ground Speed	✓								

Table 2 – Instruments and Sensors
(*GPS only used when airspeed from pitot and static is not available)
(** SV-ADAHRS-20X Magnetometer deactivated when SV-MAG-236 is installed)

Attitude Calculation

The AF-5000 artificial horizon display (attitude) is generated via a complex algorithm using a multitude of sensors as described in Table 2. In normal operation an AF-5000 uses airspeed to provide superior attitude accuracy. Should airspeed become unavailable due to inadvertent blockage of the pitot system, GPS ground speed will be used as an attitude aid. **GPS ASSIST** will be annunciated on the PFD when this mode is in effect.

Compass Accuracy Effects on Synthetic Vision, Map Performance, and Autopilot

It is critical that the magnetic heading be as accurate as possible for optimal Synthetic Vision and Moving Map performance. The SV-ADAHRS-20X – and SV-MAG-236 if included in the system – must be installed correctly, calibrated, and operating well *in all attitudes*. However, it is important to note that magnetic heading is not used to aid attitude determination under any circumstance.

GPS Receivers – SV-GPS-250 and SV-GPS-2020

The SV-GPS-250 and SV-GPS-2020 GPS modules are externally mounted GPS receivers designed specifically for use with AF-5000 systems. Both modules are powered by the AF-5000 display (and thus will provide position updates when the AF-5000 display is operating on battery backup power). Each module outputs GPS data to AF-5000 in NMEA format and automatically sets the time on the AF-5000 display. To improve positional accuracy, both the SV-GPS-250 and the SV-GPS-2020 receive Wide Area Augmentation System (WAAS) GPS correction signals (where WAAS is available). *The ability to receive WAAS GPS correction signals does not allow the SV-GPS-250 or SV-GPS-2020 to be used as a primary navigation source in an IFR environment where a TSO'd WAAS GPS may be required.*

Engine Data Modules – SV-EMS-220 and SV-EMS-221

The engine gauges on your AF-5000 Engine Page are generated from the data acquired by the SV-EMS-220 or SV-EMS-221 Engine Monitoring module and their connected sensors. These modules support popular four and six-cylinder engine installations and can measure a variety of engine and environmental parameters such as RPM, manifold pressure, oil temperature and pressure, exhaust gas temperature (EGT), cylinder head temperature (CHT), fuel levels for multiple tanks, voltage, current, fuel pressure, fuel flow, carburetor air temperature, coolant pressure and temperature, flap and trim potentiometers, external contacts, and general purpose temperature sensors.

Autopilot – Servos

Dynon Avionics SV32, SV42, and SV52 servos enable the operation of AF-5000's integrated autopilot system. Refer to the System Installation Guide for more information about Dynon Avionics autopilot servos.

Autopilot Control Panel – SV-AP-PANEL

The SV-AP-PANEL is an optional panel-mounted module that affords dedicated controls for the AF-5000. The SV-AP-PANEL includes dedicated buttons for engaging the Flight Director, Autopilot, and all modes including setting up fully-coupled approaches, VNAV, IAS Hold, and mode sequencing (provided that the necessary IFR navigation sources are installed in the aircraft). It also has a LEVEL button to immediately return the aircraft to straight and level flight.

Auto-trim

A secondary function of the SV-AP-PANEL is that it can control one or two electric trim control motors (replaces a conventional "relay deck"). If this function is installed, the AF-5000 Autopilot, when engaged, can also provide automatic trim control – Auto-trim.

Transponders – SV-XPNDR-261 and SV-XPNDR-262

The SV-XPNDR-261 (Class 1) and SV-XPNDR-262 (Class 2) are TSO'd remote mounted Mode-S transponder modules that, in addition to their transponder capability, contain ADS-B Out capability via 1090 ES, and TIS traffic input capability (US Only). **Note: Only the Class 1 SV-XPNDR-261 meets the 2020 mandate for ADS-B Out.**

ADS-B Receiver – SV-ADSB-472

The SV-ADSB-472 is a Dual Band (1090 / 978 MHz) ADS-B receiver. It can receive traffic and weather information from the Automatic Dependent Surveillance – Broadcast (ADS-B) system. ADS-B data allows integrated traffic and NEXRAD weather data to be displayed on your AF-5000 display. Currently the UAT Band is only used in the US

Com Radios – SV-COM-C25 and SV-COM-X83

The SV-COM-C25 is an integrated VHF Com Radio for AF-5000 consisting of two modules: the SV-COM-PANEL, and the SV-COM-425. The SV-COM-C25 has 25 kHz channel spacing and is intended primarily for aircraft operating in the US. The SV-COM-X83 is an integrated VHF Com Radio consisting of two modules, the SV-COM-PANEL, and the SV-COM-T8. The SV-COM-X83 has 8.33 kHz channel spacing required for European pilots. Both the SV-COM-C25 and SV-COM-X83 can tune frequencies by querying an aviation database installed in a AF-5000.

Intercom – SV-INTERCOM-2S

The SV-INTERCOM-2S is a two-place stereo intercom that is designed to pair perfectly with your AF-5000 System and AF-5000 Com Radio. It has inputs for AF-5000 audio alerts, stereo music, and multiple other mono muting and non-muting inputs.

Knob Panel – SV-KNOB-PANEL

The SV-KNOB-PANEL is an optional panel-mounted module for AF-5000. This control panel has three knobs dedicated to the most common AF-5000 bug functions – ALT, BARO, and HDG/TRK. This module is particularly useful in AF-5400 systems. Note that these bugs can also be adjusted from the three AF-5000 display knobs.

Video Input Adapter

The optional Video Input Adapter enables the display of a video signal (must be S-Video or Composite) on your AF-5000 display in a window. The Video Input Adapter must be inserted into one of the two USB plugs on the back of the AF-5000 display during system power-on and while operating.

Wi-Fi Adapter

The optional Wi-Fi Adapter allows supported devices, such as Apple iPhones and iPads, with supported apps, such as ForeFlight, to exchange data with AF-5000. For example, you can compose a flight plan (or, multiple flight plans) in ForeFlight, and after you get to your plane, ForeFlight can send a flight plan to AF-5000. The Wi-Fi Adapter must be inserted into one of the two USB plugs on the back of the AF-5000 display during system power-on and while operating.

For current devices and apps compatible with AF-5000 Wi-Fi Adapter, see http://www.dynonavionics.com/skyview-wifi-adapter.php.

External Controls, Indicators, Jacks, etc.

The primary harness for each AF-5000 display provides inputs or outputs for external buttons, switches, indicators, jacks, etc. Some of these are required (such as Servo Disconnect / CWS), while others provide optional additional functionality. As part of your familiarization with your AF-5000 system, you should identify these additional controls on your panel or elsewhere in your cabin, and how they interact with your AF-5000 system. For additional detail, please reference the System Installation Guide.

This list does not reference power control breakers, switches, or semi-automated power control systems such as ADVANCED Control Module or VP-X.

- Autopilot (Servos):
  - Servo Disconnect / Control Wheel Steering (CWS) Button

- Heated AOA/Pitot Probe:
  - Heated Pitot Off / Failed Warning Indicator

- SV-AP-PANEL (Electric Trim):
  - (These controls may be integrated into a "Hat Switch")
  - Pilot Trim Controls: Up, Down, Left, Right
  - Copilot Trim Controls: Up, Down, Left, Right

- SV-COM-425 / X83:
  - Copilot Headset Jacks
  - Copilot Push-To-Talk (PTT) Button (Likely integrated into the stick)
  - Pilot Headset Jacks
  - Copilot Push-To-Talk (PTT) Button (Likely integrated into the stick)
  - Active / Standby Frequency Flip/Flop Button
- USB Jacks (one per display)

- SV-INTERCOM-2S:
  - Copilot Push-To-Talk (PTT) Button (Likely integrated into the stick)
  - Copilot Headset Jacks
  - Music In Jack
  - Pilot Push-To-Talk (PTT) Button (Likely integrated into the stick)
  - Pilot Headset Jacks
  - Radio Select (Transmit) Switch

- SV-XPNDR-261/262:
  - Standby Switch
  - Ident Button

Visual and Aural Warnings

Each gauge can have an upper and lower *caution* and *warning* limit. If a gauge is in the *caution* area the needle will turn yellow. If a gauge is in the *warning* area the needle will turn red.

If the engine RPM is greater than 500rpm and a gauge is in the *warning* area the gauge name will be displayed in the info strip on the screen in red and an audible warning will generated. For example, if the oil pressure is low, the "Check Oil Pressure" warning should sound, this will repeat every 5 seconds until the gauge is no longer in the warning area or **[ACK]** (button 12) is pressed to acknowledge the error and stop the audible warning for that gauge.

The system will give the audible warning "Check Fuel Computer" on startup if the fuel computer's gallons remaining value does not match the fuel tanks level. This feature (if turned on in Instrument Calibration) should warn if fuel is added and the fuel computer is not adjusted. The number of gallons that will generate an error is adjusted in Instrument Calibrate. Since the fuel levels are NOT accurate when the tanks are near full this value is doubled when the tanks show full.

SYSTEM OPERATION

Turning the Unit ON

The AF-5000 Series will turn on anytime power is applied to the main power input and will stay running as long as there is power supplied. If power from the aircraft hot battery bus or backup battery is connected to the backup power input, the system can be turned on by pressing and holding button 1 (lower left button) for 2 seconds.
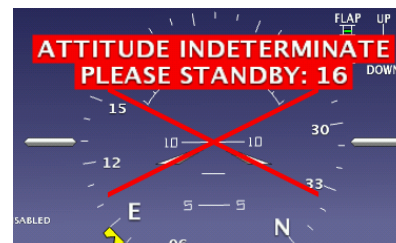
Screen Dimming

The screen can be dimmed by pressing **[CHECK]** and rotating the top knob labeled **[DIM]**

AHRS Alignment (Gyro)

When power is applied to the system the EFIS display will have a large RED X while the AHRS in initializing.

The Aircraft should not be moved until the RED X disappears from the Screen (Approximately 40-60 seconds)

If for any reason the RED X appears on the screen the Horizon Attitude, Heading, and Slip display **MUST NOT BE RELIED ON FOR PRIMARY NAVIGATION.**

Turning the Unit OFF

The system will turn off when power is removed from the Main Power input. If main power is turned off and backup power is still present, the system will start a 30-second countdown to power-off and display an on-screen alert as long as there is no airspeed or RPM.

Pressing any button will bypass the countdown and the display will remain powered on. Care should be taken not to run the aircraft battery down too low during extended periods on the ground.

Backup Power Operation

If the external battery or the aircraft hot battery bus is connected to the backup power input the unit will continue to operate down to 8 Volts.

If external power is lost in-flight and the system is running on the backup battery, it is imperative that the aircraft land immediately, before all power to the EFIS systems is lost. There are many factors that can reduce battery life depending on the configuration of the display and what external accessories are connected.

Battery Power Shutdown

The display can be turned off when on backup power by pressing **[SET] (Button 18) and then holding [PWR DWN] (Button 11).** The unit will also turn off when on backup power if there is no airspeed or RPM for 5 minutes or if the system voltage gets critically low.

DO NOT ASSUME THE EFIS HAS ONE HOUR OF BATTERY LIFE.
NEVER TAKE-OFF USING BACKUP BATTERY POWER.

When the unit is running on backup power the battery voltage is displayed on the screen Info Strip

EFIS Screen Menus

The EFIS boots in the MAIN screen menu and will automatically time out and return to it from the sub menus. In the MAIN screen menu, the knobs on the right control the function that the flag is pointed to. In this picture the top knob is controlling the Heading Bug. To make the knob control the CDI course (OBS) you would first push the CRS button and the knob flag would point to CRS. You can also type a value instead of using the knob by pressing the button and then using the on-screen keyboard.
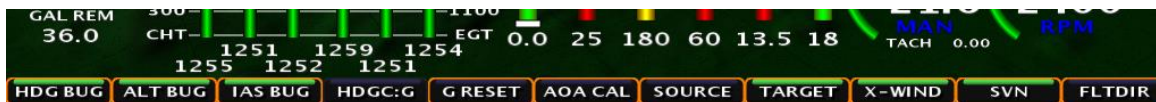

SET Menu

Pressing the upper right hand [SET] button brings up the settings menu and changes the button labels to orange. Pressing the [BACK] button returns you to the MAIN menu.

The settings menu has the following buttons and menus:

SET > EFIS Page Settings

HDG BUG	Turns ON/OFF Heading Bug
ALT BUG	Turns ON/OFF Altitude Bug
IAS BUG	Turns ON/OFF Airspeed Bug
HDGC:G	Sets the color of the EFIS DG / HIS
	Gray
	White
G RESET	Resets the G Meter
AOA CAL	Enter AOA Calibration Mode
SOURCE	Sets the GPS source for the SVN display (GNAV1, GPS2, AUTO). The Dynon GPS-250 or GPS-2020 have higher accuracy than an ARINC GPS GNAV1 source.
TARGET	Turns ON/OFF Flight Path Marker
X-WIND	Turns ON/OFF Cross Wind display
SVN	Turns ON/OFF Synthetic Vision
FLTDIR	Turns ON/OFF Flight Director
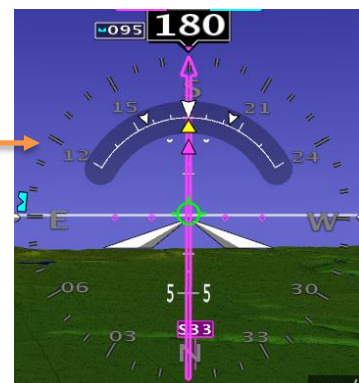
CHECK Menu

Pressing the [CHECK] button brings up the Checklist Page. You use the joystick to move between Checklist items and press in to check off the item.

The CHECKLIST page has the following buttons and menus

Side Buttons

BACK   Returns to the Main Menu

DIM   Dims the displays in the Aircraft

BARO   Enables you to adjust the Baro while doing the Checklist

PAGE   Selects the Checklist Page

CLR   Clears the Checklist items

Bottom Buttons

RADIO   Brings up the XM Radio Page

W&B   Weight and Balance Page

MAINT   Maintenance Page

ABOUT   About Menu

ELEC   Electronic Circuit Breaker Menu

AUDIO   Audio Panel Page

VIDEO   Video Display window and settings

LOGBOOK   Logbook Menu

EMER   Emergency Checklist

ESTART   Engine Starting Check List

B4-TO   Before Take Off Checklist

Screen Hardware Reboot

The display CPU can be rebooted by pressing and holding (Button 1) and (Knob 1) for 40 seconds. This causes the internal hardware to reboot and reinitialize the system. This should only be required if the EFIS failed to load the software.

Press and Hold Red Arrows for 40 seconds to force an EFIS reboot

EFIS Display Layout
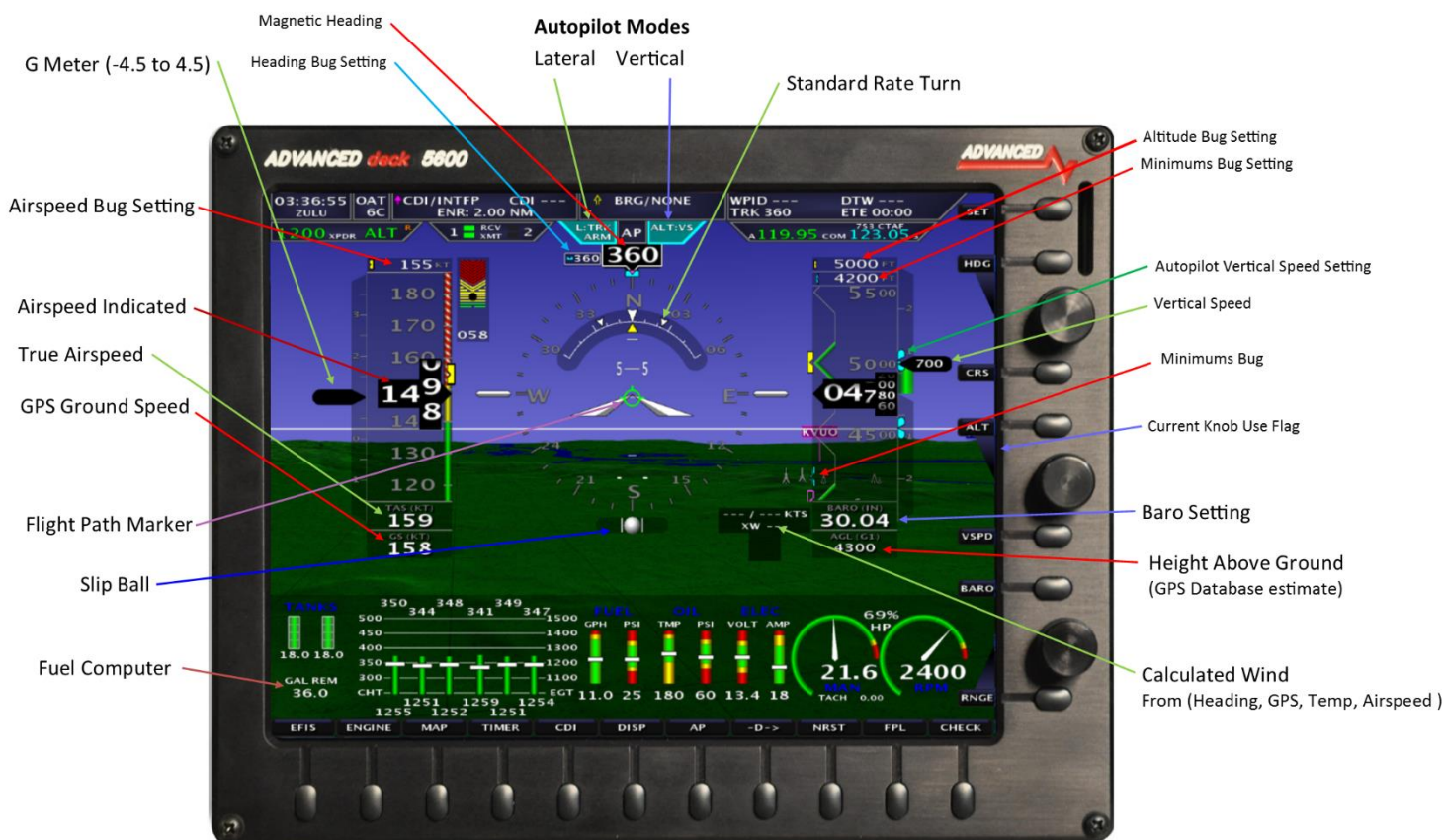
Screen Selection

The first three buttons on the screen bottom row **[EFIS]**, **[ENGINE]**, **[MAP]** control what is displayed on the EFIS screen. There are additional options available for each item that pop up when the button is pressed. The button layout is configured so that a double press of the button always changes the item from *(OFF* to *ON)* or *(ON* to *OFF)* for simplified operation.

Depending on what you have selected to display any of the (EFIS, ENGINE, MAP) displays can be one third, half ,or full screen.

⚠️ If the EFIS Horizon has been turned off double pressing Button 1 should turn it **ON**.

Screen Selection using Touch Gestures

A single finger touch and drag with longer than 1 inch of travel will cause the screen to change views as described below:

A single finger swipe in the downward direction will cause a screen in full engine view to minimize to half engine view. A screen in half engine view will change to no engine view.

A single finger swipe in the upward direction will cause a screen in full EFIS view to bring up half engine view. A screen in half engine view will change to full engine view.

A single finger swipe in the left direction will cause a screen in full EFIS view to bring up half map view. A screen in half map view will change to full map view.

A single finger swipe in the right direction will cause a screen in full map view to bring up half EFIS view. A screen in half EFIS view will change to full EFIS view.

EFIS Button Options

[OFF]	Turns the EFIS Horizon OFF
[ANALOG]	Turns the EFIS Analog 6 Pack display ON
[EFIS]	Turns the EFIS Horizon ON
[OAT F/C]	Selects Outside temperature display to Fahrenheit or Celsius
[FD ON/OFF]	Turns the Flight Director ON or OFF
[HITS ON/OFF]	Turns the Highway In The Sky ON or OFF
[AOA ON/OFF/DCL]	Turns the AOA display to always ON, always OFF, or Declutter mode
[AOA SND]	Turns the AOA Warning Audio ON or OFF
[PITCH ADJ]	Selects EFIS Horizon pitch adjust setting to compensate for panel tilt.

ENGINE Button Options

[ENGINE]	Turns the ENGINE display ON
[OFF]	Turns the ENGINE display OFF
[OAT F/C]	Selects Outside temperature display to Fahrenheit or Celsius
[PEAK]	Selects EGT Peak detect Mode
[FILL MAINS]	Sets the Fuel Computer Main Tanks to Full
[FILL ALL]	Sets the Fuel Computer Main & AUX Tanks to Full
[FC MODE]	Select the Fuel Computer display mode (HRS REM, NM/GAL, SM/GAL, GREM AT, GREQ TO, GAL USED, GAL REM)
[FC ADJ]	Let's you adjust the Fuel Computer quantity using the joystick knob. Turn the knob to select amount to change and then press the knob to set.

MAP Button Options

[AIRPORT]   Displays the Flight Guide Airport Diagram (Requires optional data subscription)

[AP PLT]   Displays the Approach Plate (Requires optional data subscription)

[OFF]   Turns the MAP display OFF

[MAP]   Displays the standard MAP screen

[SECTION]   Display the VFR Sectional (Requires optional data subscription)

[IFR LOW]   Display the IFR Low Altitude Chart (Requires optional data subscription)

[SOURCE]   Selects the GPS Map source

[TRK/NRTH]   Select Track or North up display mode for the map.

[WX]   Selects the Weather display menu

AF-5400 Interface

The 5400 Interface is very similar to the standard AF-5000 series. All AF-5400 displays are equipped with a touch screen interface to allow for equal functionality with fewer buttons and knobs. The right side button tags are all touch controlled, as is the keyboard for data input. The display recognizes the same swipe, pinch, and drag motions through the touch screen.

Screen Selection

Screen Selection is done through touch screen gestures. A single figure drag motion will turn on or off different displays in the same manner as touch screen equipped AF-5000 EFIS. (See **Screen Selection Using Touch Gestures**)

Touch Keys

To retain the functionality of an 11 button keyboard the AF-5400 uses touch keys for data input.

For example, to adjust the Barometric Pressure (BARO):

1. Tap the BARO readout tag (Directly below the altitude tape).
2. The touch keyboard will be displayed, input the new barometric pressure
3. Press [ENT] (Far right on the touch keyboard) to enter the new barometric pressure.

Changing Knob Function (Baro, ALT, Zoom…)

1. Press Knob
2. Twist knob to scroll through Menus
3. Press Knob again to set new function



Access the [SET] Menus/Calibration Page on 5400 Display

1. Tap [SET]
2. The SET categories (EFIS, ENGINE…) will be displayed across the buttons.
3. There are more categories (CAL, LOGS…) which can be paged through by twisting the left knob.

Touch Screen

Touch Screen equipped displays provide a multitude of interface control and input options for nearly every display function. User interface gains simplicity and ease of use through taps, swipes, drags and pinches.
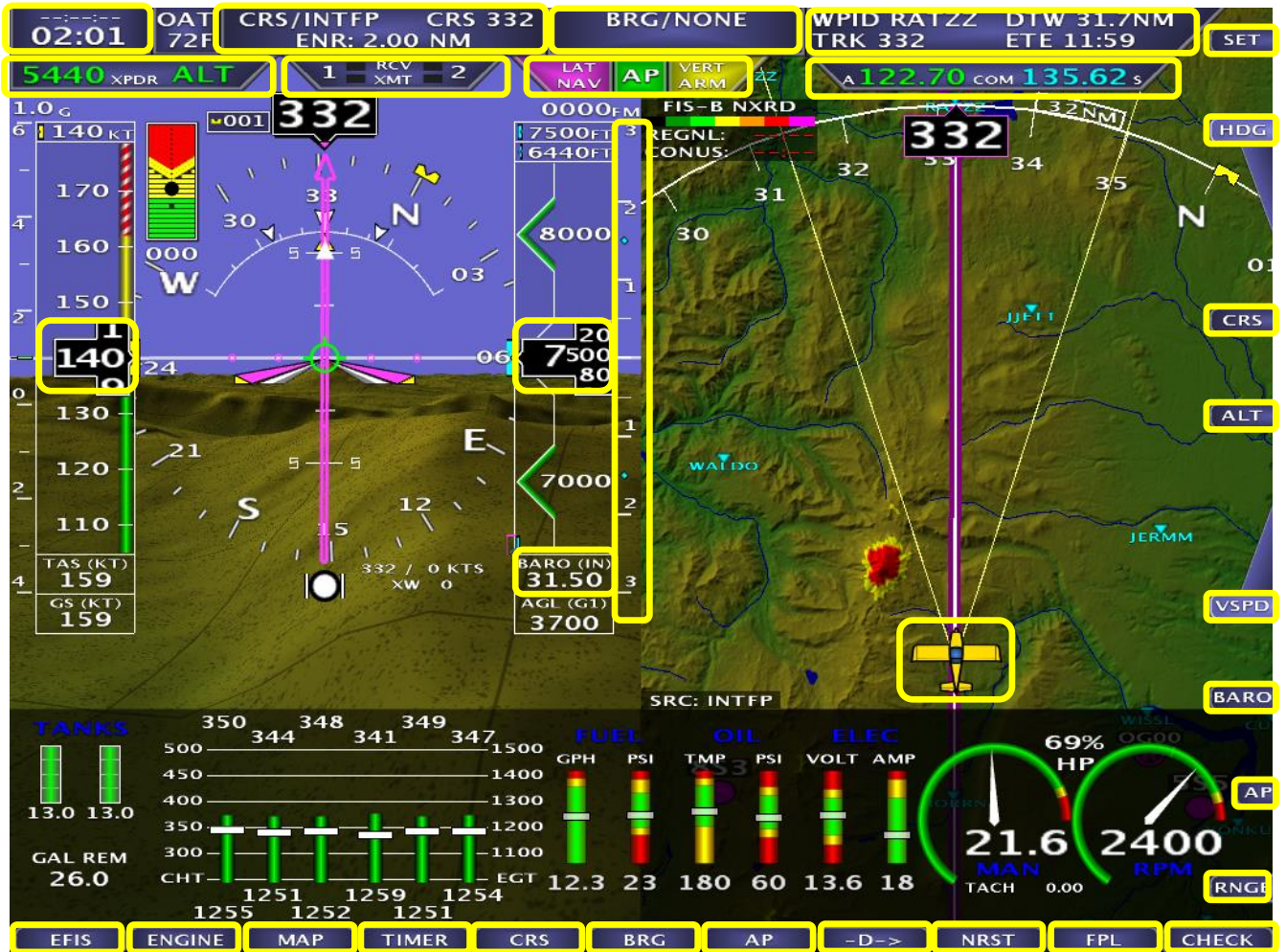
Areas boxed in yellow recognize a tap input to adjust parameters and as a shortcut to menus. For instance, a tap of the Transponder Status tab in the top left will bring up the transponder control page. Further descriptions of touch screen interface can be found in the section relative to their task (i.e. Map Panning / Pointer Control will be in the Map Panning / Pointer section of the manual).

Altitude

The altitude tape gives a visual representation of altitude. The digital readout points to current altitude, thousands of feet are displayed using large numbers while hundreds of feet are displayed using smaller numbers. The green chevrons are located at 1000' intervals for IFR cruising altitudes and the white chevrons are located at 500' indicating VFR cruising altitudes. Above the tape are two boxes showing the value of the two altitude bugs. The main ALT bug is for the Flight Director altitude pre-select. It's altitude is shown in the upper box. The lower box displays altitude for the MIN ALT bug which is used to program a DH/MDA for an IFR approach.

Barometric Pressure/Altitude

The current barometer setting is displayed in the box below the altitude tape. The value is shown in either inches of Mercury or millibars. The current barometer setting can be adjusted by turning the joystick anytime the **BARO** function is active. If **BARO** is not active, press the button above the joystick to make **BARO** the active function. The current field elevation is stored in memory so that the altitude should be correct after a power cycle.

Airspeed

The airspeed is displayed on the left side of the screen using an analog 4 color tape and digital readout. The airspeed range marks can be adjusted in Instrument Calibration under Airspeed. The airspeed units are displayed in both the upper Indicated Airspeed box and the lower True Airspeed box. A barber pole style hash will automatically show above Vne. GPS derived Ground Speed is also given below the TAS readout.

Horizon Roll and Pitch

The horizon (roll and pitch) works the same way that a traditional artificial horizon works. The white zero pitch line stays parallel to the actual horizon regardless of the aircrafts pitch and roll configuration. The zero pitch line is not always on the horizon. If the display is showing terrain above the zero-pitch line, the aircraft is below the upcoming terrain.

The parallel lines above and below the horizon line are the pitch indicator lines. Similarly the arrow rotating around the roll indicator gives visual representation of the current roll angle. Each mark represents 10 degrees of roll with longer marks at 0, 30, 45, and 60. The pitch line can be adjusted for level flight from the main EFIS page by pressing the following buttons **[SET] -> [AHRS] -> [PTCH ADJ]** or **[EFIS] -> [PTCH ADJ].** The joystick is then used to adjust for level flight pitch.

Heading – EFIS DG

This heading is displayed like a standard slaved directional gyro. The digital readout in the pointer shows the current heading. If the EFIS DG is red, the heading should not be relied on and the magnetometer wiring should be checked.

Magnetic Heading (direction the aircraft nose is pointed)
GPS Ground Track (direction the aircraft is moving over the ground)

The difference between Heading and Ground track is due to wind or magnetic interference.

Wind Display

The EFIS will calculate and display the wind speed and direction. The EFIS uses Airspeed, Altitude, OAT, magnetic heading, and GPS ground track to calculate the wind, just like you would with an E6B flight computer. *Magnetic heading and/or Pitot-Static errors can cause large errors in the wind calculations.*

Skid/Slip Ball (Inclinometer)

The skid/slip ball works like any standard mechanical gauge. If the ball is within the black lines, the aircraft is in coordinated flight. The ball on the outside of a turn indicates a skid, while the ball on the inside of a turn indicates a slip.

Standard Rate Turn Indicator

The required bank angle for a standard rate turn is indicated by a white triangle on the roll scale. If the yellow bank angle pointer is aligned with one of the white triangles a 180⁰ turn will be completed in 1 minute. The required bank angle will change with airspeed and the triangles will disappear below 30 kts.

Vertical Speed

The vertical speed is displayed using a black arrow and green bar located on the right side of the altimeter tape. The bar will increase upward for climbing flight and increase downward for descending flight. The digital vertical speed will be displayed in the black pointer.

Autopilot/FD Vertical Speed Bugs

When the autopilot is climbing to the altitude bug in vertical speed mode it will follow the Vertical Speed Bug.

G-Meter

The AF-5000 has two G Meter options, one on the left side of the airspeed tape or a round G-Meter that can be configured to pop up at G Warning. You can also select a G Meter for the left or right inset window.

[SET] -> [EFIS] -> [G METER]

The Dynon ADAHRS G Meter is limited to +10/- 8 G's and will record the maximum and minimum G's that the aircraft has seen since the last time the [G RESET] button was pressed: SET > EFIS > G RESET

Selecting the G-Meter left or right inset window:

1. Touch the center of the pitch pointer to bring up the menu.

2. Select G Meter for the left or right inset window.

3. Swipe the G-Meter left or right to remove it from the screen.

Flight Path Marker

The green flight path marker (FPM) or velocity vector shows where the aircraft is actually moving. Think of it as a visual representation of GPS Track. The green target will only be centered under steady state flight conditions with no wind. Usually the target will be moving around the display showing where the airplane is going, not where the nose is pointed. If there is a strong cross wind from the left the FPM will move to the right. If the FPM is kept on the horizon line, the aircraft will maintain level flight, even during steep turns. The FPM requires a valid GPS signal be present and Synthetic Vision enabled. The FPM will be red if there is no GPS signal or there is not enough room on the screen to show the FPM deviation.

The FPM can be turned ON/OFF by pressing **[EFIS] -> [TARGET]**

EFIS Bugs (Airspeed, Altitude, Minimum Alt, Heading)

Altitude Bug

The Altitude Bug can be turned on and off from the **[SET] -> [EFIS] -> [ALT BUG]** menu. If the Altitude Bug is on and the text over the knob is **ALT** the knob will set the desired altitude bug location. If the text is not **ALT**, should press the knob button until it appears. Holding the knob down for two seconds will sync the altitude bug to the current altitude. The box on the top of the altitude tape shows the current bug location and will have a black background when selected.
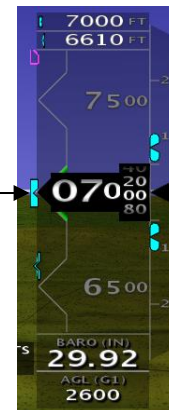
Altitude Alerting

The Altitude Alerting function provides visual and voice "ALTITUDE" alerts when approaching the Altitude Bug.

- Upon passing through 1000 feet of the Selected Altitude, the Altitude Bug changes from White to Yellow

- When the aircraft passes within 200 ft of the Selected Altitude, the Altitude Bug changes from Yellow to Cyan, and the voice alert "ALTITUDE" is generated.

- After reaching the Selected Altitude the pilot flies outside of the deviation band (±200 feet of the Altitude Bug), the Altitude Bug changes from Cyan to Yellow, and the voice alert "ALTITUDE" is generated.

Altitude > 1000' of Bug	1000' > Altitude > 200' of Bug	Altitude < 200' of Bug

Minimum Descent Altitude/Decision Height Bug

A barometric Minimum Descent Altitude Bug (MDA, or Decision Height, DH) is displayed whenever the altitude bug is turned on. The MINS bug can be changed by pressing **[SET] -> [MINS]**. Holding the knob down for two seconds will sync the bug to the current altitude. The second box on the top of the altitude tape shows the current bug location and will have a black background when selected.

MDA/DH Alerting

The MDA Alerting function provides visual and voice "MINIMUMS" alerts when approaching the Bug.

- Upon passing through 100 feet of the Selected Altitude, the Bug changes from Cyan to White.

- After reaching the Selected Altitude the Bug changes from White to Yellow, and the voice alert "MINIMUMS" is generated.

Altitude > 100' of MDA Bug	100' > Altitude > MDA Bug	Altitude < MDA Bug "MIMIMUMS"

Airspeed Bug

The Airspeed Bug can be turned on and off from the **[SET] -> [EFIS] -> [IAS BUG]** menu. If the Airspeed Bug is on, it can be selected by pressing **[SET]** and rotating the knob labeled **[IAS]**. will set the desired airspeed bug location. Holding the knob down for two seconds will sync the airspeed bug to the current airspeed. The box on the top of the airspeed tape shows the current bug location and will have a black background when selected.

Heading Bug

The Heading Bug can be turned on and off from the **[SET] -> [EFIS] -> [HDG BUG]** menu. If the Heading Bug is on and selected, it can be rotated to adjust heading. Pressing the button above the HDG knob will also bring up a numeric input on the lower row of buttons. Holding the knob down for two seconds will sync the heading bug to the current magnetic heading. The text next to the heading box shows the current bug location and will have a black background when selected. Touch Screen equipped displays recognize a touch and drag of the Heading Bug.

Clock/Timer Operation

The system time is automatically set by GPS. The unit will set Zulu time automatically when GPS signal is acquired.

Clock Setting

Touch the Time or press the **[TIMER]** button to enter the date/time adjustment menu. Press the [OFFSET] button to enter the Time Zone offset from UTC time (i.e. Pacific Standard Time is -7 UTC). Clock Format can be changed to 12-hour, 24-hour or Zulu format in the TIMER menu by pressing [CLK:12H], [CLK:24H], or [CLK:Z].

Timer Menu Functions

The system has a count-down and count-up timer. Once the timer is activated it is displayed on the upper left corner of the screen, under the clock.

ON/OFF	Turns ON and OFF the Timer
UP/DOWN	Selects UP or DOWN Timer
RESET	Resets the Timer
START/STOP	Starts the Timer or Stops the Timer
CLOCK MODE	AM/PM, 24H, Zulu
NET SYNC	Forces all screens to the same time
OFFSET	Sets the Zulu offset
SEC	Adjusts the timer seconds
MIN	Adjusts the timer minutes

The Up or Down mode is displayed with an arrow on the screen.

The timer display will flash green when 0:00 is reached and the voice alert "TIMER" will sound. The timer will also start counting in the negative, indicated elapsed time expired. The RESET button acts differently based on Timer mode. In Count Down mode, the RESET button will reset the time to the last programmed time. In Count Up mode, the RESET button will change the timer to 0:00.

Dual Screen Clock Setting

The current time on another non AF-5000 EFIS screen can be set by pressing the **[NET SYNC]** button from the timer menu on the current display. When the **[NET SYNC]** button is pressed, the time is sent over the Ethernet connection to the other screen and its clock is set to match the current screen.

Dual AHRS Monitoring

If a system has two ADAHRS units the EFIS screen will constantly compare both ADAHRS units for a mismatch error in Roll, Pitch, or Heading an **AHRS MISMATCH** error will be displayed on the center of the screen. You can select the ADAHRS that the system is using from the **OPTIONS MENU** (Touch the center of the PFD display). Selecting an ADAHRS on the Pilot PFD EFIS screen will force all MFD displays to use the same ADAHRS. Selecting an ADAHRS on a MFD display will only change it on the MFD and only for that EFIS power cycle.

AUTO
System decides which
ADAHRS to use

AHRS 1
Use ADAHRS 1

AHRS 2
Use ADAHRS 2

Angle of Attack (AOA)

See Appendix I: AOA Pressure Port Location

The EFIS can display an AOA if the optional AOA system is installed. An in-flight AOA calibration is required before the AOA indication can be deemed reliable.

The AOA in-flight settings can be adjusted from following Menu:

[EFIS] -> [AOA ON/OFF/DECLUTTER]

Button 2 in the AOA menu controls the AOA display.

OFF   The AOA display is always off

ON   The AOA display is always on

DECLUTTER   The AOA display will be on if the angle of attack is greater than the AOA declutter segment in the EFIS AOA calibration menu. Testing has shown the ideal setting for declutter is 8.

The segments are numbered using the following:

23   Warning - RED Only
16   Approach - Yellow lined up with the center of the donut
12   L/D Max - Split Green bar
 6   Bottom Green Bar.

Flap Sensor

The AOA indicator can use either the flap position sensor for the screen or the supplied switch connected to Input #3 on the main EFIS harness. The AOA "Use Flap Angle Sensor" (Found in the AOA menu in Instrument Calibration) should be set to YES if the Position Sensor is installed. The sensor used is typically a Ray Allen Co. POS-12 Linear Position Sensor.

4. AOA
          13. Use Flap Angle Sensor   YES/NO

          16. Declutter Segment   8

AOA Display

The center round donut will be green when the flaps are down and black when they are up. For a detailed explanation of the AOA system please refer to the separate AOA manual and the EFIS AOA Calibration Checklist. The numbers below the display are degrees angle of attack in tenths. If the AOA is properly calibrated, the following displays should be shown. As actual angle of attack increases the display will lose bars.
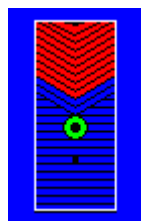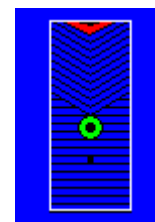

L/D Max

Best engine out glide AOA.

Approach

Desired AOA for a normal approach.

Warning

Indicates the aircraft is15% above stall and an audible "Angle Angle Push" is heard.

STALL

This should indicate upon reaching the stalling AOA

EFIS AOA CALIBRATION CHECK LIST

EFIS AOA CALIBRATION CHECK LIST

EFIS_cklst.doc   09/2014   rev 4
paper color Green

AOA PRESSURE PORT

POST INSTALLATION PRE FLIGHT

Blow into Blue tube at CPU -------- Air exits Upper Wing Port
Blow into Green tube at CPU ------- Air exits lower Wing Port
PITOT/STATIC LEAK TEST ------------------- COMPLETED
AIRCRAFT LOG --------------------------------UPDATED
AIRCRAFT CHECKLISTS ---------------------------UPDATED
ANNUAL CONDITION C/L ------------------------UPDATED
CHAPTER IX TESTING------------------------ COMPLETED

HANGAR CALIBRATION

The only thing that is required for the EFIS AOA is to check the flap switch.

FLAPS UP ....DONUT CHECKED OFF
FLAPS DOWN .... DONUT CHECKED ON

CRUISE CONFIGURATION CALIBRATION

AIRCRAFT LOCATION.....................AIRBORNE
FLAPS/GEAR.......................... CONFIRMED UP
EFIS AOA DISPLAY ON .... ON
AF-5000 AOA Calibrate Menu
SET → EFIS → AOA CAL........ PUSH/RELEASE
CONFIRM flap up calibrate page 0OL
ZERO "G" MANEUVER for 1/2 sec.................... YES
RECORD button........................... PUSH/RELEASE
CONFIRM flap up angle advisory page 0AA
AIRSPEED 1.15Vs_1 descending slow flight .... YES
RECORD button .... PUSH/RELEASE
PAGE button .... 2x PUSH/RELEASE
CONFIRM save data to non-volatile memory page 0SA
RECORD button........................... PUSH/RELEASE
YOU ARE NOW IN THE FLIGHT MODE

LANDING CONFIGURATION CALIBRATION

AIRCRAFT LOCATION.................... AIRBORNE
FLAPS/GEAR.................... CONFIRMED DOWN
EFIS AOA DISPLAY ON.................................. ON
AOA CAL Button ....PUSH/RELEASE
CONFIRM flap down calibrate page 1OL
ZERO "G" MANEUVER for 1/2 sec. .... YES
RECORD button ....PUSH/RELEASE
CONFIRM flap down angle advisory page 1AA
AIRSPEED 1.15Vso descending slow flight .... YES
RECORD button ....PUSH/RELEASE
PAGE button ....2x PUSH/RELEASE
CONFIRM save data to non-volatile memory page 1SA
RECORD button ....PUSH/RELEASE
YOU ARE NOW IN THE FLIGHT MODE

FLIGHT TEST AOA

VERIFICATION C/L ------------------- COMPLETE
CHAPTER X CALIBRATING-------- COMPLETE
CHAPTER X FLIGHT TESTING --- COMPLETE

FLY THE AIRPLANE & WATCH FOR TRAFFIC!

The POST INSTALLATION and HANGAR CALIBRATION CHECK LISTS must be completed prior to flight. The zero "G" maneuver requires that all unsecured items be removed from the aircraft prior to flight. Two pilots are required during the calibration process and one will be assigned the task to fly the aircraft and nothing more. The flight calibration area will be cleared for traffic and will be at a safe altitude with the IAS always within the green IAS band. Stalls are not required or desired!

Push button in for 1/2 second and then releasing the button is proper button technique.

Analog Instrument Page

[EFIS] → [ANALOG]

AF-5400   [SET] → [EFIS] → [ANALOG]

TCW Backup Battery

When the main power to the EFIS is lost the EFIS should continue to run on the battery backup power. A new fully charged battery should power the EFIS for about an hour.   You should dim the EFIS screen (CHECK > DIM > Top Knob) to make the battery last longer. When power is lost you should get an audible "CHECK VOLTAGE" warning and the Backup Battery Voltage will be displayed on the EFIS Status Bar.

Main EFIS Power Voltage

Backup Battery Voltage

Every time you shut off power to the EFIS it should switch to the backup battery for 30 seconds and bring up a warning that it is about to shut down. If you press any button during the shutdown warning it will continue to run for 5 minutes before doing another 30 second shutdown warning.

- *If the EFIS is displaying Airspeed or Engine RPM it will not try and shutdown.*
- *If the EFIS immediately turns off when you turn off power you should check the TCW backup battery wiring and TCW case fuse*

TCW Backup Battery Fuse

The TCW battery has a ***10 AMP ATM MINI*** fuse that can be replaced on the side of the unit.

The EFIS backup DSUB 15 connector cable has male pins and if you are not carefull when you plug it into the EFIS you can blow the TCW fuse.

Synthetic Vision

Synthetic Vision (SVN) displays a forward looking perspective of the terrain ahead. This includes mountains, rivers/waterways, obstacles, and runways. The Synthetic Vision database requires current Map Data, found on the AFS website. The Synthetic vision database is stored on the USB stick in the HRTERRAIN folder.

Note: Having synthetic vision changes the way the attitude indicator behaves; users will want to spend time flying with SVN in visual conditions before attempting to fly in IMC.

The biggest change new SVN users will notice is the lack of a definite horizon like a standard attitude indicator. Attitude indicators traditionally represent level flight when the miniature airplane is on the intersection of the blue and brown shading. Since in real life the aircraft is not level with the horizon in level flight, a synthetic **zero pitch line** must be displayed over the primary flight display. This zero-pitch line is shown as at thin white line extending from the left side of the PFD page all the way to the far-right side of the PFD page.

Zero Pitch Line

SVN will show a maximum possible distance of 50nm when at 1,800AGL and above.

SVN will show the runway with runway markings

Synthetic Vision Settings

Enable/Disable - **[SET] -> [EFIS] -> [SVN]** (green is on, dark blue is off)

Instrument Calibration: Synthetic Vision
1. Synthetic Vision ON/OFF - Enables/Disables SVN (if the software key is installed)
2. Altitude Source - (AUTO, GPS ONLY, BARO ONLY) - Selects the altitude source for SVN. Default is AUTO.
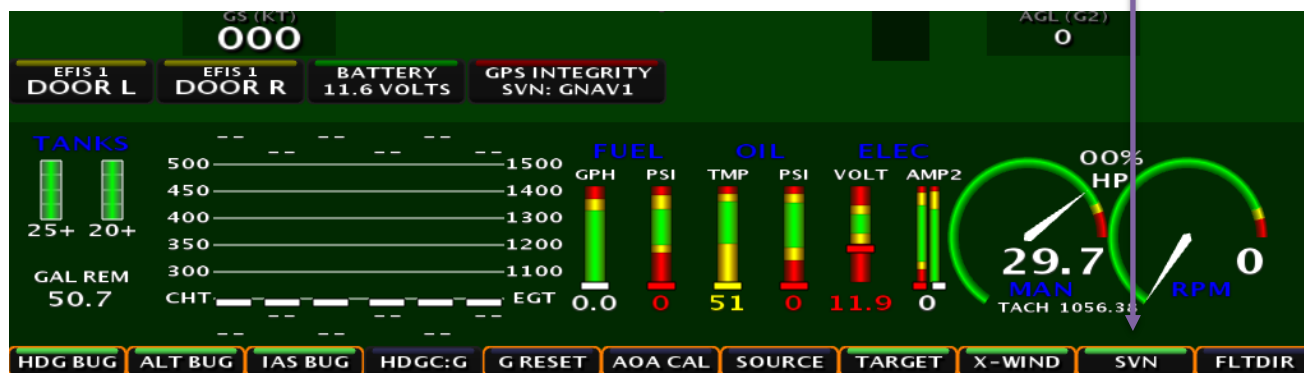
Terrain Awareness and Warning System (TAWS)

TAWS is a system designed to keep the pilot alert of altitudes that could result in Controlled Flight into Terrain (CFIT). Terrain is shaded in yellow or red based on the altitude of the aircraft and the altitude of the terrain below. When the distance between the aircraft and terrain below becomes close enough to present a conflict, the terrain is colored yellow or red. When enabled, TAWS arms automatically when airspeed is above the TAWS airspeed shutoff setting.

This is to prevent false warnings in the traffic pattern.

TAWS Terrain Colors:

RED - Aircraft is within 100ft AGL of the terrain
YELLOW - Aircraft is between 1,000ft AGL and 100ft AGL of the terrain.

SVN TAWS Settings
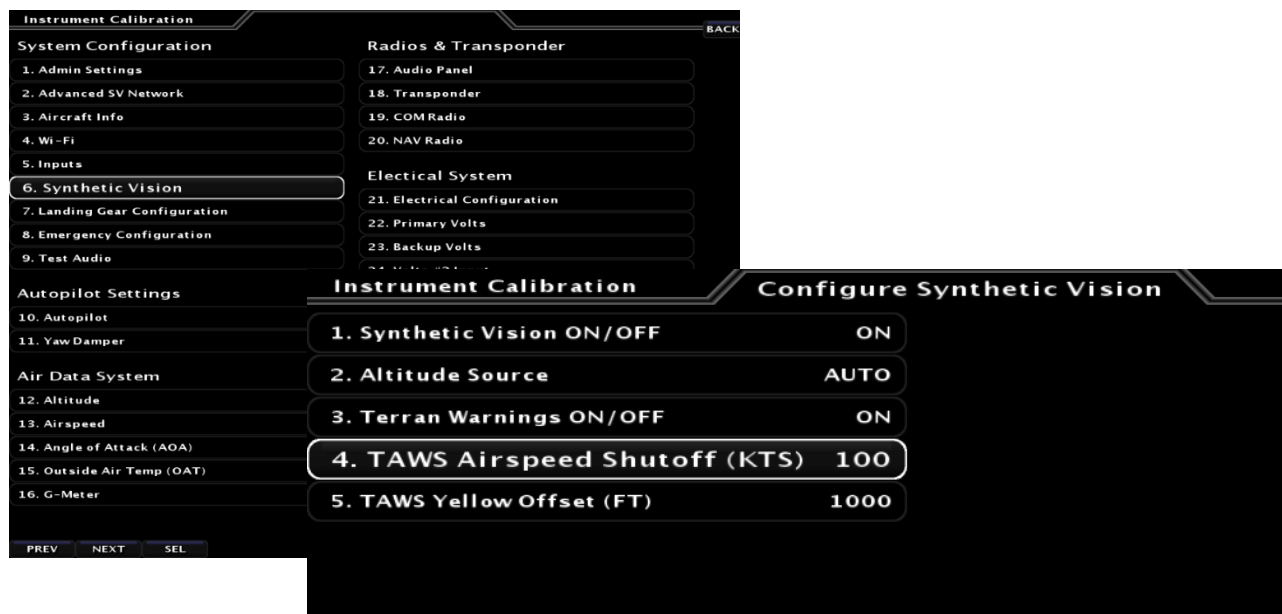
1. Synthetic Vision (ON/OFF)   Turns OFF the Synthetic Vision feature.

2. Altitude Source   Source for SVN (should be auto)

3. Terrain Warnings ON/OFF   Enables/Disables terrain shading based on altitude

4. TAWS Airspeed Shutoff (KTS)   Airspeed that the terrain warning colors turn OFF

5. TAWS Yellow Offset (FT)   Altitude that the terrain turns yellow (normally set to 1000ft)

Obstacle Display

SVN shares the same obstacle database as the top-down map page. Obstacles are shown at their proper height above ground and at their bases are drawn at half of their height.
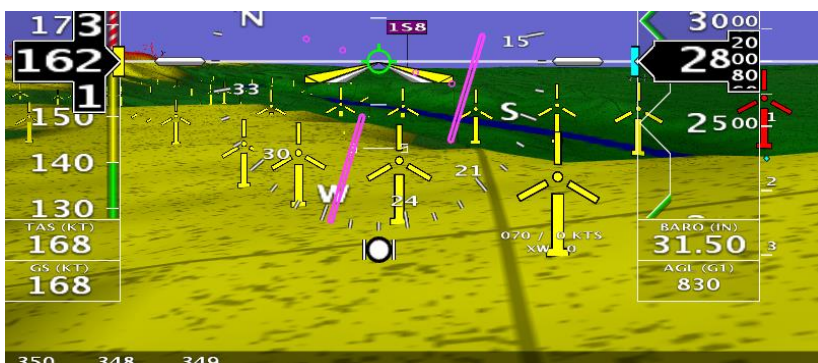
There are several exclusions users will want to be aware of:

- Obstacles beyond 18nm are not shown
- Obstacles less than 1000ft AGL are not shown beyond 6nm
- Obstacles more than 2,000ft AGL below the aircraft are not shown

RED: Aircraft is within 100ft AGL of top of tower
YELLOW: Aircraft is within 600ft AGL of top of tower
GRAY: Aircraft is within 2000ft AGL of top of tower.
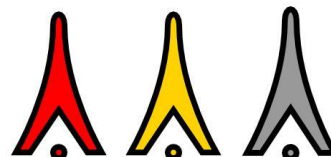
Traffic Display

When a device capable of receiving traffic information is installed and configured, traffic can be displayed within the Synthetic Vision display to improve situational awareness.

Traffic 7 NM and Climbing

Traffic 6 NM

Traffic more than 9 NM

- Traffic information is informational only, and does not relieve you-in-command of his or her responsibility to see and avoid traffic.

- Traffic is displayed as reported by the device sending it to AF-5000. The precision and accuracy of the location of traffic targets may vary from device to device, and this may impact how accurately the position is represented on the AF-5000 display. For example: TIS traffic updates, such as those received by the SV-XPNDR-261/262, may be anywhere from 2-12 seconds old due to radar latency and other technical factors. Be sure to understand the traffic-detection capabilities of your traffic device thoroughly so you understand how to best interpret the position of the traffic displayed on the EFIS.

Traffic targets are displayed using the same symbols that are used on the Map Page display of traffic. See the Traffic section in the MAP and VFR GPS Navigator Operation section for complete descriptions of the types of targets that may be shown. Unlike the Map Page display, however, relative altitude is not provided numerically on Synthetic Vision. Instead, relative altitude is depicted by having the traffic symbols appear either above or below the zero-pitch line, just like they would be if you were looking at traffic out the window. For example, in the figure above, a non-threat airborne traffic target is being displayed above the aircraft's current altitude. Similarly, traffic targets that are shown to the left or right of the center of the attitude indicator are not directly ahead of you.

Note that traffic is not visually scaled for distance. In other words, targets always appear the same size on the Synthetic Vision depiction, no matter how far away they are. However, yellow Traffic Advisory Targets (threats) are displayed larger than the diamond shaped Proximity Advisory Targets and Non-Threat Targets to accentuate their increased importance.

- Note that Traffic Advisory targets behind your aircraft will generate alerts. They can be seen on the Map Page, but will not be visible on the Synthetic Vision display as Synthetic Vision only shows the view in front of the aircraft.

Highway in the Sky (HITS)

Any EFIS system with Synthetic Vision is capable of displaying Highway in the Sky (HITS). HITS is the artificial generation of boxes that direct the pilot towards a programmed navigation course set by the GPS. HITS is depicted as magenta boxes in the synthetic vision. Waypoint names will also be displayed in the HITS box, giving the pilot further information about their location on the flight plan.

Laterally, the HITS boxes will follow the GPS course programmed by the external GPS navigator or by the internal flight plan. Vertically, HITS boxes are controlled by the altitude bug. If the altitude bug is reset to a higher or lower altitude, ALL of the HITS boxes will move up or down to the altitude. A climbing or descending path will not be displayed.

Enabling/Disabling HITS
Press [EFIS] -> [HITS ON/OFF]

Flying with HITS

Flying with HITS involves positioning the aircraft so the flight path marker (green target) is in the center of the HITS boxes. This will ensure the aircraft actually flies through the center of the boxes. The HITS boxes themselves are 700ft wide by 200ft tall, so there is a very narrow margin to fly through.

Glidepath - HITS will display a glidepath to a chosen runway when setup to do so. To use this feature, go to the Flight Plan page **[FPL]** and enter a flight plan. Select a runway at the destination, select the glide-angle, enter a crossing restriction and press ACTIVATE. HITS boxes will then be drawn at the prescribed angle up from the runway selected to the altitude entered.

Options Menu

You select the EFIS OPTIONS menu by touching the center of the PFD page.

The Options menu provides a quick way to get to frequently used items.

ADAHRS Selection

Selects the current ADAHRS to use. In AUTO mode the system will switch ADAHRS units if one fails.

TIMER

Reset, start and stop the EFIS timer displayed in the upper left hand corner.

MIN ALT

Sets the Minimums altitude bug

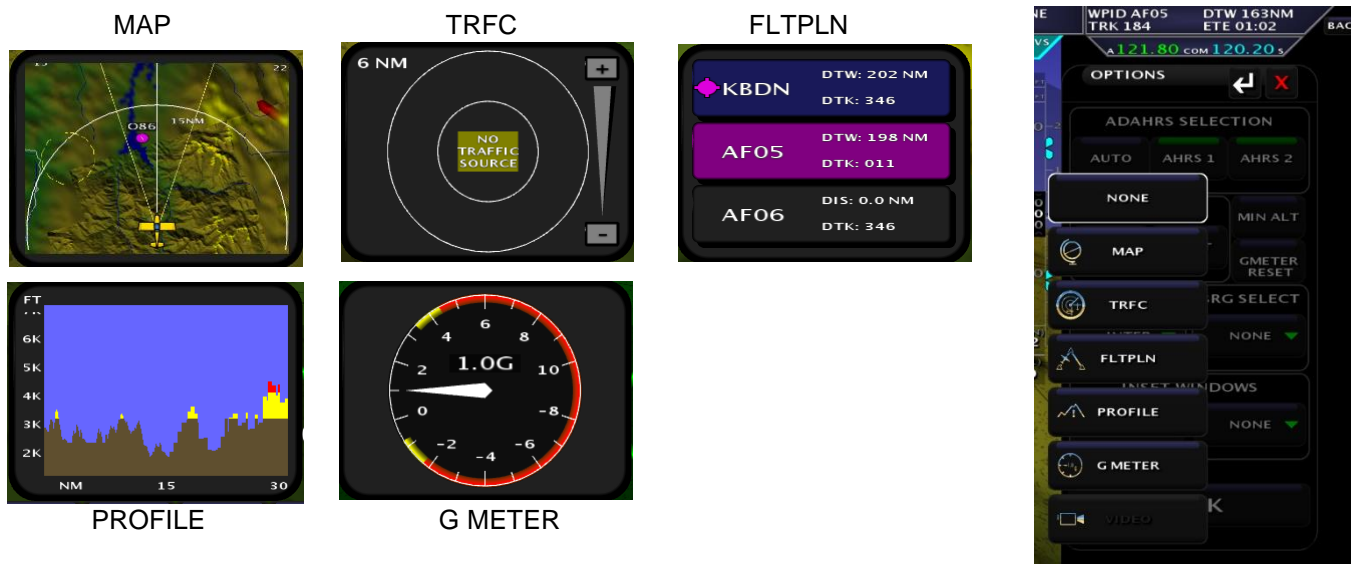### GMETER RESET

Resets the G-Meter Maximum + and – pointers to 1 G

CRS SELECT

Selects the current CDI needle source

BRG SELECT

Selects the current BRG needle source.

Inset Windows

Let's you display a small inset window on the left and right of the EFIS screen. The available inset windows are:

MAP	TRFC	FLTPLN

PROFILE	G METER

You can display an inset window on the full page map screen by first selecting the inset window on a PFD screen and then switching to a full screen map.

The inset windows will be displayed over part of the Engine Monitor window. You can remove the inset window by selecting NONE or using the touch screen to swipe them off of the window (Left or Right)

Display Configuration Menu

You select the display setup menu by pressing the **[DISP]** button from the EFIS main menu or by pressing the back-arrow icon. The Display Menu controls how the screen is split between EFIS, Engine and Mapping.

EFIS Navigation (HSI)

Bearing
Needle Info

Course
Needle Info

To/From

CDI Needle

Waypoint
Info

Waypoint
Identifier

The EFIS can display an HSI when connected to a Nav radio, GPS, or GPS Navigator. The system has two main navigation needles; Course and Bearing. The navigation source can be individually selected for each. If an separate Nav Radio is connected, a second bearing needle can be displayed when the standby Nav frequency is enabled. A MAGENTA needle is always GPS and a GREEN needle is always VOR/LOC.

The source label will indicate the radio type:

Label	Radio Type
GPSNAV1/GPSNAV2	GPS/NAV (IFD540, IFD440, GTN-650/750)
NAV1, NAV2	GNC-255, SL-30 NAV/COM
GPS1, GPS2	GPS Receiver (RS-232 Connected GPS, AF-GPS)

The following radios are supported:

RADIO	INTERFACE	SUPPORTED DATA
Garmin 430W/530W/650/750 Avidyne IDF540/440	RS-232 ARINC 429	GPS CDI GPS CDI, LPV, LNAV, LNAV/VNAV, VOR, ILS
Garmin SL-30/GNC255	RS-232	VOR, ILS
Garmin x95/x96 Series	RS-232	GPS CDI
GPS Radio with NMEA-0183	RS-232	GPS CDI

CDI/BRG Source Selection

The CDI or BRG source is selected by touching the label

Or pressing the CDI button

You can switch between the CDI and BRG Tab by touching the Tab or using the Joystick (LEFT <> RIGHT)

SOURCE
Selects the needle source

GNAV1   GPS Navigator
GPS2   Backup GPS
INTFP   Internal Flight Plan

MODE
The normal setting should be **AUTO** and let the IFD or GTN select the CDI source. *This will enable the CDI to auto switch from a GPS flight plan to an ILS approach.*

OFF   Turns off the CDI
GPS   GPS side of the Navigator
NAV   NAV side of the Navigator
AUTO   Needle will follow the VLOC on the Navigator

The **BRG Needle** always points to the Station or Waypoint

GPS Navigation Display
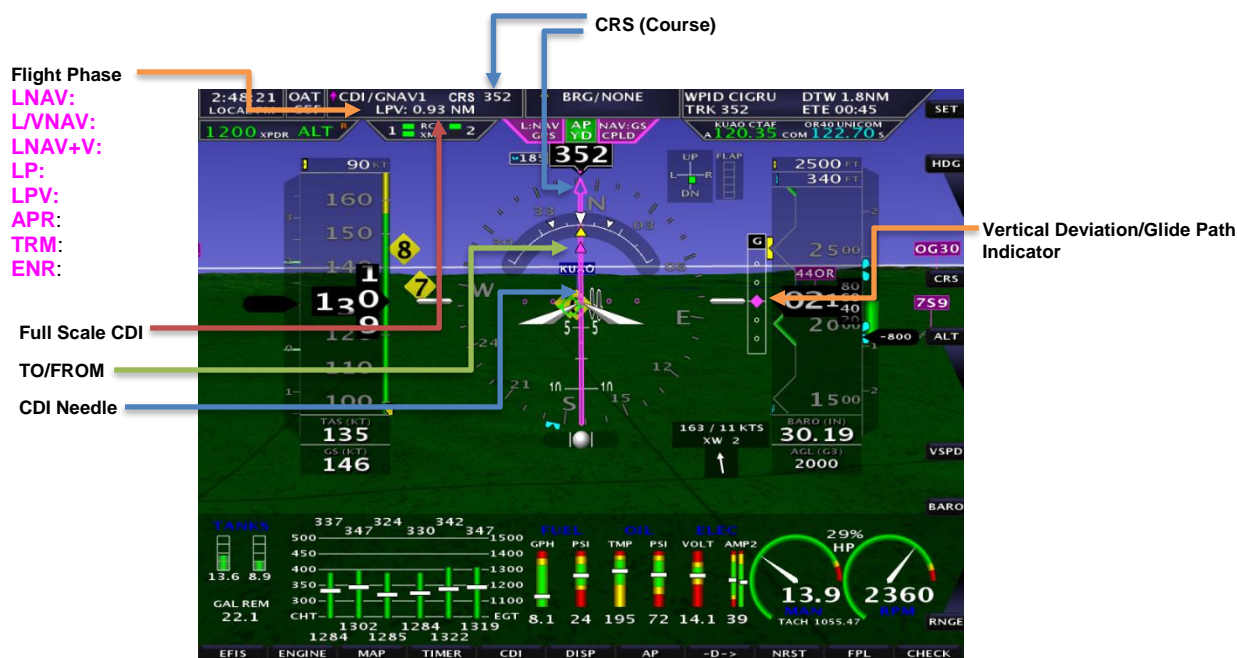
Vertical Deviation/Glide Path Indicator
The Glide Path Indicator (GPI) can be displayed from a WAAS GPS and is analogous to the glideslope for GPS approaches supporting WAAS vertical guidance (LNAV+V,L/VNV, LPV)

NOTE: Requires an IFD440, IFD540, GTN-650/750, GNS-430W/530W, along with an ARINC adaptor module.

CRS (Course)
The Magenta GPS course indicator points to the current course selected on the GPS.

CDI (Course Deviation Indicator)
The GPS CDI scale should be automatically set by the remote WAAS radio using the ARINC data line:

TRK (Track)
The current GPS track over the ground is displayed on the HSI by a Magenta triangle. If there is a crosswind it will be different than indicated magnetic heading.

BTW (Bearing to Active)
BTW displays the direct bearing to the active GPS waypoint and will be displayed on the HSI as a yellow line with two arrows. When flying directly to the waypoint on the GPS Course, the BTW needle will be under the Magenta needle.

DTW (Distance to Waypoint)
DTW displays the nautical miles to the current GPS waypoint.

WPID (Waypoint Identifier)
WPID displays the current waypoint ID from the GPS.

VOR Navigation Display

OBS Setting

VOR Frequency

To/From Indicator

CDI
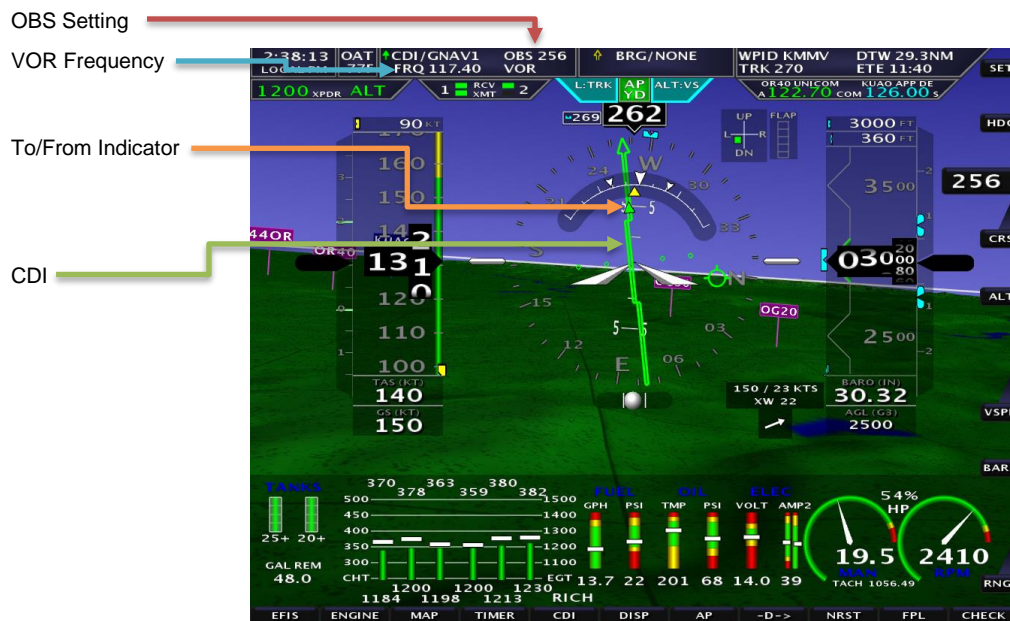
The Green course indicator points to the current course selected using the OBS setting. The OBS setting can be set using the right upper knob on when **[CRS]** is active (press the button below the top knob if **CRS** is not active). The current OBS setting is displayed in the upper CRS/BRG information boxes. If the NAV radio is tuned to a VOR, the tip of the needle (arrow) indicates the selected radial (tail of the needle indicates the radial the aircraft is on - assuming a TO indication). The SL-30 OBS setting can be set using the OBS button on the radio. The radio identifier will also be decoded and displayed only if an SL-30 radio is used.

CDI
Each dot in the course deviation indicator indicates 2 degrees of deviation from the course radial.

VOR
If the radio is tuned to a standard VOR frequency and is giving a valid TO / FROM indication the display will show **VOR** in green letters. If the radio does not have a valid indication the display will show VOR and it should not be used for navigation.

BTA
The BTA (Bearing To Active) displays the direct bearing to the active VOR station and will be displayed on the HSI as a yellow bearing needle. If the aircraft is flying directly to the VOR on the Course OBS setting, the bearing needle will be under the Green course needle.

BTS
The BTS (Bearing To Standby) displays the direct bearing to the Standby VOR station if M (monitor) is selected on the GNC255 or SL-30. The BTS (bearing to standby) will be displayed on the HSI as an orange line with a circle.

IDNT
IDNT displays the current NAV frequency identifier decoded from the SL-30.

TO/FROM
The To/From radio flag will be displayed by a green triangle on the course needle.

TO

FROM
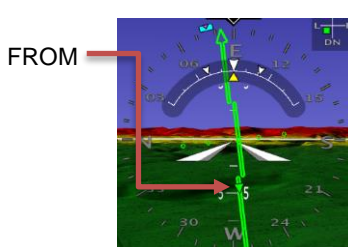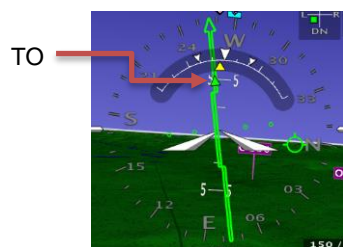
ILS Navigation Display

OBS
Always set the ILS inbound Approach Course (APP CRS) using the **CRS** knob selection.

LOC
If the radio is tuned to a standard ILS frequency and is giving a valid indication, the display will show **LOC** in green letters. If the radio does not have a valid localizer indication, the display will show LOC and it should not be used for navigation.

GS
If the NAV radio has a valid glideslope indication, the display will show **GS** in green letters. If the radio does not have a valid glideslope, it will display GS in red and it should not be used for navigation.

BC
If the NAV radio is tuned to a localizer and is in Back-Course mode, **BC** will be displayed in green.

NOTE on Back-Course: If flying a back-course with an HSI and the GNC-255/SL-30 is NOT in back-course mode, set the course selector "OBS" to the front course heading so no reversal will be needed. If the GNC-255 **is in back-course mode**, the course selector should be set to the heading of the back-course runway or the CDI needle will be reversed.

When the EFIS has detected that the GPS Navigator has switched modes from GPS to NAV ILS the EFIS will pop up a screen asking you to select the ***Inbound Approach Course***. When the GPS Navigator switches from GPS to NAV the CDI needle will change from Magenta to Green.

Autopilot Control / Flight Director

Current AP Mode
Lateral   Vertical

AP Status
AP   Engaged

Engage/Disengage AP Button

Flight Director On/Off Button

The Integrated Advanced-SV Autopilot utilizes the SV-Network servos and is commanded by, and controlled through the EFIS Display. The optional Autopilot Interface Panel adds autopilot auto trim, and dedicated physical control buttons.

For a third-party autopilot to follow the EFIS commands it must be capable of receiving GPSS and GPSV ARINC steering commands. The optional AF-ARINC module connected to the EFIS and properly configured is also REQUIRED for third party autopilot interface. Trutrak (AF-Pilot, Digiflight II, Sorcerer, Vision, Gemini AP) or Trio Pro Pilot.

The autopilot and flight director are very closely connected and are controlled from the same source. The aircraft should closely follow the flight director when the autopilot is receiving commands from the EFIS

Autopilot Operation

The autopilot can be turned ON and OFF by:
- Pressing **[AP]** on the touch screen
- Pressing **[AP]** on the remote AP Panel module
- Pressing the **[ENGAGE]** bezel button
- Pressing a remote button wired to the CWS input (usually on the control stick or panel)

When the autopilot servos engage the aircraft will immediately follow the currently selected Lateral and Vertical mode.

Lateral AP Modes:

TRK Mode

In Track mode the autopilot will make the aircraft's GPS ground track follow the **Teal** colored heading bug on the HSI. The advantage of Track mode is it compensates for any wind or magnetic heading disturbances. When you select Track mode the HSI heading bug color will change to **Teal**.

GPS ground Track (Magenta Triangle)

HDG Mode

In Heading mode the autopilot will make the aircraft's magnetic heading follow the **Yellow** colored heading bug on the HSI. When you select Heading mode the HSI heading bug color will change to **Yellow**.

Magnetic Heading
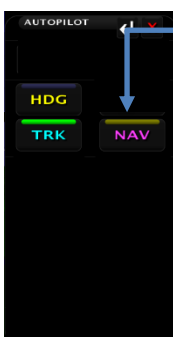
ARM Mode

In ARM mode the autopilot will follow the heading bug on the HSI until the CDI needle is less than 80% deflection and the heading is within +/- 30 deg of the CDI Needle. The Touch screen NAV button will be yellow indicating it is in ARM mode. As soon as the Heading is within 30 deg of the coarse and the CDI needle is within 80% it will switch to NAV mode.

NAV Mode

In NAV mode the autopilot will follow the GPS flight plan and should keep the CDI needle centered.

Vertical AP Modes:
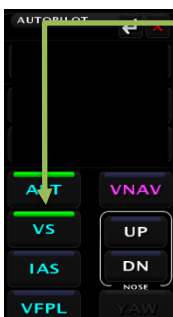
ALT - VS Mode

In ALT - Vertical speed mode the autopilot will make the aircrafts altitude follow the **Teal** colored altitude bug. When you change the altitude bug the autopilot will climb or descend following the Vertical Speed Bug.

You can change the Vertical Speed Bug using the center EFIS knob when set to VSPD.
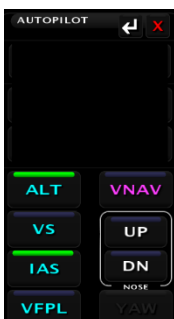
ALT - IAS Mode

In ALT – Indicated airspeed mode the autopilot will make the aircrafts altitude follow the **Teal** colored altitude bug. When you change the altitude bug the autopilot will climb or descend following the Yellow Airspeed Bug.

You can change the Airspeed Bug using the SET > IAS center EFIS knob. ***IAS mode only works with the Dynon AP servos.***

IAS Descending Considerations

If you are trying to descend and the aircraft is already at the airspeed bug you will need to reduce power or increase the airspeed bug to get the autopilot to change altitude.

IAS Climbing Considerations

If you are trying to climb and the aircraft is already at the airspeed bug you will need to increase power or lower the airspeed bug to get the autopilot to change altitude.
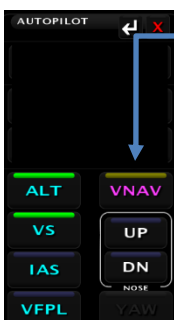
VNAV ARM Mode

In VNAV ARM Mode the autopilot will continue to follow the altitude bug until the Vertical Deviation Indicator needle (LPV or ILS glide slope) appears. Once the VDI needle starts to center the autopilot will switch to NAV mode. If you are using a TruTrack autopilot you must always intercept the glide slope from below.
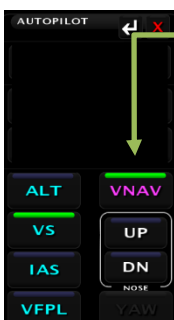
VNAV Mode

In VNAV Mode the autopilot will follow the Vertical Deviation Indicator needle (LPV or ILS glide slope).

The autopilot will not follow the glide slope below the Minimums Bug setting.

VFPL Mode

In Flight Plan mode the autopilot will follow the waypoint altitudes set in the Flight Plan Menu.

If the waypoint does not have an altitude set it will continue to follow the Altitude Bug.

The autopilot will not descend below the Altitude Bug, the EFIS will prompt you if you need to lower the Altitude Bug setting.
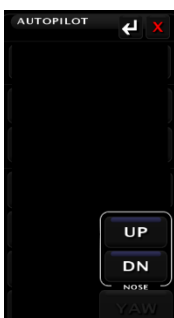
UP – DN Buttons

VS Mode
In VS mode the UP and DN buttons move the Vertical Speed Bugs

IAS Mode
In IAS mode the UP and DN buttons move the Airspeed Bug.

Dynon SV-Autopilot Gain Settings

The Dynon SV-Autopilot settings can be adjusted from the SET > CAL > Autopilot menu when not flying or you can adjust them from the SET > AP/FD screen menu.

SET > CAL > AUTOPILOT

SET > AP/FD Menu

Roll AXIS Overview

This procedure tunes the roll autopilot servo and thus, the flight characteristics of the aircraft in heading holds and turns. This procedure should be performed with the autopilot roll axis in track (TRK+ALT) mode, where the purpose of the autopilot is to keep the aircraft's GPS ground track aligned with the track bug (as well as hold altitude).

### The Roll Axis tuning process can be summarized as follows:

Change TRK command by approximately 90 degrees, and observe the results. The AP should promptly roll into a turn towards the new TRK and smoothly reach the commanded TRK with little or no overshoot.

Note: be sure to observe ground track (TRK) and not heading (HDG) during this procedure.

If the AP is slow to respond to the TRK changes, increase the ROLL AXIS SENTIVITY and watch for improvement. In some cases this may require a fair amount of increase, but be cautious about changing it too quickly. Sensitivity adjustments alone may not completely eliminate overshoot. If increasing sensitivity no longer improves performance, ROLL GAIN may be used to fine tune the roll axis. Too much sensitivity may cause AP responses to be "twitchy". Reduce ROLL SENSITIVITY if this occurs. Too much ROLL GAIN will result in a rough ride.

In particular, if the autopilot cannot keep up with the flight director roll command bar, ROLL SENSITIVITY should be increased. At some point the AP will track the command bars, but follow behind them. ROLL GAIN will reduce the gap.

Caution: Large changes in ROLL SENSITIVITY with the autopilot engaged can result in large servo movements
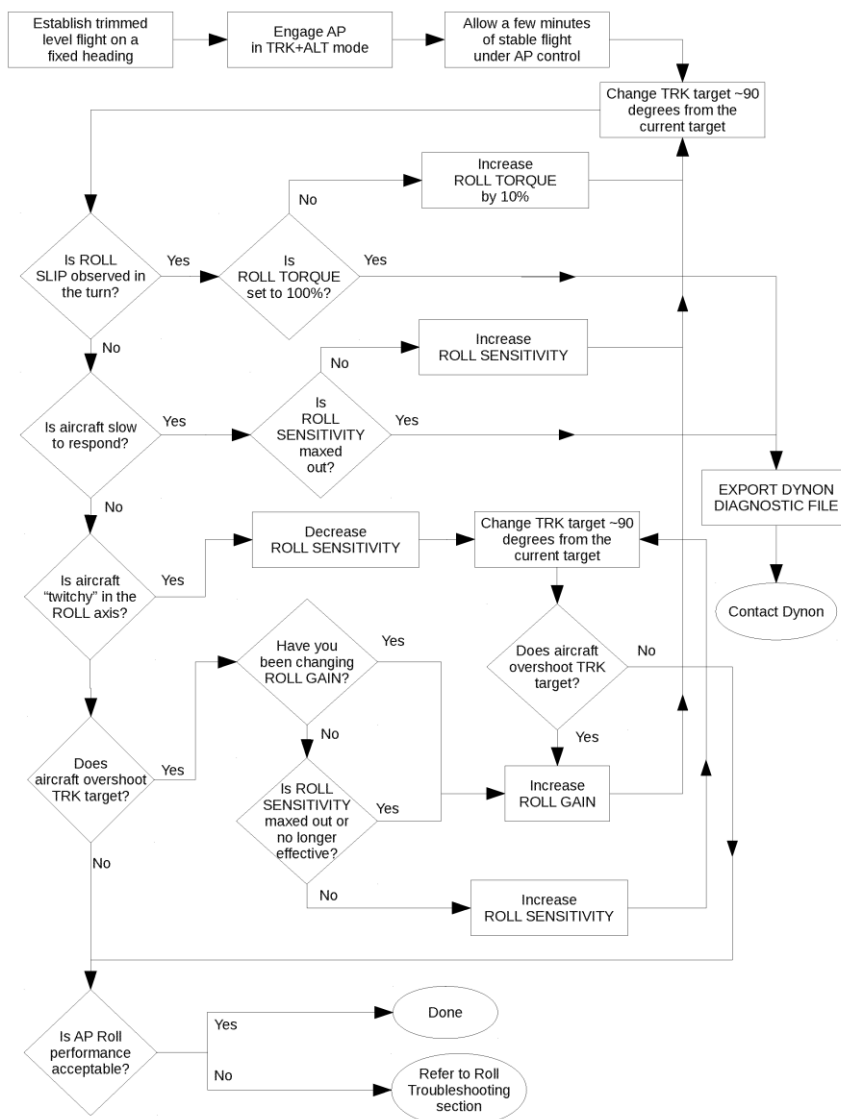
Roll Axis – TRK and Turns Procedure

BANK ANGLE LIMIT

After Roll Axis tuning is complete, BANK ANGLE LIMIT should be set to a value that results in a bank angle in AP that is comfortable for your plane and your preferences. A place to start is to set BANK ANGLE LIMIT to a value that yields a standard rate turn at typical cruise speed.

The default BANK ANGLE LIMIT is 30°.

The SV AP will always obey BANK ANGLE LIMIT. However, if BANK ANGLE LIMIT is set too low (such as 5°), the SV AP will be unable to turn.

Pitch AXIS Overview

The goal of tuning IAS Hold is to give the AP the best possible pitch axis performance. Crisp speed control is a prerequisite for good altitude and glideslope control.

The procedure which follows can be used both for initial tuning and for troubleshooting problems which may arise in your system. Like any checklist or procedure, be sure to follow each step.

- The ALT bug should be set to an altitude many thousands of feet above or below the intended flight testing altitude. This is to keep the autopilot in IAS Hold mode throughout the procedure, and prevent the autopilot from capturing the target altitude.
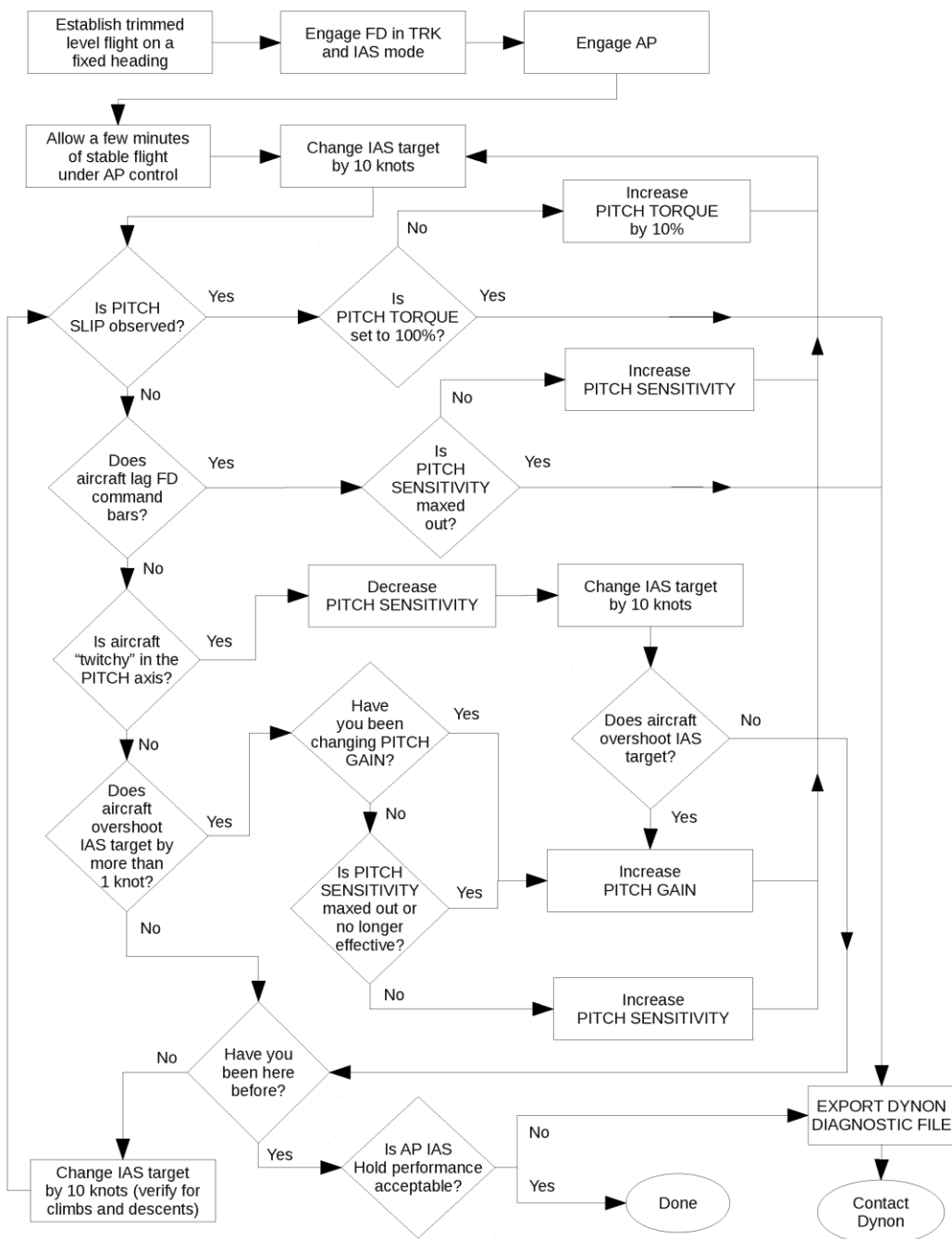
The Pitch Axis IAS Hold tuning process can be summarized as follows:

Increase or decrease airspeed command by 10 knots, and observe the results. The AP should promptly change pitch to change speed, and smoothly reach the commanded speed with little or no overshoot (above the target if increasing; below the target if decreasing).

If the AP is slow to respond to the airspeed changes, increase the PITCH SENSITIVITY and watch for improvement. In some cases this may require a fair amount of increase, but be cautious about changing too quickly. Sensitivity adjustments alone may not completely eliminate overshoot. If increasing sensitivity no longer improves performance, PITCH GAIN may be used to fine tune IAS Hold. Too much sensitivity may cause AP responses to be "twitchy". Reduce PITCH SENSITIVITY if this occurs. Too much PITCH GAIN will result in a rough ride.

In particular, if the autopilot cannot keep up with the flight director pitch command bar, PITCH SENSITIVITY should be increased. At some point the AP will track the command bars, but follow behind them. PITCH GAIN will reduce the gap.
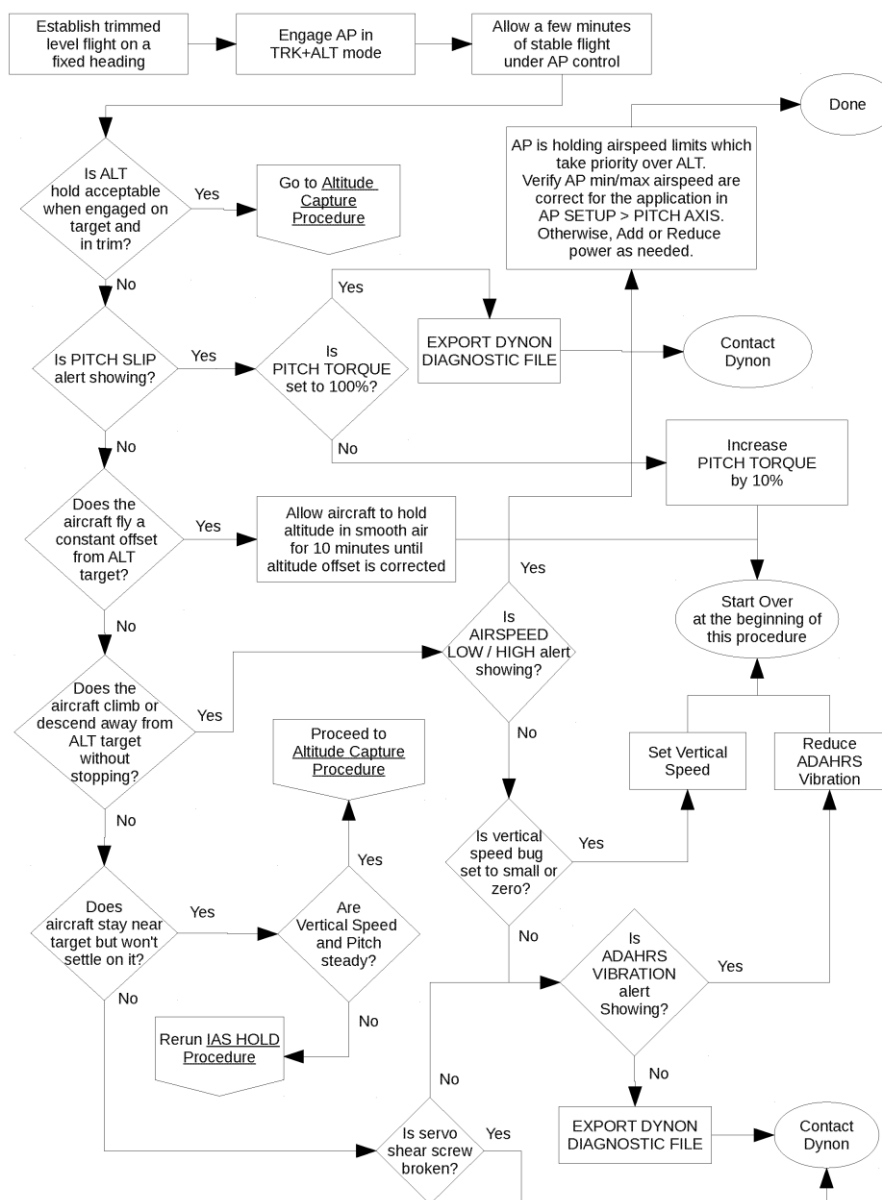
Flowchart

Establish trimmed level flight on a fixed heading → Engage FD in TRK and IAS mode → Engage AP

Allow a few minutes of stable flight under AP control → Change IAS target by 10 knots

Increase PITCH TORQUE by 10%

Is PITCH SLIP observed? — Yes → Is PITCH TORQUE set to 100%? — Yes →

No (from "Is PITCH TORQUE set to 100%?") → Increase PITCH SENSITIVITY

Does aircraft lag FD command bars? — Yes → Is PITCH SENSITIVITY maxed out? — Yes →

No → Decrease PITCH SENSITIVITY → Change IAS target by 10 knots

Is aircraft "twitchy" in the PITCH axis? — Yes

Have you been changing PITCH GAIN? — Yes → Does aircraft overshoot IAS target? — No

No → Is PITCH SENSITIVITY maxed out or no longer effective? — Yes → Increase PITCH GAIN

Does aircraft overshoot IAS target? — Yes → Increase PITCH GAIN

Does aircraft overshoot IAS target by more than 1 knot? — Yes

No → Increase PITCH SENSITIVITY

Have you been here before? — No

Have you been here before? — Yes → Is AP IAS Hold performance acceptable? — No → EXPORT DYNON DIAGNOSTIC FILE

Is AP IAS Hold performance acceptable? — Yes → Done

Change IAS target by 10 knots (verify for climbs and descents)

EXPORT DYNON DIAGNOSTIC FILE → Contact Dynon

Pitch Axis – IAS Hold Procedure

Pitch AXIS Hold and Capture

Overview

Both holding and capturing altitude are related but distinct parts of the autopilot. The Altitude Hold Procedure which follows will address common problems, and once those are resolved, direct you to the Altitude Capture Procedure, which will tune your system to capture and hold vertical speed and capture altitude targets without overshoot.
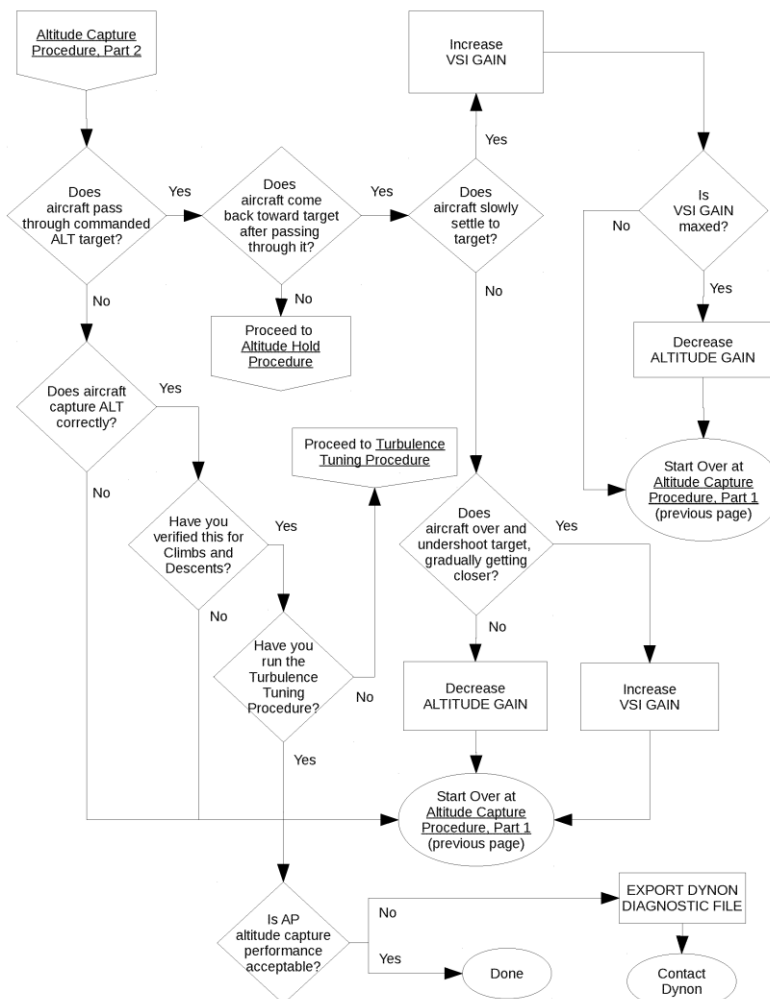
Flowchart

Altitude Hold Procedure

Establish trimmed level flight on a fixed heading → Engage AP in TRK+ALT mode → Allow a few minutes of stable flight under AP control

Change ALT target by 300 feet

Is aircraft unresponsive when a new ALT is set? — Yes → Is Vertical Speed set to non-zero? — Yes → Proceed to Altitude Hold Procedure

Is Vertical Speed set to non-zero? — No → Set Vertical Speed correctly

Is aircraft unresponsive when a new ALT is set? — No

Does ALT change too slowly, or does level off start too soon? — Yes → Have you been decreasing ALTITUDE GAIN? — Yes → Decrease VSI GAIN

Have you been decreasing ALTITUDE GAIN? — No → Increase ALT GAIN

Does ALT change too slowly, or does level off start too soon? — No → Go to Altitude Capture Procedure Part 2

Altitude Capture Procedure (Part 1 of 2)

Altitude Capture Procedure, Part 2

Increase VSI GAIN

Does aircraft pass through commanded ALT target? — Yes → Does aircraft come back toward target after passing through it? — Yes → Does aircraft slowly settle to target? — Yes → Increase VSI GAIN

Does aircraft slowly settle to target? — No

Is VSI GAIN maxed? — No → Start Over at Altitude Capture Procedure, Part 1 (previous page)

Is VSI GAIN maxed? — Yes → Decrease ALTITUDE GAIN → Start Over at Altitude Capture Procedure, Part 1 (previous page)

Does aircraft come back toward target after passing through it? — No → Proceed to Altitude Hold Procedure

Does aircraft pass through commanded ALT target? — No

Does aircraft capture ALT correctly? — Yes → Have you verified this for Climbs and Descents? — Yes → Proceed to Turbulence Tuning Procedure

Have you verified this for Climbs and Descents? — No → Have you run the Turbulence Tuning Procedure? — No

Have you run the Turbulence Tuning Procedure? — Yes

Does aircraft over and undershoot target, gradually getting closer? — Yes → Increase VSI GAIN

Does aircraft over and undershoot target, gradually getting closer? — No → Decrease ALTITUDE GAIN → Start Over at Altitude Capture Procedure, Part 1 (previous page)

Does aircraft capture ALT correctly? — No

Is AP altitude capture performance acceptable? — No → EXPORT DYNON DIAGNOSTIC FILE → Contact Dynon

Is AP altitude capture performance acceptable? — Yes → Done

Part 2 of 2

Turbulance Tuning Procedure

Overview

Once you have configured your autopilot to capture and hold airspeeds and altitudes, you may wish to adjust the ride quality in turbulence, particularly on the glideslope.

In general, the autopilot will attempt to maintain a constant G-loading through bumps by pulling or pushing G to oppose G generated by "air pockets". The amount of G the autopilot will apply is limited by G ERROR LIMIT. If, for example, you encounter a 0.5 G updraft, and G ERROR LIMIT is set to 0.25, the most the AP can do to attenuate the bump is reduce it by 0.25 G.

The amount the autopilot will apply up to that limit is determined by G ERROR GAIN. If this is set to 1, for every 1/10 G the airplane is bumped, the AP will apply 1/10 of a G. Increasing G ERROR GAIN will make response more rapid, but also more abrupt, so use this setting with care.
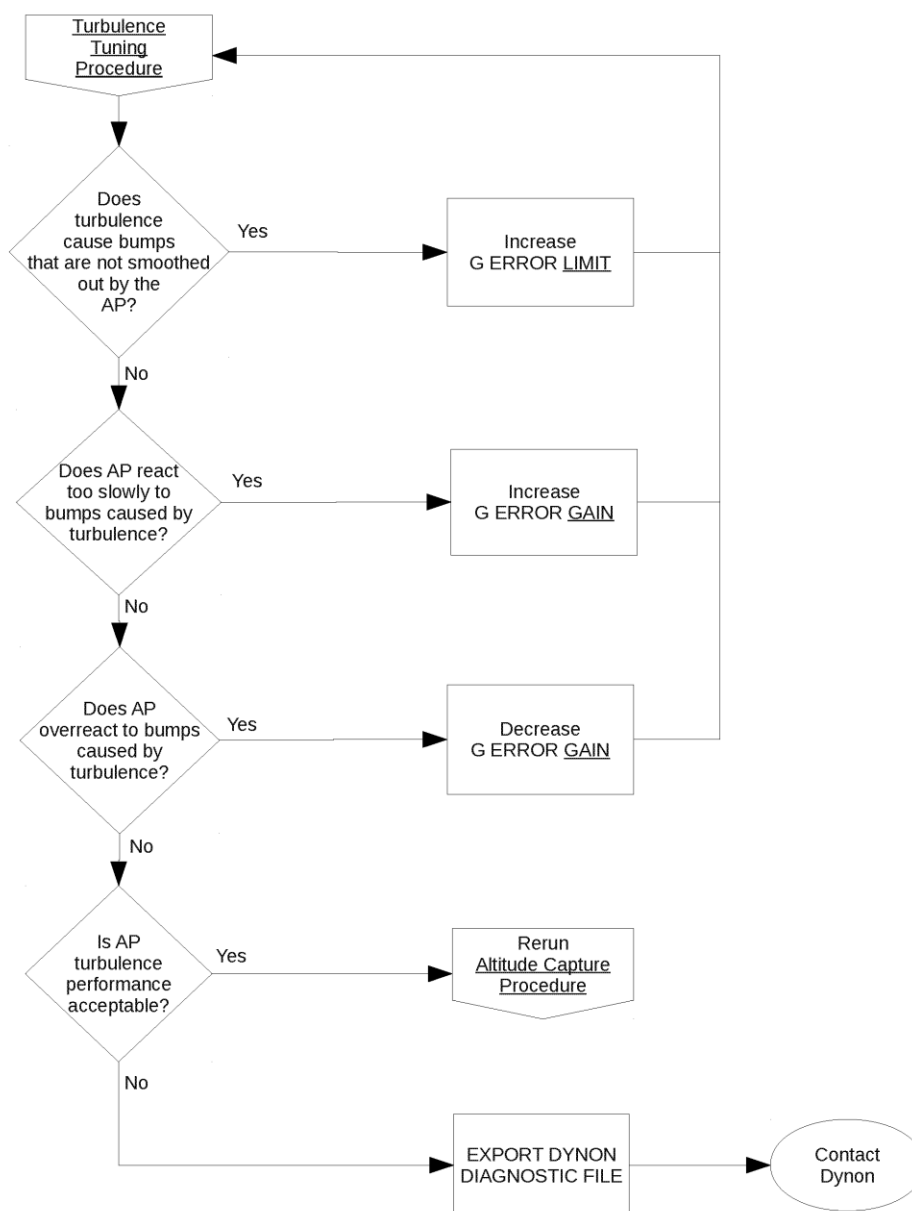
Autopilot Settings – Defaults

ROLL Axis Setting	Minimum	Maximum	Default
TORQUE	10%	100%	100%
SENSITIVITY	1	24	10
ROLL GAIN	0.0	5.0	0.0
BANK ANGLE LIMIT	5	45	30

PITCH Axis Setting	Minimum	Maximum	Default
TORQUE	10%	100%	100%
SENSITIVITY	1	24	10
PITCH GAIN	0.1	3.0	2.0
ALTITUDE GAIN	0.1	2.5	0.6
PULL RATE	1.0	2.0	1.0
VSI GAIN	0.10	2.50	1.5
G ERROR GAIN	0.0	4.0	1.0
G ERROR LIMIT	0.10	1.00	0.25
DEFAULT CLIMB VERT SPD	100 ft/min	3000 ft/min	500 ft/min
DEFAULT DESCENT VERT SPD	100 ft/min	3000 ft/min	500 ft/min
MAXIMUM AIRSPEED	1.30 * Vs1	0.95 * Vne	0.95 * Vne
MINIMUM AIRSPEED	1.30 * Vs1	0.95 * Vne	1.30 * Vs1

EFIS Flight Director

The flight director is turned on and off using the FD button.

The wings that come up when the flight director is enabled will show the aircraft positioning to follow. All the pilot has to do is keep the triangle in the wings as they move to follow the commanded source. A change in heading or track will command the wings to bank in the direction to acquire the new heading or track. A command to climb or descend to a new altitude will cause the wings to move up or down.

The Flight Director Wings are color coded based on the command source. The wing bar color will show the horizontal steering source and the triangle tip color shows the vertical steering source.

| Gray | No Source |
| Red | Source Flagged |

Yellow	Heading / Altitude Bug
Cyan	GPS Track Bug
Magenta	GPS
Green	VOR / ILS
Teal	LEVEL
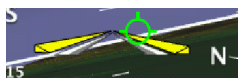
 Autopilot and Flight Director controlled by Heading and Altitude Bugs
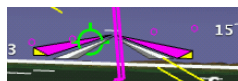
 Horizontal = GPS and Vertical = Altitude Bug

 Autopilot and Flight Director controlled by CDI source = GPS
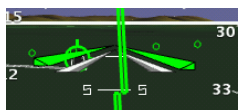
 Autopilot and Flight Director controlled by CDI source = NAV (VOR or ILS)
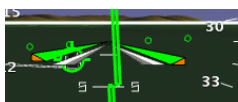
 Vertical = Minimums Bug

The Autopilot and Flight Director will level the aircraft at the Minimums Bug and not fly below it. 200 feet above the Minimums Bug the FD tips will turn Orange and a MINIMUMS warning on the EFIS screen will display.

Trutrak Autopilots

The AF-Pilot, Sorcerer, Vision and Gemini have the following modes controlled from the buttons on the face of the autopilot.

[AP] - Autopilot control mode. Pressing the AP button will cause the autopilot to turn on and follow the current ground track and the current vertical speed of the aircraft. The EFIS settings and controls will not have any effect on the autopilot. Once the autopilot is controlling the aircraft, pressing the knob button will select the Track or Vertical Speed fields. Once the cursor is on the desired field the knob to adjust either the desired track or the desired vertical speed. The Autopilot can be turned off at any time by pressing the [AP] button or external push-button if have one is installed and connected to the control wheel steering input line of the autopilot.

[EFIS] - EFIS control mode. Pressing the EFIS button will cause the autopilot to turn on and follow the current AP/FD settings from the EFIS. The Autopilot can be turned off at any time by pressing the **[AP]** button or external button if one is connected to the control wheel steering input line of the autopilot.

Trutrak AP Settings (settings in the Trutrak AP controller)
The following settings are a good starting point for the **ADVANCED** Pilot autopilot

Lat Activity	5	Vert Activity	4
Lat Torque	12	Vert Torque	12
Bank Angle	High	Static Lag	2
Microactivity	0	Microactivity	0
GPSS Gain	16	Half Step	N

EFIS AP Settings when using a Trutrak Autopilot

LATERAL EFIS Autopilot Control Settings

> **ROLL GAIN**   .05   Range (.01 – 2.0)
> The LAT Gain setting controls how fast the aircraft will respond to errors in track or heading. With too low of a setting the aircraft will hunt slowly and appear slow to respond in roll. With too high of a setting the aircraft will hunt rapidly, and appear jittery.

> **LOC GAIN**   .50   Range (.1 – 3.0)
> The Loc Gain setting controls how fast the aircraft will respond to errors in tracking the Localizer. With too low of a setting the aircraft will hunt slowly and appear slow to respond in roll. With too high of a setting the aircraft will hunt rapidly, and appear jittery.

VERTICAL EFIS Autopilot Control Settings

> **ALT GAIN**   5.0   Range (.1 – 12.0)
>
> Controls how fast the aircraft will respond to errors in altitude. With too low of a setting the aircraft will hunt slowly and appear slow to respond in altitude. With too high of a setting the aircraft will hunt rapidly, overshoot the altitude, and appear jittery.

> **GS GAIN**   3.0   Range (.1 – 10.0)
> The Glide Slope gain controls how fast the aircraft will respond to altitude errors on the ILS glide slope. With too low of a setting the aircraft will hunt slowly and appear slow to respond in altitude. With too high of a setting the aircraft will hunt rapidly, overshoot the altitude, and appear jittery.

> **FD GAIN**   1.5   Range (.1 – 10.0)
> The Flight Director gain controls how fast the Flight Director responds to errors in pitch.

> **MIN SPD**   75   Range (**Vs0 - Vne**)
> The minimum speed that the EFIS will try to command the Autopilot to fly.

> **MAX SPD**   165   Range (**Vs0 - Vne**)
> The maximum speed that the EFIS will try to command the Autopilot to fly.

Changing Autopilot Mode using the Joystick

If you are using a Trutrak autopilot and you have the AP configured for Joystick controls in the CAL > Autopilot menu, the joystick can also be used as a shortcut. LEFT and RIGHT cycle between Lateral modes while UP and DOWN cycle through Vertical modes. Moving the joystick to the left for about 1.5 sec, for example, will prompt the user "AUTOPILOT MODE L:HDG?". Press the joystick in to Confirm.

AF-5000 Series Joystick

UP (V-ALT)

LEFT (L-HDG)   RIGHT (L-ARM)

DOWN (V-ARM)
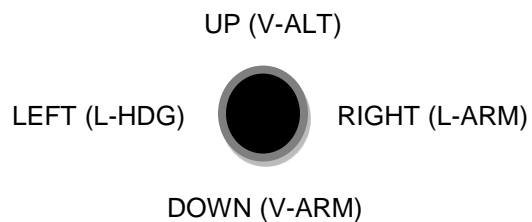
ABOUT Page

Pressing the **ABOUT** button from the Checklist page will bring up information about the system. You can touch a tab to select it or use the joystick to move between tabs.

System – MAP – Weather – Transponder – GPS

SYS Information

Displays the system Serial Number, software version information, IP address

MAP Information

Mapping Information displays the version of mapping software, region, map effective and expiration dates, and status of the map Vector and Terrain file.

WX Information

The **WX** information page contains information and diagnostics for any installed XM or ADS-B receiver.

XM Weather Information (USA and Canada)

ADSB Weather Information

Transponder Information

The XPNDR information page contains information about the Transponder

GPS Information

The **GPS** information page contains information about the attached GPS units.
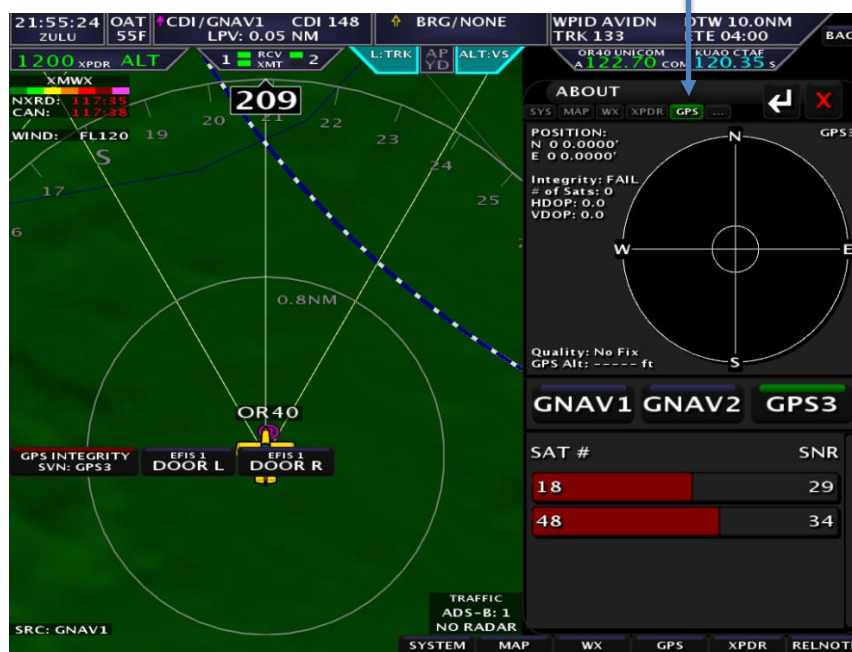
Electronic Circuit Breaker Page

The Electronic Circuit Breaker menu gives you the ability to see the current state of each electronic circuit breaker and reset any of the tripped breakers. You can also turn ON or OFF any of the outputs using the screen buttons.

Maintenance Page

You bring up the Maintenance Page by pressing the CHECK > MAINT button.

You can update the date of any of the maintenance items by selecting the item using the joystick and then pressing the **[UPDATE]** button. To edit the maintenance items, you will need to do the following:

- Transfer Maintenance file to the USB or SD card SET > CAL > Admin Settings > Transfer > Maint > Save

- Edit file with a PC text editor

- Transfer Maintenance file from the USB or SD card SET > CAL > Admin Settings > Transfer > Maint > Restore

Flight Times

Flight times are displayed on the top of the maintenance check list page. Press the **[CHECK] -> [MAINT]**

Tach Time: Hours on engine above 1250 RPM.

Hobbs Time: Hours on engine above 0 RPM.

Last Flight: Hobbs time for the last flight.

Today: Hobbs time since 12:00 AM today.

Radio / Transponder / Audio Panel Controls

The Radio and Transponder controls are selected by pressing the **[SET]** button in the upper right hand corner of the screen.

Press XPDR for the Transponder controls

Press COM for the Comm radio controls

Transponder Code   **Standby Radio Frequency**

Transponder Mode   **Active Radio Frequen**

You can remotely tune the Comm Radio or Transponder from any EFIS screen in the aircraft. If the

Radio or Transponder box is not displayed you need to verify that an EFIS serial port is configured and all screens in the aircraft are configured for the Transponder and Communications Radio type.

Com Radio Control

The Com radio remote interface supports the Dynon Com Radio, IFD540, GNC255, SL30, SL40. The radio page has three tabs (RCNT, COM, FREQ) You move between the tabs using the joystick or touching the tab.

COM Tab

GND   Selects the Ground Freq

TWR   Selects the Tower Freq

VOL   Adjust Volume (if supported)

XFR   Transfer Primary and Standby Frequencies

Keyboard   Type frequency number using the keyboard or screen buttons.

After selecting the new frequency press **ENTER** to transfer the frequency to Standby or **XFR** to transfer the new frequency to the Active frequency (the current active frequency will be moved to Standby).

FREQ Tab

RCNT Tab

Using the TWR, ATIS, GND, and ATC Buttons

When an airport is loaded on the radio, press the TWR, ATIS, GND, and ATC buttons to send frequencies associated with that airport to the standby frequency. Repeated presses of these buttons will cycle through all available frequencies of that type (for example busy airports may have multiple tower frequencies):

TWR: Tunes tower, Unicom, and Multicom frequencies.

ATIS: Tunes ATIS and other weather/information frequencies, including AWOS, ASOS, AWIB, and AWIS frequencies.

GND: Tunes ground control frequencies. Com Radio Operation

9-12 SkyView HDX Pilot's User Guide – Revision A

ATC: When on the ground: Tunes pre-taxi, clearance, and departure frequencies associated with an airport. When in the air: Tunes departure, center, and approach frequencies when associated with an airport.

Transponder Control

Access the Remote Transponder interface through **[SET]** → **[XPDR]** or by touching the transponder status readout in the top left corner of the screen.

The remote transponder has the following controls.

AUTO Turns transponder mode to Automatic

ON   Turns Transponder ON with no Altitude reporting

STBY Sets Transponder to Standby Mode

ALT   Turns transponder ON in Altitude reporting mode

IDNT Select Transponder IDENT mode

Keyboard   Type Transponder code using the keyboard.

Press the VFR button to set the code to the configured VFR code.
(1200 for US based aircraft)

Remote Audio Panel Control

Audio Panel Interface The AF-5000 has the ability to remotely control a PS Engineering remote audio panel (PDA360EX-R or PAC15) through the touch screen, and/or hardware buttons.

To bring up the Audio Panel Control page:

- **Select buttons [CHECK] → [AUDIO]**

- **Or Tap the Audio Panel Status box on the touch screen**

Selecting Active Radios

On screen touch or hardware buttons can be used to select one of the communication transceivers for the pilot and copilot position, and allows radio transmission. In "Split Mode" the PDA360EX/R has the ability to allow the pilot to transmit on Com 1 while the copilot can transmit on Com 2. A fail-safe mode connects the pilot headphone and microphone to COM 1 if power is removed for any reason. Unswitched input #1 (EFIS Audio) is also provided to the pilot headphone (left side headset ear cup) in fail-safe. A four-station voice activated (VOX) intercom is included in the PDA360EX/R.
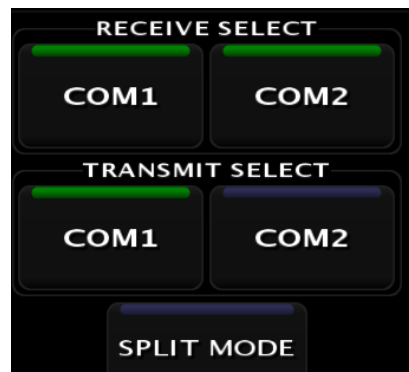
Selecting Nav Radios

On screen touch or hardware buttons can be used to select one of the NAV Radios. When the system is monitoring a NAV radio a green bar will be displayed on the NAV radio button.

USB Charging Jack

The front panel USB-type connector is available for charging devices, such as iPad or cell phones. Up to 10 Watts are available. This connector *does NOT* provide any data interface.

IntelliVox® Intercom VOX-Squelch

This system has PS Engineering's patented *IntelliVox®* circuitry that eliminates manual adjustments. The intercom system incorporates pilot isolate, all and crew modes, two independent stereo music inputs with "SoftMute™". Intercom. Intercom Volume control is through the top EFIS panel knob **[ICOM].** Intercom squelch is automatic.

No adjustment of the *IntelliVox®* squelch control is necessary. Through three individual signal processors, the ambient noise appearing in all four microphones is constantly being sampled. Non-voice signals are blocked. When someone speaks, only their microphone circuit opens, placing their voice on the intercom. The system is designed to block continuous tones; therefore people humming or whistling in monotone may be blocked after a few moments. For consistent performance, any headset microphone **must** be placed within ¼-inch of your lips, preferably against them.

Intercom Modes

The "**ICS**" touch buttons on the panel provides the selection of the three intercom modes. The description of the intercom mode function is valid only when the unit is not in the "Split" mode. Then, the pilot and copilot intercom is controlled by the ICS button selecting CRW.

This button cycles through the intercom modes ISO, ALL, CREW. A green indicator shows which mode is currently active.

ISO: The pilot is isolated from the intercom and is connected only to the aircraft radio system. He will hear the aircraft radio reception (and sidetone during radio transmissions). Copilot will hear passengers' intercom and Music, while passengers will hear copilot intercom and Music. Neither will hear aircraft radio receptions or pilot transmissions. The pilot can hear music if desired.
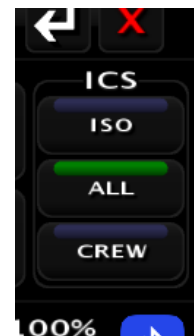
ALL: All parties will hear the aircraft radio and intercom. Crew and passengers will hear selected Music. During any radio or intercom communications, the music volume automatically decreases. The music volume increases gradually back to the original level after communications have been completed.

CREW: Pilot and copilot are connected on one intercom channel and have exclusive access to the aircraft radios. They may also listen to Music 1. Passengers can continue to communicate with themselves without interrupting the Crew and may listen to Music as configured.

Music and Music Muting

The PDA360EX has two independent music inputs at the rear connector. The PDA360EX also has the ability to receive streaming music from a Bluetooth-enabled device. The Music 1, Music 2 and Bluetooth inputs can be selectively delivered to the pilot, copilot and/or passengers using the music distribution menu.
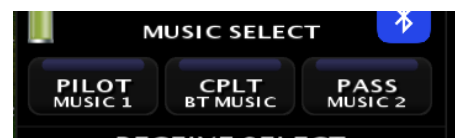
Music Muting

The SoftMute™ circuit will mute the music whenever there is conversation on the radio, the intercom, or both, depending on the "Mute" mode selected. When that conversation stops, the music returns to the previous level comfortably, over a second or so. The mute mode functions are controlled through Music Mute Menu which has **three** modes for each music input. Select: Mute **ALL**, **NONE** (Karaoke) & **RADIO** Mute.

Music Volume

The volume of the music inputs can also be adjusted using the center EFIS ENT knob and on the music device.

Bluetooth® connection

In the PDA360EX/R, a Bluetooth® wireless interface is available for wireless telephone and music connection. The audio panel is always "discoverable," so you just need to search for the PDA360EX from your Bluetooth-equipped phone or music source. The default access code is 0000, if needed. Once the PDA360EX has been "paired" with your Bluetooth device the device battery level will be displayed and the Bluetooth Icon will be displayed

Pairing and unpairing Bluetooth devices

The PDA360EX can be paired with up to eight individual devices. When that number is exceeded, the PDA360EX will randomly drop a device to allow the new device to be added.

Bluetooth® Telephone Mode

The PDA360EX serves as a full duplex interface for telephone systems such as portable cellular phones with Bluetooth connectivity.

Warning:

United States FCC Regulations contained in 47 CFR § 22.925 currently contain prohibition on airborne operation of cellular telephones. "Cellular telephones installed in or carried aboard airplanes, balloons or any other type of aircraft must not be operated while such aircraft are airborne (not touching the ground). When any aircraft leaves the ground, all cellular telephones on board that aircraft must be turned off."

In **ALL** intercom mode, all crew and passengers will be heard on the phone when they speak. All will hear selected audio. Com audio is automatically heard in the headsets.

In **CREW** mode, the pilot and copilot are connected to the telephone. The pilot and copilot will have transmit capability on the other selected transceiver Com 1 or 2, simply by using their respective PTT switch.

In **ISO** intercom mode, when the PDA360EX is in the **TEL** mode, the pilot position is in the "Phone Booth." Only the pilot will hear the telephone, and only he will be heard. He will also have access to Com 1 or 2, and will transmit on that radio using the PTT. All selected audio is provided.

NOTE

Because the cell phone uses an intercom circuit, all stations on that circuit will lose intercom capability when the cell phone is in use. Intercom conversations will still be present if the cell phone provides sidetone, or if the audio panel is modified for telephone sidetone. PS Engineering does not guarantee compatibility with personal cellular telephones.

Internal Recorder and playback

The PDA360EX comes equipped with an internal recorder. This digital system stores the last incoming audio from the radio you have selected for transmit. It can store as many of 8 incoming messages, and up to 45 seconds of audio. The pilot and copilot hear the playback. Recording is automatic. To play back the last recorded message, press and hold the COM Receive pushbutton associated with the selected radio transmitter for about one (1) second. You can either wait for the message to finish playing before accessing the prior message, or cancel the current playback and step backward. To cancel the playback, press and hold the COM receive playback button for two seconds (2). The next time the button is pressed for one (1) second, the next earlier message will be heard. The playback will stop whenever there is more incoming selected com audio, and the message can be replayed from the beginning by pressing the selected Com Receive button again for 1 second.

USB Charging Port (10)

The PDA360EX contains a USB charging port that is capable of providing 5 VDC, 1.5 amps of current to charge the batteries in smart phones and tablets used as Personal Electronic Devices. This is NOT a data transfer jack.

Moving Map Display

GPS Track
Current Waypoint
METAR Symbol
Class D Airspace
Major Road
Zoom Range
Map GPS Source
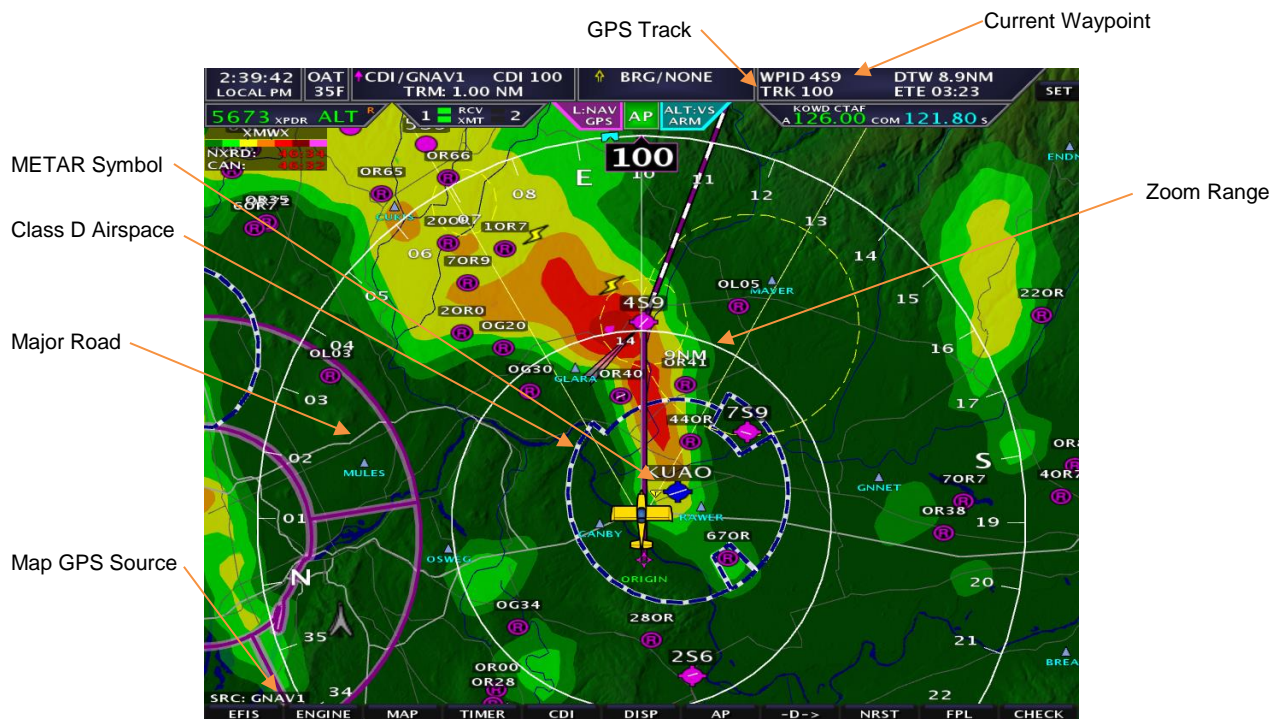
Map Features

Currently the map will display the following features:

1. Public and Private airports
2. Airspace
3. Intersections, VOR's
4. Obstructions
5. State Lines
6. Rivers
7. Major Roads

The MAP page can be displayed by swiping left on the PFD EFIS display or by double pressing the [MAP] button.

The moving map can be displayed as a partial screen along with the EFIS and/or Engine Monitor or as a complete page. Users can also select the airspeed and altitude tapes to be displayed on the map from the **[SET]** → **[MAP]** menu and selecting the **[AIRDATA]** buttons.

EFIS, MAP , ENGINE

Map Page with Air Data ON

Map Options

The Map settings page is displayed by pressing: **[SET]** → **[MAP]**

The following Map features can be turned ON or OFF

TERRAIN	Map Terrain
PRIVATE	Private Airports
INTSECT	Intersections
AIRDATA	Airspeed and Altitude Tape

Map Scale Option

KTS/NM	Knots
KPH/KM	Kilometers
MPH/SM	Statue Miles

ZM:CCW	Selects knob zoom direction
SPLT50	Selects split map mode 50% or 40% of screen.

The current map flight plan source is automatically set to the CDI source. You can select a different source from the CDI by selecting:

[MAP] → **[SOURCE]**→**[GNAV1/GNAV2/GPS1/GPS2/INTFP]**

GNAV1/GNAV2	IFD440, IFD540, GTN650, GTN750
GPS1/GPS2	External GPS unit setup as GPS
INTFP	Flight Plan activated from the internal flight plan

Zoom Range

The current zoom range is displayed by an arc on the top of the map display with its current digital range. The zoom range can be adjusted using the joystick anytime **[RNGE]** is active. The map software will progressively declutter airports, intersections and obstacles from the screen as the range is increased.

A Touch Screen equipped display recognizes a pinching motion to set the zoom range of the Moving Map.

Map Panning / Pointer

Map Panning allows you to search across the map display. This can be accomplished through the joystick by dragging it in the direction of travel anytime **[RNGE]** is active, a map pointer will be displayed allowing you to make selections on the map. Pushing in on the joystick will select an airport or airspace for more information, pressing **[ACTV]** will activate the selection as the new waypoint. The current distance, bearing, coordinates, and elevation of the pointer is displayed in a Map Pointer information box the top of the map display. Pressing the top right button **[CENT]** will center the map back onto the aircraft.

A Touch tap on the aircraft marker, followed be a swiping motion to pan the Moving Map/Move the Map Pointer. (Pressing the top right button **[CENT]** will center the map back onto the aircraft.)

Remote EFIS Joystick Control

If the PFD screen does not have a map displayed you can use the joystick to control the remote EFIS screen map. If the PFD does have a map displayed the joystick will control the local map.

You need to configure the MFD EFIS to allow joystick control from the PFD display: SET > CAL > ADMIN Settings > Map Zoom From PFD

Nearest Airport

Pressing the **[NRST]** button from the main menu will bring up a sorted list of the nearest 16 airports displayed on the screen at the current zoom level. To display the actual closest airports, zoom in before pressing the **[NRST]** button. The joystick is used to select the desired airport. Pressing the **[INFO]** button will display the information for the highlighted airport.

> **CAUTION** T*o see the actual closest airports, zoom in before pressing the [NRST] button.*

Direct To Navigation

Pressing the **[-D->]** button will allow you to input the desired airport or waypoint to navigate to. To adjust or set a new waypoint, drag the joystick down to the Identifier field. A keyboard will appear across the bottom row of buttons, or the rotary joystick can be used to input the identifier.

Identifier

Drag the joystick down to select identifier field
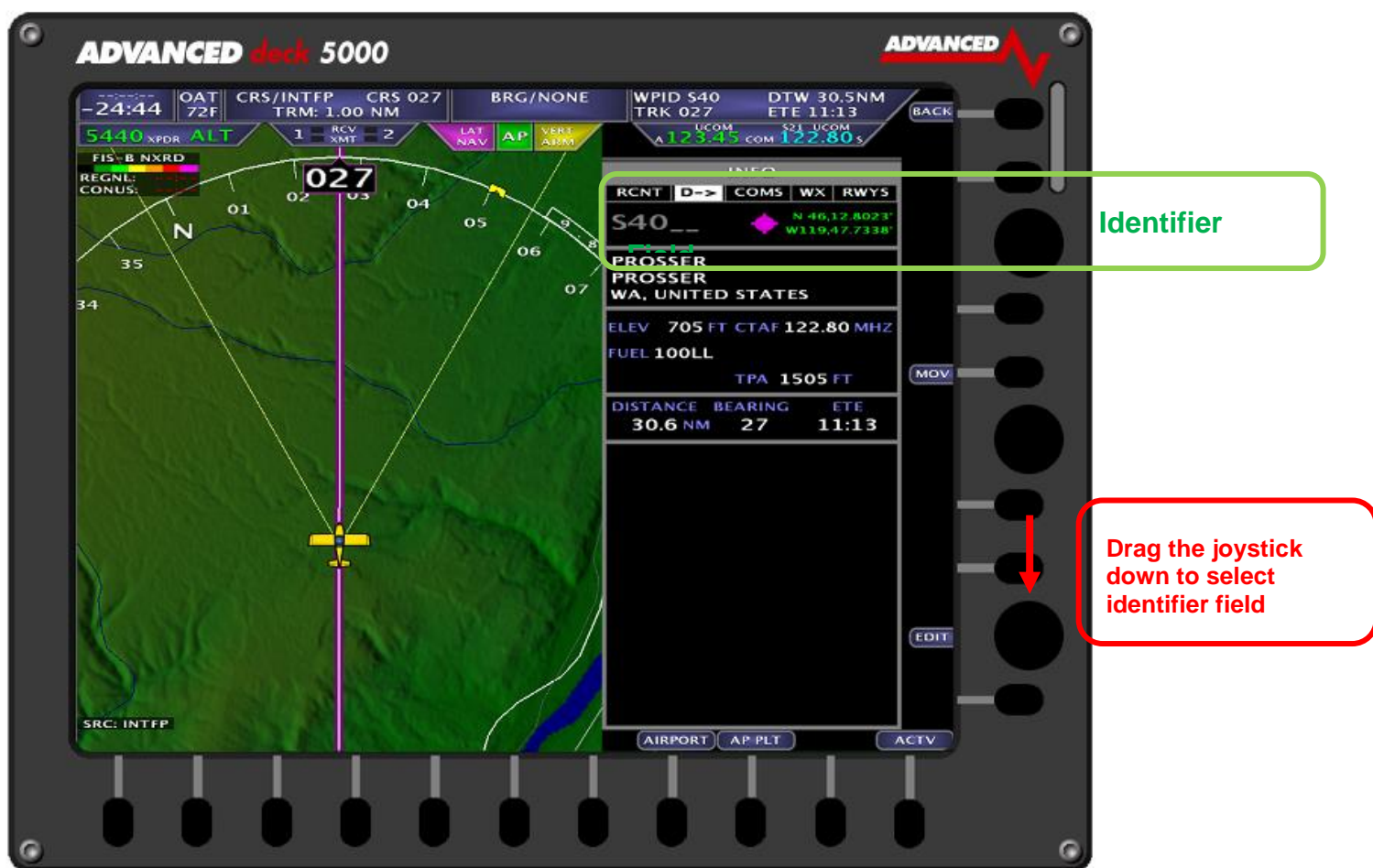
EMERGENCY Airport Button

After pressing the [NRST] button it changes to the EMERGENCY button (i.e. Double Tap **[NRST]**).

Pressing this button will bring up a list off all airports that are within engine out gliding range. You need to configure the following items in calibration for your specific aircraft:
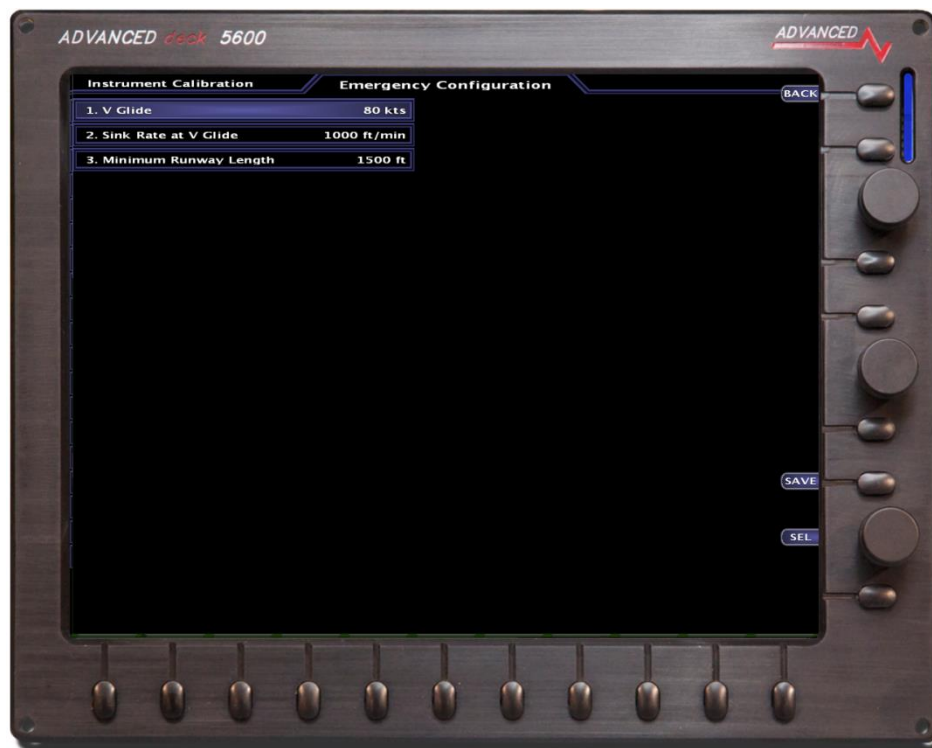
Airport Info

Pressing the **[-D->]** button from the menu will bring up multiple pages of airport info, including runways, frequencies and airport information. The pages are selected by dragging the joystick in the direction of the desired page.
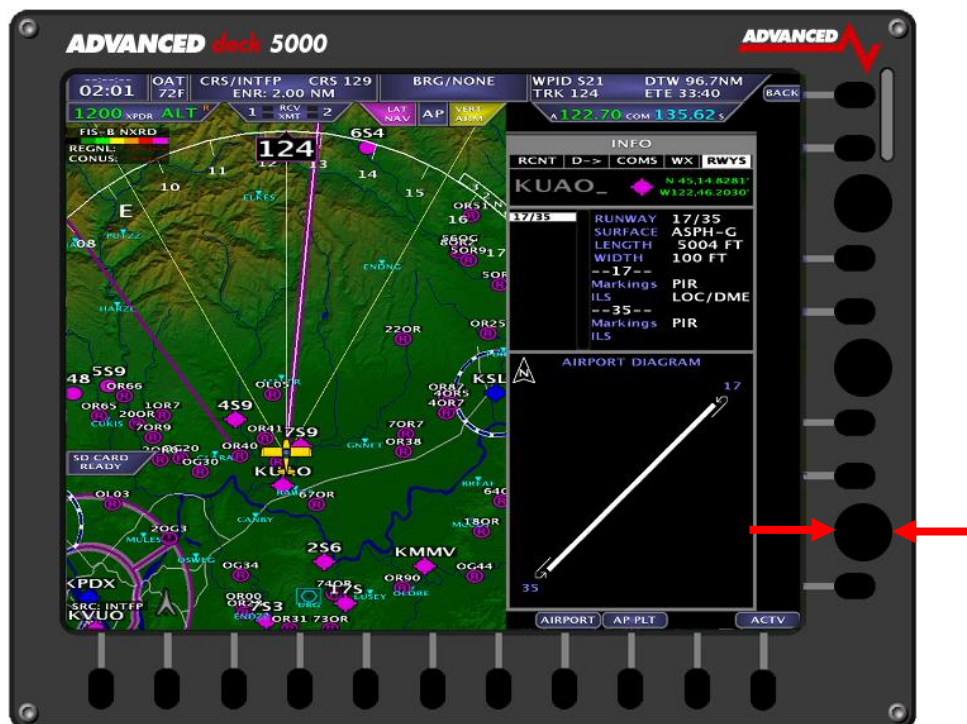
Airspace

Airspace is displayed on the moving map. Airspace Information, including the vertical boundaries, is selectable through the Map Pointer.
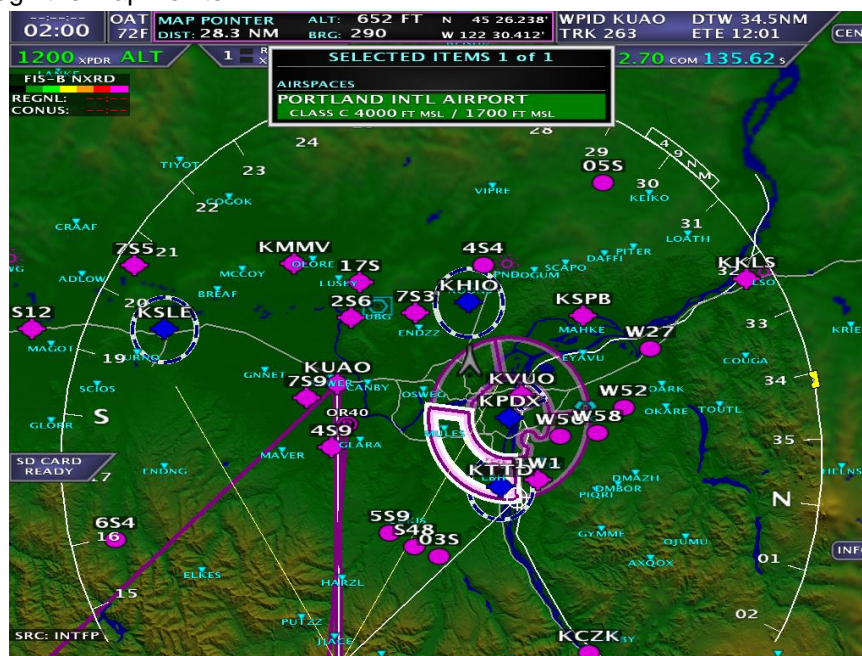
North Up/Track Up Mode

The map can be configured for North Up or Track Up mode by pressing **[MAP] -> [TRK UP]** or **[NTH UP]**

Selecting Charts

Switching between MAP, Sectional, IFR Low, IFR High, Airport diagrams, and Approach Plates can be done through a simple selection of the [MAP] Button, which will then bring up the menu to select the desired database/chart.

Selection through the Touch Screen is done by tapping the screen in any open area, then pressing the desired map ICON.

You can also zoom the map from the map screen + and - ICON's

Full Screen Mode

Split Screen Mode

IFR Low Altitude Chart

Airport Diagrams
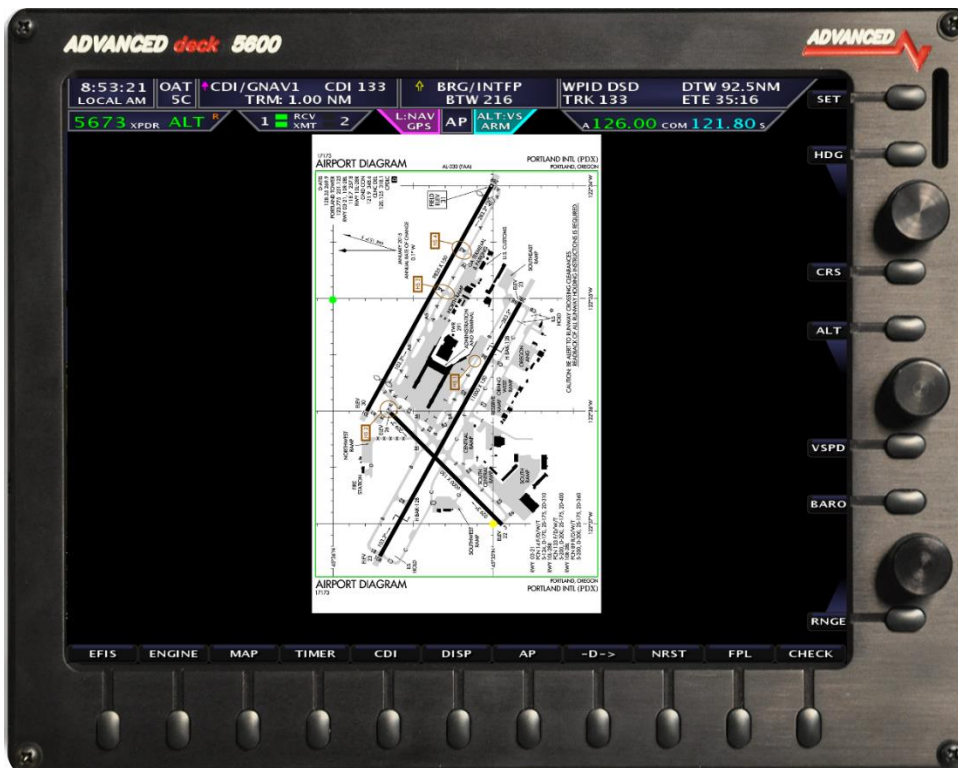
IFR Approach Plates

The EFIS can display an IFR approach plate if you have the optional Seattle Avionics Chart data. The Seattle Avionics data is stored on the system USB memory stick plugged into the back of the unit.

The approach plates are geo-referenced and will display current aircraft position (if on the approach plate area). If a traffic receiver is installed, traffic should be displayed on the approach plate. If the selected chart has the geo-referenced data, it will show a green and yellow dot at the geo-reference points.

WARNING: It is the user's responsibility to verify that the approach plates in the EFIS are current and up to date before using.
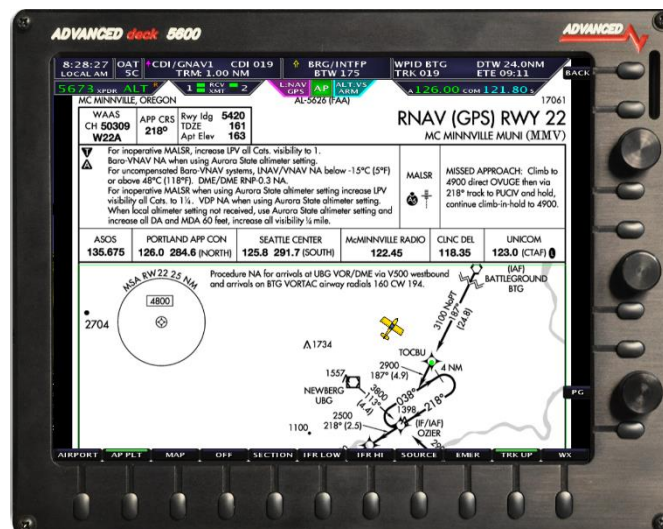
Split Screen Approach Plate

Map Weather Data Display

You can display weather data on the map and sectional from our XM Weather receiver or ADS-B receiver. The EFIS can also display ADS-B weather from a portable Wi-Fi enabled weather receiver that transmits using standard GDL90 data.
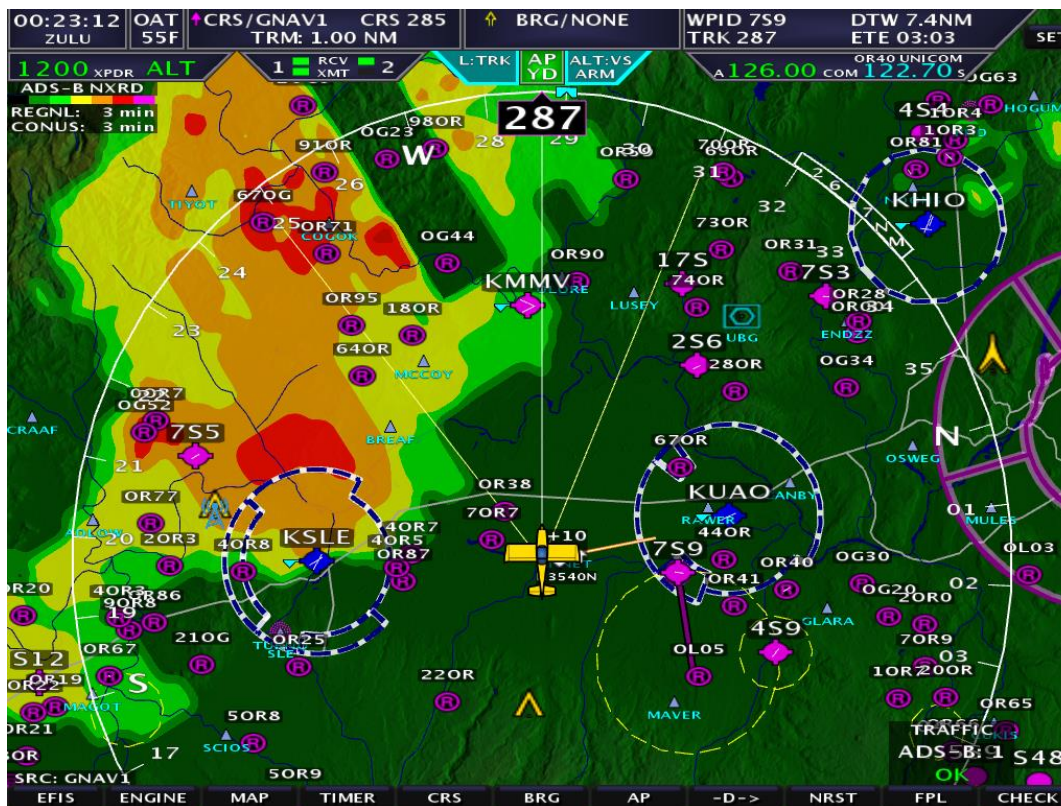
> ⚠ **CAUTION:** *NEXRAD weather data should only be used for long-range planning purposes. Inherent delays and relative age of the WX data can be experienced. NEXRAD weather cannot be used for short-term weather avoidance.*

NEXRAD

High resolution radar image of radar reflectivity and lighting strikes.

Reflectivity is the amount of transmitted power returned to the radar receiver. The NEXRAD colors directly correlate to the level of detected reflectivity from the radar.
To enable/disable NEXRAD press **[MAP] -> [WX] -> [NXRD ON/OFF]**

NEXRAD DATA AGE

The current age of the NEXRAD data is shown in the upper left corner of the map. In the screenshot above, the NEXRAD data is 5 minutes old.

NEXRAD LIMITATIONS

• NEXRAD base reflectivity does not provide sufficient information to determine cloud layers or precipitation characteristics. There is no distinguishing factors between wet snow, wet hail, and rain.

• NEXRAD base reflectivity is sampled at the minimum antenna elevation angle. An individual NEXRAD site cannot depict high altitude storms at close ranges. It has no information about storms directly over the radar site.

• When zoomed in a square block on the display represents an area of 2 ½ miles. The intensity level reflected by each square represents the highest level of NEXRAD data sampled within the area.

METARS

Airports with METAR data are displayed with a colored flag next to the airport symbol on the map.

VFR

MVFR

IFR

LIFR

If an airport has METAR data a weather page will be added to the airport info
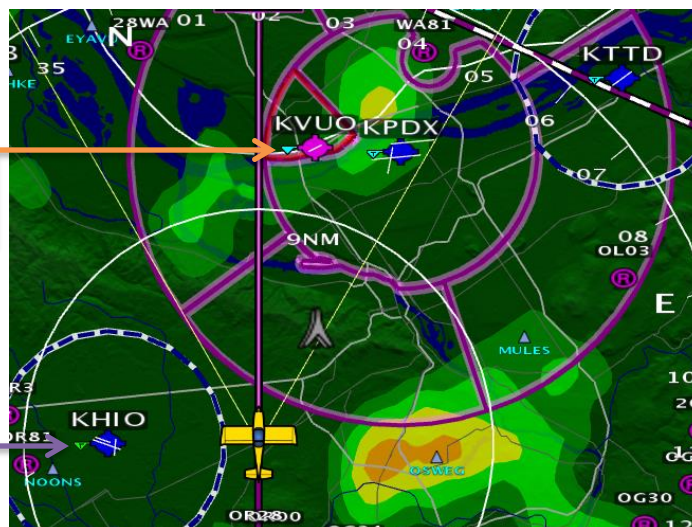
TAF

Airports with TAF's will have a special "T" symbol next to the airport on the map page. In additional, there will be a TAF button on the airports info page. TAF's are given in their original coding.

TFR's

Active TFR's are drawn in RED and future TFR's are YELLOW. The unit will remember the last TFR's displayed upon shut-down so those that remain active are displayed at the next power-up (before WX comes online). This is done by saving all TFR's into memory. If a TFR becomes inactive before the next power-cycle, that TFR will not be displayed. Similarly, if a future TFR becomes active before the next power-cycle, that TFR will be displayed. *Due to limitations in the way that the FAA currently transmits TFR information many TFRs, including but not limited to such as VIP movement / Security / Hazard / Presidential movement, cannot be depicted. Therefore, pilots should not rely on the EFIS TFR depiction as an authoritative source of TFRs. Make sure to use official briefing data sources for complete TFR information.*

Lightning (XM Only)

Lightning is displayed as lightning bolts as part of the NEXRAD weather display.
To enable/disable Lightning press **[MAP] -> [WX] -> [LTNG ON/OFF]**

Winds Aloft

Winds aloft are displayed over the map page using standard NOAA barbed symbols. To change the altitude, press **[MAP] -> [WX]** and use the joystick to select Flight Level. Altitudes are given in Flight Levels

(i.e. FL120 is 12,000ft)

To enable/disable Winds Aloft press **[MAP] -> [WX] -> [WINDS ON/OFF]**

XM Data Service

Once subscribed to an XM service plan, an activation signal will need to be sent while the EFIS and XM module are powered on (usually for about 15 minutes). The AF-5000 will display the following items from the "Aviator" XM WX Data Packages: **NEXRAD, TFR's, METAR's, TAF's, Winds and Lighting.**

XM Weather Diagnostics

The EFIS > ABOUT >WX page displays pertinent information about the status of the XM Weather receiver. The page can be displayed by pressing the **CHECK -> ABOUT and Selecting the WX** Tab.

The age of the displayed XM data

**Mode:** Screen (MASTER or SLAVE).

Receiver/Radio ID Number
Required when calling XM Activation
1-800-985-9200

Antenna: Indicates whether or not an XM antenna is connected

Signal Strength
Indicates the current strength of the XM satellite signal
(NONE, POOR, AVERAGE, GOOD)

Note: Weather Status will not be shown if WX is set as OFFLINE in Instrument Calibration.

XM Radio
If have an XM Radio subscription you can select the radio channel from the CHECK > RADIO button. You use the joystick to move between channels and press in to select. The center knob adjusts the XM radio volume, you might also need to adjust the music input volume on your audio panel.

Current Volume and Channel
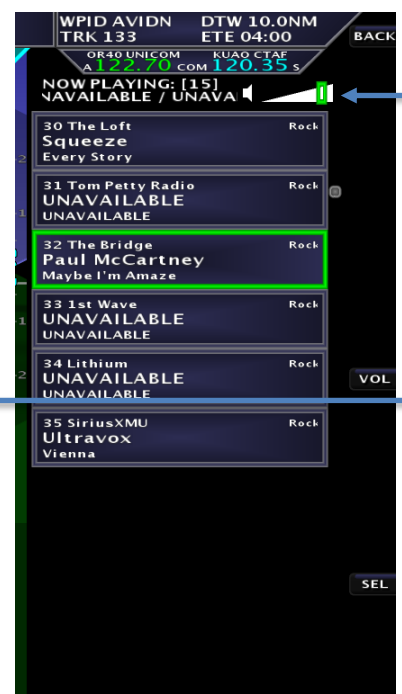
ADS-B Data Service

When connected to an SV-ADSB module, The EFIS can display NEXRAD weather and Temporary flight Restriction (TFR) information visually on the map or sectional page. Additionally, textual METAR and TAF weather reports are available for airports that report such information. The SV-ADSB receives traffic and weather via the 978 MHz UAT ADS-B frequencies, which are only utilized by the FAA's ADS-B system. Therefore, traffic and weather are only available in the US (and other places the FAA may have ADS-B ground stations, including Guam, Puerto Rico, and the US Virgin Islands). The SV-ADSB will not work outside these areas.

Weather information is transmitted continuously over a data link from the ground, but reception of weather data is dependent on ADS-B ground station proximity/coverage, signal strength, and other environmental conditions. Therefore, ADS-B weather reception may not be continuous.

Due to latencies that accumulate while NEXRAD weather images are created, and the way that the FIS-B/NEXRAD services timestamp weather data, NEXRAD images are actually ALWAYS older than the age indicated on the display. In extreme cases, this can mean that the images you see on the map may be 15-20 minutes older than the age indicated. See http://www.ntsb.gov/doclib/safetyalerts/SA_017.pdf for further information about this phenomenon.

Never rely on NEXRAD imagery to try to "squeeze" through a weather system. Often, deadly turbulence and wind shear are present, even in places in storm systems where there is no precipitation indicated.

The Weather and TFR information that the EFIS provides is supplemental information only. It should not be used as your primary means of weather information. Only official FAA briefing information sources should be used to make critical aeronautical weather decisions.

ADS-B NEXRAD Legend

NEXRAD Encoding

Code	Represents		Color	Level
0	radar data level 0	dBZ < 5, No data		No Data
1	radar data level 1	$5 \le dBZ < 18$		
2	radar data level 2	$18 \le dBZ < 30$	(green)	Light
3	radar data level 3	$30 \le dBZ < 41$	(bright green)	Moderate
4	radar data level 4	$41 \le dBZ < 46$	(yellow)	Heavy
5	radar data level 5	$46 \le dBZ < 50$	(orange)	Heavy
6	radar data level 6	$50 \le dBZ < 57$	(red)	Extreme
7	radar data level 7	$57 \le dBZ$	(magenta)	Extreme

NEXRAD Data Coverage
In some circumstances, geographic areas may not have NEXRAD imagery available. This may be the case if:

- Data is not available for the area because there is no NEXRAD coverage in the locale. This can be observed in the areas surrounding the US in Figure 152 above.
- Data blocks not received for an area due to radio signal obscuration, interference, or other radio phenomena:

Data has not yet been received for an area for which there is available coverage, due to the time it takes for the ADS-B system to transmit information.

Areas for which no data is available will depicted with a darker background.

ADS-B Receiver Status / Data Age

Current Regonal and Conus data age is displayed on the upper left hand corner of the map.

REGNL is the local high-resolution data and CONUS is the low resolution data for the continental US.
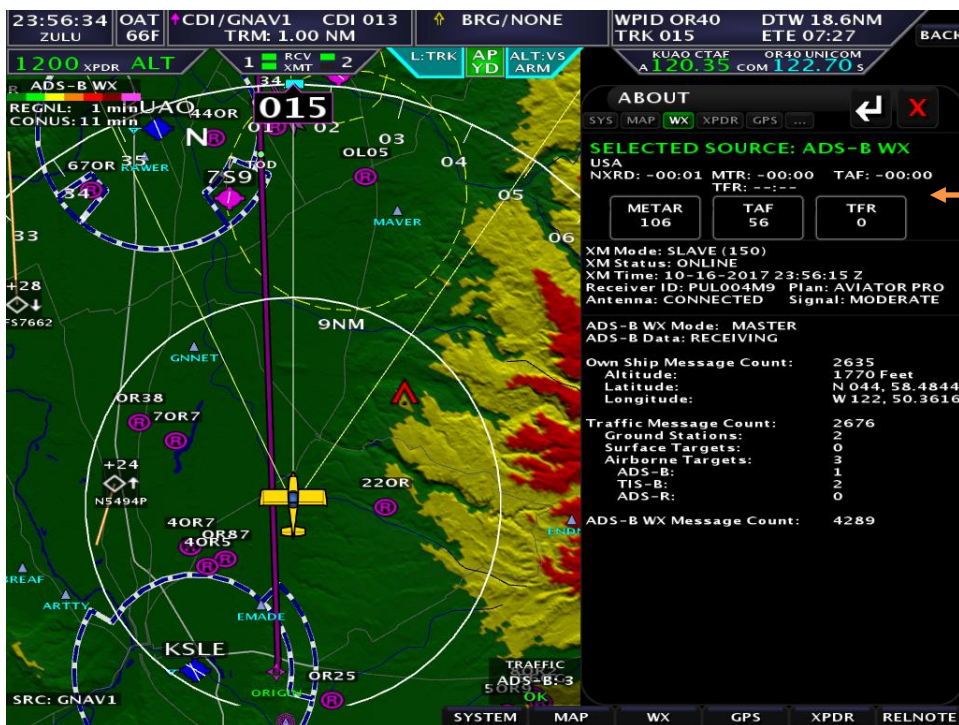
The EFIS > ABOUT >WX page displays pertinent information about the status of the ADS-B receiver. The page can be displayed by pressing the **CHECK -> ABOUT and Selecting the WX** Tab

Map Traffic Display

⚠️ **WARNING:** Traffic information displayed on the Map is provided for visually assisting in acquiring other aircraft. The aircraft should be maneuvered based only upon ATC guidance or positive visual acquisition of conflicting aircraft.

Traffic 200ft below

Traffic 800ft above and descending

Traffic direction and 2 minute arrow
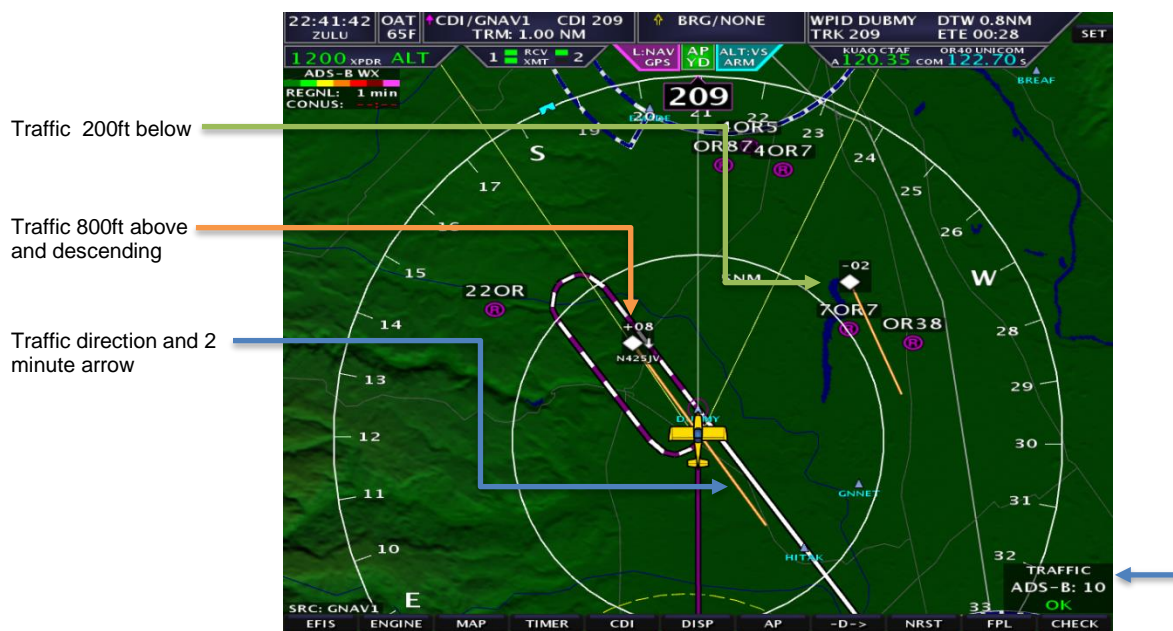
The AFS-Map can display traffic when connected to a ADS-B receiver or active traffic system.

Traffic Display on the Map

Traffic is displayed using the standard TCAS-II symbology

◈ Other Traffic (Greater than 7000ft relative altitude and greater than 7nm range)

◇ Proximity Traffic (within 1200ft relative altitude and less than 6nm range)

🟡 Traffic Advisory (within 1200ft relative altitude and less than 3 nm range)

Receiver Status

The TRAFFIC display in the lower right area of the Map Page annunciates both the device that is currently providing traffic and the status of the traffic receiver.

Possible devices and their possible states include:
ADS-B: Any ADS-B source – such as the SV-ADSB.

- **OK:** Signifies that the transponder is communicating with the US-based ADS-B ground stations; that those ground stations are replying to the ADS-B Receiver; and that your aircraft is in a known radar service volume. This allows the ADS-B ground stations to report all ADS-B targets and radar-only targets that are not yet ADS-B out equipped, thus providing a full traffic picture.

- **NO RADAR:** ADS-B system is reporting that it does not know about radar traffic targets, or that it is not receiving information from any ADS-B ground station (in this case, you may still see aircraft that are equipped with 978 MHz ADS-B out devices via the ADS-B receiver). Although you are receiving ADS-B traffic from other ADS-B equipped aircraft, you are not receiving all detectable traffic because you are not currently in a radar service volume and ADS-B service volume. Thus, the traffic portrait may be incomplete.

- **TIS:** Traffic provided from an SV-XPNDR-261/262, Garmin GTX 330, or any other device that is configured to output traffic information in the Garmin TIS format. The EFIS is receiving traffic data from the device which is providing traffic to the best of its ability.

EFIS Database Files

The moving map navigational database files are stored in internal EFIS memory. You can use the USB memory stick or SD card to update the files. The database files for the United States are updated every 28 days and provided for no charge on the www.Advanced-Flight-Systems.com web site.

The optional VFR Sectionals, IFR Low, IFR High, Airport Diagrams and Approach Plates are stored on a USB stick plugged into the back of the EFIS. The data is a subscription service provided by www.SeattleAvionics.com

The High-Resolution terrain database is stored on the USB stick plugged into the back of the EFIS. The HRTERRAIN database is provided free of charge on the www.Advanced-Flight-Systems.com web site.

See Appendix B for database update procedures.

Internal Flight Planning

The AF-5000 Series EFIS systems have an internal flight planning feature, eliminating the requirement for an external GPS to provide flight plan waypoints. Only a basic GPS with NMEA data output is required to utilize this feature (though it can still be used with any GPS navigator as well). If another GPS navigator with flight planning capability is used, it will transfer the flight plan to the EFIS internal flight plan.

Accessing the Flight Plan page
Press **[FPL]**

Information Displayed:

DTK: Desired Track to Waypoint
VSR: Vertical Speed Required
DTW: Distance to Waypoint
WPID: Waypoint Identifier
RW: Runway: (Number) > (Glide Angle)
ETE: Estimated time Enroute (leg)
Cross xx Before: Distance from waypoint to cross at
AT/ABOVE/BELOW xxx: Cross the prescribed distance from the waypoint at/above/below the set altitude

[SRC XXX] - Selects the GPS source for the internal flight plan (GNAV1 / GNAV2 / GPS1 / GPS2)
[CHART] - Displays the approach plate (if installed on the SD Card) for the destination airport

Creating a Flight Plan

There are two ways to program a flight plan; manually or automatically transfer through another GPS.

To manually create a flight plan, follow these simple steps:

Go to the FLT PLAN page **[FPL]**

Press **[INSERT]**

A waypoint box will appear with the cursor, allowing a waypoint to be entered

Once the waypoint has been entered, press in the joystick to de-select cursor mode

Press **[INSERT]** to add additional waypoints

To remove a waypoint in the flight plan, use the joystick and cursor to highlight the waypoint, press **[REMOVE]**

Activating the Flight Plan

After the flight plan has been created, pressing the **[ACTIVATE]** button will change the EFIS navigation source to follow the internal flight plan. All other screens will prompt *"Change Source to Internal Flight Plan?"*

Direct-To

Proceeding Direct-To an intermediate waypoint: Use the cursor to highlight the waypoint to proceed to, press the **[DIRECT]** button. The EFIS will then sequence to the selected waypoint.

Fly-Leg

The Fly-Leg features is used to fly a leg between two intermediate waypoints. For example, a flight plan has A, B, C, and D intersections before the destination and the pilots wants to skip A and fly the leg between B and C (an airway). Use the cursor to highlight the second of the two legs and press **[FLY LEG]**.

Suspending a Flight Plan

The **[SUSPEND]** button will freeze the current flight plan and cause the HDG and ALT bugs to sync to the current heading and altitude. It will also change the AP/FD mode to **LAT: HDG | VER: ALT**, meaning the autopilot will take-over and maintain the current heading and altitude. This is useful when ATC gives an amended clearance and time is needed to modify the flight plan.

Vertical Navigation using the internal Flight Plan

Using the internal flight plan, the EFIS can descend to preset altitudes at each waypoint. For example, if the aircraft is at 10,000ft (set by the ALT BUG), a user can program 8,000ft for the first waypoint, 6,000ft for the second waypoint, 3,000ft for the third waypoint..etc. To enter a crossing altitude, edit a waypoint and enter a distance from the waypoint to cross at and an altitude. Perform this procedure for all waypoints a crossing altitude is desired and press **[ACTIVATE]**.
Note: If no crossing altitudes are entered, the EFIS will follow the ALT bug.

Rubber Band Edit of Internal Flight Plan

You can edit the internal flight plan using the following procedure:

1. Touch the Airplane ICON to put the Map in Pan / Select Mode

2. Touch the Flight Plan leg to edit.

3. Touch MODIFY from the pop up menu

4. Move the green pointer to the new edit point on the touch screen.

5. Touch ACCEPT on the pop up menu.
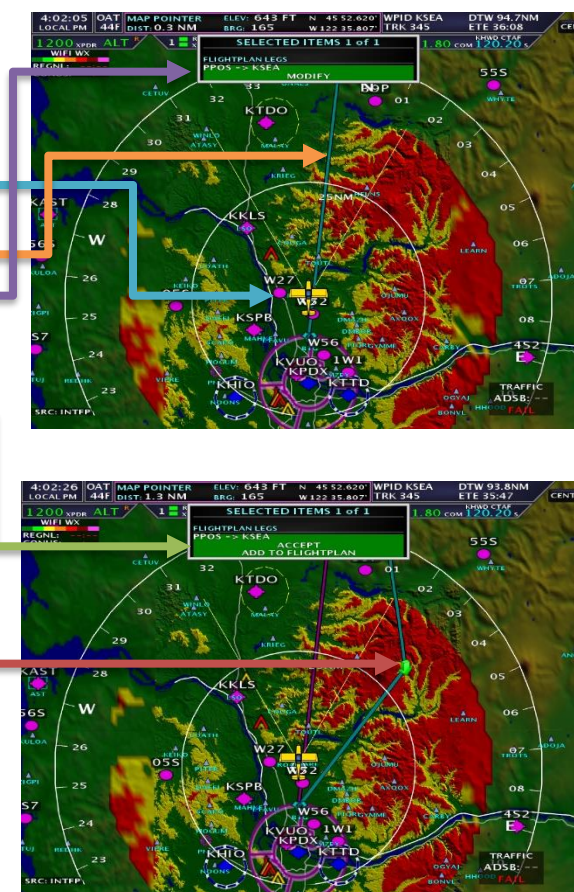
Wi-Fi Adaptor

The Wi-Fi Adapter for AF-5000 allows supported devices and third-party applications to interface with an AF-5000 EFIS. The Wi-Fi Adapter supports ForeFlight Mobile connectivity to AF-5000 on both iPads and iPhones. The Wi-Fi Adapter plugs into a USB port and must be plugged into the EFIS display before power on and remain plugged in for the full flight. Only one Wi-Fi Adapter is required in the aircraft.

Configuring the Wi-Fi Adapter

Configuration of the AF-5000 Wi-Fi system only needs to be done on one EFIS display that has the Wi-Fi module connected. To configure the Wi-Fi Adapter access the [SET] -> [CAL] MENU

The AF-5000 system supports both HOST and CLIENT Modes:
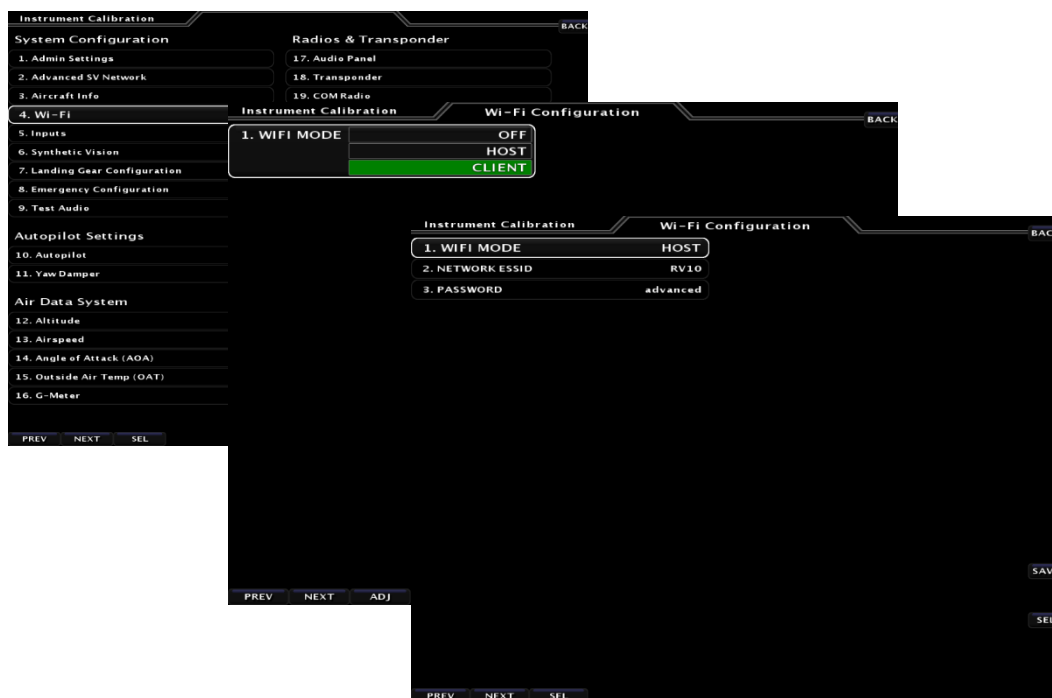
HOST Mode
Use Host mode if you want the EFIS to connect to an iPad or iPhone running a flight planning App (ForeFlight, FlyQ, FltPlanGo)

NETWORK ESSID: Displays the Wi-Fi Network name that will be displayed on a connected device; this name can be changed by the installer.
PASSWORD: User changeable password.

WI-FI PASSWORD (WPA2):
- Minimum of 8 characters
- Maximum of 12 characters
- Valid characters are A-Z, 0-9
- Uppercase and lowercase is significant – the password typed in on the device must match the uppercase.
- After entering the password, push the ENTER button. When in the WI-FI SETUP menu the password will be displayed.
- Write down the password for future reference and easy recall, such as in the plane's logbook.

Client Mode

Use Client Mode if you want the EFIS to connect to a Wifi ADS-B Module that supports GDL90 data or a Wi-Fi Hotspot. Wi-Fi Hotspot EFIS data updates will be added in a future software update.

After changing the Wi-Fi mode you will need to power down and power up the EFIS for the changes to take effect.

The Wi-Fi receiver should not be used in Client Mode connected to a Wi-Fi ADS-B module on the same EFIS screen that is configured for a wired ADS-B receiver. **You must disable any EFIS serial port that is configured for ADS-B data on the same EFIS as the Wi-Fi module.**

Selecting a Wi-Fi ADS-B receiver or Wi-Fi Hotspot

You can select the Wi-Fi network to connect to from the SET > WiFi button. Once you select the network the EFIS will ask for the password. You will need to get the password from the network administrator or device manual.
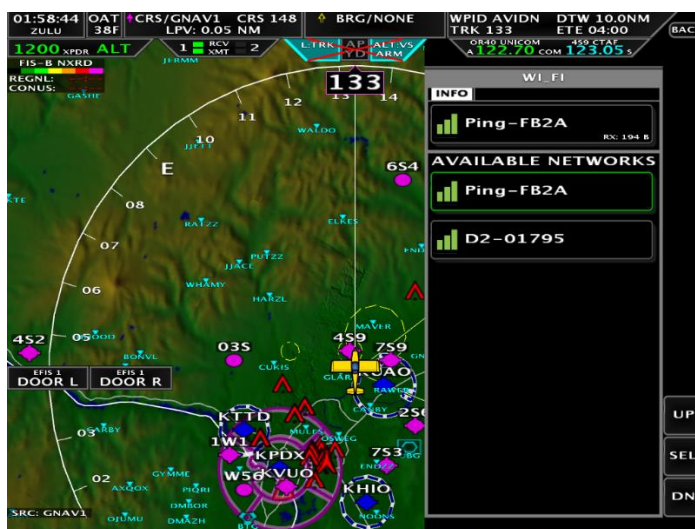
Testing Wi-Fi ADS-B data

You can verify that the Wi-Fi ADS-B unit is working from the: CHECK > ABOUT > WX button

The ADS-B WX Message Count will count if the ADS-B receiver is getting weather data from a ground station, in most areas you will need to be airborne to get data.

The Last Message count is reset every time the EFIS gets data from the Wi-Fi network and should be a small number if it is working.

Connecting AF-5000 to ForeFlight

AF-5000 and ForeFlight customers can send and receive flight plans between AF-5000 and their ForeFlight Mobile app on Apple iPad, iPhone, and iPod Touch devices running the iOS operating system. The AF-5000 will also transmit its GPS position and ADAHRS information to ForeFlight for use within the ForeFlight app. This feature requires one Wi-Fi Adapter in the aircraft. *If the Wi-Fi module is installed in the same EFIS that is wired to an ADS-B receiver it will also send ADS-B weather and traffic data to ForeFlight.*

- In the Wi-Fi menu on your iOS device, select your AF-5000 system. You'll need the password you chose when you set up your EFIS Wi-Fi connection.
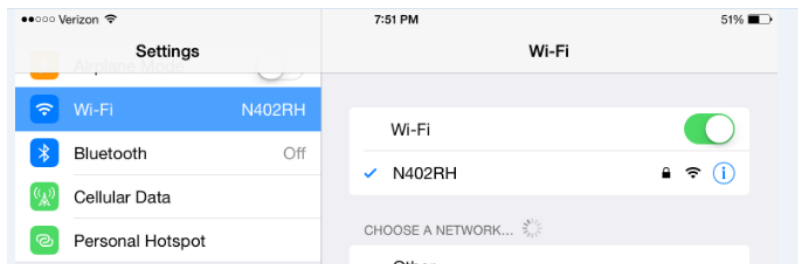
- Once your device is connected to your AF-5000 Wi-Fi network it should automatically be listed as a connected device in your ForeFlight App. Confirm that AF-5000 is connected under the Map Settings Icon [⚙] or in the [More] Devices list.
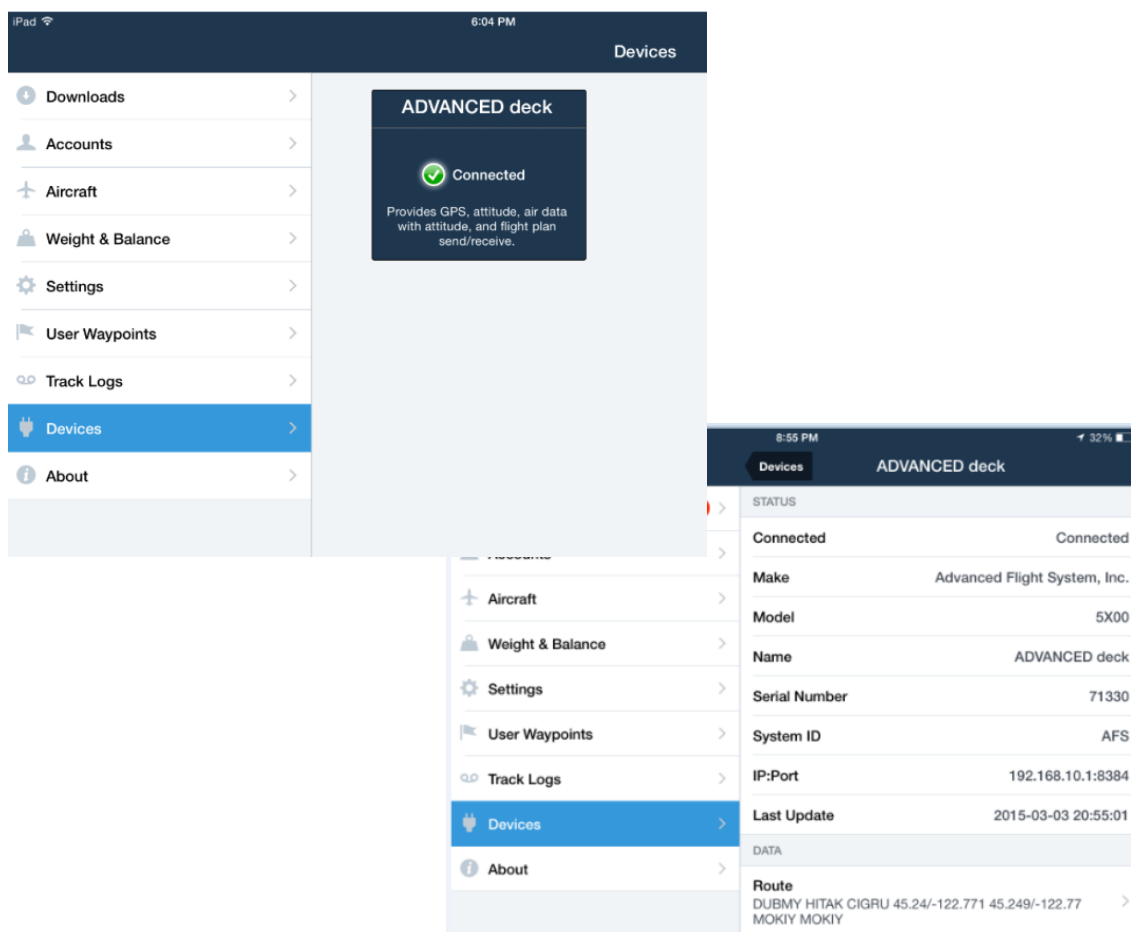
Send and Receive Flight Plans with ForeFlight

Once you have your flight plan set up in ForeFlight on your iOS device (iPad or iPhone), you can send it to AF-5000 EFIS Flight Planning page and Moving Map. *The EFIS CDI source (Flight Plan) must be set to Internal to accept a flight plan from ForeFlight.*
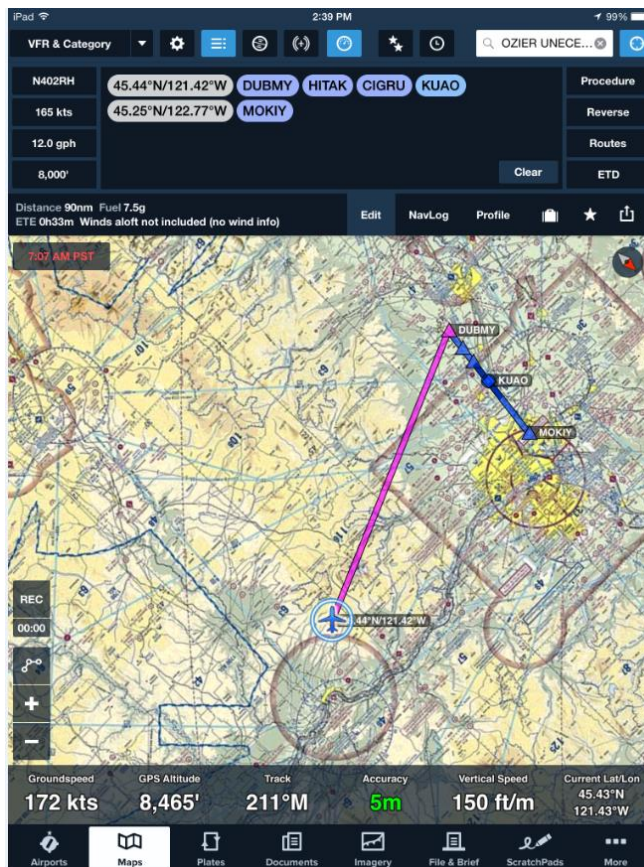
Figure - ForeFlight Flight Plan

- To send the flight plan, first ensure that the Nav Log is open. To open the Nav Log, touch the Hide/Show Nav Log button at the top of the App:
- Next, touch the Send To button:
- Finally, touch the Panel icon to send your flight plan to the AF-5000 EFIS.
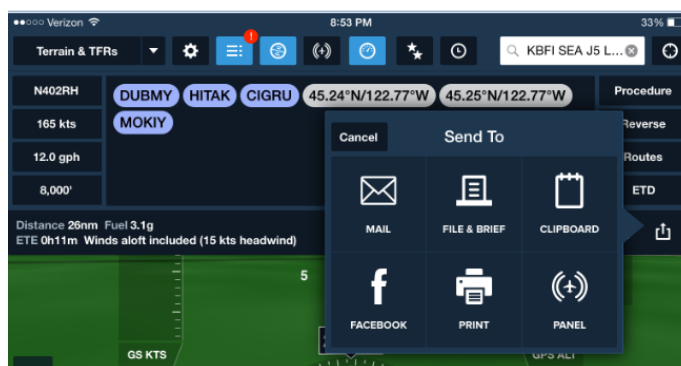
- Once AF-5000 EFIS receives the flight plan a confirmation message will appear on the EFIS and the Flight Plan will be in the EFIS Flight Plan window. The flight plan can then be used and edited on the AF-5000 EFIS.

To have ForeFlight retrieve the AF-5000 EFIS flight plan, simply touch the Panel button at the top of the app window.

Note that flight plans are only updated when you explicitly send or receive them from the ForeFlight app. This ensures that no flight plan changes are made to either ForeFlight or the AF-5000 EFIS flight plan without explicit action by the pilot.

GPS and Attitude on ForeFlight

Once the AF-5000 EFIS is connected to ForeFlight, it will also send its GPS position to the app. The GPS position sent by the EFIS is only usable within the ForeFlight app and cannot be used by other apps on the device.

The AF-5000 EFIS also continuously send primary flight instrument data for ForeFlight to display in the app. To view, touch the Attitude Indicator button at the top of the menu .

Note that as of the initial ForeFlight Mobile release, speed, altitude, and other information is GPS-based. See the ForeFlight documentation for a full description of how flight instrumentation is displayed within the app. You can confirm that the AF-5000 EFIS is ForeFlight's source of attitude information by touching the AHRS Status button.
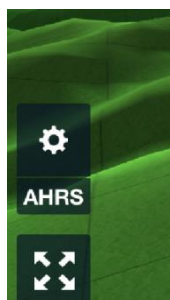
Logbook Interface

[CHECK] →[LOGBOOK]

The AF-5000 Series EFIS systems have an internal, and exportable, Log Book feature. The Log Book will store information about your flights, including Duration, Landings, Date, Departure Airport, and Arrival Airport.

To Export Logbook data from your AF-5000 insert a SD Card and press
[SET] →[LOGS] →[LOGBOOK]
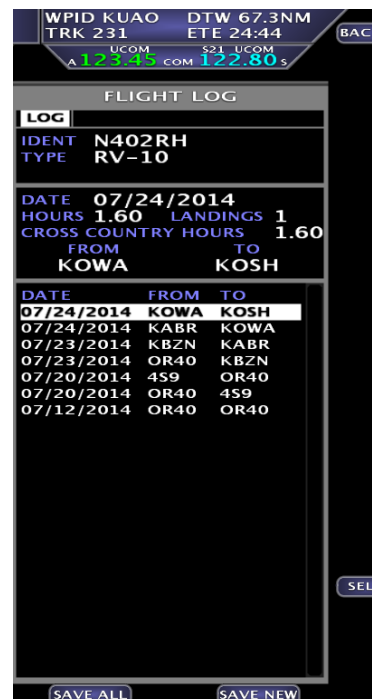
This information is easily imported to LogbookPro on your personal computer.

The file stored on the SD Card is a {,} Comma Delimited File type and will be named **FLTLOGXX.txt**
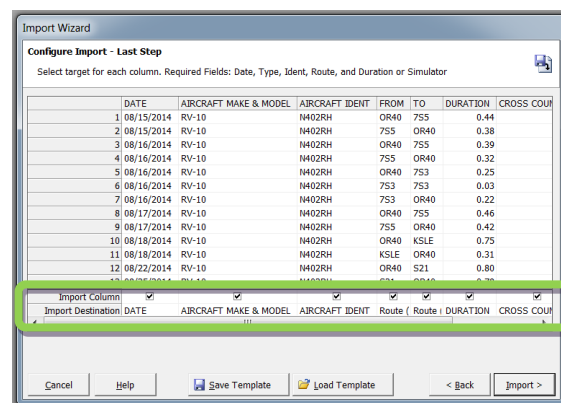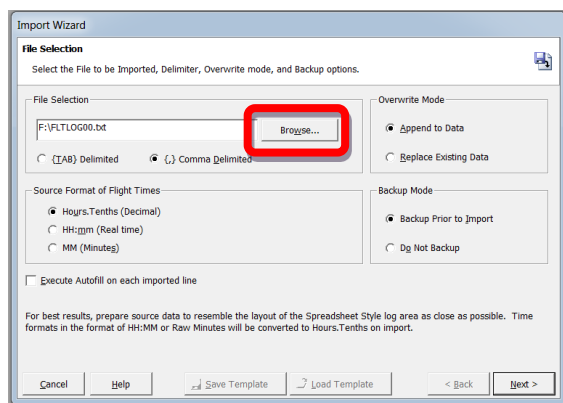
Use the Browse tool to select the Logbook file

Be sure to correctly select the "Target" for each data column in the drop down menus

<u>Import your data and enjoy your new Digital Logbook</u>

Synthetic Appraoch

With the AF-5000 series EFIS you can setup a Synthetic Approach to any airport in the map database or user airport data file with runway endpoint data. The flight plan menu lets you select the runway and set the glideslope. Once you enter a glideslope the system will remember it for later use.

Selected Runway

Glideslope

HITS Boxes for Runway

Selected Runway also displayed on the Map

Engine Monitor Display
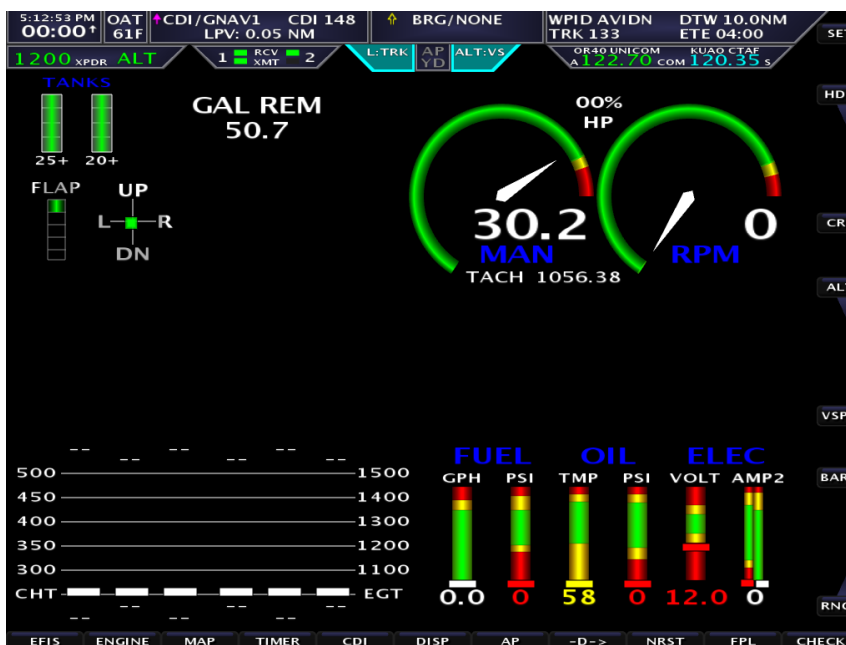
The system can display the engine monitor on the bottom of the main EFIS page or as a full Engine page if the system has one of the following:

1. The screen has an engine monitor board installed in the case.

2. The screen is connected to another screen that has an engine monitor board installed with an Ethernet crossover cable.

Fuel Computer

The fuel computer is accessed from the main screen by pressing the **[ENGINE]** button followed by pressing the **[FC MODE]** button.

⚠️ *WARNING*

The GALS USED (Gallons Used) and GALS REM (Gallons Remaining) displayed is not a measurement of the fuel in the aircrafts tanks. The fuel amount is calculated from the starting fuel level programmed in the system, minus the fuel used while the engine is running. When the system is properly calibrated and fuel is added correctly, the system will accurately measure the fuel used. It is imperative the pilot verify the calibration of the system over many tanks of fuel before using the "GALS REM" and/or "GALS USED" Modes as an indication of the fuel in the tanks or fuel used. Even after verifying the calibration of the system it should never be used as the primary indicator of fuel quantity in the tanks. It is important the pilot visually check/measure the fuel quantity for each tank before takeoff and crosscheck these readings against the Fuel Level Gauges and the Fuel Computer. It is important the pilot use preflight and flight planning techniques, in accordance with the FAR's, which will help insure the proper amount of fuel for the intended flight is on board the aircraft before takeoff. While in-flight, the fuel gauges and fuel computer should only be used to cross-check the fuel calculations of the fuel onboard. The flow rates should be checked against published data from the engine manufacturer. The use of this system does not eliminate or reduce the necessity for the pilot to use good flight planning, preflight and in-flight techniques for managing fuel. If not familiar with these techniques, contact the FAA to acquire proper training.

Fuel Computer Modes

The fuel computer display can be set to display any of the following by pressing the **[FC MODE]** button. The mode label will be RED if the fuel computer gallons remaining amount does not match the fuel tanks.

Gallons Used -> Gallons Remaining -> Hours Remaining

If the system is connected to a GPS, the following modes will also be enabled:

Kts per Gallon -> Miles per Gallon -> Gallons Remaining at Waypoint -> Gallons Required to Waypoint

*WARNING: **The Fuel Computer is only accurate when the fuel-flow sensor is calibrated properly and fueling stops are entered correctly.***

GAL USED   Gallons Used
Displays the gallons used since the last time the fuel computer was set.

GAL REM   Gallons Remaining
Displays the gallons remaining, calculated from the last time the fuel computer was set.

HRS REM   Hours Remaining
Displays the hours remaining, calculated from the last time the fuel computer was set and the current fuel flow rate.

> ⚠️ *WARNING!! The following are based on the current fuel flow and the GPS ground speed. If power setting is changed or the winds change, the fuel computer will not be correct!*

NM/GAL   Nautical Miles per Gallon
Displays the current ground distance traveled in nautical miles per gallon of fuel.

SM/GAL   Statute Miles per Gallon
Displays the current ground distance traveled in statute miles per gallon of fuel.

GREM AT   Gallons Remaining At Waypoint
Displays the fuel amount that should be remaining at the next GPS waypoint.

GREQ TO   Gallons Required to next Waypoint.
Displays the fuel amount of fuel needed to get to the next GPS waypoint. This is based on the current fuel flow and GPS data.

Adding Fuel to the Fuel Computer
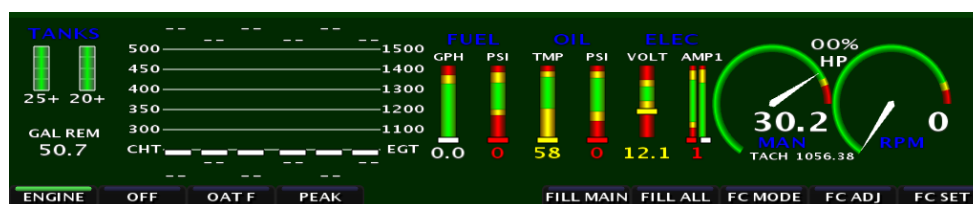
> ⚠️ *WARNING: **Every time fuel is added or removed from the aircraft tanks one of the following operations must be done to protect the accuracy of the fuel computer.***

TANKS FILLED

Set the fuel computer to the programmed full tanks by pressing one of the following buttons in the fuel computer:

1. [**FILL MAIN**] If only the main tanks have been filled

2. [**FILL ALL**]   If the main and tip tanks have been filled (only applies to systems with 3 or 4 tanks)

> ⚠️ *WARNING:* **If [FILL ALL] is pressed and no fuel was to the tip tanks, the fuel computer calculations will be incorrect**

The pilot can add or subtract fuel to the computer by pressing **[FC ADJ]** and using the keypad or rotating the joystick for the correct amount and then pressing the **[FC SET]** button.
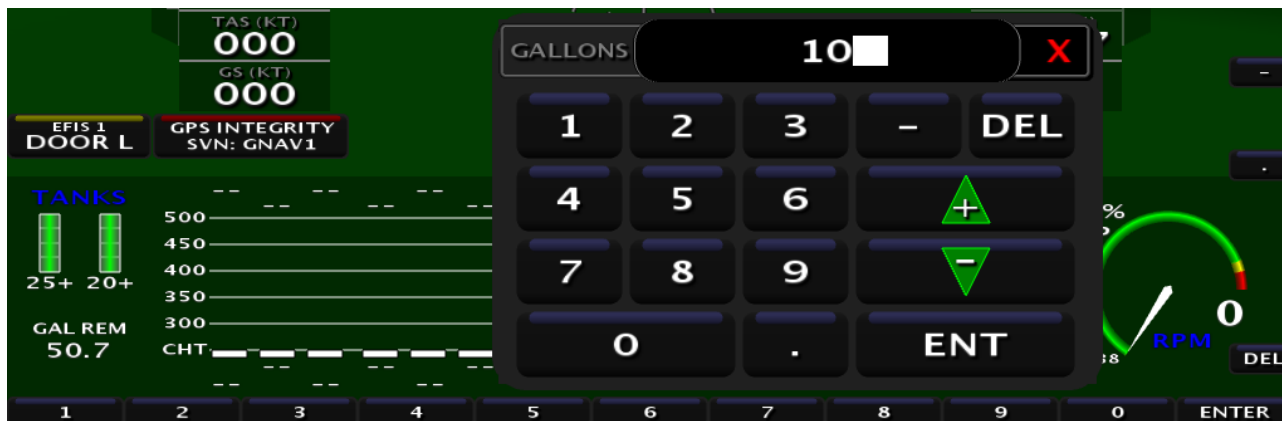
% Power Display

The system will display the estimated %Power and the current (RICH-PEAK-LEAN) Status

You need to select the correct engine type and horsepower in the calibration menu for the Horsepower to display.

EGT/CHT Display Modes

Cylinder Head Temperatures (CHT)

Exhaust Gas Temperatures (EGT)

All cylinders are continuously displayed in both analog and digital formats. The cylinders are laid out sequentially with cylinder #1 on the left followed by cylinder #2 to its right and so on. The graph uses small white bars for the CHT that are superimposed onto the larger EGT bars. The graph uses a dual scale that represents the CHT scale on the left side and the EGT scale on the right. The digital reading for each column is displayed above each bar for CHT and below for EGT. During normal operation the EGT and CHT bars will align themselves in a very easy to recognize pattern.
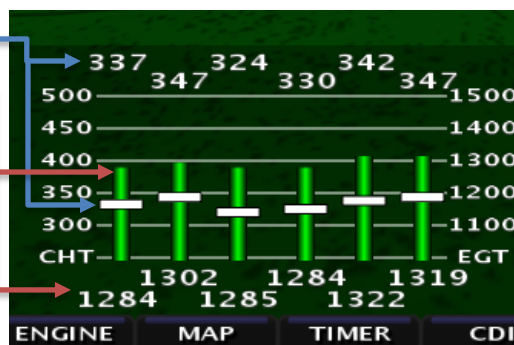
Leaning EGT Mode (Peak Detect)

The leaning peak detection mode is selected from the main screen by pressing the **[ENGINE]** -> **[PEAK]**. As the engine is leaned, the EGT bars for all cylinders will rise. As each cylinder reaches peak EGT, a tattletale marker will appear at the top of that cylinder's bar. The current EGT is shown on the bottom of the bar, Peak EGT is displayed on the top and the degrees rich or lean of peak are displayed on the bar. If the mixture is enriched before all cylinders have peaked, the unit will detect the EGT drop and display a false peak.   The peak detection can be reset at any time by pressing **[RESET]** when PEAK is selected.

> ⚠️ *Warning: **Never lean the engine with power settings beyond the factory recommended level (generally 65% to 75% power)**.*

Leaning with high power settings can cause detonation. Always verify power level with engine charts before leaning. As the engine is leaned past maximum horsepower (100F to 150F rich of peak EGT) the engine will lose power.

EFIS Checklists

To view checklists pages press the [**CHECK**] button from the main screen. Rotate the joystick to scroll through the checklists.   To return to the main screen press the **[BACK]** button.

If the **[CHECK]** button is pressed the page that is displayed is controlled by the following:

ENGINE RPM	PAGE	Normal Use
0	1	Before Starting Engine
<1250	3	Before Takeoff Checklist
>1250	6	Emergency Checklist

This will make the emergency procedures checklist easy to access in the event of an in-flight emergency.

The checklist file is stored in the CHKLST.AFD file and can be transferred using the SD card from the EFIS Calibration Menu.
[SET] -> [CAL] -> [ADMIN SETTINGS] -> [TRANSFER FILES]

1. Admin Settings
   1. Transfer Files
      2. Checklists file
         Press **[SAVE]**

The text for the checklists is stored in the following format and can be modified using Microsoft Word Pad on a PC.

```
# Lines are limited to 96 char long
#
# DO NOT USE COMMAS IN THE CHECKLIST TEXT !

CHKLST0.TITLE, BEFORE STARTING ENGINE
CHKLST0.LINE1, Preflight Complete
CHKLST0.LINE2, Spar Pins Secured - CHECK
CHKLST0.LINE3, Safety Belts - ON
CHKLST0.LINE4, Doors - LATCHED
CHKLST0.LINE5, Fuel Selector Valve - DESIRED TANK
CHKLST0.LINE6, Avionics  - OFF
CHKLST0.LINE7, Brakes - SET
CHKLST0.LINE8, Circuit Breakers - CHECK IN
CHKLST0.LINE9,
CHKLST0.LINE10,
CHKLST0.LINE11,
CHKLST0.LINE12,

CHKLST1.TITLE, ENGINE STARTING
CHKLST1.LINE1, Mixture - RICH
CHKLST1.LINE2, Prop - HIGH RPM
CHKLST1.LINE3, Master Switch - ON
CHKLST1.LINE4, Fuel Boost Pump (3 Sec)
CHKLST1.LINE5, Flaps - UP
CHKLST1.LINE6, Throttle - OPEN approx 1/4
CHKLST1.LINE7, Propeller Area - CLEAR
CHKLST1.LINE8, Ignition Switch - START
CHKLST1.LINE9, Oil Pressure - CHECK

CHKLST1.LINE10, Strobes - ON
CHKLST1.LINE11,
CHKLST1.LINE12,

CHKLST2.TITLE, BEFORE TAKEOFF 1/2

CHKLST2.LINE1, Brakes - SET
CHKLST2.LINE2, Spar Pins Secured - CHECKED
CHKLST2.LINE3, Doors - LATCHED
CHKLST2.LINE4, Flight Controls - FREE & CORRECT
```

```
CHKLST2.LINE5, Flight Instruments - SET
CHKLST2.LINE6, Altimeter - CORRECT PRESSURE
CHKLST2.LINE7, Fuel Selector Valve - DESIRED TANK
CHKLST2.LINE8, Mixture - RICH (below 3000ft)
CHKLST2.LINE9, Elevator and Aileron Trim - NEUTRAL
CHKLST2.LINE10, Throttle -- 1800 RPM
CHKLST2.LINE11, ...Magnetos - CHECK (175 max drop)
CHKLST2.LINE12, ...Prop - CHECK OPERATION
```

To restore the checklist file to the EFIS perform the same steps above but instead press **[REST]**

Maintenance Log

The system has an Aircraft Maintenance Log that can be setup to track any number of user configurable items. Each item can be configured as a Tach time or calendar time controlled event. Once the time interval has expired the item will turn red indicating the need for service.

To update the Date and Tach Time press **[UPDATE]** from the Aircraft Maintenance page: **[CHECK] -> [MAINT]**

The Maintenance Log is selected from the following menu:

[CHECK] -> [MAINT]

The Maintenance settings are controlled by the file:

MAINT.AFD

The file is in the following format and can be modified using Microsoft Word Pad on a PC.

Units must be **Tach hours** or **days**.

```
DESC, Annual Inspection
LASTDATE, 08-05-2006
LASTTACH, 210.80
INTERVAL, 250
UNITS, tach hours
NEXTLINE, 0
DESC, Tires
LASTDATE, 04-05-2005
LASTTACH, 95.10
INTERVAL, 365
UNITS, days
NEXTLINE, 0
DESC, Oil and Filter
LASTDATE, 06/19/2006
LASTTACH, 195.30
INTERVAL, 100
UNITS, tach hours
NEXTLINE, 0
DESC, ELT Batteries
LASTDATE, 08/05/2006
LASTTACH, 210.80
INTERVAL, 400
UNITS, days
NEXTLINE, 0
DESC, Insurance
LASTDATE, 08/05/2006

LASTTACH, 210.80
INTERVAL, 180
UNITS, days
NEXTLINE, 0
```

The Maintenance file can be transferred to/from the SD card to/from the EFIS by pressing **[SET] -> [CAL] -> [ADMIN SETTINGS] -> [TRANSFER FILES]**

1. Admin Settings

      1. Transfer Files

           3. Maintenance

           Press **[SAVE]** to copy the file to the SD Card
   Press **[REST]** to copy the file back to the EFIS from the SD Card

Weight & Balance Screen

The Weight & Balance page is selected from the following menu:

[CHECK] -> [W&B]

The middle knob is used to select the station to adjust. The joystick is used to adjust the weight/qty at the selected station.

The Weight & Balance settings are controlled by the files:

AIRCRAFT.AFD   Stations, Weights, Screen Location

AIRCRAFT.AFB   Standard .BMP of the aircraft picture.

To transfer the files to/from the SD card from the EFIS Calibration startup screen.

1. Admin Settings

>   1. Transfer Files

>   4. Weight & Balance

>   Press **[SAVE]** to copy the file to the SD Card
>   Press **[REST]** to copy the file back to the EFIS from the SD Card
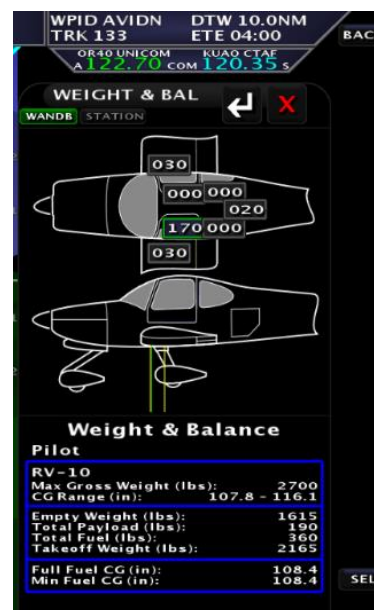
The normal weight & balance settings can be adjusted on the Weight & Balance page by pressing the **[STATIONS]** button. The QTY and ARM of the station can be modified on this page.

The X and Y of the station on the screen can by changed by pressing [**ADJ POS**] on the main W&B page. This will change where the station is displayed using X and Y screen coordinates. The upper right knob is used for [X ADJ] and the middle knob used for **[Y ADJ]** for the text on the aircraft bitmap. The Aircraft Type, Gross Weight and CG Range will need to be modified using Microsoft Word Pad and editing the AIRCRAFT.AFD file on a PC.

The aircraft bitmap can be changed using Microsoft Paint and editing the AIRCRAFT.AFB file, do not change the overall dimensions of the Bit Map.

EFIS Data Logs

The EFIS data logs can be downloaded using the USB or SD data card from the SET > LOGS Menu.
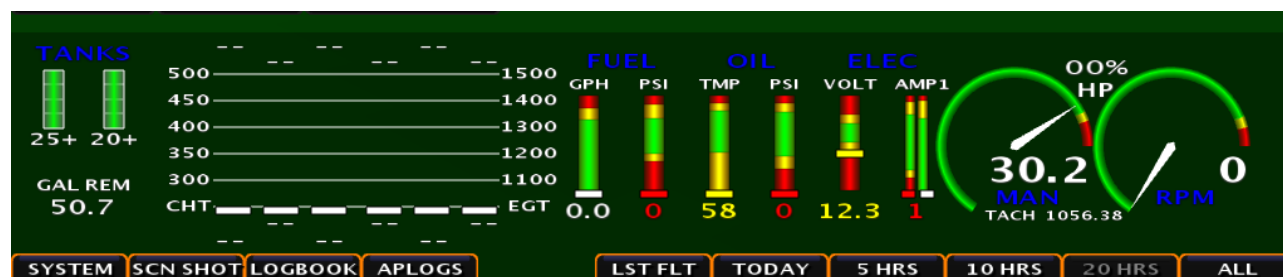
SYSTEM	System diagnostic file
SCN SHOT	Screen Captures (Press and Hold the button below the joystick to capture the screen
LOGBOOK	Logbook Files
APLOGS	Autopilot diagnostic file

Flight Data

LST FLT	Flight and Engine data from last flight (1 hz)
TODAY	Flight and Engine data from todays flights (1 hz)
5 HRS	Flight and Engine data from last 5 hours (1 hz)
10 HRS	Flight and Engine data from last 10 hours (1 hz)
20 HRS	Flight and Engine data from last 20 hours (1 hz)
ALL	Flight and Engine data all saved data (1 hz)

Importing Flight Data to Excel

 Once the data is saved onto a card, it can be imported into Microsoft Excel by the following procedure:

1. From Excel select File **Open**

2. Change the file type to All Files (*.*)

3. Open the SD drive folder

4. Select the *.ALD file to open. The data files are stored using the following name:

   ymmddhhm.ALD   where
   y   year
   mm   month
   dd   date
   hh   hour
   m   minute

5. The Text Import Wizard should start and press Next
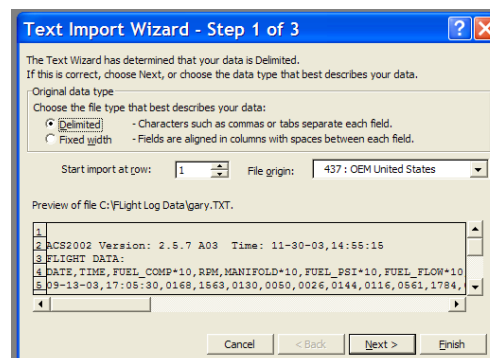
6. Select the Delimiters – Check Tab & Comma and then press Finish

Using Savvy Analysis to display the recorded Flight Data
https://www.savvyanalysis.com

The AF-5000 recorded Flight Data is compatible with Savvy Analysis

SavvyAnalysis

Professional Aircraft Engine Analysis
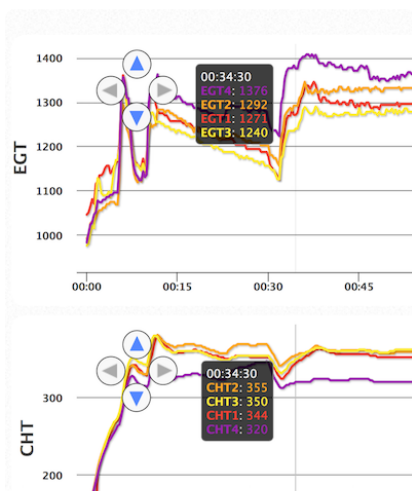
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- Fuel flows that need adjustment or fuel nozzles that need cleaning
- Problems with magneto timing or condition
- Failing EGT & CHT probes or harnesses, electrical system problems
- On turbos, sticking wastegates, induction leaks, and other turbosystem problems
- Problems with engine operating technique

For Aircraft Owners...

For Maintenance Shops...

APPENDIX A: AF-5000 IFR Procedures

Flying an LPV Approach

The following example shows how to use the EFIS and Avidyne IFD540 to fly from KEUG to KUAO using the GPS 35 LPV approach.

In this picture we have entered a flight plan into the IFD540 to go from KEUG to KUAO with the middle CVO VOR waypoint. The current waypoint (CVO) is magenta, notice the flight plan has been automatically transferred to the AF-5000 EFIS GNAV1 (GPS Navigator 1) flight plan.

Touch the AP Status Bar to bring up the Autopilot Menu.

Autopilot is Engaged

Lateral (Roll) is in NAV mode and following the CDI needle (GNAV1 GPS)

Vertical is in ALT mode and following the Altitude bug. Currently descending to 3700ft

Using Vertical Speed Mode.

VNAV is Armed and ready to capture the glide slope when it pops up. It will follow the Altitude bug when there is no glide slope.

+/- Vertical Speed bugs

CDI is GNAV1 GPS side (Magenta)
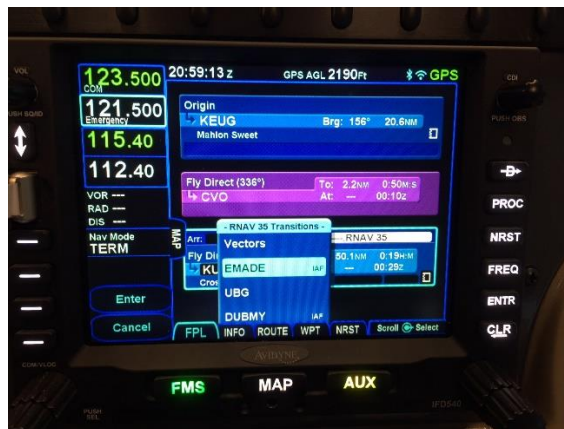
In this picture we have selected the RNAV GPS 35 LPV approach on the IFD540, selected EMADE as our Initial Approach Fix. The autopilot mode is NAV for Lateral and ARM for Vertical. This means the autopilot is following the IFD540's lateral GPS course and is holding altitude at the altitude bug until vertical guidance is provided from the IFD540 (usually just outside the FAF).

Notice all the flight plan legs including the approach have automatically transferred to the EFIS GNAV1 Flight Plan.

The current flight plan leg is drawn solid magenta on both the AF-5000 map and IFD540 map. The next leg is drawn with a magenta and white striped leg and the remaining legs are drawn white.
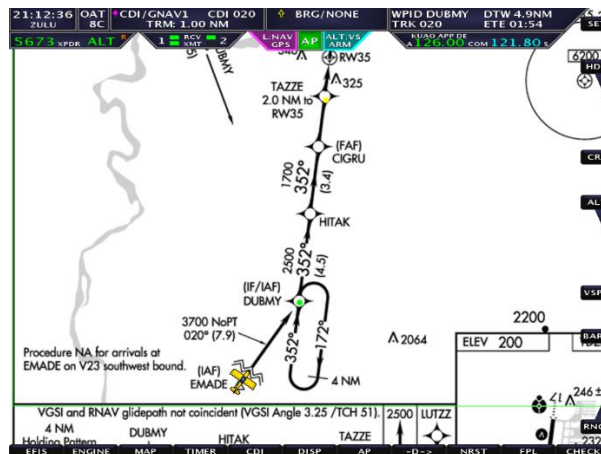
From the map screen we have selected APP PLATE, selected the RNAV 35 approach plate, and then used the knob to scroll and zoom the approach plate. The map screen will remember the current plate and scroll position making it very easy to switch back and forth from the map screen to the approach plate. From the approach plate we see that we need to be at 3700Ft between EMADE and DUBMY and we have set the altitude bug to 3700 ft. Again, the autopilot mode is NAV for lateral and ARM for vertical, the autopilot is following the GNAV1 flight plan for lateral and using the altitude bug for vertical. We have also set the Minimums bug (SET > MINA middle knob) to 450ft.

From the approach plate we see that we now need to be at 2500Ft at HITAK and we need to set the altitude bug to 2500 ft. The autopilot vertical is still in ARM waiting for vertical guidance from the IFD540.
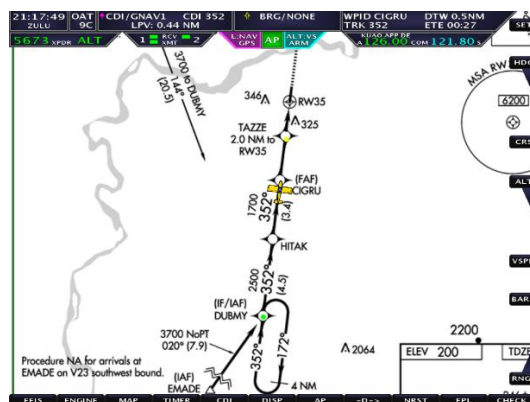
After passing HITAK we start getting vertical guidance from the IFD540 and it switches from Vertical ARM to Vertical NAV. At this point the autopilot will hold altitude until the vertical deviation indicator is centered. Once the VDI is centered, the autopilot will capture the glide-slope and hold it centered while descending.

- We have also set the Minimums Bug to the 450Ft Decision Height from the approach plate. The autopilot will not fly below the Minimums Altitude bug.

- Before reaching the decision height we have set the Altitude bug to the 4000ft missed procedure altitude from the approach plate. After pressing the SUSP button on the IFD540 the autopilot will follow the IFD540 missed procedure for lateral guidance and switch from following the Minimums bug to the Altitude bug.

APPENDIX B: EFIS Map and Charts Database Updates

AF-5000 MAP DATA

The AF-5000 series stores the digital Map data on the internal EFIS memory. The data for the United States is updated every 28 days and provided free of charge on the www.Advanced-Flight-Systems.com web site.

Every 28 days you should download the new map data from the support section of our web site.

www.dynonavionics.com/af-5000-data.php
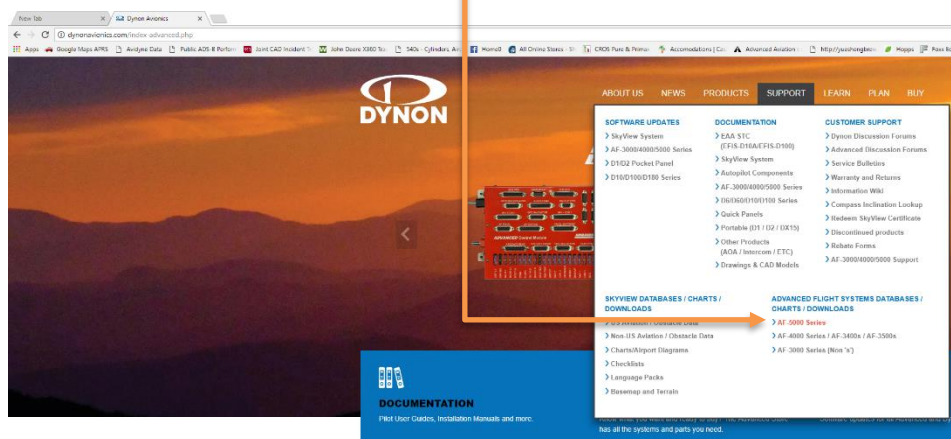
Select DOWNLOAD

Once the new file is downloaded you will need to open the zip file by clicking on the ICON usually in your Downloads directory.
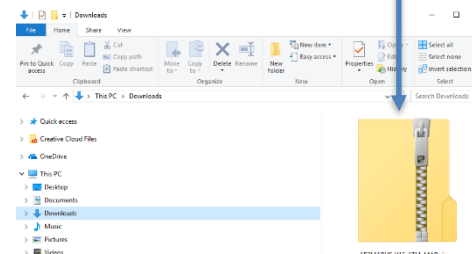
Then you will need to move the new file from the zip folder to the EFIS USB stick or SD Card.
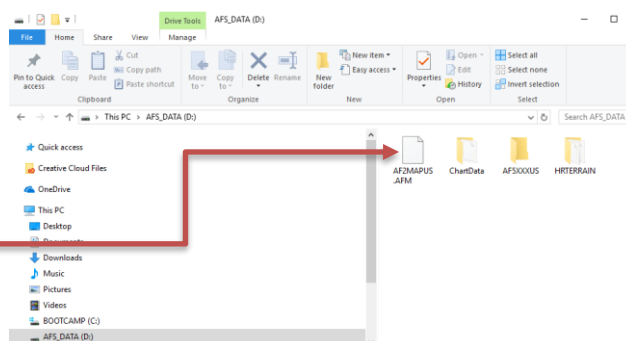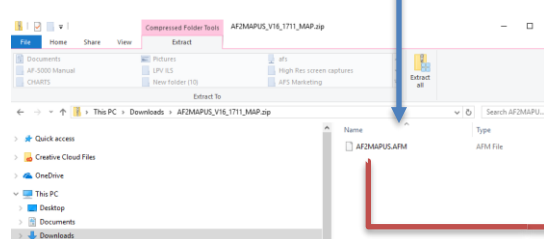
Once the AF2MAPUS.AFM file has been moved to the USB Memory Stick or SD card you can plug it back into the EFIS. The EFIS should recognize the new database and prompt to install it. You can force the EFIS to install the map data from the SET > CAL > ADMIN Settings > DATA Transfer > Upgrade Maps
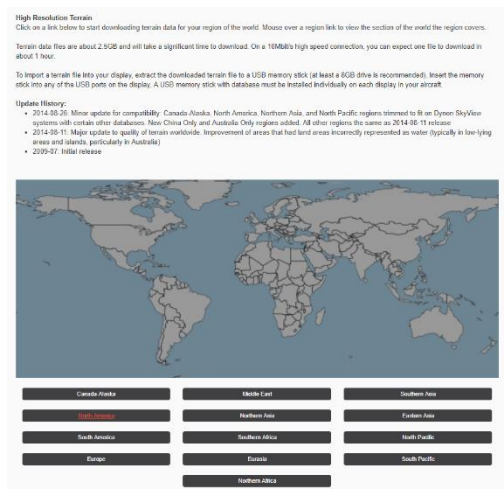

AF-5000 High Resolution Terrain DATA

The AF-5000 EFIS must have a USB Memory Stick plugged into the back of the unit with the high-resolution terrain data.   The high-resolution data is stored in the /HRTERRAIN folder on the USB Memory Stick
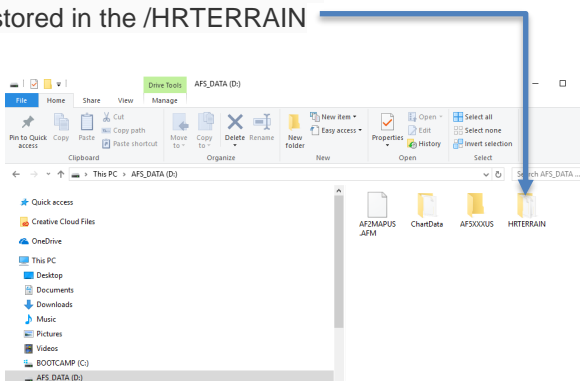
High-resolution data for other regions can be downloaded from our web site:
www.dynonavionics.com/af-5000-data.php

AF-5000 CHART DATA

For US customers, chart data subscriptions, including sectionals, IFR low and high en-route charts, procedure charts, airport diagrams. Unlike other databases that are stored in display's internal drive, charts and airport diagrams, because of their large size, must be stored on a USB memory stick that remains connected to the display during use.
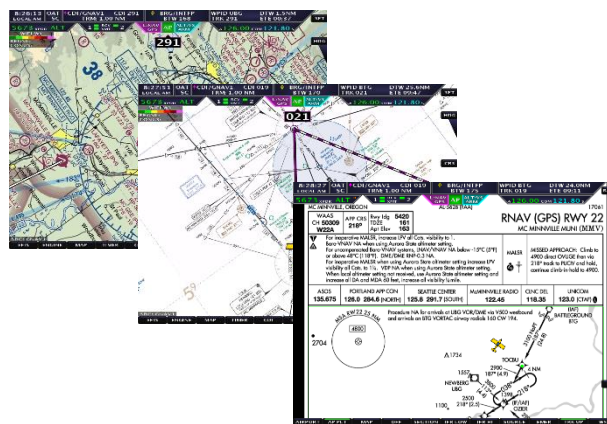
For Australia and New Zealand customers, visit **AvPlan Digital Carts**

Through a Dynon subsidized program, we are excited to offer Seattle Avionics' geo-referenced Sectionals, IFR Low and High en-route, Approach / Departure Procedure Charts and Airport Diagrams (including thousands of Flight Guide diagrams) at unprecedented pricing of $99 per year. This includes both VFR and IFR data in one flat rate. Only one subscription is needed per airplane. Most charts and diagrams are geo-referenced, which allows us to display the aircraft's location superimposed on each chart.

You will need to download the **Seattle Avionics Data Manager** and setup an account.

To purchase and use charts:

- You will need to use the USB memory stick from each display in your aircraft. This memory stick also contains the Synthetic Vision high resolution data files in the /HRTERRAIN folder.
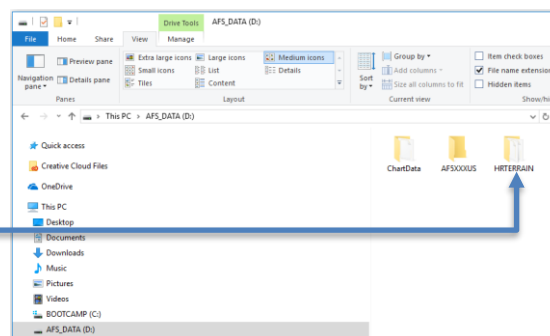
- ChartData subscriptions, along with the download manager needed to obtain charts/airport diagrams and put them on your USB memory sticks are available directly from Seattle Avionics. To purchase ChartData, go to **http://www.seattleavionics.com/dynon** and follow the instructions on the Seattle Avionics website to purchase and install AF-5000 ChartData on your USB memory stick(s). If you encounter any technical problems during this process, please contact **Seattle Avionics** at (425) 806-0249 for technical support.

After you have installed ChartData to your USB memory sticks, simply connect them to your AF-5000 display(s) to enable charting capabilities. The USB memory stick(s) must be left connected to your display(s) during normal use for charts to be available.

Using Seattle Avionics ChartData Manager

Seattle Avionics ChartData Manager will require about 8 GB worth of data to be downloaded for a full download. Seattle Avionics recommends having 32 GB of free space available on your PC's hard drive.

A full download will be about 8 GB and will take at least 17 hours on a 1 Mbps connection or 2 hours on a 10 Mbps connection. Then the data can be loaded to the USB flash drive which takes more time. Plan accordingly.
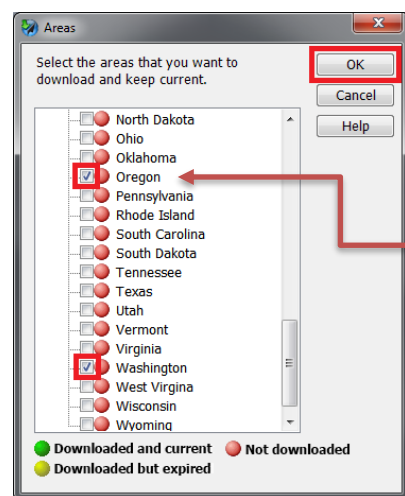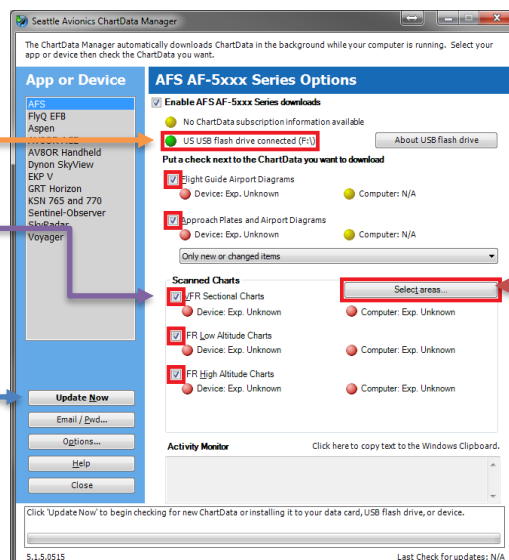
Start the ChartData Manager

Select AFS from the App or Device column
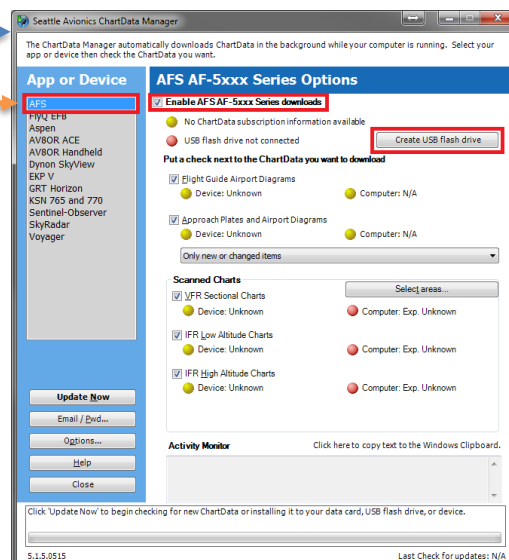
Select your AFS_DATA removable drive.

At this point you can see that the green light on US USB flash drive is connected (F:\)

Select the data elements that you want to load onto your USB flash drive. The more items selected the longer the process will take

Select the areas
that you want to view on the display. Again, the more items selected the longer the process will take. Once finished click OK

Once selected press Update Now from the App or Device column

ALL green lights next to your checked items indicates your device is READY. If not click Update Now again.

If you encounter any technical problems during this process, please contact Seattle Avionics via email at Support@SeattleAvionics.com or phone (425) 806-0249 for technical support.
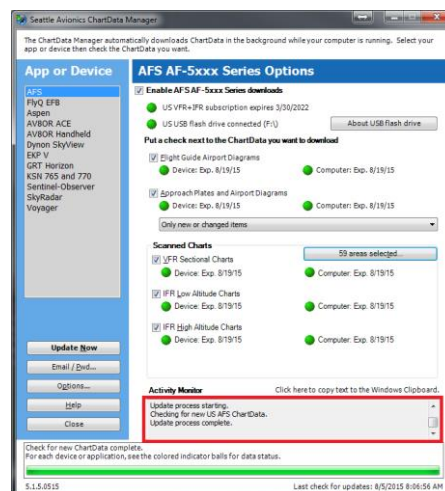
ChartData Updates

When new data is available from Seattle Avionics insert your USB flash drive into the computer running the Data Manager software. An alert will pop-up allowing the new data to be loaded onto the USB flash drive.

Click Yes to update the USB flash drive and wait for the update process to complete
ALL green lights next to your checked items indicates your device is READY.
If not click Update Now again.
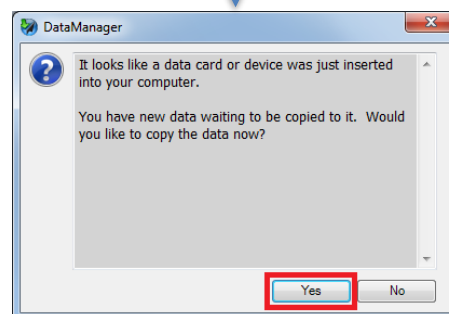
AF-5000 High Resolution Terrain DATA

The AF-5000 EFIS must have a USB Memory Stick plugged into the back of the unit with the high resolution data.   The high resolution data is stored in the /HRTERRAIN folder on the USB Memory Stick