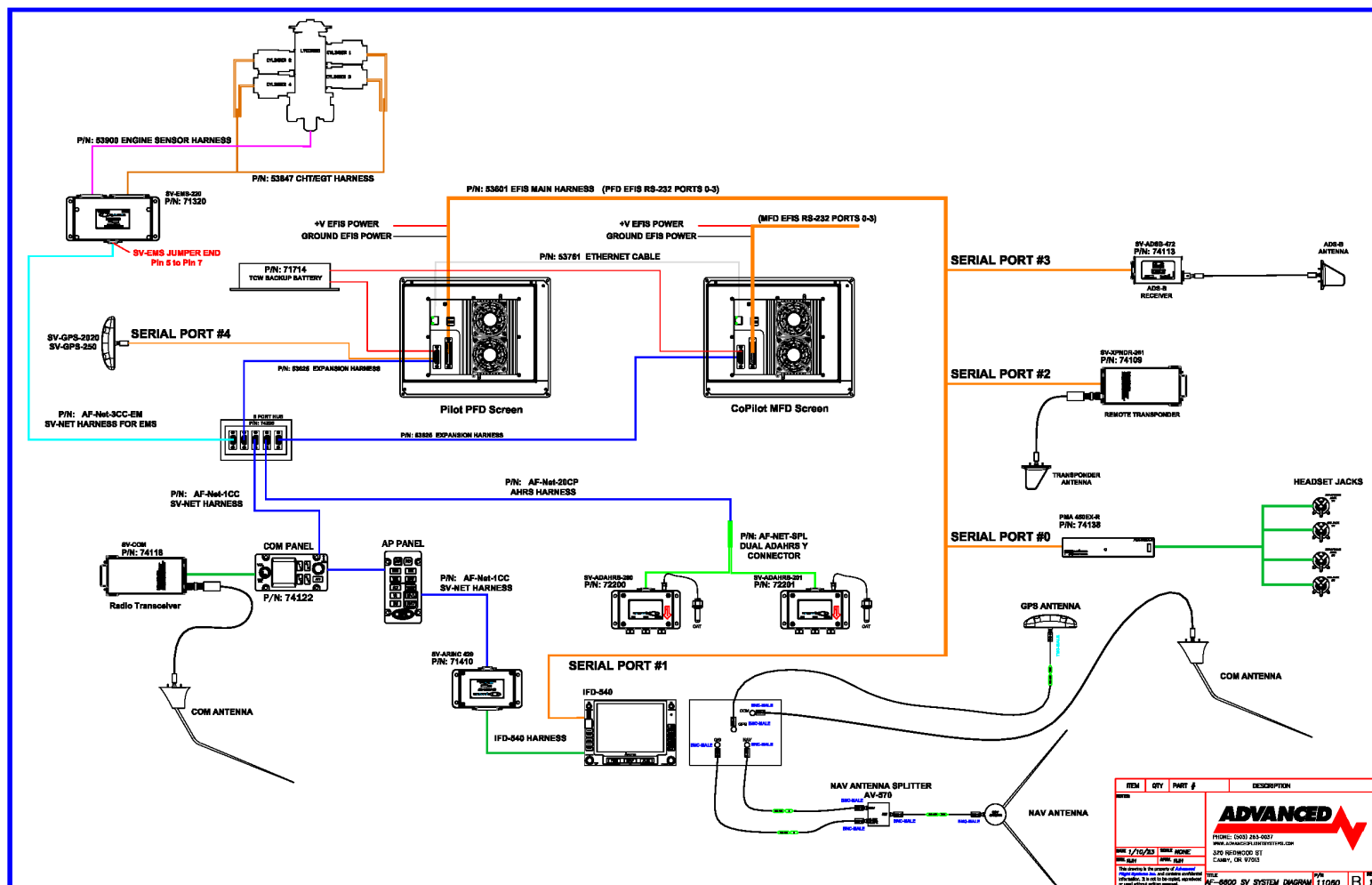


AF-6600 & AF-5000 Installation Manual



For use with all AF-6600 EFIS systems and AF-5000 EFIS systems using remote Dynon SV-EMS and SV-ADAHRS modules. ***This manual does not cover older AF-5000 systems with internal EMS or internal air data sensors.***

January 2026

*Experimental instrument limited to use in experimental aircraft.
Not approved for use in aircraft with FAA type certificates.*

Patents 6,271,769 B1 and 6,940,425

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1 Introduction

Advanced Flight Systems manufactures different size EFIS Displays. The AF-6600 and AF-5600 use a 10.4" display, the AF-5700 and AF-5800 use a 12.1" display and the AF-5400 and AF-5500 use an 8.4" LCD display. All models are high resolution LED backlit screens that provide the high intensity brightness during the day and very low intensity brightness at night. All EFIS Displays have a Touch Screen that adds flexibility, capability, and a more intuitive user experience. Synthetic Vision is a standard feature on the EFIS screens. The AF-6600 has a flush mount LCD with dual concentric encoder and light sensor for automatic dimming. Each EFIS display has five (5) RS-232 serial ports used for interfacing to external devices, two (2) USB ports, Ethernet port, and a SV Network connection.

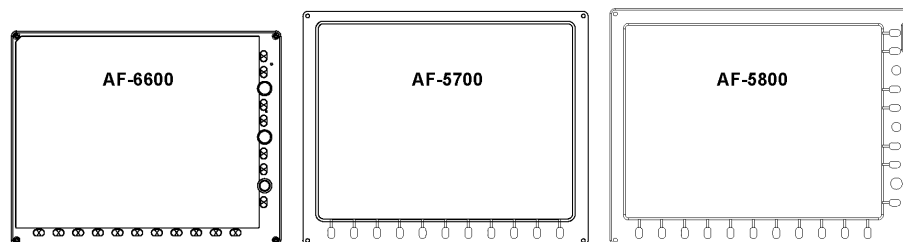
All EFIS screens have a built in Dynon SV-Network connection and are compatible with all the Dynon remote components.

Options include: Advanced Control Module (ACM) with plug-and-play features to vastly simplify an aircraft's electrical system and wiring, AOA, Autopilot, backup GPS, ARINC adapter, Com Radios, ADS-B Traffic & Weather receiver, XM Weather receiver, Remote transponder, Remote audio panel, WIFI wireless tablet communication.

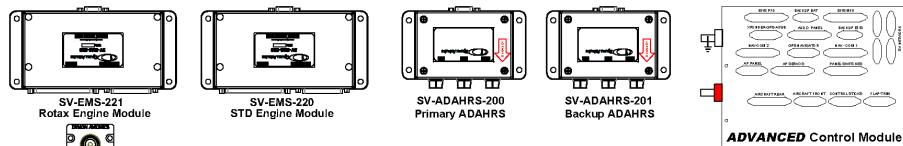


a

EFIS Screens



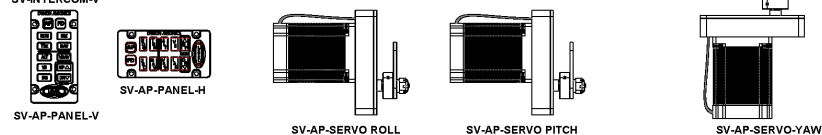
Engine Monitoring ADAHRS - GYRO Electronic Circuit Breakers



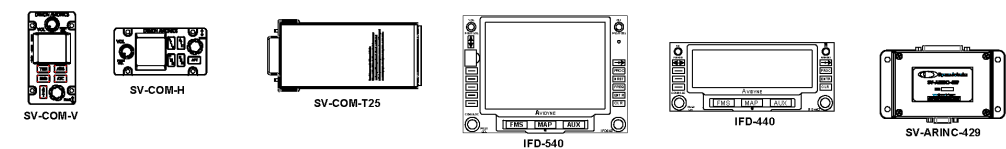
Intercoms Audio Panels



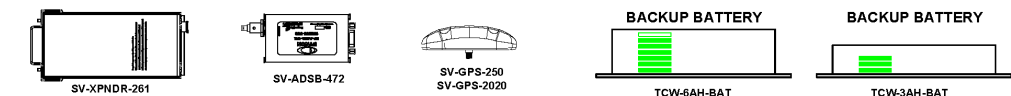
Autopilot



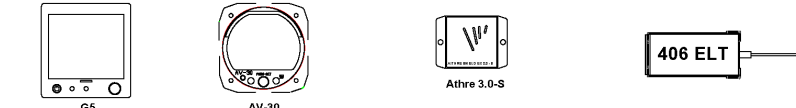
Radios NAV/COM/GPS ARINC-429 Interface



Transponder ADS-B Receiver Backup Battery



Backup EFIS CO Detectors 406 ELT



1 INSTALLATION PLANNING

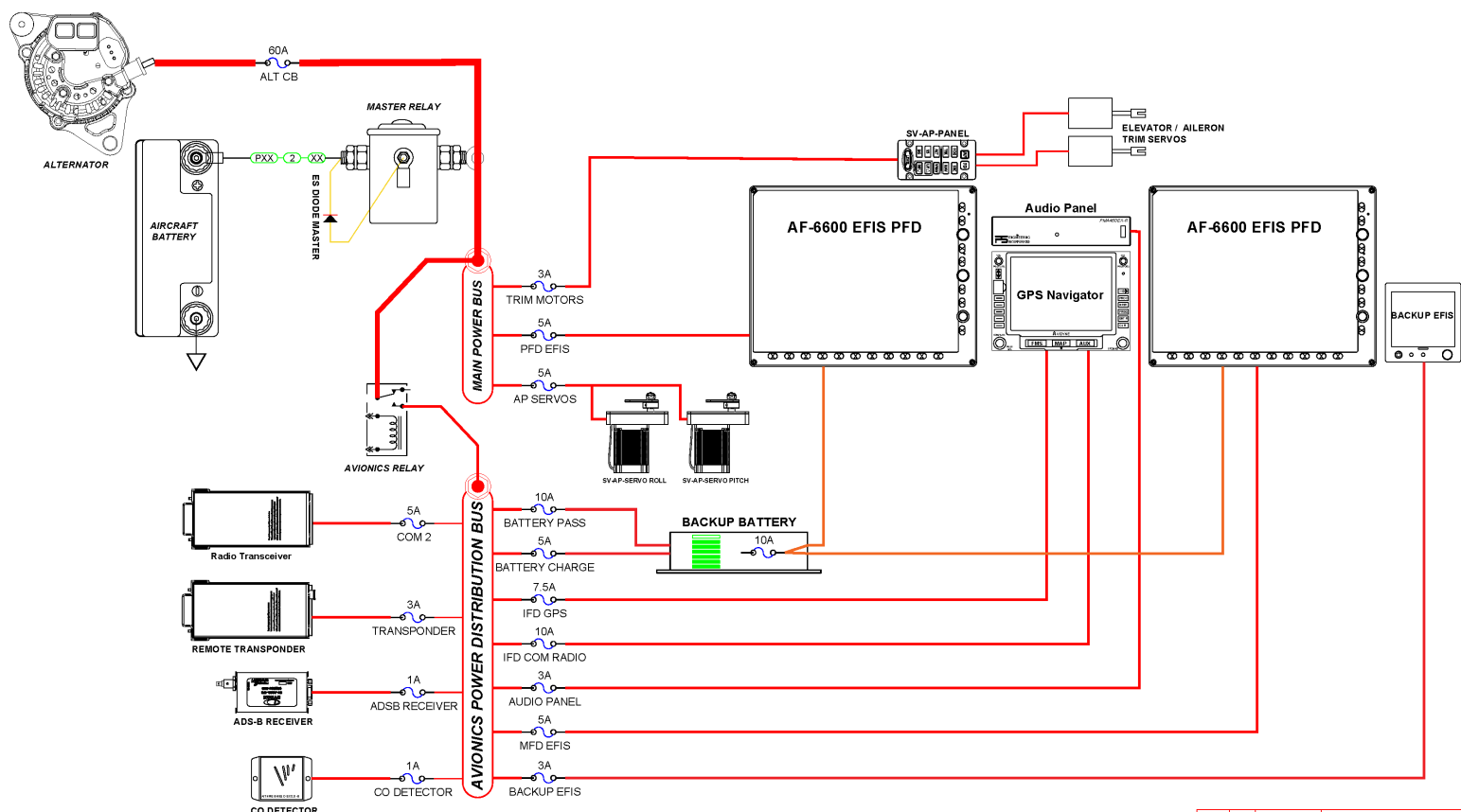
This section will provide an overview of the electrical interconnect wiring and mechanical components needed to install an AF-6600 or AF-5000 based system. It is recommended that you become familiar with this section before starting the actual installation in the aircraft.

1.1 System Architecture

A complete AF-6600 / AF-5000 based avionics system will have multiple components that are all connected together to share data and in some cases electrical power. Some of the components will be mounted in the instrument panel and some will be remote mounted, in some cases AFS offers a remote or panel mounted version. The PMA450 Audio Panel or SV-COM-T25 radio have a remote or panel mounted option. When you install avionics in an aircraft you will need to wire to an avionics power bus with circuit protection and connect to different types of data buses so all the equipment can talk with each other. There are five different data buses that are commonly used in aircraft. Properly planning and wiring all the equipment can be time consuming and complicated.

1.2 Avionics Power Bus

Most aircraft have an Avionics Power Bus that is connected to the aircraft Main Power Bus with a high current relay. The avionics bus relay is controlled by a panel mounted AVIONICS switch. The Pilot side EFIS PFD should be wired to the aircraft Main Power Bus so it can display engine data during an engine start. Once the engine and alternator are running switching on the panel mounted AVIONICS switch will power the rest of the avionics.



Recommended Aircraft Power Wire Size

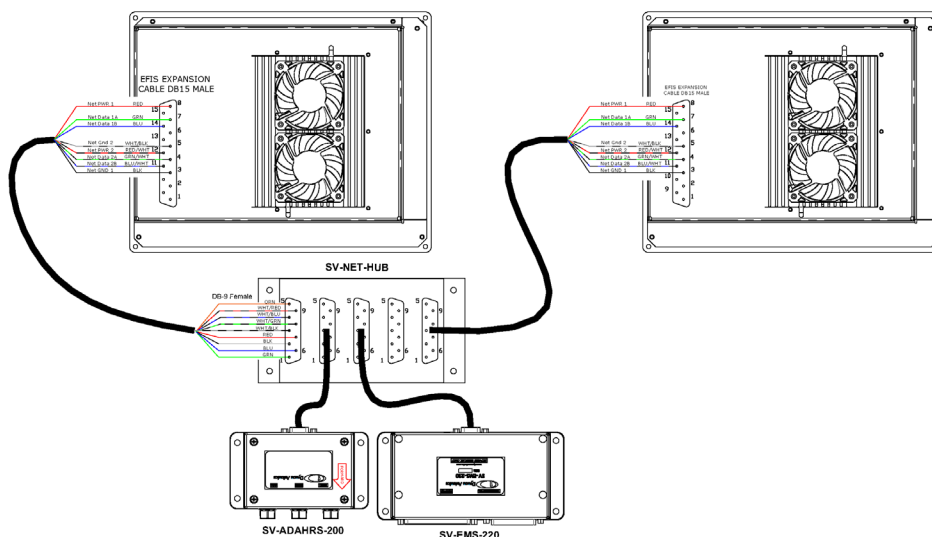
Circuit Amperage	Use wire size (AWG)
5A	20
10A	18
15A	14
RS-232/ARINC Data signals	22

1.3 Avionics Data Buses

Depending on the components you are planning to install in the aircraft you will need to wire two to five different avionics data buses. The AF-6600 / AF-5000 has five RS-232 serial ports, a Dynon SV-Network connection and Ethernet connection. If you are installing a GPS Navigator (IFD440, IFD540, IFD-550, GTN-650 or GTN-750) you will need to use an ARINC-429 to SV-Network converter so the EFIS can send and receive data from the Navigator. The Dynon SV-ARINC-429 module or Advanced Control Module (ACM-ECB) is designed to interface to a Navigator's ARINC-429 data buses. The following is a brief description of each of the Data Buses and their uses:

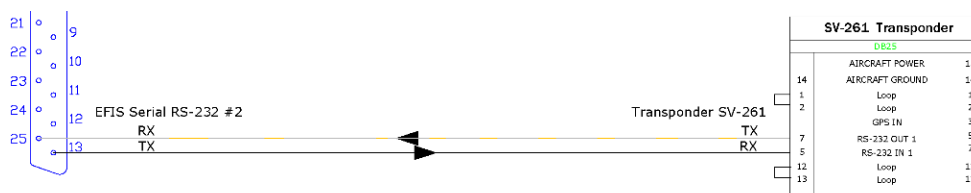
Dynon Advanced SV-Network

The Dynon proprietary SV-Network is a parallel multidrop differential pair network with +8 volt power wires. The SV-Network is designed to support up to 12 components using a 9-conductor cable with standard dsub 9 pin connectors. The SV-Network was designed for redundancy and has two separate power, ground, and twisted pair data lines. The spare 9th wire is used to provide power to the SV-EMS-220 module for a connected fuel flow transducer. Most of the Dynon components connect to the SV-Network to talk to the EFIS screens.



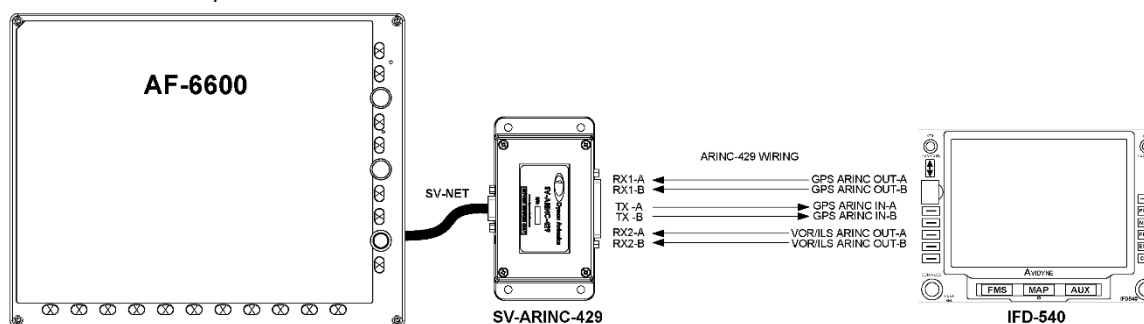
RS-232 Serial Data

Many aviation components use a RS-232 serial connection to share data. A RS-232 connection has a single transmit wire (labeled TX or TXD) and a single receive wire (labeled RX or RXD). RS-232 was really designed for only two devices to share data between them. You can have a limited number of devices receive data from a single transmitter, you should never have two transmitters on the same connection. One thing that seems to confuse people new to wiring is you need to connect the TX wire on one component to the RX wire on the other component.



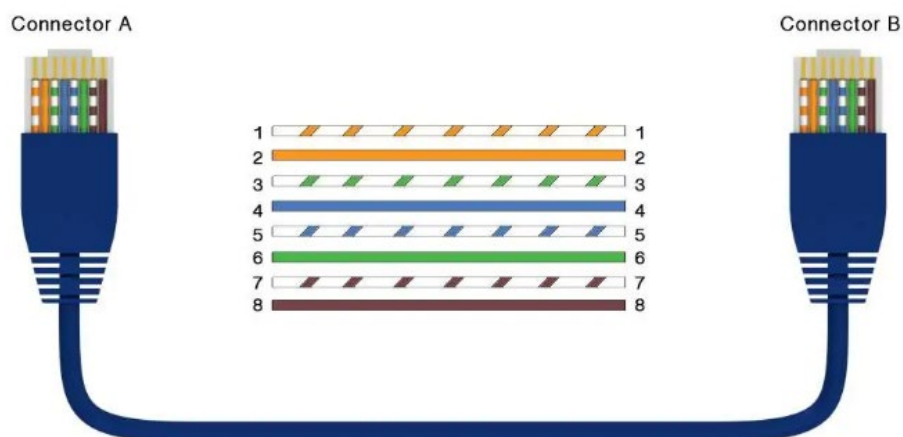
ARINC-429

ARINC-429 is a data transfer standard for aircraft avionics. The physical connection wires are on twisted pairs (Tx and Rx are on separate ports). A single wire pair is limited to one transmitter and no more than 20 receivers. If you are installing a certified NAV-COM-GPS (IFD-440, IFD540, IFD-550, GTN-650, GTN-750, GPS-175, GNS-430W) you will need to wire ARINC-429 data connections. Just like RS-232 you need to connect the TX wires on one component to the RX wires on the other component.



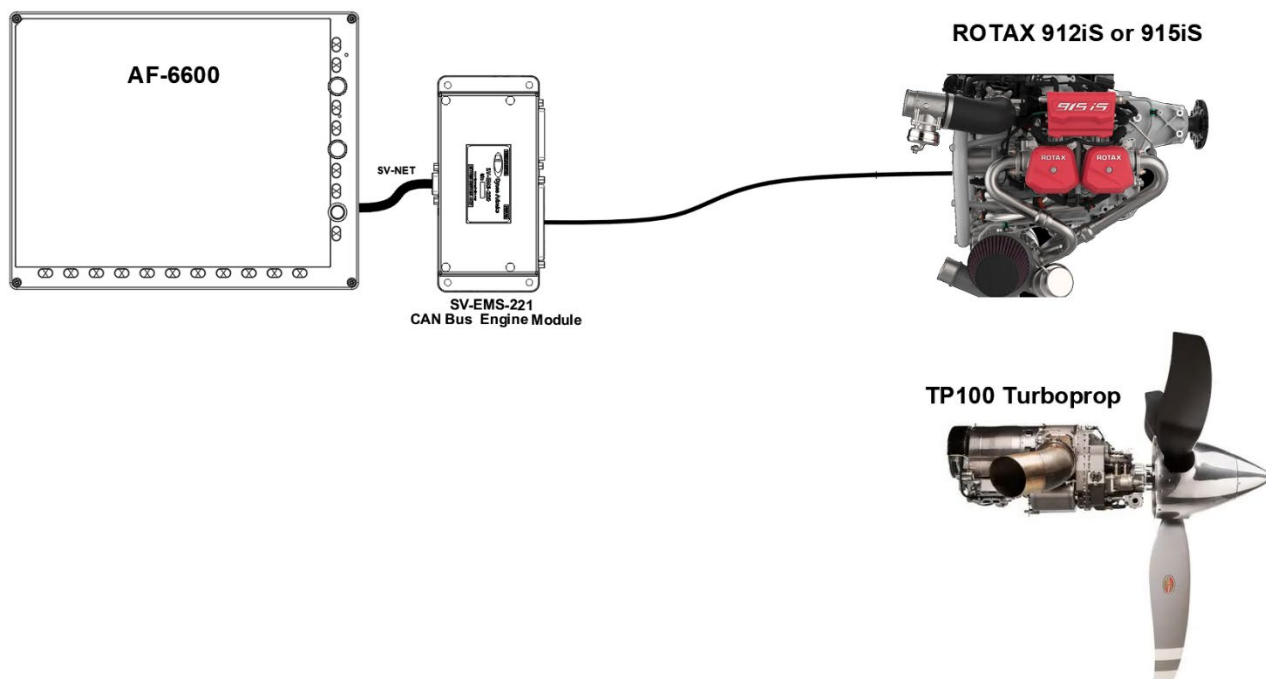
Ethernet

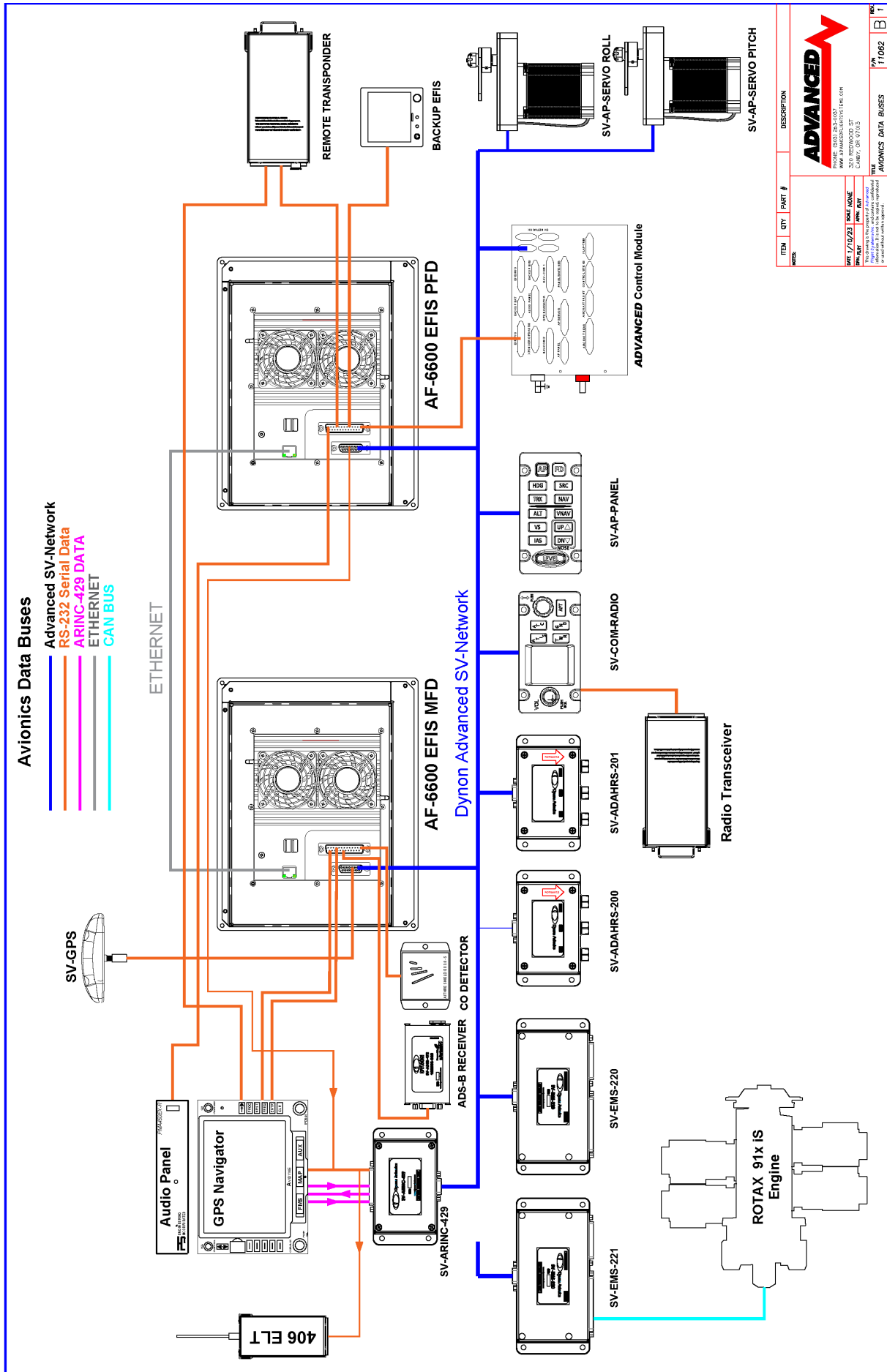
The AF-6600 / AF-5000 EFIS screens have an 8 Pin RJ45 female Ethernet connector. The Ethernet network is used to share high speed data between the EFIS screens and to also get data from the optional XM weather module. The EFIS is designed to use a standard non-crossover Ethernet cable. If you only have two EFIS screens in the aircraft panel you can use a single Ethernet cable to connect the screens together. If you have a three EFIS screen panel or have the XM Weather module you will need to use an Ethernet Switch/Hub.



CAN Bus

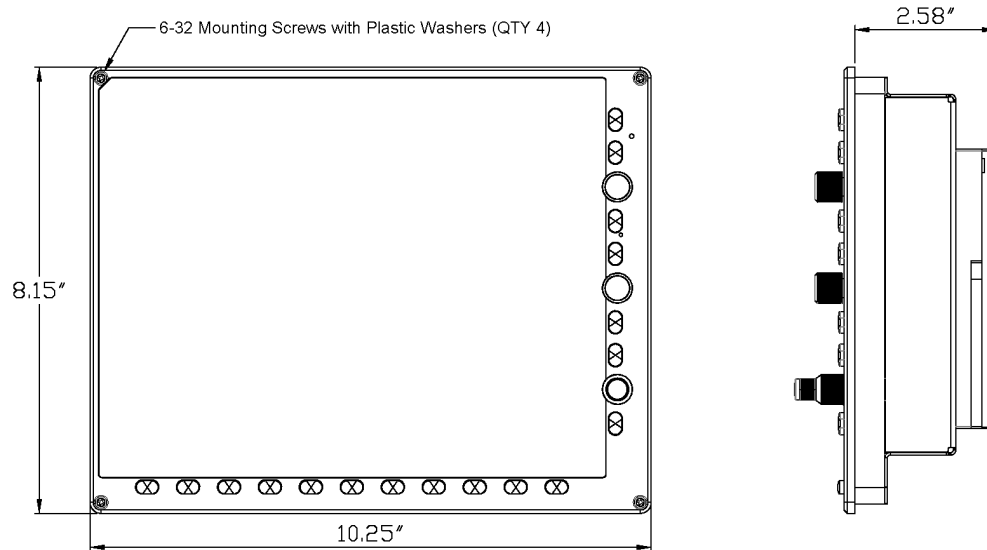
The **Controller Area Network (CAN bus)** is designed to allow devices to communicate over a twisted pair of 120 ohm wires. The Dynon SV-EMS-221 engine module is designed to interface the AF-6600 / AF-5000 EFIS to an engine FADEC controller that uses a CAN bus interface.



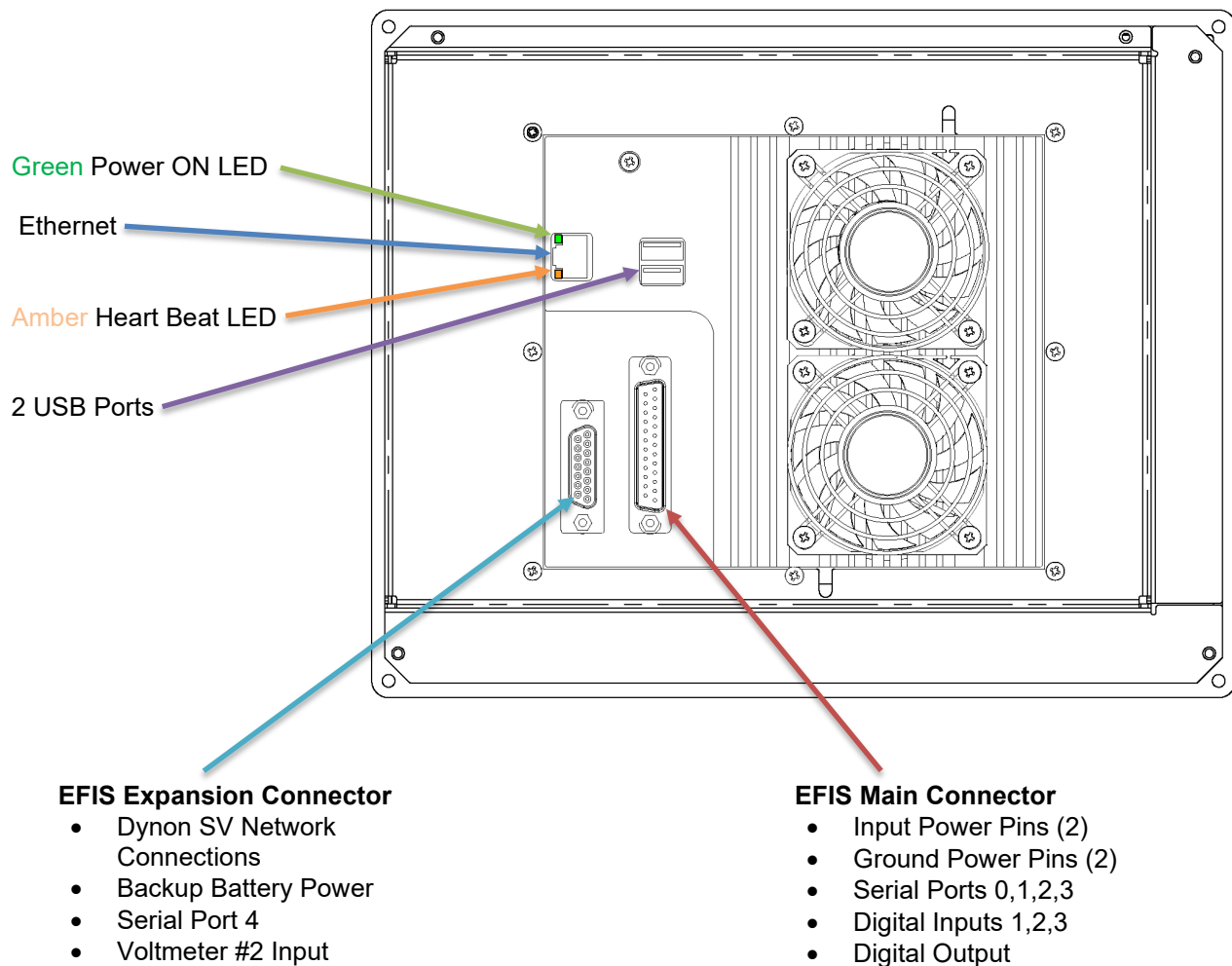


1.4 EFIS Display Mounting and Connections

The EFIS Display should be mounted from the front of the instrument panel with four 6-32 screws in the bezel corners. For ease of service the panel should have 6-32 PEM nuts or plate nuts installed for mounting the EFIS screens.



EFIS Screen Rear Connections



1.5 System Block Diagram

The following tasks/steps should be followed to successfully install an AF-6600 / AF-5000 based system in the aircraft. Detailed information of installation, calibration, component wiring... is found in sections of this manual.

1. System Block Diagram

The first thing you should do is make a block diagram of all the components that will be connected in the aircraft. The block diagram should include all the EFIS screens, Radios, GPS units, Transponder, AP, and ADS-B Receiver. The block diagram should clearly indicate where each EFIS screen's serial ports will be connected to each piece of equipment.

EFIS RS-232 Serial Port Planning

Each AF-6600 or AF-5000 EFIS has 5 RS-232 serial ports.

RS-232 Serial Port #	Pilot EFIS PFD	CoPilot EFIS MFD	EFIS MFD 2
Serial Port #0	PMA 450EX-R Audio Panel	G5 ADAHRS Data	
Serial Port #1	IFD Fuel Flow Data	ADSB to IFD	
Serial Port #2	SV-XPDR-261	IFD Radio Tuning	
Serial Port #3	SV-ADSB-472	CO Detector	
Serial Port #4	GPS-250		

The following requirements should be followed:

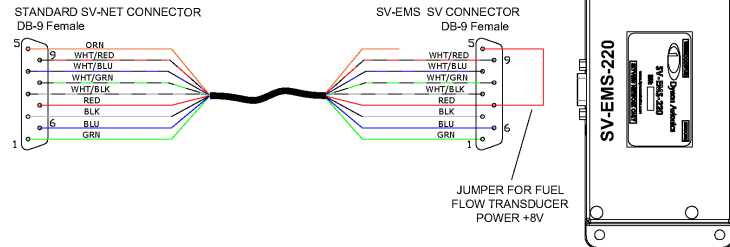
- A GPS Navigator (IFD540, IFD440, GTN650, GTN750) will need an SV-ARINC-429 module
- The Transponder should be wired to a PFD RS-232 Serial Port
- If the aircraft has two Nav radios each one should be wired to a different screen for backup reliability.
- If the aircraft has two GPS units each one should be wired to a different screen for backup reliability.
- You can't have XM and ADS-B weather with a single screen system.

2. Advanced Skyview Network Planning

Most of the AFS Dynon components communicate using our proprietary SV-Network. The SV-Network provides a primary and backup +8 Volt power source and a primary (A) and backup (B) two wire network for the remote devices. The SV-Network is designed to use 9 pin DSUB connectors and a special 9 conductor cable. The AFS-Dynon components all use a 9 Pin DSUB connector with male pins. The SV-NET harnesses all use a 9 pin DSUB connector with female pins. The SV-Network is designed to be a parallel network that does not require any special terminations. As long as all components are connected together in a single network they should communicate. Some of the Dynon components have two SV-Network connectors so you can continue the network connection to the next device. You can use multiple Dynon 5 port hubs connected if you need more ports.

SV-NET CABLE

- The following devices should be connected to the SV-Network using the standard SV-NET cables: AF-6600, AF-5000, SV-ADAHRS-200, SV-ADAHRS-221, SV-AP-PANEL, SV-KNOB-PANEL, ACM-ECB, SV-COM-RADIO, SV-ARINC-429
- The SV-EMS-220 or SV-EMS-221 require a special SV-NET cable with a jumper on the SV-EMS end of the cable to power the fuel flow transducer.



- The Dynon Autopilot servos connect to only the SV-Network data pins and will use a dedicated fused +12V power connection.

3. Component Locating and Mounting

Find convenient mounting locations for all the components: EFIS Screens, ADAHRS, Transponder, ADS-B... keeping in mind that they might need to be removed for service after the aircraft is finished. The EFIS screens should be mounted from the front of the panel using the supplied 6-32 screws. It is highly recommended that you use 6-32 PEM or Nut Plates for screen mounting to the instrument panel.

4. Component Power and Ground Wiring

Connect each EFIS screen and component to a separate properly sized fuse or circuit breaker. Each EFIS screen **MUST** have the backup power wired to a backup battery or fused direct aircraft battery connection. All EFIS screens and components should be wired to a good ground connection.

5. Screen RS-232 Serial Port Wiring

Using your block diagram wire the EFIS Screen(s) serial ports to the external equipment.

6. Screen Digital Inputs and Output wiring

a. Digital inputs are shared between screens, if you are using the inputs for door or canopy warning they should be wired to the PFD screen.

b. Inputs used for Landing Gear should be wired to the PFD

c. Inputs should be wired to a switch that connects to ground to activate.

d. The Digital Output is designed to be used with a warning light and will connect to ground anytime an EFIS warning is activated.

7. EFIS Audio Wiring

Connect only the Audio from the Pilot EFIS screen to an unswitched audio panel input. Do not connect the audio from any other EFIS.

8. Pitot-Static- AOA Plumbing

ADAHRS Pitot and Static connections are standard 1/8" NPT. Double check that you don't have them reversed!

9. Ethernet Wiring

The Ethernet connection is a Standard CAT 5 cable between screens. If you are using more than one screen and/or Ethernet XM weather you will need to use a separate Ethernet Switch.

10. Engine Sensor Installation and Wiring

Wire each engine sensor to the Engine Module using the sensor wiring schematic.

11. Configure the EFIS Advanced SV-Network

SCAN for SV-Network devices on the Pilot PFD screen in the aircraft after connecting any new device. Press **UPDT** if any detected devices need updating.

12. Configure Admin Settings for ADAHRS, Airdata, Engine on each screen

Configure the IP Address for each screen in the aircraft. The PFD EFIS Screen must have IP Address 175. Two EFIS Screens in the same aircraft must not have the same IP Address.

13. Configure Serial Ports and GPS/NAV data sources on each screen

Configure each serial port on each EFIS screen for the type of data it will be sending and receiving. The three GPS/NAV data sources on all EFIS screens in the aircraft must be pointed to the same device. You should never point a GPS/NAV data source to the RS-232 Aviation serial port connected to a GPS Navigator (IFD440, IFD540, GTN650, GTN750)

14. Select correct engine sensor part number for each engine sensor on the **PFD**.

The correct part number for each engine sensor should be selected on the PFD EFIS Screen. You cannot select the sensor part number on an EFIS screen that is not the SV-Network "Master".

15. Calibrate the Fuel Tanks sensors on the PFD EFIS.

You should calibrate the fuel tanks on the PFD EFIS Screen with all EFIS screens powered up.

16. Calibrate the Trim and Flap sensors on PFD EFIS.

17. Configure the Aircraft V Speeds on each screen

This will need to be configured on each EFIS Screen in the Aircraft.

18. Configure each Engine Gauges Red-Yellow-Green ranges on each Screen.

This will need to be configured on each EFIS Screen in the Aircraft.

19. Configure the Fuel Tank size and Red-Yellow-Green ranges on each Screen.

This will need to be configured on each EFIS Screen in the Aircraft.

20. Configure Weight and Balance data on each screen.

This will need to be configured on each EFIS Screen in the Aircraft.

21. Configure Check List data on each screen.

This will need to be configured on each EFIS Screen in the Aircraft.

22. Configure the Inputs on each Screen.

Each EFIS Screen has three unique inputs that will need to be configured.

23. Configure Radio Settings on each screen

The Radio type will need to be configured on each EFIS Screen in the Aircraft that you want to be able to tune the Radio on.

24. Configure Transponder Settings on each screen

The Transponder type will need to be configured on each EFIS Screen in the Aircraft that you want to be able to tune the Transponder on.

25. Verify Correct Airdata settings and plumbing with a Pitot/Static test before the first flight.

You should have a Pitot-Static and Transponder test performed on the aircraft to verify that everything is working correctly before the aircraft is flown for the first time.

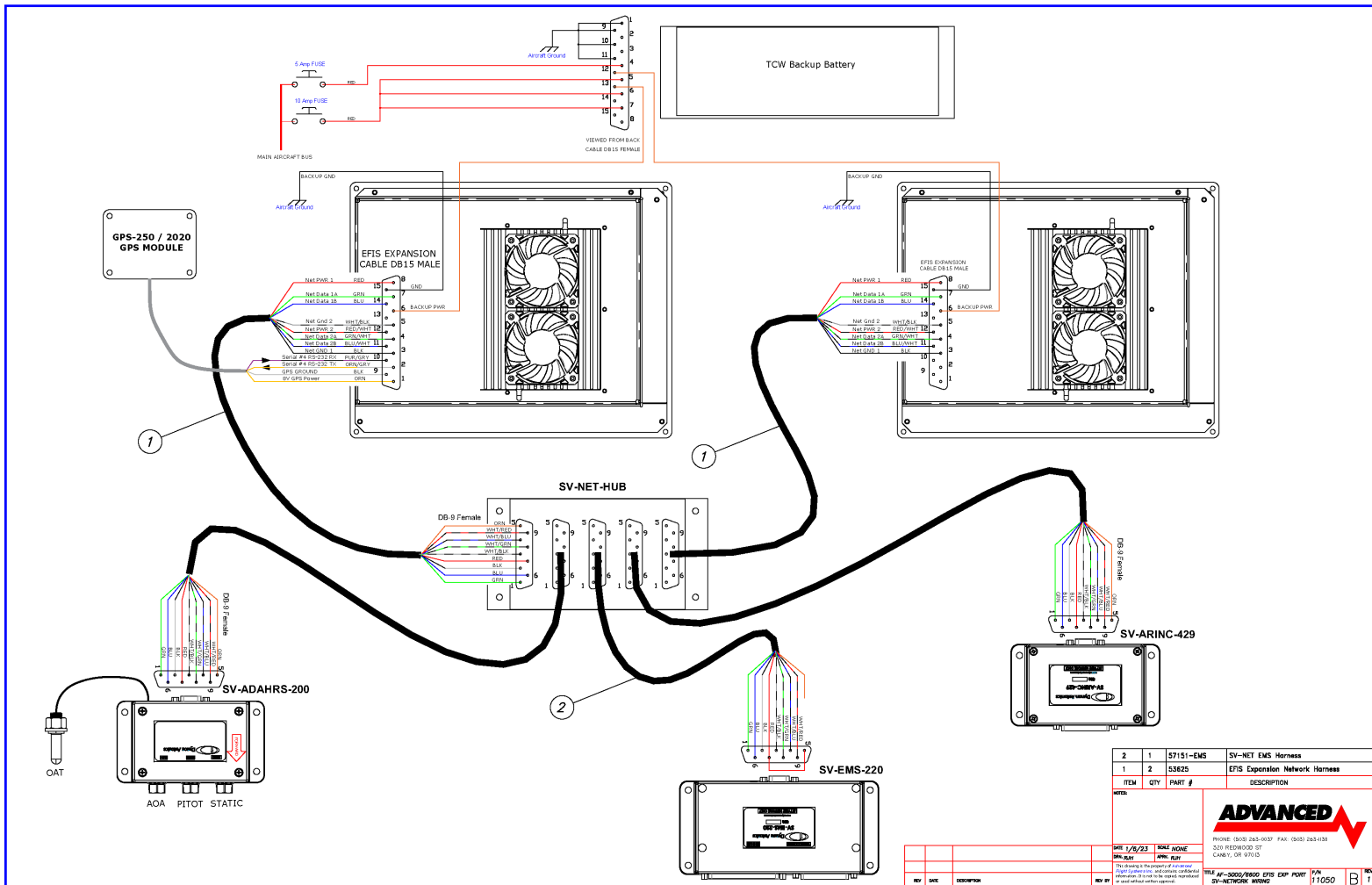
2 Advanced SV-Network Planning

All of the AF-6600 or AF-5000 EFIS screens in the instrument panel should be connected to the SV-Network. The EFIS screens SV-Network connection is made using pins in the EFIS Expansion DSUB-15 pin connector. If you are using circuit breakers and **not using** the Advanced Control Module (ACM) you should use our expansion EFIS harness P/N: 53625. The P/N: 53625 Harness converts the SV-Net pins in the EFIS Expansion connector to the standard SV-NET 9 pin male connector that will plug into a SV-NET 5 Port hub.



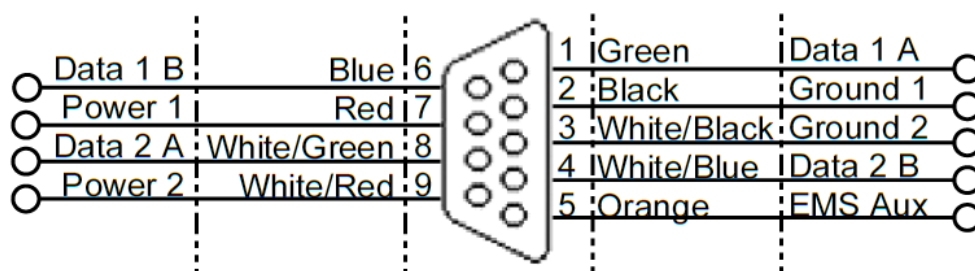
The EFIS Expansion 15 pin connector also contains the pins for RS-232 serial port #4 and the backup battery power to the EFIS. The EFIS Expansion harness has male pins and live backup +12V power when connected to the backup battery. You should be careful to not touch any of the of the harness connector pins to anything grounded to the airframe. If the harness backup battery power pin gets shorted to ground it will blow the fuse in the side of the TCW Backup Battery. The best practice is to **always disconnect the TCW Backup battery connection before connecting the Expansion harness to the EFIS.**

2.1 SV-Network Wiring to AF-6600 / AF-5000 EFIS without an ACM



2.5 Advanced SV Network Wiring Table

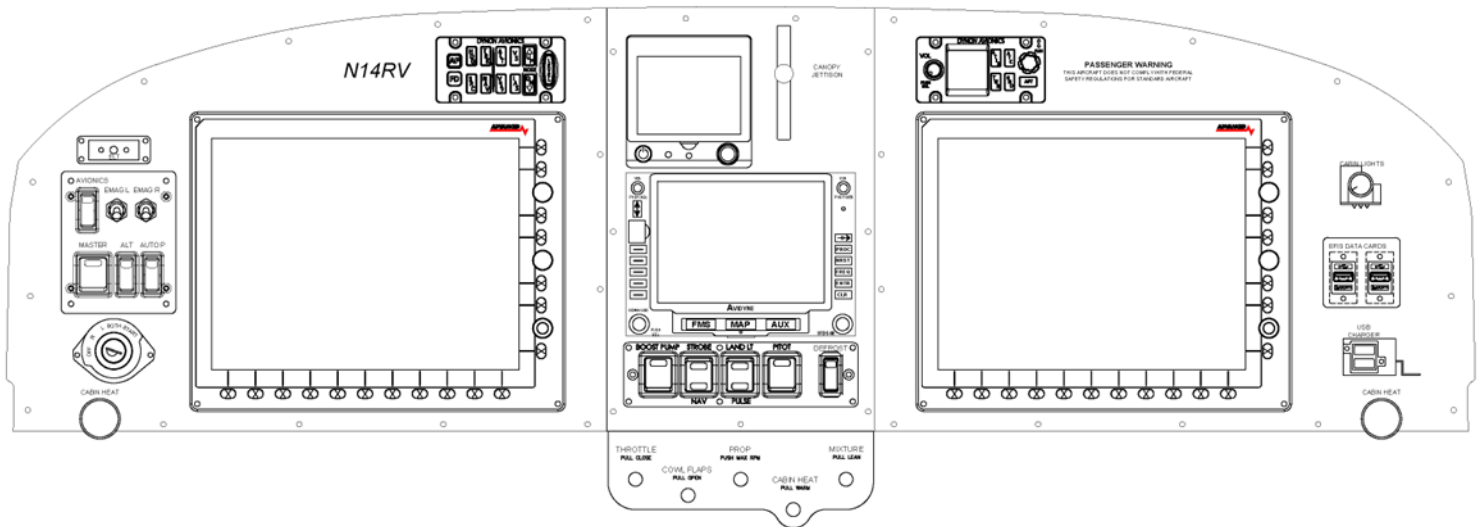
Advanced-SV Network Female D9 Pin	Advanced-SV Network Cable Wire Color	Description
1	Green	Network Data 1 A
2	Black	Network Ground 1
3	White with Black Stripe	Network Ground 2
4	White with Blue Stripe	Network Data 2 B
5	Orange	EMS Auxiliary Voltage
6	Blue	Network Data 1 B
7	Red	Network Power 1
8	White with Green stripe	Network Data 2 A
9	White with Red stripe	Network Power 2



Network Female D9 Pin Insertion View (Rear)

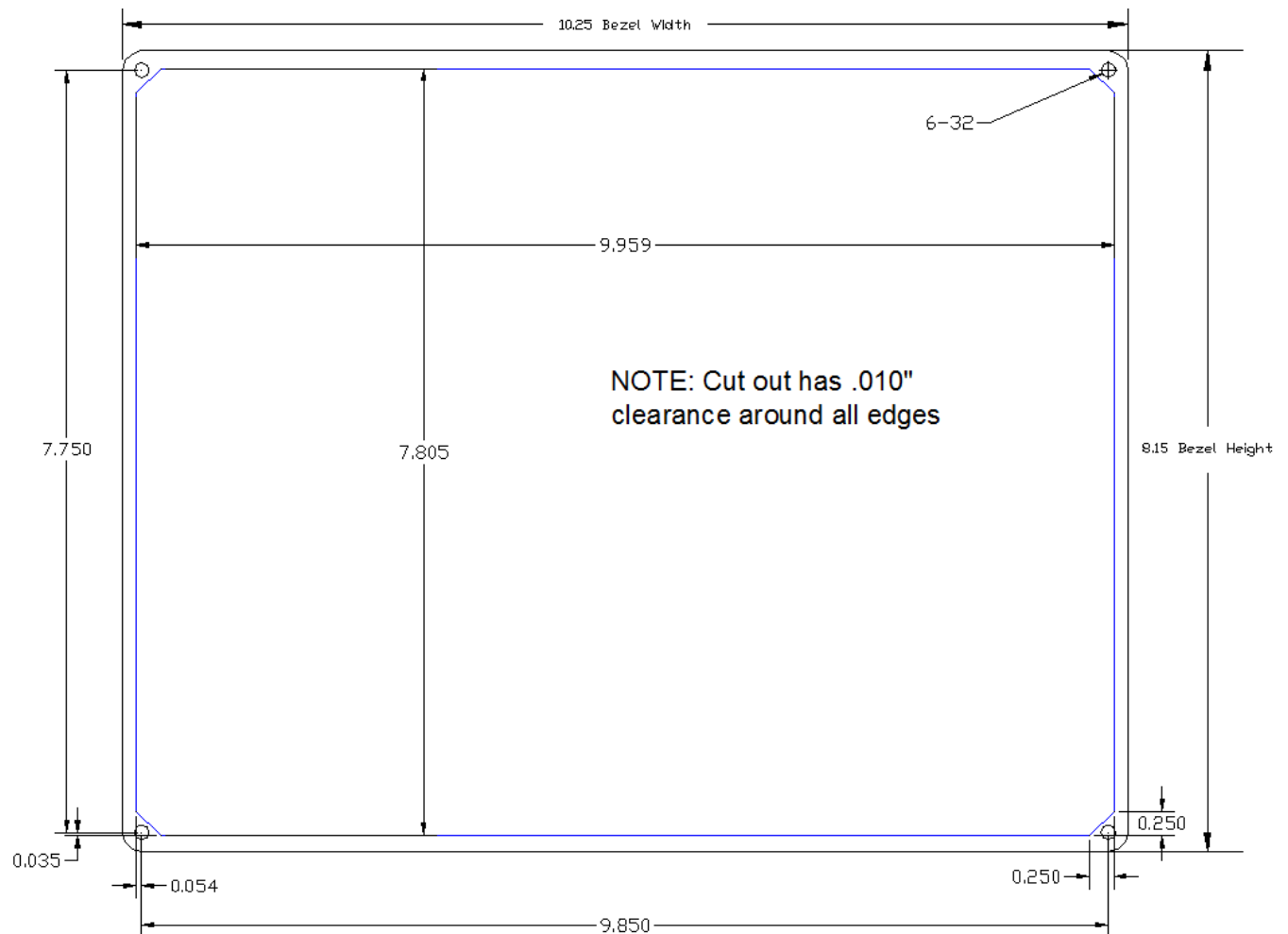
3 Component Locating and Mounting

Van's RV-14 AF-6600 IFR Panel Example



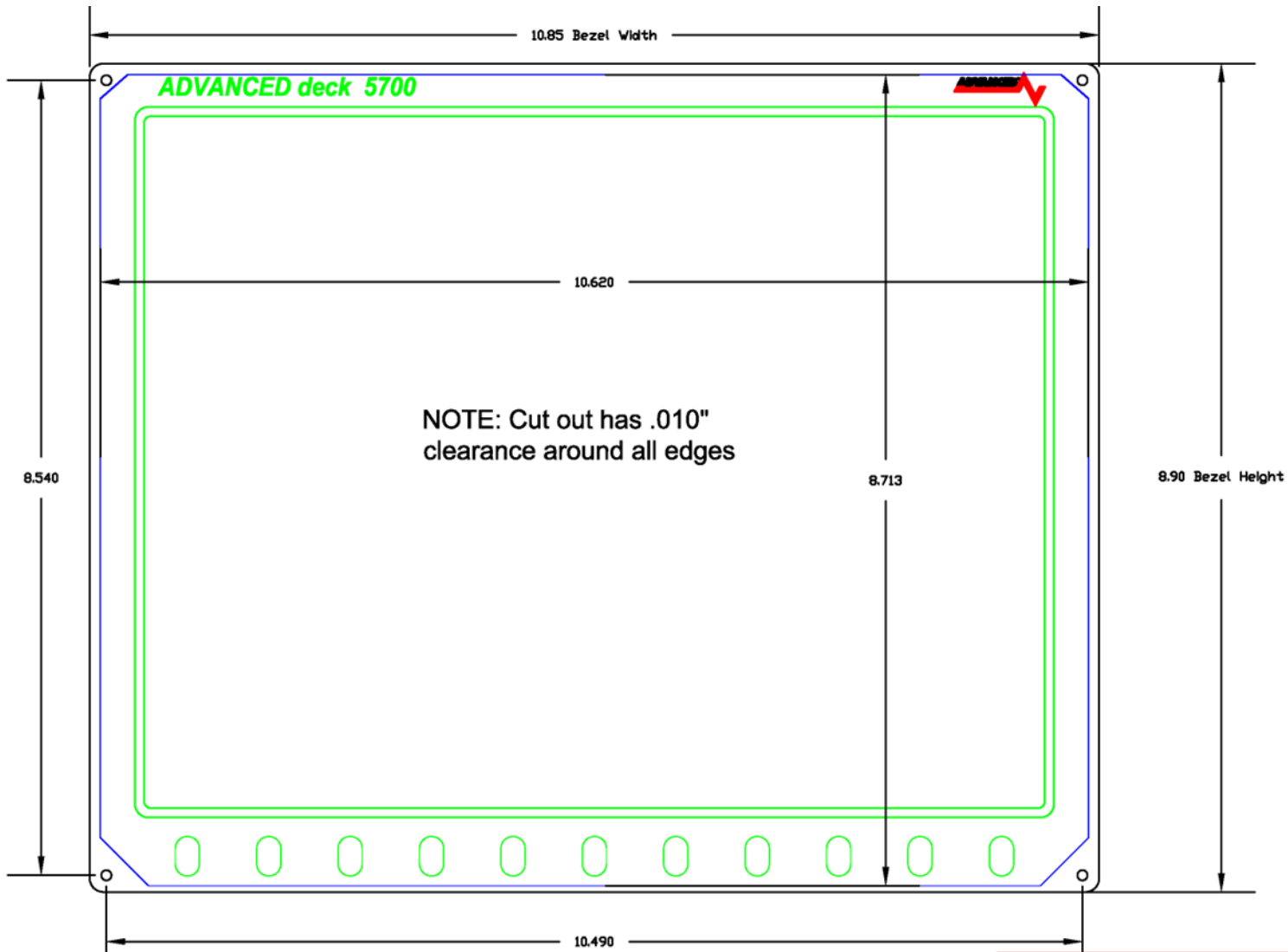
3.1 AFS EFIS Mounting and Panel Cutout

AF-6600 / AF-5600 Panel Cutout



AF-6600 / AF-5600 Screen Cut Out

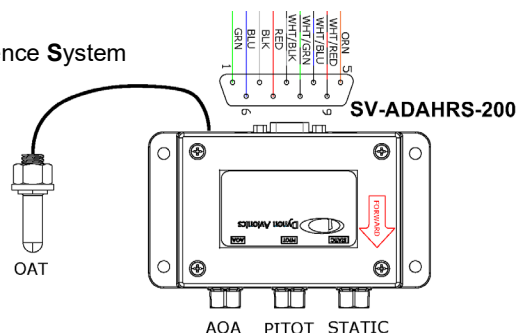
AF-5700 Panel Cutout



3.2 SV-ADAHRS-200/201

The Dynon **SV-ADAHRS-200/201 Air Data/attitude & Heading Reference System** module is where the EFIS display gets the following information:

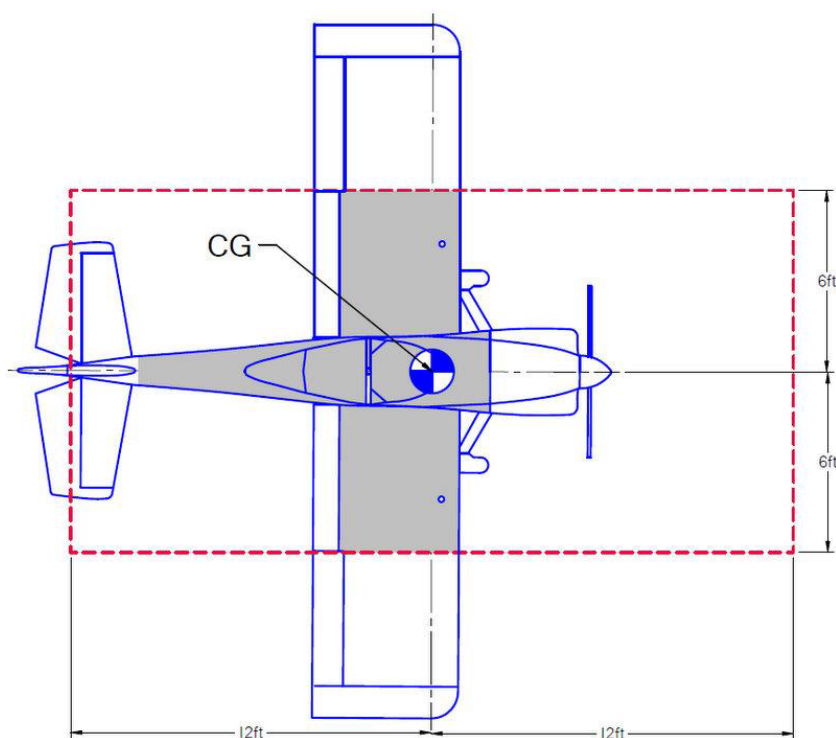
- Airspeed
- Altitude
- Vertical Speed
- Outside Temperature
- Slip Ball Data
- Pitch Angle
- Roll Angle
- Compass Heading



The ADAHRS provides all six-pack gauges in electronic form on the EFIS display. The SV-ADAHRS-200 or SV-ADAHRS-201 connects to the SV-Network. The SV-ADAHRS-200 (P/N: 72200) is designed to be the primary ADAHRS in the system and the SV-ADAHRS-201 (P/N: 72201) is designed to be the backup ADAHRS. Both units have the same performance specifications and require a separate outside air temperature probe (OAT).



Proper installation of the SV ADAHRS module(s) is critical. PFD performance is significantly linked to a proper ADAHRS installation. The installation location must meet all of the mechanical, magnetic, orientation, and environmental requirements detailed below.



ADAHRS with Respect to Center-of-Gravity

The location should also be magnetically benign. Given that it may be difficult or impossible to avoid all sources of magnetic interference, it is possible to characterize and compensate for small, static magnetic fields with calibration. Calibration cannot, however, compensate for *dynamic* magnetic fields (e.g., AC currents, non-constant DC currents, and non-stationary ferrous material such as electric turn coordinators and control surfaces). Thus, you must avoid mounting the module close to sources of *dynamic* magnetic fields, avoid wires that carry large amounts of current, and use non-magnetic fasteners for installation. AFS's general rule of thumb is that 1 to 2 feet between the module and sources of magnetic fields is generally good enough, but 2 or more feet is better.

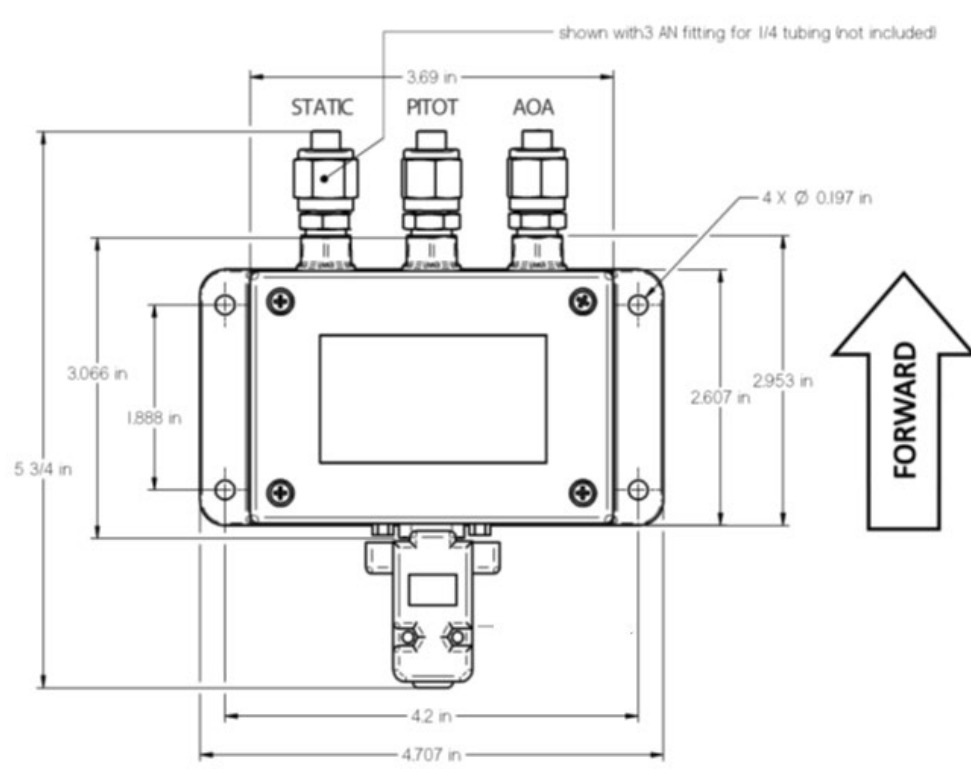


Use of stainless steel mounting hardware is not recommended as it is not always non-magnetic.

If you use a magnet to test whether possible interfering materials are non-magnetic, do not actually touch the magnet to the material you are testing, as this contact can cause the material you are testing to become magnetized.



Move a handheld compass throughout the space surrounding your intended location to get a rough idea of the suitability of the area. Note that this test should be done with major aircraft systems operating (e.g., strobe lights and radios on) because some systems can cause magnetic interference. If the compass needle deviates significantly from magnetic North or cycles back and forth, the location is not ideal for ADAHRS installation.



Advanced-SV Network ADAHRS Installation Orientation

An ADAHRS module should be mounted within one degree of parallel to all three aircraft axes, with the pneumatic fittings facing toward the front of the aircraft. The module's mounting tabs must be on the bottom. The label must be on the top. Figure 2 shows the correct orientation of the ADAHRS as it would appear if you were above the aircraft, looking down at it. The module will not operate properly if it is rotated or inverted in any other orientation.



There are no module-to-module proximity requirements when installing multiple ADAHRS modules in an aircraft. For example, one ADAHRS may be installed on top of another ADAHRS module. Other installation location requirements still apply.

The ADAHRS installation location should also adhere to the following requirements:

- Avoid locations that are lower than the lowest point in the pitot/static system to reduce the chance of allowing moisture to enter the module.
- Avoid locations that are subject to severe vibration.
- Avoid locations that are subject to rapid changes in temperature.
- Avoid locations that are subject to extreme humidity.
- Leave ample working room for electrical and pneumatic connections.

Advanced-SV Network Wiring

The Advanced-SV ADAHRS is connected to the EFIS using the Advanced-SV network cables, hubs and splitters.

OAT Sensor Installation

The SV-OAT-340 is an outside air temperature sensor. In order for it work properly, it must be able to measure air temperature accurately. Avoid exposing the sensor to sources of heat that would interfere with outside air temperature readings such as:

- Direct sunlight
- Engine heat and exhaust
- Aircraft interior (back side of sensor)
- Heated air from the cabin exiting from an open window or cabin air exhaust port

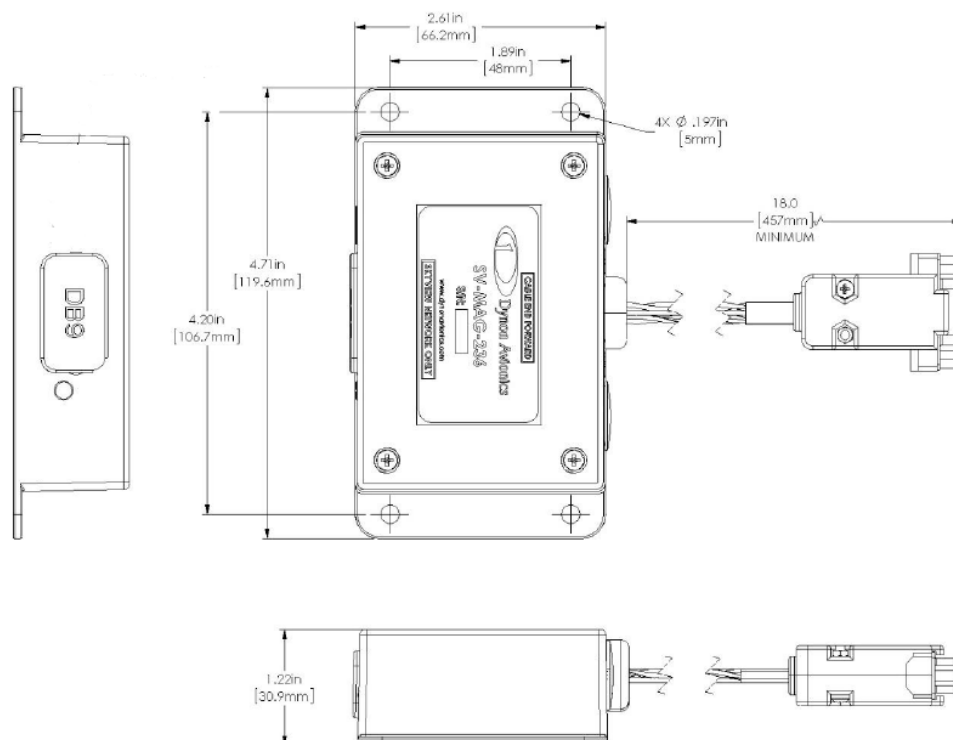
The installation area should have space for a nut and wires on the back side of the sensor. It is acceptable to extend or reduce the wire length if necessary. Reduce the wire length by cutting out the desired length from the middle of the wires and splicing together the remaining ends.

If there is a backup ADAHRS in the SkyView system, it is acceptable to install a backup OAT sensor a few inches away from the primary sensor. When running primary and backup OAT sensor wiring together tape sensor wire pairs together to avoid confusion later.

Route and secure the sensor wires to the location of the ADAHRS module. Keep wires away from radios, ignition, and other noisy electronics.

1. Carefully insert the pins on the wires into the connector housing. Pins are not polarized and lock into place when inserted correctly.
2. Connect the sensor to the ADAHRS module.

3.3 SV-MAG-236 Remote Magnetometer



The SV-MAG-236 Remote Magnetometer P/N: 72236 was developed for situations where the SV-ADAHRS-200/201's integrated magnetometer cannot be located in an area free of magnetic disturbances while satisfying the other installation constraints (such as proximity to center of gravity) of the SV-ADAHRS-200/201. The SV-MAG-236 is particularly recommended for steel-frame aircraft.



Proper installation of the Advanced-SV Magnetometer is critical. Performance is significantly linked to a proper magnetometer installation. The installation location must meet all of the mechanical, magnetic, orientation, and environmental requirements detailed below.

The location should be magnetically benign. Given that it may be difficult or impossible to avoid all sources of magnetic interference, it is possible to characterize and compensate for small, static magnetic fields with calibration. Calibration cannot, however, compensate for *dynamic* magnetic fields (e.g., AC currents, non-constant DC currents, and non-stationary ferrous material such as electric turn coordinators and control surfaces). Thus, you must avoid mounting the module close to sources of *dynamic* magnetic fields, avoid wires that carry large amounts of current, and use non-magnetic fasteners for installation. AFS's general rule of thumb is that 1 to 2 feet between the module and sources of magnetic fields is generally good enough, but 2 or more feet is better.



Use of stainless steel mounting hardware is not recommended as it is not always non-magnetic.

If you use a magnet to test whether possible interfering materials are non-magnetic, do not actually touch the magnet to the material you are testing, as this contact can cause the material you are testing to become magnetized.



Move a handheld compass throughout the space surrounding your intended location to get a rough idea of the suitability of the area. Note that this test should be done with major aircraft systems operating (e.g., strobe lights and radios on) because some systems can cause magnetic interference. If the compass needle deviates significantly from magnetic North or cycles back and forth, the location is not ideal for ADAHRS installation.

As with the SV-ADAHRS-200/201, an SV-MAG-236 should be mounted within one degree of parallel to all three aircraft axes. The SV-MAG-236 should be oriented such that:

- The SV-MAG-236's mounting tabs must be oriented towards the bottom of the aircraft.
- The label on the SV-MAG-236's must be oriented towards the top of the aircraft.
- The side of the SV-MAG-236 where the cable exists must be oriented towards the nose of the aircraft (as noted on the label of the unit – **CABLE END FORWARD**).
- The side of the SV-MAG-236 with the LED indicator must be oriented towards the rear of the aircraft.

If the SV-ADAHRS-200/201 is installed with a pitch other than 0°, the SV-MAG-236 must be installed with the same pitch.

ADAHRS-200/201 MAG-236 Magnetic Heading Calibration



AFS calibrates every ADAHRS during manufacture, however a separate calibration is required to accurately measure magnetic heading in an aircraft installation. The calibration procedure in this section simultaneously calibrates every SV-ADAHRS-20X in the Advanced-SV network.

Magnetic heading calibration requires pointing the aircraft in four directions and acquiring data at each direction. The aircraft's configuration and major systems should be in a state that resembles flight conditions during calibration (i.e., **the canopy should be closed**, the aircraft's pitch attitude matches AF-5000's attitude depiction, the engine should be running, and all electronic devices should be on). An accurate method of aligning the aircraft with magnetic North, East, South, and West, such as an airport's compass rose, is required.



Tail wheel equipped aircraft can be calibrated in their normal nose up ground attitude as long as the AF-5000 attitude display shows the correct corresponding nose up attitude.



A working GPS receiver must be connected to the AF-5000 system in order to calibrate magnetic heading. The AF-5000 uses GPS-derived position information to calculate magnetic intensity, declination, and variation.



It is important to calibrate magnetic heading in an area that has been verified to be magnetically neutral. The presence of steel reinforcement (rebar), electrical power lines under the tarmac, or other natural deposits of ferrous metals can result in an inaccurate compass calibration. Airport compass roses are usually verified to be magnetically neutral. For more information on this issue see FAA Notice Number: NOTC4031: https://www.faa.gov/files/notices/2012/Aug/CAUTION_TLP_031612_Rev10.pdf

Procedure

1. Move the Aircraft to open area on Asphalt
2. Turn on all EFIS screens in the aircraft and wait for the Attitude Indeterminate Red X to go away.
3. Select MAG cal on the PFD EFIS from the following menu: **[SET] -> [AHRS] -> [MAG CAL]**
HOLD Button for 2 seconds
4. After accessing the MAG Align menu press the **[START]** button and follow the on-screen directions.

Alarm Output

The system has an output that will be connected to ground if one of the gauges is in the RED warning band or an input is configured to trigger the alarm. The Alarm Output can be used to drive a master warning light on the panel.

If multiple screens are used, only ONE screens alarm output is needs to be utilized. All EFIS and Engine alarms will be transferred to the main screen.

Electrical Connections

For wiring information see **APPENDIX M**:

EFIS Main Power Connections

The AF-6600 / AF-5000 Series power requirement is 12 volts at 3 Amps, a 5 amp circuit breaker or fuse should be used for the system.

All wire should meet Mil Standard MIL-W-22759/16 (Tefzel insulation)

20 AWG wire is normally sufficient for the power supply and ground wires.

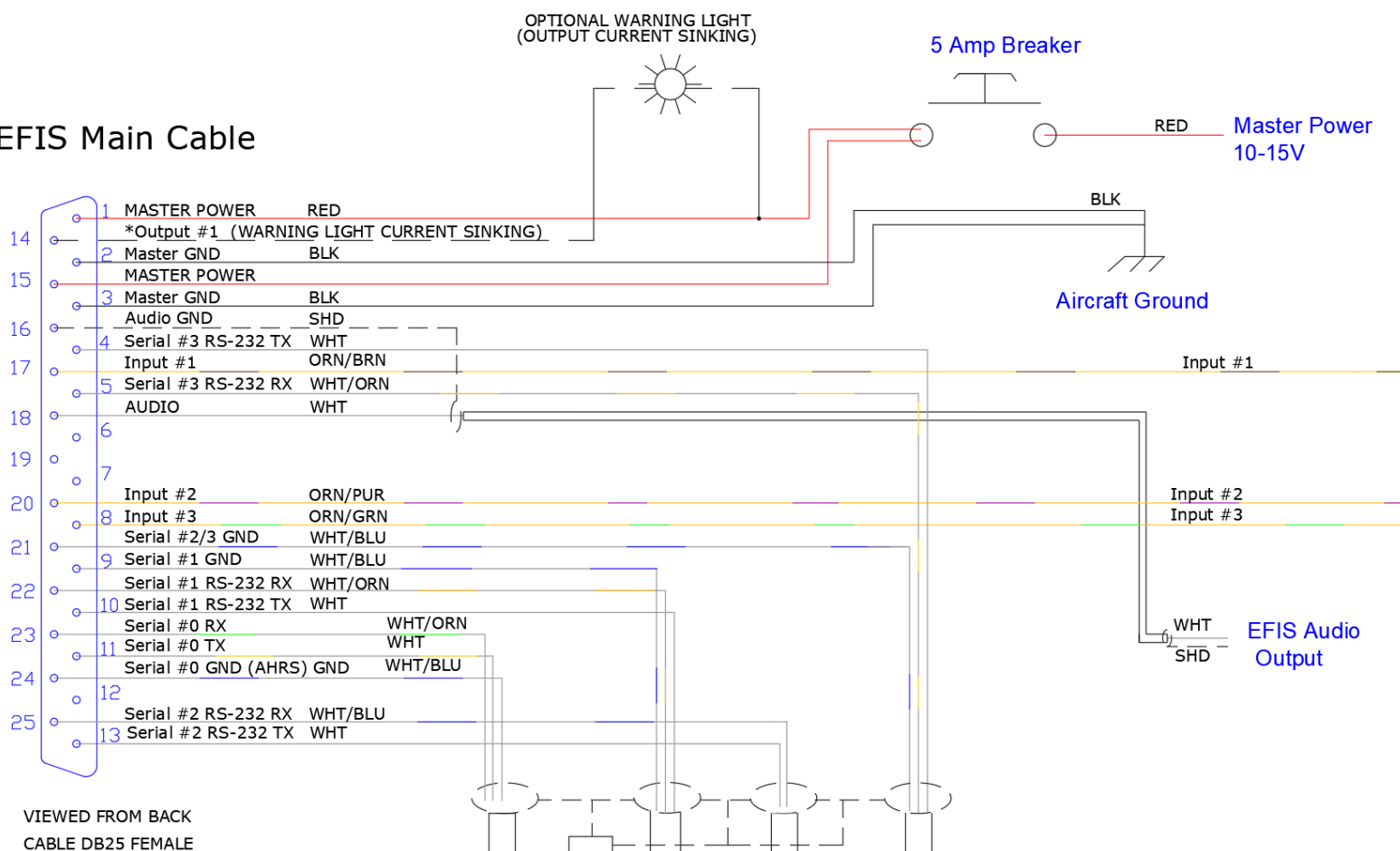
EFIS Main Cable (DB-25)

Pin 1, 15 Red Master Power

Pin 2, 3 Black Master Ground

The master power pins are internally connected.

EFIS Main Cable



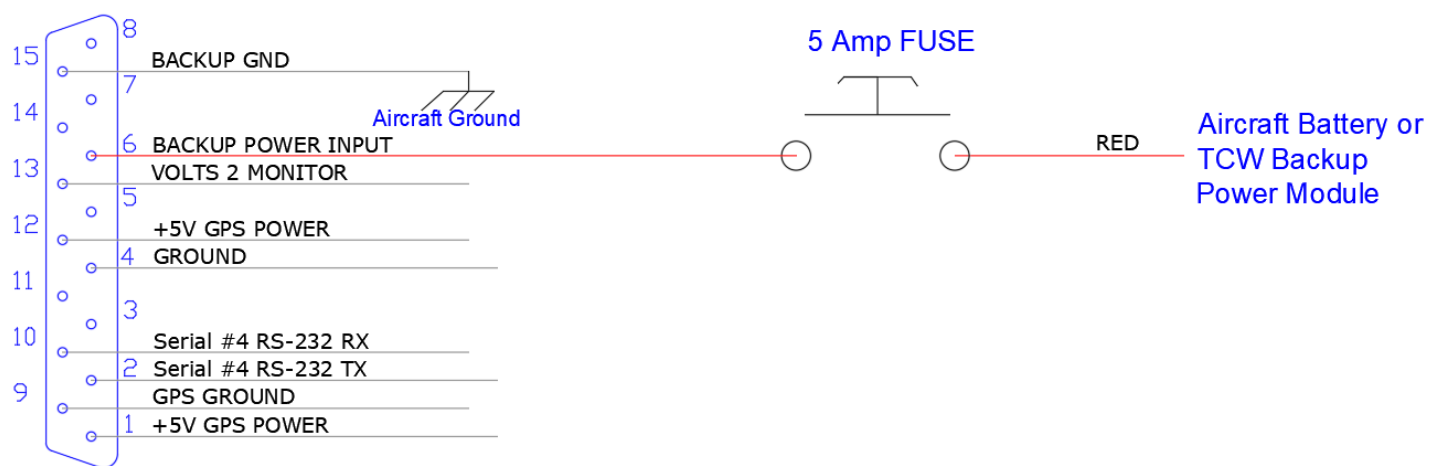
EFIS Backup Power Connections

The AF-6600 / AF-5000 Series backup power input must be connected to the aircraft battery or a TCW backup battery module. The backup power input keeps the clock time when shut down and prevents an EFIS reboot when starting the aircraft engine.

EFIS Expansion Cable (DB-15)

Pin 6	Red	Backup/KeepAlive Power Input
Pin 15	Black	Backup Power Ground

EFIS Expansion CABLE



VIEWED FROM BACK
CABLE DB15 MALE

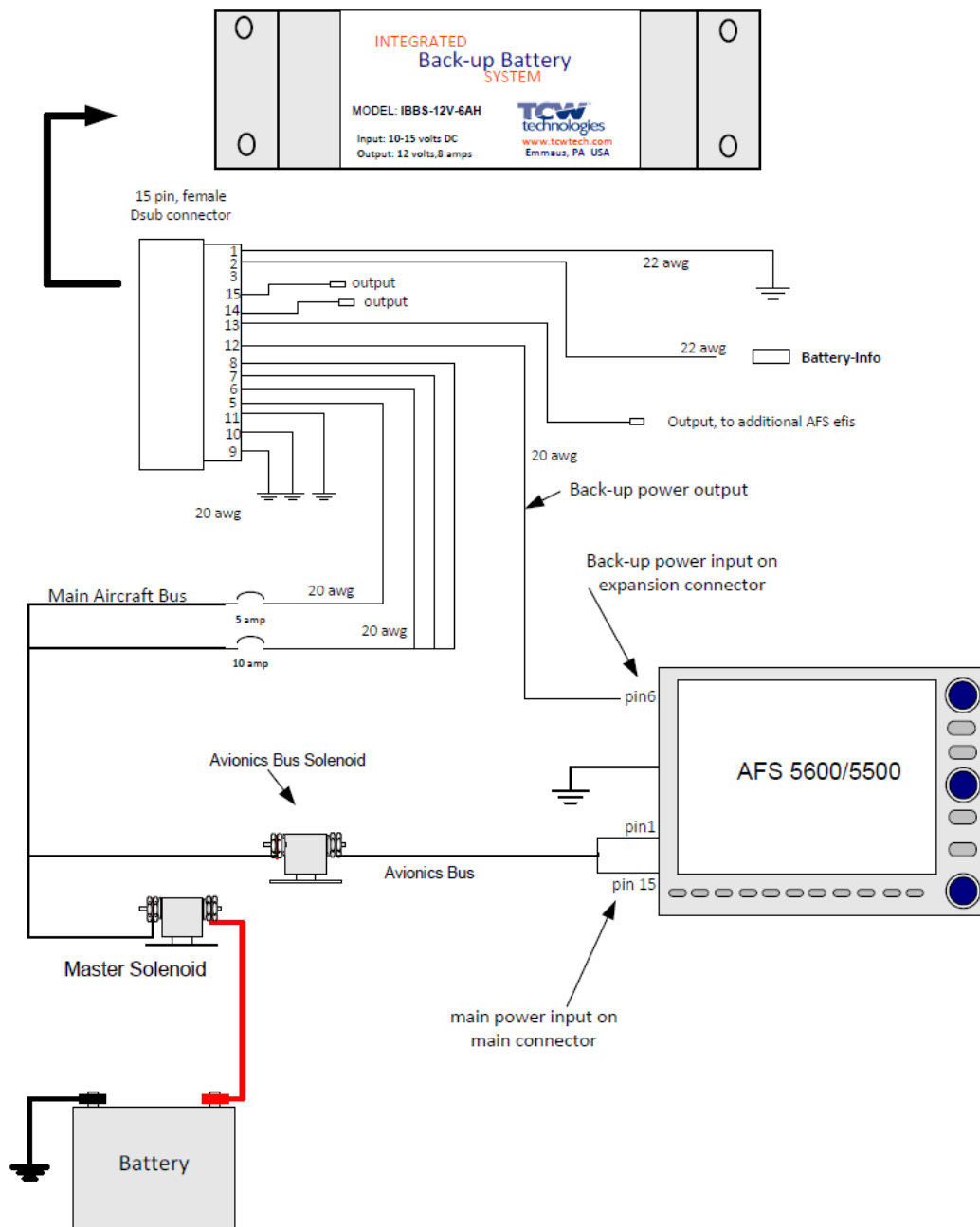
EFIS TCW Backup Battery Wiring

P/N: 71713 3 AMP hours for a single screen

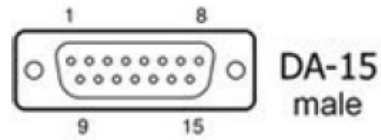
P/N: 71714 6 AMP hours for two screens

Wiring Diagram IBBS-12v-6ah

Equipment with Back-up Power Input



15 pin Male Dsub on unit



Pin #	Function	Pin #	Function
1	Back-up master switch	9	Ground
2	Batt-info	10	Ground
3	Low Volt Warn	11	Ground
4	N/C	12	Output
5	PWR + in, charge, sensing	13	Output
6	Pwr +, pass-thru input	14	Output
7	Pwr +, pass-thru input	15	Output
8	Pwr +, pass-thru input		

Audio Connections

If two EFIS units are being installed, the audio from only 1 screen should be connected. All alerts are passed through the Ethernet network.

The harness is wired for a 560-ohm audio output that allows you to match the output impedance of the system to standard aircraft audio panel and intercom audio devices. If your radio or audio panel does not have an unswitched audio input you will need to purchase an audio mixer. Do not attempt to connect the EFIS audio to a music input on an intercom, they are not the same impedance, and it will not be loud enough. Do not attempt to connect the EFIS audio along with a com radio to the same intercom input.

We recommend the following audio mixer if you do not have an audio panel:

http://www.fdatasystems.com/AP_60.htm



For wiring information see **APPENDIX M**:

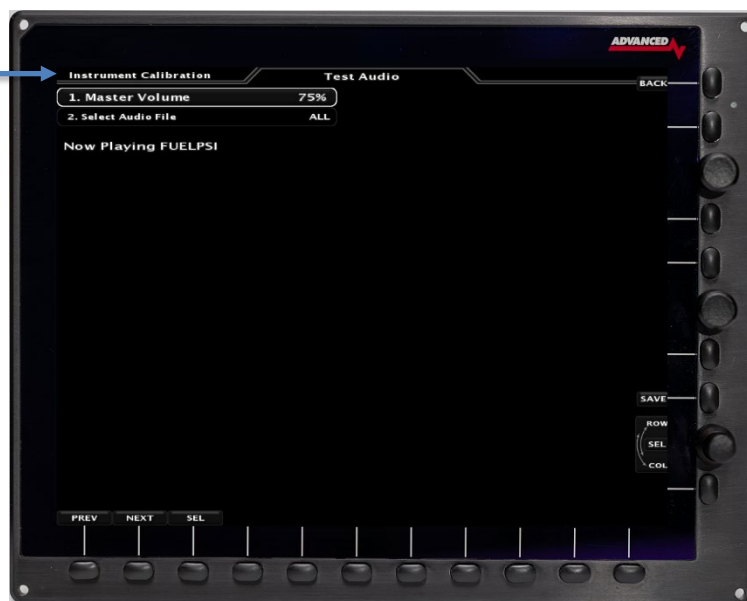
Test EFIS Audio Menu



1. Master Volume

The volume can be adjusted from (0%-100%) and is adjusted using the knob followed by pressing the **[SAVE]** button.

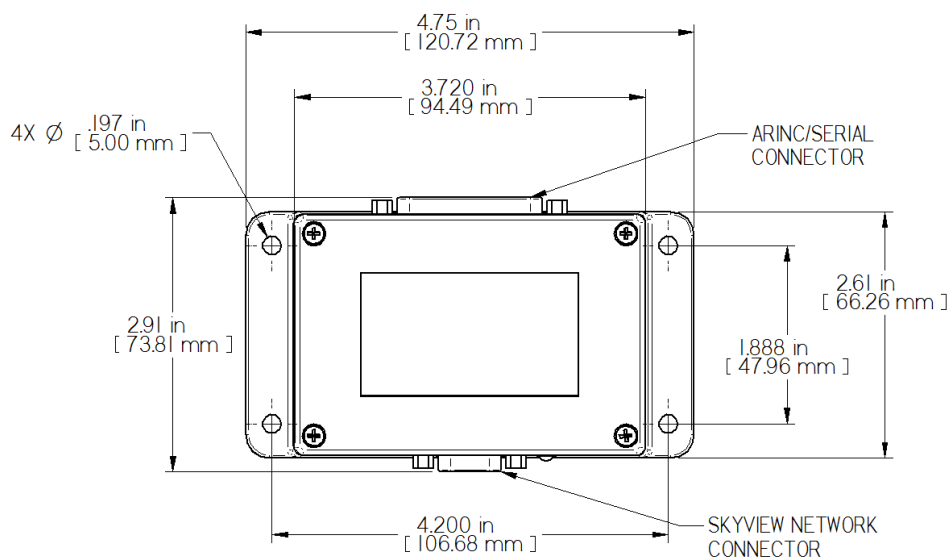
The Test Audio menu will play all the sounds in the system.



External Device Installation

71410 SV-ARINC 429 ADAPTOR

The SV-ARINC adaptor lets an AF-5000 EFIS connect to a GPS Navigator (Avidyne IFD540, Garmin GTN-650/750) using the Advanced-SV network. This eliminates the need to use an EFIS serial port for GPS navigator communication.



AFS does not provide mounting hardware with SV-ARINC-429 module. The mounting tabs on each side of the module have holes sized for #10 fasteners, but it is up to the installer to decide how the SV-ARINC-429 will be secured to the aircraft.

Follow recommended torque practices when tightening the mounting hardware. *Do not rivet the SV-ARINC-429 to the aircraft as this will hinder future removal if necessary.*

Advanced-SV Network Connection

Connect the SV-ARINC-429 module to the Advanced-SV network using the hardware mentioned in the Advanced-SV System Construction Section or using equivalent hardware.

If you have to install a connector on the end of a network cable, insert all pins into the D9 connector. Refer to Appendix C: Electrical Connections for details on connector pin-outs and wire colors. Remember to configure the Advanced-SV network after connecting all modules to a display.

ARINC-429 Device Connection

Harness Construction

Because the SV-ARINC-429 can be connected to a variety of devices, the harness requirements will vary from airplane to airplane. Therefore, AFS does not supply pre-manufactured harnesses for the SV-ARINC-429 module. Instead, your SV-ARINC-429 shipped with enough connectors and pins to generate a wide variety of harness configurations. Refer to the sections below for detailed wiring information.

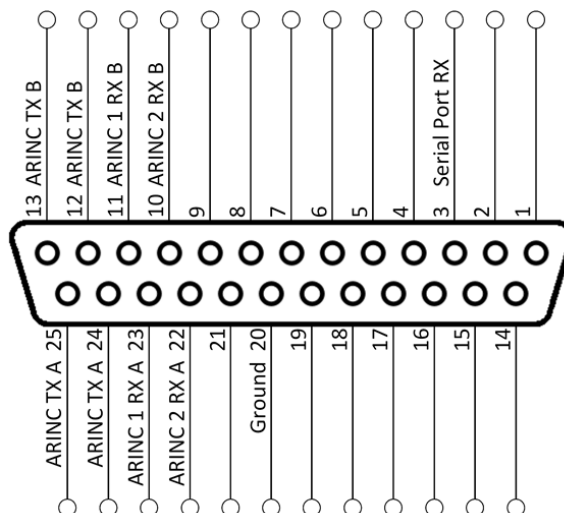
If you do not own a D-sub machined-pin crimping tool, they can be obtained for under \$50 from many retailers. See <http://wiki.dynonavionics.com> for known sources of these products. You may also find it helpful to own a pin insertion/extraction tool as well.

Additional harness construction and wiring information can be found in Appendix C: Electrical Connections.

The SV-ARINC-429 has a single 25 pin female D-Sub socket which is used for all data connections to your compatible ARINC-429 device. The pin out depicted in Figure 82 below depicts the view from the rear of your male D25 connector – the view you will have of your harness connector as you are inserting pins into the harness. Note that the pin numbers are labelled on the face of both the female and male connector.

SV-ARINC-429 Pinout

Pin	Function	Notes
1	No Connect	-
2	No Connect	-
3	Serial RX	Aviation Format Only From Connected ARINC-429 GPS
4	No Connect	-
5	No Connect	-
6	No Connect	-
7	No Connect	-
8	No Connect	-
9	No Connect	-
10	ARINC 2 RX B	-
11	ARINC 1 RX B	-
12	ARINC TX B	Pins 12/13 are the same TX signal. Provided for convenience when connecting to multiple ARINC receivers.
13	ARINC TX B	Pins 12/13 are the same TX signal. Provided for convenience when connecting to multiple ARINC receivers.
14	No Connect	-
15	No Connect	-
16	No Connect	-
17	No Connect	-
18	No Connect	-
19	No Connect	-
20	Ground	-
21	No Connect	-
22	ARINC 2 RX A	-
23	ARINC 1 RX A	-
24	ARINC TX A	Pins 24/25 are the same TX signal. Provided for convenience when connecting to multiple ARINC receivers.
25	ARINC TX A	Pins 24/25 are the same TX signal. Provided for convenience when connecting to multiple ARINC receivers.

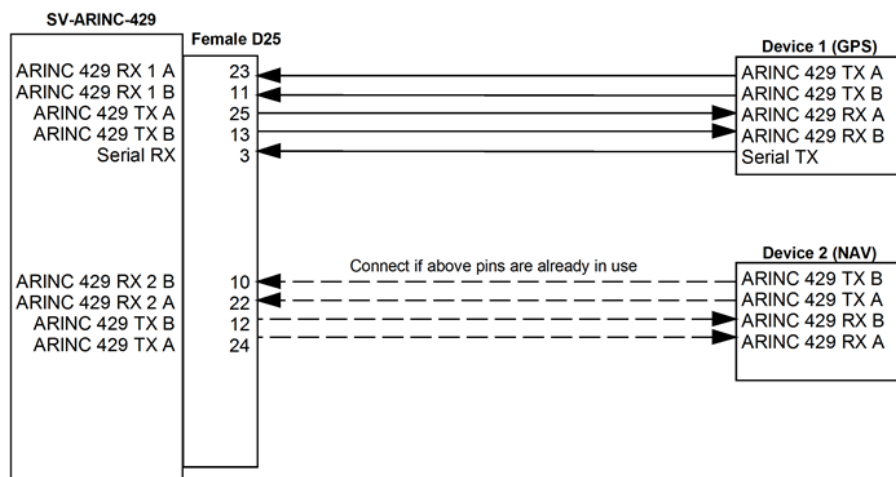


SV-ARINC-429 Male D25 Pin Insertion View (Rear)

ARINC Device Connections

The SV-ARINC-429 has two ARINC-429 receivers and one transmitter. The single transmitter may be connected to multiple devices that can accept the ARINC-429 information that the EFIS transmits.

The SV-ARINC-429 also has a serial input that is designed to provide auxiliary information that ARINC-429 GPS outputs do not provide (such as altitude). The EFIS needs this data to consider the input a valid and complete GPS position source. This input is not a general purpose serial port, and cannot be configured for other uses. Input coming into this serial port is assumed to be in Aviation format, which most ARINC-429 capable panel mount GPS units can output. The following several diagrams show some common radios and GPSs, and the preferred connection schemes between them and the SV-ARINC-429.



Garmin GTN-650/750 Series Configuration Information

The following are the typical Garmin and AF-5000 configuration settings when this combination of products is used:

Garmin Settings

"ARINC 429 Configuration" page

In 1: Low | EFIS Format 3

In 2: Unused by SkyView, configure as needed for other equipment

Out: Low | GAMA Format 1

SDI: Common

"VOR/LOC/GS Configuration Page

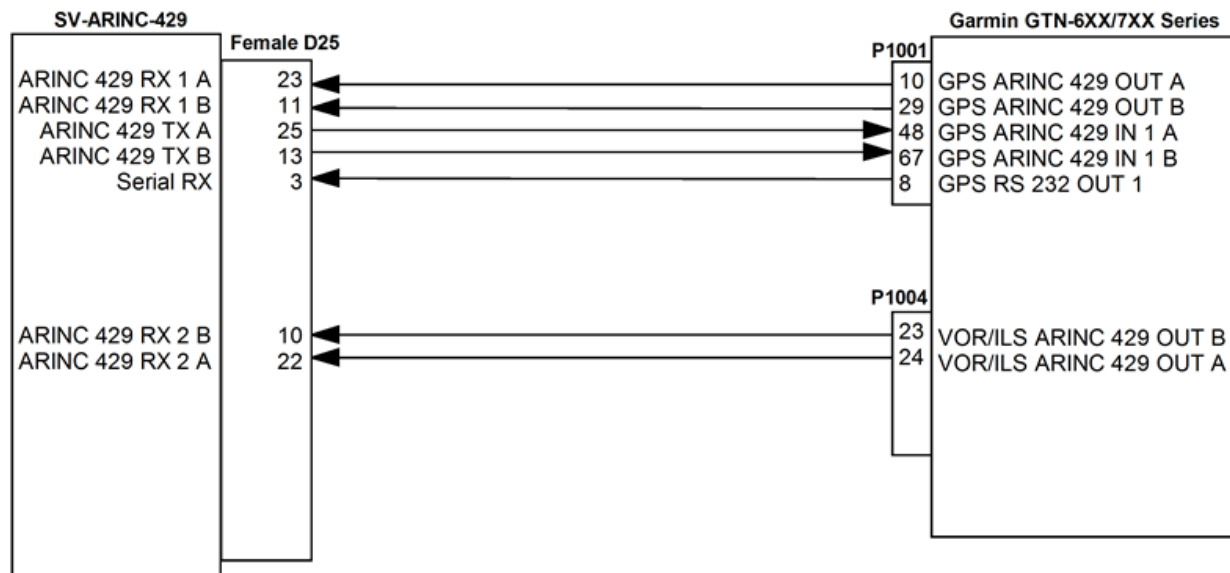
Nav Radio: Enabled ARINC 429 Configuration: Tx Speed: Low SDI: Common Other Settings: Unused by AF-5000

"RS-232 Configuration" Page

RS232 1 Output: Aviation Output 1

Optional (ADS-B)

If Dynon/AFS SV-XPNDR-261 is being used for ADS-B Out capability: Another GTN serial output should be set to "Garmin ADS-B" format. That serial port should be connected to the SV-XPNDR-261's pin 3 through a 1.21k resistor as described in the transponder installation section of this manual.

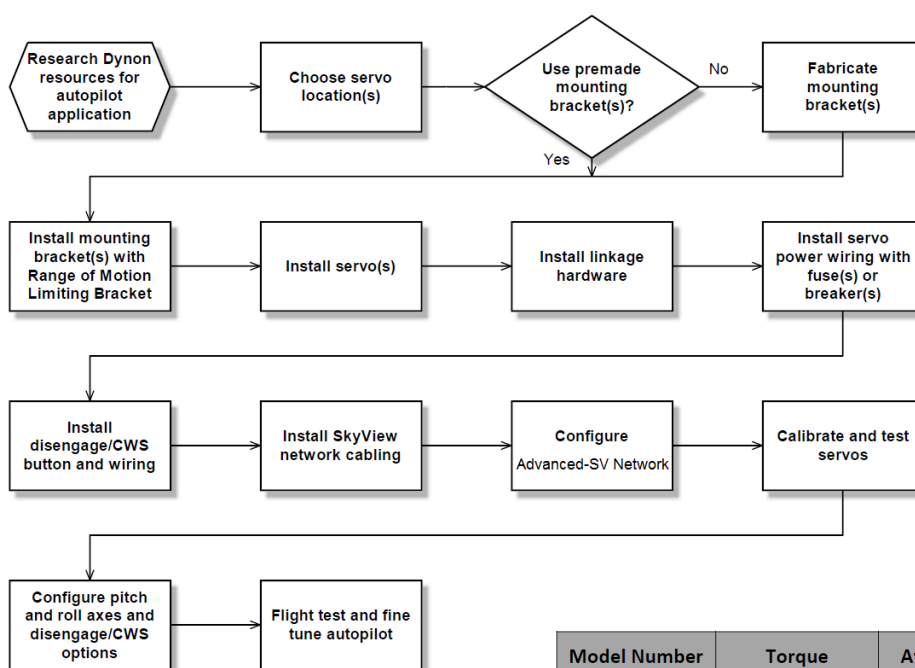


Advanced-SV Autopilot

Dynon Autopilot Servo Installation, Configuration, and Calibration

This chapter contains generic mechanical and electrical installation guidelines for the Dynon servos mentioned in Table 50. Plane-specific kits purchased from Dynon contain detailed drawings and diagrams which are intended to be used in conjunction with this guide as a complete set of installation instructions. A complete list of aircraft mounting kits is available on the current Price List/Order Form at <http://store.dynonavionics.com>. Drawings and diagrams are also available at <http://docs.dynonavionics.com>.

This Figure is a high-level overview of a suggested servo installation, configuration, and calibration procedure.



Model Number	Torque	Attachment
SV32	36 inch-pounds	Standard Arm
SV32C		Capstan
SV32L		Long Arm
SV42	55 inch-pounds	Standard Arm
SV42C		Capstan
SV42EL		Extra Long Arm
SV42L*		Long Arm
SV42T *		Torque Enhancement
SV52	72 inch-pounds	Standard Arm
SV52C		Capstan
SV52L*		Long Arm

Dynon Avionics offers the following servo models:

Compass Calibration Requirement

The Advanced-SV autopilot requires an accurate compass to operate efficiently and comfortably in heading mode and the radio-based VOR/NAV mode. Therefore it is critical that the ADAHRS be installed correctly, calibrated, and operating well in all attitudes.

Servo Mechanical Installation

Dynon Avionics has researched suitable mounting points for a number of popular aircraft and offers mounting kits and instructions for them. If you have purchased one of these kits, use the instructions included with it as your primary guide; the following mechanical installation information is more general in nature. If you have purchased cable-drive capstan servos (SV32C or SV42C), refer to the documentation that came with the included Capstan Accessory Kit (101116-000).

For installing Dynon Avionics servos in aircraft for which Dynon does not offer kits, we offer a Generic Servo Installation Kit (101020-000) of basic parts and basic installation instructions. The generic servo push-pull mounting kit includes some of the hardware to mount a servo and connect to the aircraft controls, but requires the installer to fabricate mounting brackets. This kit can be used in either pitch or roll applications that use a servo with an output arm (not suitable for use with pulley/cable servos). Some additional fasteners (not supplied by Dynon) and brackets will be required depending on the installation method chosen.



Neglecting to properly install and/or use Dynon Avionics AP hardware can result in failures which could cause loss of aircraft control resulting in aircraft damage, personal injury, or death. If there are any questions on the part of the installer it is mandatory to resolve these questions prior to flight.

When installing the servo, you must first determine a mount location for proper interaction with the existing control system. The mounting point that is chosen must allow the servo arm and associated linkage to move freely through the entire range of travel. To prevent the possibility of the servo arm going OVER CENTER, the servo arm must not travel more than a total of $\pm 60^\circ$ from neutral position. When the aircraft controls are centered, the arm of the servo should be perpendicular to the attaching push rod. If this is not the case, we recommend adjusting the length of the push rod or consider a different mounting point. For maximum efficiency and the lightest drag on the flight controls, you should choose the smallest servo that provides sufficient torque to move and hold the flight controls with a minimum of slippage.



The servo arm must not rotate even near to the point called OVER CENTER, the point at which the primary aircraft control would “lock up”. Over center happens when the angle between the servo arm and the attached push rod becomes so great that the control system cannot drive against the servo arm. To protect against this possibility, a Range of Motion Limiting Bracket is supplied with each Dynon Avionics servo. These brackets are drilled so that they can be mounted at different angles as required (18° intervals). The brackets are supplied for the protection of the pilot, and we recommend that the Range of Motion Limiting Bracket be installed to ensure that an OVER CENTER condition cannot occur. *During normal servo operation, the Range of Motion Limiting Bracket should never be used. It is only intended for use as a safety mechanism in the SkyView Autopilot system.* When installing the Range of Motion Limiting Bracket, only use the supplied screws. Using longer screws to install the bracket, you will penetrate and damage the electronics.

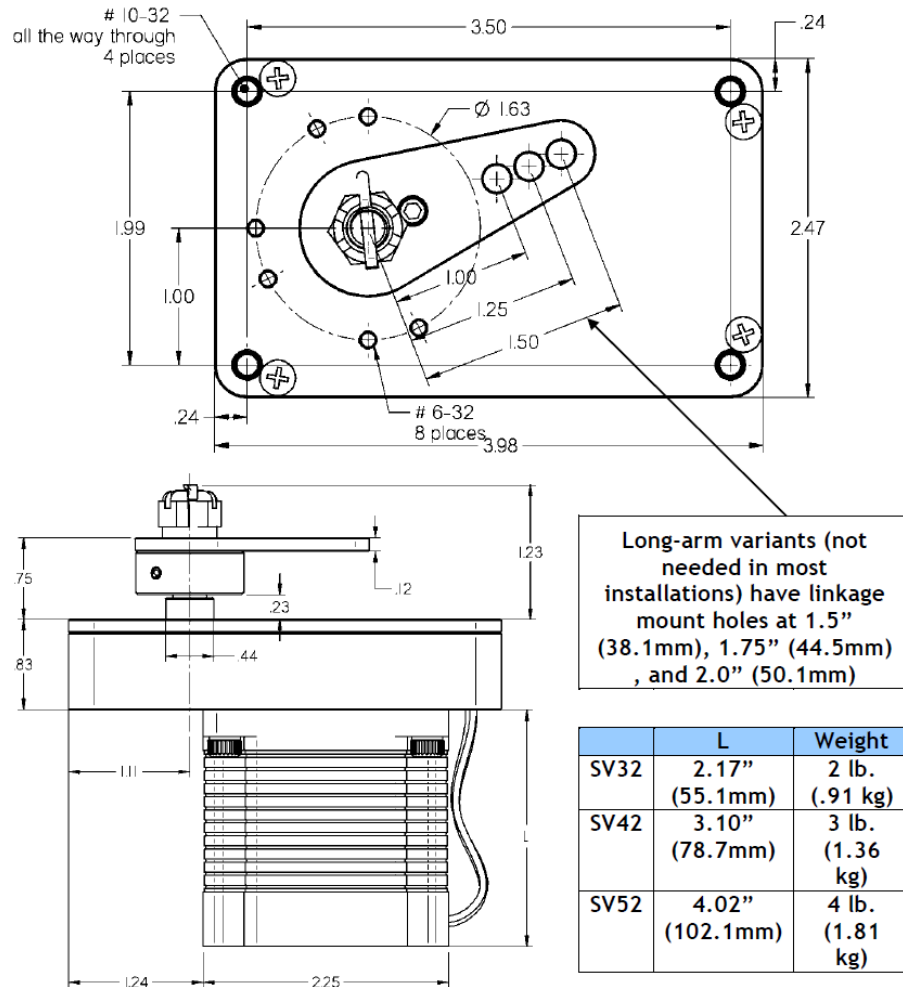
Once a suitable mounting point for each servo has been determined, the next step is to fabricate a mount for the servo to attach to the aircraft. Generally this will be a bracket made of sheet metal or corner stock. Dynon recommends using 6061 T6 aluminum with a minimum thickness of 0.050" for the best balance of strength to weight. When fabricating a mounting bracket, refer to the servo dimensions below. Be sure to leave ample room for the arm and attached linkage to move through a complete range of motion without interference.



In normal operation, autopilot servos can reach temperatures that can be very uncomfortable to, and perhaps cause burns to unprotected skin. Thus, servos should be mounted in an area, or in such a manner to prevent accidental skin contact. If mounting the servo in an exposed area *is* necessary, a shroud should be installed (that doesn't restrict ventilation) that protects against accidental skin contact with the servos.

Push-Pull Servo Dimensions

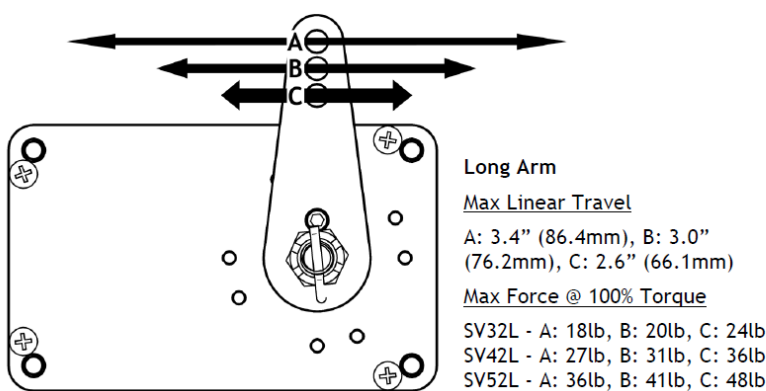
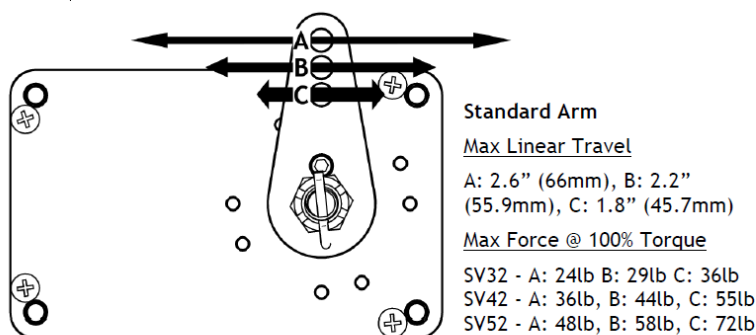
Use the following dimensions (in inches) for reference when planning and implementing your installation.



Linkage Mount Position Force and Travel

The two diagrams below illustrate the maximum travel and force available at each linkage mounting point. As can be seen, the closer you mount the linkage to the shaft, the more force the servo can deliver. However, this also means the travel of the arm is shorter.

Again, ensure that the servo arm is nowhere near going over-center throughout the entire range of the



control system.

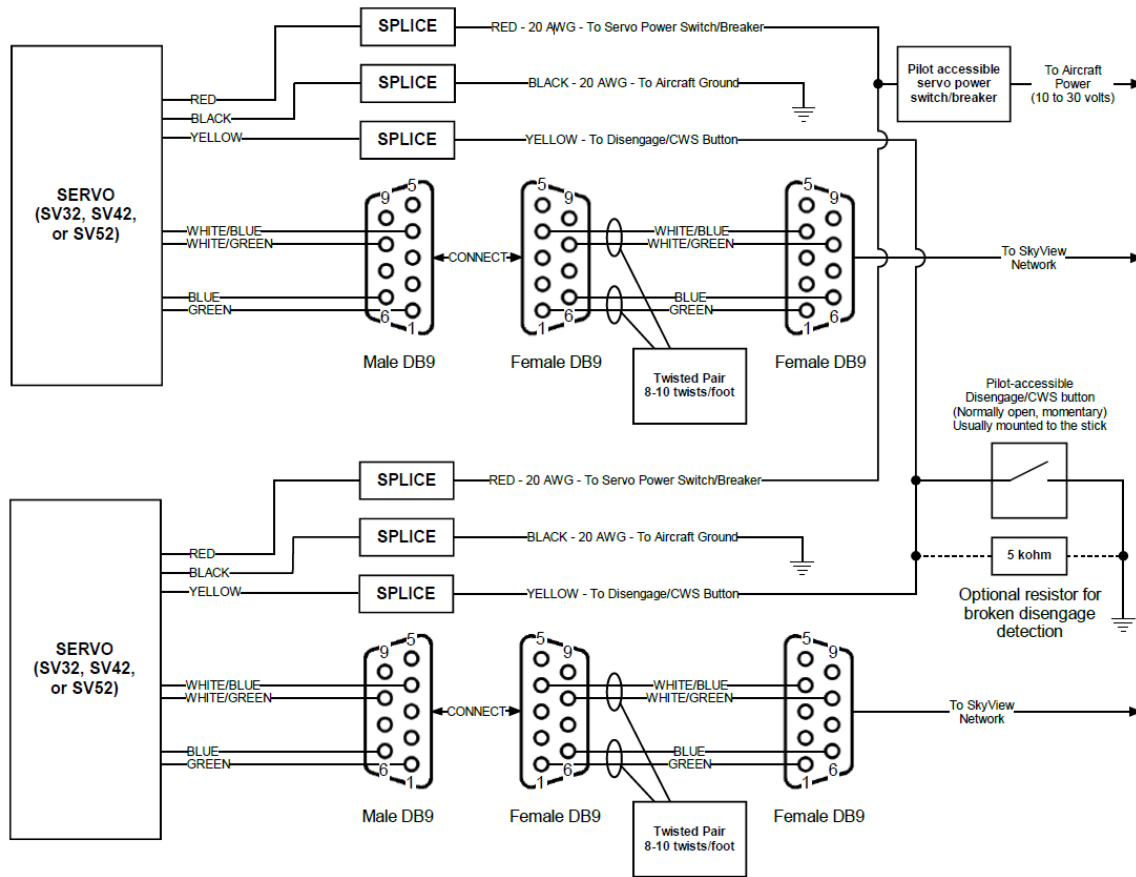
The maximum linear travel specifications called out above denote the distance traveled by the location on the arm such that it is 60° from center at maximum distance in either direction (e.g., the A hole on the standard servo arm can linearly travel 1.3" (33mm) from center in either direction).

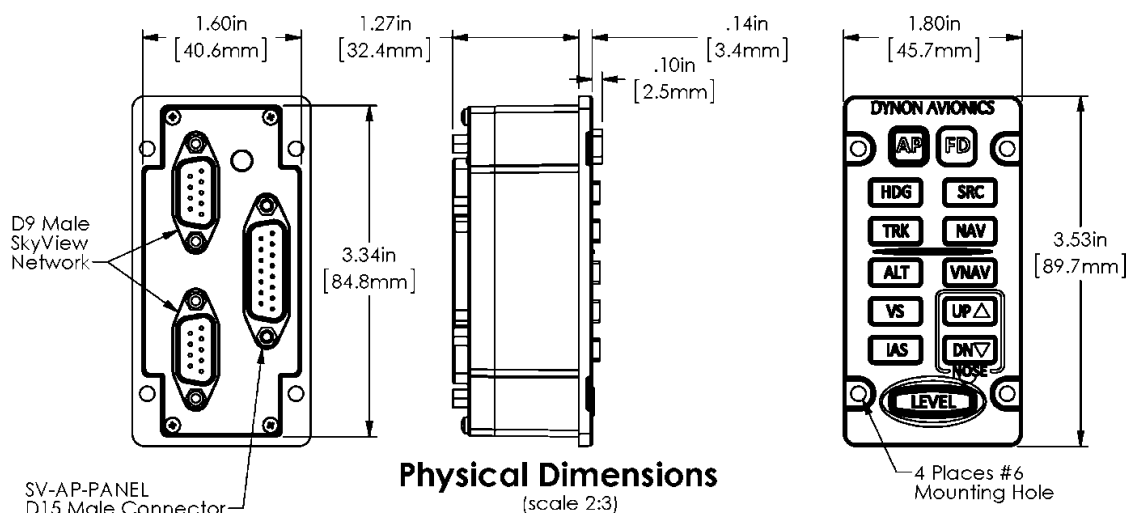
During installation, the linkage hardware must be connected to the servo arm such that the servo can actuate the connected control surface while approaching, but not exceeding the called out maximum linear travel specification. If too much slippage occurs during servo flight testing, it may be necessary to use a stronger servo.



Each Dynon Avionics servo includes a precision-machined brass shear screw that pins the servo arm to the servo arm attachment, providing an ultimate manual override. Servo shear screws will break at the application of 100 inch-pounds of torque, at which point the servo arm will travel freely. *If the brass shear screw is broken during autopilot installation or usage, do not replace it with a standard screw— contact Dynon Technical Support (contact information at the beginning of this manual) for a replacement shear screw. Instruction for replacing the shear screw can be found at <http://docs.dynonavionics.com>.*

Autopilot System Electrical Installation





Electrical Installation

SV Network The SV-AP-PANEL has two SV Network connections (D-9 connectors). Both connectors are electrically identical and are internally connected. Thus, the SV-AP-PANEL can be installed in the SV Network as a “pass-through” device, or “daisy chained” from one SV Network device, through the SV-AP-PANEL, to the next SV Network device. The SV-NET-1.5CC is an 18-inch SV Network cable that is ideal for such situations. The SV-AP-PANEL receives power (for operation of the buttons) from SV Network. Dimming of the SV-AP-PANEL is controlled by the AF-5000 display(s).

Trim Motor Control In addition to the AP mode buttons, the SV-AP-PANEL includes an adjustable, speed-sensitive trim controller, eliminating the need for relay packs or a separate trim controller. The integrated trim controller is wired to a D15 connector that can be connected to Aircraft power (12V only), pushbuttons (typically, on the stick), and power to and control of up to two trim motors - such as those made by Ray Allen. A set of pushbuttons can optionally be installed for the copilot. The pilot’s pushbuttons take priority over the copilot’s pushbuttons. Pushbuttons used for Trim Motor Control must be Push Button Normally Open (PBNO) – a momentary switch with a contact that is closed only when the button is pushed. One terminal of the pushbutton is connected to the selected pin, the other terminal of the pushbutton is connected to avionics ground (can be common with Pin 2).

Note that the SV-AP-PANEL’s trim controller only connects to the trim *motors*. The SV-AP-PANEL does not connect to or monitor trim *position*. Monitoring trim position is done by connecting the trim motor’s potentiometer (position sensor) that is mechanically ganged to the trim motor to a Trim Input pin on the AF-5000 EMS connector.

Trim Motor Control Safety Features

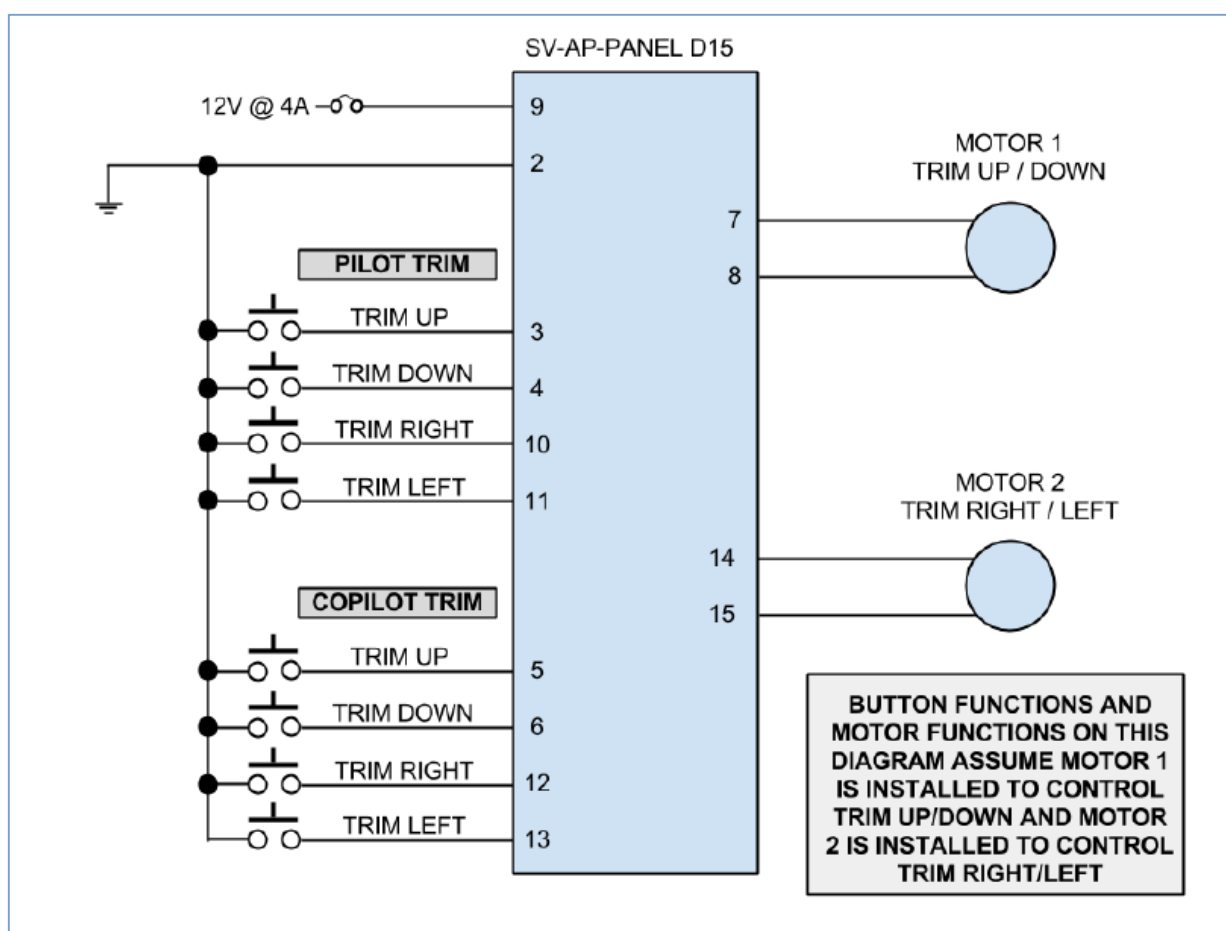
- Pilot trim controls override Copilot trim controls.
- If SV Network connection or AF-5000 power is lost, the trim motor functions will continue to function as long as avionics power is available at Pin 9. When a AF-5000 is not powered on (not communicating with the SV-AP-PANEL) the speed scheduling features (QUICKEST TRIM SPEED / SLOWEST TRIM SPEED) are not available. In this failsafe mode, the trim motors will run at their full speed when trim buttons are pushed.
- If a trim control button is detected as pushed when power is first applied to Pin 9, trim control will not activate until the button is first released.
- If a trim control button is pushed for more than five seconds (or longer, such as a stuck button), trim control on that axis will be temporarily inactivated until the button is first released.
- Motor outputs are protected against short circuits.

If two SV-AP-PANELs are installed, connect only one SV-AP-PANEL to control trim motors. Do *not* connect the second SV-AP-PANEL's D15 connector in parallel with the first SV-AP-PANEL's D15 connector – doing so could cause unexpected behavior and/or damage to the units and the trim motors.

On the D15 connector, Power (Pin 9) and Ground (Pin 2) connections are only required to control a Pitch trim motor and/or a Roll trim motor. If the trim motor outputs are not used, Power (Pin 9) and Ground (Pin 2) should *not* be connected.

Ray Allen trim motors are known to work - connect the white wires to Pins 7 and 8 (MOTOR 1) and/or Pins 14 and 15 (MOTOR 2). If using other trim motors, ensure that the trim motor's maximum current does not exceed 2A.

The functions assigned to each pin in Table 69 below reflect Motor 1 being used for TRIM UP/DOWN and Motor 2 being used for TRIM RIGHT/LEFT.



D15 Pin	Pin Function	Notes
1	This pin is not used, do not connect.	This pin is not used, do not connect.
2	Aircraft Electrical Ground	If trim motor(s) control is <i>not</i> used, do <i>not</i> connect. Power and ground for the SV-AP-PANEL front panel buttons is provided by SkyView Network.
3	PILOT TRIM UP	Motor 1: Pin 7 polarity is +, Pin 8 polarity is -
4	PILOT TRIM DOWN	Motor 1: Pin 7 polarity is -, Pin 8 polarity is +
5	COPILOT TRIM UP	Motor 1: Pin 7 polarity is +, Pin 8 polarity is -
6	COPILOT TRIM DOWN	Motor 1: Pin 7 polarity is -, Pin 8 polarity is +
7	MOTOR 1 WIRE #1	Pin 3 or Pin 5 grounded: Pin 7 polarity is +, Pin 8 polarity is - (Motor rotates in one direction) Pin 4 or Pin 6 grounded: Pin 7 polarity is -, Pin 8 polarity is + (Motor rotates in the other direction)
8	MOTOR 1 WIRE #2	
9	12 Volts @ 4A	If trim motor(s) control is <i>not</i> used, do <i>not</i> connect. Power and ground for SV-AP-PANEL front panel buttons is provided by SkyView Network.
10	PILOT TRIM RIGHT	Motor 2: Pin 14 polarity is +, Pin 15 polarity is -
11	PILOT TRIM LEFT	Motor 2: Pin 14 polarity is -, Pin 15 polarity is +
12	COPILOT TRIM RIGHT	Motor 2: Pin 14 polarity is +, Pin 15 polarity is -
13	COPILOT TRIM LEFT	Motor 2: Pin 14 polarity is -, Pin 15 polarity is +
14	MOTOR 2 WIRE #1	Pin 10 or Pin 12 grounded Pin 14 polarity is +, Pin 15 polarity is - (Motor rotates in one direction) Pin 11 or Pin 13 grounded Pin 14 polarity is -, Pin 15 polarity is + (Motor rotates in the other direction)
15	MOTOR 2 WIRE #2	

Post Installation Checks

- Verify buttons operate all AP modes.
- Verify dim commands from EFIS display dim the backlighting of the SV-AP-PANEL.
- Verify that trim controls operate as commanded from Pilot and (optional) Copilot controls.
- During a test flight, use the PITCH trim pushbuttons to bring the plane slightly out of PITCH trim. Verify that PITCH auto-trim automatically trims the PITCH as needed. (Assumes that PITCH auto-trim is enabled.)
- During a test flight, use the ROLL trim pushbuttons to bring the plane slightly out of ROLL trim. Verify that ROLL auto-trim automatically trims the ROLL as needed. (Assumes that ROLL auto-trim is enabled.)

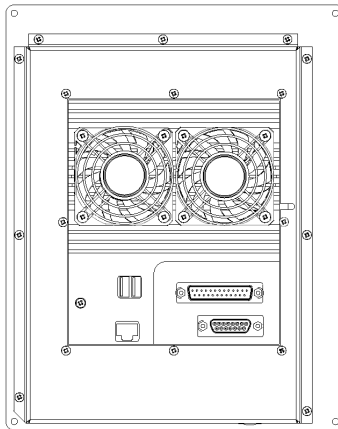
CO Guardian Display

The AF-5000 will display data from any of the CO Guardian units that support RS-232 MFD output. The current cabin CO level is displayed on any of the Check List pages. If the CO Guardian device generates a warning, the current CO level will be displayed as a pop up message on the EFIS screen. If you have the new Aero-455 (CO, heart rate, O2 level) monitor, the data will be displayed as a pop up message after about 20 seconds of monitoring your finger. The CO Guardian should be wired to any open serial port and then the serial port Admin setting set to CO Guardian.



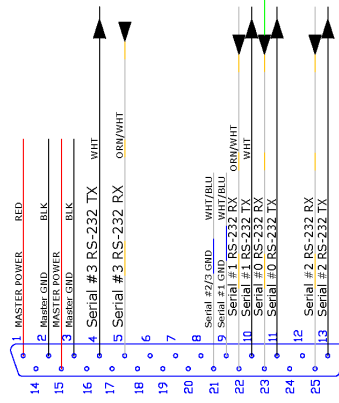
74263 Aithre 3.0-S Remote Serial CO Detector

AF-5000 / AF-6600 EFIS



EFIS RS-232 Setting > AITHRE INTEGRATOR

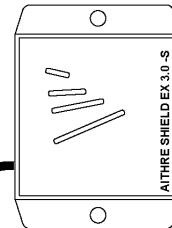
EFIS Main Cable



EFIS Expansion Cable



RED Power +12V
GREEN RS-232 TXD
BLACK Ground



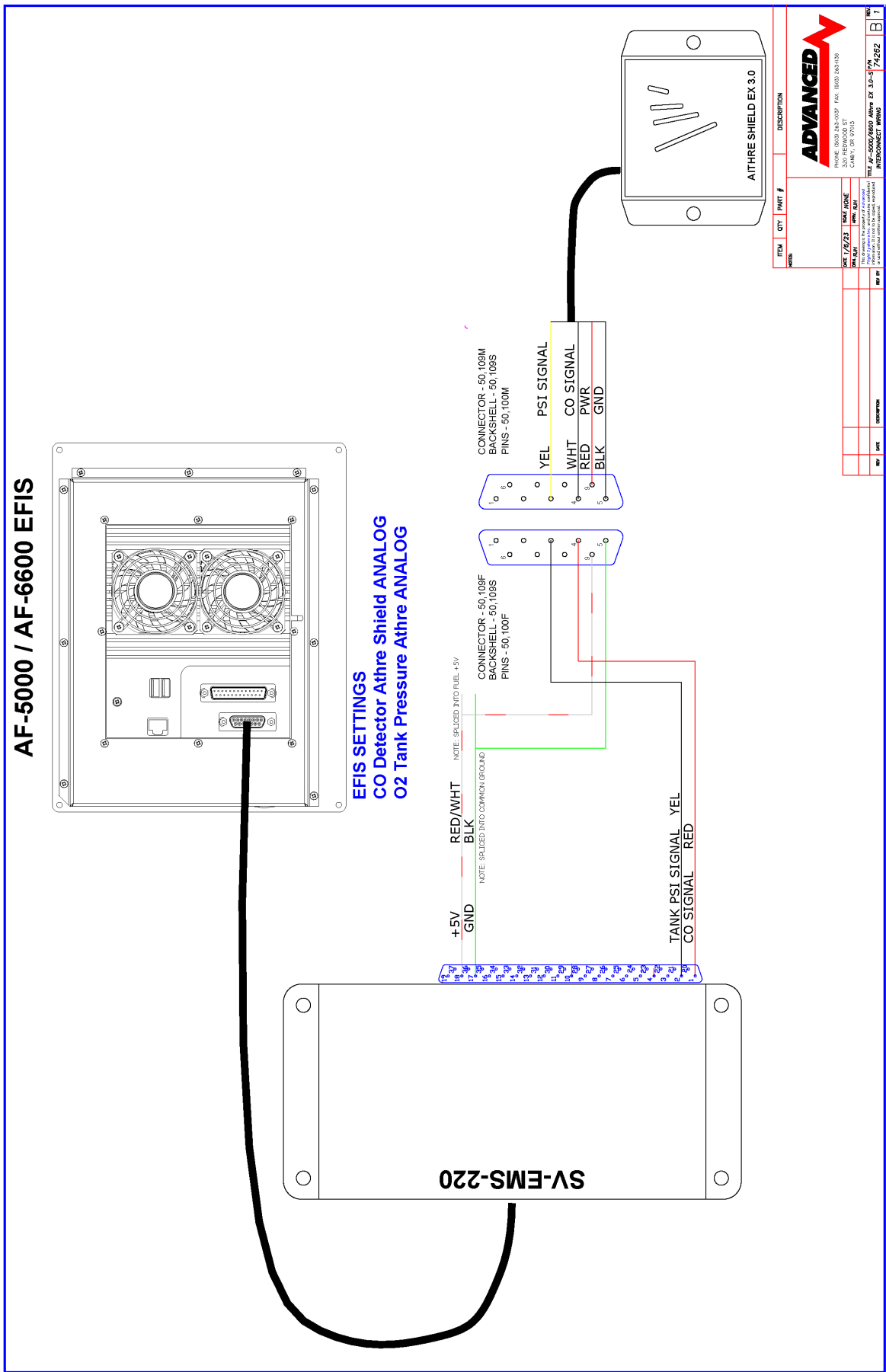
Aithre EX 3.0-S Can
wire to any open EFIS
RS-232 Serial Port

ITEM	QTY	PART #	DESCRIPTION
1	1	74263	AITHRE EX 3.0-S Remote Serial CO Detector
2	1	74263	AITHRE EX 3.0-S Remote Serial CO Detector
3	1	74263	AITHRE EX 3.0-S Remote Serial CO Detector
4	1	74263	AITHRE EX 3.0-S Remote Serial CO Detector
5	1	74263	AITHRE EX 3.0-S Remote Serial CO Detector
6	1	74263	AITHRE EX 3.0-S Remote Serial CO Detector
7	1	74263	AITHRE EX 3.0-S Remote Serial CO Detector

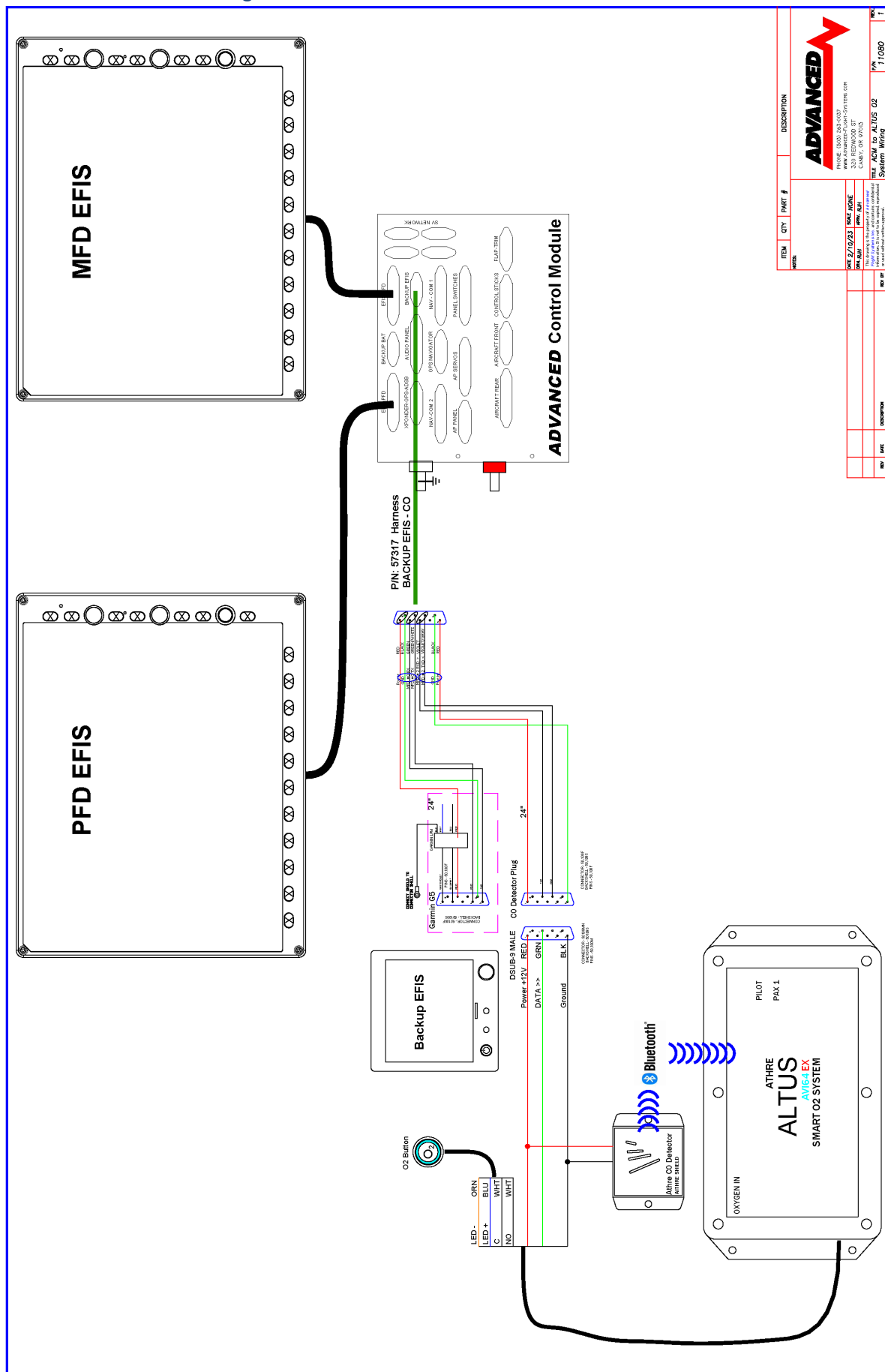
REV	DATE	DESCRIPTION
1		
2		
3		
4		
5		
6		
7		

REV	DATE	DESCRIPTION
1		
2		
3		
4		
5		
6		
7		

74262 Aithre 3.0 Remote Analog CO Detector



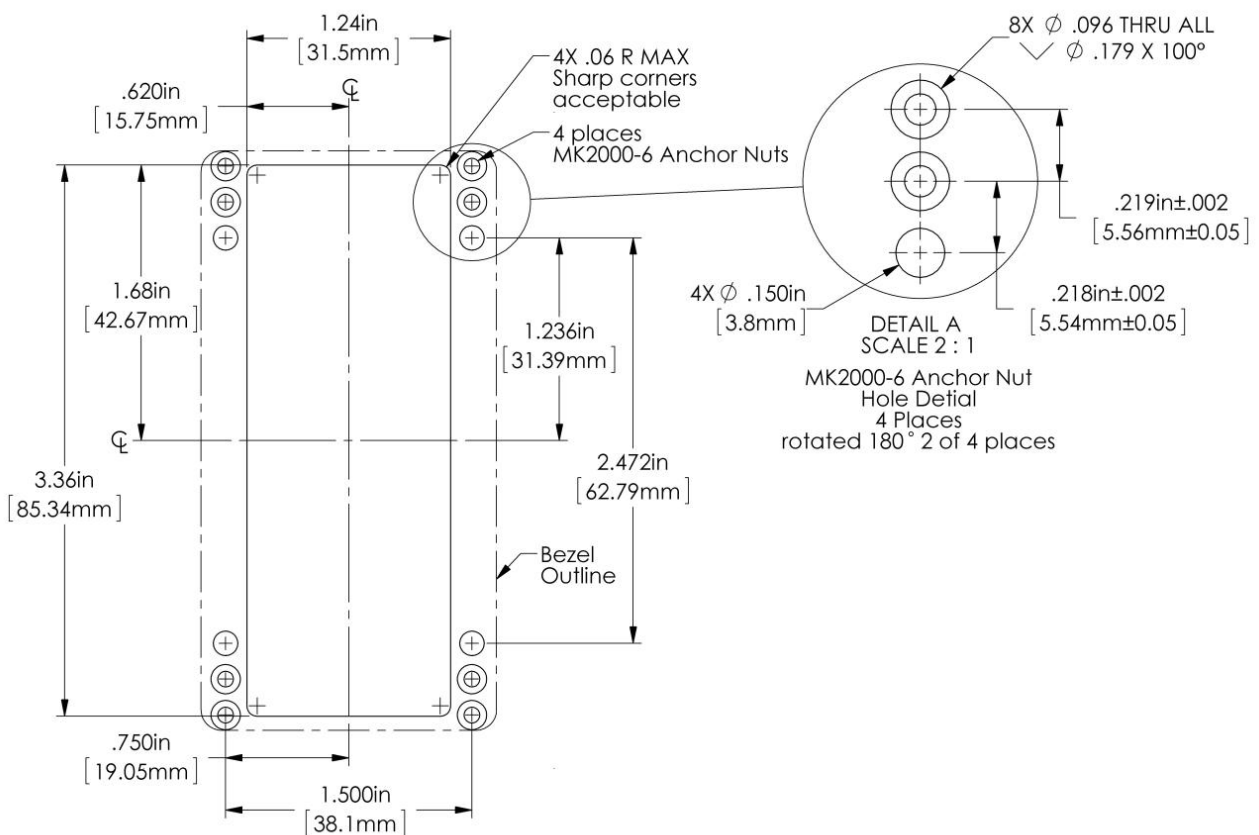
11080 Aithre Altus O2 Wiring

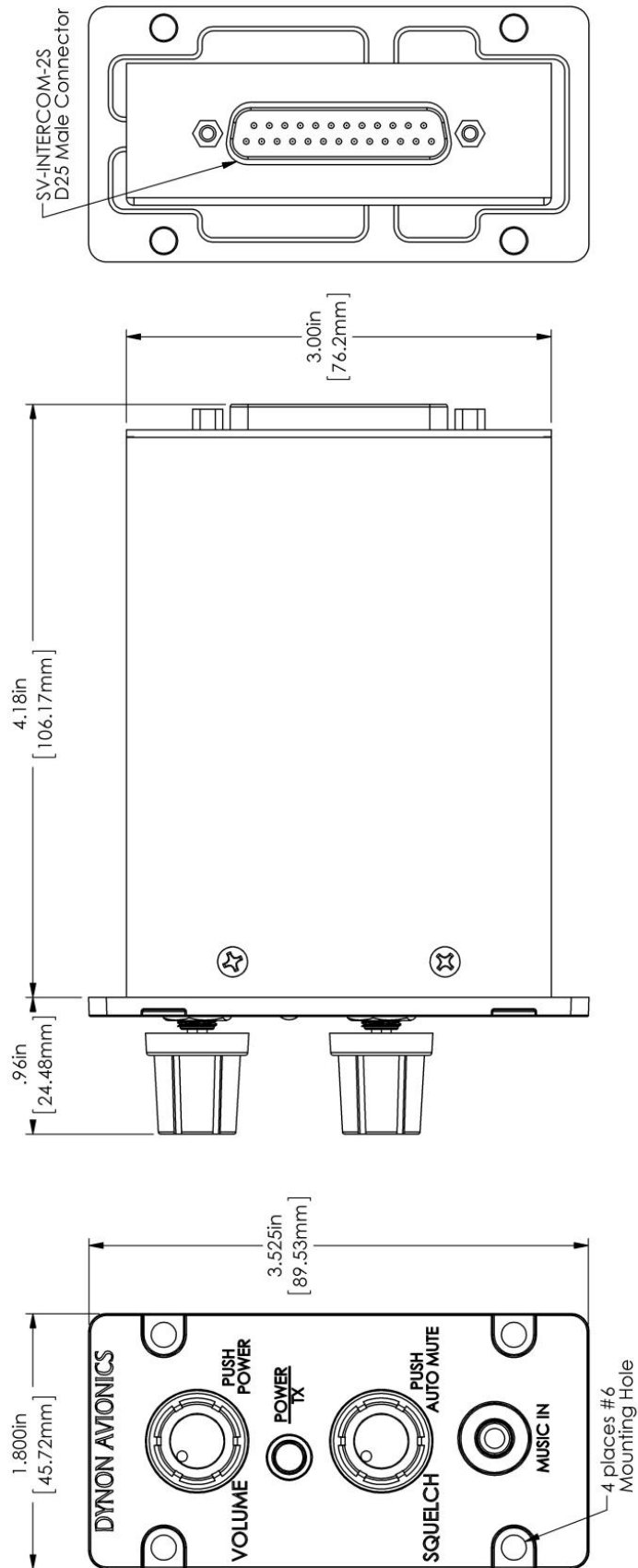


74125 SV-Intercom-2S

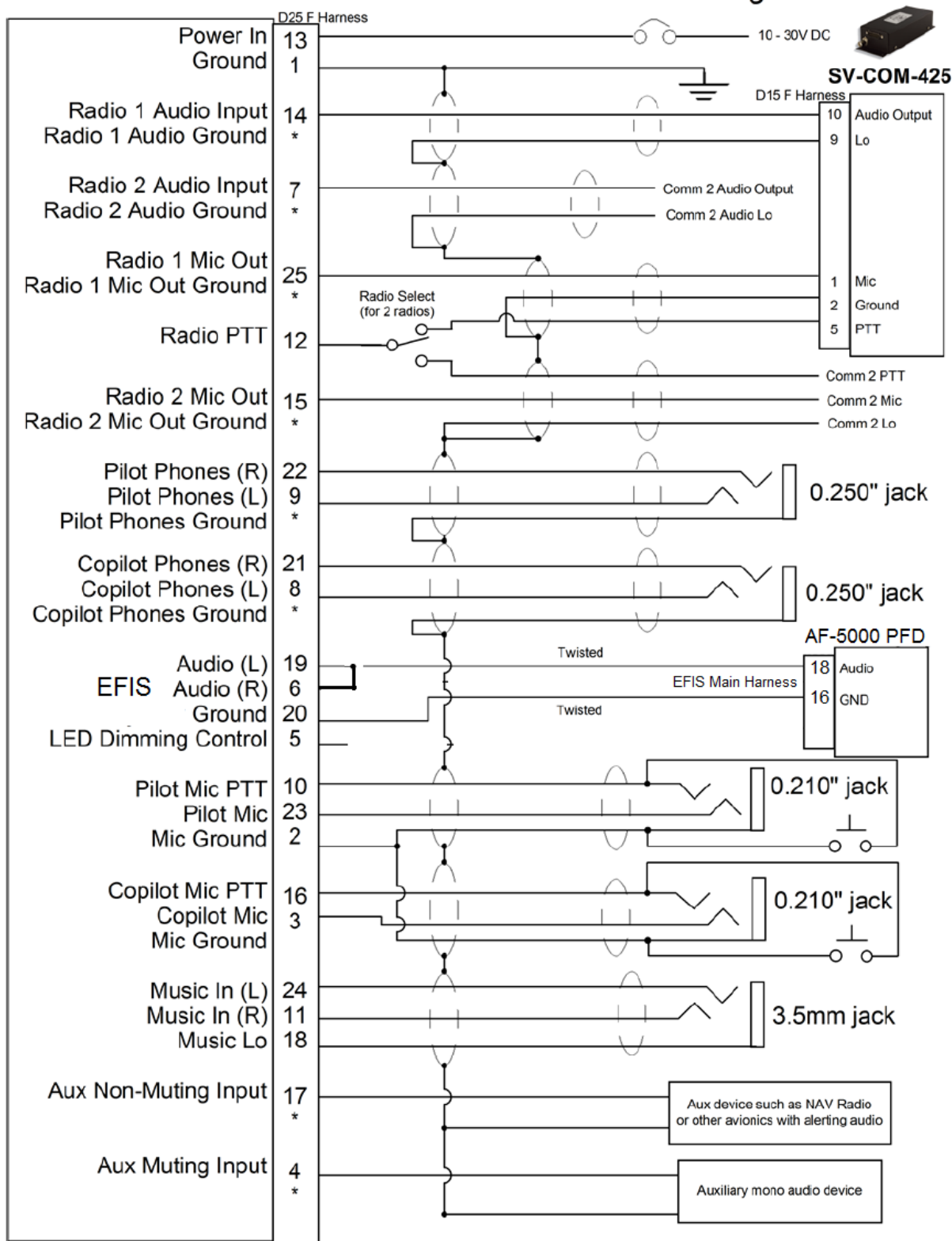
While the SV-INTERCOM-2S is designed to seamlessly complement a AF-5000 System, its design is flexible enough to be used in any experimental or light sport aircraft panel that does not required a TSO'd intercom.

Physical Installation The AF-INTERCOM-2S package includes #6-32 hex-drive round head fasteners (to match those furnished with AF-5000 displays). Fasteners are 5/8" in length and require a 5/64" hex drive tool. AFS recommends fastening the included mounting screws to nut plates installed behind the panel. If access behind the panel allows, standard #632 lock nuts or nuts with lock washers can be used. Do not rivet the AF-INTERCOM-2S to the aircraft as this will hinder future removal if necessary.



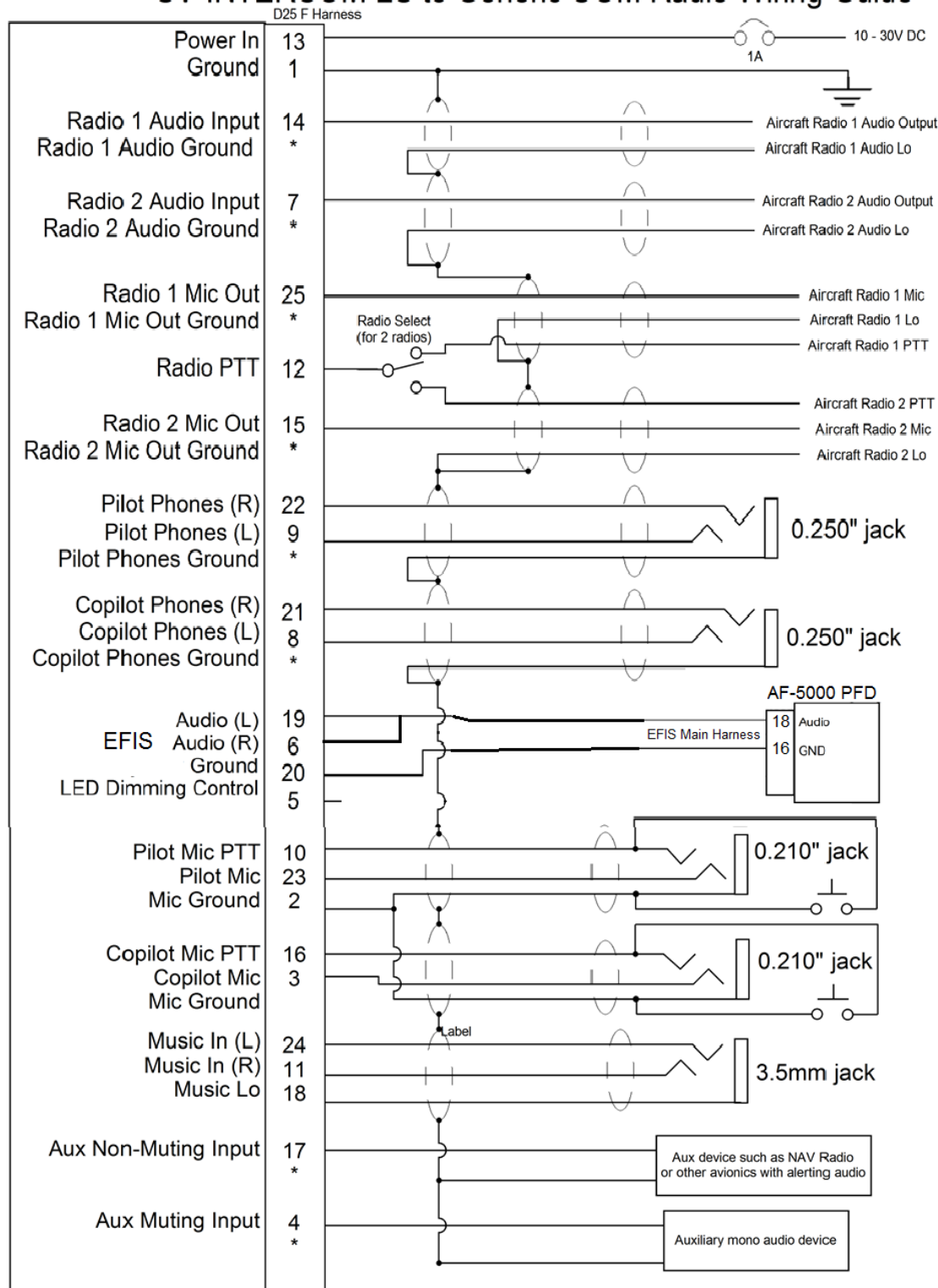


SV-INTERCOM-2S to SV-COM-425 Wiring Guide



* == While the audio grounds labeled with a * ultimately come back to the main ground on pin 1, they should NOT be wired directly from the source audio device to any ground (pin 1 or otherwise) directly. Instead, to minimize noise and interference, their ground lines should be routed with their audio signal inside the required shielded cable as far as possible and connected to ground as close to the intercom as possible. Connecting these grounds to the shield (which is also grounded at pin 1) at the intercom end of the harness is a suitable way to accomplish this goal.

SV-INTERCOM-2S to Generic COM Radio Wiring Guide



* == While the audio grounds labeled with a * ultimately come back to the main ground on pin 1, they should NOT be wired directly from the source audio device to any ground (pin 1 or otherwise) directly. Instead, to minimize noise and interference, their ground lines should be routed with their audio signal inside the required shielded cable as far as possible and connected to ground as close to the intercom as possible. Connecting these grounds to the shield (which is also grounded at pin 1) at the intercom end of the harness is a suitable way to accomplish this goal.

AF-INTERCOM -2S Pin	AF-5000	AF-INTERCOM-2S Function	Notes
1	N/A	Master Ground In / Master Shield Ground.	The shields of all shielded audio cables should be connected to this pin.
2	N/A	Microphone / PTT Ground	Pilot and Copilot
3	N/A	Copilot Microphone	
4	N/A	Auxiliary Mono Muting Input	This audio signal mutes when audio signals are received on other non-muting inputs and radio inputs. Use this input for NON critical audio signals.
5	N/A	LED Dimmer Input	
6	AF-5000 D25 Pin 18	Stereo Non-Muting (EFIS) Audio Input	This audio signal does not mute, and is typically used to receive audio from AF- 5000 or other EFIS system with stereo output.
7	AF-COM 425 #2 Pin 10	Radio 2 or Other Aux Non-Muting Audio Input	This audio signal does not mute. Typically used for a second COM, a NAV radio, or other mono avionics alerts.
8	N/A	Copilot Headphones Left	
9	N/A	Pilot Headphones Left	
10	N/A	Pilot Push-To-Talk Switch Input	
11	N/A	Stereo Music In Right	This input is over- ridden by the Music In jack on the AF- INTERCOM-2S
12	AF-COM-425 #1 Pin 5 AF- COM-425#2 Pin 5	Push-To-Talk Output	If two radios are used, this signal must be switched between the two radios so that only ONE radio transmits at a time.
13	N/A	Power In	

AF-INTERCOM-2S Pin	AF-500 Unit Pin	AF-INTERCOM-2S Function	Notes
14	AF-COM-425 #1 Pin 10	Radio 1 Headphones Input	Connects to AF-COM-425 #1 / Radio #1 Headphones Output
15	AF-COM-425 #2 Pin 1	Radio 2 Microphone Output	
16	N/A	Copilot Push-To-Talk Switch	
17	N/A	Non-Muting Mono Aux Input	This audio signal does not mute when audio signals are received on other inputs. Use this input for critical audio signals such as a NAV radio or avionics alerts.
18	N/A	Music In Ground	Used exclusively for stereo audio ground. Should not be used for other ground connections.
19	AF-5000 D25 Pin 18	Stereo Non-Muting () Audio Input Left	This audio signal does not mute, and is typically used to receive audio from EFIS system with stereo output.
20	AF-5000 DB-25 Pin 16	Stereo Non-muting (EFIS) Audio Ground	Used exclusively for stereo EFIS audio ground. Should not be used for other ground connections.
21	N/A	Copilot Headphones Right	
22	N/A	Pilot Headphones Right	
23	N/A	Pilot Microphone	
24	N/A	Stereo Music In Left	This input is overridden by the Music In jack on the AF-INTERCOM-2S
25	AF-COM-425 #1 Pin 1	Radio 1 Microphone	

Using Dim Input (Pin 5) Using Dim Input (Pin 5) you must dim this using a PWM dimmer that switches the ground side of the lighting circuit. A varying voltage or resistance will not work.

Hook pin 5 to the negative terminal of your dimmer and the transmit/power LED will dim with your dim control. This input may be connected in parallel with other loads that are dimmed by the dimmer

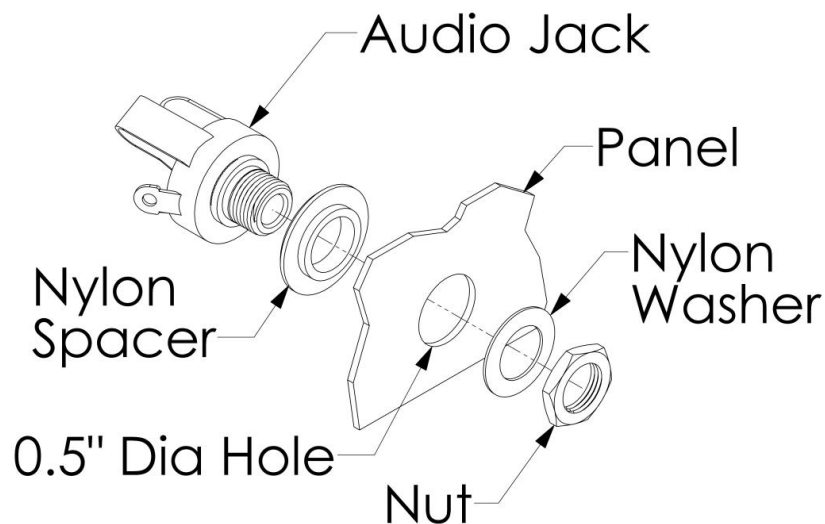
Shielded audio cable is required In an audio system such as the AF-INTERCOM-2S, it is required to use *separate* shielded cables for microphone and other input signals, and headphone and other output signals. If separate shielded cables are not used, squealing, hum, and other undesirable audio will likely be heard. To reduce electrical noise from being induced into audio circuits, separate the audio wiring as much as possible from other electrical wiring.

Audio cable shields must terminate at a common point A ground loop is more than one electrical path to ground. Ground loops are a common source of noise with audio systems. Because other electrical loads can cause large current flows in a ground path, audio system grounds should be isolated as much as possible from electrical ground. Except where specifically directed in the diagrams above, the shields for all audio cables should terminate at a single point, with that point connected directly to Pin 1 (Master Ground) of the AF-INTERCOM-2S. Additionally, the point should be as close to the AF-INTERCOM-2S side of your harness as possible.

Dual Radio PTT Installation

The AF-INTERCOM-2S has two separate radio outputs that can each be connected to an individual COM radio. The PTT output, therefore, needs to be externally switched so that you can control which radio receives the PTT signal (and therefore transmits). An external single pole, double throw (SPDT) switch (not provide) should be installed to select which radio the PTT is connected to. See the wiring schematics above (AF-INTERCOM-2S pin 12) for a depiction of this connection.

Headset jacks must be electrically isolated from the panel If your panel is electrically conductive (such as aluminum), the headset jacks must be electrically isolated from the panel. Insulating washers are included with the headset jacks. Another method is to mount the jacks on a small plastic plate instead of mounting the jacks directly to the panel.



Power

To power the AF-INTERCOM-2S on and off manually, press the volume knob.

The power switch remembers its on/off state: Once the AF-INTERCOM-2S is powered on, aircraft power can be used to turn the Intercom on and off in normal use. Therefore, the power switch need not be used in routine operation.

LED Power/Transmit Indicator

The LED indicator light in the center of the Intercom is green when the Intercom is powered on. When either the pilot or co-pilot PTT switch is depressed, the LED becomes orange to indicate radio transmission.

Volume

The volume knob adjusts the audio levels of the stereo music input and pilot-to-copilot intercom communication only. It does not adjust the volume level of aircraft radios or other devices that are connected. Adjust the volume levels on your radios and other audio devices to achieve the desired volume balance between all audio devices in the aircraft.

Squelch Adjustment

The AF-INTERCOM-2S has voice-activated (VOX) microphone channels to reduce background noise from the aircraft when no one is speaking. When either the pilot or co-pilot speaks into their headset, their microphone channel is activated, allowing them to be heard by the other person. The microphone audio level that is required to activate a microphone channel is adjusted with the squelch knob.

Adjust squelch with the engine running:

First, while no one is talking, turn the squelch knob until you hear background noise in your headset.

Next, adjust the squelch until you no longer hear background noise.

Finally, with the microphone very near your lips, talk to confirm that normal speech levels activate the microphone. The VOX feature will automatically close the microphone after you finish speaking.

To reduce background noise, the pilot and co-pilot microphones are activated individually.

Front Music In Jack

The AF-INTERCOM-2S has wiring provisions for a permanent stereo music source via its rear-mounted wiring connector.

A music device can also be plugged in to the standard 3.5mm Music In jack on the front of the intercom. When a device is plugged in to the Music In jack, it over-rides the permanent music input.

Muting Inputs

Whenever a radio or other non-muting input has audio activity, music and muting input volume is immediately decreased to near fully-muted so that you may hear important radio transmissions or audio alerts. When audio from radios/non-muting inputs ceases for a moment (.5 second), volume levels are automatically restored gradually over the next second.

Selectable Auto Mute (music only)

Press the squelch knob to toggle whether or not music is muted by intercom conversation as well as by non-muting input and radio activity. This allows you to set the music and aux muting input to not mute as you sing along or occasionally chat over the intercom:

- When Auto Mute is DISABLED: Only audio activity from radios and non-muting inputs will mute music.
- When Auto Mute is ENABLED: Audio from radios, non-muting inputs, AND intercom conversation will mute music.

Fail-safe Operation

When power is lost or the AF-INTERCOM-2S is powered off, the primary radio is connected directly to the pilot's headset. If the pilot headset is a stereo headset, you will only hear radio audio in one ear. Intercom conversation and audio from other radios and inputs (including music) will not be heard when in this unpowered fail-safe mode.

Radio Push-to-Talk (PTT) Behavior and Priority

When the pilot or co-pilot presses their PTT switch, only the person pressing their PTT is heard over the radio.

If the pilot and co-pilot PTT buttons are both depressed, the pilot PTT takes priority. Only the pilot's voice is transmitted over the radio. Additionally, the pilot PTT will take priority from the co-pilot even if the co-pilot PTT is already depressed.

Dual Radio Operation

If you have two COM radios, you will have installed an external switch that chooses which radio transmits when you press the PTT switch.

Use your radio volume control to control which radio(s) you wish to hear at any given moment.

AF-Intercom Specifications

Power Usage	0.1A at 14V
Input Voltage	10-30V DC
Weight	7.2 oz (204g)
Temperature	-40°C to +70°C
Dimensions	3.5" (89.71mm) x 1.80" (45.72mm) x 4.18" (106.17mm)
Radio Outputs	(2) COM radio outputs. External PTT selector required.
Headsets	(2) stereo headsets supported.
Non-muting Inputs	(1) stereo, differential, noise-rejecting EFIS input. (3) mono inputs for radios and other avionics. Primary radio fail-safe to pilot headset.
Muting Inputs	(1) stereo, differential, noise-rejecting music input, with panel-mounted music jack override. (1) mono input for additional muting source.

74120 Dynon SV-Com-Radio

The SV-COM-PANEL head is available in vertical and horizontal mounting. It is designed to control a remote Dynon/Trig Transceiver:

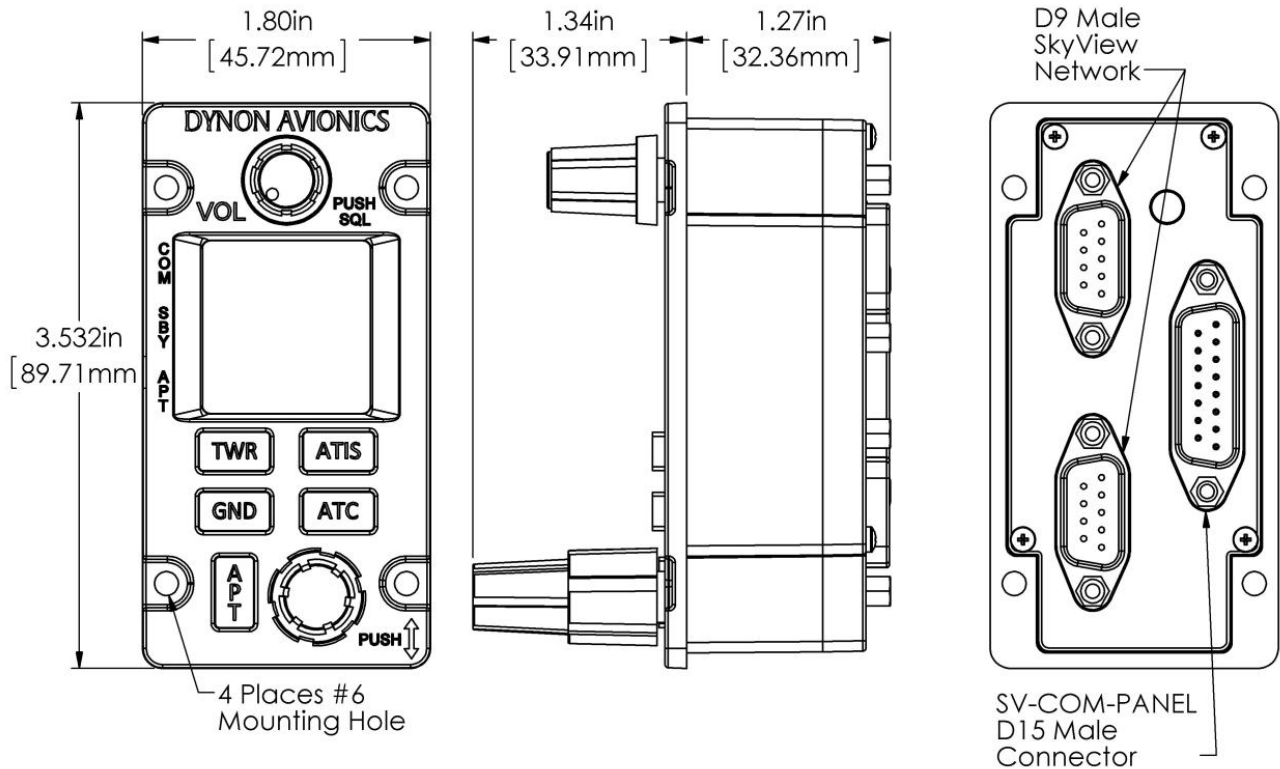
- SV-COM-T25 25 khz Transceiver
- SV-COM-X8 8.33 khz Transceiver
- SV-COM-760 25 khz Transceiver



The AF-6600 / AF-5000 EFIS can control the SV-COM-760, SV-COM-T25 or SV-COM-X8 without using the SV-COM-PANEL

Installation instructions for the AF-INTERCOM (referenced in these instructions) have their own separate manual available for download.

SV-COM-PANEL



The figures on the following pages show recommended panel cutouts, mounting hole patterns, and mechanical dimension for the SV-COM-PANEL/V (vertical) and SV-COM-PANEL/H (horizontal). Use these diagrams to plan for the space required by the display.

To mount a SV-COM-PANEL, cut the opening in your panel, drill out the mounting holes, install nutplates, and use the included mounting screws to fasten the display to the panel.

The SV-COM-PANEL is shipped with #6-32 hex-drive round head fasteners. Fasteners are 5/8" long and require a 5/64" hex drive tool. AFS recommends fastening the included mounting screws to nut plates installed behind the panel. If access behind the panel allows, standard #6-32 lock nuts or nuts with lock washers can be used. *Do not rivet the SV-COM-PANEL to the panel as this will hinder future removal if necessary.*

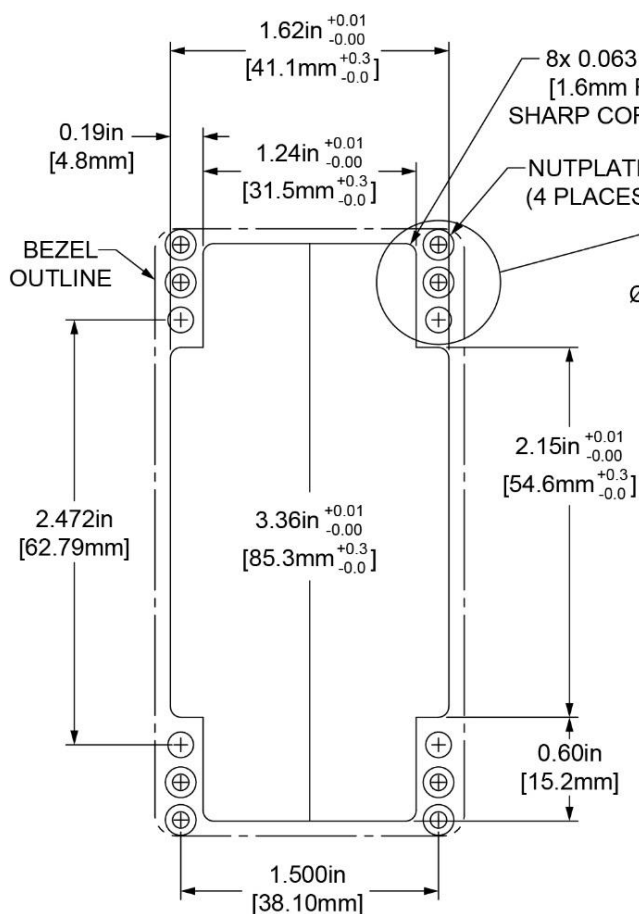
The following installation procedure should be followed to install the Dynon/Trig remote transceiver module, remembering to allow adequate space for installation of cables and connectors.

- If you are installing two COM radios, it is acceptable to co-locate the two transceiver modules.
- Select a position in the aircraft for the SV-COM-T25 or SV-COM-T8 Transceiver that is not too close to any high external heat source. (The Transceiver is not a significant heat source itself and does not need to be kept away from other devices for this reason).
- Avoid sharp bends and placing the cables too near to the aircraft control cables.
- Secure the SV-COM-T25 or SV-COM-T8 Transceiver to the aircraft via the three (3) mounting holes in the transceiver tray. The unit should be mounted to a flat surface.

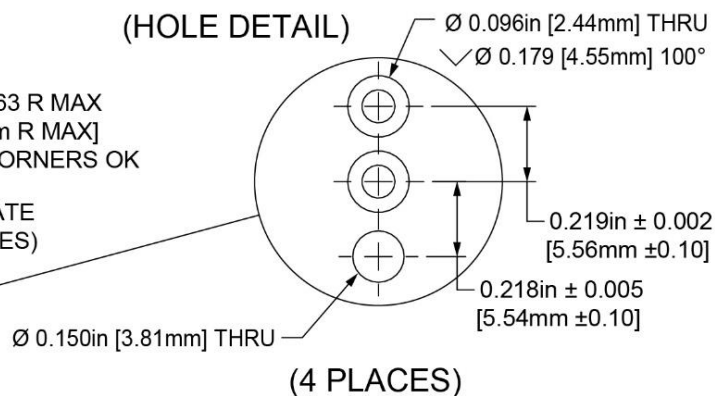
Additional items you will require for installation of SV-COM-RADIO, but which are not include:

- Nutplates for mounting AF-COM-PANEL to the panel
- Circuit breaker or fuse for power to SV-COM-T25 or SV-COM-T8 Transceiver
- Power wires to SV-COM-T25 or SV-COM-T8 Transceiver
- SV-COM-T25 or SV-COM-T8 Transceiver to AF-COM-PANEL wiring
- Advanced-SV Network cables to connect the AF-COM-PANEL to Advanced-SV Network
- COM Antenna, coaxial cable, terminated to Male TNC connector. The SV-COM-T25 or SV-COM-T8 Transceiver is compatible with aircraft COM antennas commonly available.

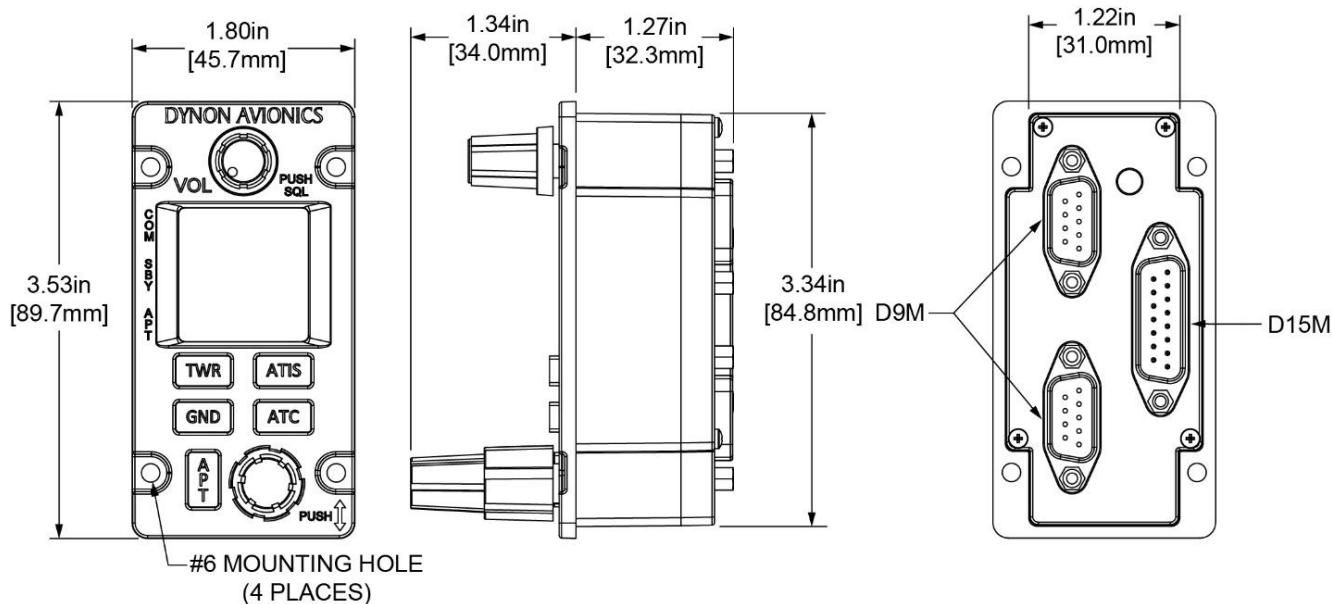
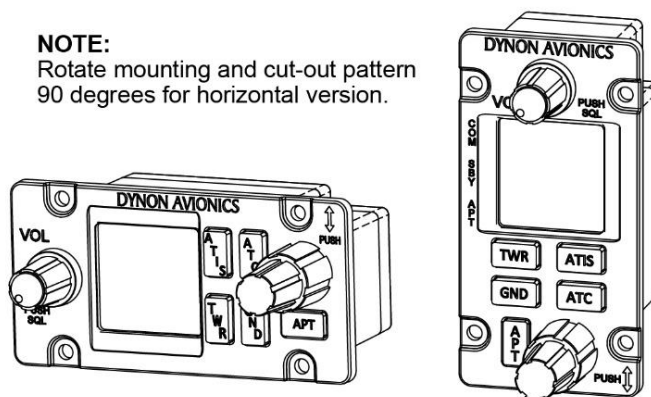
(MOUNTING & CUT-OUT DIMENSIONS)



(HOLE DETAIL)



NOTE:
Rotate mounting and cut-out pattern
90 degrees for horizontal version.



SV-COM-760 Transceiver

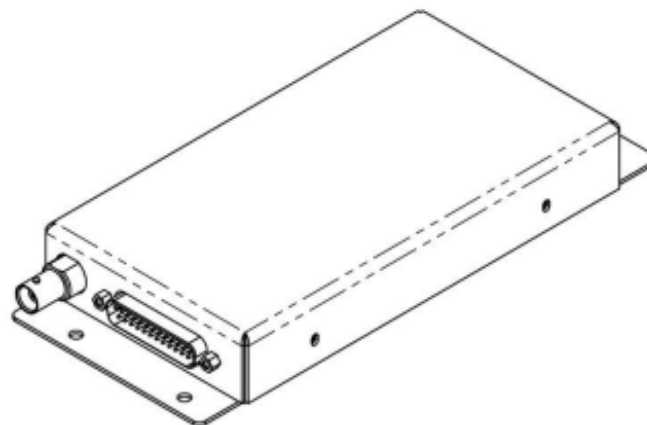
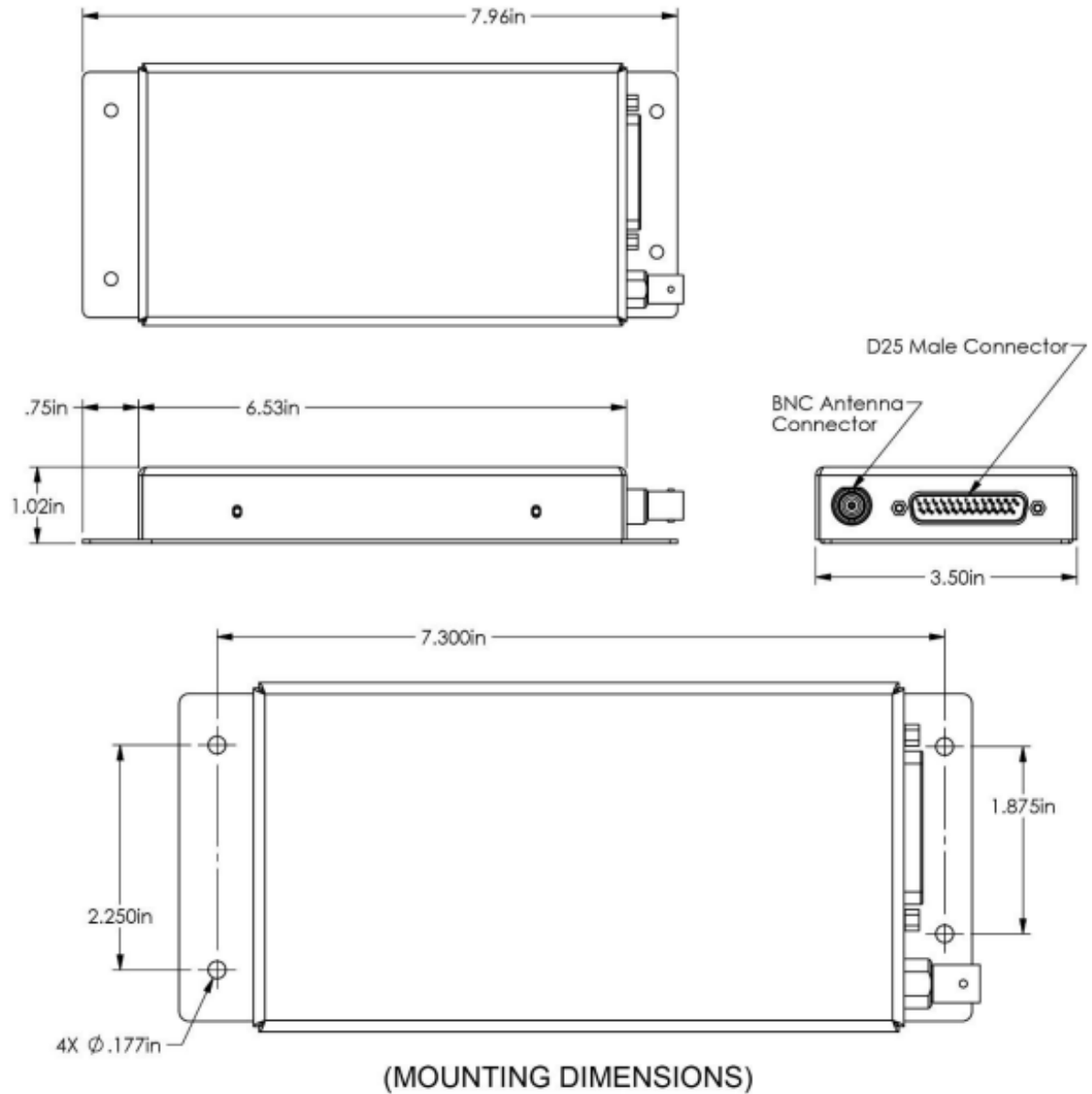
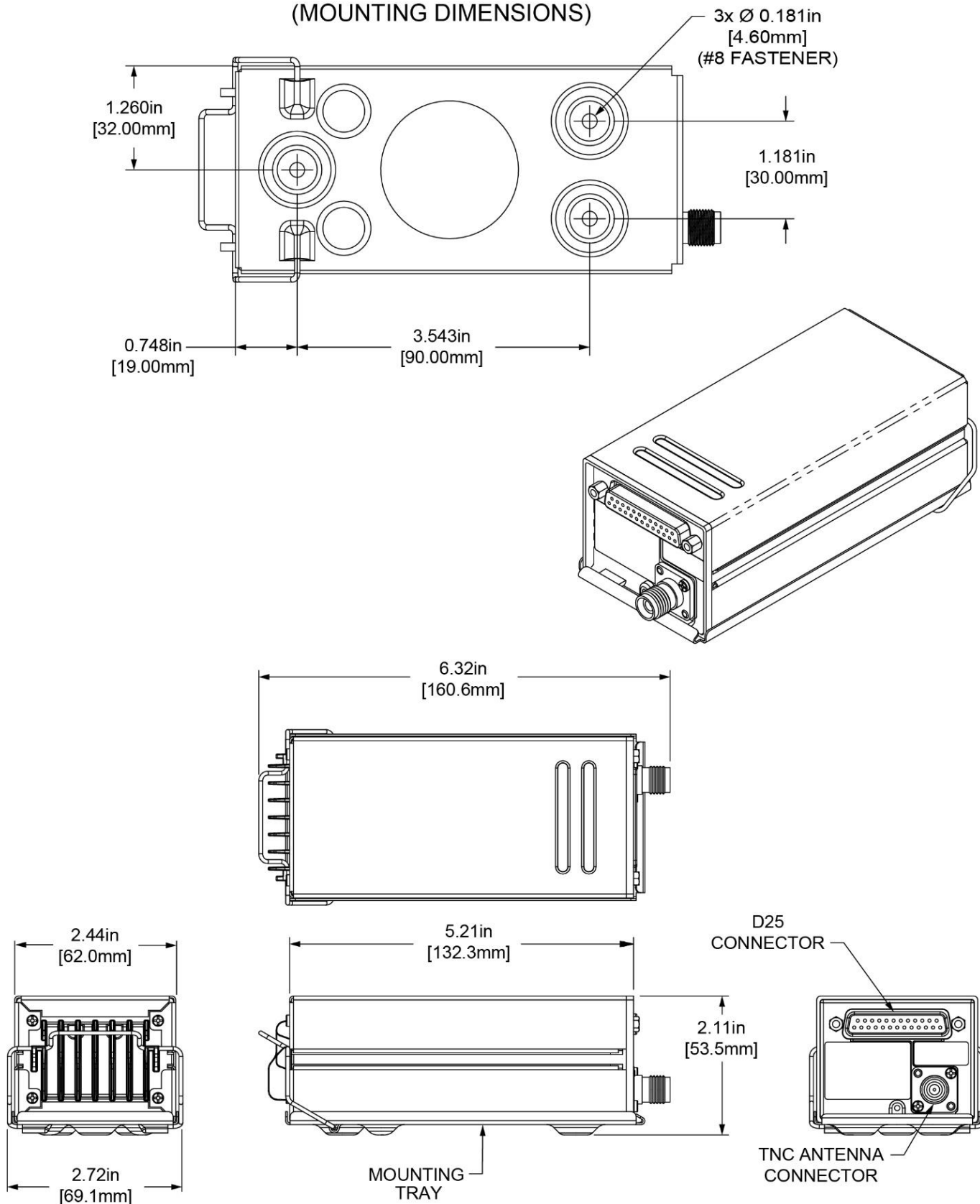


Figure 202 – SV-COM-760 Mounting Dimensions

SV-COM-T25 or SV-COM-T8 Transceiver

(MOUNTING DIMENSIONS)



Electrical Installation

Power Input

AF-COM-C25 is compatible with 12 volt and 24 volt systems (10 to 30 volts DC). Power input is connected to the AF-COM-425, which then supplies power to the AF-COM-PANEL via the 5-wire cable between the two units. See wiring diagrams and pinouts for details.

Audio Signal Grounding

Ensure that audio input and output grounds terminate at a single point - typically the intercom or audio panel. Do not connect an audio input or output ground to aircraft frame ground or a power or data ground. You should run dedicated wires from audio devices to the single point audio input and output ground.

Audio Shielding

Shielded cable must be used for all audio connections. The shield should be connected to ground only at the single point audio ground.

Advanced-SV Network Connectors

The two D9 connectors on the back of a SV-COM-PANEL display are Advanced-SV network connectors. They have identical pin-outs and are electrically connected inside the SV-COM-PANEL (i.e., they are completely interchangeable). Installers may use either connector or both connectors in AF-5000 installations. Using both of these connectors allows installers to “daisy-chain” another Advanced-SV Network module that may be co-located behind the panel.

Electrical Connections

Harness Construction

Because the SV-COM-PANEL connected to SV-COM-T25/T8 can be mounted in a variety of locations, the harness length requirements will vary from airplane to airplane. Therefore, AFS does not supply pre-manufactured harnesses. Instead, your SV-COM-T25/T8 includes connectors and pins to generate a wide variety of harness configurations. Refer to the sections below for detailed wiring information.

The AF-COM-PANEL has two (electrically identical) D9 male connectors for connection to Advanced-SV Network and one D15 male connector for connection with the SV-COM-T25/T8 and an optional Frequency Flip/Flop pushbutton input.

The SV-COM-T25/T8 Transceiver has one D25 male connector for connection to the AF-COM-PANEL, power, audio, and Push To Talk (PTT). A single TNC coaxial connector attaches to the antenna.

AF-COM-PANEL – Pinout (Male D15)

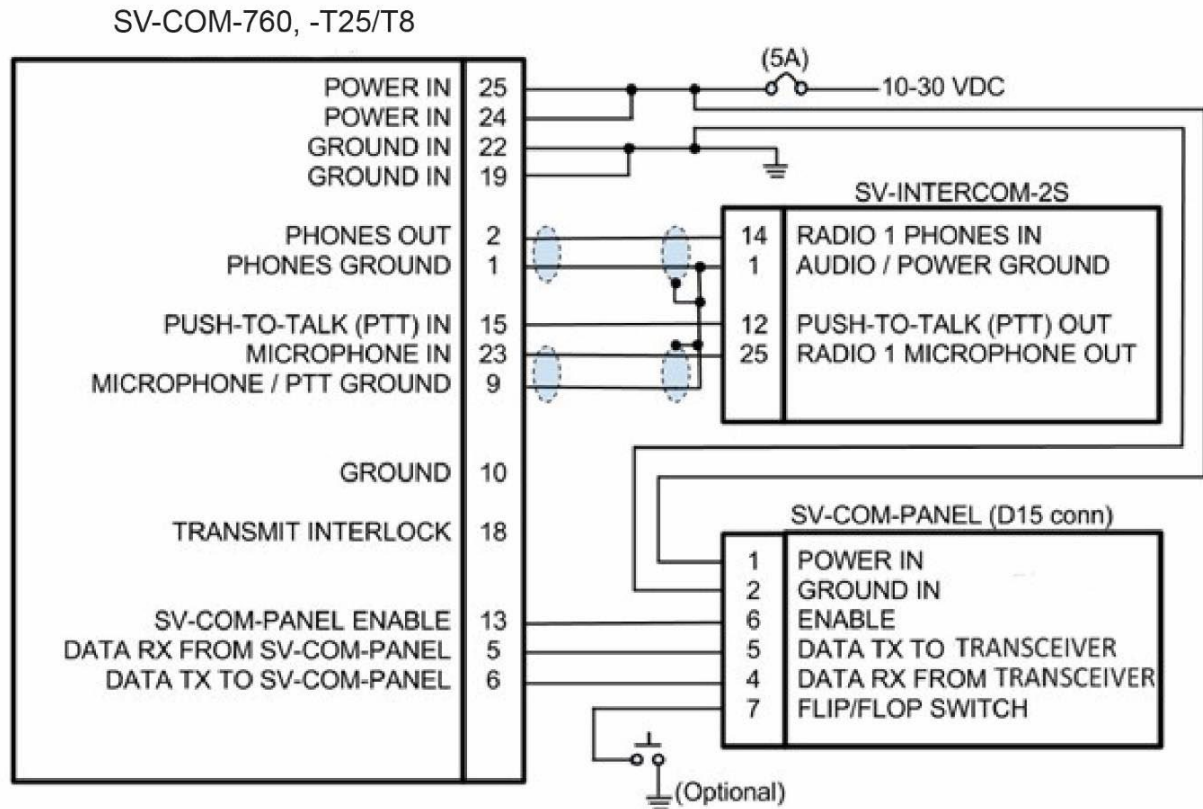
Pin	Function	Notes
1	Power In	From AF-COM-425 Pin 7
2	Ground In	From AF-COM-425 Pin 13
3	Ground Out	Optional - For Grounding Pin 7 (Flip/Flop Switch). Switch may also be grounded locally.
4	Panel RX / 425 TX	From AF-COM-425 Pin 6
5	Panel TX / 425 RX	From AF-COM-425 Pin 14
6	Enable	From AF-COM-425 Pin 3
7	External Flip/Flop (optional)	Push Button Normally Open to Ground (Pin 3 or local ground)
8	No Connection	(Pin not used)
9	No Connection	(Pin not used)
10	No Connection	(Pin not used)
11	No Connection	(Pin not used)
12	No Connection	(Pin not used)
13	No Connection	(Pin not used)
14	No Connection	(Pin not used)
15	No Connection	(Pin not used)

Dynon- SV-COM-760 or COM-T25/T8 – Pinout (Male D25)

Pin	Function	Notes
23	MICROPHONE IN	AF-INTERCOM-2S Pin 25
9	MICROPHONE / PTT GROUND	See diagram below.
13	AF-COM-PANEL ENABLE	To AF-COM-PANEL Pin 6
15	PTT IN	AF-INTERCOM-2S Pin 12 or Push Button Normally Open (PBNO) to Ground (Pins 4, 11, or 15)
6	DATA TX to AF-COM-PANEL	To AF-COM-PANEL Pin 4
	AF-COM-PANEL POWER	To AF-COM-PANEL Pin 1
24,25	POWER IN	10-30V DC @ 5A
1	PHONES GROUND	AF-COM-425 Pin 2 AF-INTERCOM-2S Pin 1 Shielded Cable – shield of Pin 10
2	PHONES OUT	AF-INTERCOM-2S Pin 14 Shielded Cable – center conductor of Pin 10
19	GROUND IN	Connect to Ground Bus
22	GROUND IN	Connect to Ground Bus
5	DATA RX from AF-COM-PANEL	AF-COM-PANEL Pin 5

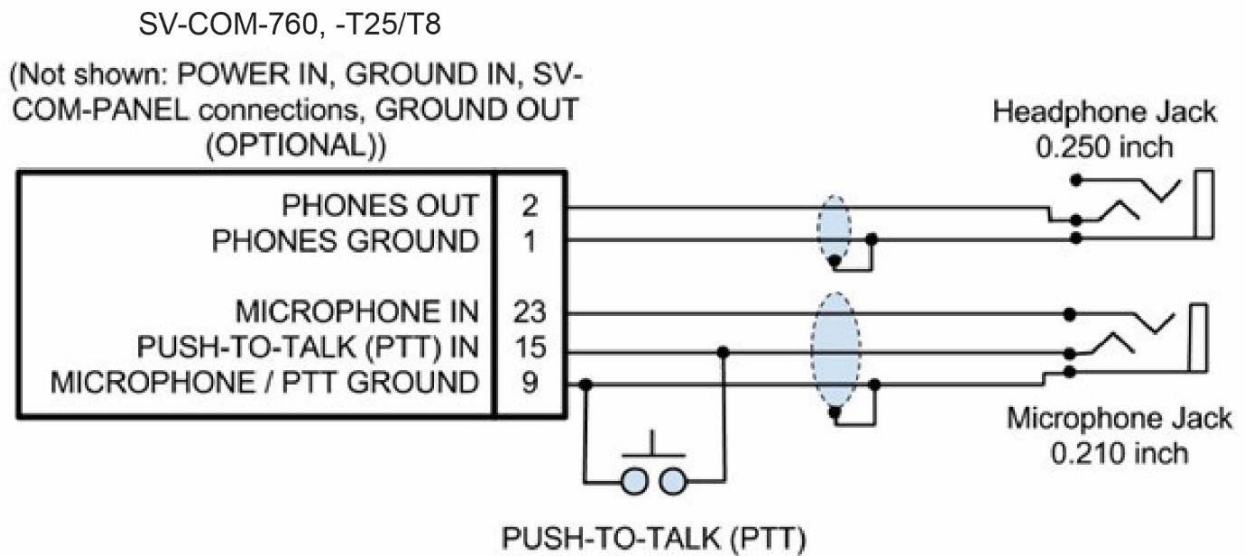
The following figure depicts how a single AF-COM-T25 is connected to an AF-INTERCOM-2S.

Note that Advanced-SV Network connection(s) on SV-COM-PANEL are not shown, nor are additional connections between the AF-INTERCOM-2S and other devices that it connects to.

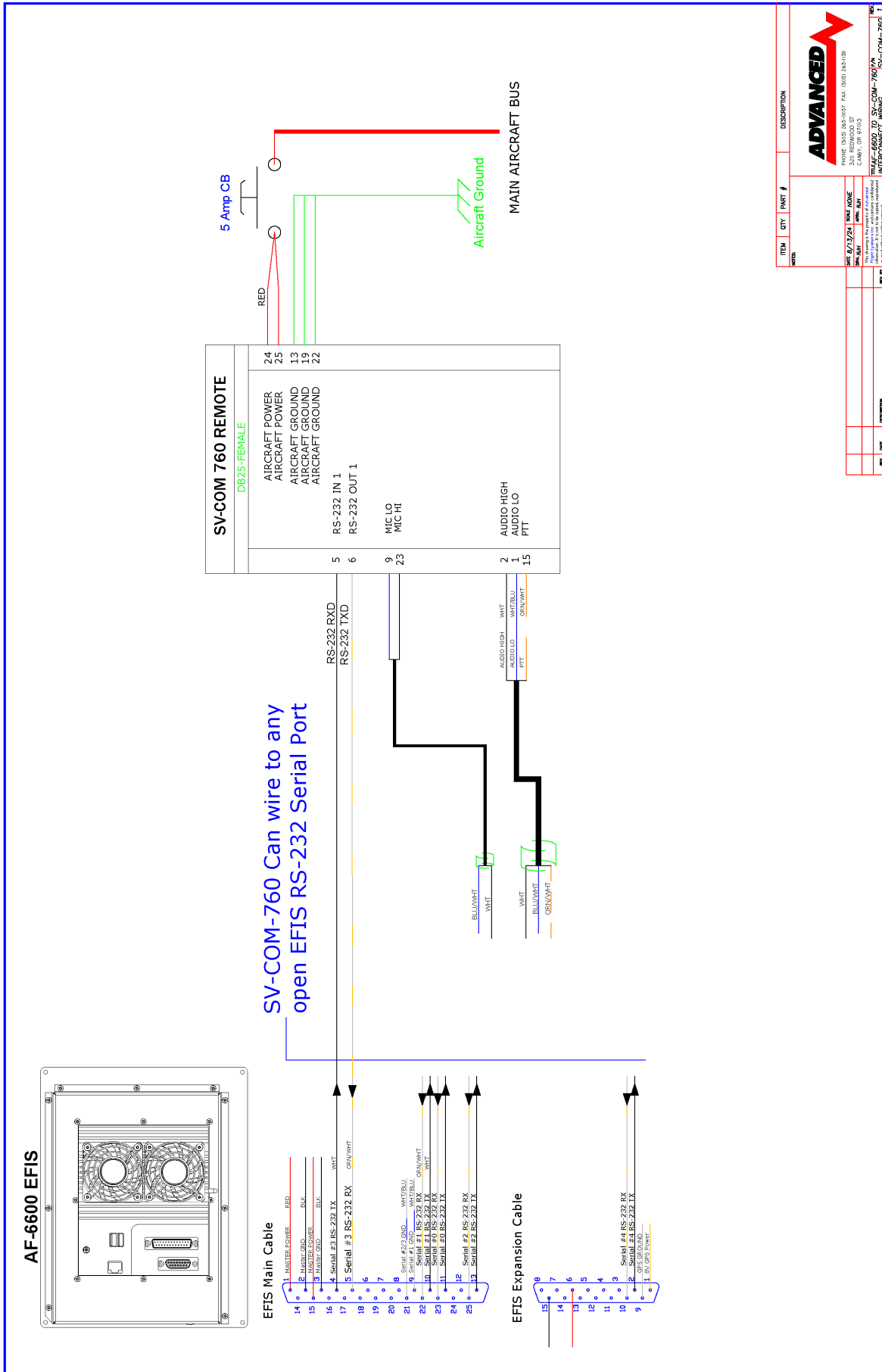


Single AF-COM-T25 to SV-Intercom-2S Wiring Diagram

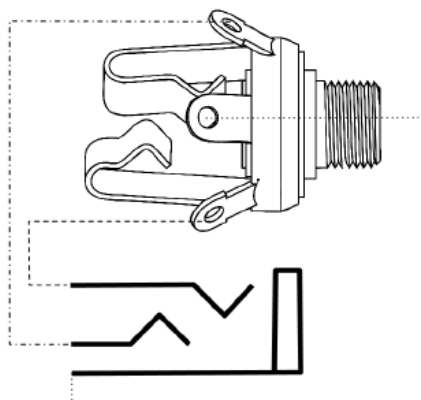
The following figure depicts connecting a SV-COM-T25/T8 directly to a single headset (headphone + microphone) and a Push-To-Talk Switch when no intercom is used in a single-place aircraft.



Wiring an SV-COM-760 / T25 / T8 Remote Radio to an AF-6600 EFIS (No SV-COM-PANEL)



ITEM	QTY	PART #	DESCRIPTION
1	1	SV-COM-760	SV-COM-760
2	1	SV-COM-760	SV-COM-760
3	1	SV-COM-760	SV-COM-760
4	1	SV-COM-760	SV-COM-760
5	1	SV-COM-760	SV-COM-760
6	1	SV-COM-760	SV-COM-760
7	1	SV-COM-760	SV-COM-760
8	1	SV-COM-760	SV-COM-760
9	1	SV-COM-760	SV-COM-760
10	1	SV-COM-760	SV-COM-760
11	1	SV-COM-760	SV-COM-760
12	1	SV-COM-760	SV-COM-760
13	1	SV-COM-760	SV-COM-760
14	1	SV-COM-760	SV-COM-760
15	1	SV-COM-760	SV-COM-760
16	1	SV-COM-760	SV-COM-760
17	1	SV-COM-760	SV-COM-760
18	1	SV-COM-760	SV-COM-760
19	1	SV-COM-760	SV-COM-760
20	1	SV-COM-760	SV-COM-760
21	1	SV-COM-760	SV-COM-760
22	1	SV-COM-760	SV-COM-760
23	1	SV-COM-760	SV-COM-760
24	1	SV-COM-760	SV-COM-760
25	1	SV-COM-760	SV-COM-760
26	1	SV-COM-760	SV-COM-760
27	1	SV-COM-760	SV-COM-760
28	1	SV-COM-760	SV-COM-760
29	1	SV-COM-760	SV-COM-760
30	1	SV-COM-760	SV-COM-760
31	1	SV-COM-760	SV-COM-760
32	1	SV-COM-760	SV-COM-760
33	1	SV-COM-760	SV-COM-760
34	1	SV-COM-760	SV-COM-760
35	1	SV-COM-760	SV-COM-760
36	1	SV-COM-760	SV-COM-760
37	1	SV-COM-760	SV-COM-760
38	1	SV-COM-760	SV-COM-760
39	1	SV-COM-760	SV-COM-760
40	1	SV-COM-760	SV-COM-760
41	1	SV-COM-760	SV-COM-760
42	1	SV-COM-760	SV-COM-760
43	1	SV-COM-760	SV-COM-760
44	1	SV-COM-760	SV-COM-760
45	1	SV-COM-760	SV-COM-760
46	1	SV-COM-760	SV-COM-760
47	1	SV-COM-760	SV-COM-760
48	1	SV-COM-760	SV-COM-760
49	1	SV-COM-760	SV-COM-760
50	1	SV-COM-760	SV-COM-760



Headset Jack Schematic

Power/Ground Input

The SV-COM-T25/T8 requires 10-30V DC. For wire runs from power distribution to the SV-COM-T25/T8 up to 6', 22 AWG wire is sufficient for power and ground wires. For wire runs from power distribution to the SV-COM-T25/T8 longer than 6', 20 AWG wire is recommended for power and ground wires. For the cable between the SV-COM-T25/T8 and the AF-COM-PANEL, 22 AWG power and ground wire is sufficient. Use a 5 Amp fuse or circuit breaker for power supply protection to each SV-COM-T25/T8.

Power Specifications	Approximate current consumption at 12 volts DC	Approximate current consumption at 24 volts DC
AF-COM-T25 – Transmit	3.0 amps average	1.5 amps average
AF-COM-T25 – Receive	0.2 amps average	0.1 amps

AF-COM-PANEL TO AF-COM-T25 Interconnections

AF-COM-T25 Pin	AF-COM-PANEL Pin	Notes
3	6	ENABLE SV-COM-T25 -> SV-COM-PANEL
7	1	POWER SV-COM-T25 -> SV-COM-PANEL
13	2	GROUND SV-COM-T25 -> SV-COM-PANEL
14	5	DATA OUT SV-COM-PANEL -> SVCOM-T25)
6	4	DATA IN SV-COM-T25 -> SV-COM-PANEL

Optional Flip / Flop Button

Pin 7 of the AF-COM-PANEL can be connected to a Push Button Normally Open (PBNO) and GROUND. Pushing this button “flip flops” the ACTIVE and STANDBY frequency selection - the same function as pressing in the TUNE knob on the AF-COM-PANEL. Typically this signal is used with a button on the stick.

Phones / Headset Connections for SV-INTERCOM-2S

AF-COM-425 Pin	AF-INTERCOM-2S Pin	Notes
10	14	PHONES OUT Audio signal from radio to headset phones
9	1	PHONES GROUND Shield connection for PHONES OUT
5	12	PUSH TO TALK IN When connected to GROUND, SV-COM-C25 switches from Receive to Transmit
1	25	MICROPHONE IN Audio signal from headset microphone to radio
2	1	MICROPHONE / PTT GROUND Shield connection for MICROPHONE IN

To avoid noise, hum, and other undesirable signals, always use shielded cable for any low-level audio signals such as microphone inputs, and connect the shield of the cable as directed.

Antenna Installation

AFS does not supply COM antennas, radio coaxial cable, or antenna TNC connectors. The antenna (including coaxial cable and connector) should be installed according to the manufacturer's instructions.

The following considerations should be taken into account when siting the antenna:

- The antenna should be well removed from any projections, the engine(s) and propeller(s). It should also be well removed from landing gear doors, access doors or others openings which will break the ground plane for the antenna.
- Separation of COM antenna(s) from transponder(s) and GPS receivers / antennas: 1 foot (12 inches).
- Separation of COM antenna(s) from Automatic Direction Finder (ADF) or 121.5 MHz Emergency Locator Transmitter (ELT): 4 feet (48 inches)
- Separation of COM antenna from another COM or NAV antenna: Recommended separation between COM antenna(s), NAV antenna(s), and ELT antennas is 6 feet (72 inches). Minimum required separation between antennas is 4 feet (48 inches). Ideally, install the primary COM antenna on the lower fuselage, and install the secondary / standby COM antenna on the upper fuselage.
- The COM antenna(s) should not be installed in close proximity to AF-5000 displays, modules, or servos to avoid RF interference.
- Where practical, plan the antenna location to keep the cable lengths as short as possible and avoid sharp bends in the cable to minimize the VSWR (voltage standing wave ratio).
- Double-shielded coaxial cable is superior to single shield coax – more of the transmit power will be coupled to the antenna, and less received signal will be lost.
- Electrical connection to the antenna should be protected to avoid loss of efficiency as a result of the presence of liquids or moisture. All antenna feeders shall be installed in such a way that a minimum of RF energy is radiated inside the aircraft.

Antenna Ground Plane

When a conventional aircraft monopole antenna is used it relies on a ground plane for correct behavior. For ideal performance the ground plane should be very large compared to the wavelength of the transmission, which is approx. 7.5 feet. In a metal skinned aircraft this is usually easy to accomplish, but is more difficult in a composite or fabric skinned aircraft. In these cases a metallic ground plane should be fabricated and fitted under the antenna.

As the ground plane is made smaller, the actual dimensions of the ground plane become more critical, and small multiples of the wavelength should be avoided, as should circles. Rectangles or squares are much less likely to create a critical dimension that resonates with the transmissions. The thickness of the material used to construct the ground plane is not critical, providing it is sufficiently conductive. A variety of proprietary mesh and grid solutions are available. Heavyweight cooking foil meets the technical requirements, but obviously needs to be properly supported.

Antenna Cable

When routing the cable, ensure that you:

- Route the cable away from sources of heat.
- Avoid routing antenna cables together.
- Route the cable away from potential interference sources such as ignition wiring, 400Hz generators, fluorescent lighting and electric motors.
- Allow a minimum separation of 300 mm (12 inches) from an ADF antenna cable.
- Keep the cable run as short as possible.
- Avoid routing the cable around tight bends.
- Avoid kinking the cable even temporarily during installation.
- Secure the cable so that it cannot interfere with other systems.

See the **EFIS Setup and Configuration section** of this manual for EFIS radio configuration.

- SQUELCH LEVEL – Adjust squelch level so that the audio is heard during transmissions, and muted when transmissions are not present.
- SIDETONE VOLUME – Adjust for your personal preference of how much microphone audio is heard in the headset when transmitting.
- MIC GAIN – The default setting of 50 should work for most installations. If other people report that your transmissions fade off at the end or can't be heard at all, you may need more mic gain. If your transmissions are reported to sound "hollow", "robotic" or if they have a lot of background noise, less mic gain is likely needed. Follow the instructions in this menu to find a value that works for your installation. Also note these issues can only be heard on real transmissions by third parties. The sidetone you hear in your own headset is completely unaffected by Mic Gain.
- PRIMARY SN – The primary radio serial number needs to be set in the Com Radio Setup Page. The serial number can be found by doing a scan in CAL→ ADVANCED SV-NETWORK

Post Installation Checks

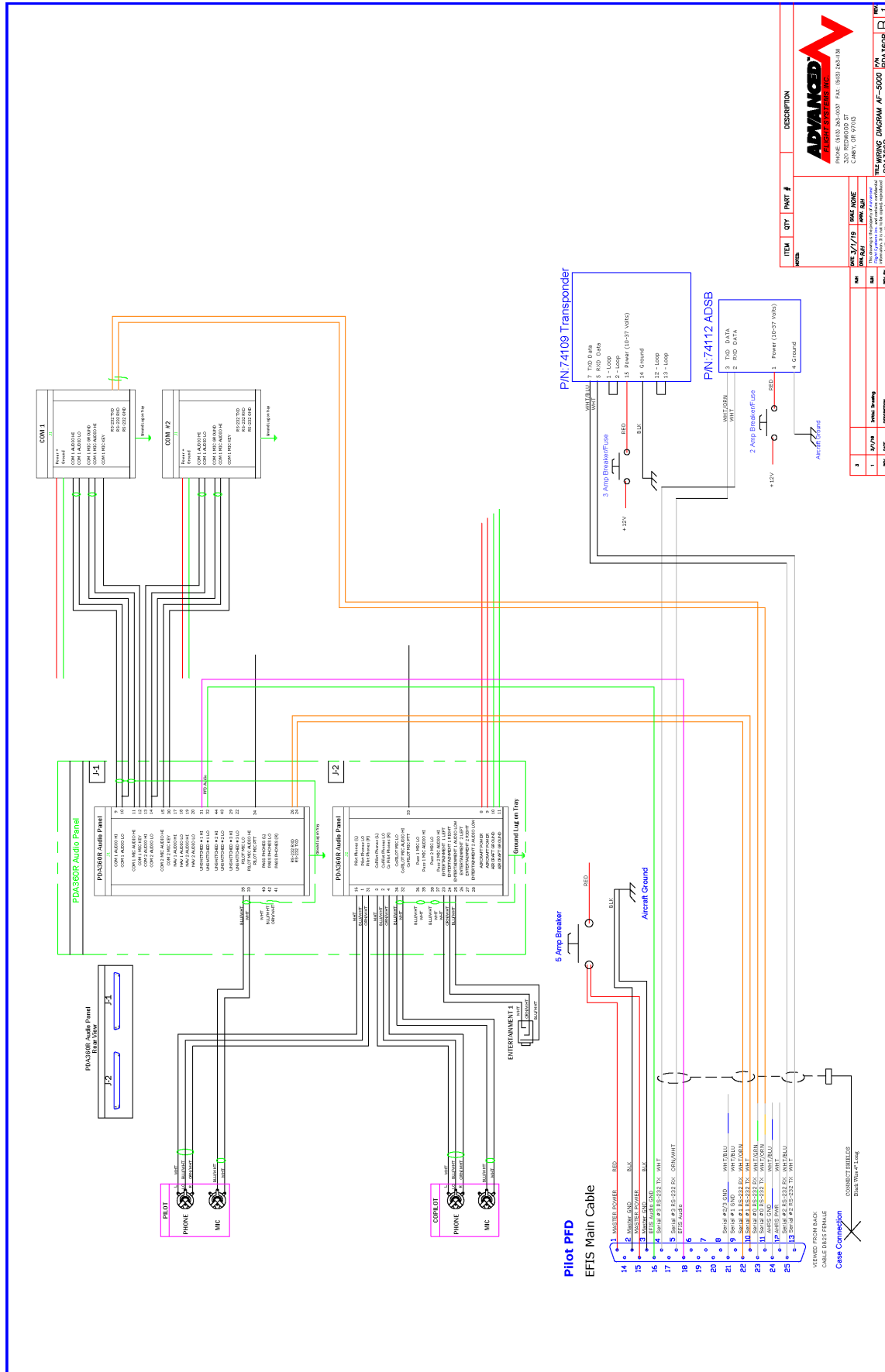
Ground Tests

1. Do all AF-COM-T25 buttons and knobs function normally?
2. Does the (optional) FLIP/FLOP pushbutton swap the STBY and COM frequencies?
3. Does pushing the PTT switch cause the AF-COM-T25 to transmit (only) when pushed? DO NOT TRANSMIT WITHOUT AN ANTENNA CONNECTED. DOING SO WILL DAMAGE YOUR AF-COM-T25 RADIO.
5. Temporarily install a VSWR meter between the AF-COM-T25 and the antenna. Using brief test transmissions, is the VSWR 3:1 or below? *The maximum acceptable VSWR for A SV-COM-T25 is 3:1.*
6. When transmitting on SV-COM-T25, is there any interference to other aircraft systems?
7. Power off the AF-6600 / AF-5000 display(s). The SV-COM-T25 should continue to operate normally, with the exception that auto-population of frequencies will not occur, and a NO SV error message will appear approx. 3 seconds after SV is not operating.

In Flight Tests

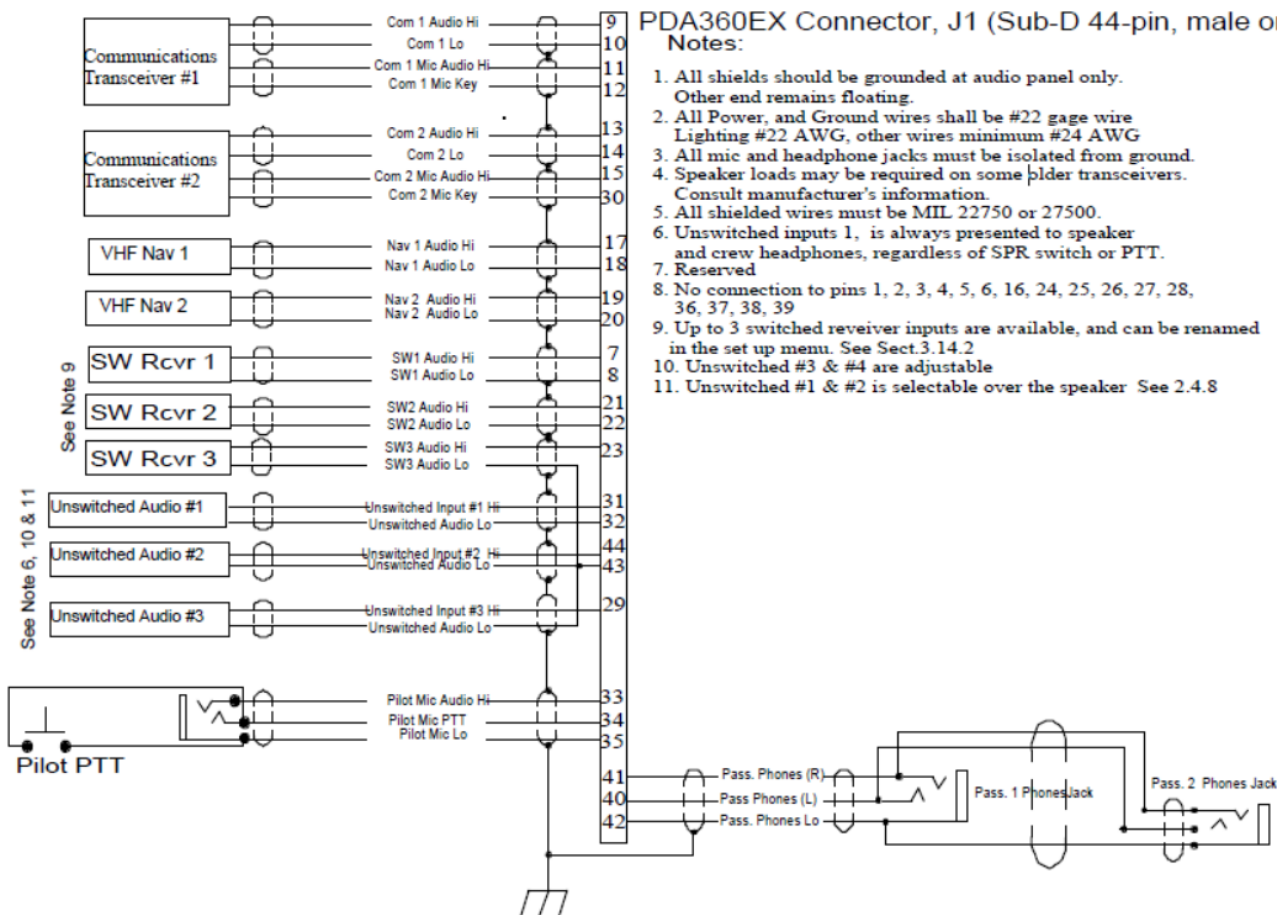
1. Does the AF-COM-T25 receive other aircraft and ground transmissions at reasonable ranges?
2. Is received audio clear at most volume levels on the AF-COM-T25? (Distortion at high volume levels is normal.)
3. Are transmissions from the AF-COM-T25 heard by others at reasonable ranges? (Keep in mind that the power output of the AF-COM-T25 is 6 watts.)
4. Are transmissions from the AF-COM-T25 clear (when received by others)?

AUDIO Panel PMA450EX / PDA360R

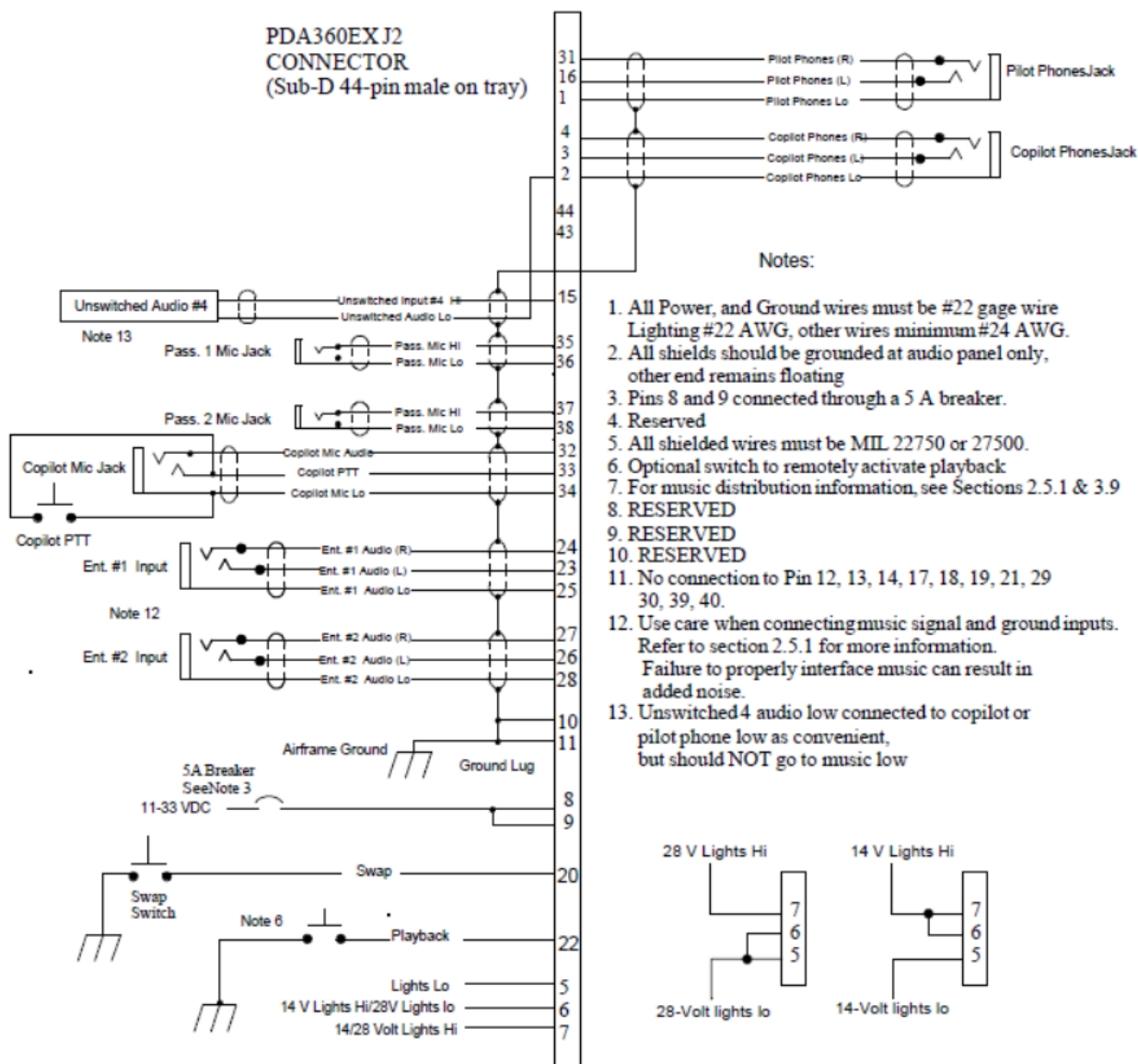


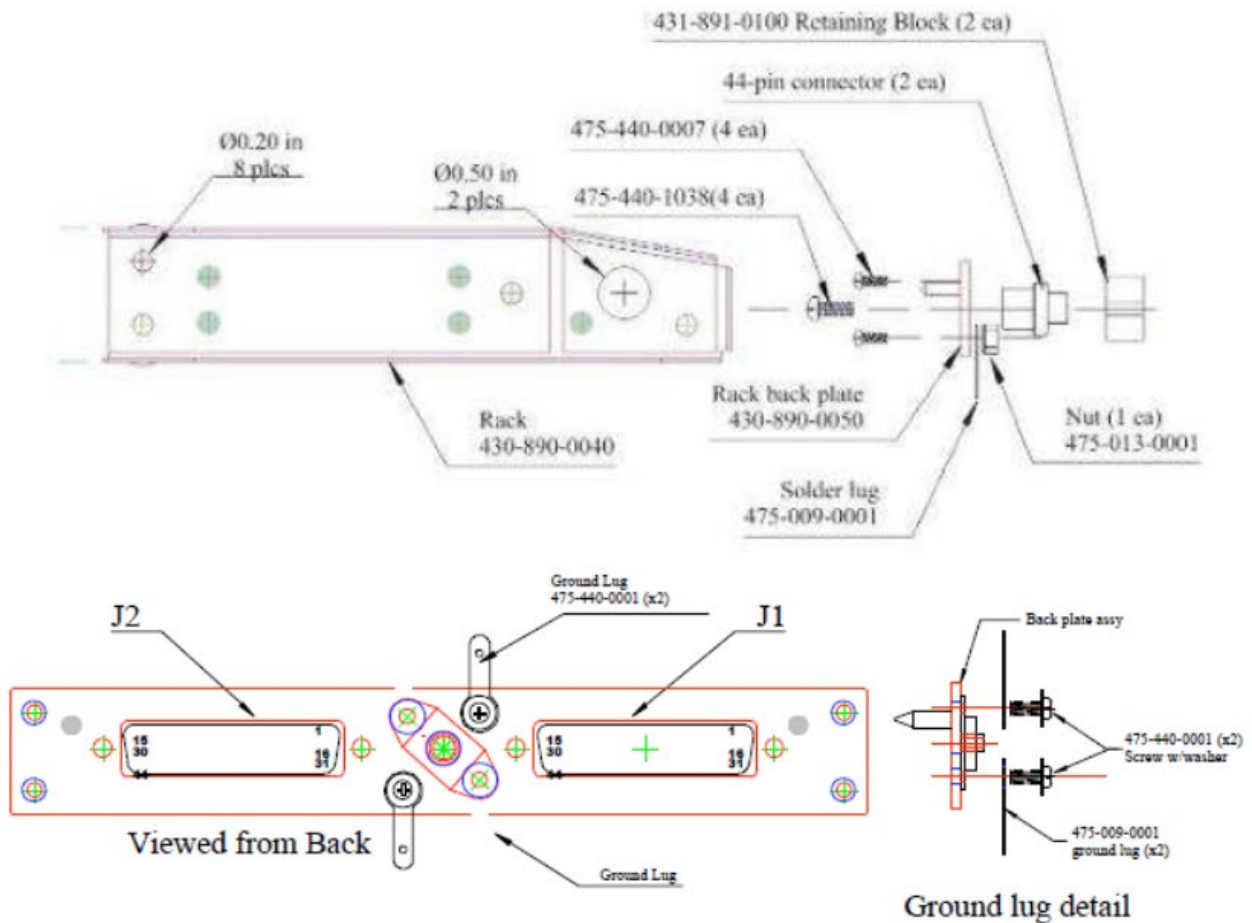
PS Engineering
PDA360EX Audio Selector Panel and Intercom System
Installation and Operator's Manual

Appendix B – J1 Connector Interconnect

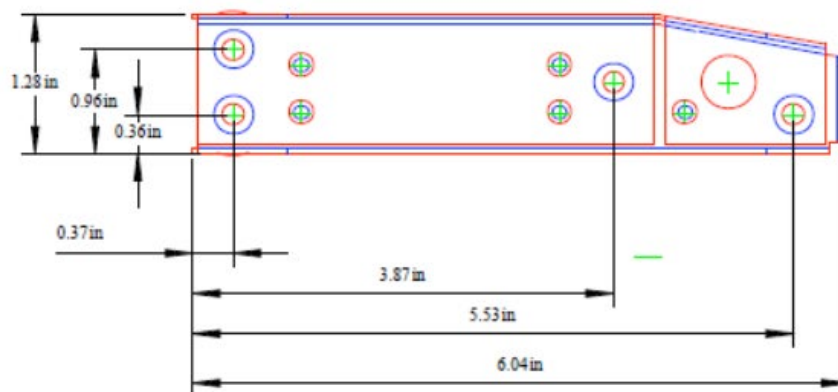
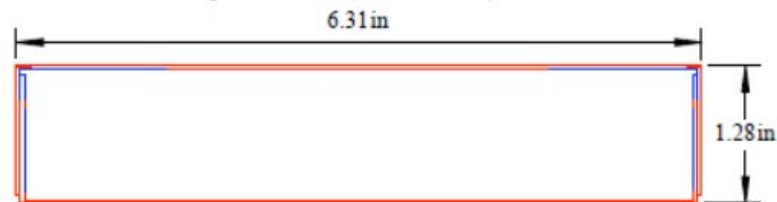


Appendix C – J2 Connector Interconnect





Rear plate detail (not to scale)



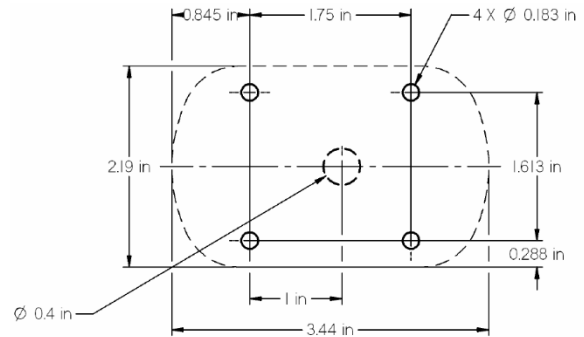
P/N: 73102 Dynon GPS-250 Antenna Module

P/N: 73120 Dynon GPS-220 Antenna Module

Physical Installation

The diagram below shows the mounting dimensions of the GPS module. Note that it utilizes a common bolt pattern found in much of general aviation.

Mounting hardware is not included. The 73102 Dynon GPS-250 or 73120 GPS-2020 Antenna Module is designed to work with #8 fasteners with 100 degree countersunk heads. The use of nut plates is recommended for convenience, but other hardware can be used if space allows. Specific hardware selection is determined by the installer. We recommend you use weather sealant around the fastener heads to keep moisture from entering the aircraft through the mounting holes. The module itself is sealed and includes a rubber gasket that seals the inner wire hole. It also allows the module to be mounted on slightly curved surfaces. For extra protection, you may use weather sealant around the outside of the AF-GPS Antenna Module where it meets the skin of the aircraft.

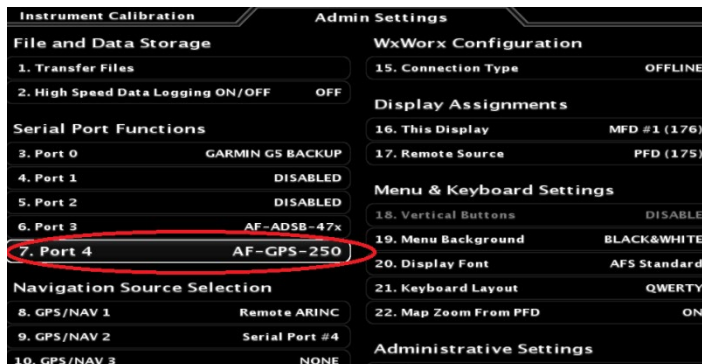
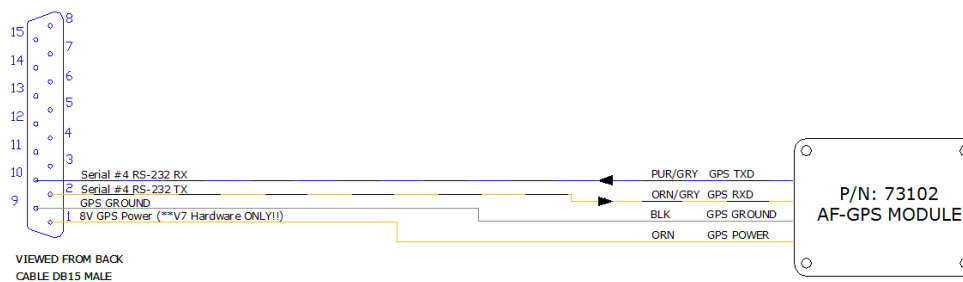


The GPS Module includes 18 feet of wire for connection to the EFIS display. The GPS Module can be connected to any available EFIS serial port.

The GPS module uses a dedicated power pin on AF-6600 or AF-5000 EFIS Expansion 15 pin connector.

GPS-250/2020	GPS Description	EFIS Connection	PIN	EFIS Description
ORANGE	Power	EFIS Expansion	1	8V Power
BLACK	Ground	EFIS Expansion	9	GPS Ground
PURPLE/GRAY	GPS TXD			RS-232 RXD
ORANGE/GRAY	GPS RXD			RS-232 TXD

EFIS Expansion Cable



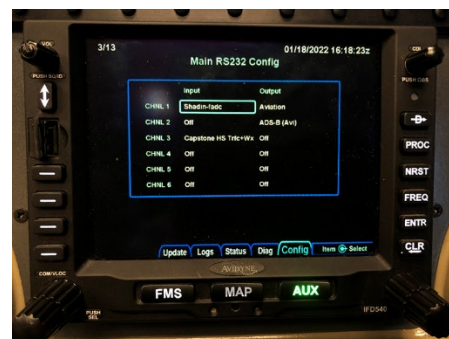
Avidyne IFD-440, IFD-540, IFD-550 GPS Navigator



The IFD uses ARINC-429 and RS-232 serial data to communicate with the EFIS. The Dynon SV-ARINC module has the connections for both the ARINC-429 data and a RS-232 Serial receive port for GPS data. An AF-6600 / AF-5000 EFIS has the ability to send ADS-B weather and traffic to an IFD Navigator using a dedicated RS-232 serial port connection. An AF-6600 / AF-5000 can also control the IFD Radio Frequency tuning using a dedicated RS-232 Serial Port. The ADS-B and/or Radio Tuning EFIS serial port do not need to be connected to the same EFIS in a multi EFIS installation. Any of the 6 IFD navigator serial ports can be connected to any of the 5 EFIS serial ports for ADS-B or Radio Tuning.

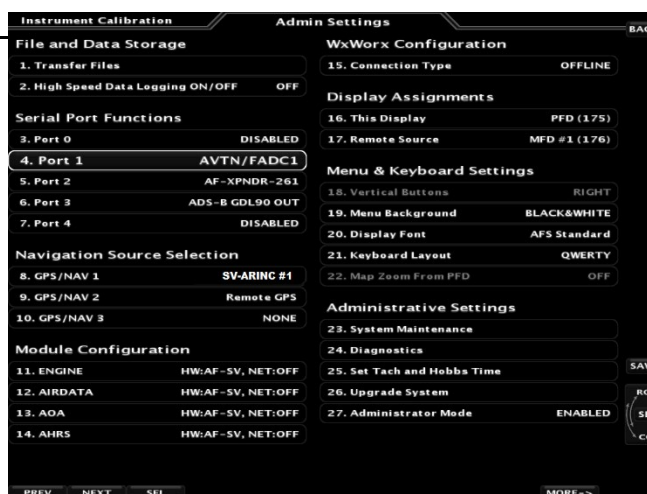
Avidyne IFD RS-232 Port Settings

Setting	Description
Shadin-fadc	Fuel flow Data from EFIS EMS
Aviation	GPS Data from IFD to SV-ARINC Module
ADS-B (Avi)	GPS data for Mode S Transponder
VhfCtrl	EFIS <> IFD Radio Tuning
Capstone HS Trfc+wx	ADS-B Wx+Trfc data from EFIS



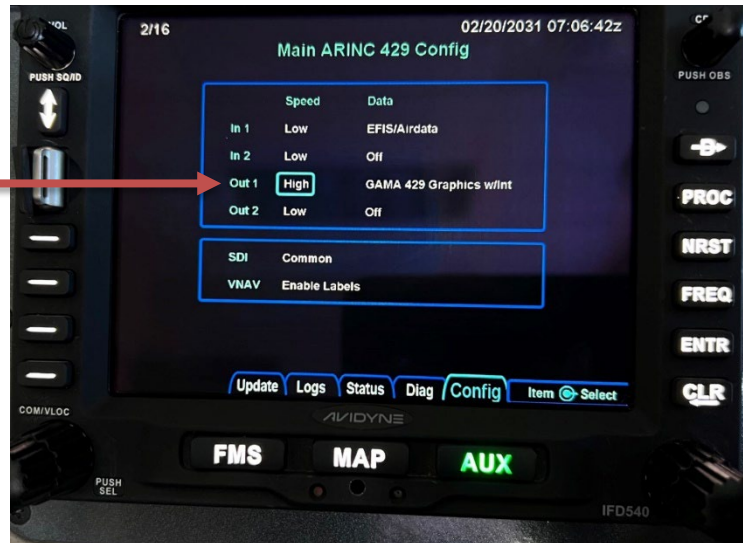
EFIS RS-232 Port Settings for IFD

Setting	Description
ADS-B GDL90 OUT	ADS-B Wx+Trfc data to IFD
FADC1	Fuel flow Data to IFD
GTR/GNC-2xx	EFIS <> IFD Radio Tuning



Main ARINC 429 Configuration

Set all channels Out to HIGH Speed and In to Low

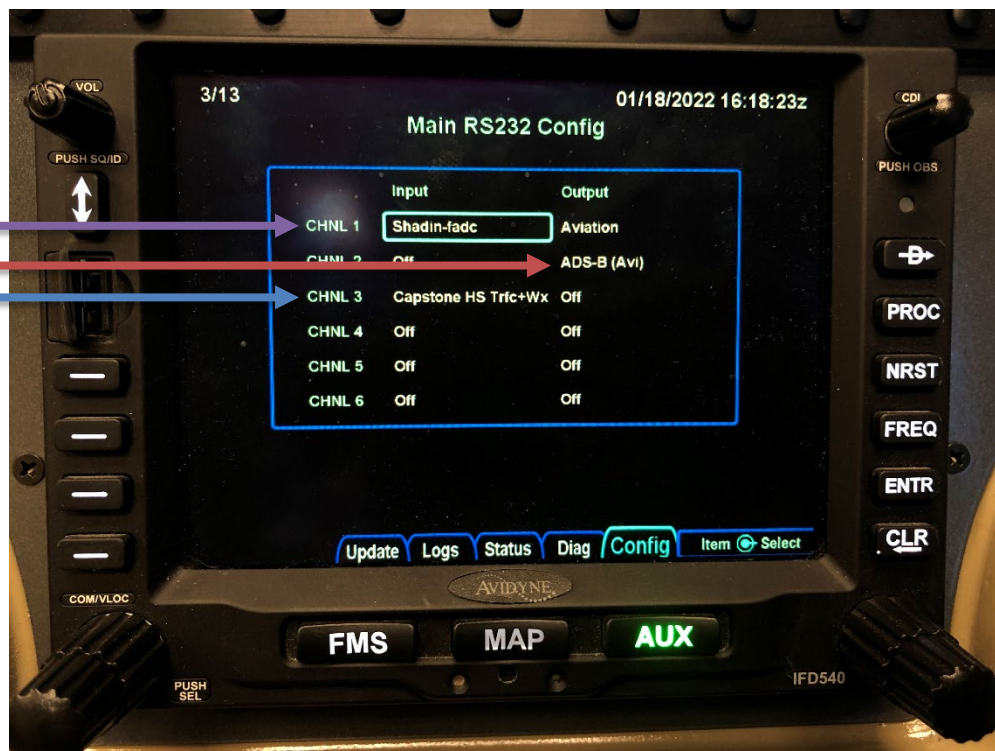


Main RS-232 Serial Port Configuration

Shadin-fadc Enables fuel range rings on IFD Map

Send GPS Data to Transponder

Used to get ADS-B data from AF-6600 / AF-5000 EFIS

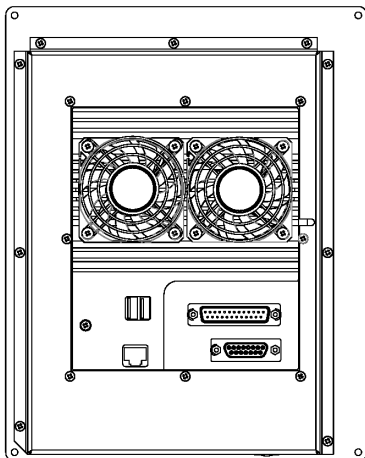


VOR / LOC / GS ARINC 429 Configuration

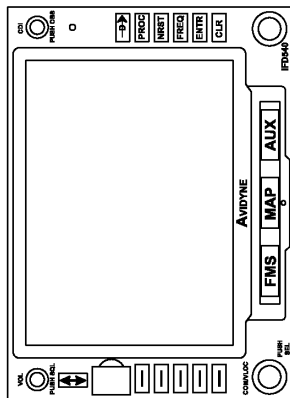
Set TX to HIGH Speed and RX to Low



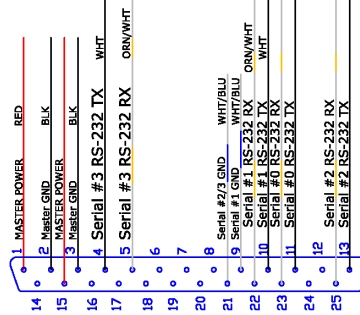
AF-5000 EFIS



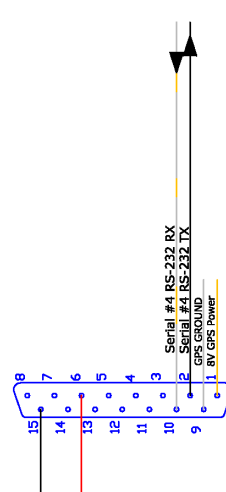
Avidyne IFD



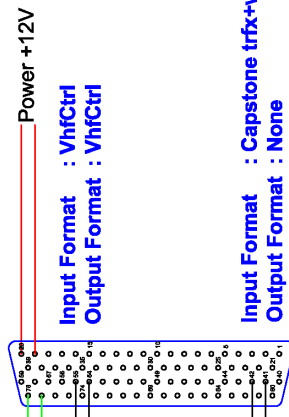
EFIS Main Cable



EFIS Expansion Cable



IFD P4001
view from rear



Radio Tuning Setting

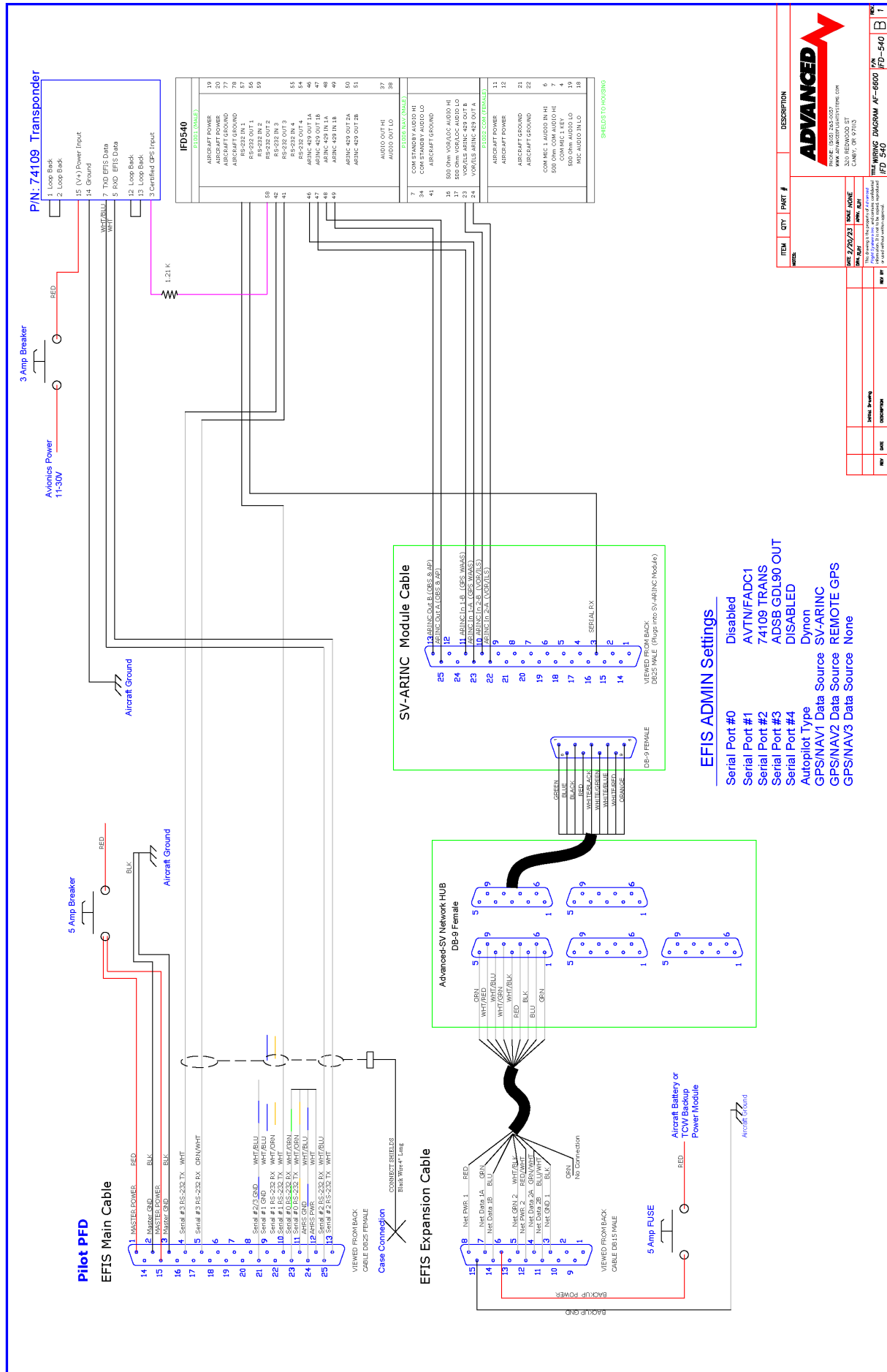
EFIS RS-232 : GTR/GNC-2xx
EFIS COM Radio Setting : GTR-200/225

ADS-b Weather & Traffic

EFIS RS-232 : ADS-B GDL 90 OUT

Can wire to any open
EFIS or IFD
RS-232 Serial Port

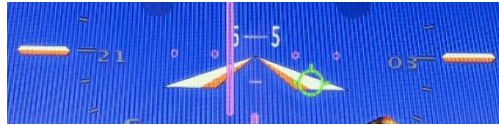
ITEM	QTY	PART #	DESCRIPTION
1	1	AF-5000	AF-5000 TO IFD
2	1	AF-5000	AF-5000 TO IFD
3	1	AF-5000	AF-5000 TO IFD
4	1	AF-5000	AF-5000 TO IFD
5	1	AF-5000	AF-5000 TO IFD
6	1	AF-5000	AF-5000 TO IFD
7	1	AF-5000	AF-5000 TO IFD
8	1	AF-5000	AF-5000 TO IFD
9	1	AF-5000	AF-5000 TO IFD
10	1	AF-5000	AF-5000 TO IFD
11	1	AF-5000	AF-5000 TO IFD
12	1	AF-5000	AF-5000 TO IFD
13	1	AF-5000	AF-5000 TO IFD
14	1	AF-5000	AF-5000 TO IFD
15	1	AF-5000	AF-5000 TO IFD
16	1	AF-5000	AF-5000 TO IFD
17	1	AF-5000	AF-5000 TO IFD
18	1	AF-5000	AF-5000 TO IFD
19	1	AF-5000	AF-5000 TO IFD
20	1	AF-5000	AF-5000 TO IFD
21	1	AF-5000	AF-5000 TO IFD
22	1	AF-5000	AF-5000 TO IFD
23	1	AF-5000	AF-5000 TO IFD
24	1	AF-5000	AF-5000 TO IFD
25	1	AF-5000	AF-5000 TO IFD
26	1	AF-5000	AF-5000 TO IFD
27	1	AF-5000	AF-5000 TO IFD
28	1	AF-5000	AF-5000 TO IFD
29	1	AF-5000	AF-5000 TO IFD
30	1	AF-5000	AF-5000 TO IFD
31	1	AF-5000	AF-5000 TO IFD
32	1	AF-5000	AF-5000 TO IFD
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41	1	AF-5000	AF-5000 TO IFD
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43	1	AF-5000	AF-5000 TO IFD
44	1	AF-5000	AF-5000 TO IFD
45	1	AF-5000	AF-5000 TO IFD
46	1	AF-5000	AF-5000 TO IFD
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50	1	AF-5000	AF-5000 TO IFD



Garmin G5 EFIS

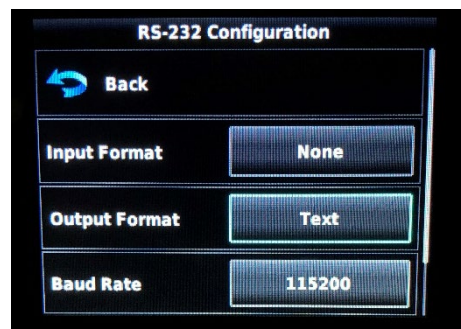
The Garmin G5 can be used as a backup ADAHRS for an AF-5000 EFIS. The AF-5000 will do AHRS cross checking using the systems SV-ADAHRS and G5. You can select the ADAHRS to use from the EFIS Options Menu by touching the aircraft symbol on the center of the screen. If an ADAHRS fails, the system should switch to the backup ADAHRS if you have selected AUTO. The color of the aircraft symbol changes based on the current ADAHRS in use. The G5 should be connected to any available AF-5000 RS-232 serial port

- Light Gray ADAHRS1
- Dark Gray ADAHRS2
- Orange Backup ADAHRS



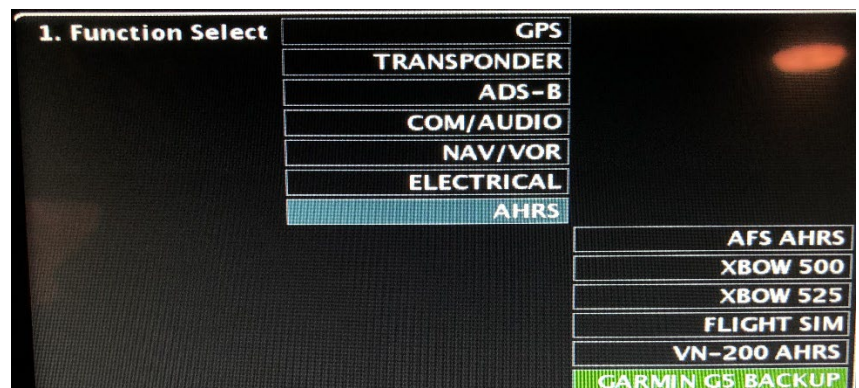
G5 - RS-232 Configuration

Input Format None
Output Format Text
Baud Rate 115200



EFIS - Serial Port Function

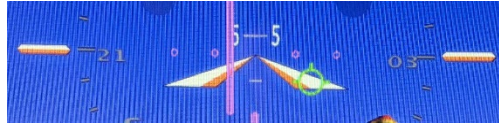
- GARMIN G5 BACKUP



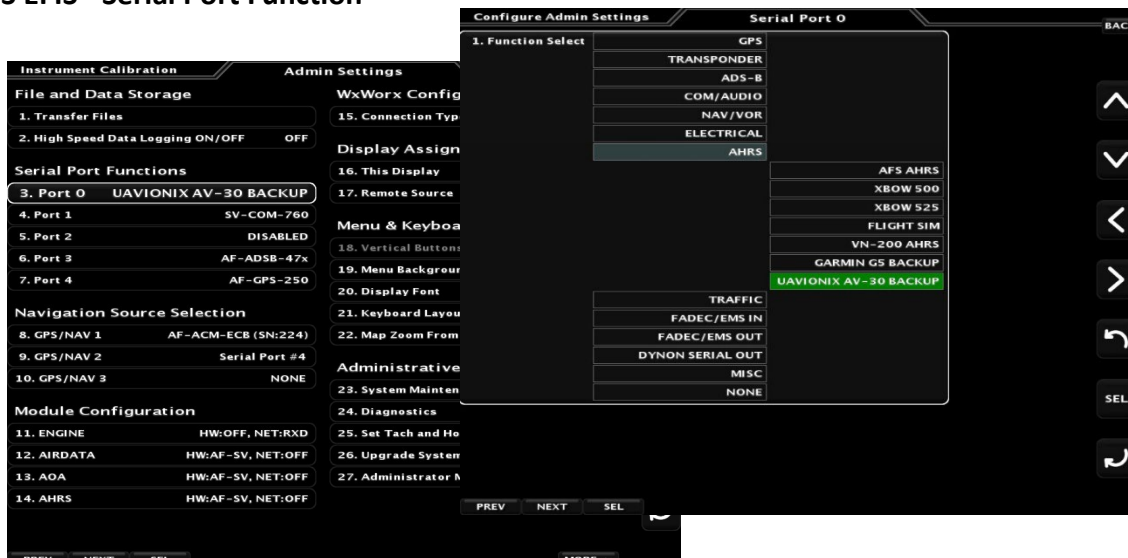
Uavionix AV-30 EFIS

The AV-30 can be used as a backup ADAHRS for an AF-5000/AF-6600 EFIS. The AF-5000/AF-6600 will do AHRS cross checking using the systems SV-ADAHRS and AV-30. You can select the ADAHRS to use from the EFIS Options Menu by touching the aircraft symbol on the center of the screen. If an ADAHRS fails, the system should switch to the backup ADAHRS if you have selected AUTO. The color of the aircraft symbol changes based on the current ADAHRS in use. The AV-30 should be connected to any available AF-5000/AF-6600 RS-232 serial port. ***If you are using the AV-30 without an external magnetometer the AV-30 operates like a directional gyro that needs to be set to an external compass. When the AV-30 is connected to an AF-5000/AF-6600 EFIS and properly configured the AFS EFIS will set the AV-30 DG heading using the AFS EFIS magnetic heading data. When the AF-5000/AF-6600 EFIS is operating using the AV-30 ADAHRS data the AFS EFIS will display magnetic heading data from the AV-30 DG data.***

- Light Gray ADAHRS1
- Dark Gray ADAHRS2
- Orange Backup ADAHRS



AFS EFIS - Serial Port Function

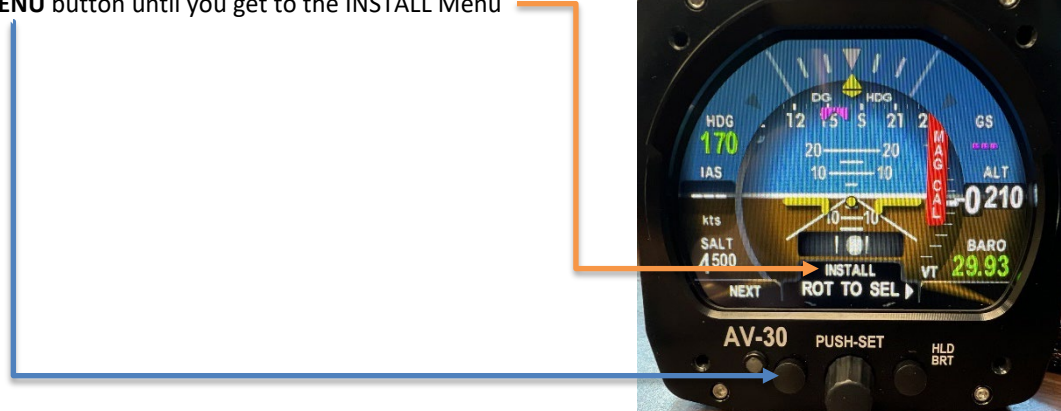


AV-30 Configuration

- Hold the AV-30 knob in while the device is powering up to enable Config Mode.
- Verify that the AV-30 is running software version 3.0.1 or later.



- Press the Left **MENU** button until you get to the INSTALL Menu



- Under the INSTALL page rotate the knob until you find **SERIAL 3**
Press in on the knob. Turn to select **EFIS** or **EFIS + AVLINK** then press in on the knob.

Note: Both the EFIS or EFIS+AVLINK option work the same way for both options.



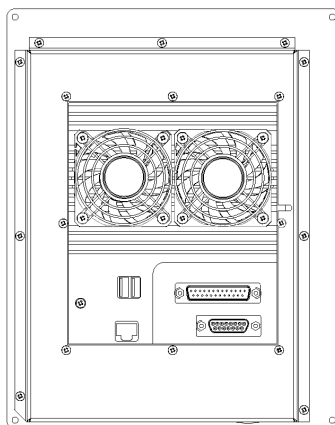
- Under the INSTALL page rotate the knob until finding the **STATE SYNC** option and press in on the knob. Select **EFIS** as the **Source** and press in on the knob to close the menu.



- Under the INSTALL page rotate the knob until finding the **AID MODE** option and press in on the knob. If you don't have an AV-30 remote magnetometer Select **NONE** and press in on the knob to close the menu.

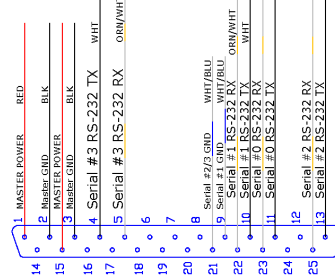


AF-6600 EFIS

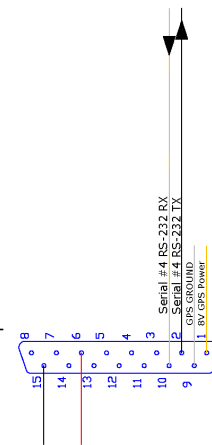


EFIS RS-232 Setting > AV-30 BACKUP

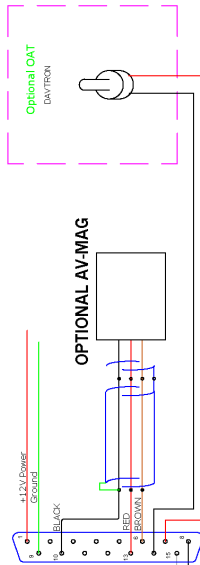
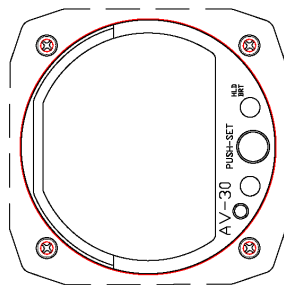
EFIS Main Cable



EFIS Expansion Cable



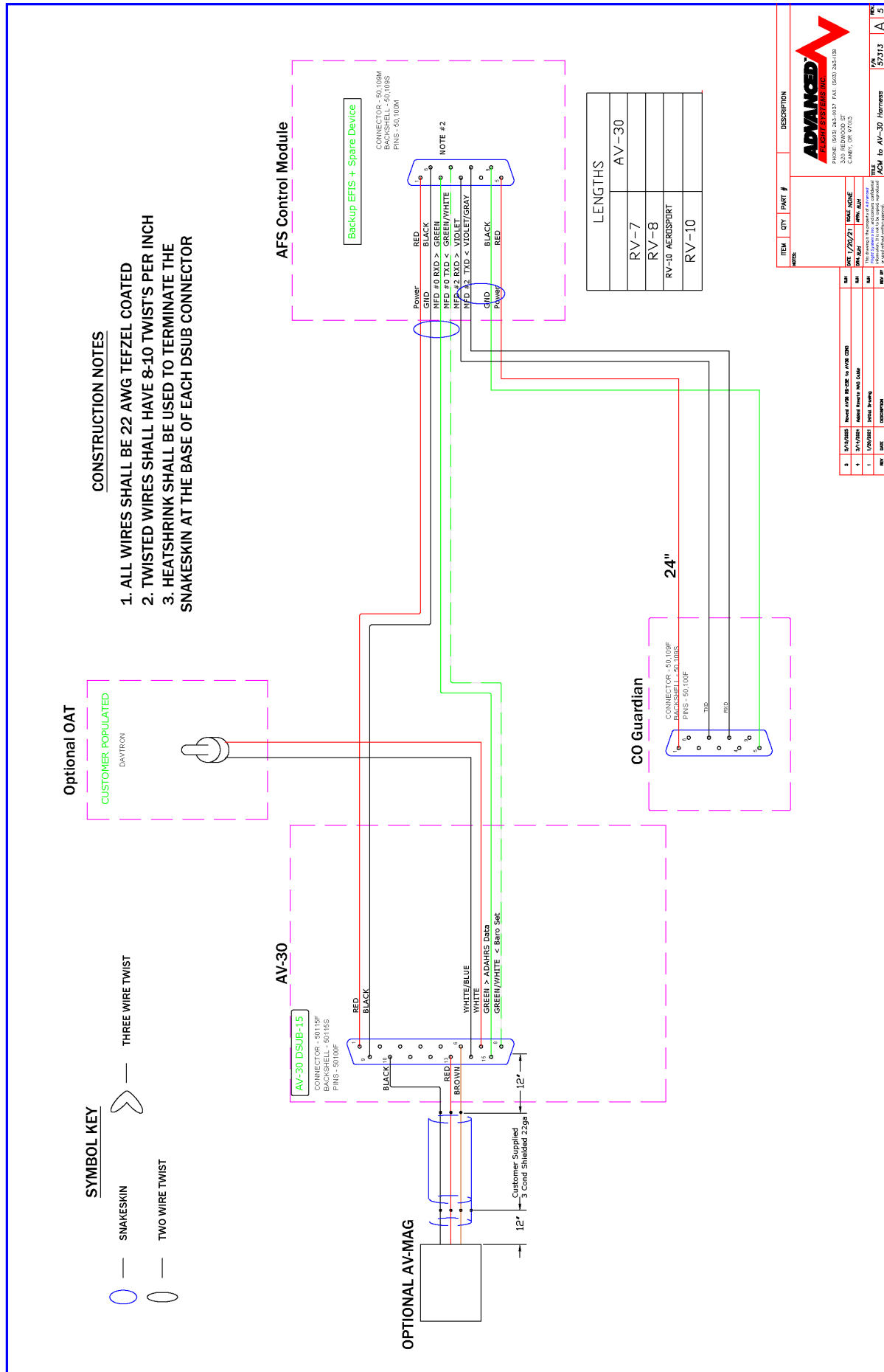
AV-30 Can wire to any
open EFIS RS-232 Serial
Port

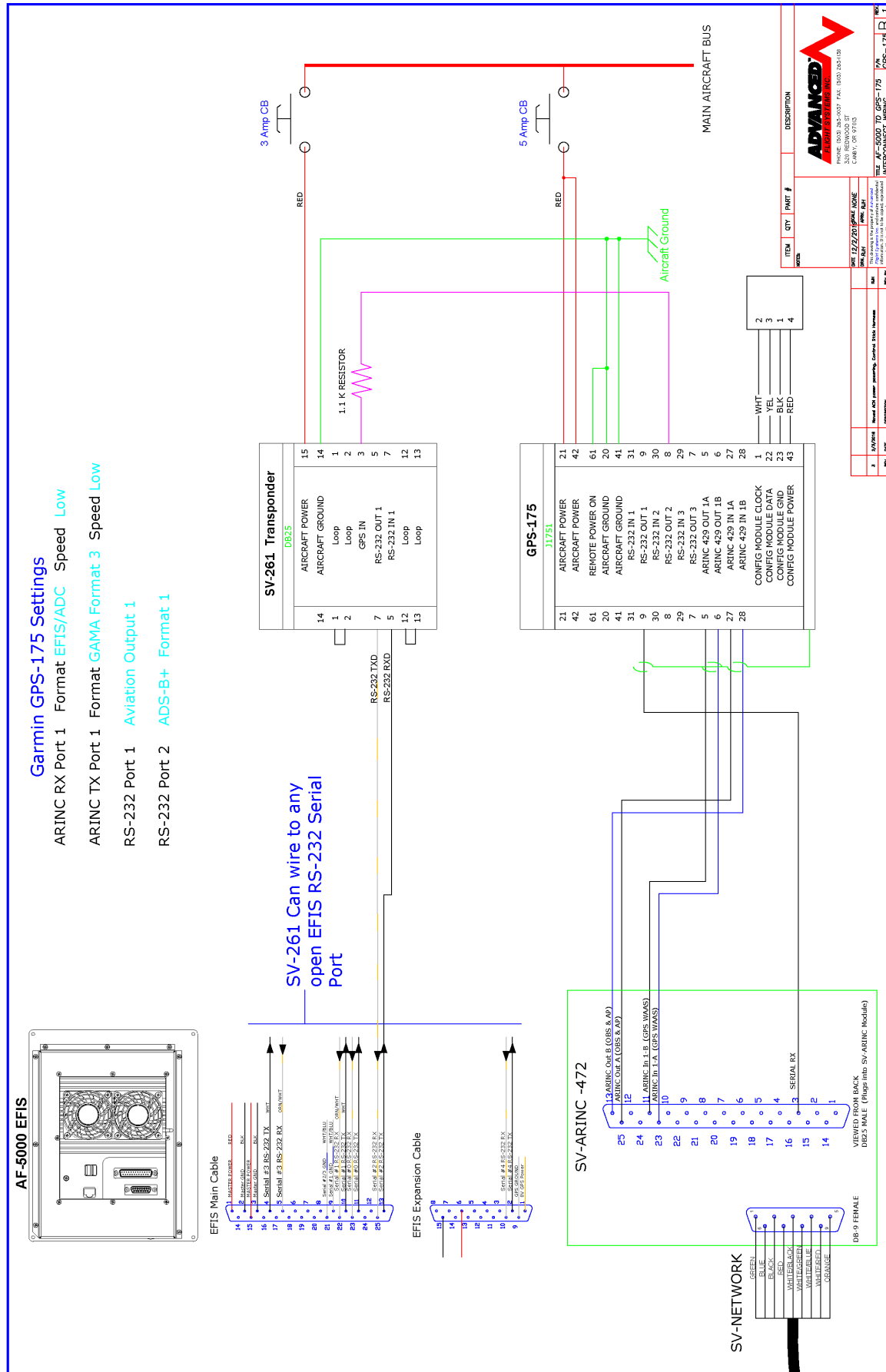


ITEM	QTY	PART #	DESCRIPTION
1	1	AV-30	AV-30
2	1	AV-30	AV-30
3	1	AV-30	AV-30
4	1	AV-30	AV-30
5	1	AV-30	AV-30
6	1	AV-30	AV-30
7	1	AV-30	AV-30
8	1	AV-30	AV-30
9	1	AV-30	AV-30
10	1	AV-30	AV-30
11	1	AV-30	AV-30
12	1	AV-30	AV-30
13	1	AV-30	AV-30
14	1	AV-30	AV-30
15	1	AV-30	AV-30
16	1	AV-30	AV-30
17	1	AV-30	AV-30
18	1	AV-30	AV-30
19	1	AV-30	AV-30
20	1	AV-30	AV-30
21	1	AV-30	AV-30
22	1	AV-30	AV-30
23	1	AV-30	AV-30
24	1	AV-30	AV-30
25	1	AV-30	AV-30
26	1	AV-30	AV-30
27	1	AV-30	AV-30
28	1	AV-30	AV-30
29	1	AV-30	AV-30
30	1	AV-30	AV-30
31	1	AV-30	AV-30
32	1	AV-30	AV-30
33	1	AV-30	AV-30
34	1	AV-30	AV-30
35	1	AV-30	AV-30
36	1	AV-30	AV-30
37	1	AV-30	AV-30
38	1	AV-30	AV-30
39	1	AV-30	AV-30
40	1	AV-30	AV-30
41	1	AV-30	AV-30
42	1	AV-30	AV-30
43	1	AV-30	AV-30
44	1	AV-30	AV-30
45	1	AV-30	AV-30
46	1	AV-30	AV-30
47	1	AV-30	AV-30
48	1	AV-30	AV-30
49	1	AV-30	AV-30
50	1	AV-30	AV-30
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52	1	AV-30	AV-30
53	1	AV-30	AV-30
54	1	AV-30	AV-30
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61	1	AV-30	AV-30
62	1	AV-30	AV-30
63	1	AV-30	AV-30
64	1	AV-30	AV-30
65	1	AV-30	AV-30
66	1	AV-30	AV-30
67	1	AV-30	AV-30
68	1	AV-30	AV-30
69	1	AV-30	AV-30
70	1	AV-30	AV-30
71	1	AV-30	AV-30
72	1	AV-30	AV-30
73	1	AV-30	AV-30
74	1	AV-30	AV-30
75	1	AV-30	AV-30
76	1	AV-30	AV-30
77	1	AV-30	AV-30
78	1	AV-30	AV-30
79	1	AV-30	AV-30
80	1	AV-30	AV-30
81	1	AV-30	AV-30
82	1	AV-30	AV-30
83	1	AV-30	AV-30
84	1	AV-30	AV-30
85	1	AV-30	AV-30
86	1	AV-30	AV-30
87	1	AV-30	AV-30
88	1	AV-30	AV-30
89	1	AV-30	AV-30
90	1	AV-30	AV-30
91	1	AV-30	AV-30
92	1	AV-30	AV-30
93	1	AV-30	AV-30
94	1	AV-30	AV-30
95	1	AV-30	AV-30
96	1	AV-30	AV-30
97	1	AV-30	AV-30
98	1	AV-30	AV-30
99	1	AV-30	AV-30
100	1	AV-30	AV-30



PHONE (800) 245-5037 FAX (800) 245-5038
350 REDWOOD ST
CANYON, UT 84015
THE AV-6600 TO AV-30
INTERCONNECT WIRING





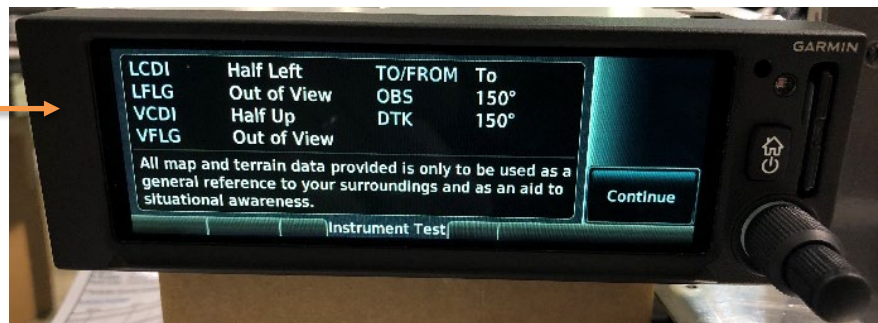
Garmin GPS-175 Configuration

The GPS-175 needs to be configured (hold knob during power on) using the following settings:

AF-6600 / AF-5000 EFIS



You can verify that the interface is working from the GPS-175 start up Instrument Test page. The EFIS LCDI, VCDI, Flag, OBS and DTK should match the GPS-175 display settings with the waypoint GARMN.



CDI Selection GNAV1
CDI Half Left
VDI Half Up
WPID GARMN



If the CDI, VDI and WPID are not displaying you should verify that the EFIS is getting the ARINC data from the GPS-175 from the following menu:

SET > CAL > Admin Settings > Diagnostics > GNAV 1 ARINC Data

Perform Diagnostics Tests

Configure Admin Settings

BACK

Looking for ARINC adapter...

AF-ACM-ECB is alive.

Serial Number: 224

Message Count: 997

GPS DATA

000002B0

(260) Date/Time: 00/00/2000 00:00:00

030046F9

(371) Equipment: GARMIN FLIGHT MGMT. COMP.

136806B1

(261) Flags: integrity: OK phase: APR

03680631

(061) Altitude: 3500 FT

6A506640

(100) Course: 149.5 GPS

6A50064C

(114) Desired Track: 149.5 TRUE

6000064D

(115) WP Bearing: 135.0

0007684E

(116) CrossTrk: 0.03 NM

000EC6D6

(326) Lateral Scale: 0.5 NM

FF9C064F

(117) Vertical Deviation: -50 FT TRK

064006D7

(327) Vertical Scale: 100 FT

18C806C8

(310) Latitude: N39 4.0533

BC846EC9

(311) Longitude: W94 53.8602

048006CA

(312) Ground Speed: 150.0 KTS

600006CB

(313) GPS Track: 135.0 TRUE

005006A9

(251) Dist to WP: 10.0 NM

00CC0651

(121) RollSteer: 1.12

VOR DATA

(371) Equipment:

(034) Frequency:

(222) Bearing To Active:

(100) Course:

(173) Localizer:

(174) Glideslope:

2. Device Logging

OFF

3. Output Pin

ON

4. Serial Loop Back

PORT 0

5. Serial Raw Logging

NONE

6. USB Read/Write Speed Test

PREV

NEXT

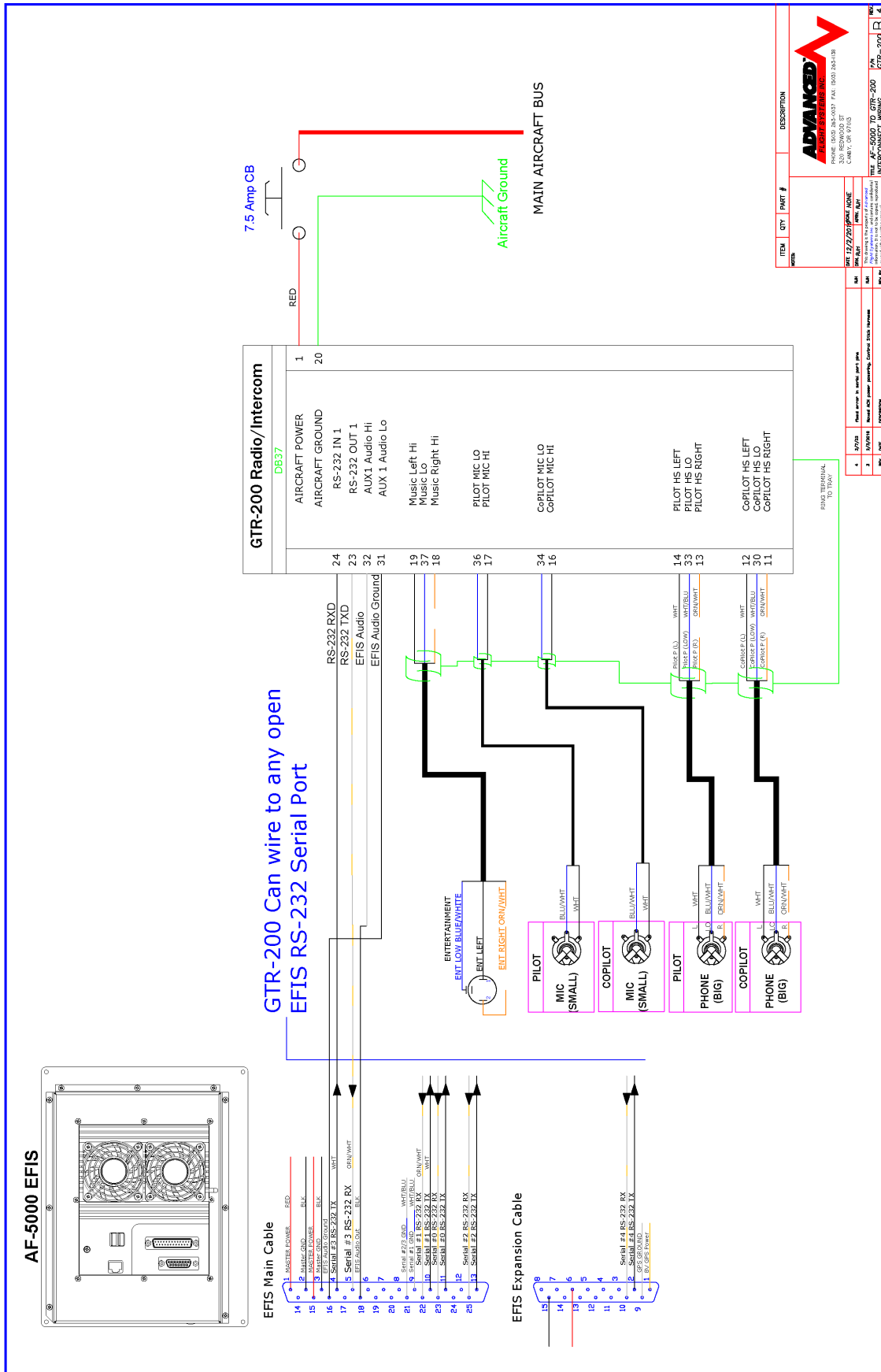
SEL

STOP

ROW

SEL

COL



Garmin 430W/530W

See Appendix M: EFIS/ARINC/AP Troubleshooting Guide

The 430W/530W should be wired for RS-232 Aviation format to serial port #1 along with their ARINC lines connected to the AF-ARINC module. See **APPENDIX M**, drawing number: 53620WD

EFIS Main Cable		430W	RS-232 Connection
Pin 10	TXD	-----	4001-57 RX
Pin 22	RXD	-----	4001-56 TX

The 430W/530W needs the following software configuration settings:

1. MAIN ARINC 429 CONFIG

Power up the 430W while holding the ENTER button and press [ENT] -> [ENT] to get to the Main ARINC 429 Config page. Configure the 430W using these settings. **OUT must be set to GAMA 429.**

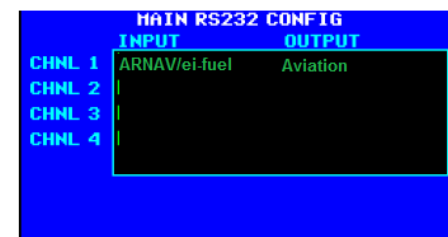
2. VOR / LOC / GS ARINC 429 CONFIG

Turn the inside right knob around 14 clicks to configure the VOR/LOC/GS ARINC 429 to the following settings.

3. Serial Ports

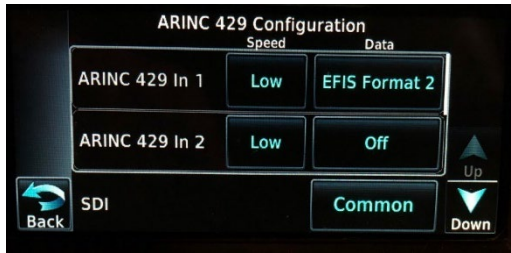
Select ARNAV/ei-fuel for the input and Aviation as the output.

If you have serial port #2 wired to the Transponder the output should be set to ADSB+

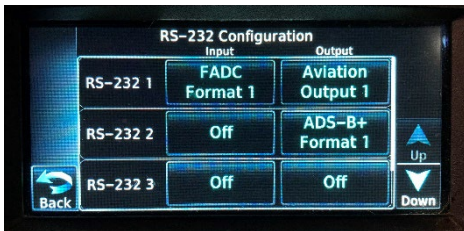


Garmin GTN650xi / 750xi

ARINC Settings



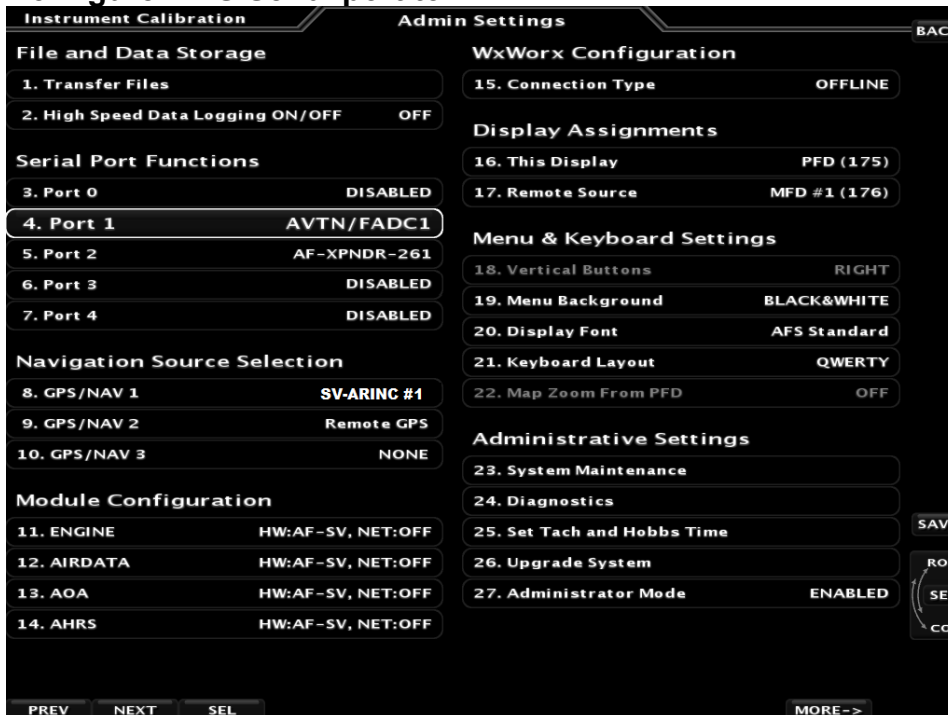
RS-232 Settings



VOR/LOC/GS Settings



Configure EFIS Serial port to AVTN/FADC1



Garmin SL-30

The AF-5000 will send/receive data from a SL30 on any configured EFIS Serial Port. The EFIS can get VOR/LOC/GS data from the SL30 and can set the OBS setting on the SL30. The EFIS can remote tune the radio frequencies on a SL30. If the EFIS is also connected to a Garmin 396/496 it will pass through any radio frequency tuning commands to the SL30.

EFIS Serial Port #3 Example

<u>EFIS Main Cable</u>		<u>SL30 37 Pin Connector</u>
Pin 4	TXD	Pin 4 RX
Pin 5	RXD	Pin 5 TX
Pin 21	GND	Pin 3 GND

The **Indicator Head Type** setting should be set to **SERIAL** in the SL30. This will enable the OBS to be set from the SL30 buttons and from the EFIS. Hold the <-> and SYS button at power up.

Garmin SL-40

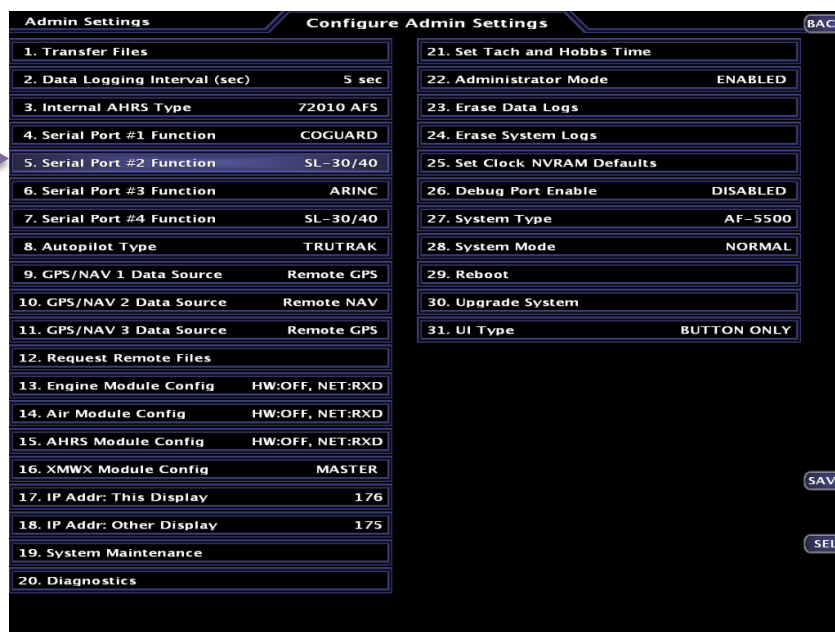
The AF-5000 will send/receive data from a SL40 on any configured EFIS Serial Port. The EFIS can remote tune the radio frequencies on a SL40.

EFIS Serial Port #3 Example

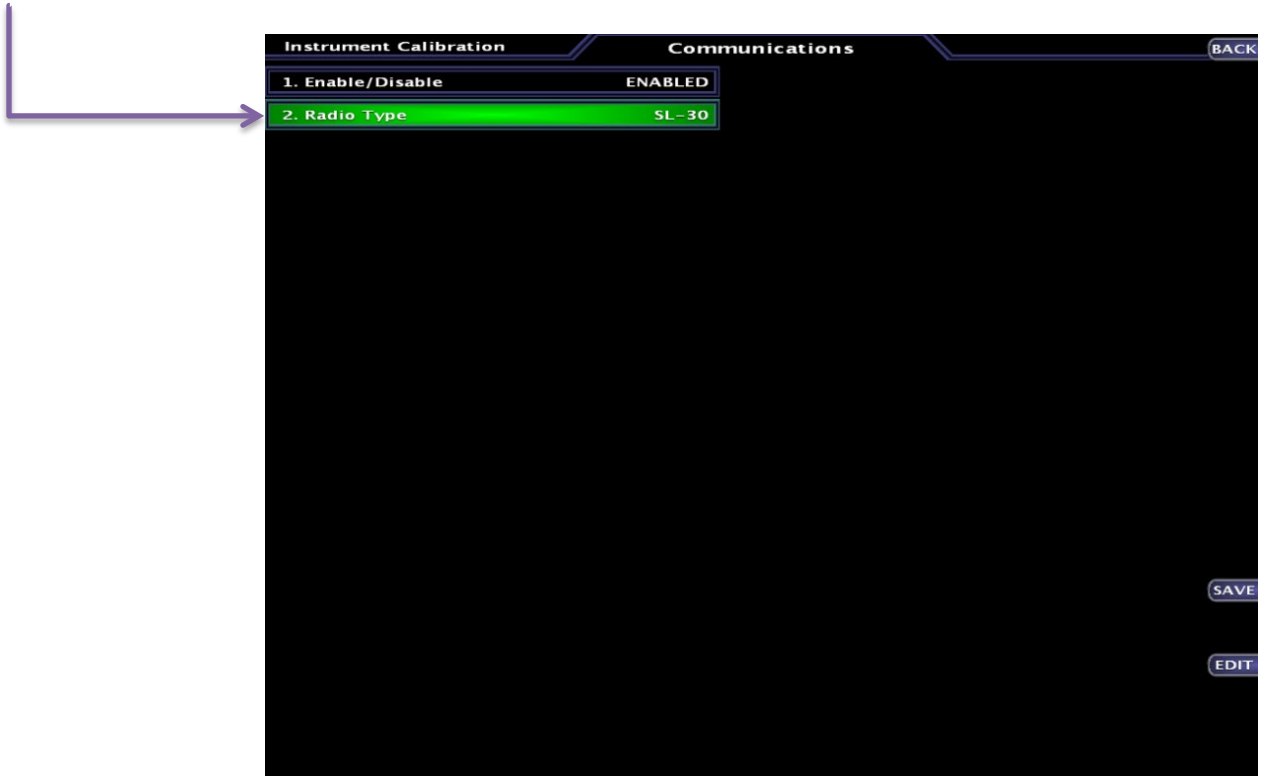
<u>EFIS Main Cable</u>		<u>SL40 15 Pin Connector</u>
Pin 4	TXD	Pin 10 RX
Pin 5	RXD	Pin 3 TX
Pin 21	GND	Pin 11 GND

No setup is required in the SL40 Radio,

The EFIS serial port should be configured as SL30 / SL40. You should not select a NAV/GPS source for the SL40.



EFIS Radio Frequency Configuration. If you want to be able to set and display the frequencies from a remote radio you will need select the correct radio from the EFIS Communications setup menu and ENABLE the feature.



Garmin GNC-255

The AF-5000 will send/receive data from a GNC255 on any configured EFIS Serial Port. The EFIS can get VOR/LOC/GS data from the GNC255 and can set the OBS setting on the GNC255. The EFIS can remote tune the radio frequencies on a GNC255.

EFIS Serial Port #3 Example

<u>EFIS Main Cable</u>		<u>GNC-255 P2001 44 Pin Connector</u>
Pin 4	TXD	----- Pin 16 RX
Pin 5	RXD	----- Pin 1 TX
Pin 21	GND	----- Pin 31 GND

The **Indicator Head Type** setting should be set to **SERIAL, IO mode: NMEA** in the GNC255. This will enable the OBS to be set from the GNC255 buttons and from the EFIS. Enter Calibration mode by cycling power while holding the **ENT** key

Garmin GTR-225

The AF-5000 will send/receive data from a SL40 on any configured EFIS Serial Port. The EFIS can remote tune the radio frequencies on a SL40.

EFIS Serial Port #3 Example

<u>EFIS Main Cable</u>		<u>SL40 15 Pin Connector</u>
Pin 4	TXD	----- Pin 10 RX
Pin 5	RXD	----- Pin 3 TX
Pin 21	GND	----- Pin 11 GND

No setup is required in the SL40 Radio,

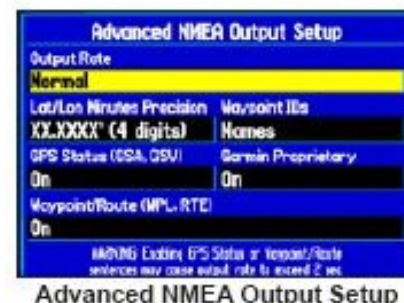
The EFIS serial port should be configured as GTR/GTN-2XX. You should not select a NAV/G

Garmin 396/496

1. The 396/496 can send RS-232 data in NMEA 4800 Baud format **or** NMEA & VHF 9600 Baud. If you also have a SL30/SL40 connected you should use the NMEA & VHF 9600 Baud setting in the GPS. This will enable you to set the standby radio frequency on the SL30 from the GPS. Make sure that you use the same baud rate setting in the GPS and EFIS Admin setup.
2. ***The NMEA output rate on the 396/496 must be set to normal.***

To access the Advanced NMEA Output Setup:

- a. Press MENU twice to open the Main Menu.
- b. Use the ROCKER to select Setup from the vertical tab list.
- c. Select Interface from the row of tabs along the top.
- d. Highlight the field below Serial Data Format. Press ENTER
- e. Select NMEA In/NMEA Out. Press ENTER
- f. Press MENU to open the options menu. Select Advanced NMEA Setup and press ENTER.



Advanced NMEA Output Setup

P/N: 74109 Dynon/AFS SV-261 Transponder

The SV-261 Mode S transponder is a DO-181D compliant Mode S level 2els datalink transponders, with support for ADS-B extended squitter, which also meets the relevant environmental requirements of DO-160F/ED-14F. The SV-XPNDR-261 has a nominal power output of 250 watts, and meets the power output requirements for Class 1. The ADS-B function meets DO-260B class B1S. The SV-261 is certified to ETSO 2C112b and ETSO C166a, and to FAA TSO C112c and C166b.

The SV- 261 transponder is controlled using the AF-5000 on-screen menu system. This allows the transponder to be mounted separately from the instrument panel and reduces the amount of panel space taken by the transponder. The AF-5000 also provides pressure altitude directly to the transponder, eliminating the need for a separate altitude encoder.

The SV-261 transponder runs from either 14 volt nominal or 28 volt nominal DC power supply with no configuration changes required.

The SV-261 transponder responds to both legacy Mode A/C interrogations and to Mode S interrogations from both ground radar and airborne collision avoidance systems. In all cases, the interrogations are received by the transponder on 1030MHz, and replies are transmitted on 1090MHz

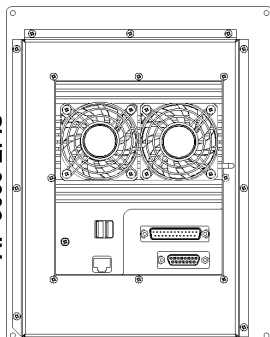
The SV-261 has a single D25 female connector which provides the data and power inputs to the transponder. A single TNC coaxial connector attaches to the antenna.

SV-261 Interface – Pinout (Female D25)

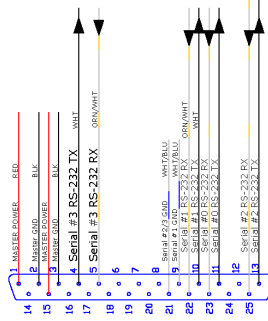
Pin	Function	Notes
1	Loopback 1	Connect to Pin 2
2	Loopback 1	Connect to Pin 1
3	GPS Serial Input	Certified GPS Only for ADS-B Out (see explanation below)
4	No Connect	-
5	Transponder Serial RX	Data Input from AF-5000
6	No Connect	-
7	Transponder Serial TX	Data Output to AF-5000
8	No Connect	-
9	No Connect	-
10	No Connect	-
11	No Connect	-
12	Loopback 2	Connect to Pin 13
13	Loopback 2	Connect to Pin 12
14	Ground	Connect to Aircraft Ground

Pin	Function	Notes
15	11-33V DC	Connect to Aircraft Power
16	No Connect	-
17	External Standby In	Optional: Not Commonly Connected
18	Mutual Suppression	Optional: Not Commonly Connected
19	Squat Switch In	Optional: Not Commonly Connected
20	Ident Switch In	Optional: Not Commonly Connected
21	No Connect	-
22	No Connect	-
23	No Connect	-
24	No Connect	-
25	No Connect	-

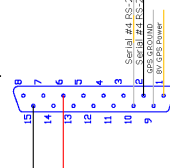
AF-5000 EFIS



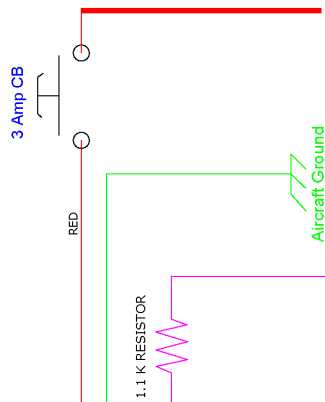
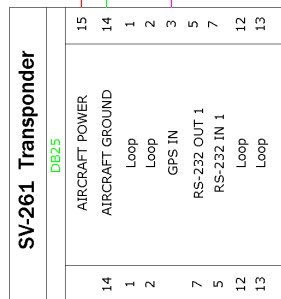
EFIS Main Cable



EFIS Expansion Cable

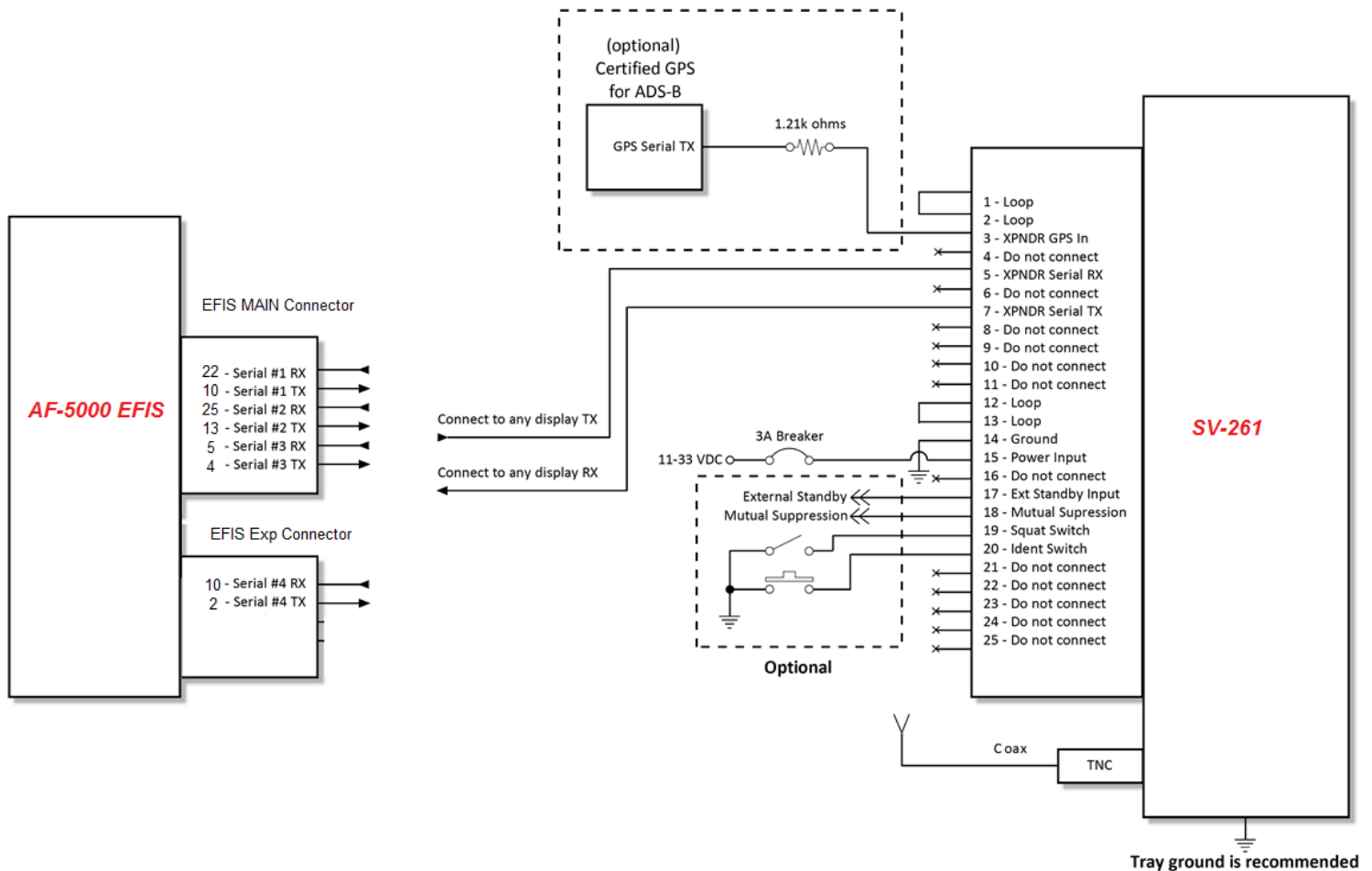


SV-261 Can wire to any open EFIS RS-232 Serial Port



Connect to GPS Navigator ADSB GPS Data output.
Not used if you are using a Dynon SV-GPS-2020 without an IFD or GTN Navigator

ITEM	QTY	PART #	DESCRIPTION
1	1	SV-261	SV-261 Transponder
2	1	1.1 K	1.1 K RESISTOR
3	1	3 Amp	3 Amp CB
4	1	DB25	DB25 Connector
5	1	RS-232	RS-232 Cable
6	1	GPS	GPS Antenna
7	1	IFD	IFD
8	1	GTN	GTN
9	1	SV-GPS-2020	SV-GPS-2020
10	1	SV-5000	SV-5000
11	1	SV-5000	SV-5000
12	1	SV-5000	SV-5000
13	1	SV-5000	SV-5000
14	1	SV-5000	SV-5000
15	1	SV-5000	SV-5000
16	1	SV-5000	SV-5000
17	1	SV-5000	SV-5000
18	1	SV-5000	SV-5000
19	1	SV-5000	SV-5000
20	1	SV-5000	SV-5000
21	1	SV-5000	SV-5000
22	1	SV-5000	SV-5000
23	1	SV-5000	SV-5000
24	1	SV-5000	SV-5000
25	1	SV-5000	SV-5000
26	1	SV-5000	SV-5000
27	1	SV-5000	SV-5000
28	1	SV-5000	SV-5000
29	1	SV-5000	SV-5000
30	1	SV-5000	SV-5000
31	1	SV-5000	SV-5000
32	1	SV-5000	SV-5000
33	1	SV-5000	SV-5000
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35	1	SV-5000	SV-5000
36	1	SV-5000	SV-5000
37	1	SV-5000	SV-5000
38	1	SV-5000	SV-5000
39	1	SV-5000	SV-5000
40	1	SV-5000	SV-5000
41	1	SV-5000	SV-5000
42	1	SV-5000	SV-5000
43	1	SV-5000	SV-5000
44	1	SV-5000	SV-5000
45	1	SV-5000	SV-5000
46	1	SV-5000	SV-5000
47	1	SV-5000	SV-5000
48	1	SV-5000	SV-5000
49	1	SV-5000	SV-5000
50	1	SV-5000	SV-5000



Note that pins 1 <> 2, and pins 12 <> 13 must be connected to each other as depicted above via your wiring harness. They are not shorted internally.

Power/Ground Input

The power supply can be 11-33 Volts DC; no voltage adjustment is required. 20 AWG wire is sufficient for wire runs up to 50' for this application. Use a 3 or 5 Amp fuse or circuit breaker for power supply protection to the SV-261.



The transponder power input is not protected against reversed power connections. Reversing the power and ground inputs to the transponder will destroy it. Check wiring before applying power.

Mutual Suppression (optional)

Mutual Suppression allows two or more transmitters on adjacent frequencies to inhibit the other transmitters when one is active to limit the interference effects. It is commonly used between transponders and DME systems, and between transponders and collision avoidance systems. Most installations will not make use of this feature, since most AF-5000 equipped aircraft have only one transponder and often do not have DME equipment or other active traffic system that interrogate other aircraft.

The Mutual Suppression pin (18) is an ARINC compatible suppression bus interface, which acts as both an input and an output. The SV-261 will assert this signal when it is transmitting, and can be suppressed by other equipment that asserts the signal. The SV-261 will drive approximately 24 Volts on the output (independently of supply voltage), and will treat the input as active whenever the bus has greater than 10 Volts. If you are using the Mutual Suppression feature, simply connect all of the Mutual Suppression wires from devices that use them together.

Ident Switch Input (optional)

AF-5000 has an IDENT button in its transponder menu that is normally used to ident when requested by ATC. However, the ident switch input allows the IDENT function to be selected using a remote switch. The input is active low, and will be asserted when the voltage to ground is pulled below approximately 4 Volts. Therefore, a momentary switch to ground should be installed on this output if a remote ident switch is desired.

Squat Switch Input (optional)

The Squat switch input allows the transponder to automatically switch between Airborne and Ground modes, and affects both the Mode S reply behavior and the ADS-B reporting behavior. The input will be asserted when the voltage to ground is pulled below approximately 4 Volts. The logical sense of the input can be programmed to be either active low or active high in the AF-5000 Setup Menu.

This must be a mechanical switch that accurately reflects the aircraft's on-ground status. Mode-S certification requirements state that this cannot be a simple airspeed switch.

On an aircraft with no appropriate squat switch circuit this input should be left unconnected, and the transponder programmed to either ignore the input or use its "automatic" airborne/ground capability. See the AUTO ALT/GND SWITCH setting in the Transponder Settings section of this chapter for further information about this capability.

External Standby Input (optional)

This input, when held low, places the transponder in Standby mode. It should be used to switch between transponders in an installation with two transponders. The input is active low, and will be asserted when the voltage to ground is pulled below approximately 4 Volts.

Direct Serial GPS Position Input

Although the AF-5000 can send its GPS information to the SV- 261 for use with its ADS-B position-reporting capability, The AF-5000 GPS does not meet any certification standard, and is not TSO'd. Additionally, appropriately certified GPS units that can provide position for regulatory-compliant ADS-B installations may need to be connected directly to the ADS-B Out device (in this case, the SV- 261) for compliance credit. For these purposes, a dedicated direct serial input is provided on the SV- 261 module that allows an appropriate GPS receiver serial output to be connected directly to the SV- 261.

If you connect a GPS to this direct input, you must install a 1.21k resistor (included with the SV -261) between the GPS and the SV-261 as shown.

The SV- 261 GPS input can recognize the following protocols:

- Industry standard "Aviation" protocol
- Freeflight GPS proprietary protocol
- Garmin proprietary ADS-B protocol (compatibility not verified)

Some of the protocols listed above may not contain all the required data for a compliant ADS-B message, depending on the intended airspace regulations. Further information can be found in the GPS Data section under the Transponder Settings of this chapter.

(US-Only) Direct Serial GPS Position Input for FAA 2020 ADS-B Out Mandate Compliance

To comply with the 2020 ADS-B Out Mandate in the US, the GPS position used for ADS-B Out position reports must be directly connected to a suitable ADS-B Out device (in this case, the SV- 261), and, that GPS must meet TSO C166b. DO NOT connect any GPS (including AF-5000 own GPS outputs) that does not meet TSO C166b directly to the transponder.

It is important to note that in the US, the ADS-B Out "mandate" and its associated GPS requirements do not go into effect until 2020. If you do not already have an appropriately TSO'd WAAS IFR GPS in the aircraft, you may continue to leave this Direct Serial unconnected for the time being. Instead the AF-5000 has the capability to send its GPS position to the SV- 261 . Although The AF-5000's GPS output does not meet the 2020 requirements, it can be used until then to "wake up" the ADS-B ground stations so that they report back traffic targets around your aircraft's position.

Antenna Installation

The antenna should be installed according to the manufacturer's instructions.

In our RV-10 Aircraft we used a Comant CI 105 DME/Transponder Antenna.

The following considerations should be taken into account when siting the antenna:

- The antenna should be well removed from any projections, the engine(s) and propeller(s). It should also be well removed from landing gear doors, access doors or others openings which will break the ground plane for the antenna.
- The antenna should be mounted on the bottom surface of the aircraft and in a vertical position when the aircraft is in level flight.
- Avoid mounting the antenna within 3 feet of the ADF sense antenna or any COMM antenna and 6 feet from the transponder to the DME antenna.
- Where practical, plan the antenna location to keep the cable lengths as short as possible and avoid sharp bends in the cable to minimize the VSWR (voltage standing wave ratio).



Electrical connection to the antenna should be protected to avoid loss of efficiency as a result of the presence of liquids or moisture. All antenna feeders shall be installed in such a way that a minimum of RF energy is radiated inside the aircraft.

Antenna Ground Plane

When a conventional aircraft monopole antenna is used it relies on a ground plane for correct behavior. For ideal performance the ground plane should be very large compared to the wavelength of the transmission, which is 275 mm. In a metal skinned aircraft this is usually easy to accomplish, but is more difficult in a composite or fabric skinned aircraft. In these cases a metallic ground plane should be fabricated and fitted under the antenna.

As the ground plane is made smaller, the actual dimensions of the ground plane become more critical, and small multiples of the wavelength should be avoided, as should circles. Rectangles or squares are much less likely to create a critical dimension that resonates with the transmissions. The smallest practical ground plane is a square around 120 mm per side; as the size increases the performance may actually get worse, but will be better by the time the ground plane is 700 mm on each side. Anything much larger than that size is unlikely to show significant further improvement.

The thickness of the material used to construct the ground plane is not critical, providing it is sufficiently conductive. A variety of proprietary mesh and grid solutions are available. Heavyweight cooking foil meets the technical requirements, but obviously needs to be properly supported.

Antenna Cable

The SV-261 is designed to meet Class 1 requirements with the same 2 dB allowance. Excessive loss will degrade both transmitter output power and receiver sensitivity.

Allowing 0.25dB loss for the connector at each end of the antenna cable assembly leaves an allowance of 1.5dB maximum loss for the cable itself.

An acceptable cable:

- Has less than 1.5 dB loss for the run length needed
- Has a characteristic impedance of 50 Ohms
- Has double braid screens or has a foil and braid screen

Once the cable run length is known, a cable type with low enough loss per meter that meets the above requirements can be chosen. Longer runs require lower loss cable. Consider moving the SV -261 closer to the antenna to minimize the losses in the antenna cable – subject to the limits identified above, the SV- 261 can be at any distance from the AF-5000 display without affecting performance in any way.

Note: Low loss cable typically uses foamed or cellular dielectrics and foil screens. These make such cables especially prone to damage from too-tight bends or from momentary kinking during installation. Once kinked, these cables do not return to full performance when straightened.

The following table is a guide to the maximum usable lengths of some common cable types. Actual cable loss varies between manufacturers, there are many variants, and the table is therefore based on typical data. Use it as a guide only and refer to the manufacturer's data sheet for your specific chosen cable for accurate values.

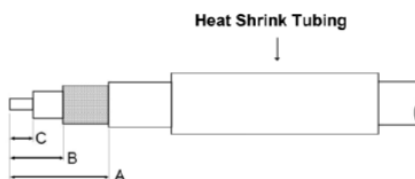
Max Length in Meters	Max Length in Feet	Insertion Loss dB/meter at 1090MHz	MIL-C-17 Cables	Electronic Cable Specialists Type	SSB Electronic
2.54	8' 4"	0.59	M17/128 (RG400)		
3.16	10' 4"	0.47		3C142B	
3.81	12' 6"	0.39	M17/112 (RG304)		
4.50	14' 9"	0.33			Aircell 5
5.25	17' 3"	0.29	M17/127 (RG393)	311601	
6.42	21' 1"	0.23		311501	
6.81	22' 4"	0.22			Aircell 7
8.22	26' 11"	0.18		311201	
12.59	41' 3"	0.12		310801	

Antenna TNC Connector

This section describes the technique for attaching the antenna cable to a TNC connector. A TNC connector is not supplied with the SV- 261. The SV-261 has a female TNC connection. Therefore, you will need to source a male TNC connector that is compatible with the antenna cable type that meets your aircraft's needs.

A dual crimp style TNC connector can be completed using a wide range of commercial crimp tools (for example the Tyco 5-1814800-3). The die apertures for the inner pin and the outer shield should be approximately 1.72 mm and 5.41 mm respectively.

- Strip back the coax cable to the dimensions in the table, as shown in the diagram below. Slide 25 mm (1 inch) of heat shrink tubing over the cable.
- Slide the outer crimp sleeve over the cable – it must go on before securing the center contact.



Dimension	Cut size (mm)	Cut size (inches)
A	17.5	0.69
B	7.2	0.28
C	4.8	0.19

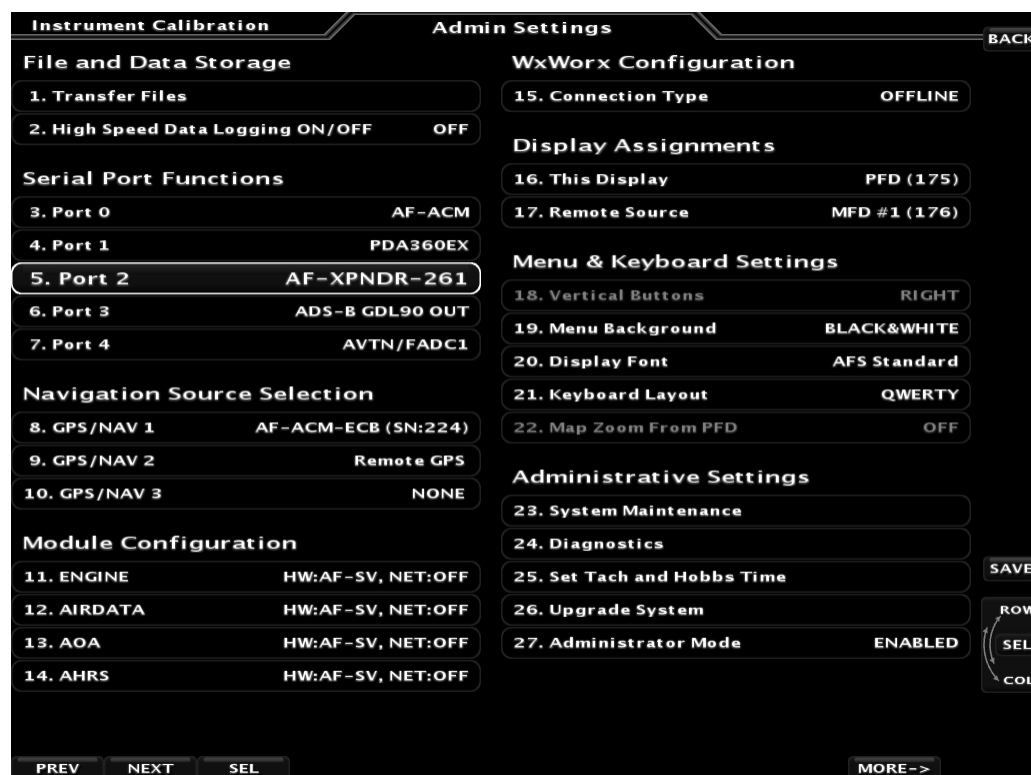
- Crimp the center contact to the cable.
- Insert the cable into the connector – the center contact should click into place in the body, the inner shield should be inside the body of the connector and the outer shield should be outside the body.
- Crimp the outer sleeve over the shield.
- Slide heat shrink tubing forward (flush to connector) and heat to shrink the tubing.

AF-5000 Configuration for SV-261 Transponder

The configuration of the Transponder is done from the AF-6600 / AF-5000 Instrument Calibration menu.

Serial Port Setup

The AF-6600 / AF-5000 serial port that is wired to the Transponder should be set to **AF-XPNDR-261** in the Configure Admin Settings menu.



Transponder Settings

Instrument Calibration		Transponder	
Transponder Configuration			
1. Instrument OFF/ON	ON		
2. Transponder Type	SV-XPNDR-26x		
3. Software Update	UNAVAILABLE		
Aircraft Settings			
4. VFR Code	1200		
5. Tail Number	N10RV		
6. Mode S Code	A003E6		
7. Category	LIGHT FIXED WING		
8. Length (Meters)	7		
9. Width (Meters)	9		
10. Max Cruise (Knots)	150-300		
11. ALT/GND Switch	AIRDATA		
Traffic Settings			
12. TIS Service	ON		
13. ADS-B In Type	1090ES & UAT		
GPS Settings			
14. Input Type	AVIDYNE (Avi)		
15. Input Baud	----		
16. Class	SDA=2(LEV C)/SIL=3		
17. Lateral Offset (Meters)	CENTERED		
18. Linear Offset (Meters)	AUTO		

14. Input Type (Configure for the GPS providing position data)

<u>GPS Wired to Transponder</u>	<u>Input Type Setting</u>
Avidyne IFD	AVIDYNE (Avi)
GTN	GARMIN ADSB+
Dynon GPS-2020	AF-GPS-2020

The following settings need to be configured before testing and using the transponder. They are all accessed from the Transponder menu.

- **AIRCRAFT Mode S CODE:** The Mode S Code is a 24 bit number issued to the aircraft by the registration authority for the aircraft. The website <http://www.airframes.org> provides hex codes for most countries' aircraft that can be directly inputted into AF-5000. The hex code is the value shown in the ICA024 result field. Alternatively, Mode S codes for US-registered aircraft can be found at the FAA aircraft registry at <http://registry.faa.gov/aircraftinquiry/>. The FAA aircraft register shows both the octal number and the hexadecimal. Setting up the SV- 261 requires the hexadecimal number. If you only have the octal number, you must convert it to hexadecimal. There is an Octal to Hexadecimal converter tool available in the support section of <http://www.trig-avionics.com/>.

The hex code needs to be set to the aircraft's assigned code for the transponder to function properly. The default code of 000000 is not a valid code. If the code is left at 000000, the transponder will only work in SBY mode.

- **VFR CODE:** When the pilot presses the VFR button, a pre-programmed code will replace the current squawk code. The pre-programmed code is set up here; the choice of code will depend on the normal location of the aircraft. In the USA, the VFR squawk code is 1200. In most parts of Europe, the VFR squawk code should be set to 7000.
- **AUTO ALT/GND SWITCH:** Allows the transponder to automatically switch between Airborne and Ground modes. Available options include:
NONE : Automatic switching disabled
SQUAT SWITCH LOW ON GND: Utilizes a physical squat switch connected the SV- 261 per the above instructions. When this option is selected, the transponder will consider the aircraft to be on the ground when this switch is low (electrically grounded).
SQUAT SWITCH LOW IN AIR: Utilizes a physical squat switch connected the SV- 261 per the above instructions. When this option is selected, the transponder will consider the aircraft to in flight when this switch is low (electrically grounded).
AUTOMATIC (AIR DATA): The transponder automatically determines whether the aircraft is in flight or not by using a combination of GPS and air data changes from AF-5000.
- **AIRCRAFT CATEGORY:** To assist ATC tracking of aircraft, an aircraft category can be transmitted by Mode S transponders. Set as appropriate for your aircraft.
- **AIRCRAFT LENGTH and AIRCRAFT WIDTH:** On the ground, ADS-B transmits encoded aircraft size information which is used by ATC to identify taxiing routes and potential conflicts. Using the aircraft length and width (wingspan), in your current distance/speed units (meters or feet), the SV- 261 will calculate the appropriate size code for transmission.
- **MAXIMUM CRUISE SPEED:** Mode S transponders can transmit their maximum airspeed characteristics to aircraft equipped with TCAS. This information is used to help identify threats and to plan avoiding action by the TCAS equipped aircraft. The airspeeds are grouped in ranges. Set as appropriate for your aircraft.
- **TIS TRAFFIC:** Enables the display of TIS traffic on the AF-5000 Map page when in an area served by a TIS-enabled radar. Note that TIS is a Mode S uplink service that is provided by some US approach radars. TIS coverage is limited to the coverage areas of those radars; there is no TIS provision outside the USA. If another traffic device is connected to AF-5000 and is set up correctly, its traffic information will trump the TIS traffic from the SV- 261, regardless of this setting.
- **GPS DATA:** Determines the source of GPS position updates for ADS-B Out:



Use of any of the DIRECT GPS-to-transponder position reporting methods below require that the GPS that is connected to the transponder be TSO'd when used in the US. Additionally, only specific models are supported via these connections. Other countries may have different regulatory requirements for GPS position indicators that are connected directly to the SV- 261's direct serial input.

- **DIRECT (AVIATION):** Generic GPS outputting Aviation format data, connected directly to SV- 261 pin 3, transmitting at 9600 baud. As this data format does not contain all of the information that ADS-B position inputs require, Trig does not recommend using this connection for any purposes. Using this setting causes the transponder to transmit the following ADS-B performance parameters:

SIL: 0 (Unknown integrity)
 NACp: 0 (Unknown position accuracy)
 NIC: 0 (Unknown containment)
 NACv: 1 (10m/s accuracy)

- **DIRECT (FREEFLIGHT):** Freeflight 1201 or 1204 GPS, connected directly to SV- 261 pin 3, transmitting at 19200 baud. Using this setting causes the transponder to transmit the following ADS-B performance parameters:

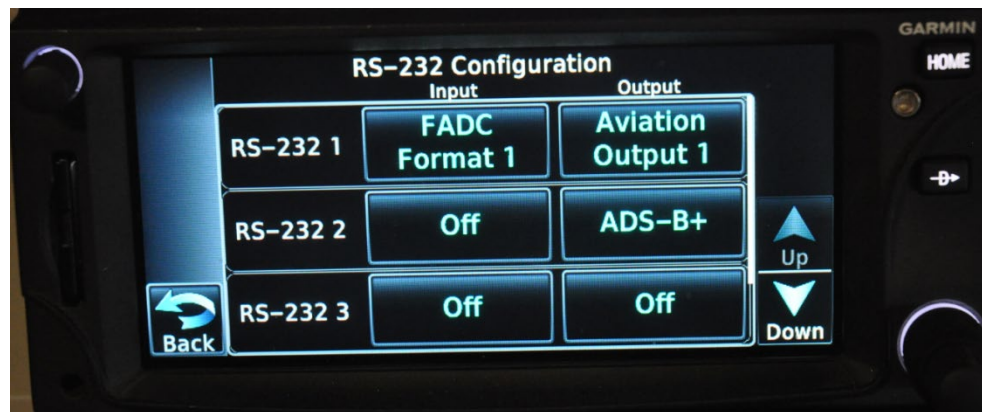
SIL: 2 (Level C integrity)

NACp: Sent from GPS to transponder. Refer to GPS documentation.

NIC: Sent from GPS to transponder. Refer to GPS documentation.

NACv: 1 (10m/s accuracy)

- **DIRECT (GARMIN ADS-B+):** Garmin GNS 400W/500W series (WAAS) or Garmin GTN series, both with appropriate software updates as designated by Garmin, connected directly to SV -261 pin 3, transmitting at 9600 baud. Note that this option only works with transponder software 2.02 or above. See the Transponder Software Updates section below for more information about transponder software. Using this setting causes the transponder to transmit the following ADS-B performance parameters:



SIL: 3 (Level B integrity)

NACp: Sent from GPS to transponder. Refer to GPS documentation.

NIC: Sent from GPS to transponder. Refer to GPS documentation.

NACv: 1 (10m/s accuracy)

- **AFS Direct:** AF-5000 reports its GPS position to the transponder via its nominal AF-5000<>SV-261 serial connection. Using this setting causes the transponder to transmit the following ADS-B performance parameters:

SIL: 0 (Unknown integrity)

NACp: 8, 9 or 10. Dynamic, as reported by GPS.

NIC: 8 (Containment radius <0.1 NM)

NACv: 1 (10m/s accuracy)

- **GPS STATUS:** Displays whether the SV-XPNDR-26X is receiving valid GPS data.
- **ADS-B IN FREQUENCY:** Tells the ADS-B system which frequency (US-only) the aircraft can receive traffic/weather information on.

NONE: The aircraft does not have ADS-B In capability

978 MHz UAT: The aircraft can receive ADS-B traffic and/or weather information via a UAT band (978 Mhz)

1090 MHz ES: The aircraft can receive ADS-B traffic information via a 1090 Mhz ES (extended squitter) device.

Transponder Post Installation Checks

Post installation checks should be carried out in accordance with your certification requirements. These checks should include:

- Mode S interrogations to verify correct address programming.
- Verification of the reported altitude using a static tester.
- Where installed, verification of correct squat switch ground/airborne indications. In an aircraft with a squat switch, setting the Mode switch to ALT when the aircraft is on the ground should leave the transponder in GND mode; when the aircraft becomes airborne, the mode should switch automatically to ALT.
- Interrogations to verify the receiver sensitivity. A Mode S transponder should have a minimum triggering level (MTL) of between -77 dBm and -71 dBm. Failure to meet this requirement usually indicates antenna or coaxial cable problems.
- Interrogations to verify the transmitted power. A Class 1 installation should have no less than 125 Watts at the antenna (and no more than 500 Watts). A Class 2 installation should have no less than 71 Watts at the antenna (and no more than 500 Watts). Failure to meet this requirement is also generally due to antenna or wiring issues.
- Where installed, verification of the GPS position source and ADS-B outputs. Whenever a valid position is received by the transponder and the transponder is in any mode other than Standby, ADS-B Extended Squitters should be observed on the transponder test set.
- Ensure all regulatory requirements are met. In the United States, the transponder must be tested and inspected per FAR 91.413.

Garmin GTX 327 / GTX 330 Transponder

The AF-5000 can act as the altitude encoder and send the current pressure altitude on EFIS Serial Port #2. The GTX 327 / GTX 330 should be configured for ICARUS 25ft altitude format. The EFIS can also be configured to receive traffic data from the GTX 330 for the moving map. **The GTX 330 should be set for Serial 1 ICARUS Input and REMOTE/TIS output.**

EFIS Serial Port	EFIS Main Cable	GTX 327	GTX 330
Serial Port #2 TXD	Pin 13	Pin 19	Pin 22
Serial Port #2 RXD	Pin 25	none	Pin 23

NOTE: The only time an altimeter and your transponder altitude will agree is when you have the baro set at 29.92. All transponders require pressure altitude referenced to standard pressure (29.92 in. Hg). The computers at the air traffic control center automatically adjust your altitude for the pressure offset. Why is this done? If it was not done this way the altitude that all the planes were reporting would be based on whatever setting a pilot had set and you would have a possibility for human error.

Sandia STX 165R Transponder

The EFIS will send altitude and commands to the remote transponder through a single serial port.

EFIS Serial Port	EFIS Main Cable	STX 165R	STX 165R Function
Serial Port #2 TXD	Pin 13	2	RS-232 RXD
Serial Port #2 RXD	Pin 25	7	RS-232 TXD
		1	Power (11-33V)
		5	Ground

Sandia STX 165R Connector Pins

Pin #	Description	I/O	Notes
1	Aircraft Power 11-33Vdc	In	
2	RS 232A (TCMD)	In	
3	Serial Ground	In	
4	RS232B (Altitude In)	In	9600 Baud
5	Aircraft Ground	In	
6	No C		
7	RS232A (TSTAT)	Out	
8	RS232B (Altitude Out)	Out	9600/1200 Baud Selectable. 9600 Baud Factory Default
9	Suppression	In	<.5V= Low, >1.8V=High)

J3
9 Pin Sub-D

P/N: 73140 Wi-Fi Module



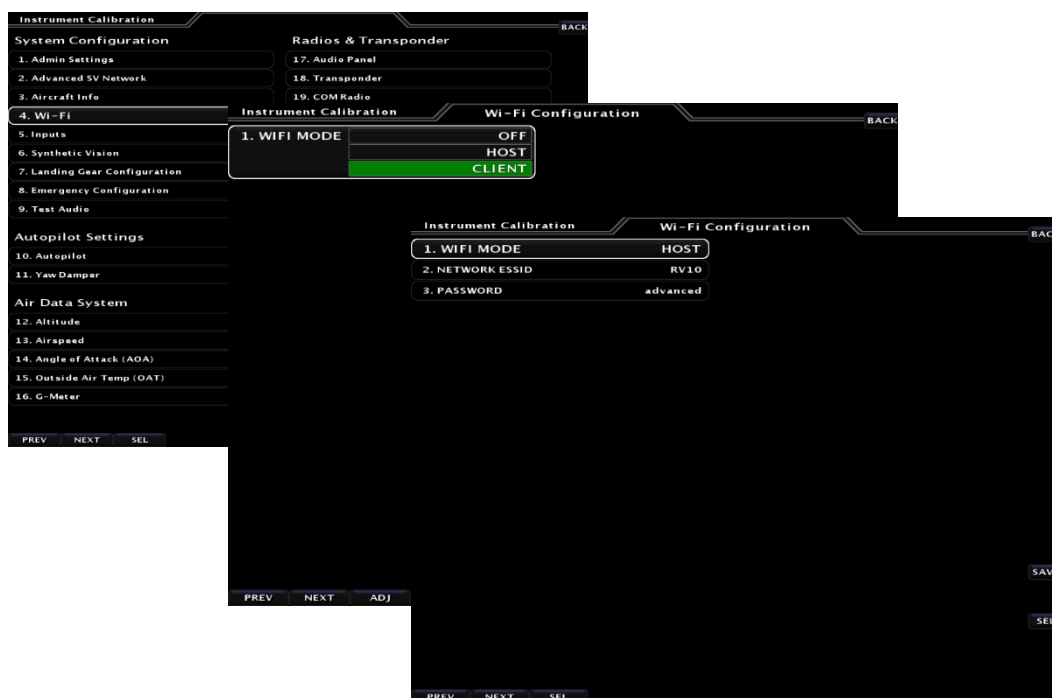
The Wi-Fi Adapter for AF-5000 allows communication with selected Wi-Fi devices and selected application software on those devices. When equipped for Wi-Fi only one Wi-Fi Adapter needs to be installed in the plane. The Wi-Fi Adapter for AF-5000 is the only Wi-Fi adapter that AFS supports for use with the AF-5000 EFIS. The Wi-Fi Adapter for AF-5000 functions as a Wi-Fi Access Point (AP) – compatible devices connect to the EFIS display as you would connect to a Wi-Fi AP for Internet Access.

While selected devices can connect to a Wi-Fi Adapter for AF-5000 in a manner similar to connecting to a Wi-Fi AP, an AF-5000 system does not provide Internet Access.

The Wi-Fi Adapter for AF-5000 is compatible with all EFIS Touch screen displays, AF-5000 Rev 7 hardware and any EFIS with the updated CPU (CHECK > ABOUT > SYS **OS: 5**). Physical installation of the Wi-Fi Adapter for AF-5000 is simple. With the AF-5000 display powered off, plug it into an available USB port on the back of the EFIS display. Each Wi-Fi Adapter is shipped with a short USB extension cable which may increase performance and/or range in certain installations.

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 Hotspot

You can connect to Once you ask for the the



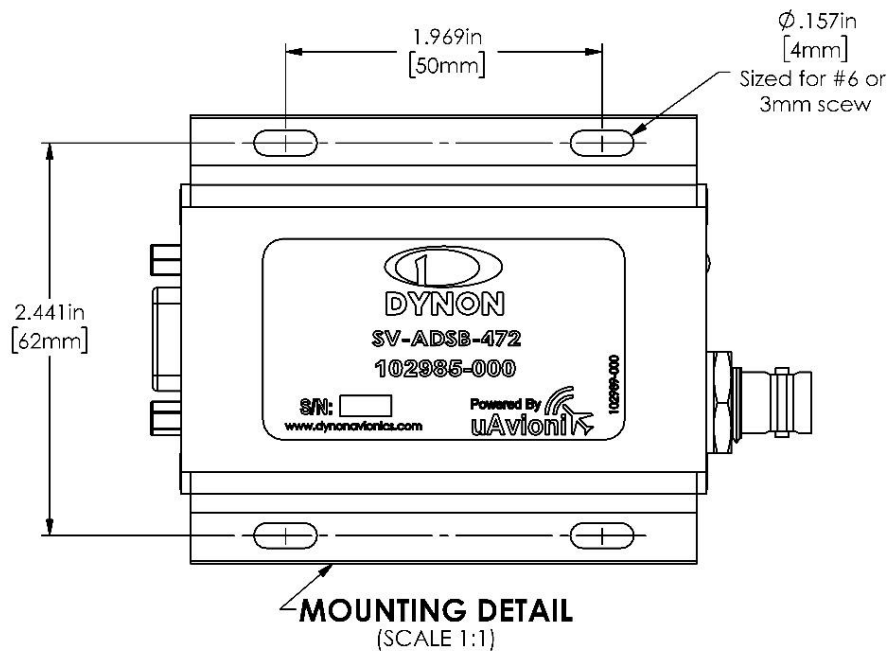
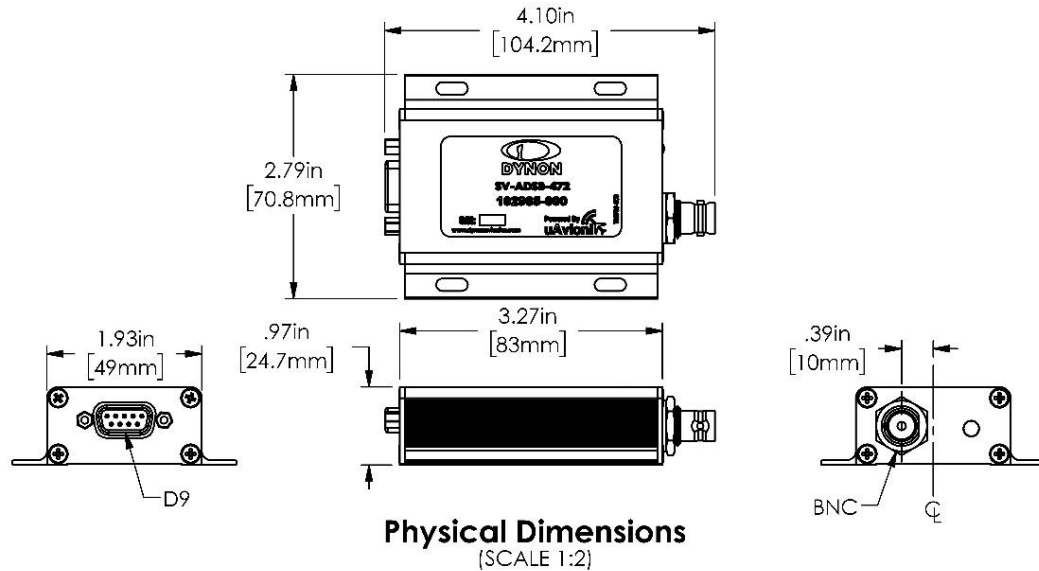
Wi-Fi ADS-B receiver or Wi-Fi

select the Wi-Fi network to from the SET > WiFi button. select the network the EFIS will password. You will need to get password from the network administrator or device manual.

P/N: 74113 SV-ADSB-472 Dual Band Receiver

AF-5000 can receive traffic and weather via the AF-ADSB Traffic and Weather Receiver. The AF-ADSB is a remote mounted module that connects to the AF-5000 via a serial port on one of your EFIS display(s). It also requires the installation of a dedicated antenna for ADS-B signal reception.

snip



P/N: 32021 AFS ADS-B Optional Install Kit

The optional AFS ADS-B install kit includes the following components:

Item	QTY	Part Number	Description
1	1	50109F	DB-9 Connector
2	1	50109S	DB-9 Connector Shell
3	9	50100M	Male DSUB Pins
4	1	73125	Ball and Stick UAT Antenna
5	2	50011	BNC Male Crimp Connector RG-142 (Antenna end)

The AF-ADSB is designed to be mounted in any convenient location in the cockpit, the cabin, or an avionics bay.

The following installation procedure should be followed, remembering to allow adequate space for installation of cables and connectors.

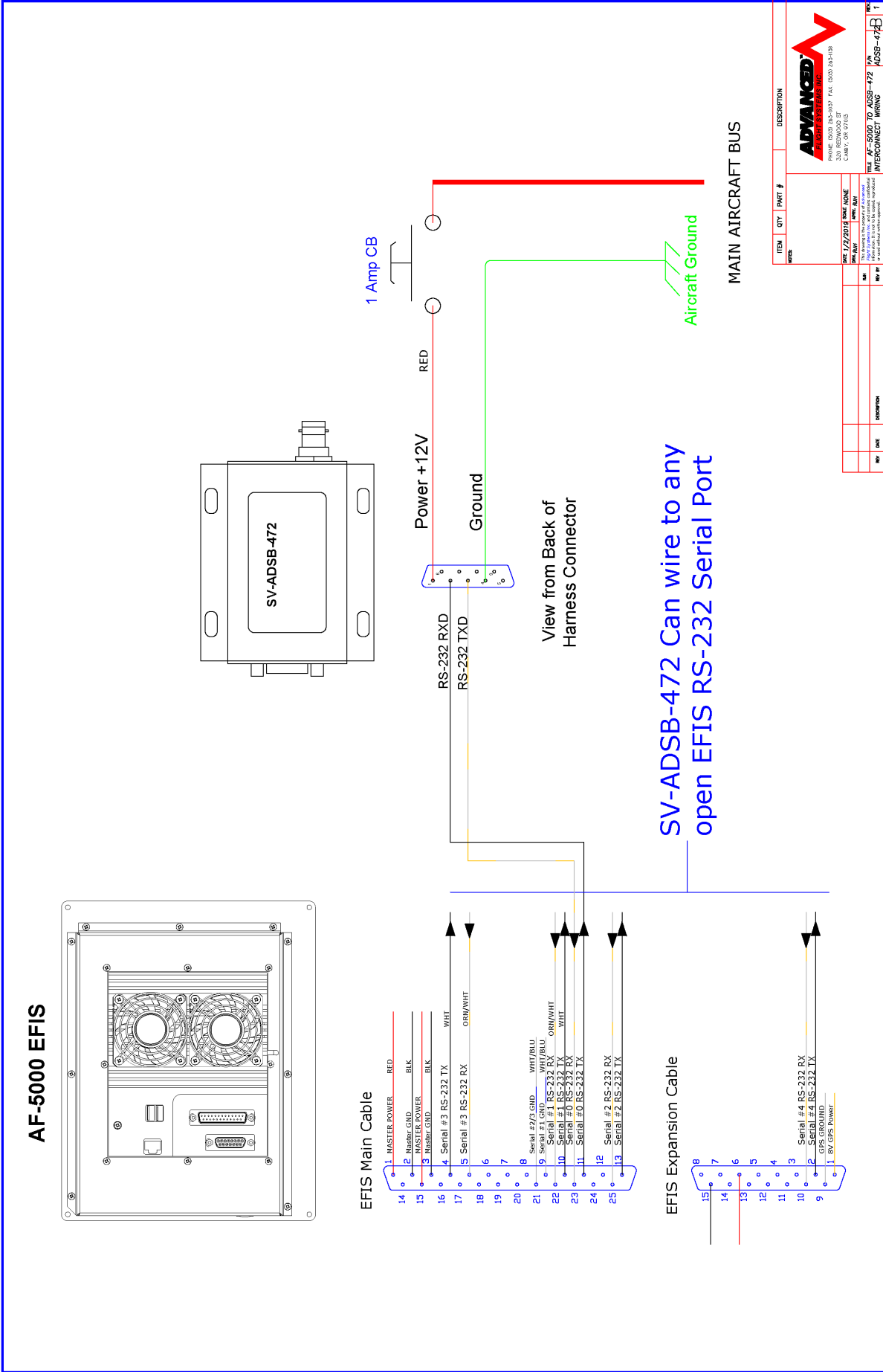
- Select a position in the aircraft that is not too close to any high external heat source. (The AF-ADSB is not a significant heat source itself and does not need to be kept away from other devices for this reason).
- Avoid sharp bends and placing the cables too near to the aircraft control cables.
- Secure the AF-ADSB to the aircraft using its four (4) mounting holes. The device should be mounted to a flat surface. The mounting tabs on each side of the module have holes sized for #8-32 fasteners, but it is up to the installer to decide how the module will be secured to the aircraft.

Additional items you will require, but which are not in the AF-ADSB package, include:

- Antenna and fixing hardware. Antenna selection suggestions are available in the following section.
- Cables and female BNC connector. You need to supply and fabricate all required cables. Guidance on cable types is given below.
- Mounting hardware: To secure the AF-ADSB to the aircraft.

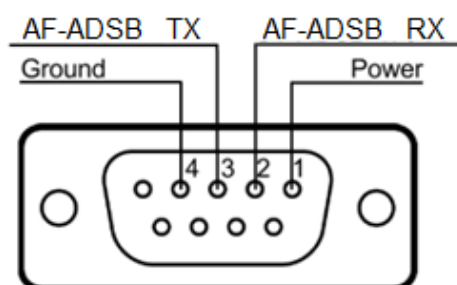
Electrical Installation

Because the AF-ADSB can be mounted in a variety of locations, the harness length requirements will vary from airplane to airplane. Therefore, Advanced Flight does not supply pre-manufactured harnesses for the AF-ADSB. Instead, your AF-ADSB shipped with the required D9 connector and pins to generate a suitable harness. Refer to the sections below for detailed wiring information.



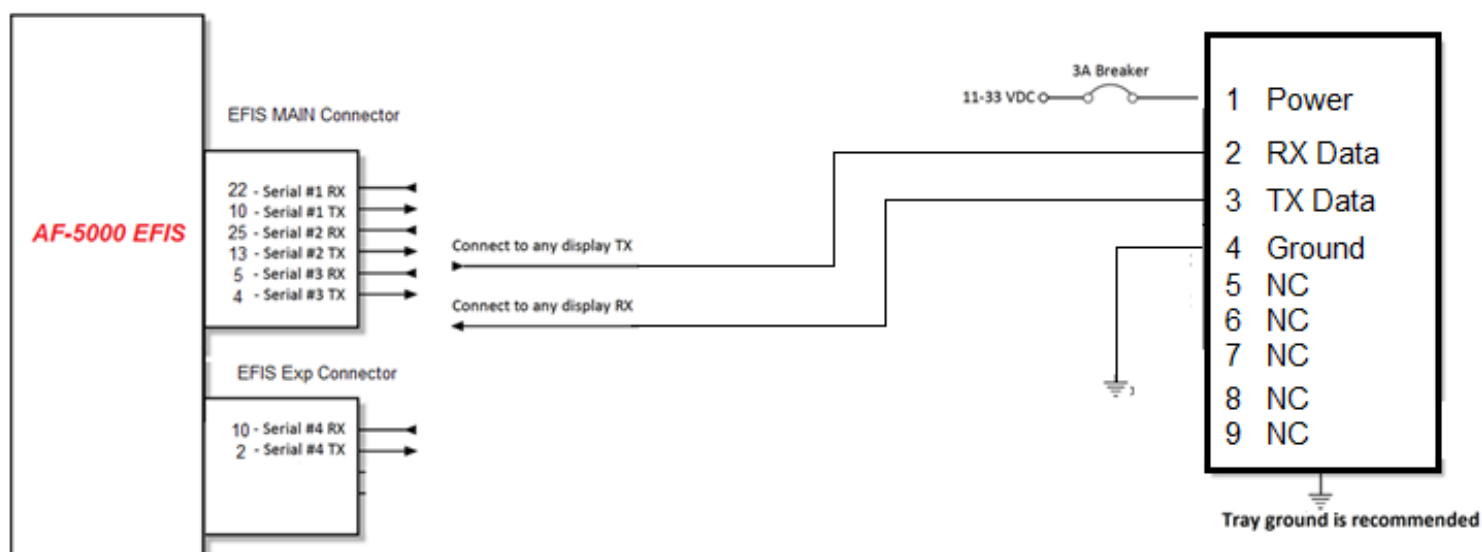
AF-ADS Pin-out Pin	Function	Notes
1	10-30V DC	Connect to Aircraft Power
2	AF-ADSB Serial RX	Data Input from AF-5000 TXD Pin
3	AF-ADSB Serial TX	Data Output to AF-5000 RXD Pin
4	Ground	Connect to Aircraft Ground
5	No Connect	-
6	No Connect	-
7	No Connect	-
8	No Connect	-
9	No Connect	-

The pin out depicted below depicts the view from the rear of your male D9 connector – the view you will have of your harness connector as you are inserting pins into the harness. Note that the pin numbers are labeled on the face of both the female and male connector.



(from back side of male D9 connector on the wiring harness)

The following shows the connections for the AF-5000's nominally available serial ports. Only ONE of the following serial ports will be used on one screen.



Power/Ground Input

The AF-ADSB can be powered by 10-30 Volts DC. 22 AWG wire is sufficient for wire runs up to 50' for this application. Use an appropriate size fuse or circuit breaker for power supply protection to the AF-ADSB. If 22 AWG wire is used, a 1 or 3 amp fuse/circuit breaker is acceptable. The AF-ADSB must be connected to aircraft power, and not to any of the AF-5000 power outputs.

Serial RX/TX

All communication between the AF-ADSB module and the AF-5000 is accomplished via a single bidirectional serial connection. To accomplish this:

- Choose an unused serial port on a EFIS display to connect the AF-ADSB. Note that both the TX and RX sides of the serial port are needed, and both the RX and TX lines must be connected.
- Connect the AF-ADSB TX wire (pin 3) to the AF-5000 serial RX of your choosing.
- Connect the AF-ADSB RX wire (pin 2) to the AF-5000 serial TX of your choosing.

Antenna Selection and Installation

The AF-ADSB requires its own antenna; it cannot share the transponder's antenna. The selected antenna should be installed according to the manufacturer's instructions. A UAT-specific antenna or a transponder antenna may be used with the AF-ADSB. Antennas available include (but are not limited to):

UAT Antennas

AFS P/N: 73,125 Ball and Stick UAT Antenna

Delta Pop (non-TSO):

http://www.deltapopaviation.com/UAT_Antenna.html

Rami AV-74 (TSO'd):

<http://www.rami.com/product-view.php?pid=24>

Transponder Antennas: Any antenna suitable for use with an aircraft transponder will work with the AF-ADSB.

The following considerations should be taken into account when siting the antenna:

- The antenna should be well removed from any projections, the engine(s) and propeller(s). It should also be well removed from landing gear doors, access doors or others openings which will break the ground plane for the antenna.
- The antenna should be mounted on the bottom surface of the aircraft and in a vertical position when the aircraft is in level flight.
- Where practical, plan the antenna location to keep the cable lengths as short as possible and avoid sharp bends in the cable to minimize the VSWR (voltage standing wave ratio).
- The AF-ADSB antenna should not be installed within 2 feet (24 inches) of the transponder antenna.

Antenna Ground Plane

When a conventional aircraft monopole antenna is used it relies on a ground plane for correct behavior. For ideal performance the ground plane should be very large compared to the wavelength of reception, which is 305 mm. In a metal skinned aircraft this is usually easy to accomplish, but is more difficult in a composite or fabric skinned aircraft. In these cases a metallic ground plane should be fabricated and fitted under the antenna.

As the ground plane is made smaller, the actual dimensions of the ground plane become more critical, and small multiples of the wavelength should be avoided, as should circles. Rectangles or squares are much less likely to create a critical dimension that resonates with the transmissions. The smallest practical ground plane is a square around 130 mm per side; as the size increases the performance may actually get worse, but will be better by the time the ground plane is 780 mm on each side. Anything much larger than that size is unlikely to show significant further improvement.

The thickness of the material used to construct the ground plane is not critical, providing it is sufficiently conductive. A variety of proprietary mesh and grid solutions are available. Heavyweight cooking foil meets the technical requirements, but obviously needs to be properly supported.

Antenna Cable

An acceptable cable:

- Has less than 3.0 dB loss for the run length needed. For runs less than 17 feet, RG58 is acceptable.
- Has a characteristic impedance of 50 Ohms
- If running the antenna cable in a bundle with or in close proximity to the transponder antenna cable:
 - Has double braid screens or has a foil and braid screen. For runs less than 17 feet, RG400 is acceptable.

When routing the cable, ensure that you:

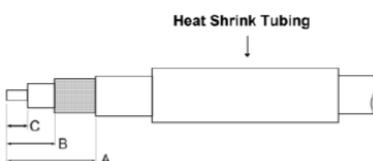
- Route the cable away from sources of heat.
- Route the cable away from potential interference sources such as ignition wiring, 400Hz generators, fluorescent lighting and electric motors.
- Keep the cable run as short as possible.
- Avoid routing the cable round tight bends.
- Avoid kinking the cable even temporarily during installation.
- Secure the cable so that it cannot interfere with other systems.

Antenna BNC Connector

This section describes the technique for attaching the antenna cable to a BNC connector. A BNC connector is not supplied with the AF-ADSB. The AF-ADSB has a female BNC connection. Therefore, you will need to source a male BNC connector that is compatible with the antenna cable type that meets your aircraft's needs.

A dual crimp style BNC connector can be completed using a wide range of commercial crimp tools (for example the Tyco 5-1814800-3). The die apertures for the inner pin and the outer shield should be approximately 1.72 mm and 5.41 mm respectively.

- Strip back the coax cable to the dimensions in the table, as shown in the diagram below. Slide 25 mm (1 inch) of heat shrink tubing over the cable.
- Slide the outer crimp sleeve over the cable – it must go on before securing the center contact.



Dimension	Cut size (mm)	Cut size (inches)
A	17.5	0.69
B	7.2	0.28
C	4.8	0.19

Crimp the center contact to the cable.

- Insert the cable into the connector – the center contact should click into place in the body, the inner shield should be inside the body of the connector and the outer shield should be outside the body.
- Crimp the outer sleeve over the shield.
Slide heat shrink tubing forward (flush to connector) and heat to shrink the tubing.

AF-ADSB -Related AF-5000 Display Settings

Serial Port Setup

Before the ADS-B STATUS menu can be accessed, the AF-ADSB needs to be set up as a serial device on the AF-5000 display. To accomplish this:

Go to CALIBRATION MENU > SET > CAL > ADMIN Settings

- Navigate to the serial port that you physically connected the AF-ADSB module to in the previous steps.
- Select 71412 AF-ADSB. Press SAVE.
- Exit SETUP.

Post Installation Checks

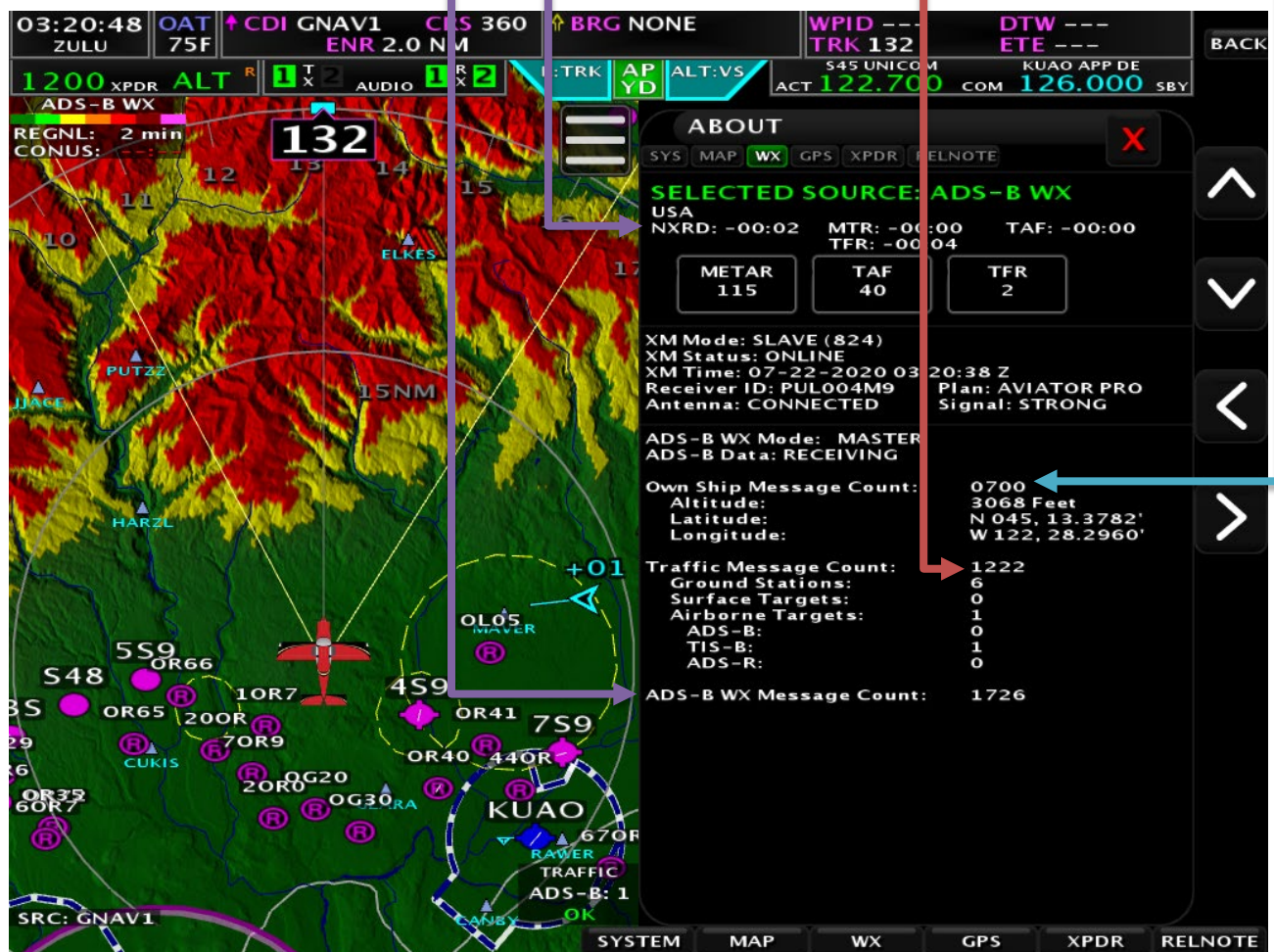
After the AF-ADSB has been configured, confirmation that communication has been established with the module by performing the following procedure:

CHECK > ABOUT > WX

This field should be counting up indicating the SV-ADSB-472 is talking to the EFIS

If the SV-ADSB-472 is receiving traffic this will be counting up

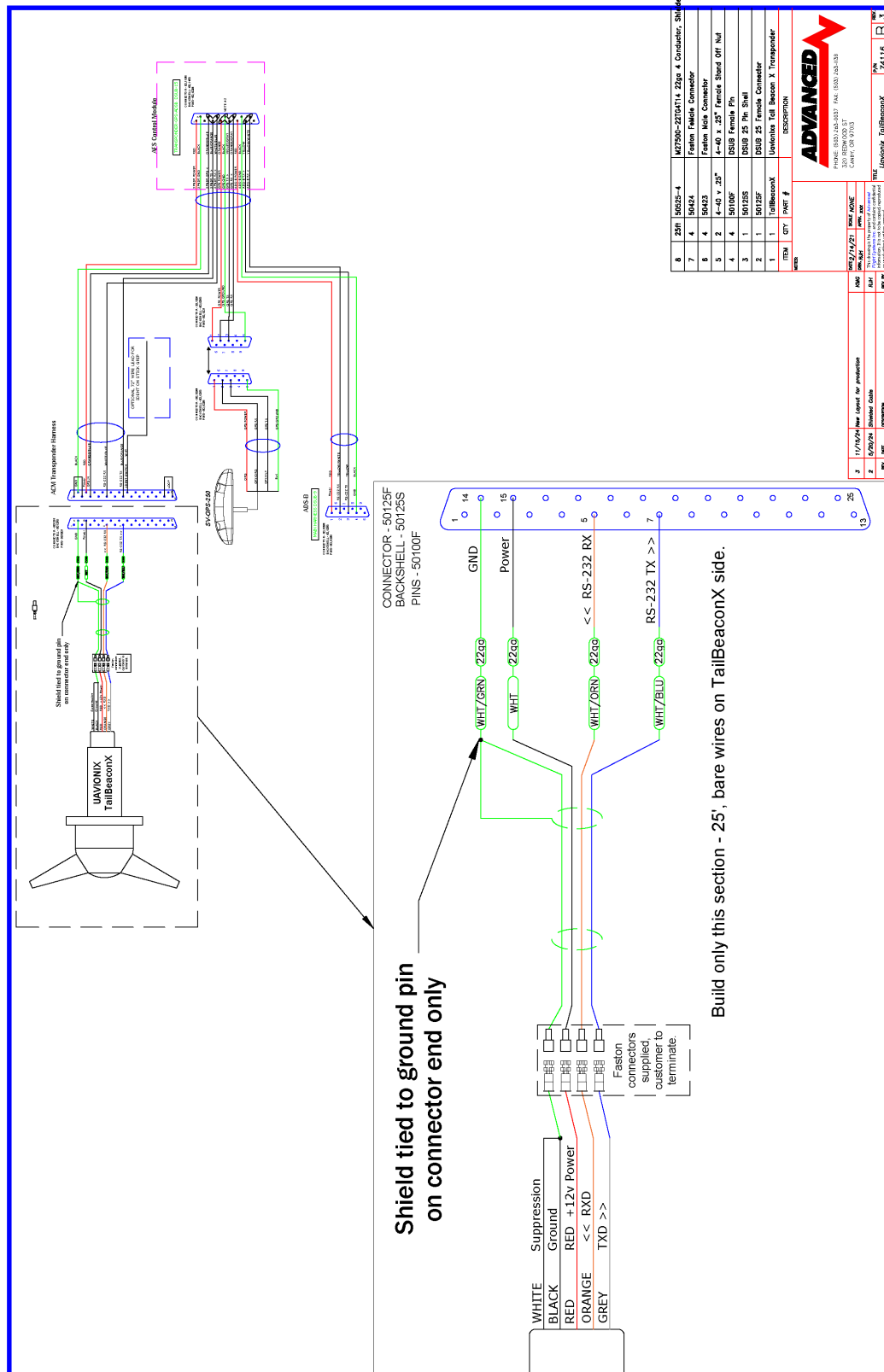
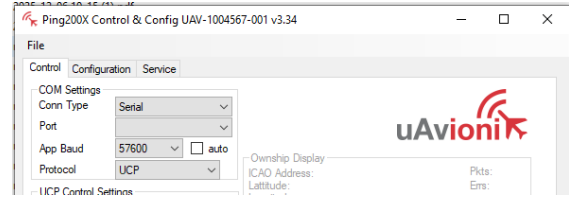
If you are within range of an ADSB ground station you should be getting FIS-B weather data.



Uavionix TailbeaconX

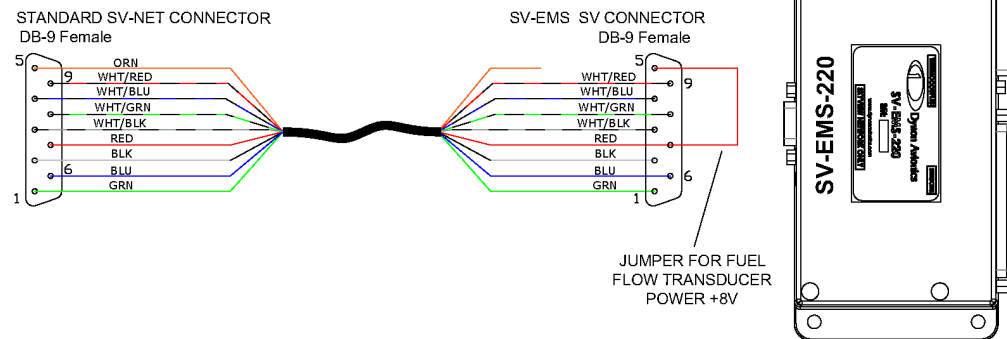
The AF-6600 / AF-5000 can control a Uavionix TailbeaconX Transponder.

You must configure the TailbeaconX Baud Rate to 57600K using the TailbeaconX App.

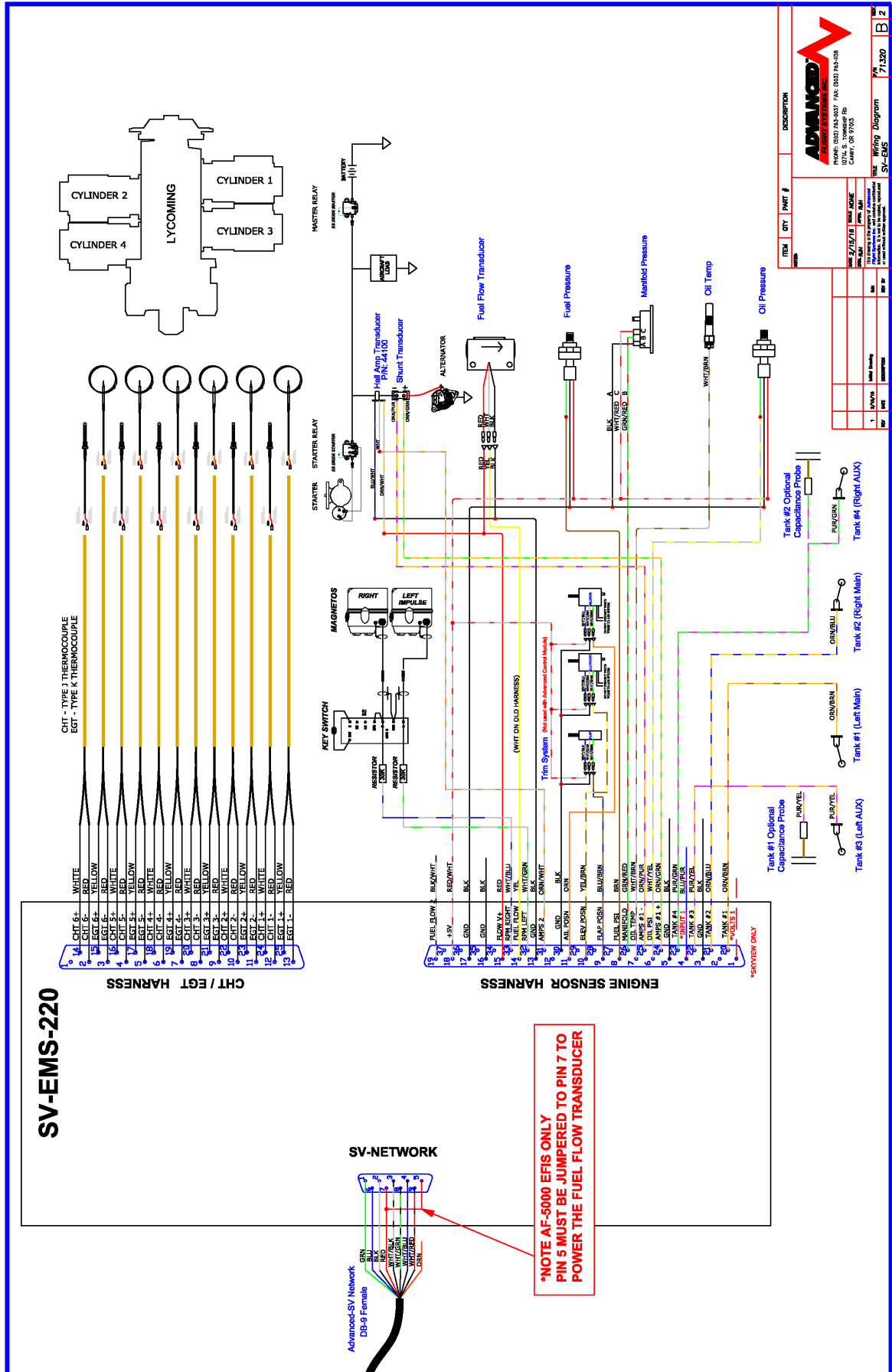


71320 SV-EMS-220 Engine Module

The SV-EMS-220 Engine Module is where you will connect all the sensors from a Lycoming or Continental Engine. The SV-EMS has a 9 pin connector for the SV-Network (with jumper on pin 7 to 5), a 25 pin connector for the CHT and EGT thermocouple probes, and a 37 pin connector for the engine sensors.



SV-EMS 220 Sensor and Transducer Wiring



If you are using our Advanced Control Module (ACM) the Elevator Trim, Aileron Trim, and Flap position will be wired to the ACM and **NOT Wired to the SV-EMS-220**.

DB-37 Connector (Engine Sensors)

Pin	EMS 37-pin Harness Wire Color	Sensor
1	Red	Optional Aithre CO Detector input
2	Yellow or Unwired	Optional Aithre Tank PSI Detector input
3	Black	Ground
4	Violet/Blue	Carb Temperature (Skyview Input #1)
5	Black	Ground
6	White/Yellow	Oil pressure
7	White/Brown	Oil temperature
8	Brown	Fuel pressure
9	Brown/Blue	Flap Position
10	Brown/Yellow	Elevator Trim
11	Orange	Aileron Trim (dsub 9 Pin 2)
12	Yellow	Rudder Trim / Coolant Temperature (dsub 9 Pin 3)
13	Black	Ground (dsub 9 Pin 5)
14	Yellow	Fuel flow
15	Red	+8V Fuel Flow & Amps Hall Transducer Power. (*Must have SV-EMS Network Pin 7 jumper to Pin 5)
16	Black	Ground
17	Black	Ground
18	White/Red	+5V Aux Out 300ma
19	White/Black	Fuel Flow Input 2
20	Orange/Brown	Tank 1 – Float Sensor Only
21	Orange/Blue	Tank 2 – Float Sensor Only
22	Violet/Yellow	Tank 3 or Capacitance Tank 1
23	Violet/Green	Tank 4 or Capacitance Tank 2
24	Orange/Green	Ammeter shunt +
25	Orange/Violet	Ammeter shunt -
26	Green/Red	Manifold Pressure
27	Open	Turbo Inlet 1 Temp +
28	Open	Turbo Inlet 1 Temp -
29	Yellow/Green	Not Used (Skyview Alarm)
30	Black	Signal Ground (dsub 9 Pin 5)
31	White/Orange	Ammeter Hall Effect
32	White/Green	Standard RPM LEFT
33	White/Blue	Standard RPM Right
34	Blue	Low Voltage RPM Left (<12 Volts)
35	Green	Low Voltage RPM Right (<12Volts)
36	Blue or Unwired	Turbo Inlet Temp 2 +
37	Green or Unwired	Turbo Inlet Temp 2 -

DB-25 Connector CHT / EGT Thermocouple Inputs

Pin	EMS 25-pin Thermocouple Harness Wire Color	Sensor
1	Open	N/A
2	Red	CHT 6
3	Red	EGT 6
4	Red	CHT 5
5	Red	EGT 5
6	Red	CHT 4
7	Red	EGT 4
8	Red	CHT 3
9	Red	EGT 3
10	Red	CHT 2
11	Red	EGT 2
12	Red	CHT 1
13	Red	EGT 1
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Upgrading from internal AFS internal Engine monitor board to Dynon SV-EMS-220

When converting from an older AF-5000 EFIS with internal EMS board to the Dynon SV-EMS you will need to do the following:

- Using this chart move the required wires-pins to the new location. **You can remove any unused harness wires, for example (Tank 3, Tank 4, TIT 1-, TIT 1+, TIT 2-, TIT 2+, Coolant Temp, ...)**

Converting from AFS EM to SV-EMS-220



AFS ENGINE MAIN			CHANGE	SV-EMS-220		
1	GND		Move to a GND	1	VOLTS 1 (SKYVIEW ONLY)	
20	TANK 1		No change	20	TANK 1	
2	TRIM PWR (10V)		Move to p18	2	VOLTS 2 (SKYVIEW ONLY)	
21	TANK 2		No change	21	TANK 2	
3	TRIM GND		No change	3	GND	
22	TANK 3		No change	22	TANK 3	
4	CARB TEMP		No change	4	CARB TEMP	
23	TANK 4		No change	23	TANK 4	
5	CARB GND		No change	5	GND	
24	SHUNT+		No change	24	SHUNT+	
6	OIL PSI		No change	6	OIL PSI	
25	SHUNT-		No change	25	SHUNT-	
7	OIL TEMP		No change	7	OIL TEMP	
26	MAP		No change	26	MAP	
8	FUEL PSI		No change	8	FUEL PSI	
27	TIT 1-		Move to p28	27	TIT 1+	
9	TIT 2-		Move to p37	9	FLAP TRIM	
28	TIT 1+		Move to p27	28	TIT 1-	
10	TIT 2+		Move to p36	10	ELEV TRIM	
29	AMP HALL PWR (10V)		Move to p15	29	WARN LIGHT (SKYVIEW ONLY)	
11	AMP HALL		Move to p31	11	AIL TRIM	
30	AMP HALL GND		No change	30	GND	
12	COOL TEMP		No change	12	COOL TEMP	
31	RPM PWR (5V)		Move to p18	31	AMP HALL	
13	FLOW GND		No change	13	GND	
32	RPM SENSOR		*See notes	32	P-LEAD RPM LEFT	
14	FUEL FLOW		No change	14	FUEL FLOW	
33	RPM ELECTRONIC		Move to p35	33	P-LEAD RPM RIGHT	
15	FUEL FLOW PWR (5V)		No change	15	FUEL FLOW & AMP HALL PWR (8V)	
34	FLAP TRIM		Move to p9	34	RPM LOW LEFT	
16	RPM GND		No change	16	GND	
35	ELEV TRIM		Move to p10	35	RPM LOW RIGHT	
17	MAP GND		No change	17	GND	
36	AIL TRIM		Move to p11	36	TIT 2+	
18	MAP PWR (5V)		No change	18	PWR (5V)	
37	GND		Move if connected	37	TIT 2-	
19	PWR (5V)		Move to p18	19	RETURN FUEL FLOW	

*RPM Signals (please check the install manual for full details):

SV-EMS p32/ p33 are for 10+ volt RPM signals.

SV-EMS p33/ p34 are for < 12 volt RPM signals.

You must use either P-lead or Low RPM input, not both.

Option 1:

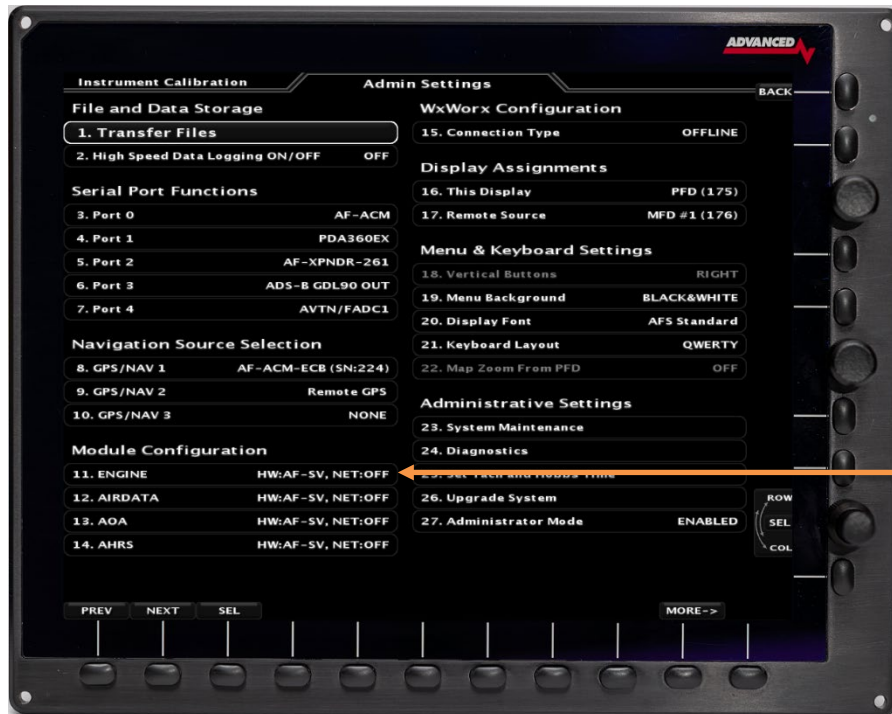
Move AFS p32 attached to Slick or Bendix sensor to SV-EMS p35 with 5kΩ resistor pull-up to 5V.

Option 2:

Connect Lycoming/Continental P-lead through 30kΩ resistor into SV-EMS p32 / p33.

- Scan for the new SV-EMS from the PFD EFIS from: SET > CAL > 2. Advanced SV-Network > SCAN
Press UPDATE if the new SV-EMS-220 shows Needs Update in the list.

3. Change the EFIS Admin Settings EMS selection on all EFIS screens to to: HW:AF-SV, NET:OFF



4. Verify the CHT (Type J) and EGT Type K) settings are correct.



5. Recalibrate the Fuel Tanks
6. Verify all the Engine Sensor selections are correct.

71321 SV-EMS 221 ROTAX 912iS/915iS Sensor and Transducer Wiring Map

DB-37 Connector

Pin	EMS 37-pin Harness Wire Color	Sensor
1	Red	Optional Aithre CO Detector
2	Yellow	Optional Aithre Tank PSI Detector
3	Black	Ground
4	Violet/Blue	Elevator Trim
5	Black	Ground
6	White/Yellow	Oil pressure
7	White/Brown	Oil temperature
8	Brown	Fuel pressure
9	Brown/Blue	Carburetor Temp
10	Brown/Yellow	Coolant Temp
11	Orange	Rotax CHT 1
12	Yellow	Rotax CHT 2
13	Black	Ground
14	Yellow	Fuel flow
15		Not connected
16	Black	Ground
17	Black	Ground
18	White/Red	+5V Aux Out 300ma
19	White/Black	Fuel Flow Input 2
20	Orange/Brown	Tank 1
21	Orange/Blue	Tank 2
22	Violet/Yellow	Flaps
23	Violet/Green	Aileron Trim
24	Orange/Green	Ammeter shunt +
25	Orange/Violet	Ammeter shunt -
26	Green/Red	Manifold Pressure
27	Open	RPM Signal to Rotax 912 iS Prop Controller
28		Grounded to common ground with Prop Controller
29		Not connected
30	Black	Signal Ground
31	White/Orange	Ammeter Hall Effect
32	White/Green	RPM (10+ Volts)
33		Not connected
34	Blue	Low Voltage RPM (<12 Volts)
35		Not connected
36	Blue or Unwired	CAN High from 912 iS ECU
37	Green or Unwired	CAN Low from 912 iS ECU

DB-25 Connector

Pin	EMS 25-pin Thermocouple Harness Wire Color	Sensor
1	Open	N/A
2	Red	CHT 6
3	Red	EGT 6
4	Red	CHT 5
5	Red	EGT 5
6	Red	CHT 4
7	Red	EGT 4
8	Red	CHT 3
9	Red	EGT 3
10	Red	CHT 2
11	Red	EGT 2
12	Red	CHT 1
13	Red	EGT 1
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Rotax 912 ULS Carbureted

Below are suggested sensor connections for a Rotax 912 ULS Carbureted engine connected to an SV-EMS-220 EMS module.

Pin	EMS D37F Harness Wire Color	Sensor (with Dynon Avionics P/N if applicable)
1	Red	Battery voltage (voltmeter input)
2	Yellow or Unwired	No connection
3	Black	Ground
4	Violet/Blue	Rotax CHT or oil (801-10-1)
5	Black	Ground
6	White/Yellow	Rotax oil pressure (Honeywell or Rotax P/N 456180) *Do not use AFS Interface module
7	White/Brown	Rotax CHT or oil (801-10-1)
8	Brown	Fuel pressure P/N 101690-000
9	Brown/Blue	Heated AOA/Pitot Probe status (contact input)
10	Brown/Yellow	No connection
11	Orange	No connection
12	Yellow	Flaps position potentiometer
13	Black	Ground
14	Yellow	Fuel flow P/N 100403-003
15	Red	Fuel flow power P/N 100403-003 / Oil pressure (Honeywell and Rotax P/N 456180 only) sensor power (*Must have SV-EMS Network Pin 7 jumper to Pin 5)
16	Black	Ground
17	Black	Ground
18	White/Red	Manifold Pressure Sensor Power (+5 volt) / Kavlico Pressure Sensors
19	White/Black	No connection
20	Orange/Brown	Fuel level left (resistive)
21	Orange/Blue	Fuel level right (resistive)
22	Violet/Yellow	Rotax CHT or oil (801-10-1)
23	Violet/Green	Elevator position potentiometer
24	Orange/Green	Ammeter shunt + P/N 100412-000
25	Orange/Violet	Ammeter shunt - P/N 100412-000
26	Green/Red	Manifold Pressure P/N 100434-000
27	Open	No connection
28	Open	No connection
29	Yellow/Green	Optional External Alarm Indicator
30	Black	No connection
31	White/Orange	Optional AMPS 2 Hall Sensor
32	White/Green	RPM
33	White/Blue	No connection
34	Blue	No connection
35	Green	No connection
36	Blue or Unwired	No connection

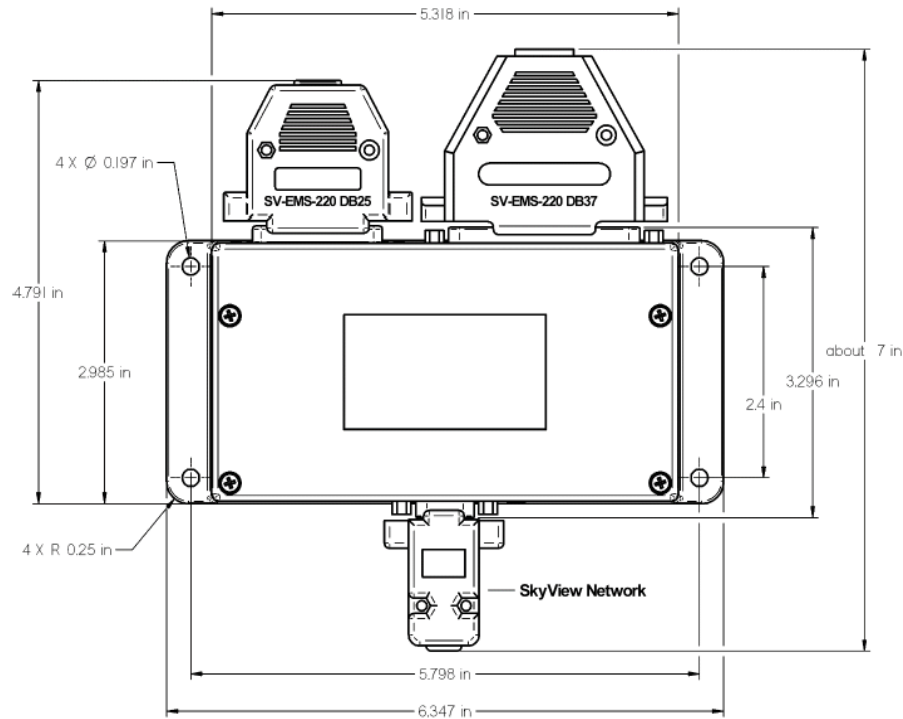
Pin	EMS D25M Thermocouple Harness Wire Color	Sensor (with Dynon Avionics P/N if applicable)
1	Open	N/A
2	Open	N/A
3	Open	N/A
4	Open	N/A
5	Open	N/A
6	Red	N/A
7	Red	N/A
8	Red	N/A
9	Red	N/A
10	Red	N/A
11	Red	EGT 2 (K-type thermocouple, 100405-000*)
12	Red	N/A
13	Red	EGT 1
14	Open	N/A
15	Open	N/A
16	Open	N/A
17	Open	N/A
18	White	N/A
19	Yellow	N/A
20	White	N/A
21	Yellow	N/A
22	White	N/A
23	Yellow	EGT 2
24	White	N/A
25	Yellow	EGT 1

Suggested Rotax 912 ULS Carbureted Sensor Connections for EMS D25M Harness

* Note that J-type and K-type thermocouples apply to all CHTs or EGTs, respectively. They are not repeated in the table for brevity's sake.

Physical Mounting

Advanced Flight Systems does not include mounting hardware for use with the SV-EMS-220. The mounting tabs on each side of the module have holes sized for #10 fasteners, but it is up to the installer to decide how the EMS will be secured to the aircraft. Use of ferrous fasteners in this location is acceptable as the EMS is not adversely affected by small magnetic fields. Dynon recommends button head style AN hardware as spacing between the holes in the tabs and the body of the enclosure will limit what style tool can be used to tighten certain fasteners.

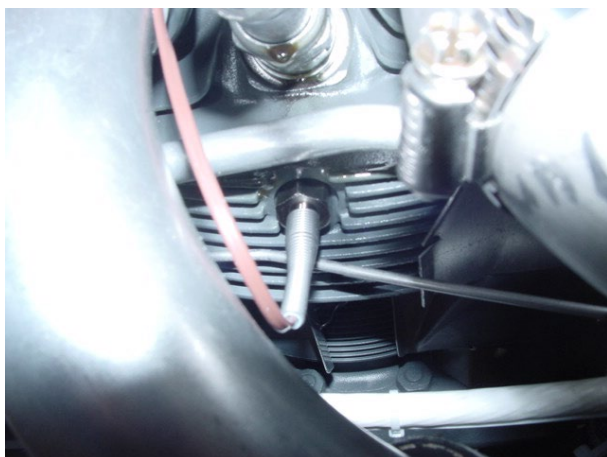


SkyView Network Connection

Connect the EMS module to the SkyView network.

Engine Sensor Installation

Lycoming/Continental



Lycoming CHT Probe Location
EGT Probe Location



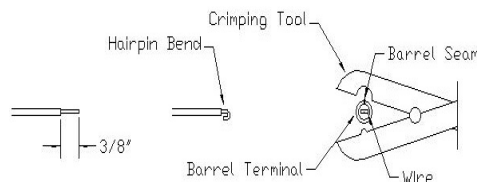
EGT Clamp Installation

1. Locate the EGT probes, P/N 40200, not less than 1 1/2" or more than 3" below the exhaust stack attachment flange. 2" to 3" is optimum, and try to mount all probes equal distance from the exhaust flanges. On curved stacks, assume probe tip is on stack centerline for determining distance to exhaust flange. Carefully center punch the probe hole locations such that the portions of the probes external to the exhaust pipes will not interfere with any parts of the engine or cowling. Drill holes with a #30 drill.
2. Carefully insert probe and clamp snugly with screwdriver.
3. Install CHT probes, P/N 40100, in threaded wells on cylinders. Torque probe bodies to 25-30 inch pounds.
4. Install terminals on #20 type J & K thermocouple wire
5. **WIRES MUST HAVE A 1/4" DRIP LOOP TO PREVENT OIL OR SOLVENT FROM RUNNING INTO THE PROBE.**

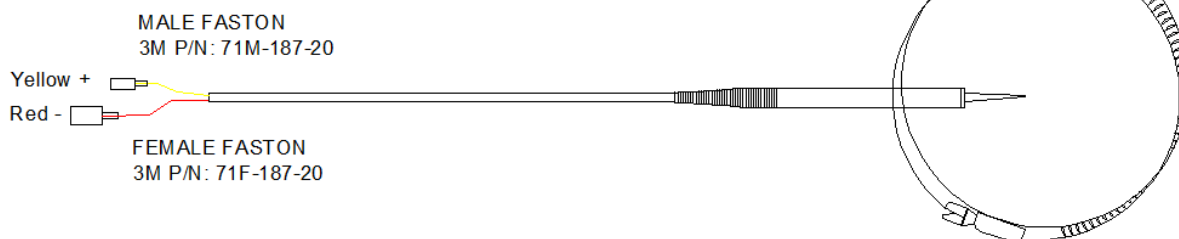
This wire is very hard and will loosen inside a crimped brass or copper terminal, as there is no "cold welding" action like there is with crimped copper wire.

To prevent loosening of the crimp in service proceed as follows:

1. Strip wire exposing 3/8" of core conductor. Take care not to nick or cut the conductor.
2. Double end of wire back in hairpin bend so crimp is on doubled wire.
3. Crimp on a non-insulated barrel terminal using a crimping tool designed for non-insulated terminals. Be sure that the barrel seam is facing the rounded side of the crimping tool and not the crimping post as this will result in a poor crimp.
4. Place a drop of Alpha Metals 51022 liquid soldering flux (Ace Hardware) in open end of crimp and then heat and sweat in rosin core solder to fill the joint.



2. Fasten the extensions to the engine by means of clamps held by valve cover screws or by tying the extensions to intake tubes. If the extension goes up to a valve cover, provide some slack for a "drip loop" so that oil and engine cleaning solvents will drip off probe lead and not run into the end of the probe. It is important that the probe lead or extension wire be first clamped or tied to the engine before being tied to the engine mount or airframe, to keep "working" of the probe lead as it comes out of the body to a minimum. AVOID CONTACT OF LEADS WITH CYLINDER HEADS OR EXHAUST PIPES. USE SLEEVING OVER LEADS IF TYING TO IGNITION HARNESS. If leads cannot pass through firewall with other wiring, drill a 3/8" hole in firewall and use a neoprene grommet for each 4 to 6 leads, seal with a sealing compound.



Engine Tachometer (RPM)

The EFIS will display RPM from either the RPM Input Left or the RPM Input Right, whichever is noticed by the SV-EMS-220 first. If the first RPM signal is lost (such as when one ignition source fails, or during a routine mag check), then EFIS will display RPM from the remaining RPM signal. If your engine only provides one RPM signal, connect it to one of the two RPM Input Left pins.



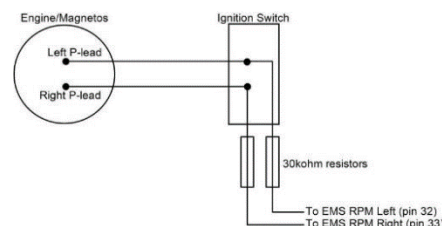
Pin 32 and Pin 34 are both LEFT RPM input. Use one, or the other, but not both.

Pin 33 and Pin 35 are both RIGHT RPM input. Use one, or the other, but not both.

P-lead pickoff (Lycoming and Continental)

If you do not have a dedicated tachometer pickoff, you must follow the instructions below.

Use the two included 30 kΩ resistors (color bands: orange, black, brown, red, brown; connect in either direction) to attach left and right P-leads to the standard RPM Left and RPM Right inputs on the SV-EMS-220/221. It is important to connect each resistor as close as possible to the spot where you tap into the P-lead. This minimizes the length of cable carrying high voltage spikes. Six-cylinder Lycoming engines sometimes need more inline resistance to prevent false readings by the SV-EMS-220/221. If you supply your own resistors, they need not be exactly 30 kΩ. Additionally, both 1/4W and 1/2W resistors are acceptable to use.



Optional Mag RPM Sensor Installation

The AFS Hall Effect Sensor P/N: 43100 can be used with the SV-EMS-220 module as long as you have a 5k resistor between the red and white wires. All P/N: 43100 sensors shipped after 1/1/2023 have a built-in pull up resistor and don't need the external resistor.

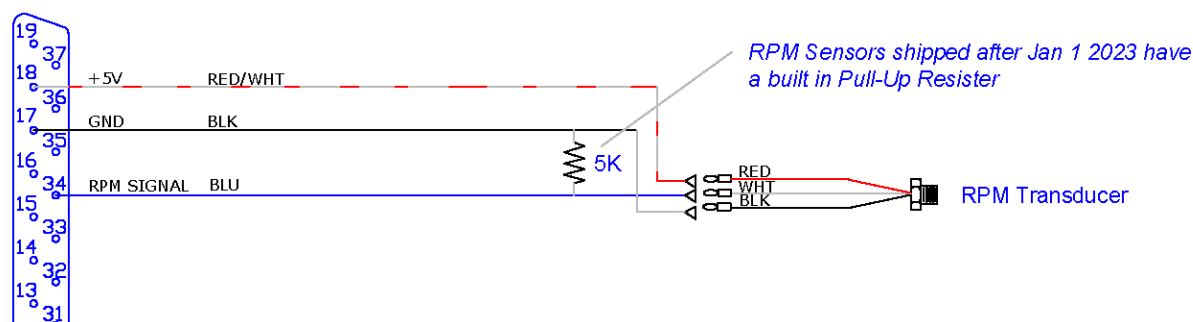
The RPM sensor should be installed in the **non-impulse** coupled magneto if possible (Engines with one electronic ignition should install the sensor in the impulse mag). The correct magneto can be found in the engine manual. The sensor is screwed into the magnet vent port nearest the magneto-mounting flange where the magneto attaches to the engine. Replace the existing vent plug with the sensor. The RPM sensor wires should be connected to the Engine Harness with Fast On Terminals, Butt Connectors or with solder and heat shrink. If using one mag and one electronic ignition, use the mag sensor for RPM input, as long as the mag is turning, RPM will be displayed even with the mag turned off.

The RED sensor is for Slick Mags and the BLUE sensor is for Bendix mags.



CAUTION: Do not route RPM sensor wires with Magneto P leads or electron ignition wiring. Most Magnetos have two ports on opposite sides, one near the plug wires and one near the drive shaft. The sensor needs to be mounted in the port closest to the drive shaft.

HARNESS	Signal	SENSOR WIRE
Pin 18 Red/White	+5V	RED
Pin 34 Blue	Signal	WHT
Pin 17 Black	Ground	BLK



ELECTRONIC IGNITIONS

EMAGS

If using EMAG's you should connect the EMAG tach signal to input pin 32 or 33 without a resistor. An EMAG will output the tach signal even when turned OFF so you only need to connect a single EMAG to the SV-EMS-220

32	White/Green	Standard RPM LEFT
33	White/Blue	Standard RPM Right

Lightspeed Ignitions

RPM Signal Connection

+12V signal, connect to SV-EMS standard RPM inputs without resistor

SV-EMS Pins

32	White/Green	Standard RPM LEFT
33	White/Blue	Standard RPM Right

ShureFly – Lycoming EIS Ignitions

RPM Signal Connection

Requires SureFly RPM TACH2 Tachometer Signal Converter

+5V signal, connect to SV-EMS Low voltage RPM inputs without resistor

SV-EMS Pins

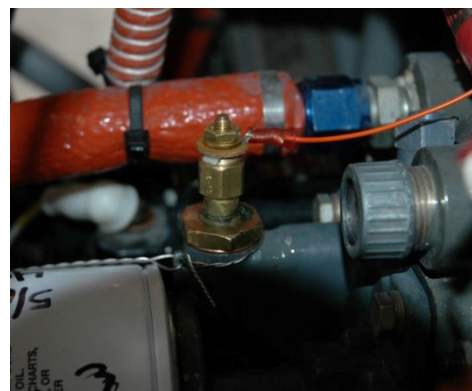
34	Blue	Low Voltage RPM LEFT
35	Green	Low Voltage RPM Right

Oil Temperature Sensor Installation

P/N: 40405

The standard P/N: 40405 oil temperature sensor is mounted on the engine. The engine manual should show the proper location for the sensor. The bushing is supplied with a crush type gasket that can only be used once. The location is usually near the filter and should be safety wired to the engine case. Replace the existing vent plug with the supplied bushing and sensor. The Oil Temperature Pressure sensor wire should be connected from the harness to the transducer by crimping a standard #8 ring terminal to the wire.

Pin 7 White/Brown



Optional 2 Wire Oil Temperature Sensors

If you oil temperature changes when you turn on and off electrical loads you have a bad engine case ground. If you are unable to fix your engine ground you can install one of the optional two wire oil temp sensors.

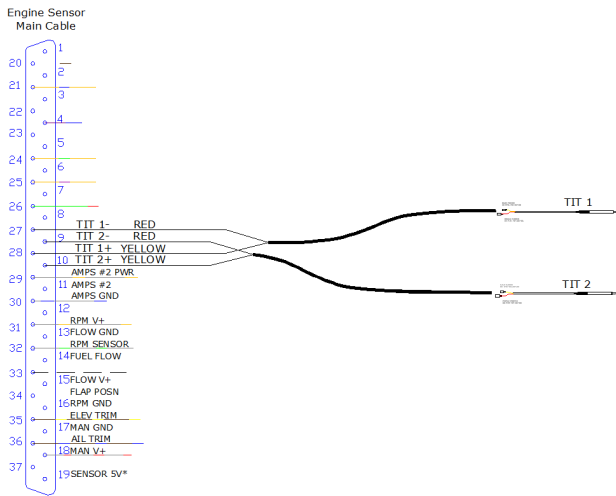
AFS Part Number	Vendor	Vendor Part Number
P/N: 40412	UMA	1B3
P/N: 40415	Westach	399S9

Connect one sensor wire to the White/Brown wire and one to an EMS ground connection. Do NOT connect to a ground on the engine.

Select the correct sensor part number in EFIS Calibration > Oil Temperature

TIT Probes

If your aircraft has turbo inlet temperature probes they are wired to the Engine Sensor Main Harness cable



Rotax Engines

CHT Probes

SV-EMS-220 Connections

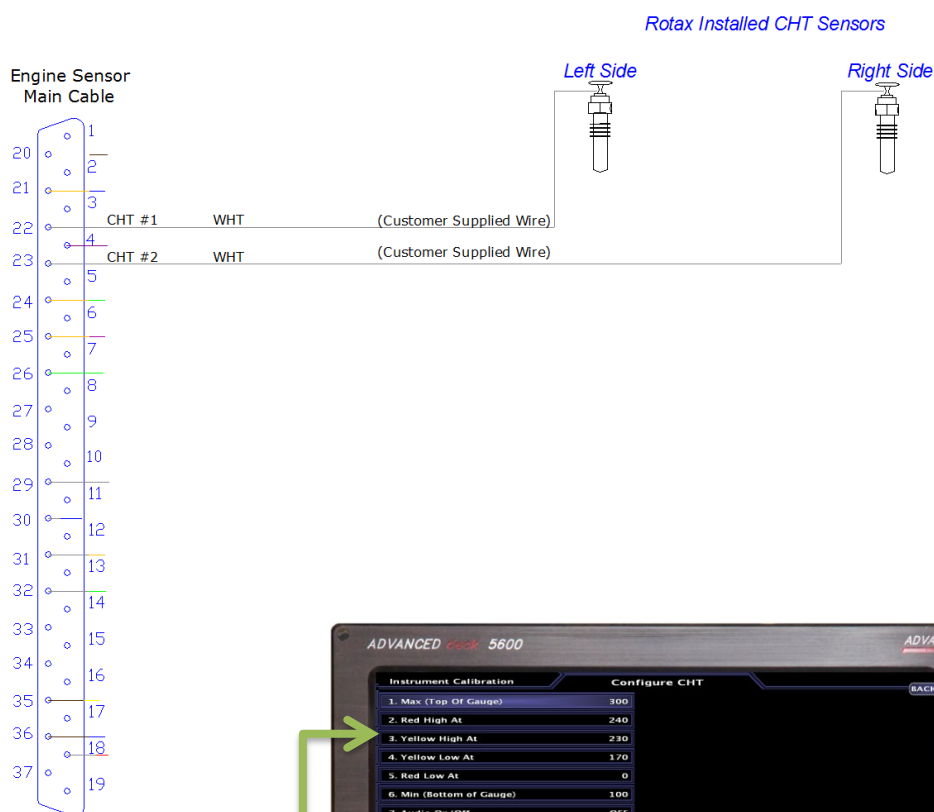
CHT 1 Pin 23

CHT 2 Pin 31

The Rotax engine has two CHT sensors preinstalled on the engine. One sensor is installed in the left side cylinder head water jacket and one is on the right side.

Rotax recommends bare ¼" female Faston terminals (6.3x0.8 DIN 46247) to connect to the CHT probes. You will need to add wires to the unpopulated connector pins.

The Rotax CHT probes are resistive sensors and should be connected to the DB-37 engine monitor plug pins 22 (Tank 3) and 23 (Tank 4). When using the Rotax CHT probes you will not be able to have four fuel tanks.



Once you have the sensors installed you will need to configure the CHT sensor type to "ROTAX CHT" and configure the Temperature Ranges for your engine.



EGT Probes

For Rotax engines two of the four cylinders are usually monitored for EGT, you can select to monitor all four EGT's of desired. If only two EGT probes are used they should be mounted on the two rear cylinder's exhaust manifolds for proper temperature comparison.

See **EGT Clamp Style Probe Installation** for instructions.

Boss Mount EGT Probes

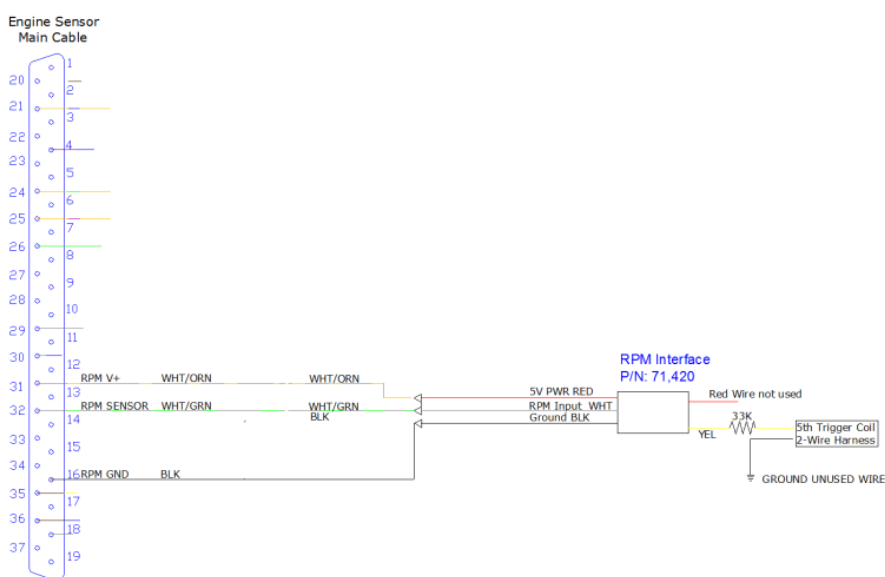
Some Rotax engine exhaust manifolds are drilled for boss mount EGT probes. If your engine has boss mount EGT locations use our optional P/N: 40,202 Boss Mount EGT Probe.

Once you have the EGT sensors installed you will need to configure the Engine Type to "ROTAX 2 EGT" or "ROTAX 4 EGT"



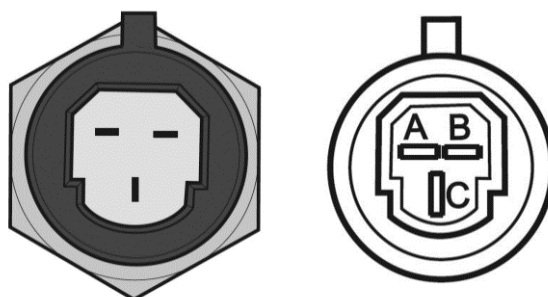
RPM

The Rotax engines have a 5th trigger coil for RPM monitoring. The trigger coil outputs on a two-wire harness. Connect one of the two wires to ground and the other to the supplied 33K resistor, the other end of the resistor than connects to the P/N: 71420 R Rotax RPM interface board yellow wire. The Rotax RPM interface board is a small heat shrinked module and should be secured on the inside of the aircraft. If you are using the P/N:71420RX you do not need to install the 33K resistor.

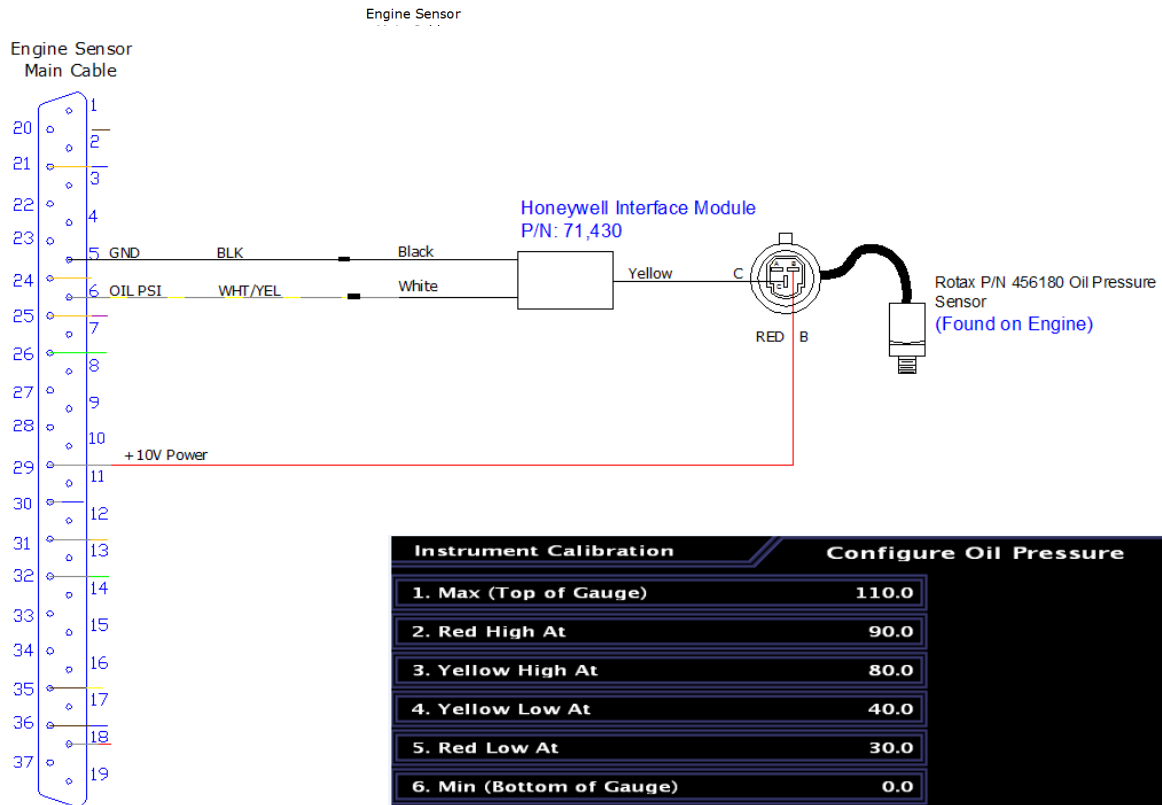


Rotax Oil Pressure

In late 2012, Rotax further switched to a new oil pressure sensor (Rotax P/N 456180). It is functionally identical to the previous Honeywell (Rotax P/N 956413) sensor, and connects in the same fashion as it. However, the connector and wiring for the sensor that Rotax includes with the engine may require some assembly. See the diagram below for the pinout of the connector. Connect the wire connected to sensor pin B of the sensor to SV-EMS-220/221 D37 pin 15 (+12 Volts Auxiliary), the wire connected to sensor pin C to SV-EMS-220/221 D37 pin 6. Sensor pin A need not be connected at all. Select the correct sensor type as described in the EMS Sensor Definitions, Mapping, and Settings Section.



Rotax Sensor Connector Pin	Rotax Connector Wire Color	SV-EMS-220/221 Wire Color	SV-EMS-220/221 Pin Number
A	N/A Do Not Connect	N/A Do Not Connect	N/A Do Not Connect
B	(Customer provided, suggested color is Red)	Red It is acceptable to share this pin / wire with other sensors; see Table 32 above.	15 It is acceptable to share this pin / wire with other sensors; see Table 32 above.
C	(Customer provided, suggested color is White)	White / Yellow	6



Select 41,102 HON RTX as the sensor type.

Instrument Calibration		Configure Oil Pressure																	
1. Max (Top of Gauge)	110.0																		
2. Red High At	90.0																		
3. Yellow High At	80.0																		
4. Yellow Low At	40.0																		
5. Red Low At	30.0																		
6. Min (Bottom of Gauge)	0.0																		
7. Audio OFF/ON/etc	ON																		
8. Instrument OFF/ON	ON																		
9. Display Units	PSI																		
10. Shift Adjust	0.0																		
11. Part Number	41,102 HON RTX																		
12. Num Cal Points	7																		
13. AD Adjust (ALL)																			
<table border="1"> <thead> <tr> <th>AD_VALUE: 0</th> <th>AD VALUE</th> </tr> </thead> <tbody> <tr> <td>0.0</td> <td>765</td> </tr> <tr> <td>20.0</td> <td>1190</td> </tr> <tr> <td>40.0</td> <td>1596</td> </tr> <tr> <td>60.0</td> <td>2004</td> </tr> <tr> <td>80.0</td> <td>2337</td> </tr> <tr> <td>100.0</td> <td>2508</td> </tr> <tr> <td>145.0</td> <td>3770</td> </tr> </tbody> </table>				AD_VALUE: 0	AD VALUE	0.0	765	20.0	1190	40.0	1596	60.0	2004	80.0	2337	100.0	2508	145.0	3770
AD_VALUE: 0	AD VALUE																		
0.0	765																		
20.0	1190																		
40.0	1596																		
60.0	2004																		
80.0	2337																		
100.0	2508																		
145.0	3770																		

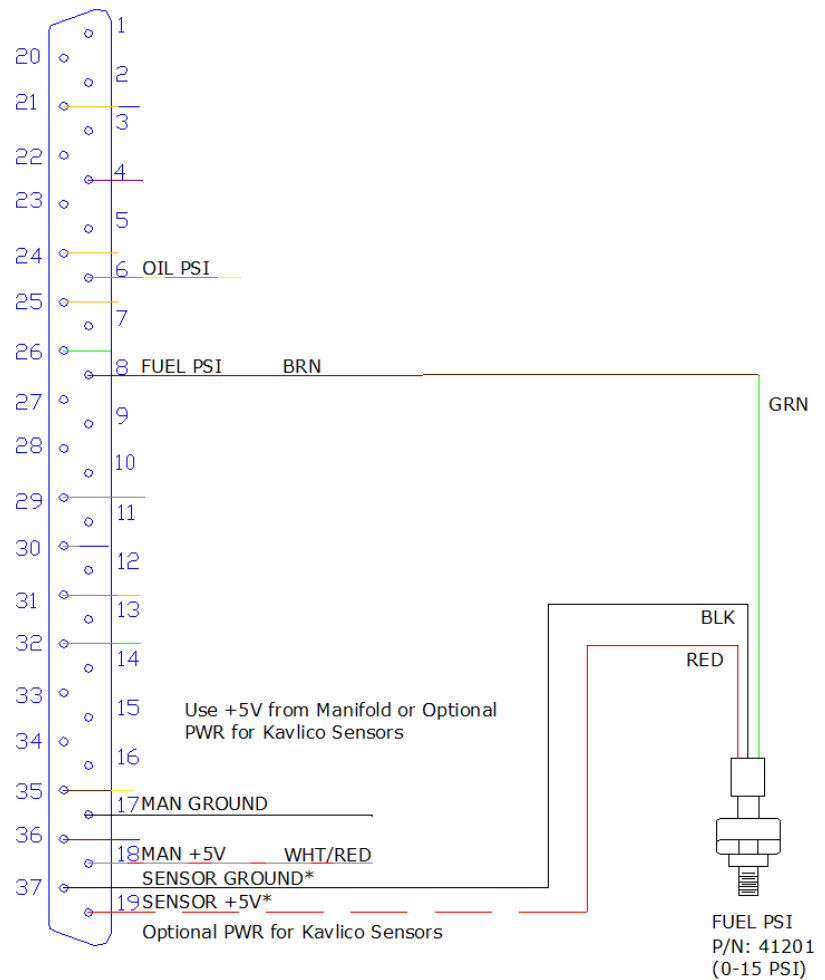
Rotax Fuel Pressure

ROTAX 912

P/N: 41201 Kavlico Fuel Pressure Sensor

EFIS must be configured for voltage sensors (-V) in the part number

Engine Sensor Main Cable

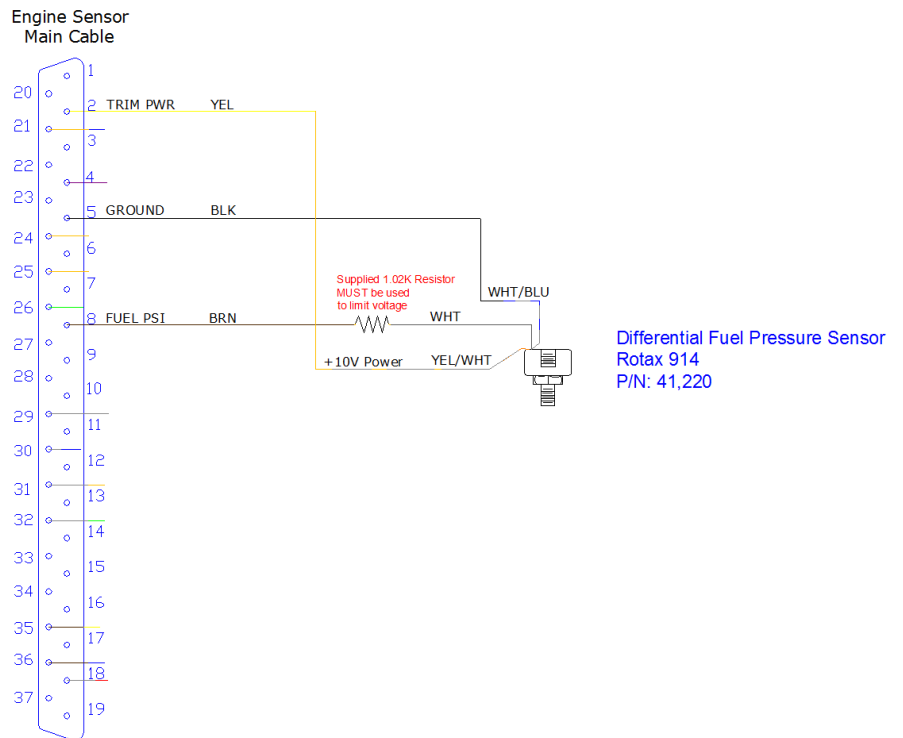


Select 41,215 VDO (0-30) Sensor
in calibration, use shift adjust to make fuel pressure display 0 PSI

Instrument Calibration		Configure Fuel Pressure		1.55 BAR / 22.5 PSI		BACK
1. Max (Top of Gauge)	40.0					
2. Red High At	36.0					
3. Yellow High At	30.0					
4. Yellow Low At	15.0					
5. Red Low At	12.0					
6. Min (Bottom of Gauge)	0.0					
7. Audio OFF/ON/etc	ON					
8. Instrument OFF/ON	ON					
9. Display Units	PSI					
10. Shift Adjust	0.0					
11. Part Number	41,201 KAV 0-15					
12. Num Cal Points	2					
13. AD Adjust (ALL)						
AD_VALUE: 0		AD VALUE				
DISPLAY (PSI)	0.0	500				
	10.0	3167				
SAVE						

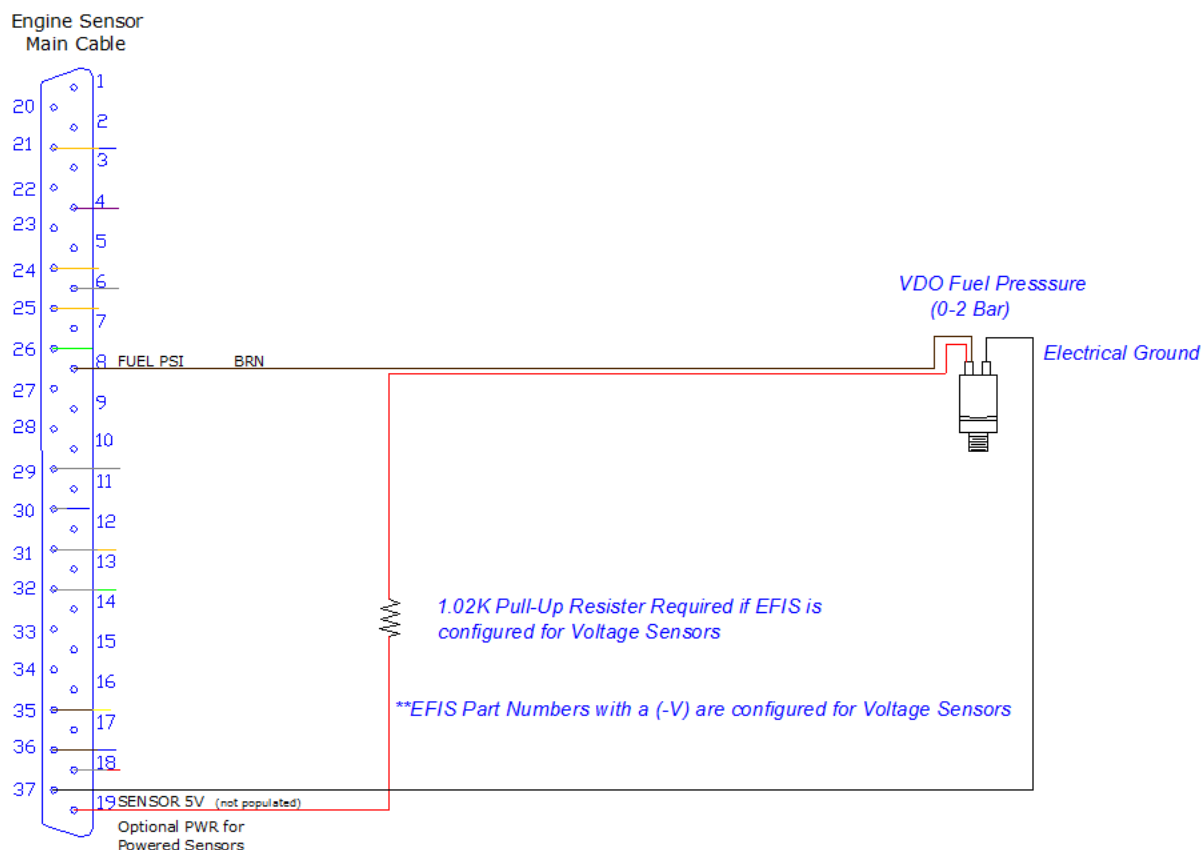
ROTAX 914

The Rotax 914 uses a special UMA differential pressure sensor P/N: 41,220.



VDO Fuel Pressure Sensor

****If your EFIS is configured for voltage sensors (-V) in the part number you will need to connect the supplied 1.02K Resistor to Pin 19.**



Select 41,215 VDO (0-30) Sensor in calibration, use shift adjust to make fuel pressure display 0 PSI

Instrument Calibration		Configure Fuel Pressure	5.96 BAR / 86.4 PSI
1. Max (Top of Gauge)	40.0		
2. Red High At	36.0		
3. Yellow High At	30.0		
4. Yellow Low At	15.0		
5. Red Low At	12.0		
6. Min (Bottom of Gauge)	0.0		
7. Audio OFF/ON/etc	ON		
8. Instrument OFF/ON	ON		
9. Display Units	PSI		
10. Shift Adjust	0.0		
11. Part Number	41,215 VDO 0-30		
12. Num Cal Points	11		
13. AD Adjust (ALL)			
AD_VALUE: 4095			
DISPLAY (PSI)	AD VALUE		
0.0	48		
1.0	55		
2.0	91		
3.0	118		
4.0	141		
5.0	175		
6.0	214		
7.0	244		
8.0	272		
9.0	304		
10.0	353		

Diemech Turbine

The Diemech Turbine uses both CAN Aerospace and individual sensors to monitor the engine. The following sensors should be connected to the engine:

Gearbox Oil Pressure

Gearbox oil pressure sensor - BD331

P/N 100084.08

Pressure range	0 ÷ 600 kPa (0 ÷ 87.02 psi)
Resistance without damage	4 MPa (580,2 psi)
Accuracy	± 0,35%
Supply	9 ÷ 36 V
Output	0,5 ÷ 4,5 V (0,5 V - 0 kPa, 4,5 V – 600 kPa)
Permissible load of electric output	10 kΩ

PSI	AD
0	419
10	893
20	1344
30	1800
40	2240
50	2693
60	3142
70	3612
80	4055
85	4094

AF-5000 EMS Connector

Sensor Pin

Customer Power (9-36V)	1	
Aircraft Ground	2	
DB-37 Pin 6	Oil Pressure	3

Oil Temperature

Oil temperature sensor TO-02 in oil tank

P/N 100079.81

Use

Resistance temperature sensors are designed for monitoring the temperatures of fluids, air or other gases in the range from -60 °C to +200 °C.

Description

The sensing element is a platinum Pt 100 thermosensor with temperature dependent resistance values, according to the standard ČSN EN 60751. The sensor is built into a protective housing from corrosion-proof steel. The housing is hexagonal in shape and comes with a fastening thread for attaching the sensor to the object and has a head with a fork for electrically connecting the sensor. Sensor terminals pass through the WK 46 248 fork.

Temperature measuring range TO-02	-60 °C to +200 °C
Sensor resistance at 0 °C	100 Ω
Resistance of insulation of electrical transmitter parts must be	
In a normal environment	100 MΩ
At a raised temperature of approx. +125 °C	min. 10 MΩ

Temp (F)	AD
75	382
100	498
125	518
150	537
180	561
200	576
225	595
250	612
275	623

AF-5000 EMS Connector

Sensor Pin

DB-37 Pin 7	Oil Temp	1
DB-37 Pin 5	Ground	5

Fuel Pressure

Uses standard AFS Kavlico (0-50PSI) sensor and wiring

EGT

QTY 1 Type K EGT probe wired to EGT #1 EMS input.

Amp Transducer Installation

Shunt Transducer

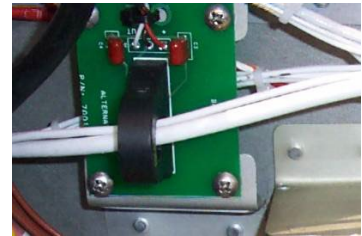
Mount the Shunt amp transducer to a stationary location in the main power wire from the Alternator.

The Shunt Amp transducer wires should be connected from the harness to the transducer by crimping two standard #8 ring terminal to the wires.

Pin 24	Orange/Green	+	Alternator Side
Pin 25	Orange/Purple	-	Battery Side

P/N: 44100 Optional Hall Effect Transducer (Used for dual Alternator Systems)

Mount the amp transducer in the cabin area to a stationary location. The amp transducer board should be mounted so that the bottom of the circuit board does not touch any metal. The amp transducer is designed to measure the current in the wire from the alternator. The wire from the alternator must pass through the transducer in the proper direction; the board is marked alternator on one side and battery on the other. Male D-sub pins will need to be crimped onto the transducer wires.



CAUTION: Always ground yourself before wiring.

Pin 15	+8V	RED
Pin 31	Signal	ORN/WHT
Pin 13	Ground	Black

Pressure Transducer Installation

Firewall Installation using Van's P/N: VA-168, 3-port manifold mounting block.

Oil Pressure Transducer Installation

Mount the oil pressure transducer in a stationary location. Connect the transducer with aircraft grade hose and fittings. The proper oil pressure port can be found in the engine manual. **The engine must have a pressure fitting with a restrictor hole in it.** The transducer is supplied with 1/8" NPT pipe thread connections. The Oil Pressure transducer should be connected from the harness to the transducer using the supplied 3 pin connector. The transducers require +5V power and ground.

SV-EMS Pin	Signal	Harness	Transducer Wire
Pin 18	+5V Power	Red/White	Red
Pin 17	Ground	Black	Black
Pin 6	Signal	White/Yellow	Green

NOTE: The pressure rating (10bar 150psi) can be found stamped on the bottom hex fitting of the transducer

P/N	Pressure	Manufacturer	Color	Termination
41150	0-150 PSI (10 bar)	Kavlico	Gold/Black	Plug

CAUTION: NEVER CONNECT THE PRESSURE TRANSDUCER DIRECTLY TO THE ENGINE.

Fuel Pressure Transducer Installation

Mount the fuel pressure transducer to a stationary location. Connect the transducer with aircraft grade hose and fittings. The proper fuel pressure connection port can be found in the engine manual. **The engine must have a pressure fitting with a .040" or smaller restrictor hole in it,** this prevents fuel pump pulsations from damaging the transducer and will slow the flow of fuel if a hose were to fail. The transducer is supplied with 1/8" NPT pipe thread connections. **The case of the sender has to be connected to ground.** The Fuel Pressure transducer wire should be connected from the harness to the transducer by crimping a standard #8 ring terminal to the wire.

SV-EMS Pin	Signal	Harness	Transducer Wire
Pin 18	+5V Power	Red/White	Red
Pin 17	Ground	Black	Black
Pin 8	Signal	Brown	Green

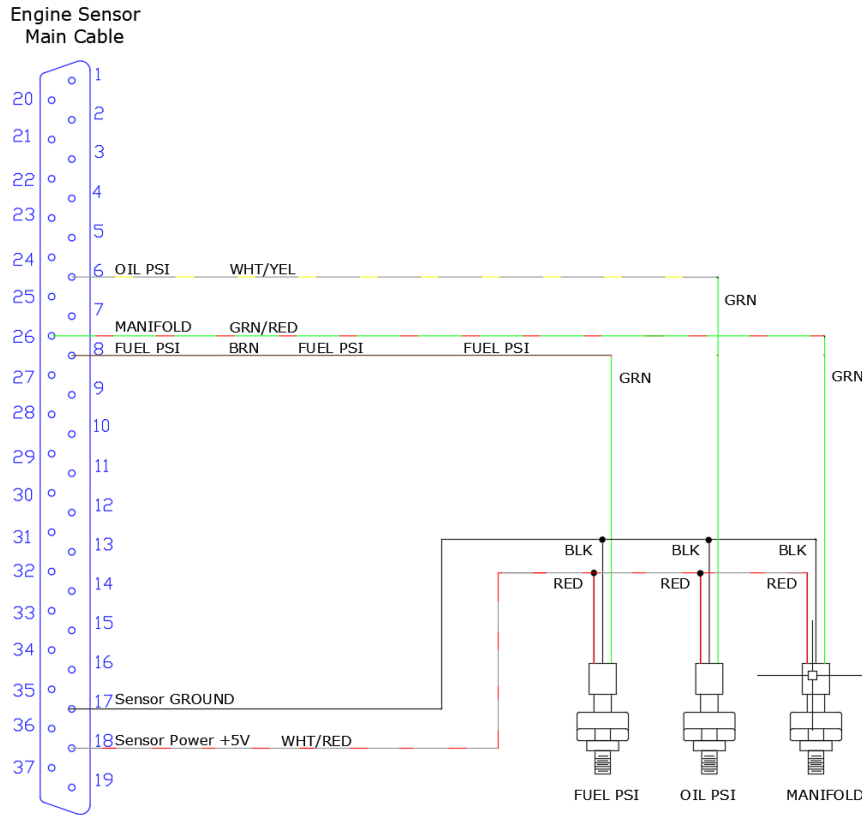
NOTE: The pressure rating can be found stamped on the bottom hex fitting of the transducer

Fuel Injected engines should use the 150 PSI sensor and Carbureted Engine should use the 15 PSI

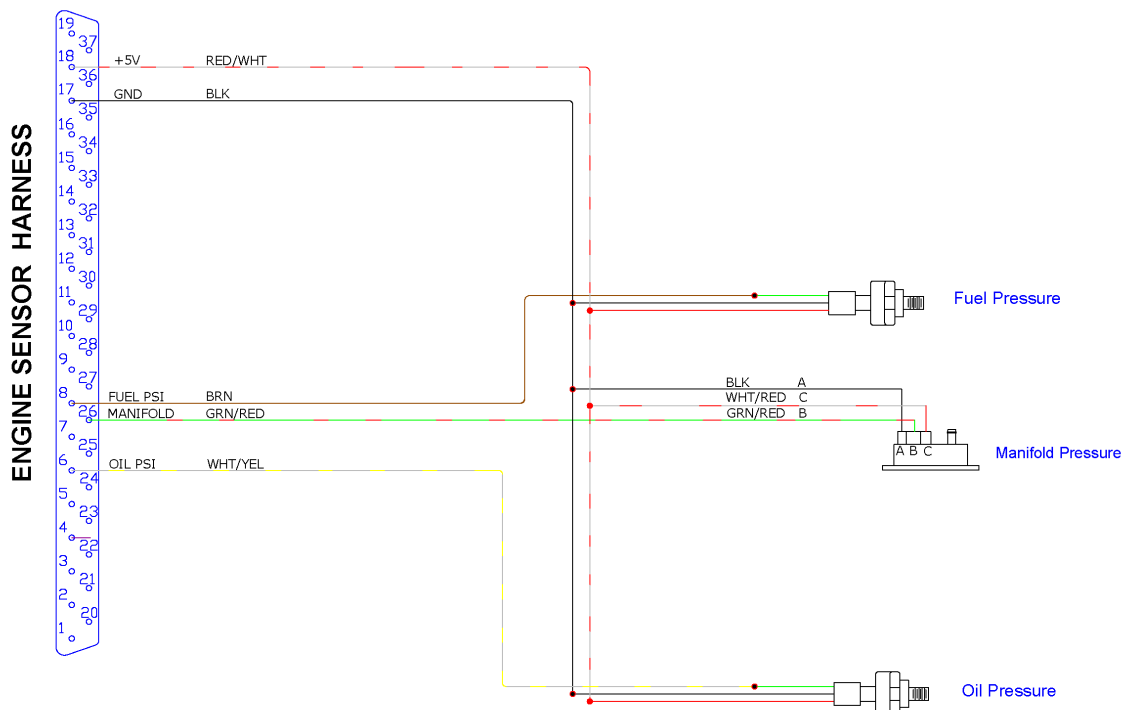
P/N	Pressure	Manufacturer	Color	Terminal
41015	0-15 PSI	Kavlico	Gold/Black	Plug
41150	0-150 PSI	Kavlico	Gold/Black	Plug

+5 Volt Sensor Power Wiring

Kavlico Manifold Sensor

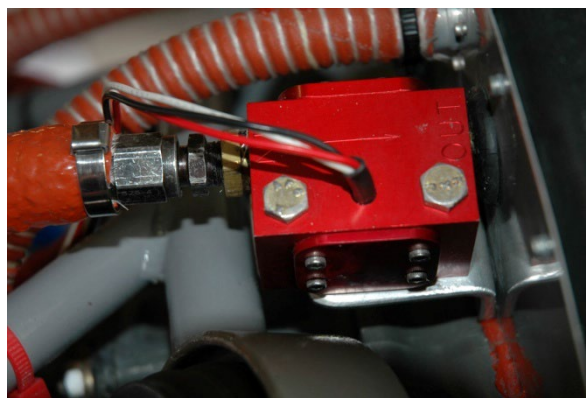


Delco Manifold Sensor



Fuel Flow Transducer Installation

The inlet and outlet ports in the fuel flow transducer have 1/4" NPT threads. Use only 1/4" NPT hose or pipe fittings to match. When assembling fittings into the inlet and outlet ports DO NOT EXCEED a torque of 180 inch lbs, or screw the fittings in more than 2 full turns past hand tight WHICHEVER HAPPENS FIRST. AFS will not be responsible for cracked castings caused by failure to use 1/4" NPT fittings, over-torquing the fittings, or assembling them beyond the specified depth. **Use only aircraft FUEL LUBE on the NPT fittings; NEVER USE TEFLON TAPE or SILICON SEALER IN AN AIRCRAFT FUEL SYSTEM.**



A screen or filter should be installed upstream of the flow transducer to screen out debris which could affect rotor movement or settle in the V-bearings.

Mount the fuel flow transducer in a position so the three wire leads are pointed straight up. Use only smooth radius curves in the fuel line and place the transducer with 5" of straight line before and after. The transducer wires should be connected directly to the 37-pin D-SUB using the cable provided. The transducer should be mounted according to the fuel metering device manufacturer's recommendations.



AFS has seen good results with the following mounting:

1. The transducer in a stationary location in-line between the electric boost pump and the engine driven pump.
2. The transducer in a stationary location in-line between the fuel injection servo and the distribution block.
3. The transducer in a stationary location in-line between the Engine driven pump and the Carburetor.

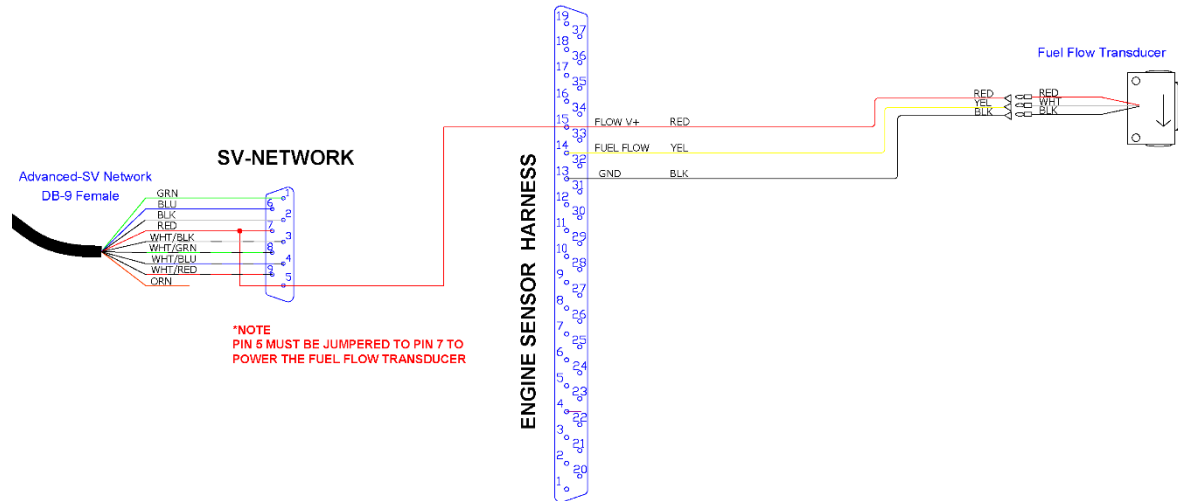
NOTE: The Electronics International FT-60 (Red Cube) transducer is rated for .6 – 70+ GPH. AFS recommends that the Electronics International FT-90 (Gold Cube) transducer be used for applications requiring more than 35 GPH (350HP) or for gravity flow fuel systems without a fuel pump (Contact AFS to exchange transducers).

CAUTION: NEVER CONNECT THE FUEL FLOW TRANSDUCER DIRECTLY TO THE ENGINE WITHOUT COVERING WITH FIRE SLEEVE.

The Fuel Flow transducer wires should be connected from the harness to the transducer using the supplied connectors.

Pin 15	Red	+8V
Pin 14	Yellow	Signal
Pin 13	Black	Ground

Fuel Flow Transducer Wiring



Manifold Pressure Transducer Installation

The manifold pressure transducer should be mounted on the firewall or in the cabin area. The transducer port is connected to the engine manifold pressure port with a 1/4" ID hose and hose clamp. The manifold pressure port location can be found in the engine manual.

P/N	Pressure	Application
41400	30 In-Hg	Old AFS Sensor for Normally Aspirated Engine
41401	59 In-Hg	Current Sensor (Normal and Turbo Engine)

We used the following fittings to connect the transducer in our aircraft:

AN823-4	45 deg pipe to 37 deg flare fitting
471-4D	37 deg flare fitting for hose
306-4	1/4" ID Black Hose



P/N: 44521 Adaptor for Kaliko Manifold sensor to 1/4" ID Hose

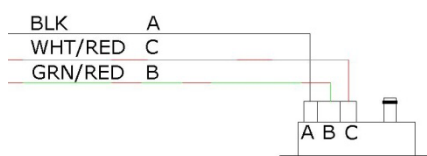
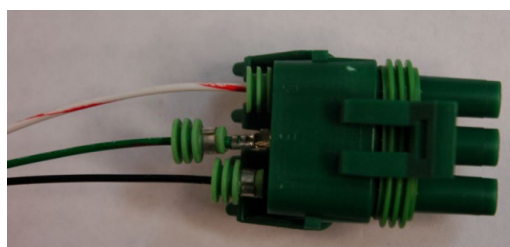
1/4" Barb x 1/8" Female Pipe

The transducer wires should be connected from the harness to the transducer using the supplied Weatherpack connector.

For information on crimping the Weatherpack pins:

<http://www.weatherpack.com>

The *Weatherpack* connector comes with three pins, three rubber seals, and a connector housing. Slide the three rubber seals onto the three wires and the pins onto the ends of the wires. Crimp the 3 pins onto the ends of the wires, ensuring that the long tabs that cradle the rubber seal wrap around the seal.



Manifold Sensor Connections:

Pin 18	WHT/RED	+5V	C
Pin 26	GRN/RED	Signal (4.5V - .5V)	B
Pin 17	Black	Ground	A

Fuel Tank Level Sensor

Float Type

Any standard 40-240 Ohm float style probe should work without any problem. The single wire from the Engine Harness should be connected to the float sensor terminal. Verify that the float mounting base is attached to the airframe ground. For the tank gauges to work properly, the floats should freely move from the top to the bottom of the tank.

Capacitance Type

If the engine monitoring system was setup at the factory for Capacitance fuel tanks input any probe or adaptor that puts out a 0-5 Volt DC signal can be used. A 1.5K OHM resistor **Must** be placed in series with the fuel tank input wire to limit the voltage to 4 Volts if using the Internal EMS board. You don't need the resistor if you are using the remote Dynon EMS module.

P/N: 51105 Dynon Van's Capacitance Tank Adaptor



Sensor Connections:

Adaptor Wire	Function	Connection
Red	+12V	EFIS Power Source
White	Signal (4V - .5V)	Tank 1 EMS Pin 22 Tank 2 EMS Pin 23
Black	Ground	Avionics Ground

Trim & Flap Position Installation

If you are using the ACM module do not connect the Flap and Trim transducers to the SV-EMS-220, they will connect to the ACM Flap and Trim Harness.

The system is designed to read the position transducer that is in the MAC trim servo. The MAC servo has 5 wires. The two white wires are for motor operation and the color-striped wires are for the position transducer.

The flap position can be measured by using the MAC linear position sensor P/N: POS-12

<http://www.rayallencompany.com/products/indsens.html>

CAUTION: DO NOT connect the MAC indicators and the AF-5500/5600 the MAC trim servos. The MAC trim indicators are +12V and the EFIS screens are +5V. The power and ground wires connect to all the servo's.

CAUTION: Verify before turning the system on the trim servo wiring is correct. If the +5V or Ground connection is wired to the WHT/GRN wire on a servo, it **could damage the servo**.



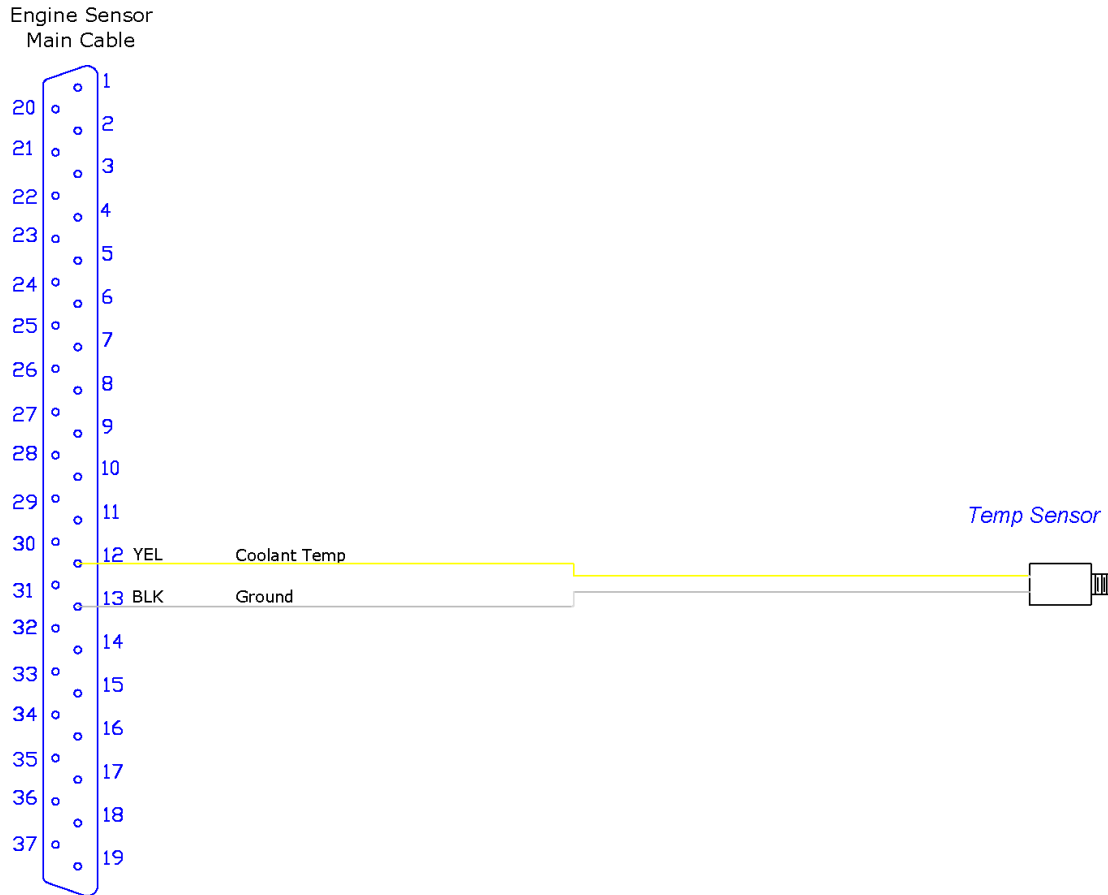
Note: Trim & Flap Positions MUST be calibrated. See the *Instrument Calibration* section.

Coolant Temp

The Coolant temp input is designed to use the AFS standard Oil Temp sensor P/N:40406

AFS has optional calibration data for the VDO P/N: 323-057 (300F) Sensor

Pin 12 Yellow Signal
Pin 13 Black Ground



Airplane Map Icon Image

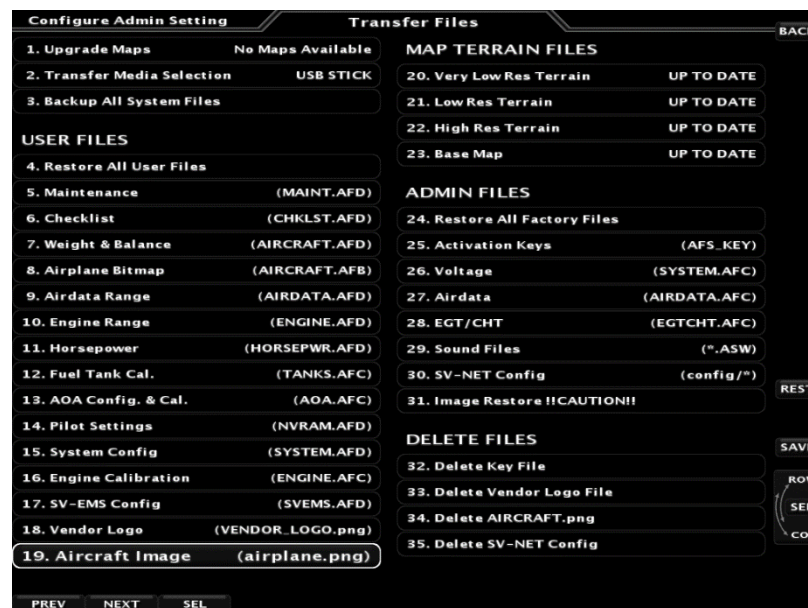
The AF-6600 / AF-5000 Map can be configured to use a custom airplane Icon. From the Calibration -> Transfer Files menu select **Aircraft Image** to transfer the new airplane Icon from the SD card to the EFIS screen.



The Airplane Icon must be a 128 x 128 pixel png file with a transparent background with the name **airplane.png**

Procedure to load new airplane Icon:

1. Using a graphics program save your new 128 x 128 Icon to a SD card using the name airplane.png
2. Place the SD card into the EFIS screen
3. Select the **Aircraft Image** menu from the **Transfer Files** menu.
4. Press the **REST** button to transfer the Icon to the EFIS screen.



Vendor Logo Splash Screen

The AF-5000 can be configured to use a custom startup splash screen. From the Calibration → Transfer Files menu select **Vendor Logo Image** to transfer the new splash screen from the SD card to the EFIS screen.

The Vendor Logo must be a 1024 x 225 pixel png file with the name **VLOGO_1024x225.png**

**** VLOGO_1024x225.png file must be smaller than 200K**

Procedure to load new splash screen:

1. Using a graphics program save your new 1024 x 225 pixel file to a SD card using the name VLOGO_1024x225.png.
2. Place the SD card into the EFIS screen
3. Select the **Vendor Logo File** menu from the **Transfer Files** menu.
4. Press the **REST** button to transfer the new file.



Landing Gear Warning System

The AF-6600 / AF-5000 landing gear warning system is designed to provide an additional level of safety for land based and amphibious, retractable gear aircraft. Both visual and audible voice alerts are used to convey the position of the gear and the landing mode.

Amphibian Aircraft

The landing gear warning system will provide information on the position of the landing gear prior to either a water landing, or a runway landing. The EFIS digital inputs #1 (Gear Down) and #2 (Gear Up) should be wired to the landing gear position limit switches. The inputs are active when connected to aircraft ground.

Landing Gear Configuration Menu

The following configuration items control the landing gear warning system

Instrument Calibration	Configure Landing Gear	BACK
1. Aircraft Type	AMPHIBIOUS	
2. Gear Overspeed Limit (MPH)	DISABLED	
3. Gear Up Airspeed (MPH)	75	
4. Gear Down Airspeed (MPH)	65	
5. Retrigger Range (MPH)	10	
6. Retrigger Delay (SEC)	60	
7. Instrument On/Off	ON	
8. Landing Gear Audio On/Off	ON	

Flight Mode

The system is activated in Flight Mode when the following conditions are detected:

The current IAS is **above**

3. Gear Down Airspeed (KTS)	83
-----------------------------	----

AND the flap down switch is not active.

In **Flight Mode** if the landing gear is not up and the aircraft airspeed is above

2. Gear Up Airspeed (KTS)	114
---------------------------	-----

you will get a "CHECK LANDING GEAR" warning.

Landing Advisory Mode

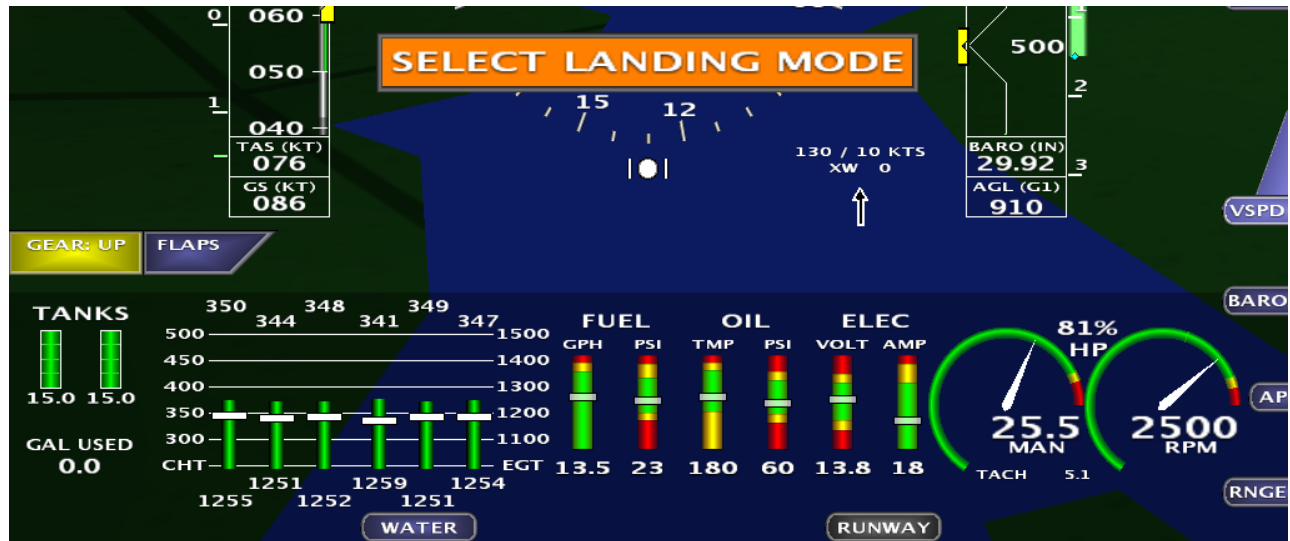
The system is activated in Landing Advisory Mode when the following conditions are detected:

The current IAS is **below**

3. Gear Down Airspeed (KTS)	83
-----------------------------	----

OR the flap down switch is active.

In **Landing Advisory Mode** the pilot will be prompted with the following message and audio "Check Landing Gear":

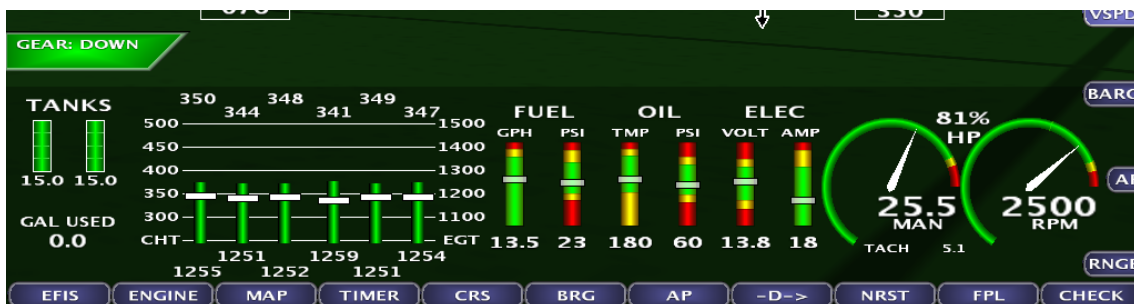


Pressing **WATER** plays the sound “Water Landing” and starts checking for the gear up input.

Pressing **RUNWAY** plays the sound “Runway Landing” and starts checking for the gear down input.

After 15 seconds if the gear is not in the correct position for the selected landing mode will trigger a new message and audio alert.

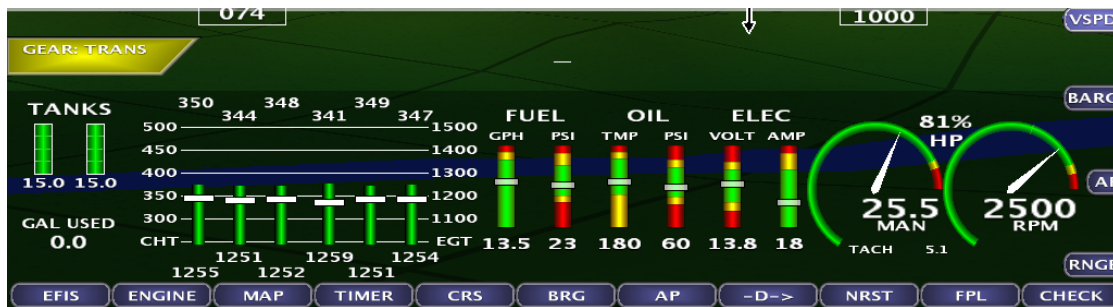
Gear Down Indication during climb-out. A Single 'Check Landing Gear' audio is issued as a reminder when passing through the Gear Down Speed.



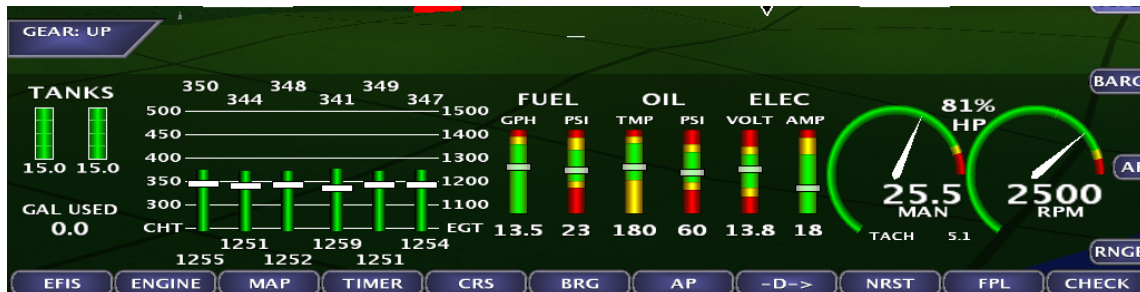
Gear Down Overspeed Indication. Will be accompanied with audio alert “Check Landing Gear”.



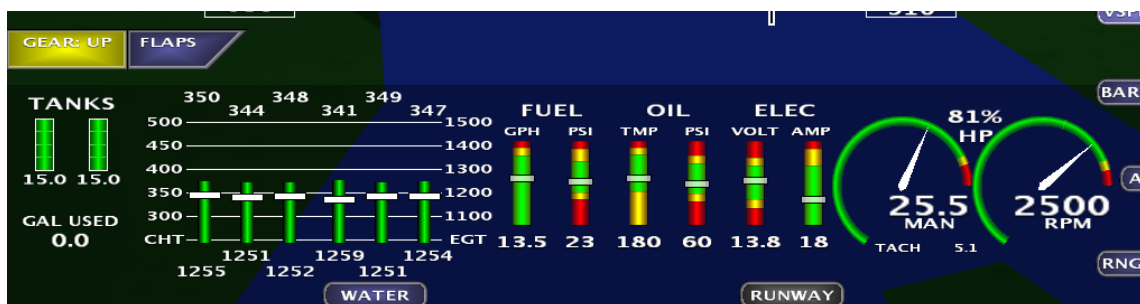
Gear Transition indication shown when lifting or lowering the landing gear.



Gear Up Indication



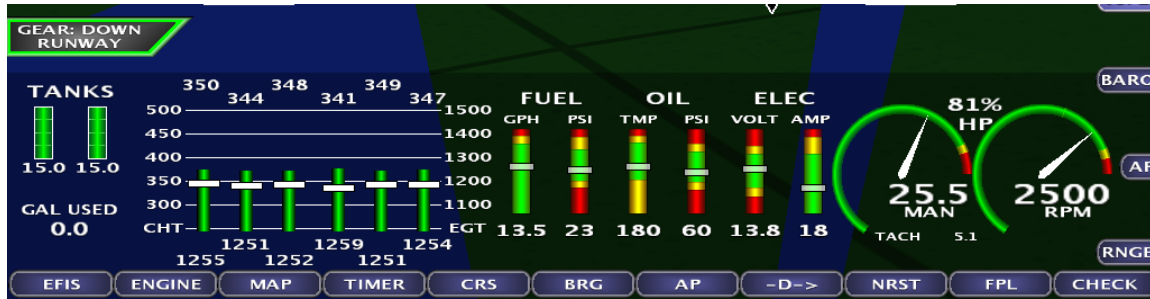
Gear Up Landing Mode Selection Initiated by Flaps Deployment.



Gear Up Water Landing Mode Selected, Green Box indicated good and Blue for water.



Gear Down Runway Landing Mode Selected, Green Box indicated good and gray for runway.



WARNING: THE AF-5000 LANDING GEAR WARNING SYSTEM SHOULD NOT BE UTILIZED AS THE PRIMARY MEANS OF DETERMINING GEAR POSITION. THE USER SHOULD UTILIZE THE NORMAL OPERATING PROCEDURES AS DEFINED IN THE AIRCRAFT FLIGHT MANUAL AS THE PRIMARY INDICATION OF GEAR POSITION.

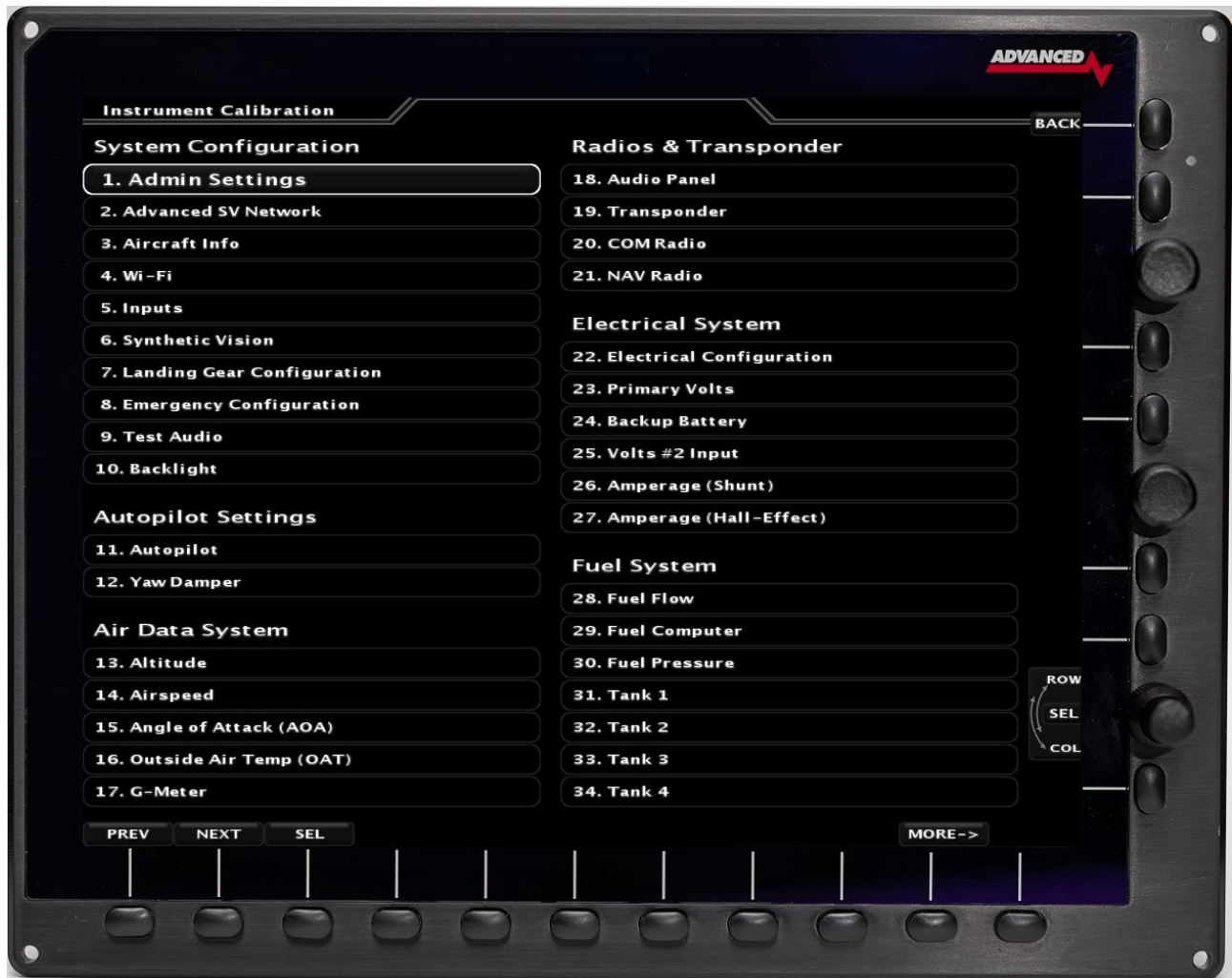
Landing Gear configuration menu.

Instrument Calibration		Configure Landing Gear		BACK
1. Aircraft Type	AMPHIBIOUS			
2. Gear Up Airspeed (KTS)	114			
3. Gear Down Airspeed (KTS)	83			
4. Instrument On/Off	ON			
5. Landing Gear Audio On/Off	ON			

SAVE SEL

1. **Aircraft Type**
Selects Land or Amphibian mode.
2. **Gear Up Airspeed (KTS)**
If the landing gear is not up and the aircraft is above this speed you will get the alert "CHECK LANDING GEAR"
3. **Gear Down Airspeed (KTS)**
The airspeed that will trigger the select landing mode message.
4. **Instrument On/Off**
Enables the gear warning system.
5. **Landing Gear Audio On/Off**
Should be ON for audible warnings.

EFIS Setup and Configuration



All the EFIS configuration and setup is done from the **Instrument Calibration** menu. From the normal EFIS run menu you press **[SET] -> [CAL]** and **Hold for 2 seconds** to enter the Instrument Calibration mode. A list of menu pages and instruments will appear. Use the lower right knob to scroll through the list. There are multiple pages of instruments.

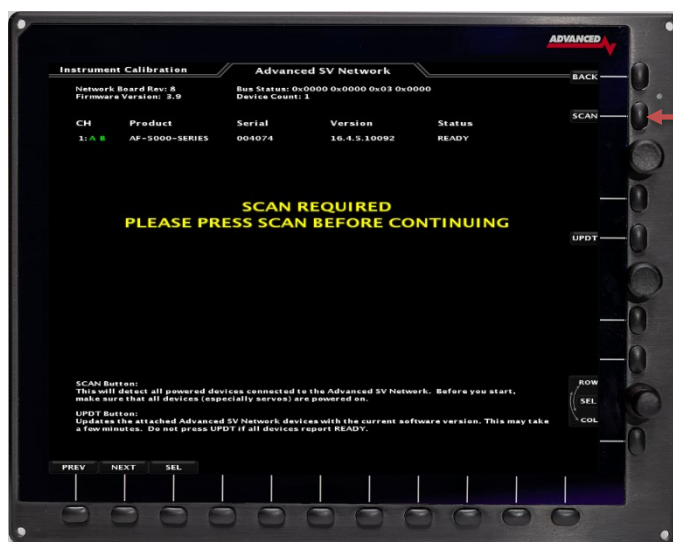
To select an item press the lower knob in while the cursor is on the desired menu item.

To exit the Instrument Calibration menu or a subpage press the **[BACK]** button to return to the previous page.

Advanced-SV Network Configuration

The first thing you should do after powering up the system for the first time is SCAN for all the components that are connected to the Dynon Advanced SV Network. Make sure you have the Ethernet cable connected between EFIS screens and they are all powered up. You should also have power to any Dynon Com Radios and Autopilot Servos.

You should do a network SCAN on all AF-5000/AF-6600 EFIS screens in the aircraft starting with the CoPilot EFIS display and always finishing on the Pilot side EFIS.



SCAN for Network Devices

Select menu item **2. Advanced SV Network** from the EFIS and press **SCAN**.

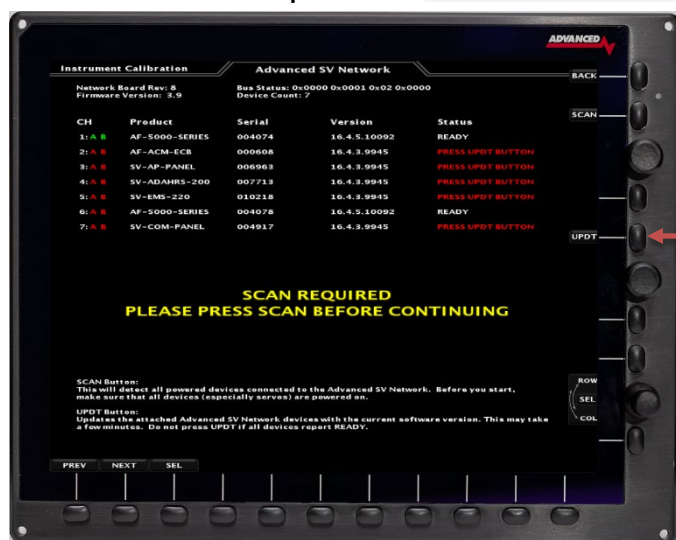


You will need to do a new **SCAN** anytime a different or new component is connected to the SV Network.

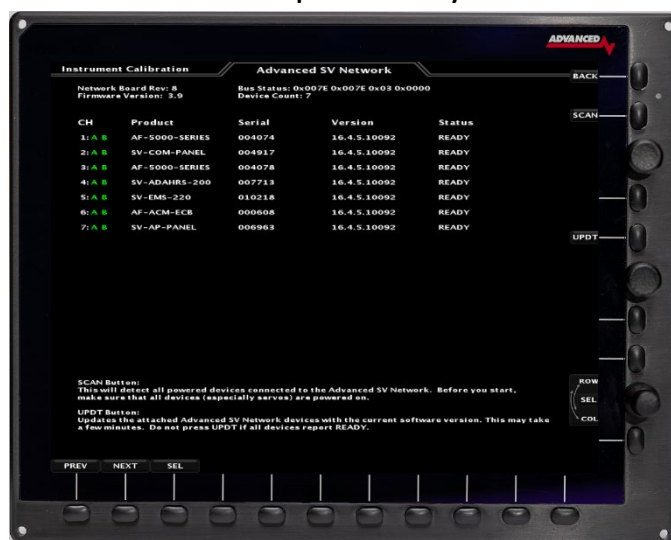
Updating Network Components

After you **SCAN** for components you should get a list of all the Dynon components that are connected to the SV Network. If any of the components have old software you will need to press the **UPDT** button to update the software on all network devices. Once the new software is loaded on the network devices you will be instructed to power down the system. Once all the EFIS screens are shut down you can turn on power to the systems and verify that all Items are ready (red text gone) and the Chancel **A** and **B** lanes are green. If you have a red **A** or **B** lane you need to check the network wiring.

Need to press UPDT



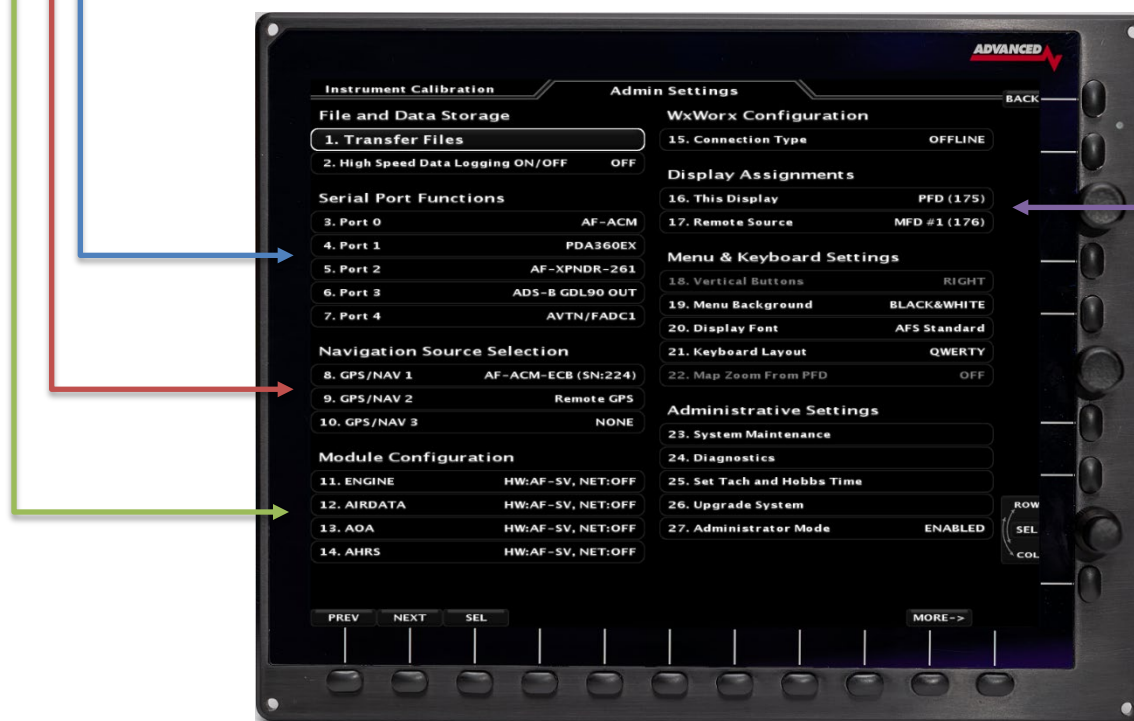
All Components Ready



Admin Settings Menu

The Admin Settings menu is where you:

- Assign the 5 EFIS RS-232 Serial Ports
- Configure the Navigational Sources
- Setup the (Engine, AIRDATA, AOA, AHRS) Modules
- Set the EFIS Ethernet IP Address (PFD:175, MFD:176, MFD2:177)



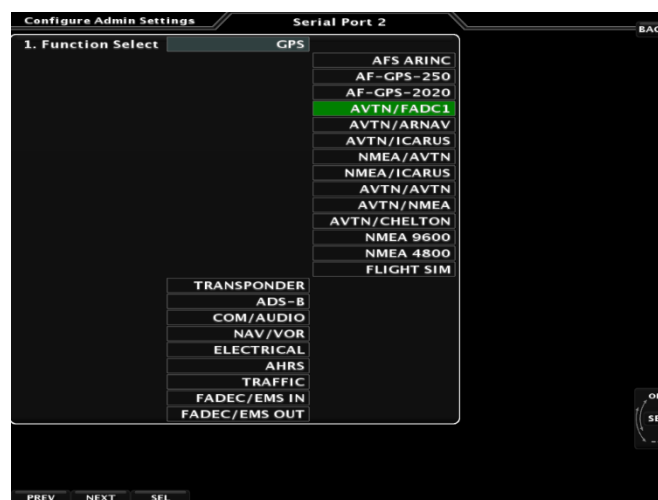
EFIS RS-232 Serial Ports

Using your system block diagram (schematic) that shows which device is wired to each EFIS serial port select the correct data format. Use the lower knob to select the desired serial port and press in to display the available options. The serial port settings are grouped by (GPS, Transponder, ADS-B, COM/AUDIO, NAV/VOR, Electrical, AHRS, Traffic, FADEC/EMS In, FADEC/EMS Out)

Most commonly used options highlighted.

GPS Options

AFS ARINC	Legacy AFS ARINC Adaptor
AF-GPS-250	Dynon GPS 250
AF-GPS-2020	Dynon GPS 2020
AVTN/FADC1	Avidyne IFD or Garmin GTN
AVTN/ARNAV	Aviation Data in, EI Fuel data out
AVTN/ICARUS	Aviation Data in, ICARUS data out
NMEA/AVTN	NMEA Data in, Aviation data out
NMEA/ICARUS	NMEA Data in, ICARUS data out
AVTN/AVTN	Aviation Data in, Aviation data out
AVTN/NMEA	Aviation Data in, NMEA data out
AVTN/CHELTON	Aviation Data in, Chelton out
NMEA 9600	NMEA 9600 Data in
NMEA 4800	NMEA 4800 Data in
FLIGHT SIM	Data from XPlane or Microsoft Flight Sym



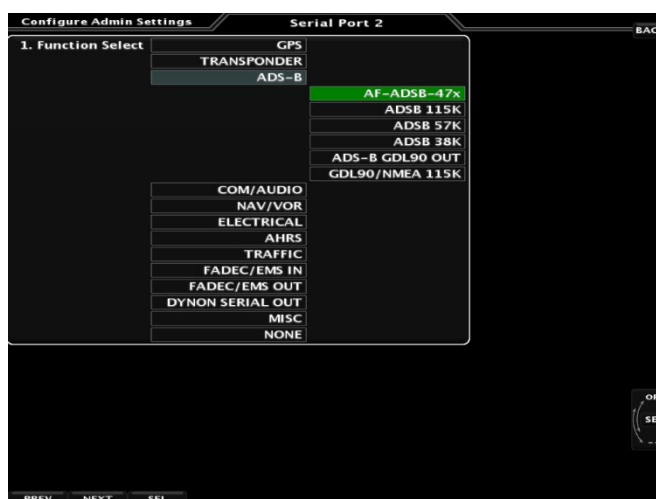
Transponder Options

AF-XPDR-261	Dynon 261 Mode S Transponder
UAVIONIX XPDR	Uavionix TailBeacon X
SANDIA	Sandia Remote Mode C
TRFC/ICARUS	GTX327 or GTX330
TRFC/SHADIN ALT	Garmin Traffic in, SHADIN data out
NMEA/ICARUS	NMEA Data in, ICARUS data out
GARMIN AT	GARMIN AT data
MEGELLON	MEGELLON data
NORTHSTAR	Northstar data



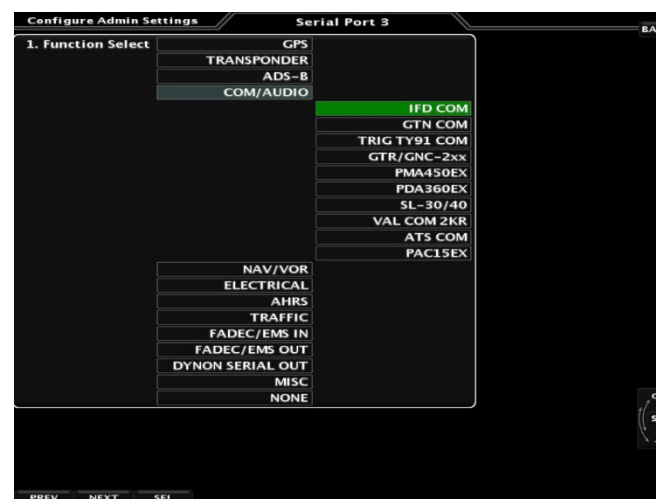
ADS-B Options

AF-ADSB-47x	Dynon 472 ADS-B Receiver
ADSB 115K	GDL90 115K Data in
ADSB 57K	GDL90 57K Data in
ADSB 38K	GDL90 38K Data in
ADS-B GDL90 OUT	Send ADSB data to Avidyne IFD
GDL90/NMEA 115k	GDL90 in, NMEA data out 115k



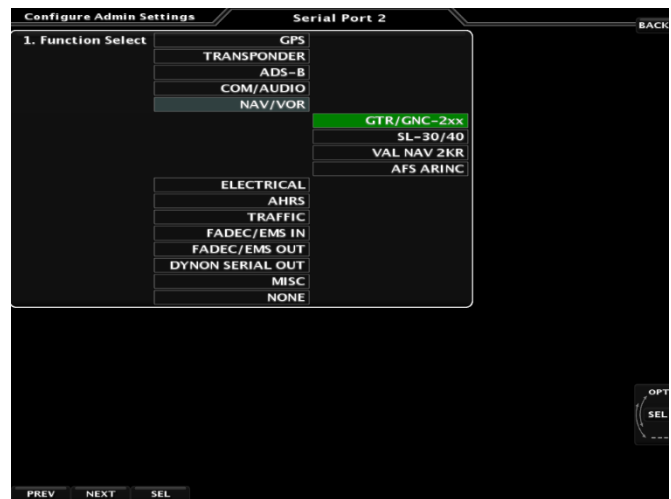
COM/AUDIO Options

IFD COM	Avidyne IFD440, IFD540, IFD550
GTN COM	Garmin GTN-650, GTN-750
TRIG TY91 COM	Dynon Remote Trig Radio
GTR/GNC-2xx	GTR, GNC
PMA450EX	PS Engineering PMA450EX Audio Panel
PMA360EX	PS Engineering PMA360EX Audio Panel
SL30/SL40	Garmin SL30 or SL40
VAL COM2KR	VAL Radio
ATS COM	ATS COM
PAC15EX	PS Engineering PAC15 Audio Panel



NAV/VOR Options

GTR/GNC-2xx	Garmin GNC-255 NAV/COM
SL30/SL40	Garmin SL30 or SL40
VAL NAV 2KR	VAL Radio
AFS ARINC	Legacy AFS ARINC Converter



ELECTRICAL Options

AFS-ACM	AFS Advanced Control Module
VPX PRO/SPORT	Vertical Power VPX



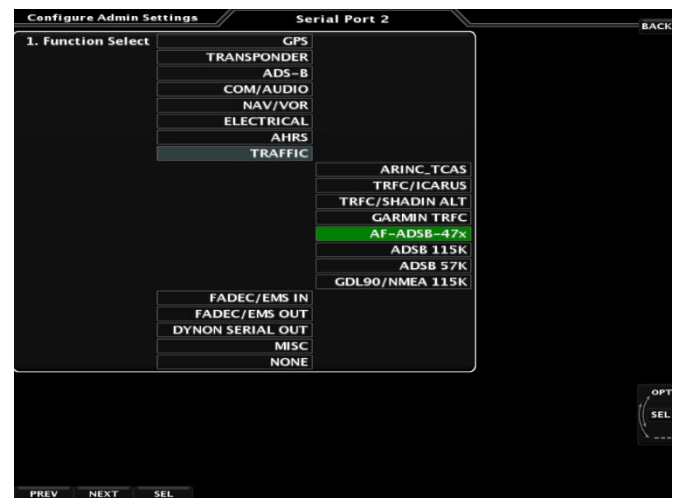
AHRS Options

AFS AHRS	Legacy AFS red Vector NAV AHRS
XBOW 500	Crossbow 500 AHRS
XBOW 525	Crossbow 525 AHRS
FLIGHT SIM	Microsoft Flight Simulator, XPLANE
VN-200 AHRS	Vector NAV AHRS
GARMIN G5 BACKUP	Garmin G5 EFIS ADAHRS data



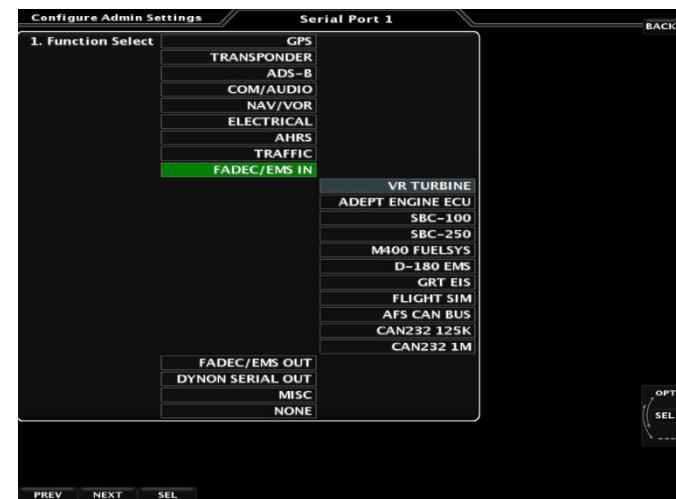
TRAFFIC Options

ARINC_TCAS	Legacy AFS ARINC TCAS
TRFC/ICARUS	GTX327 or GTX330
TRFC/SHADIN ALT	Garmin Traffic in, SHADIN data out
GARMIN TRFC	Garmin Serial traffic format
AF-ADSB-47x	Dynon 472 ADS-B Receiver
ADSB 115K	GDL90 115K Data in
ADSB 57K	GDL90 57K Data in
GDL90/NMEA	GDL90 In NMEA Out



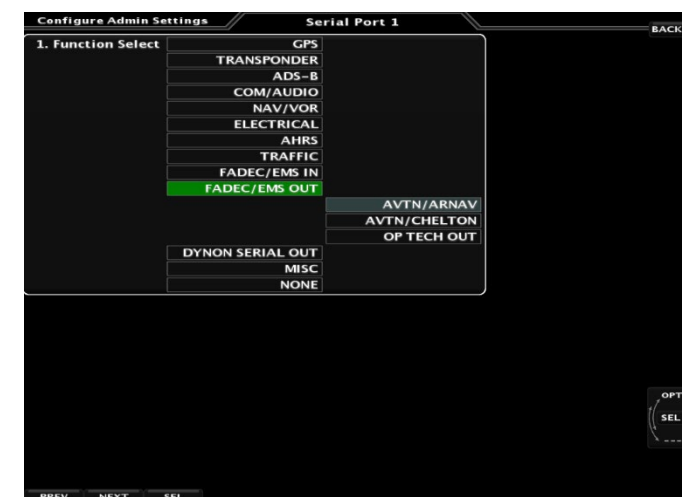
FADEC/EMS IN Options

VR TURBINE	VR TURBINE ENGINE
ADEPT ENGINE ECU	
SBC-100	
SBC-250	
M400 FUELSYS	
D-180 EMS	Use D180 as EMS
GRT EIS	Use GRT as EMS
FLIGHT SIM	
AFS CAN BUS	
CAN232 125K	
CAN232 1M	



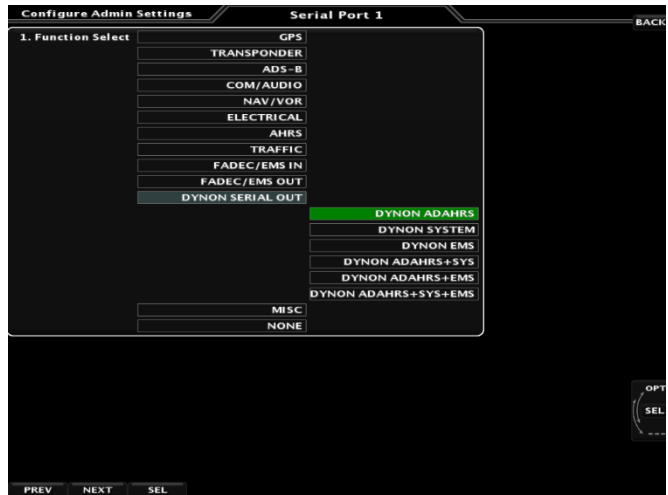
FADEC/EMS OUT Options

AVTN/ARNAV	Aviation in, EI Fuel Out
AVTN/CHELTON	Chelton EFIS
OP TECH OUT	OP Tech EFIS



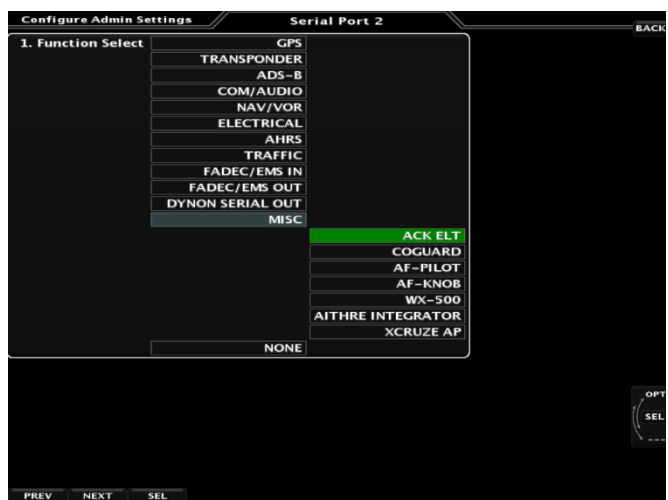
DYNON SERIAL OUT Options

DYNON ADAHRS	Dynon ADAHR Data
DYNON SYSTEM	Dynon System Data
DYNON EMS	Dynon EMS Data
DYNON ADAHRS+SYS	
DYNON ADAHRS+EMS	
DYNON ADAHRS+SYS+EMS	



MISC Options

ACK ELT	ELT GPS DATA OUT
COGUARD	CO Guardian CO + O2
AF-PILOT	TruTrak Autopilot
AF-KNOB	
WX-500	
AITHRE INTEGRATOR	Aithre CO and O2 System
XCRUSE AP	TruTrak XCRUSE Autopilot



NONE Option

DISABLED	Turn OFF Serial Port
----------	----------------------



Navigation Source Selection

The AF-6600 / AF-5000 EFIS supports up to 3 external navigational sources plus the internal flight plan. The EFIS CDI and flight plan are driven by selecting one of the 3 Nav sources or internal flight plan. The most common installations only have 2 external navigational sources. A GPS/NAV source can be any of the following:

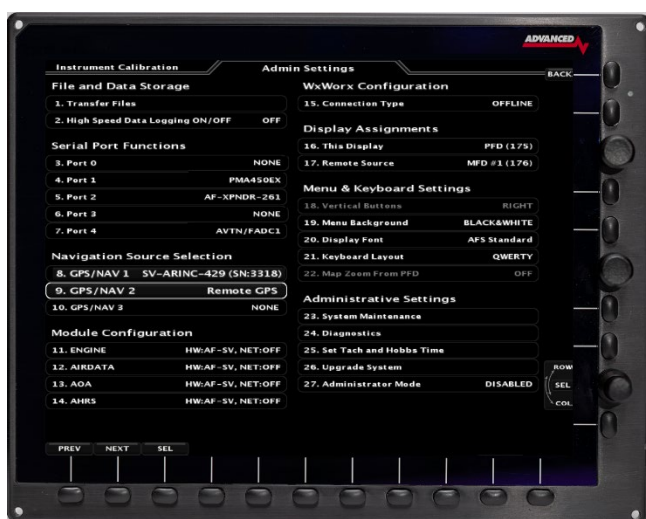
GNAV	GPS Navigator (Avidyne IFD or Garmin GTN) has both a GPS and a NAV (VOR, ILS) Radio
GPS	GPS Only (Dynon GPS-250, GPS-2020, Garmin 696,)
NAV	NAV Radio (Garmin SL30, GNC255,)

A GNAV source always points to an ARINC-429 interface module (Dynon SV-ARINC-429 or Advanced Control Module).

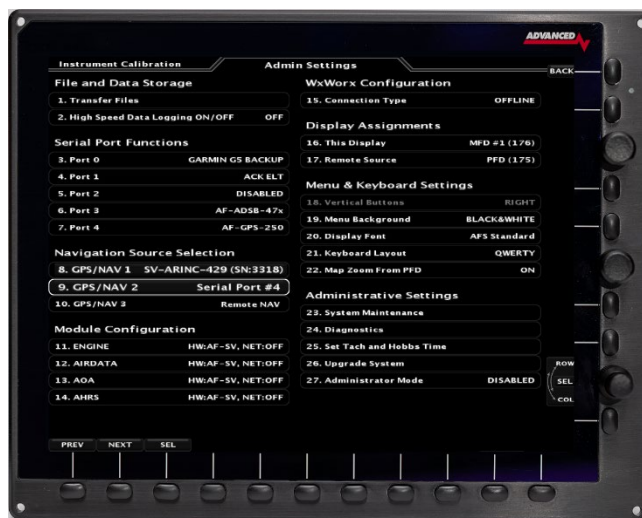
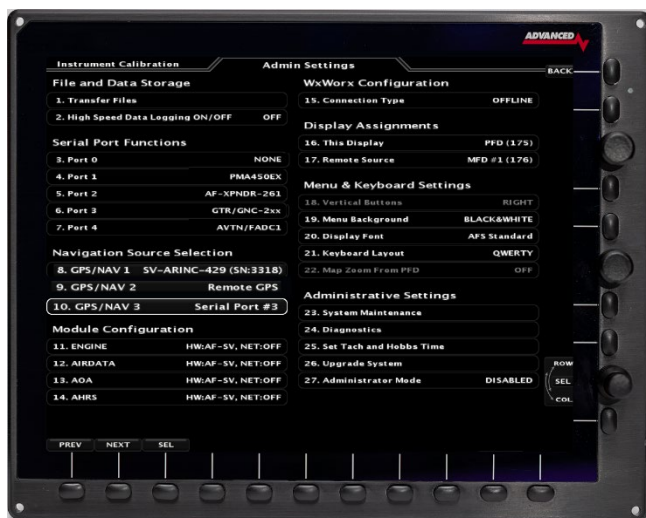
The **GPS/NAV 1**, **GPS/NAV 2**, **GPS/NAV 3** data sources for all AF-6600 / AF-5000 EFIS screens in the aircraft must point to the same navigational device. If the navigational device is connected to an EFIS serial port the actual GPS/NAV setting will be different between EFIS screens, but will point to the same device. If you have a GPS Navigator it should always be configured as the GPS/NAV1 data source.

Example Settings

AF-6600 PFD, AF-6600 MFD, Avidyne IFD, Dynon GPS-250 wired to the MFD serial port #4



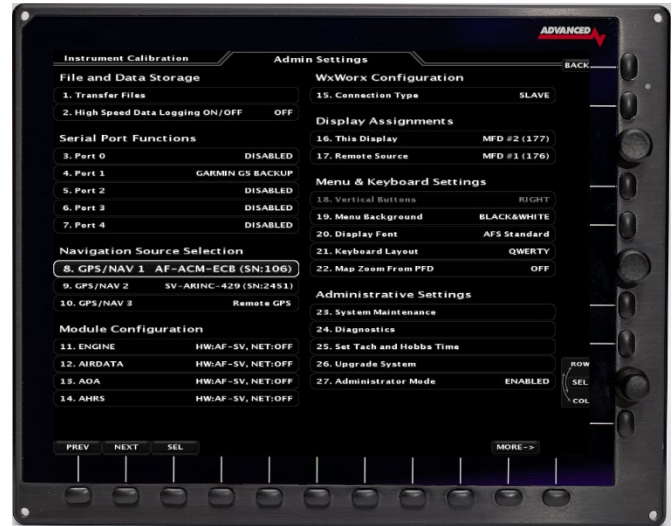
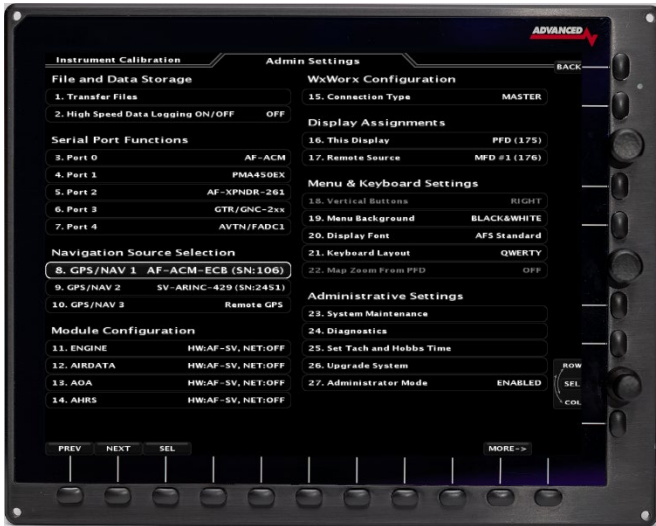
AF-6600 PFD, AF-6600 MFD, Avidyne IFD, GNC255 Wired to PFD Serial port #3, Dynon GPS-250 wired to the MFD serial port #4



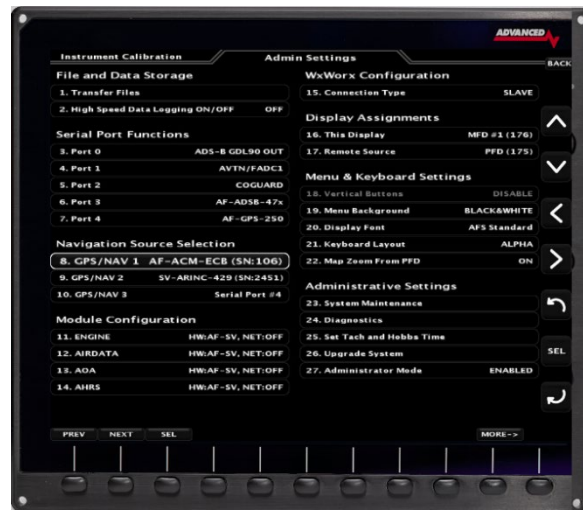
AF-6600 PFD, AF-5700 MFD #1, AF-6600 MFD #2, ACM, IFD-550, IFD-440 , Dynon GPS-250 wired to the MFD #1 serial port #4

Pilot Side PFD EFIS

COPilot Side MFD #2 EFIS

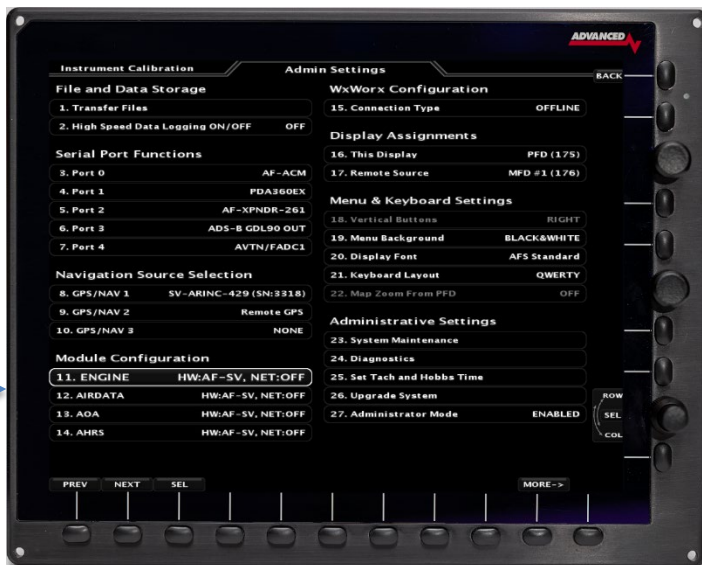


Center MFD #1 EFIS

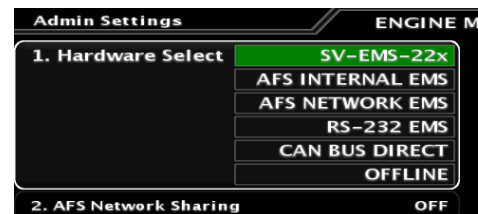


Module Configuration

For all AF-6600 and AF-5000 EFIS systems using a SV-ADAHRS-20x and SV-EMS-22x components you should have these settings configured to **HW:AF-SV, NET:OFF**



The other settings are for connecting to legacy AFS EFIS screens:



WxWorx Configuration (XM Weather-Radio)

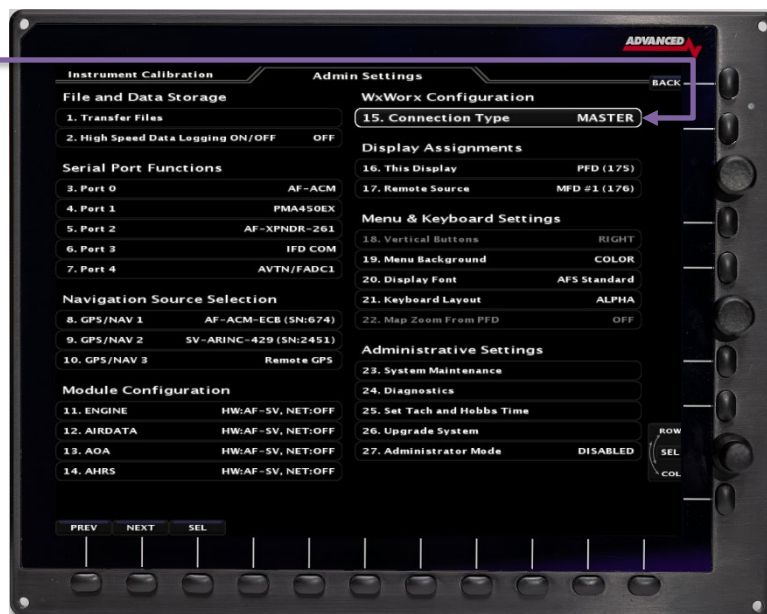
The AFS EFIS is designed to work with the Baron WR-10 XM Receiver. The WR-10 needs to be connected to the EFIS using Ethernet and configured to use IP Address 192.168.0.70 from the Baron setup software.

One of the AF-5000/AF-6600 EFIS screens in the aircraft must be configured as the XM Master. **If the aircraft has multiple AFS EFIS screens the XM Master should not be the EFIS that is wired to the Dynon ADSB-472 Receiver.**



You should configure the XM Master from the following EFIS menu:

SET > CAL > 1. Admin Setting >
15. Connection Type



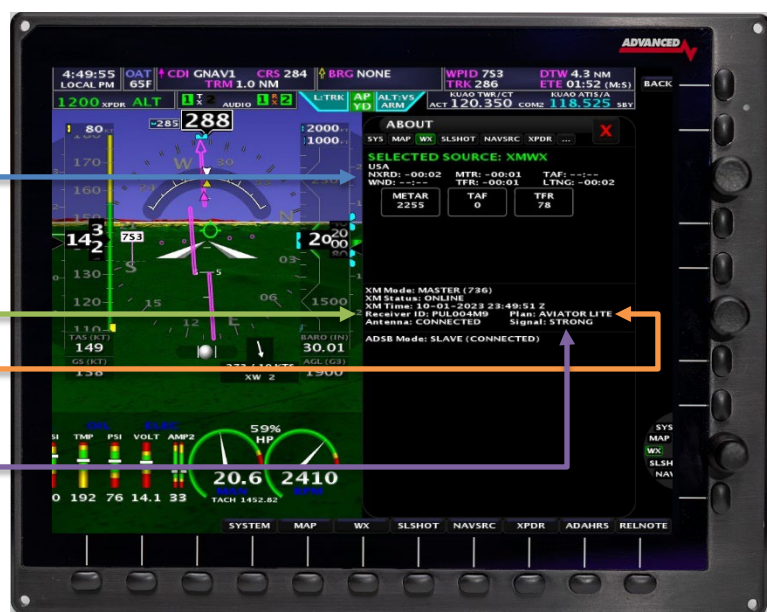
You can verify that the EFIS is receiving data from the XM receiver from the following EFIS page:
CHECK > ABOUT > WX

Data Age

Receiver ID

Plan

Signal Strength



If the EFIS is displaying the receiver ID and does not display a Plan you should do a refresh using the following link and receiver ID:

https://care.siriusxm.com/retailrefresh_view.action#/refreshradio

You can select the weather (XM or ADSB) to display on the map from the following menu:
MAP > WX

Data Age

Data to Display

Map Weather Source



METAR and TAF data will be displayed on the airport info page and with a colored flag on the map airport symbol.

Display Assignments

Each AF-6600 / AF-5000 EFIS in the aircraft must have a unique Display Address (Ethernet IP Address).

This Display

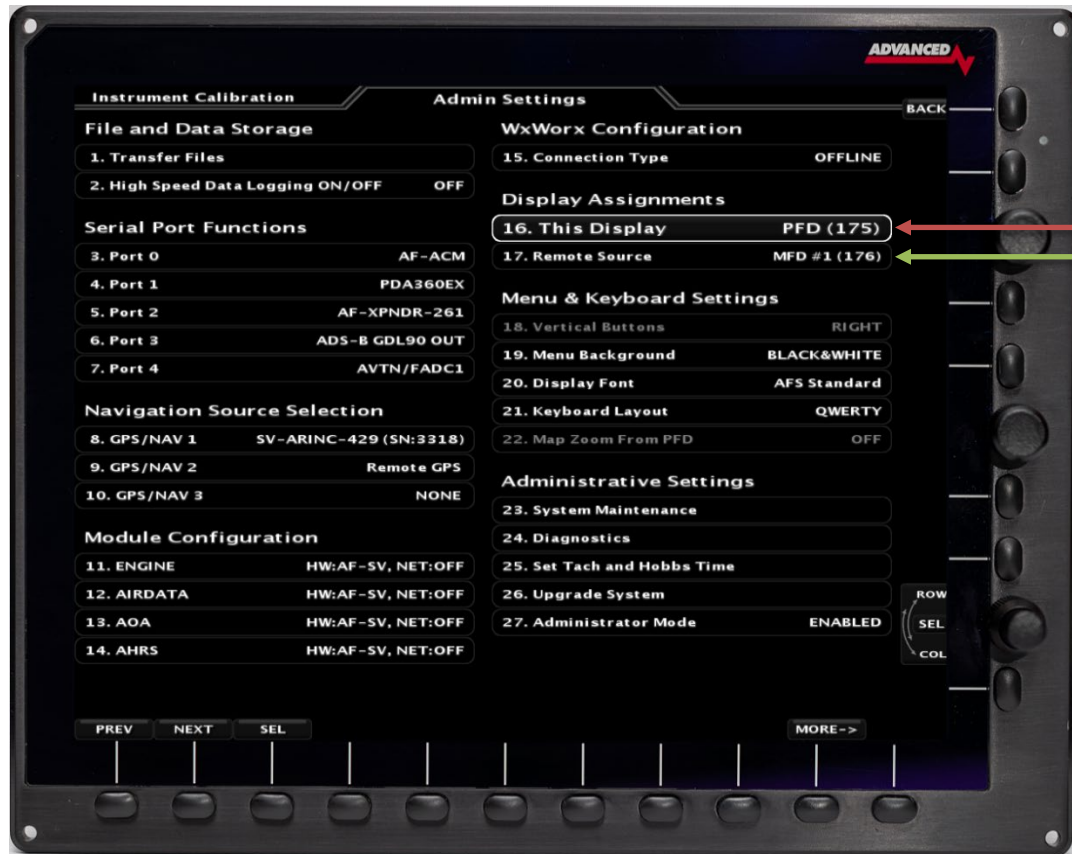
Pilot PFD EFIS should be set to **PFD (175)**

MFD EFIS screens should be set to **MFD#1 (176)** or **MFD#2 (177)**

Remote Source

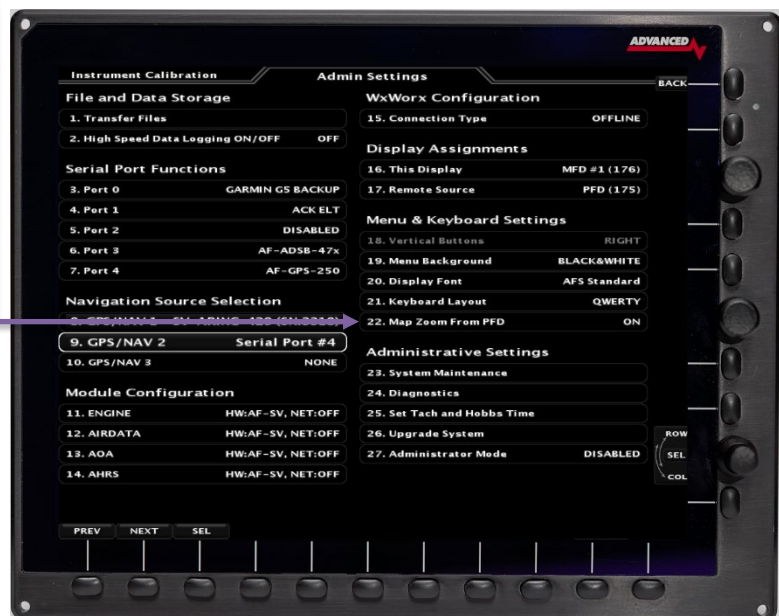
Pilot PFD EFIS should be set to **MFD#1 (176)**

MFD EFIS screens should be set to **PFD (175)**



Map Zoom From PFD

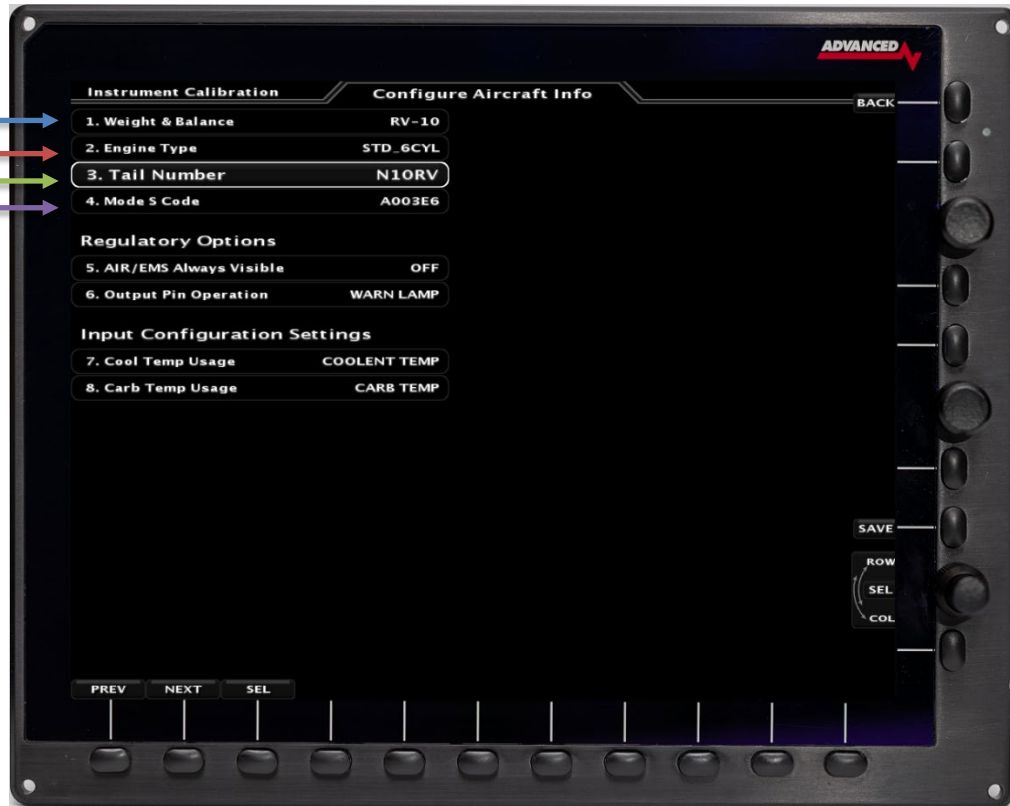
Setting Map Zoom From PFD to **ON** will enable the pilot PFD EFIS to remotely zoom the MFD EFIS map when the PFD is not displaying a map.



Aircraft Info Menu

The following items should be configured in the **Aircraft Info** menu:

1. Weight & Balance – Select Aircraft Model
2. Engine Type – Select Engine
3. Tail Number – Enter Aircraft Tail Number
4. Mode S Code – For N Number registered aircraft the EFIS will calculate, you will need to enter the Mode S code for non N number aircraft.

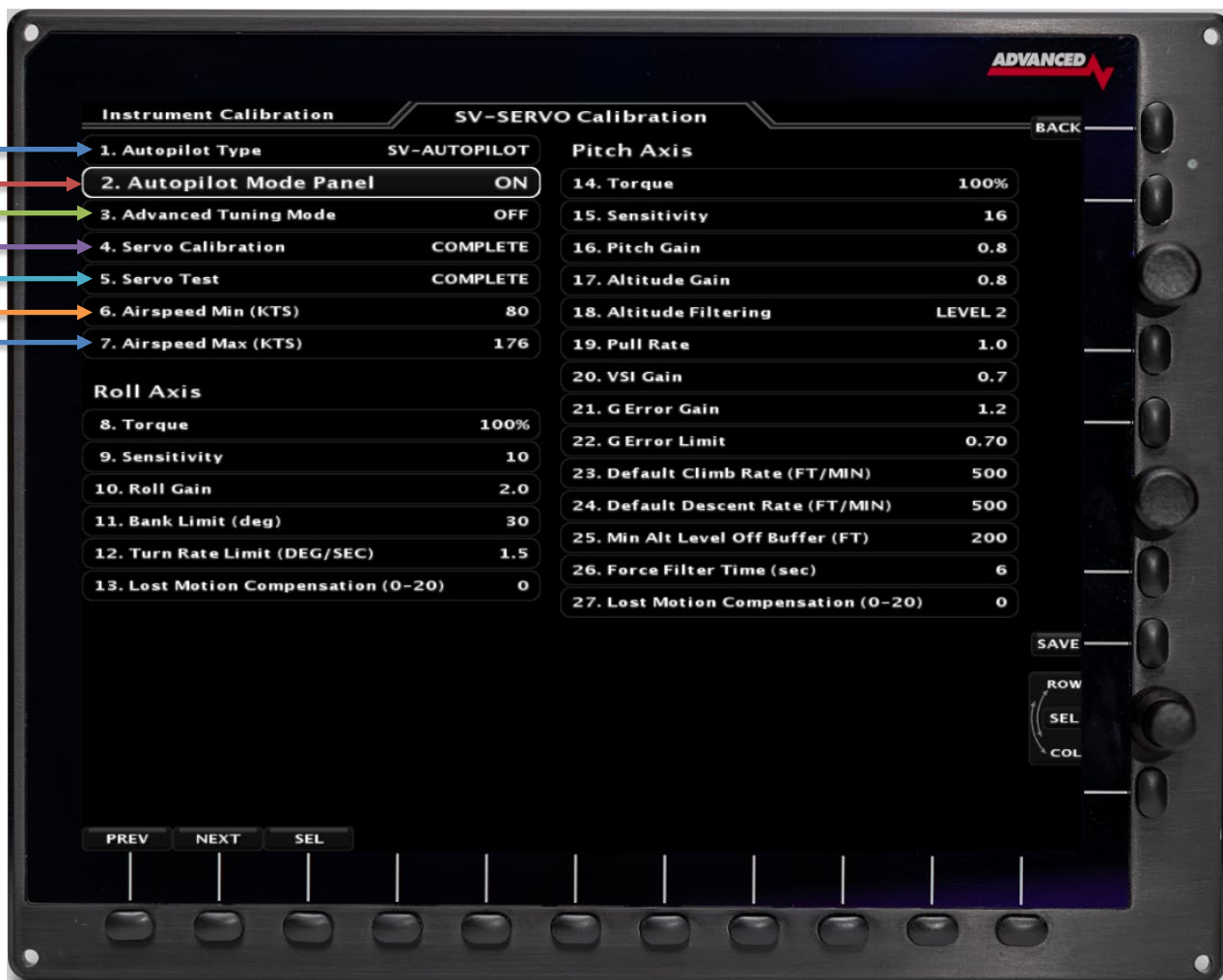


Autopilot Settings

The Autopilot in-flight tuning procedure is covered in the AF-6600 / AF-5000 Pilots Guide. The following calibration items should be configured before doing the in-flight calibration.

Autopilot (Roll & Pitch)

- | | |
|-------------------------|--|
| 1. Autopilot Type | SV-AUTOPILOT for Dynon Servos |
| 2. Autopilot Mode Panel | ON |
| 3. Advanced Tuning Mode | OFF |
| 4. Servo Calibration | See next section for instructions |
| 5. Servo Test | See next section for instructions |
| 6. Airspeed Min (KTS) | Vs1 x 1.3 is a good starting point |
| 7. Airspeed Max (KTS) | Vne x .90 is a good starting point |
| 8. Roll Axis Torque | 100% |
| 14. Pitch Axis Torque | 100% |

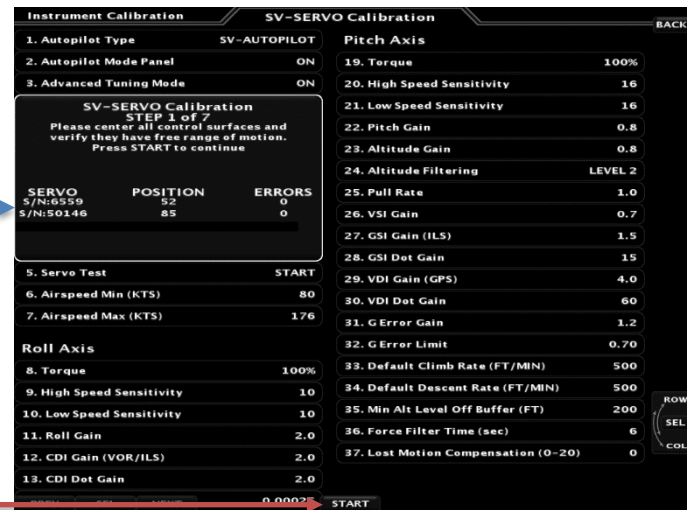


Autopilot Servo Calibration Procedure

- With the EFIS screens shut down center the Aileron and Elevator control surfaces.
- Make sure the panel mounted AUTO PILOT power switch is in the ON position.
- Turn on the aircraft Master Switch and Avionics Switch.
- Select SET > CAL > 11. Autopilot

STEP 1 of 7

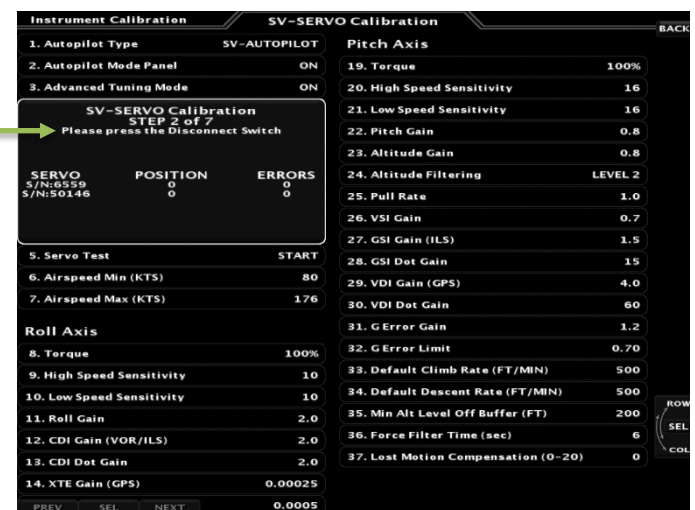
- Select **4. Servo Calibration** and verify that the SERVO POSITION values change when you move the controls.



- Press **START**

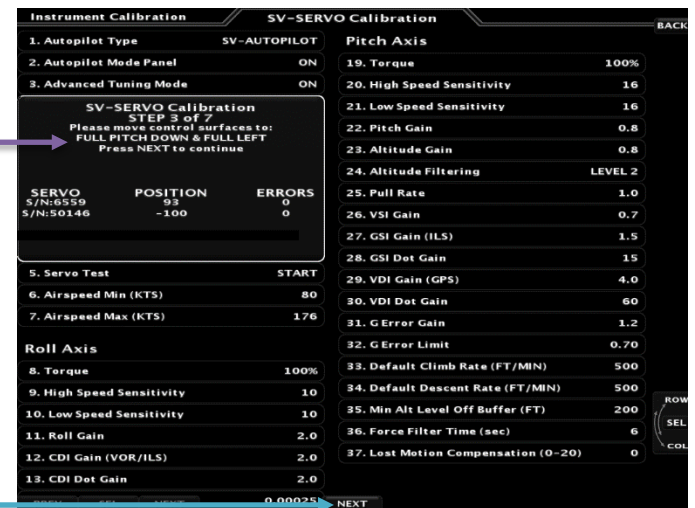
STEP 2 of 7

- Press the Autopilot Disconnect Switch (CWS) *Normally a button on the stick.*



STEP 3 of 7

- Move the control stick to the full pitch down and full left position.



- Press **NEXT**

STEP 4 of 7

- Move the control stick to the full pitch down and full right position

SV-SERVO Calibration
STEP 4 of 7
Please move control surfaces to:
FULL PITCH DOWN & FULL RIGHT
Press NEXT to continue

SERVO	POSITION	ERRORS
S/N:6559	-79	0
S/N:50146	-100	0

5. Servo Test: START
6. Airspeed Min (KTS): 80
7. Airspeed Max (KTS): 176

Pitch Axis

8. Torque	100%
9. High Speed Sensitivity	10
10. Low Speed Sensitivity	10
11. Roll Gain	2.0
12. CDI Gain (VOR/ILS)	2.0
13. CDI Dot Gain	2.0

Roll Axis

19. Torque	100%
20. High Speed Sensitivity	16
21. Low Speed Sensitivity	16
22. Pitch Gain	0.8
23. Altitude Gain	0.8
24. Altitude Filtering	LEVEL 2
25. Pull Rate	1.0
26. VSI Gain	0.7
27. GSI Gain (ILS)	1.5
28. GSI Dot Gain	15
29. VDI Gain (GPS)	4.0
30. VDI Dot Gain	60
31. G Error Gain	1.2
32. G Error Limit	0.70
33. Default Climb Rate (FT/MIN)	500
34. Default Descent Rate (FT/MIN)	500
35. Min Alt Level Off Buffer (FT)	200
36. Force Filter Time (sec)	6
37. Lost Motion Compensation (0-20)	0

0.00036 NEXT

- Press NEXT

STEP 5 of 7

- Move the control stick to the full pitch up and full right position

SV-SERVO Calibration
STEP 5 of 7
Please move control surfaces to:
FULL PITCH UP & FULL RIGHT
Press NEXT to continue

SERVO	POSITION	ERRORS
S/N:6559	103	0
S/N:50146	188	0

5. Servo Test: START
6. Airspeed Min (KTS): 80
7. Airspeed Max (KTS): 176

Pitch Axis

8. Torque	100%
9. High Speed Sensitivity	10
10. Low Speed Sensitivity	10
11. Roll Gain	2.0
12. CDI Gain (VOR/ILS)	2.0
13. CDI Dot Gain	2.0

Roll Axis

19. Torque	100%
20. High Speed Sensitivity	16
21. Low Speed Sensitivity	16
22. Pitch Gain	0.8
23. Altitude Gain	0.8
24. Altitude Filtering	LEVEL 2
25. Pull Rate	1.0
26. VSI Gain	0.7
27. GSI Gain (ILS)	1.5
28. GSI Dot Gain	15
29. VDI Gain (GPS)	4.0
30. VDI Dot Gain	60
31. G Error Gain	1.2
32. G Error Limit	0.70
33. Default Climb Rate (FT/MIN)	500
34. Default Descent Rate (FT/MIN)	500
35. Min Alt Level Off Buffer (FT)	200
36. Force Filter Time (sec)	6
37. Lost Motion Compensation (0-20)	0

0.00036 NEXT

- Press NEXT

STEP 6 of 7

- Move the control stick to the full pitch up and full left position

SV-SERVO Calibration
STEP 6 of 7
Please move control surfaces to:
FULL PITCH UP & FULL LEFT
Press NEXT to continue

SERVO	POSITION	ERRORS
S/N:6559	91	0
S/N:50146	168	0

5. Servo Test: START
6. Airspeed Min (KTS): 80
7. Airspeed Max (KTS): 176

Pitch Axis

8. Torque	100%
9. High Speed Sensitivity	10
10. Low Speed Sensitivity	10
11. Roll Gain	2.0
12. CDI Gain (VOR/ILS)	2.0
13. CDI Dot Gain	2.0

Roll Axis

19. Torque	100%
20. High Speed Sensitivity	16
21. Low Speed Sensitivity	16
22. Pitch Gain	0.8
23. Altitude Gain	0.8
24. Altitude Filtering	LEVEL 2
25. Pull Rate	1.0
26. VSI Gain	0.7
27. GSI Gain (ILS)	1.5
28. GSI Dot Gain	15
29. VDI Gain (GPS)	4.0
30. VDI Dot Gain	60
31. G Error Gain	1.2
32. G Error Limit	0.70
33. Default Climb Rate (FT/MIN)	500
34. Default Descent Rate (FT/MIN)	500
35. Min Alt Level Off Buffer (FT)	200
36. Force Filter Time (sec)	6
37. Lost Motion Compensation (0-20)	0

0.00036 NEXT

- Press NEXT

If you have a Capstan or RV-10 Pitch Servo you will get a **WARNING** about servo traveling more than 120 degrees.

- Press **YES** if you have an RV-10 or Capstan Servo

- Press **NO** if you only have Servo with an arm.

If the Pitch and Roll Servos calibrated correctly you should get a **SUCCESS** message.

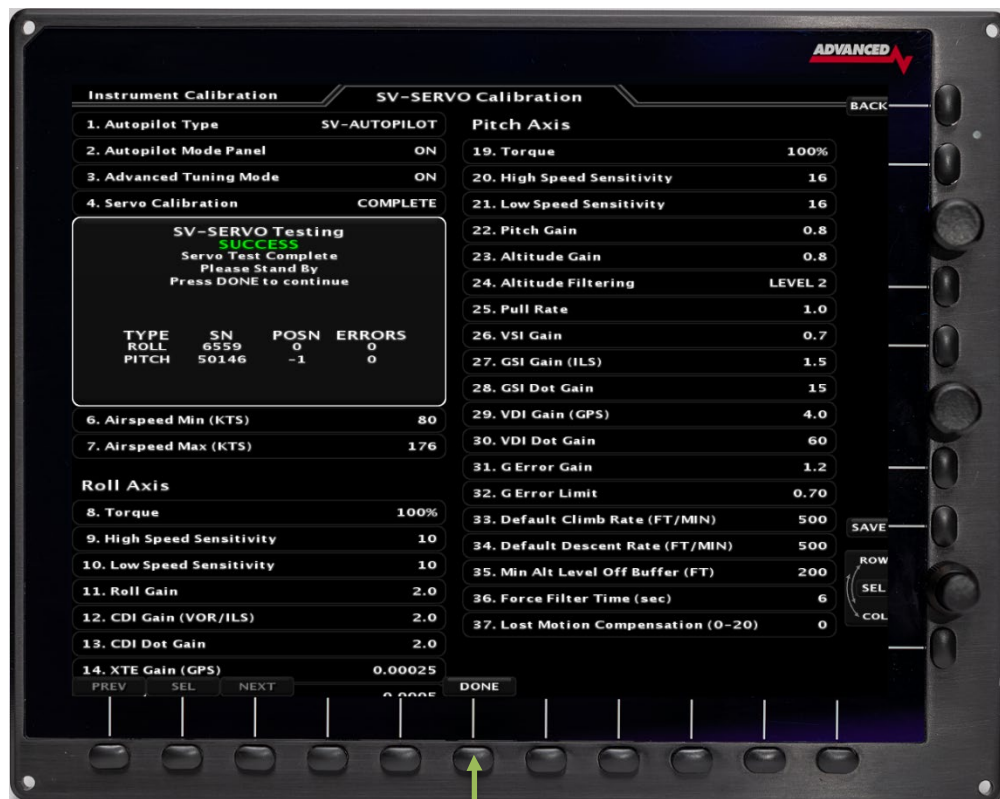
- Press **SAVE** to save the Servo Calibration

Autopilot Servo Test Procedure

- Make sure the control stick is free to move in the full range of motion.
- Select **5. Servo Test**



- The Autopilot will move the controls 80% of travel in all directions and should complete the test with a **SUCCESS** message.

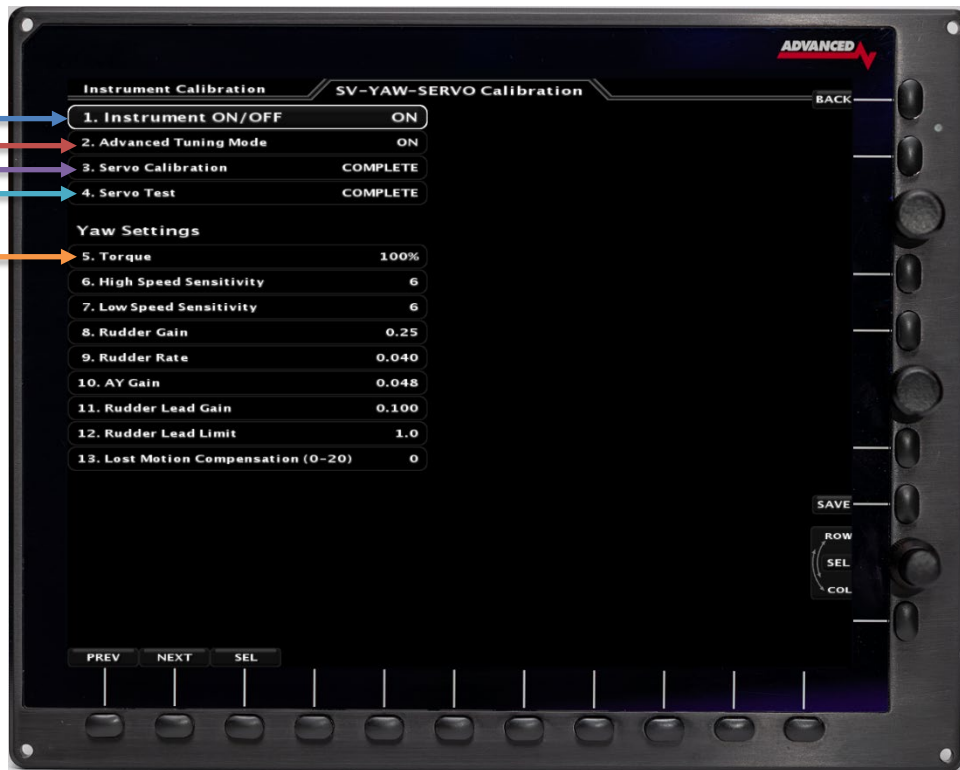


- Press **DONE**

Yaw Damper

The Yaw Damper in-flight calibration procedure is covered in the AF-6600 / AF-5000 Pilots Guide. The following calibration items should be configured before doing the in-flight tuning.

- | | |
|-------------------------|--|
| 1. Instrument ON/OFF | Turns ON or OFF the Yaw Damper |
| 2. Advanced Tuning Mode | OFF |
| 3. Servo Calibration | See next section for instructions |
| 4. Servo Test | See next section for instructions |
| 5. Torque | 100% |



Yaw Servo Calibration Procedure

- With the EFIS screens shut down center the Rudder control surfaces.
- Make sure the panel mounted AUTO PILOT power switch is in the ON position.
- Turn on the aircraft Master Switch and Avionics Switch.
- Select SET > CAL > 12. Yaw Damper

STEP 1 of 5

- Select **3. Servo Calibration** and verify that the SERVO POSITION values change when you move the Rudder.



- Press **START**
Follow the on-screen instructions
- Press **SAVE** to save the Servo Calibration

Yaw Servo Test Procedure

- Make sure the Rudder is free to move in the full range of motion.
- Select **4. Servo Test**

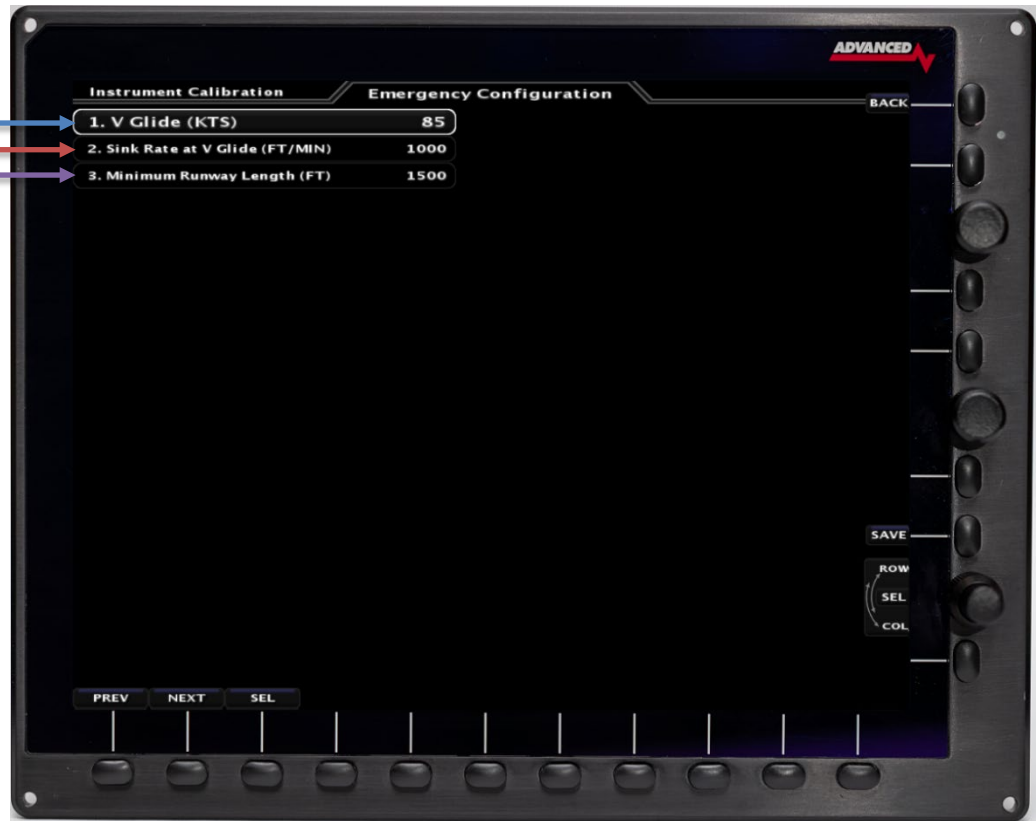


- Press **START**
- Press **DONE**
When test is complete

8. Emergency Configuration Menu

The Emergency Glide algorithm uses the following settings when selecting an airport:

1. V Glide (KTS). After enabling Emergency Glide mode the autopilot will pitch up and try to hold this airspeed.
2. Sink Rate at V Glide (Ft/Min). The aircrafts power off sink rate at the V Glide airspeed setting.
3. Minimum Runway Length (FT). Minimum required airport runway length to select for emergency glide.



The Autopilot in-flight tuning procedure is covered in the AF-6600 / AF-5000 Pilots Guide. The following calibration items should be configured before doing the in-flight calibration.

Air Data System

Altitude

The Altimeter configuration menu will display the altitude data from each of the connected ADAHRS units.

2. Display Units

Lets you select the units for the Altimeter tape.

ADAHRS 1 DATA

5. Pressure Alt (FT) ADAHRS 1

Current Altitude reading

6. Altitude Adjust (FT) ADAHRS 1

ADAHRS 2 DATA

9. Pressure Alt (FT) ADAHRS 2

Current Altitude reading

10. Altitude Adjust (FT) ADAHRS 2



The altimeter check should be performed on an as-needed basis. If one of the ADHARS altimeters is found to be out of specification you can adjust using the Altitude Adjust value to correct for any errors. After making an adjustment, ensure that the altimeter meets the tolerances allowed between 0 and 30,000 feet. If this adjustment does not correct the unit, contact Advanced Flight Systems for service.



See Appendix P for instructions on performing a Pitot/Static test on the system.

Airspeed



Display Units: Select (KTS, MPH, KPH)

Vne Source: You can configure the Vne warning to be based on (TAS, IAS, MACH, IAS & TAS) Check with your airframe manufacturer for the correct setting.



Flaps Overspeed Position (%): Lets you select when the audio “Flaps Overspeed” warning airspeed is enabled based on flap position.

The Airspeed tape color range settings should be adjusted for your aircraft. All the speeds are in Knots. You must configure these settings on each EFIS Screen in the aircraft.

V Speed Settings

Max: Top of the gauge Should be set to 240 KTS unless you have the special order high speed sensors.

Vne: Never Exceed Speed This is where the Red arc starts.

Vno: Normal Operation, This is the top of the green arc, bottom of the yellow.

Vfe: Flap Extend Speed, Top of the white arc.

Vs1: Stall Speed with the Flaps up.

Vs0: Stall Speed with the Flaps Down.

Performance Settings



Performance speeds (Vx, Vy, Va, Vo, Vg) are displayed as a letter on the right side of the airspeed tape.

Vx: Best Angle of Climb

Vy: Best Rate of Climb

Va: Maneuvering Speed, the speed at which the airplane will stall before exceeding its design limit-load factor in turbulent conditions or when the flight controls are suddenly and fully deflected in flight at gross weight.

Vo: Operating Maneuvering, speed where the airplane will stall in a nose-up pitching maneuver before exceeding the airplane structural limits.

Vg: Best Glide

Sensor Calibration

The Sensor Calibration section of the Airspeed Menu will display serial number and pressure data from the ADAHRS units that are connected to the SV-Network.

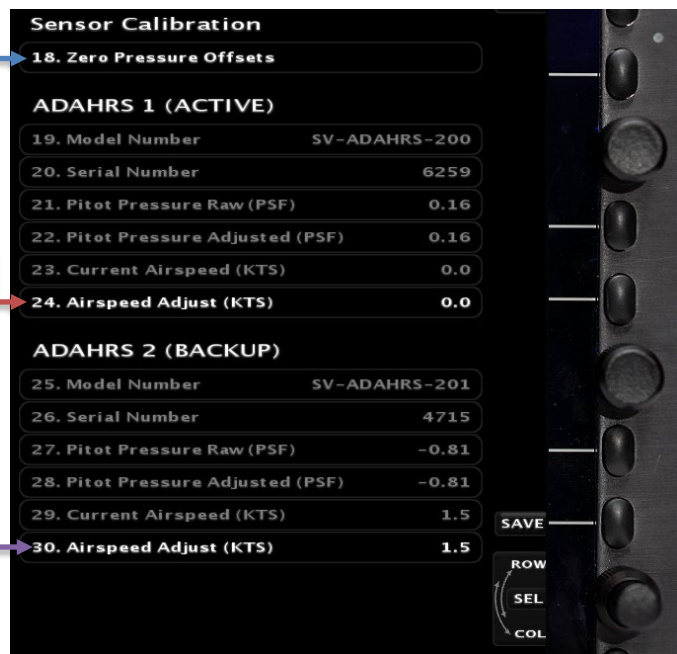
18. Zero Pressure Offsets

This will perform a zero pitot pressure calibration on the connected ADAHRS units. This should only be done in a zero wind location.

24. Airspeed Adjust (ADAHRS 1)

30. Airspeed Adjust (ADAHRS 2)

This should normally be 0, it can be used to offset the airspeed reading by a few knots (0-5 kts) to correct for airspeed errors in the normal flight airspeed range (over 30 kts)

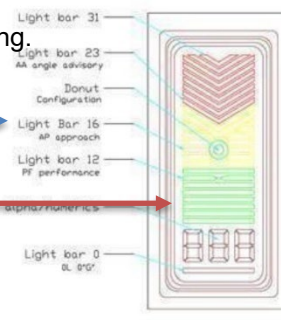


Angle of Attack (AOA)

The AOA in-flight calibration procedure is covered in the AF-6600 / AF-5000 Pilots Guide.

The following calibration items should be configured before doing the in-flight calibration.

2. **Audio Alarms**
-VOICE & TONES
-VOICE ONLY
-TONES ONLY
Voice Alert "Angle-Angle-Push"
Increasing frequency tones – steady tone at stall warning.
3. **Alert Tone Volume** (0-100%)
4. **Alert Tone Start Bar** Controls when the tones start
5. **Declutter Segment** Controls when the AOA display turns ON
6. **Landing Override (kts)** AOA audio warning turns OFF below this speed.
18. **Use Flap Angle Sensor**
-YES Uses Analog Flap position sensor to switch between flaps up and Flaps down AOA database.
-NO Uses EFIS digital input configured as flaps to select AOA database



Outside Air Temp (OAT)

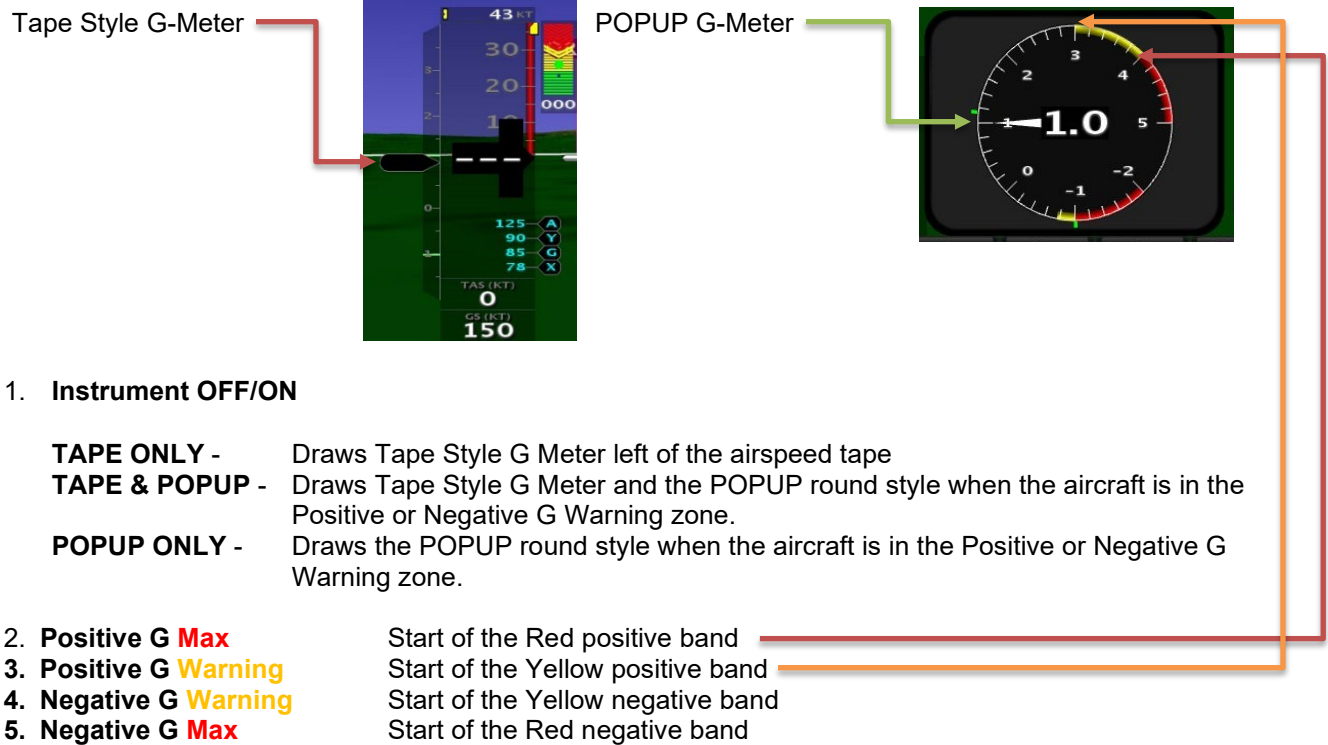
The EFIS OAT display comes from the OAT sensor wired to each ADAHRS. With a dual ADAHRS install you will have two separate OAT probes. The Configure OAT menu will display the temperature from each ADAHRS temperature sensor.

- | | |
|-----------------------|-----------------------------|
| 2. Display Units | Celsius or Fahrenheit |
| 6. OAT Adjust (degF) | Temperature Offset ADAHRS 1 |
| 10. OAT Adjust (degF) | Temperature Offset ADAHRS 2 |



G-Meter

The G Meter Calibration Menu is where you configure the yellow warning and red max settings for the aircraft. You can also select the type of G Meter to display on the EFIS screen.



1. Instrument OFF/ON

- TAPE ONLY -** Draws Tape Style G Meter left of the airspeed tape
- TAPE & POPUP -** Draws Tape Style G Meter and the POPUP round style when the aircraft is in the Positive or Negative G Warning zone.
- POPUP ONLY -** Draws the POPUP round style when the aircraft is in the Positive or Negative G Warning zone.

- 2. **Positive G Max** Start of the Red positive band
- 3. **Positive G Warning** Start of the Yellow positive band
- 4. **Negative G Warning** Start of the Yellow negative band
- 5. **Negative G Max** Start of the Red negative band



Radio & Transponder

Audio Panel

The EFIS can display and control a remote PS Engineering Audio Panel, the PMA450EX, PDA360 and PAC15 are all supported.

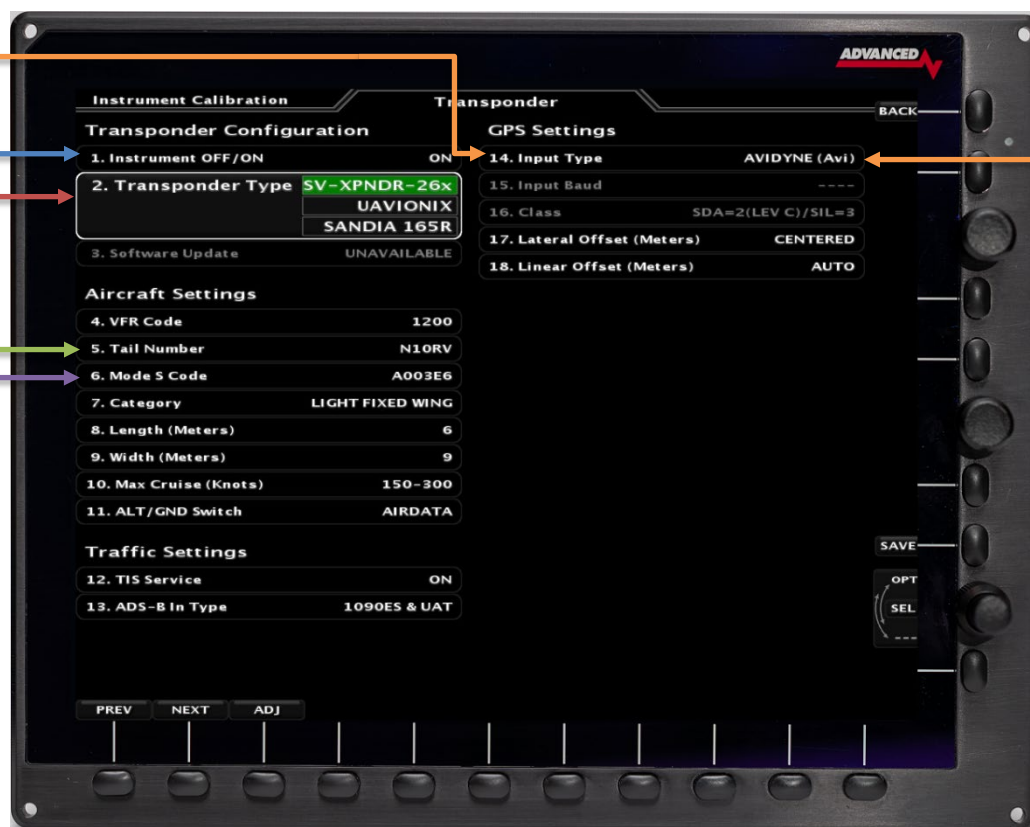
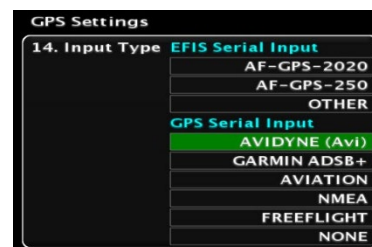
- INSTRUMENT OFF/ON Turns ON or OFF the EFIS Audio Panel display tab
Set to OFF if you don't have a supported Audio Panel
- Audio Panel Type Select the Model to Control
- Restore Factory Defaults Resets the memory in the Audio Panel.



Transponder

The EFIS can display and control a remote Transponder. The following Transponders are supported from the EFIS: Dynon/Trig SV-XPNDR-261, UAVIONIX TailbeaconX, Sandia 165R.

- **INSTRUMENT OFF/ON** Turns ON or OFF the EFIS Transponder display tab
Set to OFF if you don't have a supported Transponder
- **Transponder Type** Select the Transponder to Control
- **VFR Code** North America 1200
- **Tail Number** Aircraft N Number in the USA
- **Mode S Code** Automatically set for N Number registered aircraft
- **Length (Meters)** Aircraft Length for ADS-b
- **Width (Meters)** Aircraft Width for ADS-b
- **Max Cruise (KTS)** Max ADS-B cruise speed range
- **ALT/GND Switch** Controls ground / flight mode - set to AIRDATA
- **TIS Service** Controls Transponder TIS Traffic - set to ON
- **ADS-B In Type** Type of ADS-B receiver – set to 1090ES & UAT for Dynon 472
- **Input Type** Transponder ADS-B GPS source
The only ADS-B approved options are:
 - Dynon GPS-2020 **AF-GPS-2020**
 - Avidyne IFD (410,440, 540, 550) **AVIDYNE (AVI)**
 - Garmin(430W, GTN650, GTN750, GPS175) **GARMIN ADSB+**
- **Lateral Offset (Meters)** Antenna Lateral Offset
- **Linear Offset (Meters)** Antenna Linear Offset



COM Radio

The EFIS can display and tune the primary and standby frequencies for up to two connected COM Radios. The following radios support remote frequency control: Dynon SV-COM, Trig TY91 Remote COM, Avidyne IFD, Garmin GTN-650xi/750xi, GTR-200, GTR-225, GNC-255, SL30, SL40, VAL 2KR. The Dynon SV-COM interfaces with the EFIS on the SV-NETWORK, the other COM radios will need to be connected to an EFIS RS-232 serial port.



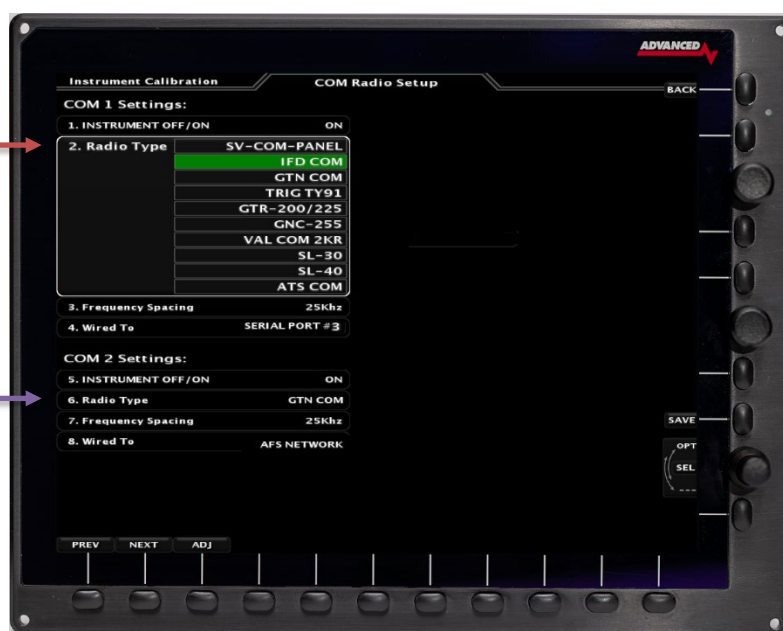
Some of the setting options will change based on the selected radio type.

COM 1 SETTINGS

- INSTRUMENT OFF/ON Turns ON or OFF the EFIS COM Radio 1 display tab
- Radio Type Select the Radio to tune as COM 1
- Frequency Spacing North America 25khz, Europe 8.33khz
- Wired To Select the Serial Port # if radio is wired to this EFIS screen
AFS NETWORK if radio is wired to a Remote EFIS serial port.

COM 2 SETTINGS

- INSTRUMENT OFF/ON Turns ON or OFF the EFIS COM Radio 2 display tab
- Radio Type Select the Radio to tune as COM 2
- Frequency Spacing North America 25khz, Europe 8.33khz
- Wired To Select the Serial Port # if radio is wired to this EFIS screen
AFS NETWORK if radio is wired to a Remote EFIS serial port.
- Squelch Level (%) Radio Squelch Setting
- Sidetone Level (%) Radio Sidetone Setting
- Mic Gain (%) Radio Mic Gain
- SV-COM-PANEL Serial Number SV-COM Panel display serial number to control

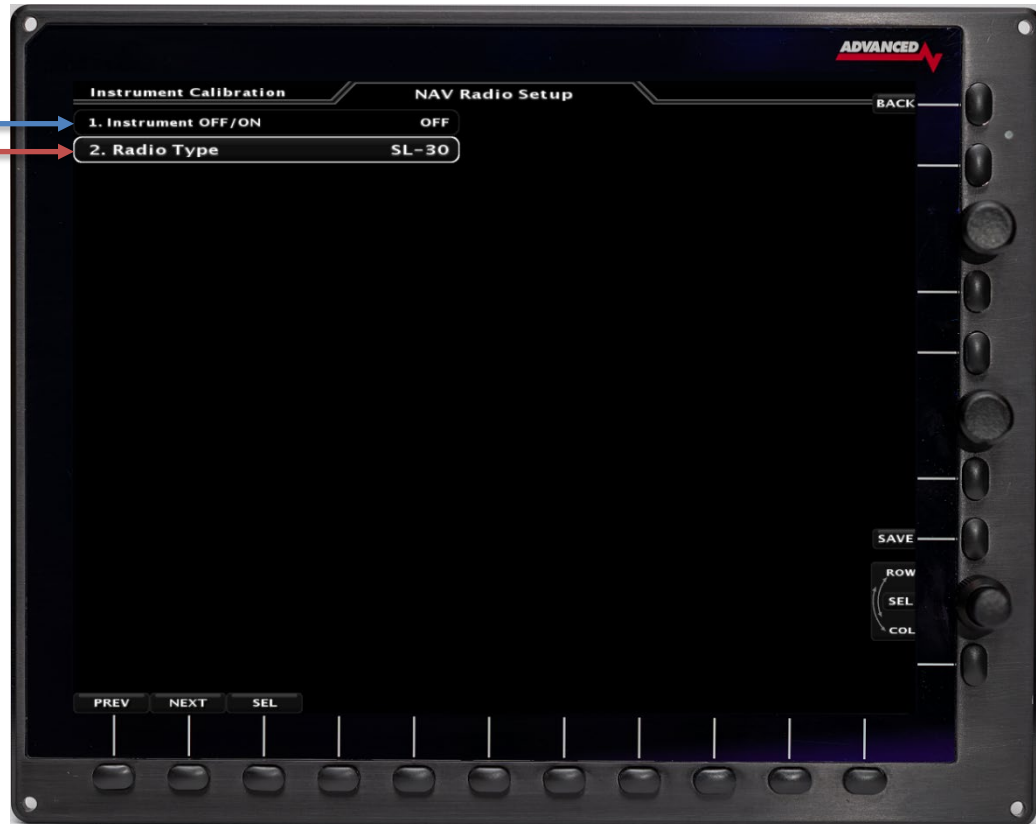


NAV Radio

- INSTRUMENT OFF/ON
- Radio Type

Turns ON or OFF the EFIS NAV Radio display tab

Select the NAV Radio to tune



Configuring EFIS Engine Gauges

Each engine gauge has several **User Settings** that should be set for your aircraft and engine.

User Settings		Sensor Calibration	
1. Instrument ON/OFF	ON	11. Sensor Type	AD_VAL: 0433 KAVLICO 150PSI FLUID PRESS (101693-000)
2. Audio Alarms	ON	12. Pin Select	C37_P8
3. Display Units	PSI		
4. Max (Top of Gauge)	40.0		
5. Red High At	36.0		
6. Yellow High At	30.0		
7. Yellow Low At	15.0		
8. Red Low At	12.0		
9. Min (Bottom of Gauge)	0.0		
10. Shift Adjust	0.0		

- Instrument ON/OFF**
Configure the Instrument to be ON or OFF (not used)
- Audio Alarms**
Enables Audio Alarms

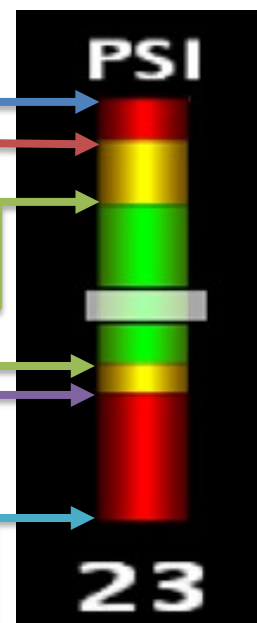


No Audio Alarm
Alarm when engine is running
Alarm when RPM is above 1500 RPM

- Display Units**
Select gauge units (Metric or Inch)



- Max (Top of Gauge)**
The instrument displayed value at the top of the gauge.
- Red High At**
The instrument displayed value when the needle turns red at the top of the gauge. If a red range is not desired, set this parameter to the max value.
- Yellow High At**
The instrument displayed value when the needle turns yellow at the top of the gauge. If a yellow range is not desired, set this parameter to the max value.
- Yellow Low At**
The instrument displayed value when the needle turns yellow at the bottom of the green arc. If a red range is not desired, set this parameter to the min value.
- Red Low At**
The instrument displayed value when the needle turns red at the bottom of the gauge. You can set this parameter to the Min value if you do not want a bottom yellow band.
- Min (Bottom of Gauge)**
The instrument value at the bottom of the gauge.



10. Shift Adjust

Lets you enter a value to offset the displayed gauge value. Used to correct for small calibration errors in transducers.

Current Gauge Displayed Value

Offset Value

User Settings	
1. Instrument ON/OFF	ON
2. Audio Alarms	ON
3. Display Units	PSI
4. Max (Top of Gauge)	40.0
5. Red High At	36.0
6. Yellow High At	30.0
7. Yellow Low At	15.0
8. Red Low At	12.0
9. Min (Bottom of Gauge)	0.0
10. Shift Adjust	0.0

0.00 BAR / 0.0 PSI

11. Sensor Type AD_VAL: 0433
KAVLICO 150PSI FLUID PRESS (101693-000)

12. Pin Select C37_P8

PSI 0.0

1 2 3 - DEL

4 5 6 +

7 8 9 -

0 . ENT

11. Sensor Type

Let's you select the sensor that is wired to the SV-EMS analog input.

Instrument Calibration

Configure Fuel Pressure 0.00 BAR / 0.0 PSI

11. Sensor Type AD_VAL: 0432

0-80 PSI FLUID PRESSURE (100411-001) ---MORE---

0-150 PSI FLUID PRESSURE (100411-002)

STEWART WARNER 16PSI PRESS (AFS 41205)

STEWART WARNER 60PSI PRESS (AFS 41305)

STEWART WARNER 15PSI (82504-F)

7 PSI DIFF PRESSURE (UMA NIEU07D)

KAVLICO 3PSI FLUID PRESS (P4055-3G-E4A)

KAVLICO 5PSI FLUID PRESS (101715-000)

KAVLICO 15PSI FLUID PRESS (101690-000)

KAVLICO 30PSI FLUID PRESS (101691-000)

KAVLICO 50PSI FLUID PRESS (101716-000)

KAVLICO 75PSI FLUID PRESS (101692-000)

KAVLICO 150PSI FLUID PRESS (101693-000)

---MORE---

12. Pin Select C37_P8

PREV NEXT ADJ

12. Pin Select

Let's you change the SV-EMS analog input pin assigned to the gauge.

Instrument Calibration

Configure Fuel Pressure 0.00 BAR / 0.0 PSI

11. Sensor Type AD_VAL: 0433
KAVLICO 150PSI FLUID PRESS (101693-000)

12. Pin Select

ELEV_TRIM C37_P4

OIL_PSI C37_P6

OIL_TEMP C37_P7

FUEL_PSI C37_P8

AIR_TRIM C37_P9

TANK_3 C37_P10

TANK_4 C37_P11

IGN_TIMING C37_P12

TANK_1 C37_P20

TANK_2 C37_P21

FLAP_ANG C37_P22

CARB_TEMP C37_P23

AMPS_HALL C37_P31

PREV NEXT ADJ

Electrical System

Electrical Configuration

The Electrical Configuration Menu is used to configure the interface between the EFIS and an Advanced Control Module (ACM) or Vertical Power VPX.

1. Instrument ON/OFF Select **ACM ECB** or **VPX** , set to **OFF** is you are not using either unit.
2. Audio Alarms Turns ON or OFF the Electrical Warning Audio Alerts

Advanced Control Module Settings

3. Strobe Switch
WITH NAV
INDEPENDENT Nav lights turn on with Strobe Switch or Nav Switch (3 Posn Switch)
Nav lights only turn on with Nav Switch
4. Switch Lights Control
ALWAYS ON
WITH NAV Switch Backlight PWM power always on
Switch Backlight PWM power turns on with NAV Lights
5. Tank Transfer Option
NOT USED
ACM ECB Used for Glasair tip tank transfer pumps
Not used
Tip tank pumps use ALT 2 and Defrost Circuits
6. Cabin Lights Control
SWITCHED
ALWAYS ON Cabin Light Circuit controlled by Cabin Switch input
Cabin Light Circuit is always ON

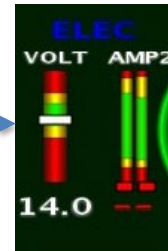
WigWag Landing Light Settings

7. Operation Mode
WIGWAG
ALWAYS ON Landing Lights use WIGWAG mode
Non WIGWAG mode
8. Warm Up Time (sec) Time before starting to flash
9. Cool Down Time (sec) Time after shutdown until the lights can be turned back on
10. On Above Airspeed (kts) Airspeed when the landing lights will start to flash



Primary Volts

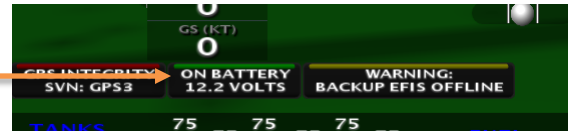
The Primary Volts is the measured voltage that is powering the EFIS, It is displayed on the EFIS Engine Monitor strip.



Backup Battery (TCW Battery)

The Backup Battery Volts is the measured voltage on the EFIS Backup Battery input pin :
EFIS Expansion Connector (DSUB 15) Pin 6

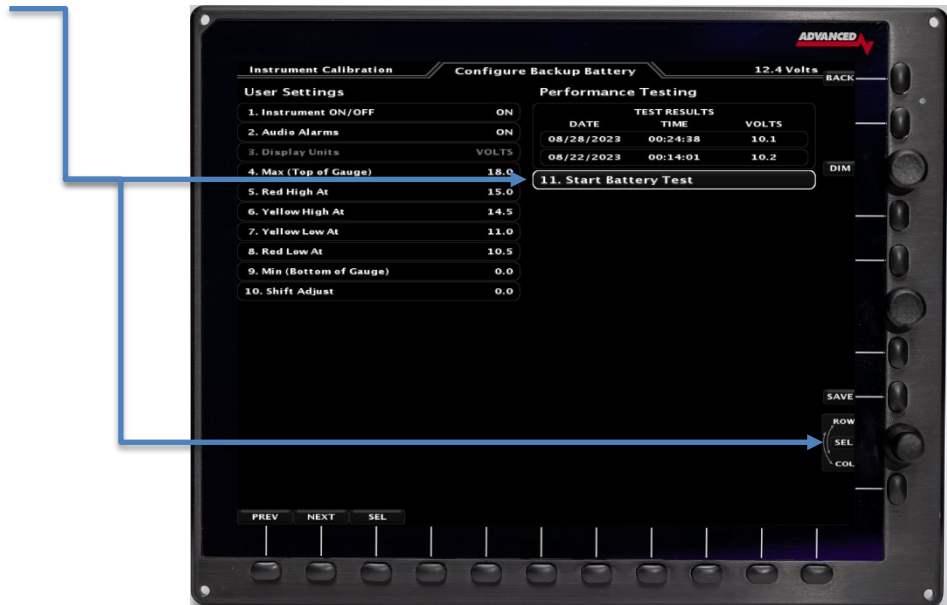
The Backup Battery voltage is displayed on the EFIS Info Strip when the EFIS is running on backup battery power.



TCW Backup Battery Test

You should perform a backup battery test after the initial installation when the battery is fully charged and during the aircraft annual Condition Inspection.

Select **Start Battery Test**



Press **YES**

The battery test will be performed when power is shut off to the EFIS.

The date and test results are displayed for the last two tests.



The battery will be drained and need to be recharged after the battery test.

The TCW battery will charge when the aircraft bus voltage is over 13 volts and can take over 2 hours to fully charge.

Volts #2 Input

When enabled the Volts #2 is displayed on the right side of a split EMS voltmeter display. The digital value will toggle between Volts1 and Volts 2

The Volts #2 Input has two different modes of operation:

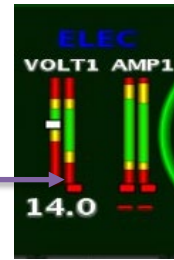
1. DIRECT CONNECT

Displays the voltage on the EFIS Expansion Connector VOLTS 2 Monitor Input (DSUB 15) Pin 13

2. TCW CHARGE LINE

When connected to an Advanced Control Module it can display the charge voltage of EFIS TCW backup battery.

The (DSUB 15) Pin 9 DIRECT CONNECT input can be used to monitor the voltage on a second aircraft battery. **The EFIS Expansion connector Pin-13 is only a voltmeter input it will not power the EFIS.**



The SV-EMS has two Amp Sensor Inputs. The normal Amp sensor is a current Shunt and the optional sensor is a Hall effect. The Dynon EMS sensor kit comes standard with a current shunt. For a dual Alternator Aircraft you should use both sensors.

Amperage (Shunt)

1. Instrument ON/OFF
OFF Turns OFF the Shunt sensor Amps Display
PRIMARY Turns ON the Shunt sensor Amps Display
BACKUP Splits the AMP sensor display and displays the Shunt Amperage as AMPS2
2. Audio Alarms Turns ON or OFF the AMPS Audio Alerts
10. Shift Adjust Compensates for small errors in the amps sensor zero reading
11. Sensor Type Select the model number for the connected sensor
12. Pin Select Should always be P24/25



Amperage (Hall-Effect)

- 3. Instrument ON/OFF
OFF Turns OFF the Hall sensor Amps Display
PRIMARY Turns ON the Hall sensor Amps Display
BACKUP Splits the AMP sensor display and displays the Hall Amperage as AMPS2
- 4. Audio Alarms Turns ON or OFF the AMPS Audio Alerts
- 13. Shift Adjust Compensates for errors in the Hall amps sensor zero reading
- 14. Sensor Type Select the model number for the connected sensor
- 15. Pin Select Should always be P31

Current Amps Reading – Use Shift Adjust to make Zero with Engine OFF



Fuel System

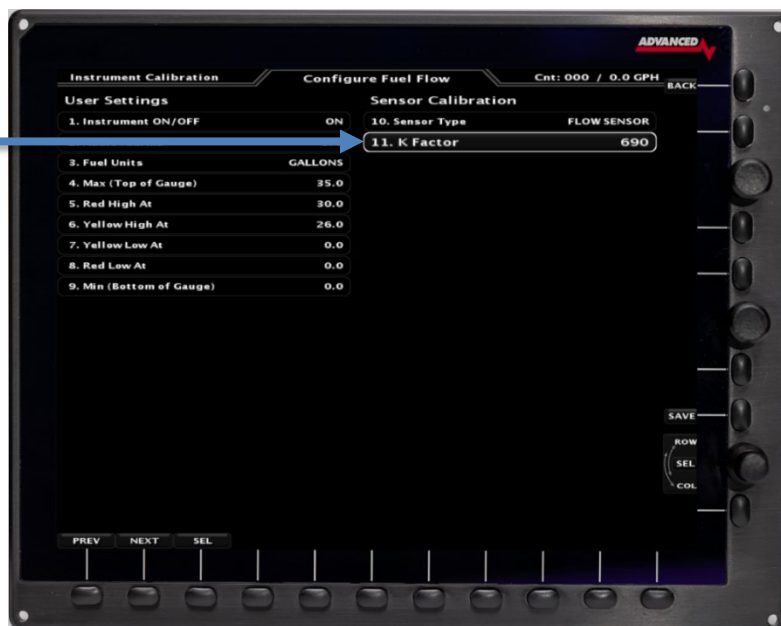
The Fuel Flow gauge and the Fuel Computer values are all based on readings from the engine mounted fuel flow transducer. The Fuel Tank Level gauges are based on the float or capacitance sending unit in the fuel tank.

Fuel Flow Gauge

K Factor = Fuel Flow transducer counts per .01 gallons

The standard K Factor setting for the EI Red Cube Transducer is 680. You will need to adjust the K Factor calibration to match the flow transducer and the variations in the installation. After running a tank of fuel use the following formula to adjust the accuracy.

New K Factor = (old K Factor) x (EFIS Displayed **GAL USED**/Fuel Pump Gallons)



Fuel Computer

The Fuel Computer (Fuel Totalizer) uses the data from the Fuel Flow gauge to keep track of the amount of fuel that has been used since the last time the fuel computer was reset (FILL MAINS, FILL ALL, Fuel Total Adjusted). **The Fuel Computer operates independently of the Fuel Tank Level Gauges**

The Fuel Computer is constantly checking its Gallons Remaining value to the amount of fuel the aircraft Fuel Gauges show.

If the difference between the Fuel Tank gauges and the Fuel Computer Gallons Remaining is greater than the **Cross Check Error Limit** value an alert will be generated.

Cross Check Error Limit

The value should be large enough to compensate for fuel float transducer errors when near full and float errors when the aircraft is not in level flight.

Generally 10.0 gallons is a good starting point.



Fuel Pressure

1. Select the correct **Sensor Type** that matches the fuel pressure transducer installed on the engine.

Fuel Injected Engine Kavlico 150 PSI

Carbureted Engine Kavlico 15 PSI



2. Verify the Fuel Pressure gauge display ranges match your engine manufacturers recommendations.

Example Settings

	<u>Carbureted</u>	<u>Injected</u>
Sensor	41015 (0-15PSI) Kavlico	41150 (0-150PSI) Kavlico150
Max	15	40
Red High	10	35
Yellow High	8	30
Yellow Low	3	15
Red Low	2	12
Min	0	0

Fuel Tank Level Gauges

The AF-6600 / AF-5000 EFIS supports up to 4 fuel tank gauges. The aircraft fuel tanks should be connected like this:

- Fuel Tank 1 Left Main Tank
- Fuel Tank 2 Right Main Tank
- Fuel Tank 3 Left Aux Tank
- Fuel Tank 4 Right Aux Tank

If you have AUX tanks without sending units they should be configured with the instrument turned OFF and the Tank Size configured. This will enable the Fuel Computer to properly track the amount of fuel used.

11. Select Instrument ON or OFF All the unused fuel tank gauges should be configured to OFF
12. Select Audio Alarms ON
13. Select Tank Units (Gallons or Liters)
14. Set Tank Size
15. Set Yellow Low value
16. Set Red Low value
17. Select tank sending unit type (Float or Capacitance)
18. Verify correct SV-EMS pin is selected.
19. Calibrate Fuel Tank using the instructions on the following pages.

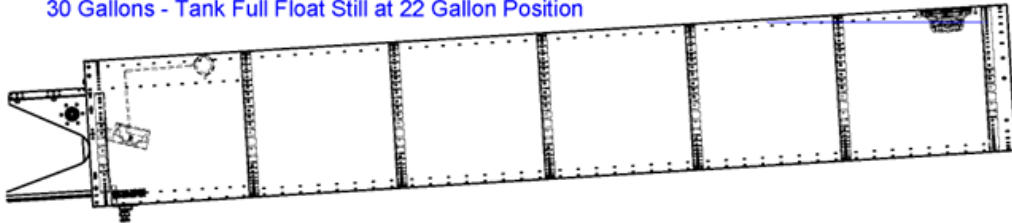


The AF-6600 / AF-5000 EFIS stores two sets of calibration numbers for each tank. It uses the ground calibration numbers when the Airspeed is less than 30kts. The flight calibration numbers are used when the airspeed is greater than 30kts. This feature enables the fuel gauges to read correct on the ground for a tail-wheel equipped airplane. If the aircraft does not have a tail-wheel set the ground and flight data to the same calibration number.

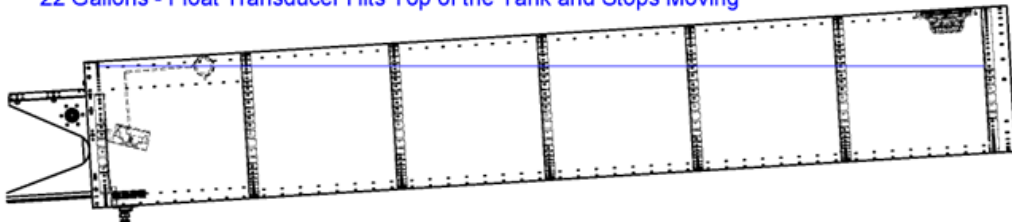


It is important to understand that fuel level measurements are subject to the physical limitations of the sensor. Depending on your fuel tank and sensor geometry, there may be some immeasurable fuel at one or both ends of the fuel level sensors' range. The end result is that you may experience fuel readings at "full" that are numerically less than the physical capacity of the tanks, and in this case you may also see no apparent change in fuel level readings when the sensor is maxed out on the full side. Similarly, on the empty side, you may see a zero quantity indication before the tank is truly empty if the sensor has reached the bottom of its travel or measuring capability when the tank still in fact has fuel in it. Most fuel tank sensors are mounted in the root of the wing. ***If your wing has dihedral, it is common for the fuel tank sensor to stop reading the fuel level at around 2/3 of a tank.***

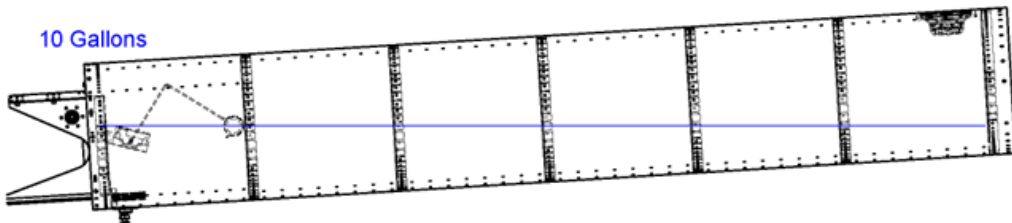
30 Gallons - Tank Full Float Still at 22 Gallon Position



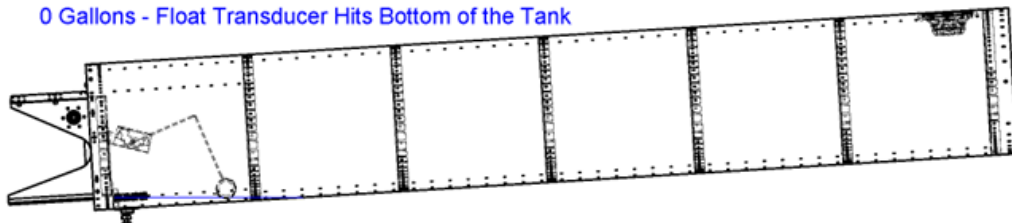
22 Gallons - Float Transducer Hits Top of the Tank and Stops Moving



10 Gallons



0 Gallons - Float Transducer Hits Bottom of the Tank



Steps To Calibrate a Fuel Tank:

1. Select Instrument Calibration mode on the Pilot PFD EFIS, verify that all EFIS screens are powered on in the aircraft. Use the lower knob to scroll to Tank 1 (Left Main), Tank 2 (Right Main), Tank 3 Left Aux, or Tank 4 Right Aux.
2. Verify the Tank is Empty.
3. Enter the max size of the Tank in the Tank Size field.
4. Set the Audio On/Off Setting. If this is set to ON, an Audio warning will sound if the fuel level is below the Red Low At setting.
5. Set the Instrument On/Off Setting. If this is set to ON the tank will be displayed.
6. Enter the number of calibration points; it must have at least two points. Four points could be used (zero, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, Full) or one point for every 2 gallons. **Every calibration point must be different from the previous value until the tank sensor cannot detect a change in the fuel level. Tank sensor values must never reverse direction.**
7. Use the lower knob to scroll down to the tank calibration data. The calibration data is displayed in columns, one for ground and one for flight. Use the lower knob to switch between ground and flight data columns. The current ADVAL (digital value of the transducer) reading for the tank is displayed at the top of the table.



8. Starting at 0 Gallons press the **[COPY]** button or use the knob to record the current ADVAL to the correct fuel amount and attitude (ground or flight).
9. Add fuel (at increments decided on) and then record the new ADVAL by pressing **[COPY]**
10. Fill and record a reading for each attitude (ground and flight). If it is a tail wheel aircraft, the best way to do this is to record the ground data then lift the tail and record the flight data after the fuel reading has settled. Repeat this for each increment until the tank is full.
11. Press the **[SAVE]** button to save the data to permanent memory and **[BACK]** to exit Tank Calibration.
12. After completing Tank 1, move on to Tank 2 and follow the same procedure. If Aux Tanks are present, follow this procedure for Tank 3 & 4.
13. **IF THE AIRCRAFT DOES NOT HAVE AUX TANKS, TURN TANKS 3 & 4 OFF!**

CAUTION: Do not turn off power before pressing the save button and exiting the calibration menu.

Calibration Tips:

When lifting the tail you should set it on something, so the level you lift it to will be consistent. You should also wait until the reading stops changing before setting it.

Fuel tank sensors are not accurate when the tank is near full. Once you notice the reading not changing much or not corresponding with the rest of the readings during calibration the last few entries in the fuel calibration data should be set to the same value.

If the tanks do not consistently show full, lower the digital value for the tank full data.

The fuel gauge will only show the digital fuel amount for the highest reading that the float changed with a plus sign indicating that the correct fuel amount is not known but is over the last reading. The analog gauge will show full for the last changing reading. It is normal for an 18-gallon tank to show 16+ when it is full. This indicates that the float stopped changing at 16 gallons and this is the highest fuel reading that can be detected by the float in the tank.

Valid Tank calibration values.

Values do not reverse direction and the sensor stopped detecting fuel changes at 25 gallons.

9. Num Cal Points			7
ADVAL: 587			
GALLONS	GROUND	FLIGHT	
0.0	2266	2266	
5.0	1839	1839	
10.0	1571	1571	
15.0	1305	1305	
20.0	995	995	
25.0	587	587	
30.0	587	587	



Common Mistakes

BAD Tank calibration values.

5.0 and 10.0 have the same AD_Value. The gauge will stop showing fuel at 5+ Gallons.

AD_VALUE: 511		
GALLONS	GROUND	FLIGHT
0.0	949	949
5.0	694	694
10.0	694	559
15.0	411	411
20.0	290	290
25.0	170	170
30.0	170	170

BAD Tank calibration values.

Values change direction at 5.0 gallons with a larger value.

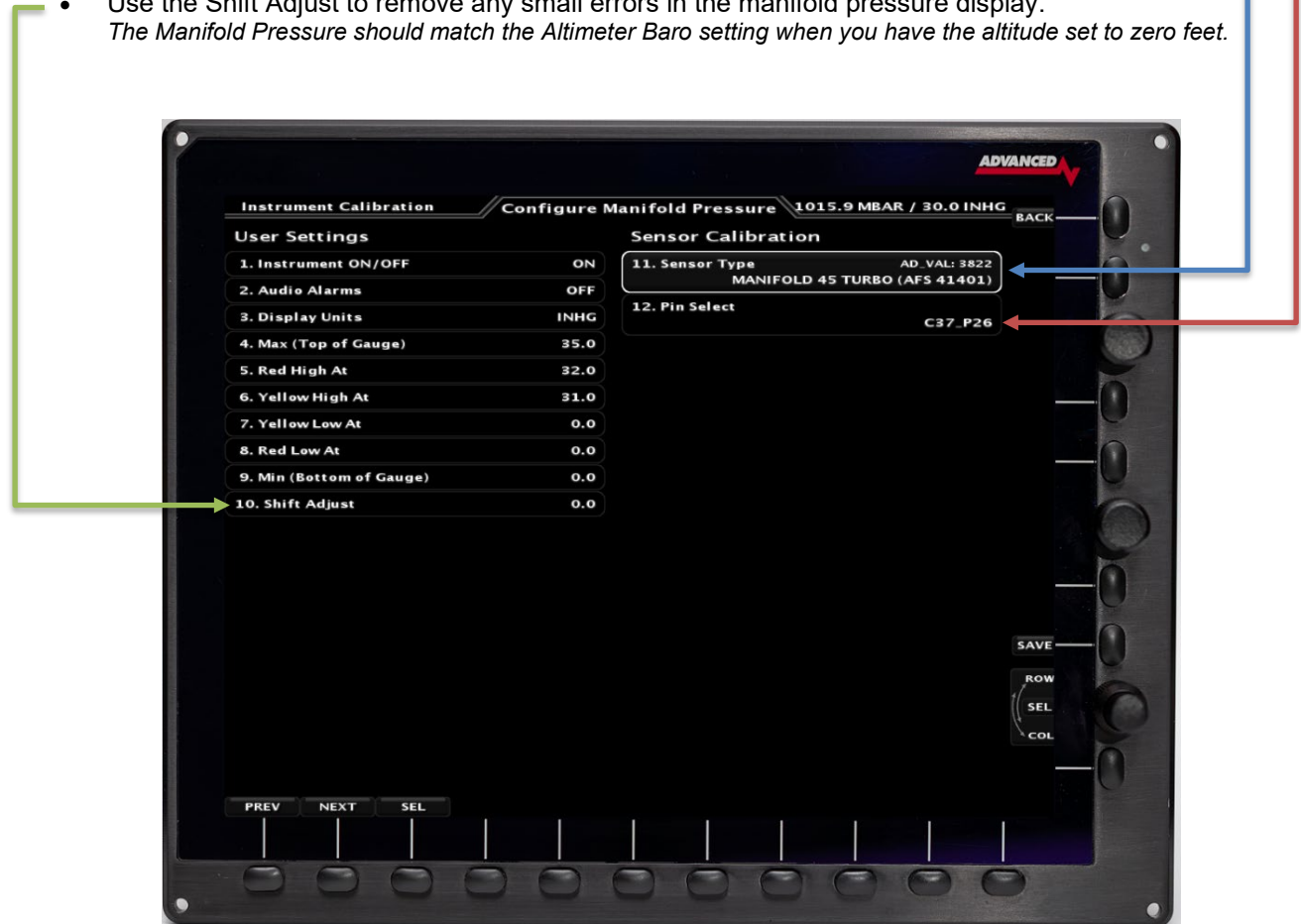
AD_VALUE: 507		
GALLONS	GROUND	FLIGHT
0.0	949	949
5.0	950	694
10.0	559	559
15.0	411	411
20.0	290	290
25.0	170	170
30.0	170	170

Engine Sensors

Manifold Air Pressure

The current Dynon SV-EMS sensor kit comes with the MANIFOLD 45 TURBO (AFS 41401) sensor. This sensor is designed to work with normally aspirated Lycoming or Continental engines. This sensor can also be used on Turbo Charged engine with boost to 45 in-mg.

- Select Installed Sensor Type
- Verify the SV-EMS Pin Select for the connected sensor. Pin 26 is the standard connection.
- Use the Shift Adjust to remove any small errors in the manifold pressure display.
The Manifold Pressure should match the Altimeter Baro setting when you have the altitude set to zero feet.



Prop RPM

The RPM Gauge has three unique features that are slightly different than the standard gauge options. These features include:

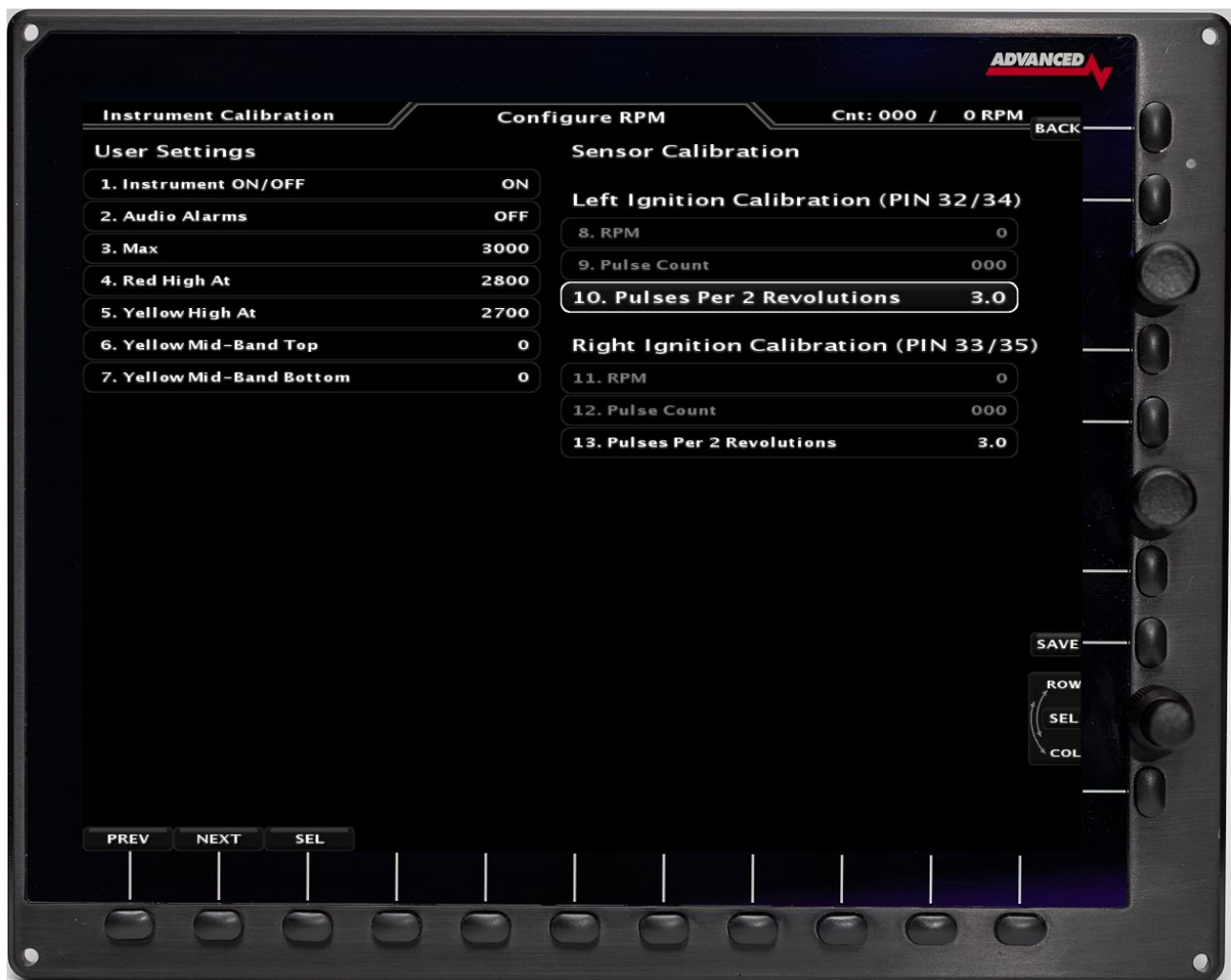
Yellow Mid Band Top: Used to depict prop operating mid range restrictions. This should be set to 0 if the propeller manual doesn't specify a mid caution range.

Yellow Mid Band Bottom: Used to depict prop operating mid range restrictions. This should be set to 0 if the propeller manual doesn't specify a mid caution range.

Pulses Per 2 Revolutions: The system needs to know how many pulses the RPM input will see in two propeller rotations. The following data should help select the correct number to use.

- | | |
|--|------------|
| 1. Standard RPM sensor with Slick Mag 4 Cylinders: | Pulses = 2 |
| 2. Standard RPM sensor with Slick Mag 6 Cylinders: | Pulses = 3 |
| 5. Electronic Ignition 4 Cylinders: | Pulses = 4 |
| 6. Electronic Ignition 6 Cylinders: | Pulses = 6 |

The EFIS lets you select a different Pulses Per 2 Revolutions for each ignition.



Oil Pressure

1. Select the correct **Sensor Type** that matches the fuel pressure transducer installed on the engine.
Dynon ships the Kavlico 150 PSI in the EMS sensor kits.
2. Verify the SV-EMS **Pin Select** is correct for the connected sensor. Pin 6 is the standard connection for the SV-EMS oil pressure sensor.



3. Verify the Oil Pressure gauge display ranges match your engine manufacturers recommendations.

Oil Temperature

1. Select the correct **Sensor Type** that matches the oil temperature transducer installed on the engine.
Dynon ships the 1/8"-27 NPT FLUID TEMP (100409-000) in the EMS sensor kits.
2. Verify the SV-EMS **Pin Select** is correct for the connected sensor. Pin 7 is the standard connection for the SV-EMS oil temperature sensor.

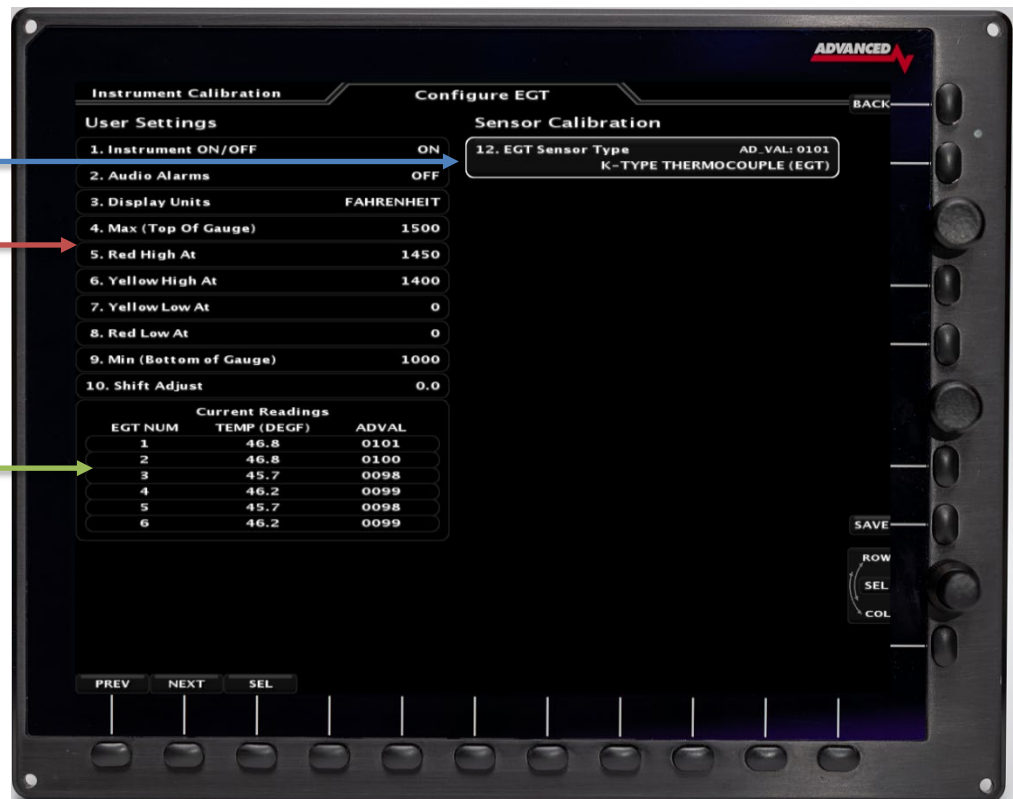


3. Verify the Oil Temperature gauge display ranges match your engine manufacturers recommendations.

Exhaust Gas Temp (EGT)

1. Select the correct **Thermocouple Type** that matches the EGT temperature transducer installed on the engine.

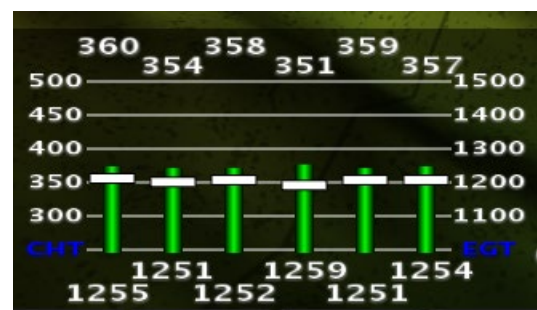
Dynon ships K-TYPE EGT Probes in their Sensor Kits.



3. Verify the EGT Temperature gauge display ranges match your engine manufacturers recommendations.

Current temperature readings for each connected EGT probe.

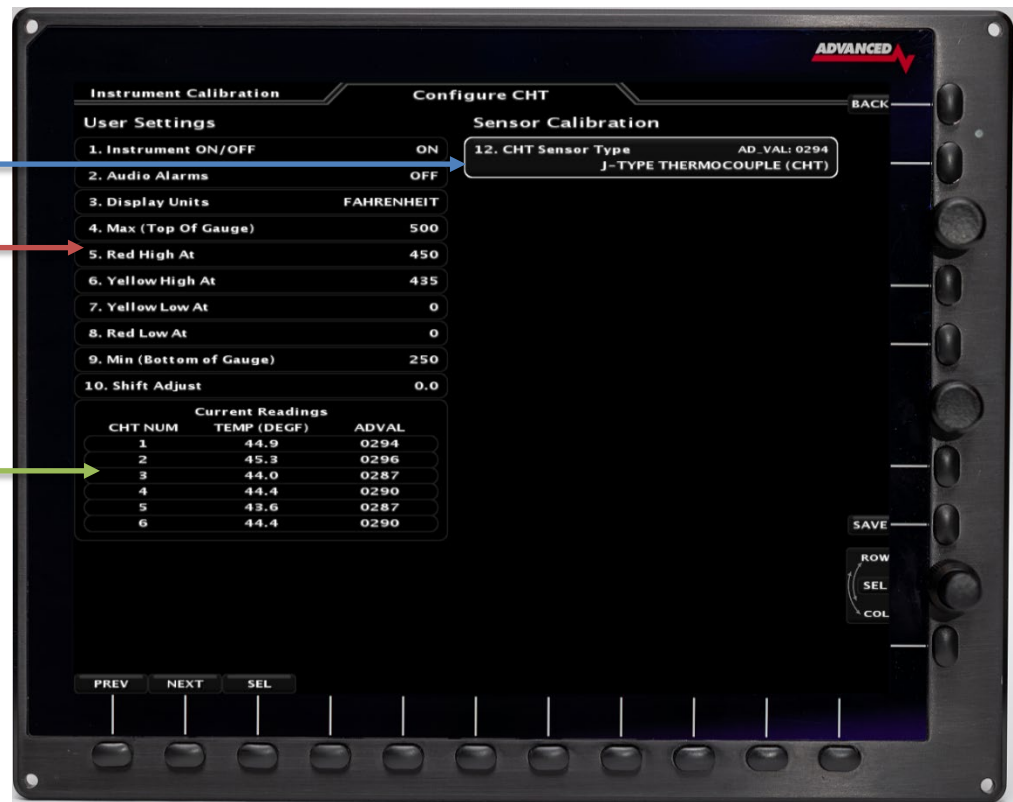
The number of cylinders displayed is controlled by the **Engine Type** setting in the Configure Aircraft Info.



Cylinder Head Temp (CHT)

1. Select the correct **Thermocouple Type** that matches the CHT temperature transducer installed on the engine.

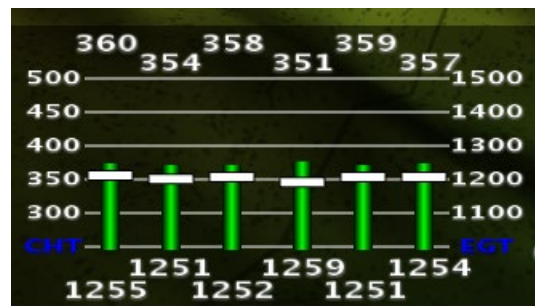
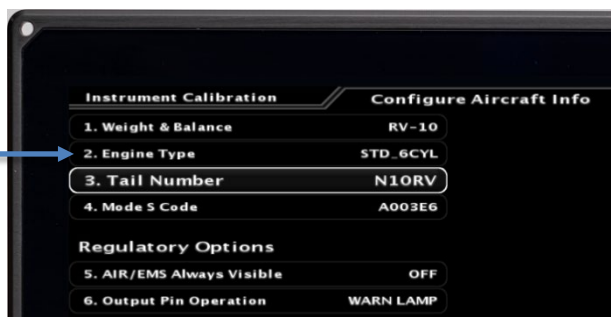
Dynon ships J-TYPE CHT Probes in their Sensor Kits.



3. Verify the CHT Temperature gauge display ranges match your engine manufacturers recommendations.

Current temperature readings for each connected CHT probe.

The number of cylinders displayed is controlled by the **Engine Type** setting in the Configure Aircraft Info.



Turbo Inlet Temp (TIT)

Horsepower

You configure the Engine Horsepower from the Calibration > Horsepower Menu. You need to set the engine type and rated HP. If you have an engine type that is in the list, please choose the appropriate engine. This will allow the system to perform some calculations that are specific to that engine, such as % power (Lycoming / Continental only) and special operating limitations (Rotax only). If your engine is not listed, choose "Other."

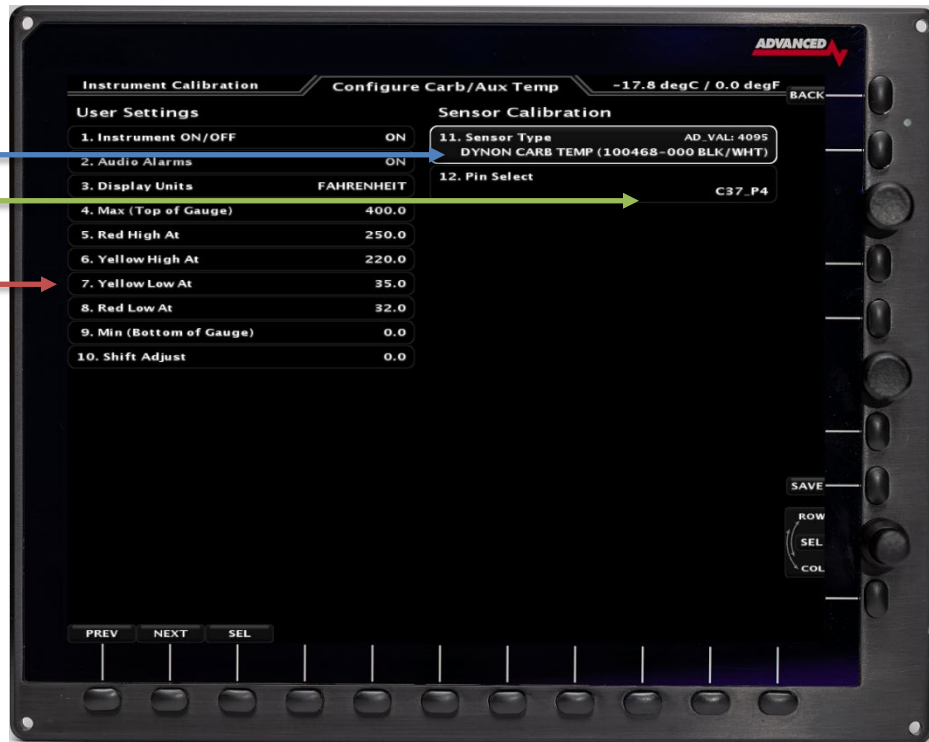
Horsepower is used to do some of the % power calculations (Lycoming/Continental engines only) and the auto Rich-of-Peak and Lean-of-Peak detection. Set it to the engine manufacturer's rated HP for initial usage. You may need to adjust this number in order to get all calculations working correctly.

If you are getting an auto Lean-of-Peak indication that is coming on too early, before the engine actually peaks while leaning, lower this number. It is not meant to be a measure of actual horsepower produced, as engines that are more efficient will act as if they are lower horsepower in the calculation. This will be particularly true if you are running a higher compression ratio than the stock charts are based upon.



Carb Temp

1. Select the correct **Sensor Type** that matches the Carb Temp sensor installed on the engine.
Dynon ships the Dynon CARB TEMP (100468-000 BLK/WHT) in the EMS Carb sensor kits.
2. Verify the SV-EMS **Pin Select** is correct for the connected sensor. Pin 4 is the standard connection for the SV-EMS Carb Temp sensor.



3. Verify the Carb Temperature gauge display ranges match your engine manufacturers recommendations.

Coolant Temp

1. Select the correct **Sensor Type** that matches the Coolant Temp sensor installed on the engine.
2. Verify the SV-EMS **Pin Select** is correct for the connected sensor. Pin 12 is the standard connection for the SV-EMS Coolant Temp sensor.



3. Verify the Coolant Temperature gauge display ranges match your engine manufacturers recommendations.

Flap Position

The Flap Position display is designed to read flap position data from an internal flap actuator sensor or external Ray Allen POS-12 sensor wired to an SV-EMS input or from an ACM/VPX unit. The EFIS Flap display can be configured to be always ON or to only display when the flap motor is moving or 5 seconds after it has moved.

1. Select Instrument ON/OFF mode

OFF	Flap display turned OFF
AUTO HIDE	Flap displayed when moving and for 5 seconds after.
ALWAYS ON	Flap display is always ON



2. Select Position Source

ACM/VPX	Flap Position Sensor wired ACM
EMS	Flap Position Sensor wired to EMS Pin input.

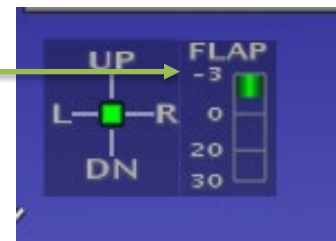


3. Flap Position Calibration

- Run the Flaps to the FULL UP position
- With FULL UP highlighted, press **[COPY]**
- Enter the Position Label
- **Repeat for Flap positions 1, 2, and full down**
- Press **[SAVE]**

4. ACM Settings

- Operation Mode (Position, Momentary)
- Retract Mode (Momentary, Continuous, Multi-Step)
- Motor Polarity (Normal, Reversed)
- Endpoint Stop Timeout (sec). Runs the motor for an additional number of seconds at the Up and Down positions.



Elevator Trim

The Elevator Trim display is designed to read trim servo position data from a trim position sensor wired to an SV-EMS input or from an ACM/VPX unit. The EFIS Trim display can be configured to be always on the EFIS or to only display when the trim servo is moving or 5 seconds after it has moved. When the EFIS is wired to a Dynon SV-AP-PANEL the EFIS has the ability to control the Trim motor speed based on airspeed. The SV-AP-PANEL can also automatically run the elevator trim motor when the autopilot is engaged to keep the elevator in trim.

1. Select Instrument ON/OFF mode

OFF	Trim display turned OFF
AUTO HIDE	Trim displayed when moving and for 5 seconds after.
ALWAYS ON	Trim display is always ON



5. Select Position Source

ACM/VPX	Elevator Trim Servo Sensor wired ACM
EMS	Elevator Trim Servo Sensor wired to EMS Pin input.

6. Set Invert Label Display

NO	Standard Label Position
YES	Swap UP and DOWN Labels



Trim Position Calibration

- Run the trim servo to the FULL UP position
- With FULL UP highlighted, press **[COPY]**
- Run the trim servo to the CENTER position
- With CENTER highlighted, press **[COPY]**
- Run the trim servo to the FULL DOWN position
- With FULL DOWN highlighted, press **[COPY]**
- Press **[SAVE]**

Auto Trim Configuration

- Set Auto Trim ON/OFF to ON
- Select 9. Auto Trim Motor Test
- Press [SEL]



STEP 1 of 8

- Center the Elevator Trim tab
- Press [START]



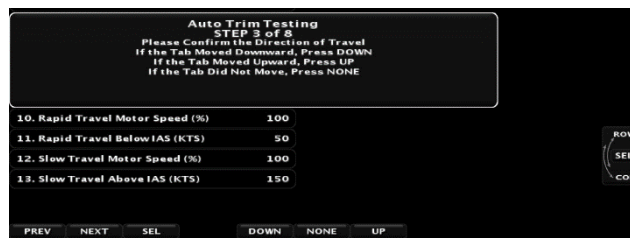
STEP 2 of 8

Trim Tab should move down for 10 seconds



STEP 3 of 8

- Press DOWN if the Trim Tab moved down
- Press UP if the Trim Tab moved up



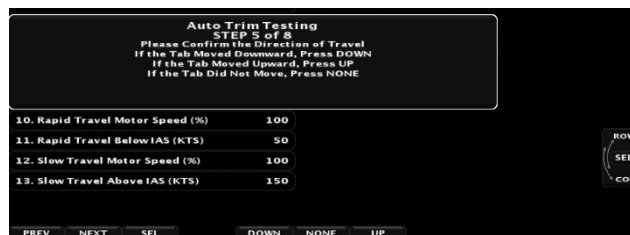
STEP 4 of 8

Trim Tab should move up for 10 seconds



STEP 5 of 8

- Press DOWN if the Trim Tab moved down
- Press UP if the Trim Tab moved up

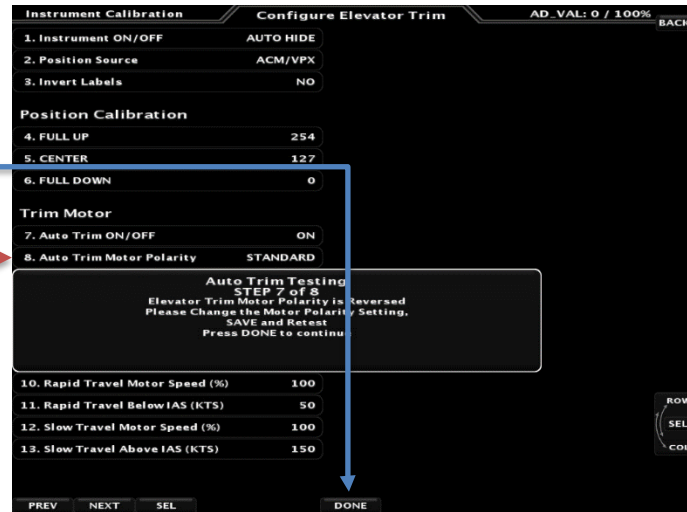


STEP 7 of 8

If the Trim Tab moved in the wrong direction, you will get a STEP 7 telling you the Elevator Trim Motor is Reversed.

- Press **DONE**
- Change the Auto Trim Motor Polarity setting to **REVERSED**
- **Redo the Auto Trim Motor Test**

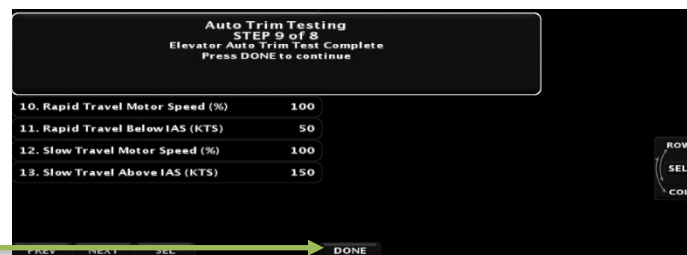
NOTE: After Changing the Motor Trim Polarity you will need to swap your Trim UP and Trim Down stick buttons.



STEP 9

Elevator Trim Test Complete

- Press **DONE**



Trim Motor Speed

The EFIS has settings that control how fast the trim motor runs based on airspeed. The actual motor speed will be a linear interpolation between the Rapid and Slow settings. You should configure the following settings:

- 10. Rapid Travel Motor Speed (%)
- 11. Rapid Travel Below IAS (KTS)
- 12. Slow Travel Motor Speed (%)
- 13. Slow Travel Above IAS (KTS)



Aileron Trim

The Aileron Trim display is designed to read trim servo position data from a trim position sensor wired to an SV-EMS input or from an ACM/VPX unit. The EFIS Trim display can be configured to be always on the EFIS or to only display when the trim servo is moving or 5 seconds after it has moved. When the EFIS is wired to a Dynon SV-AP-PANEL the EFIS has the ability to control the Trim motor speed based on airspeed.

1. Select Instrument ON/OFF mode

OFF	Trim display turned OFF
AUTO HIDE	Trim displayed when moving and for 5 seconds after.
ALWAYS ON	Trim display is always ON



2. Select Position Source

ACM/VPX	Aileron Trim Servo Sensor wired ACM
EMS	Aileron Trim Servo Sensor wired to EMS Pin input.



Trim Position Calibration

- Run the trim servo to the FULL LEFT position
- With FULL LEFT highlighted, press **[COPY]**
- Run the trim servo to the CENTER position
- With CENTER highlighted, press **[COPY]**
- Run the trim servo to the FULL RIGHT position
- With FULL RIGHT highlighted, press **[COPY]**
- Press **[SAVE]**

Trim Motor Speed

The EFIS has settings that control how fast the trim motor runs based on airspeed. The actual motor speed will be a linear interpolation between the Rapid and Slow settings. You should configure the following settings:

- 6. Rapid Travel Motor Speed (%)
- 7. Rapid Travel Below IAS (KTS)
- 8. Slow Travel Motor Speed (%)
- 9. Slow Travel Above IAS (KTS)

Cabin Environmental

CO Detector



O2 Tank Pressure

Pulse Oximeter

Test Audio

Item 33 in Instrument Calibration

The range is (0%-100%) and is adjusted using the knob followed by pressing the **[SAVE]** button. The Test Audio menu will play all the sounds in the system.

Switch Inputs

Each EFIS screen has 3 hardware inputs that can be used to monitor an external switch. To activate the hardware input the input pin must be pulled to ground.

The three input pins are located on the EFIS MAIN D-SUB 25 Connector.

Input	Pin
1	17
2	20
3	8

The Inputs will display the text on the EFIS Screen when an Input is either grounded or open. A normally open or normally closed switch is selectable in the Inputs menu. You can test the inputs from the CAL > Configure Inputs Menu. There is also a timer feature that will alarm after a set time is reached. If any input other than FUEL TANK XFR is selected, the timer will zero after the input is disabled. In the case of a FUEL TANK XFR input, the timer will only clear after a power cycle. This allows the pilot to have the total duration of the fuel tank transfer for the entire flight (to allow for multiple tank transfers).

The example picture shows Input #1 connected to the Pilot Door with a limit switch to ground. Input #2 is connected to the Copilot Door limit switch connected to ground. Input #3 is connected to the monitor line of an EarthX Lithium battery.

APPENDIX A: Specifications

Physical

AF-6600

Weight: 4.0 Lbs
 Panel Cutout: 9.959" x 7.805"
 Mounting: (Qty 4) 6-32" Screws

AF-5800

Weight: 5.8 Lbs
 Panel Cutout: 11.240" x 8.740"
 Mounting: (Qty 4) 6-32" Screws

AF-5700

Weight: 5.6 Lbs
 Panel Cutout: 10.620" x 8.713"
 Mounting: (Qty 4) 6-32" Screws

AF-5600

Weight: 5.2 Lbs
 Panel Cutout: 9.959" x 7.805"
 Mounting: (Qty 4) 6-32" Screws

AF-5500

Weight: 4.5 Lbs
 Panel Cutout: 8.775" x 6.775"
 Mounting: (Qty 4) 6-32" Screws

AF-5400

Weight: 4.5 Lbs

Power Requirements

Voltage 8 to 28 VDC

Amperage 5 Amps @ 8V 3.0 Amps @ 12V 1.5 Amps @ 24V

EFIS Main Connector (DB-25)

Pin 1, 15 Red Master Power

Pin 2, 3 Black Master Ground

The master power pins are internally connected.

EFIS AUX/ Expansion Connector (DB-15)

Pin 6 Red Backup/KeepAlive Power Input

Pin 15 Black Backup Power Ground

SD Card

The AF-5000 Series displays have a standard size **Secure Digital (SD)** memory card slot in the upper right hand corner for : Software Loading, Data Transfer.

Backup Battery

There are two primary options for backup battery power input.

- TCW backup battery module

P/N: 71704 3 AMP hours for a single screen

P/N: 71714 6 AMP hours for two screens

- Direct Aircraft Battery connection

Temperature Specifications

Environmental Specifications	Storage Temperature	Operating Temperature
Autopilot Servos SV32/42/52	-30 °C to +75 °C	-30 °C to +60 °C
72200/201 ADAHRS	-40 °C to +70 °C	-30 °C to +60 °C
74112 ADS-B Receiver	-40 °C to +70 °C	-30 °C to +60 °C
74152 AP-Panel	-40 °C to +70 °C	-30 °C to +60 °C
71410 ARINC-429	-40 °C to +70 °C	-30 °C to +60 °C
74122 COM RADIO	-40 °C to +70 °C	-30 °C to +60 °C
SV-COM-X83	-55 °C to +85 °C	-20 °C to +70 °C
AF-5500/5600/5800	-40 °C to +70 °C	-30 °C to +60 °C
SV-EMS-220/221	-40 °C to +70 °C	-30 °C to +60 °C
73102/73120 AF-GPS	-40 °C to +70 °C	-40 °C to +60 °C
72236 Remote MAG	-40 °C to +70 °C	-30 °C to +60 °C
74109 Transponder	-55 °C to +85 °C	-20 °C to +70 °C

APPENDIX B: Electrical Connections

EFIS MAIN CONNECTOR

Pin	Pin Name	I/O
1	MASTER POWER	IN
2	MASTER GROUND	IN
3	MASTER GROUND	IN
4	SERIAL #3 – TX	OUT
5	SERIAL #3 – RX	IN
6		
7		
8	INPUT #3	IN
9	SERIAL #1 - GROUND	IN
10	SERIAL #1 – TX	OUT
11	Serial #0 TXD	OUT
12		
13	SERIAL #2 – TX	OUT
14	WARNING LIGHT	OUT
15	MASTER POWER	IN
16	AUDIO GROUND	OUT
17	INPUT #1	IN
18	EFIS AUDIO	OUT
19		
20	INPUT #2	IN
21	SERIAL #2/#3 - GROUND	OUT
22	SERIAL #1 - RX	IN
23	Serial #0 – RXD	IN
24	Serial #0 - GROUND	OUT
25	SERIAL #2 - RX	IN

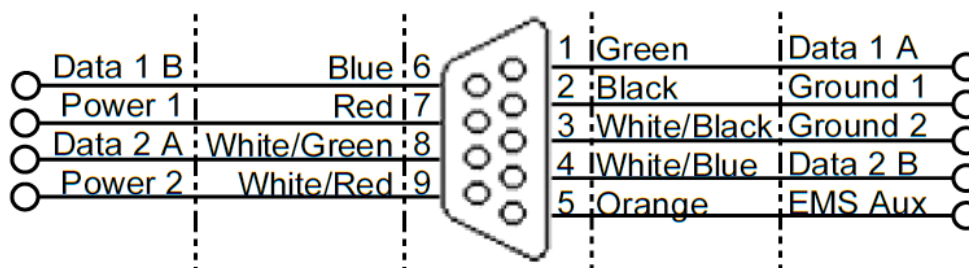
EFIS EXPANSION CONNECTOR

Advanced SV Network (SV-NET)

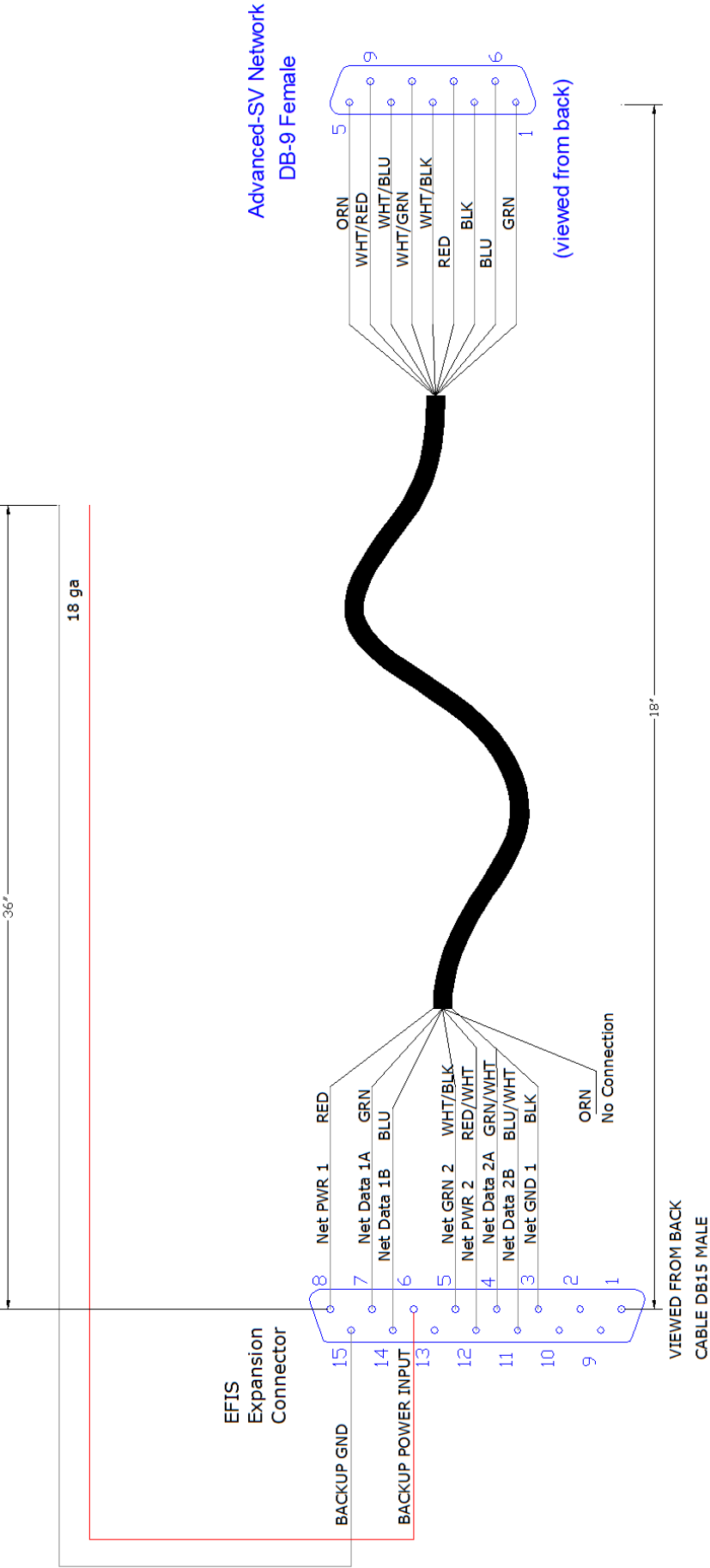
Pin	Pin Name	I/O	Color	Advanced Network DB-9 Male Pin
1	+8V DC (350mA max)	OUT	ORN	
2	SERIAL #4 - TX	OUT		
3	Network Ground 1	OUT	BLK	2
4	Network Data 2A	IN/OUT	GRN/WHT	8
5	Network Ground 2	OUT	WHT/BLK	3
6	BACKUP/KEEPALIVE	IN		
7	Network Data 1A	OUT	GRN	1
8	Network Power #1	OUT	RED	7
9	Ground	OUT		
10	SERIAL #4 - RX	IN		
11	Network Data 2B	IN/OUT	BLU/WHT	4
12	Network Power #2	OUT	RED/WHT	9
13	VOLTS #2 MONITOR	IN		
14	Network Data 1B	IN/OUT	BLU	6
15	BACKUP GROUND	IN		

Advanced SV Network Wiring

Advanced-SV Network Female D9 Pin	Advanced-SV Network Cable Wire Color	Description
1	Green	Network Data 1 A
2	Black	Network Ground 1
3	White with Black Stripe	Network Ground 2
4	White with Blue Stripe	Network Data 2 B
5	Orange	EMS Auxiliary Voltage
6	Blue	Network Data 1 B
7	Red	Network Power 1
8	White with Green stripe	Network Data 2 A
9	White with Red stripe	Network Power 2



Network Female D9 Pin Insertion View (Rear)



APPENDIX C: Metric Units

Each gauge has Display Units or Units in Calibration that can be changed to display alternate units.

EXAMPLE

Oil Temperature

Boot the EFIS in Calibration mode and select:

18. Oil Temperature

9. Display Units **[TURN JOYSTICK]** **[SAVE]**

CAUTION: Do not turn off power before pressing the save button and exiting the calibration menu.

OAT units can be changed on the main screen by pressing **[EFIS]** -> **[OAT C/F]** or **[ENGINE]** -> **[OAT C/F]** button.

Available Units

Altitude

FEET/INHG
METER/INHG
FEET/MBAR
METER/MBAR

Airspeed

KTS
MPH

Temperatures (EGT, CHT, TIT, Carb, Coolant, Oil, OAT)

Fahrenheit
Celsius

Manifold

InHg
MBAR

Fuel Flow, Fuel Computer, Fuel Tanks

Liters
Gallons

Fuel Pressure, Oil Pressure

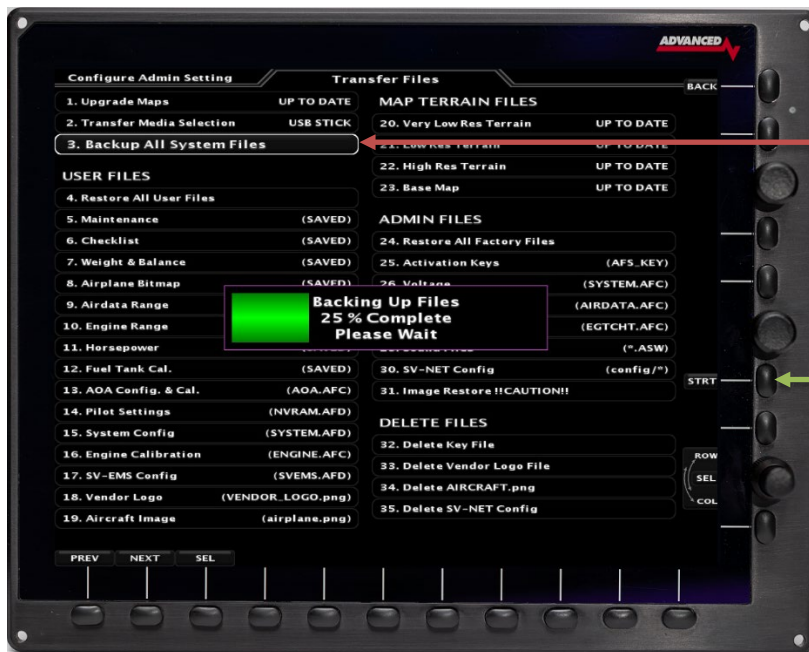
PSI
MBAR

APPENDIX D: System Data Backups

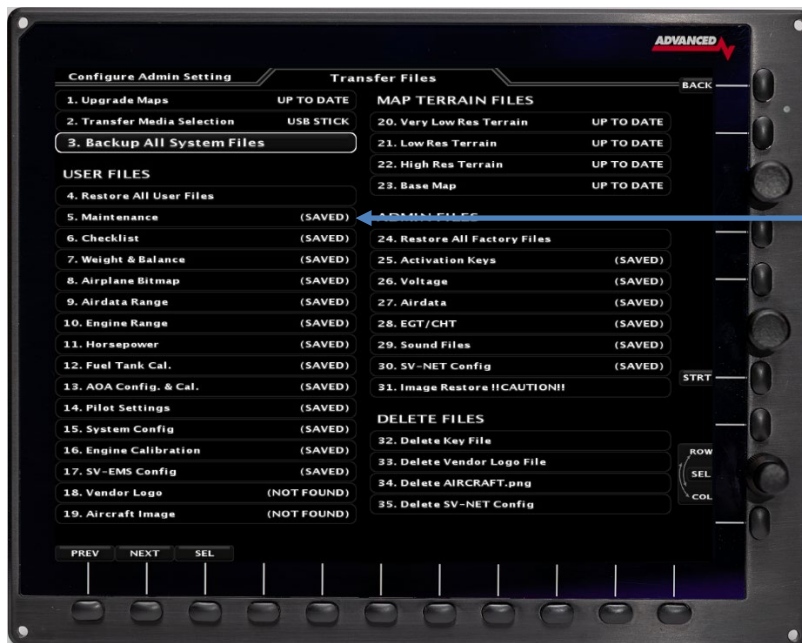
You should backup all the configuration and calibration settings for each EFIS in the aircraft in case you ever need to restore the data. The data for each EFIS should be stored on a separate USB memory stick and saved for later use.

Select SET > CAL > 1. Admin Settings > 1. Transfer Files > 3. **Backup All System Files**

Press **STRT**



As a file is saved on the USB stick you should see **SAVED** next to the file name.



The USB memory stick should have the following backup files:

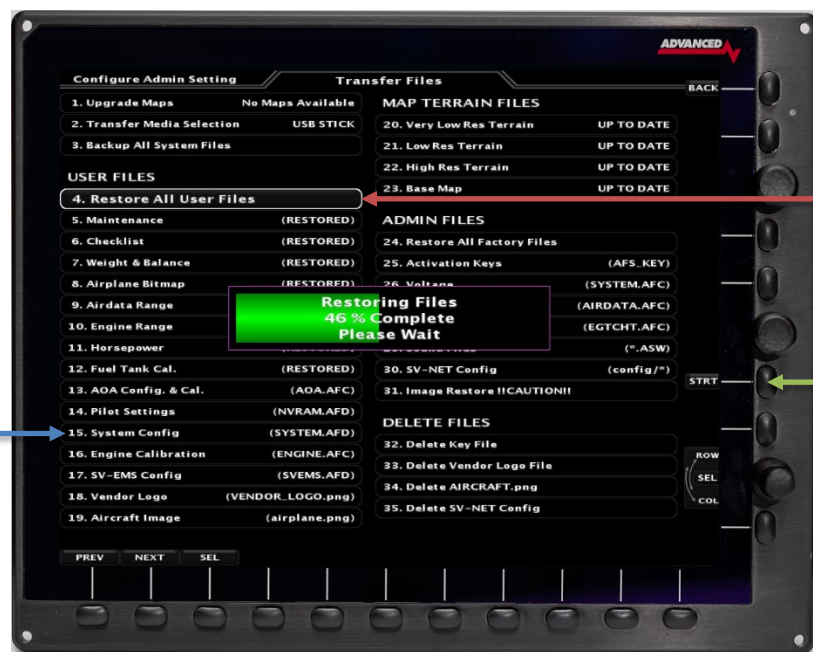
Name	Date modified	Type	Size
 EGTCHT.AFC	1/5/2023 3:14 AM	AFC File	0 KB
 AIRDATA.AFC	1/5/2023 3:14 AM	AFC File	0 KB
 SYSTEM.AFC	1/5/2023 3:14 AM	AFC File	0 KB
 AFS_KEY	1/5/2023 3:14 AM	File	0 KB
 backup_74007.tar.gz	1/5/2023 3:14 AM	GZ File	212,224 KB
 SVEMS.AFD	1/5/2023 3:14 AM	AFD File	3 KB
 ENGINE.AFC	1/5/2023 3:14 AM	AFC File	3 KB
 SYSTEM.AFD	1/5/2023 3:14 AM	AFD File	7 KB
 NVRAM.AFD	1/5/2023 3:14 AM	AFD File	2 KB
 AOA.AFC	1/5/2023 3:14 AM	AFC File	1 KB
 HORSEPWR.AFD	1/5/2023 3:14 AM	AFD File	1 KB
 TANKS.AFC	1/5/2023 3:14 AM	AFC File	2 KB
 ENGINE.AFD	1/5/2023 3:14 AM	AFD File	5 KB
 AIRCRAFT.AFB	1/5/2023 3:14 AM	AFB File	134 KB
 AIRDATA.AFD	1/5/2023 3:14 AM	AFD File	1 KB
 AIRCRAFT.AFD	1/5/2023 3:14 AM	AFD File	2 KB
 CHKLST.AFD	1/5/2023 3:14 AM	AFD File	9 KB
 MAINT.AFD	1/5/2023 3:14 AM	AFD File	1 KB

File Name	Description
AIRCRAFT.AFB	Weight and Balance .bmp Picture
AIRCRAFT.AFD	Weight and Balance Data
<i>AIRDATA.AFC</i>	<i>Not used with Dynon ADAHRS</i>
AIRDATA.AFD	Airspeed and Altitude Menu Settings
AOA.AFC	AOA Calibration
CHKLST.AFD	EFIS Checklist Data
<i>EGTCHT.AFC</i>	<i>Not used with Dynon SV-EMS Module</i>
ENGINE.AFC	<i>Not used with Dynon SV-EMS Module</i>
ENGINE.AFD	Engine Sensor Menu Settings
HORSEPWR.AFD	Horsepower Menu Settings
MAINT.AFD	Maintenance Menu Data
NVRAM.AFD	System Settings (Tach Time, Hobbs Time, Fuel Comp, display mode,.....)
SVEMS.AFD	SV EMS Engine Module configuration settings
SYSTEM.AFC	Volts1, Volts2, Backup Battery Calibration data
SYSTEM.AFD	ADMIN Menu (serial ports, inputs, transponder, ..) & Autopilot Menu Settings
TANKS.AFC	Fuel Tank Calibration Data

Restoring System Data from a USB Memory Stick Backup

You can select individual files or select **Restore All User Files**

Then press **STRT**



As a file is transferred from the USB stick you should see **RESTORED** next to the file name.



APPENDIX E: AF-6600 / AF-5000 Software Updates

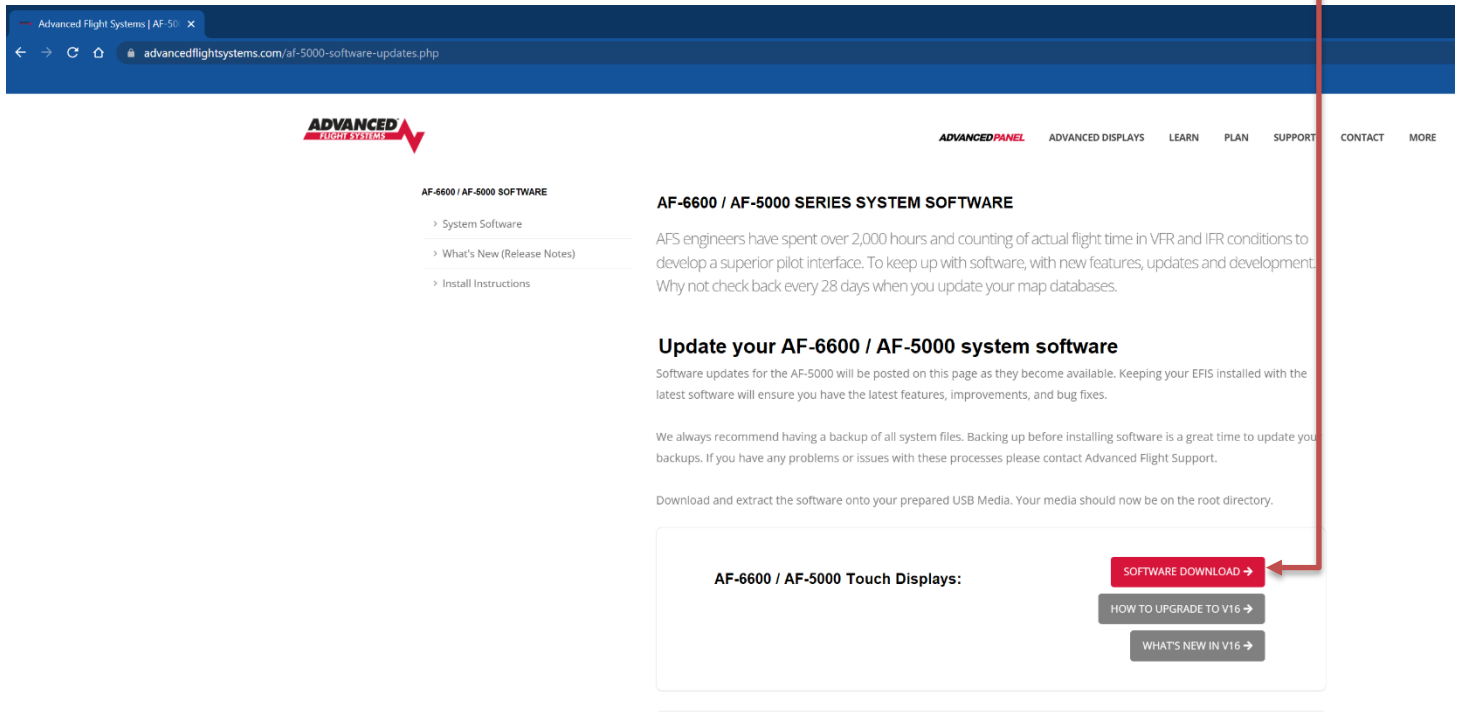
The AF-6600 / AF-5000 series EFIS software can be updated using a USB memory stick plugged into the back of the screen. **The USB Memory stick must have a volume name or the EFIS will not install the software.**

PROCEDURE

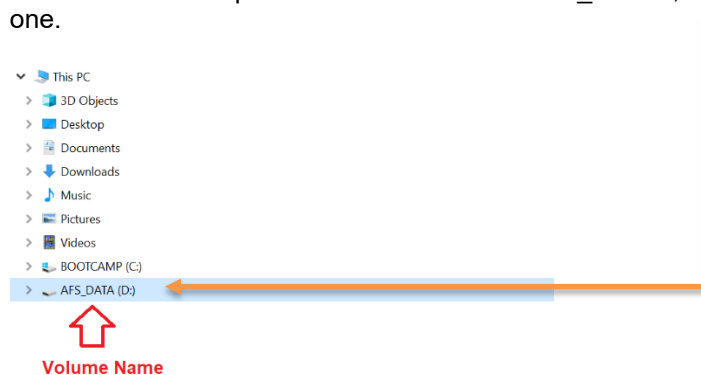
1. Download the software file with the latest version of software from:
<https://www.advancedflightsystems.com>

Select **SUPPORT > SOFTWARE UPDATES > AF-6600 / AF-5000 Series**

CLICK on **SOFTWARE DOWNLOAD**



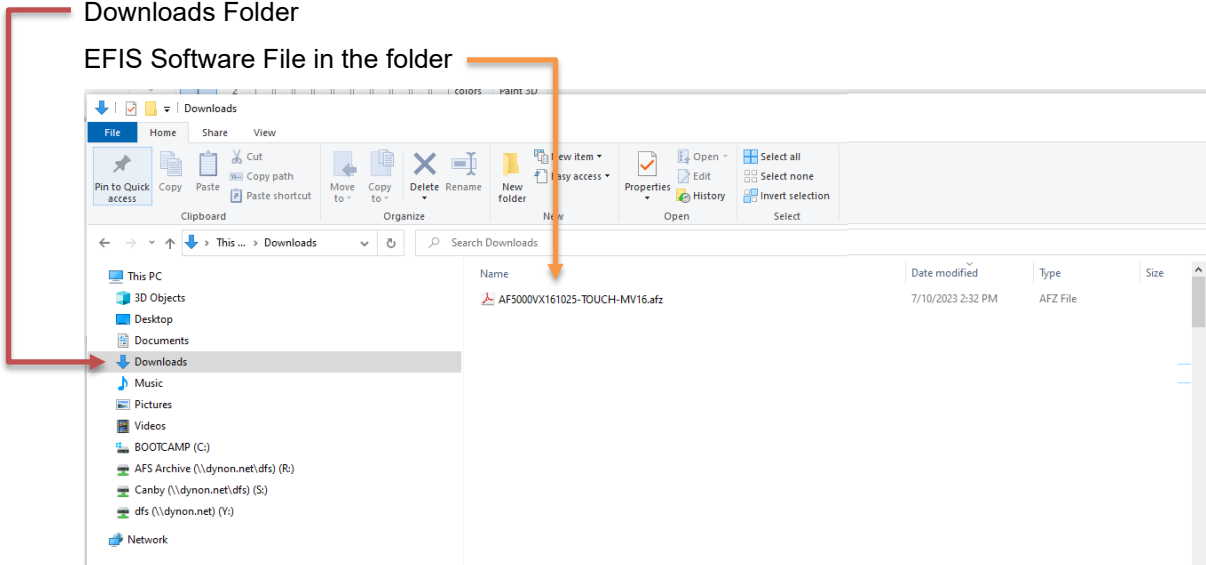
2. Plug the USB memory stick into your computer and verify that the USB memory stick has a volume name. In this example the volume name is "AFS_DATA", the name does not matter it just must have one.



3. Locate the downloaded EFIS software file on your computer, most likely in your Downloads folder.

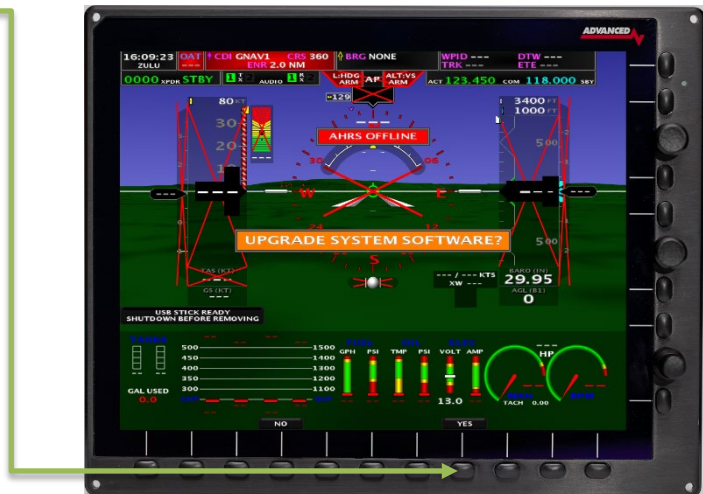
Downloads Folder

EFIS Software File in the folder



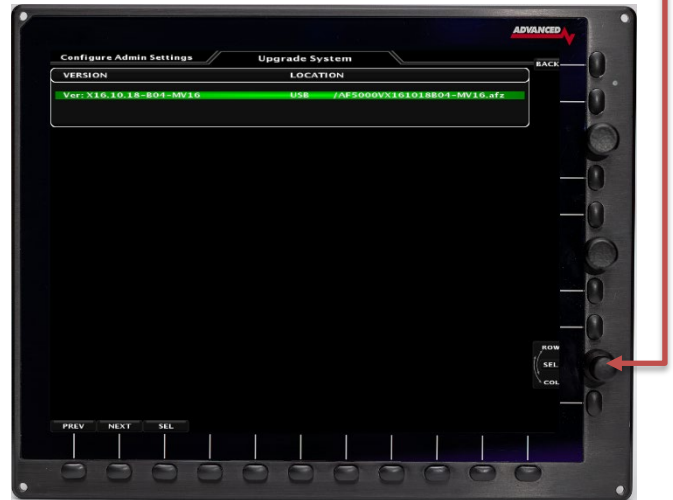
4. Move the EFIS software file from your computer to the USB Memory stick.
 - Right Click on the EFIS software file in your downloads folder and select **Copy**
 - Click on the USB Memory stick icon on your computer, Right Click and then select **Paste**
5. Eject the USB Memory stick from your computer.
6. Place the USB Memory stick in the PFD EFIS USB Socket (back of EFIS or extension cord on the panel). **Make sure you only have a single USB Memory stick plugged into the EFIS.**
7. Power the PFD EFIS screen using Master Power
8. When the EFIS boots you should get a prompt to **UPGRADE SYSTEM SOFTWARE ?**

Select **YES**

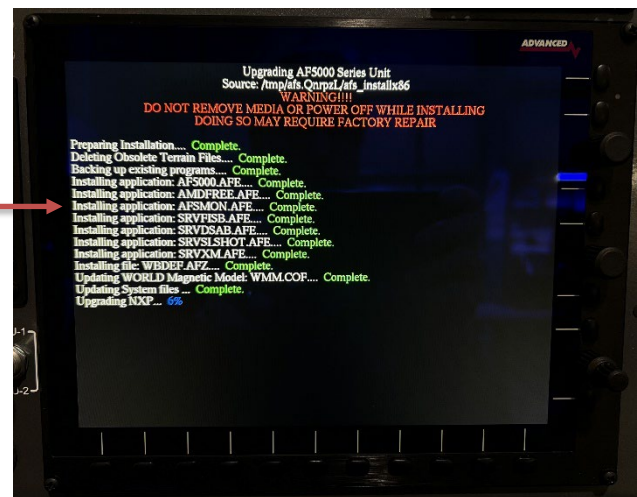


If you did not get the **UPGRADE SYSTEM SOFTWARE** prompt you can force a software load from the **SET > CAL > ADMIN Settings > 26. Upgrade System** Menu

9. Use the lower right knob to select the EFIS software



10. You should get a screen that looks like this as the system software is installed.



11. After the software installs you will get a warning message and the EFIS should reboot.

12. Repeat steps 6 – 11 for all EFIS screens in the aircraft.

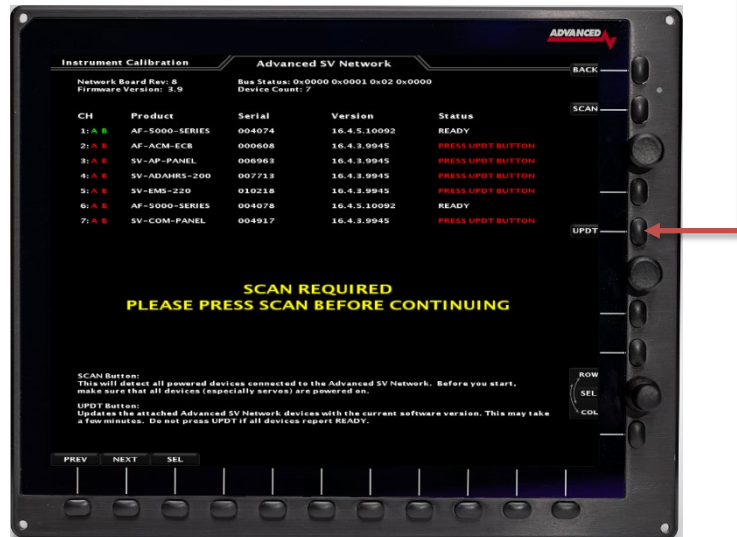
13. If after installing the new software you get a **RED X** over the airspeed and altimeter and a **Network Needs Updating** message you will need to update the software on the connected Dynon devices.

14. Touch the **Network Needs Updating** message on the **PFD EFIS** or select the following menu:

SET > CAL > 2. Advanced SV-Network



15. Press the **UPDT** button on the PFD EFIS



16. After the software is finished loading on all the connected SV-Network devices you will be instructed to power down the system.
17. Once all the EFIS screens have tuned off you can repower the system and verify that all the EFIS screens are running the latest software from the CHECK > ABOUT > SYSTEM menu.

APPENDIX F: Database Updates

The AF-6600 / AF-5000 series store the Map data on the internal EFIS memory, the Approach Plates, VFR Sectionals, IFR Low Maps and Airport diagrams are stored on a USB memory stick plugged into the back of the EFIS or panel mounted USB extension.

Seattle Avionics Dynon Skyview Chart Data

Chart data provided by Seattle Avionics is updated on the EFIS USB memory stick using the Seattle Avionics Chart Data Manager PC software. Each EFIS display in the aircraft must have a separate USB stick with the data plugged into the rear USB connector.



Seattle Avionics Data is available from the following link:

<http://seattleavionics.com>

Map Nav Data

The AF-6600 / AF-5000 series can use Map NAV data provided by:

1. AFS NAV data for USA Customers (Free from AFS web site)
See next page for instructions.
2. Jeppesen NAV Data for different regions in the world (Purchased from Jeppesen web site)
3. Pocket FMS NAV Data for different regions in the world (Purchased from Pocket FMS web site)

Loading AFS Provided USA Map/Nav Data

The AF-6600 / AF-5000 series EFIS map data for the United States is provided free of charge on the AFS website. The data should be updated using a USB memory stick plugged into the back of the screen.

If you are using the Seattle Avionics Data Manager, it will automatically update the USB stick with the AFS Map Data.

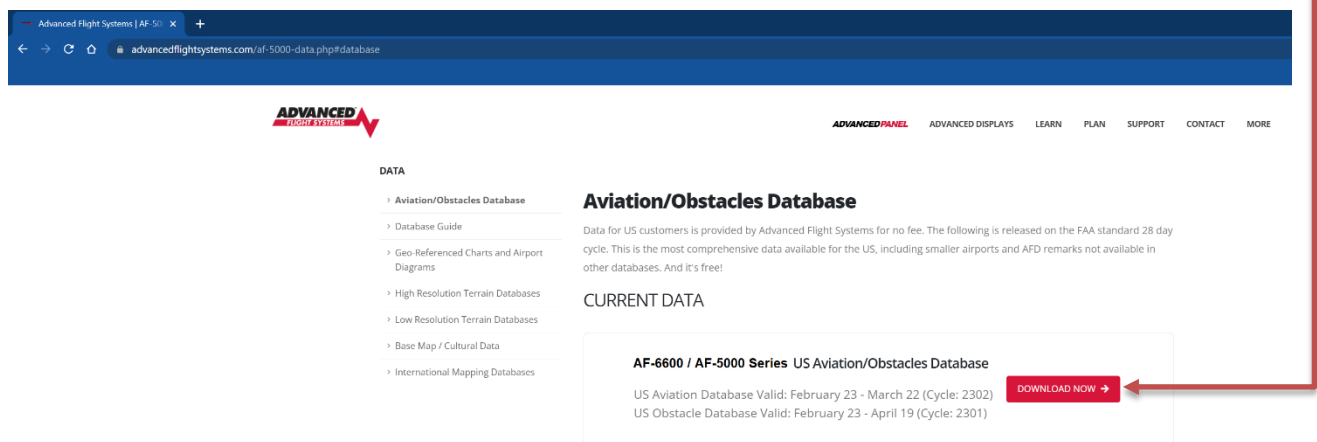
The USB Memory stick must have a volume name or the EFIS will not install the data.

PROCEDURE

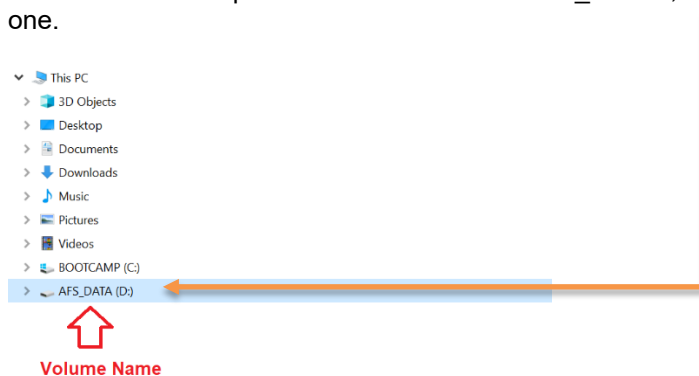
1. Download the latest Map Data file from:
<https://www.advancedflightsystems.com>

Select **SUPPORT > CHARTS AND DATABASES > Aviation/Obstacles Database**

CLICK on **DOWNLOAD NOW**



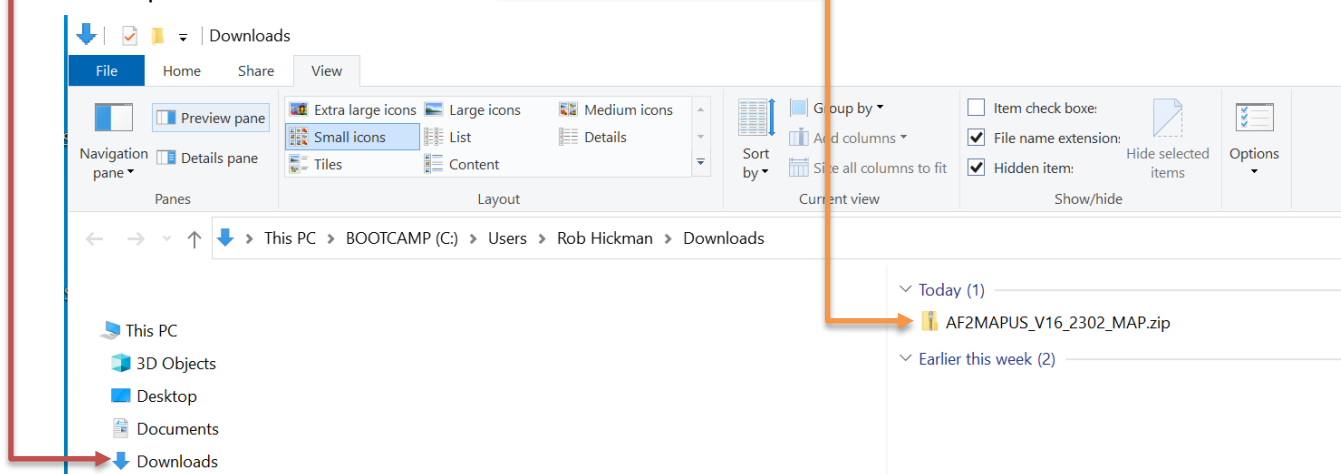
2. Plug the USB memory stick into your computer and verify that the USB memory stick has a volume name. In this example the volume name is "AFS_DATA", the name does not matter it just must have one.



3. Locate the downloaded Map Database file on your computer, most likely in your Downloads folder.

Downloads Folder

Map Database File in the folder



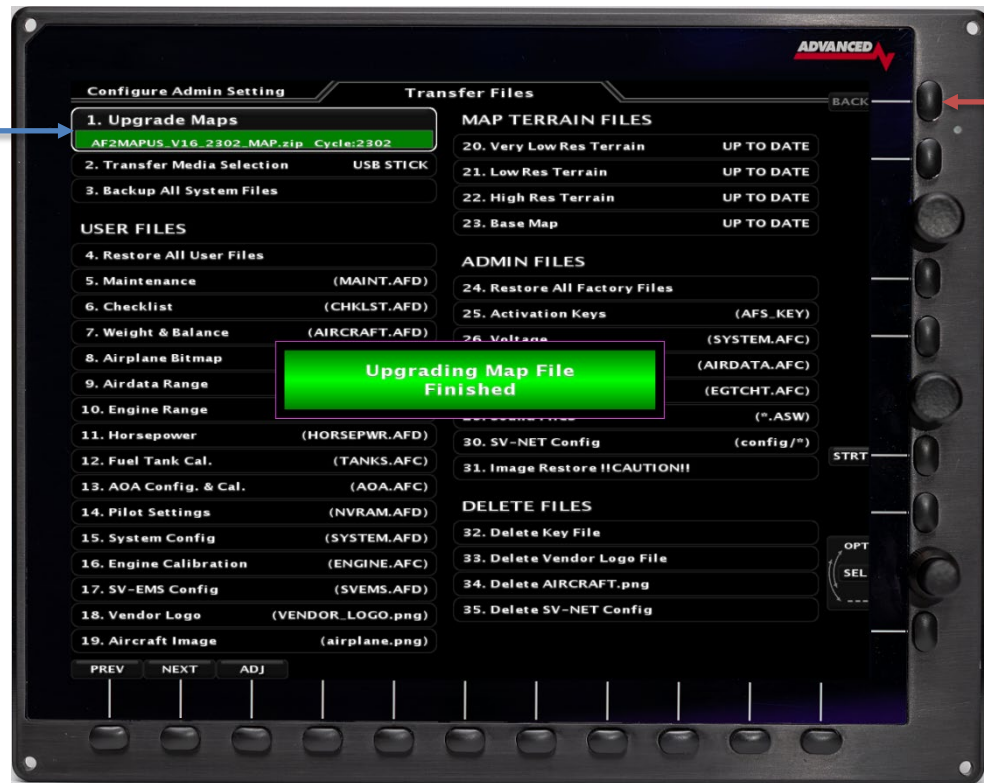
4. Move the Map Database file from your computer to the USB Memory stick.
 - Right Click on the EFIS software file in your downloads folder and select **Copy**
 - Click on the USB Memory stick icon on your computer, Right Click and then select **Paste**
5. Eject the USB Memory stick from your computer.
6. Place the USB Memory stick in the PFD EFIS USB Socket (back of EFIS or extension cord on the panel). **Make sure you only have a single USB Memory stick plugged into the EFIS.**
7. Power the PFD EFIS screen using Master Power
8. When the EFIS boots you should get a prompt to **LOAD NEW MAP CYCLE ?**

Select **YES**



If you did not get the **LOAD NEW MAP CYCLE?** prompt you can manually load from the **SET > CAL > ADMIN Settings > Transfer Files > Upgrade Maps** menu

9. After Selecting **YES** the Map Database file will load from the Transfer Files > Upgrade Maps menu.



10. When you get the Finished message, select **BACK** > **BACK** to return to the normal run mode.

Worldwide Jeppesen Data Files

The Terrain and Vector files are provided by Advanced Flight Systems and are rarely updated. The MAP files are provided by Jeppesen and install on the SD card using their JSUM program.

NOTE: If your EFIS is currently working with Jeppesen data in the region you are flying in you do not need to update any files from the AFS web store. You only need to use the Jeppesen JSUM program to update the NAV data.

File Name	Description	Source
Only updated when changing regions or switching to Jeppesen data		
AF2TERxx.AFM	Terrain height information for the US	AFS Web Store
AF2VECxx.AFM	Vector data for US roads/rivers/lakes/cities	AFS Web Store
Updated every 28 days		
AF2MAPxx.AFM	Navigational data (airports, obstacles, navaids, ...)	Jeppesen JSUM

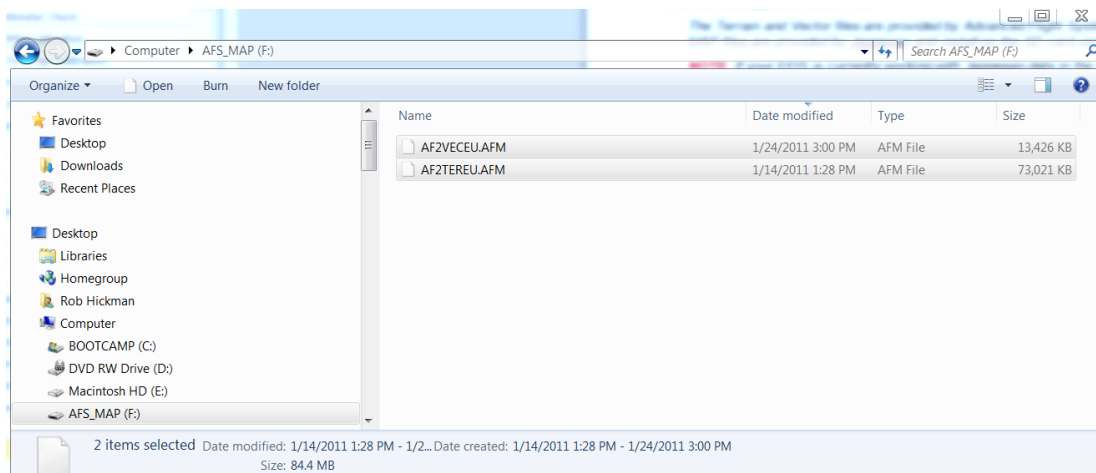
xx Region Code for your area.

AF Africa
AS Asia
EU Europe
ME Middle East
NA North America
SA South America
PA Pacific

Instructions:

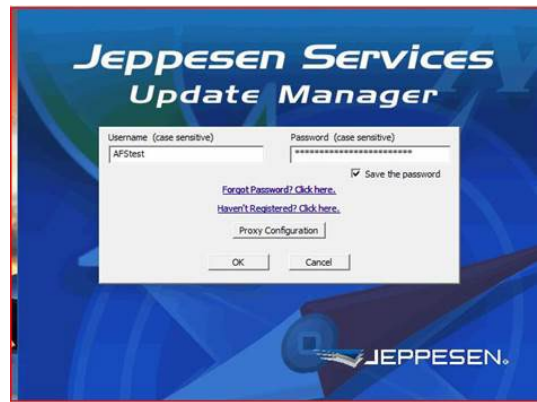
If your EFIS is currently working with Jeppesen data in the region you are flying skip to step 2

1. Using the AFS WEB Site select and download the World Wide (*Terrain and Vector*) support files onto your SD card.

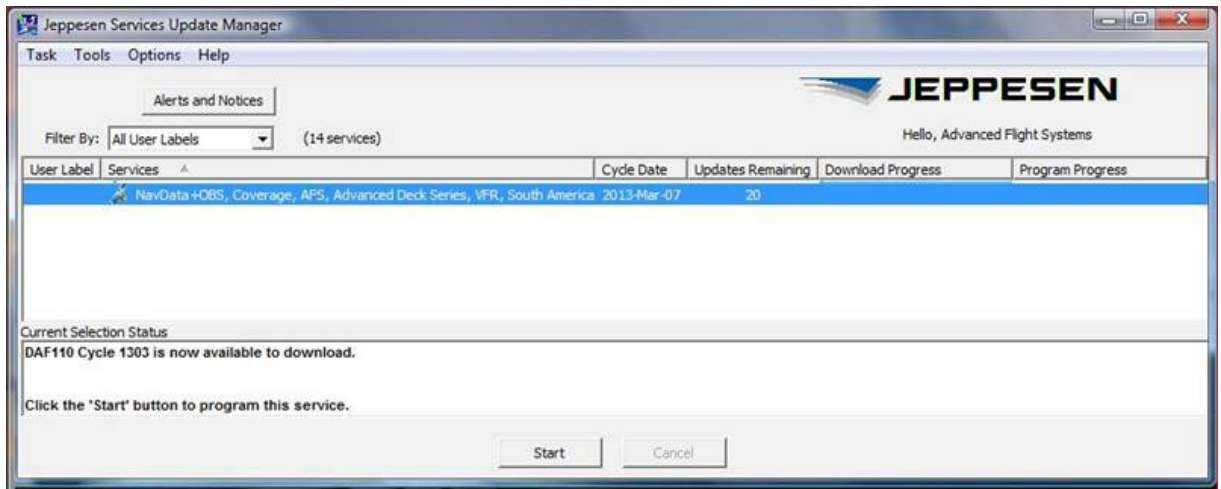


2. Using the Jeppesen JSUM program on your PC get the current AFSMAPxx.AFM map data from Jeppesen.

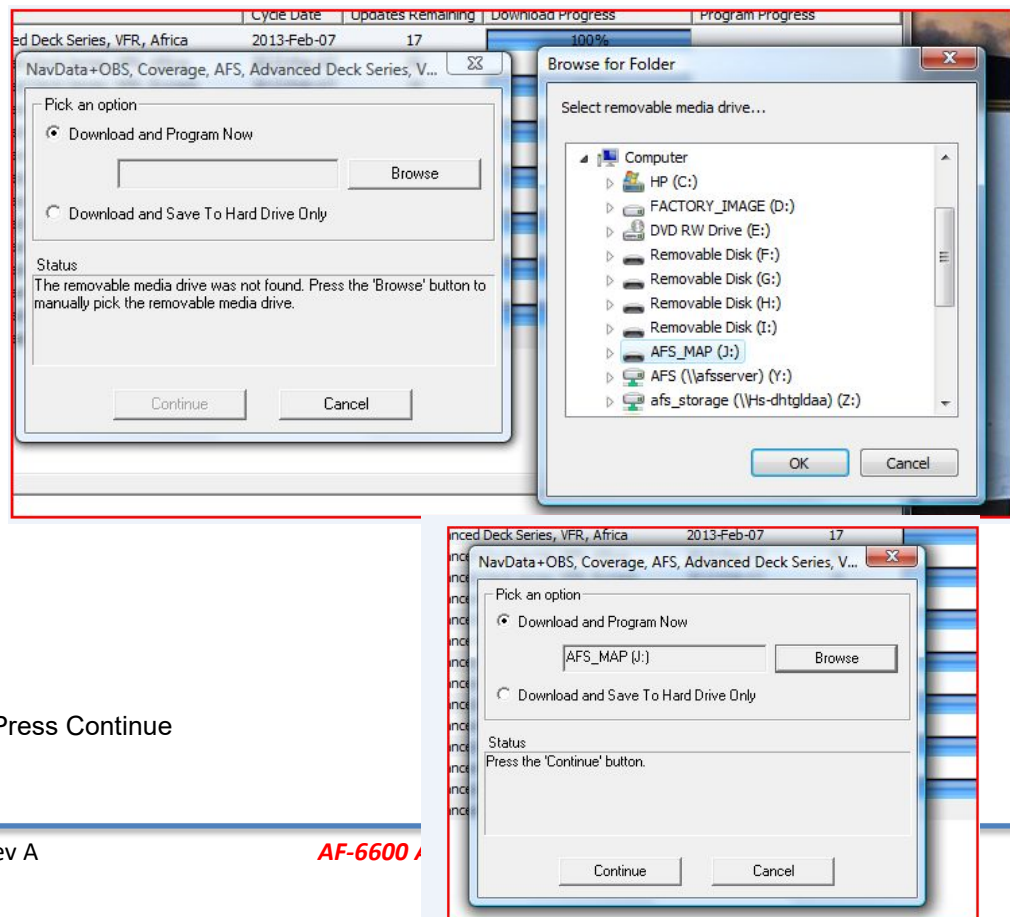
2a. Start the JSUM program on your PC and login using **YOUR** Username and Password



2b. Select your data region and press Start. If you do not have any Services you will need to contact Jeppesen to purchase the Map Data



2c. Select your Map SD card location



2d. Press Continue

2e. OK to Finish



3. See *Loading Map Nav Data from the SD card into the EFIS* in the next few pages.

Pocket FMS Map Data Files

The PocketFMS Foundation provides worldwide aeronautical data and is professionally maintained and updated every 28 days. Pocket FMS Coverage covers Europe, North America (including Canada), Australia, and New Zealand.



For more information on PocketFMS visit their website at www.pocketfms.com

The Terrain and Vector files are provided by Advanced Flight Systems and are rarely updated. The MAP NAV data file is exported from the Pocket FMS program on your PC and moved to the SD card.

NOTE: If your EFIS is currently working with PocketFMS data in the region you are flying in you do not need to update any files from the AFS web store. You only need to use the Pocket FMS program to update the NAV data.

File Name	Description	Source
Only updated when changing regions or switching to PocketFMS data		
AF2TERxx.AFM	Terrain height information for the US	AFS Web Store
AF2VECxx.AFM	Vector data for US roads/rivers/lakes/cities	AFS Web Store
Updated every 28 days		
AF2MAPFM.AFM	Navigational data (airports, obstacles, nav aids, ...)	Pocket FMS program

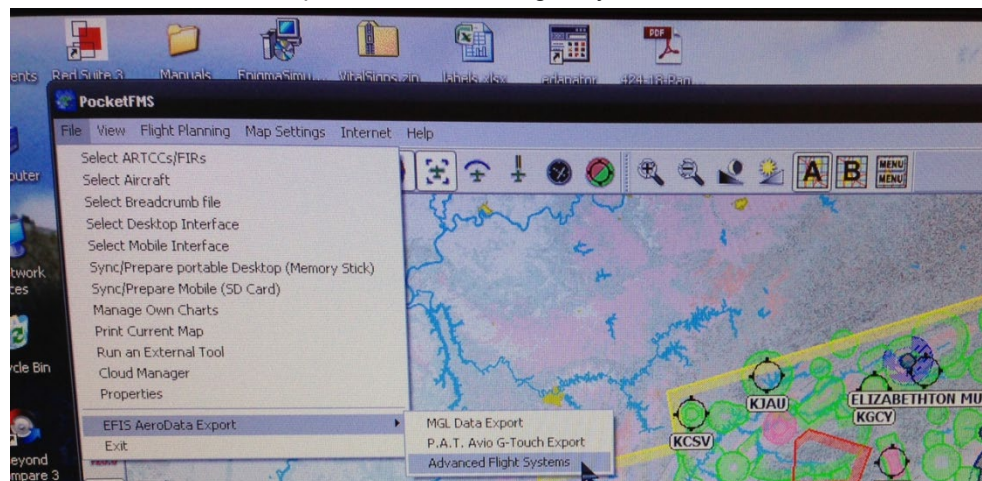
xx Region Code for your area.

AF Africa
AS Asia
EU Europe
ME Middle East
NA North America
SA South America
PA Pacific

Instructions:

If your EFIS is currently working with data in the region you are flying skip to step 2

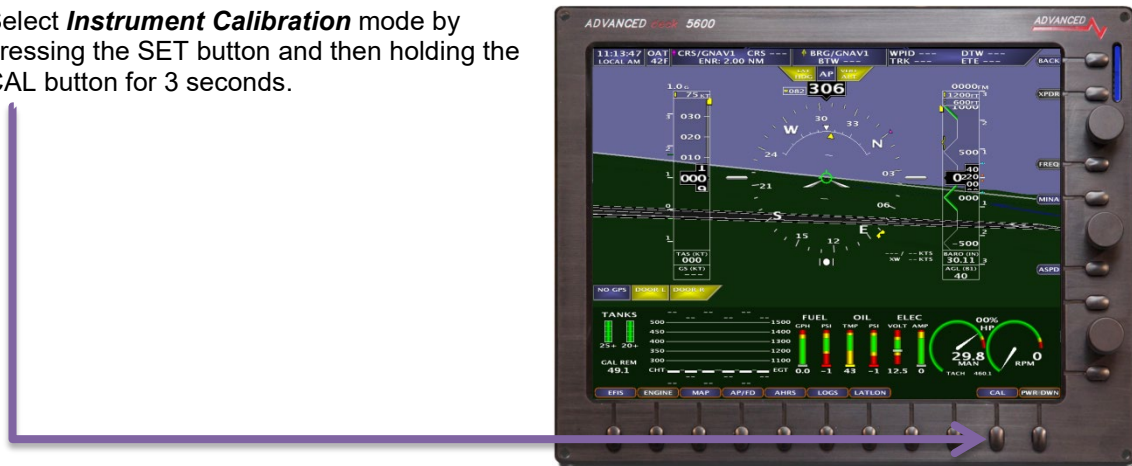
1. Using the AFS WEB site select and download the World Wide (*Terrain and Vector*) support files onto your SD card.
2. Using the PocketFMS software select:
FILE > EFIS AeroData Export > Advanced Flight Systems



3. See **Loading Map Nav Data from the SD card into the EFIS** in the next few pages.

Loading Map Nav Data from the SD card into the EFIS

1. Insert the SD card into the EFIS screen and Power the EFIS screen using Master Power.
2. Select **Instrument Calibration** mode by pressing the SET button and then holding the CAL button for 3 seconds.



3. **SE**lect Admin Settings



4. Use the bottom Joystick knob to **SE**lect Transfer Files



5. After the SD card or USB memory stick is displayed select **Upgrade Maps** with the Joystick and then press **STRT** to install the Map data.



6. After the Map data is installed you can then remove the SD card.

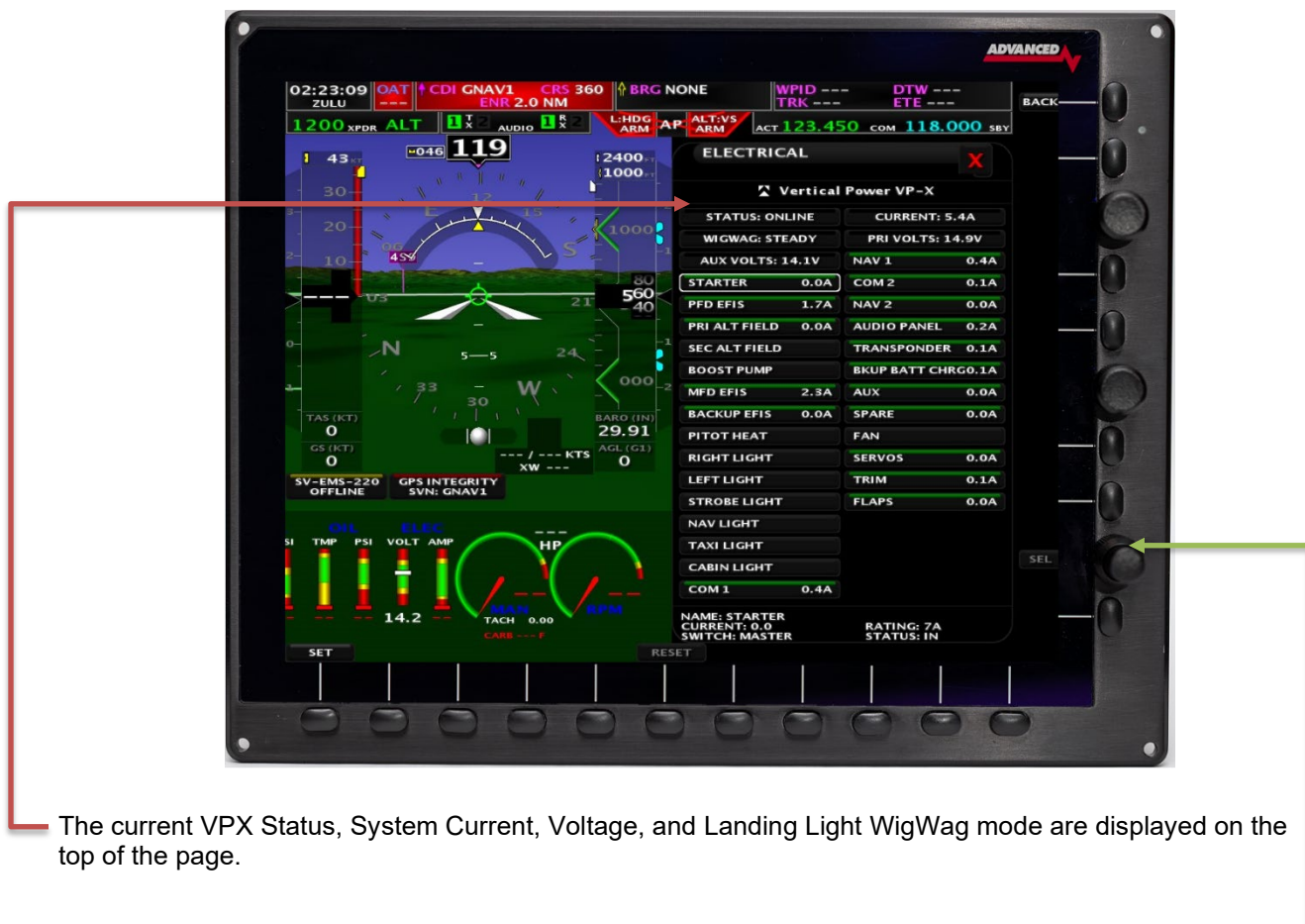
APPENDIX J: Troubleshooting

Problem	Cause	Solution
The EFIS does not power on	The EFIS is not getting power	Check circuit breakers, wire connections, and that the connector is seated properly.
The EFIS does not power off	The EFIS remains on	Verify engine RPM < 1500, verify main and backup power has been removed. Press and hold button 2 for > 5 seconds
Fuel Tank/Trim Indications are wrong	Fuel/Trim sensors have not been calibrated	Calibrate fuel tanks and trim per installation manual.
Dashes shown in CRS or BRG information on CDI	No CRS/BRG source is selected	Change NAV source settings EFIS -> NAVIGATION -> SRC
NO GPS shown on MAP	Unit cannot detect a GPS connected	Serial port function, of GPS/NAV Source not set correctly or GPS powered off
Garmin GNS-430W/530W not communicating with EFIS	EFIS or GNS-430/530 not configured properly	See 430W/530W - EFIS - Autopilot - ARINC Interface Troubleshooting Document
Fuel Computer Warning continues to flash yellow	Improperly set fuel computer setting	Due to wing dihedral, different aircraft require a different <u>Cross Check Error Limit</u> for the fuel computer to compare fuel qty and fuel flow. Change the setting to approx 15.0 in the Fuel Computer item in Instrument Calibration

APPENDIX K: Vertical Power VP-X Interface

The AF-6600 / AF-5000 series systems are capable of interfacing to a Vertical Power electronic circuit breaker power system. When enabled, the Electrical Status page can be accessed by pressing the **CHECK - > ELECT** Buttons.

Electrical System Status Page



Use the **SEL**ect knob to display more detailed information for each circuit. Once a circuit is highlighted it will display the circuit NAME, Current draw, Breaker size, Operating Switch and Status.

Circuits are color coded based on their current status:

Green Bar Circuit **ON** and OK
Black Bar Circuit **OFF**
Red Bar Tripped

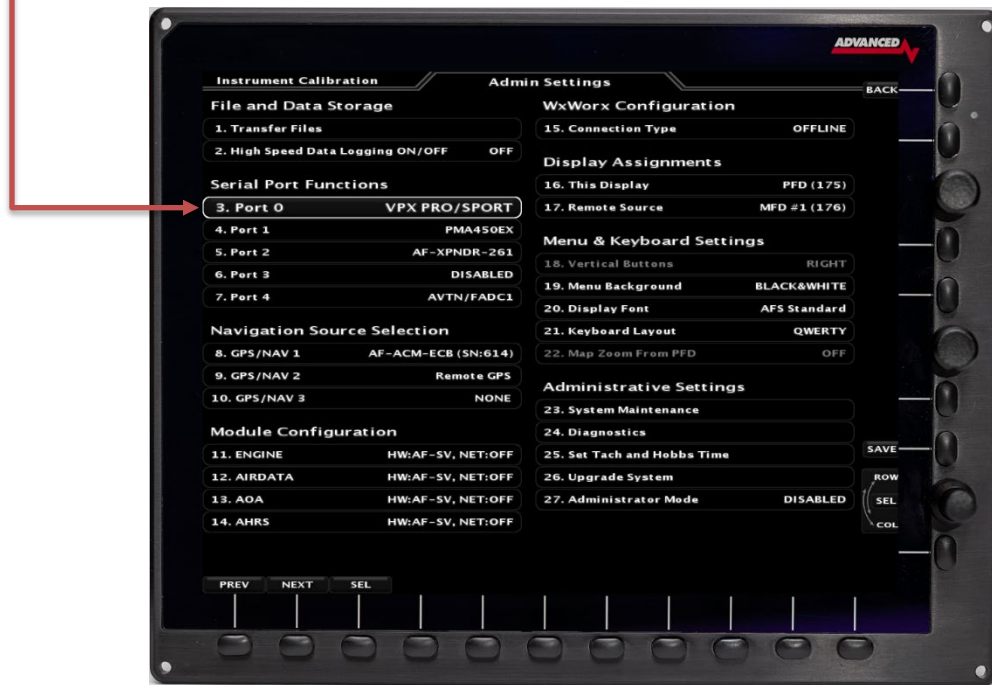
You can control each circuit using the lower screen buttons:

ON Turn Circuit **ON**
OFF Turn Circuit **OFF**
RESET Reset tripped Circuit Breaker

Serial Port Connection

The VPX System can be wired to any available EFIS RS-232 Serial Port. Once you have connected the VPX serial port to an EFIS serial port you need to set the EFIS serial port function to **VPX** from the EFIS **Admin Settings** Menu.

In this example we have configured serial port #0 for the VPX device.



VPX Configuration

You then need to set the VPX type in the **Electrical Configuration** menu.



VPX Key

You will need to purchase a VPX Key from Advanced Flight to enable the VPX EFIS interface. The VPX Key will need to be entered in the **SET > CAL > ADMIN Settings > System Maintenance > Manage Keys** Menu.

After entering the VPX Key be sure to press the **SAVE** button.



APPENDIX M: Upgrading an AF-3000/4000 to an AF-6600

If you are upgrading an existing AF-3000 or AF-4000 to the AF-6600 or AF-5000 system, you will need to do the following:

1. Install the new Dynon SV ADAHRS-200 and/or SV-ADAHRS-201 using the instructions in this manual. You will need to run Pitot and Static lines to the new ADAHRS. You will also need to install and wire the new OAT sensor to the new ADAHRS. The new ADAHRS will wire to the AF-6600/5000 EFIS using the new SV-Network cable connected to the EFIS DSUB-15 AUX connector.
 - a. Van's sells a Dynon ADAHRS mounting bracket for the RV-10 and RV-7/9
 - b. Glasair sells a Dynon ADAHRS mounting bracket for the Sportsman that mounts behind the rear baggage bulkhead. The new bracket gets bonded and blind riveted to the top of the composite fuselage. *DO NOT DRILL THROUGH THE FUSELAGE TOP SKIN.***

Install the new part number 71714 external TCW EFIS backup battery using the instructions in this manual.

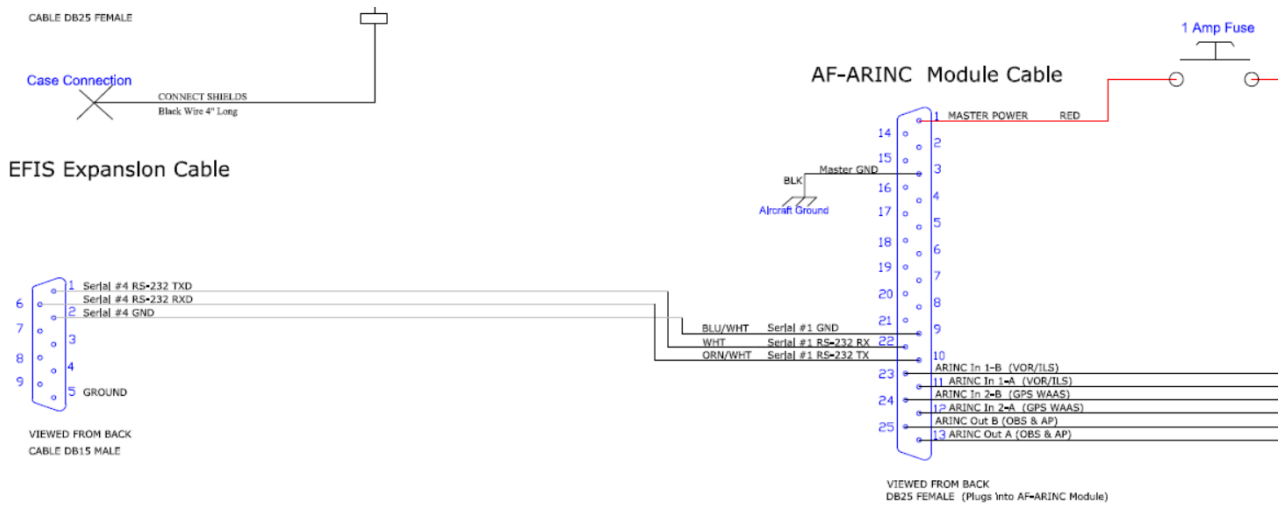
2. Replace any old Garmin GPS-18 GPS with a new Dynon SV-GPS-250 or SV-GPS-2020
3. Remove the serial port #4 wires from the old AF-3000/4000 DSUB-9 connector and install them into the new DSUB-15 Auxiliary connector using the following pins.

Pin	Pin Name	I/O	Color	AF-3000/4000 DSUB-9 Pin
1	+8V DC (350mA max)	OUT	ORN	
2	SERIAL #4 - TX	OUT		1
3	Network Ground 1	OUT	BLK	
4	Network Data 2A	IN/OUT	GRN/WHT	
5	Network Ground 2	OUT	WHT/BLK	
6	BACKUP/KEEPALIVE	IN		
7	Network Data 1A	OUT	GRN	
8	Network Power #1	OUT	RED	
9	Ground	OUT		
10	SERIAL #4 - RX	IN		6
11	Network Data 2B	IN/OUT	BLU/WHT	
12	Network Power #2	OUT	RED/WHT	
13	VOLTS #2 MONITOR	IN		
14	Network Data 1B	IN/OUT	BLU	
15	BACKUP GROUND	IN		

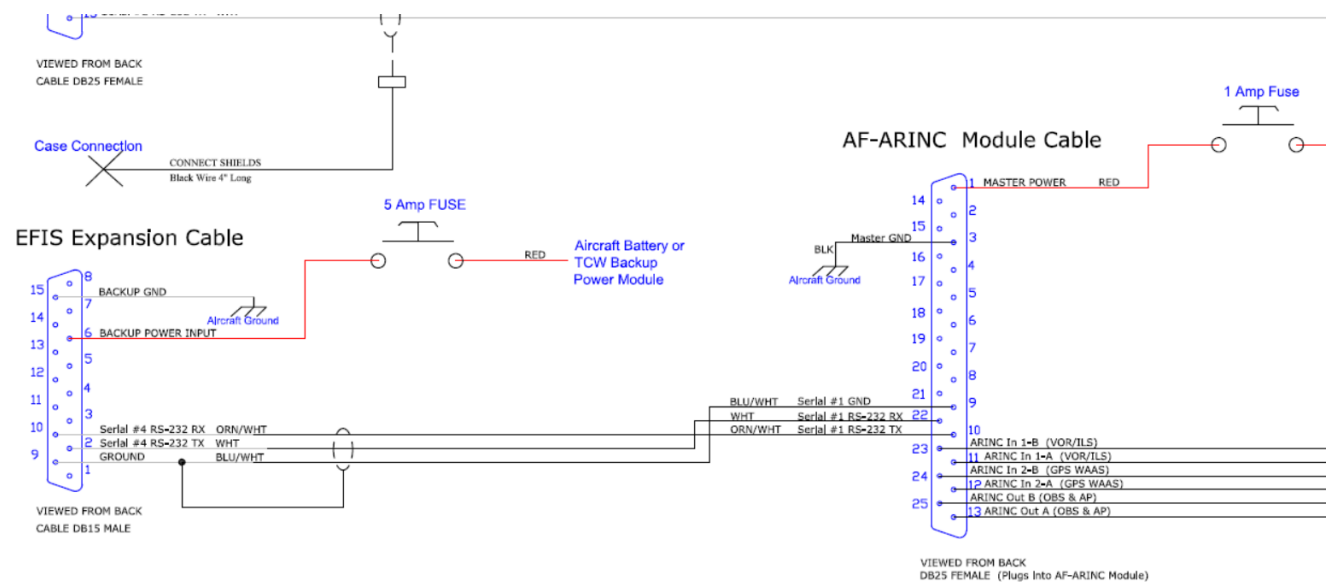


Moving AF-ARINC from AF-4500 Serial Port #4 DSUB-9 to AF-5000 DSUB 15 Pin AUX

AF-3000/4000 Serial Port #4 to AF-ARINC Wiring



AF-5000 Serial Port #4 to AF-ARINC Wiring



APPENDIX P: Performing Pitot/Static Checks

Background

Dynon Avionics SV-ADAHRS-200/201 use airspeed in the calculation of attitude (or GPS ground speed when airspeed is unavailable). The internal rate sensors are monitored and calibrated in flight using feedback from the accelerometers and from airspeed to achieve a highly accurate attitude solution.

When a pitot or static test is performed the sensors in the SV-ADAHRS-200/201 are being exposed to dynamics that are impossible to achieve in a real aircraft flight environment, namely, large airspeed changes without the accompanying accelerations and rotations. This false condition will cause a well-calibrated unit to incorrectly adjust its calibration. Furthermore, when a unit is in a test situation a change in applied pitot or static pressure will cause the attitude to pitch up or down. This is expected.

The AF-5000 EFIS contains a special mode that allows you to perform required altimeter and/or airspeed checks without affecting the calibration of the attitude-sensing components.

Pitot/Static Test Instructions

This test must be used when performing pitot/static, transponder, or other tests that manipulate either the pitot or static pressures. You

Before conducting any pitot/static testing, follow these guidelines:

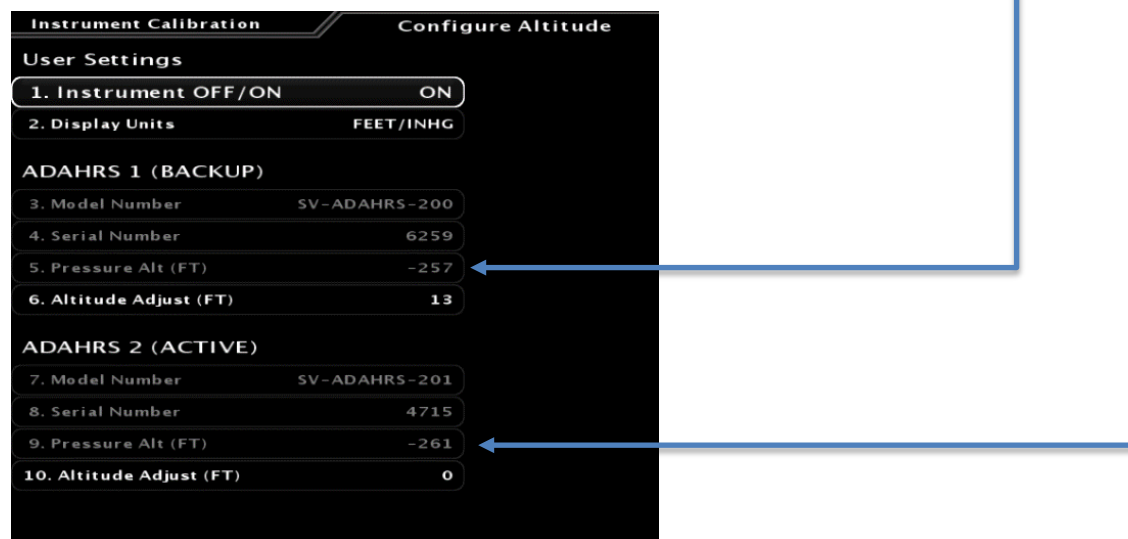
1. The aircraft itself should be temperature stable. For example, if the aircraft is moved from outside in the sun to a hangar for testing, tests should not be started until the airplane has stabilized at the hangar temperature.
2. Transponders and ADS-B OUT systems operating under test conditions transmit specific information about the aircraft, including position and altitude data. These tests frequently involve a check of the aircraft's altimetry system in which air pressure is induced into the pitot static system to simulate operation at various altitudes. In cases where transmission lines are not attached directly to test equipment, ***antenna shielding must be used to prevent propagation of test signals*** with potential to interfere with ATC operations or TCAS-equipped aircraft operating in the area.
3. Turn AF-5000 on and let it warm up until the altitude reading is stabilized. This period should be at least 5 minutes, but may take longer depending on environmental conditions.
Connect your Pitot/Static Test Set to the aircraft's Pitot and Static ports. You will need to cover the two Dynon Pitot Tube drain holes on the bottom of the Pitot Tube.
4. To enter the Altitude Test mode select: SET > CAL > 12. Altitude Menu on the EFIS. Both the active and standby ADAHRS (if equipped) are shown to allow a single test to calibrated multiple ADAHRS. The altitude values shown in this mode are the same as you would encounter while in-flight with a Baro setting of 29.92 . They are not adjusted or otherwise altered from their normal readings and behaviors.
5. Set Airspeed to stable constant airspeed on your Pitot/Static Test Unit, we usually use 65 knots.
6. Set Altitude Climb rate to a value of +/- 2000 fpm on your Pitot/Static Test Unit.
7. Perform a standard leak check on the Pitot/Static system before testing the required altitudes.
8. Set each required Altitude on your Pitot/Static Test unit and verify the altitude is within acceptable limits on each ADAHRS.

ALTITUDE ADJUST: There is a single point altitude adjustment for each ADAHRS that can be used to adjust the barometric altimeter from the AHRS if it is not in tolerance. This adjustment affects both the displayed altitude and the altitude sent to other devices.

Verifying Altitude

You can check the altitude from the Altitude Calibration Menu: SET > CAL > 12. Altitude Menu

The Configure Altitude Menu will display the non baro adjusted (29.92) altitude from each Adahrs in the aircraft.



Manual ALT / GND mode switching

Transponder checks require manual switching to ALT and GND mode. A Dynon Avionics SV-XPNDR-261/262 is normally configured to automatically switch between GND and ALT mode based on airspeed and other parameters. You can change the ALT/GND Switch to NONE so that you can turn on the Transponder ALT mode while on the ground.



Note: Before changing AUTO ALT/GND, record which squat switch configuration is set; you will need this information to restore AUTO ALT/GND to this setting after transponder testing is complete.

Pitot/Static Test Chart

Altitude - feet	Pressure	Tolerance ±(feet)	ADAHRS 200	ADAHRS 201	Backup EFIS
-1,000	31.018	20			
0	29.921	20			
500	29.385	20			
1,000	28.856	20			
1,500	28.335	25			
2,000	27.821	30			
3,000	26.817	30			
4,000	25.842	35			
6,000	23.978	40			
8,000	22.225	60			
10,000	20.577	80			
12,000	19.029	90			
14,000	17.577	100			
16,000	16.216	110			
18,000	14.942	120			
20,000	13.75	130			
22,000	12.636	140			
25,000	11.104	155			

Airspeed (kts)	Tolerance ±(feet)	ADAHRS 200	ADAHRS 201	Backup EFIS
20				
25				
40				
50				
75				
100				
125				
150				
175				

APPENDIX Q: Verifying ADS-B Output Data

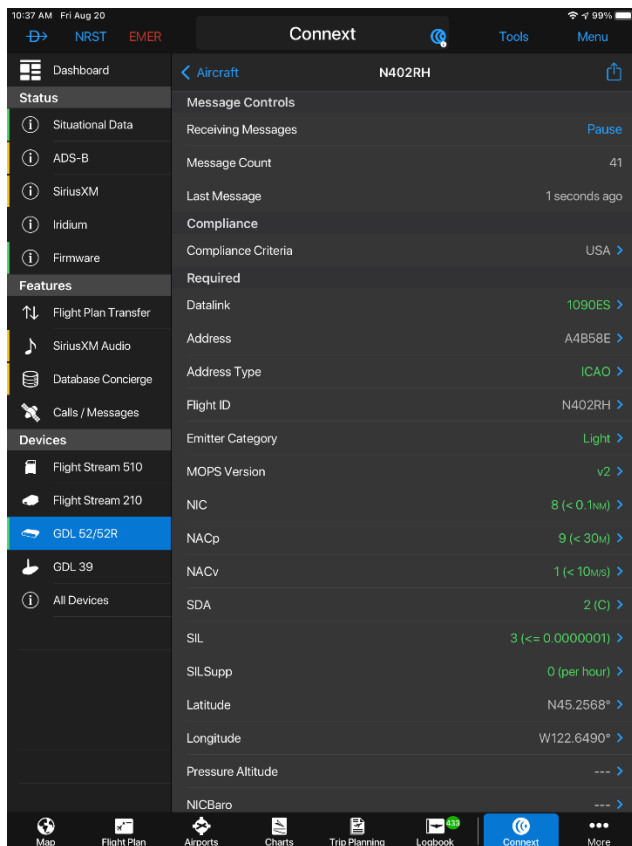
The Dynon/Trig remote Transponder will only output ADS-B data when the Transponder has a valid GPS position signal. When the Transponder does not have a valid GPS position the EFIS Transponder status will show **ALT** and will be sending only mode C data.

When the Transponder has a valid GPS position and the aircraft is on the ground the EFIS Transponder status should show **GND** mode. When the Transponder is in **GND** mode it will be sending valid ADS-B data **without Baro Pressure Altitude data**. If you have access to a Garmin GDL portable ADS-B receiver and the Garmin Pilot AP you can verify the aircraft's data output.

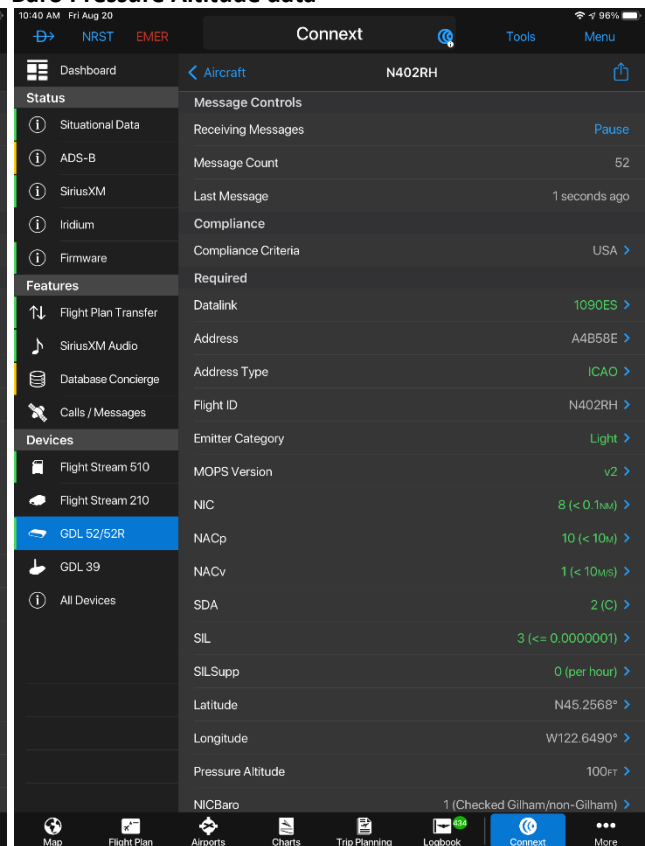
You can force the Transponder to ALT mode on the ground by changing the ALT/GND switch setting to NONE in the CAL > Transponder menu and pressing the ALT button on the normal EFIS Transponder menu.

Garmin Pilot Screen Captures with a GDL-52 Portable ADS-B receiver

Transponder in **GND** Mode



Transponder in **ALT** Mode with valid GPS Data Sending Baro Pressure Altitude data



AF-6600 / AF-5000 ARINC Output

Overview

The AF-5000 when connected to an AFS-ARINC, SV-ARINC-429, AF-ACM-FUSE or AF-ACM-ECB will send a series of ARINC labels via the output port on the supported device. All labels conform to the GAMA Publication NO. 11 - ARINC 429, General Aviation Subset.

Output Labels - AFS-ARINC

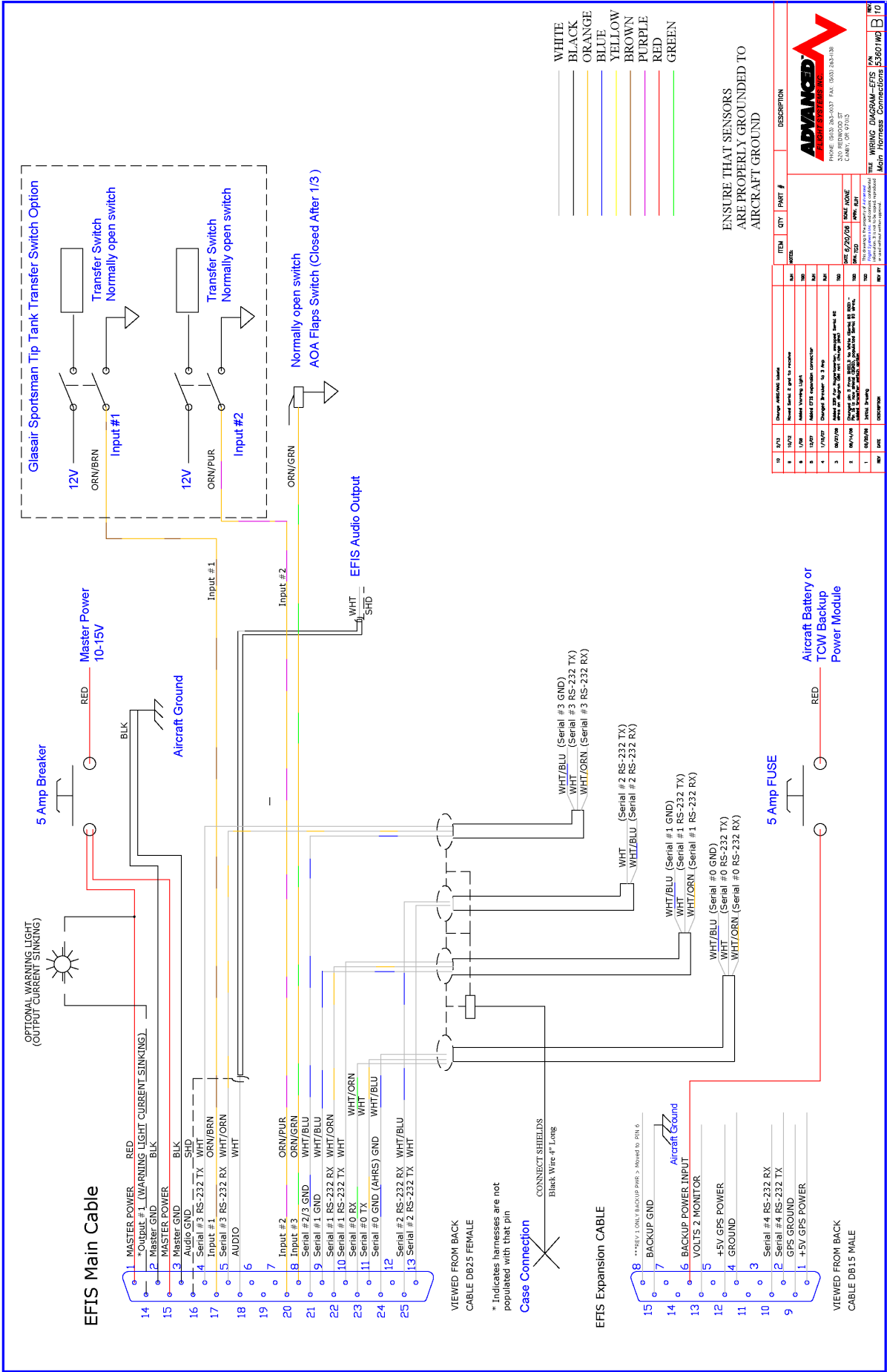
100 - Course
104 - Vertical Speed
117 - Vertical Deviation
121 - Roll Steering
204 - Baro Corrected Altitude
312 - Ground Speed
314 - True Heading
320 - Magnetic Heading

Output Labels - SV-ARINC-429, AF-ACM-FUSE and AF-ACM-ECB

100 - Course
104 - Vertical Speed
105 - Selected Heading
117 - Vertical Deviation
121 - Roll Steering
203 - Pressure Altitude
204 - Baro Corrected Altitude
312 - Ground Speed
314 - True Heading
320 - Magnetic Heading
324 - Current Pitch Attitude
325 - Current Roll Angle
210 - True Airspeed

AF-6600 FADC1 RS-232 Data

- Indicated Airspeed
- Pressure Altitude
- Outside Air Temp
- Magnetic Heading
- Fuel Flow
- Fuel Used
- Fuel Remaining
- Baro Corrected
- Altitude Baro Setting

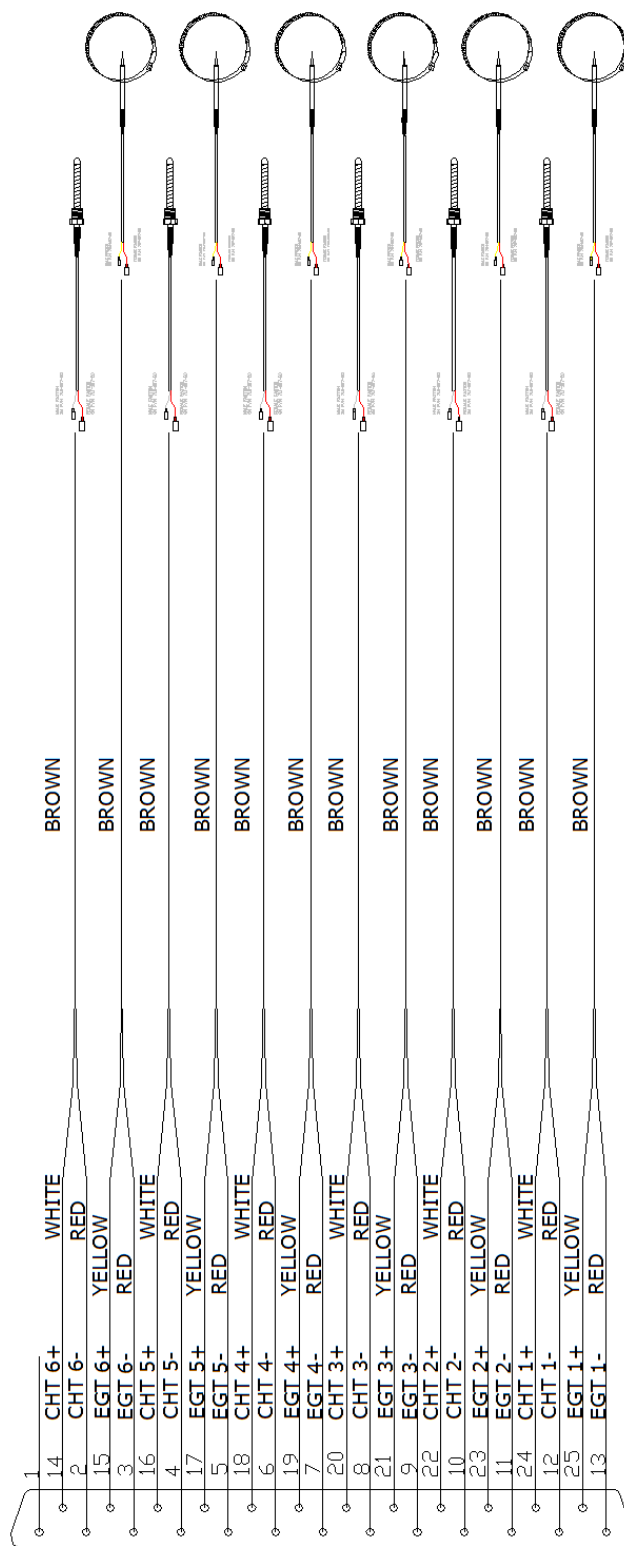


CHT/EGT
6 CYL HARNESS

P/N: 53868

FT
CYL

29



CHT - TYPE J THERMOCOUPLE
EGT - TYPE K THERMOCOUPLE

VIEWING FROM BACK
DB25 MALE

[illegible]



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 (Label up, Pitot-Static fittings forward)
- ☐ Wiring harness is properly connected to screen
- ☐ Verify relay protection diodes are installed on all large aircraft relays (Master, Starter, Avionics...etc)
- ☐ Pitot/Static and AOA plumbing is secured to the correct SV-ADAHRS ports
- ☐ Trim Servo indication wires are connected per the installation manual wiring diagram

Applying Power for the First Time

- ☐ Turn on aircraft Master Battery switch to power on the EFIS screens.
- ☐ Verify the unit powers on.
- ☐ Set the clock time-zone offset
- ☐ Set the AHRS Pitch Adjust for your aircraft's panel tilt (0 to 7 degrees typically)
- ☐ 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
- ☐ Configure your Serial Ports based on devices connected
- ☐ Configure your GPS/NAV Settings based on Serial Port selection
- ☐ Verify all GPS and NAV sources are properly communicating with the EFIS. See Appendix J: 430W - EFIS - Autopilot - ARINC Troubleshooting guide if you have an autopilot and/or a Garmin GNS-430W/530W.
- ☐ AOA Post-Installation Pre-Flight Checklist Completed

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) - Visit the AFS Website 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 AHRS installed (See video on AFS website Support Forum)
- 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)

Registration Information

To receive important notification of Service Bulletins, and service difficulty reports, please EMAIL the following information to:

Info@Advanced-Flight-Systems.com

Or Mail to:

Advanced Flight Systems Inc.
320 S. Redwood St.
Canby OR 97013 USA

Owner's Name: _____

Address: _____

City: _____

State: _____ Postal Code ZIP: _____

Country: _____

Home telephone: _____

Business Telephone: _____

E-mail: _____

Aircraft Model and N#: _____

Engine Model : _____

System Model #: _____ Serial Number: _____

Installer: _____