

AF-2500 Engine Monitoring System



IMPORTANT PRE-INSTALLATION NOTICE

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

Before starting the installation, make sure that your planned installation will not interfere with the operation of any controls. The installer should use current aircraft standards and practices to install this product. Refer to AC 43.13.

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

Inside Cover

Table of Contents

LIMITED WARRANTY / AGREEMENT	5
SYSTEM OPERATION	7
Fuel Computer	9
Adding Fuel	10
Fuel Computer Warnings	11
% Power Display	12
EGT/CHT Display Modes	13
Backlight:	15
Data Screen	15
Clock Operation	16
Check Lists	17
Display / CPU Installation	18
SCREEN Cutting Template	18
SCREEN Connections	19
Audio Connections	19
Volume Adjustment	19
Transducer Installation	22
EGT/CHT Installation	23
Tachometer Transducer Installation	24
Oil Temperature Transducer Installation	25
Outside Air Temperature Transducer Installation	26
Amp Transducer Installation	27
Pressure Transducer Installation	28
Oil Pressure Transducer Installation	29
Fuel Pressure Transducer Installation	29
Fuel Flow Transducer Installation	30

Manifold Pressure Installation	31
Trim & Flap Position Installation	31
Switch Inputs (Input #1, 2, 3, & 4)	32
<i>Instrument Calibration</i>	34
Calibration Settings	38
RPM Calibration	39
Fuel Tank Calibration	40
Fuel Tank Calibration Settings	42
Administrative Settings	43
Checklist Calibration	44
<i>Firmware Upgrades and PC Software</i>	51
Updating AF-2500 System Firmware	52
<i>Flight Data</i>	54
Down Loading Flight Data	54
Graphing Flight Data	57
Importing Flight Data to Excel	58

LIMITED WARRANTY / AGREEMENT

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

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

1. This Warranty does not extend to any engine, machine, aircraft, boat, vehicle or any other device to which the AFS monitoring system may be connected, attached, or used with in any way.
2. THE REMEDIES AVAILABLE TO THE PURCHASER ARE LIMITED TO REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE OF THE PRODUCT, AT THE SOLE DISCRETION OF AFS. CONSEQUENTIAL DAMAGES, SUCH AS DAMAGE TO THE ENGINE OR AIRCRAFT, ARE NOT COVERED, AND ARE EXCLUDED. DAMAGES FOR PHYSICAL INJURY TO PERSON OR PROPERTY ARE NOT COVERED, AND ARE EXCLUDED.
3. AFS is not liable for expenses incurred by the customer or installer due to AFS updates, modifications, improvements, upgrades, changes, notices or alterations to the product.
4. The pilot must understand the operation of this product before flying the aircraft. Do not allow anyone to operate the aircraft that does not understand the operation of the monitoring system. Keep the operating manual in the aircraft at all times.
5. AFS is not responsible for shipping charges or damages incurred during shipment.
6. No one is authorized to assume any other or additional liability for AFS in connection with the sale of AFS products.
7. IF YOU DO NOT AGREE TO ACCEPT THE TERMS OF THIS WARRANTY, YOU MAY RETURN THE PRODUCT FOR A FULL REFUND. IF YOU DO NOT AGREE TO ACCEPT THE TERMS OF THIS WARRANTY, DO NOT INSTALL THE PRODUCT.
8. This warranty is made only to the original purchaser and is not transferable. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES OR OBLIGATIONS, EXPRESS OR IMPLIED, ORAL OR WRITTEN. AFS EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THE PURCHASER AGREES THAT IN NO EVENT SHALL AFS BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING DAMAGES TO THE ENGINE OR AIRCRAFT, LOST PROFITS, LOSS OF USE, OR OTHER ECONOMIC LOSS. EXCEPT AS EXPRESSLY PROVIDED HEREIN, AFS DISCLAIMS ALL OTHER LIABILITY TO THE PURCHASER OR ANY OTHER PERSON IN CONNECTION WITH THE USE OR PERFORMANCE OF AFS' PRODUCTS, INCLUDING BUT NOT LIMITED TO STRICT PRODUCTS LIABILITY IN TORT.

Blank Page



SYSTEM OPERATION

WARNING

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

The AF-2500 will automatically turn on any time power is applied to the unit.

NOTE: The system is designed to remove a gauge from the screen if a transducer is disconnected.

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

If the engine RPM is greater than 500rpm and a gauge is in the **warning** area the gauge name will be displayed over button 1 in red and an audible warning will generated. For example if the oil pressure is low you should here "Check Oil Pressure", this will repeat every 5 seconds until the gauge is no longer in the warning area or you press button 1 to acknowledge the error and stop the audible warning for that gauge.

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

See Instrument Calibration for directions on setting the upper and lower **caution** and **warning** limits.

Blank Page

Fuel Computer



WARNING

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

Fuel Computer Calibration

The accuracy of the fuel computer is affected by the value of **Counts per .01 gals** (K factor). The K factor sets the calibration of the instrument 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. The K factor is adjusted from the Fuel Flow/Computer page in Instrument Calibration.

$$\text{Counts per .01 gals} = (\text{Counts per .01 gals}) \times (\text{GALS USED/Pumped GALS})$$

Gallons Used

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

Displays the gallons used since the last time the fuel computer was set. Select this mode by pressing the [FUEL] button from the main display and then pressing the [MODE] button until **GALS USED** is displayed.

Gallons Remaining

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

Displays the gallons remaining, calculated from the last time the fuel computer was set. Select this mode by pressing the [FUEL] button from the main display and then pressing the [MODE] button until **GALS REM** is displayed.

Hours Remaining

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

Displays the hours remaining, calculated from the last time the fuel computer was set and the current fuel flow rate. Select this mode by pressing the [FUEL] button from the main display and then pressing the [MODE] button until **HOURS REM** is displayed.

Adding Fuel

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

TANKS FILLED

You can set the fuel computer to the programmed full tanks amount by pressing the [FUEL] button from the main display and then pressing the [FILL] button.

FUEL ADD or REMOVE

You can add fuel to the computer to the pressing the [FUEL] button from the main display and then pressing the [MODE] button to select **GALS REM**. Once you are in the **GALS REM** you adjust the amount of fuel to add by turning the screen [KNOB]. The amount of fuel that will be added or subtracted will be displayed under the gallons remaining number. When you have set the correct amount of fuel you press the [ADD] button to add the fuel to the computer.



Fuel Computer Warnings

There are two color identified warning systems that operate within the fuel computer. First, the warning for crosscheck between what the tanks read and what the fuel totalizer reads is depicted by the color of the fuel computer heading (i.e. GALS REM). The heading will turn red if the difference is greater than the crosscheck error setting. The second warning monitors the amount of fuel remaining, as known by the fuel computer, and is depicted by the color of the numbers in the fuel computer display. The digital representation of the fuel remaining will turn yellow and red when the amount drops below those settings.

% Power Display

Horsepower is calculated using fuel specifics. Almost all spark ignition combustion engines have a fuel specific of approximately 0.1 gallons per H.P. per hour at full rich mixture. The AF-2500 will update the HP calculation every 1 second along with fuel flow.

The AF-2500 Calibration Mode allows you to calibrate the system to match your engine. You will need to configure the following settings.

1. Max Engine HP
2. Fuel Flow at 100% Power
3. Fuel Flow and EGT at 75% Power and Full Rich.
4. Fuel Flow and EGT at 75% Power and Max Power Lean (100F to 150F rich of peak).

After the system is calibrated and you lean for max power (100 to 150F rich of peak EGT) you should see an approximately 3% increase in horsepower.

Note: Select the hottest running cylinder for the EGT data collection and be sure to specify that cylinder number in the HP calibration.

The AF-2500 display can be switched between % Power and HP from the "PEAK/HP" menu page.

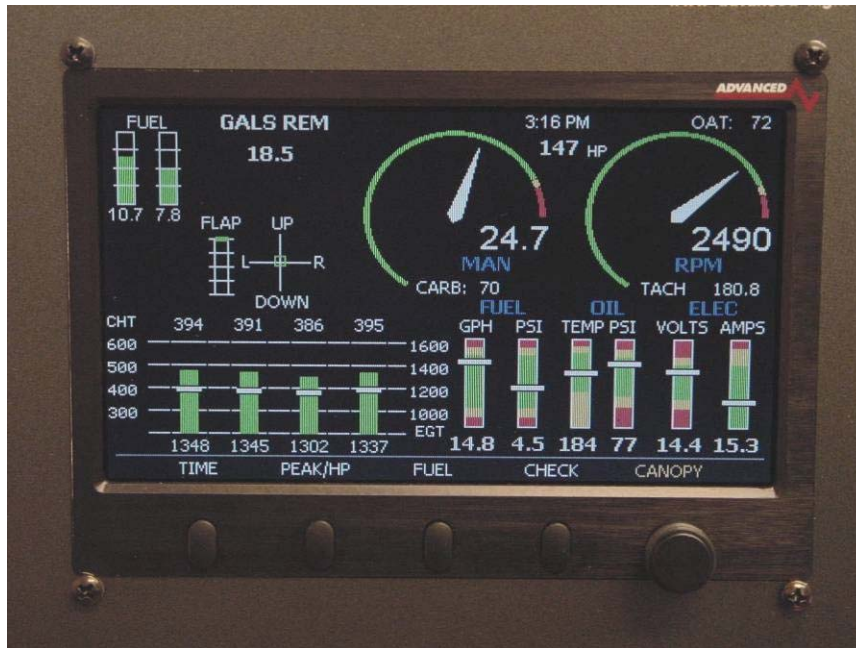
Warning: You should never lean your engine with power settings over the factory recommended level (generally 65% to 75% power).

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



EGT/CHT Display Modes

The Exhaust Gas Temperatures (EGT) and Cylinder Head Temperatures (CHT) for every cylinder are continuously displayed in both analog and digital formats on the AF-2500. The cylinders are laid out sequentially with cylinder #1 on the left followed by cylinder #2 to its right and so on. The graph uses small white bars for the CHT that are superimposed onto the larger EGT bars. The graph uses a dual scale that represents the CHT scale on the left side and the EGT scale on the right. The digital reading for each column is displayed above each bar for CHT and below for EGT. During normal operation the EGT and CHT bars will align themselves in a very easy to recognize pattern.



EGT Peak Detection

From the main screen pressing **[PEAK]** will place the AF-2500 into peak detection mode. During peak detection, the system looks for the first cylinder to peak in temperature (EGT has decreased by 10 degrees F). The cylinder's EGT temperature will change color to green and the peak temperature and degrees from peak will be displayed over button 3. Pressing button 3 will cause the system to clear the peak and signal the system to detect the next peak.

Pressing the **[RETURN]** button will bring the EGT display back to normal mode.



Waiting For Cylinder to Peak



Cylinder 4 Peaked at 1420F

Press the button under the green displayed values to reset the peak detect or press RETURN to exit this function.

Backlight:

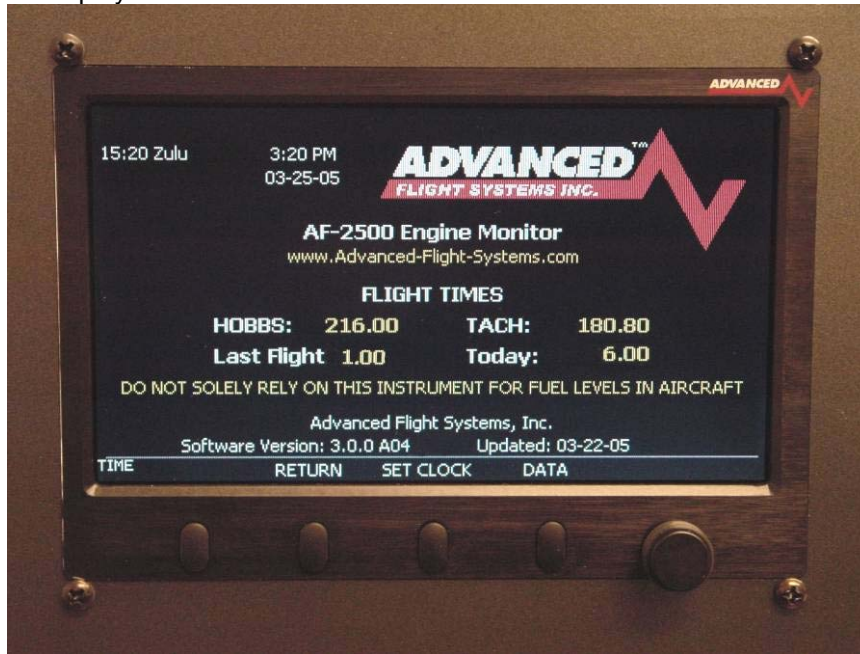
The knob on the unit is used to adjust the backlight when the MAIN screen is displayed. The backlight control has 32 steps from full on to full off and 32 steps from full off to full on. The unit will power-up at full brightness by default.

Data Screen

From the time screen pressing [DATA] will take you to the AF-2500 data download options. From this menu you can select [DOWNLOAD] to view the data download options. The first option is Download Flight Data. Pressing [START] will initiate the sending of all stored data flight data in the AF-2500. Refer to the Firmware Upgrades and PC Software section of this manual for instructions for saving this data on your PC. The other options in this menu are Send Flight and Calibration Data, Send Calibration Data and Clear Flight Data. Note that selecting Clear Flight Data will erase all stored flight data currently stored in the AF-2500. The Calibration Data downloads are included for support reasons and although interesting may not prove useful to the average user.

Flight Times

From the normal display screen press the **[TIME]** button. A screen will be displayed that shows Hobbs and Tach time.



Tach Time: Hours on engine above 1250 RPM.
Hobbs Time: Hours on engine above 0 RPM.
Last Flight: Hobbs time for the last flight.
Today: Hobbs time since 12:00 AM today.

Clock Operation

From the time screen, press the **[SET CLOCK]** button to enter the date time adjustment section.

Press **[TIME]** to enter the time adjustment menu. Button 3 will display the field that the knob will operate on. Pressing **[HOUR]** will change the label to **[MIN]** and turning the knob will change the minute field. The **[MODE]** button changes the display format between 12-hour, 24-hour, and ZULU time formats. In ZULU time mode, use the knob to change the ZULU time offset where "Zulu Offset" is displayed. Press the **[RETURN]** button to move to the previous menu.

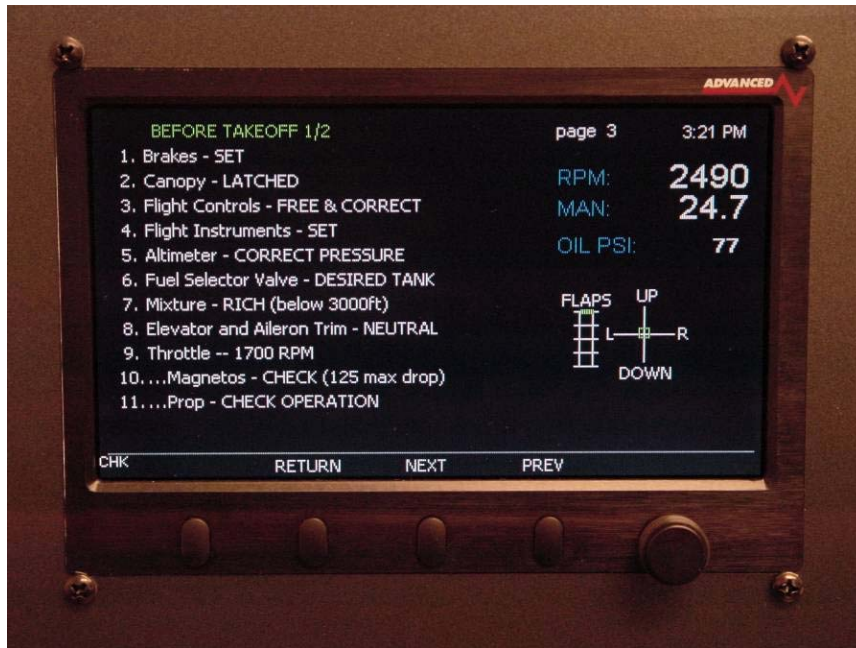
Press **[DATE]** to enter the time adjustment menu. Button 3 will display the field that the knob will operate on. Pressing **[MONTH]** will change the label to **[DAY]** and turning the knob will change the day portion of the

date. Pressing [DAY] will change the label to [YEAR] and the year portion can be changed. Press the [RETURN] button to move to the previous menu.

Check Lists

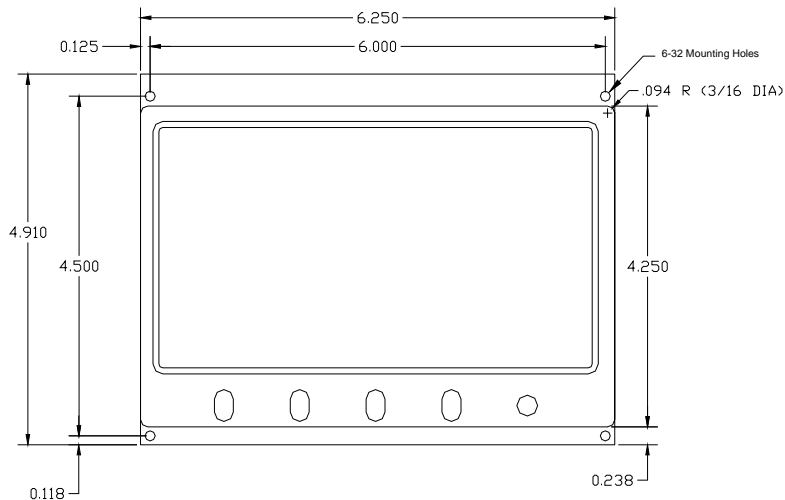
To view your checklists pages press the [CHECK] button from the main screen. Use the [NEXT] and [PREV] buttons to scroll through the checklists. To return to the main screen press the Return button.

If the engine RPM is between 1 and 1250, Checklist Page 3 will always display first and should be used as the before takeoff list. If the engine RPM is greater than 1250, Checklist Page 6 will always display first. Page 6 should be used as the Emergency Procedures list. This will make the emergency procedures check list easy to access in the event of an in flight emergency.



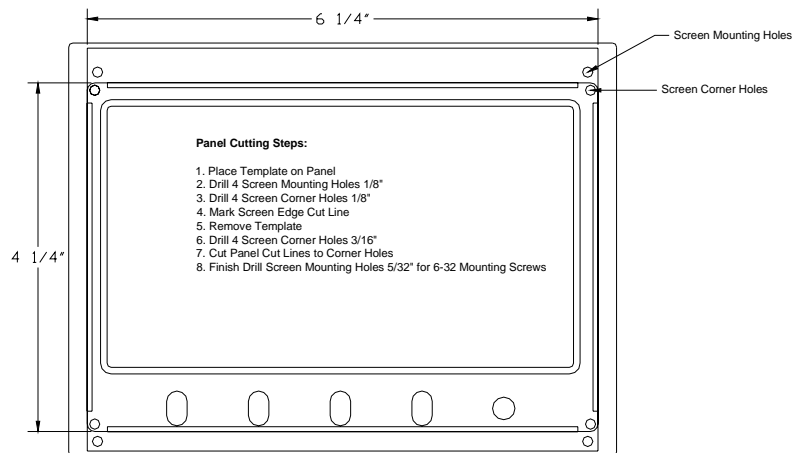
Display / CPU Installation

The Display/CPU should be mounted from the rear of the instrument panel. The display should be mounted with four 6-32 screws. Do not block the vents on the top and sides of the unit and allow clearance for the 3 connectors on the rear. See the supplied drawings for proper dimensions.



SCREEN Cutting Template

The system is supplied with the following laser-cut aluminum template to make screen installation easier.



SCREEN Connections

- <Port 1> Analog Module connection DB-37
- <Port 2> RS-232 Port 2 and Sound connections DB-9

Set <Port 2> Data Options in Calibration Menu

Pin	Description
2	TXD Data (ARNAV format for GPS systems)
3	REC Data (NMEA-0183 compliant GPS)
4	26 Ohm Speaker Audio Output
5	Ground
9	560 Ohm Audio Output

- <Port 3> RS-232 Programming Connection DB-9

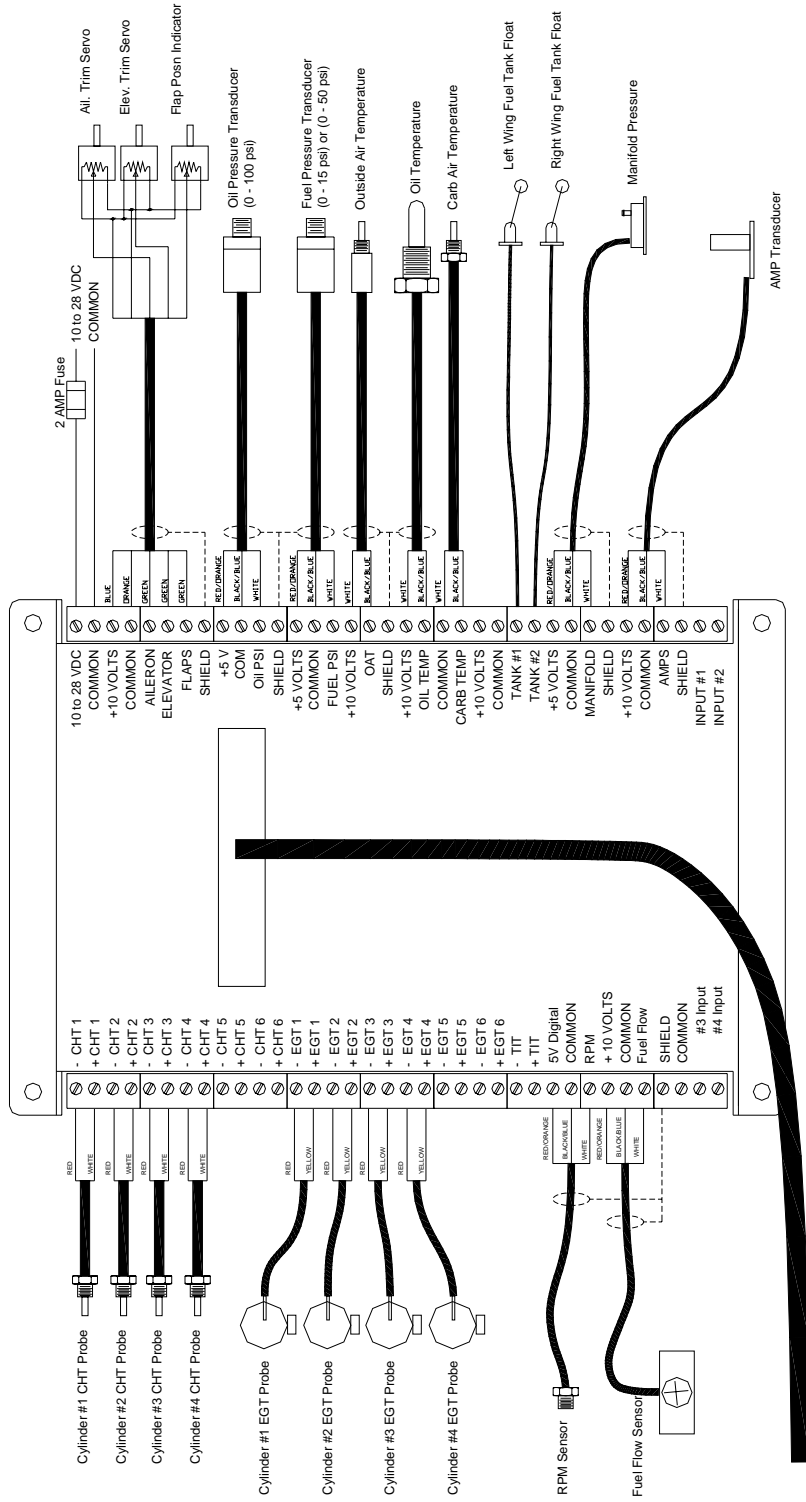
Audio Connections

The system has a 560-ohm and a 26-ohm audio output which allows you to match the impedance of standard aircraft audio devices. Direct wiring to non-amplified speakers uses the 26-ohm output and ground. Most other audio devices will use the 560-ohm output. Use shielded wire connecting only one end of the shield to ground. The Audio connection cable should be a standard DB-9 Male computer plug.

Volume Adjustment

The volume can be adjusted by the following procedure:

1. The volume is controlled by a small potentiometer located in the upper right hand corner. Insert a small flat-blade screwdriver in the hole in the back cover.
2. Turn the unit on while holding button 4 (nearest to knob) to enter the calibration menu.
3. Scroll down to Audio test and press select.
4. Adjust the potentiometer until the desired volume is set. Clockwise to increase volume and counter-clockwise to reduce volume.

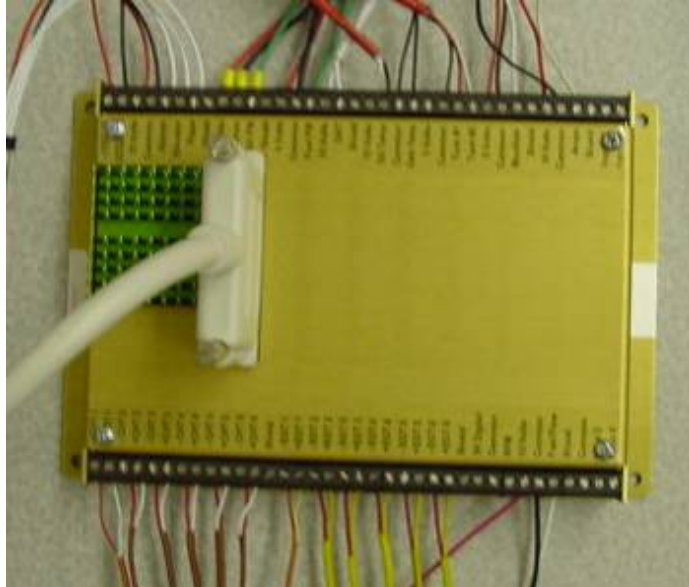


Analog Module Installation

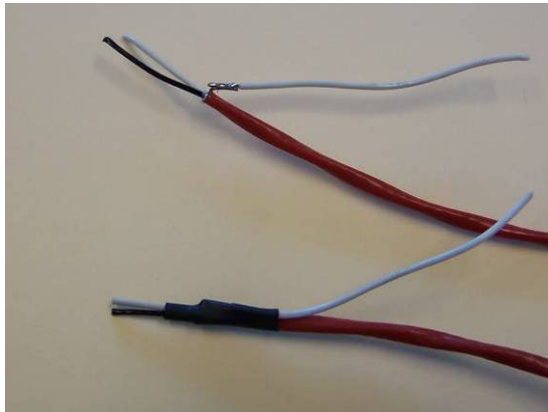
Mount the analog module in the cabin area to a stationary location. The analog module should be mounted using four #10 screws. Mount the unit in a location that provides access to the terminals for wiring and is dry and cool. Each transducer has its own terminals to connect to. Do not share power connections or use a different set of terminals than shown.

CAUTION: DO NOT MOUNT IN THE ENGINE COMPARTMENT.

CAUTION: Always ground yourself before wiring.

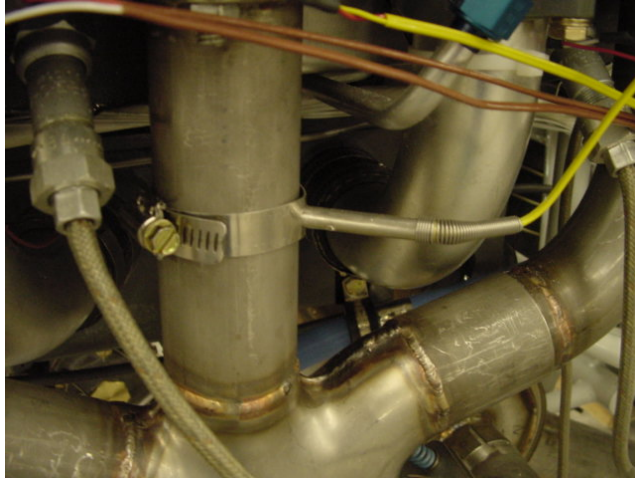


Shield wires should be soldered to the shield and heat shrink applied as shown here.

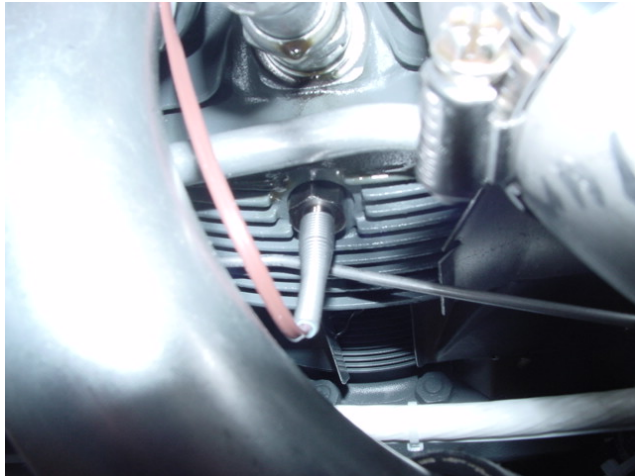


Transducer Installation

EGT Probe Installation



CHT Probe Installation



EGT/CHT Installation

1. Locate the EGT probes, P/N 40200, not less than 2" or more than 6" below the exhaust stack attachment flange. 3" to 4" 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. Connect the EGT and CHT probes to the extension leads and 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 can not 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 MIL-O-8116 sealing compound.
5. Always double back wire before crimping or putting into terminal block. The extension wires can be cut to length.

- Input RED Wire

+Input YELLOW or WHITE Wire

CAUTION: Always ground yourself before wiring.

Note: Temperature displays come factory set in Fahrenheit. To change units, change the EGT/CHT Units field of the Administrative section of the Instrument Calibration.

Tachometer Transducer Installation

The RPM transducer should be installed in the **non-impulse** coupled magneto if possible (Engines with one electronic ignition can install the transducer in the impulse mag). The correct magneto can be found in the engine manual. The transducer 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 transducer. The transducer wires should be connected directly to the Analog Module with the cable provided. The shield should be connected to the Analog Module only.

CAUTION: Always ground yourself before wiring.

+5 Volts	RED Wire
Common	BLACK Wire
RPM	WHITE Wire



Oil Temperature Transducer Installation

The oil temperature transducer is mounted on the engine. Your engine manual should show the proper location for the transducer. The transducer is supplied with a crush type gasket that can only be used once. The transducer location is usually near the filter and should be safety wired to the engine case. Replace the existing vent plug with the transducer. The transducer wires should be connected directly to the Analog Module with the cable provided. The shield should be connected to the Analog Module only.

Note: Temperature values come factory set in Fahrenheit. To change units, simply select the desired setting for Units in the Oil Temp section of the Instrument Calibration

CAUTION: Always ground yourself before wiring.

+10 Volts	WHITE Wire
Oil Temp	BLACK or BLUE Striped Wire



Outside Air Temperature Transducer Installation

The OAT transducer is mounted on the airframe where the exhaust will not affect it. We have found that the bottom of the wing works well. The transducer wires should be connected directly to the Analog Module with the cable provided. The shield should be connected to the Analog Module only.

Note: Temperature values come factory set in Fahrenheit. To change units, simply select the desired setting for Units in the OAT section of the Instrument Calibration.

CAUTION: Always ground yourself before wiring.

+10 Volts WHITE Wire

OAT BLACK or BLUE Striped Wire

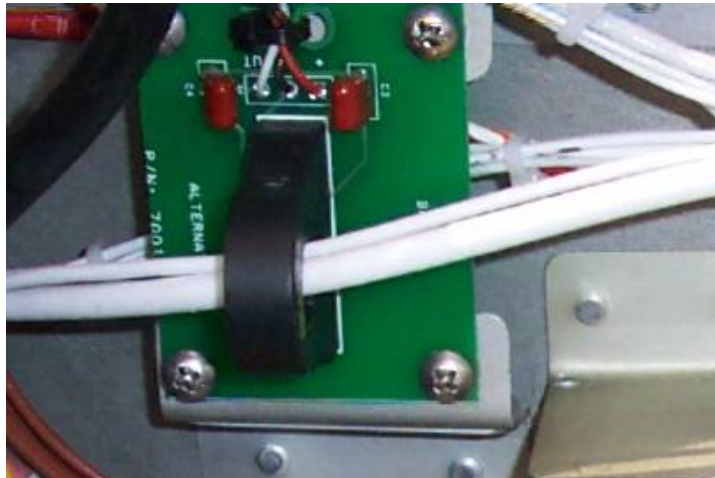


Amp Transducer Installation

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. The transducer wires should be connected directly to the Analog Module using the cable provided. The shield should be connected to the Analog Module only.

CAUTION: Always ground yourself before wiring.

+10 Volts	RED or ORANGE Striped Wire
Common	BLACK or BLUE Striped Wire
AMPS	WHITE Wire



(Small wire shown here is the feed for the essential buss employed in this aircraft. Typical installations will only pass the alternator cable through the Amp transducer.)

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 the engine or cabin area with an Adel clamp to a stationary location. Connect the transducer with aircraft grade hose and fittings. You can find the proper oil pressure connecting port in your engine manual. Your engine must have a pressure fitting with a restrictor hole in it. The transducer is supplied with 1/8" NPT connections. Make sure that the 0 - 100 PSI (P/N: 41100) transducer is used. The transducer wires should be connected directly to the Analog Module using the cable provided. The shield should be connected to the Analog Module only.

+5Volts RED or ORANGE Striped Wire

Common BLACK or BLUE Striped Wire

Pressure WHITE Wire

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

CAUTION: Always ground yourself before wiring.

Fuel Pressure Transducer Installation

Mount the fuel pressure transducer in the engine or cabin area with an Adel clamp to a stationary location. Connect the transducer with aircraft grade hose and fittings. You can find the proper fuel pressure connecting port in your engine manual. Your engine must have a pressure fitting with a restrictor hole in it. The transducer is supplied with 1/8" NPT connections. Make sure that the 0-15 PSI (P/N: 41200) transducer is used for carbureted engines and the 0-50 PSI (P/N: 41300) transducer is used for fuel-injected engines. The transducer wires should be connected directly to the Analog Module using the cable provided. The shield should be connected to the Analog Module only.

+5Volts RED or ORANGE Striped Wire

Common BLACK or BLUE Striped Wire

Pressure WHITE Wire

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

CAUTION: Always ground yourself before wiring

Fuel Flow Transducer Installation

The inlet and outlet ports in the fuel flow transducer have ¼" NPT threads. Use only ¼" NPT hose or pipefittings 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 ¼" NPT fittings, overtorquing the fittings, or assembling them beyond the specified depth. Use only aircraft FUEL LUBE on the NPT fittings, **NEVER USE TEFLON TAPE 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 Analog Module using the cable provided. The shield should be connected to the Analog Module only. 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 0.6 – 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.

+10Volts	RED or ORANGE Striped Wire
Common	BLACK or BLUE Striped Wire
Fuel Flow	WHITE Wire

Manifold Pressure 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 fabricated hose and fitting assembly. This location can be found in the engine manual. The transducer wires should be connected directly to the Analog Module using the cable provided. The shield should be connected to the Analog Module only.

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

CAUTION: Always ground yourself before wiring.

+5 Volts	RED or ORANGE Striped Wire
Common	BLACK or BLUE Striped Wire
Manifold	WHITE Wire

Trim & Flap Position Installation

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. If the indicator is reversed you will need to swap the orange and blue striped wires. The flap position can be measured by using the MAC linear position sensor or any 5k Potentiometer.

CAUTION: DO NOT connect the MAC indicators and the AF-2500 to the MAC trim servos. The MAC trim indicators are +12V and the AF-2500 is +10V.

CAUTION: Always ground yourself before wiring.

Switch Inputs (Input #1, 2, 3, & 4)

The switch inputs in the AF-2500 allow the user to customize the system for their aircraft. For example a contact switch can be installed on things like the Canopy, dip-stick hatch, carb heat, and landing gear. A ground condition on the input will result in the message being displayed above or to the left of the knob. The input can also be tied into the audio alarm system for extra protection and flexibility.



Input Label:

The message displayed for the switch inputs can be customized to any 7-character phrase you like. Use the [EDIT] button to highlight the character you want to change. The highlighted character will turn yellow and then use the knob to select from the following characters:

“ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789!@#%&*()-+=?”

Each switch input can be tied into the audio alarm system based on a settable RPM threshold. Configuration items 2-6 are all part of the audio alarm system

RPM Trigger HI/LOW:

Select ABOVE or BELOW a specific RPM to select the region of RPM that the error will occur in.

RPM Trigger Level:

Specifies the specific RPM for which the RPM Trigger Hi/LOW will use as the threshold RPM.

Audio Enable:

Select ON or OFF to enable the audio alert system for this input.

Audio Selection:

Select the appropriate message for the condition being monitored.

Audio Reactivate Delay:

Specifies the amount of time to wait after an error condition has been identified and cleared by the operator to reinitiate a warning if the error condition is still active. This is especially useful for things like air brakes, carb heat, or landing gear.

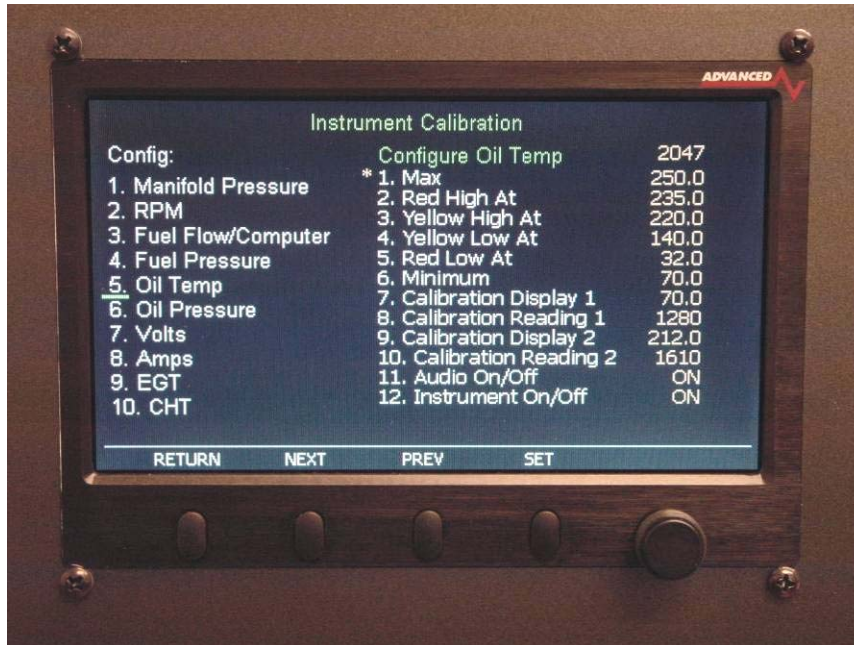
Switch Config:

Select between NORM OPEN and NORM CLOSED for the input type.

For NORM OPEN inputs grounding of the input will activate the input.

For NORM CLOSED an open condition will activate the input.

Instrument Calibration



Instrument calibration will allow you to calibrate the various instruments and set the desired warning levels.

To enter instrument calibration hold down button 4 while the system is starting. You should let up the button when **Instrument Calibration** is displayed.

A list of instruments will appear. You scroll through the list by using the **[PREV]** and **[NEXT]** buttons. There are multiple pages of instruments.

To calibrate an instrument press the **[SELECT]** button while the cursor is on the desired instrument. On the Right of your screen a calibration list will appear.

On the top right a number will appear. This is the digital value read by the sensor you are calibrating. This value will change if the condition the sensor is reading changes.

Below this number there will be a list of calibration data. Use **[NEXT]** and **[PREV]** buttons to scroll through the calibration list.

To adjust any of the warning values make sure the cursor is on the desired one and twist the knob until the value you desire is displayed.

When you have calibrated the instrument you can return to the main instrument list by pressing the **[RETURN]** button.

The following parameters can be set:

Max

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. You can set this parameter to the Max value if you do not want a top red band.

Yellow High At

The instrument displayed value when the needle turns yellow at the top of the gauge. You can set this parameter to the Max value if you do not want a top yellow band.

Yellow Low At

The instrument displayed value when the needle turns yellow at the bottom of the gauge. You can set this parameter to the Min value if you do not want a bottom yellow band.

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.

Minimum

The instrument displayed value at the bottom of the gauge.

Calibration Display 1

This is the displayed value for the lower data point.

Calibration Reading 1

This is the digital value for the lower data point.

Calibration Display 2

This is the displayed value for the upper data point.

Calibration Reading 2

This is the digital value for the upper data point.

Audio On/Off

Turns on or off the audio warning feature.

Instrument On/Off

Turns on or off the entire instrument.

Units

For Fuel Flow, Oil Temp, OAT, and Carb Temp this field allows the user to select the desired units. AF-2500 Version 3.0.4 and later will auto-convert all needed settings upon changing of the units for that instrument.

The system uses the two Calibration Display and Calibration Reading values to calculate the displayed gauge values.

To calibrate the instrument make the sensor subject to a certain condition. The number in the top right will change depending on the condition. Set the display value to the number you want to be displayed while the sensor is reading that condition. Also set the Digital value to the value the sensor is reading at that given condition. Repeat this process with the second calibration reading. The first reading used to calibrate the instrument should be on the low end of the display range. The second reading should be on the high end of the display range. This will help make your instrument readings more accurate.

Calibration Examples

OAT Outside Air temperature

1. Place the sensor in a cup of ice water and wait for the digital reading in the upper right hand corner to stop changing.
2. Enter the digital value from the upper right hand corner as Calibration Reading 1
3. Enter the temperature for ice water (32 for Fahrenheit or 0 for Celsius) as Calibration Display 1
4. Next place the sensor at room temperature and wait for the digital reading in the upper right hand corner to stop changing.
5. Enter the room temperature (Fahrenheit or Celsius) as Calibration Display 2
6. Enter the digital value from the upper right hand corner as Calibration Reading 2

Fuel Pressure

1. Make sure the sensor has zero PSI applied to it.
2. Enter the digital value from the upper right hand corner as Calibration Reading 1
3. Enter 0 as Calibration Display 1
4. Next apply a known pressure to the sensor and wait for the digital reading in the upper right hand corner to stop changing.
5. Enter the known pressure as Calibration Display 2
6. Enter the digital value from the upper right hand corner as Calibration Reading 2

Calibration Tips:

- AF-2500 systems are shipped with all sensor except Fuel Tanks and Trim / Flap sensors fully calibrated. Individual sensors should not need to be adjusted unless a new sensor is installed.
- New sensors should have the calibration data with them. You should only have to enter the new calibration values.
- Anytime you calibrate an Instrument and Enter the new data make sure to write that data down. You should keep a good record of this data with you at all time. That way if you accidentally set the default data you will have a record of what you have calibrated and will not have to do it again.
- When calibrating any temperature sensor wait until the calibration number stops changing (2-3 minutes) before recording it. This will help make the calibration more accurate.
- Any change made to calibration values are instantly stored in memory. Simply turning the power off will not erase your changes.
- The SET button is only intended to copy the A/D value into the current location and has no effect on saving of settings. All settings are saved as soon as entered.

If you choose the Restore Factory Settings it will return all of your instruments to there default settings. The calibration values will not be correct for your system and you will need to set the unit to the Calibration Settings that you have recorded in the table.

CAUTION: Use of Restore Factory Settings will erase all user-entered data and set the calibration settings to values that are close to being correct. Some transducers vary significantly from unit to unit and the system will need to have the calibration data for the specific transducer used entered. This feature has been password protected to avoid mistaken use. Please use this feature as instructed by AFS only.

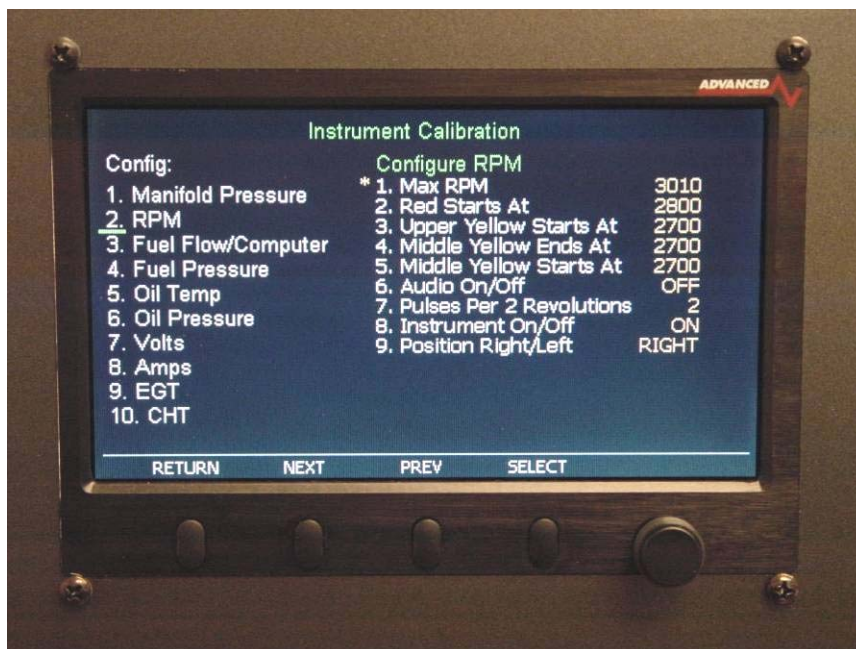
To exit the calibration page press the [RETURN] button twice. This will return you to the usual startup. The calibration data you changed will be saved and used. Make sure to use caution while calibrating your instruments. Saving bad calibration data causes your instrument readings to be off.

Calibration Settings

Record your calibration settings here. The factory settings for AD1, Dis1, AD2, and Dis2 are available on the QA form that came with the system.

Inst	Max	Red H	Yel H	Yel L	Red L	Min	AD 1	Dis1	AD 2	Dis2
Man										
RPM										
Fuel GPH										
Fuel PSI										
Oil Temp										
Oil PSI										
Volts										
Amps										
EGT										
CHT										
Elevator										
Aileron										
Flaps										
OAT										
Carb										

RPM Calibration



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

Middle Yellow: Used to depict prop operating range restrictions.

Position Right/Left: Used to swap the position of the manifold and RPM gauges for user's preference.

Pulses Per 2 Revolutions: The systems 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.

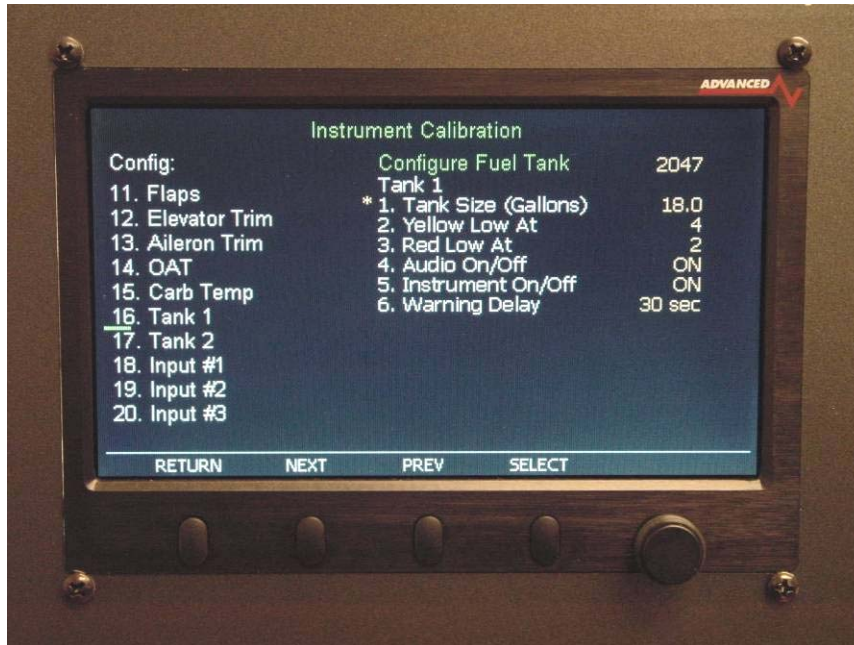
- | | |
|--|------------|
| 1. Standard RPM sensor with Slick Mag 4 Cylinders: | Pulses = 2 |
| 2. Standard RPM sensor with Slick Mag 6 Cylinders: | Pulses = 3 |
| 3. Standard RPM sensor with Lasar Mag 4 Cylinders: | Pulses = 4 |
| 4. Standard RPM sensor with Lasar Mag 6 Cylinders: | Pulses = 6 |
| 5.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

Fuel Tank Calibration

The AF-2500 stores two sets of calibration numbers for each tank. The AF-2500 uses the ground calibration numbers when the RPM is less than 1200 RPM and the flight calibration numbers when the RPM is greater than 1200 RPM. This feature enables the fuel gauges to read correct on the ground for a tail wheel equipped airplanes. Aircraft with tricycle landing gear should set the ground and flight data to the same calibration number.

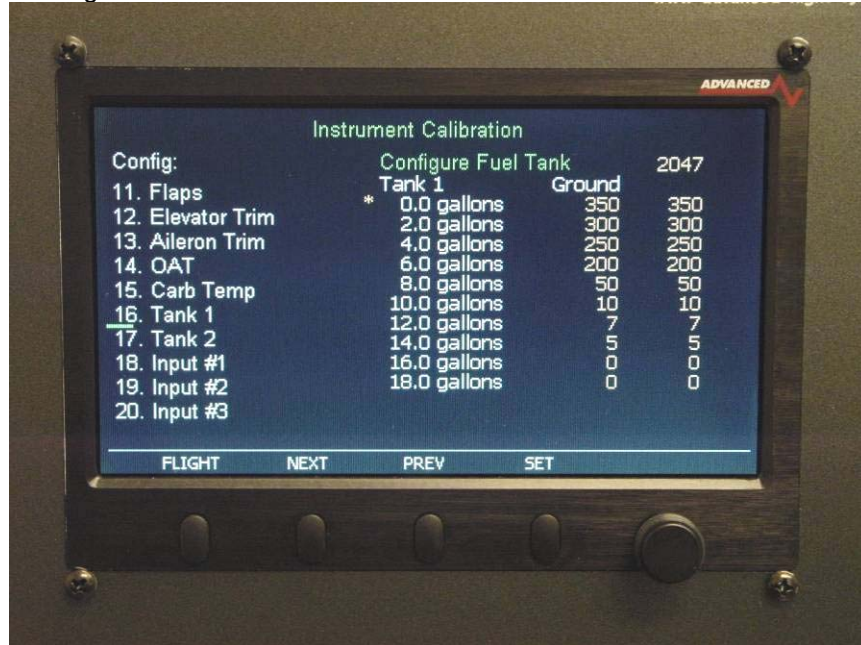
Steps To Calibrate a Tank:

1. Place the AF-2500 into Instrument Calibration mode. Use the **[NEXT]** button to scroll down to Tank 1 (Left) or Tank 2 (Right).
2. Verify that the Tank is Empty.
3. Enter the max size of the Tank in the Tank Size field.



4. Use **[NEXT]** to Scroll down to the next fuel page showing the tank calibration data. The calibration data is displayed in two columns, one for ground and one for flight. Use **[FLIGHT]** and **[GROUND]** buttons to switch between ground and flight data columns. The current digital reading for the tank is displayed at the top of the screen.
5. Starting at 0 Gallons press the **[SET]** button to record the current reading to the correct fuel amount and attitude (ground or flight). You can also adjust the set value by rotating the knob.

- The system will determine the gallon/liter increments you will need to fill and record a reading for each attitude (ground and flight). If you have 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.

- Repeatedly press **[PREV]** button to return to the first Tank page and **[RETURN]** to exit Tank Calibration.

CAUTION: Do not turn off power before 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 you should 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.

Fuel Tank Calibration Settings

Record your calibration settings here in for future reference.

Gallons/ Liters	Tank 1 Ground A/D	Tank 1 Flight A/D	Tank 2 Ground A/D	Tank 2 Flight A/D
0				

Administrative Settings



The Administrative Settings area allow configuration of parameters that are not gauge specific.

Simulation Mode: Controls the primary operation mode for the AF-2500. This setting should always be OFF for normal operation. Modes STILL and DEMO are intended to give a feel of how the device will operate when fully installed in your aircraft.

DataStorage Rate: Determines the data capture rate in seconds. The AF-2500 will store the following amount of data at these capture rates:

1 sec: 26 min	2 sec: 52 min	3 sec: 78 min
4 sec: 104 min	5 sec: 130 min	10 sec: 261 min
20 sec: 523 min	30 sec: 785 min	40 sec: 1046 min
50 sec: 1308 min	60 sec: 1570 min	

GPS Enable: Not Currently Supported in Version 3.0.0

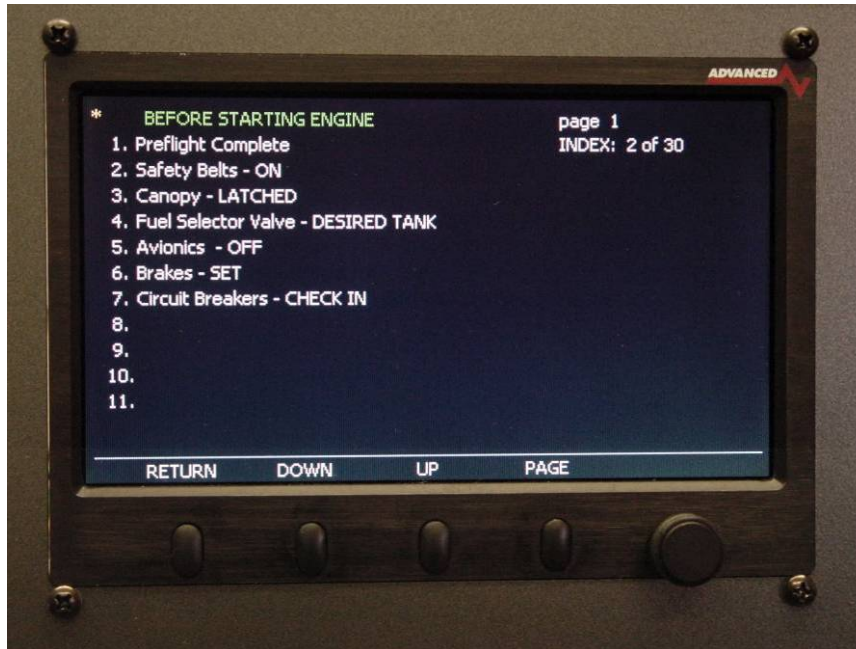
EGT/CHT Units: Controls the units for EGT, CHT and TIT for either Fahrenheit or Celcius. Changing this setting will cause all of the temperature related calibration settings in EGT and CHT calibration to change accordingly.

Orientation: To Change the AF-2500 orientation, use the knob to get the value desired and press select. The screen will flash and come up in the

new orientation. This setting will only take affect if select is pressed.

Reload Factory Defaults: This section is not intended for the average user. Please contact Advanced Flight Systems, Inc. for further support with this feature.

Checklist Calibration



The following procedure is used to set the checklist data.

1. Use the **[DOWN]** and **[UP]** buttons to position the cursor to the line to be changed.
2. Use the **[KNOB]** to scroll through the list of items until the desired text is displayed.
3. Use the **[DOWN]** and **[UP]** buttons to position the cursor to the next line to be changed.
4. Use the **[PAGE]** button to select the next checklist page.
5. Press **[RETURN]** to return to the main calibration page.

When the cursor is on the top line the Page Headings is selected, otherwise the Check List Items is selected.

The INDEX designator displays the current checklist item number to aid in selection of the desired string.

The following lists should make finding the checklist text easier.

Checklist Page Headings

1. BEFORE STARTING ENGINE
2. ENGINE STARTING
3. BEFORE TAKEOFF 1/2
4. BEFORE TAKEOFF 2/2
5. POST FLIGHT CHECKLIST
6. EMERGENCY PROCEDURES
7. ENGINE FAILURE CHECKLIST
8. ENGINE FIRE CHECKLIST
9. RADIO FAILURE
10. NORMAL TAKEOFF
11. SHORT FIELD TAKEOFF
12. ENROUTE CLIMB
13. CRUISE
14. POST FLIGHT AFTER LANDING
15. POST FLIGHT ENGINE SHUTDOWN
16. POST FLIGHT SECURING AIRCRAFT
17. EMERGENCY AIRSPEEDS
18. ENGINE FAILURE DURING TAKEOFF
19. ENGINE FAILURE AFTER TAKEOFF
20. ENGINE FAILURE DURING FLIGHT
21. ENGINE FIRE GROUND
22. ENGINE FIRE FLIGHT
23. ELECTRICAL FIRE FLIGHT
24. CABIN FIRE
25. WING FIRE
26. ELECTRICAL / ALTERNATOR FAILURE
27. LANDING LIGHTS
28. ALTERNATOR FAILURE
29. -----

Checklist Items

- 1.
2. Brakes - SET
3. Canopy - LATCHED
4. Flight Controls - FREE & CORRECT
5. Flight Instruments - SET
6. Fuel Selector Valve - DESIRED TANK
7. Mixture - RICH (below 3000ft
8. Elevator and Aileron Trim - NEUTRAL
9. Throttle -- 1700 RPM
10. ...Magnetos - CHECK (125 max drop)
11. ...Carb Heat - CHECK

12. ...Prop - CHECK OPERATION
13. ...Suction - CHECK
14. Engine Instruments – CHECK
15. Radios -- SET
16. Fuel Boost Pump -- ON
17. Transponder - ALTITUDE
18. AOA - CHECK
19. Engine Failure During Flight
20. Airspeed - CORRECT
21. Fuel Selector - SWITCH TANKS
22. Carb Heat - ON
23. Mixture - RICH
24. Ignition Switch - BOTH, LEFT, RIGHT
25. Transponder - 7700
26. Transponder - 7600
27. Safety Belts - ON
28. ...Airspeed - 55
29. ...Airspeed - 60
30. ...Airspeed - 65
31. ...Airspeed - 70
32. ...Airspeed - 75
33. ...Airspeed - 80
34. ...Airspeed - 85
35. ...Airspeed - 90
36. ...Airspeed - 95
37. Radio Freq - 121.5
38. Light Signals
39. ...Solid Green - CLEAR TO LAND
40. ...Red/Green - USE EXTREME CAUTION
41. ...Flash Red - UNSAFE DO NOT LAND
42. ...Flash Green - RETURN FOR LANDING
43. ...Red - GIVE WAY CONTINUE CIRCLE
44. Circuit Breaker - CHECK
45. Master Switch - CYCLE
46. Power Switch - CYCLE
47. Fuel Selector - OFF
48. Flaps - SET
49. Master Switch - OFF
50. Preflight Complete
51. Canopy - DOWN
52. Avionics - OFF
53. Circuit Breakers - CHECK IN
54. PROP - HIGH RPM
55. Master Switch - ON
56. Strobes – ON
57. Flaps - UP
58. Throttle

59. Propeller Area - CLEAR
60. Ignition Switch – START
61. Avionics – ON
62. Oil Pressure – CHECK
63. Fuel Boost Pump – OFF
64. +++
65. Brakes - RELEASE
66. Engine Monitor - ON
67. Altimeter - CORRECT PRESSURE
68. ...Engine Instruments - CHECK
69. Elevator Control - LIFT TAIL
70. Fuel Pressure - CHECK
71. Mixture - LEAN above 5000 ft
72. Mixture - LEAN XXX deg rich of peak
73. Mixture - IDLE CUT-OFF
74. Transponder - STANDBY
75. Electrical - OFF
76. Electrical - ON
77. Trim - ADJUST
78. Ignition Switch - OFF
79. Ignition Switch - BOTH
80. Ignition Switch - LEFT
81. Ignition Switch - RIGHT
82. Ignition Switch - KEY REMOVED
83. Strobe - OFF
84. Strobe - ON
85. Nav Lights - OFF
86. Nav Lights - ON
87. Landing Light - ON
88. Landing Light - OFF
89. Wheel Chocks - INSTALL
90. Wheel Chocks - REMOVE
91. Tie-Downs - INSTALL (as needed)
92. Tie-Downs - REMOVE
93. Pitot Tube Cover - INSTALL
94. Pitot Tube Cover - REMOVE
95. Cockpit - CLEAN & SECURE
96. Fuel Computer - RESET AFTER FUELING
97. Fuel Computer - CROSS CHECK
98. Flaps Up Speed
99. Flaps Down Speed
100. Maneuvering Speed (Va)
101. Maximum Glide
102. Cranking - CONTINUE STARTING ENGINE
103. Fire Extinguisher - OBTAIN
104. Fire Extinguisher - ACTIVATE
105. Engine - SECURE

106. Engine -SHUTDOWN & INSPECT
107. Vents/ Cabin Air/ Heat - OFF
108. Vents/ Cabin Air/ Heat – ON
109. Alternator Breaker – PULL
110. Alternator Breaker - RESET
111. Main Feed Breaker - PULL
112. Main Feed Breaker - RESET
113. Alternate Feed Switch - ON
114. Alternate Feed Switch - OFF
115. Avionics - ON, ONLY IF NEEDED
116. Flight - TERMINATE ASAP
117. ...Throttle - IDLE
118. Throttle - IDLE
119. Throttle - OPEN approx 1/4
120. Throttle - 20 in Hg
121. Throttle - 21 in Hg
122. Throttle - 22 in Hg
123. Throttle - 23 in Hg
124. Throttle - 24 in Hg
125. Throttle - 25 in Hg
126. Throttle - 26 in Hg
127. Throttle - FULL OPEN
128. Climb Speed - 65 KIAS
129. Climb Speed - 70 KIAS
130. Climb Speed - 75 KIAS
131. Climb Speed - 80 KIAS
132. Climb Speed - 85 KIAS
133. Climb Speed - 90 KIAS
134. Climb Speed - 95 KIAS
135. Climb Speed - 100 KIAS
136. Climb Speed - 105 KIAS
137. Climb Speed - 110 KIAS
138. Climb Speed - 115 KIAS
139. Climb Speed - 120 KIAS
140. Flaps - DOWN
141. Flaps - AS REQUIRED
142. Flaps - 10 deg
143. Flaps - 20 deg
144. Flaps - 30 deg
145. Flaps - 40 deg
146. Flaps - 50 deg
147. Flaps - 60 deg
148. Flaps - 70 deg
149. Flaps - 80 deg
150. Flaps - 90 deg
151. Flaps - 100 deg
152. Prop - FULL FORWARD

153. Prop - HIGH RPM
154. Prop - LOW RPM
155. Prop - 1700 RPM
156. Prop - 1800 RPM
157. Prop - 1900 RPM
158. Prop - 2000 RPM
159. Prop - 2100 RPM
160. Prop - 2200 RPM
161. Prop - 2300 RPM
162. Prop - 2400 RPM
163. Prop - 2500 RPM
164. Prop - 2600 RPM
165. Prop - 2700 RPM
166. Prop - 2800 RPM
167. Prop - 2900 RPM
168. Prop - 3000 RPM
169. Prop - SECURE
170. Airspeed - 60-80 KIAS
171. Airspeed - 70-90 KIAS
172. Airspeed - 80-100 KIAS
173. Airspeed - 90-110 KIAS
174. Airspeed - 100-120 KIAS
175. Airspeed - 110-130 KIAS
176. Airspeed - 120-140 KIAS
177. Airspeed - 130-150 KIAS
178. Airspeed - 140-160 KIAS
179. Airspeed - 150-170 KIAS
180. Airspeed - 160-180 KIAS
181. Airspeed - 170-190 KIAS
182. Airspeed - 180-200 KIAS
183. Airspeed - 190-210 KIAS
184. Airspeed - 55 KIAS
185. Airspeed - 60 KIAS
186. Airspeed - 65 KIAS
187. Airspeed - 70 KIAS
188. Airspeed - 75 KIAS
189. Airspeed - 80 KIAS
190. Airspeed - 85 KIAS
191. Airspeed - 90 KIAS
192. Airspeed - 95 KIAS
193. Airspeed - 100 KIAS
194. Airspeed - 105 KIAS
195. Airspeed - 110 KIAS
196. Airspeed - 115 KIAS
197. Airspeed - 120 KIAS
198. Airspeed - 125 KIAS
199. Airspeed - 130 KIAS

200. Airspeed - 135 KIAS
201. Airspeed - 140 KIAS
202. Airspeed - 145 KIAS
203. Airspeed - 150 KIAS
204. Airspeed - 155 KIAS
205. Airspeed - 160 KIAS
206. Airspeed - 165 KIAS
207. Airspeed - 170 KIAS
208. Airspeed - 175 KIAS
209. Airspeed - 180 KIAS
210. Airspeed - 185 KIAS
211. Airspeed - 190 KIAS
212. Airspeed - 195 KIAS
213. Airspeed - 200 KIAS
214. Airspeed - 205 KIAS
215. Airspeed - 210 KIAS
216. Airspeed - 215 KIAS
217. ENGINE STARTS
218. ENGINE FAILS TO START
219. ALTERNATOR STILL OFF LINE
220. CABIN FIRE
221. ELECTRICAL FIRE FLIGHT
222. WING FIRE
223. CRUISE
224. Magnetos - ON
225. Magnetos - OFF
226. Autopilot - ON
227. Autopilot - OFF
228. Autopilot - NOT ENGAGED
229. Standby Alternator - CHECK OPS
230. Primary Alternator - ON
231. Primary Alternator - OFF
232. Starter Isolate - ON
233. Starter Isolate - OFF
234. Alternate Air - CHECK
235. Alternate Air - ON
236. Alternate Air - OFF
237. Landing - Expedite
238. Landing - SOON AS PRACTICAL

Firmware Upgrades and PC Software

Before you can reprogram the AF-2500 Engine Monitor or capture data you will need to install the software AF-2500 Programming Software on a PC with a Serial Port. The latest software is available at <http://www.advanced-flight-systems.com/download>, click the AF-2500 Programming Software and then choose to save on your computer. You will need to run the "AF-2500_FLASH_INSTALL.exe" that you downloaded. If you type in a directory name like AF-2500 shown below

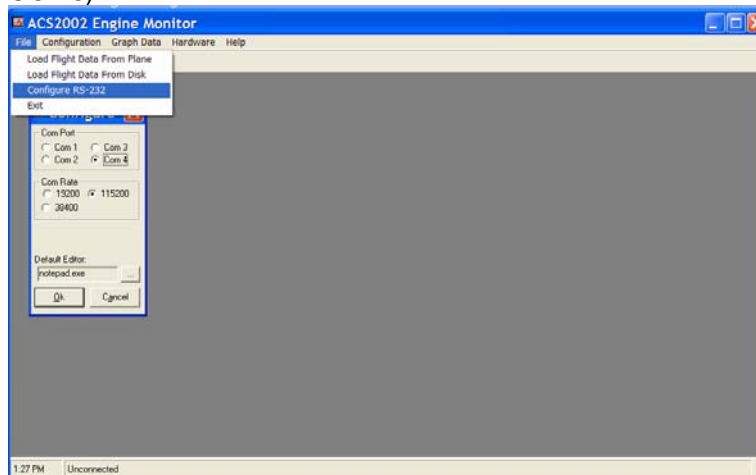


the extraction file will create it and throw the setup file in that directory.

After downloading and running the self-extracting executable you will need to run Setup.EXE to install the software. The software has been tested on the following operating systems:

Windows 98, Windows 2000, Windows XP

After you install the software for the first time you will need to select: **File** then **Configure RS-232** so that you can select the serial port number on the PC that you have plugged the communication cable into (COM1-COM6).

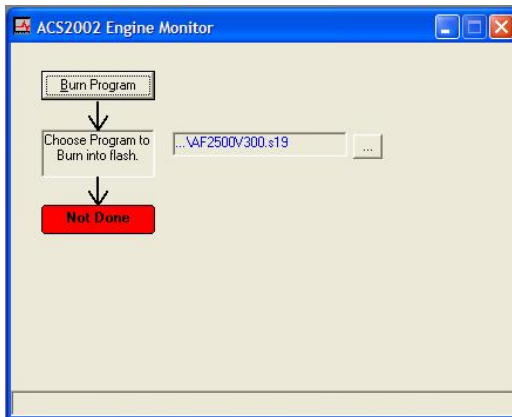
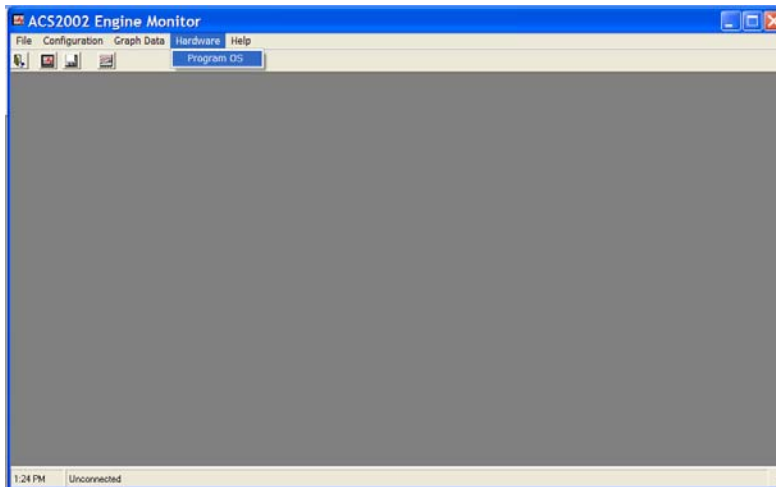


Be sure to select 115200 for the Com Rate

Updating AF-2500 System Firmware

The latest firmware is available from www.Advanced-Flight-Systems.com

AF-2500 Flash Programming

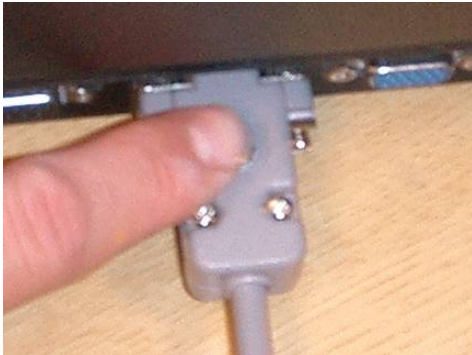


1. After starting the AF-2500 PC program select **Hardware** and **Program OS** from the menu bar. You will need to select the file to be installed on the engine monitor. You select the file by clicking on the button with the “...” on it next to the last file name programmed. Select the file previously downloaded from the web site. Be sure you have un-zipped the download file before selecting it.

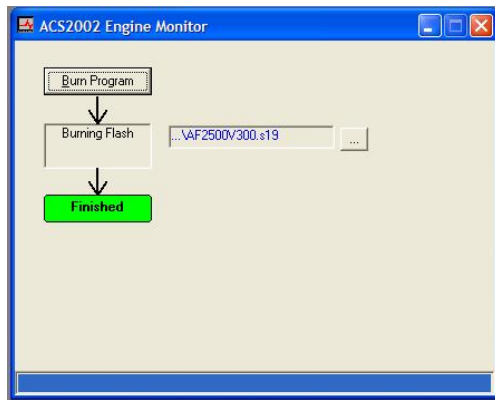
2. Plug the programming cable into Port 3 on the back of the engine monitor.



3. Plug the other end of the programming cable into your PC serial port.



4. Hold the button down on the programming cable and turn on the AF-2500 Engine Monitor. The screen on the AF-2500 should stay blank while you do this. If it turns on normally, try again.



5. Click on the **Run Program** button. The PC should start programming the AF-2500 engine monitor and the blue progress bar should start to fill. The bottom box should turn green when the new program has been installed and change to **Finished**. Be sure to close this with the red X before cycling power to the AF-2500.
6. Turn off AF-2500 engine monitor.
7. Turn On the AF-2500 engine monitor in calibration mode (hold down Button 4). You should always go into calibration mode after installing new software.
8. Press [**RETURN**] (button 1) to exit the calibration mode and start the system.

Flight Data

The system automatically stores the readings of every gauge every 5 seconds in battery backed memory. The memory will hold the last 2 hours of data and can be transferred out of Serial Port 3 to a PC. The data is sent at 19,200 Baud, 8 Data bits, 1 Stop, No Parity. The data is also sent out the port every 5 seconds during normal operation.

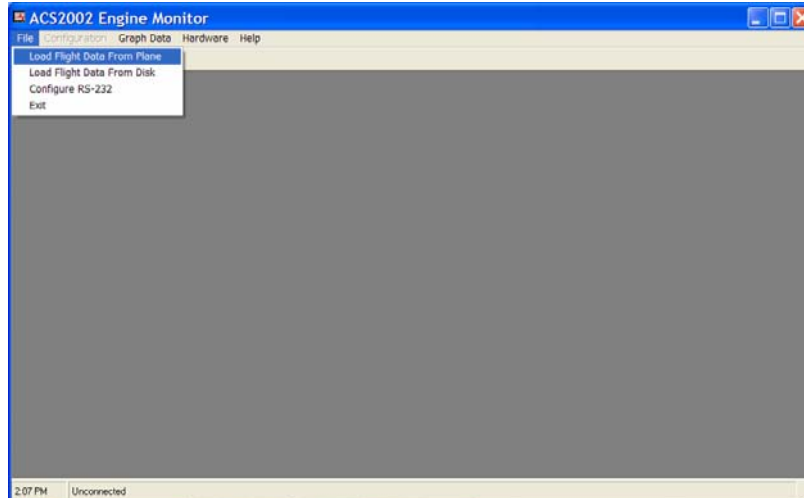
Down Loading Flight Data

The AF-2500 Engine Monitor captures all data every 5 seconds and stores the last 2 hours of data in memory. The AF-2500 PC software will enable you to easily transfer the captured data from the engine monitor to a PC.

1. Plug the programming cable into Port 3 on the back of the engine monitor.

2. Plug the other end of the programming cable into you PC serial port.

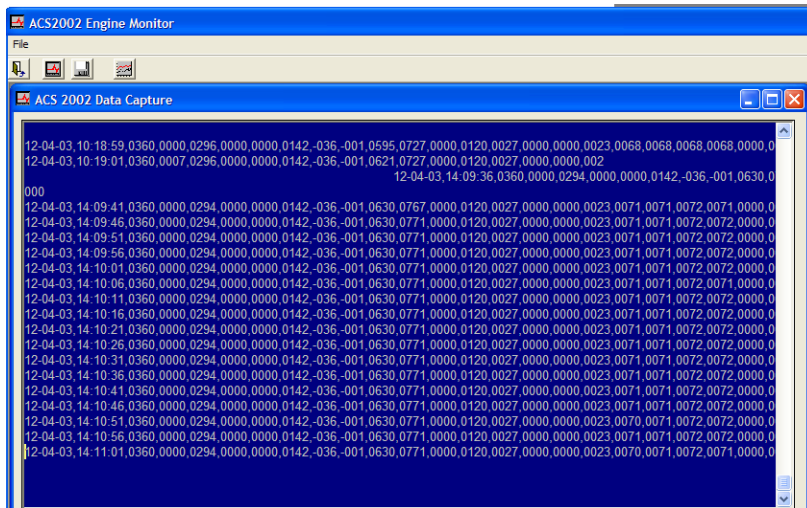
3. Select “Load Flight Data From Plane” from the File Menu or AF-2500 Icon.



4. Turn On the AF-2500 Engine Monitor (DO NOT press the button on the cable). Verify that you are getting data from the engine monitor. The terminal window on the PC should have a new line of data every 5 seconds. (Note: Version 2.5.6 and prior to Version 2.2.9 will not output data every 5 seconds)

If you are not getting data try the following:

- a. Do you have the correct serial port selected on the PC?
- b. Have you plugged the cable in correctly?
- c. Is the AF-2500 on?
- d. Is your AF-2500 running version 2.5.6 or any prior to 2.2.9?

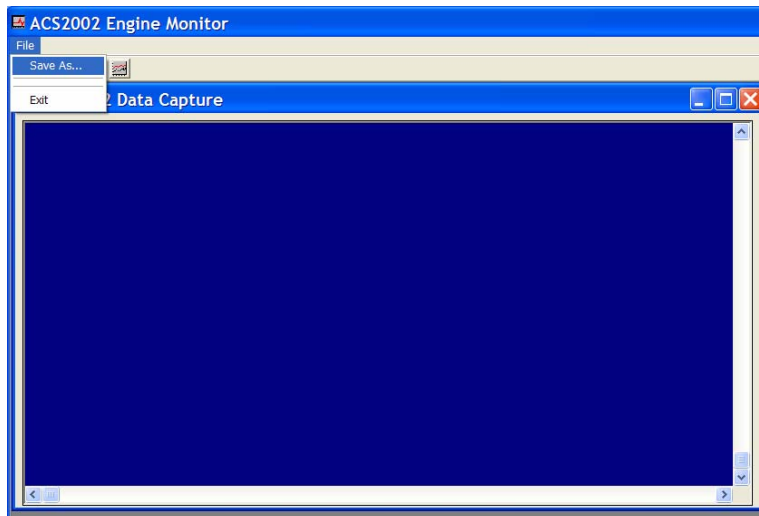


5. On the AF-2500 select the following:

- a. [TIME] Button 1
- b. [DATA] Button 4
- c. [DOWNLOAD] Button 3

The AF-2500 should now stop sending data every 5 seconds.

6. On the PC select **Save As** from the File Menu and enter a file name to use.

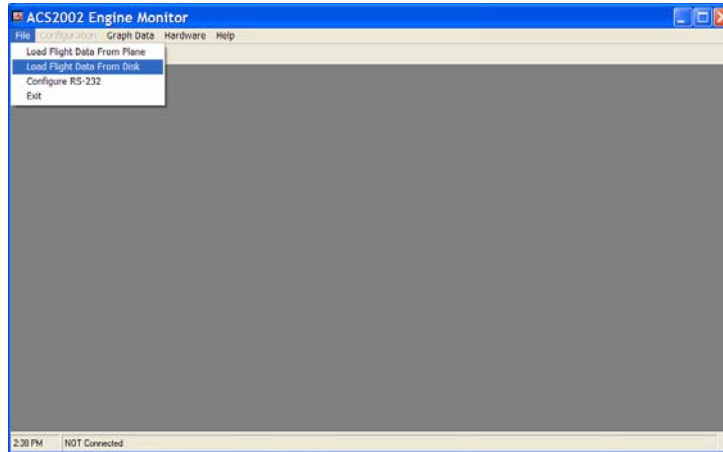


7. On the AF-2500 select the following:
 - a. **[START]** Button 3
 - b. The data should immediately start sending
 - c. Once the AF-2500 displays 100% all data has been sent
 - d. Select **[RETURN]** Button 2 on AF-2500

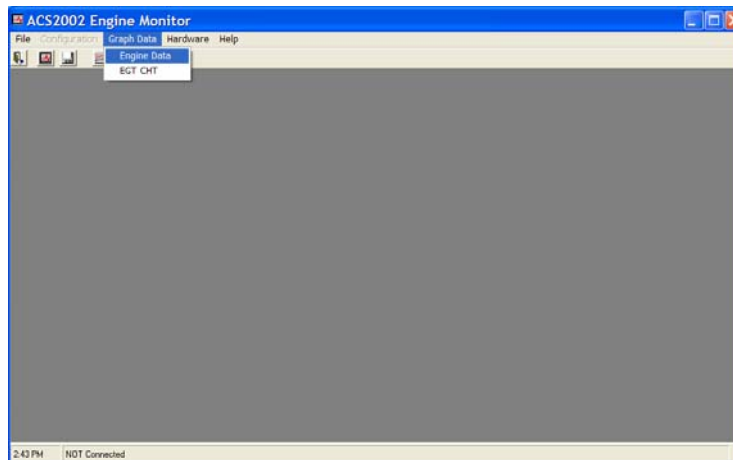
Graphing Flight Data

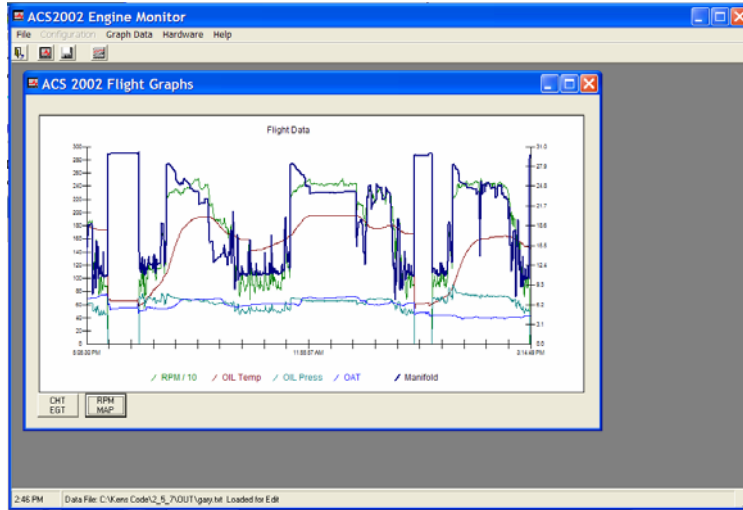
The AF-2500 PC program has a very simple graphing function that can be used to display the data. If you wish to have any detailed analysis we recommend using Microsoft Excel.

1. Select **Load Flight Data From Disk** from the File Menu. Select the file that you saved the data to.



2. Select the data to graph from the **Graph Data** menu.

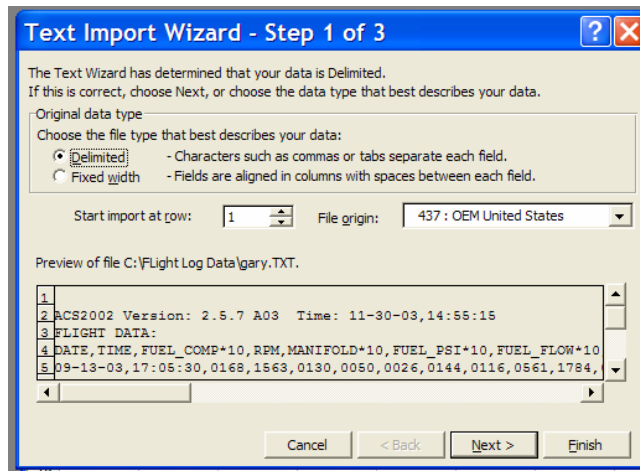




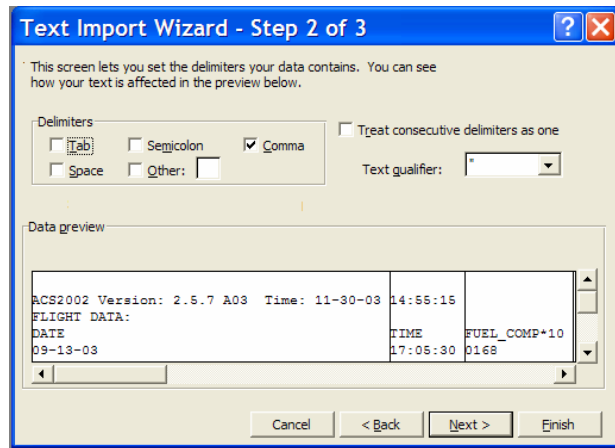
Importing Flight Data to Excel

Once you save data from the AF-2500 Engine Monitor you can import the data into Excel by the following procedure:

1. From Excel select File **Open**
2. Change the file type to All Files (*.*)
3. Select the file that you saved the data to.
4. The Text Import Wizard should start and press Next



5. Select the Delimiters – Comma and then press Finish



6. The data should now be displayed in an Excel grid.

REAR COVER