Electronics International Inc.

MVP-50T

Installation Instructions

II 1211061 - Rev. F: 02/21/18*****

The MVP-50T is an STC'd & TSO'd Primary Replacement for Engine and Aircraft System Instruments

Read this manual before installing this instrument. It contains information that may affect your decision to install this product and/or the safety of your aircraft.

Model # : _____

Serial # : _____

63296 Powell Butte Hwy · Bend, OR 97701 · (541) 318-6060 · iFlyEi.com

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Important Notice

***** MUST READ *****

If you think it is not important to read this manual, you're wrong! This manual contains important operating information that may affect the safety of the pilot, passengers, aircraft, operation of the system or time to install the system. You MUST read the manual prior to installing this system. Any deviation from these installation instructions is the sole responsibility of the installer and should be done in accordance with AC 43.13.

Read the Warranty/Agreement. There is information in the Warranty/Agreement that may alter your decision to install this product. **If you do not accept the terms of the Warranty/Agreement, do not install this product**. This product may be returned for a refund. Contact Electronics International Inc. for details.

If you are not an FAA Certified Aircraft Mechanic familiar with the issues of installing aircraft N1, N2, ITT, Torque, Volt, Amp, Oil Temperature and Pressure instruments, Do Not attempt to install this instrument. The installer should use current aircraft standards and practices to install this system (refer to AC 43.13).

If the installer does not have the skills, knowledge, tools, equipment or facility, to perform and determine whether the installation of this product is safe, reliable and accurate and to determine whether this product is operating properly after installation, **DO NOT INSTALL THIS PRODUCT**. If the owner/pilot and/or installer are unwilling to take the responsibility for the installation and operation of this product, **DO NOT INSTALL THIS PRODUCT.** This product may be returned for a refund. Contact Electronics International Inc. for details.

By installing this product, the aircraft owner/pilot and installer agree to hold Electronics International Inc. harmless and in no way responsible for monetary compensation, including punitive damages for any incident, harm and/or damage associated with this product. If you do not agree to the above, **DO NOT INSTALL THIS PRODUCT.** This product may be returned for a refund. Contact Electronics International Inc. for details.

Electronics International Inc. is not liable or responsible for a pilot's action or any situation that results in personal injury, property damage, missed commitments, lack of use of an aircraft or any expenses incurred due to: product failure, inaccuracy in displayed data or text files, display or display format issues, software bugs or problems, upgrade or customization issues, misinterpretation of the display, warning and/or limit settings, calibration problems, installation issues (leaks, mis-wiring, obstructions, damage to aircraft or components, incorrect installation of any parts, wrong parts, parts that don't fit, etc.) or any other issues related to the installation or operation of this product. All of the above are solely the pilot's and/or installer's responsibility. The pilot **must** understand the operation of this product before flying the aircraft. The pilot will not allow anyone to operate the aircraft that does not know the operation of this product. The pilot will keep the instrument Operating Instructions in the aircraft **at all times**. If you do not agree to all of the above, **DO NOT INSTALL THIS PRODUCT.** This product may be returned for a refund. Contact Electronics International Inc. for details.

Important Notice

***** MUST READ *****

Do not install a non-certified MVP-50T (MVP) in a certified aircraft. A certified MVP lists the applicable TSO numbers at the bottom of the Model Label.

Before starting the installation make sure the unit will fit in the location you intend to install it without obstructing the operation of any controls.

Before using the Weight and Balance screen check that the “Weight and Balance Setup” data in the MVP System Configuration Menu is accurate. Always verify the MVP weight and balance data with you aircraft’s POH.

Verify the horsepower displayed on the MVP is accurate, as compared to your aircraft's POH and/or engine TC data.

The MVP must be calibrated to the aircraft fuel system and the MVP's accuracy must be verified before flying the aircraft.

The accuracy and proper operation of each function displayed on the MVP should be verified before the aircraft is released for flight.

When the installation is finished, inspect the system for loose fittings, connections, clamps, probes and inspect for leaks, chafing, obstructions, heat damage and anything that may cause unsafe flight before the 1st run-up, after the 1st run-up and after the first flight.

The MVP allows the pilot to enter checklists, flight plans and general information through the USB port. This data must be verified for its accuracy (by the pilot) before it is used.

Before allowing the aircraft to be flown, verify the instrument markings displayed on the MVP screens are accurate with the aircraft’s POH for every function displayed on the MVP.

Before allowing anyone to operate the aircraft read the Operating Manual including the Important Notice there in. Keep the Operating Instructions and the POH/AFM Supplement in the aircraft at all times.

It is important the password(s) be changed to a unique and protected number before the first flight. If setup or calibration data is inadvertently or improperly changed, there could be inaccurate readings that may lead to improper operation of the aircraft or engine. This could result in engine damage and/or an emergency situation. The password must be protected from dissemination to unauthorized persons.

Important Notice

***** MUST READ *****

Fuel Level Accuracy Limitations:

The accuracy limitations of the MVP are listed below. **It is the pilot/owner's obligation to make anyone flying the aircraft aware of these limitations.**

1. Angle of Attack - The MVP must be calibrated with the aircraft in a cruise angle of attack. If the aircraft is in an angle of attack other than cruise, the MVP may display inaccurate fuel levels (depending on the mounting location and type of sensor used). If your aircraft does not sit at a cruise angle of attack when on the ground, it may not display accurate fuel levels. **Test your aircraft at different angles of attack to see the affects on the MVP fuel level readings.**

2. Full Fuel Readings - As a tank is filled the fuel sensor may not be able to detect the fuel entering the upper corners of the fuel tank. If this is the case with your sensor, the MVP will display lower fuel levels than the actual fuel in the tanks when the tanks are full. When the fuel level drops to a point where the fuel sensor starts to detect a change, the displayed fuel level should be accurate. **Check the accuracy of your system by comparing the displayed fuel levels on the MVP to the fuel levels listed in the flight manual at each fill up.**

3. Low Fuel Readings - Do not rely on the MVP to determine the fuel level in the tank for an indicated tank level below 1/8. You should always fly the aircraft in such a manner as to maintain at least the FAA minimum fuel requirements in the aircraft at all times. **Depending on the mounting location and type of fuel sensor used, the MVP may not be able to accurately measure the last few gallons of fuel in the tanks.**

4. Improper Calibration - If the MVP has not been properly calibrated it will not display accurate fuel levels in the tanks. It is important you verify the accuracy of the MVP. **Always crosscheck your measured fuel levels in the tanks with the readings on the MVP before each flight.**

5. Poor Connections - Poor connections between the wires leading from the EDC to the fuel sensors can become intermittent with age. An intermittent connection most likely will show up as wandering or inaccurate readings on the MVP. **Always crosscheck your measured fuel levels in the tanks with the readings on the MVP before each flight.**

6. Defective Fuel Level Sensors - Fuel sensors can become intermittent or change resistance with age. It is not uncommon to find intermittent problems even in new sensors. An intermittent problem with a fuel sensor most likely will show up as wandering or inaccurate readings on the MVP. **Always crosscheck the measured fuel levels in the tanks with the readings on the MVP at each fill up.**

If you ever find an inaccuracy issue or any other problem with a fuel level display on the MVP, disable the fuel level display (see the "Redlines, Limits and Color Setup" screen). This will alert anyone flying the aircraft to the condition of this display.

Important Notice

***** MUST READ *****

Important Fuel Level Considerations:

DO NOT RELY SOLELY ON THE FUEL LEVEL DISPLAYED ON THE MVP TO DETERMINE THE FUEL LEVELS IN THE AIRCRAFT. **The use of the MVP does not eliminate or reduce the necessity for the pilot to use good flight planning, preflight and in-flight techniques for managing fuel.** It is important the pilot adopt the practices listed below. If you are not familiar with these techniques, contact the FAA to acquire proper training.

1. A copy of the Operating Manual must be in the aircraft at all times.

2. Flight Planning - Always calculate the fuel requirement for each leg of a flight, including any alternate plans for bad weather. Keep this information available in the aircraft during the flight. Keep a chart of the published fuel flows for various flight/engine conditions in the aircraft. Keep a chart of the measured fuel flows for various flights in the aircraft. Measured fuel flows can be considerably different from published figures. This usually is due to old, inaccurate engine instruments.

3. Preflight - Do not rely on the MVP to determine the fuel level in the fuel tanks. The pilot must visually check/measure the fuel levels in the tanks before every takeoff. Crosscheck the measured fuel levels with the displayed levels on the MVP. Also, crosscheck these levels with the fuel requirements for the flight listed in your flight plan.

4. In Flight - Make the MVP part of your normal instrument scan. **Crosscheck the fuel levels displayed on the MVP with your flight plan at each leg of the flight or every 30 minutes** (if a leg is longer than 30 minutes). Calculate the fuel flows from the MVP displayed fuel levels and compare them with your charts of measured and published fuel flows for the aircraft. If there is a discrepancy, land the aircraft at the nearest airport and verify the fuel levels. ***Discrepancies should be taken seriously.***

5. New Pilot or Owner of the Aircraft - If there is a new pilot or owner of the aircraft, it is the previous aircraft pilot/owner's responsibility to ensure the new pilot has read this manual and is aware of any accuracy limitations and other important considerations. All limitations and operating characteristics learned from operating the MVP must be passed on to the new pilot/owner.

If you do not agree or are unwilling to comply with the information/requirements contained within this Important Notice, ***DO NOT INSTALL THIS PRODUCT***. This product may be returned for a refund. Contact Electronics International Inc. for details.

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Warranty/Agreement

Electronics International Inc. (EI) warrants this instrument and system components to be free from defects in materials and workmanship for a period of one year from the user invoice date. EI will repair or replace any item under the terms of this Warranty provided the item is returned to the factory prepaid.

1. **If you do not agree to and accept ALL the terms of this Warranty/Agreement, DO NOT Install This Product.** You may return the product for a refund, contact Electronics International Inc. for details.

2. Electronics International Inc. is not liable or responsible for a pilot's action or any situation that results in personal injury, property damage, missed commitments, lack of use of an aircraft or any expenses incurred due to: product failure, inaccuracy in displayed data or text files, display or display format issues, software bugs or problems, upgrade or customization issues, misinterpretation of the display, warning and/or limit settings, calibration problems, installation issues (leaks, mis-wiring, obstructions, damage to aircraft or components, incorrect installation of any parts, wrong parts, part that don't fit, etc.) or any other issues related to the installation or operation of this product. All of the above are solely the pilot's and/or installer's responsibility. The pilot **must** understand the operation of this product before flying the aircraft. The pilot will not allow anyone to operate the aircraft that does not know the operation of this product. The pilot will keep the instrument's Operating Instructions in the aircraft at all times.

By installing this product, the aircraft owner/pilot and installer agree to hold Electronics International Inc. harmless and in no way responsible for monetary compensation, including punitive damages for any incident, harm and/or damage associated with this product (including but not limited to the ones listed above). If you do not agree to any part of this Warranty/Agreement, **DO NOT INSTALL THIS PRODUCT.**

3. This Warranty/Agreement shall not apply to any product that has been repaired or altered by any person other than Electronics International Inc., or that has been subjected to misuse, accident, incorrect wiring, negligence, improper or unprofessional assembly or improper installation by any person. **This warranty does not cover any reimbursement for any person's time for installation, removal, assembly or repair.** Electronics International retains the right to solely determine the reason or cause for warranty repair.

4. This warranty does not extend to any machine, vehicle, boat, aircraft or any other device to which the Electronics International Inc. product may be connected, attached, interconnected or used in conjunction with in any way.

5. Personal injury or property damage due to misinterpretation or lack of understanding of this product is solely the pilots' responsibility. The pilot **must** understand all aspects of the operation of this product before flying the aircraft. If he/she does not, he or she agrees to seek training from a knowledgeable instructor. The pilot also agree that no one will be allowed to operate the aircraft that does not know the operation of this product and will **Keep the Operating Instructions in the aircraft at all times.**

6. The obligation assumed by Electronics International Inc. under this warranty is limited to repair, replacement or refund of the product, at the sole discretion of Electronics International Inc.

7. Electronics International Inc. is not liable for expenses incurred by the customer or installer due to factory updates, modifications, improvements, changes, or any other alterations to the product that may affect the form, fit, function or operation of the product.

8. Electronics International is not responsible for shipping charges or damages incurred under this Warranty.

9. No representative is authorized to assume any other liability for Electronics International Inc. in connection with the sale of Electronics International Inc. products.

10. **You must read the entire Installation and Operating Instructions for this instrument. If you do not agree to and accept the terms of this Warranty/Agreement and the responsibilities set forth in these manuals, DO NOT install this product, contact EI for a refund.**

This Warranty is made only to the original user. **THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES OR OBLIGATIONS: EXPRESS OR IMPLIED. MANUFACTURER EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. PURCHASER AGREES THAT IN NO EVENT SHALL MANUFACTURER BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING LOST PROFITS OR LOSS OF USE OR OTHER ECONOMIC LOSS. EXCEPT AS EXPRESSLY PROVIDED HEREIN, MANUFACTURER DISCLAIMS ALL OTHER LIABILITY TO PURCHASER OR ANY OTHER PERSON IN CONNECTION WITH THE USE OR PERFORMANCE OF MANUFACTURER'S PRODUCTS, INCLUDING SPECIFICALLY LIABILITY IN TORT.**

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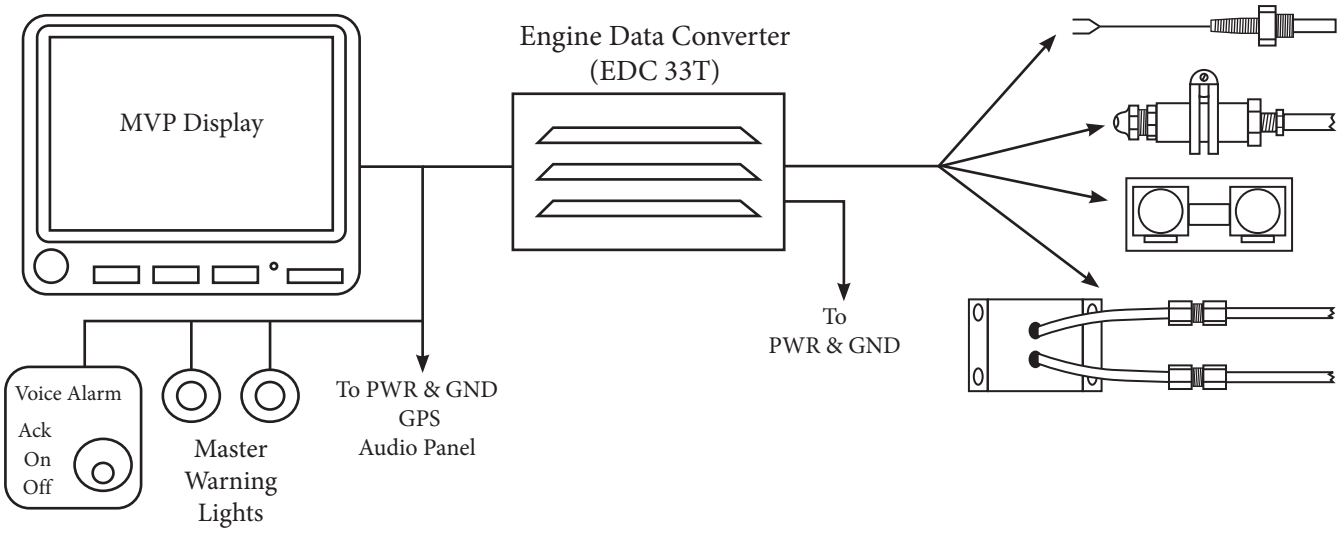
1.1 System Description

The MVP-50 Glass Panel Engine Monitor Installation consists of four major components: the MVP Display, the Engine Data Converter (EDC-33T), the Probes, Transducers & Modules, and the Wiring and Extension Cables.



1.1.1 MVP Display:

The MVP Display unit measures 5.55" wide by 5.15" high by 2.4" deep and is designed to be mounted from behind the aircraft instrument panel. The MVP could be mounted on to a sub-panel which would then be mounted to the aircraft instrument panel from the front.

The 25-pin D-sub connector on the back of the MVP Display is used to interface the MVP to the EDC-33T, Power & Ground, GPS, Master Warning and Caution Lights, Audio Panel, etc.

1.1.2 EDC-33T:

The EDC-33T (Engine Data Converter) converts all of the engine and aircraft system signals into serial data. This data is transmitted to the MVP display via two wires (RS422). If a second EDC is installed, one of the data lines will be connected to a RS232 channel on the MVP. The EDC measures 4.5" long by 3.5" wide by 2.2" high and is to be mounted on the cockpit side of the firewall or in an equipment bay. The EDC reduces the wire bundle to the instrument panel by over 100 wires. There are three 37-pin D-sub connectors that interface the EDC to the various probes, transducers and modules.

The EDC's Temperature and Fuel Level inputs can be used to monitor voltage outputs from almost any transducer. In this way almost any function can be displayed on the MVP.

Up to two EDC's can be connected to the MVP at a one time. This significantly increases the total number of functions that can be displayed on the MVP.

1.1.3 Probes, Transducers and Modules:

The various probes, transducers and modules are mounted in the aircraft at appropriate locations.

1.1.4 Wiring & Extension Cables:

The extension cables and wiring provide the connections from the probes, modules or direct connections to the EDC inputs. Once the wiring and extension cables are installed into the aircraft they become semi-permanent. Everything else (MVP, EDC, Probes and Modules) can be easily disconnected and removed.

1.2 Operational Overview:

The MVP system measures an engine or aircraft function using a probe or transducer and displays that function on the MVP screen using the following steps:

A. A probe is mechanically connected to the aircraft and electrically connected to an EDC input. The pre-wired harness provides most of the electrical connections from the probes to the EDC inputs.

B. The EDC converts the signals from the probes to a digital format (RS422) and sends the data to the MVP. The EDC has 33 inputs. Many of the inputs can be used for a number of different types of functions.

C. The MVP receives the data from the EDC and the data is processed through the MVP as follows:

1. The data received for each EDC input is assigned a function name and probe. Function names and probes are set up for each EDC input in System Configuration Screen #1. The probe assigned provides specific calibration algorithms. Calibration algorithms for any function can be modified in System Configuration Screen #5. Some functions have special calibration/setup screens (Fuel Tank Calibration, Tach Time, Engine Hours, Flight Time, Pressure Altitude, Flaps, Trim, etc.).

2. The function is then placed on the Main or System screen of the MVP. System Configuration Screens #2 or #3 allows the placement location of the function to be selected for either the Main or System screen.

3. The analog and/or digital display of the function (with redlines, limits, colors, etc) is depicted on the appropriate screen. Redlines, limits, colors, units, blinking, master warnings and voice files can be set up for any function in Configuration Screens #4.

Much of the setup for the certified MVP is done at the factory and cannot be changed by the pilot or installer. See the following Password Protection section for more information.

1.3 Installation Overview:

The installer should start the installation by reviewing the EDC Wiring Work Sheets. There are three work sheets, one for each of the 37-pin D-Sub connectors on the EDC. The work sheets are packaged with each of the three EDC wire harnesses. The work sheets provide a list of the functions and probes/transducers included with this kit. The installation is achieved by performing the following steps:

A. ***The MVP display is installed.*** The MVP can be mounted one of two ways; from behind the instrument panel or on a sub-panel, which is then mounted to the aircraft instrument panel from the front. This method hides the cutout for the MVP case and makes a clean and good-looking installation. Electronics International has a MVP sub-panel avaliable (see EI Price List for more information).

B. ***Probes and Transducers are installed.***

C. ***Control Panels, Pots and Warning Lights are installed.***

D. ***The EDC is installed***. This should be installed (with the connectors pointing down) on the inside of the cockpit or in an instrument bay. For a twin-engine aircraft it can be installed on the backside (not the engine side) of the firewall. **The EDC should NOT be installed in a location where it can be pressure washed.**

E. ***The Wire Harnesses are installed.*** The wire harnesses for the EDC and MVP are pre-wired and included in the kit.

F. ***Field Calibration/Setup steps are performed.*** Weight & Balance, Fuel Tanks, Horsepower, etc. Functions are calibrated/setup. Calibration/Setup requires a password. See the following Password Protection section for more information.

G. ***System Checkout is performed.***

1.4 Password Protection:

The MVP provides a number of screens for the pilot to use during flight, none of which require a password. It also provides many System Configuration Screens that are used to configure the MVP for a specific aircraft. Some of the aircraft functions (fuel level, flaps, trim, weight and balance, etc.) **MUST** be calibrated during installation and some must be set at the factory or by an OEM.

The MVP provides two levels of passwords for configuring and calibrating the unit.

1.4.1 Level #1 Password (Maintenance):

The Level #1 password is for the installer or maintenance personnel. This password allows the installer to perform the following:

A. Delete Log Files.
B. Set up the Gear Warning.
C. Adjust the Recovery Factor.
D. Calibrate the Fuel Level for all fuel tanks.
E. Adjust the aircraft's Weight and Balance data.
F. Set the Fuel Weight, Tach Time and Engine Hours.
G. Set up the Serial Ports.
H. Disable the Bar Graph.
I. Calibrate Pressure Altitude.
J. Calibrate Flap and Trim indications.

For a non-certified MVP, the password is "**100**." For a certified unit the password must be obtained from Electronics International Inc. To qualify for the maintenance password you must be a certified mechanic or FAA approved shop.

The password protects the MVP from unauthorized access to calibration data. If calibration data is improperly changed, it could lead to engine or aircraft damage and/or personal injury. Once the MVP is installed and checked out, the password should be changed (on either the certified or non-certified unit) to a unique number and it should be protected from unauthorized access.

If the new password is lost or a new shop requires access to calibration data (as allowed by the Maintenance Password), Electronics International has a method of providing the Maintenance Password to any ***authorized*** shop or personnel.

1.4.2 Level #2 Password (OEM/Experimental):

The Level #2 password is for the Factory, OEM's, Certified Installers, or experimental users. This password allows access to all System Configuration Data. For a non-certified MVP, the password is "**100**." For a certified unit the password is only released under a contract or agreement.

The password protects the MVP from unauthorized access to calibration data. If calibration data is improperly changed, it could lead to engine or aircraft damage and/or personal injury. Once the unit is installed and checked out, this password should be changed (on either the certified or non-certified unit) to a unique number and should be protected from unauthorized access.

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2.1 Important Information and Initial Check Out:

A. **The installer and aircraft owner must read the Warranty/Agreement before starting the installation.** There is information in the Warranty/Agreement that may alter your decision to install this instrument. **If you do not accept the terms of the Warranty/Agreement, do not install this instrument.**

B. **If you are not an FAA Certified Aircraft Mechanic familiar with the issues of installing engine and aircraft instruments, Do not attempt to install this instrument. The installer should use current aircraft standards and practices to install this instrument (refer to AC 43.13).**

C. **Check that any necessary FAA Approvals are available for your aircraft before starting the installation.** DO NOT install the MVP-50T in an aircraft that has been configured as a commuter.

D. Read the Installation Instructions entirely and resolve any issues you may have **before** starting the installation. This may eliminate any delays once the installation is started.

E. Inspect the contents of this package prior to installation. **If the MVP-50T system is to be installed into a certified aircraft, check that the Model Number listed on the TSO label incorporates the Aircraft ID for which it is to be installed. Each MVP-50T display is configured for a specific aircraft and should only be installed in that aircraft.**

F. **Do not install a non-certified MVP in a certified aircraft.** A certified MVP lists the applicable TSO numbers at the bottom of the Model Label.

G. **Before starting the installation make sure the instrument will fit in the location you intend to install it without obstructing the operation of any controls.** CFR 23.1321(a) states, "Each flight, navigation, and power plant instrument for use by any required pilot during takeoff, initial climb, final approach, and landing must be located so that any pilot seated at the controls can monitor the airplane's flight path and these instruments with minimum head and eye movement." AC 23.1311-1B provides one method (but not the only method) of complying with this CFR. AC 23.1311-1B recommends a power plant instrument be installed within a distance of 21" from the pilot's visual centerline to the middle of the instrument. The pilot's visual centerline is a perpendicular line from the pilot's eye to the instrument panel. In most aircraft, installing the MVP-50T to the right of the Radio Stack would be acceptable. In some aircraft, the visual centerline falls to the right of the Attitude Indicator.

If the power plant instrument cannot be installed within 8" of the pilot's visual centerline, AC 23.1311-1B recommends Master Caution and Warning Lights be installed. Installation of Master Caution and Warning Lights is covered in this manual.

H. If this instrument is to replace an existing gauge in the aircraft, it is the installer's responsibility to move or replace any existing instruments or components in accordance with FAA approved methods and procedures (see AC 43.13).

I. An Installation Checklist is provided to assist the installation of the MVP system. It does not replace the instructions located in this manual.

2.2 Review the "EDC Wiring Work Sheets:"

There are a number of probes and extension cables that will need to be installed. The key to keeping the installation simple is to organize the work using the **"EDC Wiring Work Sheets"** supplied with this kit. Review the functions assigned to each EDC input on the EDC Wiring Work Sheets. The work sheets are prepared at the factory with the functions and probes already assigned.

2.3 Verify You Have all the Probes, Modules, Transducers and Cables:

The three EDC 37-pin D-sub connectors and the MVP 25-pin D-sub connector are pre-wired at the factory. The three EDC connectors are marked Top, Middle and Bottom. The EDC Wiring Work Sheets provide a list of the probes supplied with this kit.

A. Check that you have all the probes listed on the EDC Wiring Work Sheets provided with your kit.

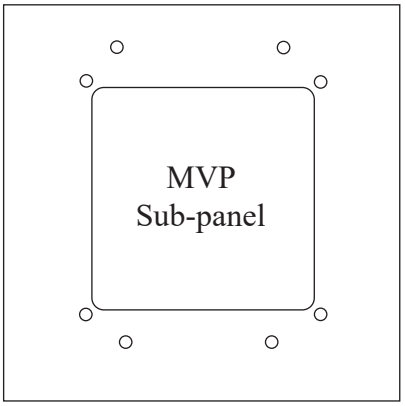
B. Check that the three EDC 37 pin-D-sub wire harnesses are provided with the proper wires for each of the probes shown on the EDC Wiring Work Sheets in your kit.

C. Check that the MVP 25-pin D-sub wire harness is provided.

2.4 Installing the MVP Display:

Before starting the installation make sure the instrument will fit in the location you intend to install it without obstructing the operation of any controls. The MVP display can be installed in one of two ways, depending on convenience or the installer's preference. The first method is the traditional method of installing the MVP display from behind the panel. An aircraft panel cutout drawing is provided at the back of this manual.

The second method is more suitable when an MVP display is to be mounted in an existing aircraft panel. This method requires creating a sub-panel slightly larger than the MVP display. The MVP display is mounted in the sub-panel and the sub-panel is mounted on the front of the existing aircraft panel. This allows the installer to rough-cut a hole in the aircraft panel to accommodate the MVP display. The sub-panel covers any imperfections in the cut hole. Also, the MVP display may easily be removed from the front of the aircraft panel.



The sub-panel should be made from .062" (or thicker) aluminum and can be painted black or the same color as the aircraft panel. Four screws (6-32 or larger) located at the top and bottom of the sub-panel should be used to mount the sub-panel to the aircraft panel. If there is no room at the top and bottom for mounting screws, they may be placed on the sides of the sub-panel.

CFR 23.1321(a) states, “Each flight, navigation, and power plant instrument for use by any required pilot during takeoff, initial climb, final approach, and landing must be located so that any pilot seated at the controls can monitor the airplane’s flight path and these instruments with minimum head and eye movement.” AC 23.1311-1B provides one method (but not the only method) of complying with this CFR. AC 23.1311-1B recommends a power plant instrument be installed within a distance of 21" from the pilot’s visual centerline to the middle of the instrument. The pilot’s visual centerline is a perpendicular line from the pilot’s eye to the instrument panel. In most aircraft, installing the MVP-50T/T to the right of the radio stack would be acceptable. In some aircraft, the visual centerline falls to the right of the Attitude Indicator.

If the power plant instrument cannot be installed within 8" of the pilot’s visual centerline, AC 23.1311-1B recommends Master Caution and Warning Lights be installed. Installation of Master Caution and Warning Lights is covered in this manual.

Installing the MVP-50T may require an instrument (or two) to be moved to a new location. The MVP-50T replaces eight or more primary instruments in the aircraft instrument panel, therefore moving an instrument to a new location may not be an issue. If the installer is unwilling or unable to find a location for the MVP-50T, **Do Not Install the MVP-50T.** The system may be returned for a refund (contact EI for more information).

2.5 Install the Temperature Probes:

Install only the Temperature Probes applicable for your configuration.

A. OIL Temperature Probe Installation:

The MVP system can interface with existing resistive or thermocouple type oil temperature probes or one of EI's Type-K sealed probes may be installed. See the EI pricelist for a list of available probes. **Check that the probe depth does not interfere with the inner workings of the engine.**

B. OAT Probe Installation:

To EDC Temp Input (Middle or Bottom Connector)

P-120 Oil Temp Probe, 5/8"-18, Type K (Used on most engines)

Mount the OAT Probe in an appropriate location on the aircraft, using the hardware supplied. The OAT Probe is sensitive to air temperature changes. For this reason, do not mount the OAT probe in the path of the cowl or engine exiting air (i.e., on the belly of the aircraft). Also, if the probe is mounted in the cowling area, radiant heat may influence the probe temperature. Other than these considerations, the OAT Probe may be mounted in an air intake vent, on the side of the cowling or anywhere else on the aircraft.

C. Other Temperature Probe Installation:

To EDC Temp Input (Middle Connector, CH 8 Recommended)

P-128 Carb Temp / OAT Probe, 1/4"-28, Type K. (Used on most engines)

Other temperature probes (Cabin Temp, Cowl Temp for fire detection, etc.) may be installed using current aircraft standards and practices (refer to AC 43.13). Make sure these probes do not interfere with the operation of the engine or aircraft.

2.6 Install the Pressure Transducers:

Install only the Pressure Transducers applicable for your configuration.

A. Torque Pressure Transducer Installation:

Some engines have a High and Low Torque pressure ports. These engines will require two pressure transducers to be installed. The MVP system can interface with many different types of pressure transducers.

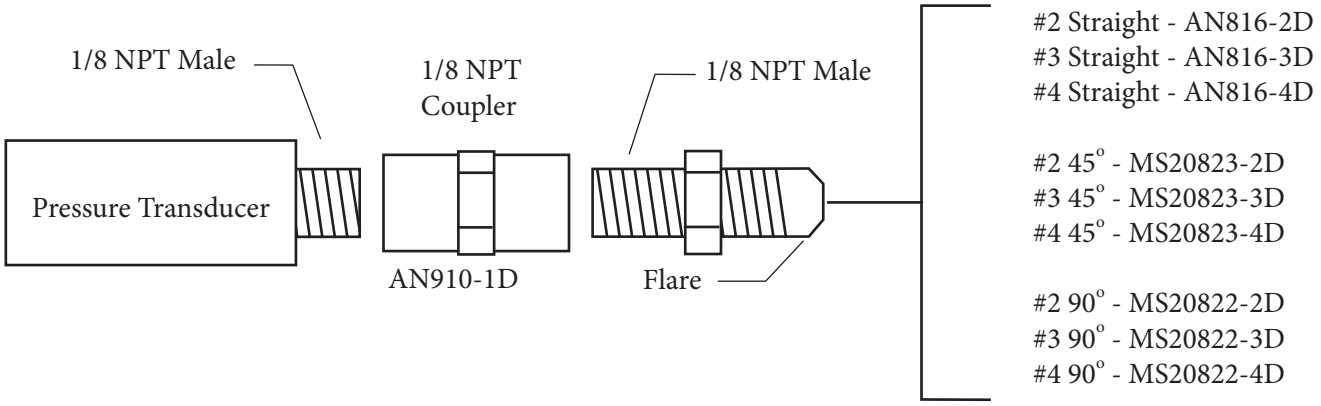
To EDC Press Input (Top Connector)

Pressure Transducer
PT-100GA-T for 0-110 psi (Hi TQ)
PT-30GA for 0-33 psi (Low TQ)

Find a convenient location on the firewall or a mounting bracket and mount the pressure transducer(s) with the clamp provided. **Do not mount the pressure transducer(s) to an engine baffle or directly onto the engine with the transducer supported by the threads.** Vibration can cause the threads to break, resulting in loss of engine fluid. The pressure transducer is equipped with a 1/8" NPT male port. This port can be adapted to any pressure line. Use only a flexible hose and fittings suitable for aircraft use. Route a flexible fuel pressure line from the primary torque pressure pick-up point to the pressure transducer and tighten all fittings. **Do not use the case of the pressure transducer to tighten the pressure fittings.**

Some fittings you may want to consider using are listed below.

B. Oil Pressure Transducer Installation:



Important Note: Aluminum fittings should only be used when flex lines are mounted on the inlet of the pressure transducer; otherwise, steel, stainless steel (SS) or brass fittings should be used.

Find a convenient location on the firewall or a mounting bracket and mount the pressure transducer with the clamp provided. **Do not mount the pressure transducer directly on the engine with the transducer supported by threads.** Vibration can cause the threads to break, resulting in loss of engine oil. The pressure transducer is equipped with an 1/8" NPT male port. This port can be adapted to any oil pressure line. Use only a flexible hose and fittings suitable for aircraft use. Route a flexible oil pressure line from the primary oil pressure pick-up point to the pressure transducer and tighten all fittings. **Do not use the case of the pressure transducer to tighten the pressure fittings.**

To EDC Press Input (Top Connector)

Pressure Transducer
PT-100GA for 0-110 psi
PT-300GA for 0-330 psi.

Some fittings you may want to consider using are listed above.

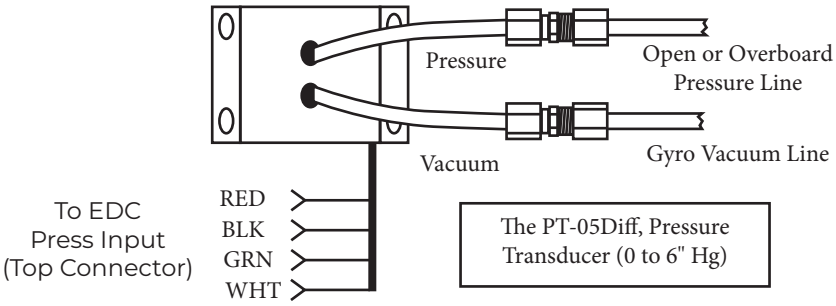
C. Fuel Pressure Transducer Installation:

Find a convenient location on the firewall and mount the pressure transducer with the clamp provided. **Do not mount the pressure transducer to an engine baffle or directly on the engine with the transducer supported by an adapter or fitting.** Vibration can cause the adapter to break, resulting in loss of engine oil. The pressure transducer is equipped with an 1/8" NPT male port. This port can be adapted to any oil pressure line. Use only a flexible hose and fittings suitable for aircraft use. Route a flexible oil pressure line from the primary oil pressure pick-up point to the pressure transducer and tighten all fittings. **Do not use the case of the pressure transducer to tighten the pressure fittings.**

Pressure Transducer
PT-30GA for 0-33 psi
PT-100GA for 0-110 psi.

D. Gyro Vacuum Pressure Transducer Installation:

Mount the PT-05Diff Pressure Transducer on the inside firewall or in the equipment bay under the aircraft instrument panel. Use the holes in the bottom plate to mount the PT-05Diff. Only two mounting holes are required.



The PT-05Diff, Pressure Transducer (0 to 6" Hg)

Connect the aircraft gyro vacuum line to the port tagged "Vac" on the PT-05Diff. Leave the port tagged "Press" open for non-pressurized aircraft. On pressurized aircraft connect the port tagged "Press" to the gyro overboard pressure line. Be sure these lines are tight. The ports are 1/4" flare union. Care should be taken not to put excess pressure on the flexible lines. **Make sure the flexible lines do not kink.**

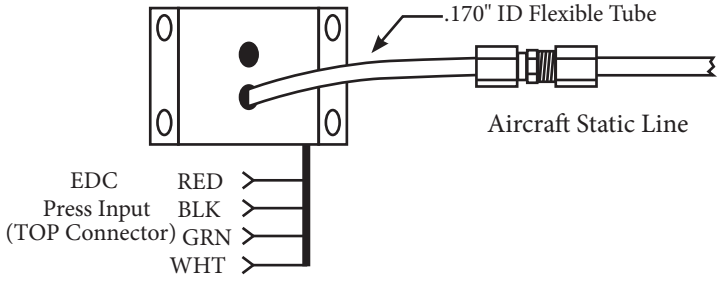
E. Airspeed Transducer Installation:

Mount the PT-05Diff Pressure Transducer on the inside firewall or in the equipment bay under the aircraft instrument panel. Use the holes in the bottom plate to mount the PT-05Diff. Only two mounting holes are required.

Connect the aircraft pitot (airspeed) line to the port tagged "Press" on the PT-05Diff. Connect the aircraft static pressure line to the port tagged "Vac" on the PT-05Diff. Be sure these lines are tight. The ports are 1/4" flare union. Care should be taken not to put excess pressure on the flexible lines. **Make sure the flexible lines do not kink.** ***The Appendix at the back of the "Operating Instructions" manual provides calibration instructions for Airspeed.***

F. Altitude Transducer Installation:

Mount the PT-30Alt Altitude Transducer on the inside firewall or in the equipment bay under the aircraft instrument panel. Use the holes in the bottom plate to mount the PT-30Alt. Only two mounting holes are required.



Connect the aircraft static line (airspeed) line to the port on the PT-30Alt. Be sure this

line is tight. The port is a 1/4" flare union. Care should be taken not to put excess pressure on the flexible line. **Make sure the flexible line does not kink.**

G. Other Pressure Transducer Installations:

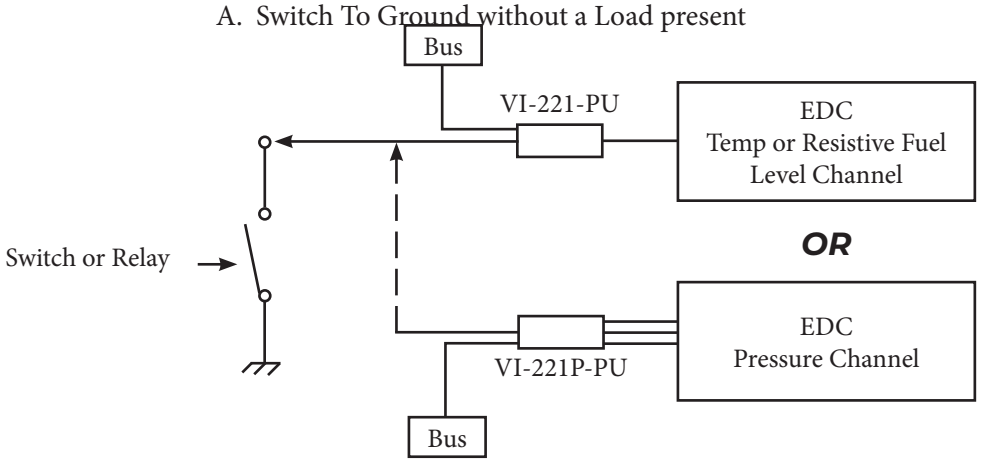
Other pressure transducers (Hydraulic Pressure, Cabin Pressure, Cabin Altitude Pressure, etc.) have the same form factor as the Gyro Vacuum Transducer or the Oil Pressure Transducer and should be mounted in the aircraft in the same manner as appropriate. ***Note: Any unused + or - pressure inputs on the EDC must be tied to a ground pin on the 37-pin connector.***

2.7 Install the Interface Circuit for Annunciators:

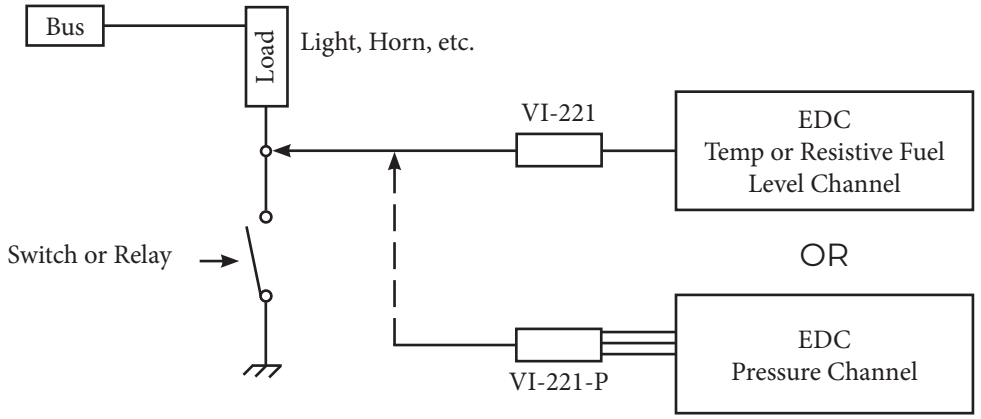
Any Temperature or Resistive Fuel Level channel on the EDC may be used to monitor the state of a switch, relay or output from a device. This output can be used to trigger a light (annunciator) on the MVP. Annunciator lights such as Chip Detect, Bypass, De-ice, Pitot Heat, Fire, Fault, Exceedance, etc. can be displayed on the Main or System screen on the MVP. To monitor a voltage, various VI-221 (Voltage Interface Units) will be required, depending on the configuration.

2.8 Install the Interface Circuit for Flap and Trim Pots (Optional):

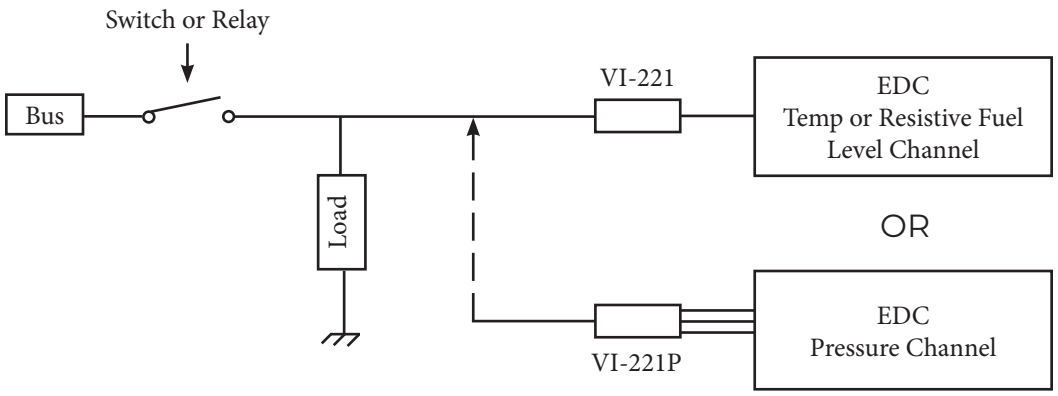
A. Switch To Ground without a Load present



B. Switch to Ground with Load Referenced to Bus

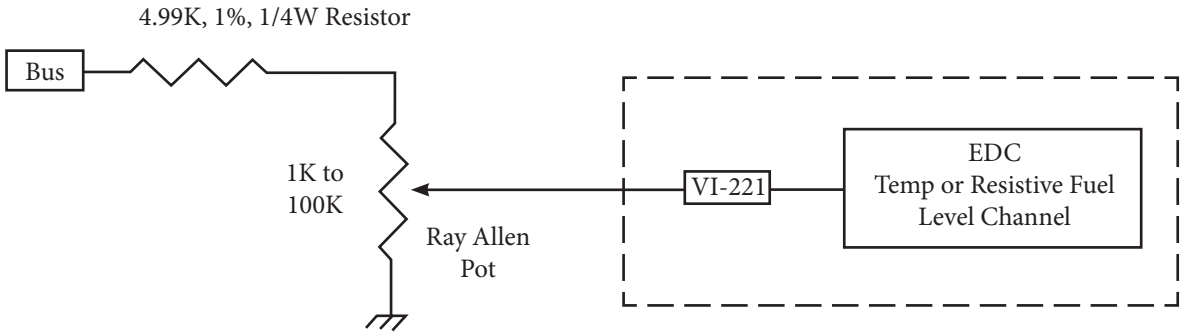


C. Switch to Bus with Load Referenced to Ground



Elevator, Aileron and Rudder trim (as well as Flap position) can be monitored and displayed on the MVP. In most cases the position of these surfaces are monitored using a Ray Allen 5K ohm pot. The following circuit may be used to interface with a 1K to 100K pot.

2.9 Install the Interface Circuit for the Gear Position, Unsafe Indicator and Gear



Warning (Optional):

The Gear Position and Unsafe Indicator shown on the MVP System Screen is intended as a backup to the aircraft's existing system. The Gear Warning operates off the Gear Position, Unsafe Indicator, Airspeed and Manifold Pressure. The Gear Warning provides a voice warning to reduce the possibility of gear up landings.

Unsafe Indicator: Operates from an unsafe signal from the aircraft. Displays as either Red or Off on the MVP. The EDC interface circuit is shown below. The Unsafe Indicator is **REQUIRED** with any landing gear options listed below and requires one EDC input.

Landing Gear Position: There are three options for interfacing the EDC to the aircraft's gear system.

Option 1: Connect the EDC to the aircraft's Right, Left and Nose Gear green down lights. The state of each gear will be displayed independently on the MVP. Select Gear Left, RT and Nose for the probes in Configuration Screen #1. This option requires three EDC inputs. The EDC interface circuit is shown below.

Option 2: Connect the EDC to the aircraft's Nose Gear green down light. The state of all three gears will be displayed on the MVP based on the Nose Gear's state. Select "Gear All" for the probe in Configuration Screen #1. This option requires one EDC input. The EDC interface circuit is shown below.

Option 3: Use this option to display only the Left and Right Main Gears (no Nose Gear) from a single input. Connect the Left or Right Main Gear to the EDC as shown below. Select "Gear Main" for the probe in

Configuration Screen #1. This option requires one EDC input. The EDC interface circuit is shown below.

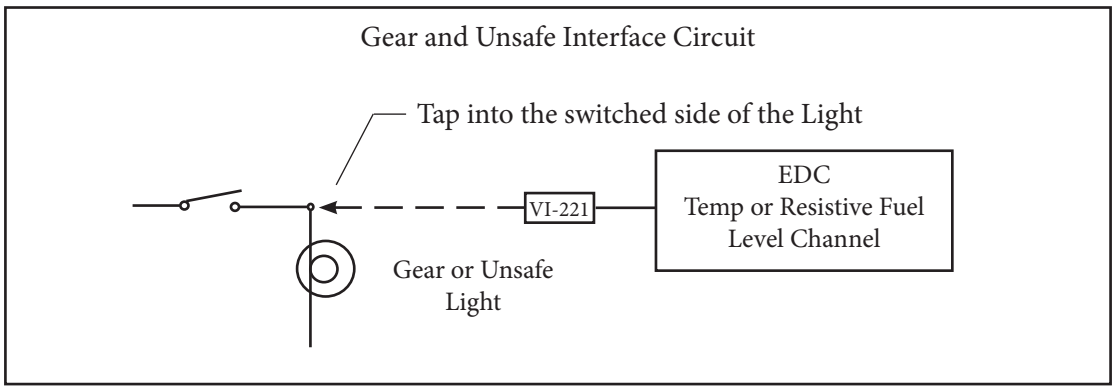
Note: ***When setting colors, use Green for down and White for up. Red will cause an error.***

Gear Up Warning: To provide a Gear Warning the MVP must monitor Gear Position, Airspeed and Manifold pressure. A voice warning is activated on the following logic:

(Any Gear is up -***OR***- the Unsafe Indicator is on) ***AND*** Airspeed is less than a set value ***AND*** N1 is less than a set value.

Note: ***See the "Aircraft Number, Gear Warning and TAS Setup" screen to set values.***

2.10 Install the CO Guardian CO Detector (Optional):



Install the CO Guardian 353-201 Remote Mount CO Detector in accordance with the appropriate CO Guardian installation instructions supplied with the unit. The CO Detector connects to RS232 Port 3 on the MVP.

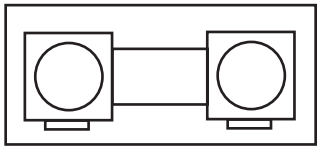
2.11 Install the Shunt:

An external shunt is a strip of metal, usually mounted on a bakelite base. This metal is made of special alloys to produce a very small, precise signal when current passes through it. It is not affected by temperature changes. If your aircraft currently has an external shunt you can calibrate your MVP to that shunt. The MVP will match any shunt on the market.

Install the External Shunt:

The external shunt should be installed in the starter-generator circuit and in an appropriate location that minimizes the routing of main cables. It should also be mounted in a location where inadvertent damage cannot occur. If the shunt can be accessed easily, it should be covered. When mounting the shunt, use self-locking or safety-wired nuts.

Shunt



The signal wires from the shunt to the EDC must be fused a short distance after they leave the shunt. If this is a new installation, install two in-line one-amp fuses in each of the signal lines from the shunt to the EDC Amp Input.

Note: If you are replacing an existing ammeter, the shunt may already be mounted in the aircraft. If you already have a shunt installed and know the value of the existing shunt, the MVP can be calibrated to that shunt.

2.12 Install the Fuel Flow Transducer:

The MVP can interface to many different types of flow transducers or the FT-180 Fuel Flow Transducer may be

considered for installation. The FT-180 should be mounted in the appropriate fuel line. Refer to the installation notes listed below.

A. Only the Electronics International FT-180 fuel flow transducer (or an equivalent unit) should be considered for use on a turboprop or jet engine. To ensure the pressure drop of the flow transducer is appropriate for the maximum flow rate for your engine, refer to the transducer's specifications and FAA document AC 23-16.

B. The Flow Transducer should be mounted so the fuel line exiting the transducer's output port travels up, even or drops no more than 4" per foot. If this is not possible, a loop should be put in the fuel line exiting the Fuel Flow Transducer. The flow transducer must be installed in the fuel line after the low pressure pump, before the high pressure pump.

C. Do not remove the yellow caps on the flow transducer until the fuel hoses are ready to be installed.

D. The flow of fuel through the transducer must follow the direction marked on the transducer.

E. The flow transducer must be mounted so the wires exiting the transducer are pointing up, or the cap with five bolts is pointing up, or the output port is pointing up, or any combination thereof.

F. Before connecting any hoses, thoroughly clean them and ensure they are free of any loose material. High air pressure may be used, however, **do not allow high air pressure to pass through the flow transducer.**

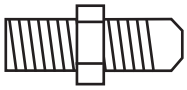
G. When mounting a Fuel Flow Transducer, make provisions for the Fuel Pressure Transducer as necessary.

H. If the flow transducer is hard mounted to a bracket, **DO NOT connect the Black Ground Wire** on the flow transducer. The bracket will provide the necessary ground to the transducer.

I. You may want to consider using some fittings and hoses shown below.

2.13 Install the P-300C Fuel Level Probes:

<u>Fittings:</u>

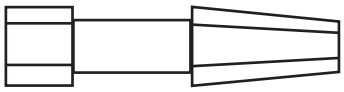
1/4" NPT  Flare

#4 Straight - AN816-4-4D
#6 Straight - AN816-6D
#8 Straight - AN816-7D

#6 45° - MS20823-6D

#4 90° - MS20822-4-4D
#6 90° - MS20822-6D

<u>Hose Fittings:</u>

Flare  Hose

Straight - MS24587-XX, Stratoflex 300-, Aeroquip 400-
45° - MS27226-XX, Stratoflex 646- and 640, Aeroquip 980006
90° - MS27224-XX, Stratoflex 649- and 643, Aeroquip 980005

NOTE: The Stratoflex teflon hose can be much more flexible and easier to route than most existing hoses. If you have a hard-to-fit installation, you might want to consider this hose.

Important Note: Aluminum fittings should only be used when the flex lines are mounted on the inlet of the flow transducer. Otherwise, steel, stainless steel (SS), or brass should be used.

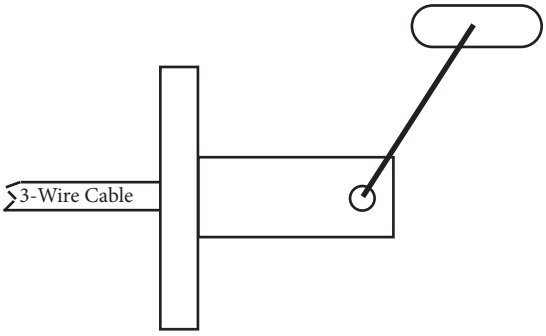
Install the P-300C (Capacitive) Fuel Level Probes in accordance with the aircraft manufacturer's instructions.

2.14 Install the P-300M Magnetic Fuel Level Sender:

The MVP system can interface with an aircraft's existing resistive fuel sensors via the RFLM-4 or these resistive fuel level sensors can be replaced with the P-300M (Magnetic Float) Fuel Level Sender. The signal produced by the P-300M Sender is a linear voltage output designed to work with the MVP system.

The P-300M's float arm and travel must match the aircraft's existing sender's arm and travel. Due to the lack of information from aircraft manufacturers, the existing sender may need to be removed from the aircraft and sent to Electronics International. This way, the P-300M's float arm and travel can be matched with the aircraft's existing sender. Contact Electronics International for further information.

The P-300M has the same bolt pattern as resistive fuel senders. The P-300M requires three wires to interface to the EDC (resistive senders only use one wire).



Note: Calibrating the MVP system to a fuel tank can compensate for nonlinearity in the tank's shape and nonlinearity in the resistive fuel level sensor. The MVP cannot correct for inconsistent or non-repeatable signals from resistive fuel level senders. Unfortunately, many older resistive fuel level senders (and in some cases, newer resistive senders) exhibit some of the following problems:

- Variation in the wiper-to-element resistance (CRV).
- Stick slip problems with bearings and wiper-to-element contact.
- Windup causing jumps in readings.
- Weak wiper tension.
- Loose or worn bearings, causing fluctuations in readings.
- Worn out wiper.
- Corroded wiper.
- Corroded or worn element.
- Build up of varnish on the wiper and element.
- Water logged floats.

If you find inconsistent or inaccurate fuel level readings (due to a defective resistive fuel level sender), you must have the sender replaced. Inaccurate readings can lead to a dangerous situation. The MVP depends on the fuel level sender for accurate fuel level information. ***Read the "Important Notice" in the MVP Operating Instructions.***

The P-300M is a float type fuel level sender that uses a magnet and pickup device to detect the float position and produce an accurate signal for the MVP system. The P-300M has no wiper or resistive element and there is no tension on the bearings. It is not subject to the numerous problems associated with resistive type senders. The P-300M has nothing to wear out or affect inaccurate fuel level readings. Also, the P-300M does not require electricity to flow through an element and wiper saturated in fuel.

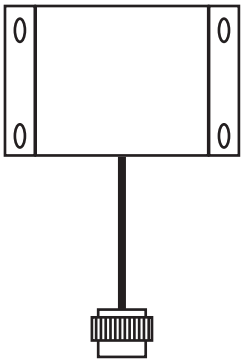
2.15 Install the Resistive Fuel Level Module (RFLM-4-X):

The RFLM-4 is a Resistive Fuel Level Module that provides pull-up resistors for 4 resistive fuel level sensors. This

module is required to interface an EDC Resistive Fuel Level Input to a resistive fuel sensor. There are two RFLM-4 modules available. The RFLM-4-12V operates on a 12-volt electrical system and the RFLM-4-24V operates on a 24-volt electrical system. The appropriate model must be used in your installation.

Mount the RFLM-4-X to the inside firewall or to an equipment bay under the aircraft instrument panel. Use the holes in the bottom plate to mount the unit. Only two mounting holes are required.

Note: For each Fuel Level Channel on the EDC you can use either the Resistive Input or the Capacitive Input, but not both.



To EDC Resistive Fuel Level Inputs (Bottom Connector) and the Fuel Level Sensor

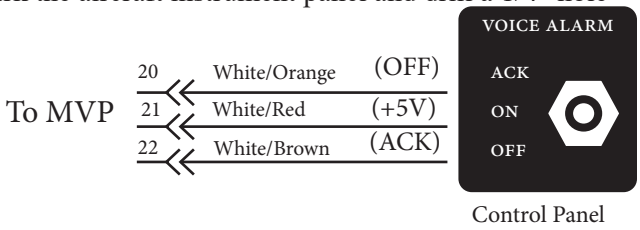
2.16 Install the Voice Alarm Control Panel (AV-17CP) (Optional):

If the voice alarms provided by the MVP are to be used, the AV-17CP Control Panel will need to be installed in the aircraft instrument panel.

A. Locate the Control Panel and Switch in the AV-17CP packet. Find an appropriate mounting location on the aircraft instrument panel for the Control Panel and Switch. The Switch will require a 3/4" clearance behind the aircraft instrument panel.

B. Using the AV-17CP Control Panel as a template, mark the aircraft instrument panel and drill a 1/4" hole for the AV-17CP Switch.

C. Mount the Switch from behind the aircraft instrument panel. Be careful not to damage the screenprinting on the Control Panel. The Switch must be mounted with the **white/orange wire up**. The lock washer should be mounted on the Switch and behind the aircraft instrument panel.



Control Panel

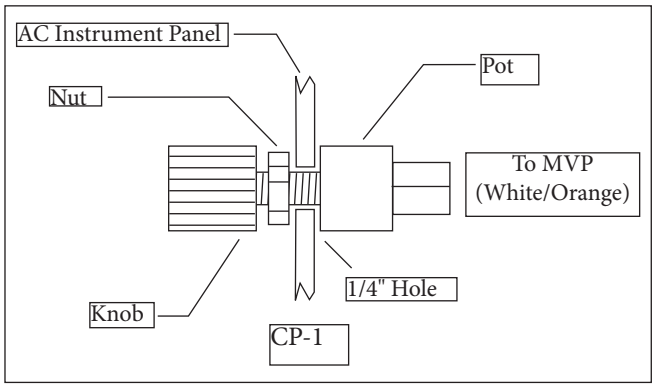
2.17 Install the Intensity Control Pot (CP-1) (Optional):

The display intensity of the MVP may be controlled internally with an electric eye or externally with a Intensity Control Pot (CP-1). The selection is pilot programmable. If the intensity is to be controlled externally, a CP-1 will need to be installed in the aircraft instrument panel.

A. Locate the Intensity Control Pot in the CP-1 packet. Find an appropriate mounting location on the aircraft instrument panel for the Control Pot. The Pot will require a 2" clearance behind the aircraft instrument panel.

B. Mark the aircraft instrument panel and drill a 1/4" hole for the Pot.

C. Mount the Pot from behind the aircraft instrument panel and install the knob.



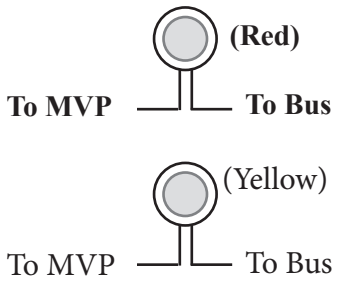
2.18 Install the Master Warning (red) and Caution (yellow) Lights (Optional):

The Warning and Caution Lights do not have to be installed unless the MVP is installed more than 8" from the pilot's visual centerline.

A. Locate the Red (AL-1R) and Yellow (AL-1Y) lights in the kit. Find an appropriate mounting location within 8" of the pilot's visual centerline. The lights will require 3/4" clearance behind the aircraft instrument panel.

B. Mark the aircraft instrument panel and drill a 5/16" hole for each light. Install the Red Warning Light and the Yellow Caution Light from behind the aircraft instrument panel.

Note: ***If the MVP Master Warning and Caution Outputs are connected to other lights or devices, the current must be limited to 0.1 amps. The outputs pull to ground when active.***



2.19 Install the USB-6A (Optional):

The USB-6A is a FAA PMA'd standalone unit that provides a USB port. The USB-6A may be installed using the instructions provided with the USB-6A unit.

2.20 Install the FM-SC or AC-1 Converter (Optional):

The FAA PMA'd FM-SC and AC-1 are used to convert engine data from a FADEC unit to the MVP-50. To install the converter, follow the instructions provided with the appropriate unit.

2.21 Install the BC-5xx (Optional)

The BC-5xx provides an interface between engine and aircraft devices and the MVP-50. The BC-5xx comes with schematics and installation instructions specific to the application. Install the BC-5xx at this time in accordance with the provided documentation.

2.22 Install the NA-1 (Optional)

The NA-1 plugs into the USB port on the front of the MVP-50. The Trend Capture option provides trend data as well as flight data to a diagnostics provider or for self diagnostics. Only the data provided by the MVP is collected. Contact E.I. for activation details.

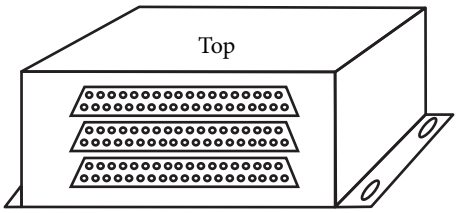
2.23 Install any Additional Modules (Optional):

Some functional modules and sensors are provided with their own schematics (GS-3, FM-GSI, FM-Flow-xx, FM-ACVF-1, FM-RPM-xx, FM-DPIM-1, FM-VA-3, FM-ACK, FM-Boost, etc.). The functional modules provide an interface from the various aircraft functions to the EDC-33T. Install these modules and sensors at this time in accordance with the provided documentation.

2.24 Installing the EDC-33T:

The EDC-33T (Engine Data Converter) converts all of the analog engine signals into serial data which is output to the MVP display via two wires (RS422). The EDC unit measures 4.5" long by 3.5" wide by 2.2" high. There are three 37-pin D-sub connectors that interface to the various probes, modules or direct connections to the aircraft.

Mount the EDC (with the connectors pointing down) on the inside firewall under the aircraft instrument panel or in an equipment bay. The EDC **SHOULD NOT** be installed in a location where it can be pressure washed. For a twin-engine aircraft, the EDC can be mounted on the opposite side of the firewall of the engine or in the cabin or equipment bay. Use the holes in the bottom plate of the EDC to mount the unit. Be sure you will have enough room to connect the three D-sub connector wire harnesses to the EDC.
Note: ***If you run out of channels on the EDC, a second EDC may be installed and connected to the MVP.***



EDC-33T

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3.0 INSTALL THE EDC WIRE HARNESSES AND ROUTE WIRES

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3.1 Attach the three EDC 37-pin wire harnesses to the EDC: 37
3.2 Connect the EDC Harness to the Temperature Probes: 37
3.3 Connect the EDC Harness to the Pressure Transducers: 37
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3.7 Connect the EDC Harness to the Capacitive Fuel Level Probes: 39
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3.13 Route the EDC RS422 Wires to the MVP Connector: 41

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When routing the EDC wire harnesses refer to the Top, Middle and Bottom "EDC Wiring Work Sheets" found at the back of this manual. Ensure no wires obstruct the freedom of travel of any controls.

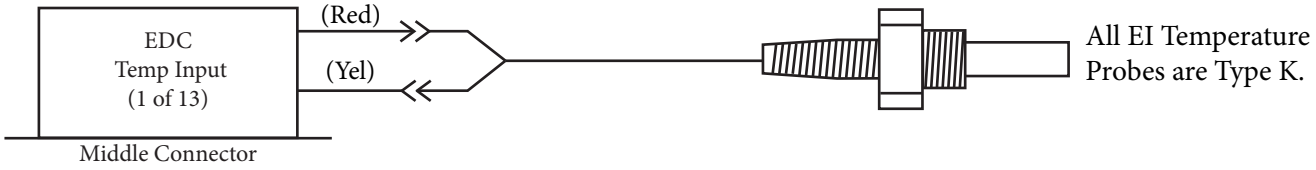
3.1 Attach the three EDC 37-pin wire harnesses to the EDC:

Secure the connectors using the supplied mounting screws.

3.2 Connect the EDC Harness to the Temperature Probes:

Route each of the temperature cables in the EDC harness to the appropriate temperature probe. Cut the wires to length, install the appropriate connectors (see the “Working with Connectors” section of this manual for more information) and connect to the temperature probe. When connecting to a temperature probe, leave some slack in the cable exiting the probe to prevent damage to the probe over time.

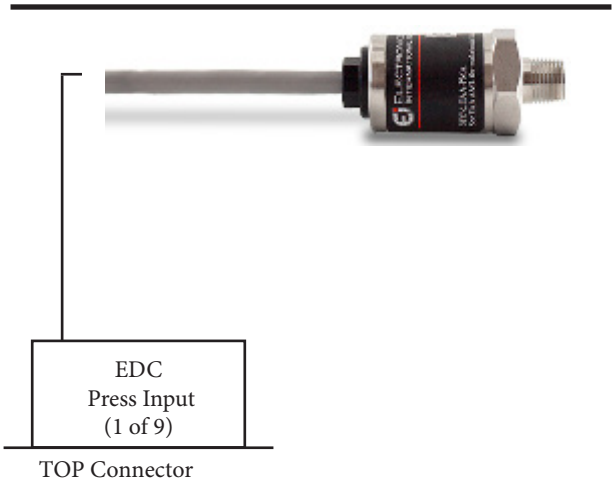
All Type K Temperature Probes



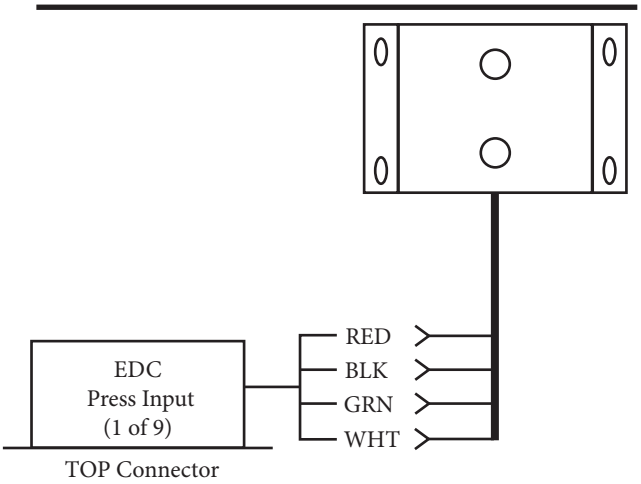
3.3 Connect the EDC Harness to the Pressure Transducers:

Route each of the pressure cables in the EDC harness to the appropriate pressure transducers. Cut the wires to length, install the appropriate connectors (see the “Working with Connectors” section of this manual for more information) and connect to the pressure transducer. When connecting to a pressure transducer, leave some slack in the cable exiting the transducer to prevent future damage to the transducer.

PT-30GA, PT-100GA, PT300GA, PT-3000S
Pressure Transducers:



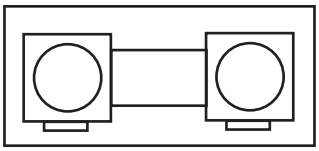
PT-30ABS, PT-60ABS, PT-05Diff, PT-04H20
Pressure Transducers:



3.4 Connect the EDC Harness to the Shunt:

Route the EDC Amps wires to the Shunt. The way the Shunt is installed in the aircraft determines which lug of the shunt is "+". The wire on the "+" lug is routed to the starter-generator. The EDC (+)Amp Input wire (***white***) should be connected to the small lug on the "+" side of the Shunt. The EDC (-)Amp Input wire (***green***) should be connected to the small lug on the "-" side of the Shunt.

Shunt

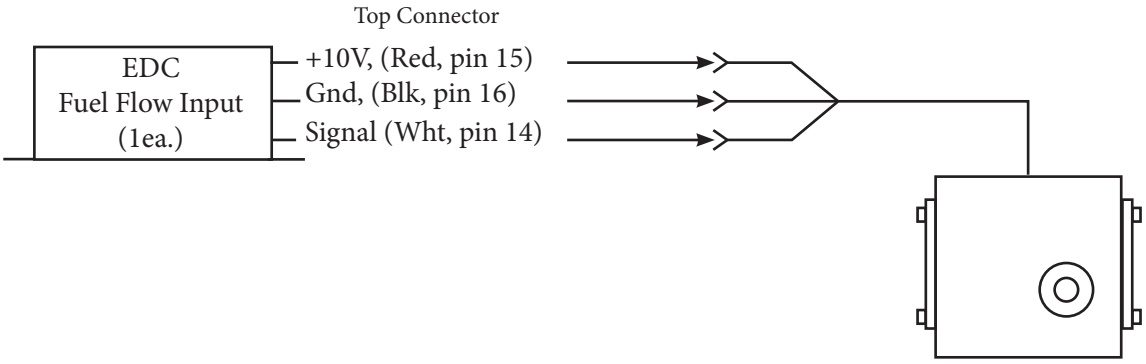


3.5 Connect the EDC Harness to the Fuel Flow Transducer:

Route the fuel flow cable in the EDC harness to the Fuel Flow Transducer. Cut the wires to length, install the appropriate connectors (see the “Working with Connectors” section of this manual for more information) and connect to the fuel flow transducer. When connecting to the Fuel Flow Transducer, leave some slack in the cable exiting the transducer to prevent future damage to the transducer.

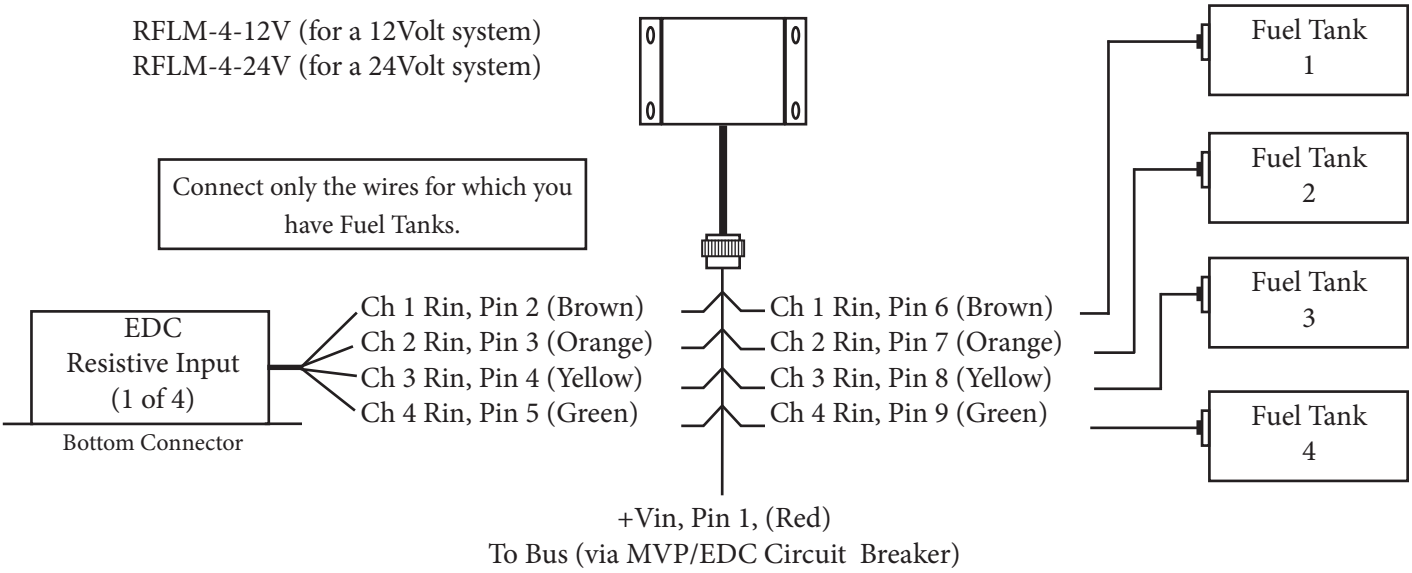
If the flow transducer is hard mounted to a bracket, **DO NOT connect the Black Ground Wire** on the flow transducer. The bracket will provide the necessary ground to the transducer.

FT-60, FT-90, FT-180
Fuel Flow Transducers:



3.6 Connect the RFLM-4-x Harness to the EDC Connector and to the Resistive Fuel Level Sensors:

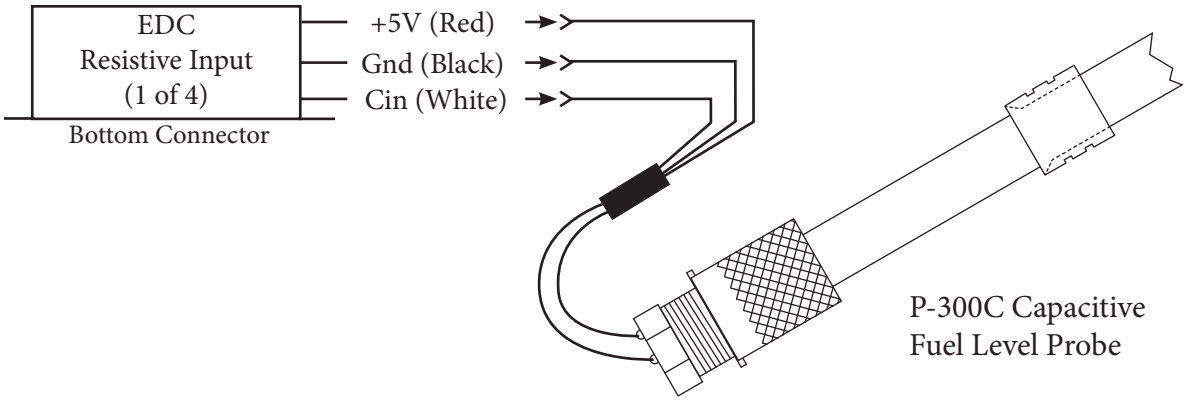
Route the appropriate resistive fuel level input wires (for the number of tanks to be monitored) in the RFLM-4-x harness to the EDC Bottom Connector. Plug the wires into the appropriate resistive fuel level channels. The excessive wire can be cut and spliced, bundled and tie wrapped up or cut to length and new D-Sub pin installed (see the "Working with Connectors" section of this manual for more information). Route and connect the corresponding wires in the RFLM-4-x wire harness to the appropriate fuel tank sensors. Route the red wire (in pin 1 of the RFLM-4-x connector) to the aircraft bus via the MVP/EDC 5-amp circuit breaker.



3.7 Connect the EDC Harness to the Capacitive Fuel Level Probes:

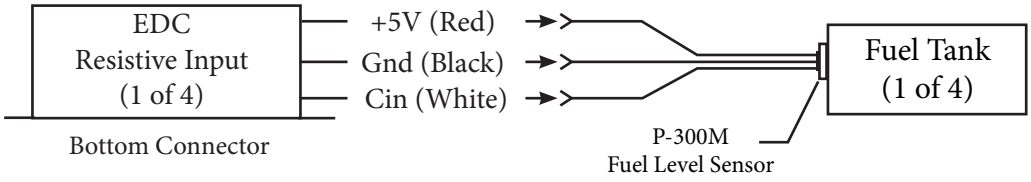
Route the appropriate capacitive fuel level wires (for the number of tanks to be monitored) in the EDC harnesses to the capacitive fuel level probes. Cut the wires to length, install the appropriate connectors (see the "Working with Connectors" section of this manual for more information) and connect to the capacitive fuel level probe.

Note: The capacitive fuel level channels are shared with the resistive channels. A single capacitive and resistive channel cannot be used simultaneously



3.8 Connect the EDC Harness to the P-300M Magnetic Fuel Level Senders:

Route the appropriate fuel level wires (for the number of tanks to be monitored) in the EDC harnesses to the P-300M magnetic fuel level senders. Cut the wires to length, install the appropriate connectors (see the "Working with Connectors" section of this manual for more information) and connect to the P-300M fuel level sender.

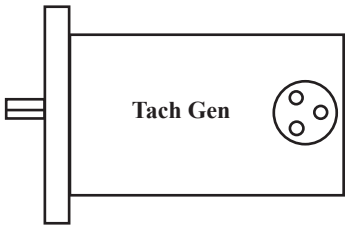


3.9 Connect the EDC Harness (Volts Measurement Pin) to the Bus:

Pin 35 of the EDC top connector monitors bus voltage. Connect this pin to the bus to be monitored.

3.10 Connect the EDC Harness to the N1 and/or N2 Tach Generator:

Most N1 and N2 Tach Generators provide an output signal on two or three pins. Most often the output signal is referenced to ground. To connect the EDC harness to the N1 and/or N2 Tach Generator perform the following:



1). ***Determine if the Tach Generator output signal is ground referenced:*** Ohm the output pins to ground. If the Ohm reading is less than 200 ohms, the output signal is ground referenced.

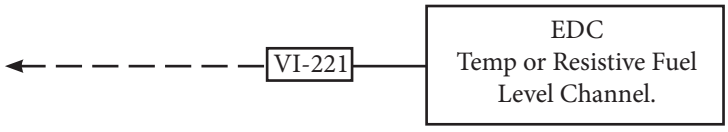
2). ***Connecting the EDC harness to a ground referenced Tach Generator:*** Connect the wire from the appropriate EDC harness to one of the output pins on the N1 and/or N2 Tach Generator. You're Done.

3). ***Connecting the EDC harness to an ungrounded Tach Generator:*** Ground one of the output pins of the Tach Generator and connect any one of the other pins to the appropriate wire in EDC wire harness. You're Done.

Note: The Walters Tach Generators have four output pins. Connect the "A" pin to ground and connect the "B" pin to the appropriate wire in EDC wire harness.

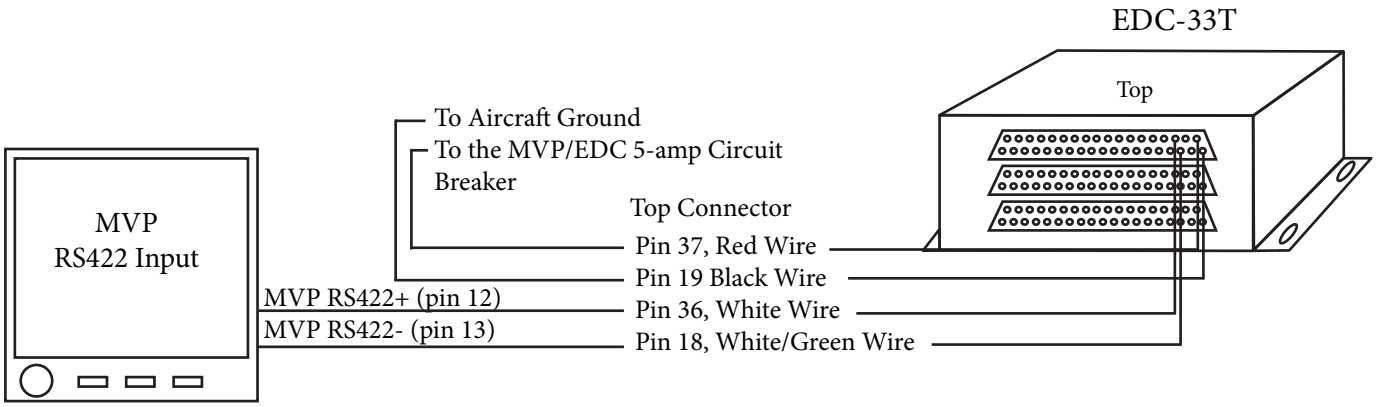
3.11 Connect the EDC Harness to the VI-221's (Voltage Interface Units):

Route the appropriate EDC wire to the VI-221's that were used to interface the Gear Position Lights, Unsafe Light, Flap Position, Trim Position and/or any indicator to the EDC.



3.12 Connect the EDC Harness to Power and Ground:

Route the power wire (Top Connector, pin 37, Red Wire) to the MVP/EDC 5-amp Circuit Breaker. Route the ground wire (Top Connector, pin 19, Black Wire) to the aircraft ground.



3.13 Route the EDC RS422 Wires to the MVP Connector:

Route the **RS422-** (white/green wire) and the **RS422+** (white wire) to the MVP connector. These wires will be connected to the MVP RS422 wires in a later step. If a second EDC is installed, see the appendix for connection information.

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4.0 INSTALL THE MVP WIRE HARNESS AND ROUTE WIRES

4.0 Install the MVP Wire Harness and Route Wires 43
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4.7 Connect the MVP Harness to the Moving Map Data Out from the GPS (Optional): 46
4.8 Connect the MVP Harness to the Fuel Data Input on the GPS (Optional): 46
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4.10 Connect the MVP Harness to Power and Ground: 47
4.11 Connect the MVP Harness to the CO-Guardian CO Detector (Optional): 47
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When routing the MVP wire harness refer to the "MVP-50 25-pin D-Sub Connector Wiring Diagram" found at the back of this manual. Ensure no wires obstruct the freedom of travel of any controls.

4.1 Attach the MVP 25-pin D-sub Connector to the MVP:

Secure the connector using the supplied mounting screws.

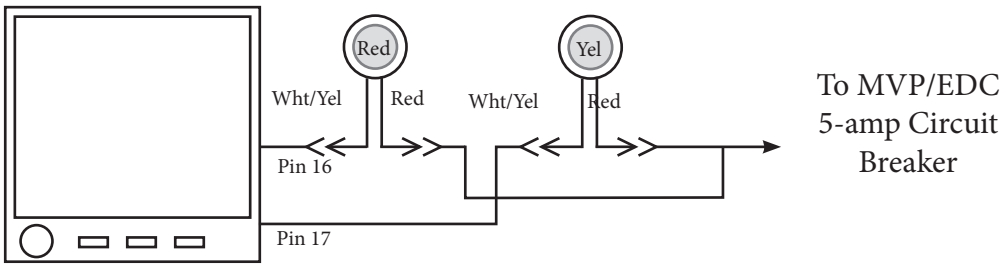
4.2 Connect the EDC RS422 Wires to the MVP RS422 Wires:

Route the EDC RS422 wires to the back of the MVP Display, cut the wires to length and connect them to the appropriate MVP RS422 wires.

4.3 Connect the MVP Harness to the Master Warning and Caution Lights (Optional):

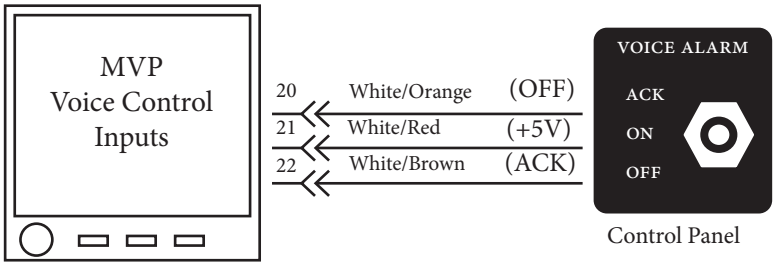
If the Warning and Caution Lights are installed, route the MVP Master Warning Out wire (White/Yellow, Pin 16) to the Master Warning (Red) Light (AL-1R) White/Yellow wire, cut the wires to length, install the appropriate connectors (see the “Working with Connectors” section of this manual for more information) and connect to the AL-1R.

Route the MVP Master Caution Out wire (White/Yellow, Pin 17) to the Master Caution (Yellow) Light (AL-1Y) White/Yellow wire, cut the wires to length, install the appropriate connectors (see the “Working with Connectors” section of this manual for more information) and connect to the AL-1Y.



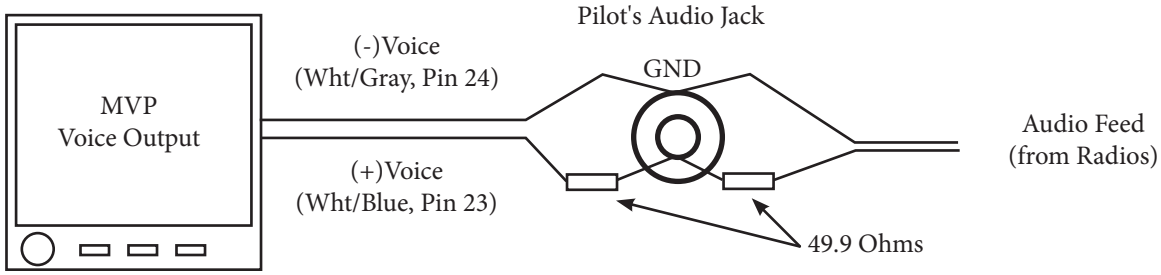
4.4 Connect the MVP Harness to the Voice Alarm Control Panel (AV-17CP) (Optional):

If the voice alarms provided by the MVP are to be used, route the three MVP Voice Control wires to the AV-17CP, cut the wires to length, install the appropriate connectors (see the “Working with Connectors” section of this manual for more information) and connect to the AV-17CP.



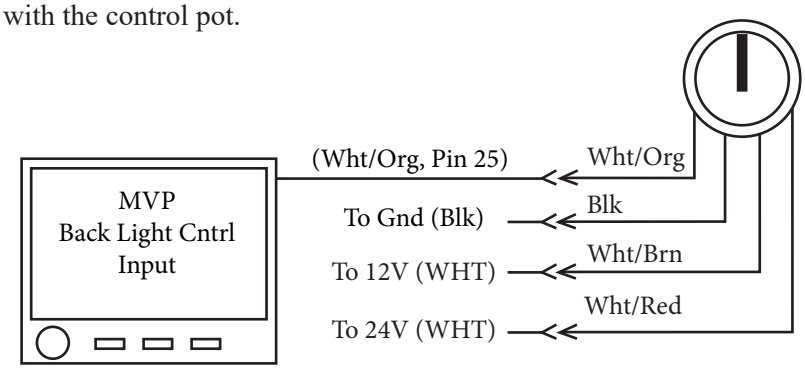
4.5 Connect the MVP Harness to the Audio Panel (Optional):

If the voice alarms provided by the MVP are to be used, route the two MVP Voice Warning Out wires to the Audio Panel, cut the wires to length and connect to the Audio Panel Aux input and ground. If an audio input is not available on the Audio Panel (or an Audio Panel is not installed) you can connect the MVP Voice Warning Out wires to the pilot headset jack. With this installation a 49.9 ohm 1/4 watt resistor will need to be installed in series with the MVP +Voice Warning Out wire and the feed wire to the jack.



4.6 Connect the MVP Harness to the External Intensity Control Pot (CP-1) (Optional):

If the MVP display intensity is to be controlled externally, route the MVP Back Light Control In wire (orange) to the CP-1, cut the wires to length, install the appropriate connectors (see the “Working with Connectors” section of this manual for more information) and connect to the CP-1. Install the ground and power wires to the CP-1 as shown in the paper work supplied with the control pot.

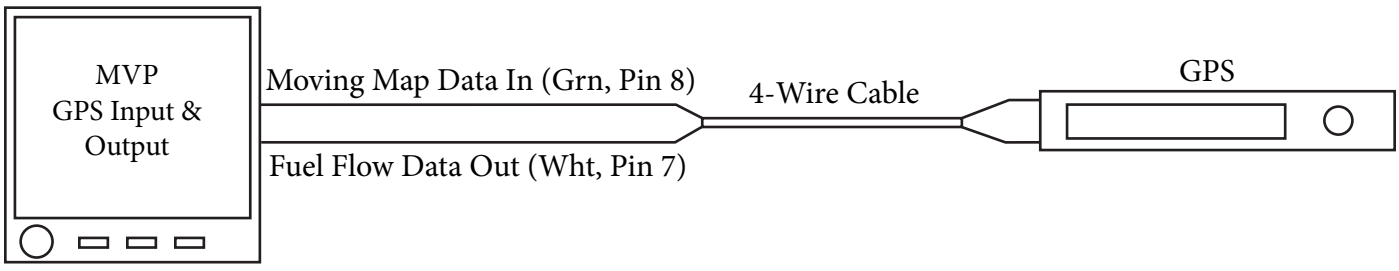


4.7 Connect the MVP Harness to the Moving Map Data Out from the GPS (Optional):

Route the MVP "Moving Map Data In" wire (green wire in a 4 wire cable) to the Moving Map Data Output Port on the GPS. Cut the wire to length, install the appropriate connector and connect to the GPS port.

4.8 Connect the MVP Harness to the Fuel Data Input on the GPS (Optional):

If fuel data is to be viewed on the GPS, route the MVP "Fuel Data Out" wire (white wire in a 4-wire cable) to the Fuel Data Input Port on the GPS. Cut the wire to length, install the appropriate connector and connect to the GPS port.



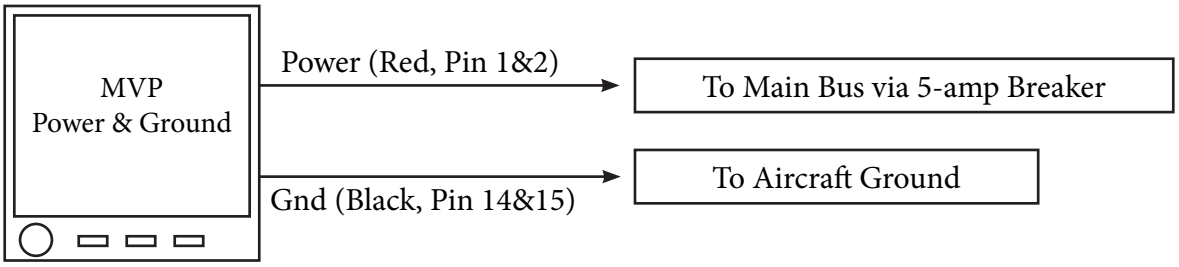
4.9 Connect the MVP "Transmit Lockout Input" pin to the Transmit Key (Optional):

Pulling the MVP Transmit Lockout Input pin to ground freezes the displayed values for the various functions. This eliminates jumpy readings during transmit. In most (if not all) cases, the MVP “Transmit Lockout Input" does not need to be connected. If transmit lockout is required, attach the appropriate pin (see the “Working with Connectors” section of this manual for more information) to a 20 gauge wire. Install the wire with pin into position 3 of the MVP connector. Route and attach this wire to the transmit key.

4.10 Connect the MVP Harness to Power and Ground:

Route the power wire (red) to the main bus via a 5-amp Circuit Breaker. Route the ground wire (black) to the aircraft ground.

WARNING: The power wire is RED and is connected to pin 1 and 2 on the MVP. If aircraft power is connected to any pin on the MVP other than pin 1 and 2, damage to the MVP and any connected hardware may occur. Ensure power is provided on pin 1 and 2 of the MVP before attaching the connector.



4.11 Connect the MVP Harness to the CO-Guardian CO Detector (Optional):

If a CO detector was installed, connect the RS232 output from the Remote Mounted 353-201 (experimental only) or 452-201-011 (certified) CO Detector to Pin 11 (Port 3 In) on the MVP. Refer to CO-Guardian’s installation instructions for further information on the CO Detector.

Note: The CO Detector shares the same port on the MVP as the second EDC. If the CO Detector is installed, a second EDC cannot be installed.

4.12 Connect to the MVP RTDO Port (Optional):

The RTDO (Real Time Data Out) port provides a method for interfacing the MVP-50T to external devices. This port is isolated for the operation of the MVP and its system components. If this port is to be used, connect it to the external device at this time.

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5.0 MANDATORY SYSTEM SETUP AND CHECKOUT

5.0 Mandatory System Setup and Checkout 49
5.1 Power-On Checkout: 51
5.2 Perform all Steps listed in the "MVP-50T Setup Checklist": 51
5.3 Ground Run Checkout: 51
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5.5 Read the "Warranty/Agreement" and the "Important Notice": 52
5.6 POH/AFM Supplement: 52

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5.1 Power-On Checkout:

Turn the aircraft master switch on. The MVP will power up and perform a system test. After approximately 14 seconds, the MVP will display the “Main Engine” screen with an add fuel message. Press any button to continue. If you have a problem with any of the following steps, see the Troubleshooting section of this manual.

A. Check the N1 and N2 for a reading of 000.
B. Check Fuel Flow for a reading of 00.0.
C. Check Oil Pressure for a reading of 00.
D. Check Oil Temp to read ambient temperature.
E. Check Volts for proper reading.
F. Check Amps for proper reading (000 when monitoring the Gen. Out).
G. Check OAT to read ambient temperature outside the aircraft.
H. Check all Annunciators for proper operation.
I. Check gear indications on the System screen to operate properly.
J. Check all other functions on the Main and System screen to operate properly.

Note: ***Fuel Level, Trim, Flaps and Pressure Altitude may not read properly until they have been calibrated.***

5.2 Perform all Steps listed in the "MVP-50T Setup Checklist":

A Setup Checklist is provided with your kit. Each step listed in the checklist must be completed before continuing with this installation.

5.3 Ground Run Checkout:

Before starting the engine, test the N1, N2 and ITT functions for proper operation. **If an important function does not appear proper during any phase of the start, abort the start.** Electronics International produces Field Test Devices that output signals to emulate ITT, N1, N2, Oil Pressure, Fuel Pressure, Oil Temperature, Fuel Flow, shunts and Resistive and Capacitive Fuel Sensors. These devices can be used to test the wiring, connections, functionality and accuracy of the MVP system installed in the aircraft. See EI's pricelist for more information. Consider testing the installation with Field Test Devices before starting the aircraft.

Start the aircraft engine. Follow all the airframe and engine manufacturer's procedures. Check that the values for each function displayed on the MVP are proper for "engine on" operation. Any problem with a specific function will be associated with a probe, cable or interconnect between the probe and the EDC for that function. If you have a problem with any function, see the Troubleshooting section of this manual.

Turn the engine off. Inspect the entire system for interference with controls, loose fittings, connections, clamps, probes, and inspect for leaks, chafing, obstructions, heat damage and any thing that may cause unsafe flight. Check that all fittings are tight.

5.4 First Flight Checkout:

Prepare the aircraft for flight. Fly the aircraft in the pattern. Check for proper operation of each function displayed on the MVP. Land the aircraft and perform the following checks as soon as possible:

A. Check all fittings, hoses and transducers for leaks.
B. Check all fittings, hoses, wires, system components and hardware to be secure and are not chafing.
C. Check for interference to any controls.
D. Check for any unsafe condition.

Do not release the aircraft for normal operation until all steps in this document have been performed and the aircraft is safe to fly.

5.5 Read the "Warranty/Agreement" and the "Important Notice":

Require the pilot to read the "Warranty/Agreement" and the "Important Notice" located in the front of the "Operating Instructions" before releasing the aircraft for flight.

5.6 POH/AFM Supplement:

The "MVP-50T Primary Engine Monitor FAA-Approved POH/AFM Supplement No. 06271101, Rev. IR" document (or later FAA approved revision) must be completed and inserted into the Airplane Flight Manual. If you need additional copies of the supplement please contact Electronics International at (541) 318-6060 or www.iFlyEi.com.

6.0 INSTALLATION DATA

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6.1 Instructions for Continued Airworthiness (ICA):

The MVP-50T Instructions for Continued Airworthiness are listed in EI document 06201101 Rev A (or latter FAA approved revision). If you need additional copies of the ICA contact Electronics International at (541) 318-6060 or www.iFlyEi.com.

6.2 Airworthiness Limitations:

The Airworthiness Limitations are listed in the MVP-50T ICA Doc. 06201101 Rev A (or latter FAA approved revision). If you need additional copies of the ICA contact Electronics International at (541) 318-6060 or www.iFlyEi.com.

6.3 Working With Connectors:

The single biggest problem seen with installations is poor crimps. Even installers with many years of experience can produce poor crimps and do not know how to evaluate a crimp. The more sophisticated the connector, the bigger the burden is on the installer to find a good crimper and produce a reliable crimp.

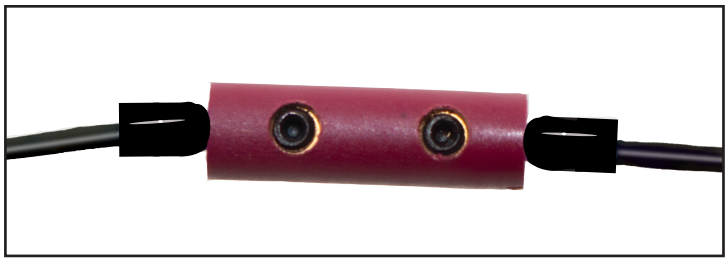
If the instructions listed below are followed, a reliable crimp can be achieved with almost any terminal crimper. DO NOT use pliers, cutters or any other tool that was not designed to crimp terminal connectors. It will NOT produce a long-term reliable crimp and eventually you will have problems.

The real key to achieving a long-term reliable crimp is to PREPARE the wire correctly, produce a TIGHT crimp and TEST the crimp. Another factor, which we have covered for you, is to use a quality connector made of material with long-term spring tension. This is most important when crimping connectors onto thermocouple (TC) wire. TC wire is strong and does not form like tin copper wire.

It is very easy to produce a good crimp. Unfortunately, it is just as easy to produce a bad one. **Read the instructions below.** A proper crimp will produce a reliable connection for a lifetime.

6.3.1 Installing the Over-Lap Connector onto Copper or TC Wire:

The OLC-2 connector bonds the two mating wires together in a gas-tight, cold-weld style junction. This is done by overlapping the wires and tightening a setscrew. Since the wires are overlapped and no dissimilar metals are introduced, the OLC-2 can be used as a precision connector. Use the OLC-2 on 20 gauge wire (or smaller) and where extreme reliability is required. ***Follow the instructions that come with the OLC-2 connectors.***



OLC-2

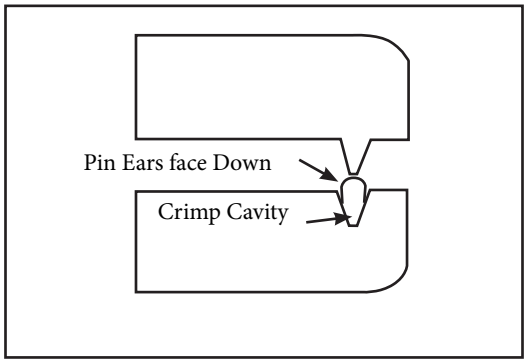
6.3.2 Installing a D-sub Pin onto a TC or Tin Copper Wire:

D-sub pins are used in D-sub connectors found on the EDC and the MVP. Most of these pins have already been installed on the appropriate wires and inserted into the proper connector. To install a D-sub pin requires a D-sub crimp tool. Most electronic stores carry a reasonably priced D-sub crimp tool. This tool will work for installing D-sub pins onto tin copper wire but it may not make good crimps on 24 gauge thermocouple wire. A pull test can be performed to test the crimp. A ratcheting crimp tool from Tyco (P/N: 91503-1) will crimp both TC and Tin Copper Wire. All crimps must pass a 3 to 4 pound pull test to be considered reliable.

To install a D-sub pin onto a 20 gauge Tin Copper Wire, perform the following steps:

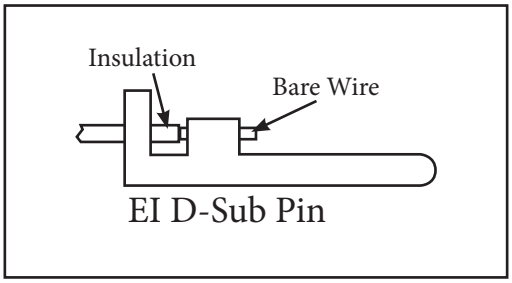
A. Strip the insulation back 1/8." **Be careful not to knick the wire**.

B. Insert the pin into the 24 gauge D-sub Pin Crimper. The crimpers have two cavities; the smaller one is used to crimp the bare wire and the slightly larger one is used to crimp around the insulation. Check that the pin is inserted into the crimpers properly. ***Note: the ears on the pin must be facing into the center of the crimp tool cavity to produce a good crimp. If the pin rotates even a little during crimping, the connection will be unreliable.***



End View
D-Sub Pin in the Crimp Tool

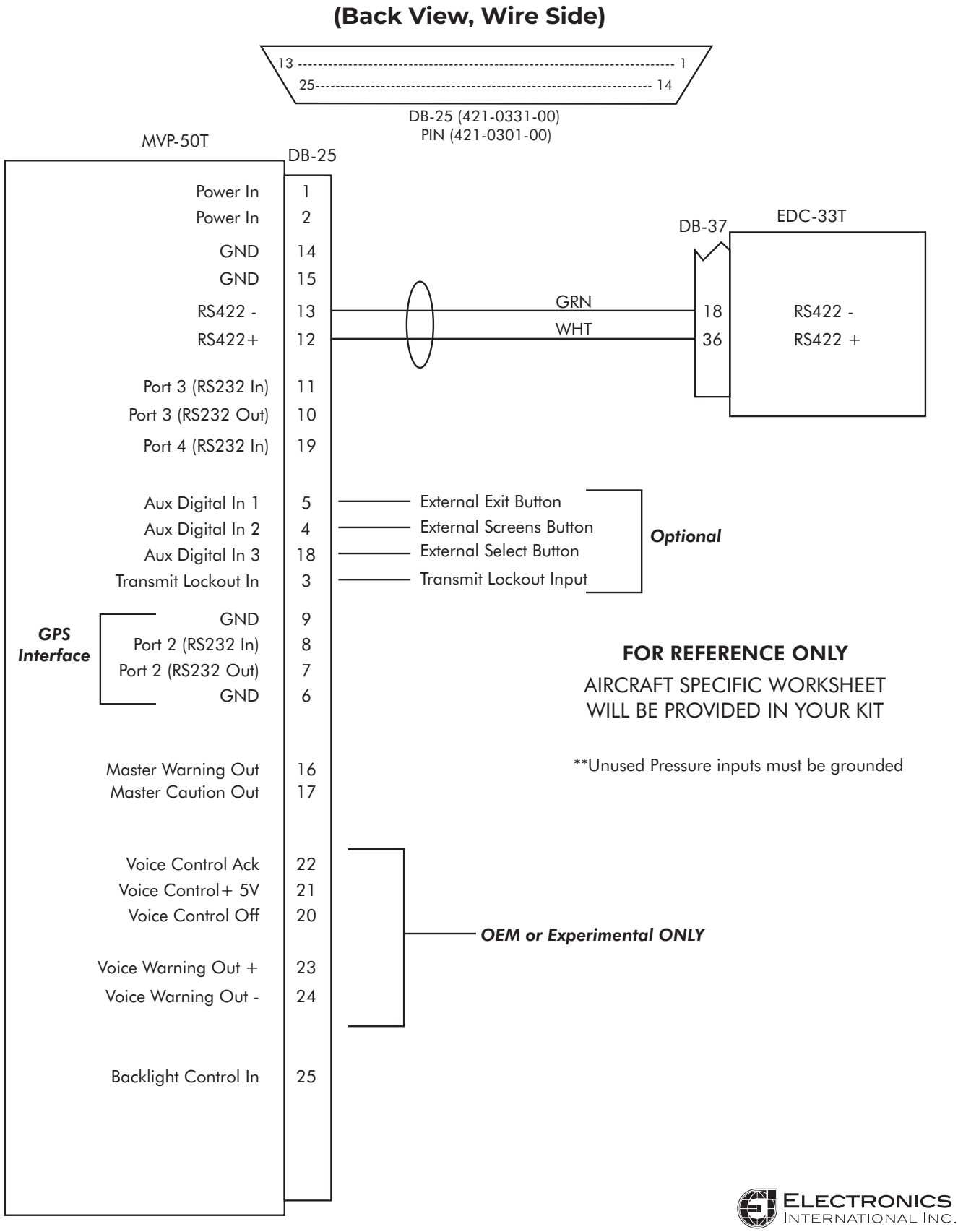
C. Insert the wire into the pin. Check that the insulation is in the strain relief crimp area but not in the bare wire crimp area. Crimp the pin onto the wire. A good crimp is very important. **Poor crimps will cause jumpy readings and are the biggest source of problems.**
D. Pull Test: Pull (approximately 3 to 4 pounds) on the wire near the connector with one hand while



holding the connector with the other hand. If the wire pulls out of the connector, you must start over using a new connector.

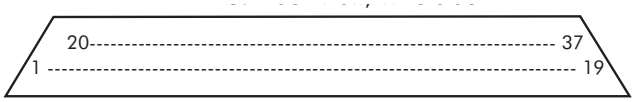
E. A well soldered connection at the crimp can be reliable. Soldering a TC wire requires a lot of heat to produce a good solder connection. Also, when soldering a TC wire, each wire should be scraped with a knife to expose fresh metal just before crimping and applying solder. Fluxing the TC will allow the solder to flow better; however, **DO NOT use acid core solder or acid flux.**

MVP-50T 25-pin D-sub Connector Wiring Diagram



EDC Wiring (Top Connector)

(Back View, Wire Side)



EDC-33T
(TOP CONNECTOR)

		DB-37
	Power	37
	GND	19
	RS422 -	18
	RS422 +	36
	Volts	35
	+Amps	32
	-Amps	33
Fuel Flow	+10V	15
	GND	16
	Signal In	14
Pressure Ch 1	+ 5V	20
	GND	21
	+Signal In	3
	-Signal In	2
	Extra GND	1
Pressure Ch 2	+ 5V	22
	GND	23
	+Signal In	5
	-Signal In	4
Pressure Ch 3	+ 5V	24
	GND	25
	+Signal In	7
	-Signal In	6
Pressure Ch 4	+ 5V	26
	GND	27
	+Signal In	9
	-Signal In	8
Pressure Ch 5	+ 5V	28
	GND	29
	+Signal In	11
	-Signal In	10
Pressure Ch 6	+ 5V	30
	GND	31
	+Signal In	13
	-Signal In	12
	Do Not Use	17
	Do Not Use	34

GRN — DB-25 pin 13 — RS422 -
WHT — DB-25 pin 12 — RS422 +

MVP-50T

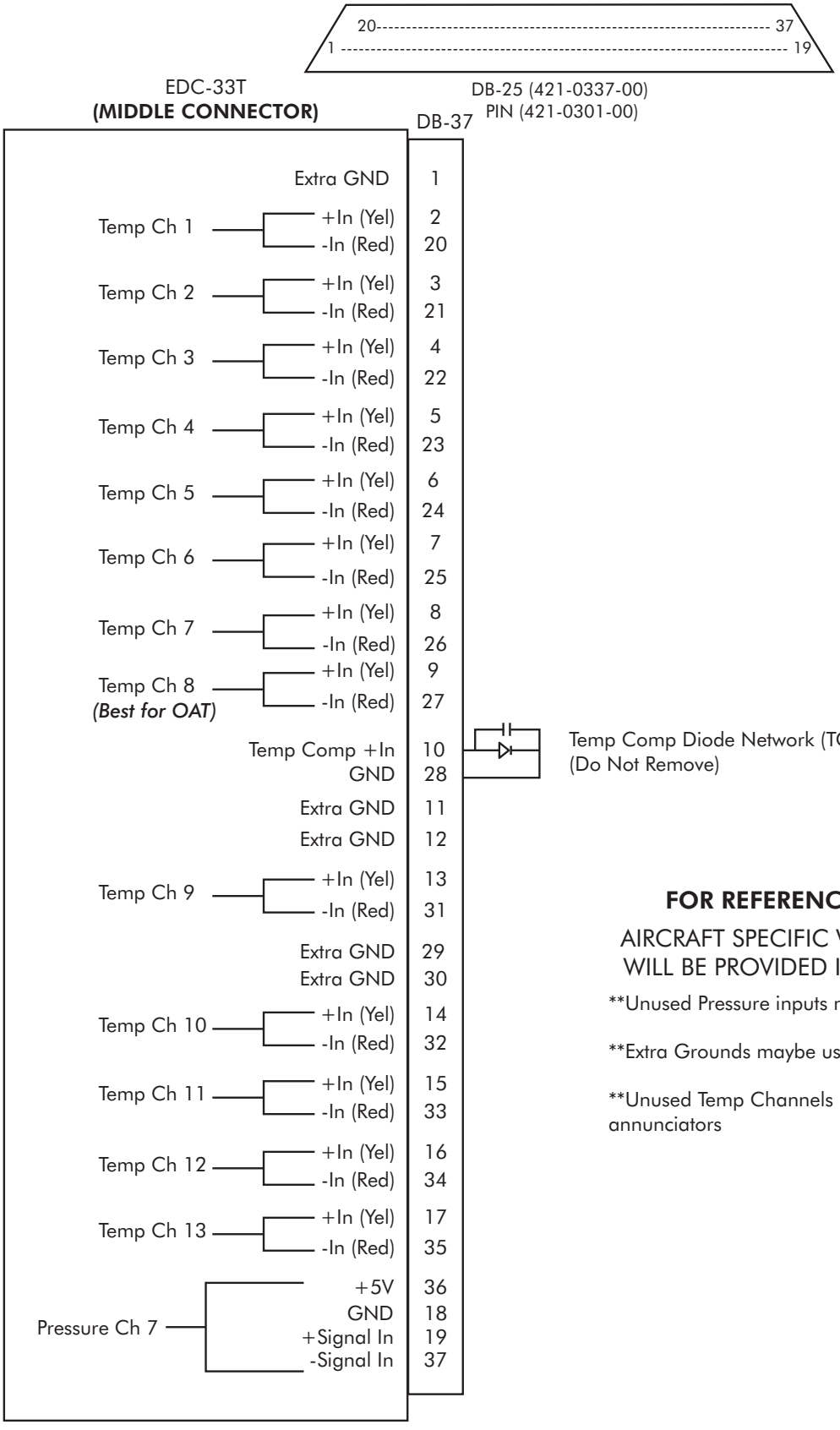
FOR REFERENCE ONLY

AIRCRAFT SPECIFIC WORKSHEET
WILL BE PROVIDED IN YOUR KIT

**Unused Pressure inputs must be grounded

ELECTRONICS INTERNATIONAL INC.

EDC Wiring (Middle Connector)
(Back View, Wire Side)



FOR REFERENCE ONLY

AIRCRAFT SPECIFIC WORKSHEET
WILL BE PROVIDED IN YOUR KIT

**Unused Pressure inputs must be grounded

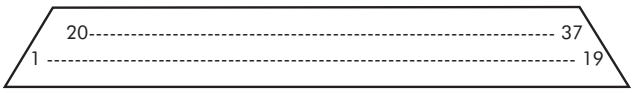
**Extra Grounds maybe used for shields

**Unused Temp Channels may be used for annunciators

ELECTRONICS INTERNATIONAL INC.

EDC Wiring (Bottom Connector)

(Back View, Wire Side)



DB-37 (421-0337-00)
PIN (421-0301-00)

EDC-33T
(BOTTOM CONNECTOR)

		DB-37
	Extra GND	24
Fuel Level Ch 1	Resistive Input	23
	+5V	21
	GND	22
	Capacitive Input	20
	Extra GND	5
Fuel Level Ch 2	Resistive Input	4
	+5V	2
	GND	3
	Capacitive Input	1
	Extra GND	36
	Extra GND	37
Fuel Level Ch 3	Resistive Input	35
	+5V	33
	GND	34
	Capacitive Input	32
	Extra GND	18
	Extra GND	19
Fuel Level Ch 4	Resistive Input	17
	+5V	15
	GND	16
	Capacitive Input	14
	RPM Ch 1	26
	RPM Ch 2	25
	Extra GND	7
Pressure Ch 8	+5V	8
	GND	11
	+ Signal In	12
	- Signal In	30
	Extra GND	29
Pressure Ch 9	+5V	10
	GND	9
	+ Signal In	13
	- Signal In	31
	Do Not Use	27
	Do Not Use	28

FOR REFERENCE ONLY

AIRCRAFT SPECIFIC WORKSHEET
WILL BE PROVIDED IN YOUR KIT

**Unused Pressure inputs must be grounded

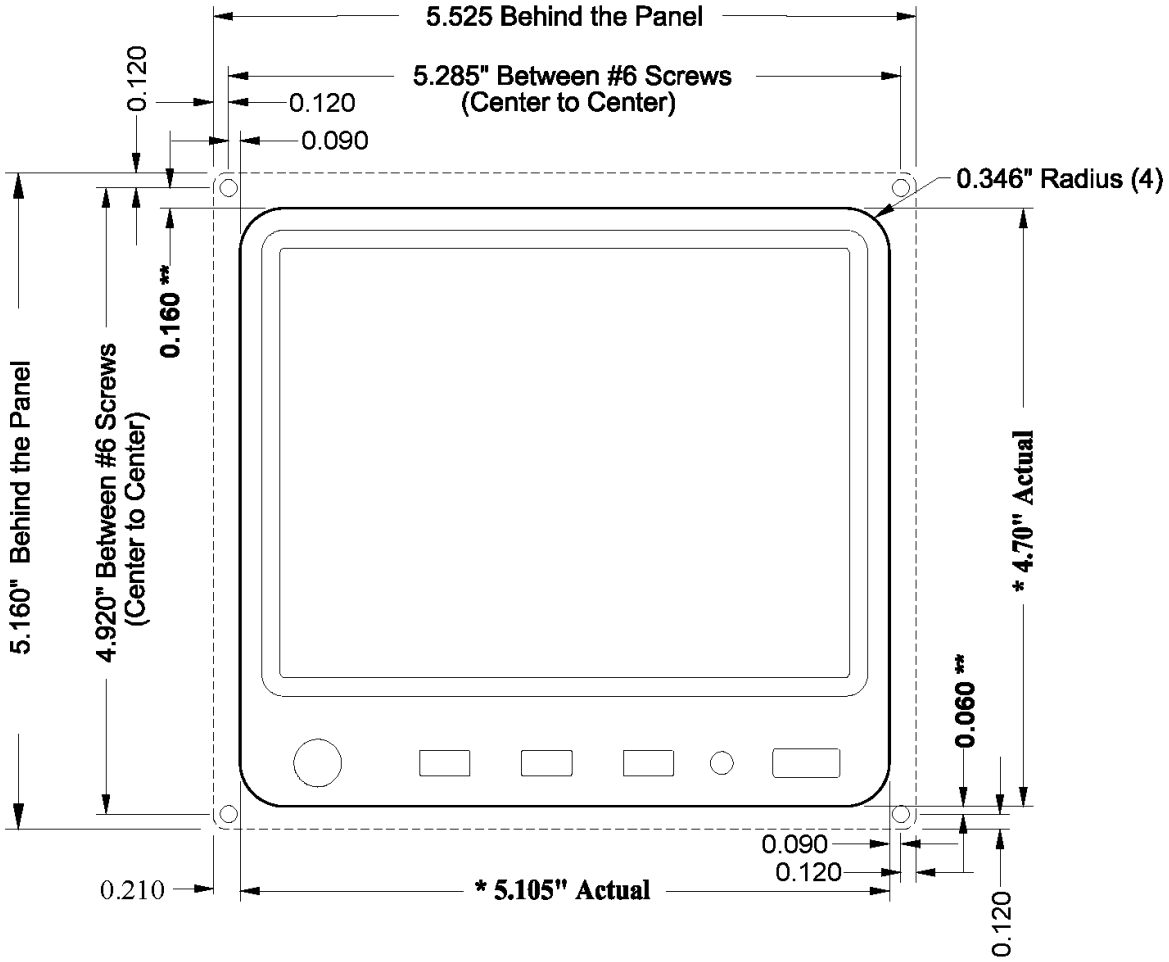
**Extra Grounds maybe used for shields

**Unused Res Fuel level Channels may be used for annunciators

ELECTRONICS INTERNATIONAL INC.

Template for MVP Cutout

Template for laying out an Aircraft Panel
(Dimensions are of the instrument Bezel not the Panel)



* Cutout

*** Panel cutout should be slightly larger than actual to allow for clearance and panel paint.**

**** Caution:**
Panel cutout is not equidistant between mounting holes.

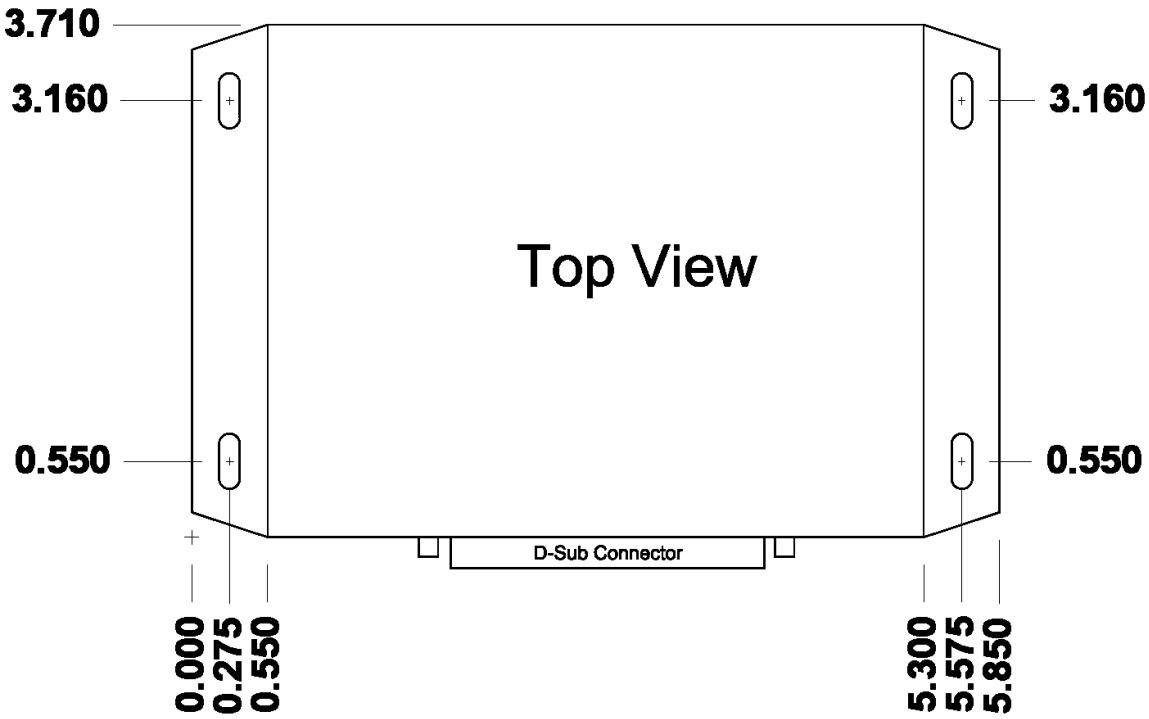
Depth: 2.425" Behind the Panel

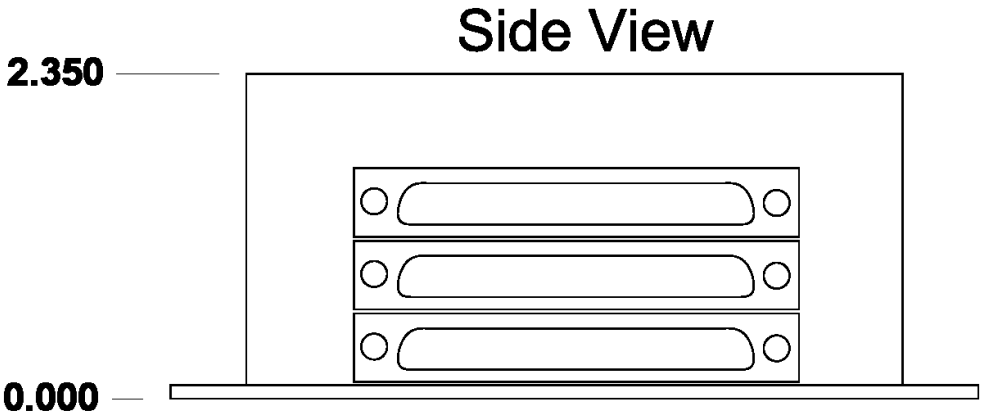
ELECTRONICS INTERNATIONAL INC.		
DATE: 4/20/05	DRAWN BY: R.R.	APPVD. BY: R.R.
SCALE: None		REV: Rev. D: 3/3/07
TOLERANCE: +/- .010"		P/N:
MATERIAL: N/A		D/N: 420051
NEXT ASSEM:		
TITLE: MVP-50 Aircraft Panel Cutout		

Template for EDC

EDC Template

0303071





7.0 TROUBLESHOOTING

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Troubleshooting the MVP system can be relatively simple. First the MVP must be powered-up. This requires only a power and ground connection to the MVP. Next the EDC needs to be powered-up and communicating with the MVP. Power and ground are supplied to the EDC on two wires and the EDC communicates with the MVP on two RS422 wires. A "COM" error will be displayed if the EDC is not communicating with the EDC.

The rest of the system is made up of individual functions performing independently of each other. A problem with a pressure channel will most likely be found in the connection to the transducer, the wire from the transducer to the EDC or the EDC connection. This same scenario is true for all the functions. Rarely is there a problem with the EDC or MVP. In some cases the problem can be in the setup programming of the MVP.

7.1 MVP or EDC Problem:

The MVP and EDC require power and ground to operate. The EDC requires two RS422 wires to communicate with the MVP. Additionally, the EDC supplies power to the Fuel Flow, Fuel Level, and Pressure Transducers. If these power wires become shorted, the EDC operation will be affected.

A. Symptom: The MVP does not power up.

1. Problem: The Power or Ground wire is open or not connected properly.

a) Action: Measure the voltage on the power and ground wires. Ohm the ground wire to ground. Look for a short.

B. Symptom: “COM” is displayed for the digital value for most functions. The EDC is not communicating with the MVP.

1. Problem: One of the EDC external +5 volt power supplies on the Bottom Connector is shorted to ground.

a) Action: Remove the Bottom Connector. If the COM error goes away, look for a short on one of the +5 volt wires.

2. Problem: The Power or Ground wire to the EDC is open or not connected properly.

a) Action: Measure the voltage on the appropriate EDC pins. Ohm the Black ground wire to ground.

3. Problem: The EDC +10 volt or one of the +5 volt supplies on the Top Connector is shorted to Ground.

a) Action: Measure the +10 volt and +5 volt supplies on the Top Connector. If one of the voltages is low, use an ohmmeter to find the problem. If all wires ohm properly (>100 ohms), the Power or Ground wire to the Top Connector may be open.

4. Problem: One of the RS422 wires from the EDC to the MVP may be open or reversed.

a) Action: Inspect the wires. Remove the connectors from the EDC and the MVP and check for continuity and polarity. Reverse the wires and see if this fixes the problem. This will not damage the EDC or the MVP.

C. Symptom: "REF" is displayed for the digital value for all temperature functions.

1. Problem: The Middle Connector on the EDC is loose or not connected. The Reference Diode on pin 10 and 28 of the EDC Middle Connector is damaged. **Note:** ***Pin 28 should measure 0 volts and pin 10 should measure around .6 volts.***

a) Action: Inspect the EDC Middle Connector and measure the voltage on pin 10 and 28.

D. Symptom: "OVR" is displayed for the digital value for a function.

1. Problem: If a channel on the EDC is over ranged (>2.5 volts between the "+" and "-" inputs), an "OVR" will be displayed for that function. ***This can happen on a channel that is used to monitor an Annunciator, Flap or Trim function***. The max input voltage for any temperature or pressure channel is +5 volts to ground. The maximum differential voltage is 2.5 volts. The VI-221 is used to drop the voltage when measuring signals that switch from ground to bus voltage.

a) Action: Measure the voltage on the EDC "+" and "-" inputs for the function with the problem.

7.2 Pressure Problem with one Function:

Pressure is measured on the aircraft with a pressure transducer. Power (+5 volts on the Red wire) and ground (Black wire) is supplied to the transducer and a differential signal (proportional to the pressure) is supplied to the EDC on the White and Green wires.

A. Symptom: Inaccurate, jumpy or zero reading.

1. Problem: One of the four wires from the Pressure Transducer to the EDC is open.

a) Action: Measure the voltage on each transducer wires at the Pressure Transducer. The voltage on each wire is as follows: Red wire = +5 volts, Black wire = 0 volts, Green wire = 2.5 volts and White wire = 2.5 volts.

Short the Green wire to the White wire and look for a zero pressure reading. If you do not get a zero reading, you may have an open wire.

Ohm the Black, Green and White wires at the pressure transducer to ground. The Black wire should be grounded, the Green and White wires should not.

7.3 Temperature Problem on all Channels:

Temperature is measured using a temperature probe with type K thermocouple (TC) wire. When the TC junction in the tip of the probe is heated, a small signal (approx. 23 micro volts per ºF) is produced and monitored by the EDC on two extension wires. These extension wires must be made of type K TC material.

When measuring temperature with TC material, an ambient reference temperature must be provided. This is done with a reference diode located on pins 10 and 28 of the EDC Middle Connector. The ambient temperature is added to the differential temperature measured by the TC junction.

A. Symptom: Inaccurate, jumpy or zero readings on all channels.

1. Problem: The Reference Diode on pin 10 and 28 of the EDC Middle Connector is damaged.

a) Action: Measure the voltage on the Reference Diode. Pin 28 = 0 volts and pin 10 = approx. 0.6 volts.

2. Problem: One of the temperature input channels is in an overvoltage state. This can happen on a channel that is used to monitor an Annunciator, Flap or Trim function. The max input voltage for any temperature or pressure channel is +5 volts. The VI-221 is used to drop the voltage when measuring signals that switch from ground to bus voltage.

a) Action: Measure the voltage on each of the temperature channels.

7.4 Temperature Problem with one Function:

Temperature is measured on the aircraft using a temperature probe with type K thermocouple (TC) wire. When the TC junction in the tip of the probe is heated, a small signal (approx. 23 micro volts per ^{o}F) is produce and monitored by the EDC on two extension wires. These extension wires must be made of type K TC material.

When measuring temperature with TC material an ambient reference temperature must be provided. This is done with a reference diode located on pins 10 and 28 of the EDC Middle Connector. The ambient temperature is added to the differential temperature measured by the TC junction.

A. Symptom: Inaccurate, jumpy or zero reading.

1. Problem: One of the two wires from the Temperature Probe to the EDC is open or shorted to ground.

a) Action: Remove the extension cable from the probe. Ohm both wires to ground. Each wire should measure 12.1K ohms to ground.

2. Problem: The temperature probe has a problem.

a) Action: Ohm between the two leads of the temperature probe. You should get a short (<10 ohms) Ohm one lead of the probe to ground. You should get an open (> 100K ohms).

7.5 N1 or N2 RPM Problem:

An N1 or N2 Tach Generator produces a sine wave at a frequency equal to the RPM of the engine. The voltage level of the sine wave is very low at low RPM and can be above 20 volts at high RPM. The signal is generated from a coil inside the unit. Most Tach Generators have three coils and one end of each of the coils is tied together as a common. On some Tach Generators the common ends of the coils are grounded. The EDC only needs a signal from one coil. In this case, one pin on the Tach Gen should be routed to the RPM input on the EDC.

Some Tach Generators have the common ends of the coils open. In this case, one end of a coil should be grounded and the other end routed to the RPM input on the EDC.

A. Symptom: Inaccurate, jumpy or zero reading.

1. Problem: Improper connection to the coil.

a) Action: Ohm the Tach Gen. pin connected to the EDC with respect to ground. It should measure between 10 and 50 ohms. If this pin is open, you may not be grounding the other end of the coil. Also, it's not uncommon to have a bad coil. In this case you can select another pin (coil) on the Tach Gen. to connect to the EDC.

b) Action: The Tach Gen. can be removed from the engine and spun with a drill (be sure the Tach Gen is grounded to the same ground as the EDC. You should see a reading around 10 to 20%. Normally, 4200 RPM = 100% reading.

c) Action: The Tach Gen. can be removed from the engine and spun with a drill (be sure the Tach Gen is grounded to the same ground as the EDC. You should see a reading around 10 to 20%. Normally, 4200 RPM = 100% reading.

2. Problem: Wrong calibration data.
a) Action: Check the calibration numbers on the "Engine Data, Hour Meters and Flight Timer Setup" screen.

7.6 Fuel Flow Problem:

Fuel Flow is measured using a Flow Transducer. Power (+10 volts on the Red wire) and ground (Black wire) is supplied to the transducer from the EDC. A rotor in the transducer spins and produces pulses (0 to +5 volts) on the White wire. The +5 volts portion of the pulse on the White wire comes from a pull-up resistor in the EDC. The K-factor found in the “Add Fuel” screen calibrates the pulses to a flow rate.

A. Symptom: Inaccurate readings.

1. Problem: The K-factor is incorrect.
a) Action: Check that the K-factor (found in the “Add Fuel” screen) is correct for the transducer installed in the aircraft (FT-60 red cube = 68,000, FT-90 gold cube = 33,800 and the FT-180 black cube = 22,400).

B. Symptom: Inaccurate, jumpy or zero reading.

1. Problem: A wire is open, shorted or mis-wired.
a) Action: Measure the voltage on the transducer wires from the EDC at the Flow Transducer. The Red lead = +10 volts, Black wire = 0 volts, White wire = + 5 volts with the White wire removed from the flow transducer.

Ohm the Black wire to ground. The Black wire must be shorted to ground (< 10 ohms).

Rapidly tap the White transducer wire to ground. A small fuel flow reading should show on the MVP.

2. Problem: The rotor in the Fuel Flow Transducer is blocked.
a) Action: Remove the Flow Transducer from the aircraft. Lightly blow into the transducer and check for the rotor to spin freely. Check for a Fuel Flow reading on the MVP when the rotor is spinning.

If the rotor in the Flow Transducer does not spin, hold the transducer over white paper and tap at all angles. Debris can lodge in the transducer and block the rotor.

7.7 Amp Problem:

Amps are measured on the aircraft using a Shunt. A Shunt has very low resistance and produces a differential voltage on the two signal wires connected to the Shunt. The differential voltage is proportional to the amperage flowing through the Shunt (50 mV at 50 Amps for the S-50 Shunt). In series with the two signal wires are two fuses to protect

the wires form catching fire in case of a short. These fuses should be located a short distance from the Shunt. The wires are then routed to the EDC Amp input.

A. Symptom: Inaccurate, jumpy or zero reading.

1. Problem: A wire, fuse or fuse connection is open, shorted or mis-wired.

a) Action: Remove one of the signal wires on the Shunt and connect it to the other signal wire. This will short the two signal wires together. The MVP should read 0.0 amps. A common problem is with the fuses or fuse holders in line with each Amp signal wire from the Shunt to the EDC. The fuses should be located a short distance from the shunt. Inspect the wires, fuses and fuse holders.

7.8 Resistive Fuel Level Problem:

Fuel can be measured in a fuel tank using a Resistive Float Sensor. The sensor must be connected to a RFLM (Resistive Fuel Level Module). This module provides a pull-up resistor to produce a voltage as the float changes resistance with changes in the fuel level. A signal wire connects the float to the RFLM and a wire connects the RFLM to the EDC. The RFLM requires bus voltage to provide the pull-up.

As the float sensor arm moves up, the resistance will change, creating a higher or lower voltage on the signal wire (depending on the float type). The EDC monitors the signal and produces a digital value (called sensor counts) based on the signal voltage. The sensor counts can be viewed in the “Fuel Tank Calibration” screen. The sensor counts are then converted to a fuel level based on the calibration data in the “Fuel Tank Calibration” screen.

Resistive floats are notoriously inaccurate and inconsistent. A float will move up and down millions of time during its lifespan. They can move even when the aircraft is parked. The metal-to-metal contact of the wiper to the coil wears and corrodes. The wiper force weakens. The bearing surfaces wear. It’s not uncommon to find even new floats that work poorly. The MVP can calibrate out nonlinearity, but inconsistency will always cause reading problems. It will cause you to perform the fuel tank calibration procedure over and over with little or no long-term improvement. Consider using a capacitive probe or our magnetic float sensor if at all possible.

A. Symptom: Inaccurate, jumpy or zero reading.

1. Problem: The RFLM is mis-wired.

a) Action: Remove the signal wire to the Resistive Float. Check for a very high (or low, depending on the float type) sensor count in the “Fuel Tank Calibration” screen. Be sure you are displaying the data for the correct tank.

The voltage on the open signal wire should measure bus voltage.

Short the signal wire to ground. Check the sensor counts go to a low (or high, depending on the float type) reading.

2. Problem: The Resistive Float does not operate properly.

a) Action: With the signal wire removed, measure the resistance of the float. This should not be done with a full or empty tank but somewhere in-between. Record the resistance reading and the variations. Lift the wing and allow it to return to its original position. Record the resistance reading and the variations. This test can be done at different fuel levels. If the resistance value does not return to its original value, you may have a defective Resistive Float.

B. Symptom: The sensor counts decrease as you add fuel.

1. Problem: The probe selected in the "1. EDC Input to Function Mapping" screen is the wrong probe.

a) Action: Check the Probe selected in the "1. EDC Input to Function Mapping" screen. The "RFLM-4 H=F" probe should be used on Resistive Floats where high resistance = full tank readings and the "RFLM-4 L=F" probe should be used on Resistive Floats where low resistance = full tank readings.

7.9 Capacitive Fuel Level Problem:

Fuel can be measured in a fuel tank using a Capacitive Fuel Probe. The Electronics International P-300 Capacitive Fuel Probe connects to an IMC (Interface Module), located near the probe, and to the EDC through three wires. Power (+5 volts) is supplied on the Red wire, ground is supplied on the Black wire and the fuel level signal (a 0 to +5 volt square wave) is on the White wire.

As the fuel level in the tank increases, the capacitance of the probe increases. The IMC Module converts the capacitance to a frequency. The higher the fuel level, the lower the frequency of the square wave on the White wire.

The EDC monitors the signal and produces a digital value (called sensor counts) based on the signal frequency. The sensor counts can be viewed in the "Fuel Tank Calibration" screen. The sensor counts are then converted to a fuel level based on the calibration data in the "Fuel Tank Calibration" screen.

A. Symptom: An "Err" is displayed for the digital value. Also, you may have an inaccurate, jumpy or zero reading.

1. Problem: The IMC is mis-wired.

a) Action: Measure the voltage on the three wires at the IMC Module (Red wire = +5 volts, Black wire = ground, White wire = +2.5 volts).

Remove the Red wire from the IMC module and check the sensor counts on the "Fuel Tank Calibration" screen increase. Be sure you are displaying the data for the correct tank.

Touch the wires between the IMC Module and the probe and check that the sensor counts increase.

2. Problem: The P-300 Fuel Probe is shorted or there is water or contamination in the tank.

a) Action: Remove the wire from the IMC Module to the center terminal of the P-300 probe. Ohm the center terminal of the P-300 probe to ground. Check for > 10 M Ohms. Remove the probe from the tank to resolve any issues.

7.10 Voltage Problem:

Bus voltage is measured on EDC pin 35 of the top connector.

A. Symptom: Inaccurate, jumpy or zero reading.

1. Problem: Pin 35 on the EDC top connector is mis-wired.

a) Action: Measure the voltage on pin 35 (look for bus voltage).

7.11 Annunciator Problem:

An Annunciator, displayed on the MVP screen, is monitored with a temperature or resistive fuel level channel on the EDC. The voltage into a temperature channel must be limited to 2.5 volts. When measuring voltages above +2.5 volts a VI-221 Module should be used in series with the temperature channel to drop the voltage to an acceptable level. The voltage into a resistive fuel level channel should be limited to 18 volts.

An Annunciator will be one color for a low voltage and another color a high voltage. The colors are set in the “4. Redlines, Limits and Color Setup” screen. Note: The color white will be displayed as black or off. You can also set the trip level at which the Annunciator changes color. The trip level is displayed in sensor counts so you will need to get a sensor count reading with the Annunciator on and then off. Set the trip level between the on and off value.

A. Symptom: The Annunciator is not changing colors.

1. Problem: Mis-wired.

a) Action: Check that the voltage on the appropriate EDC pin changes from high to low and back to high as the Annunciator is cycled.

2. Problem: The MVP is set up incorrectly.

a) Action: Check the "Start" and "End" setting in the “4. Redlines, Limits and Color Setup” screen.

Check the probe selected in the “1. EDC Input to Function Mapping” screen is "Volts 0-2.5."

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8.0 TECHNICAL DATA

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Specifications, Functions and Features

0425052

Rev. E: 07/25/2018

Models: MVP-50P, MVP-50T, EDC-33P and EDC-33T-XX

MVP-50P and MVP-50T

Weight: 1.9 Lbs.

Environmental: Designed and Tested to TSO (DO-160E, See Environmental Qualification Form)

Software: Designed and Documented to TSO (DO-178B, Level C)

Minimum Performance Standards: TSO-C43c, TSO-C44c, TSO-C45b, TSO-C47a, TSO-C48, TSO-49b and TSO-C55a.

Power Requirements: 7.5 to 30 Volts, 0.3 amps @ 24V (Typ), 0.6 amps @ 12 Volts (Typ).

USB Port: ***DO NOT use as a charger***

Display: Active Matrix TFT, 262,144 colors, Sunlight readable

Backlight: Internal electric eye and external control line.

EDC-33P and EDC-33T
(S Version)

Weight: 1.0 Lb

Environmental: Designed and Tested to TSO (DO-160E, See Environmental Qualification Form)

Software: Designed and Documented to TSO (DO-178B, Level C)

Power Requirements: 7.5 to 50 Volts, 0.1 amps (Typ).

Accuracy all Functions: < 1% (Unless otherwise noted)

Input Configuration: EDC-33P; 1-Volt Channel, 1-Amp Channel, 1-Fuel Flow Channel, 6-Pressure Channels, 17-Temp Channels, 4-Resistive Fuel Level Channels, 4-Capacitive Fuel Level Channels and 2-RPM Channels.

EDC-33T-XX; 1-Volt Channel, 1-Amp Channel, 1-Fuel Flow Channel, 9-Pressure Channels, 13-Temp Channels, 4-Resistive Fuel Level Channels or 4-Capacitive Fuel Level Channels and 2-RPM Channels.

Note: Temp, Fuel Level and Pressure channels can be used to monitor other functions or annunciators.

Specifications, Functions and Features
Continued

Volts:

Measured on pin 35 of the EDC Top Connector.
Input Resistance: 83.8K Ohms
Range: 0 to 40 volts.
Sensitivity: 6400 counts per volt.

Note: ***A VI-221 or FM-VA-MVP-xx may be used to measure Voltage on any temperature channel.***

Amps:

Common Mode Input Resistance: > 10 M Ohms
Diff. Input Resistance: 10K Ohms
Differential Input: + 2.5V to -.2V
Common Mode: +/- 90 Volt to ground
Sensitivity: 9.537uV per count.

Note: ***An FM-VA-MVP-xx module may be used to measure Voltage and Amps on any two temp channels.***

Fuel Flow:

Input Configuration: 5.11K Ohm pull-up to +5 Volts
Input Trigger: 2.5 Volt with over voltage protection.
Operating Range: 0 to 15 KHz.
Sensitivity: One count per pulse measure over a 0.356 second period.

Notes:

- ***+10 Volts are provided from the EDC to energize the flow transducer.***
- ***An FFDM-1-MVP module may be used to accommodate fuel return from a pressure carburetor.***
- ***A FM-Flow-P module may be used to measure flow from a pulsed injector.***

RPM, Piston (EDC-33P):

Two RPM channels are available. May be configured for digital or mag pickup. Also, may be set up to operate from one or two inputs. Selectable jumpers and different EDC models accommodate 2, 4, 6, 8, etc. cylinder engines. Inputs are over voltage protected. Mag Out feature provided.

Input Trigger: +3V / -1V
Input Resistance: 2.06K with 1 volt pull up.
Max RPM (EDC-33P-4/6): 4500, see Appendix for information on high RPM EDC units.
Sensitivity (EDC-33P-4/6): 20 counts per RPM

Note: ***A 79K isolation resistor (supplied in the kit) must be put in series with the input when measuring signal from mags.***

Functions, Features and Specifications
Continued

RPM, Turboprop:
Two RPM channels are available to measure N1, N2, Ng, Nh, Hp, Hl or other turboprop RPM functions. The "Engine Data, Ports, Timers, etc. Setup" screen provides data to calibrate these RPM values for a given tach generator output.

EDC-33T (Both RPM Channels):
Input Trigger: +.39V / 0V (Hysteresis)
Input Resistance: 20K ohms
Max RPM: 123 Hz.
Sensitivity: 772.52 sensor counts per Hz.
Accuracy: <= .5%

EDC-33T-H1:
Ch 1, Rotor:
Input Trigger: +.39V / 0V (Hysteresis)
Input Resistance: 20K ohms
Max RPM: 266 Hz.
Sensitivity: 372 sensor counts per Hz.
Accuracy: <= .5%
Ch 2, N1
Input Trigger: +.11V / 0V (Hysteresis)
Input Resistance: 20K ohms
Max RPM: 6140 Hz.
Sensitivity: 16.1 sensor counts per Hz.
Accuracy: <= .5%

EDC-33T-W (Both RPM Channels):
Input Trigger: +.054V / 0V (Hysteresis)
Input Resistance: >1M ohm
Max RPM: 11.0K Hz.
Sensitivity: 8.963 sensor counts per Hz.
Accuracy: <= .5%

Pressure:
Input: 0 to 2.5 Volts Differential
Input Resistance: > 20M Ohms
Common Mode Range on the Input: + 4 Volts to -.2 Volts (from ground).
+5 Volt and Ground provided to energize the pressure transducer.
Sensitivity: Ratiometric to the EDC +5 Volt supply (9.537uV x (5/(voltage of the EDC +5V supply)))

Note: ***Many pressure transducers are available to monitor many different functions.***
See EI price sheet for a list of pressure transducers available.

Functions, Features and Specifications
Continued

Temperature:

Input Range: 0 to 2.5 Volts Differential
Input Resistance: 12.1K Ohms on each input to ground
Sensitivity: 9.537uV per count.

Notes:
**** Any Temp Channel may be used to measure any thermocouple probe or any device outputting a voltage. In this way many different types of function may be monitored through a temperature channel. See EI price sheet for a list of modules available.***

**** A Reference junction is provided to accommodate TC probes. Temp channel 8 is closest to the "Ref Diode" and is best used for measuring OAT.***

Resistive Fuel Level:

The resistive and capacitive inputs share channels. Only one input type should be used per channel.

Input Range: 0 to 18 Volts single-ended input.
Input Resistance: 14.4K Ohms.
Sensitivity: .07169mV per count when set for non ratiometric measurement.

Notes:
**** The Resistive Fuel Level inputs may be used to monitor other functions or annunciators.***
**** When monitoring a resistive probe a RFLM-4-12 or -24 module will be required (see EI price sheet). Also, measurements are made ratiometric to the bus voltage.***

Capacitive Fuel Level:

The resistive and capacitive inputs share channels. Only one input type should be used per channel.

Input Trigger Level: 2.1 Volts
Frequency Range: 0 to 15 KHz.
Input Resistance: 33.2K Ohms
Sensitivity: 14 counts per Hz..

Notes: ***The Capacitive Fuel Level inputs may be used to monitor other functions.***

Functions

OAT and IAT:

OAT will be displayed as Corrected OAT when the following is true:

1. Pressure Alt is provided.
2. Airspeed is provided
3. Recovery Factor is set > 0.0

Functions, Features and Specifications
Continued

Pressure Altitude:

Pressure Altitude is calculated from the input of a PT-30ALT transducer by means of a lookup table entered in the "Pressure Altitude Calibration" screen. Also, this screen provides a temperature compensation value specific for an individual transducer. The normal value is 35.

Note: A NACA 2nd order polynomial interpolation is used between calibration points.

VSI:

VSI calculations are derived from averaging changes in altitude over time. If the altitude function is selected, VSI will be available.

Airspeed (indicated airspeed) and TAS:

Airspeed calculations are based on a NASA equation. True Airspeed will be displayed when the following is true:

1. Pressure Alt is provided.
2. OAT is provided

Note: ***If Indicated Air Speed is required in the place of TAS, select IAT function to be displayed.***

Recovery Factor:

Recovery Factor is used to calculate Corrected OAT and True Airspeed (TAS). The Recovery Factor compensates for airspeed, altitude, OAT probe design and OAT probe placement. The setting is between 0 and 1.99, with 1.0 being the average setting for most configurations. The Recovery Factor is set to produce no change in the OAT between slow flight and fast cruise.

Horsepower (MVP-50T):

Horsepower is based on the RPM, MP, EGT, Altitude and a Calibration Factor. Reference values are entered into the "Horsepower Calibration" screen.

Horsepower (MVP-50T):

Horsepower is based on (Np x Torque) / Calibration Factor. The Calibration Factor is entered in the "Engine Data, ... Setup" screen.

Torque (MVP-50T):

Torque is measured via an EI pressure transducer. Torque can be displayed as pressure or a percentage. The "Engine Data .... Setup" screen is used to calibrate Torque.

Shock Cooling (MVP-50T):

The Shock Cooling rate is calculated from the CHT readings for each cylinder. The highest Shock Cooling value is displayed.

Functions, Features and Specifications
Continued

Bar Graph (Lean Operating Mode, MVP-50T):

Once the Lean Operating Mode (LOP or ROP) is entered, an EGT must drop 3°F below its current peak to display a Peak Marker. If the EGT for a channel that has reached peak increases 3°F above its current peak, the Peak Marker will be turned off and a new peak will be established (this is a false peak).

In the Lean ROP mode only the first EGT channel to reach peak will display a Peak Marker. In the LOP mode every EGT channel that reaches peak will display a Peak Marker.

Bar Graph (EGT Max Limit Line, MVP-50T):

If the following conditions are met, an EGT Red Max Limit Line will be drawn:

1. The “Cylinder” field in the “EGT/CHT Bar Graph Limits and Color Setup” screen must be set to “ALL” for the EGT function.

2. The “To” value in the “Display Operating Range” field must be set to the same value as the Red Limit for the EGTs. Note: This is the same value found on the “Bar Graph Setup” screen “High EGT Range” field.

If these conditions are NOT met, the EGT Max Limit Line will be shown in gray.

Bar Graph (CHT Max Limit Line, MVP-50T):

If the following conditions are met, a CHT Red Max Limit Line will be drawn:

1. The “Cylinder” field in the “EGT/CHT Bar Graph Limits and Color Setup” screen must be set to “ALL” for the CHT function.

2. The “To” value in the “Display Operating Range” field must be set to the same value as the Red Limit for the CHTs.

If these conditions are NOT met, the CHT Max Limit Line will be shown in gray.

Gear Position, Unsafe Indicator and Gear Warning:

The Gear Position and Unsafe Indicator shown on the MVP System Screen is intended as a backup to the aircraft’s existing system. The Gear Warning operates off the Gear Position, Unsafe Indicator, Airspeed and Manifold Pressure. The Gear Warning provides a valuable feature (voice warning) for eliminating gear up landings.

Unsafe Indicator: Operates from an unsafe signal from the aircraft. Displays as either Red or off on the MVP.

Landing Gear Position: There are three options for interfacing the EDC to the aircraft’s gear system.

Option 1: Connect the EDC to the aircraft’s Right, Left and Nose Gear green down lights. The state of each gear will be displayed independently on the MVP. Select Gear Left, RT and Nose for the probes in Configuration Screen #1. This configuration requires three EDC inputs.

Functions, Features and Specifications
Continued

Option 2: Connect the EDC to the aircraft's Nose Gear green down light. The state of all three gears will be displayed on the MVP based on the Nose Gear's state. Select "Gear All" for the probe in Configuration Screen #1. This configuration requires one EDC input.

Option 3: Use this option to display only the Left and Right Main Gears (no Nose Gear) from a single input. Select "Gear Main" for the probe in Configuration Screen #1. This configuration requires one EDC input.

Note: ***When setting colors use Green for down and White for up, Red will cause an error.***

Gear Up Warning: To provide a Gear Warning, the MVP must be monitoring Gear Position, Airspeed and Manifold pressure. A voice warning is activated on the following logic:

(Any Gear is up -OR- the Unsafe Indicator is on) -AND- Airspeed is less than a set value -AND- Manifold Pressure is less than a set value.

Note: ***See the "Aircraft Number, Gear Warning and TAS Setup" screen to set values.***

Flaps:

Analog input signals are calibrated using the "Flaps, Trim and Special Function Calibration" screen.

Annunciators:

The MVP-50x will display annunciators activated by digital input signals routed into a Temp or Resistive Fuel Level channel on the EDC. An annunciator for landing lights, nav lights, boost pump, door or canopy latch, deicing, warning indications, chip detect, door seals, bleed air, step status, FADEC outputs, ignition status, faults, ATR, switch settings and many more status indications may be displayed on the MVP-50x.

Date, Local Time and Zulu Time:

When the MVP is off, these functions are kept alive via the MVP's backup battery.

Engine Hours and Tach Time (MVP-50P):

Engine Hours signify the time the engine has been operating (RPM above 350). Tach Time is the time the engine was operated above 1190 RPM. When the MVP is off, these functions are keep alive via the backup battery. In order to protect from loosing these values (in case of a battery failure), values are saved to Flash Memory at the end of each flight.

Engine Hours Starts and Take offs (MVP-50T):

Engine Hours signify the time the engine has been operating above an N1 setting. The number of starts and take offs increments when N1 goes above a setting and arms for the next count when N1 drops below a setting. These settings can be found in the "Engine Data ..... Setup" screen.

Flight Timer (MVP-50P):

The Flight Timer automatically starts when the RPM goes above a Start setting and stops when the RPM goes below a Stop setting. These settings can be found in the "Engine Data ..... Setup" screen.

Flight Timer (MVP-50T):

The Flight Timer automatically starts when the N1 goes above a Start setting and stops when the N1 goes below a Stop setting. These settings can be found in the "Engine Data ..... Setup" screen.

Some Error Messages -

"COM" - If communication is lost with the EDC, after 5 seconds all functions requiring signals from the EDC will display "EDC" for its value and an Error Message Box will be displayed.

"A-D" - If the EDC sends an error message for a specific channel, the function associated with that channel (on the MVP) will display "A-D" for the value.

"OVR" - If a channel on the EDC is over ranged (>2.5 volts differential), an "**OVR**" will be displayed for that function.

"Err" - If a capacitance fuel probe is unplugged, the fuel level will be displayed as "**Err**."

"REF" - If the reference for any function has a problem or a derived value used to calculate the function has a problem, the display for the function will show "**REF**."

Error Box (Compact Flash Error Message) - If the MVP detects a problem with the compact flash, an Error Box will be displayed.

Error Box (Dead Battery Error Message) - If the internal battery dies, an Error Box will be displayed.

Other - Other error messages are self explanatory.

DO-160
Environmental Qualification Form

0210081

Rev. C
2/11/2011

Nomenclature: Multi Function Engine and Aircraft System Monitor

Models: MVP-50P-(X) MVP-50T-(X), EDC-33P-(X), EDC-33T-(X)

Note: (X) represents the instrument configuration for a specific aircraft, helicopter or blimp make and model.

Accessories: The following accessories were tested with the MVP-50 systems: PT-30ABS, PT-30ALT, PT-60ABS, PT-90ABS, PT-05Diff, PT-04H20, FFDM-1-MVP, FM-VA-XX, DPIM-1, FFDM-1, FFAM-1, FM-FP-XX, FM-Gyro, CP-1, AL-1(x)

Specifications: Document # 0425052 (can be found in the MVP-50 Installation Instructions)

Manufacturer: Electronics International Inc.
63296 Powell Butte Hwy
Bend, OR 97701

Test Requirements: DO-160E Changes: 1, 2 and 3

Conditions	Section	Description of Tests Conducted
Temperature and Altitude	4	Tested to Category D1: Operating Temp: -20^{0}C to +55^{0}C Short Time Low Temp: -40^{0}C Short Time High Temp: +70^{0}C Ground Survival Low Temp: -55^{0}C Ground Survival High Temp: +85^{0}C In-Flight Loss of Cooling: N/A Altitude: 50,000 feet Decompression: 8,000 to 50,000 feet Overpressure: -15,000 feet
Temperature Variation	5	Tested to Category C: 2^{0}C/min

Humidity	6	Tested to Category A: Standard
Operational Shock and Crash Safety	7	Tested to Category B Type 5R: Operational - 6 g's at 11ms and 20ms Impulse - 20 g's at 11ms and 20ms Sustained - 20 g's for 3 sec.
Vibration	8	Tested to Categories S, R and U, Curves M, B, B1 and G. Covers Fixed Wing: Reciprocating, turboprop, turbojet, turbofan and propfan (all subsonic, supersonic and multi engine). Covers Helicopters: Reciprocating and turbojet. Unknown rotor frequency testing was performed. Note: There were no changes in critical frequencies noted during any test.
Explosive Atmosphere	9	Category X: No test performed.
Waterproofness	10	Category X: No test performed.
Fluids Susceptibility	11	Category X: No test performed.
Sand and Dust	12	Category X: No test performed.
Fungus	13	Category X: No test performed.
Salt Fog Test	14	Category X: No test performed.
Magnetic Effect	15	Tested to Category Z: Less than .3m
Power Input	16	Tested to Category Z: 12 and 24 volts. Allows use in all types of aircraft.
Voltage Spike	17	Tested to Category A: High degree of protection is provided.
Audio Frequency Susceptibility	18	Tested to Category Z: Allows use in all types of aircraft.
Induced Signal Susceptibility	19	Tested to Category ZC: High level of interference-free operation exhibited.

Radio Frequency Susceptibility	20	Tested to Category A, H, RR, TT: External HIRF levels. Shielded cables in and out of the MVP must be used for category H.
Radio Frequency Emission	21	Tested to Category M: Suitable for transport aircraft.
Lightning Induced Transient Susceptibility	22	Tested to Category B2XXX.
Lightning Direct Effects	23	Category X: No test performed.
Icing	24	Category X: No test performed.
Electrostatic Discharge	25	Category A.
Fire, Flammability	26	Tested to Category C: Flammability

STC & AML

United States of America
Department of Transportation Federal Aviation Administration

Supplemental Type Certificate

Number **SA02135SE**

This certificate, issued to **Electronics International Inc.**
63296 Powell Butte Highway
Bend, OR 97701

certifies that the change in the type design for the following product with the limitations and conditions therefore as specified hereon meets the airworthiness requirements of Part * *of the* **Federal Aviation Regulations.**

Original Product-Type Certificate Number: *See attached FAA Approved Model List No.
Make: No. SA02135SE for a list of Approved Airplane Models
Model: and Applicable Airworthiness Regulations.

Description of the Type Design Change: Installation of Electronics International Inc. Glass Panel Engine Monitor (with In-Flight Data) MVP-50T in accordance with the Installation Instructions, Document No. II 1211061, Revision D, dated June 15, 2011 or later Federal Aviation Administration (FAA)-approved revision.

Limitations and Conditions: Approval of this change in type design applies to the airplanes listed on the Approved Model List (AML) only. This approval should not be extended to other aircraft of these models unless the installer determines that the relationship between this change and any other previously incorporated approved modifications will introduce no adverse effect upon the airworthiness of that aircraft. A copy of this Certificate; FAA approved AML No. SA02135SE, Revision IR, dated July 7, 2011. Installation Instructions, Document No. II 1211061, Revision D, dated June 15, 2011 and FAA-approved Airplane Flight Manual Supplement (AFMS) Document Number AFM06271101, Revision IR, dated June 27, 2011, or later approved revisions, must be maintained as part of the permanent records for the modified aircraft.

If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: May 11, 2010
Date of issuance: July 7, 2011

Date reissued:
Date amended:

FEDERAL AVIATION ADMINISTRATION

By direction of the Administrator

(Signature)
Acting Manager, Seattle Aircraft Certification Office
(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.
This certificate may be transferred in accordance with FAR 21.47.

FAA FORM 8110-2(10-68)

FEDERAL AVIATION ADMINISTRATION (FAA) APPROVED MODEL LIST (AML) SA02135SE
FOR
Electronics International, Inc. Primary MVP-50T System

ISSUE DATE: July 7, 2011

ITEM	AIRCRAFT MAKE	AIRCRAFT MODEL	ORIGINAL TC NUMBER	CERTIFICATION BASIS FOR ALTERATION	INSTALLATION INSTRUCTIONS		FAA APPROVED MASTER DRAWING LIST		AML AMENDMENT DATE
					Number	Revision*	Drawing	Revision*	
1.	Air Tractor, Inc.	AT-302, AT-400, AT-400A	A9SW	FAR 21	II 1211061	F	MDL 0720063	F	Initial Release
		AT-503, AT-502, AT-402, AT-402A, AT-503A, AT-502A, AT-502B	A17SW	FAR 21	II 1211061	F	MDL 0720063	F	Initial Release
		AT-402B, AT-504	A17SW	FAR 21	II 1211061	F	MDL 0720063	F	Initial Release
		AT-802A, AT-802, AT-602	A19SW	FAR 23	II 1211061	F	MDL 0720063	F	Initial Release
2.	Allied Ag Cat Productions, Inc.	G-164D, G-164D (with 73" wing gap)	1A16	CAR 8	II 1211061	F	MDL 0720063	F	Initial Release
3.	Textron Aviation Inc. (formerly Beech)	A36 (w/ Turboprop)	3A15	CAR 3	II 1211061	F	MDL 0720063	F	6/14/2018
	Textron Aviation Inc. (formerly Cessna)	208, 208B	A37CE	FAR 23	II 1211061	F	MDL 0720063	F	Initial Release
		206G (w/ Turboprop), 206H (w/ Turboprop), T206H (w/ Turboprop)	A4CE	CAR 3	II 1211061	F	MDL 0720063	F	6/14/2018
		210L (w/ Turboprop), T210L (w/ Turboprop), 210M (w/ Turboprop)	3A21	CAR 3	II 1211061	F	MDL 0720063	F	6/14/2018
		T210M (w/ Turboprop), 210N (w/ Turboprop), P210N (w/ Turboprop)	3A21	CAR 3	II 1211061	F	MDL 0720063	F	6/14/2018
		T210N (w/ Turboprop), P210R (w/ Turboprop)	3A21	CAR 3	II 1211061	F	MDL 0720063	F	6/14/2018
4.	Pacific Aerospace Limited	750XL	A50CE	FAR 21	II 1211061	F	MDL 0720063	F	Initial Release
5.	Pilatus Aircraft Ltd.	PC-6/A, PC-6/A-H1, PC-6/A-H2, PC-6/B-H2, PC-6/B1-H2	7A15	CAR 10	II 1211061	F	MDL 0720063	F	Initial Release
		PC-6/B2-H2, PC-6/C-H2, PC-6/C1-H2, PC-6/B2-H4	7A15	CAR 10	II 1211061	F	MDL 0720063	F	Initial Release
		PC-7	A50EU	FAR 23	II 1211061	F	MDL 0720063	F	6/14/2018
		PC-12, PC-12/45, PC-12/47, PC-12/47E	A78EU	FAR 23	II 1211061	F	MDL 0720063	F	6/14/2018
6.	Piper Aircraft, Inc.	PA-46-500TP, PA-46-600TP	A255O	FAR 23	II 1211061	F	MDL 0720063	F	6/14/2018
7.	Thrush Aircraft, Inc.	S2R-T34, S2R-T11, S2R-T15, S2R-T45, S2R-T65	A4SW	CAR 8	II 1211061	F	MDL 0720063	F	Initial Release
		S2R-G1, S2R-G5, S2R-G6, S2R-G10	4ASW	CAR 8	II 1211061	F	MDL 0720063	F	Initial Release

FEDERAL AVIATION ADMINISTRATION (FAA) APPROVED MODEL LIST (AML) SA02135SE
FOR
Electronics International, Inc. Primary MVP-50T System

ISSUE DATE: July 7, 2011

ITEM	AIRCRAFT MAKE	AIRCRAFT MODEL	ORIGINAL TC NUMBER	CERTIFICATION BASIS FOR ALTERATION	INSTALLATION INSTRUCTIONS		FAA APPROVED MASTER DRAWING LIST		AML AMENDMENT DATE
					Number	Revision*	Drawing	Revision*	
		S2RHG-T65, S2RHG-T34, S2R-T660	4ASW	FAR 21	II 1211061	F	MDL 0720063	F	Initial Release
		S2R-H80	4ASW	CAR 3	II 1211061	F	MDL 0720063	F	6/14/2018
		S2R-T34, S2R-T15, S2R-T11	A3SW	CAR 3	II 1211061	F	MDL 0720063	F	Initial Release
8.	Viking Air Limited (formerly de Havilland)	DHC-3 (w/ Turboprop)	A-815	CAR 10	II 1211061	F	MDL 0720063	F	Initial Release
		DHC-2 Mk. I (w/ Turboprop), DHC-2 Mk. II (w/ Turboprop)	A-806	CAR 10	II 1211061	F	MDL 0720063	F	Initial Release
		DHC-2 Mk. III (w/ Turboprop)	A-806	FAR 21	II 1211061	F	MDL 0720063	F	Initial Release

* Or later FAA Approved Revision

FAA Approved: _____
for Manager, Seattle ACO Branch

AMENDED: 6/14/2018
REISSUED:

A APPENDIX

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A1.0 Appendix: Connecting an EDC Input to a Custom Probe

There are five steps to connecting a Custom Probe to an EDC Input, associating it with a Function and displaying that Function on the MVP.

1. Connecting a Custom Probe to an EDC Input:

The EDC Temperature, Pressure and Fuel Level Inputs can be interfaced to almost any type of probe. When connecting a Custom Probe to an EDC input you may need to use a resistive voltage divider to keep the output of the Custom Probe within the voltage range of the EDC input. The specifications for each of the available EDC Inputs are listed below.

EDC Temperature Input:

Type: Differential Voltage (a plus and minus input is provided).
A single ended input may be used.
Voltage Range: 0 to 2.5 Volts
Common Mode Voltage Range: 0 to 4 Volts
Resolution: 9.537 uV per Count
Maximum Counts Available: 262,143
Input impedance: 12.1K Ohms to ground (each input)
Differential impedance: 24.2K Ohms

EDC Pressure Input:

Type: Differential Voltage (a plus and minus input is provided).
The input voltage must have a ground reference.
Voltage Range: 0 to 2.5 Volts
Common Mode Range: 0 to 4 Volts
Resolution: 9.537 uV per Count
Maximum Counts Available: 262,143
Input impedance: > 20M Ohms.
Differential impedance: > 50 M Ohms

EDC Resistive Fuel Level Input:

Type: Single Positive Voltage Input.
Voltage Range: 0 to 18.8 Volts
Resolution: 0.07169 mV per Count
Maximum Counts Available: 262,143
Input impedance: 14.4K Ohms

EDC Capacitive Fuel Level Input:

Type: Frequency Input
Freq. Range: 0 to 6K Hz.
Resolution: Approx. 14 counts per Hz.
Maximum Counts Available: Approx 98,000
Trigger Level: 2.1 Volts
Input impedance: 33.2K Ohms

2. Assign a Function to the EDC Input:

A Function must be assigned to the EDC input connected to the Custom Probe. Functions are assigned in the "1. EDC Input to Function Mapping" screen on the MVP-50. Function Names and Display Units are hard coded into the MVP and cannot be changed.

Navigating to the "1. EDC Input to Function Mapping" screen.
Start with the "**Main Engine**"screen, push the MENU button.
Select "**System Configuration Menu.**"
Select "**1. EDC Input to Function Mapping**" screen.

3. Assign a Probe to the Selected Function:

A Software Probe must be assigned to the Function associated with the Custom Probe. Software Probes are assigned in the "**1. EDC Input to Function Mapping**" screen on the MVP-50. When you assign a Software Probe to a Function you are setting a series of calibration parameters that will be applied to the signal received from the Custom Probe. There are two Software Probes that may be used for most Custom Functions.

Volts 0-2.5 - Use this Software Probe when the output signal from the Custom Probe is a variable voltage (from 0 to 2.5 volts or less) and the signal voltage ***does NOT change with bus voltage.***

Res 0-2.5V - Use this Software Probe when the output signal from the Custom Probe is a variable voltage (from 0 to 2.5 volts or less) and the signal voltage ***changes with bus voltage.*** This would be the case for a resistor divider network connected to the aircraft bus. The "Res 0-2.5V" Software Probe provides a radiometric calculation referencing the bus voltage.

4. Calibrate the MVP to the Custom Probe:

The signal from the Custom Probe must be calibrated in order to produce a proper reading. The "**5. EDC Input Cal**" screen provides calibration parameters that may used to calibrate the signal from the Custom Probe.

Navigating to the "5. EDC Input Cal" screen.
Start with the "Main Engine"screen, push the MENU button.
Select "System Configuration Menu."
Select "**4. EDC Input Cal**" screen.

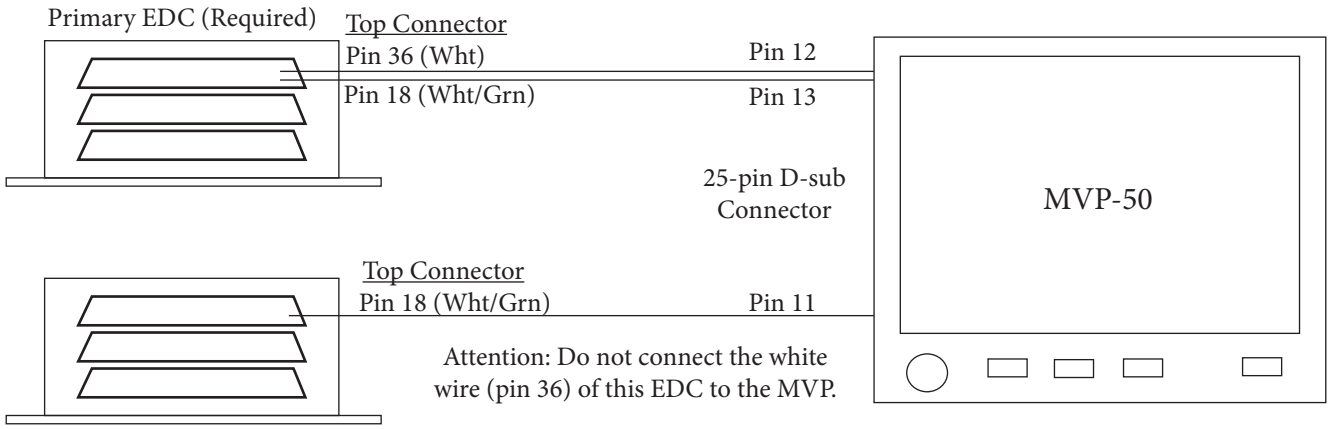
5. Assign Color Ranges and Limits to the Selected Function:

You may set color ranges and limits for the selected Function. The "4. Redlines, Limits and Color Setup" screen provides the necessary parameters.

Navigating to the "4. Redlines, Limits and Color Setup" screen.
Start with the "Main Engine"screen, push the MENU button.
Select "System Configuration Menu."
Select "**4. Redlines, Limits and Color Setup**" screen.

A2.0 Appendix: Connecting a Second EDC to the MVP

A second EDC (Engine Data Converter) may be connected to the MVP-50 in order to increase the number of analog input to over 60. The primary EDC must already be installed per the MVP-50 installation instructions. The secondary and the primary EDC's are identical units.



1. Mount the Second EDC:
Mount the second EDC to the inside firewall or in an equipment bay under the aircraft instrument panel. Use the holes in the bottom plate of the EDC to mount the unit. Be sure you will have enough room to connect the three D-sub connector wire harnesses to the EDC.

2. Install the Transducers (Sold Separately):
Find an appropriate location for each of the transducers you are connecting, and mount them following the MVP-50 installation instructions.

3. Install the EDC Wire Harness and Route the Transducer Extension Wires:
When routing the EDC wire harnesses refer to the Top, Middle and Bottom "EDC Wiring Work Sheets" found in the MVP Installation Instruction Manual. The pin designations for the wiring harnesses on the secondary EDC are exactly the same as on the primary EDC. Follow the MVP-50 installation instructions when connecting the wires from the secondary EDC wire harness to any transducers. **Tie wrap all wires so they do not obstruct the freedom of travel of any controls.**

4. Route the Power and Ground Wires to the Secondary EDC Wiring Harness:
Route the power wire (Top Connector, pin 37, Red Wire) to the MVP/EDC 5-amp circuit breaker. Route the ground wire (Top Connector, pin19, Black Wire) to the aircraft ground. **Tie wrap all wires so they do not obstruct the freedom of travel of any controls.**

5. Route the EDC RS422 Wire to the MVP Connector:
Route the secondary EDC RS422+ Pin 18 white/green wire to pin 11 (Port3, RS232In) of the MVP 25-pin D-sub connector. Do not connect the secondary EDC RS422+ white wire to the MVP.

6. Configure the MVP to Receive the Second EDC Input:
Power up the MVP and use the buttons to navigate to the "Engine Data, Ports, Timers, etc. Setup" screen from the "System Configuration Screens Menu." Scroll down to the line that reads "Port3 RS232 Input/Output/Baud:" and select "EDC#2/OFF/19200." Your MVP must be running software with an ID of 2.x.x or greater to use the second EDC.

7. Input Ambient Temp Calibration Data for the Second EDC:
Navigate to the "5. EDC Input Cal." screen found in the System Configuration Screens Menu. Change the "Input" line to "Temp Comp 2." Scroll to the "Reset values back to factory defaults" line found at the bottom of the screen and select "Yes." Next, Scroll to "Offset" and set its value to the value written on the middle connector that came with the second EDC. You're Done.

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