

# *Engine Data Converter*

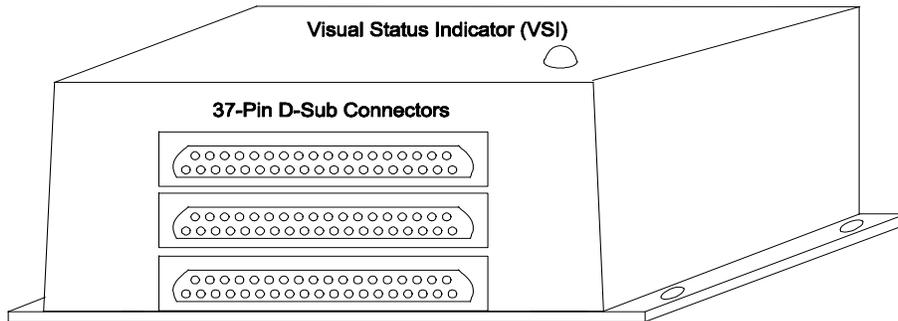
## **EDC-33( )**

### **Operating and Installation Instructions**

II 0503161

Rev A: 3/1/17 \*\*

You must read this manual before installing or operating the instrument. This manual contains warranty and other information that may affect your decision to install this product and/or the safety of your aircraft.



Part #: \_\_\_\_\_

S/N: \_\_\_\_\_



***Electronics International Inc.*** ®

63296 Powell Butte Hwy • Bend, OR 97701 • (541) 318-6060 • Buy-EI.com 

# Important Notice

\*\*\*\*\* MUST READ \*\*\*\*\*

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**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 instruments, Do Not attempt to install this unit. 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 must not allow anyone to operate the aircraft that does not know the operation of 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.

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.

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If the EDC is configured to monitor the aircrafts fuel tanks, the EDC must be calibrated to the aircraft fuel system and the EDC's accuracy must be verified before flying the aircraft.

The accuracy and proper operation of each function monitored on the EDC 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.

## Fuel Level Accuracy Limitations:

The accuracy limitations of the EDC 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 EDC 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 EDC 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 EDC 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 EDC 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 transmitted fuel levels from the EDC to the fuel levels listed in the flight manual at each fill up.**
- 3. Low Fuel Readings** - **Do not rely on the EDC 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.
- 4. Improper Calibration** - If the EDC has not been properly calibrated it will not transmit accurate fuel levels in the tanks. It is important you verify the accuracy of the EDC. **Always crosscheck your measured fuel levels in the tanks with the transmitted levels from the EDC before each flight.**
- 5. Poor Connections** - Poor connections between the wires leading from the EDC to the fuel sensors can become intermittent. An intermittent connection most likely will show up as wandering or inaccurate readings. **Always crosscheck your measured fuel levels in the tanks with the readings transmitted from the EDC before each flight.**

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**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. **Always crosscheck the measured fuel levels in the tanks with the readings transmitted from the EDC at each fill up.**

**If you ever find an inaccuracy issue or any other problem with a fuel level display, troubleshoot and fix the problem before flying the aircraft.**

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 Fuel Level Considerations:

**DO NOT RELY SOLELY ON THE FUEL LEVEL TRANSMITTED FROM THE EDC TO DETERMINE THE FUEL LEVELS IN THE AIRCRAFT.** The use of the EDC 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. 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.
- 2. Preflight** - **Do not rely on the EDC 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. Also, crosscheck these levels with the fuel requirements for the flight listed in your flight plan.
- 3. In Flight** - Make the displayed fuel level is part of your normal instrument scan. **Crosscheck the fuel levels displayed with your flight plan at each leg of the flight or every 30 minutes** (whichever happens first). If there is a discrepancy, land the aircraft at the nearest airport and verify the fuel levels. **Discrepancies should be taken seriously.**
- 4. 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 insure the new pilot has read this**

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manual and is aware of any accuracy limitations and other important considerations. All limitations and operating characteristics learned from operating the EDC 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 two years 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.**

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. It is possible for any system to fail thereby displaying inaccurate high, low or jumpy readings. Therefore, you **must** be able to recognize a system failure and you **must** be proficient in operating your aircraft safely in spite of a system failure. If you do not have this knowledge, contact the FAA or a knowledgeable flight instructor for training prior to flying the aircraft with this system.**

**4. 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.**

**5. 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.**

**6. Personal injury or property damage due to misinterpretation or lack of understanding of this product is solely the pilot's 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 agrees that no one will be allowed to operate the aircraft that does not know the operation and limitations of this product.**

**More On Back of this Page**

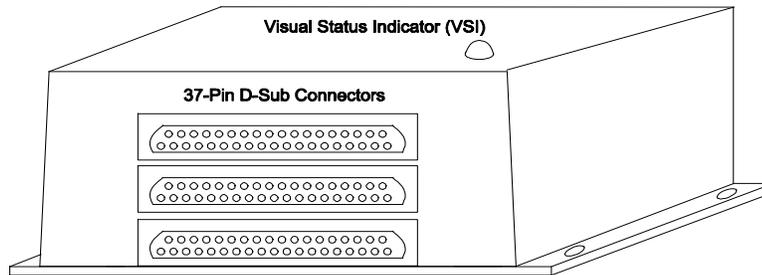
7. The obligation assumed by Electronics International Inc. under this warranty is limited to repair, replacement or refund of the product, at the sole discretion of Electronics International Inc.
8. Electronics International Inc. is not liable for expenses incurred by the customer or installer due to factory updates, modifications, improvements, changes, or any other alterations to the product that may affect the form, fit, function or operation of the product.
9. Electronics International is not responsible for shipping charges or damages incurred under this Warranty.
10. No representative is authorized to assume any other liability for Electronics International Inc. in connection with the sale of Electronics International Inc. products.
11. **You must read the entire Operating and Installation Instructions for this unit. 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 E.I. 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.**

# 1.0 Operating Instructions

## 1.1 System Description:

The EDC-33xx-( ) (called EDC) is a 4.6" x 3.6" x 2.2" box with three 37-pin D-Sub connectors on the front. Engine and aircraft functions are measured (via sensor, probes, transducers, etc.), processed and transmitted on a serial output port. The output data can then be used by another instrument to display primary engine and aircraft information to the pilot or it can be used by a recording device to log data.



The EDC can be placed in the aircraft where routing dozens of wires from the sensing devices is more convenient. The EDC will interface with the display unit through only a few wires. This keeps the wires under the instrument panel to a minimum and makes for an easy installation.

## 1.2 EDC Configurations:

The EDC measures signals from engine and aircraft sensors, and then processes this information into calibrated data that is suitable for displaying to the pilot or logging. Once processed the data is transmitted on the communication port.

Some of the EDC parameters that can be configured are; update rate, gain, offset, reference other channels using math functions, multiplier, truncation, rounding, filtering, de-jitter, decimal place, allow negative readings, snap, ratiometric, communication parameters and more. With this capability the EDC can process almost any signal into usable data.

By processing the raw sensor data via the EDCxx-( ) the workload of the display or logging unit is significantly reduced. The "xx-( )" in the model number is filled in by Electronics International with numbers and/or letters that identify the EDC-33xx-( )'s configuration. Configurations are setup at Electronics International before the units are shipped.

### **1.3 Operation:**

The EDC only has one operating mode. On power-up the unit performs a self test and within one second the Visual Status Indicator (VSI) will start flashing green (if no errors are detected).

### **1.4 Visual Status Indicator (VSI):**

The light on the top of the EDC is a Visual Status Indicator (VSI). The VSI provides a method for maintenance personal to determine the status of the EDC in an easy and quick manor. The VSI can change colors, flash or display in one solid color.

On the side of the EDC is a label providing a chart to decode the VSI. The various indications are as follows:

**Flashing Green** – Normal operation.

**Steady any color** – Internal failure.

**Off** – Power or Grounding issue or an internal failure.

**Flash Red** – System Error; internal power supply issue, communication problem with bottom or middle board, problem with one of the analog-to-digital converters, issue with initializing the communication IC or a memory failure.

**Flashing Yellow** – Middle connector issue; +5V shorted, Temp Comp RTD is open or shorted, or an input is over-ranged.

**Flashing Blue** – Bottom connector issue; +5V shorted, Temp Comp RTD is open or shorted, or an input is over-ranged.

## 2.0 Installation Instructions

### 2.1 Install the EDC-33xx(-):

Install the EDC as follows:

1. Un-box and inspect the EDC unit for defects. Do not install a defective unit.
2. Check the model number and insure the configuration is appropriate for the aircraft to which it is to be installed. See section "1.2 EDC Configurations" for more information.
3. Check that the Wiring Diagrams provided with the unit matches the EDC-33xx(-)'s configuration.
4. Read the Warranty/Agreement. If you, your company or the aircraft owner does not agree with the Warranty/Agreement, do not install this unit. Return the unit for a refund.
5. 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 unit. The installer should use current aircraft standards and practices to install this unit (refer to AC 43.13).
6. Find an appropriate location under the aircraft instrument panel or in an equipment bay to mount the EDC. Use at least two diagonal corner screw holes in the bottom plate to mount the unit. If the EDC is to be subjected to standing water due to condensation or excessive dust and sand, the unit should be mounted with the wires pointing down.
7. Route the appropriate wires from the three 37-pin D-Sub connectors to all the sensors, probes, transducer, power, ground and receiving unit (see the Wiring Diagrams provided with the EDC unit). Do not connect the wires at this time. 20ga wire is preferred.
8. Connect the routed wires to all the external devices (sensors, probes, transducer, display units, etc.).
9. Connect the power and ground wires. The power wire should be connected to a 2 to 5 amp breaker. You can use the same breaker as the display unit as long as the breaker is rated to handle the load of both units and does not exceed the wire capability. See specification section for EDC current draw.
10. Before crimping the D-Sub pins onto the wires, perform a qualification test to be sure the pins you are using are adequate. A MIL Standard pin does not insure an adequate connection. Using a sample wire (the same as the routed wire) crimp a pin onto the wire and perform a pull test. Test a wire from each group of different wire material. The wire retention strength for Electronics International's D-Sub pins are approximately:
  - 20 ga Copper Wire – 95 lbs
  - 20 ga Type K TC Wire – 60 lbs
  - 22 ga Type K TC Wire – 37 lbs.
11. Crimp the D-Sub pins onto the routed wires using the tool used above and insert the pins into the correct locations on the 37-pin D-Sub connector. Be sure you leave some slack in the wire so there is no tension on the pins when the D-Sub connectors are installed onto the EDC.

A D-Sub clam shell can be used, but is not necessary unless the unit will be subjected to standing water due to condensation or excessive dust and sand. If a clam shell is not used, place a tie wrap 3" back from the connector.

12. Tie off the routed wires. Wires should not come in contact with metal. Also, wires should not have long sections without supports.

13. Ground Test:

- A) Power-up the EDC and check the VSI for proper operation.
- B) Check the data on the receiving device for proper readings.
- C) For a STC/FAA Approval process, apply appropriate signals to the EDC and perform an accuracy test.
- D) Start the aircraft engine(s) and again check the receiving device for proper readings.
- E) Check all other instruments that may be affected by the installation for proper operation.

14. Flight Test - If the EDC data is to be displayed to the pilot, perform a flight test, check all devices and instruments for proper operation.

## **2.2 Setup and Calibration:**

The EDC-33xx-( ) unit will be setup and calibrated at Electronics International's manufacturing facility to a specific set of sensors applicable for the intended installation. When the unit is ordered, a worksheet provided (by the customer) will be required, listing the calibration output signal levels for each of the sensors to be monitored. The text and numerals that replace the parenthesis at the end of the EDC-33xx-( ) part number will be unique to the specific application and in most cases will be the aircraft model or N number. The customer will receive a detailed wiring diagram with each unit or set of the same units.

## **2.3 Periodic Maintenance:**

The EDC units do not require periodic maintenance.

## **2.4 Continued Airworthiness:**

Servicing is "on condition" only. There are no field adjustments or calibration requirements for the EDC units after they have been properly installed and approved. All servicing of the EDC units must be accomplished by Electronics International (EI).

## **2.5 Inspection Intervals:**

The EDC units do not require periodic inspections.

## **2.6 Service Life:**

Service Life is only limited to the availability of replacement parts.

## **2.7 Limitations:**

There are no unique aspects to the installation that will keep the EDC-33xx-( ) articles from meeting the TSO requirements. The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in an aircraft. The article may be installed only if performed under 14 CFR part 43 or the applicable airworthiness requirements.

This article is an incomplete TSO article, requiring engine sensors and a display system to form a complete instrument system.

## 2.8 SAE Standards, TSOs and MPS:

The EDC-33xx(-) articles carry the following TSO authorization:

- TSO-C43c, Temperature
- TSO-C44c, Fuel Flow
- TSO-C45b, Manifold Pressure
- TSO-47a, Fuel, Oil and Hydraulic Pressure
- TSO-C49b, Electric Tachometer
- TSO-C55a, Fuel and Oil Quantity

A deviation to use DO-160G in place of older version list in the applicable TSO was approved by the FAA.

The EDC-33xx(-) are incomplete articles that meet the following applicable MPS for the given SAE aeronautical standards list in the above TSO's:

### **AS8005, Minimum Performance Standard Temperature Instruments, 1-15-77**

Para #	Paragraph Text		Para #	Paragraph Text
3.	<b>General Standards:</b>		5.2	<b>Power Input:</b>
3.1	Classification by Instrument Accuracy: Class IIa		5.2.1	Electrical Input Variation Test
3.4	Marking:		5.2.2	Low Voltage Test:
3.5	Signal (Sensor) Characteristics:		5.3	Conducted Voltage Transients:
3.8	Effects of Tests:		5.4	Conducted Audio Frequency Susceptibility Test:
3.9	Interchangeability:		5.5	Audio Frequency Magnetic Field Susceptibility:
3.10	Fire Resistance:		5.6	Radio Frequency Susceptibility:
4.	<b>Minimum Performance Standards Under Standard Conditions:</b>		5.7	Emission of Radio Frequency Energy:
4.1	Standard Atmospheric Conditions:		5.9	Humidity:
4.2	Attitude:		5.15	Shock:
4.3	Vibration to Minimize Friction:		6.0	<b>Test Procedures</b>
4.4	Power Input Voltage:		6.1	Fire Resistance:
4.4.1	Direct Current:			
4.9	Magnetic Effects:			
5.	<b>Minimum Performance Standards Under Environmental Conditions</b>			
5.1	<b>Temperature Altitude:</b>			
5.1.1	Low Temperature:			
5.1.2	High Temperature:			
5.1.3	Altitude:			

### AS407c, Fuel Flowmeters, Revised 2007-07

Para #	Paragraph Text		Para #	Paragraph Text
3.	<b>General Standards:</b>		7.	<b>Qualification Tests</b>
3.1	<b>Materials and Workmanship</b>		7.1	Low and High Temperature
3.2	Identification:		7.2	Extreme Temperature Exposure
3.3	<b>Environmental Conditions:</b>		7.3	Magnetic Effect
3.3.1	Temperature:		7.4	Humidity
3.3.2	Humidity:		7.5	Vibration
3.3.3	Vibration:		Added	TSO-C44c Appendix1 added, DO-160E, Section 18
3.3.4	Altitude (51,000')		Added	TSO-C44c Appendix1 added, DO-160E, Section 17
3.4	Radio Interference		Added	TSO-C44c Appendix1 added, DO-160E, Section 18
3.5	Magnetic Effect:		Added	TSO-C44c Appendix1 added, DO-160E, Section 19
4.	<b>Detail Requirements:</b>			
4.5	Power Variations			
5.	<b>Test Conditions</b>			
5.1	Atmospheric Conditions			
5.4	Power Conditions			

## AS8042, Manifold Pressure Instruments, Issued 12-1-85

Para #	Paragraph Text		Para #	Paragraph Text
3.	<b>General Standards:</b>		4.	<b>Minimum Performance Under Standard Conditions</b>
3.4	Compatibility		4.1	<u>Test Conditions</u>
3.8	Fail-Safe Provisions		4.1.1	Atmospheric Conditions
3.9	Multiple Mode		4.1.3	Power Conditions
3.13	Temperature		5.	<b>Minimum Performance Under Adverse Environmental Conditions</b>
3.14	Altitude		5.2	<u>Temperature Tests</u>
3.15	Vibration		5.2.1	Categories
3.16	Humidity:		5.2.2	Low Temperature
3.20	Power Variations		5.2.3	High Temperature
3.22	Decompression		5.2.4	Thermal Shock
3.24	Fire Hazard (as amended by TSO-C45b appendix 1).		5.3	Altitude Exposure Test
3.26	Radio Interference		5.4	Overpressure Tests
3.27	Case Ground		5.5	Humidity Tests
3.28	Magnetic Effect		5.6	Vibration Tests
3.30	Identification		5.10	Magnetic Effect Tests
			5.11	Power Input Tests
			7.	Qualification Tests

**AS408c, Pressure Instruments – Fuel, Oil and Hydraulic  
Revised 2001-07**

Para #	Paragraph Text		Para #	Paragraph Text
3.	<b>General Requirements:</b>		7.	<b>Qualification Tests</b>
3.1	<b>Materials and Workmanship</b>		7.1	<b>Temperature Characteristics:</b>
3.2	Identification:		7.1.1	Low Temperature Operation
3.3	<b>Environmental Conditions:</b>		7.1.2	High Temperature Operation:
3.3.1	Temperature:		7.1.3	Extreme Temperature Exposure
3.3.2	Altitude:		7.1.4	Altitude:
3.3.3	Vibration:		7.2	Vibration
3.3.4	Humidity		7.3	Humidity
3.6	Radio Interference		7.4	Magnetic Effect
3.7	Magnetic Effect:		7.5	Thermal Shock:
3.9	De-Compression:		7.14	Test conditions in RTCA/DO-160E, Section 16, Power Input.
4.	<b>Detail Requirements:</b>		7.15	Test conditions in RTCA/DO-160E, Section 17, Voltage Spike.
4.8	Power Variation:		7.16	Test conditions in RTCA/DO-160E, Section 18, Audio Frequency Conducted Susceptibility - Power Input.
5.	<b>Test Conditions</b>		7.17	Test conditions in RTCA/DO-160E, Section 19, Induced Signal Susceptibility.
5.1	Atmospheric Conditions		7.18	Test conditions in RTCA/DO-160E, Section 20, Radio Frequency Susceptibility.
5.4	Power Conditions			

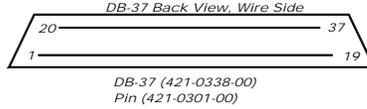
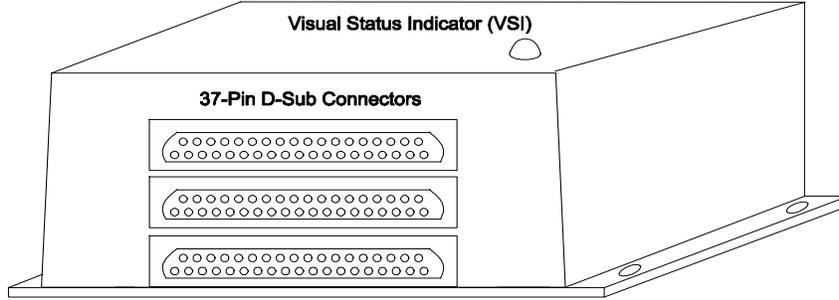
**AS404b, Electric Tachometer: Magnetic Drag (Indicator & Generator)**  
**Revised 2/1/59**

<b>Para #</b>	<b>Paragraph Text</b>
3.	<b>General Requirements:</b>
3.1	<b>Materials and Workmanship</b>
7.	<b>Qualification Tests</b>
7.1	Low Temperature
7.2	High Temperature
7.3	Extreme Temperature Exposure
7.4	Magnetic Effect
7.5	Vibration
7.6	Humidity
7.7	Acceleration Endurance
7.8	Thermal Shock:

**AS405c, Fuel and Oil Quantity Instrument, Revised 2001-07**

Para #	Paragraph Text		Para #	Paragraph Text
3.	<b>General Requirements:</b>		5.10	Applicable Environmental Conditions.
3.1	<b>Materials and Workmanship</b>		7.	<b>Qualification Tests</b>
3.2	Identification:		7.1	<b>Temperature Characteristics</b>
3.3	<b>Environmental Conditions:</b>		7.1.1	Low Temperature (-55°C)
3.3.1	Temperature:		7.1.2	High Altitude-Low Temperature
3.3.2	Humidity		7.2	Water Immersion Test
3.3.3	Vibration:		7.4	Humidity
3.3.4	Altitude:		7.5	Magnetic Effect
3.4	Radio Interference		7.7	Operational Shocks Tests.  (Added by TSO-C55a, appendix 1)
3.5	Magnetic Effect:		7.9	Power Input Test  (Added by TSO-C55a, appendix 1)
4.	<b>Detail Requirements:</b>		7.10	Voltage Spike Test  (Added by TSO-C55a, appendix 1)
4.3	Power Variation		7.11	Audio Frequency Conducted Susceptibility Test  (Added by TSO-C55a, appendix 1)
5.	<b>Test Conditions</b>		7.15	Lightning Induced Transient Susceptibility Test  (Added by TSO-C55a, appendix 1)
Para #	Paragraph Text		Para #	Paragraph Text
5.1	Atmospheric Conditions		7.17	Electrostatic Discharge Test  (Added by TSO-C55a, appendix 1)
5.4	Power Conditions		7.18	Flammability Test  (Added by TSO-C55a, appendix 1)
<b>Note</b>	TSO-C55a, Appendix 1 adds the following paragraphs:			
5.8	Accuracy Tolerances, Class 2			

# 3.0 Sample Wiring diagram



## Top Connector

DB-37	
Power	1 Power In, (9 to 65 Volts).
	20 Power In, (9 to 65 Volts).
Gnd	2 Gnd In
	21 Gnd In
Output Port	3 To Display Unit
	4 To Display Unit
Gnd	5
	24
N/C	6 No Connect
USB -	7 USB 2.0
USB +	8
	25
USB Shield	26
	27
LSS	9 Open Collector
	28
N/C	29 No Connect
	30
OC1	10 Open Collector, Not Used
OC2	11 Open Collector, Not Used
	30
EEC Data 2	12 Logic In, Trig = 1.8V/1.2V
EEC Clk 2	13 Logic In, Trig = 1.8V/1.2V
EEC Data 1	14 Logic In, Trig = 1.8V/1.2V
EEC Clk 1	15 Logic In, Trig = 1.8V/1.2V
Gnd	31
Gnd	32
+8.5V	16 <1 to >80K Hz, Trig = 21.5mV / 11mV
Pulse 2	17 <1 to >80K Hz, Trig = 21.5mV / 11mV
Gnd	33
Pulse 1	18 <1 to >80K Hz, Trig = 21.5mV / 11mV
+8.5V	19
Gnd	34
	35
N/C	36 Used to key the connectors.
	37

## Mid Connector

DB-37	
Pulse 3	1 <1 to >80K Hz, Trig = .386V/0V
Pulse 4	2 <1 to >80K Hz, Trig = .386V/0V
Pulse 5	3 <1 to >80K Hz, Trig = .386V/0V
	20
Gnd	21
	22
Analog 8 -	23 -4V to 50V
Analog 8 +	5
Analog 7 -	24 -0.2V to 2.5V
Analog 7 +	6 9.537 uV Resolution .2 to 5V CMV
Analog 6 -	25 -0.2V to 2.5V
Analog 6 +	7 9.537 uV Resolution .2 to 5V CMV
Analog 5 -	26 -0.8V to 10.2V
Analog 5 +	8
Gnd	4
Temp Comp	9 Temp Comp RTD or Ext RTD
Temp Comp Gnd	27 Temp Comp RTD
+5V	28 +5V
Analog 4 -	10 -0.8V to 10.2V
Analog 4 +	11
Gnd	29
+5V	30 Current for RTD
Analog 3	12 RTD In
Analog 3 +	13
Gnd	31
+5V	32 Current for RTD
Analog 2	14 RTD In
Analog 2 -	15
Gnd	33
+5V	34 Current for RTD
Analog 1	16 RTD In
Analog 1 +	17
Gnd	18
Gnd	19
	35
N/C	36 Used to key the connectors.
	37

## Btm Connector

Pulse 6	1 <1 to >80K Hz, Trig = . 21.5mV/11mV
Pulse 7	2 <1 to >80K Hz, Trig = . 21.5mV/11mV
Pulse 8	3 <1 to >80K Hz, Trig = .386V/0V
	20
Gnd	21
	22
Analog 16 -	23 -4V to 50V
Analog 16 +	5
Analog 15 -	24 -4V to 50V
Analog 15 +	6
Analog 14 -	25 -0.8V to 10.2V
Analog 14 +	7
Analog 13 -	26 -0.8V to 10.2V
Analog 13 +	8
Gnd	4
Temp Comp	9 Temp Comp RTD
Temp Comp Gnd	27 Temp Comp RTD
+5V	28
Analog 12 -	10 -0.8V to 10.2V
Analog 12 +	11
Gnd	29
+5V	30
Analog 11 -	12 -0.8V to 10.2V
Analog 11 +	13
Gnd	31
+5V	32 Not Used
Analog 10 -	14 RTD Current Source
Analog 10 +	15
Gnd	33
+5V	34 Not Used
Analog 9 -	16 RTD Current Source
Analog 9 +	17
Gnd	18
Gnd	19
	35
N/C	36 Used to key the connectors.
	37



# 4.0 DO-160G Environmental Qualification Form

*Electronics International Inc.*

## **DO-160G Environmental Qualification Form** EFQ 1005161

Rev A: 3/1/17

Nomenclature: Multi Function Engine and Aircraft System Monitor

Models: EDC-33PW-(), EDC-33ST-() and EDC-33SP-()

Note: “()” provides a designation of the configuration.

Specifications: Can be found in the Operating and Installation Instructions (II 0503161)

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

Test Requirements: DO-160G, Dec 8, 2010

The Models listed above were subjected to and passed the following tests:

Conditions	Section	Description of Tests Conducted
Temperature and Altitude	4	Tested to Category C4: Operating Temp: -40°C to +70°C Short Time Low Temp: -40°C Short Time High Temp: +70°C Ground Survival Low Temp: -55°C Ground Survival High Temp: +85°C In-Flight Loss of Cooling: N/A Altitude: 55,000 feet Decompression: 8,000 to 55,000 feet Overpressure: -15,000 feet
SAE Requirements	N/A	Low Temp Operating: -55°C Low Temp Non-Operating: -65°C
Temperature Variation	5	Tested to Category B: 5°C/min
Humidity	6	Tested to Category A:

Conditions	Section	Description of Tests Conducted
Operational Shock and Crash Safety	7	Tested to Category B Type 5F: Operational: 6 g's at 11ms and 20ms Impulse: 20 g's at 11ms Sustained: 20 g's all axes for 3 sec.
Vibration	8	Tested to Category R, Curves C1.  Robust Vibration Tests.  Covers fixed wing turbojet or turbofan engine (subsonic and supersonic).  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, measured 3.7 inches.
Power Input	16	Tested to Category Z: Applicable for 14 and 28 volts systems. Emergency Electrical System Operation tested.
Voltage Spike	17	Category A: High degree of protection.
Audio Frequency Susceptibility	18	Category Z: Applicable for all other types of aircraft electrical systems.
Induced Signal Susceptibility	19	Category ZC: Applicable for aircraft whose primary power is constant frequency (e.g. 400 Hz) or DC.

Radio Frequency Susceptibility	20	Tested to Category R (HIRF for systems with high criticality and requiring T-PED tolerance).  Tested to Category W between 100MHz and 400 MHz at 100V/m.
Radio Frequency Emission	21	Tested to Category M: Suitable for transport aircraft.
Lightning Induced Transient Susceptibility	22	Categories A3G3L3: Suitable for installation in a metal aircraft where the installation is only partially protected from lightning. Unshielded aperture coupling.
Lightning Direct Effects	23	Category X: No test performed.
Icing	24	Category X: No test performed.
Electrostatic Discharge	25	Category A: +/- 15,000 volts.
Fire, Resistant	26	Category C: Flammability (enclosures housing electronics).



# **Specifications / Features**

1022161

Rev.New: 10/22/16

**Models:** EDC-33PW, EDC-33ST and EDC-33SP

**Weight:** 1.0 Lbs.

**Environmental:** Designed and Tested to TSO (DO-160G), See EQF.

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

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

**Power Requirements:** 9.0 to 65 Volts, 0.073 amps @ 28V (Typ), 0.135 amps @ 14 Volts (Typ).

**Communication Port:** Configurable type and protocol.

**Accuracy all Inputs:** < +/-1% (Unless otherwise noted)

**Volts Inputs:** Differential, Max sensitivity: 9.537 uV, Diff Range: 0.2 to 2.5V, Common Mode Range: -0.2 to 5V, Configurable to higher values, +5V P.S. can be configured as a current source for RTD measurements.

**Pulse Inputs:** <1 Hz. to 80 KHz, Configurable trigger level.

**EEC Data Input:** Logic Input, Configurable.

**EEC Clk Input:** Logic Input, Configurable.

**+5 Volts Output Power Supplies:** +/- 1%, limit the max draw from each P.S to 0.1A. There is one P.S. for each of the three connectors.

**Open Collector Outputs:** Limit pull-down current to 0.1A max..

**Temp Comp:** An RTD provides the cold junction for temperature measurements from thermocouples.