Electronics International Inc.

UBG-16x

Installation Instructions

II 1111981 - Rev. A**



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.

Serial #:_____

3753 W. Gulfstream Rd, Hayden, ID 83835 • (541) 318-6060 iFlyEi.com

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 (in new condition) 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 EGT, CHT and other temperature 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 (in new condition) 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 (in new condition) 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, miswiring, 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. The pilot must keep the instrument Operating Instructions in the aircraft at all times. If you do not agree to the above, **DO NOT INSTALL THIS PRODUCT.** This product may be returned (in new condition) for a refund. Contact Electronics International Inc for details.

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.

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, miswiring, obstructions, damage to aircraft or components, incorrect installation of any parts, wrong parts, part that don't fit, etc.) or any other issue(s) 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 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 who 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 extend any other liability than the ones listed here for Electronics International's 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 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.**

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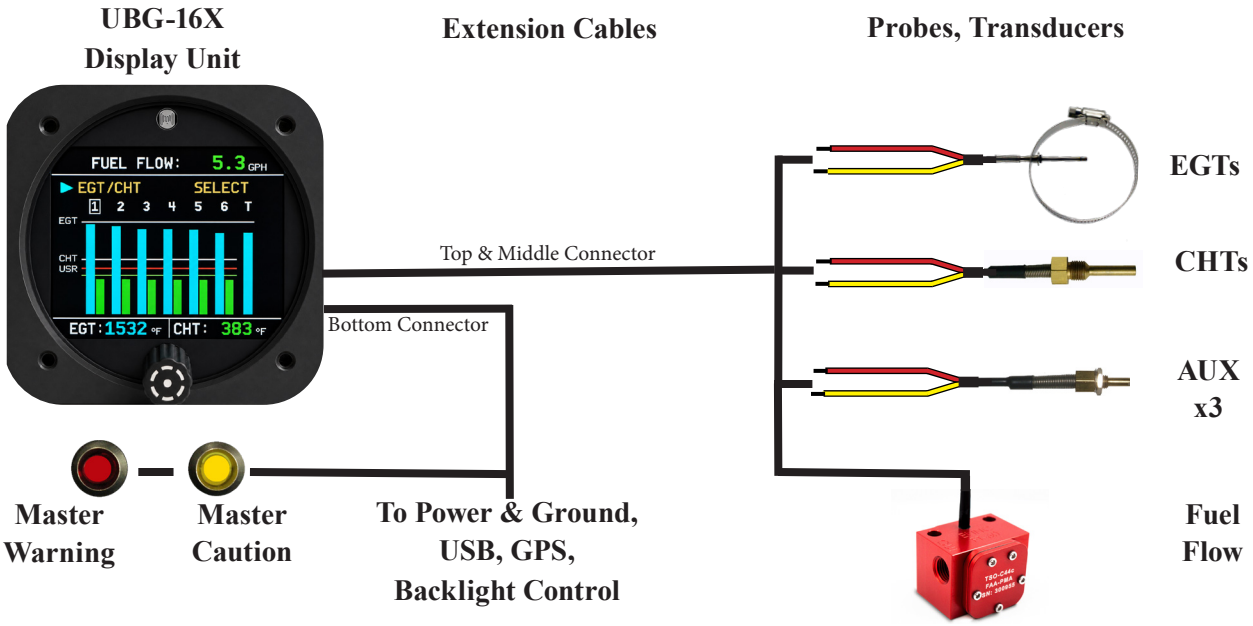
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1.0 System Overview

1.1 System Description:

The UBG-16x consists of three major components: UBG Display Unit, Probes and Transducers and Wiring and Extension Cables.



1.1.1 UBG Display:

The UBG-16x was designed to be mounted from behind the aircraft instrument panel in a standard 2 1/4 inch hole. The UBG-16x can be set up to monitor EGTs and CHTs for a 4, 5, 6, 7, 8 or 9-cylinder engine. Depending on the number of EGTs and CHTs monitored, the UBG can also monitor TIT and up to three Aux Temp channels. In addition to the temperature channels, the UBG can monitor Fuel Flow.

The UBG incorporates three D-Sub connectors, two 25-Pin D-Subs and one 15-Pin D-Sub. The top 25-Pin connector provides 11 temperature channel inputs. These inputs can be configured to monitor up to 9 EGTs channels, up to 2 Aux Temp channels, 1 TIT channel and up to 2 CHT channels in some combination that does not exceed 11 temperature channels.

The middle 25-Pin connector provides 7 temperature channel inputs. These 7 inputs can be configured to monitor up to 7 CHTs and up to 1 Aux Temp channel in some combination that does not exceed 7 temperature channels. Also, the middle connector provides pins to monitor fuel flow and the RTD (resistive temperature compensator.)

The bottom 15-Pin connector provides pins for power and ground, USB connector (for downloading flight data) and the optional functions: RTDO out, GPS out, Dimming Control and control lines for external Yellow and Red warning lights.

1.1.2 Probes and Transducers:

The UBG connects directly to the probes and transducers via cables. The UBG input channels monitor the following probe and transducer types:

EGTs - These are type K. Normally, hose clamp type probes are used.

CHTs - These are type K, but the UBG can be set up to monitor type J probes. Normally, 3/8-24 screw-in probes are used. If the aircraft uses the screw-in port to drive a primary CHT gauge, you will need to use a piggyback 3/8" gasket probe (P-102-3/8) under the primary probe.

AUX - Aux temperature channels monitor type K probes. These channels can be used to monitor OAT, Cabin T, Coolant, H2O, IAT, Cowl T, CDT or any other temperature for which we have a probe.

Fuel Flow - The UBG provides 3 wires to operate the fuel flow transducer, power (+5V), ground and signal. The signal is a 0 to +5V pulse produced by the flow transducer and routed to the UBG. The frequency of the pulses represent the flow rate.

1.1.3 Wiring & Extension Cables:

The extension cables and wiring provide the connections from the probes and transducers to the UBG-16x. The temperature probes require type K extension cables. All the other connections are provided with copper wire. The UBG comes with the 3 D-Sub connectors pre-wired.

There are interconnect harnesses available to allow a updated UBG to replace the older UBG that uses circular connections. Also, harnesses are available to replace JPI and Insight bar graph units without cutting or rerouting wires or replacing probes (plug and play). Simply replace the display unit with the UBG-16x.

1.2 Operational Overview for Troubleshooting:

The UBG temperature channels monitor the signals from the type K thermocouple (TC) probes and cables as follows:

A. The temperature probe outputs a voltage proportional to the temperature difference between the probe tip and the end of the TC cable, where it meets the connector. This is at the back of the UBG.

B. If the temperature at the probe tip is 1470'F and the ambient temperature at the back of the UBG is 70'F, there will be a voltage between the yellow (+) and red (-) wire of 32.362 mV (1400'F). We call this the "Differential Probe Tip Temperature."

C. The ambient temperature at the back of the UBG is measured with a temperature compensating device (RTD-500). The RTD is located under the heat shrink near the back of the UBG. Lets assume this temperature is 70'F

D. The UBG adds the measured Differential Probe Tip Temperature (1400'F) to the measured ambient temperature (70'F), to get the correct probe tip temperature of 1470'F. With an open temperature channel, the UBG will read the ambient temperature compensator located at the back of the instrument. If you remove the probe and connect the FCD-T-NIST in place of the probe, the UBG will read 1400'F + the ambient reading. The FCD-T-NIST is an excellent troubleshooting tool to replace the output of a type K probe. You can use it on any type K temperature channel no matter what the temperature range. Contact E.I. for details.

The Fuel Flow Transducer interfaces with the UBG as follows:

A. +8.5V and ground are provided by the UBG and connect to the Fuel Flow Transducer.

B. The UBG has a pull-up resistor on the signal wire. The fuel flow transducer pulses this wire to ground at a rate proportional to the fuel flow. If you remove the signal wire from the transducer and tap it to ground, you should see a fuel flow reading on the UBG. The faster you tap, the higher the reading.

C. If you gently blow into the inlet port of the Fuel Flow Transducer, you will see the paddlewheel spin. If the transducer is connected to the UGB, you should see a high fuel flow reading on the UBG.

1.3 Installation Overview:

The installation of the UBG-16x can be broken down into 6 steps as follows:

1. Install probes and transducers.
2. Install harnesses and route wires.
3. Connect extension cables to probes.
4. Install the UBG-16x.
5. Power-On Checkout.
6. Paperwork.

2.0 Install Probes and Transducers

If you will be replacing an older UBG, JPI or Insight display and using all the existing cables and probes, we can provide an interconnect harnesses to do this. Follow the instructions that come with the conversion kit.

If you will be installing the probes and harnesses supplied with the UBG kit, follow the instructions below:

2.1 Important Information and Initial Checkout:

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.**

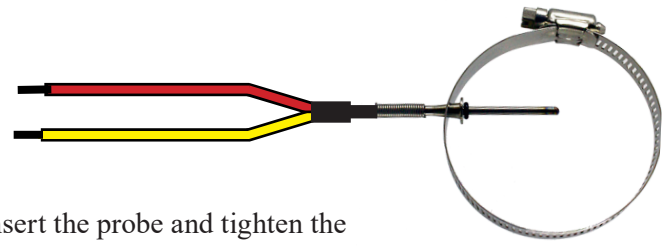
B. **If you are not an FAA Certified Aircraft Mechanic familiar with installing engine and aircraft instruments, do not attempt to install this instrument. The installer should use current aircraft standards and practices to install this instrument (refer to AC 43.13).**

C. **Check that any necessary FAA Approvals for installing this system are available for your aircraft before starting the installation. The STC and AML are located at the back of this manual.**

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 instrument package prior to installation. Check to be sure you have all the probes, transducers and appropriate wired D-Sub connectors for this installation.

2.2 Install the EGT Probes:



Look at each exhaust stack and determine the best location at which all of the EGT probes can be mounted at the same distance down from the exhaust ports. The ideal location is 1 1/2", but ease of installation should prevail. For our fast response probes drill a 5/32 hole or for our robust probes (preferred) drill a 13/64" diameter hole in each exhaust stack. Insert the probe and tighten the

hose clamp. As the hose clamp is heated and cooled, it may become loose as it conforms to the exhaust stack. **After the first 10 hours of operation, each hose clamp should be retightened.**

IMPORTANT NOTE: For Cessna 210s or any aircraft having a slip joint in the exhaust system, install the EGT probes ABOVE OR BELOW THE SLIP JOINT. Installing an EGT probe in the slip joint can damage the probe.

2.3 Install the TIT Probe:



If you currently have a TIT gauge mounted in the aircraft it may be a primary engine instrument. In this case, you will need to install a secondary TIT probe. The TIT probe should be installed on the inlet of the turbocharger one to two inches before the Turbo-charger flange. For a hose clamp probe, drill a 13/64" diameter hole in the exhaust stack. Insert the probe and tighten the hose clamp. As the hose clamp is heated and cooled, it may become loose as it conforms to the exhaust stack. **After the first 10 hours of operation, each hose clamp should be retightened.**

If a P-111, P-112 or P-114 threaded TIT probe is to be installed, perform the steps outlined in the "TIT Probe Depth Adjustment Procedure" that comes with the TIT probe.

2.4 Install the CHT Probes:



Most engines have threaded ports for the CHT probes just below the lower spark plug. Install the P-100 CHT probes into these threaded ports. If your engine has a primary CHT probe in one of the cylinders, do not remove it. Install our P-102-3/8 piggyback gasket probe under the primary probe.

2.5 Install the AUX Temperature Probes:



The UBG provides three AUX Temp channels. E.I. has probes for most temperature functions in an aircraft. A list of available probes is provided at iflyei.com/product-category/accessory. The P-128 (1/4"-28) is a universal probe used for many functions (Carb Temp, OAT, CDT, IAT, Oil Temp, Cowl Temp and others).

Install the appropriate probes for the AUX temperatures to be measured.

2.6 Install the Fuel Flow Transducer:

Install the Fuel Flow Transducer using the following instructions and important considerations.



A. If your engine is equipped with a pressure carburetor incorporating a fuel return line from the carburetor back to the fuel tank, you will need to install two flow transducers: one in the feed line from the fuel pump to the carburetor and one in the return line from the carburetor back to the fuel tank. Also, a Fuel Flow Differential Module (FFDM-1) will need to be installed. See drawings 1229932 and 1015941 on the following pages.

B. Insure the fuel flow transducer is appropriate for the horsepower of the engine.

C. The transducer output port should be mounted lower, even with or no more than 4" per foot higher than the carburetor inlet port (or fuel servo on a fuel-injected engine). If this is not possible, a loop should be put in the fuel line between the Fuel Flow Transducer and the carburetor or fuel servo (see diagram below). This loop is intended to vacate air and keep it from getting trapped in the flow transducer.

Aircraft Configuration	*Drawing #*
Fuel injected engine without a fuel return line from the fuel servo (most Lycomings).	1229932 or 1229931
Fuel injected engine with a fuel return line from the fuel servo (most Continentals).	0415941
Carbureted engine with a fuel pump and no fuel return line.	1229932 or 1229931
Carbureted engine with a fuel pump and a fuel return line (requires an FFDM-1 Module).	1229932 or 1229931, and 1015941
Carbureted engine with a gravity feed fuel system (requires an FT-90 Flow Transducer).	1229932 or 1229931

Fuel Flow Transducer Selection:

FT-60 (Red Cube): For 0 to 350 HP Engines.

FT-90 (Gold Cube): For 350 to 550 HP Engines or gravity feed fuel systems.

FT-180 (Black Cube): For 550+ HP Engines.

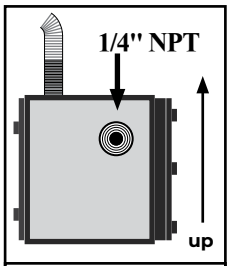
(See the transducer specification for pressure drops at a given flow rate.)

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

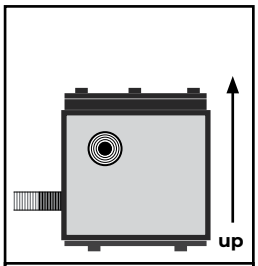
E. The flow of fuel through the transducer must follow the direction marked on the transducer.

Mounting Position

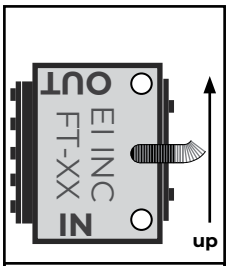
- The direction of the flow of fuel through the transducer is marked on the transducer.
- Mount the transducer with any of these options:
  1. The wires pointing up.
  2. The side with five bolts faced up.
  3. The fuel flow output side facing up.
  4. Any combination thereof.
- Positioning the transducer correctly will keep trapped air from potentially disrupting accurate flow readings



Option 1 Side View



Option 2 Side View

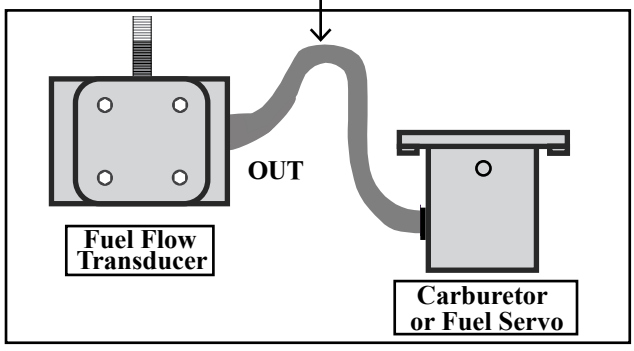


Option 3 Side View

Fuel Line Connection

If the transducer output port is mounted on a slope or grade more than 4 inches per foot higher than the carburetor or fuel servo port, add a curve in the fuel line between the transducer and the carburetor or fuel servo. This adjustment helps unwanted air bubbles escape from the Flow Transducer, ensuring accurate readings.

Add Curve to Fuel Line
(To keep air bubbles out of Fuel Flow Transducer)



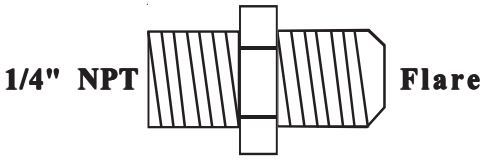
F. Mount the flow transducer with the exit wires, the five-bolt cap, the fuel outlet port, or any combination thereof pointing up.

G. Before connecting any hoses, thoroughly clean them and ensure that 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.**

H. When mounting a fuel flow transducer, make provisions for the fuel pressure transducer as necessary.

G. You may want to consider using some fittings and hoses shown below. Note: **DO NOT EXCEED a torque of 15 ft. lbs. or screw the fittings tighter than two full turns past hand tight, whichever happens first.**

Fittings:

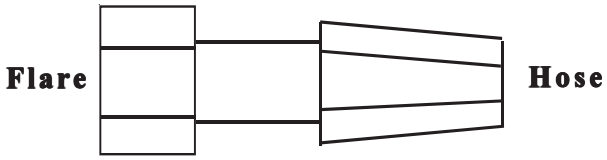


#4 Straight - AN816-4-4D
#6 Straight - AN816-6D
#8 Straight - AN816-7D

#6 45' - MS20823-6D

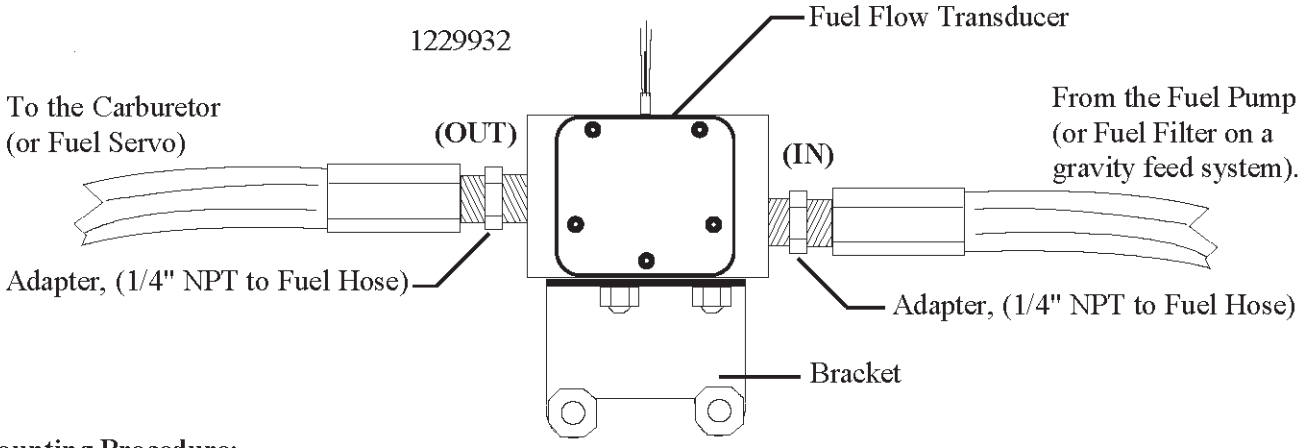
#4 90' - MS20822-4-4D
#6 90' - MS20822-6D

Hose Fittings:



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.



Mounting Procedure:

1. Find a convenient location on the firewall (away from any hot exhaust pipes) and mount a bracket for the Fuel Flow Transducer. Check both sides of the firewall for clearance before drilling any holes.

2. Mount the Fuel Flow Transducer onto the Bracket. **You must use the FT-90 (Gold Cube) Fuel Flow Transducer on a gravity feed system or for any engine over 350 H.P. If the Transducer is mounted within 6" of an exhaust pipe, the Flow Transducer must be wrapped with Fire Sleeving.**

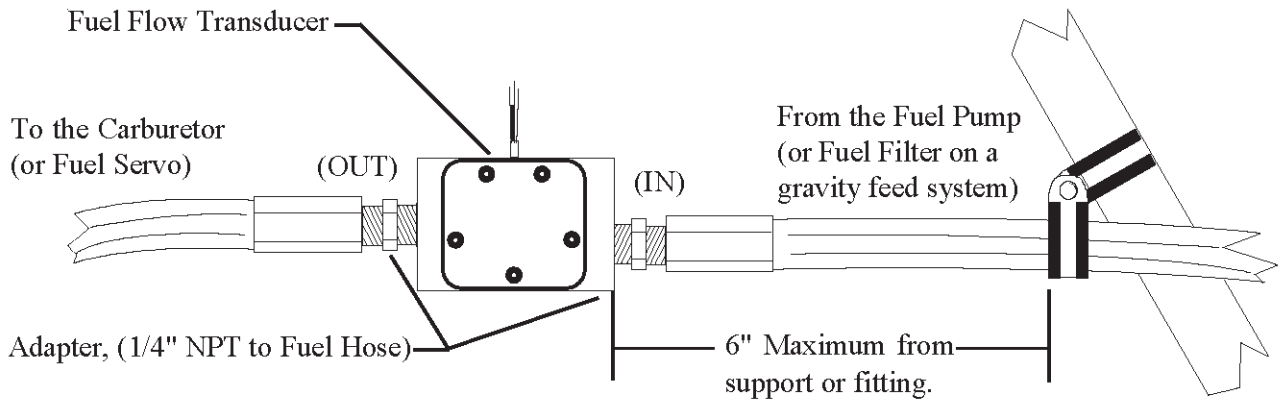
3. Remove the fuel hose which goes from the Fuel Pump (or the Fuel Filter on a gravity feed system) to the Carburetor (or Fuel Servo).

4. Purchase two new hoses, one to be used from the fuel pump (or the Fuel Filter) to the Fuel Flow Transducer (making provisions for the fuel pressure transducer as necessary) and the other to be used from the Fuel Flow Transducer to the carburetor (or Fuel Servo). There must be flexible hose in and out of the Transducer. The hoses must meet TSO-C53a Type C or D FAA specifications. The new hoses must be the same size as the current hoses in the aircraft. Sources of fittings and fabricated hoses are:

   Aircraft Spruce
   www.aircraftspruce.com
   (877) 477-7823

5. **Read the Installation Instructions for important installation considerations.**

Drawn By: R.R.	***Electronics International Inc.***		
Approved By: R.R	Installation of a Fuel Flow Transducer on the Firewall and in the fuel line from the fuel pump to the carburetor or fuel servo. **Note:** Not applicable for a fuel-injected engine with a fuel return line (see D/N 0415941).		
Scale: None			
Material:			
Next Assembly:			
P/N:	Date: 12/29/93	Rev: D: 7/2/02	D/N: 1229931



Mounting Procedure:

1. Find a convenient location within 6" of a hose support or fitting and away from any hot exhaust pipes to suspend the Fuel Flow Transducer. The hose support or fitting may be on the input or output line of the Flow Transducer and the support may be to an adjacent hose.

2. Remove the fuel hose which goes from the Fuel Pump (or the Fuel Filter on a gravity feed system) to the Carburetor (or Fuel Servo).

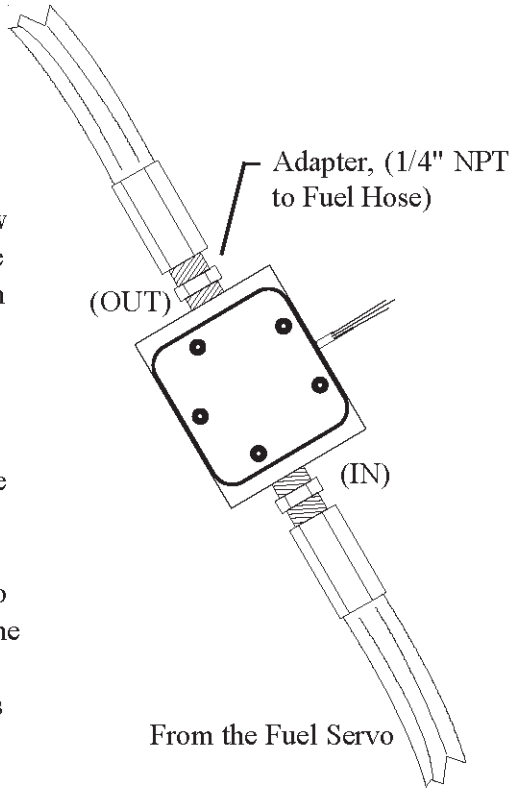
3. Purchase two new hoses: one to be used from the fuel pump (or the Fuel Filter) to the Fuel Flow Transducer and the other to be used from the Fuel Flow Transducer to the carburetor (or Fuel Servo). **There must be flexible hose in and out of the Transducer.** The hoses must meet TSOC53a Type C or D FAA specifications. **The new hoses must be the same size as the current hoses in the aircraft.** Sources of fittings and fabricated hoses are:

   Aircraft Spruce
   www.aircraftspruce.com
   (877) 477-7823

4. Mount the Fuel Flow Transducer in the fuel line. **You must use the FT-90 (Gold Cube) Fuel Flow Transducer on a gravity feed system or for any engine over 350 H.P. If the Transducer is mounted within 6" of an exhaust pipe, the Flow Transducer must be wrapped with Fire Sleeving.**

5. **Read the Installation Instructions for important installation considerations.**

Drawn By: R.R.	***Electronics International Inc.***		
Approved By: R.R	Installation of a Fuel Flow Transducer suspended in the fuel line from the fuel pump to the carburetor or fuel servo. **Note:** Not applicable for a fuel-injected engine with a fuel return line (see D/N 0415941).		
Scale: None			
Material:			
Next Assembly:			
P/N:	Date: 12/29/93	Rev: D: 7/2/02	D/N: 1229932



Mounting Procedure:

1. Find a convenient location between the Fuel Servo and Flow Divider and away from any hot exhaust pipes to suspend the Fuel Flow Transducer. The Transducer must mounted within 6" of a hose support or fitting. The support or fitting may be on the input or output line of the Flow Transducer and the support may be to an adjacent hose.

2. Remove the fuel hose which goes from the Fuel Servo to the Flow Divider.

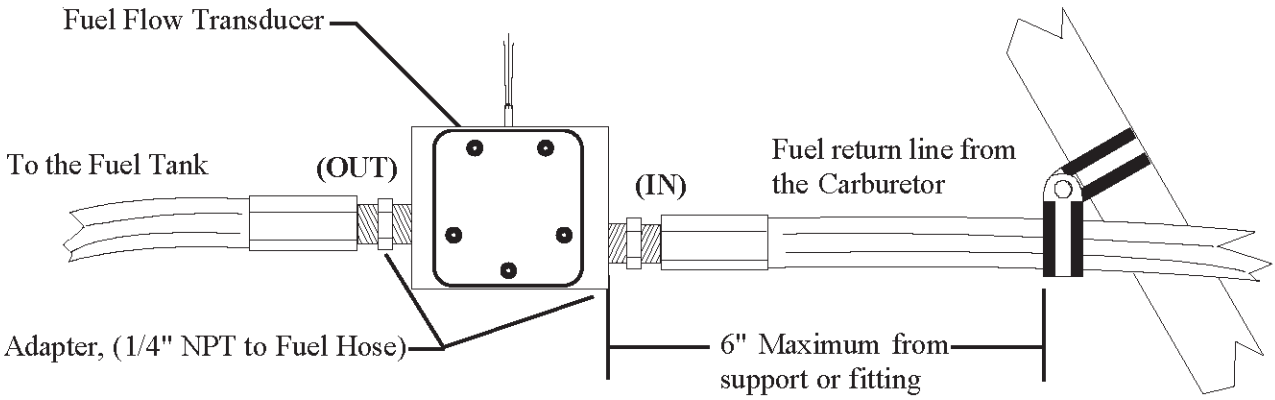
3. Purchase two new hoses: one to be used from the Fuel Servo to the Fuel Flow Transducer and the other to be used from the Fuel Flow Transducer to the Flow Divider. **There must be flexible hose in and out of the Fuel Transducer.** The hoses must meet TSO-C53a Type C or D FAA specifications. **The new hoses must be the same size as the current hoses in the aircraft.** Sources of fittings and fabricated hoses are:

   Aircraft Spruce
   www.aircraftspruce.com
   (877) 477-7823

4. Mount the Fuel Flow Transducer in the fuel line. **You must use the FT-90 (Gold Cube) Fuel Flow Transducer on any engine over 350 H.P. If the Transducer is mounted within 6" of an exhaust pipe, the Flow Transducer must be wrapped with Fire Sleeving.**

5. **Read the Installation Instructions for important installation considerations.**

Drawn By: R.R.	***Electronics International Inc.***		
Approved By: R.R	Installation of the Fuel Flow Transducer suspended in the fuel line between the Fuel Servo and the Flow Divider.		
Scale: None	Note: Only applicable for installation on aircraft with a fuel return line from the Fuel Servo.		
Material:			
Next Assembly:			
P/N:	Date: 4/15/94	Rev: B: 7/2/02	D/N: 0415941



Mounting Procedure:

1. Find a convenient location within 6" of a hose support or fitting and away from any hot exhaust pipes to suspend the Fuel Flow Transducer. The hose support or fitting may be on the input or output line of the Flow Transducer and the support may be to an adjacent hose.

2. Remove the return fuel hose which goes from the Carburetor to the Fuel Tank.

3. Purchase two new hoses: one to be used from the Carburetor to the Fuel Flow Transducer and the other to be used from the Fuel Flow Transducer to the Fuel Tank. **There must be flexible hose in and out of the Transducer.** The hoses must meet TSO-C53a Type C or D FAA specifications. **The new hoses must be the same size as the current hose in the aircraft.** Sources of fittings and fabricated hoses are:

   Aircraft Spruce
   www.aircraftspruce.com
   (877) 477-7823

4. Mount the Fuel Flow Transducer in the fuel return line. **You must use the FT-90 (Gold Cube Fuel Flow Transducer on any engine over 350 H.P. If the Transducer is mounted within 6" of an exhaust pipe, the Flow Transducer must be wrapped with Fire Sleeving.**

5. **Read the Installation Instructions for important installation considerations.**

Drawn By: R.R.	***Electronics International Inc.***		
Approved By: R.R	Installation of a Fuel Flow Transducer suspended in the fuel return line from the carburetor to the fuel tank. **Note:** Only applicable for installation on aircraft with a fuel return line from the Carburetor.		
Scale: None			
Material:			
Next Assembly:			
P/N:	Date: **10/15/94**	Rev: **A: 7/2/02**	D/N: **1015941**

3.0 Install Harness & Route Wires

3.1 Temporarily Install the Top, Middle and Bottom Connectors:

Place the Top, Middle and Bottom UBG connectors (with wire harnesses) at the bottom of the instrument panel just below the 2 1/4" mounting hole for the UBG. Later in the installation process you will be attaching these connectors to the UBG at this location and then routing the UBG up to its mounting location from behind the instrument panel. Make sure there is room to do this. Temporarily secure these connectors in place.

3.2 Route Cables to the Engine Compartment:

Route all the extension cables which will interconnect with probes and transducers in the engine compartment through the firewall. Lace these cables and wires into your existing wire harnesses (under the panel) and provide protection from chafing.

3.3 Route and Connect the Power and Ground Wires:

On the Bottom 15-Pin Connector, route the power wire (red) to the main bus via a 5-amp circuit breaker. Route the ground wire (black) to aircraft ground. Lace the wires into your existing wire harnesses.

3.4 Route USB Connector:

The Bottom Connector of the UBG-16x provides a cable with a USB Connector. This connector is used to download recorded flight data to a USB thumb drive. The following are two methods for installing this USB connector:

1. Route the USB connector to the bottom of the aircraft instrument panel. Lace the USB cable to hold it in place.

2. Produce an access hole in the instrument panel for the USB connector. Install the USB connector and lace the cable into your existing wire harnesses.

3.5 Route any Optional Function Wires:

The following optional functions are provided on the bottom connector but wires are not provided. There are extra D-Sub pins in the UBG kit to allow you to add wires for these functions. These optional functions are usually not used.

A. **RTDO Output -** This output can be connected to a BC-5 data recorder. The BC-5 can record data from many different instruments, monitoring many different functions (RPM, Manifold Pressure, Oil Temp, Oil Pressure, etc). By recording all of the data in a BC-5, all of the data can be reviewed, side by side for each timestamp.

B. **GPS Output -** This output can be connected to a GPS, allowing it to read fuel flow on the UBG.

C. **Yellow External Warning Output -** This output is intended to drive an external yellow warning light. If a yellow warning is present on the UBG, this line will pull to ground. The warning light current should be limited to 100mA.

D. **Red External Warning Output -** This output is intended to drive an external red warning light. If a red warning is present on the UBG, this line will pull to ground. The warning light current should be limited to 100mA.

E. **Back Light Input -** This input can be connected to a back light rheostat to control the UBG. Normally this is not required. The UBG has a built-in photocell on the front of the instrument to control the backlight level.

3.6 Route Optional AUX Temperature Function Wires:

The UBG has up to 3 AUX temperature channels available, depending on the number of EGT and CHT channels used. The UBG connectors may not come with the extension cables installed for these functions. Probes and cables with pins for AUX functions are provided in a separate kit.

The AUX channels are Temp Ch 8, 10 and 18. The UBG wiring diagrams, provided later in this document, shows the D-Sub connectors and pins provided for the AUX channels. Pin your AUX extension cables into any of these available channels. Route the extension cables to their appropriate probes. Lace these cables into your existing wire harnesses and provide protection from chafing. In Power-up programming you will activate the AUX functions.

4. Connect Extension Cables to Probes

At this point in the installation, the EGT, CHT and AUX extension cables have been routed into the engine compartment. You will be routing and connecting these cables to their associated probes using the following steps.

4.1 Route the Extension Cables to Probes:

Each EGT and CHT cable is marked with a cylinder number. Route the cables to their associated probes. Dress the extension cables away from the exhaust tubes and cylinder heads.

4.2 Cut and Attach Cables to Probes:

Cut the extension cables to their proper length. Prepare the cables to attach to their associated probes using the "E.I. Wire Connection Guide." Connect the extension cables to the probes using the OLC-2 connectors. Be sure to connect the red to red wires and yellow to yellow wires. Accuracy is not affected by changing the cable length.

4.3 Lace Extension Cables:

Lace the extension cables away from the exhaust tubes and cylinder heads

5. Install the UBG-16x Display

Install the UBG display head into the instrument panel as follows:

A. Connect the top, middle and bottom connectors to the back of the UBG.

B. Install the UBG in the instrument panel (from behind the panel) and secure it to the panel with 6-32 screws. Take care not to scratch the display when installing it.

C. Lace the cables so they do not obstruct the operation of any controls and do not chaff on any metal.

6. Power-On Checkout

6.1 Power-up:

Add power to the UBG-16x and check the display powers up. A problem a this step could be with the power and ground wires or the power source.

At this time you may want to configure the UBG for any AUX Temp channels. Refer to the UBG Operating Instructions, Power-up Programming section.

6.2 Check for Ambient Temp Readings:

Check all the EGT, CHT and any AUX channels to read the current temperature of their probes. If the engine has not been run, this should be around ambient temperature. If the readings are all off by a large amount, there could be a problem with the Ambient Temp Compensator. This is an RTD (resistive temperature device) located under the heat shrink on the middle connector (pins 6 and 19).

If a single channel is reading wrong, there could be a problem with the probe or extension cable. Disconnect the extension cable from the probe. If the problem goes away (readings goes to ambient), there may be a probe problem.

6.3 Check Fuel Flow Reading:

Check that the fuel flow reads 0.0 gal/hr. To get a fuel flow reading, the white signal wire (pin 24 on the middle connector) must be pulsed to ground. The flow transducer only produces this pulse when fuel is flowing through the fuel flow transducer. It would be very unusual to get a problem at this step.

6.4 Check Temp Readings at Engine Idle:

Start the engine. Check that each of the EGT, CHT and AUX channels are increasing in temperature. If one channel is decreasing, the red lead may be connected to a yellow lead at the probe.

If any channel is not moving up in temperature, you may have a connection problem at the probe.

6.5 Check Fuel Flow Reading at Engine Idle:

The fuel flow should be reading around 1.0 to 2.0 gal/hr. Increasing the throttle should increase the fuel flow. A problem at this step could be a wiring issue between the UBG middle connector and the fuel flow transducer. If you disconnect the white signal wire from the fuel flow transducer and tap the wire leading back to the UBG to ground, there will be a fuel flow reading on the UBG.

7. Specifications

Models: UBG-16 and UBG-16T

Weight: 0.77 lbs

Environmental: Meets TSO C43a.

Power Requirements: 10V to 60 Volts, 150mA @ 14V, 85mA @ 24V.

Temp Probes: All type K, CHT can be set to type J.

Extension Cables: Must match probe type. Length does not affect accuracy.

Temperature Accuracy: 1/2% in accordance with TSO C43a.

Fuel Flow Accuracy: Set by user adjustable K-Factor.

EGT/CHT Temperature Channels: Provides many engine analysis functions for a 4, 5, 6, 7, 8 or 9 cylinder engine.

AUX Temp Channels: 3 available for any aircraft temperature function.

Data Storage: All channels, last 500 Hrs.

Data Stick: FAT 32 only.

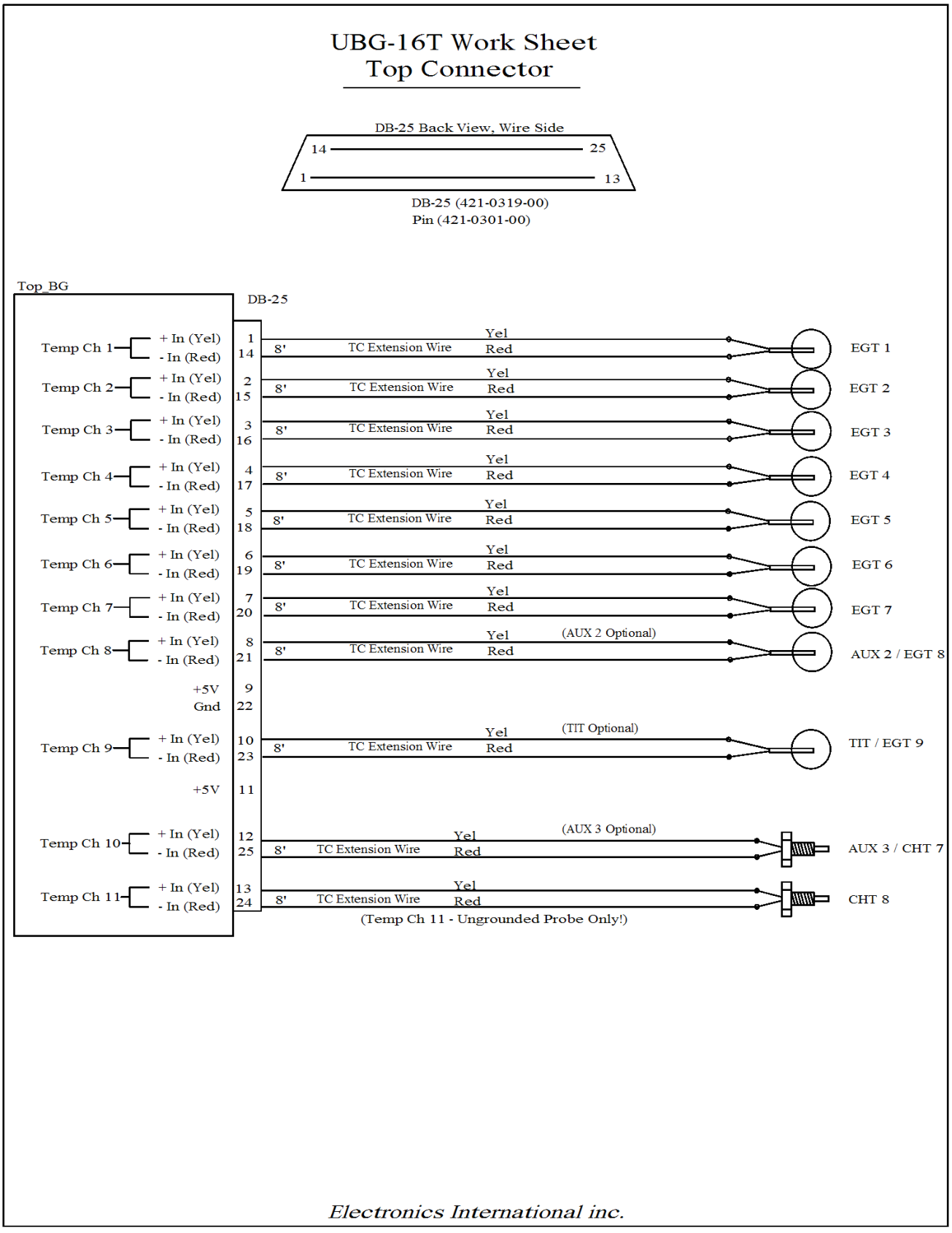
Back Light Control: Allows an external pot to control the UBG display backlighting. Two methods are provided in Power-up Programming. Control by the front panel photocell is preferred.

External Warning and Caution Control Lines: Pulls to ground when active. Max current: 100mA.

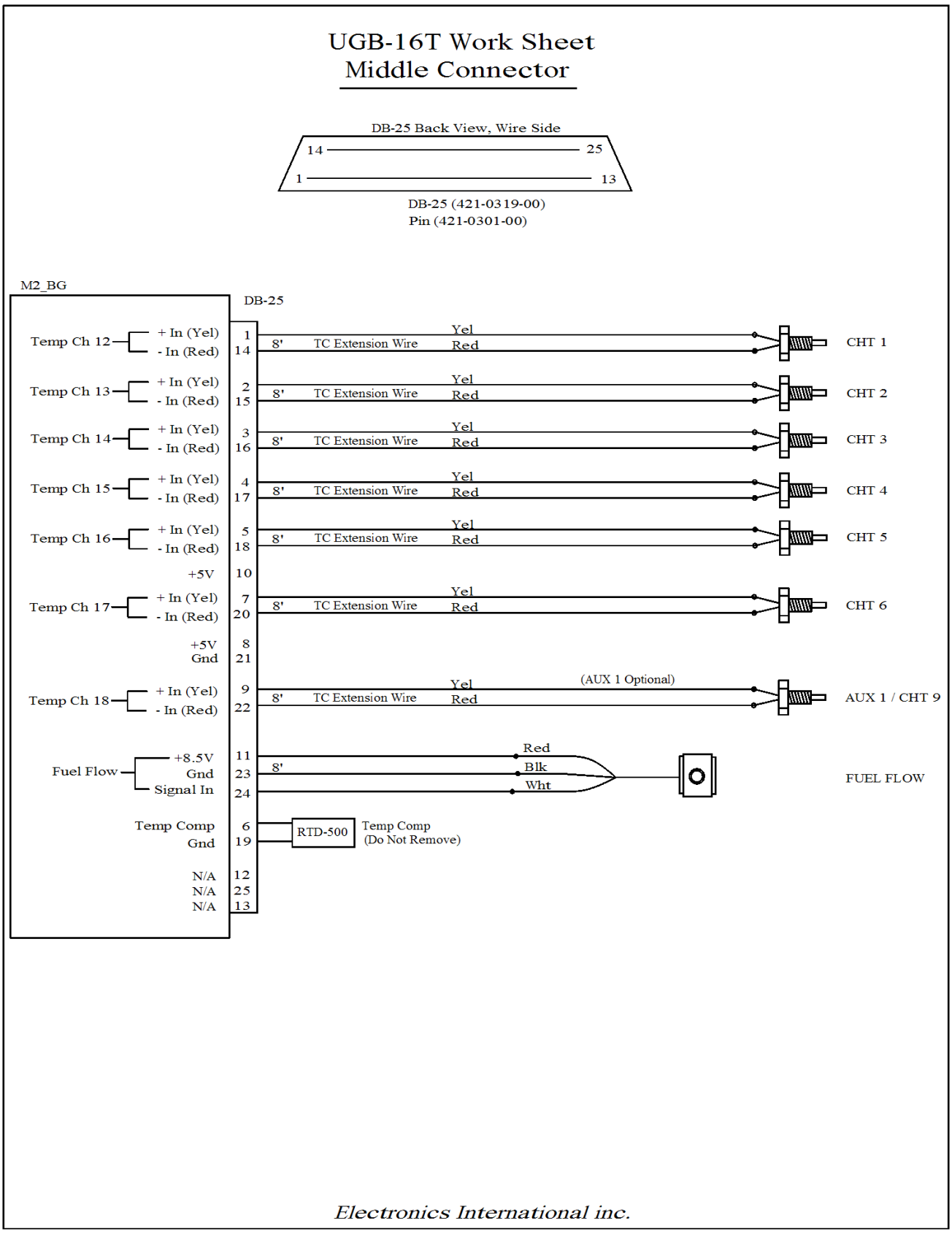
GPS Output: Outputs fuel flow data to a GPS unit. Baud is 9600. Message rate is 1 per second. Four protocols are provided in Power-up Programming.

RTDO: Real Time Data Out, 57,600 Baud, Message rate = 2 seconds.

8. Wiring Diagrams

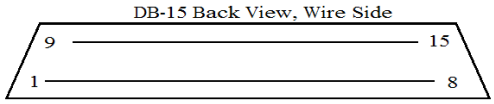


UGB-16T Work Sheet
Middle Connector

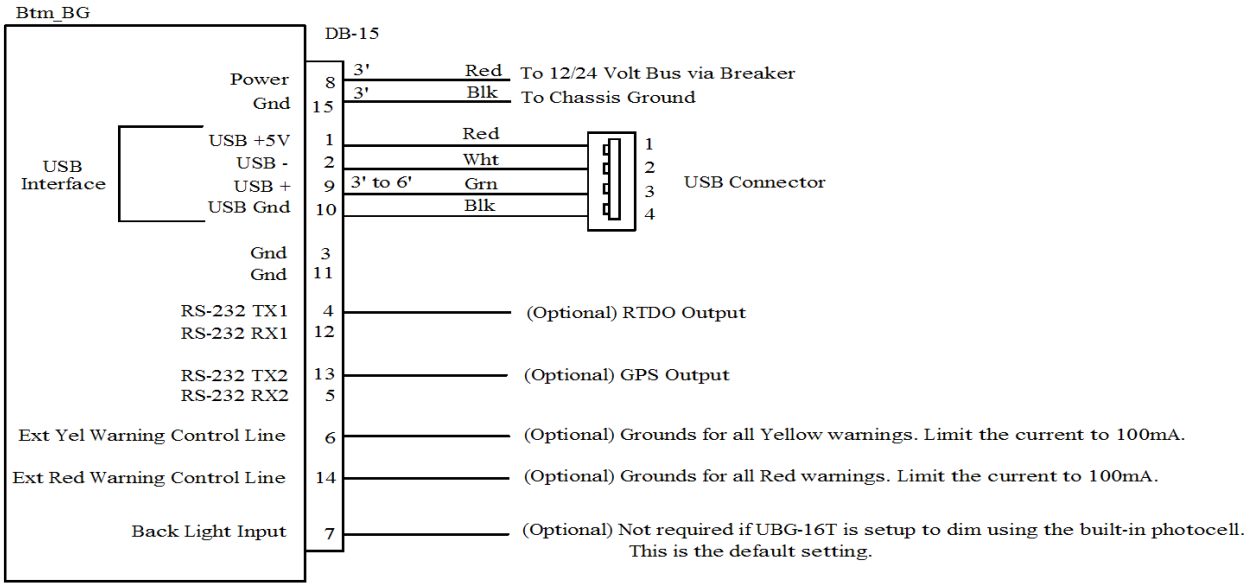


Electronics International inc.

UBG-16T Work Sheet
Bottom Connector



DB-15 (421-0319-00)
Pin (421-0301-00)



Electronics International inc.

9. STC and AML

United States of America

Department of Transportation—Federal Aviation Administration

Supplemental Type Certificate

Number SA00680SE

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

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

Original Product—Type Certificate Number: *See attached FAA Approved Model List (AML)
Make: No. SA00680SE for a list of the approved airplane
Model: models and applicable airworthiness regulations.

Description of the Type Design Change: Installation of Electronics International Inc. Model UBG-16, or UBG-16T bar graph engine analyzer in accordance with Electronics International Inc. Master Drawing List MDL 1111982, Revision "NEW", dated November 11, 1998, and Installation Instructions II 1111981, dated November 11, 1998, or later FAA approved revisions.

NOTE: The UBG-16 and UBG-16T listed here are designed as advisory engine analyzers, and are not to be used as primary engine instruments.

Limitations and Conditions: Approval of this change in type design applies to the aircraft models listed on the AML only. This approval should not be extended to other aircraft of these models on which other previously approved modifications are incorporated unless it is determined that the relationship between this change and any of those other previously approved modifications, including changes in type design, will introduce no adverse effect upon the airworthiness of that aircraft. A copy of this Certificate and AML No. SA00680SE 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: November 12, 1998 *Date reissued:* July 8, 2005
Date of issuance: March 10, 1999 *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)

FAA Approved Model List (AML) SA00680SE
For
Electronics International, Inc. Digital Automatic Engine Analyzers

Issue Date: March 10, 1999

Item	Aircraft Make	Aircraft Model	Original Type Certificate Number	Certification Basis For Alteration	FAA Sealed Drawings		Installation Instructions		AML Amended Date
					Number	Revision	Number	Revision	
----	----------	----------	----------	----------	MDL 1111982	11/11/98 IR or Later FAA Approved Revision	II 1111981	11/11/98 IR or Later FAA Approved Revision	----------
1	**Aero Commander** *(Volaire)*	10, 10A, 100, 100A, 100-180	1A21	CAR 3	"	"	"	"	7/8/2005
2	**Aerocar Inc.**	I	4A16	CAR 3	"	"	"	"	Initial Release
3	**Aeronca Inc.** *(Also See American Champion)*	C-2 Series	ATC 351	ATC 351	"	"	"	"	Initial Release
		C-3 Series	A 396	Aero Bul. 7-A	"	"	"	"	Initial Release
		K&50 Series	688, 676	688, 676	"	"	"	"	Initial Release
		L Series	ATC 596 & 614	ATC 596 & 614	"	"	"	"	Initial Release
		15 Series	A802	CAR 3	"	"	"	"	Initial Release
		50-L, 50-LA, 65-LA, 65-LB	A-702	CAR 4A	"	"	"	"	7/8/2005
4	**Aeromot**	AMT-100, AMT-200, AMT-200S, AMT-300	TG00004AT	CFR 21	"	"	"	"	7/8/2005
5	**Aerospatiale** *(Also see Socata)*	SE 3160 Alovette	H1 IN	CAR 10	"	"	"	"	Initial Release
		III	H1 IN	CAR 10	"	"	"	"	Initial Release
		SA 315 Series	H1 IN	CAR 10	"	"	"	"	Initial Release
		SA 316 Series	H1 IN	CAR 10	"	"	"	"	Initial Release
		SA 319 Series	H1 IN	CAR 10	"	"	"	"	Initial Release
		262A Series	A6EU	CAR 10	"	"	"	"	Initial Release
		SN-601	A37EU	FAR 21.29	"	"	"	"	Initial Release
		SA-350 Series, 360 Series	H8 EU	FAR 21.29	"	"	"	"	Initial Release
		SA-365 Series	H10 EU	FAR 21.29	"	"	"	"	Initial Release
6	**Aircraft Associates Inc.**	J-2	ATC 620	ATC 620	"	"	"	"	Initial Release
7	**Air Tractor**	AT-300, -302, -400	A9SW	FAR 21.25(a)(1)	"	"	"	"	Initial Release
8	**Artic Aircraft Co.**	S-1A Series	A737	CAR 4a	"	"	"	"	Initial Release
		S1B Series	A754	CAR 4a	"	"	"	"	Initial Release
9	**Alliance Aircraft Group** *(Helio Enterprises)*	H-250, H-295, HT-295	1A8	CAR 3	"	"	"	"	7/8/2005
		H-391B, H-395, H395A	1A8	CAR 3	"	"	"	"	7/8/2005
		H-391	1A8	CAR 3	"	"	"	"	7/8/2005
		H-700, H-800	1A8	CAR 3	"	"	"	"	7/8/2005
10	**Alon**	*See Univair*	----------	----------	----------	----------	----------	----------	7/8/2005
11	**American Champion** *(Aeronca, Bellanca, Trytek)*	7AC, 7BCM, 7DC, S7DC	A-759	CAR 4A	"	"	"	"	7/8/2005
		7CCM, S7CCM	A-759	CAR 4A	"	"	"	"	7/8/2005
		7JC, 7EC, S7EC, 7HC, 7KC	A-759	CAR 4A	"	"	"	"	7/8/2005
		7GCA, 7GCB, 7GCAA, 7KCAB, 7ECA, 7GCBC	A-759	CAR 4A	"	"	"	"	7/8/2005
		7KCAB, L-16A, L-16B	A-759	CAR 4A	"	"	"	"	7/8/2005
		7GCBA	A-759	CAR 8	"	"	"	"	7/8/2005
		8KCAB, 8GCBC	A21CE	FAR 23	"	"	"	"	7/8/2005
		11AC, 11BC, S11AC, S11BC	A-761	CAR 4A	"	"	"	"	7/8/2005
		11CC, S11CC	A-796	CAR 3	"	"	"	"	7/8/2005
12	**American General Aircraft**	*See Gulfstream American*	----------	----------	----------	----------	----------	----------	7/8/2005
13	**Augustair Inc.** (Varga)	2150, 2150A, 2180	4A19	CAR 3	"	"	"	"	7/8/2005
14	**Aviat Inc.**	A-1, A-1A, A-1B	A22NM	FAR 23	"	"	"	"	7/8/2005

FAA Approved Model List (AML) SA00680SE
For
Electronics International, Inc. Digital Automatic Engine Analyzers

Issue Date: March 10, 1999

Item	Aircraft Make	Aircraft Model	Original Type Certificate Number	Certification Basis For Alteration	FAA Sealed Drawings		Installation Instructions		AML Amended Date
					Number	Revision	Number	Revision	
----	----------	----------	----------	----------	MDL 1111982	11/11/98 IR or Later FAA Approved Revision	II 1111981	11/11/98 IR or Later FAA Approved Revision	----------
	(Pitts, Sky, Child F. Doyle)	S-1 Series	A8SO	FAR 23	"	"	"	"	Initial Release
	(Christen Industries)	S-2 Series	A8SO	FAR 23	"	"	"	"	Initial Release
15	**Ayres Corp.**	S2R Series	A3SW	CAR 3	"	"	"	"	Initial Release
		S2R Series	A4SW	CAR 8	"	"	"	"	Initial Release
		S Series	2A7	CAR8.10(a)(1)	"	"	"	"	Initial Release
		S Series	2A9	CAR8.10(a)(1)	"	"	"	"	Initial Release
		600 Series	A3SW	CAR3	"	"	"	"	Initial Release
16	**Ballauer**	Funk Series	2-564	CAR 04.031	"	"	"	"	Initial Release
17	**Beech Aircraft Corp.**	B17B, B17L, SB17L	ATC 560	CAR 4A	"	"	"	"	Initial Release
		B17R	ATC 579	CAR 4A	"	"	"	"	Initial Release
		C17B, C17L	ATC 602	CAR 4A	"	"	"	"	Initial Release
		C17R	ATC 604	CAR 4A	"	"	"	"	Initial Release
		18 Series	A-757, A-765	CAR 4A	"	"	"	"	Initial Release
		19 Series, 23 Series, 24 Series	A1CE	CAR Part 3	"	"	"	"	Initial Release
		33 Series, 35 Series, 36 Series	3A15	CAR Part 3	"	"	"	"	Initial Release
		45 Series	5A3	CAR Part 3	"	"	"	"	Initial Release
		50 Series	5A4	CAR Part 3	"	"	"	"	Initial Release
		60 Series	A12CE	FAR Part 23	"	"	"	"	Initial Release
		65 Series, 70 Series, 90 Series	3A20	CAR 3	"	"	"	"	Initial Release
		76 Series	A29CE	FAR Part 23	"	"	"	"	Initial Release
		77 Series	A30CE	FAR Part 23	"	"	"	"	Initial Release
		F90 Series	A31CE	FAR Part 23	"	"	"	"	Initial Release
		95 Series, 55 Series, 56 Series	3A16	CAR Part 3	"	"	"	"	Initial Release
		58 Series	A23CE	FAR Part 23	"	"	"	"	Initial Release
		99 Series, 100 Series	A14CE	FAR Part 23	"	"	"	"	Initial Release
		200 Series	A24CE	FAR Part 23	"	"	"	"	Initial Release
		300 Series, 1900 Series, 1900C Series	A24CE	FAR Part 23	"	"	"	"	Initial Release
18	**Bell Helicopter** *(Textron)*	47 Series	H-1, 2H3, 2-H1	FAR Part 29	"	"	"	"	Initial Release
19	**Bellanca Aircraft Corp.**	7 Series	A-759	CAR 4A	"	"	"	"	Initial Release
	(Also See American Champion)	11 Series	A-761, 796	CAR 4A	"	"	"	"	Initial Release
		14 Series, 17 Series	A18CE	FAR Part 23	"	"	"	"	Initial Release
		8 Series	A21CE	FAR Part 23	"	"	"	"	Initial Release
		300 Series	ATC 328	ATC 328	"	"	"	"	Initial Release
		400 Series	ATC 319	ATC 319	"	"	"	"	Initial Release
		DW-1	A4NW	FAR 21	"	"	"	"	7/8/2005
20	**Boeing Aircraft**	75 thru E75, A75JI, A75L300, A75N1 thru E75N1, 1B75A	A-743	CAR 4A	"	"	"	"	7/8/2005
21	**British Aerospace**	Twin Pioneer Series 2 & 3	7A7	CAR 10	"	"	"	"	Initial Release
		Beagle B206 Series 1 & 2	A11EU	FAR 21.29	"	"	"	"	Initial Release
		Beagle B121 Series 1, 2 & 3	A22EU	FAR 21.29	"	"	"	"	Initial Release

FAA Approved Model List (AML) SA00680SE
For
Electronics International, Inc. Digital Automatic Engine Analyzers

Issue Date: March 10, 1999

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22	**Camair Aircraft Corp.**	Navion 480	2A2	CAR 3	"	"	"	"	Initial Release
23	**Cessna Aircraft** *(Also see Reims)*	120 Series, 140 Series	A768 & 5A2	CAR 4A	"	"	"	"	Initial Release
		C-145, C-165	A-701	CAR 4A	"	"	"	"	7/8/2005
		150 Series, 152 Series	3A19	CAR Part 3	"	"	"	"	Initial Release
		170 Series	A799	CAR Part 3	"	"	"	"	Initial Release
		172 Series, 175 Series	3A12, 3A17	CAR Part 3	"	"	"	"	Initial Release
		177 Series	A13CE, A20CE	FAR Part 23	"	"	"	"	Initial Release
		180 Series	5A6	CAR Part 3	"	"	"	"	Initial Release
		182 Series, 185 Series	3A13, 3A24	CAR Part 3	"	"	"	"	Initial Release
		188 Series	A9CE	FAR Part 23	"	"	"	"	Initial Release
		190 Series, 195 Series	A-790	CAR Part 3	"	"	"	"	Initial Release
		206 Series	A4CE	CAR Part 3	"	"	"	"	Initial Release
		207 Series	A16CE	FAR Part 23	"	"	"	"	Initial Release
		210 Series	3A21	CAR Part 3	"	"	"	"	Initial Release
		303 Series, 305 Series	5A5, 3A14	CAR Part 3	"	"	"	"	Initial Release
		310 Series	3A10	CAR Part 3	"	"	"	"	Initial Release
		320 Series, 335 Series, 340 Series	3A25	CAR Part 3	"	"	"	"	Initial Release
		321	3A11	CAR Part 3	"	"	"	"	7/8/2005
		336	A2CE	CAR Part 3	"	"	"	"	Initial Release
		337	A6CE	CAR Part 3	"	"	"	"	Initial Release
		401 Series, 402 Series, 411 Series, 414 Series, 421 Series, 425 Series	A7CE	CAR Part 3	"	"	"	"	Initial Release
		404	A25CE	FAR Part 23	"	"	"	"	Initial Release
		406	A25CE	FAR Part 23	"	"	"	"	7/8/2005
24	**Christen Industries Inc.**	See Aviat	----------	----------	----------	----------	----------	----------	Initial Release
25	**Child, Doyle F.**	See Aviat	----------	----------	----------	----------	----------	----------	Initial Release
26	**Clark**	1000	2A6	CAR 8	"	"	"	"	7/8/2005
		12	2A12	CAR 8	"	"	"	"	7/8/2005
27	**Commander Aircraft**	111 Series, 112 Series	A12SO	FAR 23	"	"	"	"	Initial Release
		114 Series	A12SO	FAR 23	"	"	"	"	Initial Release
		500 Series, 520, 560-A, 560-E	6A1	CAR 3	"	"	"	"	7/8/2005
		560-F, 680, 680-E, 680-F, 680FL, 685	2A4	CAR 3	"	"	"	"	7/8/2005
		700	A12SW	FAR 23	"	"	"	"	7/8/2005
		720	2A4	CAR 3	"	"	"	"	7/8/2005
		114B	A12SO	FAR 23	"	"	"	"	7/8/2005
28	**Consolidated Aeronautic** *(Lake)*	Colonial C. Series	1A13	FAR Part 23	"	"	"	"	Initial Release
		Lake LA Series	1A13	FAR Part 23	"	"	"	"	Initial Release
29	**De Havilland** *(Bombardier, Inc.)*	DH Series	A8EU	FAR 21.29	"	"	"	"	Initial Release
		DH Series	2-439	FAR 21.29	"	"	"	"	Initial Release
		80A	2-393	FAR 21.29	"	"	"	"	7/8/2005

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		DH Series	A-816	CAR 10	"	"	"	"	Initial Release
		DH Series	A-807	CAR 10	"	"	"	"	Initial Release
		L-20A	AR-33	CAR 8	"	"	"	"	7/8/2005
		DHC Series	AR-13	CAR 8	"	"	"	"	Initial Release
		DHC Series	1A19	CAR 10	"	"	"	"	Initial Release
30	**Diamond Aircraft Industries**	DA 20-A1, DA 20-C1	TA4CH	FAR 21	"	"	"	"	7/8/2005
	Dornier-Werke	DO 27 Q-6	A8IN	CAR 10	"	"	"	"	7/8/2005
		DO 28 A-1, DO 28 B-1	7A13	CAR 10	"	"	"	"	7/8/2005
		DO 28 D, DO 28 D-1	A16EU	FAR 23	"	"	"	"	7/8/2005
		228-100, 228-101, 228-200, 228-201, 228-202, 228-212	A16EU	FAR 23	"	"	"	"	7/8/2005
31	**Enstrom Helicopter**	F Series & 280 Series	H1CE	CAR Part 6	"	"	"	"	Initial Release
32	**ERCO**	*See Univair*	----------	----------	----------	----------	----------	----------	7/8/2005
33	**Extra Flugzeugbau**	EA-300, EA-300S, EA 300/200, 300L	A67EU	FAR 23	"	"	"	"	7/8/2005
34	**Fairchild**	24R9, 24R9S, 24R40, 24R40S, 24R46, 24R46A, 24R46S	A-706	CAR 4A	"	"	"	"	7/8/2005
		24W-9, 24W-9S, 24W-40, 24W-40S, 24W-41, 24W-41A	A-707	CAR 4A	"	"	"	"	7/8/2005
		24W-41AS, 24W-41S, 24W-46, 24W-46S	A-707	CAR 4A	"	"	"	"	7/8/2005
		M62A, M62A-3, M62A-4, M62B, M62C, M-628	A-724	CAR 4A	"	"	"	"	7/8/2005
		24 C8C, 24 C8CS	A-535	BUL 7A	"	"	"	"	7/8/2005
		M-84-C	A-2-599	CAR 4A	"	"	"	"	7/8/2005
35	**Forney**	*See Univair*	----------	----------	----------	----------	----------	----------	7/8/2005
36	**Fuji**	FA-200-160, 180, 180AO	A4PC	CAR 10	"	"	"	"	7/8/2005
37	**Globe**	GC-1A, GC-1B	A-766	CAR 4A	"	"	"	"	7/8/2005
38	**Great Lakes**	2T Series	ATC354	ATC354	"	"	"	"	Initial Release
		2T Series	ATC-167	ATC-167	"	"	"	"	Initial Release
		2T Series	2-3339	2-3339	"	"	"	"	Initial Release
		2T Series	ATC22B	ATC228	"	"	"	"	Initial Release
		2T Series	A18EA	FAR 23	"	"	"	"	Initial Release
39	**Grob**	G-115, 115A, 115B, 115C, 115C2, 115D, 115D2	A-57EU	FAR 21	"	"	"	"	7/8/2005
40	**Gulfstream Aerospace**	111 Series	11SO	FAR Part 23	"	"	"	"	Initial Release
		112 Series	A12SO	FAR Part 23	"	"	"	"	Initial Release
		114 Series	A12SO	FAR Part 23	"	"	"	"	Initial Release
41	**Gulfstream American**	Grumman:	----------	----------	----------	----------	----------	----------	Initial Release
	(American General)	G164 Series	1A16	CAR 8.10	"	"	"	"	Initial Release
	(Grumman Aircraft)	G Series	1A17, A12EA	CAR 4B	"	"	"	"	Initial Release
	(Tiger Aircraft)	GA Series	A17SO	FAR Part 23	"	"	"	"	Initial Release
	(Socata Group Aerospatiale)	AA Series	A11EA, A16EA	FAR Part 23	"	"	"	"	Initial Release
42	**Helio Aircraft**	H-250	1A8	CAR 3	"	"	"	"	Initial Release
	(Also see Alliance Aircraft)	15A, 20	3A3	CAR 4A	"	"	"	"	7/8/2005
43	**Hiller**	UH-12 Series	6H1	CAR 6	"	"	"	"	Initial Release

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		UH-12 Series	6H2	CAR 6	"	"	"	"	Initial Release
		UH-12 Series	4H10	CAR 6	"	"	"	"	Initial Release
		UH-12 Series	4H11	CAR 6	"	"	"	"	Initial Release
		UH-12 Series	H1WE	CAR 6	"	"	"	"	Initial Release
44	**Hughes Helicopters**	300 & 269 Series	4H12	CAR Part 6	"	"	"	"	Initial Release
45	**Hynes**	H-2, H-4	2H2	CAR Part 6	"	"	"	"	Initial Release
46	**Industrie Aeronautic he E Meccaniche**	PD 808/526	A12EU	FAR 21.29	"	"	"	"	Initial Release
		P-166 Series	7A4	CAR 10	"	"	"	"	Initial Release
47	**Interceptor**	*See Prop-Jets*	----------	----------	----------	----------	----------	----------	7/8/2005
48	**Jodel**	D-140-B	A3IN	CAR 10	"	"	"	"	7/8/2005
		DR-1050	A4IN	CAR 10	"	"	"	"	7/8/2005
		D-1190	A10IN	CAR 10	"	"	"	"	7/8/2005
		150	A14IN	CAR 10	"	"	"	"	7/8/2005
49	**Lake**	*See Consoidated Aeronatutics*	----------	----------	----------	----------	----------	----------	Initial Release
	LTD (Navion)	H-295	1A8	CAR 3	"	"	"	"	Initial Release
		HT-295	1A8	CAR 3	"	"	"	"	Initial Release
		H-391	1A8	CAR 3	"	"	"	"	Initial Release
		H-391B	1A8	CAR 3	"	"	"	"	Initial Release
		H-395	1A8	CAR 3	"	"	"	"	Initial Release
		H395A	1A8	CAR 3	"	"	"	"	Initial Release
		500	A2EA	CAR 3	"	"	"	"	Initial Release
50	**Luscombe**	8A thru 8F, T-8F	A-694	CAR 4A	"	"	"	"	7/8/2005
51	**Marchetti** *(Also see SIAI)*	S205-18/F, -18/R	A9EU	FAR 21	"	"	"	"	7/8/2005
		S205-20/F, -20/R	A9EU	FAR 21	"	"	"	"	7/8/2005
		S205-22/R	A9EU	FAR 21	"	"	"	"	7/8/2005
		S208, S208A	A9EU	FAR 21	"	"	"	"	7/8/2005
		F260, F260B-F	A10EU	CAR 3	"	"	"	"	7/8/2005
52	**Maule Aircraft Corp.**	M Series	3A23	CAR Part 3	"	"	"	"	Initial Release
53	**McDonnell Douglas**	DC3 Series	A-807	CAR 4	"	"	"	"	Initial Release
		DC4 Series	A-618	CAR 4	"	"	"	"	Initial Release
54	**Meyers**	*See Prop-Jets*	----------	----------	----------	----------	----------	----------	7/8/2005
55	**Mooney**	M-18C, M-18C55, M-18L, M-18LA	A-803	CAR 3	"	"	"	"	7/8/2005
		M20 Series	2A3	CAR 3	"	"	"	"	Initial Release
		M22	A6SW	CAR 3	"	"	"	"	Initial Release
56	**Navion**	See Camiar Ryan and Thompson	----------	----------	----------	----------	----------	----------	Initial Release
57	**North American Aviation**	AT-6	A-2-575	CAR 4A	"	"	"	"	Initial Release
58	**Partenavia Costtruzioni Aeronautiche**	P68 Series	A31EU	FAR 21.29	"	"	"	"	Initial Release
		----------	----------	----------	----------	----------	----------	----------	Initial Release
59	**Piaggio**	P.136-L Series	A813	CAR 10	"	"	"	"	Initial Release

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	(Also see Industrie)	P-166, P-166B, P-166C	7A4	CAR 10	"	"	"	"	7/8/2005
60	**Pilatus Britten-Norman**	BN Series	A17EU	FAR 21.29	"	"	"	"	Initial Release
		PC-6, PC-6-H1, PC-6-H2	A17EU	CAR 3	"	"	"	"	7/8/2005
61	**Piper Aircraft**	2 Series	ATC595	ATC595	"	"	"	"	Initial Release
		J3 Series	ATC660	ATC660	"	"	"	"	Initial Release
		J3 Series	A-691	CAR 4A	"	"	"	"	Initial Release
		J3 Series	A-692	CAR 4A	"	"	"	"	Initial Release
		J3 Series	A-698	CAR 4A	"	"	"	"	Initial Release
		J3 Series	695	695	"	"	"	"	Initial Release
		J4 Series	A-703	CAR 4A	"	"	"	"	Initial Release
		J4 Series	708	708	"	"	"	"	Initial Release
		J4 Series	A-740, 721	CAR 4A	"	"	"	"	Initial Release
		J5 Series	A-725	CAR 4A	"	"	"	"	Initial Release
		PA-11, PA-11S	A-691	CAR 4A	"	"	"	"	7/8/2005
		PA12 Series	A-780	CAR 3	"	"	"	"	Initial Release
		PA14 Series	A-797	CAR 3	"	"	"	"	Initial Release
		PA15 Series	A-800	CAR 3	"	"	"	"	Initial Release
		PA16 Series	1A1	CAR 3	"	"	"	"	Initial Release
		PA17 Series	A-805	CAR 3	"	"	"	"	Initial Release
		PA18 Series	1A2	CAR 3	"	"	"	"	Initial Release
		PA18 Series	AR-7	CAR 8.10(b)	"	"	"	"	Initial Release
		PA-19, PA-19S	1A2	CAR 3	"	"	"	"	7/8/2005
		PA20 Series	1A4	CAR 3	"	"	"	"	Initial Release
		PA22 Series	1A61EU	CAR 3	"	"	"	"	Initial Release
		PA23 Series	1A10	CAR 3	"	"	"	"	Initial Release
		PA24 Series	1A15	CAR 3	"	"	"	"	Initial Release
		PA25 Series	2A8	CAR 3	"	"	"	"	Initial Release
		PA25 Series	2A10	CAR 8.10(b)	"	"	"	"	Initial Release
		PA28 Series	2A13	CAR 3	"	"	"	"	Initial Release
		PA30 Series, PA39 Series, PA40 Series	A1EA	CAR 3	"	"	"	"	Initial Release
		PA31 Series	A8EA	CAR 3 (FAR 23)	"	"	"	"	Initial Release
		PA32 Series	A3SO	CAR 3	"	"	"	"	Initial Release
		PA34 Series	A7SO	FAR 23	"	"	"	"	Initial Release
		PA36 Series	A9SO	FAR 23	"	"	"	"	Initial Release
		PA36 Series	A10SO	FAR 21	"	"	"	"	Initial Release
		PA38 Series	A18SO1	FAR 23	"	"	"	"	Initial Release
		PA44 Series	A19SO	FAR 23	"	"	"	"	Initial Release
		PA46 Series	A25SO	FAR 23	"	"	"	"	Initial Release
		PA60-600, PA60-601, PA-60-601P, PA60-602P, PA60-700P	A17WE	FAR 23	"	"	"	"	Initial Release

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62	**Pitts**	See Aviat	----------	----------	----------	----------	----------	----------	Initial Release
63	**Prop Jets Inc.** *(Aero Comm.)*	200 Series	3A18	CAR 3	"	"	"	"	Initial Release
64	**Reims Aviation** *(Cessna)*	172 Series	A4EU	CAR 10	"	"	"	"	Initial Release
		172 Series	A18EU	FAR 21 29	"	"	"	"	Initial Release
		150 Series	A13EU	FAR 21.29	"	"	"	"	Initial Release
		182 Series	A42EU	CAR 3	"	"	"	"	Initial Release
		337 Series	A23EU	FAR 21.29	"	"	"	"	Initial Release
		177 Series	A26EU	FAR 23	"	"	"	"	Initial Release
65	**Revo**	*See Lake*	----------	----------	----------	----------	----------	----------	7/8/2005
66	**Robinson Helicopter**	R 22	H10WE	FAR 27	"	"	"	"	Initial Release
	Rockwell International *(Also see Ayres)*	111 Series	A12SO	FAR 23	"	"	"	"	Initial Release
		112 & 114 Series	A7SO	FAR 23	"	"	"	"	Initial Release
		500, 520, 560	6A1	CAR 3	"	"	"	"	Initial Release
		680, 720	2A4	CAR 3	"	"	"	"	Initial Release
67	**Rusr, Robert F.** *(Chipmunk)*	21 Series, 22 Series	A44EU	FAR 21.29	"	"	"	"	Initial Release
68	**Ryan Aeronatical Co.**	SCW-145	658	CAR 4A	"	"	"	"	Initial Release
		ST Series	ATC 571	CAR 4A	"	"	"	"	Initial Release
		ST Series	ATC 681	CAR 4A	"	"	"	"	Initial Release
		ST Series	A-749	CAR 4A	"	"	"	"	Initial Release
69	**Ryan Aircraft Corp.**	B Series	ATC 25	CAR 4A	"	"	"	"	Initial Release
70	**Sea Bee**	*See Sky Enterprises*	----------	----------	----------	----------	----------	----------	7/8/2005
71	**SIAI Marchetti**	S205-18/F, -18/R	A9EU	FAR 21	"	"	"	"	7/8/2005
		S205-20/F, -20/R	A9EU	FAR 21	"	"	"	"	7/8/2005
		S205-22/R	A9EU	FAR 21	"	"	"	"	7/8/2005
		S208, S208A	A9EU	FAR 21	"	"	"	"	7/8/2005
		F260, F260B-F	A10EU	CAR 3	"	"	"	"	7/8/2005
		S211A	A86EU	FAR 23	"	"	"	"	7/8/2005
72	**Sikorsky Aircraft**	H19 Series	HR1SO	FAR 21.25	"	"	"	"	Initial Release
		S-39 Series	2-391	FAR 21.25	"	"	"	"	Initial Release
		S-43 Series	A-593	Aero Bul-7A	"	"	"	"	Initial Release
		VS-44-A	752	CAR 4A	"	"	"	"	Initial Release
		S-51 Series	H-2	CAR 6	"	"	"	"	Initial Release
		S-52 Series	H-3	CAR 6	"	"	"	"	Initial Release
		S-55 Series	H1NE	CAR 6	"	"	"	"	Initial Release
		S-58 Series	H1NE	CAR 6	"	"	"	"	Initial Release
		S-61 Series	H1NE	CAR 7	"	"	"	"	Initial Release
		S-62A Series	H1NE	CAR 7	"	"	"	"	Initial Release
		S-64 Series	H1NE	CAR 8	"	"	"	"	Initial Release
		S-76 Series	H1NE	FAR 29	"	"	"	"	Initial Release

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73	**Sky Enterprises** *(SeaBee)*	RC-3	A-769	CAR 3	"	"	"	"	7/8/2005
74	**Sky International**	*See Aviat*	----------	----------	----------	----------	----------	----------	7/8/2005
75	**Socata Group Aerospatiale** *(Gulfstream American)*	TB9, TB10, TB20, TB21	A51EU	FAR 23	"	"	"	"	Initial Release
		TB200	A51EU	FAR 23	"	"	"	"	7/8/2005
76	**Stearman Aircraft**	C3 Series	ATC55	ATC55	"	"	"	"	Initial Release
		C3 Series	2-159	2-159	"	"	"	"	Initial Release
		C3 Series	2-445	2-445	"	"	"	"	Initial Release
		C3 Series	ATC-305	ATC-305	"	"	"	"	Initial Release
		4 Series	2-155	2-155	"	"	"	"	Initial Release
		4 Series	ATC-305	ATC-305	"	"	"	"	Initial Release
		4 Series	ATC-292	ATC-292	"	"	"	"	Initial Release
		6 Series	ATC459	ATC459	"	"	"	"	Initial Release
77	**Stinson** *(Univair)*	SM Series	ATC16	ATC16	"	"	"	"	Initial Release
		SM Series	ATC136	ATC146	"	"	"	"	Initial Release
		SM Series	ATC48	ATC48	"	"	"	"	Initial Release
		SM Series	ATC45	ATC45	"	"	"	"	Initial Release
		SM Series	ATC61	ATC61	"	"	"	"	Initial Release
		SM Series	ATC94	ATC94	"	"	"	"	Initial Release
		SM Series	ATC98	ATC98	"	"	"	"	Initial Release
		SR Series	ATC519	ATC519	"	"	"	"	Initial Release
		SR Series	ATC530	ATC530	"	"	"	"	Initial Release
		SR Series	ATC580	ATC580	"	"	"	"	Initial Release
		SR Series	ATC594	ATC594	"	"	"	"	Initial Release
		SR Series	ATC608	ATC608	"	"	"	"	Initial Release
		SR Series	ATC609	ATC609	"	"	"	"	Initial Release
		SR Series	ATC621	ATC621	"	"	"	"	Initial Release
		SR Series	ATC625	ATC625	"	"	"	"	Initial Release
		SR Series	ATC640	ATC640	"	"	"	"	Initial Release
78	**STOL Amphibian Corp.**	UC-1 (Twin-Bee)	A6EA	CAR 3	"	"	"	"	Initial Release
		Republic RC-3	A-769	CAR 3	"	"	"	"	Initial Release
79	**Swift Museum Foundation**	GC Series	A-766	CAR 4A	"	"	"	"	Initial Release
80	**Taylorcraft Aviation**	BC & BCS Series	A-696	CAR Part 4	"	"	"	"	Initial Release
		19 & F21	1A9	CAR Part 3	"	"	"	"	Initial Release
		DC Series	A-746	CAR 4A	"	"	"	"	Initial Release
		DF-65, DL-65, DCO-65, L-2, L-2A, L-2B, L-2C, L-2E, L-2M	A-746	CAR 4A	"	"	"	"	7/8/2005
		BF Series	A-699	CAR 4A	"	"	"	"	Initial Release
		BL Series	A-700	CAR 4A	"	"	"	"	Initial Release
81	**Thompson, Jimmie, Enterprise** *(Navion)*	A thru Z Series	A-782	CAR 3	"	"	"	"	Initial Release
		L-17A, L-17B, L-17C	A-782	CAR 3	"	"	"	"	7/8/2005

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82	**Tiger Aircraft**	*See Gulfstream American*	----------	----------	----------	----------	----------	----------	7/8/2005
83	**Trytek, E.J.**	Aeronca CF, KC	ATC 655	Aero Bul. 7a	"	"	"	"	Initial Release
	(American Champion)	Aeronca K, KS	A-634	Aero Bul. 7a	"	"	"	"	Initial Release
84	**Univar Aircraft Corp.**	10A, 10B	A-738	CAR 4A	"	"	"	"	7/8/2005
	(Alon)	108 Series	A-767	CAR 3	"	"	"	"	Initial Release
	(Forney)	108 Series	A2EA	CAR 3	"	"	"	"	Initial Release
	(Mooney)	F-1 & F-1A	A-787	CAR 3	"	"	"	"	Initial Release
	(ERCO)	E & G	A-787	CAR 3	"	"	"	"	Initial Release
		415D	A787	CAR 3	"	"	"	"	Initial Release
		A-2 & A-2A	A787	CAR 3	"	"	"	"	Initial Release
		HW-75	A-709	CAR 4A	"	"	"	"	7/8/2005
		L-5, L-5B, L-5C, L5-D, L5-E, L5-E1, L5-G	A787	CAR 3	"	"	"	"	7/8/2005
		M10	A787	CAR 3	"	"	"	"	Initial Release
		415C & 415CD	A718	CAR 4A	"	"	"	"	Initial Release
		415-D, E, G	A787	CAR 3	"	"	"	"	7/8/2005
		V-77	A-774	CAR 4A	"	"	"	"	7/8/2005
85	**Varga Aircraft Corp.**	2150 Series	4A19	CAR 3	"	"	"	"	Initial Release
86	**Waco Aircraft**	A Series	ATC26	ATC26	"	"	"	"	Initial Release
		A Series	644	644	"	"	"	"	Initial Release
		A Series	677	677	"	"	"	"	Initial Release
		A Series	598	598	"	"	"	"	Initial Release
		A Series	714	CAR 4A	"	"	"	"	Initial Release
		A Series	ATC41	ATC41	"	"	"	"	Initial Release
		A Series	ATC123	ATC123	"	"	"	"	Initial Release
		B Series, C Series	ATC168	ATC168	"	"	"	"	Initial Release
		B Series, C Series	ATC538	ATC538	"	"	"	"	Initial Release
		D Series	ATC639	ATC639	"	"	"	"	Initial Release
		D Series	ATC597	ATC597	"	"	"	"	Initial Release
		D Series	ATC42	ATC42	"	"	"	"	Initial Release
		E Series	665	655	"	"	"	"	Initial Release
		E Series	2-430	2-430	"	"	"	"	Initial Release
		G Series	ATC 13	ATC 13	"	"	"	"	Initial Release
		G Series	2-363	2-363	"	"	"	"	Initial Release
		I Series, J Series, K Series	2-361	2-361	"	"	"	"	Initial Release
		I Series, J Series, K Series	ATC313	ATC 313	"	"	"	"	Initial Release
		O Series, P Series, Q Series	ATC468	ATC468	"	"	"	"	Initial Release
		O Series, P Series, Q Series	ATC491	ATC491	"	"	"	"	Initial Release
		O Series, P Series, Q Series	ATC453	ATC453	"	"	"	"	Initial Release
		O Series, P Series, Q Series	ATC502	ATC502	"	"	"	"	Initial Release

FAA Approved Model List (AML) SA00680SE
For
Electronics International, Inc. Digital Automatic Engine Analyzers

Issue Date: March 10, 1999

Item	Aircraft Make	Aircraft Model	Original Type Certificate Number	Certification Basis For Alteration	FAA Sealed Drawings		Installation Instructions		AML Amended Date
					Number	Revision	Number	Revision	
-----	----------	----------	----------	----------	MDL 1111982	11/11/98 IR or Later FAA Approved Revision	II 1111981	11/11/98 IR or Later FAA Approved Revision	----------
		R Series, S Series	ATC466	AT466	"	"	"	"	Initial Release
		R Series, S Series	ATC311	ATC311	"	"	"	"	Initial Release
		R Series, S Series	ATC543	ATC543	"	"	"	"	Initial Release
		U Series, Y Series, Z Series	ATC542	ATC542	"	"	"	"	Initial Release
		U Series, Y Series, Z Series	ATC586	ATC586	"	"	"	"	Initial Release
		U Series, Y Series, Z Series	ATC627	ATC627	"	"	"	"	Initial Release
87	Weatherly Aviation	201 Series	A10WE	FAR 21.25	"	"	"	"	Initial Release
		620 Series	A26WE	FAR 21.25	"	"	"	"	Initial Release
---	End of List	----------	----------	----------	"	"	"	"	----------

Amended Date: 07/08/2005

FAA Approved: _____

Acting Manager, Seattle Aircraft Certification Office

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