ELECTRONICS INTERNATIONAL INC.

UBG-16

INSTALLATION INSTRUCTIONS

S/N:_____

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.

Important Notice

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

If you think it is not important to read this manual, you're wrong! This manual contains important installation information that may affect the safety of your aircraft, delay your installation or affect the operation of your instrument. You Must read this manual prior to installing your instrument. Any deviation from these installation instructions is the sole responsibility of the installer/pilot and may render the STC invalid.

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 EGT/CHT 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).

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.

The pilot **must** understand the operation of this product before flying the aircraft. Do not allow anyone to operate the aircraft that does not know the operation of this product. Keep the Operating Manual in the aircraft at all times.

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

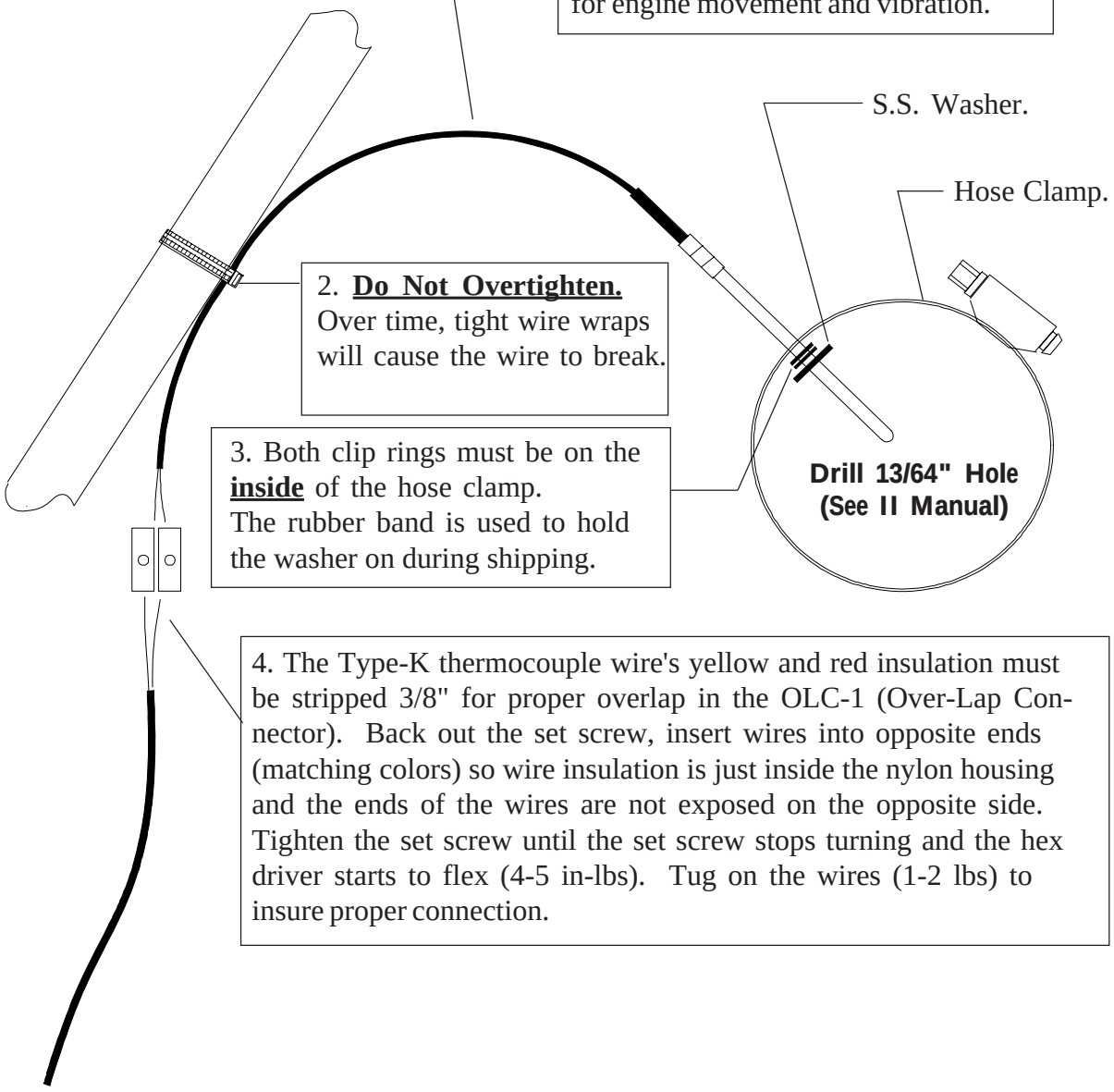
WARNING
Do Not use screws that penetrate the instrument face more than .125". Display damage may result.

P-110 Standard EGT Probe

1218121

Important Installation Information

All steps must be read before installing a probe.



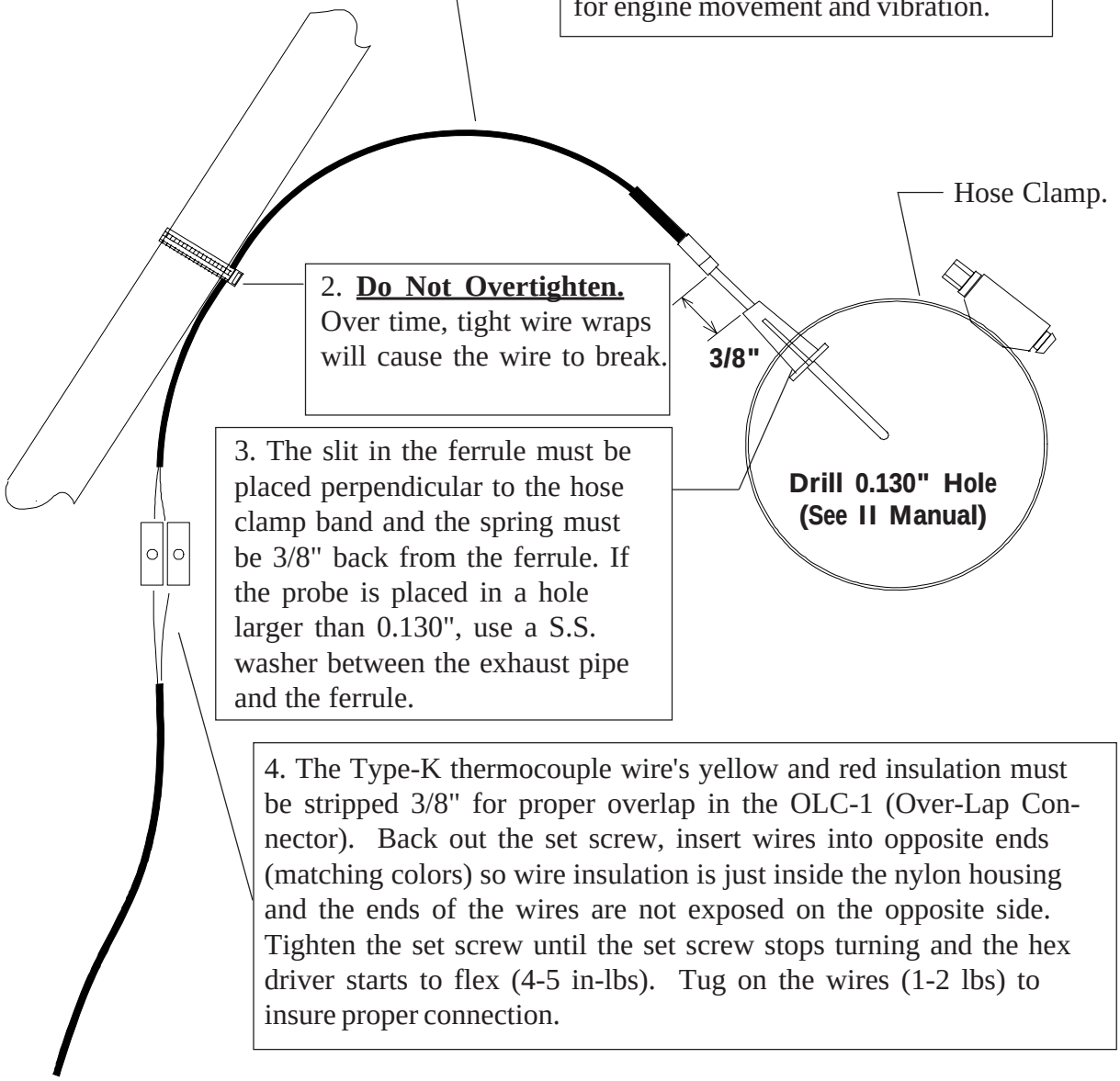
P-110 Fast Response EGT Probe

1218122

Important Installation Information

All steps must be read before installing a probe.

1. **Leave slack** in the cable to allow for engine movement and vibration.



2. **Do Not Overtighten.** Over time, tight wire wraps will cause the wire to break.

3. The slit in the ferrule must be placed perpendicular to the hose clamp band and the spring must be 3/8" back from the ferrule. If the probe is placed in a hole larger than 0.130", use a S.S. washer between the exhaust pipe and the ferrule.

4. The Type-K thermocouple wire's yellow and red insulation must be stripped 3/8" for proper overlap in the OLC-1 (Over-Lap Connector). Back out the set screw, insert wires into opposite ends (matching colors) so wire insulation is just inside the nylon housing and the ends of the wires are not exposed on the opposite side. Tighten the set screw until the set screw stops turning and the hex driver starts to flex (4-5 in-lbs). Tug on the wires (1-2 lbs) to insure proper connection.

Contents

Warranty / Agreement

Electronics International Inc. 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. Electronics International Inc. will repair or replace any item under the terms of this Warranty provided the item is returned to the factory prepaid.

1. This Warranty 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 determine the reason or cause for warranty repair.

2. 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.

3. 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.

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

5. Personal injury or property damage do to misinterpretation or lack of understanding this product is solely the pilots responsibility. The pilot **must** understand the operation of this product before flying the aircraft. Do not allow anyone to operate the aircraft that does not know the operation of this product. Keep the Operating Manual in the aircraft at all times.

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

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

8. **If you do not agree to and accept the terms of this warranty, you may return the product for a refund.**

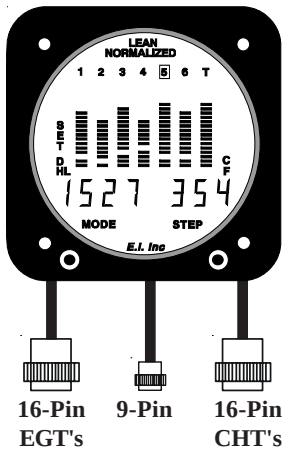
This Warranty is made only to the original user. **THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES OR OBLIGATIONS: EXPRESS OR IMPLIED. MANUFACTURER EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. PURCHASER AGREES THAT IN NO EVENT SHALL MANUFACTURER 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.**

UBG-16
INSTALLATION INSTRUCTIONS

1. *"UBG-16"* Over View

The UBG-16 was designed for use in a single engine aircraft. (For twin engines, use two UBG-16's.)

On the back of the UBG-16 are three circular connectors. As seen in the diagram to the right:



The first 1 to 7 channels of the LEFT 16-pin connector are used to monitor EGT's. Any remaining channels may be used to monitor other functions.

The first 1 to 7 channels of the RIGHT 16-pin connector are used to monitor CHT's. Any remaining channels may be used to monitor other functions.

The small 9-pin connector connects the instrument to power, ground, display intensity control, RS232 Recorder and any warning devices.

The UBG-16 comes with three preassembled wire harnesses which simply plug into the three circular connectors at the back of the instrument. Two of the wire harnesses are identical. One will be used to connect the EGT probes to the UBG-16 and the other will be use to connect the CHT probes to the UBG-16. The wire harnesses were assembled with only enough cables to accommodate the EGT and CHT channels. Any additional temperature measurement (TIT, OAT, Carb Temp, Cowl, etc.) requires a Type K thermocouple extension cable be added to the appropriate harness. Any desired function such as RPM, M.P., Oil Pressure, Fuel Pressure, Fuel Flow, Gyro Vacuum, Volts, Amps, etc., requires an Electronics International Functional Module be added to the appropriate harness.

The UBG-16 does not require any programming before installation. All setup can be accomplished on the face of the instrument. The UBG-16 does not use any internal batteries, so once installed the instrument never has to be removed from the panel.

Read step #2 below then perform only the remaining steps that apply to your configuration.

2. Important Information and Initial Check Out

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

B. **If you are not an FAA Certified Aircraft Mechanic familiar with the issues of installing aircraft EGT/CHT 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 (STC's, etc.) are available for your aircraft before starting the installation. A copy of the AML is located at the back of this manual. Resolve any issues you may have before starting the installation.**

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

E. **Inspect the contents of this package prior to installation.** Look for the following items:

1) Proper instrument (UBG-16 for a single engine, UBG-16T for a twin engine).

2) Correct length and number of extension cables (one for each temperature probe).

3) Correct number and type of temperature probes.

4) Correct Functional Modules (if required).

If you did not receive the proper instrument, probes, cables, functional modules or hardware for your installation, contact either the dealer you purchased the instrument from or Electronics International Inc. for assistance. In most cases E.I. can exchange parts for only the cost of shipping. Please have the purchase date, dealer name and serial number of the unit available when you call.

F. **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. Note: The UBG requires two non-standard holes be drilled in the aircraft instrument panel outside the bezel area.**

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

WARNING
Do Not use screws that penetrate the instrument face more than .125". Display damage may result.

3. "UBG-16" Configuration Form

If you are installing the UBG-16, fill out the following configuration form. This form will document which Temperature probes or Functional Modules will be connected to specific input channels on the UBG-16.

LEFT
8-Input Channels

RIGHT
8-Input Channels

LEFT Channels:	**Function:**	**Comments:**
1 to _____	EGTs	Up to 7 channels may be used to monitor EGTs. Each channel will be displayed on a column of bars. A total of 7 columns are available. Enter the number of EGTs you will be monitoring.
(BAR 7)	TIT, Oil T, OFF	The 7th column of bars is intended to display EGT (on a 7-cylinder engine) or TIT or Oil Temp or it may be turned off (circle one). However, the TIT or Oil Temp probe **must** be connected to the next channel after the last EGT channel (e.g., #5 on a 4-cylinder engine or #7 on a 6-cylinder engine).
L_____	_____	In order, list the unused channels on the LEFT connector and indicate the functions to be monitored on each channel. OAT or Carb Temp must only be connected to channel L7, L8, R7 or R8 (these are precision channels). If a channel is not used, write "OFF" in the Function Column for that channel.
L_____	_____	
L_____	_____	
L___8___	_____	Channel 8 is the last available channel on the left.

Right Channels:	**Function:**	**Comments:**
1 to _____	CHTs	The number of CHTs monitored must be the same as the number of EGT's monitored. The CHTs are monitored on the RIGHT Channels. Enter the number of CHTs you will be monitoring.
R_____	_____	In order, list the unused channels on the RIGHT connector and indicate the functions to be monitored on each channel. OAT or Carb Temp must only be connected to channel L7, L8, R7 or R8 (these are precision channels). If a channel is not used, write "OFF" in the Function Column for that channel.
R_____	_____	
R_____	_____	
R___8___	_____	Channel 8 is the last available channel on the Right.

Note: The UBG-16 digital display steps through the channels starting with number one on the LEFT and ending with number 8 on the RIGHT.

4. EGT Probe Installation

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. 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 will 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 210's or any aircraft using a slip joint in the exhaust system, install the EGT probes ABOVE OR BELOW THE SLIP JOINT. Installing a EGT probe in the slip joint can damage the probe.

5. CHT Probe Installation

A single CHT probe should be placed on the hottest cylinder. In a 6-cylinder engine this would be one of the center cylinders. On a 4-cylinder engine this would be one of the back cylinders.

If a second CHT probe is to be installed it should be placed on one of the front unobstructed cylinders. This will allow the UBG-16 to detect shock-cooling automatically.

Most engines have a port just below the lower spark plug for the CHT probe. If your engine has a primary CHT probe in one of the cylinders, do not remove it. The UBG-16 is not STC'd as a primary replacement instrument. Select another cylinder for your probe. If you're putting a CHT probe on every cylinder use our P-102 Gasket CHT Probe for your primary cylinder.

6. TIT Probe Installation

If you currently have a TIT gauge mounted in the aircraft it may be a primary engine instrument. If this is the case you will need to install a secondary TIT probe. The TIT probe should be installed on the inlet of the Turbo-charger one to two inches before the Turbo-charger flange. 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 will become loose as it conforms to the exhaust stack. After the first 10 hours of operation, each hose clamp should be retightened.

7. OIL Temperature Probe Installation

Sometimes finding a location for a secondary oil temperature probe can be a problem. The P-120, P-100, P-111, P-112, P-114 and P-128 are all sealed probes appropriate for measuring oil temperature. See the "Probes" section of the price sheet for dimension information.

LYCOMING
IO 320, IO 360 and IO 540

Remove the 5/8" - 18 plug located on the rear engine accessory case above and forward of the oil filter adaptor or oil screen as applicable. Install E.I.'s P-120 Oil Probe with a new oil seal and torque to Lycoming's specifications. Check for oil leaks after the first flight.

All Other Engines
Equipped with a 5/8"-18 Secondary Oil Drain Plug

Remove the 5/8"-18 Secondary oil drain plug located on the bottom of the engine. Install E.I.'s P-120 Oil Probe with a new oil seal and torque to specifications. Check for oil leaks after the first flight.

If another location is used to measure oil temperature, make sure the probe does not interfere with the operation of the engine.

8. Carb Temp Probe Installation

Remove the threaded plug located in the carburetor housing just below the throttle valve. Install the Carburetor Temperature Probe (P-128) in this hole using a lock washer. Care should be taken not to over-tighten the probe and strip the threads in the carburetor housing.

NOTE: A Carb Temp Probe should be connected to a precision channel on the UBG. That would be channel 7 or 8 on the left and right Circular Connector. A three to four degree F error can occur in some instances if the Carburetor Probe is not connected to a precision channel.

9. OAT Probe Installation

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

NOTE: An OAT Probe should be connected to a precision channel on the UBG. That would be channel 7 or 8 on the left and right Circular Connector. A three to four degree F error can occur in some instances if the OAT Probe is not connected to a precision channel.

10. Other Temperature Probe Installation

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

11. Install Additional Temperature Cables and Mark The Cables for the *"UBG-16"*

There are two identical pre-wired Extension Cable Harnesses in the installation kit. One end of each harness has a 16-pin Circular Connector and the other end has red Slip-on connectors on the individual extension cables (see the Wiring Diagram at the back of this manual). There is a type K thermocouple extension cable for each EGT and CHT temperature to be measured. The end of each extension cable in the harness has a piece of yellow heat shrink marked with its channel number. One of these harnesses is to be connected to the EGT probes (and LEFT connector on the UBG-16) and the other is to be connected to the CHT probes (and the RIGHT connector on the UBG-16). Refer to step 4 (Configuration Form) to identify which harness will be used for EGT's and which will be used for CHT's.

Mark the Circular Connector that will be connected to the EGT probes. The first 4 or 6 channels (starting with channel #1) are used to monitor EGT's. Any additional channels may be used to monitor other temperatures or functions. There are 8 channels available on each 16-pin Circular Connector. Any channel used to measure a temperature other than EGT or CHT (TIT, OAT, Carb Temp, etc.) will have a type K thermocouple extension cable lose in the kit. Plug any additional extension cables into the appropriate pins of the Circular Connector (see "Appendix A" at the back of this manual).

Any channel used to monitor functions other than temperature (RPM, M.P., Oil Pressure, Volts, Amps, etc.) will require a Functional Module. Installation of a Functional Module will be covered later in this manual.

Mark each of the Type K thermocouple extension cables in this harness (on the yellow heat shrink) with the temperature function for which it will be used (i.e., CHT, EGT, Oil, etc.). An ink pen or marker works well.

Note: If a cable needs to be removed from a connector, you must use an extraction tool. This tool may be purchased from E.I.

Mark the Circular Connector that will be connected to the CHT probes. The first 4 or 6 channels (starting with channel #1) are used to monitor CHT's. Any additional channels may be used to monitor other functions. There are 8 channels available on each 16-pin Circular Connector. Any channel used to measure a temperature other than EGT or CHT (TIT, OAT, Carb Temp, etc.) will have a type K thermocouple extension cable lose in the kit. Plug any additional extension cables into the appropriate pins of the Circular Connector (see "Appendix A" at the back of this manual).

Any channel used to monitor a function other than temperature (RPM, M.P., Oil Pressure, Volts, Amps, etc.) will require a Functional Module. Installation of a Functional Module will be covered later in this manual.

Mark each of the Type K thermocouple extension cables in this harness (on the yellow heat shrink) with the temperature function for which it will be used (i.e., CHT, EGT, Oil, etc.). An ink pen or marker works well.

Note: Any channel will accept any one of E.I.'s probes or Functional Module.

12. Route the 16-pin Circular Connectors

Do not continue with this step unless each Extension Cable has been marked as previously described.

Starting from under the instrument panel, route the 16-pin circular connector wire harness up to the instrument mounting location. (See the wiring diagram at the back of this manual). Place the circular connector about 9 inches back from the panel. Tie wrap the harness in place approximately 1 foot back from the circular connector. This will allow the harness to be flexible and accommodate varying lengths in instrument wires. Be sure these wires do not obstruct the freedom of travel of any controls.

13. Route Each Extension Cable

Starting from under the instrument panel, route each Extension Cable to its appropriate probe. If new connectors are to be installed on the ends of the cables, you may want to pull any excess cable length through the fire wall and cut it off at this time. However, it is recommended you leave some extra wire length under the instrument panel in case you choose to move the UBG to a different location at a later date. Varying cable lengths will not affect the accuracy of this instrument. The Extension Cables and Probe Wires are made of type K thermocouple wire that must not be substituted or extended with regular copper wire. Also, it is important these wires not be kinked (i.e., do not bend the wires on a radius less than 1 inch).

Connect each probe to its associated Extension Cable using the supplied OLC-1 Overlap Connectors. See OLC-1 Installation Instructions for details. When tie wrapping these cables down, be sure there is no strain or pull on the cable against the probe or connectors. Dress each cable up to the instrument keeping them away from any hot areas such as exhaust stacks, cylinder heads, etc.

Tie off any excess cable under the instrument panel. Be sure these cables do not obstruct the freedom of travel of any controls.

14. Install UBG-16 Functional Modules & Accessories

If a channel on the UBG-16 is to be used to monitor a function other than temperature, an appropriate Functional Module must be installed. A Functional Module is a small box with circuitry used to convert pressure, RPM, Voltage, Amps, etc. to an appropriate signal the UBG can display. This signal can be connected to any unused channel on the UBG-16. These modules are small and light and are tie wrapped under the instrument panel. They come with a Circular Connector so they may be installed and removed easily. Below is a list of the functional modules available:

FM-OP - Oil Pressure
FM-MP - Manifold Pressure
FM-RPM - RPM
FM-Flow - Fuel Flow (Flow only)
FM-FP - Fuel Pressure
FM-Gyro - Gyro Vacuum
FM-VA - Volts/Amps

You may install any Functional Modules at any time. Installation Instructions for the various Functional Modules are included with the modules.

The UBG-16 has optional items that may be installed. These items are listed below.

MUX-8A - Data Recorder
AP-7V - Vertical Annunciator Panel
ATG-1 - Annunciator Tone Generator
AL-1(x) - Chrome Annunciator Light
AV-17 - Voice Annunciator
AP-7H - Horizontal Annunicator Panel
CP-1 - LED Intensity Control Pot
A-103 - 3 1/8" Adaptor Plate

You may install any of the options at any time. Installation Instructions for the various options are included with the options.

15. Route the Power and Ground Wires

Route the red wire in the 9-pin wire harness to the aircraft's 12 or 24 volt **RADIO BUS** as applicable via an independent five amp circuit breaker, **the UBG-16 must be OFF during engine start**. An alternate method would be to route the red lead to the bus via a five amp in-line fuse. If the latter method is used, a spare fuse should be kept in the aircraft.

Route the black wire in the harness to a good ground . **Tie wrap these wires so they do not obstruct the freedom of travel of any controls.**

16. Route the Display Intensity Control Wire

Connect the white/orange wire to Electronics International's Intensity Control Pot (CP-1). If a CP-1 has not been previously installed in the aircraft panel, do so at this time. This CP-1 will dim the display on the UBG for night operation. If this line is left open, the display will remain at full intensity at all times.

An alternate method is to connect the white/orange wire to the panel light rheostat. When the panel lights are turned on for night operation the UBG display will dim. With this method their is no guarantee that the panel lights and UBG display intensity will match.

Tie wrap all wires so they do not obstruct the freedom of travel of any controls.

17. Route the (Optional) External Warning Control Line

The white/yellow wire can be connected to an external light (an AL-1 is supplied in this kit), buzzer (ATG-1), voice annunciator (AV-17), a relay, etc. This wire grounds when a warning is activated in the UBG. The current in this line must be limited to 1/10 of an amp maximum. Exceeding this limit will damage the unit. If this feature is not used, leave this line open. **Tie wrap this wire so it does not obstruct the freedom of travel of any controls.**

18. Route the (Optional) RS-232 Data Output Line

The white/green wire can be connected to Electronics International's MUX-8A for data recording. Refer to the MUX-8A Operating and Installation Instructions for details.

19. Drill Two Holes for the Mode and Step Switch

A drill template is enclosed in the kit. Mount the drill template to the front of the aircraft instrument panel. Punch the two holes in the drill template for the Mode and Step Switch. Remove the drill template and drill the two holes using a 1/4" drill bit. You may want to drill a pilot hole first.

20. Install the Instrument in the Panel

Install the instrument from behind the instrument panel using 6 x 32 screws. **DO NOT USE SCREWS THAT PENETRATE THE INSTRUMENT FRONT PANEL MORE THAN 1/8" -- DOING SO WILL BREAK THE GLASS DISPLAY.**

Connect all the Circular Connectors to the UBG in the following manner:

A) Push the two mating connectors together and twist them until they snap into position.

B) Turn the locking ring on the instrument connector clockwise (1 1/2 turns) until it locks into position.

If you are using the optional remote head for the UBG-16, secure the body of the UBG-16 underneath the instrument panel in a location that will not obstruct the freedom of travel of any controls. Route the wires from the body to the remote head making sure that the wires do not obstruct the freedom of travel of any controls. Connect the cable from the head to the body.

21. Configure the UBG for Your Aircraft

To configure the UBG to operate with the temperature probes and Functional modules installed in your aircraft, refer to the Power-up Programming section in the Operating Instructions. Use the Configuration Form found in this manual as a reference.

22. System Ground Test

A. Turn the master switch on and look for a near ambient temperature reading on each temperature channel. If the instrument does not power-up (display a reading), check the power and ground leads (red and black leads) for an open, loose or poor connection.

If you suspect that any channel is not receiving a signal, remove the probe from the engine (leaving it connected to the Extension Cable) and apply a temperature to it. Look for an increase in reading on the display for that channel. Check the other channels for an increase in reading. You may have connected the probe to the wrong Extension Cable. If the reading is decreasing, you may have reversed the connectors on the Extension Cable leads (the yellow wire on the probe must connect to the yellow wire on the Extension Cable).

B. Start the engine and check each channel for a proper reading. On the ground (after a few minutes) EGT's will read around 900°F and CHT's will read around 200°F. If you suspect any channel is not receiving a signal properly, see step A of the "Troubleshooting" section of this manual.

TROUBLESHOOTING SUGGESTIONS

Because high reliability is designed into Electronics International's equipment, there is no reason to put up with poor operation. We have few problems with our probes, cables and units and installation is simple. Usually fixing a problem is just a matter of inspecting the installation at a few key points.

Strategy

If you have more than one problem, FIX ONE PROBLEM AT A TIME. Trying to fix all of them at once can be confusing and misleading. In many cases fixing one problem first will lead you to the solution for fixing all of the problems. Therefore, take one problem on one channel and proceed with the following:

A. Instrument Check Out

If there is an identical symptom on each channel, then the instrument may have a problem. But if even one channel of the instrument is operating properly, the instrument probably does not have a problem. A good method to test the instrument is to remove all the Extension Cables by disconnecting the Extension Cable Circular Connector. Then look for a reading on all channels to be near cabin temperature for temperature channels or zero for channels measuring functions other than temperature (RPM, Oil Pressure, etc.). The only inputs the UBG requires to operate properly and measure cabin temperature is power (red lead) and ground (black lead). Check the power and ground leads for proper connection (pull on the wire at each connector).

Note: Few problems turn out to be the instrument.

B. Probe Check Out

There are two good methods of testing a probe. Perform one or both of the following:

1. **A probe can be tested with an ohmmeter. Disconnect the probe from the Extension Cable. When testing the resistance between the connectors, the probe should measure a "short" (less than 5 ohms). When measuring from one lead (either lead) of the probe to the probe sheath (metal tip), there should be an "open" (10k or greater).**

2. **Another method of checking a probe is to plug the suspected bad probe into a channel that is working properly. If the problem follows the probe, you have a defective probe.**

C. Extension Cable Check Out

With the Extension Cable connected to the UBG, remove the probe from the suspected bad Extension Cable. Set the UBG to the proper channel and look for a near cabin temperature reading. A very high or low reading indicates a short to ground in the cable. Next, connect an ohmmeter, set

to 10K range, to the open probe ends of the suspected bad Extension Cable. Set the UBG to the proper channel and look for a high (+ or -) reading. A near cabin temperature reading or no change in reading indicates an open in the cable or its connectors. Most problems of this kind are usually one of the following:

1. Improper OLC-1 Connections: Pull on wires installed in the Over-Lap Connector to check the connection. You may have insulation in the overlap area. Remove the wires from the OLC-1 and inspect.

2. Broken Wire: A wire can be broken from a too-tight tie-wrap or by repeatedly flexing the wire. Inspect the wires for a break. Note: A wire can be broken while the insualtion is still intact.

3. Cable Chafed to Ground: If a cable is routed around a metal object, it will over time chafe the wire and short to the object. Inspect the wires for chafing.

SPECIFICATIONS and OPERATING FEATURES

S1111981

11/11/98

Model: UBG-16

Weight: Unit only: 22 oz., One probe and 6 foot cable: 3.5 oz., One Probe and 20 foot cable: 7 oz.

Environmental: Meets TSO C43a

Power Requirements: 10.5 to 30 Volts, 3/10 Amp.

Display: Plasma (viewable in direct sunlight). Display dims for night operation.

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

Power-up Test: Flashes all bars, segments and nomenclature.

Probes: Type K, Ungrounded (for improved accuracy, stability and reliability).

Extension Cables: Type K, any length or size. Non-Temp cables are tin/copper.

Channels: Maximum of 16 Channels.

EGT and CHT Analyzer Channels: 1 to 7, programmable from front panel (left channels for EGTs and right channels for CHTs).

EGT Bar Resolution: 1 to 104°F per Bar, programmable from front panel.

CHT Bar Resolution: 33°F per Bar.

Lean Operating Mode:

A. Activated after 10°F rise in hottest EGT.
B. Peak detected when 5°F decrease in any EGT or TIT.

Scan Rate: Programmable from 1 to 9 second per channel.

UBG-16
RS-232 (5-volt) Output

0721991

7/21/99

1. General Description

The UBG transmits serial RS-232 (5-volt) data on the white/green wire (pin 9). The serial data transmitted is the same as that shown on the digital display as each channel is selected. The white/green wire may be connected to a PC through Electronics International's 8 Channel Multiplexer Unit (MUX-8). If the transmitted signal is inverted, it may be connected directly to a PC. The serial data is transmitted in a comma delimited format, suitable for importing into most spreadsheet and data base programs.

2. Instrument Operation

The UBG outputs RS232 (5-volt) data in all operating modes.

3. Transmit Specifications

*** Baud Rate:** 9600
*** Data Bits:** 8
*** Start Bit:** 1 (Logic Low)
*** Stop Bit:** 1 (Logic High 5-volts)
*** Parity:** None
*** Transmit Rate:** 5 seconds to transmit all 16 channels.

4. Transmit Format

The UBG transmits the following record:

UBG,L1,R1,L2,R2,L3,R3,L4,R4,L5,R5,L6,R6,L7,R7,L8,R8CrLf

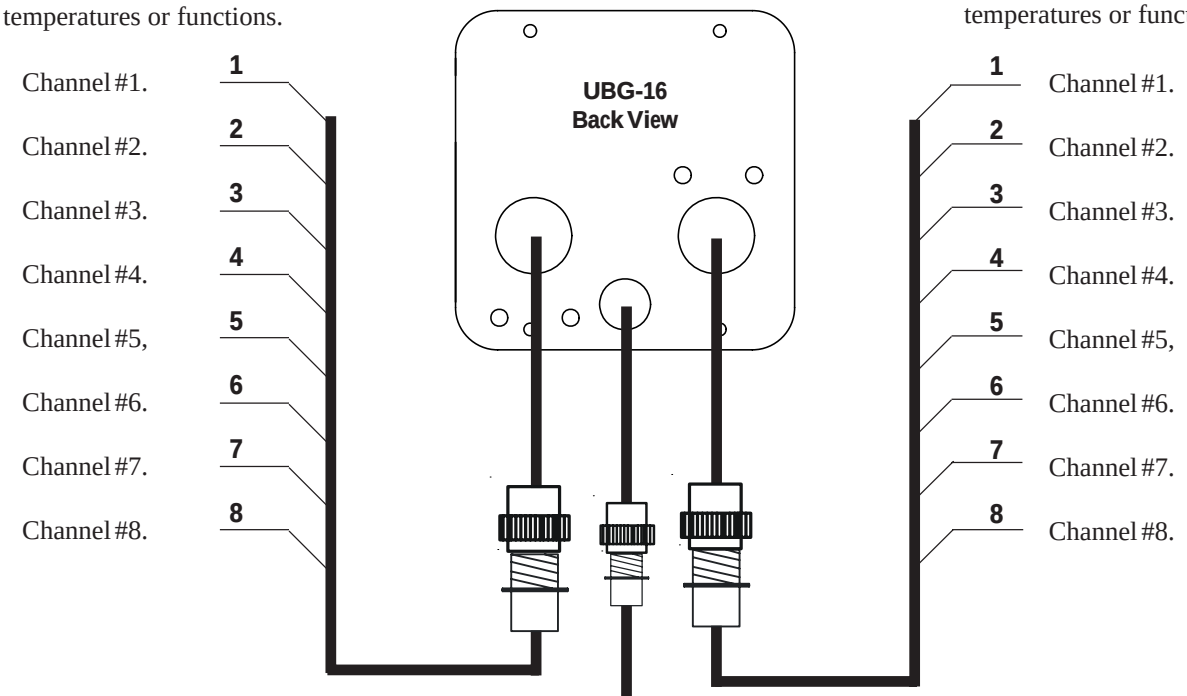
UBG	**Instrument identifier.**
,	**A comma separates data fields.**
L1	**Left channel 1 reading (-999 to 1999 decimal points are not transmitted). Other left channels are L2, L3, etc.**
R1	**Right channel 1 reading (-999 to 1999 decimal points are not transmitted). Other right channels are R2, R3, etc.**
Cr	**Carriage return (0Dh)**
Lf	**Line feed (0Ah)**

WARNING
Do Not use screws that penetrate the instrument face more than .125". Display damage may result.

UBG-16
Wiring Diagram

Right Channels
For monitoring CHT's and other temperatures or functions.

Left Channels
For monitoring EGT's and other temperatures or functions.



Right Extension Cable Harness.

Left Extension Cable Harness.

Connecting Wire Harness.

	Description	Connects To:
White/Orange	Display Dimming.	CP-1 Intensity Control Pot.
Red	Power Lead.	12/24 Volt, **Radio Bus.** via 5 amp fuse.
Black	Ground Lead.	Ground
White/Grn	(Optional) RS232 Data Output Line. Connect to MUX-8 to record data.	
White/Yel	(Optional) External Warning Control Line. Can be connected to a relay to control an external light, buzzer, etc. This line grounds when a warning is blinking on the display. Current must be limited to 1/10 amp maximum.	

Note: Any channel used to measure a temperature must be connected to a Type K thermocouple extension cable.

Note: The first 4 or 6 channels on the left and right must be used to monitor EGT and CHT respectively.

Note: If using the 7th column of bars to display TIT or Oil Temp, the probe **must** be connected to the next LEFT channel after the last EGT channel.

Note: OAT or Carb Temp must be connected to channel 7 or 8 on the left or right. These are "precision" channels.

Note: Any left or right channel will accept any one of E.I.'s probes or Functional Modules.

Note: Varying cable lengths will not affect accuracy.

Appendix A
Adding a Temperature Probe to the UBG-16

If you have an unused channel and would like to add an extension cable and probe to your instrument, perform the following steps:

1. Order an XCS Extension Cable (at the proper length) and appropriate probe from Electronics International Inc.

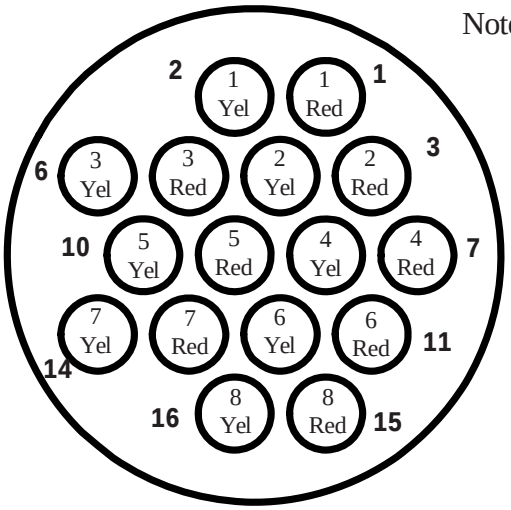
2. Disconnect the cable harness at the Circular Connector on the back of the UBG.

3. Insert the the XCS Extension Cable into the Circular Connector at the proper location (see below). Once these connectors are installed do not try to remove them without an extraction tool. Unless an extraction tool is used you can damage the Circular Connector. An extraction tool may be purchased from Electronics International Inc.

4. Follow the appropriate steps in the Installation Instructions for mounting the probes and routing the Extension Cables.

5. Reconnect the cable harness to the Circular Connector at the back of the UBG.

Extension Cable Harness
Back View (wire side)



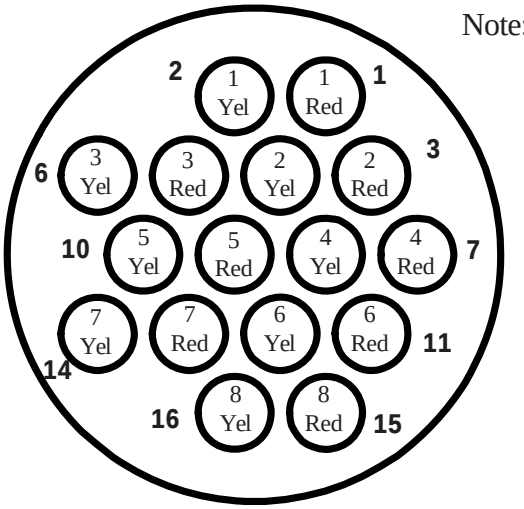
Note: 1 Red = Channel #1 Red wire.
1 Yel = Channel #1 Yel wire.

Appendix B
UBG-16
Circular Connectors

Extension Cable Harness, Back View (wire side)

OR

Instrument Connector, Front View

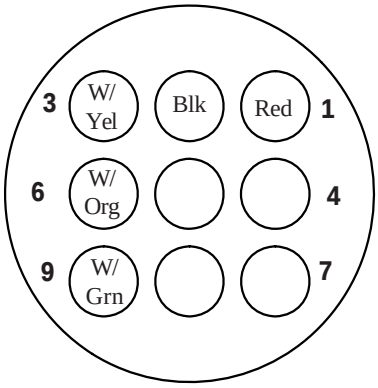


Note: 1 Red = Channel #1 Red wire (Gnd)
1 Yel = Channel #1 Yel wire (Signal)

Connecting Cable Harness, Back View (wire side)

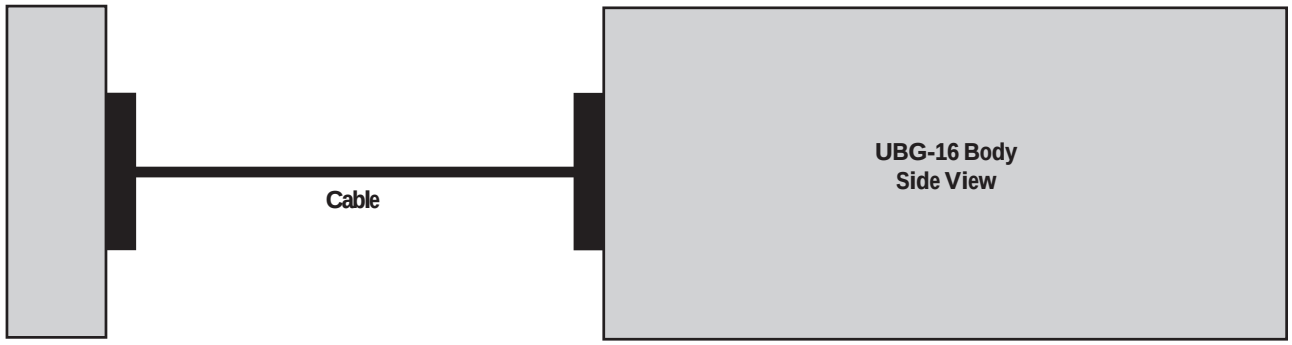
OR

Instrument Connector, Front View

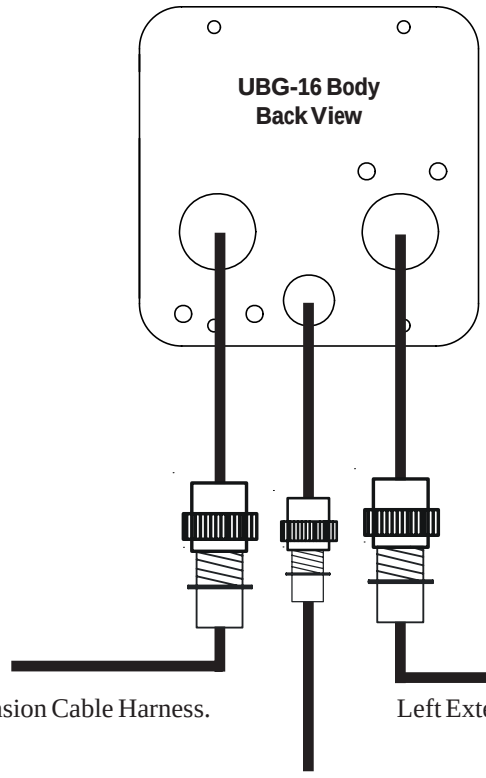


Note: See Wiring Diagram for hook up information.

Appendix C
UBG-16 Remote Head
Wiring Diagram



WARNING
Do Not use screws that penetrate the remote face more than .125". Display damage may result.



Right Extension Cable Harness.

Left Extension Cable Harness.

Connecting Wire Harness.

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 of issuance: March 10, 1999
Date reissued: July 8, 2005
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	"	"	"	"	7/8/2005
		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	"	"	"	"	Initial Release
5	**Aerospatiale** *(Also see Socata)*	SE 3160 Alouette	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, Tytek)*	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

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					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
		E90 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
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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
		200 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	ATC22B	"	"	"	"	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 *(American General)* *(Grumman Aircraft)* *(Tiger Aircraft)* *(Socata Group Aerospatiale)*	Grumman:	----------	----------	----------	----------	----------	----------	Initial Release
		G164 Series	1A16	CAR 8.10	"	"	"	"	Initial Release
		G Series	1A17, A12EA	CAR 4B	"	"	"	"	Initial Release
		GA Series	A17SO	FAR Part 23	"	"	"	"	Initial Release
		AA Series	A11EA, A16EA	FAR Part 23	"	"	"	"	Initial Release
42	Helio Aircraft *(Also see Alliance Aircraft)*	H-250	1A8	CAR 3	"	"	"	"	Initial Release
		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	"	"	"	"	7/8/2005
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	"	"	"	"	Initial Release
49	Lake	*See Consolidated Aeronautics*	----------	----------	----------	----------	----------	----------	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	"	"	"	"	7/8/2005
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	"	"	"	"	Initial Release
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	"	"	"	"	7/8/2005
54	Meyers	*See Prop-Jets*	----------	----------	----------	----------	----------	----------	7/8/2005
55	Mooney	M-18C, M-18C55, M-18L, M-18LA	A-803	CAR 3	"	"	"	"	Initial Release
		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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		RC-3	A-769	CAR 3	"	"	"	"	7/8/2005
73	Sky Enterprises *(SeaBee)*	*See Aviat*	----------	----------	----------	----------	----------	----------	7/8/2005
74	Sky International	TB9, TB10, TB20, TB21	A51EU	FAR 23	"	"	"	"	Initial Release
75	Socata Group Aerospatiale *(Gulfstream American)*	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. *(American Champion)*	Aeronca CF, KC	ATC 655	Aero Bul. 7a	"	"	"	"	Initial Release
		Aeronca K, KS	A-634	Aero Bul. 7a	"	"	"	"	Initial Release
84	Univar Aircraft Corp. *(Alon)* *(Forney)* *(Mooney)* *(ERCO)*	10A, 10B	A-738	CAR 4A	"	"	"	"	7/8/2005
		108 Series	A-767	CAR 3	"	"	"	"	Initial Release
		108 Series	A2EA	CAR 3	"	"	"	"	Initial Release
		F-1 & F-1A	A-787	CAR 3	"	"	"	"	Initial Release
		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	665	"	"	"	"	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

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		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