# Volts / Amps

(Primary Instruments)

## VA-1A, VA-1A-XX & RSVA-3

## **Operating and Installation Instructions**

#### OI 041032 and II 040934 Rev. C\*\*\*\*\* D-Sub



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.

Model: \_\_\_\_\_

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





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## **Important Notice**

## **MUST READ**

If you think it is not important to read this manual, you're wrong! This manual contains important 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.

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

Check that the instrument make and model marked on the side of the instrument and on the invoice are correct before starting the installation. The VA-1A is an internal shunt unit and the VA-1A-XX is an external shunt unit ("XX" = your aircraft shunt value in amps).

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.

The ability for this product to detect a problem is directly related to the pilot's interpretation and observation skills.

The pilot <u>must</u> 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.



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## Warranty / Agreement

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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. <u>This warranty does not cover any reimbursement for any person's time for installation, removal, assembly or repair.</u> 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 due to misinterpretation or lack of understanding this product is solely the pilot's 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. E. I. 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.



### **Features**

#### 1. 12/24 Volt Auto Select

The VA-1A automaticly sets trigger levels for the "High Volts" and "Discharge" warning features based on the input bus voltage to the unit.

#### 2. "High Volts" Warning Light

If the bus voltage rises to 15.3 volts (30.6 volts for a 24-volt system) or higher, a bright red "High Volts" warning light will alert you of this condition. The high volts feature is sensed off the red power lead and will function regardless of installation variations or what position the mode switch is in. If this light is on, an External Warning Line will be pulled low which can be used to activate an External Warning Light.

#### 3. "Discharge" Warning Light

If the bus voltage drops below 12.6 volts, (25.2 volts for a 24-volt system) a bright yellow "Discharge" warning light will alert you of this condition. The discharge warning feature is sensed off the red power lead and will function regardless of installation variations or what position the mode switch is in. If this light is on, an External Warning Line will be pulled low which can be used to activate an External Warning Light.





#### 4. Digital Display

The VA-1A comes with 12 and 24 volt digital display back light control lines. The digital display should be backlit all the time. This will allow it to be viewed easily in dim light. The digital display is best viewed in high ambient light or direct sunlight.

Voltage will be displayed in 0.1 volt increments and a "V" annunciator will show in the display. Amperage will be displayed in 0.1 amp increments for the VA-1A and any external shunted unit 60 amps and below (i.e., VA-1A-60 and below). For any external shunted unit above 60 amps (VA-1A-70 and above) amperage will be displayed in 1 amp increments. Any time the Mode Switch is in the "Amps" position, an "A" annunciator will show in the display.

Note: When the VA-1A (-XX) is mounted in the alternator lead and the engine is off, the VA-1A (-XX) may display up to  $\pm 0.3$  amps. This is due to any leakage current in the alternator and any offset in the VA-1A (-XX).

#### 5. Mode Switch

The Mode Switch sets the display between "Volts" and "Amps." The setting of this switch will not affect the operation of the "High Volts" or "Discharge" warning lights.

#### VA-1A Installed in the Battery Lead

The two common methods of installing the VA-1A or VA-1A-XX in the electrical system of your aircraft are in the battery lead and in the alternator lead. Following are the operating characteristics of the VA-1A installed in the battery lead.

#### 1. Master On, Engine Off

The following describes the operating characteristics of the VA-1A installed in the battery lead with the master switch on and the engine off.

With the Mode Switch in the "Amps" position, the VA-1A will display the electrical system load on the aircraft. Since the engine is off, all of the current is being supplied by the battery. The VA-1A will show a discharging condition (the "Discharge" light will be on) and display an accurate reading of the total current drain from the battery. With all your electrical equipment off, this will be around 2 to 6 amps. In this mode of operation any piece of electrical equipment can be checked for proper operation by performing the following steps:

- A. Note the amps reading on the VA unit.
- B. Turn on the piece of electrical equipment you wish to check.

C. If this piece of electrical equipment is working properly, you will see an increase in load current that corresponds to the current that piece of equipment requires. Compare this current with the current you measured for that same piece of equipment at an earlier date.

Using this method with the digital display of the VA-1A, many important aircraft functions (strobes, retracts, radios, transponder, ADFs, DMEs, pitot heat, etc.) can be checked from the pilot's seat. It would be worthwhile to write down the load current for the entire system and for each piece of equipment. This would give you something to compare to when you wish to check for proper operation at a later date. You may also check the entire electrical system with one check by turning all the electrical equipment on and comparing the amps reading with your normal reading taken at an earlier date. If an improper reading is noted, the VA-1A may then be used to diagnose which piece of equipment has malfunctioned by checking each piece of equipment separately.

With the mode select switch in the "Volts" position, the VA-1A will display the bus voltage to 0.1 volts. With all electrical equipment off and a fully charged battery the bus voltage will be around 12.1 to 12.5 volts (double these levels for a 24-volt system). Each battery has its own operating voltage when charged. As the battery gets near the end of its life, this voltage will start to drop. A discharged battery will also run at a lower voltage. Don't confuse a good discharged battery with an old battery.

#### 2. Master On, Engine On

The following describes the operating characteristics of the VA-1A installed in the battery lead with the master switch on and the engine on.

With the Mode Switch in the "Amps" position, the VA-1A will display the charging current to the battery. When the engine is first started, the current will jump up to 20 amps or more and will quickly decrease as the battery takes a charge. Within a few minutes, the charging current will have dropped to 6 amps or lower and will continue to drop for the next hour until it settles to 1.0 amps or lower.

With the VA-1A installed in the battery lead, load current cannot be monitored during flight. The Alternator (or generator) is supplying all of the electrical load and charging the battery. Only the battery charging current can be monitored for this installation.

With the mode selector switch in the "Volts" position the VA-1A will display the bus voltage to 0.1 volts. With the engine running, the alternator is capable of raising the bus voltage to a dangerously high level. It is the voltage regulator's job to limit the bus voltage between 13.5 and 14.8 volts (double these levels for a 24-volt system). Look for this level on the VA-1A. A low voltage reading will cause the battery to charge very slowly. A high reading can damage the battery and most of your electrical equipment. If the aircraft bus voltage goes to a dangerously high level (15.3 volts or higher) a bright red "High Volts" light on the VA-1A will warn you of this condition. If this happens turn the field to the alternator off to eliminate the over voltage condition.

Another common electrical problem is a discharging condition. If this condition goes unnoticed (which it normally does) you will end up with a dead battery in flight rendering all of your electrical equipment useless. To help you avoid this situation the VA-1A has a "Discharge" Warning Light which acts as an early warning, alerting you as soon as the battery goes into a discharging condition. The amount of discharging current can be displayed in the "Amps" position. Discharging current will be displayed as a minus number. If this situation occurs, turn off any unnecessary electrical equipment. The lower you can get the discharging current, the longer the battery will last.

The VA-1A will display trend information when your battery is in a discharging condition. As you watch the battery discharging 0.1 volts at a time, it becomes relatively easy to judge the remaining time you have before the battery reaches a seriously low condition. As the battery voltage approaches 11 volts (22 volts for a 24 volt system), the aircraft's electrical equipment will start to malfunction. The exact voltage at which each piece of equipment will start to malfunction depends on the design of that equipment. The VA-1A will work accurately from 40 to 7 volts--far below where most electrical equipment starts to fail.

### VA-1A Installed in the Alternator Lead

Two common methods of installing the VA-1A or VA-1A-XX in the electrical system of your aircraft are in the battery lead and in the alternator lead. Following are the operating characteristics of the VA-1A installed in the alternator lead.

#### 1. Master On, Engine Off

The following describes the operating characteristics of the VA-1A installed in the alternator lead with the master switch on and the engine off.

With the Mode Switch in the "Amps" position the VA-1A will display 000 (+/- a few counts). Since the battery is supplying all of the electrical load and the alternator is off (not turning), there is no current being supplied from the alternator and the "Discharge" warning light will be on.

With the mode select switch in the "Volts" position, the VA-1A will display the bus voltage to 0.1 volts. With all electrical equipment off and a fully charged battery the bus voltage will be around 12.1 to 12.5 volts (double these levels for a 24-volt system). Each battery has its own operating voltage when charged. As the battery gets near the end of its life, this voltage will start to drop. A discharged battery will also run at a lower voltage. Don't confuse a good discharged battery with an old battery.

#### 2. Master On, Engine On

The following describes the operating characteristics of the VA-1A installed in the alternator lead with the master switch on and the engine on.

With the Mode Switch in the "Amps" position the VA-1A will display the electrical system load on the aircraft plus the battery charging current. Since the engine is on, all of the current is being supplied by the alternator. The VA-1A will show a charging condition (the "Discharge" light will be off) and display an accurate reading of the total current drain from the alternator. In this mode of operation any piece of electrical equipment can be checked for proper operation during flight by performing the following steps:

- A. Note the amps reading on the VA unit.
- B. Turn off the piece of electrical equipment you wish to check.

C. If this piece of electrical equipment is working properly, you will see a decrease in load current that corresponds to the current that piece of equipment requires. Compare this current with the current you measured for that same piece of equipment at an earlier date.

Using this method with the digital display of the VA-1A, many important aircraft functions (strobes, retracts, radios, transponder, ADFs, DMEs, pitot heat, etc.) can be checked from the pilot's seat. It will be worthwhile to write down the load current for the entire system and for each piece of equipment. This will give you something to compare to when you wish to check for proper operation at a later date. You may also check the entire electrical system with one check by turning all the electrical equipment on and comparing this reading with your normal reading taken at an earlier date. If an improper reading is noted, the VA-1A may then be used to diagnose which piece of equipment has malfunctioned by checking each piece of equipment separately.



With the mode selector switch in the "Volts" position the VA-1A will display the bus voltage to .1 volts. With the engine running the alternator is capable of raising the bus voltage to a dangerously high level. It is the voltage regulator's job to limit the bus voltage between 13.5 and 14.8 volts (double these levels for a 24-volt system). Look for this level on the VA-1A. A low voltage reading will cause the battery to charge very slowly. A high reading can damage the battery and most of your electrical equipment. If the aircraft bus voltage goes to a dangerously high level (15.3 volts or higher) a bright red "High Volts" light on the VA-1A will warn you of this condition. If this happens turn the field to the alternator off to eliminate the over voltage condition.

Another common electrical problem is a discharging condition. If this condition goes unnoticed (which it normally does) you will end up with a dead battery in flight rendering all of your electrical equipment useless. To help you avoid this situation the VA-1A has a "Discharge" Warning Light which acts as an early warning to alert you as soon as the battery goes into a discharging condition. If this situation occurs, turn off any unnecessary electrical equipment. The lower you can get the discharging current, the longer the battery will last. With the VA-1A installed in the alternator lead, discharging current cannot be monitored.

The VA-1A will display trend information when your battery is in a discharging condition. As you watch the battery discharging .1 volts at a time, it becomes relatively easy to judge the remaining time you have before the battery reaches a seriously low condition. As the battery voltage approaches 11 volts (22 volts for a 24-volt system), the aircraft's electrical equipment will start to malfunction. The exact voltage at which each piece of equipment will start to malfunction depends on the design of that equipment. The VA-1A will work accurately from 40 to 7 volts--far below where most electrical equipment starts to fail.

### **General Information**

There are two types of volt/amp meters used in aircraft: Internal Shunt Units and External Shunt Units.

#### 1. Internal Shunt Units

Electronics International Inc. manufactures a VA-1A which is our only internal shunt unit. It has the shunt built into the unit, has two large lugs on the back of the unit and all of the electrical current passes through this gauge. Use this gauge if your aircraft is currently wired for an internal shunt unit or if you elect to route your main alternator or battery supply line up to the instrument panel. As with all internal shunt units, the current capability is limited. The VA-1A is capable of handling 100 amps continuous current. If your aircraft's electrical system is designed to draw more than 100 amps continuous current, you should use one of our external shunt units.

#### 2. External Shunt Units

An external shunt is a strip of metal, usually mounted on a bakelite base. This metal is made of special alloys to produce a very small, precise signal when current passes through it and is not affected by temperature changes.

If your aircraft currently has an external shunt you should order a gauge to match that shunt. Electronics International manufactures a line of external shunt units (VA-IA-XX, "XX" = shunt value in amps) that will match any shunt on the market. If your aircraft does not have an external shunt and you elect to install an external shunt, then order the VA-1A-50 and S-50 shunt (100 amp capability). For aircraft drawing more than 100 amps order the VA-1A-300 and an S-300 shunt (300 amp capability). Please note: The VA-1A and VA-1A-50 resolve to .1 amp and all other units resolve to 1 amp. With our digital display, one amp resolution will still make an excellent electrical diagnostic tool since the current requirements for almost all pieces of equipment in an aircraft are more than one amp.

### **Installation**

#### 1. Important Information and Initial Check Out

- A. <u>The installer and aircraft owner must read the Warranty before starting the installation</u>. There is information in the Warranty that may alter your decision to install this instrument. <u>If you do not accept the terms of the Warranty, do not install this instrument.</u>
- B. If you are not an FAA Certified Aircraft Mechanic familiar with the issues of installing aircraft VA instruments, <u>Do Not attempt to install this instrument</u>. The installer should use current aircraft standards and practices to install this instrument (refer to AC 43.13).
- 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. Check that the instrument make and model marked on the side of the instrument and on the invoice are correct before starting the installation.
- F. 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.
- G. If this instrument is to replace an existing unit 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.

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#### 2. Instrument Auto Set Up

The VA-1A monitors the bus voltage and automaticly sets the discharge warning level based on your aircraft's 12 or 24 volt system. If the bus voltage drops below 12.6 volts, (25.2 volts for a 24-volt system) a bright yellow "Discharge" warning light on the front of the unit will alert you of this condition.



VA-1A-XX Back Panel (External Shunt)



VA-1A Back Panel (Internal Shunt)

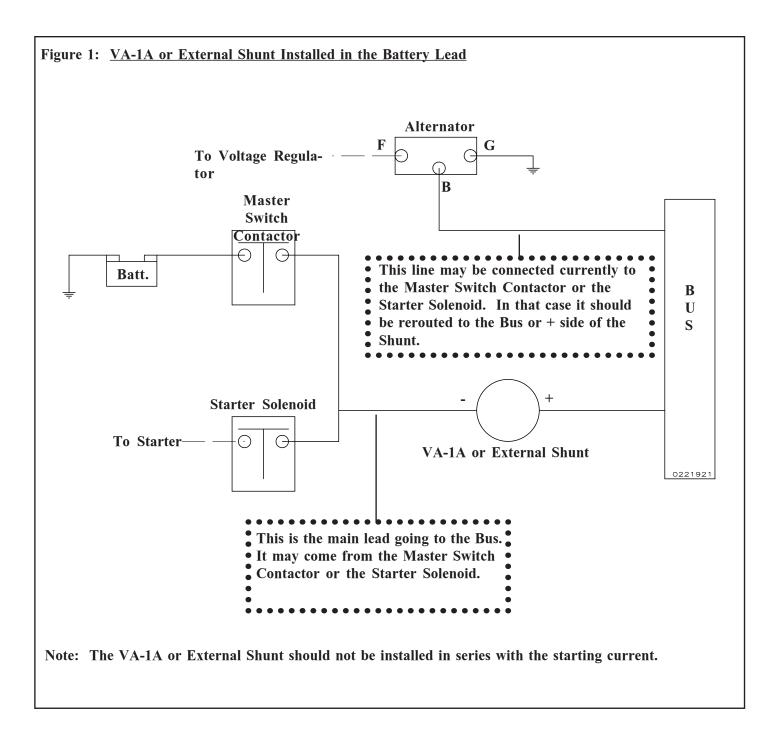
#### 3. Determine how the VA Unit will be installed in your aircraft's electrical system

Obtain an electrical diagram of your aircraft's alternator/starter system from the service manual. There are two common ways an ammeter is installed in an aircraft. One method is with the ammeter in the generator or alternator lead. The other method is with the ammeter in the battery lead. The VA-1A or VA-1A-XX may be installed using either method. The advantages and disadvantages of each method are listed below.

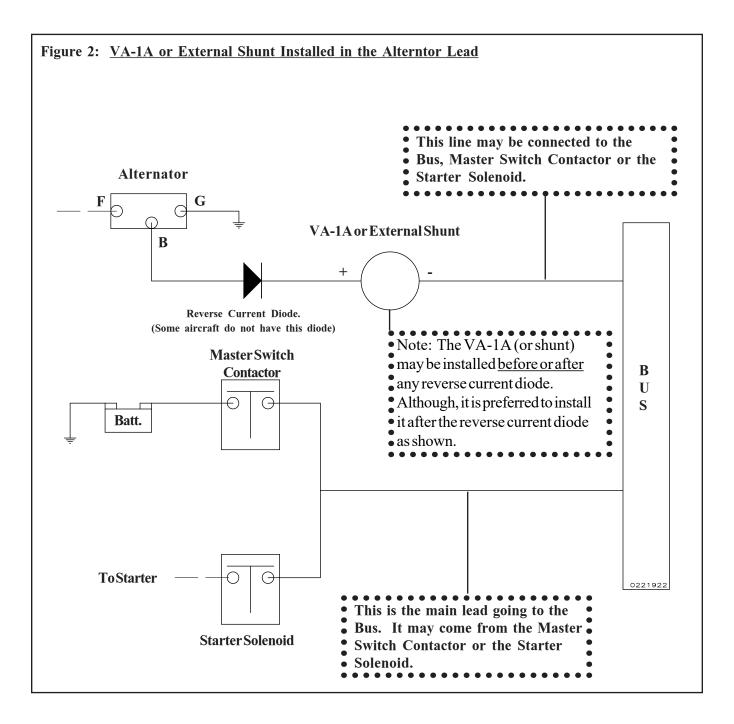
With the improvements made to the VA-1A there are few disadvantages using either method. Although EI's test pilot has a slight preference for the alternator lead when using the VA-1A, ease of installation should be the determining factor. In most cases installing the VA-1A is a simple matter of replacing your existing unit and adding a few wires (see Wiring Diagram).

Following is a typical diagram of each installation. Determine how the VA-1A or External Shunt will be installed in your aircraft.

Installation Method	Advantages	Disadvantages during
Battery Lead:	<ol> <li>Shows load current on the ground (engine off) and during an alternator failure.</li> <li>All Warning Lights are operational.</li> </ol>	1. Cannot show load current during flight or when the engine is running.
Alternator Lead:	<ol> <li>Shows load current during flight or when the engine is running.</li> <li>All Warning Lights are operational.</li> </ol>	1. Cannot show load current when the engine is off or during alternator failure.







#### 4. Install the External Shunt (External Shunt Unit Only, VA-1A-XX)

Note: If you are replacing an existing ammeter, the shunt may already be mounted in the aircraft. If this is the case, you should have ordered a VA-1A-XX unit that matches your shunt.

The external shunt should be installed in an appropriate location that minimizes the routing of main cables (refer to the wiring diagram in this manual appropriate for your installation). It should also be mounted in a location where inadvertent damage cannot occur. If the shunt can be accessed easily, it should be covered. When mounting the shunt, use self-locking or safety wired nuts.

In some rare instances a shunt may be mounted in the negative battery lead to ground. The VA-1-XX may be connected to this shunt and will work properly.

#### 5. Route the D-Sub Connector

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

#### 6. Route the Power and Ground Wires

Route the red wire in the wire harness to the aircraft's 12 or 24 volt main or emergency bus as applicable via an independent circuit breaker (one to two amps). An alternate method would be to route the red lead to the bus via a one amp in-line fuse. With this method a spare fuse should be kept in the aircraft. See the Wiring Diagram at the back of this manual.

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

#### 7. Route the Backlight Wires

For a 12 Volt system connect the White/Brown to the 12 Volt bus. Connect the White/Red wire to ground.

For a 24 Volt system connect the White/Red wire to the 24 Volt bus. Leave the White/Brown wire open.

#### 8. Route the Shunt Wires (External Shunt Unit Only, VA-1A-XX)

Route the orange wire to the "+" side of the shunt via a one amp fuse. See the appropriate wiring diagram in this manual for your installation. Connect the brown wire to the "-" side of the shunt via a one amp fuse. If you are replacing an existing unit, most of the wires and all of the fuses should already be in place. If this unit has front panel warning lights, connect the white/orange wire to the Panel Light Rheostat to dim the lights at night.

If this unit is to be used with an RSVA-3 remote switch, see the RSVA-3 Installation section of this manual.

#### 9. Connect the Large Shunt Wires (Internal Shunt Unit Only, VA-1A)

Connect the large bus, battery or alternator leads (as appropriate for your installation) to the large lugs on the back of the VA-1 unit. If any major current carrying wire is extended you must use the same size wire as the original. See the appropriate wiring diagram in this manual for your installation.

#### 10. Route the (Optional) Lines

If an External Warning Light is to be used, connect the white/yellow wire to an external light (AL-1). This wire grounds when the Discharge High Volts Warning Light is on. The current in this line must be limited to 2/10 of an amp maximum. Exceeding this limit will damage the unit. If this feature is not used, leave this line open.

If you wish to dim the front panel warning light for night operation, connect the white/orange wire to the aircraft's Panel Light Rheostat.

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

#### 11. Install the Instrument in the Panel

Install the instrument from behind the instrument panel using 6 x 32 screws. <u>These screws should not be any longer than 1/2"</u>.

#### 12. Connect the D-Sub Connector to the Instrument

- 1) Push the two mating connectors together. The wide section is on the bottom.
- 2) Screw the two connectors together.

#### 13. Ground Test

**VA-1A Installed in the Battery Lead** - With the master on and the engine off, the discharge light should be on, the Volts position will read 11.9 to 12.5 volts (23.8 to 25 volts for a 24 volt system) and the Amps position should read - 2.0 to -10.0 amps depending on your current load for the aircraft. Changing the load will change the amps reading.

With the master on and the engine on, all lights will be off, the Volts position will read 13.2 to 14.8 volts (26.4 to 29.6 for a 24 volt system) and the Amps position will read 5.0 to 15.0 amps and reducing rapidly (shows battery charging current). Changing the load will not change the amps reading. See the operating section of this manual for further details.

**VA-1A Installed in the Alternator Lead** - With the master on and the engine off, the discharging light will be on, the Volts position will read 11.9 to 12.5 volts (23.8 to 25 volts for a 24 volt system) and the Amps position should read 0.0 amps +/- 0.2 amps. Changing the load will not change the amps reading.

With the master on and the engine on, all lights will be off, the Volts position will read 13.2 to 14.8 volts (26.4 to 29.6 for a 24 volt system) and the Amps position will read 5.0 to 25.0 amps and reducing rapidly (shows battery charging current plus load current for the aircraft). Changing the load will change the amps reading. See the operating section of this manual for further details.

## **Troubleshooting**

If your VA-1A or VA-1A-XX has a problem, perform the following troubleshooting suggestions in the order listed below:

#### 1. Volts Read Incorrectly

Connect only the red and black lead (all other leads must be open). The unit must read correct voltage on the Red lead. Check for poor connections on the red and black lead. You may have a problem with the unit.

#### 2. Amps Read Incorrectly

A. Check that the red and black leads have good connections.

B. For a VA-1A (internal shunt unit), connect only one of the shunt leads on the back of the unit to the bus. (The other lead should be open). The unit must read 00.0 (+/-0.3) Amps.

C. For a VA-1A-XX (external shunt unit), connect both shunt leads (orange and brown) to the bus or one side of the shunt. The unit must read 00.0 (+/-0.3) Amps. A poor connection in the orange or brown lead will cause only the Amps reading to wander around. Check for poor connections (pull on each wire at the back of its connector). Check the fuses and fuse holders. Check that the signal shunt leads <u>do not</u> supply power to any other piece of equipment.

#### 3. Discharge Warning Light Works Incorrectly

The VA-1A automaticly sets the Discharge Warning Level based on the bus voltage during the first few seconds of operation after power-up. If it detects a 12V system, the discharge light (on the front panel) is turned on when the bus voltage (on the Red wire) drops below 12.6 volts (25.2 volts for a 24-volt system).

#### 4. High Volts Warning Light Works Incorrectly

The VA-1A automaticly sets the High Voltage Warning Level based on the bus voltage during the first few seconds of operation after power-up. If it detects a 12V system, the High Voltage Warning Light is turned on when the bus voltage (on the Red wire) exceeds 15.3 volts (30.6 volts for a 24-volt system).

#### 5. Back Light Works Incorrectly

On a 12-volt system, the 24-volt line must be grounded. See the Wiring Diagram. Check for poor connection on the backlight wires (white/brown and white/red).

#### 6. Bench Test the Instrument

To bench test the VA-1A or the VA-1A-XX connect one lead of the internal shunt (or both the orange and brown leads for the VA-1A-XX) to the red lead and connect all of them to a power supply (7 to 40 volts). Connect the black lead to ground. The unit must read 00.0 (+/-0.3) Amps and proper voltage.



International Inc.		
VA-1A		
Instrument Wiring Diagram		
Internal Shunt Unit		
• DB01202301 Rev. B		
Large Large		
Wire Wire $\bigcirc$		
$ \begin{array}{c} + & - \\ \circ \text{ VA-1A Back Panel } \circ \end{array} $		
15-Pin D-Sub Connector		
Wire Side View		
Pin 1 (Red - 20ga): Power Lead	3'	BRKR
Connects to 12- or 24-Volt Bus via 1-amp fuse.		
Do NOT connect the instrument to constant power.		
Pin 9 (Black - 20ga): To Ground	3' _	
Connects to ground.	-	GRND
6		
Pin 5 (White - 20ga): To External Warning Light	3'	
	-	
Pulls low when the discharge or high volts light is on.		
Pin 6 (White - 20ga): 12V Backlight	3'	
Backlight control line. Connects to 12-volt bus. 12 volts turn on the		
digital display backlight. Leave open for a 24-volt system.		
Pin 14 (White - 20ga): 24V Backlight	3'	
Backlight control line. Connects to 24-volt bus. 24 volts turn on the		24V BK LT 💶 🗆 🗆
digital display backlight. Connect to ground for 12-volt system.		
Din 7 (Pad 2000), Warning Light Intensity Control	3'	
Pin 7 (Red - 20ga): Warning Light Intensity Control	3	
<i>Connects to panel light rheostat.</i> 12- or 24- volts dim the display mode <i>LEDs. Insert the VI-1K in series with this line for a 24-volt system.</i>		



VA-1A-XX	
Instrument Wiring Diagram External Shunt Unit	
DB01202302 Rev. B	
VA-1A-XX Back Panel $1  \mathbb{N} \xrightarrow{A}_{2}  \mathbb{N} \xrightarrow{A}_{10}  \mathbb{N} \xrightarrow{A}_{12}  \mathbb{N} \xrightarrow{A}_{13}  \mathbb{N} \xrightarrow{A}_{14}  \mathbb{N} \xrightarrow{A}_{15}$ 15-Pin D-Sub Connector	
Wire Side View	
Pin 1 (Red - 20ga): Power Lead	3' BRKR
<i>Connects to 12- or 24-Volt Bus via 1-amp fuse.</i> <i>Do NOT connect the instrument to constant power.</i>	
Pin 9 (Black - 20ga): To Ground	3' GRND
Connects to ground.	
Pin 3 (Green - 20ga): To Positive (+) Side of Shunt	
Pin 11 (White - 20ga): To Negative (-) Side of Shunt 6' SHUNT	Inline Fuses
Pin 5 (White - 20ga): To External Warning Light	3' Shunt Top View
Pulls low when the discharge or high volts light is on.	
Pin 6 (White - 20ga): 12V Backlight	3'
Backlight control line. Connects to 12-volt bus. 12 volts turn on the digital display backlight. Leave open for a 24-volt system.	12V BK LT <b>2000</b>
Pin 14 (White - 20ga): 24V Backlight	3'
Backlight control line. Connects to 24-volt bus. 24 volts turn on the digital display backlight. Connect to ground for 12-volt system.	24V BK LT 2000
Pin 7 (Red - 20ga): Warning Light Intensity Control	3'
<i>Connects to panel light rheostat.</i> 12- or 24- volts dim the display mode <i>LEDs. Insert the VI-1K in series with this line for a 24-volt system.</i>	



## **RSVA-3** <u>Installation Instructions</u>

The RSVA-3 switch is used in conjunction with a VA-1A-XX external shunt unit in a twin engine aircraft to monitor both alternator outputs and the battery charging and discharging currents.

#### 1. Install the External Shunts

Note: If you are replacing an existing ammeter, the shunts may already be mounted in the aircraft. If this is the case, you should have ordered a VA-1A-XX unit that matches your existing shunts.

The external shunts should be installed in an appropriate location that minimizes the routing of main cables (refer to the wiring diagram at the end of this section). Also, they should be mounted in a location where inadvertent damage cannot occur. If the shunts can be accessed easily, they should be covered. When mounting the shunts, use self-locking or wired nuts.

#### 2. Install the VA-1A-XX Instrument

Install the VA-1A-XX in the aircraft as described in the VA-1A, VA-1A-XX Installation Instruction section of this manual.

#### 3. Route the Shunt Wires

Route the wires from the + and - terminals of each shunt to the RSVA-3 switch mounting location via a one amp fuses (see the RSVA-3 Wiring Diagram at the back of this section). Pair the wires for each shunt with the corresponding wires in the RSVA-3 harness. OLC connectors are provided in the RSVA-3 kit. Connect the shunt wires to the RSVA-3 harness.

#### 4. Route the Instrument Wires to the RSVA-3

Route the brown and orange wires in the VA-1A-XX instrument wire harness to the RSVA-3 switch mounting location. Crimp a female connector on the brown wire from the VA-1A-XX and a male connector on the brown wire in the RSVA-3 harness, and a male connector on the orange wire from the VA-1A-XX and a male connector on the orange wire in the RSVA-3 harness. Red slip-on connectors are provided in the RSVA-3 kit. When preparing the wires to be crimped, strip each wire and double the wires over. Doubling the wires over and a good tight crimp are critical for a good reliable connections.

Connect the VA-1A-XX instrument wires to the RSVA-3 harness wires.

#### 5. Install the RSVA-3 in the Panel

The RSVA-3 requires a 1" x 1" square mounting hole. Install the RSVA-3 switch from behind the instrument panel using the screws and nuts provided in the RSVA-3 kit. Push the two mating connectors of the RSVA-3 and its harness together and twist until they snap into position. Turn the locking ring onf the RSVA-3 connector clockwise (1 1/2 turns) until it locks into position. Tie wrap the harness <u>making sure these wires do not obstruct the freedom of travel of any controls</u>.

#### **RSVA-3** Installation Instructions

#### 6. Ground Test

**RSVA-3 in the Battery Position** - With the master on and the engine off, the discharge light on the VA-1A-XX should be on, the Volts position will read 11.9 to 12.5 volts (23.8 to 25 volts for a 24 volt system) and the Amps position should read -2.0 to -10.0 amps depending on your current load for the aircraft. Changing the load will change the amps reading.

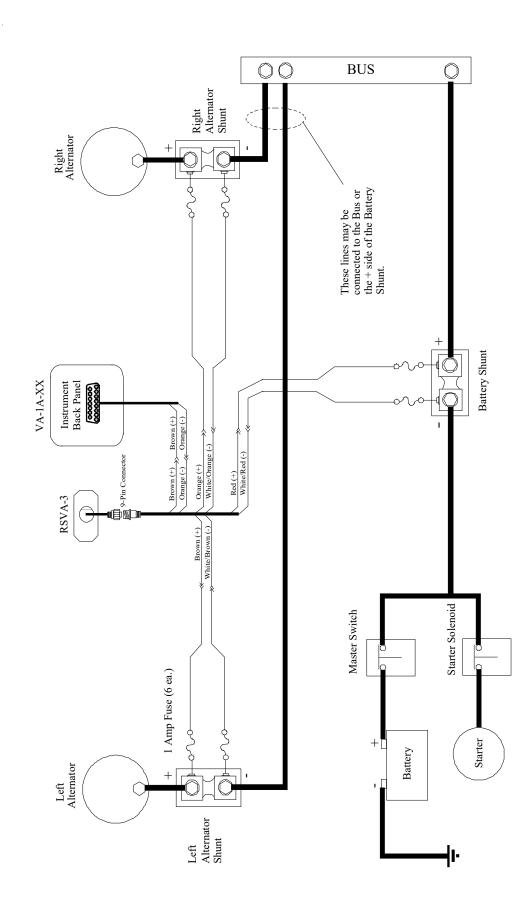
With the master on and the engine on, all lights on the VA-1A-XX will be off, the Volts position will read 13.2 to 14.8 volts (26.4 to 29.6 for a 24 volt system) and the Amps position will read 5.0 to 15.0 amps and reducing rapidly (shows batter changing current). Changing the load will not change the amps reading. See the operating section of this manual for futher details.

**RSVA-3 in the Left or Right Alternator Position** - With the master on and the engine off, the discharging light on the VA-1A-XX instrument will be on, the Volts position will read 11.9 to 12.5 volts (23.8 to 25 volts for a 24 volt system) and the Amps position should read 0.0 amps +/- 0.3 amps. Changing the load will not change the amps reading.

With the master on and the engine on, all lights on the VA-1A-XX will be off, the Volts position will read 13.2 to 14.8 volts (26.4 to 29.6 for a 24 volt system) and the Amps position will read 5.0 to 25.0 amps and reducing rapidly (shows battery charging current plus load current for the aircraft). Changing the load will change the amps reading. See the operating section of this manual for further details.



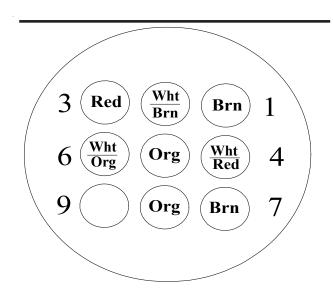


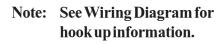


## **RSVA-3**

## **Circular Connector**

#### Wire Harness Connector, Back View (wire side)





## **Specifications and Operating Features**

Electronics

Model: VA-1A and VA-1A-XX

**Weight:** VA-1A; 9 oz., VA-1A-XX; 7.5 oz., S-50 (100 amp Shunt); 3 oz., S-300 (300 amp Shunt); 12 oz., RSVA-3 (External Select Switch); 3.5 oz.

**Power Requirements:** 7 to 40 volts, 2/10 AMP.

**Display:** 0.35" high resolution LCD display (viewable in direct sunlight). 12 and 24-volt backlight wires are provided for night operation.

**Resolution:** VA-1A and VA-1A-XX (60 amps and below) resolve amperage to 0.1 amps. VA-1A-XX (above 60 amps) resolves amperage to 1 amps. All units resolve voltage to 0.1 volts.

Accuracy: 1% of reading plus or minus one count (Amps and Volts).

**Discharge Warning Light:** For a 12-volt system, the light will be on for bus voltages below 12.8 volts (+/- 0.2 volts). For a 24-volt system, the light will be on for bus voltages below 25.6 volts (+/- 0.4 volts). The signal is sensed off the red lead.

**High Volts Light:** For a 12-volt system, the light will be on for bus voltages above 15.4 volts (+/- 0.3 volts). For a 24-volt system, the light will be on for bus voltages above 30.8 volts (+/- 0.6 volts). The signal is sensed off the red lead.

**12/24 Volt Auto Select:** The VA-1A automatically configures itself for a 12 or 24-volt electrical system based on the bus voltage connected to the unit.

VA-1A Configuration: Contains an internal shunt for measuring currents to 100 amps and voltages to 40 volts.

25

**VA-1A-XX Configuration:** This unit must be matched to the aircraft's external shunt (i.e., 100 amp, 50 mV external shunt must use a VA-1A-100).



Hand States of America Elepartment of Transportation-Hederal Aviation Administration

Supplemental Type Certificate

Number SA2693NM

This certificate, issued to

Electronics International, Inc. 63296 Powell Butte Highway Bend, OR 97701

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

Original Product—Type Certificate Number:	* See attached Master Eligibility List (MEL)
Make:	* No. SA2693NM for list of approved airplane
Model:	* models and applicable regulations

Description of the Type Design Change: Installation of Electronics International Digital Volt/Amp Gauges and Accessories in accordance with Electronics International, Inc. Installation Instructions No. II 040934.

* <u>Model</u>	Туре	Adaptability
VA-1A	Volt/Amp Gauge	Internal Shunt
VA-1A-50 through VA-1A-500	Volt/Amp/Gauge	Connected to Aircraft External Shunt
RSVA-3	Switch (Remote)	For Twin Engine Only Adapted to Aircraft External Shunt
S-50 through	External Shunt 50-500 Amp	Used with Units Requiring External Shunts
S-500		
* NOTE: The a	above models are approved as rep	placements

*Limitations and Conditions:* Approval of this change in type design applies to the above referenced aircraft models only. This approval should not be extended to other aircraft of this model 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, MEL SA2693NM, and Electronics International, Inc. Instructions No. II 040934 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:	July 8, 1983
Date of issuance:	February 16, 1985



December 29, 2004 Date reissued: Date amended: 1/26/1988: 2/21/2002: 1/24/05

By discourse of the Administrator

Acting Manager, Seattle Aircraft Certification Office (Title)

Any atteration 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) SA2693NM For	I List (AML) ! For	5A2693NM					
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Electronics

#### VA-1A, VA-1A-XX, RSVA-3 Operating & Installation Instructions OI 041032 and II 040934 Rev. C\*\*\*\*\* D-Sub

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5A5         CAR3         " <th></th> <th></th> <td>1</td> <td>A34CE</td> <td>FAR 23</td> <td>=</td> <td>-</td> <td>E</td> <td>-</td> <td>J.R.</td>			1	A34CE	FAR 23	=	-	E	-	J.R.
3A14     CAR3     "     "     "     "       3A10     CAR3     "     "     "     "       3A10     CAR3     "     "     "     "       3A25     CAR3     "     "     "     "       A2CE     CAR3     "     "     "     "			305 Series	5A5	CAR3	-	-	r	=	J.R.
3A10     CAR3     °     °     ″       3A25     CAR3     °     °     ″       A2CE     CAR3     °     °     ″				3A14	CAR 3		÷	z	E	J.R.
3A25 CAR3 " " " " " " A2CE CAR3 " "				3A10	CAR3	÷	•		I	I.R.
A2CE CAR3 " " " " "			320 Series, 335 Series, 340 Series	3A25	CAR3	÷	÷	I	z	LR.
			336 Series	A2CE	CAR 3	-	÷	T	E	1.R.

Interval         Electronic line         VALA Primery VoltAmp         Intervalues         Intervalues         Intervalues           11         Anterval         Anterval         Corrence.         Corrence.         Corrence.         Corrence.         Anterval         Interval         In			FAA Approved Model List (AML) SA2693NM	List (AML) S	MNE692A					
AltrCATT MART         AntCATT Model         Durstool         Evaluation         Evaluation           AntCATT MART         AntCATT MART         AntCATT Model         Evaluation         Evaluation         Evaluation           AntCATT MART         AntCATT The AntCATT Mark         Control         Control         Evaluation         Evaluation         Evaluation           AntCATT MART         AntCATT Mark         AntCATT Mark         AntTANTANG         Evaluation         Evaluation         Evaluation           213 States         213 States         213 States         AntCATT CATT CATT         CATT         Evaluation         Evaluation         Evaluation           213 States         213 States         AntCATT CATT         CATT         CATT         Evaluation         Evaluation         Evaluation           213 States         213 States         AntCATT         CATT         CATT         Evaluation         Evaluation         Evaluation           214 States         214 States         AntCATT         CATT         CATT         Evaluation         Evaluation           2 States         214 States         214 States         AntCATT         CATT         Evaluation         Evaluation           2 States         214 States         214 States         AntCATT         CATT			VA-IA	mary Volt/Am	p Instruments a	nd Accessorie	S			
Number         Revision         Number         Revision         Revision         Revision           Intervalue         137 Stete         137 Stete         139 Stete         100 State         Revision         Revision           Intervalue         137 Stete         137 Stete         100 State         100 State         Revision         100 State         10	ITEM			ORIGIVAL TYPE CERTIFICATE	CERTIFICATION BASIS FOT		ED DRAWINGS		LLATION	AML Amended
				NUMBER	ALTERATION	Number	Revision .	Number	Revision	DATE
							B 01/05/07 or		C 02/24/92	
Model         Series         Ance         CAR3         Revision         Revision         Revision           13 Series. 401 Series. 411 Series. 414 Series. 414 Series. 412 Series         AXCE         CAR3         -						TD 031851	Approved	II 040934	or later FAA Approved	
And         CAR3         Consist         CAR3         Consist         Consis         Consist         Consist </th <th></th> <th></th> <th></th> <th>-</th> <th></th> <th></th> <th>Revision</th> <th></th> <th>Revision</th> <th></th>				-			Revision		Revision	
Answer         Constituent         Constituent <t< th=""><th></th><th></th><th>337 Series</th><th>A6CE</th><th>CAR 3</th><th>÷</th><th>Ŧ</th><th>÷</th><th>-</th><th>J.R.</th></t<>			337 Series	A6CE	CAR 3	÷	Ŧ	÷	-	J.R.
Action         CAR3         Constitue         FAR.23         Constitue			402 Series, 411 Seri	A7CE	CAR3	=		•	z J	I.R.
Christer Industrie         Net acres         Adv. b         FAM.23         Y         Y         Y         Y           Christer Industrie         S123, S323         Scrist         Adv. b         FAM.23         Y         Y         Y         Y           Christer Industrie         S123, S323         Composition         S123, S323         Y<			4.25 Scrics	A7CE	CAK3	•				84 ·
Chrase Langener         Anomodyl (Name         FAR 23 (Array Designed Corporation)         Cork 31 (Array Designed Corporation)         Cork 31 (Array Designed Corporation)         Cork 31 (Array Designed Corporation)         Cork 4B (Array Designed Corporation)         Cork 4A (Array	2	All advertised	404 Senes 6 1 6 minus 6 2 6 minus	A230.E	FAIC 23	: +		. <u>-</u>	: =	
Consolidated A reformations         Constant         Co	1	Cirris Decian Corneration	SRAD SRAD	ADDODOCH	FAD 72	-	=	=	2	10/30/000
Entrem Helleopter         F Series, 280 Sories         H.CT.         C.RR 6         **         **         **           Extre Frigzwagpronbloines         Ex.300, E.A.300, E.A.3002, E.A.2002, E.A.2002, E.A.2002, E.A.2002, E.A.2012, E.A.2012, E.A.2012, E.A.2012, E.A.2012, E.A.2012, E.A.2013, E.A.2012, E.A.2012, E.A.2012, E.A.2013, E.A.2012, E.A.2013, E.A.2012, E.A.2012, E.A.2013, E.A.2012, E.A.2013, E.A.2012, E.A.	1	Consolidated Aeronautics	Colonial C-1. Colonial C-2. Lake LA Series 1 ake 250	1/13	CAR 3	-	=	=	=	T R
Extra Plugeageredioktions         EA 300, EA 3002, EA 300200         A6FBU         FAR23         **	2	Enstrom Helicopter	F Serics. 280 Series	HICE	CAR 6	÷	E	-	e	TR
Guldstream         Gencies         IMI7         CAR 46         P         P         P           Gencies         Antecies         Antecies         Antecies         Antecies         Antecies         P         P         P           Gencies         Antecies         Anteci	16	Extra Flugzeugproduktions	EA-300, EA-300S, EA-300/1, EA-300/200	A67EU	FAR 23	=	÷	-	=	12/10/2009
Guidstream Arosopace         GSeries         A12EA         CAR 481         **         **         **           A Series         A156         FAR 23         **         *	5	Gulfstream American		1A17	CAR 4B	÷	-	-	=	LR
Acceles         1A16         CR 8.10(a)(1)         **         **         **           A Series         A11EA         FAR.23         **         **         **           A Series         A Series         A11EA         FAR.23         **         **         **           Gulfstream Aerospace         11.1 Series         A1150         FAR.23         **         **         **           Gulfstream Aerospace         11.2 Series         A1150         FAR.23         **         **         **         **           Gulfstream Aerospace         11.2 Series         A1150         FAR.23         **         **         **         **           Helio Arreaft         11.2 Series         A1150         FAR.23         **         **         **         **           Hiller Aviation         UH-12 Series         A1150         CAR.6         **			:	A12EA	CAR 4B	=	÷	÷		1.R.
Anseries		,	G-164 Series	1A16	CAR 8.10(a)(1)	÷.	-	÷	=	I.R.
A Series         A for         FAR.23			AA Series	AIIEA	FAR 23	-	÷	ŧ	=	1.R.
Its         CAN Series         A1750         FAR 23         r         v         v         v           Guldstream Aerospace         111 Series         A1150         FAR 23         r         v			AA Series	A16EA	FAR 23	= .	÷		4	I.R.
Gutiktream Arrospace         111 Series         A1150         FAX 23         "		:	GA Series	A1750	FAR 23	÷	÷	÷	4	I.R.
Holio Aircreat Limited         112 Series 112 Series         A1250         F7R.23         F8R.23         F	18	Gulfstream Aerospace	111 Series	A11\$0	FAR 23			÷	-	ER,
Holio Aircraft Limited         H-20, H-295, H-391, H-395, H-391, H-356 fies         IVI-12 Series         H1112 Series         H112 Series         H112 Series         H112 Series         H112 Series         H112 Series         H122 Series <th></th> <th></th> <th></th> <th>A12S0</th> <th>FAR 23</th> <th>÷</th> <th>÷</th> <th>÷</th> <th></th> <th>12/20/1988</th>				A12S0	FAR 23	÷	÷	÷		12/20/1988
Hiller Aviation         UH-12 Series         6H1         CAR6         "         "         "           UH-12 Series         UH-12 Series         6H2         CAR6         "         "         "         "           UH-12 Series         UH-12 Series         4H10         CAR6         "         "         "         "           UH-12 Series         UH-12 Series         4H10         CAR6         "         "         "         "           UH-12 Series         UH-12 Series         H1WF         CAR6         "	<u>≏</u>	Helio Aircraft Limited	. H-391B,	IA8	CAR 3	=	÷	-	4	11/13/1986
UH-12 Series         6H2         CAR 6         n         n         n         n           UH-12 Series         UH-12 Series         HHI         CAR 6         n         n         n         n           UH-12 Series         UH-12 Series         HHI         CAR 6         n         n         n         n           UH-12 Series         UH-12 Series         HHI         CAR 6         n         n         n         n           UH-12 Series         DGA-9, DGA-12         UC-700, UC-70A         645         BUL 7A         n         n         n         n           DGA-11         DGA-9, DGA-12, UC-700, UC-70, GH-1, GH-2         645         BUL 7A         n <th>50</th> <th>Hiller Aviation</th> <th>UH-12 Series</th> <th>(H)</th> <th>CAR 6</th> <th>-</th> <th></th> <th>-</th> <th></th> <th>I.R.</th>	50	Hiller Aviation	UH-12 Series	(H)	CAR 6	-		-		I.R.
UH-12 Series         UH-12 Series         HIII         CAR 6         n         n         n           UH-12 Series         UH-12 Series         HIII         CAR 6         n         n         n           UH-12 Series         UH-12 Series         HIII         CAR 6         n         n         n           UH-12 Series         UH-12 Series         HIIVE         CAR 6         n         n         n           UH-12 Series         DGA-9, UC-700, UC-70A         612         BUL 7A         n         n         n           DGA-9, DGA-12, UC-70D, UC-70, GH-1, GH-2         672         BUL 7A         n         n         n           DGA-11         DGA-15, UC-700, UC-70, GH-1, GH-2         A-717         CAR 4A         n         n         n           DGA-15, UG-18, DGA-15W, UC-70, GH-1, GH-2         A-717         CAR 4A         n         n         n           DGA-18, DGA-18K         T39         CAR 4A         n         n         n         n           DGA-18, UC-70B         A-717         CAR 4A         n         n         n         n           DGA-18, UG-18K         T39         CAR 4A         n         n         n         n           DGA-18, UG-18K <t< th=""><th></th><th></th><th>UII-12 Series</th><th>6H2</th><th>CAR 6</th><th>Ŧ</th><th>÷</th><th>Ŧ</th><th>-</th><th> I.R.</th></t<>			UII-12 Series	6H2	CAR 6	Ŧ	÷	Ŧ	-	I.R.
UH-12 Series         4H11         CAR 6         n         n         n           Howard Aireraft         DGA-8, UC-700,			UH-12 Scrics	4H10	CAR 6	E	÷	<b>z</b> :	-	I.R.
Unt-L2 Series         Unt-L2 Series         H1WH         CAR6         n </th <th></th> <th></th> <th>UH-12 Series</th> <th>4H11</th> <th>CAR 6</th> <th>z</th> <th>÷</th> <th>T I</th> <th>= :</th> <th>LR.</th>			UH-12 Series	4H11	CAR 6	z	÷	T I	= :	LR.
Howard Aircraft         DGA-8, UC-70C         612         BUL 7A         *         *         *           DGA-9, DGA-12, UC-70D, UC-70A         645         BUL 7A         * </th <th></th> <th></th> <th>UH-12 Series</th> <th>HIWE</th> <th>CAR 6</th> <th>-</th> <th>-</th> <th>z</th> <th>-</th> <th>LR.</th>			UH-12 Series	HIWE	CAR 6	-	-	z	-	LR.
DioAry, Down,	71	Howard Aircraft		612	BUL 7A		<b>.</b>	- I	-	12/10/2009
Hugbes         Helicopter         DGA-151, DGA-15N, UC-70, GH-1, GH-2         A-717         CAR 4A         "			<u>DOV-17, UC-700, UC</u>	040	BUL /A		- <b>-</b>	: 2	- - -	10/10/2001
Hughes Helicopter         Gilt.3, NIH.1, UC-70B         A-717         CAR 4A         " <th"< <="" th=""><th></th><th></th><td>DGA-15P DGA-151 DGA-15W LIC-70 GH-1 GH-2</td><td>A-717</td><td>CARTA</td><td>=</td><td>E</td><td>E</td><td>E</td><td>6000/01/01</td></th"<>			DGA-15P DGA-151 DGA-15W LIC-70 GH-1 GH-2	A-717	CARTA	=	E	E	E	6000/01/01
DGA-18, DGA-18K         739         CAR 4A         "			GII-3, NI-1, UC-70B	A-717	CAR 4A	=	z.	. z		12/10/2009
Hughes Helicopter         269 Series, 300 Series			DGA-18, DGA-18K	739	CAR 4A	•		E	E	12/10/2009
Hynes         H-2 Series, H-4 Series         2H2         CAR 6         " <th"< th="">         "         "         <t< th=""><th>22</th><th>Hughes Helicopter</th><td>269 Series, 300 Series</td><td>4H12</td><td>CAR 6</td><td>=</td><td>Ţ</td><td>z</td><td>x</td><td>I.R.</td></t<></th"<>	22	Hughes Helicopter	269 Series, 300 Series	4H12	CAR 6	=	Ţ	z	x	I.R.
Luscombe         8, 8A, 8B, 8C, 8U, 8F, F-8F         A-694         CAR 4A         " <th"< th="">         "         <th"< th="">         "</th"<></th"<>	23	Hynes	H-2 Series, H-4 Series	2H2	CAR 6	z	r	E	E	I.R.
Maule Aircraft CorpM Series3A23CAR3"" <th< th=""><th>5</th><th>Luscombe</th><td>8, 8A, 8B, 8C, 8D, 8F, 8F, T-8F</td><td>A-694</td><td>CAR 4A</td><td>Ŧ</td><td></td><td>z</td><td>r</td><td>12/10/2009</td></th<>	5	Luscombe	8, 8A, 8B, 8C, 8D, 8F, 8F, T-8F	A-694	CAR 4A	Ŧ		z	r	12/10/2009
Mooney Aircraft     M20 Series     2A3     CAR 3     "     "     "       North American Navion     AT-6 Series     A-2-575     CAR 4A     "     "     "     "       Partenavia Costruzioni     P68 Series     A31EU     FAR 23     "     "     "     "	52	Maule Aircraft Corp	M Series	3A23	CAR3	E	Ŧ	E	E	I,R,
North American Navion     AT-6 Series     A-2-575     CAR 4A     "     "     "       Partenavia Costruzioni     P68 Series     A31EU     FAR 23     "     "     "     "	36	Mooney Aircraft	M20 Series	2A3	CAR 3	T	r	E	E	LR.
Partenavia Costruzioni P68 Series A31EU FAR 23 " " " "	52	North American Navion	AT-6 Series	A-2-575	CAR 4A	=	Ŧ	z	x	1.R.
	78	Partenavia Costruzioni	P68 Series	A31EU	FAR 23	÷	Ŧ	E	E	I.R.

Retrent form         Electronic function         Constrained         Constrained </th <th></th> <th></th> <th>FAA Approved Model List (AML) SA2693NM</th> <th>List (AML) S</th> <th>5A2693NM</th> <th></th> <th></th> <th></th> <th></th> <th></th>			FAA Approved Model List (AML) SA2693NM	List (AML) S	5A2693NM					
Allocate: Match         Antention			1 T T T	Port	Lot-months and	aluanana k bu				
Ancutr Must         Ancutr Must         Currterus         Currterus         Descusion         Neurons         Enstantons           Final Trends         Enstanton         Parterus         Enstantons         Enstantons         Enstantons         Enstantons           Final Trends         Enstantons         Enstantons         Enstantons         Enstantons         Enstantons         Enstantons           Final Trends         Enstantons         Enstant			VT-VA	IDIALY VOLVAID	b rostrumeous at	II Accessorie				
Number         Number<	Frem	AIRCRAFT MAKE		Original Type Certificate	CERTIFICATION BASIS FOT	FAA APPROV	ed Drawings	Instal Instre	LLATION	AML
Image: second				NUMBER	ALTERATION	Number	Revision	Number	Revision	DATE
Pittus Britten-Norman         BN Series         ATTEU         FAN33         Constant         Revision           Pipter Altrent Corp         PA.13 Series         A7780         CAR3         - <td< th=""><th></th><th></th><th></th><th></th><th></th><th>TD 031851</th><th>B 01/05/07 or later FAA Approved</th><th>II 040934</th><th>C 02/24/92 or later FAA Approved</th><th></th></td<>						TD 031851	B 01/05/07 or later FAA Approved	II 040934	C 02/24/92 or later FAA Approved	
Piper Altrends Corp         Envisor         A-100         CAM.3         Envisor	-"					,	Revision		Revision	:
Pyter Arrent Cop         Prival Series         A-780         CAR3         F <thf< th="">         F         F</thf<>	-	ralatus Britteo-Norman	BN SERES	AI/EU	FAK 23		, ,	-	-	I.R.
PA-14 Series         A-97         C.M.3         P		Piper Aircraft Corp	PA-12 Series	A-780	CAR 3		=	÷	÷	1R
Pri to Series         1.41         C.M.3         **			PA-14 Series	A-797 A-800	CAR3 CAR3	<b>c</b> 1		÷ ÷	······································	IR.
PA-15 Series         A-405         C-A03         N			PA-16 Series	IVI	CAR 3	Ŧ	Ŧ	÷	÷	1 e -
PA:18 Series         IA2         CAR3 $N$ $r$			PA-17 Series	A-805	CAR3		÷	÷		IR
Physics         MA:7         CAR 31 (0)         P         P         P           PA:20 Series         1.MA         CAR 3         P         P         P         P           PA:22 Series         1.M10         CAR 3         P         P         P         P         P           PA:25 Series         1.A13         CAR 3         P			PA-18 Series	IA2	CAR 3	I	-		. <del>4</del>	J.R.
PA-20 Series         IAA         CAR3         r			PA-18 Series	AK-7	CAR 8.10(b)	E	=	-	-	I.K.
YA-25 Series         1 M.0         C.M.3         r			PA-20 Series	144	CAR 3	T	÷	÷		I.R.
PA-25 Series         IA19         CAR3         n			PA-22 Series	1/16	CAR 3	=		-		I.R.
PA-24 Strites         M.15         C.AR.3         r         r         r         r           PA-25 Stetes         2.43         C.AR.3         r         r         r         r           PA-35 Stetes         2.43         C.AR.3         r         r         r         r         r           PA-36 Stetes         2.43         C.AR.3         r         r         r         r         r           PA-36 Stetes         A380         F.AR.23         r         r         r         r         r           PA-36 Stetes         A1800         F.AR.23         r         r         r         r         r           PA-36 Stetes         A1800         F.AR.23         r         r         r         r         r           PA-36 Stetes         A1800         F.AR.23         r         r         r         r         r         r           P			PA-23 Series	1A10	CAR3	£	:	÷	÷	I.R.
			PA-24 Scrits	- 1A15	CAR 3	Ŧ	2	=		I.R.
			PA-25 Series	2A8	CAR 3	÷	÷	. =		I.R.
$ \begin{array}{l l l l l l l l l l l l l l l l l l l $				2A10	CAR 8.10(b)	Ŧ	÷	÷	÷	J,R,
				2A13	CAR 3	C	د د	=		I.R.
PA-31 Series         A8EA         CAR 3         n         n         n           PA-31 Series         A350         CAR 3         n         n         n         n           PA-35 Series         A350         FAR 23         n         n         n         n         n           PA-36 Series         A350         FAR 23         n         n         n         n         n         n           PA-36 Series         A350         FAR 23         n			PA-30 Series	AIEA	CAR 3	¥	:	÷	÷	I.R.
			PA-31 Series	A8EA	CAR 3	E		=		1.R.
			PA-32 Series	A3S0	CAR 3	I	-	Ŧ	Ŧ	LR.
			PA-34 Series	A7S0	FAR 23	Ŧ	=		н	12/20/1988
			PA-36 Scries	A9S0	FAR 23	2	Ŧ	E	τ	LR.
			PA-36 Series	A10SO	FAR 21	-	H	x		I.R.
			PA-38 Series	A18SO	FAR 23			E		I.R.
Prap-Jet Inc.       PA-44 Sencs       A1500       FAR 23       **			PA-39 Series, PA-40 Series	AIEA	CAR3			2	E	J.R.
Prop-let Inc.         PA-60-6001, PA-60-601, PA-60-601, PA-60-601, PA-60-601, PA-60-601, PA-60-700P         A17WE         FAX 23         P			PA-44 Series	A19SO	FAR 23	•	с : :	E :	-	I.R.
Prnp-Jet Inc.         Pract-ob/2F, PA-60-700P         A17WE         FAK 23         P         P         P           Reints Aviation         150 Series         200 Series         3A18         CAR3         P         P         P         P           Reints Aviation         150 Series         36 Series         3A18         CAR3         P         P         P         P           (cessruu)         172 Series         A318         CAR10         P			PA-60-600, PA-60-601, PA-60-601P	AI7WE	FAR 23	•	z I	z	-	12/20/1988
Prep-Jet Inc.         200 Series         3A18         CAK3         *			PA-60-602P, PA-60-700P	AL/WE	FAK 25		<u> </u>	. ,		12/20/1988
Kenns Aviation         120 Series         A13EU         FAK 21.29         N	Т	rrp-Jet Inc.	ZOU DETIES	3A18	CAK 3		:		: ; ;	ĽK.
( <i>Lessnul</i> )       172 Series       A4EU       CAR 10       *       *       *         177 Series       177 Series       A26EU       FAR 23       *       *       *       *         182 Series       337 Series       A23HU       FAR 23       *       *       *       *       *         337 Series       337 Series       A23HU       FAR 23       *       *       *       *       *         Robinson Helicopter       R22 Series       A23HU       FAR 23       *       *       *       *       *         Stinson Division       R22 Series       A23HU       FAR 23       *		Keinis Avlation	150 Series	VIJEI	FAK 21.29		· · ·	. ,		I.R.
177 Series       177 Series       426U       FAR 23       *	-	Cessna)	1/2 Senes	A4EU	CAR 10	•	 E		-	LR.
IR2 Series         A42EU         CAR3         " <th"< th="">         "         "</th"<>			177 Series	A26EU	FAR 23	4	:	•		IR
337 Series     337 Series     A23H.J     FAR 23     "     "     "       337 Series     337 Series     A23EU     FAR 23     "     "     "       Robinson Helicopter     R22 Series     H10WE     FAR 27     "     "     "       Stinson Division     SM Series     ATC16     "     "     "     "       Stinson Division     SM Series     ATC16     "     "     "     "			182 Series	A42EU	CAR 3	-		r		L.R.
337 Series     337 Series     A23EU     FAR 23     "     "     "     "       Robinson Helicopter     R22 Series     H10WE     FAR 27     "     "     "     "       Stinson Division     SM Series     ATC16     ATC16     "     "     "     "       Stinson Division     SM Series     ATC136     "     "     "     "			337 Series	A23HIJ	FAR 23	Þ	c	E	=	I.R.
Robinson Helicopter     R22 Series     H10WE     FAR 27     "     "     "     "       Stinson Division     SM Series     ATC16     h"     "     "     "     "       Stinson Division     SM Series     ATC136     ATC136     "     "     "     "			337 Series	A23EU	FAR 23	-	I	I	L	I.R.
Stinson Division     SM Series     ATC16     h     h       SM Series     ATC136     ATC136     *     *	- 1	Robinson Helicopter	R22 Series	HI0WE	FAR 27	-	z	×	E	I.R.
ATC136 ATC136 " " "		Stinson Division	SM Series	ATC16	ATC16	E	I	E :	=	I.R.
			SM Series	ATC136	ATC136	=	I	I	=	i.R.

VA-1A, VA-1A-XX, RSVA-3 Operating & Installation Instructions OI 041032 and II 040934 Rev. C\*\*\*\*\* D-Sub

International line         Vietname         Electronational line         Vietname         International Accessional           100         Anscoart Macs         Anscoart Macs         Name			FAA Approved Model List (AML) SA2693NM	I List (AML) S	MNE692NM					
Altractive Marcaver More, Altractive More, Interaction         Oetoon, Connector Marcaver More, Connector Marcaver More, Marcaver Marcaver Marcaver More, Marcaver Marcaver Mar			VA-1A	imary Volt/Am	p Instruments a	nd Accessorie	S			
Number         Exeletion         Number         Revision         Number <t< th=""><th>ITEM</th><th></th><th></th><th>Original Type Certificate</th><th>CERTIFICATION BASIS FOR</th><th>FAA APPROV</th><th>ED DRAWINGS</th><th></th><th>LLATION</th><th>AML Amended</th></t<>	ITEM			Original Type Certificate	CERTIFICATION BASIS FOR	FAA APPROV	ED DRAWINGS		LLATION	AML Amended
				NUMBER	ALTERATION	Number	Revision	Number	Revision	DATE
memory internation         memory internation         TD 03181         Matrix internation         Matrix internatio							B 01/05/07 or		C 02/24/92	
Mathematical         Mathematical<						TD 031851	later FAA Annroved	II 040934	or later FAA	
No Kateles         Marceles							Revision		Revision	
Ni Stenis         ATC145         ATC145         C         C         C         C           Ni Stenis         Ni Stenis         ATC194         T			SM Series	ATC48	ATC48	=	-	-	L	
MS Series         ATC161         ATC1			SM Series	AICH45	ATC145	=	=	<b>=</b>	2	·
Number         States         ATC94         ATC910         ATC9112         ATC010         ATC010         ATC01				ATC161	ATC161	-	= .	F	E	LR
Rischeis         ATC398         ATC308         ATC30			SM Series	ATC194	ATC194	= .	=	Ŧ	x	a,
Nervises         ATCS19         ATCS10         ATCS1125         Y </th <th></th> <td></td> <td>SM Scres</td> <td>A1C298</td> <td>ATC298</td> <td>-</td> <td></td> <td>•</td> <td></td> <td>¢;<b></b></td>			SM Scres	A1C298	ATC298	-		•		¢; <b></b>
Reserve         ATC530         F <t< th=""><th></th><td></td><td></td><td></td><td>ATC519</td><td>=</td><td>=</td><td>-</td><td></td><td>Ϋ́.</td></t<>					ATC519	=	=	-		Ϋ́.
Sikeres         ATC-580         ATC-580 <t< th=""><th></th><td></td><td>SK Series</td><td>ATC530</td><td>ATC530</td><td><b>-</b> .</td><td></td><td>Ŧ</td><td>E</td><td>I.R.</td></t<>			SK Series	ATC530	ATC530	<b>-</b> .		Ŧ	E	I.R.
Site constant         ATCG34				ATC580	ATC580	-	۲ . !	= :	E	R.
Silorsky Afrenaft         Riseries         ATC606         N         N         N           Silorsky Afrenaft         H9 Series         HR18O         ATC605         N         N         N           Silorsky Afrenaft         H9 Series         HR18O         ATC605         N         N         N           Silorsky Afrenaft         H9 Series         ATC605         FAX 21.25         N         N         N         N           Silorsky Afrenaft         H9 Series         ATC605         FAX 21.25         N			SR Series	ATC594	ATC594	=	¥	=	x	I.R.
Silorisky Aircraft         BR Sortigs         ATC609         ATC60			SR Scrics	ATC608	ATC608	-	E :	=	E	LR.
Siluensky Aircraft         HIJ Series         HIJ Series         HIJ Series         HIJ Series         HIJ Series         No.         No. <th< th=""><th></th><td></td><td>SR Series</td><td>ATC609</td><td>ATC609</td><td>=</td><td>E</td><td>=</td><td>н</td><td>1.K.</td></th<>			SR Series	ATC609	ATC609	=	E	=	н	1.K.
S-39 Series     ATC-375     FAR.11.25     *     *     *       S-41     B     S-41     B     *     *     *       S-41     S-41     S-41     S-41     *     *     *       S-41     S-41     S-41     S-41     *     *     *     *       S-41     S-41     S-41     T-2     2.266     *     *     *     *       S-41     S-41     T-2     T-2     CAR.64     *     *     *     *       S-41     Series     1141     CAR.6     *     *     *     *       S-53     Series     1111     CAR.7     *     *     *     *       S-45     Series     1111     CAR.7     *     *     *     *       S-56     Series     11113     CAR.7     *     *     *     *       S-61     Series     11113     CAR.8     *     *     * <th>35</th> <td>Sikorsky Aircraft</td> <td>H19 Series</td> <td>HR1SO</td> <td>FAR 21.25</td> <td>-</td> <td>E</td> <td>=</td> <td>E</td> <td>8/26/1986</td>	35	Sikorsky Aircraft	H19 Series	HR1SO	FAR 21.25	-	E	=	E	8/26/1986
S-11-B       2-366       F.M.2.125       **       **       **         S-11 Strins       Y-3-393       Atm Ril-7A       **       **       **         Y-3-4 A       Y-3-392       Atm Ril-7A       **       **       **         Y-3-4 A       Y-3-32       CAR 6       **       **       **       **         S-11 Strins       S-51 Strins       H11       CAR 6       **       **       **       **         S-51 Strins       S-51 Strins       H114       CAR 6       **       **       **       **         S-53 Strins       H114       CAR 7       **       *       **       **       **       **       **			ries	ATC-375	FAR 21.25	=	н	÷	τ	8/26/1986
Series         A-593         Acm Bul-TA         P         P         P           VG444A         S-13 Series         CAR 4A         P         P         P           S-15 Series         S-15 Series         H14         CAR 6         P         P         P           S-2 Series         S-13 Series         H14         CAR 6         P         P         P           S-55 Series         S-13 Series         H111         CAR 6         P         P         P         P           S-65 Series         H113         CAR 6         P				2-286	FAR 21.25	=	=	Ŧ	z	8/26/1986
VS-44-A         VS-44-A         T52         CAR (A)         "         "         "           S-35 Series         H-3         CAR (6)         "         "         "         "         "           S-35 Series         S-35 Series         H111         CAR (6)         "         "         "         "         "           S-35 Series         S-11111         CAR (6)         "			S-43 Series	A-593	Acro Bul-7A	=	H	-	E	8/26/1986
B-51 Series       H-2       CAR 6       *       *       *         S-52 Series       1111       CAR 6       *       *       *       *         S-55 Series       1111       CAR 6       *       *       *       *       *         S-55 Series       1111       CAR 7       * <th></th> <td></td> <td>VS-44-A</td> <td>752</td> <td>CAR 4A</td> <td>=</td> <td>=</td> <td>÷</td> <td>x</td> <td>8/26/1986</td>			VS-44-A	752	CAR 4A	=	=	÷	x	8/26/1986
S-25 Series         H-3         CAR 6         v         v         v           S-55 Series         S-55 Series         1111         CAR 7         v         v         v         v           S-61 Series         S-61 Series         1111         CAR 7         v         v         v         v           S-61 Series         S-61 Series         1111         CAR 7         v         v         v         v           S-61 Series         1113         CAR 7         v         v         v         v         v         v           S-61 Series         1113         CAR 7         v         v         v         v         v         v           S-61 Series         1115         CAR 7         v			:	H-2	CAR 6	-	-	4	E	8/26/1986
			:	H-3	CAR 6	+	-	÷	£	8/26/1986
S-58 Series         III1         CAR 6         °         °         °           S-61 Series         S-61 Series         III13         CAR 7         °         °         °           S-61 Series         S-64 Series         III13         CAR 7         °         °         °           S-64 Series         S-64 Series         S-76 Series         III13         CAR 7         °         °         °           S-64 Series         S-76 Series         III1         CAR 7         °         °         °         °           S-76 Series         Not Alteruption         UC-1         AR 29         °         °         °         °         °           S-76 Series         UC-1         A-782         CAR 3         °			S-55 Series	1H4	CAR 6	+	=	=	=	8/26/1986
Self Series       IH15       CAR7       **       **       **         Seft Series       IH13       CAR7       **       **       **       **         Seft Series       ITN       IT       FAR29       **       **       **       **       **         Stol Aircraft Corp.       UC-1       Affrough H Scries       A-769       CAR3       **       **       **       **         Stol Aircraft Corp.       UC-1       Affrough H Scries       A-782       CAR3       **       **       **       **         Thrush Aircraft, Inc.       600 S2D, S-2R, S2R Series, S2R HO Series       A-782       CAR3       **				11111	CAR 6		4	÷ .	-	8/26/1986
				1H15	CAR 7		ŧ	÷	÷	8/26/1986
Stol Aircraft Corp.         Sed Series         H1EA         CAR 8         " <th"< th="">         "         "</th"<>			S-62 Series	1H13	CAR 7	÷	÷	-		8/26/1986
Stol Alrcraft Corp.       S-76 Series.       HINE       FAR 29       *			S-64 Series	HIEA	CAR 8	-		÷		8/26/1986
Not Altcraft Corp.         UC-1         A6EA         CAR3         U         U         U           Thompson Jimmie (Navion)         A through H Series         A creat         A creat         CAR3         V         V         V           Thrush Aircraft, Inc.         600 S2D, S-2R, S2R-S2R-S2R-S2R-S2R-S2R-S2R-S2R-S2R-S2R-	ł		S-76 Series	HINE	FAR 29		•	-	-	8/26/1986
Thompson Jimmle (Navion)         R(L-3)         Athrough H Series         S2RHG Series         AdSW         CAR 3         " <th"< th="">         "         "         &lt;</th"<>	ŝ	Stol Alferant Corp.		A0EA	CAKS	-	-		-	6/6/1990
Thrush Aircraft, Inc.         600 S2D; S-2R, S2R Series, S2RHG Series         AaSW         CAR 8         "	75	Thomson Limmia (Navion)	A through H Garias	A-707	CAR3	-		=		0.01
Water After aft         Correction         ASSW         CAR         No.	ĥ		600 SOD S.3D SOD Saries CORHO Saries	70/-U	CADS	=	÷	÷	-	11/10/2010
S2A       2A       2A       2A       0 <th>\$</th> <td></td> <td>600 S.2D. S.2R. S2R Series</td> <td>A3SW</td> <td>CAR 3</td> <td>-</td> <td>:</td> <td>÷</td> <td>.*</td> <td>10/10/2000</td>	\$		600 S.2D. S.2R. S2R Series	A3SW	CAR 3	-	:	÷	.*	10/10/2000
S-2B, S-2C, 600-S2C       2A7       CAR 8.10(a)(1)       " <th"< th="">       "       <th"< th=""></th"<></th"<>			S2A	2A9	CAR 8.10(a)(1)	÷	•	=	÷	12/10/2009
Varga Aircraft Corp         2150 Series         4A19         CAR3         " <th"< th="">         "         <th"< th=""></th"<></th"<>			S-2B. S-2C. 600-S2C	247	CAR 8.10(a)(1)	:		2		12/10/2009
Wace Aircraft         A Series         ATC 26         TC 26         " <th"< th="">         "         <th"< th="">         "&lt;</th"<></th"<>	ŝ	Varga Aircraft Corp	2150 Series	4A19	CAR 3	÷	÷	÷		I.R.
664         664         * <th>\$</th> <td>Waco Aircraft</td> <td>A Series</td> <td>ATC 26</td> <td>ATC 26</td> <td>-</td> <td>4</td> <td>-</td> <td>÷</td> <td>LR.</td>	\$	Waco Aircraft	A Series	ATC 26	ATC 26	-	4	-	÷	LR.
667         667         667         e         * </th <th></th> <td></td> <td></td> <td>664</td> <td>664</td> <td>÷</td> <td>*</td> <td>:</td> <td>=</td> <td>I.R.</td>				664	664	÷	*	:	=	I.R.
598 598 "				667	667	5	÷	÷	. <b>÷</b>	LR.
				598	598	-		:	-	L.R.

		FAA Approved Model List (AML) SA2693NM	List (AML) S	WNE692N					
		Electronics International, Inc. VA-1A Prir	imary Volt/Am	Primary Volt/Amp Instruments and Accessories	nd Accessorie				
ITEM	AIRCRAFT MAKE	Alkcraft Model	Original Type Certificate	CERTIFICATION BASIS FOT	FAA APPROVED DRAWINGS	ED DRAWINGS		INSTALLATION INSTRUCTIONS	AML
			NUMBER	ALTERATION	Number	Revision	Number	Revision	DATE
					TD 031851	B 01/05/07 or later FAA Approved Revision	II 040934	C 02/24/92 or later FAA Approved Revision	
		A Series	714	CAR 7A	÷	c	۳	r	LR.
		A Series	ATC 41	ATC 41	=	E	E		L.R.
		A Series	ATC 123	ATC 123	÷	E	. <u>r</u>	-	LR.
			ATC 168	ATC 168	÷ ,	÷	E	=	ц,
		B & C Series	ATC 538	ATC 538	÷	Ŧ	z	Ŧ	2. J.R.
		B & C Series	ATC 362	ATC 362	=	=	τ	=	LR.
		B & C Series	ATC 240	ATC 240	=	Ξ	E	Ξ	1. <b>R</b> .
		B & C Series	ATC 352	ATC 352	r	Ŧ	=	=	I.R.
		B & C Series	ATC 575	ATC 575	=	=	=	-	
		D & E Series	ATC 639	ATC 639	H	4	н	-	].R.
		D & E Series	ATC 597	ATC 597	£	=	H	-	I.R.
			ATC 42	ATC 42	2	-	-	-	I.R.
		E Series	665	665	z	=	Ξ	Ŧ	I.R.
		E Series	2-430	2-430	E	-	-	-	1.K.
		G Series	ATC 13	ATC 13	×		=	-	I.R.
		G Series	2-363	2-363	E	=	=	×	LR.
		I Series	ATC 345	ATC 345	E	-	T	Ŧ	8.R
		J Series	2-361	2-361	Σ	-	F .	× .	LR.
			ATC 313	ATC 313	E	Ŧ	F	I	L.R.
		O Series	ATC 468	ATC 468	T	T	z	z	I.R.
		P Series	ATC 464	ATC 464	=	; ; ; ;		E :	LR
		P Scries	ATC 491	ATC 491		T	<b>r</b> .		I.R.
		P Series	ATC 453	ATC 453		c ;		<u> </u>	I.R.
		P Senes	A IC 502	A IC 502		E E			I.K.
		N SETES	A1C 400	ATC 400	=	E	=	=	
		S Divisor	VICTI	AJC 311	E	c	E	-	
		0.0011cs 11 Ceries	A1C 470	ATC 479	r	' <u>r</u>		=	
		U Series	ATC 473	ATC 473	E	-	r	-	1 2
		U Series	ATC 467	ATC 467	, <b>z</b>	=	r	E	I.R.
		U Series	ATC 499	ATC 499	c	-	E	-	 
		U Series	ATC 511	ATC 511	Ŧ	-	τ	z	I.R.
		U Series	ATC 546	ATC 546	Ξ	-		E	J.R.
		U Series	ATC 568	ATC 568	-	=	r	z	I.R.
		Y Series, Z Series	626	626	-	-			I.R.
		Y Series, Z Stries	ATC 542	ATC 542	-	=	C	E	LR.

Page 6 of 7

		AML	DATE		LR.	I.R.	I.R.	I.R.	∛*R.	IR.	LR.	6/6/1990			
		INSTALLATION Instructions	Revision	C 02/24/92 or later FAA Approved Revision	E	<b>I</b>	T	L	T	E	r	z			
		LNSTAI	Number	II 040934	=	-	E	=	=		r	¥			
		ed Drawings	Revision	B 01/05/07 or later FAA Approved Revision	T	z	τ	I	E	z	τ	r.			
, , ,	id Accessorie:	FAA Approved Drawings	Number	TD 031851	=		2	+	=	=	=	-			
IMINICKOZY	VA-1A Primary Volt/Amp Instruments and Accessories	z	ALTERATION		ATC 586	ATC 627	FAR 21.25(a)	FAR 21.25(a)	CAR 3	CAR 3	CAR 4A	CAR 3		0, 12/10/2009	
For the second	mary Volt/Amp	ORIGINAL TYPE Certificate	NUMBER		ATC 586	ATC 627	A10WE	A26WE	A-767	A-787	A-718	A-767		00/1988, 6/06/1994	
5	Electronics International, Inc. VA-IA Pri	Анкскагт Меркі.			Y Scrics, Z Scrics	Z Series	201 Series		10% Series	G, F-1, F-1A, E, 415-D, A-2, A2-A, M10	415-C, 415-CD	108, 108-1, 108-2, 108-3, 108-5		Amended Date: 5/07/1986, 8/26/1986, 11/13/1986, 12/20/1988, 6/06/1990, 12/10/2009 ved:	
		AIRCRAFT MAKE					Weatherly Aviation		Univar Aircraft	(Erco, Forney, Alon)	(Stinson, Mooney)		End of List	FAA Approved:	
		ITEM	_				41 1		42 (	<u>.</u>			1		

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