

Altitude Alert and Super Clock

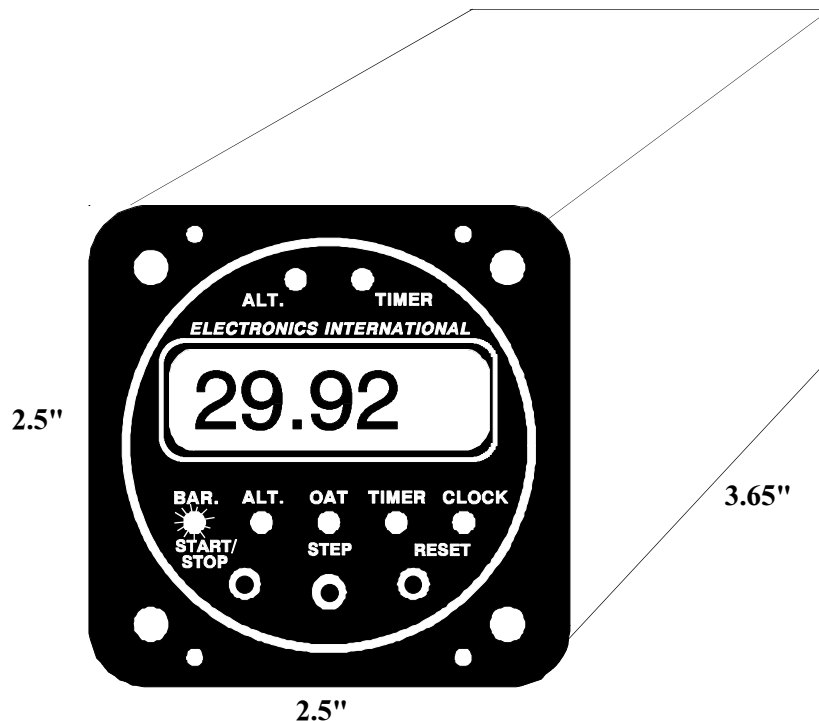
(ASC-5A and SC-5)

Installation Instructions

II 1105962

11/5/96
Rev. B: 4/1/98*

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: _____



Electronics International Inc. ®

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ASC-5A

Important Safety Notice

******* Must Read *******

If you think it is not important to read this manual, you're wrong! This manual contains important information that may affect the safety of your aircraft.

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.

The accuracy of the "ALT." readout is dependent upon the Altitude Encoder accuracy and the ASC-5A barometric pressure setting. Most FAA approved Altitude Encoders are accurate to +/- 125 feet. The ASC-5A barometric pressure setting will affect the accuracy of the displayed altitude by +/- 100 feet for each .1" of mercury the ASC-5A Barometric Pressure setting is in error of the actual barometric pressure. Your aircraft altimeter should always be your primary reference to determine your altitude.

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 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.

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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 covered 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. 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.**

ASC-5A and SC-5

Installation Instructions

I. 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 Clocks and Altitude Encoders, Do Not attempt to install this instrument.** The installer should use current aircraft standards and practices to install this instrument (refer to AC 43.13-2A).
- C. **The FAA considers the installation of clocks to be a minor alteration. A letter from the FAA to this effect is located at the back of this manual.** Installation of the SC-5 and ASC-5A can be accomplished utilizing FAA acceptable methods, techniques and practices covered under AC 43.13-2A. This is a requirement under FAR Part 1 to qualify as a minor alteration. The SC-5 and ASC-5A does not "appreciably" effect weight and balance or electrical load as described in FAR Part 1 and FAR 43 Appendix A. The SC-5 and ASC-5A meet the FAA requirements for a clock. Also, they meet the environmental requirements of DO-160B. If the installer determines the installation is a minor alteration, he must say so in the log book. Example: "**4/1/98 Installed Electronics International's ASC-5A as a minor alteration. This instrument was installed in accordance with Installation Instructions II 1105962 Rev. A dated 10/22/97 and AC 43.13-2A.**" If the installer determines the installation is a major alteration, a 337 field approval will be required. A minor alteration does not require a 337. **Resolve any FAA approval issues you may have before starting the installation.**
- D. **Before starting installation, read the entire Installation Instructions and resolve any installation, operating and performance issues you may have before starting the installation.**
- E. **THIS INSTALLATION MAY REQUIRE SOME PARTS UNIQUE TO YOUR AIRCRAFT THAT ARE NOT SUPPLIED IN THE KIT (including, but not limited to, male and female Altitude Encoder connectors used in the ASC-5A installation).** Read the Installation Instructions and acquire all the parts necessary to install this instrument before starting the installation.
- F. Check that the instrument make and model are correct before starting the installation (check your invoice and the markings on the side of the instrument). The Altitude Alert/Super Clock is marked ASC-5A and the Super Clock is marked SC-5.
- G. Before starting the installation make sure the unit will fit in the intended installation location without obstructing the operation of any controls.
- H. 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. The following Installation Instructions do not cover moving or the removal of any existing instruments or components.

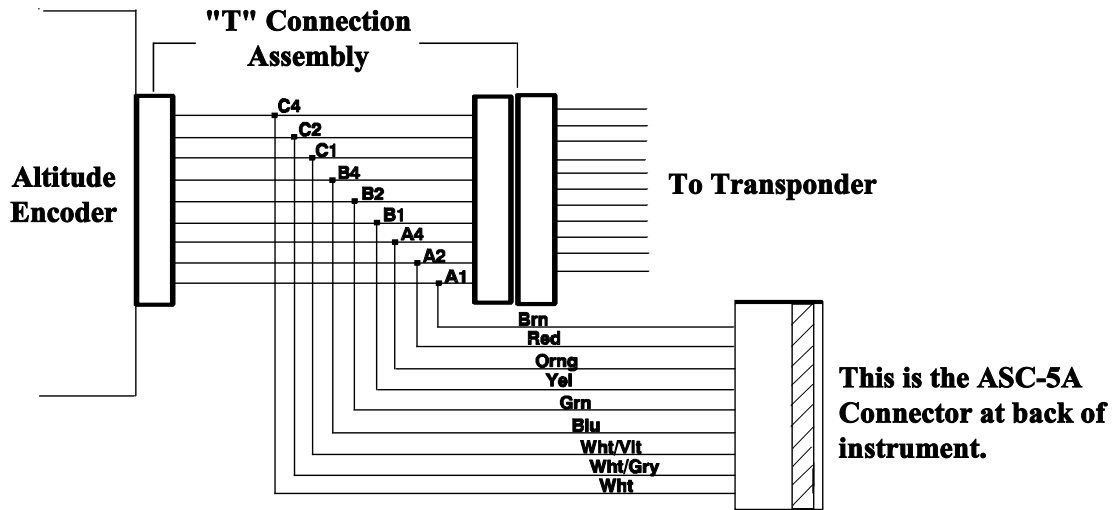
2. Install the Instrument in the Panel:

The ASC-5A and SC-5 fit in a 2 1/4" standard instrument hole. If the instrument is to be installed in a 3 1/8" hole, a brushed aluminum black anodized adaptor plate (A-102) is available from Electronics International Inc.

Install the instrument from behind the instrument panel using 6 x 32 screws. **These screws must not be any longer than 1/2"**. Make sure the instrument and wires do not obstruct the operation of any controls.

3. Fabricate an Altitude Encoder "T" Connection Assembly (ASC-5A Only):

Make a "T" Connection Assembly to connect the nine ASC-5A altitude data lines to your existing altitude data lines running from the Altitude Encoder to the Transponder using the following procedure:



- A. Connect the ASC-5A Wire Harness to the instrument. Route the ASC-5A altitude data lines (wires marked "ALT") to the Altitude Encoder. Add some additional wire length to accommodate any possible change in the mounting location of the ASC-5A or the Altitude Encoder. Cut the ASC-5A altitude data lines to the determined length.
- B. Remove the ASC-5A Wire Harness from the instrument.
- C. Make up a "T" Connector Assembly using the same type of connectors used on your Altitude Encoder, one connector must be male and the other must be female. Most Altitude Encoders use a DB-15 connector. Connect all the terminals between the male and female connectors pin for pin. Connect the nine altitude data lines in the ASC-5A Wire Harness (marked "ALT") to the appropriate pins on the "T" Connector Assembly (see your Altitude Encoder's installation manual for pin names and functions). **It may be appropriate to have an FAA approved avionics facility fabricate this "T" Connection Assembly.**
- D. Remove the Altitude Encoder connector and install the fabricated "T" Connection Assembly as shown above.

Note: The ASC-5A altitude data lines are isolated from the ASC-5A internal circuitry by 100,000 ohm resistors. Any failure of the ASC-5A will not affect the integrity of the Altitude Encoder's data to the Transponder. The ASC-5A is compatible with any Altitude Encoder that does not require a pulsed strobe.

4. Install the Circular Connector:

Starting from under the instrument panel, route the circular connector wire harness up to the instrument. Connect the wire harness to the instrument by pushing the two mating connectors together and twist them until they snap into position. Turn the locking ring on the instrument connector clockwise (1 1/2 turns) until it locks into position. Tie wrap the wire harness in place. **Be sure these wires do not obstruct the freedom of travel of any controls.**

5. Connect the Power and Ground Wires:

Do not hook this instrument up to constant power. The instrument has an internal 10+ year lithium battery to keep time. In the wire harness, the red and black 3' wires are used for instrument power and ground (see the Wiring Diagram at the back of this manual). Route the 3' red wire in the harness to the aircraft's 12 or 24-volt main or emergency bus as applicable via an independent circuit breaker (five amps or less). 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 must be kept in the aircraft.** Route the 3' 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.**

6. Connect the Backlight Wires:

Connect the backlight wires as follows:

A. It is recommended to permanently power up the digital display backlight.

1) For a 12-volt system connect the white/brown wire to the bus and connect the white/red wire to ground (see Wiring Diagram).

2) For a 24-volt system leave the white/brown wire open and connect the white/red wire to the bus (see Wiring Diagram).

B. Connect the white/orange wire to the panel light rheostat. This wire will dim the green Display Mode Indicator LEDs for night operation when the panel lights are turned on. If this line is left open, the Display Mode Indicator LEDs will remain at full intensity at all times. Also, if the voltage on this line drops below 11.5 volts, the analog LED's will be displayed at full intensity. **Tie wrap all wires so they do not obstruct the freedom of travel of any controls.**

An alternate installation method is to connect the white/orange wire to Electronics International's LED Intensity Control Pot (CP-1). The CP-1 can be connected to any E.I. instrument to provide linear control of the green Display Mode Indicator LEDs for night operation or low ambient light conditions.

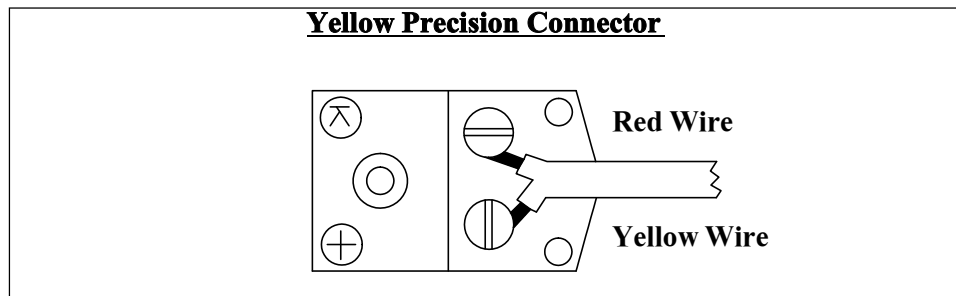
7. (Optional) External Warning Control Line:

The white/yellow wire can be connected to an external light (AL-1), buzzer (ATG-1), voice annunciator (AV-17), a relay, MUX-8A, etc. This wire grounds when the red 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. **Tie wrap this wire so it does not obstruct the freedom of travel of any controls.**

8. Install the OAT Probe and Extension Cable (ASC-5A Only):

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, the probe should not be mounted near an exhaust pipe. The radiant energy from the exhaust pipe can cause the temperature to read slightly high. Other than these considerations the OAT Probe may be mounted in an air intake vent, on the side of the cowling or anywhere else on the aircraft.

Connect the 6 foot OAT extension cable to the OAT probe and to the OAT connector on the back of the ASC-5A. We do not recommend removing the connectors when installing the extension cables but if you must shorten the cable, cut it off at this time. However, it is recommended you leave some extra wire length under the instrument panel for later modifications. Varying cable lengths will **not** affect the accuracy of this instrument. The extension cable and probe wires are made of type K thermocouple wire that **must not be substituted or extended with regular copper wire.** Attach the precision connector to the cut end of each of the extension cable as described below:



- A) Strip the overbraid back 3 1/2". Be careful not to nick the wires. Shrink a piece of 1" heat shrink over the cut portion of the overbraid.
- B) Remove the yellow cap on the Precision Female Connector.
- C) Strip back the wire insulation 1/2".
- D) Connect the yellow lead of the Extension Cable to the terminal marked "+" and the red lead to the other terminal. The insulation on these wires should almost touch the mounting screws. Replace the yellow cap on the Female Precision Connector. Be careful not to overtighten any screws or twist the wires when installing the connector.

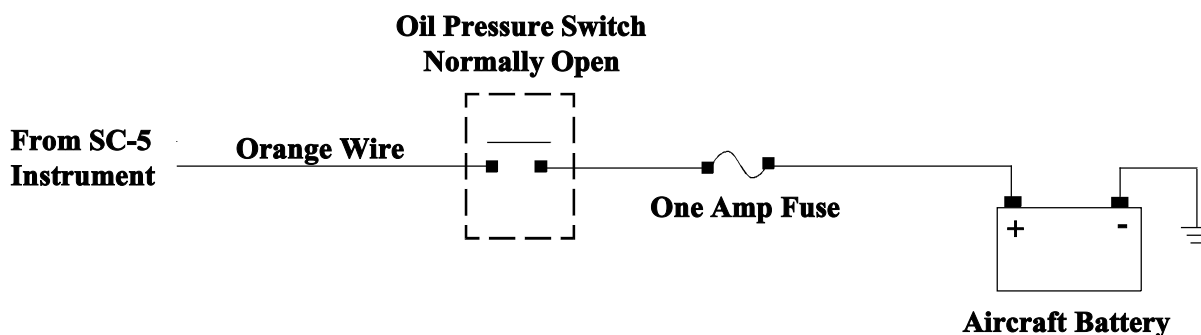
Tie off any excess cable under the instrument panel. Be sure these cables do not obstruct the freedom of travel of any controls.

9. 24 Volt Engine Timer Control Line (SC-5 Only):

If this line is left open, the SC-5 Engine Timer will run when the aircraft bus voltage rises to 13 volts or higher. If this line is grounded, the SC-5 Engine Timer will run when the aircraft bus voltage rises to 26 volts or higher. Connect the brown wire to ground for a 24-volt system. Leave the brown wire open for a 12-volt system.

10. (Optional) Engine Timer Start Line (SC-5 Only):

The SC-5 Engine Timer will run any time the engine is running. The engine's alternator (or generator) will raise the bus voltage above 13 volts for a 12-volt system or 26 volts for a 24-volt system. The SC-5 Engine Timer can be stopped when the engine is running by turning off the alternator field or by turning off the master switch. To allow the SC-5 Engine Timer to operate any time the engine is running no matter what the pilot does, connect the SC-5 Engine Timer Start Line (orange wire) to the battery via an oil pressure switch and one amp fuse as shown below. This wire can be lengthened using 20 ga. (or larger) copper wire.



11. ASC-5A System Check-out:

Check ASC-5A instrument operation as follows:

- A. Turn the aircraft master switch on and verify that the yellow Warning LEDs on the ASC-5A flash and the green "BAR." Display Mode LED is blinking. A problem at this step could be caused by poor connections on the red or black power and ground leads.
- B. Push the instrument "STEP" switch to display "OAT". Heat the OAT Probe and check that the OAT reading increases. An aircraft sitting with the engine off will pick up heat from the ground and the OAT reading may be slightly higher than ambient. If you have problems at this step, check the connections to the OAT Probe.
- C. Push the instrument "STEP" switch to display "ALT." The display will read "OFF" until the Altitude Encoder has warmed up and is outputting valid altitude data. After warm up you should get an altitude reading. The ASC-5A Barometric Pressure ("BAR.") setting may have to be set to get an accurate altitude reading (see the ASC-5A Operating Manual to set the Barometric Pressure). If you have problems at this step, check the Altitude Encoder "T" Connection Assembly. You can force the ASC-5A to read "-.8" by removing the "T" Connection Assembly from the Altitude Encoder and shorting only the C1 line (white/violet) to ground (the Barometric Pressure must be set to "29.92").

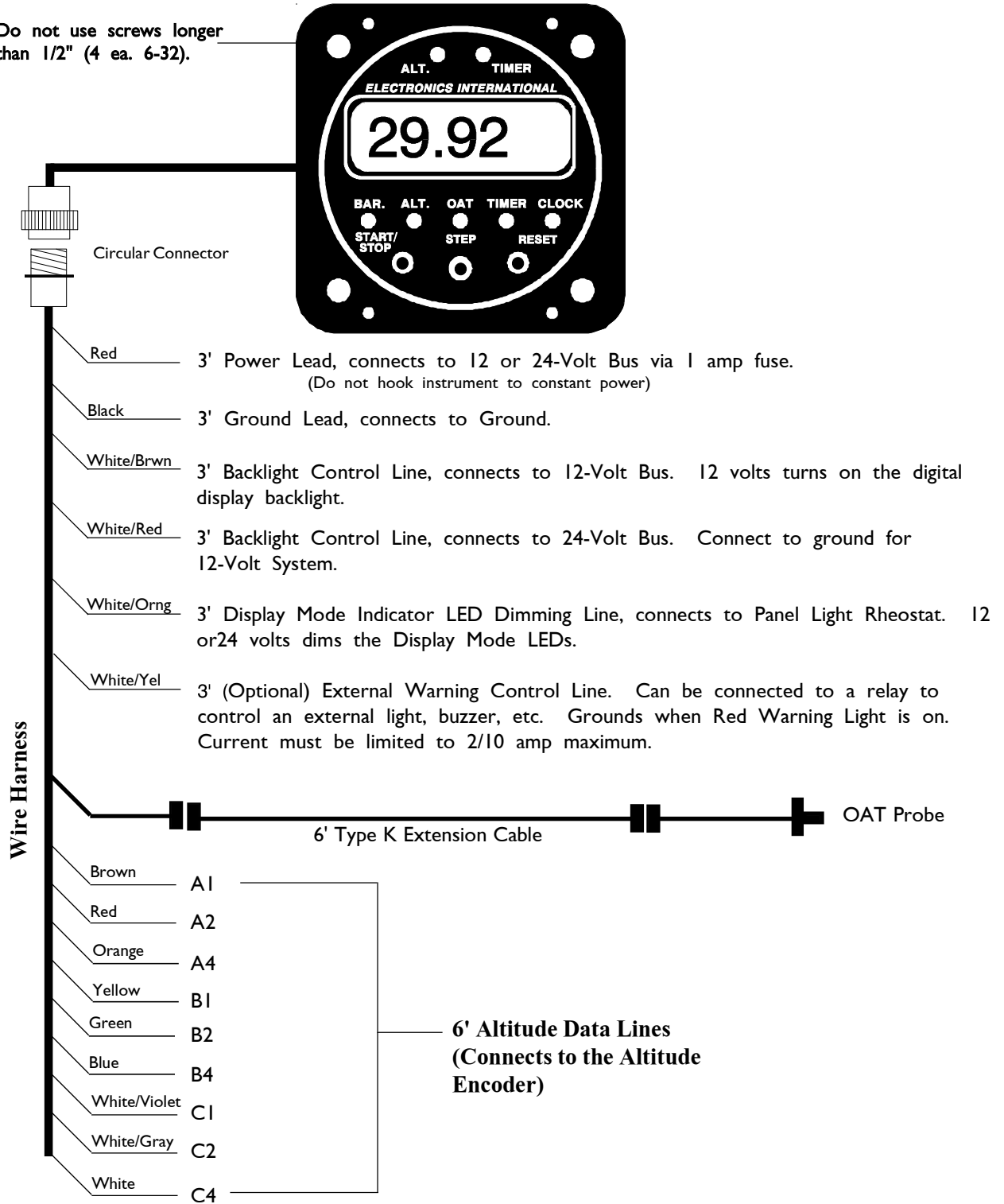
12. SC-5 System Check-out:

Check the SC-5 instrument operation as follows:

- A. Turn the aircraft master switch on and verify that the yellow Warning LEDs on the SC-5 flash and the "LOCAL" Clock green Display Mode LED is lit. A problem at this step could be caused by poor connections on the red or black power and ground leads.
- B. Push the instrument "STEP" switch to display "ENGINE TIME". The "/Hr" in the upper right corner of the LCD display should **NOT** be blinking. A problem at this step could be caused by a poor connection on the 24-Volt Engine Timer Control Line (brown wire).
- C. Start the aircraft engine, set the SC-5 to display "ENGINE TIME" and check that the "/Hr" in the upper right corner of the LCD display is blinking. Press "RESET" to view 10th and 100th hour. A problem at this step could be caused by a poor connection on the 24-Volt Engine Timer Control Line (brown wire).

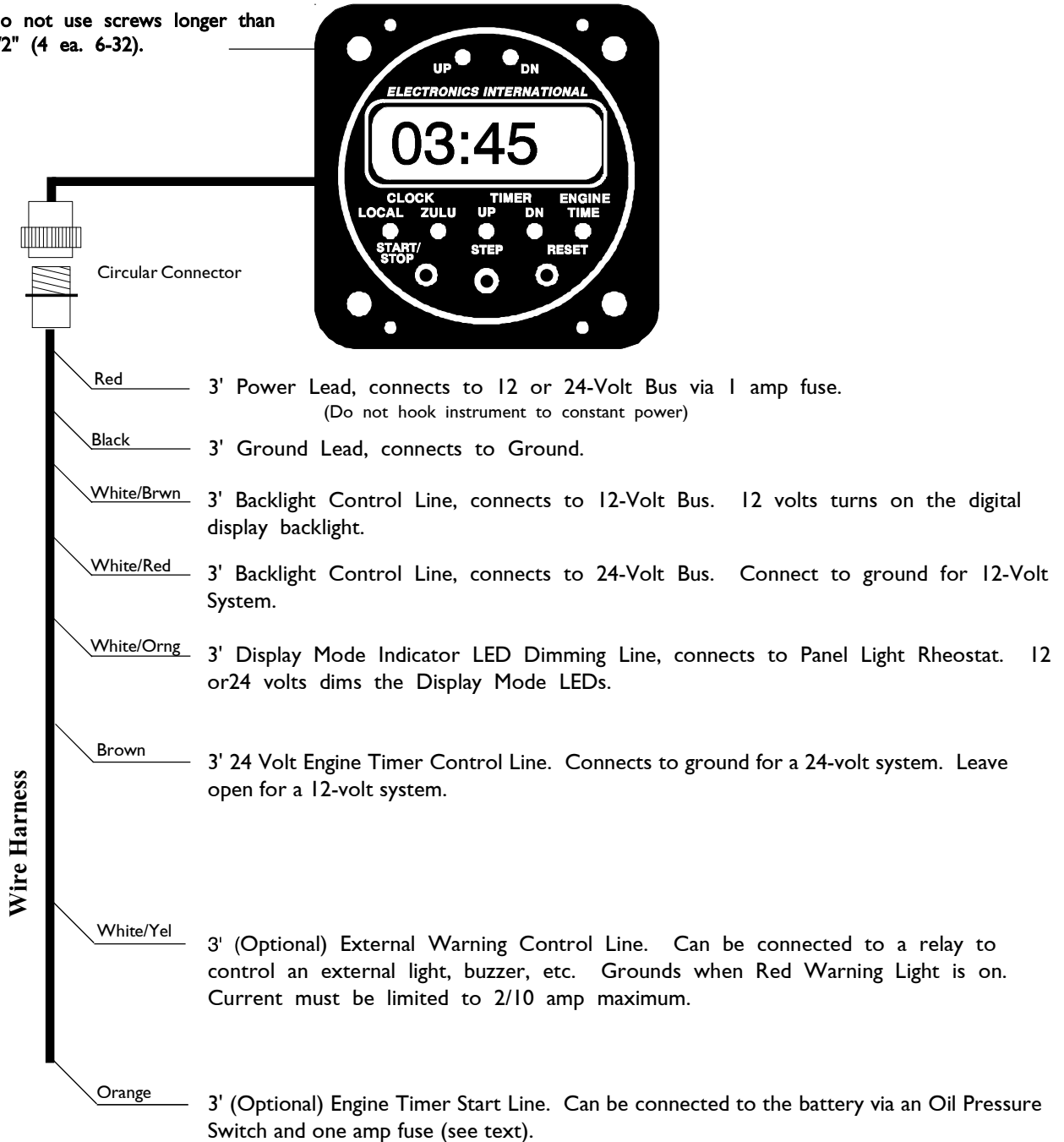
ASC-5A Wiring Diagram

Do not use screws longer than 1/2" (4 ea. 6-32).



SC-5 Wiring Diagram

Do not use screws longer than 1/2" (4 ea. 6-32).

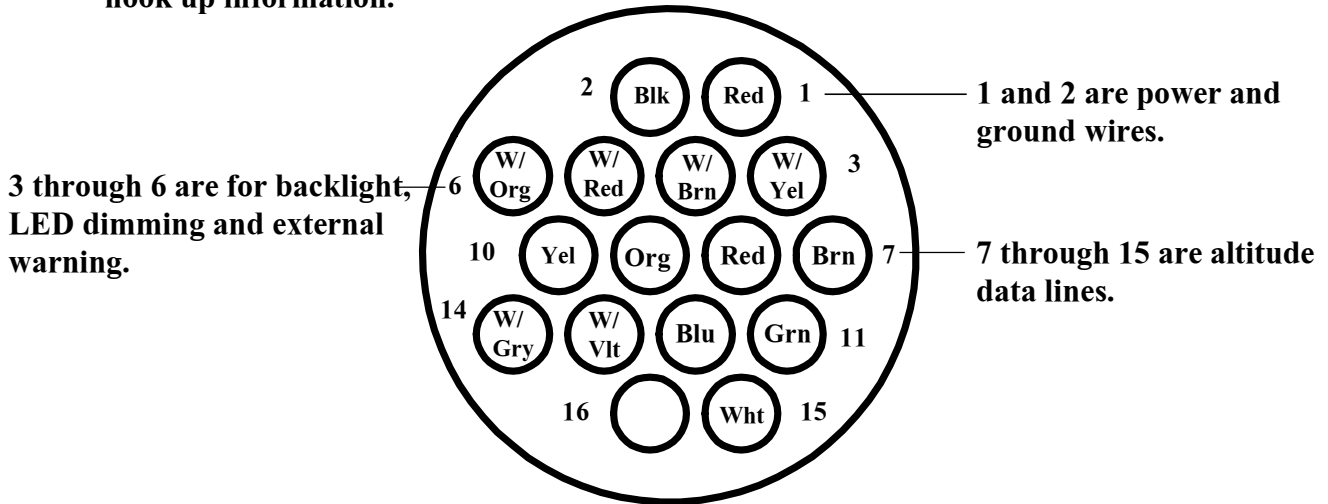


ASC-5A

Circular Connector

Connecting Cable Harness, Back View (wire side)

Note: See Wiring Diagram for hook up information.

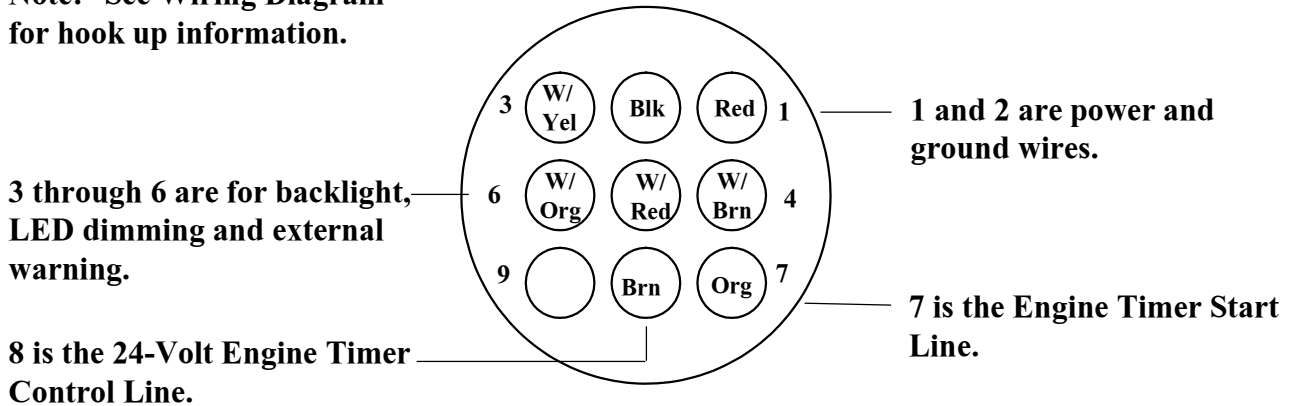


SC-5

Circular Connector

Connecting Cable Harness, Back View (wire side)

Note: See Wiring Diagram for hook up information.



Specifications and Operating Features

Model:

ASC-5A (Altitude Alert/Super Clock)

Case Dimensions:

2.5" x 2.5" x 3.65" depth, 2 1/4" Bezel.

Weight:

Unit Only - 11 Oz.

Environmental:

Meets DO-160C

Power Requirements:

7.5 to 35 Volts, 1/10 Amp.

Green Display Mode Indicator LEDs:

The intensity of these LEDs is controlled by the dimming wire. 12 or 24 volts on this wire will dim the LEDs for night operation.

Yellow "ALT." Warning LED:

This LED will blink for the following conditions:

- A. Level Off Alarm - When your altitude reaches 100 to 300 (determined by the Assigned Deviation setting) from your pilot programmed Assigned Altitude the "ALT." Warning LED will "blink." Once this alarm has been acknowledged and turned off, it will be reset when your current altitude reaches 500 feet above or below the Assigned Altitude.
- B. Assigned Deviation Alarm - If your altitude deviates more than 100 to 300 feet (determined by the Assigned Deviation setting) above or below the programmed Assigned Altitude, the "ALT." Warning LED will "blink." Once this alarm has been acknowledged and turned off, it will be reset when your current altitude is within 100 to 300 feet (determined by the Assigned Deviation setting) of the Assigned Altitude setting for 8 seconds.
- C. Approach Altitude Alarm - If your altitude drops to the programmed Approach Altitude setting or below, the "ALT." Warning LED will "blink." Once this alarm has been acknowledged and turned off, it will be reset when your current altitude reaches 300 feet above the Approach Altitude setting.

Push any button or switch to stop the blinking (acknowledge the alarm) and turn off the "ALT." Warning LED.

Yellow "TIMER" Warning LED:

If the ASC-5A Timer is set up as an Up Timer, the "TIMER" Warning LED will "blink" when the Timer reaches the programmed Recurring Alarm Setting or a multiple of this setting. If your ASC-5A Timer is set up as a Down Timer, the "TIMER" Warning LED will "blink" when the Timer reaches 0:00.

Digital Display:

LCD (viewable in direct sunlight), with 12 and 24 volt backlight control wires for night operation. Displays "88:88" on power up.

External Warning Control Line:

Grounds when any yellow Warning LED is blinking. Current should be limited to 2/10 amp.

Display Modes:

- BAR. - Displays Barometric Pressure setting.
- ALT. - Displays Encoder Altitude or Assigned Altitude determined by the Display Configuration setting. Push the "START/STOP" Button to display Encoder Altitude (displayed with an "E") or Assigned Altitude (displayed with an "A"). Push the "RESET" Button to display Density Altitude (pressure altitude corrected with OAT). Density Altitude will be displayed as "OFF" for OAT readings above 135°F. Pressure Altitude will be displayed for altitudes above 18,000 feet.
- OAT - Displays Outside Air Temp in degrees Fahrenheit (°F) or degrees Celsius (°C).
- TIMER- Displays the time on the Up or Down Timer. The Up Timer will start automatically when your aircraft reaches an elevation of 300 feet above the ground.
- CLOCK- Displays the Local or Zulu Clock.

Maximum Displayed Range or Setting:

- BAR. Setting ----- 28.00 to 32.99 inches of mercury or 900 to 1199 millibars.
- Altitude (displayed) ----- -1000 to 30,500 feet.
- Assigned Altitude (setting) ---- 0 to 99,900 feet.
- Approach Altitude (setting) -0 to 9,900 feet.
- OAT (displayed) ----- -99°F to 1999°F (-87°C to 999°C).
- TIMER (displayed) ----- 00:00 to 17 hours, 59 minutes.
- Recurring Alarm/Start Time (setting) - 00:00 to 99 minutes, 59 seconds.

Accuracy:

- Altitude: +/- 50 feet plus the accuracy of your Altitude Encoder (typically +/- 125 feet).
- OAT: +/- 2% in accordance with TSO-C43a.
- Timer: +/- .005% plus +/- .5 second.
- Clock: +/- 2 minutes/month.

Resolution:

- BAR. ----- .01 inches of mercury.
- Altitude ----- 100 feet.
- OAT ----- 1°F or 1°C.
- Timer ----- 1 second (switches to 1 minute for readings over 59 minutes and 59 seconds).
- Clock ----- 1 minute.

Pilot Programmable Modes:

		Display Modes				
	Power-up	BAR.	ALT.	OAT	TIMER	Clock
Programming	Set Local Clock	Set Barometric Pressure	Set Target Altitude		Set Recurring Alarm/Start Time	Set Local Clock Format (12 or 24)
Modes	Set Zulu Clock		Set Approach Altitude			
	Set Assigned Deviation					
	Set Altitude Display Configuration					
	Set Barometric Pressure Configuration					
	Set Minutes Lock Configuration		13			

SC-5 Specifications and Operating Features

Model:

SC-5 (Super Clock)

Case Dimensions:

2.5" x 2.5" x 3.65" depth, 2 1/4" Bezel.

Weight:

Unit Only - 11 Oz.

Environmental:

Meets DO-160C

Power Requirements:

7.5 to 35 Volts, 1/10 Amp.

Green Display Mode Indicator LEDs:

The intensity of these LEDs is controlled by the dimming wire. 12 or 24 volts on this wire will dim the LEDs for night operation.

Yellow "UP" Timer Warning LED:

The "UP" Timer Warning LED located over the digital display will "blink" when the "UP" Timer reaches the pilot programmed Recurring Alarm setting or a multiple of this setting. Push any button or switch to stop the blinking (acknowledge the alarm) and turn off the "UP" Timer Warning LED.

Yellow "DN" Timer Warning LED:

The "DN" Timer Warning LED located over the digital display will "blink" when the "DN" Timer reaches 0:00. Push any button or switch to stop the blinking and turn off the "DN" Timer Warning LED.

Digital Display:

LCD (viewable in direct sunlight), with 12 and 24-volt backlight control wires for night operation. Displays "88:88" on power up.

External Warning Control Line:

Grounds when any yellow Timer Warning LED is blinking. Current should be limited to 2/10 amp.

Maximum Displayed Range or Setting:

TIMER (displayed) ----- 00:00 to 17 hours, 59 minutes.
Recurring Alarm (setting) --- 00:00 to 99 minutes, 59 seconds.
Start Time (setting) ----- 0:00 to 99 minutes, 59 seconds.

Accuracy:

Local and Zulu Clock ----- +/- 2 minutes/month.
UP and Down Timer ----- +/- .005% plus +/- .5 second.
Engine Timer ----- +/- .005% plus +/- .5 second.

Resolution:

Local and Zulu Clock ----- 1 minute.

Up and Down Timer ----- 1 second (switches to 1 minute for readings over 59 minutes and 59 seconds).

Engine Timer ----- .01 Hours.

Engine Timer Start Voltage:

13 volts +/- .2 volts for a 12-volt system.

26 volts +/- .3 volts for a 24-volt system.

Pilot Programmable Modes:

		Display Modes					
		Power-up	Local Clock	Zulu Clock	UP Timer	Down Timer	Engine Time
Programming Modes	Local Clock	12 or 24-Hour Format			Recurring Alarm	Start Time	
	Zulu Clock						
	Minutes Configuration						



U.S. Department
of Transportation
**Federal Aviation
Administration**

**Transport Airplane Directorate
Aircraft Certification Service**

1601 Lind Avenue S.W.
Renton, Washington 98055-4056

NOV 18 1997

In Reply
Refer To: 97-190S-721

Mr. Ron Roberts
President
Electronics International, Inc.
12620 SW 231st Place
Hillsboro, OR 97123

Dear Mr. Roberts:

This is in regard to your letter and application for supplemental type certificate (STC), both dated November 11, 1997, for replacement clocks to be installed in small airplanes. We consider this change to be minor in accordance with Federal Aviation Regulation (FAR) 21.93(a). Accordingly, an STC is not required to install Electronics International clocks in non-transport category airplanes. Per FAR 21.95 copies of this letter may be given to installing mechanics as evidence that this installation is considered minor.

Since an STC is not required, we are returning your data submittal and application. If you have any questions regarding this matter please contact Mr. Jeff Morfitt of this office at (425) 227-2595.

Sincerely,

A handwritten signature in black ink, appearing to read 'A. J. Pasion', with a large circular flourish above it.

A. J. Pasion
Manager, Special Certification Branch
Seattle Aircraft Certification Office

Enclosures