



A New Generation of Digital Avionics

ELECTRONICS MANUAL

ELECTRONIC INSTRUMENTS

Item# Manual

Belite Electronics Manual For all Belite Instruments, including 1.75" and 2.25" Bezel AND Box Instruments Last Revised February 2012 **DISCLAIMER:** Products from Belite Electronics are not designed to be used in applications where their failure would endanger safe flight or human life in any way. They are intended solely for use in VFR conditions. They are not certified to meet any Technical Standard Order, and are not produced under a Parts Manufacturing Authority (TSO / PMA). As a result, they are suitable only for use in experimental and ultralight aircraft, and in Light Sport Aircraft, if meeting the requirements of the respective manufacture.

WARRANTY: Your new Belite Avionics instrument carries a one year warranty. Please contact us at info@beliteaircraft.com should your product need warranty service. International warranty service will be charged \$50.00US for repairs, which includes return shipping after repair. Payment must be received before service begins.

RETURN/REFUND INFORMATION: Must be returned in new, resalable condition within 14 days.

Contact: info@beliteaircraft.com, 316-253-6746 / Belite Enterprises LLC, 2515 N. Cranbrook Ct. Wichita KS 67226

NOTE: 1.75 inch units (square) do not include a back cover. However, 2.25 inch units (round) include a back cover.

INSTALLATION:

- (1.75 inch bezel) Cut out a panel opening with dimensions of 1.75 inch square, leave tabs on opposite corners for mounting utilizing the supplied screws. We like to drill our panels with hole diameters which will self tap for the 2-56 screws, eliminating the need to use the nuts. Experiment with scrap aluminum for your mounting. Install to your panel using the 2-56 screws.
- (2.25 inch bezel) Install in any standard round 2.25 inch panel cutout. Use the supplied screws and nuts.
- (boxed units) Velcro to your aircraft panel or dash. **IMPORTANT!!!!:** note battery orientation and position when replacing battery. Use Lithium 9v battery for longest battery life.
- (bezel units) The unit must be attached to a power source. The power connector supplied will work with a 9 volt battery. You may clip off the connector and tie into your ship's power – anything from 8v (minimum) to 14v (maximum). We recommend using a separate avionics master switch and a fuse (1A) for a typical panel installation.
- The yellow wire is for use with a LED dimmer switch or

dimmer potentiometer. If left unconnected, the unit will be at full brightness, and nighttime or evening use may be impossible, because the LEDs are so very bright. If connected (via a switch) to a +12v source, it will considerably dim the LEDs for more comfortable viewing in the dark. If connected (via a potentiometer) to +12V, you will be able to vary the brightness. You may consider connecting this input to your position lighting switch, if your aircraft is so equipped. If so, you will automatically dim the LEDs when turning on the position lighting. • (boxed units) The display is full bright all the time.

Special Installation Instructions for each unit: a) Inclinometer. Just connect power. b) Turn Rate Indicator. Just connect power. c) Turn Coordinator. Just connect power. d) G Meter. Just connect power. e) Above Ground Level altimeter. Just connect power. f) Air Speed Indicator. Connect power; also connect pitot hose tube. g) Vertical Speed Indicator. Just connect power. h) Fuel Gauge. Connect power; connect compatible fuel sender(s) to marked wire leads. (Fuel sender will also require +12v power.) i) EGT/CHT. Attach the EGT and CHT probes to the unit. The EGT pair is Red/Black; the CHT pair is Yellow/Black. Red and yellow are positive; if connected backwards, you will get no display indication.

OPERATION: a) Inclinometer. Turn on the unit. After an LED test and a calibration sequence, the unit will center in less than one minute. You must have the aircraft on level ground. If the limit of the unit is reached, either by excessive slipping or skidding, the unit will blink a LED. All units (including Inclinometers in boxes) require correct up orientation in order to calibrate properly. Recalibration may be done at any time by recycling power. b) Turn Rate Indicator. Turn on the unit. After an LED test and a calibration sequence, the unit will center in about one minute. You may not turn (rotate) the unit while the unit is centering. The red LED (second from top or bottom) is calibrated to produce a two minute turn. If the turn rate limit of the unit is reached, by executing a very quick turn, the unit will blink a LED. You may test this feature by rapidly turning the unit to the left or right. All units (including Turn Rate Indicators in boxes) require the unit to NOT BE TURNING in order to calibrate properly. Recalibration may be done at any time by recycling power. In other words, calibrate the unit on the ground, when you are not moving, or when flying, by flying straight and level. Don't turn your airplane while calibrating. c) Turn Coordinator. The Turn Coordinator is the combination of the first two units (Inclinometer + Turn Rate Indicator). Identical advice applies. d) G Meter. Turn on the unit. Keep the unit aligned with gravity – up and down – while the unit tests and calibrates. After an LED test and a calibration sequence, the unit will zero in less than one minute. You must have the aircraft on level ground, or if you have a box version, you must ensure that the box scale is perpendicular to gravity. The left side (positive G) will center on 1G while the right side (negative G) will center on 0G. The unit will show peak G's for several seconds after each bump. e) Above Ground Level altimeter. Turn on the unit. After an LED test and a calibration sequence, the unit will zero in less than one minute. If the limit of the unit is reached, either by climbing above 1200 feet or descending below zero feet, the unit will blink the appropriate LED. Operation of the boxed unit is identical. f) Air Speed Indicator. Turn on the unit. After an LED test and a calibration sequence, the unit will zero in less

than one minute. Do not taxi the airplane while the Air Speed Indicator is calibrating! If the airspeed limit of the unit is reached, the unit will blink the appropriate LED. The Air Speed Indicator produces "Indicated Air Speed". g) Vertical Speed Indicator. Turn on the unit. After an LED test and a calibration sequence, the unit will zero in less than one minute. If the limit of the unit is reached, either by climbing or descending faster than 600FPM, the unit will blink the appropriate LED. Operation of the boxed unit is identical. h) Fuel Gauge. Turn on the unit. After an LED test, the unit will provide a fuel level indication. Calibrate using an empty tank and a full tank using the calibration methodology of the fuel sender. The unit is designed to show a full tank when it receives a signal of +5v from the fuel sender. An empty tank corresponds to zero volts. When the unit receives a signal of +0v (empty), the 0% LED will flash continuously. When the unit receives a signal of approximately +5v or greater (completely full) the 100% LED will flash continuously. This is helpful for calibrating your sender. Perfect full calibration is indicated when the 100% is on continuously, but not flashing. i) EGT/CHT. Turn on the unit. After an LED test, the unit will provide current EGT and/or CHT temperature.

How to attach a Belite instrument dimmer For Belite Instruments, including 1.75" and 2.25" Bezel December 2012 Each instrument has a yellow wire which may be attached to a dimming potentiometer, so that you can control how bright the LEDs are. A) If you never plan to fly in dim light conditions, just leave the yellow wire unattached. Your unit will always be at full brightness.

B) If your bird has navigation lighting (EG: position lights) you can attach the yellow wire to them. Therefore, if your position lights are turned on, your LED indicators will be fully dimmed.

C) If you desire to have variable control over the dimming intensity, the yellow wire may be attached to a separate potentiometer (not supplied by us) to provide control. You'll need a potentiometer (10K ohm suggested) and perhaps a knob for the potentiometer, and you'll want to mount the potentiometer in your instrument panel. A suitable potentiometer is from Radio Shack, part # 271-1715, and they look like this:

The potentiometers have three connections. You'll need to connect the center one to the yellow wire; and one side to ground, and the other side to Switched +12 volts. (From your avionics master switch, for instance.) This allows the potentiometer to 'sweep' all the way from ground up to twelve volts, allowing you to select the proper intensity level of your LEDs. If you have several of our instruments, just connect all the yellow wires together.

Your Belite instrument still requires its own power. You can hook it up to the same +12v source (red wire) and the ground (black wire).

If you don't have access to a Radio Shack, and if you are so inclined, Digi-Key sells bazillions of variable potentiometers. A suitable Digi-Key part # is: 3852A-202-103AL-ND; but the Radio Shack part is a lot less expensive.

Even More Technical info: The yellow wire going into the Belite instrument is not connected directly to the LEDs. Rather, it is connected to a small microprocessor inside the instrument, which analyzes the voltage level and controls the LEDs by varying the amount of time they are turned on. This happens so quickly that your eye sees it as a dim condition, but its actually a very rapidly flashing light with a varying duty cycle. Many LED lighting systems with variable intensity work this way; for instance; LED brake lights on cars.