Installation guidelines for B400, B500 and B2500 instruments

(some parts also apply to glider instrument installations more generally)

Updated December 2008

To get the most out of your instruments some straight forward installation guidelines should be followed. Please take the time to read these guidelines in full BEFORE commencing installation.

AT ALL TIMES EXTREME CARE SHOULD BE USED TO PREVENT ANY INTERFERENCE WITH FULL CONTROL MOVEMENT OF THE SAILPLANE. WE STRONGLY SUGGEST THAT YOU HAVE A QUALIFIED PERSON INSTALL OR CHECK YOUR INSTALLATION BEFORE FLIGHT.

Mechanical:

Install the instruments in standard 57mm or 80mm panel holes with the fixing bolts supplied.

Do not use longer bolts.

To mount the B500GCD(Glareshield controller/display) see the mounting suggestions.

Cruise/climb switch - to be installed in a convenient location. Suggested places are on the control column beside the radio press-to-talk switch. (many sailplane factories offer this option in new sailplanes); on flap handle in flapped sailplanes. Switch bushing requires 1/4"(6.35mm) hole

Mount the speaker(s) supplied in a convenient location. e.g. on instrument panel, facing aft toward the pilot, under the seatpan (this works extremely well) or just behind the rear canopy bow on either or both (B500) sides.

Any other 8 ohm speaker(s) may be used.

Optional Outside Air Temperature(OAT) probe should be installed in the air vent.

Electrical:

Follow the wiring diagram attached to the top of the instruments.

Power and mode (cruise/climb) switch wiring attaches to the external connection board (XCB) by way of screw terminal connectors. **DO NOT OVERTIGHTEN THE SCREWS** on the XCB as the connector may suffer damage.

The OAT probe plugs into its socket and the speaker(s) plug into 3.5mm sockets on the XCB.

After the power , mode switch, speaker(+optional OAT) have been attached to the XCB the cable tie (supplied) may be used as a strain relief for these wires. Use any 2 of the 4 M3 holes in the XCB for this.

The XCB may be removed by removing the 2 x M3 machine screw in the top corners, tilting back to disengage the DB15 connector then lifting to remove from the bottom M3 screw which is fixed. Do not remove this screw it has been glued in place with anaerobic adhesive. The lower XCB fixture has a slot to facilitate removal.

This allows the XCB with wiring to remain in the aircraft in the event that the instrument requires servicing.

Extreme care should be taken to ensure correct polarity power is connected to the instruments. While reverse polarity protection has been fitted, we do not guarantee that under all circumstances this will necessarily protect from damage.

Instruments which receive aircraft power directly are fused on the XCB.

Power requirements are 10 to 15 volts DC from the aircraft power. Do not exceed 15 volts. 14 volt batteries are not recommended as a fully charged battery will supply greater than 15 volts.

Pneumatic:

All tubing must be in good condition and should be a very tight press fit over the fitting to avoid air leaks. Even a small air leak will compromise any variometer's performance. For extra insurance against air leaks we supply small, thick walled elastic 'donuts' which you may install over tubing several inches past the end. After the tubing is properly attached to the fitting on the instrument, slide the 'donut' back toward the end of the tube so that it supplies extra squeeze around the tubing/fitting area. Do not use electronic type nylon cable ties or twisted wire as this will guarantee a leak.

You may also use short lengths of thick walled silicon tubing instead of the supplied donuts.

Connections are marked on the label on the top of the instrument..

Connect the tubes leading from the sailplane PITOT and STATIC and T.E. source to the pneumatic connections on the rear of the B50 labelled 'PITOT' and 'STATIC' and 'TE PROBE'. Providing a good pitot and static source is very important. A Prandtl probe works well and has minimal position error.

Position error will result in incorrect speed commands and netto computation (B500).

The B500 has provision for position error correction (contact factory or dealer with copy of glider flight manual position error curve.)

* Leak check the system following installation. (See leak checking article)

Good practice hints

Mechanical

Plan your instrument panel layout for optimum scan.

* Require assistance with layout? Contact Borgelt Instruments

Electrical

Separate power circuits for the radio and vario systems are highly recommended. The reason for this is that varios draw 100-200mA and a typical radio on TRANSMIT draws 2 AMPS.

If the radios and varios share the same power buss any resistance in the circuit is multiplied by the 2 AMP current draw of the radio on transmit instead of the 200mA of the vario circuit resulting in a much larger voltage drop. This can result in your vario failing to work properly during radio transmissions particularly if the battery is low.

Of course it is a good idea to minimise resistance in the power wiring for optimal radio performance. Sources of unwanted resistance are poor switch contacts, poor fuses, poor fuseholders, poor battery connectors, wire gauge too small and bad soldering.

We recommend 18 gauge or larger **aircraft** wire, electronics industry type switches (not automotive as these sometimes have unplated brass contacts which oxidise) and CANNON type latching connectors for the battery. (4 pin - pin 1 positive, pin 4 ground. 3 pin - pin 1 positive, pin 3 ground.)

You may find that one power buss with suitable wire and good quality connectors and switches will work acceptably.

Extremely effective radio interference protection is built into the instruments and no difficulties should be experienced. However, it is good practice not to run antenna coax and power leads in close proximity for any great length. The instruments will perform properly down to a delivered voltage at the instrument of 10 volts.

On the B500 there is a voltage display on one page of the GCD.

Pneumatic

The most common mistake in variometer installations is to connect two vario systems to one Total Energy line with a T-piece at the instrument panel. The only time that this is permissible is when both instruments are of the pressure transducer type. (for example a B400 and B500) That is no flasks hence no flow. Flow sensor type instruments cause significant flows in the line to the T.E. probe and these flows can cause these instruments to interact with each other or with a pressure transducer type variometer causing weird behaviour or a general slowing of the response of both instruments connected to the T.E. probe.

The T-piece in the T.E. line should be as close as possible to the T.E. probe although in practice it has been found that if the T.E. line is split under the pilot's seat, further aft behind the seat or near the trailing edge of the wing no problems will result. Maximising the flow resistance between two vario systems and minimising the flow resistance between each system and the outside air is the aim here. DO NOT place restrictors or gust filters in the T.E. line and then split the line to two vario systems. If installing these, place a separate restrictor or gust filter in each line to the separate vario systems. Try also to ensure that there is no excessive flow resistance in the T.E. probe mount or in the probe itself.

If a paper element filter is installed in the TE line the filter body MUST BE EXTREMELY RIGID otherwise the static pressure changes during a pullup will cause spurious variometer readings. This applies also to any gust filter bottles which may be installed ANYWHERE in the T.E. system.

There should be no leaks in any of the plumbing and long lengths of tubing should be of the less flexible plastic or rigid nylon pressure hose. This prevents problems with the sudden static pressure changes in the fuselage during zoom or pushover causing weird transients in the T.E. vario readings due to these presssure changes being transmitted through soft tubing in the T.E. line. Tubing should be securely tied down.

General:

All aircraft instruments contain glues, paints and plastics. Their life may be extended by not subjecting them to extreme heat. It is good practice to use a canopy cover if the sailplane sits in the sun before and after flying and also to insulate under the black antireflection cover. `Space blanket material' works well. Make sure the material does not short any electrical connections.

Other Important Considerations

CAUTION: No matter what the instrument indications may indicate is the optimum speed to fly:

* AT ALL TIMES THE FLIGHT ENVELOPE OF THE SAILPLANE MUST BE ADHERED TO.

*** DO NOT EXCEED PLACARDED AIRSPEEDS FOR THE PREVAILING CONDITIONS.**

Cleaning:

LCDs(Liquid crystal Displays - B500 GCD, B2000) - if required use only a soft cloth and gently wipe the display, taking care not to scratch the surface. Caution: the LCD is easily damaged. Solvents MUST NOT BE USED on LCD or labels.

Meter glass: use a soft cloth dampened with water or a small amount of proprietory glass cleaning solution.

Conversion to Metric Units(B400/B500):

If ordered with metric units this will have been done in the factory.

The variometer scale on the B400 or B500 may be converted to metric indication or knots by adding or removing the 6 m/s label. The instrument calibration can be changed by contacting your dealer or the factory.

WARRANTY

If, under normal operating use, any part of the Borgelt Instruments hardware proves to be defective in material and/or workmanship within the warranty period of twenty-four months from date of purchase such defective parts and/or workmanship will be repaired by Borgelt Instruments or their approved agent. All freight charges are to be borne by the owner. This warranty is not transferrable.

This warranty does not cover damage caused by misuse, neglect, accident, reversal of polarity or repair or attempts to repair by unauthorized personnel.

Any returns must be authorised by Borgelt Instruments prior to shipping.

Please see "Return of Instruments guidelines"