B600/B800 Manual

February 2013

This manual covers operation of the B600 linear scale and B800 logarithmic scale variometers

B800

Table of Contents

FACTORY/DEALER CONTACT

Current addresses can be found on our website www.borgeltinstruments.com

email: mborgelt@borgeltinstruments.com

alternatively contact BORGELT INSTRUMENTS

Phone: 07 4635 5784

Outside Australia +61 7 4635 5784

WARRANTY

If, under normal operating use, any part of the B600/B800hardware 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.

Returns to factory

See website for current instructions/policy.

1. OPERATION

The B600/B800 system is much more than a simple variometer. Careful study of the features and operation will be repaid handsomely in flight.

While there may seem to be many features, in practice these are designed to be very easy to use and in a short time will seem completely natural and the information is very easily assimilated. This will assist greatly in your in flight decision making and give you more time for outside observation.

> { **CAUTION:** AT ALL TIMES THE FLIGHT ENVELOPE OF THE SAILPLANE MUST BE ADHERED TO.

> { **DO NOT EXCEED PLACARDED AIRSPEEDS FOR THE PREVAILING CONDITIONS**

General

On power up the B600/B800goes to full scale down for a few seconds, back to zero then all LED's light momentarily, then the pointer moves goes to zero variometer reading. The normal minute or two on first power up is still required before the vario indicates zero (CLIMB Mode only- in cruise mode the vario may show some offset on the ground at zero airspeed).

There is no mechanical zero adjust knob in the middle of the meter scale. DO NOT open the case to adjust the mechanical zero. This is done automatically every time the B600/B800is powered up.

On power up the GCD, if fitted, shows the setup page with the volume, bugs, ballast, arrival height and name of database selected. Arrival height always reverts to default on power up. Default may be set in customer PC software to any desired value.

In Flight

In flight, information is available from audio, round meter/LEDs, digital display (B800 only) and GCD (Glareshield Controller Display).

B800

The vario pointer is driven by a miniature stepper motor. The variometer scale has been expanded in the zero to +/-2 knots (1M/sec) range and reads from -12 knots to +14 knots
and the 0 to +14 knots occupies 180 degrees of pointer movement giving 15 degrees of pointer angle shift per knot versus the older varios giving 12 degrees per knot, a 25% increase. In the 8 to 14 knot range (4 to 7M/sec) the scale is compressed. Most soaring is in the 2 to 8 knot range but when conditions are weak or on slow final glides the expanded scale in the low range is useful and if conditions are strong the pointer will still move to help centering. The audio and digital averager(digital averager in B800 only) on the scale will go to at least -12
to +15 knots or more.

B600

The B600 scale is linear from -10 to +12 knots(-5 to +6 M/sec). There is no digital averager in the scale.

1.1 Climb Mode (Mode or cruise/climb switch closed – Note mode switch sense can be inverted in customer software setup for gliders with the switch installed in reverse)

The rate of climb is shown on the round display and has a range from 12knots(6m/s) sink to 14 knots(7m/s) (B800 and -10 (-5M/sec)to +12knots(6 M/sec) climb. Red and green LEDs are located near the "zero" point of the variometer. When climbing the green LED is ON when the variometer is above the running 20 second value and the audio climb "beeps" change on/off ratio above and below this value.

This means that when the green light is on and the audio "beeps" have changed, that the running average rate of climb is INCREASING.

The red LED is always ON in climb mode, OFF in cruise except in AIRMASS sink so acting as a cruise/climb indicator.

The audio ranges from 12 knots sink to 15 knots climb beginning at 12 knots sink with "clicks" which become a solid tone above 5 knots sink and above zero the tone becomes interrupted.

Audio volume is set to a default level and is adjusted by the toggle switch in the top right mounting hole position. Moving the toggle left and up increases volume, right and down decreases volume.

The toggle switch in the lower left position has three positions. Up and to the left is a momentary position and momentarily selecting this position changes the CLIMB mode audio.

The standard setup is that the audio is in "full range" (up and down audio) on power up. First momentary selection, all the blue and amber lights flash for a short time and the audio is confirmed in full range mode. Second

momentary selection the blue lights flash for a short time and the audio is in "up only" mode and the sink audio is silenced. Next selection causes both blue and the lower amber light to flash and the audio is "full range"(climb and sink) but with a silent zone between 1 and 4 knots sink (0.5 to 2 M/s). This corresponds to normal inter-thermal sink rates. Sound then signifies some significant change in the airmass is occurring. Next selection flashes all blue and amber lights and the audio is in "full range" mode. This pattern repeats with successive selections.

These audio modes are useful when ridge soaring or wave when you may want to be in climb mode instead of cruise mode with speed command which is primarily for inter thermal cruise.

In the middle position this switch selects the digital display to show the running (last circle) average. It is a slow variometer with a time constant of around 18 seconds. This is the AVERAGER.

In the lower right switch position the average for the whole climb (total height gain/time taken from start of climb to present time) is shown on the digital display. This is the INTEGRATOR. This starts with switching to CLIMB mode and stops when CRUISE mode is selected.

Indications

The white pointer indicates total energy rate of climb at all times. The basic variometer time constant is around 2 seconds. B800 only: The scale is expanded in the 0 to +/- 2 Knots (1 M/s) range, the same as the B400/B500 variometers in the 2 to 8 knot (1 to 4 M/s) range and compressed in the 8 to 14 Knot (4 to 7 M/s) range. Pointer movement is hence amplified in the low range (useful in weak lift or on best L/D final glides) and the pointer still moves in the strongest lift.

At 10 knots (5 M/s) the audio produces 1 Hz (one per second clicks) rising to 5 per second at 5 knots (2.5 M/s)sink and rising from there to 1200Hz and greater at 10 knots (5 M/s) and higher climb rate. At positive rates of climb the sound is interrupted and becomes "beeps". The beep rate increases with increasing rate of climb. **Note** that the audio ALWAYS has twice the change in pitch and beep rate from 0 to 1.5M/s (0 to +3 knots) as it does for the rest of the "up" range".

As supplied the B600/B800audio is in "competition" mode. This means that when the vario reading is below the AVERAGER running average value the beeps above zero are 70% on and 30% off. Above the AVERAGER the beeps are 50% on and 50% off. This is a subtle yet distinctive change which lets you know things are getting better or worse and which side of the thermal is best.

Contact factory for how to set to "classic" mode (always 50% On and 50% OFF for the beeps).

The green light also lights when the vario is above the AVERAGER When it goes out the running average climb rate is decreasing.

There is a 2 1/2 digit LCD in the middle of the lower part of the variometer scale. This shows either the AVERAGER or INTEGRATOR as selected by the pilot. The range is from at least -10 Knots (-5 M/s) to at least +15 knots (+7.5 M/s)

When climbing, the blue and amber lights are trend comparators between the AVERAGER and INTEGRATOR.

On beginning a climb, the inner amber and blue lights (one of each) turn on, and the lights remain on for 60 seconds after which meaningful values for both running and whole climb average will have been established. After that, the light pattern is:

AVERAGER greater than 1.2 x INTEGRATOR, two blue ON

AVERAGER greater than 1.1 x INTEGRATOR, one blue ON

AVERAGER less than 1.1 x INTEGRATOR but greater than 0.9 x INTEGRATOR , No lights ON

AVERAGER less than 0.9 x INTEGRATOR, one amber ON

AVERAGER less than 0.8 x INTEGRATOR, two amber ON

When the AVERAGER is less than 0.95 x INTEGRATOR, falling tones are heard for a short interval. This audio alert will repeat after 20 seconds while this condition exists and the rate of climb is still positive.

Of course if the current vario reading has decreased markedly and the green light is out the AVERAGER will follow soon.

Combined with the green light and audio ON/OFF ratio and audio alerts these blue and amber lights provide useful cues as to whether to remain in the thermal or to consider leaving.

Whenever the running average (AVERAGER) is greater than the whole climb average (INTEGRATOR) so far, the whole climb average is improving, conversely when the running average is less than the whole climb average so far, the whole climb average must be decreasing. The whole climb average is what determines your average cross country speed and staying in thermals for too long once they begin to weaken will hurt your whole climb average. Equally it is important to center thermals quickly as will be shown by comparing what the AVERAGER indicates for most of the climb against what the INTEGRATOR indicates as you leave.

Of course there may be good reason to remain in a weakening thermal if you suspect it is the last one of the day or there is an extensive dead area to cross.

Pilot discretion must be exercised at all times.

It is up to personal preference as to whether the AVERAGE or the INTEGRATOR is selected for display. INTEGRATOR determines cross country speed. AVERAGER is best for setting MacCready for final glide.

The trend system is reset after leaving lift but the INTEGRATOR number is preserved until ten seconds after entering CLIMB mode the next time.

When current rate of climb is below the 18 second average rate of climb the audio beeps are on 70%, off 30%. When above, on and off 50%. This provides clear information about the good and bad parts of the circle and also warns of the thermal weakening.

The digital display shows the current running average(AVERAGER) with the toggle switch in the center and the total thermal average (INTEGRATOR) with the switch in the lower position.

The large number on the main page 1 of the GCD is the current 18 second running average rate of climb and the graphic on the right hand side shows the last one minute history of the rate of climb.

The alternate display is of navigation data in this space.

1.2 Cruise Mode (Mode switch open – see above)
In cruise mode the red and green LED's indicate when the airmass is rising or sinking and the vario becomes optionally TE vario, netto or Relative netto. (selected in customer PC software setup)
Speed to fly is indicated by the blue and amber LEDS. "Fly slower" lights up one blue LED, "fly lots slower" two. Likewise the two amber LEDs indicate "fly faster".

The digital display (B800 only) shows the netto average. i.e how much the airmass is rising or falling over the last 18 seconds or so.

The "fly faster" and "fly slower" sounds are two alternating tones for "fly slower" and two very rapidly alternating tones for "fly faster". There is a silent zone at around the correct speed to fly and the audio will not make any sound on the "fly faster" side unless you are flying slower than the speed for zero MacCready. This makes the audio more pleasant and less annoying in gusty conditions.

If you wish the audio speed command to operate in the usual way with a symmetrical silent zone around the optimum speed to fly, please contact BORGELT INSTRUMENTS.

The silent band is adjustable. We recommend initial flights are made with the factory settings.

When the relative vario goes above the Macready setting the sound changes to the normal climb TE vario warning of a significant lift encounter. This feature may be disabled in customer software setup.

In cruise mode the large numbers on page 1 of the GCD display are the NETTO(AIRMASS) average over the last 20 seconds or the PERFORMANCE INDEX and the graph shows airmass movement over the last minute.

NETTO(AIRMASS) indication is most useful for picking the best path through the air between thermals and for meteorological awareness of what the AIRMASS you are flying in is doing.

PERFORMANCE INDEX is the ratio of the glider performance since leaving the last thermal(switching to cruise mode) to the theoretical clean glider perfomance at the current weight.

See Glareshield Controller/Display (GCD)section for a complete explanation of all features and functions available on the GCD

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

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

1.3 Audio
The B600/B800has a two channel audio and is supplied with left and right speakers. When the two channel audio feature is enabled (requires HP_GPS and GCD) the following applies:
When thermalling the sound is switched to one speaker when the circle should be opened in that direction.
When cruising the speed command sounds come from the side where the next turnpoint lies.
(see GCD Operation for details)
Various B600/B800audio functions are customisable.
Contact Borgelt Instruments for details.

1.4 B600/B800 GCD OPERATION

Please note: DO NOT insert or remove mini SD card from GCD with power applied. The card may become corrupted. Also eject properly after reprogramming the card in a PC.

QUICK START

Top button

Momentary press changes pages between first three (flying) pages.

Press and hold switches to setup pages. Momentary press changes setup pages until first page comes around.

Rotary encoder

Press encoder knob to move cursor on page.

Rotate encoder forwards or backwards to change number highlighted by cursor.

Press and hold to move selected turnpoint to "next turnpoint" field on page 2

Detailed explanation

The B800GCD has BLACK push button top left and under it a Black rotary encoder knob with push button action and the rest of the area is occupied by a 122 x 32 graphics LCD.

The BLACK push button changes the display page (5 pages). Momentary pushing of the BLACK push button cycles the display between pages 1, 2 and 3 which are the pages you normally want flight information on. Holding the BLACK push button down down for 2 seconds accesses pages 4 and 5 which are the setup pages and page 6 is reserved for displaying engine information for motorgliders.
Momentary pushes on these pages will eventually cycle back to pages 1, 2 and 3.

The Black rotary encoder push button moves the cursor to the variable the pilot wishes to change whereupon rotating the encoder changes the variable. The value last set is the one used by the instrument. There is no "enter" function.

On power up the GCD comes up on Page 3. This is to remind you that you need to set bugs, ballast and arrival altitude and select the correct turnpoint database.

GCD Page 1:
Cruise Mode:
The B800GCD may be configured so that the large numbers on the GCD display in cruise are the NETTO(AIRMASS) average over the last 20 seconds (N next to number for Netto) and the graph shows airmass movement over the last minute. NETTO(AIRMASS) indication is most useful for picking the best path through the air between thermals and for meteorological awareness of what the AIRMASS you are flying in is doing.
Alternatively and now the recommended and factory default the PERFORMANCE INDEX is displayed . This is the ratio of the glider performance since leaving the last thermal (switching to cruise mode) to the theoretical clean glider perfomance at the current weight. This is also shown and preserved during climb on the third GCD page just above the "bugs" (performance) setting.

Climb Mode:
The large number on the GCD is the current 20 second running average rate of climb (V next to number for variometer) and the graphic on the right hand side shows the last one minute history of the rate of climb.

The MacCready setting is the only variable so just rotating the encoder is all that is required to change MacCready setting.
Also shown is the Speed to Fly in still air for that MacCready setting (Bugs and ballast are on Page 3).
The number next to the SL in the middle left of the screen is the altitude surplus or deficit on the glideslope for the settings that have been entered on the second page.
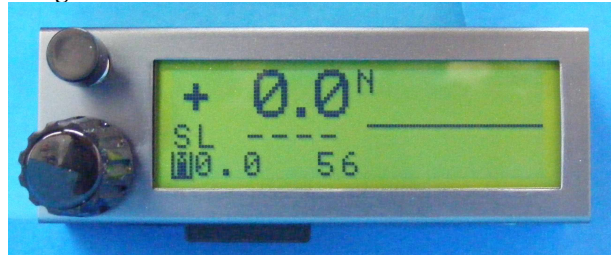
In both climb and cruise the dotted line is the current 20 second average value, TE variometer in climb, Netto in cruise.

GCD Page 2: The Nav/glide/wind page
This page is organised in two columns of four rows of fields as below:

Next Turnpoint (TP)   NAV status/wind speed and direction
Following TP   previous wind speed/direction
Distance to next turnpoint   actual wind component   wind component used in glide calculation*
Bearing/steer x degrees left/right to Next TP   Glideslope surplus/deficit around next to following TP

•   This value may be manually changed by moving the cursor to this position and rotating the rotary encoder.
•   "A" signifies automatic, "M" signifies you are in manual mode.
•
The cursor is moved by pressing the encoder button momentarily.
The cursor is always on Following TP when changing to this page so just rotate the encoder and a name will appear.
The operation is designed so that a single button press will allow you to round a TP, and then immediately select another following TP from the database.
To do this, select the desired TP name from the database. Press and hold the encoder knob for 1 second. The name will transfer to the Next TP slot at the top. Then select the following TP from the database for the second slot.
Then navigation will be to the Next TP, and glide slope is calculated to the Following TP.

On AAT tasks just press and hold the button when you decide to proceed to the following turnpoint once in the Next TP zone.

New Feature February 2013

In previous versions to select a new turnpoint database file the power needed to be cycled after making a new selection. This no longer applies and a new database file may be selected "on the fly".

You can pre program tasks using this feature. To do so just put the start, turnpoints and finish point in one of the ten allowable databases on the mini SD card in the order in which you want to fly them, then select that database. When you bring up the first point by rotating the encoder knob it will be the startpoint. Make it active(press and hold knob and the first turnpoint will appear below it. When you make the start, press and hold the encoder knob and the first turnpoint will be active and the second will appear below. Continue similarly for the other points. For databases with 15 or fewer points it is assumed that the database is a task and the following point is automatically selected.
For a general larger databases the current point appears again when making a point active. You can select any larger database at any time in flight in order to go "off task" for any reason.
You may also wish to make one database of landing points or airfields only and select this at any time in flight in order to glide to a landing point.

Wind computer
The cursor may also be moved to the "wind component used in glide calculation" field (the rightmost of the two wind component fields). This field will display the wind component to the next turnpoint from the present position, based on the wind speed and direction in the top field above which will produce a value when circling in climb mode on the B600/B800and at least two circles have been completed. It will be updated every next circle and the previous wind speed and direction is displayed below it so as you climb you can see how the wind is changing (or not). An "A" will appear denoting "Automatic" wind, next to the "used wind component" number.

Normally the headwind/tailwind component should not need to be altered unless you suspect meteorological conditions have changed up ahead, however you can place the cursor over this field and change the headwind/tailwind component that is being used in the glide calculation. An "M" will appear denoting that the wind component used is now "Manually" set. This will revert to automatic wind when a turnpoint is changed and you can revert at any time by momentarily changing the turnpoint to another and back to your original one. The wind component shown to the left of this field is the actual head or tail wind component derived from the difference between the GPS groundspeed and the True Air Speed (TAS) at any moment in cruise mode. If this is different from the component to the right you should be thinking of the reason for this. Maybe the wind has changed since you left the last thermal?
In climb mode this isn't very useful so the component shown is the wind component from present position to the next turnpoint based on the latest wind speed and direction calculation.

The lowest field on the right is the altitude surplus or deficit on the glideslope for the current MacCready, bugs ballast and wind. This is the same as on page 1.
Note there is no magic in the wind calculation. It depends on the drift in the thermal

Note that when on the ground the Bearing/steer x degrees left/right to Next TP field shows bearing to next TP.

When airborne this field shows degrees to steer left or right to the Next TP with left/right arrows.

When you pass through 30 knots on takeoff roll the two TP fields show "takeoff" if no other turnpoints have been selected. If you do nothing else you will get nav and final glide guidance to the takeoff point.
Great for local soaring!
If you select turnpoints before takeoff this feature still works but you need to select "takeoff" from the database. It is always placed at the beginning of the database.

The NAV status/wind speed and direction field will show Nav status on the ground, "No Nav" until the GPS acquires enough satellites to get a fix and "Nav good" when it does. Once airborne it will show wind speed and direction once at least two circles have been done with the B600/B800in climb mode. If you do not do good circles this will require more time to get a valid wind as it depends on the thermal drift to get wind speed and direction.

A typical screen view might look like this in flight:

Bunya Mt   240/12
Jandowae   230/11
18.4   hw7 Ah5
 >012>   SL-8567

We are 18.4 km from Bunya Mt need to turn right 12 degrees to go directly there and are going to Jandowae after Bunya Mt and we need another 8567 feet to arrive at Jandowae at the selected height above ground.(This is set on Page 3) The wind is 240 degrees at 12 knots, the previous wind calculation result was 230/11, the current headwind in the direction currently being flown is 7 knots and the wind component in the direction of Bunya Mt from present position is 5 knots based on the wind being 240/12 and the wind calculation is "Automatic". This vector wind is being used in the glide calculations on both legs. The component will change when you turn and proceed on the next leg.
Note: All bearings and wind directions are relative to TRUE north not magnetic north for simplicity.

GCD Page 3 bugs, ballast, final glide arrival height and database in use are selected here.. The cursor is on bugs when you switch to this page as the Performance Index for the last glide is stored here which helps with deciding what bugs setting to use. To change the other variables press the encoder knob to move the cursor to **Ballast** for example and then rotate the encoder to change the ballast setting.
Arrival height is height margin above the turnpoint elevation as in the turnpoint database. The factory default here is 2000 feet. This can be changed with the customer PC support software. The default appears every time the B600/B800is powered up. See software appendix.
OAT and Battery Voltage are also shown.

GCD Page 4 (setup page):
LCD contrast can be adjusted here.
Audio balance (relative level of left/right speakers to compensate for left/right ear hearing or small speaker differences)
Init Vol is the volume level of the audio on power up.
Vario response can be adjusted here to be fast or slow.
Changes on this page are stored on changing from this page.

GCD Page 5 (setup page): Thermal centering

Currently the status of this feature is "experimental".
We need feedback from users as to what settings they find are most useful for the variables. We will then make the averages from users default settings.
This page contains the adjustable settings for the left/right audio thermal centering feature.
The page looks like this:

LR Gain   xx
Threshold   yy
Delay   zz
Bal   128   Alg 1

You can change the numbers next to these variables by putting the cursor on them and rotating the encoder. They can be saved by changing pages back to the first main flying page. These settings will survive a power cycle if changed from the defaults.

The numbers are our best estimate of useful settings after our testing. There are actually 2 algorithms and you can change to alg 0 which is a smooth level transition from side to side. This may not be as noticeable in a glider cockpit as Alg 1's switching completely so only one speaker is on when the threshold is exceeded.
The most useful numbers to change will likely be the threshold number and the LR(left -right) gain number..

In order for this feature to work the speakers must be installed vertically in line with the pilots ears, on each side of the cockpit. The right hand speaker is connected to the speaker socket closest to the left hand side of the aircraft. Then the thermal centering signal is such that you fly towards the sound. This will also work in cruise so that if navigating with the B600/B800when cruising and off course to the next turnpoint the audio speed command sounds come from the same side as the turnpoint.
The technique used is basically the simple "if lift increasing significantly, open out - decreasing, tighten back"

This feature may be disabled by setting LR Gain to zero, THRESHOLD to 10 AND the centering algorithm to 0
You must do this if using only one speaker.

GCD Page 6 This page is reserved for engine data for motorgliders, obviating the need for a dedicated engine data instrument in the panel. Motorglider engine system naufcaturers are invited to contact Borgelt Instruments.

Sailplane/pilot settings

Macready: 0 - 9.5Kt   = speed to fly in 0.5 knot increments to 9.5 knots
          0 - 4.9m/s = speed to fly in 0.1 m/s increments to 4.9 m/s
Ballast: ballast state 0 = sailplane lowest flying weight, adjustable to 100 (full ballast). There is a ballast ratio number in EEprom which must be set for the particular glider for this to work properly. Default ratio is 1.6 (full ballast mass/minimum flying mass =1.6)
Note lowest flying weight is weight of glider + lightest pilot + fixed equipment (including parachute).
Bugs = sailplane performance is degraded by bugs or rain on the wings which changes the polar and hence makes the netto/relative netto and speed command inaccurate. The bugs control may be adjusted to reflect the glider's performance as a percentage of the assumed clean glider at that flight mass. This can be set from 100% (clean) to 70% (30% degradation).

Appendix 1

PC Support

System Architecture

So as to have better idea of what is done here, here is a discussion of the system architecture

The B600/B800 consists of the B800 system unit with the variometer display *(available in either 57mm or 80mm size)*, and optionally the HP_GPS(GPS sensor) and the GCD(Glareshield Controller/Display).

Inside the system unit are the meter drive processor, the sensor processor and the audio processor (along with pressure sensors and their amplifiers). These processors are networked together with the GCD processor and GPS and future devices can also be connected.

The B600/B800 operating software is distributed amongst the processors so a program upgrade or bug fix may involve one or more processors in the system.

Operational settings like the polar variables, variometer speed of response, customer choices, and much of the operating detail such as audio tones, chop rates, pitch etc are held in non volatile memory (EEprom - Electrically Erasable programmable read only memory) as numbers which are *automatically* read after power up and then used to control the operating software.

This allows a user to customise the instrument without changing the operating program, which is held in another kind of non-volatile memory (Flash).

Eeprom (polar and setup choices) settings may be changed by using the Customer version of the B600/B800 PC support program. Other B600/B800 settings may also be changed. Contact the factory for details.

The common EEprom numbers (polar and setup choices) may be changed using the customer version of the support software, making a new Setup_U.eec file, placing a new file on the card and powering up the B800after the card is inserted in its slot. The new file with settings is then loaded.

Alternatively EEprom numbers may be changed by connecting the B600/B800 to a PC with a serial port or a USB port with USB to serial adapter.

For other changes to the B600/B800, contact the factory. Many features in the B600/B800 are tunable by changing Eeprom numbers but please fly for a while with the instrument as supplied. Extensive experience has been used to arrive at the factory default setups.

GETTING STARTED PC Support

Note: Familiarity with the Windows Operating System is assumed. Windows Help is a valuable source of information on how to carry out Windows operations such as file copying, pasting and moving. Borgelt Instruments does not provide a "how to use Windows" service.

Download the B800Install.zip file from our website www.borgeltinstruments.com to a temporary folder. Unzip it and run Setup.exe, which will install the B800Support.exe and other needed files into your Program Files\B800folder.

Then download the latest version of PC support program – B800Setup Card.exe and also download Setup_U.eec and GCD_U.tea put them in the same folder.

Any turnpoint database files may be placed here also. The source files for turnpoint databases are in WinPilot *.dat format usually obtainable from the World Wide Soaring Turnpoint Exchange on the web. These files are easily human editable with any text editor such as Windows Notepad.

Run the B800Setup.exe program by double-clicking the name. Select PC from the menu bar and select the correct serial port - corresponding to the PC hardware physical port.

Create a desktop shortcut in the usual way.

If your B600/B800has not been set up for you by the factory or dealer you will need to enter data for the sailplane polar and some user choices. The method depends on whether you wish to use the mini SD card or the direct PC serial connection.

Mini SD card method

Note: In order to prevent corruption of the data structure on the mini SD card, do not insert or remove card from GCD2 while the B600/B800 is powered up.

In order to remove a card from a card reader slot in a PC the drive represented by that card must be deactivated. In Windows XP/Windows 7 this can be done by right clicking on the drive in "My Computer" and selecting "eject", then removing the card.

An SD card reader attached to a PC is required to change the data on the card. Some PC's have built in SD card slots.

The mini SD card supplied (with SD adapter to fit in SD slots on card readers) already has a B500 folder (yes it **REALLY is B500, not B800, for legacy reasons**) created on it.

When reloading a new program version or EEprom file the files are called GCD_U.tea (program)and Setup_U.eec (Eeprom values). When the files have been loaded by the GCD the names are changed to GCD_D.tea and Setup_D.eec so that a GCD can tell whether the files are old or new ones that require loading.

Setting a new polar/user choices for your sailplane

Use the "with GCD" Customer mode of the PC support program (see below) to make a new version of setup_U.eec with your polar and custom user choices on it. Once you have done this it would be wise to keep a copy on your PC for future use.

Important: Some Windows versions may have trouble automatically deleting and immediately replacing a file with the same name but altered contents. Move a copy of your old Setup_U.eec to another folder before carrying out the following:

When you wish to change the polar or any other EEPROM setups in the B600/B800put the card in your card reader attached to your PC.

Launch the B800Setupprogram and select Customer mode.

Use Open on the form to open the file Setup_U.eec which puts default settings on screen. Make your instrument setup choices and insert the appropriate polar numbers then use Save As to save the setup file as a filename appropriate for your use (for example Ventus_C.eec). A new Setup_U.eec file is then created in the B800Setup-folder with these values also. Copy the new Setup_U.eec to the folder B500 on the card. When the card is inserted in the GCD and the B600/B800 is powered up the new values are copied into the appropriate EEprom locations in the B800. Follow the instructions on the GCD screen.

Turnpoint files
The GCD operates on turnpoint files in WinPilot *.dat format. All editing of the files should be done in .dat format before conversion to .tpc format. The support program translates the .dat format file into a .tpc format file for direct use in the GCD2

From TP Data, Select Open and Open the WinPilot*.dat file you wish to use. The turnpoints will appear in the window and you can check them if desired. Then select Convert and a *.tpc file containing those turnpoints is then created.

Place this file in the B500 folder on the card.

When the card is placed in the GCD and the B600/B800 is powered up the first setup page (volume is at the top) appears. Scroll to the space at the bottom of the page by moving the cursor, then rotate the encoder knob and you will see the turnpoint filename. Change the page and this filename will be stored in EEPROM. When you next power up the instrument this file will be the active turnpoint file. You may change the turnpoint file at any time by going to the first setup page and changing to another file. Up to 10 turnpoint files may be stored on the card. Effectively there is no limit on the number of turnpoints in any one file but for ease of scrolling we suggest 50 to 100 turnpoints per file is enough.

New Feature February 2013

In previous versions to select a new turnpoint database file the power needed to be cycled after making a new selection. This no longer applies and a new database file may be selected "on the fly".

You can pre program tasks using this feature. To do so just put the start, turnpoints and finish point in one of the ten allowable databases on the mini SD card in the order in which you want to fly them, then select that database. When you bring up the first point by rotating the encoder knob it will be the startpoint. Make it active(press and hold knob and the first turnpoint will appear below it. When you make the start, press and hold the encoder knob and the first turnpoint will be active and the second will appear below. Continue similarly for the other points. For databases with 15 or fewer points it is assumed that the database is a task and the following point is automatically selected.
For a general larger databases the current point appears again when making a point active. You can select any larger database at any time in flight in order to go "off task" for any reason.
You may also wish to make one database of landing points or airfields only and select this at any time in flight in order to glide to a landing point.

Other choices

Many other variables in this instrument can be set in the EEproms such as the audio tones, break points etc. If you decide that something could be different or better please let us know and we can implement this if feasible. Contact the factory for details of how to do this.

Correction for Position Error in airspeed system

We will provide a new EEprom file for you if you send us a copy of the position error table or graph for your glider. We will provide this to you or your dealer so that the B600/B800can be set up properly.
Even better is to use a proper Prandtl probe(combined Pitot/static probe) for air data for the B800. Note that the glider's airspeed indicator must be connected to the statics used for certification.

Conversion to metric units

The B600/B800 may display metric units. The only difference is that the scale around the instrument front must be turned over and metric units selection in the PC customer support program. The meter and other necessary calibrations are then set on power up.

Direct PC serial connection method

Setting a new polar/user choices for your sailplane

The provided load cable has a DB9 on one end, a red band and a RJ plug on the other. Plug it into the red banded socket on the *XCB (eXternal Connection Board of the B800)* normally used for the B2500/PDA/PNA data.

OPTIONALLY available: We do have available a PDA_PS/dataport module which consists of a circuit board with connectors and switches which can be permanently panel mounted and plugged in to the B600/B800which lets you connect a PC to the B600/B800from a DB(on this board using a straight through serial cable.

NOTE: If you use the PDA_PS dataport with a PDA/PNA you MUST disconnect the PDA/PNA from the system while doing PC communications.

For B600/B800stand alone installations *(ie no PDA or B2000/B2500 connected)* you can mount the DB9 of the load cable in the instrument panel and plug the RJ connector permanently in to the B800.

Connect the DB9 to a PC serial port using a standard straight through DB9F/DB9M serial cable.

NOTE THIS PORT MUST NOT BE USED BY ANY OTHER SOFTWARE RUNNING IN THE BACK-GROUND, such as MICROSOFT ACTIVESYNC.

If your PC doesn't have a serial port, only USB ports, you need a USB to serial converter. Install this and the associated software to create a serial port, taking note of the port number it makes. You may need to go to control panel, system, hardware, device manager, ports, to find out.

NOTE: The B600/B800baud rate for serial communications is 38400 baud. This copes with large amounts of data in a one second frame without overflow. This is different from the 4800 baud used by the B500.
With USB to serial devices we have found a way to improve reliability of serial communications with these at the 38400 baud rate we use for the B600/B800PC communications. We use this baud rate as it is the same as the 38400 baud NMEA output from the same port in normal operation.
In control panel - system - hardware - device manager - ports, right click on the serial port to get properties and select port settings - advanced - USB transfer sizes and set to 64 for both transmit and receive or lowest value. This screen varies in details with the particular USB to serial device (may have slide bars). This has vastly improved our Belkin and Prolific USB to serial devices' performance with the B800.
We have found one other USB to serial device which seems generally superior to the rest (www.dontronics.com). Judging by the comments from customers on that website it seems that problems with other types are not uncommon but setting transfer sizes to minimum seems to help greatly.
Belkin USB to serial device may still have problems on some machines. Prolific and Dontronics devices work well.

Launch the B600/B800setup program, select "No GCD" and select customer mode from the "settings" menu.

Power up B800.

After you power up the B600/B800 you will see the NMEA messages in the box at the bottom. (this may take 10 - 15 seconds during which you see some startup messages).

Once you see the NMEA messages in the window at the bottom of the form (once per second), the B600/B800will automatically be put into PC communications mode. DO NOT HURRY as it takes a few seconds for the sequence to be completed.

Press the START button and the greyed out buttons will become active.

There is a default polar in the B800(LS4 at 345Kg, 760lb) if received from the factory or dealer without being customised for your sailplane.

You can import to the PC program the default values in the B800. For this press B800>>PC. The form will be filled in with the default polar settings and default customer settable user options obtained from the B800.

Obtain polar values for your glider by using B500polar.exe available from our website (read B500polar.txt first) or contact us and we'll give you the numbers. You will need to provide us with the minimum flying weight of your glider: glider + lightest pilot + parachute + fixed equipment. You also need to calculate the Ballast Ratio

which is mass of maximum water ballast/minimum flying mass of glider. Note that the mass of max water ballast is just the mass of the water, not the mass of the glider plus water.

Note the format to be typed into the boxes is that of the numbers produced by the B500polar.exe program. The numbers are always positive, any negative signs are automatically added as required inside the B800.
You can also change the units calibration (you will need to reverse the bezel for the vario scale if changing to metric), cruise/climb switch sense (default is closed = climb), whether the audio automatically switches to climb mode when the relative netto reading exceeds the current Speed to Fly (MacCready) setting (default is active) and the netto type chosen (default is Relative Netto) as well as the ratio maximum glider mass/minimum flying mass.

No Netto is just TE vario. For explanations of netto and relative see the article on "Basic sailplane instruments" on our website. We recommend the factory default (Relative netto in cruise).

When you have changed the default values to your choices and polar numbers, press PC >> B600/B800and the new values will be loaded and you will see the form filled in.

When finished, power off the B800.
The instrument is then ready for use with the new configuration.

Loading new turnpoint database

This is always done on the mini SD card. See above.

Other choices

Many other variables in this instrument can be set in the EEproms such as the audio tones, break points etc. If you decide that something could be different or better please let us know and we can implement this if feasible and we will send details of how to do this. New EEprom values can be set with the direct serial connection or the mini SD card if a GCD is used.

Correction for Position Error in airspeed system

We will provide a new EEprom numbers for you if you send us a copy of the position error table or graph for your glider. We will provide this to you or your dealer so that the B600/B800can be set up properly.

Conversion to metric units

The B600/B800 can be set to metric units using either the mini SD card or the direct serial connection. The only difference is the bezel on the front of the instrument must be reversed. The meter and other necessary calibrations are then set on power up.

B600/B800SOFTWARE UPGRADES

GCD (mini SD card) version

COMMUNICATING WITH B800
The provided load cable has a DB9 on one end, a red band and a RJ plug on the other. Plug it into the red banded socket on the *XCB (eXternal Connection Board of the B800)* normally used for the B2500/PDA data.
OPTIONALLY available: We do have available a PDA_PS/dataport module which consists of a circuit board with connectors and switches which can be permanently panel mounted and plugged in to the B800which lets you connect a PC to the B600/B800from the front of the panel using a straight through serial cable.

NOTE: If you use the PDA_PS dataport with a PDA you MUST disconnect the PDA from the system while doing B600/B800to PC communications.

For B600/B800stand alone installations *(ie no PDA or B2000/B2500 connected)* you can mount the DB9 of the load cable in the instrument panel and plug the RJ connector permanently in to the B800.

Connect the DB9 to a PC serial port using a standard straight through DB9F/DB9M serial cable.

NOTE THIS PORT MUST NOT BE USED BY ANY OTHER SOFTWARE RUNNING IN THE BACKGROUND, such as MICROSOFT ACTIVESYNC.

If your PC doesn't have a serial port, only USB ports, you need a USB to serial converter. Install this and the associated software to create a serial port, taking note of the port number. If you have trouble getting a program upload to work or the process stops before completion contact Borgelt Instruments.

With USB to serial devices we have found a way to improve reliability of serial communications with these at the 4800 baud rate we use for the B800program and EEprom loads. We only use this baud rate as it is the same as the 4800 baud NMEA output from the same port in normal operation. In control panel - system - hardware - device manager - ports, right click on the serial port to get properties and select port settings - advanced - USB transfer sizes and set to 64 for both transmit and receive or lowest value. This screen varies in details with the particular USB to serial device (may have slide bars). This has vastly improved our Belkin and Prolific USB to serial devices' performance with the B800.
We have found one other USB to serial device which seems generally superior to the rest (www.dontronics.-com). Judging by the comments from customers on that website it seems that problems with other types are not uncommon but setting transfer sizes to minimum seems to help greatly.
Belkin USB to serial device may still have problems on some machines. Prolific and Dontronics devices work well.

Note: Power or data must not be interrupted during a program load.

After launching the B800Setup.exe and selecting dealer mode by dropping down the "settings" menu and selecting "dealer", power up the B600/B800and wait until the NMEA messages are visible in the message box at the bottom of the form.

Then in the upper left select "sensor" in the " Device active – select" menu. Click on the small circle to do this and you will see it fills with a black dot.

Also select "Log to PC" as this will help us in the event of difficulties as a log file of what you did is created in the PC which can be emailed to us.

Then press the PC mode button and a second or two later the button will go green. Do not be in a hurry to go through the steps as the B800/PC system may take a few seconds to complete the previous command.

You may now check on the program version date for the sensor processor by pressing the "get version" button in the Program file box.

If it does not match the version shown in PC, press Program, a programming box will appear and after a few seconds the new program version will load. A progress bar shows progress and after the program is loaded the default factory EEprom file is automatically loaded.

When done, select either "meter" "Audio" or "ADU"(ADU refers to repeaters, not normally present in a single seat installation) by clicking in the small circle. The "Pass thru" button will automatically go green. Then the program version can be checked and a new version uploaded if required. There is a separate processor in each of these modules. Again, do not be in a hurry, let each step complete before proceeding to the next one.
When the first of these is done check the box for the next one and repeat the procedure until all have been upgraded.

It may be safer to do the following to upgrade the meter, audio and ADU:

When done with the "sensor", exit the program, power down the B800and then relaunch the program and power up the B800and start the same procedure as above but this time, after the PC mode button is green select either "meter" "Audio" " GCD" or "ADU"(ADU refers to repeaters, not normally present in a single seat installation) by clicking in the small circle. The "Pass thru" button will automatically go green. Then the program version can be checked and a new version uploaded if required. There is a separate processor in each of these modules. Again, do not be in a hurry, let each step complete before proceeding to the next one.
Repeat for each processor in turn by turning off the power in between processors and re-launching the PC program.

Some B600/B800program upgrades will only require one or two of the processors to be upgraded. This will be noted with the upgrade.

When finished upgrading the sensor processor, meter and audio (NOTE: NOT the GCD program) in the main unit, the GCD program is upgraded via the mini SD card by loading the new GCD_U.tea file and the default Setup_U.eec file into the B500 folder on the card (files available for download from our website, www.borgelt-instruments.com), inserting the card in the slot while the B600/B800system is powered down and then powering

up with the GCD connected to the main unit. This takes about 35 seconds and will be followed by an EEprom load (Setup_U.eec) which is indicated on the screen.

An SD card reader with mini SD adapter attached to a PC is required to change the data on the card. Some PC's have built in SD card slots. A mini SD card adapter is supplied with each GCD.

Note: In order to prevent corruption of the data structure on the card, do not insert or remove card from GCD while the B600/B800is powered up.
In order to remove a card from a card reader slot in a PC the drive represented by that card must be de-activated. In Windows XP this can be done by right clicking on the drive in "My Computer" and select-ing "eject", then removing the card.

The mini SD card supplied (with SD adapter to fit in SD slots on card readers) already has a B500 folder created on it with two files on it, GCD_D.tea and Setup_D.eec .
When reloading a new program version or EEprom file these files are called GCD_U.tea and Setup_U.eec.
When the files have been loaded by the GCD2 the names are changed to GCD_D.tea and Setup_D.eec so that a GCD2 can tell whether the files are old or new ones that require loading.

When finished upgrading reload your custom version of setup_U.eec on the card, inset card in the GCD2 and power up. Follow the instructions on the GCD2 screen to set your polar, user choices and units as these will have been reset to factory defaults.You should save these when you receive your B600/B800or save the version you made if the B600/B800was not factory configured for your glider/units etc as received.

When finished upgrading run the customer mode to set the polar, user choices and units as these will have been reset to factory defaults or just load your custom .eec file on to card to reset the B600/B800to your settings.

Appendix 2

<u>INSTALLATION</u>

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.

To get the most out of your **B600/B800**some straightforward installation guidelines should be followed. Please take the time to read these guidelines in full BEFORE commencing installation.

<u>Good Practice - Mechanical</u>
Plan your instrument panel layout for optimum scan.

Require assistance with layout?   Contact Borgelt Instruments

2.   Install the B800System Unit into a standard 57mm or 80mm panel hole (dependent on size purchased) us-ing the 3 x M4 screws provided. Note that the top left and lower right scrw holes must be drilled out to 1/4"(6.35mm) to clear the switch bushings.

3.   All wiring attaches to an external connection board (XCB).

The top label of the B600/B800contains a labeled diagram of the electrical and pneumatic connections.

DO NOT OVERTIGHTEN THE SCREWS on the XCB as the connector may suffer damage.
        Power +12V (+11 to +16 volts) and Ground (-) to marked screw terminals.
Extreme care should be taken to ensure correct polarity power is connected to the B800. While reverse polarity protection has been fitted, we do not guarantee that under all circumstances this will necessarily protect the B800from damage. A 2 AMP fuse (M205 type) is fitted.
        Cruise Climb Switch (Normal mode, switch closed - climb mode, switch open - cruise mode. There is a software option to invert the sense of the switch for gliders which have the switch installed in the opposite sense.)
Connect switch leads using screw terminal connectors on XCB and install switch in a convenient location. Sug-gested 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 shaft requires 1/4" hole).
If desired you may install a microswitch in the flap circuit although we do not prefer this option.

        Audio speakers - left and right side of cockpit. Note: the B600/B800will operate with only one speaker attached, however you lose the features of the 2 channel audio.

If you elect to install only one speaker you must set the LR Gain to zero and select Alg 0 on the third setup page on the GCD for the audio to work properly.

Outside Air Temperature Sensor - should be installed in the air vent as close to inlet as possible but shielded from solar radiation..

**HP-GPS** Mount the GPS using the M5 nylon bolts. Note orientation. Double sided foam tape may also be used.


GCD

Install the GCD using a bracket under or in front of the glare shield – note position should be within usual eyescan (this minimises time of scan) and should NEVER obscure any part of the normal view from the cockpit.

You may use the two case mounting screws on each side of the GCD to attach it to the bracket. DO not substitute longer screws.

See drawings for suggested mounting ideas.
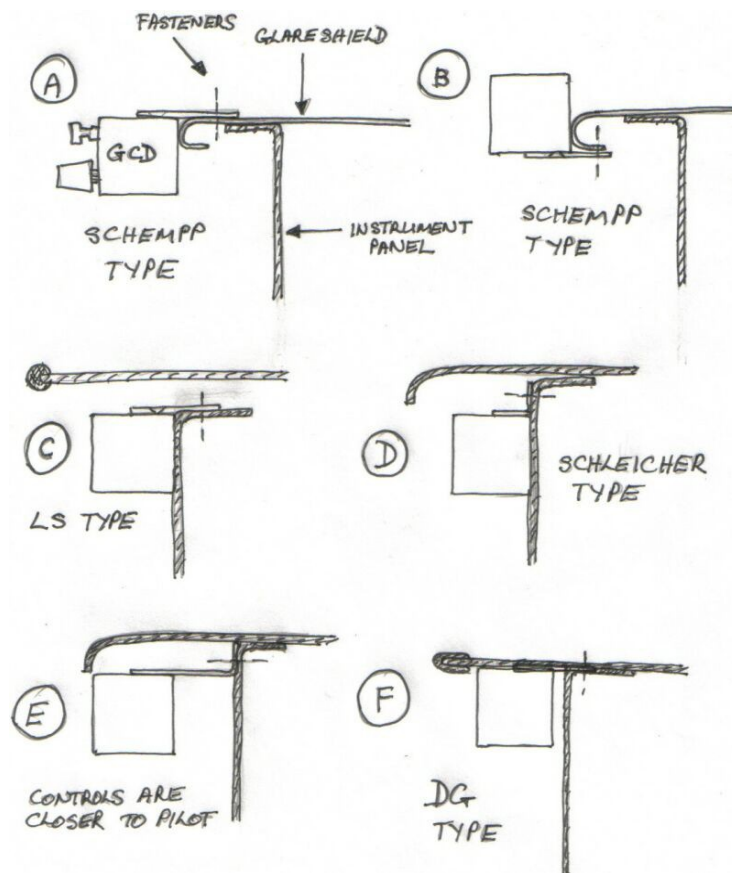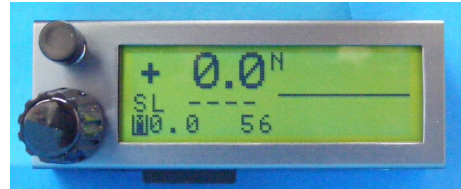
The GCD may also be mounted on Schempp type panels using a similar scheme to that shown for Schleicher.

Mounting the GCD is not much more difficult than mounting an instrument in a panel hole and has the advantages of being easier to reach and the GCD display is just below the pilot's external line of sight. Even when changing Macready, bugs, ballast, volume etc the pilot's peripheral vision is still effective outside the cockpit.

Photos of installations in a Discus 2 and an ASW27B.

Note the mini SD card slot under the GCD. This is for card access and you should allow for the card to be present in your installation as the database is always read from the card. While the GCD will work without a card present you will be unable to navigate using the B600/B800as there will not be a database.

Rear view of B800System Unit showing XCB (centimeter ruler used in photo). Note XCB is same size on both 57mm and 80mm versions. The cable (RJ45) connectors with strain reliefs are colour coded (matching heat shrink on the socket and corresponding cable)
RED –   B2000/PDA/PNA
BLACK – GCD
BLUE -   HP_GPS
After the power, mode switch, speakers, temperature sensor 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. Three M3 machine screws attach the XCB to the rear of the B800, the top two can be removed and the board gently tilted back to disengage the DB15 then removed upwards. The lower M3 machine screw is retained in the standoff and IS NOT TIGHTENED as it is locked with thread locking compound. This allows wiring to remain undisturbed in the aircraft in the event that servicing of the B800is required.
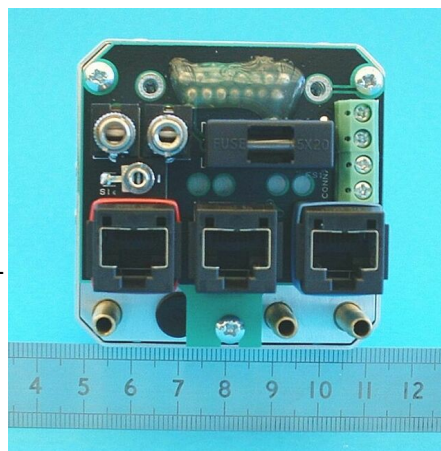
Good Practice - Electrical
Separate power circuits for the radio and vario systems are highly recommended. The reason for this is that varios draw 100-200mA and a typical radio on TRANSMIT draws 2 AMPS. If the radios and varios share the same power bus any resistance in the circuit is multiplied by the 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.)

Extremely effective radio interference protection is built into the B800 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 B600/B800 will perform properly down to a battery voltage of 10 volts. This voltage may be monitored on the digital display on the GCD.

2.4 Pneumatics – static, pitot, T.E.

Total energy compensation is by probe. TE probes provide by far the best and most reliable TE compensation. If you require a good TE probe, Borgelt Instruments offer a modified Irving TE probe (2 hole style).
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.

There are 3 connections - connect the tubes leading from the sailplane PITOT and STATIC and T.E. source to the pneumatic connections on the rear of the B600/B800 labeled `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. This may be compensated for by redefining the polar in terms of IAS (indicated airspeed) instead of CAS (Calibrated airspeed). See section on `Setting up the Polar' in Appendix 1 PC support and consult aircraft flight manual for IAS/CAS relationship.

{   **Leak check the system following installation**. (see "leaks" article on our website)

Good Practice -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 B800and B700/B400 or B50 and B40 or any combination of these) 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. Place a separate restrictor or gust filter in each line to the separate vario systems. Mechanical/pneumatic gust filters(restrictors/capacities) are not recommended with modern electronic instruments. 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. We DO NOT recommend this practice.

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 pressure changes being transmitted through soft tubing in the T.E. line. Tubing should be securely tied down.

Appendix 3

MAINTENANCE OF THE B800

3.1 Maintenance & Care
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 and does not cover the GPS. It is also a good idea to cut some holes or slots in the top of the panel cover the let hot air escape.
3.1.1 Cleaning:
LCD - 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.

3.2 Being a software based instrument various B600/B800functions are customisable by connecting the unit to a PC. Software updates are accomplished the same way. Many of these functions are user configurable however default setup will be performed prior to purchase for those not willing/able or ready to perform setups. Customer preferences can also be incorporated at this time.

3.3 Entering a new polar in the B800: if requested at time of order this will be done by the factory
The B600/B800uses a quadratic polar approximation for the netto and speed command functions. This requires 3 coefficients labelled a, b and c and a fourth coefficient d which is the typical sink rate while circling(Relative netto offset) .

Contact BORGELT INSTRUMENTS or your dealer for the correct coefficients for your sailplane. BORGELT INSTRUMENTS has available a small computer program (B500polar.exe) to derive these coefficients from a given polar. There is a lso a text file which explains how to use the program. If you have any queries regarding software upload, please contact your supplier or BORGELT INSTRUMENTS for guidance.

3.4 Zero Adjustments:
The B600/B800variometer automatically zeros on startup - no adjustment is necessary.
Under normal conditions the variometer zero **will not** require readjustment.
The Airspeed zero may require adjustment occasionally (once a year at most).
This is done by connecting the B600/B800to a PC and following the zero set instructions.
(Contact factory or dealer)

Adjustment of audio silent band in cruise mode: Contact factory
Adjusting variometer speed of response: Contact factory

3.5 TO CHECK POLAR IN B600/B800
Fly in smooth air (no convection or wave)
Stabilise speed at 40 knots or 75km/hr (if possible)
Place B800in cruise mode, select correct weight (ballast control), BUGS to 100 (clean polar)
Repeat at 50, 60, 70, 80, 90, 100 knots or 20km/hr increments.
Fill in the following table:

IAS(KTS)	40	50	60	70	80	90	100
IAS(km/hr)	75	95	115	135	155	175	195

RELATIVE NETTO
        (units)

Glider type:
Weight at test:
Minimum flying weight:
Maximum flying weight:
Current A,B,C, D (NETTO OFFSET) numbers
Your name: Address:
Phone: Email:

Send to Borgelt Instruments. Email: mborgelt@borgeltinstruments.com
A new polar will be derived and forwarded to you.

Appendix 4

Universal Power Supply/Dataport/Power-data distribution centre.

This optional device connects to the B600/B800 and supplies power and data to various other devices - a B2500 glide computer, a Flight Recorder(FR), a Flarm unit(or FR) and a PDA/PNA can receive 5 volt power at 1 amp and data from the B800.

Installation is simplified as 12 volt power must be supplied only to the B600/B800 and the PDA-PS distributes power and data to and from the FR, FLARM, PDA and B2500 and there is a serial port for B800/B2500 program maintenance.

There is a connection for a logger on this unit, connection for a FLARM (or second FR) and two panel mountable switches which allows connection of the data to/from FR/FLARM direct to the PDA/PNA for declarations and optionally allows selection of FR/FLARM/GPS or B800air data/GPS for flight information.

The PDA-PS also supplies power and data to a B2500 glide computer as well as to a PDA. (5 volts at 1 amp to PDA)

In addition the PDA_PS substitutes the FR or FLARM (whichever is selected) data for the B600/B800GPS data. If logger or FLARM data is not available B600/B800GPS data is supplied. This means that FR pressure altitude or FLARM aircraft data and pressure altitude may be passed to the PDA. To cope with the large quantity of data in some messages, input baud rates higher than the traditional 4800 are required and the B600/B800hence operates at 38400 baud and any PDA_PS connected to a B600/B80 0must be configured to receive at 38400 baud and the Flarm or FR must also transmit at this rate. Contact facatory if other baud rates are required.

Other variometer systems may also use the PDA_PS for this purpose. Check with us for compatibility details.

A DB9 plugs into rear of B2500, RJ45 into rear of B800.

PC upgrades/data loads of B800/B2500 may be performed via the DB9 serial port on the circuit board and controlled by the two switches to the right of the DB9. As these are considered maintenance functions the PDA_PS can be mounted anywhere behind the panel. A Nomex insulating cover is fitted.

At the rear edge of the circuit board are one DB9 connector and a row of screw terminals. The DB9 is for a PDA (palmtop computer) and 5 volts at 1 amp is supplied to this by a low noise filtered switch mode power supply. The screw terminals are for a Flarm/GPS/FR.

There is another row of screws terminals along one side where another GPS/FR or FLARM unit may be connected.

Note: The markings on the board next to the connections refer to the name of the connection coming from the Flarm or logger, NOT the connection name on the PDA_PS.
i.e SDO refers to Serial Data Out of the logger or Flarm, SDI refers to Serial Data In on logger or Flarm.

Image shows PDA_PS with DB9 for B2500, RJ connector for B500/B800, panel mount data control switches and serial port for B500/B800/B2500 software maintenance.

PDA connector and logger /FLARM connectors not visible (under Nomex cover)

The panel mount switches select flight or declaration mode and which logger or logger/FLARM is connected to the PDA and is supplying data to the combiner board.

In flight mode the B800settings, air data and GPS data go to the PDA and B2500. In declaration mode the logger is connected to the PDA for two way communication and this can be done in flight also but the PDA program will then be operating with GPS data only.

A jumper selects whether the B800/logger combined datastream is sent to the B2500 or whether the original B800datastream is sent to the B2500.
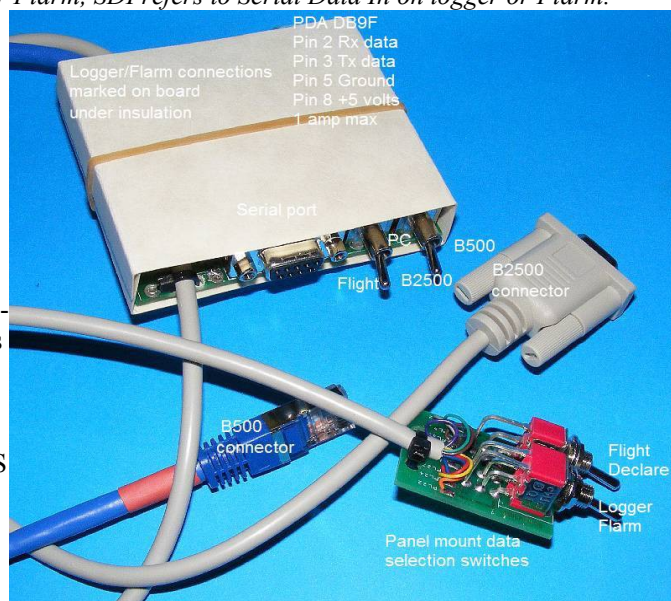
File switches.pdf from our website has a full sized outline of the panel holes and labelling required for this unit.

Appendix 5

Avier/OudieInterface Module

This is a simplified, lower cost version of the PDA_PS designed to interface the B600/B800to an Avier/Oudie color moving map flight computer or similar PNA/PDA.
The serial port to PC DB9, the B2500 cable and the flight/PC and B500/B2500 switches have been eliminated along with the 5 volt 1 Amp switch mode power supply as the Avier/Oudie is supplied with its own 12 volt to 5 volt switch mode supply. Remaining connections and operation are as for the PDA_PS.
The Avier/Oudie power supply is separately connected to the glider power and the data connections from the Avier/Oudie power supply are as follows:

Select Oudie DB9 male for plugging in to PDA/PNA outlet on Avier/Oudie Interface Module (there's only one DB connector on that board.)
Wire connections when assembling the DB9M are:\
Black   - Pin 3 Transmit from Oudie
Red   - Pin 2 Receive to Oudie
Orange   - Pin 5 Ground
Insulate all unused pins.

The power supply from www.glidertools.com may also be used. Contact Borgelt Instruments for details.

Note: When a B600/B800 is connected to to an Avier/Oudie or similar via the original PDA_PS the same connections apply. This would normally be done when there is a GCD and GPS also connected to the B600/B800-main unit and B600/B800settings come from the GCD as a normal PDA_PS does not allow for communication from Avier/Oudie to B600/B800, only uni-directional from B600/B800 to Oudie.

Avier/Oudie Interface Module with B600/B800 57mm