

PNGC

E.W. AVIONIC'S

Electronic Barograph

Warranty

If an EW Barograph fails within one year of purchase as a result of faulty workmanship or materials then EW Avionics will replace or repair it at their discretion free of charge. Barographs for such repair should be returned to EW Avionics or their authorized repair agents together with proof of the date of purchase.

Specifically excluded from this warranty are damages caused by misuse, accident or battery leakage.

This warranty is also cancelled by any repairs or alterations to the barograph concerned by persons not authorized by EW Avionics.

EW Avionics cannot be held liable for consequential losses resulting from the operation or failure of an EW Barograph except as required by law.

- 1 **Introduction.**
- 2 **Switching On.**
 - Changing the year.
 - Changing the date.
 - Changing the time.
 - Changing the user number.
 - Changing the sample interval.
- 3 **Recording.**
 - Recording functions.
 - Altitude Displays.
 - Time Displays.
 - Tagging the trace.
- 4 **Turning Off.**
- 5 **Error Codes.**
- 6 **Deleting All Traces.**
- 7 **Printing.**
 - Print Trace.
 - List Traces.
 - Delete Last Trace.
- 8 **Photographic Evidence.**
- 9 **Motor Time Evidence.**
- 10 **Battery.**
- 11 **Calibration.**
- 12 **Official Observers.**
- 13 **Specifications.**

Appendix 1: Printer Requirements.

EW Barograph

Welcome to the world of electronic barographs. You have purchased a powerful micro-computer based barograph which not only has the features needed to meet the demands of today's pilots, but is also simple and convenient to use. This combination allows the EW Barograph to be used both for validation of badge, record and competition flights and as a valuable training and statistical aid.

This manual shows you how to operate your barograph, and how to obtain the best results from it.

If you are unfamiliar with barographs of this type we suggest you get used to its operation by trying out the simple steps described in this manual before your first flight. The more practised you become at this stage the better you will ensure that there is no confusion whilst flying and printing that long awaited badge or record flight.

A simple procedure for turning the EW Barograph on must be followed to ensure that the details of the flight are recorded in memory as you wish. This procedure, once learnt, will take at most a minute or two.

If you are unsure, at any point, what to do or what numbers to enter, remember that the switch on procedure and other important information is summarised on the placard attached to the back of the barograph.

During the switch on procedure the EW Barograph prompts you to check and possibly enter certain important values. These values are:

- the date (in years, months and days),
- the time (in hours and minutes).
- the user number to be associated with the trace and
- the time interval between height samples.

Operation of the barograph is very similar to using an electronic calculator. Enter numbers as you would on a calculator. Usually, when you have finished entering a number you should press the key labeled ON and ENT.

The only exception to this is when entering numbers in recording mode - this is discussed in the next chapter.

If, during the initial switching on procedure, no key is pressed for 30 seconds the barograph will automatically turn itself off. This is to prevent problems due to unintentionally switching on the barograph when it is not being used.

Press ON

"d" (date) will momentarily appear.

The barograph will then show the current year on the display:

1989

If the year is incorrect, then enter the last two digits of the correct year by using the numeric keypad, e.g. "91". The century is set automatically by the EW Barograph.

When the year is correct:

Press ENT

The second display will show the month and day in the form.

04.30

This denotes the 30th of April.

If this display is incorrect, enter the correct month and day by using the numeric keypad. Remember to include leading zeroes if the day or month is less than 10.

When the date is correct:

Press ENT

"t" (time) will momentarily appear.

This third display will show the time in 24hr format.

1937

If this display is incorrect, enter the correct time using the numeric keypad.

Warning:

If the date or time are changed, then all traces held in memory will be labelled on printout with a message to say that the time base has been changed. This is to prevent trace fraud.

If you wish to change the date or time due to change of time zone or daylight saving time, then all traces held in memory that are to be used for flight claims must be printed before the changes are made.

If you inadvertently change the date or time, then before pressing ENT to confirm, simply press the OFF button. The trace will not have been recorded and all the previous traces will not have been labelled that the time base has been changed.

When the time is correct:

Press ENT

"U" (user number) will momentarily appear.

The fourth display will show the current user number.

50

Any number in the range 1 to 9999 may be entered from the keypad. This number will be permanently recorded with the trace and is unchangeable once the trace has begun. The number may be used to identify the pilot, aircraft, or Official Observer.

When the correct user number is displayed:

Press ENT

"Int" (sample interval) will momentarily appear.

This fifth display will show the default setting of:

30

The sample interval is the length of time between the recording of height samples. It is the time interval between dots on the graphical trace and numbers on the numeric trace. The sample interval is measured in seconds. Choosing a small number results in samples being recorded more often.

The default sample interval of thirty seconds produces a trace similar in appearance and time base to existing barographs. Any other sample interval from one second to 255 seconds can be chosen.

A useful rule of thumb is that the barograph has enough memory to store as many hours of traces as the sample interval in seconds. For example, the barograph can store just over 10 hours at 10 second sampling interval and 30 hours at 30 seconds. Of course, this is the total amount stored, an individual trace may have to be shorter if the barograph's memory is not clear before the flight.

See the notes in the following section on the time left in memory display.

For badge and record flights a sample interval of 10 seconds is suggested as this results in a much more detailed trace.

When the desired sample interval has been entered:

Press ENT

The barograph will now be recording pressure altitude at the set sampling interval. A small red LED will flash every second to give a visual indication that the barograph is recording. Each sample will be recorded in memory and used when printing the trace.

Unless you change the display mode the barograph will continuously display the most recently recorded pressure altitude in the form:

0410

Pressure altitude is the altitude an altimeter would indicate when the pressure subscale is set to standard sea level pressure (1013.25 mb). The above display denotes 0 kilometres, 410 metres.

On days when the pressure is greater than 1013.25mb the pressure altitude will be negative.

Recording Functions.

Whilst the EW Barograph is recording it is possible to use the keypad to change the display and to place tag marks on the trace.

In recording mode the keypad is normally disabled to prevent accidental inputs to the trace.

To activate the keypad:

Press ON

The small red LED will be lit constantly. When you have finished whatever action you select the barograph will automatically disable the keypad again. If you wish to do this without performing any of the functions described here just press the Ent key.

Whilst recording, if the keypad is left in the active state for more than 30 seconds without a key being pressed the keypad will be deactivated (but the recording of the trace will not be affected).

Altitude Displays:

You can select one of five different altitude displays.

- ALT : Pressure altitude in metres. This is the default display.
- 1 ALT : Gain in altitude since the start of the trace.
- 2 ALT : Lowest altitude since last tag (see tagging of traces below).
- 3 ALT : The gain in altitude in metres above the lowest point since the last tag marked on the trace. This may be used if the pilot wishes to confirm that a badge height gain has been achieved by tagging the trace as soon as possible after release from tow.
- 4 ALT : Pressure altitude updated every second. However, this display uses extra battery life and is normally only used for calibration.

Time Displays:

You can select one of four different time displays.

- TIME :** Current time of day in hours and minutes.
- 1 TIME :** Sample interval in seconds.
- 2 TIME :** Amount of time left in memory for the current trace, in hours and minutes. See notes below.
- 3 TIME :** The current battery level. The barograph will automatically display an error message if the battery level has become too low. A regular check should be made of this number. If it is nearing 350 then a new battery should be installed.

Select an altitude or time display by pressing the appropriate number on the keypad and then the **ALT** or **TIME** key. The display will change and the LED resume flashing.

Notes

If the sample interval is not a whole fraction or multiple of a minute then the time left in memory display (2 Time) will not operate. Instead it will show **00:00**. The intervals which are whole fractions or multiples of a minute are:

1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60, 120, 180 and 240 seconds.

If the time left in memory is more than 99 hours and 59 minutes then the time left is displayed in days and hours (with a "." in the middle instead of a ":").

Tagging the Trace:

The trace may be tagged or marked directly from the keypad. A pilot may wish to mark the trace at turning points or other points of interest. Any number 1 - 9999 may be entered onto the trace by:

- pressing the **ENT** key,
- entering the number of the tag and
- pressing the **TAG** key.

If no number is entered, 0 will be used to identify the tag mark.

A scribe line will be placed over the graphic trace, and the height and time written on the numeric trace. This mark is accurate to a time resolution of 1 second and to a height resolution of 10 metres.

To prevent accidentally turning off the barograph during recording, a set procedure must be followed to turn the device off.

Press ON
Press OFF
Press OFF

The off key must be pressed twice in less than approximately 2 seconds. The user will quickly adapt to the key speed required to switch the barograph off.

The recorded trace is now held in memory ready for printing.

Further traces may now be recorded by following the procedure described in the switching on section, up to the time limits set by the size of the barograph's memory. All information including dates, times, and user numbers, will be held individually for each trace.

Under certain conditions error codes will be shown on the display. These may be displayed as the unit is turned on to indicate an impending condition or during recording to indicate that the trace has not recorded correctly.

The error codes are:

- Err1 :** A fault has occurred with the device and a height sample has been missed. Please return your unit to the nearest dealer for inspection.
- Err2 :** The memory is low. The total storage time left is approximately 10 hours in 30 second sampling mode and 3.3 hours in 10 second sampling mode.
- Err3 :** The memory has run out whilst recording. The last part of the flight will not be recorded.
- Err4 :** An internal fault has occurred and the data is not being read correctly. Please return your unit to your nearest dealer for inspection.
- Err5 :** The battery's level has become low and the battery should be changed. If you are recording a trace or unable to purchase a battery, then the battery level is still able to support several hours of recording and printing of all your traces. If the device is being used under very cold conditions, e.g. at high altitude, then it is advisable to change the battery as soon as practical.
- Err6 :** The battery level has fallen to a dangerous level. The device has automatically turned itself off to protect the traces held in memory.

The battery level (Err2) and memory left level (Err5) are checked when the barograph is switched on. If these have reached a value likely to cause problems in the next flight, the appropriate error message is displayed.

The other error conditions only apply when in the recording mode.

To clear an error code, press the ENT key. If you turn the barograph off or let the device switch itself off after 30 seconds, the error message will be repeated when the barograph is next turned on. To clear this repeated error code simply press the ENT key.

Deleting All Traces

The memory of the barograph may be cleared, deleting all traces, from the keypad. Individual traces may be deleted from the print menu.

To delete all traces a sequence must be followed.

Start with the barograph turned off.

Press On

Wait momentarily for the year to be displayed in the LCD display.

Press ALT

The display will show:

CLEr

Press TAG

The display will show:

SUFE

Press TIME

The display will show:

done

All traces held in memory will be deleted.

The EW Barograph operates with any serial Epson compatible printer.

Before plugging your barograph into your printer, consult your printer's manual, to see if you need to change any of the printer switch settings. If you require further information on the type of signal from the EW Barograph, then consult the specifications and Appendix 1 at the back of this manual. Often the switches need to be reset to a setting suitable for the serial data input. If any changes are made, remember to switch the printer off and then on, to reset the printer to the new settings.

Plug the supplied lead into the barograph and to the printer.

Warning: The D type connector pins on the EW Barograph are not of the standard RS232 format. Do not plug an unauthorised lead into the EW Barograph as damage may occur to the unit.

Check all leads for correct fitting and security of connection.

Press On

Wait momentarily until the year has appeared on the display.

Press PRT

Your printer should immediately print a menu as follows:

EW Barograph - Main Menu.

1. Print trace.
2. List traces.
3. Delete last trace.

Print Trace.

At the main menu:

Press 1

Enter the trace number that you require and press ENT. The trace number "99" will always print the trace that was recorded last, i.e. your last flight.

The trace that you have selected may be printed in a graphical and/or numerical form.

The numerical form is purely height recordings, presented as a series of numbers. This form is ideal for height badge claims, as Official Observers need only read the relevant height numbers and not have to measure the trace.

The graphical form of trace is rather like a conventional barograph's trace. The trace's height scale however is automatically set to give maximum spread and visual display. The time base is set at a fixed scale dependant on what sample interval has been used.

Answer **Yes** or **No** to trace printed numerically.

Answer **Yes** or **No** to trace printed graphically.

The barograph will now print out your trace.

The barograph always lists:

The unit's serial number.

The date of printing.

The date and time of the start of the trace.

The date and time of the finish of the trace.

The user number.

The sample interval.

List Traces.

At the main print menu:

Press 2

Your printer will list all the traces held in the memory along with the date and time recording started and the trace number. The trace number, listed to the left of the printout, is used to select the trace to be printed.

Delete Last Trace.

The barograph's memory will only allow a certain amount of storage. Once you have printed your trace and no longer require a copy, it is advisable to remove that trace. The trace that is deleted will always be the last trace held in memory. If you wish to delete a number of traces then select this main menu in turn, but remember that you cannot delete a trace and keep another which was recorded later in memory.

To delete the last trace in the memory:

Press 3

Warning: If you forget to clear the memory at regular intervals, the memory capacity could be exceeded resulting in a trace not being recorded.

Paper Feed.

As printers have different distances between the print head and the visible level of the printout, the PRT key may be pressed to feed the paper through the printer. The user can determine the most economical use of the paper in this manner.

Connection and printing of traces, takes only a few minutes, once the sequence of events has been learnt.

Photographic Evidence

The EW Barograph has a port specifically set aside for an input from a camera. A special adapter has been designed for use with the Konica Pop camera using this camera's data back facility. The barograph will only record one shutter closure per second.

Procedure:

Before switching the barograph on, the wiring harness must be plugged into the camera and the D type connector connected to the barograph.

Switch on the barograph.

The barograph's circuitry will then detect that a camera has been connected. If either plug is disconnected during flight it will be recorded by the barograph.

The camera circuit can be checked by closing the camera shutter. The barographs LCD display will momentarily show:

Phot

If the photographic evidence is to be used for flight verification, then the Official Observer must see the connection of the camera whilst the barograph is still recording. This is to ensure that a camera, and no other device was connected to the camera port.

Motor Time Evidence

The EW Barograph has a port specifically set aside for an input from a motor sensor.

The sensor may be of one of the following types.

1. A contact which opens when the motor pylon is elevated.
2. A wiring harness which includes a sensor, which makes a contact open when the propellor begins to revolve.
3. A sensor which makes a contact open when the motor ignition is turned on.

The EW Barograph records both motor on and motor off events accurate to within 1 second and 10 metres in height.

Engine use is indicated by the contact opening. Disconnection of the plugs will have the same effect as using the engine (i.e. contact open indication).

Procedure:

Before switching the barograph on, the wiring harness must be first plugged into the motor sensor and the D connector connected to the barograph.

Switch on the barograph.

The barograph's circuitry will then detect that a motor sensor has been connected. If either plug is disconnected during flight it will be recorded by the barograph as a contact open event.

The motor circuit can be checked by opening the motor contact. The barograph's display will momentarily show:

OPEN

Similarly, when the engine contact is closed the display shows:

CLOS

EW Avionics must warn users to check the rulings of local governing bodies concerning additional equipment for motor gliders. A wiring

harness may infringe upon local safety rules and invalidate air worthiness certificates.

If in any doubt, then contact your nearest agent or aviation specialist.

The trace being recorded will show motor on and motor off times and heights. This facility will ease the problems of motor glider competitions, as a very accurate calculation of height gained and time used for each climb can be made.

Battery Replacement.

The battery is contained in a small compartment at the base and rear of the case.

To open the battery compartment, place a flat blade screwdriver in the slot provided, at the top edge of the compartment lid. Gently lever the small internal catch toward the base of the case. Care must be used at this stage, as the catch can be broken if too much leverage is applied. At the same time as levering the catch downwards, gently pull the lid outwards. The lid should immediately spring out where it can be removed from the case.

Before removing the battery ensure that all traces that are required have been printed or uploaded to the EW Computer software.

All internal memory will be lost once the battery lead is disconnected.

1. Gently remove the battery from its compartment and disconnect the battery lead.
2. Fit a new PP3 Alkaline type battery.
3. Replace the battery and lead into the case.
4. Refit the cover gently.
5. Reset your barograph's date and time.

Battery Checks and Warnings.

To check whether the barograph's battery is nearing the end of its life, enter the 3 Time mode whilst in recording mode.

A number proportional to the battery voltage will be displayed. If the number is nearing 350, then the battery should be replaced. A fresh battery should be approximately 500. A battery level of 300 is considered unacceptable for the recording of a trace.

Alternatively:

If the error code 5 has shown on the LCD display, at turn on, then the battery should be replaced as soon as practical. The battery level will still allow a limited amount of recording and printing time.

If the error code 6 has shown on the LCD display, during recording of a trace, then the battery should be replaced. The barograph will however have terminated the last recorded trace. This is designed to prevent total loss of all traces if the battery level has reached a dangerous level and to prevent any risk of incorrect altitude readings being recorded.

Battery Type.

The battery type is a PP3 Alkaline 9 volt battery. For emergency use only, a standard PP3 may be used. If very cold temperatures are to be encountered then an Alkaline type must be used. Alkaline battery voltage levels don't suffer dramatically from cold temperatures, unlike the standard type of battery. By using a standard PP3 in cold conditions, the user risks the possibility of the device turning itself off.

Battery Life.

All circuitry in the EW Barograph is of CMOS type which consumes very little current. Under normal usage we would expect approximately 500 hours of use. During printing the battery current is approximately 100 times normal levels, thus if a very slow printer is being used then battery life could be seriously shortened.

Each unit is calibrated at the factory and a calibration chart is provided.

Should a unit's calibration need to be adjusted then it should be returned to EW Avionics.

Calibration can be carried out by any person approved for calibration of conventional barographs in the following manner:

Start the barograph recording and place the display in constant update mode by:

Press ENT

Press 4

Press ALT

The barograph should now be placed in the decompression chamber with the display facing the operator.

The chamber can now be decompressed in the normal manner. Readings can be read directly from the display and compared with the chamber's readings.

A calibration trace could be printed if required, but we suggest that a reference chart with the displayed altitudes and true altitudes only be compiled, to give to the owner.

The EW Barograph has been designed to be as foolproof and secure as possible.

Each country will have its own rules and practices for the use of barographs, but these will conform to FAI rules on the use of barographs.

This part should be considered as a guide for Official Observers who have not seen or used this particular type of instrument before.

If as an O.O. you are unsure about the validity of the trace, then do not sign the trace.

The following is an outline procedure for the flight, turning off and printing.

Before the flight the barograph can be set up by the pilot without the need for supervision or assistance from an O.O.

1. The camera connectors connected if photographic evidence on the trace is required.
2. The barograph should be turned on.
3. The date and time checked and corrected if necessary.
4. A user number entered.
5. The barograph set recording.

The pilot should then fly the flight as normal.

If camera or motor connections are to be used as evidence for the flight then the pilot should present the barograph to the O.O. still recording and still connected. The O.O. should disconnect the leads and check that the barograph registers this on the LCD display. The barograph may then be turned off.

The above steps must be taken to ensure that it really was the camera or the motor which was connected to the barograph during the flight, and not an external switch.

Printing the Trace.

The O.O. should observe the printing of the trace.

Depending on the type of flight being claimed either a graphical or numerical trace or both can be printed. In most cases a graphical trace is sufficient but where heights are to be measured a numerical trace is also convenient.

Normally the date and time given on the trace by the barograph as the time of printing should be the correct current time. If it is not, the O.O. should annotate the trace with the actual time of printing in order to allow the time of the flight to be calculated.

When the trace has been printed the pilot and glider details in the form at the end of the trace should be filled in.

More than one trace for a flight can be printed and signed allowing the pilot to keep spare copies in case of loss.

Checks to be made.

Before signing the trace, the O.O should be satisfied of the following points:

1. By circumstantial evidence, the pilot and the aircraft are the same as written on the trace. For example matching log sheet launch times with the initial part of the trace. Of course, this is a requirement for all types of barograph.
2. There were no intervening electronic devices such as voltage or protocol converters or computers between the barograph and the printer whilst printing.
3. The trace is complete with serial number, numerical trace, graphical trace, has no warning labels about time changes and ends with the position for the O.O's signature.
4. There are no marks of damage to the seals on the barograph's case.

Specifications

- Circuitry:** Full CMOS low current technology.
Piezo-resistive silicon transducer.
10 bit analogue to digital converter.
Dual op amps.
8K EPROM.
8K Static RAM.
6303 Microprocessor.
LCD Driver and Display.
LED Light.
Dual PCB Board layout.
- Case:** ABS Black 3 part moulded case.
Tactile membrane keypad.
Longlife acrylic labels.
- Interface:** Standard RS232 compatible signal.
- Pin 1 : + 5 Volts.
Pin 2 : RX.
Pin 3 : TX.
Pin 4 : N/A.
Pin 5 : GND.
Pin 6 : Motor contact closure.
Pin 7 : RTS.
Pin 8 : CTS.
Pin 9 : Camera contact closure.
- Printer:** Standard Epson compatible with serial interface.
9600 Baud rate.
8 Data Bits, no parity.
DTR handshake.
No LF on CR.
- Weight:** 225 gms.
- Size:** 150mm x 80mm x 30mm.
- Battery:** PP3 9 volt Alkaline.
- Operating Conditions:**

Operating Height:

-250 to 9160 metres (model A).

-250 to 12300 metres (model B).

Operating Temperature Range:

Fully temperature compensated -10C to 50C (tested from -20C to 50C).

Sampling Rate:

1 to 255 seconds.

Storage: Up to 32 hours (for 30 second sample interval).

Height Scales:

Autoscaling selection on printout from 1200m, 2400m, 4800m, 9600m or 14400m ranges.

Weatherproofing:

Condensation proofed only.

Compatibility:

Camera Port.

Motor / Flap Port.

Computer software available.

Appendix 1: Printer Requirements

This appendix specifies the requirements that the EW Barograph places on printers to be used with it.

The basic requirement is for an Epson compatible printer with a serial interface.

Interface Specification

The barograph drives the serial interface at 9600 baud using 8 data bits and no parity. It expects the printer to use DTR handshake, that is to place the DTR line in space condition when it ready to receive data. The printer should not send XON/XOFF characters for flow control.

The TX (transmitted data) line of the barograph (pin 3) should be connected to the receive data line of the printer.

The GND (ground) line of the barograph (pin 5) should be connected to the signal ground line of the printer.

The CTS (clear to send) line of the barograph (pin 8) should be connected to the DTR (data terminal ready) line of the printer.

The RX (received data) line of the barograph (pin2) may be connected to the transmitted data line of the printer, or more commonly, to the transmitted data line of a computer.

The RTS (request to send) line of the barograph (pin 7) is always asserted when the barograph is in print mode and may be used to assert any line on the printer which the printer may require (eg. data carrier detect).

The other pins of the barograph's D type connector must not be connected to the RS232 level signals.

Numeric Printing

For most of its printing the barograph uses the default printer settings. For satisfactory operation, these should give a fixed pitch font with a page width of at least 40 columns.

For printing the numeric data of a trace, condensed mode is used. This is entered using the Shift In character (15 decimal) and exited using the DC2 character (18 decimal). This should give a fixed pitch font of at least 80 columns.

Graphic Printing

Before printing each line (8 rows) of graphic data the line spacing is set to 1/9th of an inch (8 dots) using ESC, A, 8 (27 decimal, 65 decimal, 8 decimal).

Each line of graphics data is printed as 480 bytes of dual density bit image data started by ESC, L, 224, 1 (27 decimal, 76 decimal, 224 decimal, 1 decimal).

Labels of tag events in graphics traces are also printed at 1/9th of an inch line spacing.

After graphics printing is finished, line spacing is set back to 1/6th of an inch using ESC, A, 12 (27 decimal, 65 decimal, 12 decimal).