EW microRecorder

Instructions

Hardware V7 Firmware V6.74 and above

December, 2007

Unit comprises-
> microRecorder
> Antenna
> USB download/charging lead
> EW microConnector

Introduction

The EW microRecorder logs GPS track and pressure trace in a secure .IGC file. These files can be downloaded over USB using Windows Explorer. The file contains an encoded digital signature. This means that any subsequent change made to the file can be detected. Hence files produced by the microRecorder can be checked to ensure that file is unchanged. The software to carry out this task is in the public domain and can be downloaded from our website www.ewavionics.com

The re-chargeable batteries provide up to 100 hours of use (dependant on update rate). Charging is by USB, or via a separate charger.

Installation

The microRecorder should be installed away from direct sunlight to prevent high temperatures inside the microRecorder. If the temperature exceeds 85 deg C (185 deg F) the microRecorder will stop functioning until the temperature has fallen to 70 deg C (158 deg F), Velcro tape is ideal for the purpose of mounting.

The antenna should be placed in clear view of the sky, on top of the coaming / glare shield in front of the instrument panel is ideal. If the signal is attenuated the microRecorder will not go into power saving and the drain on the battery life will be greatly increased. It is important to use an EW antenna, fitted with a ferrite filter to prevent the glider radio from interfering with the microRecorder operation. Great care should be used in attaching the antenna. If this is expected to be carried out regularly, we would recommend the use of the BNC adaptor and a BNC plug on the antenna lead. (See www.ewavionics.com)

On external power the microRecorder will supply 5 volts to drive a PDA. We would recommend using a 1 second update rate for driving a PDA.

The microRecorder comes with a RJ45 plug with a length of 8 core cable to enable the user to connect to the various functions.

The RJ45 lead has the following pin designations:

Pin 1 – External power in 9-15 Volts (White/Orange)
Pin 2 – 5 volts out max 1 amp, if externally powered, this can be used to drive a PDA (Orange).
Pin 3 – NMEA directly from GPS, use with hardware versions 5 and below.
Pin 4 – Serial in (blue).
Pin 5 – Pilot Event, momentary grounding gives update rate of 1 sec, for 30 sec. (White/Blue)
Pin 6 – NMEA messages are- GPGSA, GPRMC, GPVTG, PGRMZ at a default rate of 38400 baud (Green)
Pin 7 – Reset pin, connecting momentarily to ground will switch the microRecorder off. (White/Brown)
Pin 8 – Earth/Ground (Brown)

Battery Operation

Using the battery is not recommended for update rates of less than 5 seconds as drain on the battery is significantly increased.

Turning ON – Press the switch until the red power LED lights

Turning OFF – Pressing the power switch twice within 1 second. If running on the internal battery it is suggested that you either disable the Auto Off or have a time longer than the glider might be stationary on the launch point. Otherwise there is a danger of the microRecorder switching off before takeoff

External power Operation

The microRecorder can be used with an external power supply, 9-15 volts.

Turning ON – When the external power is connected the microRecorder will switch on automatically, and will remain on whilst external power is maintained. This is the recommended mode of operation, as there is no possibility of forgetting to switch the microRecorder on.

Turning OFF – Disconnect the external power and press switch twice, or disconnect power and wait for the Auto off criteria to be met.

Status LED's

There are two status LED's on the unit next to the power switch

Red LED – On battery operation; for 30 seconds after start-up the red LED shows battery status:

4 Flashes or continuous	= 80-100 % charge
3 Flashes	= 50-80 % charge
2 Flashes	= 25-50 % charge
1 Flash	= 0-25 % charge

The status can be repeated at any time by pressing the power switch. While charging the unit the red LED should remain lit.

Green LED – This indicates the satellite tracking status and fix. It is constant whilst searching for satellites. Flashing indicates a GPS fix and ready to record. After a few minutes of operation the flashing period should drop from 1 second to the update rate. If this does not happen it indicates that the GPS reception is weak and the microRecorder has not entered power saving. **Before each flight verify the microRecorder has a fix,** otherwise it will still act as a barograph and only record the pressure altitude.

Red & Green Blinking – The red and green LED will flash simultaneously when ever the microRecorder is Deleting All .IGC Files from memory (Note: files can not be deleted by command in the EW-USER.txt file on the SD card, doing so will loop infinitely in this LED state. See EW-USER.txt Settings)

Downloading Files

On connecting the microRecorder to the USB, it will automatically be recognised as a removable drive named 'EW_IGC LOGS', (On Windows2000 or later). Files can be opened or copied from the microRecorder to your computer.

It is not possible to delete individual files, but all .IGC Files can be deleted though the EW-USER.txt settings.

The oldest .IGC file will automatically be deleted by the microRecorder when the memory is full. At a 10 second update rate, 300 hours of flying may be recorded. Memory is maintained independently from the batteries.

The microRecorder will not record whilst connected to the USB.

Re-charging batteries

The microRecorder may be charged either using an EW charger or by connecting to your computer by USB.

In either case the microRecorder should be switched off and not connected to the antenna. The computer must be running and not be in a sleep mode. The red LED should remain on while charging. It can take up to 12 hours to fully charge the batteries. After even a brief charge, the battery status LED will indicate an '*optimistic'* charge state until the unit has run for a considerable time.

Batteries should not be re-charged if the unit is below 0 deg C.

The batteries do self discharge over a period of time and should be re-charged every 3 months, if this is not carried out the life of the internal lithium battery which maintains the security keys, will be reduced.

To minimise the drain on the glider battery, charging with the antenna connected will only partly re-charge the microRecorder battery when connected to external power.

FAI Approval

The microRecorder is ratified for all flights including World records. Any attempt to open the microRecorder will invalidate the file security and delete the security algorithms. The EW-USER.txt will show the unit is in a compromised state.

EW-USER.txt Settings

The memory contains a file called EW-USER.txt. This may be opened in a standard text editor such as notepad. Users can only make changes to values in the following four sections of the file:

1) Logger Settings

The following parameters ranges are accepted:

Delete All Files:	N (default, and required on SD card files), Y
Engine Noise Fitted:	Y (once set can not be changed), N
Sync Flights to SD:	All, Last

Delete All Files – Setting to 'Y' deletes all .IGC files on the microRecorder at Power On, then the setting reverts back to 'N'. The Green & Red LED's will flash simultaneously while deleting. This setting must be 'N' in the SD card version of EW-USER.txt or an infinite loop will result

Engine Noise Fitted – FAI rules prevent the ENL measurements from being disabled, once the unit is enabled for ENL

Sync Flights to SD (microRecorder SD only) – When the SD card is present you have the option of synchronising just the last file ('Last') or all files ('All') to the SD card on powering down

2) User Settings

The following parameters ranges are accepted:

GPS Update rate:	1 - 10 seconds
GPS Baud rates:	4800, 9600, 19200, 38400(default)
Auto-Off Time:	5 - 180 minutes
Auto-Off Velocity:	5 - 50 kph
Auto-Off Altitude:	0 - 500m
Start File Speed:	0 - 50 kph
Start File Pressure change:	0 - 50 m

Auto Off Criteria – If during the *Auto-Off Time* period neither the speed nor height change exceeds the *Auto-Off Velocity or Auto-Off Altitude* values then the microRecorder will switch off automatically, (providing it is not connected to external power). To disable Auto Off*,* set *Auto-Off Altitude* to zero.

Start Speed and Height – Recording will start when either criteria is met, (with a buffer of the previous 30 readings). Setting either parameter to zero will start recording immediately, (not advisable if using EW micro Charger as this will result in a large blank file). Once started, recording will continue until the microRecorder is switched off.

Suggested settings-If the microRecorder is running from its own batteries, then it is preferable to have ' Auto-Off ' feature disabled, as it is possible that the unit will remain stationary waiting

for a launch for longer than the Auto-Off period.,

For running from the glider battery, the unit will switch itself on as soon as the glider power is supplied. At the end of the flight, when the glider battery is switched off, the microRecorder can either be switched off manually, or the Auto-Off feature can be used, which can be set to its shortest time of 6 mins. This is the most foolproof way of using the microRecorder, as it switches on and off automatically with glider power.

For running off batteries use-
Auto-Off Time (mins): 90
Auto-Off Altitude Change (meters): 0
Auto-Off Velocity (kph): 0
Start File Speed (kph): 20
Start File Pressure Change (meters): 20

For running from the glider battery use--
Auto-Off Time (mins): 6
Auto-Off Altitude Change (meters): 50
Auto-Off Velocity (kph): 5
Start File Speed (kph): 20
Start File Pressure Change (meters): 20

3) User Details
All of these parameters can be up to 32 characters but only alpha numeric or spaces:

Pilot Name:	32 characters
Competition ID:	32 characters
Aircraft Type:	32 characters
Aircraft ID:	32 characters

4) Flight Declarations
Use the format shown. Default declarations will not appear in the IGC file. It is important that only alpha numeric characters are included in the declaration, as other characters such as a comma will prevent the resultant .IGC file from being validated. The microRecorder supports serial upload of declarations from a PDA.

For your changes to take effect, save the EW-USER.txt file back to the microRecorder or SD card (if fitted).

SD Card microRecorders
For units fitted with a SD card socket, ensure the card is fitted BEFORE the unit is started. If there is an EW-USER.txt on the SD card, it will be used when the microRecorder is started instead of the one in memory, otherwise the version stored in the unit will be used and also put onto the SD card.

When the unit is switched off either 'All' or the 'Last' .IGC files will be copied from the microRecorder memory to the SD card, depending on the option set in EW-USER.txt.

Calibration
The microRecorder is supplied with a calibration certificate for the atmospheric pressure sensor. This calibration is valid for two years before it must be tested and certified again. The current calibration certificate is an important document which will be required for all badge claims.

FAQ's
1. How do I access files on the microRecorder?
The microRecorder has a USB 2.0 interface and appears as a removable drive on Windows 2000 and above. No software or drivers are required to communicate with microRecorder or for file downloads. File can be opened directly from Windows Explorer. The microRecorder is compatible with Mac and Linux operating systems.

Windows 98SE can be used with additional drivers depending on your hardware. USB 2.0 ports can be added to your computer or laptop with low cost (less than £10) PCI or PCMCIA cards available online or from EW.

2. What file format is used?
The microRecorder stores IGC files in plain text that can be read directly in a text editor or flight software (e.g. SeeYou / Winpilot).

3. How do I enter my Pilot information and change the settings of the microRecorder?
The microRecorder has a plain text file called EW-USER.txt on the removable drive. Pilot, glider, competition ID etc can be entered here over the USB interface. In addition the update rate, baud rate, 'start recording' parameters and auto power off settings can be modified.

4. Can I make electronic flight declarations?
Yes. Electronic declarations are made in the EW-USER.txt using the USB interface. The microRecorder enters any declaration made into the IGC file at the start of each flight. If Declarations are present then they appear in the IGC file (C record) until they are removed or replaced in the EW-USER.txt.

5. Can I access the EW-USER.txt over a serial over a serial port from a PDA?
The microRecorder does had a serial interface via the RJ45 connector that can be used for serial uploads. There is a protocol for updating the EW-USER.txt via the serial port and this will be shortly implemented by software developers such as SeeYou so that declarations and other parameters may be updated from your PDA.

6. What update rates are supported?
1 - 10 seconds.

7. How much flight data can be stored on the microRecorder?
This is dependant on the update rate. At 10secs: 300 hours. At 1sec: 30hours.

8. Can the microRecorder act as a Barograph?
Yes. The microRecorder contains a separate pressure sensor and will record pressure height independently of GPS fix.

9. Does the microRecorder need an external GPS input?
No. The microRecorder contains a 12 Channel SirfStar II GPS receiver.

10. Does the microRecorder have a Pilot Event Button?
Yes. Pilot event is provided through the RJ45 connector on the microRecorder. Pilot event will update at 1sec intervals for 30secs.

11. Does the EW microRecorder have an NMEA output?
Yes. The EW microRecorder transmits NMEA sentences (GGA, GSA, RMC, VTG) for connection to PDAs. Moving map displays can be driven on PDA's running software such as SeeYou mobile and Winpilot. Baud rates between 4600 and 38400(default) can be selected.

12. Can I power my PDA from the microRecorder?
Yes. The microRecorder has a 5V output (rated at 800mA) for driving external devices. You can even charge your PDA in flight using this output. Note: The microRecorder must be connected to glider supply (9 Volts or higher) for this function.

13. How does the microRecorder Stop/Start recording?
Pressing the switch will start and stop the microRecorder. Alternatively connecting external power will start the microRecorder automatically. If the external power is removed the microRecorder will continue to run on its internal battery until it detects that there has been no movement for a user definable time.

14. Will the microRecorder work if the glider supply fails?
Yes. The microRecorder is designed to run from external glider supply or the internal battery. If an external supply is present then the internal battery will be charged. The internal battery will run the microRecorder for 200hrs. Note: This value is under ideal satellite conditions which allow the microRecorder to operate in low power mode (which is normally the case with an unobstructed view of the sky). The worst case scenario is if the antenna is fully obstructed or disconnected. The microRecorder stays in full power mode searching for satellites, but will still provide 20hrs of operation.

15. How do I charge the internal battery?
The internal battery is charged when the microRecorder is plugged into USB or glider supply. In addition an EW micro Charger can be provided for charging when a computer is not available. In both cases the battery will be fully charged from flat in approximately 8hrs.

16. What are the dimensions/weight of the microRecorder?
The microRecorder measures 115 x 85 x 25mm and weighs 280g.

17. How can the microRecorder be mounted?
The microRecorder is so small and light that Velcro is suitable for mounting. We've had one stuck to the side of a tug with two Velcro pads no problem. The microRecorder can be mounted in any orientation. The external antenna should be in clear view of the sky.

18. Does the microRecorder log engine noise?
Engine noise level recording is available as an option and is fully ratified by the FAI.