

# Batbox Griffin

## bat detector user guide



The **Griffin** has been designed to provide all the required functions for studying and surveying bat populations, whilst being easy to use in the dark and without the necessity for the usual connecting leads to recording equipment. Recording time is limited only by the capacity of the Compact Flash card used. The advanced design gives the user setup options, and many automatic features allow use by non-specialist operators.

### IMPORTANT

**Please read these instructions before using your Batbox Griffin bat detector**

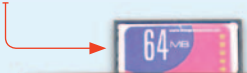
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Top view



Compact Flash card



Side view



Front view

External mic input

Headphone input

Loudspeaker

Power button



Light sensor

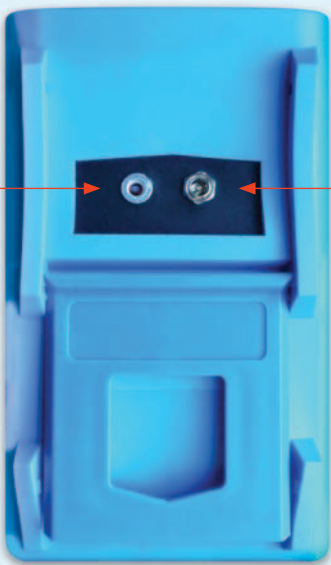
Rotary encoder

Control buttons

Rear view

Temperature sensor

External power socket



After a short introductory period, it should be very easy to operate the Griffin. The panel has a roughened texture in the area around the smooth buttons making them easy to find in total darkness. The buttons have been clustered in such a way as to make the unit operable with just the right hand thumb, if required.

- Remove the battery cover by undoing the thumb screws on the back of the unit.
- Make sure to fit the batteries according to the legend inside the battery compartment.
- Replace the battery cover by engaging the lower end first and refit the thumb screws.

A green LED can be seen flashing, every 2 seconds, through the LDR window just above the rotary encoder, indicating the batteries are in place. When 'unattended' mode is selected this turns to red flashing to show that the program is running (see *Accessing the Menu screen*).

### CF CARD MEDIA STORAGE

*(Because CF cards can be configured by the manufacturers in several ways, only CF cards approved by Batbox Ltd are guaranteed to work with the Griffin. If in doubt, contact Batbox Ltd before purchasing memory cards.)*

- Make sure the plunger at the edge of the slot at the front of the Griffin is pushed in so as to be flush with the surface of the unit.
- Carefully insert the Compact Flash card into the slot with the card brand name facing downward. The card will only fit one way round. The back edge of the CF card should be flush with the front face of the Griffin.
- To remove the CF card push the top of the plunger until it unlatches and pops up. Pushing the plunger in will release the card sufficiently to be able to pull it out of the slot.

**TO START THE GRIFFIN**, press the blue power button in the lower left of the front panel until the white 'booting' screen appears. After about 12 seconds the unit will have booted to show the **main screen**.

**The top line** of the main screen displays the division mode for real time monitoring. By pressing the 'H' button on the panel, repeatedly, it is possible to scroll through the different listening modes: Heterodyne, frequency division, binaural and silent. The setting chosen will be remembered the next time the Griffin is switched on.

**Heterodyne** is the most popular mode for real time field identification.

**Frequency division** divides the whole spectrum of sound by a given integer, making it possible to hear bats using any frequency within the range of the detector.

**Binaural** is a combination of the above two modes. When using headphones, the frequency division is in the left channel and heterodyne in the right channel. When monitoring via the built in speaker, the left and right channels are mixed and the output is monophonic.

**Silent** mode is used when using the Griffin in unattended mode where no audio output, during record, is required.

**The second line** of the main screen displays the time in hours, minutes and seconds.

**The third line** of the main screen shows the recording status. When the 'R' button is pressed this becomes a highlighted, lapsed time display for the duration of the recording.

**The fourth line** of the main screen displays the volume, in decibels, which can be adjusted with the rotary encoder. It is not possible to change the volume setting during record.

**The fifth line** of the main screen displays the battery level, the temperature, in degrees Celsius and the light level, in lux.

The tactile rubber encoder has stepped rotary increments and also a 'press to select' function. When pressed on a selected area the selection jumps to a new region of the display where the value can be modified by rotating the encoder. Having chosen a value, a single press of the encoder will select that value.

**Pressing the 'X' button will halt a routine or step back to the previous window. For instance, after pressing 'R' to start a recording, an 'X' button press will halt and save the recording.**

### SETTING THE CLOCK

From the main screen, press and hold down the 'select' function on the encoder. This takes you to a menu page on which there are four options.

Rotate the encoder until the 'Settings' option is highlighted and then press the encoder to select the next page.

On the new page, rotate the encoder to highlight 'clock'. Another press of the encoder takes you to the calendar and clock settings. When the date and time have been set, select 'Set clock' to finalise the settings.

When changing batteries the settings on the Griffin are retained for a few minutes.

## PREPARATION FOR RECORDING

The Griffin has a pre-record feature which allows a given period to be recorded before the record button 'R' is pressed. All too often a bat pass can be missed because it is too brief and/or the operator's reaction is slow.

The pre-record period can be adjusted via the 'Settings' menu from 'off' to 2.0 seconds. Because 2 seconds takes 32 seconds to play back, and usually results in most of the early part of the file to comprise silence, we have found a setting of 0.5 seconds to be sufficient in most situations.

The pre-record buffer is disabled during 'auto record'

### To begin recording, press 'R'.

Remember that however long you make your recording; it will take 16 times as long to play back.

*If you have been used to using a time-expansion bat detector the record times are often a maximum of 12 seconds.*

*The Griffin record times are limited only by the size of the CF card installed. For example, the 2 GB memory card supplied with the unit will hold around 22 minutes of full sample-rate (705kHz) recording. This is equivalent to around 5,8 hours of playback. We have found that this is enough capacity for a general emergence survey where not more than 220 episodes would be recorded with an average of about 6 seconds duration per file. The Griffin can use CF cards with up to 32GB capacity (almost 6 hours of recording- 4 days playback!).*

**To stop recording, press 'X'.** The recording will now be saved to the CF card along with two other files, one TXT file and one XML file with the same filename as the WAV file.

*(The Text file contains the exact date and time of the recording made, the temperature and the light reading. The XML files are for future design upgrades of the Griffin and should be ignored for this issue.)*

**To play back the last recorded file, press 'X' again.** You can make one recording after another without playing back the files should they need to be in quick succession or if there is a danger of missing another bat.

During playback the 'H' button becomes a 'pause' button. During 'pause' real time listening is activated.

This allows you to check if you might be missing bats during long playback times. To record again you will need to quit playback using the 'X' button, returning to the record – ready screen.

**Because the Griffin real time output is uninterrupted during record, it is possible to choose the perfect record period, by hearing the bat arriving and then moving on. All guesswork on capturing the pass is removed.**

## ACCESSING THE MENU SCREEN

Press and hold the encoder button. You now have four choices; File, Unattended, System, Settings.

### File

Select the 'File' page and press the encoder to access the file 'Playback' screen. Here will be listed all recordings on the card, with automatically allocated filenames e.g. rec00048.wav.

Select a file and press to access the next page, where you have four choices; Play, Info, Protect, Delete.

**Press 'Play' to play back the selected file.** One press of 'X' halts playback. Subsequent presses of 'X' step back through the menu pages until you return to the main screen.

### Unattended

Select 'Unattended' and press the encoder to access the 'Unattended' screen.

Here there are two modes of automatic operation; **Timed** or **Auto Record**

### Timed

Most timed recording sessions will need an external battery power supply owing to the long 'on' times involved.

Within the 'Timed' mode there are seven parameters; Threshold, Listen, RecTime, Interval, Start, End, Go.

**Threshold** – sets the minimum input level coming in through the microphone at which the unit will start to record.

*For example, where there is high ambient noise you will set the unit at a lower sensitivity than in a quiet situation in order to avoid false triggering. The higher the figure in –dB the more sensitive the unit will be. We have found a useful starting point to be in the region of -48dB to -56dB. Please note that the Griffin will not be able to discriminate bat calls from other ultrasonic noises such as beetles and cricket stridulations or dripping water. 'Trial and error' will need to be exercised with this mode, in order to obtain good results.*

**Listen** Is the period that the Griffin stays awake to 'auto record' one sample file, when the threshold is met, after which the unit will shut down

**RecTime** Is the duration of the recording

**I'val** Is the sleep interval, where the Griffin shuts down after which it re-awakes to 'listen' again.

**Start** sets the program start time of day, each day

**End** Sets the finish time, each day

**Go** Initialises the program to begin the timed recording

**Example:** You want to monitor any activity at a site between 8.00pm and 12.00pm but you don't want to record every bat pass, taking 10sec samples every 20 mins.

**Settings:** Threshold = -40dB (*depending on ambient noise*)  
 Listen = 5 mins  
 Rec Time = 10 secs  
 Interval = 20 mins  
 Start = 20.00hrs  
 End = 00.00hrs

### These settings will instigate the following program:

A red flashing LED indicates that the program is running.

At 20.00 the Griffin will power up and listen for 5 minutes. During this period, only if the threshold is passed, a recording will begin and after the set record time of 10 seconds the unit will shut down and wait for the set interval of 20 minutes before powering up again to listen for another 5 minutes.

This procedure continues until the 'end time' arrives, when the Griffin shuts down until 20.00hrs the next day. The same sequence of events will take place each day, until the system is powered up by the operator. After this point the RED flashing LED returns to the 'normal' green colour.

For long monitoring periods external battery (DC) will be required.

After pressing 'Go' you will be asked to start the program with a further press of the encoder then the Griffin will shut down. A flashing (every 2secs), red LED in the small window above the encoder indicates that the timed program is in operation (Each time the Griffin starts up during the program there will be a boot-up delay, before the recording can begin, of around 12 seconds).

### Auto Record

Only two parameters need to be adjusted for this mode; the threshold setting and the Record time.

When pressing 'GO' the Griffin goes into standby mode until a bat call passes the threshold level, after which the unit begins recording for the period set. At the end of that period the recording stops and the unit is ready for the next pass. To avoid too many files being recorded the threshold should be set a little higher than in the 'Timed' mode. This way only the closest calls will be recorded. Again, 'trial and error' will find the optimum settings for the recording environment

### System

From the System menu you can select the following: Screen, Battery, Card, Firmware

<b>Screen</b>	Allows backlight brightness levels to be adjusted from 0% to 100%. There is also an auto setting that will adjust the screen brightness automatically with fading ambient light levels. This avoids the problem of spoiling night-vision in very dark situations. The default setting is 'auto'.
<b>Battery</b>	Choose the type of battery installed. Because different types of battery have different discharge curves, the battery level indicator is rendered more accurate if the type of battery is entered. This does not apply to external battery power supplies. When using an external supply the Griffin must still have its own AA batteries installed.
<b>Card</b>	Compact flash 64Mb
<b>Info</b>	Allows you to see the card capacity (size) and also how much space is free.
<b>Eject</b>	Unmounts the CF card for safe removal whilst the Griffin is switched on.
<b>Format</b>	Will erase everything on the card. Only press this if you want to wipe clean your card.
<b>Test</b>	Checks the CF card for integrity. This can take a long time to complete depending on the size of card
<b>Firmware</b>	This page contains information about the software versions within the detector and it is from this page that firmware upgrades can be implemented

### Settings

On the settings page there are 5 options; Rec Mode, Sample Rate, Prebuffer, Monitor, Clock

<b>Rec Mode</b>	Is not adjustable in this issue. There is only a time expansion setting.
<b>Sample Rate</b>	Is not adjustable in this issue. There is only one setting.
<b>Prebuffer</b>	Sets the period of capture prior to the pressing of 'R' to record. ( <i>See 'Preparation for Recording' above</i> ).
<b>Monitor</b>	Allows the Automatic Gain Control (AGC) of the output to be turned off. Playback through the speaker will be attenuated when this is switched off.
<b>Clock</b>	See 'Setting the Clock' above.

## ON THE BACK

On the back of the Griffin you will find two devices;

1. External power socket (*secured with a hexagonal nut*) - 2.1mm x 5.5mm. The centre pin is the positive terminal.
2. Thermistor – This blue coloured thermistor is housed in a circular aluminium chamber that isolates it from the internal case temperature, which can become warm. Do not push anything into this housing. Placing your fingers over the sensor will give false readings of the ambient temperature.

## READING THE FILES ON COMPUTER

To remove the CF card push the top of the plunger until it unlatches and pops up. Pushing the plunger in will release the card sufficiently to be able to pull it out of the slot. It can then be inserted into the card reader in your computer or via an external card reader. Using Windows Explorer or similar, you can copy the files across to another folder and analyse the WAV files with BatScan or any audio analysis program.

## SOME TIPS FOR GOOD RECORDINGS

- Wear headphones to monitor your recordings. When using the speaker output some stray harmonics could be picked up by the sensitive microphone and add extra noise to the file.
- Use rechargeable batteries where possible, preferably a good quality set by a good manufacturer and with a high current capacity. They should also be recharged with a good charger – not necessarily the ‘fast-charge’ types, which often don’t fully charge the batteries.  
**Examples are:** Duracell Supreme NIMH 2450mAh  
 GP NIMH 2600mAh  
 Ansmann Max 2100mAh
- Always carry a spare set of fully charged batteries.
- Binaural mode, when using headphones will allow you to hear any bats around, in the left channel, whilst allowing you to tune the heterodyne in the right channel.
- Use a good brand of CF card. Some makes will not work at all because of the various manufacturers’ configurations. So far, we have only tested Sandisk cards although there may be many others that will work.
- Never remove the CF card during recording. This could crash the Griffin and permanently damage the CF card.
- Do not allow water, heavy moisture or rain to come into contact with the unit, which can destroy the microphone and many internal components.
- When calculating ‘switch on’ times with internal or external batteries, base your calculations on 350mA current consumption i.e. an 8.5 AH battery will power the Griffin for about 24 hours.

## POWER SUPPLIES

If, for any reason, you need use an external mains supply unit to power the Griffin it must be a 6 -12 volt DC regulated unit. In this case, you are likely to pick up mains-borne interference unless you have a special audio conditioner to reduce the mains hum and noise. This is why we recommend external battery power when using the automatic record modes, to power the unit for long periods. The centre pin of the socket on the rear of the Griffin is the positive terminal. Make sure that you use the correct size plug into the external power socket (5.5mm dia, 2.1mm pin). To test if your power plug is making connection, remove internal batteries and check if the system powers up and down.

**Internal batteries must be installed whilst the external power supply is connected in order to operate the internal clock.**

**n. b.** The other metal housing on the back is not a socket but an isolating chamber for the temperature sensor to ensure that it is the external temperature that is measured.

**Always allow the Griffin to fully power down before removing batteries or external power supply.**

Batbox Ltd accepts no responsibility for damage caused to the Griffin by the use of mains supplies not recommended by us.

## CF CARDS

There are many fake cards on the market masquerading as genuine brands. They look identical but they are usually cheaper. Make sure that any card you buy comes from a reputable supplier.

Batbox Ltd recommends Sandisk cards such as their Ultra or Extreme series. There are several other brands that may not work with the Griffin due to the many ways that different manufacturers configure their cards. Because a card works in your computer or camera does not necessarily mean it will work with the high speed, digital recording demands of the Griffin. We are currently compiling a list of brands that are compatible and information should be available in the near future.

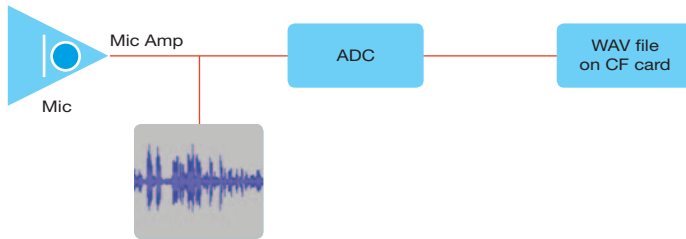
Do not take out the memory card from the Griffin whilst the unit is recording. This could damage the memory card, permanently. If you need to remove or change the card whilst the Griffin is switched on please go to the menu page and then select ‘system-card-eject’.

After installing a different card you can then select ‘system-card-info’. The Griffin will then recognise the new one.

Under no circumstances should water or severe moisture get into the Griffin so you should protect the unit from rain or other dripping water situations. Whilst most of the unit is protected against bad weather, the front where the microphone and CF card slot are situated remains the sensitive area.

## TECHNICAL CONCEPT INFORMATION

A note on dynamic range and digital recording of bats using the Griffin detector.



Reducing the recording system within the Griffin to it's most basic level, a microphone signal is amplified, converted to a digital representation and written to the compact flash card as a .wav file.

The process of analog-to-digital-conversion is one in which a measurement of the voltage signal is taken at regular time intervals (in the Griffin, 705600 measurements are taken per per second, 16 times higher than that of Compact Disc rate). Each measurement has a finite resolution (the smallest change in voltage which can be measured) and a maximum level. The Griffin uses a 16-bit number in the conversion process, giving measurement values between 0 and 65535 (or if you prefer, -32768 to 32767).

During the design process, the gain applied by the Mic Amp was chosen such that the maximum acoustic level likely to be encountered results in the maximum digital numerical output.

It is sometimes suggested that a variable analogue gain mic amp is useful, or even an amplifier where the gain is automatically varied by the circuit in response to the acoustic level sensed by the microphone (automatic gain control, or AGC for short).

### Some reasons why this might be considered a good-idea:

- To reduce the amplitude differences in the analogue signal to overcome problems when low-resolution ADC converters are used.
- To reduce the volume differences in the operators headphones (in detectors where real-time monitoring is included)

### But gain controls have problems:

- manual gain controls require manual adjustment to avoid clipping – by the time the operator has adjusted the gain, the situation may have changed, requiring a different gain – the ‘too-late’ problem.
- Automatic gain controls discard amplitude information
- Automatic gain controls distort the signal and add noise.
- Analogue automatic gain controls cannot work instantly, often resulting in clipping on transient signals.

### Noting the above points, the Griffin aims to offer the best solution:

- The Griffin has a very-low-noise, high gain mic amplifier, whose gain is pre-set to generate peak-level signals at the highest acoustic levels typically encountered.
- The Griffin uses a high resolution analogue-to-digital converter that can capture the full range of signal amplitudes without need of gain adjustments, manual or automatic.
- An all-digital automatic gain control is available for use during field monitoring

This AGC is intentionally ONLY applied to the signal fed to the headphones/speaker.

This AGC is capable of equalising signals over a 40dB range, and may be optionally disabled via the menu system

- The recorded signal is maintained at maximum quality by ensuring that the path between microphone and file is kept to the absolute minimum.

**WARRANTY NOTE**

Although the Griffin carries a guarantee of 12 months against faulty manufacture, all of our products are built to the highest quality standards and we are confident, if used according to the instructions supplied, that you will enjoy many years of good service. However, we cannot accept any responsibility for damage caused by misuse, water ingress or unauthorised opening or tampering with the unit. Your statutory rights are not affected in any way by our guarantee.

**SPECIFICATIONS:**

Frequency reduction system:	Heterodyne
Frequency reduction modes	Time expansion, heterodyne and frequency division
Sample rate	705.6 kHz
Frequency range	16kHz – 190kHz (with built-in mic)
Recording format	PCM 16bit, 44.1kHz WAV files
DSP	Equivalent processing speed: 400MHz
Storage medium	Compact flash
Storage capacity	Max 32GB (8GB = 94mins @ full sample rate recording)
Time expanded recordings	16x
Selectable frequency division rates	8/10/16 (for monitoring only)
Pre-trigger mode	Up to 2 sec or off
Linux platform	User updates of firmware possible via CF card
Recorded WAV filenames	Include date and time
Simultaneously recorded txt files	Date, time, temperature, light reading
File management	Playback, info, protect, delete
Environmental monitoring	Accurate temperature, light level readings (lux)
Menu system	Settable options via rotary encoder with push select
Backlit LCD (128 x 64)	(negative blue display) mode, frequency (kHz -heterodyne), time, volume, battery status, light level
Backlight	Manual (10 levels) or Auto
External mic input	Electret type (1.5v power) via 3.5mm socket
Batteries	4 x AA (alkaline, NiMH, or Lithium)
External power option	(6-12v DC) socket on rear of unit
Unattended trigger modes	2 automatic - timed interval recording or auto level sensing
Monitor modes	(AGC) Heterodyne, frequency division, binaural, silent
Built in speaker	36mm 0.5watt 8Ω
Headphone socket	2 channel 3.5mm
Single-handed operation	4 tactile switches and rotary encoder with select
Options	Protective rubber jacket

**Batbox Griffin** is made in England by **Batbox** Ltd

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