

# The Magenta 'Bat4' Bat Detector



The Magenta Bat4 is an entirely new Superheterodyne Bat Detector developed from our years of experience, and advice from users of Magenta Detectors. Featuring:

- Custom moulded case – Compact efficient design.
- Front facing low distortion Mylar loudspeaker.
- Specially contoured microphone housing for enhanced high frequency sensitivity.
- 4 AAA Alkaline, NiCd, or NiMH 'environment friendly' Rechargeable Cells.
- Low power design gives very long battery life.
- Top illuminated large diameter Frequency Dial.
- Conveniently placed output sockets on the bottom edge of the case.
- Constant level Recorder output socket.
- Headphone Socket which automatically mutes loudspeaker.
  
- Built in bright LED torch.
- Edgewise Volume and Frequency controls for easy operation with one hand.
- Wrist Strap for added security and convenience when taking notes.

## Magenta Bat4 Special Technical Details:

- Highly Linear Heterodyne Oscillator for easy frequency setting.
- Evenly spaced Frequency markings from 15 to 130 kHz.
- Multi Stage active filters for stable loudspeaker operation over the whole frequency range.
- Fixed level recorder output socket – before the volume control – simplifies recording.
- Headphone socket suitable for any stereo headphones from 8 ohms upwards.
- Short circuit protected headphone output.
- Wide range equalised microphone – sensitive across the whole frequency range.
- Low noise circuit techniques optimised for wide bandwidth with minimum noise.
  
- Designed in Denmark and Made in England by Magenta.
- Conforms to EU RoHS and WEEE regulations – Lead free.
- 2 Years Standard Guarantee.

## Using the Magenta Bat4 Bat detector

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### Introduction

Bats use inaudible ultrasonic 'sounds' like a sophisticated radar system to avoid obstacles and locate prey.

The bat4 detector takes the inaudible high frequency ultrasound and converts it to frequencies between 100Hz and 12kHz which are in the range of human hearing.

The detector can be tuned to receive a range of frequencies from 15 to 130 kHz. The sounds are heard via a built in waterproof loudspeaker, and there is a socket to connect standard stereo 'walkman type' headphones. A separate constant 'low level' output is provided for connection to a tape recorder or PC sound card.

### How it Works

The detector uses the Heterodyne principle. Ultrasound is picked up, amplified, and mixed in a special way with another signal generated in the bat detector. The mixer produces the audible difference frequency between the two. In a typical situation the bat will be sending ultrasound at 45kHz, the bat detector signal will be set to 43kHz and the audible output will be the difference between the two - which is 2kHz.

### Controls

There are two rotary controls. A combined volume on/off switch, and a large calibrated frequency control which adjusts the signal to be mixed with the ultrasound from the bat.

A low current led illuminates the frequency dial via a 'light tube'.

A small push button switch turns on a bright white LED torch light.

### Batteries

Four AAA alkaline or rechargeable batteries are used. The Bat4 works equally well with both types. Alkaline give very long life, whilst modern rechargeable cells - especially NiMH are an environmentally friendly alternative.

**Note: Make sure the detector is switched OFF when changing the batteries.**

### Checking

There are many common sources of ultrasound - jangling keys, rustling newspapers, rubbing two fingers together, and dropping paper clips onto a hard surface all produce interesting and different responses. Computer fans also produce steady ultrasonic whistles.

Any of these sources can be used to check that the detector is working. Start with the volume half way, and set the frequency control to 40kHz.

The 'heterodyne' principle is demonstrated very well if continuous source such as a computer fan is available. As the frequency control is rotated, the pitch of the detector output will change and fall to zero when the frequency of the fan noise and the local signal are equal. Rotating the Frequency control in either direction will result in the pitch rising, as the difference between the two signals increases.

### In the Field

When looking for bats, set the frequency to 45kHz. Many different bats echolocate at around this frequency. When looking for a particular species set the control to the appropriate frequency and 'scan' the area by pointing the detector in different directions. Ultrasound is very 'directional' and the microphone is much more sensitive to 'head on' signals than to signals from either side. It is often possible to locate a bat by pointing the detector to the strongest ultrasound long before it can be seen.

Once bats are detected, the frequency control can be 'fine tuned' to get the best signal. If there are two relatively close frequency settings that give similar signals, always choose the lower one\*.

The detector only receives ultrasound, it does not transmit anything that will disturb the bats. The only output is the audible signal from the loudspeaker - which (presumably) is of no interest to the bats even if they could hear it.

*\*Heterodyne detectors produce the difference between the bat frequency and the local signal. If the bat frequency is below the local signal frequency, a fall in the bat frequency will result in a rise in the pitch of the audible signal - because the difference will be greater. This is an inversion of the 'frequency spectrum'. If the Bat frequency is above the local signal, a fall in the bat frequency will reduce the difference and so produce a fall in the audible signal - so the 'frequency spectrum' is the right way round.*

### Technical Specification

Type:	Heterodyne
Frequency Range:	15 - 130kHz
Bandwidth:	+/- 9kHz
Output power:	0.5 watts
Headphone socket:	3.5mm Stereo
Tape Socket:	3.5mm stereo jack
Tape Output:	100mV typical
LED torch	White 5mm led.
Batteries:	4 x AAA
Speaker:	Waterproof low profile mylar
Microphone:	Wide band electret.

The Magenta Bat4 Detector was designed in Denmark and is built in England