Assessing Wildlife Recorders for Bat and Bird Monitoring: A Market Review of Static and Handheld Options

Wild Systems Lab · July 2026

Abstract

This paper reviews the acoustic recorders currently available for bat and bird monitoring in the UK and internationally, spanning static (passive, unattended) loggers and handheld (active, operator-carried) detectors. It sets out the detection technologies underpinning each device class, defines a consistent set of assessment criteria, and evaluates the current commercial lineup against them. Legacy and "classic" instruments are treated in their own section, both because several remain in active service and because they establish the performance baselines against which modern devices are judged. Indicative UK pricing is given throughout as a planning aid; prices move, frequently exclude the microphone, and are usually quoted ex-VAT, so they should be treated as orientation rather than quotation.

1. Scope and purpose

The goal is a practitioner-facing assessment rather than a laboratory benchmark. Two survey modes are covered:

- **Static / passive acoustic monitoring (PAM):** the recorder is deployed unattended for nights, weeks or seasons, running a schedule and writing triggered or continuous files to card. This is the dominant mode for occupancy studies, activity indices, roost-season monitoring and long-term soundscape work.
- **Handheld / active detection:** an operator carries the device on a transect, walked survey, emergence count or opportunistic session, listening in real time and often making short reference recordings.

Both bats (ultrasonic, roughly 15–125 kHz for UK species) and birds (audible, roughly 0.1–12 kHz) are in scope. Because the two frequency ranges impose different microphone, sampling and storage demands, the assessment treats them separately where the hardware diverges and jointly where a single device serves both — an increasingly common design goal.

2. Detection technologies (framing)

Four signal-handling approaches recur across the bat market, and the distinction still shapes what a device can and cannot deliver:

• **Heterodyne** mixes the incoming ultrasound with a tunable local oscillator to bring a narrow band into the audible range. Cheap, immediate and excellent for live listening, but it samples only a slice of the spectrum and is unsuitable for rigorous species analysis.

• **Frequency division (FD)** divides the input frequency (typically by ten) across the whole band. It is broadband and simple, produces usable zero-crossing-style output, but discards amplitude information and some fine structure.

• **Time expansion (TE)** captures a short digital snapshot and replays it slowed by a factor of ten or twenty, preserving the true call structure at the cost of a listening "dead time" during replay. It historically produced the best sonograms available.

• **Full spectrum (FS)** samples the raw ultrasound directly at high rates (typically 256–500 kSa/s) and stores it losslessly. It is now the de facto standard for analysis, superseding TE for most purposes, and underlies essentially every serious modern passive bat recorder. **Zero-crossing (ZC)** remains a compact companion format that logs only the dominant frequency over time.

For birds the picture is simpler: conventional audible-range PCM recording (16-bit WAV, 24/48 kHz and up), increasingly with 24-bit or 32-bit-float capture on handheld units. The interesting variation is in microphone configuration (omnidirectional PAM mic vs. directional/parabolic/shotgun) rather than in the fundamental capture method.

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3. Assessment criteria

Each device is considered against a consistent rubric:

1. **Acoustic performance** — microphone sensitivity and self-noise, frequency response relative to target taxa, sample rate and bit depth, triggering quality (bats-per-file vs. noise-file burden).

2. **Deployment envelope** — battery life per deployment, storage capacity, weatherproofing (IP rating), mounting and security.

3. **Usability** — configuration workflow (physical UI, Bluetooth app, desktop scheduler), field feedback, real-time display where relevant.

4. **Data and ecosystem** — file formats, GPS/timestamping, metadata, and the maturity of the analysis pipeline the device feeds (Kaleidoscope, Anabat Insight, BatSound, BirdNET-style classifiers, etc.).

5. **Total cost of ownership** — headline price, whether the microphone is included, consumables (batteries, cards), and software licensing.

A recurring theme: the sticker price of professional units is frequently the *body only*. The Anabat Swift, SM4BAT and BAR-LT all require a separately purchased microphone, and the microphone is often where the acoustic performance — and a meaningful fraction of the cost — actually resides.

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4. Static bat recorders (passive PAM)

Wildlife Acoustics — Song Meter family

The Song Meter line is the reference point for the sector. Three tiers are currently relevant:

• **Song Meter Mini Bat 2** — the mid-market workhorse, in AA and lithium-ion variants. It records full-spectrum and/or zero-crossing via an integrated ultrasonic microphone that Wildlife Acoustics and NHBS both position as comparable to the SM4BAT fitted with the SMM-U2. The generational update added a hinged IP67 lid, a ¼" tripod mount, direct screw-through fixing and Python-lock security. Battery life runs to roughly 50 ten-hour nights (AA, eight cells) or up to 125 ten-hour nights (six 18650 Li-ion). Configuration is by Bluetooth app with phone-GPS location setting. An optional acoustic stub mic adds audible-range recording, though it cannot capture ultrasonic and acoustic simultaneously. This is the device most UK ecological consultancies now reach for by default.

• **Song Meter SM4BAT FS** — the previous-generation professional standard and still widely deployed. D-cell powered (275–450 hours depending on activity), dual SD slots (up to 512 GB with SDXC), complex sunrise/sunset scheduling and a three-year warranty. The SMM-U2 microphone is typically a separate line item, and its swappable, cabled nature is an advantage for elevated or protected mic placement.

• **Song Meter SM5BAT** — the newest flagship, and notable for collapsing the bat/bird divide: it carries two ultrasonic *and* two acoustic microphones, giving a two-channel bat recorder and a stereo bird recorder in one IP67 body, with onboard GPS for multi-recorder time-sync and localisation. Wildlife Acoustics list lithium life around 150 ten-hour nights (70 on alkaline) and an expansion port for cellular remote access billed for 2026 — remote download, status checks and edge analysis. For projects that want bats and birds from a single deployment, this is the most complete off-the-shelf option currently on the market.

Titley Scientific — Anabat family

Titley's Anabat lineage is the other long-established professional standard, historically associated with zero-crossing but now fully full-spectrum:

• **Anabat Swift** — the established passive full-spectrum/ZC logger, 500 kSa/s, with the microphone (omnidirectional or directional) purchased separately. Free Anabat Insight analysis software is a genuine cost advantage over subscription models.

• **Titley Chorus** (~£816) and **Titley Ranger** (~£1,254) — the newer passive recorders. The Chorus is designed around field-replaceable, low-profile microphones (chosen partly to resist livestock and wildlife chewing) and ships with an acoustic microphone included, so bird and frog recording is available out of the box — a well-judged answer to the "mic is extra" complaint. The Ranger sits above it as the higher-specification unit.

Frontier Labs — BAR family (bird-led, bat-capable via schedule)

Frontier Labs' Bioacoustic Audio Recorders are the standout choice for long-endurance audible-range soundscape work, and are widely used in the PAM/BirdNET community:

• **BAR-LT** — a professional two-channel recorder in a rugged, camouflaged, lockable waterproof enclosure with a built-in desiccant holder. Up to four SD slots (up to ~2 TB), GPS time-sync and geo-stamping, WAV and FLAC, and 100–600 hours from one to six 18650 cells. The low-noise

omnidirectional mics carry a 20 dB Class-A pre-amp and log their own serial/age metadata. Sample rate tops out at 96 kHz, so it is an audible-range instrument (birds, frogs, terrestrial mammals) rather than a bat recorder.

• **BAR-V2** — the compact successor, packing most BAR-LT capability into a smaller, stackable, spike-based body at lower cost, with built-in selectable filters, a single SD slot (up to 1 TB), 600+ hours, and an AA fallback option.

• **Solar BAR** — a solar-charged variant for effectively indefinite continuous monitoring in remote sites.

Elekon — Batlogger

The Batlogger series (A+, S and the M2 handheld) rounds out the professional passive field, well regarded in continental European practice and available through UK resellers.

4b. Open-source, DIY and low-cost alternatives

This tier has grown from a curiosity into a genuine force in the sector, and it is where the economics of large-array PAM are being rewritten. It deserves assessment on its own terms rather than as an afterthought to the commercial range. One structural point is worth stating up front: the low-cost devices here largely share the same or very similar commodity MEMS microphone elements, so what actually separates them is the analogue signal path and the ADC — the converter, its sampling strategy and the gain stage — rather than the transducer itself.

AudioMoth (Open Acoustic Devices) is the disruptor that opened the category. It is a low-cost, open-source full-spectrum logger (8 kSa/s to 384 kSa/s) that records both audible and ultrasonic ranges, making it usable for birds *and* bats. It is small, powered by three AA cells, and configured through a free desktop app. The trade-offs are real: no weatherproofing without a case (IPX7 and other enclosures are sold separately), higher self-noise than premium mics, no GPS or scheduling sophistication on par with the flagships, and no warranty or repair channel through most distributors. Two limitations matter specifically for ultrasonic work: the standard enclosure has drawn field reports of both compromised ultrasonic performance and insect ingress, and AudioMoth reaches its top 384 kHz rate by oversampling the on-chip Gecko ADC, which introduces non-linearity in the high-frequency response — a genuine consideration for quantitative bat analysis rather than presence/absence work. But at roughly an order of magnitude below the professional units, it transforms the economics of large-array and citizen-science deployment, and the **µMoth** miniaturised variant extends the platform further. For anyone running many nodes on a fixed budget it is often the rational choice, trading per-unit performance for spatial coverage.

Pipistrelle family — DIY (pippyg.com) and Apodemus (commercial). Philip Atkin's open-source Pipistrelle designs, built around the Raspberry Pi Pico (RP2040), reach the field by two routes. As a *self-build* the design ships as files and a bill of materials: the frequently-cited ~£16–20 per-unit figure only holds when fabricating in batches of ten or more, it comes with no enclosure, and builders have reported recurring problems with the chirp-based triggering, the non-standard microphone mounting and generally difficult assembly. The design is also commercially available factory-assembled from Apodemus (**Apodemus PippyG**, ~£63 via NHBS), but it is important to understand what the commercial route does and does not change: it removes the soldering burden and adds a two-year warranty for manufacturing faults, but it does

not address the underlying design. The device remains a bare PCB requiring a separate weatherproof enclosure, and the same chirp-triggering and microphone-mounting issues apply. Both routes are best treated as hobbyist-tier instruments: useful for outreach and personal interest, but carrying limitations that make them unsuitable as primary survey tools.

Demeter (Wild Systems Lab). Our own bat *and* bird recorder (currently rev 1.5), a proprietary low-cost platform rather than an open-source design. It is built around an ESP32-S3 microcontroller paired with a dedicated high-performance audio ADC, capturing from a MEMS microphone whose frequency response has been evaluated against the relevant call ranges. It records the audible range at 8–96 kHz for birds and full-spectrum up to 384 kHz for bats, and runs for two to seven days/nights per deployment. The notable positioning is price against capability. Demeter is offered at **£55 without a case, or £100 cased (inc VAT)**. Even at the higher, weatherproofed price it undercuts the commercial dual-taxa flagships (SM5BAT, Titley Chorus) by a wide margin; in bare form at £55 it is the lowest-cost recorder on the market, below both the preassembled Apodemus PippyG (~£63) and a bare AudioMoth board (~£80 before case, cells and UK import). Crucially, it reaches that price without inheriting their compromises: it is a finished, assembled unit with a dedicated audible-range bird mode (8–96 kHz) rather than a bat-triggered full-spectrum mode, and it avoids both the AudioMoth case/oversampling caveats and the Pipistrelle-family triggering and microphone-mounting issues. Because this budget tier broadly shares the same MEMS element, that advantage sits in the signal chain and converter rather than the transducer.

A note on the analysis layer. Increasingly this tier is paired with on-device classification — e.g. BattyBirdNET-Pi and similar BirdNET-derived pipelines running on a Raspberry Pi with an AudioMoth or Echo Meter Touch microphone — which blurs the line between "recorder" and "detector." For a programme already committed to a BirdNET-style classifier, choosing recorders whose output (and GUANO metadata) drops cleanly into that pipeline matters as much as raw acoustic specification.

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5. Handheld bat detectors (active)

Wildlife Acoustics — Echo Meter Touch 2 / 2 Pro

The **Echo Meter Touch 2** (~£185) and **Echo Meter Touch 2 Pro** (~£345) plug directly into an iOS or Android device and turn the phone into a full-spectrum detector with a live scrolling spectrogram, recording and automatic species-ID suggestions via the free app. The Pro extends sensitivity and bandwidth. For transect work, training and rapid field ID they are the most popular active units in the UK, precisely because they lean on the screen and compute the surveyor is already carrying.

Titley Scientific — Anabat Walkabout and Scout

- **Anabat Walkabout** (~£1,636) — the top-of-range active detector, effectively a ruggedised Android tablet with a ~5" touchscreen, a sensitive Knowles microphone (omnidirectional with a clip-on directional cone), and 500 kSa/s full-spectrum recording beyond 200 kHz. It displays live spectrograms and offers heterodyne, time-expansion, frequency-division and pitch-shift listening, with on-device file management, species labelling and environmental logging. Reviewers consistently rate its sensitivity and build; the counterpoint is price and a learning curve around threshold tuning.

• **Anabat Scout** (~£834) — a lighter, purpose-built active detector with heterodyne, auto-heterodyne and frequency-division listening, full-spectrum and ZC recording to SD, per-file geotagging, voice notes, built-in GPS transect logging and an in/out roost counter. Its "press-and-go" simplicity makes it well suited to handing to novice surveyors, while the peak-frequency readout supports live identification of species such as pipistrelles.

Elekon — Batlogger M2 and Batscanner

• **Batlogger M2** (~£1,279) — a full-featured handheld recorder/logger.

• **Batscanner** (~£259) and **Batscanner Stereo** (~£319) — auto-tuning heterodyne detectors aimed at simplicity; the Stereo version reportedly gives a directional cue to an approaching bat when used with headphones. These bridge toward the "classic" simple-detector segment below.

Pettersson — M500 / M500-384 microphone

Not a standalone recorder but worth noting: the **M500-384** USB ultrasonic microphone brings genuine Pettersson-grade capture to a Windows tablet or laptop for active recording, and pairs with software such as SonoBatLIVE for real-time, low-noise capture with strong noise rejection.

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6. Static bird / audible-range recorders

Much of this hardware overlaps Section 4, because several manufacturers build a bat variant and an acoustic variant of the same chassis:

• **Song Meter Mini 2 Acoustic** (AA / Li-ion) — the bird/frog counterpart to the Mini Bat 2; up to ~530 hours (AA) or well over 1,300 hours (Li-ion), same hinged IP-rated body and Bluetooth workflow.

• **Song Meter Micro 2** — the smallest and cheapest in the range, single integrated mic, designed explicitly for deploying many units cheaply across a site. Ideal for BirdNET-style array work where node count matters more than per-node fidelity.

• **Song Meter SM4** — the two-channel audible-range professional recorder (20 Hz–48 kHz, up to ~650 hours on D-cells), the acoustic sibling of the SM4BAT.

• **Frontier Labs BAR-LT / BAR-V2 / Solar BAR** — as above; arguably the strongest dedicated bird-PAM instruments for long deployments and array localisation.

• **AudioMoth** — as above, fully capable in the audible range and the budget backbone of many bird-monitoring arrays.

• **Song Meter SM5BAT** — worth restating here as the one current unit that captures stereo birdsong *and* ultrasonic bats in the same deployment.

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7. Handheld field recorders for birds

Bird sound recording has one foot in the wildlife-equipment world and one in the pro-audio world, and the handheld segment is dominated by general-purpose field recorders paired with an appropriate microphone.

- **Zoom H-series** — the H5 and H6 remain the workhorses, their defining feature being interchangeable capsule modules (X/Y, mid-side, shotgun, and crucially an XLR/TRS module that turns the unit into a multitrack front-end) with preamps shared across the range. The refreshed "studio" and "essential" models (H5studio, H6studio, H4e, H6e) push into 32-bit-float capture and notably quieter preamps (EIN around −127 dBu on the studio units), which removes level-setting anxiety in the field. The palm-sized **F3** is a two-input, mic-less, 32-bit-float box for use with external mics. Indicative pricing spans roughly $200 (H5-class) to ~$350–400 (H6-class and studio models).
- **Tascam DR-series and Portacapture** — the DR-05X is a long-standing budget favourite for parabolic and PAM-adjacent work (low cost, sunlight-readable screen, clean enough preamps), with the DR-40X, DR-100mkIII and the newer Portacapture X6/X8 moving up the range into 32-bit-float multitrack territory.

The recorder is usually only half the system. Serious bird recordists pair these units with one of:

- a **parabolic reflector** (e.g. Telinga, Wildtronics) for maximum reach and gain on a distant, static singer;
- a **shotgun/hypercardioid microphone** (e.g. Sennheiser MKH-416, ME66/K6) for directional capture with more forgiving aim; or
- the recorder's **own capsules** for soundscape and close work.

A practical field note echoed by many recordists: a shotgun mic degrades quickly once the bird moves off-axis, whereas a well-placed recorder left on the ground can hold quality as the bird moves around it — which is why unattended placement and parabolic setups often outperform hand-aimed shotguns for anything but a cooperative, stationary subject. For opportunistic ID rather than archival capture, a phone running Merlin (WAV capture plus live ID) is a legitimate entry point.

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8. Classic and heritage options

Several older instruments remain in service, are frequently available second-hand, and are worth knowing both as functional tools and as the reference points the modern market grew out of.

Entry-level heterodyne / FD detectors (still excellent for listening and outreach):

- **Batbox Baton** (~£88) — single-button frequency-division detector, remarkably sensitive for the price, the classic beginner's device; add a recorder via the line-out to start capturing.
- **Batbox III D** (~£170) — manually tuned heterodyne, for years the "go-to" for UK bat-group members and still a solid choice.
- **Batbox Duet** — combines heterodyne and frequency division, feeding both to separate line-out channels for simultaneous listening and recording.
- **Magenta Bat5** (~£116) — a robust, well-supported heterodyne detector with digital tuning and a built-in torch; the kind of unit bat groups buy by the dozen for walks because they last for years.

Professional legacy instruments (the analysis baselines):

- **Pettersson D240X** (~£1,000 / €1,182) — arguably the most storied bat detector of the modern era, in production since around 2003. It combines a high-quality tunable heterodyne detector with a time-expansion recorder (×10/×20, up to 3.4 s memory), letting you both listen live and capture analysis-grade full-spectrum snapshots. Still the standard voucher-call tool for many professionals, and it holds its value on the used market.
- **Pettersson D500X** — the full-spectrum "direct recording" passive workhorse: real-time FS capture, rugged aluminium housing, up to four CF cards, sophisticated triggering with strong noise rejection, and the highly regarded Pettersson microphone. It set the passive-recording bar that the SM-series and Anabat Swift were measured against.
- **Pettersson D100 / D200 / D230** — classic heterodyne (and het/FD) detectors, several with multi-microphone designs, still encountered in the field and in teaching collections.
- **Anabat SD1 / SD2 / Anabat II** — the original zero-crossing recorders that made large-scale passive bat monitoring practical, and the reason ZC remains a supported format today. Their microphones and accessories still interoperate with parts of the current Titley range via adapters.
- **Wildlife Acoustics SM2BAT+** — the immediate ancestor of the SM4BAT; with well over ten thousand units deployed historically, a great deal of the world's long-run bat-activity data was collected on this platform, and it remains a capable passive recorder.
- **Zoom H2 / H4n** — the classic handheld pairing for time-expansion detectors and early bird recording, and the reason so many older detectors carry a "Tape" line-out label. Many are still doing exactly that job.

The through-line: the classics divide cleanly into cheap live-listening tools (Batbox, Magenta) that modern app-based detectors have largely displaced for *analysis* but not for *outreach and enjoyment*, and professional legacy recorders (Pettersson, early Anabat, SM2BAT+) whose data and workflows the current market is directly continuous with.

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9. Cross-cutting considerations

The microphone is the instrument. On professional units the separately-priced microphone frequently determines both performance and a large share of cost. Budget comparisons that ignore this systematically flatter body-only units (Anabat Swift, SM4BAT, BAR-LT) against all-in-one designs (Mini Bat 2, Chorus, AudioMoth).

Triggering vs. continuous capture. For bats, trigger quality governs the ratio of usable calls to noise files and therefore the downstream analysis burden — a genuine differentiator between premium and budget units. For birds, continuous or scheduled capture feeding a classifier (BirdNET and successors) is now the norm, which shifts the emphasis toward endurance, storage and node count over per-file cleverness.

Power and storage set the real deployment length. Li-ion 18650 platforms (Mini Bat 2, BAR-LT/V2) have largely displaced disposable D-cells for long campaigns; multi-terabyte card capacity (BAR-LT) and FLAC compression meaningfully extend unattended endurance.

Analysis ecosystem is a lock-in that matters. Kaleidoscope (Wildlife Acoustics), Anabat Insight (Titley, notably licence-free), BatSound (Pettersson) and the open BirdNET/PAM tooling each pull data in slightly different directions. Free, non-subscription analysis (Anabat Insight, open classifiers) is a recurring and underrated cost advantage.

Cost of ownership, not sticker price. Batteries, cards, microphone replacement (a strength of the Chorus's user-swappable design), warranty and repair access (a weakness of the AudioMoth channel) all compound over a multi-season programme.

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10. Comparison summary

Indicative UK retail, inc VAT (NHBS / UK resellers, mid-2026) unless noted. Professional units often exclude the microphone (a significant extra — e.g. the SMM-U2 is ~£270). An asterisk (\) marks figures that are approximate or were not confirmed at the time of writing (Anabat Swift, BAR-V2, Zoom/Tascam UK pricing) — verify before procurement.

Static / passive recorders

Device	Taxa	Method	Approx. endurance	Notable	Indicative price
SM Mini Bat 2 (Li-ion)	Bats (+ birds w/ stub)	FS / ZC	~125 × 10-hr nights	Integrated mic ≈ SM4BAT/SMM-U 2; IP67; app	£829
SM Mini Bat 2 (AA)	Bats (+ birds w/ stub)	FS / ZC	~50 × 10-hr nights	AA variant of above	£729
SM4BAT FS	Bats	FS	275–450 hrs	Pro standard; 3-yr warranty	£949 body / £1,339 w/ mic
SM5BAT	Bats **and** birds	FS + PCM	~150 × 10-hr nights (Li)	2× ultrasonic + 2× acoustic; GPS; cellular (2026)	new; price TBC
Anabat Swift	Bats	FS / ZC	Schedule-dependent	Free Insight software; mic separate	~£950* (mic extra)
Titley Chorus	Bats + birds	FS / PCM	40 nights US / 350 hrs ac	Field-replaceable mics; acoustic mic included	£816
Titley Ranger	Bats + birds	FS / PCM	100 nights US / 700 hrs ac	Higher-spec passive unit	£1,254
Frontier Labs BAR-LT	Birds/audible	PCM (≤96 kHz)	100–600 hrs	Up to ~2 TB, GPS, FLAC, camo waterproof	£986
Frontier Labs BAR-V2	Birds/audible	PCM (≤96 kHz)	600+ hrs	Compact, stackable, built-in filters, AA option	~£450*
AudioMoth	Bats **and** birds	FS (≤384 kSa/s)	AA-dependent	Open-source; case ingress + 384 kHz oversampling caveats; no GPS	~£80 board
Apodemus PippyG	Bats **and** birds	FS (384 kSa/s)	4–7 days	Preassembled Pipistrelle-family; same issues as self-build; bare PCB, no case	~£63
Pipistrelle (self-build)	Bats	Het + TE + FS (384 kSa/s)	~4–5 nights	DIY RP2040; batch-of-10 for cost; no case; triggering/mic issues; hobbyist	~£16–20 build

Device	Taxa	Method	Approx. endurance	Notable	Indicative price
Demeter (WSL)	Bats **and** birds	FS (8–96 kHz birds / ≤384 kHz bats)	2–7 days/nights	Bespoke; dedicated bird mode; assembled; lowest cost on market bare (£55) or cased (£100)	£55 / £100 inc VAT
SM Micro 2	Birds/audible	PCM	Schedule-dependent	Cheapest Song Meter; ideal for dense arrays	£156
SM Mini 2 Acoustic	Birds/audible	PCM	Schedule-dependent	Bird/frog sibling of Mini Bat 2	£489 (AA) / £589 (Li)
SM4 Acoustic	Birds/audible	PCM	~650 hrs	Two-channel audible pro recorder	£790

Handheld / active detectors and recorders

Device	Taxa	Live display	Notable	Indicative price
Echo Meter Touch 2	Bats	Phone spectrogram	Auto-ID app; most popular UK transect tool	£185
Echo Meter Touch 2 Pro	Bats	Phone spectrogram	Extended sensitivity/bandwidth	£345
Anabat Walkabout	Bats	5" touchscreen	Top-of-range; het/TE/FD/pitch-shift; >200 kHz	£1,636
Anabat Scout	Bats	OLED readout	Press-and-go; GPS transect; in/out counter	£930
Elekon Batlogger M2	Bats	Yes	Full-featured handheld logger	£1,279
Elekon Batscanner (Stereo)	Bats	Freq. readout	Auto-tuning heterodyne; simple	£259 (£319 stereo)
Zoom H5 / H6	Birds	Metering	Interchangeable capsules; XLR; 24/96–32-bit float	~£200–350*
Tascam DR-05X	Birds	Metering	Budget parabolic/PAM favourite	~£90*

Classic / heritage

Device	Taxa	Method	Role today	Indicative price
Batbox Baton	Bats	FD	Beginner listening; add recorder	~£88
Magenta Bat 5	Bats	Heterodyne	Robust group/walk detector	~£117
Magenta Bat 4	Bats	Heterodyne	Budget beginner heterodyne	~£81
Batbox III D	Bats	Heterodyne	Long-time UK "go-to"	~£170
Pettersson D240X	Bats	Het + TE	Legendary voucher-call tool	~£1,100
Pettersson D500X	Bats	FS (passive)	Passive workhorse baseline	~£1,700
Anabat SD1/SD2/II	Bats	ZC	Origin of large-scale PAM	Used market
WA SM2BAT+	Bats	FS	Ancestor of SM4BAT; vast legacy dataset	Used market

11. Recommendations by use case

• **Professional bat survey, single-site passive:** SM Mini Bat 2 (Li-ion) is the pragmatic default; SM4BAT FS or Anabat Swift where a cabled, elevated or protected microphone is needed.

• **Combined bat + bird from one deployment:** SM5BAT is the most complete off-the-shelf single-box answer; Titley Chorus is the value alternative where audible-range fidelity and field-replaceable mics matter more than simultaneous ultrasonic channels; Demeter (£55 bare / £100 cased) covers both taxa at a fraction of the flagship price in a purpose-built assembled unit with a dedicated bird mode.

• **Long-endurance bird / soundscape PAM feeding a classifier:** Frontier Labs BAR-LT (or BAR-V2 for cost/size), with Solar BAR for indefinite remote sites.

• **Large distributed array on a fixed budget:** Demeter (£55 bare / £100 cased) is the lowest-cost assembled dual-taxa option, undercutting AudioMoth (~£80 bare, with case and oversampling caveats) and the Apodemus PippyG (~£63, bare PCB, same Pipistrelle-design issues). SM Micro 2 (£156) is the cheapest fully-cased dedicated bird recorder.

• **Enthusiast wanting to build their own detector:** the open-source Pipistrelle self-build is a rewarding hands-on project, cheap only at batch scale, with real caveats — no enclosure and known triggering, mic-mounting and assembly quirks. The commercial Apodemus PippyG removes the soldering but not the underlying design issues, so neither route is recommended for anyone who needs reliable survey data over simple curiosity.

• **Active transect / walked survey:** Echo Meter Touch 2 / Pro for cost and app-based ID; Anabat Walkabout where budget allows and a large live spectrogram plus top-tier sensitivity are wanted; Anabat

Scout for handing to novice surveyors.

• **Emergence / roost counts:** Anabat Scout (in/out counter, geotagged) or a classic heterodyne unit (Magenta Bat5, Batbox III D) for live listening.

• **Archival bird recording:** a Zoom H5/H6 or Tascam handheld paired with a parabolic dish (static singer) or shotgun (moving subject); a phone with Merlin for opportunistic ID.

• **Teaching, outreach and bat walks:** the classic cheap detectors (Batbox Baton, Magenta Bat5) remain unbeaten on cost-per-unit and simplicity.

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12. Conclusion

The market has converged on full-spectrum capture for bats and classifier-fed continuous capture for birds, and is now visibly converging the two taxa into single devices — the SM5BAT and the Titley Chorus/Ranger being the clearest expressions of that trend. At the same time, the open-hardware disruption led by AudioMoth has decoupled *spatial coverage* from *per-node cost*, which is reshaping study design as much as any premium feature. For the practitioner, the decisive questions are rarely raw specification and almost always fit: whether the microphone is included and swappable, whether endurance and storage match the intended deployment length, whether the analysis pipeline is free or licensed, and whether the survey is passive-and-many or active-and-few. The classic instruments, finally, are not merely of historical interest: the Pettersson and early Anabat platforms remain the reference points for data continuity, and the cheap heterodyne detectors remain the best tools in existence for the thing that started the whole field — standing in the dark and actually hearing a bat.

Prepared as a market-orientation review. Pricing and model availability change frequently and figures here are indicative; confirm current specifications and quotations with manufacturers or resellers (e.g. NHBS, Wildlife & Countryside Services) before procurement.