



GaiaForge

ORPHEUS PRO

Recording & Field Guide

Getting the best field audio from your Orpheus Pro — recording quality, input levels, microphone placement, smart triggering, and the metadata recorded alongside every file.

For Orpheus Pro units · Recording is a Pro-only feature

1 · About Pro recording

Orpheus Pro records high-quality audio directly to a USB drive for research and analysis, alongside its playback role.

Recording is straightforward to start, but a few decisions — quality settings, input level, and where the microphone sits — make the difference between audio you can analyse and audio you can't. This guide walks through each, in the order you'll meet them when setting up a deployment.

The microphone supplied with Orpheus Pro is a **low-noise omnidirectional electret condenser capsule**, fed through a powered preamplifier into the unit's audio input. "Omnidirectional" means it captures sound arriving from every direction more or less equally — ideal for soundscape and biodiversity work, where you are documenting an environment rather than aiming at a single source.

AT A GLANCE

Bit depth **16 or 24-bit** · Sample rate **44.1 / 48 / 96 kHz** · **Mono or stereo** · Manual, scheduled & astral recording · Threshold triggering · Automatic GUANO metadata in every file.

2 · Recording quality settings

Set these on the **Audio** tab before recording. They trade audio quality against file size and power.

Bit depth — 16-bit or 24-bit

Bit depth sets the dynamic range: the distance between the quietest and loudest sound a file can hold.

- **16-bit (Standard)** — ample for loud or close subjects, and the smaller file. A sound recording standard for decades.
- **24-bit (Hi-Fi)** — much more headroom, so quiet or distant sound sits further above the noise floor and a slightly conservative input level still captures full detail. Recommended when the subject is quiet, distant, or unpredictable in level. Files are ~50% larger than 16-bit.

Sample rate — 44.1, 48 or 96 kHz

The sample rate sets the highest frequency a recording can contain — roughly half the sample rate (the Nyquist limit).

- **48 kHz** — captures up to ~24 kHz, covering essentially all bird song and audible wildlife. The best general default.
- **96 kHz** — captures up to ~48 kHz for high-frequency detail and analysis headroom. Doubles the file size and power cost; use it when the extra bandwidth genuinely matters.
- **44.1 kHz** — the legacy audio/music standard (~22 kHz); fine, but 48 kHz is usually the better field choice.

Channels — mono or stereo

- **Stereo** — captures a spatial image, so the soundscape has width and sources can be placed left-to-right. Best for ambience and soundscape ecology.
- **Mono** — a single channel, half the file size. Ideal for single-source monitoring and most automated species-ID pipelines, which expect mono.

What that costs on disk

File size is fixed by the settings — *bit depth* × *sample rate* × *channels*. Approximate rates:

Setting	Per minute	Per hour
16-bit · 48 kHz · mono	~5.5 MB	~0.3 GB
16-bit · 48 kHz · stereo	~11 MB	~0.6 GB
24-bit · 48 kHz · stereo	~16.5 MB	~1.0 GB
16-bit · 96 kHz · stereo	~22 MB	~1.3 GB
24-bit · 96 kHz · stereo	~33 MB	~1.9 GB

The Audio tab shows a live estimate for your chosen settings. Plan USB capacity from the "per hour" figure and your deployment length.

Recommended starting points

Goal	Suggested settings
Bird song / general monitoring	24-bit · 48 kHz · mono
Soundscape / ambience	24-bit · 48 kHz · stereo
High-frequency detail / archival analysis	24-bit · 96 kHz · stereo
Long unattended run, storage-limited	16-bit · 48 kHz · mono

3 · Setting input levels & gain

Level is the one thing you must get right *before* you walk away — it can't be fixed afterwards. Aim for peaks around **−12 dBFS**.

Orpheus Pro has three gain stages working together:

1. **Analog input gain** and a **preamp stage** — the main hardware gain, set automatically by Auto-Set Gain (below).
2. **Software gain** (−20 to +20 dB) — a fine trim applied in software on the Audio tab.

The Levels tab

Open the **Levels** tab to see live left/right meters while you set up. The meters are colour-coded:

- **Green** (below −12 dBFS) — comfortable, with headroom.
- **Amber** (−12 to −6 dBFS) — a healthy, strong level.
- **Red / CLIP** (approaching 0 dBFS) — too hot; the loudest sounds are being cut off. Lower the gain.

CLIPPING IS PERMANENT

A clipped peak is distortion that no amount of later processing can undo. When in doubt, set the level a little low and record in 24-bit — the extra headroom means a quiet recording still cleans up well, but a clipped one is lost.

Auto-Set Gain

The quickest way to set level correctly:

1. Open the **Levels** tab and press **Auto-Set Gain**.
2. Make (or wait for) the loudest sound you expect to record while it measures.
3. Orpheus adjusts the gain until peaks land near the −12 dBFS target, then reports the result.

If it reports that the input has reached its limit, the sound source is very quiet or very loud for the current setup — adjust the preamp itself, or reconsider mic placement.

READING THE VERDICT

No signal — check the microphone is connected and the preamp is powered. **Quiet / Low** — there's room to raise the gain. **Good** — peaks are landing with headroom. **Hot** — close to clipping; lower the gain a little.

The microphone & what its specs mean for you

Orpheus Pro's capsule is a high-sensitivity, low-noise omnidirectional electret condenser microphone — the type favoured for nature and hi-fi recording. Its specifications directly shape how you set up:

Specification	Value	What it means for your recordings
Directivity	Omnidirectional	Captures every direction equally — no need to aim; ideal for soundscapes and biodiversity surveys.
Sensitivity	−28 dBV/Pa ±3 dB @ 1 kHz (≈ 40 mV/Pa)	A strong output signal, so less gain is needed — which means less added hiss and cleaner captures of quiet or distant sound.
Signal-to-noise ratio	80 dB (A-weighted, at 1 Pa)	Exceptionally low self-noise (≈ 14 dB(A) equivalent). Faint sounds sit well above the microphone's own hiss — the key reason this capsule suits quiet field sites.
Maximum SPL	119 dB SPL	Handles loud, close events without the capsule itself distorting. In practice, set your input level so the recorder doesn't clip first (§3, above).
Frequency response	Essentially flat, ~20 Hz – 20 kHz	Neutral and faithful across the audible range, so recordings are accurate for analysis and species identification.

Putting it together: the high sensitivity and very low self-noise are what let Orpheus capture soft, distant calls cleanly — but they also mean a loud, nearby source can reach the recorder's clipping point well before the microphone's 119 dB ceiling. So the capsule rarely limits you; your *input level* does. Use Auto-Set Gain (§3) against the loudest sound you expect, and let 24-bit's headroom cover the quiet passages.

4 • Microphone placement

Where the microphone sits shapes the recording more than any setting. Small changes in position often beat any amount of gain.

Height & clearance

Raise the capsule clear of the ground and away from hard reflective surfaces (rock, walls, the enclosure) that cause echo and colouration. Keep it clear of leaves and grass that will brush it in the wind.

Distance to the subject

Closer means a stronger, cleaner signal — but a louder subject risks clipping. For unpredictable events, back off slightly and let 24-bit's headroom carry the quiet passages.

Wind

Wind is the biggest enemy of outdoor recording. Always fit a foam windscreen, and a furry cover for exposed or breezy sites. Enable **Noise Reduction** (a 100 Hz high-pass) to cut low wind and handling rumble.

Handling & cable noise

Secure the cable so it can't tap or drag on the mic, and decouple the capsule from anything that vibrates (poles, fences). These transmit as low-frequency thumps.

ABOUT THE HIGH-PASS FILTER

Noise Reduction removes low-frequency content to tame wind and rumble. That's ideal for most bird and wildlife work — but if your subject itself produces low-frequency sound you want to keep, leave it off.

Because the capsule is omnidirectional, you don't need to "aim" it — but keep it physically clear on all sides, and remember it will pick up sources behind and beside it as readily as in front. Shelter the capsule from direct rain while keeping its front clear.

5 · Recording modes & smart triggering

Record on demand, on a schedule, around the sun, or only when something is making sound.

Modes

- **Manual** — *Record Now* starts and stops by hand. Best for tests and setup.
- **Scheduled** — set a start and end time, and a repeat pattern (Once, Daily, Weekdays, Weekends, or a specific day). The unit wakes, records the window, and returns to sleep.
- **Astral** — schedule relative to sunrise or sunset (e.g. "from 60 min before sunrise to 60 min after"). Orpheus recalculates the times daily from your GPS location, so the recording tracks the dawn or dusk chorus through the season without reprogramming.

Threshold (triggered) recording

On the **Trigger** tab, Orpheus can record only when sound exceeds a level you set — saving storage and power on quiet sites.

- **Threshold** — the level that starts recording.
- **Pre-buffer** — keeps a few seconds of audio from *before* the trigger, so you never lose the start of a call.
- **Hold time** — keeps recording through short gaps so one call isn't split into fragments.
- **Ignore wind and rain (band-limited trigger)** — bases the trigger decision on a chosen frequency band only, so loud but low-pitched wind and rain don't fill the card with empty recordings. The audio saved is always the full frequency range — the band only affects *when* to record.
- **Auto-split per event** — writes each detected event as its own timestamped file.

DON'T SET THE THRESHOLD TOO HIGH

With a threshold set, anything quieter is never written. On a quiet site a too-high threshold can capture nothing at all and leave you with an empty folder. If in doubt, record everything (threshold off) for the first session, review the levels, then set a threshold. Orpheus warns you before scheduling a threshold recording for exactly this reason.

6 · Files & storage

Recordings are written as WAV files to a USB drive.

- **Filenames** follow `UNIT_YYYYMMDD_HHMMSS.wav`, where *UNIT* is your unit's name (the same name it uses for its Wi-Fi hotspot). This keeps provenance in the filename and is compatible with the folder conventions BirdNET and Kaleidoscope expect.
- **Automatic file splitting** — a single WAV can't exceed 4 GB, so long recordings roll into consecutive part files seamlessly; no audio is lost at the join.
- **Second-drive rollover** — plug in two USB sticks for a long deployment and Orpheus continues onto the second when the first fills, rather than stopping.
- **Safe stop** — if space runs low with no spare drive, recording stops cleanly so the files already written stay intact.

CHOOSING THE DRIVE

Orpheus identifies drives by their filesystem ID, not by the port they're in, so it keeps recording to the right stick even after a reboot re-orders them. Use a fast, good-quality USB drive with enough capacity for your planned hours (see the size table in section 2).

7 · What's recorded alongside your audio

Every Orpheus recording documents itself. Each WAV carries an embedded **GUANO** metadata block — the recognised bioacoustics metadata standard — that standard analysis tools (such as Kaleidoscope) read automatically.

This means a recording is never just anonymous audio: it carries where, when, and how it was made, so months later you can tell exactly what you're looking at — without a separate field notebook.

What is captured in each file

Field	What it tells you
Timestamp	Date and time (with timezone) the recording started
Make & model	GaiaForge · Orpheus (Basic or Pro)
Firmware version	The software build that made the recording
Serial / unit name	Which physical unit recorded it — the same name as its hotspot and its filenames, so a file maps to a unit with no lookup table
Sample rate, length, channels	The audio format, read straight from the file
GPS location	Latitude & longitude of the deployment (when configured)
Temperature, humidity, pressure	Environmental conditions at the moment of recording (Pro units with the sensor)
Battery voltage & %	Power state during capture
Storage drive	Which drive the file landed on
Gain & high-pass	The input gain used and whether Noise Reduction was on
Trigger settings	Threshold, pre-buffer, hold and band — when triggered recording was used

How researchers use it

- **Provenance without paperwork** — each file is self-documenting; the recording *is* its own field note.
- **Correlate with conditions** — line up activity against temperature, humidity, pressure and time of day.
- **Spot power issues** — battery state flags recordings made on a dying charge that may warrant a closer look.
- **Map and compare sites** — GPS enables spatial analysis and multi-site comparison.
- **Reproducible results** — captured gain and trigger settings let you interpret and repeat a capture exactly.
- **Tie files to units** — the serial/unit name links every file back to the exact device in the field.

TRUSTWORTHY BY DESIGN

If a reading isn't genuinely available, Orpheus **leaves it out rather than inventing a value**. A missing sensor is recorded as absent — never as a fake "0 °C" — so every number in the metadata is a real measurement you can rely on. (Basic units without an environmental sensor simply omit those fields.)

8 · Pre-deployment checklist

A two-minute pass before you walk away saves a lost deployment.

- ☐ **Quality** — bit depth and sample rate set for your target; mono or stereo chosen.
- ☐ **Levels** — run **Auto-Set Gain** on the Levels tab (or set manually to ~-12 dBFS peaks) against the loudest sound you expect.
- ☐ **Wind** — windscreen fitted; Noise Reduction (100 Hz high-pass) enabled if breezy.
- ☐ **Placement** — capsule raised and clear; cable secured against handling noise; sheltered from direct rain.
- ☐ **Storage** — USB drive inserted with enough free space for the planned hours; a second stick fitted for long runs.
- ☐ **Location & time** — GPS location and clock set (needed for astral scheduling and for the metadata).
- ☐ **Test** — make a short manual recording and check the meters and playback before leaving.
- ☐ **Schedule** — recording mode and window (or trigger) configured; threshold not set so high it records nothing.

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