AR4 V1.4

Acoustic and Bat Recorder

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Department of
Conservation

Introduction

The AR4 acoustic recorder has been developed by the Department of Conservation's electronics team to provide New Zealand conservation practitioners with a quality acoustic recorder at low cost. It is designed to be a light weight, weatherproof/waterproof, small and easy to use device and includes the option of using inbuilt recording protocols for standardised monitoring.
The recorder uses easily available and low cost consumables (AA Batteries and SanDisk Ultra SD cards). A GPS receiver is built in for accurate location and time stamping of recordings.
This manual is intended as a guide to using the recorder, not as a guide to acoustic or bat monitoring.

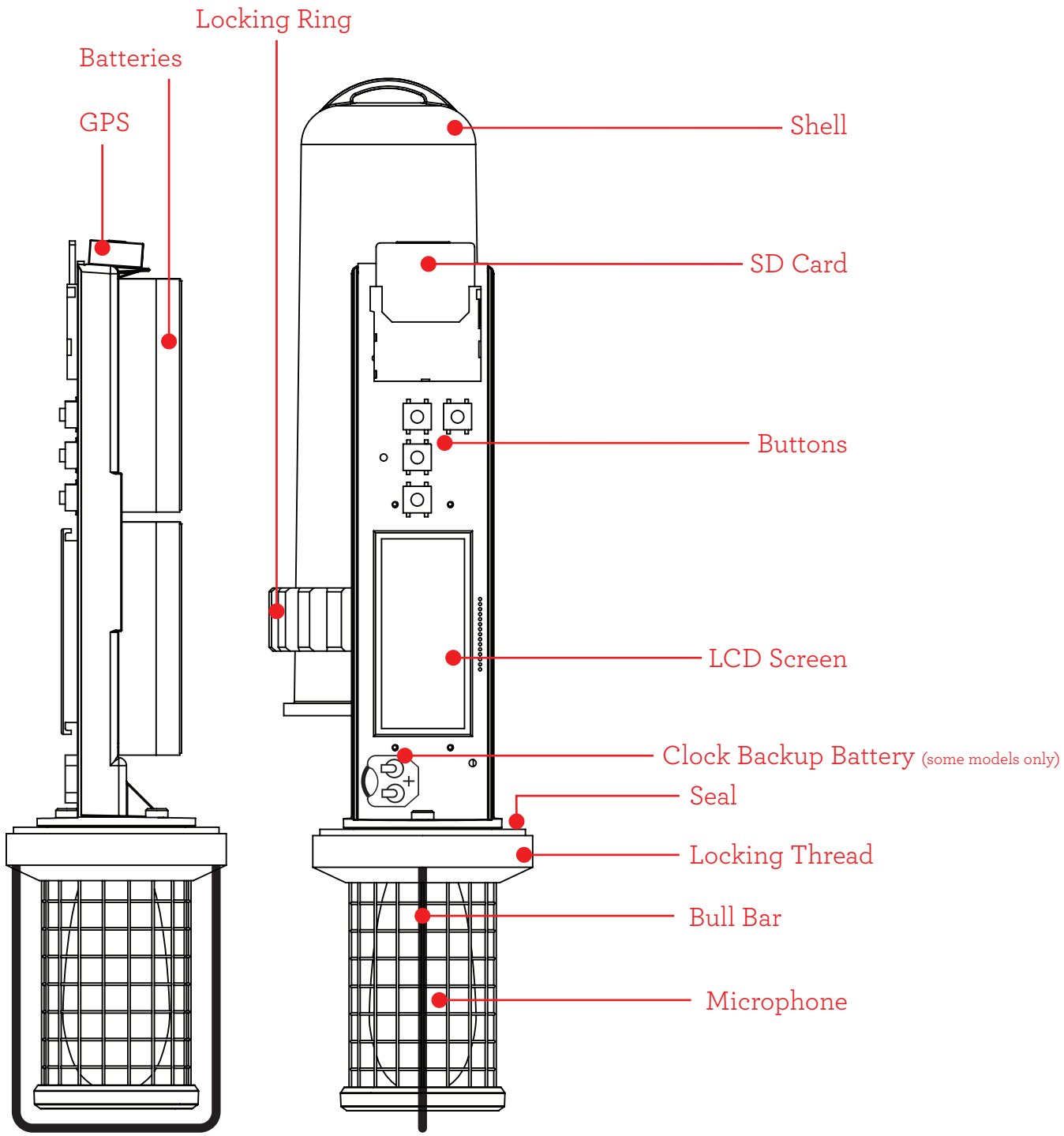
Recording Types
The AR4 can record using three recording types. The timing and type of recordings can be programmed for two separate daily routines using inbuilt protocols.

Acoustic High
Sound recordings with a high sampling rate. The high sampling rate means that high frequency sounds can be captured. This recording type is usually used for birds with high pitch calls, e.g. forest birds. The high sampling rate uses a lot of power.
Files are saved as .WAV.

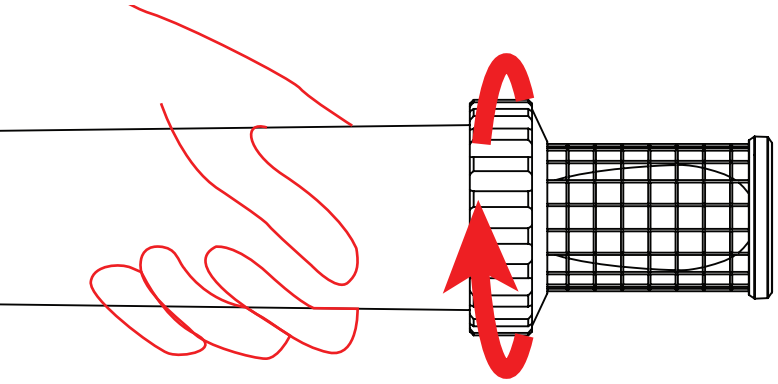
Acoustic Low
Sound recordings with a low sampling rate. This means that higher frequency sounds will not be captured, but uses less power and memory space than the higher sampling rate. This recording type is usually used for bird species with lower pitched calls such as Kiwi.
Files are saved as .WAV.

Bat
While acting as a bat recorder the AR4 is 'triggered' meaning it will only record files when it detects bat like sounds. Files are saved as .BMP - a bitmap image of a compressed spectrogram. Custom software provided by the electronics team can be used to process these files.

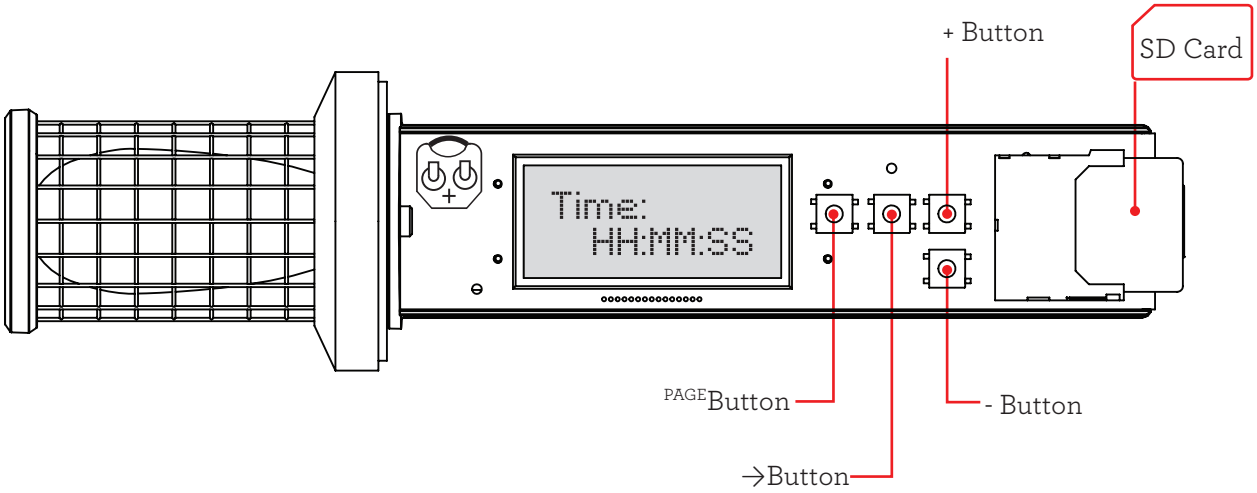
Overview

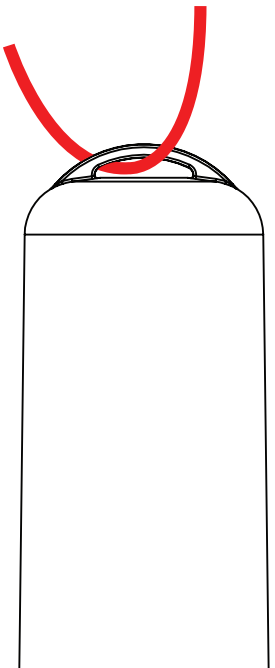

Locking Ring
Batteries
GPS
Shell
SD Card
Buttons
LCD Screen
Clock Backup Battery (some models only)
Seal
Locking Thread
Bull Bar
Microphone

Using the Recorder



Open and close the Recorder by holding the shell and turning the lock-ring anti-clockwise. Be sure not to hold the microphone cage while applying force to the ring, as it will compress and damage the cage.
If the ring is too tight, or you find it hard to tighten it enough, please use the tool provided.





The AR4 has waterproof coatings on all the electronics, and we think it is pretty robust. Nevertheless, try to avoid getting moisture or debris inside the recorder. We also strongly recommend including properly dried silica gel inside the shell of the recorder to protect the electronics from moisture and condensation.

The lanyard holder can be used to hang the AR4 in situ. Alternatively you can tape/tie/zip-tie to small trees.

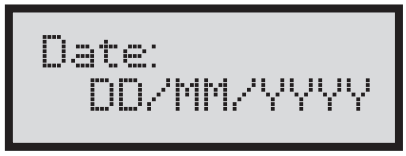
Settings

Press the page key to turn the display on. The first page will be the time page. Use the page key to move between pages, → to cycle between values and +− to modify them.

After about 20 seconds of no activity from the user the display will power down. The recorder will continue to wake up and record at the preset times as long as the batteries are in. To turn off completely, remove the batteries.

Shows the current firmware installed

Sets the current time. 24 hour format



Sets the current date

Protocol for first daily recording session. Choose between Off, Forest, Tier1 Night, Tier1 Day, Bat, High, Low. Off will disable this session.

Start and span time for the first daily recording session.

As above but for second daily recording session

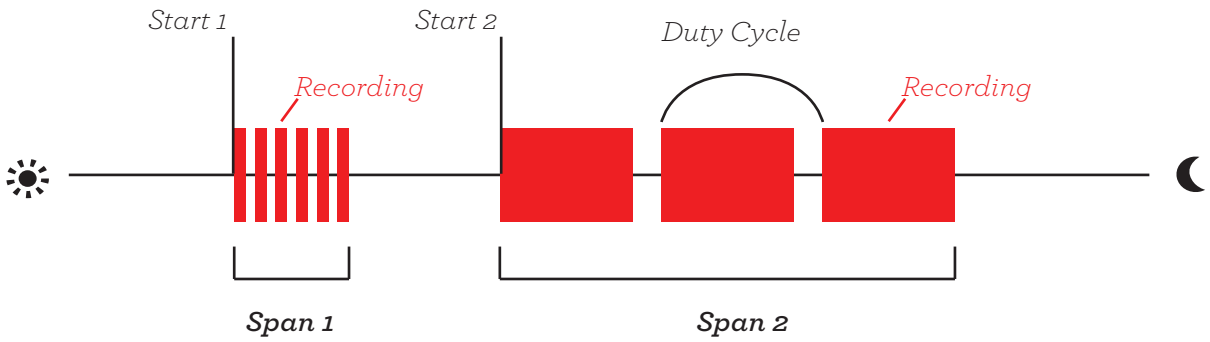
As above but for the second daily recording session

Off- GPS function turned off
Log - GPS co-ordinates logged as per version 1.31
Log and Sync - GPS co-ordinates logged as per version 1.31 **also** GPS data syncs and updates the on-board clock information

Use the card page to check (free space and function) and format the card. Use +- to toggle these functions, and → to execute them

Protocols

The AR4 has inbuilt recording protocols that allow users to quickly set up the recorder to use standard monitoring settings.
A protocol can pre-define several characteristics of recording:
Recording type [acoustic high/low or bat].
Recording start time [daily].
Recording span [hours to record for].
File size [recordings are broken into files].
Duty cycle [the recorder cycles between recording and sleep during the recording span]

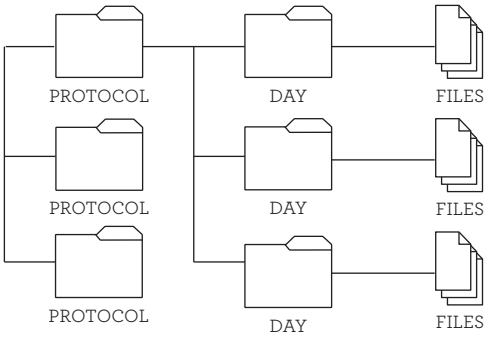


Protocol Name	*Recording Type*	*Start Time*	*Span*	*File Size*	*Duty Cycle*
High	Acoustic High	Manual	Manual	15 Minutes	100%
Low	Acoustic Low	Manual	Manual	15 Minutes	100%
Bat	Triggered Bat	Manual	Manual	Varies	Triggered
Forest	Acoustic High	Manual	Manual	1 Minute	Random
Tier 1 Day	Acoustic High	7:00	6:00	15 Minutes	100%
Tier 1 Night	Acoustic Low	20:00	10:00	15 Minutes	100%

Protocols can either be manual (where the user sets the start time and span) or predefined (all settings are automatically selected)

Files

Files are saved onto the SD card in the structure;



The files themselves are automatically named with the current date & time, e.g. a sound file recorded on the 30/08/16 at 1:36:25PM will be named 20160830_133625.wav.
The bat files are bitmap images of a compressed spectrogram. DOC electronics provides software for analysing the bat files and identifying bat calls.
A separate document describes bat monitoring using the AR4.
Email electronics@doc.govt.nz for more details.

Updates

Software fixes and updates can be programmed into the AR4 using files provided by the electronics team.

Feedback and Problems

If you have any feedback on the AR4 or are experiencing problems, please contact the DOC electronics team at

electronics@doc.govt.nz

Basic specifications:

Weight: 370gms with batteries

Acoustic sampling rate:
High - 32KHz at 16bit resolution WAV files.
Low - 8KHz at 16bit resolution WAV files.
Bat – Proprietary 0-88KHz compressed spectrogram bitmap.

Batteries: 4x AA NiMH or Alkaline (NiMH recommended).

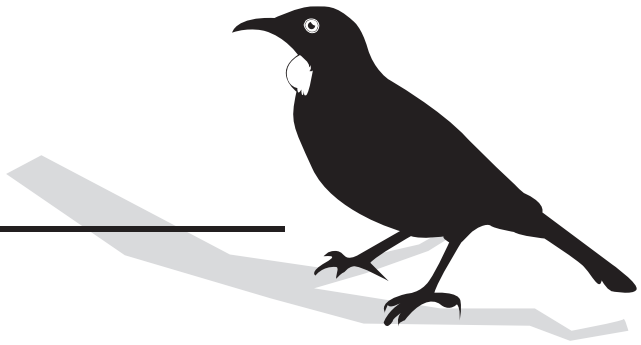
Memory cards: SD cards up to 32Gbyte (16Gbyte SanDisk Ultra recommended).

Recording times:
(approximate for NiMH)
Acoustic high 120 hours
Acoustic low 180 hours

Bat (deployment time) up to 4 weeks (reduced by high levels of bat activity).

How to use

Tier 1 Protocol



The Tier1 protocol is for use in Tier1 monitoring. This can be bootloaded onto any AR4 by downloading the installer from the electronics website, or by request to electronics@doc.govt.nz

```
Protocol 1:
Tier 1 Day
```

In protocol 1, select 'Tier1 Day'.

```
Protocol 2:
Tier 1 Night
```

In protocol 2, select 'Tier1 Night'.

```
Survey Name:
AAAAAAA
```

The 'Station' and 'Survey' pages are now available. They appear after the protocol 2 span page.
Use > to select letters and +,- to modify them. A-Z, 0-9

```
Station:
    AAAA
```

The Station can only be
BIRD, BIRA, BIRX, BIRP or BIRM

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