SNAP MANUAL

Multi-card Long-Term Underwater Acoustic Recorder

Manual v1.0

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www.loggerhead.com

Overview

Hardware

Snap is datalogger designed for collecting large amounts of underwater acoustic recordings. Setup is designed to run through a simple button interface with a display. No PC is needed to setup and deploy the Snap.

- HTI-96-min Hydrophone
- 3 Alkaline D-Cell Bateries
- 1 microSD cards formatted as FAT32

Software
Snap stores data directly as audio wav files.

Any audio analysis software (Adobe Audition, Cornell Raven, MATLAB, R, Python) will work with these files.

For noise analysis, the open source Manta software is designed to run with audio files collected by the Snap.
https://bitbucket.org/CLO-BRP/manta-wiki/wiki/Home

Setting up Snap for Deployment

See the online video for a tutorial on setting up the Snap

Step 1. Prepare microSD card. microSD cards larger than 32 GB need to be formatted as FAT32. Appendix 1 describes software that can be used to do this on Windows PCs.

The card shipped with the Snap from Loggerhead has already been formatted as FAT32.

Step 2. **O-rings**. Clean and grease o-rings with silicone grease and insert into the groove on the ring. The o-rings (-228) are McMaster part number: https://www.mcmaster.com/9452K66/

Step 3. Turn on power switch.
The Snap has battery holders for 1 set of 3 D-cell alkaline batteries.
Do not use NiMH or Lithium batteries.

Alkaline batteries can be packed in luggage on an airplane and can be bought in most field locations. When traveling to remote areas it is a good idea to bring new batteries.

The microSD cards will be scanned for free memory. There MUST be a card in slot 1.

Use buttons to change settings
> **Enter**: Used to move through menu settings and accept changes.
> **UP/DN**: Used to change values.

Display Setting	Description
UP+DN->Rec	Hold down UP + DN to start Press Enter to change settings UP+DN may also be used to stop a recording in progress.
Rec:	Record duration in seconds
Slp:	Sleep duration in seconds. This is the time from the END of one recording to the START of the next recording.
Year:	Year
Month:	Month
Day:	Day of month
Hour:	Hour (24 hour time)
Minute:	Minute
Second:	Second
SF:	Sampling Frequency (in Hz): The sampling rate of the Snap can be changed depending on the frequency of interest (the sampling rate needs to be at least twice as high as the highest frequency you want to record). E.g. 48 kHz sampling frequency can record sounds up to 24 kHz.

Step 5. Start Recording. Hold down the UP and DN buttons at the same time to start recording. If this is not done, the recorder will automatically start after 15 minutes. A red LED in the end of the hydrophone will illuminate while a recording is in process (if you are using the HTI-96-min).

Step 6. Close lid. Snap the lids into place. The water pressure will hold the lid in place underwater. If you are deploying where the water is warm, it is best to open the Snap and close the lid outside just prior to deployment. Since cold air expands when heated, it is best not to close them up inside an air-conditioned room and then deploy in water that is warmer than the air-conditioned room.

Step 7. Deploy. The Snap can be attached to a bottom mount (e.g. cinder block) or subsurface line using hose clamps or large tie wraps.

Retrieval
Upon retrieval, open the top lid by pushing up on opposite sides of the lip, and pull out the Snap board. If a recording is still happening (red hydrophone LED on and green LED on board flashing), hold down the UP + DN buttons at the same time. This will properly close the file before stopping recording. Then switch off the board and remove the microSD card.
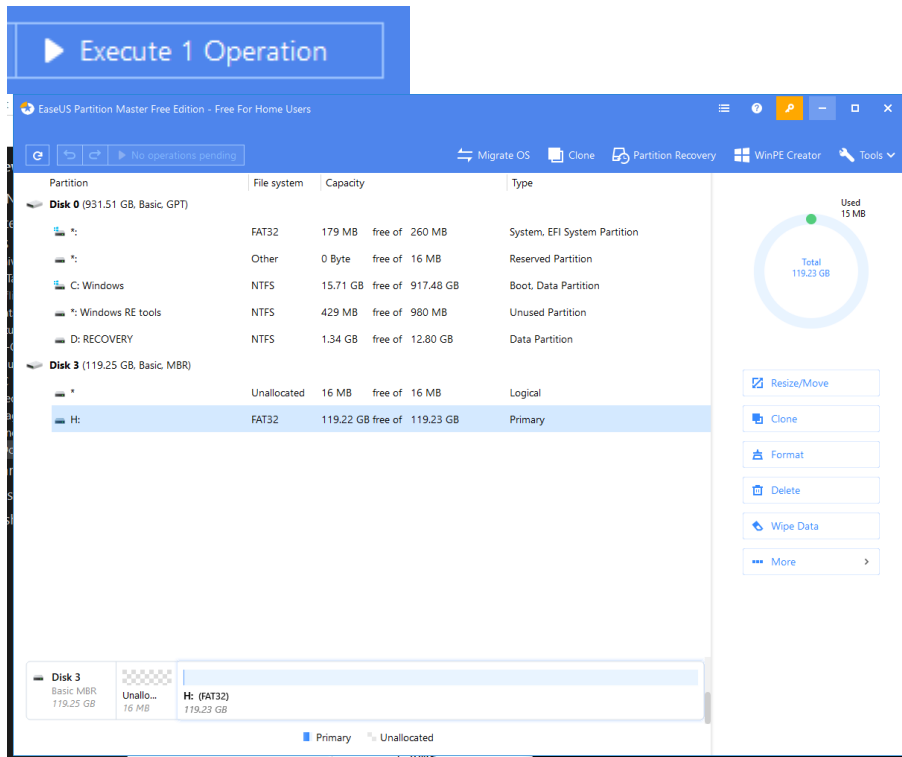
Appendix I

Formatting SD card with EaseUS Partition Master for Cards Larger than 32 GB

32 GB cards can be formatted as FAT32 in Windows with standard re-formatting. New 32 GB cards will come formatted as FAT32 (you don't need to do anything).

EaseUS Partition Master Instructions
https://www.easeus.com/download/epmf-download.html

1. Click on the drive with the microSD card.

2. Click Format button the right

3. In pop-up dialog box Change cluster size to 64 KB. Click OK
4. On top of screen click on Execute 1 Operation

Format Partition   ❓ ✕

⚠ Formatting the partition will destroy the data on the partition!

Partition label   [   ]

File system   [FAT32   ⌄]

Cluster size   [64 KB   ⌄]

                                    [OK]   [Cancel]

Appendix II

Two settings can only be changed by placing a text file on the microSD card, placing it in the Snap, and turning the Snap on. The Snap ships with defaults that work in most situations.

setup.txt Commands

All commands are optional. Default column lists values if no setting in setup.txt file. Record duration and record interval can be set through the button interface.

Command	Function	Default	Example	Setup.txt example
SG	Hydrophone system gain. See table for dB gains associated with different settings.	4	Set gain to setting '10', which corresponds to 11.1 dB gain	`SG 10`
ND	Remove DC from audio. Turning on increases electrical noise	Off	Turn on feature to remove DC from audio	`ND`

HTI Hydrophone and Recording Gain

The Snap uses a hydrophone manufactured by High-Tech Inc. The sensitivity of the hydrophone will be on a specification sheet included with the shipment (typically -170 dBV/uPa or -180 dBV/uPa).

The hydrophone has a red LED in the end to indicate when it is getting power. This will only be turned on during startup and recording. The hydrophone red LED will be off when sleeping.

The A/D converter gain can be changed through the setup.txt file. The default is setting 4. The setting can be changed with SG command in setup.txt. The actual setting that was used is stored to the log.txt file.

Setting	Clip Level (peak-peak)	Clip Level (peak)	Gain (dB)
0	3.12	1.56	-3.9
1	2.63	1.315	-2.4
2	2.22	1.11	-0.9
3	1.87	0.935	0.6
4	**1.58**	**0.79**	**2.0**
5	1.33	0.665	3.5
6	1.11	0.555	5.1
7	0.94	0.47	6.6
8	0.79	0.395	8.1
9	0.67	0.335	9.5
10	0.56	0.28	11.1
11	0.48	0.24	12.4
12	0.4	0.2	14.0
13	0.34	0.17	15.4
14	0.29	0.145	16.8
15	0.24	0.12	18.4