# A-tag

A multi purpose ultrasonic acoustic event recorder for tagging, towing and stationed platforms.

**H**ow it works? **R**esearch example **C**ollaboration **M**anual **S**pecifications **S**ales **O**ptions **R**eferences **T**echnical facts **O**pen source **A**ttachement and retrieval

**How it works?**

*A-tag* enables you to start acoustic monitoring of cetaceans, which you are interested in. *A-tag* offers multi-platform observations of cetaceans, originally developed to observe biosonar behavior, tagged on dolphins and porpoises in the wild. In recent years, *A-tag* has been applied for the acoustic transect to count the number of dolphins and porpoises, and for the long term stationed observation. A-tag can be attached on a rope from a boat, or on a pipe below a waterbreak, or on an animal using a suction cup.

*A-tag* can be used to count the number of animals. Two ultrasonic hydrophones of an *A-tag* enables to record sound pressure at each hydrophones as well as the sound source direction calculated by the sound arrival time difference between two hydrophone. Identification of each sound source enables to discriminate each phonating animal individually.

*A-tag* is a small and stand-alone system. The water resistant body of *A-tag* sizes 27 mm in diameter and 150 mm in length + external stereo hydrophones. All of the data is stored in the flash memory of *A-tag* and is downloaded after you retrieve it. *A-tag* works up to 48 hours by CR123 lithium battery (standard type) and one month by two D cells for long-life stationed type (optional).

*A-tag* offers open source. For data analysis, Igor (Wavemetrics, AZ, USA) has been used. Source code of the noise reduction and identification of biosonar clicks is archived in this web page. You can download and modify the parameters to fit your animals and noise conditions.

*A-tag* does *not* record sound waveform. It is event recorder of each pulse with received sound pressure level over the pre-set detection threshold level.

**Selected examples of research using A-tag**

**1.Tagging on the animal**

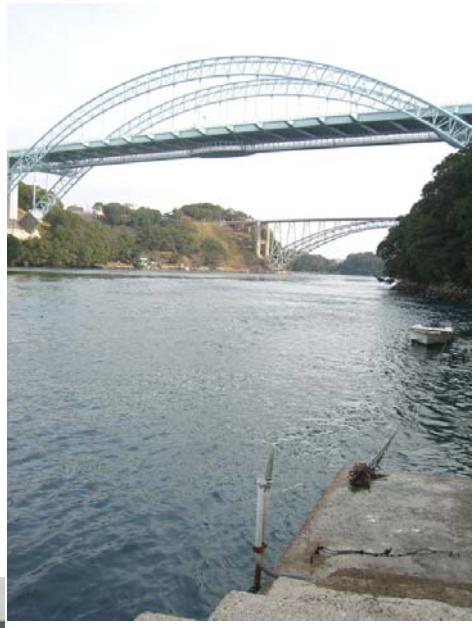
Acoustical inspection ahead in advance monitored an animal-mounted *A-tag* on free ranging finless porpoise. Free-ranging finless porpoises scan ahead by their sonar in advance before swimming silently. The inspection distance reached several tens meters that provide long enough ‘safety margin’ for the animal before facing to real risks or rewards. Once the porpoise detect a potential prey, it keeps focusing sonar to the target during approaching. When we are driving a car with listening music, we should check ahead in advance before changing a compact disk, otherwise we can crash easily. Detecting objects in their path is a fundamental perceptional function of moving organisms. *Source: Biosonar behaviour of free-ranging porpoises, Proc. R. Soc. Lond. B, 272, 797-801.*

**2.Towing from a ship**

**Quantitative acoustic strip transect to count porpoises monitored by towed A-tag from a vessel.** Yangtze finless porpoises were surveyed by using simultaneous visual and acoustical methods from 6 November to 13 December 2006. Two research vessels towed stereo acoustic data loggers, which were used to store the intensity and sound source direction of the high frequency sonar signals produced by finless porpoises at detection ranges up to 300 m on each side of the vessel. Simple stereo beam forming allowed the separation of distinct biosonar sound source, which enabled us to count the number of vocalizing porpoises. Acoustically, 204 porpoises were detected from one vessel and 199 from the other vessel in the same section of the Yangtze River. Visually, 163 and 162 porpoises were detected from two vessels within 300 m of the vessel track. The calculated detection probability using acoustic method was approximately twice that for visual detection for each vessel. The difference in detection probabilities between the two methods was caused by the large number of single individuals that were missed by visual observers. However, the sizes of large groups were underestimated by using the acoustic methods. Acoustic and visual observations complemented each other in the accurate detection of porpoises. The use of simple, relatively inexpensive acoustic monitoring systems should enhance population surveys of free-ranging, echolocating odontocetes. *Source: Estimation of the detection probability for Yangtze finless porpoises (*Neophocaena phocaenoides asiaeorientalis*) with a passive acoustic method. J. Acoust. Soc. Am. 123(6), 4403-4411.*

**3. Stationed long-term monitoring**

**Attendance and swimming directions could be measured using stationed A-tag on a seabed or a buoy.** From March 2005 to March 2006, the presence of the finless porpoise Neophocaena phocaenoides in the Kanmon Strait, Japan was monitored using a stationary acoustic event recording device. A stereo acoustic event recorder (A-tag) recorded biosonar signals as well as sound source directions, which can be used to count the number of echolocating porpoises within a distance of 126 m. During 75 days of effective observation, 37 porpoises were detected acoustically. On average, one individual was detected every two days. Most of the finless porpoises appeared at night, and no porpoises were observed from 12:00 to 18:00 hours. Shipping traffic observed using the same acoustic system showed trends opposite to that of finless porpoise during the daytime. The tidal current did not affect the presence of the animals (up to 5.2 knots). However, porpoises were suggested to swim along the current direction. Finless porpoises appeared to be isolated and used relatively long-range sonar during the observations, suggesting that the porpoises passed through the Kanmon Strait rather than searched for prey. *Source: Evidence of nighttime movement of finless porpoises through Kanmon Strait monitored using a stationary acoustic recording device, Fisheries Science 74, 970-976.*



**Specification** **ML200-AS8 Towed Type A-Tag with standard case.**

Sensor
Stereo hydrophone MHP-140ST(140KHz) or MHP-70/140(70KHz/140KHz). Frequency response Selectable Option.

Data resolution
12 bits
Minimum detection threshold level: 130 dB p-p re 1uPa @ 100kHz

Recording parameters

1.Sampling frequency: MAX10kHz (10,000 times per second)

2.Sound pressure level:
Maximum input for the circuit 3.22 Vp-p
Amplification +60dB
Resolution 12 bits
Band pass filter 55kHz - 235 kHz
Sampling interval 0.1ms, 0.5ms, 1ms, 2ms

3. Time difference: Range +/- 100us, +/-500us, +/-1000us, +/-2000us
(sampling interval 0.1ms, 0.5 ms, 1ms and 2ms)
Resolution 62.5ns, 250ns, 500ns, 1000ns
Trigger ch A level (ch B is slaver)

Start mode

1. Timer mode: Delay timer to start (0-255hours)
2. Clock mode: Start at the set date and time
3. Record mode: Continuous, Periods in a day, Selected days and Intermittent after start

Data size
200M data (8Gbit flash memory)

Interface
USB(micro B)cable is used to communicate with A-tag
Logger Tools (MLT-300) is the software to set up and data loading by PC

Size and material
Material: Polycarbonate, aluminum
D27 X L410 (mm) Maximum Size
Weight: 240g (without Battery)

Battery
CR123 for Short term use

Life time
Approximately. 48 Hours for short term use, depends on the data size and temperature.

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