January 21, 2015

Operation manual of A-tag   ver.4.40

1. What's A-tag?

2. How to setup A-tag

3. Deployment

4. How to download data

See also this page
http://cse.fra.affrc.go.jp/akamatsu/A-tag/index.html

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1. What's A-tag?

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 developped to observe biosonar behavior by tagging 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 towed from a boat, or on a pipe fixed beside a waterbreak, or on an animal using a suction cup. Application for passive acoustic monitoring, see this pdf file (ASA 2009, Portland, USA) .

A-tag can be used to count the number of animals acoustically. Two ultrasonic hydrophones of *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 can be used to descriminate each phonating animal individually.

A-tag is a small and stand-alone system. The water registant body of *A-tag* sizes 21 mm in diameter and 108 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 40 hours by CR2 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. Although the 70 kHz high-pass filter in *A-tag* reject the low frequency noise due to engine operation and water flow, heavy snapping shrimp noise in warm waters could reduce the detection performance of *A-tag*.

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*A-tag* fixed on a rope towed from a boat (left).   Long life *A-tag* for stationary observation in the Yangtze River, China

1.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.*

Towing type

Positive angle

Negative angle

A trace of a sound source

bow

stern

1 minute

Bearing angle

Pressure resistant housing

A Hydrophone B

Φ21 mm   112 mm   120 mm
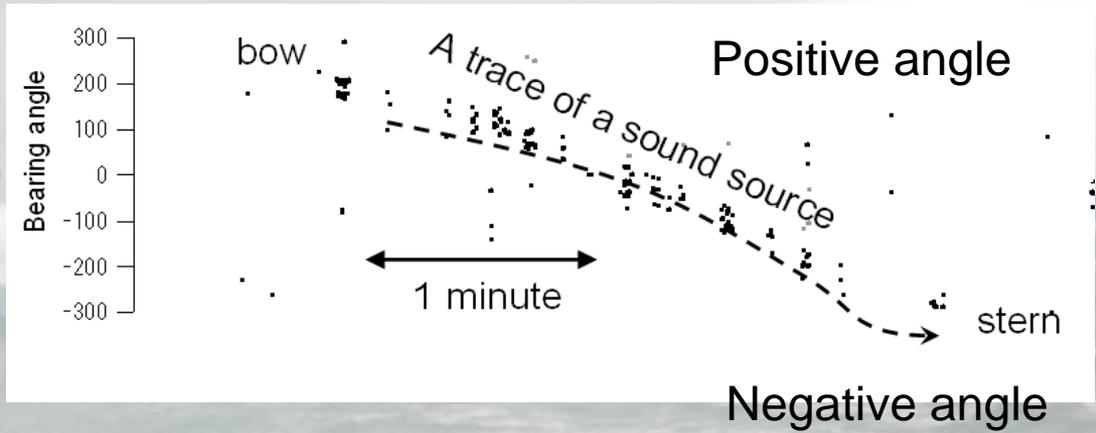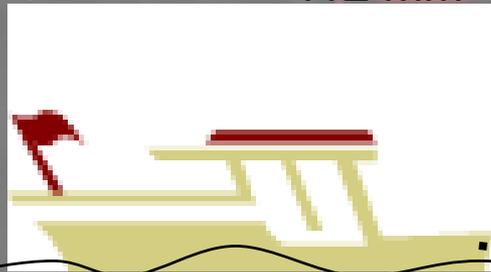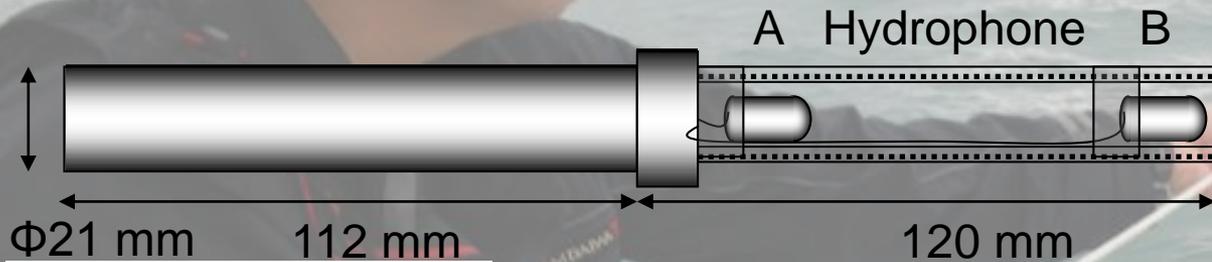
> 50 m recommended, depend on noise level

A-tag   weight

rope

Positive angle
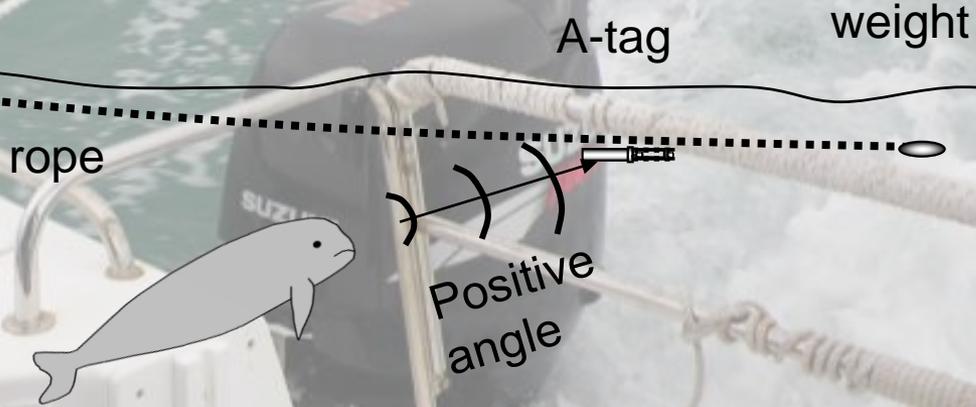
2.Fixed long-term monitoring

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. Seasonal and diurnal presence of finless porpoises at a corridor to the ocean from their habitat, Marine Biology 157, 1879-1887.*

Fixed type 1

On a waterbreak

φ42

Pressure resistant housing

250

180

470

Hydrophone A

Hydrophone B

T-shape type

A-tag

φ42

250

210

Straight type[6]

Fixed type 2

Using buoy

Iron bar (L shape)

Safety line

Plastic ties
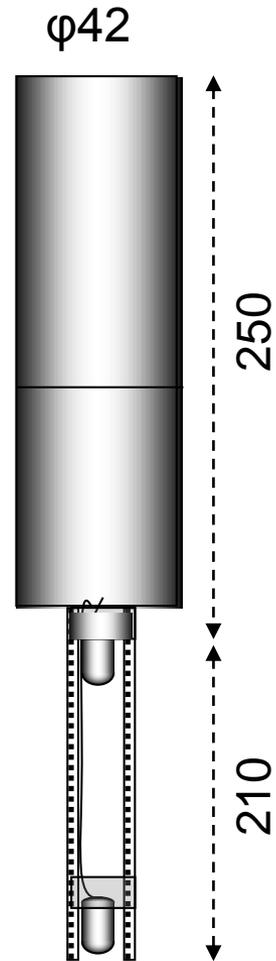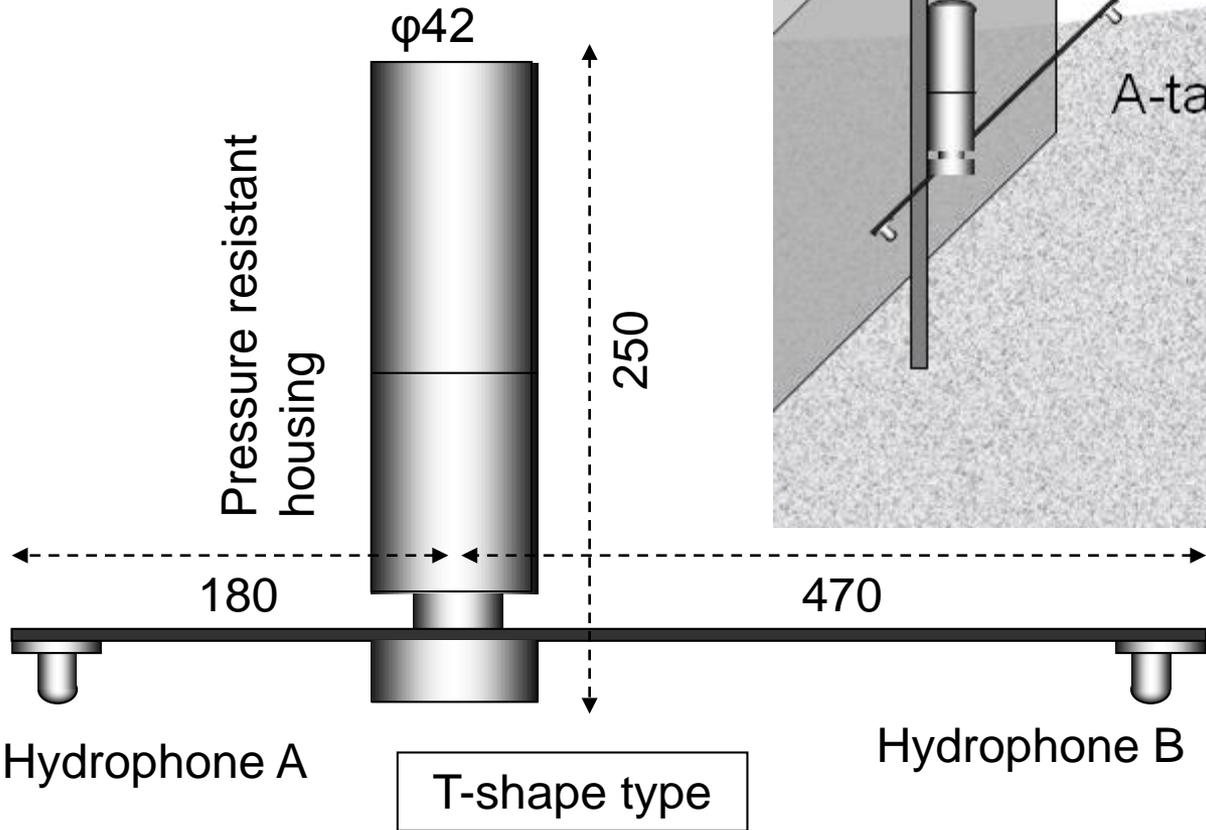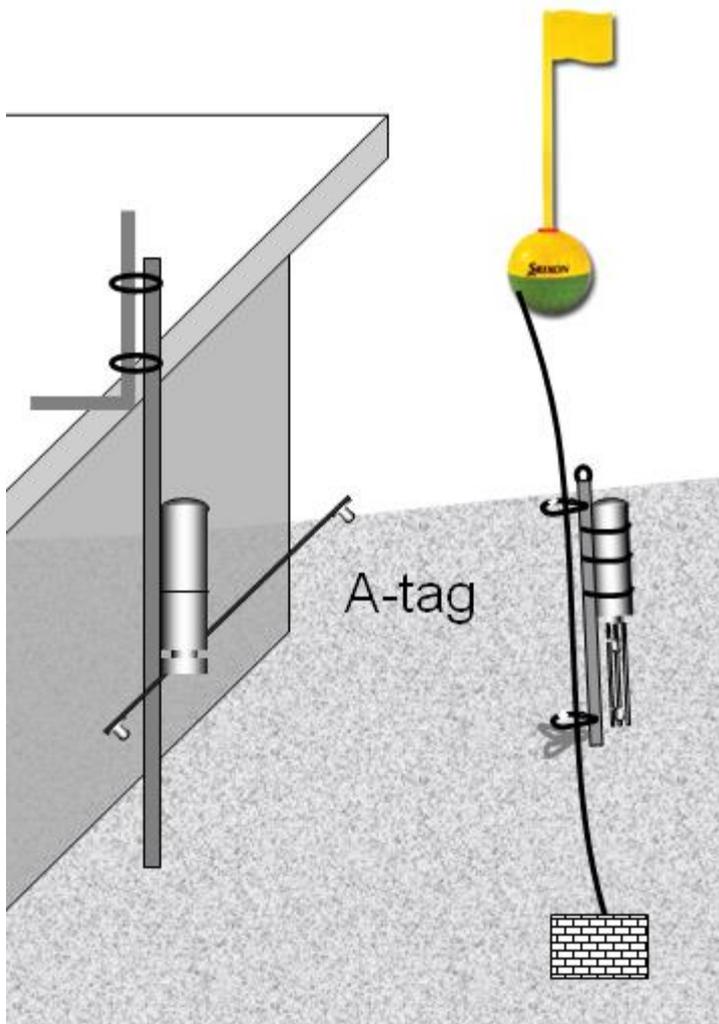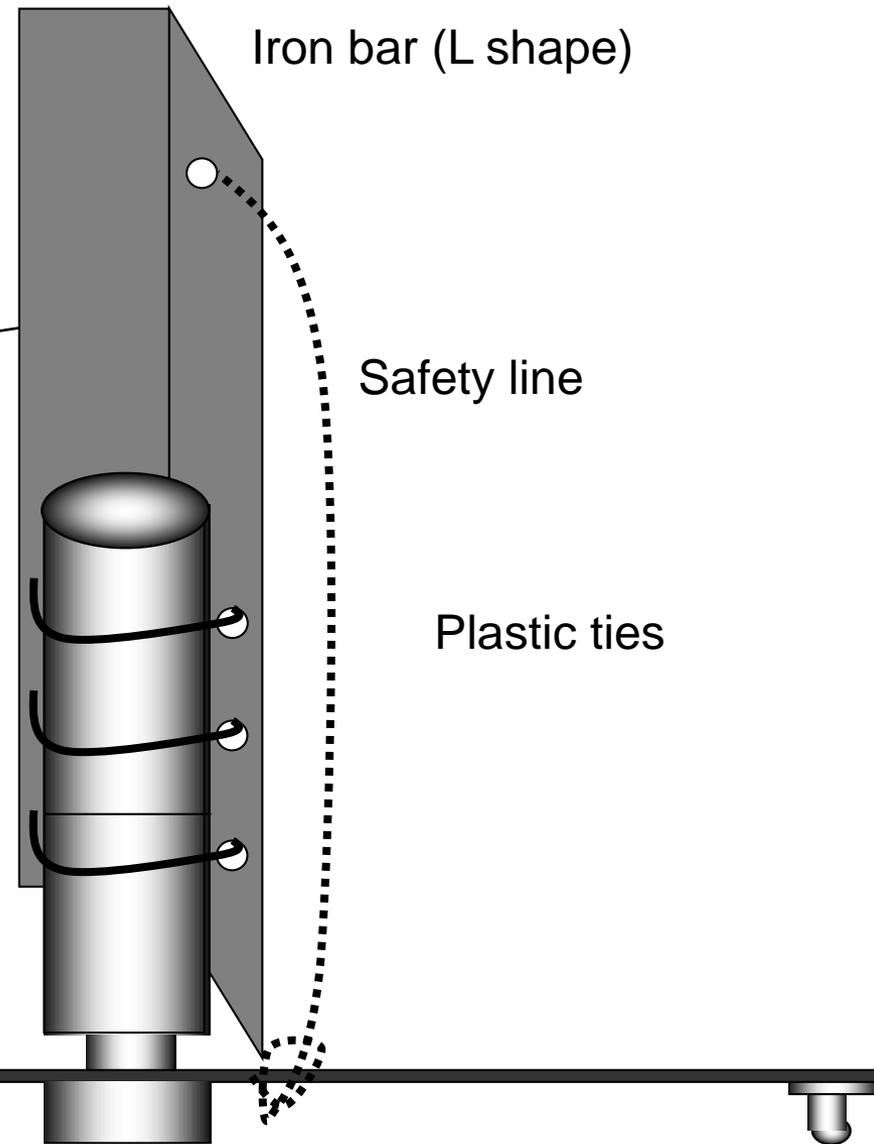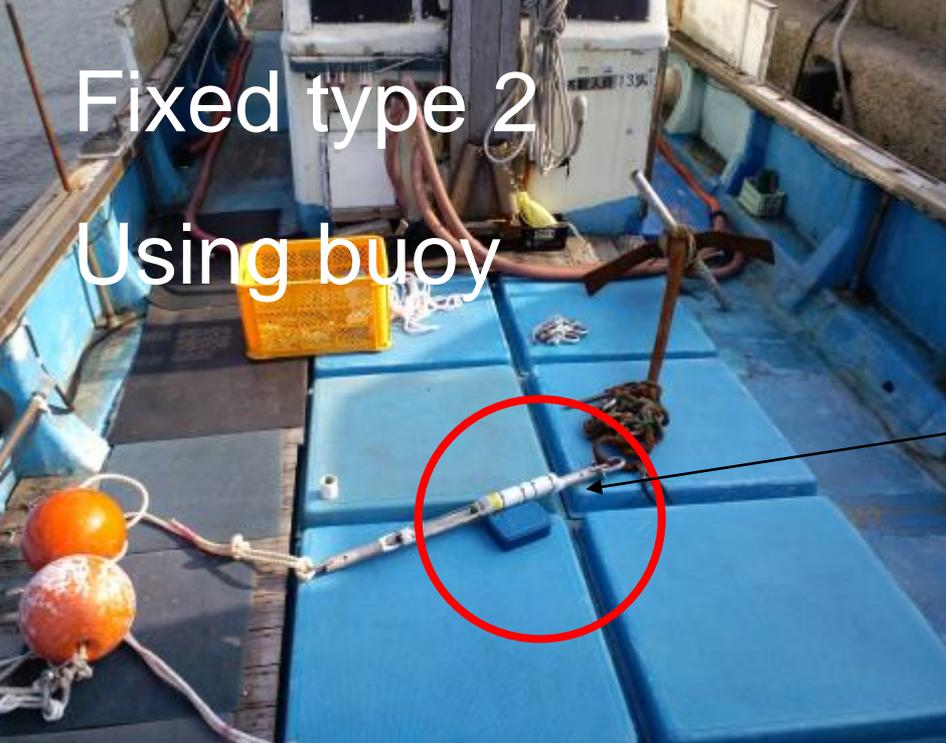
3.Tagging on the animal

Acoustical inspection ahead in advance monotired 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.*

Tagging type

A=tag: L=112 mm, Φ21 mm

VHF

Hydrophone A

Hydrophone B

Float material

Suction cup Φ80 mm
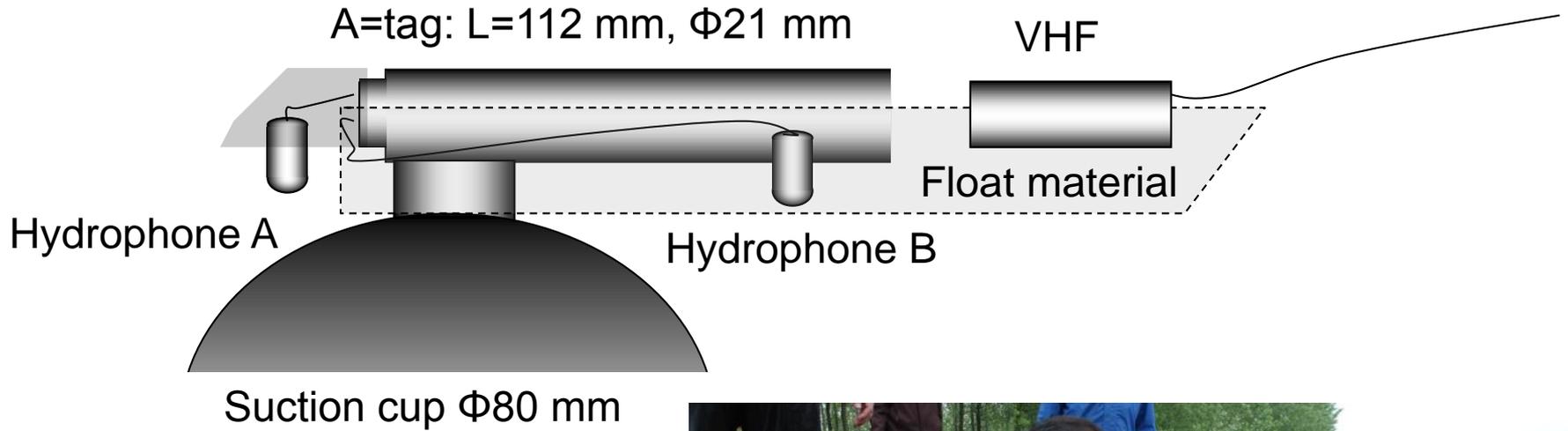
2. How to setup A-tag

A-tag systems (towing type)

A-tag (towing type)

Interface cable

Interface box

Logger Tools v.4.35

AC adaptor for the Interface box (100V-240V)

Please install Logger Tools v.4.3 in your PC first.

Open A-tag (towing type)

Plug out the battery case.

Screw and open the water proof case

Hold both side on the table when you plug out the battery case. The electronic circuit is fragile.
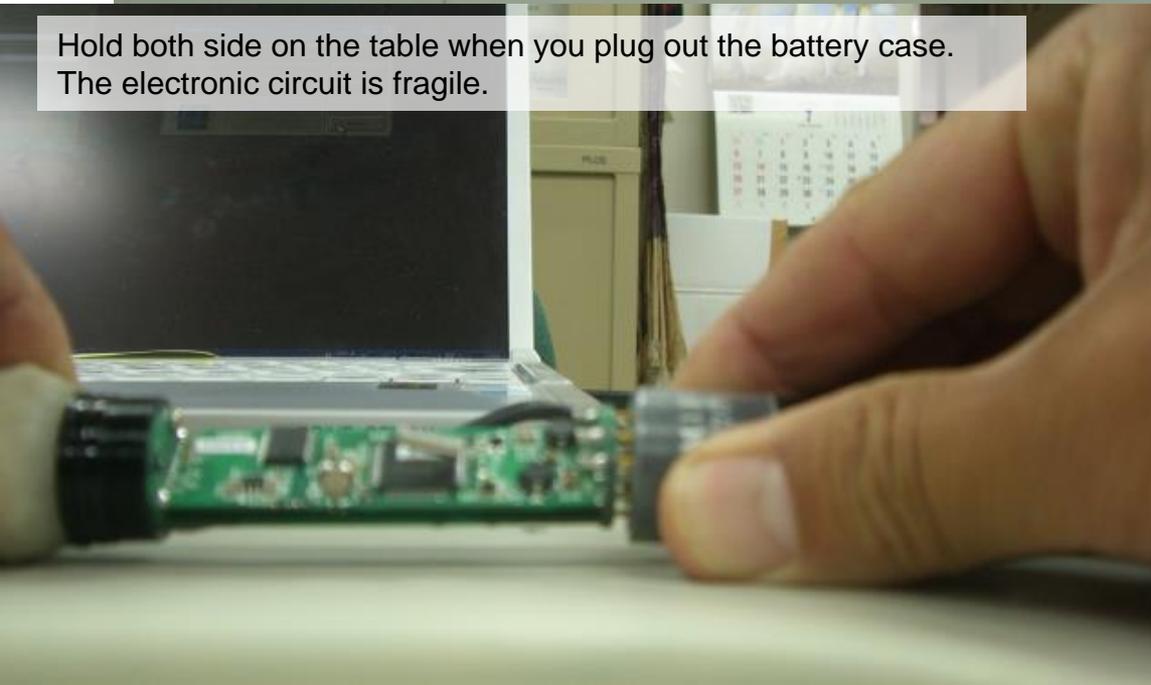
Five pins connector of the battery case
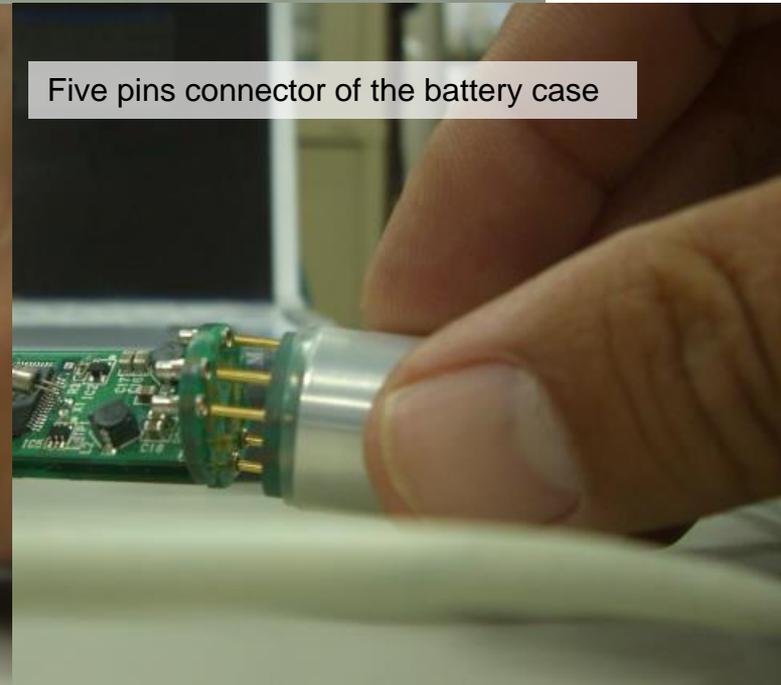
A-tag systems (fixed type) Need additional caution to use the fixed type

To cover the aluminum case by electric tape is recommended before to use in seawater. Just in case, tape on the stay to support microphone code is preferable. TAPE HERE


before

after

A-tag systems (fixed type)

Screw out the water proof case
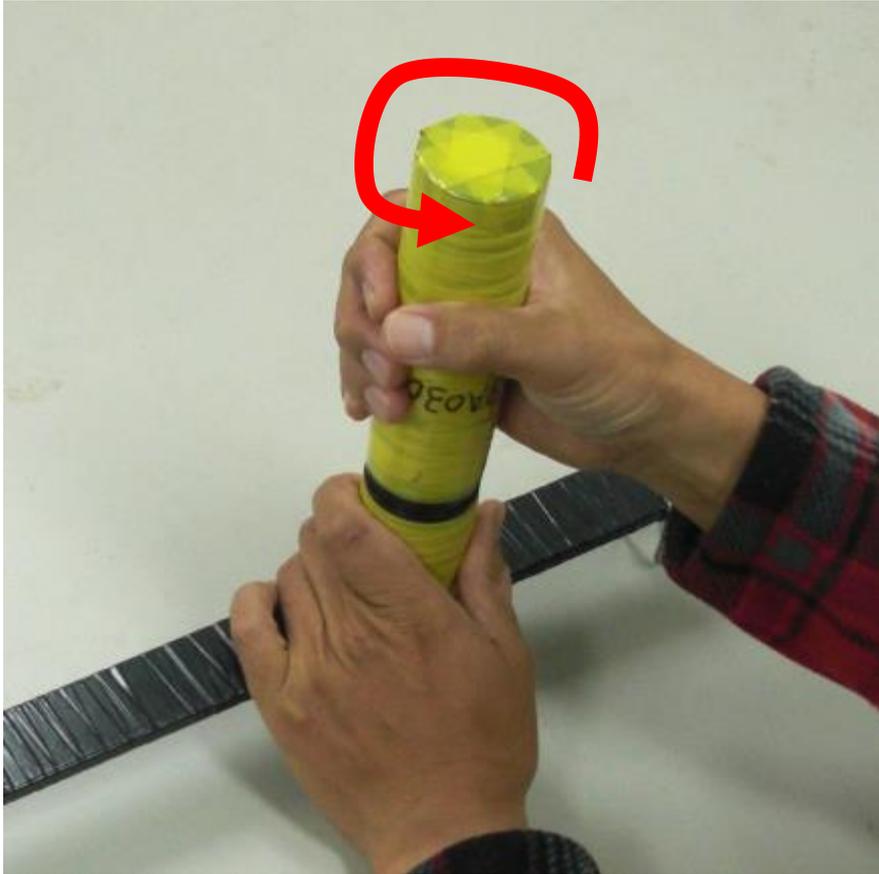
Grab and twist it

Gently take the water proof case out

A-tag systems (fixed type)

Take out the battery case

SLOWLY

Grab the battery case. take it out to straight upward SLOWLY.
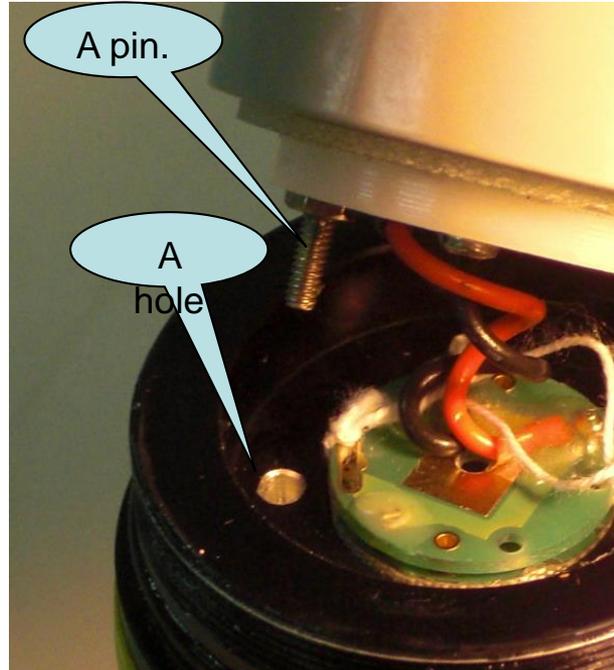

A pin.

A hole

A pin of the battery case is inserted into a hole before take it out. Pull the battery case straightly upward so that the pin smoothly out of the hole.

Be careful not to pull the battery box so quickly otherwise this code may be cut
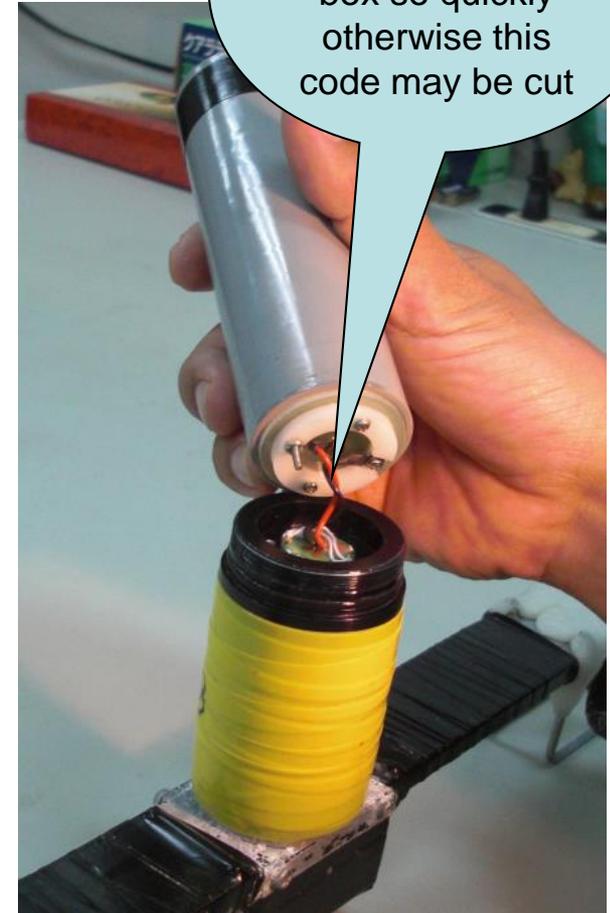
Gently take the battery case out. Do not pull too quick to prevent cutting the electric codes.

A-tag systems (fixed type)

Plug out the battery connector
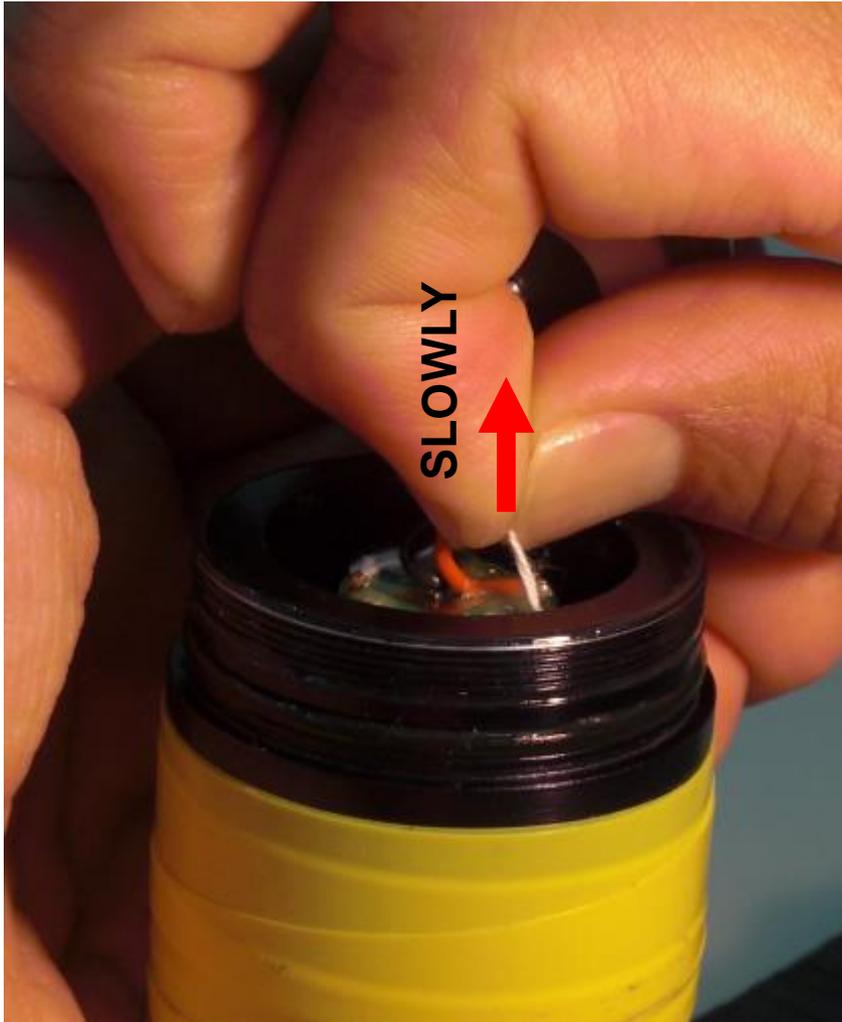
SLOWLY

**Pick the white string.
Plug it out slowly.**
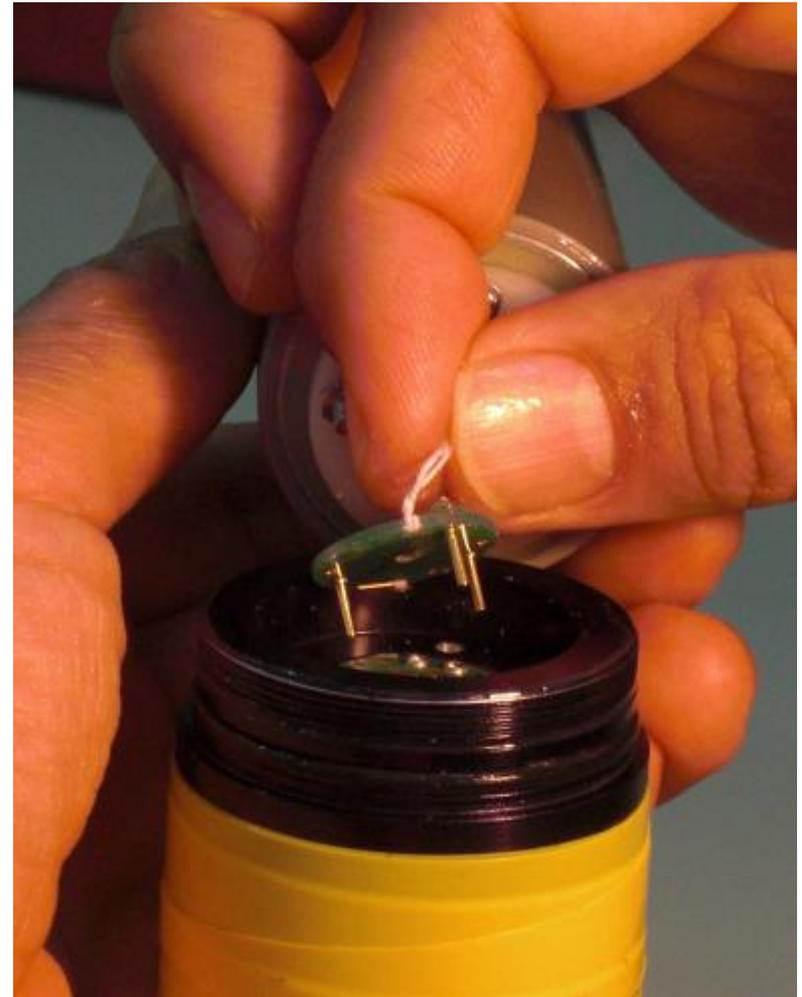
Battery connector is off now

Connect A-tag (towed type)– Interface box - PC
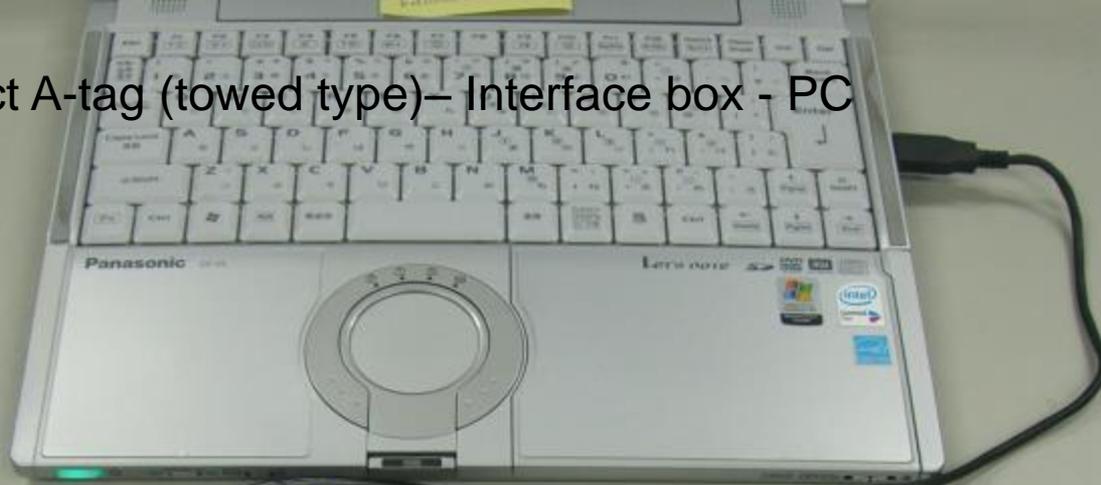
Any USB – serial converter is available. Just in case, it will be sent with A-tag

Connect here. Same manner as the battery box as shown below (there are five outside pins for power supply. Inside pins are for communication).

Interface box

Interface cable

Note that connect A-tag and the cable first. Then connect AC power to the interfacebox.
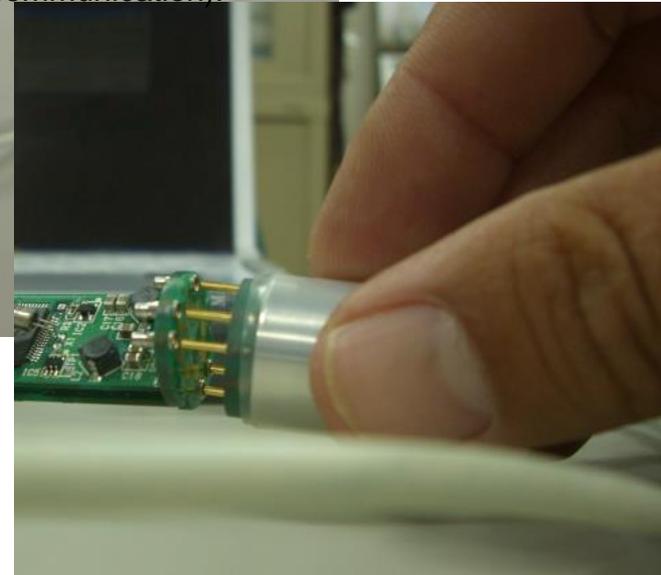
Connect A-tag (fixed type)–
Interface box - PC
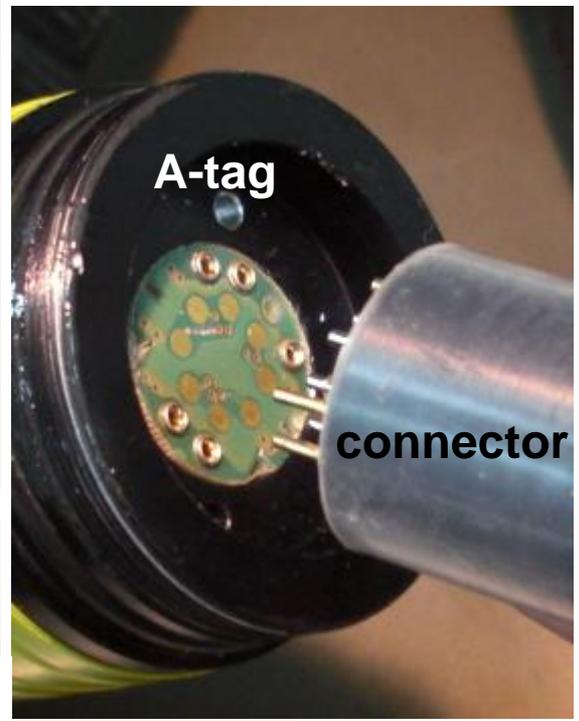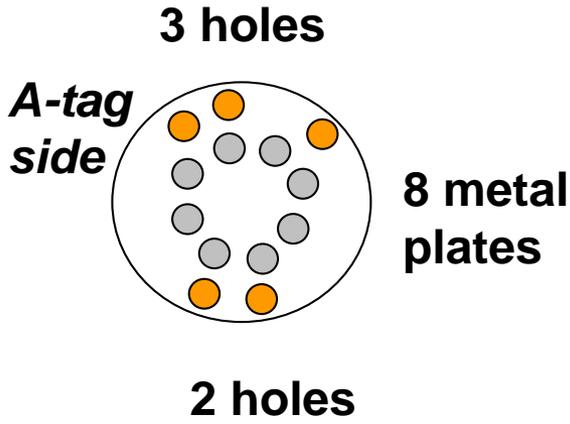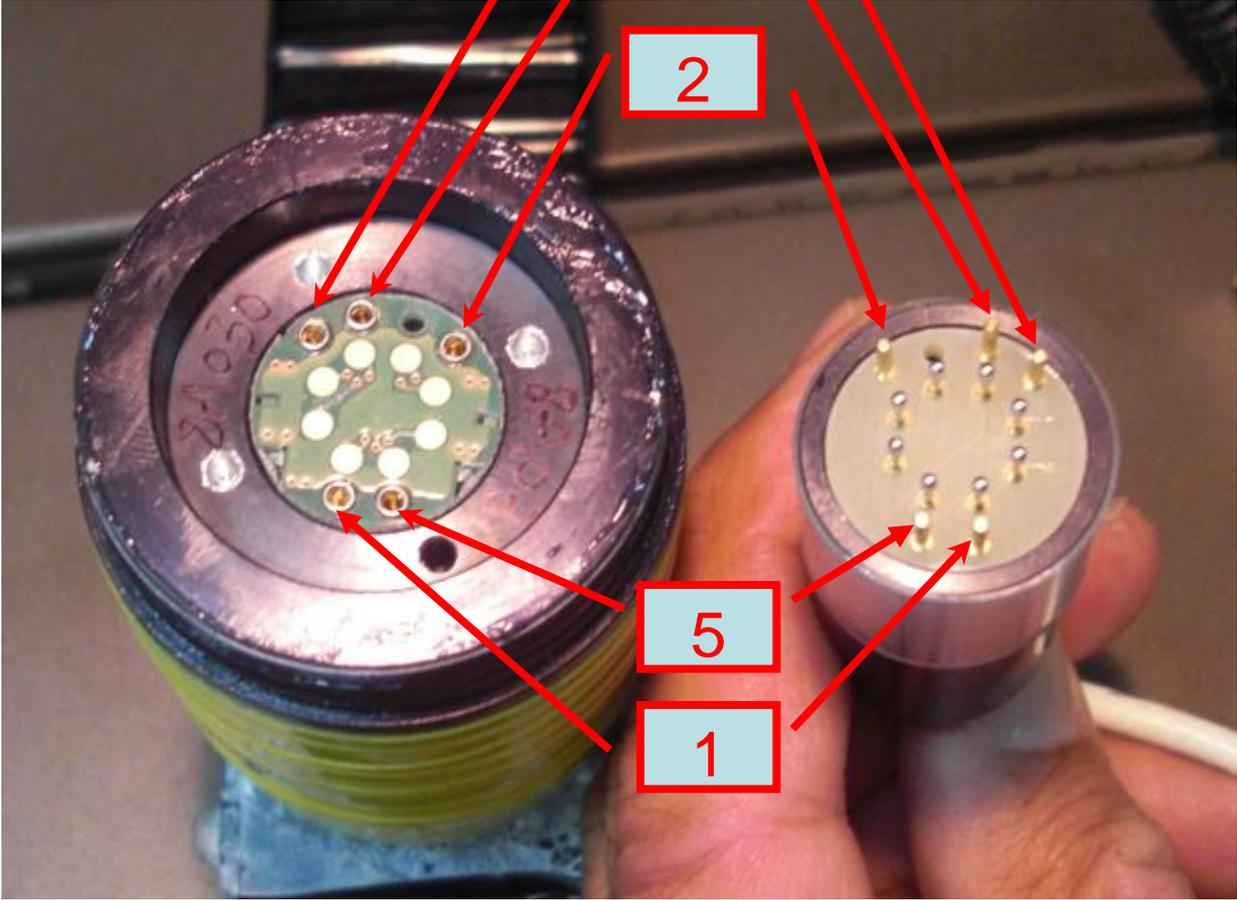
3 holes

*A-tag side*

8 metal plates

2 holes

3

4

2

5

1

A-tag

connector

Side view

Make sure the position of gold pins and holes. Try to insert No.1&5 first, then insert 2,3,4. The 8 metal plates inside will contact with the silver pins of the connector.

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Setting up A-tag

Click logger Tools ver.4.40

Then click configuration
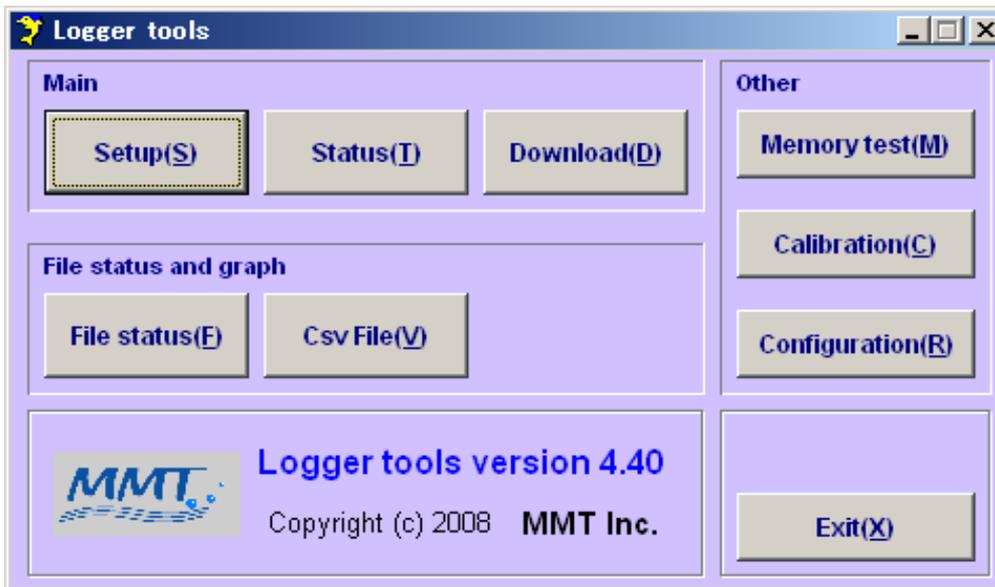
Setting up A-tag

Set Interface Port No. and click OK. Usually larger COM number is working. You can check the working com port number in the control panel>system

Other items are the path setting. It will be automatically selected when you install the Logger Tools v.4.35.

Maximum Baud Rate is recommended.

Setting up A-tag
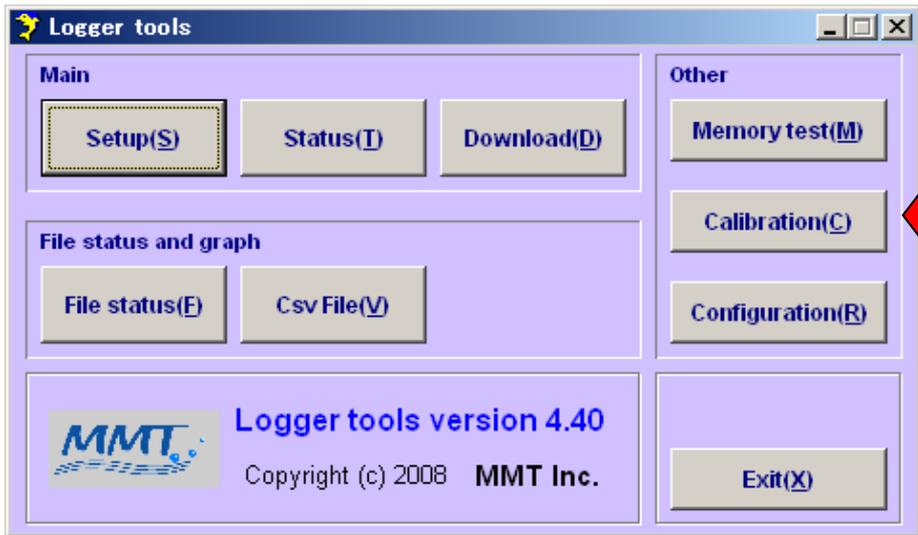

Click Calibration. Then click Start. If you see changing number of Mic A, Mic B, Time, A-tag is working.

Other wise, plug out the AC power of the interface box and plug it in. Then wait for 15 seconds until the LED blinking of A-tag stops. Please try the setting up again.
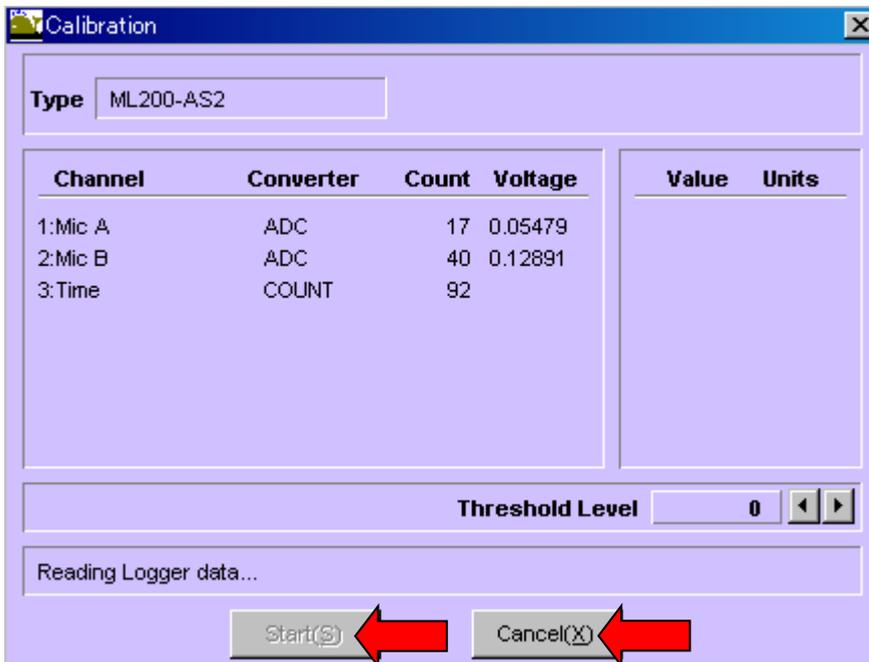
If the numbers are changing, click Cancel to back the main menu otherwise Logger Tools keep testing forever.

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Setting up A-tag

Click Setup in the main menu.
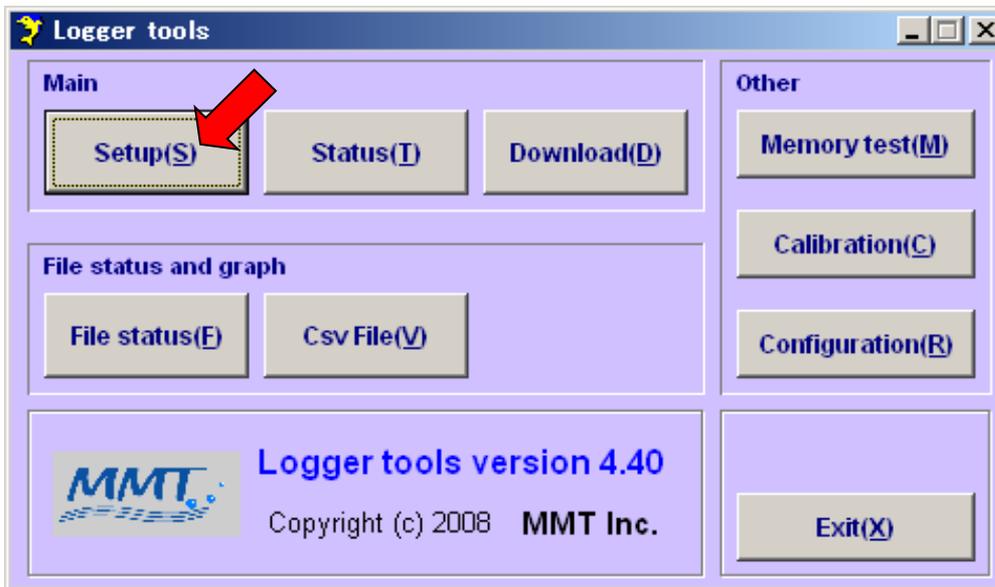
Setting up A-tag

PLEASE DISABLE ALL THESE PARAMETERS LIKE THIS.

Select max baseline short for towing system and long for fixed system (see details in next page).

Select Threshold Level at appropriate count.

"Threshold level" is the variable detection threshold of A-tag. Pascal= 0.1 x count, approximately. For example, the 50 count approximately corresponds to 5 Pa of the detection threshold level.

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Setting up A-tag

"max baseline" depends on the distance between two hydrophones as follows.

Baseline	setup	td int.	SPL int.
<208 mm	short	+/-271ns	500us
<416 mm	medium	+/-543ns	1000us
<833 mm	long	+/-1087ns	2000us

It should be selected to adjust sound travel distance during sampling with the distance between two hydrophones.

When you chose "short", sound arrival time difference to the two hydrophones is sampled every 271 ns. Because A-tag employs 10bits system (1024counts), the maximum and minimum counts are +/-512. This corresponds to maximum sound travel distance within 10bits (=+/-9bits=+/-512 counts) at +/-208mm=+/-512 x 0.271us x 1.5mm/us (sound speed in the water). Because A-tag need to wait the sound travels through the two hydrophones, data storing interval of the sound pressure level and the time difference should longer than 277us (=1024*0.271us). Same manner is applied for other baseline distance.

Baseline distance < (td int)*10 bit*sound speed

Setting up A-tag

If you would like to start A-tag later or specific time, please select either of the start mode and type the time you wiforsh to start. Note that the time of your PC is used as the standard time of A-tag at this moment. At this screen, A-tag was set to start at January 1st, 14:08:00, 2011.

Do NOT use intermittent record mode and filter setting in the beginning. False setting causes no data depends on noise conditions.

Comment can be included in the data file. This text does not affect anything on the data.

If everything is OK, SETUP!

Prepare the battery box for towing type

1.Open the lid of the battery case.

2.Insert CR2 lithium battery.

Connector side;+, Lid side;-

3.Please leave the battery box unconnected to A-tag

until finishing set up procedure.

+ -

Panasonic
CR2

a lid; use tweezers
to screw this lid.

connector

A water proof case
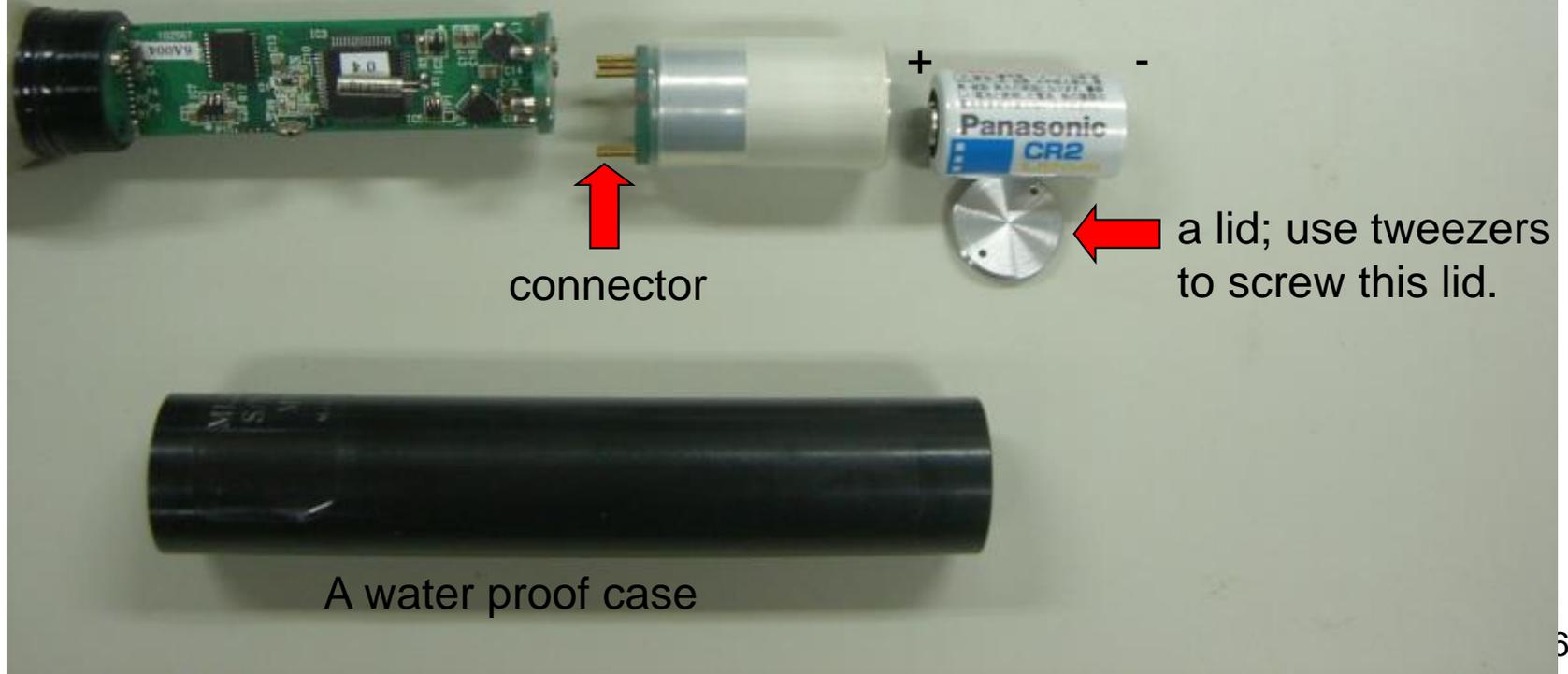
Prepare the battery box for fixed type

Insert batteries (two UM-1) into the battery box

Use coin to remove the lid
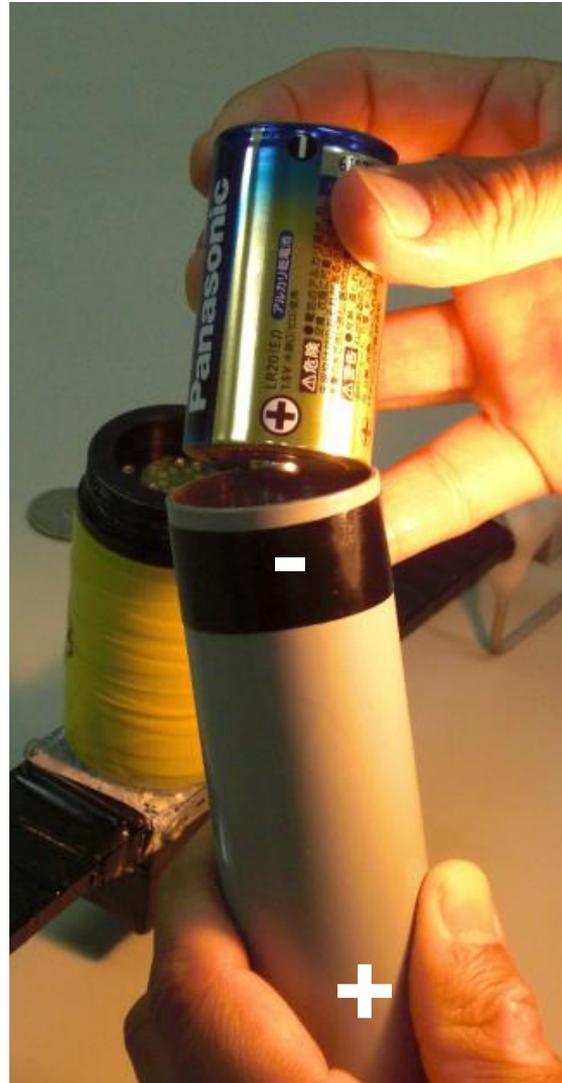
Put two UM-1 batteries. + should be connector side and – should be the lid side

Connect the battery box and close A-tag (towing type)

1. Connect battery box to A-tag (LED blinks)

2. Put silicone grease around the O-ring if necessary (optional)

3. Screw in the water proof case

O-ring

A LED blinks when the battery box connected. Blinking will stop within 15 sec.
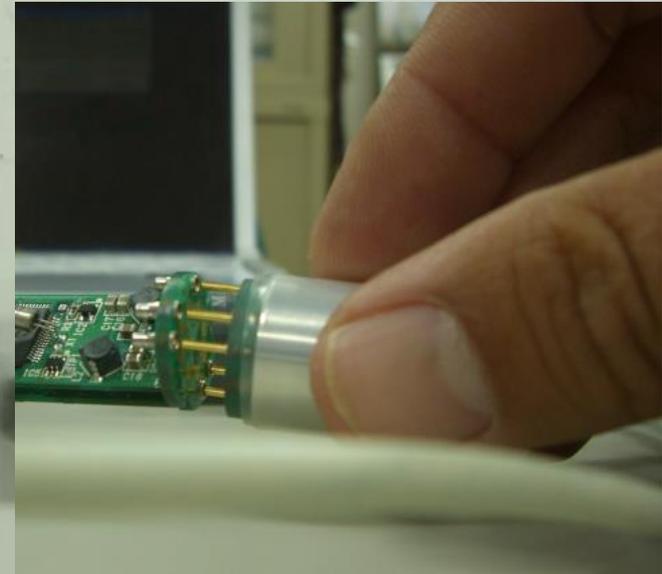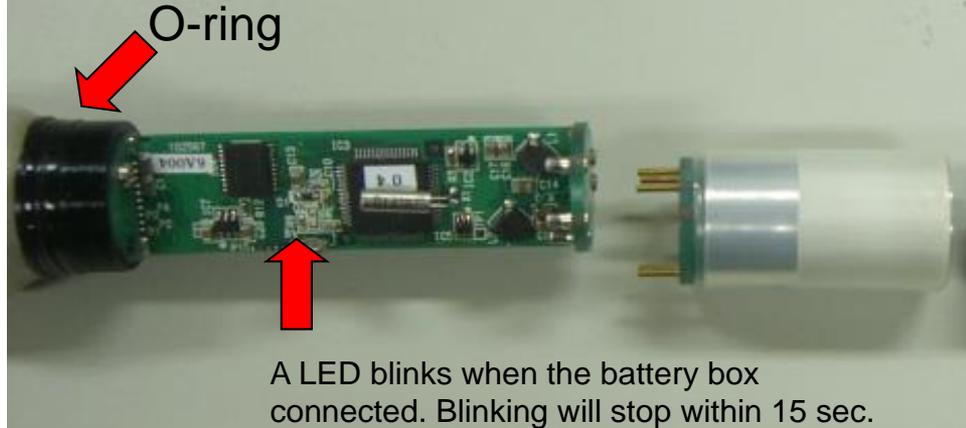
A water proof case

Connect the battery box and close A-tag (fixed type)

Insert the connector to A-tag
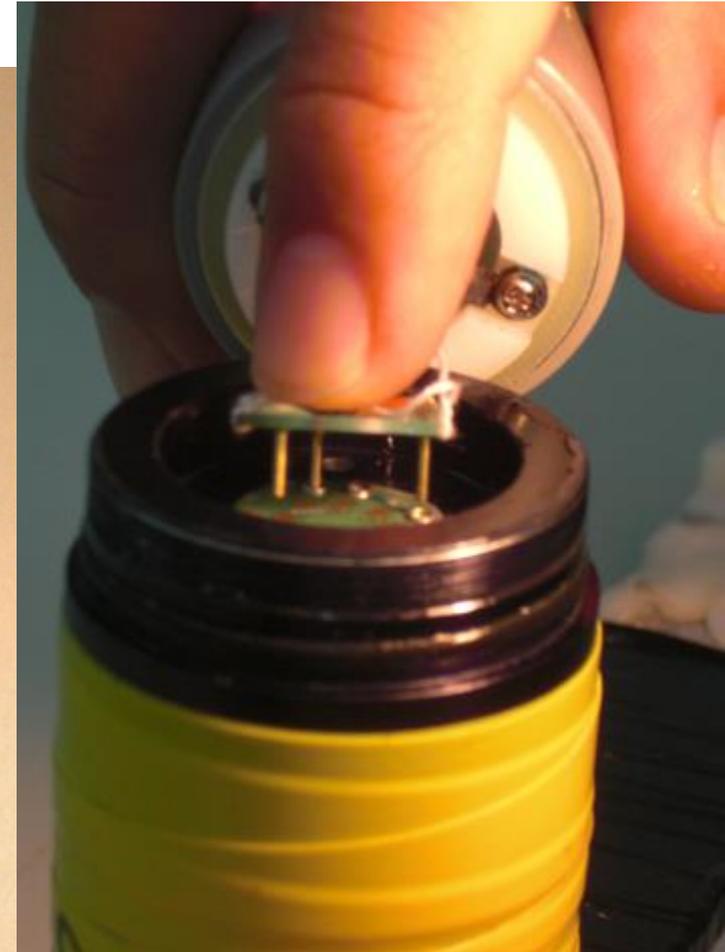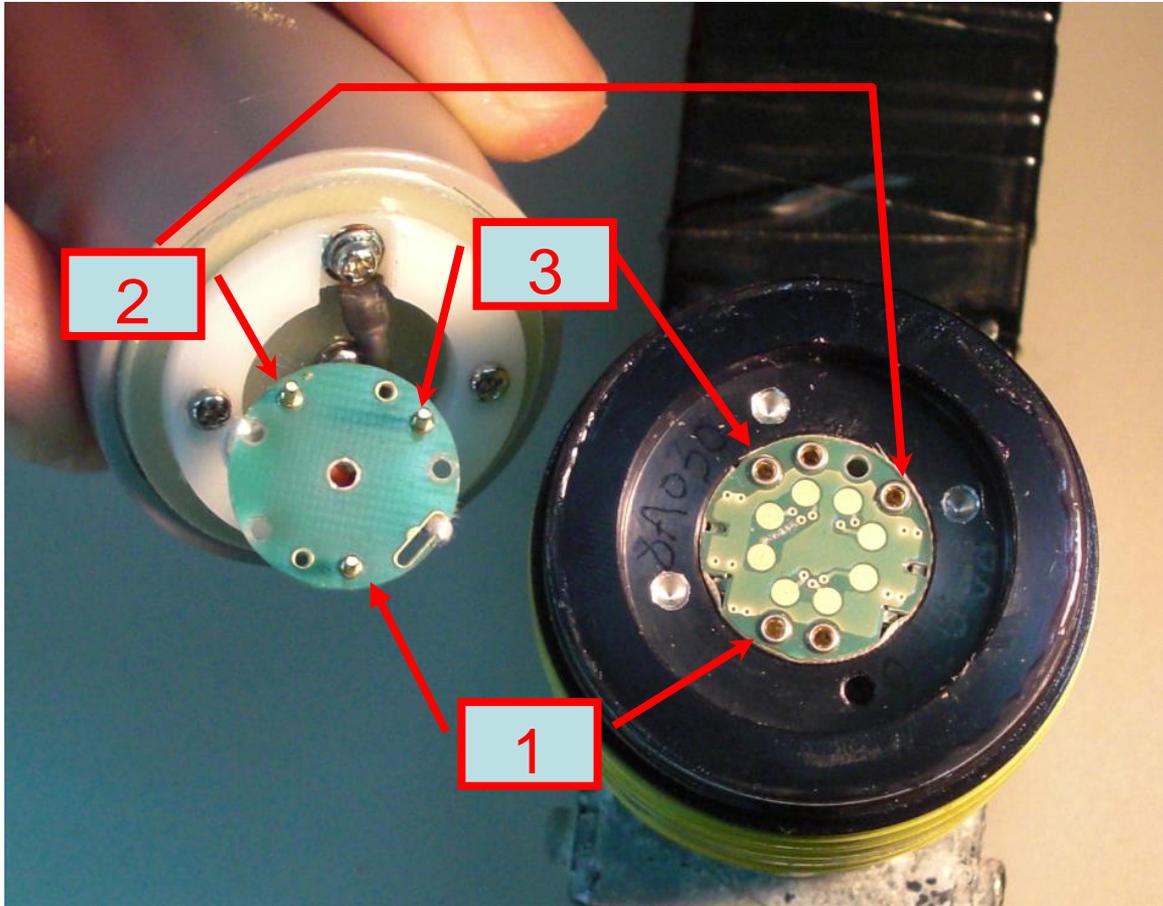
Make sure the position of connectors to insert into A-tag. Try to insert No.1 connector first, then insert 2nd&3rd

Using your index finger to insert the connector.

A-tag systems (fixed type)

Insert the battery box to A-tag

Push the connector to the end. No need to push too much.

A pin

A hole
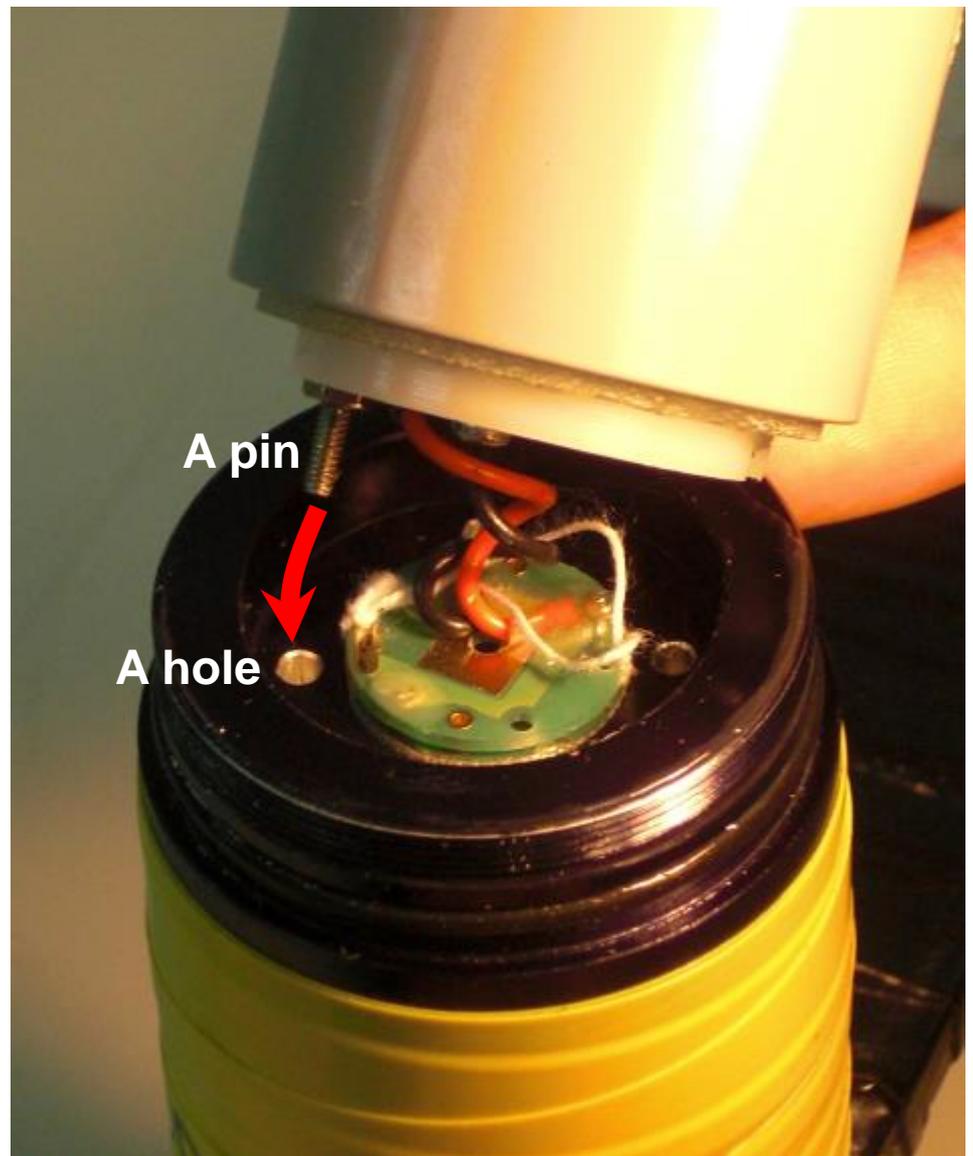
Insert the pin of the battery box into one of the 4 holes (any hole is OK). Be careful not to twist the cable too much.

A-tag systems (fixed type)

Screw in the water proof case.

Put silicon grease around here
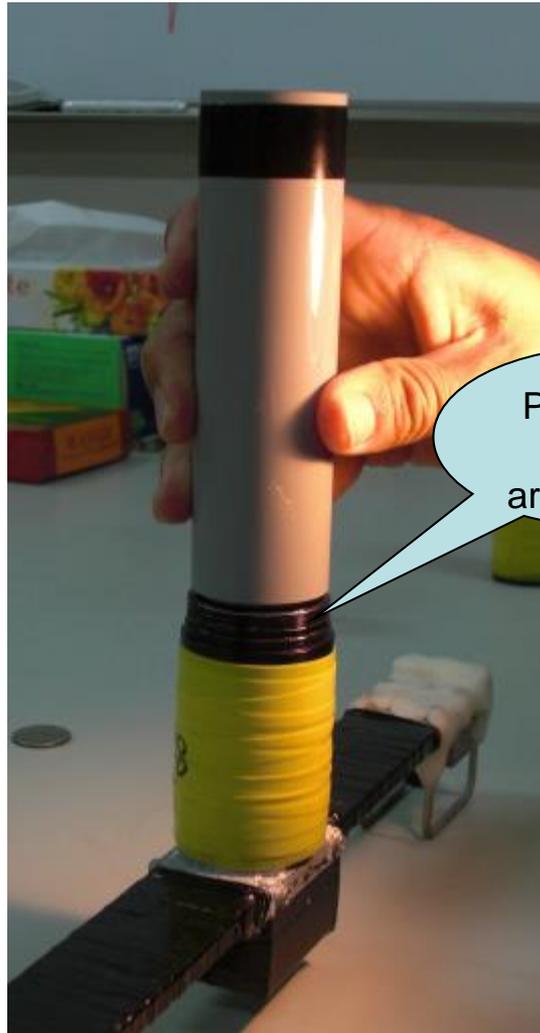
The battery case is ready

Screw in the water proof case It will be keep recording one month as long as the memory will not be full.

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3. Deployment

How to fix towing type A-tag on a rope

A-tag (towing type)

Plastic band

A caul made by duck tape

Plastic band

Rope

Aluminum case

<<To the tail

To the boat >>

Do NOT fix this white stuff by the plastic band. There is a cable for B microphone in it.
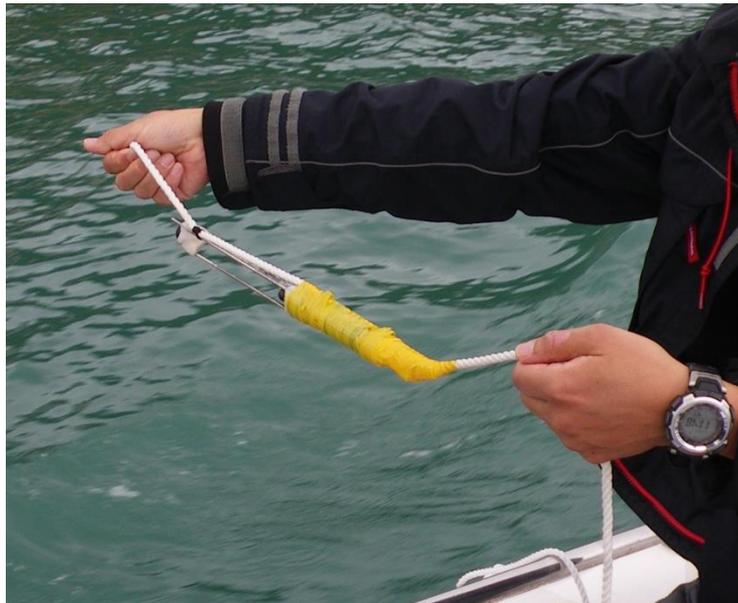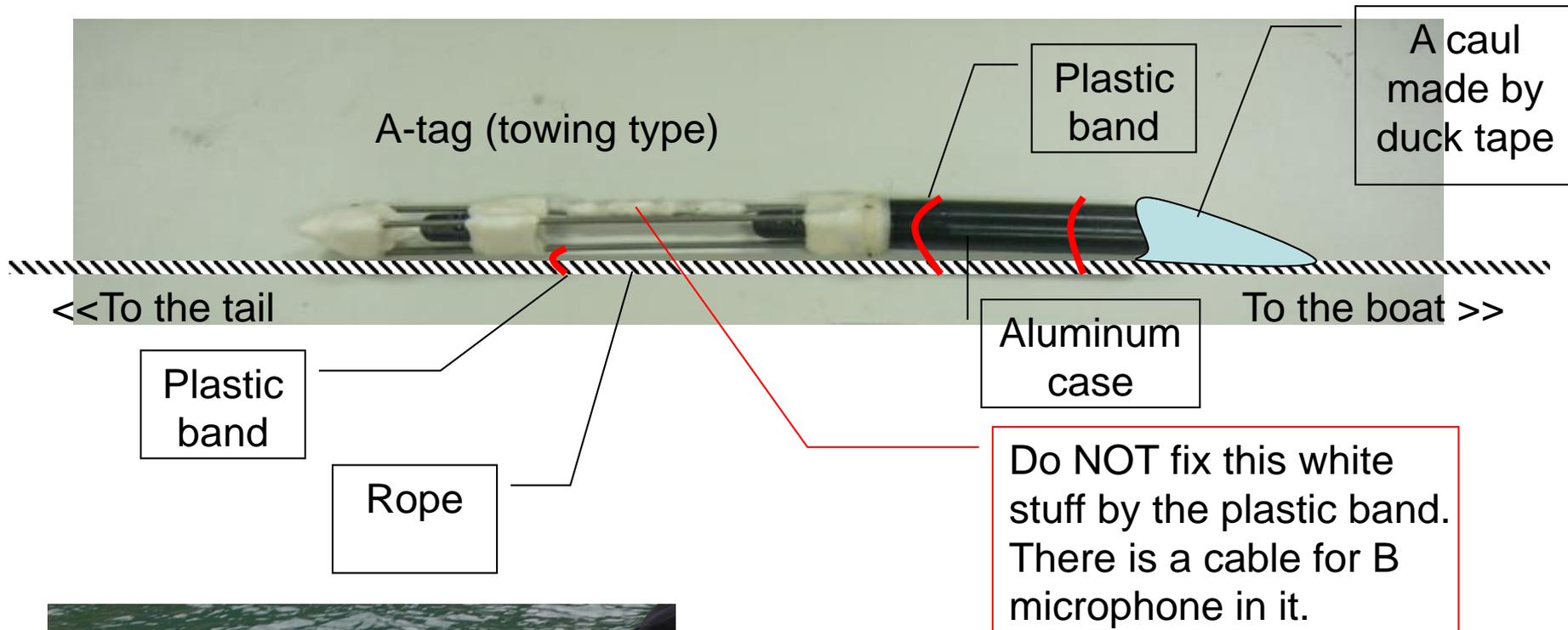
A-tag fixed on a rope.

How to fix fixed type A-tag on a pipe

on a pipe

A-tag

With an anchor

51096
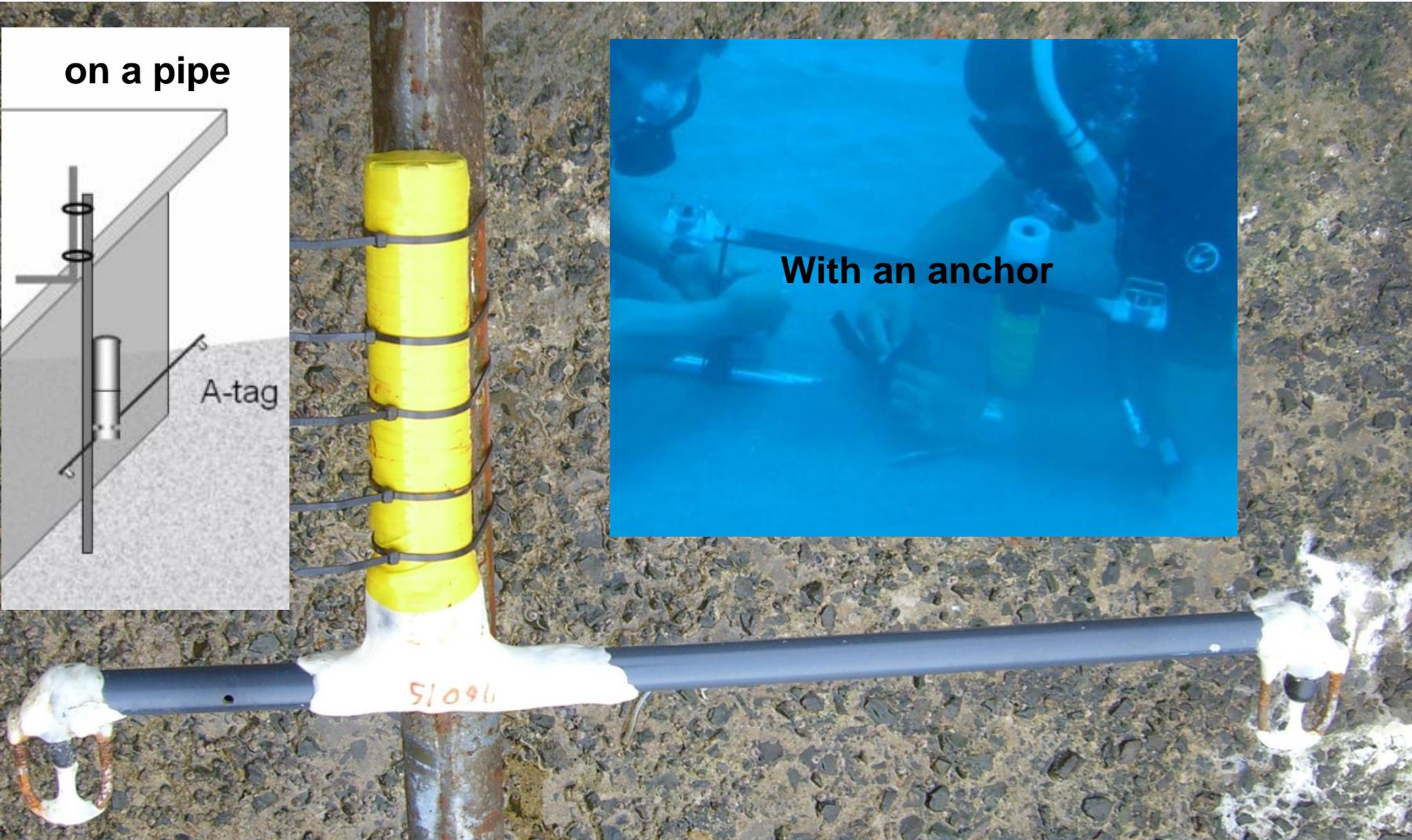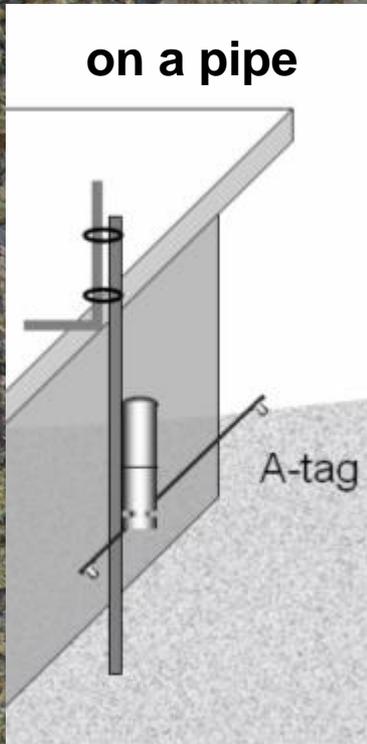
The fixed type observation lasts approximately 1 month, a large water proof case is needed.

DO YOUR SURVEY!

Fixed
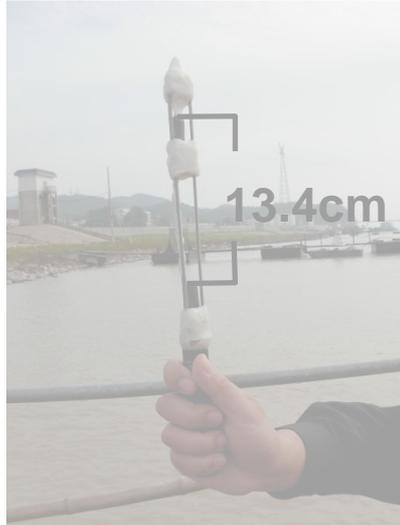
A-tag under a buoy of the ship channel for the stationary observation in China.

13.4cm

4km

Towing

Towed A-tags from a vessel. A tag can be fixed on a rope by using plastic cable tie and a vynil tape (included in the package).

Float every 2.5 m

5m

87m
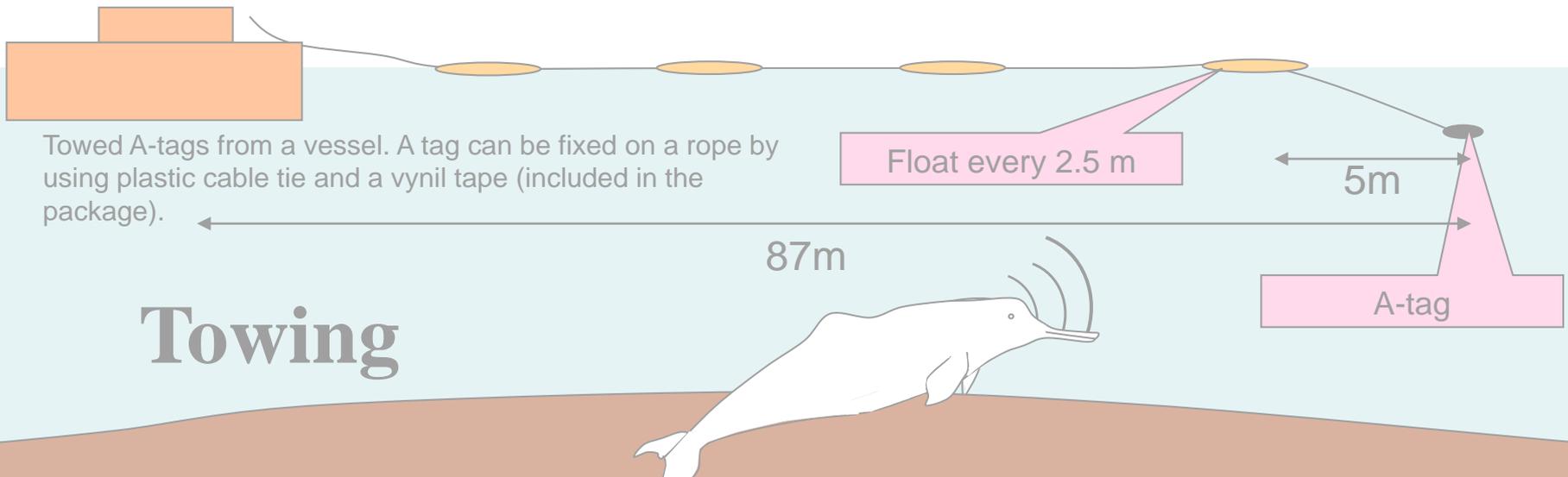
A-tag

4. How to download data

Connect A-tag – Interface box - PC
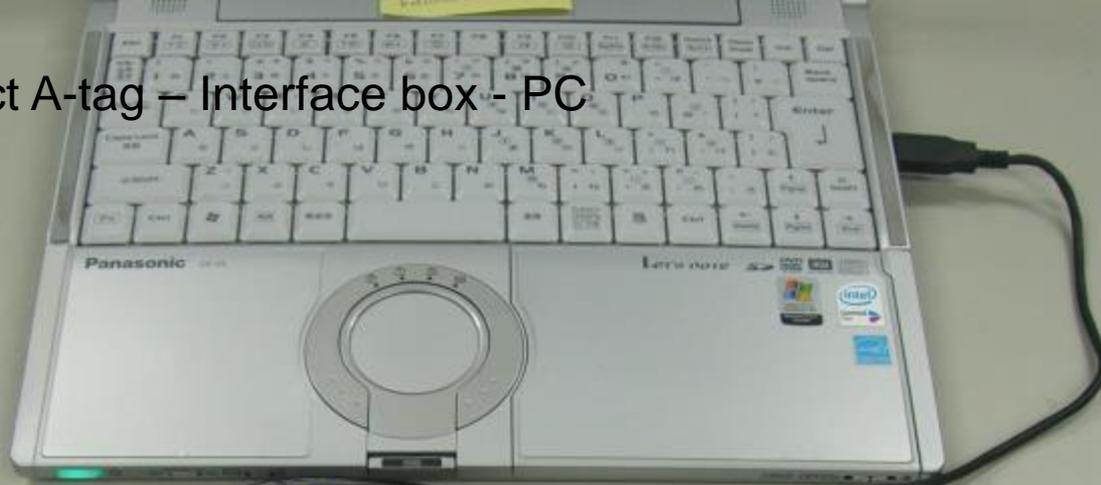
Any USB – serial converter is available. Just in case, it will be sent with A-tag

Connect here. Same manner as the battery box as shown below (there are five outside pins for power supply. Inside pins are for communication).

Interface box

Interface cable

Connect A-tag (fixed type)–
Interface box - PC
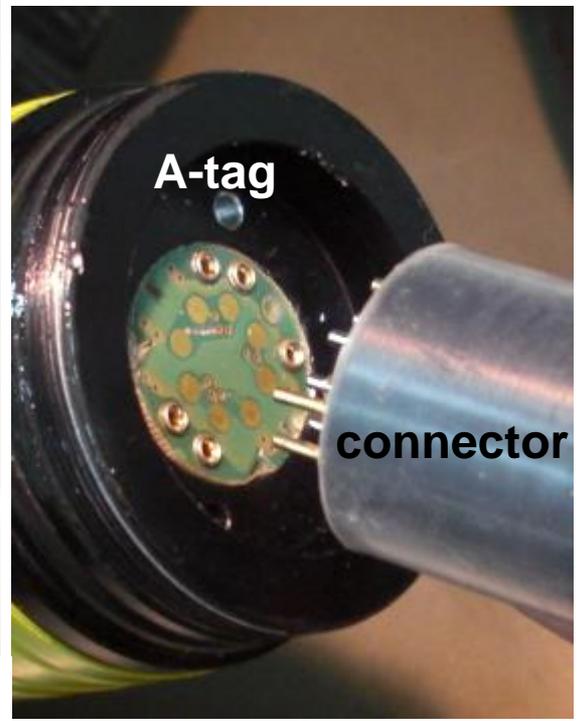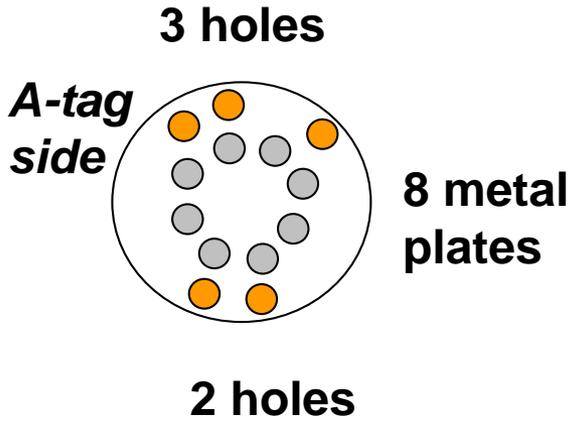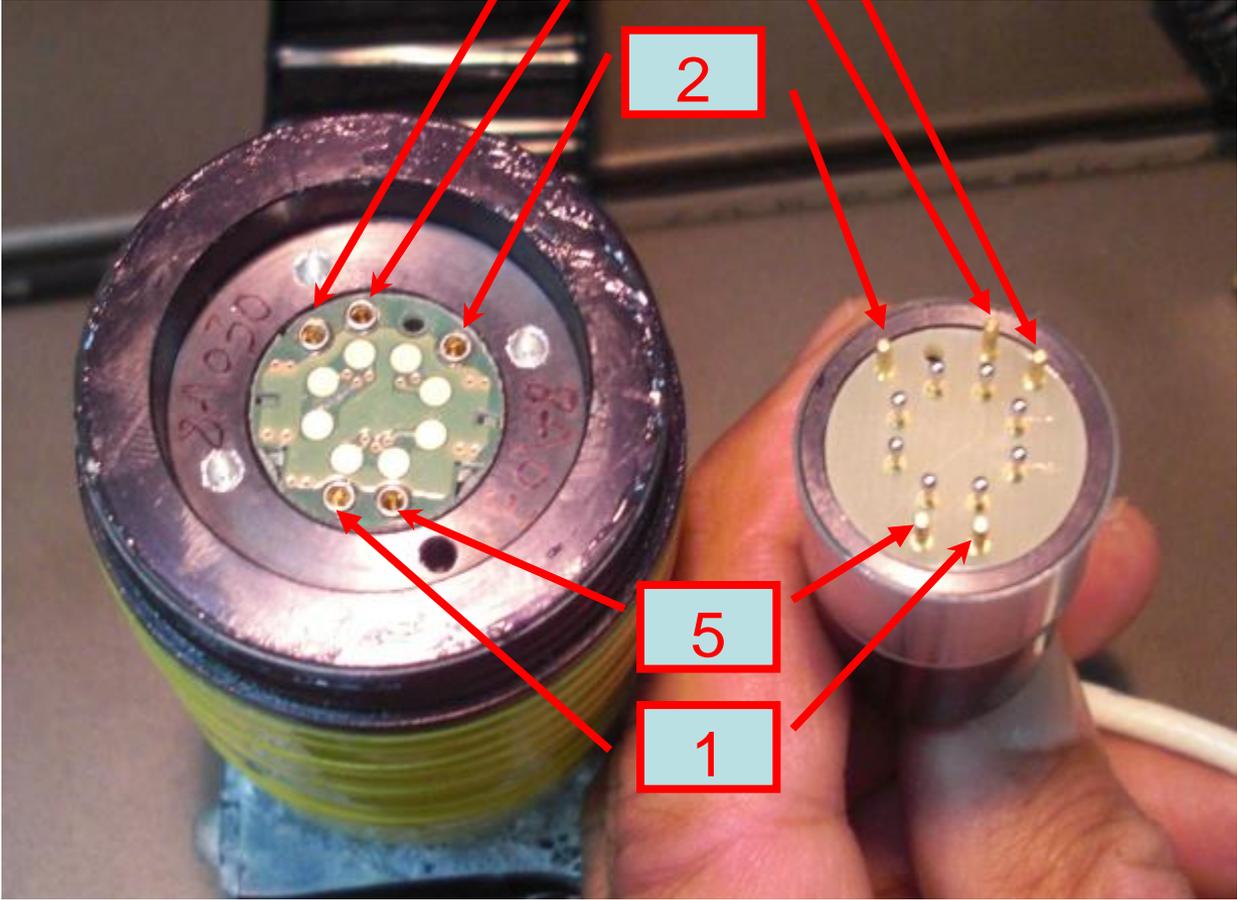
3 holes

A-tag side

8 metal plates

2 holes

3

4

2

5

1

A-tag

connector

Side view

**Make sure the position of gold pins and holes. Try to insert No.1&5 first, then insert 2,3,4. The 8 metal plates inside will contact with the silver pins of the connector.**

## Download data from A-tag
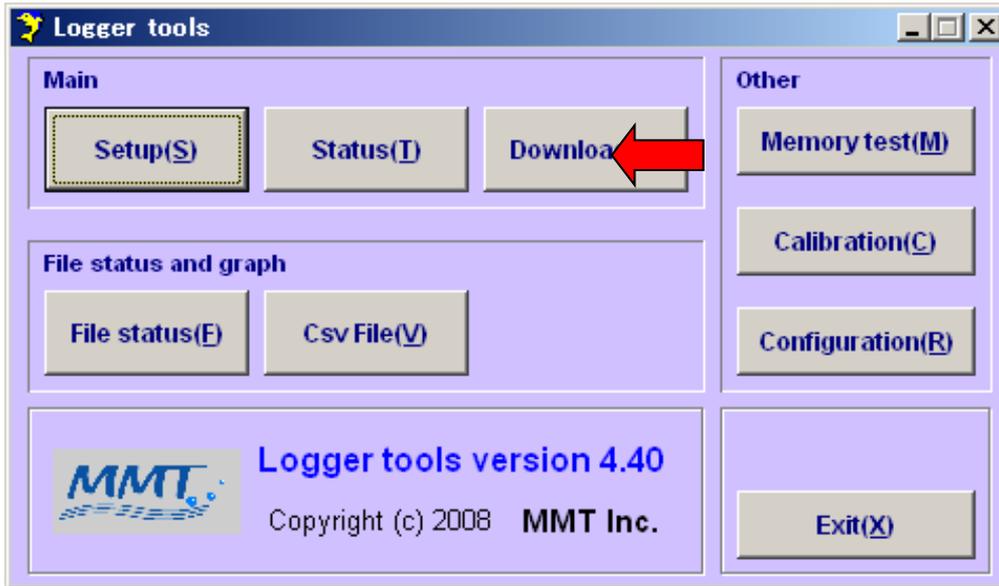
Click Download.
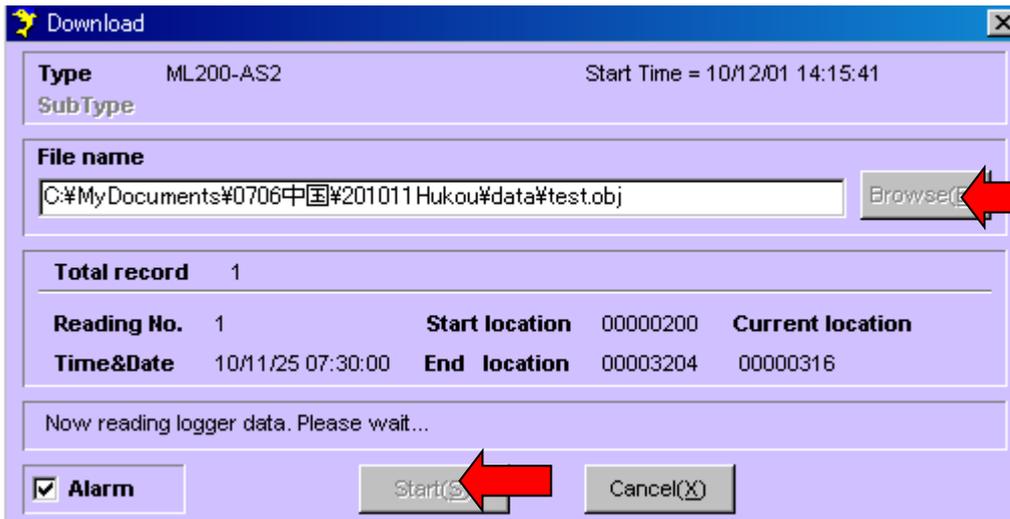
Select and type file path and name as you like.

Click START. Download may take several tens minutes when the memory is full (128MB) because of slow speed of the serial port (RS232C).

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Convert A-tag file to CSV file

Logger tools

Main

| Setup(S) | Status(T) | Download(D) |

File status and graph

| File status(F) | Csv File(V) |

Logger tools version 4.40

Copyright (c) 2008 **MMT Inc.**

Other

Memory test(M)

Calibration(C)

Configuration(R)

Exit(X)
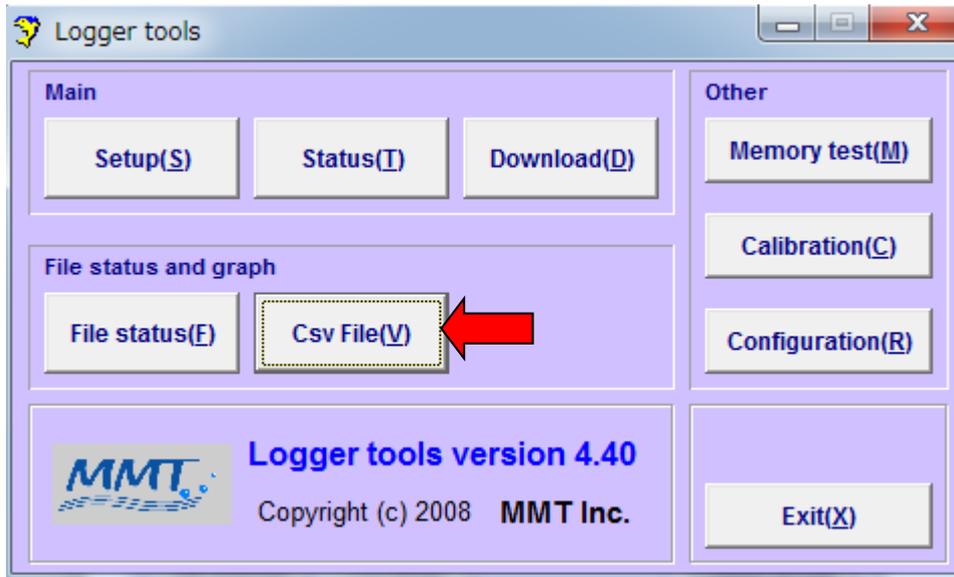
Click CSV File.

Congratulations !

This is the end of A-tag operation.
You have got data. Please move on
to the A-tag Analysis manual,
which can be downloaded below.

http://cse.fra.affrc.go.jp/akamatsu/A-tag/A-tagInstructions.html

Browse and select target *.obj file and click OK

Browse and select data file.

set Max 511

When normal End message appears, click OK.

Click OK.

CSV file Conversion Tool

File name
Input File Name
C:¥MyDocuments¥0706中国¥201208Hukou¥A-tag¥120806 6A005 boatA !   Browse

Output File Name(.csv)
C:¥MyDocuments¥0706中国¥201208Hukou¥A-tag¥120806 6A005 boatA !   Browse

☐ .wav File make(Only ML200-AS2)
Output File Name(.wav)   Note that a large file may be created
C:¥Program Files¥LoggerTools V436¥data¥120806 6A005 boatA 50m Ba   Browse

Type   ML200-AS2

Invalid data
○ set 0   ◉ set Max. (511)

Time format
○ Standard format   MM/DD/YYYY, seconds (accumulated)
◉ Igor format   seconds from 1904/01/01 00:00:00

Threshol level
◉ All data   ○ Select   [0]   over data

Record No.

OK

CsvCnvTools

Normal End.

OK

Note that this CSV could be too big and impossible to be read by Excel.

Go to Analysis manual pages below for further processing.

http:///mmtcorp.co.jp/A-tag/A-tagInstructions.html