

Echologger EA400 Quick start guide.

■ Turn on / communicate with PC / Turn off

- Turn on EA400 by hold a magnet switch 5cm below from LED for 1~2 seconds.



- Red LED will start to blink, and flash in 10 second intervals. (On)
- In Transmitting mode, the red LED will also blink as acoustic signals emit. (Blinking in 10 second interval continues in between)
- Hold magnet on the spot 1~2 seconds for changing to communication mode.
 - Check green LED blinking every 0.5 second. (Communication mode without USB cable)
 - When connected to PC via a USB cable, Green LED will be on.
- Turn off EA400 by attaching the magnet switch on the spot for appx. 5 seconds.
 - ACTIVATE' button works the same as the magnet switch does. (Open the cap)



In side the upper cap

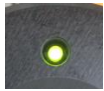
- ① MICRO SD : Slot for an SD card.
- ② ACTIVATE: Button changing modes or power on/off.
- ③ USB : USB connection to. PC
- ④ Batter connector : supplies power to device.
- ⑤ Battery holder cap.

- The cap can be opened with a stick fitting in the holes and rotating it anti-clockwise.

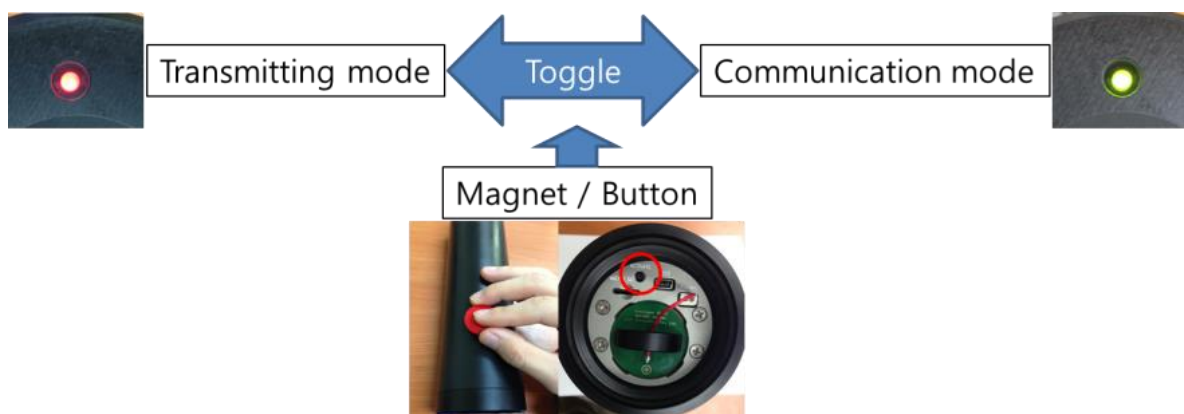


When closing the cap, a great care has to be taken not to get any sand particles or dirt be trapped on the O-sealing ring. Otherwise the device can be flooded.

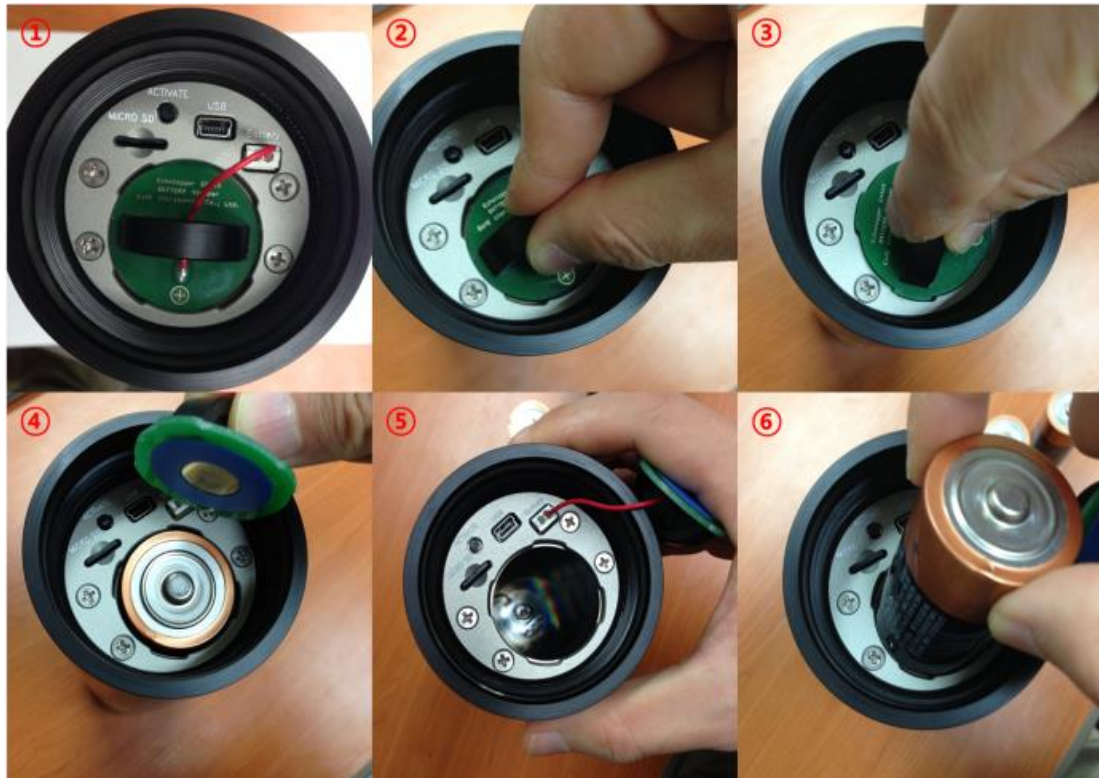
- Mode table

Mode	Activation (Hold Magnet or Button)	LED indicator	USB	Blinking interval	Note
Transmitting & Monitoring	1~2 sec. from any mode	 Red	Unplugged	10 second	Show device is on (hibernating)
				When transmitting	Works as timer setting
Communication	1~2 sec. from transmitting	 green	Both	0.25 second	No SD card
			Unplugged	0.5 second	Not connected to PC
			Plugged	No interval	Communication
Error	-	 Amber	Unplugged	1 second	SD card not exist / memory full ect.
Off	5~6 sec. from any mode	None	-	-	-

- Put the magnet switch or press ACTIVATE button, then it toggles between transmitting and communication mode.

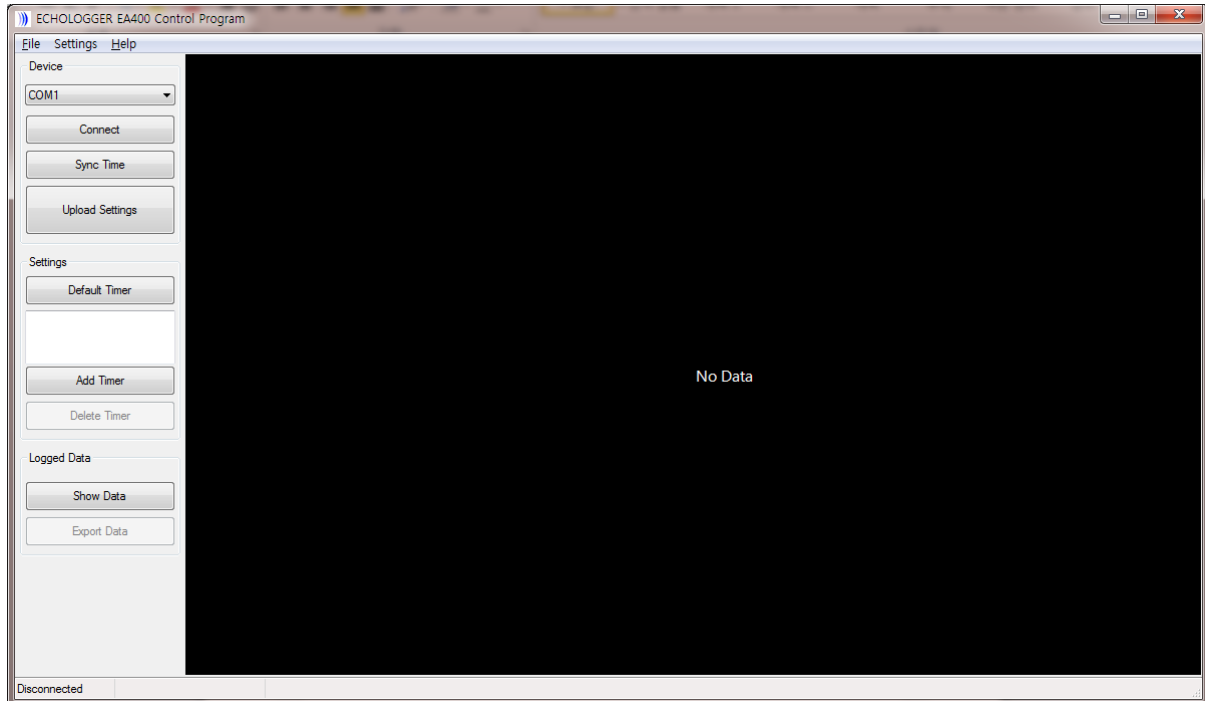


- Changing batteries

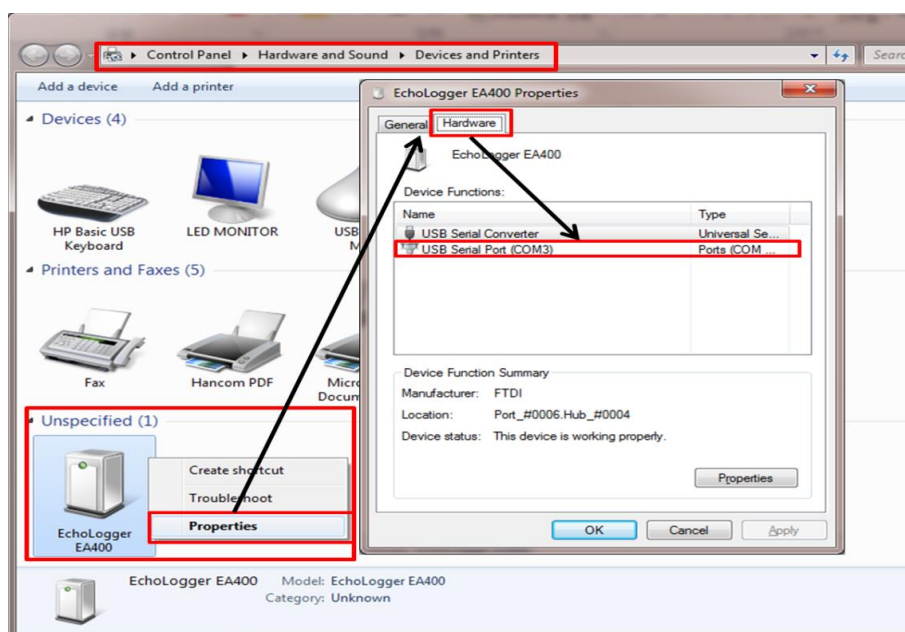


■ Setting parameters via EA400ControlProgram.exe

- Run EA400ControlProgram

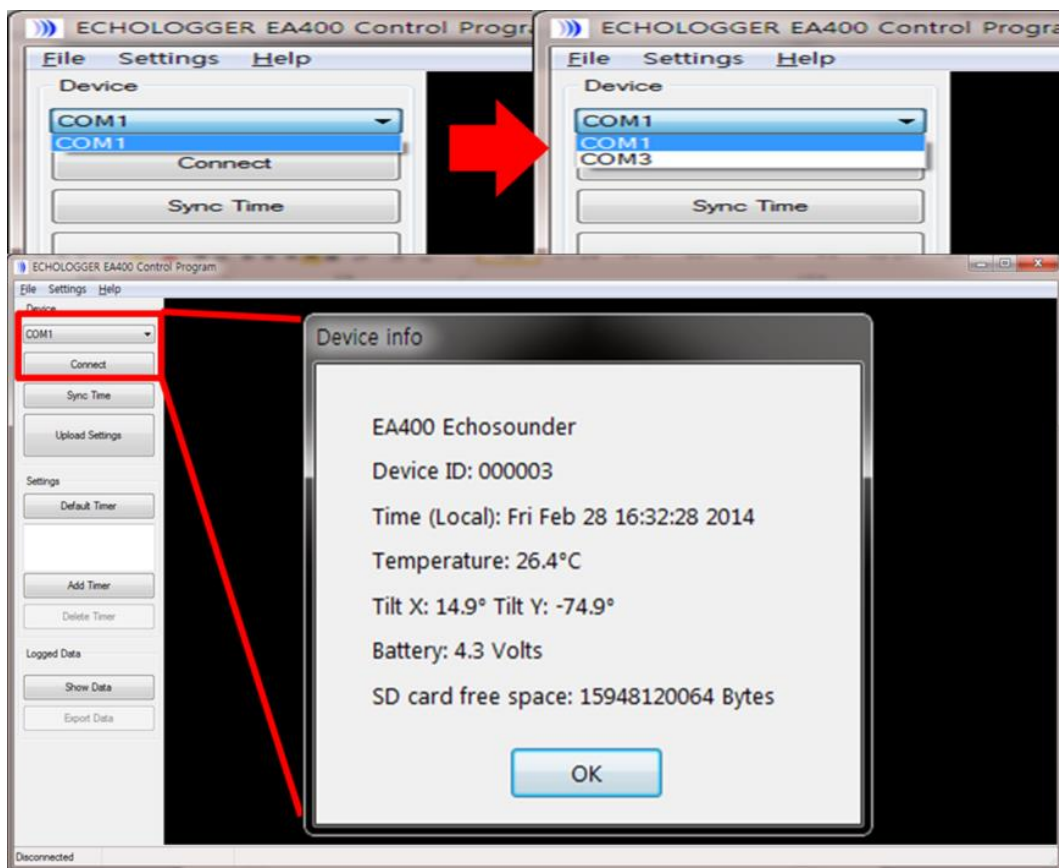


- Connect EA400 to PC with a USB cable provided.
- Correct COM port can be found in Control Panel > Hardware and Sound > Devices and Printers. (Windows 7)



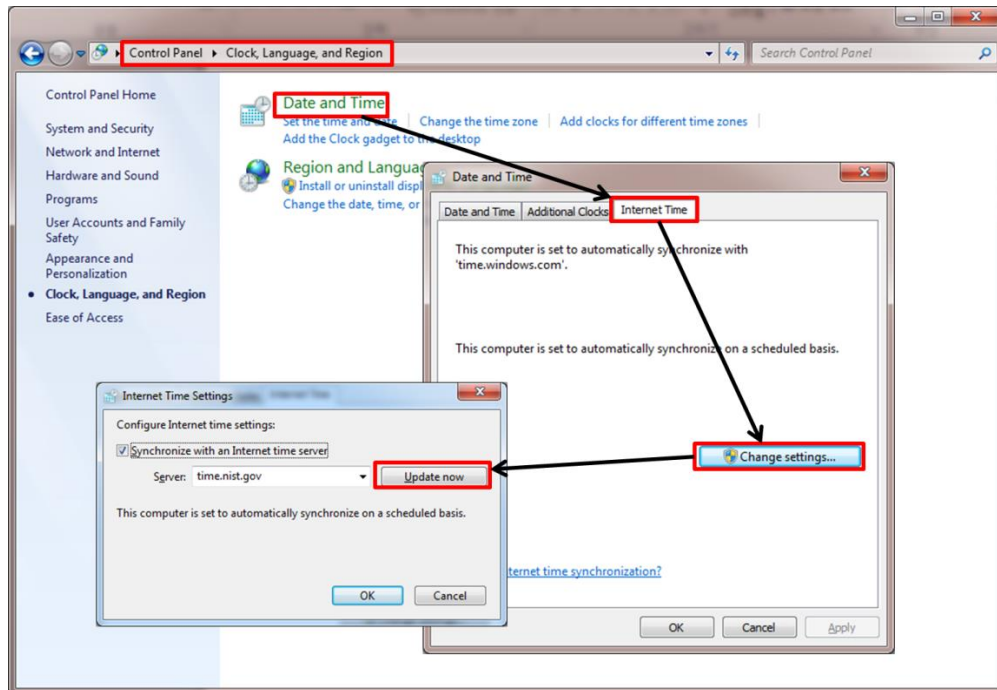
- Choose a correct data port and click 'Connect' button.

- If EA400 connected with PC then a new COM Port would appear on the list.
(When unplugged it will disappear)
- 'Device info' dialog will appear when Connect is successful (now the device is in Communication mode)



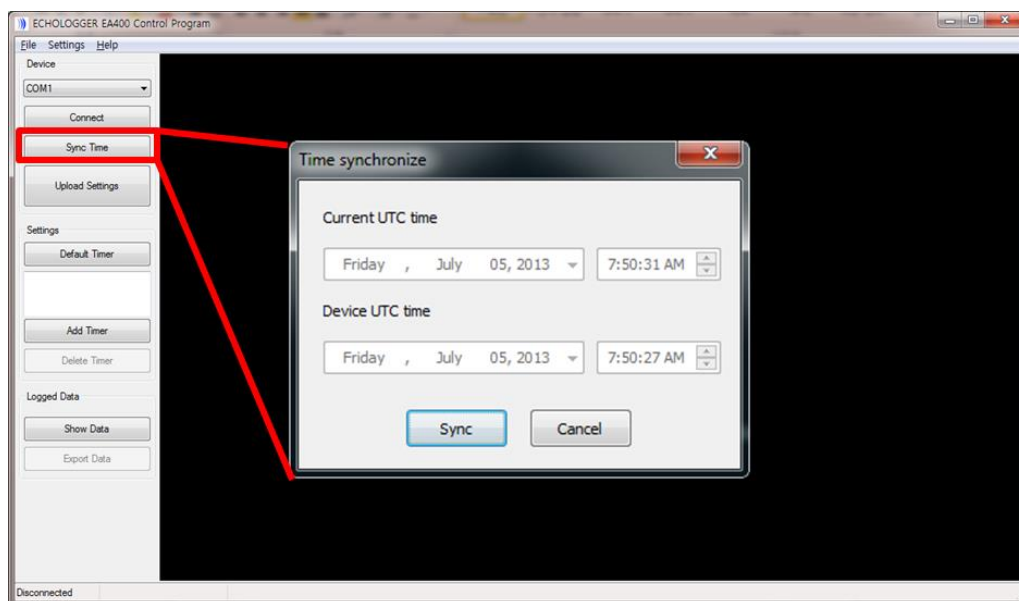
- Synchronization

1. Synchronize time of your PC and internet server first.



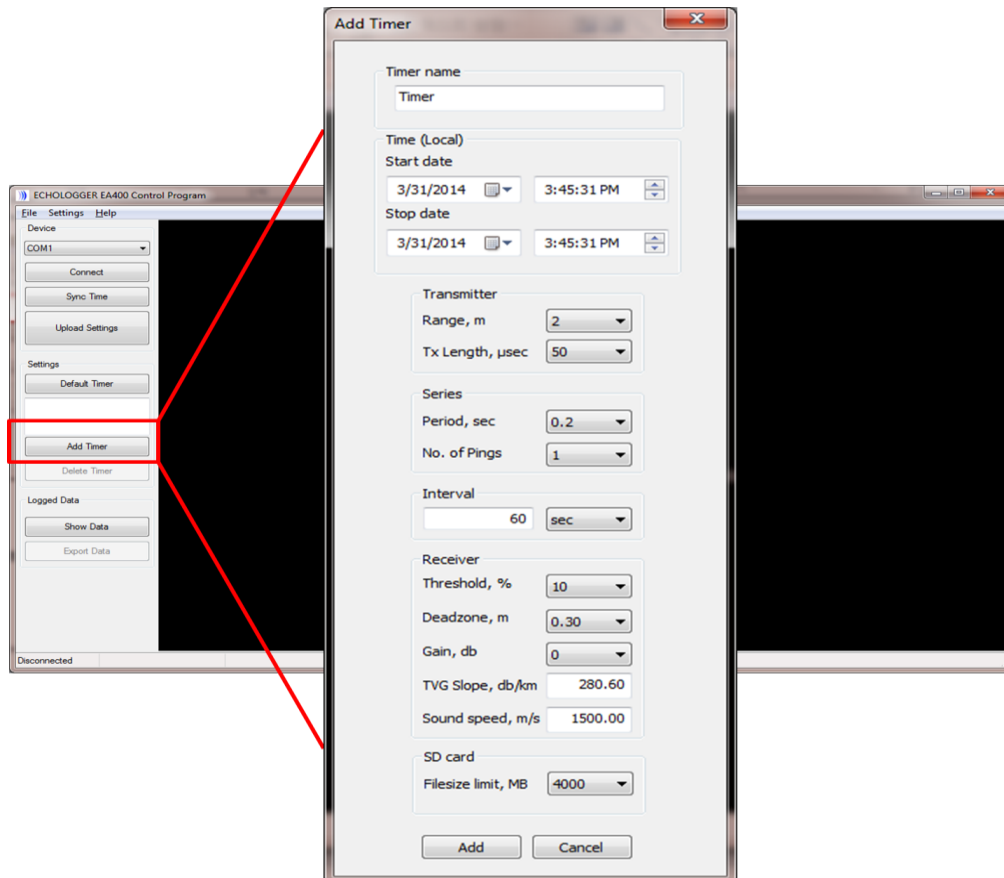
2. Synchronize time of your PC and EA400. at a UTC time

- Press buttons ; Sync Time – Sync



■ Parameter settings

- Two timer modes are available: Continuous (default timer) & Added Timers
- 'Add Timer' means some timer plan can be programmed. (Up to 32 timers)



- Parameter can be set-up differently at each added Timer

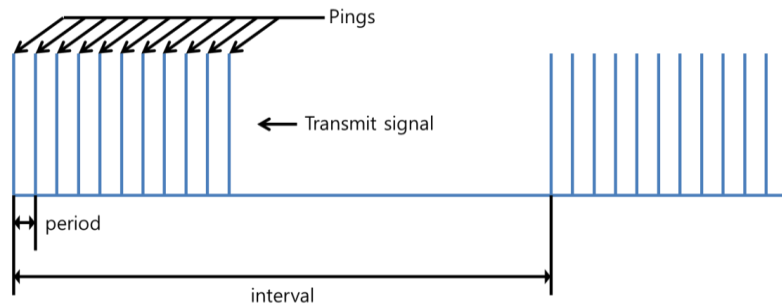
1. Timer name
: Name of the timer. (Maximum 31 characters.)
2. Start date and Stop date
: A time for start and stop this timer.
3. Range
: Maximum range of measurement.
4. Tx Length
: Pulse length in microseconds.
5. Period
: Time between each pulse in series.

6. No. of Pings

: Number of pulses in a series.

7. Interval

: Interval between series.



8. Threshold

: Threshold for altitude calculation.

9. Dead zone

: Near field zone where measurement is not possible.

10. Gain

: Gain of the receiver.

11. TVG Slope

: TVG(Time variant gain) is distance-related gain.

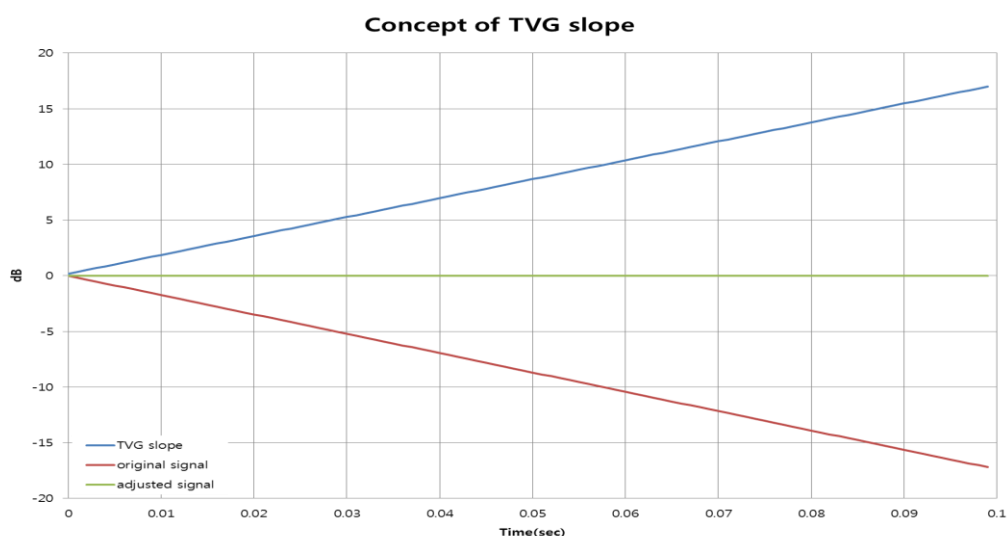
12. Sound speed

: User can define speed of sound in the water.

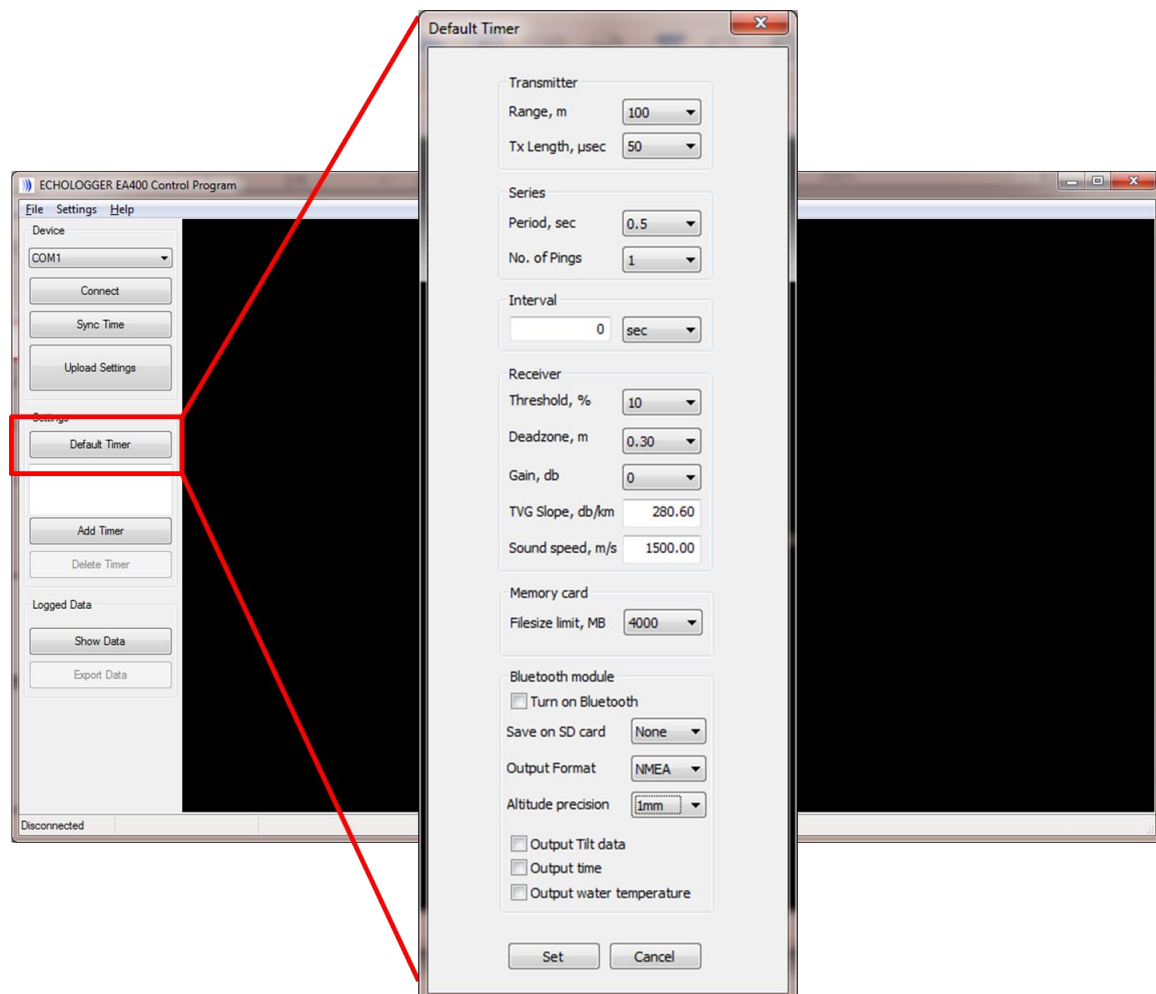
13. File size limit

: Maximum data size for each timer.

※ TVG slope could make echo signal without attenuation.



- 'Default Timer' means EA400 works continuously straightway when started. Simply set up other parameters after choosing Default Timer.



- If user wants to use EA400 as wireless real time altimeter then set Bluetooth parameters.
(Only 'Default Timer')

1. Turn on Bluetooth

: Turn on Bluetooth module.

2. Save on SD card

: Save the data to SD card.

3. Output format

: Decide format of save data.

4. Altitude precision

: Set resolution of data.

5. Output Tilt data

: Include tilted status of EA400 on data.

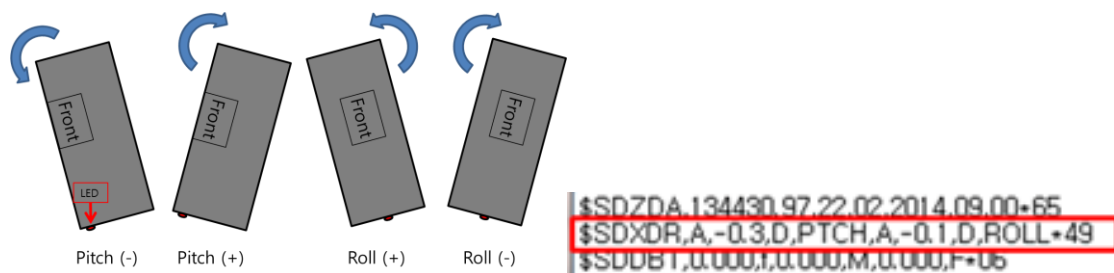
6. Output time

: Include data recorded time.

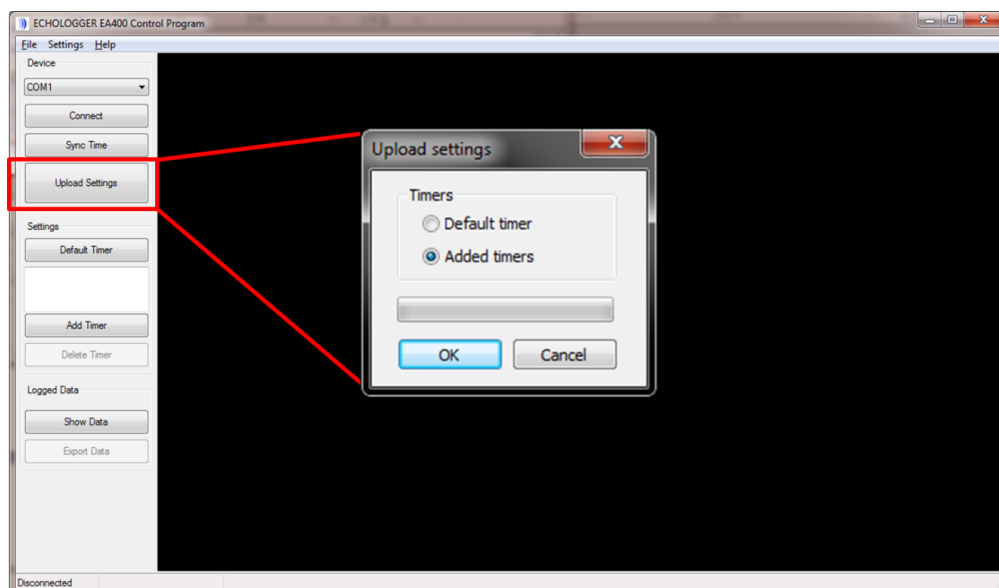
7. Output water temperature

: Include water temperature on data.

※ Recorded NMEA tilt direction according to LED position. (See below)



- Click 'Upload Settings' and select between "Default timer" and "Added timers". Selected timer(s) will be uploaded to the device. (Battery should be disconnected in this process)



- Now, setting parameters is done. (Still communication mode)
- Change to Transmitting mode (or turn off for now and turn on before deployment)
- Deploy the EA400.



IMPORTANT : DO NOT TURN OFF BEFORE THE DEVICE IS DEPLOYED. (EA400 must be transmitting mode when deployed. Turn off means Turn-off, and will not wake up on your timer setting)

■ Real time wireless communication using Bluetooth

- Connect PC with EA400 by Bluetooth.

※ Following procedure is for pairing Bluetooth. (Pairing code is 'BTWIN')



- Run EA400ControlProgram.
- EA400 in communication mode with USB connection.
- Set Bluetooth parameters with other parameters. (Only 'Default Timer')

Default Timer

Transmitter

Range, m: 100

Tx Length, μ sec: 50

Series

Period, sec: 0.5

No. of Pings: 1

Interval

0 sec

Receiver

Threshold, %: 10

Deadzone, m: 0.30

Gain, db: 0

TVG Slope, db/km: 280.60

Sound speed, m/s: 1500.00

Memory card

Filesize limit, MB: 4000

Bluetooth module

☐ Turn on Bluetooth

Save on SD card: None

Output Format: NMEA

Altitude precision: 1mm

☐ Output Tilt data

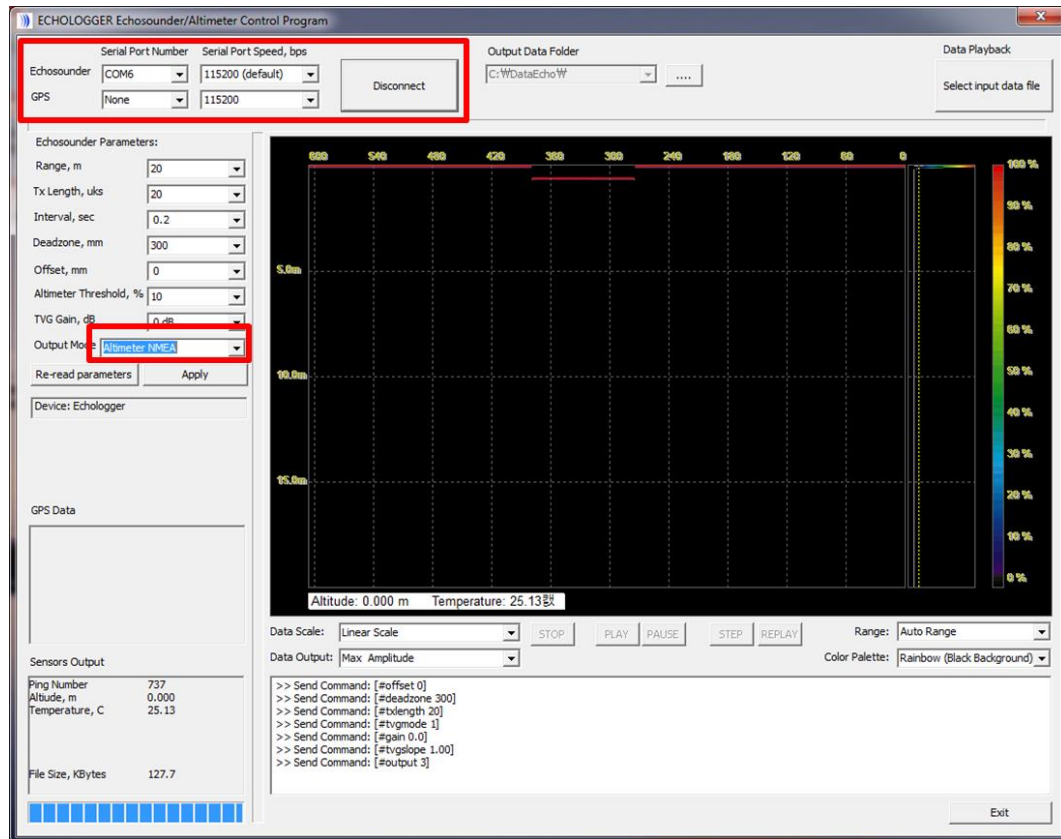
☐ Output time

☐ Output water temperature

Set Cancel

- Upload Default Timer settings.
- Change Transmitting mode.
- Run Echosounder/Altimeter Control program.

- Set correct EA400 serial port and connect. (User can connect GPS module (optional))
- Output Mode should be selected 'Altimeter NMEA'.

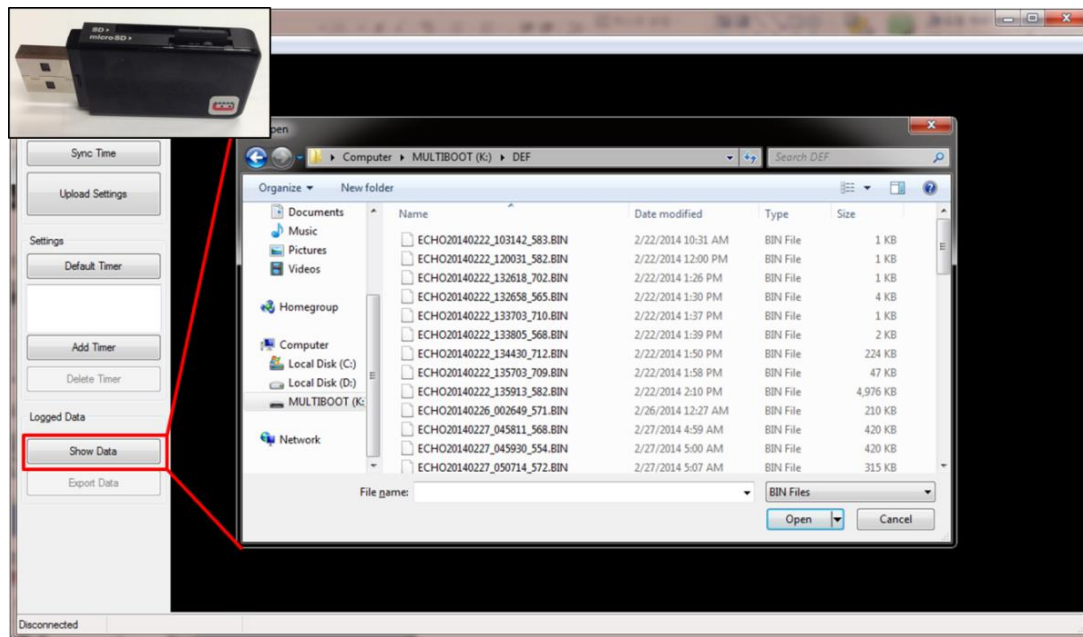


- Monitoring mode life time would be depending on range and data save mode

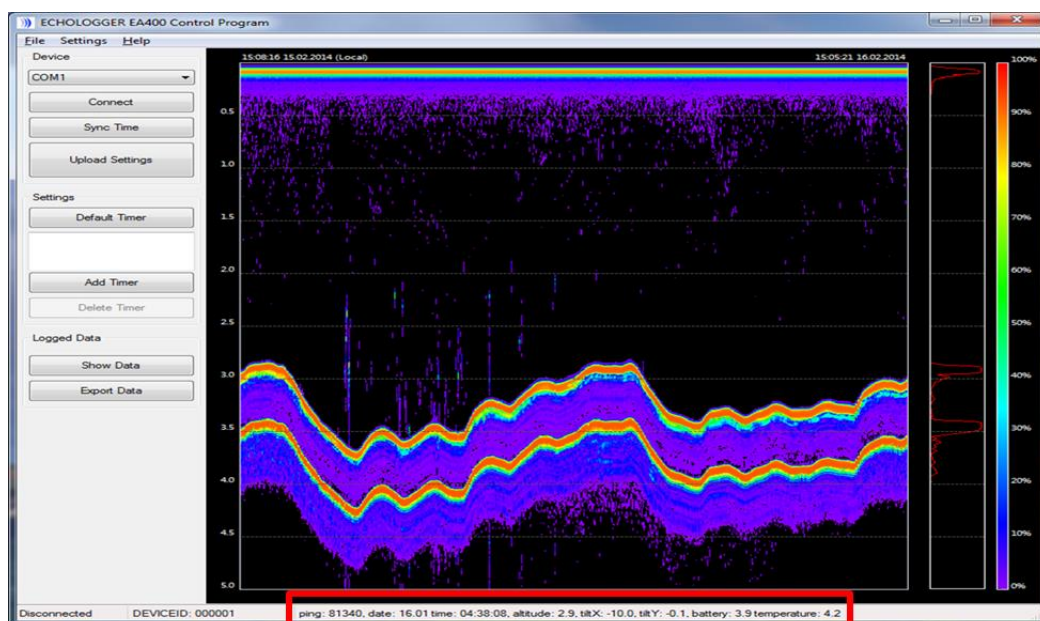
Life time (hours)	Data save	Bluetooth	Range(meters)			
			10	20	50	100
	No	On	468	348	283	217
	Yes		326	288	200	157
		Off	535	500	384	217

■ Retrieving data

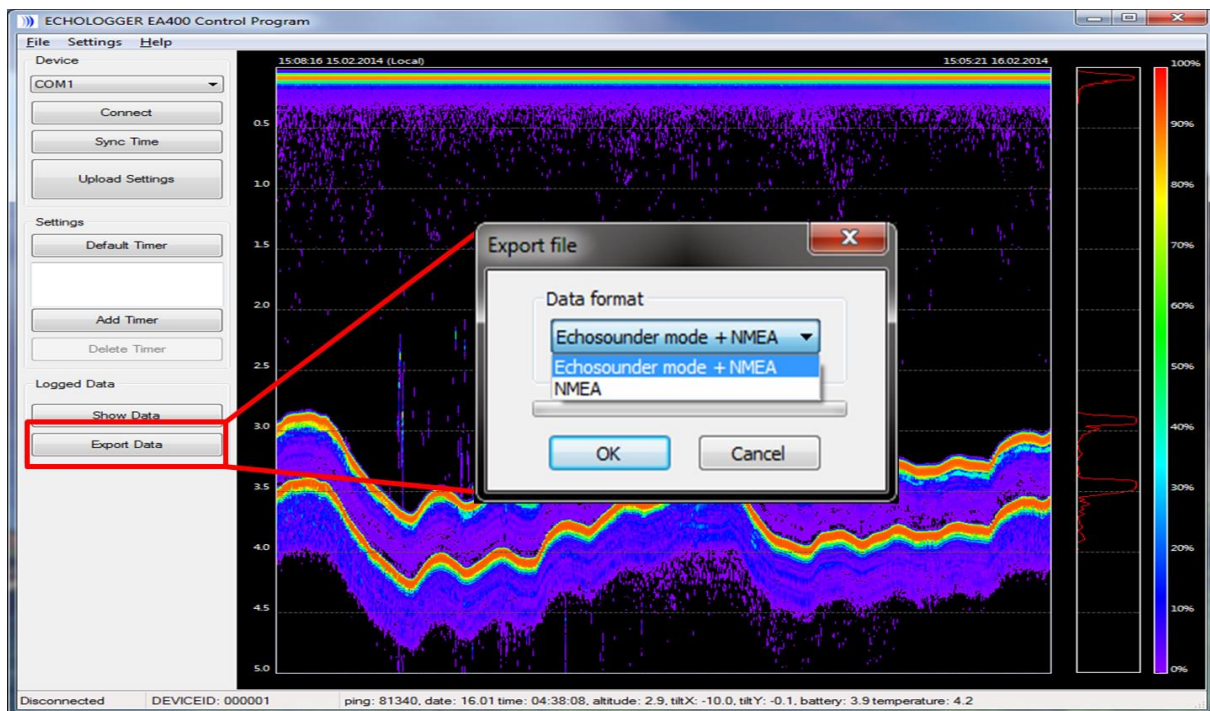
- Take out micro SD card from EA400 and put it into a USB card reader
- Connect the USB card reader into the PC and click 'Show Data' to choose data you are interested. (Binary format files are saved)



- Selected BIN file is played back on the screen.
- By placing the mouse on the picture, detailed information on the spot is displayed.



- Dragging mouse could move the displayed picture.
- 'Export Data' changes binary data to ASCII format. (Echosounder format(Echologger EU/ECT/ECS400 compatible) or NMEA format)



```
Echosounder mode + NMEA.LOG - Notepad
File Edit Format View Help
#DeviceID 000000 EA400 USB/SDCard + Alfat Type
#TimeLocal 20140222 22:44:30.97
#TimeUTC 20140222 13:44:30.97
#Ping 1
#Ping num in series 1
#Altitude,m 0.000
#Temperature, 21.68
#NSamples 272
#Resolution,m 0.0075
#SoundSpeed,mps 1500.00
#-----Parameters-----
#Tx_Frequency,HZ 450000
#Range,m 2.0
#Pulse period,sec 0.20
#Pulses in series,num 10
#Interval between series,sec 10
#Threshold,% 10
#Offset,m 0.000
#Deadzone,m 0.300
#PulseLength,uks 50
#TVG_Gain,dB +0.000
#TVG_Slope,dB/km 280.6
#TVG_Mode 1
#OutputMode 2
#Pitch,deg -0.300
#Roll,deg -0.100

$SDZDA,134430.97,22,02,2014,09,00+65
$SDXDR,A,-0.3,D,PTCH,A,-0.1,D,ROLL+49
$SDBBT,0.000,f,0.000,M,0.000,F+06

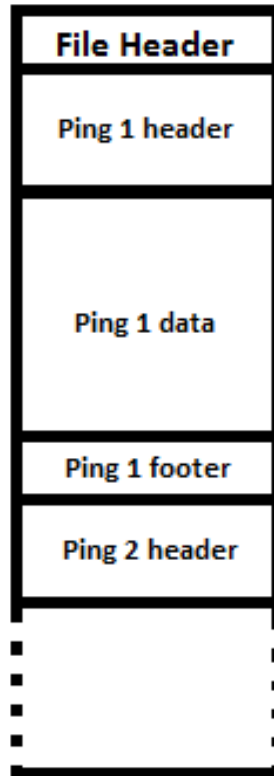
##DataStart
0
0
4
22
60
124
241
394
517
604
656
```

```
NMEA.log - Notepad
File Edit Format View Help
$SDZDA,134430.97,22,02,2014,09,00+65
$SDXDR,A,-0.3,D,PTCH,A,-0.1,D,ROLL+49
$SDBBT,0.000,f,0.000,M,0.000,F+06
$SDZDA,134431.17,22,02,2014,09,00+6C
$SDXDR,A,-0.2,D,PTCH,A,-0.3,D,ROLL+4A
$SDBBT,0.000,f,0.000,M,0.000,F+06
$SDZDA,134431.37,22,02,2014,09,00+6E
$SDXDR,A,-0.3,D,PTCH,A,-0.3,D,ROLL+4B
$SDBBT,0.000,f,0.000,M,0.000,F+06
$SDZDA,134431.57,22,02,2014,09,00+68
$SDXDR,A,-0.2,D,PTCH,A,-0.2,D,ROLL+4B
$SDBBT,0.000,f,0.000,M,0.000,F+06
$SDZDA,134431.77,22,02,2014,09,00+6A
$SDXDR,A,-0.2,D,PTCH,A,-0.3,D,ROLL+4A
$SDBBT,0.000,f,0.000,M,0.000,F+06
$SDZDA,134431.97,22,02,2014,09,00+64
$SDXDR,A,-0.3,D,PTCH,A,-0.1,D,ROLL+49
$SDBBT,0.000,f,0.000,M,0.000,F+06
$SDZDA,134432.17,22,02,2014,09,00+6F
$SDXDR,A,-0.2,D,PTCH,A,-0.2,D,ROLL+4B
$SDBBT,0.000,f,0.000,M,0.000,F+06
$SDZDA,134432.37,22,02,2014,09,00+6D
$SDXDR,A,-0.2,D,PTCH,A,-0.3,D,ROLL+4A
$SDBBT,0.000,f,0.000,M,0.000,F+06
$SDZDA,134432.57,22,02,2014,09,00+6B
$SDXDR,A,-0.2,D,PTCH,A,-0.1,D,ROLL+48
$SDBBT,0.000,f,0.000,M,0.000,F+06
$SDZDA,134432.77,22,02,2014,09,00+69
$SDXDR,A,-0.1,D,PTCH,A,-0.2,D,ROLL+4B
$SDBBT,0.000,f,0.000,M,0.000,F+06
$SDZDA,134440.82,22,02,2014,09,00+66
$SDXDR,A,-0.3,D,PTCH,A,-0.3,D,ROLL+4B
$SDBBT,0.000,f,0.000,M,0.000,F+06
$SDZDA,134441.02,22,02,2014,09,00+6F
$SDXDR,A,-0.3,D,PTCH,A,-0.2,D,ROLL+4A
$SDBBT,0.000,f,0.000,M,0.000,F+06
$SDZDA,134441.22,22,02,2014,09,00+6D
$SDXDR,A,-0.2,D,PTCH,A,-0.3,D,ROLL+4A
$SDBBT,0.000,f,0.000,M,0.000,F+06
$SDZDA,134441.42,22,02,2014,09,00+6B
$SDXDR,A,-0.2,D,PTCH,A,-0.1,D,ROLL+48
$SDBBT,0.000,f,0.000,M,0.000,F+06
$SDZDA,134441.62,22,02,2014,09,00+69
```

(Echosounder data format (EU/ECT/ECS400 compatible) and NMEA data format)

■ Binary file format

- Format of the file, produced by the EA400 is shown on below.



Output file format

- File header structure (C-language):

```
struct _timer_settings
{
    unsigned long dwSize ;
    int id ;
    char szName[32] ;
    unsigned long startdate ;
    unsigned long stopdate ;
    int is_newfile ;
    int range ;
    int txlength ;
    float pings_interval ;
    int pings_num ;
    int period ;
    int threshold ;
}
```

```

float deadzone ;
float gain ;
float tvg_slope ;
float soundspeed ;
float offset ;
int sampling_freq ;
int serialnumber ;
int reserved1[6] ;
};

```

- This file header contains the timer settings, which user set when programming timers.

- Ping header

```

struct _echoheader
{
    unsigned long    magic ;
    unsigned long    version ;
    unsigned long    nping ;
    unsigned long    nsamples ;
    unsigned long    time ;
    unsigned short   time_ctc ;
    unsigned short   reserved1 ;
    unsigned long    seriesping ;
    int              reserved[9] ;
};

```

- Ping data contains 10bit ADC data values (0~1023)

```

unsigned short echosamples[] ;

```

- Ping footer

```

struct _echofooter
{
    unsigned long    version ;
    unsigned long    nping ;
    unsigned long    nsamples ;
    float            water_temperature ;
    float            battery_voltage ;
};

```

```
float    altitude ;  
float    tilt_x ;  
float    tilt_y ;  
int      reserved[8] ;  
};
```

■ Known issue

1. Minimum Interval between pulses in series is depending on range and should be corrected when user set timer settings.

Range (Meter)	Minimum interval (Second)	Samples	Data size (Bytes)	Time (hours) for 4GB file (1pps rate)
1	0.1	144	544	2194
1.5	0.1	208	672	1776
2	0.1	272	800	1492
3	0.1	400	1056	1130
5	0.1	672	1600	746
10	0.2	1344	2944	406
15	0.2	2000	4256	281
20	0.2	2672	5600	214
30	0.2	4000	8256	145
40	0.2	5344	10944	110
50	0.3	6672	13600	88
60	0.5	8000	16256	74
70	0.5	9344	18944	63
80	0.5	10672	21600	56
90	0.5	12000	24256	50
100	0.5	13344	26944	45

IMPORTANT : Currently EA400 data acquisition is maximum 4GB per each timer. Please consider when use long-term and/or long range data.

2. Serial port speed can only be 115200baud speed for now