Catalogue

Chapter 1 Introduction to Echo Sounder

Acoustic instruments in oceanography have significantly and technologically developed. Many advanced acoustic instruments in oceanography, such as multi-beam seabed imaging system, sidescan Echo-sounder, sub-bottom profiler, underwater sonobuoy responder, etc. have already been manufactured in many countries. Echosounder is common device of acoustic instruments ~~and~~ at present. Most of them ~~internationally~~ are of mechanical record stylus type or hot sense record type. Danmark's E-sea sound was the first to adopt digital imaging Echo-sounder. Its price is very high, but it can only store 30 minutes image data. In China most of the echosounders are of mechanical record stylus type, bulky, high energy-consumptive and high broken-down.

Now Hi-Target Inc. has invented its' own digital imaging Echo-sounder called HD-17/HD-18/HD-20 after several years' research, which can display analog signals in digital image. Moreover it can restore and print data, reuse image at any moment ex post facto, and it can catch underwater echo signals by means of high-precision and reliable digital processing, use flash memory to store 50-100 hours image data and additionally equips USB disk to export data.

Meanwhile, HI-TARGET Inc. has invented a portable engineering Echo-sounder called HD-16 that may be the smallest one so far. Although it can only display and output the depth without image, it is high-precise and reliable because the result is handled after complicated digital processing. HI-TARGET offers the most advanced commercial Echo sounder products in China at the present.

At the end of 2004, HI-TARGET started to promote its second-generation HD-2*series Echo sounder. Compared to the first generation Echo sounder, the performance of the second one is more perfect.

In February 2007, HI-TARGET invented the second generation HD-2*T series Echo sounder, which have improved in the following advantages: more stable CPU, more perfect protection system , faster response and larger data throughput , make it more suitable for field operation.

Based on the successful productions of HD-27T series, HI-TARGET has invented the third generation digital Echo sounder HD370/380/390. They are the frequency-adjustable echosounder, adopting the advanced international frequency mixing technique to reduce transducer buzz and surface noise, enhancing echo

strength. Furthermore, frequency mixing technique provides HD3*0 with ability to configure with diverse frequency transducer to meet various needs from different marine survey projects. With perfect TVG curve designed according to the transmission properties of sonar, user can choose one suitable to different environment, which can optimize the accuracy of sounding and improve performance in shallow water sounding.

1.1 Principle of Echosounder

Suppose that the velocity that sound wave spreads in water is V. The probe of transducer loads pulse sound wave signals, then the sound wave is sent to the seabed and is received by the probe when the sound wave was reflected. Thus get the time that the sound wave signals go and return, as indicated in Figure 1-1:

$$Z = v_t / 2$$

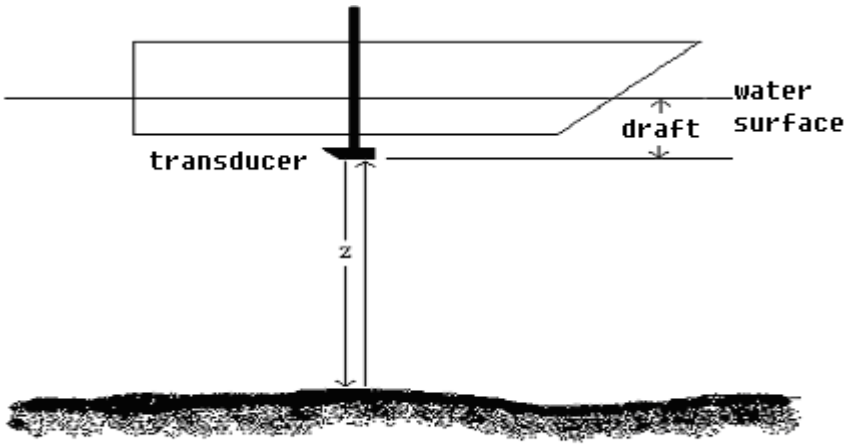


Figure 1-1 Principle of echo

Z is the length between the probe and the seabed, the depth of water is Z + draft.

1.2 Submarine Signal Identifying Technology

Although the principle of echo sounding is simple, underwater situations are often so complex that signal is not easy to be identified: there are parasitic echo, echo from fish and other things, and there may be second-trace echo, triple-trace echo in offshore area because of different submarine reflecting conditions. So we must take measures to track and get real echo signals from intruders.

1 Submarine Gate Tracking（Also named Time Gate Tracking）

Time Gate can be understood as a time range. As indicated in Figure 1-2, the depth of water doesn't greatly change between two soundings (about 0.1 second) for the bottom changes imperceptibly. Suppose the percentage of water depth variation is ±10%, we will open a time window from the foregoing 10%×Z(the reflection interval is Z) to the latter 10%×Z of the correct echowave time. (100%±10%)×Z is called the width of time window and only the echowave that received in the time window will be recognized as the real signal. If there is no echo in the time window, the width of time window will amplify to search echo until there is correct echo available.

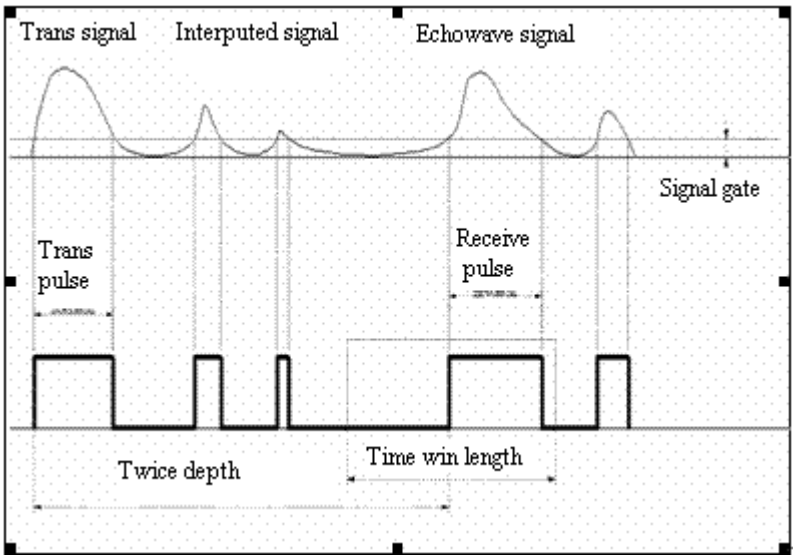


Figure 1-2 Tracking technique of the Time Gate

2 Choice of Pulse Width

Generally speaking, the width of the echo pulse from bottom is larger compared to the pulse width of interferential signals and second-trace echo. Distinguishing the one that has the largest pulse width from all the pulse as the correct one. Also should with the help of time window technology.

3 Signal Threshold

Signal threshold can be amplified to filter interferential signal if there is much interference in surveying area or environment, as indicated in Figure 1-2. However, signal threshold can't be amplified too much so that weaker signals are filtered. For the different signal threshold will influence the precision of echo sounding, to select a proper signal threshold is helpful for restraining interference and tracking stably.

4 Automatic Gain Control (AGC)

AGC can measure the intensity of echo pulse signal, when echo pulse signal is excessively strong the amplifier of automatic control receiver will reduce gain to avoid too much interference signal and when echo pulse signal is excessively small the amplifier of automatic control receiver will increase gain to receive echo pulse. The range of AGC is the key for judging of the receiver channel performance. The AGC range of HI-TARGET Echo sounder is 90 Db, which can be adjusted manually or automatically.

5 Time Varied Control (TVG)

Sound intensity reduces exponentially when it spreads in the water. In order to keep signal range stable, TVG will control receive amplifier to increase by contraries. This is the principle of TVG, as indicated in Figure 1-3.

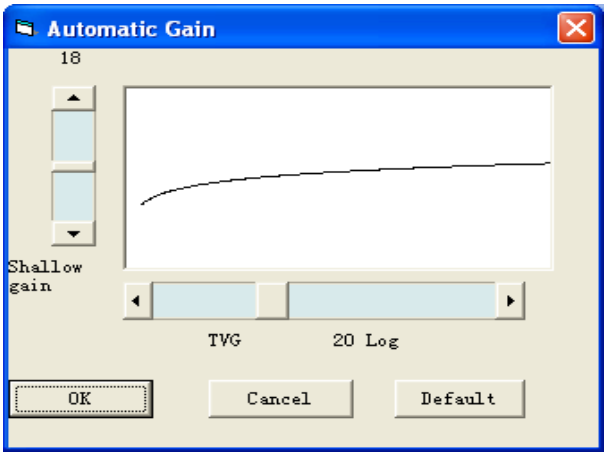


Figure 1-3 TVG Principle

Chapter 2 HD-3*0 Series Echo Sounder

2.1 Specifications and Features

Set HD370 single adjustable frequency Echosounder as example:

Figure 2-1 HD-370 Echosounder

Specifications:

1. Work Frequency: 100-750KHz(adjustable)
2. Transmission Power: 500W (for 200KHz transducer)
3. Bathymetric range: 0.3m-600m
4. Bathymetric Accuracy: ±10mm+0.1%h definition 1cm
5. Draft range: 0.0m-15m
6. Adjustable range of sound velocity: 1370-1700m/s，definition 1m/s
7. Rugged high-speed low-power embedded CUP frequency: 1.6GHZ
8. Memory: 1 G

9. Depth max-sampling Rate: 30times/second
10. Internal Devices：4G CF card storage(can be customized)
11. Data which output from the serial port: Emulate various formats, baudrate adjustable
12. External Ports：2 RS-232 ports, 3 USB ports, 1 DC power port, 2 TX ports (for transducer)
13. LCD Display：12 inches, definition 1024×768, 1000cd/m2
14. Power supply: DC 10-14V or AC 220V,
15. Power consumption : 20W
16. Working environment: -30℃～60℃, waterproof, shockproof
17. Dimensions: 440mmL ×341mmW ×164mmH
18. Weight: 9kg

Features:

⊙Adopting frequency mixing technique, allowing work frequency range continuously adjustable (100-750KHZ)

⊙High-speed sounding acquisition, more accurate and more meticulous

⊙High-speed A/D transformation, sampling rate 153600/s, waterfall display.

⊙Digital image processing technology, waterfall image display and record, enabling replay and printing

⊙Enabling both fully automatic shift and manual shift

⊙AGC automatic gain control, TVG time gain control

⊙Submarine gate tracking technology and choice of Pulse width technology are perfectly combined

⊙Built-in Sounding and Surveying 2 in 1 Software allows HD370 to connect with any GPS positioning instrument, attitude indicator or surge compensator to get the corresponding data

⊙ Windows XP operation system, adopting unique "Quick Mapping Revert" technique, protecting the system away from virus

⊙ Dual storage disk, dual system protection, with one key recovery

⊙ more stable touch mouse pad, allowing external USB keyboard and mouse connection for operation

⊙ Allowing external VGA screen connection, supporting multi-display terminal

⊙ High brightness LCD, with huge visible angle, can operate under strong light

⊙ High strength PB+PC material shell, more beautiful design and more portable

Figure2-2 single-frequency transducer

2.2 Configuration

Standard configuration list (Model: HD-370) edition: A

	Name	Type	Quantity	Description
1	Mainframe	HD-370	1	
2	370 Transducer	DS-27C	1	200KHz
3	DC power cable	PW-3	1	
4	AC adapter	CL-37	1	
5	Length rod aluminium alloy box	LH-27F	1	
6	Transducer Fixing Pole	TD-27	1 pair	
7	1-divide-into-3 USB cable	USB 1-3	1	
8	COM Port cable	DB9-WY	2	
9	VGA cable	DB15-WY	1	

2.3 Connect and install

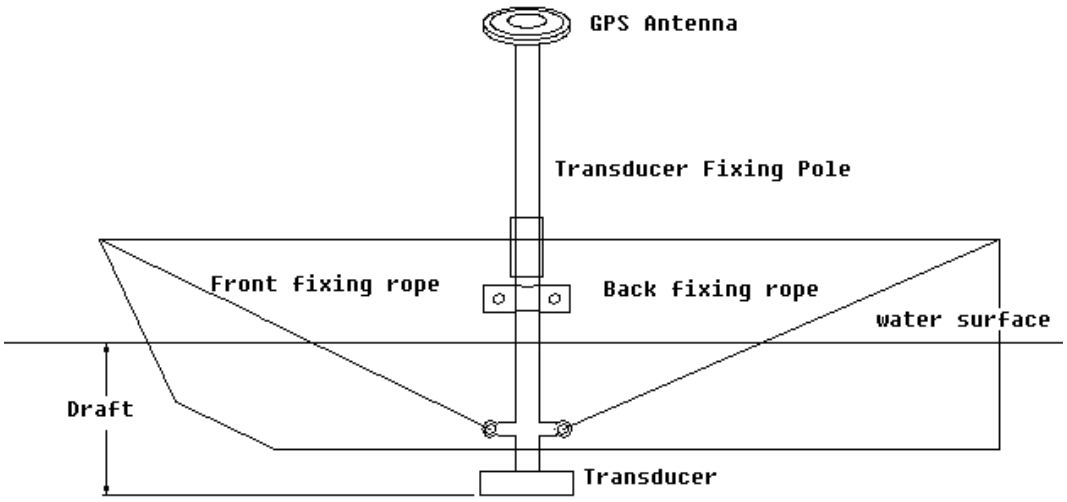


Figure2-3 installation indication

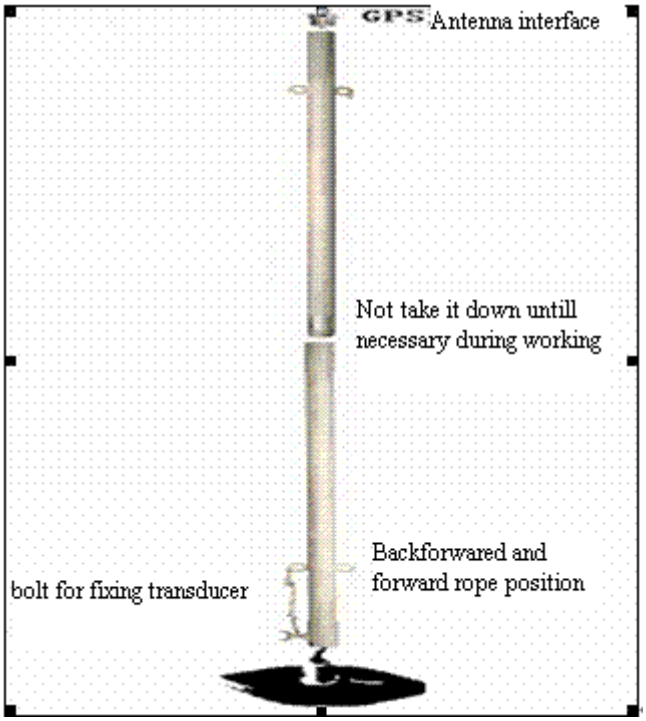


Figure2-4 Connect transducer to rod

Ports of Echosounder HD 370/HD 380:

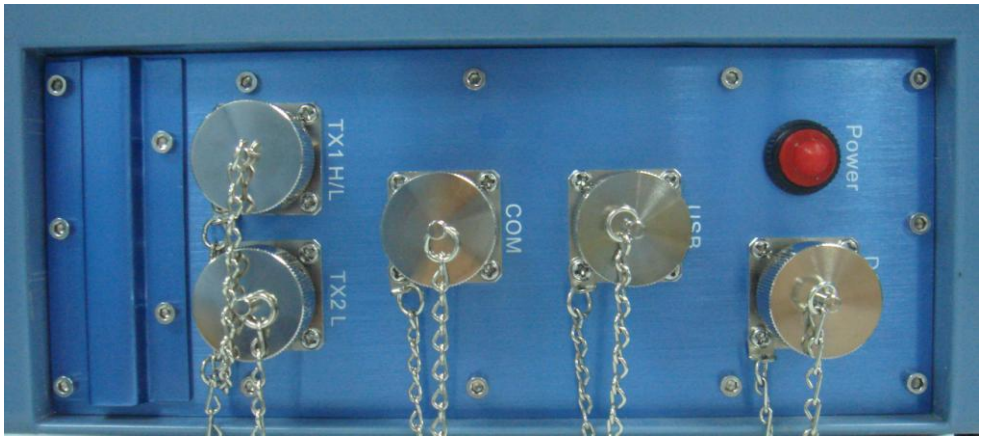


Figure 2-5 ports connection

2.4 Sounding main interface

After finishing connecting, press power key to turn the HD370/380/390 on. Then the system starts running, and the sounding software start automatically as figure 2-6:

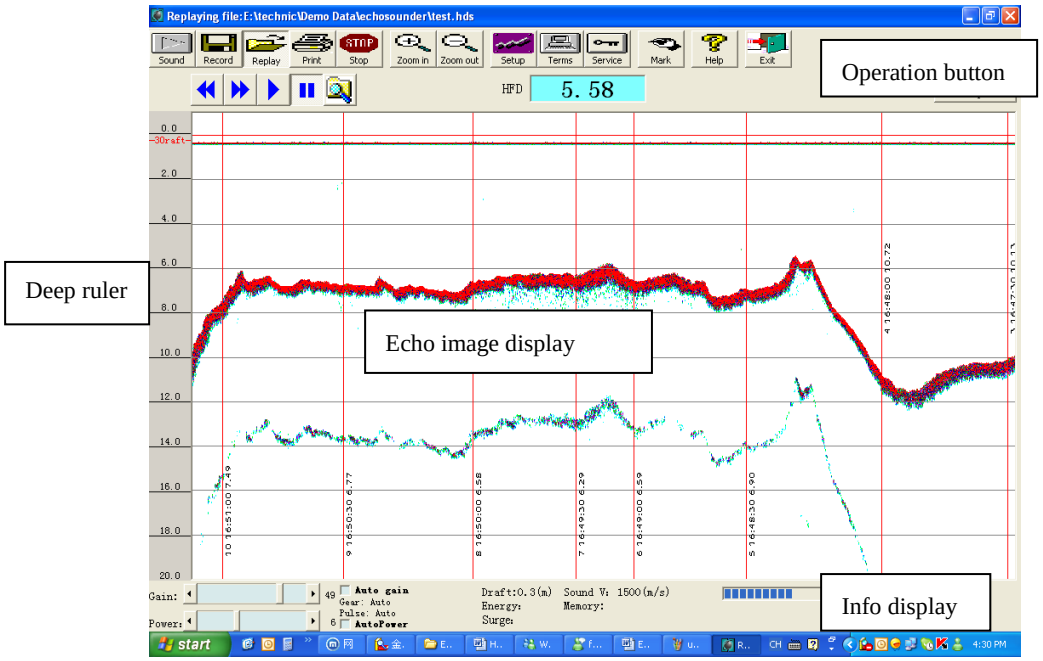


Figure 2-6 sounding interface

1. Echo image display window

Waterfall display echo image signal from up to down is: zero meter line, emission line (waterline) and echo wave line. When marked you will see a red mark line with node message. When using the orders to control marking the note is offered by external software; When using any other marking method, note is only continuous dot number and marking time.

2. Depth scale

Depth scale shows corresponding depth value with scale level, the following are scale levels:

- 1 0～10m
- 2 0～20 m
- 3 0～40 m
- 4 0～80 m
- 5 0～160 m
- 6 0～320 m
- 7 0～640 m

The level will automatically switches to next level when configuration is ***"Gear Auto Switch"*** without marking ***"Span"*** and depth is more than 90% of present level. Present level automatically switches to smaller level when depth is less than 30% of present level. Present level automatically moves up when configuration is ***"Gear Auto Switch"*** with marking ***"Span"*** and depth is beyond the present level. If the level has alredy switched 4 times, then the level will switch to the next level.

When using "***Gear Manually Switch***", echo signal may lose when it is beyond 50% of display scope.

3. Echo waveform display

Waterfall echo image area can be transformed into echo waveform display, just like oscillograph, clearly showing wave shape from transmitting to receiving. In waveform mode, sounding and recording are running in the background. It will switch between "***Fall***" and "***Wave Shape***" forms by clicking upper right button in the window.

Waveform will be shown all through the time in waveform mode. The range of wave represents intensity of echo wave signal. Red square wave represents tracked

echo wave from water bottom, as indicated in Figure 2-7:

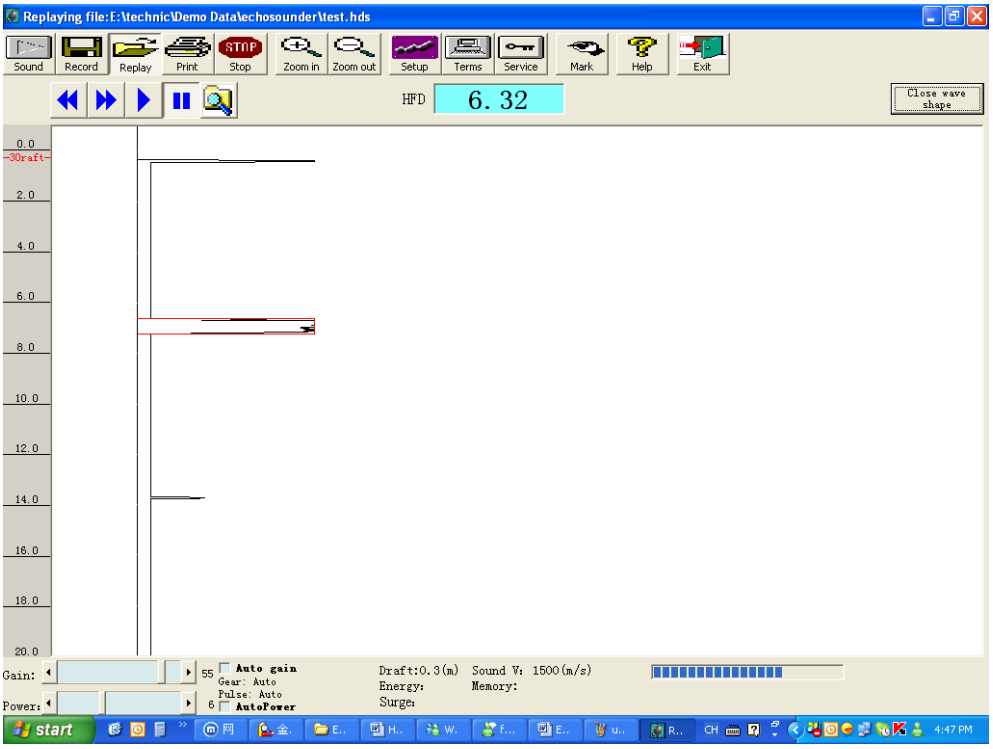


Figure 2-7 echo wave shape window

4. Depth display window

This window shows water depth of the corresponding communication channel. It shows " ***?*** " after water depth value tracking fails. It shows " ***Warn*** " when depth value is smaller than alert value with the shallow water alert turning on.

5. Menu and toolbar

All function and operation buttons are showed as figure 2-8:

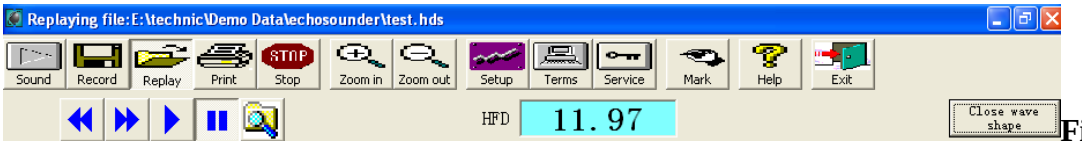


Fig Figure 2-8 Operation buttons

- Sound: Start sounding without recording
- Record: Start sounding and recording, application software will prompt you

to give file name and automatically assign unique ID according to date.

- Replay: Replay recorded sounding file and can go forward and backward, pause and search.
- Print: Print recorded sound file by ink jet printer or heat-sensitive printer
- Stop: Stop sounding and emitting sound wave, economize on electricity
- Zoom in: Manually magnify sound display scope
- Zoom out: Manually narrow sound display scope
- Setup: Set the sound parameters
- Terms: Modify work mode and port output format etc
- Service: Register product and update firmware driver etc
- Mark: Manually mark (in manual mode)
- Exit: Close sound application software and return to the desktop

2.5 Parameters and environment configuration

Click button "***setup***" and show parameters configuration dialog, as indicated in Figure 2-9.

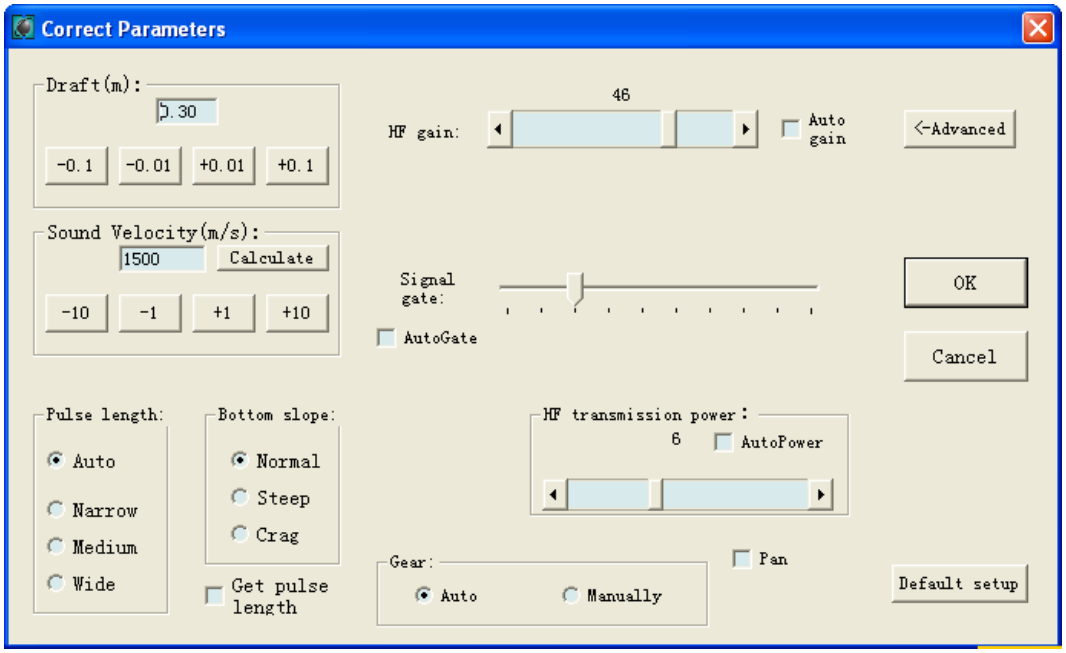


Figure 2-9

1. Draft: 0~15m.

2. Sound velocity: 1370 ～ 1700 m/s. For shallow water sounding, you can use the comparison sound velocity temperature or salinity to calibrate, and calculate sound velocity.

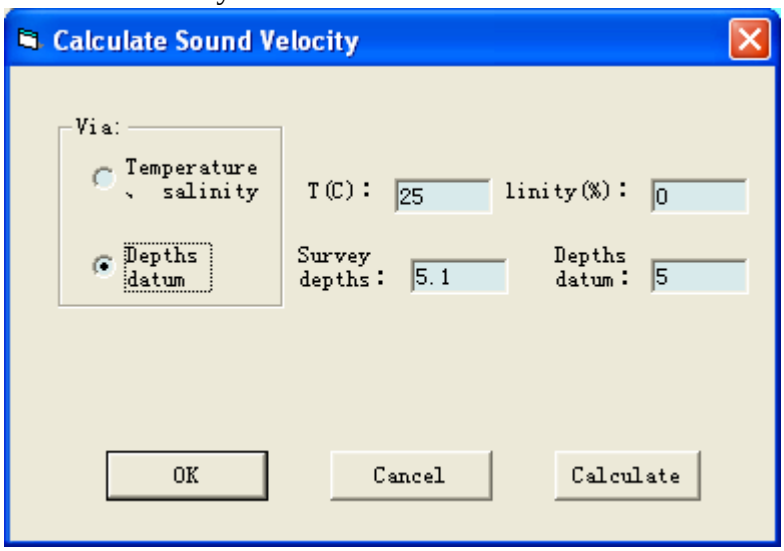


Figure 2-10 sound velocity calculate

3. ***Emission pulse width*** is to control pulse width and use different pulse width, in "***AUTO***" mode it will transmit the pulse according to different gears.
4. Bottom gradient used to control time windows: time windows width in "***Normal***" is 5% depth, time windows width in "***Steep***" is 10% depth, time windows width in "***Crag***"is 15% depth.
5. Selectable transmission power: level 1- 15. You can click on "***AutoPower***" option so that the system will choose the proper level according to the real situation.
6. Signal Threshold: signal threshold value, which restrains small range of interferential signal is divided into ten levels; maximum value is 60% of signal's full extent. In shallow water it can be set up a little more, while in deep water it can be set up a little less, as figure 2-11.

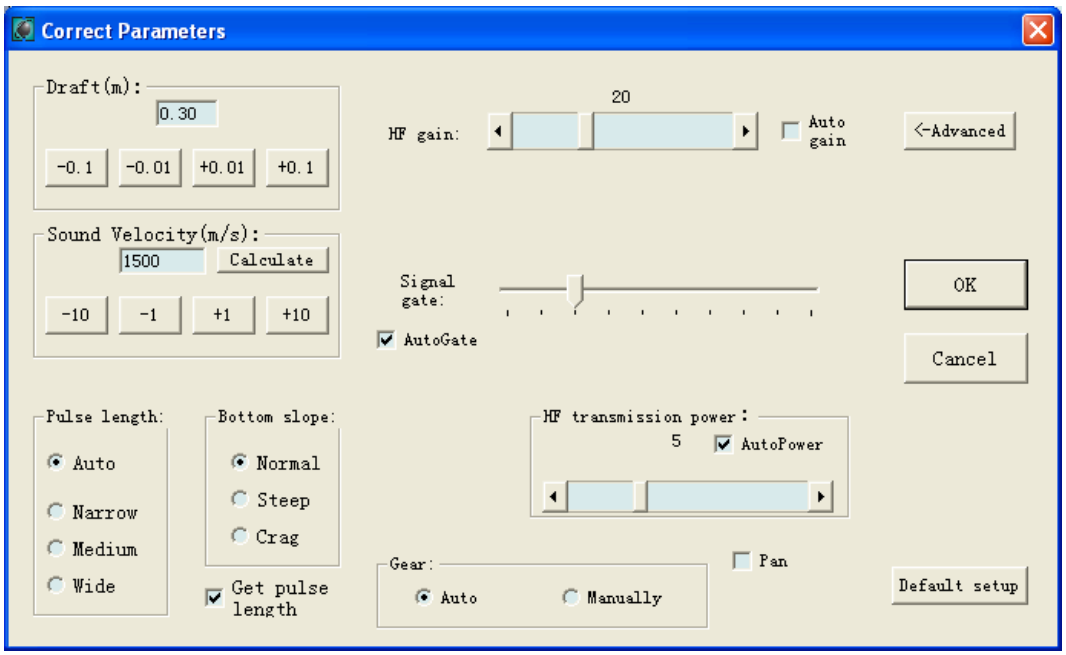


Figure 2-11 Parameters and environment configuration

7. Gain control: modifying gain value by adjusting slide bar or in main screen when closing "***AUTO***" mode. When "***AUTO"*** mode is open, the system automatically controls gain according to automatic gain scheme set in "***Advance***", as indicated in Figure 2-12.

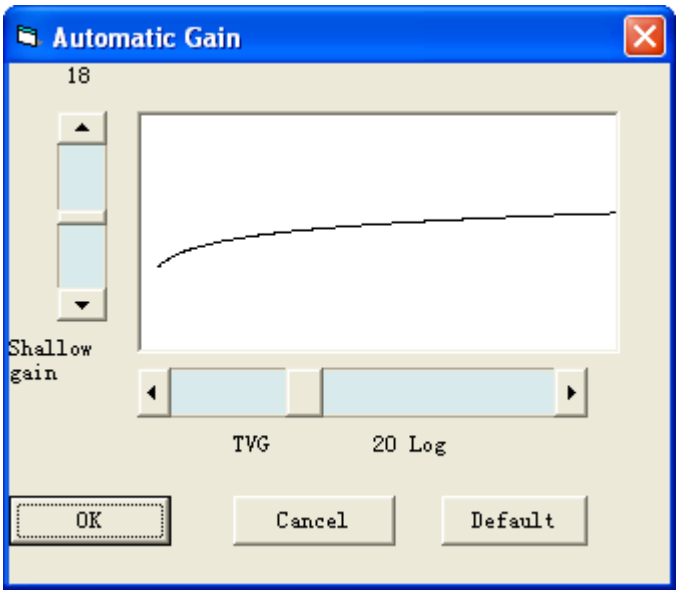


Figure 2-12 Automatic gain

When using "***Via depth***" to modify gain, adopt correct shallow water gain and TVG, to modify well "***Shallow water gain***" value is helpful for tracking shallow echo wave within two meters. Different values could be used according to water bottom properties---add the value if echo wave is very weak, otherwise reduce the value if echo wave is not clear. TVG value rises as water depth does. Increscent extent of gain is called gain slope that mainly determine gain status from five to twenty meters. The larger its value is, the faster gain increases. For example, increase TVG value if echo wave is weak in 10 meters of depth. Usually it is set as 20 Log.

You can click button "***Default value***" to reset default setup parameters if you don't know how to set. However, ***Draft*** must be set according to the underwater depth of probe.

Click "***Terms***" button to show as following figure 2-13:

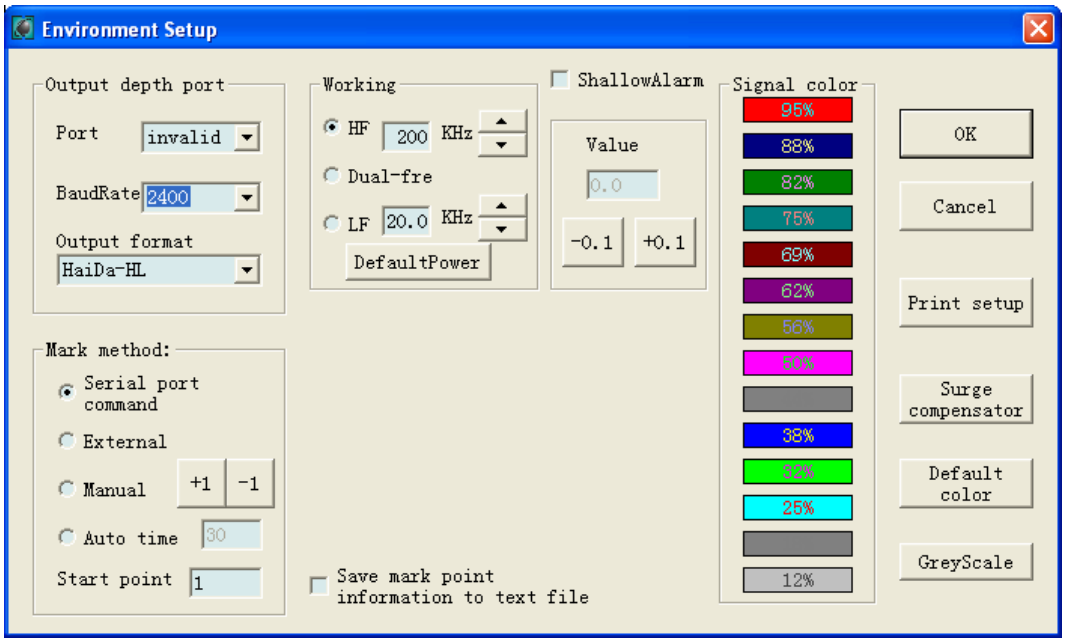


Figure 2-13 environment setup

Depth output port:

Now HI-TARGET echosounder can emulate many sound data formats in the world. You can select sound output baud rate and data format according to systematic requirement. In general, single frequency sonar may select Haida-H data format and single frequency sonar may select Haida-HL data format. Data output port can be COM1 or COM2.

Work mode:

You can choose proper work mode according to your echosounder. HD-370 can work in high frequency only, HD380 can work in dual-frequency (low and high), while HD390 can work in single high frequency but with multi-channels.

Mark mode:

4 mark modes are available.

Shallow water alarm:

You can input water depth limit value after activating the shallow water warning. Once water depth value is less than the limit one window will show ***"Warn***".

Save information of mark point to text file:

When you open this function to start recording, the system will automatically save mark information to the file that has the same filename as HDS file and TXT postfix file, its format is point number, time, depth H, depth L, draft, velocity of sound.

Surge compensator port as figure 2-14:

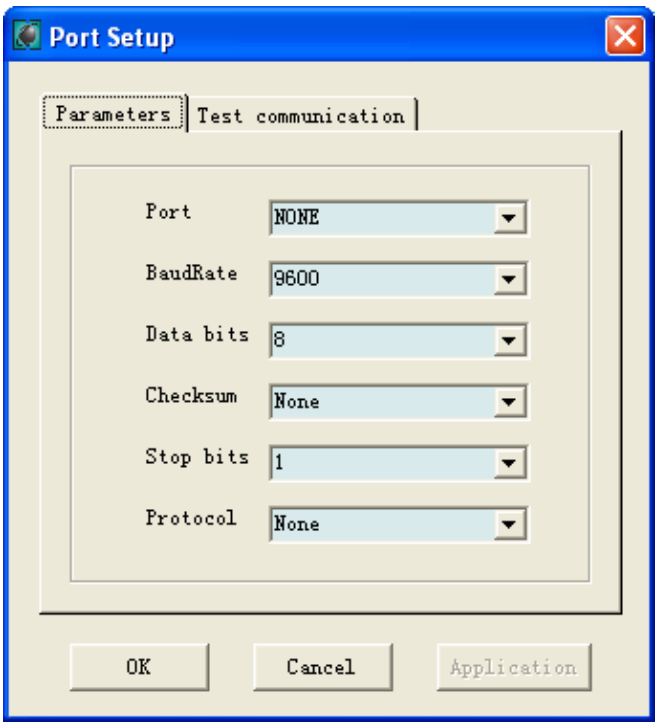


Figure 2-14

You can connect it with COM1 or COM2 if you have a surge compensator, as indicated in Figure 2-14. Then you set "Port" and "Baudrate". If you are not clear about how to set the "Data bits", "Checksum", "Stop bits" and "Protocol", please leave it to be the default settings as the figure 2-14.

In “Test communication”, you can click “***Start***” to test whether the port is set successfully.

Register:

If you have bought permanent usage of our product, please get register code from your echosounder supplier to register product. The following is register procedure:

Click button “***Service***” and input register code in below textbox:

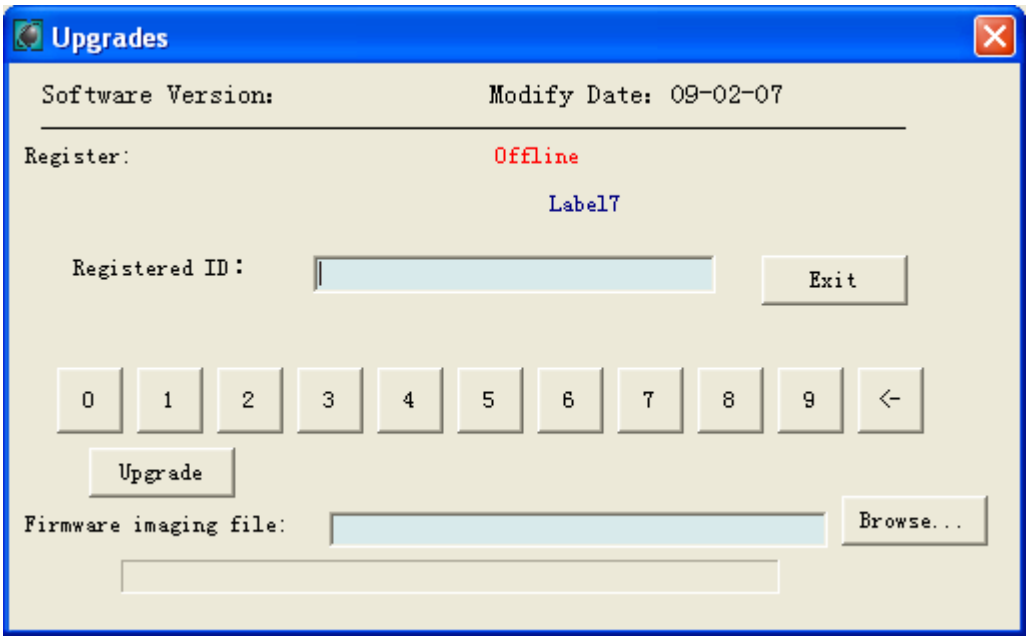


Figure 2-15 product register

2.6 Start sounding (or recording)

After pressing “***Sound***”, echosounder starts emitting and receiving echo, displaying echo image and outputs water depth value of proper format in depth window. Sounding mode can not record, which is a good method to save memory if you don’t need to record image, because it will occupy 6M memory in one hour with image record. If you are formally sounding, you can use button “***Record***”. In “***Record***” mode, the system will show a file dialog that requires you to input a

filename, meanwhile, the system will automatically create a unique filename according to system date and you can click button "***OK***", or you can use Chinese characters and start soft keyboard or connect an external keyboard to input a customized filename. When the filename you input already exists, the system will show a prompt to ask you if you overwrite the file. if you choose "***OK***" the old file will be overwrote. Our suggest is that an hour recording is enough because the system will often show such trouble prompts as "***disk insufficient***" or "***paper shortage***" etc. when you copy or print very big file. Please notice whether storage space is enough. You'd better copy recording files (*.hds) to other computer or data disk after finishing you work everyday and remember to delete these files (*.hds) in order to spare more memory space.

The system can automatically identify correct echo wave if there is several times echo wave or interferential wave during your sounding. You can click blank area above correct echo wave to resume in cascade or wave shape window if it is tracking interferential wave.

Notice: click blank area above correct echo wave to make compulsory tracking.

2.7 Replay, Search and Print

You can view sound files (*.hds) at any time with the replay function. The recording files can be called "***digital record paper***" for the replay content you are watching is the same copy as you are sounding, which is the reason we don't print real-time data during the process of surveying. Why do we still keep piles of record papers in digital times? Isn't more convenient to hand in a CD disk if handing in material? You can install echosounder software (from equipped CD or download it from HI-TARGET Inc. website) in any computer to view "***digital record paper***".

In replay mode, the software will show a dialog in which you choose the replay file to replay according to normal velocity. You can click button "***FAST FORWARD***" if you want to fast view it and also use button "***FAST BACKWARD***" or "***PAUSE***". Besides, you can directly go to the location you want to view if you search according to mark number.

You'd better connect echosounder with series paper printer and click button "***PRINT***" to print hard copy material as record paper if you really need record paper.

You can firstly click button "***PAUSE***" and then put mouse arrow to the place

you want to measure if you artificially measure. Depth window will show water depth value according to mouse place.

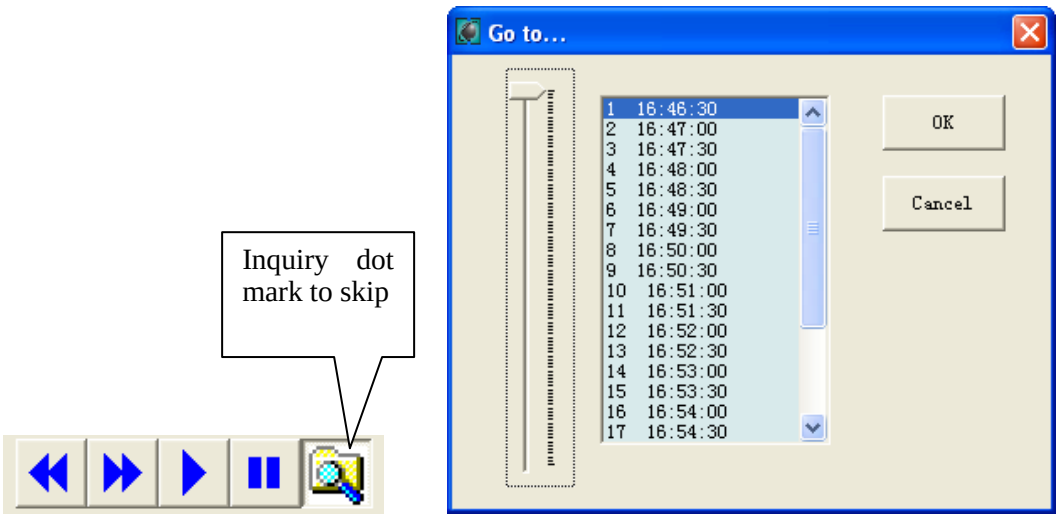


Figure 2-16 skip point display depth

In sounding and recording, the system will create an automated file that has an extended name LST to save search material. You can search more quickly if you have the file, so you should copy this file together with your data files. If not, the software will automatically create a LST file when you click "***SEARCH***" during playback, but you may wait for some time according to the size of file.

2.8 Depth output format

1. HaiDa-H (high frequency out) and HaiDa-L (low frequency out):
   DTE#####<CR><LF>
   DT: identification head
   3 bit: an "***E***" when water depth is wrong, a space when it is right
   4~8 bit: water depth value, unit (CM)
   <CR>enter
   <LF>newline
2. HaiDa-HL format (dual frequency output)
   DTE##### E#####<CR><LF>
   DT: identification head
   3 bit: an "***E***" when water depth is wrong, a space when it is right
   4~8 bit: high frequency water depth value, unit (CM)
3. ESO 25 format

High frequency channel:
DA#####.##<space>m<CR><LF>
Low frequency channel:
DB#####.##<space>m<CR><LF>
D: identification head
A: High frequency channel
B: Low frequency channel
#####.##: water depth value, unit (M)
<space>: space bit
m: meter

4. INNERSPACE format
<STX>#####<CR>
<STX>: identification head, hexadecimal digital 02Hex
2~6 bit: high frequency water depth value, unit (CM)
5. NMEA 173 DBS format
SDDBS,####.#,f,####.#,M,###.#,F<CR><LF>
6. ODOM DSF et format
High frequency channel:
et#####H<CR><LF>
Low frequency channel:
et#####L<CR><LF>
et: identification head
H: High frequency channel
L: Low frequency channel
#####: water depth value, unit (M)

2.9 Marking control

Operation: set marking mode on the bottom left environment configuration interface.

1. Receive COM command

Marking is controlled by marine survey software and mark command changes with selected water depth output format.

The following is command of Haida_H, Haida_L and Haida_HL:

$MARK，*<CR>

Other command accord with corresponding format, please view pertinent information.

"***"** expresses inserted print string.

2. External marking

Connect equipped mark cable with water output serial port in echosounder. Clicking button at another end of the cable one time means one marking and point number automatically adds.

3. Manual marking

Press the button "***MARK***" in the interface to mark one time and the point number will accumulates automatically.

4. Automatic timing

The system can automatically make time mark according to initialized time interval (second) and point number accumulates automatically.

Notice: it works only when setting the corresponding mark mode in the "***environment***" regardless of any mark mode

2.10 Using marine survey software in echosounder

HD-3*0 echosounder has "NAV3*0 Surveying Software" and you can survey while connected with GPS on COM1 or COM2 port, thus you will spare a PC and a lot of survey software. The depth value of echosounder software is provided by survey software. It can transfer with zero-latency and have better synchronization between water depth and positioning. Figure 2-17 will show after running "***NAV370 survey software***" on the desktop:

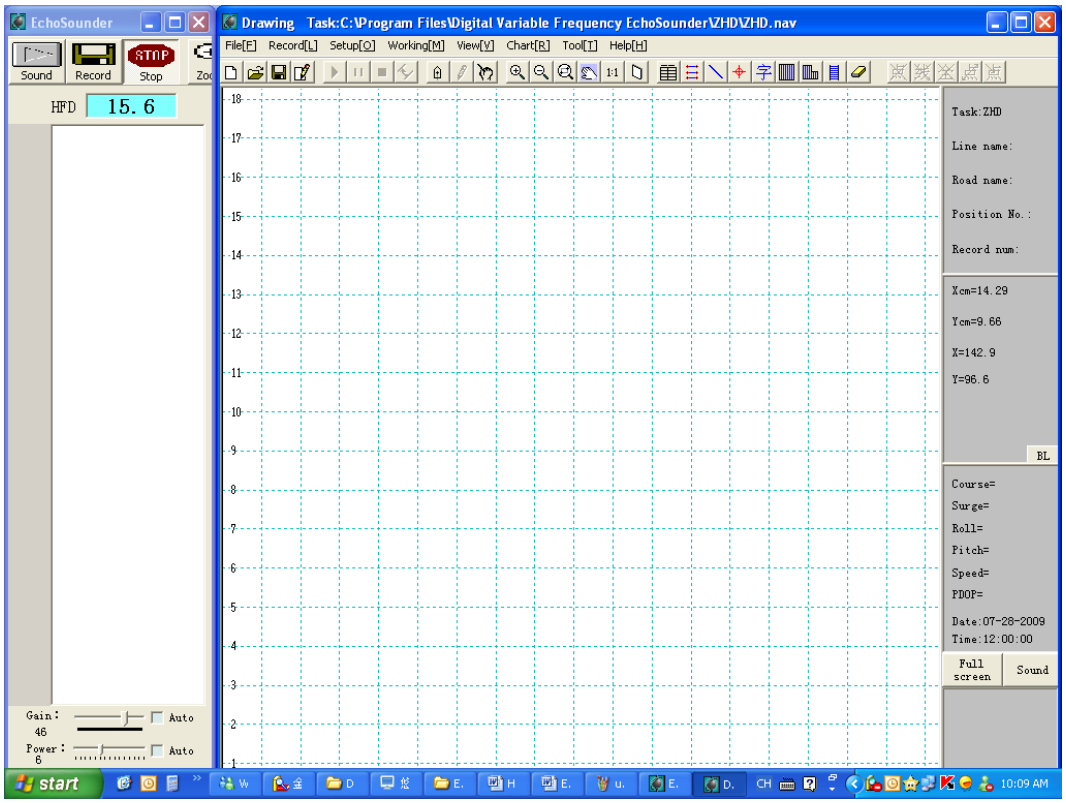


Figure 2-17

The left section is echosounder window and its operation is the same as the sounding software; the right section is navigation window and its operation is the same as survey software..

- "***Full Screen***": Display in full screen
- "***Dual Screen***": Display in Double screen with sounding and surveying
- ***"Sounding***": Display in full sounding screen
- **"Position**": Display in double screen

operating procedure:

After all the settings in "***HD-3*0 EchoSounder Softwave***" have been set to be correct, now we go into "***NAV3*0 survey software***" to set the others:

1. Create a new task in the survey interface;
2. Port setup: enter "Setup" -> "Port". connect GPS with COM1 and set port number as COM1 and baud rate in survey interface, as indicated in Figure 2-18:

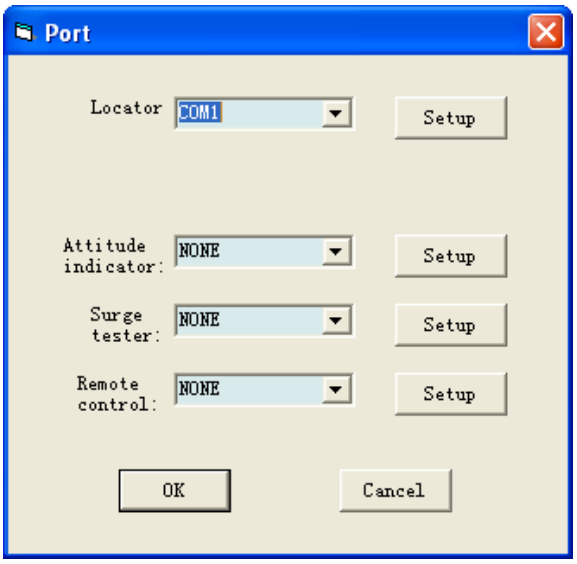


Figure 2-18

Note: make sure the port you select has not been occupied by the other equipment such as surge compensator or attitude indicator.

3. enter “Setup” -> “Data Format” in survey interface to select positioning data format, as indicated in Figure 2-19:

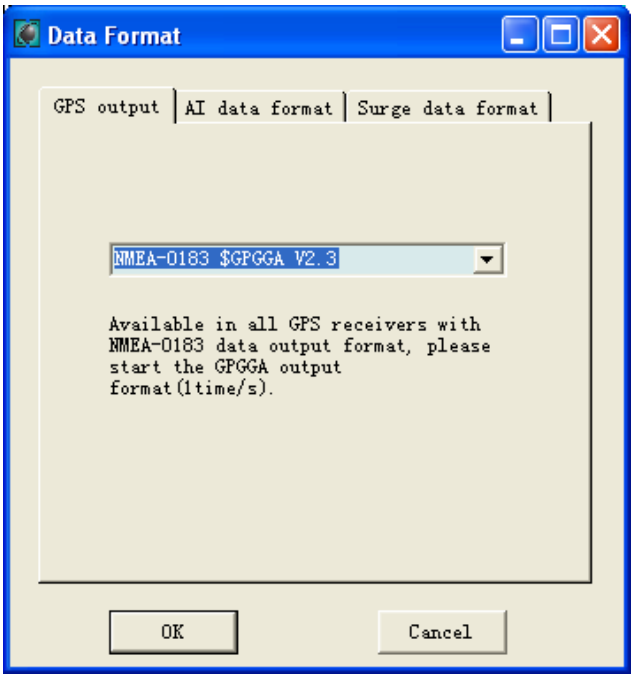


Figure 2-19

4. in surveying interface, click “Working” -> “Survey” to connect the positioning instruments
5. Start “***sounding”*** or “recording” in sounding interface to test the sounding or really do record the sounding data
6. In surveying interface, click “Record” -> “Start” to record.

Chapter 3 Depth Data Post-processing

For users' convenience, Hi-Target Inc provides free built-in depth data post-processing software in sonar, which can convert raw data (*.ss) provided by survey software to the data for mapping. The following are some functions of depth data post-processing software:

Convert raw data (*.ss) into usable data (*.HTT) according to drawing density requirement;

Dynamic draft and sonar correction;

Correction of water level (not RTK and work without tidal test);

Convert data into requisite format;

Subsidiary functions.

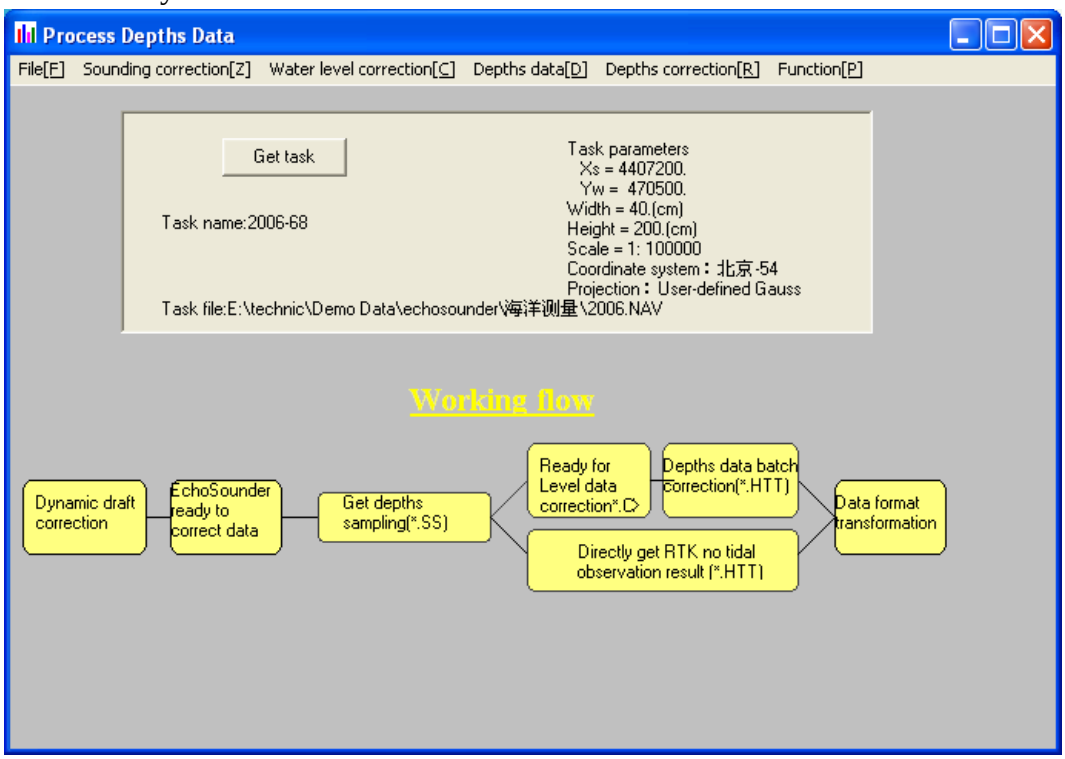


Figure 3-1

Run depth data post-processing software on desktop, as indicated in Figure 3-1.

At first, you get the task (*.NAV) that you use in surveying to determine some parameters such as coordinate system and projection, the following is the work procedure according to Figure 3-1 diagram.

3.1 Dynamic draft and echosounder amendment

Dynamic draft and echosounder correction parameter table is as Figure 3-2.

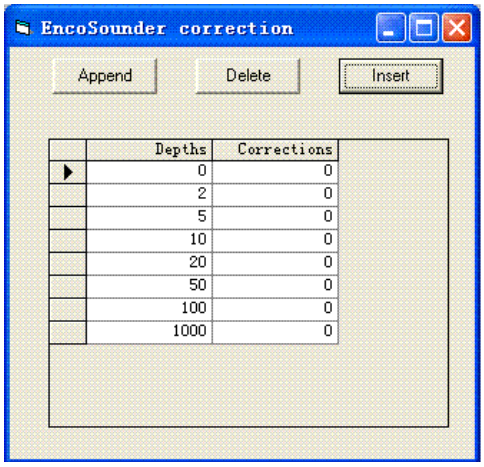


Figure 3-2

Depth value must include maximum and minimum depth value of surveying area; velocity table must include maximum and minimum boat speed during surveying.

3.2 Depth sampling

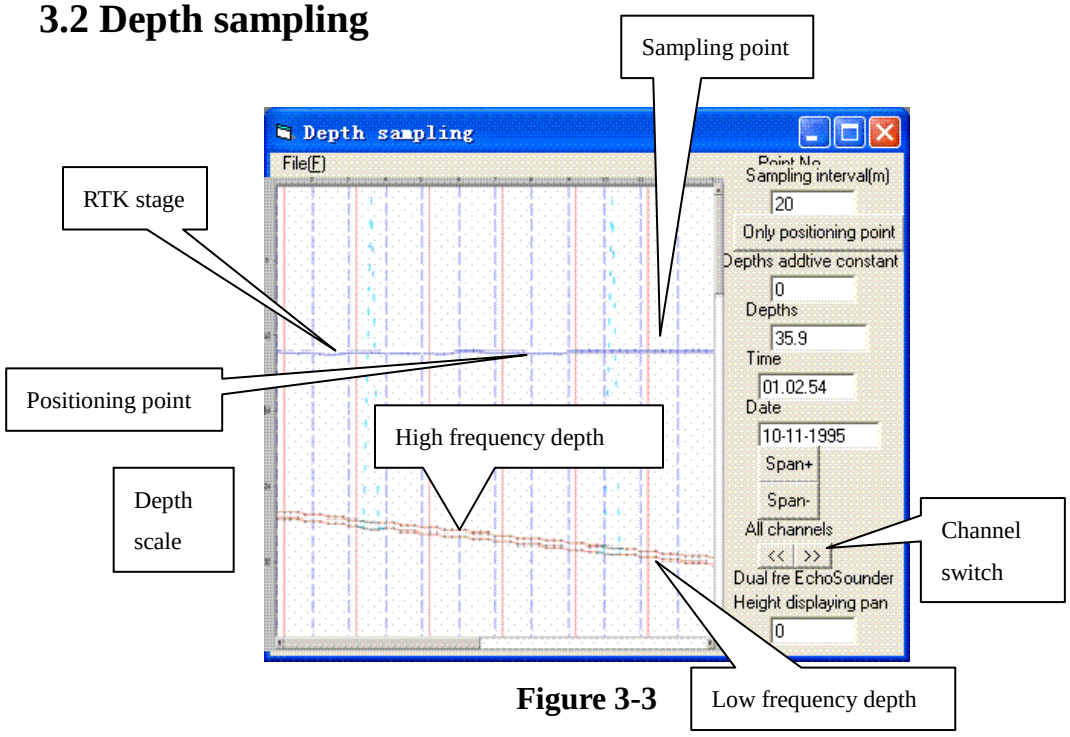


Figure 3-3

Run “depth gathering sampling” and show depth edit interface. Open raw depth file and water depth stage, Figure 3-3 shows data sample provided by dual frequency echosounder.

Measurement: ***“Range+”*** used to amplify depth display scope; ***“Range-”*** used to reduce depth display scope.

Sampling interval: the interval (unit: M) between adjacent depth points. Set sampling interval before opening file or reset sampling interval after opening file, and then click some depth point by mouse during the processing and sampling from the point on according to new sampling interval. Clicking ***“Positioning Point Only”*** will superpose all sampling lines and navigation lines.

RTK stage: water level elevation surveyed by RTK. If survey area is river, lake or reservoir, depth value may be very big and is not near depth line, so it can’t be shown and edited. At this time you can input “elevation display horizontal shift value” to modify elevation line into window and edit.

Depth constant: add constant amendment if draft is wrong during sounding.

Channel switch: if instrument is dual frequency, multi-channel or multi-beam echosounder, channel switch can solely display every channel or display all channels. You can make edits only in sole channel display.

Positioning point: blue broken line represents positioning points corresponded to sounding and to mark line on which is point number on echo picture.

Sampling point: sampling point number calculated by software according to sampling interval. You can sampling anew or use mouse to drag sampling line.

Depth line: each point on depth line represents depth. Depth value is wrong when the point is a red circle. You can edit and smooth these points by using mouse to drag them.

After edit, system will prompt you to save changes when you open another file or quit system. The software will save edited data in the file (*.SS1) without changing the raw file (*.SS) when you save. You also may reopen edited file (*.SS1) to edit, at the same time you save, and save sampling points which have dynamic draft amendment and echosounder amendment to file (*.HTT). If instrument is a dual frequency echosounder, the software will create three HTT files: high frequency file (*-1.HTT),low frequency file (*-2.HTT) and dispersion value file (*-12.HTT).

3.3 Data format conversion

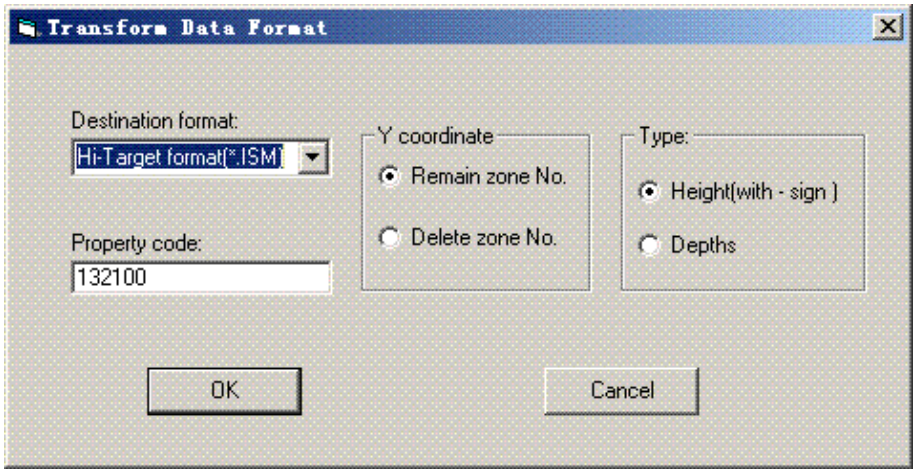


Figure 3-4

HI-TARGET marine mapping software can directly use processed data file (*.HTT). If you want to use other mapping software (i.e., WelTop, KeyStone and South etc) you must convert the data format, as indicated in Figure 3-4. Select data format and type, then click OK and show file dialog in which you select HTT files in batch. The system will finally make object files with same filename and different extensible names.

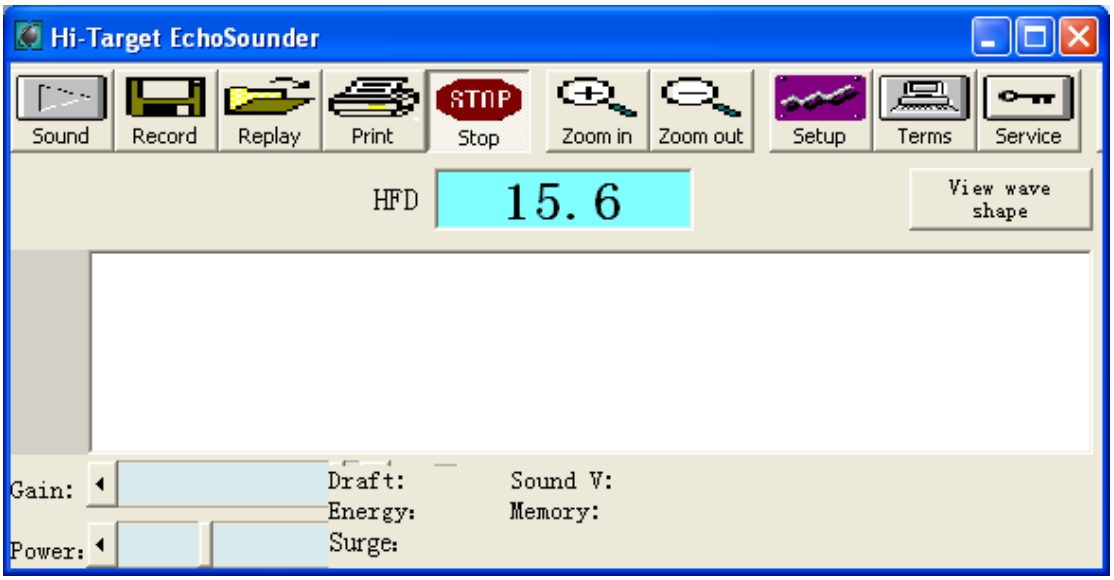
Chapter 4 Quick Guide in HD3*0 Surveying Work

4.1 Switch on Equipment

At the beginning before you turn on the equipment, make all the connections ok, include the mouse and the keyboard, the power supply----12V DC power supply (red is for positive pole, black is for negative pole) or 220V AC power supply, the GPS and other accessories in need. Then press "on/off" key on rear of the equipment.

4.2 Debugging on Echo-sounder Software

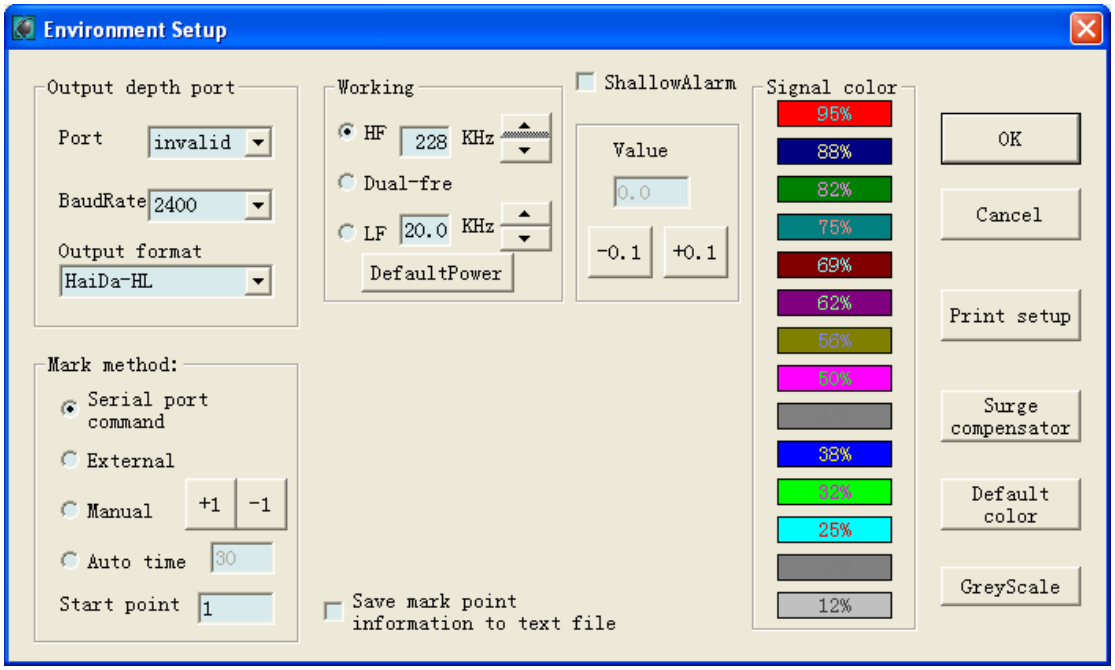
Echo sounder software will open automatically as soon as the equipment switched on, see the below chart:



HD370/HD380 Echosounder (Frequency adjustable)

Power: this is set according to the water depth. If it is very deep and the requirement of transducer is very high, then set this value to be comparatively higher; if not, set it low.

4.2.1 "Term" settings



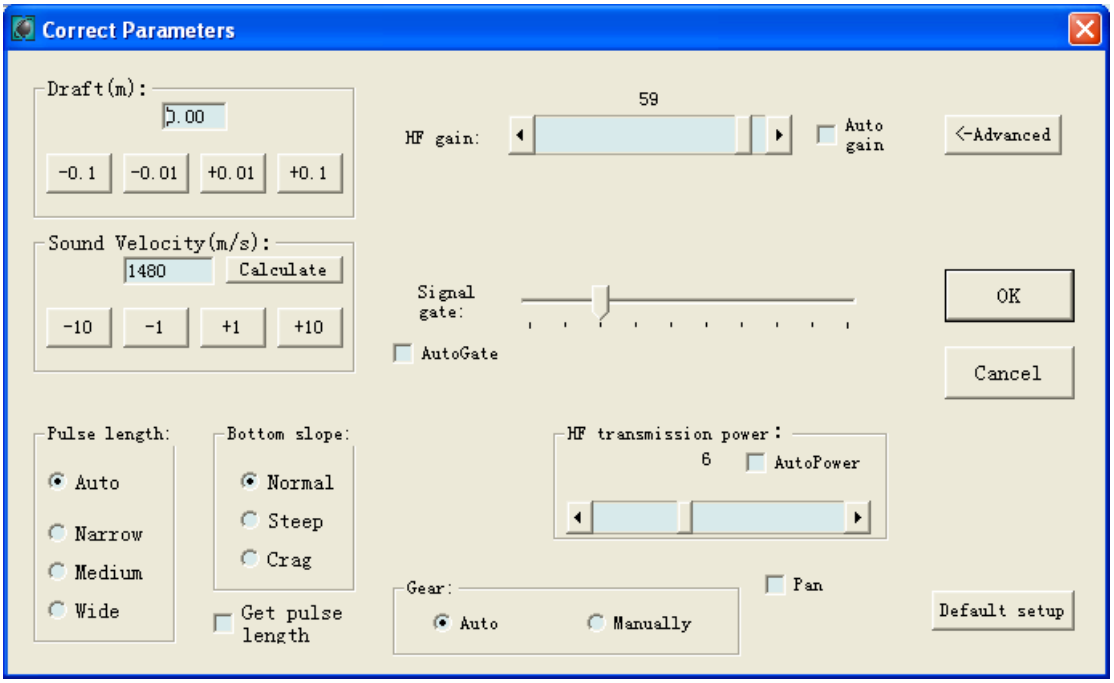
Output depth port: Data output port

Mark method: two ways to mark on the map when you do echo sounder surveying. The default is "Serial port command".

Working: "HF" standing for High frequency is selected in HD370/HD380 Echosounder and the frequency is adjustable within the range of 100KHz to 750 KHz, while "LF" for low frequency and "Dual- frequency" for dual frequency which is both high and low frequency in 28T Echosounder.

Shallow Alarm: the security water depth value. If lower than this depth, the software will make alarm.

4.2.2 "SETUP" settings

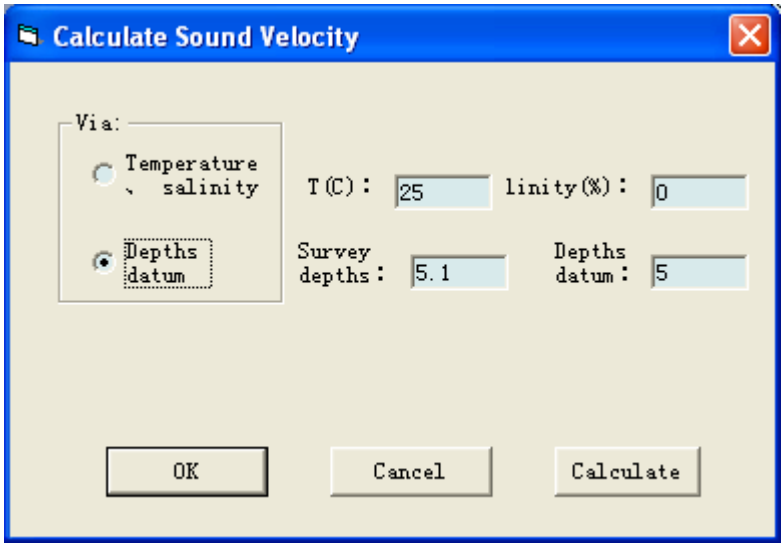


HD370 Echosounder

Draft: it is according to the actual draft scope of the transducer to measure the draft value, which should be measured from the water surface to the bottom of the transducer. The scope is 0-15m.

Sound Velocity: Calculate the sound velocity according to the depth and temperature of water and salinity. Sound velocity scope is from 1300m/s to 1700m/s.

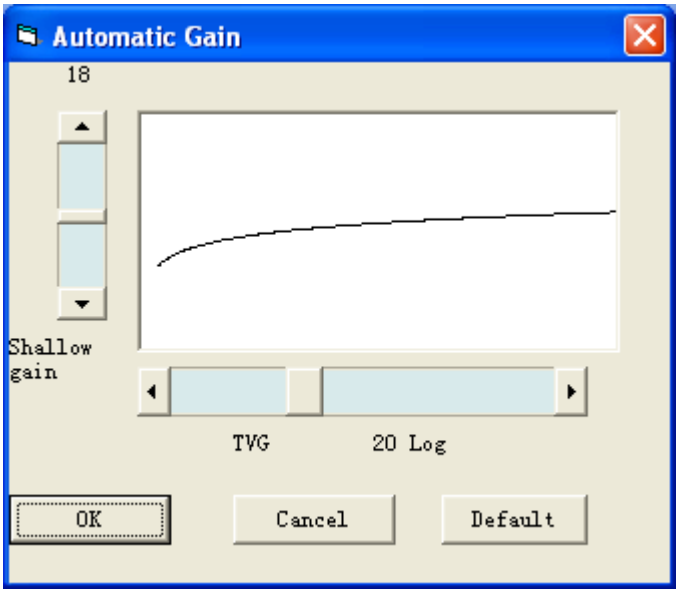
Calculate: Engineer user applying comparison measured method selects "Depths Datum". Input "Survey depths" (depth measured by the Echo Sounder) "Depths datum"(depth measured by the other ways), press "Calculate", then the software will calculate the accurate velocity of this region automatically, and press "OK" button to input the velocity automatically.



HF gain： Setting the common value as below chart:

Shallow water gain： Power value of measuring certain water region. (the default value is 28. if you are sounding in very low water and find the signal back from transducer is too strong, you can lower this value, commonly as 18)

TVG： Power increase and decrease corresponding to the change on depth of the measured water. (The common value is 20).



”Default Setup” button restores the original setting for "Pulse length|", "Bottom slope", "Signal gate", "HF transmission power", "Gear".

4.2.3 Start Sounding

---- Press "Sound", Echo sounder starts measuring water depth (but not record). Check whether the measured value consistent with the true depth, if not, adjust the sound velocity. If yes, begin to record.

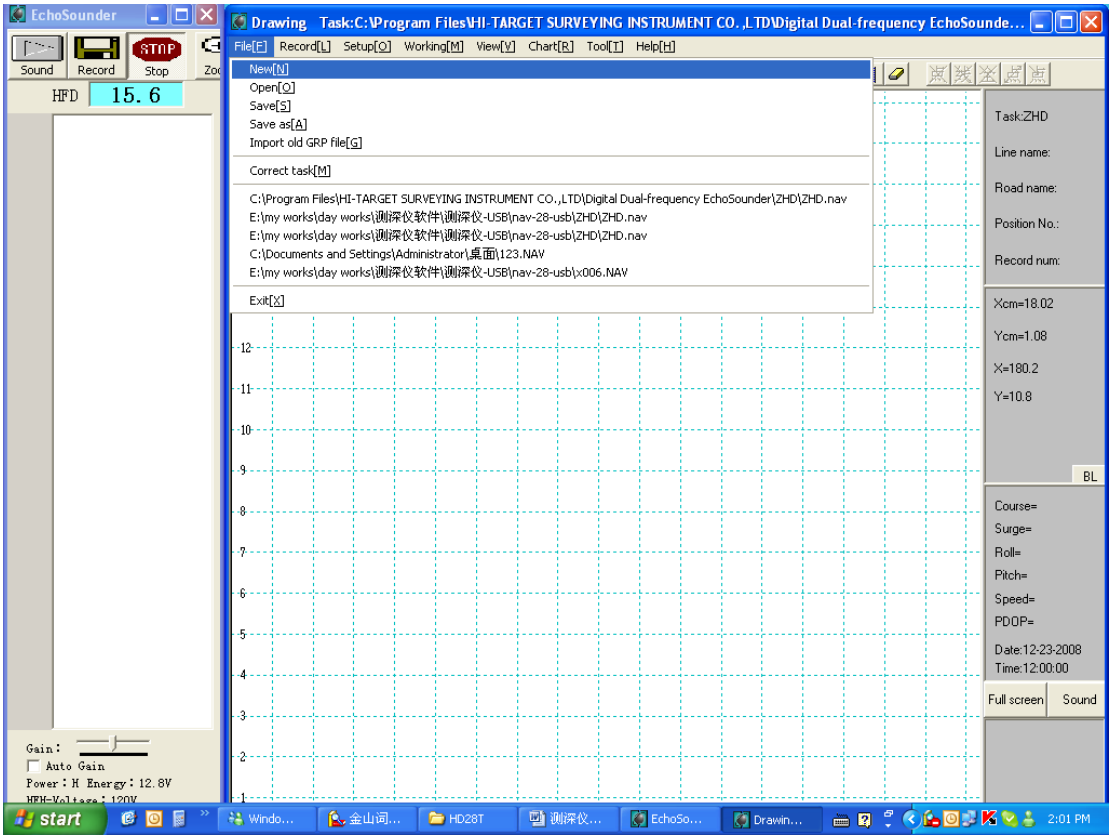
---- Press "Record" to record the Echo image (*hds) while measuring the depth.

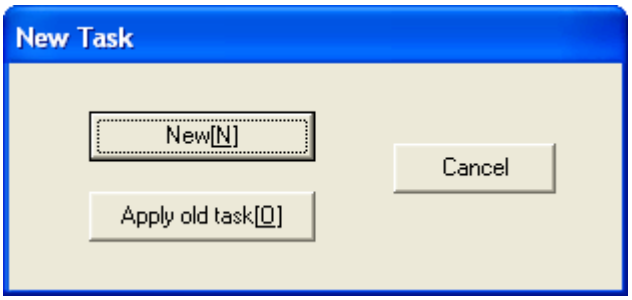
---- Press "Replay": Replay recorded waveform image.

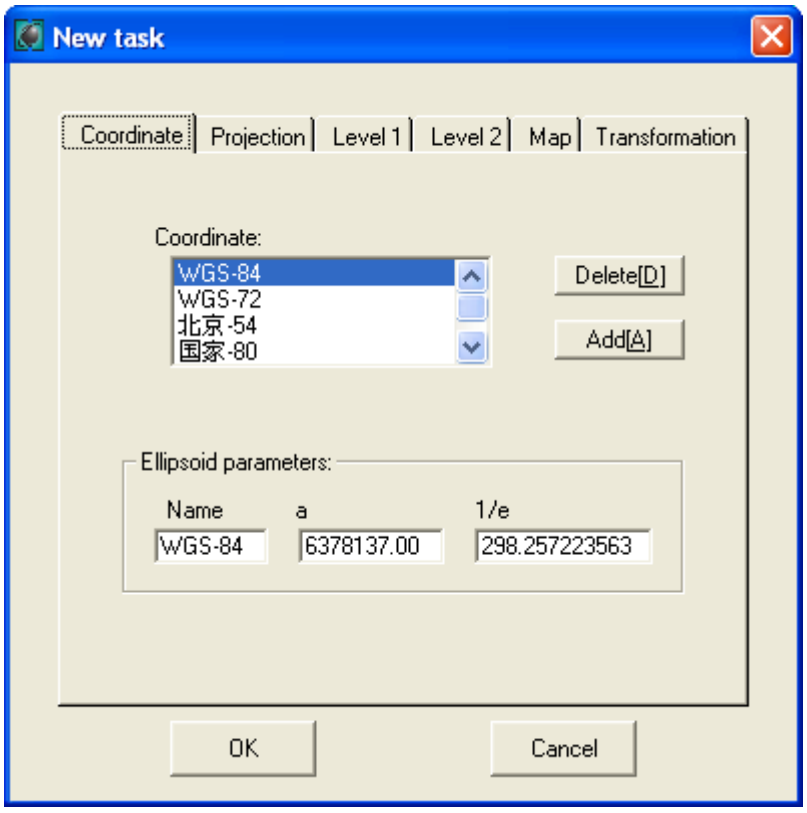
4.3 NAV3*0 Surveying Software

4.3.1 Set up a new task

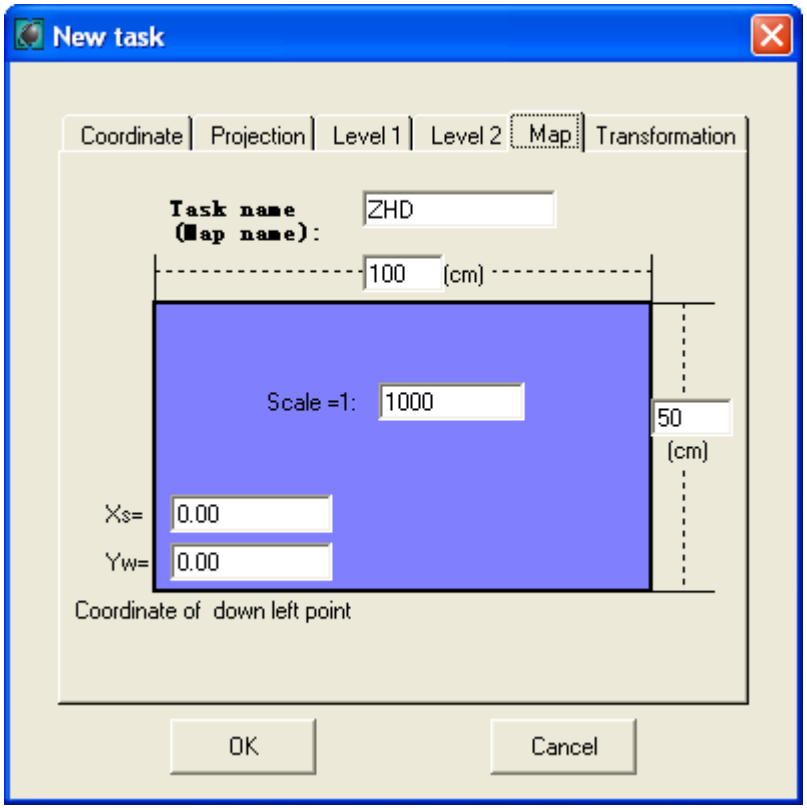
Refer to the below chart:







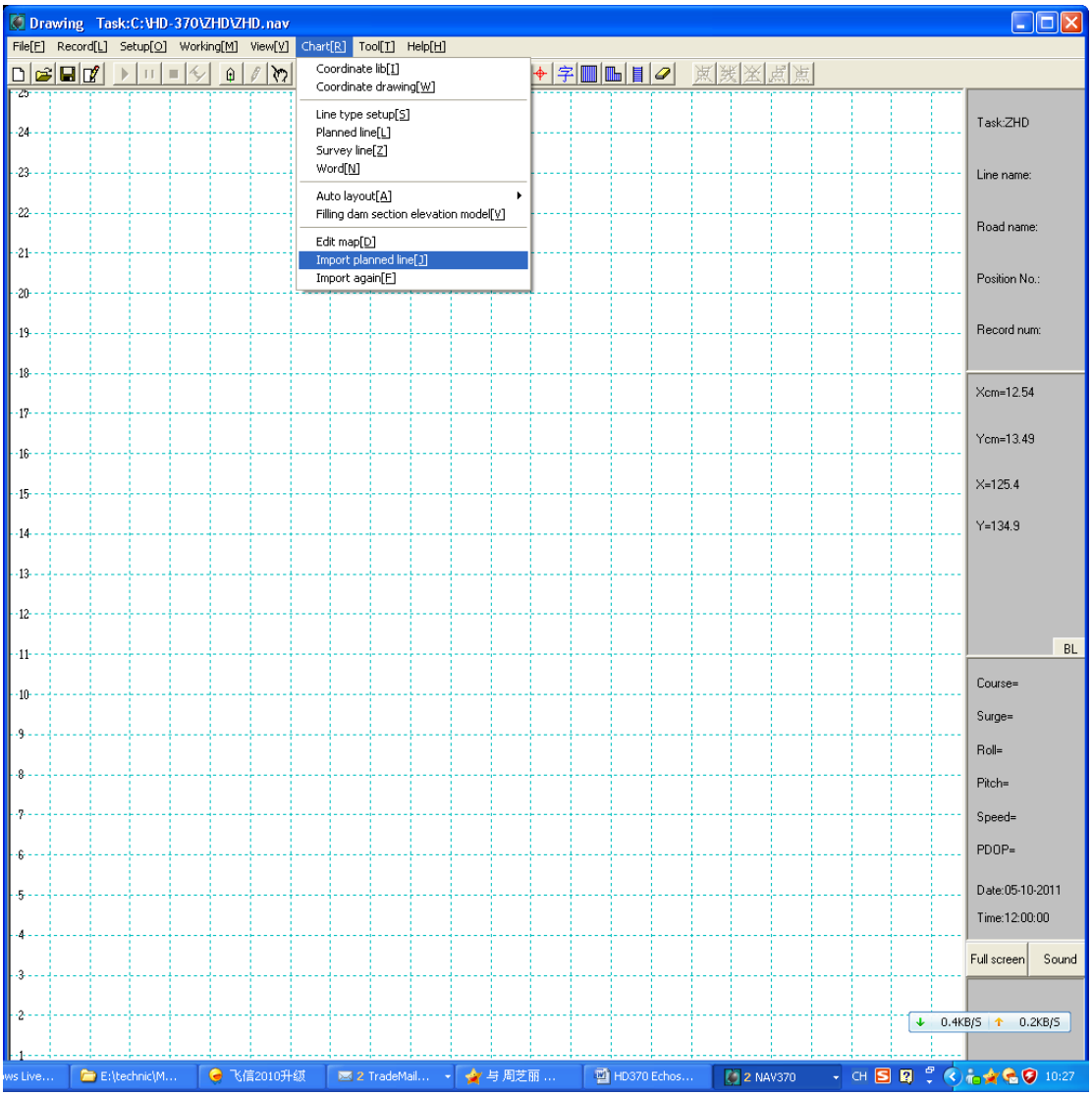
Input the information in the dialogue box: Coordinate, Projection, Level1, Level2, Map and Transformation.

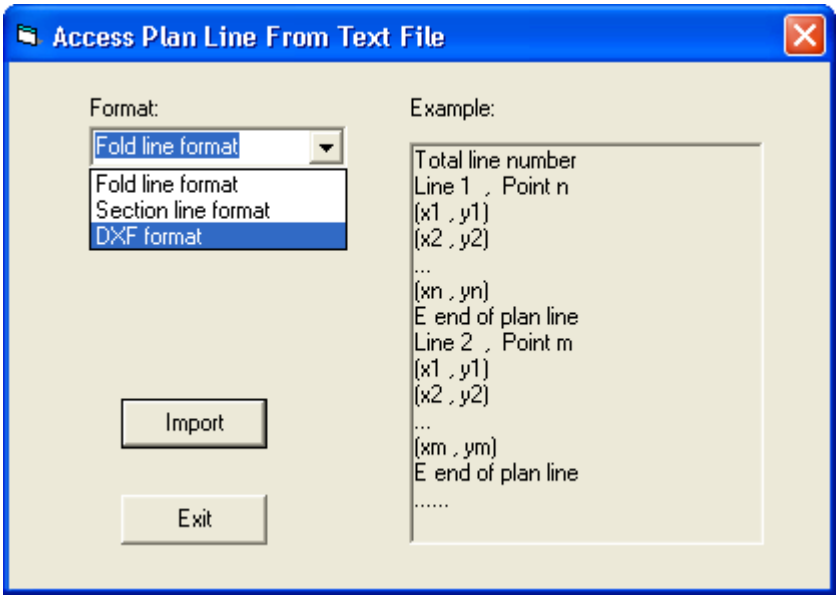


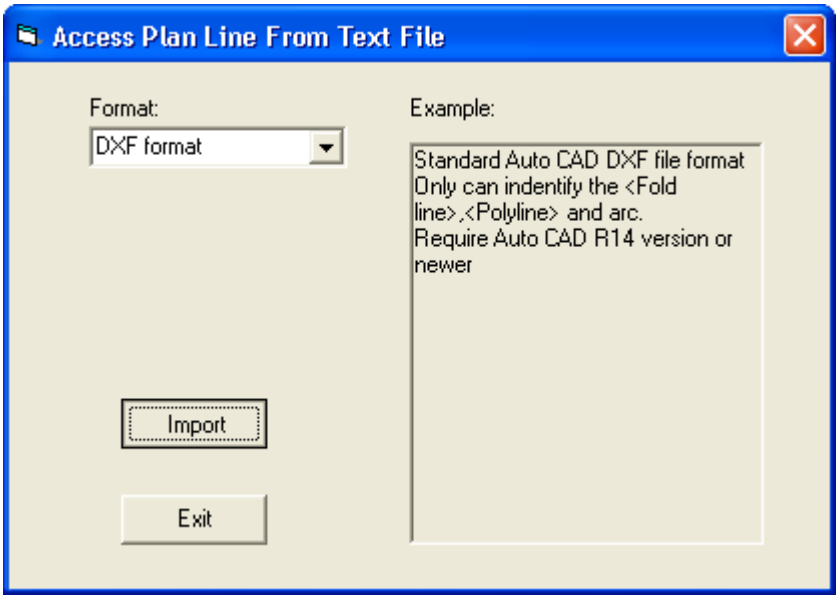
"Map" Note: A new frame must cover all of the working area; the southwest point to be correct is very important.

4.3.2 Project Line

You can easily import ".dxf" file to be the background map as the survey lines:


Drawing Task:C:\HD-370\ZHD\ZHD.nav
File[F] Record[L] Setup[O] Working[M] View[V] Chart[R] Tool[T] Help[H]
Coordinate lib[I]
Coordinate drawing[W]
Line type setup[S]
Planned line[L]
Survey line[Z]
Word[N]
Auto layout[A]
Filling dam section elevation model[V]
Edit map[D]
Import planned line[J]
Import again[F]
Task:ZHD
Line name:
Road name:
Position No.:
Record num:
Xcm=12.54
Ycm=13.49
X=125.4
Y=134.9
BL
Course=
Surge=
Roll=
Pitch=
Speed=
PDOP=
Date:05-10-2011
Time:12:00:00
Full screen
Sound
0.4KB/S
0.2KB/S
E:\technic\M...
飞信2010升级
2 TradeMail...
与 周芝丽 ...
HD370 Echos...
2 NAV370
CH
10:27

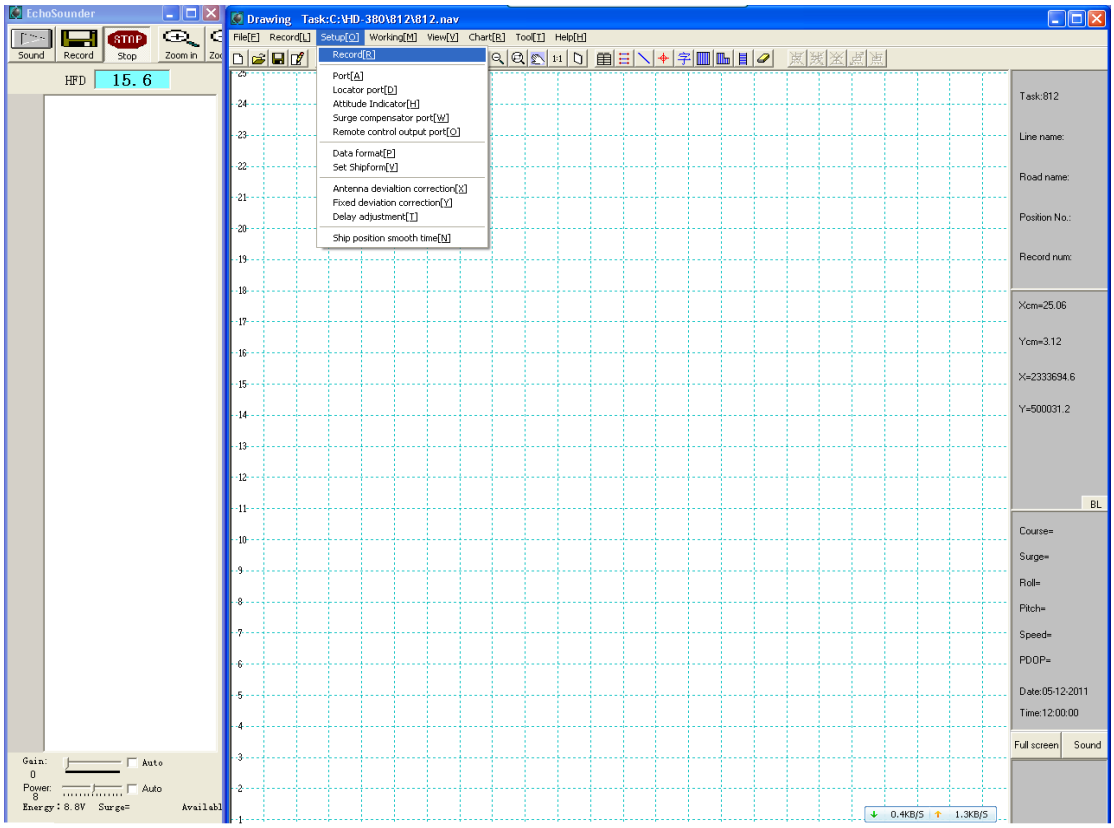




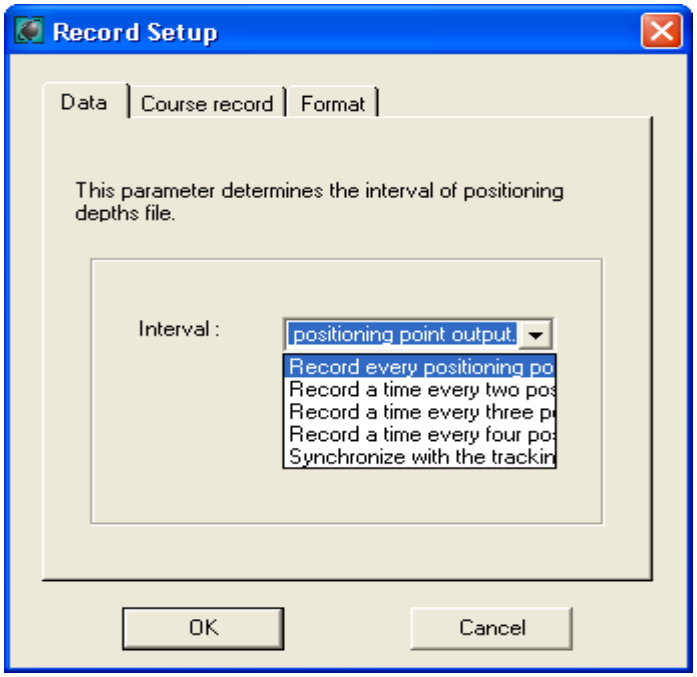
Then choose the DXF file which must be with the same coordinate system and surveying area with the project in this echo sounder surveying software project.

4.3.3 Data Record Setup

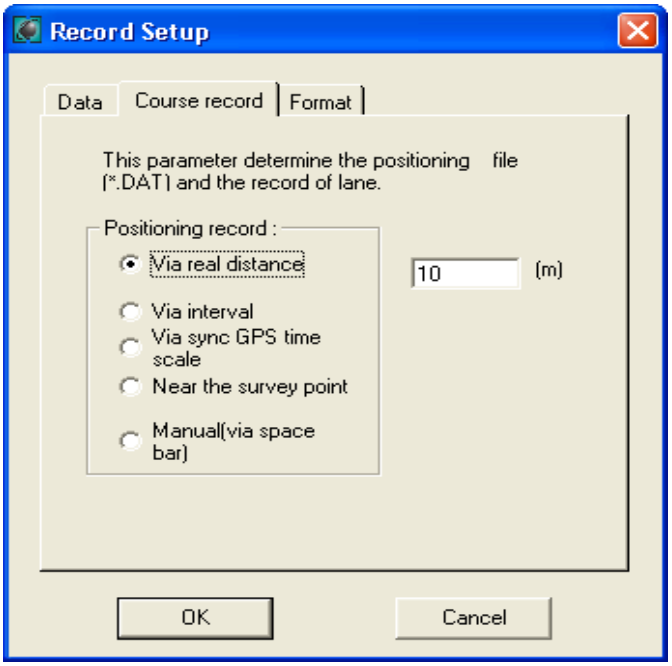
"Setup" → "Record"

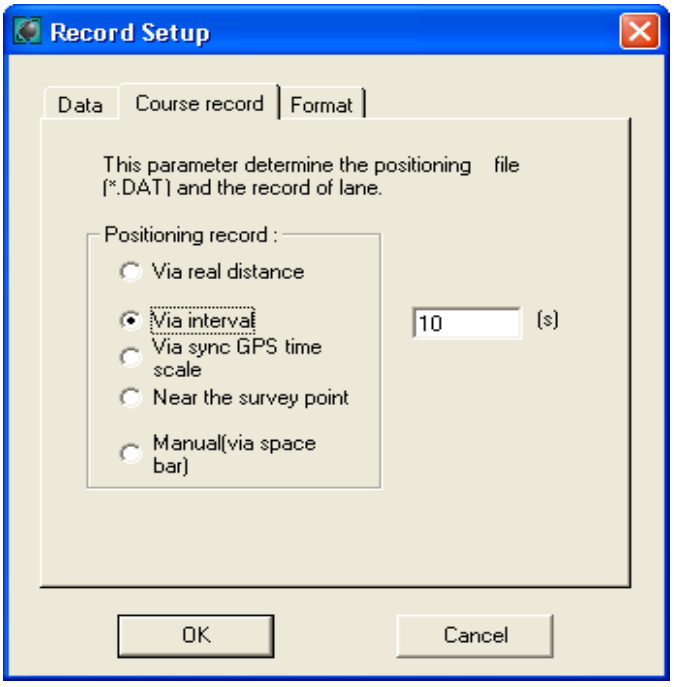


Choose the first one record every second positioning data

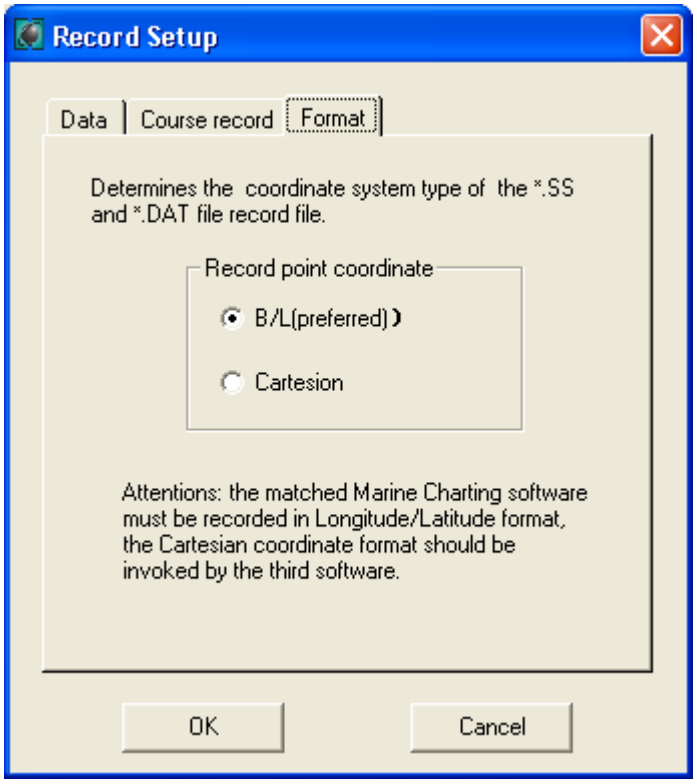


Furthermore，you can set the collection interval for the positioning data, usually we choose the below two ways (for the interval, usually if in a very small area such as below 1km*1km, you can set 10 meters as the interval; if in about 2km*3 km surveying area, you can set 20 meters sampling; if even larger to be 5km or more as the side length, usually we set 50 meters. But this depends on the surveyors requirements):


Record Setup
Data
Course record
Format
This parameter determine the positioning file (*.DAT) and the record of lane.
Positioning record :
Via real distance
Via interval
Via sync GPS time scale
Near the survey point
Manual(via space bar)
10
(m)
OK
Cancel

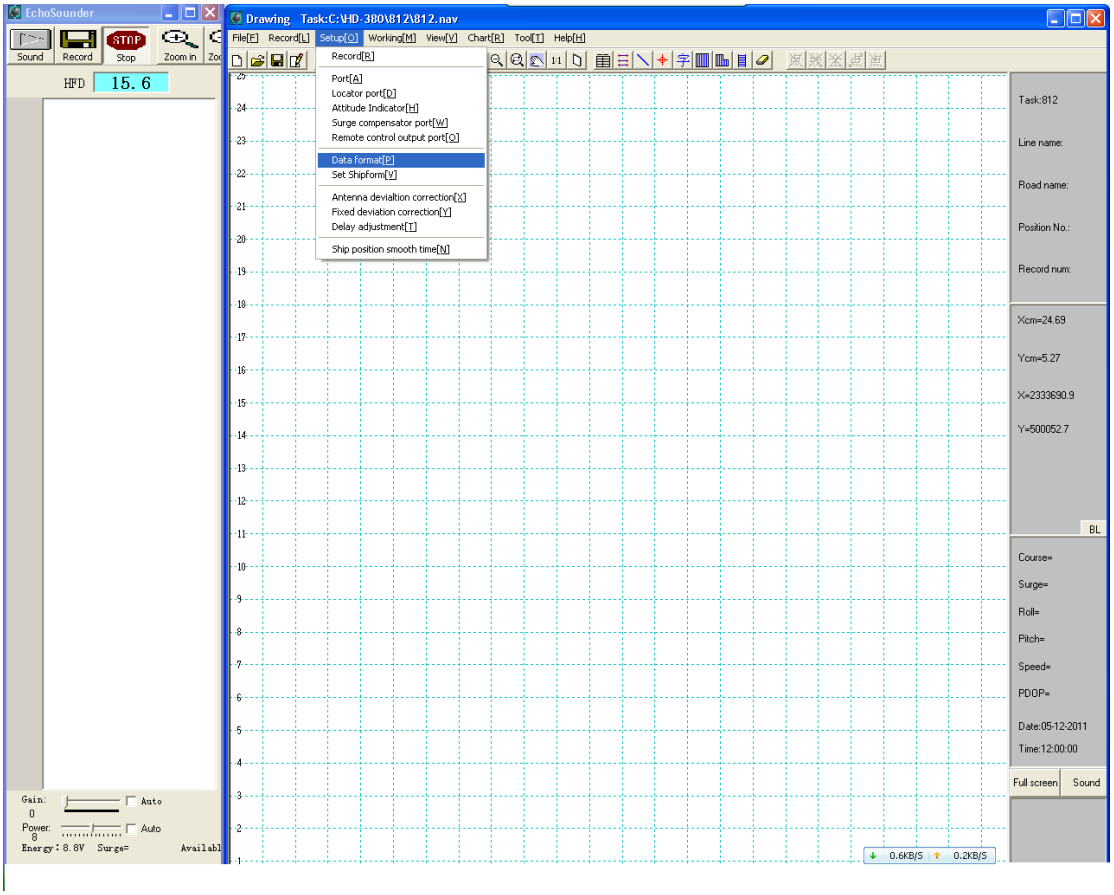

Record Setup
Data
Course record
Format
This parameter determine the positioning file (*.DAT) and the record of lane.
Positioning record :
Via real distance
Via interval
Via sync GPS time scale
Near the survey point
Manual(via space bar)
10
(s)
OK
Cancel

Then we just keep the default settings as below in “Format” part:

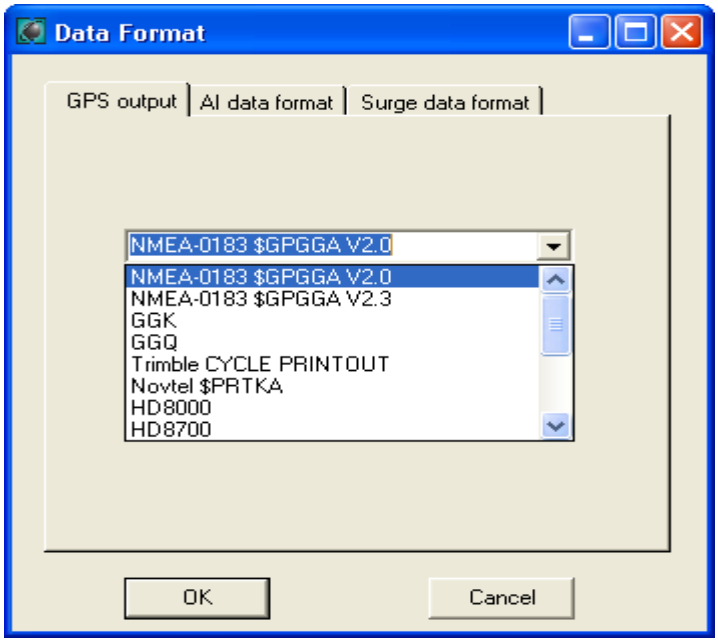


4.3.4 Data format Setup

Set the data format of the navigation instrument to import to the echosounder.



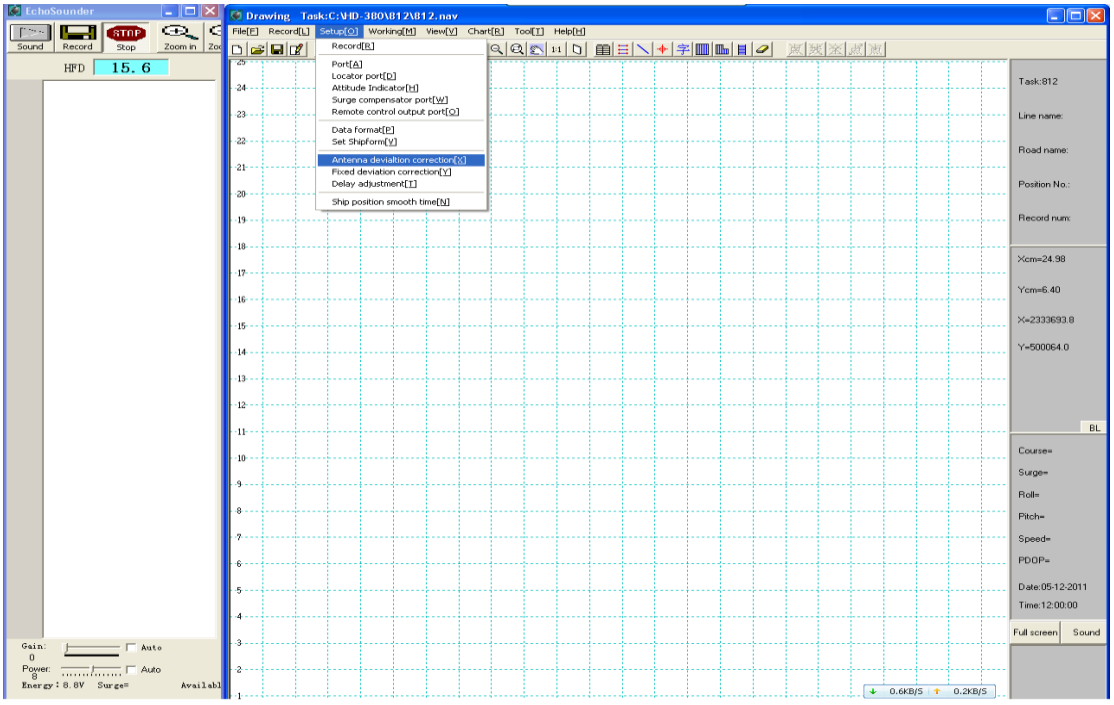
Usually we choose the first two standard formats:



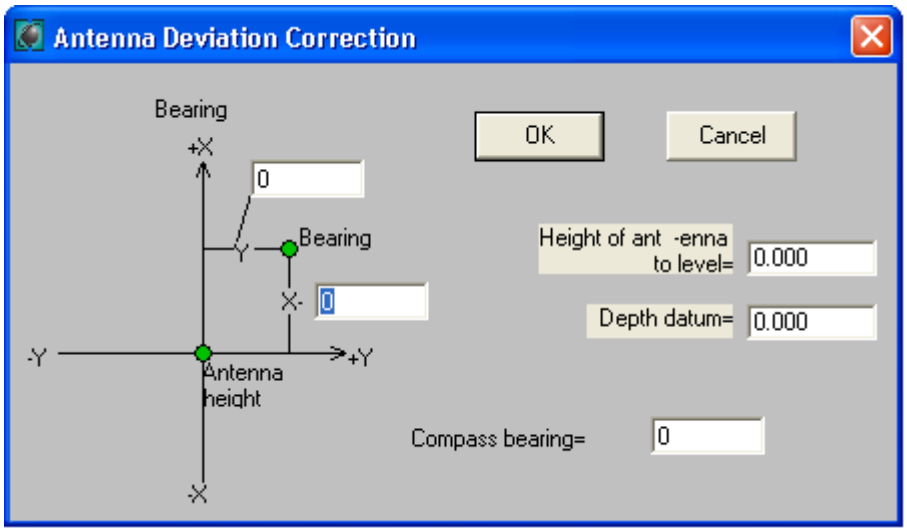
Then click “OK”

4.3.5 Antenna Deviation Setup

“Setup” → “Antenna Deviation Setup”:



Just as we suggest locating the GPS receiver (or GPS antenna if you use a split GPS receiver) on the right above of the transducer, so here below we can make the settings much easier: (+x is the heading)



For the **deviation of x and y**, we just put "0";

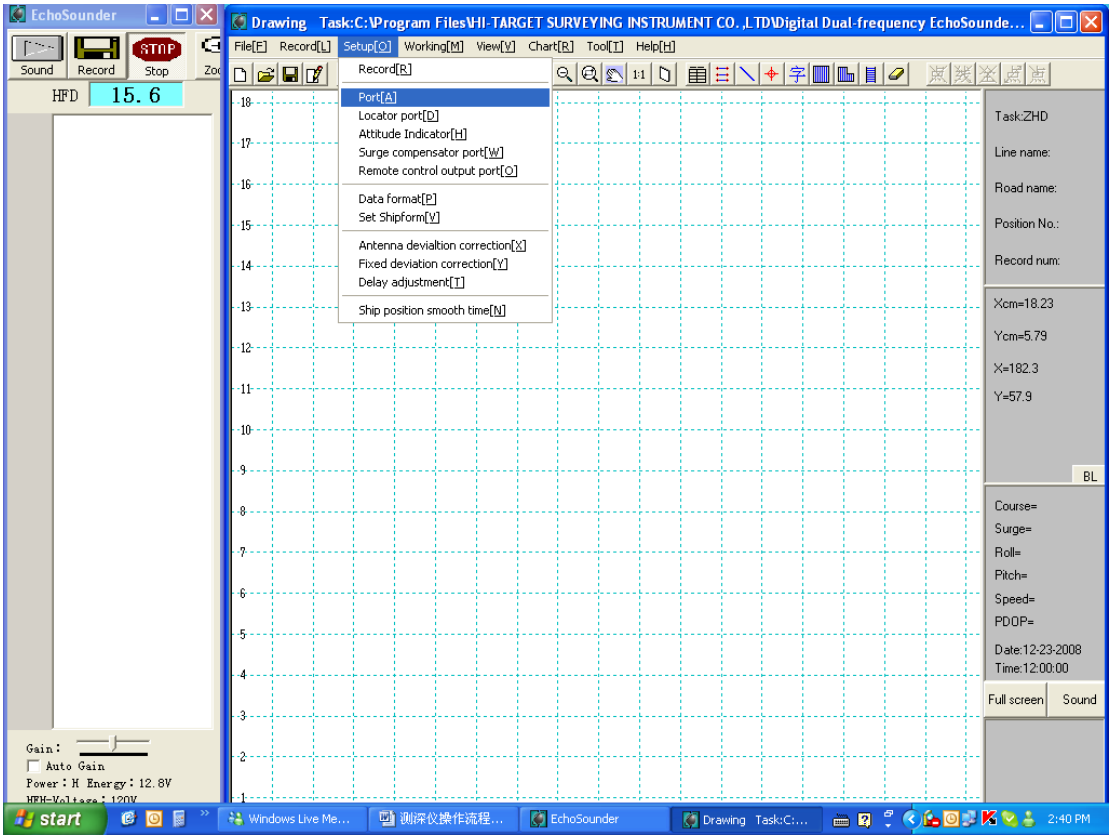
For the "**Height of antenna to level**": which is vertical height from the GPS antenna measuring point to the water surface (unit in meter);

For the "**Depth datum**": it is the height difference from the local mean sea level to the 0 height of the coordinate system in the project (unit in meter. If mean sea level higher, then this value is positive; or else, negative);

For "**Compass**": you can keep as 0

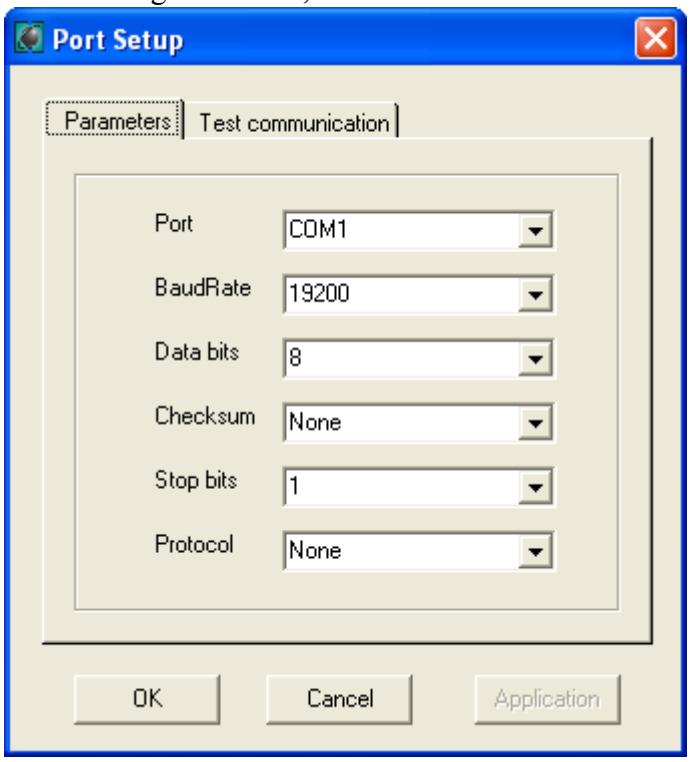
4.3.6 Connect GPS

Connect GPS to COM1/2 of the Echo sounder.
Select “Port” after choosing “SETUP” in the software menu, referring to the below chart:



"Locator": Choose GPS connection port
"None" is selected in the other options.

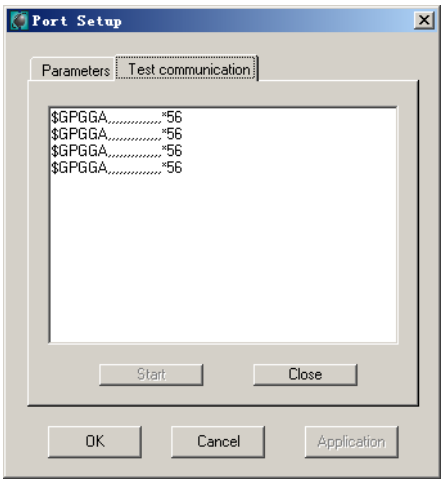
Enter "Setup" after choosing "Locator", see the below chart.



Set the value as the above chart “COM1, 19200, 8, None, 1 , None”

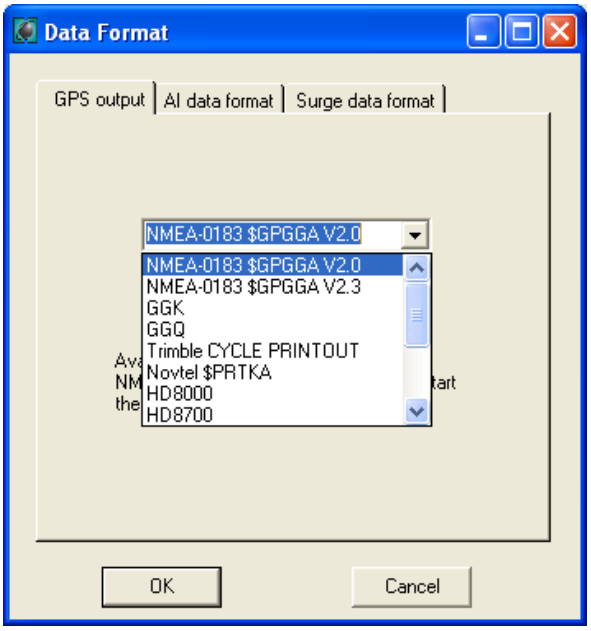
Attention: If the navigation instrument is in some other brand (besides Hi-Target), the “Baud Rate” possibly should be “**9600**”

Click on "Start" under "Test communication" menu, if the port is correct, GPGGA or “disordered characters” will appear in the window, otherwise, there is no information. (“disorder character” is Hi Target output format)

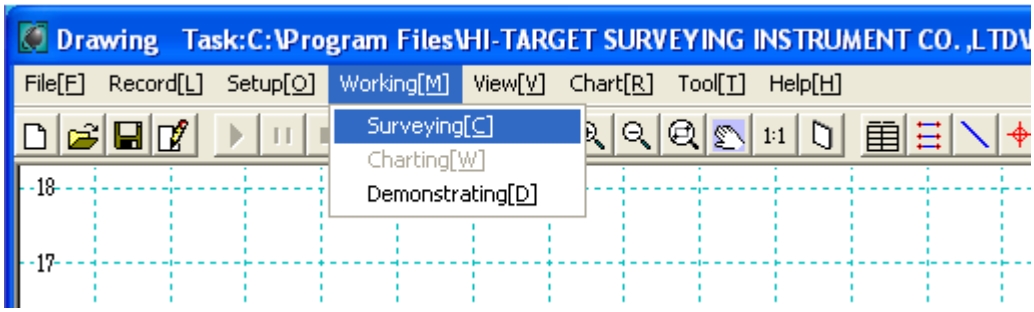


Once being successful in “Port Setup”, enter “Data Format” after pressing “Setup”

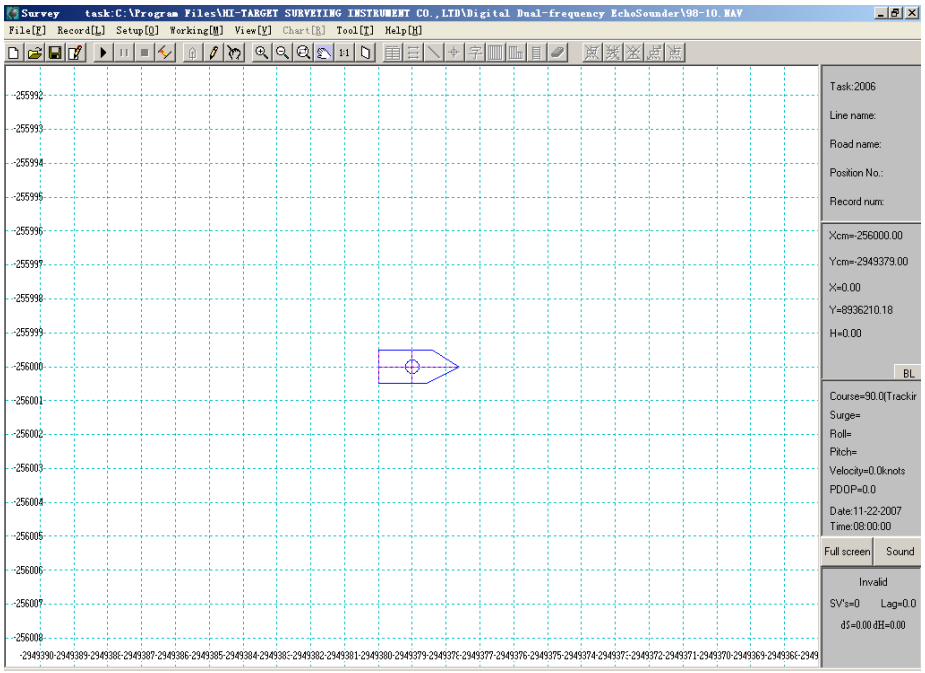
Select “NMEA-0183 $GPGGA V2.0” or “NMEA-0183 $GPGGA V2.3”data in “GPS output” menu.



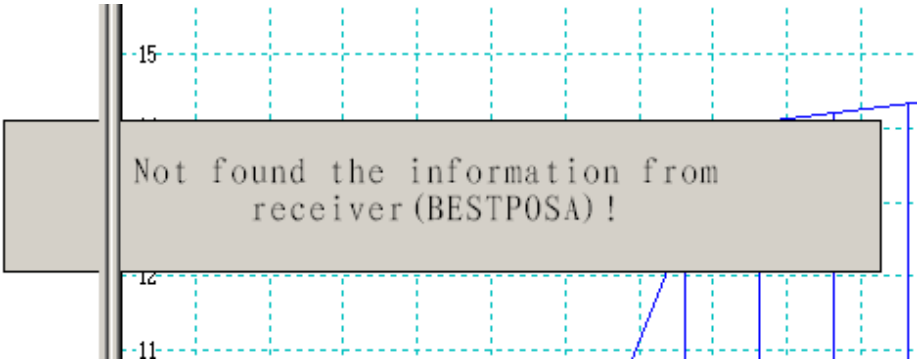
Press “surveying” under “Working” menu, and connect with GPS.



After successful connection, the boat shape will appear in the below interface:



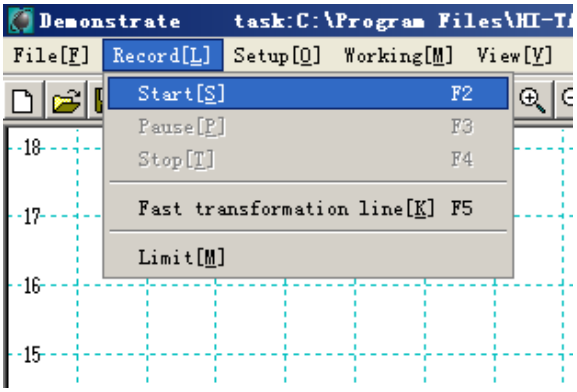
If connection fails, the dialogue box will appear as below. Then “Port Setup” and “Date Format” need to be rechecked.



4.3.7 Record Data

Press “Start” under “Record” Menu to start recording.

Note: The collected points can not be more than 1000, when nearly up to 1000 points, click "Fast transformation line", then the new folder will be built for recording the file.



Notes:

1. For the whole settings, please firstly set up the Echo sounder Software, then go to the Surveying Software to finish all settings
2. when doing the surveying and record, make sure that you are doing the

"Record" instead of the "Sound" so as to make sure all the water depth data you need are recorded instead of only sounder for testing

3. After all the surveying work is finished, first end the record in position task in the Surveying Software, and then stop the "Record" in the Echo sounder Software to end the water depth measuring.

PS: One key reset for Echosounder

System reset procedure:

1. Before turn on echo sounder, insert the system reset USB flash disk which is in the whole package of your echo sounder. Then turn on echo sounder and wait until you see hints “Press [Y] to replace the system disk or press [Ctrl]+[Alt]+[Del] to restart the computer...” on the screen.

   If you are sure to reset the system, now press “Y” on your keyboard and then “Enter” for confirming, this will make the echo sounder system run ghost and reset the system automatically.（Note: this reset system operation will lose all the data in this echo sounder. Please back up beforehand.）

   If you do not want to reset system, press “Ctrl”+”Alt”+”Del” and take out the pan drive at the same time.

   If the system can not start from the pan drive, please restart the echo sounder and keep pressing “Del” key on the key board to enter BIOS interface, choose “USB” to be the Priority startup disk (or first startup disk) and then press “F10” and “Enter” on the keyboard, which will restart the system.

2. Wait until the echo sounder hints to restart computer, please now press “Enter” on keyboard, take out pan drive.

Now, the system reset for echo sounder is completed.