CH1, CANADIAN HYDROACOUSTIC DATA ANALYSIS TOOL 1 USER'S MANUAL, (VERSION 2.0)

Y. Simard, I. McQuinn, M. Montminy, Y. Samson,
C. Lang, C. Stevens and D. Miller

Regional Science Branch
Department of Fisheries and Oceans
Maurice Lamontagne Institute
P.O. Box 1000
Mont-Joli , Québec
Canada G5H 3Z4

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CH1
Canadian Hydroacoustic Data Analysis Tool 1
User's Manual, (version 2.0)

Y. Simard[1], I. McQuinn[1], M. Montminy[2], Y. Samson[1],
C. Lang[3], C. Stevens[3] and D. Miller[3]

Regional Science Branch
Department of Fisheries and Oceans
Maurice Lamontagne Institute
P.O. Box 1000
Mont-Joli, Québec
Canada G5H 3Z4

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[1] Department of Fisheries and Oceans, Maurice Lamontagne Institute, P.O. Box 1000, Mont-Joli, Québec, Canada G5H 3Z4
[2] Blizzard Logiciels, 1135 Murray, #3, Québec, Québec, Canada G1S 3B7
[3] Department of Fisheries and Oceans, Northwest Atlantic Fisheries Center, P.O. Box 5667, St. John's, Newfoundland, Canada A1C 5X1

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ABSTRACT

Simard, Y., I. McQuinn, M. Montminy, Y. Samson, C. Lang, C. Stevens and D. Miller. 1998. ***CH1***, Canadian Hydroacoustic Data Analysis Tool 1, User's Manual (version 2.0). Can. Tech. Rep. Fish. Aquat. Sci. 2256: viii + 100 pp.

CH1 is the acronym for Canadian Hydroacoustic data analysis tool 1. It is a Windows 95® Multiple Document Interface (MDI) C++ application, developed by the Department of Fisheries and Oceans within the framework of the Data Analysis Tools (DAT) project of its National Hydroacoustic Program (NHP). It is a versatile tool designed to acquire hydroacoustic data produced by analog or, digital multi-channel (multiple frequencies or beams) echosounders under a standard, upgradable, and versatile data format, called the ***HAC*** format (Simard *et al.* 1997). Both analog echosounders (e.g., Biosonics 102 types) and digital echosounders (e.g., Simrad EK500 or EY500) are considered by ***CH1***, which is able to acquire data from many echosounders simultaneously. It incorporates variable threshold functions (TVT, Time Varied Threshold) which can adapt to ambient noise. Data from analog echosounders are collected via Bridgenorth Inc. 16-bit A/D converters and a Digital Signal Processor (DSP), coupled to a signal conditioning box to which the analog outputs of the detected echosounder channels are connected. Data from the Simrad EK500 digital echosounder are acquired via an Ethernet port. ***CH1*** can configure the EK500 by sending its parameters through a serial port. The NMEA-183 GPS position is read from a serial port. This manual is a guide to the use of ***CH1***. Some of the information presented is also available from the ***CH1*** on-line help. Other tools of the NHP-DAT project are designed to read, display or, translate *.***HAC*** files to or from other formats. These tools are known as ***CH2*** and ***HAC-trafic***.

RÉSUMÉ

Simard, Y., I. McQuinn, M. Montminy, Y. Samson, C. Lang, C. Stevens and D. Miller. 1998. ***CH1***, Canadian Hydroacoustic Data Analysis Tool 1, User's Manual (version 2.0). Can. Tech. Rep. Fish. Aquat. Sci. 2256: viii + 100 pp.

CH1 est le sigle pour ***C***anadian ***H***ydroacoustic data analysis tool ***1***. Il s'agit d'une application Windows 95® C++ MDI ("multiple document interface"), developpée par le Ministère des Pêches et Océans dans le cadre du projet Data Analysis Tools (DAT) du Programme National en Hydroacoustique (NHP). C'est un outil versatile dédié à l'acquisition de données hydroacoustiques produites par des échosondeurs analogiques ou numériques à plusieurs voies (fréquences ou faisceaux multiples) sous un format standard, versatile et modifiable, nommé ***HAC*** (Simard *et al.* 1997). ***CH1*** peut acquérir des données de plusieurs échosondeurs simultanément, qu'ils soient de type analogique (e.g., du type Biosonics 102) ou numérique (e.g., Simrad EK500 ou EY500). Il comprend des fonctions de seuillage variables (TVT: "Time Varied Threshold") pouvant s'ajuster au bruit ambiant. Les données des échosondeurs analogiques sont récoltées via des convertisseurs analogiques/numériques 16 bits et un DSP ("Digital Signal Processor") de Bridgenorth Inc., couplés à une boîte de conditionnement de signal qui accueille les signaux analogiques rectifiés de l'échosondeur. Les données de l'échosondeur numérique Simrad EK500 sont acquises via un port Ethernet. ***CH1*** peut configurer le EK500 en transmettant ses paramètres via un port série. La position GPS en format NMEA-183 est lue d'un port série. Le présent manuel est un guide d'utilisation de ***CH1***. Une part de l'information présentée est aussi disponible à partir de l'aide en ligne de ***CH1***. D'autres outils du projet NHP-DAT sont dédiés à la lecture, la visualisation et la traduction des fichiers ****.HAC*** vers ou à partir d'autres formats. Ce sont ***CH2*** et ***HAC-trafic***.

CH1
Fisheries and Oceans Canada
Pêches et Océans Canada

PRODUCT OF THE
DATA ANALYSIS TOOLS PROJECT OF THE NATIONAL HYDROACOUSTIC PROGRAM

1. INTRODUCTION

The development of a user-friendly, multi-channel hydroacoustic data acquisition tool started at the acoustic laboratory of the Maurice Lamontagne Institute (MLI) of the Department of Fisheries and Oceans (DFO) in 1994. The initial objective was to simultaneously acquire hydroacoustic data from multiple channels of an analog echosounder, with high resolution in time/space and amplitude and adequately filtered for background (vessel) noise. This was accomplished by developing a Windows® C++ program controlling a Digital Signal Processor (DSP) coupled with analog-to-digital (A/D) converters connected to the various channels. The multi-channel approach and the Windows® user interface proved to be appropriate for acquiring multifrequency hydroacoustic data and monitoring this polychromatic information in real time at sea. It was therefore decided to expand this development to acquire data from the Simrad EK500, a digital echosounder used at several DFO laboratories.

In 1995, DFO headquarters launched a five-year priority research program to improve the use of hydroacoustics in fish stock monitoring and estimation, which is now known as the DFO National Hydroacoustic Program (NHP). One of the NHP thematic projects was dedicated to the development of data analysis tools (DAT) to acquire and process the data, from the initial step of raw data acquisition up to the final production of fish-species biomass estimates and maps with their confidence intervals (Figure 1-1.). The first NHP-DAT initiative was to generalise the multi-channel data acquisition tool in development at the MLI acoustic laboratory. This was accomplished by moving the software to the new 32-bit Windows 95® environment and by defining, through a software analysis phase (Coleman et al. 1994), a larger plan (Figure 1-2.) that includes all steps of the data processing sequence.

The generalisation of the software dictated a standard format for the raw data and the subsequent steps of data processing. This required considerable effort. In collaboration with manufacturers and various users around the world, a versatile and upgradable standard format for raw and edited multi-channel hydroacoustic data was defined. This standard format, called the ***HAC*** format, is described in detail in Simard et al. (1997). The Windows 95® multi-channel and multi-echosounder data acquisition tool has been written to produce this standard data format. This C++ MDI (Multiple Document Interface) application has been called ***CH1***, which is the acronym for <u>*C*</u>anadian <u>***H***</u>ydroacoustic data analysis tool <u>*1*</u>. "*CH*" are also the letters identifying a long-time famous Canadian hockey team.

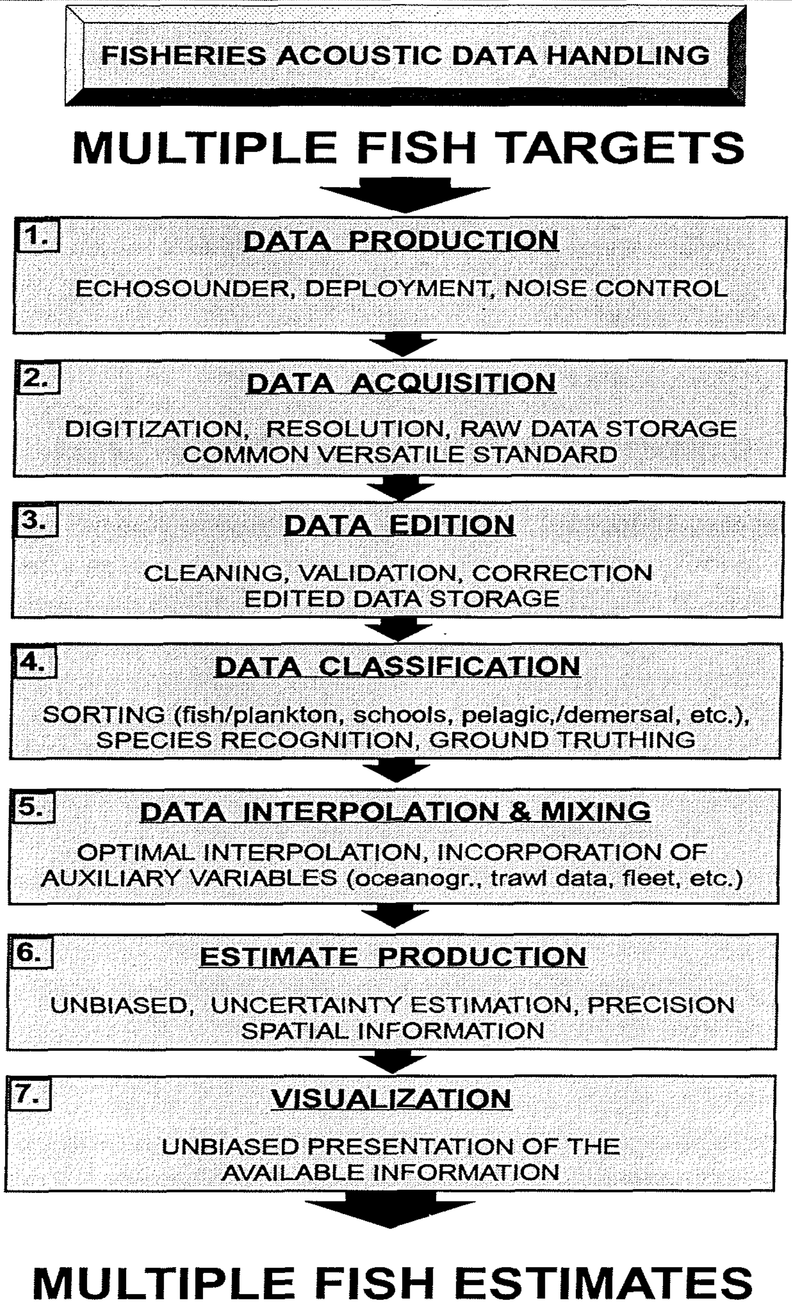


Figure 1-1. The seven data handling steps of the DAT plan.

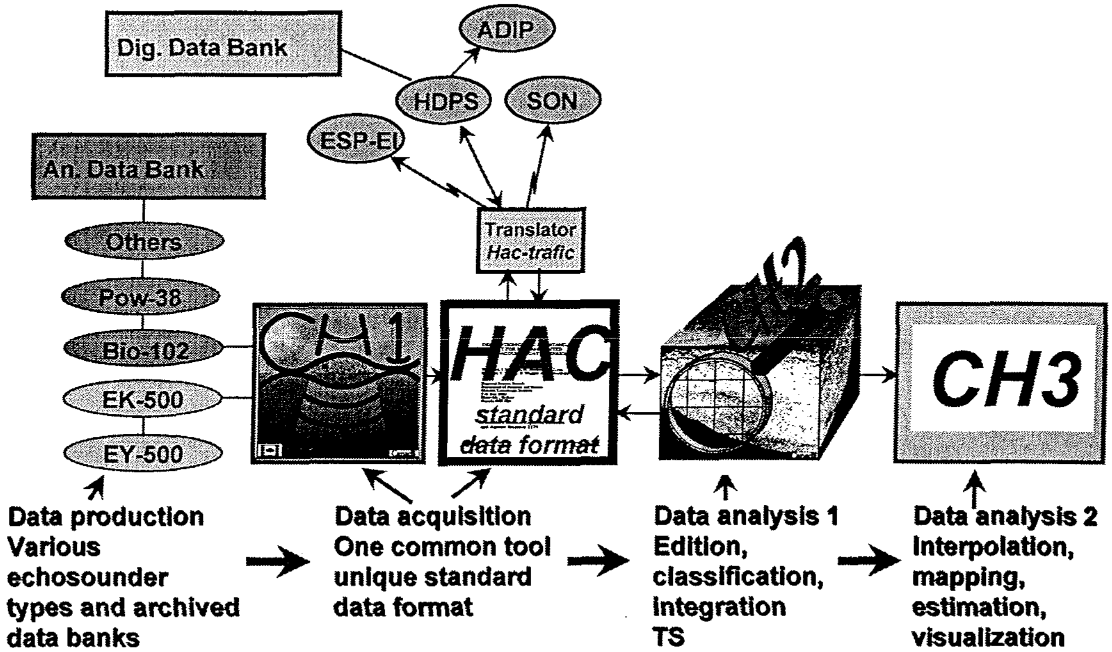


Figure 1-2. Organization of the DAT software modules and ***HAC*** standard data format.

The current document is the user's manual and the reference for version 2.0 of this software. Much of this information is also available from the ***CH1*** on-line help. The echosounder types considered by ***CH1*** are the analog Biosonics 102 (which covers most analog echosounders) and the digital EK500 (or EY500). Other tools of the NHP-DAT project are designed to read, display, or translate *.***HAC*** standard data format files to or from other formats. These tools are known as ***CH2*** and ***HAC-trafic*** (Figure 1-2.). Both applications are under development. In its final version, ***CH2*** will accomplish the subsequent processing steps of data editing, echo classification, and integration. ***CH3*** will be the estimation, mapping and presentation tool.

2. INSTALLATION

This chapter describes the installation for the two echosounder types supported by ***CH1***. The first part describes the installation and requirements for the analog echosounders. It is based on the Biosonics 102 echosounders but is also valid for any analog echosounder or magnetic tape playback system that outputs a positive sync. signal and a detected echo envelope signal smaller than 15 volts. Data from the analog echosounders are collected via Bridgenorth Inc. A/D converters and DSP cards, coupled to a signal conditioning box to which the analog outputs of the detected echosounder signals are connected (Figure 2-1.).

The second part describes the installation for the digital echosounders EK500 (or EY500). Data from these echosounders are acquired via an Ethernet port (Figure 2-2.). ***CH1*** can configure the EK500 by sending its parameters through a serial port. For both echosounder types, the NMEA-183 GPS position is read from a serial port. The software installation is the same for both echosounder type, but this step is repeated here for convenience. ***CH1*** can simultaneously acquire data from many echosounders. However, users who plan to do so should check that their PC is fast enough to cope with the data flow.

2.1 Analog data acquisition

Requirements: a Pentium PC with two free ISA slots, large data storage capacity (hard disk or other fast storage devices), 120 MHz, 32 Mb of RAM, a COM port to read the NMEA-183 GPS data, and Windows 95® environment. ***CH1*** could run on lower configuration if the required data flow is low, but the results may not be reliable.

2.1.1 Material

- 1 DFO/IML power supply box 110 VAC
- 1 DFO/IML EBDI-0055 signal conditioning box (for the A/D converters)
- 1 technical information sheet for the DFO/IML EBDI-0055 and power supply
- 1 ISA DSP-tms320-C40 Bridgenorth-4000 board,
- 1 ISA quad A/D 16 bits Bridgenorth-1416 board, connected to the DSP board
- 2 9-pin connector cables, 1.3 metre long
- 2 15-pin connector cables, 1.3 metre long
- 1 Y 15-pin to 25-pin connector cable, 0.2 metre long
- 1 4-conductor to 15-pin connector cable, 0.5 metre long
- 1 ***CH1*** version 2.0 CD-ROM containing ***CH1***, ***CH2*** (*beta*), ***HAC-trafic,*** examples of ***CH1*** configuration files (*.ch1) and ***HAC*** data files
- Bridgenorth BN-4000 and BN-1416 user's guide, DSP Development and Data Acquisition Systems
- 1 calibration sheet for the Bridgenorth-1416 quad A/D converter board

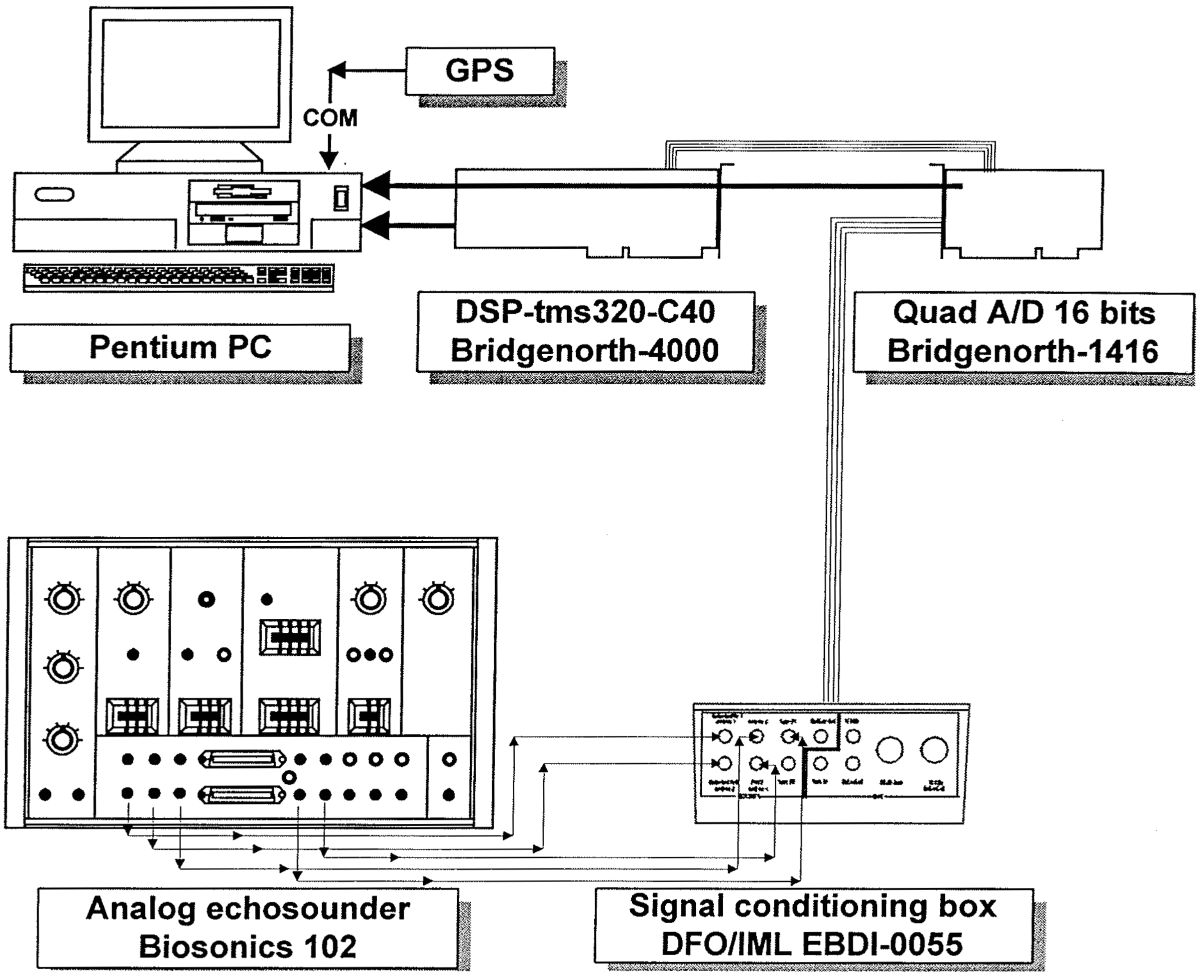


Figure 2-1. Hardware configuration for data acquisition from an analog echosounder.

2.1.2 Connections

a) Check on the Bridgenorth-4000 DSP board that four jumpers (see Bridgenorth BN-4000 user's guide p. 2-3 to 2-5) are placed in positions 3, 4, 6, and 8.
b) Check that the Bridgenorth-1416 board is properly connected to the Bridgenorth-4000 DSP board (Analog interface module, Figure 2.1. BN-1416 user's guide p. 2-3). The four jumpers LK1, LK2, LK3 and LK8 should be connected. The two jumpers LK6 and LK7 should be left open.
c) Install, with caution, the Bridgenorth-4000 DSP board and the Bridgenorth-1416 board in two ISA slots on the PC (take care to place the Bridgenorth-1416 A/D board far away from electrically noisy PC boards).
d) Connect the Y 15-pin to 25-pin connector cable to the two 15-pin connector cables as indicated by the labels on the cables and connectors. (This may seem awkward, but it is done to allow the use of the same cables and connectors on the DFO/IML EBDI-0055 signal conditioning box to connect to other Bridgenorth A/D cards.)
e) Connect the other ends of the 15-pin cables to the appropriate 15-pin connector on the signal conditioning box, as indicated by the labels on the cables and connectors.
f) Connect one of the 9-pin cables to the 9-pin connector A/D board 1 of the signal conditioning box. Connect the other end to the 9-pin connector of the Bridgenorth-1416 A/D board. The other 9-pin cable is a spare cable for other Bridgenorth dual A/D cards.
g) Connect the 4-conductor to 15-pin connector cable to the 15-pin connector labelled "Power Supply" on the side of the DFO/IML EBDI-0055 signal conditioning box; connect the 4-conductors other end to the power supply box.
h) Connect the power supply box to the 110 VAC and turn it on (nothing should smoke…!). The red LED of the DFO/IML EBDI-0055 signal conditioning box should light up.
i) Connect the echosounder-detected output channel signals (e.g., Biosonics 102, detected channels 1 to 3) to the appropriate BNC connectors of the signal conditioning box, located in the part labelled "Biosonics 102". N.B.: the signal allowed is 0-15 V.
j) Connect the echosounder output frequency-detection signal (e.g., Biosonics 102, F1/F2 channel) to the F1/F2 BNC connector of the signal conditioning box, located in the part labelled "Biosonics 102". N.B.: ***CH1*** assigns F2 when the voltage on this channel is < 1.87 V.
k) Connect the echosounder frequency-sync. signals (e.g., Biosonics 102, detected sync. F1, sync. F2, or Master sync.) to the appropriate BNC connectors (sync. F1 or sync. F2) on the signal conditioning box, located in the part labelled "Biosonics 102". N.B.: These two lines are crossed in the DFO/IML EBDI-0055 signal conditioning box. Therefore, the only important thing is to get a sync. from these lines. One could connect the master sync. to either BNC or swap the F1 and F2 sync. and it will just work fine as well.

Note: The additional BNC connectors on the DFO/IML EBDI-0055 signal conditioning box are used for other applications (e.g., to read data from DAT recorders) and should not be used here.

2.1.3 GPS connection

- Connect the GPS (format NMEA-183) to a COM port on the PC. **Warning**: The GPS must be configured to send the strings "$GPGLL" and "$GPZDA" of the NMEA format. Check that your GPS can acquire and send the position with the precision you required. If no GPS is connected, the GPS must be disabled in ***CH1*** (see chapter 10, GPS menu).

2.1.4 Software installation

As indicated in the file readme.txt of the ***CH1*** version 2.0 CD-ROM:

- Execute the Setup.exe programs located in the ***CH1***, ***CH2***, and ***HAC-trafic*** folders of the ***CH1*** version 2.0 CD-ROM.
- Copy the examples of ***CH1*** configuration files (*.ch1) and ***HAC*** data files, located in the ***CH1***\Config. and ***HAC*** folders, to folders on your PC Windows 95® environment.

2.2 Digital acquisition for the Simrad EK500 echosounder, version 5.3

Requirements: a Pentium PC with an Ethernet port (preferably a "plug-and-play" board), large data storage capacity (hard disk or other fast storage devices),120 MHz, 32 Mb of RAM, a COM port to read the NMEA-183 GPS data, a COM port to communicate to the EK500, and Windows 95® environment. ***CH1*** could run on lower configuration if the required data flow is low, but the results may not be reliable.

2.2.1 Material

- 1 ***CH1*** version 1.0 CD-ROM containing ***CH1***, ***CH2*** (beta), ***HAC-trafic***, examples of ***CH1*** configuration files (*.ch1) and ***HAC*** data files.

2.2.2 Configuration of the Ethernet communication

- Install the Ethernet board in the computer (e.g., a TrendNet 16 XP/C with Windows 95® drivers, "free" interrupt).

- Run the Windows 95® utility winipcfg.exe to get the PC IP configuration. You will need to know: the Ethernet adapter address of the board (e.g., 00:40:05:1B:83:C1) and the **TCP/IP address** of the PC (e.g., 128.100.202.002).

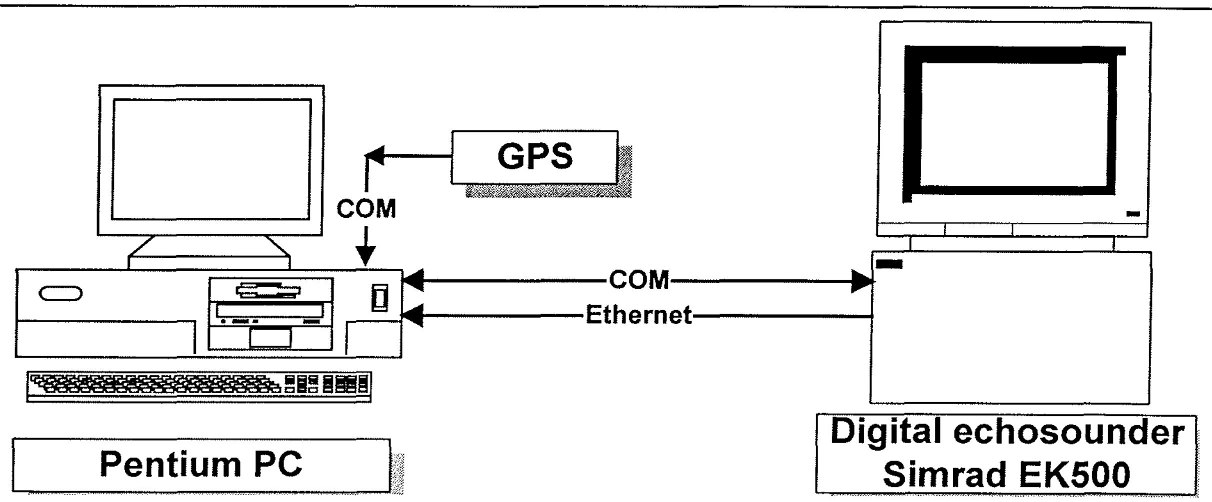


Figure 2-2. Hardware configuration for raw data acquisition from digital echosounders EK500 or EY500.

- Configure the EK500-PC Ethernet communication, giving the host and server addresses for the TCP/IP communication protocol. This can be done in the Windows 95® Control Panel / Network / Configuration dialog box. Select the TCP/IP component and click Properties. Under the IP address Tab, activate the option Specify an IP Address and enter:
  IP address: IP number of your PC board: e.g., 128.100.202.002
  Subnet mask: e.g., 255.255.255.0

- Click OK and reboot the PC to activate the changes.

2.2.3 On the Simrad EK500

- Set the Serial Com. Menu / USART Menu to: 4800,8,1,none.
- Set Serial Com. Menu / Telegram Menu to Format = ASCII, Remote Control = On.

2.2.4 GPS connection

- Connect the GPS (format NMEA-183) to a COM port on the PC. **Warning**: The GPS must be configured to send the strings "$GPGLL" and "$GPZDA" of the NMEA format. Check that your GPS can acquire and send the position with the precision you require. If no GPS is connected, the GPS must be disabled in ***CH1*** (see chapter 10, GPS menu).

2.2.5 Software installation

As indicated in the file readme.txt of the ***CH1*** version 2.0 CD-ROM:

- Execute the Setup.exe programs located in the ***CH1***, ***CH2***, and ***HAC-trafic*** folders of the ***CH1*** version 2.0 CD-ROM.
- Copy the examples of the ***CH1*** configuration files (*.ch1) and ***HAC*** data files, located in the ***CH1***\Config. and ***HAC***, to folders in your PC Windows 95® environment.

3. GETTING STARTED

This chapter is a brief description of the basics of operating ***CH1***. It is intended for users who want to get an overview of the application. This should not replace reading the next chapters, which are essential to properly operate ***CH1***.

1. To start ***CH1***, click the ***CH1*** icon. At the opening dolphin window (Figure 4-2.), click a dolphin to get the File / New dialog box (Figure 5-1.), which presents the three types of documents (i.e., data sources) that ***CH1*** presently handles. A warning is presented to advise you to check the Date/Time settings (Figure 4-3.).

2. Choose the type you want to configure or click Cancel if you want to use a previously saved ***CH1*** data source configuration file (*.ch1) such as the file examples supplied with ***CH1***.

3. Configure the ***CH1*** settings for the chosen data source and save this configuration in a *.ch1 file for future use with the File / Save menu. For that, you have to go through at least the Aquisition (data) menu, the Channel menu, the GPS menu, and the EK500 menu if you are using this echosounder type. We recommend completing the EK500 menu first (Serial port configuration and Ethernet configuration), followed by the GPS / Configuration menu, the various Channel configurations, and finally the Acquisition (data) / File and Configuration menus.

4. In the EK500 / Serial port configuration, the serial port must be configured to be able to communicate various parameters to the EK500 in order to match the ***CH1*** and EK500 operation parameters. In the EK500 / Ethernet configuration menu, you must enter the transceiver numbers for each data type you wish to collect as well as the following Ethernet communication parameters:
   - Local Eth. addr.: must be different from the remote Ethernet address
   - Local IP addr. Simrad EK500 IP (e.g., 128.100.202.001)
   - Remote Eth. addr. = Ethernet address of the board (e.g., 00:40:05:1B:83:C1)
   - Remote IP addr. = unique IP of the PC (e.g.,128.100.202.002)

5. When the values have been entered, click Send Config. to enter these parameter values in the EK500 Ethernet menu. The EK500 should respond "Remote Parameter Entered", indicating that communications are correctly established and that the Ethernet is correctly configured to send sample data to ***CH1***. The Send Config. button also sets up the Ethernet Menu / UDP Port Menu automatically so that ***CH1*** will recognise the sample data telegrams.

6. In each ***CH1*** dialog box, the framed (three-dimensional) fields (Figure 4-14) identify important fields affecting how ***CH1*** will work and acquire data. The other fields either serve as comments or they carry some information required for further data processing steps, but they do not affect the acquisition by ***CH1***. Note that the ***CH1*** menus that are available are

window-dependent. On a channel window, the left part is the echogram window and the right part is the oscilloscope window (Figure 4-5). You can move the separation line by dragging it with the mouse. Some menus are only available when acquisition is started and others when ***CH1*** is not acquiring data. Use the Channel menu to add channels. Do not forget to configure the GPS connection through the GPS menu. Tile your channel windows using the Windows / Tile menu to view all of them simultaneously.

7. You are now ready to start acquiring data in the *****.HAC*** data file (that you have specified in the Acquisition (data) / File menu) by clicking the green-light icon. To stop acquisition, click the red-light icon. You can repeat these two operations to append new data (new runs) to the active file or create new files, according to your choice of file naming in the Acquisition (data) / File menu. The current detected depth (or range), time, and position are indicated in the status bar at the bottom of the ***CH1*** main window along with the time and position at the beginning of the run, the size (Mb) of the current data file, and the remaining disk space (Mb). File name and channel identifications are indicated in the windows heading.

8. To zoom along the range or depth axis in the channel windows, click on the echogram window. Then right-click and hold the mouse (a horizontal bar appears, Figure 4-10.) at a start range and hold it down while moving to an ending range. To get a vertical scale, click the Z-Scale icon. To unzoom, click the unzoom icon. Click the palette icon to get the palette colour you want. Note that ***CH1*** keeps only the last 20 pings for display when the screen is refreshed.

9. To threshold-out data below the ambient noise, put your echosounder in receive mode, only triggering but not transmitting. Then select the number of pings for which you want to evaluate a Time Varied Threshold (TVT) from the Acquisition (data) / Configuration menu. Start the acquisition and click the Evaluate TVT icon. For a Biosonics configuration, the TVT parameters of all channels will be updated. For an EK500 configuration, if the All Frequencies radio button in the Acquisition (data) / Configuration menu is activated, the TVT parameters of all channels will be updated. If the Active Frequency radio button is activated, only the parameters of the transceiver of the active window will be updated. To view the fitted TVT curve for an active window channel, click on the oscilloscope window and then click the View TVT curve icon.

10. Consult the on-line help for more information.

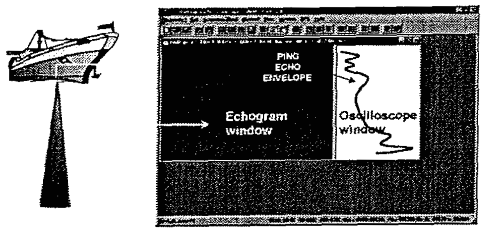
11. The *****.HAC*** standard hydroacoustic data format is described in detail in Simard *et al.* (1997).

12. The *****.HAC*** data can be viewed, printed, and exported to an ASCII file with ***HAC-trafic*** or displayed and printed as echograms with ***CH2*** (*beta*), the other applications of the NHP/DAT project supplied with your ***CH1*** version 2.0 CD-ROM.

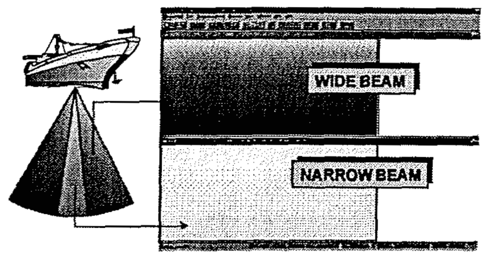
4. OVERVIEW

This chapter outlines the general aspects of operating ***CH1***. ***CH1*** is an MDI (Multiple Document Interface) application, which means that the software can handle more than one type of document (see Appendix 1) at the same time. Here, a document means one of the three types of data sources that ***CH1*** can handle: the Biosonics-like analog echosounders, multiplexed Biosonics-171 signals played back from tapes, and the digital Simrad EK500 type. Therefore, ***CH1*** can acquire data from many echosounders at the same time. ***CH1*** would then create one ***HAC*** data file for each echosounder. An echosounder could have many channels, which would represent either different frequencies, different beams, or other information (Figure 4-1.). ***CH1*** must therefore be carefully instructed on the type(s) of echosounder(s) it is acquiring data from and the associated settings and calibration parameters. This information is entered through three main menus, which are the File (config.) menu, the Acquisition (data) menu, and the Channel menu. The configuration can then be saved in a file for future use. These ***CH1*** configuration files have the extension *.ch1.

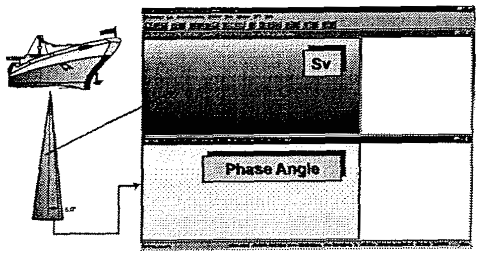
In this manual, the "/" is used as a separator for the menu hierarchy (e.g., Acquisition (data) / Configuration, Acquisition (data) / File). Capital letters are used in the text to identify the specific ***CH1*** fields and menus, as they appear in the windows and dialog boxes. The term "group" is sometimes used to specify a group of fields associated to the same function and assembled in a portion of the dialog boxes surrounded by a line. The text is intentionally redundant for some parts that are common to different data sources or functions. This was done to provide the most direct access to the user who wants to rapidly find the complete information on the subject he is looking for. As this manual is a reference book, we did not expect the user to read the entire manual but only the sections specific to his needs.



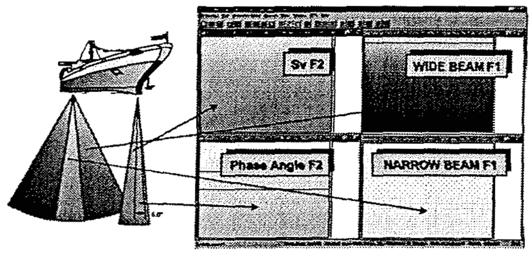
A) *CH1*, single beam, single frequency.



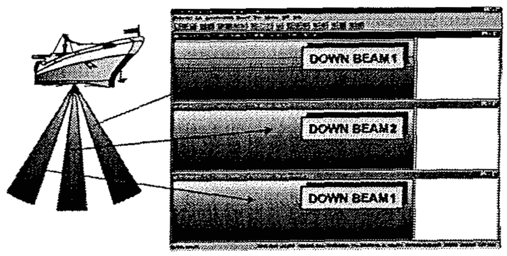
B) *CH1*, dual-beam, single frequency.



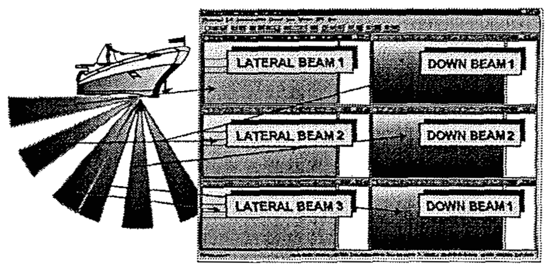
C) *CH1*, split-beam, single frequency.



D) *CH1*, split-beam and dual beam, two frequencies.



E) *CH1*, three beams, any frequency.



F) *CH1*, six beams, alternating 3 by 3, any frequency.

Figure 4-1. Examples of ***CH1*** multi-channel, multi-echosounder configurations.

At the start of ***CH1***, the following window (Figure 4-2.) with four swimming dolphins is displayed. When you click on a dolphin, a warning message is displayed (Figure 4-3.) to inform

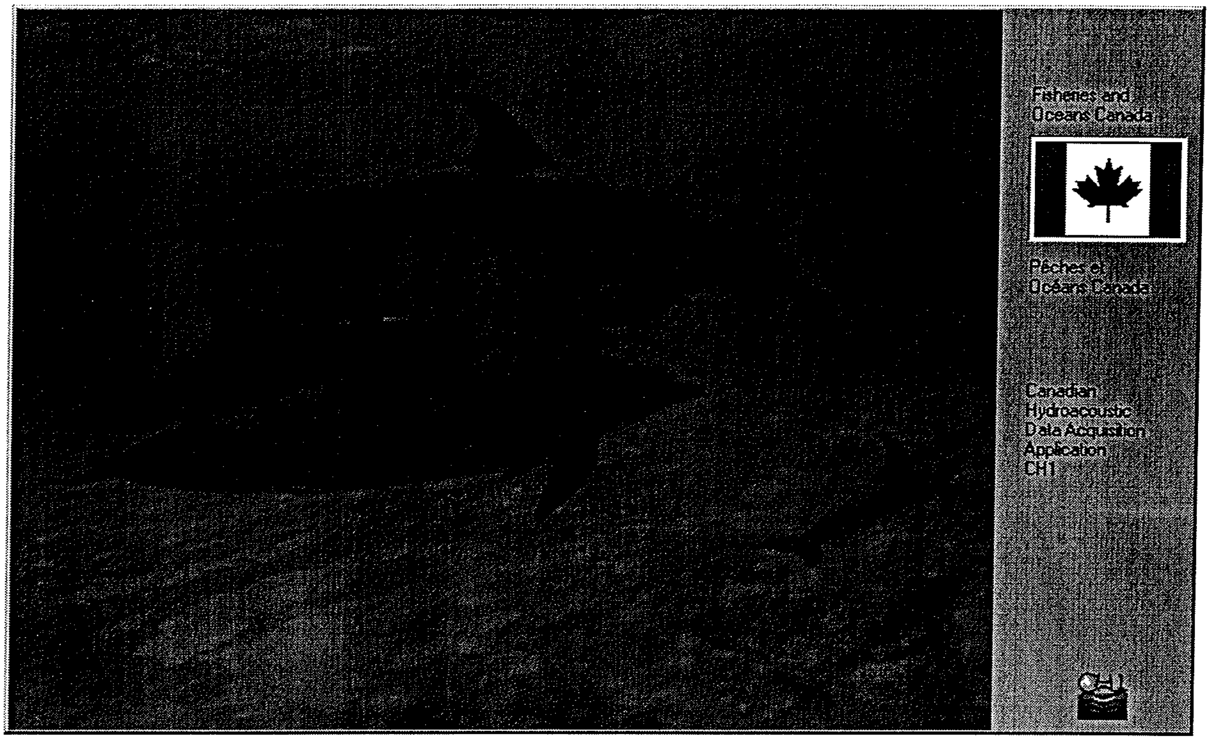


Figure 4-2. ***CH1*** opening window.

the user of the importance of properly setting the PC clock.

After having acknowledged this message by clicking on OK, the document (i.e. data source) selection dialog box (Figure 5-1.) opens. The three types of data sources ***CH1*** presently handles are offered. They correspond to the three data acquisition configurations mentioned above. These are detailed under the File (config.) menu chapter.

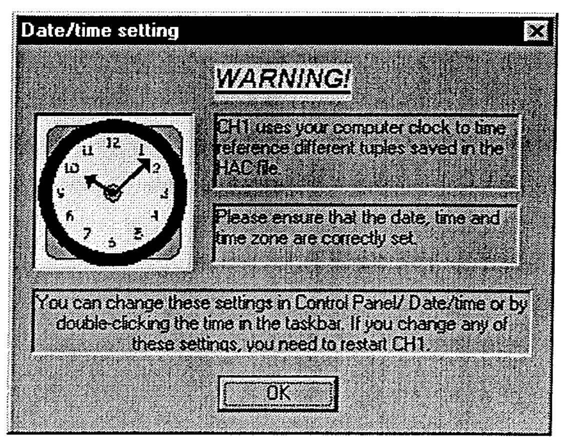


Figure 4-3. ***CH1*** opening window.

After choosing a configuration, the main ***CH1*** window opens (Figure 4-4.) for the chosen data source. It shows one channel-window, split in two parts. Dragging the division line with the mouse will move it. The echogram part on the left will display the echogram of the

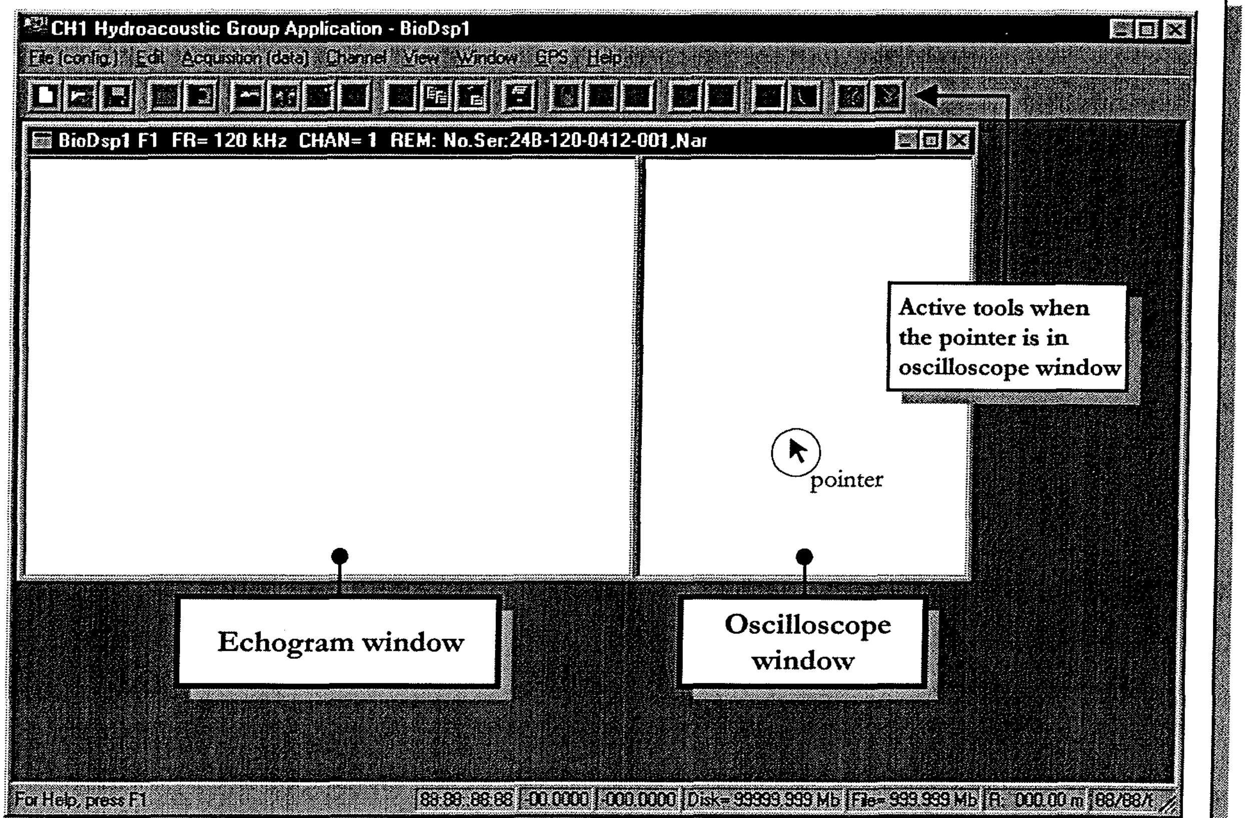


Figure 4-4. ***CH1*** main acquisition window with one channel for the Biosonics DSP configuration and the pointer in the oscilloscope window.

corresponding channel. The oscilloscope part will display the amplitude of the samples (in volts, Sv, TS, etc.) corresponding to the current ping. Note that the tools that are available depend on which part of the window contains the pointer and whether the acquisition has started or not. Figure 4-4. illustrates the tools that are available when the pointer is in the oscilloscope window and the acquisition has not started.

The various menus presented in Figure 4-5. are used to configure ***CH1*** for data acquisition. These same menus are available for all types of data sources except the EK500, whose menu is particular to that type of echosounder.

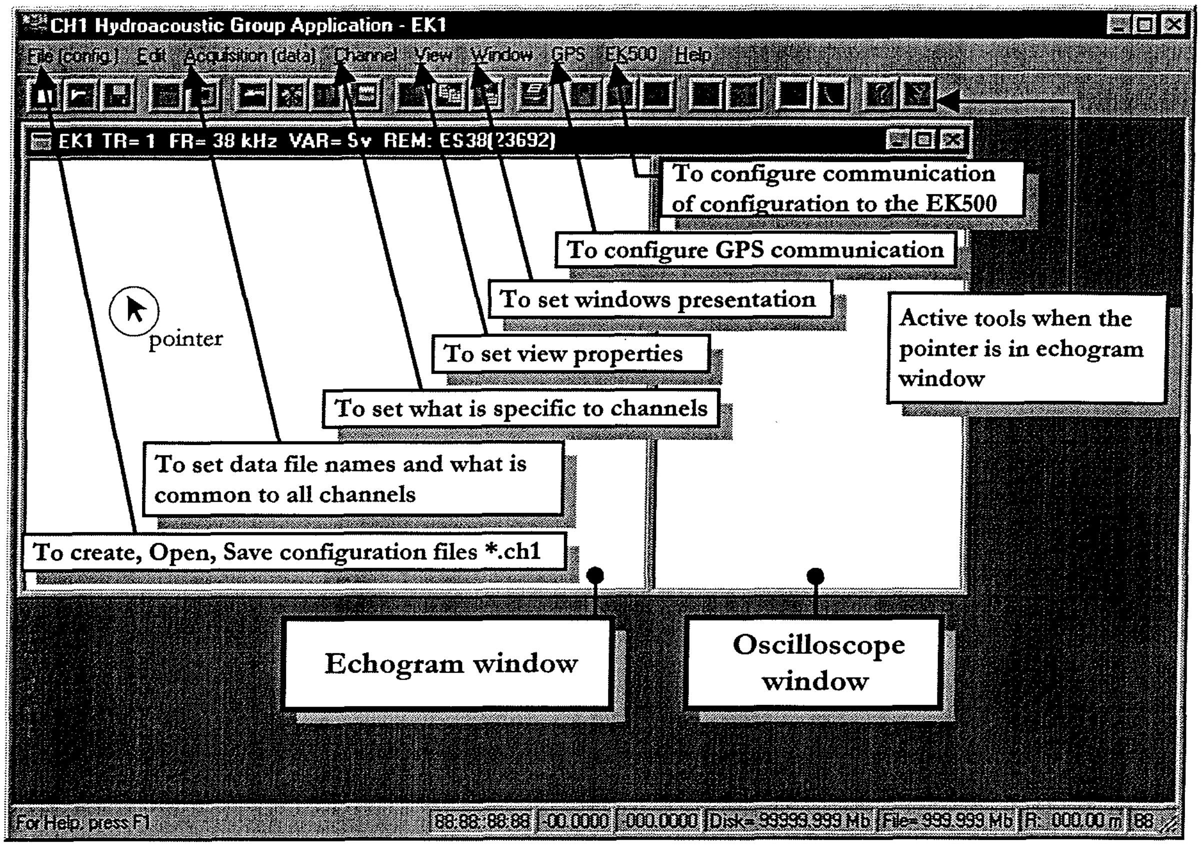


Figure 4-5. Specific functions of the ***CH1*** menus.

However, dialog boxes corresponding to these menus are specific to the selected data source. The Edit menu is not implemented yet and is reserved for future uses such as real-time echogram copy.

The File (config.) menu (Figure 4-6.) is used to create, open, or save a ***CH1*** configuration. These configurations contain all the settings of the different ***CH1*** menus for the corresponding data source. Each data source has its own configuration file (for details see Appendix 1). Configurations are saved in ASCII files having the extension .ch1. They can be retrieved with the usual File / Open menu of Windows 95®.

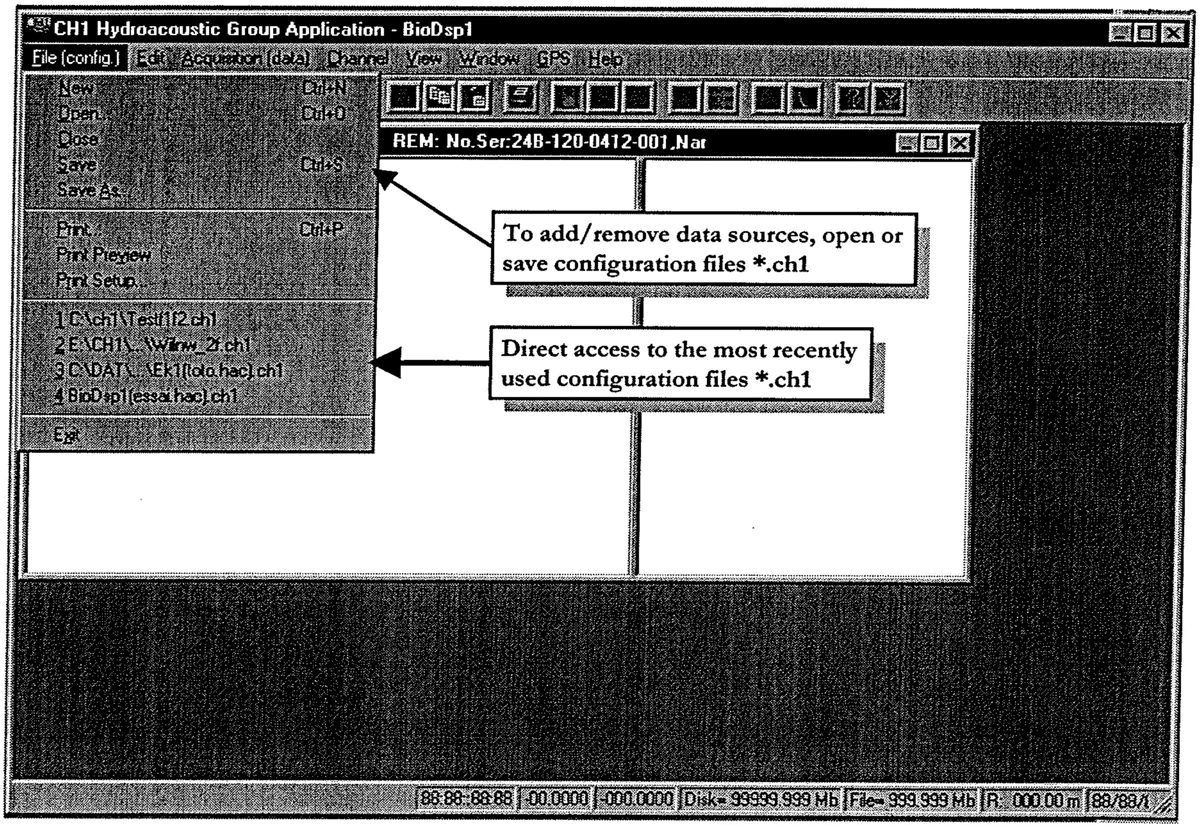


Figure 4-6. File (config.) menu functions.

The Acquisition (data) menu (Figure 4-7.) is used to give the general configuration of the data source and the name and location of its corresponding *.***HAC*** data file. This menu gives the parameters that are common to all channels of the selected data source. It includes the start, stop, and TVT-evaluation functions. However, these latter utilities are more easily accessed via the direct tools. The DSP calibration dialog box is used to enter the proper A/D calibration

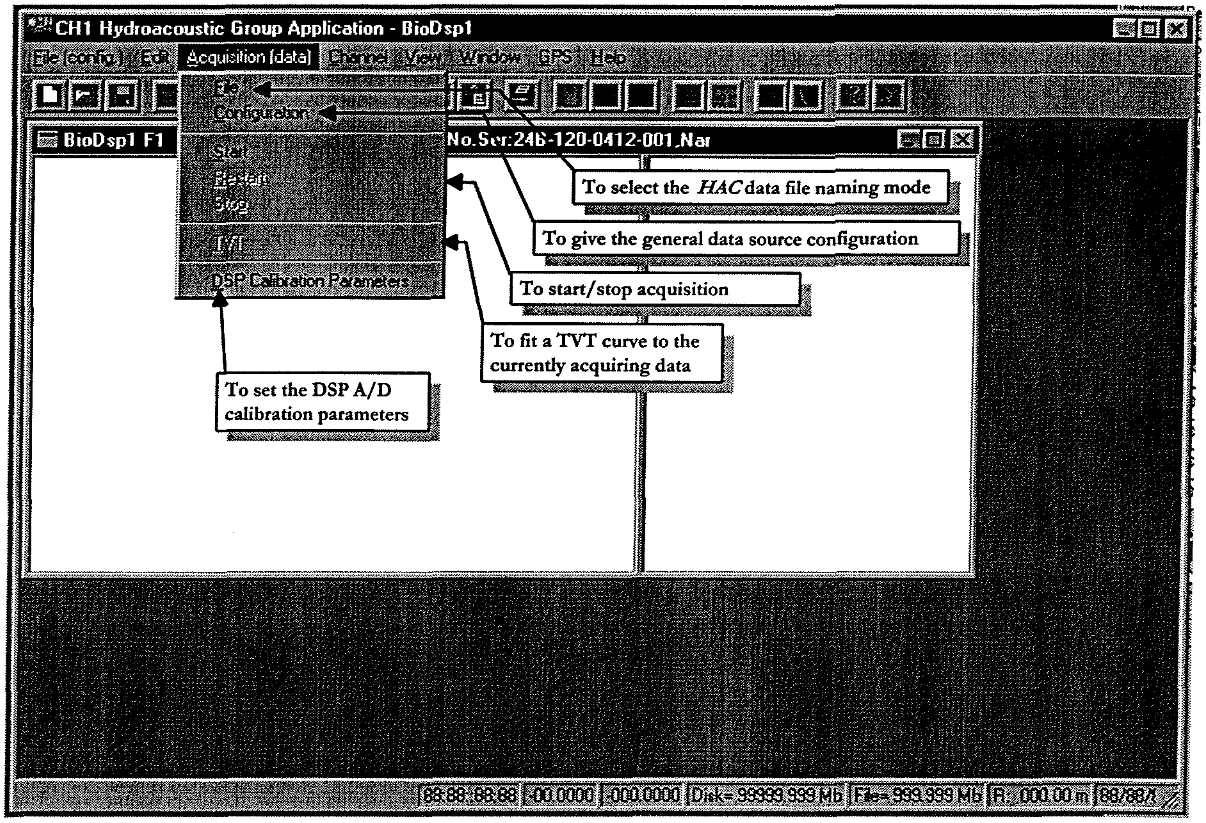


Figure 4-7. Acquisition (data) menu functions.

parameters to convert volts to 16-bit words. These parameters are not saved in the *.ch1 configuration files but in the Windows 95® registry on the PC used. They are therefore associated with the PC because they are related to the particular hardware (signal conditioning box, A/D, and DSP boards) used by the PC. When exchanging *.ch1 configuration files from one PC to another, the user must keep in mind that the A/D calibration parameters are not transferred and should make sure that the proper A/D calibration parameters are used.

The Channel menu (Figure 4-8.) is used to add or remove data channels and to edit their parameters. A data channel is associated with each particular type of data recorded from its parent data source. For example, it could be the echo envelope voltage for different acoustic frequencies or transducer beams, the volume backscatter (Sv), or the split-beam phase angle of the detected echoes. The types of data recorded and their corresponding acoustic calibration

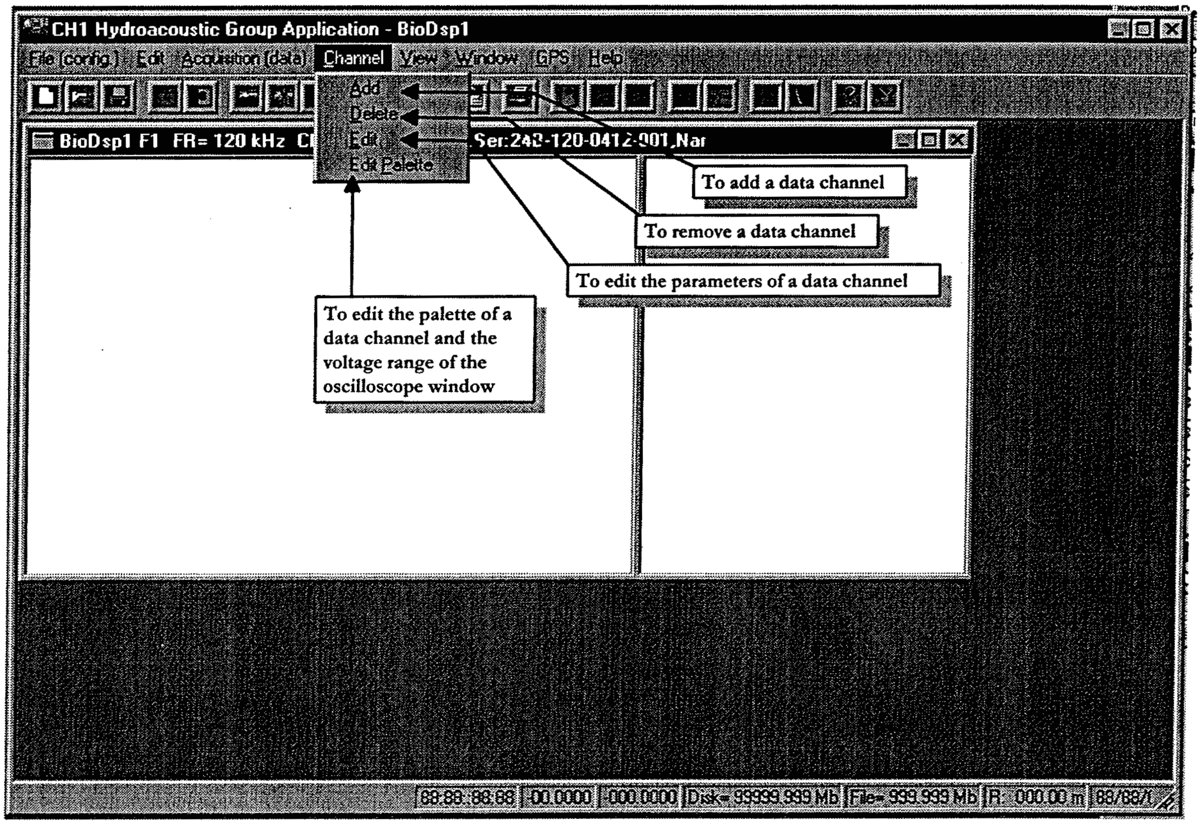


Figure 4-8. Channel menu functions.

parameters are specified via the Channel dialog boxes. A particular palette is associated with each data channel and this can be edited at any time from the Edit Palette function of the Channel menu. The Palette tool provides direct access. The chosen palette range gives the range displayed on the oscilloscope window.

The View menu (Figure 4-9.) activates the ***CH1*** Tool bar and Status bar and sets the channel vertical axis display options. Except for the choice of Depth or Range and the Z-Scale

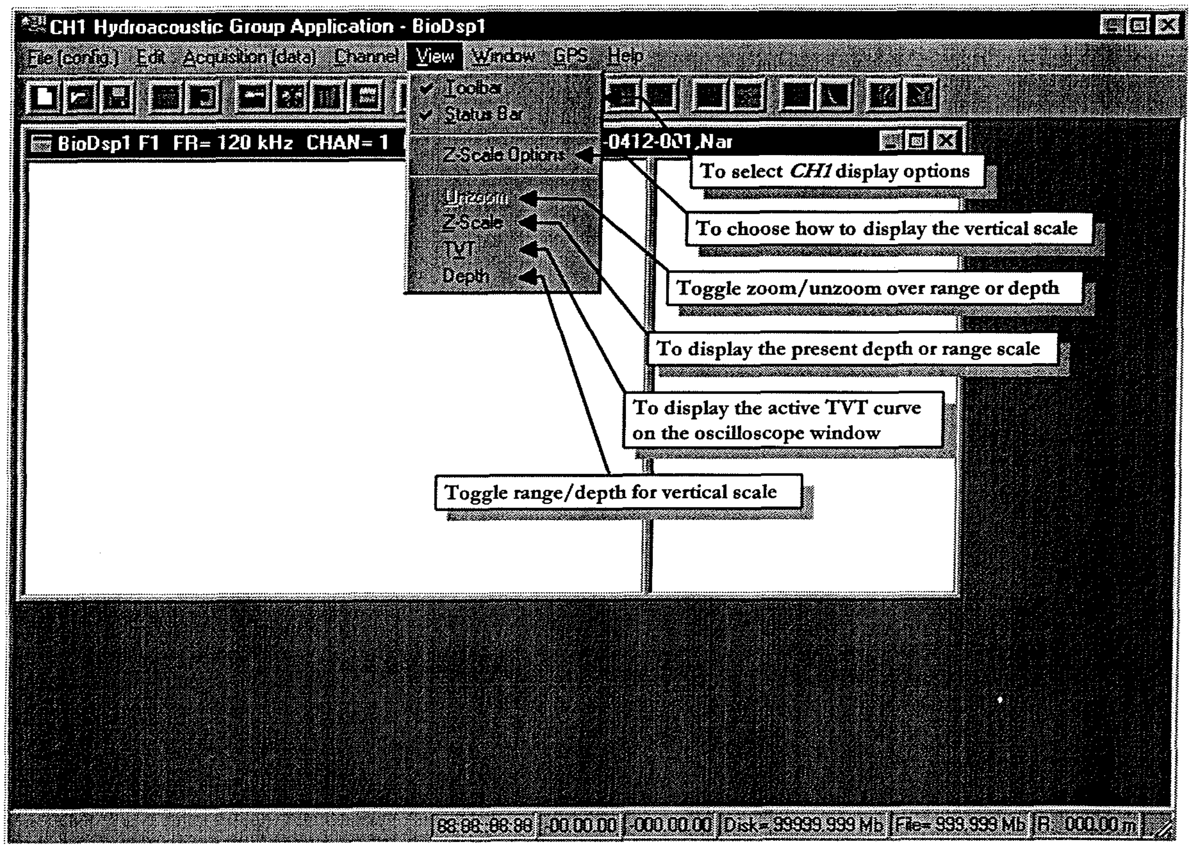


Figure 4-9. View menu functions.

options for the vertical axis, all the channel functions are directly available from the tool bar at any time during the acquisition. To have access to the TVT curve display, the pointer must be in the oscilloscope window.

To zoom along the range or depth axis, click on the echogram window. Then right-click and hold the mouse (a horizontal bar appears, Figure 4-10.) at a start range; hold it down while moving to an end range. To get a vertical scale, click on the Z-scale tool. To unzoom, click on the Unzoom tool. Note that ***CH1*** keeps only the last 20 pings for display when the screen is

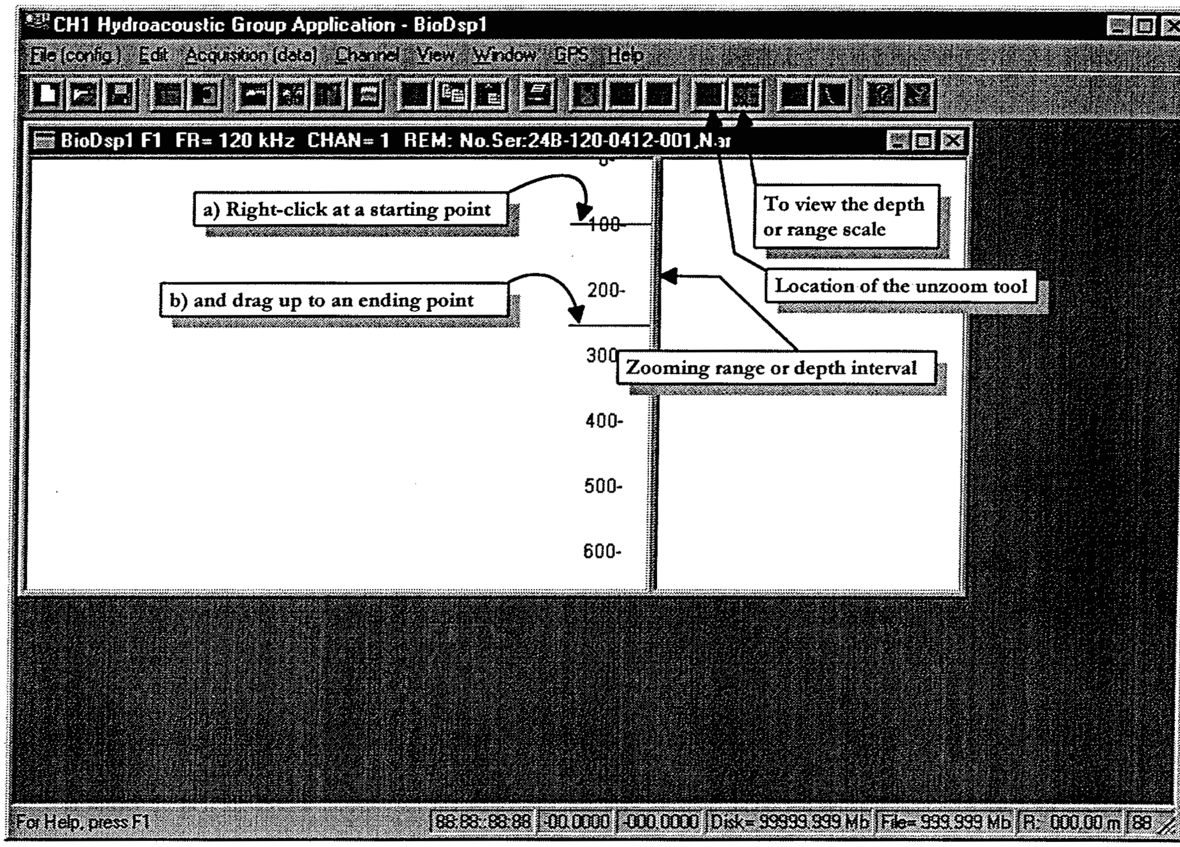


Figure 4-10 Zooming on range or depth intervals and viewing the Z-scale.

refreshed. The status bar indicates in embossed fields, from left to right: the time and position at the beginning of the current acquisition run, the remaining disk space, the size (Mb) of the ***HAC*** data file, the current detected depth (or range) and the current time and position. Occasional ***CH1*** messages to the user are displayed on the left side.

The Window menu (Figure 4-11.) is used to arrange the channel windows in the main ***CH1*** window. Use Tile to view all channels after you have set the size of the ***CH1*** window. In doing so, take care not to hide the oscilloscope window, which often happens because of particularities of Windows 95®.

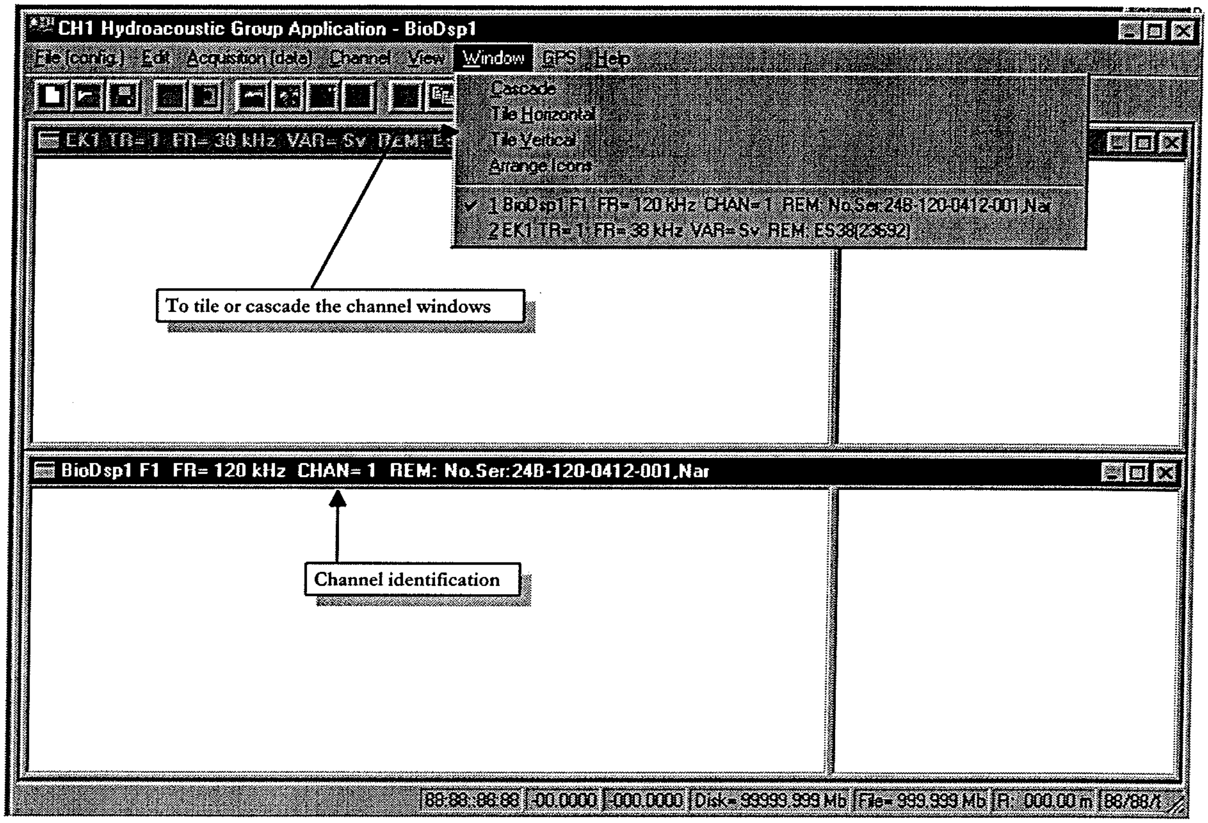


Figure 4-11. Window menu functions.

You can minimise any channel window you don't wish to display. The channel identification is given in the window heading.

The GPS menu (Figure 4-12.) is used to configure the serial port connected to the GPS and to choose how the latitude and longitude data will be displayed in the status bar. The GPS serial port is automatically set to Open when the acquisition is started, so it is not necessary to manually select the Open or Close mode. The GPS can be disconnected via the GPS configuration dialog box.

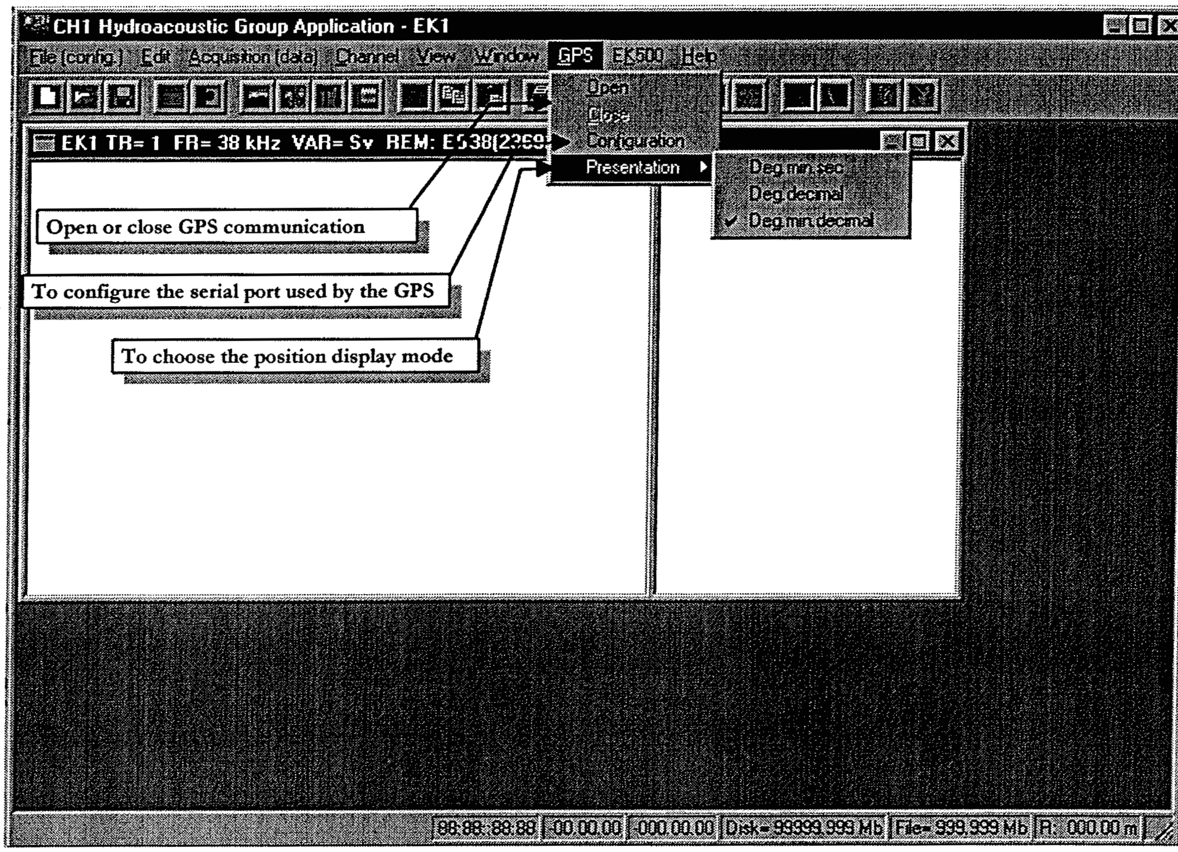


Figure 4-12. GPS menu functions.

The EK500 menu (Figure 4-13.) is used to configure the serial port to communicate the echosounder settings (selected in ***CH1*** menus) to the EK500 and to configure the Ethernet port through which the data are sent by the EK500.

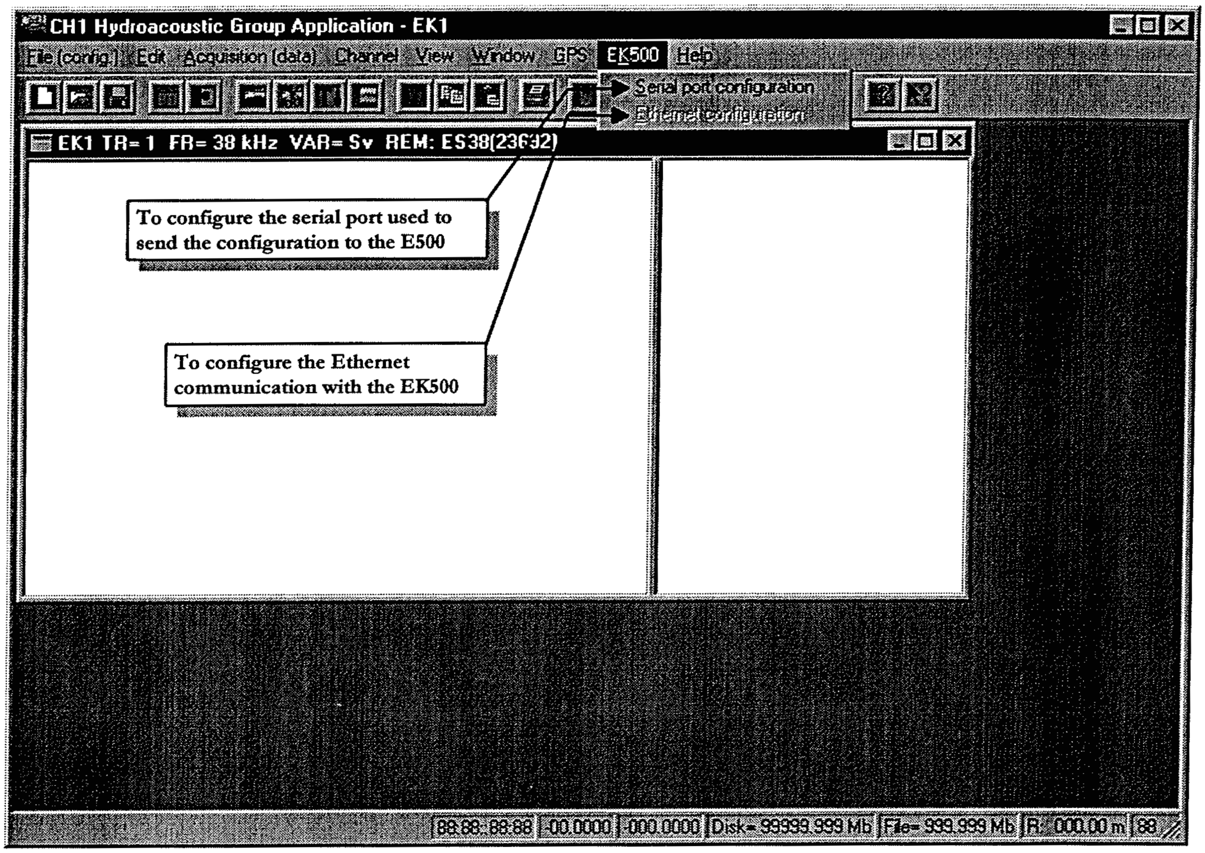


Figure 4-13. EK500 menu functions.

The on-line help is accessed through the Help menu or via the Help tools. All tools are identified by tool tips that are displayed when the pointer is over each tool.

In *CH1* dialog boxes, the framed (3-dimensional) fields (Figure 4-14.) identify important fields affecting how *CH1* will work and acquire data. The other fields are either dedicated to comments or to carry information required for further data processing steps, but they do not affect the acquisition by *CH1*.

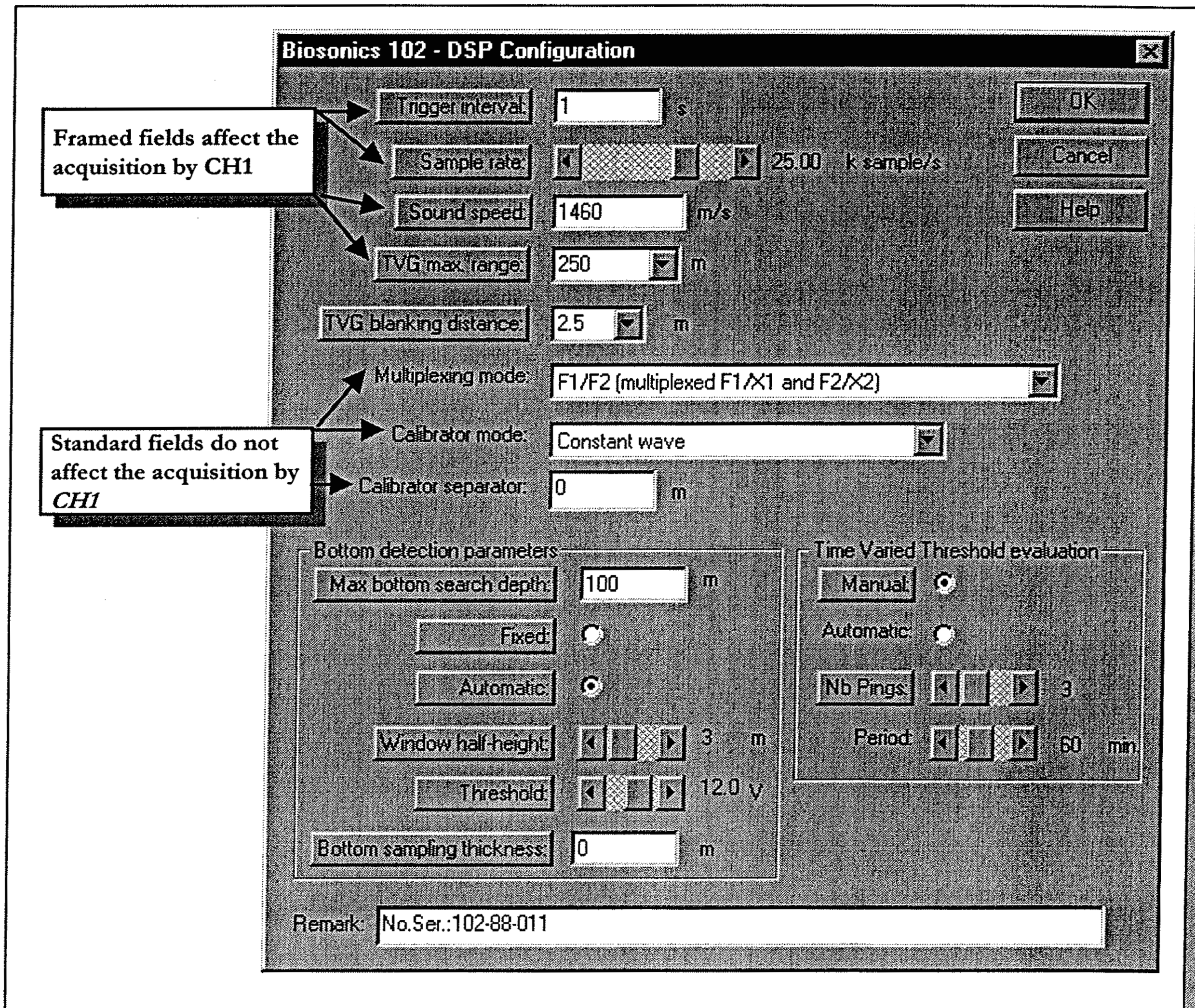


Figure 4-14. The framed fields and standard fields of *CH1* dialog boxes.

5. FILE (CONFIG) MENU

The File configuration menu offers the following commands:

New	Opens a dialog box to select one of the three types of configurations available.
Open	Opens a previously saved configuration file *.ch1.
Close	Closes the selected data source.
Save	Saves the configuration under the current *.ch1 file name.
Save as	Saves the configuration under a new *.ch1 file name.
Print setup	Configures the printing setup. **<u>This option is not yet implemented</u>**.
List of recent configurations files	Opens a recently saved configuration file *.ch1.
Exit	Closes ***CH1***.

5.1 File (config) / New (Figure 5-1.)

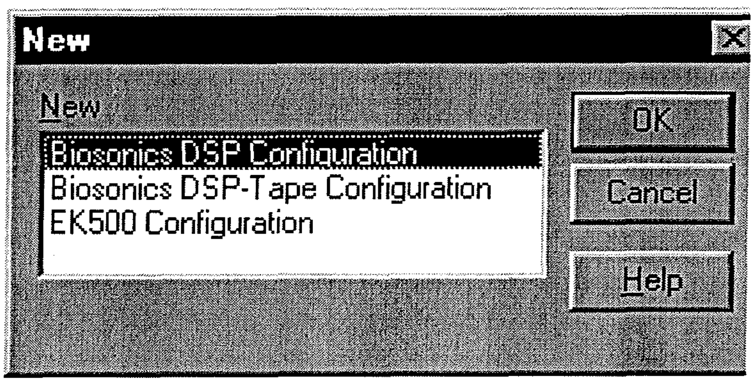


Figure 5-1. Dialog box to select the type of ***CH1*** document.

Choose the type of data source you want to configure, or click Cancel if you want to use a previously saved ***CH1*** data source configuration file (*.ch1) such as the file examples supplied with ***CH1***.

5.1.1 Biosonics DSP Configuration

This document describes the type of analog echosounder based on the Biosonics 102, a two-frequency dual-beam echosounder. Three channels simultaneously output the following information:

1. Narrow beam (40 log R)
2. Wide beam (40 log R)
3. Narrow beam (20 log R)

The frequency may optionally be multiplexed on alternate pings depending on the setting of the echosounder. The software assumes that for F2, the F1/F2 signal is low (< 1.87 volts). The proper absorption coefficient used by the echosounder for the frequencies should be given in the Alpha field of the Channel menu. If this absorption coefficient is not adequate for your environment, you could make the necessary corrections in further steps of data processing with ***CH2***.

5.1.2 Biosonics DSP-Tape Configuration

This special data source refers to complex multiplexed PCM data (recorded on two tracks of VCR or DAT tapes) that conform to Biosonics Model 171 tape recording interface instructions (Biosonics manual 1987). For non-multiplexed data recorded on tapes (e.g., the sync. for each ping is read from one channel and the signals are read from other channels), use the Biosonics DSP configuration. During the acquisition and recording on tape, the Biosonics Model 102 echosounder alternates frequency every ping, and three channels provide dual-beam and echo integration data simultaneously. These three channels are recorded on the two tracks of the tapes, and the sync. is alternated from one track to the other according to the data type (for details see the Biosonics DSP-tape Configuration).

5.1.3 EK500 Configuration

This document describes the Simrad EK500 version 5.3 echosounder parameters. Older versions are not supported by ***CH1***. This digital echosounder can be equipped with three split-beam transceivers. It transmits on all transceivers at the same time.

The ***CH1*** Aquisition (data) / Configuration and Channel menus are designed to store all the essential parameters needed to document the data acquisition process. ***CH1*** stores these parameter settings and can send them to the EK500 via the serial port selected in the EK500 menu to configure the echosounder. All changes to essential EK500 operating parameters should be made through ***CH1*** and sent to the EK500 to ensure that the ***CH1*** data source and the EK500 are configured concurrently.

When collecting data from the EK500, the user may choose to collect Sv samples (20 log R), TS samples (40 log R), power samples (no TVG applied), or split-beam phase angle data. **Warning**: In the current version of ***CH1***, one Sv data channel must be opened for each transceiver for which data is requested (e.g., to acquire TS data from transceiver 2, the Sv data channel for this transceiver must be opened along with the TS data channel.).

5.2 File (config.) / Open (Figure 5-2.)

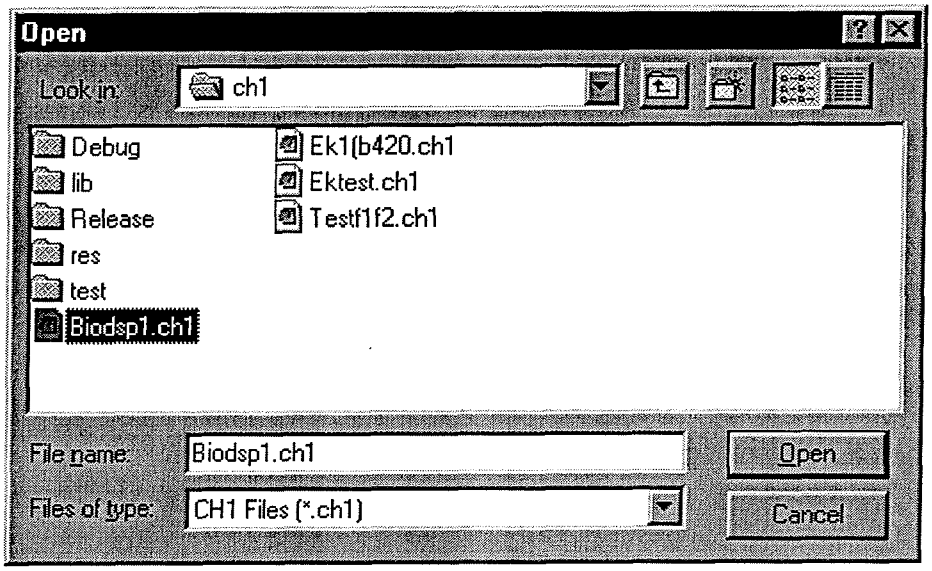


Figure 5-2. File (config.) open dialog box.

This dialog box is used to browse through your disks to select a previously saved *.ch1 configuration file that you want to reuse. If this file is one of the last four *.ch1 configuration files used by ***CH1***, select the file from the list that is displayed when you click on the File (config) menu.

5.3 File (config.) / Exit

Select this option if you want to close ***CH1***. You can also exit ***CH1*** using the standard Windows 95® closing window button.

6. ACQUISITION (DATA) MENU

The Acquisition (data) menu offers the following commands:

File	Specifies where and how the ***.*HAC*** binary data files will be saved.
Configuration	Configures the acquisition process.
Start	Starts acquiring data.
Restart	Erases data in the active file and restarts data acquisition.
Stop	Stops the acquisition process.
TVT	Launches the evaluation of the Time Varied Threshold
DSP calibration parameters	Specifies the calibration of the first three channels of the Bridgenorth-1416 A/D converter.

6.1 Acquisition (data) / File (Figure 6-1.)

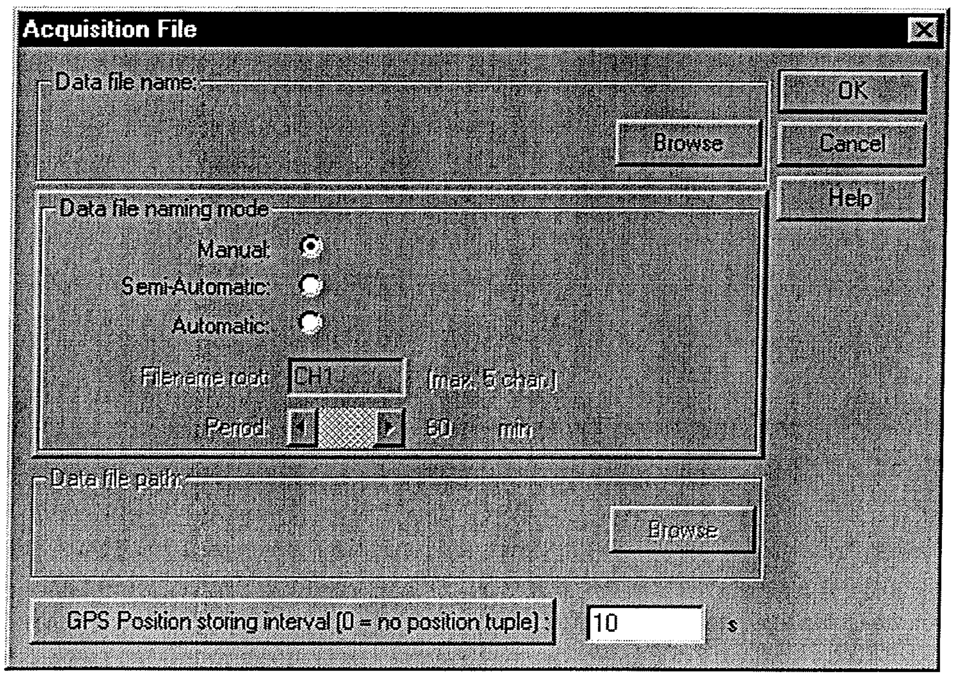


Figure 6-1. Acquisition file dialog box.

This dialog box is used to specify where and how the binary data files (*.***HAC***) will be saved.

6.1.1 Data file name (Browse)

Description	Select data file name for Manual file naming mode by clicking on the Browse button.
Effects	Determines the folder and the name of the ****.HAC*** binary data file where data will be acquired for the active data source. This field is saved in the *.ch1 configuration file.
Remarks	This Browse button is only available under Manual file naming mode. The chosen file name will be displayed in the heading of the ***CH1*** main window.

6.1.2 Data file naming mode

Description	Naming mode for data files.
Limits	Manual, Semi-Automatic, or Automatic.
Effects	Determines how, where, when, and under what name the ****.HAC*** binary data files will be saved. This field is saved in the *.ch1 configuration file.

Remarks

- When Manual is chosen, all data will be saved in one file that the user will specify using the Browse button in the Data file name box. When acquisition is stopped, an acquisition run is closed for that file (End of run tuple). When acquisition restarts, a new run is opened to append the new data (Start of run tuple).
- When Semi-Automatic is chosen, a new file is created each time the user starts the acquisition process. The user specifies the file directory where the files will be created using the Browse button in the Data file path box. He or she also needs to specify the root of the file names (first five characters) in the File name root edit box. Default name is CH1. The program will automatically append a file name sequence number starting at 000 and incrementing by one with each new file created. If one or many files exist with the name specified by the user, the program will increment the highest sequence number used with the specified filename root. For example, if the user specifies the filename root as CH1 and the following files exist in the selected data file path CH1000.***HAC***, CH1001.***HAC*** and CH1005.***HAC*** then the program will generate the file names CH1006.***HAC***, CH1007.***HAC***, etc. Note that the program does not fill the holes in the sequence but pursues the series from the greatest number already used.
- When Automatic is chosen, a new file is created every x minutes, where x is a time period in between 0 and 180 minutes that the user specifies with the period scrollbar. For the filename root and file directory, see Semi-Automatic mode.

6.1.3 Data file path (Browse)

Description	Select data file path for Semi-Automatic and Automatic file naming mode, by clicking on the Browse button.
Effects	Determines the folder where the ***.*HAC*** binary data files will be saved for the active document (i.e. data source). This field is saved in the *.ch1 configuration file.
Remarks	This Browse button is only available under Semi-Automatic and Automatic file naming mode. The chosen file path and name will be displayed in the heading of the ***CH1*** window.

6.1.4 GPS Position storing interval

Description	Time interval to store the GPS positions in ***.*HAC*** data files (seconds).
Limits	0 to 10800 seconds (10800 seconds = 3 hours).
Effects	Determines the frequency at which the position tuples will be generated for the file (or files) specified in this dialog box. This field is saved in the *.ch1 configuration file.
Remarks	A value of x seconds will lead to the generation of a Position tuple every x seconds. If the frequency specified is higher than the frequency at which the GPS updates its position, then a new tuple will only be generated if the time sent by the GPS has changed since the last tuple was generated. This is done to avoid having multiple tuples with the same GPS time and position, which does not add any information. On the other hand, if the position has not changed and the GPS time has, a new tuple will be generated to show that the boat was stationary. **Warning**: If the GPS string "$GPZDA", which gives the GPS time, is not sent by the active GPS, no position tuple will be generated and a warning message will be displayed in the status box. If the GPS connection is disabled in the GPS menu (Figure 10-1.) and/or the GPS position storing interval is set to zero, this message will not be displayed and no position will be recorded.

6.2 Acquisition (data) / Configuration

This menu item opens a dialog box that is used to configure the acquisition process. The dialog box is document sensitive, meaning that it will be different depending on the type of document (i.e. data source) associated with the active window.

- Biosonics 102 - DSP Configuration
- Biosonics DSP-Tape Configuration
- EK500 Configuration

6.2.1 Biosonics 102 - DSP Configuration (Figure 6-2.)

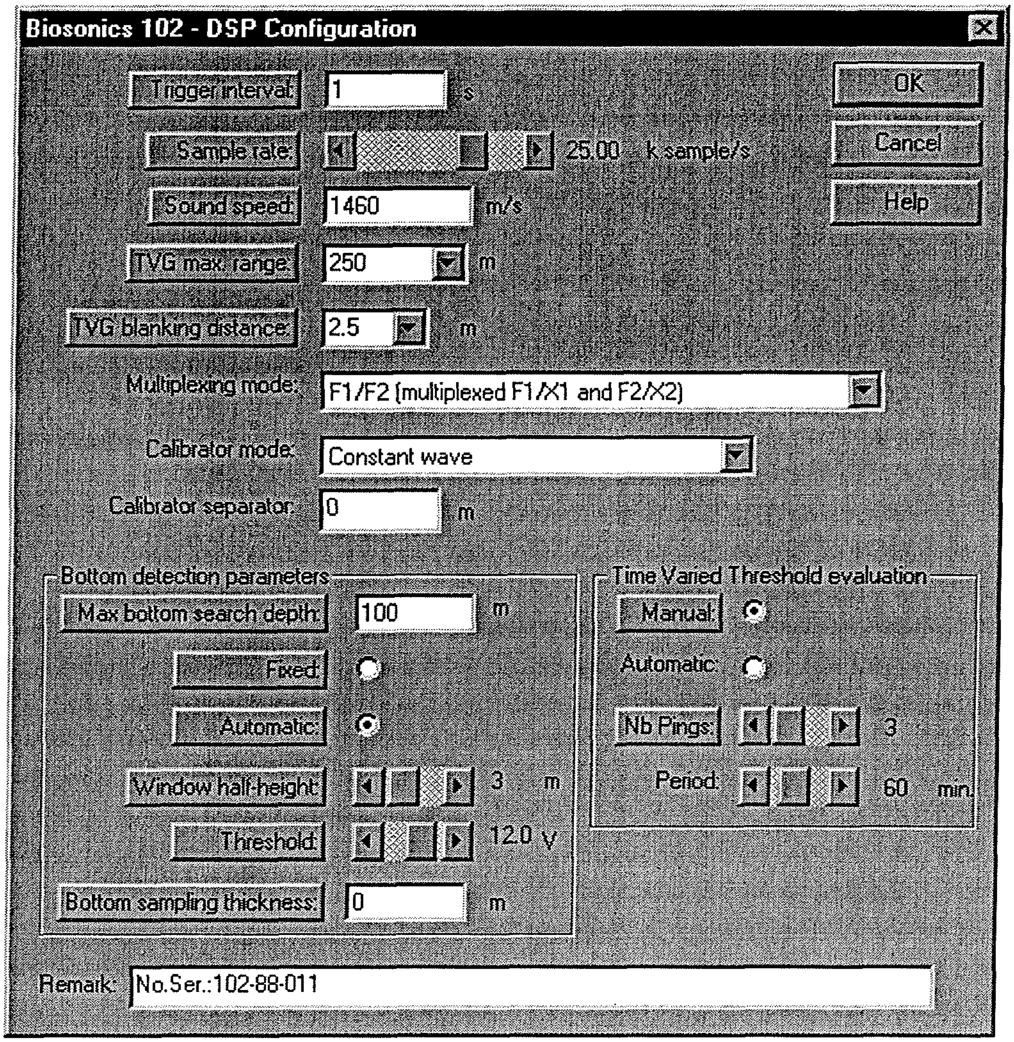


Figure 6-2. Biosonics DSP configuration dialog box.

6.2.1.1 Trigger interval

Description	Time interval between pings (seconds).
Limits	>0 to 10 seconds.
Effects	Determines how often (every 0.1 trigger interval) the PC looks at the DSP to read the data sent by the echosounder. Determines the maximum range (or depth) displayed on the channels (which is

90% of sound propagation time).
This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Echosounder tuple).

Remarks: This field should correspond to the selected trigger interval of the echosounder.

See also: Time Varied Threshold evaluation.

6.2.1.2 Sample rate

Description: Digitisation rate of the A/D converters in kilo samples per second.

Limits: 7.81 to 100 kilo samples/s.

Effects: Controls the rate at which the analog signal is digitised by the 16-bit A/D converters connected to the DSP.
This field is saved in the *.ch1 data source configuration file and *.***HAC*** data f (Channel tuple).

Remarks: The data file size is greatly influenced by this value. While setting this value, you must consider hardware limitations (DSP, computer, number of channels, etc.). Under very dense echo conditions (e.g., low threshold and very thick scattering layers), you may not be able to acquire the signal at the selected rate due to a lack of processing power. This would result in an error message and an interruption of data acquisition or in the failure to acquire data on some or all channels. We would not recommend a sampling rate higher than 25 k samples/s. This corresponds to a range resolution of 3 cm, which is sufficient given the pulse widths commonly used in fisheries acoustics.

6.2.1.3 Sound speed

Description: Average speed of sound (metres/s) in the sampled medium.

Limits: 1400 to 1700 metres/s.

Effects: This field influences the maximum depth represented in the channel window, corresponding to 90% of sound propagation time during the trigger interval. It is used to compute the depth and range for the channels. It is involved in the TVT evaluation to determine the range.
This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Echosounder tuple).

Remarks: This field is involved in further processing of the acoustic information.

6.2.1.4 TVG max. range

Description: Maximum range in metres on which the TVG (Time Varied Gain) is applied. After that range, the gain is constant at the maximum value reached by the TVG (when the Blank-at-range switch is put to Normal on the Biosonics 102 echosounder).

Limits: 0 to 999.9 metres.

calibrator is off. This field is only a comment.

6.2.1.8 Calibrator separator

Description	Separation distance for the calibrator pulses when this mode is selected (previous field).
Limits	0 to 99.9 metres.
Effects	This field is saved in the *.ch1 data source configuration file and **.*HAC*** data file (Echosounder tuple).
Remarks	This separation distance uses the sound speed assumed by the echosounder, which is 1500 metres/s for the Biosonics 102. This field is only a comment.

6.2.1.9 Remark

Description	Character string comment.
Limits	30 characters.
Effects	This field is saved in the *.ch1 data source configuration file and **.*HAC*** data file (Echosounder tuple).
Remarks	Enter information that might be useful to uniquely identify the echosounder, such as the echosounder serial number.

6.2.1.10 Bottom detection parameters group

This group of parameters is used to determine where the bottom will be set, to limit the bottom detection algorithm to a given range and to choose how many samples will be acquired after the detected bottom.

6.2.1.10.1 Fixed bottom depth (a) / Max. bottom search depth (b)

Description	a) If fixed bottom operation mode is selected, this field is the maximum range (in metres) up to which the user wants to collect all data under the fixed bottom mode, including the bottom echoes if the bottom is shallower than this fixed range. b) If automatic bottom detection is selected, this field is the maximum range (in metres) up to which the user wants to search for the bottom.
Limits	>0 to 1 000 metres. Not more than 90% of the maximum range that can be reached during 1 ping interval.
Effects	a) All samples deeper than this range are ignored. The bottom detection algorithm on the DSP is by-passed, which leaves more time for the other DSP algorithms. b) If the bottom is not detected before the Max. bottom search depth is reached, the bottom is lost for that ping (see below for the next steps). This field is saved in the *.ch1 data source configuration file and in the **.*HAC*** data file.
Remarks	Operating under Fixed bottom mode or with a low Max. bottom search depth may help to solve acquisition problems related to difficulties to detect the bottom

on steep slopes or to data flow under very high sample densities.
Warning: Setting this value too small may lead to rejection of valuable samples in the water column, setting it too high could unnecessarily inflate the data collected because a lot of samples in bottom (simple or multiple) echoes will be higher than the TVT and acquired in the *.***HAC*** data file.

See also Time Varied Threshold evaluation. Trigger interval.

6.2.1.10.2 Operation mode (Automatic / Fixed)

Description Determines how ***CH1*** will set the bottom depth.

Effects This field is saved in the *.ch1 data source configuration file but not in the *.***HAC*** data file.

Remarks
a) In the Fixed depth mode, no bottom detection is applied and data are acquired up to the chosen range.
b) In the Automatic mode, the bottom (given by the specified voltage threshold) is searched in a window height (in metres) around the previous bottom, specified with the height scrollbar.
When the specified bottom voltage threshold is not found for a given ping, the bottom is lost, and samples are recorded up to 90% of sound propagation time. The window height is ignored for the next ping and the first sample larger than the bottom voltage threshold is considered as the new bottom. This search continues up to the given Maximum bottom search range.
This is a primitive bottom recognition algorithm that works relatively well under normal conditions, but more complex algorithms will have to be implemented for complex conditions. For such cases, it is presently possible to collect all data up to a given depth with the Fixed bottom mode. The bottom could then be determined during post processing with ***CH2***.

See also Time Varied Threshold Evaluation group. Trigger interval.

6.2.1.10.3 Window half-height

Description Half-height of the window (in metres) in which ***CH1*** looks for the bottom specified by the threshold value.

Limits >0 to 30 metres.

Effects This field is saved in the *.ch1 data source configuration file but not in the *.***HAC*** data file.

Remarks When the selected bottom voltage threshold is not found in the previous ping, the window height is ignored for the current ping and the first sample larger than the bottom voltage threshold is considered as the new bottom.

See also Time Varied Threshold evaluation.

6.2.1.10.4 Threshold

Description	Minimum voltage that can qualify as a bottom echo.
Limits	0 to 15 volts.
Effects	This field is saved in the *.ch1 data source configuration file and in the ***.HAC*** data file (Channel tuple).
Remarks	Data will still be collected down to the detected bottom plus the chosen Bottom sampling thickness. **Warning**: Setting the voltage too low may result in false bottom detection on strong fish echoes. Setting it too high may result in undetected bottom or in collecting data samples in the bottom echoes.
See also	Time Varied Threshold evaluation.

6.2.1.10.5 Bottom sampling thickness

Description	Range sampled after the bottom detection in metres.
Limits	0 to 100 metres.
Effects	Samples following the detected bottom range will be recorded in the data file (**.HAC*) down to the given thickness. This field is saved in the *.ch1 configuration file.
Remarks	Selecting a large thickness can significantly increase the amount of data collected and therefore the requirement for storage space.
See also	Bottom Detection Menu.

6.2.1.11 Biosonics Time Varied Threshold evaluation group

The parameters within this group determine how the Time Varied Threshold (TVT) will be evaluated. The TVT is a threshold that is affected by the TVG applied on the given data channel. Noise data are acquired at the channel sample rate, up to the TVG max. range, while the echosounder is in receive mode only (not transmitting but triggering) and the echosounder TVG is applied. The ping data acquired during the TVT evaluation are stored in the *.***HAC*** data file (Ping tuples). A series of 100 regularly-spaced samples from these data are stored for the first ping and compared, pairwise, to the equivalent 100 samples of the next ping; the maximum of the two samples is retained. The process is repeated up to the Number of pings chosen for the TVT evaluation. Then a curve is fitted by least squares to the regularly spaced 100 maxima retained. By this method, the TVT is evaluated along the upper limit of the noise data envelope. However, because it is a least squares process, some noise samples will be larger than the fitted curve. If you want to move the TVT curve to threshold out these samples, increase the TVT offset in the Channel menus. The TVT curve fitted on the voltage (i.e., not the intensity, V^2) are: 1) $A\,R\,e^{BR} + C$ for the 20 log R TVG and 2) $A\,R^2\,e^{BR} + C$ for the 40 log R TVG, where R is the range, A and C are the estimated coefficients and B is obtained from the sound absorption coefficient (B = alpha / 10 log e). (See MacLennan and Simmonds (1992, p.21-22) and Medwin and Clay (1998, p.103-104) for the relationship between the sound absorption coefficients alpha and beta. Here, B = 2 beta.

6.2.1.11.1 Operation mode (Manual/Automatic)

Description	Automatic: automatic evaluation of the TVT at regular time intervals. Manual: evaluation process is activated when the user clicks the Aquisition (data) / TVT menu item.
Limits	Manual, Automatic.
Effects	This field is saved in the *.ch1 data source configuration file and in the *.***HAC*** data file (Echosounder tuple).
Remarks	**Automatic mode is not yet implemented for the Biosonics data sources.** It will be available only when a computer-echosounder interface is present to control the echosounder setting by software (e.g., a PPI interface for the Biosonics).

6.2.1.11.2 Nb Pings (number of pings)

Description	This field specifies the number of pings over which the TVT will be evaluated.
Limits	1 to 20 pings.
Effects	This field is saved in the *.ch1 data source configuration file and in the *.***HAC*** data file (General Threshold tuple). The ping data acquired during the TVT evaluation are stored in the *.***HAC*** data file (Ping tuples).
Remarks	See above for the Time Varied Threshold evaluation method.

6.2.2 Biosonics DSP-Tape Configuration (Figure 6-3.)

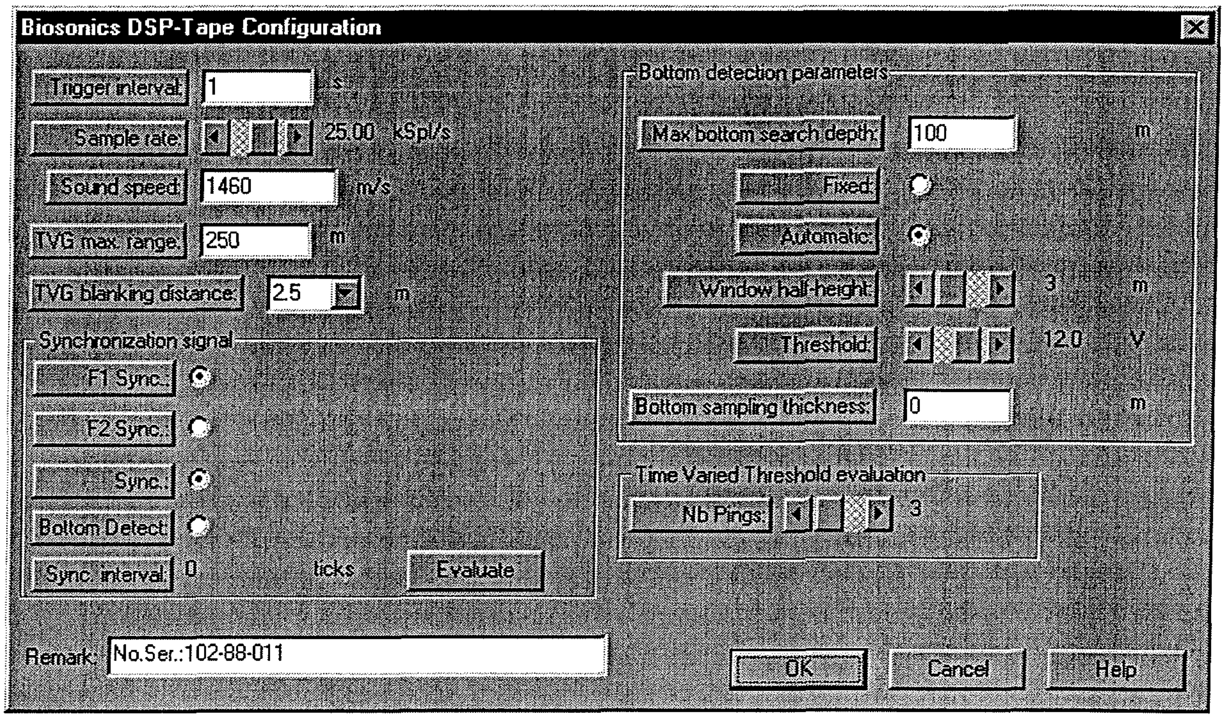


Figure 6-3. Biosonics DSP-Tape Configuration dialog box.

6.2.2.1 Trigger interval

Description	Time interval between pings (seconds) at the original acquisition from the echosounder. This is not the sync. interval because the sync. was not recorded for some pings.
Limits	>0 to 10 seconds.
Effects	Determines how often (every 0.1 ping interval (not sync. interval)) the PC looks at the DSP to read the data sent by the Biosonics interface model 171. Determines the maximum range (or depth) displayed on the channels (which is 90% of the sound propagation time). This field is saved in the *.ch1 data source configuration file and *.*HAC* data file.
Remarks	This field should correspond to the interval between pings (seconds) during the original acquisition from the echosounder. In contrast to the direct DSP acquisition, the echosounder ping rate here cannot

	be slowed to ease the TVT evaluation. It is therefore possible that some pings could be missed during TVT evaluation because the computer does not keep up. The only effect is that the TVT will be evaluated using fewer pings than what was specified.
See also	Time Varied Threshold evaluation.

6.2.2.2 Sample rate

Description	Digitisation rate by the A/D converters in kilo samples per second.
Limits	7.81 to 100 kilo samples/s.
Effects	Controls the rate at which the analog signal is digitised by the 16-bit A/D converters connected to the DSP. This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).
Remarks	The data file size is greatly influence by this value. While setting this value, you must consider hardware limitations (DSP, computer, number of channels, etc.). You may not be able to acquire the signal at the selected rate because of lack of processing power, which would result in an error message or in the failure to acquire data on some or all channels. We do not recommend a sampling rate higher than 25 kilo samples/s; this corresponds to a range resolution of 3 cm, which is more than enough given the pulse widths commonly used in fisheries acoustics.

6.2.2.3 Sound speed

Description	Average speed of sound (metres/s) in the sampled medium.
Limits	1400 to 1700 metres/s.
Effects	This field influences the maximum depth represented in the channel window, corresponding to 90% of sound propagation time during the trigger interval. It is used to compute the depth and range for the channels. It is involved in the TVT evaluation to determine the range. This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Echosounder tuple).
Remarks	This field is involved in further processing of the acoustic information.

6.2.2.4 TVG max. range

Description	Maximum range in metres on which the TVG (Time Varied Gain) was applied. Above that range, the gain is constant at the maximum value reached by the TVG (if the Blank-at-range switch was put to Normal on the Biosonics 102 at acquisition).
Limits	0 to 999.9 metres.
Effects	This field is saved in the *.ch1 data source configuration file and *.***HAC*** data

	file. For the Time Varied Threshold evaluation, only the samples whose range is smaller the than TVG max. range will be considered.
Remarks	This range should correspond to the setting of the echosounder and should be consistent with the TVG used during the calibration. The TVG is assumed to start at a range of zero metre. If samples are collected at a range larger than the TVG max. range, the TVG will have to be adjusted in further data processing.
See also	Time Varied Threshold evaluation.

6.2.2.5 TVG blanking distance

Description Blanking distance, in metres, up to which the receiver output was blanked to zero.

Limits 0 to 999.9 metres.

Effects This field is saved in the *.ch1 data source configuration file and **_*.HAC_** data file. (Echosounder tuple).

Warning: The Time Varied Threshold evaluation starts at a range equal to 1% of the TVG max. range. If the blanking distance was larger than this value, some blanked samples will be considered for the TVT evaluation. This may severely affect the TVT evaluation if the blanking distance is large. Usually this blanking distance is kept at 1% of the TVG max. range.

Remarks This range should correspond to the setting of the echosounder and should be consistent with the TVG of the calibration.

The TVG is computed from the face of the transducer but it is applied only after the selected blanking distance. For the Biosonics 102, 1.25, 2.5, 5.0, and 10.0 metres are minimum TVG ranges associated with TVG max. ranges of 125, 250, 500, and 999.9, and the blanking distance is often set to these minima.

See also Time Varied Threshold evaluation.

6.2.2.6 Synchronisation signal group

6.2.2.6.1 F1 Sync. or F2 Sync.

Description Indicates which frequency the sync. signal is synchronised with.

Effects This field is saved in the *.ch1 data source configuration file but not in the **_*.HAC_** data file.

Remarks These complex PCM data (recorded on two tracks of VCR or DAT tapes) conform to Biosonics Model 171 tape recording interface instructions (Biosonics Model 171 manual, 1987). During the acquisition and recording on tape, the Biosonics Model 102 echosounder alternates frequency every ping, and three channels are providing dual-beam and echo integration data simultaneously. These three channels are recorded on the two tracks of the tapes, and the sync. is alternated from one track to the other according to the data type. The Model 102 echosounder sync. for the selected frequency (F1 or F2) provides the trigger for the Model 171. By selecting F1, we indicate that the sync. signal is synchronised with the frequency F1 on the 40 log R signal. By selecting F2, we indicate that the sync. signal is synchronised with the frequency F2 on the 40 log R signal. The unselected choice (F1 or F2) is called the "alternate frequency" in the text below.

The multiplexed sequence of recorded data on tape is:

Ping 1:
- C1-track1: 40 log R narrow beam signal for the selected frequency (F1 or F2) with the sync. signal superimposed (read from the sync. BNC of the interface Model 171, which corresponds to the Sync. option of the next field 6.2.2.5.2). (***CH1*** will generates this sync. signal if the recorded sync. is read from the Bottom Detect BNC, see next field 6.2.2.5.2);
- C2-track2: 40 log R wide beam signal for the selected frequency (F1 or F2)

Ping 2:
- C1-track1: 40 log R narrow beam signal for the alternate frequency (F1 or F2) without any sync. signal superimposed (***CH1*** generates this sync. signal);
- C2-track2: 40 log R wide beam signal for the alternate frequency (F1 or F2)

Ping 3:
- C1-track1: 40 log R narrow beam signal for the selected frequency (F1 or F2) without any sync. signal superimposed. (***CH1*** will generates this sync. signal if the recorded sync. is read from the Sync. BNC, see next field 6.2.2.5.2);
- C2-track2: simultaneous 20 log R narrow beam signal for the selected frequency (F1 or F2) with the sync. signal superimposed (read from the bottom detect BNC of the interface Model 171, which corresponds to the Bottom Detect option of the next field 6.2.2.5.2)

Ping 4:
- C1-track1: 40 log R narrow beam signal for the alternate frequency (F1 or F2) without any sync. signal superimposed (***CH1*** generates this sync. signal)
- C2-track2: simultaneous 20 log R narrow beam signal for the alternate frequency (F1 or F2) without any sync. signal superimposed.

Warning: The program assumes the above physical channel and data order. Choosing the wrong channel allocation in the Channel menu may result in wrong data and mixing of 40 log R with the 20 log R data in the same data channel.

See also Channel menu.

6.2.2.6.2 Sync. or Bottom Detect

Description Origin of synchronisation signal.

Effects This field is saved in the *.ch1 data source configuration file but not in the *.*HAC* data file.

Remarks — By selecting Sync., we indicate that the sync. signal is coming from the sync. BNC (channel 1). By selecting Bottom Detect, we indicate that the sync. signal is coming from the Bottom Detect BNC (channel 2). This choice determines the synchronisation in decoding the above-defined ping sequence.

6.2.2.6.3 Evaluate button

Calls the Synchronisation Time Interval dialog box to evaluate the time between successive sync. signals from a 10 sync. series.

6.2.2.6.3.1 Synchronisation Time Interval (Figure 6-4.)

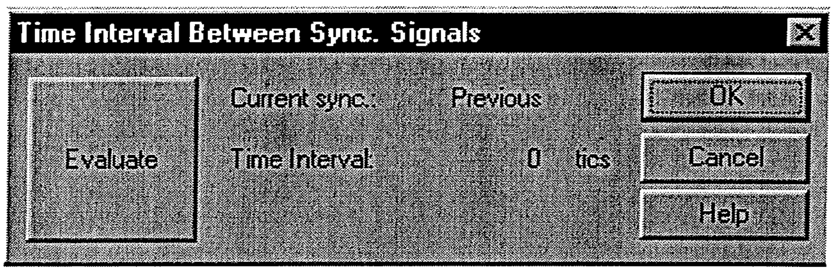


Figure 6-4. Synchronisation Time Interval dialog box.

Description — Use this dialog box to evaluate the time interval between the sync. signals by clicking the evaluate button.

Effects — Determines the precise ping interval to allocate the signal to the different pings for those pings for which the sync. was not recorded. The results is saved in the configuration document file *.ch1.

Remarks — *CH1* will read a series of 10 sync. signals and evaluate the time interval between them.

Warning: While this time interval is evaluated, after having clicked on the large Evaluate button, check that the time interval does not change significantly from one sync. to another. If this happens, some sync. signals are missed (e.g. not clean enough to be considered as a sync. and they are not seen in the evaluation process) and the evaluated time interval is wrong. You will have to redo the evaluation.

6.2.2.7 Bottom detection parameters group

This group of parameters is used to determine where the bottom will be set to limit the bottom detection algorithm to a given range, and to determine how many samples will be acquired after the detected bottom.

6.2.2.7.1 Fixed bottom depth (a) / Max. bottom search depth (b)

Description
a) If fixed bottom operation mode is selected, this field is the maximum range (in metres) up to which the user wants to collect all data under the fixed bottom mode, including the bottom echoes if it is smaller than this fixed depth.
b) If automatic bottom detection is selected, this field is the maximum range (in metres) up to which the user wants to search for the bottom.

Limits
>0 to 1 000 metres. Not more than 90% of the maximum range that can be reached during 1 ping interval.

Effects
c) All samples deeper than this range are ignored. The bottom detection algorithm on the DSP is by-passed, which leaves more time for the other DSP algorithms.
d) If the bottom is not detected within that range, the bottom is lost for that ping (see below for the next steps).

This field is saved in the *.ch1 data source configuration file and in the *.***HAC*** data file.

Remarks
Operating under Fixed bottom mode or with a low Max. bottom search depth may help to solve acquisition problems due to difficulties with the bottom algorithm on steep slopes or under very high sample densities.

Warning: Setting this value too small may lead to rejection of valuable samples in the water column, setting it too high could unnecessarily inflate the data collected because a lot of samples in bottom (simple or multiple) echoes will be higher than the TVT and acquired in the *.***HAC*** data file.

See also
Time Varied Threshold evaluation. Trigger interval.

6.2.2.7.2 Operation mode (Automatic / Fixed)

Description
Determines how ***CH1*** will set the bottom depth.

Effects
This field is saved in the *.ch1 data source configuration file but not in the *.***HAC*** data file.

Remarks
a) In the Fixed depth mode, no bottom detection is applied and data are acquired up to the chosen depth.
b) In the Automatic mode, the bottom (given by the specified voltage threshold) is searched in a window height (in metres) around the previous bottom, specified with the height scrollbar.

When the specified bottom voltage threshold is not found for a given ping, the bottom is lost, and samples are recorded for up to 90% of the sound propagation time. The window height is then ignored for the next ping and the first sample larger than the bottom voltage threshold is considered as the new bottom. This search continues up to the given Maximum bottom search range.

This is a primitive bottom recognition algorithm, which works relatively well under normal conditions, but more complex algorithms will have to be implemented for complex conditions. For such cases, it is presently possible

	to collect all data up to a given depth with the Fixed bottom mode. The bottom could then be determined during post processing with ***CH2***.
See also	Time Varied Threshold evaluation group.

6.2.2.7.3 Window half-height

Description	Half-height of the window (in metres) in which ***CH1*** looks for the bottom specified by the threshold value.
Limits	>0 to 30 metres.
Effects	This field is saved in the *.ch1 data source configuration file but not in the *.***HAC*** data file.
Remarks	When the selected bottom voltage threshold has not been found in the previous ping, the window height is ignored for the current ping and the first sample larger than the bottom voltage threshold is considered as the new bottom.
See also	Time Varied Threshold evaluation.

6.2.2.7.4 Threshold

Description	Minimum voltage that can qualify as a bottom echo.
Limits	0 to 15 volts.
Effects	This field is saved in the *.ch1 data source configuration file and in the *.***HAC*** data file (Channel tuple).
Remarks	Data will still be collected down to the detected bottom plus the chosen Bottom sampling thickness. **Warning**: Setting the voltage too low may result in false bottom detection on strong fish echoes. Setting it too high may result in undetected bottom or in collecting data samples in the bottom echoes.
See also	Time Varied Threshold evaluation.

6.2.2.7.5 Bottom sampling thickness

Description	Range sampled after the bottom detection in metres.
Limits	0 to 100 metres.
Effects	Samples following the detected bottom range will be recorded in the data file (*.***HAC***) down to the given thickness. This field is saved in the *.ch1 data source configuration file.
Remarks	Selecting a large thickness can significantly increase the amount of data collected and therefore the requirement for storage space.
See also	Bottom Detection Menu .

6.2.2.8 Time Varied Threshold evaluation group

6.2.2.8.1 Nb Pings (number of pings)

Description	This field specifies the number of pings over which the TVT will be evaluated.
Limits	1 to 20 pings.
Effects	This field is saved in the *.ch1 data source configuration file and in the *.***HAC*** data file (General Threshold tuple). The ping data acquired during the TVT evaluation are stored in the *.***HAC*** data file (Ping tuples).
Remarks	***CH1*** evaluates the TVT by fitting a curve over this data. The TVT curves fitted on the voltage (i.e, not the intensity, V^2) are: 1) A R e^{BR} + C for the 20 log R TVG, 2) A R^2 e^{BR} + C for the 40 log R TVG, where R is the range, A and C are the estimated coefficients, and B is obtained from the sound absorption coefficient (B = alpha / 10 log e).
See also	MacLennan and Simmonds (1992, p.21-22) and Medwin and Clay (1998, p.103-104) for the relationship between the sound absorption coefficients alpha, and beta (here, B = 2 beta). Time Varied Threshold evaluation.

6.2.3 EK500 Configuration (Figure 6-5.)

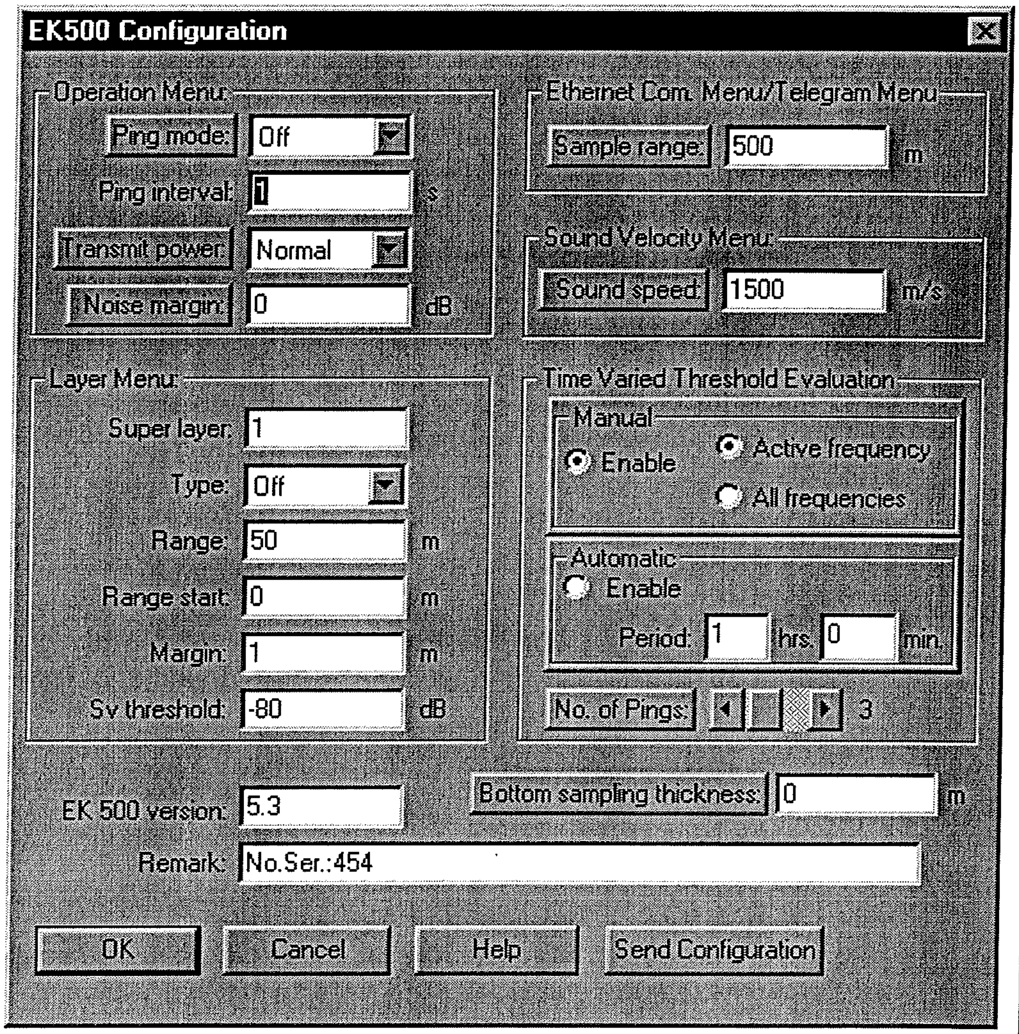


Figure 6-5. EK500 configuration dialog box.

6.2.3.1 Operation Menu

6.2.3.1.1 Ping mode

Description	Ping mode of the echosounder.
Limits	Off, Normal, Ext. Trig.
Effects	This field is saved in the *.ch1 data source configuration file and *.*HAC* data file (Echosounder tuple).
Remarks	This command controls the operation mode of the echosounder. The parameter is always saved as OFF in the configuration document file (*.ch1) to prevent

	accidental activation of the ping mode with the Send Configuration button.
See also	Simrad EK500 Operator Manual - Command References (p.6)

6.2.3.1.2 Ping interval

Description	Ping interval of the echosounder (seconds).
Limits	0 to 20.0 seconds in steps of 0.1 second.
Effects	This field is saved in the *.ch1 data source configuration file and ****.HAC*** data file (Echosounder tuple).
Remarks	If the echosounder is unable to ping as fast as the selected ping interval, a warning will be given by the EK500 and the ping will be delayed by one or more ping intervals. If one operates with a ping interval set at 0, the echosounder will ping as fast as possible (delayed only by sound propagation time and internal data processing). The ping interval can therefore be increased by reducing the amount of data processing requested of the EK500, i.e., sending unnecessary output telegrams increases processing time.
See also	Simrad EK500 Operator Manual - Command References (p. 7).

6.2.3.1.3 Transmit power

Description	Nominal output power.
Limits	Normal, Reduced.
Effects	This field is saved in the *.ch1 data source configuration file and ****.HAC*** data file (Echosounder tuple).
Remarks	The transmit power is reduced from its nominal value by 20 dB on all transceiver channels by entering Reduced.
See also	Simrad EK500 Operator Manual - Command References (p. 7).

6.2.3.1.4 Noise margin

Description	Noise margin.
Limits	0 to 40 dB in steps of 1 dB.
Effects	This field is saved in the *.ch1 data source configuration file and ****.HAC*** data file (Echosounder tuple).
Remarks	The system noise is defined as the sum of receiver noise and ambient noise. It is continuously estimated by the EK500 during normal operation based on a precise and relatively robust algorithm. Independent computation is performed for each transceiver channel. Signal power samples from the receiving system are only forwarded to further processing if their power level exceeds the system noise level plus the noise margin setting. Thus, with the Noise Margin set to 10 dB, most of the noise samples will be disregarded and only a few noise spikes will appear on the Channel as isolated coloured dots. The noise margin should be kept as low as possible. A noise margin of 0 dB disables the EK500 threshold mechanism just described. **Note**: The noise margin must be disabled when using the TVT evaluation to determine the noise threshold.
See also	Simrad EK500 Operator Manual - Command References (p. 6-7), Theory of Operation - Noise (p. 21-22).

6.2.3.2 Layer Menu

6.2.3.2.1 Super layer

Description The Super layer number identifies which of the layers is designated to be the Super layer.
Limits 1 to 10.
Effects This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file. (Echosounder tuple).
Remarks Various special functions are related to this layer: TS bar chart, fish behaviour (target) window, integration line, sample data on the FIFO port, and the scope.
See also Simrad EK500 Operator Manual - Command References (p. 36), Theory of Operation (p. 15-16).

6.2.3.2.2 Type

Description Super layer type.
Limits Off, Surface, Bottom, or Pelagic.
Effects This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Echosounder tuple).
Remarks A layer is either OFF, referred to the sea Surface (bottom detection by the EK500 is required for EK500 integration, TS measurements, and FIFO sample data output), referred to the detected Bottom, or Pelagic (referred to the sea surface but with no bottom detection required). The pelagic type should be used in deep waters when the bottom is deeper than the max. bottom detection range.
See also Simrad EK500 Operator Manual - Command References (p. 37), Theory of Operation (p. 15-16).

6.2.3.2.3 Range

Description Super layer thickness.
Limits 0.0 to 1000.0 metres in steps of 0.1 metre.
Effects This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Echosounder tuple).
Remarks Only sample data from within this Super layer range and above the detected bottom (for Surface and Bottom layer types) will be output from the receiver.
See also Simrad EK500 Operator Manual - Command References (p. 37), Theory of Operation (p. 15-16).

6.2.3.2.4 Range start

Description Beginning depth of Super layer.
Limits -10.0 to +9999.9 metres in steps of 0.1 metre.
Effects This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Echosounder tuple).
Remarks The upper depth limit of the layer is either referred to the sea surface (positive values below the surface) or to the detected bottom (positive values above the bottom).
See also Simrad EK500 Operator Manual - Command References (p. 38), Theory of

Operation (p. 15-16).

6.2.3.2.5 Margin

Description	Layer limit margin.
Limits	0.0 to 10.0 metres in steps of 0.1 metre.
Effects	This field is saved in the *.ch1 data source configuration file and **.*HAC*** data file (Echosounder tuple).
Remarks	The margin parameter causes a surface layer to stop at the margin distance above the detected bottom and a bottom layer to stop at the margin distance below the transducer face. This parameter is ignored for a pelagic layer.
See also	Simrad EK500 Operator Manual - Command References (p. 38), Theory of Operation (p. 15-16).

6.2.3.2.6 Sv threshold

Description	Volume backscattering strength threshold value.
Limits	-100 to 0 dB in steps of 1 dB.
Effects	This field is saved in the *.ch1 data source configuration file and **.*HAC*** data file (Echosounder tuple).
Remarks	This parameter sets the volume backscattering strength threshold for echo integration by the EK500.
See also	Simrad EK500 Operator Manual - Command References (p. 38), Theory of Operation (p. 15-16).

6.2.3.3 Ethernet Com. Menu / Telegram Menu

6.2.3.3.1 Sample range

Description	Sample range in metres.
Limits	0 to 1000 metres.
Effects	This parameter sets the range for which sample data will be sent to the Ethernet port for processing by ***CH1***. This field is saved in the *.ch1 data source configuration file and **.*HAC*** data file (Echosounder tuple).
Remarks	The maximum number of samples that the EK500 produces for a given channel is 10000. Therefore the maximum sample range for the 38 kHz transceiver is 1000 metres and 300 metres for the 120 kHz transceiver, given their fixed sample rates of 7.5 and 25 kilo samples/s, respectively. **Note**: This parameter should be set at the minimum range required to prevent the unnecessary processing of excessive data samples.
See also	Simrad EK500 Operator Manual - Command References (p. 44-45).

6.2.3.4 Sound Velocity Menu

6.2.3.4.1 Sound speed

Description	Sound speed.
Limits	1 400 to 1 700 metres/s in steps of 1 metres/s.
Effects	This field is saved in the *.ch1 configuration file and *.***HAC*** data file (Echosounder tuple).
Remarks	The EK500 computes range using a sound velocity profile rather than an average velocity for all depths. However, presently this field allows the user to enter only a single average value that is saved in the *.ch1 data source configuration file and *.***HAC*** data file. **Warning**: This parameter is not sent to the EK500 with the Send Configuration button.
See also	Simrad EK500 Operator Manual - Command References (p. 98-102), Theory of Operation (p. 12).

6.2.3.5 Time Varied Threshold Evaluation group

The parameters within this group determine how the Time Varied Threshold (TVT) will be evaluated. The TVT is a threshold that is affected by the TVG applied on the given data channel. Noise data are acquired at the channel sample rate, up to the chosen Sample range while the echosounder is in receive mode only (not transmitting but triggering). The ping data acquired during the TVT evaluation are stored in the *.***HAC*** data file (Ping tuples). A series of 100 regularly spaced samples from these data are then stored for the first ping and compared, pairwise, to the equivalent 100 samples of the next ping and the maximum of the two samples is retained. The process is repeated up to the Number of pings chosen for the TVT evaluation. Then a curve is fitted by least squares to the regularly spaced 100 maxima retained. By this method, the TVT is evaluated along the upper limit of the noise data envelope. However, because it is a least squares process, some noise samples will exceed the fitted curve. If you want to raise the TVT curve to threshold out these samples, just increase the TVT offset correction in the Channel menus. With the EK500, the TVT curve $[A(20 \log(R)+2\alpha R) + C]$ is fitted to the Sv data channel, where R is the range, A and C are the estimated coefficients and α is the sound absorption coefficient. If a sample is below the TVT curve on the Sv channel, it will be removed, along with the corresponding sample on all other channels for the same transceiver.

If the All frequencies radio button is activated, the TVT parameters of all channels will be updated. If the Active frequency radio button is activated, only the TVT parameters of the active window channel will be updated. If the TVT evaluation is successful or unsuccessful, a message to that effect will be displayed in the status bar. If the algorithm is unable to optimise to the TVT curve, change the starting TVT offset or amplification values in the Channel / Edit menu and retry. To view the fitted TVT curve for an active window channel, click on the View TVT curve icon.

6.2.3.5.1 Operation mode (Manual / Automatic)

Description — Automatic: automatic evaluation of the TVT at regular time intervals.
Manual: evaluation process is activated when the user clicks the Aquisition (data) / TVT menu item.

Limits — Manual, Automatic.

Effects — This field is saved in the *.ch1 data source configuration file but not in the **.HAC* data file (Echosounder tuple).

6.2.3.5.2 Manual mode

Description — This field specifies whether the TVT will be evaluated for all frequencies or for only the active frequency.

Limits — Active frequency, All frequencies.

Effects — This field is saved in the *.ch1 data source configuration file but not in the **.HAC* data file (Echosounder tuple).

Remarks — Selection of the All frequencies radio button will cause the TVT parameters to be updated for all open frequencies each time a TVT evaluation is requested; activating the Active frequency radio button allows for the independent TVT evaluation of each frequency.

6.2.3.5.3 Automatic mode

Description — This field specifies the time interval for automatic TVT evaluation.

Limits — 0 to 59 for the minutes and 0 to 720 for the hours.

Effects — This field is saved in the *.ch1 data source configuration file but not in the **.HAC* data file (Echosounder tuple).

Remarks — Selection of the All frequencies radio button in the Manual mode field will cause the TVT parameters to be updated for all open frequencies after each time interval. Activating the Active frequency radio button in the Manual mode field causes the TVT parameters to be updated for the active frequency only.

6.2.3.5.4 Nb Pings (number of pings)

Description — This field specifies the number of pings over which the TVT will be evaluated.

Limits — 1 to 20 pings.

Effects — This field is saved in the *.ch1 data source configuration file and in the **.HAC* data file (General Threshold tuple). The ping data acquired during the TVT evaluation are stored in the **.HAC* data file (Ping tuples).

Remarks — See the Time Varied Threshold evaluation method above.

6.2.3.6 Bottom sampling thickness

Description	Range sampled after the bottom detection in metres.
Effects	Samples following the bottom detected range will be recorded in the *.***HAC*** data file down to the given thickness. This field is saved in the *.ch1 data source configuration file .
Remarks	Selecting a large thickness can significantly increase the amount of data collected, and therefore the requirement for storage space.
See also	Bottom Detection Menu.

6.2.3.7 EK500 version

Description	Version of the EK500 software used.
Limits	1 to 99.99.
Effects	This field is saved in the *.ch1 configuration file and *.***HAC*** data file (Echosounder tuple).
Remarks	Presently, ***CH1*** only supports version 5.3.

6.2.3.8 Remark

Description	Comment character string.
Limits	30 characters.
Effects	This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Echosounder tuple).
Remarks	Enter information that might be used to uniquely identify the echosounder, such as the echosounder serial number.

6.2.3.9 Send Configuration button

The Send Configuration button transmits the present echosounder configuration to the EK500 via the serial port configured in the EK500 menu (see section 11.1). The EK500 will beep and display "Remote Parameter Entered" to acknowledge reception of the configuration.

6.3 Acquisition (data) / Start

Starts the acquisition process for the active document. The command is not available when the active document is acquiring. This launches the following actions:

1. Prepares the binary *****.HAC*** data file: creates a new file or opens an existing file to append new data at the end, depending on the file acquisition mode. For a new file, writes the Echosounder tuple and a Channel tuple for each channel.
2. For a Biosonics DSP or DSP-Tape Document: initialises the DSP for data transfer from the echosounder. For the EK500 document, creates a new Ethernet socket to communicate with the Simrad echosounder.
3. For a Biosonics DSP or DSP-Tape Document: sets a timer (for each channel) to the interval at which ***CH1*** needs to look for transfering data from the DSP. For the EK500 document, a listener is added for each channel.
4. If the connection with GPS is not yet established, a connection with GPS is established on serial port unless the GPS connection is disabled (see section 10.3.6).
5. Enables the menu items: Acquisition (data) / Restart, Acquisition (data) / Stop.
6. Disables the menu items: Acquisition (data) / File, Acquisition (data) / Configuration, Acquisition (data) / Start, Channel / Add, Channel / Edit, Channel / Delete.

6.4 Acquisition (data) / Restart

Restarts the acquisition process for the active document. The purpose of this command is to erase the acquired data from the active *****.HAC*** data file when they are not wanted, for example during a false start in acquisition on transects. The command is only available when ***CH1*** is currently acquiring. This launches the following actions:

1. The user is warned that the data acquired in the active *****.HAC*** data file since the beginning will be lost (erased from the file) and is asked to confirm.
2. If the user has confirmed:
   - The acquisition process is stopped.
   - The content of the binary *****.HAC*** data file is erased.
   - The acquisition restarts.

6.5 Acquisition (data) / Stop

Stops the acquisition process for the active document. The command is only available when the active document is currently acquiring. This launches the following actions:

1. Closes the binary *****.HAC*** data file.
2. For a Biosonics DSP or DSP-Tape document, kills the timer associated with each channel. For the EK500 document, deletes the Ethernet socket object and removes pending messages in the queue.

6.6 Acquisition (data) / TVT

Launches the evaluation of Time Varied Threshold. This function is included in the tool bar for easier access. If the acquisition is not activated, the TVT will not be applied. After activation of the TVT during acquisition, all data samples will be recorded (and stored in the ***.HAC** data file) without any threshold for the number of pings chosen for the TVT evaluation in the Acquisition (data) / Configuration dialog box.

During TVT evaluation, the echosounder should not transmit pulses but only listen to the ambient noise on which the TVG of the echosounder is applied. The TVT is a threshold that is affected by the TVG applied on the given data channel. Ambient noise data are acquired at the chosen sample rate, up to the chosen TVG max. range, while the echosounder is only listening (triggering but not transmitting). A series of 100 regularly spaced samples from these data are then stored for the first ping and compared, pairwise, to the equivalent 100 samples of the next ping; the maximum of the two samples is retained. The process is repeated up to the number of pings chosen for the TVT evaluation. A curve is fitted by least squares to the regularly-spaced 100 maxima retained. By this method, the TVT is evaluated along the upper limit of the ambient noise data envelope.

EK500 specific:

If the All frequencies radio button in the Acquisition (data) / Configuration menu is activated, the TVT parameters of all channels will be updated. If the Active frequency radio button is activated, only the channel of the active window will be updated. The transceiver mode (Channel Menu) is set automatically to Passive (receive only) and ***CH1*** waits for three pings before accumulating samples for the TVT evaluation. After the required number of pings has been accumulated, the Transceiver mode is automatically set to its condition prior to the evaluation, i.e., if the Transceiver mode was Active before the evaluation, it will be set to Active after the evaluation. Note: If the transceiver is in Test mode, it will remain in Test mode throughout the evaluation. The TVT curve $[A\ (20 \log(R) + 2\alpha R) + C]$ is fitted to the Sv data channel, where R is the range, A and C are the estimated coefficients and α is the sound absorption coefficient. An option is provided to only optimise for the TVT Offset parameter C. If a sample is below the TVT curve on the Sv channel, it will be removed along with the corresponding sample on all other channels for the same transceiver.

Biosonics specific:

The TVT curves fitted on the voltage (i.e., not the intensity, V^2) are: (1) $A\ R\ e^{BR} + C$ for the 20 log R TVG; and (2) $A\ R^2\ e^{BR} + C$ for the 40 log R TVG; where R is the range, A and C are the estimated coefficients and B is the sound absorption coefficient (B = alpha / 10 log e).

There are two operating modes, Manual and Automatic. When Manual mode is selected in the Acquisition (data) / Configuration, the evaluation process is activated when the user clicks the Acquisition (data) / TVT menu item (or the TVT evaluation tool). ***CH1*** evaluates the TVT curve parameters for all channels by fitting a curve to the noise data. Note: The Automatic mode is not yet implemented for the Biosonics type of echosounder.

6.7 Acquisition (data) / DSP-calibration parameters (Figure 6-6.)

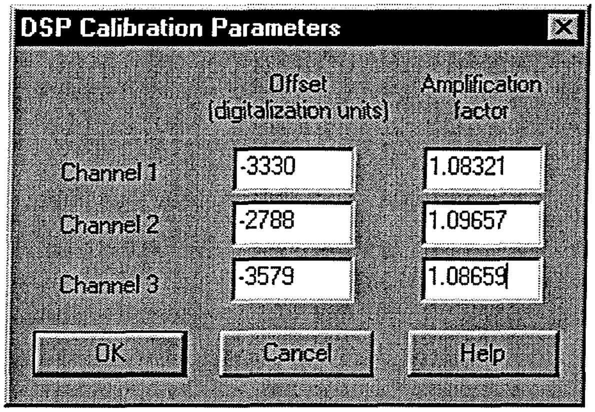


Figure 6-6. DSP Calibration Parameters.

Description	Use this dialog box to enter the calibration parameters of the Bridgenorth 1416 A/D converters for channels 1 to 3.
Limits	Offset < 65536, amplification > 0.
Effects	These parameters are modifying the voltage conversion factors of the A/D converters.
Remarks	These parameters are the offset and slope of the equation Y = m x + b, where Y is the right voltage (expressed as a 16-bit word, 0 = 0 volts, 65536 = 15 volts), x is the voltage given by the A/D converter when m = 1 and b = 0. These parameters were supplied with your ***CH1*** system but should be checked regularly for drift in the acquisition system.

To evaluate these parameters, the offsets of all channels should be set to 0 and the amplification factors to 1. Then known voltages are sent to the channels and a *.***HAC*** data files are acquired. The voltages given by the A/D converters are read using the ***HAC-trafic*** utility. These voltages are converted to 16-bits words, as indicated above, to estimate the value of m and b from a linear regression. After entering the new parameters, the test should be run again to confirm that the injected voltages and the voltages stored in the *.***HAC*** are the same.

Warning: These parameters are not saved in the *.ch1 configuration files but in the Windows 95® registry on the PC used. They are therefore associated with the PC because they are related to the particular hardware (signal conditioning box, A/D converters and DSP boards) used by the PC. When exchanging *.ch1 configuration files from one PC to another, the user must keep in mind that the A/D calibration parameters are not transferred and should make sure that the proper A/D calibration parameters are used.

7. CHANNEL MENU

The Channel menu offers the following commands:

Add	Adds a new channel to the active document
Delete	Deletes the last channel created
Edit	Edits the channel parameters of the active channel
Edit Palette	Edits the colour palette of the active channel

7.1 Channel / Add

Use this menu item to add a new channel to the active document. This action opens a dialog box to configure the channel. The dialog box is document-dependent, meaning that it will vary according to the type of document that is active when it is called.

7.1.1 Biosonics DSP and DSP-Tape Channel Parameters (Figure 7-1.)

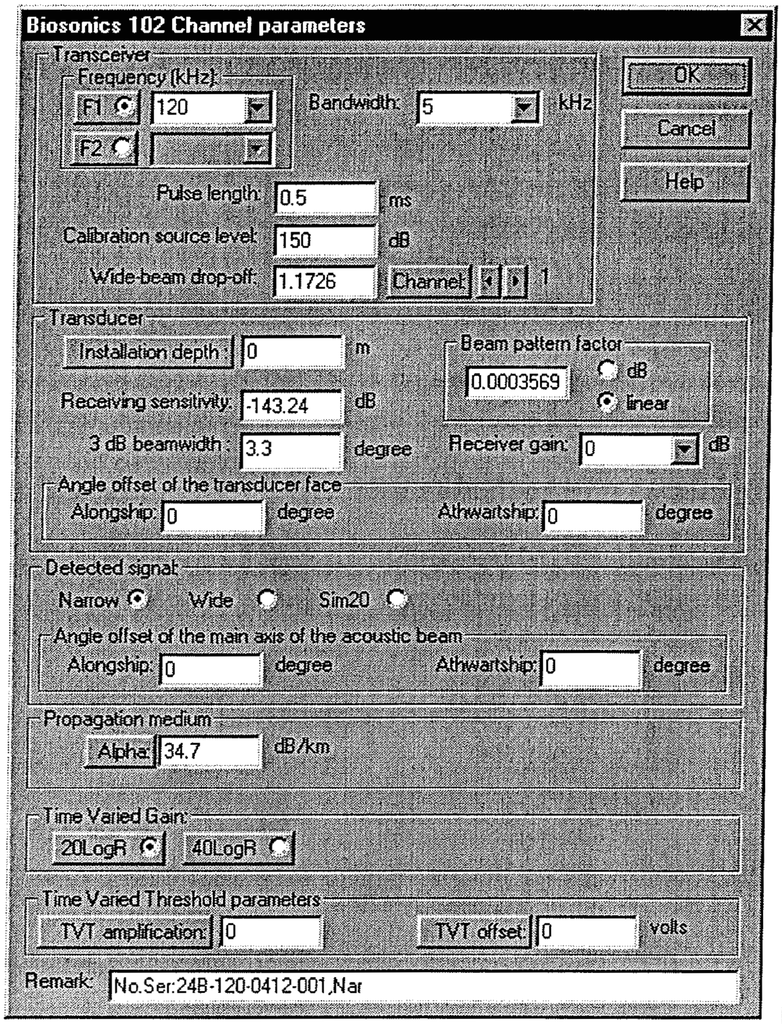


Figure 7-1. Biosonics DSP and Biosonics DSP-Tape Channel Parameters dialog box.

7.1.1.1 Transceiver group

7.1.1.1.1 Frequency

Description	Acoustic frequency corresponding to the (F1 or F2) channel.
Limits	1 to 1000 kHz.
Effects	The only use of this field is to label the collected information. It is not involved in any computation. This field is saved in the *.ch1 data source configuration file and **.HAC* data file (Channel tuple).
Remarks	**Warning:** ***CH1*** assumes that for F2, the F1/F2 signal is low (< 1.87 volts) and vice-versa for F1. If the wrong choice is made, ***CH1*** will not start acquiring for this channel until it gets the proper F1/F2 signal on channel 4 on the DFO/IML EBDI-0055 signal conditioning box. The proper absorption coefficient used by the echosounder for this frequency should be given in the Alpha field of the propagation medium menu.
See also	Time Varied Threshold evaluation, Alpha.

7.1.1.1.2 Bandwidth

Description	Transceiver-specific bandwidth in kHz.
Limits	1.25 or 2.50 or 5.00 or 10.0 kHz.
Effects	This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).
Remarks	This field is a comment only.

7.1.1.1.3 Pulse length

Description	Duration of the transmitted pulse in ms.
Limits	0.10000 to 9.900000 ms.
Effects	This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).
Remarks	This field is involved in further processing of the acoustic information.

7.1.1.1.4 Calibration source level

Description	Source level (in dB) of the echosounder from the calibration (SL of the sonar equation).
Limits	150.000 to 250.000 dB re 1 μPa @ 1 metre.
Effects	This field is saved in the document configuration file *.ch1 and *.***HAC*** data file (Channel tuple).
Remarks	This field is involved in further processing of the acoustic information.

7.1.1.1.5 Wide-beam drop-off

Description	Wide-beam drop-off for this transducer.
Limits	1.0000 to 1.5000.
Effects	This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).

Remarks	The wide-beam drop-off (d) is the factor relating the narrow-beam directivity in dB (Bn) to the difference between the narrow-beam and wide-beam (Bw) directivities in dB: Bn = d (Bn-Bw). It describes the decrease in wide-beam directivity over the angular range of the narrow beam. This field is involved in further dual-beam processing of the acoustic information.

7.1.1.1.6 Channel

Description	DSP-A/D Channel (1, 2, or 3) where the data are coming from the signal conditioning box connected to the echosounder or to the Model 171 tape playback interface. For the DSP-tape configuration, it is the channel used at the original acquisition, not the channel used while reading the tape.
Limits	1, 2, or 3.
Effects	This field is saved in the ***CH1*** data source configuration file *.ch1.
Remarks	Presently ***CH1*** uses the channel 4 of the DSP-A/D to read the F1/F2 signal. The channels 1, 2, and 3 are used to read the data channels. **Warning**: Be careful not to mix the channel connections. For the DSP-tape configuration, use the channel at the original acquisition (e.g., Biosonics sim20 is usually channel 3, the wide beam is usually channel 2, and the narrow beam is usually channel 1), not the physical channel of the signal conditioning box and A/D and DSP boards used while reading the tape (which are: channel 1 for track 1 and channel 2 for track 2).
See also	Biosonics DSP-Tape Configuration.

7.1.1.2 Transducer group

7.1.1.2.1 Installation depth

Description	Installation depth of the transducer relative to the sea surface in metres.
Limits	0 to 999.9 metres.
Effects	This field is used when depth is the selected View option to display the vertical axis of the active channel is instead of the range from the transducer. This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).
Remarks	The Z-Scale is also affected by this field when depth is the selected View option.
See also	View / Depth/Range.

7.1.1.2.2 Beam pattern factor / Directivity index

Description	Beam pattern factor for this transducer beam (expected value of b^2). For a circular transducer of an active face diameter d, the approximate formula for the beam pattern factor is: $(\text{lambda} / \pi\ d)^2$, and for the directivity index: $10 \log\ (\pi\ d / \text{lambda})^2$ (see Urick 1983, p. 42-43, 240-243; Medwin & Clay 1998, p. 145-146). For the wide-beam of a dual-beam transducer, usually the beam pattern factor is the composite 2-way beam pattern.
Limits	0 to 1.0000000 for the beam pattern factor.

Effects	This field is saved in the *.ch1 data source configuration file and **.HAC* data file.
Remarks	This field is involved in further processing of the acoustic information.
See also	Biosonics DSP-tape configuration.

7.1.1.2.3 Receiving sensitivity

Description	Receiving sensitivity of the echosounder in dB from the calibration (VR of the sonar equation), which includes the receiver gain setting of the echosounder (e.g., if the calibration sheets give the receiving sensitivity for a receiver gain setting of 0 dB on the echosounder as is usually done, but you operate the echosounder with a receiver gain setting of +12 dB, this field must be the sum of the two values).
Limits	-200.000 to -100.000 dB v.
Effects	This field is saved in the *.ch1 data source configuration file and **.HAC* data file (Channel tuple).
Remarks	This field is involved in further processing of the acoustic information.

7.1.1.2.4 Receiver gain

Description	Receiver gain of the echosounder.
Limits	-99 to +99 dB v.
Effects	This field is saved in the *.ch1 data source configuration file and **.HAC* data file (Channel tuple).
Remarks	The receiver gain is included in the receiving sensitivity field to get the VR of the sonar equation. This field is only a comment.

7.1.1.2.5 3-dB beamwidth

Description	Half power (3-dB) beamwidth of the transducer.
Limits	1 to 50 degrees.
Effects	This field is saved in the *.ch1 data source configuration file and **.HAC* data file (Channel tuple).
Remarks	This field is only a comment.

7.1.1.2.6 Angle Offset of the Transducer Face group

Alongship offset

Description Mechanical offset angle of the transducer face relative to the horizontal in the fore-and-aft plane. As in trigonometry, zero is the horizontal in the fore direction, positive is counter-clockwise and negative is clockwise. Zero is the usual position (down-looking, horizontal transducers), -90 (+270) is for a side-looking transducer oriented in the aft direction, -180 (+180) is for an upward-looking transducer, etc.

Limits -360 to 360 degrees.

Effects This field is saved in the *.ch1 data source configuration file and **.*HAC*** data file (Channel tuple).

Athwartship offset

Description Mechanical offset angle of the transducer face relative to the horizontal in the starboard-and-port plane. As in trigonometry, zero is the horizontal in the starboard direction, positive is counter-clockwise and negative is clockwise. Zero is the usual position (down-looking, horizontal transducers), -90 (+270) is for a side-looking transducer oriented in the port direction, -180 (+180) is for an upward-looking transducer, etc.

Limits -360 to 360 degrees.

Effects This field is saved in the *.ch1 data source configuration file and **.*HAC*** data file (Channel tuple).

7.1.1.3 Detected signal

7.1.1.3.1 Narrow / Wide / Sim20

Description Type of detected signal from the Biosonics echosounder.

Limits Narrow, Wide, or Sim20.

Effects This comment field is saved in the *.ch1 data source configuration file but not in the **.*HAC*** data file.

Remarks This is for information only. The three choices correspond to three different detected output channels from the Biosonics 102 echosounder.

7.1.1.3.2 Angle offset of the main axis of the acoustic beam

Alongship axis angle

Description Mechanical offset angle of acoustic beam main axis of the transducer relative to the vertical in the fore-and-aft plane. Negative is in the aft direction, zero (0) is perpendicular to the transducer face.

Limits -20 to 20 degrees.

Effects This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).

Athwartship axis angle

Description Mechanical offset angle of acoustic beam main axis of the transducer relative to the vertical in the starbord-and-port plane. Negative is in the port direction below the horizontal, zero (0) is perpendicular to the transducer face.

Limits -20 to 20 degrees.

Effects This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).

7.1.1.4 Propagation medium group

7.1.1.4.1 Alpha

Description Average sound absorption coefficient in dB/km for the corresponding acoustic frequency in the sampled medium.

Limits 0 to 300 dB/km.

Effects This field is involved in the coefficient B of the TVT equations fitted on the voltage (i.e., not the intensity, V^2), which are: 1) $A\ R\ e^{BR} + C$ for the 20 log R TVG; and; 2) $A\ R^2\ e^{BR} + C$ for the 40 log R TVG ; where R is the range, A and C are the estimated parameters and B is the sound absorption coefficient (B = alpha / 10 log e). This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).

See also MacLennan and Simmonds (1992, p.21-22) and Medwin and Clay (1998, p.103-104) for the relationship between the sound absorption coefficients alpha, and beta (here, B=2•beta).
Time Varied Threshold evaluation. For the sound speed in the propagation medium, see Acquisition (data) / Configuration.

7.1.1.5 Time Varied Gain (TVG)

Description: Type of Time Varied Gain applied by the echosounder on this channel.
Limits: 20 log R or 40 log R.
Effects: This field is used to determine the TVT formula to use in the TVT evaluation. This field is saved in the *.ch1 data source configuration file and **.*HAC*** data file (Channel tuple).
Remarks: This field is involved in further processing of the acoustic information.
See also: Alpha, Time Varied Threshold.
Acquisition (data) / TVT.

7.1.1.6 Time Varied Threshold parameters

7.1.1.6.1 TVT amplification

Description: Parameter A of the TVT formula fitted on the voltage (i.e., not the intensity, V^2), which are: (1) $A\ R\ e^{BR} + C$ for the 20 log R TVG, and (2) $A\ R^2\ e^{BR} + C$ for the 40 log R TVG, where R is the range, A and C are the estimated coefficients and B is given by the sound absorption coefficient (B = alpha / 10 log e).
Limits: 0 to 50.
Effects: Changing this field will change the shape of the TVT curve. Samples smaller than the TVT are not recorded in the **.*HAC*** file.
This field is saved in the *.ch1 data source configuration file and **.*HAC*** data file.
Remarks: Changing this value is an easy way to change the TVT shape when the noise is increasing or decreasing as a function of range during data acquisition.
See also: Acquisition (data)

7.1.1.6.2 TVT offset

Description	Parameter C of the TVT formula fitted on the voltage (i.e. not the intensity, V^2) which are: (1) A R e^{BR} + C for the 20 log R TVG, and (2) A R^2 e^{BR} + C for the 40 log R TVG, where R is the range, A and C are the estimated parameters and B is given by the sound absorption coefficient (B = alpha / 10 log e).
Limits	0 to15 volts.
Effects	Changing this field will move the TVT curve along the voltage axis. Samples smaller than the TVT curve are not recorded in the *.***HAC*** file. This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Threshold tuple).
Remarks	Changing this value is an easy way to offset the TVT least squares fitted curve or to change the threshold when the noise is increasing or decreasing by a constant during data acquisition.
See also	Acquisition (data) / TVT.

7.1.1.7 Remark

Description	Character string comment.
Limits	30 characters.
Effects	This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).
Remarks	Enter information that might be used to uniquely identify the channel such as transducer serial number and the beam angle.

7.1.2 EK500 Channel Parameters (Figure 7-2.)

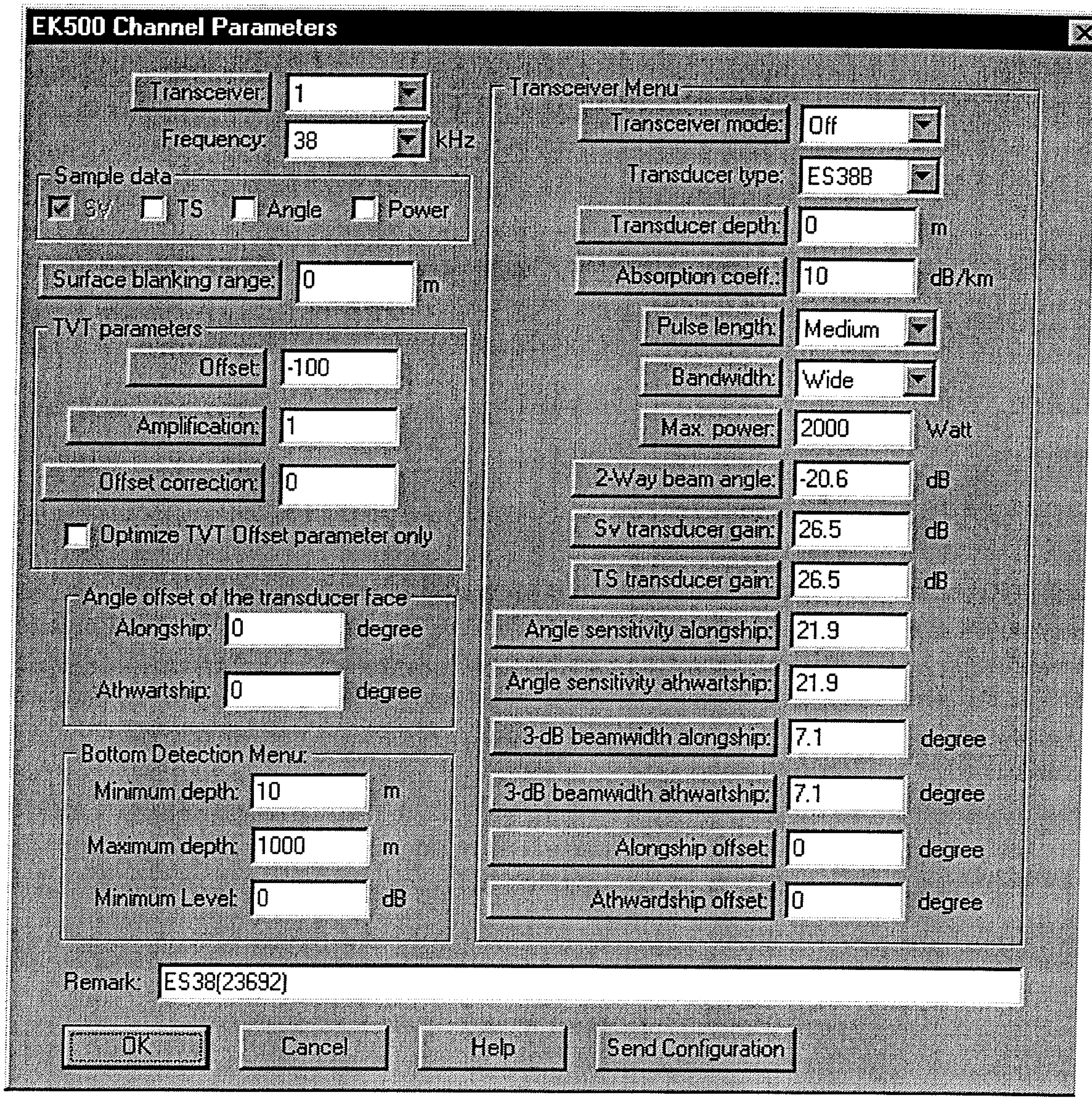


Figure 7-2. EK500 Channel Parameters dialog box.

7.1.2.1 Transceiver

Description	Transceiver channel number.
Limits	1, 2 or, 3.
Effects	This field is saved in the *.ch1 data source configuration file and **.HAC* data file (Channel tuple).

Remarks	There are three possible transceiver channels for the EK500.
See also	Simrad EK500 Operator Manual - Command References (p. 23).

7.1.2.2 Frequency

Description	Acoustic frequency.
Limits	12, 18, 38, 49, 70, 120, 200, 710 kHz.
Effects	This field is only a comment. This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).
Remarks	The frequency indicated in this field corresponds to the nominal frequency of the transceiver channel number in the previous field.
See also	Transceiver.

7.1.2.3 Sample data

Description	Ping-based sample data output.	
Limits	Angle, Power, Sv, or TS.	
Effects	This field defines the type of data that is stored for is channel in the *.***HAC*** file (Channel tuple). The setting is saved in the *.ch1 configuration file. For all sample telegrams, the maximum number of samples is 10000 per ping.	
Remarks	Sv:	This output telegram provides volume backscattering strength sample data, i.e., echo intensity with a 20 log R TVG applied, and is **compulsory**. To acquire any other variable with ***CH1***, the Sv data must be also acquired.
	TS:	This output telegram provides target strength sample data, i.e., echo intensity with a 40 log R TVG applied.
	Angle:	This output telegram provides angle sample data from the split beam transceiver. The fore-and-aft (alongship) and athwartship electrical angles are output as one 16-bit word.
	Power:	This output telegram provides power sample data from the transceiver, i.e., with no TVG applied.
See also	Simrad EK500 Operator Manual - Communication Ports - The Lan Port (p. 12-23). Command References - Ethernet / Telegram Menu (p. 44-45).	

7.1.2.4 Surface blanking range

Description	Blanking range, in metres, from the transducer face up to which data samples are eliminated.
Limits	0 to 999.9 metres.
Effects	This field is saved in the *.ch1 data source configuration file but not in the *.***HAC*** data file.
Remarks	This range is used to eliminate surface noisy samples originating from transducer

ringing or surface bubbles. The range is computed from the face of the transducer.

7.1.2.5 TVT parameters group

7.1.2.5.1 TVT offset

Description Parameter C of the TVT formula fitted on Sv data, in dB. The TVT curve fitted for the EK500 Sv data is A (20 log(R) + 2αR) + C, where R is the range, A and C are the estimated coefficients, and α is the sound absorption coefficient.

Limits -200 to 60 dB.

Effects Changing this field will move the TVT curve along the Sv axis. Data smaller than the TVT are not acquired in the *.***HAC*** file. This field is added to the TVT offset correction below and the result is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Threshold tuple).

Remarks Parameter C: changing this value is an easy way to offset the TVT least squares fitted curve and to change the threshold when the noise is increasing or decreasing by a constant over all ranges during data acquisition.

See also Acquisition (data).

7.1.2.5.2 TVT amplification

Description Parameter A of the TVT formula fitted on Sv. The TVT curve fitted for the EK500 Sv data is A (20 log(R) + 2αR) + C, where R is the range, A and C are the estimated coefficients, and α is the sound absorption coefficient.

Limits 0 to 5.

Effects Changing this field will change the shape of the TVT curve. Data smaller than the TVT are not acquired in the *.***HAC*** file. This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Threshold tuple).

Remarks Changing this value is an easy way to change the TVT shape when needed because of the noise is increasing or decreasing as a function of range during data acquisition. Activating the Optimize TVT Offset parameter only radio button causes this parameter to remain unchanged during subsequent TVT evaluations. A value of 1.0 implies that an exact 20 log R TVG and the correct absorption coefficient are used by the echosounder.

See also Acquisition (data) / Configuration, Acquisition (data) / TVT.

7.1.2.5.3 TVT offset correction

Description Additional offset added to the TVT offset parameter.

Limits -200 to 200 dB.

Effects Changing this field will move the TVT curve along the Sv axis in addition to the TVT offset determined by the TVT evaluation. This field is added to the TVT offset above and the result is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Threshold tuple).

Remarks Changing this value is an easy way to offset the TVT least squares fitted curve and to change the threshold when the noise is increasing or decreasing by a constant over all ranges during data acquisition.

See also Acquisition (data) / Configuration, Acquisition (data) / TVT.

7.1.2.5.4 Optimize TVT Offset parameter only

Description Constraint imposed on the TVT evaluation.

Limits On or off.

Effects When this option is selected ***CH1*** will only evaluate the Offset parameter of the TVT.

Remarks Use this option if you do not want to change the active TVT amplification parameter but you want that ***CH1*** evaluate the offset only.

7.1.2.6 Transceiver Menu

7.1.2.6.1 Transceiver mode

Description Transceiver mode.

Limits Off, Active, Passive or Test.

Effects This field sets the transceiver operating mode. Active mode is the normal operating mode; in Passive mode the transmitter is disabled and in Test mode, a test signal is sent to the receiver and the transmitter is disabled. This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).

Remarks Both the Transceiver mode and the Ping mode must be activated for the EK500 to operate.

See also Simrad EK500 Operator Manual - Command References (p. 25).

7.1.2.6.2 Transducer type

Description Transducer type for the active channel.

Limits List.

Effects Choose from a list of possible transducers. This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).

Remarks This field is a comment only.

See also Simrad EK500 Operator Manual - Command References (p. 25).

7.1.2.6.3 Transducer depth

Description Installation depth of transducer relative to the sea surface.

Limits 0.00 to 999.99 metres in steps of 0.01 metre.

Effects This field is used when depth is the selected View option to display the vertical axis of the active channel is instead of the range from the transducer. The Z-Scale is also affected by this field when depth is the selected View option. This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).

Remarks The installation depth must be input to allow the EK500 to add the difference in depth between the transducer face and the sea surface.

See also Simrad EK500 Operator Manual - Command References (p. 55).

7.1.2.6.4 Absorption coeff.

Description	Alpha, average absorption of sound in the propagation medium.
Limits	0 to 99 dB/km in steps of 1 dB/km.
Effects	This value is used in the TVT curve fitting and in the compensation for absorption losses by the TVG within the EK500. This field is saved in the *.ch1 data source configuration file and ****.HAC*** data file (Channel tuple).
Remarks	The default values are computed according to François and Garrison (1982) for a temperature of 10°C, a salinity of 35, a depth of 250 m, and a pH of 8.
See also	Acquisition (data), Simrad EK500 Operator Manual - Command References (p. 6), Theory of Operation (p. 23).

7.1.2.6.5 Pulse length

Description	Transceiver-specific pulse length.
Limits	Short, Medium, or Long.
Effects	This field selects a pulse length (pulse duration) for the transmitted signal. This field is saved in the *.ch1 data source configuration file and ****.HAC*** data file (Channel tuple).
Remarks	The user may select between three different pulse lengths (pulse durations). The actual pulse length (ms) of the transmitted pulse is found in the Simrad EK500 Operator Manual - Technical Specifications -Transducer Types and Transceiver Parameters (p. 8).
See also	Simrad EK500 Operator Manual - Command References (p. 27).

7.1.2.6.6 Bandwidth

Description	Transceiver-specific bandwidth.
Limits	Narrow, Wide, or Auto.
Effects	This field selects a bandwidth for the transceiver. This field is saved in the *.ch1 data source configuration file and ****.HAC*** data file (Channel tuple).
Remarks	The user may select between Wide and Narrow manual bandwidth or Auto for automatic selection. In Auto, the bandwidth is automatically adjusted to the pulse length. • Wide bandwidth for Short and Medium pulse length. • Narrow bandwidth for Long pulse length. Note that Narrow bandwidth should not be used in combination with Short and Medium pulse length. Wide bandwidth is approximately 1/10 of the frequency, Narrow bandwidth is approximately 1/100 of the frequency. The actual bandwidth (kHz) of the transmitted pulse is found in the Simrad EK500 Operator Manual - Technical Specifications -Transducer Types and Transceiver Parameters (p. 8).
See also	Simrad EK500 Operator Manual - Introduction (p. 11), Command References (p. 27).

7.1.2.6.7 Max. power

Description	Transmit power referred to the transducer terminals.
Limits	1 to 10000 watts in steps of 1 watt.
Effects	This field sets the maximum transmission power parameter in the EK500. This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).
Remarks	The Transmit Power parameter (Pt) in the EK500 Operation Menu must be set to Normal. This setting only affects the value for Pt used in the computations, not the actual power going out.
See also	Transmit Pw, Simrad EK500 Operator Manual - Command References (p. 27), Theory of Operation (p. 7-11).

7.1.2.6.8 Two-Way beam angle

Description	Equivalent Two-Way beam solid angle.
Limits	-99.9 to 0.0 dB in steps of 0.1 dB.
Effects	This field affects the EK500 computation to establish the correct level of the returned bottom echo. This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).
Remarks	The nominal value of Two-Way beam angle is given by the transducer characteristics in the Simrad EK500 Operator Manual - Technical Specifications. A more appropriate value can be calculated from data collected during a beam pattern calibration using the equation: Two-Way beam angle = 10 log(B1*B2)/5800, where B1 and B2 are the alongship and arthwartship beamwidths as determined by the Lobe software (provided by Simrad).
See also	Simrad EK500 Operator Manual - Introduction (p. 11), Command References (p. 28), Theory of Operation (p. 17-19), Calibration of the EK500.

7.1.2.6.9 Sv transducer gain

Description	Peak 20 log R transducer gain.
Limits	0.0 to 99.9 dB in steps of 0.1 dB.
Effects	This field is used during the EK500's computation of volume backscattering strength (Sv). This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).
Remarks	This field is the 20 log R system gain determined from the standard sphere calibration method. The nominal Sv transducer gain for a given transceiver is found in the Simrad EK500 Operator Manual - Technical Specifications.
See also	Simrad EK500 Operator Manual - Command References (p. 28), Theory of Operation (p. 7-11), Calibration of the EK500.

7.1.2.6.10 TS transducer gain

Description	Peak 40 log R transducer gain.
Limits	0.0 to 99.9 dB in steps of 0.1 dB.
Effects	This field is used during the EK500's computation of target strength (TS). It is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel

tuple).

Remarks — This field is the 40 log R system gain determined from the standard sphere calibration method. The nominal TS transducer gain is found in the Simrad EK500 Operator Manual - Technical Specifications.

See also — Simrad EK500 Operator Manual - Command References (p. 28), Theory of Operation (p. 7-11), Calibration of the EK500

7.1.2.6.11 Angle sensitivity alongship

Description — Ratio between the electrical and mechanical angle specific to the split beam transducer in the fore-and-aft direction.

Limits — 0.0 to 99.9 in steps of 0.1.

Effects — This field is required in further data processing to convert the raw phase data received over the Ethernet to actual degrees off axis. This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).

Remarks — The angle sensitivity of a split beam transducer equals the electrical phase angle in degrees for one mechanical phase angle in degrees. The actual angle sensitivity for each split beam transducer is found in the Simrad EK500 Operator Manual - Technical Specifications.

See also — Simrad EK500 Operator Manual - Command References (p. 28), Theory of Operation (p. 17-19).

7.1.2.6.12 Angle sensitivity athwartship

Description — Ratio between the electrical and mechanical angle specific to the split beam transducer in the starboard-and-port direction.

Limits — 0.0 to 99.9 in steps of 0.1.

Effects — This field is required in further data processing to convert the raw phase data received over the Ethernet to actual degrees off axis. This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).

Remarks — The angle sensitivity of a split beam transducer equals the electrical phase angle in degrees for one mechanical phase angle in degrees. The actual angle sensitivity for each split beam transducer is found in the Simrad EK500 Operator Manual - Technical Specifications.

See also — Simrad EK500 Operator Manual - Command References (p. 29), Theory of Operation (p. 17-19).

7.1.2.6.13 3-dB beamwidth alongship

Description — 3-dB beamwidth of the transducer in the fore-and-aft plane.

Limits — 0.0 to 50.0 degrees in steps of 0.1 degree.

Effects — This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).

Remarks — The default 3-dB beamwidth of the transmitted pulse is found in the Simrad EK500 Operator Manual - Technical Specifications. The actual value can be calculated using the Lobe software (provided by Simrad), which estimates the beam pattern of the transducer during a standard target calibration.

See also Simrad EK500 Operator Manual - Command References (p. 29), Theory of Operation (p. 7-11), Calibration of the EK500.

7.1.2.6.14 3-dB beamwidth athwartship

Description 3-dB beamwidth of the transducer in the starboard-and-port plane.

Limits 0.0 to 50.0 degrees in steps of 0.1 degree.

Effects This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).

Remarks The default 3-dB beamwidth of the transmitted pulse is found in the Introduction section of the Simrad EK500 Operator Manual - Technical Specifications. The actual value can be calculated using the Lobe software (provided by Simrad), which estimates the beam pattern of the transducer during a standard target calibration.

See also Simrad EK500 Operator Manual - Command References (p. 29), Theory of Operation (p. 7-11), Calibration of the EK500.

7.1.2.6.15 Alongship offset

Description Mechanical offset angle of the main axis of the acoustic beam of the transducer relative to the vertical in the fore-and-aft plane. Negative is in the aft direction, zero (0) is perpendicular to the transducer face.

Limits -20.0 to 20.0 degrees in steps of 0.1 degree.

Effects This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).

Remarks This field is the fore-and-aft offset angle determined from the standard sphere calibration method. It is most easily calculated using the Lobe software (provided by Simrad), which estimates the beam pattern of the transducer to determine the correct TS compensation for off-axis targets.

See also Simrad EK500 Operator Manual - Command References (p. 29), Calibration of the EK500.

7.1.2.6.16 Athwartship offset

Description Mechanical offset angle of the acoustic beam main axis of the transducer relative to the vertical in the starboard-and-port plane. Negative is in the port direction, zero (0) is perpendicular to the transducer face.

Limits -20.0 to 20.0 degrees in steps of 0.1 degree.

Effects This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).

Remarks This field is the starboard-and-port offset angle determined from the standard sphere calibration method. It is most easily calculated using the Lobe software (provided by Simrad), which estimates the beam pattern of the transducer to determine the correct TS compensation for off-axis targets.

See also Simrad EK500 Operator Manual - Command References (p. 30), Calibration of the EK500.

7.1.2.7 Angle offset of the transducer face group

7.1.2.7.1 Alongship

Description Mechanical offset angle of the transducer face relative to the horizontal in the fore-and-aft plane. As in trigonometry, the horizontal in the fore direction is the zero reference, positive is counter-clockwise and negative is clockwise. Zero is the usual position (down-looking, horizontal transducers), -90 (+270) is for a side-looking transducer oriented in the aft direction, -180 (+180) is for an upward-looking transducer, etc.

Limits -360 to 360 degrees.

Effects This field is saved in the *.ch1 data source configuration file and **.*HAC*** data file (Channel tuple).

Remarks Negative is below the horizontal relative to the fore direction.

7.1.2.7.2 Athwartship

Description Mechanical offset angle of the transducer face relative to the horizontal in the starboard-and-port plane. As in trigonometry, zero is the horizontal in the starboard direction, positive is counter-clockwise and negative is clockwise. Zero is the usual position (down-looking, horizontal transducers), -90 (+270) is for a side-looking transducer oriented in the port direction, -180 (+180) is for an upward-looking transducer, etc.

Limits -360 to 360 degrees.

Effects This field is saved in the *.ch1 data source configuration file and **.*HAC*** data file (Channel tuple).

Remarks Negative is below the horizontal relative to the starboard direction.

7.1.2.8 Bottom Detection Menu

7.1.2.8.1 Minimum depth

Description Minimum depth for the bottom detection algorithm.

Limits 00.0 to 9999.9 metres in steps of 0.1 metre.

Effects This field is saved in the *.ch1 data source configuration file and **.*HAC*** data file (Channel tuple).

Remarks This parameter defines the depth below which the bottom detector searches for a bottom signal.

See also Simrad EK500 Operator Manual - Command References (p. 31-32), Theory of Operation (p. 12-13).

7.1.2.8.2 Maximum depth

Description	Maximum depth for the bottom detection algorithm.
Limits	00.0 to 9999.9 metres in steps of 0.1 metre.
Effects	This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).
Remarks	This parameter defines the depth above which the bottom detector searches for a bottom signal.
See also	Simrad EK500 Operator Manual - Command References (p. 32), Theory of Operation (p. 12-13).

7.1.2.8.3 Minimum Level

Description	Minimum volume backscattering strength for setting the bottom.
Limits	-80 to 0 dB in steps of 1 dB.
Effects	This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).
Remarks	After bottom detection, the detected depth is decremented in sample steps until the received echo signal (volume backscattering strength) is below the Minimum Level setting.
See also	Simrad EK500 Operator Manual - Command References (p. 33), Theory of Operation (p. 12-13).

7.1.2.9 Remark

Description	Character string comment.
Limits	30 characters.
Effects	This field is saved in the *.ch1 data source configuration file and *.***HAC*** data file (Channel tuple).
Remarks	Enter information that can be used to uniquely identify the channel such as the transducer serial number.

7.1.2.10 Send Configuration button

The Send Configuration button transmits the present channel configuration to the EK500 via the serial port. The EK500 will beep and display "Remote Parameter Entered" to acknowledge reception of the configuration.

7.2 Channel / Delete

Deletes the active channel. A dialog box appears to confirm deletion. Choose Yes to confirm or No to cancel. If the channel is an EK500 Sv channel, the warning message informs the user that all channels associated with this transciever will also be deleted. The Sv is compulsory to acquire other types of sample data on the EK500 channels (see section 7.1.2.3 Sample data).

7.3 Channel / Edit

Edits parameters of the active Channel (see section 7.1 Channel / Add).

7.4 Channel / Edit Palette (Figure 7-3.)

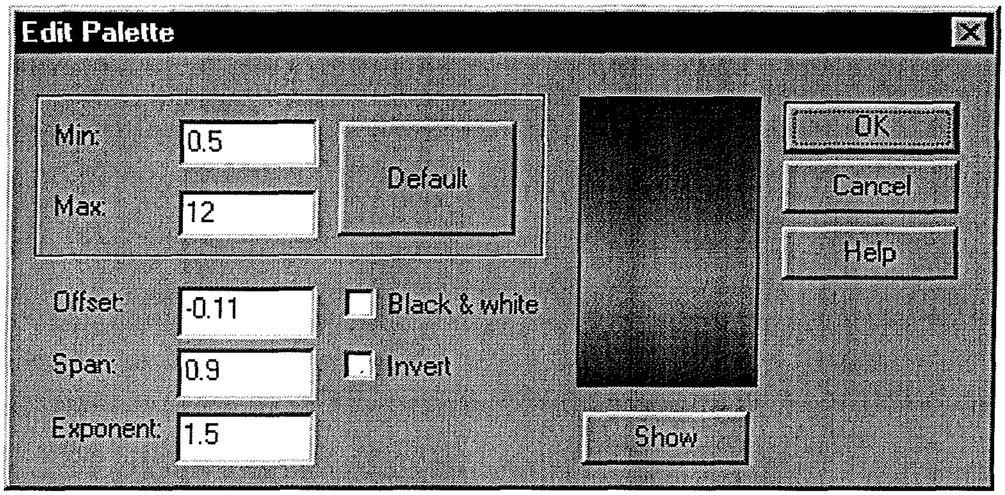


Figure 7-3. Edit Palette dialog box.

Use this dialog box to edit the palette of the active channel and to set the data limits of the corresponding oscilloscope window. A tool provides a direct access to this dialog box. Palettes are channel attributes. The palette can be viewed as a circular ribbon of colours. The palette settings for the channel are saved in the *.ch1 configuration file.

7.4.1 Min / Max

Determines the range of the active variable (in its own units) to which the palette will be applied for the echogram window and the oscilloscope window. Values below Min will be shown with minimum palette colour and will not be visible on the oscilloscope window. Values equal to or greater than Max will be shown with maximum palette colour and will occupy the full window width of the oscilloscope.

7.4.2 Default button

Resets Min and Max value to default values, set to 0.5 and 12 respectively. These values are convenient for voltages outputs with the Biosonics 102.

7.4.3 Offset

Use this field to determine where you want to start in the palette colour sequence. The offset is expressed as a fraction of a complete sequence. For example, an offset of 0.25 will shift the beginning of the palette to 25% of the full colour sequence. Negative values are valid.

7.4.4 Span

Use this field to determine how many times you want the full sequence of palette colours. For example, a value of 1.5 will produce a palette showing up to 1.5 times the full colour sequence.

7.4.5 Exponent

Determines the exponent of the X-Y curve that allocates the palette (Y axis) to the displayed variable (X axis). For example, a value of one is a linear allocation. All other values are exponential.

7.4.6 Black & white

Sets a black and white palette.

7.4.7 Invert

Inverts the palette.

7.4.8 Show

Shows the resulting palette according to the parameters entered.

8. VIEW MENU

8.1 View / Unzoom

Restores the maximum view of the channel Z-Scale (range or depth depending on the view mode chosen) once it has been zoomed. This item is enabled only after a zoom has been done.

8.2 View / Z-Scale

Superimposes the vertical scale (range or depth depending on the view mode chosen) on the active channel echogram. Note that the vertical scale is NOT automatically updated if you do something that affects the appearance of the channel such as scrolling up or down the image or zooming. In these cases, you have to manually refresh the vertical scale with the Z-Scale tool.

8.3 Z-Scale options (Figure 8-1.)

8.3.1 Z-Scale interval mode group

The interval between the vertical scale tics is determined automatically when the automatic mode is chosen. It is displayed at any given interval in the fixed mode.

8.3.2 Display Z-Scale

The vertical scale is periodically displayed on the echogram, after the selected nunber of pings. When the number of pings is set to zero, the vertical scale is displayed at the user request via the Z-Scale tool or the View / Z-Scale menu item.

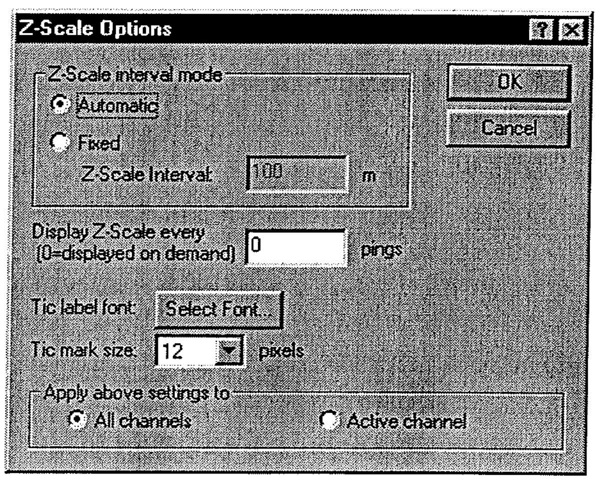


Figure 8-1. Z-Scale Options dialog box.

8.3.3 Tic label font and Tic mark size

The font characteristics for the vertical scale labels are determined using the selected font button. The tic size options vary from 6 to 20 pixels.

8.3.4 Apply above settings to

The selected Z-Scale options can be applied to either all channels or only to the active channel by selecting the appropriate radio button.

8.4 View / TVT

Displays the fitted Time Varied Threshold curve as a red line in the oscilloscope window. A tool provides a more direct access to this function. This tool is only active when the pointer is in the oscilloscope window.

8.5 View / Depth/Range

This toggle displays the channel vertical scale as depth or range depending on the choice made.

9. WINDOW MENU

9.1 Window / Cascade

Overlays the channel windows.

9.2 Window / Tile horizontal

Tiles the channel windows horizontally. Take care to not hide the oscilloscope window when using this option. If this happens, place the pointer on the separation line between the echogram and oscilloscope window and drag it to the desired location.

9.3 Window / Tile vertical

Tiles the channel windows vertically. Take care to not hide the oscilloscope window when using this option. If this happens, place the pointer on the separation line between the echogram and oscilloscope window and drag it to the desired location.

9.4 Window / Arrange icons

Arranges the icons of the minimized channel windows.

9.5 Window / List of open window documents

Lists the open channel windows. The active one is marked.

10. GPS MENU

The GPS menu offers the following commands:

Open	Opens GPS communication
Close	Closes GPS communication
Configure	Configures the GPS communication serial port
Presentation degree.min.sec	Presents the GPS position in the ***CH1*** status bar in degree.min.seconds (e.g., 48°59'59").
Presentation degree.decimal	Presents the GPS position in ***CH1*** status bar in degree.decimal (e.g., 48.9997°)
Presentation degree.min.decimal	Presents the GPS position in ***CH1*** status bar in degree.min.decimal (e.g., 48 59.98")

10.1 GPS / Open

Opens GPS communication when ***CH1*** is not acquiring data. If ***CH1*** is acquiring data, communication with the GPS is opened automatically.

10.2 GPS / Close

Closes GPS communication.

10.3 GPS / Configuration (Figure 10-1.)

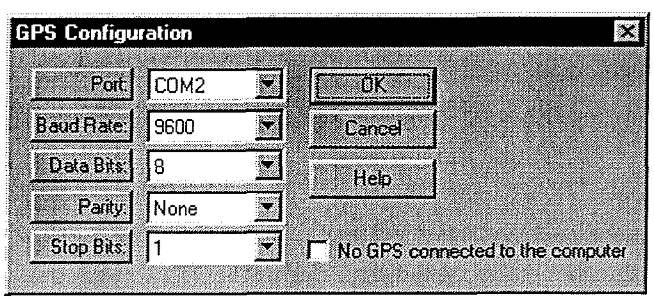


Figure 10-1. GPS Configuration dialog box.

10.3.1

10.3.2 Port

Description	Communication port through which GPS communicates with computer.
Limits	COM1, COM2, COM3, or COM4.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.

10.3.3 Baud Rate

Description	Baud rate at which GPS communicates with the computer.
Limits	110, 300, 600, 1200, 2400, 4800, 9600, 14.4k, 19.2k, 38.4k, 56k, 128k, or 256k bits per second.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
Remarks	See your GPS manufacturer's documentation for the proper setting. **Warning:** A slow baud rate (< 1200) may result in ping losses during GPS readings, depending on the echosounder data flow rate and the loading of the GPS NMEA-183 output.

10.3.4 Data Bits

Description	Number of data bits.
Limits	5, 6, 7, or 8.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
Remarks	See your GPS manufacturer's documentation for the proper setting.

10.3.5 Parity

Description	Parity.
Limits	None, Even, Odd, Mark, or Space.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
Remarks	See your GPS manufacturer's documentation for the proper setting.

10.3.6 Stop Bits

Description	Number of stop bits.
Limits	1, 1.5, or 2.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
Remarks	See your GPS manufacturer's documentation for the proper setting.

10.3.7 No GPS connected to the computer

If no GPS is connected to the computer, select this option in order to avoid repeated warning messages in the status bar and malfunctioning of ***CH1***. In that case the GPS position storing interval in the Acquisition (data) menu (Figure 6-1.) should be set to zero.

11. EK500 MENU

11.1 EK500 / Serial Port Configuration (Figure 11-1.)

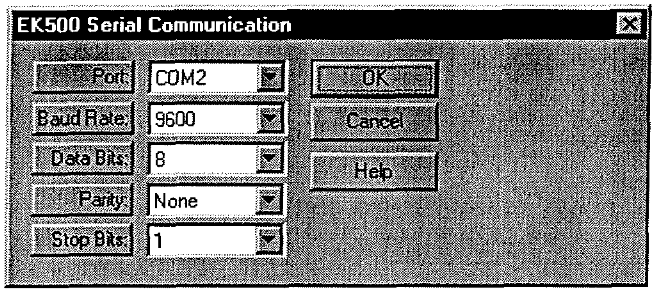


Figure 11-1. EK500 COM Configuration dialog box.

11.1.1 Port

Description	Communication port through which ***CH1*** communicates with the EK500.
Limits	COM1, COM2, COM3 or COM4.
Effects	This field sets the computer's COM port. This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
Remarks	The COM port of the computer must be connected to the serial port 1 of the EK500. This serial port is used for remote computer command input and data output.
See also	Simrad EK500 Operation Manual - Communication Ports (p. 5-11).

11.1.2 Baud Rate

Description	Baud rate at which ***CH1*** communicates with the EK500.
Limits	300, 600, 1200, 2400, 4800, 9600, or 19.2k bits per second.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
Remarks	This field must match the setting on the EK500 Serial Com. Menu / USART Menu. A baud rate faster than 9600 may result in communication errors.
See also	Simrad EK500 Operation Manual - Communication Ports (p. 5-11).

11.1.3 Data Bits

Description	Number of data bits.
Limits	7 or 8.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
Remarks	This field must match the setting on the EK500 Serial Com. Menu / USART Menu.
See also	Simrad EK500 Operation Manual - Communication Ports (p. 5-11).

11.1.4 Parity

Description	Parity.
Limits	None, Even, or Odd.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
Remarks	This field must match the setting on the EK500 Serial Com. Menu / USART Menu.
See also	Simrad EK500 Operation Manual - Communication Ports (p. 5-11).

11.1.5 Stop Bits

Description	Number of stop bits.
Limits	1 or 2.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
Remarks	This field must match the setting on the EK500 Serial Com. Menu / USART Menu.
See also	Simrad EK500 Operation Manual - Communication Ports (p. 5-11).

11.2 EK500 / Ethernet Configuration Menu (Figure 11-2.)

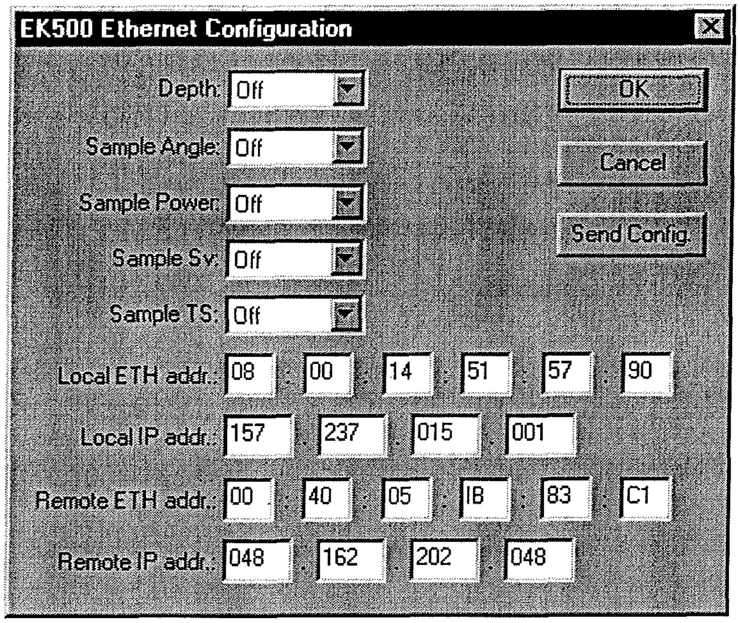


Figure 11-2. EK500 Ethernet Configuration dialog box.

11.2.1 Depth

Description	Switches On and Off the transmission to the Ethernet port of the detected depth output telegram for the various transceivers.
Limits	Off, 1, 2, 1&2, 3, 1&3, 2&3, 1&2&3.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
Remarks	This field is required by ***CH1*** to determine where to cut off data acquisition and must be On for each transceiver for which sample data is collected.
See also	Simrad EK500 Operation Manual - Command References (p. 46).

11.2.2 Sample Angle

Description	Switches On and Off the transmission to the Ethernet port of the output telegram containing angle sample data for the various transceivers.
Limits	Off, 1, 2, 1&2, 3, 1&3, 2&3, 1&2&3.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
Remarks	This field must be On for each transceiver for which sample angle data is collected.
See also	Transceiver / Sample data, Simrad EK500 Operation Manual - Command References (p. 47).

11.2.3 Sample Power

Description	Switches On and Off the transmission to the Ethernet port of the output telegram containing power sample data for the various transceivers.
Limits	Off, 1, 2, 1&2, 3, 1&3, 2&3, 1&2&3.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
Remarks	This field must be On for each transceiver for which sample power data is collected.
See also	Transceiver / Sample data, Simrad EK500 Operation Manual - Command References (p. 47-48).

11.2.4 Sample Sv

Description	Switches On and Off the transmission to the Ethernet port of the output telegram containing Sv sample data for the various transceivers.
Limits	Off, 1, 2, 1&2, 3, 1&3, 2&3, 1&2&3.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
Remarks	**Warning:** This field must be On for each transceiver for which sample Sv data is collected by ***CH1***.
See also	Transceiver / Sample data, Simrad EK500 Operation Manual - Command References (p. 48).

11.2.5 Sample TS

Description	Switches On and Off the transmission to the Ethernet port of the output telegram containing TS sample data for the various transceivers
Limits	Off, 1, 2, 1&2, 3, 1&3, 2&3, 1&2&3.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
Remarks	This field must be On for each transceiver for which sample TS data is collected.
See also	Transceiver / Sample data, Simrad EK500 Operation Manual - Command References (p. 48).

11.2.6 Local ETH addr.

Description	Ethernet address of the echosounder.
Limits	Sequence of 6 bytes.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
See also	Installation Guide, Simrad EK500 Operation Manual - Command References (p. 43).

11.2.7 Local IP addr.

Description	Ethernet address of the echosounder.
Limits	Sequence of 4 bytes.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
See also	Installation Guide, Simrad EK500 Operation Manual - Command References (p. 43).

11.2.8 Remote ETH addr.

Description	Ethernet address of remote host (computer Ethernet board)
Limits	Sequence of 6 bytes.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
See also	Installation Guide, Simrad EK500 Operation Manual - Command References (p. 43).

11.2.9 Remote IP addr.

Description	Internet address of the remote host (PC Ethernet card).
Limits	Sequence of 4 bytes.
Effects	This field is saved in the file ***CH1***.ini when you exit ***CH1*** and is loaded automatically when you start the application.
See also	Installation Guide, Simrad EK500 Operation Manual - Command References (p. 43).

11.2.10 Send Configuration button

The Send Configuration button transmits the displayed EK500 configuration to the EK500 via the serial port. The EK500 will beep and display "Remote Parameter Entered" to acknowledge reception of the configuration.

12. TROUBLESHOOTING

12.1 GPS position

No position is indicated in the status bar while ***CH1*** is acquiring data:

- check that the GPS is not disable in the GPS / Configuration menu (section 10.3).

The position is not updated in the status bar while ***CH1*** is acquiring data and a warning message is displayed in the status bar:

- check that the GPS is working;
- check that the COM connection is working well (e.g., use Windows 95® terminal.exe program). If not, check your serial cables;
- check that your GPS is sending the NMEA-183 strings "$GPZDA" and "$GPGLL". If not, set your GPS to send these two character strings.

The position in the status bar is intermittently indicating wrong values:

- check that your COM connection is clean using Windows 95® terminal.exe program (e.g., vibrations of the platform may be transmitted to the connectors of your serial cable and make intermittent contacts, electrical interference may corrupt the serial information).

No position is acquired in the **.HAC* data files:

- check that the GPS is not disabled in the GPS / Configuration menu (section 10.3) and/or that the GPS position storing interval of the Acquisition (data) / File is not set to zero (section 6.1).

12.2 Acquisition does not start (Biosonics DSP configuration)

- Check that the DFO/IML EBDI-0055 signal conditioning box is powered (power red LED is on) and that the sync. is received (sync. green LED). If you are on an F1 configuration, check that the F1 signal is detected (F1 green LED).
- If the selected channel frequency configuration is F1, make sure that a signal stronger than ~2 volts (ideally between 10 to 15 volts) is supplied to the channel 4 on the DFO/IML EBDI-0055 signal conditioning box. ***CH1*** needs that signal to acquire data on all channels configured as F1. Inversely, ***CH1*** assumes that the F1/F2 signal is low (< 1.87 volts) for F2. If the wrong choice is made, ***CH1*** will not start acquiring for this channel until it gets the proper signal on channel 4 of the DFO/IML EBDI-0055 signal conditioning box.

- Check that the Bridgenorth-4000 DSP board and the Bridgenorth-1416 A/D board are working by running the programs chekbn40.exe and chek1416.exe supplied by Bridgenorth. If the results are negative, check that the cable wire-up and connections are right (see the installation instructions, section 2.1) and that the cables are good (conductor continuity test).

12.3 *CH1* stops acquiring on one or all channels, with or without an error message

- Check that the DFO/IML EBDI-0055 signal conditioning box LED is indicating that you are transmitting (sync. green LED), that the frequency corresponds to your chosen configuration (F1 green LED), and that your connections are right.
- If you got an error message indicating that the DSP cannot keep up with the incoming samples, you can correct by:
  - closing all other running applications, including those in the background such as virus protection, to force Windows 95® to concentrate on ***CH1***
  - lowering the digitization frequency (section 6.2.1 or 6.2.2)
  - collecting less samples by using a higher threshold (TVT) (section 7.1.1.6)
  - reducing the sampling depth using the Fixed depth option (section 6.2.1.9.2 or 6.2.2.6.2)
  - reducing the number of samples collected when the bottom is lost by reducing the Max. bottom search depth (section 6.2.1.9.1 or 6.2.2.6.1).
- If the channels of only one frequency are affected, check that your F1 signal on channel 4 of the DFO/IML EBDI-0055 signal conditioning box is stronger than 2 volts (ideally between 10 to 15 volts) or, inversely, that the F2 signal is smaller than 1.87 volts (see F1/F2 detection, section 7.1.1.1.1).
- If the problem co-occurred with a missed bottom detection, which results in sampling all the ping up to the Max. bottom search depth, try to adjust your bottom detection parameters. If you often encounter very shallow waters —shallower than your blanking distance— the bottom will not be detected and the high number of samples collected during the missed-bottom detections could cause the problem. In such cases, use the Fixed depth option instead of the Automatic bottom detection (section 6.2.1.9.2 or 6.2.2.6.2).

12.4 Bottom detection problems

- When the bottom is not detected in a Biosonics configuration of ***CH1***, sampling continues until the Max. bottom search depth. If this occurs too often, you have to adjust your bottom detection parameters (section 6.2.1.9 or 6.2.2.6):

- lower your bottom voltage Threshold if the bottom echo is too weak, taking care to not lower it too much as this could cause bottom detection on demersal fish schools.
- enlarge your bottom detection Window if you often encounter steep slopes and the step between pings is larger than your bottom detection Window setting. Take care not to enlarge too much, which could cause bottom detection on strong demersal fish schools if their echoes are as strong as the selected threshold for bottom detection.
- If you often encounter very shallow waters —shallower than your blanking distance— the bottom will not be detected. In such cases, use the Fixed depth option instead of the Automatic bottom detection.

12.5 Time Varied Threshold (TVT)

- For evaluating the TVT, the echosounder should not transmit but only receive the ambient noise. Since the TVT least squares fit is made on the max sample values over a selected number of pings, there could be a problem with solution convergence (e.g., when there are high peaks of electrical or other interferences).
  - raising the number of pings used for the TVT evaluation could help to solve the problem (see Acquisition (data) / Configuration)
  - reducing the number of channels used during the TVT evaluation would help to identify the problematic channel(s)
  - try to isolate the cause of the interference and correct the problem
  - turn off (or synchronise) any other sounders during TVT evaluation
  - key in the TVT parameters manually, fitting the TVT curve by eye.

13. ACKNOWLEDGMENTS

We wish to thank Jérôme Benoit, who wrote the initial program at the origin of ***CH1***. André Ducharme and Marc-Donald Gagné contributed to the routine used to communicate with the Simrad EK500. Daniel Thibault contributed to the electronics of the signal conditioning box for the acquisition from analog echosounders. Discussions with Tom Foxall were appreciated for programming the Bridgenorth Inc. DSP board. We also thank colleagues from the Department of Fisheries and Oceans who contributed to the improvement of this software by their comments and assistance, or as beta testers. We are grateful to Martin Castonguay, Diane Lavoie, and Laure Devine for revision of this manual. Anne-Marie Cabana helped to put the final version in word processing format.

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15. APPENDIX 1

15.1 Document-view architecture

CH1 follows the document-view architecture proposed by Microsoft and other software manufacturers. In simple terms, the document-view architecture separates data from the user's view of the data. The document contains the data, and a document object is associated with one

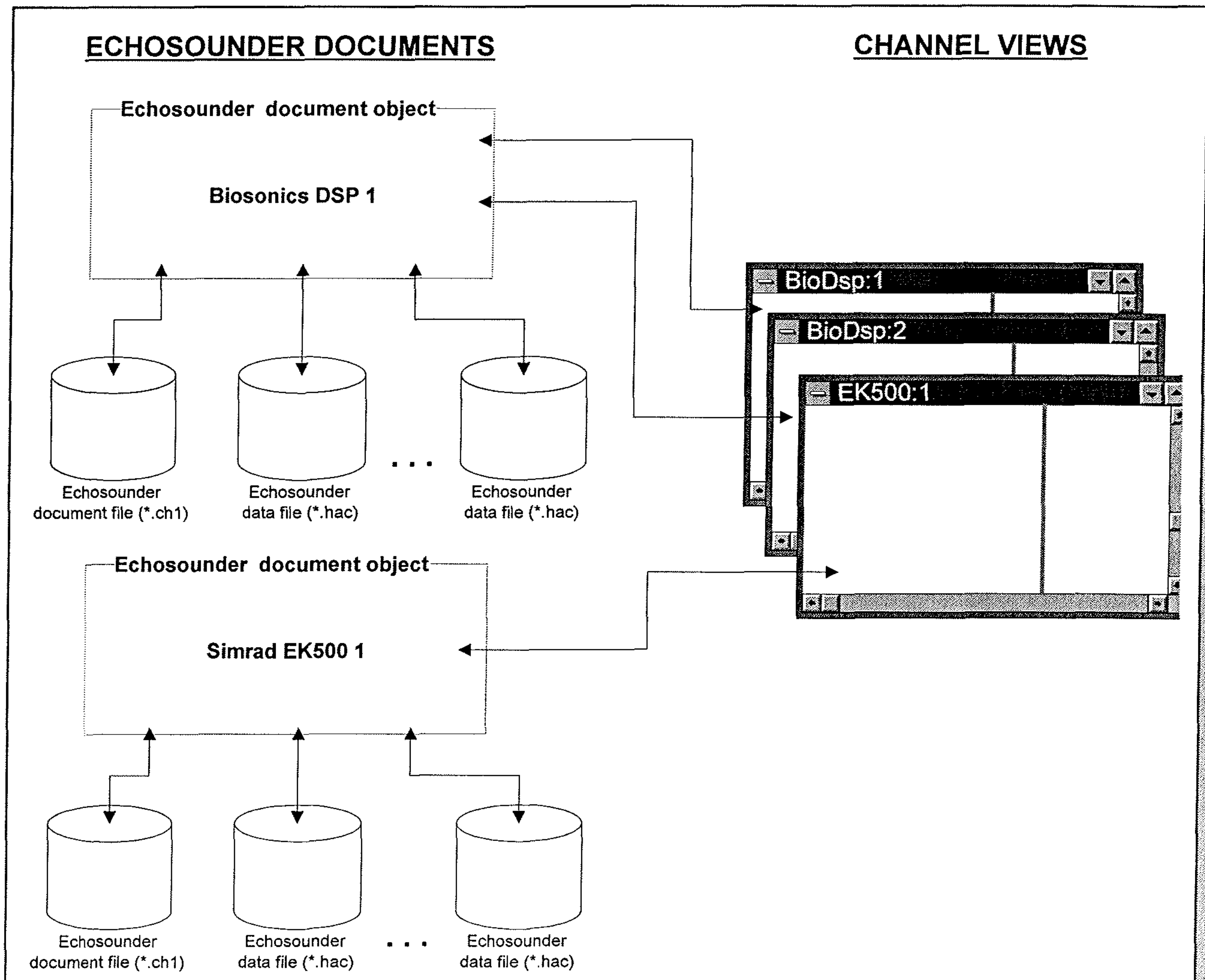

Figure 15-1. Document-view architecture.

or more views of the data (Figure 15-1.). Each view is a representation of the data and has its own window. For example, in a spreadsheet software like, Microsoft Excel, you can have a table that you can view at the same time using a histogram, a pie chart, or the default table view. The histogram, the pie chart, and the table are three different views of the same data or document. If you modify the data in the table view, the other views will be updated automatically. In most cases, a document is associated with a disk file, but this does not need to be the case — it could be objects stored in a database. There are two kinds of document-view applications, Single Document Interface (SDI) applications and Multiple Document Interface (MDI) applications. An SDI application can manipulate (read, show, change and write) only one type of document while an MDI can manipulate different types of documents.

CH1 is an MDI application. In ***CH1*** there are three types of documents that correspond to the three sources of data presently supported. These sources are: (1) data acquired by an analog echosounder (e.g., the Biosonics model 102 and 2000 types) and processed immediately by the DSP-A/D boards (Biosonics DSP Document); (2) data acquired by a Biosonics echosounder, recorded in a multiplexed way, and then replayed by an interface (e.g., Biosonics Model 171) and processed by the DSP-A/D boards (Biosonics DSP-Tape Document); and (3) data acquired by a Simrad echosounder (EK500 Document). Each document object is associated with a disk file. In many MDI applications, each document type has its own file extension but ***CH1*** uses the same extension (*.ch1) for all types of documents.

15.2 *CH1* document

This section explains what information is contained in a ***CH1*** document. A document object contains the data that the software manipulates. In ***CH1***, we can identify three different of data for a document: (1) the information entered by the user via the dialog boxes —for example, the choice of a ping rate of 1 ping per second in the Acquisition (data) / Configuration dialog box; (2) the data acquired by the echosounder and processed, displayed, and saved in *.***HAC*** data files by ***CH1***; and (3) the information that ***CH1*** uses for internal purposes. In many software applications, all the data are stored in the same disk file. For example, when you use a word processor and you save the document you are working on, all the data is saved in a single file that you have specified. When you reopen the file, all the data (text and viewing options) are loaded back into the computer memory as if you hadn't stopped working on the document. To do so, the word processor saves all the necessary information in the file: the text, its formatting and other settings such as the viewing area, etc.

Since the amount of data acquired by the echosounder is considerable, and the information can no longer be used by the application after it has been processed and saved, ***CH1*** follows a different approach. ***CH1*** saves the document data in two types of files, ASCII document configuration files (*.ch1) and binary data files (*.***HAC***). Each document object is associated with one *.ch1 file and one or more *.***HAC*** files (depending on the Acquisition (data) / File parameters). The left part of Figure 15-1. shows the relationship between a ***CH1*** document object and its associated file. The *.ch1 document files can be read back by ***CH1*** with the File / Open dialog box. The ****.HAC*** binary data files cannot be read by ***CH1*** but are input files for ***CH2*** or ***HAC-trafic***. Both types of files have different contents depending on the acoustic data source. The the content of the *.ch1 document configuration files and ****.HAC*** data files corresponding to each data source is not detailed here but can be found in the document pertaining to the different file formats (e.g., Simard et al. 1997).

A ***CH1*** document configuration file (*.ch1) includes the following informations:

1) the parameters describing how the acquired data will be saved in the data files (file names, acquisition mode, etc.). This information is entered by the user through the Acquisition (data) / File dialog box;
2) the configuration parameters for the acquisition process. This information is supplied by the user via the Aquisition (data) / Configuration dialog box. It includes items such as the ping rate, the sample rate, the TVT evaluation parameters, and the bottom detection parameters. These parameters may vary from one echosounder to another.
3) the number of acquisition channels and their respective configuration parameters as entered by the user via the Channel / Add dialog box and their associated palettes.

A ***CH1*** binary data file (****.HAC***) contains acoustic sample data for all the channels for a particular document during the entire acquisition period or a part of it, depending on the Acquisition (data) / File parameters. Remember that each document has a unique data source. Each binary data file is a stand-alone file, which means that it contains all the information necessary for its own interpretation — when you use another application to view the channels stored in a data file (****.HAC***), you do not need the associated document configuration file (*.ch1).

15.3 *CH1* views

As stated above, a view is a representation of the document data. You can have different views for the same document. Each view is displayed in its own window. Figure 15-1. summarises the relationships between a ***CH1*** document and its associated views. In ***CH1***, a view corresponds to a channel. You can have any number of views for a particular document; however, for a particular data source, there is only a limited number of distinct channels. For example, for the Biosonics model 102 echosounder type, a combination of three channels times two frequencies gives a possibility of six different channels at the same time. For the Simrad-EK500, we have 12 different channels simultaneously (3 transceivers times 4 variables). Each view has the name of the associated document in its title bar. If more than one view exist for a document, then the first view will be identified by the suffix ":1" to the name of the document, the second view by the suffix ":2", etc. For example, if you create a new Biosonics DSP Document, ***CH1*** gives it the default name "BioDsp1" and the title bar of this first view will display "BioDsp1". The second view will be displayed "BioDsp2". If you add a new channel to the document 1, a new view is created and its title bar will display "BioDsp1" plus the specific characteristics of the new channel.

16. INDEX