CODA-DA System User Manual

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Read This First!

Security Devices

Coda systems are fitted with either a DAT or an Exabyte tape IO sub-system or an optical disk IO sub-system. Both of the sub-systems are covered in this manual. The sets of instructions and descriptions of the sub-systems are grouped together by task (Using DA System).

You should read the following information before using the system.

- The Coda system uses a hardware security device (dongle) to prevent illicit copying of the system's software. (The security device is enclosed within the Coda system and under normal circumstances you should be unaware of its presence.) Notwithstanding any other agreements, the security device is the only proof Coda Technologies will accept of legal software ownership. Under no circumstances will a replacement security device be issued unless the original is returned.

Loss of the dongle means loss of the software!

DAT Tapes

- Coda systems which are fitted with DAT drives use Digital Data Storage (DDS) certified Digital Audio Tapes (DAT). Do not use audio DAT tapes: they will not function correctly.
- Use only DAT tapes with one of the following markings:

- We recommend that you use DAT tapes by the following manufacturers: **TDK**, **HP**, **Verbatim** and **Fujifilm**.

Optical Disks

- We recommend that you use Maxoptix ISO 14517, rewritable, 2.6 GB polycarbonate disks with 1024 bytes per sector – Maxoptix part no. 3015385 R/W – for systems fitted with optical disk drives, though other major manufacturers' rewritable disks can be used, provided that they comply with ISO/IEC 14517.

Warnings

- Do not look inside the optical disk drive or use a mirror to look inside the drive. The laser can cause eye damage.

Cautions

Connecting the System:

- Failure to ensure that the input voltage of the power supply unit is set correctly for the AC supply voltage may damage the unit.
- Connecting a monitor that cannot operate at the required resolution – an 80Hz refresh rate whilst displaying 1040x780 non-interlaced pixels – may damage the monitor.
- If the DA System was in transit and has recently been unpacked, or if it has been brought from a cool area to a warm one, leave it for some time (at least an hour) to reach ambient temperature before powering up. This prevents condensation from forming within the system, which may seriously damage the electronics and the drive mechanism.

Powering Down & Packing Up

- The DA System system must be shut down – by selecting **Shutdown** from the **File** menu. Failure to do so may cause the system to malfunction.

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- Before powering down the system, make sure that no tapes or disks have been left in the drives. Failure to do so may result in damage to the tapes or disks or to the drives.

Updating Software

- The DA System system must be shut down – by selecting **Shutdown** from the **File** menu – at the end of installing a software update. Failure to do so may cause the system to malfunction.

Tape System

- The status of the write-protect tab on the tape must not be changed while the tape is in the tape drive. Doing so can lead to damage to the tape or the tape drive.
- Do not press the tape eject button whilst recording. Doing so may result in data loss. The recording session should be closed via the recording pop-up before ejecting the tape.

Optical Disk System

- If the drive emits noises or vibrations, immediately eject the media and turn off the power to the drive.
- The drive must perform a self diagnosis for about 6 seconds immediately after powering on. If an optical disk cartridge is inserted during self diagnosis, the loading time will be delayed until the self diagnosis is complete.
- The drive does not require user maintenance. If the drive does not operate properly, do not try to fix it yourself. Contact Coda Technologies.

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Part I: Introduction

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1 Welcome

Congratulations on buying or hiring the CODA-DA System *data acquisition* system. Your investment in the DA System will make working with your sonar data easier and faster.

The DA System provides automated interpretation tools and a suite of interactive enhancement and *event*-marking tools, all of which are designed to improve data interpretation and report generation. Whether you are new to digital sonar acquisition, an experienced data processor or a professional geophysicist, you will find the DA System a reliable and versatile system for acquiring, displaying, processing and interpreting sonar data.

The DA System has been developed by:

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1.1 The DA System

The DA System system can be used either as a stand-alone module for acquiring and processing data or as the data input system for one of Coda's processing and automated interpretation modules: *GeoKit*, Pipeline Inspection (*PI100*), *TrackPlot*, *TrackPlot Plus* and *Mosaic*.

The DA200 retains the acclaimed look and feel of the DA100 system. The main difference between the two systems is that the DA200 can accept dual independent input triggers whereas the DA100 accepts only a single trigger. The DA50 provides the look and feel of the DA100, restricted to two acquisition channels, in a portable and compact form.

The data acquisition and playback system of the DA System is sophisticated, yet easy to use. It can be used to acquire data from both *sidescan sonar* and *sub-bottom profilers*, to manipulate and display this data, and to record the data to tape or optical disk. Previously recorded data can be played back rapidly through the system for later viewing or manipulation. The system allows you to record data in a high-resolution *digital* format which does not degrade with time, and it can output the data to *on-line* data-processing systems. Furthermore, it provides fast access to data on tape or disk for post-processing or data quality assessment.

Broadly speaking, the DA System operates in one of two modes: *data acquisition mode* or *data playback mode*.

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In *acquisition mode*, a number of *sonar inputs* are connected to the system. Each input can be digitally sampled and recorded to tape or disk. Sampled data can be manipulated in various ways before being displayed on a scrolling screen. Two input data channels can be displayed simultaneously in one window, up to four windows of data can be displayed at any one time; the channels selected for display may be changed at any time. Data recorded to tape or disk consists of all of the original sampled data with no processing applied, and any additional information input to the system (for example, navigation data). This means that the original data is always available and that no information is lost in any processing steps.

In *playback mode*, data previously recorded to tape or disk can be manipulated and displayed in the same way as in *acquisition mode*. The *playback speed* can be varied from zero (paused) to typically two or three times the original acquisition rate. The format, time and channels recorded to the tape or disk are shown when the media is first loaded. You can select channels for display; the *display channels* can be changed at any time.

In both modes, the DA System provides a number of processing options and several powerful tools which enable you to configure the setup to best suit your needs. These features include *multi-resolution* data display, scrolling speed adjustment, single or dual channel *waterfall or horizontal displays*, *slant-range correction*, *TVG* and TVF enhancement, *image enhancement*, *zoom* facilities, *real-time* cursor navigation position, and on-screen measurement.

The DA System is available with a number of options, including a tape or optical disk system, single drive or dual drives (for continuous recording), and a GPIB port (for real-time data output to thermal recorders).

1.2 About this Manual

This manual is designed to help you get the most out of the DA System system, whatever your level of experience.

- Part I: The Introduction and Basics – contains basic information about Coda systems' display features and types of pointers, as well as the terminology used in Coda manuals. If you are new to the DA System, we recommend that you read this section before using the system. The Quick Start will refresh your memory about operating procedures, if you are an experienced operator of the DA System in *data acquisition* and *playback modes*.

- Part II: Using the DA System – contains operating instructions for the DA System. They explain HOW TO DO SOMETHING (for example, image enhancement, tape recording), through step-by-step instructions, and give hints on how to get the best out of the system. These sections are intended for users at any level of experience. Is also describes in detail the external parts of the DA System system, the areas of the DA System display and the various menus and menu items available with the system. They explain WHAT CAN BE DONE (for example, the range of adjustment that is possible for TVG correction). Reading through these sections reveals the true power and flexibility of the system.

- Part III: Technical Details – contains technical information about the DA System system.

- Part IV: Getting Help – gives details of our Technical Support service and explains how to solve the most common problems you might encounter using the DA System.

- Part V: Appendices – contains information about additional menus, navigation data and formats; provides examples of acquisition setups; and explains how to test the DA System. It also explains what you need to know about using the tape or optical disk drives.

- Part VI: Checklists – contains checklists for mobilising the DA System and additional software modules; acquiring and recording data; inputting navigation data and corrected navigation data; saving and loading tag files; and using tag and reporting setups during data interpretation.

- Part VII: Glossary & Conversions – contains a table of useful conversions; a full list of the terminology used in this manual; and a software defect report form, product feedback form and manual feedback form.

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1.2.1 Conventions Used in this Manual

As you read this manual, bear in mind the following conventions:

- *Italics* indicates words or phrases that are explained in the Glossary and modes of operation.
- **This font** identifies menu items and data control buttons. When two or three menu items are joined by an arrow you must select the first item and then the second or third; for example, **File→Open Acquisition** means that you must click on **File** on the Menu Bar and then, in the pull-down menu that appears, click on **Open Acquisition**.
- Keyboard keys appear within greater and lesser symbols. When key names are joined by a hyphen (-) you must hold down the first key, press the other key and then release both keys. For example, <Control-z> means you must hold down <Control> and press <z>.
- British English spelling is used throughout this manual.
- To keep instructions brief, we refer to clicking or pressing a MOUSE button, rather than a MOUSE OR TRACKBALL button. If your system comes with the optional trackball, click or press the appropriate button. If no button is specified, use the left button.
- The graphics for the single trigger systems (DA50 and DA100) are identical to those of the DA200.

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2 Quick Start

This section includes a quick-start procedure, which summarises the basic instructions for operating the DA System in *data acquisition* and *playback modes*. It also contains a list of tips and shortcuts to help you work more quickly and efficiently.

If you have used the DA System before, use this section to remind yourself about the operating procedure. If you are new to the DA System, read through the list of tips and shortcuts, as they will save you time, but work through the operating instructions in Part II before referring to the quick-start procedure.

2.1 Quick-Start Procedure

2.1.1 Setting up the DA System

1. Remove the system from its packaging.
2. Connect the power supply, monitor, keyboard and *mouse* or *trackball* cables to the system; if using a printer, also connect the printer cable and power on the printer. For data acquisition, connect the *sonar* data, *trigger* and *navigation data* inputs to the system.
3. Power up the system and wait for its user *interface* screen to appear.

2.1.2 Acquiring Survey Data

1. Select **File→Open Acquisition** or *click* on the **Open Acquision** icon to initialise acquisition mode.
2. In the **Channels 1-4** tab, click on the **Active** on/off switches of the data channels to be digitised, and *toggle* on the **Device Active/Inactive** button in the **Open Acquisition** pop-up. Set the voltage range and the description of the channels to be digitised. In the **Triggers** tab, set the number and source of the triggers to be used. When all the parameters have been set, click on the OK button.
3. Click on the **Play** button in the *Data Control Area* to start the data display.
4. In the **Scale Display Data** pop-up, configure the display scale and range. Do this either by clicking on the **Auto** button or by using the **Shift** and **Scale** arrow buttons to make adjustments manually. The blue band (range of screen values) should cover the green trace (incoming data). The green trace can be adjusted using the **Channel Voltage** range in the **Open Acquisition** pop-up.
5. Select **Settings→Fix Lines** and select the navigation/survey data items to be displayed on the fix lines.
6. Select **File→Raw Nav Input** to initialise *navigation input*. In the **Nav Input Settings** pop-up, select the *navigation string* and input port to be used. Click on the **Nav input on** *one-of selection switch*. Click on the **OK** button.
7. Select **Processing→Fish Height** and configure the *fish height*.
8. Record data:
   - To start recording, insert a blank *DDS* or *DDS*2 standard DAT tape or a Coda-formatted optical disk into the appropriate drive; if using continuous record, insert tapes or disks in both drives. Click on the **Recording On** toggle in the Data Control Area. In the **Record Set-up** pop-up, select *continuous record* (if required), the channels to be recorded, the recording format and the drive on which to start recording. Click on the **Recording On** toggle of the appropriate drive to switch it on, then click on the **OK** button.
   - To stop recording, click on the **Recording Off** button in the Data Control Area. In the **Record Set-up** pop-up, click on the **Record** toggle to switch it off, then click on the **OK** button. Eject the tape (if the system has not already done so) or eject the optical disk and *write-protect* it. Label the tape or disk using the start and stop recording times and fix information from the information window.

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2.1.3 Playing Back Survey Data

1. Insert a previously recorded tape or optical disk into the appropriate drive.
2. Select **File**→**Open Playback** or *click* on the **Open Playback** icon to initialise playback mode.
3. In the **Open Playback** pop-up, click on the appropriate drive's tab form (if it is not selected already). Then, do one of the following:
   - If you are using a tape system, check the **File Information** window to make sure that you have the correct file and recorded channels. If not, use the appropriate action buttons to find them. Then, click on the **OK** button.
   - If you are using an optical disk system, select a file from the **Files** window. Check the **File Information** window to make sure that you have the correct file and recorded channels. Then, click on the **OK** button.
4. Click on the **Play** button in the Data Control Area to view the selected channels.
5. If required, select **Processing**→**Fish Height** and configure the fish height.
6. If required, select **Settings**→**Playback Speed** and set the rate at which the system replays the data.
7. In the **Scale Display Data** pop-up, configure the display scale and range. Do this either by clicking on the **Auto** button or by using the **Shift** and **Scale** arrow buttons to make adjustments manually. The blue band (range of screen values) should cover the green trace (incoming data).
8. Set up the display, using the **Processing** menu options, such as **TVG Enhancement** or **Slant-Range Correction**, and use the appropriate data control buttons, such as **Fast Forward** or **Goto**.

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3 The User Interface

Coda's systems use *menus*, *pop-up windows*, *text-entry boxes*, icons, key shortcuts and so on in a similar way to other *windows* applications. If you are familiar with *Microsoft Windows®*, or the *X Windows* system, you will immediately find the operation of Coda's systems familiar. If you are not familiar with other windows applications, you will find the main features and terms explained below.

3.1 The Main Display

The main display has seven areas, as shown in Figure 3-1, this page. Six of the areas – Title Bar, Menu Bar, Tool Bar, Data Display Area, General Information Area and Data Control Area – are identical for all Coda systems and software modules. The Application Specific Area, however, changes according to the application being used. The functions of all six areas in the DA System are explained in the following sections.

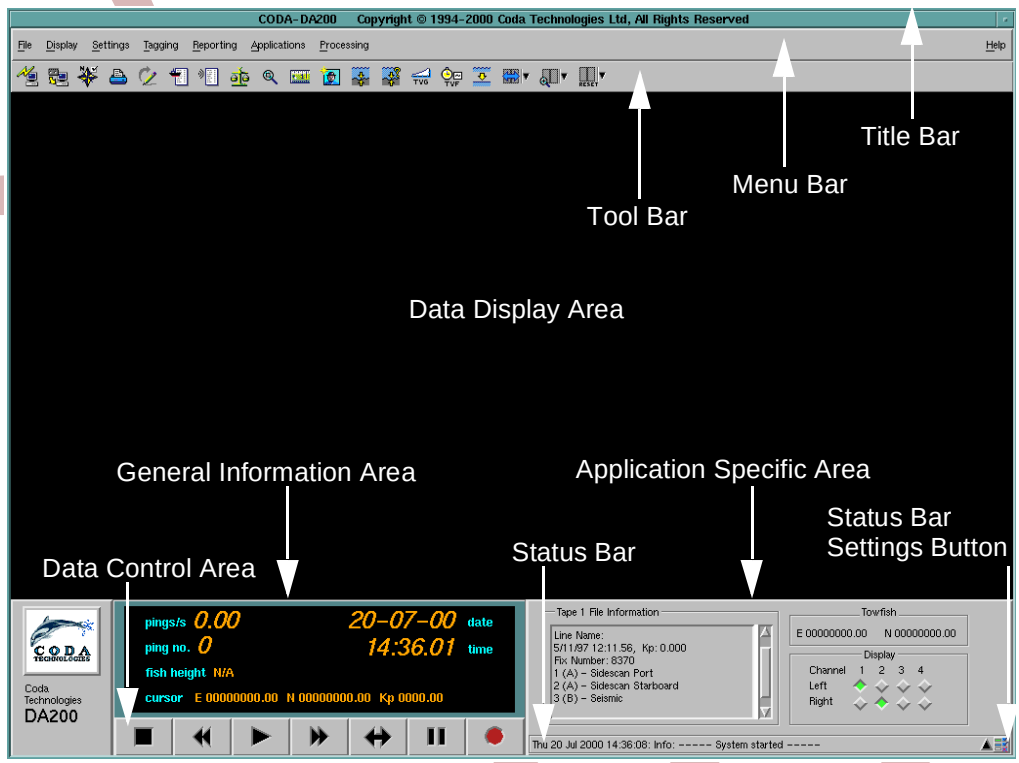

Figure 3-1 The Main Display in Playback Mode

3.1.1 The Title Bar

The DA System provides additional commands through its **Title Bar** menu. You use this pull-down menu when you want to test navigation loopback data, change the size of the main display and restart the programme, see Section 12.2.

Figure 3-2 The DA System Title Bar

3.1.2 The Menu Bar

Figure 3-3 The Menu Bar

The **Menu Bar** lies across the top of the screen throughout operation of the DA System. It displays eight menu options: **File**, **Display**, **Settings**, **Tagging**, **Reporting**, **Applications**, **Processing** and **Help**. When you *click on* any of these options (that is, you move the pointer over an option and then click the left mouse button), a pull-down menu appears. The functions of the various menu options are explained in Part II.

3.1.2.1 Tear-off Menus

The pull-down menus can be detached from the Menu Bar and moved around the screen; they remain on screen until dismissed. To detach a pull-down menu, *select* the dotted tear-off strip at the top of the menu; this changes the menu to a *pop-up window*. To move the window, *press and drag* it to another part of the screen (that is, move the pointer over the window's titlebar, press the left mouse button and hold it down while you drag the pointer to the desired position, then release the mouse button). To dismiss the window, *double-click* on the button in the top left corner of the window, or position the pointer over the window and press <Escape>.

3.1.3 Tool Bar

Figure 3-4 The DA System Tool Bar

Directly below the **Menu Bar** is a **Tool Bar**. The icons included in the **Tool Bar** allow you to perform a number of operations within the window without opening the relevant menus.

3.1.4 Trackplot/Mosaic

This option, which is used to display visually the track and image data of the survey, is available as an additional software module. If you have bought this module, refer to the CODA Trackplot/ Mosaic Manual. For further information, contact Coda Technologies.

3.2 Multiple Windows

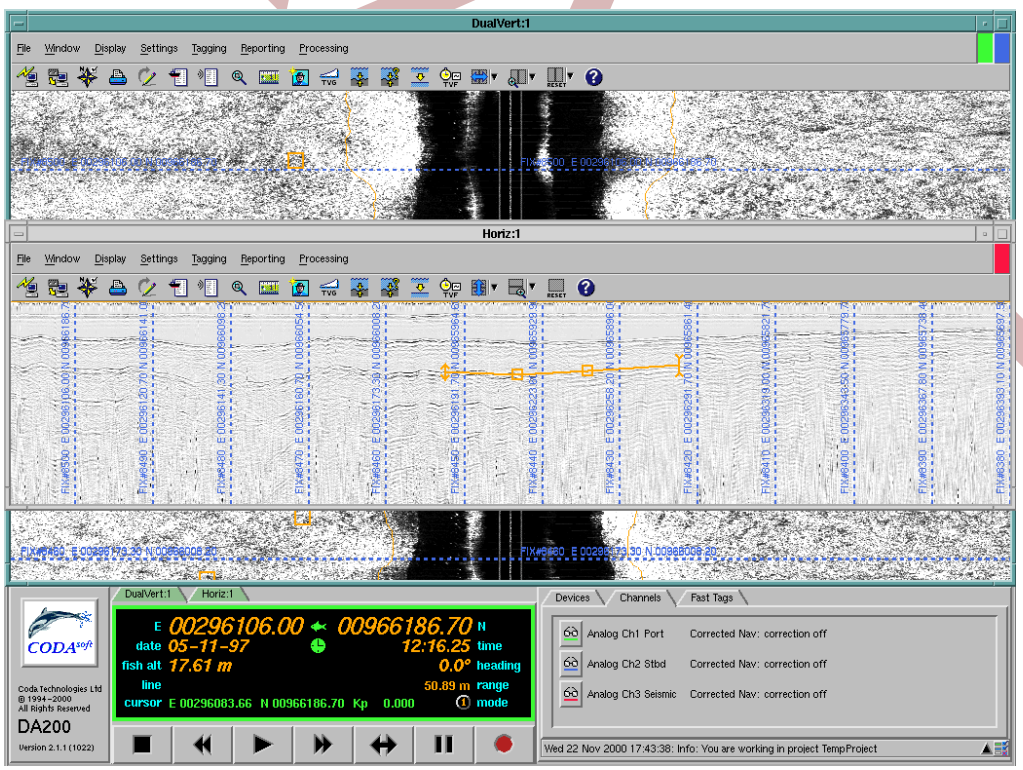

Figure 3-5 The Main Display Area in Playback Mode, showing two Data Display windows

Depending on how your system is configured, it is possible to activate a number of data display windows. When you switch your Coda system on, the default is one data display window configured as a dual channel vertically scrolling down display.

3.2.1 Opening a Data Display Window

Figure 3-6 The Open New Window pop-up window

When you select **Windows→Open New Window** in any open Data Display window, the Open New Window pop-up appears (see Figure 3-6, this page). This allows you to choose parameters for the new window.

- **Window Type**: This *scrolling option list* can be set to either **Horizontal Window** or **Vertical Window** indicating the angle at which the data will scroll.
- **Number of Channels**: The scrolling option list can be set for either 1 or 2 channels.
- **Scroll Direction**: This scrolling option list can be set for either **Left** or **Right** for a horizontal window or **Up** or **Down** for a vertical window

3.2.2 Menu Bar Options

Author Note - not for publication!: different applications to be listed in Appendix L

When more than one data display window is open, the **Menu Bar** options can apply to that particular window, or to the whole system, or to an input channel. A list of the different applications is in Appendix L

- When **Menu Bar- Window** options are selected, the selection will apply to the window from which the pop-up was called. The same pop-up function can be called once for each data display window open.
- **Menu Bar - System** options apply globally. Although system options can be called from any open data display window, if a pop-up is already open calling it from another open data display window will only have the effect of bring the open pop-up to the foreground of the main display.
- **Menu Bar- Input Channel** options apply to input channels and can be displayed in one or a number of windows. Although channel options can be called from any open data display window, if a pop-up is already open calling it from another open data display window will only have the effect of bring the open pop-up to the foreground of the main display.

3.2.3 Data Display Window Identification

The **Title Bar** of each open window indicates the format of that window. If more than one window is open with the same format, a number will be added to the description.The description in the **Title Bar** is repeated in the associated tab of the **General Information Area** (see Figure 3-5, page 22).

3.2.4 Colour Coding

In addition to labels describing the format of each display window, a colour coding system is used to identify which channel or channels are being displayed in each window and which channel data is being displayed in each **General Information Area** tab.

The following aspects of the **Data Display Area** can be seen in Figure 3-5, page 22.

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- The channel colours are indicated on a bar on each channel icon on the **Channels** tab of the **Application Specific Area**.
- The channels being displayed in each data display window are indicated by coloured buttons on the top right hand side of the **Menu Bar** of each data display window.
- The channel to which the information in the **General Information Area** refers is indicated by the colour of its border.

3.2.5 Window Polling

Pressing the <Alt> and <Tab> keys at the same time will bring each window or iconised window to the foreground of the main display in turn, each *click* will bring the back-most window to the front.

3.3 Menu Features

3.3.1 One-of Selection Switch

Figure 3-7 One-of Selection Switches

The diamond button (or toggle) is a *one-of selection* switch for a group of options, only one of which can be selected at a time. To change the selection, click on another diamond button. In the example above, from the **Report Setup Options** menu, the green diamond indicates that the **Tab** option has been selected; the **Space** and **Comma** options are automatically deselected.

3.3.2 On/Off Switch

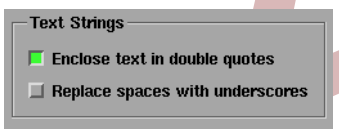

Figure 3-8 On/Off Switches

The square button is an on/off switch. When the square is grey the option is disabled (or off); when the square is green the option is enabled (or on). More than one on/off switch can be enabled. To toggle from one setting to another, click on the square button. In the example above, also from the **Report Setup Options** menu, the **Enclose text in double quotes** has been selected.

3.3.3 Option Selection Button

Figure 3-9 An Option Selection Button

The option selection button displays a currently held value and indicates that other values can be selected. In Figure 3-9, this page from the **File→Open Acquisition** menu, the **Trigger** is set to **Trig A**. *Click* on the option button to display a list of other options (in this case, **Active Trigger**s) and then drag the *pointer* to another trigger to select that trigger for the channel.

3.3.4 Spin Box

Figure 3-10 A Spin Box

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Spin boxes appear in pop-ups where you are required to specify a numerical setting. You can either *click* in the box and type the required numbers or use the up and down arrows to change to the correct setting. Pressing and dragging on the horizontal bar between the up and down arrows allows you to alter the value, too – if you drag upwards, the value will increase, and if you drag downwards the value will decrease.

3.3.5 Scrolling Option List

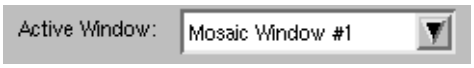

Figure 3-11 A Scrolling Option List

Scrolling option lists consist of a text area and a down arrow. They provide a flexible method of choosing from a list of available options. *Click* on the down arrow to display the list of options. You can then move through the list by typing the first letters of your chosen option or by using the up and down arrows on your keyboard. Each option will be highlighted as you scroll onto it. To select the highlighted option, either press the space bar or <Enter>, or click on it with the mouse. To reset your selection, use either the left or right arrow on your keyboard. You can then begin making our selection again. To scroll directly to your chosen option, click in the text box and use the keyboard arrows to move to your choice. To dismiss the list, either press <Esc> or click outside the list area.

3.3.6 Scroll Bar

Figure 3-12 A Scroll Bar

The scroll bar appears at the bottom or on the side of some pop-ups and indicates that only part of a list of items is currently being displayed. To view other items in the list, click on the arrows in the scroll bar or press and drag the scroll box in the scroll bar up or down, or to the left or right.

3.3.7 Tab Forms

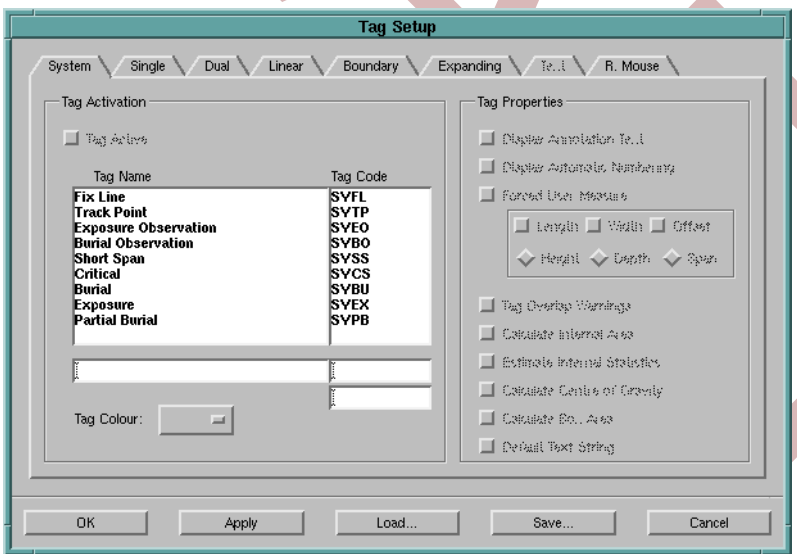

Figure 3-13 A Tab Form

Some pop-ups have several tab forms; for example, the **Tag Setup** pop-up from the **Tagging** menu has eight tab forms (see Figure 3-13, this page). A tab form contains a number of related items of information or selections and has a labelled tab at the top; they are arranged so that they overlap each other. To select a tab form, click on its tab. This brings the form to the front of the pile; the information can then be read and changes made to it. When a tab label is greyed out it cannot be accessed.

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3.3.8 Pop-up Selector

Figure 3-14 Pop-up Window Selectors

The three-point ellipsis (...) is appended to some menu items and indicates that selection of the item will cause a pop-up window to appear; the window will contain further selections associated with the menu item. This hierarchical structure enables the comprehensive functions of the DA System to be accessed in a way that is logical and easy to understand. In the example above, from the **Settings** menu, selecting **Playback Speed** will open a pop-up which contains three possible settings for the speed at which data can be replayed.

3.3.9 Pop-up Action Buttons

Figure 3-15 Pop-up Action Buttons

Action buttons are positioned at the bottom of pop-ups; they are used either to confirm changes made within the pop-up or to cancel those changes. Click on the **OK** button to confirm the changes and dismiss the pop-up from the screen; click on the **Apply** button to confirm the changes but retain the pop-up on screen. Click on the **Cancel** button to cancel the changes and leave the previous settings as the current definition.

Additional action buttons are displayed on some pop-ups:

Figure 3-16 Store and Factory Action Buttons

Click on the **Store** button to store the settings of the current pop-up as the default setting. Click on the **Factory** button to reset the settings to Coda Technologies' original settings. To revert to the **Factory** settings as the default setting after the default setting has been changed, click on the **Factory** button and then the **Store** button.

Figure 3-17 Load and Save Action Buttons

Click on the **Load** button to load previously saved settings for the current pop-up. Click on the **Save** button to save the current pop-up settings to file for reloading at a later date.

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3.3.10 File Selection Window

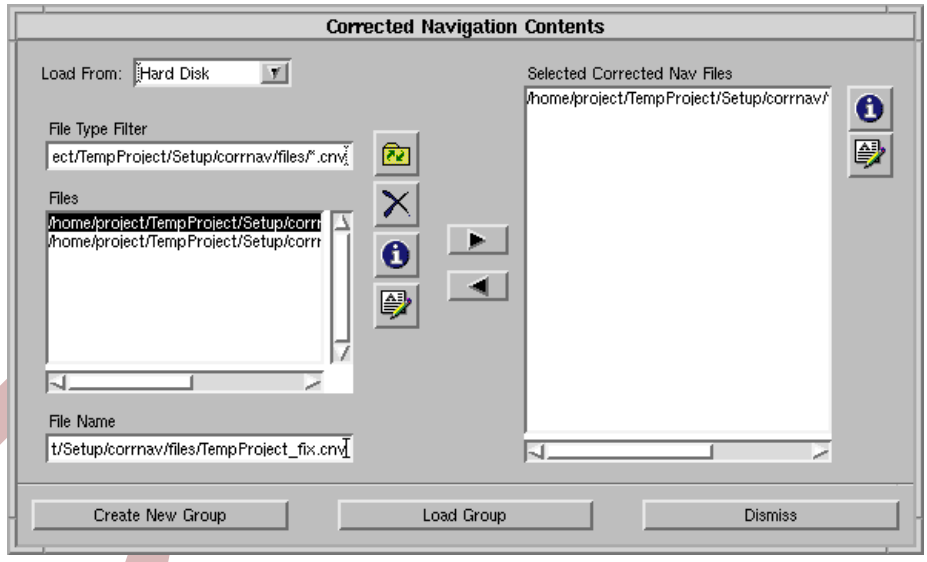

Figure 3-18 A File Selection Window

The **File Selection Window** is used to select a file or a group of files from a directory in the DA System file system (for example, for the input of corrected navigation data). The **File Type Filter** item shows the search pattern being used to select which files are listed in the **Files** item. This uses a similar pattern matching procedure to MS-DOS or Unix, so all files can be listed by entering * or *.*, or only those files with (for example) a .TXT ending can be listed by entering *.TXT. To select one of the files in the File list, use the scroll bars as necessary to move through the list and either click on the required file name (using the left mouse button) and press the RIGHT ARROW, or double click on the selection. Continue to select until all required files are listed in the **Select Corrected Nav Files** list and then **Create New Group**. Existing groups can be edited in the same way by using the **Load Group** button and then adding or subtracting files.

To remove a nav file from the hard disk, select the file to be deleted and click on the <Delete> icon. A window is popped up asking for confirmation. Click the **Yes** button to delete the file, or the **No** button to abort the delete.

3.3.11 Load Settings

Figure 3-19, page 28, shows an example of a **Load Settings** pop-up; this pop-up appears when you click on the **Load** button in the **Format** *tab form* of the **Reporting→Report Setup** menu.

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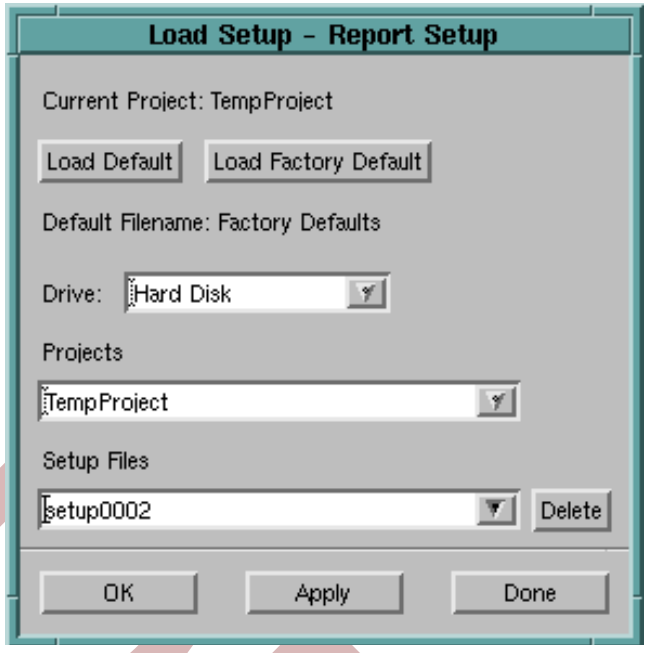

Figure 3-19 A Load Settings Pop-up Window

Click on the **Select Default** button to make the default file the selected file; the name of the default file appears beside the **Default Filename** label. Click on the **Select Factory Default** button to reset the pop-up to Coda Technologies' original setting; the string 'FACTORY DEFAULT SELECTED' appears in the **File Name** text-entry box at the bottom of the pop-up.

Click on the **Drive** option button to select the drive from which to load the settings file; only **Hard Disk** is currently available.

Use the **Project** *scrolling option list* to search for correct project and the **Set-up Files** scrolling optin list to search and veiw particular settings files. To select a settings file from the list, *click* on the file name. Altwernatively, if you know the file name, move the pointer onto the **Set-up Files** *text-entry box* and type the file name.

Click on the **Delete** button to remove the currently selected file from the hard disk. In the window that appears asking for confirmation, click on the **Yes** button to delete the file or the **No** button to abort the delete. If the file to be deleted is the default file, a window appears asking for confirmation.

Note: All settings files have a '.set' ending. Files cannot be loaded if the directory is not shown. Trying to do so results in an error.

Click on the **Apply** button or the **OK** button to load the settings stored in the file shown in the **File Name** window. If no file has been selected, a warning window appears. Click on the **Done** button to cancel any changes made to the settings and dismiss the **Set-up - Report Set-up** pop-up.

3.3.12 Save Settings

Figure 3-20, page 29, shows an example of a **Save Settings** pop-up; this pop-up appears when you click on the **Save** button in the **Format** *tab form* of the **Reporting→Report Setup** menu.

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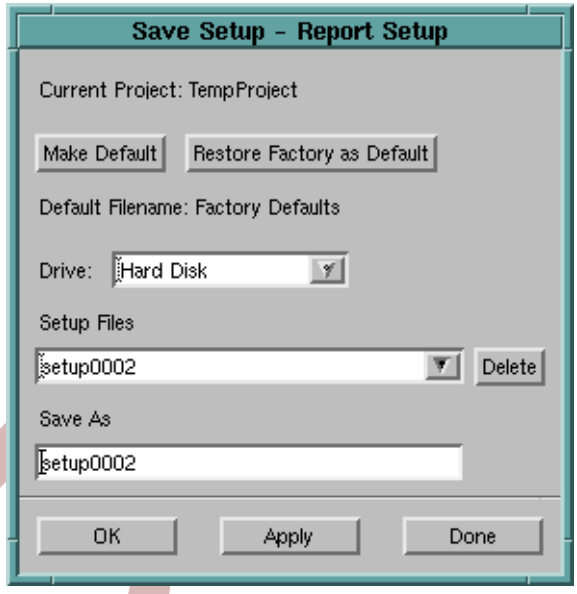

Figure 3-20 A Save Settings Pop-up Window

Click on the **Make Default** button to make the selected file the default file; the name of the file appears beside the **Default Filename** label. If no file is selected, the settings are saved to a file called 'unnamed.default.set'.

Click on the **Drive** option button to select the drive to which to save the setting file; only **Hard Disk** is currently available.

Use the **Set-up Files** *scrolling option list* to search and view particular settings files. To select a settings file from the list, *click* on the file name; the **Save A**s text entry box is updated to display the selected file. Alternatively, if you know the file name, or you wish to use a new one, move the *pointer* into the **Save As** text-entry box and type the file name.
Click on the **Delete** button to remove the currently selected file from the hard disk. In the window that appears asking for confirmation, click on the **Yes** button to delete the file or the **No** button to abort the delete. If the file to be deleted is the default file, a window appears asking for confirmation.

Note: All settings files have a '.set' ending. Files cannot be saved if the directory is not shown. Trying to do so results in an error.

Click on the **Apply** button or the **OK** button to save the current settings to the file shown in the **File Name** window. If no file has been selected, a warning window appears. Click on the **Done** button to cancel changes made to the settings and dismiss the **Save Settings** pop-up window.

3.4 Message Window

Figure 3-21 The Message Window

A **Message Window** appears at the bottom right of the DA System display. This gives time-stamped CODA system information. As they appear, messages are colour coded, red for errors, blue for warnings and black for information. Once a new message appears, the older one disappears and is stored in black in the list of messages created since your system was started up. You can scroll through this list by *clicking* on the down arrow at the side of the window.

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3.5 Status Bar Settings

Figure 3-22 The Status Bar Settings Button

This button is on the bottom right of the **Message Window** (see Figure 3-1, page 21). Clicking on it produces the **Status Bar Setup Window** (see Figure 3-23, this page, Figure 3-24, page 30 and Figure 3-25, page 31). In this pop-up you can specify how you want information in the status bar to be displayed, whether you want the system to sound a **Beep** and produce separate Pop-ups detailing the message, for how long you want the pop-up to remain and the size of the message Log File. Each tab form gives a description of the effect of selecting items within the pop-up.

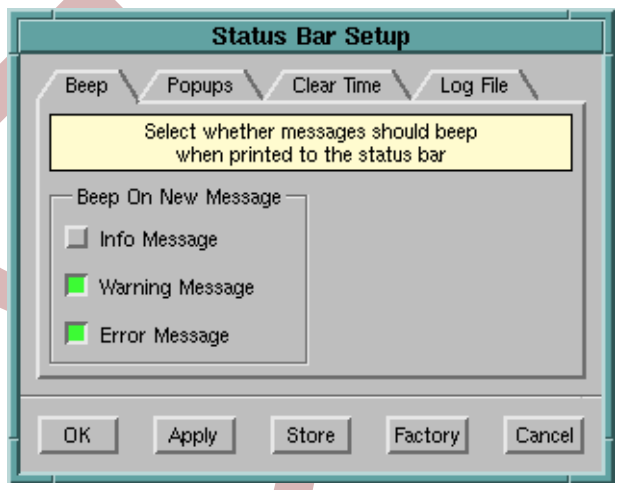

Figure 3-23 The Status Bar Setup Window showing Beep settings

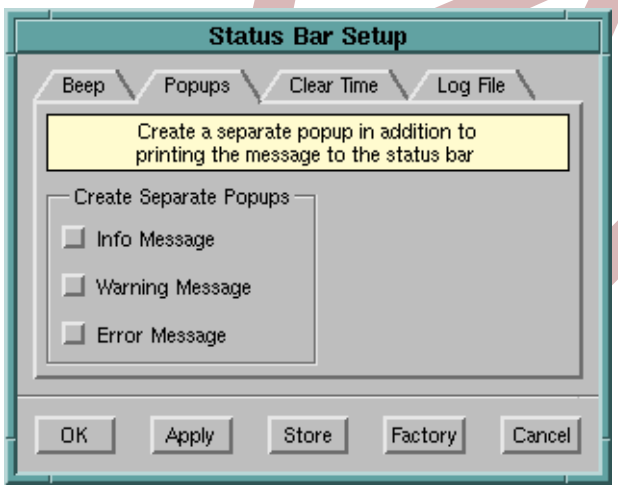

Figure 3-24 The Status Bar Setup Window showing Popups settings

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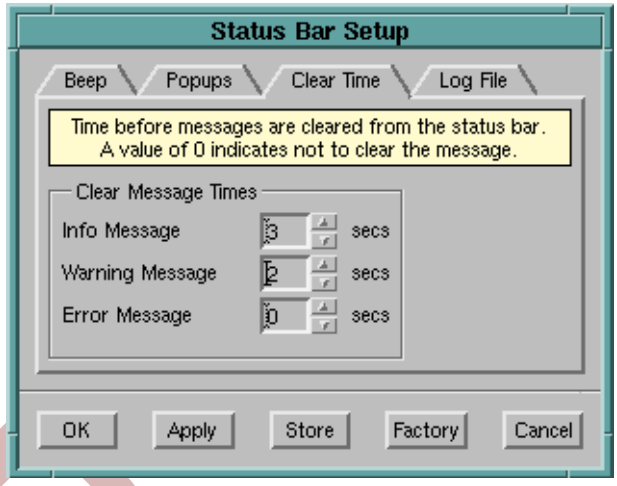

Figure 3-25 The Status Bar Setup Window showing Clear Time settings

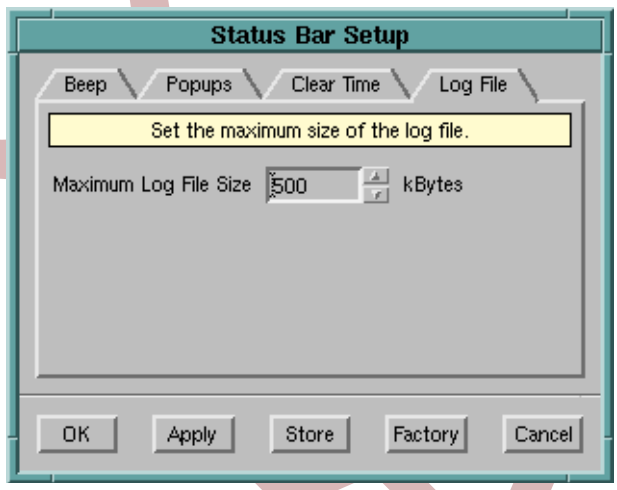

Figure 3-26 The Status Bar Setup Window showing Log File Size setting

3.6 Pointer Types

Twelve mouse pointers are used in the DA System.

	The arrow pointer is the pointer type most commonly used in the DA System.
	The pencil pointer is used to create tags. Keyboard shortcuts: <F1> to <F12>
	The crosshair pointer is used to make on-screen measurements and appears when the DA System is in measure mode. Keyboard shortcut: <Control-s>
	The zoom pointer appears when the DA System is in zoom mode. Keyboard shortcut: <Control-z>
	The move pointer is used to move tags. Keyboard shortcut: <m>
	The watch pointer appears when the system is waiting for an operation to complete.
	The automatic tracking pointer is used to reset the bottom tracking position. Keyboard shortcut: <b>

	The text-entry pointer appears when the pointer is placed in a text-entry box and is used to enter text in the selected field of a pop-up.
	The Centre On pointer appears after selecting the Centre On icon from the tool bar. Click on a point on the screen you wish to view at the centre of your window.
	The Fix Zoom pointer appears after selecting Fix Zoom from the tool bar. Click on a point on the screen you wish to be the centre of the zoom.
	The Pan Grab pointer appears after selecting the Pan Grab icon from the tool bar. Click and hold on a point on the screen, the move the mouse around to move the image. Release the mouse button when the image is in the desired position.
	The Egg Timer pointer appears only when the CODA system is initialising. It is not seen during any other operations.

When the pointer is in a particular mode – for example, for moving or deleting tags – you must complete the operation, or deselect the mode, before selecting another pointer mode. If you fail to do so, a warning pop-up appears on screen, reminding you that a pointer operation is already in progress. Click on the **OK** button to dismiss the pop-up and then complete the pointer operation, or deselect the mode, before continuing to the next pointer operation. Deselecting a mode usually involves repeating the action for selecting the mode.

3.7 Terminology

The most common computer terms used in this manual are defined below. A more complete list of terms can be found in the Glossary at the end of this manual.

Apply — this button applies the settings or options selected and retains the pop-up window on screen.

Cancel — this button cancels any items or options selected and dismisses the pop-up window; the previous settings are retained.

click — press down and release the appropriate mouse button. If no button is specified, use the left button.

double-click — press and release the appropriate mouse button twice in rapid succession. If no button is specified, use the left button.

information window — a window that provides information during acquisition or playback; this information cannot be edited. It can be displayed for any length of time, and is dismissed by clicking on the **OK** or **Done** button.

Menu Bar — the area at the top of the main display in which eight menu options are permanently displayed: **File**, **Display**, **Settings**, **Tagging**, **Reporting**, **Applications**, **Processing** and **Help**. Selecting any of the options causes a pull-down menu to appear.

OK — this button selects and applies the settings or options selected and dismisses the pop-up window from the screen.

pop-up menu — an option selection menu with a specific user-alterable value or parameter.

pop-up window — a general term applied to a window that automatically appears when a menu item or control function is selected; it may be a text-entry box (in which you type your requirement), or an area of information (which requires no action on your part). In this manual this phrase is abbreviated to pop-up.

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press and drag	position the pointer over an object, press the left mouse button and hold it down while you drag the object to the desired position, then release the mouse button. If no button is specified, the left button should be used.
pull-down menu	a pop-up that appears directly beneath an option in the Menu Bar when that option is selected.
scroll bar	the means by which all the items in a list appearing in a menu or pop-up window may be examined.
select	click the left mouse button on the appropriate item (such as a menu item, toggle or value selection).
select a *menu item*	click the left mouse button on a Menu Bar option, and then release the mouse button over an item in the pull-down menu that appears below the Menu Bar option.
tab form	a form that contains a number of related items of information or selections and has a labelled tab at the top. As tab forms overlap, the required tab form may have to be brought to the front of the pile by clicking on its tab.
tear-off menu	a pull-down menu that can be detached from the Menu Bar for permanent display.
text-entry box	an area in a window for entering text or numerical values. Click within the rectangular area and type text or edit the text using the keyboard.
toggle	switch from one setting to another, usually between on and off. A toggle switch is a switch that has just two positions.
toolkit	a pop-up that contains various tools for processing the data, for example **TVG** and **Image Enhancement**. Each pop-up contains an interactive graph and several *smart icons*.

3.8 Restart

This shuts down the software of the DA System system and causes the program to restart. It does not cause the DA System to reboot. The short-cut key is <Control-c>, as indicated on the menu. A box pops up, asking for confirmation that the system is to restart; click **Yes** or **No** as appropriate.

3.9 Key Shortcuts

Many of the common commands can be carried out using key shortcuts. A key shortcut is a single keystroke or a combination of keystrokes that executes a command.

The <Alt> key can be used to activate pull-down menus. To do this, press and hold down the <Alt> key and then press the key of the underlined letter in the required option in the *Menu Bar*. For example, pressing <Alt-f> causes the **File** menu to appear. An item from the *pull-down menu* can be selected by pressing the key for the underlined letter of the required menu item's name.

A list of other keyboard shortcuts can be displayed on screen by selecting **Help→Key Shortcuts** (see Figure 3-27, this page. The number of shortcut keys available, however, depends on the module of the DA System being used.

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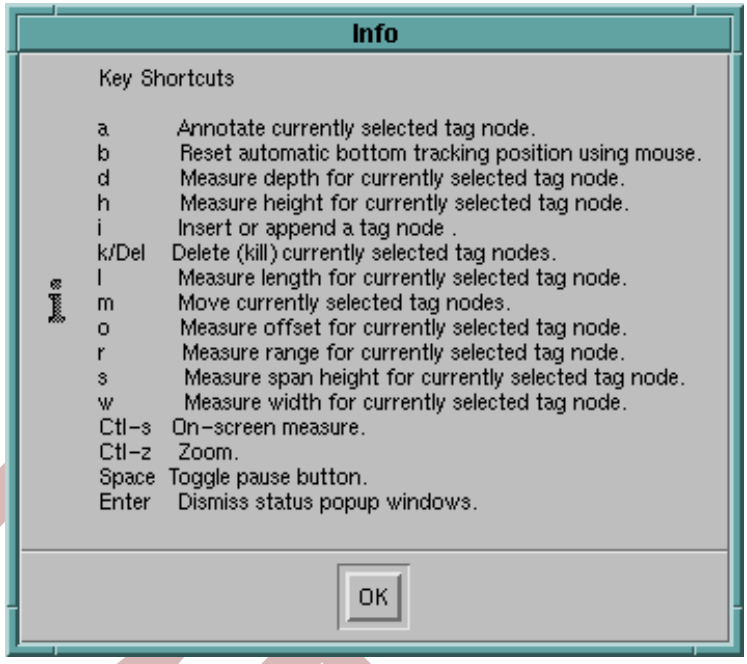

Figure 3-27 The Key Shortcuts Pop-up window

Some keyboard shortcuts are also listed in the pop-up menus; for example, <Control-z> appears in more than one pop-up. However, note that these shortcuts are only available when the pointer is in the Data Display Area.

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Part II: Using the DA System

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4 The System Hardware

4.1 DA100/200Hardware

4.1.1 The Front Panel

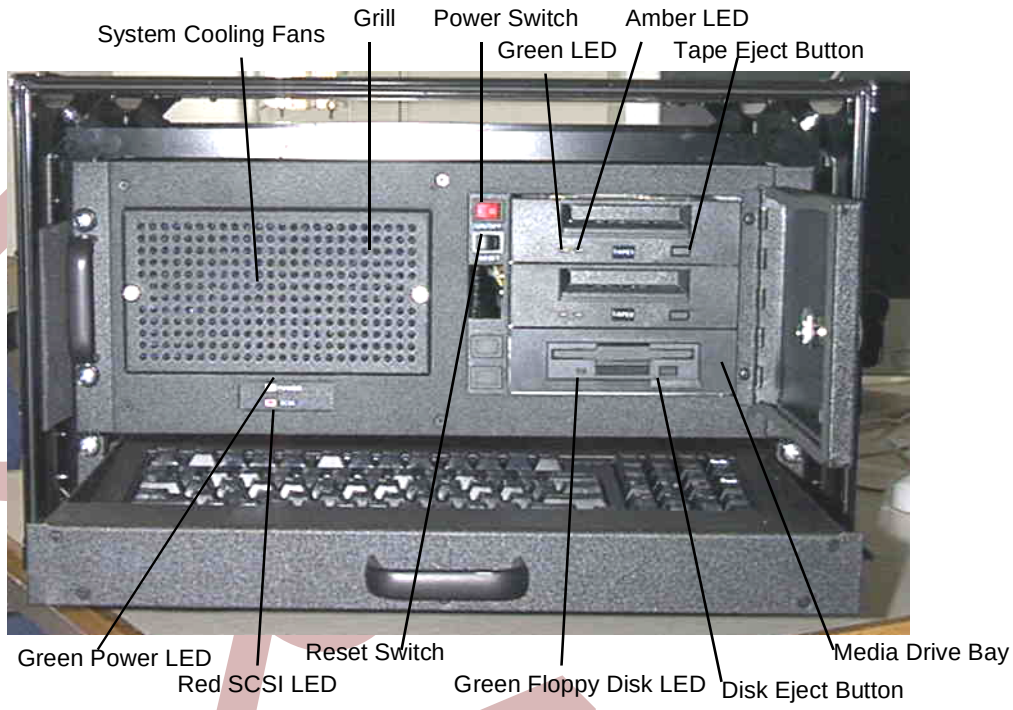

Figure 4-1 The DA200 Front Panel (DAT tape version)

Figure 4-1, this page, shows the typical layout of the DA System's front panel when a DAT tape system is installed. Read this whilst examining your system, noting the location of the following parts:

- Floppy disk drive: The drive's LED is lit while the system is using the drive. Do not remove a *floppy disk* or turn off the system when the LED is on. Doing so may damage the data on the disk.
- Power switch: Do not turn off the power until the DA System has been shut down correctly (see Section 13.2). On some systems the Power switch is located to the left of the Reset switch.
- Soft Power switch: On older DA Systems only. This switch can be used to turn on the system. It should only be used to turn off the system after the system has been shut down correctly.
- Reset switch: Do not use this switch unless the DA System has been shut down correctly; it can then be used to turn on the system again.
- System cooling fans: The DA System has two system cooling fans. It may be worth checking occasionally to see if dust has built up on the grill in front of the fans, which might impair performance. If the grill needs cleaning, remove the two screws from the front of the grill, pull off the grill and remove any dust or dirt. When you have done that, put back the grill and secure it in position with the two screws.

4.1.1.1 Tape Drives

Figure 4-1, this page, shows the front panel of a 4mm DAT tape drive. In a twin-tape system, upper *tape drive unit* is Tape 1. The units usually have two *LEDs* (one green and one amber), though 8mm Exabyte tape units have three.

- The left-hand green LED should flash periodically when data is being recorded or played

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back from tape.

- The right-hand amber LED should not come on during normal operation, and indicates a fault status.

See Appendix H for further information on interpreting the DAT drive LED display, and for information on interpreting the LEDs of 8mm Exabyte tape units.

4.1.1.2 Magneto-Optical Disk Drives

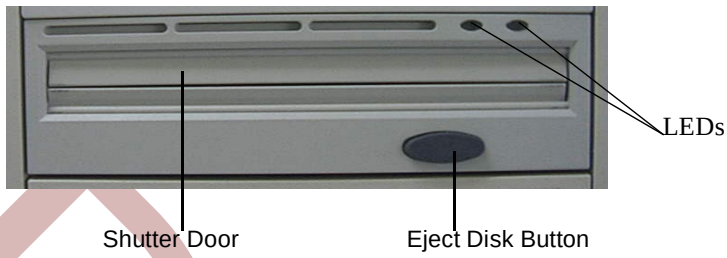

Figure 4-2 Close-up of Magneto-Optical Disk

Figure 4-2, this page, shows the front panel of a magneto-optical disk. The upper optical disk drive is referred to as **Optical 1**.

- Eject disk button: This button has no effect while the disk is still mounted. To remove a cartridge from the drive, first click on the **Unmount** button in the appropriate pop-up and then press the eject button.
- LEDs: The left LED shows the media status and the right LED shows the status of the drive
- Optical Disk Eject tool: Some, non Star, optical disk drives have a small hole through which a manual ejection tool can be inserted to force ejection of the disk in the event of a problem with the drive. This tool hangs – with the system keys – from a strap which is attached to one of the handles. It may be used in the last resort to remove a cartridge which the drive has failed to eject. However, this should only be attempted after the system has been shut down. Use only gentle pressure to attempt to remove the disk, as the ejection mechanism is easily damaged.Star series optical drives can be manually ejected: It is first essential to make sure the power to your DA System is switched off. Remove the rubber eject button and turn the inside shaft counter clockwise with a flat bladed screwdriver until the disk is fully ejected.

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4.1.2 The Back Panel

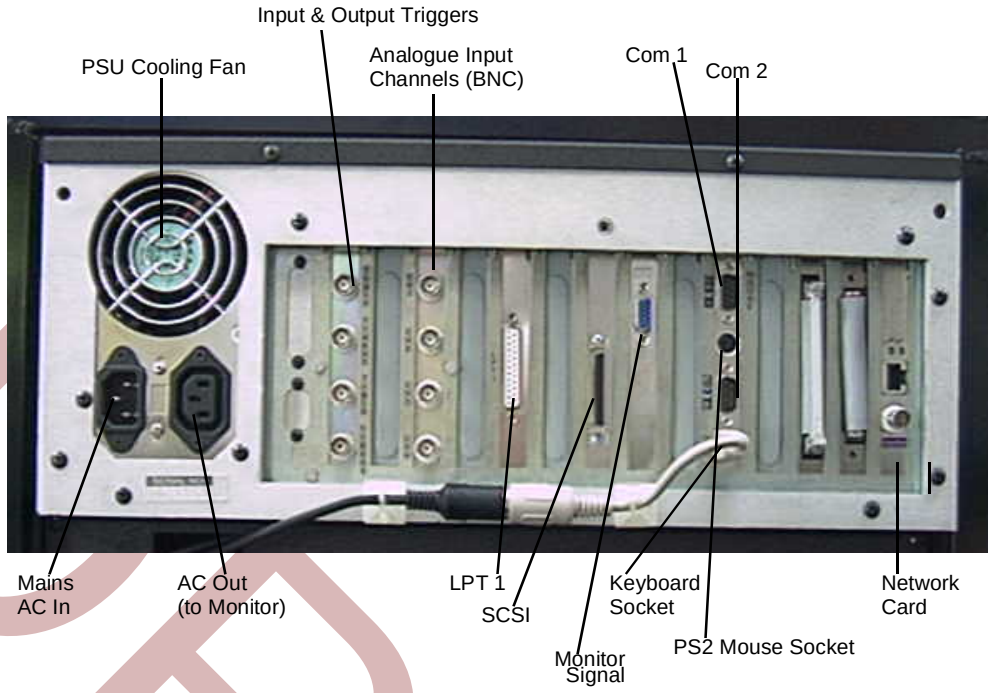

Figure 4-3 The DA System Back Panel and Cable Connectors

Figure 4-3, this page, shows the typical layout of the DA System's back panel. It identifies the connectors, *serial ports* and other item. Use this illustration to acquaint yourself with the cable connections before you try to connect the system, using the instructions below. Note the location of the following parts, which are identified from left to right:

- Voltage selector switch: In older DA Systems only. Newer systems automatically select the correct voltage. This is located between the AC In and AC Out sockets. It has two settings: 240V and 110/120V. The DA System is delivered with the input voltage (mains voltage) of its power supply unit (*PSU*) set to 240V. If the local/onboard supply is 110/120V, the voltage selector switch must be set accordingly. Failure to do so would result in damage to the PSU. If this switch is not present, then the system has an auto-switching power supply, and no manual switching between mains voltages is necessary.

  Caution: Always confirm that the system voltage has been set correctly before switching on the system for the first time - incorrect voltage selection can damage the power supply unit.

- Keyboard socket: Figure 4-3, this page, shows a DA System fitted with two PS/2 connectors. If the system that you are using has two PS/2 connectors, you must use the lower one to connect the keyboard. Other DA System systems are fitted with either a single PS/2 or a single non-PS/2 connector for connecting the keyboard, depending on hardware.

- USBs: Some systems are fitted with two USB connectors; however, they are not currently supported.

- *COM2* is a male D-type *RS-232 serial port* and is used for connecting the *navigation data* input to the back panel. For most applications, a simple two-wire connection (data in at pin 2 and signal ground at pin 5 if a 9-way connector is fitted, or data in at pin 2 and signal ground at pin 7 if a 25-way connector is fitted) is all that is required for trouble-free setup and operation.

- *COM1* is a 9-way D-type male RS-232 serial port which is used for connecting the mouse or *trackball* to the back panel. The mouse or trackball is an integral component of the DA System system and should always be connected before powering up the system.

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- *LPT1*: This port is a 25-way D-type female interface. It is compatible with a wide range of thermal printers. An additional GPIB interface is also available as an optional extra for compatibility with those thermal printers which use a GPIB interface. Contact Coda Technologies for further information.
- Monitor signal connector: The monitor signal is available from a 15-way, high-density D-type connector, as widely used in PC compatibles. The monitor used must be capable of an 80Hz refresh rate whilst displaying 1040 x 780 non-interlaced *pixels*.

For instructions on how to connect the system components together, and how to power up the system, refer to Section 4.3 and Section 4.4.

4.2 DA50 Hardware

4.2.1 The Front Panel

Figure 4-4 The DA50 Front

Figure 4-4, this page, shows the typical layout of the DA50's front panel. Read this whilst examining your system, noting the location of the following parts:

- Power switch: Do not turn off the power until the DA50 has been shut down correctly (see Section 13.2). On some systems the Power switch is located to the left of the Reset switch.
- Display screen: Integral to the system.
- Keyboard and mouse connections: These connections should be made by removing the cover at the back of they keyboard and plugging int he two connectors stored under the cover.
- Keyboard and Glide Pad: Integral to the system.

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4.2.2 The Side Panel

4.2.2.1 The Side Panel of the DA50

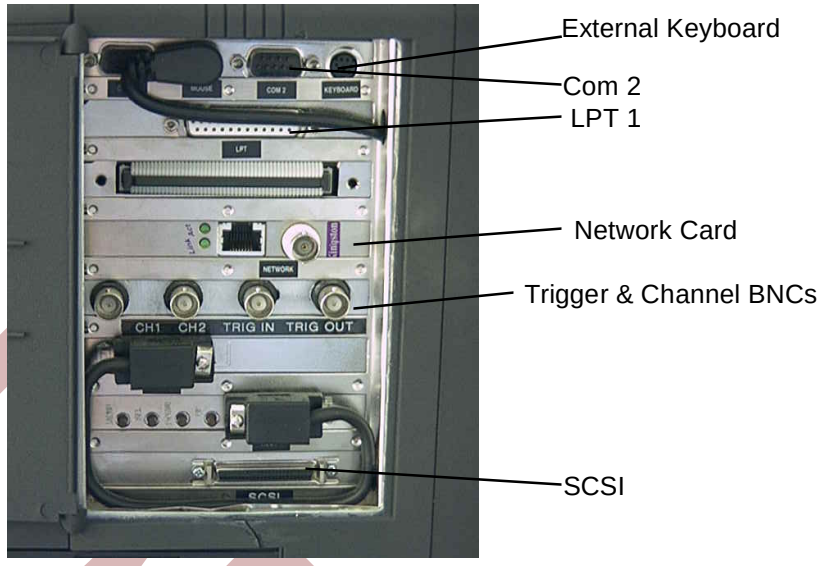

Figure 4-5 The DA50 Side Panel Showing Interface Connections

Figure 4-5, this page shows the typical layout of the DA50 side panel. Read this while examining your system, noting the location of the following parts:

- *COM2* is a male D-type *RS-232 serial port* and is used for connecting the *navigation data* input to the back panel. For most applications, a simple two-wire connection (data in at pin 2 and signal ground at pin 5 if a 9-way connector is fitted, or data in at pin 2 and signal ground at pin 7 if a 25-way connector is fitted) is all that is required for trouble-free setup and operation.
- *LPT1*: This port is a 25-way D-type female interface. It is compatible with a wide range of printers. An additional GPIB *Centronics*-type interface is also available for compatibility with thermal printers.
- Monitor signal connector: By using the VGA splitter cable provided with your DA System, a monitor can be connected to the unit as well as the integral screen.

4.2.2.2 The Side Panel of the DA50 with Magneto Optical Drive

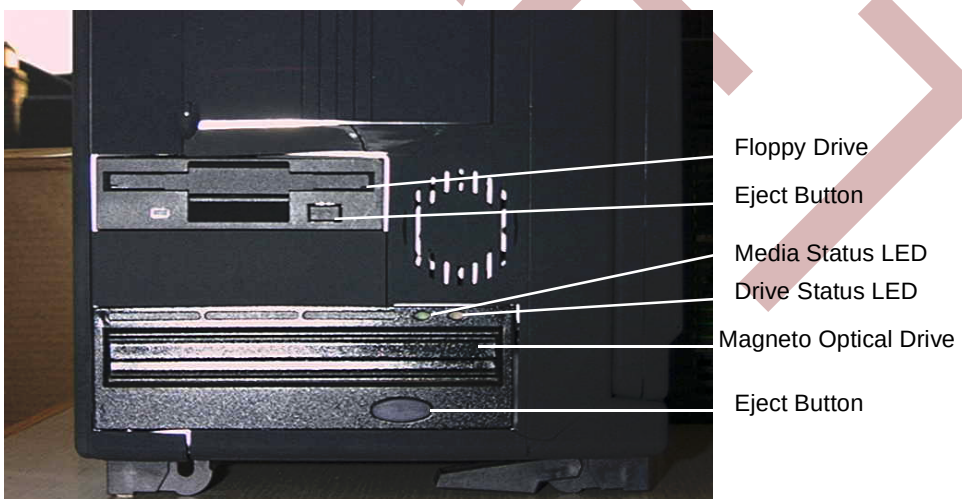

Figure 4-6 The DA50 System Side Panel Showing Magneto Optical Drive Bay

Figure 4-6, this page shows the typical layout of the DA50 side panel when a Magneto Optical drive is installed. Read this while examining your system, noting the location of the following parts:

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- Optical Disk drive: Two LEDs indicate the status of the disk, the status of the drive and fault reporting.
- Eject button: this button has no affect when the disk is still mounted. To remove a cartridge from the drive, first click on the Unmount button in the appropriate pop-up and then press the eject button.
- Optical Disk Eject tool: Some, non Star, optical disk drives have a small hole through which a manual ejection tool can be inserted to force ejection of the disk in the event of a problem with the drive. This tool hangs – with the system keys – from a strap which is attached to one of the handles. It may be used in the last resort to remove a cartridge which the drive has failed to eject. However, this should only be attempted after the system has been shut down. Use only gentle pressure to attempt to remove the disk, as the ejection mechanism is easily damaged.
- Star drives can be manually ejected: It is first essential to make sure the power to your DA System is switched off. Remove the rubber eject button and turn the inside shaft counter clockwise with a flat bladed screwdriver until the disk is fully ejected.
- Floppy disk drive: The drive's LED is lit while the system is using the drive. Do not remove a *floppy disk* or turn off the system when the LED is on. Doing so may damage the data on the disk.

4.2.2.3 The Side Panel of the DA50 showing DAT Drive Bay

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Figure 4-7 Side Panel of the DA50 Showing DAT Drive Bay

Figure 4-7, this page shows the typical layout of the DA50 side panel when a DAT drive is installed. Read this while examining your system, noting the location of the following parts:

- *COM2* is a male D-type *RS-232 serial port* and is used for connecting the *navigation data* input to the back panel. For most applications, a simple two-wire connection (data in at pin 2 and signal ground at pin 7 if a 25-way connector is fitted) is all that is required for trouble-free setup and operation.
- *LPT1*: This port is a 25-way D-type femal interface. It is compatible with a wide range of printer. An additional GPIB Centronics-type interface is also available for compatibility with thermal printers.
- Monitor signal connector: By using the VGA splitter cable provided with your DA System, a monitor can be connected to the unit as well as the integral screen.

- Tape Drive: The units usually have two LEDS (one gree and one amber) though 8mm Exabyte tape units ahve three. The left hand green LED should flash periodically when data is being recorded or played back from tape. The right hand amber LED should not come on during normal operation, and indicates a fault status. See Appendix H for further information on interpreting the DAT drive LED display, and for information on interpreting the LEds of 8mm Exabyte tape units.

4.3 Connecting the System

Caution: Failure to ensure that the input voltage of the power supply unit is set correctly for the AC supply voltage may damage the unit.

1. If your DA System has a voltage selector switch (see Section 4.1.2), make sure that the voltage selector switch is set correctly for the local/onboard supply.
   The input voltage (mains voltage) of the power supply unit (*PSU*) is preset to 240V. If the local/onboard supply is 110/120V, the voltage selector switch must be set accordingly.
2. Plug the power cable into the Mains AC In socket.

Caution: Connecting a monitor that cannot operate at the required resolution – an 80Hz refresh rate whilst displaying 1040 x 780 non-interlaced pixels – may damage the monitor.

3. For DA100/200 systems only. Plug the monitor power cable into the AC Out socket and the monitor signal cable into the monitor signal socket.
4. Plug the keyboard cable into the keyboard socket.
   On systems which have two PS/2 sockets, the keyboard cable must be plugged into the LOWER one.

Caution: Do not attempt to plug in another mouse type, (for example a Microsoft mouse) as this might not work using the default system settings. Contact Coda Technologies if you need to use a different type of mouse.

5. For DA100/200 systems only. Plug the mouse or trackball cable into the serial port labelled *COM1*.
6. If required, connect a printer to the parallel port labelled *LPT1*.

For data acquisition only:

7. Connect the *analogue* sonar signals to the *BNC connectors*. These are labelled CH1 to CH4 in the DA100/200 and CH1 and CH2 in the DA50/25.
8. Connect the *trigger* signal:
   - If an external trigger is to be used, the trigger signal should be connected to the trigger input BNC sockets labelled TRIG A IN (or TRIG B IN for DA200 systems, which have two trigger inputs). For *sub-bottom profilers*, the trigger input should be the output of the *heave compensation unit*, where fitted.
   - If the DA System is being used as the trigger source for external sonar equipment, the trigger signal should be connected through BNC connectors to the trigger output sockets labelled TRIG A OUT (or TRIG B OUT for DA200 systems, which have two trigger outputs).
     The system generates a *TTL* level output signal, whose period can be adjusted manually (see **File→Open Acquisition→Triggers**).
9. Connect the *navigation data* input to the serial port labelled *COM2*.

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4.4 Powering Up the System

Caution: If the DA System was in transit and has recently been unpacked, or if it has been brought from a cool area to a warm one, leave it for some time (at least an hour) to reach ambient temperature before powering up. This prevents condensation from forming within the system, which may seriously damage the electronics and the drive mechanism.

- If using a printer through LPT1, ensure it is connected to, and powered up before the Coda system.
- *Power up* the system and wait for the Coda Technologies screen.
  The system automatically starts up and initialises the DA System display interface.
- A pop-up will appear on the screen giving details of the release status of the software on your DA System. You can also view this at any time by selecting the **Release Info** option from the **Help** menu.

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5 Acquiring and Recording Survey Data

The DA System can be used to acquire survey data from both *sidescan sonar* and *sub-bottom profilers* and other seismic sources, and to record the data to tape or disk. This section explains how to initialise the acquisition system, how to initialise the *navigation input*, how to set the *fish height* and how to record the data. If you have used the Coda system before, Section 2 Quick Start provides a summary of these procedures.

Before starting *data acquisition* you should carry out some or all of the *off-line* tests that are described in Section 12; they enable you to check the system for 'sane' operation without using external inputs from sidescan units or navigation computers. Then, carry out the tasks in the Mobilisation Checklist in Appendix M, to make sure that the system is correctly integrated with the survey spread.

The DA System can acquire survey data from both analogue and digital sources. Your dongle (part of the DA System's hardware) will be pre-programmed by Coda to meet your requirements for either analogue or digital acquisition. The following chapter contains information on both Analogue and Digital acquisition. Refer to either Section 5.2.1 for Analogue Acquisition or Section 5.2.2 for Digital Acquisition.

Figure 5-1, page 46, shows the procedures for using the DA System – from connecting the system and powering up, to acquiring data, powering down and getting the system ready for transportation. Each of these procedures is described in detail in this part of the manual. If you are unfamiliar with the operation of the DA System system, we recommend that you read through this section thoroughly before using the system for *on-line* acquisition.

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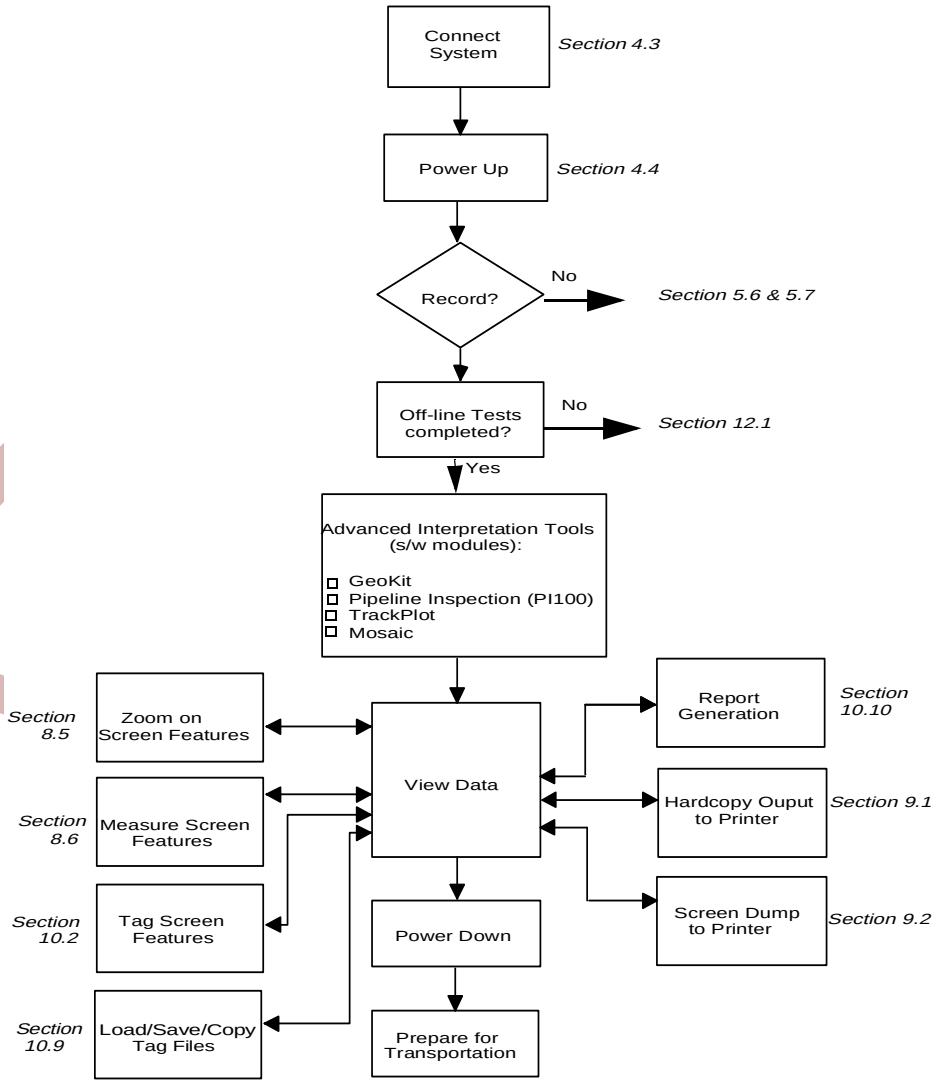

Figure 5-1 Flow Chart of DA System Operations

Obtaining High Quality Sonar Data

There are 6 keys to obtaining high quality survey data, which should be tackled in the following order:

1. Mobilisation
2. Data Acquisition
3. QC by viewing the data
4. Navigation inputs
5. Bottom Tracking
6. Recording to tape or disk.

The following sections deal with each of these 6 issues in turn.

5.1 Getting High Quality Data, Step 1: Mobilisation

A recent review of all the Technical Support cases which Coda Technologies has dealt with over the past 2 years revealed that over 80% of data gathering problems could have be isolated by the user when the survey spread was being mobilised, reducing lost survey time and improving the quality of data obtained.

To help to spot such problems during mobilisation, we have created a checklist which will ensure that when you arrive on site, you're ready to collect the data of the best possible quality. This checklist is presented in Part VI, and should be followed for every mobilisation.

The key issues dealt with in the mobilisation checklist include:

- Ensuring that each item of equipment the DA system will be connected to is fully operational.
- Checking that the sonar data can be acquired correctly with satisfactory noise performance.
- Checking the correct operation and updating of online navigation.
- Checking that the system records correctly, and that enough disks or tapes are available to complete the survey.

5.2 Getting High Quality Data, Step 2: Data Acquisition

5.2.1 Acquiring Analogue Data

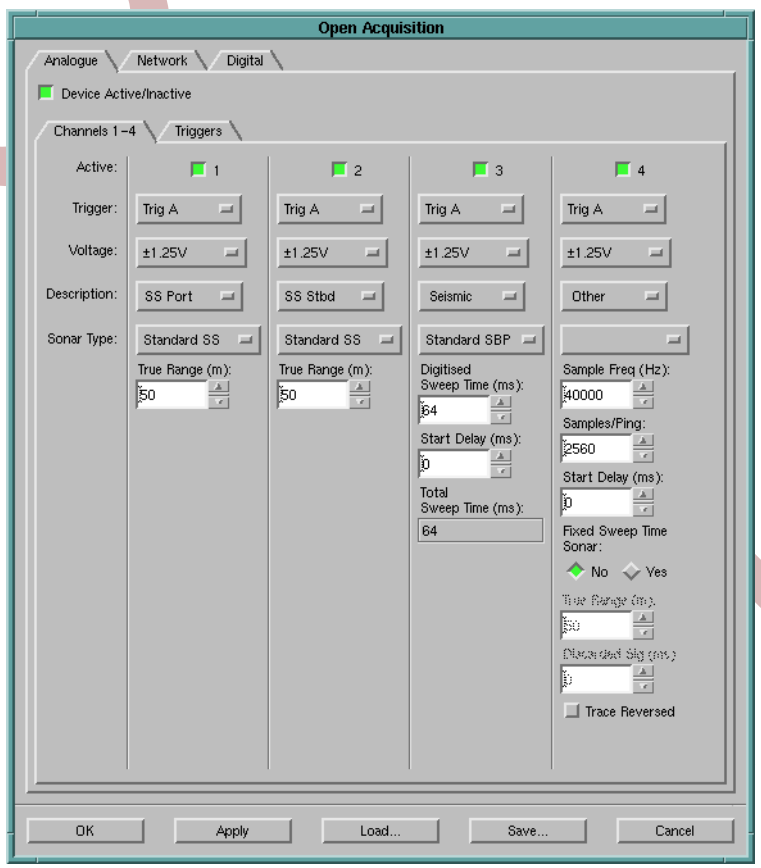

Figure 5-2 The Open Acquisition Pop-up Window showing the Channels Tab Form

5.2.1.1 Triggering Analogue Data Acquisition

Select **File→Open Acquisition** to bring up the **Acquisition Setup** popup, then select the **Analogue** tab and the **Triggers** tab to show the trigger setup window (Figure 5-3, page 48). The DA200 System has two independent triggers, which can be set to either internal or external, while other Coda acquisition systems have a single internal or external trigger. An external trigger is one which is derived from another piece of equipment – a sub-bottom profiler or sidescan sonar, for example. The internal trigger can be used when no external trigger is available, or if the DA System is to be used to generate the master trigger for use by other equipment.

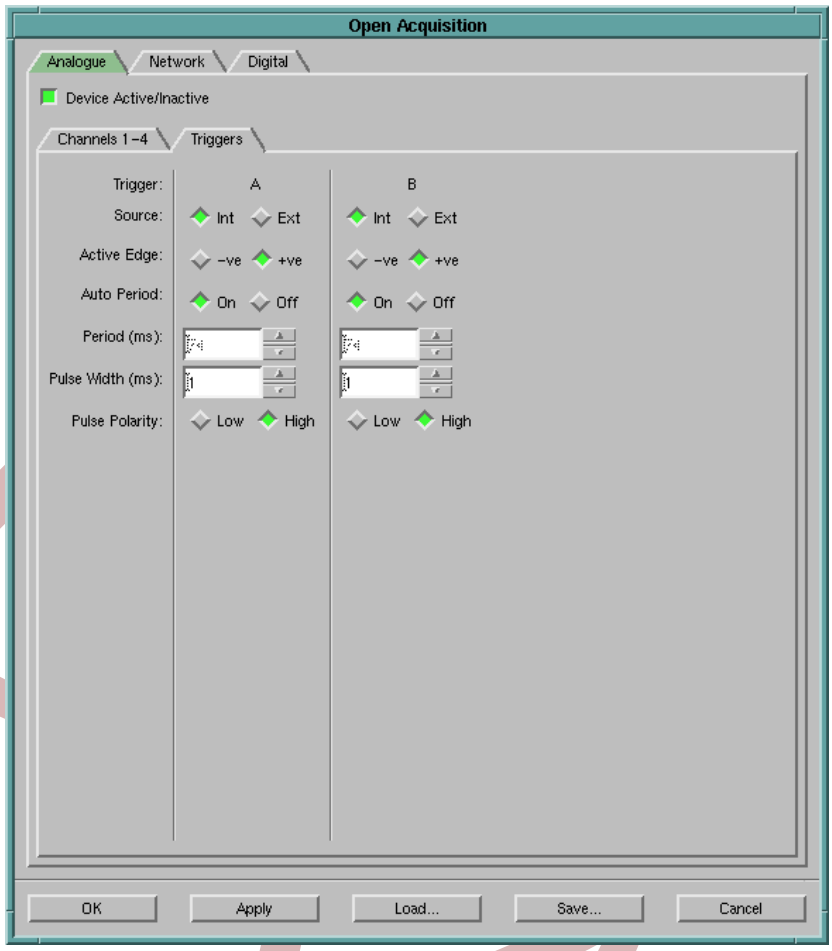

Figure 5-3 The Triggers Tab Form of the Open Acquisition Pop-Up Window

The **Triggers** tab form can be used to specify the details of the triggers (see Figure 5-3, this page). The settings can be changed as follows:

- **Trigger Source**: these can be set to **INT**ernal or **EXT**ernal by clicking on the option selection button and choosing the appropriate option. When external triggering is used, sampling starts whenever a pulse is received on the **TRIG IN** input. When set to internal trigger, the text-entry box can be used to define the frequency of the trigger produced by the DA System, or it can be configured automatically when **Auto Period** is on. No connection to **TRIG IN** is required. The **Period** of the trigger is set as described below.

  If an internal trigger is selected, all subsequent fields will be available. When an External trigger is selected, only the **Active Edge** is available; the remaining fields will be greyed out.

- **Active Edge**: a toggle to indicate whether digitisation of the sonar data starts after a positive (rising) edge, or a negative (falling) edge.

- **Auto Period**: this toggle can be used to set the internal trigger period; it automatically calculates the longest period for the trigger and adds ‘dead’ time.

- **Period (ms)**: this field sets the period (in milliseconds) of the trigger produced at the **TRIG OUT** connector. When internal trigger is selected, this field will show the trigger period in seconds (default 74 milliseconds or 13.5 triggers/second). This can be altered by typing a new entry in the *spin box*. This field is greyed out if an external trigger is selected.

- **Pulse Width (ms)**: (DA200 only) a spin box which is used to set the width, in milliseconds, of the internal trigger pulse. This field is greyed out if an external trigger is selected.

- **Pulse Polarity**: (DA200 only) two toggles which set the polarity of the internally generated trigger pulse. The options are either **Low** or **High**. A **High** polarity setting implies that the pulse is high for the time specified by **Pulse Width**. The remainder of the pulse (**Period** minus **Pulse Width**) is at a low level. For a **Low** setting, the reverse is true.

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When you have set all the parameters activate the device. To do this you need to check to **Device Active/Inactive** box at the top of the tab.

5.2.1.2 Acquiring Analogue Sidescan Data

The **File→Open Acquisition** pop-up selects *data acquisition mode* and allows the *acquisition parameters* to be set. Select the **Analogue** tab form to set up analogue acquisition (Figure 5-3, page 48). This is the only menu that has a direct effect on the quality of digitised data; therefore, it is important to make sure that the correct options and values are selected.

Select the parameters for each of the data channels to be digitised:

- **Active** is used to select the channels to be digitised by the system. A channel is selected by clicking on the on/off switch beside its number. Activating a channel changes its on/off switch from grey to green and makes its parameters available for selection. The parameters are unavailable (greyed out) for channels that are not active.

- **Trigger** shows the triggers to be used with specific channels. The triggers available are shown in the **Triggers** tab form (see Figure 5-3, page 48).

  Trigger defaults to **Trig A** where the selected **Description** is **SS Port** or **SS Stbd**, and defaults to **Trig B** when the **Description** is **Seismic**.

- **Voltage** is used to select the voltage range of the active channels. Each channel can have a different voltage range. The voltage range is changed by clicking on the option buttons of the active channels and selecting a new value. The options available depend on the digitisation option purchased, but the typical range is ±1.25V, ±2.5V, ±5V and ±10V. Selecting the voltage range that most closely matches the range of the input signal is the best option.

  The setting for the *input voltage range* is crucial to the acquisition of high-quality data. When acquisition has started, it is worth examining the **Scale Display Data** oscilloscope trace to ensure that the voltage range is set appropriately. No useful information is usually held in the outgoing pulse of sidescan sonar or sub-bottom profilers; the outgoing pulse may be *clipped*, allowing a smaller input voltage range to be selected than would otherwise be the case. For sidescan sonar operations, it is best not to finalise the input voltage range until the *towfish* is positioned at a typical survey altitude from the seabed, so that the voltage range of the received signal can be assessed.

- **Description** is used to select the source of the input data. The description is changed by clicking on the option buttons for the active channels. The options available are: Sidescan Port (**SS Port**), Sidescan Starboard (**SS Stbd**), **Seismic**, and **Other**. Each sonar type has its own set of input fields.

  Neighbouring sidescan channels which share the same trigger, which are of the same sonar type (for example, standard sidescan) and which are in the order ‘SS Port’ followed by ‘SS Starboard’ are linked, and the word ‘linked’ will be printed between the **Active** on/off switches for the two channels. This means that changes in one channel’s true range are automatically copied to the other channel.

- **Sonar Type** is used to set the type of input sonar. The options available depend on the **Description** setting (see above).

  Setting **Description** to either Sidescan Port (**SS Port**) or Sidescan Starboard (**SS Stbd**) provides three options in the **Sonar Type** field: **Standard SS**, **Widescan SS** or **Custom SS**.

Standard Sidescan

- **True Range (m)**: This *spin box* is used to define the across-track swathe size for the data channel. The actual true range of the sidescan is dependent on its altitude; the true range selected will be correct for any fish altitude from 0 to 40% of the true range. The DA System will automatically calculate the sample frequency and the number of samples per ping required for the given range. If your DA System is a DA200, different sample frequencies can be selected for each trigger.

  If you’re using an external trigger, it is necessary to ensure that the range settings on the DA System are compatible with the sonar processing unit. If you set the range on the DA System to be the same as that on the sidescan processing unit, you may find that the outer edges of

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the sidescan swathe are not being digitised, or (more critical for your data quality), that the Coda system is digitising for so long after each trigger that it misses the next trigger - effectively halving your along-track resolution.

To get range settings which match the trigger rate of your sidescan processing unit, set the range on the processing unit, then increase the range setting on the Coda system until the ping rate (which is displayed in the General Information Area) drops to half the rate you would expect for the range setting on the processing unit (e.g. if the range setting on the processing unit is 100m, then the expected ping rate is about 6.5 per second; adjust the range on the Coda system to the point where the ping rate in the GIA drops to about 3 per second). At this point, you know that the Coda system is sampling for too long after each external trigger, and is missing every second trigger. Decrease the range setting in the Open Acquisition popup until the trigger rate returns to the expected value, then decrease it by a further 1m to allow for any variation in trigger timing.

Using this procedure, you have ensured that you're getting the maximum across-track and along-track resolution from your sidescan sonar.

Ultra Widescan

- **True Range (m)**: This *option button* is used to define the across-track swathe size for the data channel. A **True Range** can be selected from the following options: 50m, 100m, 150m, 200m, 250m, 300m, 350m and 400m. The actual true range of the sidescan is dependent on its altitude; the true range selected will be correct for any fish altitude from 0 to 40% of the true range. The DA System will automatically calculate the sample frequency and the number of samples per ping required for the given range.

Custom Sidescan

- This allows you to alter the acquisition settings at a very low level, and requires an in-depth understanding of the Coda system's software. Most users will not need to use this set of options; for those who do, Appendix A gives some detailed examples.

To view the incoming data on the channels selected, click on the **Play** button in the *Data Control Area*. When you press the **Play** button, the **Scale Display Data** pop-up appears on screen and can be used to optimise the display.

Note: Make sure that all parameters are selected correctly, as they determine how the data is recorded. Incorrect parameters may reduce the quality of the data and the accuracy of auxiliary information, such as position and fish height.

5.2.1.3 Acquiring Analogue Shallow Seismic Data

The File **Open Acquisition** pop-up selects *data acquisition mode* and allows the *acquisition parameters* to be set. Select the Analogue tab form to set up analogue acquisition (Figure 5-3, page 48). This is the only menu that has a direct effect on the quality of digitised data; therefore, it is important to make sure that the correct options and values are selected.

- **Active** is used to select the channels to be digitised by the system. A channel is selected by clicking on the on/off switch beside its number. Activating a channel changes its on/off switch from grey to green and makes its parameters available for selection. The parameters are unavailable (greyed out) for channels that are not active. The default active channels are data channels 1 and 2 (for single trigger systems) or 1, 2 and 3 (for the dual trigger systems).

- **Trigger** shows the triggers to be used with specific channels. The triggers available are shown in the **Triggers** tab form (see Figure 5-3, page 48).

  On the DA System, **Trigger** defaults to **Trig A** where the selected **Description** is **SS Port** or **SS Stbd**, and defaults to **Trig B** when the **Description** is **Seismic**.

- **Voltage** is used to select the voltage range of the active channels. Each channel can have a different voltage range. The voltage range is changed by clicking on the option buttons of the active channels and selecting a new value. The options available depend on the digitisation option purchased, but the typical range is ±1.25V, ±2.5V, ±5V and ±10V. Selecting the voltage range that most closely matches the range of the input signal is the best option. The setting for the *input voltage range* is crucial to the acquisition of high-quality data. When

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acquisition has started, it is worth examining the **Scale Display Data** oscilloscope trace to ensure that the voltage range is set appropriately. No useful information is usually held in the outgoing pulse of sidescan sonar or sub-bottom profilers; the outgoing pulse may be *clipped*, allowing a smaller input voltage range to be selected than would otherwise be the case. For sidescan sonar operations, it is best not to finalise the input voltage range until the *towfish* is positioned at a typical survey altitude from the seabed, so that the voltage range of the received signal can be assessed.

- **Description** is used to select the source of the input data. The description is changed by clicking on the option buttons for the active channels. The options available are: Sidescan Port (**SS Port**), Sidescan Starboard (**SS Stbd**), **Seismic**, and **Other**. Each sonar type has its own set of input fields.

- **Sonar Type** is used to set the type of input sonar. The options available depend on the **Description** setting. Setting **Description** to **Seismic** provides two options in the **Sonar Type** field: **Standard SBP**, or **Custom SBP**.

Standard SBP

- **Digitised Sweep Time (ms)**: a spin box for supplying the time over which the signal is sampled. This is two-way travel time.

- **Start Delay (ms)**: the delay in seconds between receiving the trigger and starting to acquire data. This can be used (for example) to reduce the length of the sampled water column. The default start delay is 0 milliseconds, but can be increased for each data channel in the appropriate spin box.

- **Total Sweep Time (ms)**: a label showing the calculated sweep time for the given input values. This is two-way travel time.

Custom SBP

- This allows you to alter the acquisition settings at a very low level, and requires an in-depth understanding of the Coda system's software. Most users will not need to use this set of options; for those who do, Appendix A gives some detailed examples.

To view the incoming data on the channels selected, click on the **Play** button in the *Data Control Area*. When you press the **Play** button, the **Scale Display Data** pop-up appears on screen and can be used to optimise the display.

Note: Make sure that all parameters are selected correctly, as they determine how the data is recorded. Incorrect parameters may reduce the quality of the data and the accuracy of auxiliary information, such as position and fish height.

5.2.1.4 Other Channels

When **Other** is selected, there is no valid Sonar Type. Do not use this setting, except for signals which you do not wish to view on the scrolling display.

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5.2.2 Acquiring Data from a Digital Sonar

5.2.2.1 Edgetech DF1000

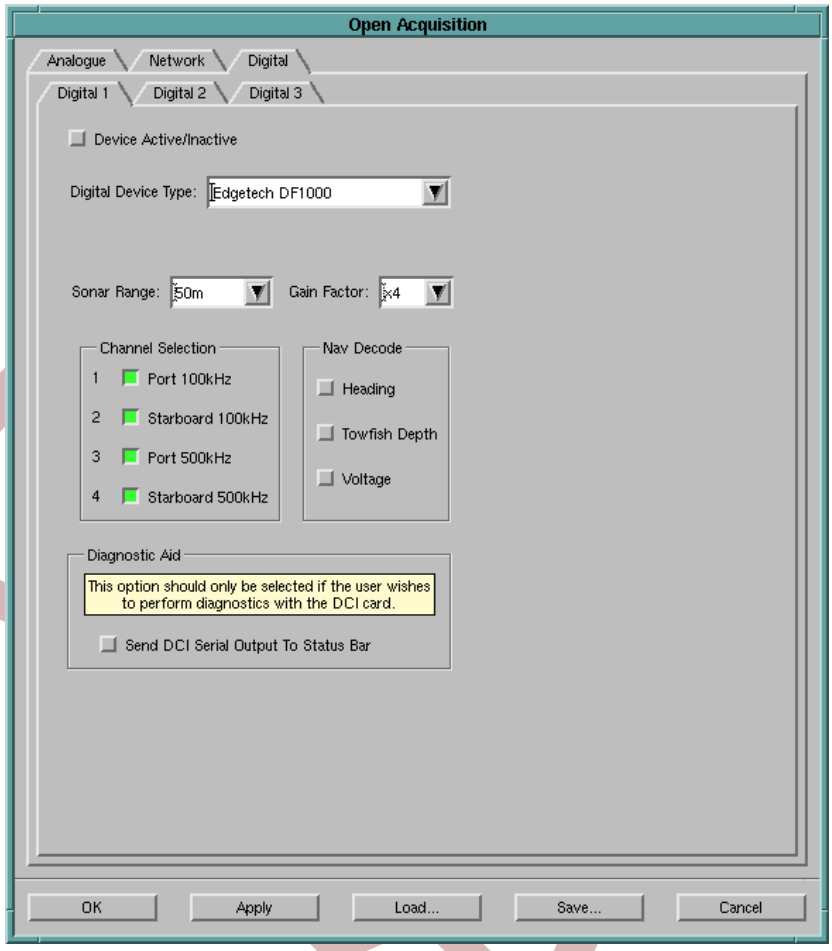

Figure 5-4 The Digital Tab Form of the Open Acquisition Window showing the setup for an Edgetech DF1000 towfish

Figure 5-4, this page shows the **Open Acquisition Digital** Tab Form for an Edgetech DF1000 digital towfish.

First, select the **Sonar Range** for which the data will be collected. This is the true range for each channel or swathe over which the sonar will collect data. The available ranges are; 25m, 50m, 75m, 100m, 150m, 200m, 300m, 400m and 600m.

The channel selection option gives the choice of frequencies to be acquired by the fish. Each channel can operate at either 100kHz or 500kHz. It is possible to gather data for all 4 channels at once, namely Port and Starboard at both 100kHz and 500kHz. If you only wish to collect data for 2 channels rather than 4, simply select the channels you require. It is not possible to select data acquisition for only one channel.

The input channel numbers for the DF1000 data are fixed. The Coda display channels are as follows:

- Port 100kHz - Input Channel 1
- Starboard 100kHz - Input Channel 2
- Port 500kHz - Input Channel 3
- Starboard 500kHz - Input Channel 4

The DF1000 towfish has an optional feature of providing instrumentation data. The towfish can supply data for the heading, towfish depth and towfish voltage. It is possible to store the values as part of the navigation data. These values can be stored by selection the appropriate toggle buttons in the **Nav Decode** frame.

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If water depth is being received from the **Navigation Input** through the COM2 port then towfish depth is ignored. However if water depth is not being received through this port, then it is calculated by adding towfish depth to fish height to derive the water depth. These fields can then be reported, see **Report Generation** Section 10.10.2. The towfish depth may be used to calculate water depth, for the report.

If navigation data is currently being received using Navigation Input then selecting the DF1000 values will override the values received from **Navigation Input**.

The **Device Active/Inactive** toggle button is used to either switch on or switch off DF1000 acquisition.

Use the **Diagnostic Aid** toggle button if you want to send information from the DCI card of your sonar device to the DA System **Status Bar**.

5.2.2.2 Edgetech ACI

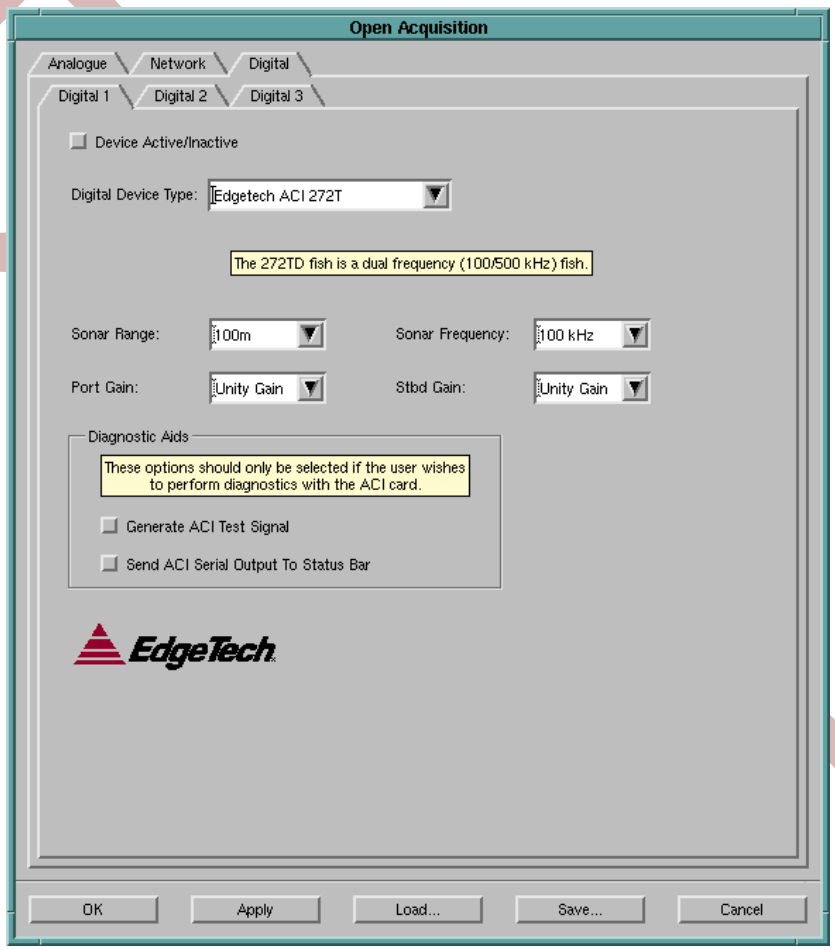

Figure 5-5 The Digital Tab Form of the Open Acquisition Window showing the setup for an Edgetech ACI272T and AC272TD towfish

Figure 5-5, this page shows the Open Acquisition Digital Tab Form for an Edgetech ACI 272T and ACI 272TD digital towfish.

First select the digital device type to be used, ACI 272TD (dual frequency) or ACI 272T (single frequency).

Select the Sonar Range for which the data will be collected. This is the true range for each channel or swathe over which the sonar will collect data. The available ranges are; 25m, 50m, 75m, 100m, 150m, 200m, 300m, 400m and 600m.

Select the frequencies option to be acquired by the fish either 100kHz or 500kHz (100kHz only on ACI 272T).

Select the gain for the port and starboard channels, these range from -12dB to +12dB.

Use the Diagnostic Aid toggle buttons if you want to send information from the ACI card of your sonar device to the DA System Status Bar or to generate a test signal.

5.2.3 Acquiring Data over a Local Area Network

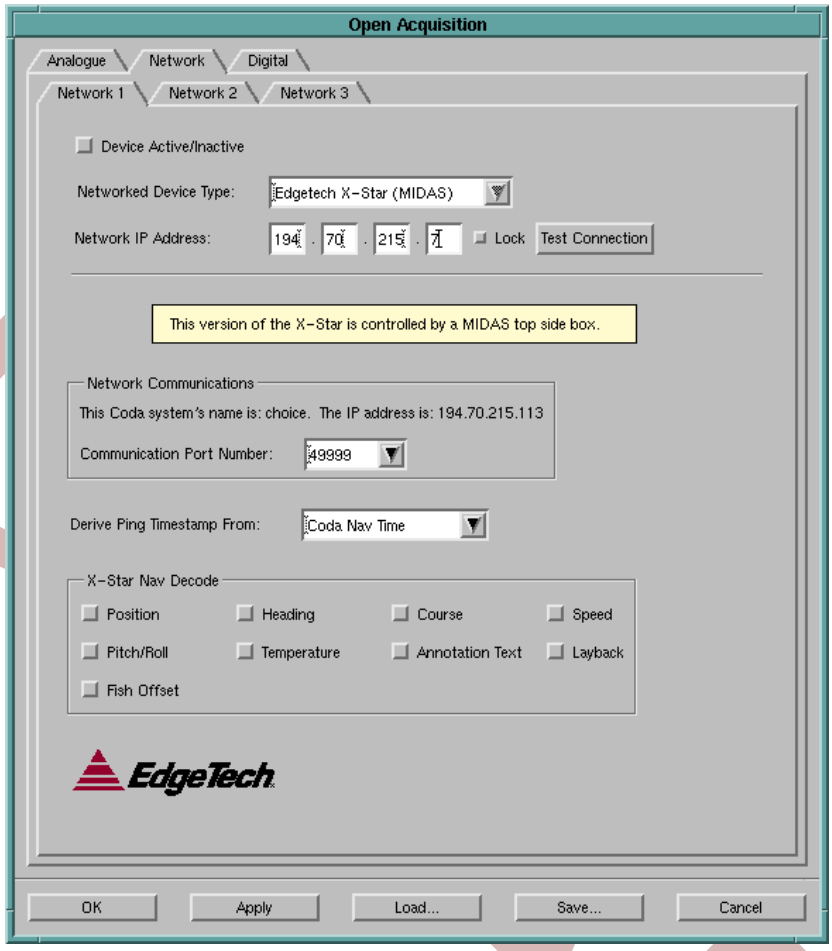

Figure 5-6 Open Acquisition pop-up showing Network Acquisition

5.2.3.1 Networking to an Edgetech MIDAS XSTAR system

Note: Before Starting please read through instructions and ensure that you are confident that you can complete the configuration before attempting to change anything.

Both the Coda system and the XSTAR system must have the same network address (the first three entries in an IP address). The simplest way to do this is to change the Coda system's IP address to the XSTAR network as follows:

1. Choose a free IP address on the XSTAR's network.
2. Select the **Change IP Address** option from the Coda system's **Maintenance Menu** and use this free IP address (see Section 12.3.4). When finished, your system will reboot.
3. When the system has rebooted, check you have added your Coda system to the network. Select **Maintenance Menu→X Terminal**. In the **X Terminal** screen, type "ping(IP Address)". If you get a reply from other machines on the network, you have successfully added your Coda system to the XSTAR network

Now configure the MIDAS XSTAR software to tell it how to connect to the CODA system.

1. Edit the /etc/hosts file on the MIDAS system to add the Coda entry.
2. *Right click* on the **Menu Bar** with your mouse and select **Shells→Shell Tool**.
3. At the prompt, obtain root permissions by typing *su <return>* and enter the root password.

Note: The Root Password is documented in your DA System's Technical Manual, Software Build printout. Contact Coda Technologies for further information.

4. When the system's name appears in the display, type */usr/bin/textedit /etc/hosts*. This will bring up an editor.
5. Add the Coda system entry in the editor and save this file by *right clicking* the mouse over the menu area of textedit and then selecting the appropriate menu.
6. Exit the editor, by *right clicking* on the **Title Bar** and selecting **Quit**. At the shell prompt type *exit*. This will exit su mode.
7. Now edit the ethernet.txt file by typing */usr/bin/textedit /home/bottom/ethernet.txt*.
8. The first line of this specifies the Coda host to connect to. Enter this appropriately.
9. The second line specifies the port to connect to. Set this to *49999*.
10. Save this file and quit the editor.
11. Reboot the MIDAS XSTAR. Type *shutdown 0* at the prompt (you may need to su to do this). At the boot prompt type boot.

You should now be able to ping the Coda system from the MIDAS XSTAR. You should also be able to output data using the ethernet option from the MIDAS Menu. It is advisable to output raw data to the Coda so that the data is retained at its full resolution.

Note: The ethernet output button must be clicked twice for data to be sent to the Coda system.

5.2.3.2 Networking to an Edgetech FSIU Interface System

Both the Coda system and the FSIU system must have the same network address (the first three entries in an IP address). The simplest way to do this is to change the Coda system's IP address to the FSIU network as follows:

1. Choose a free IP address and obtain the sub-net mask on the FSIU's network.
2. Select the **Change IP Address** option from the Coda system's **Maintenance Menu** and use this free IP address and sub-net mask (see Section 12.3.4). When finished, your system will reboot.
3. On the **Network** tab of the of the **Acquisition** pop-up, seeFigure 5-7, page 56, enter, in **Network IP Address**, the IP address of the FSIU.
4. Press **Test Connection**. This activates a ping test on the FSIU IP address to check the integrity of the network connection. If successful the system will return the message "IP (address) is alive".
5. Use the **Lock** button to prevent accidental change and save the set-up using the **Save** button.

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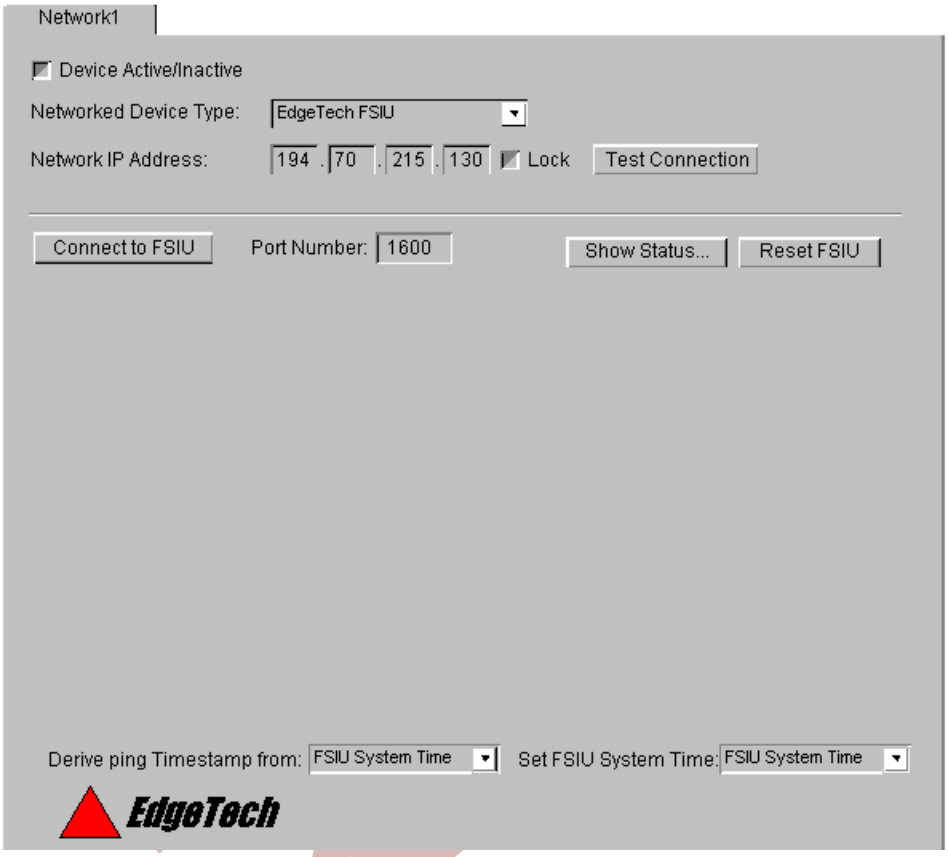

Figure 5-7 The Network Tab Form of the Open Acquisition Window showing an Edgetech FSIU system on initial opening.

Figure 5-7, this page shows the Open Acquisition Network Tab Form with the Edgetech **FSIU Network Device Type** selected. When initially viewed, the **Network** tab will only display the **Connect to FSIU, Port Number, Show Status**, **Reset FSIU**, **Derive ping Timestamp** and **Set System Time** items.

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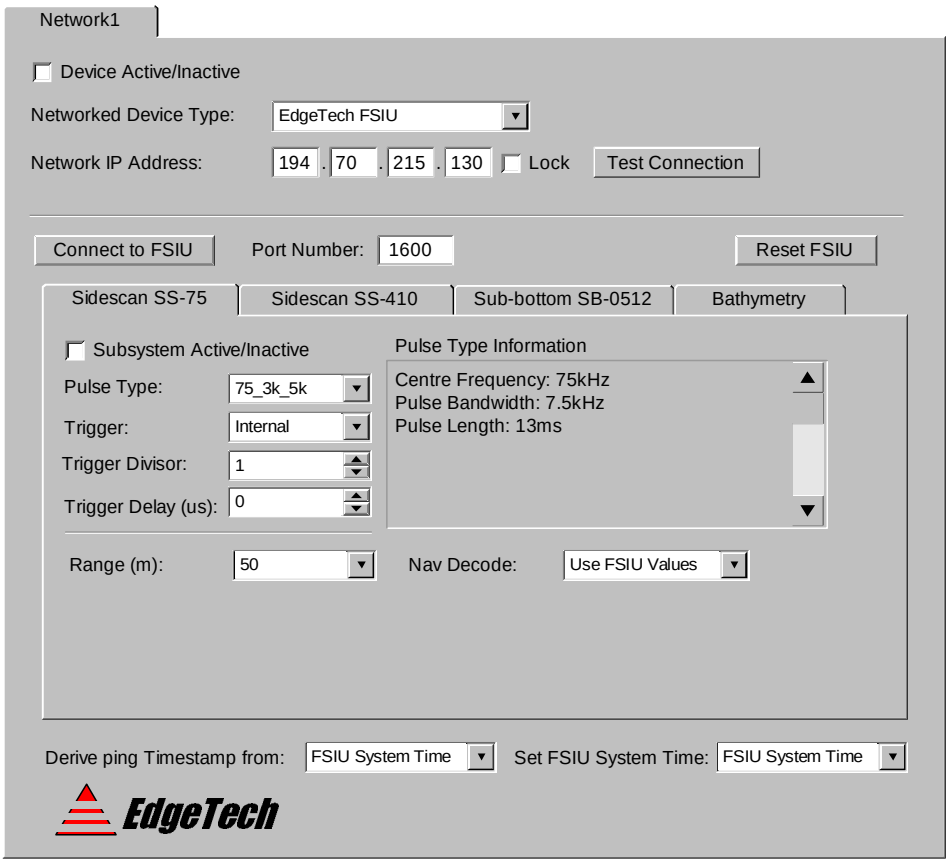

Figure 5-8 The Network Tab Form of the Open Acquisition Window showing the set-up for an Edgetech FSIU system

Figure 5-8, this page shows the **Open Acquisition Network** tab form with the Edgetech FSIU **Network Device Type** selected after clicking on the **Connect to FSIU** button. This will establish a connection with the FSIU unit and interrogate the subsystems on the unit. The results of the interrogation will then determine the number and type of device tabs to be displayed on the form.

The **Reset FSIU** button causes a reset message to be sent to the FSIU and for the tab area to be cleared. Re-clicking the **Connect to FSIU** button will cause the tab area to be redrawn.

5.2.3.2.1 Edgetech FSIU Sidescan

The **Sidescan** tabs are shown in Figure 5-8, this page. There are two separate tabs, one for high frequency sidescan and one for the low frequency sidescan. The tabs allow the user to activate the subsystem, select the type of pulse and trigger and the range.

The **Pulse Type** is obtained by interrogating the FSIU unit (this is done at the same time as the interrogation for subsystems). Selecting a different **Pulse Type** from the scrolling option list causes the Pulse Type Information area to be updated with the information of the newly selected pulse type.

The **Trigger** scrolling option list gives the choice of internal, external, coupled or gated trigger types.

- Internal trigger is internal to the FSIU unit and not to the Coda system. When **Internal** is selected the **Trigger Divisor** and **Trigger Delay** fields are greyed-out
- When **External** is selected, the **Trigger Divisor** is greyed out. The **Delay** field can also be used for **External** triggers, specifying the delay from the trigger
- When **Coupled** trigger is selected, the trigger can be coupled to another subsystem e.g. SBP. Each option for coupling subsystems will be displayed in the list as, for example, Coupled SB-0512. In **Coupled** mode, the **Divisor** and **Delay** fields can be used
- In **Gated** mode, the external trigger is used as a trigger inhibit, with the time of inhibit being

controlled by the value in the **Inhibit Time** field. This field replaces the **Trigger Delay** field when the **Trigger Type** is set to **Gated**.

- The **Divisor** field acts to subdivide the master (coupled) trigger.
- The **Delay** field can be used to further delay this trigger from the master.

The **Navigation Decode** scrolling option list allows the following choices:

- When **Use FSIU Values** is selected the position (E, N), heading, heave, pitch, roll, yaw, depth, fish offset, layback, speed, course and temperature are all set from the FSIU.
- When **Use Coda Navigation Values** is selected the navigation values from the Coda navigation string are used.

5.2.3.2.2 Edgetech FSIU Sub-Bottom

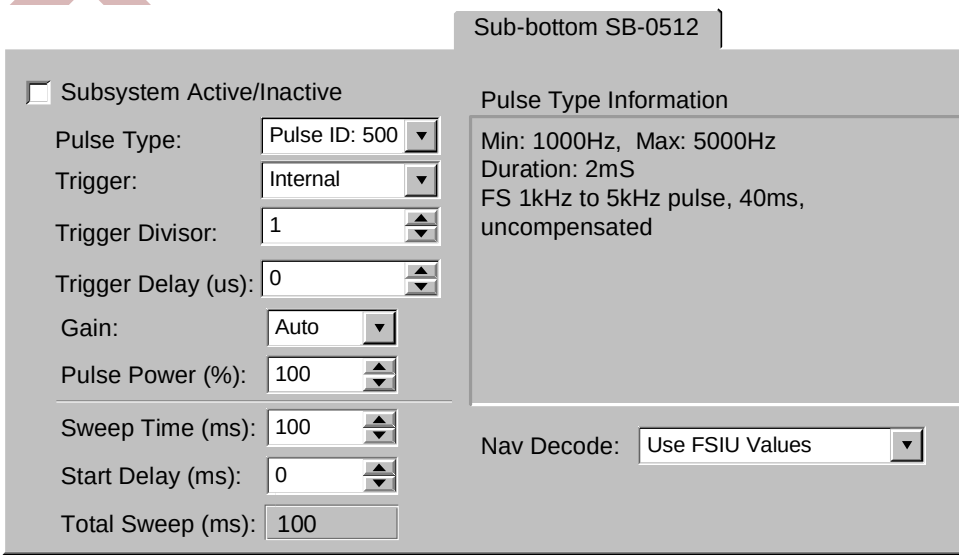

Figure 5-9 The FSIU Sub-bottom Tab Form of the Network Tab Form

The **Sub-bottom** tab is shown in Figure 5-9, this page. The tab allows you to activate the subsystem, select the type of pulse, trigger, gain, and power and also select the sweep time parameters.

The **Pulse Type** is obtained by interrogating the FSIU unit (this is done at the same time as the interrogation for subsystems). Selecting a different **Pulse Type** from the scrolling option list causes the **Pulse Type** Information area to be updated with the information of the newly selected pulse type.

The **Trigger** scrolling option list gives the choice of internal, external, coupled or gated trigger types.

- Internal trigger is internal to the FSIU unit and not to the Coda system. When **Internal** is selected the **Trigger Divisor** and **Trigger Delay** fields are greyed-out.
- When **External** is selected, the **Trigger Divisor** is greyed out. The **Delay** field can also be used for **External** triggers, specifying the delay from the trigger.
- When **Coupled** trigger is selected, the trigger can be coupled to another subsystem e.g. SSS. Each option for coupling subsystems will be displayed in the list as, for example, Coupled SS-410. In **Coupled** mode, the **Divisor** and **Delay** fields can be used.
- In **Gated** mode, the external trigger is used as a trigger inhibit, with the time of inhibit being controlled by the value in the **Inhibit Time** field. This field replaces the **Trigger Delay** field when the **Trigger Type** is set to **Gated**.
- The **Divisor** field acts to subdivide the master (coupled) trigger
- The **Delay** field can be used to further delay this trigger from the master

The **Gain** option allows a pre-selected gain to be applied to the received data. Selecting the value Auto will cause the FSIU to choose the optimum gain.

- **Pulse Power** allows the user to select the outgoing pulse power as a percentage.
- The **Sweep Time** spin box allow the user to set the two way sweep time.
- The **Start Delay** spin box allow the user to set an initial period over which no data is gathered
- The **Total Sweep** field automatically calculates the sum of the **Sweep Time** and **Start Delay** *spin boxes*.

The **Navigation Decode** scrolling option list allows the following choices:

- When **Use FSIU Values** is selected the position (E, N), fish offset, layback, pitch, roll, heading, temperature, course, annotation text, and speed are all set from the FSIU.
- When **Use Coda Navigation Values** is selected the navigation values from the Coda navigation string are used.

Edgetech FSIU Common Features

Below the tabbed area are parameters common to all sensors on the FSIU.

- The **Derive Ping Timestamp From** *scrolling option list* allows the user to select where the ping timestamp is derived from. The choices are either **FSIU System Time**, **FSIU Navigation Time** or **Coda Navigation Time**. When the option is set to **Coda Navigation Time**, the actual value will depend on whether the Coda system is time-synched with a nav computer or using its own system time.
- The **Set FSIU System Time** scrolling option list allows the **System Time of the FSIU** to be set. When set to **FSIU System Time**, the time is left unchanged, when set to **FSIU Navigation Time**, the FSIU time will be set by the navigation time. When set to **Coda System Time**, the Coda time will be used. The time updated occurs each time **OK** or **Apply** is selected in the **Open Acquisition** dialog.

5.2.3.3 Networking to a Reson Seabat 8125 Interface System

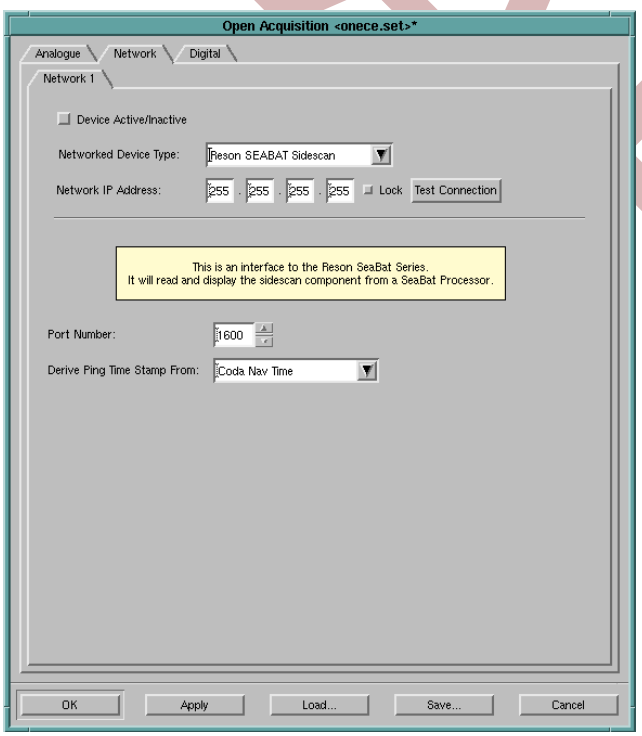

Figure 5-10 The Network Tab Form of the Open Acquisition Window showing the Reson Seabat 8125 system.

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The Seabat 8125 is a 455 kHz Ultra High Resolution Focused Multibeam Echosounder (MBES) system. It can output data either on an RS-232 port or on an Ethernet port. The Coda interface decodes sidescan data transmitted from the Ethernet Port.

Note: The Ethernet protocol used in data transmission is UDP, which is a connectionless protocol. It does not guarantee delivery or correct order and can be severely affected by heavy network traffic. For this reason, it is recommended that the Reson Seabat 8125 and Coda System have their own private network and are linked simply by a crossover cable.

Both the Coda system and the Reson Seabat 8125 system must have the same network address (the first three entries in an IP address). It is very simple to configure IP addresses in the Seabat 8125 system, so it is recommended that the IP address of the Coda system stays constant, and the local and remote addresses are configured on the Seabat 8125.

However if the Coda IP address is to be changed to that of the Reson network, carry out the following:

1. Choose a free IP address and obtain the sub-net mask on the Reson Seabat 8125 network.
2. Select the **Change IP Address** option from the Coda system's **Maintenance** menu and use this free IP address and sub-net mask (see Section 12.3.4). When finished, your system will reboot.
3. On the **Network** tab of the of the **Acquisition** pop-up, see Figure 5-10, page 59, enter, in **Network IP Address**, the IP address of the Reson Seabat 8125.
4. Press **Test Connection**. This activates a ping test on the Reson Seabat 8125 IP address to check the integrity of the network connection. If successful the system will return the message "IP (address) is alive".
5. Use the **Lock** button to prevent accidental change and save the set-up using the **Save** button.

On the Reson Seabat 8125, it is possible to configure the UDP base port number. Get the details of this port number and enter it in the **Network Tab Form**, **Port Number** *spin box*, see Figure 5-10, page 59.

The final selection can be made in the **Derive Ping Time Stamp From** *spin box* to either **Coda Nav Time** or **Reson Seabat System Time**, see Figure 5-10, page 59.

5.3 Getting High Quality Data, Step 3: QC by Viewing the Data

It's obviously important to be able to see the data, and check that it looks correct - without any obvious noise problems, for example. This section gives a brief summary of how to get your data scrolling on the screen so that you can QC it. For more complete information, refer to Section 6.

5.3.1 Choosing Which Channels to View

Coda's acquisition system can collect up to 8 channels of data and can display all of these on the display simultaneously (depending on the system specification). Up to two channels that use the same trigger can be viewed at the same time in the same window.

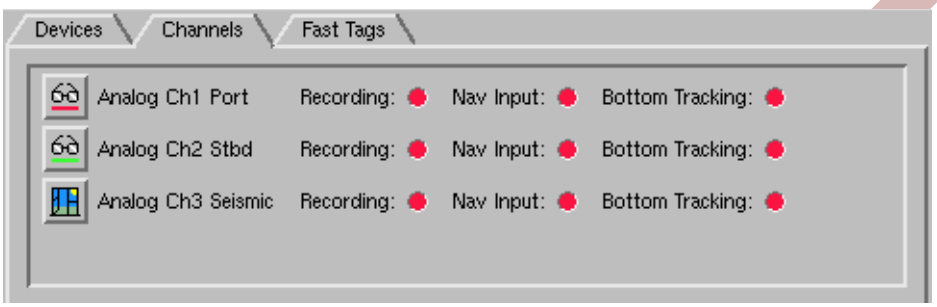

Figure 5-11 Application Specific Area, Channels Tab

The **Channels** tab of the Application Specific Area (Figure 5-11, this page) displays the channels that have been activated in the **Open Acquisition** pop-up.

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The default display window is a vertical scrolling dual channel display and the system will pick the most appropriate channels to display. In the above example the system has picked **Analogue Ch1 Port** and **Analogue Ch2 Starboard** side scan channels, this is indicated by the icon next to these channels showing a pair of spectacles. **Analogue Ch3 Seismic** is not selected, indicated by its icon showing an open window.

Author Note - not for publication!: these bullets need checking

The Application Specific Area also shows, by red or green LEDs the status of recording, nav. input and bottom tracking as follows:

- **Recording**: shows green when the channel has been selected for recording and red when not.
- **Nav. Input**: shows green when navigation input has been assigned, red when not.
- **Bottom Tracking**: shows green when automatic bottom tracking has been selected for that channel, red when not.

To view more channels in another window simply click on the non-displayed icon and an appropriate window will be opened, in the above example if the **Analogue Ch3 Seismic** icon were to be clicked this would open a horizontally scrolling single channel window. Alternatively open a new window, **Window→Open New Window**, and set the **Window Type**, **Number of Channels** and **Scroll Direction**, (Figure 5-12, this page) to suit the requirements of the channel or channels to be displayed. Clicking **OK** will open the new window and the system will select the most appropriate channel or channels to be displayed; in the example given in Figure 5-12, this page, Ch3 Seismic will be selected automatically if the window is set up for one horizontal channel.

Figure 5-12 Open New Window Pop-up Window

If you need to change the channel or channels being displayed in a window select **Display→Display Input Channels** (Figure 5-13, this page) and select the required channels.

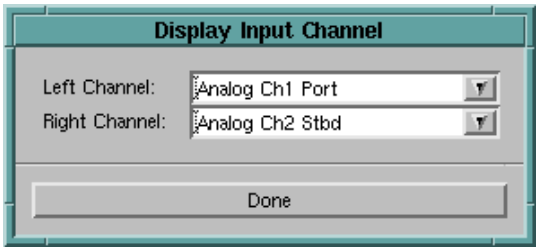

Figure 5-13 Display Input Channel Pop-up Window

5.3.2 Setting Offset and Gain for Each Channel

As the system acquires 12-bit data, but must use 8 bits for display, you must select which part of the data range to see. The system offers a number of mechanisms for doing this (see Section 7), but at this point, all you need to do is ensure that the data looks correct, without any fine tuning of the display.

To do this:

1. Press the **Play** button in the Tape/Disk controls area (this has the same graphic as a Video or Tape recorder play button).

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2. A pop-up window labelled **Scale Display Data** will appear; it will automatically adjust the offset and gain applied to your data, using different defaults for sidescan and shallow seismic data. Click on **Done** in this pop-up to dismiss it.

3. Now check that your data looks correct; if you need to fine tune the display, refer to Section 7 for detailed instructions.

5.4 Getting High Quality Data, Step 4: Navigation Inputs

Navigation input to the system is initialised by selecting **File→Raw Nav Input**. This option is available only if the acquisition system has already been set up (see Section 5.2); in playback mode it is *greyed out.*

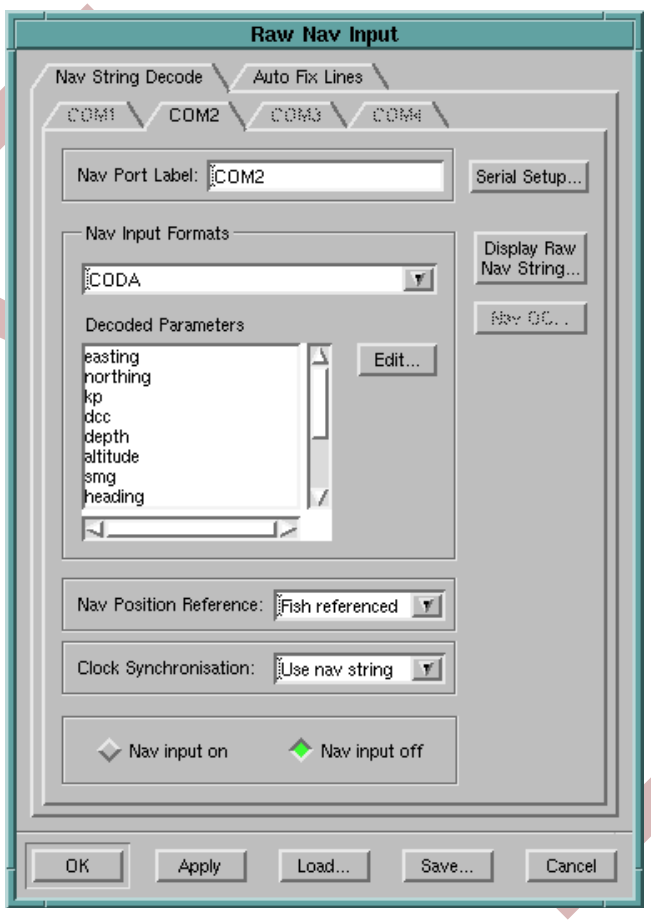

Figure 5-14 The Raw Nav Input Selection Pop-up Window

5.4.1 Setting Up RS232 Communication

1. Ensure that the serial port you are using to acquire navigation data is connected to your navigation computer or GPS set.

2. The **Input Device** to be used for the navigation data can be chosen by clicking on the appropriate device tab (usually COM2). Navigation input is connected to the DA System via a serial port. The **Serial Setup** button may be used to pop up the **COM Setup** window, which allows the baud rate, the number of data bits, the number of stop bits, the parity and the method of flow control to be selected. These should be set to match those of the serial device sending the navigation data to the DA System. Selections are made by clicking on the appropriate toggle buttons; when a suitable selection has been made, click on the **OK** button in the **COM Setup** window. Figure 5-15, page 63 shows a **COM Setup** pop-up window.

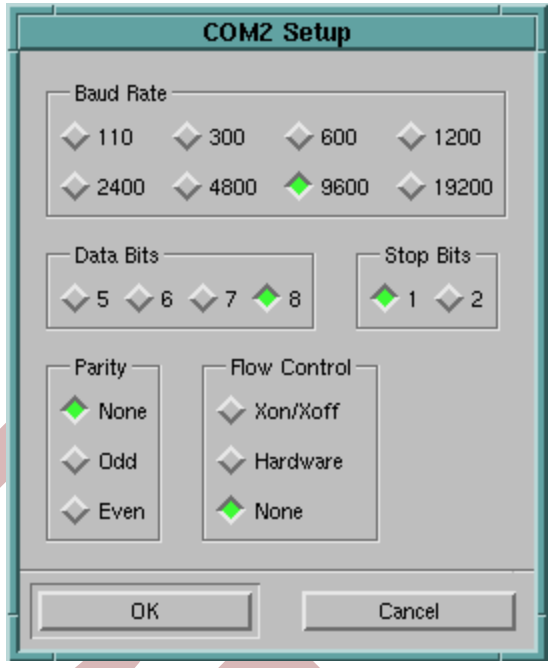

Figure 5-15 COM Setup Pop-up Window

3. Use the **Display Raw Nav String** option of the **File→Raw Nav Input→Nav String Decode** tab pop-up to ensure that you are receiving RS232 navigation data correctly and to confirm that its format is correct. This option pops up a window which displays the ASCII characters as they are read in from the selected serial input port, and before they are formatted by the system. Figure 5-16, this page, shows an example of the unformatted serial input for the Coda navigation string.

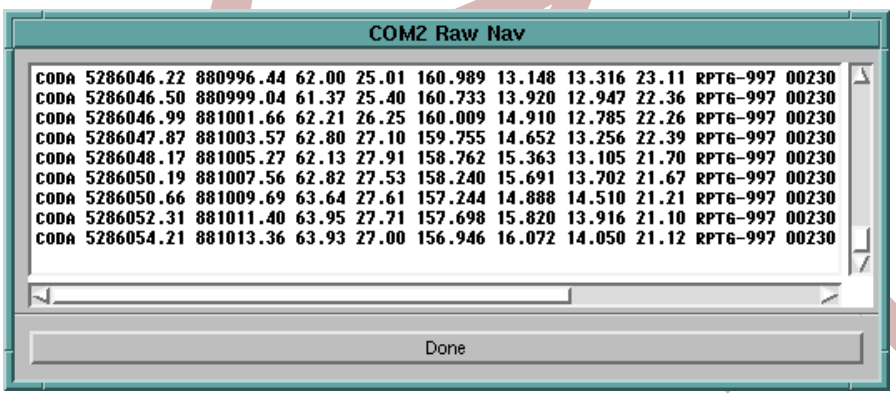

Figure 5-16 Display of Unformatted Serial Input, for Coda Navigation String

5.4.2 Checking the Format of the Incoming Nav Data

1. Use an internal or external trigger (or digital or network device connection) to allow data to scroll on the screen. You will not be able to QC the navigation without scrolling data, though you do not need to have any input apart from the trigger connected.

2. Select the **Nav Input Format** by scrolling through the list of formats available. The format chosen should match that of the navigation data which will be input to the DA System. The list may be scrolled to allow those items off the bottom or top of the display window to be seen. **Edit** should be selected if the format you need is not in the list and a new navigation library entry is required. A description of the format for navigation data is given in Appendix B.

3. To check that the navigation variables are being updated and what their current values are, click on the **Nav input on** button, the **Apply** button and then the **Nav QC**. This option can be selected when testing the navigation input with a new RS-232 navigation string, or when checking that navigation equipment is delivering a correctly formatted navigation string. If

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the output of the Nav QC is unsatisfactory (with variables updated incorrectly or not updated at all), click on **Nav input off** and **Apply** and view the raw navigation data being delivered to the system (see 5.4.1).

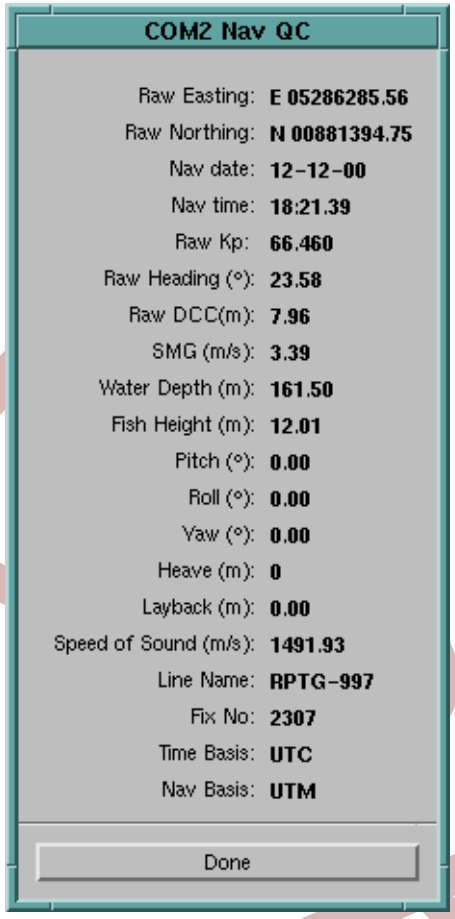

Figure 5-17 The Nav QC Pop-up Window

- If the data being read in from the serial port by the DA System is not recognisable as the data sent by the navigation system, the serial port setup is incorrect. The parity, number of data bits, number of stop bits, handshaking, and baud rate for the navigation interface may all be changed using the **Serial Setup** item in the **Raw Nav Input** pop-up. The hardware specification for the RS-232 navigation interface is given in Section 14.
- If the data displayed in this window matches that sent by the navigation system, the data is being passed through the RS-232 port but it is being interpreted incorrectly. The problem is likely to be caused by an incorrect navigation format being selected in the **Raw Nav Input** pop-up. If the wrong format has been selected from the list of navigation library entries, make another selection from the list; if the incoming format is not compatible with any of the navigation library entries, then a new navigation library entry is required. **Edit Nav Format** can be selected to add a new navigation library entry, or to rectify faults in an existing one. Full details of the syntax for library entries are given in Appendix D.

5.4.3 Setting Up Navigation Input

Selecting the **File→Raw Nav Input** menu item brings up the **Raw Nav Input** settings pop-up, and the **Nav String Decode** tab enables the appropriate RS-232 navigation string and serial input port to be selected (see Figure 5-9, page 58).

To initialise navigation input:

1. Check that the RS232 port is set up correctly, and that the incoming navigation string has the expected format (see Section 5.4.1 above).
2. Select the appropriate navigation library format from the list, and QC it to ensure it is being decoded correctly (see Section 5.4.2 above).

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3. If necessary, set the **Clock Synchronisation**.

   The **Clock Synchronisation** setting defaults to **Use nav string**. This allows the system to use the date and time obtained from the navigation computer as a time stamp for its data; this is essential when generating corrected navigation data (see Section 6.6). If no time information is available from the nav string, or if it is not desirable to synchronise with the navigation computer, set the **Clock Synchronisation** to **Use system time**. The Coda system's time can be set via the **Maintenance Menu** (see Section 12.3).

   If **Turn nav input on** is selected, and **Nav** is set in the **Clock Sync**, when the DA System time has synchronised a "Nav clock Synchronised OK" message appears on the message bar and the clock face in the General Information Area turns from red to green

   If **Nav** is set in the **Clock Synchronisation** but synchronisation has been lost, then clock face in the General Information Area turns from green to red to indicate that the DA System's clock is not synchronised with the navigation data.

   Note that the time displayed in the General Information Area may not match the current time on the navigation computer or GPS receiver. This is because the time displayed in the GIA is the time for the ping at the top of the display; if data has been buffered for any reason, this ping will have a time somewhat later than the GPS or nav computer time.

4. If required, click on the **Auto Fix Line** tab and set the time interval between fix marks. By default, this setting is off and the DA System takes in fix marks via the navigation input. For the DA System to generate fix marks automatically, select the **Auto fix marks on** *toggle* and set the time interval in seconds between the fix marks. Fix marks are numbered from one by default but can be set to a preferred number, as can the increment rate. Fix marks are reset to one each time the navigation input is restarted.

5. The **Nav position reference** scrolling option list on the **Nav String Decode** tab allows you to select either **Fish reference** or **Ship reference**. When **Fish** is selected, the Coda system expects the position received over the nav string to be the towfish position, and layback and offset settings in the **Settings→Parameters** window have no effect. When **Ship** is selected, layback and cross-track offset may be entered to allow the DA System to calculate a derived fish position (see Section 6.6.4.). The setting of the **Nav position reference** is indicated in the General Information Area by a picture of a fish or a ship or in the **Display→Survey Data** pop-up.

6. In the **Raw Nav Input→Nav String Decode** tab frame, click on **Nav input on** and then click on **Apply**. Navigation input is then read and merged with the sonar data being digitised and recorded. If **Nav input on** has not been selected when recording starts, a warning appears.

   Note: Navigation data is only displayed or updated when **Nav input on** is selected in the **Raw Nav Input→Nav String Decode** tab pop-up. It is not displayed when **Display Raw Nav String** is selected, or when **Turn nav input off** is selected.

   When navigation input is turned on, the system monitors input from the navigation input device.If no navigation input is received within a given number of seconds (specified as part of the navigation format – for **Coda** format it is 30 seconds), a message appears on the screen warning that navigation input has not been detected. This warning continues to pop up at regular intervals until navigation input is once more detected or navigation input is switched off. To turn the input off, the **Raw Nav Input→Nav String Decode** tab menu item should be reselected and **Nav input off** clicked, followed by selecting the **OK** at the bottom of the pop-up.

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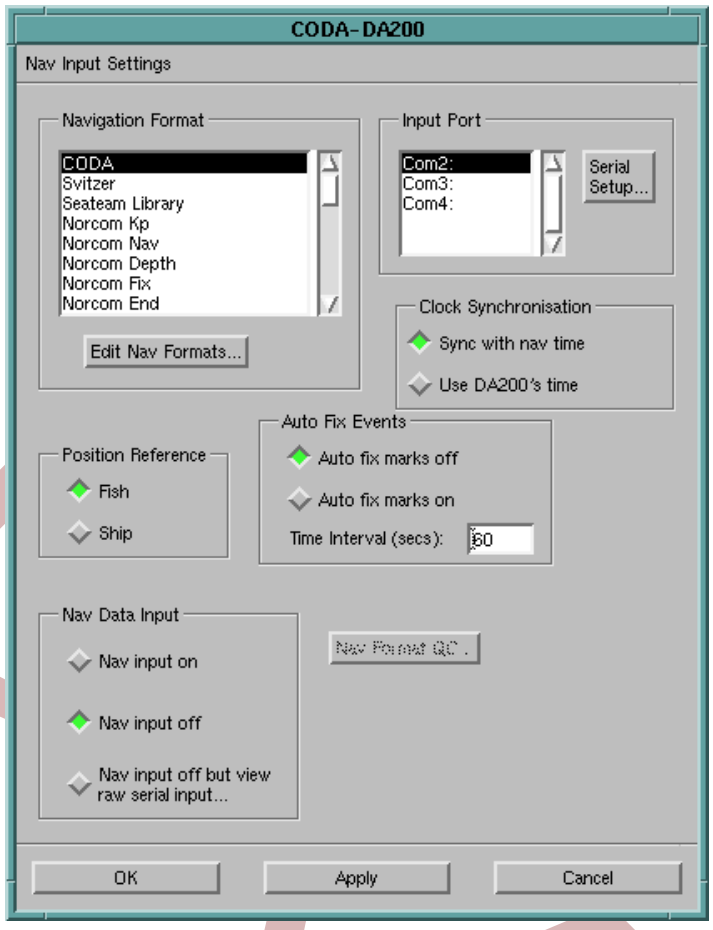

Figure 5-18 The Navigation Input Selection Pop-up Window

5.4.4 Other Navigation Parameters in Acquisition Mode

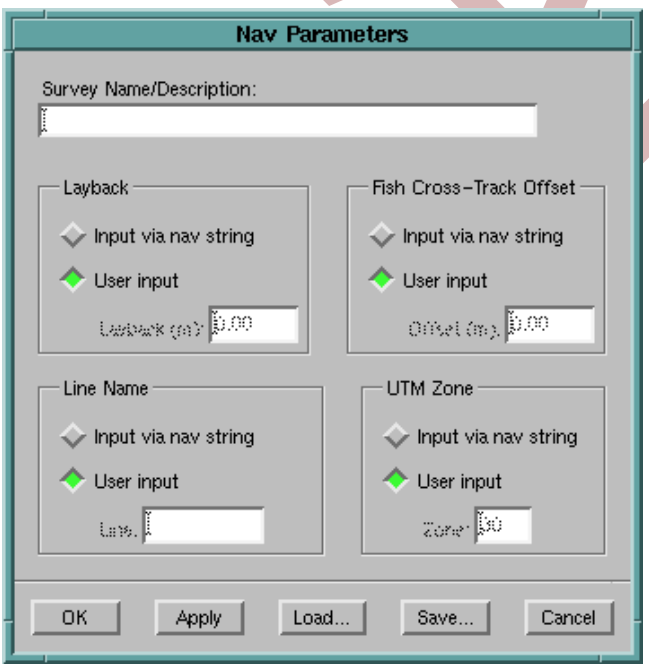

Figure 5-19 The Navigation Parameter Settings Pop-up Window

The **Settings→Navigation Parameters** *pop-up* is used to enter a number of parameters which are normally input automatically via the *navigation input* string supplied to the system from the *RS-232* port (see Section 5.4.1). However, if a fixed format navigation string is being used, it

may be difficult to obtain some parameters in this manner. The **Nav Parameter** pop-up therefore provides the means to manually enter values for parameters that may not be provided by onboard navigation facilities.

In *acquisition mode*, the values entered for these parameters are recorded to tape or optical disk along with the other navigation data. They are also displayed to screen via the **Display→Survey Data** pop-up.

Note that entering parameter values in the pop-up overrides any corresponding parameter values supplied from the nav input.

In *playback mode*, parameters entered in this pop-up override the corresponding recorded values.

5.4.4.1 Survey and Line Name

The **Settings→Navigation Parameters** pop-up contains the **Survey Name/Description** *text-entry box* which is used to store text data for one survey with a chosen name or description of up to 48 characters. If no name or description is entered, and no name is available from the RS232 Nav String the **Survey Name** in the **Survey Data** pop-up is shown as 'Unknown'.

Line Name is used to mark specific parts of a survey with a name of up to 16 characters in length. This is most useful in *acquisition mode* to mark on the data which sections were within specific survey run lines. Usually it is more convenient if this is available as part of an RS232 navigation string.

5.4.4.2 Setting Towfish Layback and Offset

When **Layback** and **Fish Cross-Track Offset** are entered in the text-entry boxes, the DA System is able to use the ship's position to estimate the position of the towfish.

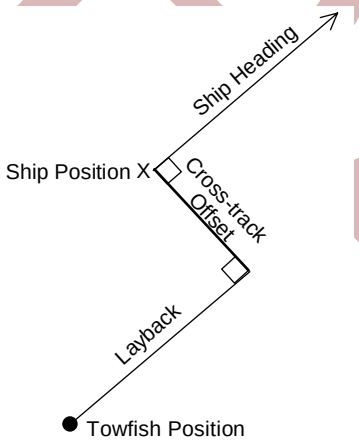

Figure 5-20 Diagram showing Cross-Track Offset and Layback

The **Layback** value is the along track distance in metres from the ship position to the fish position, and the **Fish Cross-Track Offset** is the distance (also in metres) cross-track, from the ship position to the fish position (see Figure 5-20, this page). A positive offset indicates an offset to the right (starboard), and a negative offset indicates the offset is to the left (port).

5.4.4.3 Setting the UTM Zone

The **Settings→Navigation Parameters→UTM Zone** selector can be used to enter the UTM zone number for converting positions from Eastings and Northings to lat/long co-ordinates. The value can either be taken from the nav string by clicking on the **Input via nav string** item or it can be entered manually by clicking on the **User Input** and typing the zone number in the *text-entry box*.

5.5 Getting High Quality Data, Step 5: Bottom Tracking

The **Processing→Fish Height** pop-up (see Figure 5-21, page 68) enables you to select the source of the *fish height* to be used during data acquisition and playback. The fish height is used to determine the seabed return position, which is used in feature height calculations and in *slant-range correction*.

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In *acquisition mode*, the resulting fish heights are recorded to the data storage device with the raw data.

In *playback mode*, previously recorded values may be used, or they may be reviewed using one of the bottom detection algorithms available in the **Fish Height/Seabed Tracking** pop-up.

The **Fish Height Record File** utility is provided to allow the user to store the results of this review. Where the user iterates on "difficult" data to obtain better fish height results, the record file can be updated with the new values.

On playback of a data file which has a fish height record file, the system will automatically apply this file to the data set if the enabling toggle **Remember/Use Previous Position** is selected. (Section 5.5.1.4)

5.5.1 Setting Up Bottom Tracking

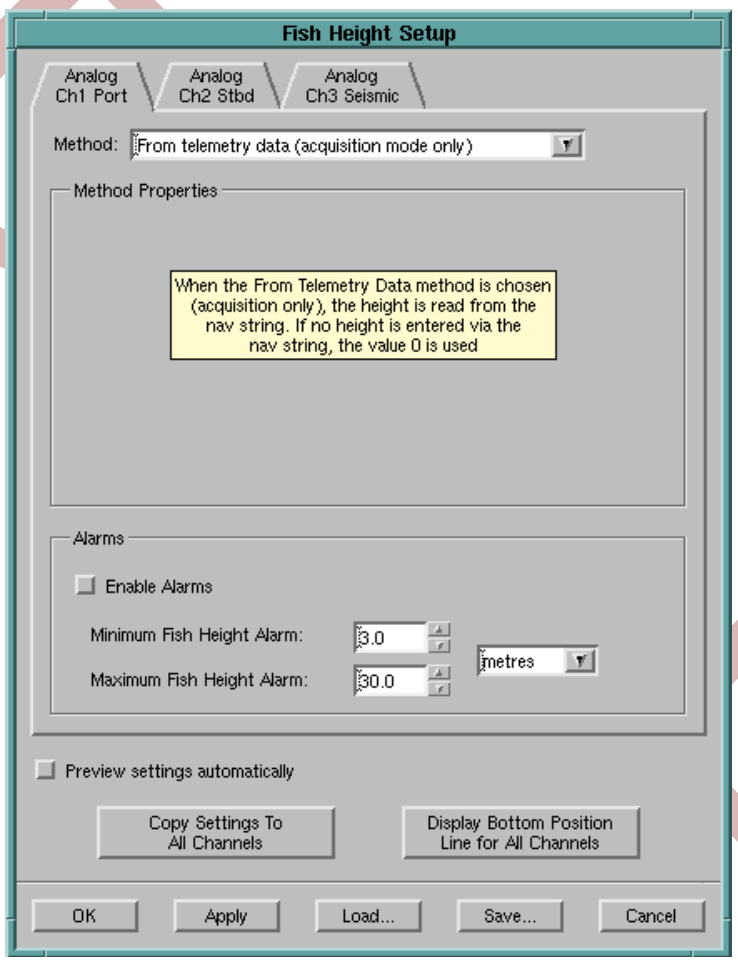

Figure 5-21 Fish Height Setup Popup Window for Sidescan Data

The **Channel** tab forms are used to select which channel or channels to apply the fish height-setting to.

5.5.1.1 Fish Height Source - Selection

For selection of fish height source there are eight options on the *scrolling options list.* The first item will be either **From Telemetry Data** if the system is in *acquisition mode* or **Keep Existing** if the system is in *playback mode*.

From Telemetry Data (acquisition mode only)

Figure 5-22 Fish Height Source Selection - Keep Existing

The other standard options are :

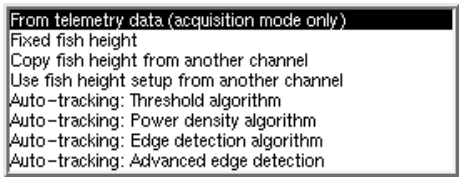

Figure 5-23 Fish Height Source Selection - Standard Options

Note: **Advanced Edge Detection** is only available for **Sidescan**.

- **From Telemetry Data (acquisition mode only)** - receiving the towfish height as part of the navigation data, based on the towfish altimeter reading – is usually the best option if data from this source is available. If this is not the case, an **Auto-Tracking** algorithm should be used. This setting gives additional options for influencing the automatic bottom tracking algorithm; these options enable you to enter minimum and maximum fish height, alter the sensitivity of the algorithm, and interactively reset the tracking algorithm if necessary. On occasion, however, the characteristics of the seabed or water column may result in unpredictable performance by the automated bottom tracking algorithm, in which case the **Fixed Fish Height** setting should be used.
- **From Telemetry Data** is available only in *acquisition mode* and causes the height to be read from the nav string; this setting can be used if an altimeter is fitted to the towfish, and the altitude is being sent from the towfish to the navigation computer. If no height is entered via the nav string, fish height will be set to 0.
- The option **Keep Existing** can only be selected in *playback mode* and causes the previously recorded fish height to be used. The fish height input will vary depending on system settings, it can be via **Corrected Navigation**, **Fish Height Record File** or **Existing Value from Raw Acquisition File** (see Section 5.5.1.6).
- Selecting **Fixed Fish Height** causes the fish height to be set to a user-defined height. The height can be entered in metres, milliseconds or samples, using the *scrolling options list*. It remains fixed at this value until you choose a different fish height setting or change the value of the fixed fish height.
- **Copy Fish Height from Another Channel** allows the fish height value to be copied from another channel, using the *scrolling options list*. For example, channel 1 could be set to **Auto-Tracking : Threshold Algorithm** and channel 2 then set to copy the height from channel 1. This could be useful when the data in channel 2 is too noisy for automatic tracking to work reliably.
- **Use Fish Height Settings From AnotherChannel** allows pop-up settings to be copied from another channel. In this case, the fish height will still be computed independently for each channel since it is not the fish height value but the computational parameters that are being copied across. Note that this is distinct from **Copy Fish Height from Channel** where the final computed fish height value is being copied.

Automatic Tracking offers four methods for automatic detection:

- **Thresholding**: This method which sets a threshold amplitude for the bottom return and is the preferred method of detection because it is highly configurable for varying conditions.
- **Power Density**: This method automatically sets its own thresholds and looks for the greatest energy in the search window.
- **Edge Detection**: This method automatically sets it own thresholds and looks for the fastest edge in the search window.
- **Advanced Edge**: This is the conventional bottom tracking for sidescan data available in earlier releases of the Coda software and is only available for sidescan.

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5.5.1.2 Fish Height Source - Method Properties

Each selection of fish height source will display its associated Method Properties worksheet. In the example below (see Figure 5-24, this page) the Method Properties for **Auto-Tracking : Threshold Algorithm** are shown.

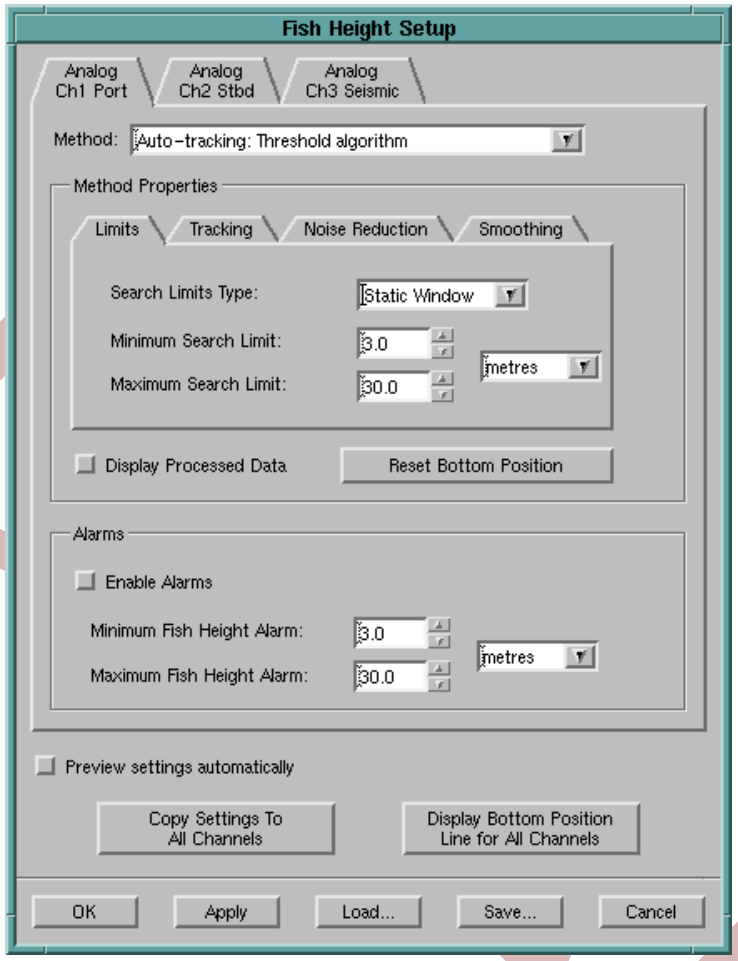

Figure 5-24 Fish Height Setup Pop-up Window for Sidescan Data

Method Properties - Static Limits

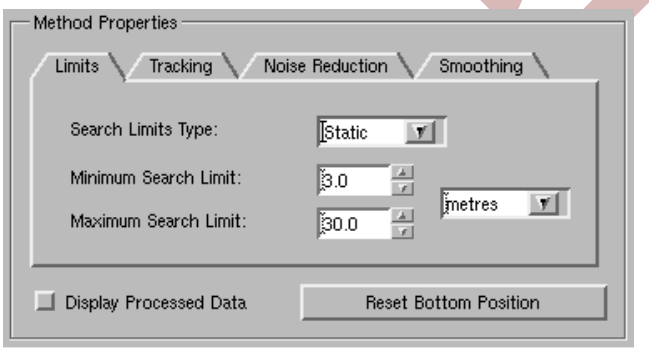

Figure 5-25 Method Properties Worksheet - Static Limits

- **Search Limits Type** defines the type of searching window used. **Static** applies a fixed position search window to the data. The window extends between **Minimum Search Limit** and **Maximum Search Limit**.
- **Minimum Search Limit** defines the lower search limit from the seabed. The units can be entered in metres, samples or milliseconds. The minimum height may be used to “mask out” noisy data at the start of the sonar trace.
- **Maximum Search Limit** defines the upper search limit from the seabed. The units can be

entered in metres, samples or milliseconds.

Method Properties - Moving Window

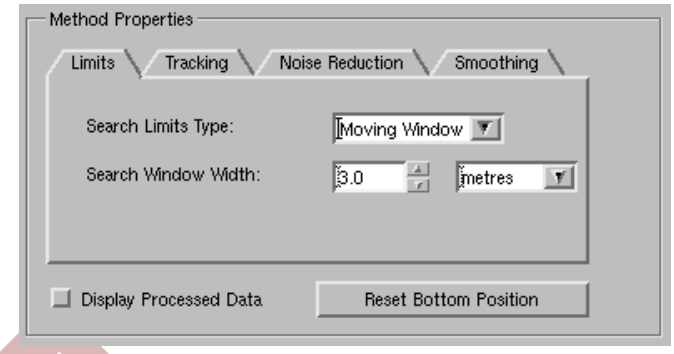

Figure 5-26 Method Properties Worksheet - Moving Window

- **Search Limits Type** defines the type of searching window used. **Moving Window** applies a active position search window to the data. The window width is defined by **Search Window Width**.
- **Search Window Width** defines the width of the window in which the search for the bottom return will take place, it keeps bracketing the bottom return as the return is tracked. The units can be entered as metres, samples or milliseconds.

Method Properties - Tracking (Threshold)

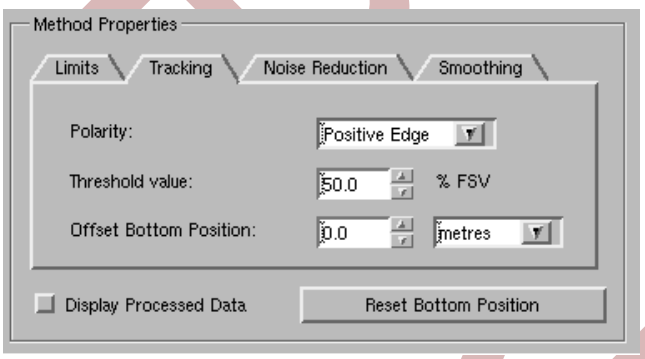

Figure 5-27 Method Properties Worksheet - Tracking (Threshold)

- **Polarity** allows the choice of positive or negative going edges.
- **Threshold Value** sets a threshold amplitude for the bottom return as a percentage of the full scale value of the signal amplitude.
- **Offset Bottom Position** allows a fixed offset to be applied to the fish height. A positive value indicates that the fish height will be increased.

Method Properties - Tracking (Power Density, Edge Detection, Advanced Edge)

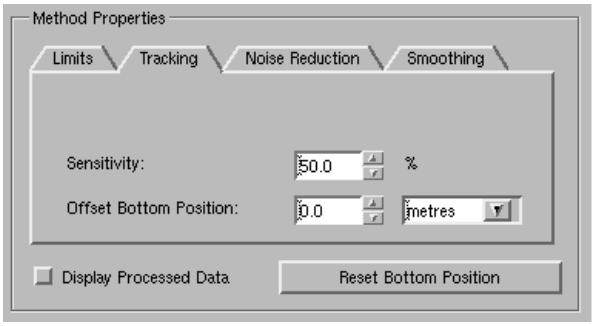

Figure 5-28 Method Properties Worksheet - Tracking (Power Density, Edge Detection & Advanced Edge)

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- **Sensitivity:** this parameter relates the trade-off between detection ability and sensitivity to noise. When sensitivity is low, the algorithm is less sensitive to noise but not as good at tracking weak bottom returns. Conversely, when sensitivity is high, the algorithm is more sensitive to noise but better at tracking poor bottom returns.
- **Offset Bottom Position** allows a fixed offset to be applied to the fish height. A positive value indicates that the fish height will be increased.

Method Properties - Noise Reduction

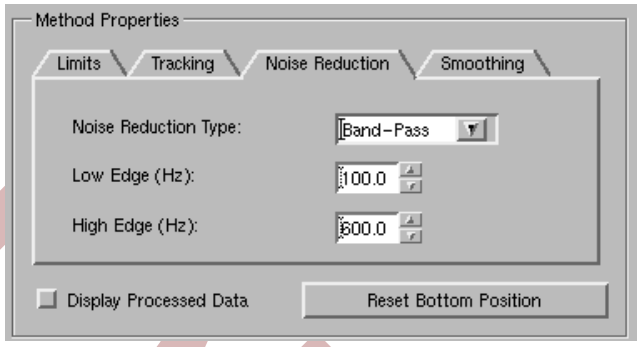

Figure 5-29 Method Properties Worksheet - Noise Reduction (Threshold, Power Density & Edge Detection)

- **Band Pass Filter Low Edge** defines the low frequency 3dB cut off point for the filter.
- **Band Pass Filter High Edge** defines the high frequency 3dB cut off point for the filter.
- **Noise Reduction** is not an available option for **Advanced Edge Detection**.

Method Properties - Smoothing

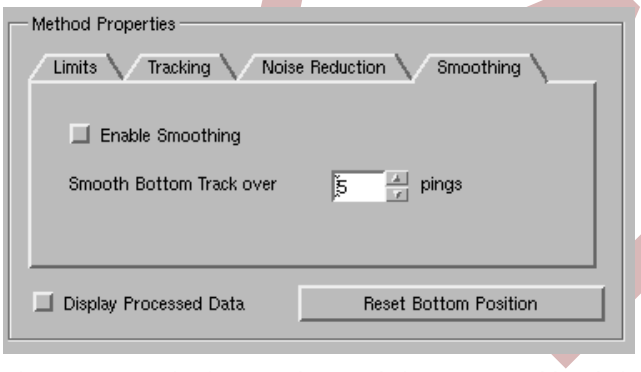

Figure 5-30 Method Properties Worksheet - Smoothing (Threshold, Power Density, Edge Detection)

- **Smooth Bottom Tracking Over** defines the number of pings the bottom tracking should be smoothed over in the along track direction.
- Smoothing is not an available option for **Advanced Edge Detection**.

Common Functionality

Display Processed Data works in the **Threshold**, **Power Density** and **Edge Detection** algorithms. It displays the characteristics of the detection envelope instead of the bottom return. When this option is selected, a warning message will be displayed in the **Scale Display Data** window.

The **Reset Bottom Position** button in the **Fish Height/Seabed Tracking** pop-up or the **Reset Seabed Position** icon allows you to reset the bottom position. *Clicking* on the button - or using the key shortcut <b> - changes the *arrow pointer* to the *automatic tracking pointer*. This allows you to reset the tracking algorithm by clicking with the left mouse button over the appropriate bottom position in the data display.

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5.5.1.3 Fish Height Alarms

Fish height alarms are only available in *acquisition mode*. The user can set the fish height in terms of **metres**, **msec** and **samples** from the scrolling options list.

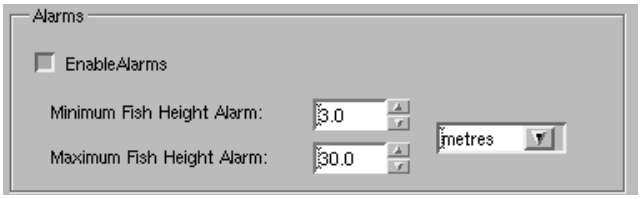

Figure 5-31 Fish Height Alarm Worksheet

The alarm is an audible double beep every ten seconds when the fish height exceeds either the **Maximum** or **Minimum** limits. In addition the status bar is updated to report alarm condition.

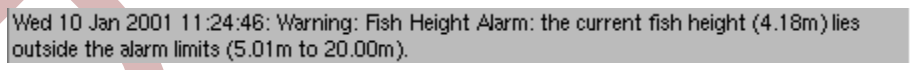

Figure 5-32 Status Bar - Fish Height Alarm Message

5.5.1.4 Fish Height - Recomputed File

During a survey, set up and acquire the fish height with the raw data (See Section 13.1.1).

If this has not been possible or the resulting fish height is unsatisfactory, perhaps due to environmental conditions, review the fish height values in playback mode.

The **Read/Write Fish Height Values** utility is provided to allow you to store the results of this review. On future playbacks of the data the record file if available, will be used by the Coda system as the fish height source for data processing in preference to the fish height recorded with the raw data at the time of acquisition.

Note: **Fish Height** in **Corrected Nav** will always take precendence.

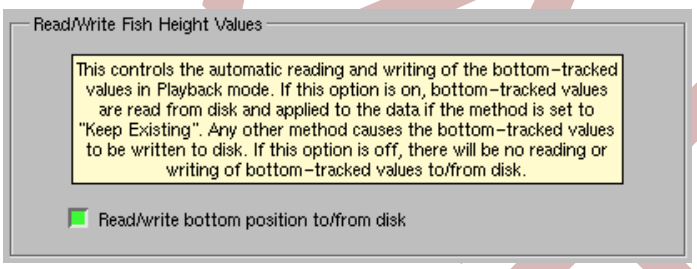

Figure 5-33 Fish Height Recomputed File Worksheet

To create a **Fish Height File**, select and configure the desired fish height source from the *scrolling options list* (see Section 5.5.1.1) There are seven **Fish Height Sources** that can be used as inputs to the record file.

The first fish height source, **Keep Existing (playback mode only)**, is used to retrieve recorded fish height during playback of data (see below).

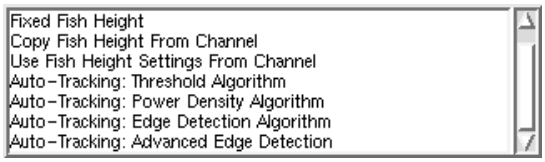

Figure 5-34 Fish Height Source Selection

In addition to the fish source, the **Read/Write bottom position to/from Disk** utility must be activated (see Figure 5-33, this page). When the raw data file is played back, you can review the quality of the seabed tracking and manipulate the source settings to obtain the best response. During this stage, fish height for each ping is stored in the record file.

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There are no restrictions on the data playback sequence; any iteration through the data set to recompute the fish height will store a new set of values in the record file.

The **Fish Height** file is updated if more than 1 second has elapsed AND the seabed value has changed by > 2% for a non-flat seabed

OR

Updated every 5 seconds for a flat seabed.

5.5.1.5 Fish Height - Play Back Fish Height File

To play back a data file using the **Fish Height File**, you must select **Keep Existing (playback mode only)** as the fish height source. The **Remember/Use Previous Bottom Position** toggle must also be selected. The system will automatically detect the Record File and apply it to the data set being played back.

In playback, the fish height can be applied to a data set via a corrected navigation file, a fish height file or simply by reading fish height values recorded in acquisition. The Coda system will detect which inputs are available on the system and apply a status to each one thus determining which input will be used for fish height. The pre-defined status from highest to lowest is **Corrected Navigation**, **Fish Height Record File** and **Keep Existing**.Therefore, a **Corrected Navigation** file which contains fish height will be used in preference to all other inputs. If this is not available then the system will check for the availability of the **Fish Height File**. If this is not available, the system will revert to reading the acquired fish height value from the data file.

The **Fish Height** file can be switched off by deselecting the **Remember/Use Previous Bottom Position** toggle. This will prevent a Fish Height file being created or from being accessed in playback mode. In this condition, the system will revert to reading the acquired fish height value from the data file.

The fish height record files are stored in /home/dp100/fish_alt/, and each recorded data file has a directory of fish altitude files which has the same name as the tag files for that recording (this will be the data and time of the start of the recording). If you are transferring fish altitude files between machines, be sure to copy the appropriate directory and all its contecnts, rather than isolated fish altitude files.

5.5.1.6 Fish Height - Additional options

Figure 5-35 Fish Height - Additional Options

Preview Settings Automatically allows the user to monitor real-time the effect on Fish Height/ Seabed Tracking of changes made to **Method Properties**. By selecting **Cancel**, the user can revert to previous settings. By selecting **OK** or **Apply** the user confirms the changes made to the **Method Properties**.

Clicking on the **Copy Settings to All Channels** button copies the settings from the current channel.

Clicking on the **Display Bottom Position** button produces the **Display Bottom Position** pop-up.

The action buttons at the bottom of the pop-up include the option to **Load** previous settings or **Save** current settings so that they can be used in future.

5.5.2 Setting Up Sub Bottom Profiling

5.5.2.1 Showing the Seabed Position

The **Display→Bottom Position Line** menu item produces the **Display Bottom Position** pop-up. This pop-up is used to choose which data channel will display an orange line in the display, indicating the position of the seabed return in the display area, namely the left or right channel, or both channels. To select a data channel, click on the appropriate **Left Channel** or **Right**

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Channel*toggle*.

Figure 5-36 The Display Bottom Position Pop-up

The **Bottom Position Line** shows where the Coda system believes the seabed to be, from the settings in the **Processing→Fish Height Setup** pop-up (see Section 5.5.2.2). The **Bottom Position Line** is displayed in the correct position even when sub-sampling or offsets are applied to either of the displayed channels (see Section 7.4).

5.5.2.2 Setting Up Bottom Tracking

Figure 5-37 Fish Height Settings Pop-up Window for Seismic Data

From Telemetry Data - receiving the towfish height as part of the navigation data, based on the towfish altimeter reading - is usually the best option if data from this source is available. If it is not, **Automatic tracking** should be used. This setting gives additional options for influencing the automatic bottom tracking algorithm; these options enable you to enter minimum and maximum fish height, alter the sensitivity of the algorithm and interactively reset the tracking algorithm if necessary. On occasion, however, the characteristics of the seabed or water column result in unpredictable performance by the automated bottom tracking algorithm, in which case the **Fixed Fish Height** setting should be used.

The **Channel** tab forms are used to select which channel or channels to apply the fish height setting to.

From Telemetry Data is available only in *acquisition mode* and causes the height to be read from the nav string; this setting can be used if an altimeter is fitted to the towfish, and the altitude is being sent from the towfish to the navigation computer. If no height is entered via the nav string, fish height will be set to 0.

The option **Keep Existing Value** can only be selected in *playback mode* and causes the previously recorded fish height to be used.

Selecting **Fixed Fish Height** causes the fish height to be set to a user-defined height. The height can be entered in metres, milliseconds or samples, using the *option selection button*. It remains fixed at this value until you choose a different fish height setting or change the value of the fixed fish height.

Copy Fish Height from Other Channel allows the fish height value to be copied from another channel, using the option selection button. For example, channel 1 could be set to **Automatic Tracking** and channel 2 then set to copy the height from channel 1. This can be useful when the data in channel 2 is too noisy for automatic tracking to work reliably.

Automatic Tracking offers three methods for automatic detection:

- **Edge Detection**. This method automatically sets it own thresholds and looks for the fastest edge in the search window. It is most suited to hard seafloor and high frequency shallow seismic sonar.
- **Power Density**. This method automatically sets its own thresholds and looks for the greatest energy in the search window. It is most suited to lower frequency profilers.
- **Thresholding**. This method which sets a threshold amplitude for the bottom return and is the preferred method of detection because it is highly configurable for varying conditions.

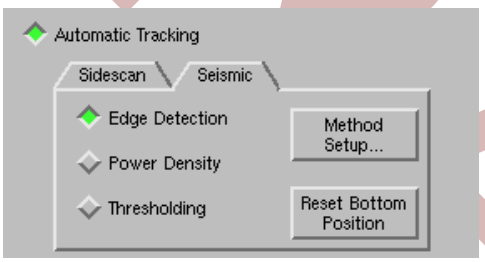

Figure 5-38 Fish Height Setting Method (Seismic and Other sonar)

Clicking on the **Method Setup** button pops up the **Automatic Tracking Setup** pop-up. The setup options are:

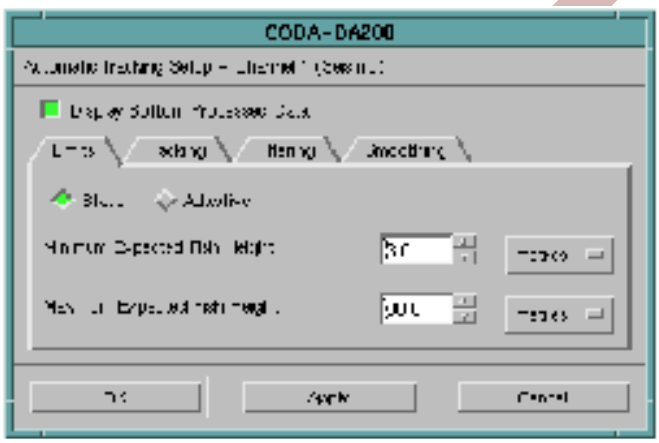

Figure 5-39 Automatic Tracking Setup: Seismic Limits, Static

- **Minimum Expected Fish Height** defines the lower search limit from the seabed. The units can be entered in metres, samples or milliseconds. The minimum height may be used to "mask out" noisy data at the start of the sonar trace.
- **Maximum Expected Fish Height** defines the upper search limit from the seabed. The units

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can be entered in metres, samples or milliseconds.

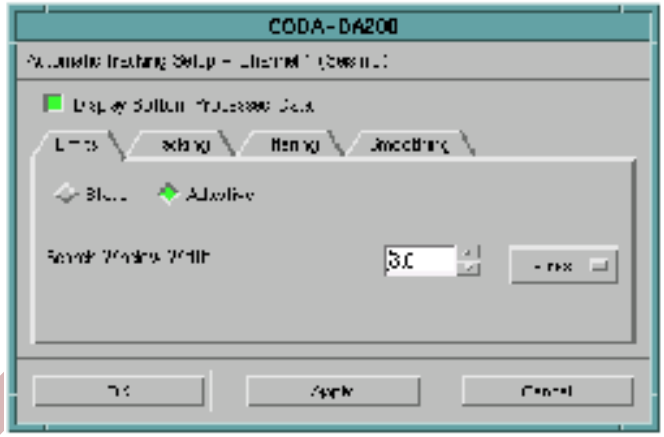

Figure 5-40 Automatic Tracking Setup Seismic Limits, Adaptive

- **Search Window Width** defines the width of the window in which the search for the bottom return will take place, it keeps bracketing the bottom return as the return is tracked. The units can be entered as metres, samples or milliseconds.

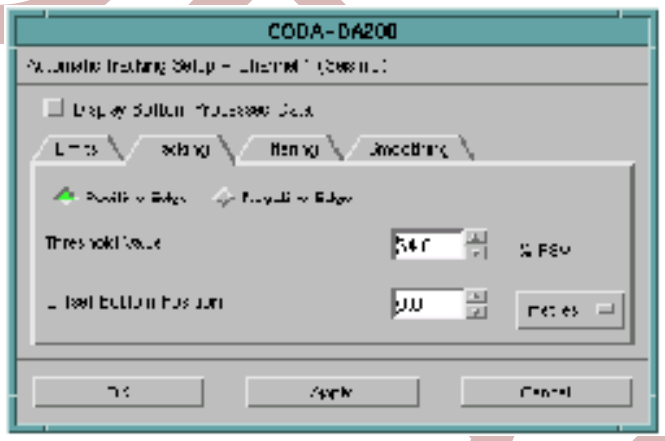

Figure 5-41 Automatic Tracking Setup: Seismic Tracking (Thresholding)

- **Sensitivity**: this parameter relates the trade-off between detection ability and sensitivity to noise. When sensitivity is low, the algorithm is less sensitive to noise but not as good at tracking weak bottom returns. Conversely, when sensitivity is high, the algorithm is more sensitive to noise but better at tracking poor bottom returns.
- **Offset Bottom Position** allows a fixed offset to be applied to the fish height. A positive value indicates that the fish height will be increased.

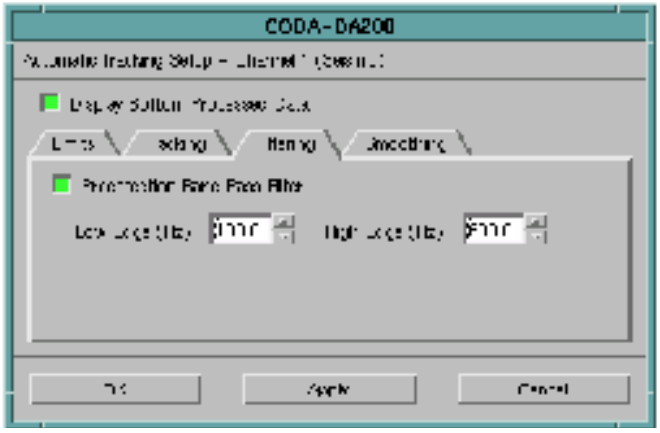

Figure 5-42 Automatic Tracking Setup: Seismic Filtering

- **Band Pass Filter Low Edge** defines the low frequency 3dB cut off point for the filter
- **Band Pass Filter High Edge** defines the high frequency 3dB cut off point for the filter

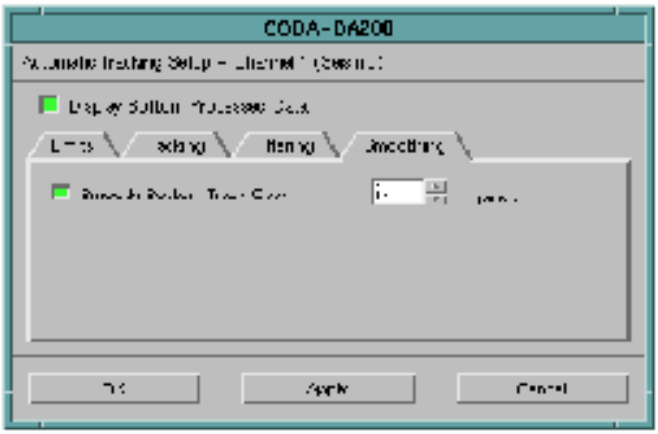

Figure 5-43 Automatic Tracking Setup: Seismic Smoothing

- **Smooth Bottom Tracking Over** defines the number of pings the bottom tracking should be smoothed over in the along track direction.

The **Display Bottom Processed Data** works in the *Power Density mode* and displays the characteristics of the detection envelope instead of the bottom return. When this option is selected, a warning message will be displayed in the **Scale Display Data** window.

The Reset Bottom Position button in the **Fish Height Settings** pop-up or the **Reset Seabed Position** icon allows you to reset the bottom position. Clicking on the button - or using the key shortcut <d> - changes the *arrow pointer* to the *automatic tracking pointer*. This allows you to reset the tracking algorithm by *clicking* with the left mouse button over the appropriate bottom position in the data display. Clicking again on the button causes the pointer to revert to its previous mode.

Clicking on the **Copy Settings to All Channels** button copies the settings from the current channel.

Clicking on the **Display Bottom Position** button produces the **Display Bottom Position** pop-up Figure 5-36, page 75.

The action buttons at the bottom of the pop-up include the option to **Load** previous settings or **Save** current settings so that they can be used in future. The name of the settings file appears at the top of the pop-up. If an asterisk (*) appears at the same time it means the settings have been altered from those saved to the hard disk.

5.5.2.3 Automatic Tracking Hints (Seismic)

If the data is prone to noise, particularly in the water column, the automatic tracking will performless well.

1. Select **Display→Bottom Position Line** to display the bottom tracking line.
2. In the **Fish Height Settings** pop-up, click on the tab of the appropriate channel and then click on the **Automatic Tracking** toggle.

For best results, try the various detection modes in the follow order:

Thresholding

1. Toggle the **Thresholding** button.
2. *Click* on the **Method Set-up** button and select the **Limits** tab.
3. Select the **Adaptive** toggle and set the **Search Window** width to 10% of the line length.
4. Click on the **Tracking** tab and select the edge you with to track.
5. Set the **Threshold Value** to just above the mean signal level for a positive edge or just below the mean signal level for a negative edge.

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6. If the water column is noisy, enter **Filter** characteristics to enhance the signal.
7. If the bottom lock is jittering, apply enough **Smoothing** to compensate (starting with a low level).
8. Remember to use the **Apply** button to confirm the changes before dismissing the pop-up.

Power Density

1. Set up is similar to Thresholding, but **Sensitivity** (not **Threshold Value**) is applied in **Tracking**. A high sensitivity will enable detection of faint bottom returns, but will be more sensitive to noise.
2. Use the **Offset Bottom Position** *spin box* to adjust the track to the beginning of the bottom-return.

Edge Detection

1. This is very similar in application to **Power Density**, but detects the largest edge rather than peak power in the search window.

Improving Bottom Tracking

The systems described above are very versatile and, with practice, can be a very powerful tool to track automatically the bottom in a wide variety of conditions and circumstances.

If the bottom tracking line deviates from the true bottom position, try one of the following:

1. 1. Redirect the automatic tracking using the **Reset Bottom Position** button, or the key shortcut <b>.
2. If the bottom tracking is persistently positioned ABOVE the true bottom position, REDUCE the automatic tracking **Sensitivity** or use **Offset Bottom Position**.
3. If the bottom tracking line is persistently positioned BELOW the true bottom position, INCREASE the automatic tracking **Sensitivity** or use **Offset Bottom Position**.

5.5.3 The Tape/Disk Controls in Acquisition Mode

The Tape/Disk control buttons are analogous to those of a video tape or audio recorder, though their functions change according to the mode being used, *acquisition mode* or *playback mode*. This section describes the functionality of the buttons in acquisition mode - for details of their effect in playback mode, refer to Section 6.7.

5.5.3.1 The Record Button


This button controls all the record functions of the system. When it is selected, a pop-up appears. Section 5.5.3 has described how to start and stop recording to tape and disk. Note that the record button turns from red to green when recording is taking place, and that recording is started and stopped by the popup which appears if the record button is pressed. Pressing the record button accidentally during recording will not have any effect.

5.5.3.2 Play


During acquisition this button starts the display scrolling; it has no effect on the recording of data. During playback this button controls the reading of data from tape or optical disk and its display on screen.

When the **Play** button is pressed after **File→Open Playback** or **File→Open Acquisition** have been selected, the **Scale Display Data** pop-up appears in the display area to enable you to optimise the display.

5.5.3.3 Stop


During acquisition this button stops the display of data, not the recording of data. (Recording of data is started and stopped using the pop-up accessed from the **Record** button, described in Section 5.5.3.1.) Thus, when this button is selected, incoming data from the acquisition system continues to be read and recorded, but it is discarded without being displayed.

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5.5.3.4 Pause

key shortcut: <Spacebar>

During acquisition this button has no effect on recorded data; it simply pauses the display of data on the screen. If, however, the pause is so long that the display buffer fills up, the display automatically starts scrolling again. This *auto pause release* feature ensures that all incoming data can be seen on the display. Clicking on the **Pause** button again also starts the data scrolling. Alternatively, if the pointer is in the Data Display Area, the space bar can be used to pause and release the data.

5.5.3.5 Goto

This button has no effect during acquisition.

5.5.3.6 Fast Forward/Cue

This button has no effect during acquisition.

5.5.3.7 Rewind/Review

This button has no effect during acquisition.

5.6 Tips for Recording High-Quality Data

- Check for green light on record button, to indicate the recording has started.
- Check for blue (not red) time in GIA, indicating that the system is syncing to nav time.
- Check that nav string has all possible values and they're being decoded correctly.
- Check bottom tracking is on and working satisfactorily.
- Check that ping rate is as expected, based on sidescan range or seismic ping rate.
- Check that voltage range is correct, without clipping data of interest.

5.7 The Application Specific Area in Acquisition Mode

The **Application Specific Area**, which lies near the bottom right of the display screen, is shown in Figure 5-44, this pageand Figure 5-45, this page. Different views are displayed by selecting the appropriate tab. See also Section 5.3.

5.7.1 The Application Specific Area in Acquisition Mode 1

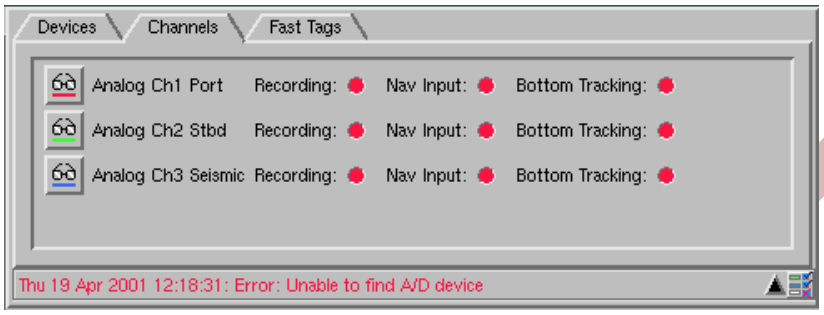

Figure 5-44 The Application Specific Area - Channels Tab in Acquisition Mode

When the DA System is in Acquisition mode the **Channel** tab in the Application Specific Area shows information on the number and type of channels open and whether the channel is being recorded, has **Nav Input** applied and has **Bottom Tracking** applied (Figure 5-44, this page). This is indicated in each case by a red status indicator for "off" or a green status indicator for "on".

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5.7.2 The Application Specific Area in Acquisition Mode 2

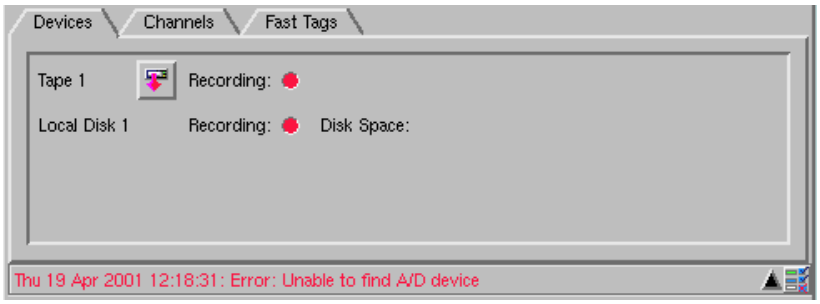

Figure 5-45 The Application Specific Area - Device Tab in Acquisition Mode

When the DA System is in Acquisition mode, the **Devices** tab in the Application Specific Area, shows information on the tape devices or disk devices, present and activated on the system (see Figure 5-45, this page). A status indicator for each device indicates which device is recording (green) and which are not (red). For tape and optical drives there is a device icon which can be used to eject the media from the drive and in the case of optical drives and local disks there is an indication of free disk space.

5.8 The General Information Area in Acquisition Mode

The General Information Area, which lies near the bottom left of the display screen, is shown in Figure 5-46, page 81 and Figure 5-47, page 82. There are two modes, selected by the button in the bottom right hand corner of the area, and they provides the information listed below for which ever window is selected on the tab bar.

5.8.1 The General Information Area in Acquisition Mode 1

Figure 5-46 The General Information Area in Acquisition Mode 1

- **Position**: The position of either the fish or the vessel in either Lat/Long or UTM appears at the top of the display and shows the position of the newest ping in the window. A symbol of a fish or a vessel appear in the middle of the position to indicate the position reference point.
- **date/time**: the present date and time. (The date is displayed as dd-mm-yy.)
- **Nav Sync**: A clock face displayed between date and time shows green when the navigation data is in sync and has a red cross on the face when not in sync.
- **fish alt**: shows the distance of the towfish above the seabed when the data was acquired.
- **heading**: shows the direction in which the vessel or towfish is heading.
- **line**: the line name which is either taken from the Nav String or entered by the user.
- **range**: displays either the true range in meters for a side scan window or sweep time in msecs for a seismic window.
- **cursor** (pointer): the position directly under the cursor on the screen; namely, Eastings, Northings and Kp. The information is colour coded to indicate the channel over which the cursor is positioned, channel colour is indicated in the top right of the display window. The position is fully geo-corrected and is calculated using the navigation data stored with each ping. If the fish height is known, the position is automatically slant-range corrected.

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Positions that are off-track are calculated using the geographical ping position, heading and across-track distance from the position. For accurate off-track positions it is essential that the heading is correct.

Note: To calculate an off-track position lat/long is converted to UTM, the position is calculated and then this position is converted back from UTM to lat/long.

The format in which the cursor information is displayed can be changed from eastings and northings to lat/long – and vice versa – by clicking on the appropriate one-of selection button in the **Display Nav Basis Type** frame of the **Nav Data Settings** pop-up.

5.8.2 The General Information Area in Acquisition Mode 2

Figure 5-47 The General Information Area in Playback Mode 2

- **Position**: The position of either the fish or the vessel in either Lat/Long or UTM appears at the top of the display and shows the position of the newest ping in the window. A symbol of a fish or a vessel appear in the middle of the position to indicate the position reference point.
- **date/time**: the present date and time. (The date is displayed as dd-mm-yy.)
- **Nav Sync**: A clock face displayed between date and time shows green when the navigation data is in sync and has a red cross on the face when not in sync.
- **pings/s**: the rate (pings per second) at which the trigger is running
- **ping no**: the number of the ping being displayed in the top line of the Data Display Window. It is continuously updated while data is scrolling.
- **survey**: displays the survey description as entered in the **Nav Parameters** pop-up
- **Kp**: the kilometre post number of the newest ping in the display window.
- **cursor** (pointer): the position directly under the cursor on the screen; namely, Eastings, Northings and Kp. The information is colour coded to indicate the channel over which the cursor is positioned, channel colour is indicated in the top right of the display window. The position is fully geo-corrected and is calculated using the navigation data stored with each ping. If the fish height is known, the position is automatically slant-range corrected.

Positions that are off-track are calculated using the geographical ping position, heading and across-track distance from the position. For accurate off-track positions it is essential that the heading is correct.

Note: To calculate an off-track position lat/long is converted to UTM, the position is calculated and then this position is converted back from UTM to lat/long.

The format in which the cursor information is displayed can be changed from eastings and northings to lat/long – and vice versa – by clicking on the appropriate one-of selection button in the **Display Nav Basis Type** frame of the **Nav Data Settings** pop-up.

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6 Playing Back Survey Data

This section describes how to use the system to replay previously recorded data tapes or disks. It includes descriptions of how to initiate *playback mode*, how to use the **Goto** command to move to a specific point in the data and how to incorporate *corrected navigation data*. Features which can be used in both acquisition and playback modes are not dealt with in this section, but are discussed in Section 7.

We recommend that you practice using the DA System in playback mode to become familiar with the look and feel of the interface. A sample tape or disk of data acquired using the DA System is provided for this purpose, and a summary of the procedure is given in below.

6.1 Summary of the Playback Procedure

Author Note - not for publication!: Flow chart not yet checked and updated.

Figure 6-1, page 84, shows a summary of the procedure for playing back survey data using the DA System – from connecting the system, powering up and playing back data, to powering down and getting the system ready for transportation. The cross references within the flow diagram indicate which section to go to for more details on the procedure and *screen dumps* of the relevant display areas, menus and menu items.

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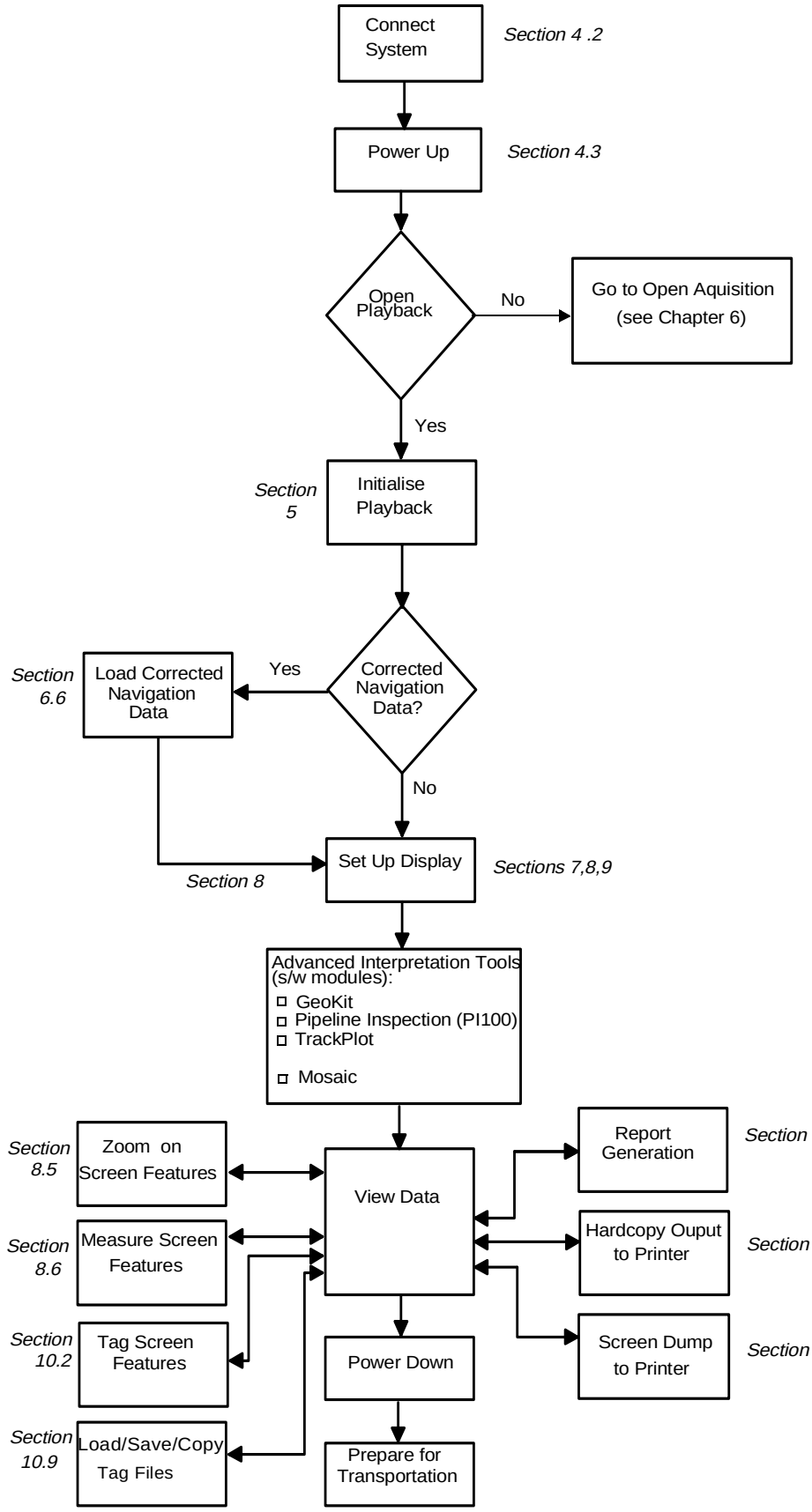

Figure 6-1 Flow Chart of DA System Operations

6.2 Playing Back Data, Step 1: Starting Playback

To play back data, you must first put the system in *playback mode*. This is done by selecting the **Open Playback** menu item. You can then use the appropriate data controls and adjust the settings, such as the speed of playback, as required.

Note: Playback mode cannot be started whilst a recording session is active. The recording session should be stopped via the Recording Popup. If previously in acquisition mode a confirmation prompt will appear when opening playback. Clicking **Yes** will open playback and terminate the current acquisition session.

6.2.1 Starting Playback on a Tape System

1. Insert a tape of previously recorded data into the tape drive.
   In a twin-tape system the upper drive is **Tape 1**; the lower drive is **Tape 2**.

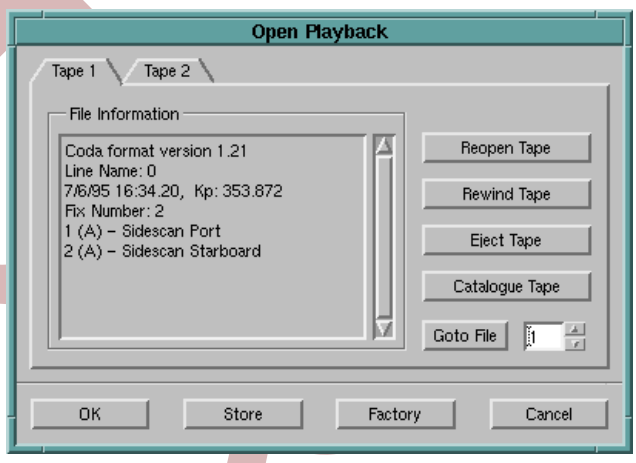

Figure 6-2 Open Playback Pop-up Window

2. Select **File→Open Playback**.
   The system automatically begins to read the tape (or the tape in **Tape 1** in a twin-tape system), and the **Open Playback** pop-up appears, displaying information about the files recorded to that tape. For a dual tape system, two tab forms will be present in the pop-up - **Tape 1** and **Tape 2**; only the **Tape 1** tab will be present in single tape systems. To produce a list of all files on the tape, select **Catalogue Tape**. The location of the file list will be displayed in the **File Information** area of the pop-up.

   - If an error message appears when the system tries to read the tape (for example, 'Tape Not Ready'), click on the **Reopen Tape** button to make another attempt to read the tape.
   - If the file details indicate that the wrong tape has been inserted, click on the **Eject Tape** button, insert another tape, and then click on the **Reopen Tape** button.
   - If the tape needs rewinding, click on the **Rewind Tape** button. When the tape has rewound, click on the **Reopen Tape** button to allow it to be read.

     Note: The tape drive automatically rewinds tapes after recording has stopped and before ejecting them, so a newly recorded tape inserted into the tape drive will not need rewinding. For some tape formats (for example, SDEF), however, some of the information needed for playback is found at the start of each file (recording session) on the tape. Tapes of such formats are rewound automatically to the beginning of the current file to retrieve this information.

3. If the tape that you wish to access is in the lower drive of a twin-tape system, click on the **Tape 2** tab.
4. Locate the *file* that you want to open.
   A file is defined by the beginning and end of a data recording session. The file name and details appear in the **File Information** window.

   - If you can't immediately locate a file, you can use the **Goto File** spin box in the **Open Playback** pop-up to search for it. Enter an *absolute* value either by typing a number in the *text-entry box* or by using the up and down arrow buttons. The number of the file relates

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to its place on the tape; for example, type '3' to go to the third file on tape. Alternatively, enter a *relative* value in the text-entry box by prefixing a number with '-' or '+'; for example, type '+3' to go forward three files or '-3' to move back three files from the current position.

6.2.2 Starting Playback on an Optical Disk System

When this menu item is selected, the system automatically begins to read the selected disk, and the **Open Playback** pop-up appears. The pop-ups for the single-drive system and the dual-drive system are almost identical, with a **File Information** window, a **Files** search pattern area and four action buttons at the bottom of the pop-up; however, the dual-drive system has two tab forms instead of one (see Figure 6-3, this page).

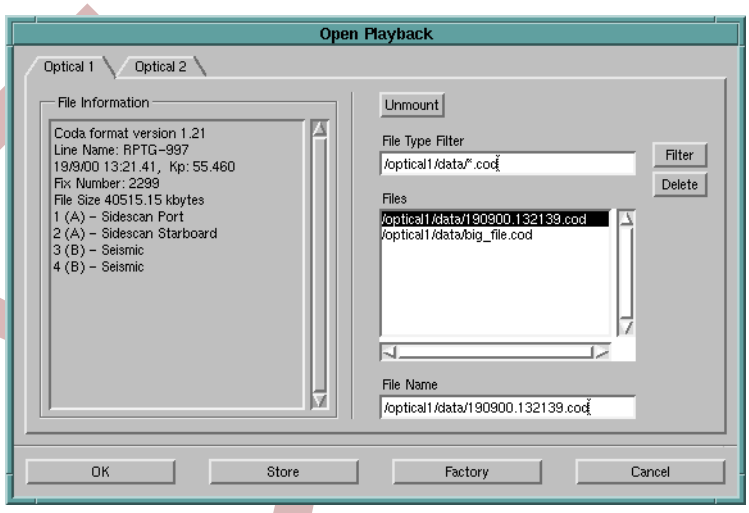

Figure 6-3 Open Playback Pop-up Window

1. Insert a disk of previously recorded data into the disk drive.
   In a twin-tape system the upper drive is **Optical 1**; the lower drive is **Optical 2**.
2. Select **File→Open Playback**.
   The system automatically begins to read the disk (or the last accessed disk in a dual-drive system), and the **Open Playback** pop-up appears. It displays information about the files recorded to that disk.
   - If the file details indicate that the wrong disk has been inserted, click on the eject icon for the drive in the Application Specific Area and insert another disk.
3. If the disk that you wish to access is in the lower drive of a dual-drive system, click on the **Optical 2** tab.
4. Select the file that you want to open by clicking on the name of that file in the **Files** window. Use the scroll bars if necessary to move through the list of files until the name of the file that you want to open is visible.

   The name of the selected file appears in the **File Name** window and details of that file appear in the **Files Information** window. Note that files recorded in Coda format have a '.cod' extension, while those recorded in SEG-Y format have a '.sgy' extension.

6.2.3 Starting Playback on a Local Disk

When this menu item is selected, the system automatically begins to read the selected disk, and the **Open Playback** pop-up appears. The pop-up for the Local Disks has a **File Information** window, and a **Files** search pattern area and there is a separate tab for each Local Disk that is mounted.

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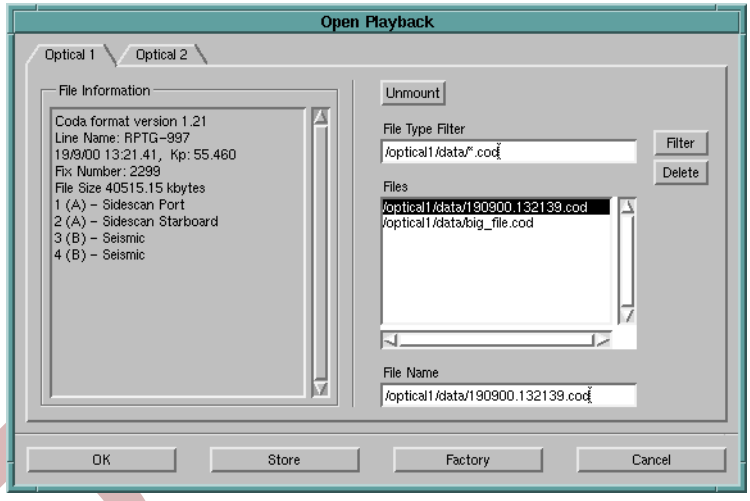

Figure 6-4 Open Playback Pop-up Window

1. Insert a disk of previously recorded data into the disk drive. In a twin-tape system the upper drive is Optical 1; the lower drive is Optical 2.
2. Select **File→Open Playback**. The system automatically begins to read the disk (or the last accessed disk in a dual-drive system), and the **Open Playback** pop-up appears. It displays information about the files recorded to that disk. If the file details indicate that the wrong disk has been inserted, click on the **Unmount** button, eject the disk and insert another disk.
3. If the disk that you wish to access is in the lower drive of a dual-drive system, click on the Optical 2 tab.
4. Select the file that you want to open by clicking on the name of that file in the **Files** window. Use the scroll bars if necessary to move through the list of files until the name of the file that you want to open is visible. The name of the selected file appears in the **File Name** window and details of that file appear in the **Files Information** window. Note that files recorded in Coda format have a '.cod' extension, while those recorded in SEG-Y format have a '.sgy' extension.

6.3 Playing Back Data, Step2: Viewing the Data

This section gives a brief summary of how to get your data scrolling on the screen. For more complete information, refer to Section 7.

6.3.1 Choosing Which Channels to View

Coda's acquisition systems can collect up to 8 channels of data and display all of these simultaneously (depending on the system specification). Up to two channels which use the same trigger may be viewed at the same time in the same window.

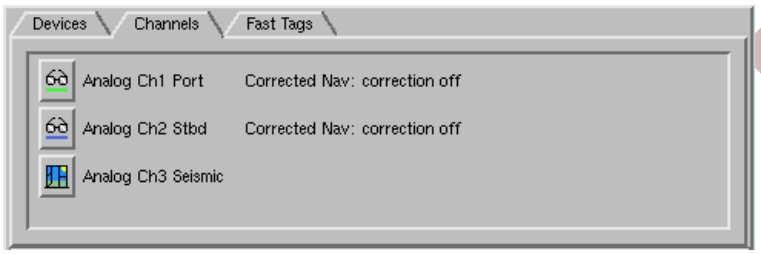

Figure 6-5 The Application Specific Area of the DA System, showing the Channels Tab

The **Channel** tab of the Application Specific Area displays the channels available from the media being played back.

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The default display window is a vertical scrolling dual channel display and the system will pick the most appropriate channels to play back. In Figure 6-5, this page, the system has picked Analogue Ch1 and Analogue Ch2 Starboard Sidescan channels. This is indicated by the icon next to these channels showing a pair of spectacles. Analogue Ch 3 Seismic is not selected; indicated by its icon showing an open window.

To view more channels in another window, simply click on the non-displayed icon. The system will open an appropriate window in the display. In the above example, clicking on the Analgue Ch3 Seismic icon would open a horizontal single channel window.

6.3.2 Setting Offset and Gain

As the system acquires 12-bit data, but must use 8 bits for display, you must select which part of the data range to see. The system offers a number of mechanisms for doing this (see Section 7), but at this point, all you need to do is ensure that the data looks correct, without any fine tuning of the display.

To do this:

1. Press the **Play** button in the Tape/Disk controls area (this has the same graphic as a Video or Tape recorder play button).
2. In the window of interest, choose **Settings→Scale Display Data**. The **Scale Display Data** pop-up will appear, it will automatically adjust the offset and gain applied to your data, using different defaults for sidescan and shallow seismic data. Click on **Done** in this pop-up to dismiss it.
3. Now check that your data looks correct; if you need to fine tune the display, refer to Section 7 for detailed instructions.

6.4 Playing Back Data, Step 3: Controlling Playback Speed

From the display window you have open, using the **Settings→Playback Speed** popup previously acquired data can be replayed at different speeds, controlling the length of time for which data remains displayed on screen during scrolling.

Figure 6-6 The Playback Speed Settings Pop-up Window

The **Playback Speed Setting** has three modes: **Real-Time**, **Fast as Possible**, and **Fixed Rate** (see Figure 6-6, this page);

- **Real-Time** playback simulates acquisition speed and replays the data at the rate at which it was acquired.
- **Fast as Possible** means the data is replayed as fast as possible. The maximum achievable ping rate depends on the speed of the optical disk drive used or on the speed of the tape unit used and the format of the tape.
- **Fixed Rate** allows you to select the number of pings, the default is 5 pings/sec. This can be changed by clicking the mouse in the pings/sec text-entry box below the fixed rate option and entering the ping rate required.

Setting the ping rate above the fastest possible ping rate causes the data to play back at the fastest possible ping rate.

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For a fixed rate of playback the pings/sec display in the General Information Area shows small fluctuations about the fixed value.

6.5 Playing Back Data, Step 4: Bottom Tracking

It is vital for any measuring that you carry out on your data, or any interpretation using Coda-PI or GeoKit, that the position of the seabed is accurately known by the system. This applies equally to sidescan and shallow seismic data. Bottom tracking settings may have been incorrect during acquisition, so it is important to check where the bottom tracking line is being drawn - that it matches the actual seabed position. Use **Display→Display Preferences** and the **Display Toggles** pop-up to turn on display of this line. You must do this with each display window open. If the position of the line does not match the actual seabed position, then review Section 5.5, which describes how to set up bottom tracking; this will allow you to ensure that the system accurately tracks the seabed during data replay.

6.6 Playing Back Data, Step 5: Corrected Navigation

6.6.1 Incorporating Corrected Navigation Data

The DA System acquires 'raw' position information from a vessel's navigation computer; however, the accuracy of this data varies and a degree of jitter is likely to be present in the estimated towfish position. To overcome this, the DA System can incorporate processed (corrected) navigation data (see Appendix C for a definition of the format of this data). When sonar data is played back, the position information stored on tape or optical disk is modified using the processed navigation data, so that the positions reported are as accurate as possible.

The positional data stored on tape or optical disk is not modified; therefore, the processed navigation file must be present and readable by the system, either on floppy or hard disk, if corrected positions are required.

This option is only available in playback mode. As no corrected navigation data is available during data acquisition, the item appears *greyed out* and cannot be selected.

The heading is used to calculate off-track positions, so it is essential that corrected easting, northing AND heading are included in the corrected navigation file to ensure accurate reporting of positions off the survey track.

To incorporate corrected navigation data:

1. Select **File→Corrected Nav Input**.
   The **Corrected Nav Input** pop-up appears, see Figure 6-7, page 89. This pop-up can be selected from any open window, but cannot be duplicated if already displayed.

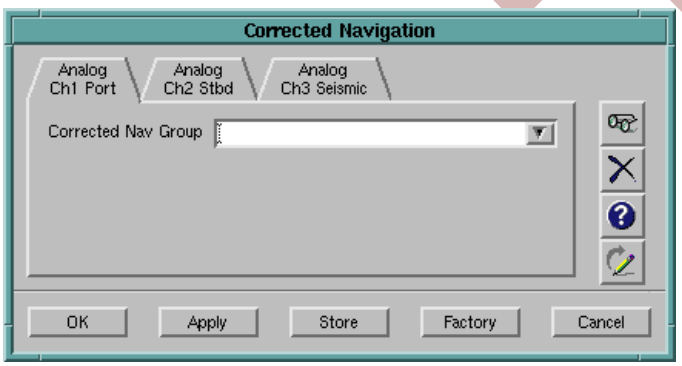

Figure 6-7 The Corrected Nav Input Pop-up Window

2. Click on the spectacles icon to show all available files. The Carrected Navigations Contents pop-up will appear (see

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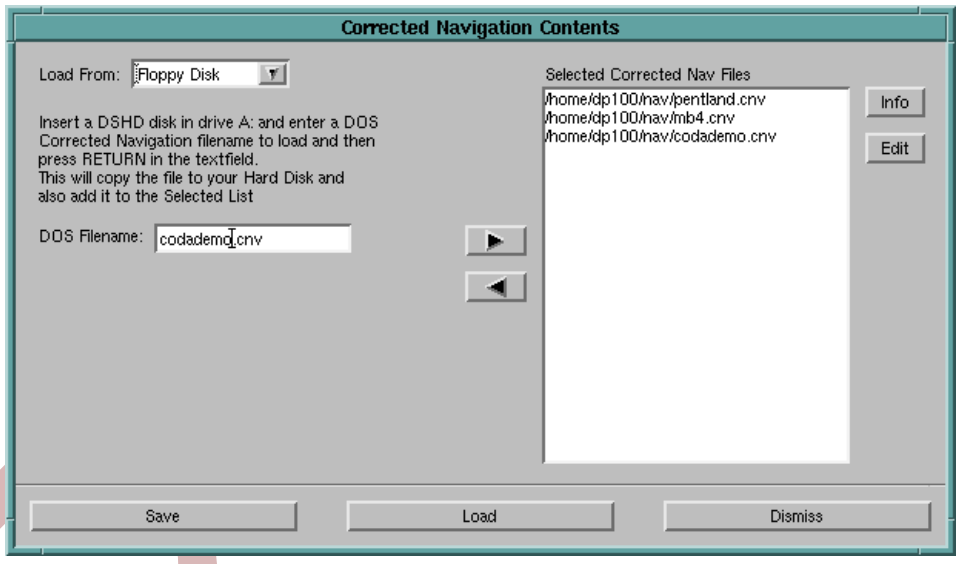

Figure 6-8 The Corrected Navigation Contents Pop-up Window

3. Choose one of the following options:

   - Click on **Floppy** in the *drop down list*. In the *text entry box* that appears, type a DOS filename.This file is copied to the system's hard disk to increase the speed with which the data file can be read, and is also added to the **Corrected Nav Group Files list**. A number of files may be added to this list.

   - Click on **Hard Disk**. In the window that appears, select a file from the directory on the hard disk to add to the **Corrected Nav Group Files** list.

     Note: Copying data from floppy disk takes much longer if the system is being used for acquisition or playback. To complete the copying operation as quickly as possible, pause the screen display while copying data.

4. Save the selection. Click on the **Save** button. The **Save Setup - Corrected Nav Contents** pop-up will appear (see Figure 6-9, page 90). Enter a new name in the Save As data entry window and click on the OK button.

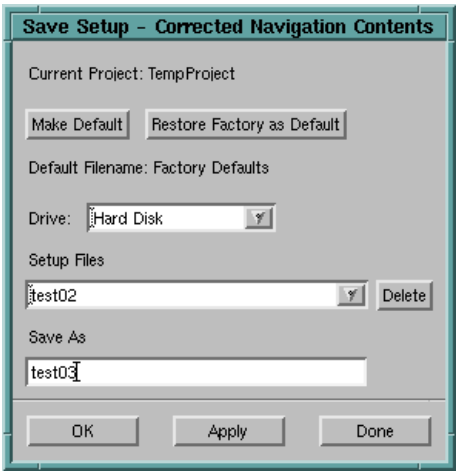

Figure 6-9 The Save Setup - Corrected Navigation Contents Pop-up Window

5. Dismiss the **Corrected Navigation Contents** pop-up, select the required **Corrected Nav Group** name from the scrolling list option in the **Corrected Navigation** pop-up and click **OK**.

Note: The times in the corrected nav file must coincide with the times from the displayed data for nav. corrections to be applied successfully.

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Note: Selecting the corrected nav file will not automatically turn on corrected nav for the data set. This should be selected from Settings Nav Data Type pop-up (see Section 6.6.2).

6.6.2 Selecting Raw or Corrected Navigation

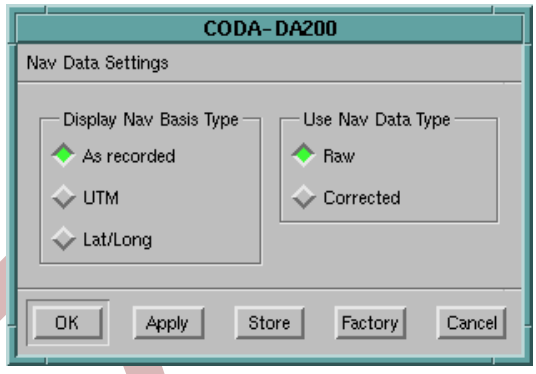

Figure 6-10 The Nav Data Type Pop-up Window

The **Settings→Nav Data Type** pop-up is used to choose whether to use **Raw** or **Corrected** navigation information when in playback mode, or when producing a report from a tag database file. Raw navigation data is the navigation information stored on tape or optical disk, with the sonar data; corrected navigation data is derived from an ASCII file downloaded onto the DA System (see Section 5.4). Selecting **Corrected** navigation data in this pop-up has no effect if the file selected to correct the data in the **Corrected Nav Input** window (see Section 5.4) contains data which is in an incorrect format, or which does not correspond to the data being read from tape or optical disk. In either of these cases, the raw navigation data continues to be used (and this fact is displayed in the **Survey Data** window).

If **Corrected Nav Data Type** is selected in *playback mode* the DA System uses corrected navigation data. This is displayed in, for example, the **Survey Data** pop-up, and the **General Information Area**, in addition to being stored to the tag database.

To apply the corrected navigation data, select **Settings→Nav Data Type**, click on the **Corrected** *one-of selection button* and then click on the **OK** button. The system uses the most recently selected file of corrected navigation data (either from hard disk or floppy) to correct the navigation information in the data being read from tape or disk.

- If the corrected navigation file does not correspond to the data on the tape or disk (for example, if the times do not match), an error message appears stating that no correction of the navigation data from the tape or disk can be performed.
- To check if correction of the navigation data is being carried out on data from a tape or disk that is being played, select **Display→Survey Data** and see if the **Nav Data** field is set to **Corrected** or **Raw**. It should be set to **Corrected** when the navigation data is being corrected.
- If corrected nav is applied to a field this will be indicated in the survey data popup by a letter 'C' next to the value.

6.6.3 Choosing UTM or Lat/Long Coordinate Display

The **Settings→Nav Type** pop-up contains the **Display Nav Basis Type** selector, which allows you to display nav data in either **UTM** or **Lat/Long** format, irrespective of the original nav format input at acquisition time.

For data originally input as UTM, the correct UTM zone must also be present to convert the values to lat/long (see Figure 6-11, this page). Conversion to and from lat/long and UTM assumes lat/long values use the WGS84 spheroid.

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6.6.4 Other Navigation Parameters

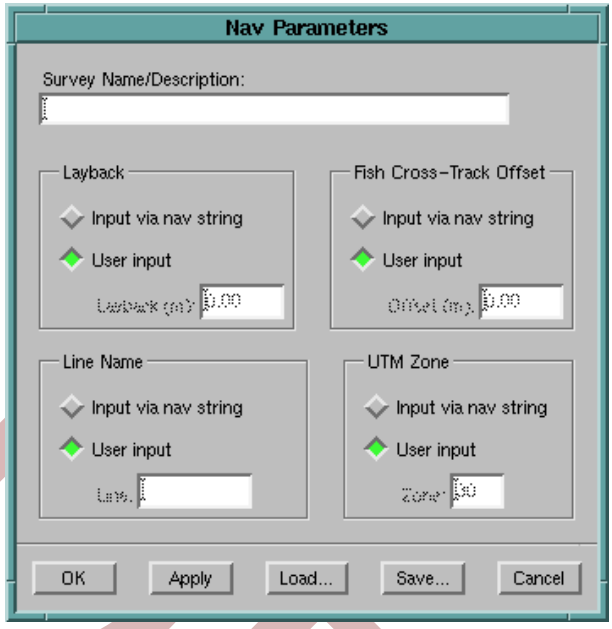

Figure 6-11 The Navigation Parameter Settings Pop-up Window

The **Settings→Navigation Parameters** *pop-up* is used to enter a number of parameters which are normally input automatically via the *navigation input* string. In general, navigation parameters are supplied to the system via a nav input string from the *RS-232* port (see Section 5.4.1). However, if a fixed format navigation string is being used, it may be difficult to obtain some parameters in this manner. The **Navigation Parameter Settings** pop-up therefore provides the means to manually enter values for parameters that may not be provided by onboard navigation facilities.

In *playback mode*, parameters entered in this pop-up override the corresponding recorded values.

6.6.4.1 Survey and Line Name

The **Settings→Navigation Parameters** contains the **Survey Name/Description** *text-entry box* which is used to store text data for one survey with a chosen name or description of up to 48 characters. If no name or description is entered, and no name is available from the RS232 Nav String the **Survey Name** in the **Survey Data** pop-up is shown as 'Unknown'.

Line Name is used to mark specific parts of a survey with a name of up to 16 characters in length. This is most useful in *acquisition mode* to mark on the data which sections were within specific survey run lines. Usually it is more convenient if this is available as part of an RS232 navigation string.

6.6.4.2 Setting Towfish Layback and Offset

When **Layback** and **Fish Cross-Track Offset** are entered in the text-entry boxes, the DA System is able to use the ship's position to estimate the position of the towfish.

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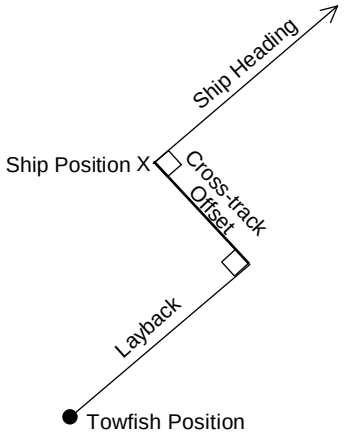

Figure 6-12 Diagram showing Cross-Track Offset and Layback

The **Layback** value is the along track distance in metres from the ship position to the fish position, and the **Fish Cross-Track Offset** is the distance (also in metres) cross-track, from the ship position to the fish position (see Figure 6-12, this page). A positive offset indicates an offset to the right (starboard), and a negative offset indicates the offset is to the left (port).

6.6.4.3 Setting the UTM Zone

The **Settings→Navigation Parameters→UTM Zone** selector can be used to enter the UTM zone number for converting positions from Eastings and Northings to lat/long co-ordinates. The value can either be taken from the nav string by clicking on the **Input via nav string** item or it can be entered manually by clicking on the **User Input** and typing the zone number in the *text-entry box*.

Note: Fix Number is not currently affected by corrected nav files.

6.7 The Tape/Disk Controls in Playback Mode

The Tape/Disk control buttons are analogous to those of a video tape or audio recorder, though their functions change according to the mode being used, *acquisition mode* or *playback mode*.

6.7.1 Playing the Tape or Disk

During playback this button controls the reading of data from tape or optical disk and its display on screen.

6.7.2 Stopping the Tape or Disk

During playback this button stops the screen display scrolling, and stops data being read from tape or disk into the display buffer; it also stops **Fast Forward/Cue** and **Rewind/ Review** operations.

6.7.3 Pausing Replay

key shortcut: <Spacebar>

During playback this button stops the display from scrolling, allowing other operations – zooming, tagging or making on-screen measurements – to be carried out more easily; it does not stop data being read from the tape or disk into the display buffer. Clicking on the **Pause** button again also starts the data scrolling. Alternatively, if the pointer is in the Data Display Area, the space bar can be used to pause and release the data.

6.7.4 Goto

Clicking on this button brings up the following window:

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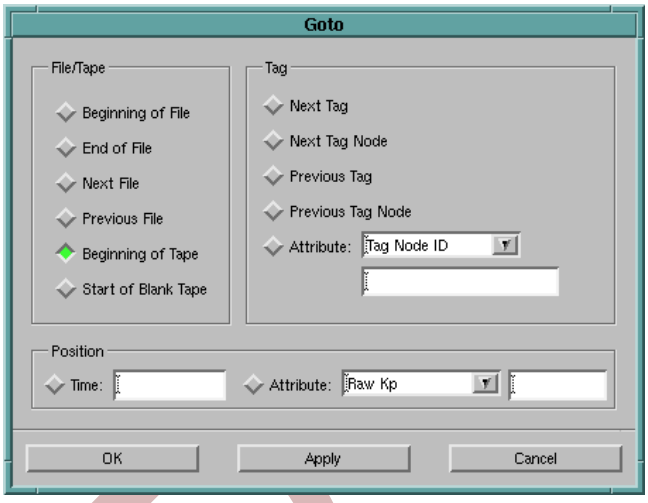

Figure 6-13 The Goto Menu (tape version)

This menu allows you to move to a specific point in the data, using one of the options explained below.

6.7.4.1 Goto to a Position on a File or Tape

A *file* is defined by the beginning and end of data recording sessions. If you are using the optical disk system, only the first two options are available; the other four options are *greyed out*.

- **Beginning of File** moves the tape or disk to the start of the current recording session.
- **End of File** moves the tape or disk to the end of the current recording session.
- **Next File** moves the tape to the start of the next recording session.
- **Previous File** moves the tape to the start of the previous recording session.
- **Beginning of Tape** rewinds the tape to the beginning.
- **Start of Blank Tape** moves the tape to the end of the last recorded data block. Data can then be written to a blank section of tape – assuming the tape is not write-protected – during the next recording session.

6.7.4.2 Goto to a Specific Tag

- **Next Tag** finds the next tag in the recording session. The tape or disk moves to a point about 4 seconds before the time the next tag will appear at the top of the screen. This is to ensure that the tag is visible in the first full screen of data after the goto command. If the tag is within 4 seconds of being displayed when the command is used, or if the tag is already visible on screen, the message ‘Next tag is just off screen’ appears, and no goto is performed.
- **Next Tag Node** moves the tape or disk to the next tag node in the recording session. The tape or disk moves to a point about 4 seconds before the time the next tag will appear at the top of the screen. This is to ensure that the tag is visible in the first full screen of data after the goto command.
- **Previous Tag** moves the tape or disk to the previous tag in the current recording session. To ensure that the tag is clearly visible in the first full screen of data after the goto command, the goto moves to a point about 4 seconds before the time the tag event occurred.
- **Previous Tag Node** moves the tape or disk to the previous tag node in the current recording session. To ensure that the tag is clearly visible in the first full screen of data after the goto command, the goto moves to a point about 4 seconds before the time the tag event occurred.
- **Attributes** (see Figure 6-13, page 94).
    - **Tag ID** moves the tape or disk forwards or backwards to a specific tag and type the tag’s ID number in the text-entry box. Only the digits of the code – no letters or

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punctuation – should be entered. The tag ID is printed when a report is generated. Cut and paste the tag's ID number using the **Reporting** menu. Select **Reporting→Report Generation→Text Window→Generate Report**. In the **Tag Report File** window, scroll to the **Tag ID** column and *double-click* on the tag's number to copy it. In the **Goto** menu, place the pointer over the **Tag ID** box and click the MIDDLE mouse button to paste the tag's number. The tape or disk moves forwards or backwards to a point about 4 seconds before the tag will appear on screen, so that the tag is visible in the first full screen of data after the goto command.

- **Anomaly ID** can be used as an alternative to Tag Node ID, but moves the tape or disk forwards or b ackwards to a specific anomaly.

6.7.4.3 Goto a Specific Time

Sometimes, particular points of interest in the data may not have a tag associated with them; in me. Enter an absolute time (as a 24-hour clock value) by typing six digits without punctuation in the box; for example, type 053400 to search for the time of 05:34:00. This command is restricted to times in the same day as the current time on the data being replayed. For example, at 23:35:57 you cannot goto 01:13:00 on the following day; the system would search for 01:13:00 on the same day, probably resulting in a failure of the goto command. Enter a relative time by prefixing the time with '+' or '-' without punctuation; for example, type '+031712' to move 3 hours 17 minutes and 12 seconds ahead in the data. This command allows you to move from one day to another. If the system is unable to goto the time requested, it goes to the nearest time it can find on the file. If that point is more than 5 seconds from the time specified, a warning pop-up appears.

6.7.4.4 Goto a Specific KP/Chainage

Click on **Attribute** and select **Raw Kp** (kilometre post) in the scrolling option list and in the text-entry box enter the *Kp* value that you want to find. The Kp value is obtained from the navigation stored with each ping – as the basis for the search. Specify either an absolute or a relative Kp value. Enter an absolute Kp value by typing the number including punctuation in the box; for example, type 345.12 to go to Kp345.12. The system searches forwards or backwards to find the Kp requested. Enter a relative Kp value by prefixing the Kp value with '+' or '-'. To use this command, you must keep track of whether the Kp are increasing or decreasing as the data is played. The system searches forwards or backwards to find the Kp requested. If the system is unable to find the Kp requested, it goes to the nearest point it can find on the data. If that point is more than 25 metres from the position requested, a warning pop-up window appears.

Note: Note: The Kp values used for goto commands are taken from the raw navigation data stored with each ping.

6.7.4.5 Goto a Specific Fix Number

Click on **Attribute** and select **Fix Number** in the *scrolling option list* and in the *text-entry box* enter the fix number that you want to find. This command uses the fix number from the tag database entry. Again, specify either an absolute or a relative value. Enter an absolute fix number by typing the number in the box. The system searches forwards or backwards to get to the fix number requested. Enter a relative value by prefixing the fix number with '+' or '-' without punctuation. The system searches forwards or backwards to find the specified number.

6.7.4.6 Goto a Specific Ping Number

Click on **Attribute** and select **Ping number** in the *scrolling option list* and in the *text-entry box* enter the ping number that you want to find. Again, specify either an absolute or a relative value. Enter an absolute fix number by typing the number in the box. The system searches forwards or backwards to get to the fix number requested. Enter a relative value by prefixing the fix number with '+' or '-' without punctuation. The system searches forwards or backwards to find the specified number.

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6.7.5 Fast Forward/Cue

This button has two modes of operation during playback; they determine the speed of movement through the data on tape or disk. If the **Play** button is depressed when this button is pressed, *cue mode* is selected; a tape system will display every third line of incoming data from a tape and an optical disk system will display every fifth line of incoming data from disk, allowing fast searches through the data. If the **Play** button is not depressed when this button is pressed, *fast forward mode* is selected; both a tape drive and an optical disk drive will move the media forward repeatedly by 10 000 lines of data. Each mode of operation continues until the **Stop** button is pressed.

6.7.6 Rewind/Review

This button has two modes of operation during playback; they determine the speed of rewind. If the **Play** button is depressed when this button is pressed, *review mode* is selected; a tape drive will rewind a tape 250 lines at a time and an optical disk drive will rewind a disk 7 lines at a time, stepping back through the data and displaying it on screen. If the **Play** button is not depressed (in other words, data is not being played) when this button is pressed, *rewind mode* is selected; both a tape drive and an optical disk drive will rewind the media 10 000 lines of data at a time. The data lines are not displayed on screen in this mode. Each mode of operation continues until the **Stop** button is pressed.

6.8 Ejecting Tapes and Disks

1. Click on the **Stop** button in the *Data Control Area*.
2. Do one of the following:
   - If you are using a tape system, press the Eject button on the front of the tape drive.
   - If you are using an optical disk system, select **File→Open Playback**, click on the **Unmount** button in the **Open Playback** pop-up, click on the **OK** button, and then press the Eject button on the front of the disk drive.

6.9 Deleting Files from an Optical Disk

A file can be deleted by selecting it and *clicking* on the **Delete** button. This option is password protected and you will be prompted for the correct installation password before the file can be deleted. If an optical disk is read-only, the delete button will be *greyed out*.

It is not possible to delete single files from a tape; however, a tape or disk's entire contents can be erased (see Appendix H and Appendix I).

6.10 The General Information Area in Playback Mode

The **General Information Area**, which lies near the bottom left of the display screen, is shown in Figure 6-14, page 96 and Figure 6-15, page 97 There are two modes, selected by the button in the bottom right hand corner of the area, and they provides the information listed below for which ever window is selected on the tab bar. See also Section 5.2.

6.10.1 The General Information in Playback Mode 1

Figure 6-14 The General Information Area in Playback Mode 1

- **Position**: The position of either the fish or the vessel in either **Lat/Long** or **UTM** appears at the top of the display and shows the position of the newest ping in the window (see Section

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6.6.3). A symbol of a fish or a vessel appear in the middle of the position to indicate the position reference point.

- **date/time**: the date and time at which the data was recorded. (The date is displayed as dd-mm-yy.)
- **Nav Sync.**: A clock face displayed between date and time shows green when the navigation date is in sync and red when it is not.
- **fish alt**: shows the distance of the towfish above the seabed when the data was acquired.
- **heading**: shows the direction in which the vessel or towfish was heading when the data was acquired
- **line**: the line name which is either taken from the Nav String or entered by the user (see Section 6.6.4)
- **range**: displays either the true range in meters for a side scan window or sweep time in msecs for a seismic window.
- **cursor (pointer)**: the position directly under the cursor on the screen; namely, Eastings, Northings and Kp. The information is colour coded to indicate the channel over which the cursor is positioned, channel colour is indicated in the top right of the display window. The position is fully geo-corrected and is calculated using the navigation data stored with each ping. If the fish height is known, the position is automatically slant-range corrected. Similarly, if corrected navigation data mode is available, this can also be used to provide a further stage of correction.

  Positions that are off-track are calculated using the geographical ping position, heading and across-track distance from the position, as shown in Figure 6-9, page 83. For accurate off-track positions it is essential that the heading is correct.

Note: To calculate an off-track position lat/long is converted to UTM, the position is calculated and then this position is converted back from UTM to lat/long.

The format in which the cursor information is displayed can be changed from eastings and northings to lat/long – and vice versa – by *clicking* on the appropriate *one-of* selection button in the **Display Nav Basis Type** frame of the **Nav Data Settings** pop-up.

6.10.2 The General Information Area in Playback Mode 2

Figure 6-15 The General Information Area in Playback Mode 2

- **Position**: The position of either the fish or the vessel in either Lat/Long or UTM appears at the top of the display and shows the position of the newest ping in the window (see Section 6.6.3). A symbol of a fish or a vessel appear in the middle of the position to indicate the position reference point.
- **date/time**: the date and time at which the data was recorded. (The date is displayed as dd-mm-yy.)
- **Nav Sync.**: A clock face displayed between date and time shows green when the navigation date is in sync and red when it is not.
- **pings/s**: the rate (pings per second) at which the display lines scroll down the screen. In playback mode the rate can be changed using the **Settings→Playback Speed** pop-up.
- **ping no.**: the number of the ping being displayed in the top line of the Data Display Window.

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It is continuously updated while data is scrolling.

- **survey**: displays the survey description as entered in the Nav Parameters pop-up (see Section 6.6.4).
- **Kp**: the kilometre post number of the newest ping in the display window.
- **cursor (pointer)**: the position directly under the cursor on the screen; namely, Eastings, Northings and Kp. The information is colour coded to indicate the channel over which the cursor is positioned, channel colour is indicated in the top right of the display window. The position is fully geo-corrected and is calculated using the navigation data stored with each ping. If the fish height is known, the position is automatically slant-range corrected. Similarly, if corrected navigation data mode is available, this can also be used to provide a further stage of correction.

  Positions that are off-track are calculated using the geographical ping position, heading and across-track distance from the position, as shown in Figure 6-9, page 83. For accurate off-track positions it is essential that the heading is correct.

  Note: To calculate an off-track position lat/long is converted to UTM, the position is calculated and then this position is converted back from UTM to lat/long.

  The format in which the cursor information is displayed can be changed from eastings and northings to lat/long – and vice versa – by clicking on the appropriate one-of selection button in the **Display Nav Basis Type** frame of the **Nav Data Settings** pop-up.

6.11 The Application Specific Area - Devices in Playback Mode

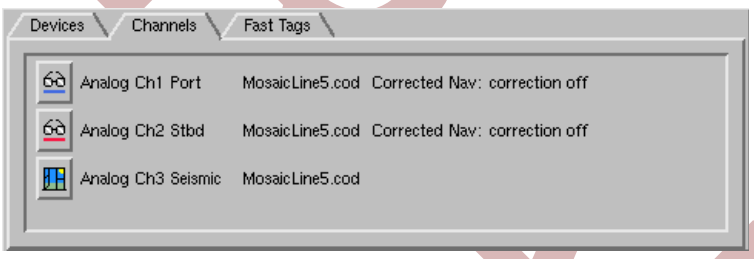

Figure 6-16 The Application Specific Area - Channels Tab in Playback Mode (tape version)

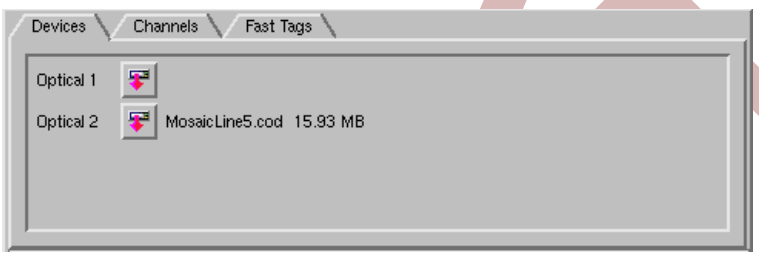

Figure 6-17 The Application Specific Area - Device Tab in Playback Mode (optical disk version)

When the DA System is in playback mode, the **Devices** tab in the Application Specific Area, shows information on the tape devices or disk devices, present on the system (see Figure 6-16, page 98 and Figure 6-17, page 98).

If optical drives are fitted, this display indicates what file, if any, has been selected (see 6.2.2) by displaying it along side the relevant device icon.

The icon acts as a media eject button by clicking on the relevant device icon.

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6.12 Using Other Coda Software Modules

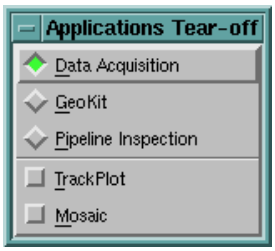

Figure 6-18 The Applications Menu

The **Applications** menu allows you to select which Coda application you wish to run. The *Application Specific Area* of the main display will change according to the application being used.

The only option available on the standard DA System system is **Data Acquisition**. For information about the other software modules, contact Coda Technologies directly, or consult the appropriate software module manual.

When an automated interpretation application is running (for example, automated pipeline inspection), the letter 'R' is appended to the application menu item. This lets you switch between application modules while remaining aware of which application is currently running.

GeoKit: The Geophysicist On-line Interpretation Toolkit provides a suite of on-screen and on-line interpretation tools for site survey, route survey, search and recovery, and target detection. The user configurable on-line event-marking tools are enhanced to allow interactive marking of target objects, seabed features and sediment types in real time. The database facilities allow flexible, comprehensive reports detailing locations, dimensions, seabed and target type, surveyor's comments and automatic calculations to be printed on screen, via a printer, or output to a DOS format floppy disk for integration into a windows based charting package, GIS, database, spreadsheet or word processor.

Pipeline Inspection: The PI100 Pipeline Inspection module is designed as a tool for surveying sub-sea pipelines. It carries out automated pipeline tracking and span and burial detection, as well as offering a comprehensive set of database annotation tools. This allows pipeline surveys to be conducted without using thermal paper printouts of the survey.

TrackPlot: This module provides route planning and coverage information of the vessel and towfish positions during hydrographic survey, displayed in real-time.

Mosaic: This module produces real time mosaicing of the seabed from sidescan sonar image data. Mosaic includes annotation and manipulation tools and can be used to any scale and include a built in tracking system.

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7 Processing Sonar Data for Display

The Processing functions are applied in the order they are turned on by the user with the following exceptions: TVG is always applied last; Fish height/bottom tracking is always applied to raw data, for example, it is first applied to a copy of the raw data; the swell value calculation is always applied to raw data.

Note: Changes made in the **Processing** menu in *playback mode* affect only the data being displayed to the screen; the data on the tape or optical disk is not affected in any way. Similarly in *acquisition mode*, processing has no effect on data being recorded to tape or optical disk. Fish height and swell values, however, are recorded alongside ping data and can be referenced in playback mode.

7.1 Choosing Which Data To View

The number of channels displayed can be changed from two channels (*dual channel mode*) to one channel (*single channel mode*), using the **Display** menu. Selecting **Left Data Channel** or **Right Data Channel** from this menu causes the display to show either the left or right *display channel* respectively. To revert to *dual channel mode*, select **Both Data Channels**. Note, however, that two separate channels can only be displayed in *dual channel mode* if they were recorded on the same *trigger*.

7.2 Adjusting the Offset and Gain Applied to the Data

The **Processing→Scale Display Data** pop-up is used to select the portion of the input signal range to be displayed to the screen. The input signal is digitised at a resolution of 12 bits (4096 discrete levels), whereas the display resolution is limited to 8 bits (256 colours or grey levels); therefore, the 12-bit input data must be converted to 8 bits for display. Note that this conversion applies only to displayed data; all data is recorded and all analysis and processing is performed at the full input data resolution.

The **Settings→Scale Display Data** pop-up appears automatically across the screen when you start acquiring data or when you start playing back data. It can, however, can be accessed through the **Settings** menu whenever the data needs to be rescaled; for example, when a significant change occurs in the voltage levels of the signal.

When **Scale Data Display** is selected, a window appears across the Data Display Area, showing an oscilloscope trace and a number of controls (see Figure 7-1, page 101).

7.2.1 Automated Scale and Offset Adjustment

The trace is displayed differently depending on which of the two **Viewing Ranges** is selected. The default setting is **Viewing Range** to **Input** (as indicated by the green *one-of selection* button).

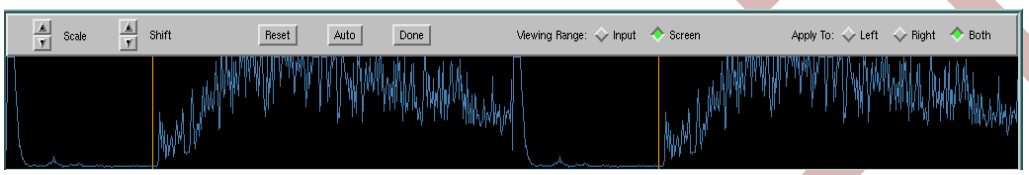

Figure 7-1 The Scale Display Data Pop-up Window showing the Screen Range

When the **Viewing Range** is set to **Input**, the green oscilloscope trace shows the full resolution of the signals after any processing. To view the raw input signal, select the **Raw A-Scan** pop-up (see Section 8.7). The range of the window is set to the full input voltage range, as selected in the acquisition parameters when in acquisition mode, or to the range over which the signal was originally recorded when redisplayed in playback mode.

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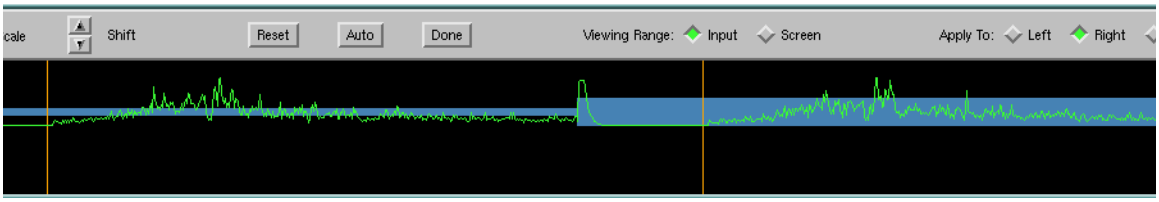

Figure 7-2 The Scale Display Data Pop-up Window showing the Input Range

Setting the **Viewing Range** to **Input** causes a blue rectangle to be displayed in the **Scale Display Data** window (see Figure 7-2, this page). This rectangle shows the current range of the DA System display. Without automatic scaling, the rectangle is typically at the bottom of the range, is very narrow, and does not cover any of the input signal. In this instance, the data displayed to the screen is almost white. To alter the effective range of the input data displayed to the screen, use the **Shift** arrow keys on the screen to move the blue rectangle over to the bottom of the green oscilloscope trace. Alternatively, click on **Auto** and the rectangle shifts to cover the input signal.

When the DA System is started in either acquisition or playback modes, the display data is scaled automatically as the data begins to scroll. **Auto** scaling uses a statistical analysis of the energy of the signal to ensure that the display range coincides with the range of the important information in the input signal, thereby optimising the display. If the energy content of the signal changes significantly in either acquisition or playback modes, the quality of the display deteriorates because the display range does not coincide with the range which covers the important information in the input signal. The data should be rescaled by clicking on the **Auto** button in the pop-up.

The **Reset** button resets the display data parameters back to those at system initialisation.

The **Shift**, **Scale**, **Auto** and **Reset** conversion settings can be made to both display channels simultaneously (the initial default), or to either channel individually. This is controlled by the **Apply To** toggle. Setting the toggle to **Both** causes both display channels to be altered. Setting to either **Left** or **Right** applies the conversion changes to the respective single data channel only. This allows the two channels to display different portions of their respective input signals, thereby allowing individual channel displays to be optimised.

When suitable conversion parameters have been selected, the **Scale Display Data** window may be dismissed by clicking on the **Done** button. The parameters may be altered at any time by re-selecting the **Scale Display Data** menu item and re-scaling the data either automatically or manually.

7.2.2 Manual Scale and Offset Adjustment

The pop-up shows an oscilloscope trace and a number of controls. It has two viewing ranges. The default setting for **Viewing Range** is **Input**. It shows a green trace, which corresponds to the input signal (*acquisition*) or the signal being read from the disk or tape (*playback*), and a blue rectangle, which indicates the portion of the input signal that is on display in the *Data Display Area*.

To scale the display data manually, the **Scale** and **Shift** arrows should be used to move the input signal until it coincides with the display range. This is represented in the **Scale Display Data** pop-up by a solid blue rectangle (illustrating the display range) covering the desired range of the incoming signal.

In addition to appearing when selected from the **Settings** menu, the **Scale Display Data** pop-up appears when the **Play** button in the **Data Control Area** is pressed after changes have been made to the acquisition setup or **Open Playback** has been selected from the **File** menu.

Setting the **Viewing Range** to **Screen** causes the oscilloscope trace to show the blue display data range (that is, what is actually visible on the screen) rather than the input data range. The arrow keys can, again, be used to alter the range being displayed. However, on this viewing range, selecting the up and down **Shift** arrows on the screen causes the trace itself to be moved up or

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down respectively. The **Scale** arrow keys cause the trace to be scaled in size; the up **Scale** arrow increasing the size, the down arrow reducing it. This viewing mode allows fine tuning for the settings of input data to display data conversion.

Scale and **Shift** adjustments can be made for **Both** channels, or **Left** and **Right** independently, as for **Auto** scaling. The **Reset** button resets the display data parameters back to those at system initialisation.

When you have finished making your adjustments to the **Scale** and **Shift** values, dismiss the pop-up by pressing the **Done** button.

7.3 Setting Time Varying Gain

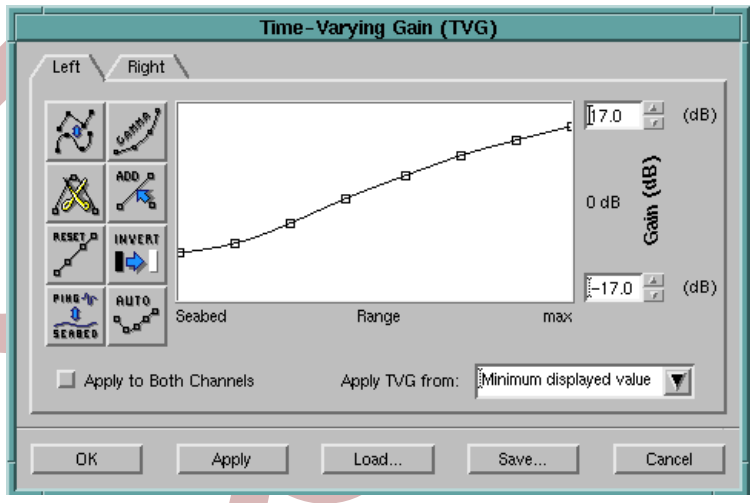

Figure 7-3 The Time Varying GainToolkit Pop-up Window

The **Processing→Time-Varying Gain** (TVG) pop-up (Figure 7-3, this page) shows an interactive graph which allows the gain applied across the range of the displayed data to be altered. The icons are used to: toggle between round or straight line curves in the graph; enter a *gamma* value for the gain applied across the ping return; remove *grips points* from the graph; add grip points; reset the gain back to 1; invert the TVG function; and apply the gain from the seabed, rather than the start of ping.

The best **TVG Enhancement** curve is one which gives a consistent maximum data value *across-track*. This is done by either reducing or increasing the gain for some parts of the scan. You can see the effect of manipulating the TVG function by using the **Scale Display Data** pop-up.

The *time-varying gain* function can be used to alter the gain across the data trace and as a result improve image quality across the data display. Selecting **TVG Enhancement** or the **Setup TVG Functionality** icon pops up the **Time Varying Gain (TVG)** toolkit (see Figure 7-3, this page).

The TVG graph, however, is a graph of the gain applied across the range of the displayed data. The function can be specified by moving the points on the TVG function curve to the required shape. The steps are the same as the **Image Enhancement** toolkit.

The TVG toolkit contains eight smart icons, six of which look identical to those in the **Image Enhancement** toolkit. They are used to:

- toggle between round or straight line curves in the graph
- enter an exponential function value (gamma) for the gain to be applied across the ping return
- remove grip points from the graph
- add grip points to the graph
- reset the gain back to one
- invert the TVG function
- apply TVG from start of ping or seabed (dependent on correct fish height tracking)
- apply an automatic gain profile to the signal.

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The **Auto TVG** function attempts to generate a TVG curve that yields a consistent signal in the across-track direction. It does this by:

- Calculating a mean ping over the first ten pings since the **Auto TVG** button was pressed.
- Dividing this mean ping into a series of bins, starting from the current bottom position to the end of the trace.
- Calculating the mean signal level for each bin.
- Calculating a gain factor for each bin so that when this gain factor is applied to the binned data, the mean signal level in the bin is equal to the mean signal level calculated previously.
- Adjusting the minimum and maximum gain values so that the curve is scaled appropriately on the graph.
- Interpolating, using a spline fit, between bin positions to produce a smooth curve.

To get good results from **Auto TVG**, the following points are important:

- There should be a reliable fish height position available to the system.
- Data should be scrolling.
- The **Apply TVG from Drop Down** option should be set to **Minimum** displayed value, to avoid taking any dc offset into account.

After an **Auto TVG** function has been applied, it may be advisable to rescale the data using the **Scale Display Data** pop-up to yield the best possible image (Figure 7-1, page 101).

In addition to these icons, the vertical scale gain can be varied to a maximum of 100dB by using the **Gain** *spin boxes*; the entry in one box will be mirrored in the other.

Apply TVG from Drop Down will set the point from which TVG is applied to either **Zero Volts** or **Minimum display value**. With **Zero Volts**, selected amplification will be applied to any dc offset to the signal as well as the signal itself, whereas the **Minimum display value** will apply the gain to the signal only. Distortion may occur if the **Shift** buttons on the **Scale Display Data** pop-up (see Figure 7-1, page 101) are altered after setting the TVG.

The toolkit is similar to that of **Image Enhancement** (see Section 7.5); both contain an interactive graph and several smart icons.

Any processing applies to the incoming data at the top of the screen only, rather than the whole Data Display Area. To apply TVG changes to the whole image, select **Display→Refresh Display**. The **Scale Display Data** pop-up can also be used to see the effect **TVG Enhancement** has on your data on a per ping basis (see Section 8.8).

Note: This processing is only applied to the displayed data. The data being recorded or stored on tape or optical disk is not affected by any processing.

As with the **Image Enhancement** pop-up, changes to the graph are applied immediately to the display data, although the graph settings are initially stored on a temporary basis. To cancel the changes and dismiss the pop-up, click on the **Cancel** button. To save the changes, click on **Apply** or **OK**. **OK** will dismiss the pop-up as well as saving the changes.

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7.4 Choosing Which Part of the Trace To View

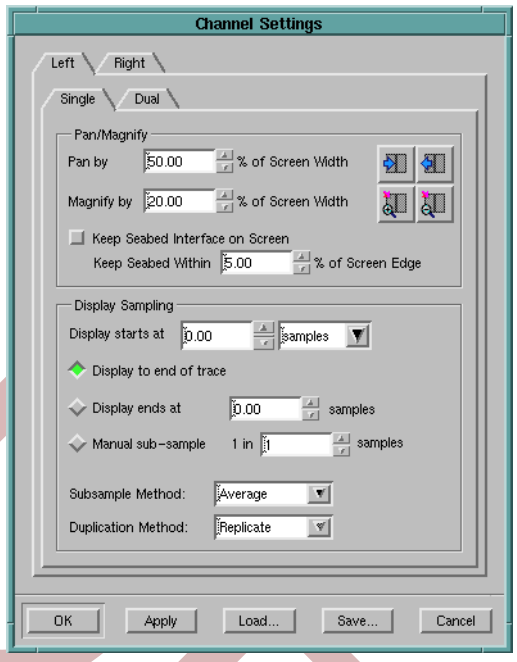

Figure 7-4 The Left Display Channel Pop-up Window

The attributes of the **Left Display Channel** or **Right Display Channel** can be changed by selecting this menu item (**Settings→Left Display Channel**). The pop-up is divided into **Single Channel Display** settings, which apply when only one channel is displayed in the Data Display Area, and the **Dual Channel Display** settings which are used when both data channels are displayed.

The **Offset** is the number of samples from the start of the raw ping at which the screen display begins: for example, if the raw ping is 2560 samples long, an offset of 400 will shift the line 400 samples to the right (for example, in order to 'remove' the water column). Negative offset values are therefore invalid – the system will not accept them and will display an error message and ask for the offset value to be changed. The visible effect of changing the offset value is to move the data across the screen.

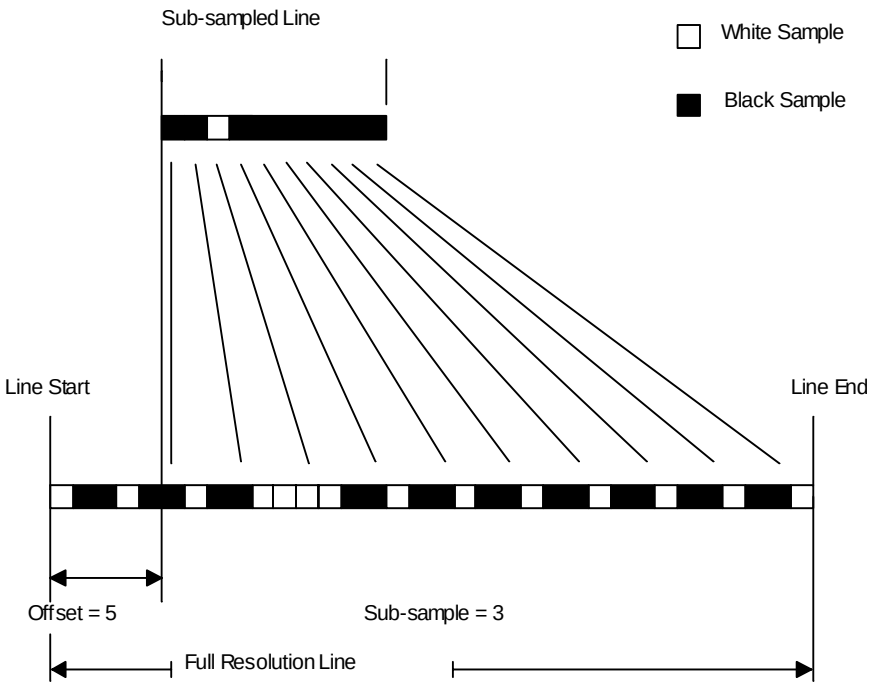

Figure 7-5 Offset and Sub-sampling of Incoming Data

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The **sub-sample** rate determines how much of the full resolution line appears in the display by ignoring a proportion of the samples and displaying the remainder. Data is usually recorded with more samples per ping than can be displayed in the Data Display Area. The number of samples displayed across the width of the screen is limited to a total of 1024 – usually 512 samples per display channel; however, the number of raw data samples is typically much larger than 512 per data channel – usually 2560 samples or more.

By default, **automatic sub-sampling** is carried out to allow the whole of the incoming line of data to be displayed, by using only one sample to represent the rest of its neighbours. If you've entered an **Offset** value, the automatic sub-sample rate will be recalculated so that the whole of the remainder of the line is displayed.

Manual sub-sampling to change the default settings, can be selected by editing the text-entry boxes. To display only every second sample the text-entry boxes should read '1 in 2' samples, for every sixth sample they should read '1 in 6' samples and so on. Manual sub-sampling can be used to view the data in more detail.

To view the data at full resolution, set manual sub-sampling to 1 in 1 samples. However, at levels of detail higher than the automatic value, the full width of the data cannot be shown on the screen. In this case, the offset parameter should be used to select the appropriate section of the data line to be displayed.

Note: It is likely that different settings will be required for single and dual display modes.

Note: **Zoom mode** can also be used to display a section of data at full resolution (see Section 8.5).

Remember that the right and left data channels of sidescan data are displayed in from the centre of the screen, so data in the right channel appears to shift in the opposite direction to data in the left channel.

The DA System default settings are to display two channels of data simultaneously and to sub-sample the full *swathe* of the incoming data to fit into the width of the *Data Display Area*. You may, however, want to view only one channel or to view a specific section of a channel in more detail. This is done by changing the settings in the **Display** and **Settings** menus.

The **Display** settings control the viewing mode: *single channel mode* displays either the left or the right channel; *dual channel mode* displays both left and right channels. The **Settings→Left Display Channel** and **Setting→Right Display Channel** pop-ups both contain two options – *offset* and *sub-sampling* – which control the position and the resolution of the display data.

It is worth experimenting with these settings; if, for example, you wish to view only the pipeline within a sidescan sonar swathe, you can centre the display channel on this region, allowing the display of the pipeline to use the full digitised resolution.

7.5 Enhancing the Image

The DA System's default *waterfall display* is monochrome and the shades of grey are directly proportional to the data values. This may not, however, be the most useful way to display your data. If your data has very low or high *contrast*, you can improve the contrast or change the colour to reveal more details, using the **Processing→ Image Enhancement** *toolkit*. You can also invert the image for printing, using the toolkit. Remember that changes to image enhancement will not affect the data being recorded - just how the data appears on the screen.

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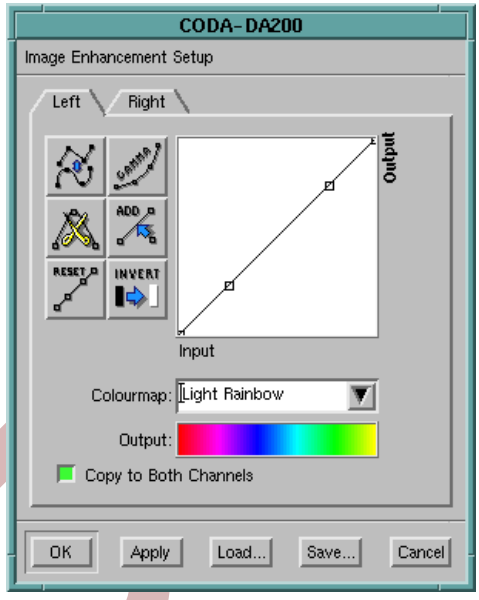

Figure 7-6 The Image Enhancement Pop-up Window

Enhancement is applied to the whole screen area for the channel selected, not just for incoming data.

Image enhancements can be made to the **Left**, **Right**, or **Both Channels** of data. Each display channel keeps its own interactive graph. If **Both** is selected Left and Right channels are assigned the same graph. You can save your favourite settings using the **Load** and **Save** options.

To cancel any enhancements and restore the Data Display Area to its previous state, click on the **Cancel** button. Enhancements can be applied with or without dismissing the toolkit window by clicking on the **OK** or **Apply** button respectively.

Note that the **Image Enhancement** pop-up behaves differently to most other pop-ups in that it allows the displayed data to be modified without the need to click on the **Apply** or **OK** buttons. This allows you to experiment with changes to the settings, without losing your original settings.

7.5.1 Contrast Adjustment by Gamma Correction

This smart icon pops up a text-entry box to input gamma enhancement values. A gamma function is an exponential function; that is, its values increase in a non-linear fashion. Its effect is similar to a television's 'contrast' control. To decrease the contrast (making the Data Display Area brighter) requires values greater than one, whereas to increase contrast (making the display area generally darker) requires a value of less than one. Typing <enter> in the text box, or clicking on **OK** causes the curve in the graph area of the toolkit window to be redrawn according to the input value. Gamma values are a quick way of configuring the graph without having to move grip points.

In normal use, the best display quality is often obtained by using the **Gamma Correction** smart icon to set a gamma value (contrast value) for the data, rather than by moving the grip points on the graph. If the display is too dark, a gamma value of greater than 1 should be used (normally between 1.3 and 2.0). A higher gamma value tends to make the display brighter, though it decreases contrast. If the screen is too light, a gamma value of less than 1 should be used (normally in the range of 0.5 to 0.9).

7.5.2 Colourmap Selection

Clicking on the **Colourmap** drop down gives a choice of 16 different colourmap options. These can be used to map the incoming data values to different shades of colour.

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7.5.3 Inverting the Colourmap

To invert the data displayed to its 'negative' – that is, black becomes white and vice versa – simply click on this smart icon. This tool is useful for switching to and from a 'paper trace' style display.

7.5.4 Manipulating the Image Enhancement Graph

The **Image Enhancement** toolkit contains an interactive graph, six *smart icons*, left and right output displays and five *one-of selection* switches. The graph plots the raw input data signal (labelled **Input**) against the brightness of the display *pixels* (labelled **Output**). The icons are used to: toggle between round or straight line curves in the graph; enter a *gamma* value for the brightness of the data displayed; remove *grips points* from the graph; add grip points; reset the graph; *invert* the displayed data to its 'negative'; and change the colour mapping of the display.

7.5.4.1 Changing the Image Enhancement Graph

The Image Enhancement graph consists of lines joined by small square boxes, known as *grip points*.There are four on the default version of the graph, one at either end and two in the central portion. The grip points can be positioned by *pressing and dragging* on them to alter the shape of the graph.

7.5.4.2 Choosing a Straight Line or Spline Fit

This icon is used to either apply a smoothing function (called a *spline*) between grip points on the graph, or to apply no smoothing, resulting in straight lines between the grip points. This determines how smoothly the grey levels change in the display. A smooth curve gives a smooth transition between greyscales while a graph composed of line segments can cause more abrupt changes in greyscale. Straight line functions are more suited to thresholding or rectifying data to aid interpretation. Clicking on the spline icon toggles the smoothing on and off.

7.5.4.3 Adding a Grip Point

This smart icon is used to add grip points to the graph. To add a grip point, click on the icon. The pointer changes to an arrow with the extra grip point. Click the cursor at the location on the graph where the grip point is to be added. The head of the arrow corresponds to the location of the new grip point

7.5.4.4 Deleting a Grip Point

This smart icon is used to remove grip points from the graph. To remove a grip point, click on the icon. The cursor changes to a pair of scissors. Click the cursor on the grip point to be removed. The graph is redrawn without this grip point.

Note: The two end grip points cannot be deleted.

7.5.4.5 Resetting the Graph

This smart icon is used to reset the graph to a straight line with four grip points, restoring the Data Display Area to its original state.

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7.5.4.6 A Practical Example: Rectifying the Data

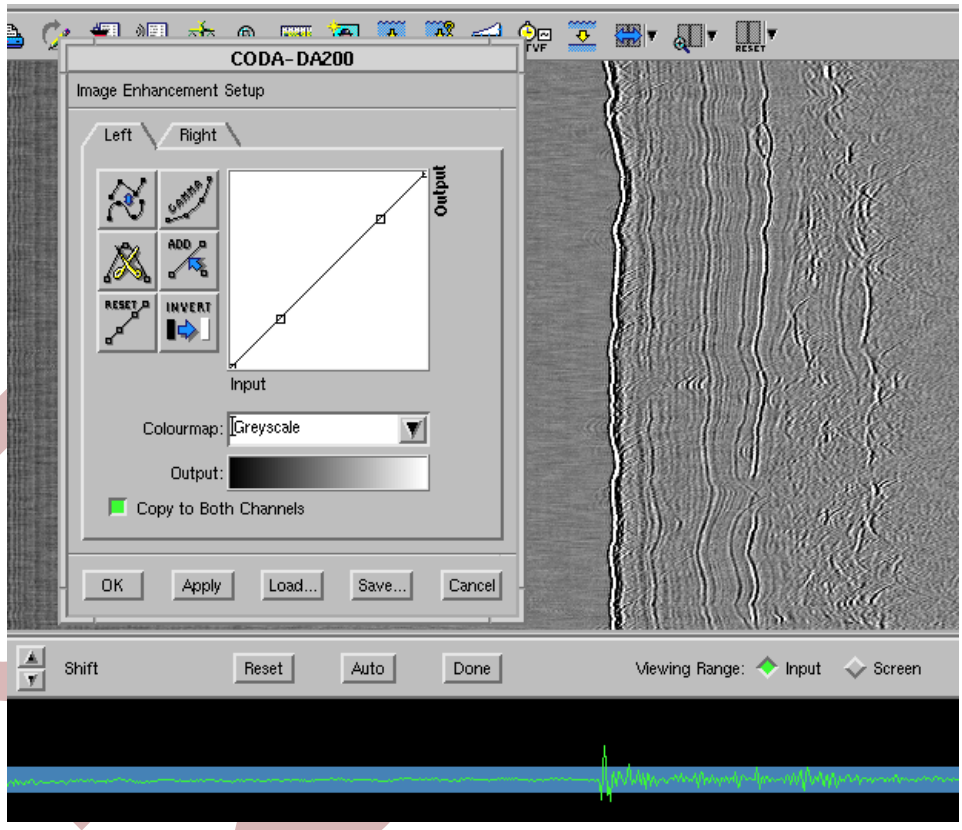

Figure 7-7 Example of Seismic Return before Rectification

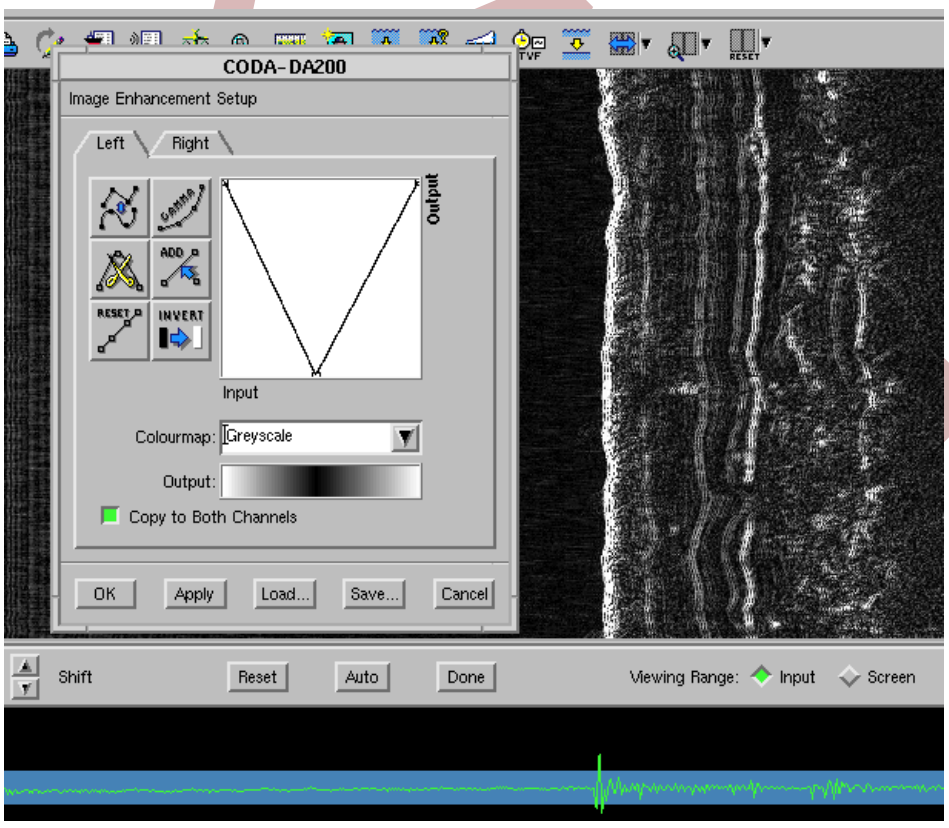

Figure 7-8 Example of Same Seismic Return with Full Wave Rectification

Full wave rectification can be simulated by applying the transfer characteristics in the Image Enhancement graph shown in Figure 7-8, this page

7.5.4.7 A Practical Example: Setting a Black Level

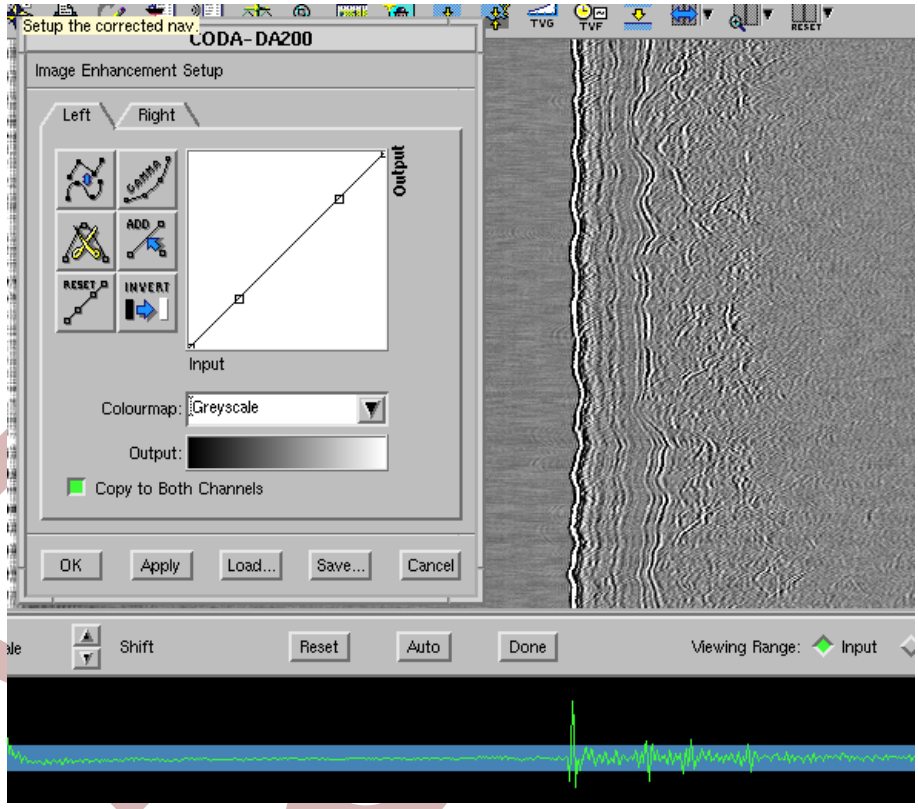

Figure 7-9 Example of Seismic Return before setting Black Level

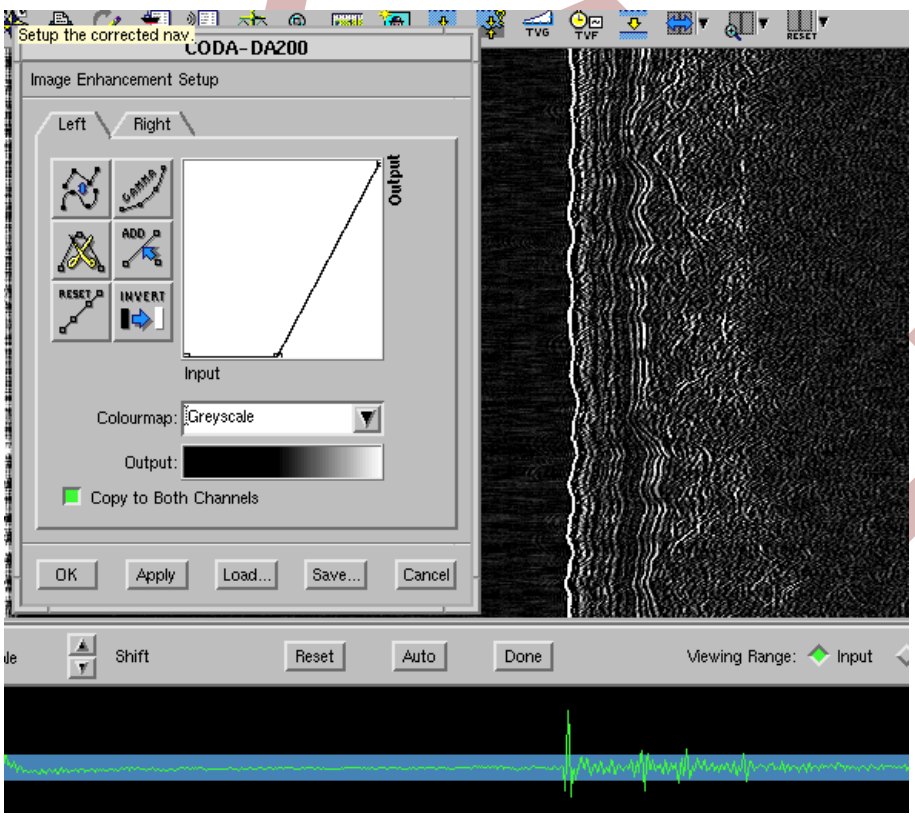

Figure 7-10 Example of Same Seismic Return with Black Level Set

Setting the black level can be simulated by applying the transfer characteristics in the Image Enhancement graph shown in Figure 7-10, this page. This also simulates half wave rectification.

7.6 Refreshing the Display

When changes are made to items in the **Settings** or **Display** menus, their effect is seen from the newest line of data being processed onwards. Selecting **Refresh Display** displays the effect of such changes for the whole screen. The effect of any changes – for example, filtering – without the data having to be replayed. Depending on the amount of processing being asked of the system, the DA System may take up to 5 seconds to redraw the screen.

Note: There may be a few seconds' delay between selecting this item and the screen being redrawn, depending on the amount of processing being used by the system at the time.

7.7 Processing Sidescan Data

7.7.1 Removing Noise

'Noise' from natural sources (such as currents or marine life) or from man-made sources (such as ships) may affect the quality of the raw data. It can obscure or degrade features of interest and should therefore be minimised, if not eradicated.

7.7.1.1 Cross-Track Smoothing

*The **Processing→Cross-track Smoothing*** option removes unwanted spikes of 'noise' within a ping in sidescan sonar data. It does this by locally averaging the data in each ping. You can control the extent of smoothing, and therefore the extent of noise reduction, by selecting the size of smoothing filter – small, medium or large, see Figure 7-11, this page.

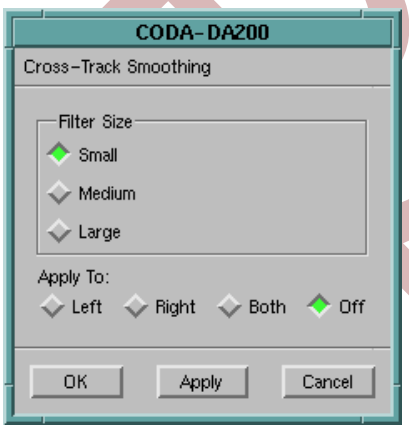

Figure 7-11 The Cross-Track Smoothing Pop-up Window

The size of the filter determines the extent to which the data is smoothed. The **Small** filter reduces the magnitude of noise spikes to a lesser degree, but ensures that the image remains sharp. By contrast, the **Large** filter reduces the noise spikes to the greatest extent, but renders the image more blurred.

Note: None of the cross-track smoothing options performs any *along-track* smoothing.

Cross-track smoothing is more suitable for sidescan data than shallow seismic data. For removing noise from shallow seismic data, use a combination of time-varying frequency filtering, *trace mixing* and swell filtering.

Cross-track smoothing can be applied to the **Left Channel**, **Right Channel**, or **Both Channels** together. At any time, the display can be restored to its previous state by clicking on the **Cancel** button. The desired smoothing filter can be applied with or without dismissing the pop-up window by clicking on the **OK** or **Apply** button, respectively. This processing is only applied to the displayed data; the data being recorded or replayed is not affected by any processing.

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7.7.2 Eliminating Sonar Distortions

Geometric factors can distort the sonar image; for example, in sidescan sonar the height of the sensor/towfish from the seabed gives a slanted view of the seabed; in seismic sonar the effect of swell on the sensor produces swell on the image. There are two tools for eliminating these distortions: *slant-range correction* for sidescan sonar and swell filtering for seismic sonar.

Before applying these options, make sure that the system has a valid bottom position; otherwise, you will introduce further distortions. You can display the bottom position line either by clicking on **Bottom Position Line** in the **Display** menu or by clicking on the **Display Bottom Position** button in the **Fish Height Settings** pop-up (see Section 5.5). The bottom position line can be displayed in either channel or both channels. The settings can be stored by clicking on the **Store** button or reset to the factory defaults using on the **Factory** button.

7.7.2.1 Slant-Range Correction

Slant-range correction maps the incoming data samples to their actual *across-track* range from the sonar transducer, rather than their *slant rang*e. It assumes that the seabed is flat, and performs a geometric correction of the position of each incoming data sample, placing it at the correct across-track range from the transducer. This has the effect of 'stretching' the samples nearest the transducer (as there are fewer samples per unit distance across-track in this region), and 'compressing' the samples furthest from the transducer (as there are more samples per unit distance across-track in this region). This also has the effect of shifting the data samples to remove the water column.

For sidescan data, slant-range correction can be used to get a true range visualisation of the seafloor. It removes the water column from the image. This can be particularly useful for *mosaicing* sidescan imagery.

Processing→Slant Range Correction can be turned on or off by clicking on this menu item. The *on/off toggle* beside the option changes to green indicating that the processing has been switched on. Slant-range correction is only effective if a valid fish height is available. Fish height can be recorded with the data or can be recalculated during playback (see Section 5.5).

Note: The use of slant range correction cannot add information about the scene being surveyed, but modifies the data being displayed. The use of slant range correction is largely superseded by the provision in the DA System of measurement tools which give true across- and along-track dimensions. Slant range is usually turned on only in those situations where the DA System output is to be used by other devices which need slant range corrected imagery; for example, hardcopy output devices.

7.8 Processing Shallow Seismic Data

7.8.1 Frequency Filtering

Frequency *filtering* can be used to remove or preserve certain frequencies from within a specified range in a ping. Frequency filtering is primarily intended for the processing of sub-bottom (seismic) data, though it may be used for sidescan sonar data.

The **Time Varying Filtering** pop-up allows you to design a suite of filters with which to process data in both acquisition and playback. You can design up to four digital filters for each input channel and you can choose from one of five types of filter. For each filter you can specify the start and end positions between which the filter applies. The order of the filters remains the same throughout operation.

You can also specify whether the filter is fixed or continuously varying with time. When the filter is fixed, the same filter is applied to each data sample. When the filter is continuously time-varying, the cut-off frequency of the filter is modified at each data sample, giving a smooth varying filter.

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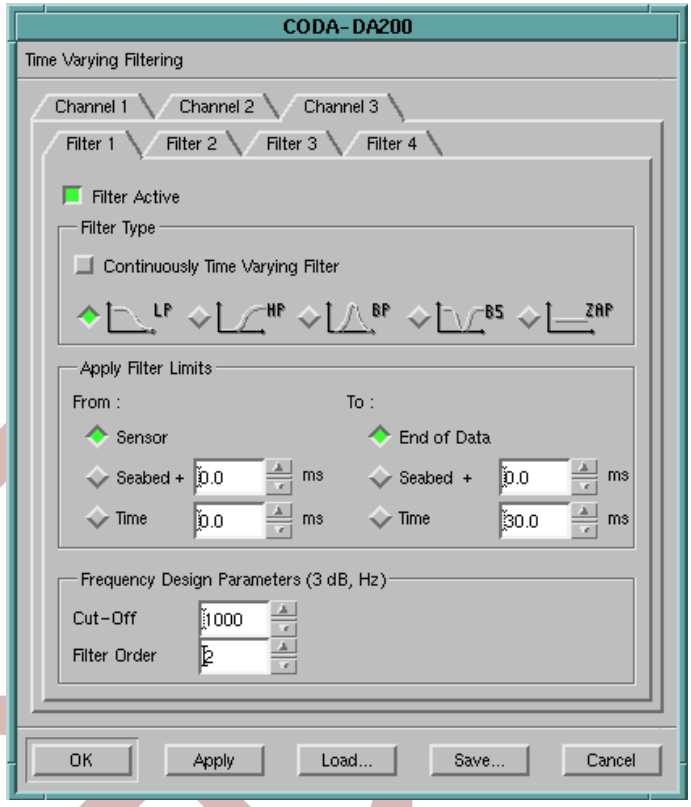

Figure 7-12 The Time Varying Filtering Pop-up Window

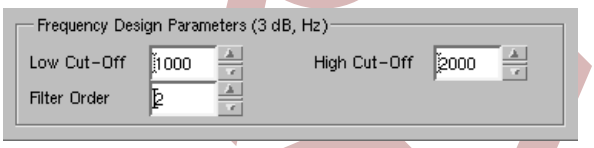

Figure 7-13 Frequency Design Parameters for Band Pass and Band Stop filters

The **Time Varying Filtering** pop-up shows two levels of tab forms and an action area. The first level of tab forms is used to select which input channel to apply the filter to; the second level to select an input channel's filter number. The filters are always applied in ascending order. You can choose from one of five filters: low pass (**LP**), high pass (**HP**), band pass (**BP**), band stop (**BS**) and **Zap**. To select one of the filters, click on its *one-of selection* button. This has the effect of changing the contents of the bottom frame in the pop-up, allowing you to enter the values for the filter's parameter set.

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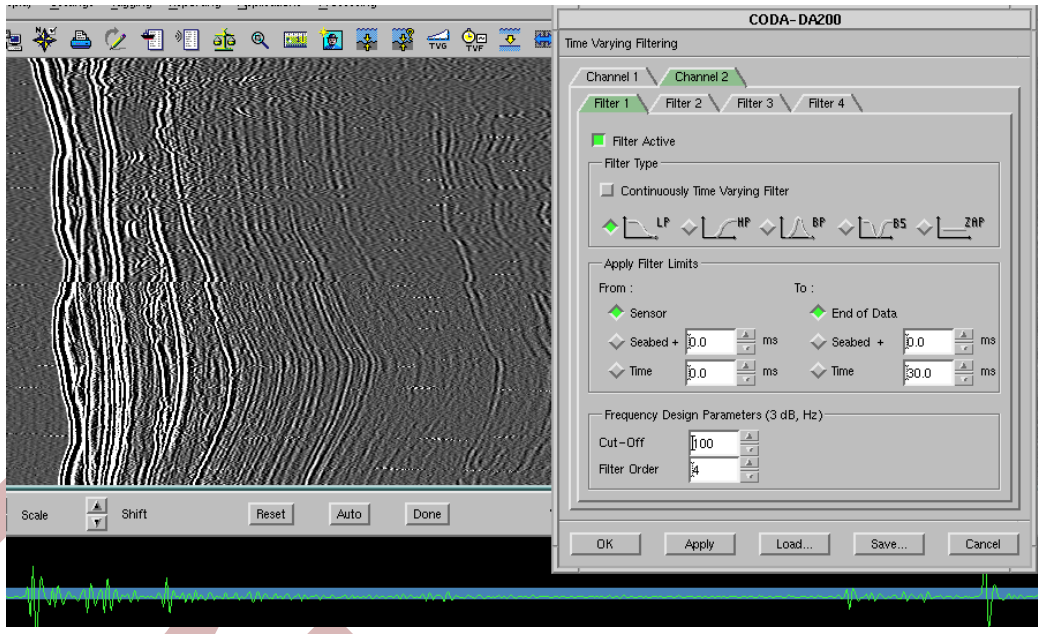

Figure 7-14 Low Pass Filtering

- **LP**: Low-pass filtering removes high frequency information from the data. You can specify both the cut-off frequency in Hertz and the order of the filter.

  The cut-off frequency defines the (3dB) point at which frequencies in the data start to become significantly attenuated. The cut-off frequency must always be less than half of the sample frequency of the input (the Nyquist frequency). If too high a cut-off frequency is selected, a warning message appears, giving the maximum frequency that can be used. The order of the filter governs the rate of attenuation of the filter after the cut-off frequency (that is, the roll-off rate). A higher order gives a steeper roll-off rate. The maximum allowable filter order is four.

  A low-pass filter can be continuously varying with time.

  Figure 7-14, this page shows the Data Display Area with the Low Pass Filtering pop-up window settings for the data displayed on the screen. The bottom half of the display shows data before low pass filtering was applied, while the top half of the display shows the data with the illustrated Low Pass Filtering settings applied.

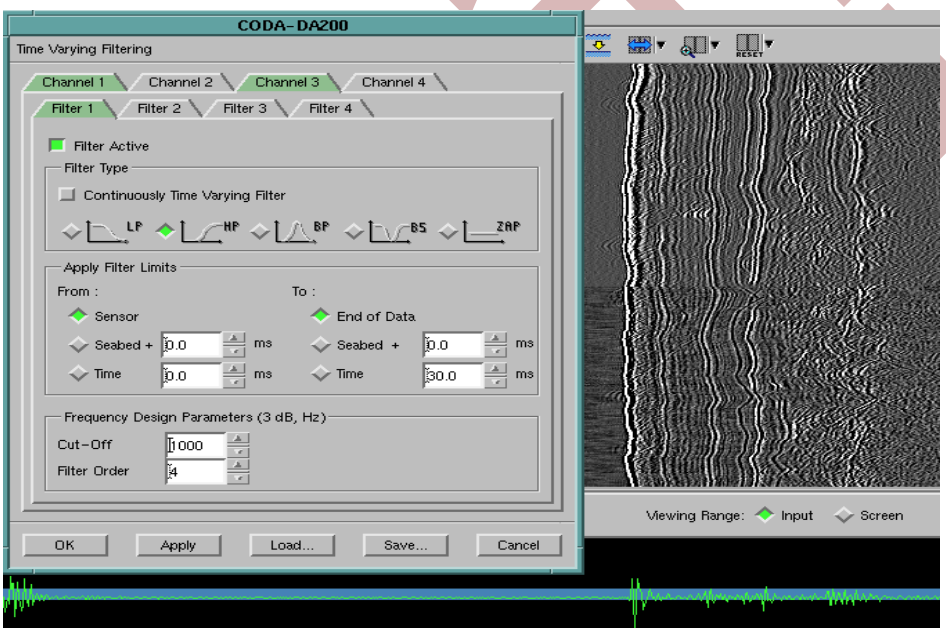

Figure 7-15 High Pass Filtering

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- **HP**: High-pass filtering removes low frequency information from the data. The high-pass filter is set up in much the same way as the low-pass filter with a cut-off frequency and filter order. Again, the cut-off must be less than the Nyquist frequency and the filter order must be between one and four inclusive.

  A high-pass filter can be continuously varying with time.

  Figure 7-15, page 114 shows the Data Display Area with the High Pass Filtering pop-up window settings for the data displayed on the screen. The bottom half of the display shows data before low pass filtering was applied, while the top half of the display shows the data with the illustrated High Pass Filtering settings applied.

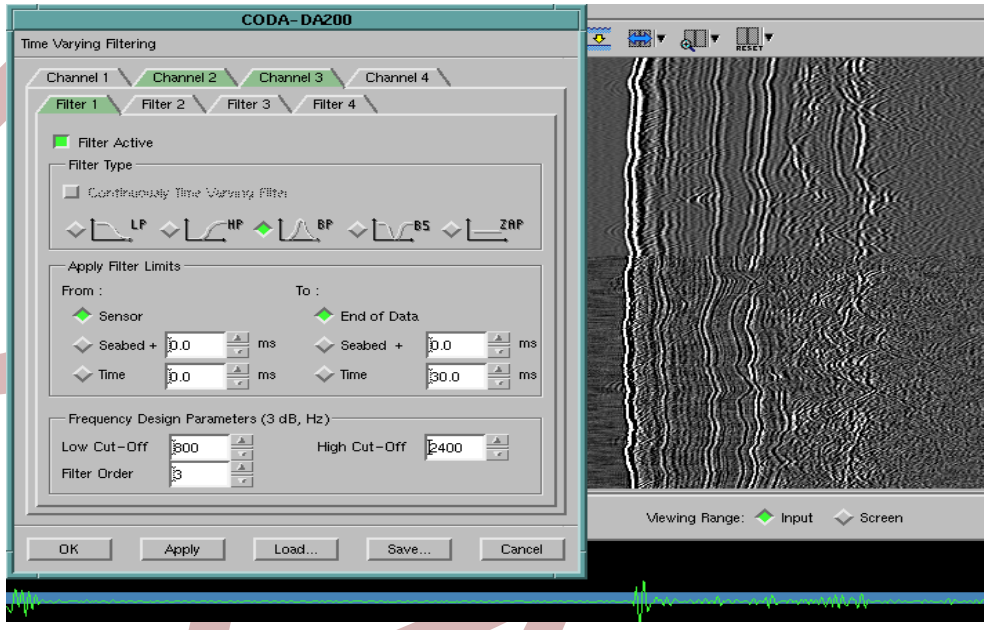

Figure 7-16 Band Pass Filtering

BP: Band-pass filtering attenuates frequencies below one frequency and above a second frequency. You can enter lower and upper cut-off frequencies in Hertz and specify the order of the filter.

The lower and upper cut-off frequencies define the (3dB) point at which frequencies in the data start to become significantly attenuated. The cut-off frequencies must always be less than half of the sample frequency of the input (the Nyquist frequency). The lower cut-off frequency must always be less than the upper cut-off frequency. The order of the filter governs the rate of attenuation of the filter after the lower cut-off frequency and prior to the upper cut-off frequency (that is, the roll-off rate). A higher order gives steeper roll-off rates. The maximum allowable filter order is four.

A band-pass filter CANNOT be continuously varying with time.

Figure 7-16, this page shows the Data Display Area with the Band Pass Filtering pop-up window settings for the data displayed on the screen. The bottom half of the display shows data before low pass filtering was applied, while the top half of the display shows the data with the illustrated Band Pass Filtering settings applied.

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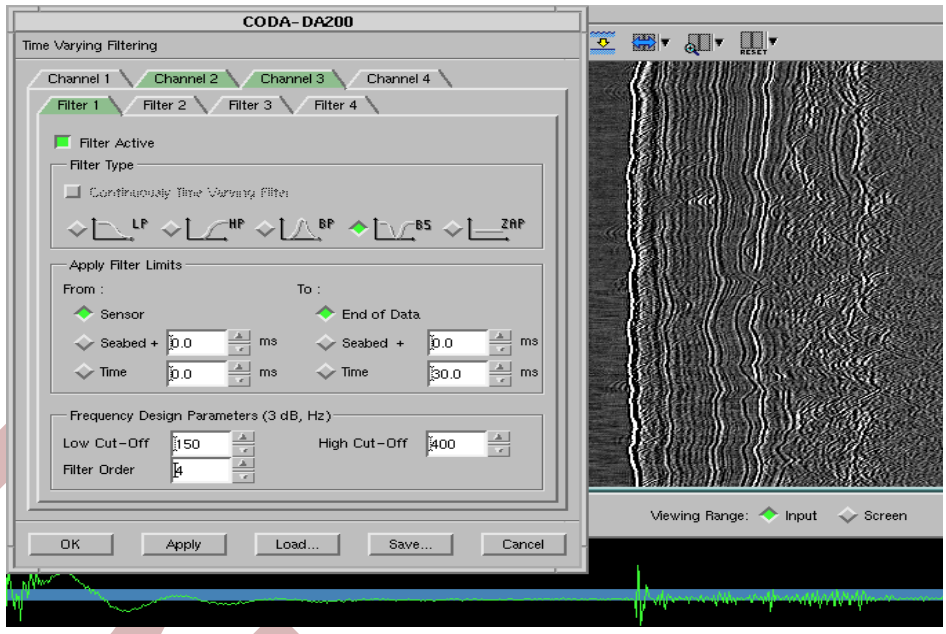

Figure 7-17 Band Stop Filtering

- **BS**: Band-stop filtering suppresses a range of frequencies in the data. The band-stop filter is set-up in much the same way as the band-pass filter, with two cut-off frequencies and a filter order. These cut-offs must be less than the Nyquist frequency and the order of the filter must be between one and four inclusive.

  A band-stop filter CANNOT be continuously varying with time.

  Figure 7-17, this page shows the Data Display Area with the Band Stop Filtering pop-up window settings for the data displayed on the screen. The bottom half of the display shows data before low pass filtering was applied, while the top half of the display shows the data with the illustrated Band Stop Filtering settings applied.

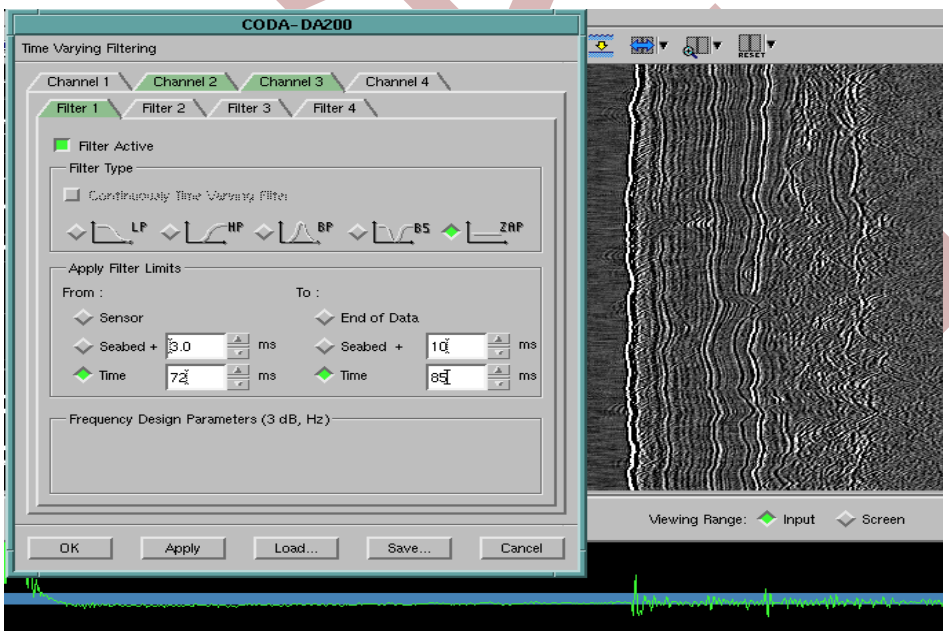

Figure 7-18 Band Zap Filtering

- **Zap**: Zap filtering suppresses all frequencies in the data, leaving the data between the start and end positions at the (DC) level of 0 volts. There are no parameters to enter. Typically this filter is used to remove noise in the water column.

Figure 7-18, page 116 shows the Data Display Area with the Band Zap Filtering pop-up window settings for the data displayed on the screen. The bottom half of the display shows data before low pass filtering was applied, while the top half of the display shows the data with the illustrated Band Zap Filtering settings applied.

In each filter tab, there is a **Filter Active** on/off toggle and three frames for setting up the type of filter, the range of samples over which the filter is to be applied, and the filter's parameters.

When you have selected the type of filter, you can select a range of samples over which the filter is to be applied and the filter's design parameters respectively.

To use frequency filtering:

1. Select **Processing→Time Varying Filtering** or click on the **Setup TVF Functionality** icon.
   The **Time Varying Filtering** pop-up appears.
2. Click on the input channel that you wish to apply the filter to.
3. Click on **Filter 1** tab.
4. Click on the **Filter Active** toggle.
   This sensitises the rest of the tab form.
5. If required, click on the **Continuously Time Varying Filter** button.
   This option is available only with low-pass filtering and high-pass filtering.
6. Select a type of filter: **LP, HP, BP, BS** or **ZAP**.
   The contents of the **Frequency Design Parameters (3dB,Hz)** box change according to the filter type selected.
7. Select which part of the ping you want the filter to apply to, for example from **Sensor** to **Seabed**.
   If seabed is selected, you must ensure that a valid bottom position is available to the system.
8. Specify cut-off frequencies and filter order for the filter type specified.
9. Repeat steps 3 to 8 for the number of filters you require for that channel.
   The maximum number of filters per channel is four.
10. Repeat steps 2 to 8 for every input channel.
11. Click on the **OK** or **Apply** button.
    The input channel tab and the filter tab turn green to indicate that a filter is active.

Alternatively, you can load previous settings, using the **Load** button. You can also save the current settings, using the **Save** button. The name of the current setup file is displayed at the top of the pop-up. If an asterisk appears beside the name it means that the settings have changed from those saved to disk.

Continuously Time Varying Filters: This option is available only for low-pass and high-pass filters. When this option is selected, you can enter start and end cut-off frequencies and the filter order. The order and the start cut-off frequency defines the filter at the first sample to be processed, whereas the filter for the last sample to be processed is defined by the filter order and the end cut-off frequency. Between these samples the filter is designed by linearly interpolating between the start and end cut-off frequencies.

Apply Filter Limits: This frame allows you to select the start and end points between which a digital filter is applied.

For the start sample, specify one from **Sensor**, **Seabed** or **Time**. If **Sensor** is selected, the filter is applied from the start of data onwards, whereas if **Seabed** is selected, the filter is only applied from the seabed onwards. You must ensure that a valid fish height value is available to the system (see Figure 5-21, page 68). Selecting **Time** allows you to apply the filter from a fixed time in the data. This time is specified via the text-entry box as a two-way travel time in milliseconds. Time selections always take account of any start delay in the input channel.

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For the end sample, specify one from the **Seabed**, **End of Data** or **Time**. The end sample must always be after the start sample. If **Seabed** is selected, the filter is applied only up until the estimated position of the seabed, whereas if **End of Data** is selected the filter is applied to all subsequent data samples. Choosing **Time** allows you to apply the filter up until a fixed time in the data. This time is specified via the text-entry box as a two-way travel time in milliseconds.

Note: A valid fish height must be available if **Seabed** is specified as one of the limits.

7.8.2 Swell Filtering

For seismic data, you can remove periodic noise from the data in the *along-track* direction by using the swell filtering option. This option is available in both acquisition and playback modes.

The **Processing→Swell Filter Setup** pop-up, which is accessed from the **Processing** menu, is similar in look and feel to the **Fish Height Settings** pop-up (see Section 7.8.2.1). The default setting is no value. The source of the swell filter can be set using: keep existing value; copy value from another channel; bottom flattening or swell filter (either automatic or manual). The **Bottom Flattening** option is the easiest option to use; however, it should only be used if you know that you have a bottom that is reasonably flat; otherwise, seabed features may be lost. The **Swell Filter** option has two methods: **Manual** and **Automatic**. Use the former method if you know the frequency range of the swell. Use the latter to detect the frequency of the swell and remove it. The action buttons at the bottom of the pop-up allow you to copy settings to all channels and to display swell filtered data, allowing you to see effect of the swell filtering.

To use swell filtering:

1. Select **Processing→Swell Filtering**.
   The **Swell Filter Setup** pop-up appears. The number of seismic channels available is indicated by the number of tab forms.
2. Select the source of the swell filter to be used. Choose one of the following options:
   - Select from **Keeping Existing Value (Playback only)**, **Copy Swell Value from Other Channel**, **Bottom Flattening** or **Swell Filter**. If you select **Swell Filter**, either click on the Manual **Setup** button and enter the cut-off parameters in seconds or Hertz and click on the **OK** or **Apply** button; or click on **Automatic Setup** and enter the minimum and maximum expected swell in seconds or Hertz. When the swell is measured in seconds, this is automatically recalculated to Hertz by the system. Also in the **Automatic Setup**, if you want the system to recalculate the swell frequency as the survey progresses, click on the appropriate toggle and input number of second between recalculations. If you want the system to display lost swell warning messages, click on the appropriate button.
   - Load settings from a previous file.
     The name of the current setup file is displayed at the top of the **Swell** Filter Setup pop-up.

   The settings from the current channel can be copied to other active channels by clicking on the Copy Settings to **All** Channels button.
3. Click on the **Display Swell Filtered Data** button and in the pop-up that appears select the channels to apply the swell filter to.
4. Click on the **OK** or **Apply** button.

7.8.2.1 Swell Filtered Output

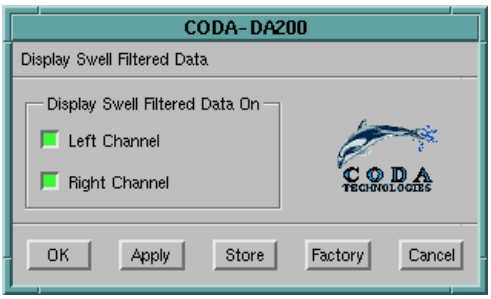

Figure 7-19 The Display Swell Filtered Data Window

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This menu item allows the **Swell Filtering** options of the **Processing** menu to be applied to the display of sub-bottom data (see Section 7.8.2.1). This option has no effect on sidescan data. Swell filtered data may be displayed in either *data channel* by clicking on the appropriate toggle. The *toggle* beside the selected channel label is green to indicate the selection. Alternatively, both channels display swell filtered data if both the **Left Channel** and the **Right Channel** toggles are selected. The pop-up action buttons include the option to **Store** the chosen selection for future use, or to use the **Factory** setting (see Section 3.3.9.)

The *swell filtering* option can be used to eliminate unwanted periodic noise from acquired seismic data in an along-track direction. The swell filter used is a configurable digital Butterworth band reject filter.

The **Swell Filter Setup** pop-up is accessed from the **Processing** menu; however, the pop-up can be accessed only if there is an active seismic channel. The pop-up is similar in look and feel to the **Fish Height Settings** pop-up.

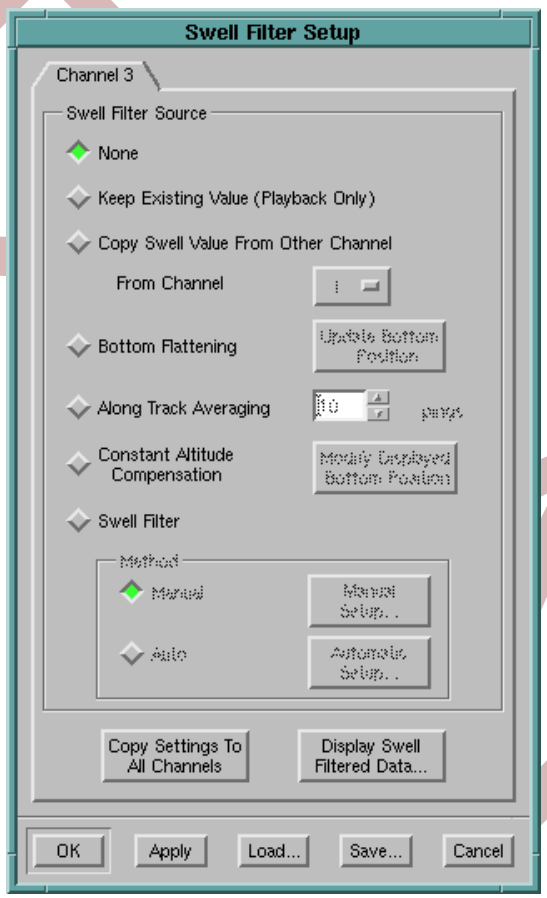

Figure 7-20 Swell Filtering Setup Window

The **Channel** tab forms are used to select which data channel or channels to apply the swell filter settings to.

None is the default setting, and no swell filtering is performed.

The **Keep Existing Value** option can be selected only in playback mode and causes the previously recorded swell filtering to be used. If, however, swell filtering was not used in recording mode, then no swell filtering will take place.

Copy Swell Value From Other Channel allows the swell filter value to be copied from another channel, using the option selection button.

Selecting the **Bottom Flattening** causes the system to assume that the seabed is completely flat. It averages the bottom position over a number of pings and then shifts each line to re-align the bottom position to this average value. You can recalculate this average bottom position by clicking on the **Average Bottom Position** button. This option should be used with care: it assumes that the seabed is flat, and so valid seabed features may be lost when this option is applied.

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Swell Filter has two options: **Manual** and **Automatic**.

Clicking on the **Manual Setup** button produces the **Manual Swell Filter Setup** pop-up (see Figure 7-21, page 120). Two parameters can be modified in this pop-up: Low Cut-Off and High Cut-Off. These specify the 3dB band edges of the band reject swell filter. The values can be specified in Hz or in seconds. Entering a value in seconds in the text-entry box and then applying the change will recalculate the value to Hz.

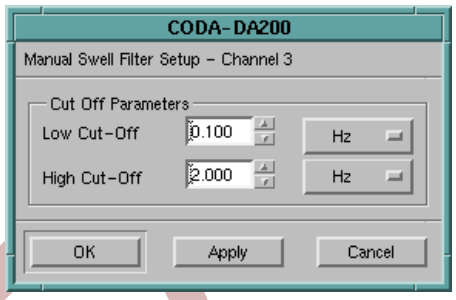

Figure 7-21 Manual Swell Filter Setup

Clicking on the **Automatic Setup** button pops up the **Automatic Swell Filter Setup** pop-up (see Figure 7-22, page 120).

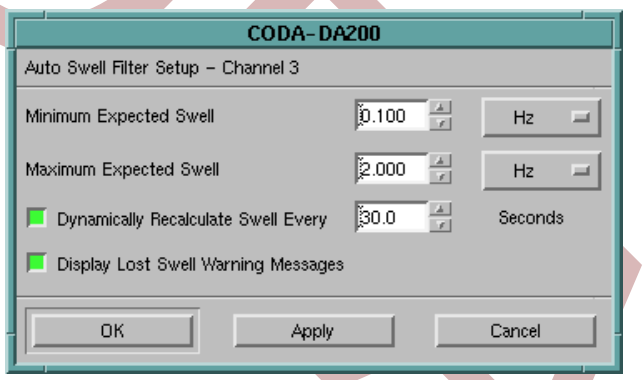

Figure 7-22 Auto Swell Filter Setup Window

The setup options are:

- **Minimum Expected Swell** and **Maximum Expected Swell**: these fields define the search window over which the system will try and detect a swell frequency. The values can be specified in Hz or in seconds
- **Dynamically Recalculate Swell Every**: clicking on this toggle causes the system to try and determine the swell frequency every *n* seconds. If the toggle is disabled, the system calculates the swell frequency when the swell filter is first applied and continues to apply this filter until the filter is disabled.

  We recommend enabling this toggle with the recalculation taking place every 30 seconds.
- **Display Lost Swell Warning Messages**: this toggle allows you to specify whether or not to display lost swell warning messages. These occur if the system cannot determine a swell frequency within the search window.

  We recommend that this toggle is enabled.

Clicking on the **Copy Settings To All Channels** in the **Swell Filter Setup** pop-up copies the settings from the current channel to all other active channels.

Clicking on the **Display Swell Filtered Data** button causes the **Display Swell Filtered Data** pop-up to appear. Swell filtered data can be displayed in either data channel by clicking on the appropriate toggle. The swell filtered data can be compared to the original unfiltered data.

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The action buttons at the bottom of the pop-up include the option to **Load** previous settings or to **Save** current settings so that they can be used in future. The name of the current setup file is displayed at the top of the pop-up. If an asterisk appears beside the name it means that the settings have changed from those saved to disk.

7.8.3 Changing Sub-bottom Velocity

The **Settings→Sub Bottom Parameters** Popup is used to change the sound velocity for measurement in sub-bottom data. When using a *sub-bottom profiler*, it is important to have an accurate prediction of the speed of sound in the seabed medium; otherwise, on-screen distance measurements will be in error. You can change the default value – 1600m/s – using the **Settings** menu.

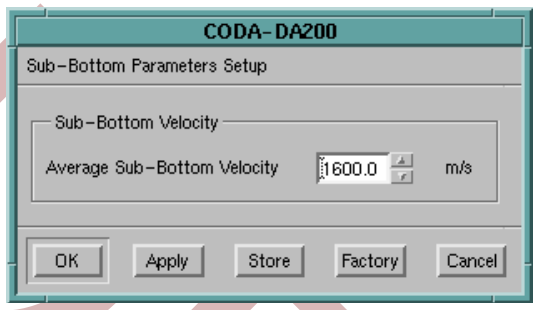

Figure 7-23 The Sub-Bottom Sound Velocity Pop-up Window

Note: In calculations, this velocity is used throughout the ping, including the water column.

7.8.4 Trace Mixing and Anti Mixing

Trace mixing of shallow seismic data either enhances or removes features with a strong *along-track* trend by averaging the raw data in neighbouring pings. It has two modes: mixing mode (also known as stacking) which enhances features which persist between neighbouring pings; and anti-mixing mode (also known as anti-stacking) which removes features such as noise. You can control the extent of mixing or anti-mixing

The *trace mixing* option mixes the signal amplitudes from neighbouring pings of data; that is, trace mixing (also known as *stacking*) performs *along-track* smoothing. Choosing this option from the **Processing** menu produces a pop-up which can be used to define the trace mixing mode, the trace mix fold, and the trace mix run off. **Mixing** mode can be used to enhance information that persists in the along-track direction. **Anti-Mixing** mode in contrast can be used to suppress noise that persists in the along-track direction.

To use trace mixing:

1. Select **Processing→Trace Mixing**.
   The **Trace Mixing** pop-up appears.
2. In the appropriate **Channel** tab, click on a *one-of selection* switch to choose the mixing mode: **Mixing** or **Anti-Mixing**.
3. Do one of the following:
   - If using the mixing mode, use the arrow buttons to input a **Trace Mix Fold** value and a **Trace Mix Run-Off** value, or type the value in the text-entry box.
   - Load previously saved settings.
4. Click on the **OK** or **Apply** button.

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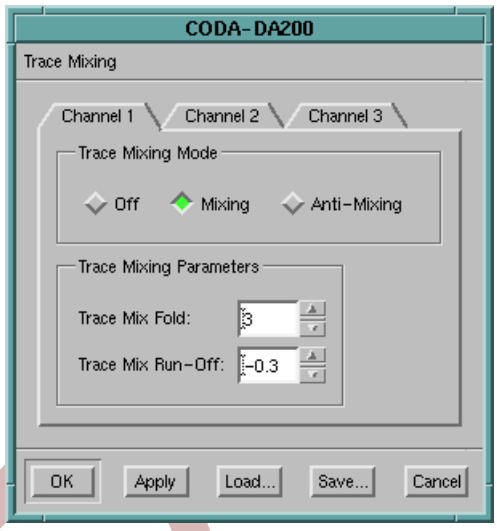

Figure 7-24 The Trace Mixing Pop-up Window

In trace mixing, an input signal value is replaced by the sum of weighted values of itself and the corresponding signal values in the neighbouring traces. In mixing mode, the sum of these weighting coefficients is defined to be one, whereas in anti-mixing mode this sum is defined to be zero.

The number of traces that are combined is defined by the trace mix fold. Equal numbers of traces are used from either side of the input trace, hence a fold of three uses the input trace and those traces immediately before and after it. With mixing mode and fold set, the weighting coefficients are determined by the trace mix run-off. This value is defined as the absolute difference in value between two neighbouring coefficients. Hence for a fold of 3 and a run-off of 0.25, the weighting coefficients are 0.5 and 0.25 respectively.

The **Channel** tab forms can be used to set the parameters for each channel. The action buttons at the bottom of the pop-up can be used to **Load** previous settings or the **Save** current settings.

This processing is only applied to the displayed data. The data being recorded or replayed is not affected by trace mixing.

7.8.5 Seismic TVG

TVG can be used for seismic data to amplify the return of a signal with depth. The sub-bottom will tend to attenuate the signal much more than the water column, so it may be necessary to use a higher maximum gain setting than you would normally use for sidescan data.

The geophysicist is normally only interested in sub-bottom features, so the **Apply TVG from Seabed** option is a useful feature to avoid having to amplify noise in the water column.

Depending on the quality of your data, it may not be appropriate to use the **Auto TVG** function. Strong multiples or horizons can result in an **Auto TVG** function that can make the image appear banded. It is best to experiment, and if the results are not as expected set a manual TVG curve.

7.8.6 Colour Maps

In addition to the various continuous tone colour maps provided through the **Image Enhancement** pop-up, there are several colour maps that are specifically targeted to seismic and Ground Penetrating Rada (GPR) processing.

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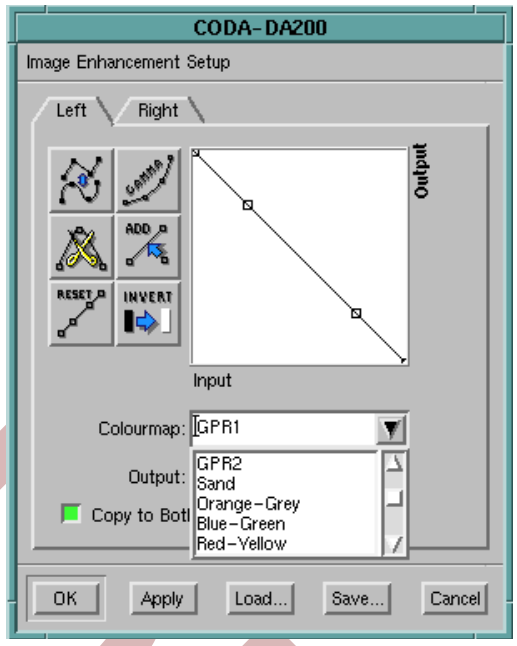

Figure 7-25 The Image Enhancement Pop-up

These colour maps are quantised so that they highlight various sub-bottom reflectors and enable you to quickly distinguish and characterise features in the sub-bottom layers by simply looking at the colour of the feature.

We have developed these colour maps in consultation with our customers so the data is shown in a standardised way through a whole suite of seismic processing tools. If you have a requirement for a particular colour map that is not currently available, please contact Coda Technologies and we will try to include it in a future release of the software.

7.8.7 Swell Filter Hints

There must be an accurate **Fish Height Value** available to the system for swell filter to be effective (see Section 5.5).

Try to set up an automatic swell filter with minimum and maximum frequencies that are appropriate to the swell experienced (swell period can range from 0.5 to 30 seconds period). The maximum swell that can be filtered is a function of the along-track ping frequency. If the value entered is greater than the along-track nyquist frequency, a warning will appear in the display.

There must be sufficient periodic swell in the search range for the system to detect a swell frequency. If there is not, the system will report that it cannot detect a swell frequency within the given range.

If **Automatic Swell Filter** fails, try to specify a manual filter around the swell frequency. For example, a **Low Cut-Off** of 0.1 Hz and a **High Cut-Off** of 1.0 Hz will attempt to filter out frequencies in this range (1 second to 10 seconds period).

For deep water seismic operation it may not be feasible to use a frequency based approach as the effective nyquist frequency in the along-track direction will be very low. In this case, the **Along Track Averaging** function may be more appropriate. This function will smooth the data in the along-track direction, effectively performing a crude low pass filter.

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8 General Display Tools

8.1 Displaying Event marks, Scale Lines and Fix Marks

The DA System has an *overlay plane*, which displays a set of coloured screen markings that indicate *tag* marks and *fixes*; these markings are displayed over the sonar image, without affecting the displayed data. You can toggle the display on or off. For details on tagging, see Section 13.

To display tags:

1. Select the **Display** menu.
2. Click on the **Overlay Data** *toggle* to turn on the overlay plane. The toggle turns green. Clicking on the toggle again turns off the overlay plane and the toggle turns grey again.

8.1.1 Displaying Fix Information

When the overlay plane is on (see Section 8.1), the DA System displays the **Fix Number** and an Easting and Northing pair (**E,N**) on the *fix* lines. The Fix Number is not currently affected by corrected nav files. You can select other data items to appear on the fix lines, using the **Fix Data** pop-up. The other data items are: **Date**, **Time**, **Kp**, **Speed**, **Heading**, **Fish Height**, **Line Name**, **Survey Description** and, for Pipeline Inspection software **Pipe Offset** and **Striking Angle**.

You can also choose whether to display every fix line or only some fix lines. If you select **Display some fixes**, you can specify in the text-entry box how many fixes to display, from 1 in 2 fixes to 1 in 100 fixes.

To set the fix data information to display:

1. If you have not done so already, turn on the **Display→Overlay Data** toggle.
2. Select **Settings→Fix Data**.
   The **Fix Data Setup** pop-up appears.
3. In the **Fix Data To include** frame, click on the items that you wish to display on the fix lines.
4. In the **Fix Display Frequency** frame, click on **Display every fix** or click on **Display some fixes** and specify the number you wish to display.
5. Click on the **OK** or **Apply** button.

8.2 Overlay Data

This menu item toggles **On** and **Off** the display of overlay data in the display area. By default, **Overlay Data** is switched on; however, by switching the *overlay plane* off, data can be recorded or played back without displaying tags or fix lines. This item does not affect the storing of tags; that is, if overlay data is **Off** and a tag is marked using the right mouse button, the tag is not be drawn to the screen but is saved to the database.

8.3 Scale Lines

Scale lines are displayed as vertical red lines on the data, representing either distance or time. These provide a visual guide to the travel time (either one-way or two-way travel time) or distance (either true range or *slant range*) as the *survey data* is displayed. When the scale lines are displaying distance, this is either true range or slant range, depending on the toggle selected. If **True Range** is selected, a valid **Fish Height** value must be available to the system (see Section 5.5). Scale lines can be displayed over sidescan data or sub-bottom data.

Note: Scale lines are not recorded with the data, they are only visible in the DA System waterfall display or on hardcopy output.

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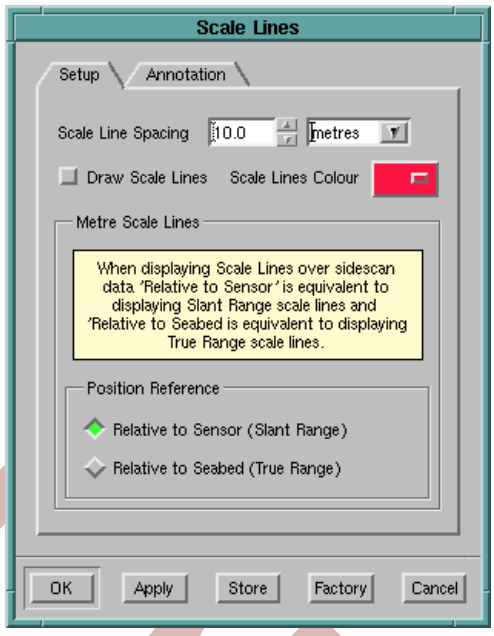

Figure 8-1 The Scale Lines Settings Window: Setup using distance (metres)

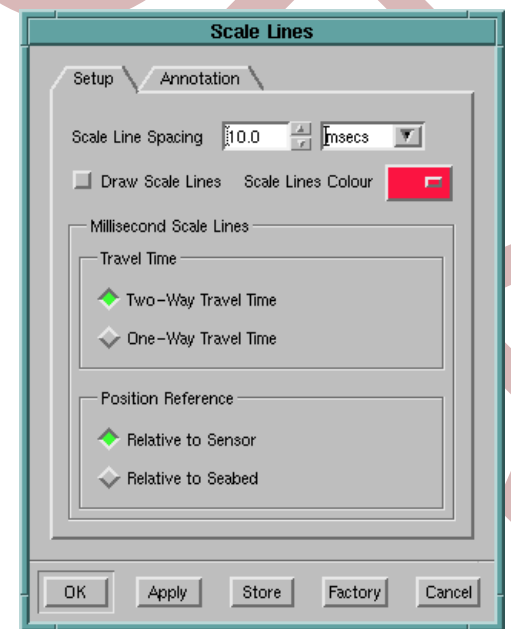

Figure 8-2 The Scale Lines Settings Window: Setup using time (msecs)

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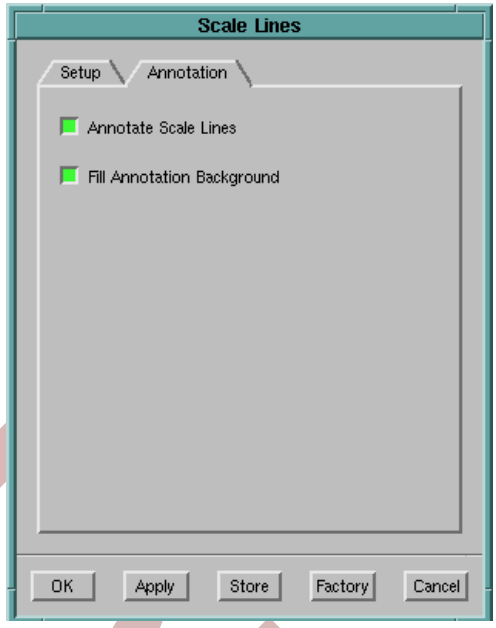

Figure 8-3 The Scale Lines Settings Window: Annotation

This pop-up window allows the scale lines options to be set.

- **Draw Scale Lines**: This button is used to toggle on or off the display of scale lines on the data display.
- **Scale Line Spacing**: This field is used to set the space between scale lines in either **metres** or **milliseconds**. By using the scale lines spacing option button, an accuracy of 0.1 metres or milliseconds may be defined.
- **Annotate Scale Lines**: This option allows automatic scale line annotation to be **On** or **Off**. When annotation is **On**, the appropriate distance or time label appears beside each scale line on the display.
- **Position Reference**: The type of scale lines to display is selected using the *one-of* selectors in this option box. The **Relative to Sensor** option displays scale lines at Slant Range Distance. The **Relative to Seabed** option displays scale lines at True Range Distance.

  Note: When displaying metres scale lines over sub-bottom data, only true distances are used. This is the case even if the **Slant Range Distances** option is selected, as slant range is equal to true range in this case.

- **Travel Time**: These options are only available when displaying **millisecond** scale lines and relate to the travel time for each ping of data. The type of millisecond scale lines to display are selected using the one-of selectors in this option box. A setting of **Two-Way Travel Time** displays millisecond scale lines at two-way travel time intervals, while a setting of **One-Way Travel Time** displays millisecond scale lines at one-way travel time intervals.

Note: For sub-bottom data the sub-bottom sound velocity is used to calculate the position of the scale lines (see Section 7.8.3).

8.4 Displaying Fix Information

When the overlay plane is on (see Section 8.1), theDA System displays the **Fix Number** and an Easting and Northing pair (**E,N**) on the *fix* lines. The Fix Number is not currently affected by corrected nav files. You can select other data items to appear on the fix lines, using the **Fix Data** pop-up. The other data items are: **Date**, **Time**, **Kp**, **Speed**, **Heading**, **Fish Height**, **Line Name**, **Survey Description** and, for Pipeline Inspection software **Pipe Offset** and **Striking Angle**.

You can also choose whether to display every fix line or only some fix lines. If you select **Display some fixes**, you can specify in the text-entry box how many fixes to display, from 1 in 2 fixes to 1 in 100 fixes. Ensure **Display→Overlay Data** is switched on.

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8.4.1 Fix Data Setup

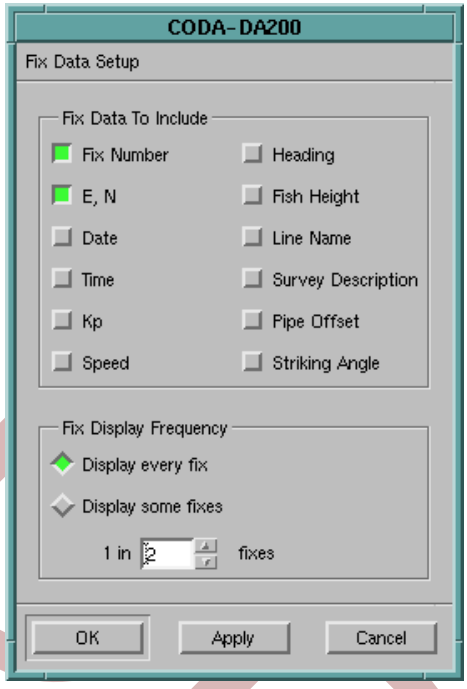

Figure 8-4 The Fix Data Setup Pop-up Window

In addition, the **Fix Display Frequency** options can be used to choose between **Display every fix** (the default), where every fix line is displayed to the screen; and **Display some fixes**, where a selected number of fixes only are displayed, varying between 1 in 2 fixes and 1 in 100 fixes according to the selection in the text-entry box.

8.5 Zooming on Screen Features

key shortcut: <Control-z>

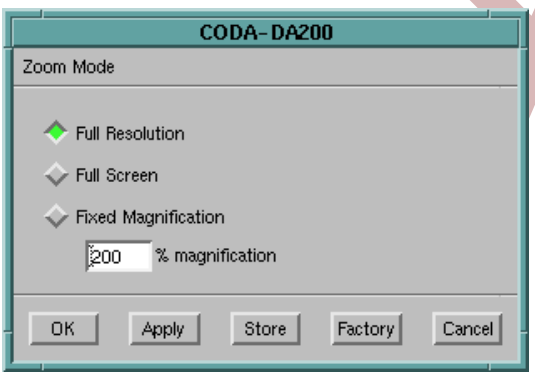

Figure 8-5 The Zoom Mode Pop-up Window

The **Zoom** function selects a rectangular area of the DA System display to be viewed under magnification. Using the key short-cut <Control-z> or selecting this menu item causes the zoom pointer to appear in the Data Display Area. The pointer can then be moved to the position of either the top left or bottom right corner of the area to be magnified. Pressing and dragging with the left mouse button defines the zoom area. Releasing the mouse button causes the zoom pop-up window to appear. It remains on the screen until dismissed by pressing the **Done** button.

The **Processing→Zoom** function magnifies a selected area of the display and, by default, displays the data at *full resolution* in the zoom pop-up. You can change the setting to zoom to full screen or zoom to fixed magnification, in the **Zoom Mode** pop-up. The selected mode is applied when you select an area to be magnified.

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An area of interest in the display data can be viewed at greater resolutions using the **Processing→Zoom** menu item. Section 8.5 contains details of how to zoom in on regions of the display area.

Full Resolution mode displays the true resolution of the data (without *sub-sampling*). This is useful for spotting small features in sidescan or sub-bottom data; however, the zoomed image may appear distorted compared to the screen display, for if the screen display is sub-sampled, the zoomed image appears stretched in the across-track dimension. (This is because no sub-sampling is carried out in the along-track dimension by the DA System). **Full Screen** mode enlarges the selected area to the size of the display area. If the area of zoom is small, however, the individual *pixels* in the zoomed image tend to be more prominent than the magnified feature. **Fixed Magnification** mode combines the least distortion of the image (compared to the screen display) with an acceptable magnification. This magnifies the selected area of the screen by a set factor; usually a setting of 200–400% of the original image size will be found to be satisfactory.

Additional points to remember:

- Zoom to full resolution only has an effect if the display is not already showing the full resolution data. To display the full resolution of an area of the *swathe* continuously, adjust the **Left** or **Right Display Channel** setups in the **Settings** menu (see Section 7.4).
- The fixed magnification and full screen zooms use the full resolution data, not the display data, as the source for the zoomed image. This gives the highest quality zoomed images.

The selected setting is then applied when **Zoom** is selected from the **Processing** menu, or when the keyboard short-cut <Control-z> is used.

8.6 Making On-screen Measurements

key shortcut: <Control-s>

The DA System can measure the on-screen distance between two points and the height of an on-screen feature using the **Processing→Measure** option. When you select *measuring mode* and mark the distance to be measured, the DA System will calculate the distance or height, using the measurement method selected.

The *Data Display Area* can be used for measuring distances and heights. *Measuring mode* is started by selecting **Measure** from the **Processing** menu, or by using the keyboard short-cut <Control-s>. The ARROW pointer changes to the CROSSHAIR pointer to indicate measuring mode. To measure the distance between two points on the screen, *press and drag* the left mouse button from the starting point to the end point. A blue line is drawn, representing the distance being measured. When the mouse button is released a pop-up window appears displaying the distance measured (see Figure 8-7, page 131).

8.6.1 Measurement Method

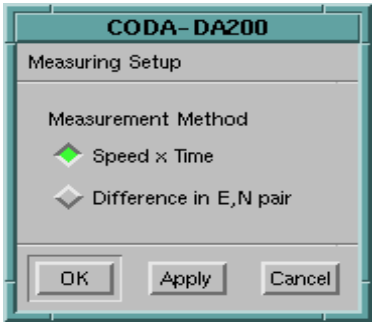

Figure 8-6 The Measurement Method Pop-up Window

The DA System allows the on-screen measurement of features. Distances can be calculated using one of two methods: **Speed x Time** or **Difference in E,N pair**. The default setting is Speed x **Time** calculated using the relative time between pings and the ship's speed. When this method is used, the start point is calculated from its geographical ping position; then, using time, ship speed and speed of sound, the along-track and across-track distances are calculated and used to

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determine the measurement distance. When **Measurement Method** in the **Settings** menu is set to **Difference in E, N pair**, both start and end points are calculated from their geographical ping positions and ping heading, using *corrected navigation data* if necessary. The measurement distance is then calculated from the difference in the Easting and Northing pairs.

The **Speed x Time** method tends to give more accurate results over short distances; raw navigation data is typically updated only every second and instantaneous headings can change considerably. This method, however, should only be used if you have an accurate speed over ground supplied through the *navigation string*. The **Difference is E/N pair** method should be used for long measurements or when corrected navigation data is available.

If the screen is scrolling when the measurement is performed, the measuring start point scrolls with the data. This allows measurements to be made of features that are larger than the screen height.

There are a few other points to bear in mind when making on-screen measurements:

- For sidescan data (labelled **SS Port** and **SS Stbd** in the **Description** field of the **Open Acquisition** menu), the height is also displayed in this pop-up. The height reading is valid only if a shadow has been measured. This height corresponds to the height of an *event* that would cast a shadow corresponding to the across-track distance measured on the screen.
- If the display is paused, the blue measuring line remains on screen until the measurement pop-up is dismissed.
- An accurate *fish height* is essential for on-screen measurement (see Section 5.5).
- In acquisition mode, the start and end positions of the measurement line are calculated using raw *navigation data*, including towfish heading and velocity; so the measurements are dependent on the quality of the navigation data.
- In *playback mode*, *corrected navigation data* is only used in the calculation if the **Nav Data Type** in the **Settings** menu is set to **Corrected**.
- The *along-track* dimension of a measurement is based on either an estimate of the towfish velocity and heading or the difference between the start and end positions (derived from incoming navigation data).
- If lat/long co-ordinates are being used by the DA System as part of the *nav string*, measurements of start and end positions are performed by converting the ping lat/long values to *UTM* (that is, Easting, Northing) values, and then calculating the start and end positions from these. Where necessary, the start and end positions are converted back to lat/long for display.
- True cross-track distances are calculated whether slant-range correction is on or not (see Section 7.7.2.1).
- To make measurements in the zoom window, the data in the zoom window must still be visible in the *Data Display Area*.

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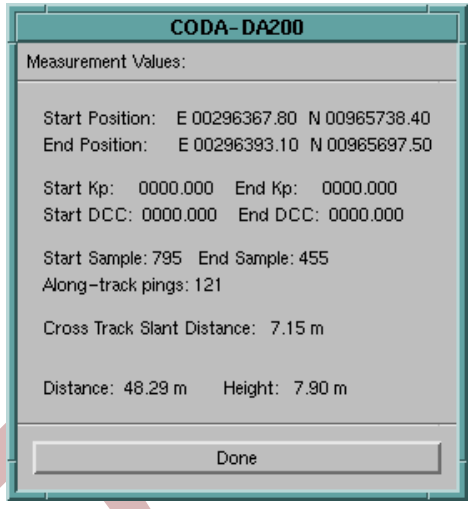

Figure 8-7 On-screen Distance Measurement

The **Measurement Values** pop-up, which appears automatically, displays the start and end Eastings and Northings of the line, start and end *Kp* and *DCC* of the line, start and end sample numbers, *across-track* pings, *cross-track slant distance*, and line length (distance) and height in metres. (If a measurement is made in sub-bottom data the cross-track distance and the height are not reported, as they have no meaning.)

8.7 Raw A-Scan

This area can also display an A-scan trace of the sample data when the **Raw A-Scan** toggle on the **Display** menu is on. Any adjustments to the main *waterfall display* are reflected in the A-scan trace; for example, switching to *single channel mode* causes the **Raw A-Scan** window to display only one channel across the full screen width.

Selecting the **Raw A-Scan** menu item produces a pop-up window that displays an oscilloscope or waveform trace of each line as it is displayed to the screen (see Figure 8-8, this page). The oscilloscope trace is for the top line of data in the Data Display Area. The trace is only updated when a new line of data is displayed to the screen; therefore the DA System must be scrolling data before the trace becomes visible.

Note: The presence of the **Raw A-Scan** pop-up can slow the rate of scrolling in playback.

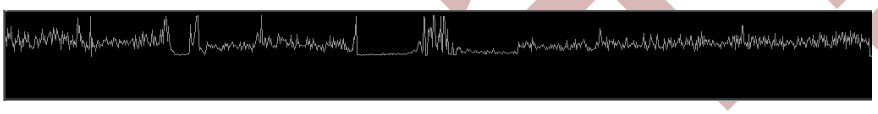

Figure 8-8 The Raw A-Scan Oscilloscope Trace

The **Raw A-Scan** pop-up shows the current position of the bottom tracking line as an orange vertical line.

8.8 Displaying Survey Data

Display→Survey Data, or *clicking* on the Display Data for the Survey icon, pops up a window displaying various survey data parameters as shown in Figure 8-9, page 132. The parameters are continuously updated as new sonar pings are displayed to the screen. The information displayed in the **Survey Data** pop-up corresponds to the last sonar ping drawn to the top of the display, and for the channel being displayed in the left display channel (usually the Port channel for sidescan sonar data). The DA System should be scrolling data, otherwise no data will appear in the **Survey Data** popup.

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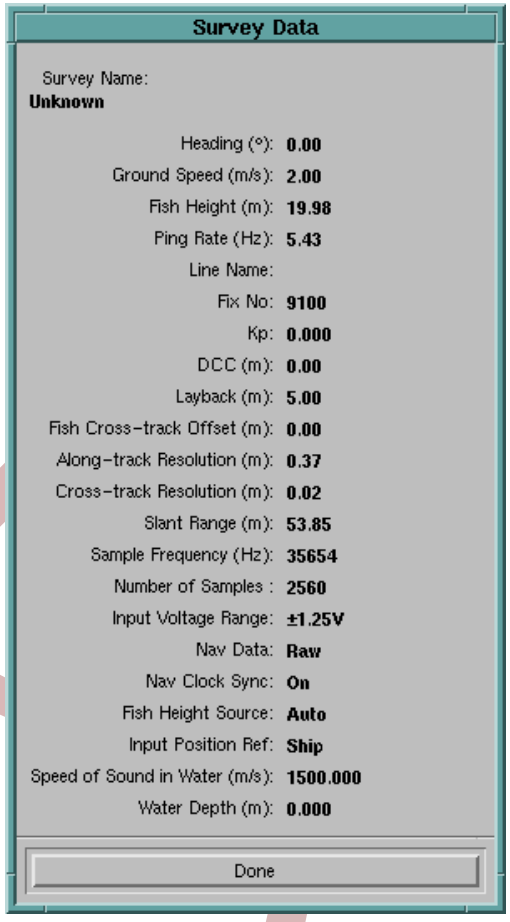

Figure 8-9 The Survey Data Parameters Pop-up Window

- **Heading**: directional information obtained from the nav input (see Section 5.4.4).
- **Ground Speed**: obtained from the nav input (see Section 5.4.4).
- **Fish Height**: the height of the towfish from the seabed. This may either be obtained automatically from the nav input or be entered manually (see Section 5.5).
- **Ping Rate**: the rate at which the data was acquired (this may differ from the playback rate).
- **Line Name**: a user-defined label marking specific parts of the survey (see Section 6.6.4).
- **Fix No**: a reference obtained from the nav input (see Section 5.4.4).
- **Kp**: the **K**ilometre **p**ost chainage value obtained from the navigation interface which can be used in place of time as a basis for searches through the data.
- **DCC** (**D**istance **C**ross **C**ourse): the across-track distance of the fish from the survey centre line in metres. This can be entered manually or taken from the RS232 nav input (Section 6.6.4).
- **Layback**: the along-track distance in metres from the ship position to the fish position, which can be entered manually or taken from the RS232 nav input (see Section 6.6.4).
- **Fish Cross-Track Offset**: the across-track distance from the ship position to the fish position. A positive offset indicates an offset to the right (starboard), and a negative offset indicates the offset is to the left (port). This may be input manually or taken from the RS232 nav input (see Section 6.6.4).
- **Along-track Resolution**: the distance between pings in the along-track direction.
- **Cross-track Resolution**: the distance between samples in the across-track direction.
- **Slant Range**: the maximum slant range from the sonar transducer (see Section 7.7.2.1).
- **Sample Frequency**: the rate (in Hz) at which data samples are taken. This is defined while setting up the acquisition parameters.
- **Number of Samples**: the total number of samples that have been acquired for this ping. This is defined while setting up the acquisition parameters (see Section 5.2).
- **Input Voltage Range**: the voltage setting defined in the acquisition parameters.
- **Nav Data**: whether raw or corrected navigation data is being used (see Section 5.4.4). This is

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only relevant in playback mode.

- **Nav Clock Sync**: whether the DA System clock is synchronised with the RS232 nav input clock (see Section 5.4.4).
- **Fish Height Source**: whether it has been manually entered (**Fixed**), or it has come from the nav data (**Auto**) or from **Telemetry** (see Section 5.5).
- **Input Position Ref**: whether **Fish** or **Ship** is being used (see Section 5.4.4).
- **Speed of Sound in Water**: either the speed of sound entered by the RS232 nav string or the default value of 1500m/s.
- **Water Depth**: the depth of water, obtained from the nav string.

You can keep the pop-up open, so that you can monitor changes in the parameters as data scrolls down the screen. To prevent the pop-up from obscuring part of the **Data Display Area**, you can move it about the screen. To do this, *press and drag* on the title bar.

8.9 Ping Data

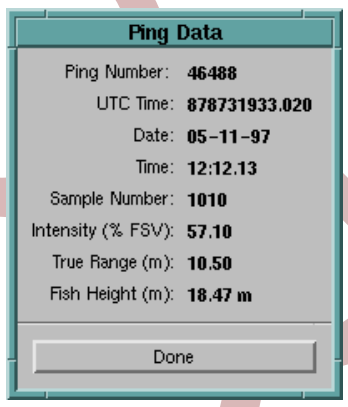

Figure 8-10 The Ping Data Pop-up Window

This pop-up gives you information about the data under the current pointer position. Moving the pointer around the Data Display Area will cause the pop-up to be updated in real time. The values displayed are the current **Ping Number**, the **Time** of the ping in UTC and date/time format, the **Sample Number** within the ping and the **Intensity**, expressed as a percentage of the full-scale value (FSV) of the analogue input, in addition to **True Range** and **Fish Height**, both in metres.

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8.10 Nav Data QC

Figure 8-11 The Nav Parameters QC Pop-up Window

This option can be selected when testing the navigation input with a new RS-232 navigation string, or when checking that navigation equipment is delivering a correctly formatted navigation string (see Section 5.4.2).

8.11 General Information Area

Figure 8-12 The General Information Area

The General Information Area (see Figure 8-12, this page) lies near the bottom left of the display screen. It provides the following information:

- **pings/s**: the rate (in pings per second) at which the display lines scroll down the screen. In acquisition mode, the rate is determined by the **Open Acquisition→Triggers→Trigger Period** settings (see Section 5.2)
- **ping no.**: the number of the ping being displayed in the top line of the Data Display Area. It is continuously updated while data is scrolling. The ping number is assigned to the data during acquisition and is reset to zero only when the system is restarted. This means that consecutive tapes or optical disks used during data acquisition have sequential ping numbers.
- **date/time**: the date and time at which the data was recorded. (The date is displayed as dd-mm-yy.) During acquisition, if **Navigation Input→Sync with Nav Time** has been set the date

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and time displayed are those supplied by the RS232 navigation data; otherwise the current date and time on the DA System are displayed. If the system is not able to synchronise with the external navigation clock, the time label changes colour from cyan to red.

- **fish height**: the height the towfish is from the seabed.
- **cursor (pointer)**: the position directly under the cursor on the screen, expressed as Eastings, Northings and Kp. The position is fully geo-corrected and is calculated using the navigation data stored with each ping. If the fish height is known, the position is automatically slant-range corrected. Similarly, if corrected navigation data is available, this can also be used to provide a further stage of correction.

8.12 Application Specific Area

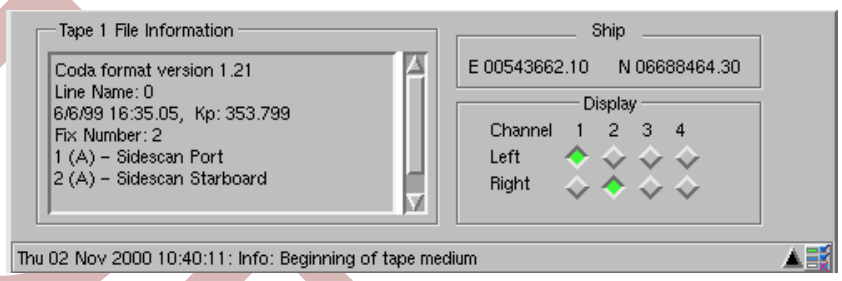

Figure 8-13 Application Specific Area in Acquisition Mode

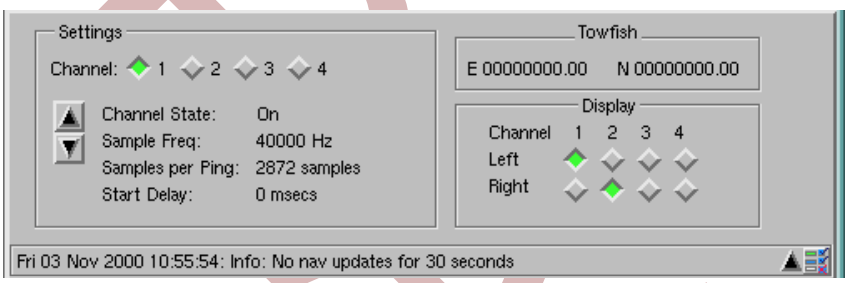

Figure 8-14 Application Specific Area in Playback Mode

In playback mode, the Application Specific Area shows three types of information: **Tape Channels** or **Disk Channels**, **Position** and **Display** (see Figure 8-13, this page and Figure 8-14, this page)

- **Tape Channel/Disk Channels** shows information about the type of survey data on the current tape or disk. during playback it refers to the data being replayed. Depending on which drive is being used, this frame of the display is labelled either **Tape 1 Channels**, **Tape 2 Channels**, **Disk 1 Channels** or **Disk 2 Channels**.
- **Position**: This section displays the UTM or lat/long co-ordinates of the Ship or Towfish for the most recent line of data displayed at the top of the Data Display Area. When the waterfall display is scrolling, these co-ordinates are continuously updated
- **Display**: This section shows which data channels are being displayed and where they are displayed, namely the left or right display channel. the number of channels available for display corresponds to the number of channels being recorded or replayed. Any data channel can be displayed on either the left or right display channel by clicking on the corresponding toggle, provided it is on the same trigger as the data in the other channel. For example, data channel 2 can be displayed as the right display channel by clicking on the selector toggle under channel 2 in the row which corresponds to the right display channel.

In acquisition mode, the Application specific Area is divided into the following areas: **Settings**, **Position** and **Display**. The **Position** and **Display** area have the same function as in *playback mode*.

- **Settings**: On optical disk systems, this area displays the amount of disk space free when recording. (Unfortunately, it is not possible to display the amount of space remaining on a

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tape because of the limitations of SCSI tape devices.) It also displays the acquisition system settings for a specific data channel, as set through the **Open Acquisition** pop-up under the **File** menu. The data channel is selected by *clicking* on the appropriate *one-off selection switch* for **Channel**. The up and down arrows can then be used to look through all the acquisition settings for the data channel selected.

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9 Data Output

This section explains how to obtain print-outs of acquired data. You can obtain *hardcopy* by sending the data to a printer or thermal plotter, or you can save the image displayed on screen in either a *Postscript*® format or a *TIFF* format; images can then be incorporated into reports or other computer packages. Many common *windows* applications (for example, word processing packages and presentation packages) are able to import Postscript® and TIFF graphics.

9.1 Hardcopy Output

The **Hardcopy Output** option sends digital data via a parallel interface or a GPIB interface to a printer or thermal plotter; it can be used in acquisition or playback mode, and allows *real-time* plotting of survey data.

Lines of data are sent to the printer or plotter as they are displayed at the top of the *Data Display Area* or as they reach the bottom of the *Data Display Area*. The second option allows event tags to be positioned before the data is printed. However, the rate at which data can be sent to the printer or plotter may be limited when used with certain types of plotter, preventing the real-time plotting of data in acquisition mode and slowing the rate of data display.

It is normal for the display to pause when a printer or plotter is selected; this is because a Reset command is being sent to the printer. This pause has no effect on the recording of data, and the screen display rapidly catches up with the incoming data from the acquisition system, tape or disk.

Before using this option, make sure that the printer or plotter to be used is set up correctly and that the cables are connected correctly to the selected output port.

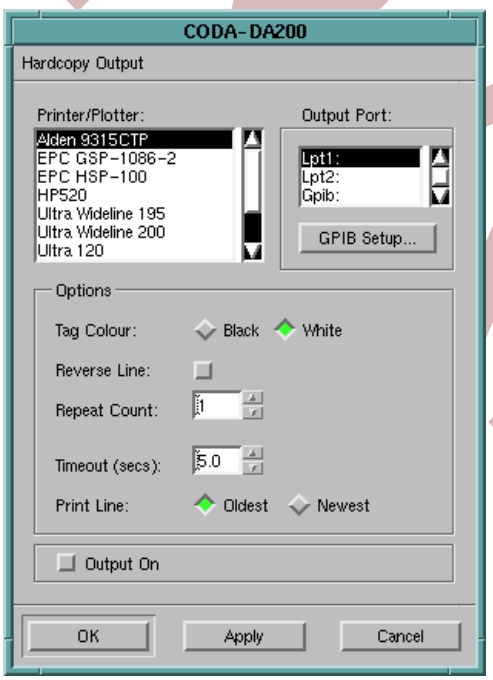

Figure 9-1 Hardcopy Output Pop-up Window

A hardcopy (printing) device must be connected to the DA System via the parallel *port* or the GPIB port (see Section 4.3). To enable output, the appropriate printer or plotter should be chosen from the list in the **Printer/Plotter** window (by clicking on its name) to match the connected hardcopy device. For details of how to set up individual printers, see Appendix J. The **Output Port** to which the hardcopy device is connected should also be selected; if the GPIB port is selected, the **GPIB Setup** options should be checked (see Section 9.1.1). The **GPIB Setup** pop-up appears when the **GPIB Setup** button is clicked. This displays addresses for the DA System and the hardcopy output device can be set in this pop-up.

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As coloured hardcopy output is not available through this menu item, the tag colours must be converted to either black or white. The **Tag Colour** option allows a *one-of* choice of either **Black** or **White** in which all tags will be printed. Finally, the **Output On** *toggle* in the **Hardcopy Output** window should be switched on (green). The pop-up can then be dismissed by clicking **OK** if the settings are correct, or **Cancel** to revert to the previous settings.

The data line is normally drawn from left to right on the hardcopy device. However the line may be reversed and drawn from right to left by selecting the **Reverse Line** option. Normally each line is only printed once. However if it is desirable to stretch the hard copy in the along-track direction, the lines may be repeated by setting the **Repeat Count** value. Increasing the repeat count will generally slow the overall print speed.

When sending data to the printer, the Coda system requires hardware signals to be returned from the printer. If these are not received (for example, if the printer is busy) the Coda system will stop scrolling data until it can communicate with the hardcopy device. This ensures that the rate of Coda system scrolling is not faster than the printer can print out. However, if the printer does not communicate for a long time (for example, if the printer is off-line or has developed a fault), the Coda system will time out waiting for the communication. **Hardcopy Output** will then be automatically turned off. You can specify the length of **Timeout** (in seconds) in the text field in the pop-up.

When output is enabled, you can select for output to the printer or plotter to be either from the top line of the screen, by selecting **Newest** in the *one-of* **Print Line** choices, or from the bottom line by selecting **Oldest**. If you choose **Oldest**, tags that have been added will appear on the hard copy. All image enhancement and processing applied to the on-screen data is also applied to the data sent to the hardcopy device.

Note: As the data being printed is that at the bottom of the screen, it is important to ensure that the system keeps acquiring and recording data at the end of a survey line for long enough to cause the whole line's data to be output to the printer.

9.1.1 GPIB Setup

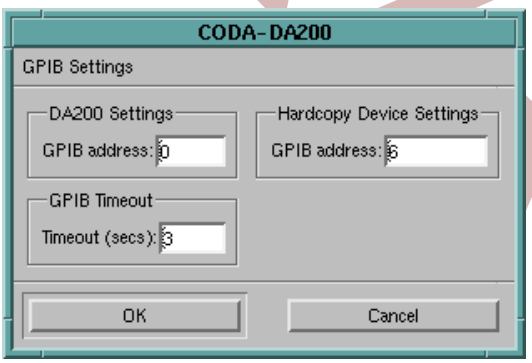

Figure 9-2 The GPIB Settings Pop-up Window

Clicking on the **GPIB Setup** button in the **Hardcopy Output** window pops-up a window that defines the **GPIB Settings**. The **DA System Settings** frame is used to set the GPIB address for the DA System. By default this is set to zero. The **Hardcopy Device Settings** frame is used to set the external device number; this is usually 6. The two GPIB addresses must be different.

The **GPIB Timeout** frame enables the time out value used for communications between the DA System and the GPIB hardcopy device to be set. The default is 3 seconds, and is satisfactory for most devices. If, however, printing to a device stops repeatedly with the error 'I/O Operation Was Aborted', the timeout value should be increased. Valid values are 1, 3, 10 or 30 seconds.

9.2 Screen Dump

The screen dump menu item allows the current waterfall display window either to be saved as an image to disk or printed out directly on a connected printer. When the menu item is selected from the **File** menu, the following pop-up window appears:

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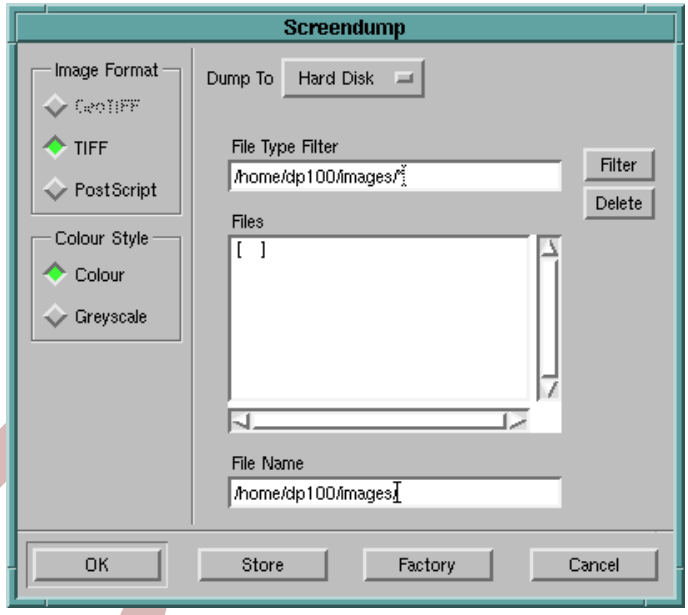

Figure 9-3 The Screen Dump to Hard Disk Pop-up Window:

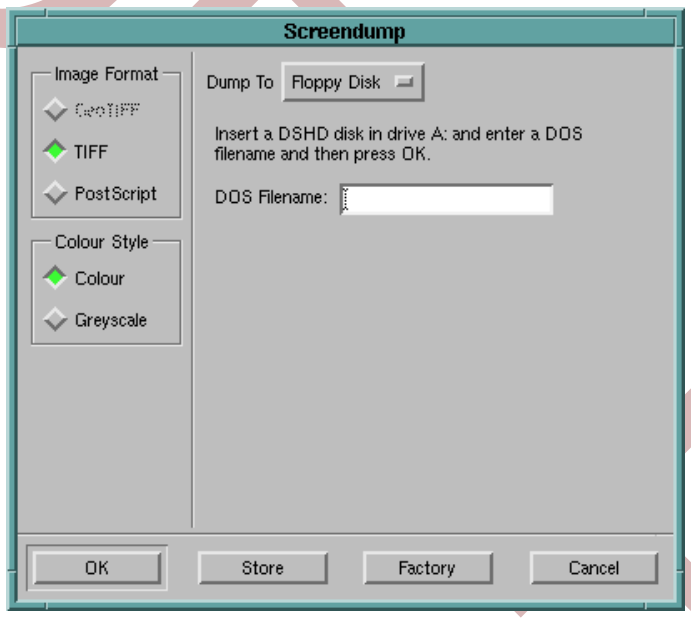

Figure 9-4 The Screen Dump to Floppy Disk Popup Window

Screen dumping must be carried out only in *playback mode*; it should not be attempted in *acquisition mode* because it may cause loss of data. It is also a comparatively slow process. It takes longer if you are generating *screen dumps* on floppy disk when the system is scrolling. Pausing the screen display allows the screen dump operation to complete more quickly.

Note: The Printer option applies only to Postscript® images. TIFF images cannot be dumped to a Postscript® printer.

- **Floppy**: When prompted, insert a blank, DOS-formatted floppy disk into the floppy disk drive and enter a filename for the screen dump. When entering filenames, bear in mind that DOS expects filenames to be a maximum of 12 characters long including the '.' character; some packages expect Encapsulated Postscript® files to have the '.EPS' extension; some packages expect TIFF files to have the '.TIF' extension. Click on the **OK** button. The system automatically dumps the image to floppy disk and the **Screen Dump** pop-up disappears.
- **Printer**: Click on the **Printer Setup** button. In the **Printer Setup** pop-up, select the printer port, the format of the page (portrait or landscape) and the type of file (ASCII or Postscript®), then click on the **OK** button. In the **Screen Dump** pop-up, click on the **OK** button. This sends

the screen dump to the printer.

The image 'dumped' to disk or printer will include any overlay features (such as tags or fix lines) as well as the image data. Any image enhancement or processing techniques applied to the waterfall display will also be reflected in the dumped image.

Within the **Screen Dump** window, the format, tag colour and destination for the image can be selected. **Image Format** provides a one-of choice between **PostScript**® and **TIFF**; **Tag Colour** allows a choice of **Black** or **White**; and **Dump To** gives the option of **Printer** or **Floppy**.

If the **Image Format** selected is **PostScript**® and **Printer** is selected in the **Dump To** options, a **PostScript**® compatible printer is required. Similarly, when **Floppy** is selected in the **Dump To** options, a single **PostScript**® or **TIFF** file will be produced on the floppy disk in DOS format. A prompt will ask for a file name to be entered.

Before attempting to dump the file to floppy, ensure that the floppy disk is a 1.44MB (DSHD) disk, formatted for DOS. If **PostScript**® format is selected, the file produced will be an Encapsulated PostScript® file, whereas if TIFF is selected a TIFF format file is produced. Both are suitable for import to many different PC applications.

Tag Colour provides a one-of choice of **Black** or **White**. This ensures that the colour for any tags in the dumped file can be selected to suit a specific purpose.

If the screen image is to be dumped to a printer, click on the **Printer** toggle. To set up the particular printer configuration, click on the **Printer Setup** button. This brings up a pop-up window that allows printer port and output format selections to be made. Section 9.2.1 explains the use of the **Printer Setup** window.

After selecting the appropriate format and printer port, select **OK** in the **Screen Dump** window. The image is then dumped to the printer. Depending on the speed of the attached printer, this may take between a few seconds and several minutes.

If the image is to be dumped to **Floppy**, click on the **Floppy** toggle, first ensuring that a disk has been inserted in the floppy disk drive. A dialogue box appears asking for the name of the file to be dumped. When the name has been entered and **OK** selected, the image is dumped to disk. This takes several minutes.

Note: The process of dumping the screen image to floppy disk takes much longer if the system is being used for playback or acquisition at the same time as an image is being dumped. It is not advisable to carry out screen dumps in acquisition mode (a loss of data to the screen may result, owing to the time taken for the screen dump to complete); in playback mode, pausing the display allows the screen dump to be completed more quickly.

The action buttons at the foot of the pop-up include the option to **Store** the chosen settings for future use, or to use the **Factory** setting (see Section 3.3.9).

9.2.1 Printer Setup Window

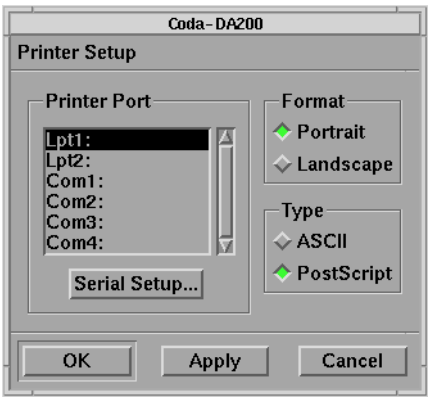

Figure 9-5 The Printer Setup Pop-up Window

Selection of the appropriate printer *port* is made by clicking on the port to which the printer is connected. If the port is a serial port, the **Serial Setup** button should be clicked to set up the serial line parameters (see next section).

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Either **Portrait** or **Landscape Format** may be selected for PostScript® images by clicking on the appropriate toggle. For screen dumps the image is scaled to fit the page; landscape format therefore produces a larger printed image. Where a screen dump is being saved in TIFF format, this selection does not apply and is therefore ignored. **Type** allows a choice of **ASCII** or **PostScript**® printer. Only **PostScript**® is available for screen dumps, selecting **ASCII** produces an error message.

When the appropriate selections have been made, clicking on the **OK** button applies the settings and dismisses the pop-up, **Apply** uses the settings without dismissing the pop-up, and **Cancel** dismisses the pop-up, ignoring any changes made.

Note: The printer should be connected to the required port of DA System before **OK** or **Apply** is clicked (see Section 4.3 and Appendix J).

9.2.2 The Serial Setup Window

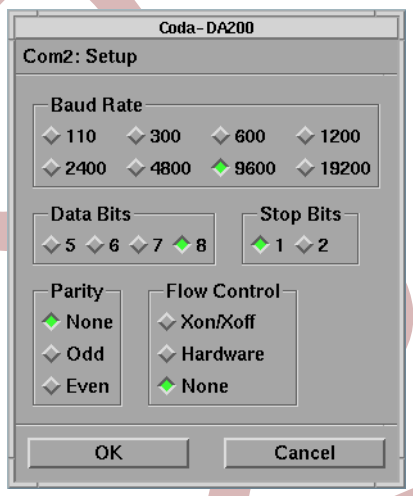

Figure 9-6 The Serial Setup Pop-up Window

The **Serial Setup** window may be accessed from a number of different menus – for example, the **Navigation Input** menu or the **Printer Setup** window, which itself can be accessed through a number of different menu selections (for example, **File→Screen Dump→Printer Setup**, **Tagging→Tag Management→Report Generation**).

Selecting the **Serial Setup** option pops up a window allowing the *baud rate*, the number of data bits, the number of *stop bits*, the *parity* and the method of *flow control* to be selected (see Figure 9-6, this page). Click on the appropriate *toggles* to make the selections. These should correspond to those of the printer, plotter, computer, etc. to which this serial line of the DA System is connected. When the serial setup has been completed, select **OK**.

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10 Tagging & Using the Event Database

The DA System enables you to place tags on the display data in order to mark features of interest (known as *events*) on screen. This is done either by using the **Tagging** menu or by clicking the RIGHT mouse button over the event. An orange box appears around the event. Tagging can be performed during both data acquisition and playback.

Only one type of tag can be created in the DA: a single point (or node) non-specific tag, labelled 'Unknown'; these tags are represented as an orange box in the display. Other tag types and tagging tools are available with the *PI100* and *GeoKit*.

The DA System maintains a tag database for each file on the tape or disk, so that information on each screen tag can be stored to hard disk. This allows tags created in *acquisition mode*, or previous *playback* sessions, to be automatically replayed with the accompanying d*ata channel*. The display of tags can be toggled on or off. Tag databases may also be saved to tape or disk, loaded to the hard disk or copied to disk, so that tag files can be archived.

The tag file database can be used in **Goto** commands and it can be used to produce an ASCII format report.

Another type of tag – a *fix* tag – is generated automatically by the DA System. This tag is based on incoming *navigation data*. Whenever the fix number in the navigation data changes, a fix tag is created. Fix tags are represented on screen as coloured dashed line. The **Fix Data Setup** option is used to set the information included on the fixes and the frequency they are displayed as well as to toggle the display on and off (see Section 8.1.1). Fix tags are only entered into the database in acquisition mode.

A tag file is created for each data set; the tag files can be stored to the tag database and replayed with the accompanying data channel as required.

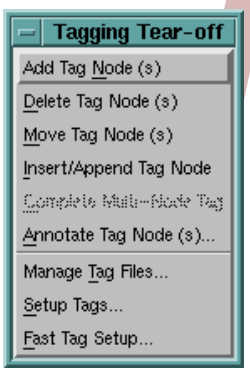

Figure 10-1 The Tagging Menu

A tag must be selected and made the current tag before it can be moved or deleted. A tag is selected by clicking on it. The selected tag flashes between its normal colour and light blue. It can then be moved or deleted.

10.1 To Turn on Tag Display

The DA System has an *overlay plane*, which displays a set of coloured screen markings that indicate *tag* marks and *fixes*; these markings are displayed over the sonar image, without affecting the displayed data. You can toggle the display on or off, using the **Display→Overlay Data** option. You should also turn off the scale line option.

10.2 Creating Tags

Selecting this menu item causes the mouse pointer to change to a pencil (see Section 3.6). If the pencil is moved within the display area and the left mouse button pressed, a tag is marked. If the menu item has been selected but no tagging is required, or if no further tags are to be added, re-selection of the **Add Tag Node (s)** menu item causes the pencil pointer to be replaced by the usual mouse pointer; the tagging operation is abandoned.

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To create a tag, do one of the following:

- Select **Tagging→Add Tag Node(s)**. The ARROW pointer changes to a PENCIL pointer, which indicates that the system is in *add mode*. Move the pointer to the required part of the display screen and click with the left mouse button. This marks the event with an Unknown tag, an orange box.

  Repeat the procedure as often as required. When you have finished or when you want to change to *select mode* – so that you can delete or move a tag – select **Tagging→Add Tag Node(s)** again. This switches off *add mode*, and the pointer reverts to the arrow type.

- Move the pointer to the required part of the display screen and click the right mouse button – a much faster method of creating tags.

Tags can also be added without the use of the **Tagging** menu, by positioning the mouse pointer as required in the display area and pressing the right mouse button.

10.3 Selecting and Deselecting Tags

A tag must be selected and made the current tag before it can be moved or deleted.

- To select a tag, click on it with the left mouse button. The selected tag flashes between orange and light blue and the pointer changes from a PENCIL to an ARROW, which indicates that the system is in *select mode*. The selected tag can then be moved or deleted.

- To deselect a tag, click on it with the left mouse button or click on another tag. The tag stops flashing and is no longer the current tag; it must be reselected before it can be moved or deleted.

The current tag can be deselected by clicking on a tag-free area of the display, or by clicking on another tag to make it the current selection.

10.4 Deleting Tags

key shortcut: <Delete> or <k>

Selection of this menu item, or the letter <k> (for kill) or the <Delete> key on the leyboard, deletes the current tag from both the Data Display Area and the tag database. After deleting the tag, there is no current tag selected.

1. Select the tag to be moved by clicking on it.
   The selected tag flashes between orange and light blue, indicating that it is the currently selected tag.

2. Select **Tagging→Delete Tag Node(s)** or press the key short-cut, <Delete> or <k> (for kill).
   The tag disappears from the display and is removed from the database.

If **Delete Tag Node(s)** is selected but there is no current tag selection, a warning appears in the display area: ‘No nodes currently selected’.

10.5 Moving Tags

Move Tag Node(s) allows you to move a tag to a different position in the display. This function can be selected from the **Tagging** menu, or by using the keyboard short-cut <m>.

Tag nodes must be selected before they can be moved. If **Move Tag Node(s)** is selected but no tag nodes are selected, a warning will appear in the display area: ‘No nodes currently selected’.

Move Tag Node(s) allows tags to be moved within a data channel, but the DA System does not permit tags to be moved between channels.

The move operation consists of two stages. First, the current tag is removed from the screen and the tag database, and the pointer changes to the crossed arrows move tag pointer (see Section 3.6). Then the selected nodes are pasted back into the display area. This is done by moving the pointer to the required point and clicking with the left mouse button. The tag remains active to allow further actions (for example, measurements) to be taken. Incomplete moves may be cancelled by pressing <m> again.

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1. Select the tag to be moved by clicking on it.
   The selected tag flashes between orange and light blue, indicating that it is the currently selected tag.
2. Select **Tagging→Move Tag Node(s)** or use the short-cut key <m>.
   The current tag disappears from the screen and the pointer changes to the crossed arrows MOVE pointer. If no tag is selected, an error message appears.
3. Move the pointer to the new position for the tag and click the left mouse button.
   The tag is pasted back into the display area. It remains active to allow further actions to be taken. Incomplete moves may be cancelled by pressing <m> again.
4. When you have finished, deselect the tag by clicking on it or clicking on another tag.

10.6 Options Only Available in PI or GeoKit

10.6.1 Insert/Append Tag Node

This option is available only in PI100 or GeoKit.

10.6.2 Complete Multi-Node Tag

This option is available only in GeoKit.

10.6.3 Annotate Tag Node(s)

This option is available only in the PI100 or GeoKit.

10.7 Replaying Tags

The DA System system automatically labels each sonar data file on a **Coda** format data tape or disk with the file name of its associated tag file. If the selected tag file is in the tag file directory of the DA System hard disk or optical disk, the tags in the file are automatically replayed along with the data from the tape or disk during playback. Loading tag files from tape, saving tag files to tape, and copying tag files to and from optical disk are described in Section 10.9.2.3 and Section 10.9.3.1.

If the **Overlay Data** toggle in the **Display** menu is on, then the tags are overlaid on the sonar data. If this toggle is off, the tags are still read from the file but are not displayed on the screen.

10.7.1 Using Goto to Replay a Tag

When the DA System is in *playback mode* the **Goto** command can be used to move between tags. Refer to Section 6.7.4 for details of how to use the **Goto** command.

10.8 Setup Tags

Most of the facilities in this menu item are only useful for PI100 or GeoKit modules. However, the colour used to display fix lines may be altered in this pop-up. Select the **System Tab**, followed by the **Fix Line** item in the **Tag Name** list. Change the file line colour by selecting a colour on the **Tag Colour** option menu below the **Tag Name** list. Once this has been applied, all fix lines will be displayed in this new colour.

10.8.1 Fast Tag Setup

This option is available only in the PI100 or GeoKit.

10.9 Managing Event Database Files

During a long survey, a number of tag database files are created; these can easily be tens, or even hundreds, of megabytes long. To cope with this, the DA System provides ways to manage the tag database files; they enable you to load/save, copy and delete tag database files.

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The system automatically updates the list of files in the **Tag Management** pop-up after a **Load/ Save**, **Copy** or **Delete** operation has been carried out; it also updates the display of the amount of hard disk space available.

The **Rescan** option, which forces an update of the list of tag database files and hard disk space, is only needed when changes are made to the tag database files without the use of the **Load/Save**, **Copy** or **Delete** options. For example, if you change the data tape or disk that you are playing back, a tag file for the new tape or disk is created – if it doesn't exist already. The new file, however, will not automatically appear on the list of the tag database files if the **Tag Management** pop-up is on screen; press the **Rescan** button to make it appear

Each tag database entry (fix or user-defined tag) uses about 2KB of file space. Keep a check on the amount of disk space available to ensure that the hard disk does not fill up in mid-survey.

10.9.1 Loading, Saving and Copying Tag Files

Each recording session produces its own tag database file, which is named using the time that the recording session started. Tag files tend to be very large, so they are stored on tape or disk, as used for sonar data storage.

We strongly advise you to have a strict set of procedures for recording sonar data and tag database files. For example, for a dual-drive system, we recommend that **Tape 1** or **Optical 1** is used to record data, whereas **Tape 2** or **Optical 2** is used to store database tag files, using the procedure listed below.

If a large amount of data is produced by Trackplot, Mosaic or Corrected Nav, the hard disk file will eventually become full. A pop-up warning will appear warning you that your system is running short of free disk space. If this warning appears the hard disk needs to be cleared, either by backing up data to DAT or MO drives and then deleting the files from the hard disk, or by deleting the files without backing them up. Data which is deleted without backing up will be lost.

10.9.2 Manage Tag Files on a Tape System

The **Manage Tag Files** menu item allows you to organise the many tag files which are created during a survey. If you are using a tape system, selecting this menu item produces the **Tag Database Management** pop-up shown in Figure 10-2, this page. If you are using an optical disk system, see Section 10.9.3.

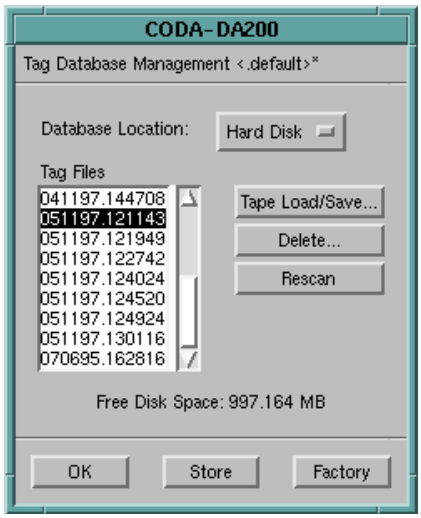

Figure 10-2 Tag Database Management Pop-up Window

DA System automatically names tag files according to the date and time when recording data began (that is ddmmyy.hhmmss). The file system layout for DA System is discussed in Section 14.

The **Database Location** option button allows you to select the drive on which to locate the tag files you wish to save, load or delete; only **Hard Disk** is currently available.

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When the **Tag Database Management** pop-up is opened, the default tag file selection is the current tag file and this is the file highlighted on the list. The scroll bar can be used to move up or down the list of **Tag Files**. A tag file can be selected by clicking on it with the left mouse button. To make a multiple selection, either press and drag the pointer to highlight adjacent files or hold down <Control> while clicking on specific file name.

The pop-up also displays the amount of space available on the hard disk. Each tag database entry uses about 2KB of file space.

The **Store** and **Factory** buttons currently have no function in the tape system.

10.9.2.1 Saving Tag Files to Tape

Use the following procedure to save tag database files that are on the hard drive to tape.

1. Load a blank 'tag file' tape into**Tape 2** (or the tape drive to which the sonar data is not being recorded).
2. Select **Tagging**→**Manage Tag Files**.
   The **Tag Database Management** pop-up appears.
3. Select the file or files currently on the hard disk to be save to tape. For one file, *click* on the tag file name; for several files either *press and drag* the pointer to highlight a group of tag files or hold down <Control> while clicking on the tag file names to make multiple selections. If necessary, scroll through the list of tag files to find the correct files.
   The selected files are highlighted in black.
4. To save the selected tag files, collectively called a batch, click on the **Load/Save** button.
   The **Load/Save Tags to Tape** pop-up appears.
5. In the **Save** frame of the pop-up, select **Save Batch Overwrite** or **Save Batch Append** either to overwrite the data on the tape or to add the current batch at the end of the previous data on the tape.
6. When prompted to load a tape into the appropriate tape drive, do so, if a tape is not already loaded, and click on the **OK** button.
   The system tells you when all the selected files have been saved to tape and rewinds the tape to the beginning when the save is completed.
7. When the tag file has been written to tape, click on the **Done** button to dismiss the **Load/Save Tags to Tape** and **Tag Database Management** pop-ups.
8. Remove the tape and write-protect it by sliding along the plastic tab.
9. Mark the tape clearly with the tag file name or names.

For single-tape systems, a similar procedure should be followed, though tag files cannot be saved to tape while the tape drive is being used for data acquisition or tape playback. Tag files can, however, be saved to the hard drive. You have to eject a data tape from the system before you can select **Load/Save**.

10.9.2.2 Loading Tag Files from Tape

When playing back data tapes, you may need to reload a set of saved tag files.

Note: Loading tag database files with the same name as any files currently on the hard disk will cause the files on the hard disk to be overwritten.

Note: The **Load Remote** option does not relate to loading tag files from tape. To use this option, contact Coda Technologies.

To load tag files from tape to hard disk:

1. Select **Tagging**→**Manage Tag Files**.
   The **Tag Database Management** pop-up appears.
2. Click on the **Load/Save** button.
   The **Load/Save Tags to Tape** pop-up appears.
3. In the **Load/Verify** frame of the pop-up, select **List All Batches** to find the position of the

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batch that contains the required tag file.

4. In the **Load/Verify** area of the pop-up, select **Load Batch**.
   The system prompts you to load the tag file tape into the appropriate tape drive.
5. When the tape is loaded, click on the **OK** button.
   The tag file or files from the batch are loaded automatically and the tape is rewound to the beginning.
   - If you have problems loading tag files, eject and reload the tag file tape to make sure that it returns to the start of the tape.
6. Remove the tag file tape from the drive and store it safely.

Note: If a tag file copied onto the system's hard drive is updated during playback, remember to re-save the modified tag file to tape, either on a new tape or at the end of an old tag file tape.

10.9.2.3 Tape Load/Save

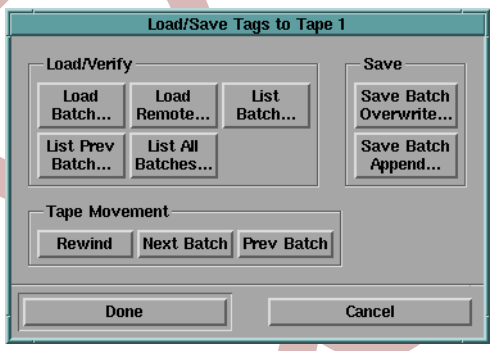

Figure 10-3 The Load/Save Tags to Tape Pop-up Window

This pop-up allows you to load tag files from tape to hard disk, save tag files to tape and also to list tag files which have been saved to tape previously. For single tape systems, tag files cannot be accessed on tape while the tape drive is being used for any other purpose (that is data acquisition or playback).

Note: Tag files and sonar data should be saved to different tapes to prevent data being accidentally overwritten.

Saving Batches

When tag files are saved, each separate save writes a *batch* of tag files to the tape. The batch contains the highlighted tag files in the **Tag Database Management** pop-up and can therefore contain one or more tag files. Batches can be saved to the tape one after another, but tag files can be loaded only one batch at a time. Thus, if three tag files were saved as three separate batches, all three files would have to be loaded individually, whereas if they were saved as a batch consisting of the three files, they could be loaded together using the **Load Batch** option. There is no limit to the number of tag files which can be saved as a single batch.

Tag files are selected for **Save** by clicking the left mouse button on the tag file name in the list of tag files. If more than one tag file is to be saved, either press and drag the left mouse button to highlight a group of tags, or hold down <Control> while clicking on the tag file names to add more tag files to a group.

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Listing Batches

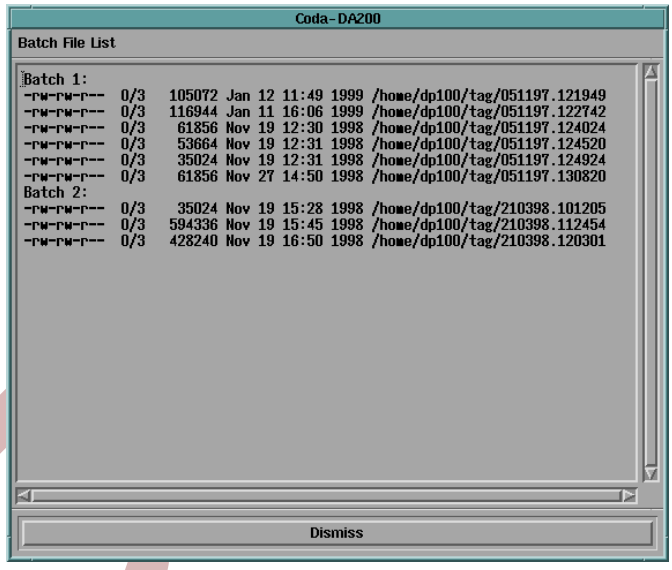

Figure 10-4 : The Batch File List Pop-up Window

Batches are read and written to tape sequentially; after a batch has been saved, the tape is therefore positioned at the end of that batch. To verify that a batch of newly saved tag files contains the appropriate files, the **List Prev Batch** option should be used. All the batches on a tape can be listed by clicking on the **List All Batches** button. This is useful for determining which batch on a tape contains the required tag file.

Note: Listing a batch causes the batch to be read but not loaded. The tape is therefore left at the end of a batch after a list request.

Tape Movement

The **Tape Movement** commands in the pop-up can be used to move backwards or forwards through successive batches.

Loading Batches

A batch of tag files can be loaded from tape using the **Load Batch** option. If this is selected, a pop-up appears with the message ‘Insert tape in tape drive 1 and press OK’ (or tape drive 2, depending on which tape drive is available). DA System then loads a batch of tag files from the tape drive into the tag file directory on the system hard disk, and indicates that this is taking place.

Note: If any of the tag files on the tape have the same name as those already in the DA System tag file directory, they will overwrite the files on the hard disk.

The tag database files are saved in binary, machine-readable format using this command. To access the database in an ASCII format suitable for import into spreadsheets, databases and word processing packages, use the **Report Generation** option (see Section 10.10.2).

Load/Save Command Summary

- **Load Batch** loads the batch file recorded at the current tape position.
- **Load Remote** allows a tag file to be loaded from another DA System system on the same Ethernet network. Contact Coda Technologies for further information.

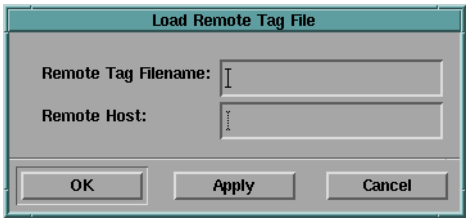

Figure 10-5 : The Load Remote Tag File Pop-up Window

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- **List Batch** lists the batches on a tape before loading. Before using this option, the tape must be rewound. When the tag file details have been checked, the pop-up is dismissed by clicking on the **Dismiss** button at the bottom of the pop-up.
- **List Previous Batch** displays details of the previous batch of tag files on the tape, relative to the current tape position.
- **List All Batches** displays details of all the batches of tag files on the tape.
- **Save Batch Overwrite** saves a batch file, overwriting any data already on the tape. The tape is automatically rewound to the beginning before saving the batch.
- **Save Batch Append** saves a batch file to the end of existing data on the tape. The tape is wound forward automatically to the end of any data on the tape before the batch is saved.
- **Rewind** rewinds the tag file tape to the beginning.
- **Next Batch** moves the tape forward by one batch to the start of the next batch.
- **Previous Batch** moves the tape backward by one batch to the start of the previous batch.

10.9.2.4 Delete

If tag files are no longer required, or if they have been saved to tape, they may be deleted from the tag file directory on the system hard disk. The selection process is as outlined in **Save** (see Section 10.9.2.3).

Make single selections by clicking the left mouse button, and multiple selections by either clicking and dragging or by clicking with <Control> held down. Once the selection process has been completed, click on the **Delete** menu item. A pop-up will appear, to ask 'Are you sure?'; if you click on **Yes**, the highlighted tag files will be deleted. Any tags currently on the screen which were in the deleted tag files will be automatically removed from the screen.

10.9.2.5 Rescan

Rescan causes the directory entries of the tag file directory on the system hard disk to be re-read, updating the list of tag files in the **Tag Database Management** window (see Section 10.9.2). This should be carried out after loading or deleting tag files, as described above.

10.9.3 Manage Tag Files on an Optical Disk System

Figure 10-6 Tag Database Management Pop-up Window

If you are using an optical disk system, selecting the **Manage Tag Files** menu item produces the **Tag Database Management** pop-up shown in Figure 10-6, this page. It allows you to organise the many tag files which are created during a survey.

DA System automatically names tag files according to the date and time when recording data began (that is ddmmyy.hhmmss). The file system layout for DA System is discussed in Section 14.

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The **Database Location** option selection button displays the drive on which the tag files will be created. (A list of files on that drive is displayed in the **Tag Files** window.) It is also the drive from which files will be deleted and the source for files to be copied. In Figure 10-6, this page, **Database Location** is set to **Optical 1**. Clicking on the option button displays the other options available: **Optical 2** (in a dual drive system) and **Hard Disk**.

The **Tag Files** window displays all the tag files that appear on the selected database location. A tag file can be selected by clicking on it with the left mouse button. To make a multiple selection, either press and drag the pointer to highlight adjacent files or hold down <Control> while clicking on specific file name. The scroll bar can be used to move up or down the list.

The pop-up also displays the amount of space available on the hard disk. Each tag database entry uses about 2KB of file space.

The **Store** action button at the bottom of the pop-up gives you the option of storing the currently selected database location as the default location. Clicking on the **Factory** button will restore the database location to **Hard Disk**.

10.9.3.1 Copy Tag Files

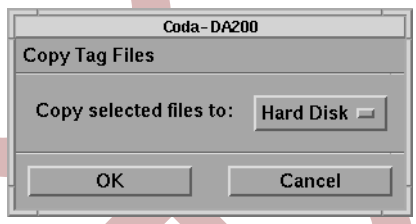

Figure 10-7 Copy Tag Files Pop-up Window

The **Copy Tag Files** pop-up lets you select the target drive for the tag files that you wish to copy and to direct the system to copy those files from the source database location to the target drive.

To copy tag files, you must first have selected the source drive (Database Location) of the tag files that you wish to copy and have highlighted the relevant tag files from the list in the **Tag Files** window. Clicking on the **Copy Tag Files** button produces the **Copy Tag Files** pop-up. The target drive for the tag files can be selected using the **Copy selected files to:** option selection button; the options available are **Hard Disk**, **Optical 1**, and **Optical 2** (in a dual drive system). When you click on the **OK** button, the system automatically copies the files from the source database location to the target drive. To check that the tag files have been copied to the new location, you can select the new database location and see that the tag files appear in the **Tag Files** window.

10.9.3.2 Copying Tag Files

The optical disk system has a **Copy Tag Files** *option selection button* instead of a **Load/Save** button. You can use the copying option to copy tag database files from the hard disk to an optical disk and vice versa, or from disk to disk.

1. Load a blank ‘tag file’ disk into **Optical 2** (or the disk drive to which the sonar data is not being recorded).
2. Select **Tagging→Manage Tag Files**.
   The **Tag Database Management** pop-up appears. The name of the current tag database file is displayed on the title bar.
3. Select the location of the tag database files to be copied: **Hard Disk**, **Optical 1** and **Optical 2** (in a dual-drive system).
   The names of the files appear in the **Tag Files** window.
4. Select the files to be saved. For one file, click on the tag file name; for several files either *press and drag* the pointer to highlight a group of tag files or hold down <Control> while clicking on the tag file names to make multiple selections. If necessary, scroll through the list of tag files to find the correct files.
   The selected files are highlighted in black.
5. Click on the **Copy Tag Files** button.
   The **Copy Tag Files** pop-up appears.

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6. Select the destination of the files: **Hard Disk**, **Optical 1** and **Optical 2** (in a dual-drive system)
7. Click on the **OK** button.

10.9.3.3 Deleting Tag Files

The procedure for deleting tag files is similar to that of copying tag files. First, the source of the tag files must be selected in the **Tag Database Management** pop-up, using the **Database Location** option selection button. Then, the files that you want to delete must be selected from the list that appears in the **Tag Files** window. Clicking on the **Delete** button then deletes the files from the database.

10.9.3.4 Rescan

This button updates the list of files in the **Tag Files** window and the disk space available either on the system hard disk or on the selected optical disk. This can be carried out after copying or deleting tag files, as described above.

10.9.3.5 Unmount

This button directs the optical disk drive to unmount the disk. It must be selected before the optical disk can be ejected from the optical disk drive.

10.9.4 Deleting Tag Files

You may want to delete tag files from the hard drive – or from an optical disk – either because you no longer need them or to free up space on the hard disk or optical disk. The **Tag Database Management** pop-up displays the amount of free space available.

1. Select **Tagging→Manage Tag Files**.
   The **Tag Database Management** pop-up appears.
2. Do one of the following:
   - If you are using a tape system, scroll through the list of tag files currently on the hard disk.
   - If you are using an optical disk system, select the location of the tag database files to be deleted: **Hard Disk**, **Optical 1** or **Optical 2** (in a dual-drive system). Scroll through the list of tag files available.
3. Select the files to be deleted. *Click* the left mouse button on a tag file to make an individual selection; press and hold the <Control> key to make multiple selections; or *press and drag* to select a block of tag files.
   The selected files are highlighted in black.
4. Click on the **Delete** button, and press <y> when asked to confirm the deletion.

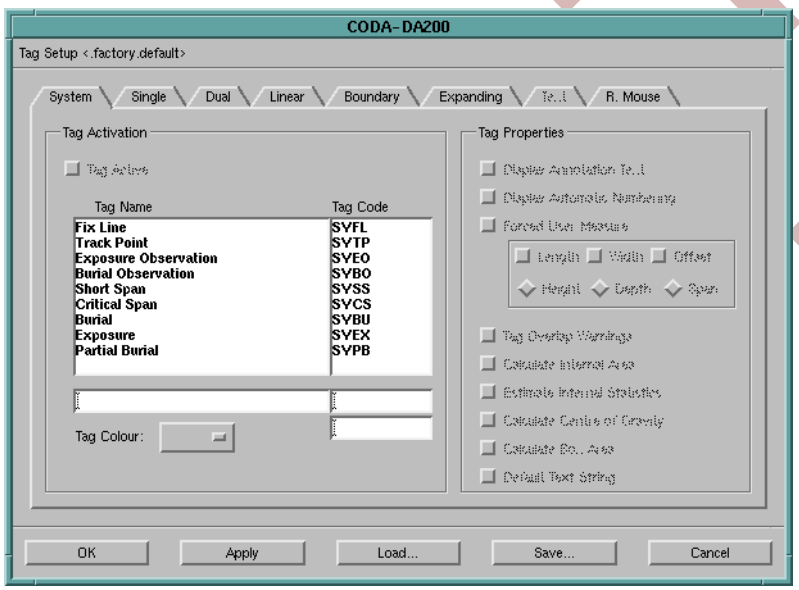

Figure 10-8 The Tag Setup System Tab

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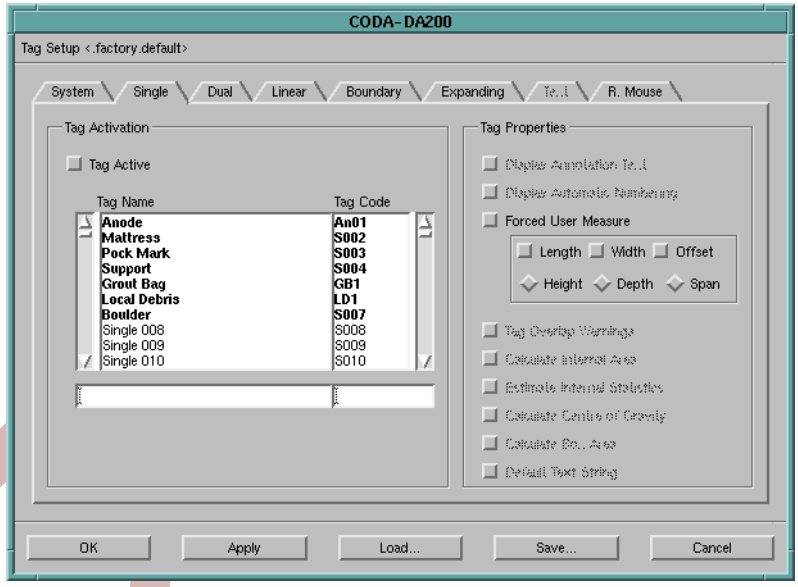

Figure 10-9 The Tag Setup Single Tab

10.10 Report Setup and Generation

Figure 10-10 The Reporting Menu

This menu allows you to generate text reports in ASCII format from the contents of tag database files; this is necessary because the tag database files are stored in binary, machine-readable – but not human-readable – format. The report files generated can then be saved to floppy disk or output to the screen or a printer.

10.10.1 Generating Tag Database Reports

Tag database files are stored in binary, machine-readable format, which enables them to be read and interpreted quickly by the DA System. But binary is not a human-readable format, so the files are put into *ASCII* form, using the **Reporting** menu option. The tag database reports that are generated in ASCII format can then be viewed on screen, printed to the printer defined by the **Printer Setup** menu (see Section 9.2.1) or saved to floppy disk. **Floppy** output of a report requires a blank DOS-formatted floppy disk to be present in the floppy disk drive, and saves the report to the disk, which enables it to be imported by charting, CAD, database, spreadsheet or wordprocessing packages.

To generate a tag database report in ASCII format:

1. Select **Reporting→Report Setup**.
   The **Report Setup** pop-up appears.
2. Click on the **Format** tab and select the format required for the report or load a previously saved setup. When finished click on the **OK** button.
   This tab form allows you to change the columns reported and their order from the default.
3. Click on the **Options** tab and select the options required for the column separators, report labels, sort order and text string.
   The options for dual tags and multi-node tags do not apply to the DA System.
4. Click on the **Contents** tab and define the tag types to be included in the report; although the only tag type which can be created on the DA System is ‘Unknown’, changes to the tag types may be necessary if the active database is one loaded from *GeoKit* or the *PI100*.
5. Select the **Reporting→Report Generation** option.

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The **Report Generating** pop-up appears.

6. Select the tag file for which you wish to generate a report.
   If a tag file has been created for the data currently in use, this file is automatically highlighted in the pop-up.
7. Select the report destination: **Text Window**, **Printer** or **Floppy**.
8. Click on the **Generate Report** button.

10.10.1.1 Report Setup

The **Report Setup** pop-up provides the options for defining the contents and style of the report. Each of the aspects of the **Report Setup** has its own list of options, contained on the appropriate tab form pop-up: **Format**, **Options**, **Contents**.

At the bottom of the pop-up, you have the option to **Load** a previous report setup, or **Save** the current setup for future use, in addition to **Cancel**, **Apply**, and **OK**. These buttons apply to all three tab forms in the **Report Setup** pop-up window, resulting in a single combined report setup. Section 3.3.11 and Section 3.3.12 describe how to load and save settings.

Note: It is important to realise that within the **Report Setup** menu are options which do not apply to tag files created using the DA System, and that changing the setup of these options has no effect on the report generated. These items are, however, relevant where the tag file being played back using the DA System was itself created using a Coda module with enhanced tagging features, such as GeoKit or the PI100.

Report Setup Format

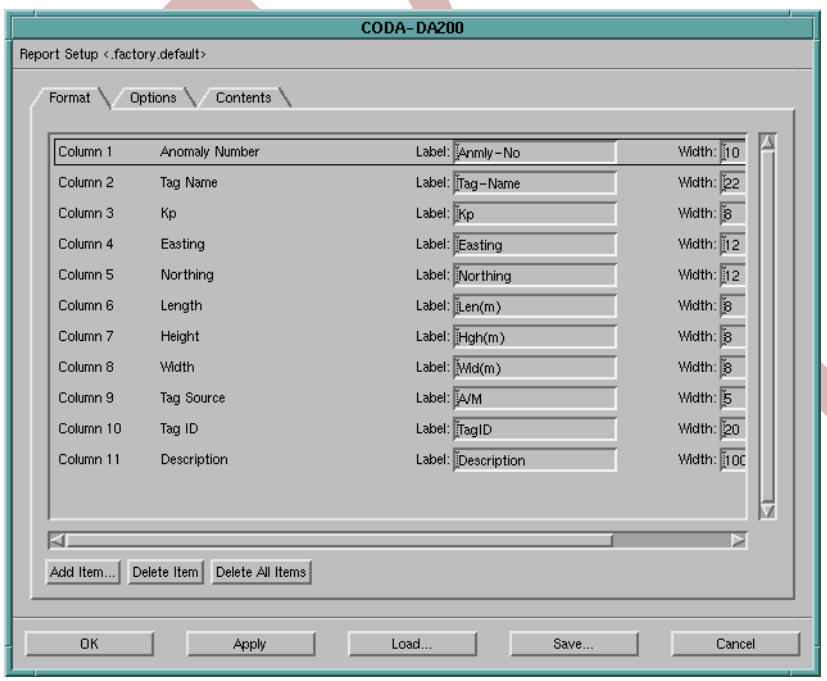

Figure 10-11 The Report Setup Format Tab Form

Clicking on the **Format** tab of the **Report Setup** pop-up allows you to alter the number of columns reported and the order in which they are printed. Report column entries may be added or deleted. To do so, select one of the report columns from the scrolling form by clicking on a column number. The **Add Item** or **Delete Item** button should then be selected.

You may define some or all of the following parameters for each column in the report.

- **Label** allows you to define the label for each column in the report.
- **Width** allows you to specify the width of each column.
- **Precision** allows you to define the number of figures after the decimal point for non-integer numbers in the report.

Examples of a number of the available column types are listed below.

- **Anomaly Number**: the client anomaly ID entered in the **Annotate Tag Node** pop-up.
- **Tag Name**: the tag type selected. Tags created using the DA System are always ‘Unknown’.
- **Kp**: the geo-corrected Kp position of the event tag.
- **Easting, Northing**: the geo-corrected position of the event tag. If the nav input used is UTM, then Easting and Northing are given; if the nav input used is lat/long, then latitude or longitude is given.
- **Length**, **Height** and **Width**: the dimensions of the anomaly entered either using the **Annotate Tage Node** pop-up, or by automated measurement by the PI100 module.
- **Tag ID**: the system’s tag ID. This field can be used with **Goto Tag ID** to goto this specific tag on the data tape or disk (see Section 10.7.1).
- **Description**: text entered in the **Annoate Tag Node** pop-up of the **Tagging** menu.

A complete list of the reportable items available, with a brief description of each of them, can be found in the GeoKit User Manual.

Add Item

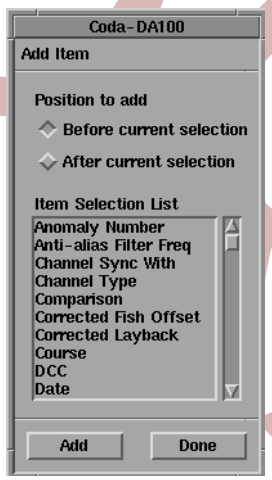

Figure 10-12 The Add Item Pop-up Window

Clicking on the **Add Item** button opens a pop-up window (see Figure 10-12, this page). This produces an alphabetically sorted list of report column types available in GeoKit and the PI100, as well as the DA System. It is used to produce reports with the DA System from data collected using other Coda modules. Thus, the report column types listed are not all available when the data has been collected using the DA System, and selecting such items results in field entries such as ‘0.0’ and N/A’.

In this pop-up you can select items from the scrolling list by clicking on the names in the list and you can specify their position in the report by clicking on either the **Before current selection** button or the **After current selection** button.

The appropriate action button at the bottom of the pop-up (**Add** or **Done**) should be clicked on when all items have been added. Alternatively, double-click on the item to add it to the report. Multiple selections may be made by using a *press and drag* action over the required item in the list.

Delete Item and Delete All Items

The two delete buttons on the **Format** tab allow you to delete either the selected entry (**Delete Item**) or all the entries in the report (**Delete All Items**).

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Report Setup Options

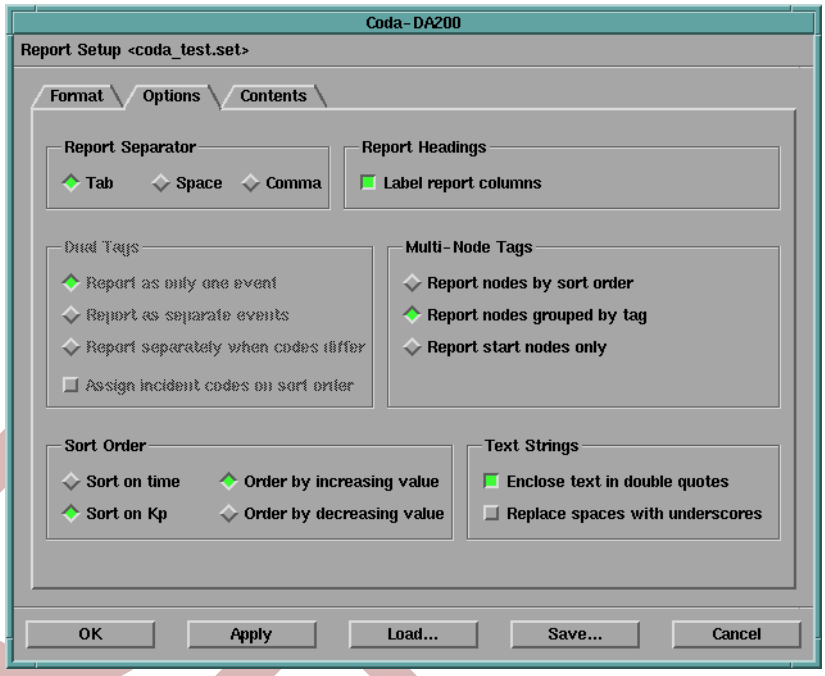

Figure 10-13 The Report Setup Options Tab Form

The **Options** tab allows you to specify how the report is constructed. Figure 10-13, this page, shows the options available.

Report Separator

The options within this section of the pop-up allow you to select the type of separator for the columns of the report from the *one-of option* switches: **Tab**, **Space**, and **Comma**. **Tab** inserts a single tab character between columns, **Space** inserts a single space, and **Comma** inserts a single comma with no additional spaces.

Report Headings

This allows you to toggle on or off the labels at the top of the report columns.

Dual Tags

This option is only available when the database in use has been created using the PI100 Pipeline Inspection module. They have no effect on a database created by DA System.

Multi-Node Tags

This option is only available when the database in use has been created using GeoKit. They have no effect on a database created by DA System

Sort Order

This option allows you to choose whether to sort by **Time**, or by **Kp**, and whether these should appear in **increasing** or **decreasing** order in the report.

Text Strings

You can select either to **Enclose text in double quotes**, or to **Replace spaces with under-scores**. This can be used to ensure that columns whose output contains spaces are not created as several columns when input to another computer package. You should choose the output best suited to the software the report will be used with.

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Report Setup Contents

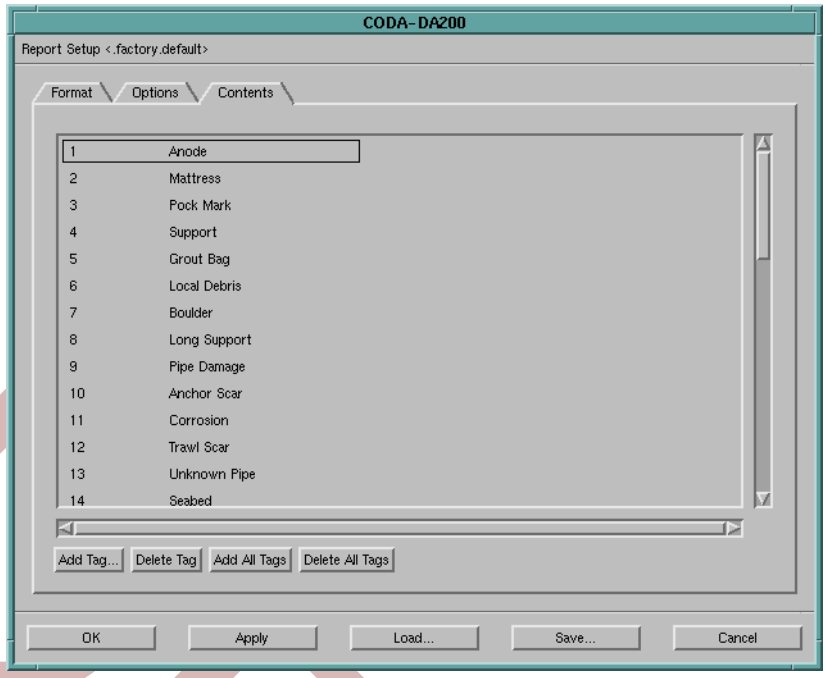

Figure 10-14 The Report Setup Contents Tab Form

This pop-up allows you to define which tag types should be included in the report and the order in which they should appear (see Figure 10-14, this page). For example, you may wish to exclude **Fix Lines** from the report.

This form contains a scrolling list of the active System and User tags, as well as **Add Tag**, **Delete Tag**, **Add All Tags** and **Delete All Tags** buttons. The functions of these buttons are described below. Before tags can be added or deleted using these buttons, they must be selected from the scrolling list by clicking on their names. Single selections can be made by clicking on the required tag's name; multiple selections can be made using a point and drag action on the names of the required tag types, or by pressing <Control> at the same time as pressing with the left mouse button. It is not possible to add the same tag name more than once to the report contents list.

Any changes made in this form will be confirmed or cancelled when one of the action buttons at the bottom of the pop-up is pressed.

Add Tag

Clicking on this button adds the currently selected tag to the list of tag types which appear in reports produced using the current tag database.

Delete Tag

Clicking on this button removes the currently selected tag from the list of tag types which appear in reports produced using the current tag database.

Add All Tags

Clicking on this button adds all of the currently active tag types to the list displayed on the **Contents** tab form.

Delete All Tags

Clicking on this button deletes all of the currently selected tag types from the list displayed on the **Contents** tab form.

10.10.1.2 Generating Reports Using a Corrected Nav Data File

1. Acquire the data as usual, creating event tags as required.
   All the tag database entries contain raw *navigation data* at this point, so the report files are uncorrected.

2. With the DA System in *playback mode*, select **File→Corrected Nav Input**.

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The **Corrected Nav Input** pop-up appears (see Section 6.6.1).

3. Select the location of the corrected nav file:
   - **Floppy**: If floppy disk is the source, insert the appropriate floppy disk into the disk drive.
   - **Hard Disk**: If the hard disk is the source, select a file from the **File Selection** window that appears.
4. Select **Settings** and click on the **Corrected** button in the **Nav Data Type** area of the pop-up (see Section 6.6.2).
5. Follow the steps to generate a event database report in Section 10.10.1.

The report generated contains only corrected navigation values, as all the raw navigation data is corrected automatically.

10.10.2 Report Generation

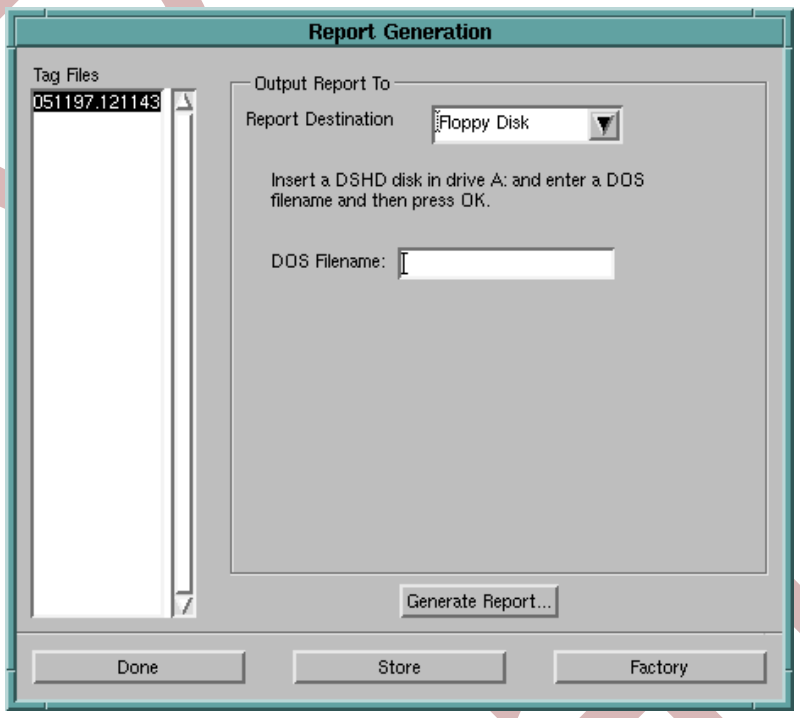

Figure 10-15 The Report Generation Pop-up Window

The **Report Generation** pop-up allows you to generate one or more ASCII text reports in the style defined by the **Report Setup** (see Section 10.10.1.1). To select a report for output, click on the appropriate entry in the scrolling list. (The current tag database will always be selected when the window first pops up.) You can select more than one tag file by pressing and dragging over the required files or by holding down <Control> while clicking on the tag file names. To generate the report, click on the **Generate Report** button. The watch pointer will appear while the report is being generated. Alternatively, double clicking on the tag file name or pressing <enter> will automatically generate a report to the selected output device.

The buttons in the **Output Report To** frame allow you to select the destination for the report file. The **Printer** option is available only if a suitable hardcopy device is connected to the DA System (see Section 4.3)

If **Text Window** is selected from the output options, a report file is generated by the system and displayed in a text window which is overlaid on the screen. You can scroll through this window to view its contents (Figure 10-16, page 159).

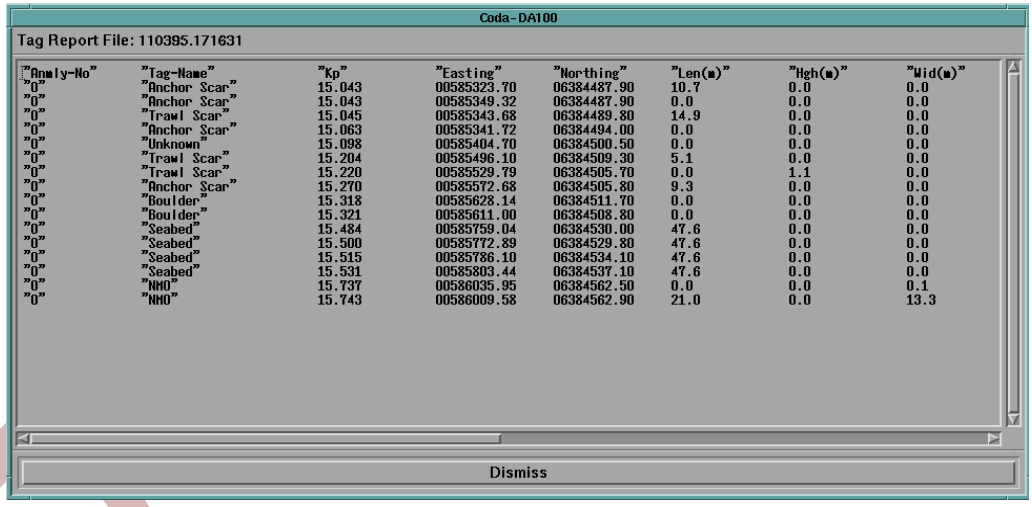

Figure 10-16 Report File Displayed in Text Window

If output to **Printer** is selected, the report file is sent to the printer, according to the options selected in the **Printer Setup** menu (see Section 10.10.2.1). The printing process can be stopped at any point by pressing the **Cancel** button.

If the output is to be saved to a floppy disk, **Floppy Disk** should be selected, and a blank DOS-formatted floppy disk inserted in the floppy disk drive and a DOS file name given to the disk. After **Generate Report** is clicked, a further window will appear asking for the name under which the report file should be saved to the floppy disk. Once the name has been entered, press **OK** to start copying the report file to disk. The report file saved to disk will be an ASCII dump of the database contents, in exactly the same format as the report sent to a printer, or to the screen. All files are saved with the extension '.rep'.

Note that the size of ASCII file which can be copied to a floppy disk is limited to the formatted capacity of the floppy disk – normally 1.44 MB.

Note: If the system is being used for data acquisition or playback, the process of saving a report file to floppy disk will take longer to complete. To speed up the process, pause the display until the report file has been saved to the floppy disk.

10.10.2.1 Printer Setup Window

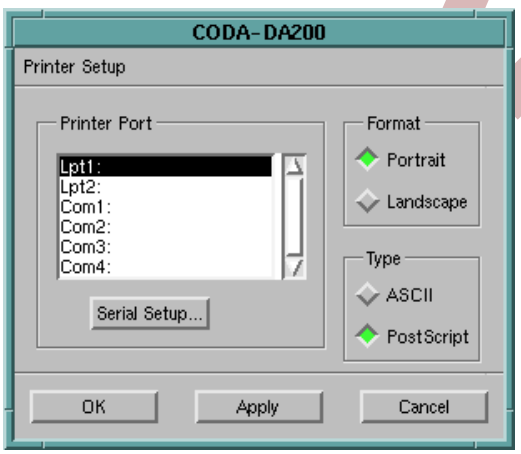

Figure 10-17 The Printer Setup Pop-up Window

Selection of the appropriate printer port is made by clicking on the port to which the printer is connected. If the port is a serial port (one of the **Com** ports), the **Serial Setup** button should be clicked to set up the serial line parameters.

Either **Portrait** or **Landscape Format** may be selected for PostScript® printers by clicking on the appropriate toggle. Where a printout is being saved in ASCII format, this selection does not apply and will therefore be ignored. **Type** allows a choice of **ASCII** or **PostScript**® printer.

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Once the required selections have been made, the appropriate action button at the bottom of the pop-up should be clicked on.

Note: The printer should be connected to the required port of DA System before **OK** or **Apply** is clicked (see Section 4.3 and Appendix J).

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11 Making Backup Copies

You will probably want to make backup copies of the data acquired by the DA System. You may also want to change the recording from Coda format to another format. This section describes how to make copies of data tapes and disks.

To make a copy of a data tape or disk, you must have a dual-drive DA System. Note that when copying tapes or disks, the raw *navigation data* is always copied, regardless of the presence of *corrected navigation data*.

On a tape system, you can select the format in which the target tape is to be copied; that is, you can copy a tape recorded in Coda, SEG-Y, SDEF or Q-MIPS™ compatible format onto another tape in any of these formats. Bear in mind, however, that multi-trigger data cannot be copied from Coda format into other data formats, and that copying from Coda format to another data format always results in loss of navigation information.

Another point to bear in mind: If you choose to copy the target tape in Coda format, the data is copied in the current version of Coda format. This means that the target tape may be recorded in a more recent version than the source tape if the latter was also in Coda format.

On an optical disk system, only Coda format is available.

11.1 Copy Media on a Tape System

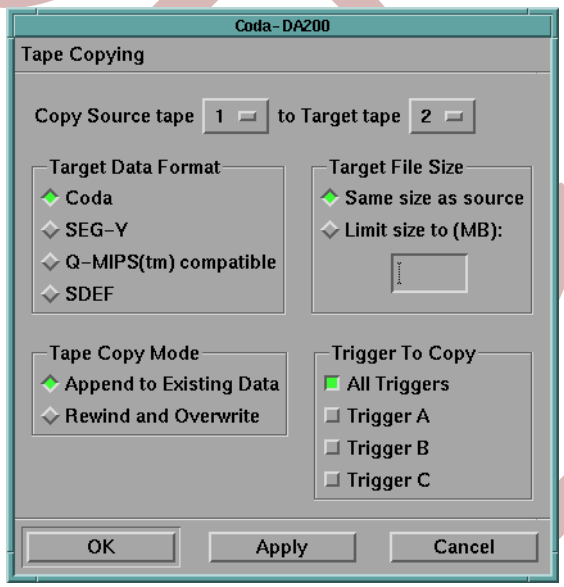

Figure 11-1 The Tape Copying Pop-up Window

The **File→Copy Media** menu option allows you to make backup copies of data tapes and also to copy the data on tape to a different format; however, it is only possible if you have a dual drive DA System.

Note: When copying tapes the raw *navigation data* is always copied, regardless of the presence of *corrected navigation data*. You can reapply corrected navigation on the copied data by copying the nav file and reapplying (see Section 6.6.1, Appendix C).

The **Copy Source tape** and **to Target tape** *option selection* buttons display the drives from which the data will be copied and to which the data will be written. The default setting is to copy from **Tape 1** to **Tape 2**, but the setting can be changed by setting the option selection buttons.

The tape operating system automatically detects the data format on the source tape and offers a choice of formats for the target tape in the **Target Data Format** frame. A format is selected by clicking its *one-of selection* switch.

The **Tape Copy Mode** *one-of selection* switches allow you to choose whether to add the data you are copying to the end of the existing data on the target disk or to rewind the target tape and overwrite the existing data.

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The **Target File Size** frame provides the options of limiting the file size when writing to the tape, by editing the *text-entry box* under **Limit Size to (MB)**, or by default to keep the file size the same as the original (**Same size as source**).

Finally, depending on the format into which you have chosen to copy the data, you can select whether to copy all triggers or only specific ones with the data, using the **Triggers to Copy** one-of selection switches.

A number of limitations exist when copying data:

- Multi-trigger data cannot be copied from Coda format into other data formats.
- Copying from Coda format to another data format always results in the loss of navigation information; for example, fix marks are not copied into SDEF format.
- Copying from Coda format to SDEF format results in the loss of channel information, so all channels subsequently show as PORT when data in this format is played back.
- If copying to Coda format, the data is copied in the current version of Coda format. This means that the target tape may be recorded in a more recent version than the source tape if the latter was also in Coda format.

Note: In order to copy part of a tape, goto appropriate start point and then copy from there. Pressing cancel whilst copying will stop the copy at that point. It will not cancel the complete copy.

Note: No well-defined, universally accepted standards exist for the storing of sidescan and sub-bottom profiler data to *SCSI* tape devices. It is therefore possible that data tapes not recorded on the DA System may not be able to be copied using this facility. If this is the case, contact Coda Technologies for further help.

11.2 Copy Media on an Optical Disk System

Figure 11-2 Copy Media Pop-up Window

This menu option allows you to copy data from optical disk to optical disk; however, it is only possible if you have a dual drive DA System.

The **From Source Device** and **To Target Device** *option selection* buttons display the drive from which the data will be copied and to which it will be written. The default setting is from **Optical 1** to **Optical 2**. Clicking on the option buttons displays the other options available.

The **Store** action button at the bottom of the pop-up gives you the option of storing the currently selected source and target drives as the default setting. Clicking on the **Factory** button restores the source disk drive to **Optical 1** and the target disk drive to **Optical 2**.

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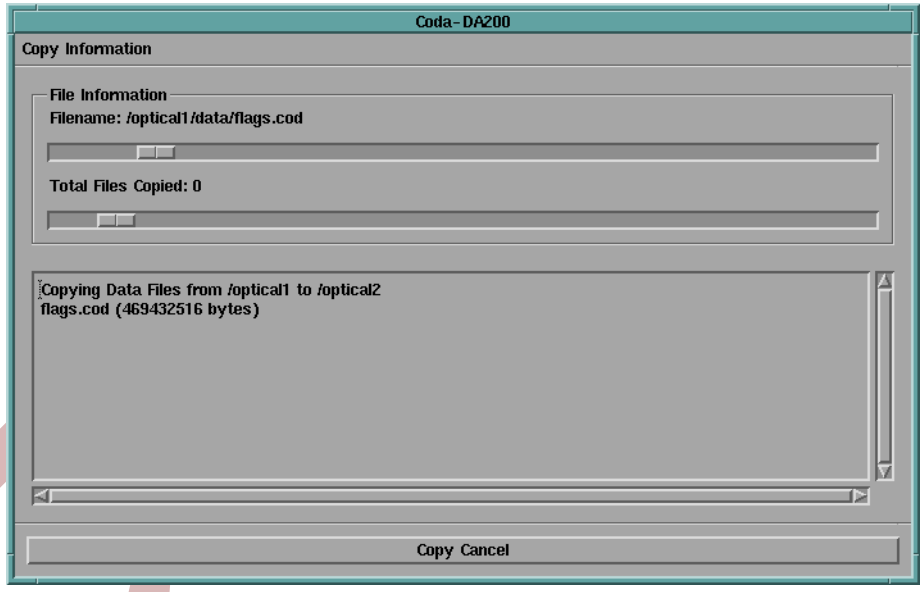

Figure 11-3 Copy Information Pop-up Window

When you start **Copy**, by pressing **OK** or **Apply** in the **Copy Media** pop-up, the **Copy Information** pop-up window will appear (see Figure 11-3, this page). This pop-up shows which files have been copied and indicates the progress of the copy. You can stop the copy at any time by *clicking* on the **Copy Cancel** button.

Two scale bars at the top of the pop-up indicate the amount of data transferred for the whole disk and the current file respectively. Copying is complete when the top scale bar reaches its maximum value.

Data files are copied first, followed by tag files, setup files, navigation files, corrected nav files, report files and project files.

To copy an optical disk:

1. Select **File→Copy Media**.
   The **Copy Media** pop-up appears.
2. Select the source disk drive and the target disk drive, using the *option selection* buttons.
   Files can be copied to: **Hard Disk**, **Optical 1** and **Optical 2** (in a dual-drive system).
3. Click on the **OK** button.

The **Store** action button at the bottom of the pop-up gives you the option of storing the currently selected source and target disk drives as the default setting. Clicking on the **Factory** button restores the source disk drive to **Optical 1** and the target disk drive to **Optical 2**.

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12 System Maintenance and Testing

12.1 Off-line Testing

When mobilising the DA System on board a vessel, it may be useful to carry out some or all of the off-line tests described below; they allow the system to be checked for 'sane' operation without the use of external inputs from sidescan units or navigation computers. A minimal amount of equipment is needed to carry out these tests. The flow chart below indicates the recommended order for completing the off-line tests.

12.1.1 Test Incoming Data Using A/D Internal Triggering

Set up the DA System for acquisition, using the internal trigger (**INT**) set to a period of 0.1 seconds. When the **Play** data control button is pressed, data should begin to scroll down the screen. The digitised data will be whatever signals are present at the analogue BNC inputs.

12.1.2 Navigation Loopback

Plug a 9-way or 25-way D-type connector with pins 2 and 3 shorted together into the COM2 (navigation data input) connector. This can be done with the system powered up. Click on the Title Bar with the right mouse button (see Appendix A), and select the **Start Loopback Test** menu item. From the second **Nav Loopback Menu** that this produces, select the Coda format nav string. Start the DA System in *acquisition mode*, then open navigation input and select the **Coda** data format. Select **Nav input on** in the **Nav Data Input** menu, then click on the **Nav Format QC** button to make sure that navigation data is being acquired correctly by the system (see Section 5.4.4). The system generates a beep every time a navigation string is output through the serial port, until the **End Nav Loopback Test** item in the Title bar menu is selected.

12.1.3 Record/Playback

Having completed the two tests above, insert a blank tape or optical disk into the relevant drive, and begin recording (see Section 5.2). Allow several minutes of recording to take place, stop recording. Attempt to play back the data, checking that the time and position are updated correctly.

12.1.4 Off-line Noise Test

Short the signal input by attaching a 50Ω termination BNC connector to the input channel Perform the test in Section 12.1.1. The displayed data should be a flat line with noise no greater than one binary digit on the **Input Range** of the **Scale Display Data** pop-up window. Repeat this for each channel.

12.2 The Title Bar Menu

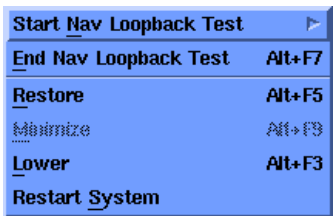

Figure 12-1 The Title bar Menu

The DA System provides additional commands through its Title Bar menu. You use this pull-down menu when you want to test navigation loopback data, change the size of the main display and restart the programme.

The Title bar menu is accessed by clicking and holding the right mouse button on the Title Bar, which is displayed across the top of the DA System main display, see Section 3.1.

Having selected the Title bar menu, drag the pointer to the menu item required (see Figure 12-1, this page).

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12.2.1 Start Nav Loopback Test

When you select **Start Nav Loopback Test**, the **Nav Loopback Menu** appears. It lists several navigation formats (see Figure 12-2, this page). Clicking on one of these formats starts a program that synthesises navigation data output. When the appropriate *loopback* connector – a 9-way or 25-way D-type connector with pins 2 and 3 shorted together – is connected to the COM2 port, the DA System's navigation interface can be tested, as described in the Off-line Testing section. Clicking on another format ends the loopback test and starts another one. While the loopback program is running, the DA System beeps continuously.

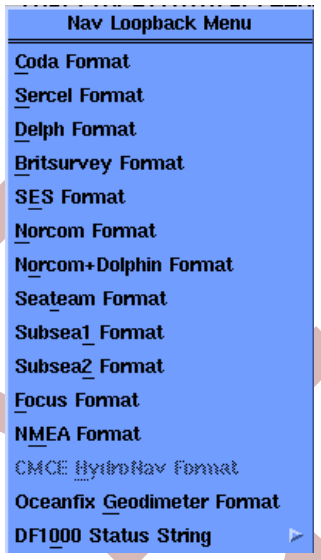

Figure 12-2 The Nav Loopback Menu

12.2.2 End Nav Loopback Test

Titlebar Menu→End Nav Loopback Test stops the program generating navigation loopback data. If the nav loopback program is not running, selecting this menu item has no effect.

12.2.3 Restore

Restore returns the DA System main display to its full size if it has been iconified. This option is unavailable if the DA System is not iconified.

12.2.4 Minimise

Minimise reduces the DA System main display to an icon displayed on the Coda background window.

12.2.5 Lower

Lower moves the DA System display window into the background. This menu item has an effect only when there is more than one window open.

12.2.6 Restart DAx00

This option closes the current DA System display and restarts the DA System. This stops all recording and automated analysis.

12.3 The Maintenance Menu

The **Maintenance Menu** contains several commands that are not required for everyday operation of the DA System. These include installing a software upgrade, loading a navigation library, backing up tag setup files and changing various system settings.

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You access this menu by iconifying the DA System main display; this is done either by pressing <Alt-F9> or by clicking on the iconify symbol in the top right corner of the Title Bar (see Figure 3-2, page 21). When the main display is iconified and the background Coda window is revealed, press <Alt-Shift-m> to bring up the **Maintenance Menu**.

The commands that appear on the **Maintenance Menu** differ slightly, depending on whether you are using a tape system or an optical disk system (see Figure 12-3, this page). The tape system has an **Erase Tape** command, whereas the optical disk system has three alternative commands: **Format Optical Disk**, **Repair Optical Disk** and **Unmount All Disks**.

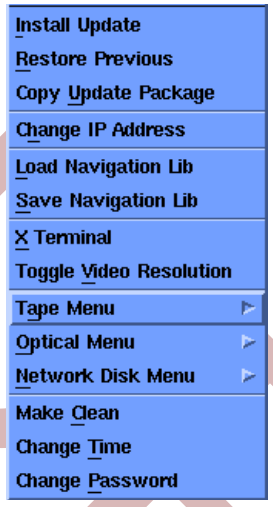

Figure 12-3 The Maintenance Menu for a tape system (left) and an optical disk system (right)

12.3.1 Install Update

Caution: The DA System system must be shut down – by selecting **Shutdown** from the **File** menu – at the end of installing a software update. Failure to do so may cause the system to malfunction.

Note: Before selecting this item, make sure that the tape or optical disk drives are not in operation. If you are unsure about the status of the drives but wish to continue with maintenance, restart the DA System by selecting **Restart** from the **File** menu.

Note: The default **Nav Lib** file will be automatically overwritten when the update is installed, so it is important to remember to save the current Nav LIbrary before installing an update.

This menu item is used to install a software upgrade from DAT or Exabyte tape, floppy disk or optical disk.

When **Install Update** is selected, the system asks for the install password. If the password is typed correctly, the following set of instructions and questions appear in the update window.

'Do NOT switch off power during installation.
WARNING: During update installation the system will be restarted and all playback and acquisition will be aborted.
Do you wish to proceed with the installation (default:n)?[y,n]'

Press <y> to start the installation process.

A prompt appears asking for the source of the update:

'Do you wish to install the update from diskette, tape or optical (default:d)? [d,t,o]'

Press either <d>, <t> or <o> and then press <Return>.

Note: The following example is for installation from a tape. If the update is from floppy disk or optical disk, similar messages and prompts appear.

When tape is selected, the following prompts appear:

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'Insert the update tape into a tape drive NOW.'
'Which tape device do you wish to install the update from (default 1)? [1,2]'

The default is to install from tape drive 1.

Insert the update tape into a tape drive. Press either <1> or <2> and then press <Return>.

The system informs you that the previous DA System software is being saved:

'Saving previous DAx00...'

A prompt appears asking for the update tape to be inserted:

'Insert a cartridge into Tape Drive 1.
Type [go] when ready,
or [q] to quit: (default: go)'

Type <go> or press <Return>.

Do not attempt to eject the tape until the update has finished.

The installation process then lists the packages on the tape:

'The following package(s) are available:
1 UpdToCurr Coda Technologies DA System Update Package
(i386) Tue Jul 02 13:05:41 1998
Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,??, q]:'

Type <all> or press <Return> to continue, or press <q> to abort the update.

As the update progresses, various messages may be printed to the screen. These are a normal part of the update installation and require no action by you.

If the update package is a new software version, the system automatically backs up the previous software configuration on disk.

The system is automatically re-booted to make sure that all of the software modifications in the update take effect.

Some packages, however, may require more than one disk or tape, in which case the following prompt appears:

'Insert a cartridge into Tape Drive 1.
Type [go] when ready,
or [q] to quit: (default: go)'

Insert the next disk and type <go> to continue the update. The disks should be inserted in the order indicated on the labels. Follow the instructions above until all the update disks have been used. When all the disks have been used, press <q> to the above prompt.

The system is automatically re-booted to make sure that all of the software modifications in the update take effect.

12.3.2 Restore Previous

Caution: The DA System system must be shut down – by selecting **Shutdown** from the **File** menu – at the end of installing a software update. Failure to do so may cause the system to malfunction.

Note: Before selecting this item, make sure that the tape or optical disk drives are not in operation. If you are unsure about the status of the drives but wish to continue with maintenance, restart the DA System by selecting **Restart** from the **File** menu.

This menu item is used to restore the previously installed system update, returning the system to its state before the update was applied.

When **Restore Previous** is selected, the system asks for the install password. If the password is typed correctly, the following set of questions appear in the maintenance window:

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WARNING: During update installation the system will be restarted and all playback and acquisition will be aborted. Do you wish to proceed with the installation (default:n)?[y,n]'

Press <y> to start the installation process.

The following prompt then appears:

'Do you wish to retain your current navlib (default: y)? [y,n]'

The default is to retain your current navigation library.

Press <y> or press <Return> to save this file; otherwise press <n>.

A prompt appears asking whether to proceed with restoring the previous DA System as follows:

'Are you sure you wish to restore the previous DAx00? (default: y) [,n]'

Press <y> to confirm the request.

The restoration proceeds automatically and the operating system of the DA System is rebuilt.

12.3.3 Copy Update Package

This menu item is used to create a backup copy of an update package on tape or optical disk. The following example is for installation from a tape. If the update is from optical disk, similar messages and prompts appear.

When **Copy Update Package** is selected, the system asks for the install password. If the password is typed correctly, a prompt appears, asking for the source update tape to be inserted into the tape drive.

'Which tape device do you wish to copy from (default: 1)? [1,2]'

Insert the update tape into the tape drive. Press either <1> or <2>, and then press <Return>.

'Insert a cartridge into Tape Drive 1.
Type [go] when ready,
or [q] to quit: (default: go)'

Type <go> or press <Return> to continue.

The system informs you that the update package is being transferred.

'Transferring <UdpToCurr>. Package instance to <\home\install\spool>in file system format'.

The package details then appear on screen.

'Insert the target update tape into a tape drive NOW,
then press any key to continue.'

Insert a blank tape into the tape drive.

'Which tape drive do you wish to copy to (default: 1)? [1,2]'

Select the tape drive to be used to copy the tape to and press <Return>.

The following message appears on screen.

'Insert a cartridge into Tape Drive 1.
Type [go] when ready,
or [q] to quit: (default: go)'

Type <go> or press <Return>.

The system transfers the package to the drive specified and exits when it has finished.

12.3.4 Change IP Address

This menu item is used to change the IP address of the system.

When **Change IP Address** is selected, the system asks for the install password. If the password is typed correctly a warning appears in the maintenance menu:

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WARNING - After this process has finished the system will be restarted and all playback and acquisition will be aborted.

"Do you wish to proceed (default: n)? [y,n]"

Press <y> to proceed.

The system then prompts for the name of the system. Enter the name and press <return>.

A message appears giving the current system name and IP address.

Enter the new IP address and press <return>.

A message appears asking for confirmation of the new IP address. Press <return>.

The next message requests the subnet mask. Enter the default <return>.

A message will appear confirming the IP address update and will ask whether another IP address is to be changed (default n).

Press <return>.

The system will now shut down and re-boot.

12.3.5 Load Navigation Lib

This menu item is used to load a navigation format library from a DOS-formatted floppy disk.

When **Load Navigation Lib** is selected, the system asks for the install password. If the password is typed correctly, a prompt appears, asking for a diskette to be inserted into the floppy disk drive.

'Insert a diskette into Floppy Drive 1.
Type [go] when ready,
or [q] to quit: (default: go)'

Insert a diskette and type <go> or press <Return>.

The diskette is expected to contain a file called NAVLIB.USR which should be your navigation format library. A prompt asks if the current nav format library is to be overwritten:

'Are you sure you wish to overwrite your existing navigation library (default:y)? [y,n]'

Press <y> to copy the navigation format library on the diskette to the DA System hard disk.

12.3.6 Save Navigation Lib

This menu item is used to save the current navigation format library to a DOS-formatted floppy disk.

When **Save Navigation Lib** is selected, the system asks for the install password. If the password is typed correctly, a prompt appears asking for a diskette to be inserted into the floppy disk drive.

'Insert a diskette into Floppy Drive 1.
Type [go] when ready,
or [q] to quit: (default: go)'

Insert the diskette and type <go> or press <Return>.

This copies the current user navigation format library to a file on the diskette called NAVLIB.USR.

12.3.7 X Terminal

Selecting this option causes a terminal window to appear on the DA System display. This is for Coda engineers only. No attempt should be made to access this window, which is password protected.

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12.3.8 Toggle Video Resolution

This menu option toggles the screen between high and low video resolutions. Contact Coda Technologies before using this option.

12.3.9 Tape Menu

Selecting this menu item brings up the following sub menu:

12.3.9.1 Erase Tape (tape system)

Note: Before selecting this item, make sure that the tape drives are not in operation. If you are unsure about the status of the tape drives but wish to continue with maintenance, restart the DA System by selecting **Restart** from the **File** menu.

This menu item enables you to erase tapes, and is only available for tape systems. Do not attempt to do this if the data on the tape is valuable as ALL data will be lost. Write-protected tapes cannot be erased.

When this item is selected, the system asks for the install password. If the password is typed correctly, a prompt appears, asking for the number of the tape drive from which the tape is to be erased.

'Which tape device do you wish to use when erasing (default:1)? [1,2]:'

Press either <1> or <2> and then press <Return>.

A prompt asks for the tape that is to be erased to be inserted into tape drive 1.

'Insert the tape into Tape Drive 1.
Type [go] when ready,
or [q] to quit: (default: go)'

Type <go> or press <Return>.

A prompt appears asking for confirmation.

'Are you sure you want to erase the tape in Tape Drive 1
(default:n) [y,n]?'

Press <y> to erase all the data on the tape.

12.3.9.2 Backup Setup Files

This menu item is used to store to tape all of the setup files, for example tag setup files.

When **Backup Setup Files** is selected, the system asks for the install password. If the password is typed correctly, the following prompt appears:

'Which tape device do you wish to copy setup files to (default:1)? [1,2]:'

Press either <1> or <2>, and then press <Return>.

A prompt appears asking for a tape to be inserted into tape drive 1.

'Insert the tape into Tape Drive 1.
Type [go] when ready,
or [q] to quit: (default: go)'

Type <go> or press <Return> to continue.

The setup files are then saved on tape. The following prompt appears:

'Setup files were successfully backed up to tape drive 1'

12.3.9.3 Restore Setup Files

This menu item is used to restore setup files from tape to the hard drive.

Note: Existing setup files with the same name on the hard disk will automatically be overwritten.

When **Restore Setup Files** is selected, the system asks for the install password. If the password is typed correctly, the following prompt appears:

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'Which tape devise do you wish to copy setup files from (default:1)? [1,2]:'

Press either <1> or <2>, and then press <Return>.

A prompt appears asking for the tape to be inserted into tape drive 1.

'Insert the tape into Tape Drive 1.
Type [go] when ready,
or [q] to quit: (default: go)'

Type <go> or press <Return> to continue.

The setup files are then copied from the tape to the hard drive. The following prompt appears:

'Setup files were successfully restored to tape drive 1'

12.3.10 Optical Menu

This menu item will bring up a sub menu as follows:

12.3.10.1 Format Optical Disk

This menu item formats optical disks for use with the CODA system and creates the necessary directory structure on the optical disk.

12.3.10.2 Repair Optical Disk

This menu item audits the optical disk and repairs inconsistent conditions on the disk. It is possible for the data on the disk to become inconsistent if there is a power failure to the CODA system. In such cases, the **Repair Optical Disk** function should be used.

12.3.10.3 Unmount All Disks

Clicking on this menu item unmounts optical disks in both drives. Disks must be unmounted before they can be ejected. This option should only be used if the disk cannot be unmounted from the viewer. Before using this menu item, check that the disk is not mounted for **Playback**, or for tagging in the **Manage Tag Files** menu option.

12.3.10.4 Backup Setup Files

When **Backup Setup Files** is selected, the system asks for the install password. If the password is typed correctly, the following prompt appears:

"Which optical drive do you wish to copy setup files to (default:1)? [1,2]"

Press either <1> or <2>, and then press <Return>.

A prompt appears asking for a disk to be inserted into drive 1.

"Insert the optical disk into Drive 1.

Type [go] when ready,

or [q] to quit: (default: go)"

Type <go> or press <Return> to continue.

The setup files are then saved on disk. The following prompt appears:

"Finished backing up Setup files."

12.3.10.5 Restore Setup Files

This menu item is used to restore setup files from an optical disk to the hard drive.

Note: Existing setup files with the same name on the hard disk will be automatically overwritten.

When **Restore Setup Files** is selected, the system asks for the install password. If the password is typed correctly, the following prompt appears:

"Which optical drive do you wish to copy setup files from (default:1)? [1,2]:"

Press either <1> or <2>, and then press <Return>.

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A prompt appears asking for the disk to be inserted into drive 1.

"Insert the optical disk into Drive 1.

Type [go] when ready,

or [q] to quit: (default: go)"

Type <go> or press <Return> to continue.

The setup files are then copied from the disk to the hard drive. The following message appears:

"Finished restoring Setup files."

12.3.11 Network Disk Menu

This option allows the use of a network disks with other unix systems. Contact Coda Technologies before using this option

12.3.12 Make Clean

This menu item is used to remove all user-specific files from the system.

When **Make Clean** is selected, the system asks for the install password. If the password is typed correctly, the following set of questions appear in the cleaning window:

'Do you wish to clean tag directory (default: n)? [y,n]'

The default is not to clean the tag directory.

Press either <y> or <n> and then press <Return>.

'Do you wish to clean the log directory (default: n)? [y,n]'

The default is not to clean the log directory.

Press either <y> or <n> and then press <Return>.

'Do you wish to clean the nav directory (default: n)? [y,n]'

The default is not to clean the nav directory.

Press either <y> or <n> and then press <Return>.

'Do you wish to clean setup directory (default: n)? [y,n]'

The default is not to clean the setup directory.

Press either <y> or <n> and then press <Return>.

12.3.13 Change Time

This option is used to change the system time. This may be necessary if you wish to use the DA System time in acquisition and it is set incorrectly.

When this item is selected, the system asks for the install password. If the password is typed correctly, the system displays the current date and time, and prompts you to update them both. Enter the current time in hours, minutes and seconds in the format HH:MM:SS (for example, 21:17:05), and the current date (month, day and year) in the format mm-dd-ccyy (for example, 09-17-1997). When these values have been entered, the system clock immediately sets itself to the time and date requested.

12.3.14 Change Password

Selecting this option allows you to change the install password for the system. The system prompts you to type the old install password twice, then the new password. The new password must then be re-typed to ensure that it has been entered correctly.

The system password should consist of at least six characters, and should contain at least two alphabetic and one numeric characters. It must differ from the old password by at least three characters.

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Do NOT allow the install password for the system to fall into the hands of those not trained to carry out system updates or cleaning. Do NOT write the password down.

12.3.15 Screen Saver Option

A screen saver can be turned on or off by pressing <Alt-Shift-S> and <Alt-Shift-Q> respectively. If the screen saver option is turned on and the screen remains inactive for a period of 5 minutes, the screen will be blanked. To reactivate the screen, simply move the mouse.

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13 Powering Down & Packing Up

13.1 Shutdown

This option shuts down the Unix operating system of the DA System, to allow the power to be turned off, or the machine to be rebooted. If this item is selected, a pop-up appears asking for confirmation that the system is to shut down; if **Yes** is selected, the shutdown takes place, and any tapes in the tape drives are ejected. (Eject diskettes from the floppy disk drive prior to rebooting the machine.) Shutdown cannot be halted at this point.

13.2 Powering Down the System

Caution: Before powering down the system, make sure that no tapes or disks have been left in the drives. Failure to do so may result in damage to the tapes or disks or to the drives.

The correct procedure for powering down the system is given below:

1. Select **File→Shutdown**.
2. When the prompt 'Are you sure you wish to Shutdown the System?' appears, click on **Yes**. The shutdown procedure begins. If you are using a tape system, any tapes in the tape drives are automatically ejected.
3. If necessary, remove any diskettes from the floppy drive.
4. When the message 'Press <CTL><ALT><DEL> to reboot your computer' appears, turn off the system power.

Note: The correct sequence for powering down should be followed; however, in the event of an unexpected power loss, no damage should result to the system. No data previously recorded to tape or disk by the system will be lost.

13.3 Preparing the System for Transportation

The following steps should be taken to prepare the DA System for transportation between worksites:

Caution: Before packing the DA System, make sure that no tapes or disks have been left in the drives. Failure to do so may result in damage to the tapes or disks or to the drives.

1. Remove any data tapes or disks from the drives.
2. Unplug all cables and connectors, including the keyboard, from the back of the system.
3. Store the cables and the mouse or trackball in the monitor flight case. The trackball should be placed in a padded bag before being stored in the flight case.
4. Attach the front and back covers to the system flight case.

Follow any other packing instructions that come with your system.

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Part III: DA System Technical Details

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14 Technical Description of the DA System

14.1 DA System Hardware

The DA System is based on cost-effective, but proven and reliable, PC technology. In recent years, the processing power available at low cost on a PC platform has developed to the point where it is now possible to undertake complex *real-time signal processing* tasks without resorting to the use of specialised *digital signal processing* devices.

The DA System uses a high-specification Intel Pentium or compatible processor, with 32MB or 64MB of random access memory (RAM). The industry standard high-bandwidth *PCI interface* is used for *IO* operations where appropriate. All of the components on the PCI and *ISA* buses in the DA System are industry standard, cost effective and reliable. A high-bandwidth *SCSI-2* bus interface is provided; this allows the processor to communicate with both the system's hard disk (with up to 4.3GB of available storage depending on the system) and the SCSI tape or optical disk drives at rates of up to 10MB/sec. The system's easy to use *graphic user interface* (GUI) and *waterfall display* software make use of the graphics capabilities of an S3 graphics card using 2MB or 4MB of video RAM. *Analogue data acquisition* and *A/D conversion* is handled by a high-bandwidth A/D converter, which uses the ISA bus.

Ancillaries such as the *RS-232* and parallel interfaces are available directly on the PC mother-board.

System expansion is straightforward, benefiting from the open architecture of the PC standard. *Ethernet* or *Token Ring* interfaces are available as options, and provide the capability of broad-casting *full resolution* raw digitised data to the network with almost no CPU overhead.

The DA System may be supplied with either one or two 4mm *DAT DDS2* or 8mm *Exabyte* SCSI *tape units*. Both use high speed SCSI-2 interfaces, and both DAT and Exabyte drives are capable of data rates up to 500Kbytes/sec. Or, the system may be supplied with either one or two Maxoptix optical disk drives. They use high speed SCSI-2 interfaces and are capable of data rates of 2–4MB/s.

The DA System system and keyboard are supplied in 4 and 1U, 19in Rackmount chassis and drawer. These are enclosed in a 5U floating frame flight case. The system comes with a choice of *trackball* or *mouse*. A free-standing 17in monitor is also supplied with flight case.

14.2 Operating System

The DA System uses SCO UnixWare, a vendor-specific implementation of Unix System VR4.2. *Unix* is a true multi-tasking operating system with real-time extensions, allowing pre-emptive scheduling of real-time processes. It also has support for the *X Window* system and the *Motif* 1.2.3 GUI. *TCP/IP* networking is available as an option.

The DA System uses the Unix SVR4.2 VERITAS (vxfs) file system; this has significant advan-tages over the file systems used under earlier versions of Unix, and those used by *Windows* or *MS-DOS*. The major benefit is that the file system's integrity is ensured if there is a power failure or if the power to the system is inadvertently switched off.

14.3 DA System Software and GUI

The DA System is written in C++ and C, and uses the Motif 1.2.3 GUI for the X Window system. A device driver for the A/D acquisition system has been developed specifically for this product by Coda Technologies.

14.4 Data Flow in the DA System

The DA System uses the *multi-tasking* capabilities of the Unix operating system to process data, as shown in Figure 14-1, page 180.

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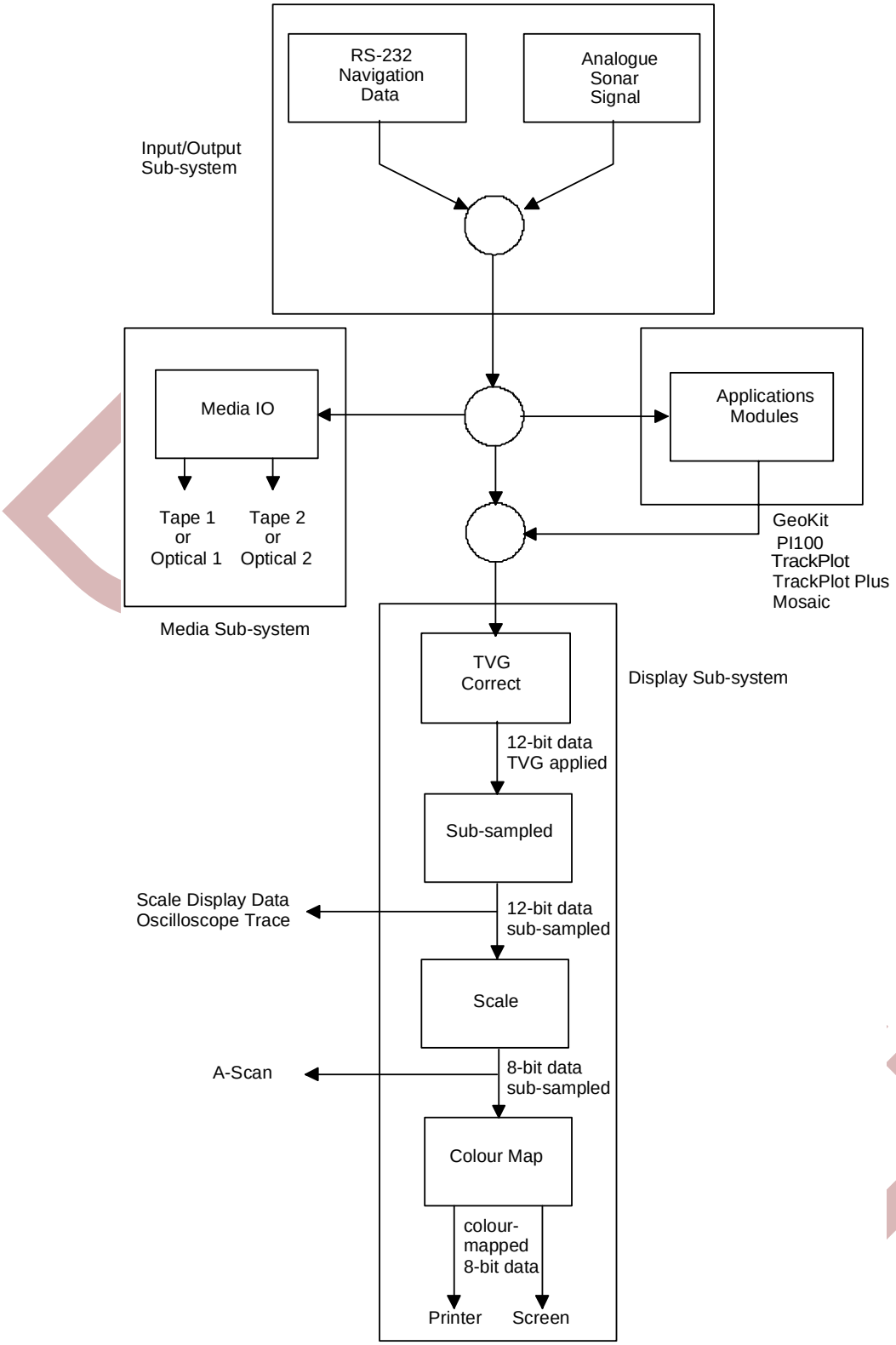

Figure 14-1 Data Flow in the DA System

A single program running as a real-time process in the Unix operating system digitises the incoming analogue data and reads in RS-232 navigation data. The incoming analogue data is time stamped with the ping time (in *UTC*), and the latest navigation data is combined with it. Note that the navigation data, the *acquisition parameters* and the ping time are all stored for each *data channel* and each *ping* with the digitised analogue data (see Appendix E for a description of the data stored in the **Coda** data format). Once this process of combination has been carried out, the data is available either within the DA System system (for use by the media IO sub-system or the display sub-system), or optionally over Ethernet.

The media IO sub-system is responsible for saving full resolution data to tape or optical disk. If dual drives are fitted, the recording can be continuous, without the need to pause for tape or disk changes. Otherwise, a brief gap will appear in the recorded data during the change period. It should be noted that the media IO and the acquisition sub-systems are independent of the user interface and display systems.

When the full resolution data has been transferred to the display sub-system, *TVG* curve compensation can be carried out. This allows compensation for a *sidescan sonar*'s inbuilt TVG curve, if required. This compensation is carried out on the 12-*bit* digitised data, and is controlled by the user through the **TVG Enhancement** option in the **Processing** menu (see Section 7.5). The ideal at this point is to obtain a signal whose mean and minimum values are constant.

The display sub-system receives a constant stream of full resolution, 12-bit digital data, which has been time-stamped by the acquisition system and has had navigation data appended to it. The display resolution, however, is limited to 8 bits, using a colourmap or *palette* to match incoming digital values to displayed intensities or colours. Moreover, the data is usually acquired at a line length which exceeds the display resolution (1024 pixels, or 512 pixels per display channel). Therefore, the first task of the display sub-system is to decimate or *sub-sample* the incoming data. The sub-sampling is carried out according to the values entered in the **Left/Right Display Channel** window in the **Settings** menu; this reduces the incoming *pixels* in the displayed channels to a number which can be displayed on the screen.

The 12-bit data is then reduced to 8 bits for screen display, again based on parameters input by the user in the **Scale Display Data** window of the **Settings** menu. This defines a linear mapping of the 12-bit data to 8 for display; however, the distribution of intensities in the 12-bit data or the 8-bit data derived from it is unlikely to be uniform. Therefore, a final series of adjustments to the data can be carried out, allowing a non-linear mapping of 8-bit values to displayed intensities or colours. This *LUT* or palette selection is carried out by the user in the **Image Enhancement** toolkit, accessed through the **Processing** menu. Hardcopy or screen dump output uses the same LUT, 12 to 8-bit conversion and line sub-sampling as the screen display. It should be emphasised that the data saved to tape or disk is always full resolution, 12-bit data with no TVG or *image enhancement* corrections applied.

14.5 File Structure of the DA System

All user data is stored on the /home partition of the DA System, ensuring that files loaded by the user cannot corrupt the system software which is held in the /usr partition. The user data is loaded into one of the sub-directories of the /home/dp100 directory – either /home/dp100/setup (for user setup files), /home/dp100/nav (for corrected navigation data), /home/dp100/tag (for tag database files), /home/dp100/lib (for other system files) or /home/dp100/log (for system log files). No direct interaction of the DA System user with these directories is permitted by the system; nor does the DA System create files in any other directories on the system. The **Make Clean** option in the **Maintenance Menu** allows the owner of a DA System system (or any user with access to the install password) to empty the setup, navigation, lib, and tag directories.

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15 DA System Specifications

15.1 Trigger Input

Trigger type: TTL

Equivalent TTL loads: 1

Overvoltage Protection: ± 40V

Minimum Pulse Width: 40ns

Trigger Type: Positive, edge sensitive

15.2 Trigger Output

Trigger type: TTL

Overvoltage protection: ± 40V

Trigger type: 50% duty cycle clock

15.3 Analogue Input

Voltage Ranges: ±1.25, ±2.5, ±5, ±10V

System Error (±1.25V): ±0.05%FSR

System Error (±2.5, ±5, ±10V): ±0.07%FSR

Overvoltage Protection: ±35V on, ±20V off

ESD Protection: 1.5kV

Throughput: 250KHz

Resolution: 12 bits

Input Impedance (ON channel): 100MW/100pf

Input Impedance (OFF channel): 100MW/10pf

CMRR: 80dB typ. @ 60Hz

Sample Clock: 5MHz, 15ppm accuracy, divided down to sample frequency

Internal Trigger Clock: 5MHz, 15ppm accuracy, divided down to trigger frequency

15.4 Parallel Output

Bi-directional parallel port with Enhanced Parallel Port support

15.5 Serial Input/Output

Baud rates: 110, 300, 600, 1200, 2400, 4800, 9600, 19200

Handshaking: Xon/Xoff, Hardware or None

Data bits: 7 or 8

Parity: Even, Odd or None

Stop bits: 1 or 2

Connector: 9-way D type (male). Input on pin 2, ground on pin 5; or
25-way D type (male). Input on pin 2, ground on pin 7

15.6 GPIB Output

Data Rate: Up to 1MByte/second.

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Compatibility: IEEE488.1, IEEE488.2 – SH1, AH1, T5, TE5, L3, LE3, SR1, PP1, PP2, RL1, C1, C2, C3, C4, C5, E1, E2

Connector: IEEE488 standard 24-pin

15.7 Monitor Output

Vertical Refresh Rate: 80Hz

Horizontal Line Rate: 65.5KHz

Display Resolution: 1040x780 pixels

Video Signal: Analogue, 1.0V p-p, 75W, positive

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Part IV: Getting Help

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16 Getting Help

16.1 The Help Menu

The **Help** menu gives you access to more information about the DA System and its modules, and about Coda Technologies.

Figure 16-1 The Help Menu

16.1.1 Key Shortcuts

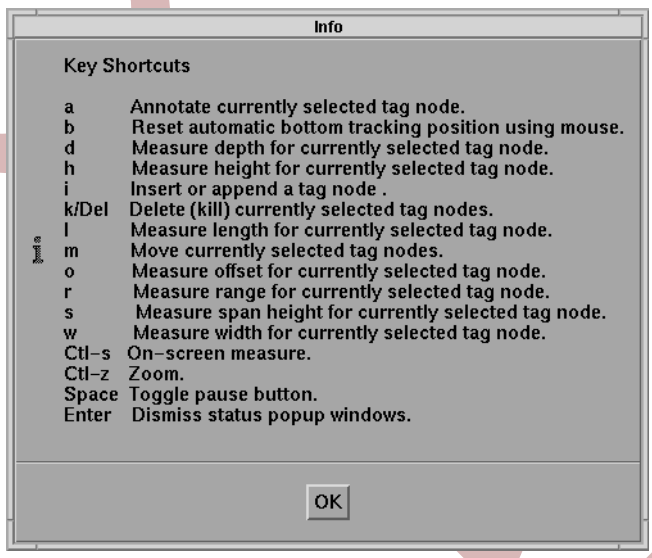

Figure 16-2 The Key Shortcuts Pop-up Window

Selecting the **Key Shortcuts** menu item produces pop-up which lists the keys that can be used to initiate tasks which are otherwise available via the menu bar. The number of short-cut keys available depends upon the module of the DA System being used. For example, the <s> key allows span heights to be measured when using the PI100 module. To use a short-cut key, position the pointer in the display area if it is not there already, and then press the appropriate key or keys.

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16.1.2 Technical Support

Figure 16-3 The Technical Support Pop-up Window

The **Technical Support** menu item provides brief details for contacting Coda's Technical Support Team. Full details of this 24 hour service can be found in 'Technical Support' inside the front cover of this manual and in Section 16.

16.1.3 Product Information

The **Product Info** menu item can be selected to pop up a window describing the modules available for the DA System system. These are also listed on the inside of the back cover of this manual.

16.1.4 Coda Technologies Info

Selecting this item from the **Help** menu pops up a window providing contact information for Coda Technologies.

16.1.5 DA System Version

Selecting this menu item pops up a window listing the version numbers of the software installed on the DA System. These can be compared with the version numbers supplied with Coda Technologies update packages and should be quoted when contacting Coda Technologies about the DA System.

16.2 24 Hour Technical Support

Coda Technologies operates a 24 hour telephone support service for users with technical queries or problems. Should you need to use this service, call one of the numbers below. Out of hours calls are diverted to mobile phones to ensure a swift response.

USA – tel: 1 888 340 CODA
Rest of the World – tel: +44 131 553 7003

When you call, please have the following information available:

1. Your contact telephone (and fax) number.
2. The Coda system serial number. This is stamped on the tamper-proof label at the rear of the DA System.
3. The version of the software currently running on your DA System. This is listed in the **Help** menu under **DA System Version** (see Section 16.1.3).

Your call will be logged and allocated a technical support reference number which you should note for future reference.

Less urgent Technical Support matters can also be addressed by e-mail to:

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support@coda.co.uk or support@coda-technologies.com

The following list of common problems should first be reviewed before contacting Coda Technical Support.

16.3 Troubleshooting the DA System

Image lacks contrast/has too much contrast

- In acquisition mode, check that the input voltage range selected in the **Channels 1-4** tab of the **Open Acquisition** menu is correct (see Section 5.2).
- Select the **Scale Display Data** item in the **Settings** menu. Proceed as outlined in Section 5.3 to ensure the incoming signal is converted to displayed intensities correctly.
- Use the **Image Enhancement** toolkit under the **Processing** menu to set a gamma value which optimises the displayed data greyscale; or select and manipulate the colourmap used; or modify the graph mapping incoming intensities to colourmap intensities (see Section 7.5).

Image too dark or bright, across the whole line of data

- see 'Image lacks contrast/has too much contrast', above.

Unable to write to a data tape

- Check that the data tape is not write protected (see Appendix H).

Unable to replay data tape

- Does the **Open Tape Playback** selection produce a meaningful contents list? (See Section 6.2) If so, the tape should play back without difficulty, unless it is physically damaged. If not, check that the tape you are trying to play is a valid **Coda** or **SEG-Y** format tape. Note that DAT tapes recorded on commercial DAT data recorders are not compatible with the DA System.

DAT tapes don't last as long as expected (10 hours for conventional sidescan)

- Check that 120m DDS2 (DAT) tapes are being used, rather than 60m or 90m DDS DAT tapes. Although a 90m tape is three-quarters of the length of a 120m tape, it has only half the capacity.

On-screen measuring gives inconsistent/unreliable results

- Check that the system is using the correct fish altitude value, by turning on the **Bottom Position Line** option in the **Display** menu (see Section 6.5).
- Check that the vessel speed and heading are correct, by checking the **Survey Data** display in the **Display** menu (see Section 8.8).
- If there are problems with either of these in acquisition mode, then there may be a problem in interpreting the navigation data coming into the DA System.

Slant-Range Correction doesn't work correctly

- Check that the system is using the correct fish altitude value, by turning on the **Bottom Position Line** option in the **Display** menu (see Section 5.5).

Bottom tracking line not visible or in wrong place

- Check the fish height value coming into the system by looking at the **Survey Data** window (see Section 8.8). If this value is incorrect, the incoming telemetry value from the navigation string is being read incorrectly, or the automated bottom tracking has mistaken where the first bottom return is, or a nonsensical value has been entered as a fixed fish height.
- If the automated bottom tracking is not following the bottom correctly, either reset the search area using the automatic tracking pointer (see Section 3.6), or redefine the automatic tracking parameters (see Section 5.5). If the automated tracking continues to

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perform badly, it may be that the combination of seabed and water column characteristics are such that it cannot follow the seabed return accurately. In this case, switch to a fixed towfish height, or use the telemetry input.

The message 'No nav updates for xxx seconds' appears

- Check that the navigation computer is producing output by switching to **Nav input off but view unformatted serial input** in the **Navigation Input** menu (see Section 5.4). If no data is visible, check that the navigation computer is working correctly, and that the serial interface setup of the DA System is compatible with that of the navigation computer.
- Check that both ends of the RS-232 cable are properly connected.
- If correctly formatted ASCII raw nav strings can be seen when **Nav input off but view raw serial input** menu item is selected, reselect the **Nav input on** option, and the **Nav Format QC** window (see Section 5.4). If the values appearing in the QC window are not correct, it is probable that the incoming string of serial data is not being interpreted correctly. Either change the format of the incoming serial string, or modify the navigation library entry to interpret the incoming serial data correctly, whichever is easiest and preserves the greatest amount of navigation information.

'No Tape Detected' error

- This is a common error caused by the tape being accessed before it has been initialised by the system. Repeat the **Open Tape** procedure (see Section 6.2). If, however, this problem persists, contact the **Coda** helpdesk.

No input data on display

- Use internal triggering to ascertain that the A/D sub-system is functioning correctly (see Appendix K).
- Ensure that a TTL level external trigger is connected to the BNC labelled **TRIG IN** (see Section 4.3).

Ping rate is half the expected rate

- The usual cause for a ping rate being lower than expected is that the line length that has been selected in the **Open Acquisition** window is too long (see Section 5.2). Try increasing the sampling frequency, or if this is at the maximum value, decrease the line length.

CPU Overload – for example, very slow display

- Try turning off **TVG**, **Slant Range Correction** or **Raw A-Scan** display (see Section 7.3, Section 7.7.2.1 or Section 8.7).

> Note: **TVG**, **Slant Range Correction** and **Raw A-Scan** display all use relatively large amounts of computing power, whilst **Image Enhancement** uses almost none.

Login problems (**Maintenance Menu**)

- Ensure that the Caps Lock key isn't on – Unix logins are *case sensitive*.

Problems saving tags

- If the error 'Unable to write tag – file system full' appears, this indicates that the DA System file system hard disk is full, and that it is not possible to add more tags to the tag database. To cure this, use the **Tag Management** item in the **Tagging** menu to delete some of the tag files on the system (see Section 10.9). This error will only occur if there are either a very large number of tag files on the system, a very large number of navigation correction files on the system, or the tag files on the system are very large.

Problems loading **Corrected Nav** files

- The file system may be full. See the comments under 'Problems saving tags' (above).

'No tapes detected for playing' error

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- The DA System system has been unable to find any tape devices on the SCSI bus, and will be unable to playback or record data. If this message appears, contact Coda Technologies' Technical Support in Section 16.2.

'Unauthorised Software – Contact Coda Technologies Ltd'

- The copy protection mechanism has detected that the software being used is not an authorised copy. If, having first rebooted the machine and attempted to restart, this warning continues to appear and the software was obtained from Coda Technologies or their recognised agents, contact them for rectification of this problem.

- Ensure that the Coda system is NOT connected to a printer which is powered off.

'Unrecoverable medium error'
This error may appear if a sequence tape control command fails for some reason. The following steps should be taken:

- Reselect **Open Tape Playback** from the **File** menu, and continue tape playback (see Section 6.2).

- If this fails, eject the tape, re-insert the tape and then select **Open Tape Playback** again.

- If this fails, re-start the viewer and select **Open Tape Playback**.

- If all of the steps above fail, shutdown and re-boot the system.

The display does not scroll in acquisition or playback mode

- Ensure that two display channels have been selected (see Section 6.3). The DA System requires two display channels to be operating before it can scroll the waterfall display

DA System 'locks up' completely
The DA System can only lock up under very unusual circumstances; most users will never experience this. The following remedies should be attempted

- Check whether the system is still recording (indicated by intermittent flashes of the SCSI light). If so, the data will still be being written to the tape. You may wish to follow these next instructions once it is convenient to stop recording.

- If mouse movements cause the pointer on the screen to move and the DA System display responds, then select the **Restart** option from the **File** menu (see Section 13.1).

- If mouse movements cause the pointer on the screen to move, but selection of the **File** menu is not possible, activate the **Title Bar Menu** (see Section 12.2) and select the option **Restart DAx00** from this menu.

- If selection of the **Title bar Menu** is not possible, then the operating system has crashed. Remove all tapes from the tape drive units, and use the **Reset** switch on the DA System front panel to cause the system to reboot itself (see Section 12.2).

'Channel X samples for longer than its trigger period'

- This error message can appear if the total time spent sampling by a given channel, plus the start delay for that channel, add up to more than the trigger period selected (internal triggering only). Either increase the sampling frequency (to obtain the desired number of samples in a shorter period), or if this is not possible (for example, the sample rate is at the maximum value), reduce the start delay (to decrease the overall time from the arrival of the trigger pulse to the end of sampling) (see Section 5.2).

Hardware fault LED on (DAT tape drive)

- If the right-hand amber LED on a DAT tape drive stays lit, a hardware fault has occurred on the drive. Shut down and power off the DA System system and re-boot it to cure the fault. If this has no effect, contact Coda Technologies.

The system does not accept incoming navigation data, even though the correct string format has been selected.

- Ensure that the format you have selected has not been edited to make it incompatible with

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the incoming navigation data. If a standard string is being used (for example, Coda, NMEA), select **Default Formats** in the **Navigation Format Editor** (accessed as **Add New Format** in the **Nav Input** pop-up in the **File** menu.

DAT tapes recorded on instrument recorders (for example, TEAC, Sony) will not replay.

- DAT tapes which have been recorded using instrument recorders (for example, TEAC and Sony recorders) cannot be replayed directly using the DA System. These tapes have not been recorded in a computer-compatible digital format and must be re-digitised to replay them using the DA System. The instrument recorder outputs can be connected to the BNC input channels on the DA System (see Section 4.3). However, navigation information will inevitably be missing, resulting in many of the on-screen measurement and location functions being unavailable.

The keyboard short-cut keys (<Control-c>, menu shortcut keys) stop working.

- Ensure the Caps Lock key is off.
- Shut down the machine using the **Shutdown** option in the **File** menu.
- Make sure that the pointer is located in the Data Display Area.

The tape unit LED does not flash continuously during data recording to tape, although the correct data acquisition procedure has been followed.

- Provided the HDD light on the DA System front panel is flashing continuously, data will be recording successfully (see Section 4.1.1). The tape drive LED not flashing continuously does not indicate a problem with data acquisition.

'Write protect' error message appears during data acquisition.

- If the tape has been write protected (see Appendix H), eject the tape, ensuring it is labelled correctly, and replace with a blank, unprotected, tape.
- This error message can also be caused by using a non-DDS tape in DAT tape systems. See Appendix H for details of the correct tape type to use.

Caution: The status of the write-protect tab on the tape must not be changed while the tape is in the tape drive. Doing so can lead to damage to the tape or to the tape drive.

The system fails to display the Coda screen when first switched on.

- Ensure that the mouse or trackball is connected to the correct port – COM1 (see Section 4.3).

Fix number, speed of sound and time/date have spurious values when Coda nav format is used for the nav string.

- Make sure that the line name given to the Coda nav string contains no spaces. Use, for example, underscore instead (see Appendix B).

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Part V: Appendices

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A Example Acquisition Setups

Owing to the constraints of the A/D hardware, some combinations of acquisition settings which have been selected may not be configurable by the system. If this is the case, two warning pop-ups will be displayed; the first will warn you that the current settings are not possible and the second will tell you which particular setting is invalid. Detailed descriptions of valid example acquisition setups can be found in Appendix A.

The constraints placed on the settings by the acquisition hardware are detailed below.

Note: The sampling frequencies entered in the **Open Acquisition** pop-up must be integer divisors of the highest sampling frequency of any of the triggers. (That is, the frequency must divide into the highest sampling frequency with no remainder.) For example, in an acquisition setup with 3 active channels, valid sampling frequencies could then be 20KHz, 10KHz and 40KHz respectively, as 20KHz and 10KHz are integer divisors of 40KHz (the highest of the three frequencies). Invalid frequencies would be 30KHz, 25KHz and 40KHz as neither 30KHz nor 25KHz is an integer divisor of 40KHz.

1. The sum of all sample frequencies must not exceed 160KHz.
2. All sample frequencies must be an integer divisor of the highest sample frequency.
3. The maximum number of samples for any channel must not exceed 20,480.
4. The maximum number of samples for any trigger must not exceed 32,000.
5. An internal trigger period should always exceed the sweep time for any channel on that trigger by at least the system dead time.
6. The minimum allowable sample frequencies for sidescan and seismic channels are 14KHz and 3.5KHZ respectively.
7. The shortest allowable trigger period is 34 msecs.
8. Widescan channels on an internal trigger should not have a trigger period of less than 67 msecs.

Custom Sidescan

- **Sample Freq (Hz)** determines the number of samples used to represent the incoming data and can be altered via a text-entry box. The default sample frequency of 40 000Hz (40KHz) per data channel can be altered by clicking on the text-entry box and edited using the keyboard. It is very important to ensure that the sampling frequency is high enough to prevent *aliasing* or undersampling. Typical suggested sample frequencies are given in Appendix A. The minimum sampling frequency is 14KHz; the maximum sampling frequency is 160KHz overall, in other words if four channels are being used, the maximum frequency for each channel is 40KHz.
- **Samples/Ping** is the number of samples used for each ping return. It can be altered via the associated text-entry box. This setting affects the time over which the signal is sampled and hence the sampled range of the input sidescan signal, or the sampled depth for a seismic signal. For example, with a sampling frequency of 40KHz and 2560 samples per line, this gives a sampling time of $\frac{2560}{40000} = 0.064$ seconds. For a typical speed of sound in water of 1500m/s, this will give a distance of $0.064 \times 1500 = 96$ metres. The slant range is therefore $\frac{96}{2} = 48$ metres.

  Note: If samples per ping is set too high, it may take so long to collect the required number of samples that the next trigger is missed. This will result in the beginning of the next pulse being displayed as a continuation of the current ping. The sampled ping rate (indicated by the lines per second in the General Information Area) will also appear to halve, as every second trigger will be ignored. To remove this effect, decrease the number of samples per ping.

- **Start Delay (ms)**: the delay in milliseconds between the end of any discarded signal and starting to acquire data. This can be used (for example) to reduce the length of the sampled water column. The default start delay is 0 milliseconds, but can be increased for each data

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channel in the appropriate text-entry box. When a start delay has been entered in the text-entry box, this will be used in calculations where appropriate.

- **Fixed Sweep Time Sonar**: a *toggle* to indicate whether or not the input is from a fixed sweep-time sonar. If **No** (the default) is selected, the **Fixed Sweep Time Range** and **Discarded Signal** text-entry box is greyed out. (Most sonar inputs are not of the Fixed sweep-time type.)
- **True Range (m)**: when Fixed sweep-time sonar is selected this allows the range in metres to be entered for the Fixed sweep-time sonar. When Fixed sweep-time is not selected, this displays the calculated range from the sampling frequency and samples per ping.
- **Discarded Sig (ms)**: a text-entry box which is used to enter a value, in milliseconds, for the amount of signal to be discarded after the trigger is received. The discarded portion of the signal is not taken into account in any calculations (see **Start Delay**). Its intended use is for extracting a single channel from composite sidescan signal, for example, Ultra Widescan. A discarded signal can only be entered when a fixed sweep time sonar has been selected.

  Note: This field should be used with extreme caution – the portion of the signal discarded cannot be recovered after acquisition.

- **Trace Reversed**: if this option is selected (by default it is off), the order of the samples in a ping of data will be reversed before they are recorded or displayed. This option should only be selected when recording data from sidescans which output their port and starboard channels as one composite channel of data (for example, Ultra Widescan). In this instance, both data channels (**CH1** and **CH2**, or **CH3** and **CH4**) should be connected to the composite signal, and the two channels separated in the A/D conversion process using the **Discarded Sig** setting. Due to the nature of the composite ping, one data channel is digitised in reverse order, so the ping reversed field for that channel should be set. It is easy to establish which data channel is reversed, as the outgoing pulse and water column will appear at the outer edge of the display area, rather than the centre.

A.1 Default Setups

The Acquisition pop-up has been designed so that users can use standard settings or more detailed customised settings. The standard settings allow you to simply input the true range for sidescan sonars and the Sweep Time and Start Delay for shallow seismic sonars. The only other parameters that need to be set up for standard settings are Trigger (A or B), Input Voltage Range (±1.25v, ±2.5v, ±5v, ±10v) and the description (SS port, SS starboard, Seismic) as described in Section 5.2.

The following example setups describe the more detailed options to allow customised settings to be used where greater flexibility during acquisition is required.

A.2 Description of Sidescan Parameters for Custom Settings

There are five important parameters in the acquisition pop-up window, each interlinked and related to the others. The relationship between these parameters governs the setup for data acquisition. The five parameters are:

1. Trigger Period
2. Samples Per Ping
3. Sampling Frequency
4. Slant Range
5. True Range

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1. Trigger Period

This represents another method of presenting the triggering rate, or ping rate. If the DA System system is triggered externally, this value is computed automatically and can be read from the General Information Area, as it corresponds to the **pings/s**. If the sonar is triggered by the DA System (that is, an internal trigger is output via the **Trigger Out** connection) this value can be automatically calculated by the system or computed by the user to ensure that:

- it provides a trigger at the correct rate
- it is not in conflict with the samples per ping and sampling frequency values, as outlined below.

2. Samples per Ping

The number of samples or pixels (or dots) used to digitise each ping. This corresponds to the number of pixels which would be drawn across a thermal recorder's sheet for the channel.

3. Sampling Frequency

The rate at which the digitising hardware samples the incoming analogue data. The sampling frequency must be high enough to ensure that the required number of samples per ping are acquired for each successive trigger.

These three parameters are closely related according to the expression:

$$\mathrm{SamplingFrequency} \geq \mathrm{NumberOfPingsPerSecond} \times \mathrm{SamplesPerPing}$$

Therefore, $\mathrm{SamplingFrequency} \geq \mathrm{TriggerRate} \times \mathrm{SamplesPerPing}$

$$\mathrm{SamplingFrequency} \geq \frac{1}{\mathrm{TriggerPeriod}} \times \mathrm{SamplesPerPing}$$

4. Slant Range

The trigger period, samples per ping and sampling frequency parameters are also related to the slant range of the survey as this governs the triggering rate. For example, a 50m slant range sidescan sonar survey would have the following setup:

Range = 50 metres, therefore the time between triggers should allow sound to travel 50m through the water and 50m back to the transducer – a total of 100m.

Sound travels through water at approximately 1500 metres/s so it would take at most $\frac{100\mathrm{m}}{1500\mathrm{ms}} = \frac{1}{15}$ seconds for the ping to leave the transmitting transducer and return to the receiving transducer. So the maximum triggering rate is 15 pings/second. This corresponds to a sweep time of 67ms (milliseconds).

Now that the triggering rate (ping rate or pings/s) has been established as 15 pings every second we can determine the best sampling frequency for a desired number of samples per ping.

For high resolution digital data it is desirable to have a high number of samples per ping. The screen can display a maximum of 1024 pixels at any time, but using the flexibility of the channel settings of the zoom function, data can be displayed, processed, and interpreted at much higher resolutions. We recommend that data be acquired and recorded in multiples of 512 (for example, 1024 samples/ping or 2560 samples/ping).

Continuing with our example, if we have a 50m slant range survey and, therefore, a ping rate of 15 pings/second and we decide on 2560 samples/ping, we can calculate the minimum sampling frequency according to the expression

$$\mathrm{SamplingFrequency} \geq \mathrm{Sweeptime} \times \mathrm{SamplesPerPing}$$

as described above.

Therefore the minimum sampling frequency is

$$\mathrm{SamplingFrequency} \geq \frac{1}{0.067} \times 2560$$

$$\mathrm{SamplingFrequency} \geq 38400\mathrm{Hz}$$

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This is 38.4KHz which can be increased to 40KHz to allow for very short gaps between the sampling of successive triggers.

5. True Range

The true range of a sidescan swathe is defined by the slant range and the altitude of the sidescan towfish. Generally, the towfish is towed at an altitude of 10% of the true range, as illustrated below:

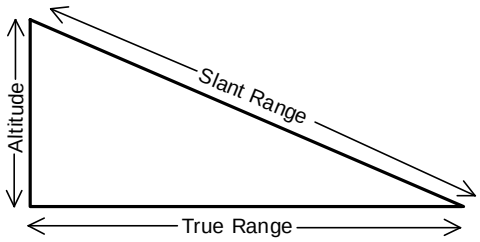

Figure A-1 Calculation of True Range

If, for example, the towing altitude is 10m and the true range is 100m, then the slant range required (by Pythagoras) will be $\sqrt{100^2 + 10^2} = 100.500\text{m}$. Thus, the towing altitude and the desired true range are used to define the slant range, which the user can control by altering the number of samples per ping and the sampling frequency (2. and 3. above).

Note that changing the towing altitude for a given slant range will affect the true range to some extent – raising the towfish decreases the true range. When automatically deriving the slant range (and thereby sampling frequency and number of samples per line), the DA System assumes a towing altitude of up to 40% of the true range. This has the effect that if the fish is at 10% of the true range, the actual true range obtained is greater than the required true range.

For example, a minimum true range of $100\text{m} \Rightarrow 40\text{m}$ maximum towing height:

So the required slant range = $\sqrt{100^2 + 40^2} = 107.7\text{m}$

If the actual towing altitude is 10m, with a slant range of 107.7m,

the actual true range of swathe data = $\sqrt{107.7^2 - 10^2} = 107.2\text{m}$

A.2.1 Example Sidescan Setups

A.2.1.1 Typical Sidescan Sonar, 50m True Range

Requirement:

The DA System is required to digitise the two analogue channels of data (Port and Starboard) from a sidescan sonar operating at a true range of 50 metres. An external trigger is to be used.

Explanation:

Two channels (1 and 2 in this case) will be active, and will be labelled Sidescan Port and Sidescan Starboard.

The sample frequency is determined as follows:

- It is desirable to collect as many samples as possible from the sidescan signal; where possible, the number used should be a multiple of 512, as this is the width available per display channel in the data display area of the screen.
- The minimum sample frequency used should be about 20KHz, to ensure that no *aliasing* of the signal occurs.
- Using a maximum towfish altitude of 40% of true range, the required slant range is $\sqrt{50^2 + 20^2} = 53.85\text{m}$. The range is 53.85m, giving a maximum ping rate of approximately $\frac{1500}{(2 \times 53.85)} = 13.93\text{Hz}$. To fit 1024 samples into a period of $\frac{1}{13.93} = 71.8\,\text{ms}$ would give a

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sample period of $\frac{71.8}{1024} = 70.1\mu s$ or a sample frequency of 14.3KHz. Similarly, 1536 samples would give a sample frequency of 23.1KHz, 2048 samples a frequency of 28.5KHz, and 2560 samples a sampling frequency of 35.7KHz. Therefore, choose 2560 samples per data channel, and a sample rate of approximately 35.7KHz.

- Allow a 'dead' time of at least 2ms before each trigger.

No start delay or line reversal is required (the line reversal toggles are all off), and the range will be calculated from the elapsed time since the trigger pulse, so range should be set to **Auto**.

The trigger should be trigger A, which should be set for an external trigger.

The choice of voltage range will depend on the voltage produced by the sidescan, which will in turn depend on the towing altitude, input gain, TVG curve, and so on. A setting of ±1.25 or ±2.5 volts is usual.

A.2.1.2 Typical Sidescan Sonar, 100m True Range

Requirement:

The DA System is required to digitise the two analogue channels of data (Port and Starboard) from a sidescan sonar operating at a slant range of 100 metres. An external trigger is to be used.

Explanation:

Two channels (1 and 2 in this case) will be active, and will be labelled Sidescan Port and Sidescan Starboard.

The sample frequency is determined as follows:

- It is desirable to collect as many samples as possible from the sidescan signal; where possible, the number used should be a multiple of 512, as this is the width available per display channel in the data display area of the screen.
- The minimum sample frequency used should be about 20KHz, to ensure that no aliasing of the signal occurs.
- Using a maximum towfish altitude of 40% of true range, the required slant range is $\sqrt{100^2 + 40^2} = 107.7\text{m}$, giving a maximum ping rate of approximately $\frac{1500}{(2 \times 107.7)} = 6.96\text{Hz}$. To fit 1024 samples into a period of $\frac{1}{6.96} = 143.6\text{ms}$ would give a sample period of $\frac{143.6}{1024} = 0.14\text{ms}$, or a sample frequency of 7.13KHz. Similarly, 2560 samples would give a sample frequency of 17.8KHz, 4096 samples a frequency of 28.52KHz, and 5120 samples a sampling frequency of 35.6KHz. Therefore, choose 5120 samples per data channel, and a sample rate of approximately 35.6KHz
- Allow a 'dead' time of at least 2ms before each trigger.

No start delay or line reversal is required (the line reversal toggles are all off), and the range will be calculated from the elapsed time since the trigger pulse, so range should be set to **Auto**.

The trigger should be trigger A, which should be set for an external trigger.

The choice of voltage range will depend on the voltage produced by the sidescan, which will in turn depend on the towing altitude, input gain, TVG curve, and so on. A setting of ±1.25 or ±2.5 volts is usual.

A.2.1.3 Ultra Widescan, 50m True Range

Requirement:

The DA System is required to digitise data from an Ultra Widescan sonar, operating at 50m true range. The sweep period of the output from the Widescan is 67ms. An external trigger is to be used.

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Explanation:

Channels 1 and 2 will be digitised, and are labelled Sidescan Port and Sidescan Starboard.

The sampling frequency is arrived at as follows:

- The sweep time is 67ms, so it is necessary to capture as many samples as possible in that time. The sweep time allows 33.5ms per data channel, over which the minimum effective sample rate should be 20KHz (to avoid aliasing of the signal); this implies a minimum actual sample rate of 40KHz, as 67ms of data per channel has been compressed into 33.5ms per data channel.
- The number of samples per data channel should be a multiple of 512, to allow each data channel to occupy half the width of the data display area of the DA System.
- A line width of 1024 samples per data channel requires a sample period of $\frac{33.5\text{ms}}{1024} = 0.0327\text{ms}$, or a sample frequency of $\frac{1000}{0.0327} = 30.58\text{KHz}$. Similarly, 1536 samples implies a sample frequency of 45.9KHz. Therefore, choose a sample frequency of about 45.9KHz
- Allow a 'dead' time of at least 2ms at the end of each line.

The **discarded signal** for the starboard channel should be set to around 33.5ms (but can be adjusted to ensure that the outgoing pulse of the starboard data channel is aligned with the beginning of the acquired data for the starboard channel). This is because the delay for the first data period for the first data channel is 0, but about half the sweep period for the second data channel.

The **line reversed** field will be set by default for the Port data channel, as this channel is received 'backwards'. The line reversed field for the Starboard data channel is not set.

The **range** setting for both channels is 50m, to ensure that the DA System can calculate measurements correctly, in spite of the fact that the distance of a sample from the start of the line is not proportional to the speed of propagation of sound through water.

The trigger will be trigger A, and is set to external.

The voltage range output by the Ultra is 0–5V, so the DA System should be set to its ±5V range.

Note: As the Ultra produces output on a single, composite data channel, the output analogue output of the Ultra should be connected to both CH1 and CH2 BNC connectors.

A.2.1.4 Ultra Widescan, 100m True Range

Requirement:

The DA System is required to digitise data from an Ultra Widescan sonar, operating at 100m true range. The sweep period of the output from the Widescan is 67ms, although the actual time to capture a channel of data is 134ms. An external trigger is to be used.

Explanation:

Channels 1 and 2 will be digitised, and are labelled Sidescan Port and Sidescan Starboard.

The sampling frequency is arrived at as follows:

- The sweep time is 67ms, so it is necessary to capture as many samples as possible in that time. The sweep time allows 33.5ms per data channel, over which the minimum effective sample rate should be 20KHz (to avoid aliasing of the signal); this would imply a minimum actual sample rate of 60KHz, as 134ms of data per data channel has been compressed into 33.5ms per channel.
- The number of samples per data channel should be a multiple of 512, to allow each data channel to occupy half the width of the data display area of the DA System.
- A line width of 1024 samples per data channel requires a sample period of $\frac{67\text{ms}}{(2 \times 1024)} = 0.0327\text{ms}$ or a sample frequency of $\frac{1000}{0.0327} = 30.56\text{KHz}$. Similarly, 2048

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samples implies a sample frequency of 61.2KHz. Therefore, choose a sample frequency of about 61.2KHz.

- Allow a 'dead' time of at least 2ms at the end of each line.

The **discarded signal** should be set to around 33.5ms (but can be adjusted to ensure that the outgoing pulse of the starboard data channel is aligned with the beginning of the acquired data for the starboard channel). This is because the delay for the first data channel is 0, but about half the sweep period for the second data channel.

The **line reversed** field will be set by default for the Port data channel, as this channel is received 'backwards'. The line reversed field for the Starboard data channel is not set.

The **range** setting for both channels is 100m, to ensure that the DA System can calculate measurements correctly, in spite of the fact that the distance of a sample from the start of the line is not proportional to the speed of propagation of sound through water.

The trigger will be trigger A, and is set to external.

The voltage range output by the Ultra is 0–5V, so the DA System should be set to its ±5V range.

Note: As the Ultra produces output on a single, composite channel, the output analogue output of the Ultra should be connected to both CH1 and CH2 BNC connectors.

A.2.2 Default Sidescan Setups

The following table shows the settings used by the DA System system for a Standard Sidescan data channel.

True Range (m)	Slant Range (m)	Trigger Period (msec)	Trigger Rate (pings per sec)	Sample Frequency (Hz)	Samples/ Channel
25	27	38	26.3	42 784	1536
50	54	74	13.5	35 654	2560
100	108	146	6.8	19 609	2816
150	162	218	4.6	19 015	4096
200	216	290	3.4	19 609	5632
400	432	580	1.7	14 000	8042

A.2.3 Default Widescan Setups

The following table shows the settings used by the DA System system for a Widescan data channel.

True Range (m)	Slant Range (m)	Trigger period (msec)	Trigger Rate (pings per sec)	Sample Frequency (Hz)	Samples/ Channel
50	54	69	14.5	40 000	1340
150	162	69	14.5	40 000	1340
250	270	69	14.5	40 000	1340
350	377	69	14.5	40 000	1340

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A.3 Description of Shallow Seismic Parameters for Custom Settings

6. **Sample Freq (Hz)** determines the number of samples used to represent the incoming data and can be altered via a text-entry box. The default sample frequency of 40 000Hz (40KHz) per data channel can be altered by clicking on the text-entry box and edited using the keyboard. It is very important to ensure that the sampling frequency is high enough to prevent *aliasing* or undersampling. Typical suggested sample frequencies are given in Appendix A. The minimum sampling frequency is 3.5KHz; the maximum sampling frequency is 160KHz overall, in other words if four channels are being used, the maximum frequency for each channel is 40KHz.
7. **Samples/Ping** is the number of samples used for each ping return. It can be altered via the associated text-entry box. This setting affects the time over which the signal is sampled and hence the sampled range of the input sidescan signal, or the sampled depth for a seismic signal. For example, with a sampling frequency of 40KHz and 2560 samples per line, this gives a sampling time of $\frac{2560}{40000} = 0.064$ seconds. For a typical speed of sound in water of 1500m/s, this will give a distance of 0.064 x 1500 = 96 metres. The range is therefore $\frac{96}{2} = 48$ metres.

   Note: If samples per ping is set too high, it may take so long to collect the required number of samples that the next trigger is missed. This will result in the beginning of the next pulse being displayed as a continuation of the current ping. The sampled ping rate (indicated by the lines per second in the General Information Area) will also appear to halve, as every second trigger will be ignored. To remove this effect, decrease the number of samples per ping.

8. **Start Delay (ms)**: the delay in milliseconds between the start of the trigger and starting to acquire data. This can be used (for example) to reduce the length of the sampled water column. The default start delay is 0 milliseconds, but can be increased for each data channel in the appropriate text-entry box. When a start delay has been entered in the text-entry box, this will be used in calculations where appropriate.
9. **Total Sweep Time**: a label showing the calculated sweep time for the given input values.

The important parameters for acquisition of shallow seismic data are similar to those for sidescan. These parameters are:

1. Trigger Period
2. Samples Per Ping
3. Sampling Frequency
4. Sweep Time (corresponding to range depth)

Again, these parameters are interrelated in a similar way to that described in Section A.2

1. Trigger Period

This represents another method of presenting the triggering rate, or ping rate. If the DA System system is triggered externally, this value is computed automatically and can be read from the General Information Area, as it corresponds to the **pings/s**. If the sonar is triggered by the DA System (that is, an internal trigger is output via the **Trigger Out** connection) this value can be automatically calculated by the system or computed by the user to ensure that:

- it provides a trigger at the correct rate
- it is not in conflict with the samples per ping and sampling frequency values, as outlined below.

2. Samples per Ping

The number of samples or pixels (or dots) used to digitise each ping. This corresponds to the number of pixels which would be drawn across a thermal recorder's sheet for the channel.

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3. Sampling Frequency

The rate at which the digitising hardware samples the incoming analogue data. The sampling frequency must be high enough to ensure that the required number of samples per ping are acquired for each successive trigger.

These three parameters are closely related according to the expression:

$$SamplingFrequency \geq NumberOfPingsPerSecond \times SamplesPerPing$$

Therefore, $SamplingFrequency \geq TriggerRate \times SamplesPerPing$

$$SamplingFrequency \geq \frac{1}{TriggerPeriod} \times SamplesPerPing$$

4. Sweep Time

The sweep time selected must be long enough to ensure that the correct range is achieved. In addition, the sweep time is related to the sampling frequency and the ping rate. The ping rate should be slow enough or the trigger period should be long enough to ensure that each ping has enough time to travel through the water, penetrate the correct depth and return to the receiving transducer. In mathematical terms this means that:

$$SweepTime \leq TriggerPeriod + DeadTime$$

Allow a 'dead' time of at least 2ms. In order to calculate the correct sweep time from the custom settings, one must use the sampling frequency and samples per ping values.

If one wants a sweep time of 50 milliseconds, one must ensure that sweep time is related to the sampling frequency and samples per ping in the custom settings according to:

$$SweepTime \geq \frac{SamplesPerPing}{SamplingFrequency}$$

In addition, the sweep time determines the range of the ping through water and sediment.

Range = Sweep Time x Velocity of Sound Through Medium

Assuming that all sediments have a speed of sound higher than water, we can calculate the maximum sweep time required for a specific range using:

$$SweepTime = \frac{PenetrationRequired}{VelocityOfSoundInWater}$$

So once the sweep time is calculated for the required range, then the sampling frequency and ping rate can be calculated.

The example which follows should clarify the above theory.

Note: Please note that this theory and the following examples only take into account those parameters for accurate digital data acquisition. Parameters for the shallow seismic sonar itself e.g., sonar frequency which determines the sonar range has not been addressed here. These parameters must be determined by the sonar engineer. As long as the information here is used correctly then the sonar data will be recorded correctly, at the correct resolution and sampling rate.

A.3.1 Shallow Seismic Custom Settings – Example 1

Requirement:

A range of 50m is required (20 metres water depth and 30 metres through clay).

Explanation:

Typical settings can be derived as follows:

The sweep time can be calculated using the expression derived above:

$$SweepTime = \frac{PenetrationRequired}{VelocityOfSoundInWater}$$

Therefore, using a velocity of 1500m/s:

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$$SweepTime = \frac{50}{1500} = 0.033s = 33.3ms$$

To select the correct sampling frequency and ping rate, the following expression is used:

$$SweepTime \geq \frac{SamplesPerPing}{SamplingFrequency}$$

The number of samples per ping should ideally be a multiple of 512, as this is the width of a display channel on the DA System.

The sampling frequency should be high enough to prevent aliasing, and so a minimum sampling frequency of 20KHz should be used.

If this minimum value of 20KHz were used, the number of samples per ping would be defined by:

$$0.0333 \geq \frac{SamplesPerPing}{20000}$$

So, $SamplesPerPing \geq 20000 \times 0.0333$

That is, the number of samples per ping should be at least 667.

However, as the number of samples per ping is the maximum number of points visible on the screen per ping, it would be better to maximise the number. This determines the maximum resolution of the display in a similar way that dots across the paper trace affect the image on thermal paper recorders.

In addition, we wish to make the samples per ping a multiple of 512. Therefore, it would be better to have at least 1024 samples per ping. Doubling (roughly) the samples per ping should double the sampling frequency to maintain the relationship:

$$SweepTime \geq \frac{SamplesPerPing}{SamplingFrequency}$$

So $0.033 \geq \frac{1024}{40000} = 0.0256$, or $33ms \geq 25.6ms$.

These settings are suitable to obtain range of 50m, no aliasing, and good display resolution.

A.3.2 Shallow Seismic Custom Settings – Example 2

There is a requirement to sample the data from a SBP of at least 40KHz. The SBP ping rate is 10Hz, and the master trigger is to be provided by the DA System.

Only the channel with sub-bottom profiler data should be digitised (data channel 1 in this case), and its **Description** field should be set to seismic.

The sample rate is arrived at as follows:

- The line length should be a multiple of 1024 (so that the displayed line will fill the data display area of the screen) – either 1024, 2048, 3072 or 4096 samples.
- The required sample frequency is at least 40KHz, so that would imply that at least $\frac{40000.0}{10} = 4000$ samples would be required. Therefore, use 4096 samples per line.
- Allow a 'dead' time of at least 2ms before each trigger.

No start delay or line reversal is required. Range will be on **Auto** (unused by Seismic type data, in any case). The trigger will be trigger A.

The trigger setup is straightforward – an internal trigger, with a period of 0.1 seconds, is required.

The voltage range selected will depend on the magnitude of the incoming signal; in this instance, a signal which varies between -1.25 and +1.25 volts is assumed.

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A.3.3 Approximate Sound Velocities Table

As mentioned earlier, the sweep time determines the range of the shallow seismic sonar system. For convenience, the following table can be used to convert between sweep time in seconds and range in depth (m).

The range of the shallow seismic profiler is defined in terms of seconds rather than depth. Some rough calculations can convert this time to depth for different seabed types as follows:

Material	Velocity of Sound (approximate)
Clay	1600
Soft Mud	1500
Rock	1800
Gravel	1700

For example, sound travels through soft mud at a rate of 1500ms, so in 25ms (it must be reflected and travel back to the receiver) it would travel a distance of (0.25 x 1500) = 37.5metres. If the same ping were to travel through rock, the range would be (0.025 x 1800) = 45 metres.

A.3.4 Default Sub-Bottom Profiler Setups

The following table shows the settings used by the DA System system for a Standard Sub-Bottom Profiler data channel.

Sweep Time (msec)	True Range (in water, m)	Trigger period (msec)	Trigger Rate (pings per sec)	Sample Frequency (Hz)	Samples/ Channel
50	75	50	20	40 960	2048
100	150	100	10	35 840	3584
200	300	200	5	19 200	3840

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B Coda Navigation Data String

To get the most from the Coda-DA System system, you must ensure that the system has access to the highest quality navigation data available. The following variables should be passed to the system, if at all possible: towfish easting (UTM or lat/long), towfish northing (UTM or lat/long), towfish Kp, towfish DCC, water depth, towfish altitude, towfish speed made good, towfish heading, survey line designation, fix number and system time.

A number of optional navigation string entries are available on the system; new entries can be edited on the system or can be made up by Coda on request. However, we would encourage you to use the 'CODA' string format, as it has all the fields necessary to ensure that features such as on-screen measurement and cursor position reporting function correctly. The nav string should be updated as frequently as possible, though updates at greater than the pulse repetition rate will be ignored.

The output of an accurate system time is vital if the instantaneous navigation data is intended to be updated with corrected navigation data. The time input allows the Coda system to synchronise with the DGPS/nav computer clock, allowing for easy correction of the navigation information stored with each sonar ping. It should be noted that this time must be the time of transmission of the navigation string from the nav computer to the Coda system, rather than the time of the fix. A separate field is provided to allow the delay between obtaining a navigation update and its transmission to the Coda system to be entered. It is important that the clock source used for the system is as reliable and consistent as possible; the reliability of the system may be adversely affected if the incoming time is unreliable or inconsistent.

Two Coda String Formats exist: Coda-Date, which uses a date/time format for the date and time, and the Coda Format, which uses a UTC format for time.

B.1 Coda Format

The Coda string format is an ASCII string which is started with the key 'CODA' followed by floating point values and strings, separated by the ASCII space character and terminated by a carriage return and line feed, as follows:

CODA Easting Northing Kp DCC Depth Altitude Speed Heading Line Fix Soundspeed Delay Time<CR><LF>

The floating point format allows any number of characters before and after the point. The point itself may be omitted if unnecessary.

- **Easting** is UTM or lat/long Easting of the towfish in metres.
- **Northing** is UTM or lat/long Northing of the towfish in metres.
- **Kp** is along-track kilometre point in kilometres.
- **DCC** is distance cross course in metres; this is defined to be negative if the towfish is to port of the survey centreline, and positive if the towfish is to starboard of the survey centreline.
- **Depth** is water depth in metres.
- **Altitude** is towfish altitude in metres.
- **Speed** is towfish speed in knots.
- **Heading** is towfish heading in degrees (0–360).
- **Line** is survey line number or name, as a 15 character ASCII string with NO SPACES.
- **Fix** is last valid fix number.
- **Soundspeed** is the speed of sound through water in metres per second.
- **Delay** is the delay between the fix data being obtained and its time of transmission, in seconds.
- **Time** is system (DGPS) time in seconds since January 1st 1970 (Co-ordinated Universal Time, UTC). To convert date and time to UTC, see Appendix C.

Example:

CODA 123.354 33998.005 12.234 77.09 34.5 10.2 4.3 031.8 RFP1002 344 1503.45 1.03 797619096.002<CR><LF>

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This string means: towfish at easting of 123.354m and northing of 33998.005m, at a Kp of 12.234 km and dcc of 77.09m, in a water depth of 34.5m and a fish height of 10.2m, travelling at 4.3 knots with a heading of 031.8 degrees. The survey line number is RFP1002, and the last valid fix was number 344; the sound velocity was 1503.45 m/s, the delay between fix and transmission was 1.03 seconds, and the date and time of transmission was 20th April 1994, 15:50 and 2 milliseconds.

B.2 Coda-Date Format

The Coda-Date format replaces the UTC 'time' entry with a time entry of the form hh:mm:ss dd:mm:yy; that is, hours, minutes, seconds followed by day, month, and year (since 1900).

Example:

CODA-DATE 123.354 33998.005 12.234 77.09 34.5 10.2 4.3 031.8 RFP1002 344 1503.45 1.03 15:50:00 20:04:94<CR><LF>

(This string has the same meaning as the Coda string given in the example above).

Note: The on-screen measuring and tag position calculation both rely heavily on the accuracy of the incoming navigation data. It is particularly important that jitter or noise in the incoming data is eliminated as far as possible. For instance, the heading information derived from flux-gate compasses (as fitted to towfish) can vary widely over a short period of time. To increase the accuracy of the measurements obtained from the instantaneous navigation data, such noisy inputs should be filtered to reduce the extent of fluctuations. The best quality navigation data, and therefore on-screen positioning, is derived from smoothed or corrected navigation data (see Section 6.6.1).

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C Corrected Navigation Data Format

Section 6.6.1 discusses the details of how to correct navigation data as it is read from tape by the DA System system. Correction of the navigation data requires a floppy disk with an appropriate smoothed or processed navigation file. The format for the corrected navigation file is described below.

The corrected position at each fix is written in ASCII text to the file, with white space (tabs or spaces) separating each entry:

time fix easting northing heading kp dcc layback fish_offset fish_height water_depth

The time should be in UTC format – that is, the time in seconds since 1st January, 1970. (The note at the end of this section shows how to convert a date and time in GMT to UTC.) The Easting and Northing should be in the same format as the original Easting and Northing – metres if the navigation basis was UTM, and degrees if the navigation basis was WGS84; in both cases, the easting or northing should be written as a decimal fraction (for example 59.6543), rather than in degrees, minutes and seconds of arc. The corrected heading should be in degrees (0 to 359.999), Kp in kilometres and dcc, layback and fish_offset in the same units as those originally used when the navigation data was obtained, that is, metres. If a field is not relevant or if no value has been calculated, the character '-', '#' or '*' should be placed in the appropriate column.

Each corrected entry should be on a single line, with entries in ascending time order. If entries are not in ascending order, nav correction will not be applied correctly.

The system's basic frame of reference is the time stamp for each ping, which is why it is necessary for the DA System clock to be synchronised with the navigation clock if navigation correction is to be carried out.

Example:

800984945.435 2116 332348.99 5757666.95 * * * * * * *

This entry means that the correct position for fix 2116 taken at 800984945.435 was 332348.99 East and 5757666.95 North; no update was made to the heading, kp, dcc, layback or fish-offset fields.

It should be noted that navigation data can only be corrected if it lies between two points in the corrected nav file; interpolation to discover actual position and heading is otherwise impossible.

C.1 UTC Time Offsets

UTC Time Offset			UTC
00.00.00	1 January	1970	0
00.00.00	1 January	1996	820454400
00.00.00	1 January	1997	852076800
00.00.00	1 January	1998	883612800
00.00.00	1 January	1999	915148800
00.00.00	1 January	2000	946684800
00.00.00	1 January	2001	978307200
00.00.00	1 January	2002	1009843200
00.00.00	1 January	2003	1041379200
00.00.00	1 January	2004	1072915200
00.00.00	1 January	2005	1104537600

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D Editing Navigation Library Strings

The DA System is delivered with a library for interpreting different navigation data string formats. Users are encouraged to use one of the formats in that library; however, if this is not possible users may create their own interpretation strings. Alternatively, contact Coda Technologies at the address in the front of this manual for further help.

Each navigation library entry allows the DA System to read data from ASCII text received through a serial interface (usually COM2:). The navigation library format is described in the following sections, using the following symbols:

| – indicates logical ‘or’.

[ ] – indicates that the entry enclosed by the square brackets is optional.

The format of the library entry is as follows:

ident "*identifier*"
interpretation_list
endnav

A navigation library entry is defined to consist of a line beginning with the string ‘ident’ followed by an identifier, delimited by double quotes. The identifier must be unique within the navigation library file.

Note: Any of the navigation entries which consists of more than one word should be enclosed in inverted commas, for example "ASCII Text".

Text may be edited in **Edit Nav Formats** using the following options:

- **Selecting Text**: Text may be selected (that is, highlighted on the screen) by pressing the left mouse button at the start of a section of text and dragging the pointer to the end of the desired text. Alternatively, double-clicking the left mouse button with the mouse pointer over a word selects that word. (A word is defined as text delimited by spaces or the beginning/end of a line.) Triple-clicking the left mouse button with the pointer over a line selects the complete line of text. Quadruple-clicking selects all the text in the file.

  Clicking the left mouse button while text is selected deselects the text.

- **Adding Text**: Text may be added by clicking the left mouse button at the desired cursor location. Typing text then inserts the text at that point.

- **Deleting Text**: Text may be deleted by using the Backspace key, to remove text before the pointer, or the Delete key to remove text after the pointer. Selected text (see above) may be deleted by pressing the Backspace key or the Delete key to remove the highlighted selection.

- **Copying Text**: To copy text, select the text to be copied (as detailed above) and click the middle mouse button when the pointer is at the position where the selected text is to be inserted. Clicking the middle mouse button inserts the text.

- **Moving Around the File**: The screen may be scrolled in the desired direction by selecting the appropriate arrow in the scroll bar on the border of the screen. Clicking and dragging the rectangle between the arrows scrolls the screen interactively. A further alternative is to click the left mouse button in the area between the rectangle and the arrows. This causes the screen to be scrolled either up or down by a page. Using the Page Up and Page Down keys on the keyboard, provided the pointer is in the window, produces the same effect. A further option enables a percentage position in the file to be scrolled by clicking the middle mouse button in the area between the rectangle and the arrows in the border (that is, clicking the right mouse button 10% of the way between the two arrows moves 10% of the way through the data, clicking 90% of the way between the arrows moves 90% of the way through the data).

The **Default Formats** option in the **Navigation Format Editor** (accessed by selecting **Edit Nav Format**) can be used to reset the user copy of the navigation string library to its default values.

Note: Any changes that you make are discarded when **Default Formats** is pressed.

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D.1 Navigation Interpretation Lists

A single navigation library entry is composed of an interpretation_list, which is defined to be composed of a setup_list followed by a value_list. The setup_list contains general definitions about the incoming navigation data (whether GMT or local time is being sent, for example), while the value_list is the list of variables which will be updated from the navigation string.

interpretation_list:
setup_list
value_list

setup_list:
setup_entry | value_entry
[setup_list]

setup_entry:
setup_field_name value

From the above, it can be seen that a setup_entry in the setup_list is composed of a setup_field_name followed by a value. The list of setup_field_names and their legal values is given in the following table.

setup_field_name	Value Description	Status
key	a unique identifier for the string	required for group; otherwise optional
nav basis	"LATLONG": incoming values are latitude and longitude "METRES": incoming values are UTM	required
nav termination	The terminator of the string (for example LF, CR) value_entry type	required for ASCII optional for binary
separator	ASCII character which separates navigation string entries value_entry type	required for ASCII not valid for binary multiple separator entries are legal
time basis	"GMT" : incoming time is GMT "LOCAL": incoming time is local	required
update warning	time in seconds for the navigation time-out – if no new data has been received through the RS-232 interface, an error message will appear on the screen	optional (defaults to 30 seconds)

The value_list defines the variables to be updated by the incoming navigation string, and the means of interpretation of the incoming value.

value_list:
value_entry
[value_list]

value_entry:
value_field_name interpretation_entry width_entry [offset [gain]]

The value_list is seen to be a list of value_entries, which are themselves made up of a line beginning with a value_field_name followed by an interpretation_entry, followed by optional offset and gain values. Note that the order of value_entries within the value_list is the order in which incoming ASCII characters in the navigation string will be expected to be parsed.

interpretation_entry:
"ASCII Text"|"ASCII Number"|"Binary Integer" – this defines whether the entry is ASCII (text or value) or a binary integer.

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width_entry:
"Variable"|[0-9][0-9][0-9]|ascii_string – either the word "variable" to show that the field width is variable, or the number of bytes in the field. Binary fields may not be of variable length. An ascii_string is a set of printable ASCII characters, enclosed by quotes if it contains spaces, for example "CODA DATE". An ascii_string is used to define the contents of a field as well as its width (for example for the key field).

Offset and *gain* allow the conversion of the incoming values from one set of units to another (e.g. conversion of speed made good from metres per second to knots). The offset value in the value_entry is added to the incoming value; this operation is defined only if the interpretation_entry contains is "ASCII Number" or "Binary Integer"; it is permissible to set an offset value if the interpretation_entry contains "ASCII Text", but it will be ignored. The gain entry is multiplied by the incoming data value before the offset is added; again, the operation is not defined for character strings, but a gain entry for character strings is legal.

The list of value_field_names is given in the following table.

value_field_name	Incoming Value Interpretation	Units
altitude	altitude of towfish above seabed	metres
cable out	length of cable deployed to towfish	metres
cep heading	heading of major axis of the CEP (0 to 360)	degrees
cep major	length of the CEP major axis	metres
cep minor	length of the CEP minor axis	metres
course	course (0 to 360)	degrees
data age	time from receipt of GPS position data to transmission of RS-232 string from navigation computer	seconds
day	day of month not required if nav_time is set	days
dcc	distance cross course; defined to be positive if towfish track is to the starboard of the survey centreline	metres
depth	depth from sea surface to seafloor	metres
easting	easting if nav_basis is UTM longitude if nav_basis is LATLONG	metres degrees
easting minutes	not required if nav_basis is UTM; minutes of longitude if nav_basis is LATLONG	minutes of arc
east switch	string to match if longitude is East; otherwise longitude is West not required if nav_basis is UTM	ASCII
fix number	fix number	none
fix valid	string to match if this is a valid fix	ASCII
gdop	geometric dilution of precision	none
hdop	horizontal dilution of precision	none
h flap	ROTV horizontal flap. Starboard positive	degrees
heading	towfish or vessel heading in degrees (0 to 360)	degrees
heave	instantaneous heave (up is positive)	metres

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value_field_name	Incoming Value Interpretation	Units
heave velocity	instantaneous heave velocity (up is positive)	metres/sec
hours	hour of day (0 to 23) not required if nav_time is set	hours
interrogate dolphin	string/binary sequence with which to ask for a nav time update	none
interrogation period	interval between requests for nav time updates	seconds
junk	string data to be discarded	ASCII
kp	kilometre post value	kilometre
layback	distance from vessel to towfish	metres
line name	string containing survey line description (maximum 15 characters)	ASCII
milliseconds	number of milliseconds since last integer second	milliseconds
milliseconds in minute	number of milliseconds from the start of the last minute	milliseconds
minutes	minutes of hour (0 to 59) not required if nav_time is set	minutes
minutes in day	number of minutes since 00:00	minutes
month	month of year (1 to 12) not required if nav_time is set	months
nav time	UTC time in seconds since 1st January 1970	seconds
nmen valid	string to match if nav string is valid	ASCII
northing	northing if nav_basis is UTM latitude if nav_basis is LATLONG	metres degrees
northing minutes	not required if nav_basis is UTM minutes of latitude if nav_basis is LATLONG	minutes of arc
north switch	string to match if latitude is North; otherwise latitude is South not required if nav_basis is UTM	ASCII
pdop	positional dilution of precision	none
pitch	instantaneous pitch value; forward rotation is positive	degrees
position fish	source of position information: 0 – ship 1– towfish (defaults to towfish if not set)	none
roll	instantaneous roll; roll to starboard is positive	degrees
seconds	seconds in minute (0 to 59.9999) not required if nav_time is set	seconds
seconds in day	number of seconds since 00:00	seconds
smg	speed made good	knots

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value_field_name	Incoming Value Interpretation	Units
speed of sound	speed of sound in water	metres/sec
surge	instantaneous surge; starboard positive	metres
sway	instantaneous sway; starboard positive	metres
tdop	time dilution of precision	none
temperature	water temperature	degrees Celsius
utm zone	UTM zone number (0 to 60). default is 0 if not set	none
vdop	vertical dilution of precision	none
v flap	ROTV vertical flap setting; up positive	degrees
yaw	instantaneous yaw; starboard is positive	degrees
year	year (AD) not required if nav_time is set	year

D.2 Navigation Groups

The purpose of the navigation group_list is to define a set of navigation library entries which are all legal at the same time – the navigation computer is allowed to send whichever type it prefers or makes most sense.

For a group to be legal, each of the navigation library entries must be able to be distinguished from each other when they are received; this means that the key field (see Section D.1) must uniquely identify each member of the group. It should be noted that all the entries in a navigation group must have the same termination string.

The format of the library entry for a navigation group is as follows:

ident "identifier"
group_list
endnav

The group_list may be further defined as:

group_list:
group_entry
[group_list]

So a group_list is a list of one or more group_entry entities, where the group_entry is defined:

group_entry:
group "identifier"

A group_entry is a line beginning with the word "group", followed by a double quote delimited string which is the identifier of a navigation library entry. An example of the definition of a navigation group is given below.

D.3 Navigation Library Explained

An NMEA GGA string is being sent by your navigation computer to the DA System system. An example string is shown.

$GPGGA,121345.65,5523.45,N,09333.45,E,O,11,0.9,9.3,M,1.3,M,3.2,1022*23<CR><LF>

This string contains the following information:

121345.65	the fix time - 12:13:45.65 (GMT)
5523.45	Northing coordinate, 55 deg 23.45 min N (Latitude)

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09333.45	Easting coordinate, 93 deg 33.45 min E (Longitude)
0	invalid GPS fix
11	11 satellites in view
0.9	horizontal dilution of precision
9.3	antenna altitude, 9.3 m
1.3	geoidal separation, 1.3 m
3.2	differential gps data is 3.2 seconds older
1022	differential ground reference station used was number 1022
23	checksum of 23
<CR><LF>	carriage return, line feed, string terminator

The first task is to determine the navigation identifier. This is stored against the key word "ident". This is the entry that appears in the "Navigation Format" list of the **Nav Input Settings** pop-up (see Figure 5-18, page 66). In our example the entry should read:

ident "NMEA 0183 GPGGA"

We now need to build our interpretation list. This is made up of two parts. The setup_list and the value_list. The setup_list contains general definitions. Our setup_list for the example navigation list would look like the following:

"Time basis"	GMT
"Nav basis"	LATLONG
separator	"ASCII TEXT" ","
key	"ASCII TEXT" "$GPGGA"
<All value_list nagivation entries, see below>	
"Nav Termination"	"Binary Integer" 1 10
endnav	

Note: We are not supplying "update" warning as we are happy with a time of 30 seconds. If our separator was a space we would use the entry separator "ASCII TEXT" " ".

Some of the common mistakes that lead to an error when accessing your navigation library entry are:

- spelling **separator** incorrectly,
- missing closing quotes on strings,
- failing to enclose keys with more than two strings in quotation marks: for example, "Nav Basis".

Note: Please check for all of these if you have an error decoding your navigation string.

Now that we have set up the ident and setup, we must set up the value_list. These key words are used to access data passed in your navigation string. We need to access the values in the order in which they appear.

hours	"ASCII Number"	2	This will read	12

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minutes	“ASCII Number”	2	This will read	13
seconds	“ASCII Number”	Variable	This will read	45.65
northing	“ASCII Number”	2	This will read	55
“Northing Minutes”	“ASCII Number”	Variable	This will read	23.45
“North Switch”	“ASCII Text”	“N”		
easting	“ASCII Number”	3	This will read	093
“Easting Minutes”	“ASCII Number”	Variable	This will read	33.45
“East Switch”	“ASCII Text”	“E”		

None of the navigation entries shown above requires an “offset” or “gain” to be applied. We could have entered a 0 then a 1 after each entry, but as this is the system default, we have intentionally left “offset” and “gain” blank.

We are not interested in any of the other values in the navigation string so we are going to junk them. The following does this for us:

junk	“ASCII Text”	Variable
junk	“ASCII Text”	Variable
junk	“ASCII Text”	Variable
junk	“ASCII Text”	Variable
junk	“ASCII Text”	Variable
junk	“ASCII Text”	Variable
junk	“ASCII Text”	Variable
junk	“ASCII Text”	Variable
junk	“ASCII Text”	Variable

Our complete interpretation list for the example navigation string looks like this:

ident	“NMEA 0183 GPGGA”	
“Time Basis”	GMT	
“Nav Basis”	LATLONG	
separator	“ASCII TEXT” “,”	
key	“ASCII TEXT” “$GPGGA”	
hours	“ASCII Number”	2
minutes	“ASCII Number”	2
seconds	“ASCII Number”	Variable
northing	“ASCII Number”	2
“Northing Minutes”	“ASCII Number”	Variable
“North Switch”	“ASCII Text”	“N”
easting	“ASCII Number”	3
“Easting Minutes”	“ASCII Number”	Variable

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“East Switch”	“ASCII Text”	“E”	
junk	“ASCII Text”	Variable	
junk	“ASCII Text”	Variable	
junk	“ASCII Text”	Variable	
junk	“ASCII Text”	Variable	
junk	“ASCII Text”	Variable	
junk	“ASCII Text”	Variable	
junk	“ASCII Text”	Variable	
junk	“ASCII Text”	Variable	
junk	“ASCII Text”	Variable	
“Nav Termination”	“Binary Integer”	1	10
endnav			

D.4 Example Navigation Library Entry

The following navigation library examples are taken directly from the navigation library on the DA System.

```
#
# Coda nav type
# CODA Easting Northing KP DCC Depth Altitude Speed Heading Fix SpeedofSound
# DataAge LineName NavTime
#
#
ident          “CODA”
“Time Basis”          GMT
“Nav Basis”           METRES
“Update Warning”      30
separator             “ASCII TExt”    “ “
key                   “ASCII Text”    CODA
easting               “ASCII Number”  “variable”    0      1
northing              “ASCII Number”  “variable”    0      1
kp                    “ASCII Number”  “Variable”    0      1
dcc                   “ASCII Number”  “Variable”    0      1
depth                 “ASCII Number”  “Variable”    0      1
altitude              “ASCII Number”  “Variable”    0      1
smg                   “ASCII Number”  “Variable”    0      1
heading               “ASCII Number”  “Variable”    0      1
“Line Name”           “ASCII Text”    “Variable”    0      1
“Fix Number”          “ASCII Number”  “Variable”    0      1
“Speed of Sound”      “ASCII Number”  “Variable”    0      1
“Data Age”            “ASCII Number”  “Variable”    0      1
“Nav Time”            “ASCII Number”  “Variable”    0      1
# Note - time offsets in seconds for UTC
# these can be used as offsets for the Nav Time string
# e.g. “Nav Time” “ASCII NUmber” “Variable” +820368000 1 - would add the offset
# to the seconds since start of year for 1996
# 00:00:00 1/1/96     820368000
# 00:00:00 1/1/97     851990400
# 00:00:00 1/1/98     883526400
# 00:00:00 1/1/99     915062400
# 00:00:00 1/1/2000   946598400
# 00:00:00 1/1/2001   978220800
```

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```
"Nav Termination"    "Binary Integer" 1    10
endnav
```

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E Coda Data Format Summary

E.1 Coda Data Information Table

The following data is stored along with the data from each ping by the DA System system. It may not be a full list of data stored. For more details, contact Coda Technologies directly.

Variable	Storage Class	Description
channel	byte	label describing data – sidescan port, sidescan starboard, seismic, unknown
channel_count	byte	number of channels of data arising from this trigger event
sync_with	byte	which channel to synchronise with for display purposes
start_delay	byte	delay from trigger to start of data sampling (as a number of samples)
input_channel	byte	the input data (A/D) channel the data was captured on
trigger_number	byte	trigger used
tag_database_id	long integer	number which corresponds to the start time of the recording session, to allow correct database to be accessed
ping_number	long integer	incremented for each trigger event for the channel
line_time_secs	long integer	the time the trigger event, in seconds since 00:00:00, 1st January, 1970 (UTC).
line_time_usecs	long integer	microsecond fraction of the trigger event time
pixel_time	float	effective sample period, in seconds
ad_sample_frequency	float	actual A/D sample frequency
aa_filter_frequency	float	anti-aliasing filter frequency
sonar_frequency	float	operating frequency of the sonar, in Hertz.
tx_power_db	float	the transmission power in decibels
rx_gain_db	float	the gain applied at the receiver in decibels
zero_offset	short integer	DC level of data samples
voltage_range	byte	voltage range used to acquire the data
fish_height	float	towfish distance from seabed as samples since trigger event
water_depth	float	total depth of water
speed_of_sound	float	speed of sound in water, in metres per second
temperature	float	water temperature
time_basis	byte	whether the time zone is LOCAL or UTC (GMT)

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Variable	Storage Class	Description
nav_basis	byte	whether the navigation data is lat/long (WGS84), or undefined
utm_zone	byte	the UTM zone number used (0 to 60)
speed_over_ground	float	speed of vessel/towfish over ground, in knots
easting	double	vessel/towfish position E/W (UTM or lat/long)
northing	double	vessel/towfish position N/S (UTM or lat/long)
corr_easting	double	corrected vessel/towfish position E/W (UTM or lat/long)
corr_northing	double	corrected vessel/towfish position N/S (UTM or lat/long)
course	float	vessel/towfish course
heading	float	vessel/towfish heading
corrected_heading	float	corrected vessel/towfish heading
kp	float	vessel/towfish kp
corrected_kp	float	corrected vessel/towfish kp
dcc	float	vessel/towfish dcc
corrected_dcc	float	corrected vessel/towfish dcc
roll	float	vessel/towfish roll
pitch	float	vessel/towfish pitch
yaw	float	vessel/towfish yaw
heave	float	vessel/towfish heave
heave velocity	float	heave velocity in metres/second
gdop	float	general dilution of precision
pdop	float	position dilution of precision
hdop	float	horizontal dilution of precision
vdop	float	vertical dilution of precision
tdop	float	time dilution of precision
cable_out	float	number of metres of cable deployed
survey_line_name	16 bytes	the line designation, as ASCII characters
flags	byte	flags defining the following: 1. presence/absence of anti-aliasing filtering 2. navigation correction 3. Start delay value to be used/not used in calculating distances. 4. towfish altitude source – altimeter, fixed height, automated bottom tracking. 5. DA System clock synched/not synched with nav. computer. 6. Position datum – towfish or towing vessel

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Storage classes:	
byte	8 bit integer
short integer	16 bit integer
long integer	32 bit integer
float	32 bit IEEE floating point number
double	64 bit IEEE floating point number

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F Filters

Both the low-pass and high-pass filtering options use time-domain implementations of digital Butterworth filters (see T.W. Parks and C.S. Burrus, *Digital Filter Design*, Wiley, 1987). Since the Butterworth filter is an infinite impulse response (IIR) filter, it has the advantage of using relatively few filter coefficients and therefore consumes less computing power. The Butterworth filter also has the advantage of a monotonic frequency response that is smooth over the complete range of frequencies.

F.1 Butterworth Filter

The digital Butterworth filter is completely specified by three parameters: the sampling frequency of the data, the cut-off frequency, and the roll-off rate. Whilst the sampling frequency is obtained from the survey data, the values for both the cut-off and roll-off may be selected by the user. The cut-off frequency marks the transition between the filter's pass band and stop band. From analogue filter theory, the cut-off frequency is defined as the point at which the frequency response is 3dB down and, as such, indicates the point at which the frequency attenuation or suppression starts to become significant. The cut-off frequency must always be below the Nyquist frequency (that is, less than half the sampling frequency).

The roll-off rate is a measure of the rate at which frequency attenuation increases after the cut-off frequency. For high-pass filters, the roll-off rate is always expressed as a positive value, whereas for low-pass filters, this value is always negative. A roll-off rate with a higher magnitude results in greater degrees of attenuation for those frequencies closest to the cut-off. Occasionally, the magnitude of the roll-off rate requested by the user is not sufficient to allow the required filter to be realised. In this case, the user will be prompted to double the roll-off magnitude. Band-stop and band-pass filtering can be implemented by combined low-pass and high-pass filters. A low-pass filter that is combined with a high-pass filter that has the higher cut-off frequency will result in a band-pass filter, whereas a low-pass filter that is combined with a high-pass filter that has the lower cut-off frequency will result in a band -stop filter.

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G Data Formats

Tapes can be recorded in both the Coda format and the SEG-Y format; however, we strongly recommend that they are recorded in the Coda format. This is because the Coda format stores a greater amount of information than the SEG-Y format, all of which is necessary if the Coda processing modules are to be applied to the data with complete success.

Note: Recording in SEG-Y is unavailable for multi-trigger data, due to the restriction in the SEG-Y format. It is possible, however, to record in SEG-Y format when you are acquiring more than one trigger, provided that you record only one trigger's worth of information. If you try to record the channel with another trigger, the system will pop up a warning and reset to Coda format.

Four tape formats (Coda, SEG-Y, Q-MIPS and SDEF) can be played back through a DA System system if recorded or copied on a DA System system. However, not all DA System functions and features can be guaranteed to work unless the format is Coda.

G.1 Copy Tape Format

The **Copy Tape** option allows tapes to be copied from Coda, SEG-Y, Q-MIPS™ or SDEF to any of the CODA, SEG-Y, Q-MIPS™ or SDEF formats (see Section 11). This option can also be used for making backup copies of data tapes.

Note: While Coda Technologies Ltd allow playing of SDEF, SEG-Y and Q-MIPS™ compatible format, we do not guarantee that tapes of SEG-Y format which have been recorded on other systems will play on the CODA-DA System.

Although every effort has been made to ensure that tapes in SDEF, SEG-Y and Q-MIPS™ format are compatible with those produced on other systems, no guarantee of compatibility can be given.

For further details of the SEG-Y format, contact the Society for Exploration Geophysicists, P.O. Box 3098, Tulsa, Oklahoma 74101, USA.

Note: Some SEG-Y readers cannot read the data recorded or copied in SEG-Y format if the files have channels of differing line length.

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H Tape Drive Units

The DA System is supplied with one of three tape units: the HP C1533 or the HP C1599A DAT DDS2 4mm tape drive; or the Exabyte Eliant 820 8mm tape drive unit. The DAT tape drives may be recognised by the size of the slot for tapes (1 cm x 7.5 cm), which is smaller than that of the Exabyte unit (1.6 cm x 9.5 cm).

H.1 Hewlett Packard HP C1533/C1599A 4mm DAT Tape Unit

H.1.1 Head Cleaning

Head cleaning should be carried out weekly if the system is being used continuously. The tape drive indicates that head cleaning is necessary by low flashing of the right (amber) LED on the tape front panel, as detailed below. Only a DDS head cleaning cartridge should be used; head cleaning cassettes for audio DAT recorders will not work. The cleaning can be carried out at any time during the acquisition or playback process. Inserting the head cleaning cartridge in the tape drive initiates the automatic head cleaning process. When cleaning is completed, the head cleaning cartridge is automatically ejected from the tape drive.

H.1.2 LED Interpretation

The front panel of the tape unit has two LEDs, the Tape LED (left) and the Clean/Attention LED (right).

The left-hand green Tape LED shows tape activity as follows:

- Slow flashing green when the tape is being loaded or unloaded.
- Steady green when the tape is loaded.
- Fast flashing green during read/write operations.

The right-hand amber Clean/Attention LED shows the following conditions:

- Slow flashing amber (the Media Caution signal) to indicate head cleaning necessary, or that the tape cartridge is at the end of its useful life.
- Steady amber to indicate a hardware fault (see Part IV).

Figure H-1, this page shows all the possible combinations for the LEDs:

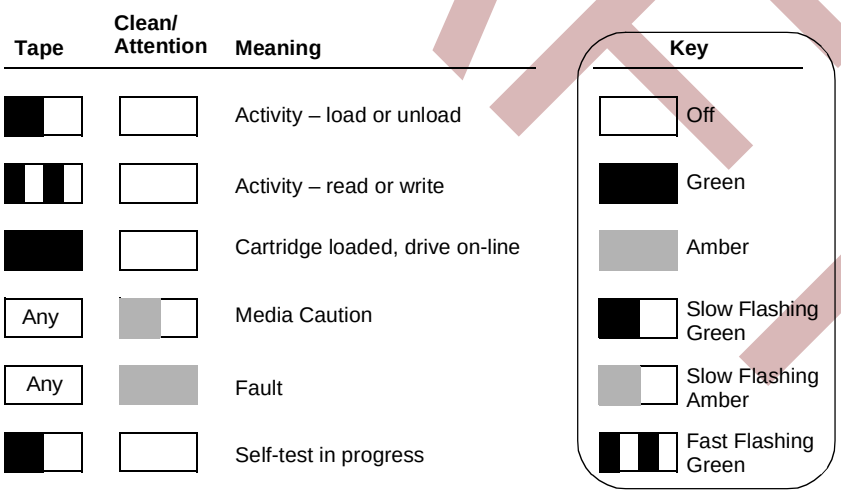

Figure H-1 LED Combinations for the HP C1533/C1599A

H.1.3 Recommended Tapes

To ensure the best possible results and maximal reliability, we recommend tapes by the following manufacturers are used: TDK, HP, Verbatim and Fujifilm.

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H.1.4 Environmental Specifications

These specifications are for the HP C1599A tape drive. If a tape is in the drive, these specifications may be modified by the specifications for the tape, in which case the more stringent figures apply.

Parameter		Specifications	
Ambient Temperature	Operating	5°C to 40°C (ΔT < (10°C)/h)	
	Non-Operating (mech.)	-40°C to 70°C (ΔT < (20°C)/h)	
	Non-Operating (tape)	-40°C to 45°C (ΔT < (20°C)/h)	
Humidity	Operating	20% to 80% RH, non-condensing. Max wet bulb temperature = 26°C	
	Non-Operating (mech.)	5% to 95% RH (change RH<30%/h)	
	Non-Operating (tape)	20% to 80% RH (change RH<30%/h)	
Vibration	Operating (3 Axis)	Swept Sine:	0.3 g peak, 5–500 Hz @ 1 octave/min
		Random:	5–350 Hz @ 0.00053 g²/Hz
			350–500 Hz @ -6 dB/octave
			500 Hz @ 0.000271 g²/Hz (= 0.5 g rms)
	Non-Operating (3 Axes)	Swept Sine:	0.75 g peak, 5–500 Hz @ 1 octave/min
		Random:	5–100 Hz @ 0.02 g²/Hz
			100–137 Hz @ -6 dB/octave
			137 –350 Hz @ 0.0107 g²/Hz
			350–500 Hz @ -6 dB/octave
			500 Hz @ 0.0052 g²/Hz (= 2.41 g rms)
Shock	Operating (3 Axis) no performance change	5.0 g peak for 3 ms – ½ sine	
	Operating (3 Axes) no data loss	8.0 g peak for 11 ms – ½ sine	
	Non-Operating (3 Axes) no damage	90 g peak for 3 ms – ½ sine 30 g peak for 26 ms – trapezoidal	
Altitude	Operating	0 km to 4.6 km (0 to 15 000 ft)	
	Non-Operating	0 km to 15.2 km (0 to 50 000 ft)	
Suspended Particles	Operating and Non-Operating	Suspended particle environment, particles < (200µgram)/m³	

H.1.5 Hints and Precautions

- Always allow the DA System to reach ambient temperature before switching it on. Failure to do so may damage the tape drive.
- Always remove tapes from the tape drives before powering down the system. Failure to do so may result in data loss or damage to the tape drive.

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- Data cartridges may be write protected by sliding open the tab on the right of the cartridge, so that the coloured tab becomes invisible. Do NOT do this while the cartridge is in the tape drive.
- Always use DDS Media Recognition System Standard DAT type tapes. Do NOT use audio DAT tapes under any circumstances; they are not of high enough quality for storage of computer data.
- For best results, use DDS2 standard 120m tapes, rather than 60m or 90m tapes. The DDS2 standard tapes allow the tape unit to operate with a higher bandwidth, and a 120m DDS2 tape stores twice as much data (4GB) as a 90m DDS tape (2GB). When recording two channels of sidescan data, a 120m tape will last for at least 8 hours, a 90m tape will last for a minimum of 4 hours. The system is unable to read from or write to non-DDS tapes.
- DAT tapes which have been recorded using instrument recorders (for example, TEAC and Sony recorders) cannot be replayed directly using the DA System. These tapes have not been recorded in a computer-compatible digital format and must be re-digitised to replay them using the DA System. The instrument recorder outputs can be connected to the BNC input channels on the DA System (see Section 4.1.2). However, navigation information will inevitably be missing, resulting in many of the on-screen measurement and location functions being unavailable.
- As with all other types of magnetic tape, it is recommended that DAT tapes are passed completely through the tape drive once a year to prevent sticking.

H.2 Exabyte Eliant 820 8mm Tape Units

H.2.1 Head Cleaning

The tape drive should be cleaned regularly. When the tape drive needs cleaning, the top (amber) and bottom (green) LEDs flash. As soon as posible after the LEDs start flashing, the tape drive should be cleaned, using an approved Exabyte cleaning cartridge; cartridges for 8mm video recorders are unsuitable.

H.2.2 LED Interpretation

The tape drive uses three LEDs to indicate its status. The top (amber) LED flashes when the tape drive has an error or needs to be cleaned. The middle (green) LED flashes to indicate SCSI bus activity. The bottom (green) LED indicates the presence of a tape in the tape drive, and flashes when the tape is in motion or when the tape drive needs cleaning.

Figure H-2, this page, shows the various LED combinations that occur during normal tape drive operation:

	Power-on self-test (POST)	Failed POST	Ready (no tape loaded)	Ready (tape loaded)	Normal tape motion	High-speed tape motion	SCSI bus reset	Error	Time to clean	Cleaning in progress
Top LED (error)	■	fast	□	□	□	□	■	slow	fast	□
Middle LED (SCSI)	■	irreg	irreg	irreg	irreg	irreg	irreg	n/a	n/a	irreg
Bottom LED (tape)	■	□	□	■	slow	fast	■	□	fast	slow

Key: ■ = On □ = Off = Flashing
slow = 1 flash/second (0.94 Hz)
fast = 4 flashes/second (3.76 Hz)
irreg = Rate of flash varies with SCSI bus activity. If the tape drive is not connected to the SCSI bus, this LED will be off.

Figure H-2 LED Combinations for the Eliant 820

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H.2.3 Environmental Specifications

Operating temperature	+5°C to +40°C (+41°F to +104°F)
Operating rel. humidity	20% to 80%, non-condensing

H.2.4 Hints and Precautions

- Always allow the DA System to reach ambient temperature before switching it on. Failure to do so may damage the tape drive.
- Always remove tapes from the tape drives before powering down the system. Failure to do so may result in data loss or damage to the tape drive.
- Data cartridges may be write protected by sliding closed the tab on the right of the cartridge, so that the coloured tab becomes fully visible. Do NOT do this while the cartridge is in the tape drive.
- Always use computer data standard cartridges. Do not use 8mm video cartridges, as they are not of high enough quality for the storage of computer data.
- As with all other types of magnetic tape, it is recommended that Exabyte tapes are passed completely through the tape drive once a year to prevent sticking.

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I Optical Disk Drive Units

Warning! Do not look inside the optical disk drive or use a mirror to look inside the drive. The laser can cause eye damage

The drive does not require user maintenance. If the drive does not operate properly, do not try to fix it yourself. Contact Coda Technologies.

I.1 Drive Controls

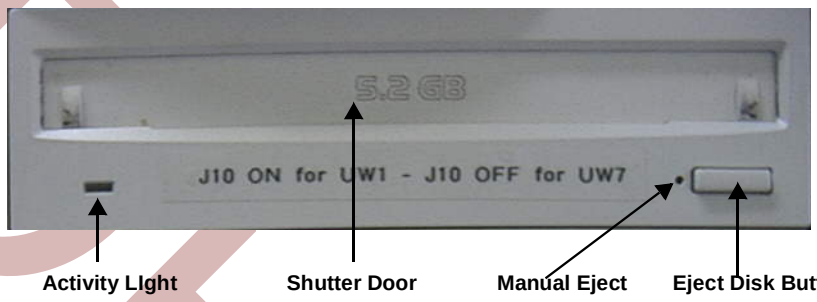

Figure I-1 Drive Switch and LED

Eject Button

Pressing this button causes the disk to stop spinning and then eject the cartridge. This button has no function while the Prevent Media Removal command from the host is in effect, or if a command from the host is being executed.

Activity Light

Shown below are the operating states indicated by the LED.

Red flickering	The drive detected a Self Diagnostic (CUDG) error. A detailed list of error codes is provided in Chapter 5.
Green on	The drive is being powered up, the drive is reading data.
Green flickering	The drive is executing a command.
Orange on	The drive holds write data in the buffer memory.
Orange flickering	The drive is executing a command and holds write data in the buffer memory or performing of an internal calibration.
Off	The drive is not ready

I.2 Error Conditions

Error	Color 1	Color 2	Color 3	Color 4
RAM TEST FAILURE	Orange	Orange	Orange	Orange
SCSI RESET ALWAYS ASSERTED (SEE TERMINATION PROBE)	Orange	Orange	Orange	Green
DSP WATCHDOG TIMER FAILURE	Orange	Orange	Green	Orange

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Error	Color 1	Color 2	Color 3	Color 4
MICROCODE CHECKSUM FAILURE	Orange	Orange	Green	Green
SCSI CHIP TEST FAILURE	Orange	Green	Orange	Orange
ENDEC CHIP TEST FAILURE	Orange	Green	Orange	Green
POWER SUPPLY FAULT	Orange	Green	Green	Orange
OVER TEMPERATURE FAULT	Orange	Green	Green	Green
DISK BUFFER TEST FAILURE	Green	Orange	Orange	Orange
DSP ROM CHECKSUM FAILURE	Green	Orange	Orange	Green
DSP RAW R/W TEST FAILURE	Green	Orange	Green	Orange
INVALID VALUES FOUND IN NON-VOLATILE MEMORY	Green	Orange	Green	Green
LOADER FAILURE OR EJECT FAULT	Green	Green	Orange	Orange
SPIN UP OR SPIN DOWN FAULT	Green	Green	Orange	Green

I.3 Using Optical Media

Figure I-2, this page shows the location of the write-protection switch on the optical media cartridge.

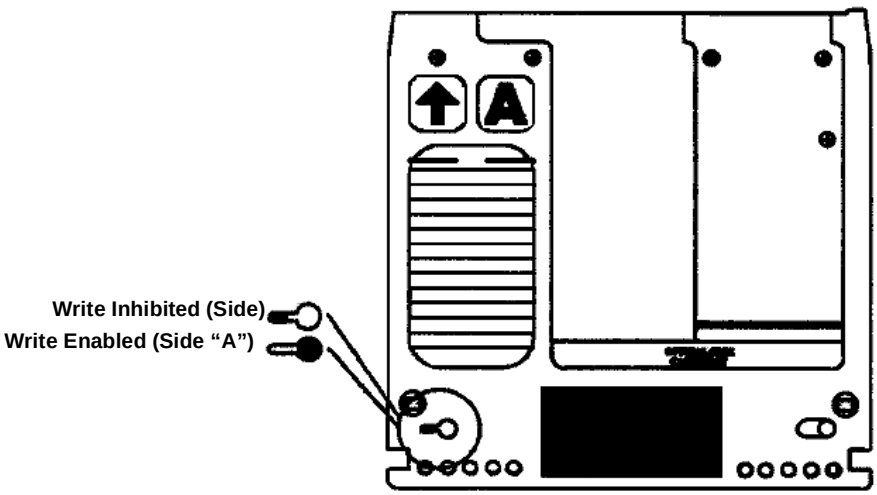

Figure I-2 Drive Write-Protection Switch

Observe these precautions when handling and storing optical media cartridges:

1. Keep cartridges free from dust or dirt. Check the media periodically and clean it when necessary. Cartridge cleaning kit are available from Maxoptix.
2. Keep cartridges free from moisture. Do not allow condensation on or in the optical disk cartridge. Do not put cartridges in a damp place or by an air conditioner.
3. Do not expose cartridges to direct sunlight or place them near a heat source.
4. Do not open the shutter of the cartridges.
5. Do not drop cartridges.
6. Place a cartridge in its protective case when not inserted in the drive.
7. Keep the cartridge case horizontal or vertical during storage.

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8. Do not stack “uncased” cartridges. Do not stack more than five “cased” cartridges.
9. Store media cartridges in an environment with the following specifications

Temperature	10C to 55C
Relative humidity	3% to 90% RH
Absolute humidity	1g/m3 to 30 g/m3
Atmospheric pressure	60 kPa to 106kPa
Temperature gradient	15C/h max
Relative humidity gradient	10%/h max

I.4 Recommended MO Disks

To ensure best possible results and maximum reliability, we recommend a 2.6 Gb 1024 bytes per sector MO disk by the following manufacturers:

- Maxoptix
- Sony
- Verbatim

or any 2.6 Gb 1024 bytes per sector MO disk that conforms to ISO/IEC CD 14517 (RW/WO)

I.5 Formatting Disks

Full details of how to format optical disks listed in Section 12.3.10.1.

I.6 Caring for the Drive

To maintain drive performance, observe these precautions:

1. Remove all media before moving the drive.
2. Avoid a dirty or dusty environment. Maintain the environmental specifications (temperature, humidity, etc.) shown in section 5.9.
3. Do not use non-standard, non-specified or non-approved media in the drive. Do not use damaged cartridges.
4. Do not stick objects into the drive (screwdrivers, etc.). Objects can damage internal mechanisms mechanically or through static discharge.
5. Do not turn the drive on or off during cartridge loading or ejection.
6. Do not move, bump, or shock the drive during operation.

Caution: If the drive emits noises or vibrations, immediately eject the media and turn off the power to the drive.

I.7 Performance Specifications

	2.6 GB (4X) FORMAT	
CAPACITY, ON LINE	512 BPS	1024 BPS
	1.519 GB	1.318 GB
ROTATIONAL SPEED	3868 rpm	
SPINDLE SEQUENCE	4.0/1.9 sec	

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	2.6 GB (4X) FORMAT
UP/DOWN TIME (typical) PLASTIC DISK	
SEEK TIME**	
Average (1/3 full stroke)	<19 msec
Track to track	<0.3 msec
Mamimum (full stroke)	<55 msec
LATENCY (Average)	7.8 msec
TRANSFER RATE FROM/ TO DISK	24-48 Mbits/sec
AT SCSI (Async), Maximum	5 Mbytes/sec
AT SCSI (Fast Sync), Maximum	10 Mbytes/sec

** Time includes carriage motion and settling

Note: Loading time includes spin-up time. Loading time is defined as the time in which the START/STOP UNIT command, using polycarbonate medium, takes to execute. But, in the case of immediate loading after power on, the drive must perform a self diagnosis of about 6 seconds. If the optical disk cartridge is inserted during self diagnosis, the loading time will be delayed until the self diagnosis is complete.

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J Hardcopy Devices

J.1 Alden 9315 CTP Series Printers

The DA System can output data in real time during acquisition to the Alden printer via a parallel interface.

Note: Before connecting the printer to the DA System, both the printer and the DA System must be shut down and the power supplies to both switched off (see Section 13.1). The DA System should only be powered up when the printer has been connected to the appropriate port of the DA System (see Section 4.3). The printer must be switched on before the DA System has been powered up.

J.1.1 Configure the Printer

It is recommended that the Alden Electronics Operator's Manual is used in conjunction with the following instructions.

To print successfully from this device, the printer must first be configured correctly before selecting the Alden printer from the DA System's list of available printers.

Configuring the printer is only necessary when first setting up the DA System and the Alden printer or after a hard reset of the printer (that is, switching the power on while the ON-LINE button is pressed). The configuration is normally retained when the power is switched off.

In default mode the printer can print only about 8 lines per second. Resetting the printer allows the Alden to achieve a maximum speed of 14 to 15 lines per second. This maximum speed restricts the ping rate to the speed of the printer in *acquisition mode*. For best quality output, therefore, Coda recommends that data is printed when the DA System is in *playback mode* rather than in acquisition mode.

To reset the printer to default mode

1. Hold down the ON-LINE button while switching the power to the printer on (see 'Reset' in the Alden Operator's Manual).

To change the ADDR function (address) from the default (SCSI port) to the Parallel interface:

1. Press the OFF-LINE button twice.
   This puts the printer into Detach mode (as indicated on the printer's display).
2. Press successively on the ADDRESS button to cycle through the options.
   The Parallel interface is selected when '----' appears in the ADDR display (see 'Address' in the Alden Operator's Manual).

To enable the printer to print at 15 lines per second

1. Switch the HEAD CALIBRATION off.
   See 'Custom Settings' in the Alden Operator's Manual.
2. Press and hold the PAPER key and turn the power ON.
   The printer prints the CONSTANT test pattern and displays the default printer settings.
3. Switch the Head Calibration OFF by pressing either the TEST or ADDRESS buttons.
   These buttons toggle the Head Calibration default between ON and OFF.
4. Press the ON-LINE button to exit test mode.
5. Select the appropriate PAPER TYPE.
   See 'Paper' in the Alden Operator's Manual.
6. Press the OFF-LINE key twice to put the printer into Detach mode. Cycle through the paper options by pressing the PAPER button until the appropriate paper type is selected, ensuring that the display shows an asterisk after the paper type; this designates high speed. The printer is now configured correctly for use with the CODA-DA System.
7. Switch the printer on line by pressing the ON-LINE button.

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J.1.2 Select the Printer

Hardcopy Output is described fully in Section 9.1.

1. Switch on the DA System.
   The DA System should be switched on after the printer is switched on.
2. Select **File→Hardcopy Output**.
3. From the scrolling list of printers/plotters which appears, select Alden 9315 CTP.
4. Select the appropriate parallel port (LPT1 or LPT2), depending on which port the printer is attached to (see Section 4.3).
5. Select tag colour from the one-of options of **Black** or **White**.
6. Toggle **Output** on.
7. Click on **Apply** or **OK**.
   This starts printer output. To switch the output off, toggle the **Output On** button off and press either **Apply** or **OK**.

J.1.3 Troubleshooting

see also: 'Troubleshooting' in the Alden Electronics Operator's Manual.

No output

- Check the printer is on-line and ready.
- Check the parallel interface is selected (ADDR display on the printer shows '----').
- Check the parallel cable connection. Note that both the printer and the DA System must be switched off before removing or connecting a parallel cable.
- Check that the correct printer port has been selected from the DA System **File→Hardcopy Output** menu item, and that the **Output On** toggle is activated in the **Hardcopy Output** pop-up. Ensure that either the **OK** or **Apply** button has been clicked at the bottom of the pop-up.

Slow output

- Check the printer HEAD CALIBRATION setting is OFF.
- Check the printer's paper type setting shows '*' appended to the medium selected.
- Check that the DA System has the correct playback speed selected in the **Settings→Playback Speed** menu item. This should be set to **Fast as Possible**.

Error message appears when the DA System is powered up

- Shut down the DA System, ensure that both the DA System and the printer are powered off. Switch the DA System on after switching on the printer.

J.2 EPC 1086-2 Thermal Printer

The DA System can output data in real time during acquisition to the EPC 1086-2 thermal printer via a parallel interface.

Note: Before connecting the printer to the DA System, both the printer and the DA System must be shut down and the power supplies to both switched off (see Section 13.1). The DA System should only be powered up when the printer has been connected to the appropriate port of the DA System (see Section 4.3). The printer must be switched on before the DA System has been powered up.

J.2.1 Configure the Printer

It is recommended that the manufacturer's manual is used in conjunction with the following instructions.

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To print successfully from this device, the printer must first be configured correctly before selecting the EPC 1086-2 printer from the DA System's list of available printers.

Configuring the printer is only necessary when first setting up the DA System and the EPC printer or after a hard reset of the printer (that is, switching the power on while the ON-LINE button is pressed). The settings can then be saved for future use.

Configure the printer using the following settings:

Shades:	64	data input:	parallel
Medium:	Film or Paper	sweep:	reverse
Scale Lines:	10	message user:	1
repeat cal.:	2	margin:	0.0
contrast:	0–10%	char size:	2
Lpi:	20.0	Background:	data
event:	solid	Auto event:	off
width:	2048	signal:	single
data type:	8 bits	key rate:	0.125
line repeat:	1	scan rate:	0.1
slope:	rising	delay:	0.000

J.2.2 Select the Hardcopy Device

Hardcopy Output is described fully in Section 9.1.

1. Switch on the DA System.
   The DA System should be switched on after the printer is switched on.
2. Select **File→Hardcopy Output**.
3. From the scrolling list of printers/plotters which appears, select **EPC GSP-1086-2**.
4. Select the appropriate parallel port (LPT1 or LPT2), depending on which port the printer is attached to (see Section 4.3).
5. Select tag colour from the one-of options of **Black** or **White**.
6. Toggle **Output** on.
7. Click on **Apply** or **OK**
   This starts printer output. To switch the output off, toggle the **Output On** button off and press either **Apply** or **OK**.

J.2.3 Troubleshooting

see also: The manufacturer's manual.

No output

- Check the printer is on-line and ready.
- Check the parallel cable connection. Note that both the printer and the DA System must be switched off before removing or connecting a parallel cable.
- Check that the correct printer port has been selected from the DA System **File→Hardcopy Output** menu item, and that the **Output On** toggle is activated in the **Hardcopy Output** pop-up. Ensure that either the **OK** or **Apply** button has been clicked at the bottom of the pop-up.

Error message appears when the DA System is powered up.

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- Shut down the DA System, ensure that both the DA System and the printer are powered off. Switch the DA System on after switching on the printer.

J.3 EPC HSP100 Printer

Note: Before connecting the printer to the DA System, both the printer and the DA System must be shut down and the power supplies to both switched off (see Section 13.1). The DA System should only be powered up when the printer has been connected to the appropriate port of the DA System (see Section 4.3). The printer must be switched on before the DA System has been powered up. The printer should NOT remain connected to the DA System if it is powered off.

Configure the Printer

The printer has a set of internal DIP switches which control the printer setup parameters. These switch settings must be set correctly in order to optimise the printed output when connected to the Coda system. For the HSP-100 to be in GSP-1086 emulation mode (6 BIT), it is necessary to have the internal Dip Switch Number 8 turned ON.

Changing to Digital Mode

J.4 Ultra 120, 195 or 200 Printer

The DA System can output data in real time during acquisition to the Ultra 120, 195 or 200 printer via a parallel interface. The following example describes the setup of the Ultra 120 printer; the instruction for the setup of the Ultra 195 and the Ultra 200 are very similar.

The DA System can output data in real time during acquisition to the Ultra 120, 195 or 200 printer via a parallel interface.

Note: Before connecting the printer to the DA System, both the printer and the DA System must be shut down and the power supplies to both switched off (see Section 13.1). The DA System should only be powered up when the printer has been connected to the appropriate port of the DA System (see Section 4.3). The printer must be switched on before the DA System has been powered up. The printer should NOT remain connected to the DA System if it is powered off.

Note: If the Ultra 120 fails to work, and using the power off/on and reset buttons does not work, there is a reset button hidden under the unit which must be pressed to get the printer working again.

Configure the Printer

It is recommended that the printer manual is used in conjunction with the following instructions.

To print successfully from this device, the printer must first be configured correctly before selecting the Ultra 120, 195 or 200 printer from the DA System's list of available printers.

Configuring the printer is only necessary when first setting up the DA System and the Ultra printer or after a hard reset of the printer (that is, switching the power on while the ON-LINE button is pressed). The settings can then be saved for future use.

To prepare the printer, the following steps are necessary:

- Put printer in Digital mode.
- Select the Centronics option.
- Place the printer in Run mode.

This is achieved as follows:

Power up the Ultra printer.

The following settings will be displayed as in Figure J-1, page 241:

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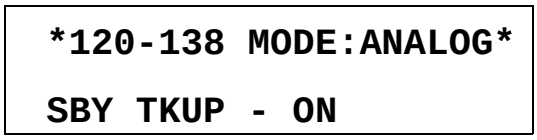

Figure J-1 Ultra 120 Standard Display

The first line of the display gives an indication of the printer mode; the *120-138 MODE: is a standard output to the display and will not change. The description after the mode will be **ANALOG** or **DIGITAL**.

The second line contains details of the mode.

Analog Mode Display	
SBY	Standby; The printer is in standby and will not print data.
RUN	Run; The printer is ready to receive data.
TKUP	Take Up (ON/OFF); When ON the paper will be wound onto a takeup roller.

A typical **Digital** mode display is shown in Figure J-2, this page.

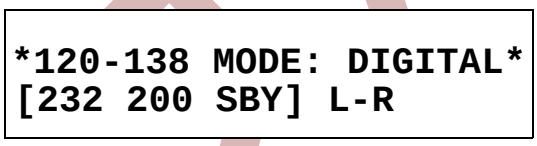

Figure J-2 Typical Ultra Printer Digital Mode Display

The display in Figure J-2, this page, represents [Interface Lines per Inch Standby/Run] L-R Takeup. These settings are described in the following table.

Digital Mode Display	
232	Interface 232/CEN - Either RS232 or Centronics
200	Lines per Inch 100/150/200 - Number of Lines per inch to be printed
SBY	Standby/Run - Whether in Standby or Run mode (Start/Stop printing)
L-R	Always Left and Right channel for digital
T	Takeup T (or blank)- If T is present then roller will take up paper

Changing to Digital Mode

Place the printer in **Digital** Mode. The first line of the display show the current mode of the printer. If the mode shows **Analog** then put it into Digital mode by pressing

<CTRL + RS232/ANALOG>

The printer will restart and will now be in digital mode. The display will be similar to the following figure.

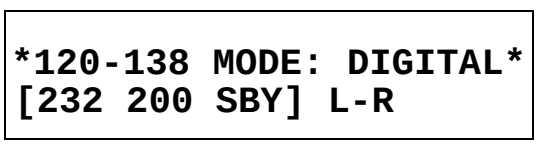

Figure J-3 Typical Display for Ultra Printer in Digital Mode

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Changing to Centronics Interface

The second line of the display will show the type of interface. If the mode (first three character after the [) shows 232 then the printer is in RS232 interface mode. This can be changed as follows:

Firstly, ensure that the printer is in standby mode. This can be checked by examining the three characters before the]. If this does not display **SBY**, the printer is not in standby mode. The printer can be put into standby mode by pressing the keys

<SHIFT + ON LINE/TEST>

The **STANDBY** light will be lit and the display will show **SBY** before the **]** character. The display will be similar to Figure J-4, page 242.

```
*120-138 MODE: DIGITAL*
[232 200 SBY] L-R
```

Figure J-4 Typical Display for Ultra Printer in Standby Mode

Change to Centronics interface by pressing the SETUP Key twice

<SETUP ><SETUP >

The display will now show:

```
INTERFACE SERIAL
[232 200 SBY] L-R
```

Figure J-5 Typical Display for Ultra Printer Interface Setup

Press the Clear/Enter key to change the Interface.

<CLEAR/ENTER>

The display will now show:

```
INTERFACE CENTRONICS
[CEN 200 SBY] L-R
```

Figure J-6 Ultra Printer, Centronics Interface Setup

Now exit the Setup menu by pressing

<SETUP>

The display will now show:

```
CENTRONICS
INTERFACE
```

Figure J-7 Ultra Printer, Set up to Receive Centronics Interface

Prepare the printer to receive data by putting it in RUN mode.

<SHIFT + ON LINE/TEST>

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The display will now show:

```
*120-138 MODE: DIGITAL*
[CEN 200 RUN] L-R
```

Figure J-8 Ultra Printer, Set up for Centronics Interface

The printer is now setup to receive data over the Centronics port and can be selected as the **Printer** in the **Hardcopy Output** pop-up (see Section 9.1).

Note: If the Ultra printer has to be powered down or disconnected from the DA System, ensure that the parallel cable is disconnected first. The printer can the be safely powered down without affecting the DA System.

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K A/D Card DOS Diagnostics Test

K.1 Test Procedure

If a problem occurs with data acquisition and a hardware fault is suspected, the following instructions should be followed.

1. Shut down the system using **Shutdown** in the **File** menu.
2. Insert a DOS boot floppy disk into the DA System floppy disk drive.
3. Press <Control-Alt-Delete> to boot from the DOS boot floppy disk and allow the machine to re-boot.
4. When the 'Enter new time:' prompt appears, press <Return> to get the DOS prompt 'A:\'.
5. Eject the DOS boot floppy disk and insert the DT31EZ/34EZ Diagnostics floppy disk.
6. Type <diag31> at the command prompt 'A:\>' and press <Return>.
7. Select the DT34-EZ menu item using the <Return> key.
8. Respond with <n> to the question about using factory configuration.
9. Press <i> and use the arrow keys to select **interrupt level 15** for the A/D card. Press <Return> when this has been done. Leave this screen by pressing <Return>.
10. In the **Main Test Menu** select **Acceptance Test**. Hit <Return>.
11. If the acceptance test passes all steps, ignore the question about the loop test, eject the diagnostics floppy disk and press the **Reset** button. Otherwise, note the acceptance test failure message and contact Coda Technologies.

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L Multiple Windows

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Part VI: Checklists

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M Mobilisation Checklists

Before starting a survey with the CODA-DA System system, you should check that the equipment is mobilised correctly. Correct mobilisation procedures ensure that, at the time of sailing, the system is functioning correctly and is receiving all the data it needs in a form that it understands.

We recommend that the mobilisation procedures are observed every time a vessel sails, and that they form the basis of any ISO9000 definition of readiness for use before sailing.

If any of the items in the list below are unclear, feel free to consult our Technical Support staff at any time. Details are given on the inside front cover of this manual.

Our Technical Support staff may ask about the mobilisation checklist items if technical support is required during a survey.

M.1 DA System Mobilisation Checklist

	DA System Mobilisation	Comments	Initials
1	System		
1.1	Does the hardware have the correct specifications for the job?		
1.2	Have you had enough training to operate the system?		

2	**Trigger Input**		
2.1	Is an external trigger required?		
2.2	Does the system trigger repeatedly?		
2.3	Does the pings per second displayed by the system correspond to the external trigger rate? (see Section A)		

3	**Trigger Output**		
3.1	Is a trigger output required?		
3.2	Connect all the systems which will be triggered by the DA trigger. Do they all trigger correctly?		

4	**Analogue Data Input**		
4.1	Is the rub test/overside test satisfactory? Is the noise level acceptable?		
4.2	Is the level of crosstalk between channels acceptable?		
4.3	Is the ping rate detected by the DA system at the desired rate?		
4.4	Is the range or sweep time correct? If not, reduce the range settings or sweep time.		

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	DA System Mobilisation	Comments	Initials
4.5	Is there annotator output on the data? There should not be.		

5	**Navigation Data Input**		
5.1	Is the input coming in to the correct pins?		
5.2	Are the baud rate, parity and number of stop bits correct? (In other words, is the raw nav string arriving correctly?)		
5.3	Are you being sent the expected nav string? (Look at the raw nav string.)		
5.4	Are you using the best possible nav string? (In other words, are you using as many of the Coda string fields as possible?)		
5.5	Is the nav string being interpreted correctly?		
5.6	Is each variable that you expect the nav string to update being changed by the nav string?		N/A
	Make a list below of the variables and tick them off:		N/A
5.7			
5.8			
5.9			
5.10			
5.11			
5.12			
5.13			
5.14			
5.15			
5.16			
5.17			
5.18			
5.19	Save your nav string to floppy and reload it onto the system.		
5.20	Write-protect the floppy and write the file name on it.		
5.21	Does the system time synchronise with the nav time and does it remain so for >2 minutes?		

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	DA System Mobilisation	Comments	Initials
6	**Hardcopy Output**		
6.1	Does the printer produce the correct output in playback?		
6.2	Does the printer produce the correct output in record/real time?		
6.3	Do fix marks appear in the same place on annotator output (if used) as they do on the DA system? Note: Switch off annotator output after you have checked the fix marks.		
6.4	Do you have sufficient printer paper for the job?		

7	**Data Recording**		
7.1	Does data recorded have the nav and time set and is it updated correctly?		
7.2	Do the start and end recording pop-ups appear at the start and end of recording?		
7.3	Does data recorded on one tape/optical disk drive play back on another? Are any tape/disk drive warning lights active?		
7.4	Do you have enough tapes (of the right kind)/optical disks for the job?		

8	**System Security**		
8.1	Is the system lashed down securely?		
8.2	Is the monitor lashed down securely?		
8.3	Are all cables tied down, with no direct strain possible?		

	Signed	Date
CODA system mobilised for acquisition		

M.2 GeoKit/PI100 Mobilisation Checklist

	GeoKit/PI100 Mobilisation	Comments	Initials
1	**Tag Setup Files**		
1.1	Are the correct tag types set up? Have you included all the tag types required by the client?		
1.2	Are the start/end codes correct?		
1.3	Are the correct tags active?		

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	GeoKit/PI100 Mobilisation	Comments	Initials
1.4	Are the forced measures set for the appropriate tags?		
1.5	Is the Tag Setup saved on the system hard disk/optical disk?		
1.6	Has the Tag Setup been saved to tape/optical disk, using **Maintenance Menu→Backup Setup Files**?		
1.7	Has the Tag Setup file name changed on the system hard disk/optical disk?		
1.8	Has the Tag Setup been reloaded onto the system hard disk from tape/optical disk, using **Maintenance Menu→Restore Setup Files**?		
1.9	Is the tape/optical disk labelled and write-protected?		

2	**Fast Tag Files**		
2.1	Are the Fast Tag Setup files correct for the job?		
2.2	Is the Fast Tag Setup saved on the system hard disk/optical disk?		
2.3	Has the Fast Tag Setup saved to tape/optical disk, using **Maintenance Menu→Backup Setup Files**?		
2.4	Has the Fast Tag Setup file name changed on the system hard disk/optical disk?		
2.5	Has the Fast Tag Setup been reloaded onto the system hard disk from tape/optical disk, using **Maintenance Menu→Restore Setup Files**?		
2.6	Is the tape/optical disk labelled and write-protected?		
2.7	Has the right mouse button been set up for maximum efficiency?		

3	**System Hard Disk**		
3.1	Have all previous interpretations and tag files been stored to tape/optical disk and labelled correctly?		
3.3	Have all unwanted tag files on the system hard disk/optical disk been deleted?		

4	**Report Files**		

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	GeoKit/PI100 Mobilisation	Comments	Initials
4.1	Are the Report Setup files correct for the job?		
4.2	Can the Report ASCII output on floppy be read by the system the report is intended for?		
4.3	Is the report format as required and meaningful?		
4.4	Is the Report Setup file saved onto the system hard disk/optical disk?		
4.5	Have the Report Setup files been saved to tape/optical disk, using **Maintenance Menu→Backup Setup Files**?		
4.6	Has the Report Setup file name changed on the system hard disk/optical disk?		
4.7	Has the Report Setup been reloaded onto the system hard disk from tape/optical disk, using **Maintenance Menu→Restore Setup Files**?		
4.8	Is the tape/optical disk write-protected and labelled?		

	Signed	Date
CODA system mobilised for Tagging & Reporting		

M.3 PI100 Mobilisation Checklist

	PI100 Mobilisation	Comments	Initials
1	**Tagging & Reporting**		
1.1	Have all the checks in the GeoKit/Pipeline Inspection Mobilisation Checklist (above) been carried out successfully?		

2	**Pipeline Inspection**		
2.1	Is the pipeline external diameter known for all the pipelines to be surveyed?		
2.2	Is the client spec for touchdown known for all the pipelines to be surveyed?		
2.3	Is the minimum span length to report known for all the pipelines to be surveyed?		

	Signed	Date
CODA system mobilised for Pipeline Inspection		

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M.4 TrackPlot/Mosaic Mobilisation Checklist

	TrackPlot/Mosaic Mobilisation	Comments	Initials
1	**Start TrackPlot/Mosaic**		
1.1	Has TrackPlot been switched on in the Coda system?		
1.2	Is the tape/optical disk ready for playback?		
1.3	Is the seabed being tracked so slant-range correction can be applied to TrackPlot/ Mosaic?		
1.4	Have you selected the appropriate corrected nav file(s) in the Survey Overview window?		
1.5	Is the heading correct?		

2	**Navigation Data**		
2.1	Have you selected the appropriate corrected nav file(s) in the Survey Overview window?		
2.2	Is the heading correct?		

3	**Data Display**		
3.1	When you start playing the tape/optical disk, is the vessel track displayed in both the Survey Overview and TrackPlot windows?		
3.2	Are you focusing on the correct Track?		
3.3	Have the tags for display been selected in both windows?		
3.4	Have Object Properties been set in the required Tracks of data?		
3.5	In Mosaic, has image display been switched on in the TrackPlot window?		
3.6	Once the Mosaic has built up, has it been manipulated to produce the desired image?		
3.7	Have any required screen dumps been generated?		

	Signed	Date
CODA-TrackPlot/Mosaic mobilised		

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N On-Line Checklists

The purpose of these checklists is to ensure that the system operator is carrying out all the required steps when tagging or generating reports with the Coda system.

N.1 Saving Tag Files to Tape/Disk Checklist

Tape System:

Blank tape loaded into drive 1	1.
Files saved using **Tagging→Manage Tag Files→Tape Load/Save**. (**Save Batch Overwrite** to overwrite existing data on tape; **Save Batch Append** to write to the first blank section of the tape)	1.
Tag files saved correctly (**List Previous Batch** showed the appropriate tag files)	1.

Optical Disk System:

Blank optical disk loaded into drive.	1.
Tag files located and selected using **Tagging→Manage Tag Files→Database Location**	1.
Tag files copied to target location using **Copy Tag Files**	1.
Tag files saved correctly (Database Location showed the appropriate tag files)	1.

Tape/Disk Systems:

Tag file tape labelled correctly:	1.
Date and time of recording	1.
Data Source	1.
Client	1.
Kp (start and end)	1.
Tag file name	1.
Tag file tape/optical disk write protected	1.
Tag file stored with data file tape/optical disk	1.

N.2 Loading Tag Files to System Hard Disk Checklist

Tag file tape/disk loaded into correct drive	1.
Tag file tape rewound (tape system only)	1.
Tag file copied correctly. Tag filename appears in **Tagging→Manage Tag Files** window following **Rescan**	1.

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O Interpretation Checklist

The purpose of this checklist is to make sure that the same tag and reporting setups are used throughout the interpretation process, whether onshore or offshore. Problems will occur if the data is being interpreted on systems which have different setups.

O.1 GeoKit/PI100 Interpretation Checklist

	GeoKit/PI100 Interpretation	Comments	Initials
1	**Tag Setup Files**		
1.1	Are the correct tag types set up? Have you included all the tag types required by the client?		
1.2	Are the start/end codes correct?		
1.3	Are the correct tags active?		
1.4	Are the forced measures set for the appropriate tags?		
1.5	Is the Tag Setup saved on the system hard disk/optical disk?		
1.6	Has the Tag Setup been saved to tape/optical disk, using **Maintenance Menu→Backup Setup Files**?		
1.7	Has the Tag Setup file name changed on the system hard disk/optical disk?		
1.8	Has the Tag Setup been reloaded onto the system hard disk from tape/optical disk, using **Maintenance Menu→Restore Setup Files**?		
1.9	Is the tape/optical disk labelled and write-protected?		

2	**Fast Tag Files**		
2.1	Are the Fast Tag Setup files correct for the job?		
2.2	Is the Fast Tag Setup saved on the system hard disk/optical disk?		
2.3	Has the Fast Tag Setup been saved to tape/optical disk, using **Maintenance Menu→Backup Setup Files**?		
2.4	Has the Fast Tag Setup file name changed on the system hard disk/optical disk?		
2.5	Has the Fast Tag Setup been reloaded onto the system hard disk from tape/optical disk, using **Maintenance Menu→Restore Setup Files**?		

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	GeoKit/PI100 Interpretation	Comments	Initials
2.6	Is the tape/optical disk labelled and write-protected?		
2.7	Has the right mouse button been set up for maximum efficiency?		

3	**System Hard Disk**		
3.1	Have all previous interpretations and tag files been stored to tape/optical disk and labelled correctly?		
3.3	Have all unwanted tag files on the system hard disk/optical disk been deleted?		

4	**Report Files**		
4.1	Are the Report Setup files correct for the job?		
4.2	Can the Report ASCII output on floppy be read by the system the report is intended for?		
4.3	Is the report format as required and meaningful?		
4.4	Is the Report Setup file saved onto the system hard disk/optical disk?		
4.5	Have the Report Setup files been saved to tape/optical disk, using **Maintenance Menu→Backup Setup Files**?		
4.6	Has the Report Setup file name changed on the system hard disk/optical disk?		
4.7	Has the Report Setup been reloaded onto the system hard disk from tape/optical disk, using **Maintenance Menu→Restore Setup Files**?		
4.8	Is the tape/optical disk write-protected and labelled?		

	Signed	**Date**
CODA system mobilised for Tagging & Reporting		

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Part VII: Glossary & Conversions

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Conversion Table

The following tables may be used for conversion from one unit of measurement to another. The units are grouped under the headings: angle, area, length/distance, temperature, time, velocity/speed, weight.

An Example of Use of the Tables

To convert a measurement from a unit in the first column (Unit A) to a unit in the fourth column (Unit B), you multiply the measurement by the multiplier/conversion factor in the second column (Unit A to Unit B multiplier/conversion). For example, to convert 10 knots to metres per second: 10 x 0.5145 = 5.145 metres per second.

To convert a measurement from a unit in the fourth column (Unit B) to a unit in the first column (Unit A), you multiply the measurement by the multiplier/conversion factor in the third column (Unit B to Unit A multiplier/conversion). For example, to convert 10 metres per second to knots: 10 x 1.944 = 19.44 knots.

Angle

Unit A	Unit A→Unit B multiplier/conversion	Unit B→Unit A multiplier/conversion	Unit B
degrees (angle)	1.745×10^{-2}	57.3	radians

Area

Unit A	Unit A→Unit B multiplier/conversion	Unit B→Unit A multiplier/conversion	Unit B
acres	4.356×10^{4}	2.296×10^{-5}	square feet
acres	4047	2.471×10^{-4}	square metres
square feet	9.290×10^{-2}	10.76	square metres
square miles	3.098×10^{6}	3.228×10^{-7}	square yards
square miles	640	1.562×10^{-3}	acres
square miles	2.59	0.3861	square kilometres
square millimetres	1973	5.067×10^{-4}	circular mils

Length/Distance

Unit A	Unit A→Unit B multiplier/conversion	Unit B→Unit A multiplier/conversion	Unit B
chain (surveyors')	66	1.515×10^{-2}	feet
fathoms	6	0.1667	feet
feet	30.48	3.281×10^{-2}	centimetres
feet	0.3048	3.281	metres
inches	2.54	0.3937	centimetres
inches	8.333×10^{-2}	12	feet

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Unit A	Unit A→Unit B multiplier/conversion	Unit B→Unit A multiplier/conversion	Unit B
inches	1.578×10^{-5}	6.336×10^{4}	miles
inches	1000	0.001	mils
inches	2.778×10^{-2}	36	yards
kilometres	3281	3.048×10^{-4}	feet
leagues	3	0.33	miles (approximately)
metres	1.094	0.9144	yards
miles (nautical)*	6076.1	1.646×10^{-4}	feet
miles (nautical)*	1852	5.400×10^{-4}	metres
miles (nautical)*	1.1508	0.869	miles (statute)
miles (statute)	1.609	0.6214	kilometres
miles (statute)	5280	1.894×10^{-4}	feet
yards	3	0.3333	feet
US Survey Feet	0.3048006096	3.2808	metres
Mod Survey Feet	0.3048122530	3.2807	metres
Clarkes Survey Foot	0.3047972651	3.2809	metres
Indian Survey Feet	0.3047876058	3.2810	metres

* Conversion factors for the nautical mile and, hence, for the knot, are based on the International Nautical Mile

Temperature

Unit A	Unit A→Unit B multiplier/conversion	Unit B→Unit A multiplier/conversion	Unit B
Centigrade (Celsius)	$\left(C° \times \frac{9}{5}\right) + 32$	$(F° - 32) \times \frac{5}{9}$	Fahrenheit

Time

Unit A	Unit A→Unit B multiplier/conversion	Unit B→Unit A multiplier/conversion	Unit B
GMT date & time	see Appendix C	see Appendix C	UTC seconds
UTC seconds	see Appendix C	see Appendix C	GMT date & time

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Velocity/Speed

Unit A	Unit A→Unit B multiplier/conversion	Unit B→Unit A multiplier/conversion	Unit B
knots**	1.688	0.5925	feet per second
knots**	30.87	0.0324	metres per minute
knots**	0.5145	1.944	metres per second
knots**	1.1508	0.869	miles (stat) per hour
metres per minute	3.281	0.3048	feet per minute
metres per minute	0.06	16.67	kilometres per hour
miles per hour	0.4469	2.2374	metres per second
miles per hour	88	1.136×10^{-2}	feet per minute
miles per hour	1.609	0.6214	kilometres per hour

** Nautical miles per hour

Weight

Unit A	Unit A→Unit B multiplier/conversion	Unit B→Unit A multiplier/conversion	Unit B
kilograms	2.205	0.4536	pounds (avoirdupois)

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Glossary

A/D conversion	the process of converting an *analogue* signal to a *digital* one
absolute	using a predefined frame of reference (0 Kp, or 0:00 on 1st January, 1970); see also *relative*
AC	Alternating Current; mains supply
acquisition	see *data acquisition*
acquisition mode	see *data acquisition mode*
acquisition parameters	the settings used within the *acquisition sub-system* to determine the quality and volume of the *digital* data obtained
acquisition sub-system	the parts of the DA100/DA200 concerned with obtaining a *digital* form of the *analogue sonar* inputs
across-track	at 90° to the *towfish* or vessel *track*
across-track resolution	the distance *across-track* covered by each sample of *sonar* data
active channel	a *data channel* which is currently being *digitised*
aliasing	distortion of the input signal caused by carrying out *digitisation* at too low a *sampling frequency*
along-track	along the line of the *towfish* or vessel *track*
along-track resolution	the distance *along-track* covered by each sample of *sonar* data
altitude	(of *towfish*) the distance above the seabed
ambient temperature	the temperature of the surrounding air
analogue	conveying information by changes in signal amplitude and phase; see also *digital*
annotation	(of sonar records) the practice of using an external device to overlay the *analogue sonar* data with navigation information
Application Specific Area	the part of the *DA100/DA200* display (in the bottom right of the screen) whose functions change in *playback* and *acquisition* modes
Apply	A button which applies the settings or options selected and retains the *pop-up window* on the screen.
ASCII	American Standard Code for Information Interchange; the world-wide standard means of sending alphanumeric characters in a 7-bit format
auto pause release	(of the *DA100/DA200*) a feature which prevents the freezing of the screen display by the **Pause** button if further pausing would cause loss of data to the screen
automatic position pointer	the pointer type used for resetting the position of automatically tracked features during *PI100* operation
automatic sub-sample	(of the *DA100/DA200*) the default *sub-sample* mode; this automatically derives a sub-sample rate which allows the full swathe width to be displayed on the screen
batch	a group of *tag* files saved in the same save operation

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baud rate	(of *RS-232* interfaces) the rate at which raw data bits are sent; roughly equivalent to *bits*/second
bit	binary digit; the smallest information unit in a *digital* system
BNC connector	industry-standard bayonet connector for *analogue* and *digital* signals
bottom tracking	(of the *DA100/DA200*) automated location of the seabed *first return* to allow the *towfish altitude* to be calculated
byte	8 *bits*
Cancel	this button cancels any items or options selected and dismisses a *pop-up window*, retaining the previous settings
case sensitive	recognising the difference between lower and upper case letters (for example, 'a' and 'A')
Centronics	industry-standard parallel interface for connecting devices such as printers and plotters to computer equipment
cleaning cartridge	the means of carrying out head cleaning for *DAT* or *Exabyte* tape drive units; a tape cartridge which holds cleaning tape rather than recording tape
click	press down and release the appropriate mouse button; if no button is specified, the left button should be used
clipped	(of *analogue* input signals) not converting the whole of the input range, thus losing some of the signal (for example, the *outgoing pulse* in *sonar* data); this should only be allowed to happen if the information being discarded will NEVER need to be recovered
Coda format	Coda Technologies' format for storing data to a recording media; retains more information about the recorded data than other proprietary data formats
COM1	the name commonly used in *DOS* systems for the first *serial port*
COM2	the name commonly used in *DOS* systems for the second *serial port*
compression	(of tape drives) the practice of eliminating redundancy in the data being recorded, allowing a larger amount of data to be stored in a given space
continuous record	(of the *DA100/DA200*) a facility which allows recording of incoming data to carry on continuously, without the need to stop recording when changing data tapes or optical disks
contrast	the variation in shades of grey or *hue* within the display
corrected navigation data	navigation information which has been smoothed to remove spikes or jitter from the positional information
creator node	the first node in a multi-node tag
critical length	(*PI100*) the length in metres that an automatically detected span must be before it is deemed to be a critical span (user-defined)
cross track	at ninety degrees to the direction of travel of the towing vessel
cross-track offset	the straight line cross-track distance from the vessel *datum point* to the point where the tow cable passes over the stern of the vessel

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cross-track slant distance	the distance measured between two points solely in the *cross-track* direction. It is a non-slant corrected measure (i.e. it is dependent on *fish height*)
cross-track smoothing	(of *sidescan sonar* data) low pass filtering of the sonar signal from the nearest to the farthest end of the swathe, using a filter of fixed frequency response
current tag	(of the *DA100/DA200*) the event marker selected to be active by clicking on the appropriate area of the *Data Display Are*a. The selected *tag* flashes between its normal colour and light blue
cursor	symbol that shows the position on the display where any typed text will be entered
DA100	Coda Technologies' system for acquiring, processing and replaying *sidescan sonar* or *sub-bottom* data, with single *trigger* capability
DA200	Coda Technologies' system for acquiring, processing and replaying data from two independently firing *sonars*, e.g. *sidescan sonar* and boomer
DAT	Digital Audio Tape; an international standard for the recording of *analogue* data to *digital* tape; see also *DDS* and *DDS2*
data acquisition	the process of obtaining data (usually in *digital* form)
data acquisition mode	(of the *DA100/DA200*) the operation mode in which the DA100/DA200 is *digitising* and records data; see also *data playback mode*
data bits	the number of *bits* used to hold the information from each sample; usually an integer number of *bytes* (8, 16 or 32 *bits*)
data channel	a flow of data (for example, sonar data) into or within the *DA100/DA200*; see also *display channel*
Data Control Area	(of the *DA100/DA200*) that part of the DA100/DA200 *interface* which controls the operation of the tape or optical disk drive unit or units
Data Display Area	(of the *DA100/DA200*) that part of the screen given over to the display of data from the *acquisition* sub-system or from tape or optical disk; the upper portion of the screen
data format	(of tapes or optical disks) the scheme used to record the *digital* data onto the tape or optical disk. Different formats can result in different amounts of data being stored; see also *Coda format*, *Q-MIPS™ format*, *SDEF format*, *SEG-Y format*
data playback mode	(of the *DA100/DA200*) the operation mode in which the DA100/DA200 reads previously recorded data from tape or optical disk and displays it on the screen
database	a structured means for storing and retrieving data in *digital* form, allowing rapid *random access* to individual data entries
datum point	the point on the towing vessel from which all measurements are referenced
DCC	Distance Cross Course; the *across-track* distance of a point from the survey line
DDS	Digital Data Storage; the standard format for storing computer data to *DAT* tapes

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DDS2	an improvement to the *DDS* standard, allowing a higher recording density to be used, hence obtaining more storage capacity from a given length of magnetic tape
dead time	(in *digitisation*) the time allowed between the end of sampling for a given data line (or *ping*), and the arrival of the next *trigger* pulse
DGPS	Differential GPS. A form of *GPS* which uses a base station to send corrections to the satellite derived positions, allowing more accurate fixes to be obtained
digital	representing information by a sequence of bits, rather than using the signal amplitude and phase; see also *analogue*
digital signal processing	using numerical techniques to carry out signal filtering or amplification in the *digital* domain, rather than the *analogue* domain
digitisation	the process of converting an *analogue* signal's amplitude and phase information into *digital* form
display channel	a *data channel* which is displayed on the *DA100* screen
DOS	see *MS-DOS*
DOS formatted	(of floppy disks) formatted on the *MS-DOS* operating system
double-click	press and release the specified mouse button twice in rapid succession; if no button is specified, the left button should be used
dual tape	(of *DA100/DA200*) a system having two tape drive units, rather than one
dynamic range	that portion of an *analogue* signal which actually conveys information; that is, the range of values between the highest and lowest encountered
Eastings	distance East or West in metres of a given position from the *UTM* or lat/long origin
edge sensitive	(of *TTL* input) reacts to the change in voltage level, rather than to the steady-state voltage level
Encapsulated Postscript®	a form of *Postscript*® which is suitable for incorporating into documents on word processing packages, spreadsheets, and so on
EOT	End Of Tape
Ethernet	*Local Area Network* using a coaxial cable with *BNC connectors*, capable of up to 1.25MB/second transfer rate
event	(*DA100/DA200*) a point in the data which the user wishes to mark using a *database* entry
Exabyte	8mm magnetic tape drive unit (based on 8mm video tape technology) used for storage of digital computer data
external trigger	(DA100/DA200) a *TTL trigger* which originates outwith the *DA100/DA200*, used by the system to initiate the *acquisition* for each *ping*
fast tag	(*PI100/GeoKit*) colour-coded keys for accelerated marking of *events* during pipeline inspection

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file	a set of data which exists as a distinct entity; on tape, file extents are defined by end of file markers; on disk, they are defined by the *operating system*
filtering	the alteration of the frequency content of a signal; usually the removal of unwanted (noise) frequencies
first return	(in *sonar* data) the first echo which rises above the noise level of the water column; the first point of contact of the *outgoing pulse* with the seabed
fish	abbreviation for *towfish*
fish height	(*PI100*) the true height of the *sonar transducer* (fish) above the seabed
fix	a reference point (in time and space) for navigation purposes
fix tag	the database entry for a given *fix*; see also *tag*
floppy disk	portable magnetic media. Usually refers to 3½ inch double-sided, high density disks with a capacity of 1.44MB (formatted)
flow chart	method of breaking down a task into a sequence of actions and decisions in diagrammatic form
flow control	also known as *handshaking*
forced measure	(following tag operation in *PI100/GeoKit* mode) a sequence of measurements of the tag's features which may have to be carried out manually, rather than automatically by the system. The Tag Placement Rules define which measurements are required for a given tag
full resolution	(*zoom*) using all the available samples for display; no *sub-sampling* of any sort is carried out
gamma	(colour mapping) the exponential function used to map incoming intensities to *greyscale* values
gamma correction	the process of redisplaying the image data displayed on screen using a new *gamma* value
GB	Gigabyte, approximately 1 000 000 000 bytes
General Information Area	(*DA100/DA200*) that area of the screen which holds the current *ping* number, time and cursor position; situated above the *Data Control Area*
GeoKit	Coda Technologies' software module for geophysical interpretation, which allows the user to *tag events* and generate *ASCII* report output
goto	(*DA100/DA200*) a command allowing *random access* to *sonar* data stored on magnetic tape or optical disk
GPS	Global Positioning System – a satellite-based navigation system
graphical user interface	the means of interaction of the computer user with the programs running on the computer; uses the display, the keyboard and the *mouse*/*trackball*
greyed out	(*DA100/DA200*) menu items which cannot be selected are *greyed out*, written in lighter, grey text
greyscale	the range of shades from black to white

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grip	see *grip point*
grip point	(*DA100/DA200*) a point on an interactive graph, signified by a small square, which can be moved by users (using the *mouse*/ *trackball*) to alter the shape of the graph
GUI	*Graphical User Interface*
half-wave rectify	remove those portions of an incoming *analogue* signal which are below some threshold value (usually 0 volts)
handshaking	(of *RS-232* interfaces) the means by which the starting and stopping of data transfers is effected; this can be carried out in *hardware* or *software*
hard disk	the magnetic disk which is permanently attached to a computer system
hardcopy	printed output; the generation of printed output
hardware	electronic components
hardware handshaking	*handshaking* carried out by electronic components, without the intervention of any computer program
heave compensation unit	a piece of equipment external to the sonar which monitors the vessel's heave, and varies the timing of the *trigger* pulse sent to recording equipment (for example, the *DA100/DA200*), so that the effect of vessel heave is largely eliminated; used for *sub-bottom profiling*
height trigger	(*PI100*) the minimum height of the bottom of the pipe above the seabed that will trigger the pipe span condition (user-defined)
high contrast	a large proportion of the available grey is used to display the regions of the image the user is interested in
high pass filtering	removing the low frequency component of a signal
high resolution	(of digital storage) retaining a large proportion of the original information content of the signal
hue	the shade or tint of a colour
Hz	Hertz; the SI equivalent of cycles/second
icon	small symbol on the computer screen which represents some entity or function within the computer system
image enhancement	performing *image processing* in order to improve the quality of an image (for example, the display of *sonar* data on a screen)
image processing	performing manipulations to an incoming *digital* signal on the assumption that the data contained therein has some meaning as an image
indented	(*DA100/DA200*) the buttons used to control the functions of the DA100/DA200 (for example the data control buttons) have a three-dimensional look; when a button has been activated, the shading changes and the button appears to have sunk into the interface – to have been indented
information window	a *window* which supplies the user with information, but does not accept any input from the user (for example, the **Survey Data** window)

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input voltage range	the range of voltages which can be *digitised* by the *DA100/ DA200*
intensity	strength, brightness, magnitude or amplitude of a signal
interface	a means of transferring information from one piece of computer equipment to another
internal trigger	(*DA100/DA200*) a *TTL trigger* pulse which is generated by the DA100/DA200, allowing it to trigger other equipment (for example, to trigger the *sonar ping*)
interpolation	the practice of estimating the value of a variable at a point by setting it between the values of later and earlier samples
invert	causing the range of shades (for example, from black to white) to be reversed, so that items which were coloured black become white, and vice versa
IO	Input/Output
ISA	Industry Standard Architecture; a type of signal bus used inside PCs
jitter	the noise present on a signal, causing observations which should be identical to differ
KB	Kilobytes (1 024 bytes)
Kp	Kilometre post (distance along the survey line or pipeline, in kilo-metres)
Landscape mode	(*Postscript*®) printed so that the bottom of the Postscript® document is aligned with the long edge of the sheet of paper
layback	the *along-track* distance from the *datum point* on the vessel to the *towfish*
LED	Light Emitting Diode: small coloured light attached to electronic equipment
line of data	all the data arising from a given sonar ping; for *sidescan* this implies both *port* and *starboard* channels
local area network	the cabling and interfacing standards which allow a collection of computers to be connected to each other to share data and resources (for example, *Ethernet*, *Token Ring*)
lookup table	the rule used to translate incoming *digital* signals into grey levels or colours for display; also known as *palette*
loopback	testing a piece of equipment by using its own output as an input signal, thus testing both the input and output functionality
low contrast	a comparatively small range of grey levels is used to display all the parts of the image the viewer is interested in; see also *contrast, high contrast*
low pass filtering	removing the high frequency component of a signal
LPT1	the name commonly used on *DOS* systems for the first *parallel port*
LUT	*Lookup Table*
master trigger	a *trigger* used to start a number of pieces of electrical equipment, to ensure their synchronisation

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MB	Megabyte; roughly 1 000 000 bytes
Media Recognition System	second-generation *DDS* standard tapes, which have markings which allow the length of tape to be determined by the *tape drive unit*
megabyte	approximately 1 000 000 bytes; see also *MB*
menu	an area of the display (either a *Menu Bar* or a *window*) which allows users to choose from a number of options, using either the keyboard or the *mouse*/*trackball*
Menu Bar	an area (at the top of the display in the *DA100/DA200*) in which a number of menu items are permanently displayed
merge length	(*PI100*) the minimum length (or separation) between separate pipe events (e.g. *spans*) that will prevent the *events* from being merged as one single event (user-defined)
Microsoft Windows™	a windowing *operating system* for IBM-PC compatibles
minimum length	(*PI100*) the minimum length a pipe event (e.g. *span*) can be without it being discarded as being too short (user-defined)
Mosaic	Coda's software module for *Mosaicing sidescan sonar* records
mosaicing	the process of geopositioning *sidescan sonar* records such that an image of a large area of the seafloor is built up line by line
Motif™	a library of *software* routines used for building user *interfaces*, giving a characteristic 'look and feel'
mouse	a pointing device for use with computers. Movement of the mouse moves the screen *pointer*; see also *trackball*
MS-DOS	Microsoft Disk Operating System; see also *DOS*
multi-node tag	an *event* marker which has several user-positioned points (or *nodes*), used to define a boundary or a layer
multi-resolution	capable of displaying or processing data at a number of scales
multi-tasking	(of *operating systems*) able to run several programs simultaneously
nav string	abbreviation for *navigation string*
navigation data	any form of navigation information within the *DA100/DA200*
navigation input	any form of navigation input to the *DA100/DA200* system
navigation library	(*DA100/DA200*) the reference table which allows the DA100/DA200 to interpret incoming *navigation strings*
navigation string	an *ASCII string* holding *navigation data*
node	see *tag node*
non-interlaced	(of computer monitors) displaying all the *pixels* within the display in a single pass; interlaced displays take two passes, each displaying every second line of pixel data
northings	distance North or South in metres of a given position from the *UTM* or lat/long origin
off-line	processing which does not take place as data is being *acquired*, or at the rate of *acquisition*

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offset	(*DA100/DA200*) the distance of a given sample from a *datum point*; usually the distance of the start of the raw data line to the start of the displayed line
OK	a button which selects and applies the settings or options selected and dismisses the *pop-up window* from the screen
on-line	processing which takes place as the data is being *acquired*, and at the rate of *acquisition*
on/off toggle	a switch on the *DA100/DA200* display which turns a system function on or off; each selection of the switch changes the state of the function (if it is 'on', selection turns it 'off'; subsequent selection turns it 'on' again)
one-of selection	a form of switch on the *DA100/DA200* display which selects one from a number of possible options, where all the possible options are displayed
operating system	the program which 'manages' a computer, allowing the user's programs to run (e.g. *Unix*, *Windows*, *DOS*)
option selection	a form of switch on the *DA100/DA200* which selects one from a number of possible options, where all the options except the one selected are hidden
outgoing pulse	the pulse of sound energy which is reflected to form *sonar* images; visible on recorded sonar data as the bright stripe at the beginning of each line
overlay plane	additional coloured graphics which can be displayed on top of *sonar* data; these may be switched on and off without affecting the displayed data
overwrite	record another set of data over the first, making the first data set unrecoverable
palette	equivalent to *lookup table*
parallel port	a form of interface which allows a computer to interchange data with the outside world in parallel form (that is, passing all 8 *bits* of a *byte* simultaneously)
parity	a form of error checking for each *byte* of data transferred (for example, through a *serial* or *parallel port*)
password	a collection of letters and numbers which uniquely allows access to a computer or a set of programs on a computer
PCI	Peripheral Component Interconnect: an advanced, high-speed bus system used by PC-compatible computers
PI100	Coda Technologies' Pipeline Inspection system, which allows complete pipeline surveys to be undertaken without the use of thermal recorders
ping	a single *sonar* scan, resulting in a *line of data* being acquired
pipe distance	(*PI100*) the slant distance from the sonar *transducer* (*fish*) to the front of the pipe
pipe grazing angle	(*PI100*) the angle made between the ensonified pipe, the *transducer* and the seabed directly below the transducer
pipe height	(*PI100*) the true height of the bottom of the pipe above the seabed

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pipe striking angle	see *pipe grazing angle*
pixel	picture element; the dots on the screen from which an image or *GUI* is built
playback mode	see *data playback mode*
playback speed	the rate at which sonar lines are displayed on the screen
pointer	the *icon* which reflects changes in the *mouse* position, or movements of the *trackball*. Usually an arrow, but may take other forms
pop-up menu	a *menu* which appears as the result of a selection in a previous menu
pop-up window	any form of *window* which appears as the result of a *mouse*/*trackball*, or keyboard selection from a *menu* in the interface
port	equivalent to *interface*; also left – see also *starboard*
Portrait mode	(of *Postscript*® documents) printed so that the bottom edge of the document is aligned with the shorter edge of the paper
positive edge	(of *TTL* inputs) a signal which changes from 0 to 5V
Postscript®	a language for describing printed matter (text, diagrams and images)
power down	the procedure to be observed when turning off the mains power to an item of electrical equipment
power up	the procedure to be observed when turning on the mains voltage to an item of electrical equipment
pre-emptive scheduling	allowing one program running in a *multi-tasking* operating system to cause other programs to be suspended and only restarted once the pre-empting program has completed its tasks
press and drag	press down the appropriate *mouse* button, and without releasing it, move the mouse so that the *pointer* is in the desired position on the screen; then release the mouse button
processed navigation data	see *corrected navigation data*
PSU	Power Supply Unit: converts mains (*AC*) voltage to the lower voltages required by computer equipment
pull-down menu	a menu which appears when a *Menu Bar* option is selected; items within a pull-down menu are selected by *pressing and dragging* to the required menu item
Q-MIPS™ format	a format for the storage of *sonar* data to tape
random access	obtaining data from a file or memory in an order which is not the same as the order the data was stored in
real-time	occurring at the speed of data *acquisition*, or faster
reboot	cause a computer system to completely re-initialise itself, as though the power had been turned off, then on again
recording session	the time from the start of recording data to the cessation of recording

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relative	using a local frame of reference (for example, time or distance measurements as an offset from the current time or distance); see also *absolute*
resolution	the level of detail which may be extracted from a set of data
ROTV	Remotely Operated Towed Vehicle. Subsea vehicle on which a *sidescan sonar* or *sub-bottom profiler* may be mounted
RS-232	an international standard for the interchange of serial data between computers
sampling	to convert *analogue* data to *digital* form, it is necessary to measure its amplitude at regular intervals; this is known as sampling the signal
sampling frequency	the frequency at which an *analogue* waveform is sampled to allow it to be converted to *digital* form
saturation	(of colours) the depth of a given tint or shade
screen dump	producing an image of the screen display, and either printing it or saving it to disk
scroll bar	the means by which all the items in a list appearing in a menu or *pop-up window* may be examined
scrolling	moving gradually up or down the display; one *line* of data must move out of the bottom of the display for every new line which appears at the top
SCSI-2	Small Computer Systems Interface, version 2; an improved version of the SCSI standard for connection of peripheral devices (such as tape drives, disks and scanners) to computers
SDEF format	Sonar Data Exchange Format: sonar interchange format developed by Meridian Sciences and US Geological Survey
SEG-Y format	Society of Exploration Geophysicists 'Y' format; obsolescent standard for seismic and sonar data storage
seismic	using vibrations to obtain an understanding of the underlying geological structure
select	click the left *mouse* button on the appropriate item
serial port	a form of *interface* which allows a computer to interchange data with the outside world in serial form (that is, one *bit* at a time)
shortcut key	a single typed character or sequence of keyboard inputs which allows the user to carry out interaction with the *DA100/DA200* interface without using the *mouse*
sidescan sonar	a form of *sonar* which uses twin sideways looking transducers to obtain an image of the seabed as it is towed through the water
signal processing	see *digital signal processing*
single tape	(of *DA100/DA200*) a version of the DA100/DA200 which has only one *tape drive unit*
slant range	the distance *across-track* to a point on the seabed from the *towfish* position; this is directly proportional to the time from the *outgoing pulse* transmission

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slant-range correction	a geometric correction to the incoming sonar signal which converts the *across-track* scale of the sonar data so that it is directly proportional to distance *across-track*, rather than to time
slave trigger	the incoming *TTL trigger* pulse which causes a piece of electronic equipment to start a sequence of operations (for example, the *digitisation* of sonar data)
smart icon	an *icon* which if *selected* causes a sequence of operations to take place on the interface (for example, the *inversion* of the display)
smoothed navigation data	see *corrected navigation data*
software	computer programs
sonar	sound navigation and ranging; the use of sound underwater to detect objects or make measurements
sonar input	the *analogue* signal output by a *sonar* processing and control unit (for example, EG&G 260) which can be accepted as an analogue input by the *DA100/DA200*
span	(*PI100*) section of pipe that is unsupported by the seabed
spline	a function which smoothes the line of a graph through a number of points
stacking	see *trace mixing*
starboard	right; see also *port*
stop bits	(of *RS-232 interfaces*) the number of *bits* following the data bits, before the start of the next *byte* transmission
string	(of *ASCII* data) a collection of valid ASCII alphanumerical characters
sub-bottom profiler	a low-frequency *sonar* device for obtaining *seismic* information about the geology under the seabed
sub-sampling	the practice of missing out data samples at regular intervals, allowing a signal to be represented by fewer samples
substrate	the material which makes up the seabed or sub-bottom
swathe	the area of the seabed covered by a *sidescan sonar* trace
tab form	a form which contains a number of related items of information or selections and has a labelled tab at the top. As tab forms overlap, the required tab form may have to be brought to the front of the pile by clicking on its tab
tag	(of the *DA100/DA200*) a group of one or more interconnected *tag nodes*
tag node	(of the *DA100/DA200*) a unique database entry defining a point within the data, or the screen graphic associated with it
tape cartridge	the plastic cartridge containing the magnetic tape medium
tape drive	see *tape unit*
tape head	that part of the *tape drive* which is in contact with the tape medium, and causes the data to be written to the tape

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tape unit	(or tape drive unit) that part of the *DA100/DA200* mechanism which contains the *tape head*, and into which the *tape cartridge* is loaded
TCP/IP	Transmission Control Protocol/Internet Protocol; an interface standard for *local area networks*
tear-off menu	a *pull-down menu* which can be detached from the *Menu Bar* to allow it to be displayed permanently on the interface
telemetry	measurements carried out at a distance (for example of the *towfish altitude*)
text-entry box	an area in a *window* which allows the user to type input using the keyboard, thus changing system parameters
thresholding	the act of setting a level (for example, a *greyscale* intensity level, or a voltage), above and below which different actions are taken on the incoming signal
TIFF	Tag Image File Format – a common, industry standard format for storing and exchanging binary image data
time varying gain	see TVG
titlebar	(of the *DA100/DA200*) the area at the top of the DA100/DA200 screen which holds copyright information
toggle	a form of switch which if pressed once is on, and if pressed again is off
Token Ring	the IBM Token Ring protocol for *local area networking*
toolkit	a set of tools or functions accessed through a single *pop-up window*
topology	the shape of a surface
towfish	the vehicle towed by a surface vessel in which the *sonar transducers* are mounted
trace mixing	adding (or subtracting) the data from succeeding *sonar pings* to remove *along-track noise*; also known as *stacking*
track	the path of the vessel or *towfish* over the seabed
trackball	a pointing device for use with computers; movement of the trackball moves the screen *pointer*; see also *mouse*
TrackPlot	Coda's software module for displaying vessel and *towfish* track information
TrackPlot Plus	a version of *Trackplot* which allows the user to modify the *tagging* carried out in a given survey area
transducer	a mechanism which transforms energy from one form into another (for example, a sonar transducer converts electrical energy to sound energy)
trigger	either an input which causes a piece of electronic equipment to start a sequence of operations, or an output generated by one piece of equipment, which others will use in this way; see also *slave trigger* and *master trigger*
trigger source	the piece of electronic equipment from which the *trigger* pulse originated

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TTL	Transistor-Transistor Logic; an electrical interfacing standard for *digital* signals
TVG	Time Varying Gain: an amplification applied to *sidescan sonar* signals which compensates for the spreading loss of the signal, which is roughly proportional to the log of the range in metres
TVG enhancement	(of the *DA100/DA200*) a set of facilities which allow users to alter the *time varying gain* applied to the incoming *sonar* signal
undersampling	sampling at too low a *sampling frequency*, so that *aliasing* occurs
Unix	a multi-user, timesharing operating system, with real-time facilities; uses the *X Window* graphical user interface
update	a revision to the *DA100/DA200* software, incorporating new features and/or bug fixes
user-specific	(of *files*) the files in the *DA100/DA200* system which are placed there by users (for example, *database files*, *smoothed navigation data files*)
UTC	Coordinated Universal Time; the world time standard; equivalent to GMT
UTM	Universal Transverse Mercator; a form of geographical projection which allows positions to be measured relative to each other in metres, over a restricted area
watch pointer	the *pointer* which appears on the display screen when the *DA100/DA200* is waiting for an operation to complete
water depth	the depth of water input into the system; the user may define this relative to a datum on the vessel, as the depth under the keel, or as the depth under the echo-sounder *transducer*
waterfall display	a *scrolling* display of image data
window	an area of the *graphical user interface* set aside for a specific operation, often disappearing when that operation has been completed
Windows	see *Microsoft Windows*, *X Window*
write protect	(of disk or *tape cartridge*) set so that it cannot be written to, only read from
X Window	a *graphical user interface* standard for the *Unix operating system*
zoom	the process of *selecting* an area of the display to be redisplayed in greater detail
zoom mode	defining the type of *zoom* operation to be carried out (for example, *full resolution*, fixed magnification)

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Software Defect Report Form

Coda Technologies has made every effort to ensure that its software is reliable and performs satisfactorily at all times. However, as with any software-based product, some defects may still be present. If you encounter unexpected, undocumented or illogical behaviour by the system, please complete this form and fax or mail it to:

Coda Technologies Ltd
Admiral House
29-30 Maritime Street
EDINBURGH
EH6 6SE
Tel: +44 131 553 1380
Fax: +44 131 554 7143

User

Company

Unit Type
(rental/sale)

Date

Time

System Type
(e.g. DA100/PI100)

Software Version Number

Serial Number

Mode in which fault occurred (playback/ acquisition)

Description of Fault
(please be as specific as possible)

Was recovery possible?
How?

On receipt of this form, Coda Technologies will contact you and issue a reference number for this report and describe the remedial action to be taken.

For Coda office use only: **Reference Number**: _____

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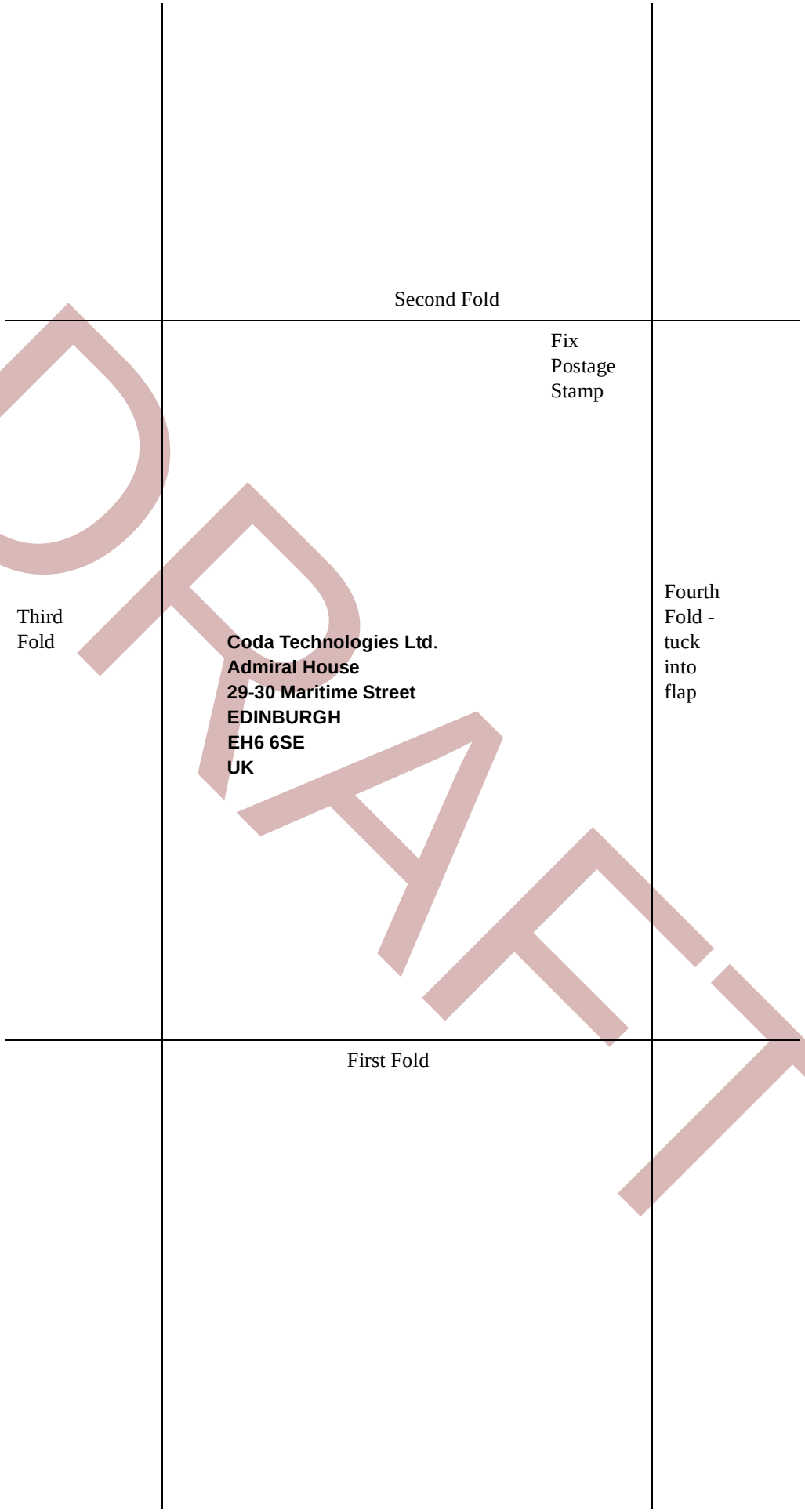
Second Fold
Fix
Postage
Stamp
Third
Fold
Fourth
Fold -
tuck
into
flap
Coda Technologies Ltd.
Admiral House
29-30 Maritime Street
EDINBURGH
EH6 6SE
UK
First Fold

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Product Feedback

We at Coda value your opinion. Please give us your opinion of our products, in each of the following areas. We'll send you a **free** mousemat on receipt of your form.

Product Name _____

	Excellent	Good	Fair	Poor
Ease of Use: is the product easy to use?	❒	❒	❒	❒
Hardware: is the hardware reliable?	❒	❒	❒	❒
Software: is the software reliable?	❒	❒	❒	❒
Range of Facilities: are there enough tools?	❒	❒	❒	❒
Appearance: Do you like the format of the display?	❒	❒	❒	❒
Physical: Is the product ergonomically designed?	❒	❒	❒	❒
Suitability: Is the system suited to your application?	❒	❒	❒	❒
Automation: Do you rely on automated interpretation?	❒	❒	❒	❒

Does the product meet your need? Why, or why not?

_____

_____

_____

_____

What's the single most important improvement we could make to the product?

_____

_____

Please complete the following information:

Name (optional): _____

Job Title or Function _____

Organisation _____

Address _____

_____

Phone _____

If we need more information, may we contact you? Yes ❒ No ❒ **Thank You**

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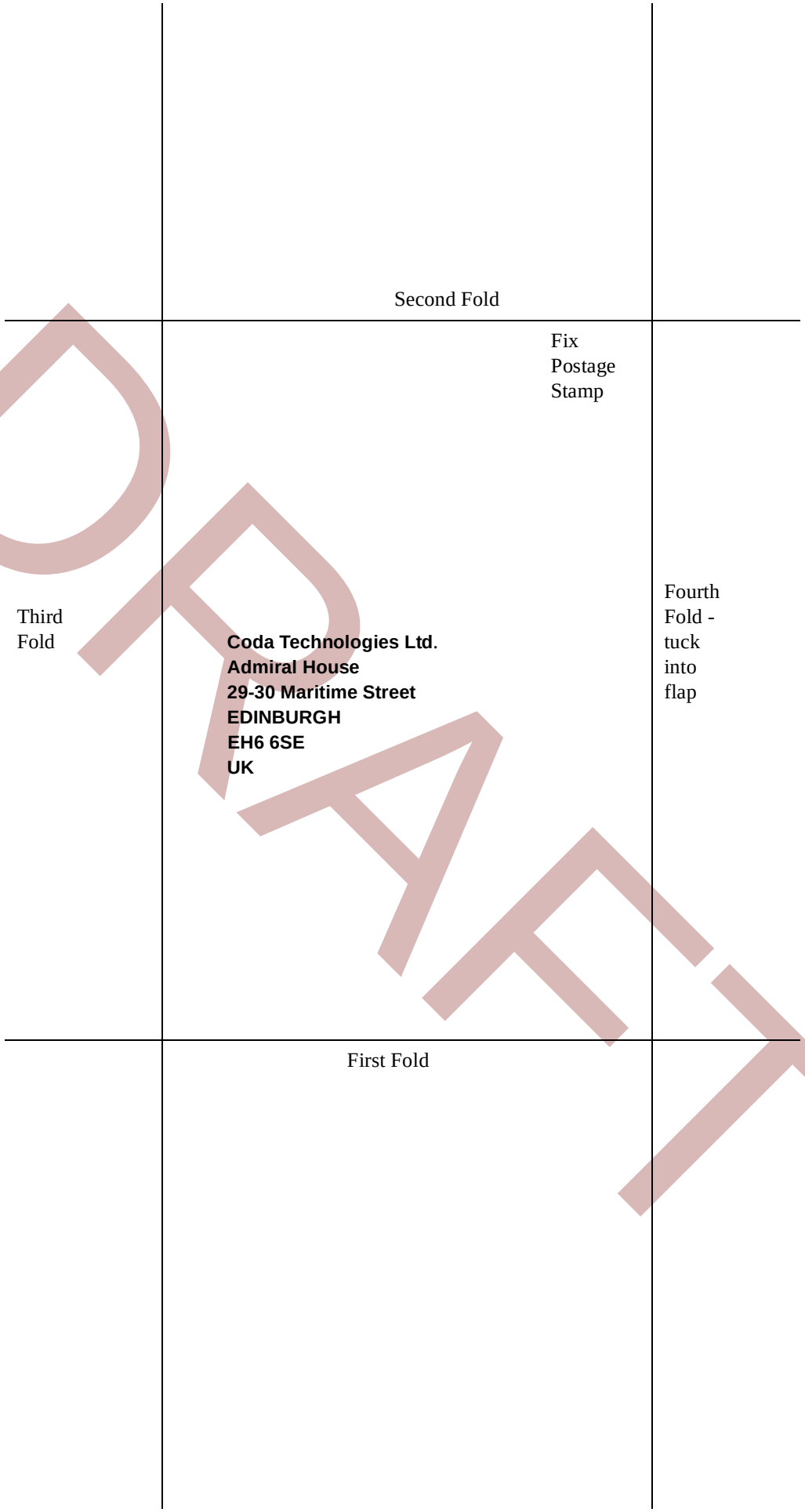
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Manual Feedback

We at Coda value your opinion. Please give us your opinion of this manual, in each of the following areas. We'll send you a **free** mousemat on receipt of your form.

Manual Title _____

	Excellent	Good	Fair	Poor
Accuracy: Is the information correct?	❒	❒	❒	❒
Completeness: Is information missing?	❒	❒	❒	❒
Organisation: Is the information easy to find?	❒	❒	❒	❒
Clarity: Do you understand the information?	❒	❒	❒	❒
Examples: Are there enough?	❒	❒	❒	❒
Illustrations: Are there enough?	❒	❒	❒	❒
Appearance: Do you like the page format?	❒	❒	❒	❒
Physical Binding: Do you like the cover and binding?	❒	❒	❒	❒

Does the manual meet your need? Why, or why not?

_____

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What's the single most important improvement we could make to the manual?

_____

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_____

Please complete the following information:

Name (optional): _____

Job Title or Function _____

Organisation _____

Address _____

_____

Phone _____

If we need more information, may we contact you? Yes ❒ No ❒ **Thank You**

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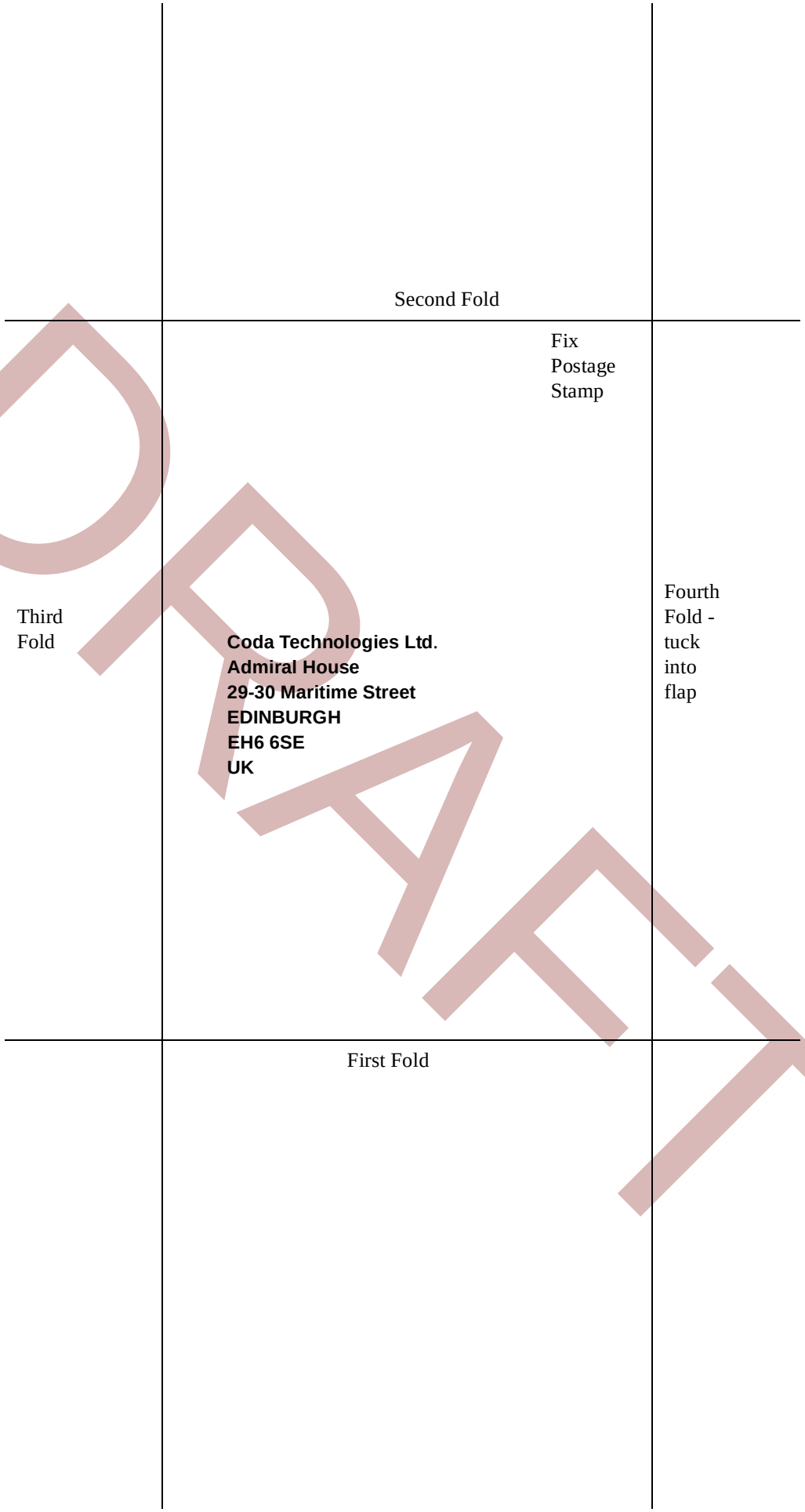
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