

**COMPUTER PROGRAM MANUAL
(SURVEY DATA REDUCTION MANUAL)**

DAT39W

Version 1.00

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1. Introduction

This Windows based program replaces the DOS version of software DAT39. Survey data reduction program for Geonics EM39 borehole conductivity, gamma, and magnetic susceptibility meters operates under Windows 95/98/XP/NT(4.0), and Windows 2000. While both versions, DOS and Windows, perform basically same functions, the Windows version of DAT39 provides a much easier users interface, better information on the screen, larger amount of readings can be operated on in one block, limited only by capacity of a computer hard drive, support for any printer and plotter supported by Windows, and has more control and faster completion of most of the tasks.

1.1 About DAT39W

The program DAT39W is designed to process data collected by Polycorders 720 operating under corresponding program EM39 or data acquired directly in the computer through the RS232 interface. It allows transfer of data files from the Polycorder to a Personal Computer (PC). Subsequently, it can be used to display, edit, print and plot data files. Data can be plotted on the computer screen and on any printer supported by Windows.

This Windows based version of DAT39W provides a much easier interface and better information on the screen. The amount of readings is limited only by the capacity of a computer hard drive. It supports any printer and plotter that is supported by Windows and gives more control and faster completion of tasks.

Additional improvements were also introduced to the data downloading. The program lists the Polycorder data files and their sizes, and the user may simply select files to be downloaded without having to review the Polycorder directory. Still, DOS based downloading programs are included on the disk in order to support older DOS or 16 bit Windows (3.1 or 3.11) based computers.

Overall processing of the EM39 data with this Windows based software will result in much greater productivity. File formats are compatible with older DOS based versions of DAT39 program. However to download data from the Polycorder 720 a new version of the Polycorder program EM39 (for Polycorder 720) has to be installed in the logger. These new Polycorder program is still compatible with the DOS based software so data files can be downloaded using a new DAT39W for Windows as well as older DOS based DAT39 software.

EM39 readings are arranged in boreholes (or holes) profile lines. Each profile line can contain up to two separate curves: Inphase and Quadrature (Conductivity) or Magnetic Susceptibility 1 and 2, Gamma ray profile contain only one component. Note that the Quadrature component is generally referred to as Conductivity in this manual.

Two sample data files, DEMOCI.G39 and DEMOG.G39 are included on the program disk. It allows the user to become familiar with running the DAT39W program.

1.2 Contents of DAT39W Distribution Disk

Program DAT39W is supplied on one CD disk. Disk contains following files and directories:

- SETUP39.EXE - setup program for DAT39W.
- UploadFiles - directory with following Polycorder files:
FORMDL.720 and EM39.720 for Polycorder 720 and analog EM39.
These files are also placed by Setup39 program in subdirectory UploadFiles of the DAT39W program directory.
- DAT39DOS - directory containing all EM39 DOS based program and associated files
- Documentation - directory containing Geonics manuals available in PDF format
- DAT39Wdisks - directory containing two subdirectories (Disk1, Disk2, and Disk3) for users that require floppy disks to run Setup39

1.3 DAT39W Software Installation

DAT39W uses setup program to load files on your computer. The following section describes the installation process.

To install DAT39W insert the DAT39W CD disk into computer CD disk drive. Exit all Windows applications before installing the program.

From the Windows File Manager, select **Run** from the **File** menu. The Run dialog box opens (Figure 1.1).

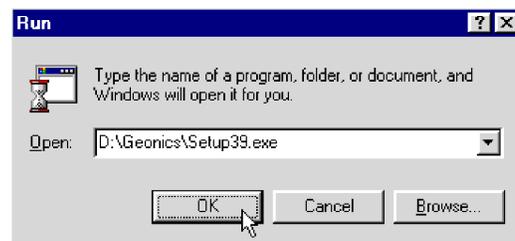


Figure 1.1: Run Dialog window

Browse for the file SETUP39.EXE in the directory of the diskette. Click **OK** to launch the Setup program. Once the Setup determines your computer configuration the Welcome window opens (Figure 1.2).

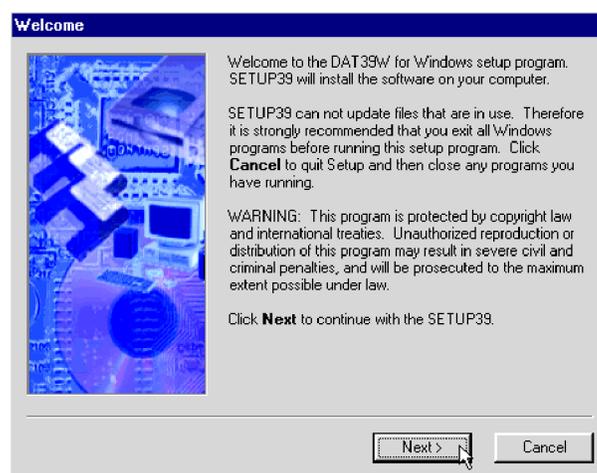


Figure 1.2: Welcome window

Read the text and click the **Next** button. The Serial Number window will be displayed (Figure 1.3).

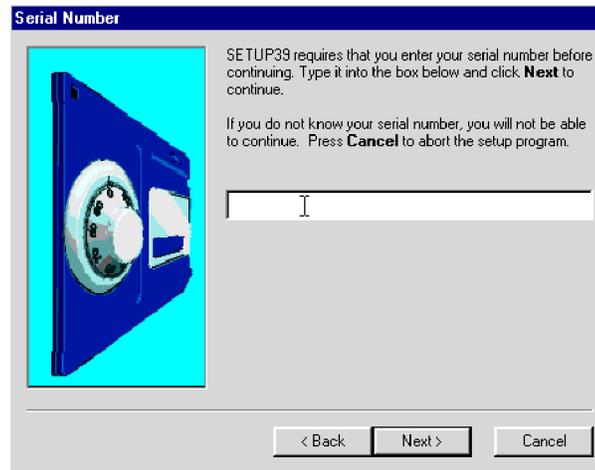


Figure 1.3: Serial Number window

Type the Serial Number into provided box and press the **Next** button. (If you do not know the Serial Number, you will not be able to continue.) The Installation Directory window opens (Figure 1.4).

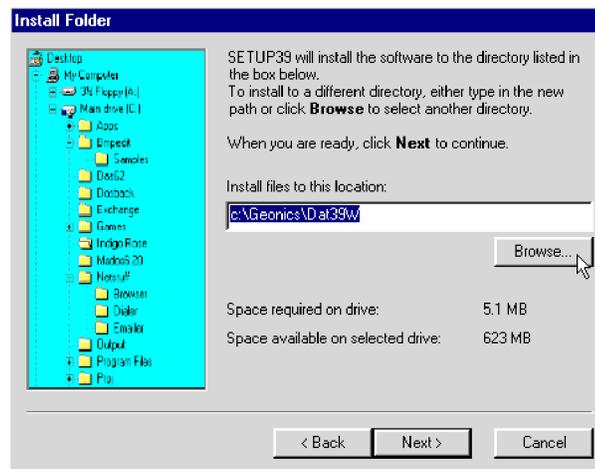


Figure 1.4: Installation Directory window

The default directory is c:\Geonics\DAT39W. Click the **Next** button to install the program to this directory. If you wish to install DAT39W to another directory, click the **Browse** button and the Select Installation Directory window will open (Figure 1.5).

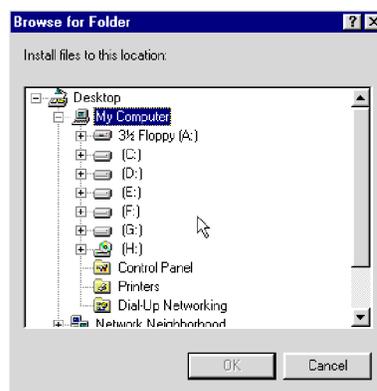


Figure 1.5: Select Installation Directory window

Select a target directory and click **OK**. The Select Installation Directory window closes, and the Installation Directory window opens with the selected directory listed. Click the **Next** button. The Select Short cut Folder window opens (Figure 1.6).

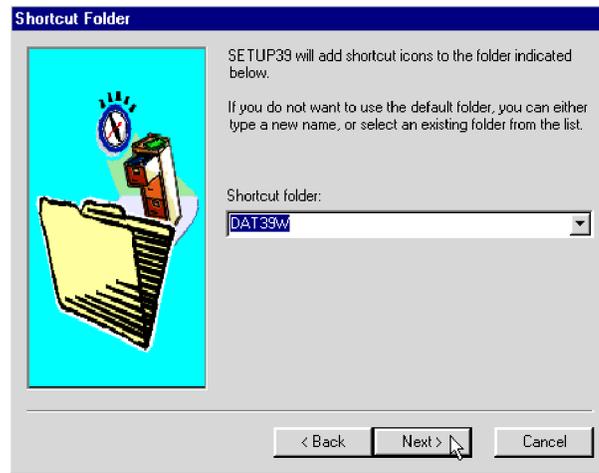


Figure 1.6: Select Shortcut Folder window

The setup program will create a DAT39W menu item in the Program menu accessible by clicking **Start**. If you do not want to use the proposed folder, you can either enter a new name, or select an existing folder from the list. Click **Next** and Ready to Install window will follow (Figure 1.7).

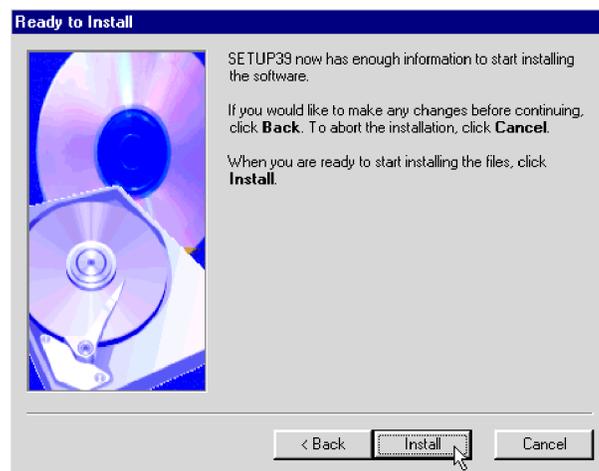


Figure 1.7: Ready to Install window

In case you would like to make any changes before installation, click **Back**. To abort installation click **Cancel**. If you are ready to start installation, click **Finish**. The installation progress bar will appear (Figure 1.8).



Figure 1.8: Installing Files progress bar

The Installing Files window with a progress bar displays the percentage of the installation completed. When finished, the End of Installation window will appear (Figure 1.9).



Figure 1.9: Finished window

Click **Finish** to end installation. SETUP39 creates a DAT39W program group and places **DAT39W** and **Uninstall** icons into it. The setup program creates also a **DAT39W** menu item in the Program menu accessible by clicking **Start**. A reminder to restart the system will be displayed at the end of the Setup39 program (Figure 1.10).

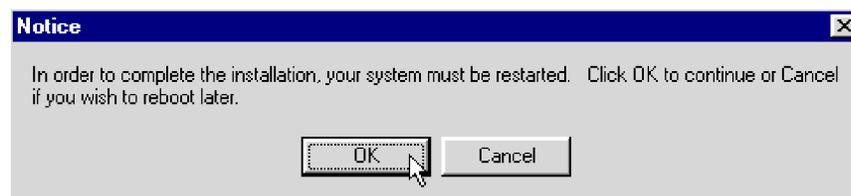


Figure 1.10: Restart Notice window

The destination directory that was chosen earlier contains program files, sample files, and the subdirectory UploadFiles that includes files necessary for uploading the Polycorder 720.

In addition, DAT39W disk includes DOS based programs necessary for downloading data in case the field computer does not have Windows 95/98/XP or NT(4.0)/2000 installed. These files are located in the **DAT39WDOS** subdirectory of the disk.

1.4 Program Overview

Start the DAT39W by double clicking the DAT39W icon in the **Start | Programs** menu, in Windows Explorer, or on the desktop if a shortcut was created. At the start, DAT39W occupies the entire screen (Figure 1.11):

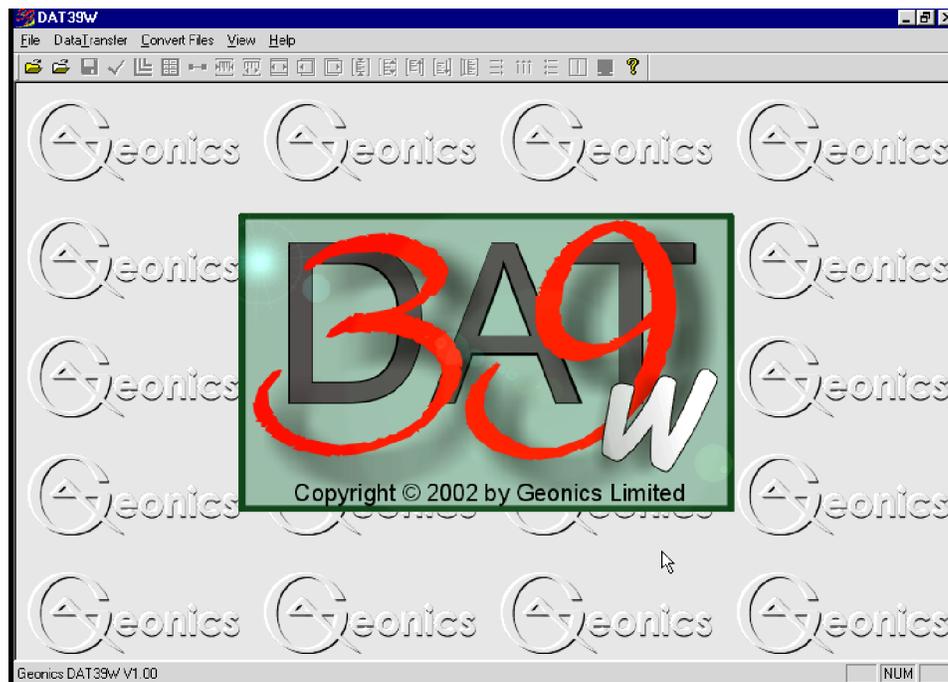


Figure 1.11: DAT39W Initial Screen

The DAT39W defaults to a maximized screen and clicking the minimize button allows access to other applications behind DAT39W. At this point, the user can:

- upload program to the Polycorder 720,
- download data from the Polycorder 720,
- convert raw Polycorder 720 files to DAT39 format (.G39) files,
- load data files: DAT39 profile files (.G39 files) and small (up to 64K) text files,
- select display (tool bar and status bar).

After DAT39 profile file (G39) is loaded tool bar becomes active and the screen has following shape (Figure 1.12):

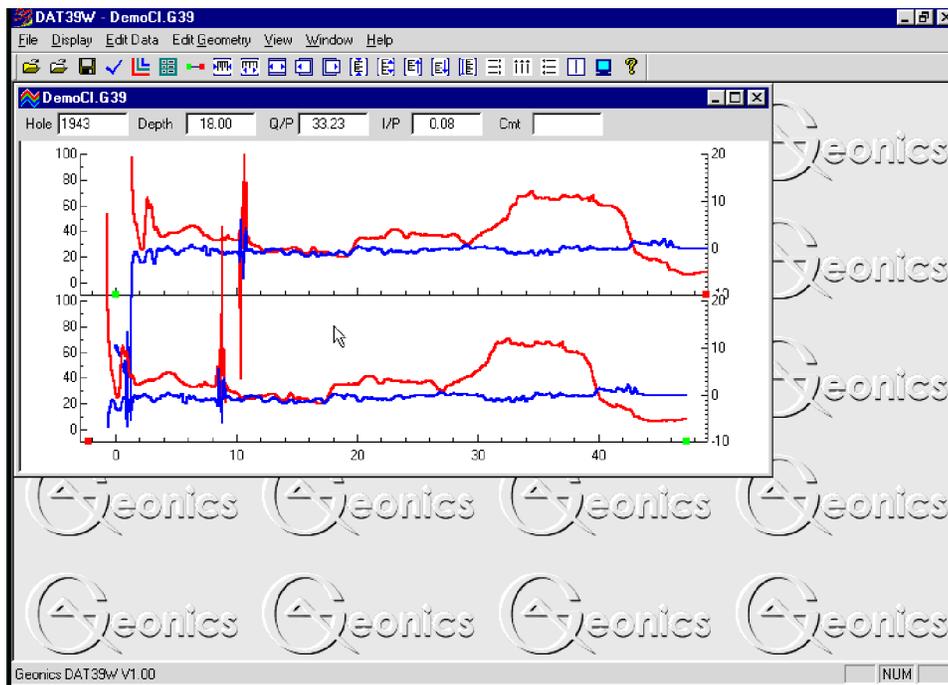


Figure 1.12: DAT39W Screen after profile file is loaded

A stacked profile display can be enlarged to occupy the entire screen by clicking the maximize button. The tool bar (if selected in View menu) is displayed across the top of the screen. The following quick access tools (Figure 1.13) are described below, starting from the left side of the bar:



Figure 1.13: DAT39W Tool Bar



Load EM39 profile file (data file in DAT39 format with extension name .G39).



Load text file (this function is similar to Notepad in Windows and allows user to edit small, up to 64K in size, text files).



Save As allows user to save data under different file names at any time during data processing.



Select Boreholes allows user to select survey holes to be displayed. This function also allows you to delete and rename boreholes.



Select Data Type allows the user to select the EM39 data types (to be profiled and/or displayed numerically in windows below the tool bar).



Set Display Parameters allows user to set the range of display as well as define axes ticks.



Adjust Survey Line allows user to adjust ends of survey lines. The procedure allows moving start of the line (green square) without changing its length and moving end of the line (red square) without repositioning of the start point of the line.

Modify Horizontal Scale (group of five buttons) allows user to:



compress (squeeze) scale,



expand scale,



return to default range,



shift plot left



shift plot right,

Increments are the same increment of minor tic of horizontal axis.

Modify Vertical Scale (group of five buttons) allows user to:



compress (squeeze) scale,



expand scale,



shift plot up,



shift plot down,



return to default range.

Increments are the same increment of minor tic of vertical (conductivity) axis.



Show Moving Bar displays a vertical bar (line) which can be moved along horizontal axis. This bar may allow to compare alignment of anomalies located at various survey lines.

A detailed description of the functionality of each tool is provided in relevant sections of the manual.

2. Quick Start

This chapter is intended for users who wish to quickly start downloading and editing an EM39 survey. Detailed information on all functions and capabilities of the program is given in later sections. It is assumed that the Polycorder 720 or the PC field computer was loaded with necessary files to collect field data.

2.1 Download Data

Download Data from the Polycorder 720

Select **Data Transfer** in the program menu and then select the **Download EM39 Files from Polycorder 720** item (Figure 2.1).



Figure 2.1: Data Transfer menu

The Download EM39 Files from Polycorder 720 window will appear (Figure 2.2).

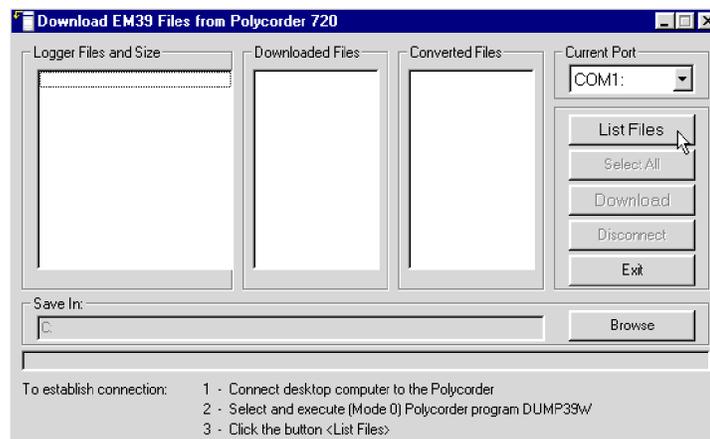


Figure 2.2: Download Data window

The basic procedure for downloading files is displayed in the bottom of the Download EM39 Files from Polycorder 720 window, and is as follows:

- connect the Polycorder and desktop computer with the dumping cable.
- check the port number.
- Select and execute the **DUMP39W** program in the Polycorder.

- click the **List Files** button to get data file names contained in the Polycorder. After several seconds, when communication is established and tested, list of all available files to download will appear in the left list box. At the same time the **Download** button will be activated.
- select files to be downloaded from the logger. Selected files are highlighted.
- click on **Download**. At this point a progress bar indicates the percentage downloaded for each file. Transferred files will be displayed in the centre list box.
- after transfer is completed files are automatically converted from raw EM39 format to DAT39 format, with the extension name G39.

Please refer to section 3 (Transfer Data) for a detailed description of downloading a data file from Polycorder 720.

2.2 Convert Files

Convert Polycorder 720 Files

The data acquisition program EM39, operating in the Polycorder, saves readings in a raw files format. DAT39W uses the ASCII format of data files. These files are given the extension name G39. When the raw data files are downloaded from the Polycorder they are converted at the same time to DAT39 (G39) format. In cases where files in the DAT39 format (G39) are lost, accidentally overwritten, or not available for any reason an option called **Convert Files | Convert Polycorder 720 Files** allows you to convert the Polycorder raw data files to ASCII files (G39).

To convert Polycorder files select **Convert Files** in the program menu and then select the **Convert Polycorder 720 Files** item. The Convert Polycorder EM39 Files to DAT39 Format window will appear (Figure 2.3).

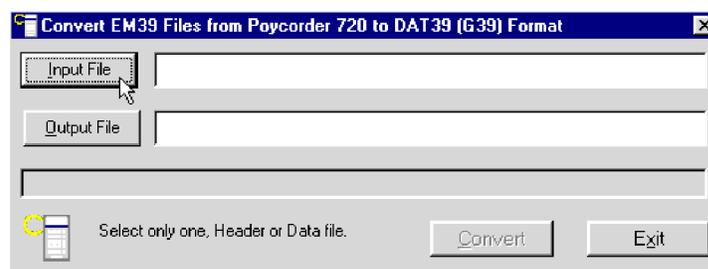


Figure 2.3: Convert Polycorder EM39 Files to DAT39 (G39) Format window

Select the file to be converted by clicking on the **Input File** button. An open file window will appear with list of available files. (Polycorder files do not have extensions, therefore all files in the selected directory will be displayed. The user has to select EM39 data files which were created in the Polycorder.) In a similar way click on the **Output File** button and specify the output file name with extension G39. After both files are displayed in the corresponding text windows the button **Convert** will be activated. When the **Convert** button is clicked the selected Polycorder file is converted to G39 format. This file can subsequently be loaded to the program as a “EM39 Profile” file.

The above procedure can be repeated for any number of remaining raw data files to be converted.

2.3 Displaying Data as Profiles

Loading and Displaying Data Files

To display data, select **File | Open EM39 Profile File** in the menu or click the left mouse button on the toolbar  button (load EM39 Profile File). The **Open EM39 File** window will be displayed (Figure 2.4).

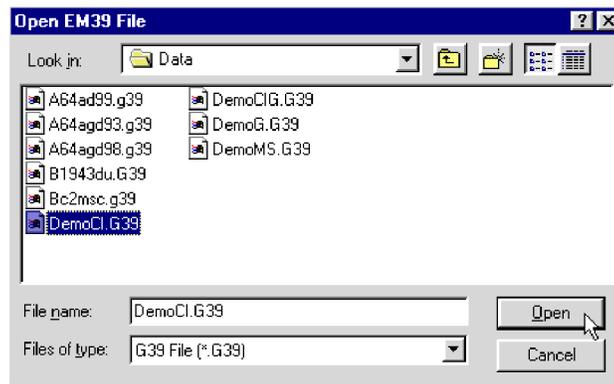


Figure 2.4: Open EM39 File window

Select a directory and file name and then click on **Open** (you can also simply double click the left mouse button or press **Alt_O** on the keyboard). The **Open EM39 File** window displays available files with the extension name G39.

After the file is loaded, data is displayed in the stacked profile format shown in Figure 2.8. Boreholes are organized in panels, which contain recorded data. In general, each survey line belongs to a separate panel, although, in the case where two or more boreholes have the same borehole (hole) name and same instrument probe, they will be placed in the same panel. In order to display these lines in separate panels the borehole names must be changed.

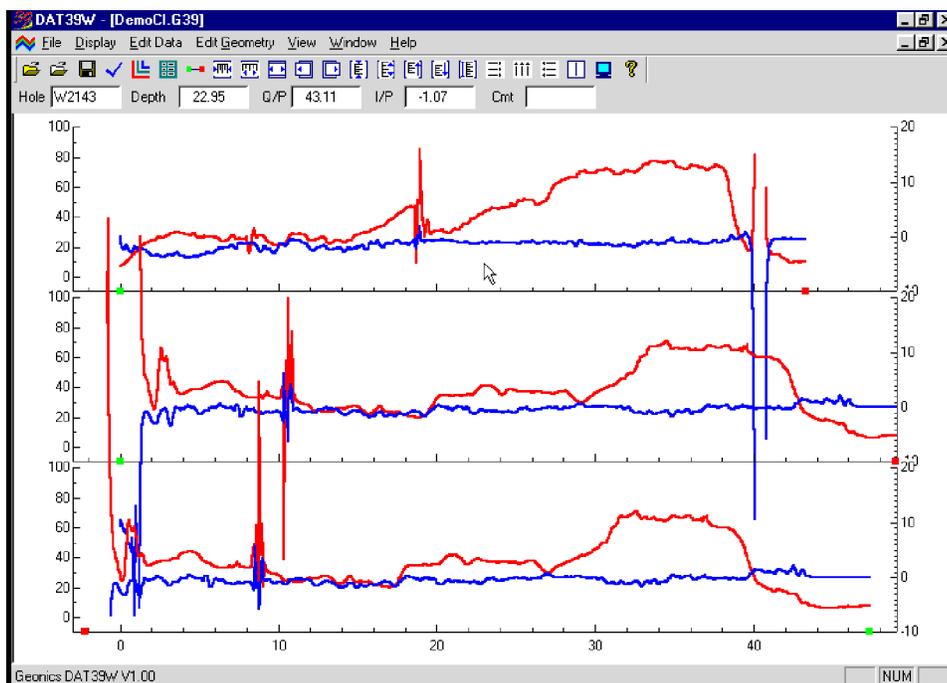


Figure 2.5: DAT39W screen with stacked profiles

Each panel will include one or more data types (channels) as specified in the Select Data Type window. This window can be accessed from the main menu by selecting **Display | Select Data Type** or by clicking the  (Select Data Type) button located on the tool bar. See Select Data Type section below.

By default all data types are displayed for all boreholes. The left vertical axis relates to the EM39 apparent conductivity (Quad-phase component) and it is labeled in millisiemens per meter (mS/m), while right axis corresponds to the EM39 Inphase response and it is labeled in parts per thousands of Primary Field (ppt). Similarly, for profiles of Magnetic Susceptibility the left vertical axis corresponds to Magnetic Susceptibility Channel 1 (S1) while the right axis is associated with Magnetic Susceptibility Channel 2 (S2).

Selecting Boreholes

When a data file is loaded, all boreholes are profiled. To display a selection of boreholes lines select **Display | Select Boreholes** in the menu or click on the  toolbar button (Select Lines). The Select Boreholes window is shown in Figure 2.6.

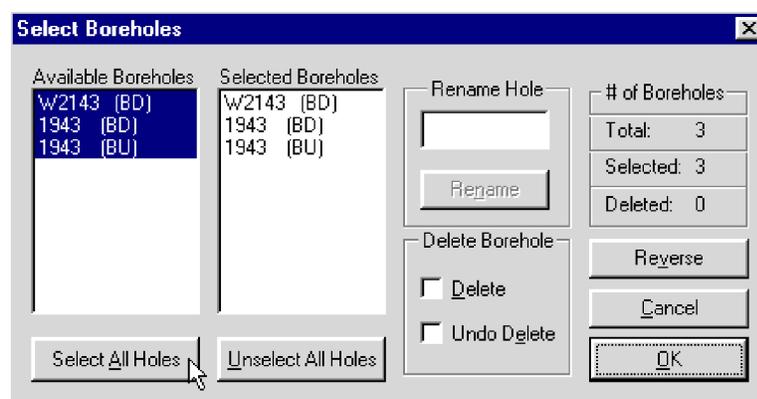


Figure 2.6: Select Boreholes window

Select and deselect boreholes to be displayed, by clicking on the borehole names in list boxes. The EM39 component of the instrument and direction of profiling (D - down or U - up) are displayed at each line as the EM39 Data Type and Direction. Buttons **Select All** and **Unselect All** are also available. All highlighted line names will be profiled on the screen after clicking **OK** button.

Deleting and Renaming Boreholes

The most common initial task in data processing is deleting and renaming survey lines. Both tasks can be accomplished in the **Select Boreholes** window (Figure 2.6).

To delete a survey line from the loaded set of data, click on the check box next to the Delete Borehole label. When a check mark is visible, click on the appropriate Borehole name in the borehole name list box. The letter **D** will be displayed next to the borehole name. These boreholes will not be displayed nor written to the output file during **Save** or **Save As** tasks.

Boreholes also can be renamed in the Select Boreholes window. Click on the name in the borehole names list: the highlighted borehole name will appear in the edit box located at the Rename Hole label. Edit the name in the Edit Box and click the **Rename** button. The updated name will now be displayed in the borehole names list.

Please refer to section 4 (Data Display) for a detailed description of type of formats for data presentation.

Please note that Deleted and Renamed boreholes will be valid as long as the program is running. In order to save changes permanently use “Save As” or “Save” option to create a new data file which can be used later by the program. It is recommended that you use “Save As” and keep the original data in an un-edited form.

Changing Display Parameters

To adjust the range of displayed parameters select **Display | Set Display Parameters** in the menu or click the left mouse button on the  toolbar button. The **Set Display Parameters** window is shown in Figure 2.7.

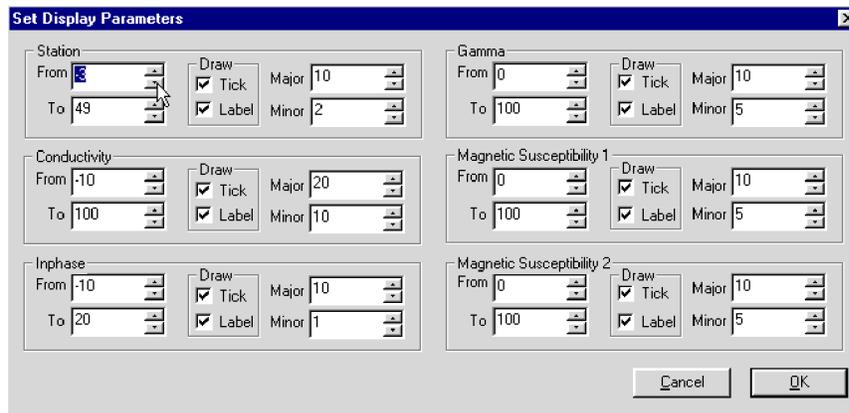


Figure 2.7: Set Display Parameters window

Selecting Channels to Display

To set the channels to be displayed select **Display | Select Data Type** in the menu or click the left mouse button on the  toolbar button. The **Select Data Type** window is shown in Figure 2.8.

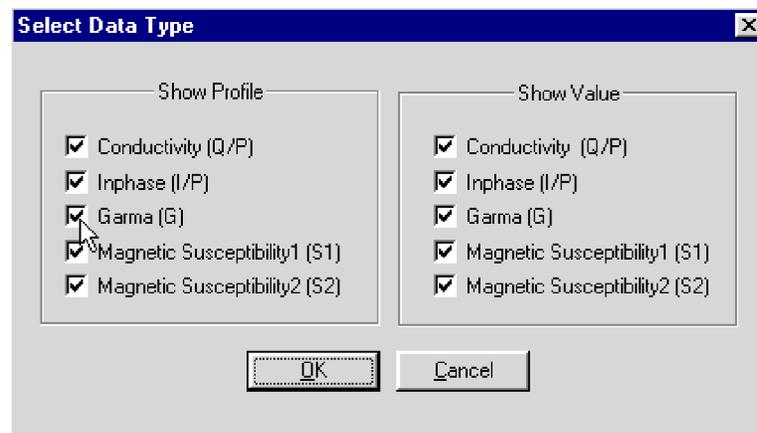


Figure 2.8: Select Data Type window

This window contains check boxes for each type of EM39 data. The Select Data Type window is divided into two sections, Show Profile and Show Value. The profile section lets you select data types to be displayed as profiles. To select a data type click on the check box next to the channel number. The Show Value section lets you choose the channels that will be displayed in numerical form in windows located below the toolbar.

Please refer to section 4 for a detailed description of the Select Data Type to Display procedure.

2.4 Editing Survey Geometry

The program lets you adjust borehole geometry by changing the placement of start and end stations. Corrections of common field errors, such as an incorrect start station or survey direction, can be made using the **Set Borehole Limits** or **Shift Boreholes** option in the Edit Geometry menu shown in Figure 2.9.

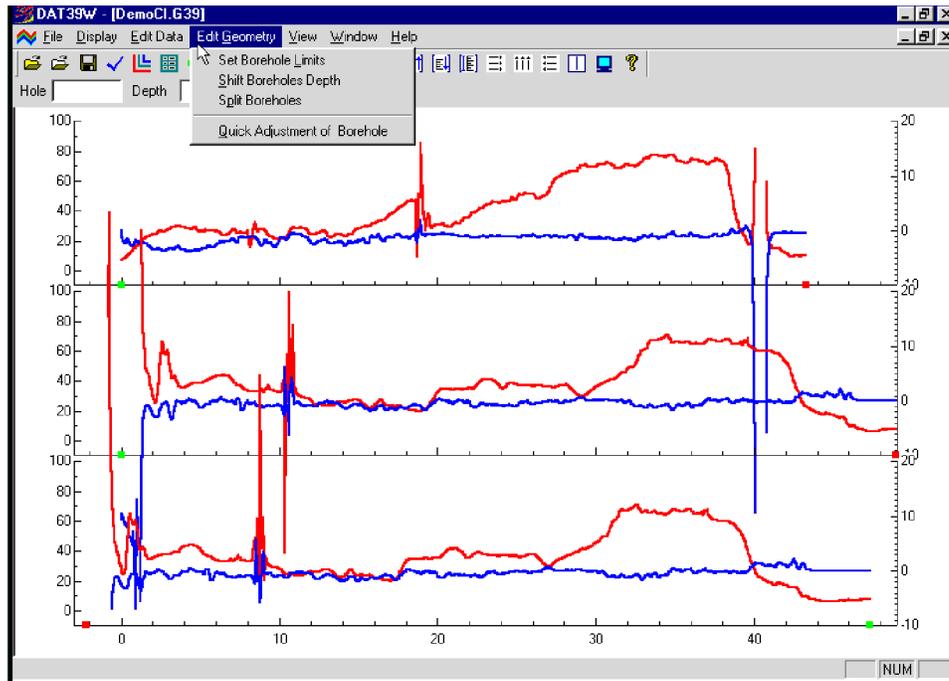


Figure 2.9: Edit Geometry menu

3. Data Transfer

This chapter describes the transfer of files (program and data files) between the Polycorder 720 and the computer.

3.1 Polycorder Communication Parameters

The Polycorder communication parameters are the same for all Uploading and Downloading procedures. These parameters are usually properly set after resetting the logger with the RESET module. In case they are modified, set the communication parameters (using Polycorder Mode 5-2) according to Table 3.1.

Table 3.1: Polycorder communication settings

Parameter	Setting	Parameter	Setting
BAUD RATE	9600	INP LINE TERM	<CR>
DATA BITS	8	INP MAX LENGTH	95
PARITY	N	TRANSMIT DELAY	0
STOP BITS	1	CHECKSUM	N
DUPLEX	H	END OF LINE SEQ	<CR><LF>
XMT PMTS	N	END OF PAGE SEQ	<CR><LF>
LINE REQ	A	END OF FILE SEQ	<CR><LF>
REPEAT REQ	B	MATING CALL	A or <CR>
CONTINUOUS REQ	C	BEEP TONE	55
STOP REQ	D	BEEP TIME	10

Character <CR> (Carriage Return) is represented on the Polycorder display as a left pointing arrow, while <LF> (Line Feed) is shown as a check mark.

If DOS based programs are used for Uploading or Downloading files, change the parameter MAT-ING CALL to <CR>. To set <CR> in the Polycorder press the following keys on the Polycorder keypad: CTL (one key) 0 1 3.

If necessary, refer to the manufacturer documentation for more details regarding the Polycorder communication parameters.

3.2 Upload Program Files to Polycorder

General Information

Normally, the Polycorder 720 that is supplied with the EM39 system contains all the necessary programs for running the instruments. However, there are several circumstances when uploading the Polycorder program files should be performed:

- Polycorder does not contain necessary programs.
- loading updated versions of Polycorder programs.
- changing instrument that will be used with the logger.
- after routine or necessary clean up of the Polycorder.

The Polycorder EM39 program supplied with the Windows based software is almost identical to the previous versions supplied with the DOS based DAT39 program. Data files created during data collection are also compatible. The difference is in the downloading of files which is handled by new routines, DUMP39W for the Polycorder 720. If data is to be downloaded with Windows based software, a new version of the Polycorder programs (version 4.0 or later) must be uploaded to the Polycorder.

If data is collected using an older version of Polycorder software it should be downloaded with the DOS based software (DOS based DAT39) and then data files in DAT39 format processed with the DAT39W. While data files in DAT39 format (G39) can be used in both DOS and Windows based software, raw data files in Polycorder format have small differences. Therefore, if files were downloaded using DOS based DAT39 and separate conversion to DAT39 format is required, these files must be converted using DOS based DAT39. Similarly, if files were downloaded using DAT39W they can be converted using only Windows based DAT39W.

It is advised to reset the Polycorder and reload the programming after several days of use. This will keep the directory file refreshed. The Polycorder has no system directory and the internal data file, FILEDIR, is used to log all entered file names. When the directory file contains many file names, the downloading procedure becomes more time consuming. In addition, there will be less choice in naming files. Since the EM39 program does not allow the appending of data files, the file names present in the directory file can not be used even in the case where they were previously deleted from the system.

The Polycorder is reset with the RESET module. To reset the Polycorder, make sure that all data are downloaded and saved, since all data will be permanently deleted. Insert the RESET module to the Polycorder connector with the RESET label facing the operator and press the ON key (or OFF and ON if the logger was ON initially).

Description of Polycorder Program Files

Two file types, format files and program files have to be transferred to the Polycorder to run the EM39 Polycorder program: FORMDL.720 and EM39.720. These files are placed in the subdirectory UploadFiles of the directory chosen during DAT39W installation.

Polycorder 720 files

FORMDL.720 this file contains format files necessary for EM39 data files and two files:

- DIRFILE** - directory file to log entered file names. Do not edit this file.
- DUMMY01** - small text file that can be safely erased in case additional memory is needed to run downloading programs.

EM39.720 contains programs for Polycorder 720. It includes following programs:

- EM39** - data acquisition program for Geonics EM39 instrument.
- DUMP39W** - program to download data files while using DAT39W (Windows based) computer program.
- DUMP** - program to download data files while using DAT39 (DOS based).
- BATTERY** - program to display status of the Polycorder 720 battery.

Format file (FORMDL.720) can be loaded only when the Polycorder is reset. The Polycorder system does not allow format files to be overwritten.

Format file must be present in the Polycorder prior to uploading the corresponding program file.

Download programs DUMP39W and DUMP require about 500 bytes (corresponds to about 70 records) of free memory in the Polycorder. In cases where the Polycorder memory is entirely used during field work and the dump program can not be run, erase the file DUMMY01 using the Polycorder Mode 4-2.

When file DUMMY01 is erased and not immediately replaced through uploading, create your own “dummy” file by recording a file with about 100 readings that can be deleted, if necessary.

Uploading Files to the Polycorder

Select the **Data Transfer | Upload Files to Polycorder 720** in the program menu (Figure 3.1).

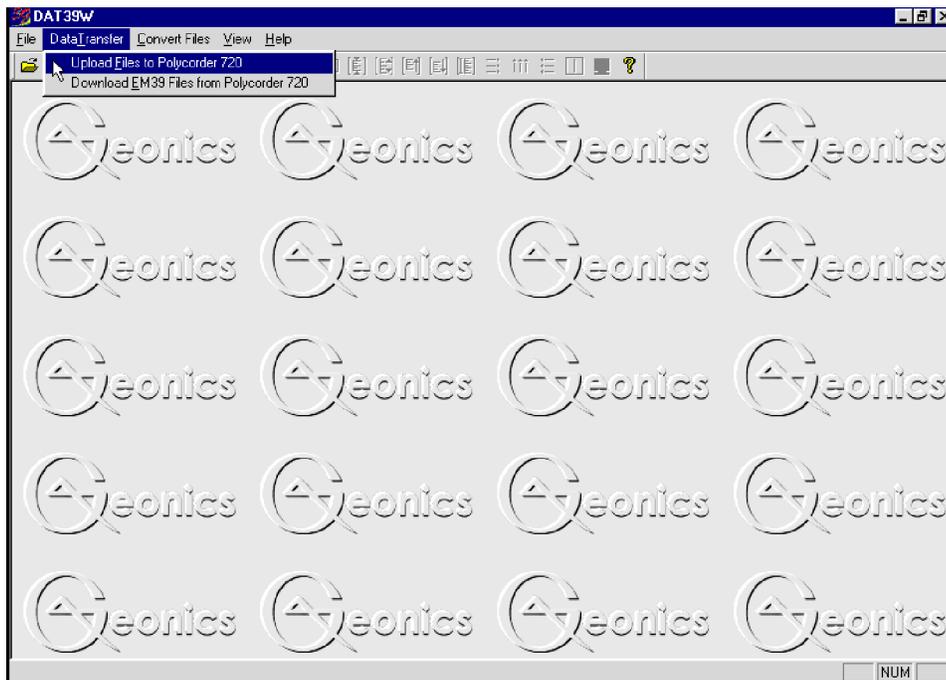


Figure 3.1: Data Transfer menu

After clicking the **Upload Files to Polycorder 720** item shown in Figure 3.1, the Upload Files From PC to Polycorder window will appear (Figure 3.2). In this figure files FORMDL.720 and EM39.720 are displayed in the Files to Upload list box.

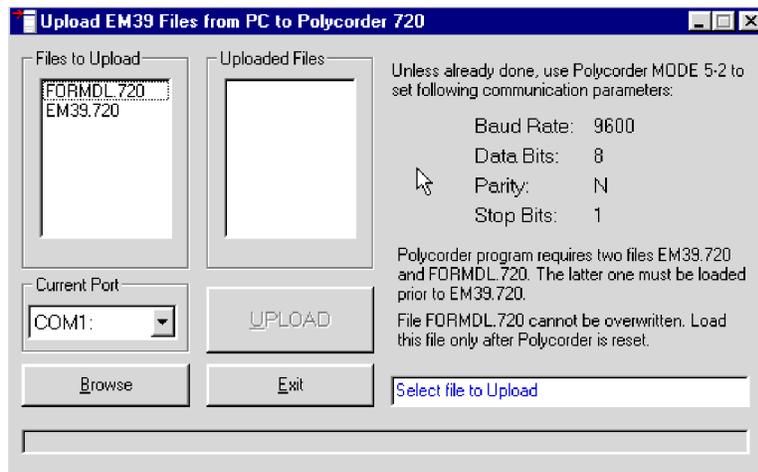


Figure 3.2: Upload EM39 Files from PC to Polycorder 720 window

Normally, the Polycorder files are located in the subdirectory UploadFiles of the program folder (chosen during installation). The program checks this subdirectory. If the Files to Upload list box does not contain necessary files, click the **Browse** button to locate the Polycorder files.

Change of the port assignment can be done by clicking the Down arrow button in the field labeled Current Port. The pull down list box will be displayed, as shown in Figure 3.3. Select required COM port number.

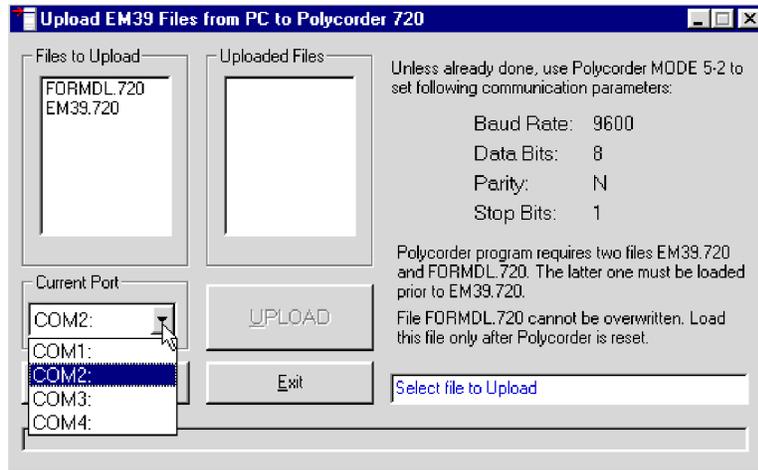


Figure 3.3: Selecting serial port number

To upload files to the Polycorder, follow the instructions on the screen (Figure 3.2). Select a file by clicking the left mouse button on the name in the list box. The file name will be highlighted and the **Upload** button will be activated. Using the left mouse button, click the **Upload** button and then, with the Polycorder turned ON, enter the Polycorder Mode 3-2. Information reminding you to enter Polycorder Mode 3-2 is displayed (Figure 3.4). If Polycorder Mode 3-2 is not entered during 15 seconds the program will reset the Upload File window.

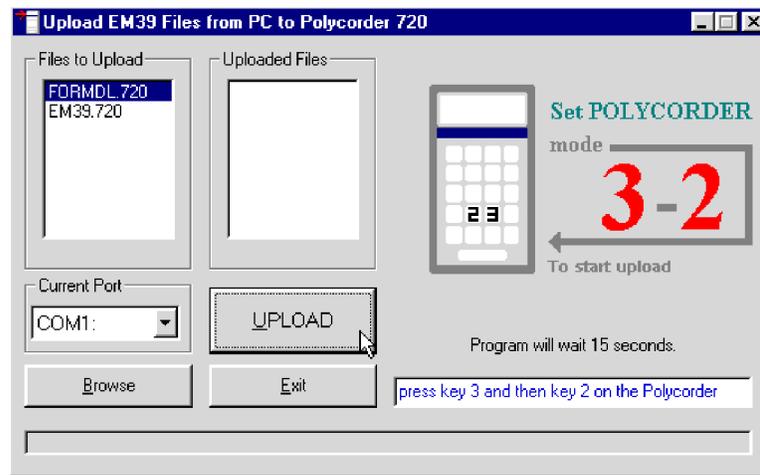


Figure 3.4: Upload File window waiting for Polycorder entry

After Mode 3-2 in the Polycorder is entered, uploading starts, which should be confirmed by an updated graphic and by a progress bar located at the bottom of the Upload File from PC to Polycorder window (Figure 3.5).

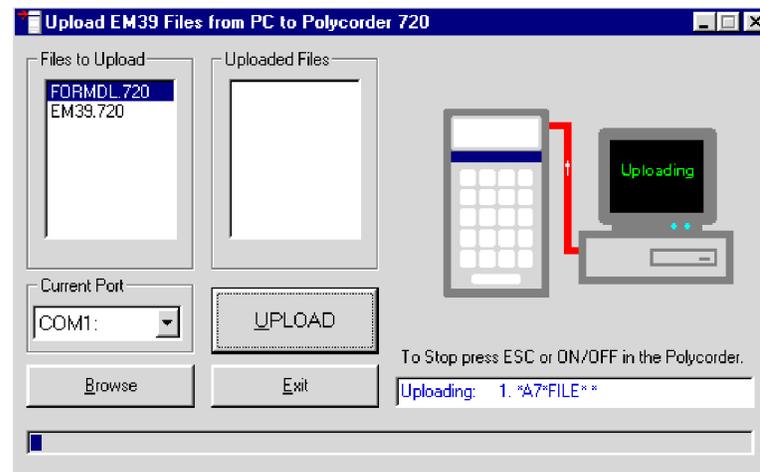


Figure 3.5: Upload EM39 Files from PC to Polycorder 720 window during transmission

When a file is uploaded, the file name is displayed in the Uploaded Files list box. At this point the next file can be uploaded.

Format files are loaded very quickly (within a few seconds), whereas uploading of the program files, EM39.720 and EM39.720, will take approximately 8 minutes.

If there is a problem during the transmission of files, the progress bar will stop moving. At this point you should check the cable and the communication parameters.

3.3 Download Data from the Polycorder

Data File Formats

Data files in the logger are formatted in proprietary Polycorder format. The Polycorder 720 (EM39) data set is saved in two files: Header file and Data file. Header and Data files have a common base name, but different prefixes, H for header and D for data files.

Files in the Polycorder format are automatically converted to the DAT39 format during the downloading of data. These new files have same base name with an added extension name G39. Files in the DAT39 format can be loaded and processed by the DAT39W program.

While only files in the DAT39 format are used in data processing, it is strongly advised that data in the Polycorder format be saved as well. In case of any hardware malfunction, e.g. a damaged instrument cable, only the file in Polycorder format may indicate the source of the problem. Additionally, Polycorder files also contain useful information about the instrument settings used during field work. Files in the Polycorder format can be converted to the DAT39 format at any time using the Convert Files option of the DAT39W menu.

Description and samples of EM39 files in the Polycorder 720 formats, as well as an example of a file converted to the DAT39 format are placed in Appendix A.

Download Procedure

Select **Data Transfer** in the program menu and then click the **Download EM31-MK2 Files from Polycorder 720** menu item (Figure 3.6).

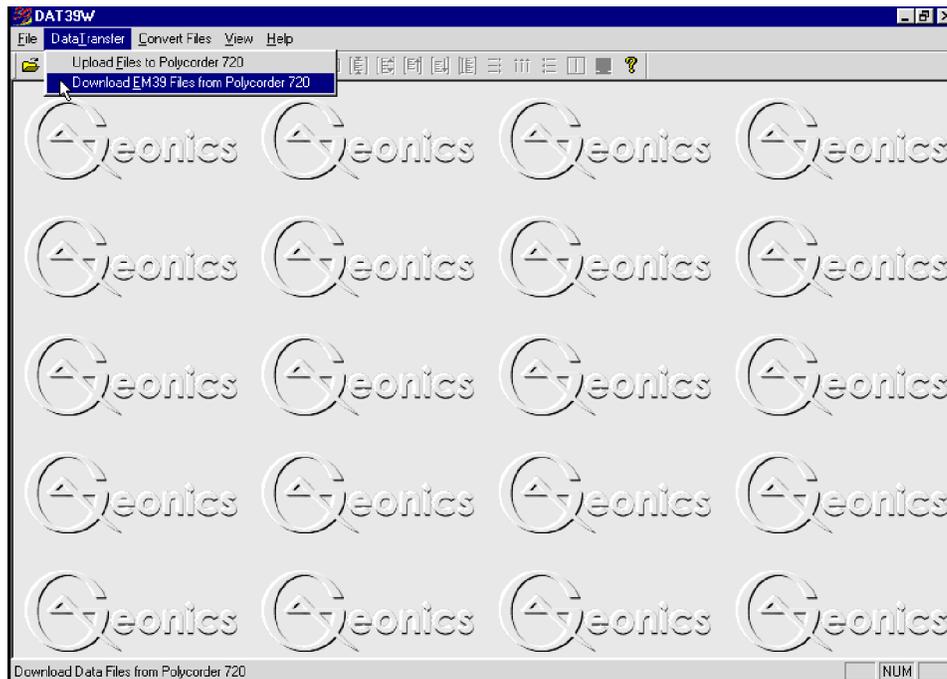


Figure 3.6: Data Transfer menu

After clicking the **Download Files from Polycorder** item shown in Figure 3.6, the Download data from Polycorder window will appear (Figure 3.7).

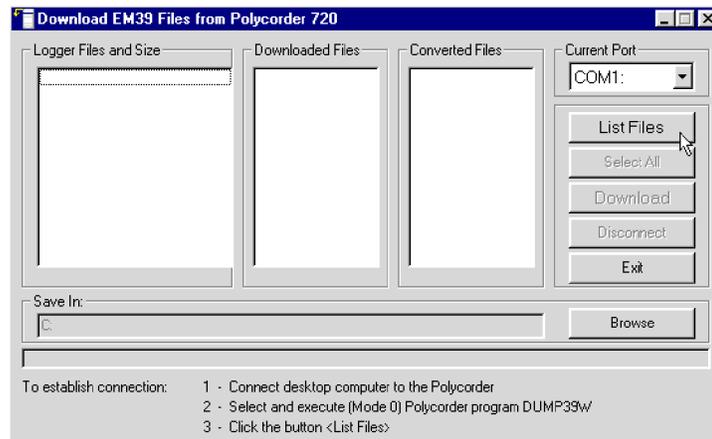


Figure 3.7: *Download EM39 Files from Polycorder window*

The Download data from Polycorder window has three list boxes. The first from the left, labeled Logger File(s) and Size will contain, after **List Logger Files** button is clicked, a list of data files located in the Polycorder and available to download. Along with file names, their size in bytes is displayed. The second list box, labeled Transferred File(s), will list downloaded data files in Polycorder format, and the third, Converted File(s), will list files converted from Polycorder to DAT39 format. If file names, either in Polycorder or DAT39 format, exist on the computer hard disk, an underscore followed by a number will be added to the base name, e.g. file name ABC would be changed to ABC_1 and ABC_1.G39.

The directory where transferred files will be placed can be selected by using the Browse function. Click the **Browse** button with the left mouse button and the Select Directory window will be displayed (Figure 3.8).

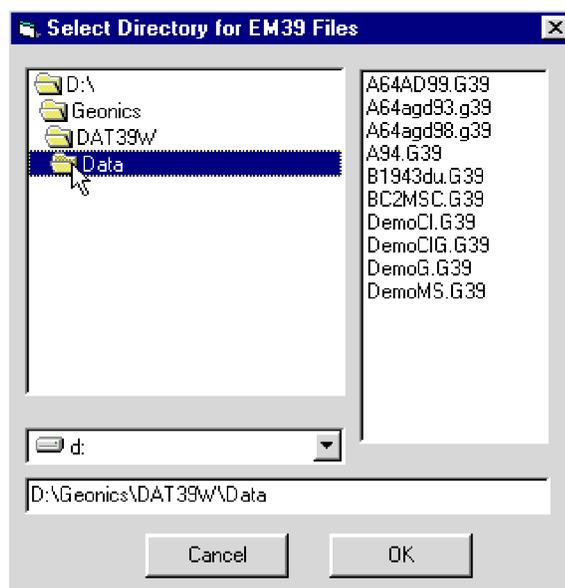


Figure 3.8: *Select Directory for EM39 Files*

After the directory is selected, it will be displayed in the bottom part of the Download data from Polycorder window. The selected directory will be saved and it will be displayed as a default directory during subsequent DAT39W executions. If the directory is removed the main directory on C: drive will be used as a default directory.

Change of the port assignment can be done by clicking the Down arrow button in the field labeled Current Port. The pull down list box will be displayed, as shown in Figure 3.9. Select required COM port number.

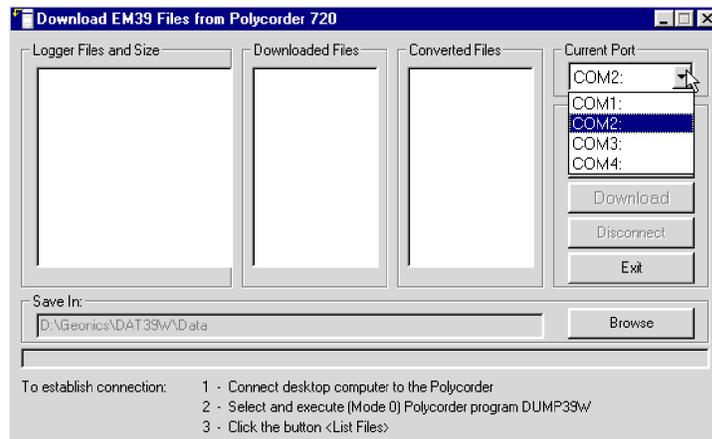


Figure 3.9: Selecting Serial Port number

To start downloading the data files, connect the Polycorder and computer with the dumping cable.

Run the Polycorder program **DUMP39W** for the Polycorder 720. (To run program in the Polycorder: enter *MODE 0*, select program name and press *ENTER*).

Do not mistake the above programs with DUMP, which is included in the Polycorder for DOS based program only.

Using the left mouse button click the **List Files** button. After several seconds the Logger File(s) and Size list box will be updated with names of data files available for download (Figure 3.10). At the same time, the window buttons **Download**, **Select All**, and **Disconnect** will be activated.

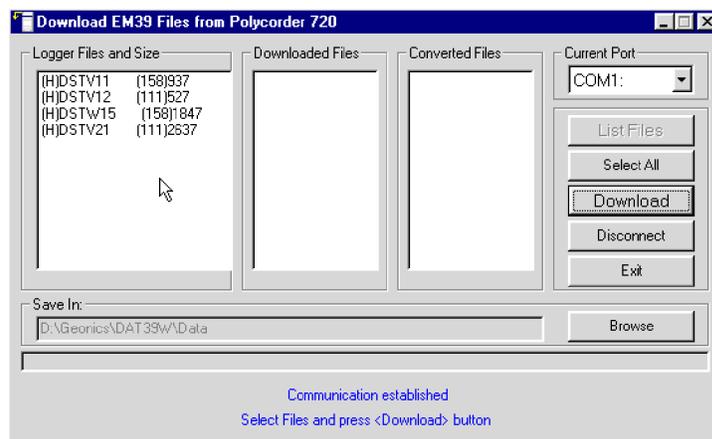


Figure 3.10: Download EM39 Files... window after Logger Files are listed

Select the files to be downloaded from the Polycorder by clicking on individual file names in the list box or click the **Select All** button to select all available files. When selection of files is complete, click the **Download** button. At this point the name of each transferred file is displayed at the bottom of the window and a progress bar indicates the percentage of downloading completed for each file. Transferred files (in Polycorder format) will be displayed in the centre list box. After the transfer of all selected files is complete, files in the Polycorder format are automatically converted to the DAT39 format (with extension name G39). Converted files will be displayed in the Converted File(s) list box (Figure 3.11).

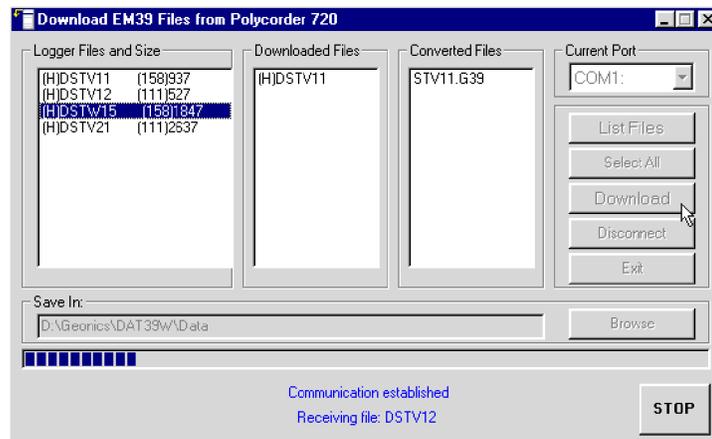


Figure 3.11: Download EM39 Files... window during data transfer

Data transmission can be stopped at any time by clicking the button **STOP** located at the window bottom. All other buttons are disabled during downloading data.

Converted files (with G39 extension name) can be loaded and processed further in the DAT39W program.

Click the **Disconnect** button to cancel communication with logger. The Download EM39 Files from Polycorder 720 window will remain on the screen and the next data transfer session (i.e. from another logger) can be performed. Clicking the **Exit** button will stop Data Transfer function and the Download EM39 Files from Polycorder 720 window will disappear.

4. Loading and Displaying Data

Two types of files can be loaded to the DAT39W program. Files containing EM39 readings and displayed in the program as profiles have the extension name G39. These files are described in this section. The Polycorder raw data files and DAT39 file (G39) formats are described in Appendix A.

DAT39W can also display the text of any ASCII file. The latter function is similar to Windows Notepad, and is limited to files not exceeding 64Kbytes in size in Windows 95 and 98.

4.1 Loading EM39 Profile Files

Loading Data File

To display data select **File | Open EM39 Profile File** in the menu (Figure 4.1) or click on the  toolbar button (marked by a yellow file symbol).

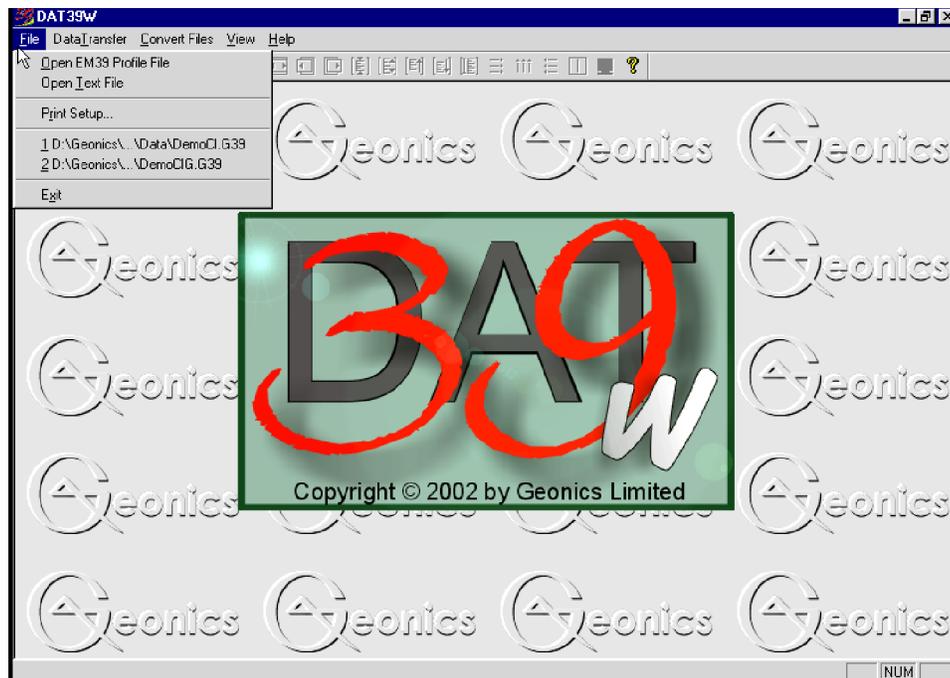


Figure 4.1: DAT39W File menu

The **Open EM39 Profile File** window will be displayed (Figure 4.2). Select the directory and file name and then click the **Open** button (or double click the left mouse button, or press **Alt_O** on the keyboard). Data files in DAT39 format have the extension name G39.

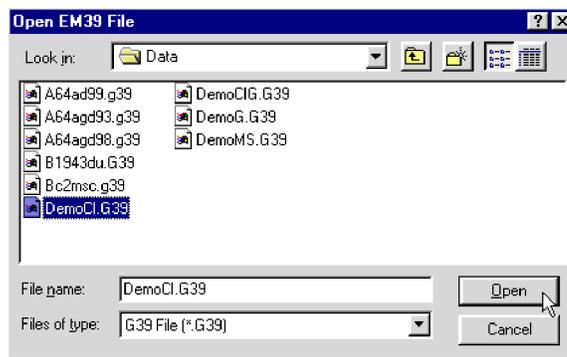


Figure 4.2: Open EM39 File window

When a larger data file in DAT39 format is loaded to the program a progress bar shows the percentage of file loaded (Figure 4.3).

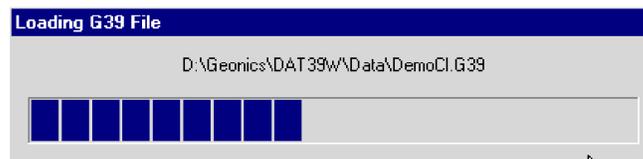


Figure 4.3: Progress Bar during Loading .G39 File

After a DAT39 profile file is loaded, data is displayed in a stacked profile format as shown in Figure 4.4. Boreholes are organized in panels, which contain the recorded readings. In general, each borehole surveyed in one instrument mode and direction appears in a separate panel. In the case where two or more boreholes have the same name, however, they will be placed in the same panel. In order to display these holes in separate panels the borehole names must be changed (see section 4.3).

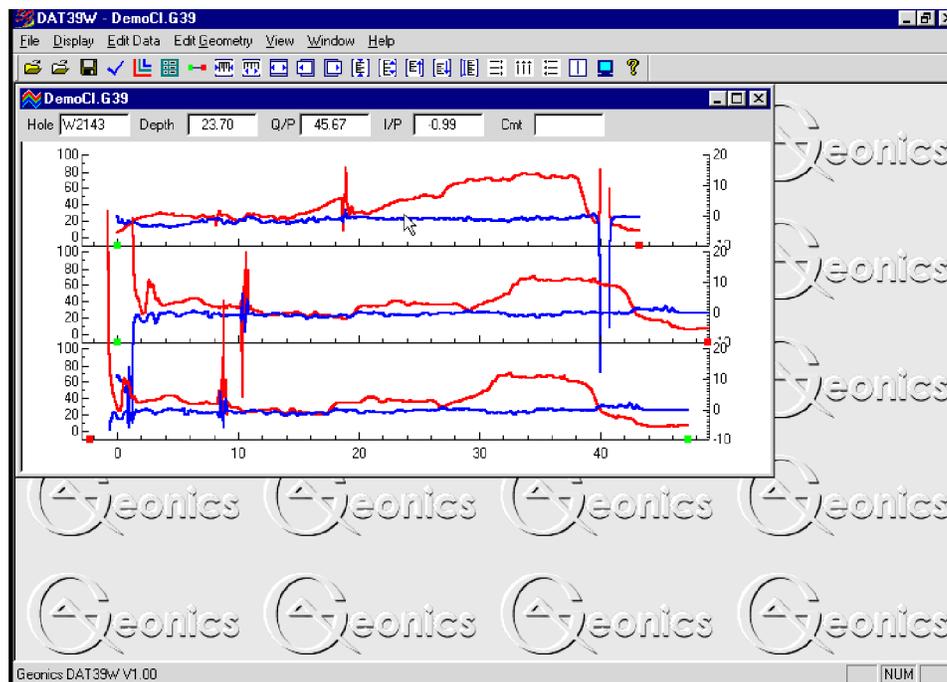


Figure 4.4: DAT39W screen with stacked profiles

In each panel the data type selected for display (see section 4.4 below) are profiled. In default settings, all data types are profiled. The left vertical axis corresponds to EM39 Quad-phase component (conductivity) in milliSiemens/m (mS/m), while the right axis is assigned to EM39 Inphase component in parts per thousands (ppt) of Primary Filed.

Loading Additional Data Files to Separate Windows

To display more data in a separate window select **File | Open EM39 Profile File** in the menu (Figure 4.5) or click the left mouse button on the  toolbar button (marked by yellow file symbol).

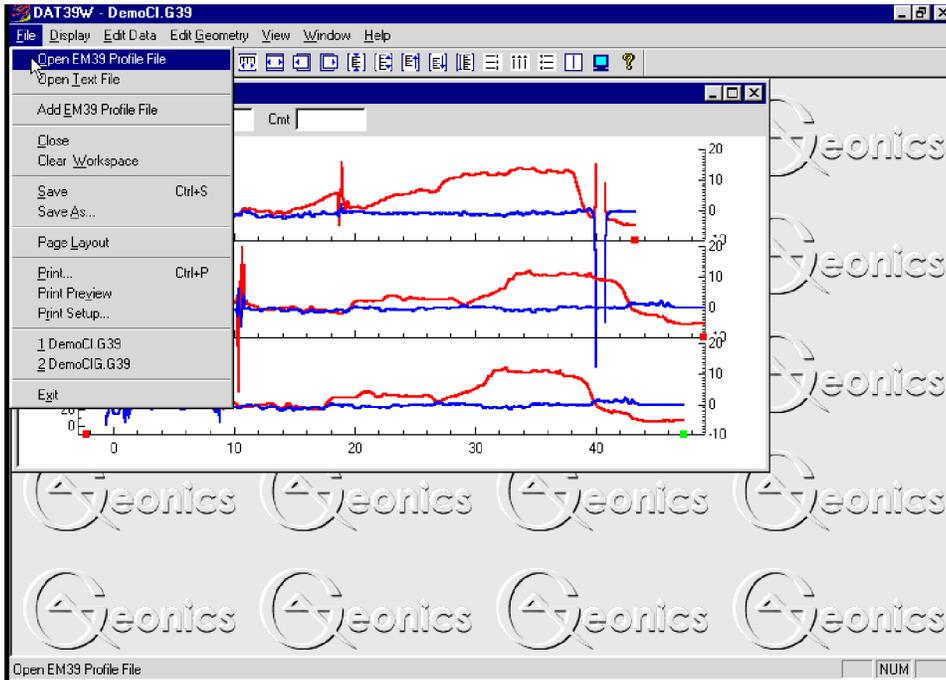


Figure 4.5: DAT39W File menu

The Open EM39 File window will be displayed (Figure 4.2). Select directory and file name and then click the **Open** button (or double click the left mouse button, or press **Alt_O** on the keyboard).

After the new profile file is loaded, data is displayed in a stacked profile format in a new window, as shown in Figure 4.6. Any number of windows (limited only by the memory of the computer) containing separate

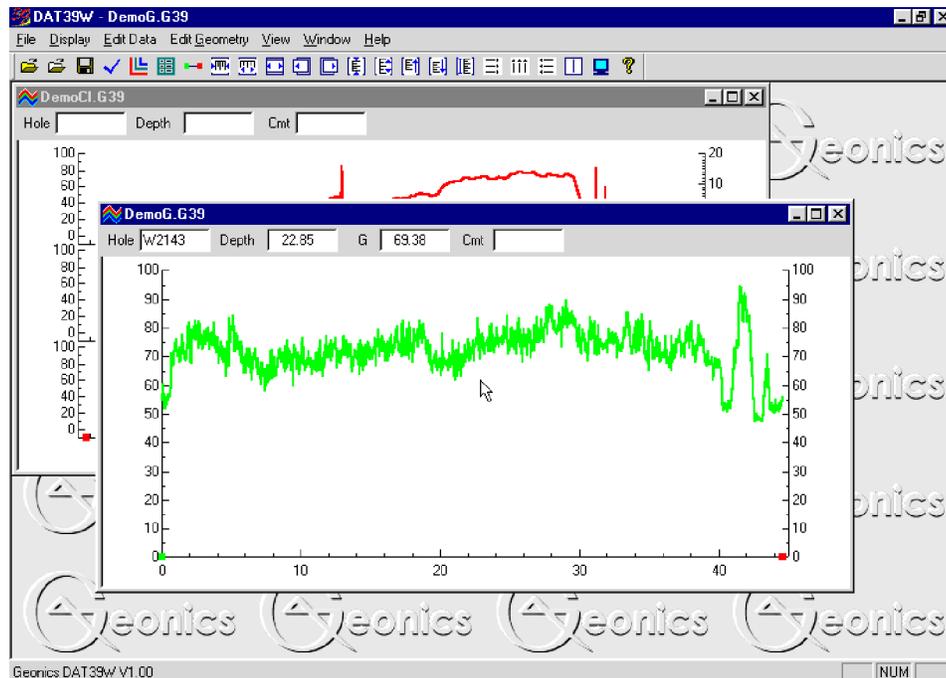


Figure 4.6: DAT39W screen with stacked profiles in two windows

files can be opened. This includes multiple entry of the same file name, so the same data set can be displayed in separate windows. Windows can be resized or tiled (vertically or horizontally) using the Window menu. The menu displayed at the top of the screen is always associated with the active window.

Adding Data to the Existing Window

To insert data to the existing window select **File|Add EM39 Profile File** in the menu (Figure 4.5). The Open EM39 File window will be displayed (Figure 4.2). Select directory and file name and then click the **Open** button (or double click the left mouse button, or press **Alt_O** on the keyboard).

After the new profile file is loaded, data is appended to the existing data set and displayed in a stacked profile format in the same window (Figure 4.7). Any number of files (limited only by the capacity of the computer memory) can be loaded to one window.

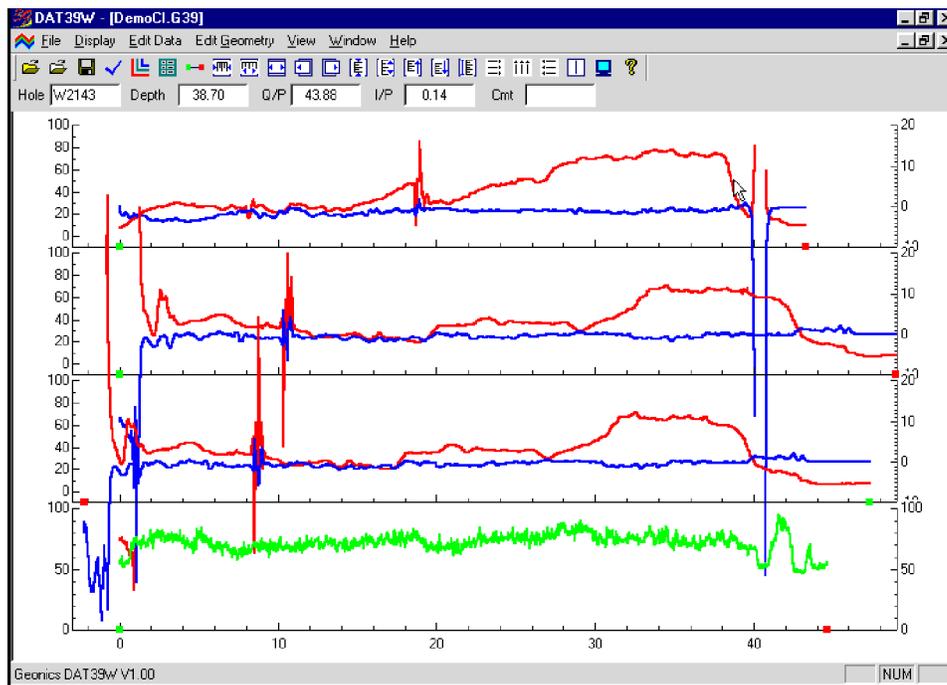


Figure 4.7: DAT39W screen with content of three files in one window

Data loaded to one window can be saved only as a single file. After several files are loaded to one window it is worthwhile saving the data set (using function **Save As**) as a separate data file in order to preserve the content of the original data files.

4.2 Closing Profile Window and Saving Data

Closing Active Window

To close any active window select **File|Close** in the menu (Figure 4.8). This procedure can also be performed by clicking the close button of the active window.

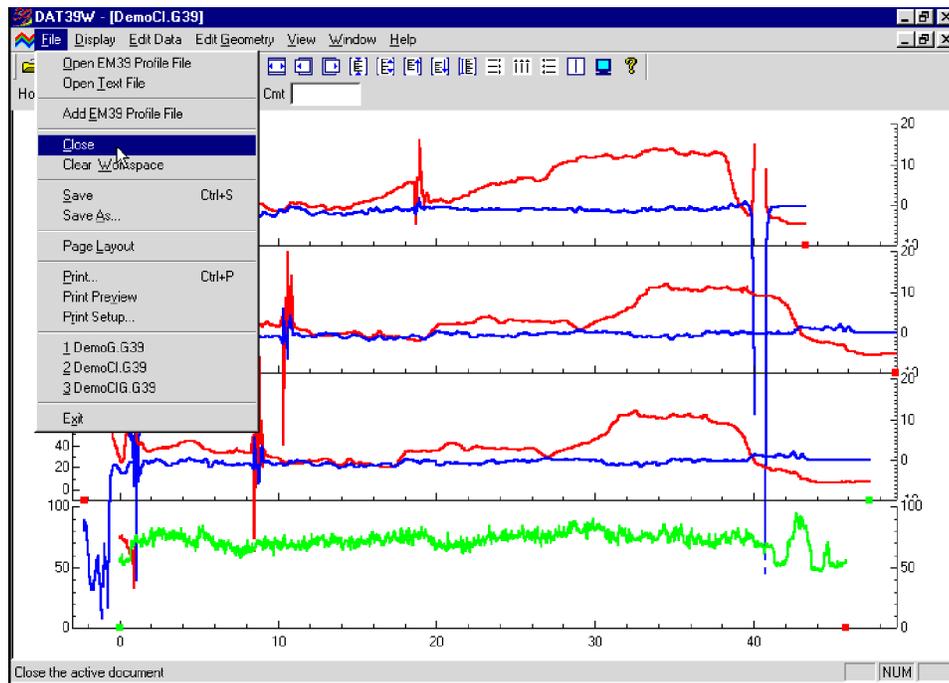


Figure 4.8: DAT39W File menu

If any data processing was performed on the loaded data set and items not saved using **Save** nor **Save As** functions (see below), a Save Changes window will appear as shown in Figure 4.9.

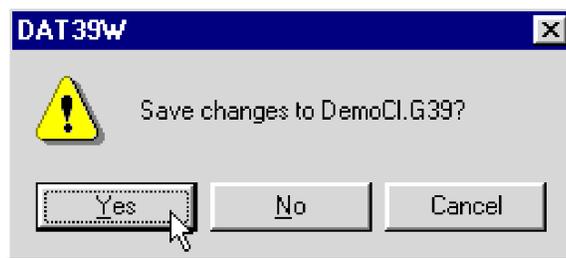


Figure 4.9: Save Changes window

Clear Workspace

To close all existing windows (data files) select **File | Clear Workspace** in the menu (Figure 4.8). Any editing of data is **not saved** during this procedure.

Save Data

To save data to the currently opened file select **File | Save** in the menu (Figure 4.8) or click the left mouse button on the  toolbar button. If several files are open, the caption displayed at the top of the active window will be used as the file name.

It is recommended that you use the option Save As, to maintain the original data in an unedited form.

Save Data to Specified File (Save As)

To save data to a different file select **File | Save As** from the top menu (Figure 4.8). The Save As window will be displayed (Figure 4.10). Select a directory, specify a file name and then click the **Save** button (or double click the left mouse button, or press **Alt_S** on the keyboard). Data files containing EM39 readings will have the extension name G39.

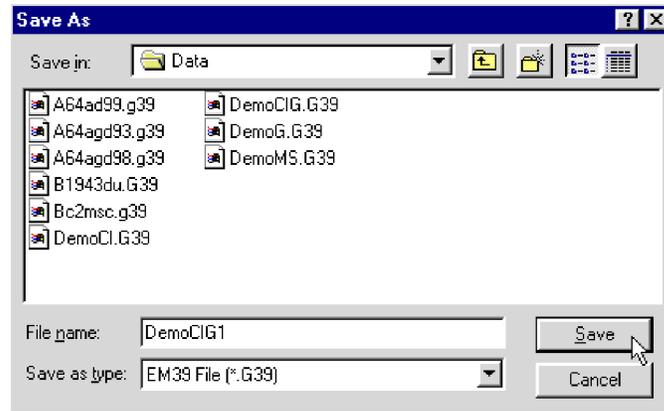


Figure 4.10: Save As window

4.3 Select, Delete and Rename Boreholes

Selecting Boreholes

When a data file is loaded, all boreholes contained in the file are displayed. To display a selection of boreholes select **Display | Select Boreholes** from the top menu (Figure 4.11) or click the left mouse button on the toolbar button.

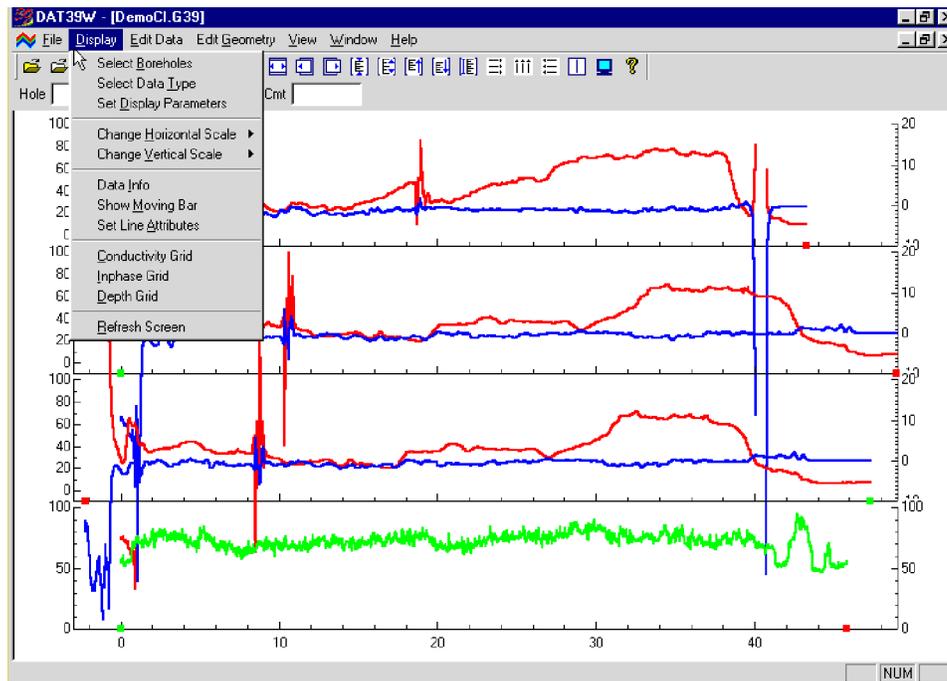


Figure 4.11: DAT39W Display menu

The Select Boreholes window is shown in Figure 4.12. In the top right section the number of available boreholes (Total), the number of currently selected boreholes (Selected.), and the number of deleted boreholes (Deleted) are displayed.

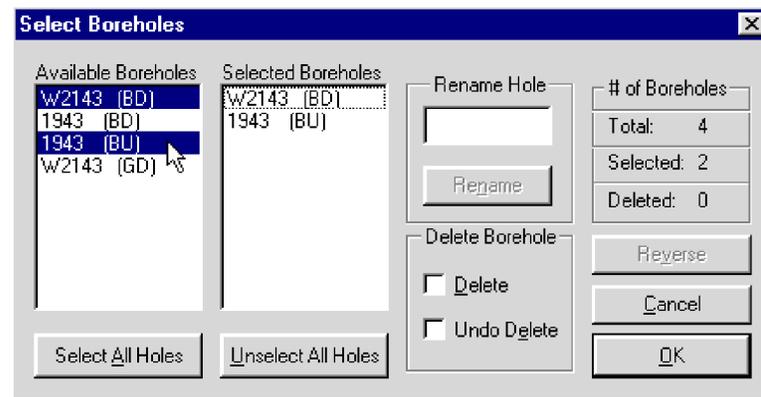


Figure 4.12: Select Boreholes window

The left list box, labeled Available Boreholes, displays all available boreholes, data type (EM39 component and direction of profiling). The right list box, labeled Selected Boreholes, shows the boreholes selected for display. When saving data (**Save** or **Save As** options), data will be saved in the order shown in the Select Boreholes window.

Select (and deselect) boreholes to be displayed by clicking the borehole names in the corresponding list box. **Select All/Unselect All** are also available. All highlighted borehole names will be displayed on the screen after clicking the **OK** button. Figure 4.13 is an example of a screen with three selected boreholes. (The corresponding Select Boreholes window is shown in Figure 4.12.)

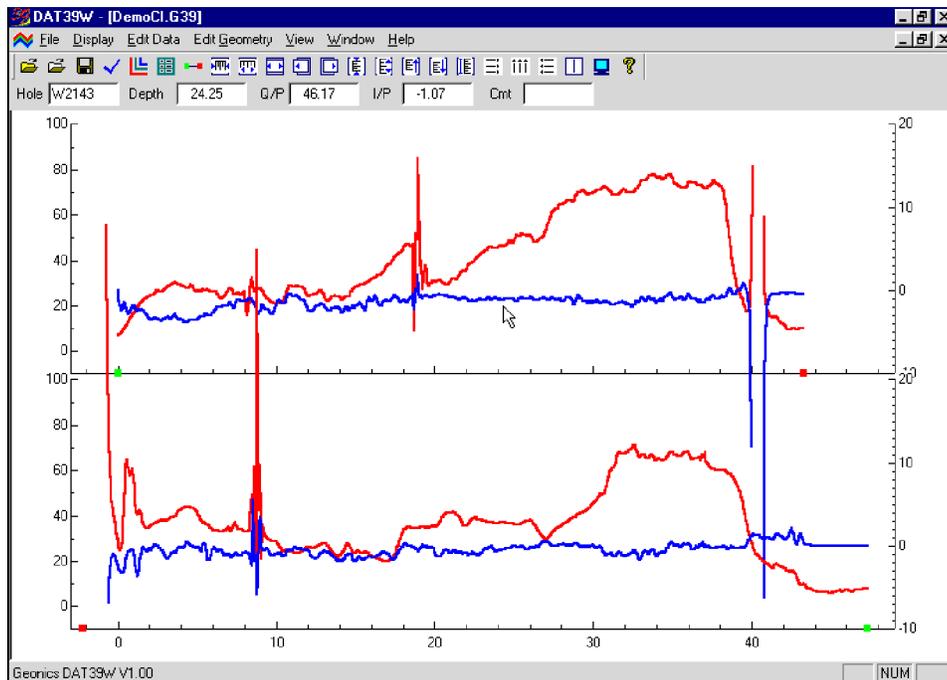


Figure 4.13: The DAT39W screen with selected boreholes

The selection of boreholes has no effect on the execution of **Save**, **Save As**, and **Create XYZ File** options. Select Boreholes only affects the current display. Therefore, one or two boreholes can be displayed and examined in detail and then saved with all other (not deleted) boreholes to a new file.

Deleting Boreholes

You can delete and rename boreholes with the **Select Boreholes** window (Figure 4.12).

To delete a borehole from the loaded set, first click the **Delete** check box. When a check mark is visible in the box click the appropriate borehole name in the list box. The letter **D** will be displayed next to the borehole name (and corresponding sensor type and direction) in the Available Boreholes list (Figure 4.14). These boreholes will not be displayed nor written to the output file during **Save** and **Save As** tasks.

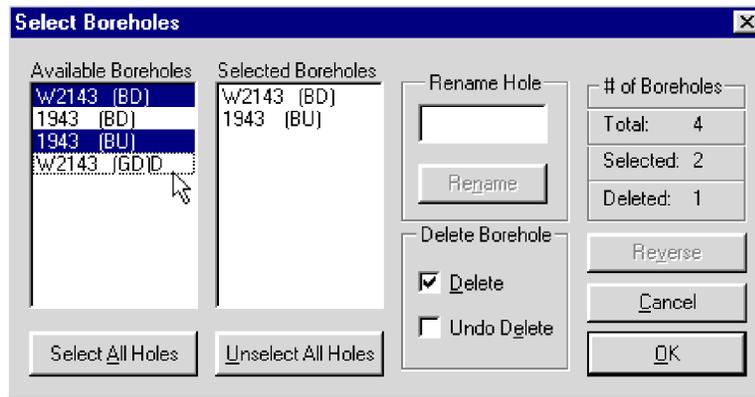


Figure 4.14: Select Boreholes window during Delete Boreholes procedure

Boreholes can be undeleted as well. To undo previously deleted boreholes (as long as program is running), first click the **Undo Delete** check box. When a check mark is visible in the box click the appropriate borehole name (with letter D next to its name) in the list box. The letter **D** will disappear and the borehole can be displayed, edited, and saved.

Renaming Boreholes

You can rename boreholes in the Select Boreholes window as well. Click on the appropriate borehole name in the list box. The highlighted borehole name will appear in the Rename Hole edit box (Figure 4.15). Enter the name and click the **Rename** button. The updated name will now be displayed in the borehole names list.

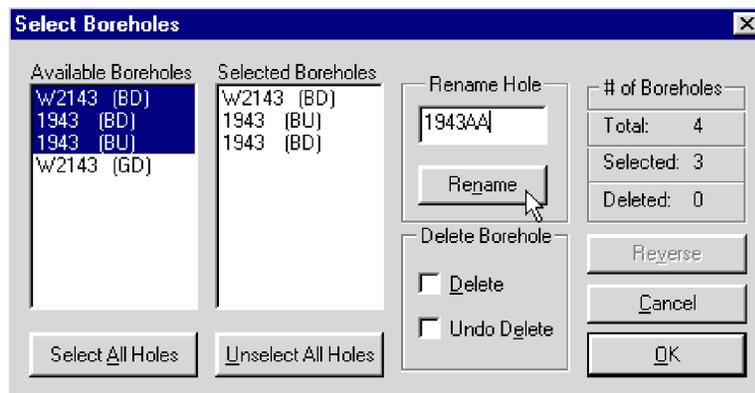


Figure 4.15: Select Boreholes window during Rename Borehole procedure

Deleted and Renamed boreholes will be valid as long as the program is running. In order to save changes permanently, use the Save As option to create a new

data file which can be used later by the program. It is recommended that you use the option Save As in order to maintain the original data in an unedited form.

4.4 Select Data Type

To select the type of data to be displayed select the **Display | Select Data Type** from the top menu (Figure 4.11) or click on the  toolbar button. The Select Data Type window will appear as shown in Figure 4.16.

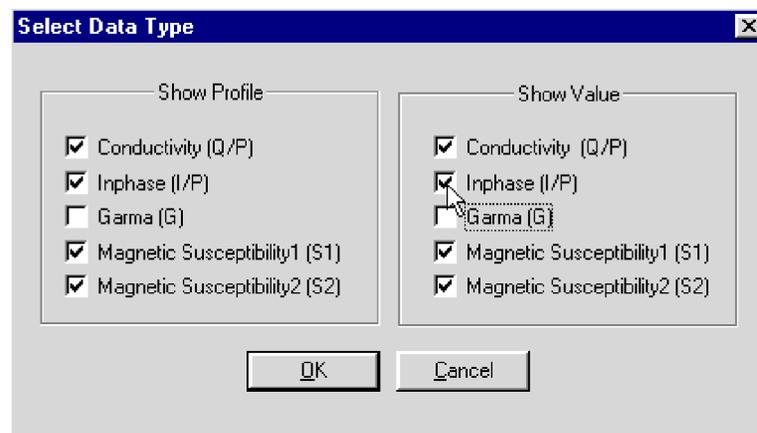


Figure 4.16: Select Data Type window

The window lists all available EM39 data types. Further, this window is divided to two sections, Show Profile and Show Value. Each section contains check boxes for all types of EM39 data.

The profile section lets you select channels to be displayed as profiles. To select a data type click on the check box next to the data type name in the Show Profile section. Data Types selected in the Show Value section of the **Select Data Type** window (Figure 4.16) will be displayed in display boxes located under the toolbar. To select a data type click on the check box next to the data type name.

After all parameters are selected click the **OK** button located at the bottom of the window. Clicking the **Cancel** button will cancel the selection and the display will not change.

4.5 Changing Display Parameters

The display parameters can be changed by using the **Set Display Parameters** window or by employing Quick scale adjustments accessible from the tool bar. The Quick scale adjustments provide a simple and interactive means of adjusting the display parameters. The Set Display Parameters window allows for a more detailed setting of parameter while viewing the data.

Set Display Parameters Window

To open the Set Display Parameters window (Figure 4.17) select **Display | Set Display Parameters** from the top menu (Figure 4.11) or click the left mouse button on the  toolbar button.

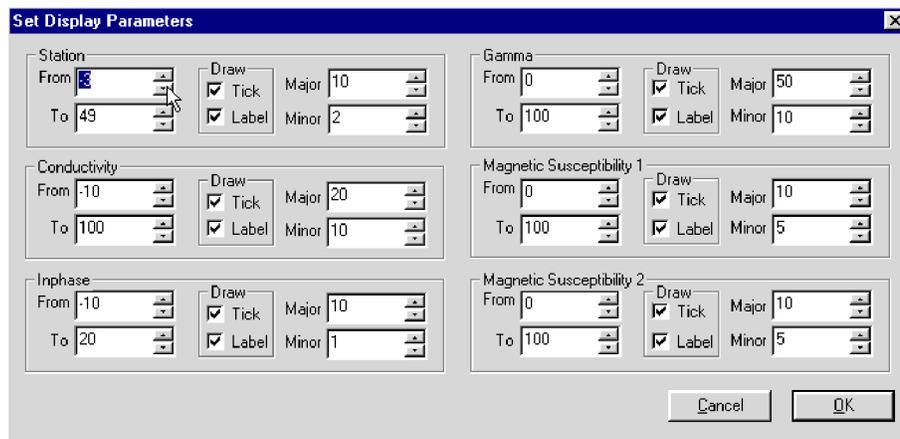


Figure 4.17: Set Display Parameters window

This option allows a range to be set for the length of the borehole (stations displayed), and the EM39 conductivity, Inphase, Gamma, and Magnetic Susceptibility amplitudes. The major and minor axis tick intervals are also controlled through this window. (Labels and optional grid boreholes are plotted at the major ticks only.) After all parameters are set, press the **OK** button and the profile display will be updated.

Quick Change of Horizontal and Vertical Scales

To adjust the horizontal range of the profiles can select **Display | Change Horizontal Scale | ...** in the menu (Figure 4.18), but it is much more convenient to use the buttons located on the toolbar (Figure 4.19). To access the functions click on the appropriate toolbar button.

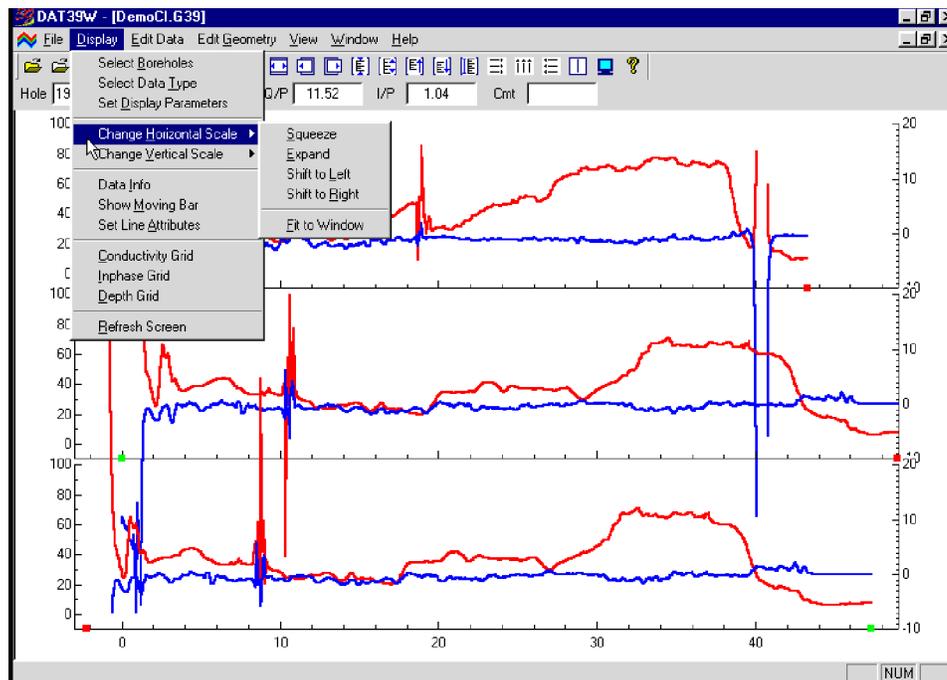


Figure 4.18: Change Horizontal Scale menu

These options allow a quick change of the horizontal scale in increments equal to the minor tick setting (refer to the Set Display Parameters Window earlier in this section). The options are self explanatory. Buttons shown in Figure 4.19 are (from left): compress, expand, fit to the page, shift left and shift right.



Figure 4.19: Change Horizontal Scale toolbar buttons

To adjust the vertical parameter scale you can select the **Display | Change Vertical Scale | ...** in the menu (Figure 4.20), but, as for horizontal scale, it is much more convenient to click on the appropriate toolbar buttons (Figure 4.21).

These options allow a quick change of the vertical scale in increments equal to the minor tick setting. The menu options are self explanatory. The buttons shown in Figure 4.21 are (from left): compress, expand, shift up, shift down, and scale according to the minimum and maximum values of the response.

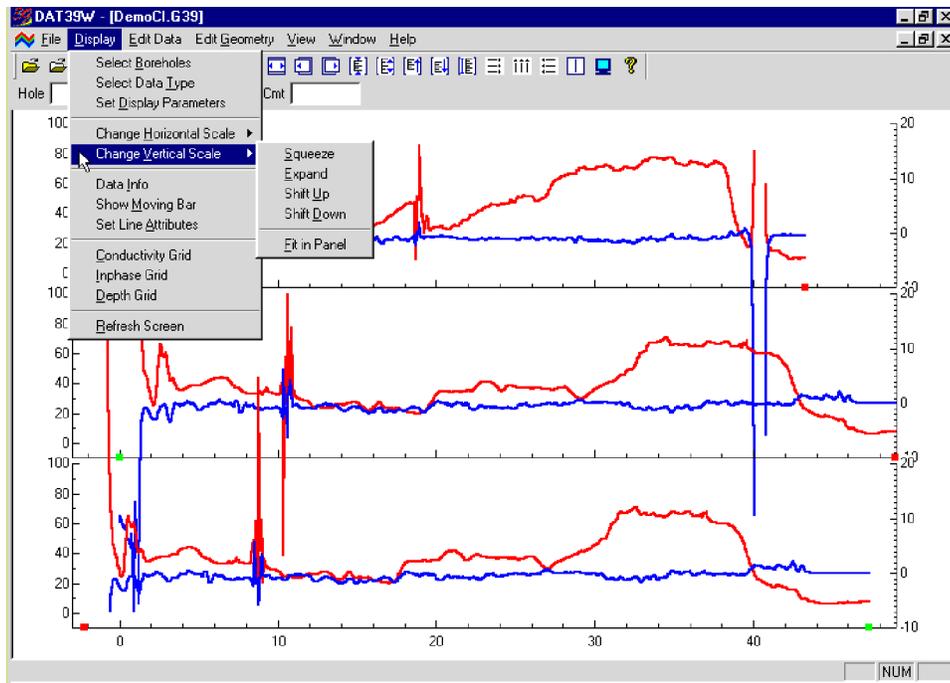


Figure 4.20: Change Vertical Scale menu



Figure 4.21: Change Vertical Scale toolbar buttons

4.6 Data Info

To obtain information about data entered into the program select **Display | Data Info** in the menu (Figure 4.20). The Data Information window that will appear is shown in Figure 4.22.

This window is divided in to four portions. The targets, top portion of the window shows Start and End station and number of readings. The left vottom part presents minimum and maximum values for each data type present in the data set. The right bottom part of the Data Information window shows total number of boreholes, number of readings, and minimum and maximum values for stations. At the bottom, the symbols used to denote the start and end station of each borehole and comments are displayed.

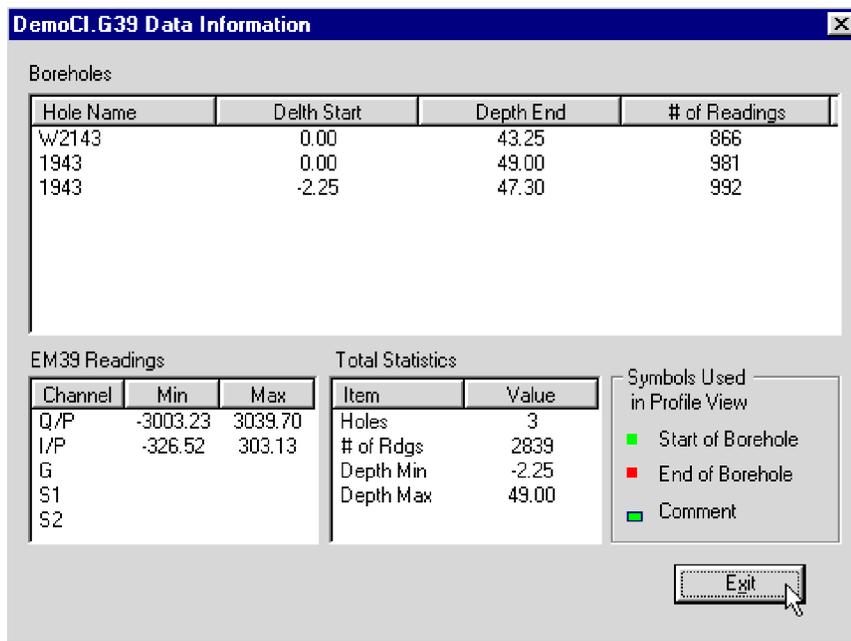


Figure 4.22: Data Information window

4.7 Grid Lines

To obtain horizontal and/or vertical lines at major ticks along the axes, select **Display | Conductivity Grid**, **Display | Station Grid**, or **Display | Inphase Grid** from the display menu (Figure 4.20). These options can also be selected by clicking on toolbar buttons , , or  corresponding to Conductivity (or Gamma and Magnetic Susceptibility 1) Grid, Station Grid, or Inphase (and Magnetic Susceptibility 2) Grid. The screen with grid lines is shown in Figure 4.23.

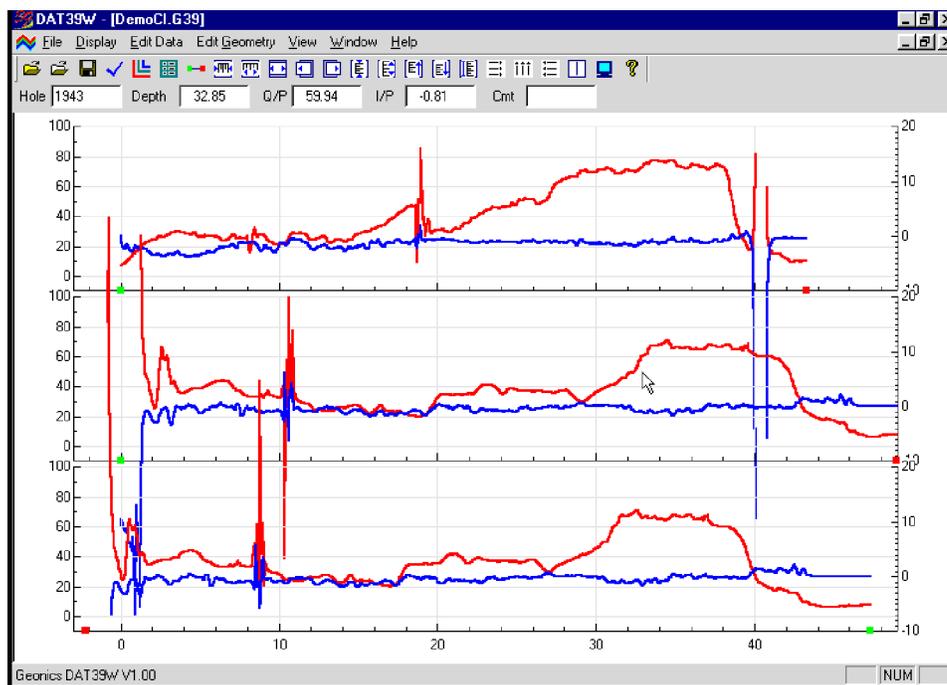


Figure 4.23: DAT39W screen with grid lines

Grid lines are plotted across each panel at corresponding major ticks as light grey lines. These options can be useful in examining the alignment of anomalies which are distributed across more than one borehole, as well as for comparing anomaly amplitudes.

4.8 Moving Bar

To obtain a vertical line (bar) that can be dragged by the mouse across boreholes, select **Display | Show Moving Bar** item from the top menu (Figure 4.20). Or you can click on the toolbar button . A vertical line will appear on the display (Figure 4.24). To move the line, move the mouse to the line and drag (holding the left mouse button depressed) either left or right. This option can be useful in examining the alignment of anomalies which are distributed across more than one borehole.

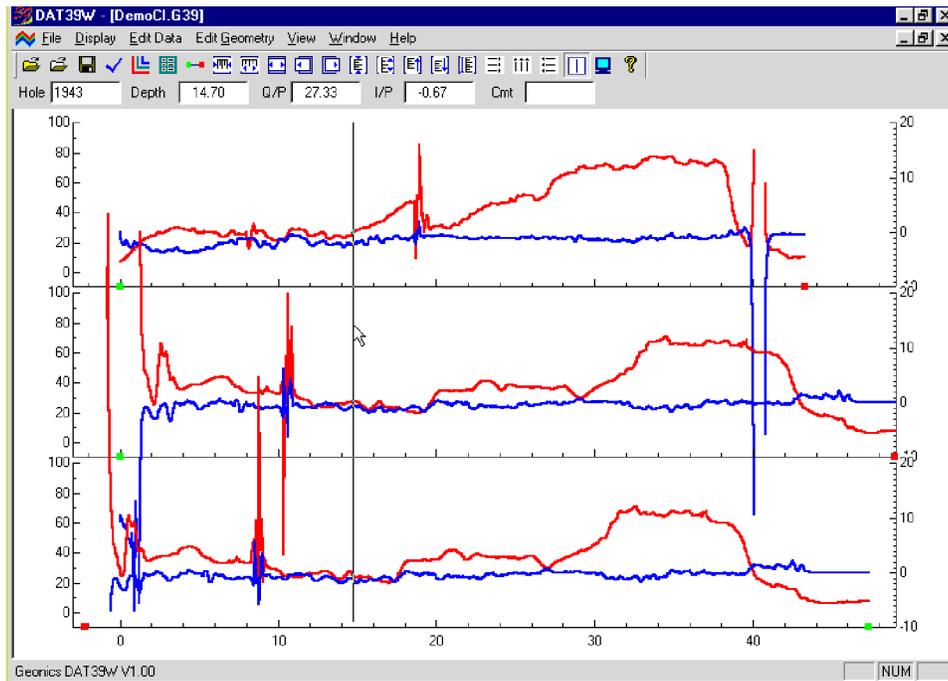


Figure 4.24: DAT39W screen with the moving bar

4.9 Set Line Attributes

To change the colour and/or thickness of the profile lines of each channel select **Display | Set Line Attribute** from the top menu (Figure 4.20). The **Set Line Attributes** window is shown in Figure 4.25.

Each profile line is of a different type, given by the data type name indicating instrument component (see section 4.4). The line types are displayed in the left list box together with samples of the lines. To change colour or thickness, click the appropriate line in the list box, then click the desired colour bar in the Colour box and thickness in the Width box. If a colour not provided in the Colour box is desired, click the **Custom** button and the Colour window with a larger selection of available colours will be displayed (Figure 4.26).

The background colour can be changed as well. Click the **Background** button and the window shown in Figure 4.26 will appear.

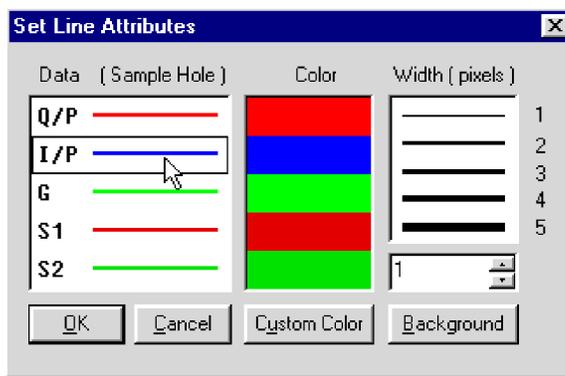


Figure 4.25: The Set Line Attributes window

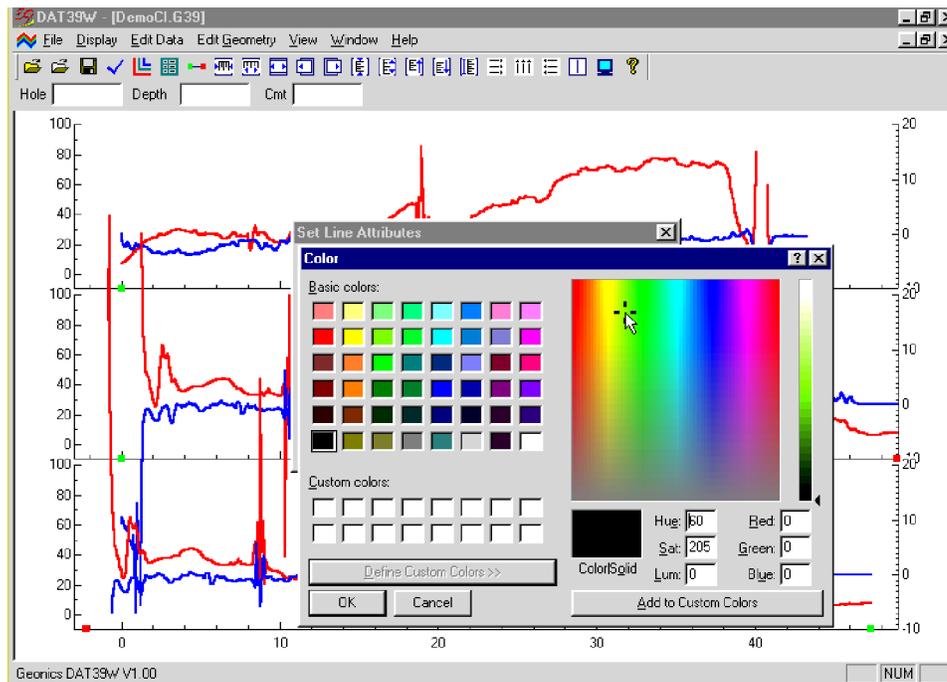


Figure 4.26: The Color window

After all attributes are set, click the **OK** button and the profile display will be updated. Line attributes are written to the DAT39W initial file (DAT39W.INI): during future executions of the program these attributes will be used as default settings.

4.10 Refresh Screen

To redraw the screen, select the **Display | Refresh Screen** item in the Display menu (Figure 4.20) or click the left button on the  toolbar button. The entire screen will be redrawn immediately.

5. Editing Data

To display the Edit Data menu select **Edit Data** from the main menu at the top of the screen (Figure 5.1).

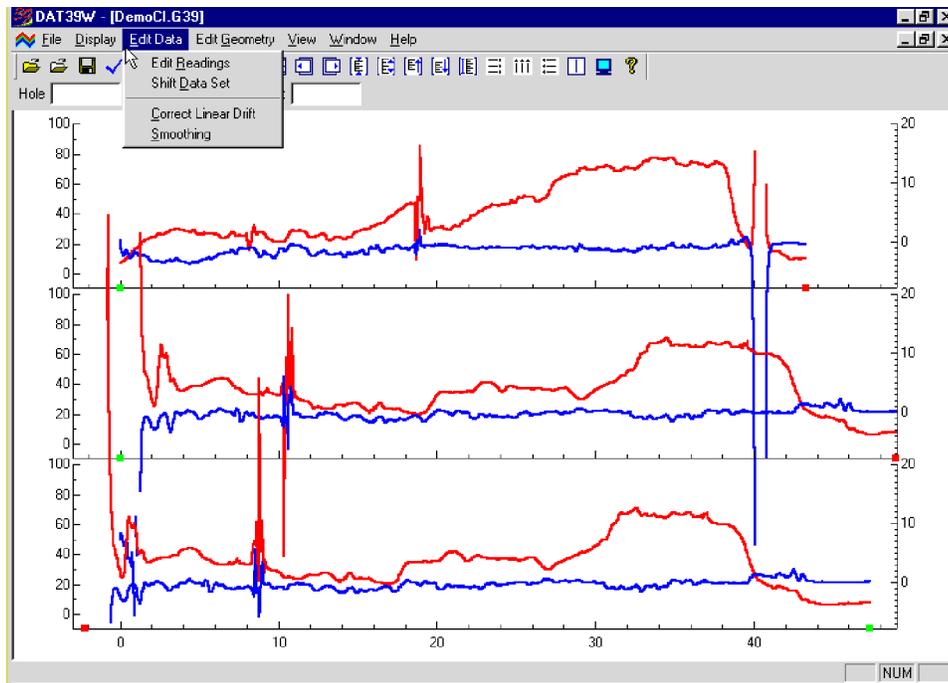


Figure 5.1: DAT39W Edit Data menu

The Edit Data menu contains the following five items:

Edit Reading is used to display the numeric values of readings, delete selected readings, and change values of any data type.

Shift Data Set is used to increase or decrease selected channels readings for the entire data set, or selected boreholes.

Correct Linear Drift function allows you to remove linear offset for all data types.

Smoothing is used to smooth data using linear and quadratic filters.

5.1 Edit Reading

To display the Edit Reading window select **Edit Data | Edit Reading** from the main menu (Figure 5.1). The Edit Reading window is shown in Figure 5.2.

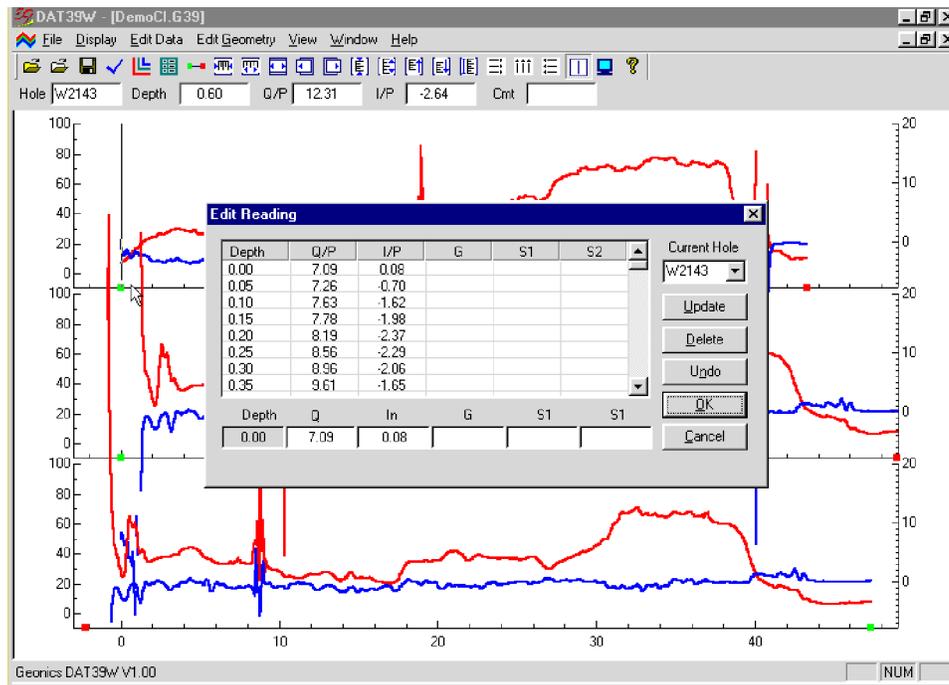


Figure 5.2: Edit Readings window

Boreholes are selected in the section labelled Current Borehole. Any borehole can be selected by displaying a pull down list of available boreholes (Figure 5.3) and clicking on the one wanted. The name of the selected borehole is displayed in the Current Hole display box.

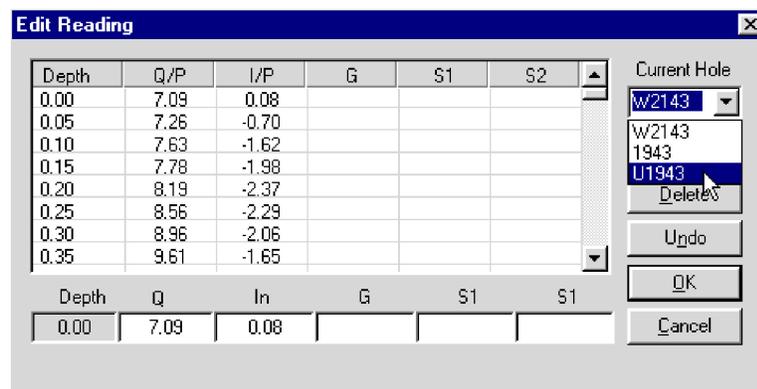


Figure 5.3: Editing Readings window with list of Boreholes

Readings are displayed in the list box located in the central portion of the window. Each row in this box displays: the station number **Depth**, and **Q/P** (mS/m), **I/P** (ppt), **G** (counts), **S1** (ppt), **S2** (ppt). The scroll bar located at the right edge is used to scroll through the stations of the selected borehole. Scrolling can also be performed using the keyboard Up and Down keys. A short grey bar on the profile display indicates the position of the active (highlighted) reading (Figure 5.4). A row of edit boxes with values corresponding to the selected depth is located at the bottom of the Edit Readings window. These boxes are used to editing readings.

Closing the Edit Reading window with **OK**, or the close window button (right top corner of the window) will temporarily save all changes performed while the window was active. Changes can be saved permanently with the **Save** or **Save As** options (Section 4.2). Pressing the **Cancel** button will discard any editing, and data will be returned to original values.

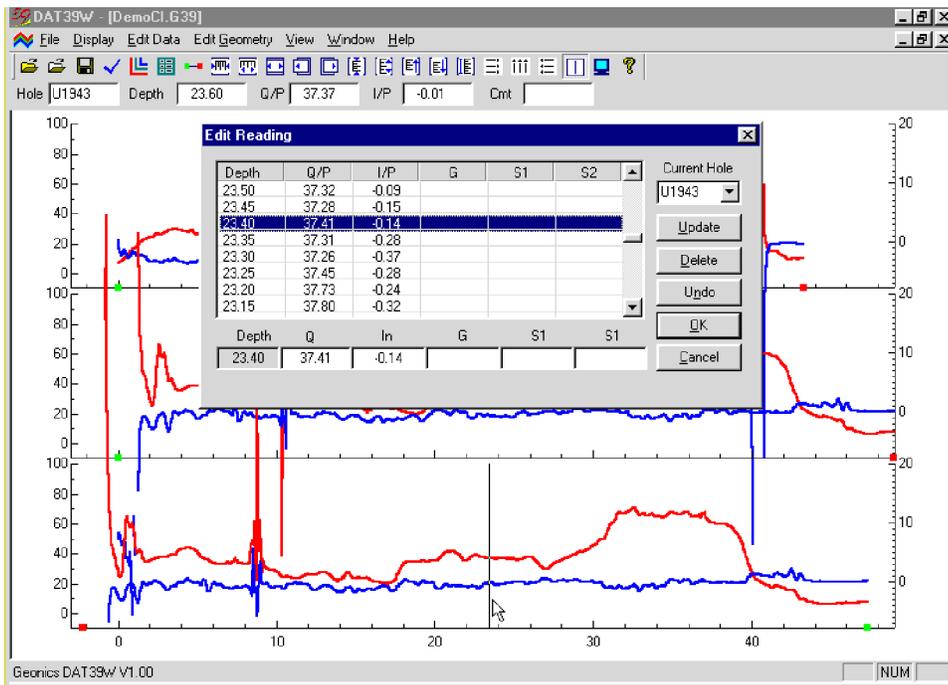


Figure 5.4: Edit Reading window with a vertical bar indicating position of the depth in the profile view.

Deleting Readings

To delete the readings at a depth (station), click on the station in the list box of the Edit Reading window (Figure 5.4). The readings at that station will be highlighted. Then click the **Delete** button. Values for all channels at the depth will be removed. Figure 5.5 shows a data set with six stations removed. Readings are removed from the profile view at the same time.

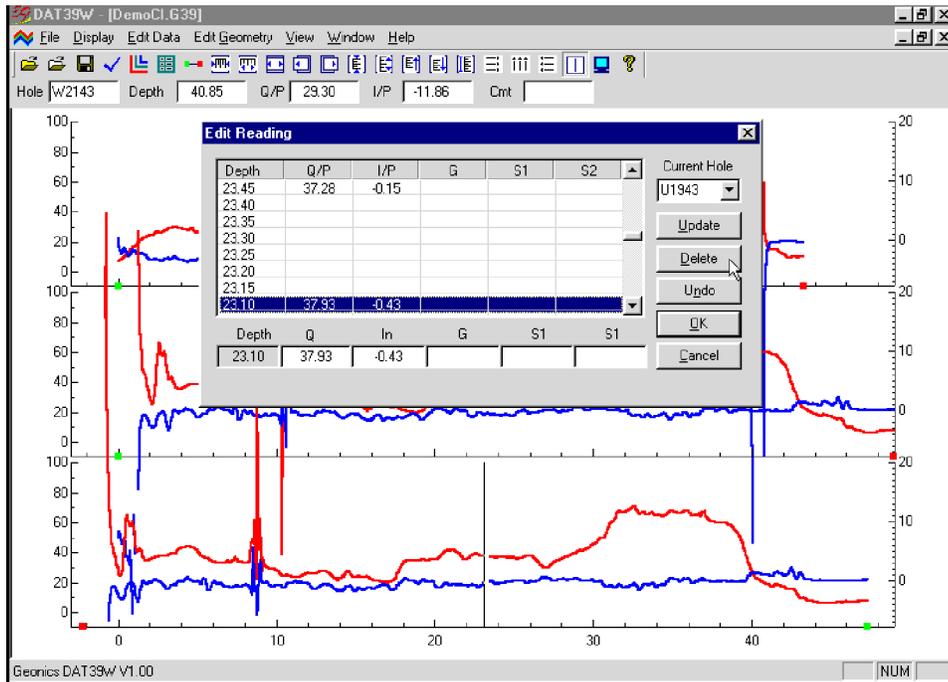


Figure 5.5: Edit Reading window during Delete Reading procedure

The Delete Reading function can be applied to any number of stations. To undelete readings click the **Undo** button which restores removed stations one by one. The Undo function has an unlimited number of steps.

Updating Readings

To update the value of any reading, click on the appropriate station (depth). The selected station will be highlighted. At the same time, values for the active channels, as well as the status of the fiducial marker will be displayed in the edit boxes located in the bottom of the Edit Readings window (Figure 5.6).

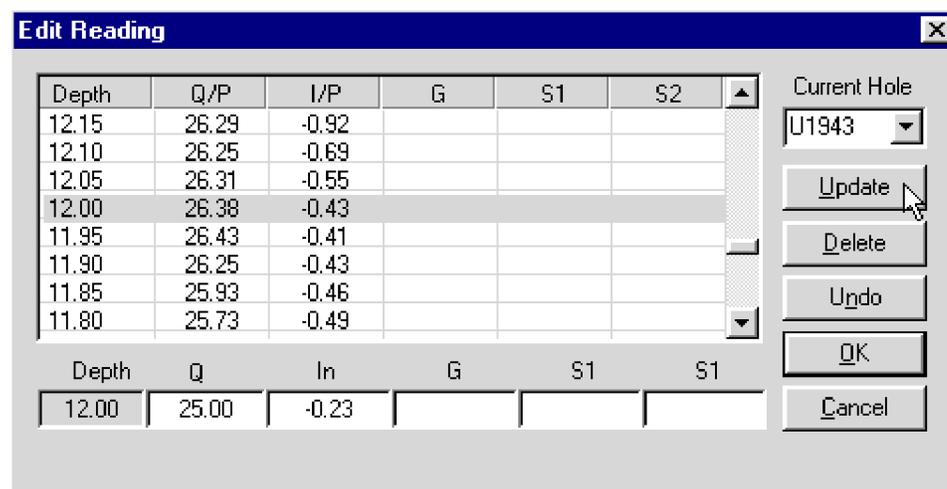


Figure 5.6: Edit Readings window during editing value of readings

To edit any of these values, click on the appropriate edit box. After entering the new value(s) press the **Update** button. Updated values will be displayed in the Depth list box, and the profile view will be updated in real time (Figure 5.6).

Note that changes can be removed by clicking the **Undo** button. The Undo function associated with this procedure removes changes one by one and has an unlimited number of steps.

Note that changes are saved temporarily in the in the program memory while the window associate with the data set is active. Changes can be saved permanently with the Save As option as discussed in Section 4.2.

(We recommend to use Save As instead of Save, to preserve the original data.)

5.2 Shift Data Set

To display the **Shift Data Set** window select **Edit Data | Shift Data Set** from the main menu (Figure 5.1). The window that will appear is shown in Figure 5.7.

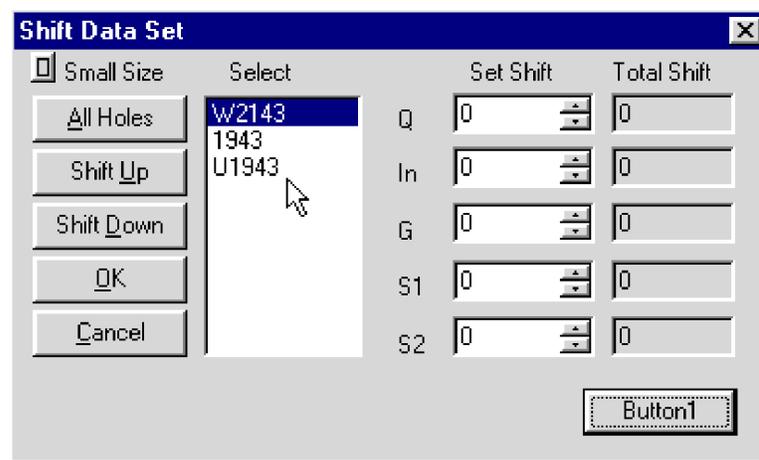


Figure 5.7: Shift Data Set window

The shifting of data function - to increase or decrease the values of all readings on a borehole by a constant amount - can be applied to any number of selected boreholes and to any selected data types. Click on the **All Holes** button to shift data for all boreholes listed in the Select Lines list box. Data is shifted in increments specified in edit boxes labeled Shift Value located in the right section of the Shift Data Set window. The increment can be set from the keyboard (after positioning the cursor in the edit box), or with the speed buttons located at the right edge of each edit box. Increment 0 causes no shift for the data.

To shift data for the selected boreholes click on the **Up** or **Down** button. The total shift will be shown in the display box labeled **Total Shift** and the graphic display (profile view) will be updated in real time. The original curves will be displayed in grey. The screen with the shifted readings is shown in Figure 5.8.

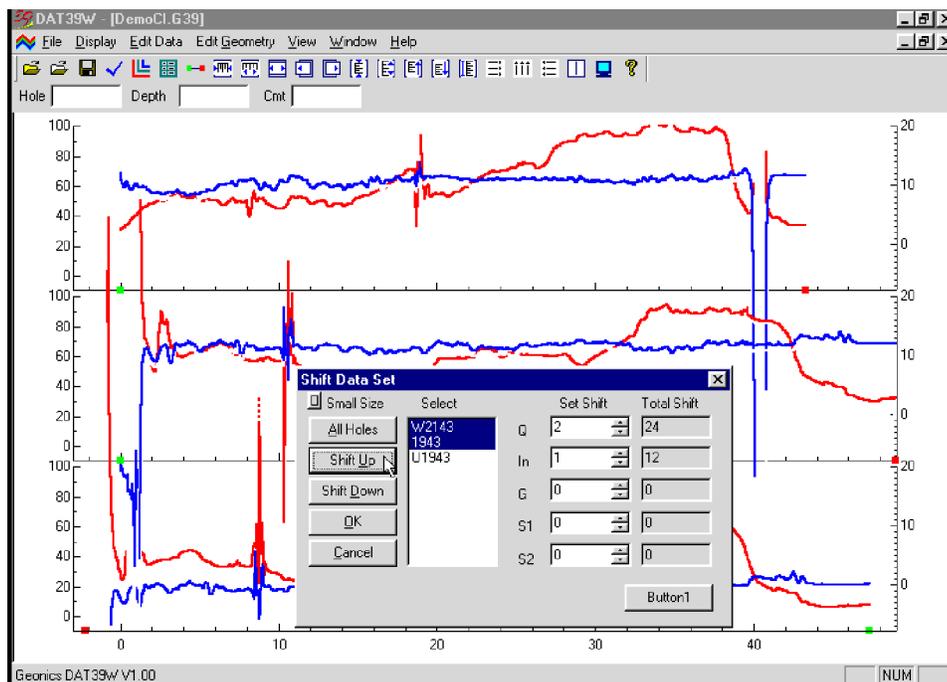


Figure 5.8: DAT39W screen during Shift Data procedure

To close the Shift Data Set window click on **OK** or the close window button. This will temporarily save any changes in the data set.

5.3 Linear Drift Correction

To display the Linear Drift Correction window select **Edit Data | Linear Drift Correction** from the main menu (Figure 5.1). The window that will appear is shown in Figure 5.9.

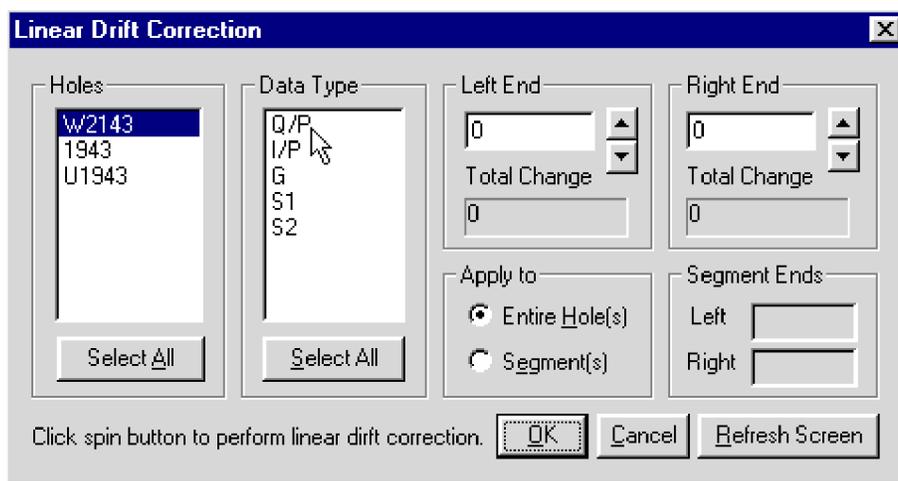


Figure 5.9: The Linear Drift Correction window

Editing the Entire Borehole

The linear shifting of data - to increase or decrease the values of all readings along the borehole as determined by a linear interpolation between the values at the two end points - can be applied to any number of selected boreholes. To select boreholes point and click the left mouse button on all appropriate boreholes in the list box labeled Boreholes. Data are shifted in increments which must be specified in the edit boxes labeled **Left End** and **Right End** located in the top right part of the window. Increments (steps) can be entered from the keyboard, after positioning the cursor in the edit box. Increment values apply to all data types. Select data to be edited in the list box labeled Data Type. Increment must be specified separately for each end station of the borehole, left and right end of the graphic display (regardless how actual Start and Final stations of the boreholes are located).

After the step is specified, data can be changed by pressing the speed buttons located at the right side of the Increment edit boxes labeled Left End and Right End. The values of steps for stations located between the start and end stations will be calculated using linear interpolation. Values of the total shift will be shown in the display boxes labeled **Total Change**. The graphic display will be updated in real time. The original curves will be displayed in grey. The screen with the shifted readings (Conductivity curve of the selected borehole) is shown in Figure 5.10.

Where results are not satisfactory, changes can be removed by clicking the appropriate speed button until the Status value displays 0.

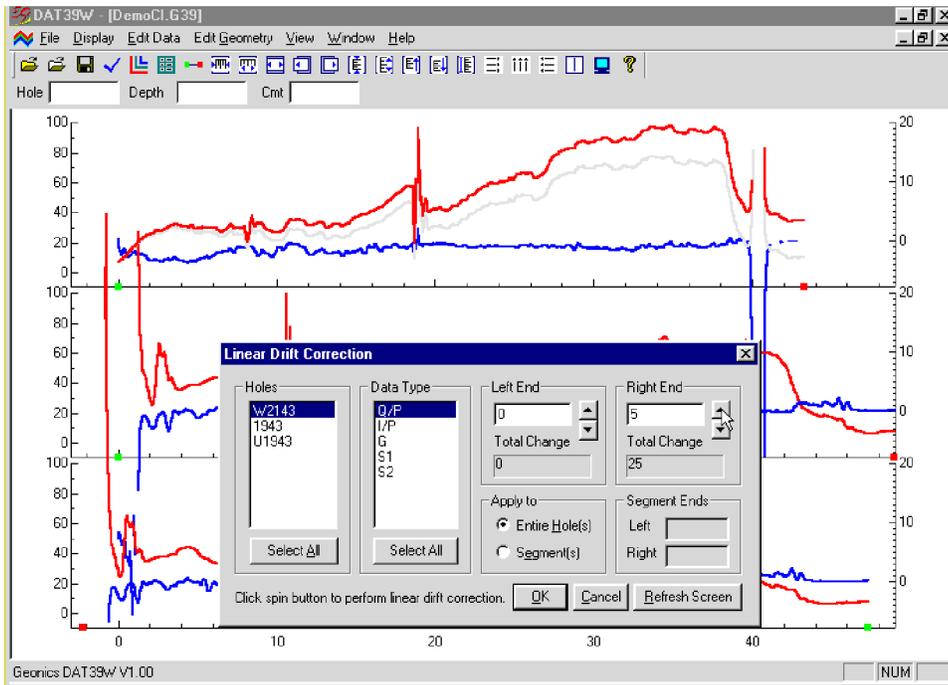


Figure 5.10: The DAT39W screen during Linear Drift Correction for the Entire Hole

Editing a Segment of the Borehole

To correct drift from within a segment of the borehole only click the **Segment(s)** button located in the **Apply to** window (Figure 5.9). The Segment Ends section will be activated as shown in Figure 5.11.

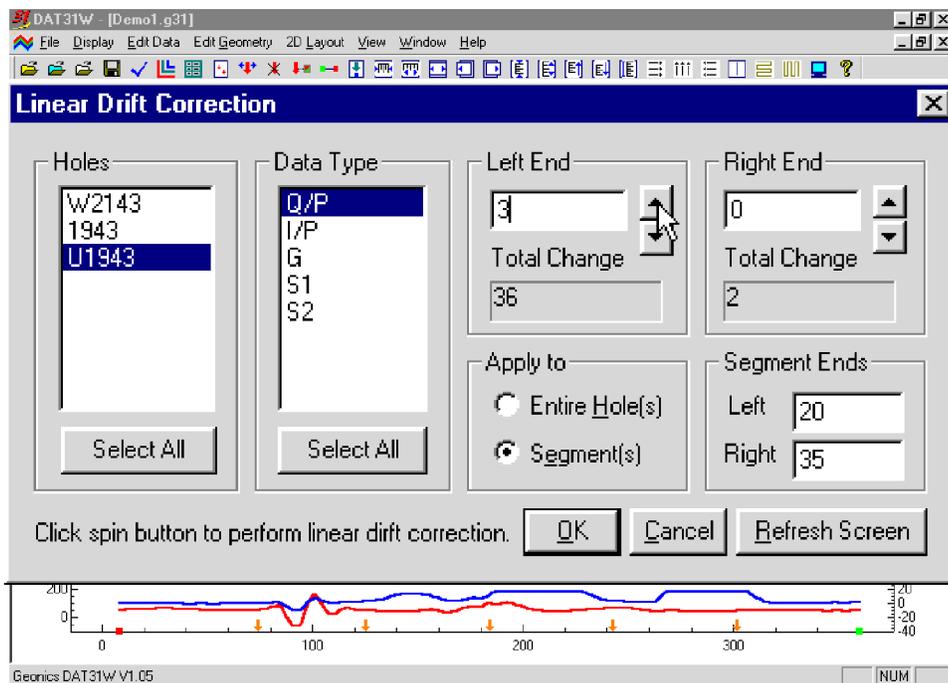


Figure 5.11: The DAT39W screen during Linear Drift Correction of Hole Segments

After specifying a segment of the borehole, the procedure is the same as for correction of the entire borehole. Changes will be applied only within the specified segment. An example is shown in Figure 5.11.

Closing the Linear Drift Correction window using **OK** or the close window button will temporarily save any changes in the data set.

5.4 Smooth Data

To display the **Smooth Data** window select **Edit Data | Smooth Data** from the main menu (Figure 5.1). The window that will appear is shown in Figure 5.12

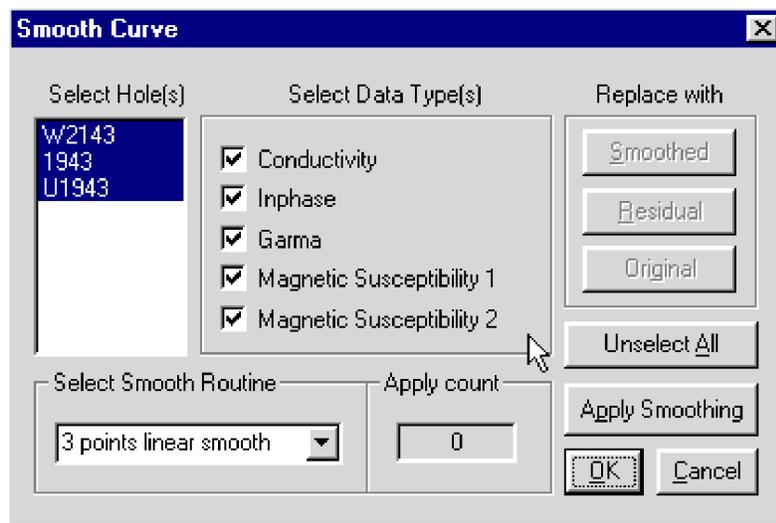


Figure 5.12: The Smooth Data window

The smoothing procedure can be applied to any number of selected boreholes and to any data type. To select boreholes click on all appropriate boreholes in the list box labeled Holes. To select data type to be smoothed click appropriate check boxes in Select Data Type(s) section of the Smooth Data window. Checkboxes labeled Conductivity or other will select or deselect all data types associated with the corresponding component. Several methods of smoothing are available: 3 point linear smooth, 5 point linear smooth, etc. They are listed and selected using the Select Smooth Routine pull down menu (Figure 5.12).

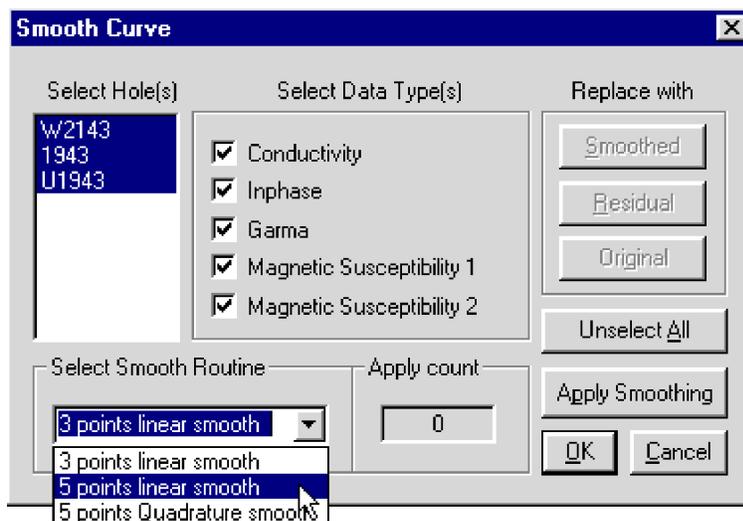


Figure 5.13: The Smooth Data window with list of available smooth functions.

After the boreholes, data type and the method of smoothing have been selected, press the **Apply Smoothing** button to smooth. Smoothing can be applied to a selected set of data several times. The number of smoothing applications is displayed and updated in the display box at the bottom of the window (left to the **Apply Smoothing** button), labeled **Apply Count**. The graphic display is updated in real time, with the original curves displayed in grey, as shown in Figure 5.14.

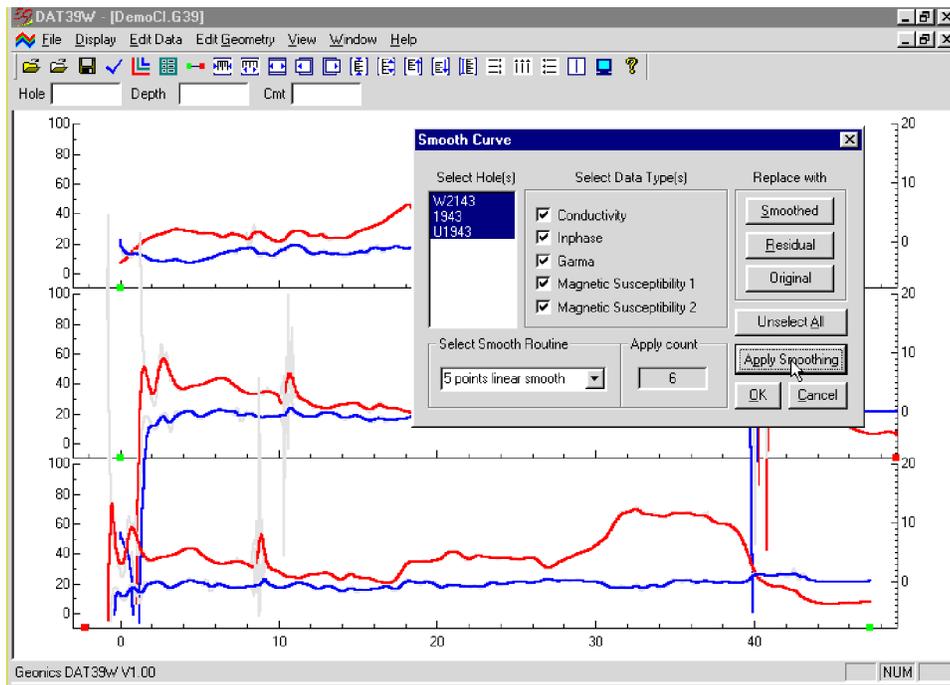


Figure 5.14: DAT39W screen while smoothing selected data

After smoothing is applied, the buttons located in the **Replace with** window become active. The original data can be replaced with the Smoothed or Residual values at any time by pressing the corresponding button. If the smoothing result is not as desired, click on **Original** to return to the original values.

The simple, three point linear smoothing function, applied several times, is adequate for “average” EM39 data. Ultimately, however, the method of smoothing (or generating residual curves) and the degree of smoothing depends on the particular data set, objectives, desired method of presentation, etc.

Closing the Smooth Data window using **OK** or the close window button will temporarily save changes in the data set.

Note that changes are saved temporarily in the in the program memory while the window associate with the data set is active. Changes can be saved permanently with the Save As option as discussed in Section 4.2.

(We recommend to use Save As instead of Save, to preserve the original data.)

6. Editing Survey Geometry

The Edit Geometry option allows adjustment of the profile geometry, including the repositioning of both the start and end stations of each borehole, as well as any station marked with the fiducial switch. To display the Edit Geometry menu select **Edit Geometry** in the main menu at the top of the screen (Figure 6.1).

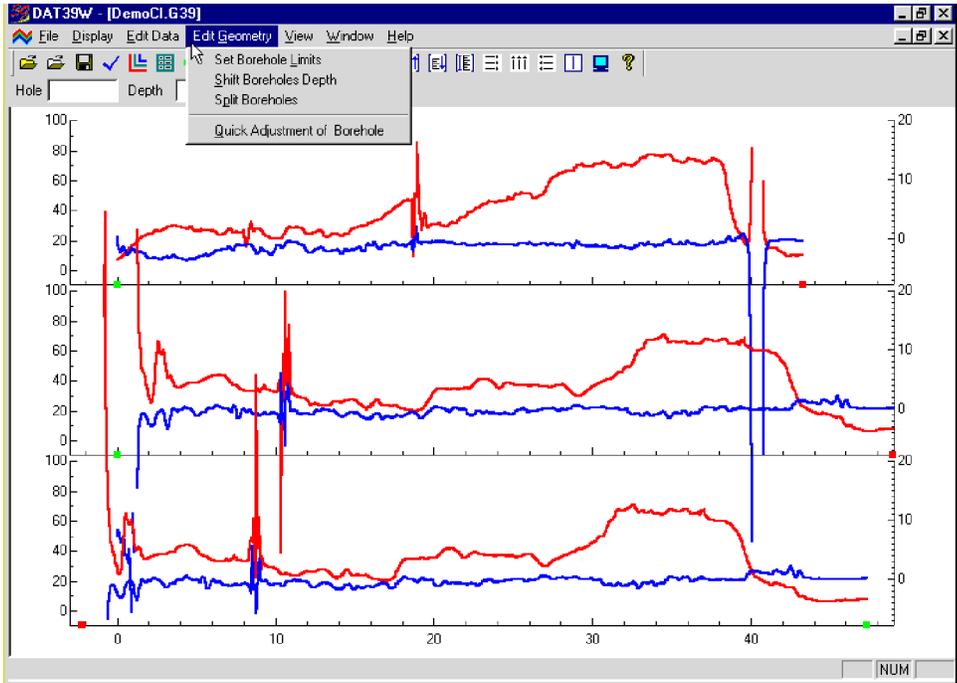


Figure 6.1: DAT39W Edit Geometry menu

The Edit Geometry menu contains two groups of items. In the first group, **Set Borehole Limits** changes the position of the start and end stations of any selected group of boreholes; **Shift Boreholes Depth** can be used to move any selected group of boreholes in either a positive or negative direction along the profile axis; **Split Boreholes** will separate any related borehole into two independent boreholes.

The second group contains one item that allow quick (although less accurate) positioning of the start and end stations of each borehole. This “quick” tool are easily accessible from a button located on the tool bar.

6.1 Set Borehole Limits

To display the **Set Borehole Depth Limits** window select **Edit Geometry | Set Borehole Limits** in the menu (Figure 6.1). The Set Borehole Limits window is shown in Figure 6.2.

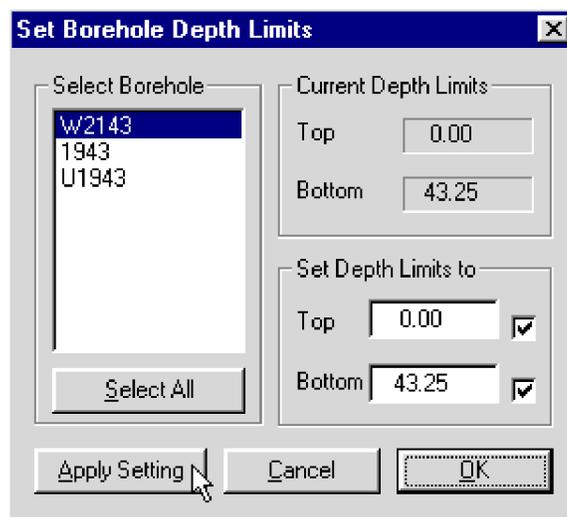


Figure 6.2: *Set Borehole Depth Limits window*

You can set borehole depth limits (positions of the start and end stations) for any number of selected boreholes at one time. To select boreholes, use the list box labeled **Select Borehole(s)**. In the **Current Depth Limits** display box, the minimum (**Top**) and maximum (**Bottom**) positions of stations are shown. (**Top** corresponds to the minimum station positions on the left side of the screen, while **Bottom** corresponds to the maximum positions on the right side for the selected boreholes.) You can specify new **Top** and **Bottom** positions in the two edit boxes labeled **Set Depth Limits to**.

If both edit boxes are checked (Figure 6.2), both ends of the selected boreholes will be repositioned to the specified values. In this case, the station intervals will be adjusted accordingly. If only one edit box is checked (Figure 6.3), the active station will be repositioned to the specified location, while the non-active station will remain unchanged.

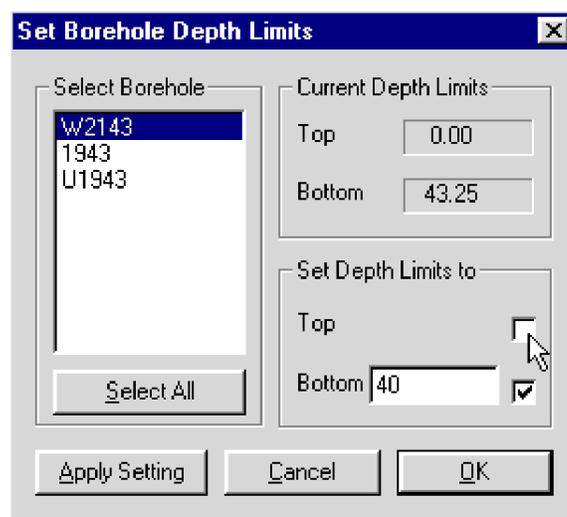


Figure 6.3: *Set Borehole Depth Limits window with one edit box checked*

After you click the **Apply Setting** button, the specified adjustments are completed. The graphic display will be updated in real time. The procedure can be repeated for any additional sets of boreholes and settings.

If any change is not satisfactory, click the **Cancel** button to close the **Set Borehole Depth Limits** window and return all stations to their original positions. Clicking the **OK** button will close the **Set Borehole Depth Limits** window and apply the changes.

6.2 Shift Boreholes

To display the **Shift Boreholes Depth** window select **Edit Geometry | Shift Boreholes** from the main menu (Figure 6.1). The window is shown in Figure 6.4.

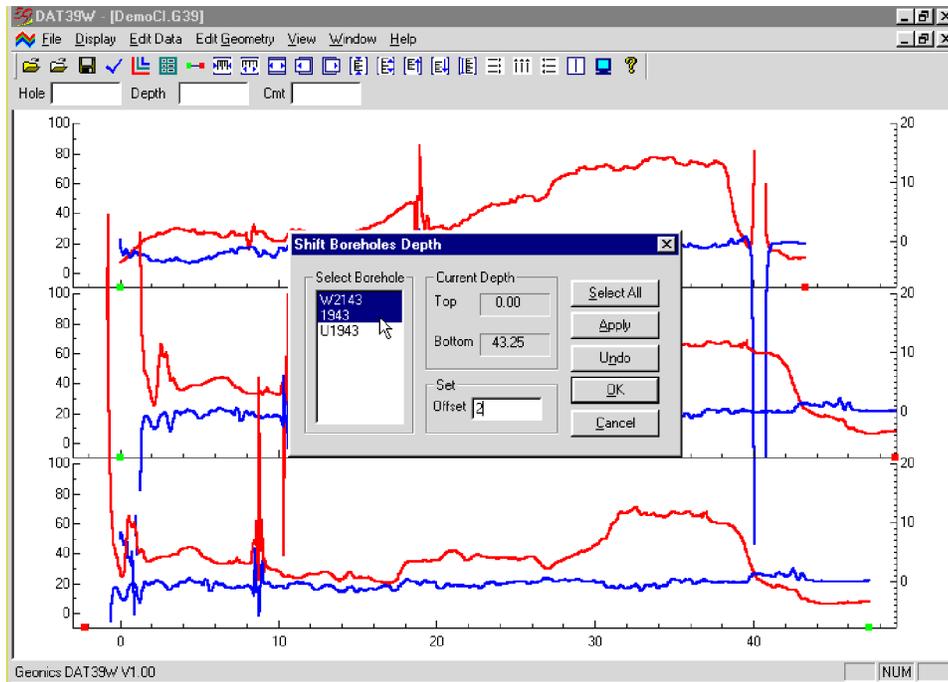


Figure 6.4: DAT39W screen with Shift Borehole Depth window

This option lets you shift any number of selected boreholes, left or right, along the profile axis. The boreholes can be selected from the list box labeled **Select Borehole(s)**. The information on current positions of the end points of the current borehole is shown in the display box labeled Current Position. The shift increment (step) can be entered in the edit box labeled Set Step. If the step is positive, the selected boreholes will be shifted to the right, with the station numbers increasing accordingly. A negative step will shift boreholes to the left, with station numbers decreasing accordingly. The lengths of the boreholes will not change.

After the step is entered, click on **Apply** to shift the selected boreholes. The graphic display will be adjusted in real time. The last operation can be cancelled by clicking the **Undo** button.

To end this operation, click on **OK**: the Shift Boreholes window will close, and all changes will be applied.

If any change is not satisfactory, click the **Cancel** button to close the Shift Boreholes Depth window and return all stations to their original positions.

6.3 Split Boreholes

To display the **Split Boreholes** window select **Edit Geometry | Split Boreholes** from the main menu (Figure 6.1). The window is shown in Figure 6.5.

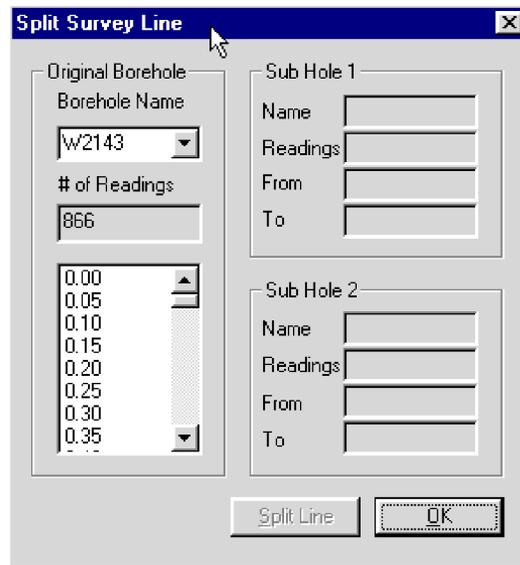


Figure 6.5: Split Boreholes window

This option allows a borehole to be divided into two independent boreholes. The borehole can be further divided into any number of separate boreholes, simply by repeating the procedure.

The borehole to be split is selected in the Original Borehole section. Click on the arrow beside the Borehole Name box to open the pull down list of available boreholes, then click on the borehole to be split (Figure 6.6). The number of stations in the selected borehole, and the positions of the stations, will be displayed below the Borehole Name box.

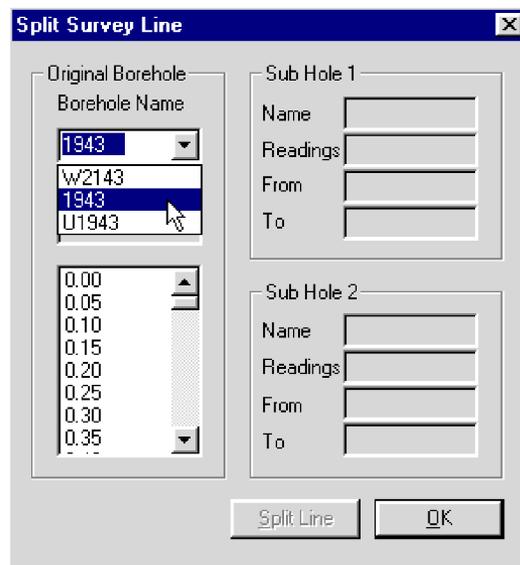


Figure 6.6: Selecting a borehole in the Split Borehole window

To select the station at which the borehole will be split, scroll to and highlight the desired depth. After splitting, the selected depth will be the last station of the first borehole, while the next station will be the first station of the second borehole. This information, as well as the number of stations in each new borehole, is provided in the windows labeled Sub Borehole1 and Sub Borehole2 (Figure 6.7).

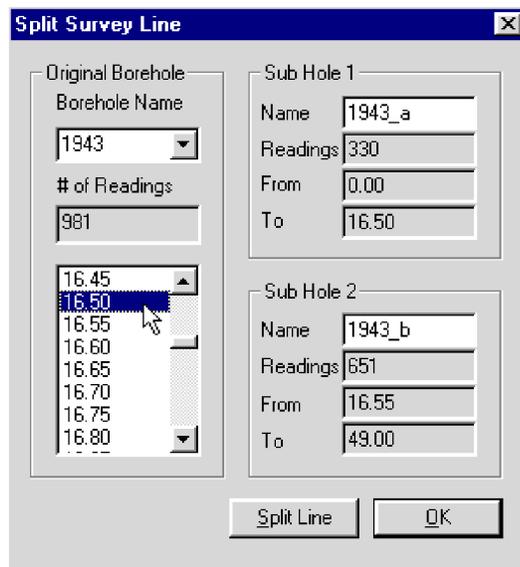


Figure 6.7: Selecting the depth in the borehole

A vertical bar will move along the borehole profile indicating the position of the selected station on screen (Figure 6.8).

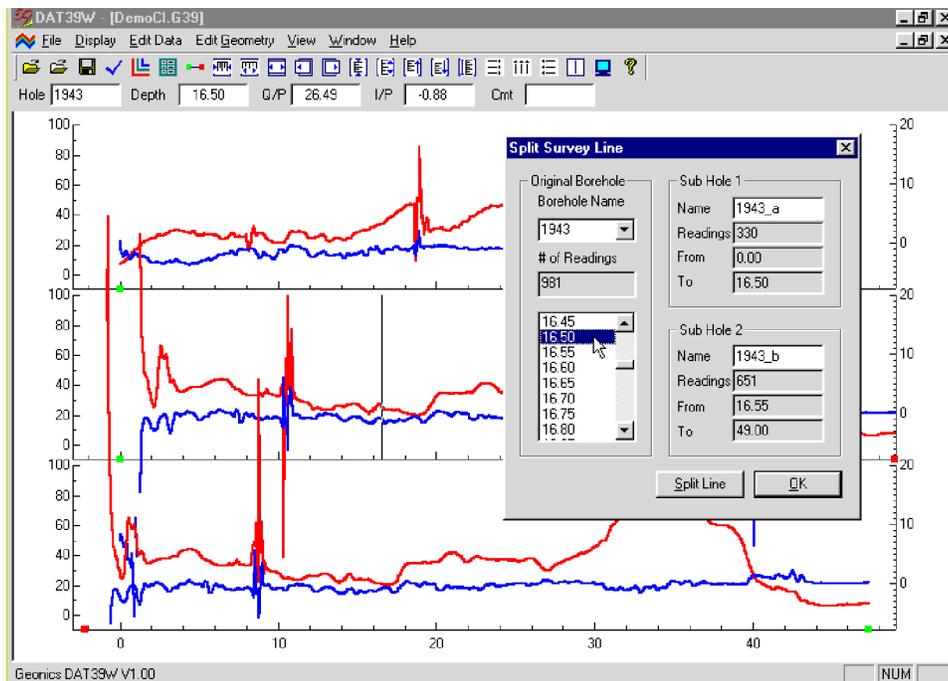


Figure 6.8: Profile View display before borehole split

After the station is selected you can apply the split by clicking the **Split Borehole** button. The effect is shown in Figure 6.9.

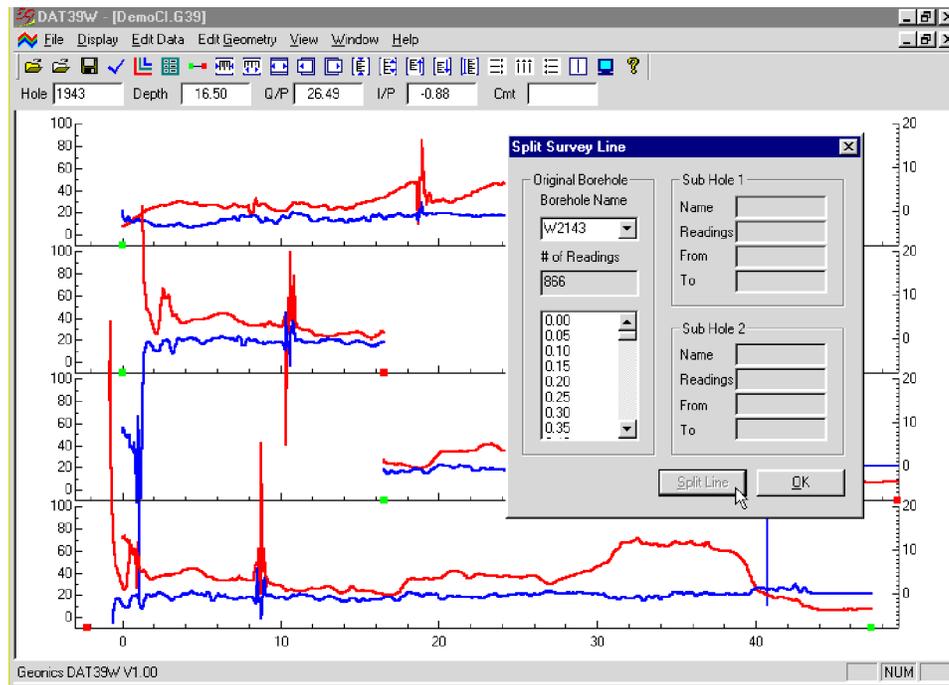


Figure 6.9: Graphical display after borehole split

The new boreholes are named by using the original name with an added underscore and an alphabetic character in sequence. You can rename later using the Select Borehole option.

To exit click the **OK** button, and the Split Borehole window will close, applying all changes.

6.4 Quick Borehole Adjustment

The Edit Geometry menu provides a tool for quick adjustments of start and end depth stations (Figure 6.10).

This is:



Quick Adjust Borehole

The accuracy of the “quick” repositioning of stations is relatively limited compared to the **Set Borehole Limits** option (described in section 6.1) due to the limited resolution of the screen. They are very useful, however, for the initial adjustments of boreholes geometry.

To access this tool select **Edit Geometry | Quick Adjust Borehole** in the menu (Figure 6.10), or click the button , on the tool bar.

Quick Adjust Borehole

Select **Quick Adjust Borehole** in the Geometry menu or click the  button on the tool bar. This option allows adjustment of the start and end stations of each borehole. To reposition any borehole move the mouse cursor to the start or end station of the borehole, marked by a small green (start) or red (end) circle. Press and hold the left mouse button, and drag the station to the desired position. The positions of all points on the borehole will be changed according to the following rules:

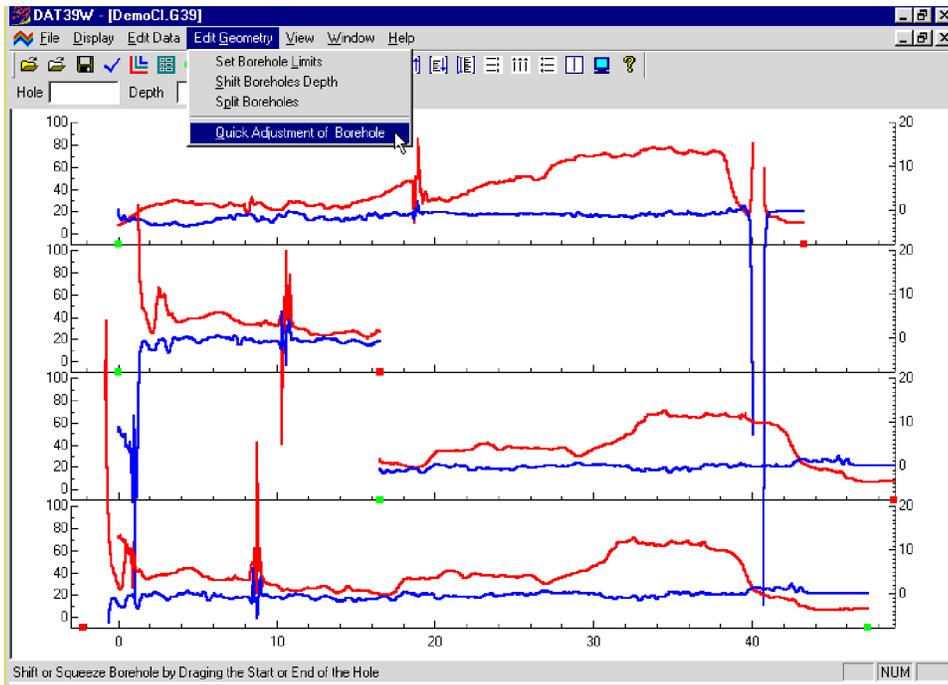


Figure 6.19: DAT39W Edit Geometry menu

If the start station is repositioned, the entire borehole will be shifted without changing the length of the borehole. The end station will move as well.

If the end station is repositioned, the end station will move while the start station remains fixed. The length of the borehole and distance between stations (increment) will be changed (expanded or squeezed) accordingly.

APPENDIX A

A.1 The Data File in DAT39 (G39) Format

The first row the DAT39 data file contains name of the instrument, number of version, original name of file, and name of an operator (not used if file is created after editing).

The row started with **H** specifies beginning of the borehole, it is followed by the borehole name, and borehole parameters (two characters e.g. BD):

1st component (B - both, Q - Quad-phase, I - Inphase, S - magnetic susceptibility, G - gamma ray),

Both components means that data include conductivity (Quad-phase) and Inphase readings.

2nd direction (D - down, U - up).

Both components means that data include conductivity (Quad-phase) and Inphase readings.

The next field specifies station increment.

The following row starts with T and contains time and date of borehole creation.

Character C on the beginning of the row indicates field comment. In this case text of comment follows character C.

The first column contains station (depth) numbers.

If one component is recorded (Q, I, G), it is placed into following (second) column while the other columns (third) contains zeros. Conductivity data are always placed in the second column of numbers while Inphase readings are placed in the third column.

Any data (i.e. Quad-phase and Inphase) values 800000.000 indicate skipped station.

The DAT39 data file can be easily edited using any text editor, however care should be taken on preserving proper placement of all parameters.

A.2 Example of EM39 File in DAT39 Format

```
EM39 V3.20 L39 TEST
H 06      BD  0.2      Hole 06 starts
T 15:31:32 10/11/2002
  0.000    20.100    3.396
C WELL-6      comment
  0.200    20.200    3.203
  0.400    20.200    3.047
  0.600    20.200    2.842
  0.800    20.400    2.649
  1.000    20.620    2.432
  1.200    17.580    1.301
  1.400    17.580    1.276
  1.600    17.760    1.301
  1.800    17.640    1.301
  2.000    17.520    1.325
  2.200    17.580    1.361
  2.400    17.700    1.301
  2.600    17.700    1.337
  2.800    16.140    1.325
  3.000    16.140    1.337
  3.200    16.080    1.325
  3.400    16.920    1.337
  3.600    17.520    1.349
H 6      BU  0.2      start of new hole
T 15:43:32 10/11/2002
 10.000    20.580    3.047
   9.800    20.680    3.107
   9.600    20.620    3.083
   9.400    20.880    3.131
   9.200    20.880    3.107
   9.000    21.040    3.071
   8.800    21.000    2.986
.....
```


A.4 Table of Multipliers for Gain

EM39 (Conductivity and Inphase)

Scale	Digital Representation	Multiplication Factor	
		Quad-phase [mS/m]	Inphase [ppt] (if single component)
3000	0	10000	500
1000	-1	1000	500
300	-2	1000	150
100	-3	100	50
30	-4	100	15

EM39 (Gamma-ray)

Scale	Digital Representation	Multiplication Factor Gamma-ray [counts/s]
1000	-3, -4	400
300	-2	120
100	-3	40

EM39 (Magnetic Susceptibility)

One scale in ppt

Channel 1 (1st column in data file) - multiplication factor is **300**

Channel 2 (2nd column in data file) - multiplication factor is **30**

If absolute value of digital reading is larger than 128, it indicates UP direction.

Example

Value of digital reading is **253**

$253 > 128$ ==> direction DOWN

$255 - 253 = 2$

If Both or Quad-phase (conductivity) component was collected this indicates scale 300, therefore according to above table, the reading in the first column of data has to be multiplied by 1000.

The reading in the second column (Inphase) will be multiplied by 100.