GEOEXPLORER DoReMi

Version 2.3.0

USER MANUAL

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SARA electronic instruments s.r.l.
Via Mercuri 4 – 06129
PERUGIA – ITALY
Phone +39 075 5051014
Fax + 39 075 5006315
email: info@sara.pg.it
URL: www.sara.pg.it

Warning! Some software features may be different compared to this manual but the basics remain the same.
If you are in trouble understanding the software's operations feel free to ask for help to our engineers.

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Warning!

This software is provided for business and research purposes. It must be used in a computer system in conjunction with suitable electronic devices, by qualified personnel in compliance with applicable laws regarding construction, civil engineering, mechanics and electronics.

The use of the software to record geophysical data and/or evaluate risk levels and mechanical properties of the soils is reserved to qualified and specialized personnel such as doctors in engineering, architecture and physics who have attended specialization courses in geophysics and structural analysis.

The developer of GEOEXPLORER DoReMi assumes no responsibility for any loss, injury or damage of any kind when the software is used in a context of vital importance or without the technical expertise needed to validate the obtained data.

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Table of contents

1 DoReMi seismograph overview.

The DoReMi looks quite different from many instruments currently on the market. It has been designed and constructed to be light, practical and flexible in its usage. Compared to the other seismographs, the DoReMi is almost “invisible” because all (or almost) of its electronics are embedded along the cable, instead having a long cable carrying analogue signal for hundreds of meters, the DoReMi digitizes the signal “on site” very near to the geophones and transfers the data digitally to a computer.

As mentioned the seismograph is distributed with the channels along the seismic line. This has many advantages including a very important one regarding the possibility of replacing the various elements and their use in various configurations; but the most important is the dramatic improvement of the signal-to-noise ratio.

In the seismograph DoReMi, unlike the seismographs integrated into a single box where the channel selection is wired, each element (or channel) corresponds to an address that can range from 1 to N, the sequence is usually progressive, but the system will work even if installed using an arbitrary sequence.

Obviously you must be aware of the precise location of each item to make sense of the acquisition.

Normally when you receive a new instrument all the channels are assigned in consecutive order with the serial number of the lowest set to channel 1. From now on we will refer to the address so as to **channel.**

As a user you can then work with your system-wide channels, giving them some common parameters and other independent parameters. A common parameter is the *sampling interval* and another it is the *recording time*, an independent parameter is the *gain* (often called sensitivity). Each channel can then be suitably programmed to have a reasonable gain, for example according to the distance which is from the shot.

The independence of the channels number allows you to set easily the system in many different configurations. Although in most cases you will use the channels in their progressive serial number and perhaps with some configuration of gain (for example, if the shot is at the beginning or at the end or in the middle of the survey line), the possibility to change the order of stringing or strings in its distribution and the ability to divide an N-channel system in K systems each consisting of N/K channels, make DoReMi an extremely flexible and practical system.

The software is dedicated to the GEOEXPLORER DoReMi management in all the ways in which it is used for seismic surveys, allowing you to set the acquisition parameters, to set the geometry of your survey, to do some elaboration and check the quality of your acquired data directly.

The GEOEXPLORER DoReMi software is designed to be user friendly and complete allowing you to work smoothly and quickly.

The DoReMi system can be used to investigate the ground with different techniques like MASW, SASW, REMI, refraction, reflection, down-hole, cross-hole and so on.

DoReMi eliminates:

- Costly, analog cables.
- Expensive connectors.
- Noise at 50 or 60 Hz.
- Massive use of filtering.
- Heavy battery packs and instrument cases.
- The need of have *a number* of cables for *each number* of different spacings.

Actually is possible to have the DoReMi seismograph in two different versions: 16 bit and 24 bit.

The 24 bit is characterized by faster data download, wider band-pass, higher resolution, the 16 bit version still have higher resolution at high sampling rates (generally above 2000Hz).

The DoReMi seismograph offers:

- True 16 bit and 24 bit operation at all sampling frequencies.
- High dynamic range > 140 dB (for 24 bit system).

  (high dynamic range at high sampling rate)
- Excellent rejection of electrical noise without special filtering.
- The ability to use a single system for any geometry

  (with very few, if any, additional cables)
- The ability to split the system into two systems (or more) by simply adding a communication interface at an affordable price.
- Allow variable geophone spacing with simple, economical extensions that you can even construct (and repair if needed) on your own using common four-pole XLR connectors.
- A lightweight system (even lighter than a standard seismic cable).
- A sampling range of 200 to 20000 samples per second for the 24 bit and to 50000 for the 16 bit.
- A virtually universal system for all types of surveys: refraction, reflection, MASW, down-hole, cross-hole, microtremor, ESAC, SPAC, etc.
- Reduced downtime; no need to send the whole system back to factory for repair if just an element (channel) fails; send only the faulty channel in for repair, and continue using the rest.

1.1 DoReMi seismograph architecture.

Many customers are confused when they see the DoReMi seismograph for the first time because they *do not physically "see*" the seismograph. The old concept consists of a cable connected to the seismograph (typically a rather big case).

The DoReMi is different; its electronics are distributed along the cable (instrument chain), which connects to a PC through a small interface, the size of which is determined mostly by the dimensions of its internal battery pack. A small notebook or laptop PC manages and displays the signals.

Illustration 1.1

1.2 Main components.

When you receive our instrument you will find:

- A number of channels (it depends on how many you have ordered).
- At least one head unit (also called interface).
- One AC-to-DC wall power charger.
- One RS232-to-USB converter.
- Two terminations for instrument chain (already connected to the ends of the cable).
- USB key with all the software and driver you need.

Accessories:

- Geophones
- Vertical trigger geophone.
- Horizontal trigger geophone.
- Shooting plate (PVC or aluminum).
- Geophone holders.
- Power booster.
- Trigger cable extension.

1.3 Powering the DoReMi system.

The seismograph is powered by a rechargeable battery pack located inside the head unit; for instrument chains consisting of up to 24 channels, no additional external power supply is required. An additional power source is required for chains longer than 24 channels or for previous versions of the system. In these cases you need additional power sources called power boosters.

Although you could power the system with an external suitable power supply it is absolutely necessary you NEVER USE AN UNREGULATED POWER SUPPLY! Only use batteries or regulated power supplies. We can provide you with an excellent, high-quality power supply; do not risk damaging your seismograph by using an inappropriate power source.

1.4 The Unit Head.

The unit head or interface unit (see figure below) connects the instrument chain and the PC. It powers the instrument chain, manages communications with the PC and provides precise propagation of the trigger signal from the energy source (varies depending on type of survey conducted).

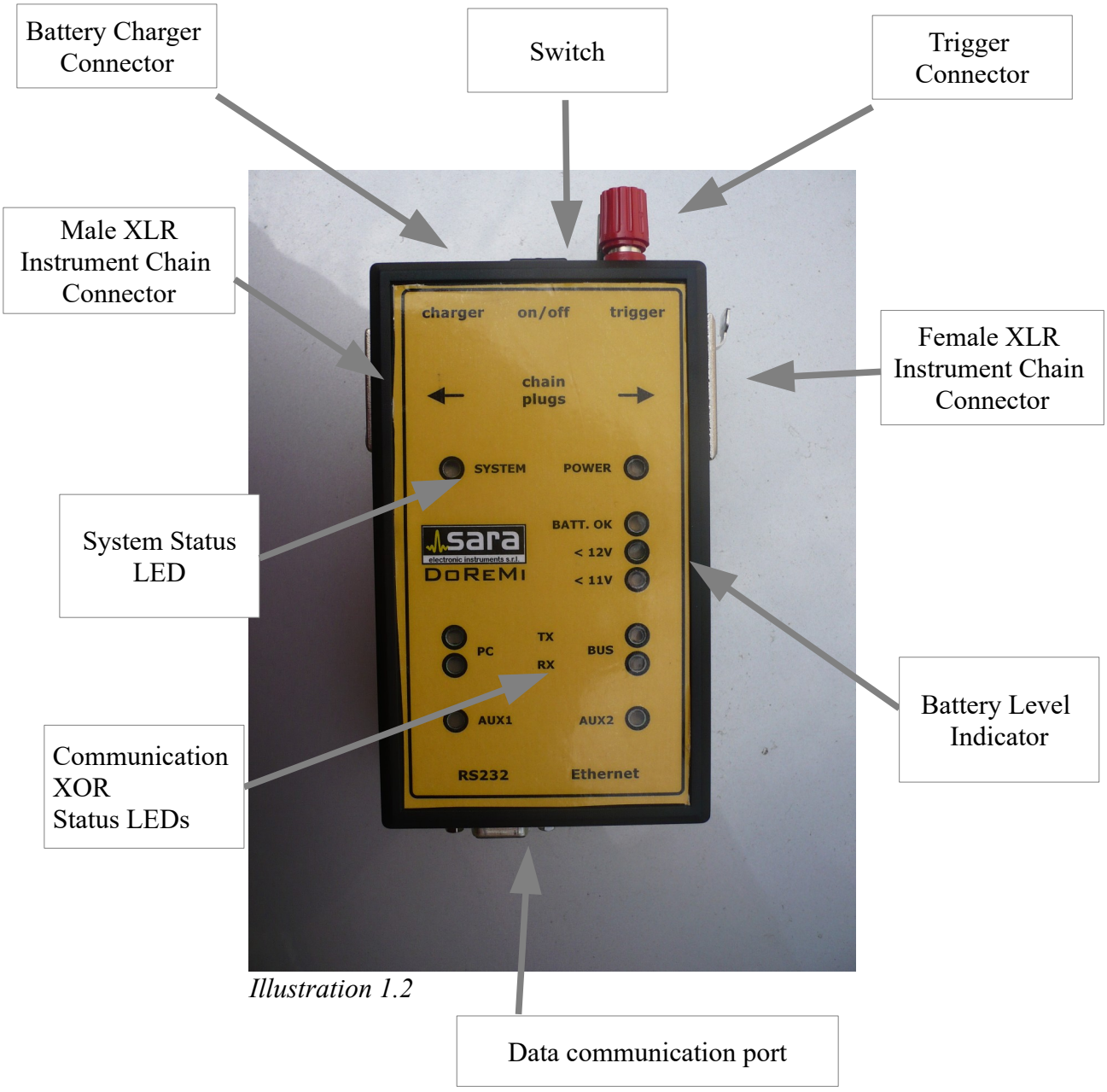


Illustration 1.2

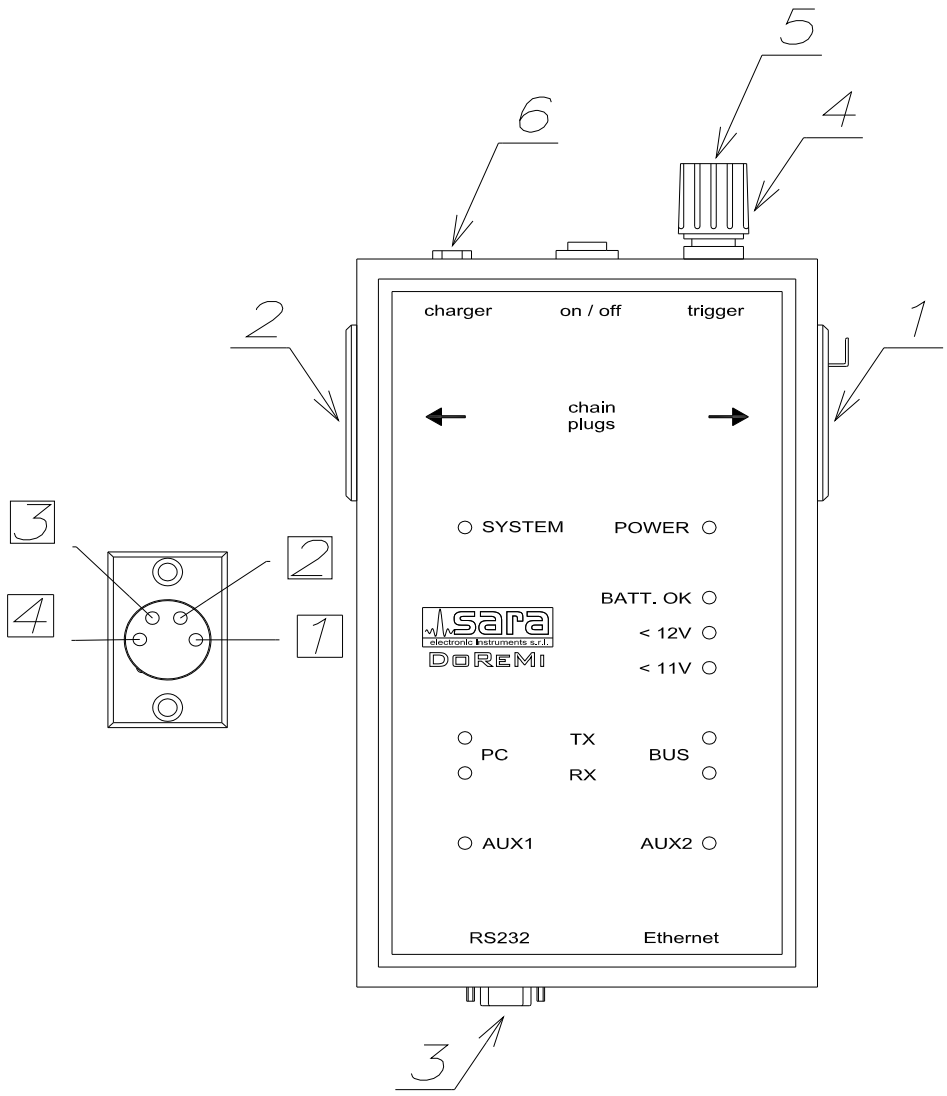


Illustration 1.3

Unit Head components:

1 Instrument Chain Data Connector (XLR Female).

2 Instrument Chain Data Connector (XLR Male).

3 Data Communications Connector (RS-232 Female).

4 Trigger Ground (Black).

5 Trigger Signal (Red).

6 Battery Charger Connector.

Instrumental Chain Data Connector Pinout:

1 Positive supply.

2 Tx/Rx –.

3 Tx/Rx +.

4 Negative supply.

1.5 The digitizer or deismographic channel.

There are two cables originating from the digitizer, one terminated with a male XLR connector and the other with a female XLR connector.

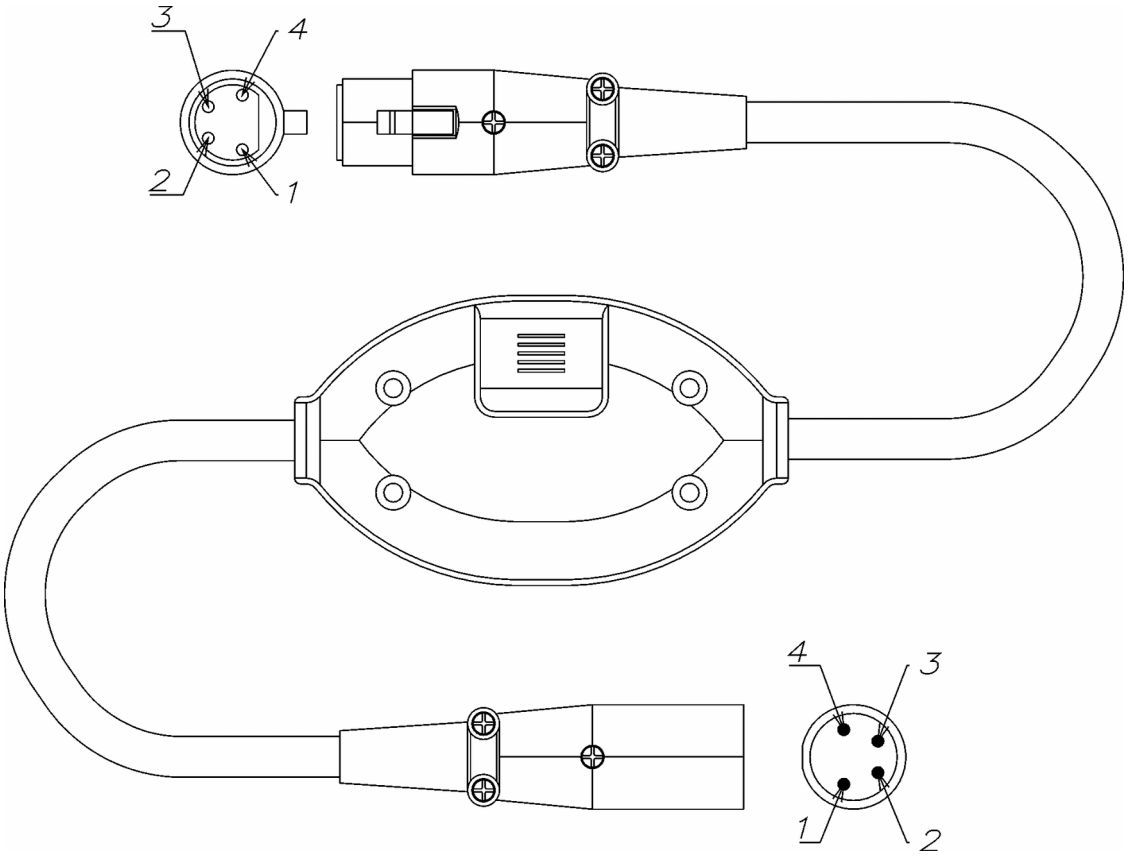


Illustration 1.4

Positive

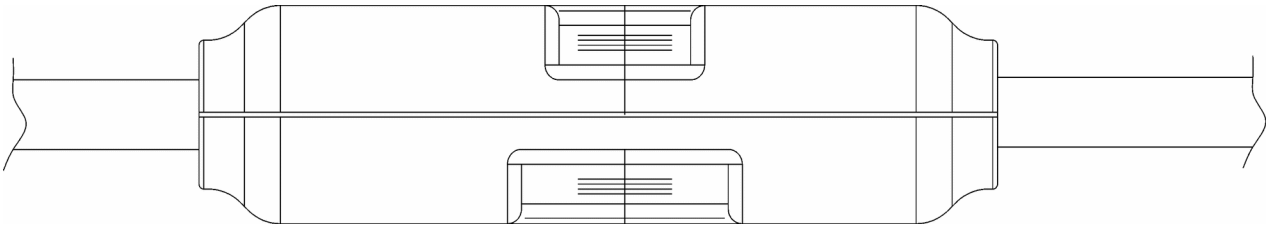


Illustration 1.5

Negative

1.6 Powering the seismograph On/Off.

Before powering on the interface unit, connect the instrument chain to it.

Before disconnecting the instrument chain, power off the interface unit.

When powering on the interface unit, the *Power* LED illuminates and the *System* LED flashes. If this does not happen, refer to the FAQ section (see chapter 4 FAQ page 105). Since the system is designed to operate in relatively harsh conditions, there is no specific power-down procedure to follow. Simply disconnect any external battery or power supply or toggle the power switch off the unit itself.

However, a general rule (valid for all electrical and electronic equipment) is to avoid manipulating the terminals or switches in a way that causes intermittent power cycling, sparks, etc. Doing so could damage your system and/or other equipment connected to the same line. It is good practice to wait 5 seconds between the connection and disconnection of power (and vice versa).

1.7 Electrical and operational safety requirements.

The instrument is designed to be used either with its internal batteries or with an external battery. NEVER CONNECT THE DEVICE TO THE ELECTRICAL MAINS. The power adapter is only to be used as a charger indoors, in a dry environment and with the instrument chain disconnected.

If using a power supply other than the one provided, make sure it is compliant with local electrical safety and protection regulations and prescribed by law. In the European Union, standard VAC is 240 Volts at 50 Hz and requires the use of circuit breakers with 30 mA differential break current (valid for construction sites, rural areas and autonomous systems powered by generator sets). We always recommend seeking assistance from an engineer qualified to install electrical systems in accordance with local regulations.

1.8 Lightning and surge protection.

We strongly discourage using the system in the rain, and especially in conditions favorable for lightning strikes it puts you and your equipment at risk!

If you have to deploy your instrument in a permanent installation, keep in mind that there are many ways to protect it from lightning damage. While almost nothing can withstand a direct lightning strike, there is a lot you can do to protect against power surges caused by lightning or other shocks. However, the cost is justifiable only for permanent installations.

Since the DoReMi system is not to be used in the rain nor in conditions favorable for lightning strikes, the device has no protection against such conditions. The same applies for devices connected to the DoReMi system or persons who may be present during its operation.

IT IS ALWAYS DANGEROUS to extend cables or conductors of any kind over long distances in open fields, and especially in mountainous areas subject to lightning strikes. WE THEREFORE RECOMMENDED THAT YOU DO NOT OPERATE THE SYSTEM IF THERE IS AN OBVIOUS OR EVEN SUSPECTED RISK OF LIGHTNING STRIKES.

1.9 Environmental precautions.

Since the DoReMi system is designed for outdoor use, it has a measure of temperature and humidity resistance and can withstand modest mechanical stress. However, it is not designed to be submerged in water or mud and should thus not be used in flooded soils or other wet conditions. Failure to observe these limitations will accelerate instrument wear. Furthermore, such geological conditions do not produce accurate results; saturated soil and rain beating down on the geophones invariably distort the measurements.

The spring connector contacts on the geophone cables and the XLR connectors on the channel module cables both provide good grip even in harsh environments. Be careful not to overdo it though the instrument should still be kept relatively clean when in use. If you suspect that water or moisture has infiltrated the connectors, we recommend drying them out with hot air (temperature below 100°C) and cleaning them with a dry cloth. Mere presence of water does not damage the contacts; electrical power together with the moisture causes electrolysis, which, in turn, corrodes the contacts. As a result, they become less efficient and eventually malfunction.

1.10 Cleaning the instrument chain.

Since the system is used on the ground, the instrument chain inevitably collects dust and sometimes mud. Wait until any dust, mud or dirt dries before cleaning the instrument, especially the geophone contacts. Once dried, remove the dust, dirt or mud with a dry cloth. To remove stubborn residue, use a wooden or plastic utensil with rounded edges.

If any element has been soiled by solvents or paint, stop the survey in progress and clean them immediately so as to avoid damage. Different contaminants require different cleaning methods. We generally recommend using water first as it can dilute most acids or solvents without causing further damage to the casing around the channel modules and the seismograph. Be sure to put gloves on and then use a dry cloth to absorb the substance.

Afterwards, clean the geophone contacts using a stiff, nylon bristle brush. If necessary, use a small amount of paint thinner or alcohol, then dry with a clean cloth.

Follow the same procedure to clean the various connectors between modules. Use care when cleaning connector contacts. Male connectors are relatively easy to clean with a nylon brush, and if needed, a bit of alcohol to remove any oxidation. Make sure to always keep female connectors free from any accumulation of soil, dust and mud. Clean them frequently so that the contacts do not expand; use thin-beaked tweezers and a cotton cloth soaked in alcohol. A dental micro-brush may also be useful. You can find these in most supermarkets.

The connector on the last module of the instrument chain is most prone to debris buildup. Always use the included protective cover.

1.11 Specifications.

The seismograph can be composed of a variable number of channels. Here is a summary of the main characteristics for a single channel:

No. of Bits:	16	24
A/D Converter Type	SAR	SIGMA DELTA
Converter Input Span	5 V	5 V
Signal to Noise Ratio @ 500 SPS, 27dB gain	96 dB	140 dB
Signal to Noise Ratio @ 5000 SPS, 27dB gain	94 dB	130 dB
Signal to Noise Ratio @ 20000 SPS, 27dB gain	92 dB	105 dB
Input Type:	Unipolar Differential	Unipolar Differential
Input Impedance:	> 100 kΩ	20 KΩ
Common Mode Rejection:	> 60 dB	> 60 dB
Maximum Sample Rate:	20000 Hz (latest version 50000Hz)	20000 Hz
Low Pass Filter:	200 Hz	400 Hz
High Pass Filter:	2 Hz	From DC
Maximum Sampling Lag Between Channels:	<30 ppm	<30 ppm
Maximum Error Between Trigger Channels:	1 ns	< 1 ns
Channel Memory:	64000 bytes	128000 bytes
Maximum Samples:	30000	40000
Sampling Rates:	200, 300, 400, 500, 1000, 1500, 2000, 3000, 4000, 5000, 6000, 8000, 10000, 20000, 25000, 30000 (40000 and 50000 latest version)	200, 300, 400, 500, 1000, 1500, 2000, 3000, 4000, 5000, 6000, 8000, 10000, 20000
Maximum Connectable Channels:	255	255
Power Consumption:	<0.3W per module (<30mA @12V)	<0.3W per module (<30mA @12V)
Analog Input Protection:	+/-1.5 kV	+/-1.5 kV
Power Line Protection:	Battery reversal protection Fuse on head unit 18 V max over-voltage for 2 seconds	Battery reversal protection Fuse on head unit 18 V max over-voltage for 2 seconds
Communication line protection:	+/- 1.5 kV	+/- 1.5 kV
Instrument max Chain Length without Additional Power Supply:	240 m (geophone spacing 5m)	240 m (geophone spacing 5m)
Instrument Chain Max Length with Additional Power Supply:	1000 m	1000 m
Recommended Geophones:	4.5 Hz High Gain 80 V/m/s	4.5 Hz High Gain 80 V/m/s
Diagnosis:	Memory Status (OK / Fault)	Memory Status (OK / Vdc)
Baud Rate:	115200 baud (230400 lastest version), N, 8,1	115200/230400, N, 8,1

Notice! Specifications are always subject to change without prior notice.

1.12 Length of instrument chains and application of additional power supplies.

When increment the number of channel you must compensate for voltage drop along the line. When additional power is applied appropriately, even instrument chains over 1000 m long will perform properly. Simply adhere to the following specifications:

		Cable length (m)	
		5	10
Number of Channels	6	OK	OK
	12	OK	OK
	18	OK	OK
	24	OK	POWER BOOSTER
	30	POWER BOOSTER	POWER BOOSTER
	36	POWER BOOSTER	POWER BOOSTER
	42	POWER BOOSTER	2 POWER BOOSTER
	48	POWER BOOSTER	2 POWER BOOSTER

Please Note: we recommend after the 24th channel to use the Power Booster; every 12 channel is a good idea to have and use one. This recommendation is valid for the standard cable length of 5 m.

2 GeoExplorer DoReMi software introduction.

GeoExplorer DoReMi is an application software used only with the DoReMi data acquisition systems produced by SARA electronic instruments s.r.l.

This section provides no guidance on how to proceed with the execution of seismic surveys, but rather is a reference guide to the system control and data acquisition.

DoReMi software has been developed for Windows PC and is therefore compatible with all operating systems Microsoft Windows 32 and 64 bit: Win98, WinMe, NT, 2000, XP, Vista, Windows 7 and Window 10.

> *Please Note: Compatibility with Windows Vista is not guaranteed, there is no development or testing for this operating system. Windows 7 is fully supported, at the moment we did not encounter any problems using the GeoExplorer DoReMi software. Compatibility with any Windows on virtual machine is not guaranteed, there is no development or testing for this configuration.*

2.1 System requirements.

DoReMi software requires to work with the PC a Microsoft Windows operating system. The requirements for RAM, processor and Hard Disk space are not demanding but it is important to take into account the needs of the operating system itself.

2.2 Head unit.

The Head Unit communicates with the PC by a classic RS232 serial port. The majority of personal computers have none; the DoReMi system is then provided with a USB-RS232 adapter which has been successfully tested.

On request you can have a Head Unit with Ethernet connectivity. This solution enables the simultaneous connection of multiple lines DoReMi also spread over considerable distances.

On the main page of the Suite GeoExplorer, is possible, by using the feature *Install USB-Serial converter driver*, from the *Tools* menu, install the driver.

At the first Suite installation, the driver will be automatically installed.

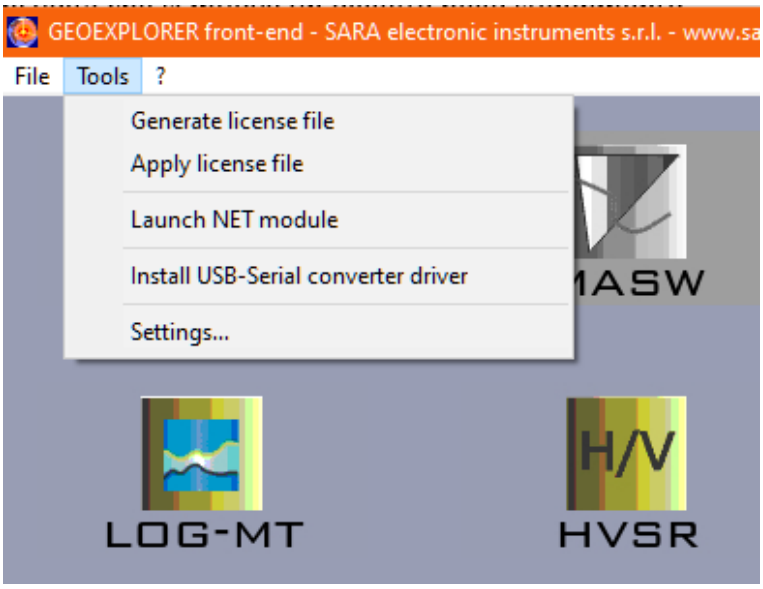


Illustration 2.1

2.3 Remote data transmission.

Since 1.4.4 GeoExplorer suite version we added the SEISMONET features from the SEISMOWIN suite.

These feature allows to send the data remotely since the PC is connected to internet with different protocols:

- Periodic data download and upload with FTP server
- Data upload by email after the data recording

Some examples:

- Every 10 min the software upload the data from the local folder to the server
- Periodically is possible to download the files from the server and delete them from the server
- When the software record a file and save it in the work folder is possible to monitor this folder and send the new file by email, moving the recorded file to another folder.

An interesting feature of the software is that it shows in real time all the operations it is carrying out, also giving the possibility to act, in some specific cases, and interrupt any unwanted action.

For more details refer to the software manual in the SEISMOWIN suite.

2.4 Installation.

If your PC has a serial port is recommended to use that port instead of the USB adapter.

If your PC has no serial port is needed to install the USB adapter BEFORE the software.

To install the adapter you must to open the USB flash driver, given with the instrument, and in the folder “SOFTWARE” you will find the folder “RS232_USB_DRIVERS” where are the USB-RS232 driver or download it from our web site www.sara.pg.it, section services – download driver. Launch the installer and AFTER the ending of the installation you can connect the adapter to the PC.

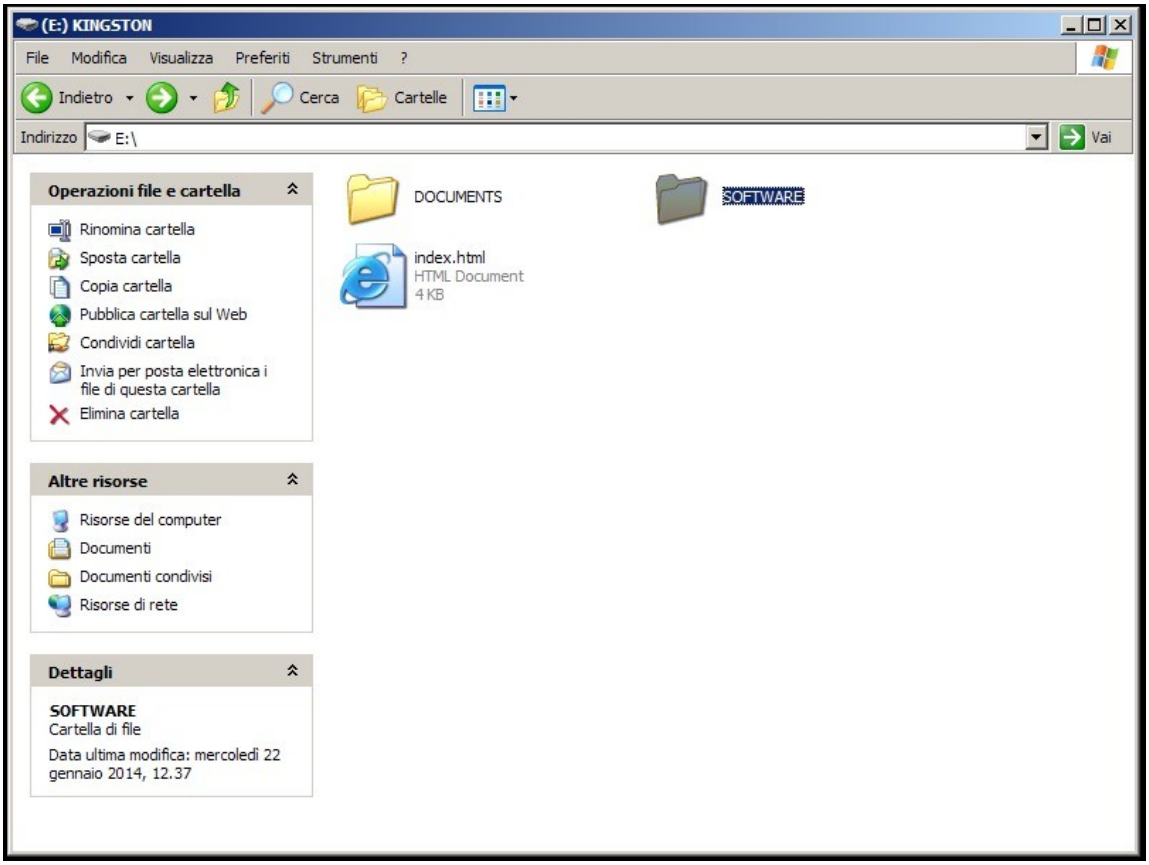


Illustration 2.2

In general it should be noted that the USB-RS232 adapters are used to configure the serial port with a port arbitrary identifier COMx for example COM5 and COM7 or any other number between 1 and 64.

> *Please Note: It is important to know that, often any USB port (especially for the best PC) is headed to its own USB controller and thus engaging the adapter on a port different from the previous operating system to require you to reinstall the drivers to the new position. This is neither bad nor good, it is important to bear this in mind, however, given that every time you use the adapter to a different USB port, it will be seen by the operating system as a different COM port and it should be taken into account for the correct software operation of the seismograph. Is recommended that the seismograph is used always with the same USB port, this will avoid confusion.*

After installing the driver for the USB-RS232 proceed with the installation of the suite GEOEXPLORER. Inside the "SOFTWARE" folder you will find the "GEOEXPLORER" folder, or download it from our website www.sara.pg.it section products-software. By double-clicking on the "GEOEXPLORER.MSI" you will start the installation process. Unless other instructions given by the manufacturer or your dealer can follow the proposals for the installation.

2.5 Launching the program.

After the installation, the GEOEXPLORER icon will appear on your desktop and the GEOEXPLORER folder will appear on your Program menu and on C:\GEOEXPLORER.

By double clicking on the desktop icon or by clicking on the start icon you will open the suite. On the main windows you will see the DoReMi icon on the top left.

Illustration 2.3

2.6 *The main window overview.*

This main window allows you to set both the software and hardware parameters, contains the command buttons of the testing, acquisition and data display.

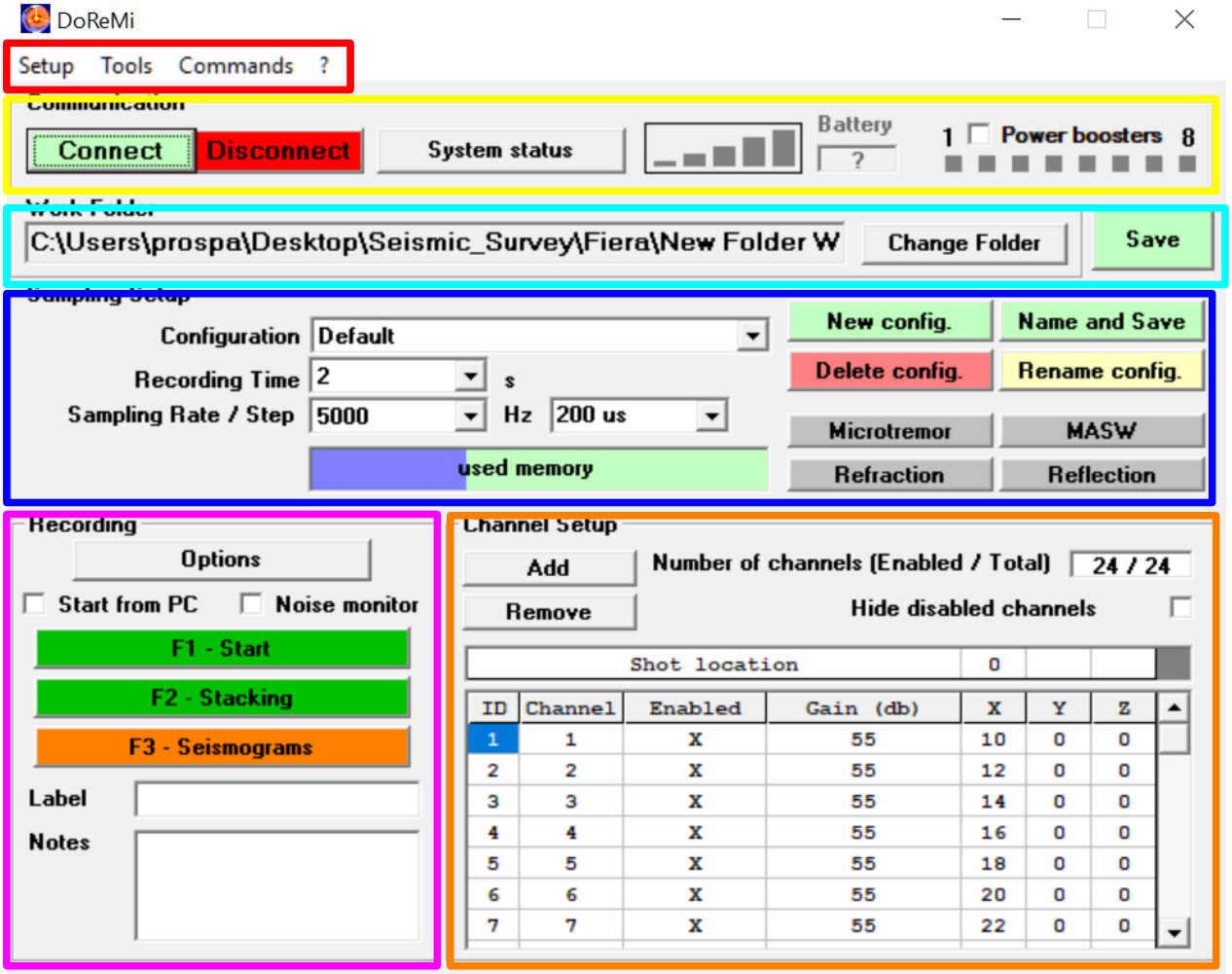


Illustration 2.4

3.1 *Communication, Firmware, Battery and Boosters.*

This frame shows the communication status, the firmware version, the battery level and allows you to enable and check the status of the Power Boosters (yellow box).

3.2 Work folder.

This frame shows and allows to configure the main folder, where the data will be stored (light blue box).

3.3 Sampling setup.

This frame allows the user to set all the acquisition parameters of the survey and to create/save and delete new configurations (blue box).

Please note: when the configuration is saved, will be stored even the geometrical configuration.

3.4 Recording.

This frame allows the user to start the acquisition, to write some notes, to do some operations during the acquisition, to visualize stored data, to do a quick check of the instrument and set the options for the recording (purple box).

3.5 Channel setup.

This frame allows the user to set the channel number manually, to set the geometry of the survey. For the 16 bit system it allows to set the gain of every channel (brown box).

3.6 *Menu bar.*

The Menu bar contains all the features and the GeoExplorer DoReMi modules (red box).

3 GeoExplorer DoReMi Software

We choose to start the software description starting from: *2) Communication, Firmware, Battery and Boosters*, because the Menu bar contains some technical features that need to be explained after the main features.

3.1 Communication, Firmware, Battery and Boosters.

In this part of the main window is possible to connect and disconnect the DoReMi to the computer, to check the battery level with the icon and the value of the voltage and to enable the Power Booster.

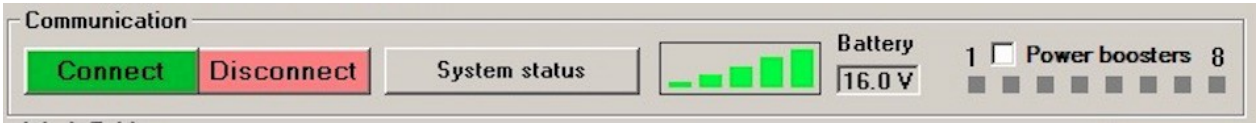


Illustration 3.1

3.1.1 Power booster.

With this feature is possible to enable up to 8 Power Boosters.

3.1.2 System status.

In this window is possible to check the battery level (Voltage column), temperature and version of every power booster, unit head and channel.

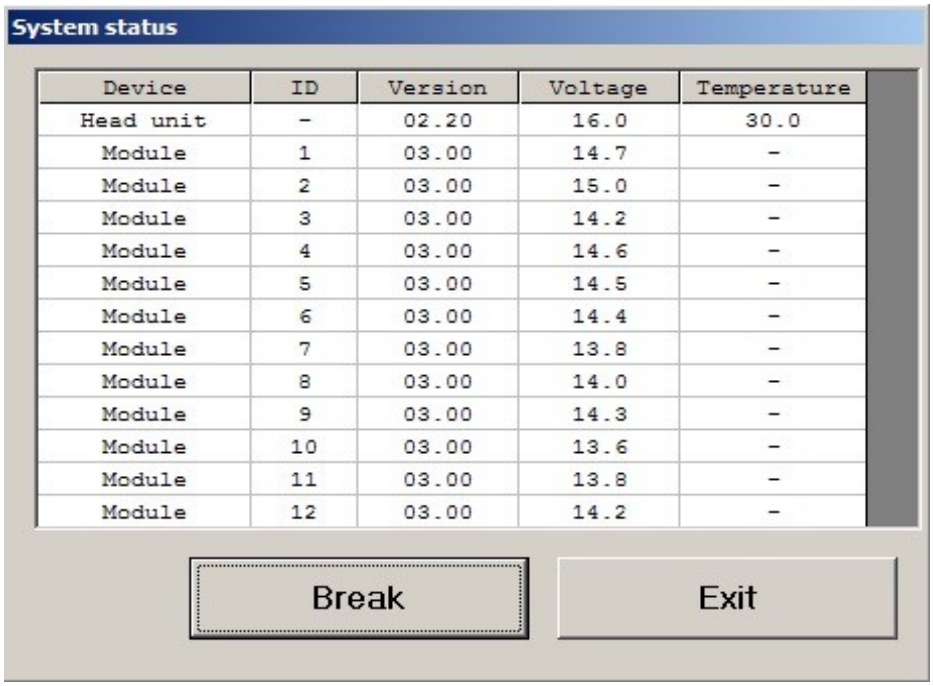


Illustration 3.2

3.1.3 Connect and Disconnect.

Connect.

With this button is possible to connect the instrument with the computer.

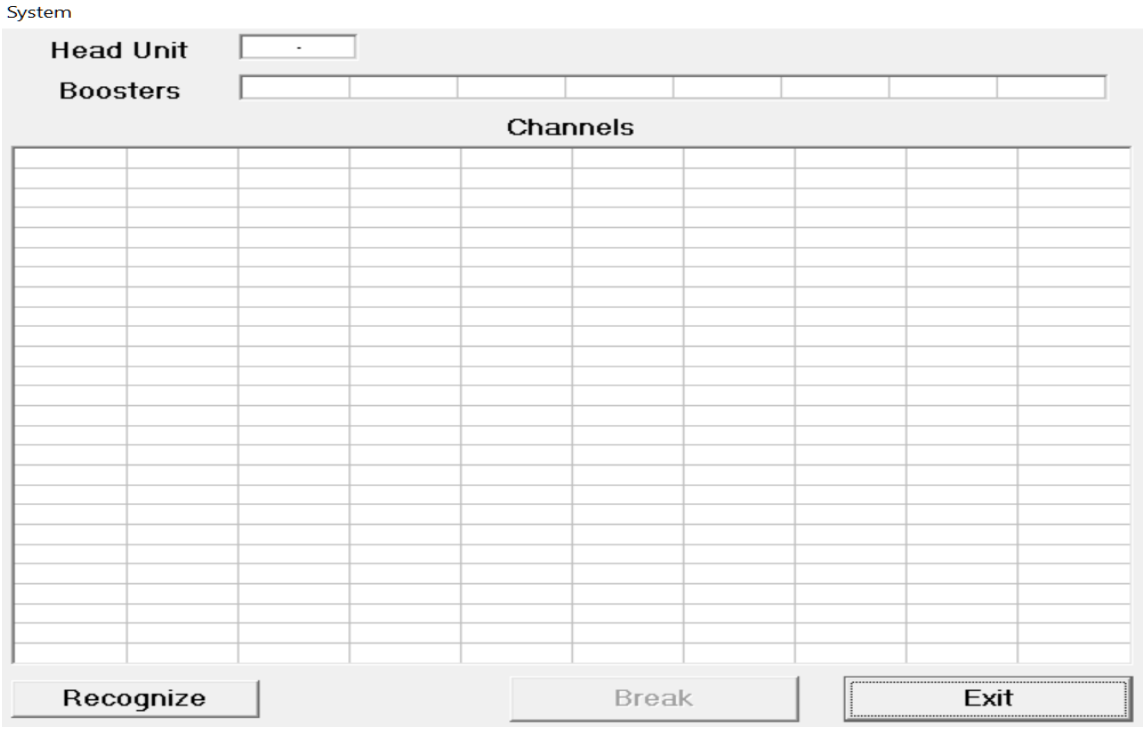


Illustration 3.3

> *Please Note: the software will try to connect the instrument every time you launch the application if you do not have disabled the automatic port comm search (see chapter 3.6.1.2 Instrument. page 46).*

This window allows to check the Head Unit version and Booster version if connected and switched on, and the channel version and ID.

With the button *Recognize* the DoReMi software will check all the channels and when is clicked *Break* will store this information. That helps avoiding to check always all the channel at every connection. That means the software after the first connection will check always the last system you have connected, recognized and stored. The button *Exit* will close the this window.

> *Please Note: the first time you connect the DoReMi seismographer to the GeoExplorer DoReMi, the software has stored as default 1 channel, so it is MANDATORY to Recognize the channel of your system. Every time you change the channel connected is MANDATORY to Recognize the system.*

Please Note: this window will open all the time you start an acquisition if you have not enabled the advanced mode. In this case if you have a booster or the interface under the 12V the software will open the warning pop up. To disable the advanced mode read the chapter 3.6.1.2 Instrument. page 46.

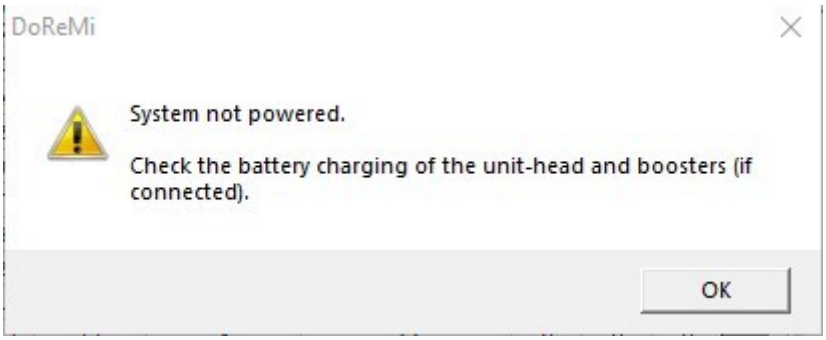


Illustration 3.4

Disconnect.

Clicking on it you will disconnect the instrument form the computer.

3.2 Work folder.

The *Work Folder* indicates where the data will be stored. The figure below shows a default work folder:

C:\Documents and Settings\Administrator\Desktop\Seismic_Data

Illustration 3.5

This feature allows the program to separate and tidy the work or acquisitions carried out in different place, day in and/or different conditions.

When the program starts, the last working folder is used is set as the current working directory.

Please note: also the parameters of serial port configuration are set as the last use.

3.2.1 Change folder and create a new folder.

Opens the *Work Folder* window that allows you to change the working folder.

Create new Folder button allows you to create a new folder inside the selected folder on the list.

The *OK* button confirms the displayed settings.

The *Cancel* button cancels the settings without restoring the last.

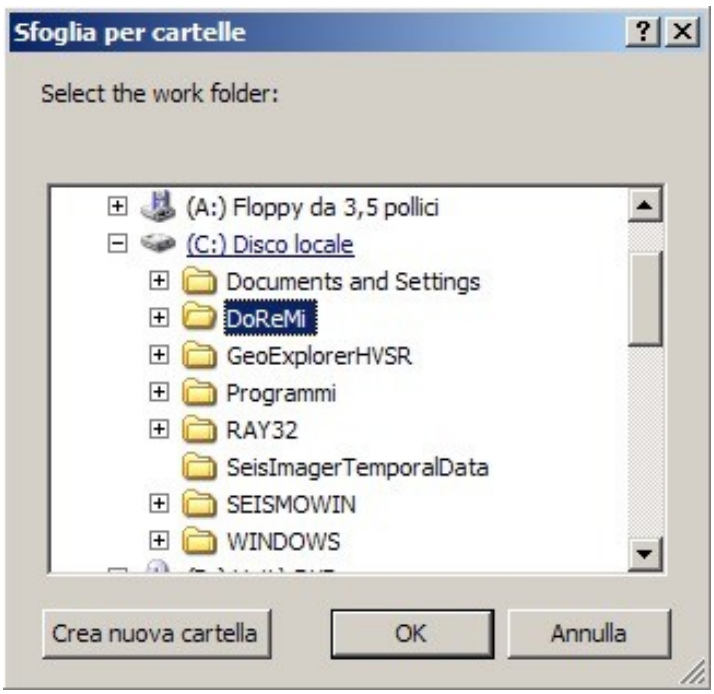


Illustration 3.6

3.3 Sampling setup.

Allows you to select the current configuration of your survey. You can create as many configurations you want.

Each configuration set their values and their settings, such as length and frequency of sampling, automatic gain, removal of DC component, number of Channels, single Channel parameters (Gain, coordinates X-Y-Z, Enabled).

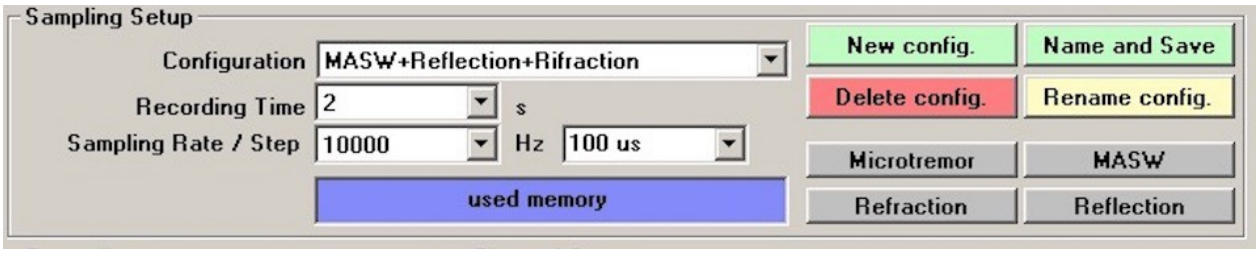


Illustration 3.7

This feature of the program can be used to quickly change the parameters of your survey.

Illustration 3.8

3.3.1 New configuration (New config.).

Allows you to create a new configuration.

The current parameters (SPS / Step; Recording Time / Delay; Channels and geometry; Gain) are saved on the current configuration and asks for the name of the new configuration.

Illustration 3.9

3.3.2 Delete configuration (Delete config.).

Allows you to delete the current configuration, after asking for confirmation.

3.3.3 Rename configuration (Rename config.)

Allows you to change the name of the current configuration.

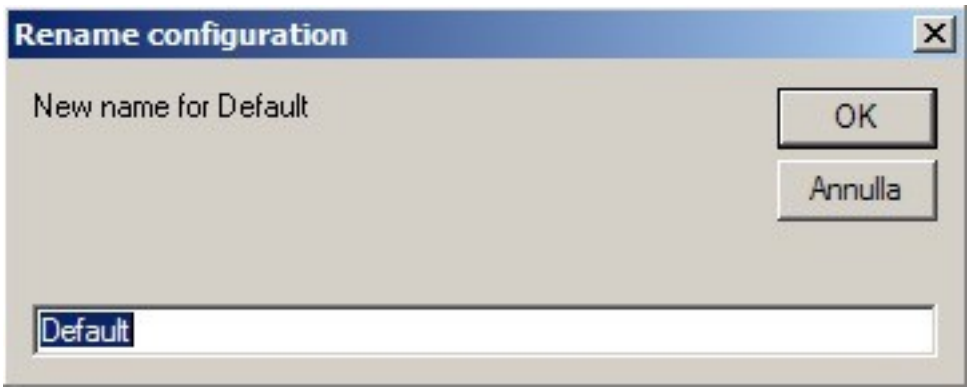


Illustration 3.10

3.3.4 Name and save.

Allows to change the name of your configuration and to save it directly.

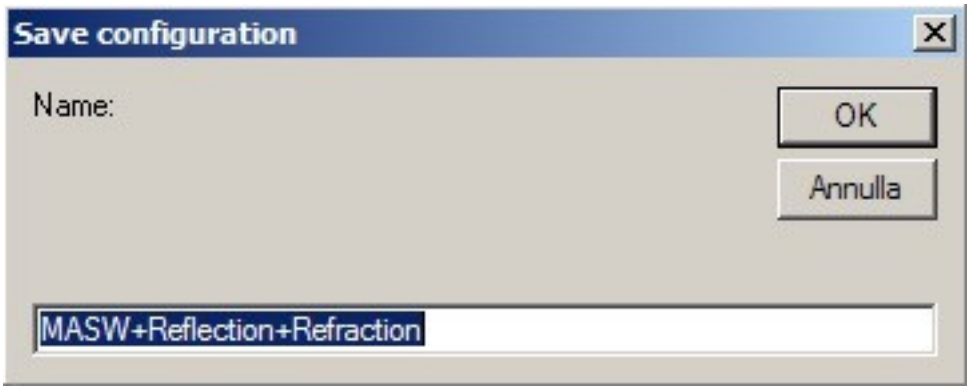


Illustration 3.11

3.3.5

Save.

Save the current settings and geometry selected.

3.3.6 Recording time.

Allows to choose the recording length in second for every enabled Channel.

Select recording time from the following record lengths (s): 0.1, 0.15, 0.2, 0.25, 0.3, 0.4, 0.5, 1, 1.5, 2, 3, 4, 5, 6, 10, 15, 20, 30, 40, 50, 60, 90, 120, 150.

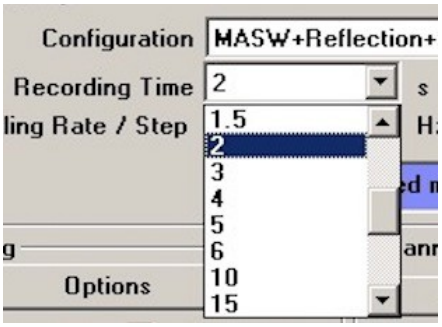


Illustration 3.12

3.3.7 Sampling rate and Sampling step.

This configuration can be made independently using either the control which is a reciprocal of the other. So it is possible to set the number of samples per second (sampling rate; Hz) or the sampling period of acquisition (sampling step; ms or us).

The sample rates selectable are: 200, 300, 400, 500, 1000, 1500, 2000, 3000, 4000, 5000, 6000, 8000, 10000, 20000,25000, 30000. for the latest 16bit version there is 40000 and 50000.

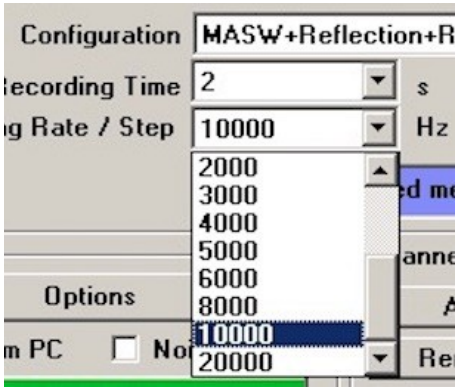


Illustration 3.13

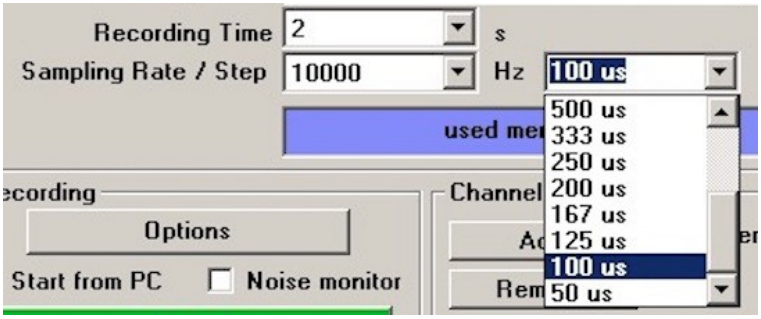


Illustration 3.14

The sampling periods are selectable in milliseconds (m)s, or decreasing, in microseconds (u)s and are as follows: 5ms, 3.33ms, 2.5ms, 2 ms, 1 ms, 667 us, 500 us, 333 us, 250 us, 200 us, 167 us, 125 us, 100 us, 50 us, 40us, 33.33us, 25us, 20us.

Please Note: In the SI (International System) to represent the unit of measurement of time in seconds you should use the symbol "s " (lowercase). In this case, to ease of reading and being obvious size shown, we used the symbol "S" (uppercase). (For reference, this is the SI unit of measurement of conductivity measured in Siemens.) Likewise, for typographical reasons we have represented the symbol "micro " with a "u" lowercase.

3.3.8 Microtremor, MASW, Refraction and Reflection buttons.

These buttons change your sampling setup with the parameters that are considered a standard for most of the expert for those kind of survey. Also the Gain is modified for each Channel with a value that is believed ideal.

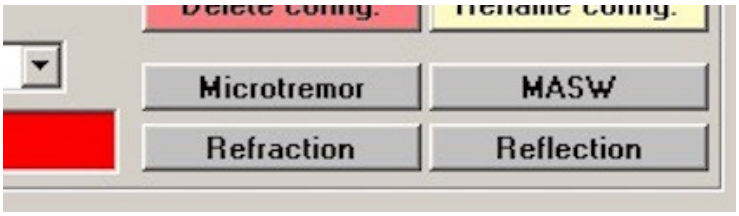


Illustration 3.15

Microtremor: Recording Time 60s; Sampling Rate 500Hz.

MASW: Recording Time 2s; Sampling Rate 1000Hz.

Refraction: Recording Time 0.25s; Sampling Rate 5000Hz.

Reflection: Recording Time 2s; Sampling Rate 5000Hz.

3.3.9 Memory bar

Each channel of DoReMi has 60Kb of memory in 16bit system and 128Kb in the 24bit system, for fast temporary storage of data. Memory usage is dependent on the recording time and the sampling rate. The bar indicates the used memory space in the Channels memory that would be used with the current values of length and frequency in comparison with the maximum memory available in the Channels themselves (60 KByte = 30000 samples and 128kb = 40000).

A RED bar will alert you if you use more than the memory capability; also the writing: OUT OF MEMORY, will appear in the red bar and the acquisition is inhibited.

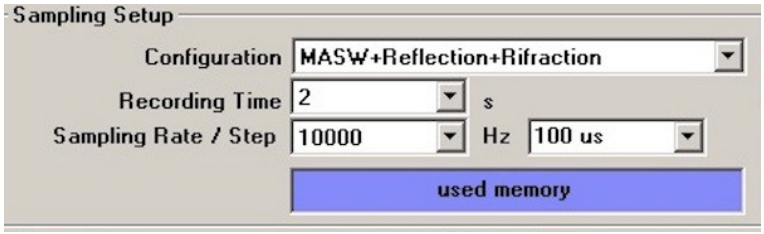


Illustration 3.16

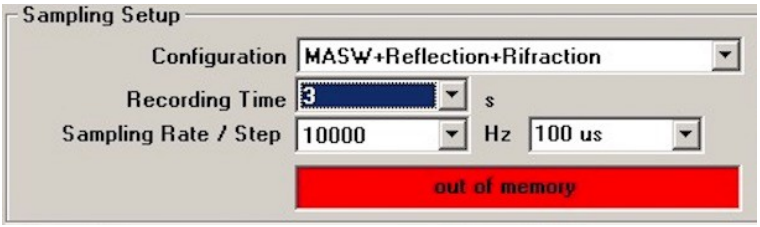


Illustration 3.17

3.4 Recording.

This portion of the main window allows you to write some notes during the survey and save them with the data, to apply different Gain function in relation of what survey you are performing, to apply digital filters to the signal, to start the acquisition, to stack the data and to visualize the recorded and stored data.

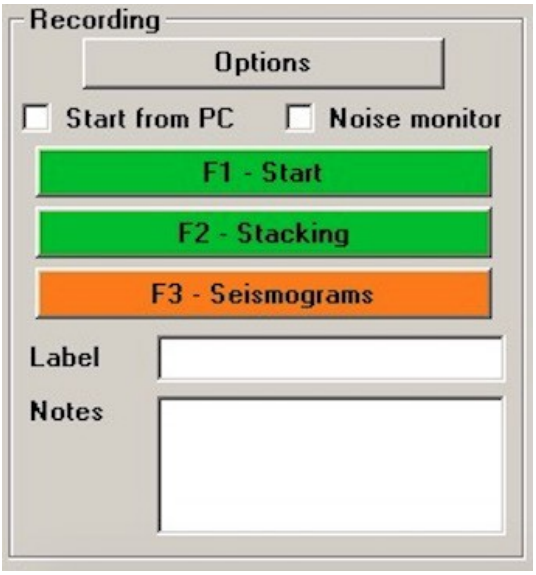


Illustration 3.18

Text Box: Label.

It allows you to insert one mnemonic label that will be created with the next recording. This label will be visible with the main file parameters in the F3 - Seismograms *File Management* window.

Text Box: Notes.

It may contain information that you would like to include in the data acquisition saved. Some basic information that could be included are: the contractor's work, the location of the acquisition, etc..

The information written in the notes can only be viewed in *Properties,* in the window *Seismograms; (*see chapter 3.8.3.1 Menu bar. page 81).

Please note: All the information you may need to write in Label and Notes box, MUST to be written BEFORE giving the command: F1 – Start.

Start from PC.

When performing a new survey the software arm all the enabled Channel, but to record the data it is necessary to trigger the instrument with a signal recorded by the starter geophone.

With this option enabled, the recording will start directly from the PC without the trigger of the starter geophone. This option is useful for all the passive survey, like ReMi.

Noise Monitor.

When performing a new survey the software can show in real time the signal of every Channel; that allow you to choose the right moment for the energization, and/or to check if one Channel has an unexpected behavior (e.g. the geophone is above a pipe, etc..).

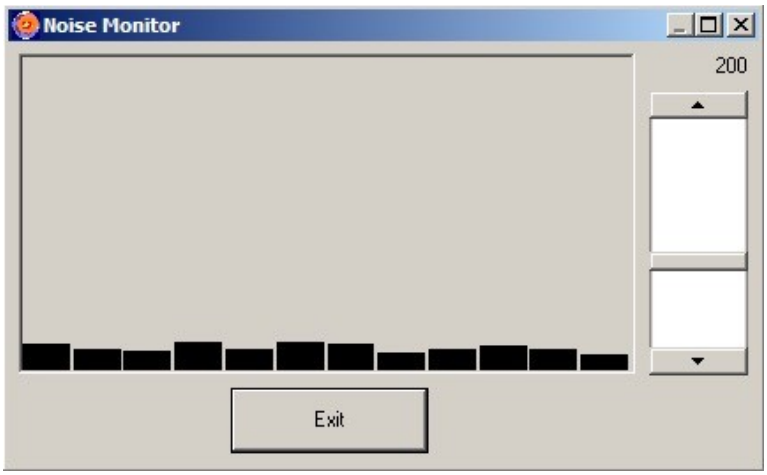


Illustration 3.19

3.4.1 Recording options.

This window allows you to set the Automatic Gain, the number of consecutive recording and the digital filters.

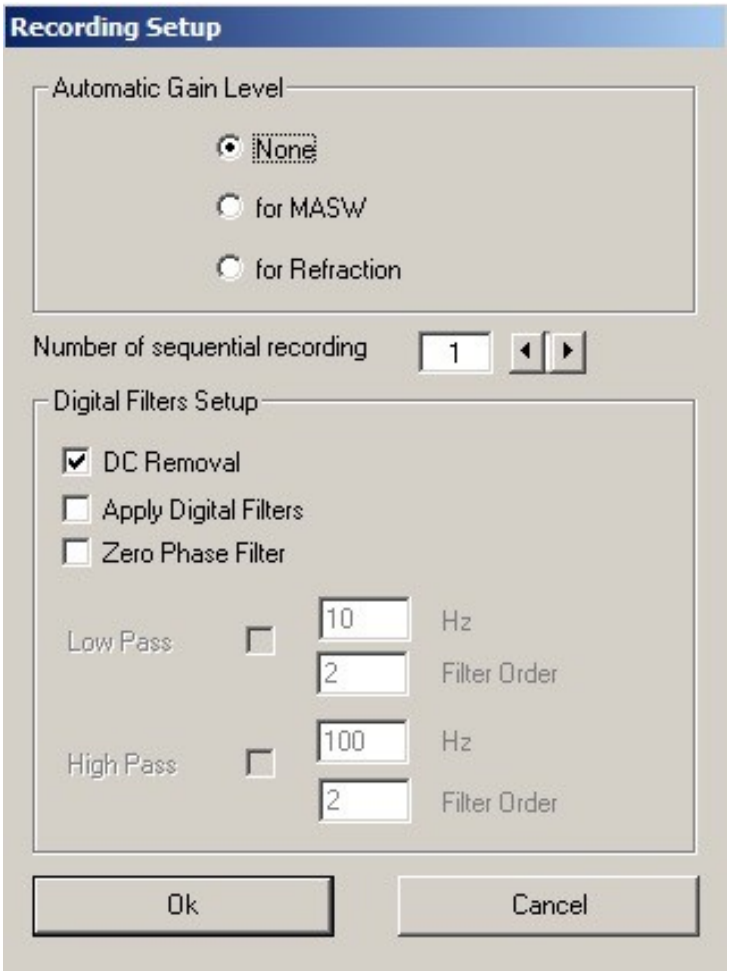


Illustration 3.20

Automatic Gain Level box sets the selection function of the gain.

Please Note: this feature works only with the 16 bit DoReMi instrument.

None option disables the function.

for MASW option enabled, the program will calculate the optimum gain function for the stringing and will apply this function on each channel.

for Refraction option enabled the program will calculate the optimum gain function for each channel and will apply this function on each channel.

This is the sequence of operations performed:

1. Setting the minimum gain on all channels.
2. Arming and waiting to start a recording.
3. Data acquisition.
4. Based on the minimum and maximum values recorded by each channel, the gain is calculated to exploit the full range of sample values (-32768 to +32767) without causing an outside staircase.
5. Setting the optimum gain for each channel.
6. Waiting to start a recording.
7. Data acquisition.
8. Data storage.

Please Note: The Automatic Gain Level option works only when you are scanning with the F1- Start (from the main window, keyboard or from Commands menu). For every acquisition with this option enabled the DoReMi will ALWAYS perform two acquisitions; the first (TEST) is calculated the optimum gain for each channel, the second acquisition is the stored data with the gain set with the fist energization.

Number of records

Indicates the number of subsequent acquisitions should be conducted with the Start command.

Please Note: the maximum amount of consecutive acquisition is 99.

Digital filter setup.

Allows the user to set some digital filter to the data before the storing; see chapter 3.7 Digital filters page 66.

Please Note: USE THIS FUNCTION CAREFULLY BECAUSE IT WILL DELETE INFORMATION WHILE RECORDING.

THE DATA WILL NOT CONTAIN THE INFORMATION FILTERED. WE RECOMMEND TO APPLY FILTER IN OFFICE ON A BACKUP OF THE RAW DAT.

3.4.2 F1 – Start.

Performs automatically and in sequence the commands: *Set the gain and arm*; *Request data* and *Seismograms.* It is possible to select some options inside *Recording Options*. Pressing F1 on the keyboard is equivalent of the *F1 – Start* clicking.

These 3 images show the three steps of *F1 – start:*

1. Save window (see chapter 3.6.1 Setup. page 45 to skip this step).

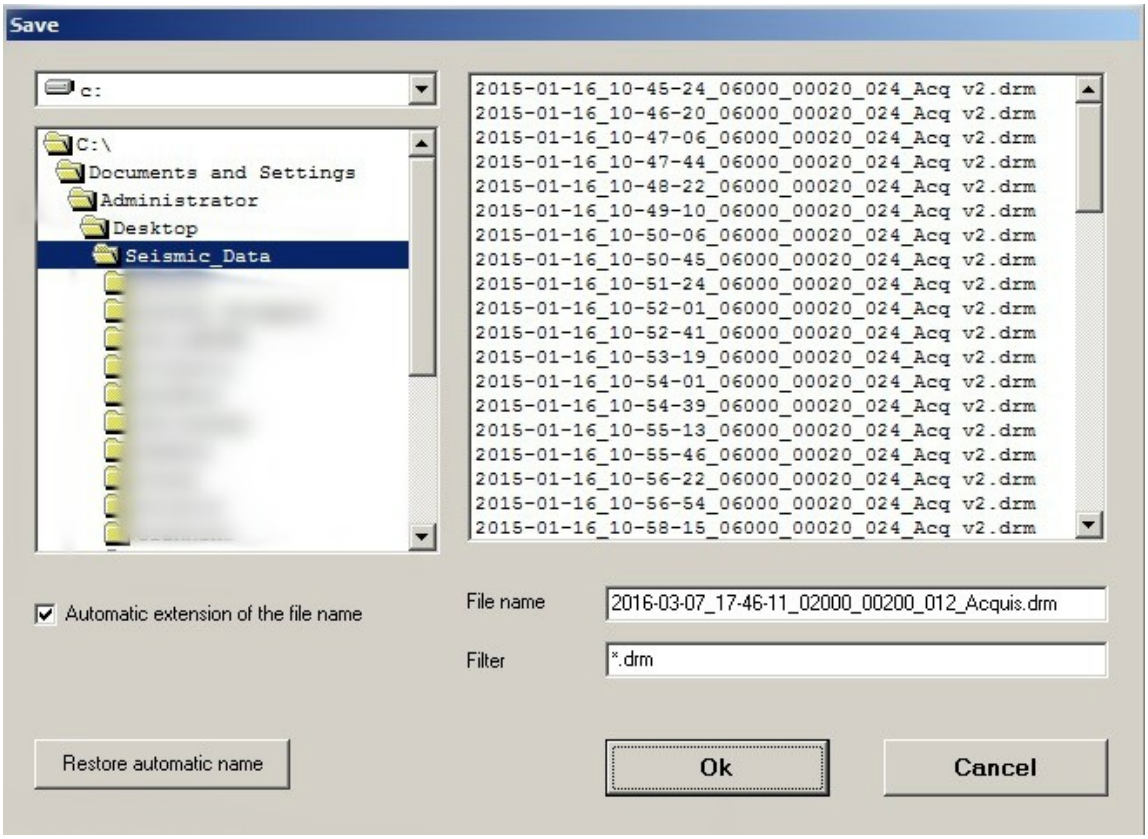


Illustration 3.21

2. Acquisition (*Set the gain and arm*; *Request data).*

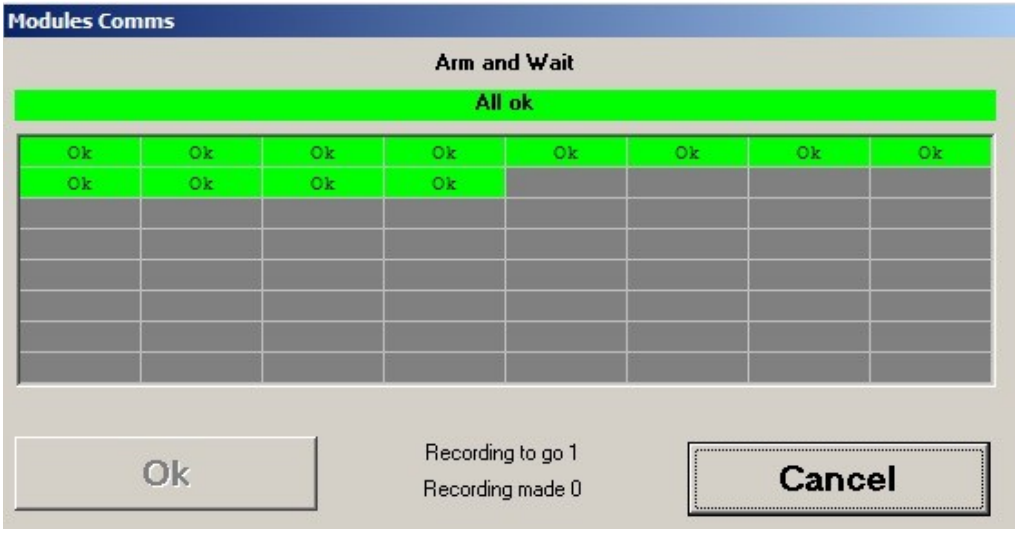


Illustration 3.22

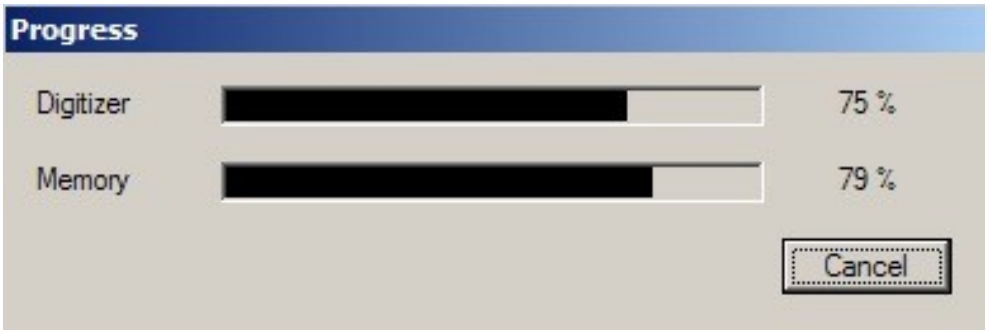


Illustration 3.23

Please Note: after the end of the acquisition download the instrument will stop to power the channels giving you the opportunity to change the position of the interface, without disconnect it form the PC and switch off it, and/or disconnect and connect channels like for the roll-a-long.

3. Data visualization *(Seismograms window).*

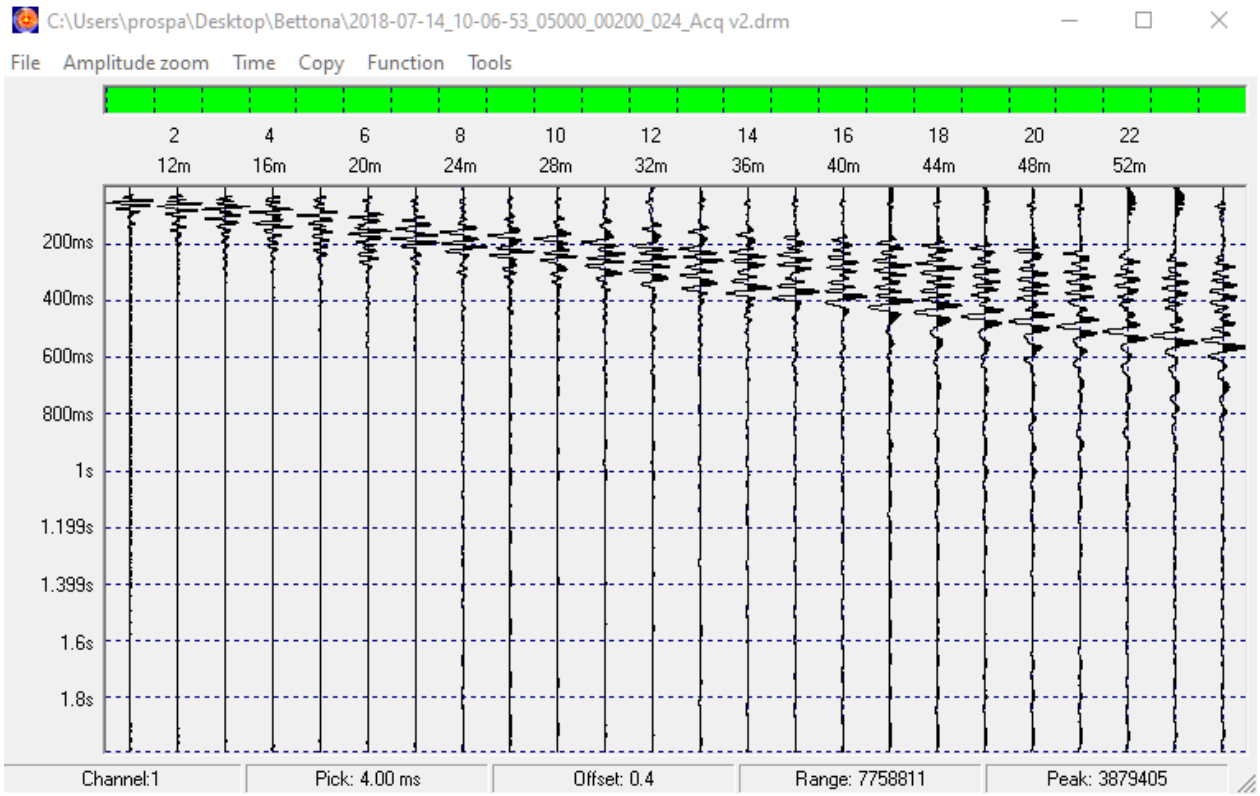


Illustration 3.24

3.4.3 F2 – Stacking.

Opens the stacking window where is possible to performs automatically the F1 – Start commands consecutively, allowing to acquire automatically N° shots for the stacking, by clicking on the button Start recording.
Pressing F2 on the keyboard is equivalent of the *F2 – Stacking* clicking.

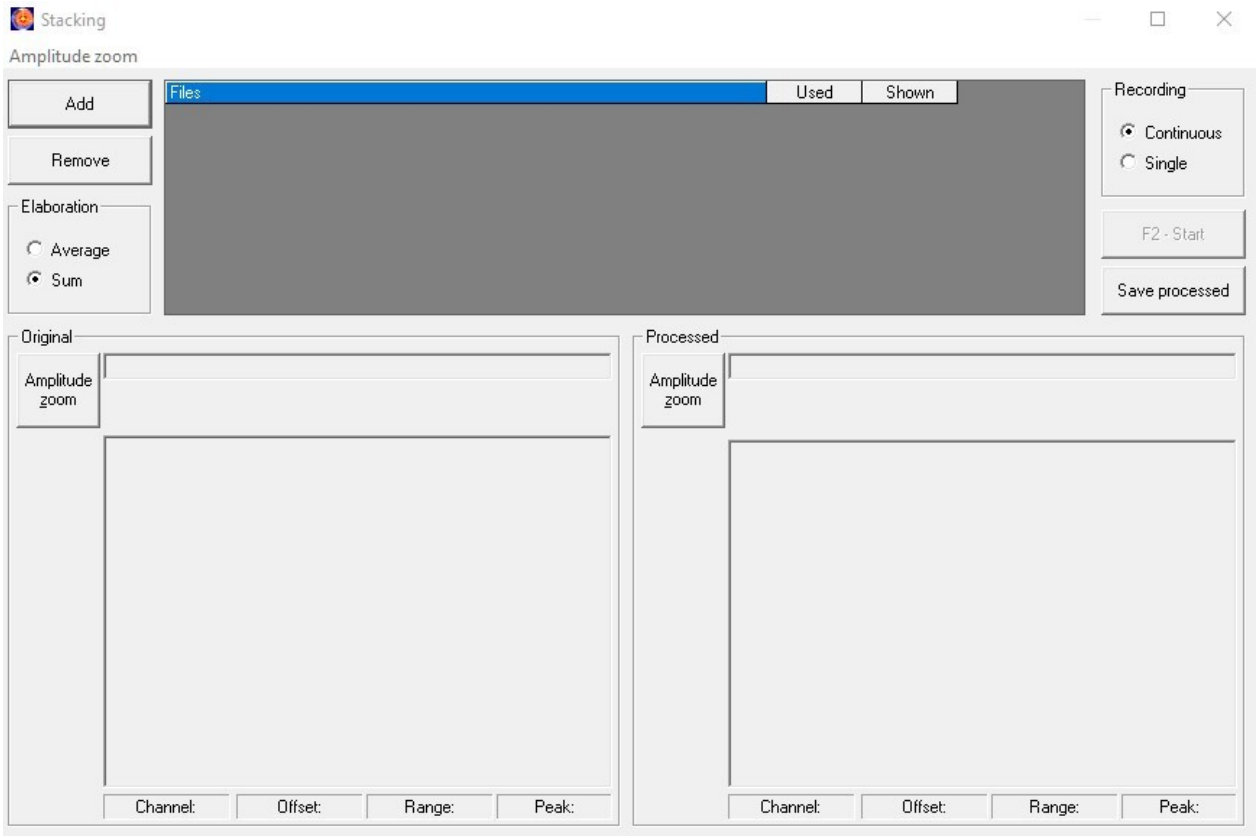


Illustration 3.25

This window can work in the continuous mode, that means it will perform acquisition continuously for the desired number of shots, or for a single shot. In the single mode it will show every single seismogram and stack them waiting to continue the acquisition.

After the acquisition it is possible to perform different advanced operation for the stacking elaboration in the stacking window. The result of this elaboration is a wavelet derived from the sum or the mean value of the data acquired by one Channel for each Channel.

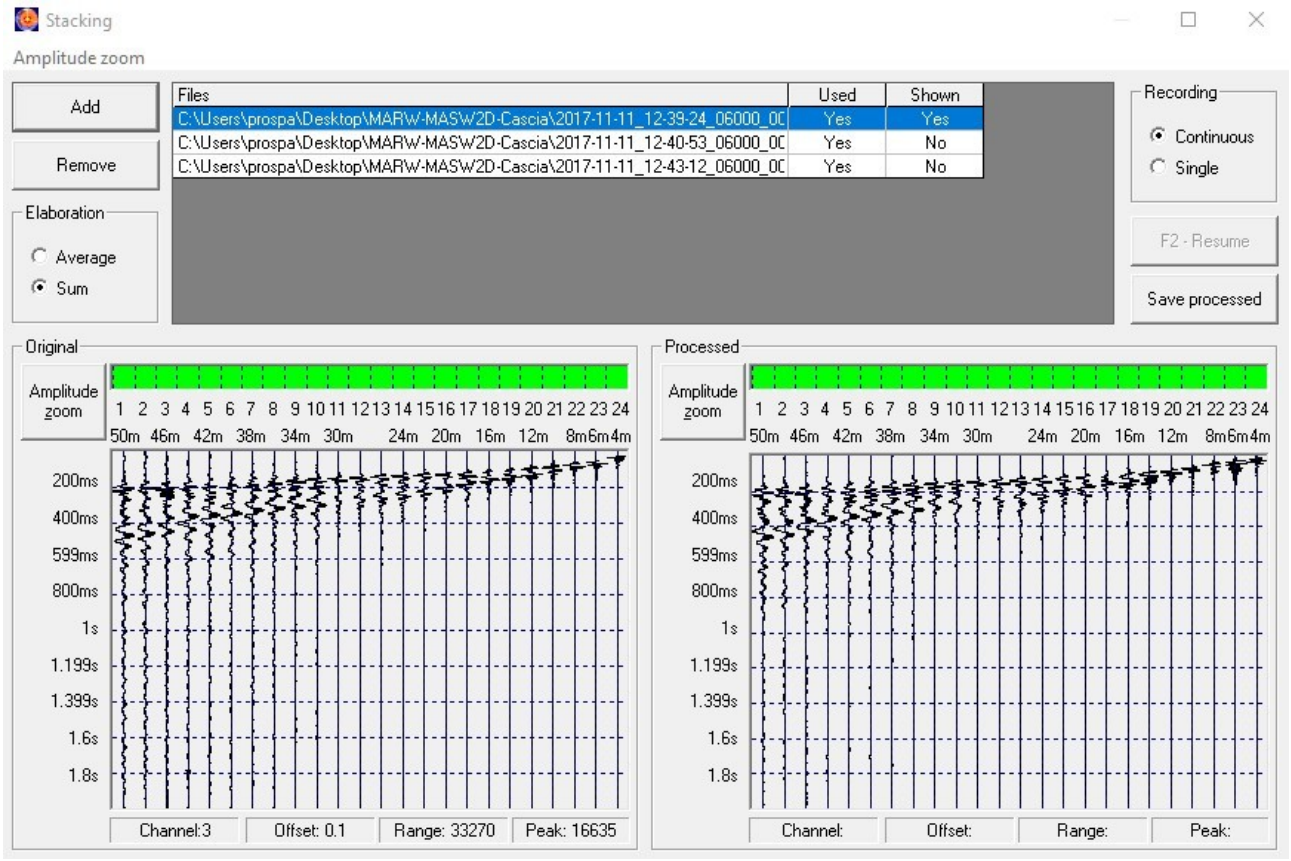


Illustration 3.26

When at least one file is included in the list, the software visualize two seismograms. On the left is possible to watch the original seismogram with *Yes* on the *Shown* column. On the list is possible by double click on the cell to switch between the original seismograms.

With the same process is possible to choose what seismogram to use for the stacking by double click on the *Used* column. When an entire seismogram or a Channel is not used for the stacking the wavelet is gray instead of black.

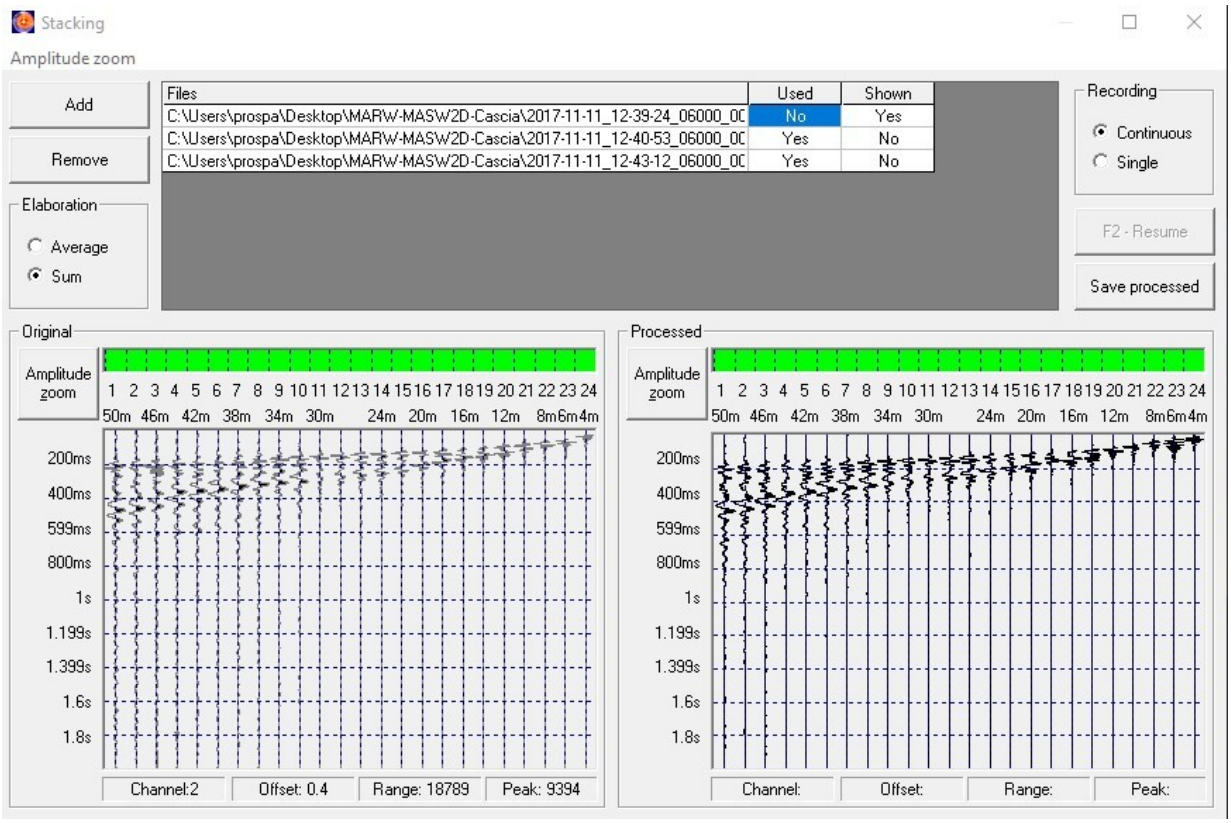


Illustration 3.27

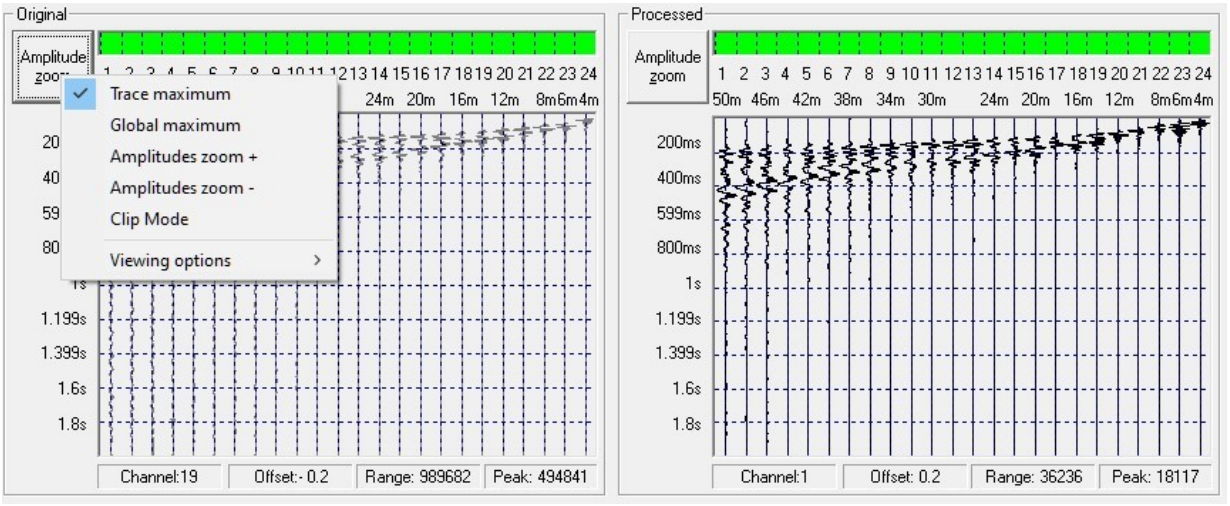


Illustration 3.28

The visualization option are present on the *Amplitude zoom* button on the top left of every seismogram and in the right click menu. Every window has independent parameters that could be copied by using the *Viewing option* sub menu.

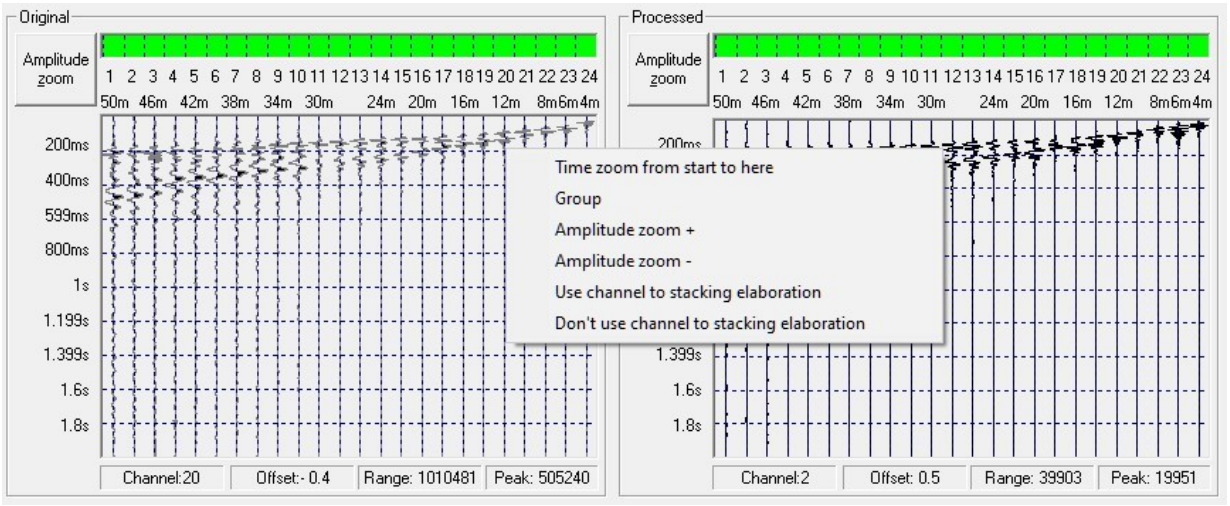


Illustration 3.29

By right-click on one single Channel, on the right seismogram panel, is possible to choose if use or not one Channel. Choosing "*Don't use the Channel to stacking elaboration*" you will disable the trace on that shot; with "*Use this Channel to stacking elaboration*" you will enable this trace.

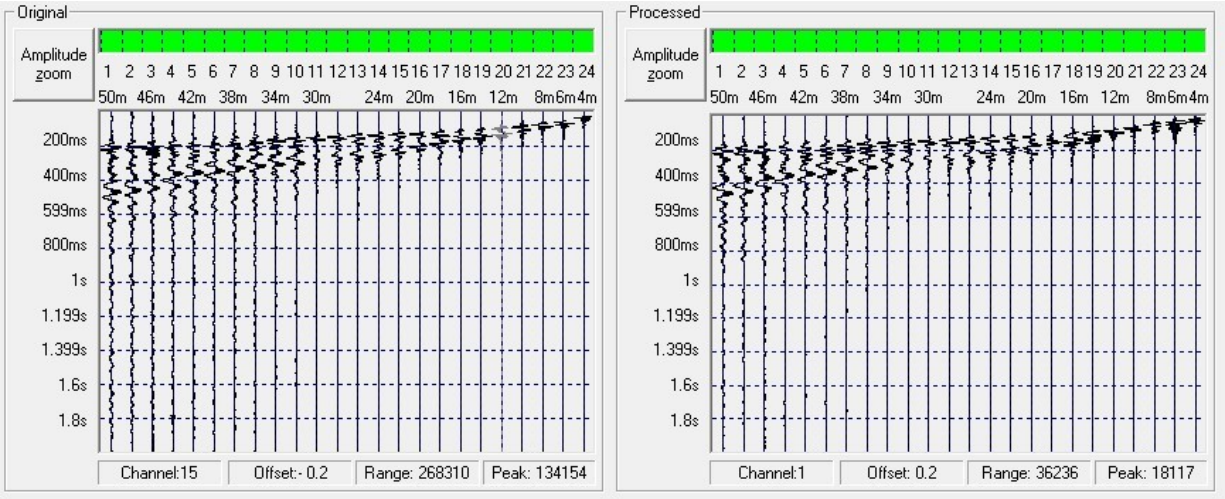


Illustration 3.30

The *Add* button allow the user to add to the list a previously recorded seismogram.

> *Please Note: All the files MUST to have the same length, samples for second and number of Channels.*

The *Remove* button allow the user to remove one seismogram from the list.

> *Please Note: All the removed files will NOT be deleted from the PC.*

The *Average* option compute the wavelets stacking by the mean of all the used seismograms.

The *Sum* option compute the wavelets stacking by the sum of all the used seismograms.

The *Resume* button appear only when a recording session is paused, and allow the user to start a new series of acquisition that will be included on the paused acquisition.

The *Save processed* button will open the *Save window* to save the staked seismogram and close the stacking window; it is equivalent to use the ESC button on the keyboard or close directly the stacking window.

3.4.4 F3 – Seismograms.

Display the data recorded. With the *File Management* window is possible to choose the data; for more details see chapter 3.8 F3 - Seismograms page 72.

Pressing F3 on the keyboard is equivalent of the *F3 – Seismograms* clicking.

3.5 Channel setup.

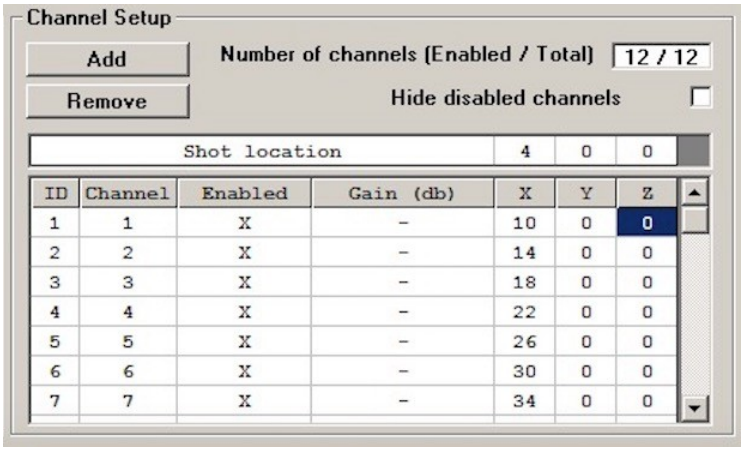


Illustration 3.31

The Channel Setup box allows you to modify the number of Channels, the geometry and Gain for each Channel. The DoReMi can handle up to 255 Channels and it is very ease to set the geometry survey.

The table is certainly the most used and important feature for the geometry setup. It contains the Channel identification number (**ID**), the Channel number (**Channel**), if the Channel is enabled or not (**Enabled**), the gain applied to the Channel (**Gain**) and the position on the three axis (**X, Y** and **Z**) for all the Channels and for the shot location.

On the tab you can move between the cells with the arrow keys and the Enter key or double-click on a given cell allows you to change it.

Specifically in the case of the values in column **Enab**, alternate values **X** (Channel enabled) and **-** (Channel disabled). Any change is not possible for the **ID** and **Ch** number column that is set automatically and consecutive.

Please Note: the channels turned off, even if present in the list, do not receive commands and do not send data.

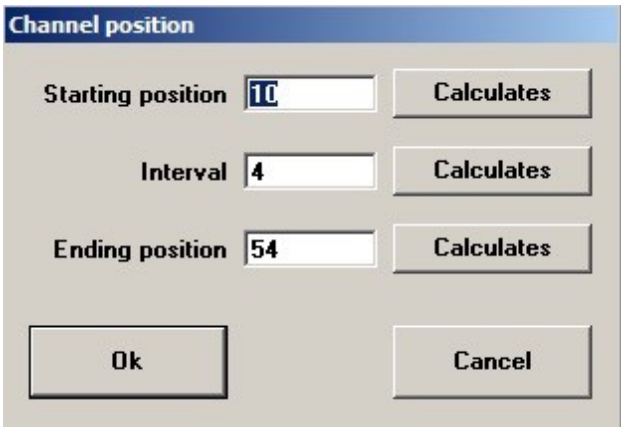


Illustration 3.32

By clicking on the **X** or **Y** or **Z** coordinates is possible to select all the column, or by drag selection is possible to select more than 1 cell; by SHIFT + ENTER key is possible to open the *Channel Position* window, that allows you to calculate the position of each channel knowing the beginning of the seismic line and the distance between geophones.

Please Note: The coordinates MUST to be written as numbers, it handles decimal in point or comma and negative values.

Add.

Allows you to add a new Channel to the list. This is done by pressing the **INS** key or **I**.

Remove.

Allows you to delete from the list the last Channel. It can be done by pressing the **Delete** key or **backspace** or **D**.

Number of Channels shows how many Channels has the System.

Channels enabled shows how many Channels are enabled.

Hide disabled Channels hide in the table the Channels which the user has disabled.

3.5.1 Channel gain window.

In the 16 bit system is possible, by double click on the **Gain** cell, to "draw" the survey gain function in the *Channel Gain* window.

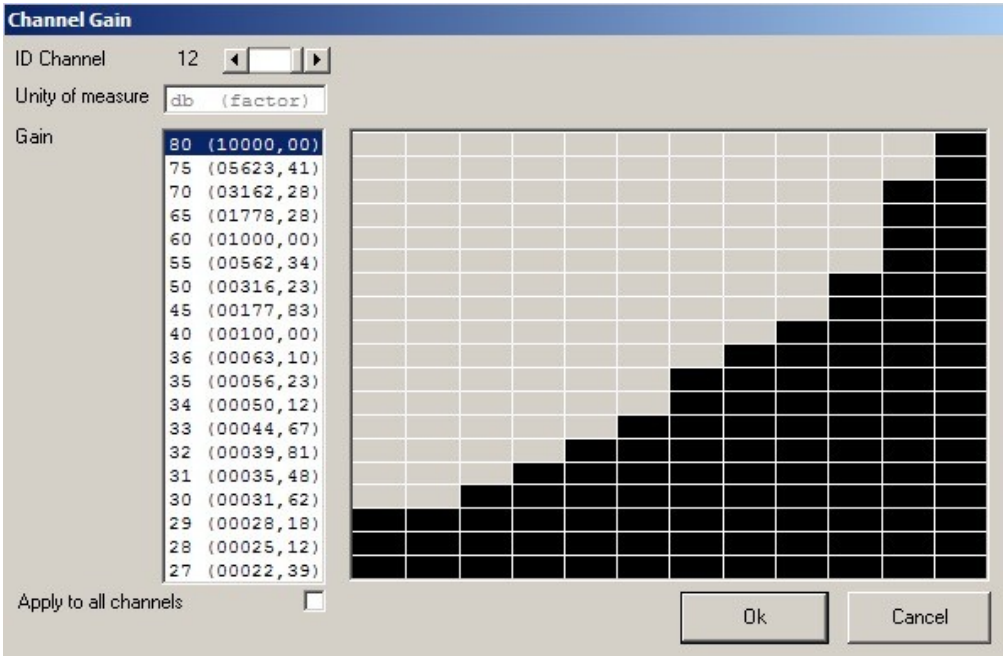
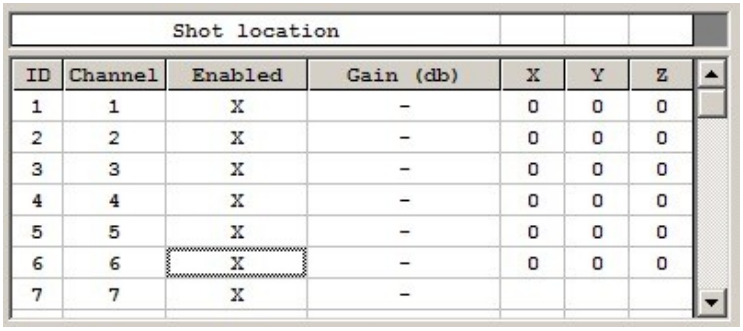


Illustration 3.33

When a 24 bit system is used, the double click on gain cell is disabled (-) and the software use a specific gain function that is not possible to modify.



ID	Channel	Enabled	Gain (db)	X	Y	Z
1	1	X	-	0	0	0
2	2	X	-	0	0	0
3	3	X	-	0	0	0
4	4	X	-	0	0	0
5	5	X	-	0	0	0
6	6	X	-	0	0	0
7	7	X	-			

Illustration 3.34

3.6 Menu bar.

Illustration 3.35

The Menu Bar contains all the DoReMi features:

3.6.1) Setup menu.

3.6.2) Tools menu.

3.6.3) Commands menu.

3.6.4) ? menu.

3.6.1 Setup.

Has the sub-menu to set the system.

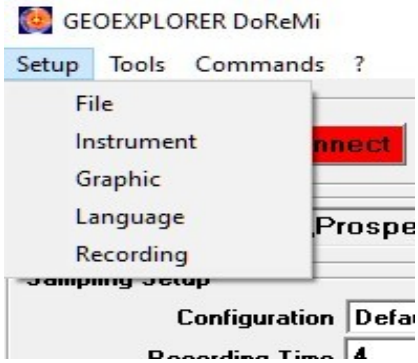


Illustration 3.36

3.6.1.1 File.

Opens the window *Setup File* that allows you to disable "*Ask file name when save*" the window that allows you to choose the file name before the recording, see chapter 3.4.2 F1 – Start. page 35.

To choose the file extension and to enable the auto conversion of the recorded data to SEG-2 and SEG-Y.

The *OK* button confirms the displayed settings.

The *Cancel* button cancels the settings keeping the last settings.

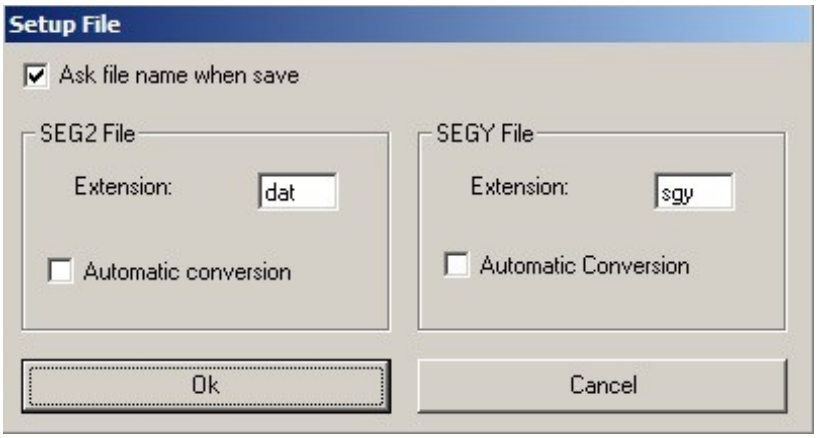


Illustration 3.37

3.6.1.2 Instrument.

You can setup the communication between the Head Unit and the computer, the Head Unit behavior, to run some tests, to setup Power Boosters and Channels.

The *Instrument setup* window allows to setup some main instrument features.

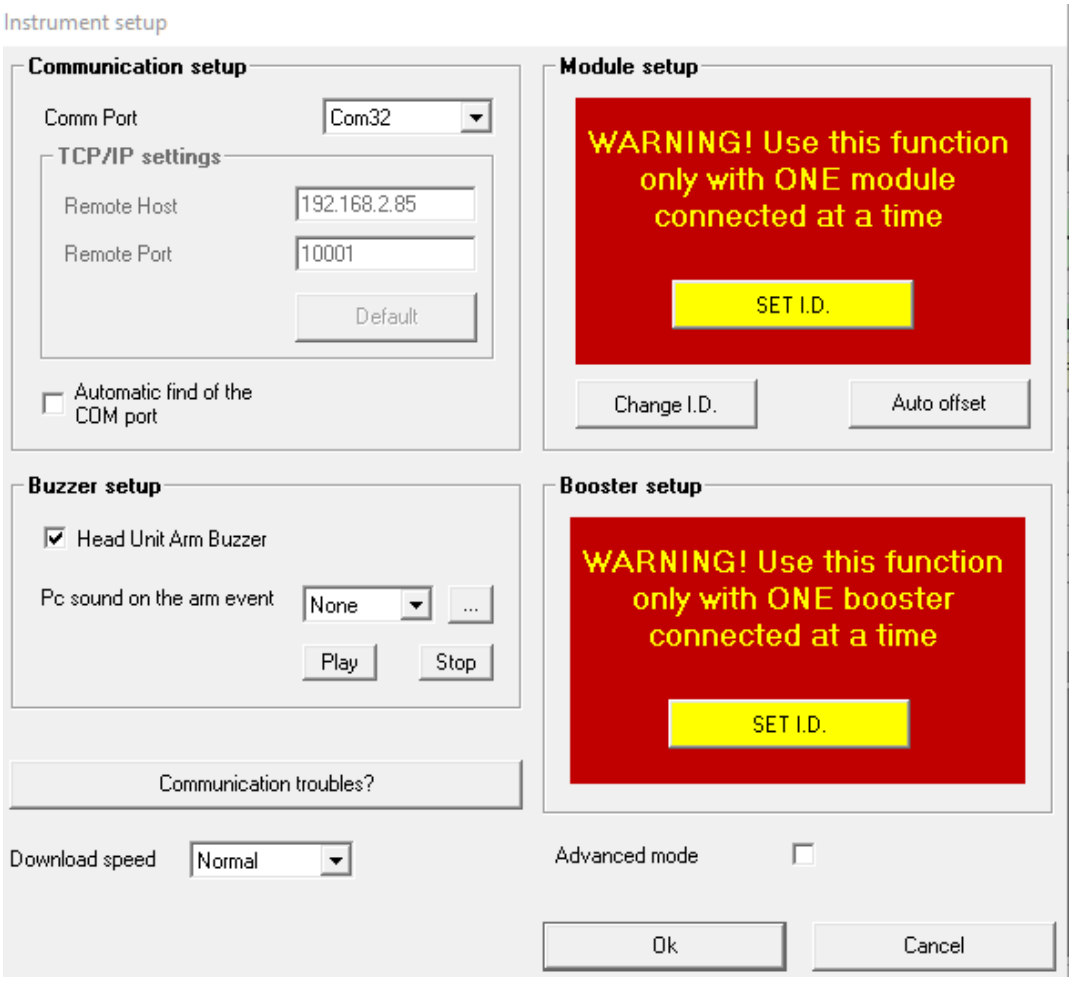


Illustration 3.38

Communication setup allows the user to set the instrument comm port that your PC uses to communicate with the Channels DoReMi.

Please Note: By default software find automatically the comm port.

Please note: The parameters of serial port configuration is set as the last use.

The selectable ports are COM1 to COM16. If you use a USB-RS232 adapter, this allows you to select ports with identifiers greater than 32, but we recommend to use the DoReMi with a port number between 1 and 16.

The communication parameters are set automatically and the data transfer takes place at 115200 baud, 8 data bits, stop bits, no parity, no hardware control.

If the Head Unit used is the Ethernet port, communication port selection should select TCP/IP. In this case you need to set the values IP Address and Remote Port.

Please Note: The Default button sets the current setting to default values.

The option *Head Unit Arm Buzzer* determines if after the operation *Set the gain and arm* the instrument will advise you with a buzzer. The buzzer is used to warn if battery is running low or other functions.

Please Note: The DoReMi manage the power supply and power off automatically the channel after 30 seconds of inactivity and after every single acquisition.

It is possible to set a sound from PC that will be played as buzzer. It is possible to choose any audio .WAV with the button ...

With the buttons *play* and *stop* is possible to to start and stop the audio reproduction.

Communication Troubles? button start a tutorial that allows the user to change the communication setup that the PC is not managing automatically.

3.6.1.3 Module setup.

Allows you to assign an identification number of the connected channel.

The identification number MUST to be a number between 1 and 255.

Please Note: each channel connected in the series MUST have a different identification number. On the contrary, there will be communication errors.

Set I.D button allows to assign an identification number; proceed as follows:

1. Disconnect the head unit from all channels.
2. Unplug the channel that you want to set from all the other channels.
3. Connect the channel to be set at the head unit.
4. Run the Setup command set ID and the identification number that will be displayed in the window.

The *ID* number can be changed whenever necessary.

However, the last number of identifier assigned is stored, and then the channel can continue to be used with that number. This avoids to assign a number to the channels every time you use.

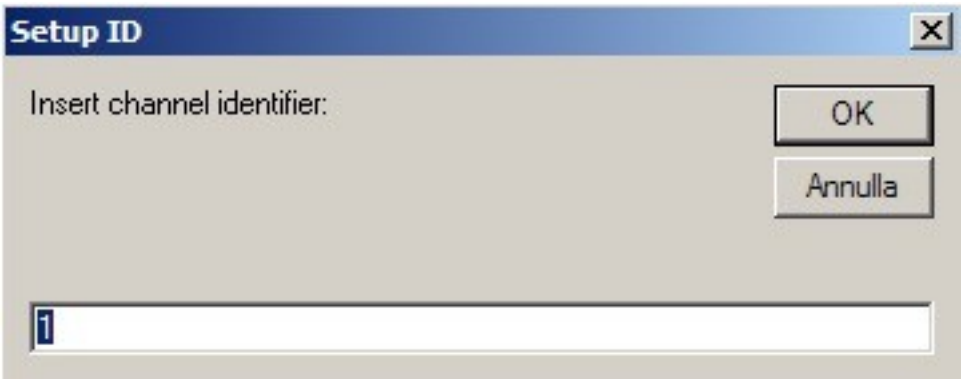


Illustration 3.39

It is not necessary for the proper functioning of channels connected together in numerical order. However, it is usually better to do then to get a graphical representation of forms consistent with the configuration of spread, the waveforms are in fact still represented in ascending numerical order.

Change I.D. button allows to change the identification number of a channel. You must to do the same process explained for the I.D. setting, the only difference is that you are not forced to disconnect all the channels from the head unit.

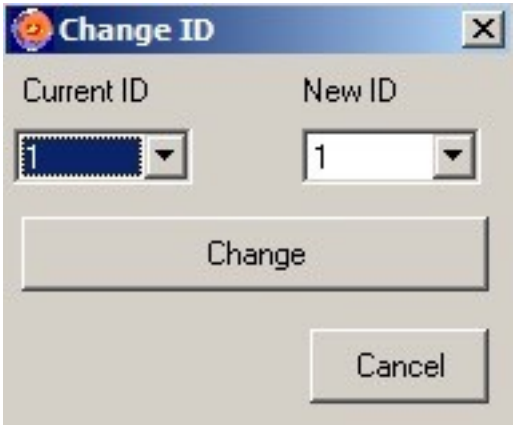


Illustration 3.40

Please note: no channel recognition or connection attempt have to be done to change an ID.

3.6.1.4 Booster setup.

Allows you to assign an identification number of the connected Power Booster, to power on and check the Power Booster status.

Power on button allows to switch on the Power Boosters connected

The identification number to be entered must be a number between 1 and 8.

Please Note: each Power Booster connected in the series must have a different identification number. Otherwise there will be communication errors.

Set I.D button allows to assign an identification number; proceed as follows:

1. Connect the Power Booster with at least one Channel.
2. Connect the Channel to the Head Unit.
3. Run the Setup command set ID and the identification number that will be displayed in the window.

Illustration 3.41

Please note: even in this process the Power booster must not have got any connection or attempt of connection.

3.6.1.5 Download speed.

This option allows to chose the download speed up to 1,6x.

Please Note: this options need a better PC to do not have trouble in the field.

3.6.1.6 Advanced mode.

When this option is enabled the system does not power off the chain, increasing the speed of acquisition process but reducing the batteries because the system does not switch off.

In any case the system will switch off the chain after 20sec of inactivity.

Is suggested to use this mode only when you are recording some acquisition consecutively to avoid a fast batteries consumption.

3.6.1.7 Advanced port comm search.

This feature is hidden, is it possible to show the button only pressing ALT. It allows to perform an automatic search of the port avoiding any other port that could communicate with the software but is not the interface.

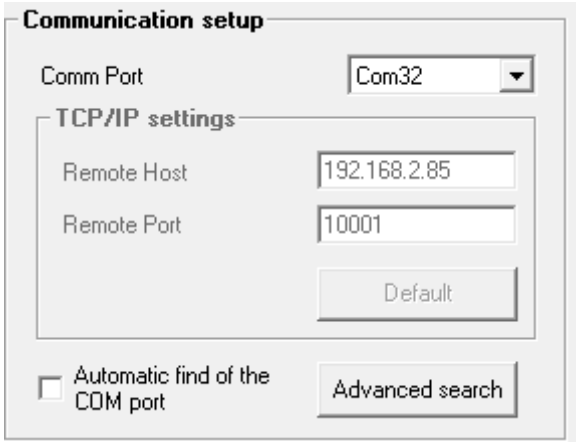


Illustration 3.42

3.6.1.8 Graphic.

In this window you can set the display options and the standards waveform.

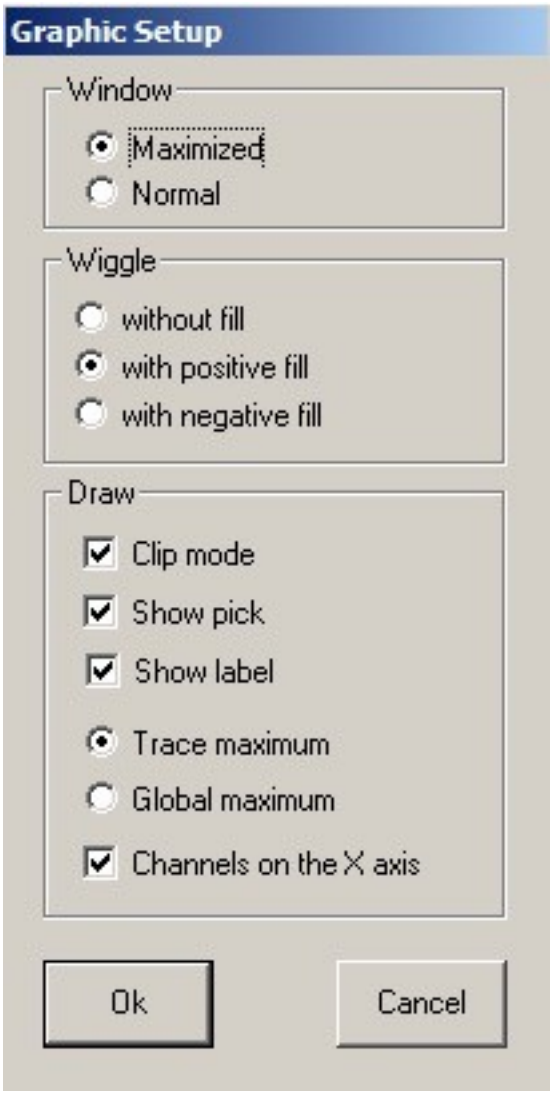


Illustration 3.43

Window options allow you to choose when the seismogram window opens to full screen mode, with *Maximized*, or in standard size mode, with *Normal.*

Wiggle options allow you to choose if or what portion of the waveform must to be filled.

The *without fill* option does not fill any area.

The *with positive fill* option fills the positive area.

The *with negative fill* option fills the negative area.

Draw options allow you to choose how to visualize the waveform.

Clip mode option indicates whether, when you perform an amplitude zoom in the view, the excess of the waveform display area of the Channel must be cut off thus avoiding overlap with other Channels tracking (see chapter 3.8.3.2 Amplitude zoom. page 84).

Show pick option indicates whether the display of the waveform will also shot the first arrivals picking (see chapter 3.8.3.2 Amplitude zoom. page 84).

Show label option indicates during the waveform display, the possibility to show the label on the vertical and horizontal scale axis (see chapter 3.8.3.2 Amplitude zoom. page 84).

Trace Maximum option indicates that the waveform must be represented with the greatest possible scale (see chapter 3.8.3.2 Amplitude zoom. page 84).

Global Maximum option indicates that the waveform of each Channel must be represented with the same scale (see chapter 3.8.3.2 Amplitude zoom. page 84).

Channels on the X axis option indicates that the seismogram will be drawn with the Channels on the X axis and the time on the vertical axis.

The *OK* button confirms the displayed settings.

The *Cancel* button cancels the settings without restoring the last.

3.6.1.9 Language.

This windows allows to choose what is the program language. Actually is possible to choose Italian, English or Chinese.

Illustration 3.44

Note Please: the language will change after the software relaunch.

3.6.2 Tools.

This menu allow you to chose what survey perform:

- Downhole acquisition
- Surface acquisition
- HVSR acquisitionV.

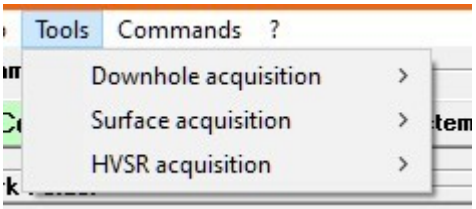


Illustration 3.45

3.6.2.1 Downhole acquisition

It has:

New.

Sets a new procedure for downhole survey.

Open.

Open a downhole survey.

3.6.2.1.1 Downhole window.

Allows you to set the parameters for the downhole surveys, enter the acquisitions which are part of the investigation and generate output files.

This wizard can be used either from zero, when there were no recorded data or after the acquisition to perform the first data elaboration.

In the latter case, the files of the various acquisitions must be added manually to the file list of the survey (see A*dd* button) and, again manually, must be modified the parameters type and depth of each file (see *Modify* button).

However, if you start a process from zero, first of all, you must set some parameters: the *Type* option and the *Depth* options (*Max, Step, Current*). The processing options only determines how will be calculated the waveforms of the final horizontal shots, and can be changed at any

time.

The *Process* button generates the output files of the investigation.

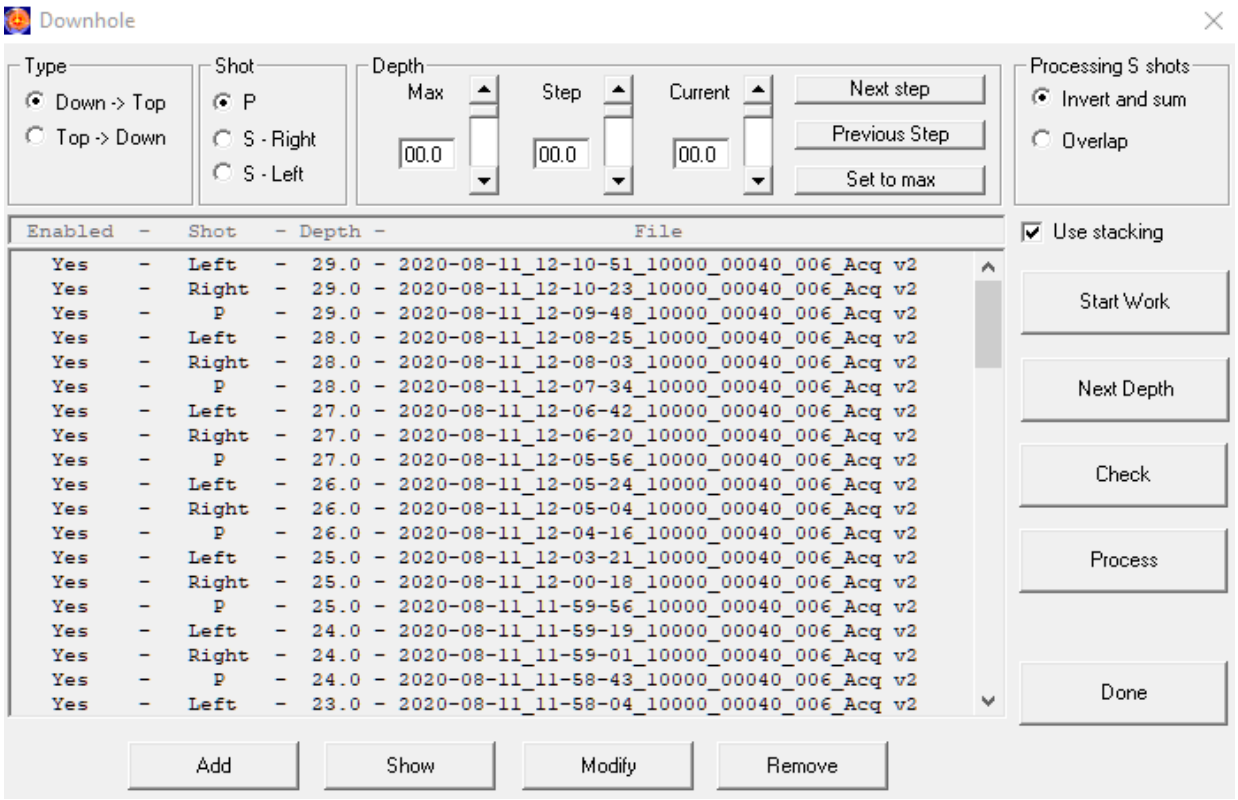


Illustration 3.46

Please Note: the acquisition parameters as SPS and recording length are defined on the main window (see chapter 3.3 Sampling setup. page 28).

Type.

Allows you to set the sequence that will be executed acquisitions.

The *Down -> Top* indicates that acquisition start from the maximum depth then continue while the instrument is pulled up to the surface.

The *Top -> Down* indicates that acquisition start from the surface while the tool is lowered into the hole.

When you run the wizard, this option affects the calculation of the current depth. In fact, after carrying out an investigation at a given depth, your choice determines whether the depth next to be investigated should be increased or decreased.

Shot.

Indicates what type of energization is being executed. The program assumes that the acquisition will be carried out following the information indicated by this option. This option is stored in the individual waveforms will be used to generate the resulting files.

"P" indicates the shot for vertical waves, and "Right" and "Left" are the options for the horizontal waves.

"Right" and "Left" are not absolute references, simply indicate an inverse measure to another.

This option is changed automatically while you follow the wizard.

However, as needed, can also be selected manually.

Depth.

Indicates and allows you to set the parameters of the depth of the investigation.

Max indicates the maximum depth of investigation in meters. In the wizard, if the survey is done with sequence *Down -> Top*, this value will be the depth of the first acquisition. If the investigation is done with sequence *Top -> Down*, when the value of the current depth has reached or exceeded this value, will be a sign that the investigation was completed.

Step indicates the space in meters between the depths to which we investigated. When you run the wizard, the current depth value is increased or decreased by this value, depending on the value set in type option.

Current shows the depth to which you are currently investigating. The program assumes that the acquisition will be executed at the depth specified by this value. The value stored in the individual waveforms will be used to generate the resulting files.

This value is automatically updated from the procedure, but it can also be changed manually both using the appropriate scroll bar, or with next step and previous step buttons to increase or decrease the current value of the amount indicated by the value set in Step.

Use stacking.

This feature open the stacking window (see chapter 3.4.3 F2 – Stacking. page 38).

Process.

Allows you to choose the way in which the horizontal waves file is generated. This option does not affect the data themselves.

Invert and sum generates a file in which a waveform is reversed in polarity and then summed with the other.

The *Overlap* option creates a file in which the two waveforms are superimposed, then you will see the opposite polarity.

Start Work.

Performs an acquisition with the parameters currently set. It is the button you should use when you start to run the acquisition for downhole surveys or when you want to run other shots in the sequence of the same type and at the same depth.

A message box will show, according to the options previously set, what kind of measure the program expects. Also shows the depth to which the instrument should be.

Pressing OK on this message box the program will run the acquisition.

Next Depth.

Continue the wizard to the downhole surveys. Sets the type of shots and depth according to the values entered in the options.

A message box will show, according to the options previously set, what kind of measure the program expects. Also shows the depth to which the instrument should be.

Pressing OK on this message box the program will run the acquisition.

Check.

Verify that the files in the list of the survey are homogeneous. In other words, the program expects for each depth, there are three files, one for each type of shot.

Process.

Generates output files for the survey.

Use the acquisition files of the survey list and enabled (*Yes* in column headed *Enabled*).

On the acquisitions with the same type of shot and at the same depth, stacking procedure is performed (the values of the waveforms are summed).

All acquisitions of horizontal shots are displayed and prompts you to choose a single horizontal Channel. To chose a seismogram right click on that seismogram and click on "*Select the horizontal Channel*".

Please Note: The program offers the one that has a higher amplitude.

Finally, four files are generated. One represents the waveforms of the vertical Channel, one represent all the right shots and one the left shots, and one the waveforms of the horizontal Channels with the elaboration you have chosen. All those horizontal seismograms are the result of your choice during the previous selection.

Add.

Allows you to choose and add a file previously registered. Treats it as part of the investigation. The file you choose to add MUST to have the same acquisition parameters. In some cases, you must manually edit the values for the type of shot and the depth.

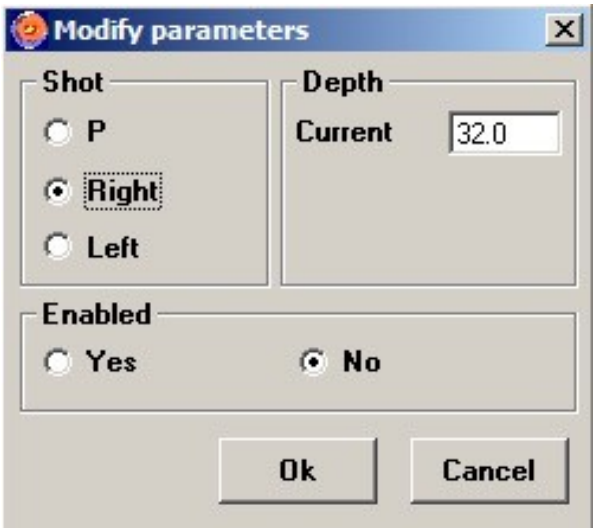


Illustration 3.47

Show.

Display the data recorded selected in the file list of the survey.

Modify.

Allows to modify the parameters of the selected file in the file list of the survey. These parameters are: *Enabled, Type of Shot, Depth.*

The *OK* button confirms the displayed settings.

The *Cancel* button close the windows without applying the modifications.

Remove.

Delete the selected file from the list of surveys.

Please Note: The file is also deleted from computer memory.

An alternative is to set the Enabled parameter file with "No ", that does not include the file in the process but leaves it in the computer memory.

Done.

Exit the Downhole window.

3.6.2.2 Surface acquisition.

Allows you to perform a new seismic reflection survey or the refraction acquisition or MASW acquisition with a new 2D visualization of the geometry to handle the process in an easier way

This will open a new window (*Reflection window*) where you will see the 2D representation of your survey (blue box), the *Commands to modify streamer* (orange box) and the shot list, the file and acquisition controls (green box).

Please note: this features works ONLY if you have set the geometry of the acquisition (see chapter 3.5 Channel setup. page 43)

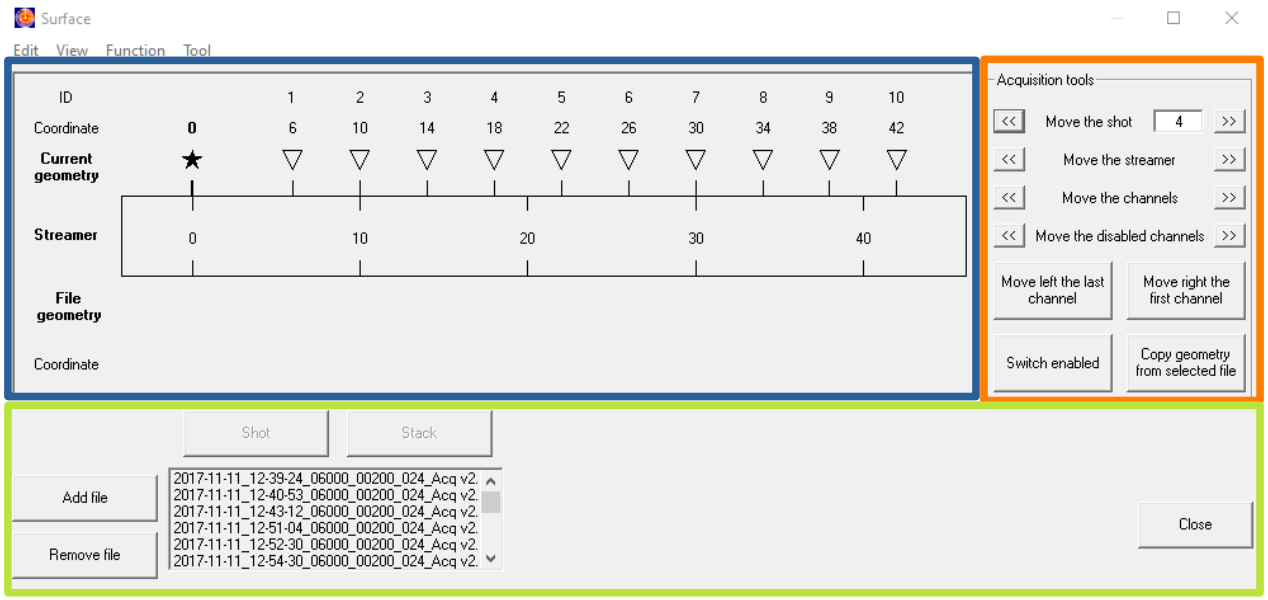


Illustration 3.48

On the menu bar there are just two simple functions:

- The *Undo* inside the *Edit menu*

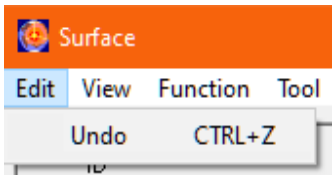


Illustration 3.49

- The *View menu* that allows to change the visualization of the 2d representation

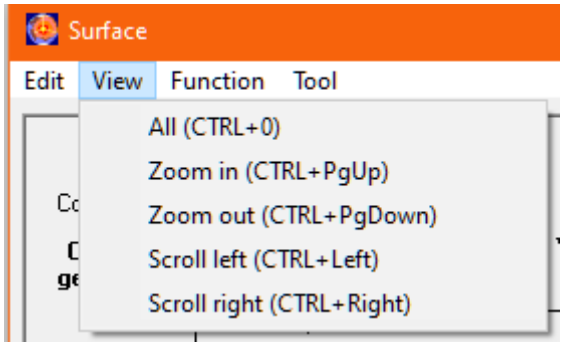


Illustrazione 3.50

- *Compute the space between the channels* inside *the Function menu*. This function will calculate the distance between the channels.

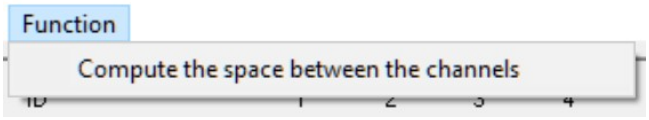


Illustration 3.51

- *Tool* allows to open the data with the module GEOEXPLORER MARW for the complete elaboration

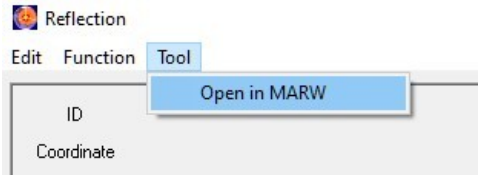


Illustration 3.52

3.6.2.2.1 2D seismic survey representation box

On this window is possible to visualize the actual geometry of your survey, with the position and the channel ID over the geophones, represented by a triangle, and the shot location, represented with a star. Under the *streamer* is possible to see the geometry of the selected file on the shot list.

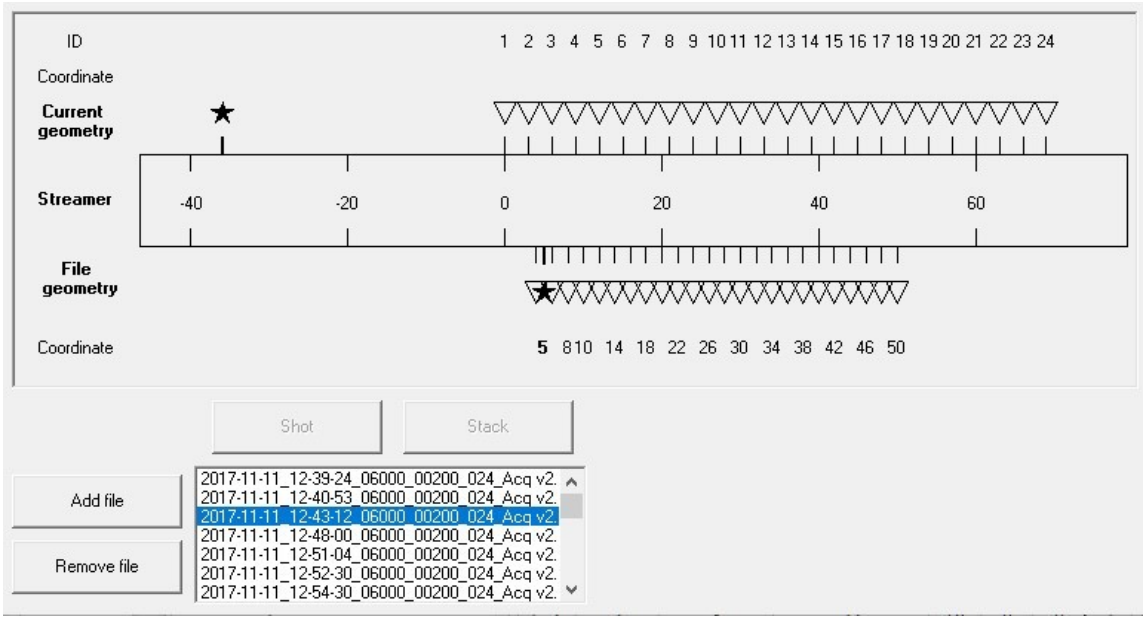


Illustration 3.53

Clicking under the geophone (over the vertical line) with the right click will change the geophones status from enable to disable (dashed figure); the left click will enable it.

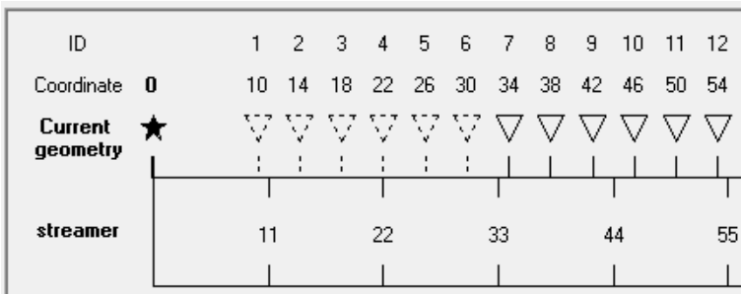


Illustration 3.54

3.6.2.2.2 Commands to modify streamer

On this panel is possible to do some operation on the geophones and on the shot location, allowing you to move the seismic line.

Move the shot: allows you to move the shot location to the right or to the left with a value of the movement indicated on the text box (in meters).

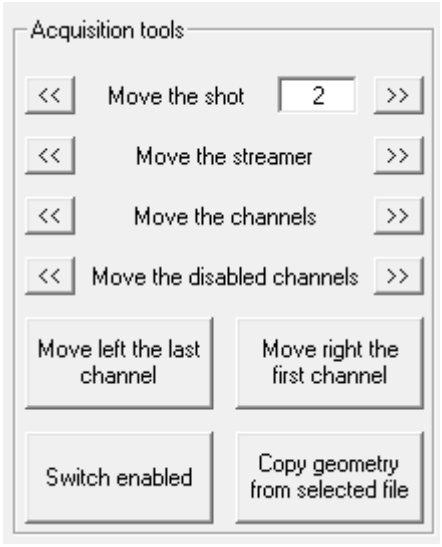


Illustration 3.55

Move streamer: allows you to move the entire seismic line right or left after the last channel.

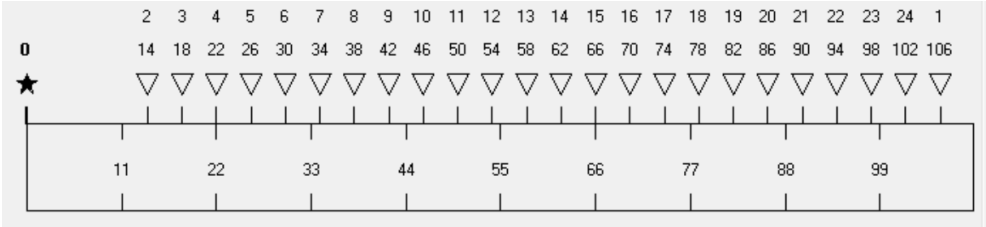


Illustration 3.56

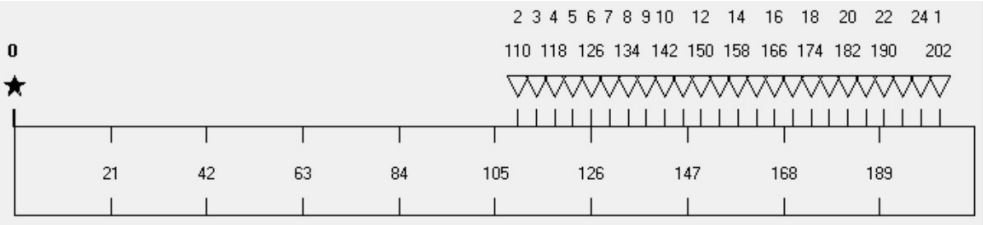


Illustration 3.57

Move the first channel: allows you to move the first channel after the last channel (right) or move the last channel before the first channel (left) for a roll along.

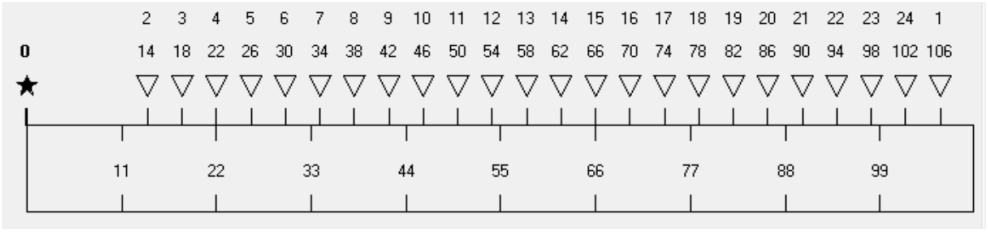


Illustration 3.58

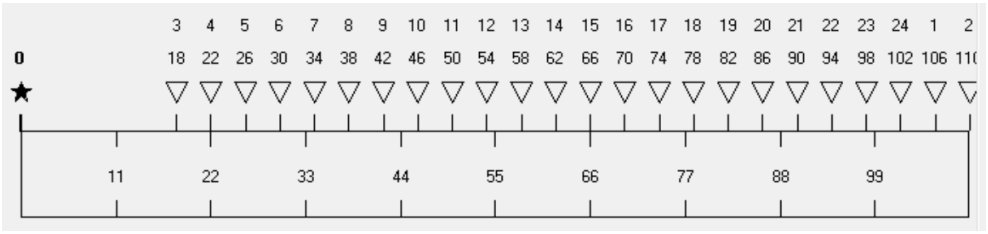


Illustration 3.59

Switch enabled: allows you to change geophones status.

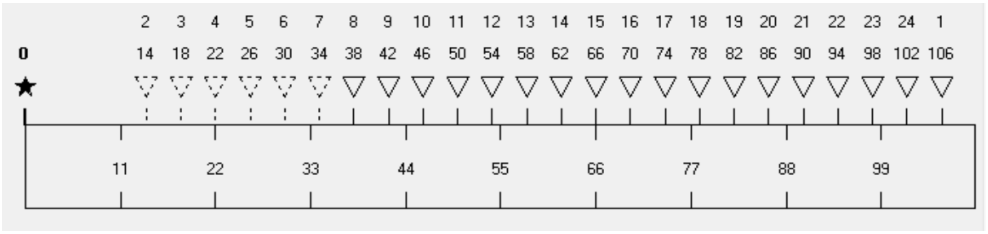


Illustration 3.60

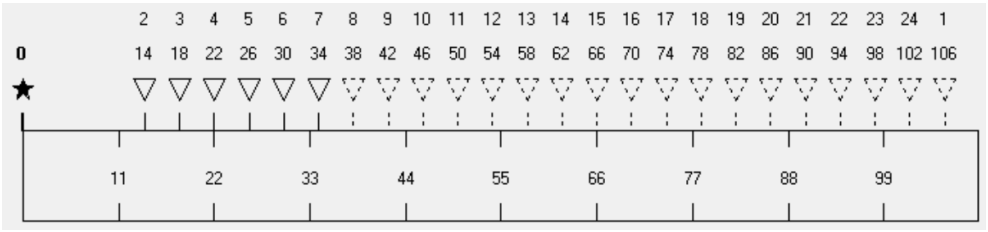


Illustration 3.61

Move the channels: move each channel by the spacing between geophones on the right or left.

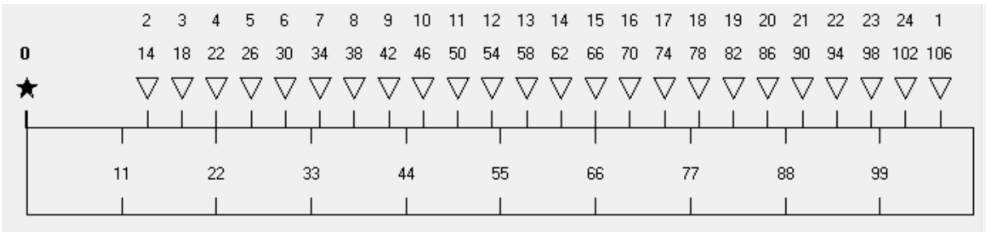


Illustration 3.62

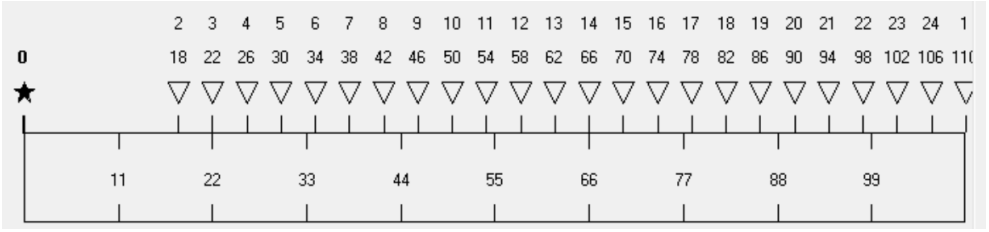


Illustration 3.63

Move the disabled channels: move the disabled channel beyond the last geophones on the right or the left.

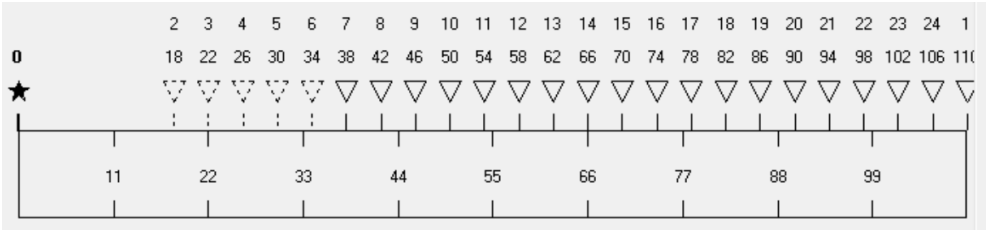


Illustration 3.64

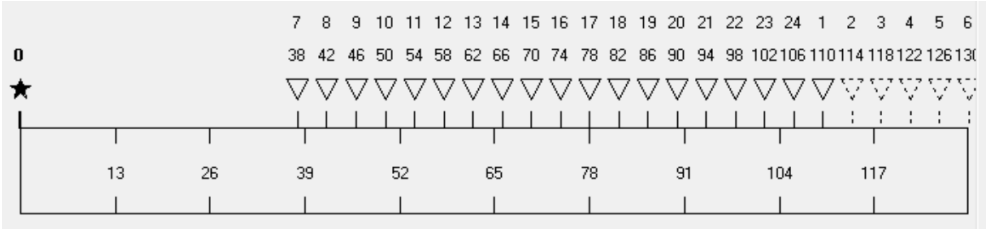


Illustration 3.65

Copy the geometry of file: with this option is possible to set the geometry of a loaded file.

3.6.2.2.3 Seismogram quality check and elaboration

To help with the data quality check of your acquisition, during the survey, every shot you record will be stored and shown on the list below the geometry representation (red box).

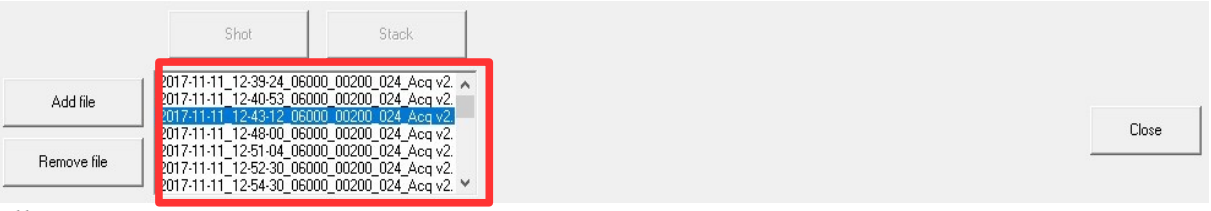


Illustration 3.66

At the top of the list there is the *Shot* button. It is the equivalent of *F1 – start* on the main windows of the DoReMi. (see chapter 3.4.2 F1 – Start. page 35), there is the *Stack* button that is equivalent to the *F2 – Stacking* of the *F2 – Stacking* on the main window of DoReMi (see chapter 3.4.3 F2 – Stacking. page 38)

Add and *Remove file* allows the user to delete or add an acquisition.

Close will close this window

3.6.2.3 HVSR acquisition.

Allows you to perform an acquisition with our sensor GeoJar.

Please Note: The GeoJar sensor is a triaxial seismometer with 3 embedded DoReMi channel and 3 calibrated 4.5Hz geophones high gain.

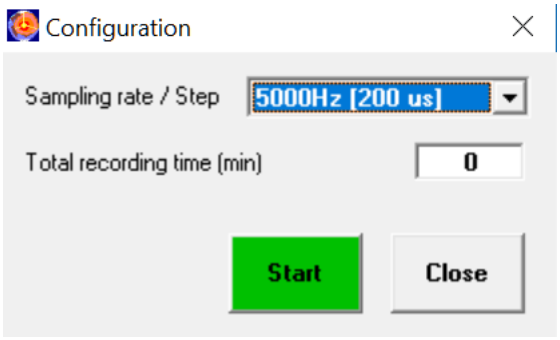


Illustration 3.67

On this window you can choose the total recording length and the Sampling. After selected the parameters, pressing start the software will open the acquisition window.

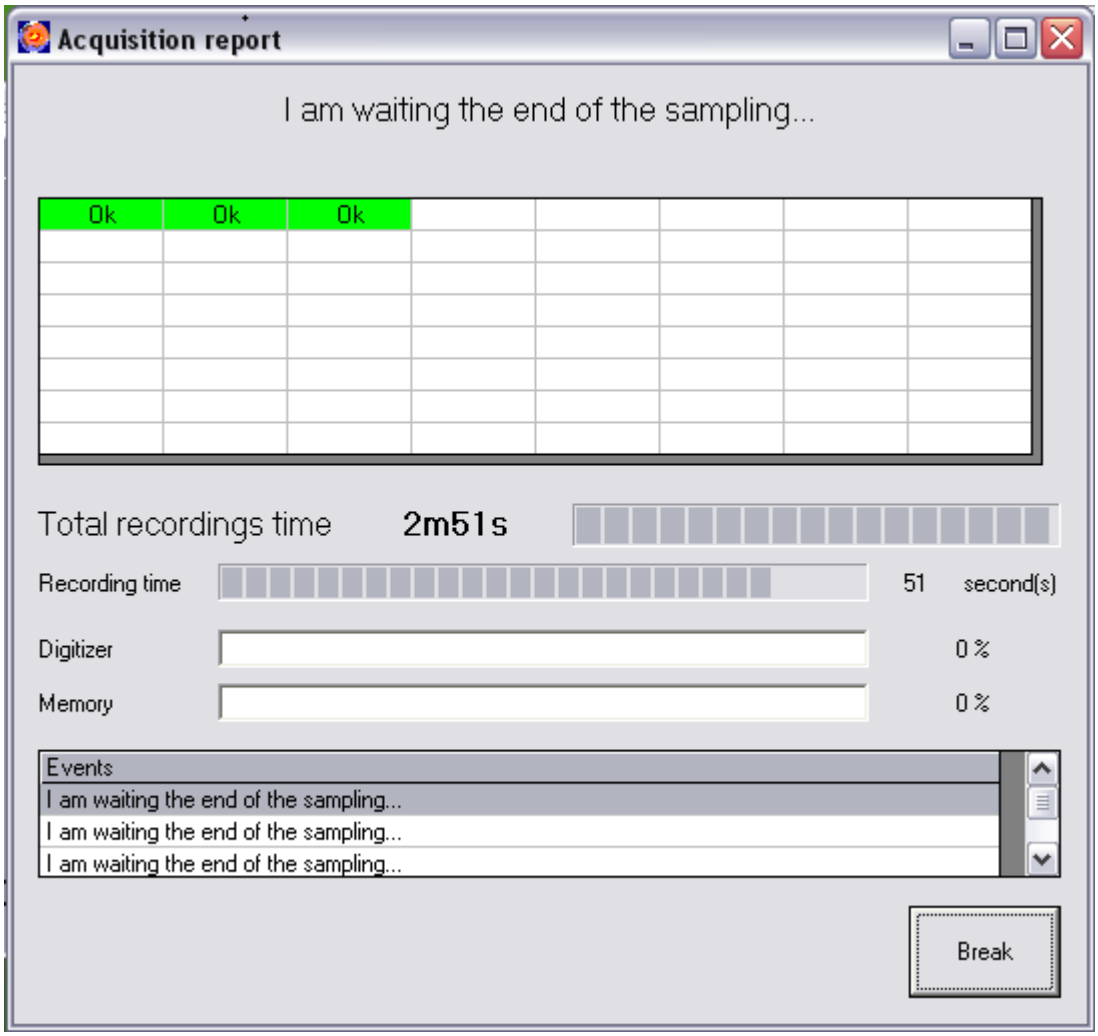


Illustration 3.68

It will performs several recording, opening the HVSR window, the seismogram window and concatenating all the file to create a final file.

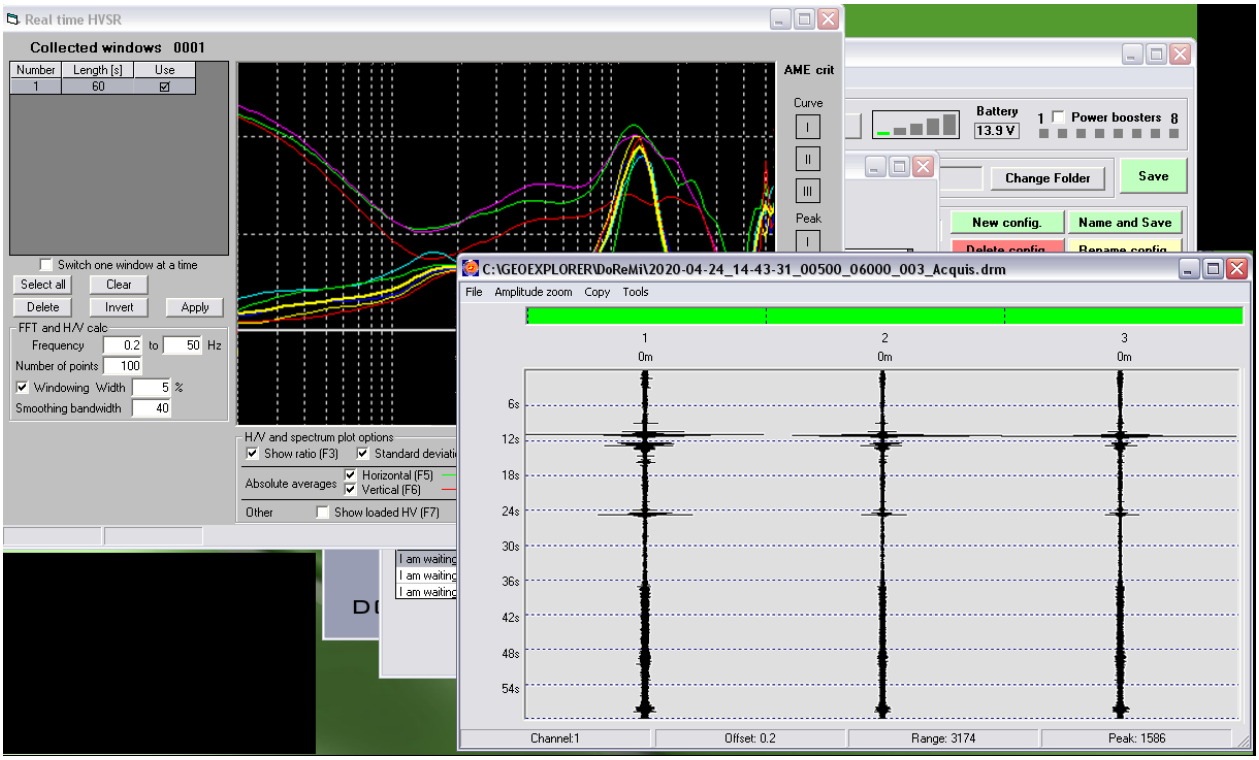


Illustration 3.69

3.6.3 Commands.

Allows the sending of the secondary controls.

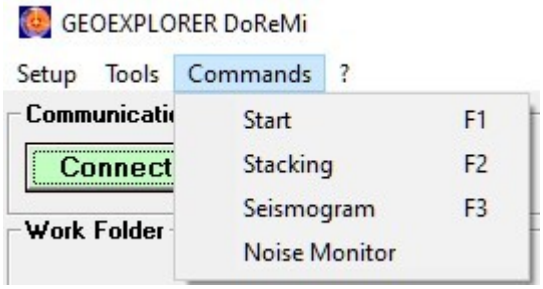


Illustration 3.70

F1 - Start.

See chapter 3.4.2 F1 – Start. page 35.

F2 - Stacking.

See chapter 3.4.3 F2 – Stacking. page 38.

F3 - Seismograms.

See chapter 3.8 F3 - Seismograms page 72.

Noise Monitor.

See chapter 3.4 Recording. page 32.

3.6.4 ?.

It has inside the *About* option

About.

Show some information about the software and about SARA electronic instrument s.r.l.

Illustration 3.71

Illustrazione 3.72

3.7 Digital filters

With version 1.1 of the program we have introduced the ability to set the digital filters that are activated automatically when receiving the signal. This feature allows you to work directly with the frequency range of interest. For example, using geophones from 4.5Hz (essential for MASW tests or ReMi or ESAC/SPAC) may become more difficult to perform work on refraction because the response characteristic of these sensors is greatly larger than sensors with 8 or 10Hz usually used for polls in refraction and / or reflection.

The program then makes available programmable low-pass filters and high pass either traditional or zero phase.

We enter into a detailed technical description of digital filters on but we will give some basic guidelines with examples to allow easy use of the same if deemed necessary.

> *Please Note: when you are performing an acquisition with the filter activated, your data will be filtered before the storing. Your data will not have the filtered frequencies. e.g. if you acquired data with the 4.5Hz geophone and filter the data with this features, for example a high pass filter of 14Hz with 2 poles, all the frequencies under 14Hz will be attenuated by the filter. That means is with this data want to perform a MASW you MUST to consider you will not have data under the 10Hz.*

To adjust the digital. filter is a setting in the *Recording Option* panel (see chapter 3.4.1 Recording options. page 33)

These settings apply to all records and then, if the digital filters are activated, signals are stored in the filtered mode and not so rough. It must be said that our company has always been a supporter of the philosophy that the raw data should never be modified and that all processes should be carried out in post-processing. However, we realize that it can be very inconvenient for the user to perform these calculations in post-processing when it is expected already in the process of acquiring a certain type of data, for example those who only find it useful to apply a refraction high-pass filter to 8Hz to simulate the use of geophones 8Hz. Therefore, it seemed more useful, in this case, ensure that all digital processing during the acquisition remain that way.

Those who wish to maintain complete control over the data must acquire data without any filter in place and provide then with the analysis software. We believe that this will avoid confusion about how the files are stored and / or processed.

3.7.1 DC Removal.

A signal may have acquired a residual signal (positive or negative) often referred to as *offset*. If this signal is visible in this diagram as the "zero line" of the ideal signal is shifted slightly on the positive side or negative side of the diagram. This "defect" is so typical of all digitization equipment and is usually very low, but as a further refinement of the program can provide for the removal of this offset number.

Although placed in this box, and its implementation can be through the use of digital filters, the *DC Removal function* is not considered as a digital filter in the offset correction process does not happen with a filter algorithm (es. IIR or FIR) but simply by calculating the arithmetic mean of points in the seismogram of each Channel and removing it from each sample. So the wave form and all its frequency components remain unchanged in both amplitude and phase.

This option allows you to act on the data immediately after acquisition, and is calculated automatically canceled if the small offset in this circuit. This option affects all connected Channels.

This development brings the average value recorded by the Channel to 0, eliminating the offset that the Channel could have.

If this option is selected, the acquisition values recorded by the Channels are processed. Specifically, for each Channel calculates the average value of recorded data. This average value is considered as an offset the Channel has. Hence, the data will be stored by subtracting the average value acquired or offset.

For example, if the average value of Channel 3 is 35, a recorded sample -225 is stored as -260 writing. (-225-35 =- 260). While the average value of the Channel 8 is -10, a recorded sample is stored as 17 writing 27 (17 - (-10) = 27).

> *Please note: It should be noted that Run processing software. This means that if a system had so high an offset to be achieved during the acquisition, the full scale of values, the problem must be solved by means of the Channel at the hardware level.*

Obviously under normal conditions the offset is minimal, but this small automatic procedure is an elaboration trivial and practically operated at no cost from the system and, therefore, was made available. It is not automatic because the presence of a significant offset (I.E. more than 1% of full scale, which is a symptom of a malfunction of the system) must be verified by the operator.

3.7.2 Apply digital filters.

This option tells the program whether it should apply digital filters or not. If you want to apply only one filter type (for example, only the high pass filter) the corresponding value the *filter order* must be set to zero. In case you use the digital filters keep in mind that the removal of the DC component (*DC Removal*) is always applied automatically.

Zero Phase Filter: This option allows to use the Zero-phase filter (see chapter 3.7.3 Zero phase filter. page 71).

Low Pass Filter Frequency.

Specifies the cutoff frequency of low pass filter. Beyond this frequency the signal will be attenuated in proportion to the number of filter order.

Low Pass Filter Order.

Specifies the filter order. A first-order filter attenuates less than a fourth-order filter

High Pass Filter Frequency.

Specifies the cutoff frequency high pass filter. Below this frequency the signal will be attenuated in proportion to the number of filter order.

High Pass Filter Order.

Specifies the filter order. A first-order filter attenuates less than a fourth-order filter.

Examples:

Diagram amplitude (blue) and phase (purple) of of a low pass filter 10Hz 4th order. All frequencies below 10Hz pass unchanged, the upper ones suffer attenuation.

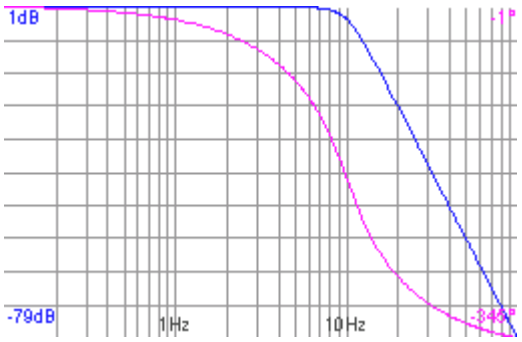


Illustration 3.73

Diagram amplitude (blue) and phase (purple) of of a 1 Hz high pass filter of 4th order. All frequencies above 1Hz pass undisturbed, the lower ones suffer attenuation.

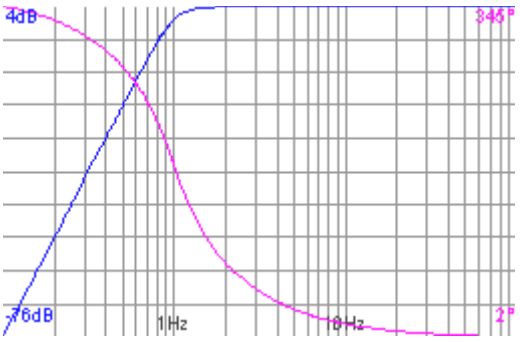


Illustration 3.74

Diagram amplitude (blue) and phase (purple) of a couple of filters: low pass at 10Hz 1st order high pass filter with 1 Hz to 1 order.

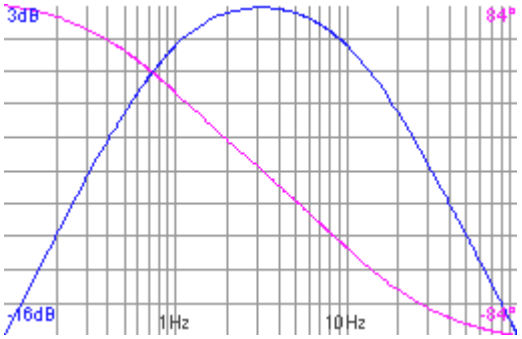


Illustration 3.75

Diagram amplitude (blue) and phase (purple) a couple of filters: low pass 2nd order 10Hz high pass filter with 1 Hz 2nd order.

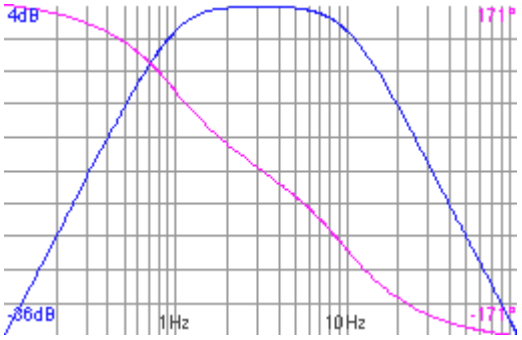


Illustration 3.76

Diagram amplitude (blue) and phase (purple) a couple of filters: low pass 4th order 10Hz high pass filter with 1 Hz 4th order.

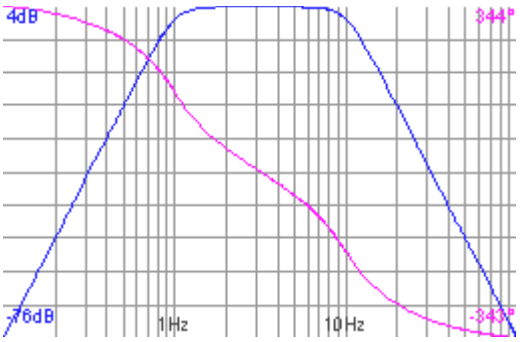


Illustration 3.77

Please Note: although the forms are similar in fact those of higher order are less rounded corners and the attenuation is greater than 36dB in the 2nd-order and 76dB in the 4th.

Using filters to simulate different frequencies.

You may want to use a sensor for refractive index and a sensor for MASW and REMI. Using sensors at 4.5Hz (MASW and REMI) refraction can sometimes be difficult to read because of the low frequencies that tend to confuse the reading of the first arrival.

In this case you can use digital filters to correct the global response of the system. For example the figure above shows the frequency response of 4.5 Hz, 14 Hz and 40 Hz.

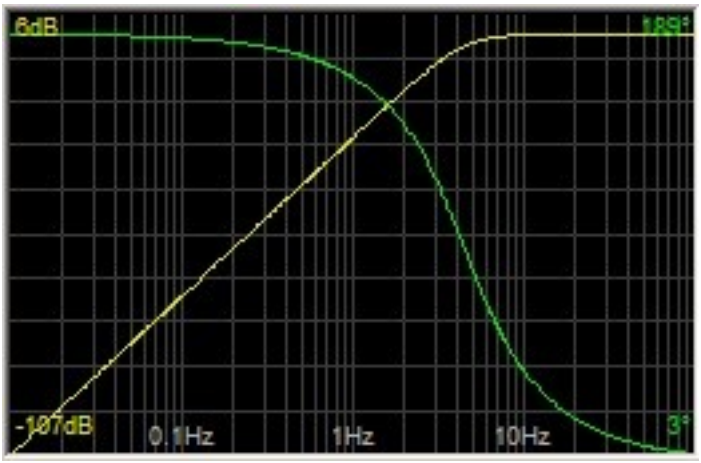


Illustration 3.78

If you want to get the response of a sensor with one from 4.5Hz to 8Hz can filter the signal acquired by a filter with a 4.5Hz geophone to 8Hz. The result would be illustrated by two figures: on the left of the response of a geophone 8Hz (h = 0.4), on the right's answer to a 4.5Hz geophone with a filter 1-pole 8Hz. The steps are different but the amplitudes are almost overlapping.

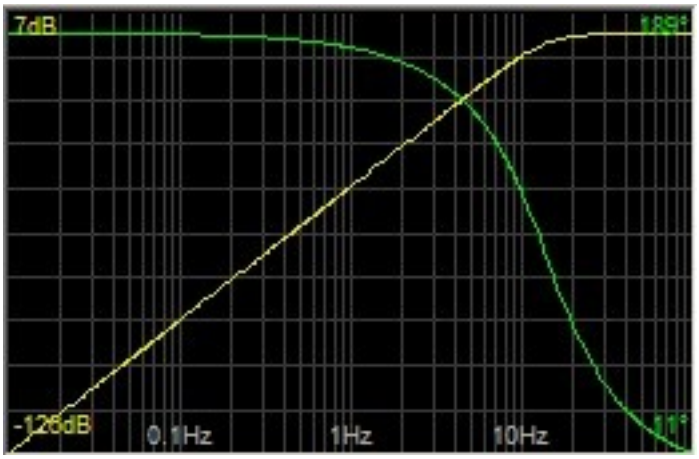


Illustration 3.79

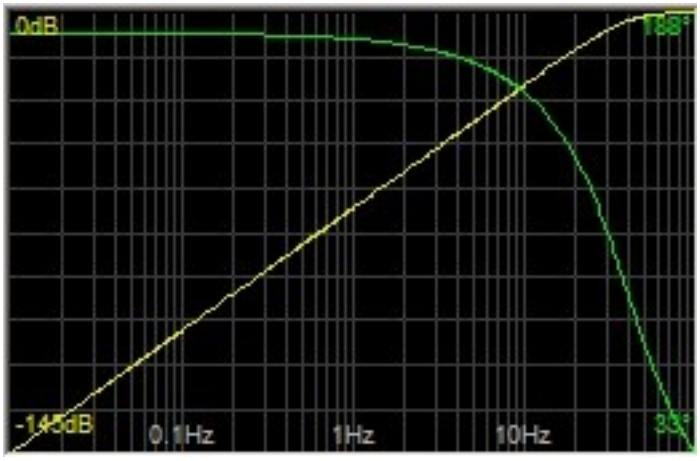


Illustration 3.80

3.7.3 Zero phase filter.

The filters used in this application are IIR filters of Butterworth type. They are so easy description for those who were to perform other processing on the signal. Usually these filters are known to be in phase zero, or always introduce a phase shift as do the filters applied to conventional electronic amplification circuits. However, activating this option you can get a filter that introduces a time lag between the various wave crests. An example is shown in the figure below.

The trace on the top represents a portion of the acquired signal at 1000 Hz with a 4.5Hz geophone high gain; in the middle is possible to see a zero-phase 100Hz filtered data and the last one is a non zero-phase 100Hz filtered data.

As you can see the zero-phase filter do not cause a phase shift between the crests of the first and the second signal. This is a good result, in comparison with the third signal, but you pay with a side effect and should be considered: the circle shows the “predictive effect” of the zero-phase filter; this artifact is the result of the zero-phase filter that process the signal both forward (from first to last sample) and backward (from last to first sample).

So when to use the zero-phase filter?

If the processing software will use as a main signal phase comparison of the various geophones then the zero phase filter (e.g. MASW and REMI) will be more useful as it maintains such information and introduce changes there, but if you wants to observe accurately the time of first arrival (e.g. the refraction) then the effect would make it less easy to predict the "picking", while the phase shift introduced by a zero-phase filter would not

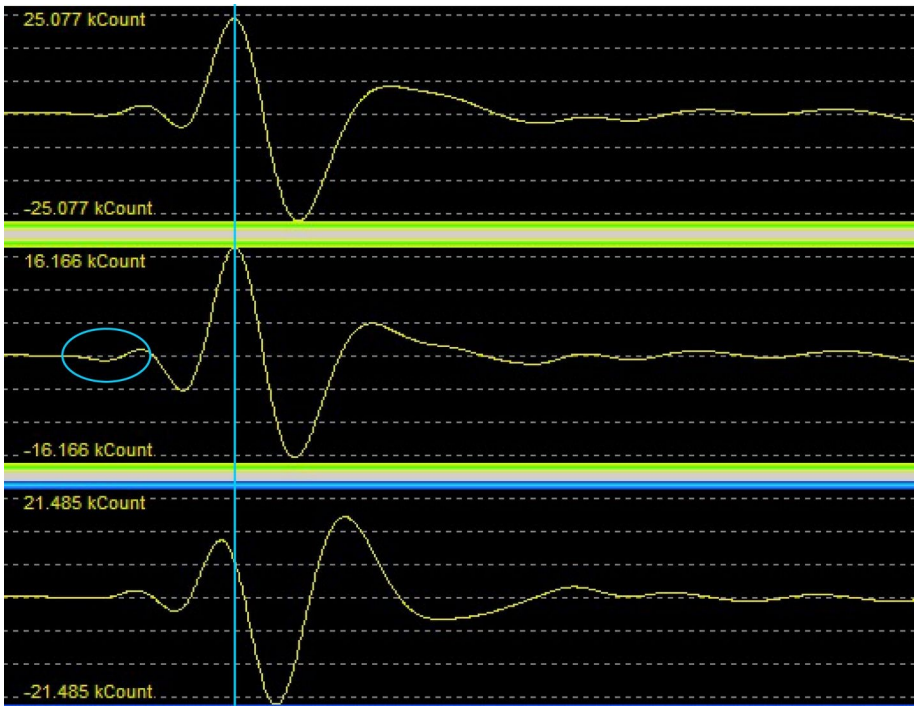


Illustration 3.81

particularly bother.

3.8 F3 - Seismograms

Opens the *File Management* window. That window open the set work folder and allow to open, delete, convert and elaborate the acquired data.

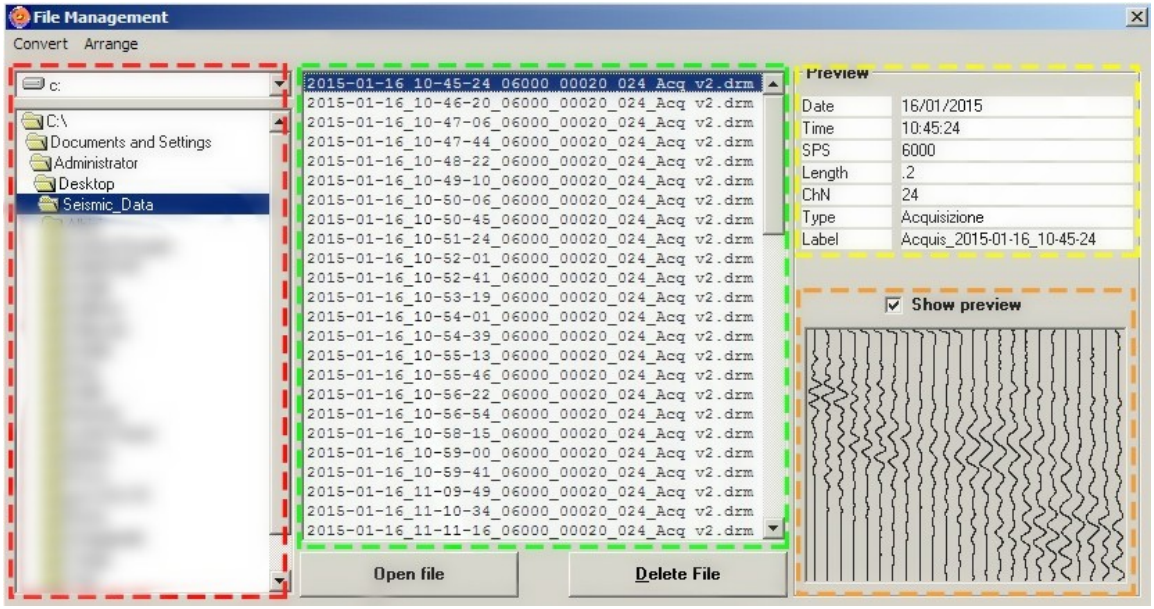


Illustration 3.82

The list on the left (red square) allow the user to select the folder where are stored the data.

The central list (green square) show the data stored in the selected folder.

The *Preview* box (yellow square)shows the information of the selected file:

Date: DD/MM/YYYY

Time: HH:MM:SS

SPS: Sample per Second

Length: Length in second

ChN: Number of Channels

Type: Type of data

Label: if the user has not written anything (see chapter 3.4 Recording. page 32), this filed show the file name

Type shows what kind of elaboration has been done:

Acquis: the seismogram is the result of an acquisition.

Aggior: the seismogram is the result of an upgrade of old file format to new file format.

DT_XXX: the seismogram is the result of a downhole down-top elaboration.

XXX represent the progressive channel number.

TD_XXX: the seismogram is the result of a downhole top-down elaboration.

XXX represent the progressive channel number.

Reass: the seismogram is the result of the reassignment of the channels position

StackAv: the seismogram is the result of the stacking average

StackSm: the seismogram is the result of the stacking sum

Workaw: the seismogram is the result of the sequential merging in space of two shots Channels

Interl: the seismogram is the result of the alternated merging in space of two shots Channels

Concat: the seismogram is the result of the sequential merging in time of shots channels

The *Show preview* (orange square) option allow to visualize the wavelet of the selected file.

The *Open file* button opens the *Seismograms* window of the selected files; it is possible to open that window with double click on the file.

The *Delete file* button delete the selected files.

3.8.1 Convert.

The *Convert* menu allows the user to change the format of the selected files. It is possible to convert the DoReMi files (.drm) to: SEG-Y; SEG-2; CSV; SAF. The conversion process create a new file converted with the original name. On the *Setup* menu in the main window, *File* is possible to choose the automatic conversion and the file extension of the recorded converted seismogram for SEG-2 and SEG-Y.

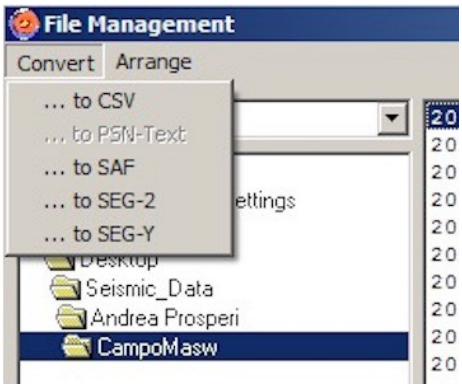


Illustration 3.83

Please Note: To import the CSV file on the spreadsheet the separator character is the semicolon (;).

3.8.2 Arrange.

The elaboration menu allows the user to perform different operation with the selected seismograms.

Please Note: the selected seismograms MUST to have the same Length, SPS and number of Channels.

The elaborations are: Stacking, Concatenation, Downhole (Down/Top , Top/Down), Invert and sum, Overlaps, Walkaway, Interlace.

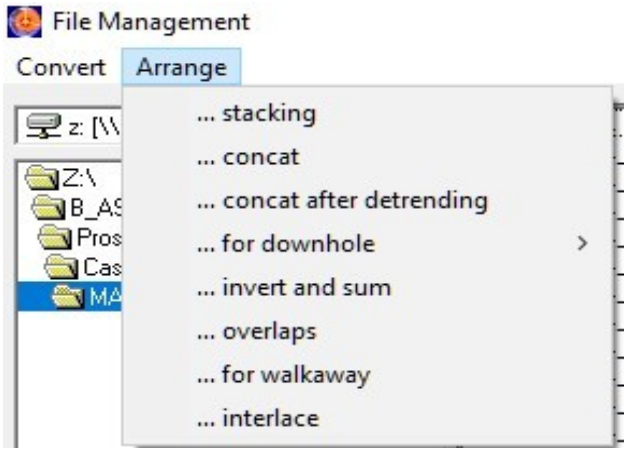


Illustration 3.84

3.8.2.1 Stacking.

Opens the *Stacking* window (see chapter 3.4.3 F2 – Stacking. page. 38).

3.8.2.2 Concatenation (concat.).

Seismogram 1	1	2	3	4	5
Seismogram 2	1	2	3	4	5
Result	S1(1)+S2(1)	S1(2)+S2(2)	S1(3)+S2(3)	S1(4)+S2(4)	S1(5)+S2(5)

The result of this operation is a new file with the same number of Channels lined up from the oldest one to the younger and the sum of the length of every file used.

Concatenation after detrending (concat. After detrending).

The result of this operation is a new file with the same number of Channels lined up from the oldest one to the younger and the sum of the length of every file used deleting the possible trend. To do this it must be chosen the degree of the polynomial function

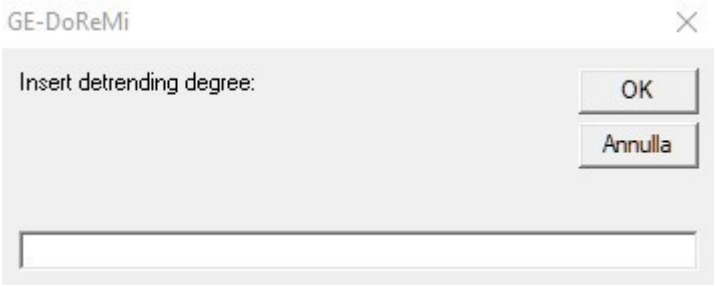


Illustration 3.85

3.8.2.3 Downhole.

With this operation, the software assumed that the selected seismograms are recorded at different depth. The results are N° seismograms as the Channels number of the selected files. Each generated seismogram has N° Channels as the number of the selected files. Each seismogram represent the recorded data for one depth step.

Down/Top and Top/Down indicate the acquisition direction. This operation is the inverse function explained in the downhole (see chapter 3.6.2.1 Downhole acquisition page 55).

3.8.2.4 Invert and sum.

This elaboration allows to use only two seismograms. The result is a seismogram computed with the sum of the first selected file with the wavelet inversion of the second seismogram.

3.8.2.5 Overlaps.

This elaboration allow to use only two seismograms. The result is a seismogram that is the overlap os the two selected files.

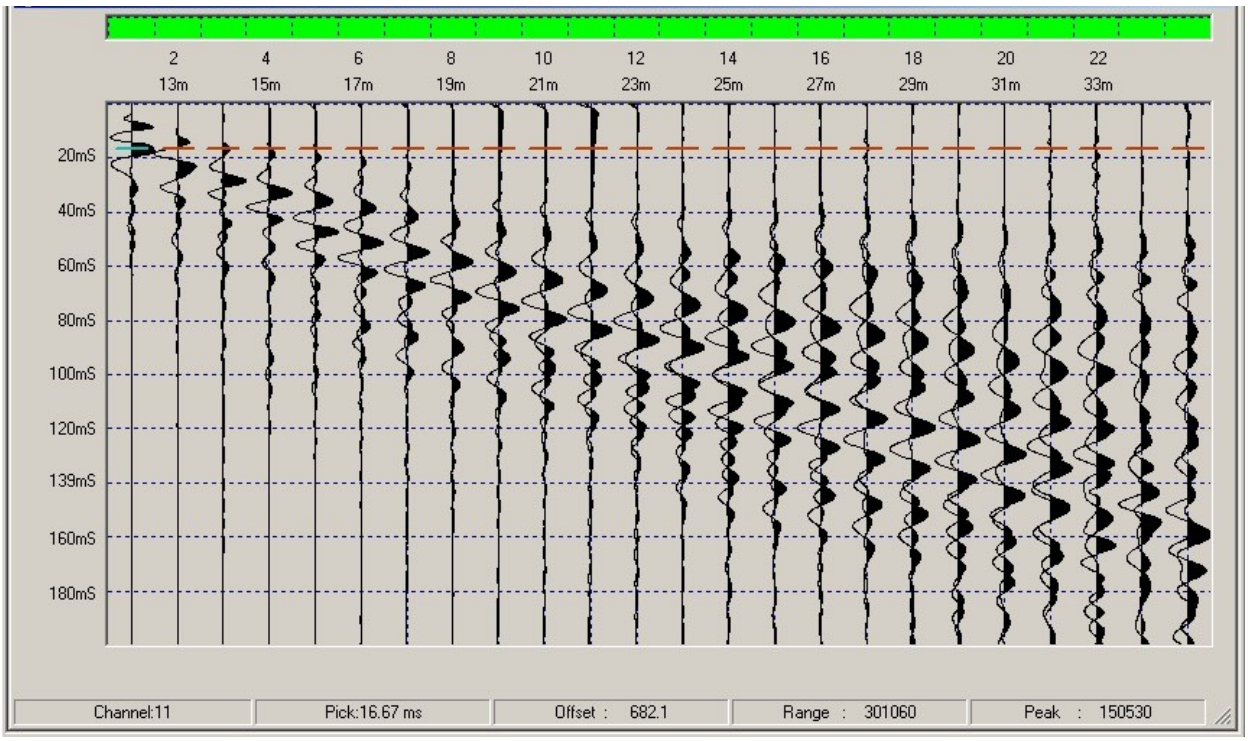


Illustration 3.86

3.8.2.6 Walkaway.

This elaboration allow to use only two seismograms. The result of this operation is a seismogram with the channels number equal to the sum of the channels of the two selected files. The spatial arrangement is shown on the table below:

Seismogram 1	Seismogram 2	Result
1		1
2		2
3		3
4		4
	1	5
	2	6
	3	7
	4	8

The S*witch the file order* button invert the position of the two file on the final seismogram, as is shown on the sketch box.

The *Coordinates of waveform interlaced or merged* box allow, or not, the software to modify the position value of each channel.

The *OK* button confirms the displayed settings.

The *Cancel* button cancels the settings without restoring the last.

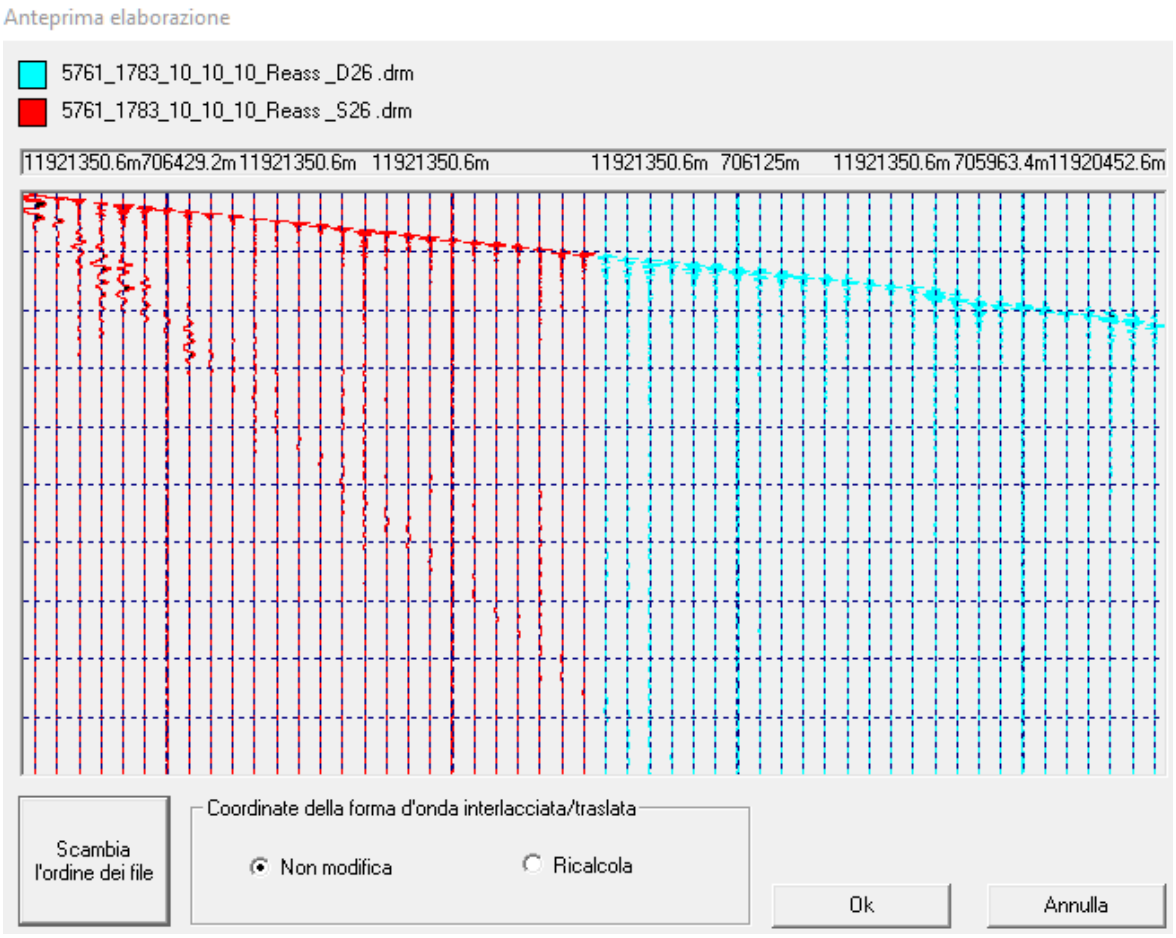


Illustration 3.87

3.8.2.7 Interlace.

This elaboration allow to use only two seismograms. The result of this operation is a seismogram with the channels number equal to the sum of the channels of the two selected files. The spatial arrangement is shown on the table below:

Seismogram 1	Seismogram 2	Result
1		1
	1	2
2		3
	2	4
3		5
	3	6
4		7
	4	8

The S*witch the file order* button invert the position of the two file on the final seismogram, as is shown on the sketch box.

The *Coordinates of waveform interlaced or merged* box allow, or not, the software to modify the position value of each channel.

The *OK* button confirms the displayed settings.

The *Cancel* button cancels the settings without restoring the last.

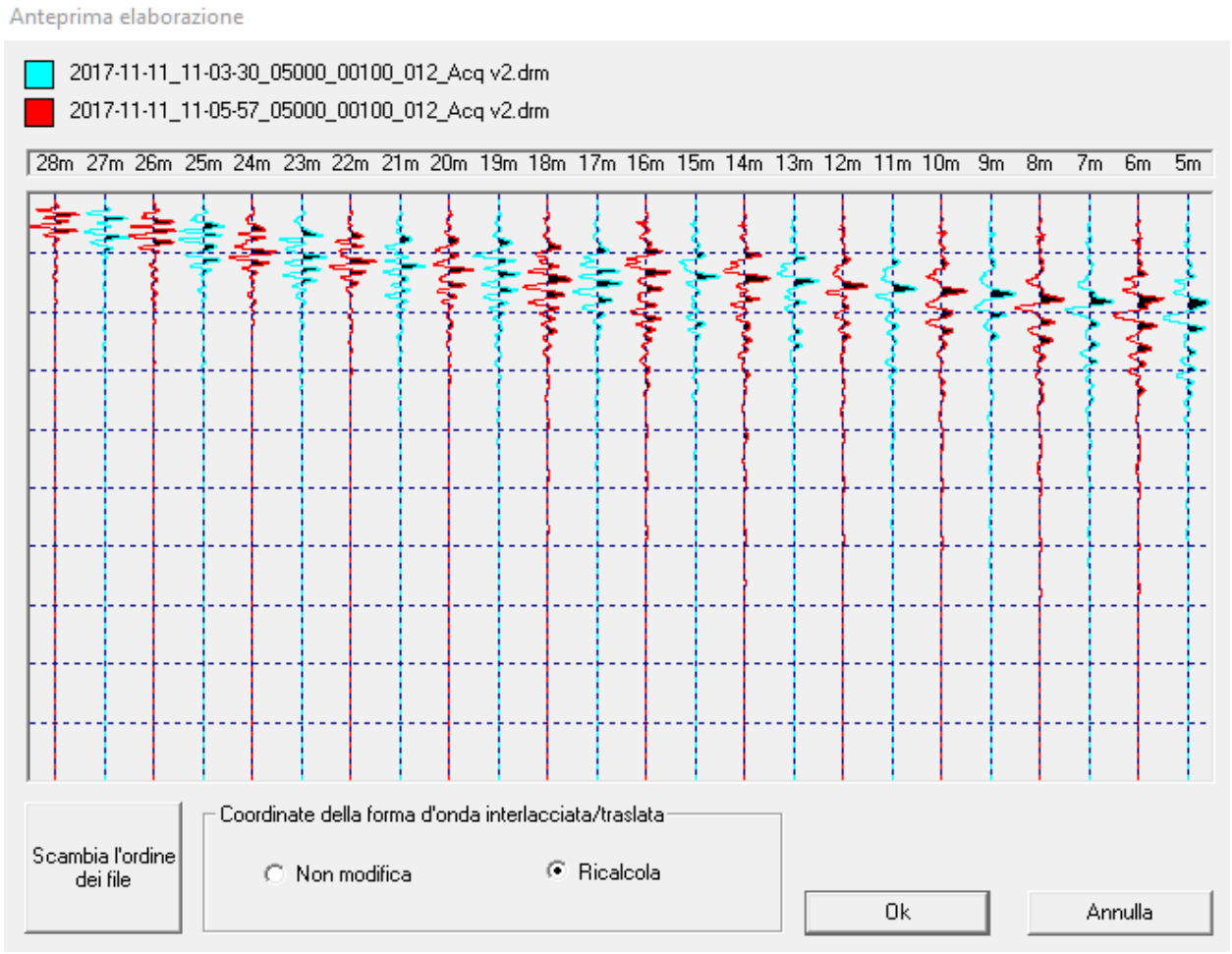


Illustration 3.88

3.8.3 Seismograms window.

Opening the selected file on the *File Management* window, the software will open the *Seismograms* window. For each selected file the software will open a different seismograms window.

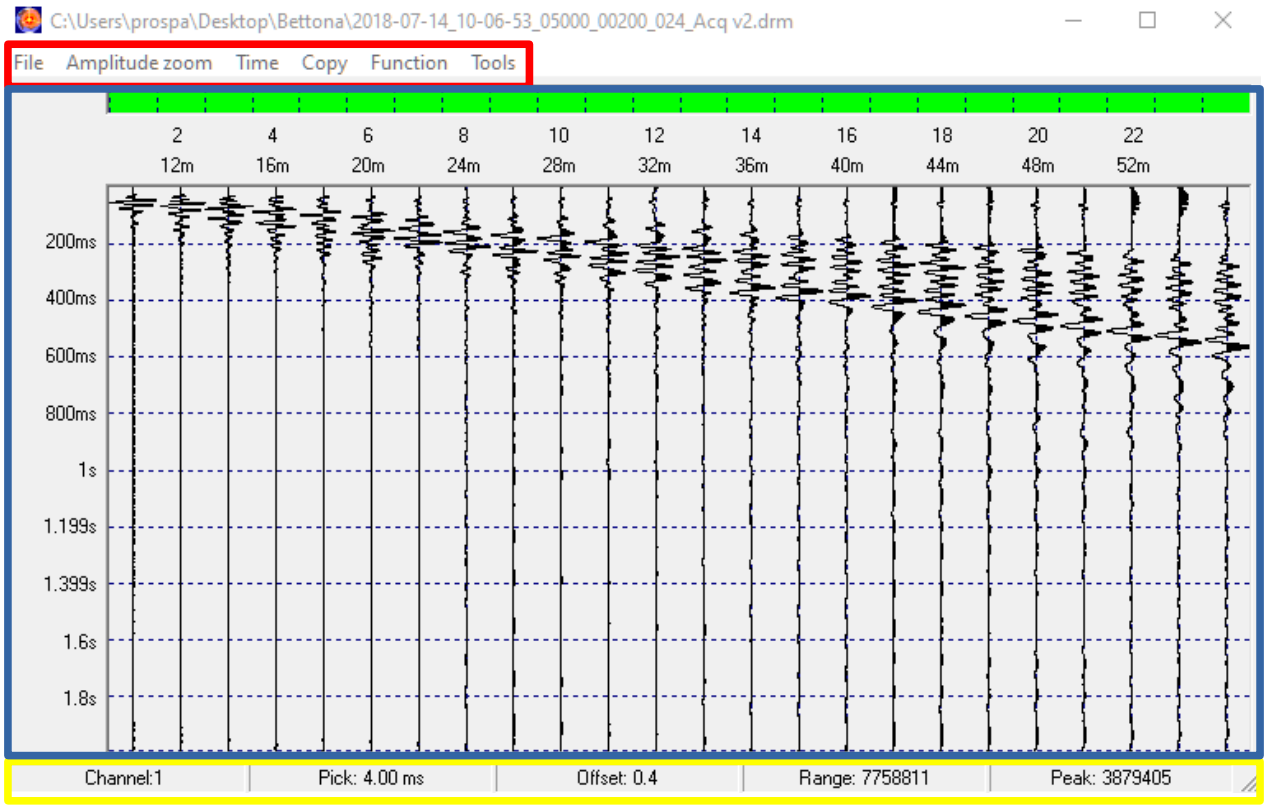


Illustration 3.89

The Seismograms window has three main features: the *Menu Bar* (Red Box) that allow you to do some operation, the *Seismogram representation box* (Dark Blue Box) and the *Parameters Bar* (Yellow Box).

When you move the mouse over the seismogram, the *Parameters Bar* show what channel is under the mouse, the time picking, the amplitude average value (Offset), the amplitude range and the maximum amplitude value (Peak).

On the top of the *Seismogram representation box*, is possible to see a colored bar, with a square for every channel; this bar show the result of quality data check, and the result is shown with a color.

Green means the data is ok; Yellow means there is clipping; Red is critical and means there is a high offset value, or some sample with value 0 or the recording is missing some data.

Under this bar is possible to see the channel number and the distance from the shot location or the X, Y or Z value you have set with the geometry.

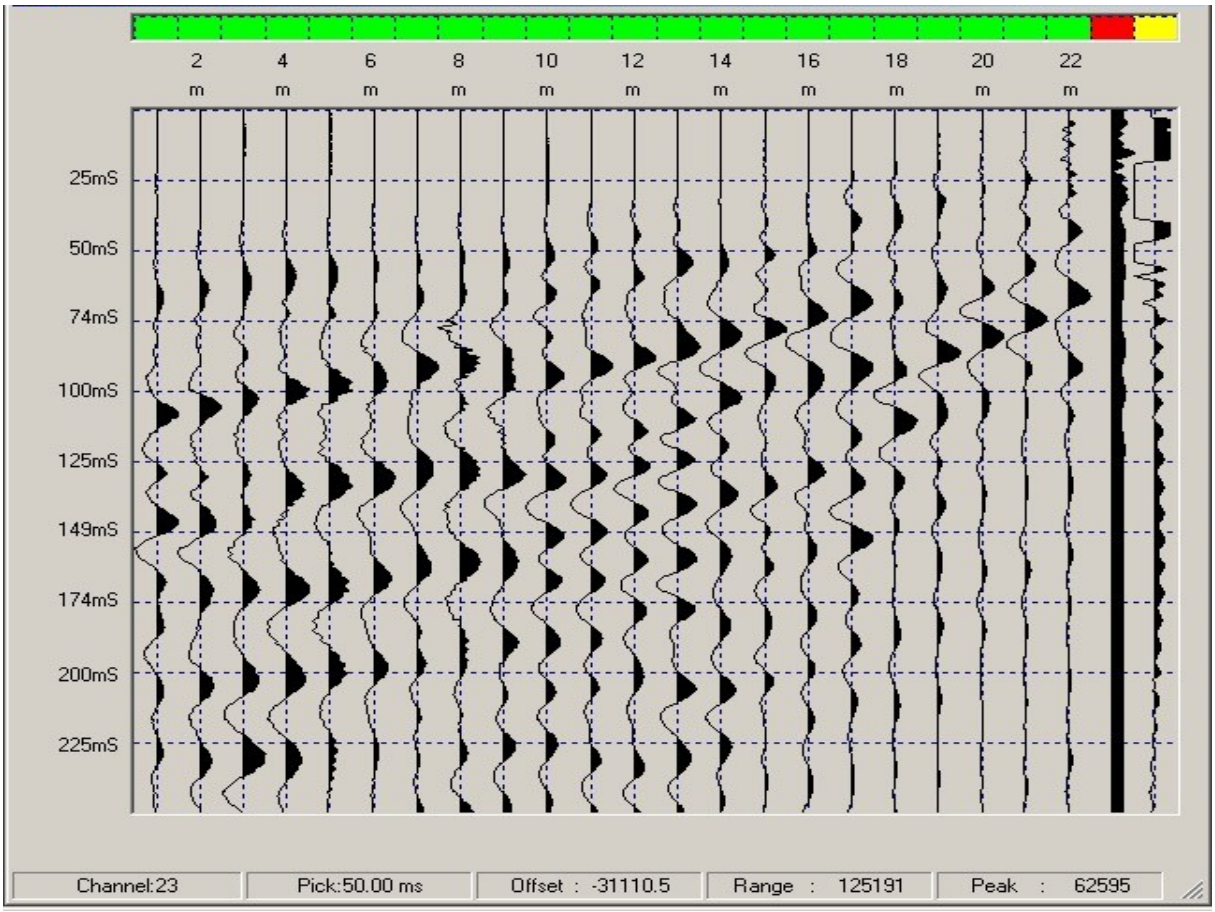


Illustration 3.90

3.8.3.1 Menu bar.

Allows you to do some operations on the visualization, in the File Header and save the modified file.

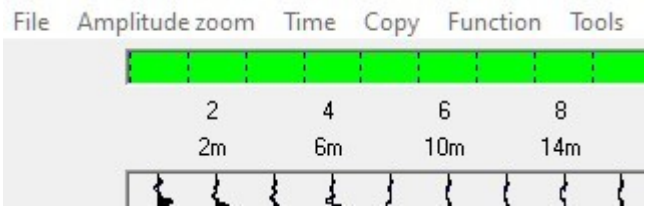


Illustration 3.91

File.

Open allows the user to open the *File Management* window.

Save allows the user to save the seismogram.

Save how... allows you to save the seismogram as a converted file (.CSV or .SAF or SEG-2 or SEG-Y or as a .drm processed).

Please Note: Saving the file as a .drm processed create a new file that is the image of the visualized seismogram.

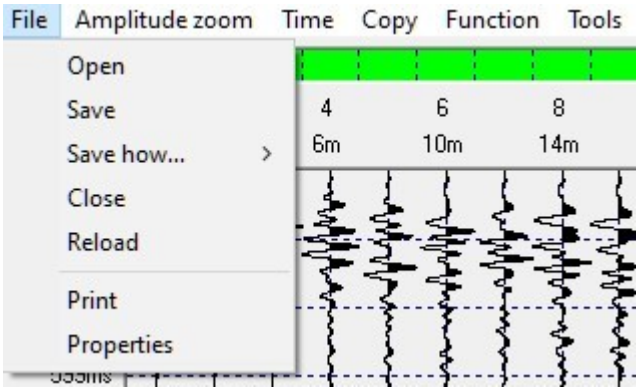


Illustration 3.92

Close allows you to close the selected seismogram.

Close all allows you to close all the opened seismograms.

Reload allows you to reload the selected seismogram with the last saved parameters.

Print allows you to print the selected seismogram.

Properties opens the *Header window.* That window allows you to change any information of the recorded seismogram (Date and Time of the recording; Shot Location in X,Y and Z; Label and Notes).

Copy on clipboard allows to copy the picking and gives the possibility to paste it.

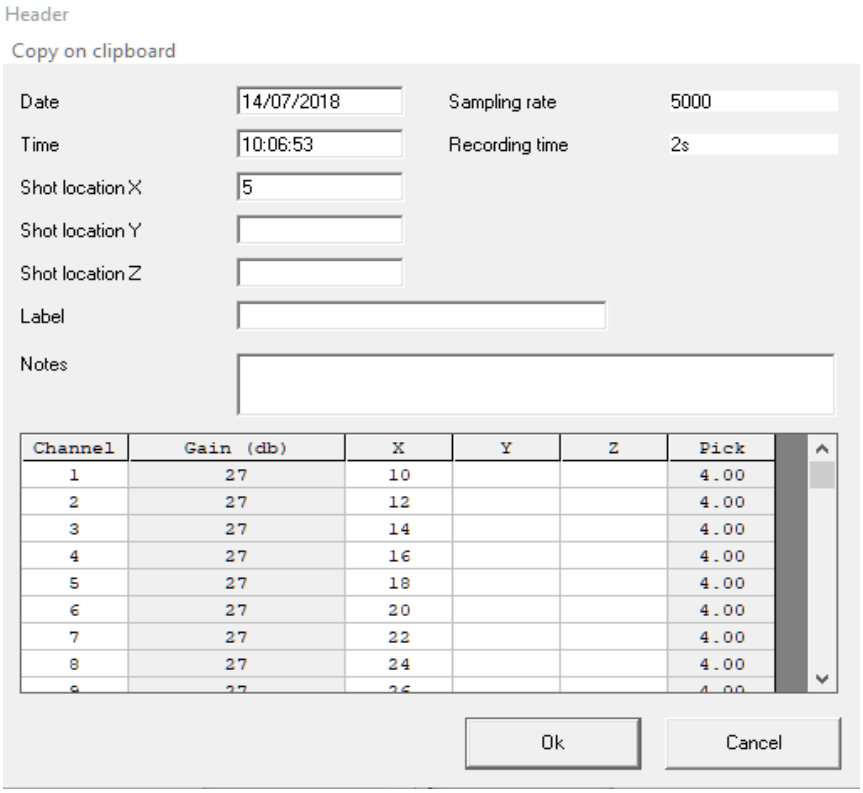


Illustration 3.93

On the table is possible to modify the geometry by drag selection and then by ENTER button is possible to open the *Channel position* window (see chapter 3.5 Channel setup. page 43).

The *OK* button confirms the displayed settings.

> *Please Note: if any change has been done on the ID, the software will save a new file.*

The *Cancel* button cancels the settings without restoring the last.

3.8.3.2 Amplitude zoom.

Allows you to choose what kind of visualization to use on the selected seismogram.

Is possible to apply those visualization options using the *Graphic Setup* (see chapter 3.6.1.8 Graphic. page 51).

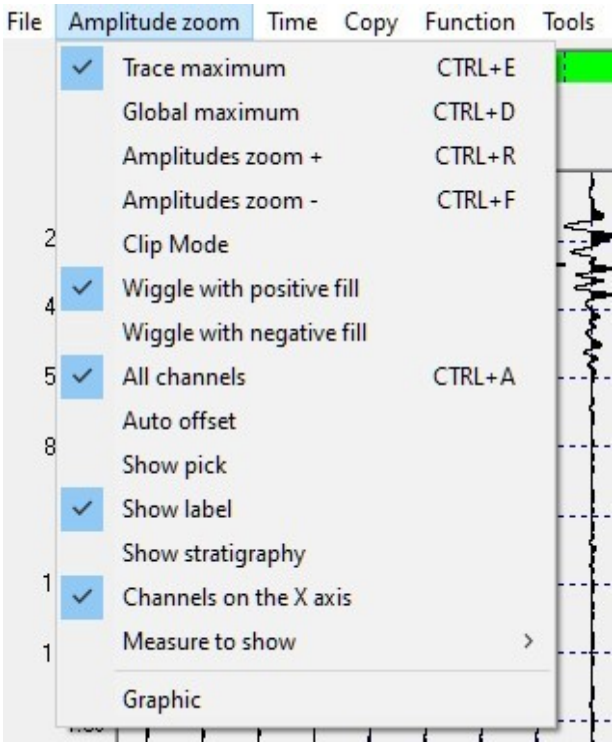


Illustration 3.94

Trace maximum and Global maximum.

Trace maximum optimizes the wavelet amplitude for each Channel. Every Channel has a different graphical scale.

Global maximum optimizes the wavelet amplitude for every Channel with the same graphical scale.

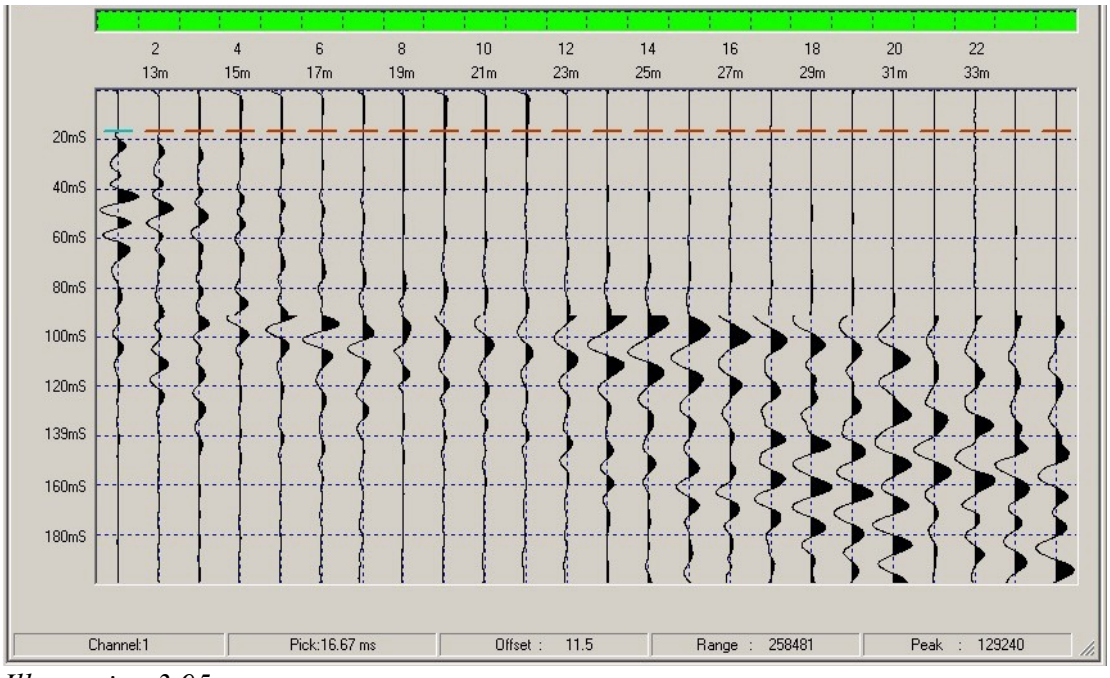


Illustration 3.95

Amplitude zoom + and Amplitude zoom –.

Allow the user to modify the signal amplitude of the seismogram.

Please Note: this option works only on the visualization, it does not affect the data.

Clip mode.

This option indicates whether, when you run amplitude zoom in the view, the excess of the waveform display area of the Channel must be cut off thus avoiding overlap with other Channels tracking. the picture below shows the same seismogram with the clip mode activated (upper part) and not activated (lower part).

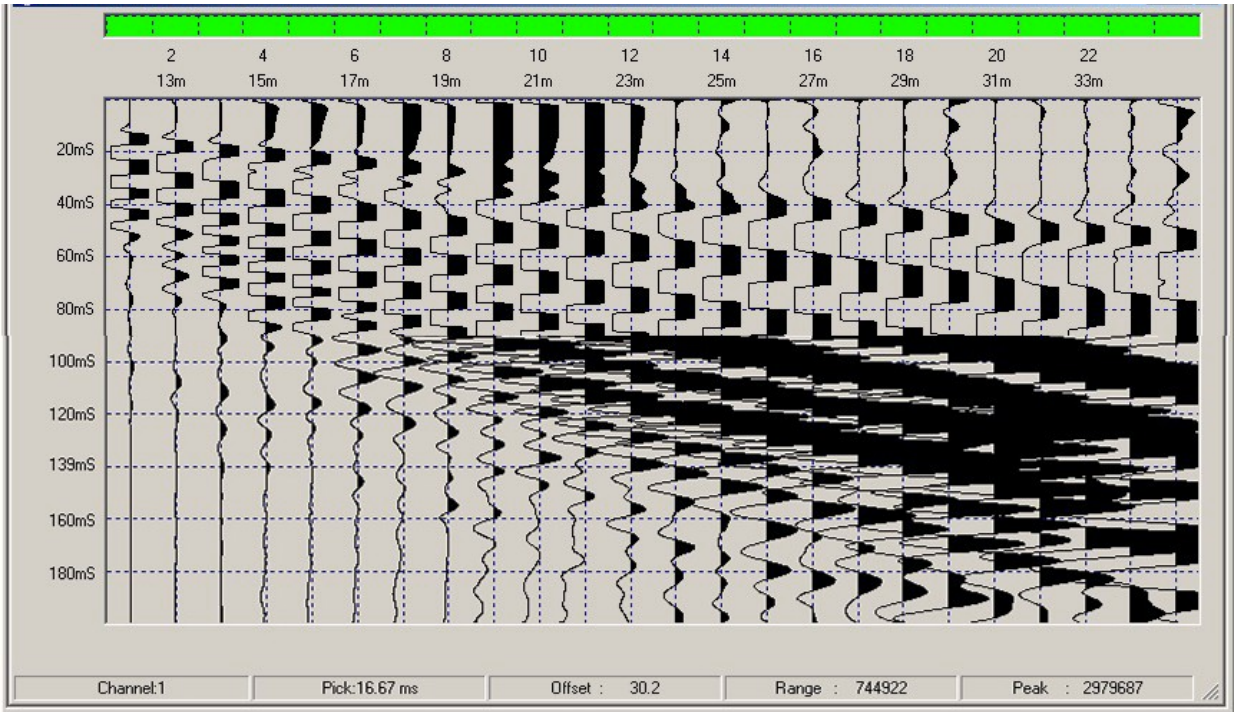


Illustration 3.96

Wiggle with positive fill and *Wiggle with negative fill* allow the user to choose what portion of the wavelet to fill.

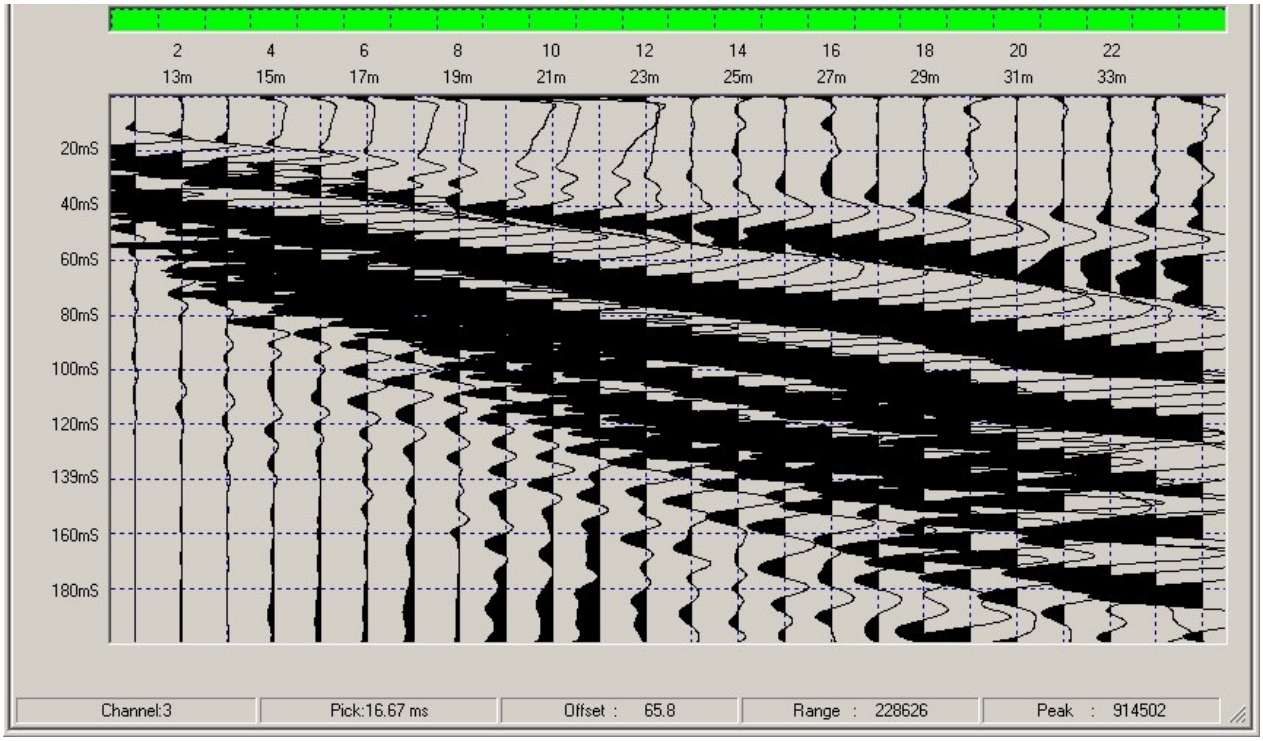


Illustration 3.97

All Channels allows you to visualize all the channels after the option *Group*.

Show pick.

Seismogram with picking.

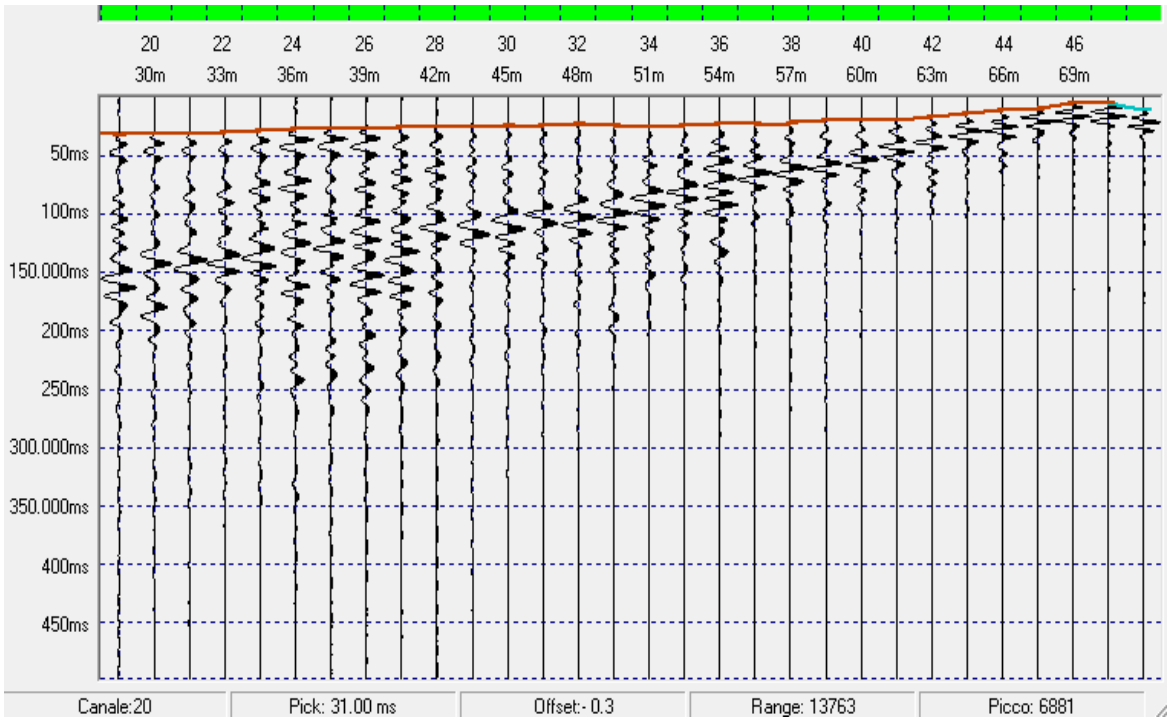


Illustration 3.98:

Show stratigraphy.

This option works with the Time intercepted method based with the picking.

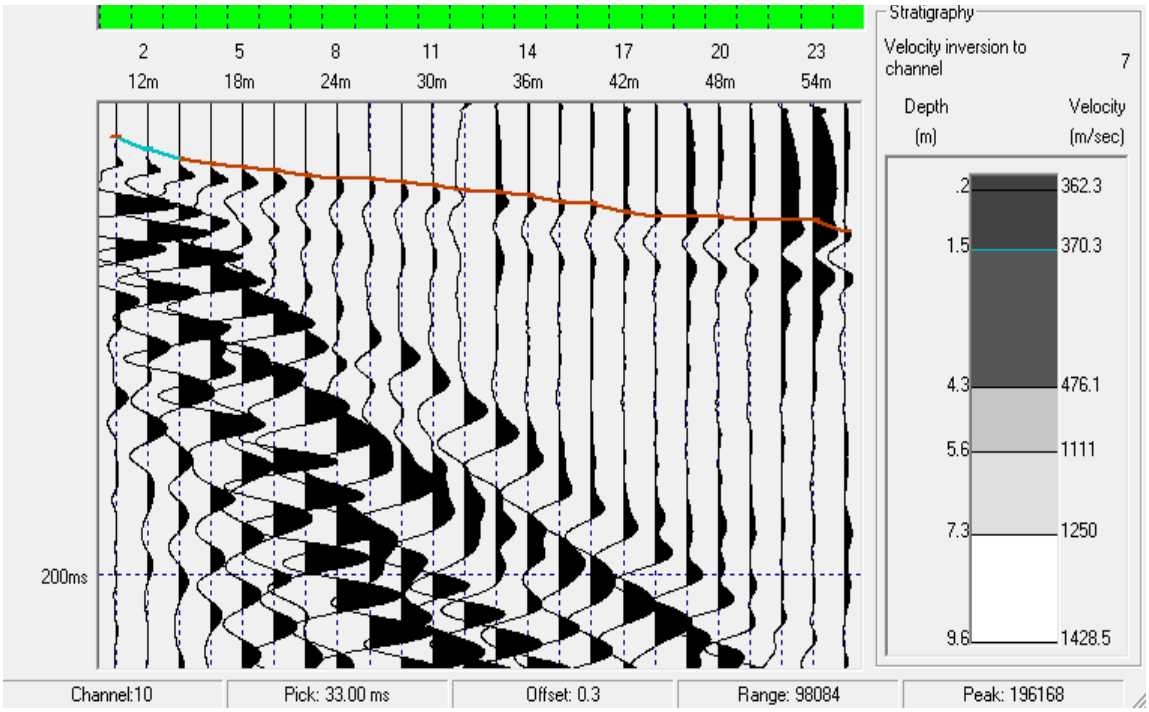


Illustration 3.99

Show label.

If not selected the software hides the vertical and horizontal (X and Y axis) scale.

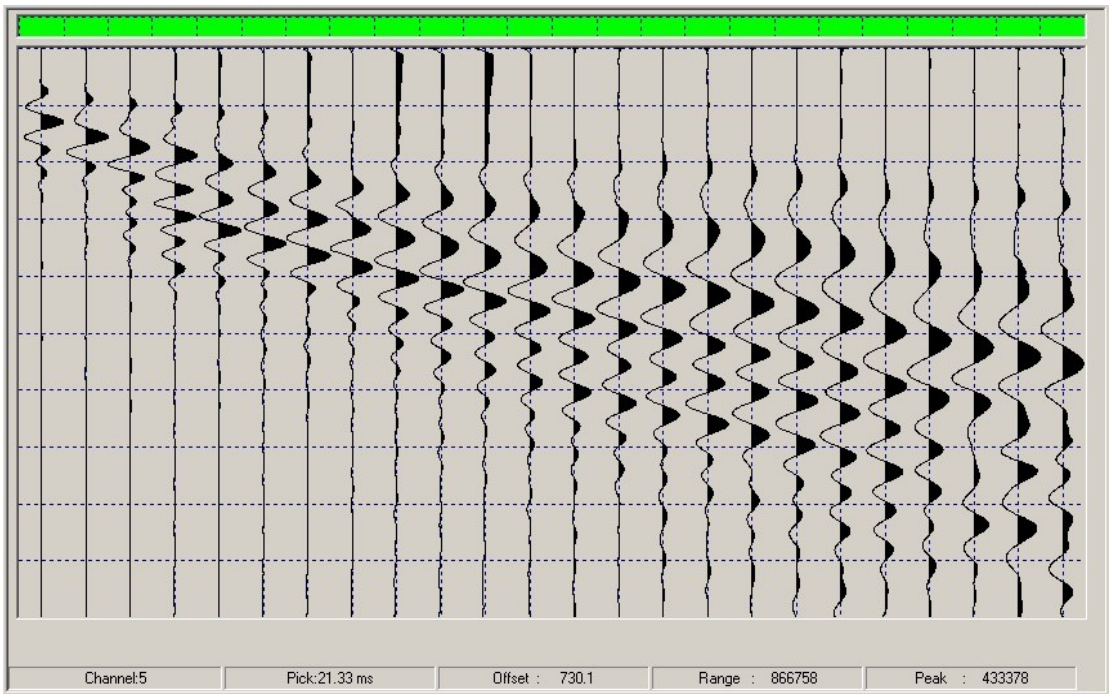


Illustration 3.100

Channels on the X axis.

If not enabled it switch the visualization from left to right

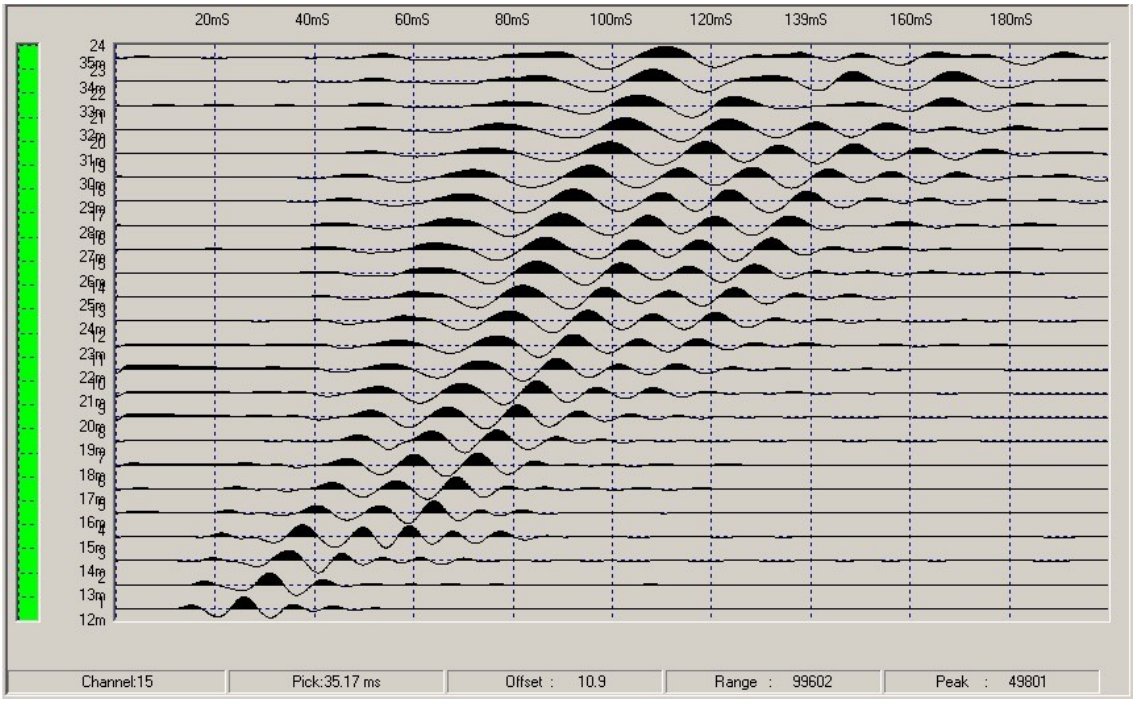


Illustration 3.101

Measure to show.

This feature allows you to show the X, Y or Z coordinates of every channel or to calculate and show the distance between the shoot and every channel.

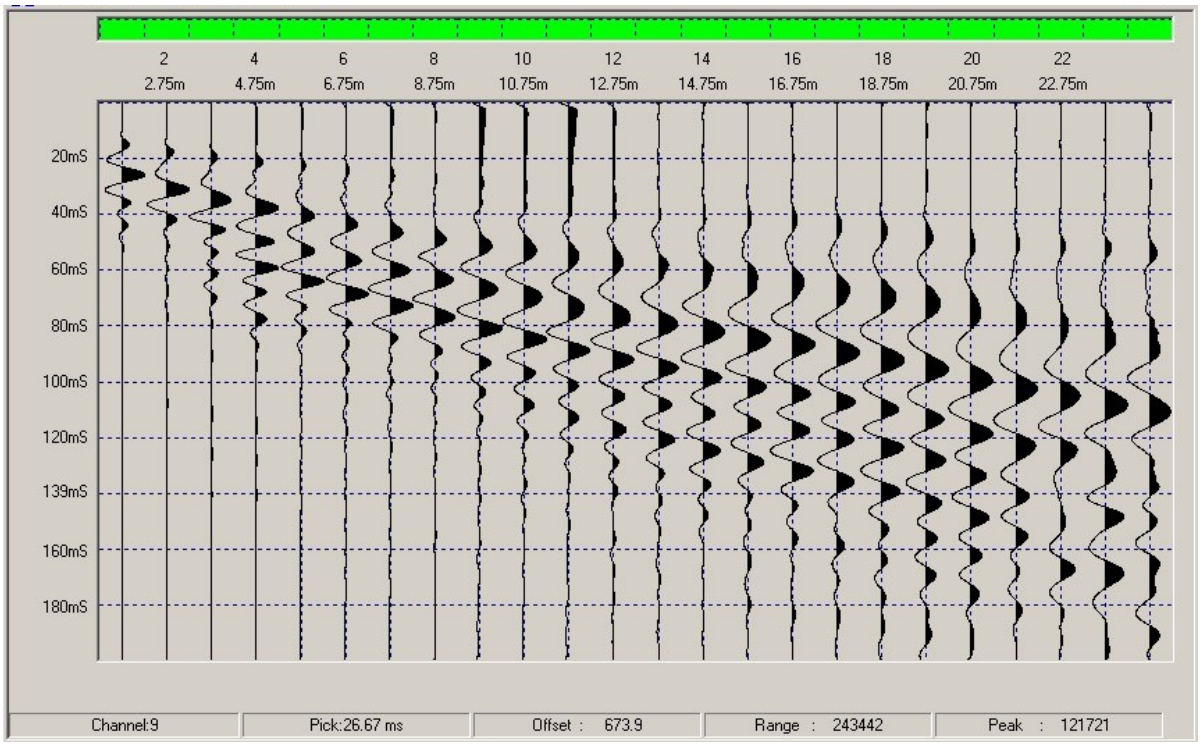


Illustration 3.102

3.8.3.3 Time.

Allows you to modify the time of the selected seismogram. This operation allows to manually synchronize different seismograms.

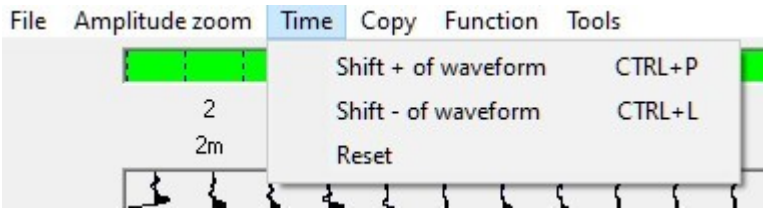


Illustration 3.103

Please Note: This operation works on the recorded data. We recommend to save the seismograms as a .drm processed. In that way the software will save a new file without modifying the original file. This operation does not affect the picking.

Shift + of waveform and Shift - of waveform.

Shift + of waveform moves the wavelet t0 up or left (it depends on the visualization). The effect is the translation of all the wavelets.

Shift - of waveform moves the wavelet t0 down or right (it depends on the visualization). The effect is the translation of all the wavelets.

Reset brings back the wavelet to the original position.

Shift + of waveform.

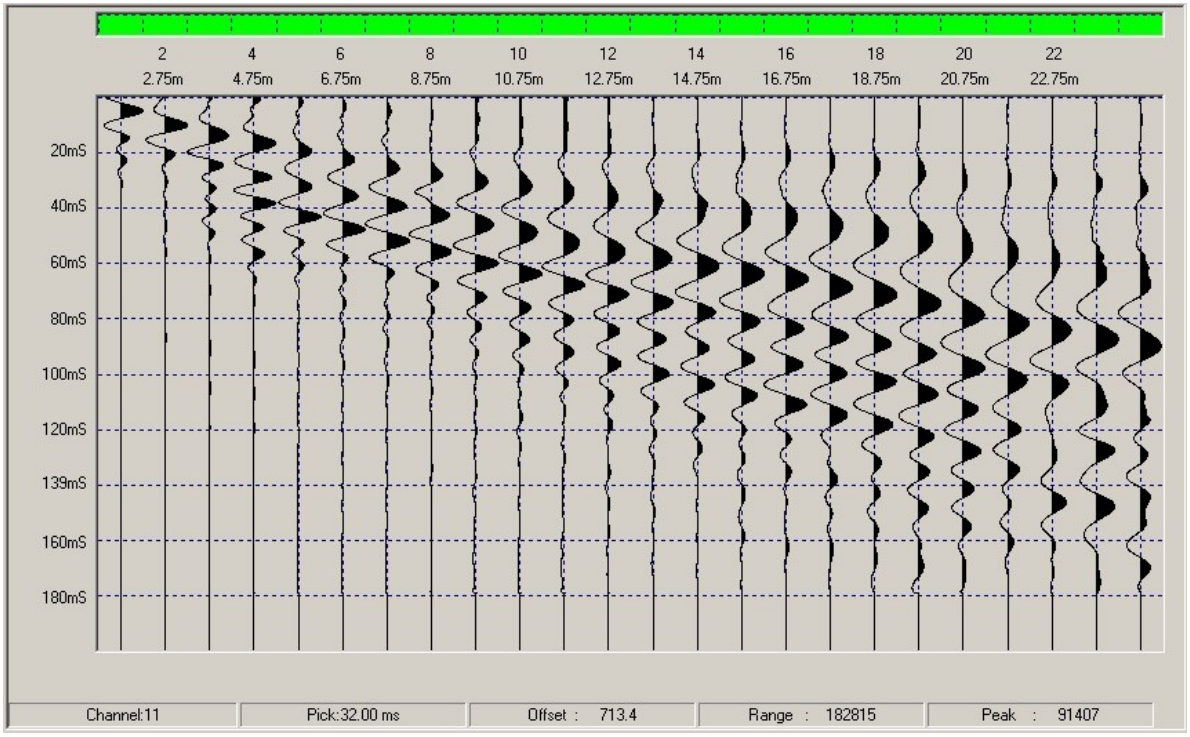


Illustration 3.104

Shift - of waveform.

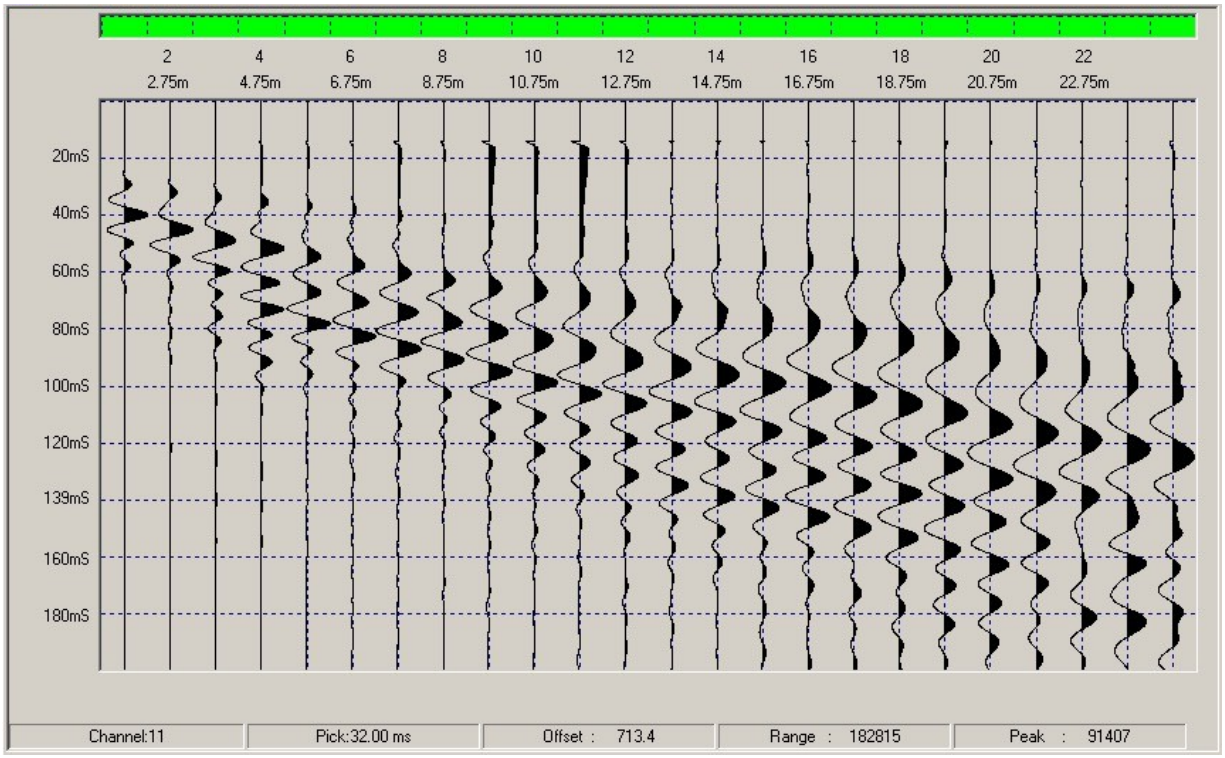


Illustration 3.105

3.8.3.4 Copy.

This tool copies all the waveforms of the selected seismogram, and allows to paste it on any graphical program.

3.8.3.5 Function.

Inside is present the function *Invert all* that will invert all the seismogram polarity.

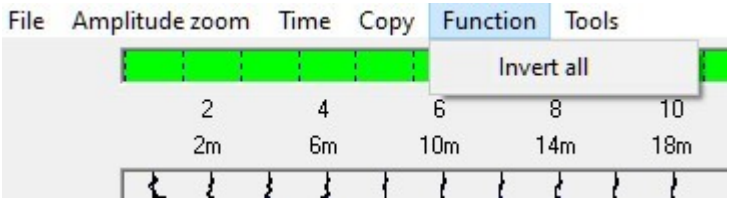


Illustration 3.106

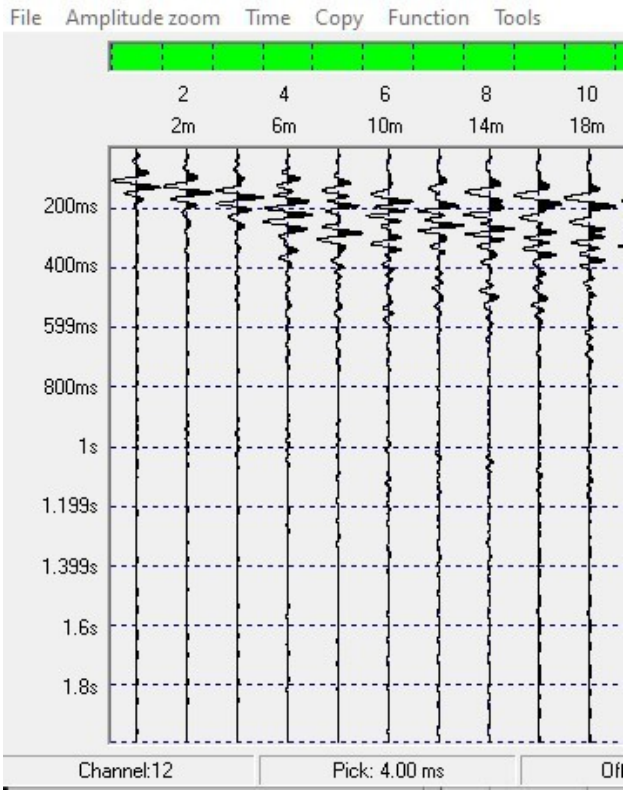


Illustration 3.108

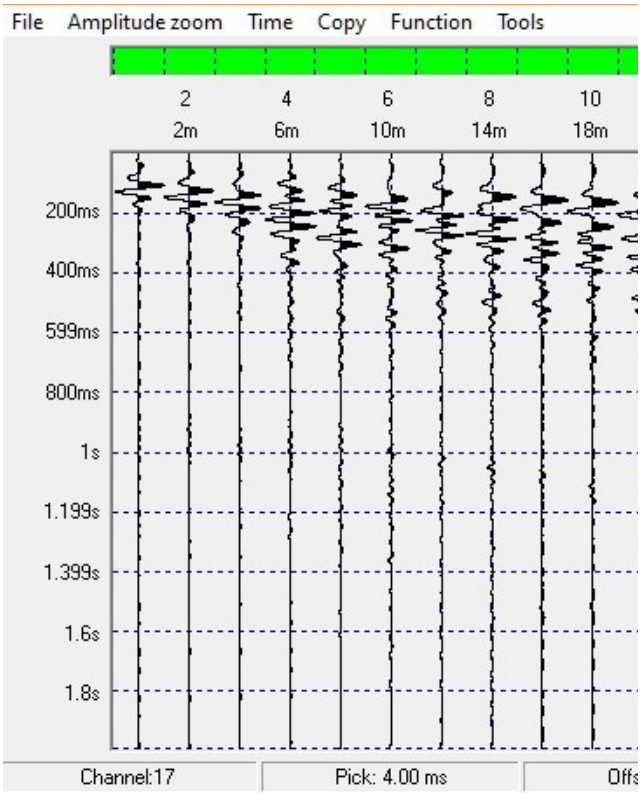


Illustration 3.107

3.8.3.6 Tools

This menu has several options:

- *Modify waveforms*
- *Show elaboration window*
- *Open in MARW*
- *Open in SSV*

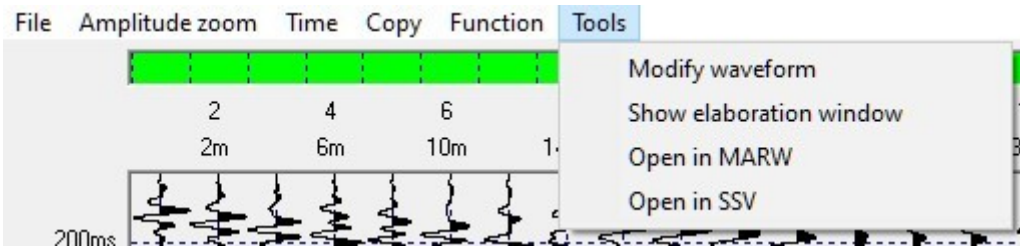


Illustration 3.109

Modify waveforms

It opens a new window where is possible to modify the seismogram

On the top left is possible to open the visualization options (see chapter 3.8.3.2 Amplitude zoom. page 83)

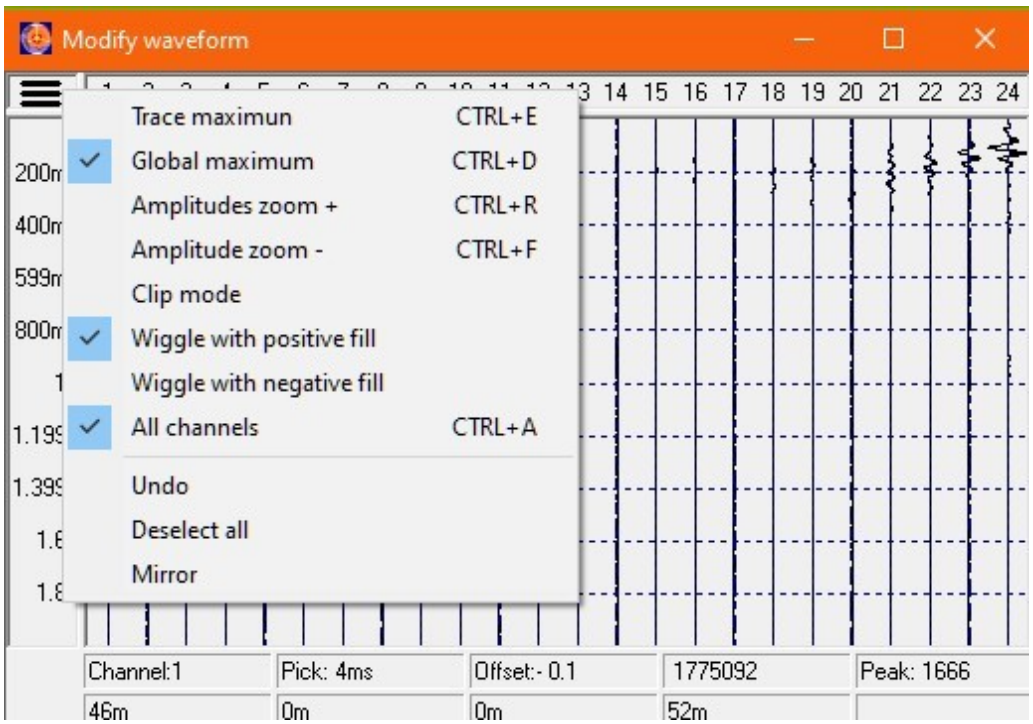


Illustration 3.110

On this menu is possible to chose between: *Undo, Deselect all, Mirror.*

Undo.
The software will store the last applied function, and with this option is possible to undo the last operation.

Deselect all.

While you are working on the seismogram, it will be possible to select more then one channel.

Using this option will deselect all the channels selected.

Mirror.

This option will flip the position of each channel.

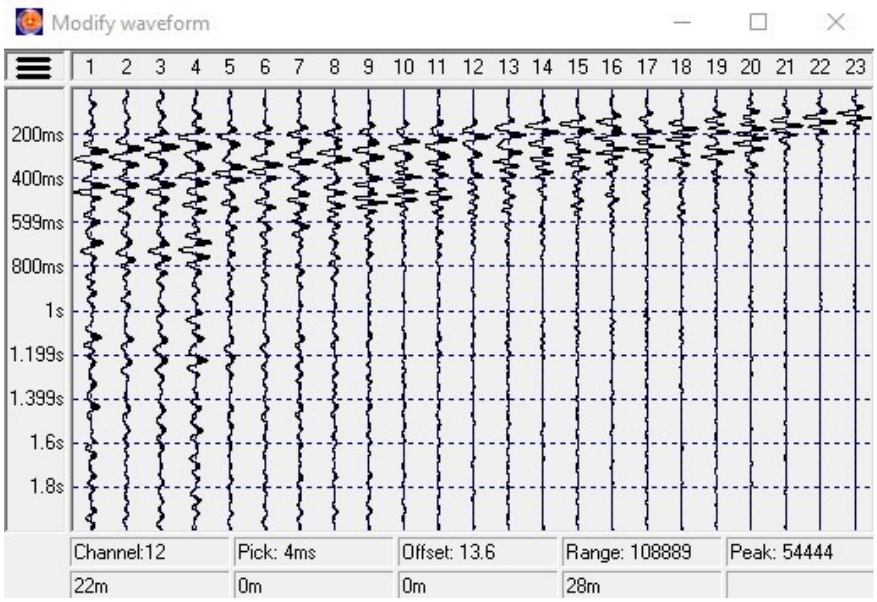


Illustration 3.111

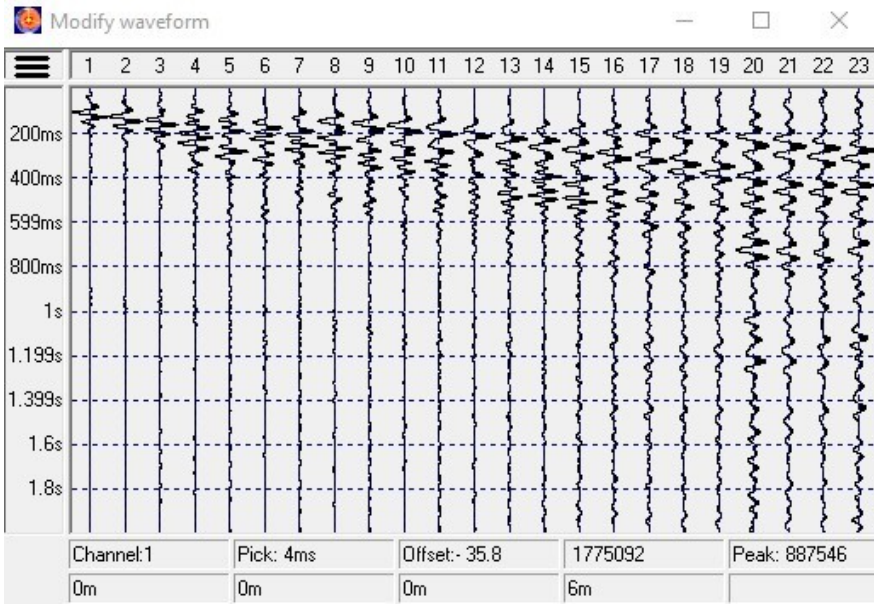


Illustration 3.112

With the right click on the seismogram is possible to open the editing menu of the seimsograms for the visualization (see chapter 3.8.3.2 Amplitude zoom. page 83 and chapter Seismogram representation box. page 97) and it has different options:

1. Select to movement
2. Delete
3. Mute
4. Move here the selected channels
5. Mute above here

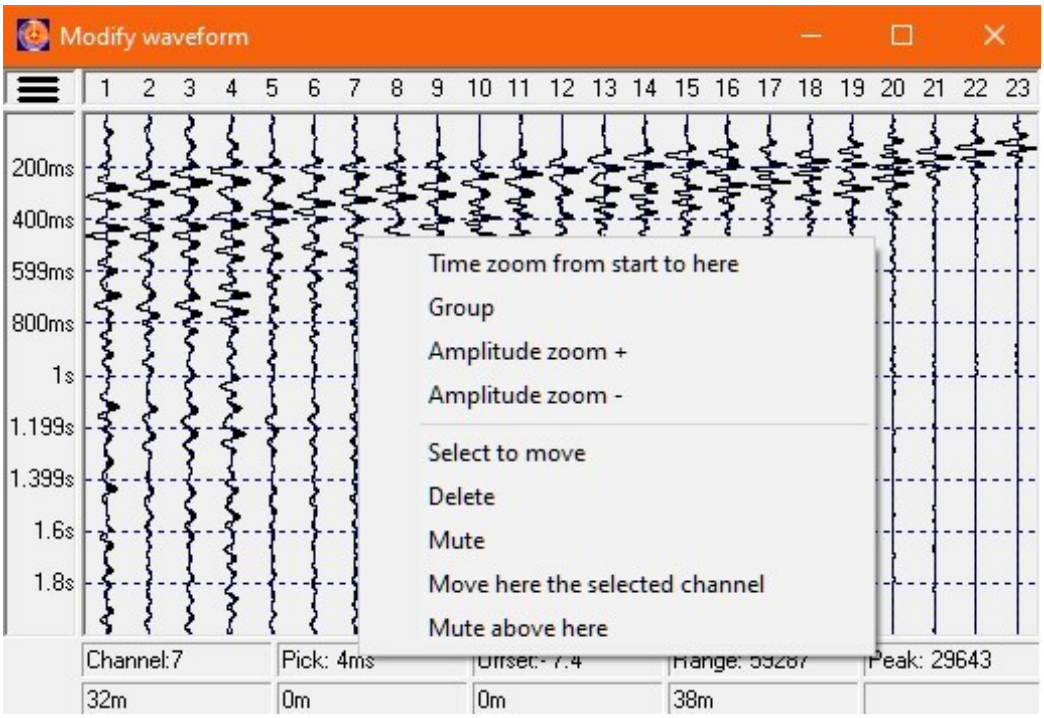


Illustration 3.113

1. Select to move.
This option allows to select 1 channel and combined with *Move the selected channel* and move this channel in another position in the seismogram.

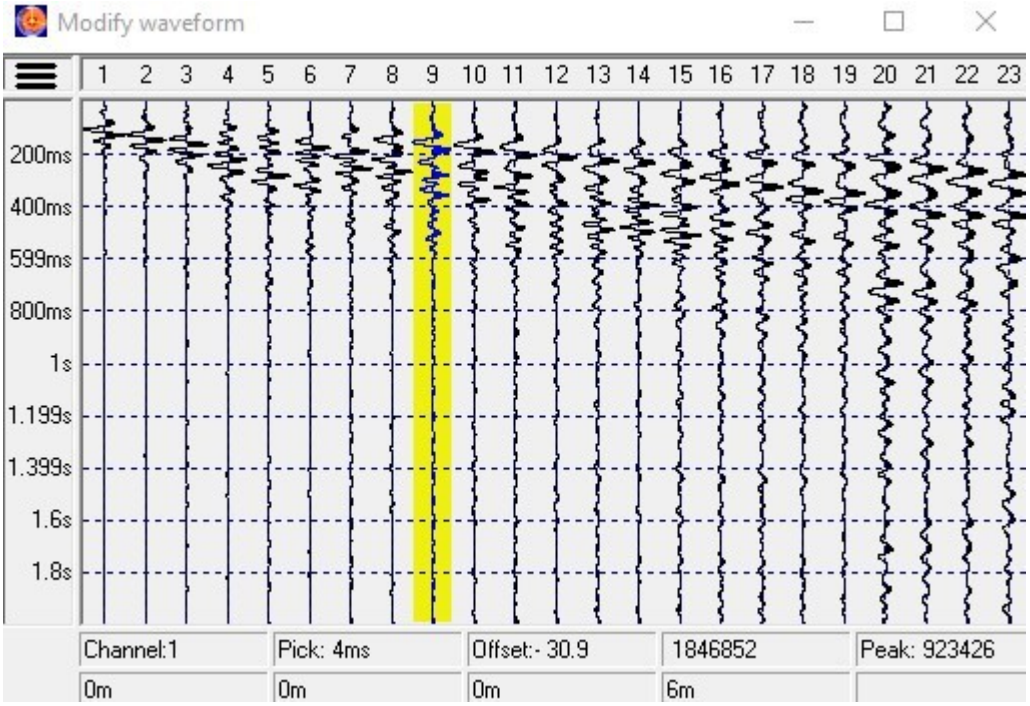


Illustration 3.114

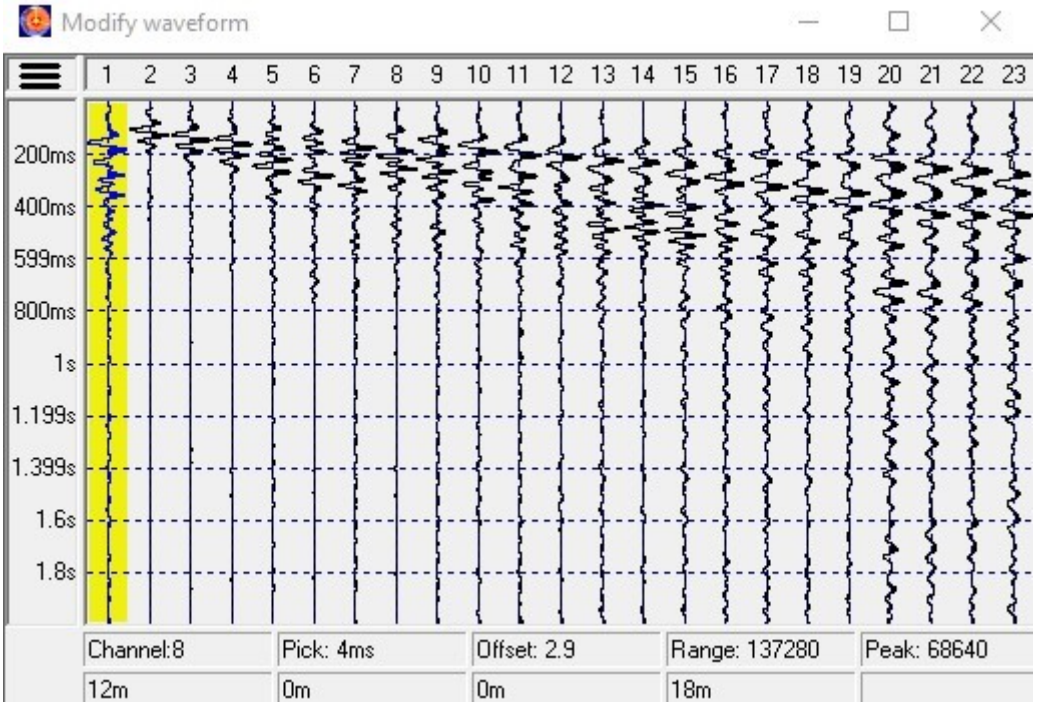


Illustration 3.115

2. Delete.
This function allows to delete one channel.

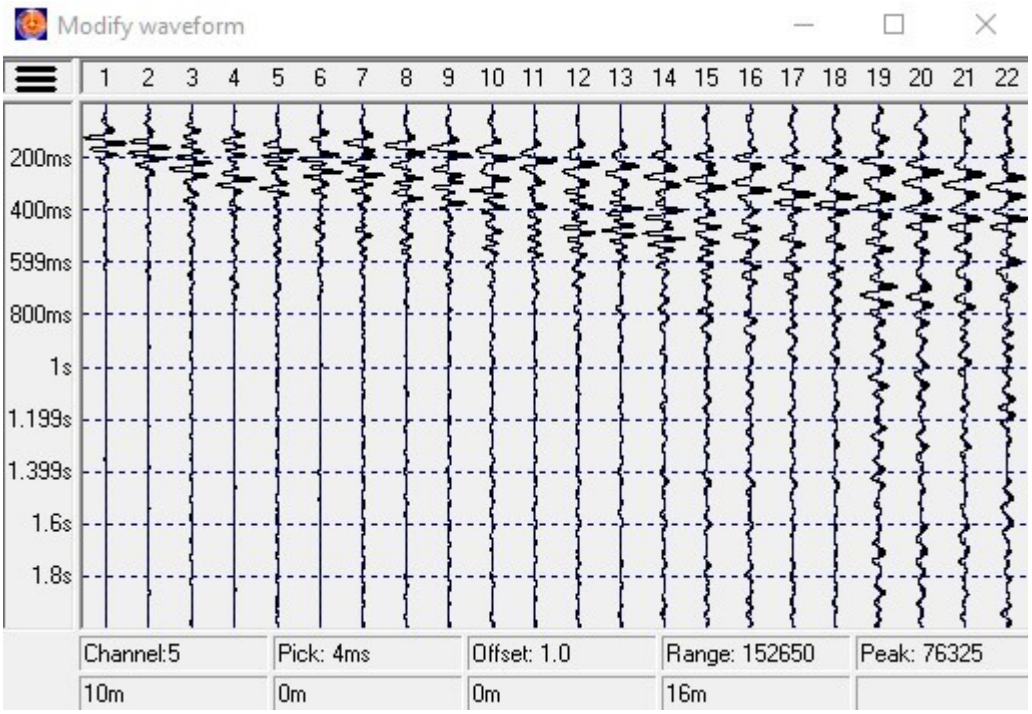


Illustration 3.116

3. Mute.
This option works without selecting the channel, it will work on the clicked channel setting all the sample amplitudes to 0 value.

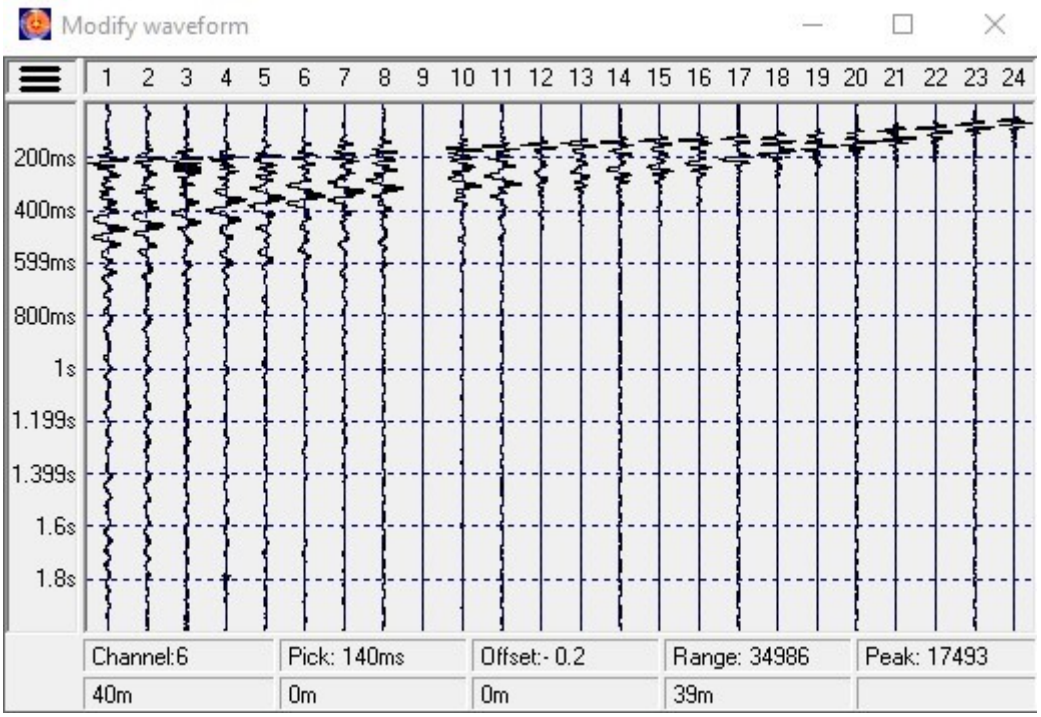


Illustration 3.117

3.8.3.7 Seismogram representation box.

By right click on the seismogram is possible to open the *Seismogram representation box menu*.

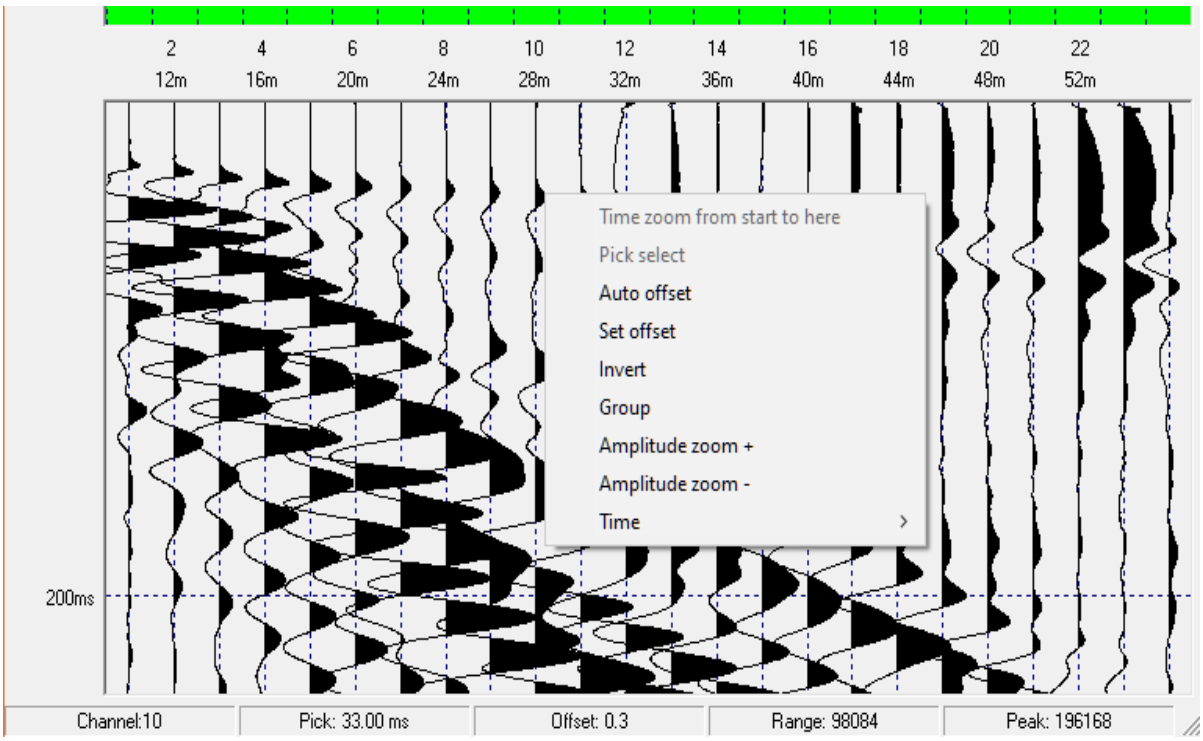


Illustration 3.118

This menu contains some features already explained (Zoom + and Zoom -, Time) and some other features explained below.

Zooming options.

Using the option *Time zoom from start to here* it is possible to visualize the data fro the T_0 to the time of the right click.

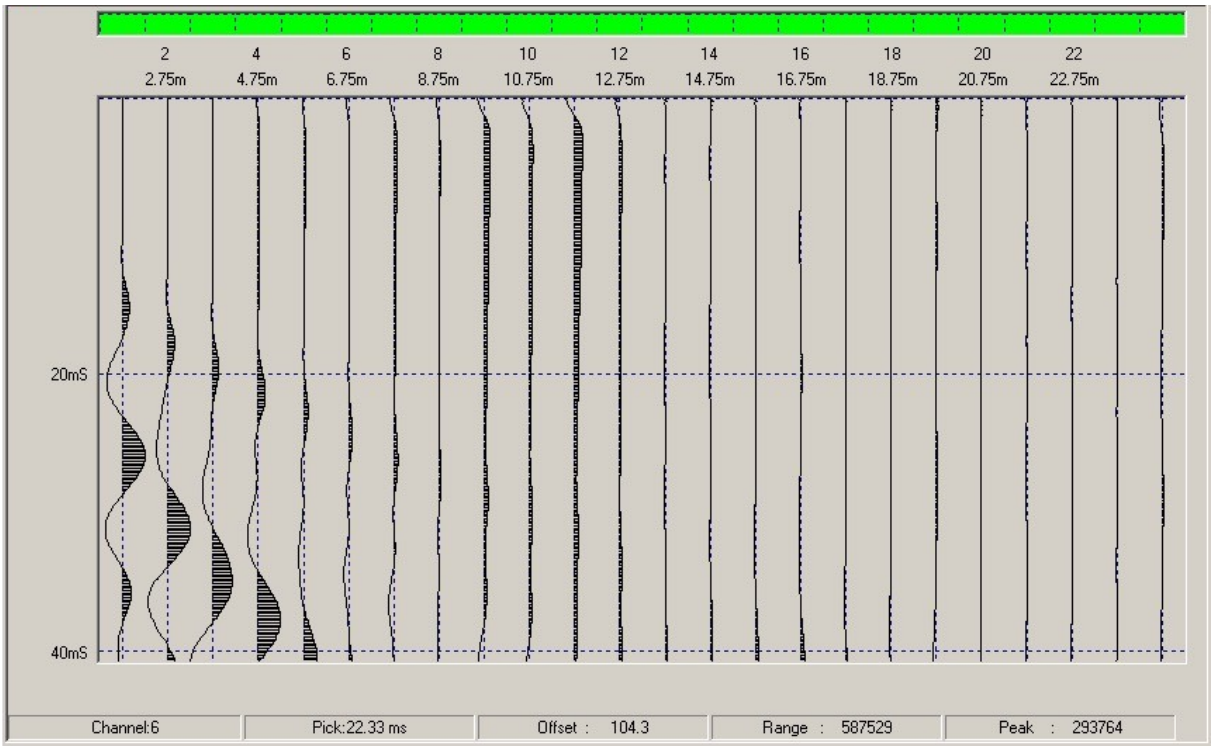


Illustration 3.119

With the normal click the software return to the default visualization.

With the normal click it is possible to set the Time *zoom green line*. After that by another click below (in millisecond) the line the software will zoom from the line to the clicked position.

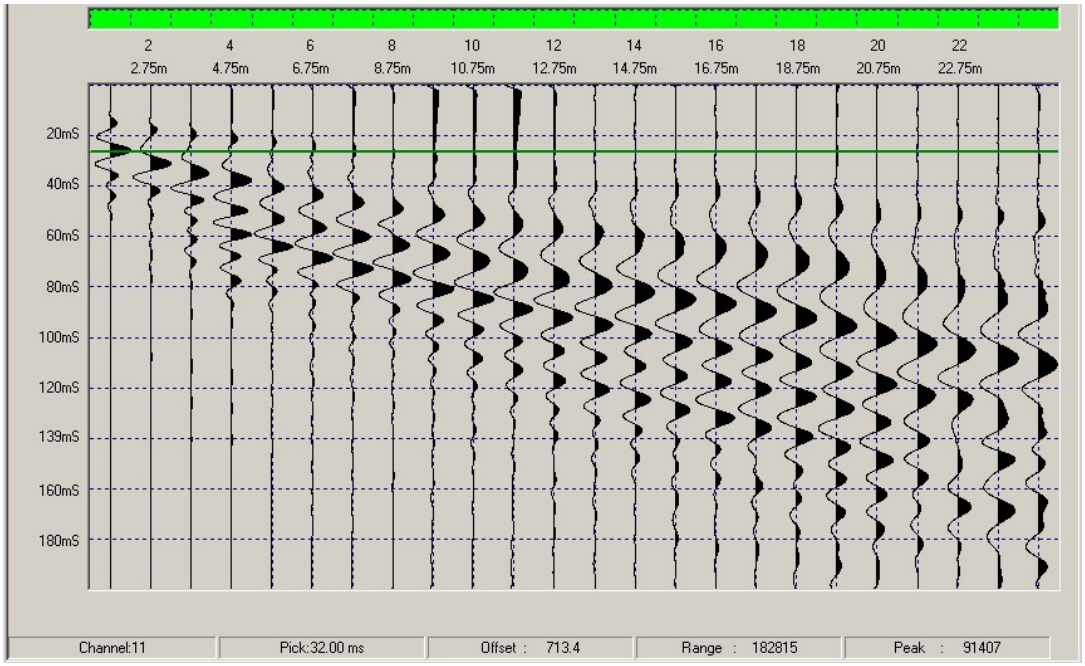


Illustration 3.120

Time zoom from 45ms to 145ms.

With the normal click the software return to the default visualization.

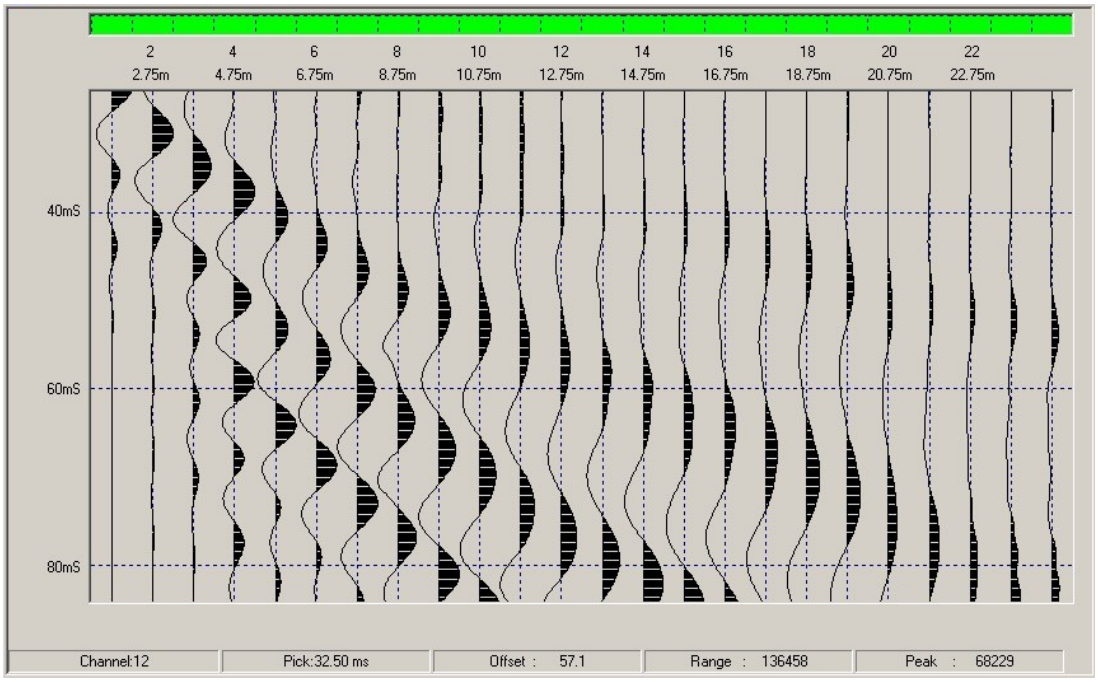


Illustration 3.121

Pick select.

That option allows you to pick the first arrival on the selected Channel (if the option *show pick* is not selected, this option will be disabled) at the time of the right click. A light blue line will appear and with the keyboard arrow up and down it will be possible to move the picking sample per sample. All the picking not selected will have the brown color. It is possible to switch between Channels using the left and right arrow on the keyboard.

Please Note: The software default picking is 4ms

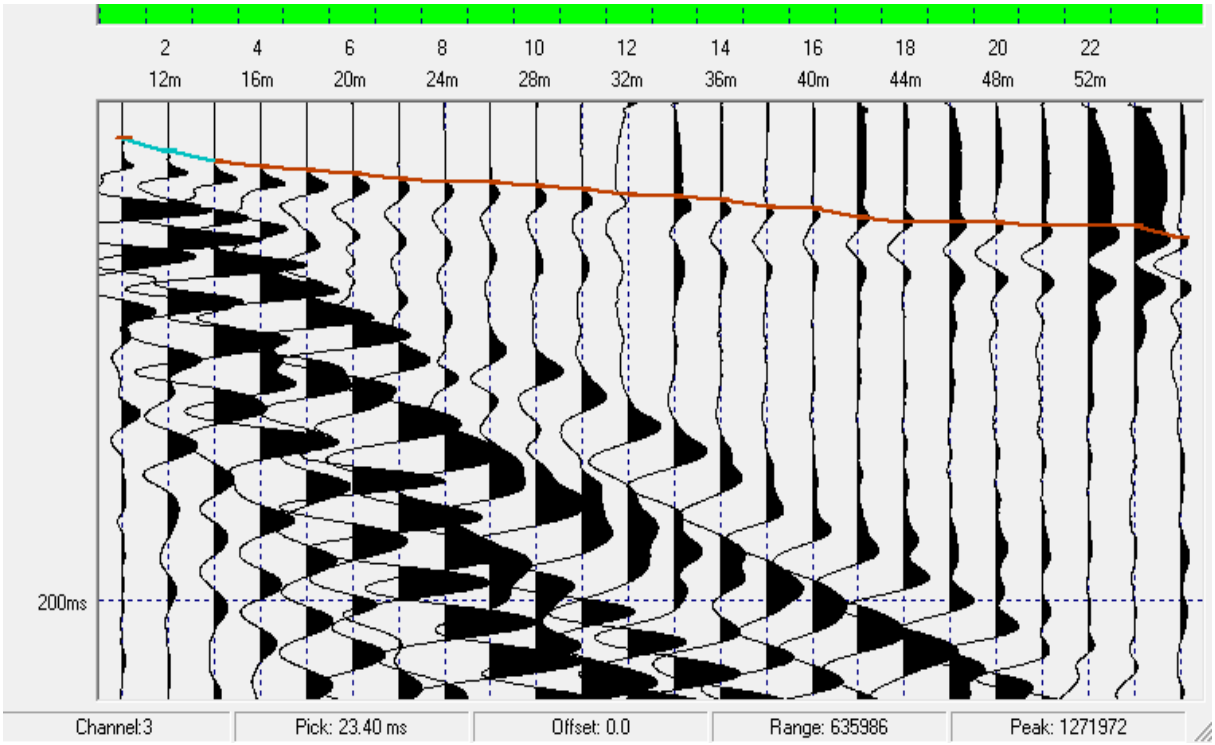


Illustration 3.122

It is possible to perform the picking by the combination Shift + Click and dragging the mouse over the channels.

Set offset.

Allows to choose the position of the 0 value of the single Channel; that position is define by the right-click. The effect is the translation of the wavelet.

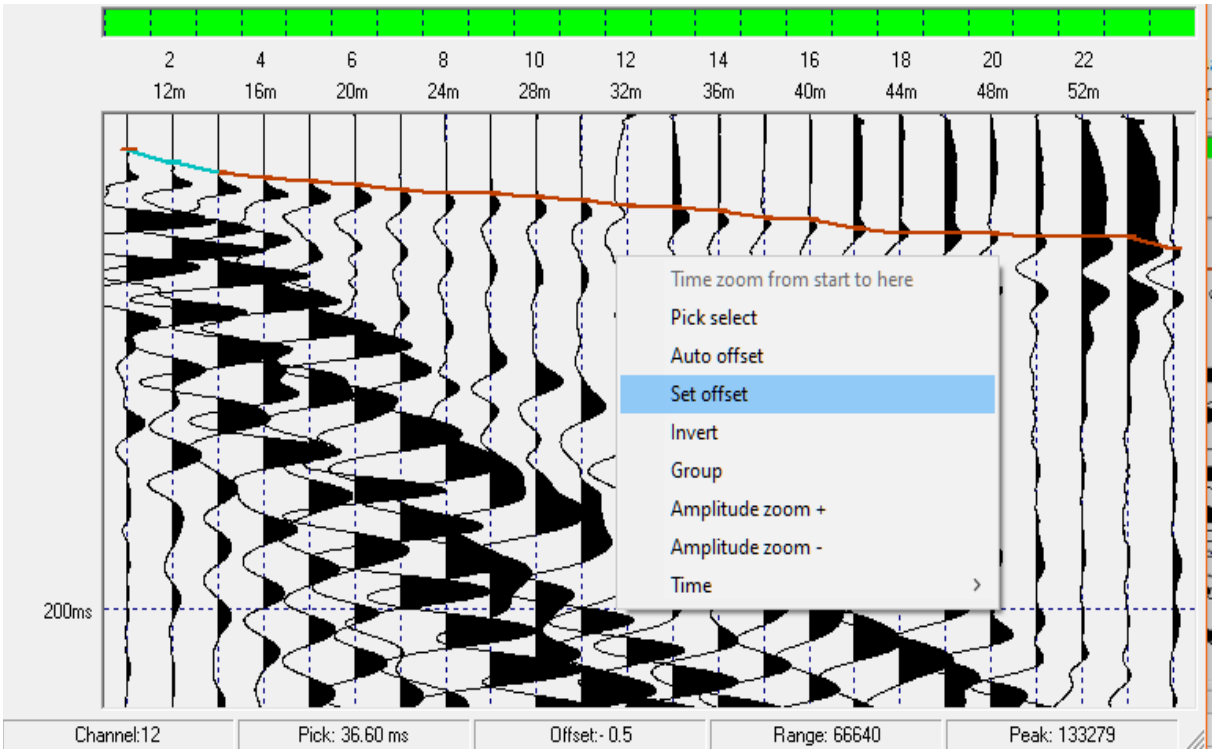


Illustration 3.123

In this screenshot is possible to see the effect of a high value of offset on the quality test on the colored bar (see chapter 3.8.3 Seismograms window. page 79).

Auto offset.

The software calculates the best correction for the selected Channel.

Please Note: The software calculates this correction as default position for every Channel.

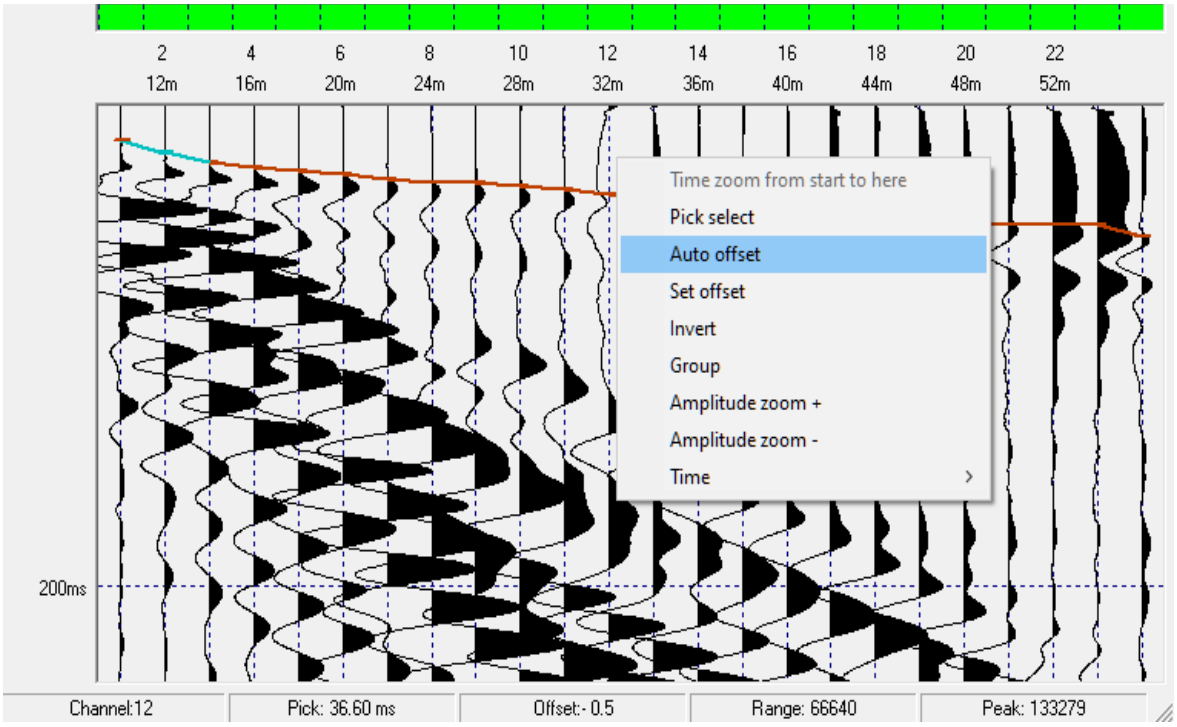


Illustration 3.124

Invert.

This option allows you to invert the polarity of the selected Channel.

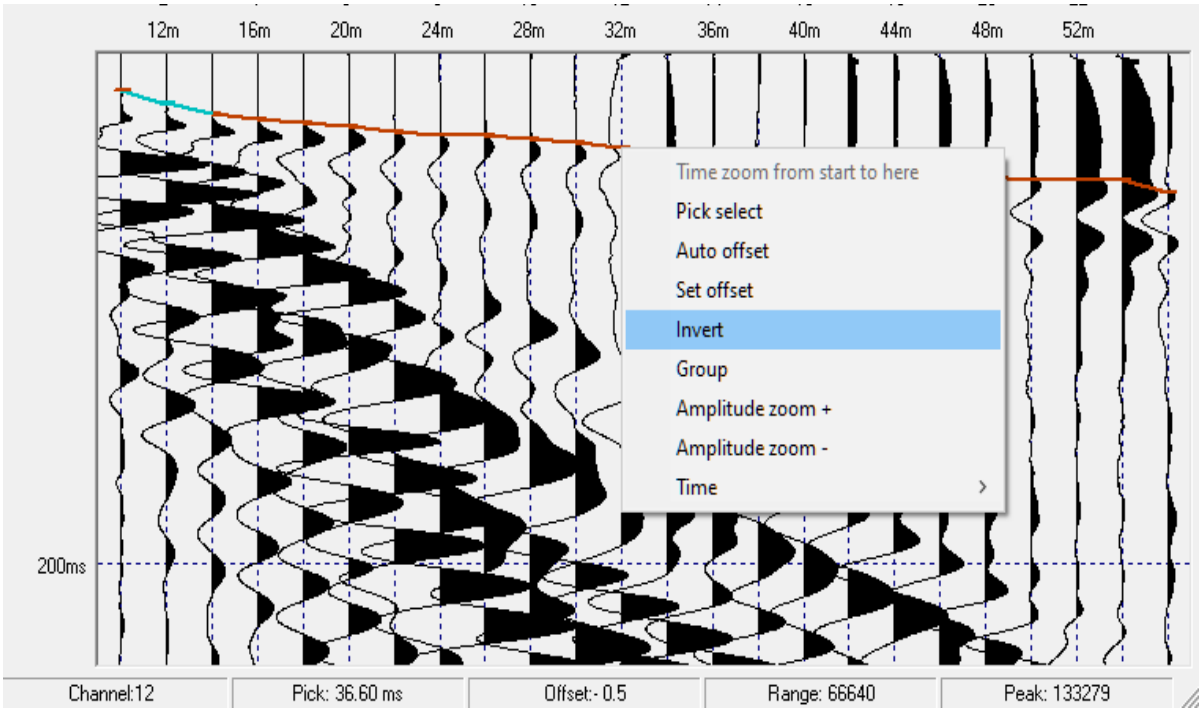


Illustration 3.125

First Channel inverted polarity.

Group.

This option allows you to define a group of Channels and to visualize only this group. The group is defined from the first Channel to the Channel selected by the right click.

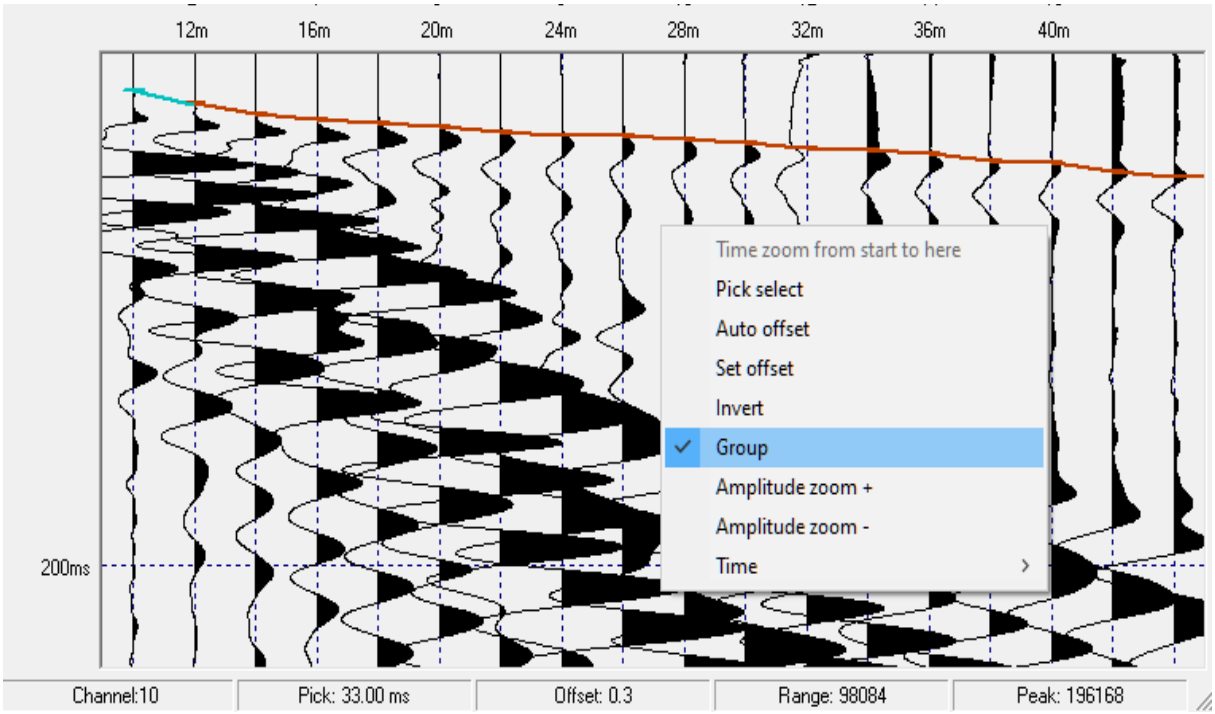


Illustration 3.126

Group of the first 8 channels, with the first channel inverted.

Amplitude zoom + and *Amplitude zoom* -.

Time is the same menu described at chapter 3.8.3.3 Time. page 88.

4 FAQ

On my Head Unit no LED is flashing or is switched on.

Usually this happens when the instrument is out of battery. This behavior is possible when the Unit Head is subject to high temperature; in that case put the Unit Head to cool down.

After few acquisition, or just after the instrument starting, the battery level is running low.

This problem is caused by the degradation of the battery. The degradation is function of how often is used the instrument. An intense use, or an extremely rare use of the instrument will affect the battery health. In out experience the average life period of a battery is 3 years. We recommend to run a complete charge at least once a month.

How long does the DoReMi battery last?

Under the hypothetical condition the Unit Head battery will last up to 5 hours in continuous download/sampling operation. The instrument is not always working, and after 30 seconds of inactivity the Head Unit stop the power supply of all the channels. The main problem instead is the computer battery last.

How long is the charge duration?

We recommend to charge the instrument for 6 to 8 hour with the Unit Head switched on.

Is there the possibility to charge or use the seismograph with external power supply, as car battery?

Yes it is possible. There are different solutions; the most ease is to buy a car laptop power supply. To charge the DoReMi battery and/or the laptop battery. If for any reason you do not have the possibility to use the car cigar lighter, you could use an external battery (12V) with the adapter (alligator clips / cigar lighter adapter) and connect the car laptop power supply.

Please Note: The car laptop power supply must to be: 

Please Note: This solution is good to charge the instrument; we recommend to avoid acquisition during the charge, if not necessary.
If you want to power more channels, so you are exceeding the 24 channels, you MUST use a Power Booster.

One channel or more have an anomalous behavior.

That problem could have different origins:

a) geophone or channel broken.

In that case moving the geophone to different channels and see if the problem is moved with the geophone or not will indicate if the problem is the geophone or the channel.

b) Inverted connection between the geophone and the channel.

You must to take care when you are connecting the geophone split spring to the channel digitizer because the split springs and digitizer have a specific shape. Sometimes during an acquisition is ease to connect with the inversion.

c) Wet and dirty connection between geophone and channel.

It is possible to perform a survey on wet grass; in that case we recommend to protect the connection from wet grass; water can modify the signal and ruin the metal.

In other situation soil or vegetable parts could get stuck between the split spring and digitizer deteriorating the signal.

d) Power supply.

Sometimes, when the battery is running low or you have exceeded the suggested number of channels/ geophones (24 for each battery), it could be possible the system does not have enough power to supply all the chain and some channels could show anomalous behavior.

e) Geological and/or environment setting.

It is possible the behavior is independent from all the reason explained before and the waveform is dependent on geological and/or environment where you are performing the survey; in that cases it will be a pleasure to help you and share our experience (see chapter 1.9 Environmental precautions. page 15). **We recommend to send us a .zip file with the recorded data and the description of the survey, geological and environment settings.**

How many Channels the Unit Head can power?

The Unit Head can power 24 Channels without any problem with a cable length of 5m. If you are using more Channel is necessary to add a Power Booster. Every Unit Head/Power Booster can supply at last 24 Channels with the same cable length. For any doubt or issues with the geometrical disposition to optimize the Batteries duration we recommend to contact us.

There is no communication between my computer and my Unit Head.

First of all check the battery level and the cable connection. If any led is flashing or switched on the problem could be the battery. If everything is fine there are three possible causes:

a) wrong port comm.

Inside the DoReMi software is possible to find a tutorial that explain how to change the comm port number (inside: setup/instrument/setup/communication troubles? See chapter 3.6.1.2 Instrument. page 46).

b) wrong cable and/or damaged cable.

The cable you are using is the cable we gave to you? You must to consider that if you are using a different cable, there are two different serial cable: normal and inverted. The first one is used to connect PC to modem or printer or others devices as DoReMi; the inverted cable is use to connect PC to PC. If you have doubt or do you still have this problem do no hesitate to contact us.

c) RS232 driver.

When you are installing the driver of the RS232, you must to install the driver and then connect the RS232. If you do this process in a different order (connect and install) it is possible to have connection troubles.

There is no communication between the Unit Head and the channels.

That could happen when you change the ID Channel, but you do that with all the Channels connected. Every channel will have the same ID and the will be a conflict between Channels and the software will not be able to communicate with them. In that case we recommend to follow our instruction explained at chapter 3.6.1.3 Module setup. page 47.

The new version of the GE DoReMi needs at the first connection, or all the time the number or ID of the channels connected change, to the instrument to recognize the channel connected. if this step is skipped, the software Could have problems witht he comunication with the channels.

After an acquisition the seismogram visualized are not completely coherent; the first break is not aligned as expected.

That could happen if you have switched the position between Channels, e.g. you have move the first Channel between 3th and 4th Channel, or you have modified the ID of a channel and put it in the wrong position. To correct the seismograms you must to reassign the Channels number in the seismogram (see chapter 3.8.3.6 Tools page 91).

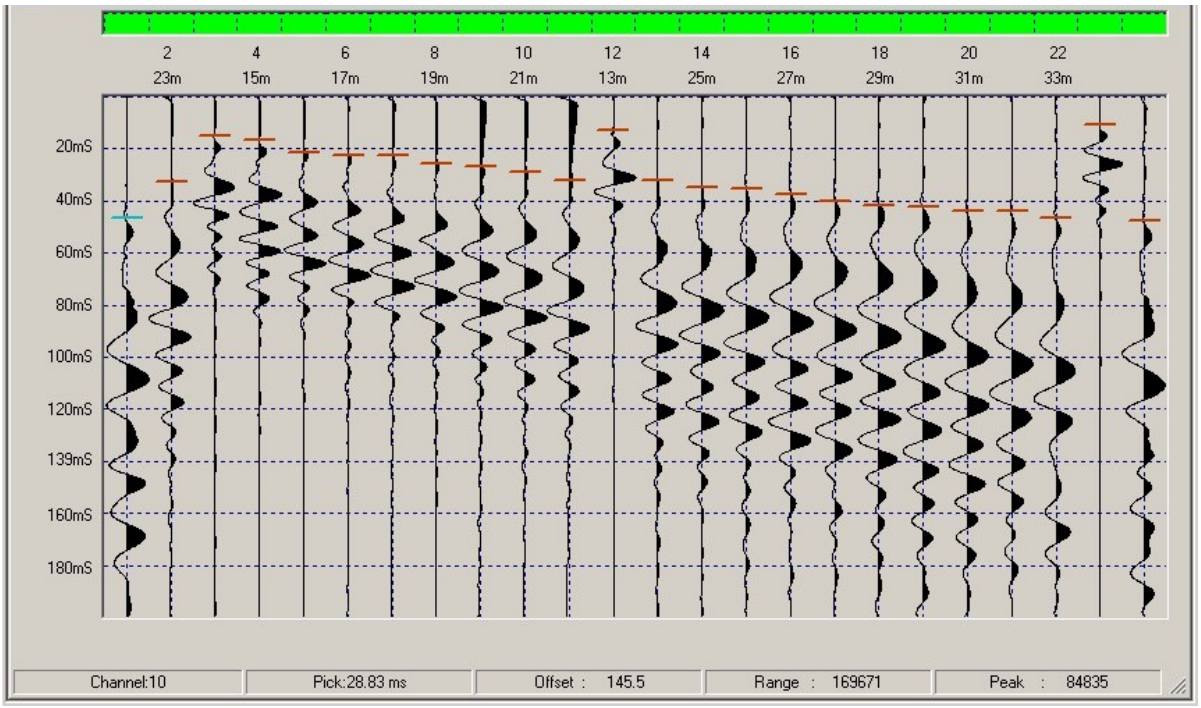


Illustration 4.1