SEISMOWIN
Seismic Data Logging Software
Version 02.23

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Preliminary english translation

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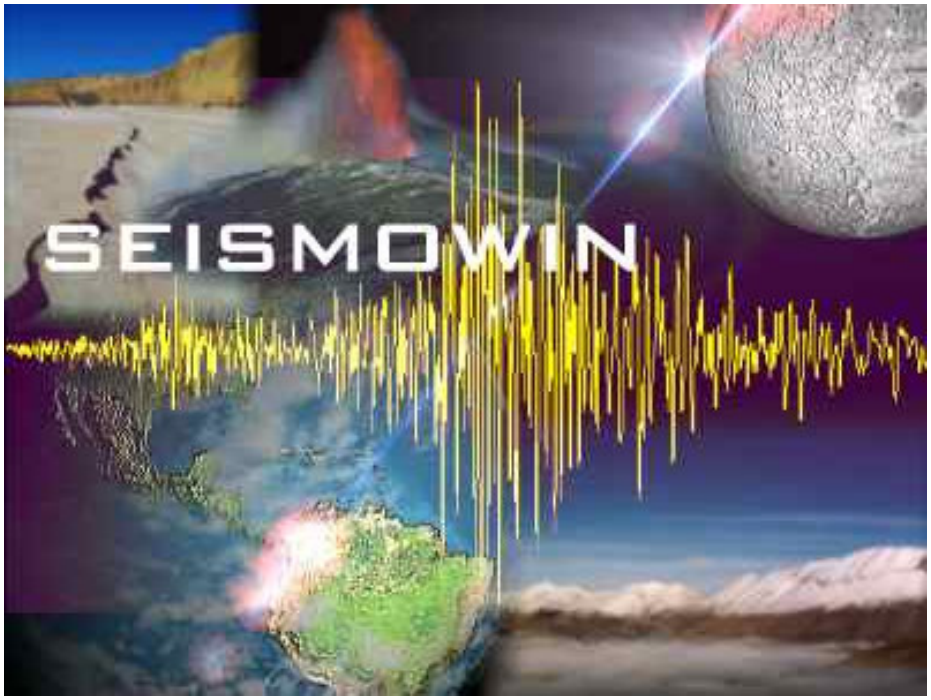


Notice: Some functions and controls of the software could be recently modified,
the basic functionalities described in the manual are mantained

Important notice!

This software is for hobbistic and amateur pourpose, this mean basically for entertainment pourpose and education. It must be used in a computerized system and or other appropriate electronics boards of that assembly and setup should be accomplished by trained personnel and under the EEC laws in matter of electric safety and Electromagnetic Compatibility. All certifications of that equipments, design, are under the direct responsability of the final user. The software is provided AS IS without any warranty implicity or explicity.

The designer of the SEISMOWIN software will be no responsible of loss of any kind, damages, injuries, loss of data, casualties or other kind of damage if this software will be used in a context of life protection of any kind. This software is only proposed for training and entertainment pourposes.

Overview

The SEISMOWIN software is a program that should be used with one an electronic board able to convert signal from analogic to digital. It allows the acquisition of up to 4 channels with automatic storage of seismic events and storage of continues files (datalogging) for retrieve of past data.

The supported a/d boards are driven by SEISMOWIN in order collect data. Features available from SEISMOWIN are different for each supported boards.

Best performance, due to the explicit design of SEISMOWIN for it, are obtained from using SADC10 card supplied by SARA snc www.sara.pg.it.

This board can use an embedded real time clock to syncronize the incoming seismic data with a very precise reference time. The a/d card embeddes an DCF77 decoder to decode the time transmission from Germany.

SEISMOWIN is based especially on DCF77 for its syncronization.

This not exclude the possibility to use it with other time references like GPS systems. SEISMOWIN can be adjusted in order to have a precise timing by the PC real time clock if it is syncronized by a GPS system of a NTP server.

SEISMOWIN can be used toghether with others tools like SEISMONET and SEISMODOCTOR that are able to give extra features to your seismic station.

System requirements

SEISMOWIN require the usage of a Pentium Class processor. It is not needed a big memory of ram and the hard disk capacity is subdue to the will of the owner in order to record more or less seismic data.

Item	**Minimum requirements**	**Suggested**
Processor	Pentium 60	Pentium Celeron or Pentium 2 or higher
Ram	8 mbytes	32 Mbytes
Hard disk	200 Mbyte	2 Gigabyte
Operating system	Windows95	95/98se/Me/XP (not NT, 2000)
CD rom	-	yes
Audio board	-	yes
Parallel port	-	yes
Video board	640x480 (VGA)	SVGA 1024x768
Monitor	monochrome	color

Installation

Istallation of SEISMOWIN can be executed by the proper SETUP.EXE file present in disk1 of the distribution floppy disk or from the folder of the Compact Disc.

SEISMOWIN should be installed in the C hard drive and in the “\6smowin” standard folder.

Update of the 6SMOWIN.EXE executable file can be accomplished simply by replacing the EXE file unless otherwise specifiied.

Glossary

A/D	Analogic to Digital conversion
ALIAS	Effect that corrupt the signal integrity if a/d sampling is not correctly performed. See the related paragraph of this manual.
Baud	Speed of data transmission expressed in bit per second
Buffer	Transferring memory for serial datas. It is used as a damper of data flux. When the processor is busy for other duty this buffer is filled until the processing is passed to 6smowin again to collect the buffered data.
Data rate	Speed of transferring data from the card to the 6smowin. The speed of the data is affected not only by the baud rate but also by the transfer protocol used that can strongly decrease the data rate.
DCF77	Time broadcasting standard for accurate timekeeping
Datalog	Data collection
Event	Seismic event, earthquake
Firmware	Software stored inside a microcontroller chip
GPS	Global Positioning System, used in seismology especially for accurate timekeeping, sites coordinates picking and ground strain/stress long period monitoring.
Handshacke	Term used to express the electrical signal used to syncronize two equipments when they need to transfer data bewteen themselfes.
Log	Like Datalog
NTP	Network Time Protocol, used to syncronize the pc real time clock throught Internet
Packet	Group of bytes that are related to a specific items of data to be transmitted as a single “package” and that will be decoded after received.
Sps	Samples per second

Communication protocol
SEISMOWIN receives and transmits data using a simplified protocol in order to increase the data rate at low baud speed. It is able to self detect the speed of the Com port at 14400 or 38400 baud. The boards SADC10 with the firmware at 9600 are no longer recognized. The boards with firmware at 14400 baud can provide up to 100 SPS, the boards at 38400 can generates 200 SPS per channel up to 4 channels.

The communication protocol is bidirectional.
The PC can adjust the TIME of the board and its acquisition speed indipendently for each channel.
The a/d board send to the PC its time and the sampled data.
The Com port must be opened in binary mode, without handshake, 8 bits of data, 1 stop bit, no parity.

How to detect the a/d card speed.
Two ways can be used. One is to read for some seconds the data of the TIME at 14400 and determine if there are transmission errors on the packet received. (The card always transmit the TIME datas). If there are errors the receiving routine should try to change at 38400 baud to detect if this speed is able to receive the TIME data correctly. One another way is to ignore the TIME data and transmit to the a/d card a Firmware Version request, in first istance at 14400 baud and then at 38400 baud until a correct firmware revision data is received.

Firmware command request: 0x81 0x00 0x00 0x00 0x00 0x00

ex: PRINT #1,CHR$(VAL("&H81"));CHR$(0);CHR$(0);CHR$(0);CHR$(0);CHR$(0)

The answer could be: V150 meaning version 1.50 (the answer is in ASCII code)

Adjusting the GMT/UTC time correction
When the a/d card is powerd up it start to send data about the TIME. This data surely will be wrong because the card is not adjusted before and no DCF77 syncronization has been received.

Sending to the card this command: 0x82 GMT 0x00 0x00 0x00 0x00

You can adjust the the GMT correction, it should be provided in two complement binary, (signed integer of 8 bit).
If the correction is positive you can send 1, 2 or 3 and so on… if negative you must send –1 (255 in two's complement format), or –2 (254 in two's complement format). If no correction is needed (because you are using a GPS source) you can send 0 (zero).

> Note: Considering the DCF77 is always transmitted with +1 time offset (Germany Local time) you should always apply –1 to have the UTC time. UTC adjustement is provided to mantain free the user to set any desidered time. No variations are needed to adjust the time for the daylight save time changeover because the decoder recognize by itself the variation and apply the properly +1 correction. If a GPS-DCF converter is used the UTC adjustment can be used and the daylight changeover is not considered.

If the data has been correctly received the a/d card replies with one acknowledge byte: 0xF8, chr$(248)

Time Adjust
To adjust the TIME send to the card: 0x83 sec min hour 0x00 0x00
(The cents of seconds timer will be cleared.)

The parameters sec, min, hour must be send in binary, NOT in BCD or ASCII. For example to adjust the time to: 12:33:24 you must send:

ex: PRINT #1,CHR$(VAL("&H83"));CHR$(24);CHR$(33);CHR$(12);CHR$(0);CHR$(0)

If the data has been received correctly the card replies with one single acknowledge byte: 0xF8, chr$(248)

Adjusting sampling rate
On power up the a/d card can send data or not, depending on the firmware.
If the firmware is previous the V.01.31 the a/d card not send data. If the firmware is higher than 1.31 the board retains the SPS selected the previous time and send data if, before powered down, it was sending data. The a/d card remember in a eeprom registers its last configuration of GMT and SPS for each channel. This allow the usage of standalone cards with a wired or radio modems, for example.

To setup the sps rate you must send: 0x84 sps1 sps2 sps3 sps4 0x00

Where sps1..4 are the speed of the 4 channels. If a channel is not used, st this spsX to zero. If a channel is used setup it with the following formula:

Spsx = 100 / Sps required

For example if you want set up the channel 1 at 20 SPS, 2 at 50 SPS, 3 at 25 SPS and turn of the 4th, set:

ex: PRINT #1,CHR$(VAL("&H84"));CHR$(5);CHR$(2);CHR$(4);CHR$(0);CHR$(0)

For firmware version 1.6 and 1.8 (16 bit 200sps or 18 bit 200 sps capable) the formula is:

Spsx = 200 / Sps required

Immediately the card start to send datas at the various frequencies.

Receiving data from the a/d card
The card transmits packet of 6 or 4 bytes. The end of the packet is identified by a byte with the value greather than 251. As general rule the data greather or equal than absolute value of 128 are control bytes or special byte.
Pure data bytes are lower than 128. This mean that the protocol uses only 7 bits of data for each byte, but this is necessary to determine the kind of data is receiving and to don't make the protocol too much long. (I.E. the IntelHEX protocol uses 1 bytes for each 4 bits of data, this DOUBLE the length needed to transmit a packet of data).
In this protocol you use too 4 bytes for 2 bytes of data but within the 4 bytes also control bytes are sent in order to detect wrong transmissions and receive data from a multiple channel device.

TIME	0x81	sec	min	hour	extra	0xFF
Sample from CH1	0x82	low	high	extra/end		
Sample from CH2	0x83	low	high	extra/end		
Sample from CH3	0x84	low	high	extra/end		
Sample from CH4	0x85	low	high	extra/end		

The TIME is transmitted on time per second. It contains always pure binary data. (Obviously time data will be never have a value greather than 128). The extra byte of the TIME packet contains the data of the two auxiliary lines L1 and L2 available on the card. L1 is used to detect the DCF77.

"Extra" byte coding of the TIME packet.

Bit0	Reserved
Bit1	Reserved
Bit2	Reserved
Bit3	L1 line status
Bit4	L2 line status
Bit5	Received a SYNC from DCF77 radio (remains = 1 for 6 seconds after a valide packet received by DCF77)
Bit6	Reserved
Bit7	Reserved

After decoded you can find the digitized data expressed in two's complement format as provided by the ADS7825P. The LOW and HIGH bytes needed to be completed because they are transmitted without the bit number 7 (counting bits from 0 to 7). Also bits number 16 and 17 are needed to be attached to the data word if a 18 bit protocol is used.
To do this, the fourth and last byte, is used to identify the end of the packet because is always greather or equal than 240 (0xF0). It is also the container of the bit number 7 of the *low* and *high* byte, and the bits number 16 and 17 if a 18 bits protocol is used).

Byte *Extra /end* is encoded as follows:

Bit0	bit nr 7 of byte *low*
Bit1	bit nr 7 of byte *high* (meaning the sign bit if a 16 bit protocol is used)
Bit2	bit nr 16 of the 18 data bits (if 18 bit board is used, otherwise = 1)
Bit3	bit nr 17 of the 18 data bits, meaning the sign bit (if 18 bit board is used, otherwise = 1)
Bit4	always 1
Bit5	always 1
Bit6	always 1
Bit7	always 1

For the fact to be always greather or equal to 240d (0xF0) this byte indicates that the packet is terminated.

For 16 bits board you can apply these rules:

if = 252 *low* and *high* must be not modified
if = 253 *low* must be increased of +128
if = 254 *high* must be increased of +128
if = 255 both *low* and *high* must be increased of +128
build the final data computing data = low + high * 256, the result is a 16 bit signed integer data type

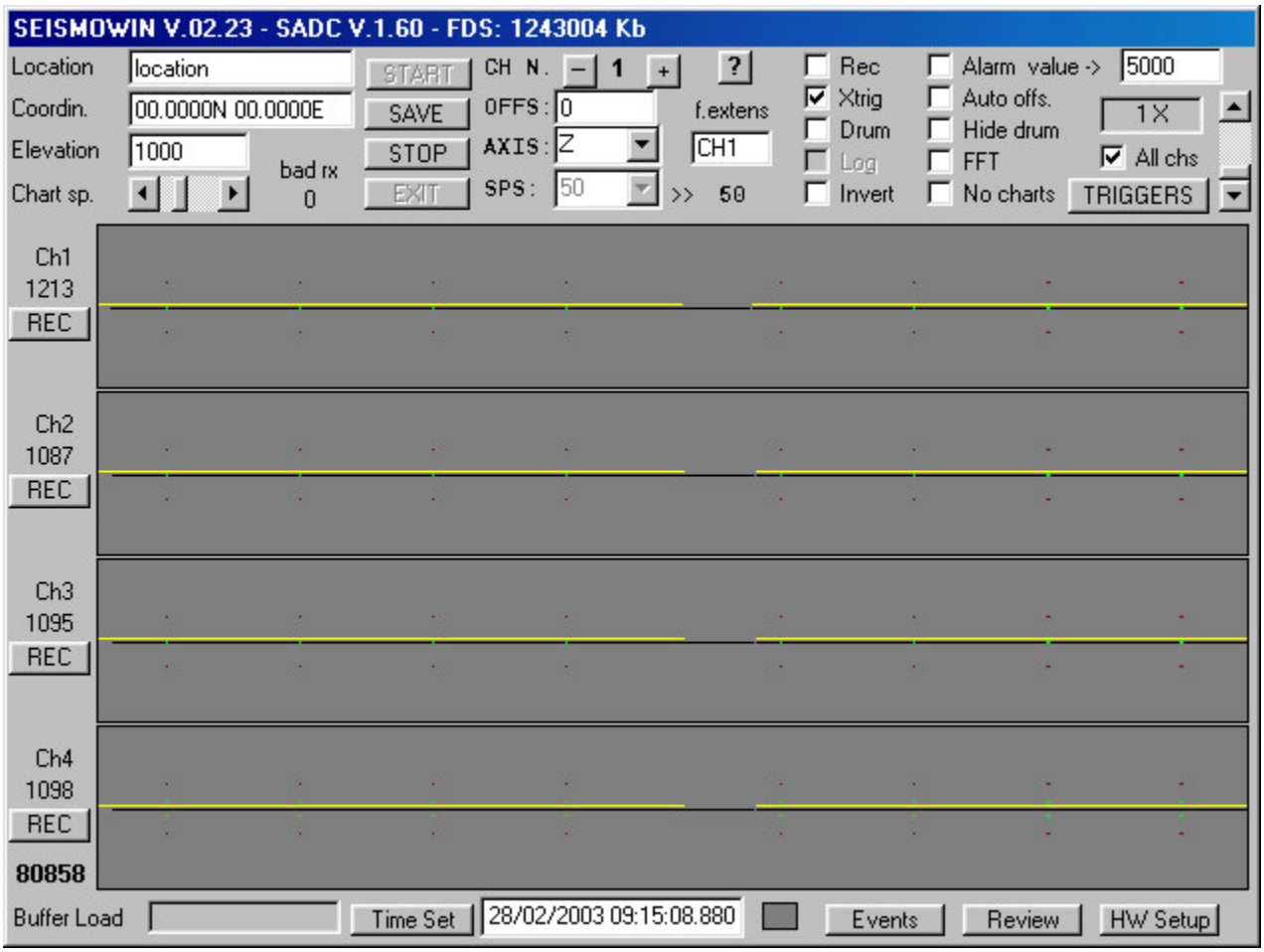
For 18 bits board you can apply these rules:

1. have the data in a long_integer data type
2. build the low and high byte with the 16 bits board rules and put it in the long_integer data
3. if the "bit2" is 1 add 65536 to the long_integer data
4. if the "bit3" is 1 add to the constant "-131072" the data just obtained and present in the long_integer data

Error detecting

This protocol is not 100% reliable on error detection and no error correction is possible. It has been conceived for data transmission at small distances (few meters) and at low speeds, so error correction and detection is not much important for good results. Counting the bytes received after one header (0x81 for TIME stamp or 0x82,0x83,0x84,0x85 for datas) and before the end data packet (any value >= 240) and comparing the count with the number of expected data for each packet, you can be quite sure if the packet is well received or not and, if not, discard it. Obviously, if your system experience a packet error the data for that second cannot be considered syncronized to the main clock and the time error will reflect the number of wrong packets multiplicating the time fraction 1/SPS of the channel experienced the error.

Control panel
The control panel appears like the picture below.



The majority of the controls are in this main panel ; following all controls are described.

LOCATION
Write the name of the place of your seismic station. This parameter will be used to mark the event files.

COORDIN.
Insert here the geographical coordinates of your station i.e. 43.19N 12.33E. The coordinates should be written in centesimal notation with in longitude/latitude order with N and E identification.

ELEVATION
Insert here the altitude of your station in meters

BAD RX
Counts the bad packet received from the serial port. This number is automatically cleared every 10 minutes. If it reach 5 counts a warning window is opened.

CHART SPEED
Adjust the horizontal scanning speed of the charts. This parameter is not related to any measurement unit, you'll have to adjust it in your best preference.

START

This button STARTS the acquisition process and the eventually the recording of the events if all others parameters are correctly settled. If you give the command button SAVE meanwhile an acquisition process is running, at the next launch of the program the START button will be pressed automatically and the acquisition process will start by itself.

STOP
Button for stop the acquisition process.

SAVE
Button for saving all modified settings to disk

EXIT
Button that terminate the execution of the program (There is no possibility to terminate the program using ALT+F4 or reducing it to icon)

Ch.N
With the plus and minus keys (+ / -) placed near to this label you can select the channel to edit or to check for its settings. All the parameters on the main control panel are referred to this setting.

OFFSET
Offset of counts incoming from a/d board. You can use a positive or negative value to adjust small counts differences from a/d board and mantain the signal to a graphic zero point.

AXIS
Identification of the sensitivity axis of the sensor. You can choice between V (vertical), E (east –west), N (north-south), G (geophone) or ? for unknow or undetermined.

CH EXTENS.
File extension of 3 chars used to store event files in the appropriate folder. You can use 3 chars without the point that is automatically added by the software. If the extension is for example "RMZ" the files will be stored in the format: YYMMDDXXX.RMZ where YY states for YEAR, MM for MONTH, DD for DAY and XXX states for the sequential number of file event of that day. This number is automatically increased event by event. Usually the extension is related to 2 chars to code the station and the 3th char to identify the axis. This allow to recognize the desired file without open or check it.

SPS
Samples per second. Number of samples per second established as acquiring data rate for that channel. The number at right of this setting shown the real data rate recorded by SEISMOWIN during the last second. If there are differences between the sps adjusted and the real data rate means that there is a problem on the communication link or in the a/d card. This parameter is not valid if the BUFFER LOAD indicator is indicating a buffer load greather than zero.

> WARNING! To do not record anomalous signals, different from the reality, you must keep present a basic law of signal processing. To sample in digital form a signal without altering the waveform you have to sample it at least twice SPS frequency than the frequency you are interested to analyze. For example if your sensor or electronic amplifier filtering board has a bandwidth of 5 Hz you MUST sample at least 10 Hz (or SPS). Practically it will be useful to sample 5 times the interesting frequency in the example at 25 Hz. At the same time sampling more than 25 SPS if you have a bandwidth of your electronic of 5 Hz is useless and you are only capturing more data than are necessary. Obviously you must also apply an electronic filter that not allow to any frequency higher than one half of your sps rate to reach the converter. If this happens strange ALIAS phenomena will affect your recording. One way to check if you are in aliasing problem is to extend the SPS and watch if the waveform change. If it change you were observing an alias and not the real signal. You will have to apply an appropriate anti-alias filter and select the proper SPS rate.

SPS data rate is locked using it with some kinds of a/d board.

AUTO REC.
Enable/Disable the automatic recording of the channel

X TRIG
Enable/Disable of the function that eXtend the record triggering to all others recording enabled channels.

DRUM
Enable/Disable the virtual drum option. This option allows you to have a daily chart of the seismic activity for your reference during the day and the next day. Other settings for drum option are present on R.A.A.Q. window.

In the 6smowin folder the drum option store two files. DRUMx.BMP and PD_DRUMx.BMP for the current day and the previous day.

LOG
Enable/Disable the recording of daily files for the selected channel.

INVERT
Enable/Disable the inversion of the polarity of the channel

ALARM
Enable/Disable the acoustic beep in the occasions of quake events.

VALUE
The number adjustable on the right of this checkbox is the trheshold over the acoustic signal will be triggered.

AUTO OFFS.
Enable/Disable an high-pass filter used to remove the small dc offset you could have from your electronics, it could be used instead of the manual OFFSET adjust.

HIDE DRUM
This control allows to hide the drum window related to that channel if drum is enabled. Drum images are saved as the drum is visible.

No Chart
Enable/Disable the chart drawing allowing to slow machine to have faster sps rates.

Y Zoom
Scale Y or zoom factor for tracks graphic view. With 1 the chart has a +/-32767 (or +/-131072 if 18 bit board is used) range on the graphic window. You can select if change the scale simultaneously on all channel or only one by one checking the *All chs* control.

TRIGGERS
This button opens the windows that adjust the automatic triggering of the event recording.

CH1..CH4
Each chart is displayed in scope mode. The data are tracked in a continue loop. If you are using an amplitude threshold you will see green dots and red dots that mark (each second) the threshold for START recording (green dots) and STOP recording (red dots). Giving a double click on the chart the chart will be expanded to a bigger one to better analyze the signal.

REC/STOP
For each channel a REC button is available. This button activates the recording of the channel in manual mode. After pressing REC that button become a STOP button to deactivate the channel recording. If you don't press on STOP the channel will stop the recording according to the STOP parameters selected for automatic channel event recording.
If you give a manual STOP the related AUTO REC function will be disabled. You'll have to re-enabled it if you are interested to record events automatically.

BUFFER LOAD
The receiving data from a/d card is performed by serial port. The gauge BUFFER LOAD shows how many data are stored in the serial port buffer. The data incoming the buffer even if effectively collected by 6SMOWIN seconds and sometimes minutes after the effective sampling time are always refferred to the time when they was sampled. The gauge indicator must not increase, it can increase sometime when the personal computer is performing something else but after that task is finished the buffer level must decrease until become zero. If the buffer load increase and increase until the color become red it mean that the total SPS received exceed the performance of the PC to collect data. If the buffer load overflow data will be lost and a warning window will happear.

EVENTS
This button open the window where the recorded events are listed

TIME SET
This button open the TIME SET window and the function to adjust them and the UTC time.

TIME
Real time clock indicator

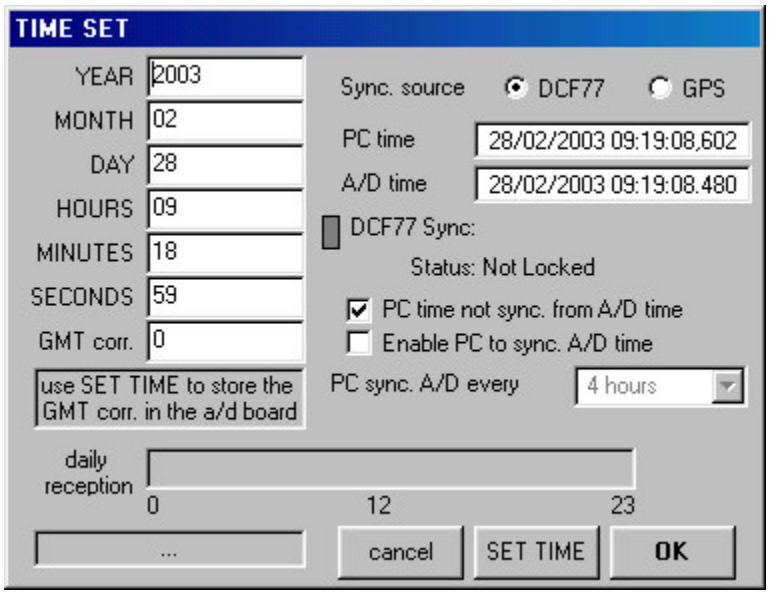
REVIEW
Button for review of the datalog files and event file extraction.

H/W Setup
Button for opening the hardware/software setup window.

Time adjust

Using the TIME SET button from main panel you can activate this window.
From here you can adjust the time and the time correction for the appropriate time zone. (GMT / UTC).

Notice for the users of SADC10 a/d board: The A/D card embedded his own real time clock that provides the counting of hours, minutes and seconds. Days, months and years are not counted. If you have a DCF77 time receiver the internal real time clock is syncronized by it. The internal clock counter is needed because the DCF77 receiver cannot be used as a clock but only as a clock syncronizer. The DCF77 signal is not always present, often it is interrupted by atmospheric storms and other electromagnetic noises. The AD90S2313 controller check the DCF77 data stream and detect errors to avoid mistakes in the syncronization. This means that often the syncronizing tag is well received only few times per day. It depends from environemental conditions. For this reason the time must be always adjusted with the proper time after the card is powered up.
The a/d card detect from the DCF77 signal the UTC time compensation and the daylight DCF77 changeover.



The fields: YEAR/MONTH/DAY and so on are preloaded by the software with the current time in the moment the window is opened.

SYNC source
This control select if a DCF77 source or a GPS source is used for accurate timing.
Considering DCF77 is always transmitting +1 UTC time or +2 during summer time, GPS will always transmit UTC and a different GMT correction is needed. This correction between DCF77 and GPS is made automatically by the software. You have only to provide 0 on the field GMT corr. Or you own GMT correction to meet the time of your zone.

PC Time
Is updated with the PC time, and it is refreshed one time per second.

A/D Time
Is updated with sampling rate from the a/d card and contains the time received by the a/d card.

DCF77 Sync
The box is light in green during a DCF77 syncronization. And the following text will show the date and time of the sync When a correct frame is received the clock inside the a/d card is updated and the file: TIMEFILE.TXT is updated.

Status
Indicator showing if the system is considered Locked or Not Locked by the time receiver (DCF or GPS).
For DCF77 receiver Locked mean that the a/d board received a sync packet within the past 60 minutes
For GPS receiver Locked mean that the a/d board received a sync within the past 5 minutes.
In all the other cases the Status indicator become: Unlocked.
Variation of the Time Status are reported in the file TIMEFILE.TXT.

PC time not sync. from A/D time
This selection allow to the PC clock to be not syncronized by the a/d time received. Anyway all data received by the a/d card will be always linked to the a/d card.

Enable PC to sync. A/D time
This option allow SEISMOWIN to refresh the a/d time on the interval time specified at PC sync A/D every. This is useful when you want use a different kind of syncronization system like NTP or GPS that sync directly your PC. In this case PC time not sync. From a/d time must be selected to preevent sync conflicts.

PC sync A/D every
This option setup the frequency of the a/d clock refresh. For most of application a daily refresh is enough. Set the most appropriate timing according to your needs.

CANCEL
Close the TIME SET window

SET TIME
Adjust the time according to the values selected on the field at the left side of the window.

OK
Close the window accepting the GMT setting and the other option in the window. The modification must be saved using the SAVE button on the main window.

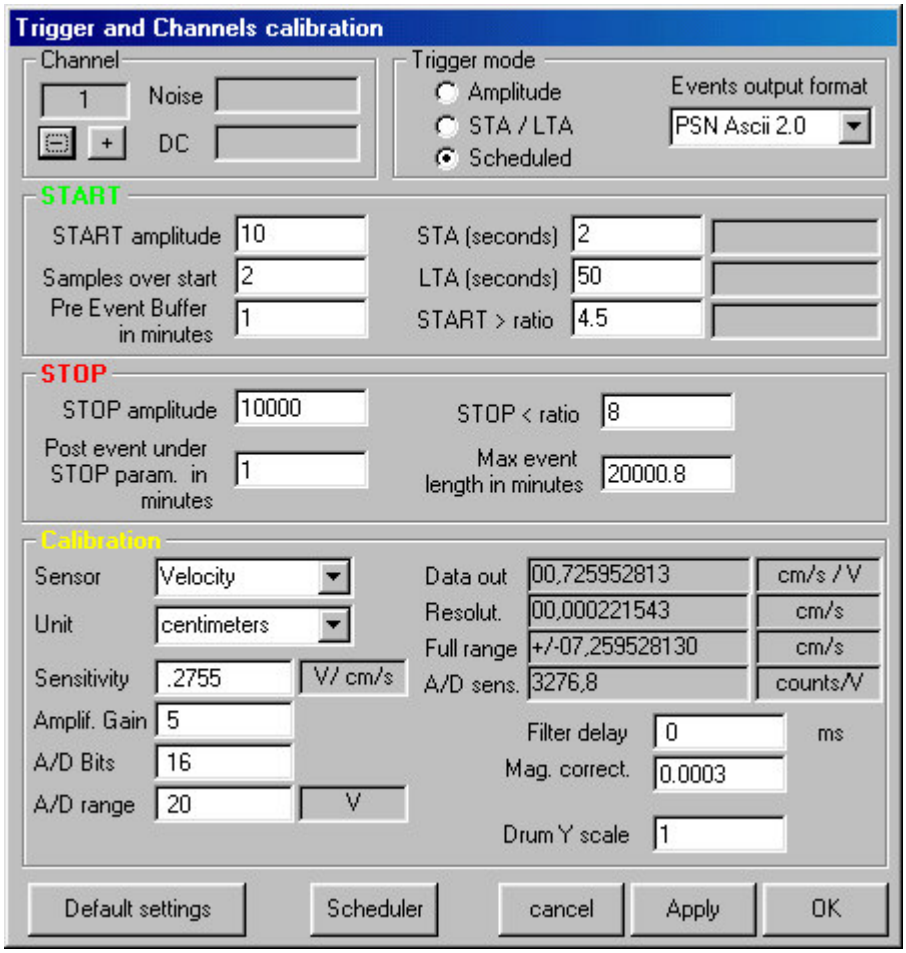
Daily SYNC reception
This chart allow to see in what hours the DCF signal is more strong. A green vertical bar is written on the chart each time a correct time frame is received. The chart can be cleared clicking on the chart. The box in the bottom left side of the window indicate if a solar time or legal time is received by the DCF77 converter.

DCF77 Time
This label shows if the DCF77 is broadcasting solar time or daylight (summer) time.

Notice: **To improve the DCF77 receiver setup you can apply the DCF77 pulsing signal to one of the channel of your a/d board. In this way you can able to see on the seismic channel where you applied the DCF77 signal the pulsing signal as an oscilloscope. This is very useful to determine the best orientation of the antenna. Even if during the setup the signal is disturbed, when you oriented the antenna at the best receiption angle during the next 24 hours you will surely have enough syncronizations.**

Triggering and channel calibration

This window allow to adjust the parameters of automatic triggering and some other controls



Channel frame

The channel control allow to select directly from this window on which channel operates, from 1 to 4.
The same frame contains the averaged noise computed when the signal cross the zero point.
The DC value is the offset computed by the high-pass filter. (See Auto Offset control)

Trigger mode

There are 3 triggering modes. The first trigger using the amplitude threshold. The second is the classic STA/LTA triggering method. The third is Scheduled

Amplitude threshold

Two thresholds are to be adjusted, start and stop. The program verify if the signal goes over a certain number of sample over the threshold value. If this happens a recording is triggered. The generated file will have a preevent time accordin to the pre event time setting.
When a recording is started to stop the recording a stop threshold is analyzed to see for how much time the signal remains under the stop threshold. This allow to the entire earthquake coda to be recorded.

STA/LTA algorythm

STA means Short Time Average, LTA means Long Time Average. The STA react quickly to the amplitude variations and the LTA react slowly acting as a low pass filter. Analyzing the ratio between these two values an event can be "declared" or triggered when the ratio increases over an preset value.
To stop the recording a stop ratio must be reached for a certain time to assure the recording of the earthquake coda.

Scheduled

Clicking on the Scheduler button at the bottom of the board you can activate up to 20 scheduled triggering event to record the signal of blasts or shot for seismic refraction or reflection study.

Events output format
There are 3 kinds of output formats. All are in ASCII.
PSN ASCII 1.0 is the first format supported and could be in use for old version of Winquake.
PSN ASCII 2.0 is the current text PSN format
ASCII is a general format that contains in the first row all information on the quake an sequentially the data it can be used to port data to other analisys software like HYPO71, BINAWIN or SEISAN.

START/STOP frames
Here you can find all the controls needed to declare and close an event file.

START frame
START amplitude
Start Amplitude threshold for amplitude triggering mode

Samples over start
Number of samples (not counts) over the start threshold to declare triggered an event.

Pre Event buffer
Minutes of buffer used to save the data before the event declaring. This is needed to pick also the P waves often pass under the start threshold.

STA
Short Time Average frame. The value showed at the right box is the absolute amplitude value computed for the STA time frame

LTA
Long Time Average frame. The value showed at the right box is the absolute amplitude value computed for the LTA time frame

Start ratio
Threshold ratio to start the recording The value showed at the right is the current computed ratio bewteen STA/LTA.

STOP frame
STOP amplitude
Amplitude threshold for stop event recording

Post event…
Post event record duration. This parameter setup the length of the recording after the triggering allowing to record all the coda.

Stop ratio
Threshold of stop ratio for STA/LTA algorythm.

Max event length
Max length of an event. Reached this time in any condition the event recording is terminated even if all other stop condition are not satisfied.

START/STOP settings notice.
Someone would like to use these parameters in a less dynamic way. For example someone preferr to record exactly 2 minutes before the event and 2 minutes after the event. This is possible in this way.
Using the Amplitude method adjust the START threshold as you prefer according to the background noise of the site. Adjust the STOP threshold to the maximum allowed or let's say at 10000 count or more. Set the preevnt time at 2 minutes and the post event time at 2 minutes. The majority of the events will be surely under the STOP threshold so as soon an event is declared 2 minutes of buffer will be recorded in the file, then the STOP sequence will be intiated due the signal is already under the STOP thereshold and just after 2 minutes from the START time the event will be stopped having an event length of 4 minutes.

Calibration frame
This frame contains all the data needed to calibrate your data with the sensor output and the electronic system. Control for magnitude correction factor and a Y scale of the drum are included too.

Sensor
You can select four different type of sensor from Unknow, Velocity, Displacement, Acceleration.

Unit
This allow to select the measurement unit. You can chose from meters to nanometers.

Sensitivity
You should put here the signal value in Volts that your sensor generates. The measurement unit of this number depends on the sensor type. The measurement unit is showed in the box at right of this control. For example if you have a velocity sensor you should be able to obtain how much Volts it generates at one meter per second velocity.

Amp. Gain
Put here the gain factor of your amplifier. You can compute it looking carefully to the schematic you have or ask to who supplied your amplifier.

A/D Bits
Put here the number of bit of resolution your a/d has. Usually 14, 16, 18, 24 bits are common size. You can also use this field to know how a a/d converter can behave in seismic analisys rather one another.

A/D range
Put here the full range of your a/d. Put the peak-to-peak value. For example if your a/d is able to pick signal from –10V to +10V your full range is 20V.

Data Output
This is an output field. Data output mean what signal is generated for a unity of measurement of your sensor. It is the reciprocal of the Sensor Sensitivity multiplied for the amplifier gain factor.

Resolution
This is the final resolution of your system. It represent what is the smallest measurement unit your system is able to resolve. Smaller is this value more precise is your system. Go low in resolution can be accomplished increasing the gain of the amplifier but this make narrow the full range of your system.

Full range
This is the maximum amount of measure your system is able to record in the selected measurement unit.

A/D sensitivity
This represent the a/d sensitivity in count per Volts. It is used in the internal computation of resolution.

Other controls in the same frame
Magnitude correction
Here you can insert the correction factor you find in WinQuake. The parameters can be modified also inside WinQuake. If you already know the appropriate values you can instert them here and WinQuake will interpret these opening the event file. In this frame is also the DRUM SCALE control that allow to adjust the Y chart magnification of the drums.

Default settings
This button activates the setup of automatic settings for 3 channels, the default sequence setting will ask if you want to setup the channel for teleseismic or regional monitoring.

Filter delay
This data is not used at moment, it will be used in future to compensate the delay of analogue filters.

Scheduler
The scheduler windows allow to select up to 20 timed events to record the seismic signal.
This allow to accomplish refraction or reflection seismic study or simply to check the background noise level at various time of the day. Up to 20 events are allowed.

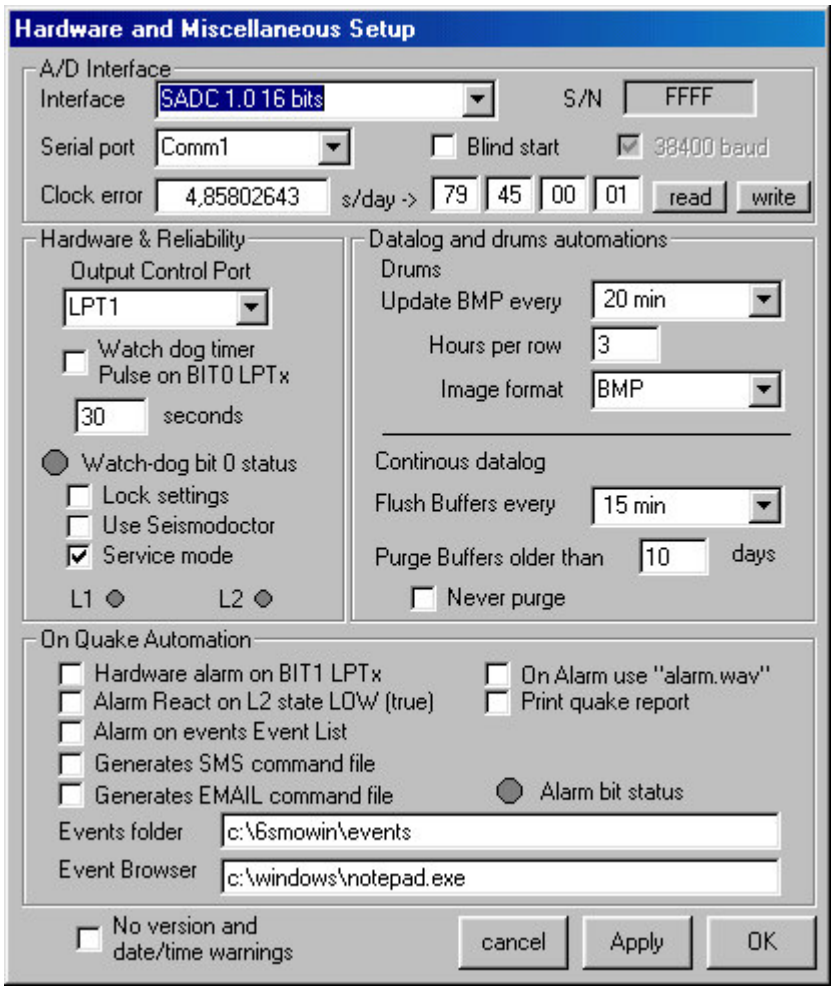
This window allow to set, modify or delete the scheduling list.

Use Add to add an event, Delete to delete an event, Modify to modify and event.
Clicking on a TIME in the Scheduled recording list the row selected become colored and the time appear in the editing fields YYYY/MM/DD HH:MM:SS Ch.

You can also select what channel must record the event, alternatively the trigger will be exteded on all channel with Xtrig option enabled.

Give Apply to make opoerative the changes, remember to click on SAVE button of the main control panel to save the parameters, else at the next launch of seismowin the scheduled events will be lost.

HARDWARE / SOFTWARE Setup
This window allow to setup several functions and controls for hardware and software automation.



A/D Interface
This section allow to setup the hardware connected to Seismowin. You must choice what board are you using and in which serial port is connected.

Interface type — Select the board to be used for a/d conversion processing.
Version 2.21 of SEISMOWIN supports 4 kinds of boards:
- SADC10 (16 bit board) 14400 baud rate
- SADC20 (18 bit board) 38400 baud rate
- INFILTEC 16b
- N.E. LX1500

Serial Port — Select the communication serial porto from 1 to 4
The number at the right side is an error counter. It counts any transmission error detected from the a/d card. If it increases mean that something is bad on the link. Maybe the interface of the PC or the A/D card or in the cable.

Clock error — This selection allow to specify how many second per day the a/d board cristal have as absolute frequency error. This allow to clear the Crystal Absolute Frequency tolerance.
Pressing the key ENTER on your keyboard when you are on this field allow you to recompute the s/day hex code to be written in the a/d board pressing the *write* button.
You can check the value of the board pressing the *read* button.

Blind Start — This control avoid the checking of the Seismowin on the firmware and a/d board speed. This function allow to have a *one direction communication line* like in a radio link or a half duplex modem link. Seismowin simply starts with the selected board speed 14400 as default or 38400 if selected function.

S/N — This box contains the serial number read from the a/d board.

Hardware and Reliability
Seismowin can control a parallel port to executes some hardware functions.

OUTPUT CONTROL PORT
This control selecty what parallel port use to drive bits for hardware automations.

WATCH DOG TIMER PULSE ON BIT0 LPTx
Select if a pulse to refresh an eventually external watch-dog circuit must be used or not.
A Watch-dog circuit is a special timer (long time timer) that is able to RESET your pc if it is not refreshed periodically. This allow to a system to reboot automatically if it hangs.
An appropriate watchdog device should reset the PC acting on the power supply unit or on the RESET switch push-button contacts.
The period of the pulsing signal is set by the SECONDS parameter.

WATCH-DOG BIT0 STATUS
This indicator monitor the action of the bit in the parallel port circuit.

L1
The indicator L1 is related to the ON/OFF input in the a/d card. This signal is used to decode the DCF77. If a receiver is present and used by the a/d card this indicator will blink. The blinking of this indicator is not in real time with the DCF77 pulse per second sequence.

L2
This indicator is connected to the ON/OFF input number 2 of the a/d card.

Lock settings
This parameter allow to lock the settings of whole program. A password is required to lock and unlock the settings. The password setting is not visible so you must remember it. Anyway the password is visible inside the 6smowin.ini file at the line 'PSW=…."

Use seismodoctor
This function tell to seismowin to generate a file that link Seismowin and Seismodoctor in order to preevent system hangs. When this option is used the Seismodoctor software is looked in the c:\6smodct folder with the name 6smodct.exe. If it is present it will be automatically executed after Seismowin startup.

Service mode
This function allow seismowin to enter in service mode. The service mode allow to show up the trimming window and the FFT functions. These functions are not so user friendly it is recomended to use the service mode only with the direct assistance of an expert. The FFT can be used freely, even if it is not well documented, experiments will not compromise the program running.

On Quake Automations
Hardware alarm on bit1 LPTx
This control set if the BIT 1 of the selected LPT parallel port should be used as a signal to give an electric alarm. The bit change the state and it can drive a relay contact when a quake is recorded.

Alarm react on L2 state low
This control set if the BIT 1 of the selected LPT parallel port should react on the changing state of L2 to ground. This function can be useful to read the signal of a seismoscope or as an intrusion alarm system on the place where sensors are. The signal to be detected must remains closed for at least 2 seconds.

Alarm on events Event list
This control set the hardware alarm bit (BIT 1 of selected LPT) must be excited in occasions of events added on Event List.

Generates SMS command file
This control allow the update of the file SENDSMS.TXT on the application folder. It can be used to send an updated SMS message.

Generates EMAIL command file
Thic control allow the update of the file SENDMAIL.TXT on the application folder. It can be used to sens an updated email message.

Alarm bit status
Indicator of the status of BIT1 of the selected LPT parallel port.

Event folder
Identify the folder where events should be recorded.
For standard operation selects: C:\6SMOWIN\EVENTS
On Alarm use ALARM.WAV
This check box allow you to ask Seismowin to recall the file ALARM.WAV from the SEISMOWIN folder to be reproduce as a WAV file. The WAV file can contains any sound or speech not more long of few seconds. The file will be played when the recording is active and over the threshold instead of a normal beep from PC speaker.

Event Browser
Identify the standard event browser path to be called automatically from EVENT LIST

Datalog and drums automations

Drums Section
The software can (if selected from the main control panel) activate a sort of virtual drum to watch to a daily overview recording. A JPG file is saved each morning (00.00am) and / or after a STOP command. A file is saved also periodically according to the selection: *Update DRUM every x minutes* in order to update networks archives.

Hours per row
Select how many hours you want to see in the drum.
Keep present that a drum is related to 24 hours of the day. Selecting 3 hours 8 rows will compose the drum, selecting 4 hour the drum will be composed of 6 rows and so on.

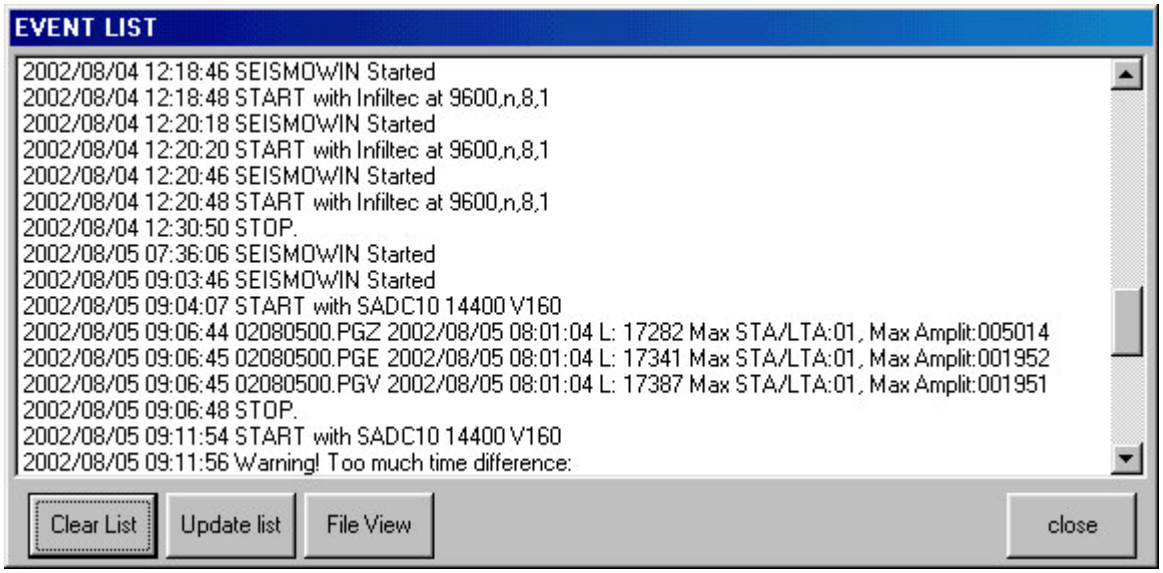
Image format
Allow you to select the image format of the drums images between JPG, BMP or GIF format.

Datalog section
Datalogger
If continous LOG of data is selected on main control panel this control perform the buffer flush every time is selected accordin to the control: *Flush Buffers every x minutes*

File purging
SEISMOWIN can retain all datalog files. This mean that the disk will fill continously until it become filled or someone or something not erase unused data. For this reason this automatic purge function is prepared. To wipe out old datalog files. The control *Purge file older than x days* will remove all the files older than N days.

Never Purge
If you preferr to save all datalog file check this control.

Event list window
This window allow to see the description of the warning messages and the events description recorded by the triggering methods.



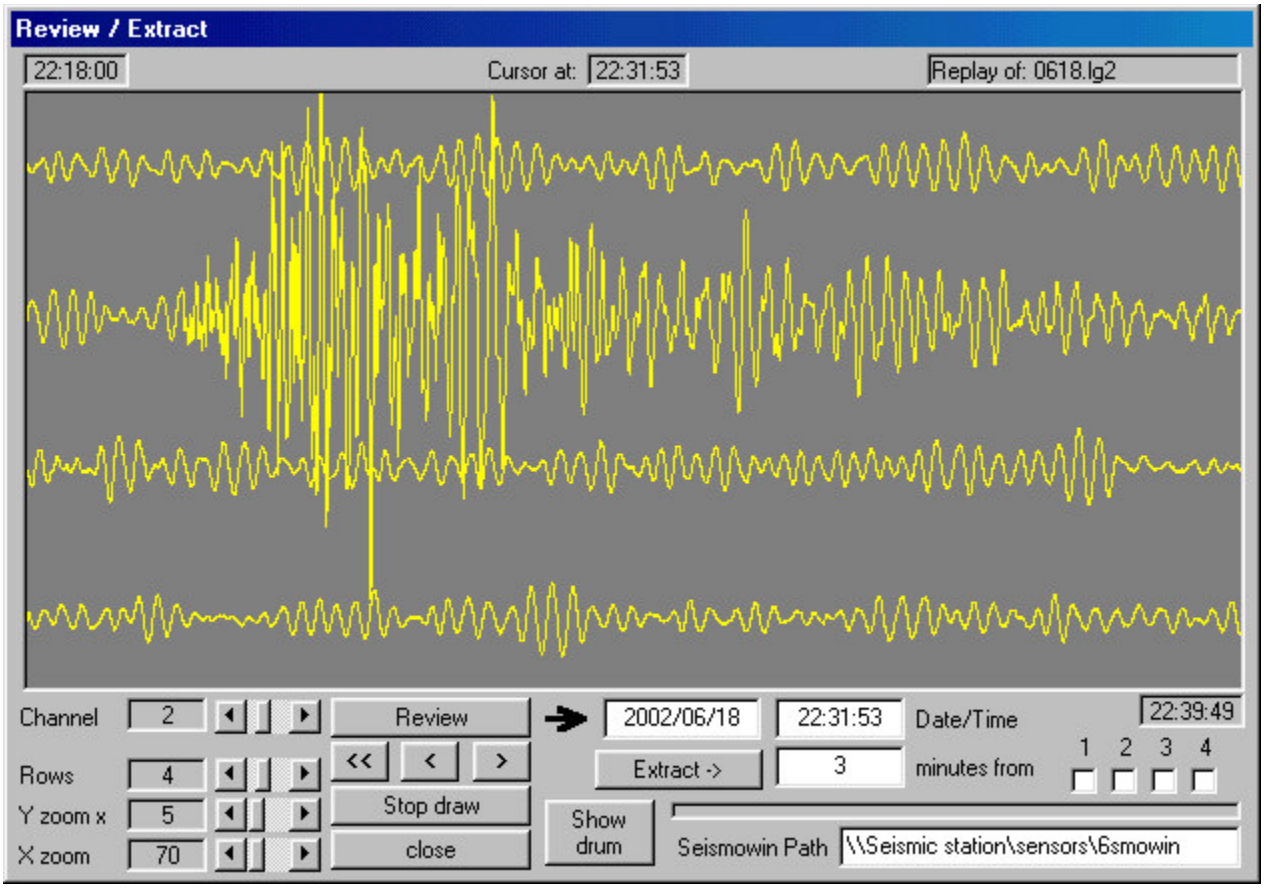
Clear List
Clean the eventlist file. Files recorded are not removed. It is cleared only the list.

Update List
Refresh the text list of the event list.

Close
Close the Event List window

File view or double click on event file.
Selecting an event file and clicking on File View you can open automatically your favourite event browser.
The event browser is selected on H/W Setup window.

Review and Extract
Using this window you can review datalogged files in the past days.
It is possible to point at one specific time and extract a piece of recorded file from there.



Channel
Select what channel to replay

Rows
Select how many rows see in the screen

Y zoom
Adjust the Y scaling factor

X zoom
Adjust the X scaling factor

Review
Start the replay of the LOG file selected by the channel option beginning from the date and time selected in the fields at right (Date/Time)

<<
Fast Rewind to 00:00:00 time of the selected day

<
Go back one page

>
Go ahead of one page

Stop draw
Stop the current review

Close
Close the Review/Extract window

Extract
Extract the selected minutes beginnig from the selected time.

Seismowin Path
Select the path where find the datalog files

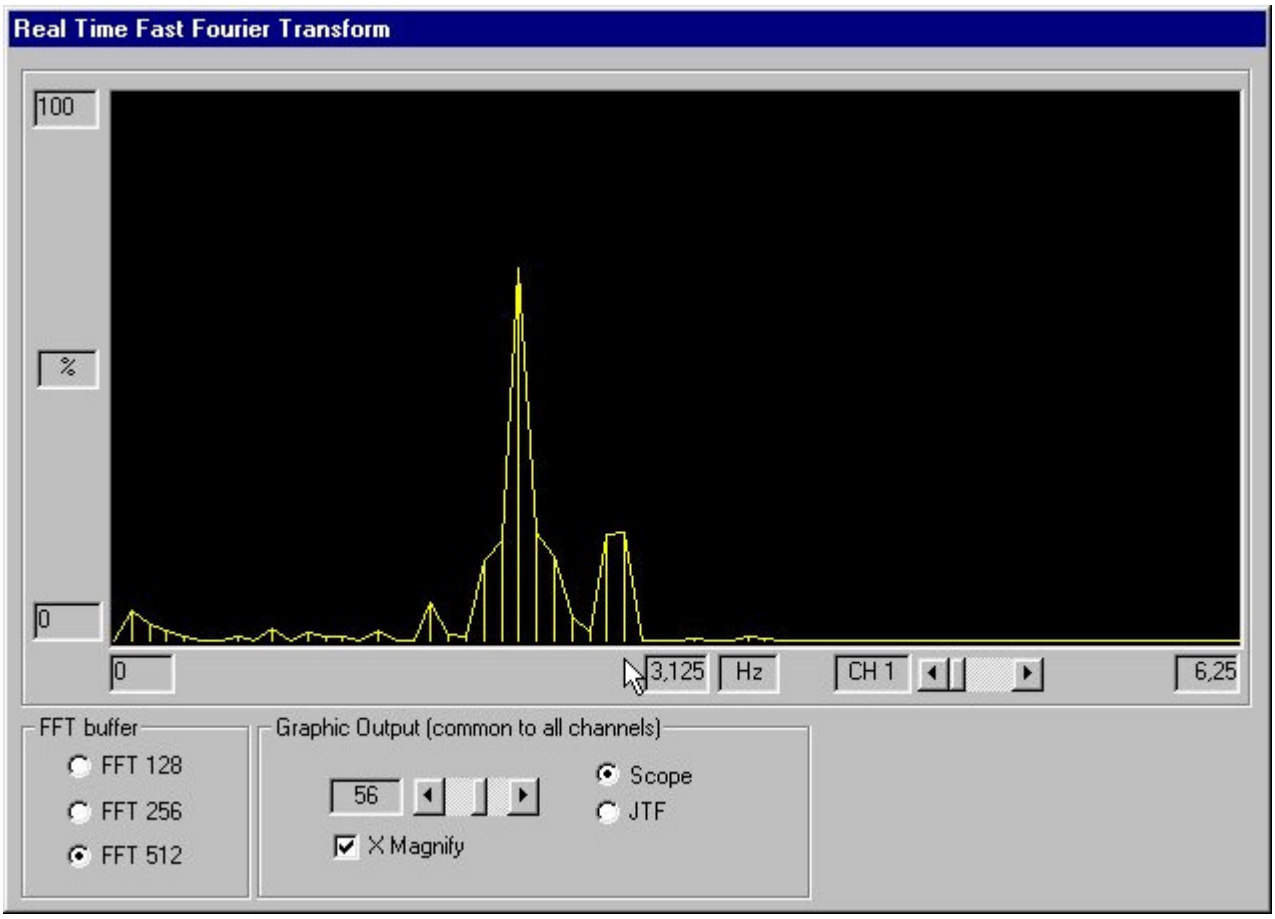
1, 2, 3, 4
Select the track to be extracted

Show drum
Show the current drum active. If present. To close the drum window, close the Review window.

Chart picture
Double clicking on the chart you can start the review of the following data starting from where you clicked.
The mouse movement point at the time on the chart. You can see the time in the indicator above the chart.

FFT e JTF

This window is enabled from the main control panel only when a Service mode is active.
A FFT indicator will happear between Hide drum and No Charts controls.



This function is under development.
I hope to finish it as soon as possible.
It will be very useful to know the spectrum in time during 24 hours.

FILES

Event files
The events files are stored in ASCII according to the format selected on the TRIGGER setup.
They are readable with any TEXT editor.

Datalog files
The datalog files are stored in RAW 16 bit binary format. Low/high order.
The datalog files have the LGx extension where x is the related channel number.
One more file is parallel to LGx files, is the LLx file. The LLx files store the START/STOP operations executed by the operator and store also information on SPS for each recorded segment.
These information are used by the Review/Extract window to reply the files and/or extract segments of files. This file that contains the story of the LOG files allow to change SPS rate and mantain readable the files of the same day.
It is not possible extract files with two different SPS rate but it is possible to extract segment of the same day recorded in differents rates.

The TIMEFILE.TXT file
This file contains a recording of the DCF77 receptions.
It can be used to orient at best the DCF77 antenna.

File 6SMOWIN.DCT
This file is used in conuction with the SEISMODCT.EXE.
When it is generated SEISMODCT doesn't reboot the machine understanding SEISMOWIN is alive and well operating.

File SENDSMS.TXT and SENDMAIL.TXT
It is a list of recorded events.