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MINI-SEIS III Pro™

OPERATING MANUAL



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Explosive Technical Services

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A Word Concerning This Manual

The content of this manual references the most recent Pro firmware. Instruments with older firmware versions may not conform to the content. White recommends that the Pro firmware be kept current. The current version of Seismograph Data Analysis will contain the most recent Pro firmware. Some earlier versions of Seismograph Data Analysis do not support the Mini-Seis III Pro. The trade names Mini-Seis III Pro, Mini-Seis III, Mini-Seis and Seismograph Data Analysis are the property of White Industrial Seismology, Inc.

Introduction

The Mini-Seis III Pro is an enhanced version of the Mini-Seis III and is designed to replace the Mini-Seis III. It features a 32 bit processor and 16 bit A/D. The Pro has over 3.5GB of memory and can store many hours or days of continuous waveform data and many months if not years of continuous histogram data. It may be possible to use the seismograph for many years without having to erase the memory. Ruggedness, reliability, accuracy and power conservation are built in to the design. Data transfer by both serial and high speed USB is supported.

The Pro supports the standard 4 channel configuration, an optional 8 channel configuration and a high speed single channel mode.

Use

The Pro is designed for many types of vibration monitoring including:

- ✓ Blast Vibration
- ✓ Environmental
- ✓ Construction
- ✓ Demolition
- ✓ Underwater
- ✓ And more...

It can also work with non-standard sensors like hydrophones, dynamic strain gauges and tilt gauges. The Seismograph Data Analysis V13 and later software was designed for use with the Pro with both standard and non-standard records.

Operating Modes

- **Waveform** – The standard selection for time history vibration monitoring with trigger thresholds and a fixed record duration.
- **Histogram** – Primarily used for monitoring continuous or semi-continuous vibration. The measured data includes the peak levels in each sample interval, the frequency at the peaks and optionally the vector sum.
- **Histogram/Waveform** – Merges both Waveform and Histogram modes so that waveform events can be recorded simultaneously with histogram data based on user specified trigger thresholds.

- **Manual** – A waveform mode where the instrument triggers based on a key press or the application of an external trigger.

Ranges and Resolutions

The standard unit has a maximum seismic range of 10.24 in/sec (260 mm/sec) and a maximum linear weighted acoustic range of 148 dB (512 Pa). The 16 bit seismic resolution at the standard range is 0.0003125 in/s (0.00794 mm/s). The linear acoustic 16 bit resolution is 0.000156 Mb (0.0156 Pa). The maximum range of the seismic and acoustic sensors can be modified at the factory for more or less sensitivity.

The downloaded data resolution can be changed between 16 bits and 12 bits with the Seismograph Data Analysis software. Changing the resolution does not affect the native data, which is stored using 16 bits. However, since the data are normally compressed when accessed through the USB or serial interface, the 12 bit option will result in smaller file sizes. The 12 bit seismic resolution at the standard range is 0.005 in/s (0.127 mm/s). The linear acoustic 12 bit resolution is 0.0025 Mb (0.25 Pa).

Sample Rates

The available waveform sample rates are 1024, 2048, 4096, 8192 and 16384 over 4 or 8 channels of data. A 64K and 128K rate is available for single channel waveform. The available histogram sample rates with the 4 channel model are 1024, 2048, 4096, 8192 and 16384. The 8 channel histogram sample rate is limited to no more than 8192.

WAVEFORM MODE (4 OR 8 CHANNEL)

1K to 16K in powers of two.

WAVEFORM MODE (1 CHANNEL)

64K or 128K.

HISTOGRAM OR HISTOGRAM/WAVEFORM MODE (4 CHANNEL)

1K to 16K in powers of two.

HISTOGRAM OR HISTOGRAM/WAVEFORM MODE (8 CHANNEL)

1K to 8K in powers of two.

Waveform Recording Duration

The waveform recording duration can be from 1 to 120 seconds at all sample rates. There is also a pre-trigger of 1024 samples. The time of the pre-trigger will thus vary with the selected sample rate. At a sample rate of 1024, the pre-trigger is one second. At a sample rate of 4096, the pre-trigger is 0.25 second.

Battery Life

In waveform mode, at a sample rate of 1024 samples per second, the unit will operate for approximately 7 to 10 days with a full charge. With the Timer Mode set to an eight hour monitoring day, the continuous operating time can be extended to approximately one

month. The instrument can also be connected to AC power or a DC source such as an automobile battery or solar cell for extended or unlimited operating time.

Communication

The Pro supports local communication by both serial and USB. It also supports remote communication by serial. Any remote access device that supports serial, like a cellular modem, WiFi router, or satellite modem, can be used to download data from and interact with the seismograph. The instrument features serial baud rates from 1200 to 460800, allowing it to work with a multitude of remote serial data devices.

External Data Storage

In addition to the seismograph's internal memory, records can easily be transferred to a USB thumb drive directly from the instrument. Data can also be transferred to a computer using the Seismograph Data Analysis software. The thumb drive feature removes the need for a computer in the field to download events.

Note: It is strongly recommended that after transferring data to a thumb drive that the transfer be verified before erasing the memory.

Accessories and Software

All required accessories are provided. The Seismograph Data Analysis software can be downloaded from the White website at www.whiteseis.com. It is recommended that the latest version be used.

Data Compression

The Pro can use data compression to reduce the size of the downloaded files. The amount of compression will vary depending on the waveform characteristics and the selected resolution. Compression is turned on by default. However, compression can be turned off if needed.

Automatic Reporting

The Pro supports the automatic reporting of data through the serial connector. There are multiple modes of operation. Please refer to the chapter on Automatic Reporting for more information.

Options

8 CHANNEL

The 8 channel instrument can have two tri-axial seismic packages and two overpressure microphones. Both seismic packages must use the same units and range. Both microphones must also use the same units and range. However, if there is only one microphone, it can be A weighted.

GPS

The Pro can be equipped with GPS for location logging. If available, GPS information will be included in the summary of each waveform or histogram record.

RANGES

The standard unit will have a maximum seismic range of 10.24 in/sec (260 mm/sec) and a maximum linear weighted acoustic range of 148 dB (512 Pa). These ranges can be modified at the factory for more or less sensitivity. Please check with White or your nearest Mini-Seis III Pro reseller for the availability of other ranges.

NON-STANDARD SENSORS

The Pro does not support the direct display of data from non-standard sensors. However, the software can display and analyze data from non-standard sensors. The standard sensors are a tri-axial geophone package and an overpressure microphone.

Non-standard sensors might include accelerometers, strain gauges, hydrophones, etc. We can supply a bud box with the desired connectors and signal conditioning so that individual sensors can be used. The Pro can support both AC and DC coupled sensors. There can be from 1 to 8 non-standard sensors used, depending on the Pro configuration. Contact White for more information.

A WEIGHTING

The Pro can be equipped with a logarithmic amplifier board for non-certified Type 2 A weighting. We stress non-certified as we cannot test it to certify that it meets ANSI standards. However, it has been tested and compared with ANSI certified devices. A separate microphone should be used for A weighting versus linear overpressure. A weighting is only available for channel 4.

NEW FEATURES

New features may be added. Please check with White or your nearest White Seismograph reseller at any time for information concerning specific features.

Connectors

The standard 4 channel unit has four connectors, two push-pull connectors for the sensors and two DB9 connectors. The 8 channel unit has two additional push-pull connectors. On the 8 channel unit, the connectors closest to the outside of the case represent channels 1 through 4. The inside connectors represent channels 5 through 8. The push-pull sensor connectors are interchangeable for any channel set.

The female top DB9 is the serial connector. This connector can be used for serial communication and external charging by an AC or DC source. The male bottom DB9 is the USB connector. The USB connection generates a high speed virtual com port.

***WARNING** – Do not attempt to charge the unit using the male DB9. Doing this could cause significant damage. Always use AC chargers and DC cables supplied by White for external power. A splitter cable can be provided if both power and serial communication are needed at the same time.*

Connecting a Sensor

To connect a sensor, align the notch of the male connector with the tab in the top of the female connector and push in until it clicks. To disconnect a sensor, pull back on the sliding fixture. The connectors are very rugged. However, care should be taken so that significant amounts of dirt and mud do not become impacted around the pins.

Communication

The serial DB9 (female) is nulled so that it is not necessary to use a null cable with a cellular modem. This means that standard local serial communication would require a null adapter. However, it is anticipated that local communication will be with USB (male DB9). The change in the serial DB9 also means that cables used with the Mini-Seis are not compatible with the Mini-Seis III Pro.

The male DB9 connector is for USB data transfer. There are two USB cables supplied. One cable is for computer communication, the other cable is for data transfer to a USB thumb drive. While we have tested many thumb drives, it is possible that not all USB thumb drives will function with the Pro. White recommends avoiding low priced generic cables in favor of known brands. Mini-Seis III USB cables are not compatible with the Pro and vice versa.

Charging

The standard instrument will contain a sealed rechargeable lead acid battery. The Mini-Seis III Pro has circuitry which helps prevent overcharging. It is harder on the internal battery to let it discharge than to keep it charged.

The Keypad and Display

The Mini-Seis III Pro has various control keys that help to simplify operation. It also has an easy to read backlit graphics display.

ON Key

Pressing the ON key turns on the unit. The Pro can be activated without any sensors attached. Unlike the older Mini-Seis, attaching or removing the sensors does not automatically activate or deactivate the unit.

Note: Due to a change in impedance when connectors are not attached, tapping the connectors can cause the unit to trigger.

OFF key

Pressing the OFF key turns off the unit as long as it is not activated in histogram mode. Unplugging the sensors will not turn the instrument off. The unit features a forced hardware shutdown for cases where it might become unresponsive. Holding down the key for a few seconds will force the instrument off regardless of any operation in progress.

Note: Forcing a hardware off has a small chance of causing data corruption.

ENTER Key

The ENTER key is primarily used to accept entries. If the unit is on, but the display is blank, pressing ENTER or any other key will activate the display.

Up/Down Arrow Keys

These keys move the highlight from field to field in the displayed screen.

Left/Right Arrow Keys

When a modifiable field is highlighted, these keys change the value.

Soft Keys

Soft keys are available below the display. The functions of these keys will vary depending on the displayed screen. A common soft key is labeled Next. Using this key advances to the next screen. The Home soft key returns to the Main Screen. The Back soft key returns to the previous screen viewed.

Display

The graphics display is backlit and easy to read.

Displayed Fields

Some of the data displayed on the screen can be modified. These fields will generally have a label followed by a value. Other fields are used to link to additional screens. These fields are usually contained by hyphen characters, for example -Setup Menus-.

Instrument Screens (in order as they appear)

Information Screen

At power on the Mini-Seis III Pro will briefly display an information screen. The screen will show the model, serial number, firmware version and battery status. The display will be similar to the following:

White Industrial Seismology Mini-Seis III Pro

MODEL: 00

S/N: 10000

VER: 2.0

BAT: 6.4V - OK

After a few moments the Calibration Screen will appear.

Calibration Screen

The calibration screen shows the name of the authorized calibration facility that last calibrated the seismograph. It also shows the channels that were calibrated, the date of the calibration and the sensor serial numbers.

CALIBRATION

LAB: White

Chan 1-4

01-Jan-2021 SEIS: 10000

01-Jan-2021 AIR: 10000

Chan 1-5

01-Jan-2021 SEIS: 10000

01-Jan-2021 AIR: 10000

Since the sensors may be interchangeable between data collectors, it is possible for the serial number of the data collector to differ from that of the sensors. If this is the case, the authorized calibration facility should change the displayed serial numbers accordingly. After a few moments the Stabilization Screen will appear.

Stabilization Screen

The stabilization screen indicates the amount of background vibration present. If the background levels are below the trigger thresholds, a bar on the right side of the screen will show the progress of stabilization. If the background levels are above the trigger

thresholds, the unit will not stabilize. The highlight will go to the Seismic Trig or Acoustic Trig field so that the value can be increased in order to stabilize. The left and right arrow keys are used to increase or decrease the threshold value.

Background Levels

A1: 057.8558 dB	+4	
R1: 0.00062 IPS	+2	
V1: 0.00062 IPS	+2	
T1: 0.00062 IPS	+2	
Seismic Trig: 0.0500		
Acoustic Trig: 120.0		
Lock: Off		

Lock

Ch 5-8

More

Next

The values shown to the right of the channel labels represent the background levels being measured by the instrument. The numbers to the right of that show the number of bits represented by that level. The vertical bar shows the progress of the stabilization.

The Lock soft key can be used to lock the stabilization screen. Locking the stabilization screen is normally used for calibration purposes. This feature allows a technician to dynamically read the values as the channel is being calibrated. If the screen is locked, the soft key text will change to Unlock.

If the unit is an 8 channel model, pressing the Ch 5-8 soft key will display the background data for these channels. The soft key text will change to Ch 1-4. The Ch 5-8 soft key will not display if the instrument is a 4 channel model.

When the More soft key is selected, the user will be presented with other soft key options. These options should only be used by authorized calibration facility personnel.

CalPulse

Send a test pulse to the sensors to test the response.

DC Ofst

The DC Ofst option attempts to correct the A/D for any DC offset.

Note: This option should only be used by an authorized calibration facility and should never be used with the sensors attached.

ZerOfst

This function will remove all A/D offsets. This option should only be used by an authorized calibration facility.

Note: Clearing DC offsets may result in retriggering issues.

Back

Go back to the previous soft key display.

The Next soft key can be used to bypass stabilization. However, once the instrument is armed it may begin triggering.

If the displayed is not locked, the instrument will display the Main Screen after stabilization.

The Main Screen

The Main Screen is displayed after stabilization. It will appear similar to the following:

Bat: 6.3V - OK
Free Memory: 100%
08-Apr-2021 13:54:11 S
33.068064, -96.806473 (if GPS is present)
-Setup Menus-
Trigger: Disarmed
Data Port: RS-232
Baud Rate: 115200

Next

The items on the Main Screen are discussed in the section titled Main Screen Functions.

Next

Select Next to advance to the current Mode screen.

Current Mode Screen

There is a display that is used to change from the current operating mode. If a mode using waveform is active, the trigger must be disarmed before the mode can be changed. If a mode using histogram is active, the histogram must be made inactive before the mode can be changed.

The mode display is accessed by pressing the Next soft key from the Main Screen. To change the mode, press the left or right arrow key while the mode is highlighted in the mode display (see below).

Waveform

Rate: 1024 /SEC
Duration: 8 SEC

Seismic Trig: 0.05000 IPS
Acoustic Trig:: 125 dB

Next

In this example, we can change the mode from Waveform when the trigger is disarmed. Pressing the right arrow key while Waveform is highlighted displays the Select Mode screen.

Select Mode

-Histogram-

-Histogram/Waveform-

-Manual-

Back

The contents of the display will depend on the current mode. If a selection is not made within 30 seconds, the display will revert to the current mode. The various operating modes will be discussed in another section of this manual. Select Back to return to the Current Mode Screen. Pressing the Next soft key from the Current Mode Screen will display the event screen.

Event Screen

Waveform Events

BAT: 6.5V EVENT: 00002

04-08-2021 11:20:42

IPS/dB Hz CAL

V: 0.114 9.85 OK

R: 0.802 16.78 OK

T: 0.684 7.42 OK

A: 125.0 33.7 OK

Copy

Back

Histogram Events

BAT: 6.5V JOB: 00003

04-08-2021 11:40:37

IPS/dB Hz CAL

V: 0.237 9.85 OK

R: 0.115 16.78 OK

T: 0.213 7.42 OK

A: 113.0 33.7 OK

Copy

Back

The OK under CAL means that the sensor self-test responded within acceptable parameters when sent a test pulse. This action does not calibrate the sensor, nor is it an indication of whether or not a sensor is in calibration. The calibration of a sensor can only be tested and adjusted with the proper equipment.

Main Screen Functions

The first two lines show the approximate battery voltage and free memory. If the date and time needs to be modified, use the up and down arrow keys to place the highlight on the S and press ENTER.

Setting the Date and Time

08-Apr-2021 13:55:22

Day: 08

Month: Apr

Year: 2021

Hour: 13

Minute: 55

Second: 22

Back

Please note that the time cannot be changed while the trigger is armed.

-Setup Menus-

Selecting this field displays a list of setup options.

Setup Menus

-Unit Options-

-System Log Options-

-Timer Setup-

-Multi Triggering-

Home

Back

-UNIT OPTIONS-

The Unit Options setup menu contains the following selections:

Unit Options

-File System-

-Unit Setup-

-Use Factory Defaults-

-GPS-

Home

Back

-File System-

File System

Total Memory: 3866208 KB

Free Memory: 3865465 KB

Histogram: 1369780 KB

Waveform: 2495686 KB

Number of Files: 0

Erase

Home

Back

The amount of memory shown is for illustration. Your model may have more or less memory.

Use the Erase soft key to erase the memory. A confirmation will be required. Once the memory has been erased it cannot be recovered.

-Unit Setup-

Unit Setup

Air Used: Yes

Air Weighting: Linear

Unit: Range

Air dBL 148.2

Seismic IPS 10.24

Vector Sum: No

Home

Back

The range field values are set at the factory and cannot be modified from the user interface.

Air Used

The Air Used field indicates whether or not a microphone is being used.

Air Weighting

The standard seismograph uses linear overpressure weighting. Non ANSI certified type 2 A weighting is available if the hardware is present in the instrument. Linear weighting normally has an upper range of 148 dB (5.12 Mb or 512 Pa) and a 2 Hz low frequency response. The upper frequency response is approximately 1/4 the sample rate. Linear weighting is appropriate for blast overpressure monitoring. It is not appropriate for noise monitoring.

A weighting should be used for noise monitoring and requires a separate microphone. The standard A weighting range will normally be 44 to 114 dBA or less. The frequency range is approximately 50 Hz to 10 kHz. The A weighted option should not be used for monitoring blast overpressure. The A weighting is non-ANSI certified Type 2 so ensure that this restriction is acceptable.

If using both linear and A weighting with separate microphones, it will be necessary to reprogram the acoustic channel each time a change is made. Contact White if help is needed.

Air Units

This field indicates the units that will be used to display acoustic data. Linear weighting options are dBL (linear decibels), Mb (millibars), PSI (pounds per square inch) and Pa (Pascals). A weighting uses dBA.

Note: Changing the air units does not change the units used to record data. It only changes the units used to display data. The units used to recorded data can be changed from the current version of the Seismograph Data Analysis software.

Air Range

This field value shows the maximum level that can be recorded. It is set at the factory and can only be changed through the Seismograph Data Analysis software.

Warning: The true Air Range is determined by the hardware in the microphone, not the software. Setting the software range to a value different from the microphone hardware range will result in incorrect values.

Seismic Units

This field indicates the units that will be used to display seismic data. The options are IPS (inches per second), and MMPS (millimeters per second). The units may be changed from the UI. Changing the units automatically changes the displayed range.

Note: Changing the air units does not change the units used to record data. It only changes the units used to display data. The units used to recorded data can be changed from the current version of the Seismograph Data Analysis software.

Seismic Range

This field value shows the maximum level that can be recorded. It is set at the factory and can only be changed through the Seismograph Data Analysis software.

Warning: The true Seismic Range is determined by the hardware, not the software. Setting the software range to a value different from the hardware range will result in incorrect values.

-Use Factory Defaults-

This option replaces existing settings with factory default values.

-GPS-

Instruments equipped with GPS will display this option.

GPS

Loc: +33° 04' 0.51"
-96° 48' 23.3"

Time: 17:43:56

Format: D.MM.SS

Refresh: Startup

Time Sync: No

Sync Now

Home

Back

This display will show the GPS location coordinates in the selected format. The format choices are D.MM.SS (degrees, minutes, seconds), D.MM (degrees, minutes) and D (degrees).

The Refresh options are Startup or Record. The Startup option refreshes the GPS only when the instrument is turned on or when the Sync Now soft key is used. The Record option refreshes the GPS when a triggered event occurs. There is a power and performance cost to using the GPS. If the Startup option is used, the GPS will power down after acquiring the coordinates. If the Record option is used, triggering will be disabled while the GPS is powered up and retrieving coordinates. Then it will be shut down and triggering will be re-enabled.

Once implemented, the Time Sync option will be settable to Yes or No. If set to Yes, then the GPS is left on, and each record is stored with the number of counts into the record when the first GPS sync pulse occurred. Since all records are at least 1 second long, this guarantees that the GPS sync pulse will be past the point at which the record started. Note that this is applicable only to waveforms.

Use Sync Now to manually acquire the GPS location and refresh the data. Triggering may need to be disabled to use this soft key.

SYSTEM LOG OPTIONS

The System Log tracks when the unit is armed and disarmed and when charges are made to setup parameters. Each entry in the log consists of a date and time and text to indicate what the entry represents.

System Log: 1215
08-Apr-2021 15:04:40

Clear

Home

Back

The various log entries can be reviewed on the display using the left and right arrow keys. They can also be retrieved and displayed by the Seismograph Data Analysis software.

Clear

Use the Clear soft key to clear all log entries.

TIMER SETUP

The timer can be set to specify when the instrument will be operational. The starting and ending hour can be from 0 to 23. The starting and ending minute can be 0 or 30.

If the On Timer is set to Enabled, no operating mode can be activated outside of the timer. The active operating mode will be started at the On time and stopped at the Off time.

Timer Setup

On Timer: Enabled

Off Timer: Enabled

Settings	HR	MIN
On	08	00
Off	17	00

Home

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The above instructs the seismograph to turn on at 8:00 am and turn off at 5:00 pm. If the On Timer is Enabled, but the Off Timer is Disabled, the seismograph will activate at the On time and will stay in continuous operation thereafter. If the On Timer is Disabled, but the Off Timer is Enabled, the seismograph will inactivate at the Off time and will not turn back on.

MULTI TRIGGERING

The Pro has two additional triggers for activating devices such as a strobe or horn. For example, the seismograph may be set to trigger and record an event at the standard level. A second level could be used to activate a strobe and a third level could be used to activate a horn.

Multi-Triggering

Sensor: 1

	Seis IPS	Air dB
Lv 1:	0.25000	130.0000
Lv 2:	0.50000	140.0000

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Sensor

Different levels can be applied to channels 1-4 and channels 5-8. Sensor 1 represents channels 1-4. Sensor 2 represents channels 5-8.

Units and Levels

Lv 1 (level 1) is the first optional level. In the above example it will fire at 0.25 ips or 130 dB.
Lv 2 (level 2) is the second optional level. It is set to fire at 0.50 ips or 140 dB.

Main Screen Trigger

If the operating mode is set to waveform, the trigger can be set to Armed or Disarmed. If the field is set to Disarmed, the instrument will not trigger.

At power on, the trigger will be set to Disarmed. However, if the display is allowed to power down, the trigger will arm. This feature means that, when in Waveform Mode, the instrument can be powered on and will automatically arm itself after approximately one minute. Also, if for some reason a remote unit would reset, it would automatically rearm.

Note: If the unit is disarmed remotely using software, it will not automatically rearm unless reset.

Note: The instrument cannot be powered off while the trigger is armed or while a histogram is active, unless a forced power off is used.

Main Screen Data Port

The Data Port specifies what will be used for sending automatic reports. However, at this time reporting is only possible using RS232. The Pro will respond to both USB and RS232 connections at any time.

The USB will consume a significant amount of power if left on. As long as a computer connection is detected, the USB will remain active. However, if the connection is removed, the USB will power down after a period of inactivity. It can be reactivated by attaching the USB cable again.

When the USB cable is connected to the instrument and then connected to the computer, a virtual COM port will be created. This COM port will be visible in the list of available ports in the Seismograph Data Analysis software. The virtual COM port can also be displayed by looking at Device Manager in Windows.

If the virtual COM port is not created, the drivers may need to be installed. The driver may be installed from the Seismograph Data Analysis software.

Main Screen Baud Rate

The Baud Rate field only applies to the RS232 Data Port selection. Whatever rate is selected, the same rate must be set in the Seismograph Data Analysis software when using a direct serial connection. When using a remote access device like a cellular modem, the baud rate of the remote access device must match the instrument's baud rate.

It is anticipated that USB will be used for direct connections and not RS232. Remote access using serial may necessitate using a lower baud rate if the signal quality is poor.

Mode Screen Functions (Waveform Mode)

Waveform Mode is most often used for monitoring transient vibration sources like blasting. However, it is also appropriate for other vibration sources where capturing the time history is desired. For continuous or semi-continuous vibration sources, the Histogram or Histogram/Waveform Mode may be a better selection.

Waveform Mode utilizes trigger thresholds for ground vibration and air overpressure. If either of these thresholds are met or exceeded, the instrument will activate and record for a specified duration at a fixed sample rate. There is a pre-trigger buffer of 1024 samples. Thus, the pre-trigger duration varies proportional to the sample rate. For example, a 2048 sample rate has a pre-trigger of 0.5 second.

Waveform

Rate: 1024 /SEC
Duration: 8 SEC

Seismic Trig: 0.05000 IPS
Acoustic Trig:: 125 dB

Next

Rate

The sample rate is selectable at 1024, 2048, 4096, 8192 or 16384 over 4 or 8 channels of data. Single channel rates of 64K or 128K are also available. To change the rate, select the field and use the left or right arrow key.

Duration

The duration is the amount of time the unit will actively record after receiving a trigger. This time does not include the pre-trigger. The duration can be from 1 to 120 seconds. To change the duration, select the field and use either the left or right arrow key.

Note: In general, the higher the sample rate and the longer the duration, the larger the record size.

Seismic Trigger

This is the trigger threshold at which the unit will trigger from a ground vibration. To set the value, highlight the field and use the left or right arrow key. Holding the keys down will change the value at a faster rate.

The trigger resolution is based on the maximum range of the seismograph. The standard minimum trigger starts at 0.01 in/s (0.254 mm/s) and can be increased in steps of 0.005 ins (0.127 mm/s) based on a maximum range of 10.24 in/s (260 mm/s).

Acoustic Trigger

This is the trigger threshold at which the unit will trigger from an air overpressure, or a noise level in the case of A weighting. To set the value, highlight the field and use the left or right arrow key. Holding the keys down will change the value at a faster rate. The minimum linear acoustic trigger setting is approximately 88 dBL (0.5 Pa) based on a 148 dBL range.

TRIGGER LEVEL CONSIDERATIONS

There is no one best setting for the trigger thresholds. Ideally, the thresholds will be set low enough to trigger to the event, while being high enough to prevent significant false triggering. The ISEE Field Practice Guidelines for Blasting Seismographs 2017 Edition suggests 1.3 mm/s (0.05 in/s) seismic and 20 Pa (0.20 millibars or 120 dB). This document is available at www.isee.org.

Histogram Mode Functions

Histogram mode is ideal for recording peak vibration levels over intervals of time. It is most often used when recording continuous or semi-continuous vibration where a time history is not needed. The mode continuously samples, keeping the peak values in the specified time interval. It also stores the frequencies at the peak values and optionally the vector sum.

Histogram

Rate: 1024 /SEC

Period: 60 SEC

Interval: 0 Hrs

Status: Inactive

Activate

Next

Rate

The histogram sample rate can be 1024, 2048, 4096, 8192 or 16384 over 4 channels. The 8 channel model is limited to 8192 sps.

Period

The sample period choices are 1, 10, 20, 30, 40, 50, 60 and 900 seconds. In general, the shorter the sample interval, the larger the record size.

Interval

The value of the interval is the amount of time the histogram will run before closing. The value is in hours and can be from 0 to 12. A value of 0 means that the interval is disabled.

TO RUN A CONTINUOUS HISTOGRAM

1. Do not set a timer.
2. Set the rate and period as desired.
3. Set the Interval to 0.
4. Press the Activate soft key.

The histogram will run continuously until midnight. At midnight the histogram will be closed and a new histogram will be started. The process will continue until the histogram is made inactive.

TO RUN AN INTERVAL HISTOGRAM

1. Do not set a timer.
2. Set the rate and period as desired.
3. Set the Interval to the number of hours desired. For illustration we will use 4.
4. Press the Activate soft key.

After 4 hours have elapsed, the histogram will close and a new histogram will start. The process will continue until the histogram is made inactive.

TO RUN AN INTERVAL HISTOGRAM STARTING AT A SPECIFIC TIME

1. Go to Timer Setup, set the On Timer to Enabled and set the On time HR and MIN to the time to start.
2. Set the rate and period as desired.
3. Set the Interval to the number of hours desired. For illustration we will use 4.

The mode will activate automatically when the set Start Time is reached. After 4 hours has elapsed, the histogram will close and a new histogram will start. The process will continue until the histogram is made inactive. The Start Time will not be reused.

TO RUN AN INTERVAL HISTOGRAM STARTING AND ENDING AT A SPECIFIC TIME

1. Go to Timer Setup, set the On and Off Timer to Enabled and set the On and Off HR and MIN to the time to start and end.
2. Set the rate and period as desired.
3. Set the Interval to the number of hours desired. For illustration we will use 4.

The mode will activate automatically when the set On time is reached and inactivate automatically when the Off time is reached. If the Off time is more than the Interval, after the Interval has elapsed, the histogram will close and a new histogram will start. If the Off time is less than the Interval, the histogram will close at the Off time. If the seismograph is not manually inactivated, the process will continue each day until the histogram is made inactive.

Status

To manually activate the histogram select the Activate soft key. The soft key text will change to Inactivt. To end an active histogram select the Inactivt soft key. A histogram cannot be manually activated if the Timer is set.

Note: Do not turn off power to the instrument while the histogram is active. Making the histogram inactive allows the firmware to write the proper summary entries. Failure to do this may result in a corrupted record.

Histogram/Waveform Mode Functions

This mode is designed for recording both histogram and waveform. In addition to the histogram, the user can set seismic and acoustic trigger thresholds. While the histogram is being taken, if the data exceeds one of the thresholds, the unit will record a waveform of the event.

Histogram/Waveform

Rate: 1024 /SEC

Period: 60 SEC

Duration: 4 SEC

Interval: 0 Hrs

Seismic Trig: 0.0500 IPS

Acoustic Trig: 120.0 dB

Status: Inactive

Activate

Next

Rate

The 4 channel histogram sample rate can be 1024, 2048, 4096, 8192 or 16384. The 8 channel histogram sample rate is limited to 8192.

Period

The sample period is the selected interval. The choices are 1, 10, 20, 30, 40, 50, 60 and 900 seconds. In general, the shorter the sample interval the larger the record size.

Duration

The duration is the amount of time the unit will actively record after receiving a trigger. This time does not include the pre-trigger. The duration can be from 1 to 120 seconds. To change the duration, select the field and use either the left or right arrow key.

Note: In general, the longer the duration, the larger the record size.

Interval

The value of the interval is the amount of time the histogram will run before closing. The value is in hours and can be from 0 to 12. A value of 0 means that the interval is disabled. See the histogram section for information on using the interval and timer settings.

Seismic Trig

This is the trigger threshold at which the unit will trigger from a ground vibration. To set the value, highlight the field and use the left or right arrow key. Holding the keys down will change the value at a faster rate.

Acoustic Trig

This is the trigger threshold at which the unit will trigger from an air overpressure. To set the value, highlight the field and use the left or right arrow key. Holding the keys down will change the value at a faster rate.

TRIGGER LEVEL CONSIDERATIONS

There is no one best setting for the trigger thresholds. Ideally, the thresholds will be set low enough to trigger to the event, while being high enough to prevent significant false triggering. The ISEE Field Practice Guidelines for Blasting Seismographs 2009 Edition suggests 1.3 mm/s (0.05 in/s) seismic and 20 Pa (0.20 millibars or 120 dB). This document is available at www.isee.org.

Status

To manually activate the histogram select the Activate soft key. The soft key text will change to Inactivt. To end an active histogram select the Inactivt soft key. A histogram cannot be manually activated if the Timer is set.

Note: Do not turn off power to the instrument while the histogram is active. Making the histogram inactive allows the firmware to write the proper summary entries. Failure to do this may result in a corrupted record.

Event Screen Functions

There are two types of records that can be displayed on the Event Screen, waveform and histogram.

Waveform Events

BAT: 6.5V EVENT: 00002

04-08-2021 11:20:42

IPS/dB Hz CAL

V: 0.114 9.85 OK

R: 0.802 16.78 OK

T: 0.684 7.42 OK

A: 125.0 33.7 OK

Copy

Back

Histogram Events

BAT: 6.5V JOB: 00003

04-08-2021 11:40:37

IPS/dB Hz CAL

V: 0.237 9.85 OK

R: 0.115 16.78 OK

T: 0.213 7.42 OK

A: 113.0 33.7 OK

Copy

Back

The OK under CAL means that the sensor self-test responded within acceptable parameters when sent a test pulse. This action does not calibrate the sensor, nor is it an indication of whether or not a sensor is in calibration. The calibration of a sensor can only be tested and adjusted with the proper equipment.

Copy

The Copy soft key is used to write records to a USB thumb drive. A special cable is provided for this purpose. It has a female DB9 connector on one end and a USB connector for a thumb drive on the other end. The cable uses the male DB9 connector on the seismograph.

COPY EVENT OPTIONS

The Copy Event Options display gives us three copy options. All, Range or Date. The appearance of the display depends on the selected option.

All

Copy Event Options

Select Events: All

Copy

Done

Range

Copy Event Options

Select Events: Range

Range: 00002 - 00005

Copy

Done

Date

Copy Event Options

Select Events: Date

Start: 2021 Apr 08

End: 2020 Apr 08

Copy

Done

Copy

Use the Copy soft key to write the range of events specified to the thumb drive.

Done

Returns the display to the Event Screen

Note: It is strongly advised to check the thumb drive to make sure the records were written correctly prior to erasing the seismograph's memory.

4 Channel, 8 Channel and Single Channel Configuration

The standard Pro has a 4 channel configuration. The 8 channel configuration is an option and requires a different case and circuit boards. Both the 4 and 8 channel models can run as a single high speed channel at 64K or 128K samples per second. Otherwise the sample rates are from 1K to 16K except for the 8 channel histogram which is limited to an 8K rate.

The Pro will be programmed for the desired configuration when ordered. The 8 channel model can be programmed as a 4 channel or single channel configuration using CLI commands sent through Seismograph Data Analysis. However, it is recommended that only knowledgeable users employ CLI commands to change configurations.

Should a configuration change be required, please contact White for the appropriate procedure to follow.

Automatic Reporting

Automatic reporting is the process of having the seismograph send out a report string after a waveform trigger, the closing of a histogram, at a fixed time of day, or at specified intervals.

Automatic reporting is normally used with remote monitoring. With a White approved remote access device, the data can be forwarded to a network running our AutoReceive™ software. This software processes the incoming data and can be used to send notifications of measurements by email and SMS. We offer our Reporting Service for customers who do not wish to host their own.

The Pro can be programmed to output a report string under one of the following three conditions:

Triggered Reporting

A report string is sent out after a triggered waveform event or at the closing of a histogram.

Fixed Reporting

A report string is sent out at a fixed time of day.

Interval Reporting

A report string is sent out at regular intervals.

Heartbeat

The Pro can also output a heartbeat at a specified time of day. The heartbeat is not a report. Rather it is simply an indication that the unit is functioning.

The Command Terminal of the Seismograph Data Analysis software is used to program the seismograph for automatic reporting. Please refer to this software.

Note: The Pro is not supported by AutoReceive V2. Check with White for the version of AutoReceive that supports the Pro.

Using a USB Thumb Drive

A very useful feature of the Mini-Seis III Pro is the ability to write records to a USB thumb drive at a very high rate. To do this a special cable is supplied. The cable has a female DB9 pin on one end and a USB slave receptor connector on the other end. The following steps can be used to copy records to a USB thumb drive.

1. Turn the seismograph on and wait for it to stabilize. It is not necessary to connect any sensors to active the instrument.
2. Connect the thumb drive cable to the instrument.
3. Connect the thumb drive to the cable.
4. Navigate to the Event Screen. While on the screen, determine what data you want to transfer. All records, a range of event numbers, or a range of dates.
5. Press the Copy soft key.
6. On the Copy Event Options screen, set the copy type and supply any additional information.
7. Press the Copy soft key.
8. When finished copying, press the Done soft key.
9. Disconnect the thumb drive from the cable and the cable from the seismograph.
10. It is recommended to verify that the thumb drive contains the desired files in a folder with the instrument serial number before erasing the memory.

The instrument stores the files in a folder on the thumb drive specified by the unit serial number. If the same thumb drive is used with multiple units, there will be a directory for each serial number. The filenames will be of the format

[sn][yyyy][MM][dd][hh][mm][ss][event] where

[sn] is the unit serial number

[yyyy] is the event year

[MM] is the event month

[dd] is the event day

[hh] is the event hour

[mm] is the event minute

[ss] is the event second

[event] is the event number

Field Use

It is strongly recommended that the user obtain a copy of the ISEE Field Practice Guidelines for Blasting Seismographs (available from the ISEE at www.isee.org). Our recommendations for field use follow these guidelines.

Transducer Coupling

Burial of the seismic transducer package is recommended, except in super-saturated soil conditions. To bury the transducer first connect the spikes. Then dig a hole roughly six inches deep. The bottom of the hole should be relatively flat and smooth. Orient the arrow on top of the transducer toward the vibration source and press the transducer assembly into the bottom of the hole. Carefully replace the soil around and over the transducer. After monitoring, care should be used when removing the soil so that the transducer cord will not be cut.

For surface spiking in good soil conditions, first connect the spikes. Orient the arrow on top of the transducer toward the vibration source and press the transducer assembly firmly into the earth. A sandbag may also be used.

When mounting on concrete is necessary, bolting or gluing of the transducer package is recommended. Never simply place the transducer on concrete without proper coupling.

Note: Transducer coupling becomes a significant issue whenever ground accelerations approach or exceed 0.2 gravities. At a frequency of 30 hertz, a particle velocity of 0.40 ips (10 mm/s) yields 0.2 g acceleration.

Microphone

The microphone will normally be installed in the provided microphone stand. Another method is to use tape to fasten the microphone to a rod driven into the ground. The supplied wind screen should always be used to prevent the acoustic readings from being influenced by wind. Also, use the supplied rain shield package to protect the microphone from any rain. To use the rain shield package, put it over the microphone and loosely tie it off at the bottom with a rubber band or similar item.

Note: Never use tape or any material that directly obstructs the microphone element. The linear weighted microphone is used to record changes in overpressure. The measurements will be valid as long as the pressure around the element changes uniformly with the pressure change in the environment.

Preparing for Operation

Activating and Stabilization

After the transducer and microphone are installed, they can be connected to either one of the connectors on the Mini-Seis III Pro case. In the case of the 8 channel model, the outer most connectors are for channels 1-4, the inner most for channels 5-8. **The sensors should be connected before turning on the power.** Next press the ON button to activate the

instrument. The splash screen will appear and then the stabilization screen. If the instrument does not stabilize, it means that there is activity that is above one or both of the trigger thresholds. If this is the case, you can increase the trigger thresholds from the stabilization screen by selecting a threshold and using the right arrow key.

Main Screen

After stabilization the Main Screen will be displayed. Changes to basic information such as seismic or acoustic units can be made using the -Setup Menus- selection. Changes to the operating values of the mode to be used can be made from the screen for that mode. Before leaving the instrument, if using waveform mode, make sure the Trigger field shows Armed. If it shows Disarmed, select the field and change it to Armed.

Note: In Waveform Mode, the instrument will automatically arm itself after some brief period of inactivity, usually one to two minutes. Histogram or Histogram/Waveform Mode will not automatically activate unless using a timer.

Mode Screens

If the displayed mode screen is the mode you wish to use, check the settings and make any necessary adjustments. If this is not the desired mode, press the right or left arrow key to change the mode.

In Waveform Mode, when the trigger is armed the instrument is ready to take events. No other steps are needed. Histogram mode or histogram/waveform mode must be activated unless using a timer.

Reviewing Data

It is likely that the instrument's display will be blank after an event. The instrument shuts down the display after a period of inactivity to save power. Press ENTER to activate the display. If a trigger occurred, the display should show the Event Screen. If not, press ENTER until the screen is displayed.

While the event number is selected, the left and right arrow keys can be used to scroll through the events in memory. It is from this screen that a user can copy events to a USB thumb drive.

Example Steps for Monitoring Using Waveform Mode

1. Prepare the transducer and microphone as described in the chapter titled Field Use.
2. Couple the transducer and microphone.
3. Press the ON key.
4. The first screen displayed will be the splash screen. A few moments later the stabilization screen will appear. If the instrument does not stabilize, increase the trigger thresholds as described in the Field Use chapter.
5. From the Main Screen, make note of the value of the Trigger field. Remember that when the field value shows Armed, the unit is ready to trigger to an event. If you do not want the unit to trigger accidentally, make sure the field value shows Disarmed. Press the Next soft key.
6. Make sure the Waveform mode screen is displayed. If it is not, press the right arrow key to show the Select Mode display and change to Waveform.
7. Check the settings and make any necessary changes.
8. If you left the Trigger field on the Main Screen on Disarmed, navigate to that screen and change the value to Armed. Otherwise, the unit will automatically arm itself after a brief period of inactivity, usually one to two minutes.

Example Steps for Monitoring Using Histogram Mode

1. Prepare the transducer and microphone as described in the chapter titled Field Use.
2. Couple the transducer and microphone.
3. Press the ON key.
4. The first screen displayed will be the splash screen. A few moments later the stabilization screen will appear. If the instrument does not stabilize, increase the trigger thresholds as described in the Field Use chapter.
5. When using Histogram mode, the value of the Trigger field is removed from the Main Screen. Press the Next soft key.
6. Once on the mode screen, make sure the mode is Histogram. If it is not, press the right arrow key to show the Select Mode display and change to Histogram.
7. Check the settings and make any necessary changes.
8. If not using a timer, to begin monitoring, press the Activate soft key.
9. In not using a timer, when finished monitoring, return to the Histogram mode screen and press the Inactivt soft key. Turning off power without inactivating the histogram may corrupt the record.

Updating the Firmware

There will be firmware updates available as new features are added and reported issues are fixed. Using Seismograph Data Analysis, the firmware can be updated either locally or remotely from within the software. When a new firmware build is available, we will include it in a new analysis software build. When the analysis update is installed, the firmware update will be part of the install.

It will generally be advisable to apply the most recent version. Instructions for applying the update using Seismograph Data Analysis are available from the software help system. Applying an earlier software build can also be done, but there may be unexpected issues.

CLI Commands

There are numerous commands that can be used to setup and control Pro operation. It is best to use these commands with the Command Prompt in Seismograph Data Analysis. All commands persist through a power cycle.

Command	Description	Parameters
AU enable	Get or set whether the air channels are used. If <i>enabled</i> is 1, air channels are included. If <i>enabled</i> is 0, air channels are excluded. If passed with no parameter, returns the current value.	enable: 0 = Air is disabled 1 = Air is enabled
AW used	Get or set whether A-weighting is used. If the A-weighting board is not installed, the result will always be 0. If passed with no parameter, returns the current value. If the A weight board is installed and enabled the return value will be 2.	used: 0 = Not used 1 = Use A-weighting
CHEN channels	Enables 8 channels (channels = 2), four channels (channels = 1), or none (channels = 0) and configures enabled channels as follows: Channels 1-3: Seismic Channel 4: Air Channels 5-7: Seismic Channel 8: Air The commands SSP 0, SSP 1, or SSP 2 should be used to configure the range, units, and min.	channels: 0 = All disabled 1 = Channels 1-4 enabled, channels 5-8 disabled 2 = All enabled 3 = Single channel
CHG	Returns the external charging voltage.	None
CL	Clears the system log.	None.
CO text	Get or set the text of the comment preset. Text is all characters following the space following CO (up to 126 characters, so comments may include spaces and punctuation in addition to numbers and letters. The line feed character (' <code>\n</code> ' / 0x0A) is treated as a carriage return. If passed with no parameters, returns the current text for the comment.	text: Any combination of up to 126 ASCII characters from 0x20 (space) to 0x7E (tilde), inclusive, as well as 0x0A (line feed).
COMP enabled	Turn compression on/off when downloading.	Enabled: 0 = Disable compression 1 = Enable compression
CS enable	Enable or disable comment inclusion with subsequent records. Note that comment text is set using the CO command. If sent with no parameters, returns the current enable value.	enable: 0: Do not include the comment preset on subsequent records. 1: Include the comment preset with records collected following enabling comments.
DU seconds	Get or set the waveform duration in seconds.	seconds: 1 to 120
EM	Erase memory	none
ER mode [HHMM]	Set automatic reporting mode and parameters. Note that HH and MM must be 0-padded. If passed with no parameters and the current mode is 0 or 1, returns only the value of the current mode. If passed with no parameters and the current mode is 2 or 3, returns the current values of all parameters.	mode: 0 = Disable automatic reporting 1 = Triggered mode 2 = Fixed mode 3 = Interval mode HH: 00–23 (required for fixed and interval modes) MM: 00–59 (required for fixed mode)

Command	Description	Parameters
FL	Returns a list of the valid event and histogram files in memory. The format of the output is as follows: /<year>-<month>-<day>-<hour>-<minute>-<second>-<id>-<ext>, where year is the 4-digit year, month is the 2-digit month, day is the 2-digit day, hour is the 2-digit, 24-hour representation of the hour, minute is the 2-digit minute, and second is the 2-digit second at which the record was started; id is the 4-digit file ID, and ext is "proevt" for waveform-type files and "prohst" for histogram-type files. Note that invalid files (ones not closed properly) are skipped. Example waveform: /2016-12-08-11-59-23-0001.proevt Example histogram: /2016-12-08-11-59-23-0002.prohst	none
FN	Returns the total number of event and histogram files in memory.	none
FU	Copies the current settings to the factory defaults. Returns "OK" when successful.	none
GR	Queues sending the latest automatic report for delivery in three seconds.	none
HB enable [HHMM]	Enables or disables the daily heartbeat message and sets the time for the message. If HH and MM are omitted, the last heartbeat time set is used (or the default, if the heartbeat time has never been set). If passed with no parameters and disabled, returns "0". If enabled, returns 1 (enabled) and the hour and minute at which the heartbeat is to be sent. Note that HH and MM must be 0-padded.	Enable: 0 = Don't send daily heartbeat messages 1 = Send daily heartbeat messages HHMM: 24-hour time at which to send the daily heartbeat message. HH: 00-23 MM: 00-59
HI interval	Get or set the histogram interval duration (hours). If passed with no parameters, returns the current value.	interval: 0-12
NE event	Returns the summary and event data for event. If event is invalid or blank, returns "Invalid index."	event: The ID of the event for which to get summary and event data as indicated in the FL command. Valid values are 1 up to the number of entries returned by the FN command.
NS event	Returns the summary data for event. If event is invalid or blank, returns "Invalid index."	event: The ID of the event for which to get summary data as indicated in the FL command. Valid values are 1 up to the number of entries returned by the FN command.
RE bits	Get or set the ADC resolution. If passed with no parameters, returns the current value.	bits: 12 = 12-bit 16 = 16-bit
RF	Restores the default parameters.	none
RI interface	Get or set the interface used for remote reporting and heartbeats. If passed with no parameters, returns the current value.	interface: 0 = RS-232 1 = USB
RM	Reset the seismograph.	none
RT rate	Get or set the sample rate for the current mode. If passed with no parameters, returns the current value.	rate: 1024

Command	Description	Parameters
		2048 4096 8192 16384 65536 (Single channel waveform only) 131072 (Single channel waveform only)
SI rate	Set the baud rate of the serial link (only RS232 Console). If passed with no parameters or an invalid parameter, returns the current value. Using this command from the USB interface has no effect.	rate: 1200 2400 4800 9600 19200* 38400 57600 115200 230400 * Default
SM mode	Get or set the current operating mode. If passed with no parameters, returns the current value.	mode: ID: Idle (maintains current mode but disables data collection) HI: Histogram HW: Histogram/Waveform MA: Manual WF: Waveform
SP seconds	Get or set histogram sample period in seconds. Period may be 1, 10, 20, 30, 40, 50, 60, or 900.	period: 1 10 20 30 40 50 60 900
SSP sensor range unit min	Get or set the sensor parameters for sensor-type, which can be 0 (air), 1 (seismic), or 2 (A-weighted air). If passed with no parameters, returns an error. If passed with only sensor-type, returns the current parameters for that type in the format: <sensor-type as integer> <range as float> <unit as integer> [<min as float>] Note that min is only sent if the sensor type is 2. Sensor-type 0 parameters affect channel 4, and channel 8 if enabled. Sensor-type 1 parameters affect channels 1-3, and 5-7 if enabled. Sensor-type 2 parameters affect channel 4 only. If sensor type 2 is selected, then channel 8 (if enabled) uses the SSP 0 settings.	Sensor is the type of sensor. Valid values are: 0: Air 1: Seismic 2: A-Weighted Air Range is the maximum reading (in units) for the channel. Unit is the unit-type and is sensor-type specific. For air: 0: dBL 1: mb 2: Pa 3: PSI For seismic: 0: IPS 1: MMPS The unit-type is ignored for A-weighted air and is always dBA.

Command	Description	Parameters
		Min is only used for A-weighting and is the minimum reading (in dBA) for the channel.
SSP2 4 unit max min	Used to set single channel parameters for channel 4. It is also used to get or set sensor full-scale range step size for a Unit type. If passed with only a channel, returns the current values for that channel in the format: <channel as integer> <unit as integer> <max as float> <min as float>	Channel is the index of the single channel to configure. The single channel must be channel 4. Unit is the displayed value (and also specifies the type of measurement, e.g., seismic or air). Valid values are: • 0: Disabled • 1: IPS (seismic) • 2: MMPS (seismic) • 3: dBL (air) • 4: mb (air) • 5: Pa (air) • 6: PSI (air) • 7: dBA (air with A-weighting card) All other values are reserved for future use. Max is the maximum reading for the channel. Min is the minimum reading for the channel.
TA raw	Get or set acoustic trigger. If passed with no parameters, returns the current value. The threshold in units is given by: $\text{threshold_units} = \text{range} \cdot (\text{raw} - 32768) / 32768$ The threshold in counts is given by: $\text{threshold_counts} = \text{raw} - 32768$ As an example, if the range is 5.12 mb, valid values of raw are 32784 through 65520. If raw is 32784, the threshold in units is 0.0025 mb, and the threshold in counts is 16.	raw: The raw ADC reading at which to trigger, 32784–65520 in 16-count increments.
TBV	Get the last raw battery voltage in the format #.##.	None
TM onEn onHH onMM offEn offHH offMM	Enable/disable and set start and stop timers. If the start and stop times are the same, the start timer is enabled, but the stop timer is disabled. If sent with no parameters, returns the current settings.	onEn and offEn enable or disable the start and stop timer, respectively. 0 = disable 1 = enable onHH and onMM are the hour and minute at which to turn on data collection, and offHH and offMM are the hour and minute at which to turn off data collection. HH: 00–23 MM: 00–59
TS raw	Get or set seismic trigger. If passed with no parameters, returns the current value.	Raw is the raw ADC reading at which to

Command	Description	Parameters
	The threshold in units is given by: $\text{threshold_units} = \text{range} \cdot (\text{raw} - 32768) / 32768$ The threshold in counts is given by: $\text{threshold_counts} = \text{raw} - 32768$ As an example, if the range is 10.24 IPS, valid values of raw are 32784 through 65520. If raw is 32784, the threshold in units is 0.005 IPS, and the threshold in counts is 16.	trigger, 32784–65520 in 16-count increments.
TT sensor channel tier threshold	Set/get the multi-triggering thresholds. If passed with no parameter, returns the current value.	Sensor (required): 1 for sensor 1 2 for sensor 2 Channel (required): 0 for acoustic 1 for seismic Tier: 1 for Tier 1 2 for Tier 2 Threshold: 0 to disable the trigger 16–32752 in 16-count increments, sets the threshold for the specified channel and tier.
TV#	Returns the major, minor, and release candidate versions of the installed software in the format: MM.mm.rr, where MM is the major version, mm is the minor version, and rr is the release candidate number. Each value has a range of 00 to 99.	none
V#	Returns the major and minor firmware versions of the installed software in the format: MM.mm, where MM is the major version and mm is the minor version. Each value has a range of 00 to 99	none
VSEN enable	Set/get whether vector sums are enabled. If enabled is 1, vector sums will be calculated and reported with all future records. If enabled is 0, vector sums are not calculated or reported.	enabled: 0: Vector sums disabled 1: Vector sums enabled

Enhanced Descriptions

The following provides enhanced descriptions for some of the CLI commands.

AU

Turning off the acoustic channel will result in smaller file sizes. The acoustic channel should not be turned off if a microphone is being used, either linear or A weighted.

AW

The Pro supports non-ANSI certified Type 2 A weighting through the use of a logarithmic amplifier board. It will be best to use a separate microphone for A weighting versus that used for linear overpressure. It will also be necessary to use the SSP 0 command each time the microphone type is changed.

CHEN

The Mini-Seis III Pro is available in a 4 or 8 channel configuration. It will be configured at the factory based on the choice of 4 or 8 channel. An 8 channel unit can be configured as a 4 channel unit by issuing the CLI command CHEN 1. This command will enable channels 1-4 and disable channels 5-8. To restore the unit to 8 channels we issue the command CHEN 2. A 4 channel unit cannot be configured as an 8 channel unit.

There is also a high speed single channel configuration that is set by using CHEN 3. Then we can use SSP2 to set the parameters for the single channel which is always channel 4. When using a single channel the sample rate can be set to 65536 or 131072. When changing back to 4 or 8 channel configuration, we must first set the sample rate to a value of 16384 or less before issuing the CHEN 1 or 2 command.

CHG

There are two voltage parameters available, the internal voltage and the external charging voltage. The CHG command returns the external charging voltage. This value may be useful if the instrument is connected to a battery or solar panel.

COMP

All measured values are stored using 2 bytes. However, when downloaded the data can be compressed or uncompressed. The algorithm used to compress and decompress the data is proprietary. To access raw data be sure and issue the command COMP 0 prior to downloading.

ER

The Mini-Seis III Pro can report after a triggered waveform event or inactivated histogram. This feature is useful for units that are connected remotely. To do this requires a remote access device capable of forwarding serial data to an IP address or DNS. The receiving network must also be running our AutoReceive software. White offers a Reporting Service for a very low monthly fee.

The ER command has three modes.

ER 1 instructs the instrument to report after a triggered waveform event or inactivated histogram.

ER 2 HHMM instructs the instrument to report at a fixed time daily. Example: ER 2 0930 would instruct the instrument to send a report at 9:30 AM each day.

ER 3 HH instructs the instrument to report every fixed number of hours. Example: ER 3 04 instructs the instrument to report every 4 hours.

ER 0 turns off reporting.

HB

The ER command can be used to report waveforms and histograms. But what if there are no waveform triggers? How do we know the system is working? The HB command instructs the instrument to send a heartbeat.

HB 1 HHMM instructs the instrument to send a heartbeat at a fixed time daily. Example: HB 1 0815 instructs the instrument to send a heartbeat at 8:15 AM every day.

HB 0 turns off the heartbeat.

HI

The normal operation for a histogram is to automatically end at midnight whereupon a new histogram will be started. We can use the HI command to set an interval for the histogram.

HI HH instructs the instrument to end a histogram after HH hours and then start a new histogram. Example: HI 04 instructs the instrument to inactivate a histogram every 4 hours.

RE

As stated previously, all measured values are stored using 2 bytes. The RE command can be issued to return the data as 16 bits (2 bytes) or 12 bits when downloaded. Setting the download resolution to 12 bits will result in a smaller file size, but with less dynamic range.

RT

Sets the sample rate. For 4 or 8 channel waveform or 4 channel histogram, the values may be 1024, 2048, 4096, 8192 or 16384. For 8 channel histogram, the maximum rate is limited to 8192. The single channel rate can be set to 65536 or 131072.

SM

Sets the operating mode.

SM ID instructs the instrument to idle the current mode. This command disarms the waveform trigger and inactivates histogram.

SM WF instructs the instrument to arm waveform mode.

SM HI instructs the instrument to activate histogram mode.

SM HW instructs the instrument to activate a histogram and arm waveform.

SM MA instructs the instrument to go into manual trigger mode.

Note: If SM ID is used to disarm waveform mode, it will not automatically rearm unless the unit is reset.

SSP

This command is used to set parameters for the standard three seismic one acoustic configuration.

SSP 0 [range] [units]

Configures the acoustic channels (channel 4 and channel 8). The [range] should be a floating point value. The [units] can be:

0	dBL
1	Mb
2	Pa
3	psi

With the exception of dBL, the range value should be in the units specified. If dBL, the range value should be in millibars. This is because the decibel is logarithmic.

SSP 0 5.12 0 sets the acoustic range to 5.12 Mb and displays the data as dBL.

SSP 0 5.12 1 sets the acoustic range to 5.12 Mb.

SSP 0 512 2 sets the acoustic range to 512 Pa.

SSP 0 5 3 sets the acoustic range to 5 psi.

The SSP 0 parameters should be based on the microphone's hardware range. Changing the parameters with SSP 0 does not change the microphone's hardware range.

SSP 1 [range] [units] [min]

Configures the seismic channels (1-3 and 5-7). The [range] should be a floating point value. The [units] can be:

0	ips
1	mmps

The [min] should be 0.

SSP 1 10.24 0 0 sets the seismic range to 10.24 ips.

SSP 1 260 1 0 sets the seismic range to 260 mmps.

The SSP 1 parameters should be based on the hardware range of the seismic package. Changing the parameters with SSP 1 does not change the range.

SSP 2 [range] [unit] [min]

Configures channel 4 as A weighted. The [unit] is always dBA so a value of 0 is used.

SSP 2 114 0 44 sets the A weighted range to 114 with a minimum of 44. A weighting always has a 70 dBA spread.

The SSP 2 parameters should be based on the range of the A weighted microphone. Changing the parameters with SSP 2 does not change the range.

SSP2 4 [UNIT] [RANGE] [MIN]

This command is used to setup single channel use. The Pro supports a limited number of native units.

1	ips
2	mmps
3	dB
4	Mb
5	Pa
6	psi
7	dBA (with A weighting)

The single channel is always channel 4. The range is the maximum linear range and the min is the minimum value. It is recommended that Seismograph Data Analysis be used to deal with the presentation of single channel data. It has an advanced record feature that allows the user to custom specify the unit and range.

TA

This command sets or returns the linear acoustic trigger level in A/D counts. To determine the actual linear trigger value we use the equation:

$$range * \left(\frac{ADC - 32768}{32768} \right)$$

Assume we are using a microphone with a range of 5.12 Mb and that the trigger A/D count is 34048. This gives us a trigger value of:

$$5.12 * \left(\frac{34048 - 32768}{32768} \right) = 0.2$$

To convert that to dB we use:

$$20 * \log \left(\frac{0.2}{0.0000002} \right) = 120$$

If we want to determine the A/D count for a desired trigger level (TL) we use the equation:

$$\left(\frac{TL}{range} * 32768 \right) + 32768$$

TS

This command sets or return the seismic trigger level in A/D counts. To determine the actual linear trigger value we use the equation:

$$range * \left(\frac{ADC - 32768}{32768} \right)$$

Assume we are using a tri-axial geophone with a range of 10.24 ips and that the trigger A/D count is 34048. This gives us a trigger value of:

$$10.24 * \left(\frac{34048 - 32768}{32768} \right) = 0.4$$

If we want to determine the A/D count for a desired trigger level (TL) we use the equation:

$$\left(\frac{TL}{range} * 32768 \right) + 32768$$

TT

It will be much easier to setup multi-triggering from the instrument's UI. However, this command can also be used to setup multi-triggering. There are two tiers for triggering external devices like an alarm or strobe. The TT command is followed by [sensor] [channel] [tier] [threshold].

[sensor] – Sensor number. In the case of a 4 channel unit the sensor will be 1. In the case of an 8 channel unit the sensor can be 1 or 2.

[channel] – Channel type. The value is 0 for acoustic or 1 for seismic.

[tier] – Tier number. The value is 1 for tier 1 or 2 for tier 2.

[threshold] – Trigger threshold in A/D counts.

Examples

We have a strobe attached so that when the vibration exceeds 0.25 ips the strobe will activate. To do this we program tier 1 for 0.25 ips. To determine the A/D count we use the last equation shown for the TS command. We are assuming a 10.24 ips range.

$$\left(\frac{0.25}{10.24} * 32768 \right) + 32768 = 33568$$

TT 1 1 1 33568 is the command.

Later we add a horn so that when the vibration exceeds 0.5 ips the horn will sound. To do this we program tier 2 for 0.5 ips. To determine the A/D count we use the last equation shown for the TS command. We are assuming a 10.24 ips range.

$$\left(\frac{0.5}{10.24} * 32768 \right) + 32768 = 34368$$

TT 1 1 2 34368 is the command.

Limited Warranty

White Industrial Seismology, Inc. warrants that each new instrument manufactured or sold by us is free from defects in materials and workmanship, and agrees to repair or replace any part of such instrument which under normal installation and use discloses such defect, provided the instrument is delivered intact to White Industrial Seismology, Inc. for examination with all transportation charges pre-paid within one year from the date of delivery to the purchaser, and that such examination discloses in the judgment of White Industrial Seismology, Inc. that it is defective. This warranty does not extend to any parts which have been damaged by misuse, neglect, accident or improper application, nor does it cover batteries or expendable items which may be supplied with the equipment.

This warranty is in lieu of all other warranties expressed or implied, and White Industrial Seismology, Inc. assumes no liability related to the use of its products other than that specified herein.