

MINI-SEIS III

OPERATING MANUAL

ARM V1.X, MSP V1.X



Chapter 1. Introduction

The Mini-Seis III represents the state-of-the-art in vibration monitoring instrumentation. It features a 32 bit processor and multiple 16 bit A/Ds. It has the ability to address a large amount of memory and can store many hours of continuous waveform data and many weeks or months of continuous histogram data. Ruggedness, reliability, accuracy and power conservation are built in to the design. Data transfer by both serial and USB is supported.

Operating Modes

The instrument is primarily designed for both blast vibration monitoring and industrial and construction vibration monitoring. Operating modes include:

- **Waveform** – The standard selection for blast 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 certain key press or the application of an external trigger.
- **Waveform Auto** – A waveform mode where the instrument continues to record as long as the vibration level remains above the trigger threshold. (not yet available)
- **Snapshot** – This mode is used to initiate a waveform recording at prescribed intervals. (not yet available)
- **Waveform/Histogram** – A histogram is recorded while the instrument is monitoring in waveform mode. The histogram record could serve as proof of operation and what levels were present. (not yet available)

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 0.000305 in/s (0.00775 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 data resolution can be changed between 16 bits and 12 bits with the Seismograph Data Analysis V11 software. Changing the resolution does not affect the native data, which is stored using 16 bits. However, since the data are 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 16 bit resolution is 0.0025 Mb (0.25 Pa).

Sample Rates

The available sample rates are 1024, 2048 and 4096 over 4 channels of data. Versions utilizing sample rates of 8192 and 16384 are under consideration. A single channel sample rate of 65536 is also being considered.

Recording Durations

The minimum recording duration is one second. The maximum recording duration is 120 seconds. 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 a seven 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.

Support for lithium-ion batteries is also possible. Contact White for more information.

Communication

As noted earlier, the Mini-Seis III supports communication by both serial and USB. Any remote access device that supports serial or USB, like a cellular or satellite modem, can be used to download data from and interact with the seismograph. The instrument features serial baud rates from 1200 to 230400, allowing it to work with a multitude of serial data access devices.

Data Storage

In addition to the seismograph's internal memory, records can easily be transferred to a USB thumb drive. This feature removes the need for a computer in the field to download events. Some firmware versions may have a 1021 limit on the number of records that can be stored. If this is a concern, check with White to see if your version has this limitation.

Accessories and Software

All required accessories are provided. A Seismograph Data Analysis software CD may also be included. If not, the software can be downloaded from the White website at www.whiteseis.com.

Data Compression

The Mini-Seis III uses 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.

Automatic Reporting

The Mini-Seis III supports the automatic reporting of data through the serial connector. There are multiple modes of operation. Please go to the Automatic Reporting chapter for more information.

Options (some are not yet available)

Additional versions of the instrument may support options such as A weighted acoustic data, GPS integration, WiFi, 8 channels and the ability to work with multiple types of sensors. Some of the options may involve an extra charge. Please check with White or your nearest Mini-Seis III reseller for the availability of options and their costs.

Ranges

As noted above, 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 reseller for the availability of other ranges.

Resolution

The Mini-Seis III uses 16 bit A/Ds (15 bits +/-). Using the full 16 bit resolution will reduce data compression resulting in larger file sizes. A lower resolution option may be available in the future which will result in greater compression and faster data transmission times. The amount of compression cannot be determined in advance as it depends on the character of the vibration.

Note: Using the full 16 bits the effective resolution will probably be limited by two to three bits of system noise.

Acoustic Weighting

The Mini-Seis III is designed to support both linear and A weighted acoustic data. A-weighting is available in this version with the A weight hardware installed in the Mini-Seis III. A weighting

requires special hardware and it is not available in the standard instrument. When available, the desired weighting can be selected from the Unit Setup menu. Linear weighting should be used to measure overpressure such as that produced by blasting. A weighting should be used to measure sound as experienced by the human ear.

GPS (not yet available)

The integration of GPS provides two benefits:

1. The coordinate location of the seismograph is saved in the record summary and
2. The seismograph's clock is synchronized with the GPS time

WiFi (not yet available)

The instrument may eventually support WiFi. It is still being considered for development.

Other Sensors (not yet available)

The Mini-Seis III may eventually be able to function as a generic data collector. If so, this feature will allow the instrument to be used with many different types of sensors, i.e. accelerometers, hydrophones, crack gauges and others. This option is not yet available.

New Features

New features will be added as they become available. Please check with White or your nearest White Seismograph reseller at any time for information concerning specific features.

Chapter 2. Connectors

The standard unit has four connectors, two push-pull connectors for the sensors and two DB9 connectors for data and charging. The push-pull sensor connectors are interchangeable.

The optional 8 channel instrument will have additional connectors. Other connectors may also be present for special needs.

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 female DB9 connector is for charging and serial communication. A splitter cable can be provided if both power and serial communication are needed at the same time. A cable that splits power for use with a modem is also available.

The serial DB9 (female) is wired so that it is not necessary to use a null cable with a cellular modem. This means that standard serial communication would require a null cable. However, it is anticipated that direct 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. Mini-Seis III cables will be tagged.

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.

Charging

The standard instrument will contain a sealed rechargeable lead acid battery. The Mini-Seis III has circuitry which helps prevent overcharging. It is harder on the internal battery to let it discharge than to keep it charged. Alternative battery sources may be available, including rechargeable lithium-ion or C or D cell types.

Chapter 3. The Keypad and Display

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

ON Key

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

OFF key

Pressing the OFF key deactivates the unit. Unplugging the sensors will not turn the instrument off. A short press of the key will turn the unit off as soon as it finishes any operation in progress. Holding down the key for two seconds will turn the instrument off regardless of any operation in progress. In the case the instrument does not respond, holding down the OFF key will force it to turn off.

ENTER Key

The ENTER key is primarily used to move between screens. 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.

Alpha-Numeric Keys

These keys can be used to enter some setup values and supply comments. When entering comments, the keys work like most cellular phone keypads. Continuing to hold down a key will cause a cycle through various choices. For example, holding down the 1 key will result in the following character cycle: **1ABCabc:**. The key cycles are as follows:

Key	Characters
1	1ABCabc:
2	2DEFdef;

3 3GHIghi/
4 4JKLjkl?
5 5MNOMno-
6 6PQRpqr+
7 7STUstu=
8 8VWXvwx@
9 9.YZ,yz#
0 0 SPACE

Display

The display is backlit and is easy to read. The display is graphics-based which means that it is possible to display some data graphically.

Displayed Fields

Some of the data displayed on the screen can be changed. 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-.

Chapter 4. Stabilization

Information Screen

At power on the Mini-Seis III will briefly display an information screen. The screen will show the serial number and model. It will also show the last calibration dates of the sensor package and microphone and the company that performed the last calibration. Finally it will show the ARM and MSP firmware versions and battery voltage. The display will be similar to the following:

```
White Mini-Seis III  
Ser: 8000 Mod: 01  
-CALIBRATION DATES-  
16-Aug-2014 Seis 8000  
16-Aug-2014 Air 8000  
Cal Lab: White  
ARM: 1.0 Bat: 100%  
MSP: 1.0 <Contrast>
```

Stabilization Screen

The next 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 cursor will go to the S Trig or A 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: 081.2 dB  
R1: 0.0021 IPS  
V1: 0.0021 IPS  
T1: 0.0018 IPS  
S Trig: 0.0500 IPS  
A Trig: 120.0 dB  
Lock: Off
```



Chapter 5. The Main Screen

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

```
Bat: 100%
Free Memory: 99%
24-Aug-2014 17:24:11 S
-Setup Menus-
Trigger: Disarmed
Data Port: USB
Baud Rate:
-Next-
```

The first two lines show the approximate percentage of battery voltage and free memory. If the date and time needs to be modified, place the cursor on the S and press ENTER.

Setting the Date and Time

```
14-Aug-2014 09:36:22

Day: 14
Month: Aug
Year: 2014
Hour: 09
Minute: 36
Second: 22
```

To change any value, select the field and either press the left or right arrow or type the value using the keypad. If using the keypad, type a leading 0 with single digit entries. For example, if setting the day to 7, type 07. Press Enter when finished.

-Setup Menus-

Selecting this field displays a list of setup options. These options are discussed in the next chapter.

Trigger

If in an mode that uses 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 two minutes. Also, if for some reason a remote unit would reset, it would automatically rearm.

Data Port

The Data Port specifies what will be used for communication. The choices are RS232 and USB. The RS232 selection means that serial communication will be used. The USB selection means that USB will be used.

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 minute or two of inactivity. It can be reactivated by selecting USB as the Data Port.

When the USB cable is connected to the Mini-Seis III 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. To show Device Manager in Windows 7:

1. Click Start.
2. Right click Computer.
3. Choose Properties in the drop down.
4. Choose Device Manager in the dialog.
5. Expand Ports (COM & LPT)

Baud Rate

The Baud Rate field only applies to the RS232 Data Port selection. The baud rate can be from 1200 to 230400. Whatever rate is selected, the same rate must be set in the computer software when using a direct serial connection. When using a remote access device like a cellular modem, the baud rate of the device must match the instrument's baud rate.

A baud rate of 230400 should work fine when using a direct connection. However, 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, although we have tested data transfer at rates of 230400.

-Next-

Select -Next- to advance to the current Mode Screen.

Chapter 6. Setup Menus

The Setup Menus provide access to setup options.

Setup Menus

- Unit Options-
- System Log Options-
- User Defaults-
- Timer Setup-

-Back-

-Unit Options-

The Unit Options setup menu contains the following selections:

Unit Options

- File System-
- Unit Setup-
- Administration-
- Apply Defaults-

-Back- -Home-

-File System-

File System

Total Memory: 524288KB
Free Memory: 524288KB
Number of Files: 0
Erase & Format: Off

-Back- -Home-

This screen displays the total memory available, the free memory available and the number of files in memory.

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

To erase the memory, move the highlight to the Off field value next to Erase & Format. Then press the right or left arrow key to change the value to Set. With Set highlighted, press ENTER. Once the memory has been erased it cannot be recovered.

Unit Setup

Unit Options

Air Used: Yes
Air Weighting: Linear
Air Units: dB
Air Range: 154.2
Seismic Units: IPS
Seismic Range: 10.24
-Back- -Home-

Air Used

The Air Used field indicates whether or not the microphone is being used. It is still being determined how this feature will function.

Air Weighting

The standard unit uses linear overpressure weighting. 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. The standard A-weighting range is 50 to 120 dBA. The frequency range is approximately 50 Hz to 10 kHz. The A-weighted option should not be used for monitoring blast overpressure.

Air Units

This field indicates the units that will be used to display acoustic data. With linear weighting the choices are dB (decibels), Mb (millibars), PSI (pounds per square inch) and Pa (Pascals). With A weighting the only choice is dBA.

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 software by a recognized White Seismograph service center. Changing this value does not modify the recording capability of the microphone.

Seismic Units

This field indicates the units that will be used to display seismic data. The choices are IPS (inches per second), and MMPS (millimeters per second).

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 software by a recognized White Seismograph service center. Changing this value does not modify the recording capability of the seismic package.

Apply Defaults

This option replaces existing settings with either factory or user default values. User default values are entered through Setup Menus – User Defaults.

System Log Options

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

<p>System Log: 0020 14-Aug-2013 09:35:40 Disarmed, 0 Triggers</p> <p>-Clear-</p> <p>-Back- -Home-</p>
--

The log can be reviewed on the display and retrieved and displayed by the software.

-Clear-

To clear all log entries, highlight the command and press ENTER.

User Defaults

This function can be used to specify user default preferences.

User Defaults

Data Port: USB
Baud Rate:
Seismic Units: IPS
Air Units: dB

-Back- -Home-

Data Port

The Data Port specifies what will be used for communication. The choices are RS232 and USB. The RS232 selection means that serial communication will be used. The USB selection means that USB will be used. Since the two selections share the same communication line, the type of communication must be specified.

Baud Rate

The Baud Rate field only applies to the RS232 Data Port selection. The baud rate can be from 1200 to 230400. Whatever rate is selected, the same rate must be set in the computer software when using a direct serial connection. When using a remote access device, the baud rate of the device must match the instrument's baud rate.

Seismic Units

This field indicates the units that will be used to display seismic data. The choices are IPS (inches per second), and MMPS (millimeters per second).

Air Units

This field indicates the units that will be used to display acoustic data. The choices are dB (decibels), Mb (millibars), PSI (pounds per square inch) and Pa (Pascals). These choices do not apply to A weighted data.

Chapter 7. Changing Modes

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.

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 Comments: Off S Trig: 0.1700 IPS A Trig: 120 dBL Timer: Off

In this example, we can change the mode from Waveform when the word Waveform is highlighted and the trigger is disarmed. Doing this displays the Select Mode display.

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.

Chapter 8. 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/Waveform Combo 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 one second when the sample rate is 1024 samples per second. The pre-trigger buffer 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: 4 SEC
Comments: Off
S Trig: 0.0500 IPS
A Trig: 120 dB
Timer: Off

Rate

The sample rate is selectable at 1024, 2048 or 4096 over 4 channels of data. Rates of 8192 and 16384 are in the process of being implemented. It is also planned to offer a rate of 65536 for very high sampling of a single channel. 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.

Comments

User comments can easily be entered and stored with recorded events. The field value can be On, Off or Manage. If the value is On, the currently selected comment will be used. If the

value is Off, no comment will be stored. Set the field value to Manage and press ENTER to manage comments.

Manage Comments

There can be as many as 10 comment records. The comment currently being used will be denoted with an asterisk next to the comment number. When the comment number is highlighted, press the left or right arrow keys to change the number. Once the desired number is displayed, move the cursor to the Cmd field at the bottom of the screen. Pressing the left or right arrow keys will scroll the value to show Exit, Edit, Select or Clear.

Edit

Use the Edit command to enter or edit a comment. When entering a comment, holding down the number keys will cycle through the displayed characters. The following shows keys and the values available.

Key	Characters
1	1ABCabc:
2	2DEFdef;
3	3GHIghi/
4	4JKLjkl?
5	5MNOmno-
6	6PQRpqr+
7	7STUstu=
8	8VWXvwx@
9	9.YZ,yz#
0	0 SPACE

Select

Use this command to select the displayed comment for use.

Clear

This command clears the data for the displayed comment.

Exit

Leave the comments display.

Trigger Thresholds

Seismic Trigger (S 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 higher rate.

The trigger resolution is based on the maximum range of the seismograph. The standard trigger resolution is 0.005 in/s (0.127 mm/s) based on a maximum range of 10.24 in/s (260 mm/s).

Acoustic Trigger (A 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 higher 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.

Timer

When using external power, it could be desired to disable operation during a specific time period. The Mini-Seis III can be programmed to turn on at one time and off at another time. To use this feature change the Timer setting to Set and press Enter.

Timer Configuration Screen

The hour and the minute of the time to turn on and off is set by selecting the fields and then using either the left or right arrow keys or the keypad to set the value. When using the keypad, format each entry as a two digit number. For example, enter 8 as 08.

Chapter 9. Histogram Mode

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 the vector sum.

Histogram

Sample Period: 10 Sec

Status: Inactive

Comments: Off

Timer: Off

Sample Period

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

Status

To activate the histogram select this field, change the value to Active and press Enter. To end an active histogram select this field, change the value to Inactive and press Enter.

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.

Comments

User comments can easily be entered and stored with recorded events. The field value can be On, Off or Manage. If the value is On, the currently selected comment will be used. If the value is Off, no comment will be stored. Set the field value to Manage and press ENTER to manage comments.

Manage Comments

There can be as many as 10 comment records. The comment currently being used will be denoted with an asterisk next to the comment number. When the comment number is highlighted, press the left or right arrow keys to change the number. Once the number is determined, move the cursor to the Cmd field at the bottom of the screen. Pressing the left or right arrow keys will scroll the value to show Exit, Edit, Select or Clear.

Edit

Use the Edit command to edit the comment. When entering a comment, holding down the number keys will cycle through the displayed characters. The following shows keys and the values available.

Key	Characters
1	1ABCabc:
2	2DEFdef;
3	3GHIghi/
4	4JKLjkl?
5	5MNomno-
6	6PQRpqr+
7	7STUstu=
8	8VWXvwx@
9	9.YZ,yz#
0	0 SPACE

Select

Use this command to select the displayed comment for use.

Clear

This command clears the data for the displayed comment.

Exit

Leave the comments display.

Timer

When using external power, it could be desired to disable operation during a specific time period. The Mini-Seis III can be programmed to turn on at one time and off at another time. To use this feature change the Timer setting to Set and press Enter. If the timer is set during a histogram, the instrument will end the current job when inactivated and will start a new job when reactivated.

Timer Configuration Screen

The hour and the minute of the time to turn on and off is set by selecting the fields and then using either the left or right arrow keys or the keypad to set the value. When using the keypad, format each entry as a two digit number. For example, enter 8 as 08.

Chapter 10. Histogram/Waveform Mode

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

Sample Period: 10 SEC

Duration: 4 SEC

Comments: Off

S Trig: 0.0500 IPS

A Trig: 120.0 dB

Timer: Off

Status: Inactive

Sample Period

The sample period is the selected interval. The choices are 1, 10, 20, 30, 40, 50 and 60 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.

Comments

User comments can easily be entered and stored with recorded events. The field value can be On, Off or Manage. If the value is On, the currently selected comment will be used. If the value is Off, no comment will be stored. Set the field value to Manage and press ENTER to manage comments.

Manage Comments

There can be as many as 10 comment records. The comment currently being used will be denoted with an asterisk next to the comment number. When the comment number is highlighted, press the left or right arrow keys to change the number. Once the number is determined, move the cursor to the Cmd field at the bottom of the screen. Pressing the left or right arrow keys will scroll the value to show Exit, Edit, Select or Clear.

Edit

Use the Edit command to edit the comment. When entering a comment, holding down the number keys will cycle through the displayed characters. The following shows keys and the values available.

Key	Characters
1	1ABCabc:
2	2DEFdef;
3	3GHIghi/
4	4JKLjkl?
5	5MNomno-
6	6PQRpqr+
7	7STUstu=
8	8VWXvwx@
9	9.YZ,yz#
0	0 SPACE

Select

Use this command to select the displayed comment for use.

Clear

This command clears the data for the displayed comment.

Exit

Leave the comments display.

Trigger Thresholds

Seismic Trigger (S 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 higher rate.

Acoustic Trigger (A 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 higher 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.

Timer

When using external power, it could be desired to disable operation during a specific time period. The Mini-Seis III can be programmed to turn on at one time and off at another time. To use this feature change the Timer setting to Set and press Enter. If the timer is set during a histogram, the instrument will end the current job when inactivated and will start a new job when reactivated.

Timer Configuration Screen

The hour and the minute of the time to turn on and off is set by selecting the fields and then using either the left or right arrow keys or the keypad to set the value. When using the keypad, format each entry as a two digit number. For example, enter 8 as 08.

Status

To activate the histogram select this field, change the value to Active and press Enter. To end an active histogram select this field, change the value to Inactive and press Enter.

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.

Chapter 11. 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. The report string consists of an identifier, the unit SN, the last event transferred and the most recent event recorded.

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 also offer an Automatic Reporting Service for customers who do not wish to host their own.

The Mini-Seis III 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 Mini-Seis III 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 Advanced Terminal of the Seismograph Data Analysis V11 software is used to program the Mini-Seis III for automatic reporting. Please refer to this software.

Chapter 12. Event Screen

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

Waveform Events

BAT: 6.5V EVENT: 00002			
08-28-2014 11:20:42			
	IPS/dB	Hz	CAL
V:	0.114	9.85	OK
R:	0.802	7.42	OK
T:	0.684	7.42	OK
A:	125.0	170.67	OK
Cmd: Off			

Histogram Events

BAT: 6.5V JOB: 00001			
08-28-2014 10:05:33			
	IPS/dB	Hz	CAL
V:	0.161	8.98	OK
R:	0.879	7.11	OK
T:	2.046	7.21	OK
A:	133.2	3.66	OK
Cmd: Off			

The information displayed should be easy to understand. The word OK means that the sensor tested 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.

Cmd

The Cmd option has three selections: Off, Copy and Test.

Copy Options

The copy Event Options screen is used to write a range of 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 Select Events: Range Range: 3 - 3 -Copy- -Cancel- -Done-
--

Select Events

The options are Range (default) or All. If All is specified, the Range numbers do not matter.

Range

The range of events to copy can be changed by selecting the numbers and using the left and right arrow keys.

-Copy-

Select this field to write the range of events specified to the thumb drive.

-Cancel-

Select this field to cancel a copy in progress.

-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.

Test (Not Yet Implemented)

Press Enter when this field is selected to perform a test of the sensors. The test is a dynamic test that moves the geophone coils. This action does not calibrate the sensor, nor is it an indication of whether or not a sensor is in calibration. However, an OK result indicates that there has probably been no significant change since the last calibration. The calibration of a sensor can only be tested and adjusted with the proper equipment.

Chapter 13. Using a USB Thumb Drive

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

1. Turn the Mini-Seis III on and wait for it to stabilize. It is not necessary to connect any sensors to active the instrument.
2. Navigate to the Event Screen. While on the screen, determine what event numbers you want to transfer.
3. Move the highlight to the Cmd field and change the value to Copy.
4. Press Enter.
5. On the Copy Event Options screen, specify the range of event numbers to copy.
6. Connect the cable to the instrument.
7. Connect the thumb drive to the cable.
8. Highlight the -Copy- selection and press Enter.
9. The specified event range will be copied to the thumb drive.
10. When finished, select -Done- and press Enter.
11. Disconnect the thumb drive from the cable and the cable from the seismograph.

The instrument stores the files in a directory 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 USB chip in the instrument cannot use long filenames, so each filename will be limited to eight characters plus the three character extension. The filenames will not obviously relate to a specific event.

Chapter 14. 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/ps) 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 case. **It is strongly recommended that the sensors 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 units can be made using the -Setup Menu- selection. Changes to the operating values of the mode to be used can be made from the screen for that mode. If using any modes where triggered waveform time histories are taken, make sure the Trigger field shows Armed. If it shows Disarmed, selected the field and change it to Armed.

Note: The instrument will automatically arm itself after some brief period of inactivity, usually one to two minutes.

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.

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.

BAT: 6.5V EVENT: 00002		
01-28-2014 11:20:42		
IPS/dB	Hz	CAL
V: 0.114	9.85	OK
R: 0.802	7.42	OK
T: 0.684	7.42	OK
A: 125.0	170.67	OK
VS: 0.856	Cmd: Off	

The screen will be similar to that shown above. 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.

Chapter 15. 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. Highlight -Next- and press ENTER.
6. Make sure the Waveform mode screen is displayed. If it is not, press the right arrow key to show the Select Mode display.
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.

Chapter 16. 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 display.
6. Once on a mode screen, make sure the Histogram mode screen is displayed. If it is not, press the right arrow key to show the Select Mode display.
7. Check the settings and make any necessary changes.
8. When ready to begin monitoring, make sure the Status field value shows Active and not Inactive. When the Status is made Active, the histogram will begin.
9. When finished monitoring, return to the Histogram mode screen and change the Status value to Inactive. Failure to do this may corrupt the record.

Chapter 17. Specifications

General

Channels	One (1) acoustic and three (3) seismic channels standard. Optional 8 channel upgrade (not yet available)
Seismic (tri-axial geophone package)	
Range	Standard 260 mm/s (10.24 in/s)
Resolution (16 bit)	0.008 mm/s (0.0003 in/s)
Frequency Range (ISEE)	Varies with sample rate, from 2 to 250 Hz at 1024 samples/s
Frequency Range (DIN)	DIN 45669-1 Standard, 1 to 315 Hz (minimum 2048 sample rate needed)
Accuracy (ISEE)	Conforms with ISEE Performance Specifications for Blasting Seismographs
Accuracy (DIN)	DIN 45669-1 Standard Approximately 2.01 g/cc (1.25 lb/ft ³)
Transducer Density	
Acoustic	
Weighting	Linear or A (available in ARM V0.109 and greater with installed hardware)
Linear Range	58 to 148 dBL (512 Pa, 5.12 Mb, 0.074 PSI)
Linear Resolution (16 bit)	0.0156 Pa (0.000156 Mb, 0.00000023 PSI)
Linear Frequency Response	Varies with sample rate, from 2 to 250 Hz at 1024 samples/s
Linear Accuracy	Conforms with ISEE Performance Specifications for Blasting Seismographs
A-Weighting Range (16 bit)	40 to 110 dBA or 50 to 120 dBA
A-Weighting Resolution	0.1 dBA
Timer	Allows an instrument to be active only during selected times on a daily basis.
Communication	USB Serial – baud rates from 1200 to 230400.
External Data Storage System Log	Write to USB drive. A log is kept in memory to track the active monitoring periods and whenever important setup changes are made.

Waveform

Modes	Waveform, Manual, Auto, Snapshot, Waveform/Histogram
Waveform	Standard mode used for blast monitoring and discrete transient events.
Manual	Trigger from the keypad or an external switch. Multiple

units can be chained together and triggered simultaneously.

Auto (under development)

When triggered, the instrument will continue to record until the levels are below the trigger thresholds for some period of time.

Snapshot (under development)

The instrument will trigger and record at user specified intervals.

Waveform/Histogram (under development)

A histogram is recorded while the instrument is in Waveform Mode.

Sample Rate

1024, 2048 and 4096 [rates of 8192, 16384 and 65536 (single channel) are under development]

Duration

1 to 120 seconds.

Pre-Trigger

1 second at 1024 sample rate. The pre-trigger time decreases proportional to the sample rate.

Minimum Trigger Levels

Seismic – 0.127 mm/sec (0.005 in/s) at 260 mm/s (10.24 in/s) range

Acoustic - 88 dBL

Records Stored

Varies depending on sample rate and duration. The unit can store well over 1000 records at a 1024 sample rate and 5 second duration.

Downtime Between Events

There is no downtime or data loss between events regardless of the sample rate or duration.

Dynamic Sensor Test

A dynamic sensor test is performed at the end of every event. This test will appear in the pre-trigger of continuous events.

Automatic Sensor Test

The unit will automatically generate a sensor test after a user-specified period of inactivity.

Histogram Mode

Modes

Histogram

Histogram and Histogram/Waveform

Standard mode for recording discrete measurements from continuous and semi-continuous sources.

Histogram/Waveform

A waveform is recorded when one of the trigger thresholds is received.

Sample Interval

1, 10, 20, 30, 40, 50 or 60 seconds

Data Stored

Channel peaks and their frequencies, also the vector sum.

Records Stored

Histogram data will vary depending on the sample interval. The unit can store approximately 100 eight hour days at a 10 second interval.

The number of waveform records that can be recorded is limited by the available memory.

Dynamic Sensor Test

A dynamic sensor test is performed at the beginning and end of every histogram.

Physical

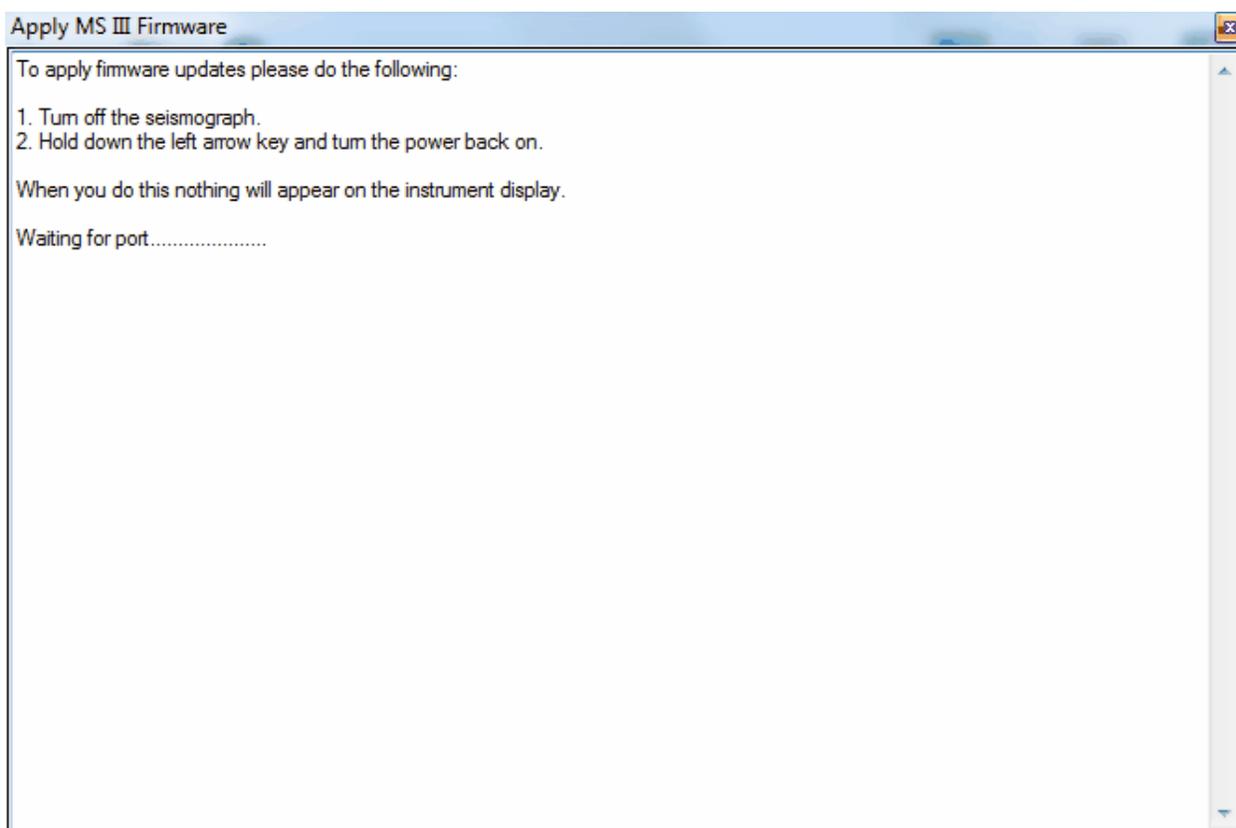
Size	Approximately 15 cm. x 11.5 cm. x 9 cm. (6 in. x 4.5 in. x 3.5 in.)
Weight	Approximately 1.6 Kg. (3.5 lbs.) without accessories Approximately 2.7 Kg. (6 lbs.) with accessories including the storage case
Battery Display	Internal 6 volt rechargeable The high contrast graphics display facilitates the instrument's setup. It also allows the operator to view operating parameters and summary data
Keypad	The alphanumeric keypad can be used to supply comments and setup data.
Clock	A 24 hour clock maintains the date and time to the second, even if primary power fails.
Operating Time	With a fully charged battery the unit will operate from 7 to 10 days at 1024 samples per second. Longer times may be obtained using the timer mode or external power from a solar panel or deep cycle battery.
Charging	An internal charging circuit allows charging with the supplied plug-in wall mount charger or any 10 to 15 volt DC supply. Power supplies for international use are available.
Operating Temperature	0 to 130 degrees F (-18 to 54 degrees C)
Timer	Allows an instrument to be active only during selected times on a daily basis.
Communication	USB Serial – baud rates from 1200 to 230400
Remote Access	Compatible with any network device that supports serial.
External Data Storage	Write to USB thumb drive.
System Log	A log is kept in memory to track the active monitoring periods and whenever important setup changes are made. (feature is working, but needs more development)
External Alarm	Supports attaching a strobe and/or horn when threshold levels are exceeded.
Integrated GPS (under development)	Saves the latitude and longitude in the event summary and syncs the clock.

Chapter 18. Updating the Firmware

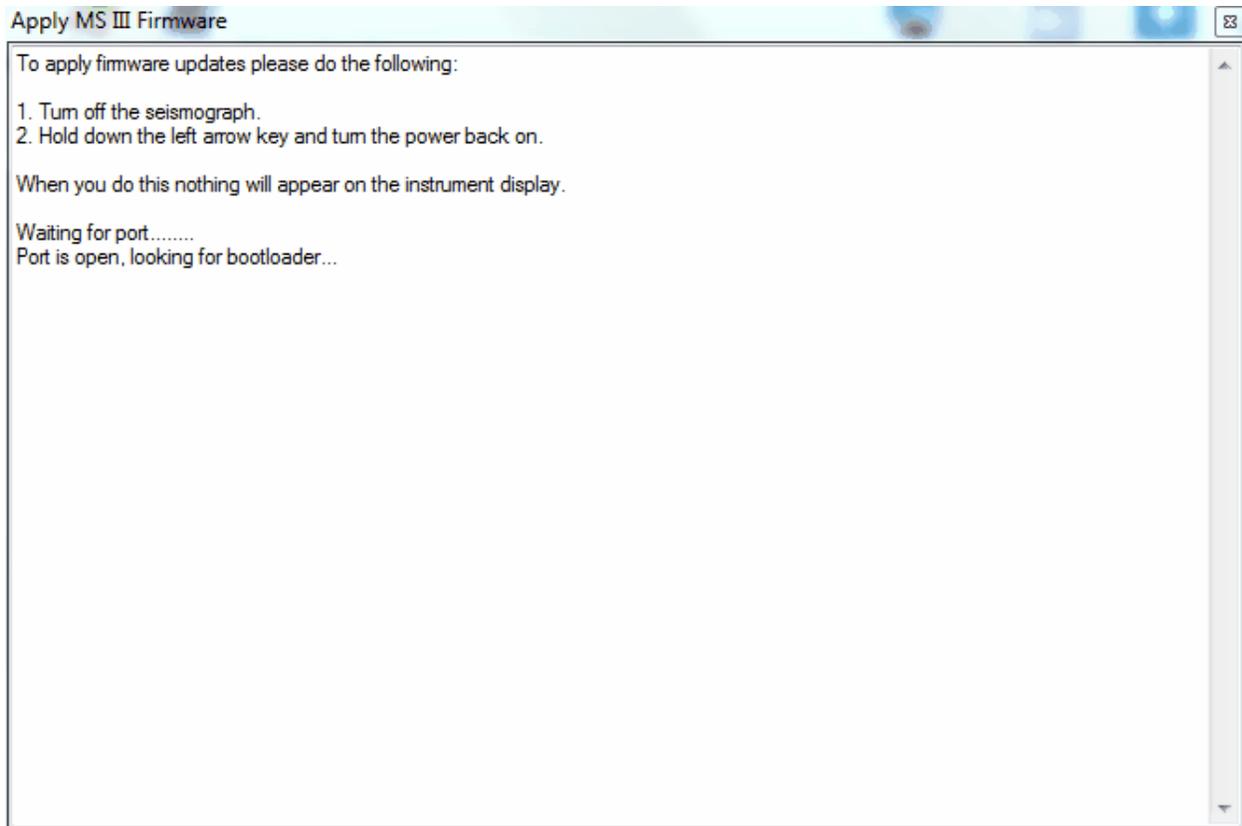
There will be firmware updates available as new features are added and reported issues are fixed. Beginning with Seismograph Data Analysis V 11.0.0.105, the firmware can be updated from within the software. When a new Mini-Seis III firmware version is available, we will include it in a new analysis software 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 help system. They are shown below for your convenience.

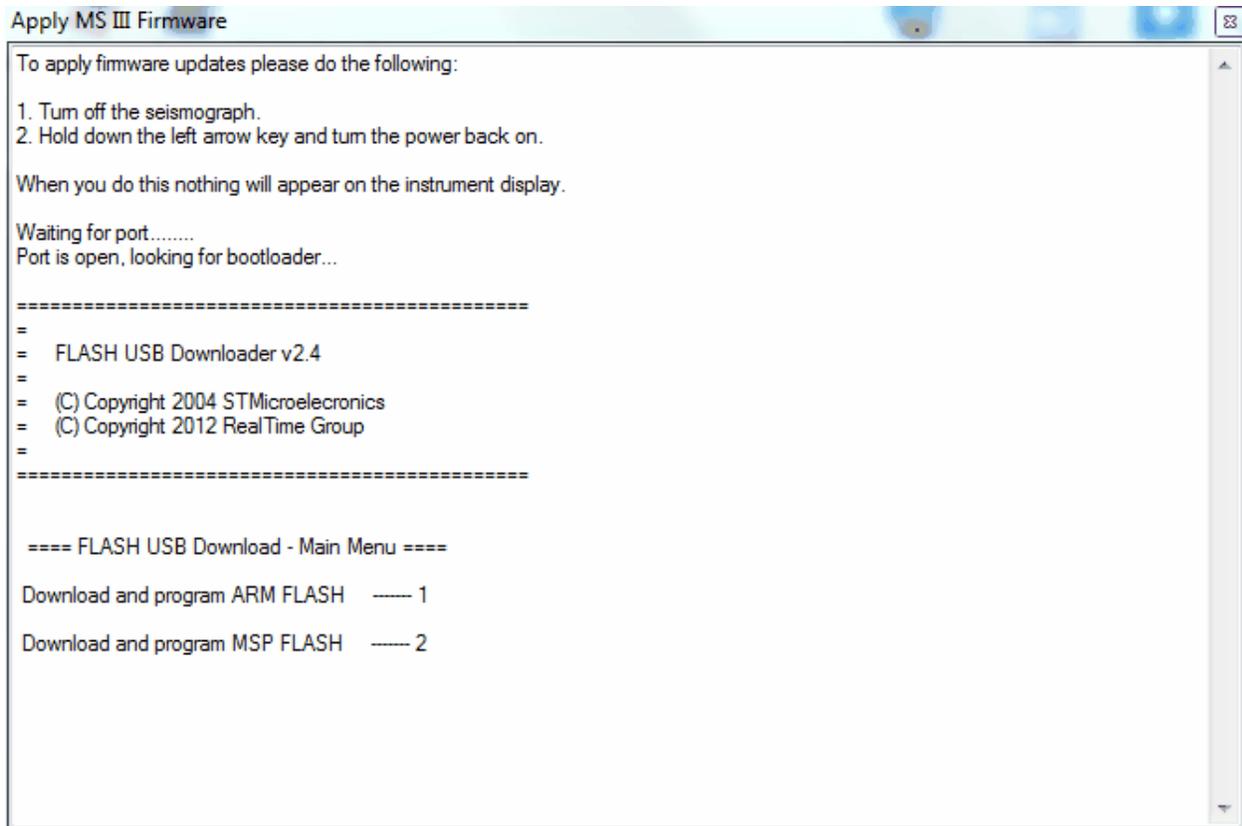
From Seismograph Data Analysis V11.0.0.105 or later, click the Communication tab. Then click Test for MSIII Firmware Update. There will be a message displayed to make sure that the Mini-Seis III is on and USB is selected as the Data Port. Then if a successful connection to the seismograph is made, a message will be displayed indicating whether or not a firmware update is available. If you choose to continue, the following will be displayed:



Follow the instructions and the display should show:



and then finally



To update the ARM, type 1 and then Y. To update the MSP type 2 and then Y.

When Finished

Hold down the Mini-Seis III OFF key for a few seconds to power down the instrument. If the ARM and MSP were programmed, the new version numbers will be displayed on the splash screen at startup.

Chapter 19. 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.