SpotSee

ShockLog User Manual



Contents

Introduction 6
Product Overview 6
ShockLog 298 7
ShockLog 248 8

Overview of Accessories/Options 9
ShockLog Accessory Kit 9
ShockLog Cellular Communication Module 9
ShockLog Satellite Communication Module 9
ShockLog H/T Sensor 9
HPT (Humidity Pressure Temperature) Sensor 9
ShockLog 298 Tilt and Roll 10
ShockLog 298 GPS 10

Getting Started 11
Identifying Software Versions 11
Identifying HARDware Versions 11
ShockLog Software Installation 12
Automatic Check for Updates 16
Language Support 16
Batteries 16
Installing the Batteries 17
ShockLog Mounting Recommendations 18

Opening the Software & Initial Layout Setup 20

Creating a Setup File 22
Select Model or File 22
Setup Window 22
Firmware Options 22
Standard Options 23
Factory Options 23
Peripherals 23
RD401 23
iButton Password 24
Settings 24
Protocol 24
Setup Name 24
Mission Comment 24
Start Date 25
Slots 25
Slot Contents 25
Slot Interval 25
Summary Interval 26

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Journey Duration Option for Slot & Summary Intervals 26
Events 26
Record 26
Length 27
Max Time 27
Ordered Data 27
Thresholds 27
Understanding Threshold Levels 28
Slot Alarms 30
gRMS (Vibration) 30
Environment 30
T&R Alarms 31
Finish 31
Saving Setup File 32
Sending Setup to ShockLog 32

Start Monitoring 33
Understanding the Status LEDs 33
Stopping the ShockLog Satellite 34

Downloading the ShockLog 34
USB Communication 34

Overview of Software Screens 35
File Viewer Window 35
Report 35
Explorer Window 35
Record Table 35
Event Table 36
Communications Window 37
View Setup Record 37
Slot Breaks Grid 38

Analyzing the ShockLog Data 39
Report 39
Data File Summary 39
Summary of Events 40
Report Time Period Selector 40
Slot Graph 41
Slot Graph Selection 41
Event Data Graphs 42
Event Summary Graph 42
Detailed Event Curve 43
Drag 'n' Zoom 43
Settings 43
Slots 45
Select Slots 46
Tilt & Roll 46

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Drag 'n' Zoom 47
Zoom All 47
Show Events 47
Export 47
Slot Alarms 48
Summaries 48
Column Data 49
Sorting Summary Data 50
Show Events 50
Show Slots 50
Export 51
Events 51
Text Data 52
Drag 'n' Zoom 52
Frequency Calculations 53
Zoom All 53
Show Slots 54
Show Data 54
Export 55
Graph Scaling 55
Filters 56
Report and Post Processing Options 57
FFT/PSD 57
SRS Analysis 59
Delta V Analysis (Δ V) 60

Exercise: Desk Top Test 62
Connecting the ShockLog to a PC 62
Communications Window 62
Send Default Setup 62
Drop Test 63
Download the Data 64
View File 64

ibutton Communications 65
Read 65
Passwords 65
iButton Passwords 66
ShockLog Passwords 67
Program 67
Setup Passwords 68

Security Log 69

Multiple File Export 69

Database Manipulation 70
Explorer Window 70

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Records Table 70
Column Data 71
File Sorting 71
Hyperlink to Additional Information 71
Event Table 72
Column Data 72
File Sorting 72
Hyperlink to Additional Information 73

Menu Options 74
File Menu 74
New 74
Open 74
Import 74
Export 75
Delete 76
Print 76
Tools Menu 77
Graph / Unit Options 77
Data Paths 77
Communication Port 77
Compact and Repair Database 77
Export Current Record as a Database 78
Restore Default Settings 78
Save Current Settings 78
Restore Saved Settings 78
Unit Radio Setup 78
Read Last GPS Data 78
Create Edit User Setup List 78
View Menu 79
Windows Menu 79
Help Menu 79

Import of Legacy Data Files 80

Appendix A - ShockLog Satellite 81

Appendix B - ShockLog Cellular 86

Appendix C - SpotSee Platform 89

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Introduction

Welcome to the ShockLog® product family. The manual has been designed to provide useful information to all levels of users from new users to those expert users of the legacy ShockLog products.

The ShockLog User Manual has been written to address the full range of ShockLog products. While many of the pictures will include references to the ShockLog 298, they are equally applicable to the ShockLog 248. Please note that some features are only available on the ShockLog 298.

Product Overview

ShockLog recorders are small battery-powered data loggers with three built-in piezoelectric accelerometers and an internal temperature sensor. The design is optimized for the measurement of shock and vibration for investigative and protective purposes of goods in transit and storage throughout the supply chain.

The ShockLog is suitable for applications where the cost of exposure to out of tolerance impact/environmental conditions is high. It is suitable for monitoring fixed or mobile installations and investigating conditions during transport, storage or operation.





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ShockLog 298

The ShockLog 298 combines advanced tri-axial piezoelectric accelerometer technology, the latest electronic technology, software and optional connectivity modules into a world class shock and vibration recorder.

The ShockLog 298 monitors shock and vibration based on acceleration or velocity measurements.

The wake up, warning and alarm levels, frequency of data collection, setting of the acceleration or velocity range and cut-off frequency of the filter are programmed by the user. When a user defined impact level is exceeded, a visual alarm will alert the user and store the data for future analysis.

Features

- Complete journey profiling
- Acceleration or velocity measurements
- Programmable warning and alarm thresholds
- Detailed record of up to 870 impact events
- Built-in internal temperature sensor
- Programmable frequency cut-off filters
- Operation, warning and alarm LED indicators
- Date & time stamping of events / alarms
- Data stored in non-volatile memory
- Up to 18 month battery life
- AA size lithium or alkaline battery power*
- Completely self-contained (battery operated)
- Tamper-proof factory and user passwords
- USB & iButton interfaces

Options

- External temperature / humidity sensor
- Cellular communication module
- Satellite communication module
- GPS recording module
- External temperature/humidity/pressure sensor
- Tilt & roll sensor

*Battery Tips

- Always use lithium batteries for journeys where the temperature may be outside the -5°C to +50°C range.
- The capacity of alkaline batteries drops dramatically when exposed to temperatures below 10°C.
- If using a lithium battery and the ShockLog will be traveling by air, make sure the battery is approved for air cargo.
- If the batteries are accidentally installed with the wrong polarity, the ShockLog will not be damaged; however, the life of the battery may be severely affected.



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ShockLog 248

The ShockLog 248 combines advanced tri-axial piezoelectric accelerometer technology, the latest electronic technology and software into an advanced shock and vibration recorder.

The ShockLog 248 monitors shock based on acceleration measurements. The software allows the wake up, alarm levels and frequency of data collection to be programmed by the user. When a user defined impact level is exceeded, a visual alarm (LED) will alert the user and store the data for future analysis.

Features

- Complete journey profiling
- Acceleration measurements
- Built-in internal temperature sensor
- Programmable alarm thresholds
- Date & time stamping of events / alarms
- Detailed record 1st & 14 most significant events
- 100G / 250Hz, 30G / 90 Hz or 10G / 40 Hz models
- Completely self-contained (battery operated)
- Up to 12-month battery life
- AA size lithium or alkaline battery power*
- Tamper-proof factory and user passwords
- USB & iButton interfaces
- Operation and alarm LED indicators

Options

- External temperature / humidity sensor

*Battery Tips

-Always use lithium batteries for journeys where the temperature may be outside the -5°C to +50°C range.

-The capacity of alkaline batteries drops dramatically when exposed to temperatures below 10°C.

-If using a lithium battery and the ShockLog will be traveling by air, make sure the battery is approved for air cargo.

-If the batteries are accidentally installed with the wrong polarity, the ShockLog will not be damaged; however, the life of the battery may be severely affected.



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Overview of Accessories/Options

A benefit of the ShockLog product line is the availability of accessories that enable additional information to be gathered.

ShockLog Accessory Kit

First time users of a ShockLog recorder are required to purchase an accessory kit in order to receive all of the necessary communication cables and software licenses needed to operate the ShockLog.

The ShockLog accessory kit contains the following items:
1 – ShockLog Software (USB drive containing software and user manual)
1 - Quick Start Manual
1 - USB Communication Cable
2 – AA Lithium Batteries
1 - iButton Set (START, STOP, DOWNLOAD, SETUP and CLOCK)
1 - iButton USB Connection BUS and Cable

Each ShockLog unit is shipped with batteries, mounting kit and a companion label.

In the unlikely event that any of the above items are missing when the kit is received, please immediately inform your SpotSee Regional Manager or local distributor to arrange for a replacement.

ShockLog Cellular Communication Module

The ShockLog Cellular Communication Module delivers real-time notifications of unacceptable handling in the supply chain. Alarm and location summary are transmitted via the global cellular network to the SpotSee Cloud where the information is accessible from anywhere in the world.

ShockLog Satellite Communication Module

The ShockLog Satellite Communication Module delivers real-time notifications of unacceptable handling in the supply chain. Alarm and GPS location summary information is transmitted via the GlobalStar satellite network to the SpotSee Cloud where the information is accessible from anywhere in the world.

ShockLog H/T Sensor

The HT sensor measures humidity and temperature. It enables any version of the ShockLog 298 or 248 to monitor an extended range of environmental factors.

HPT (Humidity Pressure Temperature) Sensor

The HPT sensor measures humidity, pressure and temperature. It enables any version of the ShockLog 298 to monitor an extended range of environmental factors. The HPT meets the requirements for IP30 and can operate at temperatures between -40 and +85°C. An optional extension cable is available for applications where the HPT must be mounted remotely from the recorder. A bulkhead adapter is required when using the extension cable.

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ShockLog 298 Tilt and Roll

The Tilt & Roll feature extends the monitoring capabilities of the ShockLog 298 beyond impact and vibration to include tilt & roll. Users have the capability to monitor and measure the entire physical environment during a journey or storage period. The ShockLog software includes two additional time slot graphs in order to provide a graphical representation of the tilt and roll activity recorded. The additional graphs show the Tilt (front to back) and Roll (left to right) movement of the unit and are represented as degrees of movement. The data is recorded and displayed in a range of ±180°. Reaching 180° indicates full turn over.

ShockLog 298 GPS

The ShockLog 298 is available with a built-in GPS receiver that records the GPS position of the unit at every summary interval and when an event occurs. The receiver / antenna must have line of site visibility to GPS satellites to record such information.

Data files with GPS information will be displayed with additional columns in both the summary table and the events table. The additional columns include:

- GPS Time and Date
- GPS Latitude
- GPS Longitude
- Globe icon (Link to Google Maps)
- GPS Velocity
- GPS Course (COG)

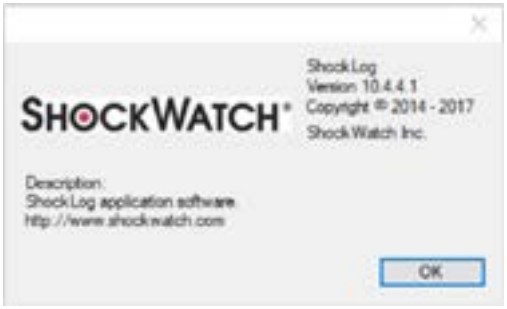
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Getting Started

The ShockLog manual applies to ShockLog software version 10.2.4.1 or greater and is to be used in conjunction with all ShockLog units (298 and 248 products). It also applies to most legacy ShockLog ranges including the RD298 ShockLog (embedded code version 103 or higher) and RD317 Micro ShockLog units (embedded code version 103 or higher). While other combinations of the software and embedded code versions of a lower number should function in a similar manner, there may be some exceptions.

Identifying Software Versions

To determine which version of ShockLog software is installed, start the software, look under the "Help" menu option at the top of the screen and select "About". In this case the version is 10.4.4.1 release date 2017.



Identifying Hardware Versions

The hardware version of the ShockLog is displayed in the "Communications" dockable window. The communication information is only updated when a ShockLog is connected to your PC. In this case, the code version is 21.



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ShockLog Software Installation

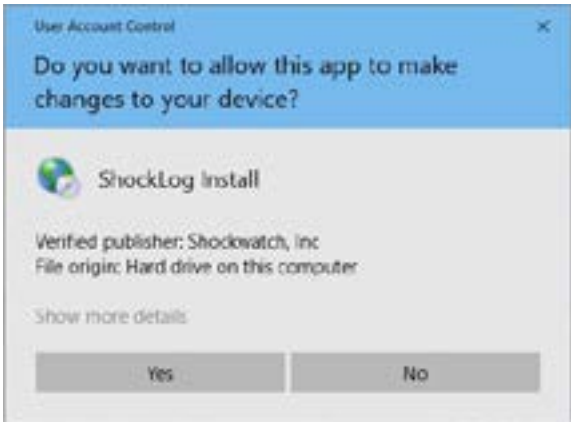
To get started with the ShockLog, the first step is to install the software. Please note that many IT systems prevent individual users from installing software on their machines or users may have restricted rights. Therefore, it is essential that you consult your IT Department to ensure you have sufficient rights to install the software. The ShockLog software has been designed to run on a standard PC under Windows 10, 8, 7, XP or Vista. All of these operating systems require administration rights to install the software.

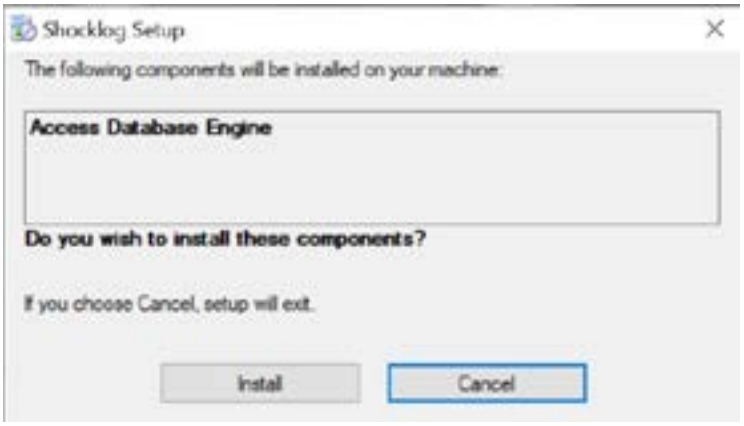
Insert the CD into the CD/DVD player on your PC. The set-up process should run automatically. If for any reason the set-up program does not automatically run, go to the Start menu and in Run, enter V:\shocklogsetup.exe (where v:\ is the CD/DVD driver on the PC) and open the program from there.



Enter your name, company name and the unique serial code supplied with the ShockLog CD. The code can be found inside the CD software case. The code will begin with “SW.” Once the appropriate information and a valid code have been entered, click “OK.”

If Microsoft.NET Framework and Microsoft Access are not installed, the following steps will be executed. A new window will appear displaying the Microsoft.net end user license agreement, click “Accept”.
The installation will continue and the system will install components from the CD for the Access Database Engine. Click “Install” to continue.





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The Microsoft Access database engine installation wizard will run next. Click “Next” to continue.

Accept the Microsoft Access End - User License Agreement terms.

The Access database location is set up next. Click “Install” to continue.

Click “OK” to complete the setup of the Access Database.

Microsoft.net framework will install next.

After Microsoft.net Framework and Access have been installed, the installation of the ShockLog software will begin automatically. A ShockLog Setup Wizard will install the ShockLog software on your computer. Click “Next” to start the installation.

A new window detailing the end user license agreement required to utilize the software will appear. The user must accept the terms of the software by selecting “I accept the terms in the License Agreement”. Click “Next” to continue.



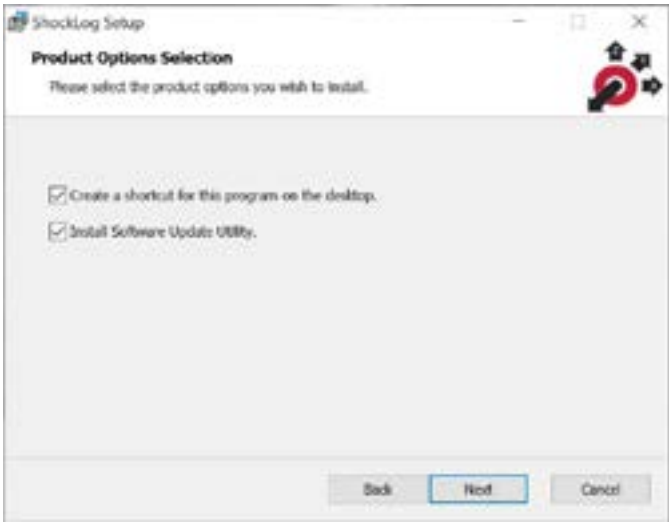


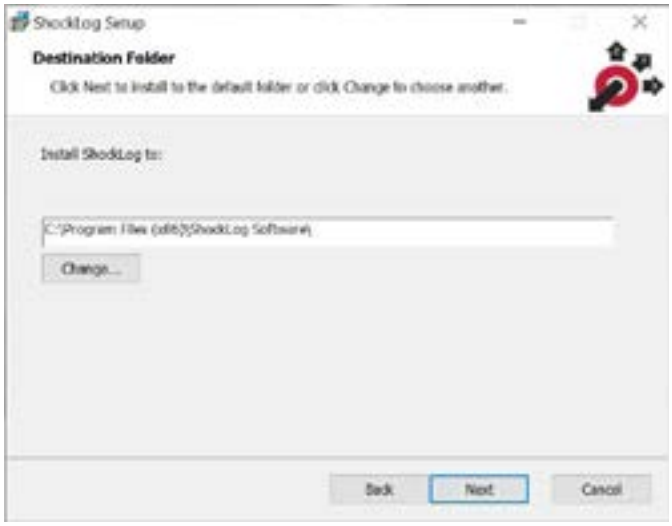
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Next, another ShockLog Setup window will prompt the user for the product options to install. Verify that both “Create a shortcut for this program on the desktop” and “Install Software Update Utility” are checked. Click “Next” to continue.

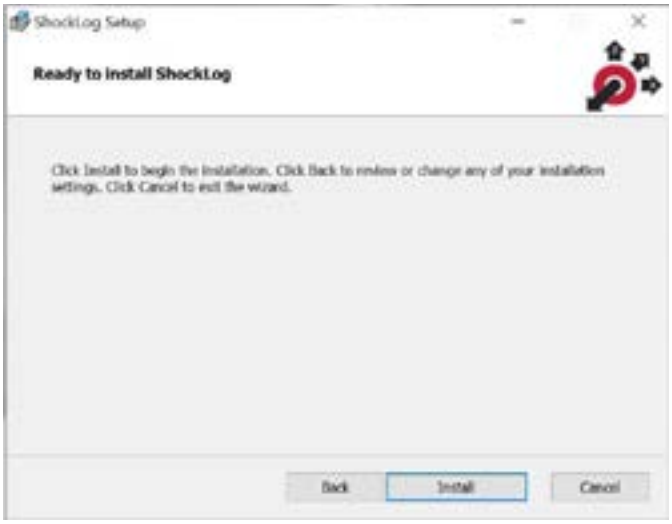
Users can select the location of the software installation. However, it is recommended that the default settings be accepted.

To change the directory address, either type over the information in the box or browse for the desired directory by selecting the “Change” button. Once you have selected the desired directory, click on the ‘Next’ button.





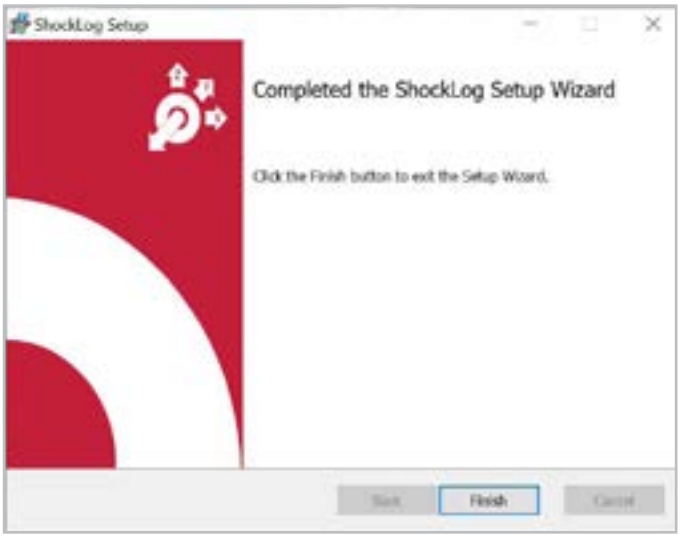
A window stating “Ready to install the ShockLog” software will appear. Click “Install” to continue.



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The system will begin the installation of the ShockLog software. At this stage a number of progress bar windows will appear. A Microsoft software installation warning stating that the software has not been verified for compatibility to Windows XP will appear. Click on the “Continue anyway” button. The same window will appear a second time. Click on the ‘Continue anyway’ button. When asked to install Maxim and The IMC Group drivers, click “Install”.

Once the system has fully installed, a “Completed the ShockLog Setup Wizard” window will appear. Click “Finish” to complete the installation.



The ShockLog software is now loaded and the computer should be back at the Desktop view. In order to create a short cut on the Desktop, right click on the Start menu and select the “Explore” option.

The ShockLog programs will have been copied into the following directory: c:\ProgramData\ShockLogSoftware\ShockLog or it will be installed in the destination directory specified earlier in the setup process.

Right click on the ShockLog program icon and select “Create Shortcut”. Once the short cut has been created, it can be dragged onto the Desktop.

To open the ShockLog software, double click on the shortcut icon from the Desktop.

When first attaching the ShockLog unit to the PC, it will be necessary to install new USB drivers for the PC to communicate with the ShockLog. After connecting the ShockLog to the PC via the USB cable, a “Found New Hardware Wizard” window will appear. To the question, “Can Windows connect to Windows Update to search for software?” it is essential that the user select “No, not this time” to prevent the system from going to the Microsoft website to find the drivers.

Click “Next” and a second “Found New Hardware Wizard” window will appear.

Select “Install the software automatically (Recommended)” and click “Next”.

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A window with a Microsoft software installation warning stating that the software has not been verified for compatibility to Windows XP will appear. Click “Continue anyway”.

The appropriate drivers now will be loaded on the PC and will allow the ShockLog device to communicate with the ShockLog Software.

If the drivers do not load correctly, it may be necessary to return to this window and select “Install from a list or specific location (Advanced).” Browse the PC to find the appropriate drivers within the ShockLog directory.

If the ShockLog does not connect after successfully loading the drivers, please check the communication ports are correct. The port settings are found in the “Tools” menu under Communication Properties. These settings are only relevant to legacy ShockLog products.

Automatic Check for Updates

The ShockLog software has a built-in facility to automatically check the internet for the latest version of software. When installing the software, users will be given the option of enabling this feature by the use of a check box. Should you wish to change this option after installation, select the “Help” menu. Users are able to turn this on or off with the “check for updates” option.

Language Support

The ShockLog software is multilingual. Upon installation, the software will detect the country settings within the Windows files and select the appropriate language. Where no translation is available, the system will default to English.

If after installation a user wishes to revert back to English settings, it is possible to change the software back to English by checking the “English” tick box in the graph and unit options under the Tools menu.

Batteries

All ShockLog units operate with AA size batteries. Either 1.5V Alkaline or 3.6V Lithium cells are acceptable. (Do not attempt to operate the ShockLog with a mixture of Alkaline and Lithium batteries). The ShockLog 298 unit requires two batteries and the ShockLog 248 unit requires one battery.

Two (2) AA size lithium batteries are supplied with a ShockLog kit. It is highly recommended that lithium batteries be used whenever possible as they will provide a greater service life across a wider temperature range. The use of alkaline batteries is recommended only on very short journeys or for experiments where the ambient temperature is fairly constant and above 10°C/50°F.

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Battery Tips

- Always use lithium batteries for journeys where the temperature may be outside the 10°C to +50°C range.
- The capacity of alkaline batteries drops dramatically when exposed to temperatures below 10°C.
- If using lithium batteries and the ShockLog will be travelling by air, make sure the batteries are approved for air cargo.
- If the batteries are accidentally installed with the wrong polarity, the ShockLog will not be damaged; however, the life of the battery may be severely affected.

Installing the Batteries

The battery compartment is located on the back of the ShockLog unit. (ShockLog 298 shown to right).



Remove the four screws and lift the battery cover clear.

Ensure the orientation of the batteries is correct and insert them into the ShockLog unit.



Both batteries are oriented in the same direction; the positive terminal for both batteries is at the same end of the ShockLog unit.

Ensure the rubber seal is correctly positioned, replace the battery cover and insert the 4 screws. Care should be taken when securing the lid. Ensure the screws are tightened evenly in a diagonal rotation and tightened to 25cNm torque (hand tight).

Note: All ShockLog units are rated to IP67. The battery compartment is isolated from the main body of the ShockLog unit and a poor fitting of the battery cover will not dramatically affect the IP rating of the main unit. However, if there is water ingress into the battery compartment, the batteries are likely to short and cause corrosion of the battery terminals. If this corrosion occurs, the ShockLog will not function correctly, and the unit will need to be returned to SpotSee for repair.

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ShockLog Mounting Recommendations

Mounting Orientation



The ShockLog axes are indicated on the side of the unit. Mount the ShockLog either vertically or horizontally and note the orientation. Variation from the orientation of the ShockLog should be noted in order to assist with data analysis at the end of the journey.

Securing the ShockLog

Whenever possible, it is recommended you mount the ShockLog directly to the product being monitored. Several alternatives exist for securing the ShockLog to the shipment:

- Use all four (4) supplied mounting bolts as shown in Figure A.
- A mounting plate is available that has been predrilled for the four isolation bushings provided in the mounting kit. A mounting hole in the middle of the plate attaches to the shipment as shown in Figure B. The mounting hole has been sized for an M8 bolt but can be drilled out to accept a larger bolt.
- Magnetic mounts are available and can be secured to the four corners of the ShockLog.

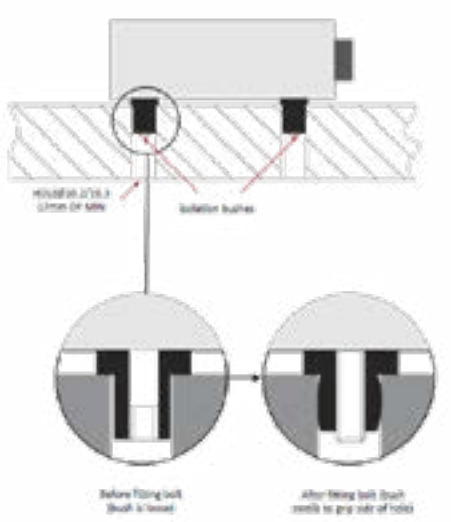


FIGURE A

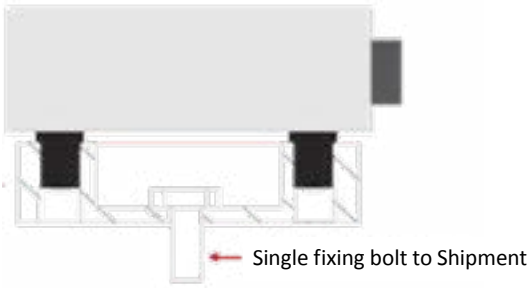


FIGURE B

Mounting Best Practices

Mount the ShockLog as low as possible, but it is more important to be nearest to the most sensitive part of your product. Be sure to mount the device to a location that is structurally sound and avoid mounting in the middle of a panel.

When mounting, avoid metal-to-metal contact, and use the rubber bushings provided in the mounting kit to decrease excess vibration.

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Avoid building special brackets to mount the ShockLog. If a cover is required, place the cover over the ShockLog but do not attach it to the ShockLog.

When mounting inside packaging or crates, make sure the product is secured by foam or mounting screws to ensure the unit records accurate impacts during shipment. If the ShockLog is not attached securely to a shipment, the journey data could be compromised as the measurement may be of the ShockLog moving independently of the product being monitored

When monitoring a large shipment, always use the anti-vibration bushes. The isolation bushes must fit as shown in the Figure A below. For the bushes to work correctly, the ShockLog must not make metal-to-metal contact.

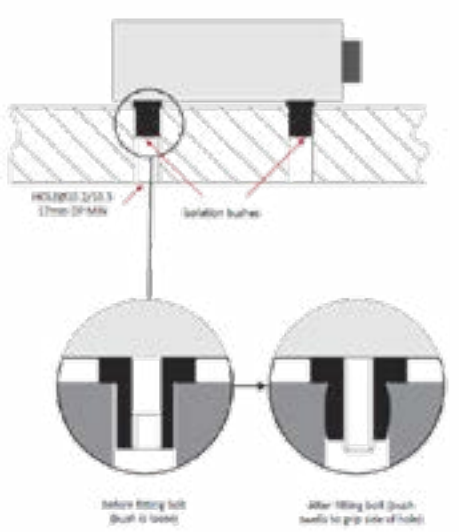


FIGURE A

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Opening the Software & Initial Layout Setup

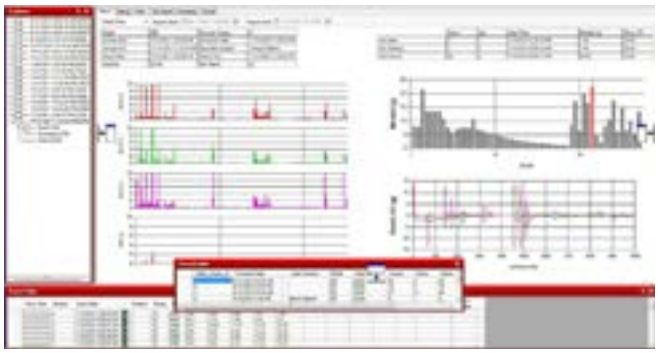
The ShockLog user interface has a variety of "dockable" windows that allow the user to view information of interest. These windows make it easy for users to move around in the journey data files.

To get started the software can either be opened by double clicking the ShockLog shortcut icon or by selecting the ShockLog program from the Start menu.

When the software first opens you will be presented with a "File Viewer" screen in addition to a "dockable" Explorer window on the left. Dockable windows in the bottom of the screen containing tabs for Communications, Record Table, and Events Table will also be presented.

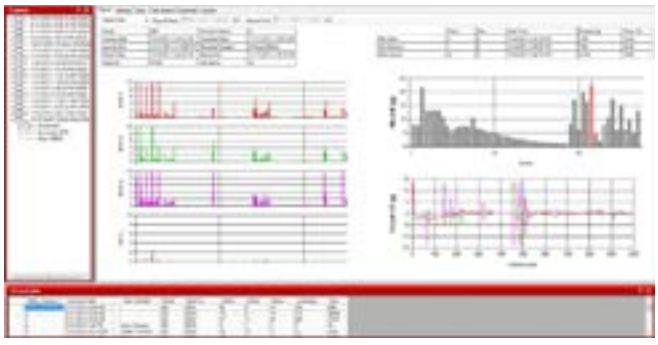


Move each dockable window by clicking the left mouse button and holding. Drag the window around and notice that small window icons appear at the left, right, top and bottom of the screen. As the windows are moved closer to one of these icons, it will highlight in green where the window will sit.



All of the dockable windows work in any position. However, the Explorer window generally works better in either of the left/right vertical positions, whereas the Record and Event Table windows are better suited to the top/bottom horizontal positions.

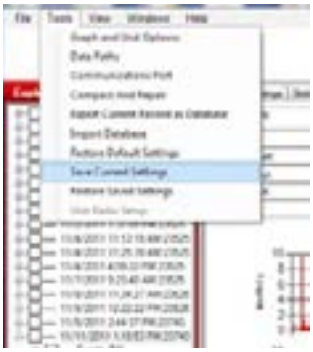
It is possible to dock more than one window in the same location. If only two windows are to be docked in the same location, the windows will be displayed side by side. If three windows are to be docked in the same location, the software displays an additional icon with a series of tabs to move between the windows.



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When the dockable windows are in the desired locations, adjust the size of each window by dragging the border of each window. Adjust the window size in order to maximize the available screen area for the File Viewer.

Windows can be moved and adjusted at any time.

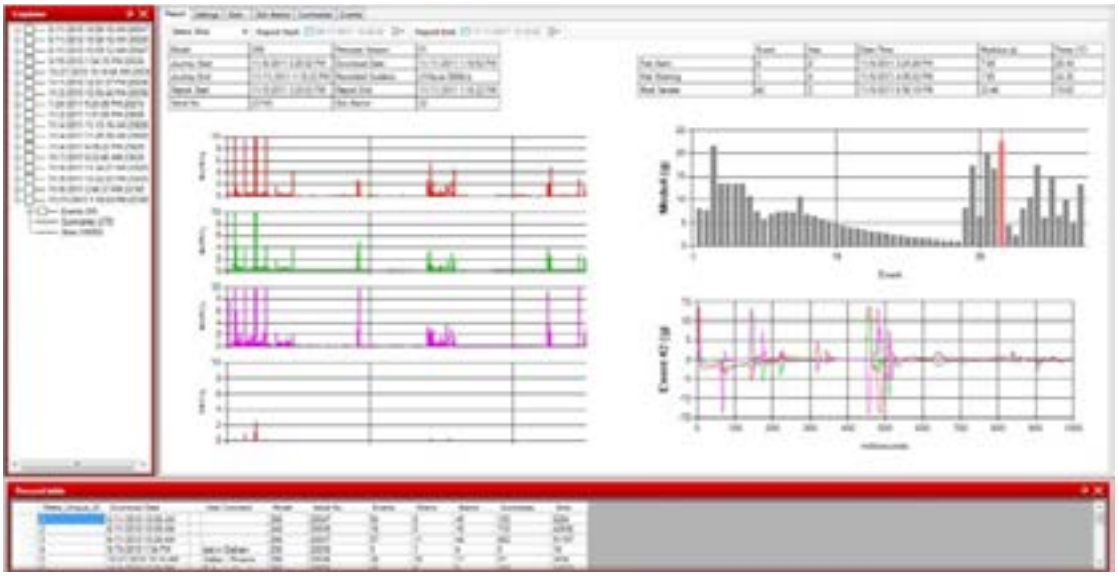


The position of the docked windows can be saved so they are in the same location when exiting and entering the ShockLog system. From the Tools menu, select “Save Current Settings”. Once this has been done, a confirmation window will appear.

For demonstration purposes, a number of files are included in the database installed with the ShockLog software. These files are shown in the Explorer and Record view. Click on one of the available files and the Summary Report will be displayed in the File Viewer. The demonstration files may be deleted at any time.

With a file open, it is possible to explore the information available from the File Viewer screen. Notice the six tabs along the top of the viewer. These tabs link to more detailed information relating to the open file record. The information includes:

- Report
- Setup
- Slots
- Slot Alarms
- Summaries
- Events



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Creating A Setup File

Select Model or File



To create or modify a setup file, go to the "View" menu at the top of the screen and select "Setup." A new window will appear listing the available ShockLog models.

The user will select a ShockLog model and create a setup file or open and modify an existing file that has been created in the past.

The ShockLog model selected will affect the options available in the setup screens. Certain features are only available on certain models.

To open an existing file, select the ShockLog model of interest and click the "Load File" button. A list of available setup files related to the selected model will be shown. Highlight the desired file and click on "Open."

To create a new setup, click "New Setup."

The "Current File" button allows you to interrogate a connected ShockLog to determine what setup has been loaded into the unit.

Setup Window

When the appropriate ShockLog model has been selected or the desired setup file has been opened, a new window will appear. In this example, "Setup – 298" indicates that a ShockLog 298 setup will be created.

The setup window has a series of tabs that guide the user through the available options for the selected ShockLog model. The software requires that the user complete the appropriate areas. For a new setup, the system will adopt a default setting and complete some sections. The user must step through every window and modify the settings or select "Continue." Guiding the user to step through every window for a new setup ensures that all the options have been considered and reduces the chance for a setup error.

Firmware Options

The first tab in the Setup screen is "Firmware Options." This section defines what factory or peripheral accessories are being used with the selected ShockLog. If the options are grayed out and selected, they are default options and cannot be changed. If they are grayed out without being selected, the options are not available for the selected ShockLog.



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Standard Options

gRMS (Vibration) – Users have the option to record the gRMS values within the time slot graphs, allowing users to see the vibration levels throughout a given time slot period. When measuring gRMS, it is required that the 250Hz filter be selected. This selection is done automatically by the software. More details on filter settings will follow.

Factory Options

External RH/T – Relates to the ShockLog 298 and 248 with the factory optional Temperature and Humidity sensor added.

External RH (RD317 only) – Relates to the Legacy RD317 Micro ShockLog with the factory optional Temperature and Humidity sensor added.

Internal Tilt/Roll – Relates to the ShockLog 298 with the factory optional sensor added to detect tilt & roll.

GPS Module – refers to ShockLog 298 with optional GPS module to record GPS coordinates of an impact and coordinates when a time slot summary is made.

Peripherals

Optional accessories may be added to the ShockLog setup.

- **RD299 HPT** – Humidity, Pressure, Temperature Sensor
- **RD400 Remote Accelerometer** – Legacy product supported by ShockLog RD298 – recorded single access acceleration in a location remote from the ShockLog.
- **RD401 Remote Indicator** – Legacy product supported by ShockLog RD298 – brought alarm warning lights to a location away from the ShockLog.
- **RD404 Tilt & Roll** – Legacy product – external tilt and roll accelerometer
- **Satellite / Cellular** – Accessories available to provide near-real time impact notification and location information. Communication modules transmit information to SpotSee Cloud. For additional information regarding connected devices, please refer to Appendix A - ShockLog Satellite or Appendix B - ShockLog Cellular and Appendix C - SpotSee Cloud Platform.
- **External** – custom connection; discuss additional input requirements with your SpotSee representative.

Click the box for any options that will be utilized with the ShockLog, then click “Continue.”

RD401

These settings are available for a customized legacy solution from SpotSee. They are not supported by the ShockLog 298 or 248.

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iButton Password

Users are able to create password protection in the iButton system. These passwords prevent unauthorized users from interfering with the ShockLog through the iButton interface. To create password protection on the iButton interface, users program the ShockLog with their own password (up to 8 characters in length and case sensitive). Any iButton used to communicate with the ShockLog must be programmed with the same password. Otherwise, the ShockLog ignores the iButton.

The Password is created by clicking in the Password box and typing in the password. The password is confirmed by typing in the confirm box. The confirmation passwords must be exactly the same as the original password.

Settings

The Settings window allows the user to select the protocol, create setup name, enter mission comment and set start date.



Setup Name

Users are able to name their setup and save it as a unique file for future use. With a new setup the word “Default” will be in the setup name field. The user must change this name before they are able to save the setup, send it to a ShockLog unit or move onto the next stage of the setup process.

Tip: If you have a setup you want to use as the preferred setup, make this the user default by going to the options screen, double clicking on the user default setup box and selecting your setup file name.

Mission Comment

Users can add notes to the setup file and these notes will be recorded by the ShockLog. These comments will be displayed on the Report screen when the file is downloaded.

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Start Date

If the user would like the ShockLog unit to begin monitoring at a future date/time, click on the right-hand arrow to bring up a calendar selector and select the desired date. If the unit should start recording at a specific time, it is possible to set the start time as required. The start time will be +/- 10 minutes of the specified start time.

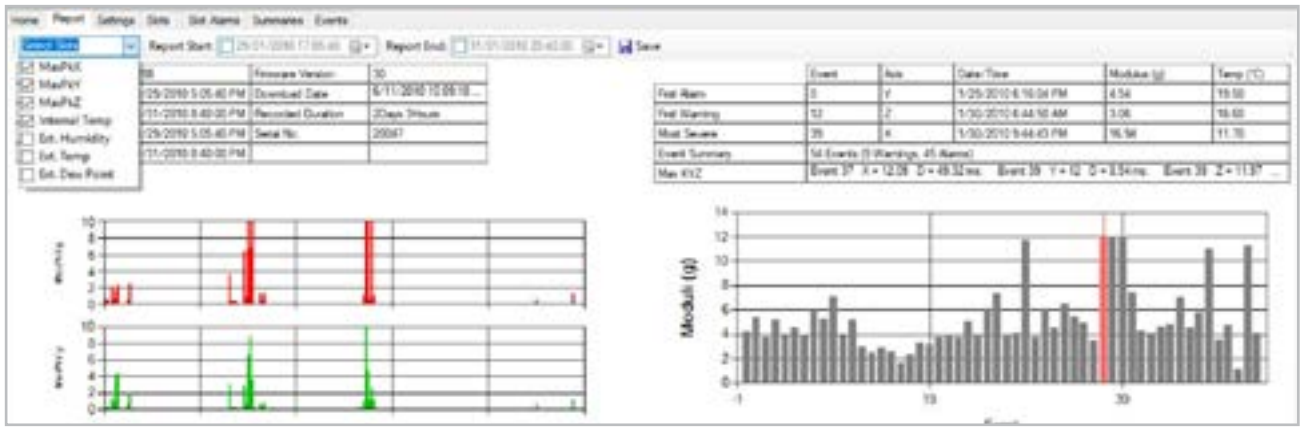
Tip: It is possible to start the ShockLog sooner than the Start Date by connecting the ShockLog via USB to the PC, opening the software and clicking "Start" in the Communications Window. This action will override the delayed start, and the ShockLog will begin recording immediately. The "Start" iButton being applied to the reader port will also override the delayed start and begin the recording.

Slots

Slots are user defined periods of time in which various criteria will be recorded.

Slot Contents

Slot contents define the criteria to be recorded in the Slots graphs. Select the parameters of interest by clicking the appropriate boxes. The four default settings are max peak x, y, z and internal temperature. Depending on the configuration of the ShockLog, the available slots include max / min peak for the three axes, temperature, humidity, dew point, pressure, tilt and roll. Setting threshold limits for these values will be done in the Slot Alarms and T&R alarms sections.



Tip: Selecting additional parameters will decrease the amount of time in which data can be recorded. Only select parameters that are of interest in order to maximize recording time available.

Slot Interval

The Slot Interval defines the how often a time slot will be recorded. The window below the Slot Interval setting will show how long the maximum number of slots and run time based on the setting.

Tip: Battery life is not affected by time slot frequency. It is advisable to always select a time slot interval that will last longer than the expected journey length.

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Summary Interval

Summaries provide an overview of what was recorded by the ShockLog in a given period of time (the summary interval). A summary records the number of warnings/alarms and the maximum recorded slot values in the summary interval. The Summary Interval allows the user to set the time period between each summary period.

Tip: Battery life is not affected by summary interval setting. It is advisable to always select a summary interval that will last longer than the expected journey length.

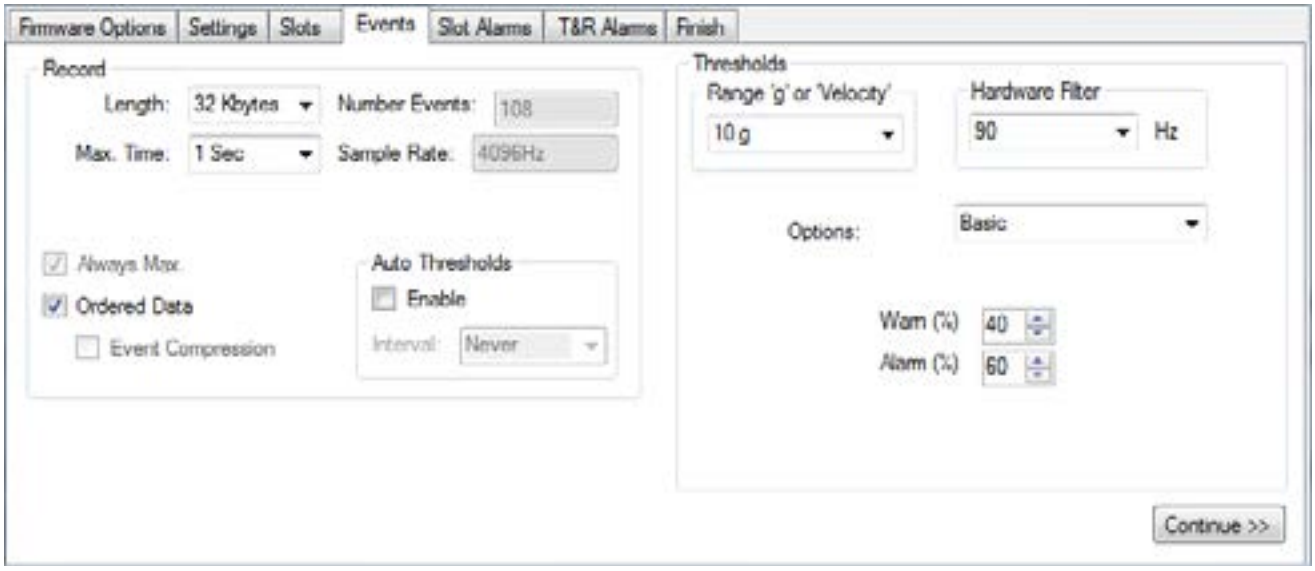
Journey Duration Option for Slot & Summary Intervals

The Journey Duration button allows users to select the expected journey length, and the ShockLog will automatically optimize the slot and summary intervals settings.

Note: It is important for users to allow for potential delays during the journey or through customs. The journey duration should always be set slightly longer than the expected journey length to prevent the possibility of losing end of journey information.

Events

Impacts above the user defined threshold are defined as events. The Events section allows the user to define the criteria to be considered when recording a potentially damaging event.



Record

This section allows users to specify the resolution / memory to be allocated to each event. From the resolution and memory setting, the number of recorded events is calculated by the software.

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Length

The more memory allocated to an event, the more points the event graph will display, and the higher the event resolution will be. The ShockLog always records 4096 samples per second. However, the ShockLog will compress saved data according to how long the event is. The peak of an event will not be lost when data is compressed as the ShockLog always keeps the max & min samples of each compressed data section.

Tip: Generally, it is desirable to log detailed events when damage may have occurred to the shipment. Settings that allow for the maximum number of events is not always advisable. The user must determine if having fewer, more detailed events or more events with less resolution is more desirable. Remember that a time slot graph capturing the max peak in a time slot is produced for the entire journey.

Max Time

Max time is the length of any recorded event. All events are recorded for at least 1 second. The longer the event, the more the data will be compressed. In certain situations, it may be desirable for the ShockLog to record the full length of an event (potentially up to 128 seconds). If this is the case, the "Always Max" box must be selected. In general, this setting is only used in a test environment, as most impact events are less than 1 second in duration.

Unless there is a specific reason to do so, do not use the Always Max setting. Let the ShockLog decide when the event has finished by the dropout threshold. The dropout threshold is covered in the Understanding Threshold Levels section.

Ordered Data

Unless Always Max is selected, the ShockLog will record events in an uncompressed format displaying the full 4096 samples per second.

Thresholds

Range 'g' or 'Velocity': The range field sets the maximum g-level to be recorded by the ShockLog. To set the 'g' range, click the drop-down menu and view all the possible ranges (1, 3, 10, 30, 100 & 200). The ShockLog 298 has the ability to record in velocity; this will automatically occur if a range in cm/s is selected. However, most users are interested in g-range.

Tip: Selecting the range is a very important part of the ShockLog setup. Be aware of what impact levels are of interest. Do not assume if the ShockLog is set to the 100g range everything will be recorded. In this scenario, the resolution will be compromised, and low-level events may not be recorded at all. The wake-up threshold for a detailed event must be at least 5% of range (and recommended to be no less than 10%). On a 100g range, events lower than 10g with a 10% wake up threshold will not be recorded.

It is impossible to make exact recommendations for the range on a particular shipment. However, as a rule of thumb, the larger and heavier the object, the less acceleration (g) it takes to damage. Therefore, the 10g range is generally used for large objects (e.g. something weighing tons). The 30g, 100g and 200g ranges are used for lighter shipments.

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Hardware Filter - After the range is selected, set the frequency cut off of the hardware filters to be applied to the event data. These filters enable users to reduce the number of unwanted higher frequency events where it is known that this type of event will not cause damage to the object being monitored.

The lower the filter frequency, the more severe it is in eliminating high-frequency events. The lower frequency filters are generally used for large heavy objects with a high metallic content, especially where the object is prone to high levels of resonance. These resonances will create a “bell-like” ring that a ShockLog can detect as a high g event if the appropriate filters are not applied. Filters are recommended in environments where a high frequency vibration is probable such as rail freight applications. The correct use of filters can eliminate any unwanted events being recorded. If gRMS is to be recorded, the frequency filter must be set to 250Hz.

Options: The user selects one of four modes for the thresholds.

Basic – The default setting is “Basic.” The Warning level and the Alarm level can be adjusted by the user. The wakeup and dropout levels are set automatically in the software based on the warning level selected.

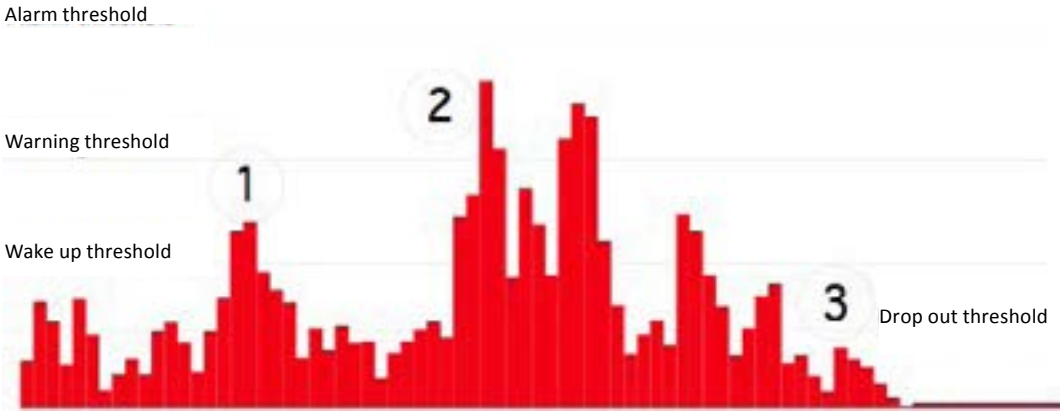
Multiple – Allows the user to set all four thresholds (wake, warning, alarm, and dropout). The user is also able to adjust the thresholds for each axis independently.

Link XYZ - All of the axes operate off of the same thresholds.

Timed Events - Allows users to record a detailed event at the end of every summary period. This setting is not dependent on thresholds being breached. Timed Events is an option for the ShockLog 298 only.

Understanding Threshold Levels

The threshold settings determine what level of impact will cause the ShockLog to wake up, the levels at which a warning or alarm is created, and the dropout level of the event. The simple bar chart below can best explain these thresholds.



It is not desirable for the ShockLog to constantly be awake due to low level vibration caused by the mode of transport. The ShockLog uses 100 times more battery power when it is recording at higher resolutions than when it is monitoring peak time slot values for wakeup thresholds. The ShockLog can easily see 0.5 to 1g of activity when being transported in a car on normal roads.

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If any accelerometer activity exceeds the wake-up threshold, the ShockLog will start recording accelerometer data at a faster rate. The ShockLog takes 0.25 msec to start recording higher resolution data once the wake-up threshold has been exceeded. If the activity does not exceed the warning level and drops below the wake-up threshold, the ShockLog will go back to monitoring time slot peaks. An event will not be recorded.

When the wake-up threshold and the warning levels have been breached, the ShockLog will record a detailed event and flag it as a warning. The same logic is applied when the alarm threshold level is breached. The ShockLog will record a detailed event and flag it as an alarm.

Once the event activity has dropped below the drop out threshold (or reached the maximum allowed event length), the ShockLog will stop the dynamic event recording and go back to monitoring peak values during time slots.

"Wake": The level at which the ShockLog will wake up and begin recording. The wake-up threshold should be set to approximately 80% of the warning level.

> **Tip:** It is not advisable to use wake up or drop out thresholds of less than 10%. However, it is possible to set levels down to 5% if necessary.

"Warn and Alarm": Warning and alarm events are recorded in exactly the same way. The thresholds distinguish how the events are flagged in the ShockLog data file and how the LEDs on the ShockLog unit flash once a threshold has been breached.

> **Tip:** Warning and alarm thresholds become more important when the ShockLog LEDs are to be used as part of a shipment's receiving audit. Example: Set a warning level to indicate the shipment should be quarantined pending further investigation. Set the alarm threshold to indicate the shipment must be inspected without delay.

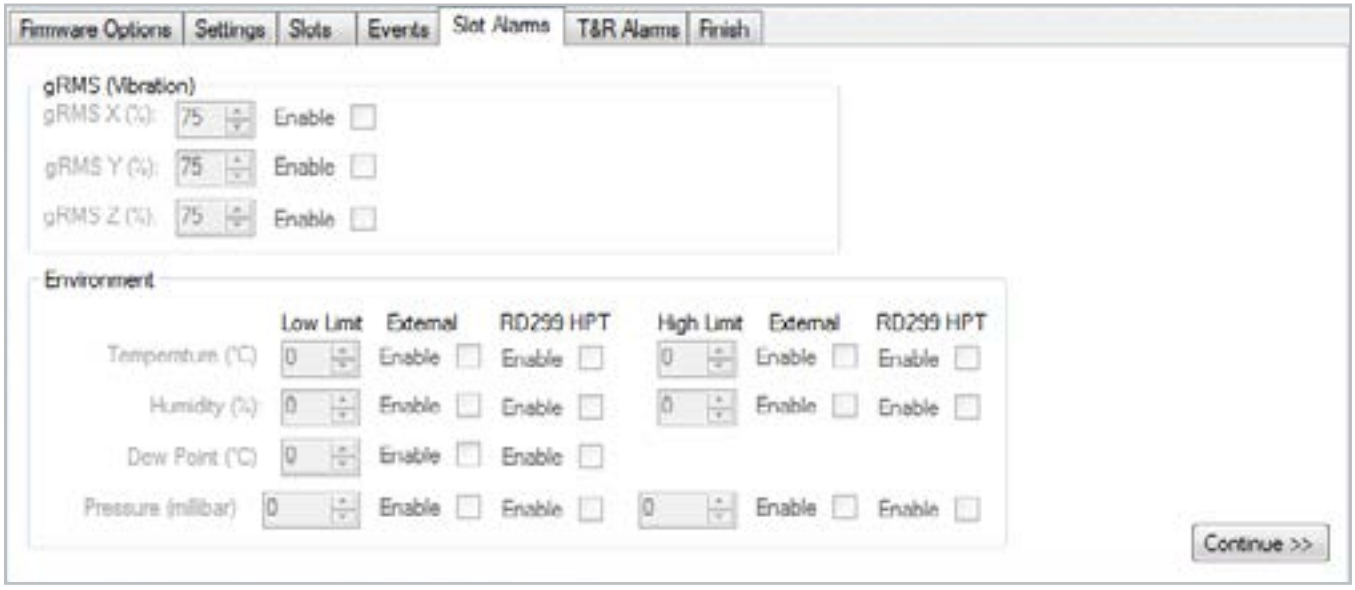
"Drop out": The acceleration level at which the ShockLog will stop recording an event provided it has been set to record for longer than 1 second and the "Always Max" box has not been selected. The drop out level should be no lower than the wake-up threshold and can be as high as the warning.

If you are unsure of how to set your thresholds, please contact SpotSee Technical Support for assistance.

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Slot Alarms

The Slot Alarms window allows the user to specify alarm settings depending on the factory options and peripherals that have been specified in the Firmware Options tab.



gRMS (Vibration)

gRMS alarms allow ShockLog 298 users to set slot alarms for gRMS data. In the setup window, users must select the gRMS option (Firmware Options) for this measurement to be available.

Users should enable the axes for which a gRMS alarm is required and set the level as a percentage of the shock range.

Environment

When temperature, humidity, and pressure sensors are to be used, the environment section allows users to set low and high thresholds for these parameters. This section is where settings are made for both factory installed temperature/humidity sensors or the external temperature/humidity/pressure sensor.

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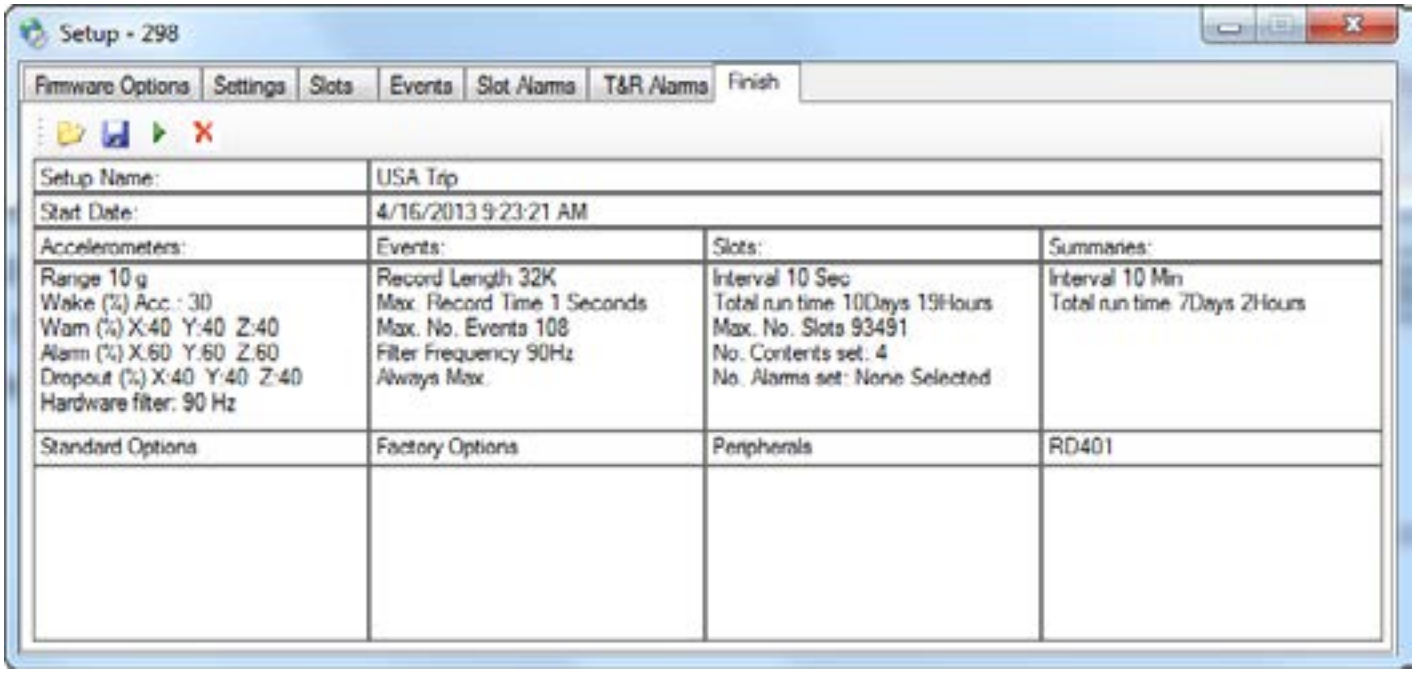
T&R Alarms

The T&R Alarm window is used when either the Tilt & Roll option (internal) has been purchased as part of the ShockLog 298 or the legacy Tilt & Roll accelerometer (external) is being used. The alarms of interest should be enabled, and the degree of tilt / roll should be entered by the user. Alarms can be set for both upper and lower levels for tilt and roll.



Finish

The Finish window provides a summary of the settings and provides an opportunity to save the setup file and send it to the ShockLog.



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Saving Setup File

After a setup has been defined, it must be saved before it can be sent to a ShockLog.

Click the disk save icon to save the file. 

The system will automatically save the file in the default setup directory and can be retrieved for editing or sending to a ShockLog at any time.

Sending Setup to ShockLog

Once the setup has been created and saved, it can be sent to the ShockLog.

Connect the ShockLog via the USB cable to the PC and click the “Play” icon. 

The status bar at the bottom of the screen will change to “OK” once the file has been successfully sent.

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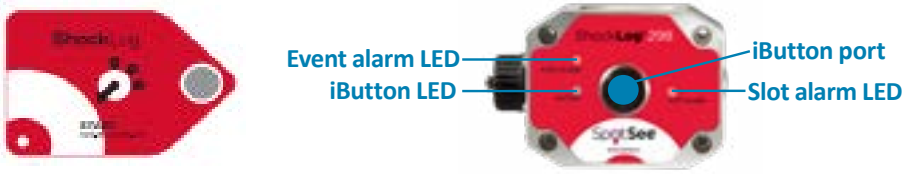
Start Monitoring

Once the ShockLog has been programmed, the unit must be started to begin recording. It is recommended that the ShockLog be mounted prior to starting the recording to prevent the capture of impacts resulting from the mounting process.

Depending on how the device was configured during the setup process, the device may have a preprogrammed start date. If so, the ShockLog will begin recording with no additional user interaction.

However, it is possible to start the ShockLog by connecting the ShockLog via USB to the PC, opening the software and clicking "Start" in the Communications Window. This action will override a preprogrammed start date, and the ShockLog will begin recording immediately.

The "Start" iButton being applied to the reader port will also override the delayed start and begin the recording. Remove the black center cap from the ShockLog iButton port and insert the START iButton into the port. When the iButton LED on the ShockLog is red and the Slot Alarm LED is green, remove the iButton. The unit will start recording in one minute.



Understanding the Status LEDs

ShockLog units have three status LEDs that display the unit's condition:

1. iButton

- Single color LED (red)
- Illuminated when a valid iButton is inserted
- Used in conjunction with the SLOT ALARM LED, which flashes green when the iButton command is accepted

2. Slot Alarm

- Tri-color LED (green, amber & red)
- Flashes every ten (10) seconds when in Waiting State, or every five (5) seconds when in Running State
- Condition
- *No slot alarms* - Flashes green
- *One or more slot alarms* - Flashes red

3. Event Alarm

- Tri-color LED (green, amber & red)
- Flashes every ten (10) seconds when in Waiting State, or every five (5) seconds when in Running State
- Condition
- *No events* - Flashes green
- *Warning event(s) recorded (with no Alarm events)* - Flashes amber
- *Alarm event recorded* - Flashes red

For ShockLog units with firmware v27 and above, All LED's flash red every ten (10) seconds when the unit is in the Stopped state.

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Stopping the ShockLog Satellite

The ShockLog can be stopped with the Stop ibutton or it can be stopped after connecting the ShockLog to a USB port. To prevent capturing impact events resulting from dismounting the ShockLog, a best practice is to use the Stop ibutton.

Remove the black plug from the ibutton port.

Insert the STOP ibutton into the ibutton port.

All three LEDs will flash red every ten (10) seconds when the unit has been stopped.



Downloading The ShockLog

USB Communication

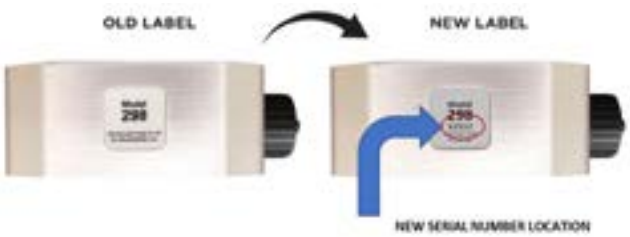
Open the Communications Window and connect a ShockLog through the USB to the PC. The ShockLog USB port is on the side of the ShockLog under a silver screw connector. The Communication Window information boxes will automatically update from the ShockLog. With ShockLog software version 9.x and greater, it is possible to communicate with both the latest generation of ShockLog products and legacy products.



The Communication window information includes the following parameters:

Model: Variant of the ShockLog attached i.e. ShockLog 298, 248, ShockLog RD298 or RD317.

Serial Number: Serial number of the attached ShockLog; this field will not populate for most legacy products. The ShockLog serial number is located on the side label of the ShockLog below the model number. For older units, the serial number will be engraved on the side of the ShockLog above the USB port.



Version: Firmware code version of the attached ShockLog.

State: Operating state of the ShockLog: Waiting, Running or Stopped.

Connection: Type of connection currently utilized to communicate with the ShockLog

Date / Time: Date and time set in the ShockLog unit; this field will update every 10 seconds while the unit is connected.

Range: G range set in the attached unit.

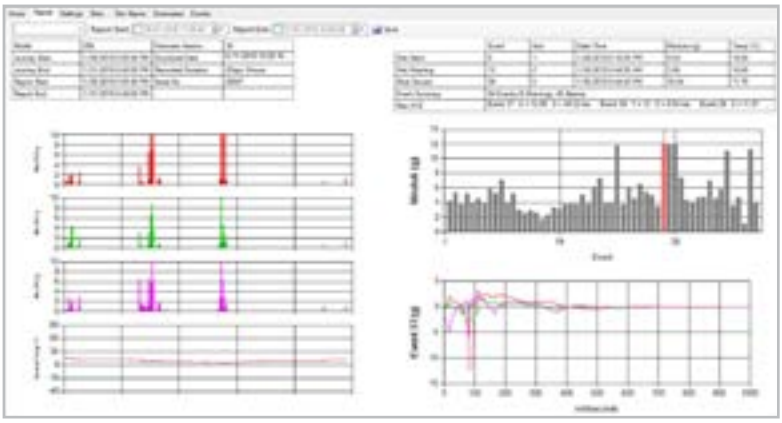
Setup Passwords and Security Log can be activated from the View menu at the top of the screen. Once activated the buttons enable users to setup passwords and view the security log of the attached ShockLog. These capabilities are described in more detail later in this manual.

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Overview of Software Screens

File Viewer Window

The File Viewer Window is the main section of the software window and displays all of the information related to the selected file.



Report

In the File Viewer, the Report View is the first screen displayed. The report provides an overview of the entire journey, storage period, experiment, etc. Information is provided in text and graphs. The Report will be discussed in greater detail in the Analyzing the ShockLog Data section.

Explorer Window

The Explorer window provides a list of all available data files in the main database. Click on any of the files and the report data will appear in the File Viewer. The file data in the Explorer window will break down into more detail showing Events, Summaries and Slots.

Click on “Events” in the Explorer window, and the system will display the individual events. By selecting any of the events, the “File Viewer” will display the detailed curve for that event.



Record Table

The Record Table window provides an alternative view of the data files in the database. It provides the user with an overview of the number of Events, Warnings, Alarms, Summaries and Slots. It is also possible to see the user comment associated with the file. The user comment can make the date more meaningful to the person reviewing the data.

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From this screen, users have the ability to sort the database by the columns of data. This feature will be discussed in more detail in the Analyzing the ShockLog Data section of the manual.

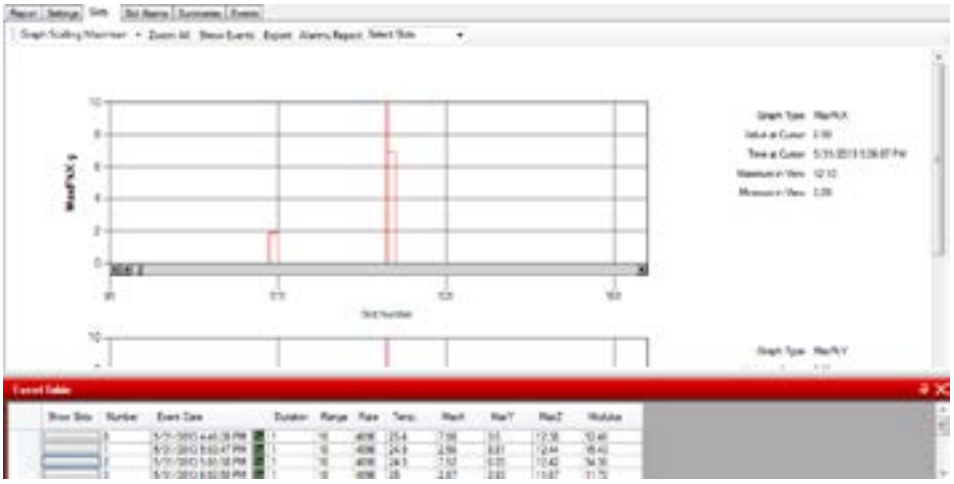


Event Table

When a file with “Events” is selected, the “Event Table” will refresh to display details of all the events associated with the highlighted data file. The “Event Table” displays the Event Number; Event Date; Duration (seconds); Range; Rate (samples recorded per second); Temperature; Max X,Y,Z (highest G measurement in each axis during the event) and the Modulus value of the event.



Click on the Event number and the File Viewer will change to display the detailed event curve for the selected event.
It is possible to move from the Event Table to the relevant slot graph by clicking “Show Slots” next to the desired event.



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Communications Window

The Communications Window displays live data from a connected ShockLog. It allows a user to perform tasks while connected to the ShockLog. Information displayed in the Communications Window includes: Model of the ShockLog connected, Serial Number (not available on legacy products), Version of firmware, State (running or stopped), Connection (USB or Serial), Date/Time, Range (impact scale), Status (alerts if memory is full), Alarms (number recorded) and Protocol of the attached ShockLog.



In the Communications Window, it is possible to perform a variety of functions:

Download: Downloads data from the ShockLog.

Start: If a ShockLog is in a stopped state, “Start” will restart the unit.

Send Setup: Sends a new setup to a ShockLog and clears the ShockLog memory.

Set Clock: Sets the clock of the ShockLog to match the PC.

Stop: If a ShockLog is in a running state, “Stop” will stop the unit.

Read Setup: Allows the user to read the setup data and save as a separate setup file for future use.

In addition to the above buttons, two others are grayed out. “Setup Passwords” and “Security Log” are specialist functions and will be explained in the iButton Communications section.

View Setup Record

With a ShockLog unit attached to the PC, it is possible to view the setup file on the screen.

From the “Communications” window, select the ‘Read Setup’ button and the PC software will interrogate the attached ShockLog displaying the installed set-up in the setup window. It is possible to save the set-up file to the local PC, and users will be offered this option as they close the setup window.

Note: While unlikely, if the Communication Window is opened, a ShockLog is connected and the information does not update, disconnect and reconnect the ShockLog device to reactivate the window.

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Slot Breaks Grid

The Slot Breaks table displays a list of breaks in the Time Slot data. These breaks can include all communication with an iButton, the first slot record or could relate to alarm resets from a Remote Monitoring System. The list will be shown in date/time order and will indicate what slot had a break in it and what the break event was. To access the Slot Break table select “Windows,” “New Window” then “Slot Breaks Grid.”

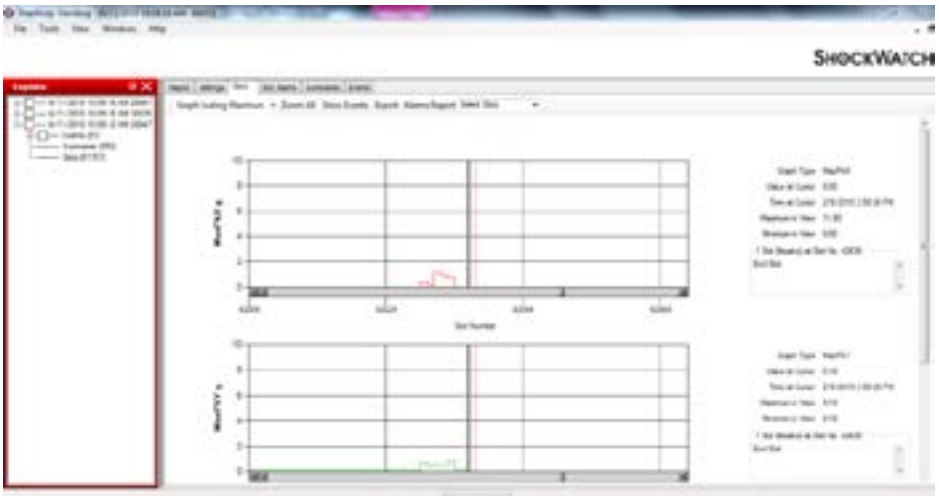


Date & Time	Slot No.	Break Event
20/04/2010 17:08:16	1	First Slot;
20/04/2010 17:10:08	13	iButton action;
20/04/2010 17:19:06	60	iButton action;
20/04/2010 17:19:21	61	iButton action;
21/04/2010 09:01:10	5,704	iButton action; Stopped;
21/04/2010 09:01:18	5,704	iButton action; Started;

To view the slot breaks on the time slot graphs, double click on any of the slot breaks in the table and the software will link to the appropriate time slot period on the graph.

On the slot graphs, slot breaks are represented by a grey vertical line. Click one of the grey lines, and a text box will appear on the right side of the graph. The text box will provide details regarding what caused the slot break and the slot number of interest. It is possible for more than one slot break to occur in a single time slot period. If this is the case, the text box will list all of the slot breaks in time order.

If the last slot break is selected, a red line will illustrate the end of the final slot.

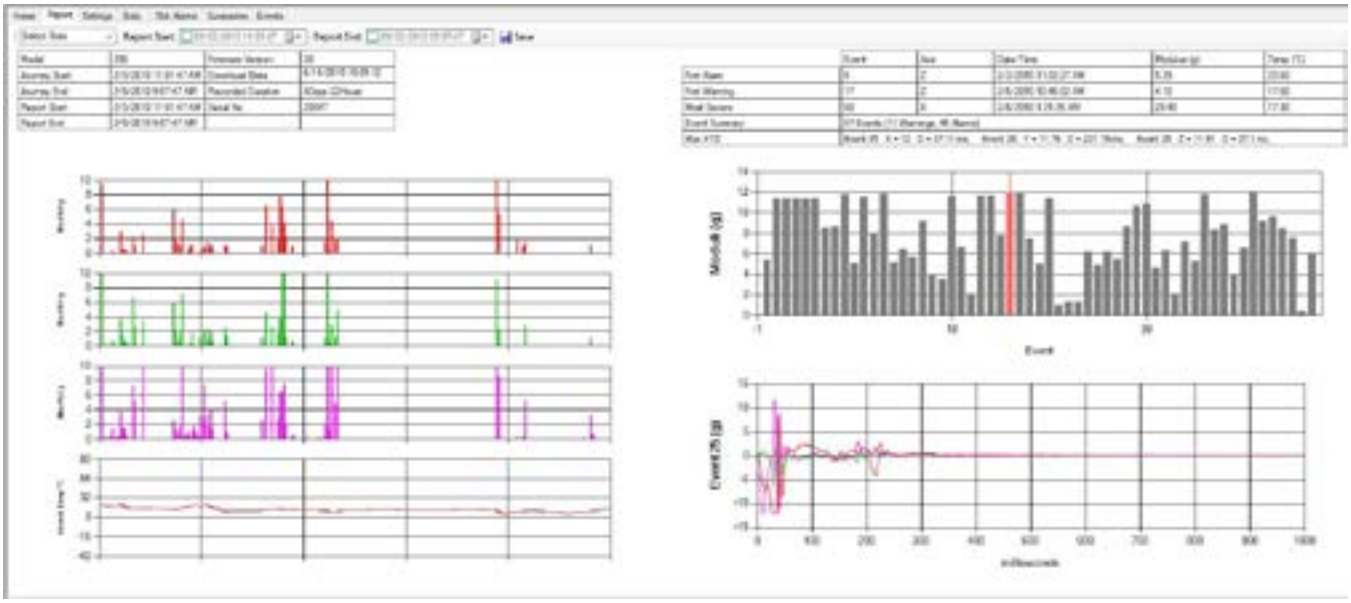


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Analyzing the ShockLog Data

Report

When a file is opened, the Report View is displayed. The report provides an overview of the entire file (journey / storage period experiment), providing information in both text and graphical formats.



The text data is broken down into two separate tables providing the following data:

Data File Summary

The file summary provides an overview of the ShockLog that was deployed for the journey and summary information regarding the actual journey.

Model:	298	Firmware Version:	30
Journey Start:	1/29/2010 5:05:40 PM	Download Date	6/11/2010 10:09:18 ...
Journey End:	1/31/2010 8:40:00 PM	Recorded Duration	2Days 3Hours
Report Start:	1/29/2010 5:05:40 PM	Serial No.	20047
Report End:	1/31/2010 8:40:00 PM		

Model: ShockLog model used for the data file 298 and 248 denote the latest ShockLog ranges, and RD298 & RD317 are the legacy products.

Journey Start: Date the unit started to record the data file.

Journey End: Date the unit stopped recording the data file.

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Report Start: Beginning date of the report. If the report has been adjusted to display only a section of the data file, this field provides the starting point. Data viewed on the Report page will begin with the Report Start Date.

Report End: Date the data on the report ends. If the report has been adjusted to display only a section of the data file, this field provides the end point. Data viewed on the Report page will end with the Report End Date.

Download Date: When the data file was extracted from the ShockLog unit.

Recorded Duration: Length of time the ShockLog recorder actually recorded data.

Serial No: Serial number of the ShockLog unit that recorded the data file.

Summary of Events

The summary of events provides details of the Events seen in the data file.

	Event	Axis	Date/Time	Modulus (g)	Temp (°C)
First Alarm	0	Y	1/29/2010 6:16:04 PM	4.54	19.50
First Warning	12	Z	1/30/2010 6:44:50 AM	3.06	16.60
Most Severe	39	X	1/30/2010 9:44:43 PM	16.94	11.70
Event Summary	54 Events (9 Warnings, 45 Alarms)				
Max XYZ	Event 37 X = 12.09 D = 49.12 ms; Event 39 Y = 12 D = 8.54 ms; Event 39 Z = 11.97 ...				

First Alarm: Provides details of the first alarm event that was recorded, it includes Event Number, Axis, Date/Time, Modulus (g) and Temperature at time of event.

First Warning: Provides details of the first warning event that was recorded. It includes Event Number, Axis, Date/Time, Modulus (g) and Temperature at time of event.

Note: First Warning is only applicable to the 298 and RD298 versions.

Most Severe: Provides details of the most severe event recorded. It includes Event Number, Axis, Date/ Time, Modulus (g) and Temperature at time of event.

Event Summary: Provides the quantity of events (Warnings and Alarms) which occurred

Max XYZ: Lists the event that had the maximum acceleration / duration for all three axes. Event number, Acceleration, Duration

Report Time Period Selector

There may be circumstances when showing the complete data file of a journey, test or storage period is not necessary. When a smaller section of time within the recorded data is of interest, the ShockLog software incorporates a “report time period selector” that allows users to define the time period of interest and hide the remaining of the data. As a safe guard to prevent abuse of this feature, the ShockLog software always displays the complete recorded period and the actual time period being displayed for the graphical data in the file. The report time period selector does not delete the full data set; it only allows the report to focus on the areas of interest. This information can be found in the trip summary section of the Report.

At the top right-hand corner of the File View window, just below the tabs, there are two drop down windows with dates. When opening a new file these will represent the start and end dates / time of any given file.



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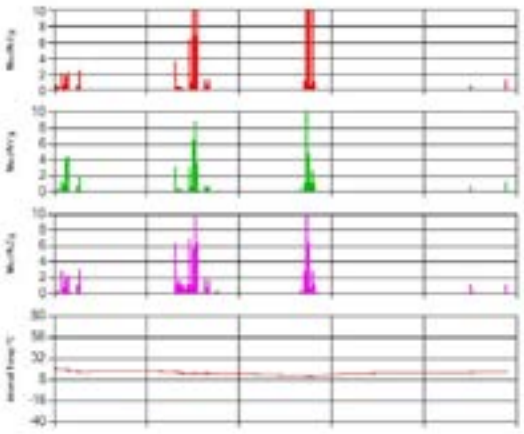
The start and finish date / time of the report displayed can be amended by either changing the date & time in a calendar drop down option or by using a slide bar, both of which are activated by checking the appropriate check box for either the report start or report end boxes.

With the calendar system, when a user clicks on the drop-down menu, a calendar for selecting the required start or end date will appear. Note: it is necessary to click on both the start and end check boxes and drop-down menus independently. The dates cannot both be changed through a single calendar screen.

From the drop-down screen, a user can select a new start date for the report. Once the date is selected, it is possible to amend the start time by typing over the time next to the selected date.

After making these amendments, the main report within the file viewer window changes to display only the information after the selected start date, ignoring all earlier information. However, the "Recorded Period" shown in the information box will not change.

To use the slide bar, place the cursor over the moving bar, press and hold the left mouse button and drag the bar to the approximate time desired. The main report will update automatically. The date and time being displayed will change in the window so the user is able to track the position in the report.

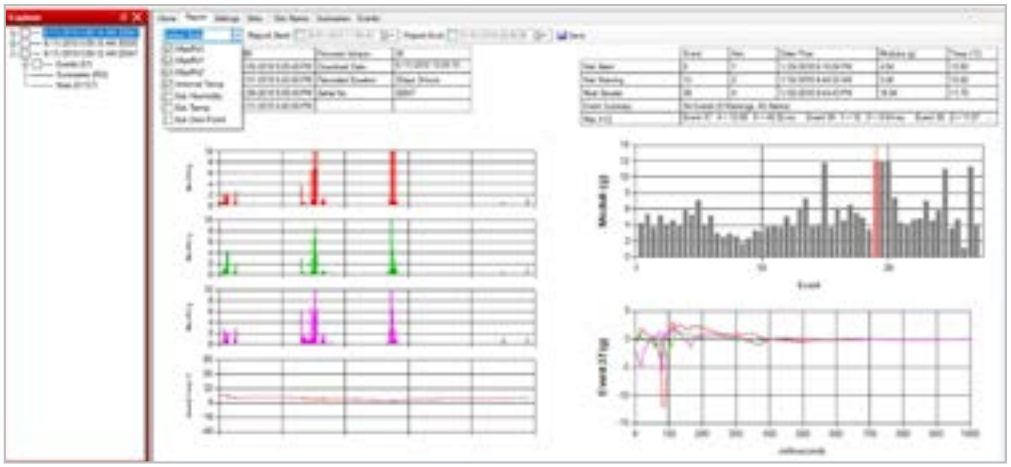


The same process is used to change the end dates of a report. This function makes it possible to create custom reports for different periods of the file.

Slot Graph

X, Y and Z axis impacts, as well as the internal temperature, are the default graphs that appear in the Report. Users can select different data channels as required. This process is described in the Creating a Setup File section.

When the desired channels have been selected, the report will automatically update and display the revised charts.



Click on the arrow to go back to the report.

The display can be changed as many times as desired and the various versions can be printed or the record.

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Event Data Graphs

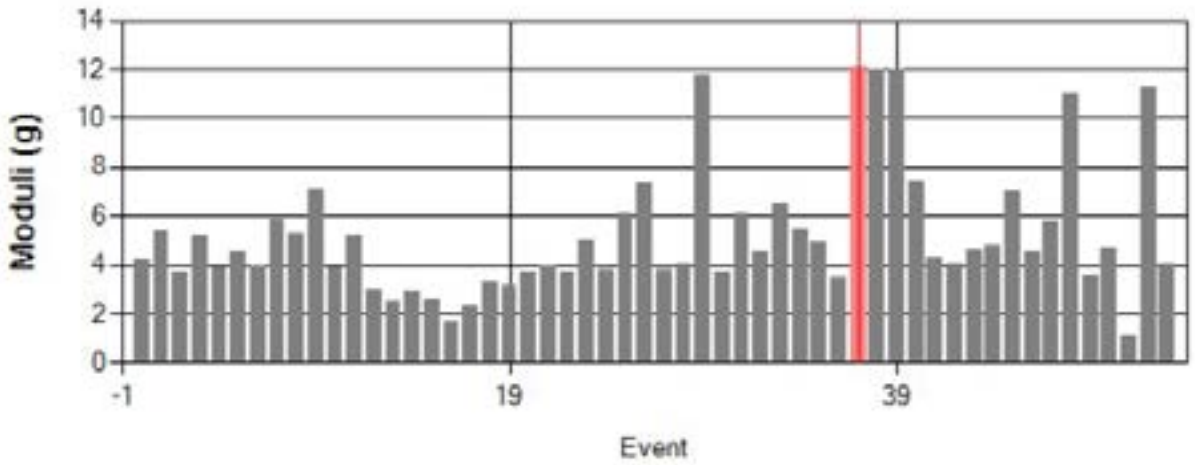
The right side of the Report Tab contains information about the event data recorded. This section will appear blank when viewing a file where no event has been recorded.

The data is split into two different graphs: Event Summary and Detailed Event Curve.

Event Summary Graph

This bar chart graph shows the modulus value of all events recorded within the data file and highlights the most severe event by displaying it in red.

When a data file is first opened, the most severe event is not only highlighted in red but also has a red cursor bar running through it. The cursor bar is used to show which event is being displayed in the detailed event curve below and can be moved by clicking on another event (bar).



It is possible to zoom in on smaller proportions of the summary chart and highlight the area of events that are of interest. The events are listed in the order they occurred. Events may be within minutes or days of each other.

To zoom in on an area, click and hold the left mouse key on the first event of interest and drag the mouse to the last event of interest. The events of interest will be the area of focus. Changing the date selection as described in the Report Time Period Selector section will have a similar effect on the summary chart.

After zooming in on an area, it is possible to move through the events by using the slide bar at the bottom of the chart.

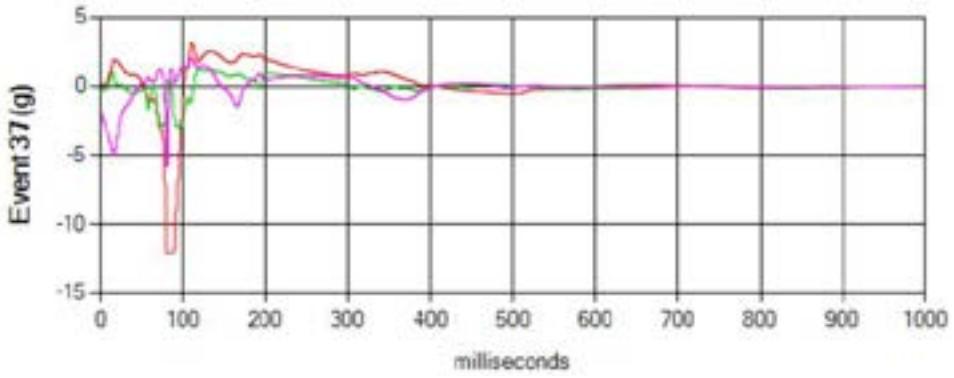
By clicking on any of the visible events, the detailed event curve below will change.

To return to the full screen, click the button at the left-hand end of the slide bar.

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Detailed Event Curve

The event curve displays the detailed data curve for a given event. It will display the most severe event when the report is first opened. Different events are displayed by clicking on them from the Event Summary Graph. The detailed event curve shows the magnitude and duration of the impact event, with the horizontal axis displaying the time in milliseconds and the vertical axis showing the force of the impact in g. All three axes will be displayed giving users a full understanding of the level of impact seen across all axes.



Drag 'n' Zoom

Like the summary event graph, it is possible to zoom in on the most relevant areas of a detailed event graph allowing users to see the area of most interest.

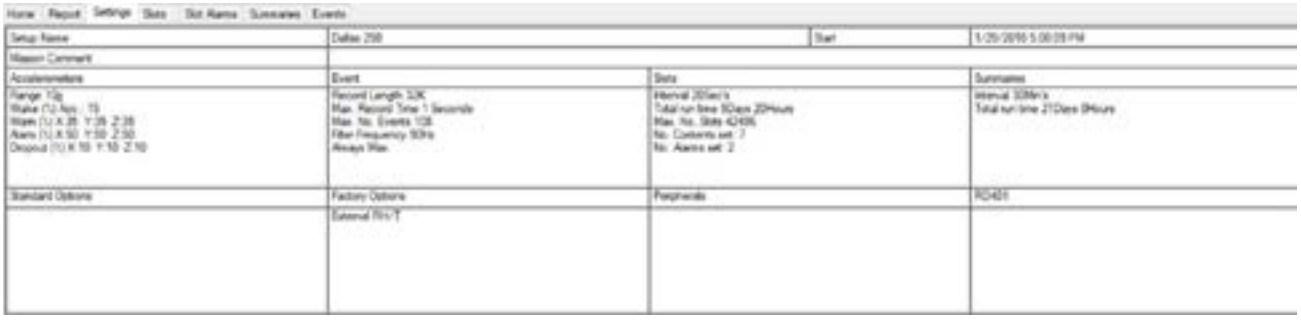
In order to zoom, place the cursor at the beginning of the area of interest, click and hold the left mouse button and drag it to the end of the relevant area.

In this example, the area between 0 and 100 milliseconds is of interest. By zooming in, the first 10% of the event can be displayed with more visual detail. This area is where most of the event activity occurred.

If desired, it is possible to zoom in further. The same method for zooming is used. It is possible to move backwards and forwards along the event time line utilizing the slide bar at the bottom of the chart. To return to the previous graph/ zoom, click on the button to the left of the slide bar.

Settings

The settings tab provides a summary of the ShockLog setup associated with the data file. Information regarding the accelerometer, event, slot and summary settings is detailed.



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Setup Name: The name of the setup used for the data file.

Mission Comment: Displays the mission comment if one was entered during the creation of the setup file.

Accelerometers: Displays the following information:

Range	Acceleration or velocity range selected (or factory set).
Wake (%)	Accelerometer wakeup level of the processor; set as a percentage of the range and is point at which the processor will wake up and start to record at full speed in preparation of an event.
Warn (%)	Applies only to the ShockLog 298 and RD298; shows the g value (X, Y, Z) at which events will be recorded as a warning. Each individual axis can be set to a different sensitivity based on the requirement of the product being monitored.
Alarm (%)	Shows the g value (X, Y, Z) at which events will be recorded as an alarm. Each individual axis can be set to a different sensitivity based on the requirement of the product being monitored.
Drop Out (%)	Applies only to the ShockLog 298 and RD298; shows the g value (X, Y, Z) at which events will stop recording once they have passed 1 second and are not set to "Always Max." Each individual axis can be set to a different sensitivity based on the requirement of the product being monitored.

Hardware Filter: Displays the hardware filter selected

Events: Displays the following information:

Record Length	Provides information about the amount of memory allocated to each event. For this case, 32K is the largest amount.
Max Record Time	Shows the maximum length of time an event is recorded. If the 'Always Max' is set to Yes, the max record time is the length of every event. If not set to Yes, max record time will record an event between 1 second and this maximum figure, depending upon when the drop out level is reached.
Max. No Events	Shows the maximum number of events that the ShockLog recorder is capable of recording with these settings.
Filter Frequency	Displays the selected hardware filter frequency
Always Max	If this is set, an event will always record for the maximum length set and drop out threshold is ignored.

Slots: Displays the following information:

Interval	The time slot interval setting, i.e. the length of time each time slot is measured.
Total Run Time	Shows the maximum length of time that the unit is able to record before the time slot memory is full.
Max No Slots	Shows the total number of time slot periods that are available for each channel of data.
No. Content Set	Shows the number of channels selected. Channels can include: Max X, Y & Z, Min X, Y & Z, grms X, Y & Z, Internal Temperature, External Temperature, Humidity, Pressure, Dew Point, Tilt & Roll and External Channels.
No. Alarms Set	Shows the number of Slot Alarms that have been set in relation to the channels of data being recorded. Slot alarms can include high/low temperature, humidity & pressure, angles of tilt or roll as well as impact alarms.

Summaries: Report will display the following information:

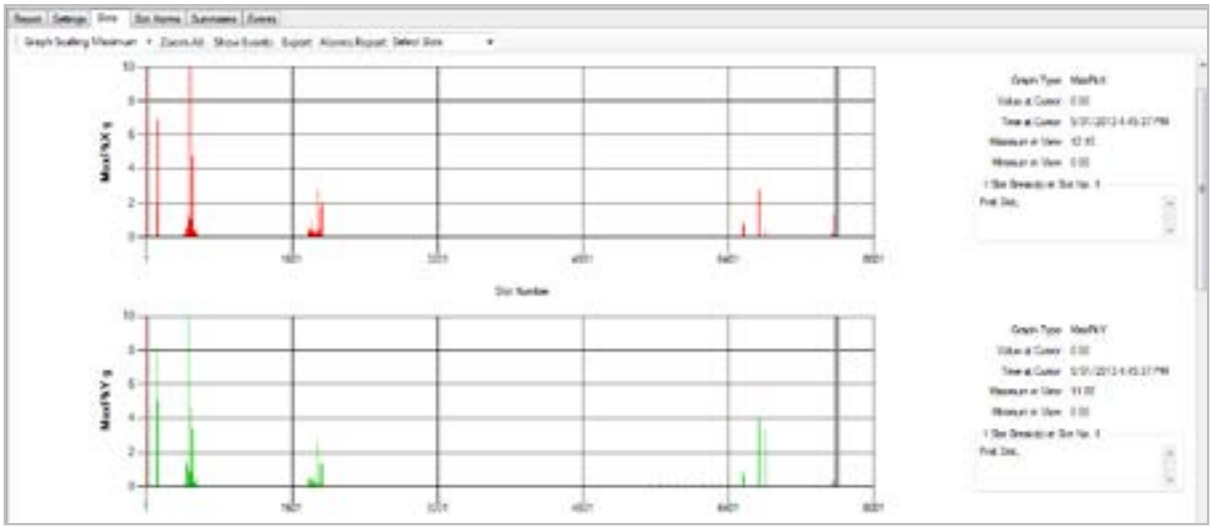
Interval	Shows the length of time between each summary record. For this example, the interval is every 30 minutes.
Total Run Time	The maximum length of time that the unit can record before the summary memory is full.

Standard Options, Factory Options, and *Peripherals* display the options selected in the setup.

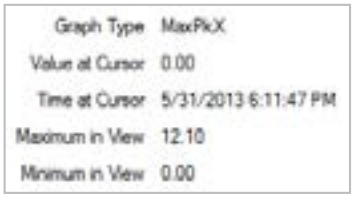
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Slots

In the File Viewer, selecting Slots tab will bring up a new screen displaying a number of time slot bar graphs in relation to the data file currently being viewed. This tab provides the user a more detailed view of all the available slot data. On the right side of the screen text data will be presented in relation to the graphs displayed. Just below the tabs, the options of Select Slots, Show Events and Export are available. This section will detail how these functions operate. With the graphs themselves, the Y axis will display the unit of measure for the given channel of data (i.e. g, temperature, etc.), and the X axis displays the slot number.



The text information on the right side of the screen provides additional information about the slot graph being viewed. More specifically, it provides information regarding the highlighted area or where the cursor is positioned. When the slot tab is first selected, the cursor will be at the far left zero position and is depicted by a red line.



The information is displayed in bar chart format and can include the following:

Acceleration (X, Y & Z): Peak acceleration max or min recorded in g or cm/s

Temperature: Peak value recorded in Celsius or Fahrenheit.

Humidity: Peak value recorded as a percentage.

Dew Point: Calculated based upon the temperature and humidity recorded.

Pressure: Peak value recorded in BAR.

Tilt & Roll: Maximum angle of movement, recorded as degrees of angle +/- 180 degrees.

g-RMS: Calculated RMS values based on the acceleration data captured within the time slots.

The information is displayed in bar chart format and can include the following:

Graph Type: Tells the user which channel of information is being displayed in the slot graph. In this example MaxPKX, the maximum peak values seen on the X axis is being displayed.

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Value at Cursor: Shows the channel value where the cursor has been positioned. In this example, it is at zero, because the cursor has not been moved from its original starting position. This feature can be used to highlight spikes/peaks in the data and quickly ascertain actual values at these points.

Time at Cursor: Allows the user to see the date and time at each slot point so that a peak value can quickly be associated to a place and potentially a responsible person or organization.

Maximum in View: Considers all the values for this channel currently visible on the graph and will tell the user the highest value seen. As the user zooms in on the data, this value potentially will change if the original peak in not in the zoomed area.

Minimum in View: Considers all the values for this channel currently visible on the graph and will tell the user the lowest value seen. Generally, this feature is more useful for the environmental parameters such as temperature and humidity where it will display the upper and lower limits for the displayed period. For the impact graphs this value will be displayed as zero.

Slot Breaks: Only appears when slot breaks are displayed at the same point as the cursor on the graph and are indicated by a grey vertical line. The values will correspond with the Slot Break table.

To get a quick snapshot of the values associated with a bar on any of the graphs, hold the mouse cursor over any of the individual bars and click the right mouse button. This action will display a small text box next to your cursor displaying the data value at that point, i.e. the peak acceleration value, as well as the date and time of the data point. The text box will appear for about 5 seconds before clearing.

Each parameter recorded requires a set amount of memory. Increasing the number of parameters recorded in the slots will decrease the available recording time. Users must balance the measurement parameter requirements and memory to ensure that appropriate data is captured for the entire recording period.

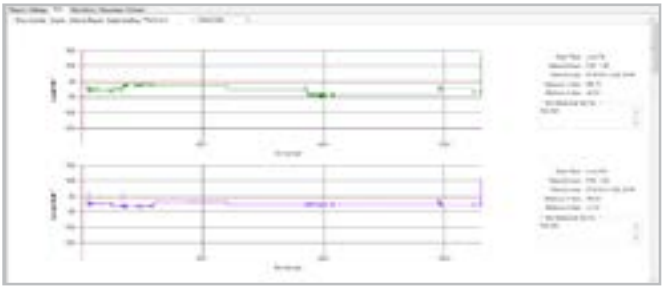
Select Slots

As a default, when viewing the slot graphs all recorded channels will be shown on the slot tab. By scrolling down with the slide bar or the center wheel of the mouse, it is possible to view the various graphs. In order to simplify the interpretation of the recorded data, it may not be appropriate to view all the available graphs. Using the Select Slots drop-down menu, it is possible to select and unselect channels of data as appropriate. It is not possible to change the order in which the graphs are displayed; the graphs can be viewed or not viewed in the given order.

When the appropriate graphs have been selected, click onto the graphs and the drop-down menu will clear. The graphs being displayed can be changed at any time.

Tilt & Roll

These two data points are separated into two graphs, named Roll Traces and Tilt Traces. Any breaks in the communication channel that can occur during the recording period are represented as a red cross on the respective graph.



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Drag 'n' Zoom

When viewing the slot graphs, the default will scale the graphs to fit the complete recording period on the screen. The system will compress the data and merge several time slots into each bar of the chart making it difficult to focus on specific time periods within the recorded data.

To assist in this area, the ShockLog software allows the user to zoom into specific areas of the graph and highlight the key, potentially damaging areas of information. The process of zooming in is very simple. Placing the mouse cursor at the beginning of the period of interest, click and hold the left mouse button, drag it to the end of the period of interest, and release.

The graph will zoom in to display the highlighted area as a full screen view. This zoom area will be reflected in all the graphs displayed. It is not possible to zoom in on only one of the graphs.

It is possible to continue zooming in until each individual time slot is displayed as a separate bar within the graph, making it easier to identify potential damage creating time slots. When positioning the cursor to create the text information, it is necessary to position the cursor to the left side of the bar chart, as this is the point recognized by the system for each time slot period.

Zoom All

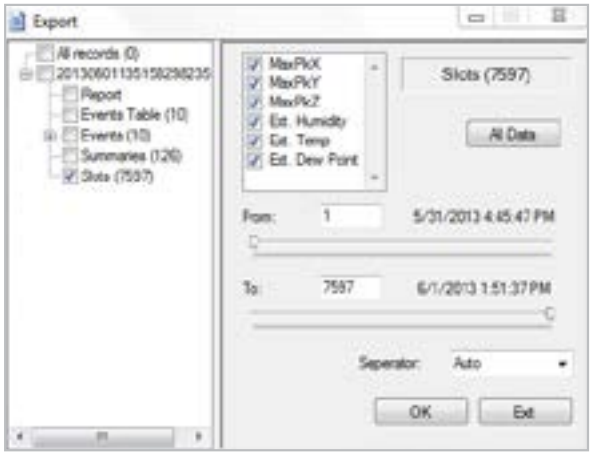
Pressing this button allows the user to return to the original view of the graph, canceling all zoomed-in areas.

Show Events

The ShockLog software has been written with several hyperlinks enabling the user to move between relevant sections of data. From the Slot graphs, it is possible to jump to the detailed event curves associated with the period of time being displayed by the slot graphs. When first entering the slot tab, the user is presented with all the events recorded in the data file as the whole time period will be in view. As the user zooms in, the number of events for the time period in view will reduce.

Export

From all the detailed graph tabs it is possible to export the raw data from the data files to allow manipulation of the data in alternative packages such as Excel and MATLAB.



To export the Slot data from the Slots tab, click the "Export" button and the user will be given the opportunity to choose a location for the saved file. After naming the file and selecting save, the export window will appear.

In the Export window, the slot data has been checked with the rest being left blank. In this example, the six channels of slot data will be exported.

All these parameters are adjustable. If the user does not wish to export an available channel of data, uncheck the appropriate box. Additionally, if only a proportion of the data file is of interest, the slide bars can be used to adjust the start and finish times of the data to be exported.

The Separator drop down menu allows the user to select the character used to separate fields in the export data.

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The auto option will use the separator commonly associated with the computer's language setting. For example, a comma is used in the USA or UK and a semicolon is used in France or Germany. Other languages will vary. Other options for a separator can be manually set via the drop-down menu as a comma, semicolon or space.

To add any of the event or summary information in addition to the slot data, simply check the appropriate boxes. Click the "Export" button, and when the system has finished, an export completed window will appear.

The exported data files are recorded in the Export directory under the ShockLog system. If the route to the directory is unknown, view the Data Path option under the tools menu, and the export folder can be found in the directory that holds the Data, Setup and XML files. The files can be imported into any appropriate software application as required.

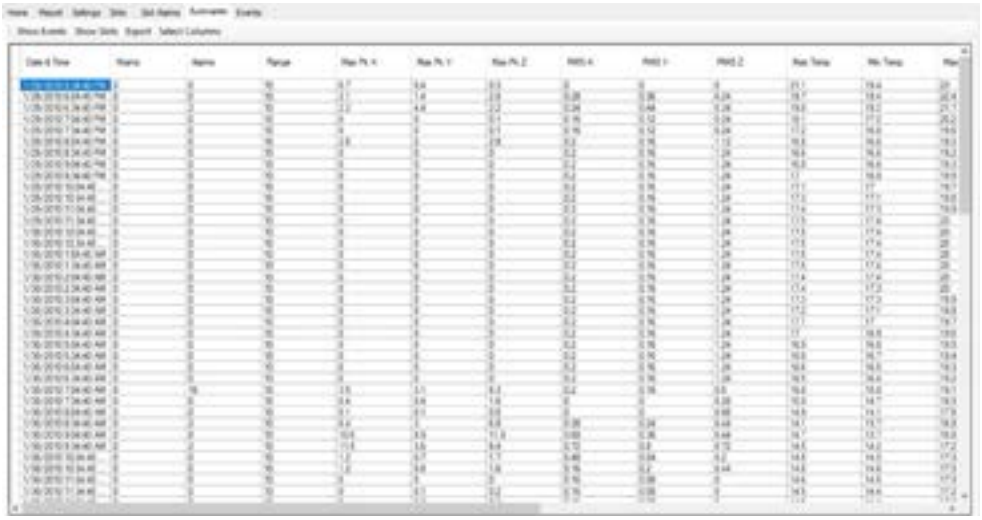
Slot Alarms

In the File Viewer screen, the slot alarms tab will bring up a table of slot alarm levels and indicate if they are in an alarm condition.



Summaries

In the File Viewer screen, the Summaries tab will bring up a table of data, summarizing what has happened in each of the summary periods including the number of events, peak acceleration and any environmental conditions recorded.



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Column Data

The information is presented as a grid with columns of data that relate to the data file being viewed. The potential columns of data include:

Date/Time: Specifies the date and time of the summary record.

Warns: Specifies the number of warning events recorded in summary period.

Alarms: Specifies the number of alarm events recorded in summary period.

Range: Denotes either the user selected range (298) or factory set range (248).

Max PK X, Y & Z: Records the maximum peak value recorded for each of the axes during the summary period.

RMS X, Y & Z: Records the RMS values recorded for each axis on the summary period

Max Temperature: Displays the maximum temperature recorded by the internal sensor during the summary period.

Min Temperature: Displays the minimum temperature recorded by the internal sensor during the summary period.

Max Ext. Temperature: Displays the maximum temperature recorded by the external sensor (if installed) during the summary period.

Min Ext. Temperature: Displays the minimum temperature recorded by the external sensor (if installed) during the summary period.

Max Ext. Dew Point: Displays the maximum dew point recorded by the external fitted sensor (if installed) during the summary period.

Min Ext. Dew Point: Displays the minimum dew point recorded by the external fitted sensor (if installed) during the summary period.

Max Ext. RH: Displays the maximum humidity recorded by the external fitted sensor (if installed) during the summary period.

Min Ext. RH: Displays the minimum humidity recorded by the external fitted sensor (if installed) during the summary period.

Ext. Temp Max RH: Displays the maximum temperature recorded by the external fitted sensor (if installed) during the summary period.

Ext. Temp Min RH: Displays the minimum temperature recorded by the external fitted sensor (if installed) during the summary period.

Max Pressure: Shows the maximum recorded pressure from an HPT sensor (if installed) during the summary period.

Min Pressure: Shows the minimum recorded pressure from an HPT sensor (if installed) during the summary period.

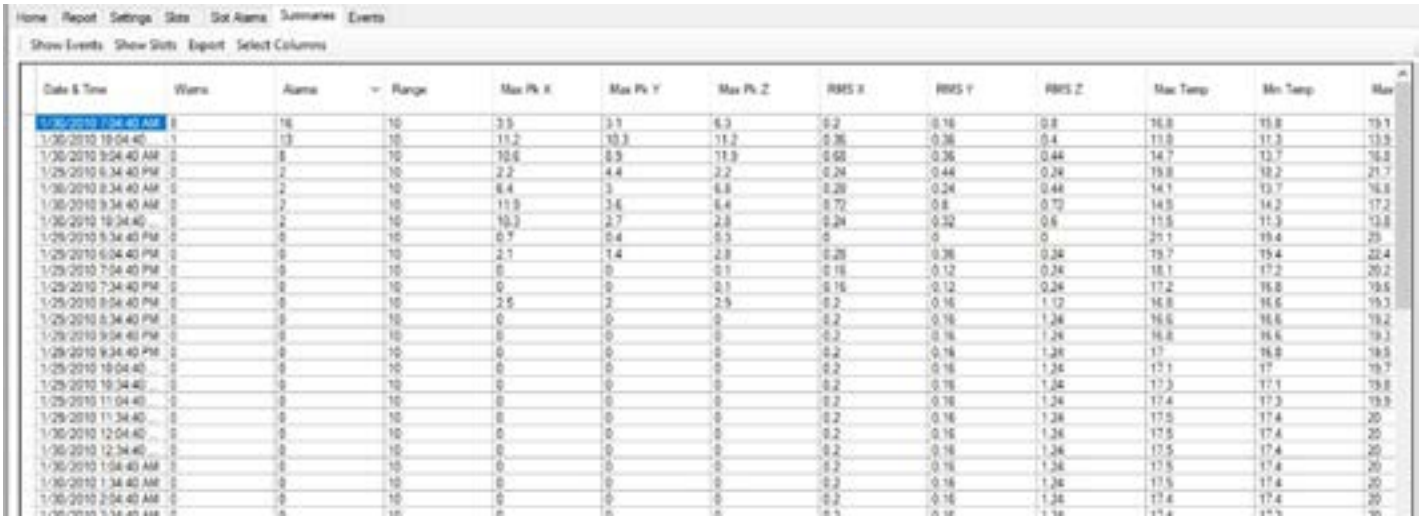
Ext Temp Max Dew Point: Shows the maximum calculated dew point from an HPT sensor (if installed) during the summary period.

Ext Temp Min Dew Point: Shows the minimum calculated dew point from an HPT sensor (if installed) during the summary period.

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Sorting Summary Data

Summary data is presented in a spreadsheet style grid and can be sorted via the column headings. An example is to view the data based on number of alarms. Click on the column header and the data will be sorted into ascending or descending order. Click again and the order will reverse. This principle applies to all the columns. For example, if interested in finding the summary periods with the greatest temperature, simply click on the column heading of “Max Ext Temp” and the whole grid will sort into the temperature order.



Click at the top of the date & time column, and the data will be sorted back into date/time order.

Show Events

From the Summary tab, it is possible to jump to the detailed event curves and slot graphs associated with the summary period currently highlighted. The summary table will display whether warnings or alarms have occurred in any given period, and where events have occurred. Click on the “Show Events” button, and the software will go to the first relevant event curve.

Upon clicking the Show Events button, a drop-down window showing how many events are associated with the visible slots will appear. Click OK and the software will go to the first of the associated events in the events tab.

To get back, click on the Summary tab.

Show Slots

In addition to the hyperlink to Events, the ShockLog software enables the user to link between summaries and relevant slot data.

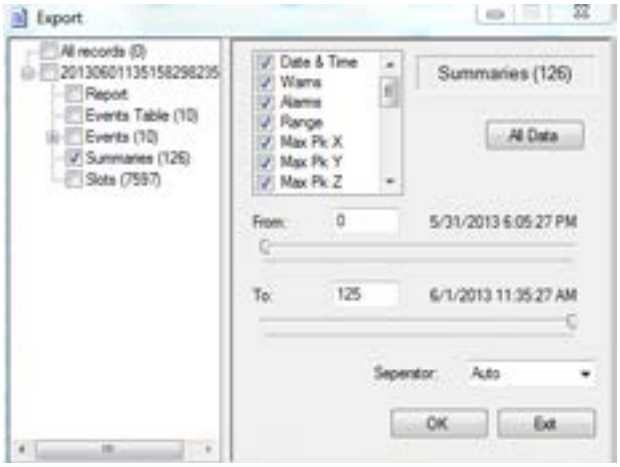
Each summary period has several time slot periods within it, and the slot graphs scales to show all the relevant slots for a given summary period.

To view the Slot graphs, it is necessary to click “Show Slots” in the top left menu of the Summary tab. The software will move to the Slots tab with the slot graphs zoomed into the summary period time frame. From here all the normal functionality within the Slots tab can be accessed. To get back, click on the Summary tab.

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Export

As well as being able to Export from the detailed graph tabs, it is possible to export the raw data from the summary tab allowing manipulation of the data in alternative packages such as Excel and MATLAB.



To export the summary data from the Summary tab, click the "Export" button and the user will be given the opportunity to choose a location for the saved file. After naming the file and selecting save, the export window will appear.

In the Export window, the summary data is checked with the rest of the fields being unchecked.

All these parameters are adjustable. For example, if there are channels of data that are not of interest simply uncheck the appropriate box. It is possible to use the slide bars to adjust the start and finish times of the data to be exported.

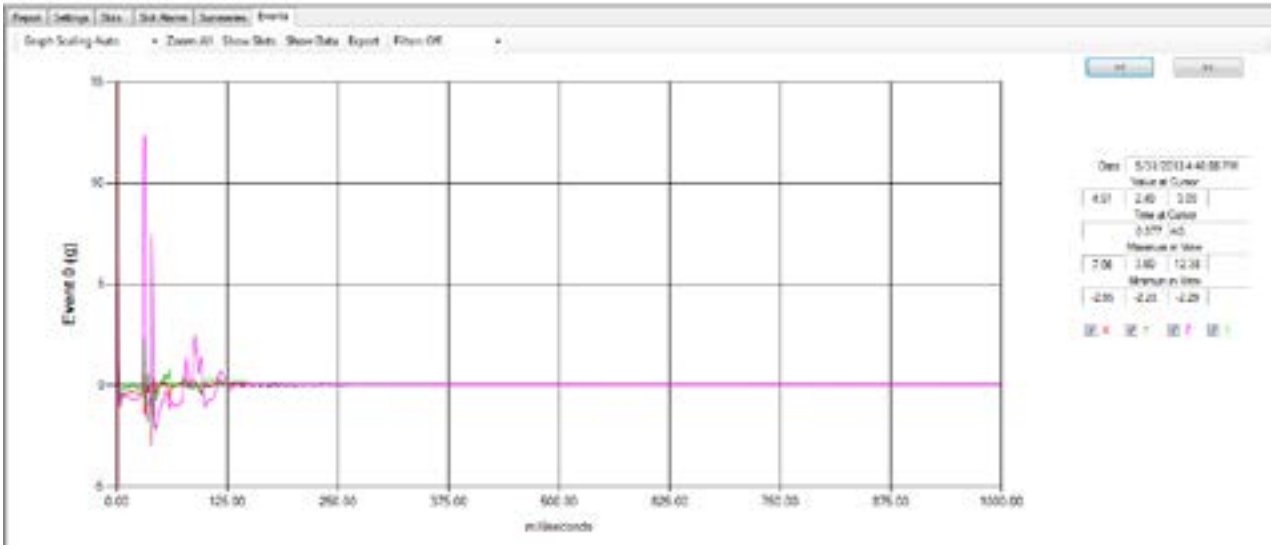
If any of the event or slot information is of interest, simply check the appropriate boxes of interest and click the "Export" button. When the system has finished, an export completed window will appear.

The user can select the required folder to save the exported data files in via the Browse for Folder dialog. Click OK to save the exported data.

For more detail on exporting data, please refer to the specific section later in this manual under Menu Options.

Events

The final tab in the file viewer is the "Events Tab". This tab displays the detailed event curves for alarm and warning events. Text data related to a graph is displayed. Above the text there are two arrow buttons that allow the user to scroll through the events. The event under examination is labeled on the left side of the event. This section details the different methods of interrogating the Event data to better understand the recorded data.



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Text Data

The text information on the right side of the screen is intended to provide additional information about the event graph being viewed and more specifically the area highlighted or where the cursor is positioned. When first entering the slot tab, the cursor is at the far-left position of zero and the cursor text information is blank. By clicking on a different area of the curve, the cursor bar will move, and the text field will be completed with the localized information. The cursor bar is depicted by a red, vertical line.

The data is split into the different axes, X, Y & Z with an E for any potential external accelerometers that may be installed. The information is as follows:

Date: Tells the user the date and time that the current event was recorded. The date and time are in relation to the ShockLog clock and won't necessarily match that of the computer.

Value at Cursor: Shows the value in relation to the event being viewed, the individual axis and where the cursor has been positioned. In this display, there are four individual boxes, which represent X, Y, Z and E (E=external) and these individual fields will display the value seen at this point of the event.

Time at Cursor: Displays the number of milliseconds from the start of the event to the cursor location.

Maximum in View: Considers the values for the event currently visible on the graph and tells the user the highest value seen. If the user zooms in on the data, this action will potentially change if the original peak is not within the zoomed area.

Minimum in View: Considers the values for the event currently visible on the graph and tells the user the lowest value seen. If the user zooms in on the data, this action will potentially change if the original peak is not within the zoomed area.

X, Y, Z, E: Determines what data will be represented on the graph. Four squares with ticks inside and a colored letter, X, Y, Z or E next to them represent the different axis of accelerometers represented by the colored curves on the graph. By clicking inside any of the boxes different axis or environmental data can be added or removed from the graph. If a specific axis of data is of interest, it is possible to remove all the others and focus on a single axis.

Drag 'n' Zoom

When viewing the event graphs, the default always scales the graphs to fit the complete event on the graph, therefore making it difficult to focus on specific time periods within the event data. In many events the actual period of activity of interest can be less than 200 mS. As a result, most of the graph displays as a straight line.

To assist in this area the ShockLog software allows the user to zoom into specific areas of the graph and highlight the key areas of information.

The process of zooming in is very simple. Place the cursor at the beginning of the period of interest, click and hold the left mouse button, drag the cursor to the end of the period of interest and release. The graph will zoom in to display the highlighted area as a full screen view. This zoom area will be reflected in all the graphs if you try to scroll through to other events. Once zoomed in only this range will be seen.

It is possible to continue zooming in until each individual millisecond is displayed as a separate point on the graph. This action would provide a very detailed analysis of the main activity within the event.

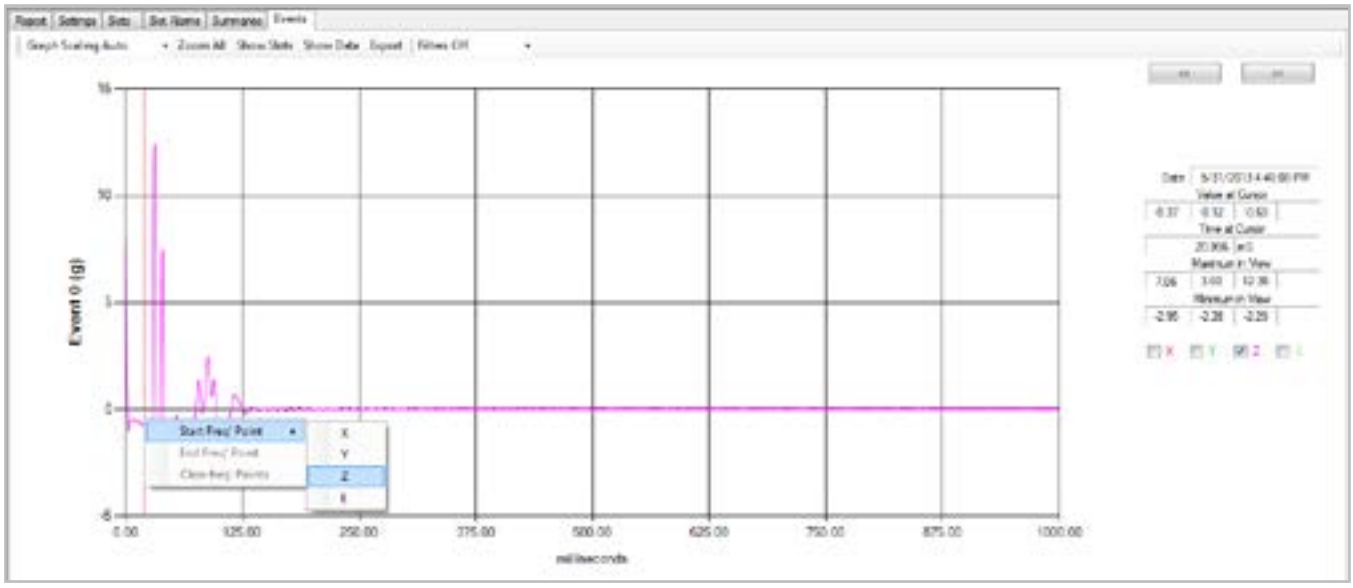
While in a zoomed in view, it is possible to scroll along the event curve using the scroll bar at the bottom of the graph. Click and hold on the main bar, then drag the bar left or right or click the arrows or the light grey area on either side of the slide bar.

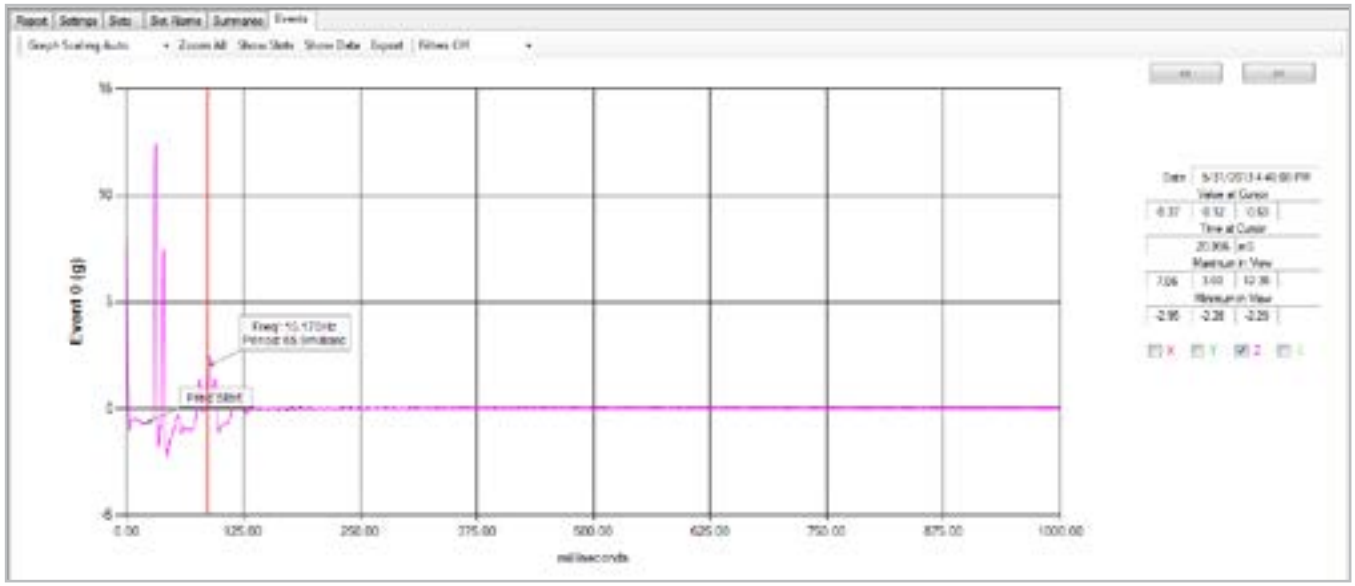
To return the graph to its original position, click on the small button to the left of the scroll bar. Clicking this button will step the user back one zoom level. If the graph has been zoomed in on several times, it will be necessary to press the button as many times to return to the original graph setting.

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Frequency Calculations

The ShockLog can calculate frequency and period (duration) of an event on a per axis basis. In the example below, the axis of interest is the Z axis. The X and Y axes have been deselected on the right side of the screen. To calculate the frequency between two points, right click on the first point and select the starting point per axis and then move the cursor to the ending point of interest and right click on the point. The ShockLog software will display the frequency and period between the two points. This feature can be used in when the data has been zoomed. To clear the calculations, right click and select ”Clear Freq’ Points.”





Zoom All

Pressing this button allows the user to return to the original view of the graph, canceling all zoomed-in areas.

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Show Slots

Like the Slot and Summary tabs, the Events tab contains hyperlinks that allow the user to move between relevant sources of data. The ShockLog software enables the user to move between Event and relevant Slot data.

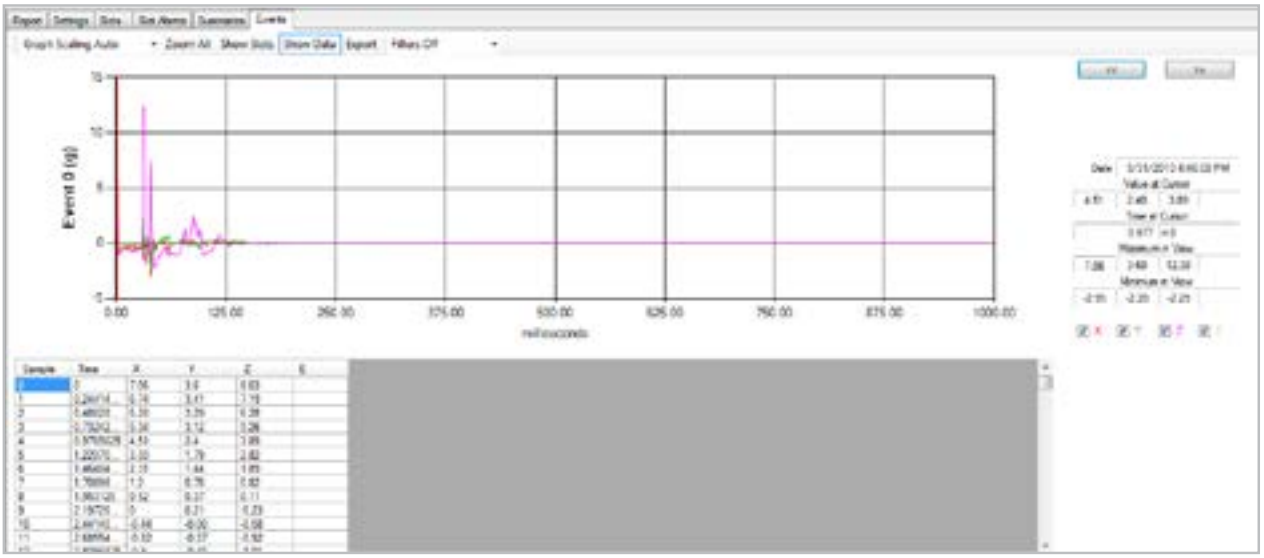
When moving back to the event graph, the time slot period that the event belongs to is being displayed.

To view the Slot graphs, it is necessary to click on the button “Show Slots” in the top left corner of the Events tab.

After clicking this button, the Slots tab with the slot graphs zoomed into the appropriate time frame that the event relates will appear. From here all of the normal functionality within the Slots tab can be accessed. To return, click on the Summary tab.

Show Data

While viewing the detailed event curves, the ShockLog software provides an option for users to view the underlying data behind each curve as it is being viewed. The data table is displayed in an Excel style spreadsheet showing the g values at every sample point throughout and event period.



The columns of data include:

Sample: A straight count from zero to the maximum number of samples, with 4096 being the highest possible, for a given event.

Time: The number of milliseconds from the start of the event that the sample relates to.

X, Y, Z: The g value seen by each of the axes at the given sample point.

E: The value seen by the external sensor if installed.

To move up and down the list of data, use the scroll bar on the right-hand side of the screen. The data table works like a database and can be sorted in order to find the specific information of interest. For example, if the highest g value seen on the Z axis is of interest, click in the Z column header, and the data table will sort into g value order with the most significant at the top. If the user then wanted to know the lowest impact value, clicking the header again will reverse the order into the least significant g value.

This data sorting process works on all column headings. The graph will not change its view with any of the sorting; it will remain as the original event. To return to the original order and structure, just click on the Sample header and the data will sort into sample order.

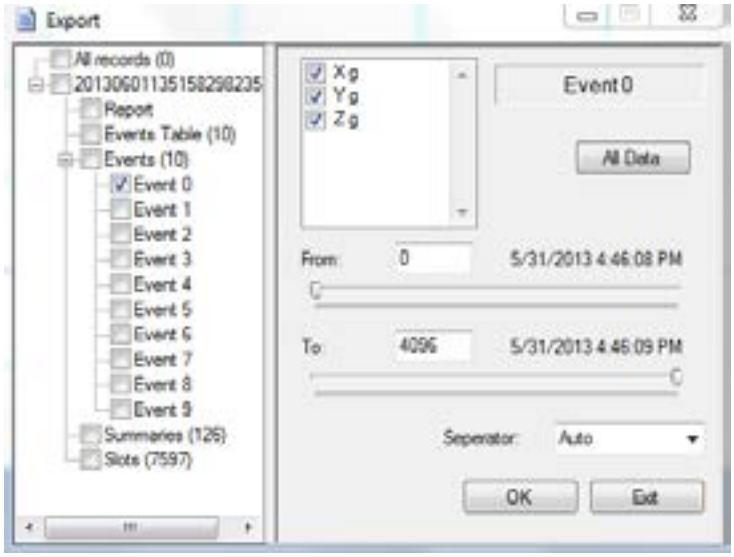
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Export

As with the other tab screens, it is possible to Export the raw data from the Events tab allowing manipulation of the data in alternative packages such as Excel and MATLAB.

To export the event data from the Event tab, click the "Export" button and the user will be given the opportunity to choose a location for the saved file. After naming the file and selecting save, the export window will appear.

In the Export window, notice that the Event data is checked for the specific event being viewed and the rest are unchecked.



All of these parameters are adjustable. If other events or the slot data on any of the available channels of data is to be downloaded, check the appropriate box. If the entire data file is not of interest but only a proportion is, use the slide bars to adjust the start and finish times of the data to be exported.

Tip: It is not advisable to scroll through the events when the Events data table is open as it will dramatically reduce the speed at which the software is able to load the next event.

To add any of the summary or slot information in addition to the event data, check the appropriate boxes to be exported. Click on the "Export" button, and when the system has finished an export completed window will appear.

The exported data files are recorded in the Export directory under the ShockLog system. If unsure of the route to this directory, view the "Data path" option under the tools menu, and the export folder can be found in the directory that holders the Data, Setup and XML files. The files can then be imported into any appropriate software application as required.

Graph Scaling

With the ShockLog software users have the option to choose how graph scaling is presented. The system default is to present the graphs on an "Auto" scaling setting that will maximize the scale to fit the page display. However, this can prove to be a little confusing if the user is trying to scroll through a number of events to identify the more significant ones as the scale will continuously changes when scrolling between the various events. It is possible to set the system into a "Maximum" setting that will retain the axis at the g range set for the recorded data.

To change the settings, click on the arrow next to "Graph Scaling" and select either the "Auto" or "Maximum" from the drop-down menu. Once changed, this setting will be applied to all future data files viewed until changed again.

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Filters

It is possible to post-filter collected data with the filters tool. This tool allows the user to apply a lower frequency filter to the measured data. The user can determine if impacts were the result of high frequency ringing versus longer duration impacts which can be more damaging. It is only possible to apply a lower frequency filter not a higher frequency filter.

To illustrate the effect that such filtering can have, the exact same data file presented is shown below with two different filters: 250Hz filter in Figure A and 10Hz filter in Figure B. The peak of the Z-axis is reduced from over 10G in Figure A to below 0.2G in Figure B.

If you are unsure whether it is advisable to post-filter your data, please contact SpotSee Technical Support to discuss your application.

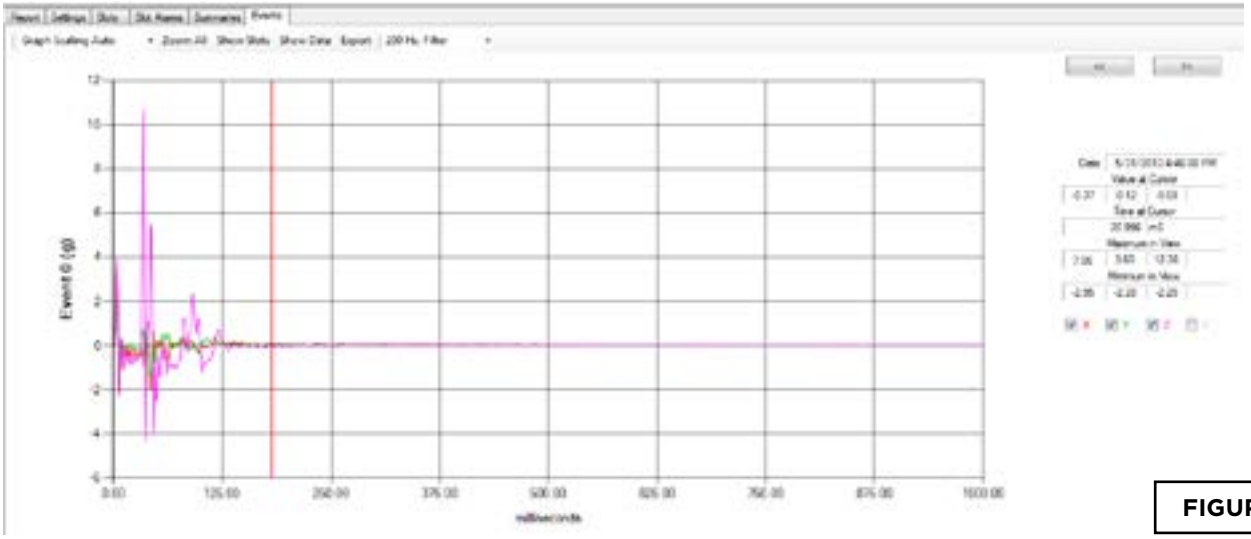


FIGURE A

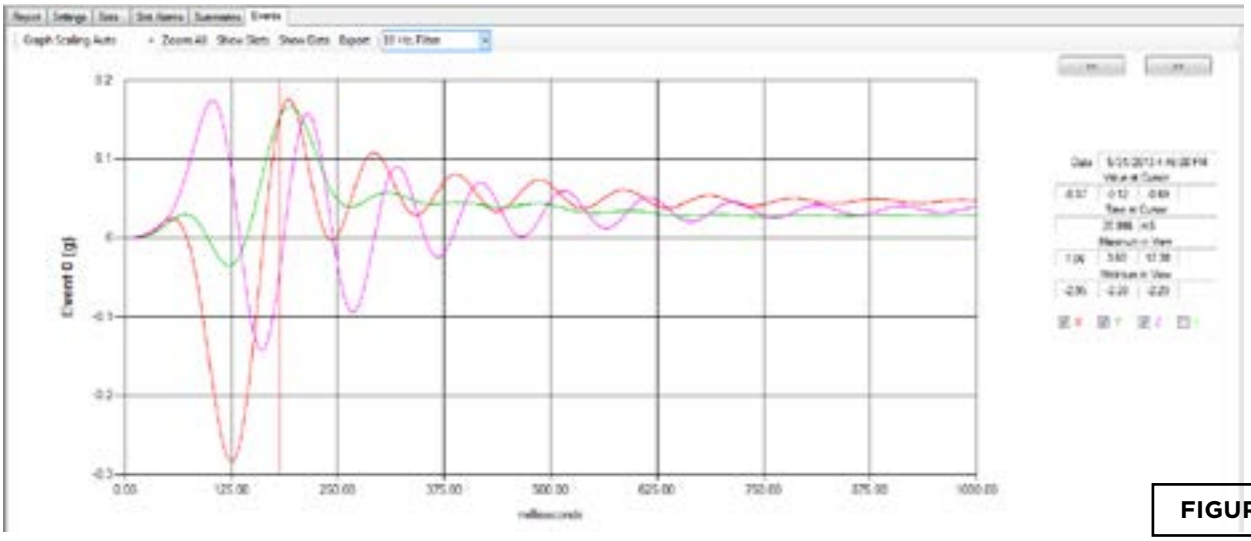
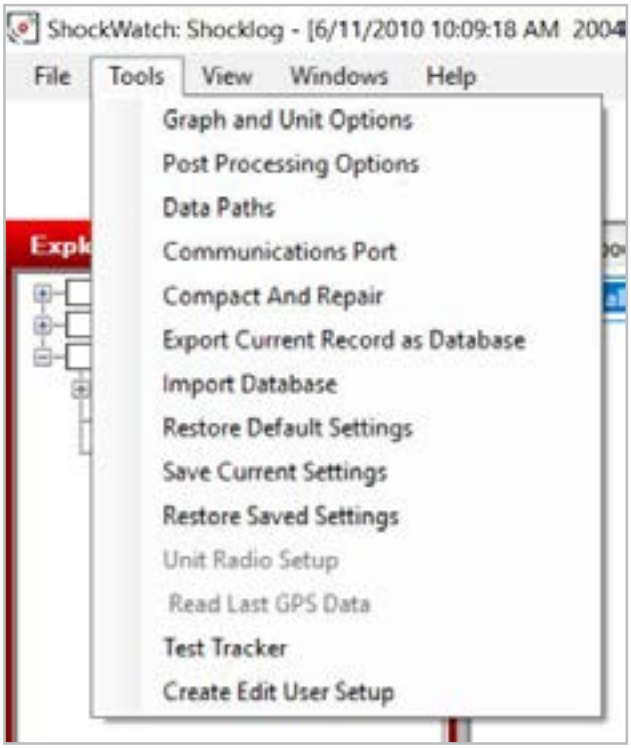


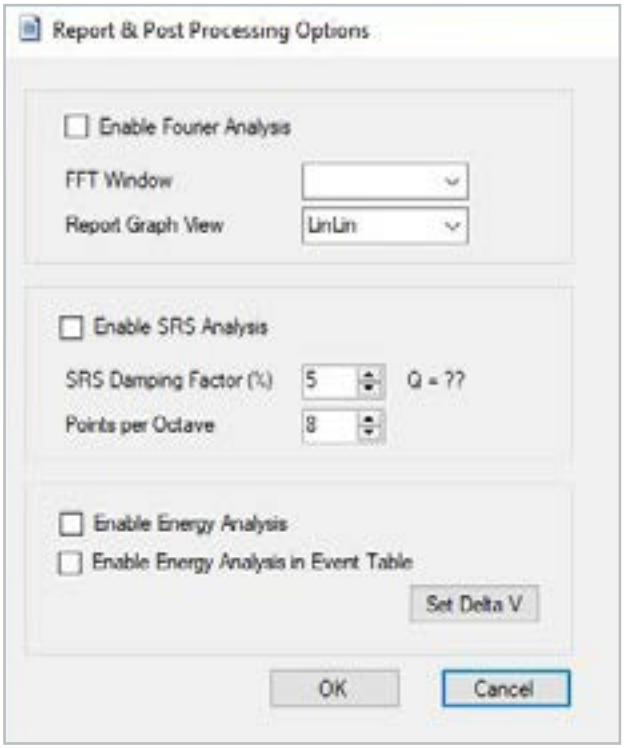
FIGURE B

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Report and Post Processing Options

The ShockLog software allows users to perform several post processing functions that enable additional analysis of impact event waveforms. To enable these functions, select Tools>Post Processing Options. The Report & Post Processing Options screen will open.





FFT/PSD

FFT tools transforms time-based data into the frequency domain. It is a mathematical method for decomposing a signal into its constituent frequencies.

A signal's spectrum is the statistical average of a certain signal as analyzed in terms of its frequency content. PSD refers to the spectral energy distribution found per unit time. PSD analysis is suitable for transient events whose energy is concentrated around one time window.

These two tools allow a user to transform an event in time to the frequency domain for additional analysis

Enable FFT/PSD by clicking the check box.

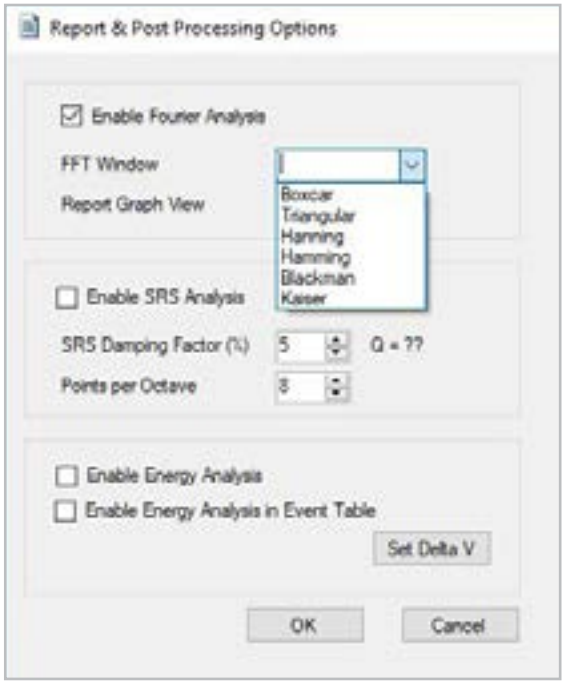
Select the FFT window for the analysis.

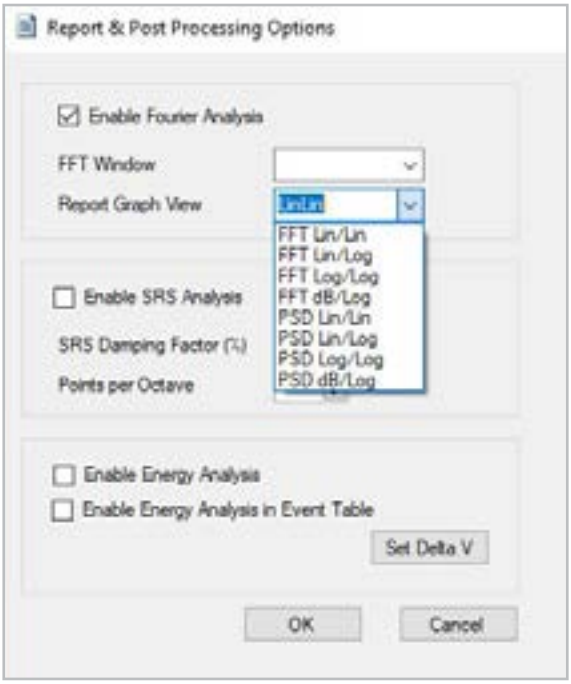
Note: Windowing functions are used to smooth the effects of artificially fast transitions.

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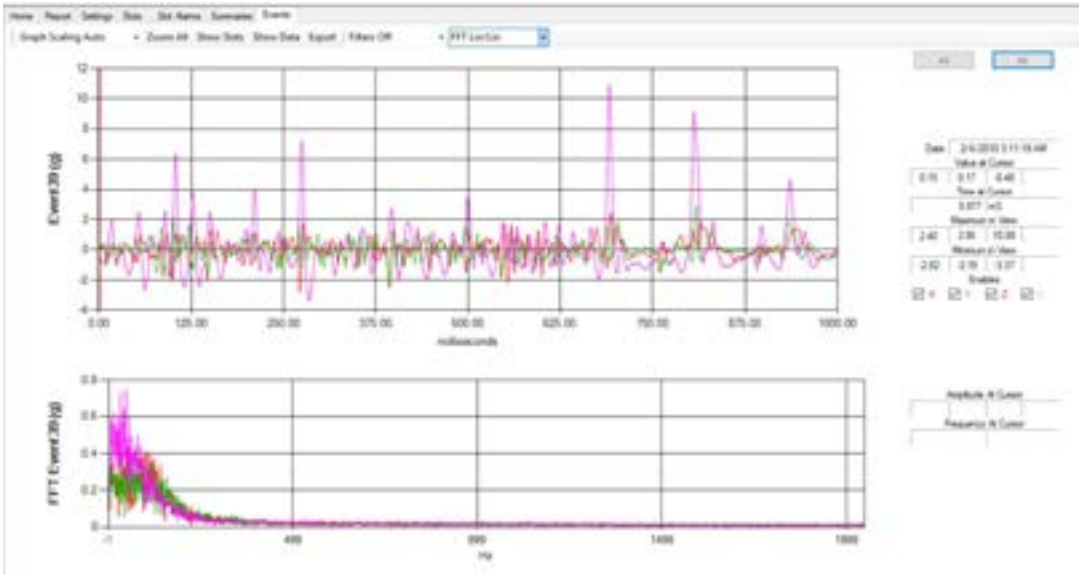
The Rectangular (Boxcar) is the equivalent of having no windowing. The Hanning window is a common windowing tool. The various window tools allow the user to address the beginning and ending of an impact event which by its nature is not a continuous signal.

The Report Graph View sets the scales (linear or logarithmic) of the FFT graph.





Scroll through the events until the event of interest is displayed. Turn the FFT or PSD analysis on by clicking FFT/PST Off and selecting the desired graph view. FFT Lin/Lin was selected for the image below:



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SRS Analysis

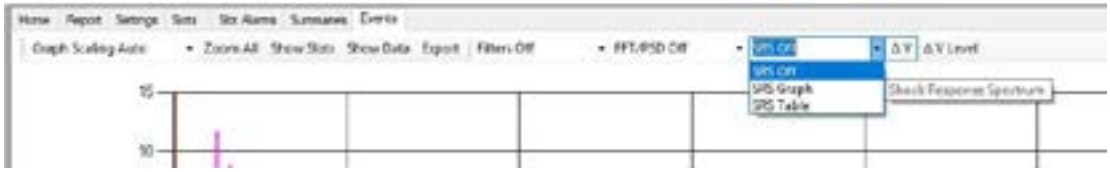


Shock response spectrum (SRS) is a means to graphically represent an impact event in terms of how a single degree of freedom system would respond to that event. The horizontal axis shows the natural frequency of the system and the vertical axis shows the peak acceleration the system would undergo as a result of the impact event.

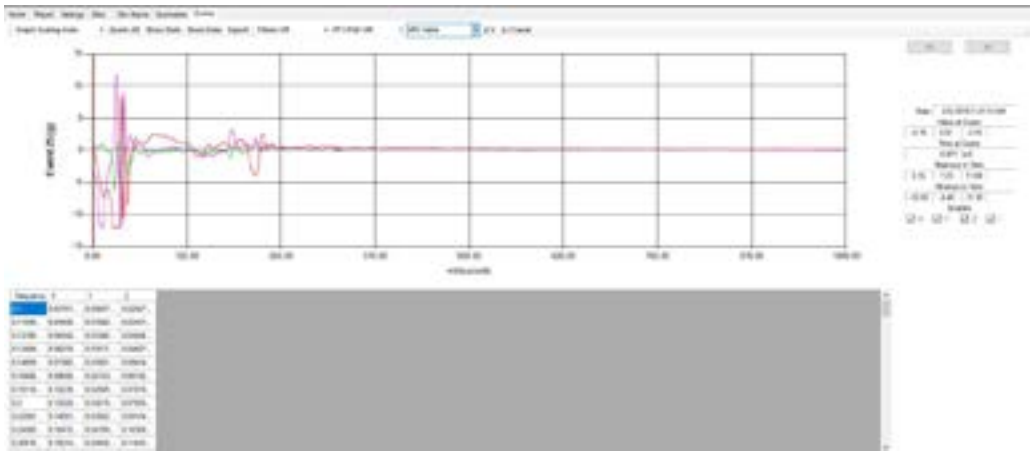
To enable this function, select Tools>Post Processing Options. The Report & Post Processing Options screen will open.

Click Enable SRS Analysis to enable the tool. The user may vary the SRS Damping Factor (%) and the Point per Octave.

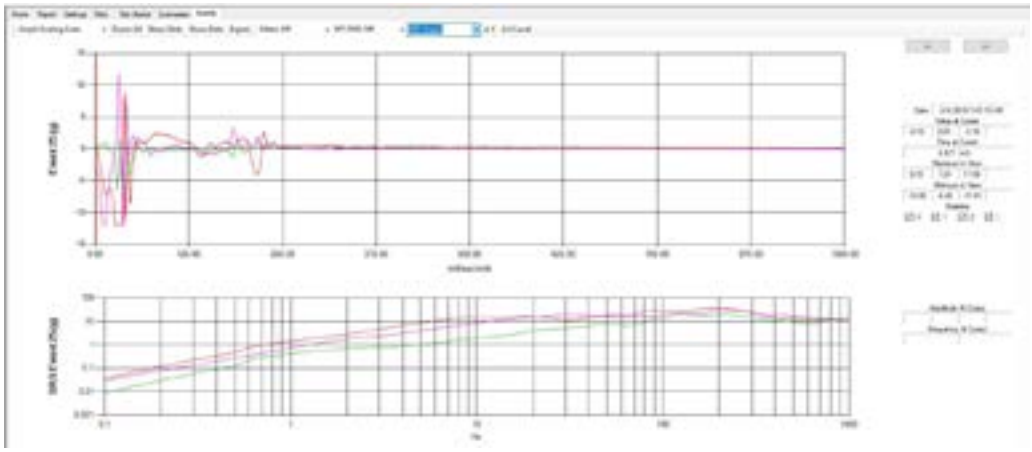
In the Events screen, the SRS analysis can be displayed as a table or as a graph. Select the preferred view and the analysis will appear on screen.



SRS Table



SRS Graph



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DELTA V ANALYSIS (Δ V)

To enable this function, select Tools>Post Processing Options. The Report & Post Processing Options screen will open.

Click Enable Energy Analysis and/or Enable Energy Analysis in Event Table to enable the tool.

Enable Energy Analysis displays the Δ V analysis for each event separately (Figure C).

Enable Energy Analysis in Event Table displays the Δ V analysis for all events in the journey record (Figure D).

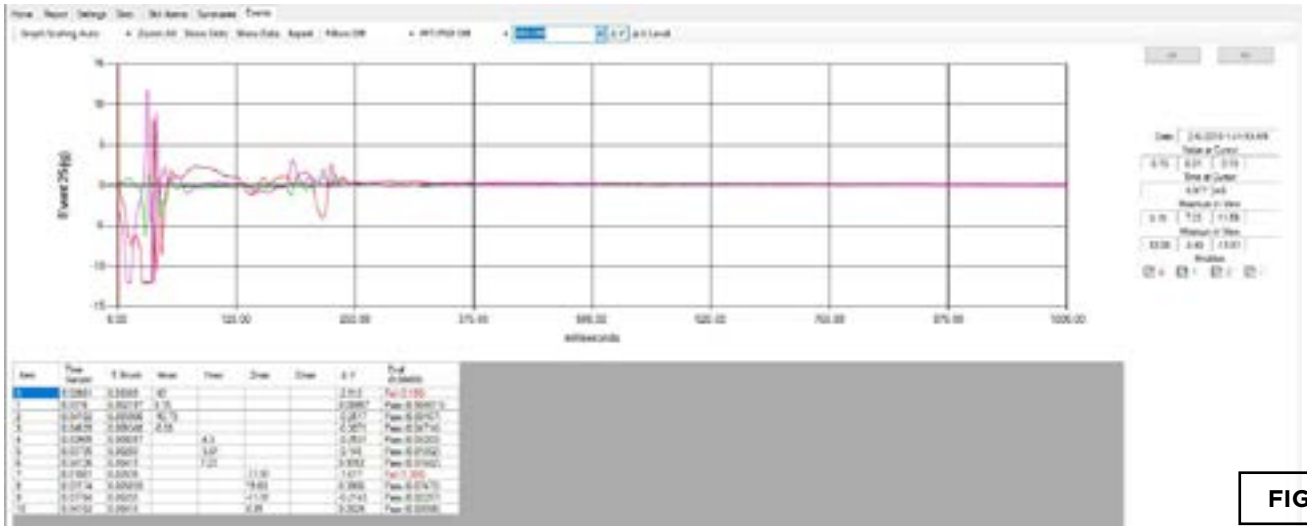


FIGURE C



FIGURE D

Click Δ V Level to enter the Pulse Width (seconds) and Pulse Amplitude (g) to be used for the analysis. These values are used to calculate the velocity threshold used in the Δ V analysis.



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The table created for each event, is illustrated below:

Time Sample (sec)– time at which the max peak of the individual event occurred

T Shock (sec)– duration of the individual pulse

Xmax, Ymax, Zmax (g) - maximum amplitude of the event

Emax (g) – maximum amplitude of a measurement made with an external accelerometer (legacy product)

Δ V – change in velocity; measured / calculated by the ShockLog.

Eval – compares each pulse to the threshold derived when setting the Δ V levels and determines if the threshold was exceeded.

*Note: Amplitude (g) is measured by the ShockLog; Δ t is based on the sample rate set by the user when the ShockLog was programmed. Δ V = 9.8g * Δ t.*

Item	Time Sample	T Shock	Xmax	Ymax	Zmax	Emax	Δ V	Eval (8.001)
0	0.02661	0.00369	-12				-2.512	Pass (3.156)
1	0.0376	0.002197	8.15				0.08957	Pass (0.004011)
2	0.04102	0.003906	-10.73				-0.2517	Pass (0.03167)
3	0.04639	0.006348	-8.59				-0.3071	Pass (0.04714)
4	0.02905	0.008057		-6.3			-0.2531	Pass (0.03203)
5	0.03735	0.00293		-5.61			-0.145	Pass (0.01052)
6	0.04126	0.00415		7.23			0.1812	Pass (0.01642)
7	0.01001	0.02539			-11.91		-1.617	Pass (1.308)
8	0.03174	0.005859			11.69		0.3866	Pass (0.07473)
9	0.03784	0.00293			-11.91		-0.2143	Pass (0.02297)
10	0.04102	0.00415			8.89		0.2029	Pass (0.02058)

When examining the data in the Event Table, the same information is available. However, the Δ V calculation is done using the modulus value of an impact.

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Exercise: Desk Top Test

The following exercise will allow the user to practice the fundamental skills necessary to enter a basic setup, create a few impact events and view the downloaded data.

Connecting the ShockLog to a PC

The USB communication port is located on the right side of the ShockLog opposite the connector with the black cover. It is secured behind a threaded, protective cap that serves as the IP67 seal for the USB port. To access the USB port, carefully unscrew the protective cap and expose the USB connector.

Connect the USB cable to the ShockLog and then connect the other end to the PC USB port.

Communications Window

Upon plugging in the ShockLog, you will notice that the Communications window will appear in front of the other windows. From this window you can communicate with the ShockLog unit and to monitor the current status.

If the Communications window is not already in the screen, from the “View” menu at the top of the screen, select “Communications.” A new “Communications” window will appear at the top of the screen. Position this dockable window as previously described. It is now possible to view the current status of the ShockLog in the various fields of the communication window.



Send Default Setup

A default setup has been installed with the ShockLog software. This setup will be used for the purposes of this exercise. From the Communications window click “Send Setup” and a file selection window will appear. The system will automatically go to the appropriate directory, and the file default.setup413 will be listed.

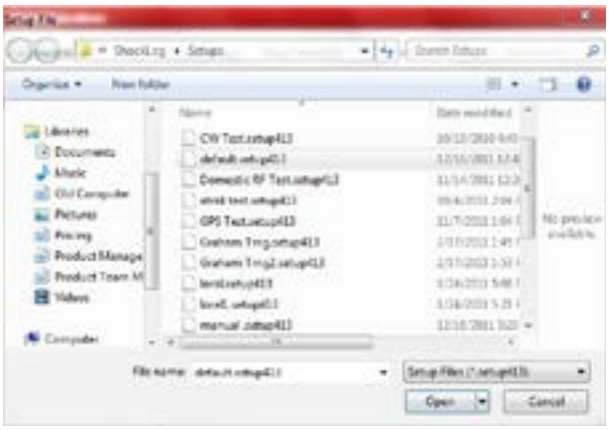
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Select the default.setup413 file and click “Open.”

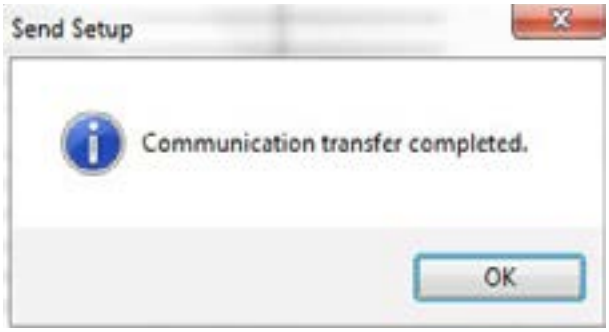
Select “Yes” when prompted with the question “Set the ShockLog unit’s clock to the current PC date and time?”

The information bar at the bottom of the screen will show a connecting status and change to “OK.” A confirmation window will appear after the setup has been successfully sent to the ShockLog unit.

After selecting “OK,” the Communications window will gray out for a few seconds and then will come back with several of the boxes completed. At this point, the ShockLog memory is being cleared and the unit is being reset for a new recording period. This process may take several minutes depending on the amount of data being cleared. Once completed, the status field will display “Running,” and the ShockLog can be disconnected from the PC.







Drop Test

The ShockLog is now recording. The green Slot Alarm LED will flash every 5 seconds indicating that the ShockLog is recording.

Create a few events by dropping the unit on a desk. Ideally, drop the ShockLog onto a mouse pad or notepad. It should only be necessary to drop the ShockLog from approximately 25mm (1” inch) to create an 8 to 10 g impact event.

Repeat this process a number of times and have the unit land on different faces to create impacts in all three axes.

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Download the Data

After allowing the ShockLog to run for a short period of time and generating a number of events, reconnect the ShockLog to the PC via the USB cable. From the Communications window, it will be possible to view the status of the ShockLog and verify that a number of events have been recorded. In this case, 37 alarms were generated.



Click the “Download” button on the Communications window and there is an option to enter comments regarding the journey/data that has been recorded. For this exercise, enter “Desk Top Drop” and click “OK.”

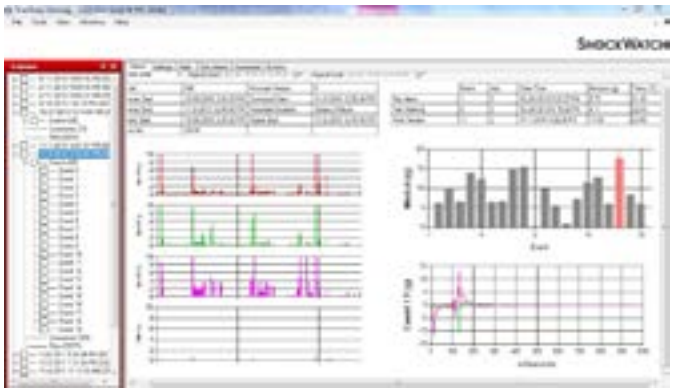


The status bar at the bottom left part of the screen will change from “Connecting” to “Data Transfer”; then a new separate window will indicate that the communication transfer is complete.

Click “OK” status and a new file will appear in the “Explorer” and “Records Table” windows.

View File

The ShockLog data file is now ready to be viewed. Click on either the file in the Explorer window or the Record Table window. The File Viewer screen will display the data from the desk drop test file that was just created.



Examine the data file by selecting the various screen options – Report, Setup, Slots, Slot Alarms, Summaries and Events.

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iButton Communications

The ShockLog family of products allows for an efficient method of communication through an iButton interface. This interface allows users to perform basic ShockLog operations without a PC connection. iButtons are available to setup, start, stop, set clock and download the ShockLog report.

The iButton interface serves as the link between iButtons and a PC.

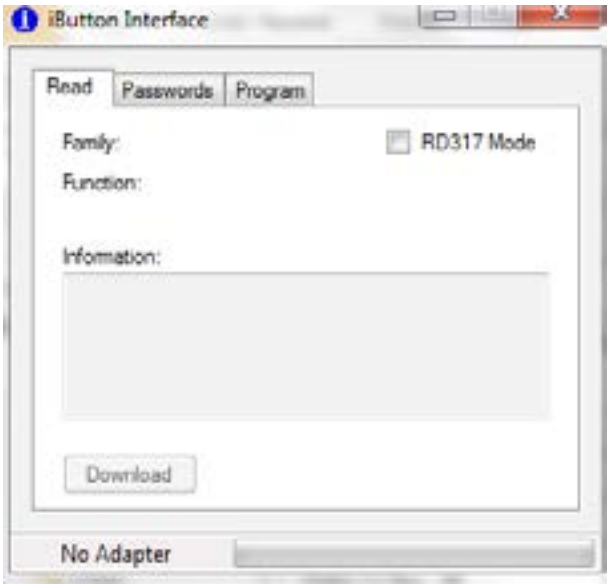
The iButton Interface window is accessed via the "View" menu. Within this window users are presented with three tabs: Read, Passwords and Program.

Read

Read is the first tab presented to users after opening the iButton interface. This screen is used to read what is on an attached iButton. The USB connector and BUS connector should be plugged into the PC USB port. It may be necessary to download drivers, but the download process is similar to the process described in the Software Installation section.

When an iButton is plugged into the connector bus, the software will display the type of iButton being read and whether there is data on the device.

To download data from a Download iButton, the user must click on the '"Download" button while the iButton is firmly in the connector bus.



If the user is using an iButton originally set up for the legacy RD317 products, a warning will appear stating that the iButton is for an RD317 and asking "do you wish to change to RD317 mode?" By selecting "Yes", the RD317 mode tick box will be completed and any programming of the iButton will be created in the RD317 compatibility mode.

If a new iButton is being set up, and it is desirable to use it with a legacy RD317 unit, it is necessary to select the RD317 Mode box before proceeding to ensure the iButton is setup correctly for use with the older products.

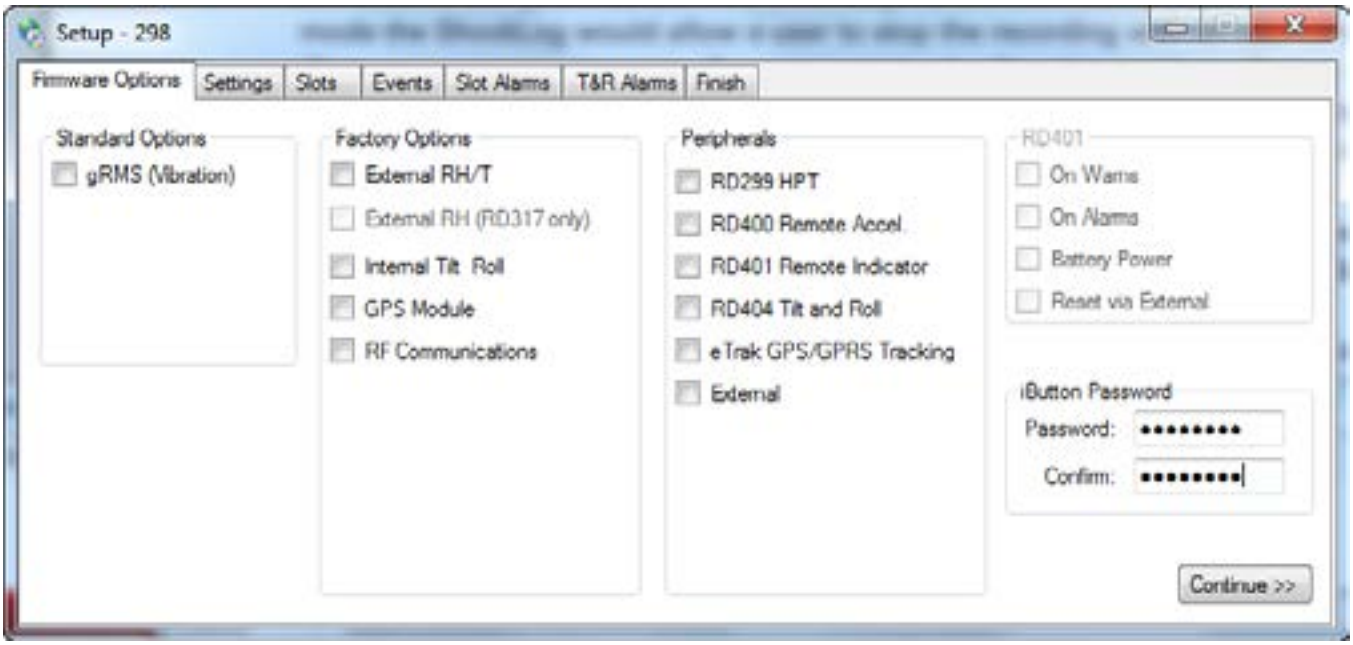
Passwords

With iButtons and ShockLog units, there are two levels of password protection. The iButton password is the first level and is user definable. The ShockLog password is the second level and is factory set. ***The ShockLog password cannot be changed by the user.***

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iButton Passwords

The iButton passwords must be less than 8 characters and are set on the “Firmware Options” tab of the ShockLog Setup Window. The password needs to be entered into the password box and then repeated in the confirm box.
Passwords are case sensitive and will accept alphanumeric values. However, symbols are not acceptable characters.



When a ShockLog is programmed with an iButton password, all iButtons used with that ShockLog unit must be programmed with the same password, otherwise the ShockLog unit will ignore the command. To program an iButton with the appropriate password, the iButton must be connected to the PC via the USB connection BUS and then the Password tab selected.



Move to the Password box and enter the password exactly the same as the setup file. Move to the confirm box using either the Tab key or moving the mouse to the box. Re-enter the password to confirm.

Once the password has been set, it is necessary to reprogram the iButtons by following the instructions in the “Program” section below.

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ShockLog Passwords

The ShockLog Passwords are factory defined and cannot be changed by the user. The ShockLog passwords work in a similar way to the iButton passwords, preventing communication with the ShockLog from iButtons that do not have the appropriate passwords. However, the ShockLog passwords are unique to each ShockLog and are supplied with the units when purchased. These passwords provide a unique number for every ShockLog preventing generic passwords from being set up and used on all units.

Every unit shipped from the factory has 3 passwords supplied with it: Level 1, Level 2 and Level 3. The ShockLog password used here requires the Level 2 password.

In order to activate the passwords in the ShockLog unit, the user must follow the instructions in “Setup Passwords” later in this manual. Once these passwords have been activated, the only iButtons that will communicate with the ShockLog unit are those programmed with the same ShockLog Level 2 password.

To program an iButton with the appropriate password, place it into the USB connector BUS attached to the PC and open the iButton interface. Select the Passwords tab and enter the ShockLog password into the Password box under the ShockLog section. Re-enter the password in the confirm box and then go to the Program tab and follow the instructions as detailed later in this manual.

Program

With an iButton attached to the USB Connection BUS, when entering the “Program” tab, the user will be presented with two check boxes for the different passwords available and five buttons that are either grayed out or live, depending upon the iButton that is attached.



The buttons allow for the creation of: Start, Stop, Setup, Clock and Download iButtons. A number of the iButtons utilized by the ShockLog can be programmed for a number of different options providing the user with more flexibility in their stock of iButtons.

If an iButton is to be set with a password, it is necessary to click on either the iButton or ShockLog password box at the top of the tab. This action will take the user back to the Password tab, where the passwords must be entered or created. For instructions, refer to the “Password” section earlier in the manual.

Once the passwords have been set, click on the appropriate program button to send the program into the iButton. “Finished” will appear when the programming is complete. If the user is sending a setup to the iButton, when the setup button is selected, the user will be presented with the file search window and will be asked to select the desired setup file. Please note that if passwords are required, they must have been setup within the setup file before sending to the iButton. Refer to the File Setup section earlier in this manual.

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Setup Passwords

ShockLog passwords allow users to protect their units from unauthorized access, download and corruption. The ShockLog passwords are factory defined for every ShockLog and are unique to each ShockLog serial number.

To set the passwords within a ShockLog, activate the “Setup Passwords” key on the Communications window. Go to the View menu and select the “Password Setup” button. The “Password Setup” button will now be available in the Communications window.



Attach the ShockLog to the PC, click on the “Password Setup” button in the Communications window and a new window will open. Enter the 8 digit numeric code (provided with the ShockLog), click “Enable Passwords” and then “OK.”

The Status bar will show that the system is connecting to the ShockLog and will return “OK.” The ShockLog is now password protected.

Now, when a user attempts to communicate with the ShockLog, it will be necessary to enter an appropriate level password to gain access. A window requesting the required level of password will be displayed. The following levels are required:

Stop	Level 1
Start	Level 1
Download	Level 2
Send Setup	Level 2
Set Clock	Level 1
Read Setup	Level 2

Note: The ShockLog program has been set up to memorize a password while in the same session with the same ShockLog attached. Once a password has been entered, it will not need to be re-entered until a new ShockLog session is opened.

To remove the password from a ShockLog unit, attach the ShockLog to the PC and open the Communication window. Click on the Setup Password button and enter the Level 2 password but this time select “OK” when the “Enable Passwords” button has not been selected. The password settings will be removed from the ShockLog.

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Security Log

The Security Log provides users with a detailed list of communication activity for the ShockLog unit. This data includes dates and times of activities, a description of the activity and provides an additional audit trail for a data file. The ShockLog Security Log can only be cleared by the factory during the ShockLog calibration process. For security reasons, users cannot clear this file.

To view and export the ShockLog security log, it is necessary to activate the "Security Log" key on the communications window. Go to the View menu and select the Security Log Button. Return to the Communications window and the Security Log button will be available.

After the Security Log button has been activated and a ShockLog unit is attached to the PC, clicking on the button will bring up the following grid of information:

The Grid provides the following data columns:

Rec' No	Sequential number given to every activity recorded.
Date & Time	Provides the specific date and time the activity occurred.
Entry	Provides a description of the activity recorded.
Data	Shows the size of the data recorded.

The grid can be sorted by column by clicking on the top of any of the columns. The data will be sorted by the selected column. By sorting on the "Rec' No" column, the data will return to the original order.

The Security Log data can be exported into a comma delimited file (*.csv) for importing into other applications such as Microsoft Excel or Word. To Export the file, click the "Export" button at the bottom right hand side of the grid. A file save window will appear. Amend the file name as required and select a different directory as required from the drop down selection at the top of the screen.

Click the "Save" button and the file will automatically save as a .csv file for importing into other applications.

Multiple File Export

It is possible for users to export batches of data files as well as individual files via the records table.
Within the records table, by highlighting an individual record and then pressing the right hand mouse button you will be presented with a small menu with the option of "Export to Database." This will open a standard Windows Save window, and the user is able to create a new database to save the selected data file.

If more than one file is to be exported, the user is able to either click on the first required file and hold down the left hand mouse button while dragging down to the last required file, or click on the first file, press and hold the shift key and click again on the last data file required. Once the range is highlighted, a right hand mouse click will return the menu allowing for the export to database function to be used.

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Database Manipulation

In manual section various tools and techniques available for users to manipulate the data file database will be overviewed. These tools and techniques allow the user to find and analyze data as quickly and efficiently as possible. The various tables of data will be reviewed and the different options available for each display will be explored.

Explorer Window

The Explorer window displays the available data files within the database. The system utilizes a 'Windows Tree' format to enable users to quickly search through the files.

The file name format is in keeping with the legacy file names and provides the date and time of download along with the serial number of the ShockLog unit used for monitoring.

Click on a given file and the File Viewer will display the Report tab for the selected file. The Explorer window will open the file showing the number of events, number of summary records and number of slot periods within the data file.

The events can be further expanded to show each individual event as separate entries. In the Event tab, with the events listed individually it is possible to quickly change between the individual events by double clicking upon the event number.

While in any of the tabs, it is possible to view a number of events together. Click in the box to the left of each event number (will enter a check and change the background to yellow). Initially only the last event selected will be displayed on the main viewer screen. The headers have changed slightly and no longer display the various tab options. This is because additional windows are opened for each of the events checked.

Now that the events are opened, it is possible to restructure the screen view using the cascade and tile options under the View menu. This option will be detailed later in the manual.

Each individual event can now be used as in the Events tab, with full zoom capability and the cursor bar to provide additional data. The additional text information is not available on the right hand side of the screen but g value information and the number of milliseconds at the cursor point are displayed in the bottom left hand corner of the screen.

Records Table

The Records table provides an alternative file selection to the Explorer window. The advantage of the Records Table over the Explorer window is that the user is able to sort and re-order the data files within the Records Table making it a powerful search tool.

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Column Data

The Records Table is constructed in a tabular format with various columns of data for each of the data files within the database. The main columns are as follows:

Download Date: Provides the date and time that the data file was downloaded into the database.

User Comment: When downloading a file, users are offered the opportunity to enter a comment; this comment will be displayed in this column, up to a maximum of 15 characters.

Model: Displays the type of ShockLog used to record the data file.

Serial No: Displays the serial number of the ShockLog device.

Events: Provides the total number of events recorded within the data file (Warn & Alarm added together).

Warns: Shows the number of Warning events.

Alarms: Shows the number of Alarm events.

Summaries: Displays the number of summary periods recorded during the data file.

Slots: Shows the number of Slot periods recorded during the data file.

To move around the Records table, the user can move up and down by either the center wheel on a mouse (if available) or by using the scroll bar on the right-hand side. When the Records table is in a landscape view there will be no need for a scroll bar to move left and right as all columns will be visible. However, should the user decide to dock the Records table in a portrait position, a scroll bar at the bottom of the table will be presented and will enable the user to move left and right through the columns.

File Sorting

In the Record Table, it is possible to change the order of the display by any of the columns, enabling the user to search for specific sections of data. By clicking on the title of a column, the database will be sorted by the information held within that column. By clicking the column again, it is possible to change between the ascending and descending views of the data.

For example, if a user is interested in knowing all of the files downloaded from a ShockLog with a specific serial number, click on the title of the Serial Number column to put all of the files into serial number order. All data files from the same serial number will be displayed together.

Likewise, if the highest number of events is of interest, it is possible to sort the database via the events column and quickly identify the files with the highest number of events.

In order to return the database to its original setting, sort the files via the Download Date Time column and the data will return to date order.

Hyperlink to Additional Information

From the Records table it is possible to hyperlink to any of the data files being viewed. Double click on the Download Date Time column on the desired file. This action will open the selected file in the Report tab view.

To change files, double click on a different file and the system will change files. Whatever view the user is in when a file is selected, the Report tab view will be opened.

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Event Table

The Event Table displays all of the events, both Warning and Alarm, from a selected data file. The table provides details of an individual event and allows the user to sort the information to identify information such as the most significant event in terms of shock or the modulus value. In addition, the table provides a number of hyperlinks directly to other related sections of data.

Column Data

The Event Table is constructed in a tabular format with various columns of data for each of the data files within the database. The main columns are as follows:

Show Slots: A hyperlink button to the time slot data associated with the event.

Number: The event number that represents the order the event data has been recorded in. Please note that the first event of any ShockLog data file is 0 (zero) and not 1 (one).

Event Date: Displays the date and time the specific event was recorded; relates to the ShockLog internal date and time and may vary with the PC date settings if the unit was set up in another time zone.

Duration: Shows the length of time in seconds that the event lasted and can be 1, 2, 4, 8, 16, 32, 64, or 128 seconds.

Range: Displays the g range that the ShockLog was set to when recording the event.

Rate: The effective sample rate that the ShockLog recorded the event at and will be dependent upon the compression selection made by a user when setting up the ShockLog unit. All events are sampled at 4,096 samples per second. However, depending upon the compression required and the user selections made the recorded sample rate may be lower.

Temp.: The temperature recorded via the internal thermistor at the time of the event.

Max X, Y & Z: These columns show the maximum g value seen on each of the axes during the recorded event.

Modulus: The Event Modulus which is the vectored X, Y and Z data, calculated with the following formula: Modulus = Sqr(XSample ^ 2 + YSample ^ 2 + ZSample ^ 2).

To move around the Event table, the user can move up and down with either the center wheel on a mouse (if available) or by using the scroll bar on the right side. When the Event table is in a landscape view there is no need for a scroll bar to move left and right as all columns will be visible. However, should the user dock the Event table in a portrait position, a scroll bar at the bottom of the table will make it possible to move left and right through the columns.

File Sorting

In the Event Table, the user has the capability of changing the order of the display by any of the columns, making it possible to search for specific sections of data. Click on the title of a column and the database will be sorted by the information held within that column. Click the column again and it is possible to change between ascending and descending views of the data.

For example, if interested in knowing all the events within the data file with high modulus values, click on the title of the Modulus column to put all of the events into modulus value order. Likewise, if interested in the highest g value on Y axis, it is possible to sort the database via the Max Y column and quickly identify the events with the highest g value for the Y axis in the events.

To return the database back to its original setting, it is necessary to sort the files via the Number column and the database will be back to event number order.

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Hyperlink to Additional Information

From the Event Table it is possible to hyperlink to the Slot graphs and the event graphs for individual events. The Show Slots column has a button to click upon for each event. By clicking on this button the main File Viewer screen will move to the appropriate section of the slot graphs, zoomed into the section that relates to the event time period.

If the user now wishes to view the event curve for this specific event, there is a choice of linking straight to it from the Slots tab or from within the Event Table. From the Event table, it is possible to hyperlink by double clicking any of the Number column, the Event date or the graphic next to the date.

By clicking on any of these options the user will go to the selected event curve within the Events tab and will be able to interrogate the event curve as explained earlier in this manual.

It is possible to continue clicking on different events and the File viewer will continue to update the event curve as the user works through the events from the Event Table. Additionally, once in the Event tab, it is possible to scroll through the events using the arrows in the top right corner.

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Menu Options

In this manual section all of the available menu options and features that have not already been discussed will be covered.

File Menu

New

The “New” option in the File Menu allows users to create a new database. This feature is used for various reasons including the creation of archive databases, creating unique databases for different companies or departments etc. By clicking on the option, the user will be presented with a save file window. Enter the desired name into the ‘File Name’ box at the bottom of the window. Ensure the file is being saved in the correct directory, which can be selected via the drop-down window at the top of the screen.

While viewing a database, it is possible to identify the current database by the name presented in the information bar at the top of the screen. In addition to the Database name, you will also be presented with the data file name currently opened for viewing.

Open

The “Open” option from the file menu provides the user with the ability to open different databases that have been created. Users can open archive databases or different databases for different parts of the company / organization.

Click “Open” in the menu, the user will be presented with a file ‘Open’ window and will default to the ShockLog directory created for storing ShockLog databases.

When the desired database has been found, click the appropriate file name and then click “Open.” The ShockLog software will appear to close but will automatically reopen, this time with the selected database opened. The name in the header bar will now show the new database name. To change back, follow the above procedure and select the default database “ShockLog.” Databases from different directories can be selected and the ‘Look in’ drop down menu can be used to search different directories as required.

Import

The “Import” function under the file menu allows users to import data files into the current database. Generally, this feature will be used to import legacy ShockLog data files that a user may have recorded on their system and wishes to view under the new software package.

The download process of ShockLog products will automatically import the data files into the opened database and will not require the import option. However, should a problem occur with the automatic importation of data files following a download from the latest ShockLog ranges, it is possible to import the data file through this method.

To import a single data file, select the “Import” option from the file menu. The ShockLog Data directory will open and show a list of data files. The system default will display data files from the latest generation of ShockLog units ending with .sl_sdr. To select one of these files, click on the desired file and then click “Open”. The system will take a few seconds and the file will appear at the bottom of the Explorer window and in the Records Table.

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If the user wants to import legacy data files, it is necessary to change the “Files of Type” to .sl_data, which represents older legacy data files. Once the desired file has been selected, click “Open”. For more details, refer to Importing Legacy Data Files section

Should the user wish to select a number of files at the same time, i.e. a complete directory of legacy files, this is possible within the same menu option. Go into the “Import” menu option and select the file type (new or old), click on the first file, then if it is a list of files, all in order, press and hold the ‘Shift’ key on the keyboard and then click (with the mouse) on the last required file. The whole selection is highlighted. If this is all of the desired files, click “Open” and all of the selected files will be imported. Please note this procedure may take a couple minutes for the computer to complete the importation depending upon how many files are being imported.

If the desired files are not listed all together, it is possible to select any group of files using the Alt key on the keyboard. Click on the first of the data files, press and hold the Alt key, with the mouse proceed to click on all of the desired data files, one at a time, until all of the files have been selected. Once all files have been selected, release the Alt key and click on the Open button with the mouse. All of the files will now be imported. The process can take several minutes depending upon the number of files being imported.

Export

The Export function has been covered in the individual sections of Slots, Summaries and Events. The Export option under the file menu works in a very similar style but instead of focusing on one section of a data file it focuses on the option to export the complete data file or selection of data files. It should be noted though that this export facility can also be focused down to exporting a small section of a data file just as if it had been entered from the Slots, Summaries or Events.

The data file being viewed from the Explorer window will be highlighted as the main option. However, no data will be selected for export.

On the left side of the Export window an Explorer tree style display will appear. The user will have an option of “All records (x)” with X being the number of files in the database, or the long description of the data file currently being viewed. On the right side a number of tools to narrow down the export criteria are available.

A number of options are available for downloading all of the files (or some of the files) within the database. Click in the tick box next to the “All records” entry on the left side. The box to the right will be filled with a list of the data that is to be exported with ticks to the side, which will include:

- Download Data
- Warns
- User Comment
- Alarms Model
- Summaries
- Serial no
- Slots Events

If the user does not want to export any of this data, click the tick to blank the selection box. To highlight all of the boxes again, click on the “All Data” button and all of the ticks will be filled in again.

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There are two slide bars on the right-hand side of the screen. When exporting all records, these will represent the data files within the database. The user can move these bars left and right to select the range of files to be exported right down to an individual data file. Once the user has selected the data required and the data files for the information to be extracted from, click "Export".

The system will display a "Browse for Folder" window that allows the user to select the desired export location for the file. Select the directory where the export is to be stored and press "OK". Alternatively, it is possible to create a new directory for the export file by selecting "Make New Folder". Upon pressing this button, the system will create a new folder under the current directory and name it "New Folder". To change the name, right click on the new folder and select "Rename". Type the new name, press return, and save the export file to the new directory.

The Export will create separate comma delimited files for the different sections of data being exported. These files can be opened in such programs as Microsoft Excel and the data can be used to further analyze the journey or storage period.

Delete

The "Delete" option under the File menu allows users to remove data files from the database and must be used with extreme caution.

To remove a file, select it from the Explorer Window, go to the file menu, and select 'Delete'

The following window on the right will appear warning the user that a complete data file is about to be removed from the database. Click "OK", the file will be deleted, and the user will be returned to the Explorer Window.

Print

The printing options under the File Menu consist of 4 sections and provide the following functionality:

Print – Prints to the default (or selected) printer and will print the current view within the file viewer screen depending on the current tab being viewed.

Report – Will generate the one-page report, giving users a summary of the slots and events seen in a given recording period.

Slots – Will print the Slot graphs and will create a page for each of the slot graphs currently being viewed in the slot tab.

Summary – Generates a selection window, providing the user with the ability to select the columns of data of interest (in Summary Tab). Additionally, users can insert a custom report title that will be printed on the top left side of the report.

Events – Generates a print out of the event currently being viewed (in Event Tab).

Print Screen – Sends the whole ShockLog software screen currently being viewed to the printer. It will include the Explorer window, Records Table, Events table and any other window currently being displayed on the ShockLog software screen.

Print Setup – Opens the Microsoft Printer selection and setup window, which can be used in the same manner as any Microsoft windows package.

Print Preview – Allows users to view what is going to be printed before committing it to paper. When selecting this option, the user will be presented with the Microsoft Printer selection and set-up window. Selecting print from this window will display the print document on the screen and offer the users the ability to print the document.

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Tools Menu

Graph / Unit Options

This window provides users with several options including customizing the color settings for the graphs and changing the units of measure being displayed. To change the color settings for a given graph parameter, click on the desired parameter button, i.e. 'Max Pk X', and an additional window showing a color pallet will be presented. The user has the choice of selecting any of the standard colors displayed on the front or creating a custom color by selecting the "Define Customer Colors" button and defining the desired color.

The units of measure to be displayed can be changed with the options on the right side of the window.

Acceleration Defined as g, m/s2 or ft/s2
Pressure Displayed as bar or lb/sq in.
Temperature Displayed as Celsius or Fahrenheit.
Velocity Displayed as cm/s, m/s, ft/s or in/s.

Additional options can be selected by checking the following checkboxes:

Limit Software Filtering – Relates to the post processing filters on the Event graphs. When this box is checked and the data file being viewed has a frequency filter of less than 250Hz, this feature will limit the filtering options to the filter value set in the settings. For example, if the settings file had a frequency filter setting of 90Hz, the highest filter setting available for post filtering will be 90Hz. If this option is not checked then the filter options available will be 250Hz and lower. The default setting is to have this option selected.

No Range Bars – Relates to how the event graphs will be displayed when the events have not been recorded at 4,096 samples per second. If this option is selected it will present the graph as a smooth line, taking the mean values between the min and max values of the compressed data. If it is not checked the user will see the range bars, i.e. the range between the max and min values in each group of compressed data. This option must be selected for every journey.

English – Select if English language it so be used

Unicode CSV – Select if the data exported is in Unicode CSV or ASCII

Data Paths

The Data Paths option displays the directory routes that are currently set for the XML, Setup Files and Data files. The XML files are configuration files for the ShockLog accessories and should not be touched by users unless instructed to do so by the ShockLog Technical Support team. The Setup and Data files path show the default settings of where these will be stored and any changes that are made here will change the directories where such files will be stored and searched for future use. Any changes within this section should be made with extreme caution and advice should be taken from the ShockLog Technical Support Team prior to making such changes.

Communication Port

The selection of communication ports is generally only required when using serial communication and the system is unable to automatically select the correct serial connection. Users are able to select from the drop-down menu the appropriate port being utilized. To find the correct port being used by the computer, users must check under the device manager within the computer control settings. Contact IT if it is unclear how to proceed.

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With this option, users are also able to select the baud rate at which the ShockLog will communicate. There are times when a slower baud rate may be required. If the user is experiencing communication difficulties, slowing the baud rate may resolve the problem.

Compact and Repair Database

Compacts and repairs corrupted databases.

Export Current Record as a Database

Exports the currently selected record as an Access database.

Restore Default Settings

Restore Default Settings will restore the ShockLog to settings when it was first installed. Any custom settings and directory paths that the user has set will be removed. When selecting this option, the user will be presented with a warning that all current settings will be lost. If “YES” is selected, the default settings will be set. It is not be possible to revert back to custom settings after restoring default settings. Please use extreme caution with this option.

Save Current Settings

This feature allows users to save the screen settings with their own preferred layout. Once a user is happy with where they have the different tables and screens docked, they are able to save these settings so that if another user moves things, they are able to restore their preferred settings.

Restore Saved Settings

If a user has saved their preferred settings and they should get moved up, by clicking on this option all settings will be returned to the last saved settings.

Read Last GPS Data

When a ShockLog 298 unit with the GPS module installed is attached, it is possible to request the last positional information recorded. This feature will indicate where or not the antenna is in view of the satellites.

Create Edit User Setup List

Allows the user to edit and delete setup files created for the ShockLog.

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View Menu

Opening the View menu presents the user with a list of different screens, sections and buttons that can be activated or deactivated in the ShockLog software.

Status Bar: Shown at the bottom of the screen; contains information in relation to a connected ShockLog unit. By default, the status bar will be visible but can be switched off through the use of this option

iButton Interface: Opens a new window allowing users to interface with the iButton options. This function is fully described earlier in this manual.

Setup: Opens a new window allowing the user to create or modify ShockLog setup files. This function is fully described earlier in this manual.

Communications: Opens a new "dockable" window that allows users to communicate with an attached ShockLog device. This function is fully described earlier in this manual.

Password Setup Button: Enables or disables the Password button on the Communications window.

Security Log Button: Enables or disables the Security log button on the Communications window.

View Read Setup: Allows the user to view the current setup.

Processed Data: Removes known anomalies from the data being viewed.

Windows Menu

The Windows menu allows the user to open and arrange various viewing screens to maximize the available data.

By hovering over the New Window option, an additional menu appears to the right side listing a number of different screens and tables that are available.

The Explorer, Record Table, Events Table, Slot Breaks Grid, and Radio Table and are all dockable windows and are explained in detail earlier in this manual.

Tile Vertical and Tile Horizontal options are used to rearrange the file viewer screens when more than one is being used at the same time. For example, if a user selects several events to be viewed at the same time, it is possible to have these displayed in different ways. The user can have the events tiled on the screen so that all the graphs can be seen at once. It should be noted that if the user tries to view more than four graphs at once, it is difficult to view them in a tile view is likely the better option.

The Close All option will close all screens currently open within the file viewer area except for the main file viewer screen with the Report, Slots, Summary and Event tabs. This feature is a very useful tool if many event graphs have been viewed at the same time.

Help Menu

The Help menu contains the 'About' option that will provide details as to the current version installed. Here, users can also select if they'd like to automatically check for software updates.

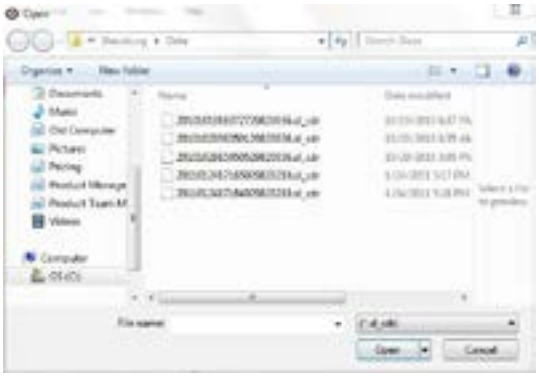
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Import of Legacy Data Files

In order to convert the legacy data files, it is necessary to import them into the database.



A file selection window will appear.



If the data file has been downloaded using the latest software, the correct directory will appear, and it will only be necessary to change the file type to view the old-style data files.

Select (*_sl_data).

A list of available data files will be displayed. Highlight the desired file and click “Open”. After a few seconds the file will appear at the bottom of the Explorer Table window.

If it is necessary to import data files that have already been downloaded with the old ShockLog software, change the data directory to that of the old software data directory.

Highlight the required data file and click “Open”.

If there are a number of data files to be imported, follow the process as described above, but instead of selecting a single file, find the first file in the list, click on the file, hold the shift key and click on the last file of interest then release the shift key. A range of files will be highlighted and by clicking the “Open” button, all the files will be imported. This operation can take several minutes, and the software will appear to be doing nothing until the files begin to appear in the Explorer Table.

It is also possible to select a number of specific files using the control key to highlight the required files from within the list. Clicking the “Open” button once the desired files have been highlighted will import the files.

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Appendix A - ShockLog Satellite



Description & Features

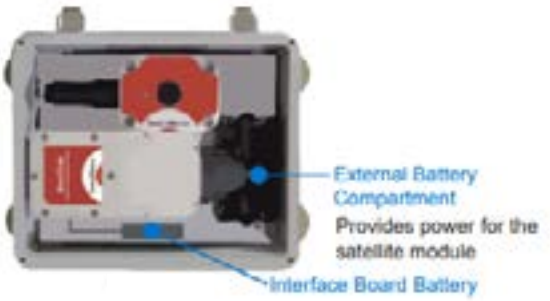
The ShockLog Satellite Impact Recording and Tracking System combines the ShockLog 298 impact recorder and a satellite communication module to deliver outstanding impact recording, real-time reporting and asset location. Real-time reporting of impact alerts informs the right people when unacceptable conditions have occurred during a journey.

Powering the ShockLog Satellite

All required lithium batteries for the ShockLog and ShockLog Satellite module are installed at the factory unless otherwise arranged with SpotSee. Batteries included are as follows:

Component	Battery Type	Quantity
ShockLog	3.6V AA Lithium Batteries	2
Interface Board	3.6V AA Lithium Battery	1
ShockLog Satellite Module (Internal)	1.5V AA Lithium Batteries	4
ShockLog Satellite Module (External)	3.6V C Lithium Batteries	4

CAUTION - RISK OF EXPLOSION IF BATTERIES ARE REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS.



NOTE: Operating the ShockLog Satellite in a location without line of sight to the sky will significantly reduce the battery life of the satellite module.

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Connecting the ShockLog Recorder to the Satellite Module

The ShockLog Satellite satellite module and the ShockLog must be connected prior to use. A plug on the satellite module covers the communication port between the module and the ShockLog.





Prior to use, the satellite module will show OFF on the end of the module.

Unscrew the plug and remove.

Connect the black connector / cable to the communication port of the satellite module.

Keep the plug in a safe place as it will be used to turn the device off when not in use.

Mounting

IMPORTANT: When mounting the ShockLog Satellite hardware, care must be taken to allow for line of sight to the sky. Failure to do so will result in compromised satellite communication.

It is recommended that you mount the unit prior to starting it. This action prevents any impacts being recorded that are a result of the mounting process.

Find a suitable mounting location on the asset with line of sight to the sky.

The ShockLog Satellite has x, y, and z axes noted on the unit. If the mounting of the ShockLog Satellite does not allow you to match the axes of the unit, it is advisable to make a note of the exact mounting in order to correctly analyze the reported impact values.

The ShockLog Satellite uses magnets for mounting. Grasp the unit in the positions noted by “Hold Here.” Position two magnets in place and then carefully roll the last two magnets into position. Magnetic mounts are intended for temporary mounting.

Safety Warning



MAGNETIC FIELDS PRESENT

The mounting plate described in these instructions has a magnetic field. Do not locate near pacemakers or other equipment that is sensitive to magnets.

PINCH HAZARD

Mounting ShockTrak may cause injury to hands. Exercise caution to avoid pinching hands and fingers when installing the mounting unit.

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Start Monitoring

Once the ShockLog has been programmed and the ShockLog Satellite unit has been mounted, the unit must be started to begin recording.

It is recommended that the START iButton be used to start the ShockLog Satellite. Remove the black center cap from the ShockLog iButton port and insert the START iButton into the port. When the iButton LED on the ShockLog is red and the Slot Alarm LED is green, remove the iButton. The unit will start in one minute.



The ShockLog could also have been preprogrammed to start at a specific time. Refer to Configure the ShockLog Satellite / ShockLog section of this manual for details.



Close the lid of the ShockLog Satellite system and secure the latches. When an impact event occurs during the journey, an alert will be sent through the web-hosted application and the ShockLog LED Event Alarm will flash red every five (5) seconds for an alarm condition and every ten (10) seconds for a warning condition.

Stopping the ShockLog Satellite

The ShockLog Satellite can be stopped with the Stop ibutton or it can be stopped after connecting the ShockLog to a USB port. To prevent capturing impact events resulting from dismounting the ShockLog Satellite, a best practice is to use the Stop ibutton.



Open the ShockLog Satellite case, remove the black plug from the ibutton port.

Insert the STOP ibutton into the ibutton port.

All three LEDs will flash red every ten (10) seconds when the unit has been stopped.

Downloading the ShockLog Satellite

When the ShockLog Satellite system's journey has ended, the full dataset from the ShockLog can be downloaded through the USB port. This step is recommended if impact data needs additional analysis.

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Recommended Storage

When the unit is not in use, it is recommended that the ShockLog be stopped and the satellite module be turned off.
To turn off the satzellite module, locate the satellite module in the ShockLog Satellite box and disconnect the connector/cable.

Locate the plug and insert it into the connector such that the word OFF is visible. NOTE If the word ON is visible, you will be powering the module and draining the battery.





Redeploying the ShockLog Satellite

When the ShockLog Satellite is ready for another journey, the ShockLog should be reprogrammed for the new journey.
When a new setup is sent to the ShockLog, all existing data is deleted from the device. Refer to Creating a Setup section for instructions on creating a new setup.

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Appendix B - ShockLog Cellular



Description & Features

The ShockLog Cellular Impact Recording & Tracking System combines the ShockLog 298 impact recorder and a cellular communication module to deliver impact recording, real-time reporting of event/alarm conditions and asset location.

The ShockLog Cellular Module may be used with any ShockLog 298 Impact Recorder with firmware revision 30 or greater.

Powering the ShockLog Cellular Module

All the required lithium batteries for the ShockLog Cellular are provided unless otherwise arranged with SpotSee.

To install the batteries, please follow the instructions below:



Unscrew the Battery Panel (see image to the right).
Note: A Phillips screwdriver is required to complete this step.

Install the six (6) AA batteries provided in the direction noted in each battery slot, verify that the gasket is in place and replace the battery panel making sure that the certification label is visible. Tighten the screws on the battery panel to preserve IP 67 rating.

Connecting the ShockLog Cellular Module

The ShockLog Cellular module and the ShockLog 298 must be connected prior to use. Attach the Hirschman connector on the cellular module to the Hirschman plug on the ShockLog 298.



Mounting the ShockLog Cellular Module

Important: The ShockLog Cellular does not require line of site for any communication. However, it must be able to receive cellular signals. If mounting in a container, ensure that any metal content of the container does not block cellular reception. Rule of thumb: If a cell phone works where the ShockLog Cellular is mounted, the device will communicate.

The ShockLog 298 and ShockLog Cellular may be mounted to the mounting plate included with the ShockLog Cellular. The mounting plate may be attached to the shipment with mounting bolts or magnetic feet (included). Avoid metal to metal contact when mounting the ShockLog.

It is recommended that you mount the unit prior to starting the ShockLog. This action prevents impacts resulting from the mounting process from being recorded.

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Start Mounting

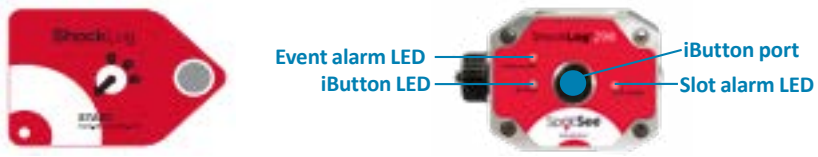
Once the ShockLog Cellular has been mounted, the unit must be started to begin recording.

If the start date has been preprogrammed, there is no additional action required of the user.

To start recording immediately, it is recommended that the START iButton be used to start the ShockLog. Remove the black center cap from the ShockLog iButton port and insert the START iButton into the port. When the iButton LED on the ShockLog is red and the Slot Alarm LED is green, remove the iButton. The unit will start in one minute.

When an impact event occurs during the journey, an alert will be sent through the web-hosted application and the ShockLog.

LED Event Alarm will flash red every five (5) seconds for an alarm condition and every ten (10) seconds for a warning condition.



Stopping the ShockLog

The ShockLog can be stopped with the Stop ibutton or it can be stopped after connecting the ShockLog to a USB port. To prevent capturing impact events resulting from dismounting the ShockLog Cellular, a best practice is to use the Stop ibutton.

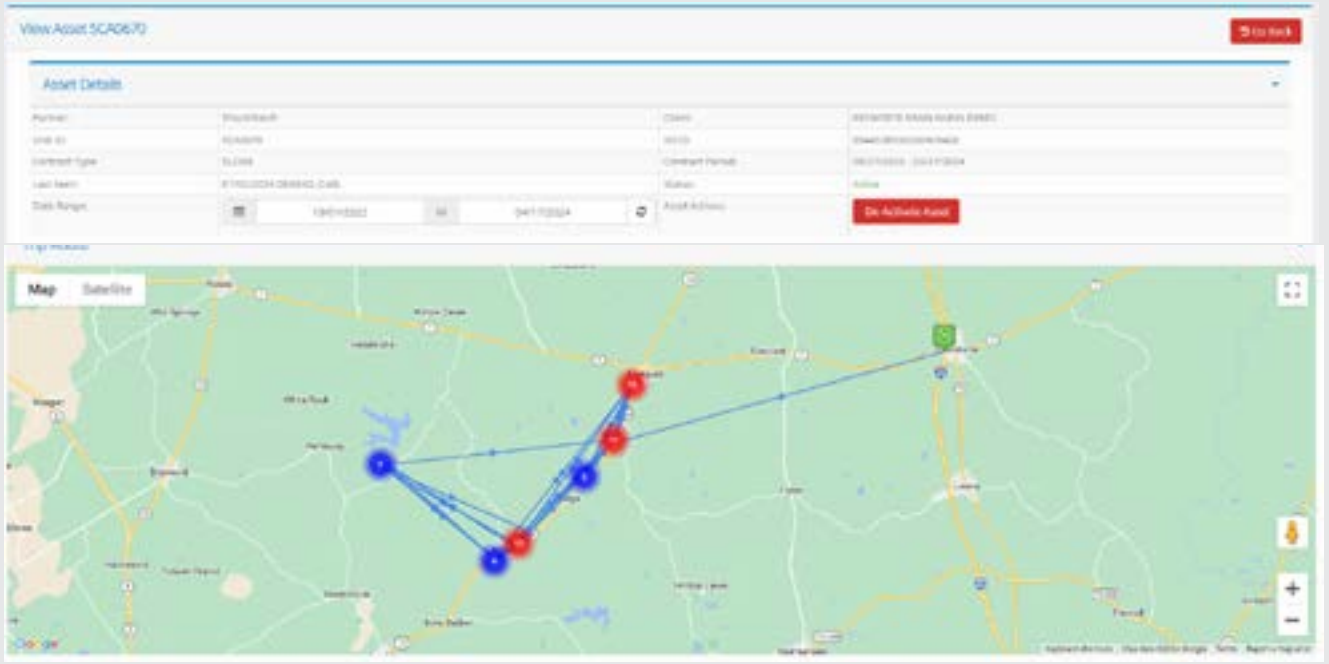
Remove the black plug from the ibutton port.

Insert the STOP ibutton into the ibutton port.

All three LEDs will flash red every ten (10) seconds when the unit has been stopped.

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Appendix C - SpotSee Platform



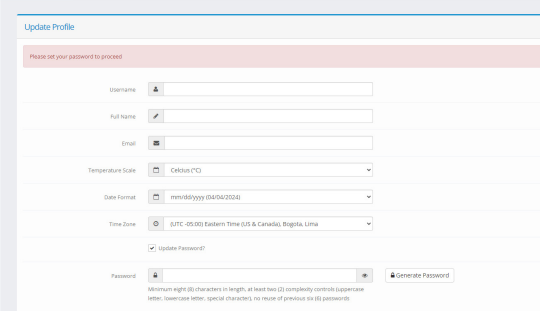




Appendix C SpotSee Platform

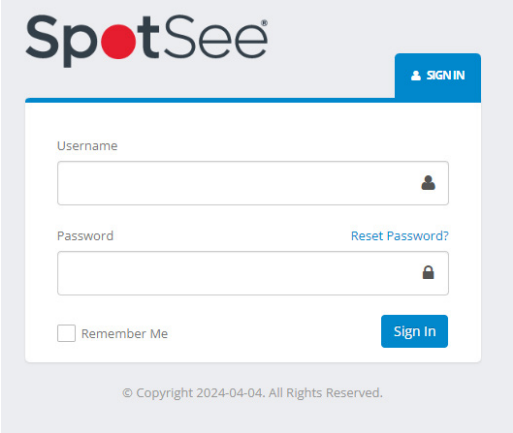
New User Set Up

Access the SpotSee Cloud by navigating to: track.spotsee.io. New users will be prompted to set up a user name and password as well as to define some basic preferences.



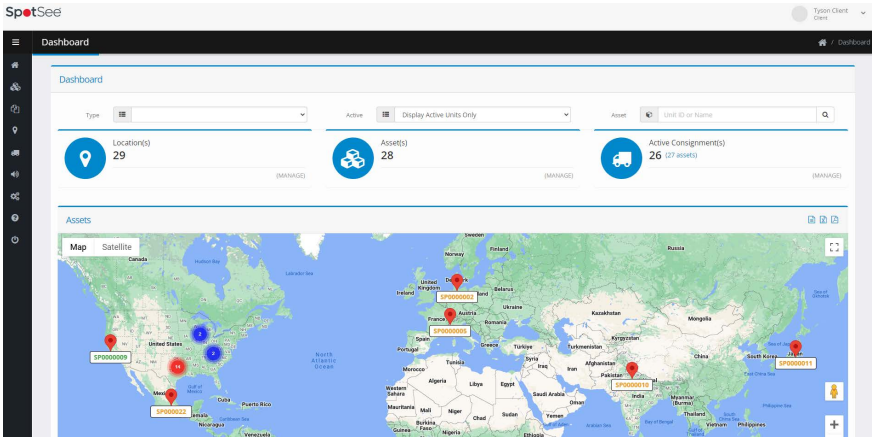
Returning User Sign On

After a username and password have been established, users can sign in by navigating to track.spotsee.io and signing in.



Dashboard

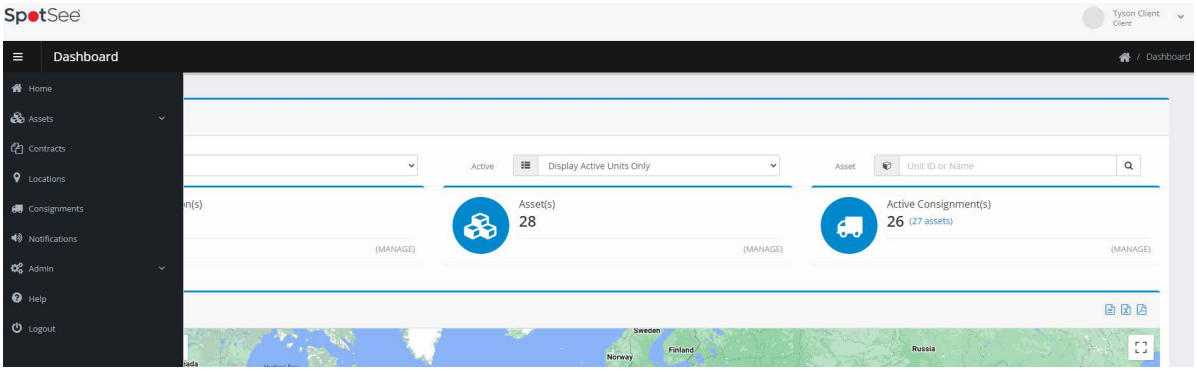
Upon signing in, users will access their Dashboard which provides an overview of the Locations, Assets, and Consignments (or Trips) belonging to that user. These items can be filtered by Asset Type and Status. It also enables search for a specific Asset.



Appendix C SpotSee Platform

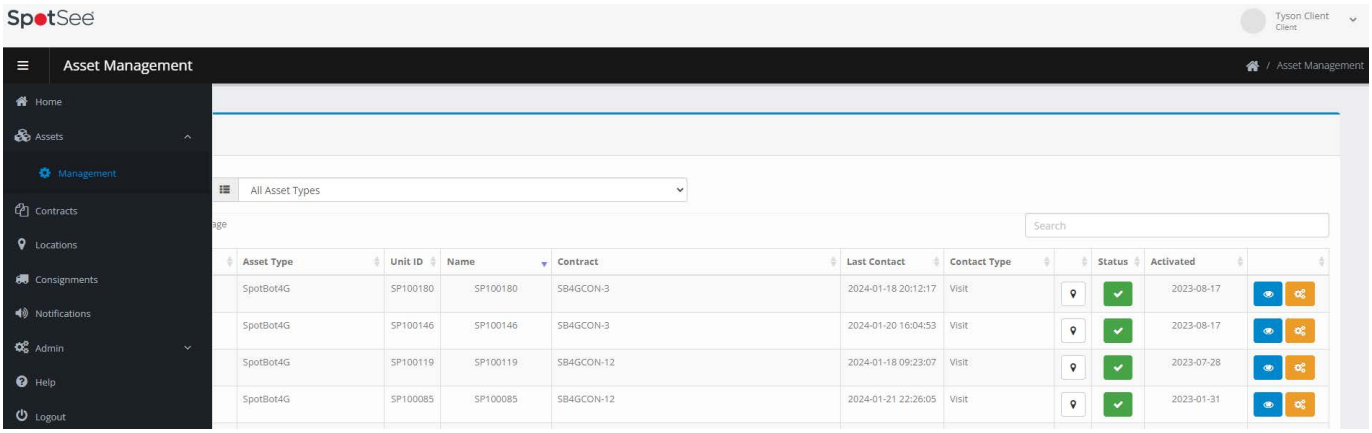
Navigation Bar

When the cursor is positioned over the left side of the DASHBOARD, the NAVIGATION BAR will appear. This menu allows the user to choose the appropriate screens for configuration and visualization of assets, contracts, locations, consignments, notifications.



Assets Management Screen

By using the Navigation Bar to enter the Asset Management Screen, the user will display summary information for each of their devices.



Below are definitions for the fields and buttons found on the Asset Management Screen:

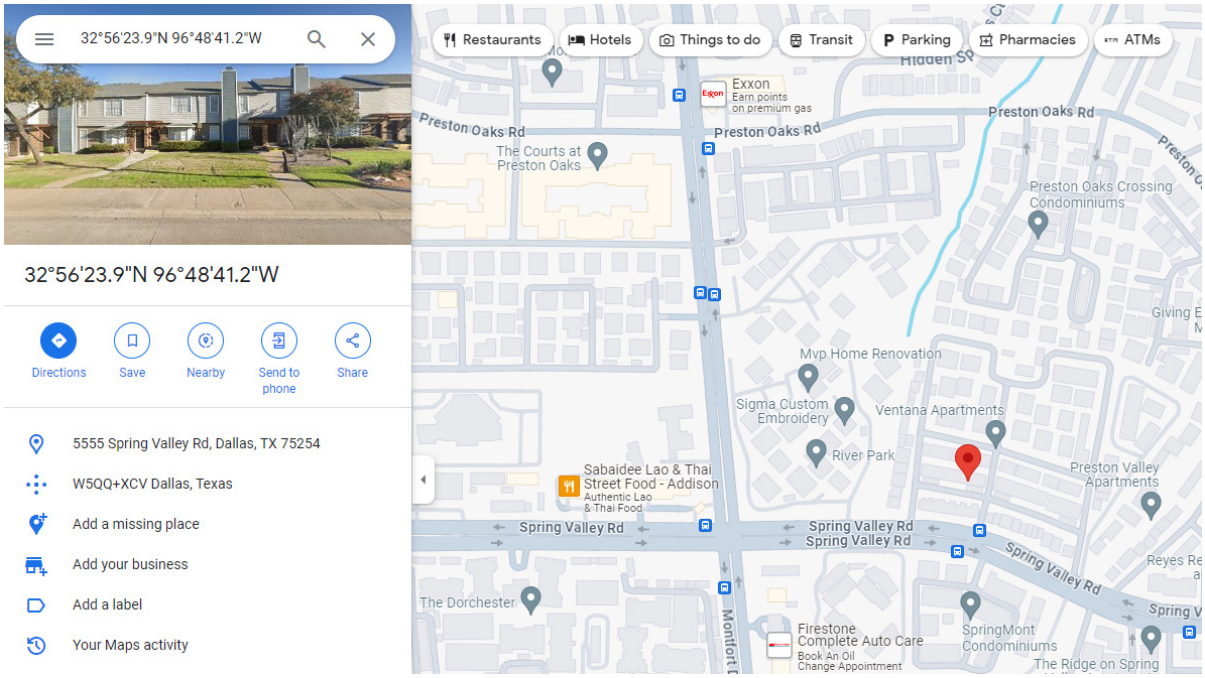
- **Client:** Company name of the Client (purchaser) of the Connected Device
- **Asset Type:** Type of SpotSee connected asset (SpotBot4G, ShockLog Cellular, ShockLog Satellite, etc.)
- **Unit ID:** Serial number of the unit (this number can be found on the front label of the device)
- **Contract:** Service contract associated with the device (3 Month, 6 Month, or 12 Month)
- **Last Contact:** Date and time when the unit last reported to the SpotSee Cloud
- **Contact Type:** Methodology used to deliver the most recent position of the unit (Visit = WiFi, Cell = Cellular Network)
- **Status:** Activation status of the device (green icon = active, red icon= inactive, and yellow icon = update pending)
- **Act vated:** Date the unit was activated

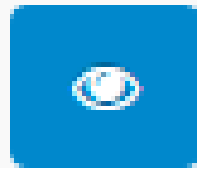
Appendix C SpotSee Platform

Users can view or edit detailed information for specific devices by clicking on one of the following icons associated with that device.

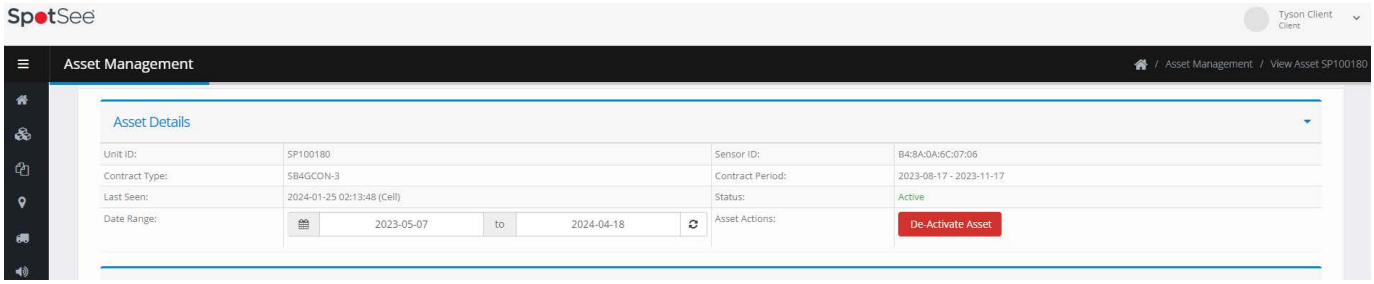


By clicking on the pin icon the user will open a new window with last reported geographic location of the device in google maps.



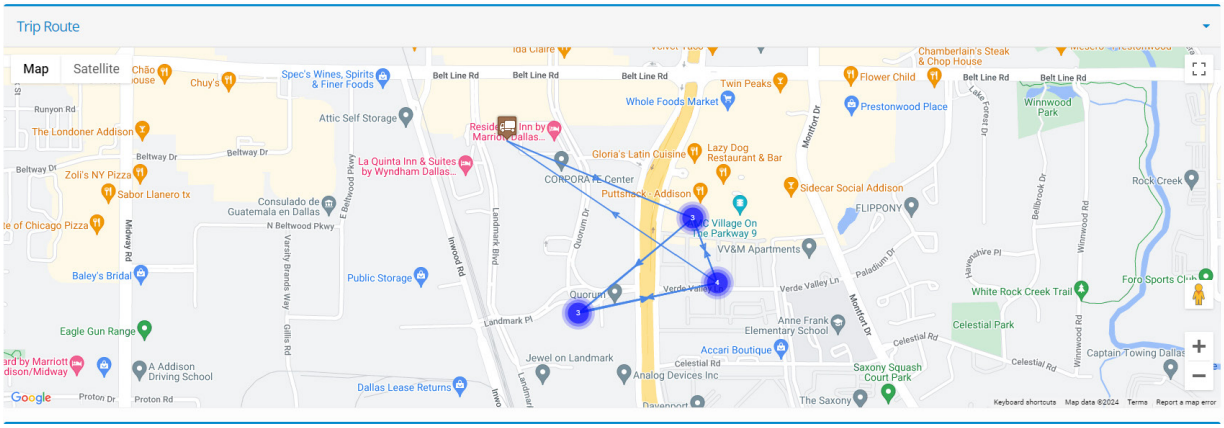


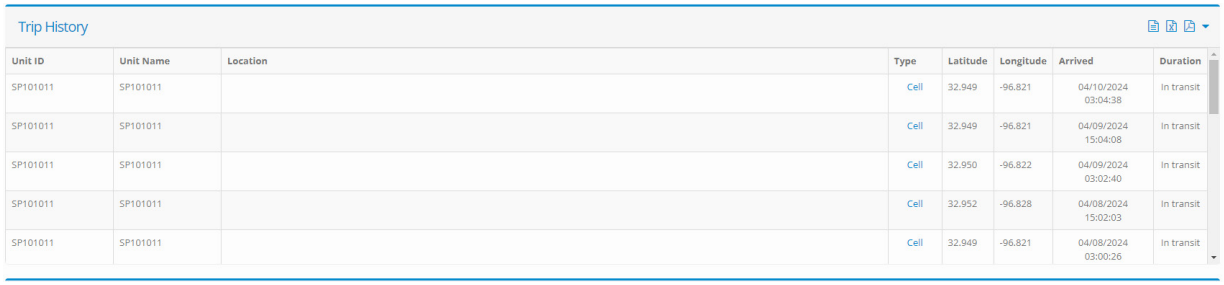
Clicking on the blue eye icon allows provides access to a screen with Asset Details, the Trip Route, the Trip Communication History, and the Temperature & Humidity Data for that specific device. From this screen the user can change the date range of the data viewed. The user can also deactivate the asset from this screen.



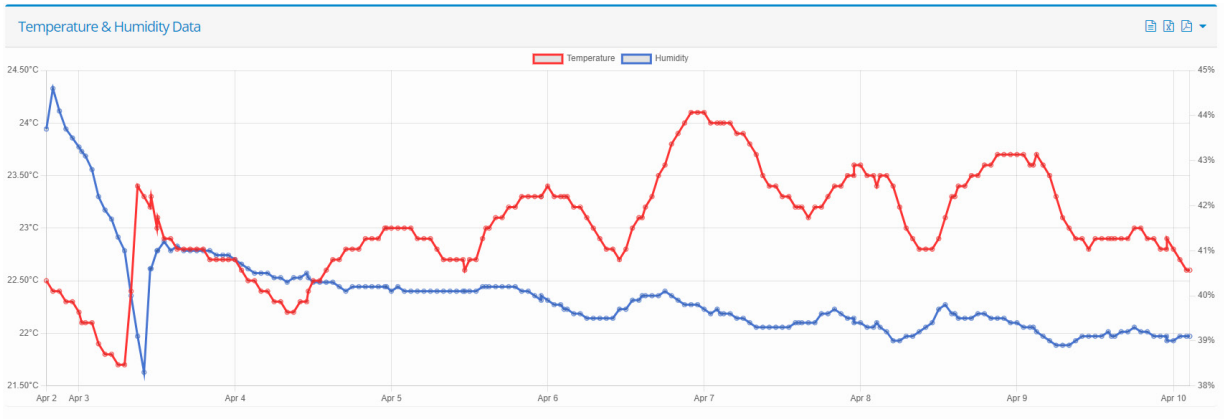
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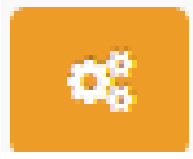
Appendix C SpotSee Platform





Unit ID	Unit Name	Location	Type	Latitude	Longitude	Arrived	Duration
SP101011	SP101011		Cell	32.949	-96.821	04/10/2024 03:04:38	In transit
SP101011	SP101011		Cell	32.949	-96.821	04/09/2024 15:04:08	In transit
SP101011	SP101011		Cell	32.950	-96.822	04/09/2024 03:02:40	In transit
SP101011	SP101011		Cell	32.952	-96.828	04/08/2024 15:02:03	In transit
SP101011	SP101011		Cell	32.949	-96.821	04/08/2024 03:00:26	In transit

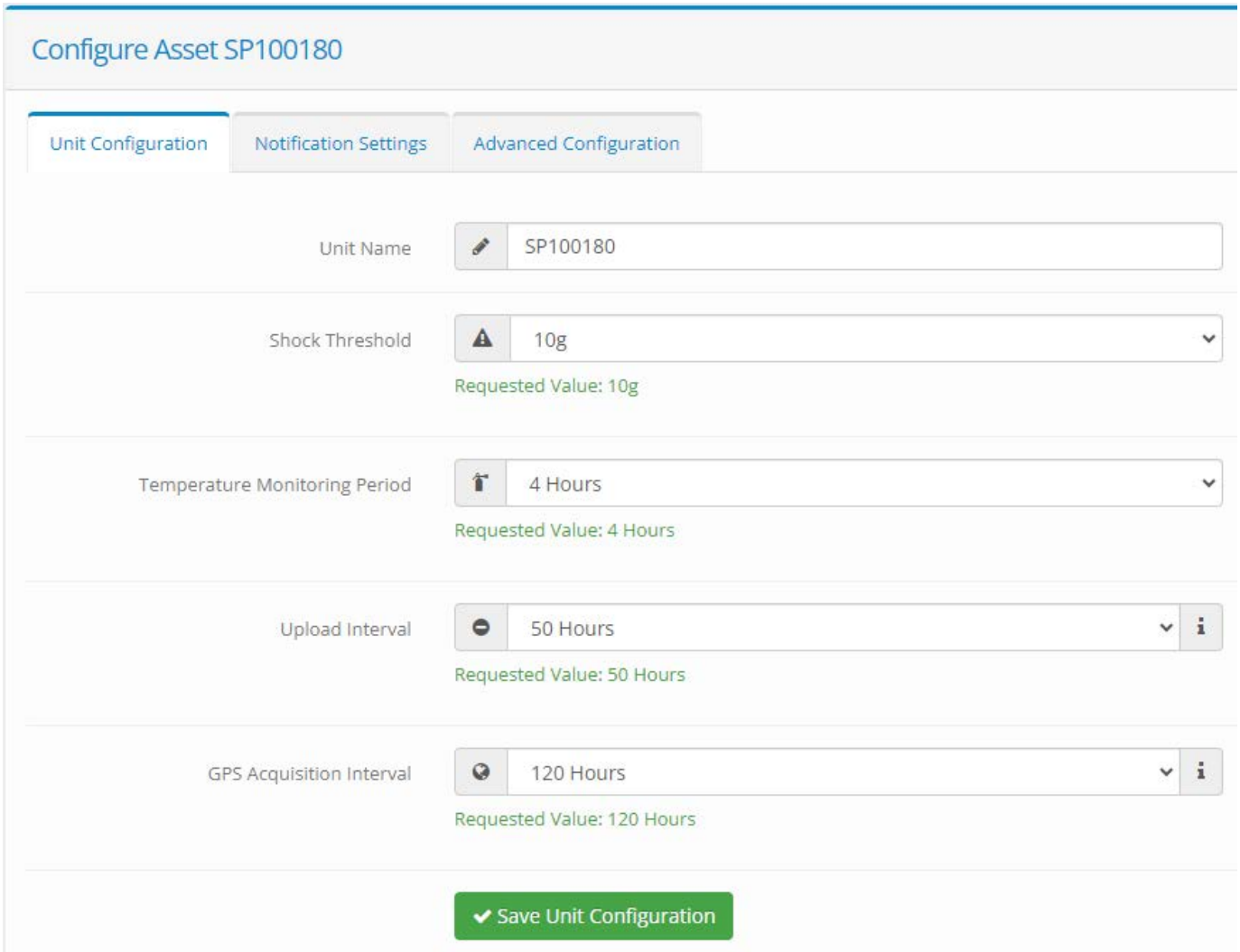




By clicking on the yellow settings icon, the user will navigate to the configuration screens for that device. The three tabs on this screen display the current unit configuration, notification, and advanced settings and provide the user with the opportunity to adjust these settings using drop-down menus.

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Appendix C SpotSee Platform



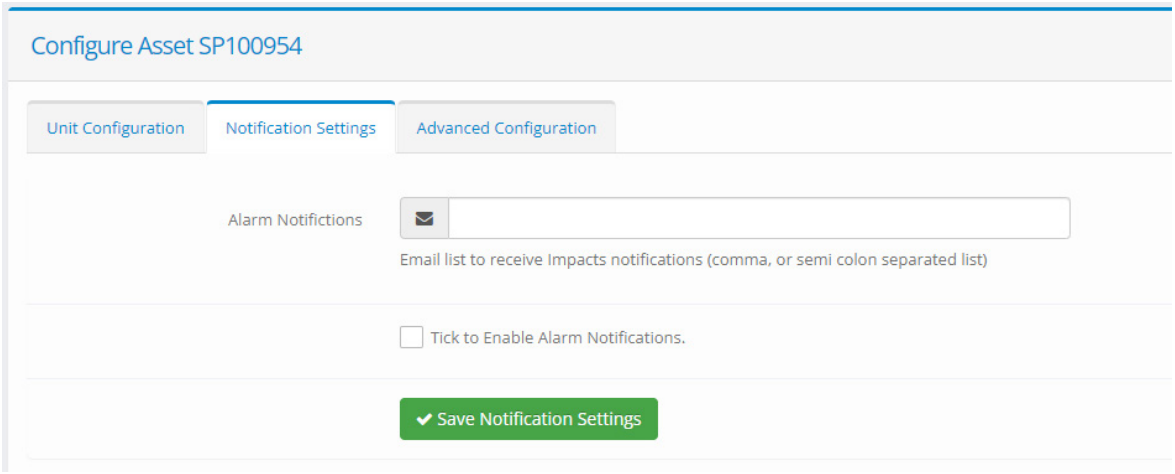
Unit Configuration

Drop down menus may be used to adjust the following parameters:

- **Shock Threshold:** Range of impacts that will be recorded/reported by the unit (3-100G or Disable Shock Sensor)
- **Temperature Monitoring Period:** Interval for the device to record/report temperature/humidity data (15 Minutes- 150 Hours or Disable Temperature/Humidity Sensor)
- **Upload Interval:** Time interval for data upload when no movement is detected (2-100 Hours)
- **GPS Acquisition Interval:** Time interval between attempts to obtain a GPS location (48-144 hours)

The setting change is done over the air; a cell connection is needed for the configuration to be changed so it may take up to 24 hours for the update to be reflected in the unit. Select SAVE CONFIGURATION when you have completed the changes.

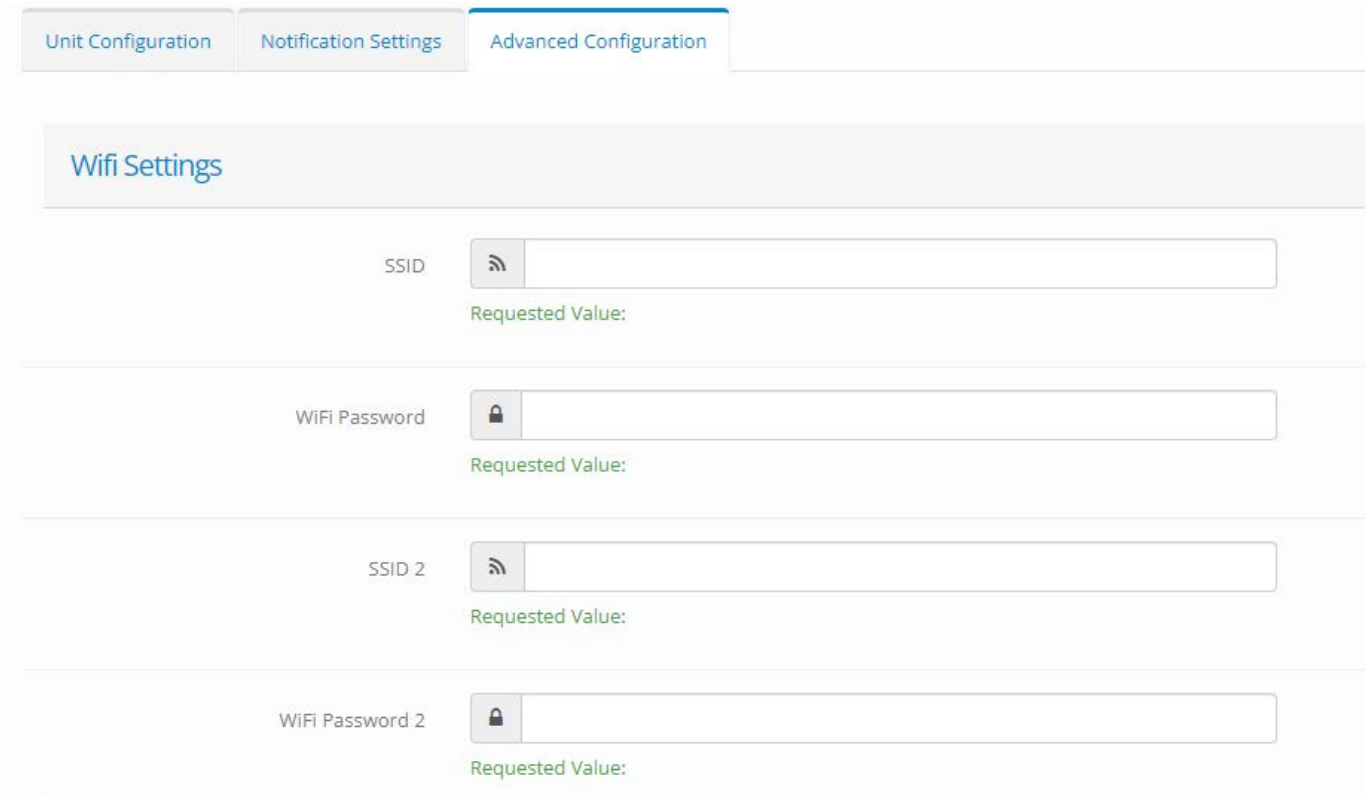
Appendix C SpotSee Platform



Notification Settings

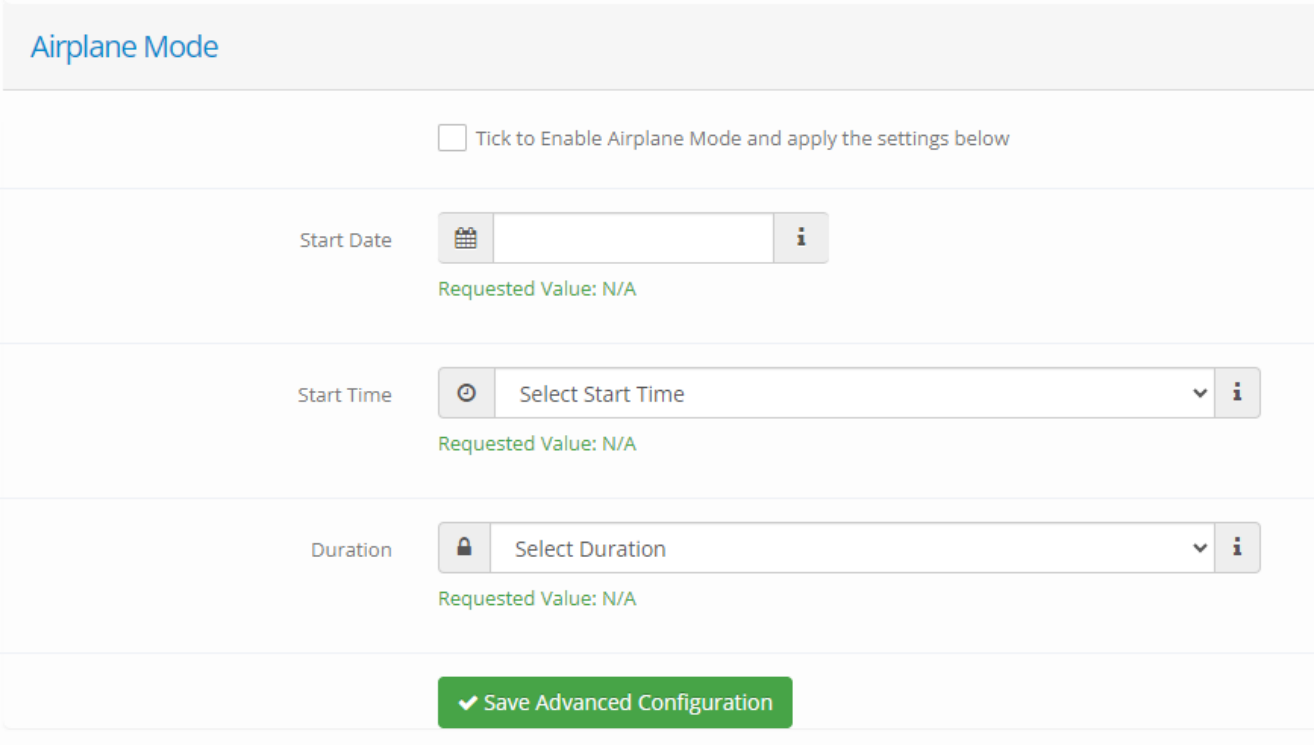
To receive impact Alarm Notifications:

- Enter the email addresses of those to receive the alarms (separated by commas or semi-colons)
- Tick the check box to enable the notifications function
- Click the Save Notification Settings button



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Appendix C SpotSee Platform



Advanced Configuration

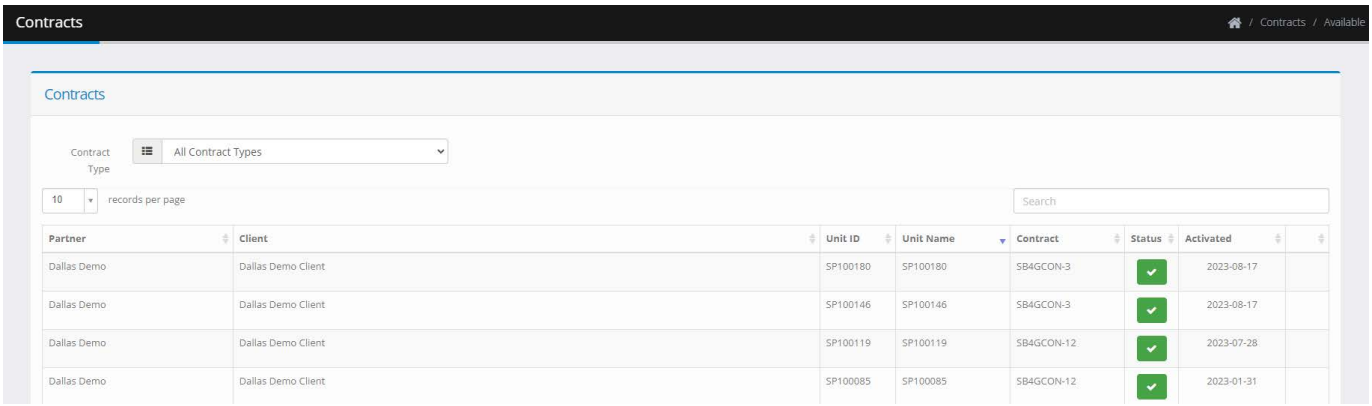
The Advanced Configuration settings allow a user to adjust:

- **Wi i Settings** - known Wifi devices and passwords that the device may communicate with along its journey
- **Airplane Mode** - period when device will be in-flight and should not utilize cellular communication.

Appendix C SpotSee Platform

Contracts Screen

By using the Navigation Bar to enter the Contracts Screen, users are able to view Available and Allocated Contracts and make edits or changes to this allocation. The Contracts Screen provides a simple view of the contract length associated with each ASSET owned by the CLIENT.

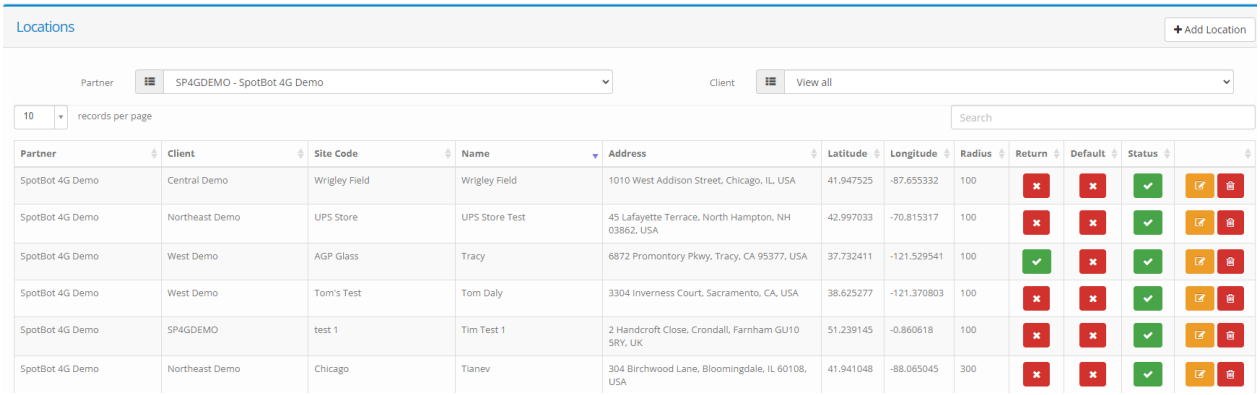


- **Contract:** Service contract associated with the device (3 Month, 6 Month, or 12 Month)
- **Status:** The icons in the Status column denote the status of a contract (green check for active and red x for inactive).
- **Activated:** Date the unit/contract was activated.

The user has the ability to Unallocate, Edit, or Remove Contracts by clicking on the appropriate icons in the final column (hover cursor over the icon to determine its function).

Locations Screen

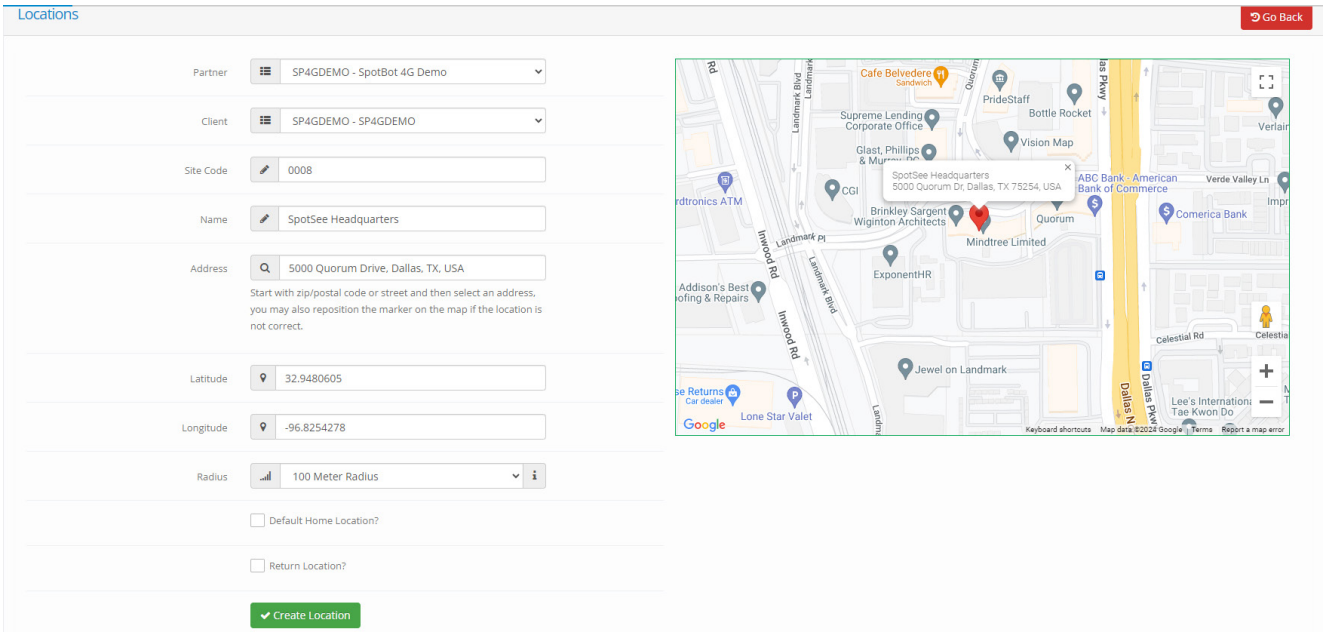
The Locations screen allows the user to set the origin point and destination point(s) for shipments. At a minimum, origin and destination LOCATIONS must be created to generate a CONSIGNMENT (or trip).



Appendix C SpotSee Platform

Add Locations

Click the +Add Location button on the Locations Screen to create a new location.



The **Site Code** and **Name** are determined by the Client. Enter the physical address (or business name) into the Address field. This field is supported by Google Maps. A pin will appear in the **Map** on the right side of the screen. The pin can be moved to the exact location desired. It is possible to use the person icon to get a street level view of the address if desired.

Latitude and **Longitude** are populated automatically and will update if the pin is moved.

Radius is determined by the Client and represents the area around the pin that will determine if the shipment is at the defined location. The radius may be set between 100-1,500 meters.

Locations may also be assigned one of the following designations:

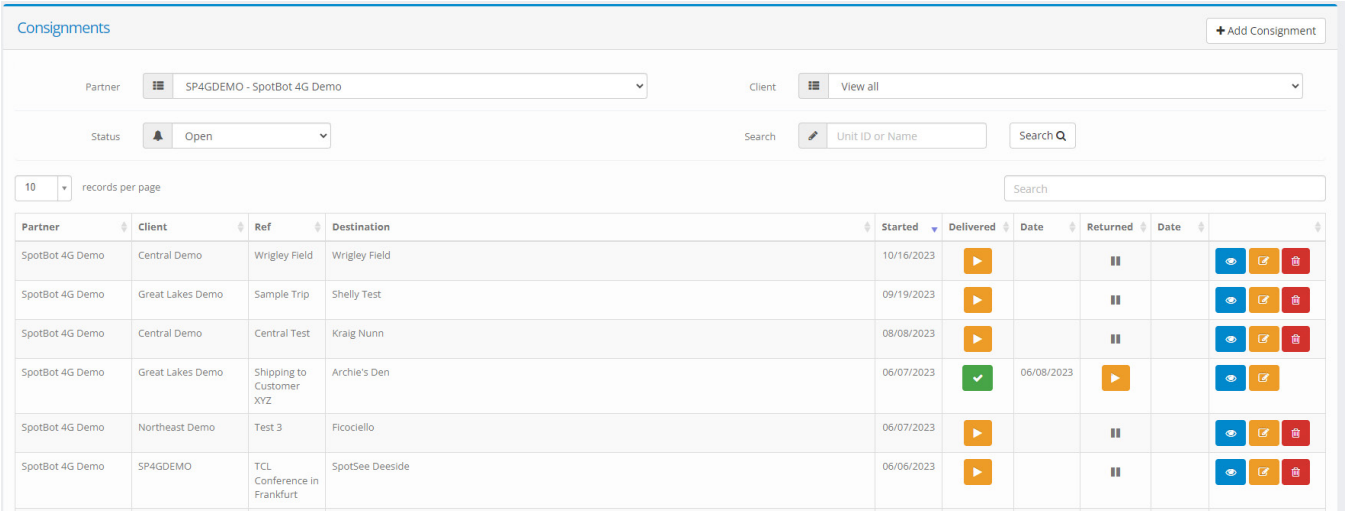
- **Default Home Location:** A user might choose this designation if it represents a point of origination for multiple Consignments.

- **Return Location:** A location where the device should be returned to if the units are in a closed supply loop. This field allows the user to know when units have returned and are available for redeployment.

Appendix C SpotSee Platform

Consignments Screen

The Consignments screen allows users to create specific trips. This screen contains information relevant to a trip: the partner, client, order reference, destination, journey start date, and status/date of delivery. In cases where the device is to be returned to its origin, the status under Returned and Date will be updated accordingly.



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Appendix C SpotSee Platform

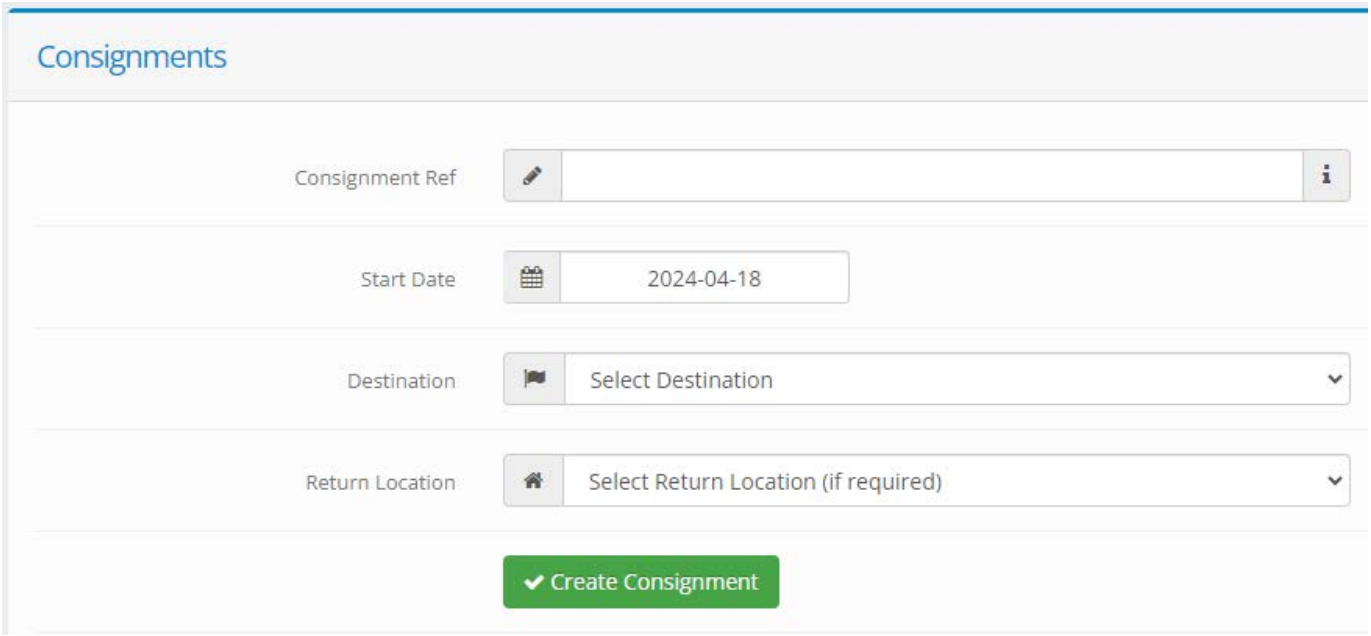
Add Consignment

To add a consignment, select +Add Consignment. The Consignment Ref field is user defined and the Client should determine a name/number that is meaning for them.

The **Start Date** defaults to the current date but should be adjusted to reflect the date that the journey is to begin, and the unit will start recording.

All Locations defined by the user will be available as options in the **Destination** and **Return Location** drop down menus. The user should select the appropriate, pre-defined, location for each. The **Return Location** is the address where the device will be returned at the end of a journey.

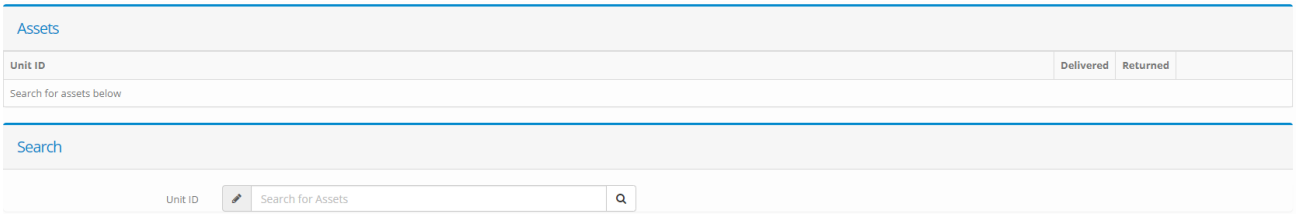
Once all the desired fields have been updated appropriately, click the **Create Consignment** button to move on to the phase of adding assets to the consignment.



Appendix C SpotSee Platform

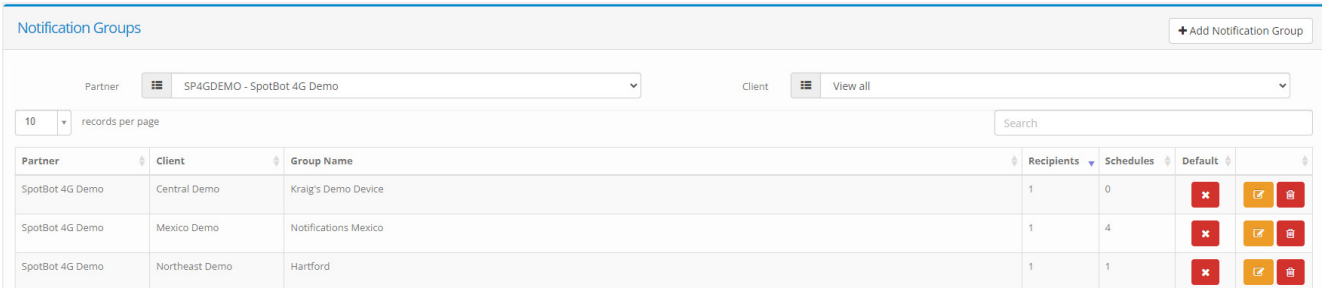
Selecting Assets for a Consignment

When the user clicks on the **Create Consignment** button an **Assets** menu will appear. This screen allows the user to search and identify the unit or units that will be used on the consignment.



Notifications Groups Screen

The Notification Groups screen provides many more notification and reporting options than the simple impact alerts that can be specified in the Notification Settings tab of the Asset Management screen. In Notification Groups, users can set up Impact, Temperature, Humidity, Transit, and Consignment reporting and alerts (as well as identify the timing and recipients for these notifications). To generate and distribute these reports to the appropriate parties, the user must first navigate to the Notification Groups screen.

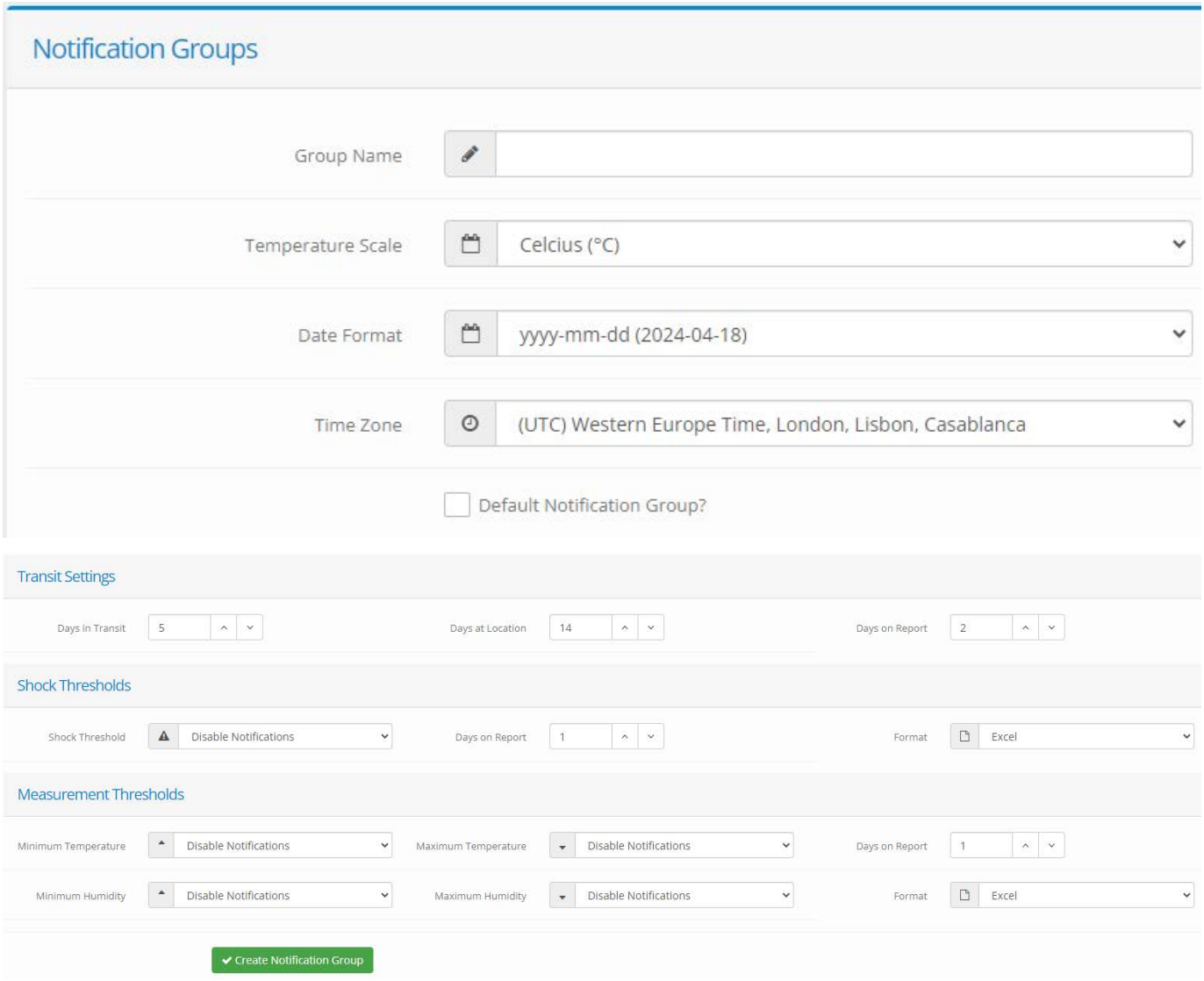


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Appendix C SpotSee Platform

Add a Notification Group

To add a Notification Group, click the +Add Notification Group button and the screen that enables configuration will appear.



Appendix C SpotSee Platform

The transit settings allow the user to easily identify consignments or shipments that are outside of the expected delivery timeframe. The user will define Days in Transit for the shipment as well as Days at Location. Days on Report references the number of days that these parameters will be monitored.

Users will also determine the monitoring thresholds for Shock, Temperature, and Humidity using the appropriate drop-down menus. For each condition the user may also choose to Disable Notifications.

The user must select the format for reporting (pdf, excel, or CSV). Once the parameters are updated, click the Create Notifications Group button. The screen that appears allows the user to identify the report recipients and define the reporting schedule.

