

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

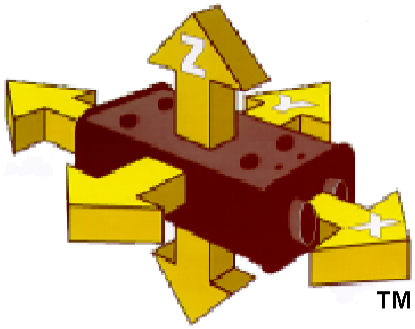
Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Visit our website - *Click HERE*

Lamerholm Electronics

ShockLog™ Manual RD298 and RD317



Version 6.0

26th March 2002

Entire contents copyright © Lamerholm Electronics Ltd 1998 - 2003

Table of Contents

Technical Support 3

Trademarks 3

Software Licence 4

Warranty 6

ShockLog™ recorder identification 7
Introduction to the ShockLog™ recorder 7
Software Versions 8
New Features 9

30 minute guide to Recording Shock and Vibration 11

Getting Started 11
Software Installation 11
Battery 13
Connecting the PC to the ShockLog™ recorder 15
Setting up the ShockLog™ recorder 16
Running the ShockLog™ recorder 17
Examining Data from the ShockLog™ recorder 19

Principles of Operation 20

Principles of RD298 ShockLog™ recorder Operation 20
RD298 ShockLog™ recorder Events 20
Principles of Micro ShockLog™ recorder Operation 23
Micro ShockLog™ recorder Events 24
Summaries 26
Time Slots 26
LED operations 27

ShockLog Software Details 29

Main window 29
Passwords 31
Password Editor 32
E-mail options 34
Security Log 36
Date/Time editor 39
Filenames 42
Attach 43
Main Tabs 44
- Monitor Tab 44
- Download Tab 47
- Download Report 51
- Online Viewer 55
- Health Check 57
- Examine Data Tab 60
- Setup Tab 62
- Setup tab (Micro ShockLog™ recorder) 67
- Setup Checklist 69
- Set Other Alarms 71
- Setup Wizard 73
- Options Tab 75
- Select Directory Window 78

Data 87
- Summaries Tab 87

Events Tab 91
Time Slots Tab 94
Hyper-Linking 95
Events 96
Time Slots 101
Exporting Data 105

HPT Sensor 115

Introduction to the HPT sensor 115
Connecting the HPT 115
Setting up your ShockLog™ recorder to use the HPT 116
Operating the ShockLog™ recorder with an HPT 117

Setup and Applications 118

Setting up your ShockLog™ recorder 118
ShockLog™ Recorder Hardware Installation 119
Air Cargo Applications 121

iButtons 122

Introduction to iButtons 122
Setting up the iButton on your PC 124
iButton Exercises 126
iButton security 130
Using the iButton with the Micro ShockLog™ recorder 132
PC utilities 133
iButton Window Read tab 133
iButton Window Program tab 135
iButton Window Passwords tab 137
iButton passwords window 138
iButton Window Download tab 139
iButton Window Bus tab 140
iButton Window status 142
iButton Trouble-shooting 143

Specifications and Declarations 145

RD298 ShockLog™ recorder 145
ShockLogTM tri-axial Shock and Vibration Monitor 145
HPT Sensor 149
RD317 Micro ShockLog™ recorder 151
RD298 ShockLog™ recorder EMC Declaration 156
HPT EMC Declaration 157
RD317 Micro ShockLog™ recorder EMC Declaration 158
Calibration Declaration 159
Spare Parts List 160
RD298 ShockLog™ recorder spares 160
RD317 Micro ShockLog™ recorder spares 160

Technical Support

Your first resource for Technical Support is the manual and the Help facility. If you can't find the information, you need try using the *Find* tab in the Windows on line help. This will build an index of all the words in the Help file and should allow you to find the information you need.

If you still are unable to resolve your problem, the best course of action is to Email our help desk. To enable us to resolve your problem quickly make sure your email contains the following information:

- Your name, your company name and a return email address.
- ShockLog serial number (stamped into the underside of the case at the connector end and displayed in the *Examine Data* tab for each file).
- ShockLog PC software version (displayed on the PC software Help/Help About window).
- ShockLog PC software serial number (displayed on the installation CD case).
- ShockLog code version and type (displayed on the *Monitor* tab once the ShockLog is sending status messages to the PC).
- A description of the problem.
- A relevant data file (if any) as an attachment.

Our email address for Technical Support is:
help@lamerholm.com

Our telephone number is:
(from the UK) 01462 481396
(from outside the UK) 044 1462 481396

The (snail) mail address is:
Lamerholm Electronics Ltd.,
The Pixmore Centre,
Pixmore Avenue,
Letchworth,
Herts.
SG6 1JG
England.

Trademarks

ShockLog is a registered trademark of Lamerholm Electronics Ltd.

Microsoft, Windows, Windows 95, Windows 98, Windows NT, Excel, Exchange, OutLook Express, Internet Explorer are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

Dallas Semiconductor, 1-Wire, DS, all device numbers, iButton, Memory Button, MicroLAN are either registered trademarks or trademarks of Dallas Semiconductor Corporation.

DURACELL and PROCELL are registered trademark of Duracell, Incorporated.
Netscape, Netscape Certificater Server, Netscape FastTrack Server, Netscape Navigator, Netscape ONE, SuiteSpot, and the Netscape N and Ship's Wheel logos are registered trademarks of Netscape Communications Corporation in the United States and other countries. Netscape Communicator are also trademarks of Netscape Communications Corporation, which may be registered in other countries.

QUALCOMM is a registered trademark and registered service mark of QUALCOMM Incorporated. Eudora is a trademark or registered trademarks of QUALCOMM Incorporated.

Intel and Pentium are either registered trademarks or trademarks of Intel Corporation.

Other product and company names mentioned herein may be the trademarks of their respective owners.

Software Licence

LAMERHOLM ELECTRONICS LTD

SOFTWARE LICENCE

By installing upon your computer the Software supplied with the ShockLog™ system you are deemed to have read and accepted all the terms of this Licence and you and your employees will be bound by the terms of this Licence. If you do not wish to accept the terms return the Software in its package unopened to Lamerholm Electronics Limited or its agent from whom you have obtained this package and any Licence fee you may have paid will be refunded.

Software Licence

The Licensor is Lamerholm Electronics Limited registered in England under company number 4581024 and whose registered office is at The Pixmore Centre, Pixmore Avenue, Letchworth, Hertfordshire, SG6 1JG England.

The customer using the Software with the licensor's ShockLog™ system is referred to as the Licensee.

1. **Acceptance and Entitlement**

1.1 The terms of this Licence are accepted by the parties by the Licensor despatching the Software to the Licensee and by the Licensee installing the Software upon his computer.

1.2 The Licence entitles the Licensee to install as many copies of the Software on as many computers as the Licensee chooses, subject to the restriction that the Software is solely used for the purpose of controlling hardware manufactured by the Licensor or by manipulating data acquired by such hardware.

1.3 The Licensee is granted a non-exclusive, non-transferable Licence to use the Software and the operational manuals relating to the Software subject to the restrictions in this Licence.

2. **Restrictions Upon Use**

2.1 The Licensee may not:

2.1.1 Translate, adapt, vary or modify the Software.

2.1.2 Disassemble, de-compile or reverse engineer the Software provided that in the case of de-compilation, the Licensee may de-compile the Software only if it is necessary to do so in order to achieve inter-operability of the Software with another software program provided that the information obtained by the Licensee during de-compilation is only used for that purpose and is not disclosed to any third party without the Licensor's prior written consent and is not used to create any other software which is similar to the Software.

2.2 The Licensee must:

2.2.1 Supervise and control use of the Software in accordance with the terms of this Licence.

2.2.2. Ensure that its employees, agents and others who will use the Software are notified of this Licence and of its terms.

2.2.3. Reproduce and include the copyright notice of the Licensor as specified in or on the Software on all copies.

2.2.4. Not provide the Software or any part of it in any form to any person other than the Licensee's employees without prior written consent from the Licensor.

2.2.5. Not copy the printed material accompanying the Software.

3. **Warranty**

3.1 The Licensor guarantees the Software against material defects for a period of 90 days from the date of despatch to the Licensee. The Software will perform in accordance with its published specifications.

3.2 COMPUTER SOFTWARE IS GENERALLY ACCEPTED NOT TO BE ERROR FREE AND THE EXISTENCE OF MINOR ERRORS WILL NOT CONSTITUTE A BREACH OF THIS WARRANTY.

3.3 IN THE EVENT THAT THE LICENSEE DISCOVERS MATERIAL ERRORS WHICH SUBSTANTIALLY AFFECT THE USE OF THE SOFTWARE WITHIN THE WARRANTY PERIOD, THE LICENSOR WILL USE REASONABLE ENDEAVOURS TO CORRECT SUCH ERRORS, PROVIDED THAT SUCH ERRORS HAVE NOT BEEN CAUSED BY ANY MODIFICATION, VARIATION OR ADDITION TO THE SOFTWARE NOT PERFORMED BY THE LICENSOR OR HAVE BEEN CAUSED BY THE INCORRECT USE OR ABUSE OR CORRUPTION OF THE SOFTWARE OR BY USE OF THE SOFTWARE WITH OTHER SOFTWARE OR NOT IN CONJUNCTION WITH THE SHOCKLOG™ SYSTEM OR ON INCOMPATIBLE EQUIPMENT OR CONTRARY TO THE PROVISIONS OF THE USER MANAL.

3.4 THE LICENSOR DISCLAIMS ALL OTHER WARRANTIES WITH RESPECT TO THE SOFTWARE WHETHER EXPRESS OR IMPLIED INCLUDING ANY IMPLIED WARRANTY OF SATISFACTORY QUALITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

3.5 THE LICENSOR HAS SCANNED THE SOFTWARE FOR VIRUSES PRIOR TO DESPATCH BUT THE LICENSEE IS SOLELY RESPONSIBLE FOR VIRUS CHECKING THE SOFTWARE ONCE INSTALLED.

3.6 NO WARRANTY IS GIVEN AND THE SOFTWARE IS NOT AUTHORISED FOR USE AS A CRITICAL COMPONENT IN A LIFE SUPPORT SYSTEM. A LIFE SUPPORT SYSTEM IS ONE INTENDED FOR SURGICAL USE OR TO SUPPORT OR SUSTAIN LIFE. A CRITICAL COMPONENT IS ONE WHOSE FAILURE WOULD CASE FAILURE OF THE WHOLE SYSTEM AT THE RISK OF SERIOUS INJURY OR DEATH TO THE USER.

4. **Liability**

4.1 THE LICENSOR EXCLUDES LIABILITY FOR LOSS OR DAMAGE ARISING DIRECTLY OR INDIRECTLY IN CONNECTION WITH THIS LICENCE INSOFAR AS SUCH LIABILITY MAY BE LAWFULLY EXCLUDED.

4.2 THE LICENSOR EXPRESSLY EXCLUDES LIABILITY FOR INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL LOSS OR DAMAGE WHICH MAY ARISE IN RESPECT OF THE SOFTWARE AND ITS USE INCLUDING CLAIMS FOR LOSS OF PROFIT, BUSINESS, REVENUE, GOODWILL OR ANTICIPATED SAVINGS.

4.3 IF ANY EXCLUSION IS HELD TO BE INVALID AND THE LICENSOR IS LIABLE FOR LOSS THEN SUCH LIABILITY SHALL BE LIMITED TO THE SUM OF THE LICENCE FEE PAID BY THE LICENSEE FOR THE SOFTWARE.

4.4 THE LICENSOR DOES NOT EXCLUDE LIABILITY FOR DEATH OR PERSONAL INJURY TO THE EXTENT THAT CLAIMS ARISE AS A RESULT OF THE NEGLIGENCE OF THE LICENSOR, ITS EMPLOYEES OR AUTHORISED REPRESENTATIVES.

5. **Copyright**

5.1 Copyright and all other intellectual property rights subsisting in or used in connection with the Software including documentation and manuals are and remain the sole property of the Licensor. The Licensee shall not question or dispute the ownership of such rights by the Licensor.

6. **Software Indemnity**

6.1 The Licensor will indemnify the Licensee in respect of any claims that the Software infringes the copyright or other intellectual property right of any third party provided that:

6.1.1 The Licensee has not done or permitted any activity which caused such infringement, and

6.1.2 The Licensee has exercised a reasonable standard of care in protecting all rights in the Software.

6.2 The Licensee will give the Licensor prompt notice of any claims specified in 6.1.1 above and the Licensor shall have the right to defend such claims and make settlements at its own discretion.

6.3 In the event that infringement occurs, the Licensor may at is sole option and expense:

6.3.1 Procure for the Licensee the right to continue using the Software, or

6.3.2 Modify or amend the Software so that it becomes non-infringing, or

6.3.3 Replace the Software by other Software of similar capability.

7. **Confidential Information**

7.1 All information, data, specifications, documentation, software listing, source or object code relating to the Software is proprietary and confidential. The Licensee agrees that it will use this information solely in accordance with the provisions of this Licence and that it will not, at any time, disclose confidential information whether directly or indirectly to any third party without the Licensor's prior written consent.

7.2 These provisions do not prevent the disclosure or use by the Licensee of any information which is or becomes (through no fault of the Licensee) public knowledge or to the extent permitted by law.

8. **Assignment**

The Licensee may not assign or transfer the Software or this Licence without the prior written consent of the Licensor.

9. **Severability**

If any of these terms are rendered void or unenforceable by any legislation then such terms shall be severed from the remainder of the Agreement which shall remain valid and enforceable.

10. **Law**

This Licence and these terms and conditions shall be construed in accordance with English law.

Warranty

LAMERHOLM ELECTRONICS LTD

SHOCKLOG™ WARRANTY

1. **GENERAL**

In this document 'the Company' means Lamerholm Electronics Ltd and 'the Customer' means the person, firm or company purchasing the product. Goods means any hardware component supplied as part of the ShockLog™ system. No variation to these conditions shall be binding unless agreed in writing between the authorised representatives of the Customer and the Company. Any advice or recommendation given by the Company or its employees or agents to the Customer or its employees or agents which is not confirmed in writing by the Company is followed or acted upon entirely at the Customer's own risk.

2. **WARRANTY**

2.1 THE COMPANY WARRANTS TO THE CUSTOMER THAT THE GOODS ARE BELIEVED TO BE FREE FROM DEFECTS OF WORKMANSHIP AND MATERIALS AND THE COMPANY WILL REPLACE OR REPAIR AT HIS OPTION THE GOODS (OTHER THAN CONSUMABLE ITEMS) FOUND TO BE DEFECTIVE WITHIN ONE YEAR OF THE DATE OF DESPATCH WHERE SUCH DEFECTS ARE AS A RESULT OF FAULTY MATERIALS OR WORKMANSHIP.

2.2 EACH CLAIM OF THE CUSTOMER UNDER THIS WARRANTY SHALL BE SENT IN WRITING TO THE COMPANY SPECIFYING THE NATURE OF THE DEFECT. THE COMPANY WILL HAVE THE OPTION OF TESTING OR INSPECTING THE GOODS AT THE CUSTOMER'S LOCATION OR HAVING THE GOODS RETURNED TO THE COMPANY OR SUCH OTHER ADDRESS NOTIFIED, FREIGHT PRE-PAID. REPLACEMENT PARTS OR GOODS WILL BE SENT BY THE COMPANY FREIGHT PRE-PAID.

2.3 WHERE ON INVESTIGATION ANY CLAIM UNDER THIS WARRANTY IS FOUND BY THE COMPANY TO BE OUTSIDE THE SCOPE OR DURATION OF THIS WARRANTY THEN THE COSTS OF INVESTIGATION AND REPAIR (GENERALLY 15% OF ORIGINAL INVOICE PRICE OF THE GOODS) WILL BE PAID BY THE CUSTOMER.

2.4 THE COMPANY WILL NOT BE LIABLE FOR DAMAGE OR DEFECTS IN THE GOODS CAUSED BY IMPROPER USE, ABUSE, MISMANAGEMENT OR BY USING THE GOODS OUTSIDE THE SPECIFICATIONS AND INSTRUCTIONS DETAILED IN THE MANUALS AND DOCUMENTATION RELATING TO THE GOODS OR OUTSIDE THE SPECIFIC APPLICATION OF THE GOODS.

3. **LIMITATION OF LIABILITY**

3.1 THE COMPANY EXCLUDES LIABILITY EXCEPT AS PROVIDED IN CLAUSE 2 FOR ANY OTHER CONDITION OR WARRANTY EXPRESS OR IMPLIED AS TO SATISFACTORY QUALITY OR FITNESS FOR ANY PURPOSE OF THE GOODS AND FOR ALL LOSS OR DAMAGE ARISING DIRECTLY OR INDIRECTLY IN CONNECTION WITH THE SALE OF THE GOODS INSOFAR AS SUCH LIABILITY MAY BE LAWFULLY EXCLUDED.

3.2 THE COMPANY EXPRESSLY EXCLUDES LIABILITY FOR INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL LOSS OR DAMAGE WHICH MAY ARISE IN RELATION TO THE GOODS AND THEIR USE INCLUDING CLAIMS FOR LOSS OF PROFIT, BUSINESS REVENUE, GOODWILL OR ANTICIPATED SAVINGS.

3.3 IF ANY EXCLUSION IS HELD TO BE INVALID AND THE COMPANY IS LIABLE FOR LOSS THEN SUCH LIABILITY SHALL BE LIMITED TO THE SUM PAID BY THE CUSTOMER FOR THE GOODS.

3.4 THE COMPANY DOES NOT EXCLUDE LIABILITY FOR DEATH OR PERSONAL INJURY TO THE EXTENT THAT CLAIMS ARISE AS A RESULT OF THE NEGLIGENCE OF THE COMPANY, ITS EMPLOYEES OR AUTHORISED REPRESENTATIVES.

4. **INTELLECTUAL PROPERTY RIGHTS**

4.1 All and any trademarks, copyrights, patents and other intellectual property rights used or subsisting in connection with the Goods are and remain the sole property of the Company. The Customer shall not question or dispute the owners who have such rights by the Company.

5. **CONFIDENTIAL INFORMATION**

5.1 All information, data, specifications, documentation and drawings relating to the Goods is proprietary and confidential. The Customer agrees that it will use this information solely in connection with its use of the Goods and that it will not at any time disclose confidential information whether directly or indirectly to any third party without the Company's prior consent.

5.2 These provisions do not prevent the disclosure or use via the Customer of any information which is or becomes (through no fault of the Customer) public knowledge or to the extent permitted by law.

6. **SEVERABILITY**

If any of these terms are rendered void or unenforceable by any legislation then such terms shall be severed from the remainder of the Agreement which shall remain valid and enforceable.

7. **LAW**

This contract shall be governed by and construed in accordance with the Laws of England.

ShockLog system

ShockLog™ recorder identification

As this document concerns itself with two products that have differences, then the different ShockLog™ recorder units will be identified as follows:

RD298 ShockLog™ recorder	used when referring to the RD298 ShockLog™ recorder only
RD317 Micro ShockLog™ recorder or Micro ShockLog™ recorder	used when referring to the RD317 Micro ShockLog™ recorder only
RD317 Micro Humidity ShockLog™ recorder or Micro Humidity ShockLog™ recorder	used when referring to the RD317 Micro ShockLog™ recorder with humidity sensor
Unit or ShockLog™ recorder	Generic. Refers to the RD317 Micro ShockLog™ recorder and the RD298 ShockLog™ recorder.

Introduction to the ShockLog™ recorder

The ShockLog™ recorder is a small battery powered data logging system fitted with three built-in accelerometers and a temperature sensor. The design has been optimised for the measurement of shock and vibration for investigative and protective purposes on goods in transit.

Two versions of the ShockLog™ recorder are available, the RD298 ShockLog™ recorder and the RD317 Micro ShockLog™ recorder, which work together to offer analysis and protection.



The RD298 ShockLog™ recorder

This product has been in operation since 1998. The RD298 ShockLog™ recorder has increased flexibility and it can be used to analyse the environment with high detail.

The RD298 ShockLog™ recorder has part number 298….



The RD317 Micro ShockLog™ recorder

This is a product, which is smaller than the RD298 ShockLog™ recorder, with the capability of being operated with small hand held devices (iButtons). It does not require off-site PC support. The RD317 Micro ShockLog™ recorder offers high volume low cost protection.

The RD317 Micro ShockLog™ recorder has part number 317….

Software Versions

ShockLog™ PC Software

Current ShockLog™ recorders are shipped with version 6.0 PC software and version 6.0 help files. If you have an earlier version of software please contact your supplier to discuss an upgrade, or visit our web site to download the latest version.

Version History

Version 1.0 to 1.1 no HPT support.

Version 1.2 includes full support for the optional HPT humidity, pressure and temperature sensor.

Version 2.0 includes support for Independent warning, alarm and dropout thresholds for each acceleration axis, Hyper-Linking and pasting graphics to other applications.

Version 2.2 can now communicate with certain Toshiba PCs and includes the option to insert source information into the header of exported files.

Version 2.3 has improvements in the communications and warns the user if the data memory is corrupt, in association with embedded version 102.

Version 3.0 General enhancements

Version 4.0/4.01 Introduction of Download report, parameter styles options, unit options, event summary graph, online viewer and mission comment.

Version 5.0 Support for RD317 Micro ShockLog™ recorder and iButtons. Regional date/time format options. E-mail facility. Setup Wizard. No longer support Min Pk X, Y and Z.

Version 5.1 E-mail compression, select up to 8 COM ports, support DS1411 iButton bus, displays iButton date/time on iButton function Read window. Fixed Comms problem for East Asian windows systems.

RD298 ShockLog™ recorder Embedded Software

Current ShockLog™ recorders are shipped with version 103 of the ShockLog™ recorder embedded software. If you have an earlier version of software please contact your supplier to discuss an upgrade. The new features in Version 2 of the PC software will not work correctly with earlier versions of the ShockLog™ recorder embedded code.

Version 93 includes full support for the optional HPT humidity, pressure and temperature sensor.

Version 94 and 95 never issued.

Version 96 prevents security log filling up with power-on events if the battery runs down slowly, by limiting the maximum number of consecutive power-on reset entries to 5. Prevents corruption of first summary if the security is full. A bug that causes the clock to be reset when the battery is changed in December is corrected. The Max Record Time will operate correctly up to 128 seconds.

Version 97 never issued.

Version 98 includes support for Independent warning, alarm and dropout threshold for each axis X, Y, and Z. The option to always use the maximum record time.

Version 99 corrects a bug that could cause an increase in power consumption when the HPT sensor was fitted.

Version 100 never issued.

Version 101 never issued.

Version 102 checks that the data memory has been cleared correctly, and will try up to 16 times.

Version 103 corrects a date issue that would reset the ShockLog™ recorder date/time if it was powered off within 1 hour of setting the clock after 1999.

RD317 Micro ShockLog™ recorder Embedded Software

Version 100 Initial release

Version 108 Bug fixes and test/production development.

Version 109 Test/production development.

Version 110 Fixed comms problem with slow PCs.

Version 112 Test/production development.

Version 121 Dynamic auto-zero fix.

Version 128 Developments:-

Supports humidity sensor.

New temperature/humidity alarm system.

New over-range alarm system.

New Health Check facility.

Supports new User ID iButton

Transmits Micro ShockLog recorder model to the Monitor tab.

Fixes:-

Unit would lock-up if communicating while recording events.

Download data iButton now indicates invalid data if iButton removed part way through data transfer.

Cleared problem where communications would stop working.

New Features

Version 6.0 consists of developments to support the new Micro ShockLog™ recorder features (version 128) as well as some bug fixes. The changes are as follows:

Alarms on temperature and humidity

This provides the facility to set humidity and/or temperature alarms. You can specify a high and/or low limit, beyond which an alarm will be activated. If an alarm has been activated, the alarm will be visible on the Micro ShockLog™ recorder by the alarm LED, on the *Monitor* tab, in the *Summaries* table and on the Download Report. See the Other Alarms topic on setting the alarms and the *Monitor* Tab , *Summaries* Tab and the Download Report topics for reading the alarms.

Over-range shocks

This feature is permanently activated and detects if the Micro ShockLog™ recorder has exceeded its operational limits i.e. 100g acceleration, -40°C and +85°C temperature limits. If these limits are exceeded, then an LED sequence is activated on the iButton LEDs. See the LED operations topic for more information. Note that the 100g detection is not enabled on a 10g unit as it is not capable of measuring 100g, but is capable of operating up to 100g.

Calibration date warning

When a setup is sent to the ShockLog™ recorder the calibration date within the unit is checked. If the calibration period is near or past the expiry date, a warning message is displayed at the end of the setup. As this is a new feature, not all ShockLog™ recorders will contain a calibration date, and thus cannot be assessed.

Health check

This is a new facility on the Micro ShockLog™ recorder that allows the user to test the functionality of the ShockLog™ recorder to check that it is okay for the next mission. It has been developed from the factory production tests. See the Health Check topic for more information.

E-mail data protection act

When sending an e-mail to technical support, a message box appears explaining the purpose of the data and information. The user can either continue or cancel the e-mail.

User ID iButton

A new iButton is now available, which identifies a user by a number and is logged in the security log. This provides a system to identify who has been operating the Micro ShockLog™ recorder. See the iButton Window Program tab topic for more information.

Micro ShockLog™ recorder variant information

The Micro ShockLog™ recorder now sends the information about itself to the Monitor tab i.e. 10g/100g/humidity. This information is also present in files downloaded with the latest code. See the *Monitor* Tab topic for more information.

Setup file name extensions

The setup files for the RD298 ShockLog™ recorder and the RD317 Micro ShockLog™ recorder are now distinguishable by their extensions. The RD298 ShockLog™ recorder setup files are now named *.setup298, and the RD317 Micro ShockLog™ recorder are now named *.setup317. The old file names *.sl_setup can still be used. A facility on the Options tab can rename old files to the new names. See the *Options* Tab topic for more information.

Summaries table and RD298 OEM ShockLog™ recorder

Although the RD298 OEM ShockLog™ recorder is no longer supported, the summaries table can now display data concerning the OEM recorder. See the Summaries Tab topic for more information.

Event temperatures displayed on Download Report

The events table (top right corner) now displays the temperature when the event occurred. This is not available for data downloaded from an iButton. See the Download Report topic for more information.

Time Slots graph fix

When displaying data with less than 64 slots on a slot graph, the slot graph would only display some of the data. This was a particular problem on the Download Report, where the data viewed cannot be adjusted. Also when altering the viewing date/time on the download report with any data, the slot graph did not display the data to a useful time scale.

IButton in East Asian windows systems

The iButton can now be used on Windows systems that do not have extended ASCII. It has always worked on Windows systems with the extended ASCII capability.

Print out information

Any print outs from this software will now have information describing the data source. See the Printer Options Window topic for more information.

Additional advice concerning COM port communications

Problems can occur if the PC/COM port interface is slow. This can still occur on fast PCs and is dependent upon the hardware architecture, for example, using a COM port on a PCI plug-in card is slower than a built in COM port.

Many applications, processes or services running on a slow PC can cause problems.

Number of graphs on Time Slots graph

The slot graph will display the number of parameters recorded, up to a maximum of 4. For example, if you have only 2 parameters recorded, then the Time slots graph will initialise with just those 2 graphs. If you have 4 or more parameters, then the Time slots graph will initialise with 4 graphs. This also applies to the time slots graph on the Download Report.

Clipboard Management

The software will now clear the Windows clipboard when it is closed. This only happens if the item on the clipboard has originated from the ShockLog software.

Printers on COM ports

Setting printers on COM ports can interfere with ShockLog™ recorder communications. The type of problem depends upon the operating system you are using.

Windows 95/98/Millenium

On Windows 95/98/Me systems, if there is no printing activity on this port then there should be no problems.

If you have the ShockLog software running and try to print on this port, Windows will notify you that the printer could not print.

If you are printing on this port, and start the ShockLog software, then the ShockLog software will notify you that the COM port is not available.

Windows NT4/2000

If you have a printer setup for the COM port you wish to use, then it will not allow the ShockLog software to use the port, even if a printer is not connected or dormant.

30 minute guide to Recording Shock and Vibration

Getting Started

This Chapter of the manual tells you how to get up and running in the least possible time.

We recommend that you read the complete text of each topic and then carry out the operations it describes. This method will give the optimum balance between theory and practice and familiarise you with the ShockLog™ recorder and its software without making too many mistakes.

Familiarisation with the iButton for the Micro ShockLog™ recorder is dealt with in separate topics, which are Setting up the iButton on your PC topic and the iButton Exercise topic.

Software Installation

The ShockLog™ recorder is controlled by software which runs on a standard PC under either the Microsoft Windows 95, Windows 98, Windows NT 4.0 (updated with service pack 3), Windows Me and Windows 2000 operating systems. Do not try to install the software under earlier versions of Microsoft operating systems - it will not work.

The software will run with any processor that supports an approved operating system but for acceptable performance a 75MHz Pentium processor with at least 16M bytes of RAM is recommended.

The software is delivered on a CD-ROM, although floppy disks can be created or obtained from the company if required.

The installation program creates the ShockLog directory and the Data and Setups sub-directories on your computer, in which some demo and example files will be placed. The ShockLog™ program and help files are installed in the ShockLog directory. The program also installs all the files necessary for iButton operations and e-mail file compression.

Step by Step Software Installation

Stop any programs currently running on your computer. If you are installing from your CD-ROM drive, follow the CD-ROM instructions. If you do not have a CD-ROM drive on the computer on which you intend to install the software then follow the Floppy Disk Installation instructions.

During the installation process, (if you have an older version of Windows 95), you may be asked to approve the replacement of out of date system files on your computer. The ShockLog™ software will not run unless the files are updated. This activity is normal practice and is unlikely to cause problems. If you are concerned then consult your company IT experts.

If the setup requires restarting the computer, it is advisable to do so immediately. When Windows restarts, the setup will run again to complete the installation. To ensure that this works correctly, the installation CD-ROM should be left in the drive, or if using floppy disks, Floppy Disk 1 is inserted after the operating system starts and before Windows starts.

It is always a good idea to ensure that all the valuable data on your computer is backed up before you install any new software.

The installation will prompt for a serial number, which can be found on the CD-ROM case.

CD-ROM

Insert the CD-ROM into the drive on your computer. The CD will autorun and start the installation. If the PCs auto-notification is disabled, then do the following steps:-

- Insert the CD-ROM into the drive on your computer
- Click the Windows Start button
- Click Run
- Type d:\setup.exe in the dialogue box (if your CD-ROM drive is not drive d then type x:\setup.exe where x is your CD-ROM drive)
- Click OK
- Follow the on screen instructions

Floppy Disk Installation

The ShockLog™ system is not shipped with floppy disks but does have the disk images included on the CD-ROM. If you have access to a CD-ROM drive, you can copy the ***contents*** of the directories Disk1, Disk2…, to a set of floppy disks. Label these disks Disk1, Disk2 etc. and proceed as follows.

If you have no access at all to a CD-ROM drive contact, Technical Support and we will supply a set of floppy disks. (There is a charge for this service.)

- Insert Disk1 into the floppy drive on your computer
- Click the Windows Start button
- Click Run
- Type a:\setup.exe in the dialogue box (if your floppy drive is not drive A then type x:\setup.exe where x is your floppy drive)
- Click OK
- Follow the on screen instructions

Windows 95 re-installation precautions

If you are installing on a Windows 95 system and you intend to keep the previous version of software as a backup, take these following precautions:

If you rename your 'ShockLog' folder to 'ShockLog backup' you may find that the software will install into the 'ShockLog backup' folder, despite all indications of installing into 'ShockLog'. This is believed to be a Windows 95 problem.

To avoid this happening, either you can reboot your machine after renaming the folder and before starting the new installation, or you can rename the folder to a name that does not include 'ShockLog 5.1'.

Running the Software

Click the Windows Start button

Move the mouse pointer on to Programs

Click on ShockLog 6.0 folder item and then ShockLog 6.0 icon.

Battery

A single C size cell powers the ShockLog™ recorder, and a single AA size cell powers the Micro ShockLog™ recorder. You can use either lithium or alkaline type depending on the life required and the anticipated conditions of service.

The ShockLog™ recorder is shipped with a battery in the carrying case – you will need to fit it as described in the next paragraph.

Replacing the Battery on a RD298 ShockLog™ recorder



- If the ShockLog™ recorder contains data that you wish to preserve (and has a battery with some life in it) then download the data first. This is so that the power used by the download process will not reduce the life of the new battery. Any recorded data is maintained when the battery is removed.
- Remove the battery cover by undoing the 4 securing screws. Take care not to lose the screws, washers or rubber seal.
- Remove the old battery by pulling the plastic tape.
- Fit the new battery ***making sure that it is the right way round***. Take care to position the plastic tape underneath the new battery – it is very difficult to remove the battery if the plastic tape is positioned incorrectly.
- Replace the battery cover plate, taking care to position the rubber seal correctly.
- Replace and tighten the 4 screws.

Replacing the Battery on a Micro ShockLog™ recorder



- If the ShockLog™ recorder contains data that you wish to preserve (and has a battery with some life in it) then download the data first. This is so that the power used by the download process will not reduce the life of the new battery. Any recorded data is maintained when the battery is removed.
- Remove the battery cover by undoing the single screw at the bottom, the battery should just slide out.
- Fit the new battery with the +ve end in first.
- Replace the battery cover screw.

NOTE: if you are replacing a Lithium battery with an Alkaline battery, you will need to remove the Lithium battery, wait 5 minutes and then insert the Alkaline battery.

Battery Tips and Hints

- If you insert the battery, the wrong way round the ShockLog™ recorder will not be damaged but the battery will discharge very rapidly. If you accidentally leave a battery inserted the wrong way round for more than a few seconds then ***do not use that battery*** for any application where the full battery life is required.
- If the ShockLog™ recorder appears to be operating normally (status lamps flashing and monitor messages received by PC every 10 seconds) but will not download or clear properly the battery may well be at the end of its useful life. Try fitting a new battery.
- Alkaline batteries can offer very good value but remember the restrictions on operating temperature range and life.
- If you have problems obtaining suitable batteries, contact Technical Support.

Choice of Battery Type

An alkaline battery will give about 1 month of service whereas a lithium battery will give more than 12 months of service for the RD298 ShockLog™ recorder, or 6 months service for the Micro ShockLog™ recorder. Alkaline batteries are not suitable for use over extended temperature ranges so a lithium type should always be selected if temperatures outside the range -5°C to +50°C are anticipated.

In calculating the lifetime of a battery, we have assumed that the complete event, summary and timeslot memories are filled once with data and that only one *Download* and *Send* setup operation is performed. The *Clear and Reset to Defaults* and the *Send* (setup) operations consume the most power and are the most demanding of battery performance. The *Download* function (especially for large amounts of data) also consumes a lot of battery power. If the battery is near the end of its life, do not attempt these operations at extremes of temperature.

Alkaline batteries are much cheaper than lithium types and since it is our recommendation that ***the battery should be changed at the start of any new experiment*** a significant reduction in operating costs can be achieved by their use when a series of short duration measurements are undertaken.

Note! Research has shown that many alkaline batteries offer much reduced capacity at temperatures below +10°C. If you are using alkaline batteries remember to replace them at the start of ***every*** mission. Take care even if moderately low temperatures are anticipated.

Recommended Battery Types

	RD298 ShockLog™ recorder	**RD317 Micro ShockLog™ recorder**
Alkaline:	DURACELL MN1400 (part no. 88702)	DURACELL size AA (part no. 88705)
(Restricted temperature range -5°C to +50°C.)		
Lithium:	Hawker Eternacell T52/7BA1 (part no. 88704) Sonnenschein SL2770	Hawker Eternacell T06/8AA1 (part no. 88706)

Acceptable Battery Types

Alkaline:	LR14	LR6
Lithium:	C size lithium thionyl chloride 3.6V nominal voltage	AA size lithium thionyl chloride 3.6V nominal voltage.

If your ShockLog™ recorder is supplied with a battery this will usually be marked 'DURACELL PROCELL'. This is the same as a copper coloured DURACELL from a retail shop.

WARNING

The recommended lithium battery is classed as restricted by European and worldwide carrier organisations. Consult your carrier before shipping a ShockLog™ recorder with a lithium battery by air. A smaller lithium battery and an adapter can be used for certain applications, to comply with safety regulations. Check with Technical Support for details. Refer to Air Cargo Applications topic.

Connecting the PC to the ShockLog™ recorder

Connect the ShockLog™ recorder to the PC serial port using the supplied communications lead.

RD298 ShockLog™ recorder: Connect the 7-pin socket on the lead to the connector marked ‘B’ on the ShockLog™ recorder. The ShockLog™ recorder will not be damaged if you attach to the wrong connector but it will not communicate with the PC.

RD317 Micro ShockLog™ recorder: Connect the jack plug on the lead to the connector socket on the ShockLog™ recorder.

If you know nothing at all about PC serial ports the documentation which came with your PC may help you to locate the correct sockets on the PC. On most machines the 9-pin D plugs on the ShockLog™ recorder, lead will only fit one or two sockets on the PC and these will be the COM port(s).

You may have heard that you must remove power from your PC and other equipment before connecting via the serial ports. The ShockLog™ recorder complies with European (CE) requirements and it is not necessary to remove power from it before connecting it to a PC. Almost all PCs comply with European or similar requirements and do not require you to switch them off before making connections to the serial port.

If the ShockLog™ recorder has a good battery then one or more of the lamps will be flashing – if not then go back to the Battery topic.

Start the ShockLog™ software on the PC. (Click Start then Programs then ShockLog V6.0, then ShockLog V6.0.)

Click the button *1* on the ShockLog™ start up screen

The ShockLog™ working screen will appear with the *Monitor* tab selected.

(It is possible that your ShockLog™ software may have been configured for offline working – if this is the case then the first two buttons on the start up screen will be greyed out and will not operate. Click the third button on the start up screen and the working screen will appear with the *Examine Data* tab selected. Click on the *Options* tab then select Com1 or Com2 in the Serial Port box to match the serial port you have used for the ShockLog™ recorder. Now click the *Monitor* tab.)

The status message at the bottom of the ShockLog™ screen will say 'ShockLog on Com 1' (if using Com port 1 foe example). If the PC and the ShockLog™ recorder are communicating correctly, the monitor display will be updated once every 10 seconds. The PC will beep (most PCs beep, some do not) to indicate that the display has updated and the box labelled 'Seconds since last contact' will be set to zero. If this updating process is not operating you must locate and correct the problem before attempting to perform any other communication dependent functions. (You can examine data already downloaded even if the PC and the ShockLog™ recorder are not communicating.)

To gain a full understanding of the *Monitor* tab functions you can jump to that topic to study it now.

Setting up the ShockLog™ recorder

You can configure the ShockLog™ recorder for exactly the kind of measurements that suit your application. For a detailed explanation of how to set up the ShockLog™ recorder, study the *Setup* tab topic.

If you just want to get used to using the ShockLog™ recorder, and don't want to learn the details of defining a custom setup right now you can use the default setup built-into the ShockLog™ recorder.

Alternatively, you can try the Setup Wizard, which has an extensive help facility to assist you in setting up your ShockLog™ recorder.

Running the ShockLog™ recorder

This procedure will destroy any data stored in the ShockLog™ recorder - make sure that you are authorised to do this before you start. These instructions assume that passwords have not been enabled. If they have (messages will appear requesting device specific passwords when you attempt any operations in the *Download* tab) then study the Passwords topic for details of the ShockLog™ recorder password system.

Select the *Monitor* tab. Now compare the two boxes labelled 'ShockLog Time and date' and 'PC Time and date'. If the times and dates are different by more than a few minutes then you should reset the ShockLog™ recorder clock.

(To reset the clock, select the *Download* tab and click on the *Set Clock* button. You will be asked to confirm that you want to reset the clock and to acknowledge that the process has completed. Click the *Monitor* tab.)

RD298 ShockLog™ recorder: If the ShockLog™ recorder clock is wrong (it gets reset to 1/1/1990 if the power is removed for more than about 1 hour), the ShockLog™ recorder may never start recording because the factory default recording start time is in 1997. Study the *Setup* tab topic for a more detailed explanation of these settings.

The main controls for the ShockLog™ recorder are located in the *Download* tab. You can check out that topic now for a detailed explanation of how it all works or you can just follow the instructions below to get started quickly.

Click the *Clear and reset to defaults* button. This will erase any data stored in the ShockLog™ recorder and return the setup to the factory defaults stored in the ShockLog™ recorder. These are good settings for some tabletop experimentation but will usually require some adjustment for any specific project.

A window will appear headed 'Clear and reset to defaults'. Click the *Yes* button. The attach window will appear briefly (usually for no more than 10 seconds) and then an information window headed 'ShockLog clear and reset'. Click the *Yes* button on this window. After about 30 seconds (the time it takes to clear all the ShockLog™ recorder memory), the attach window will re-appear to check and correct the ShockLog™ recorder's clock.

RD298 ShockLog™ recorder

Click the *Monitor* tab. There should be 0 Warnings, 0 Alarms and the Status should be 'Waiting: No recorded data'. If you waited a long time (more than 20 seconds) before checking the *Monitor* tab a recording may have started and these readings might be different. The green LED should be flashing once every 10 seconds.

Wait until the Status changes to 'Running: Recorded data available'. The green LED should be flashing once every 5 seconds. Carefully and gently, place the ShockLog™ recorder on your mouse mat. Lift the battery cover end about 2cm above the mouse mat and let it go. After 30 seconds, you should see the Monitor tab display change to indicate a Warning or an Alarm. If you got a warning then the Red and Green LEDs should be flashing, if an Alarm then just the red LED. For LED reference, see LED Operations .

RD317 Micro ShockLog™ recorder

Because of the setup start date set in the Micro, the Micro will not start running until 2050, so we need to start it manually. This can be done by clicking on the *Start* button on the *Download* tab. You will get 'Start ShockLog' message box, click *Yes*. When it has finished starting, click *OK* on the following message box.

Click the *Monitor* tab. There should be 0 Alarms and the Status should be 'Waiting: No recorded data'. If you waited a long time (more than 20 seconds) before checking the *Monitor* tab a recording may have started and these readings might be different. The green 'pwr' LED should be flashing once every 8 seconds.

Wait until the Status changes to 'Running: Recorded data available'. The green 'pwr' LED should be flashing once every 4 seconds.

For the 10g Micro ShockLog™ recorder, carefully and gently, place the ShockLog™ recorder on your mouse mat. Lift one side about 3cm above the mouse mat and let it go. For the 100g model, raise the ShockLog™ recorder 4cm above the mouse mat and drop it.

After 30 seconds, you should see the display change on the *Monitor* tab to indicate an Alarm. Just the red 'alarm' LED flashing every 4 seconds. For LED reference, see LED Operations .

Now you have some test data stored in your ShockLog™ recorder you are ready to download it to your PC.

Downloading data

Select the *Download* tab and click the *Download data* button. A box headed 'Enter user file name' will appear. Type the name 'mousemat1' into the text box and press the return key or click the *OK* button. The download checklist will appear and the PC will start to download data from the ShockLog™ recorder. Messages about the download progress

will appear in bold type in the status box and other messages about the status of the communications system may appear in the status line at the bottom of the ShockLog™ window. When the download is complete, a message box will appear headed ‘Data Downloaded’. The box tells you the name of the file where the data has been stored. (You do not need to remember this file name – for a detailed explanation of ShockLog™ file names and extensions, study the Filenames topic.)

Click *No* on the Data Downloaded box. This will not present the Download Report window, which is a single page presentation of the data, and more information can be found in the Download Report topic.

Examining Data from the ShockLog™ recorder

Once you have downloaded data from the ShockLog™ recorder to your PC then you can analyse it using the functions in the *Examine Data* tab. For full details of all the functions study that topic – for a quick tour follow the instructions below to look at the data recorded by the ShockLog™ recorder during your mouse mat drop test.

Make sure the *Examine Data* tab is selected. You will see a table of the data files available on your PC. The last entry in that table should have the User comment 'mousemat1'. Position the mouse pointer on that row and double-click. (Several other columns need not concern you now – for full explanation study the *Examine Data* tab topic.)

The display will change and show three new tabs labelled *Summaries*, *Events* and *Time Slots*. Click the *Events* tab and a table of the shock events recorded in your data file will appear. For a complete explanation of the functions available, study the *Events* tab topic. If you performed the mouse mat experiment just right there will be one event in the table. Position the mouse pointer on that row in the table and double-click. (If there are several events then select and double-click the one which occurred at the right time for your mouse mat drop.)

A new window will open which displays the event data as a graph. You should see from your mouse mat experiment a large acceleration on Z and much smaller accelerations recorded for X and Y. The graph window offers several functions for examining your shock data in more detail – for a full explanation study the Event Graph topic.

Now you have successfully recorded, downloaded and examined shock data with your ShockLog™ recorder, that completes the Getting Started section of this document. To really know the ShockLog™ recorder and how to get the best from it study the topics listed under 'ShockLog™ recorder details' and experiment with the instrument.

ShockLog™ recorder Details

Jump to these topics to learn about the details of ShockLog™ recorder operation.

Monitor tab

Download tab

Examine Data tab

Setup tab

Options tab

Parameter Units

Online Viewer

Summaries tab

Events tab

Event Graph

Event Summary graph

Time Slots tab

Time Slot Graph

Download Report

Security Log

Filenames

Attach

RD298 Hardware Installation

Passwords

Principles of Operation

Principles of RD298 ShockLog™ recorder Operation

The ShockLog™ recorder is based on a high performance low power microprocessor with 32k bytes of internal program flash memory and 2M bytes of external flash memory for data storage. 128 k bytes of external Ram memory are used to buffer data before storing it in the non-volatile flash memory.

When it is operating, the processor uses too much power to give a satisfactory battery life so it is kept in a low power sleep mode as much as possible. A very low power clock chip keeps track of the time and date and wakes the processor once every second. The processor wakes up to perform various housekeeping tasks due to these regular alarm calls and returns to sleep again as quickly as possible. The basic housekeeping tasks are:

every second	keep track of time
every 5 seconds	flash LEDs, read and reset peak hold circuits
every 10 seconds	possibly update time slots, transmit monitor message, possibly attach to a PC and do RMS readings
every 1 minute	read external humidity, pressure and temperature sensor (if fitted)
every 10 minutes	check internal temperature, re-calibrate, and possibly update summary

The primary sensors for the ShockLog™ recorder are its three built-in piezo electric accelerometers. The signals from these are amplified and filtered by several analogue circuits that must remain powered all the time. These analogue circuits are configured by the processor to have the correct gain and response for the ShockLog™ recorder setup chosen by the user. Their outputs are routed to a multi-channel Analogue to Digital converter in the microprocessor. The amplified and filtered signals from all three accelerometers as well as the signal from the external input on connector B is compared with a threshold level (the wake threshold). If the threshold is exceeded the processor will be woken up and will start monitoring the signal levels at the rate of 4096 samples per second. If the level of any of the signals exceeds the warning or alarm thresholds, (and various other conditions are satisfied), the ShockLog™ recorder will start recording an Event.

The processed analogue acceleration signals are also routed to an analogue peak hold system which stores the largest signal seen on each accelerometer. This peak hold system is measured and cleared by the processor every 5 seconds and the data from it is the key input for the Time Slot view of the acceleration data.

The ShockLog™ recorder records acceleration and other environmental data in three ways simultaneously – Summaries , Events and Time Slots . A fixed amount of memory is allocated to each recording method.

RD298 ShockLog™ recorder Events

When accelerations over a user-determined threshold occur, the ShockLog™ recorder will record an event. The sample rate, duration and memory allocated to the event record are determined by the way the ShockLog™ recorder has been set up and partly by the nature of the event itself. Event records are a short snapshot of a critical period.

The important factors that control event recordings are:

Wake up

The ShockLog™ recorder conserves battery energy by keeping its microprocessor in a low power sleep mode as much as possible. When an event occurs it takes about 1mS for the processor to wake up and start measuring – this means that the first 1mS of the event is lost. In many applications, an event will be preceded by accelerations at a lower level. If the processor wakes up it will not then miss the beginning of the event. The wake up is usually driven by the levels on the accelerometers (set by the wake up threshold) but can be controlled by levels on the Ext1 analogue input on connector B for special applications. Wake up driven by Ext1 is not implemented on the current software release so all the options in the Wake Up box are greyed out to indicate that they can not be altered.

Thresholds

Four thresholds determine the characteristics of event recording. All four are set as percentages of the range set in the *Range* box on the *Setup* tab. For example: if the range is set to 10g and the wake threshold to 15%, the wake level will be 10 * 15/100 = 1.5g. The wake up threshold is the same for all three axes but you have the option of using different warn, alarm and drop out thresholds for each axis.

The *Acceleration wake* threshold sets the level at which the processor will be woken from its sleep mode and will be ready to record an event with no further delay. If you set this level too low the ShockLog™ recorder may spend too great a proportion of its time awake and the battery life will be drastically reduced. Never try to set a level below 5% (try to keep above 10%) and always set the level at the highest acceptable if battery life is a concern.

The *Acceleration warn* threshold sets the level at which event recording will start if the section of memory reserved for warn level events is not full. You should always set the warning threshold higher than the wake threshold.

The *Acceleration alarm* threshold sets the level at which event recording will start if the section of memory reserved for alarm level events is not full. You should always set the alarm threshold higher than the warn threshold.

The *Acceleration drop out* threshold sets the level at which event recording will stop (subject to RAM buffer availability and the Max Record Time setting). Never try to set a level below 5% or above the warn or alarm thresholds.

Record Length

When the ShockLog™ recorder records an event, it always uses 32k bytes of volatile RAM memory to do so. The event is then checked for significance (is it a warn or alarm) and transferred to non-volatile FLASH memory. When the event data is transferred, it may be optionally compressed to allow a larger number of events to be stored. This compression process reduces the sample rate of the stored data but does preserve the maximum and minimum values of all the data. If you need to store a large number of events select a shorter record length – the number of events that will be stored for the memory you have in your ShockLog™ recorder, and the record length you have selected, is displayed in the Max no. of Events box.

Max Record Time

When the ShockLog™ recorder records an event, it always starts sampling at 4096 samples per second. If the event has stopped, the event recording will stop after 1 second. If the event has not stopped then event recording will continue until either the Max Record Time is reached or the event stops. Each time the event time is ‘stretched’ the effective sampling rate is halved by combining samples in groups. The event length may also be stretched if several events occur in a short time interval and the ShockLog™ recorder runs out of RAM memory to buffer the events. The event length is never stretched beyond the Max Record Time you set. If you tick the *Always Max* box in the *Setup* tab then all events will be stretched to the Max record Time.

Implications of the Event recording Technique

The processor will start an event, sampling data at 4096 samples per second. As it is doing this, it will sort the data into pairs of successive readings in maximum/minimum order. If the event finishes after 1 second, the 2048 pairs of samples will be saved in a buffer to be checked and transferred to flash memory.

If the event continues, the processor will still sample at 4096 samples per second but will now collect data for a further second and group it into 1024 pairs, where each pair is the maximum and minimum of 4 successive samples. At the same time, the previous 2048 pairs of data (representing the first second) are compressed to 1024 pairs where each is the maximum and minimum of two successive pairs, or 4 successive original data samples. At the end of this stage, the two seconds-worth of data is represented by 2048 maximum and minimum pairs, each representing 4 data samples. This process will continue until either the event stops, (and a buffer is free to save it), or the maximum record time is reached.

If an event is stretched to the maximum length of 128 seconds the number of pairs stored per second of the event is 2048/128 = 16 so the effective sampling rate is 16 samples per second.

If the Record Length has been set to 32 k bytes, no further data compression will be required. The data will be checked to be sure that it does exceed either the warning or the alarm thresholds, and stored in flash memory.

If the Record length is shorter than 32 k bytes, it will be compressed by more pairing to reduce the size of the event record by a factor of 2,4,or 8. This can reduce the effective sampling rate to as low as 2 Hz.

The ShockLog™ recorder presents this event data in a unique way – because each data point is a maximum/minimum pair the error in that data point can be estimated. If the errors (difference between the max and min for a point) are small, the reduced sampling rate has not lost any data. If the errors are large, it is still possible to evaluate the largest accelerations applied to the ShockLog™ recorder. This data-processing technique allows the ShockLog™ recorder to measure large numbers of events of varying length whilst using reasonable amounts of memory and with minimal probability of losing data or providing misleading results.

Effective sampling rates for different Record duration and Lengths

Event duration	Record length = 32k	Record length = 16k	Record length = 8k	Record length = 4k
1	2048	1024	512	256
2	1024	512	256	128
4	512	256	128	64
8	256	128	64	32
16	128	64	32	16
32	64	32	16	8
64	32	16	8	4
128	16	8	4	2

Principles of Micro ShockLog™ recorder Operation

The Micro ShockLog™ recorder is based on a high performance low power microprocessor with 128k bytes of internal program flash memory and 512k bytes of external flash memory for data storage. When it is operating, the processor uses too much power to give a satisfactory battery life so it is kept in a low power sleep mode as much as possible. A very low power clock circuit keeps track of the time and date and wakes the processor once every second. The processor wakes up to perform various housekeeping tasks due to these regular alarm calls and returns to sleep again as quickly as possible. The basic housekeeping tasks are:

every 2 seconds	keep track of time
every 4 seconds	check the iButton, flash LEDs if running, read peak hold circuits.
every 8 seconds	flash LEDs if waiting or stopped.
every 10 seconds	possibly update time slots, transmit monitor message, possibly attach to a PC, do RMS readings and read and reset peak hold circuits.
every 2 minutes	Check humidity sensor (if fitted), and possibly write a temporary summary record.
every 10 minutes	check internal temperature, re-calibrate, and possibly update summary.

The primary sensors for the Micro ShockLog™ recorder are its three built-in piezo electric accelerometers. The signals from these are amplified and filtered by several analogue circuits that must remain powered all the time. These analogue circuits are configured by the processor to have the correct gain and response for the ShockLog™ recorder setup chosen by the user. Their outputs are routed to a multi-channel Analogue to Digital converter in the microprocessor. The amplified and filtered signals from all three accelerometers are compared with a threshold level (the wake threshold). If the threshold is exceeded the processor will be woken up and will start monitoring the signal levels at the rate of 1024 samples per second. If the level of any of the signals exceeds the alarm thresholds, (and various other conditions are satisfied), the ShockLog™ recorder will start recording an Event.

The processed analogue acceleration signals are also routed to an analogue peak hold system which stores the largest signal seen on each accelerometer. This peak hold system is measured by the processor every 4 seconds and the data from it is the key input for the Time Slot view of the acceleration data.

The ShockLog™ recorder records acceleration and other environmental data in three ways simultaneously – Summaries , Events and Time Slots . A fixed amount of memory is allocated to each recording method.

The Micro ShockLog™ recorder has a stopped state, which can only be activated by a Stop iButton. In this state, the Micro ShockLog™ recorder will not re-start until a Start iButton has been applied, or a Start command is received form the PC. If you stop the Micro from the PC, the Micro will start up after 30 minutes.

In the stopped or waiting state, the analogue circuits are all turned off and much less power is used.

Embedded version 128 and above

Over Range alarm

The Over Range alarm system monitors the temperature and accelerations to identify any readings outside of operational limits (±100g acceleration, –40°C and +85°C temperature). The ±100g limit cannot be monitored on 10g units, as they are built to operate up to 100g, but accelerations beyond 12g cannot be measured.

This system is only active while the unit is running. If the limits are exceeded, then an LED sequence is activated (see LED operations topic).

The temperature is monitored every 10 minutes.

The accelerations are monitored every 10 minutes (using data gathered every 2 seconds) and when an event occurs.

Humidity/temperature alarms

The data is analysed every time the recorder reads the appropriate sensor (every 10 minutes for temperature, every 2 minutes for humidity).

As a consequence of this system, summaries data are written between the prescribed summaries intervals and has a small impact on battery consumption. This has been minimised by only writing summary records if the maximum/minimum recorded data has changed within the summary period, i.e. if the minimum temperature recorded was -38°C and the temperature no longer went below this level, then there will be no additional summaries data recorded between intervals.

Micro ShockLog™ recorder Events

When accelerations over a user-determined threshold occur, the Micro ShockLog™ recorder will record an event. The sample rate and duration of the event record are determined by the way the Micro ShockLog™ recorder has been set up and partly by the nature of the event itself. Event records are a short snapshot of a critical period.

The key factors that control event recordings are:

Wake up

The Micro ShockLog™ recorder conserves battery energy by keeping its microprocessor in a low power sleep mode as much as possible. When an event occurs it takes about 1.5mS for the processor to wake up and start measuring – this means that the first 1mS of the event is lost. In many applications, an event will be preceded by accelerations at a lower level. If the processor wakes up it will not then miss the beginning of the event. The wake up is usually driven by the levels on the accelerometers (set by the wake up threshold).

Thresholds

Two thresholds determine the characteristics of event recording. Both are set as percentages of the range set in the *Range* box on the *Setup* tab. For example: if the range is set to 10g and the wake threshold to 15%, the wake level will be 10 * 15/100 = 1.5g. The wake up threshold is the same for all three axes but you have the option of using different alarm thresholds for each axis.

The *Acceleration wake* threshold sets the level at which the processor will be woken from its sleep mode and will be ready to record an event with no further delay. If you set this level too low the Micro ShockLog™ recorder may spend too great a proportion of its time awake and the battery life will be drastically reduced. Never try to set a level below 5% (try to keep above 10%) and always set the level at the highest acceptable if battery life is a concern.

The *Acceleration alarm* threshold sets the level at which event recording will start.

With respect to the ShockLog™ recorder, there are no warning levels and the drop out threshold is irrelevant as the event duration is fixed.

Max Record Time

When the Micro ShockLog™ recorder records an event, it always samples at 1024 samples per second. The Micro ShockLog™ recorder will analyse each sample to build up a max and min value appropriate to the defined Max Record Time/Sample Rate. For example, the max and min of 4 samples are used for the 512Hz sample rate data. The table below shows the Max Record Time/Sample rate relationship. The event length is always the Max Record Time, the *Always Max* box in the *Setup* tab does not affect the event duration.

Max Record Time (s)	**Sample Rate (Hz)**
4	512
8	256
16	128
32	64

Event summaries

Due to reduced memory resources, the Micro ShockLog™ recorder can store only 10 events, so it stores a summary of the events that have occurred. Event summaries data is stored for both existing events and past events and stores the information for the last 128 events. The event summaries data includes, date/time, temperature, Max X, Max Y, Max Z and Max Modulus.

Event recording technique

The Micro ShockLog™ recorder stores the first event, the 9 largest events and the summaries of the last 127 events. This means that when an event is recorded its severity needs to be assessed before it can be placed in to the events memory area.

When an event is triggered, the event is recorded and stored in a buffer. Its modulus (resultant of all 3 vectors) is continually analysed to determine if this event is one of the 9 largest events. If it is, then it will replace the smallest of the largest events. If it is not big enough, the data will be discarded. All events, regardless of their severity, will be recorded in the event summaries, maintaining the last 128 events.

The Micro ShockLog™ recorder can record back-to-back events without loss of data, and if the last $1/8^{th}$ of an event exceeds the alarm acceleration level, then a follow on event will record immediately after.

The Micro ShockLog™ recorder presents the event data in a unique way – because each data point is a maximum/minimum pair the error in that data point can be estimated. If the errors (difference between the max and min for a point) are small, the reduced sampling rate has not lost any data. If the errors are large, it is still possible to evaluate the largest accelerations applied to the Micro ShockLog™ recorder.

Handling Micro ShockLog™ recorder events

The Micro maintains 10 detailed events and 128 event summaries. Due to the nature of the event handling, the Micro ShockLog™ recorder does not manage the order of magnitude of the events or the date order of the event summaries, this is the task of the PC software after download. The PC uses the date/times to sort out the events.

The PC tries to match up event summary dates with detailed event data, to see if the data is from the same event. If they are, then they are allocated the same event number. It is very likely that you may have 10 detailed events, 50 event summaries, totalling to 50 events, as 10 of the event summaries are the same as the 10 detailed events. Just as equally, if you have a large number of events e.g. 10 detailed events and 128 event summaries; you may see 138 events in total. This is because the 10 event summaries associated with the detailed events have been replaced by later event summaries.

Once it has been established how many events there are altogether, the event numbers are then allocated sequentially from 0 to each event in date/time order.

If you download data with events and then leave the recorder to record more events, it is possible for the same events to be allocated different event numbers, so take caution. It is advisable to compare event dates between the 2 downloads to confirm the event number allocation.

Summaries

Whenever it is running the ShockLog™ recorder will condense data gathered at regular intervals into a summary record. The period over which data is summarised can be set between 10 minutes and 24 hours according to the demands of the application. The summary records can be used to give an overview of a long period of data logging in a conventional spreadsheet format. A maximum of 512 summaries can be recorded so you must take care to set a summary period commensurate with the length of record you propose to make.

Study the Summaries tab topic for more details.

Time Slots

When the ShockLog™ recorder is running it can record a selection of data values at intervals from 10 seconds to one hour. The number of available time slots can range from 15,000 to more than 250,000 depending on the contents chosen for each slot. The Micro ShockLog™ recorder has half the available time slots. The time slot records can be used to present the complete set of data recorded by a ShockLog™ recorder in a few simple graphs or to investigate the data in detail.

The parameters that can be stored in a Time Slot record are:

- **max pk X, max pk Y, max pk Z** the largest values of absolute (unsigned) acceleration captured by the peak hold circuits in the Time Slot period.

- **max Ext 1, max Ext 2** the largest voltages measured on the External inputs during the Time Slot period. (Ext 1 not currently implemented)

- **min Ext 1, min Ext 2** the lowest voltages measured on the External inputs during the Time Slot period. (Ext 1 not currently implemented)

- **Internal Temp** the temperature in degrees C measured by the internal temperature sensor. This sensor has a long thermal time constant since it is embedded inside the ShockLog™ recorder.

- **Humidity** the relative humidity measured by an HPT sensor if fitted or a Micro ShockLog™ recorder with an internal Humidity sensor.

.

- **Pressure** the barometric pressure measured by an HPT sensor if fitted. Does not apply to Micro ShockLog™ recorder.

- **External Temp** the temperature measured by an HPT sensor if fitted. This sensor has a much shorter thermal time constant than the internal pressure sensor. Does not apply to Micro ShockLog™ recorder.

You can set the Time Slot interval to as little as 10 seconds and this will record useful data for acceleration. The readings for internal temperature are only updated every 10 minutes and for humidity, pressure and external temperature every 1 minute. This will result in blocks of Time Slot records with exactly the same value.

Study the *Setup* tab and Time Slot Graph topics for more details.

LED operations

RD298 ShockLog™ recorder

The ShockLog™ recorder has two LED lamps visible through the main label on the top surface; these provide a visual indication of the ShockLog™ recorder's operating status.

Green lamp flashing:	ShockLog™ recorder operating no alarms or warnings recorded.
Green and red lamp flashing:	ShockLog™ recorder operating one or more warnings recorded.
Red lamp flashing:	ShockLog™ recorder operating one or more alarms recorded.
Flashing once per 10 seconds:	ShockLog™ recorder waiting – will not record data.
Flashing once per 5 seconds:	ShockLog™ recorder recording.

If an internal fault is detected both lamps will flash once per second – if this happens remove the battery for 10 seconds then replace it (with a new battery if required) and restart the ShockLog™ recorder.

ShockLog™ recorder LED operation during data memory clear (Embedded version 102 and later)

During a memory erase, the green LED will flash for each memory sectors it erases. It will then flash more rapidly when checking the sectors. If the memory erase failed, the ShockLog™ recorder will try to erase the memory again, this time flashing the red and green LEDs. The ShockLog™ recorder will try up to 16 times before returning a DATA MEMORY CORRUPT message.

RD317 Micro ShockLog™ recorder

There are five LEDs on the Micro ShockLog™ recorder. Three of them are operation indicators ('pwr', 'alarm' and 'stop'), and two are for the iButton ('in' and 'ok').

Standard operation

Green 'pwr' lamp flashing every 8 seconds:	ShockLog™ recorder waiting.
Green 'pwr' lamp flashing every 4 seconds:	ShockLog™ recorder running with no alarms recorded.
Red 'Alarm' lamp flashing every 8 seconds:	ShockLog™ recorder waiting, one or more alarms recorded.
Red 'Alarm' lamp flashing every 4 seconds:	ShockLog™ recorder running one or more alarms recorded.
Red 'Stop' lamp flashing:	ShockLog™ recorder has been stopped by the Stop iButton.

iButton LEDs

Following sections in this topic use the iButton LEDs. The following iButton LED operations will always over-ride the sequences from the Health Check or Over range alarms.

Green ‘in’ lamp on	iButton is being accessed
Red ‘ok’ lamp on	iButton transaction has completed
Flashing green ‘in’ lamp	iButton has been locked out. See Using the iButtons with the Micro ShockLog™ recorder topic.

Health Check

This displays the sequences for Health Check running, passed and failed. See the Health Check topic for more information.

Red iButton ‘in’ LED alternating with green iButton ‘ok’ LED every 2 seconds.	Health Check running.
Red iButton ‘in’ LED and green iButton ‘ok’ LED on together for 2 seconds, off together for 2 seconds. Other LEDs flash every 2 seconds.	Health Check fail
Red iButton ‘in’ LED and green iButton ‘ok’ LED on together for 2 seconds, off together for 2 seconds. Other LEDs standard operation as described above.	Health check pass

Over range Alarms

The following sequence occurs when the Micro ShockLog™ recorder has exceeded the 100g range or operational temperature range.

Red iButton ‘in’ LED on 2 seconds, off 8 seconds, green iButton ‘ok’ LED on 2 seconds, off 8 seconds.	Acceleration/temperature exceeds operational limits.

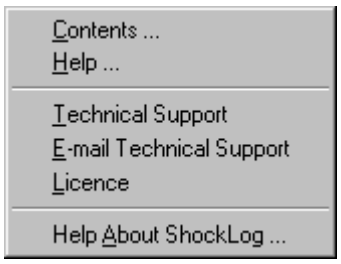
ShockLog Software Details

Main window

The ShockLog™ window always displays the *Help* and *Exit* buttons at the top left.

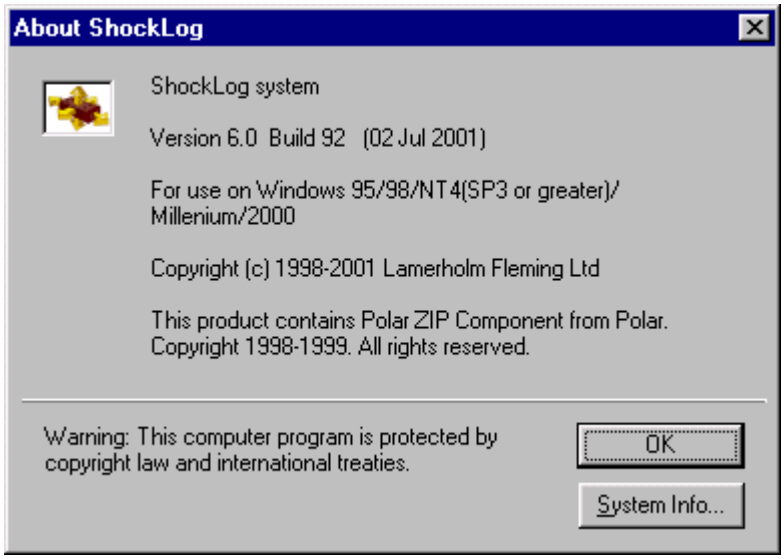
Help

Click to display the help popup menu, shown below.



The Help popup menu provides direct access to various parts of the help system

Contents …	Displays the contents section of Help. May not display a help topic in the main Help window.
Help …	Displays the Help
Technical Support	Displays Technical Support information
E-mail Technical Support	Starts up the e-mail service to e-mail the Technical support team. See the E-mail options topic for more information.
Licence	Displays the Licence Agreement
Help About ShockLog …	Displays the Help About window, shown below



Exit

Click to close down the ShockLog™ PC software. This function has no effect on any ShockLog™ recorder connected to the PC. The *Exit* button will cause the ShockLog™ program to stop and return to Windows immediately without any ‘Are you really sure you want to quit’ nag messages.

E-mail

This starts up the e-mail service for the user to send data to a colleague or technical support. See the E-mail options topic for more information.

iButton

Starts up the iButton function window.

Passwords

The ShockLog™ recorder can be protected against unauthorised interference by means of its built-in password system. ShockLog™ recorder passwords are disabled when they are shipped, but they are easily enabled from the *Download* tab.

For the RD298 ShockLog™ recorder, once enabled the password system cannot be turned off with out Technical Support. Such assistance may be chargeable.

In addition to the ShockLog™ recorder passwords, the Micro ShockLog™ recorder has user-defined passwords, which are fully editable and can be disabled using the Password Editor.

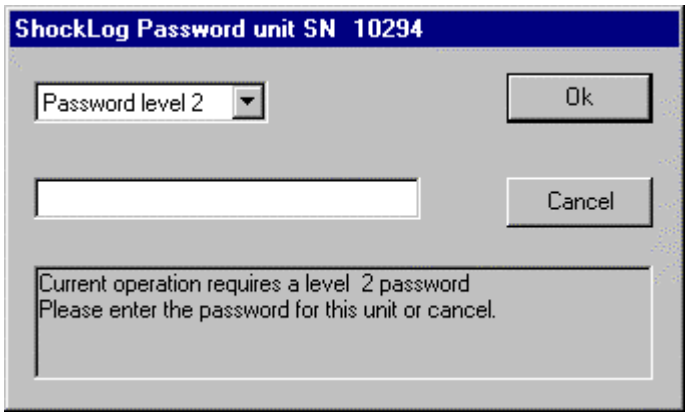
There are three levels of password with increasingly sensitive operations requiring higher levels of password.

The ShockLog™ recorder passwords are fixed 8 digit numbers and cannot be altered by the user of the ShockLog™ recorder.

User-defined passwords are available on the Micro ShockLog™ recorder. See the Password Editor topic.

Customers are supplied with the level 1 and 2 passwords for each ShockLog™ recorder that they purchase. There is a printed record of the ShockLog™ recorder password packed in the case.

Once you enable passwords you will be presented with a password entry box when you attempt to perform certain operations. Types in the password at the level requested or select a higher-level password from the drop down box, and enter that. Then click the *OK* button. The password could also be the user-defined password if the unit is a Micro ShockLog™ recorder.



Once the password has been entered and you continue working with the same ShockLog™ recorder, you will not be prompted for a password again, unless the required level of access has increased.

You may find that when this window is opened, the PC software sometimes loses contact with the attached ShockLog™ recorder and displays the incorrect serial number. If this occurs, then you will get a 'Lost contact with ShockLog, will now try and re-attach' message.

Functions that require no password

- Monitor tab

Functions that require level 1 passwords

- Download
- Set ShockLog™ recorder clock
- Stop ShockLog™ recorder
- Start ShockLog™ recorder
- Security Log
- Read (setup from ShockLog™ recorder)

Functions that require level 2 passwords

- Clear and reset to defaults
- Send (setup to ShockLog™ recorder)
- Editing passwords (Micro ShockLog™ recorder only)
- Clearing over range alarms (Micro ShockLog™ recorder only).

Functions that require level 3 passwords

- Diagnostics

Password Editor

The password editor window is only displayed for the Micro ShockLog™ recorder once the passwords are enabled. It offers the options of applying or clearing a user-defined password for both level 1 and level 2 passwords. It also provides the option to disable the passwords. You require a level 2 password to access this window.



Both password levels have the same options, which are described as follows:

Do not change password

This option allows you to leave this level unchanged, if you want to make changes to the other password level.

Change password to

Allows the user to enter a user-defined password, which is a case-sensitive 8-character alphanumeric value. Once this is set, the user can then enter this password or the factory password when prompted for a password, as described in the Passwords topic.

This action will enter 'Level *n* password change' in to the security log; where *n* is either 1 for level 1, or 2 for level 2.

Clear user defined password, reverting to factory password

This removes the user-defined password and only the factory password can be used to access the Micro ShockLog™ recorder.

Disable passwords

The Micro ShockLog™ recorder is no longer password protected.

Help

Display the online help.

OK

Click this to apply the changes defined. You will be prompted by a confirmation of the changes you defined. Click Yes and the new password settings will be applied, click No and you will return to the password editor window.

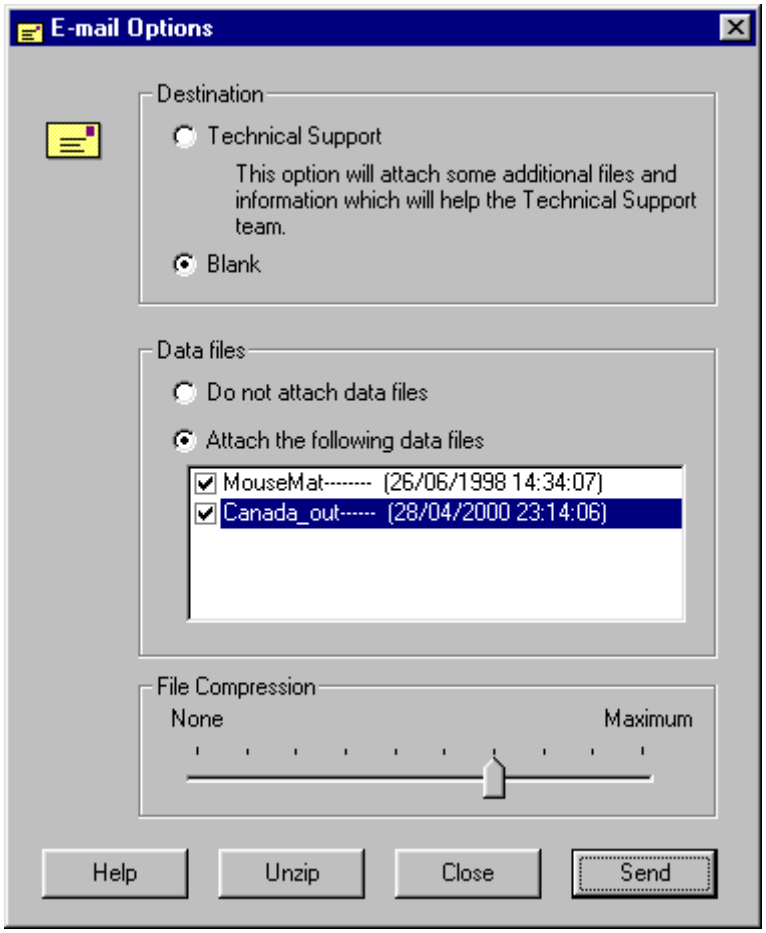
Cancel

Click this and no password changes will happen. The Password editor window will close.

E-mail options

The *E-mail options* window provides an easy way to send data to a colleague directly from the program. It also provides the option of Technical Support. This window is to assist in preparation of an e-mail message. Once the options are selected, the Send button will start up your e-mail service and provide you with your usual e-mail editing box, from which you can edit the message before sending.

You can access this window from two locations, the *E-mail* button on the main window or the *E-mail Technical Support* item on the Help pop-up menu.



Destination

Technical Support	The program enters the Technical Support e-mail address as the destination in the message box. This option will also attach files that are useful for the Technical Support team to resolve any issues, as well as entering some system information in the e-mail message text box. This option is the default selection if the *E-mail options* window is opened from the *E-mail Technical Support* item on the Help pop-up menu.
Blank	Leaves the destination in the message box blank, allowing you to enter your own destination. This option is the default selection if the *E-mail options* window is opened from the *E-mail* button on the main window.

Data files

This is only available if the *E-mail options* window is started while viewing the *Examine Data* tab. The files that are selected on the *Examine Data* tab will be listed in the data file box and all files will be ticked. You can then select and de-select whichever files you wish to send. The program will only attach the ticked files.

If the destination is Technical Support, then the program will also attach the supporting slots data file, if they exist.

File Compression

Selects 10 scales of file compression, 0 – None to 9 - maximum. The data files will be compressed into a single ZIP file which will be attached to the e-mail.

Help

Open the on-line help.

Unzip

Basic facility to extract the data files from the ZIP file. This will first prompt for a source ZIP file, and then for a destination (default ShockLog data directory). All files within the ZIP file will be extracted to the selected destination directory.

Close

This closes the window without sending any e-mail.

Send

Opens the e-mail service on your system and displays a prepared e-mail message box. Depending upon your e-mail system, you may just get an e-mail editor window or you may have the e-mail service window displayed.

You will receive a message if you do not have an e-mail service on your computer. Depending upon the operating system setup, you may be prompted with additional windows attempting to set an e-mail service for you.

The e-mail will use your system default e-mail service, and may not be the e-mail service that is normally used.

E-mail problems

This feature has been tested on Windows 95/98/NT 4.0 systems and the following e-mail systems:-

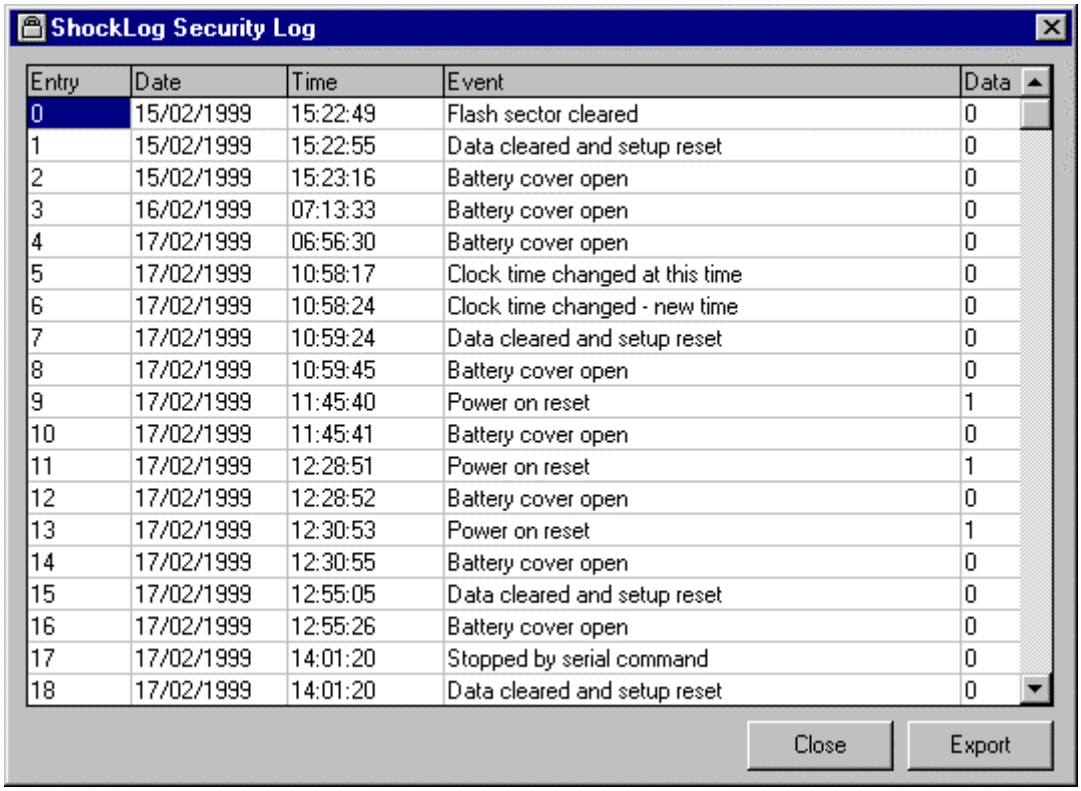
- Microsoft Exchange (Stand alone!)
- Microsoft OutLook Express 4.72 (Internet Explorer 4.0 SP2)
- Microsoft OutLook Express 5 (Internet Explorer 5.0)
- Netscape Communicator 4.7
- QUALCOMM Eudora 4.3
- Microsoft Outlook 2000

If this feature does not work, check that the e-mail software is set up to work with MAPI services. You may need assistance from your IT support.

Security Log

The security log gives details of all the significant control actions performed on the ShockLog™ recorder since its last calibration – there are up to 4096 time stamped entries. The security log can only be cleared by re-calibrating the ShockLog™ recorder.

If you need to save the Security Log data, you can do so by using the *Export* function.



Entry	Date	Time	Event	Data
0	15/02/1999	15:22:49	Flash sector cleared	0
1	15/02/1999	15:22:55	Data cleared and setup reset	0
2	15/02/1999	15:23:16	Battery cover open	0
3	16/02/1999	07:13:33	Battery cover open	0
4	17/02/1999	06:56:30	Battery cover open	0
5	17/02/1999	10:58:17	Clock time changed at this time	0
6	17/02/1999	10:58:24	Clock time changed - new time	0
7	17/02/1999	10:59:24	Data cleared and setup reset	0
8	17/02/1999	10:59:45	Battery cover open	0
9	17/02/1999	11:45:40	Power on reset	1
10	17/02/1999	11:45:41	Battery cover open	0
11	17/02/1999	12:28:51	Power on reset	1
12	17/02/1999	12:28:52	Battery cover open	0
13	17/02/1999	12:30:53	Power on reset	1
14	17/02/1999	12:30:55	Battery cover open	0
15	17/02/1999	12:55:05	Data cleared and setup reset	0
16	17/02/1999	12:55:26	Battery cover open	0
17	17/02/1999	14:01:20	Stopped by serial command	0
18	17/02/1999	14:01:20	Data cleared and setup reset	0

Entry

This is the entry number. All security log entries are numbered from 1 to 4096.

Date

This is the date, in dd/mm/yyyy format, read from the ShockLog™ recorder internal clock when the logged event occurred. If, the ShockLog™ recorder clock is reset for, it will be set to 00:00:00 on 01/01/1990.

Time

This is the time in hh:mm:ss format at which logged event occurred.

Event

The ShockLog™ recorder records 10 different types of event in the security log It is possible for an event to also log a data value, although most events return a data value of zero.

Battery cover open	cover opened or power applied with cover open (RD298 ShockLog™ recorder only)
Power on reset	power applied (Data = 1, clock OK, Data = 2, clock reset)
Watchdog reset	major software fault caused ShockLog™ recorder hardware to reset it
Clock time changed at this time	clock set command from PC records original time on ShockLog™ recorder clock
Clock time changed – new time	clock set command from PC records original time PC set it to
Data cleared and setup reset	got (and executed) Clear and Rest to defaults command from PC
Flash sector cleared	single sector in Flash was cleared (Data = sector)
Clock reset by hardware	clock reset by ShockLog™ recorder hardware monitoring system
Stopped by serial command	ShockLog™ recorder stopped by serial command from PC
Started by serial command	ShockLog™ recorder started by serial command from PC
iButton presented	iButton was presented and accepted (Data=1, Start, Datat=2, Stop, Data=3, Setup, Data=4, Download)
iButton failed	iButton was corrupt
iButton setup sent	Setup was loaded from an iButton successfully
iButton setup failed	Setup failed to load from an iButton
iButton download successful	Data was uploaded to an iButton successfully
iButton download failed	Micro ShockLog™ recorder failed to upload data to the iButton
Health check started	Health check was started
Health check successful	Health check passed its test
Health check failed	Health check failed its test. Data = fail status
iButton User ID	IButton identifying the user was applied. Data = user id.

(When the battery runs flat, it is possible that many ‘power on reset’ events will occur. To prevent the security log from being filled with such events the ShockLog™ recorder will only record 5 consecutive power on reset events without any other type of event to separate them.)

Certain common events generate characteristic sequences of security log entries:

Send (setup)	Data cleared and setup reset(0), Flash sector cleared(2), Started by serial command(0)
Set ShockLog™ recorder Clock	Clock time changed at this time(0), Clock time changed – new time(0)

The security log will usually start with a Flash sector cleared (0) entry, which is generated by the factory calibration procedure.

Data

It is possible for an event to also log a data value, although most events return a data value of zero.

Close

Click to close the Security Log window and return to the *Download* tab.

Export

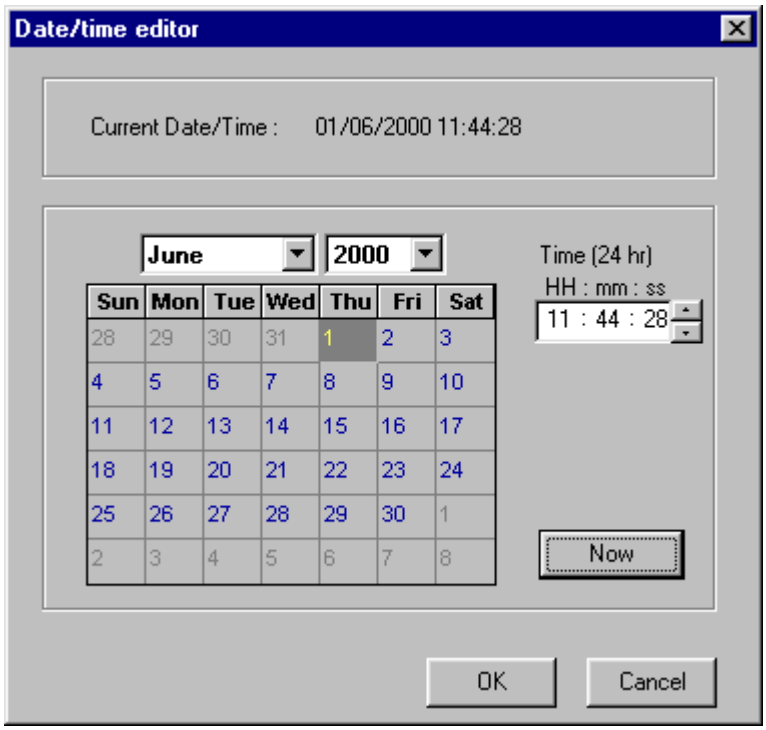
Click to export the complete Security Log. (Selecting a range of cells has no effect on the Export function, which will always export the complete Security Log.)

A dialogue box will allow you to choose a filename for the export file and the directory to save it in. The default directory will be the one you select for exports in the *Options* tab, but you can use any directory you choose.

Date/Time editor

Date/time editor (calendar view)

This window is displayed when Setup start date/time is set, when a manual Slot Break start time needs to be entered manually, and when the date/times on the Setup Wizard. In the following picture, the window is shown in a single date mode. It can also operate in a date/time range mode like the Data view shown later in this topic, where you can specify a start/end time. This also applies restrictions to the date/times that can be selected in order to keep the values within the range.



Current Date/Time

Displays the date/time that the date/time editor will apply when *OK* is clicked. This will be displayed in the date/time format that has been selected on the Options Tab .

Date Calendar

You are provided with two drop-down boxes to select the month and year, and a grid to select the day. Using the drop-down boxes alone will not alter the date/time of the editor, you need to select a day on the grid to update the date/time. If you have changed the month and year without clicking on the date, you will be informed that what you have selected has not been applied.

Time (24 hr)

Shows the time in 24-hour format. Each number can be changed individually by either typing in a new number or by using the step buttons to the right. You will not be able to enter an invalid time. You need to click on the component you wish to change.

Now

This sets the date/time window to the current system date/time.

OK

Closes the Date/time editor window, applying the date/time displayed at the top (*Current Date/Time*)

Cancel

This closes the Date/time editor window, without applying any changes.

Date/time editor (data view)

This window is available when viewing the Download Report .

This view displays the summary, slots coverage and when the events occurred. The report start and end times can be altered by sliding the bars, or if a more accurate time is required, you can switch to the calendar view.

If the summary line (white) does not reach the far right of the period then the next summary interval had not been reached. If a small vertical bar is at the end of the line, then the summaries are full. If there is no summary line, then it may be that the download was done before the first summary interval was reached.

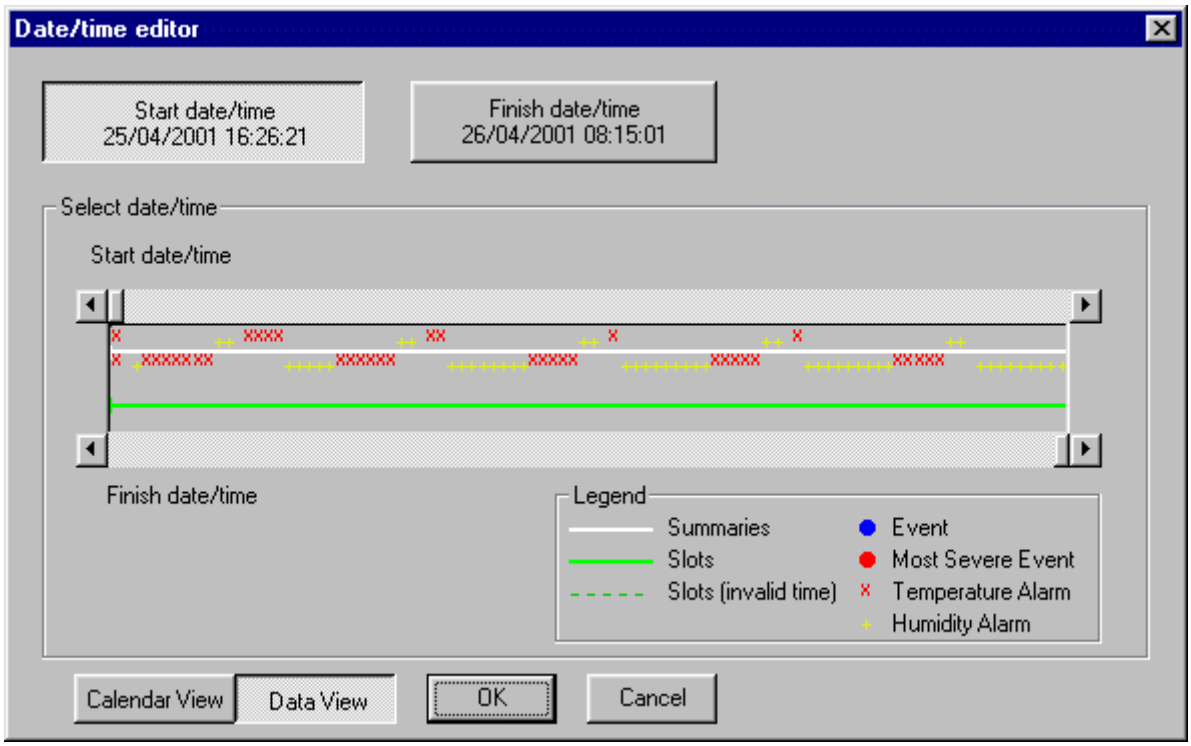
Like the summaries, if the time slots line (green) does not reach the far right of the time frame then the next slot interval had not been reached. If a small vertical bar is at the end of the line, then the slots are full.

If an invalid slot break had occurred during recording, then the time slot line becomes a green dashed line at the point the slot break occurs. There may exist breaks in the slot line, where the ShockLog™ recorder was not recording for a period and then continued.

The events appear as blue circles, apart from the most severe event, which is red. The event numbers are not shown for clarity, but clicking on a circle will show the event number as a tool-tip text. The most severe event displayed here is the most severe event for the whole download, and not the selected report time.

This period is particularly useful for assessing if your summary interval and slot set-ups cover the whole mission, and if the slots are full before the mission is complete. You can easily identify that events have occurred beyond the time slots report.

The *Temperature Alarm* and *Humidity Alarm* legends are always displayed. If a marker appears below the Summaries line (white line), then an alarm that has exceeded the lower limit has occurred. If a marker appears above the Summaries line, then an alarm that has exceeded the upper limit has occurred. See the Set Other Alarms for more information.



Start date/time

This button displays the start date/time of the time range. In the Data view, this will set the focus on the *Start date/time* scroll bar. In the Calendar view, the calendar will display the start date/time.

Finish date/time

This button displays the finish date/time of the time range. In the Data view, this will set the focus on the *Finish date/time* scroll bar. In the Calendar view, the calendar will display the finish date/time.

Select date/time

This frame graphically displays the time history of the data. You can use the two scroll bars to select the start and finish date/times. If you click on the top scroll bar, you will adjust the start date/time and select the *Start date/time* button at the top. If you click on the bottom scroll bar, you will adjust the finish date/time and select the *Finish date/time* button at the top. You will not be allowed to set the start date/time after the finish date/time.

Calendar View

Displays the Calendar view as shown earlier in this topic, with the *Start date/time* and *Finish date/time* buttons displayed at the top and the *Calendar View* and *Data View* buttons at the bottom. The data and times in the Data view will be transferred to the calendar view.

Data View

Shows the data view. This button is used to move from the Calendar view to this view. The date and times on the Calendar view will be transferred to the data view.

The calendar view will have restrictions on what date/times that can be selected, to keep the start and end times within the data range.

OK

Closes the Date/time editor window, applying both the start and finish date/times displayed.

Cancel

Closes the Date/time editor window, ignoring any changes that were made.

Filenames

The ShockLog™ software stores files on your PC's disk drive for programs, data and control. The Install process will locate the ShockLog™ software in a directory called Program Files\ShockLog by default. It will then generate subdirectories called:

Program Files\ShockLog\data

Program Files\ShockLog\exports

Program Files\ShockLog\setups

These directories will be the default locations for data files, export files and setup files, but you can change the defaults from the *Options* tab and choose alternative locations for export files on a file by file basis. Unless you have a special reason to do so, you are advised not to change the default directories for data and setups.

The ShockLog™ software stores setup files in the default directory and uses the Setup Name as the file name, with the extension setup298 or setup317.

Data files are stored in the default directory with an automatically generated file name.

A typical name is 1998060611213800999mousemat1-------.sl_data. This name is composed from the download date and time, the ShockLog™ recorder serial number and a 16 character optional user comment – in this case 'mousemat1'. The file extension is sl_data. There is no provision for users to choose their own file names for data files – this is to guarantee that every ShockLog™ recorder data file has a completely unique name which ensures that no problems will occur even when files from many different units are processed on the same PC. The files should not be renamed, as it is important to the software.

You may notice files with the same name as your data files but the extension sl_slots. These are slot files and contain the time slot data from your data files processed to enable very fast graphical display. A slot file will be generated when you open the data file from the Examine Data tab or displaying the Download Report, thus there may be files that do not have a supporting slot file. If you need to copy data files to another machine you do not need to copy the slot files – these will be re-generated from the data as required. If you are archiving data files, there is no need to archive the slot files. If the data file is in a read only location, then the slot file will be generated in the Windows temporary directory.

Attach

The Attach window appears whenever the PC is attempting to synchronise serial communications with the ShockLog™ recorder. This process will normally take less than 10 seconds unless the ShockLog™ recorder is busy. Under normal circumstances the attach process should never take longer than 60 seconds – if it does you can cancel the Attach window; this will in turn cancel the process which needed to communicate with the ShockLog™ recorder.

The most common causes of failure to attach are:

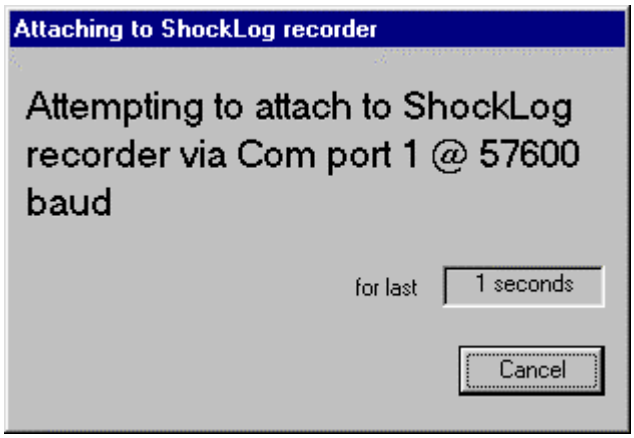
if the *Monitor* tab **is not** getting updates from the ShockLog™ recorder every 10 seconds:-

- ShockLog™ recorder not connected to the Com port selected in the *Options* tab
- For RD298 ShockLog™ recorder, PC to ShockLog™ recorder lead plugged into connector A on the ShockLog™ recorder (it should be plugged into connector B)
- ShockLog™ recorder has no/flat battery
- For a Micro ShockLog™ recorder, the jack DIN plug is not fully inserted

if the *Monitor* tab **is** getting updates from the ShockLog™ recorder every 10 seconds:-

- PC too slow to use with ShockLog™ software (75MHz Pentium recommended).
- Large numbers of processes, services or applications are running. Try closing some applications.
- Non-standard or faulty serial interface hardware on PC
- PC/Comms too slow, caused by slow PC/comms interface. Possible reason is plug-in COM ports (i.e. PCI boards), try using a built in COM port instead.
- COM port monitoring software. This software is usually associated with Palm top (or similar) communications where the software continually monitors the ports searching for a device. This needs to be disabled.

If the ShockLog™ recorder attaches after several attempts but at the lower (19600 or 38400) baud rates, you will save time if you select the preferred baud rate in the *Options* tab



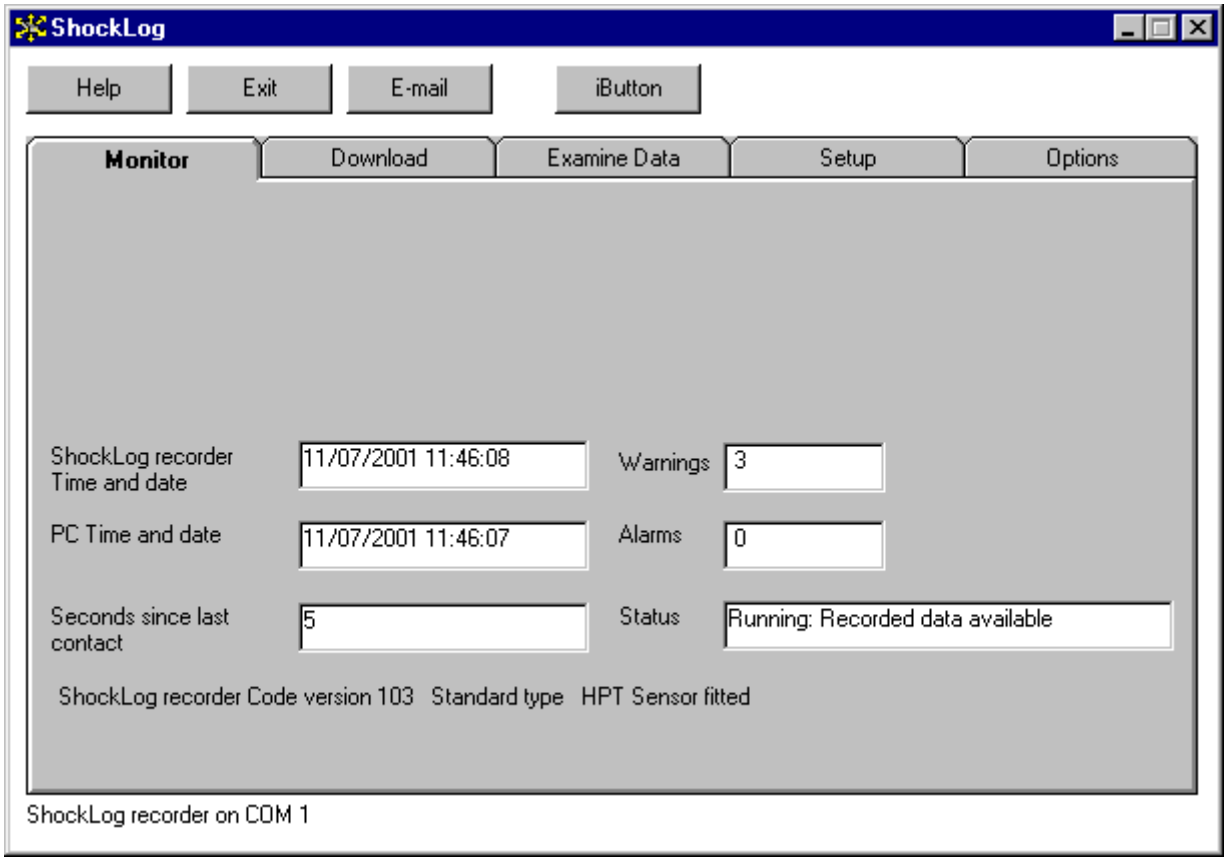
Main Tabs

Monitor Tab

The *Monitor* tab allows you to check the status of a ShockLog™ recorder without disturbing its normal operation in any way. No password is required to monitor a ShockLog™ recorder. There are 5 data windows (6 for RD298 ShockLog™ recorder) and 1 information line on the tab. The information line appears once the PC has established the identity of the ShockLog™ recorder and shows the ShockLog™ recorder software version, type and if any external sensors are fitted. If you need to contact Technical Support, be sure to have a note of this information.

If a unit has not been detected for 20 seconds, then some of the data will start to fade with time.

If a Micro ShockLog™ recorder has humidity/temperature alarms activated, then an additional frame appears. An example of this is shown at the end of this topic.



ShockLog recorder Time and Date

This is the Time and Date according to the ShockLog™ recorder's built-in clock. If the ShockLog™ recorder has reset its internal clock (normally due to power failure) it will reset it to 00:00:00 1/1/1990, or 00:00:00 1/1/2000 for the Micro ShockLog™ recorder.

PC Time and Date

This is the Time and Date according to the clock in the PC.

Seconds since last contact

This is the time in seconds since the PC last received a status message from the ShockLog™ recorder. Under normal conditions, the ShockLog™ recorder sends a status message every 10 seconds. If the PC is not receiving regular

status messages from the ShockLog™ recorder, you will not be able to download data or perform any other interaction with the ShockLog™ recorder.

Warnings

This is the number of warning level events stored in the ShockLog™ recorder's memory. It is only displayed if an RD298 ShockLog™ recorder is attached.

Alarms

This is the number of alarm level events stored in the ShockLog™ recorder's memory.

Status

The ShockLog™ recorder status may be 'Waiting', 'Running', 'Stopped', 'Paused' or 'DATA MEMORY CORRUPTED – NOT RECORDING'. If there is any data stored in the ShockLog™ recorder and available for download this will be indicated in the Status box.

Waiting: the ShockLog™ recorder's internal clock has not yet reached the recording start time determined by the current setup. The ShockLog™ recorder will always be in the Waiting state for at least the first minute after power is applied or after a software reset. The Micro ShockLog™ recorder can be in a Waiting state, after any iButton or COM communication.

Running: the ShockLog™ recorder is active and recording data – it will respond to shock and vibration events according to the parameters you defined in the Setup screen. You can still download data from the ShockLog™ recorder when it is running. The Micro ShockLog™ recorder will stop during a download.

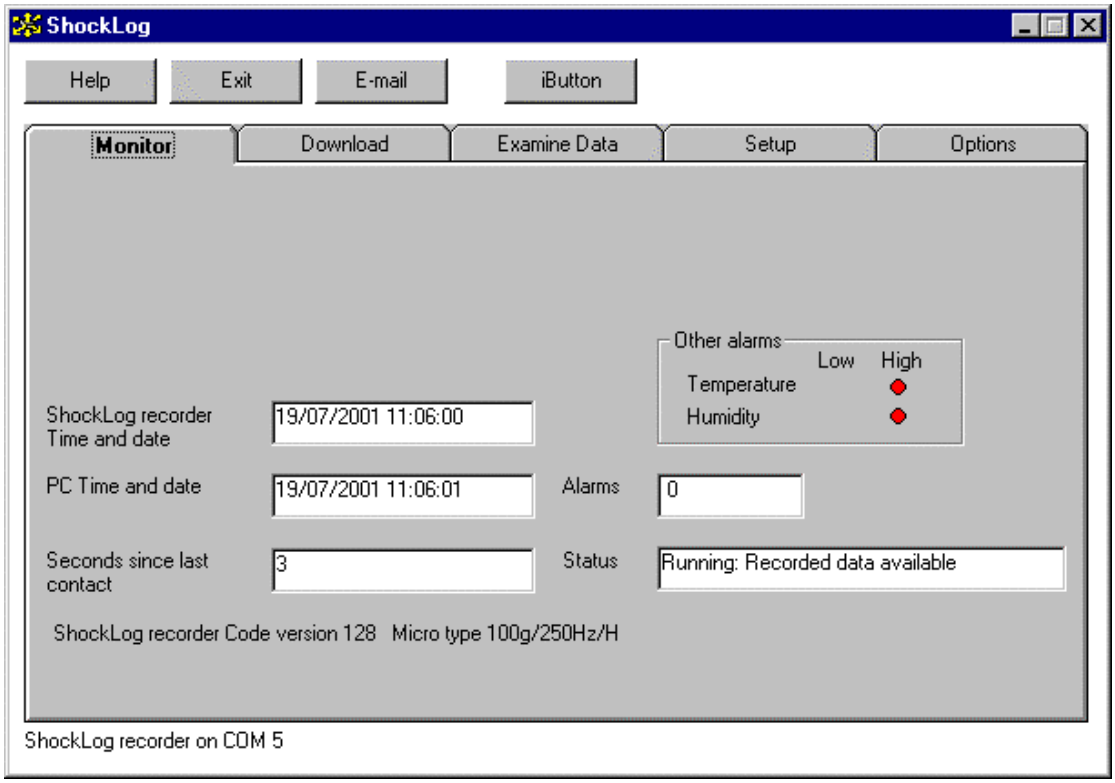
Paused: the ShockLog™ recorder has been stopped by a command from the PC and will not record any data until it has been restarted by executing a Start Command, a Clear and Reset command or by removing and replacing the ShockLog™ recorder power source. If none of these actions occur, the ShockLog™ recorder will re-start automatically between 30 and 40 minutes after the action that caused it to stop.

Stopped: the ShockLog™ recorder has been stopped by a Stop iButton and will not record any data until it has been restarted by a Start iButton, a Clear and Reset command or by removing and replacing the ShockLog™ recorder power source.

DATA MEMORY CORRUPTED – NOT RECORDING: the ShockLog™ recorder has data in the data memory area that should not be there. This is due to a failed data clear operation, possibly due to a low battery or a power interrupt during memory reset operations. This can be corrected by either sending a new setup, clicking the *Clear and reset to defaults* button or clicking the *Clear all data from ShockLog* buttons on the *Download* tab, ensuring that the ShockLog™ recorder has a good power supply.

Monitor tab for RD317 Micro Shocklog™ recorder

There are 3 variations on the *Monitor* tab that will be discussed here, concerning the RD317 Micro Shocklog™ recorder. Below is an example of what can be seen while monitoring a Micro Shocklog™ recorder.



Other alarms

This frame appears if the monitored unit has either a humidity alarm or temperature alarm activated. This frame does not reflect the setup in the unit, but always displays *Temperature*/*Humidity* and *Low*/*High*, and only appears if an alarm has been activated. A red circle indicates what alarms have been activated.

Unit type identification

This appears at the end of the status line at the bottom of the tab window. (below *Seconds since last contact*). In the example above, it displays *100g/250Hz/H*. This identifies the unit as a 100g unit with humidity. This will only display for units with embedded code 128 and above. Below are the possible unit types:

10g/40Hz	10g unit with no humidity sensor
10g/40Hz/H	10g unit with humidity sensor
100g/250Hz	100g unit with no humidity sensor
100g/250Hz	100g unit with humidity sensor
No information	Embedded code version before 128

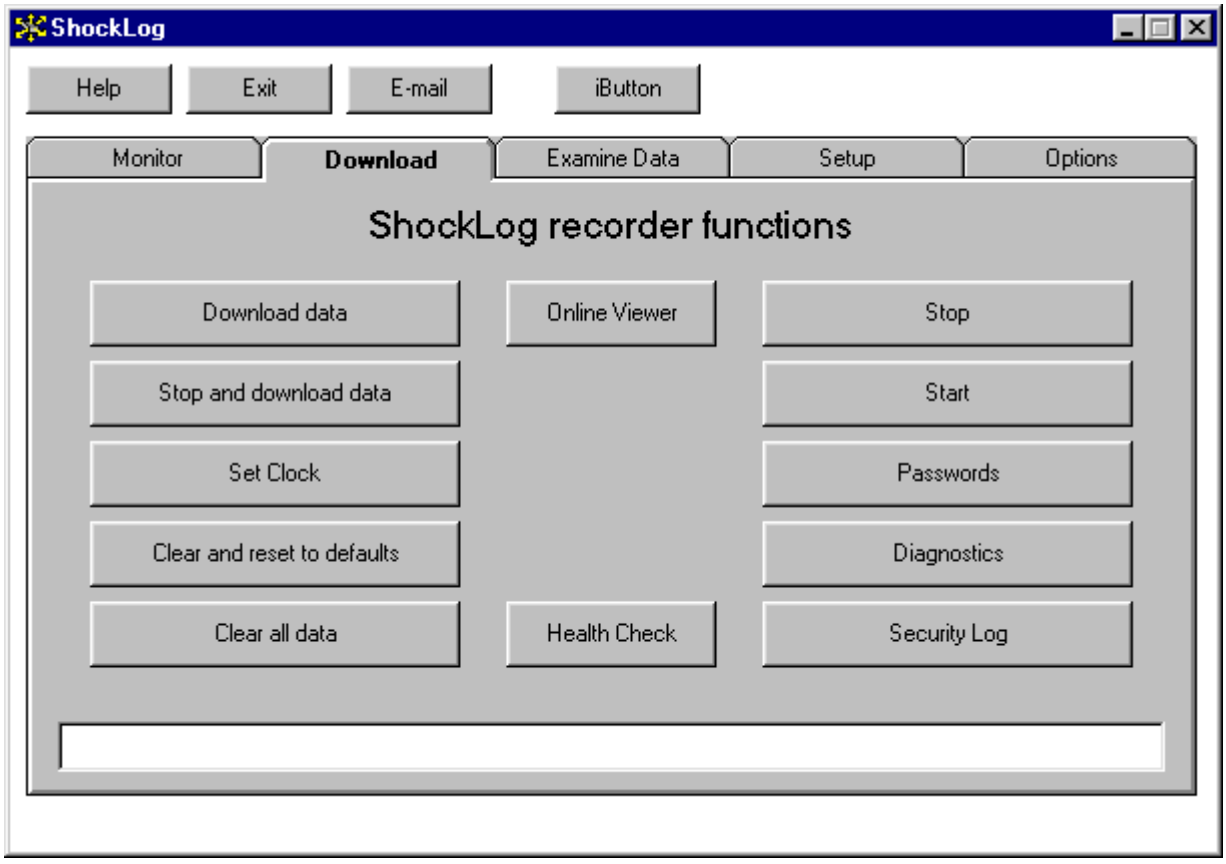
Calibration warning messages

If a calibration warning message as follows "The ShockLog recorder is not properly calibrated: *n*" may appear on the *Monitor* tab, you must contact Technical Support. This message will appear above the *Alarms* box or above the *Other Alarms* frame if displayed. This means that the recorder has lost its calibration and needs attention.

Download Tab

The *Download* tab allows you to extract data from the ShockLog™ recorder and perform other 'housekeeping' functions. There are 12 buttons whose functions are described below, and a status window, which is used to provide progress information.

The functions in this tab cause the ShockLog™ recorder to use far more battery power than normal. If the battery is weak, the ShockLog™ recorder may not behave as described. If this happens try replacing the battery - you will not lose any recorded data because the ShockLog™ recorder requires no power to retain recorded data in its memory.



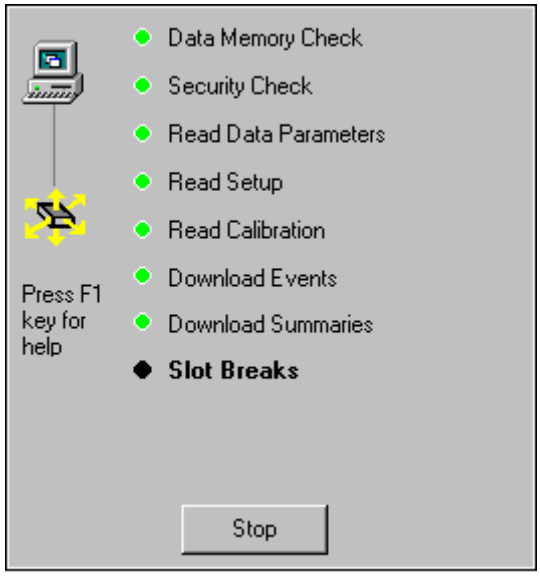
Download Data

Press this button to download data from the ShockLog™ recorder. You will be asked if you want to add a user label to the file name. It is strongly recommended that you do add your own labels although the ShockLog™ software will automatically construct a unique file name. Choose file labels that are as descriptive as possible – the ShockLog™ software can easily discriminate between 100 files all with the user label 'Test', but you may have difficulty!

If the ShockLog™ recorder is not stopped during the download process, the download may fail if an event occurs. If this happens you can either try again or stop the ShockLog™ recorder, before attempting another download. The Micro ShockLog™ recorder will stop to download anyway.

For the RD298 ShockLog™ recorder, you may receive a message warning about DATA MEMORY CORRUPT. You can continue, but expect problems. See Status in *Monitor* tab for advice on data corruption.

When the download proceeds, you see the following checklist window:



The checklist will start with only a few items on the list, until it has assessed what type of ShockLog™ recorder is attached.

The contents of this list will vary depending upon what ShockLog™ recorder is attached, and whether an HPT is connected. You can either click the Stop button or press the ESC key to cancel the download. The Stop button may not always be available, depending upon the download stage.

If there are communication problems, a flashing '?' will appear on the flashing green line and a message to press F1 for help will also appear. You should then press F1 for help on solving communication problems.

The key for the status of the items on the checklist

- **Active**
- OK
- Failed

When the download has successfully completed, you will be prompted to see the Download Report .

Stop and download data

Press this button to stop recording and download data from the ShockLog™ recorder. This option is the same as above, but the ShockLog™ recorder will be automatically stopped before downloading the data.

Note! With this option the ShockLog™ recorder is stopped during the download and will remain stopped after the download. See Stop ShockLog.

Stopping the ShockLog™ recorder during download will speed up the operation if you are using the 57,600-baud rate.

You may receive a message warning about DATA MEMORY CORRUPT. You can continue, but expect problems. See Status in *Monitor* tab for advice on data corruption.

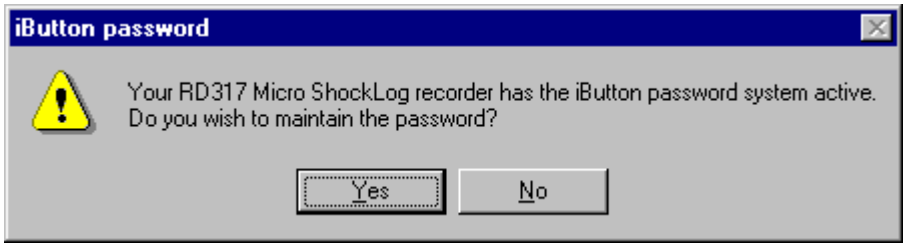
Set Clock

Press this button to set the ShockLog™ recorder clock to the same time and date as the PC.

Clear and reset to defaults

Press this button to clear all the data from the ShockLog™ recorder's memory and reset its setup to the 'Factory Default Setup'. (If you want to clear the ShockLog™ recorder memory and start it up with your own setup then use *Clear all data from ShockLog* option). See LED Operations for information on LED operation during this process. After this process, the ShockLog™ recorder's clock will be set to the PC's time.

If you are resetting a Micro ShockLog™ recorder with the iButton password system activated, then you will be prompted with the following message box.



If you click *Yes* then the iButton password will remain in the Micro ShockLog™ recorder.

If you click *No* then you will be prompted to enter the iButton password to clear it.

Clear all data

Press this button to clear all the data from the ShockLog™ recorder's memory and retain the current setup. The Attach box will appear and disappear several times - this is quite normal. Wait until the process is finished (buttons and tabs return to black from grey) before attempting to use any other functions.

Online Viewer

Opens the Online Viewer window to attach to a ShockLog™ recorder and read the current Time Slot data online. This facility is not available for the Micro ShockLog™ recorder.

Health Check

Opens the Health Check. This used by the RD317 Micro ShockLog™ recorder (embedded version 128 and above) to run a check on the hardware system.

Stop

If you are having trouble with downloads from the ShockLog™ recorder due to events being triggered during the download process, then stop the ShockLog™ recorder by pressing this button. ***No data at all is recorded when the ShockLog is stopped***. The ShockLog™ recorder will re-start automatically after 30 minutes.

Start

Press this button to re-start the ShockLog™ recorder. If you attempt to re-start the ShockLog™ recorder during event recording, the event record may be corrupted. Do not use the *Start* button unless you are sure that the ShockLog™ recorder is paused (you can check this from the *Monitor* tab).

Passwords

RD298 ShockLog™ recorder: Press this button to enable the password system. TAKE CARE!! Once passwords have been enabled, you will not be able to turn them off without Technical Support. Such assistance may be chargeable. Study the Passwords topic before enabling passwords.

RD317 Micro ShockLog™ recorder: Press this button to enable/edit the password system. If the passwords are already enabled, then the Password Editor window will open.

Diagnostics

This function if not intended for normal operation. If you need Technical Support, you may need to use this function. In these circumstances, the necessary passwords and instructions will be provided by the help desk operator.

Security Log

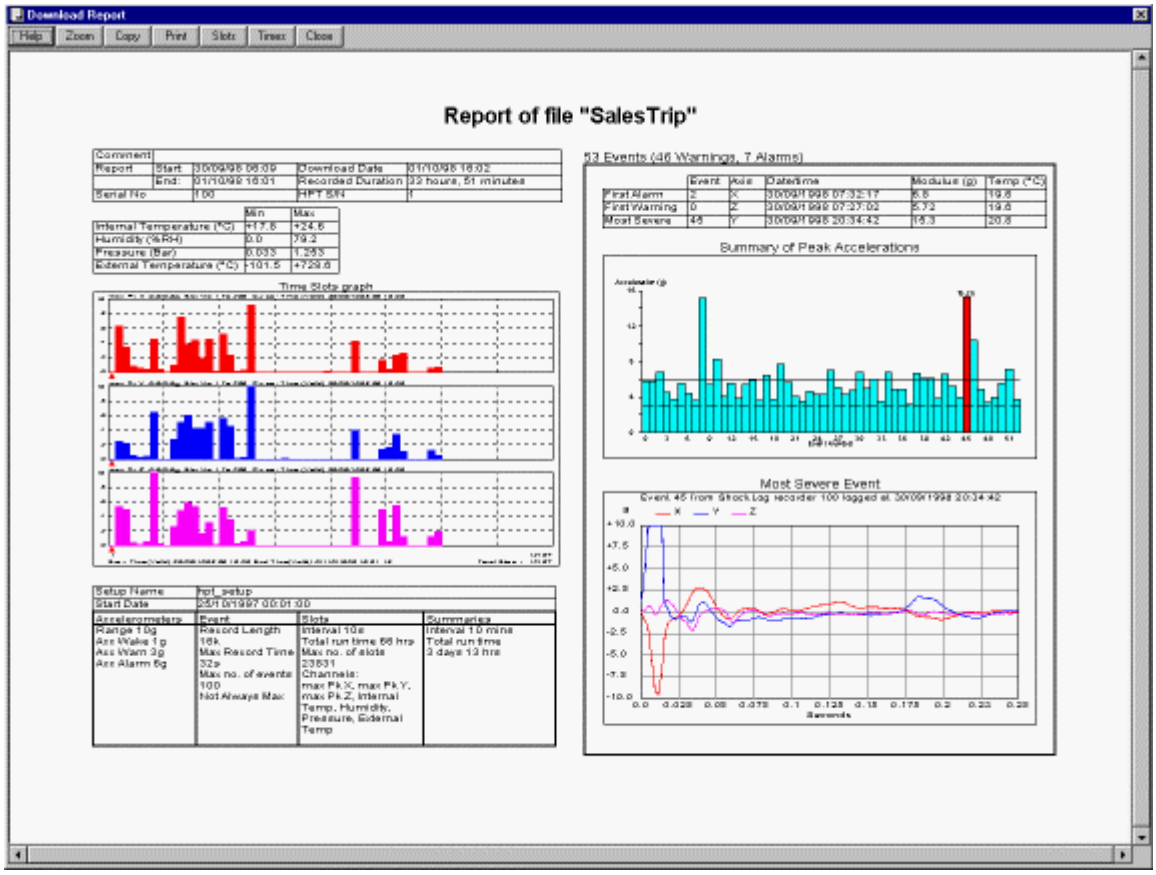
Press this button to download the security log from the attached ShockLog™ recorder. The security log gives details of all the significant control actions performed on the ShockLog™ recorder since its last calibration. Study the Security Log topic for more details.

Download Report

The Download Report presents the important information in a single window, providing the user with a single page report that can be printed on a single sheet or copied into another document.

The report presents the Time Slots graph , an Event Summary graph , and the most severe event as well as configuration information. The report time can be adjusted to focus on an area of the mission.

All graphs, data and statistics are presented for the selected report start and end time, the report always opens displaying the full download.



Help

Click this button to display the On Line Help.

Zoom

This provides information on how to zoom in and out of the report. This is explained in more detail in the **Zoom control** paragraph in this topic.

Copy

Click this button to copy the report as a metafile on the Windows clipboard. The metafile is of A4 landscape size. This will copy the picture at its current size and view, and can then be pasted in to other programs.

Print

Click this button to open the ShockLog™ Printer Options window. The print function will print the report at its current view on A4 paper with landscape orientation.

Slots

The user can select what 4 available slot parameters can be displayed on the slot graph on the report. If there are less than 4 parameters, then it will provide a selection box to match the number of parameters.

Times

Displays the date/time editor window in data mode, to enable the user to select a report time range from a graphical representation of the time history. This button is disabled if the data is from an iButton.

Close

Closes the window

Zoom control

When the report summary window first opens, the report will be displayed in full. For low-resolution screens, the information will not be readable, so the user can zoom into areas to magnify the information.

You can enlarge the picture either by dragging a selected area using the mouse, or by adjusting the size of the scroll bar.

When using the mouse, the area selected is of fixed aspect ratio. If you wish to stop the drag select, press the ESC button before releasing the mouse button.

To change the pictures size by using the scroll bar, right click and drag the scroll bar button. The scroll bar indicates whereabouts on the sheet you are focused on, by the scroll bars button position and size. In order to maintain the aspect ratio, a change of scroll bar size in one axis will be reflected in the other axis.

To return to the previous zoom, right click on the picture. Subsequent right-clicks will half the size of the picture.

The largest allowable zoom is 1000% (10 times the size of the normal image).

Information Table

Comment				
Report	Start:	30/09/98 06:09	Download Date	01/10/98 16:02
	End:	01/10/98 16:01	Recorded Duration	33 hours, 51 minutes
ShockLog S/N		100	HPT S/N	1

Comment :	Mission comment stored in ShockLog™ recorder at time of download
Report Start/End:	Time range covered by the Report. Can be adjusted from the Times button on the Report window
Download Date:	Date/time of download
Recorded Duration:	Estimated time of ShockLog™ recorder operation
ShockLog S/N:	ShockLog™ recorder serial number
HPT S/N:	HPT serial number. If a HPT is not fitted, ‘N/A’ will be displayed

Max/min table

Displays the maximum and minimum of the slots data other than the accelerations, i.e. Internal Temperature, humidity, pressure and external temperature parameters for the report time range.

	Min	Max
Humidity (%RH)	50.7	63.9
Pressure (bar)	0.990	1.021
External Temperature (°C)	+15.3	+21.2
Internal Temperature (°C)	+18.0	+24.0

If an RD317 Micro ShockLog™ recorder has humidity/temperature alarms, then the table will extend itself to display this information as follows:

			Other Alarms	
	Min	Max	Low	High
Internal Temperature (°C)	-38.9	+82.7		X
Humidity (%RH)	2.0	100.0	X	X

A cross indicates what alarms have occurred during the report period, a blank cell indicates no alarm has occurred during the report period.

Setup table

Displays the setup information within the ShockLog™ recorder at download time.

If the accelerometers are linked, then the 'Acc Warn' and 'Acc Alarm' values show a single value. If they are independent, then the value for each axis is displayed. The 'Acc Warn' value is not displayed for the Micro ShockLog™ recorder.

For more explanation of the setup information listed, see the *Setup* tab .

Setup Name	hpt_setup		
Start Date	25/10/97 00:01:00		
Accelerometers	Event	Slots	Summaries
Range 10g Acc Wake 1g Acc Warn 3g Acc Alarm 6g	Record Length 16k Max Record Time 16s Max no. of events 100 Not Always Max	Interval 10s Total run time 2 days 18 hrs Max no. of slots 23831 Channels: Max pk X, Max pk Y, Max pk Z, Internal Temp, Humidity, Pressure, External Temp	Interval 10 mins Total run time 3 days 13 hrs

If an RD317 Micro ShockLog™ recorder has humidity/temperature alarms set, then information concerning this setup is displayed in the *Summaries* column as follows:

Setup Name	bothalarms		
Start Date	07/07/1998 14:16:17		
Accelerometers	Event	Slots	Summaries
Range 100g Acc Wake 80g Acc Alarm 90g	Record Length 32k Max Record Time 4s Max no. of events 10 Always Max	Interval 10s Total run time 61 hrs Max no. of slots 21845 Channels: max Pk X, max Pk Y, max Pk Z, Internal Temp, Humidity	Interval 10 mins Total run time 3 days 13 hrs Other alarms: Humidity : <20 or >80 %RH Temp : <-20 or >60°C

Events table

This displays information for the first alarm, first warning and the most severe events within the selected report time. The most severe event is the event that has the largest modulus. The ‘Axis’ is derived from analysing the event data and deriving the most likely axis that triggered the event. In most cases, it is obvious which was the ‘trigger’ axis, but there may be situations where it is indistinguishable, so use this value as a guidance rather than absolute.

	Event	Axis	Date/time	Modulus (g)	Temp (°C)
First Alarm	2	X	30/09/1998 07:32:17	6.8	19.6
First Warning	0	Z	30/09/1998 07:27:02	5.72	19.6
Most Severe	45	Y	30/09/1998 20:34:42	15.3	20.8

Event	Event number
Axis	Axis that most likely triggered the event
Date/time	Date/time the event started
Modulus	Maximum modulus within the event. resultant of all 3-axis
Temp	Temperature when event occurred. This is not displayed for iButton data

Online Viewer

The Online Viewer provides the ability to monitor the Time Slot data recorded by a ShockLog™ recorder while it is still operating, and can be opened from the *Download* tab . This facility is not available for the Micro ShockLog™ recorder.

When you open the window, the table will show the latest data, but will not be continually monitoring the ShockLog™ recorder. If you have a HPT fitted, the window will take time to appear while the software reads the HPT calibration data.

When the window is continually monitoring, the ShockLog™ recorder is checked every 5 seconds (to keep it awake) for new Time Slots. When new Time Slots data has been detected, the table is updated with the latest data. The table is setup to display all the available slots that are defined in the ShockLog™ recorder's setup file, you can hide data by resizing the columns. The number of data in the slot table can be set between 1 and 99.

The update rate is the same as the slot interval defined in the ShockLog™ recorder's setup, therefore, if you wish to view the data as frequently as possible, you should set the slot interval to 10 seconds. Although the HPT data is present at every slot interval, it updates every 60 seconds.

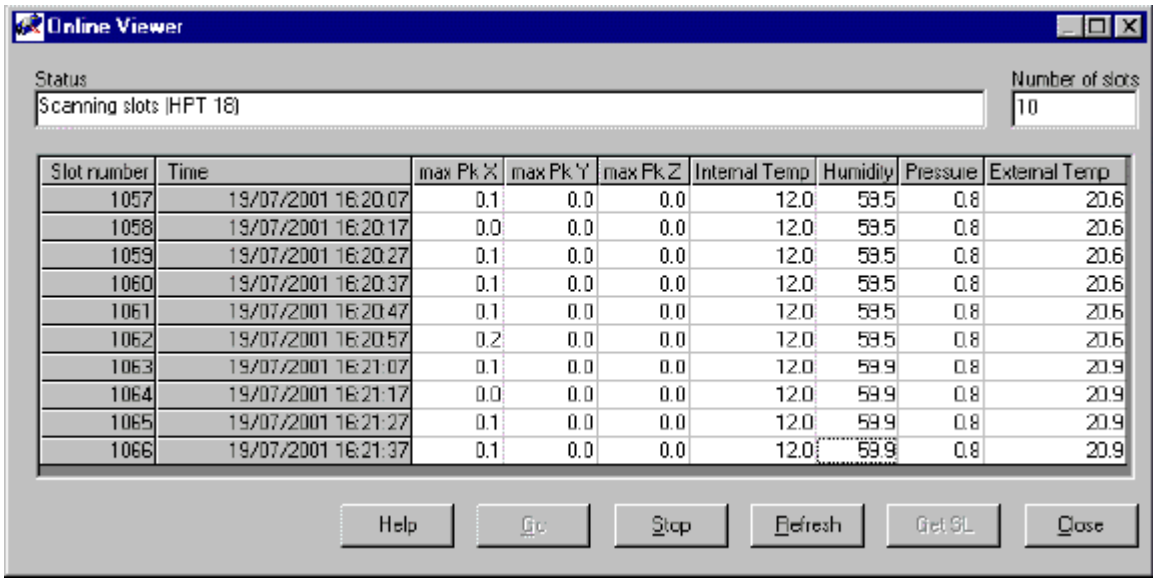
Because the HPT sensor is detachable, special consideration has been given to the data. If, for any reason during monitoring, the HPT sensor has been replaced by another one or removed and replaced, the data will be displayed with a line through it, indicating that the data is not reliable. The ShockLog™ recorder will continue to monitor the HPT data until reliable data appears, which will then appear as normal. If the HPT has been removed and not replaced, the HPT data columns will read '~~No HPT~~'. The software automatically detects a change in HPT sensor, reloads the calibration data for that sensor and updates the Status box.

If the ShockLog™ recorder has been swapped with another ShockLog™ recorder during monitoring, the data in the table may appear unusual. This can be made worse if the selection of slots recorded in one ShockLog™ recorder is different to another. To cure this, click the *Get SL* button. The *Get SL* button should be clicked if the ShockLog™ recorder has changed during monitoring.

The *Time* header will be accompanied by a validity statement, which could be either Invalid, valid or duplicate. See Slot Breaks topic for more information.

If events occur during monitoring, the ShockLog™ recorder will be occupied managing the event data and thus will not be able to pass slot data back until the events are over and stored.

During monitoring, the ShockLog™ recorder is awake all the time, which consumes the battery resources and thus it is recommended to attach a power supply or use a new battery.



Status

Displays the status of the monitoring system and the HPT serial number will appear if a HPT sensor is fitted.

Number of slots

Type in any number between 1 and 99. The number will be set to 1 if any invalid numbers/characters are entered. This number specifies the number of slots to be displayed and consequently resizes the table.

Table

Slot Number: The actual slot number

Time Slot time (not current time). The title will be accompanied by the status of the current slot time (Valid, Duplicate or Invalid).

Data columns: Displays the data in the units specified by the user from the Parameter Units window.

Help

Provide on-line help

Go

Start the on-line monitoring. This will be disabled when monitoring is active.

Stop

To stop the on-line monitoring. This will be disabled when there is no monitoring activity.

Refresh

This updates the table with the latest ShockLog™ recorder data. This can be done whether the monitoring is active or not.

Get SL

Reloads/Loads the ShockLog™ recorder setup and calibration information. This is disabled during monitoring.

Close

Closes the window and terminates any on-line monitoring.

Health Check

This facility runs a self-test on the Micro ShockLog™ recorder to check that the hardware is functional. The test takes approximately 10 minutes and displays an LED sequence described in the LED operations topic.

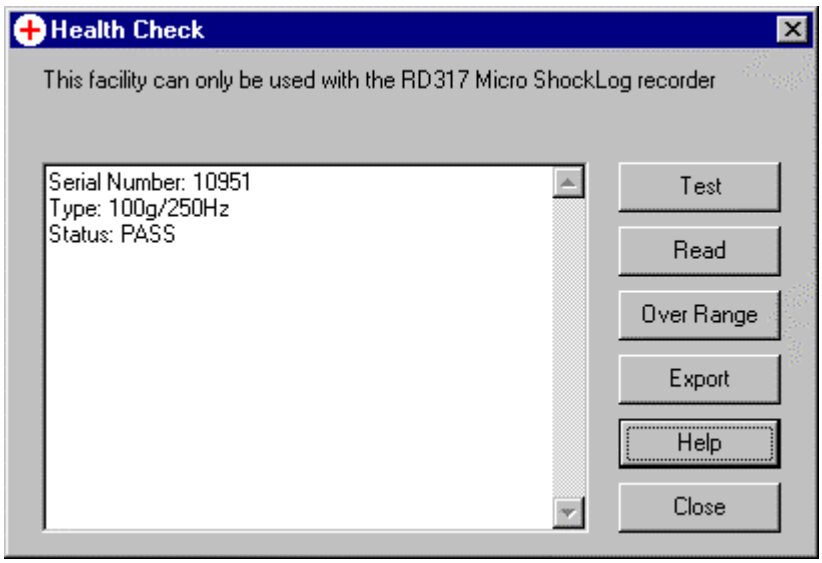
The tests include:

- Wake-up threshold
- Accelerometer filters
- Peak hold and rectifier circuits for the accelerometers.

While the unit is running the Health check, you will no longer be able to communicate with it, until about 1 minute after it has finished.

In addition, this window provides the facility to identify an over-range alarm. An over-range alarm is described in the RD317 Micro ShockLog recorder topic and the LED sequence identifying an over-alarm is described in the LED operations topic.

Below shows the *Health Check* window following a successful Health Check.



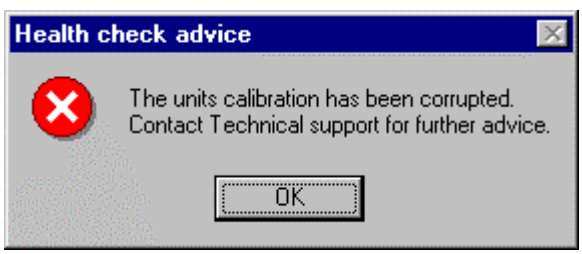
Test

Run the health check on the connected unit.

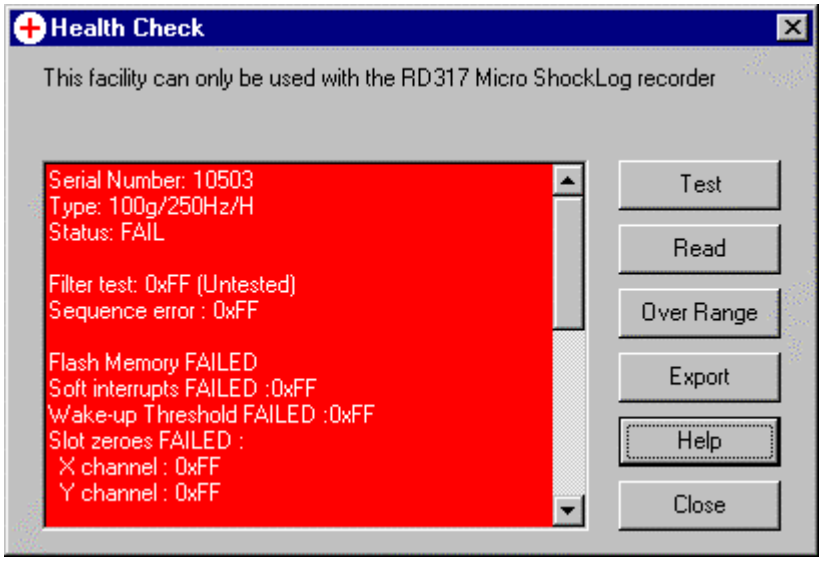
Read

Read the results of the Health check. If the Health check passed, then you will see the window above.

If the Health check has failed, then depending upon the failure mode, you will either receive the following message or a message advising you to re-try the Health check.



This window shows a typical failure report.



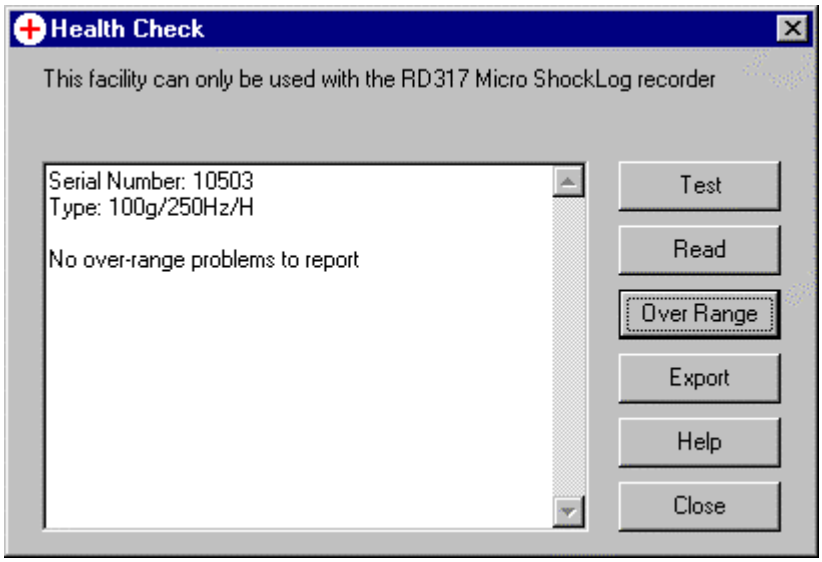
Over Range

This analyses the over-range alarm data. If an over-range has occurred, the LED will sequence as described in the LED operations topic.

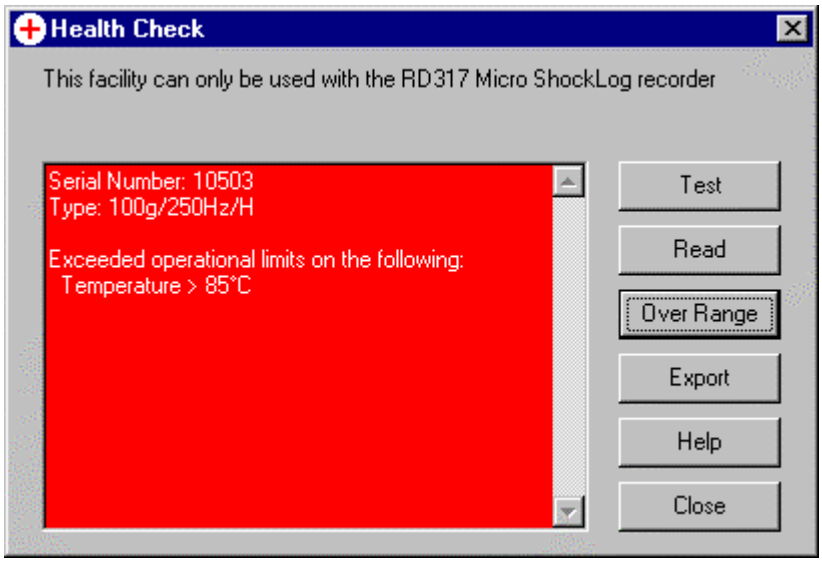
This button will display a popup menu from which there are 2 actions: *Read* and *Clear*.

Over Range: Read

This window shows a report of a unit with no over-range alarms.

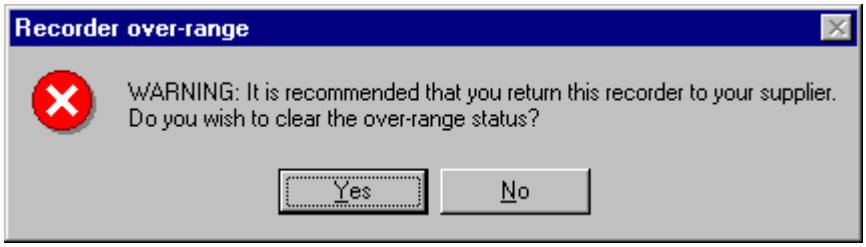


This window shows a report of a unit with a temperature over-range alarm.



Over Range Clear

If the ShockLog™ recorder does have an over-range alarm, then you will see the following message.



Click *Yes* to clear the over-range alarm, click *No* to maintain the alarm.

If the alarm is cleared it may take up to 10 minutes before the LED sequence stops.

Export

Exports the contents of the report to a user-specified text file, with the ShockLog™ systems Export directory as the default folder.

If exporting a Health check report, the file will also contain EEPROM maps of the relevant addresses to assist technical support.

Help

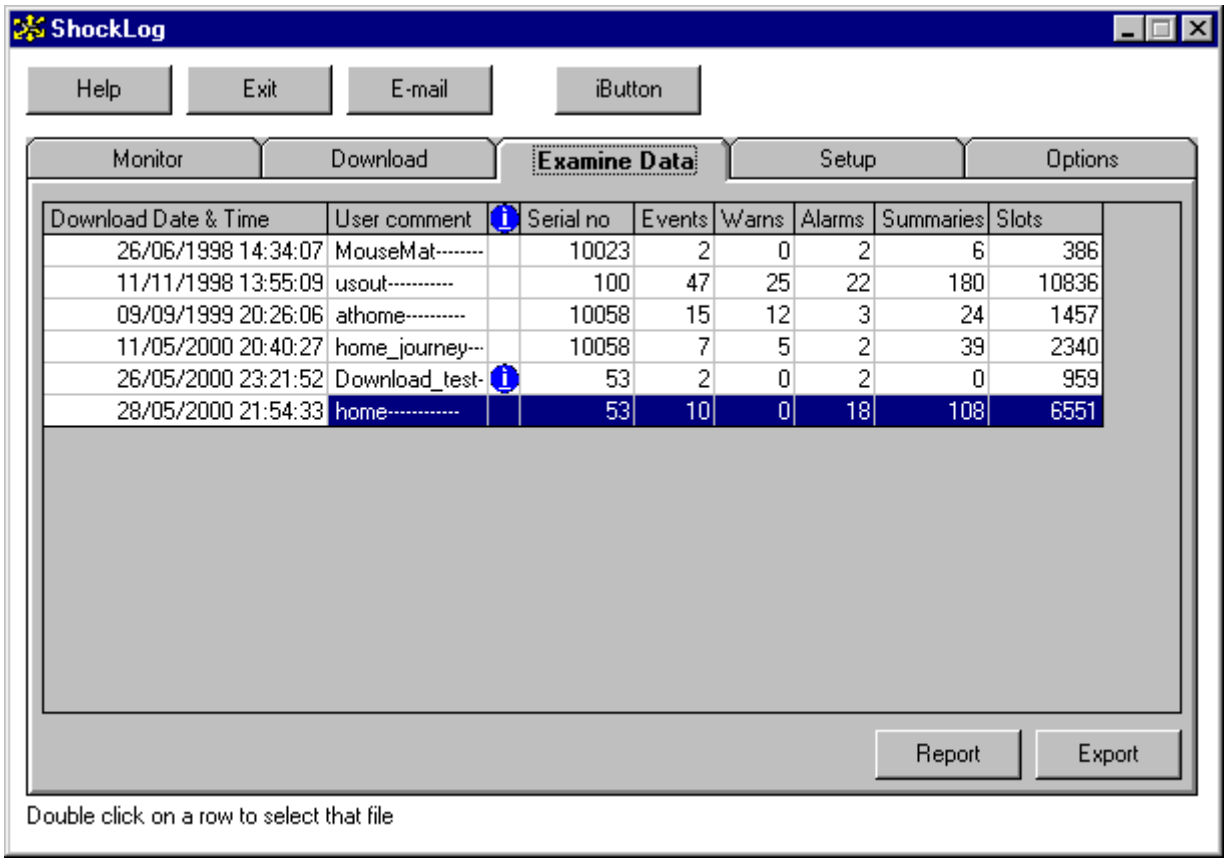
Displays the on-line help file.

Close

Closes this window.

Examine Data Tab

The *Examine Data* tab allows you to select a data file from your PC's disk drive for analysis. The available files are displayed in a table that gives a brief summary of the contents of each file. To select a file for examination, double-click the row of the file.



The nine data columns in the *Examine Data* tab are:

Download Date & Time

This is the date and time that the file data was downloaded from the ShockLog™ recorder. This information is embedded in the file name.

User comment

This is the comment the user entered during the download process. If no user comment was entered, a line of dashes will be shown.



Identifies that the data file is an iButton data file. This data is from a Micro ShockLog™ recorder, compressed into a Download iButton, and then downloaded to the PC. All information displayed on this grid should be correct, other than the *Summaries* which will always be 0. This data can only be shown on a Download Report due to the small amount of data stored in an iButton. See iButton Window Download tab topic for more details on iButton data.

Serial no

The serial number of the ShockLog™ recorder that the data came from.

Events

This is the number of events recorded in the data file. It is possible that the total number of events exceeds the sum of alarm and warn level events (only on data downloaded from any RD298 ShockLog™ recorder, running code before version 98). Study the Events topic for a detailed explanation.

Warns

This is the number of events at the warning level recorded in the file. If an event was recorded at the alarm level, it will not also be counted as a warning. This will always be zero for Micro ShockLog™ recorder data.

Alarms

This is the number of events recorded at the alarm level.

Summaries

This is the number of summaries recorded in the file.

Slots

This is the number of time slots recorded in the file.

Report

Displays a single Download Report window for the selected file.

Export

Press this button to export the contents of the selected file or files to text files. See Exporting Data .

Note! You can select all the cells by clicking in the grey cell in the top row.

Setup Tab

The *Setup* tab is used to control the settings of the ShockLog™ recorder – you can check the way a ShockLog™ recorder is set up, copy its set up to disk, copy a pre-defined set up from disk to a ShockLog™ recorder or define a new set up.

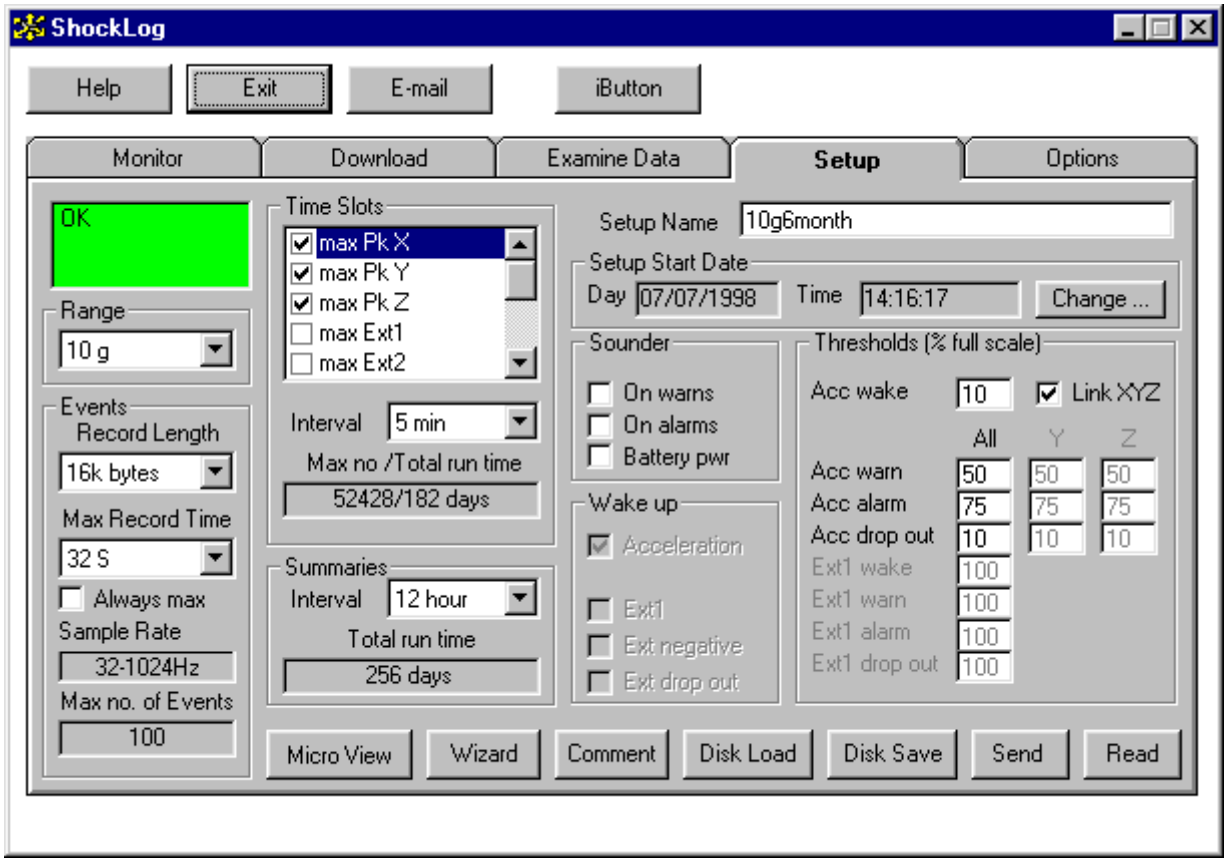
The ShockLog™ installation procedure has installed several example setup configurations on your computer. You may well be able to use these unmodified or find it convenient to use them as a basis for your own set-ups. Check that any example setup you use is suitable for your job – in particular that you have allowed enough run time to cover the recording you want to make.

There are two views for this screen, the view for the RD298 ShockLog™ recorder and the view for the RD317 Micro ShockLog™ recorder. Although the files can be used on either of the ShockLog™ recorder types, the Micro ShockLog™ recorder has restrictions on some of the parameters and these are reflected in the Micro view. The view mode will change to suit whatever ShockLog™ recorder is attached, or whatever file is loaded from the disk.

A Setup wizard is provided, enabling a step-by-step process to define a setup, which can then be loaded to the Setup tab, saved to file or sent to the ShockLog™ recorder.

You may find that the details in this section are more readily understood if you study the Principles of RD298 ShockLog™ recorder or RD317 Micro ShockLog™ recorder Operation topic first.

The following picture shows the Setup tab for a RD298 ShockLog™ recorder. For variations on the Micro ShockLog™ recorder, see the Setup tab (Micro ShockLog™ recorder) topic.



Status Window

The small window in the top right hand corner is used to indicate the set up status of the attached ShockLog™ recorder (if there is one) or the settings in the *Setup* tab. The window is colour-coded and will be green if the setup is good, and red if not. The following messages may appear in the status window:

Background Colour	Message	Means
Green	OK	The displayed setup is valid
Green	Resetting	The ShockLog™ recorder is being set to the displayed setup
Green	Disk Setup	The displayed setup has been loaded from disk
Green	New Setup	The displayed setup has been modified
Green	Setup Saved	The displayed setup has been saved to disk
Green	ShockLog Setup OK	The displayed setup is that of the attached ShockLog™ recorder
Green	iButton Setup OK	The displayed setup is that of the an iButton
Red	Illegal Setup Values	The displayed setup contains illegal values
Red	ShockLog Setup BAD	The displayed ShockLog™ recorder setup contains illegal values

Range

RD298 ShockLog™ recorder: This drop down box allows you to select the working range of all three ShockLog™ recorder acceleration axes. The RD298 ShockLog™ recorder can work in velocity mode and this is automatically selected if you pick a range in cm/s. For most purposes you should use the acceleration ranges – take great care not to select a velocity range inadvertently.

The ShockLog™ recorder will not accurately measure acceleration or velocity amplitudes much greater than the range value.

RD317 Micro ShockLog™ recorder: see the Setup tab (Micro ShockLog™ recorder) topic.

Record Length

RD298 ShockLog™ recorder: When the ShockLog™ recorder records an event, it always uses 32k bytes of volatile RAM memory to do so. The event is then checked for significance (is it a warn or alarm?) and transferred to non-volatile FLASH memory. When the event data is transferred, it may be optionally compressed to allow a larger number of events to be stored. This compression process reduces the sample rate of the stored data but does preserve the maximum and minimum values of all the data. If you need to store a large number of events, select a shorter record length. The number of events that will be stored for the memory you have in your ShockLog™ recorder and the record length you have selected is displayed in the Max no. of Events box.

Early versions of the ShockLog™ software incorrectly measure the record length in samples – the correct measure is bytes – this error may have been corrected on the version of software you are running.

RD317 Micro ShockLog™ recorder: see the Setup tab (Micro ShockLog™ recorder) topic.

Max Record Time

RD298 ShockLog™ recorder: When the ShockLog™ recorder records an event it always starts sampling at 4096 samples per second. If the event has stopped, the event recording will stop after 1 second. If the event has not stopped then event recording will continue until either the Max Record Time is reached or the event stops. Each time the event time is 'stretched' the effective sampling rate is halved by combining samples in groups. (For more details, study the Principles of RD298 ShockLog™ recorder or Micro ShockLog™ recorder Operation topic.)

The event length may also be stretched if several events occur in a short time interval and the ShockLog™ recorder runs out of RAM memory to buffer the events. The event length is never stretched beyond the Max Record Time you set.

RD317 Micro ShockLog™ recorder: see the Setup tab (Micro ShockLog™ recorder) topic.

Always Max

RD298 ShockLog™ recorder: Allows you to override the event drop out threshold and always use the Max Record Time for all events.

RD317 Micro ShockLog™ recorder: see the Setup tab (Micro ShockLog™ recorder) topic.

Max no. of Events

This is an information box and tells you how many events can be stored in the ShockLog™ recorder's non-volatile memory with the current settings.

RD317 Micro ShockLog™ recorder: see the Setup tab (Micro ShockLog™ recorder) topic.

Summary Interval

At regular intervals, the ShockLog™ recorder records a summary of the data measured in the last summary period. You can set this period from 10 minutes to 24 hours. The ShockLog™ recorder can record up to 512 summaries so you must take care that you choose a summary interval which will allow you to cover the full period over which you wish to record. The amount of time the summaries will cover is displayed in the Total run time box. For more details, study the *Summaries* tab topic.

Total run time

This information box indicates how much time the summaries will cover with the current settings.

Slot Contents

By ticking options in the Slot Contents, box you can determine what parameters will be recorded in each time slot. The more you record in each slot the smaller the number of slots you can fit in the available memory. The 'Max no /Total run time' box calculates the number of slots and the time span they will cover for the parameters you set. If an HPT sensor is attached, there are additional parameters available, see Setting up your ShockLog™ recorder to use the HPT .

For variations on the Micro ShockLog™ recorder, see the Setup tab (Micro ShockLog™ recorder) topic.

Slot Interval

The slot interval is the time between each time slot record. You can set the slot interval from 10 seconds to 1 hour. If you set a short interval, the maximum time span before you run out of memory will be reduced.

Max no. / Total run time

This information box indicates how many time slot records can be stored in the ShockLog™ recorder's non-volatile memory and the time span they will cover with the current settings.

Setup Name

This box is the name of the setup. You can use almost any name you like, embedded spaces are allowed, but it must be at least 5 characters long. The setup name is used to identify the setup when it is sent to the ShockLog™ recorder or stored on disk.

Setup Start Date

The ShockLog™ recorder will start recording at this the date/time. If the ShockLog™ recorder's internal clock is reading a date/time before this date, the ShockLog™ recorder will not start recording. Once a recording has started it will continue even if the ShockLog™ recorder's internal clock is then set to an earlier date. (The ShockLog™ recorder checks the Start Date and Start Time 60 seconds after a reset and every 10 minutes thereafter. If you send a setup to the ShockLog™ recorder and then set the ShockLog™ recorder's clock so that the new time and date should start the ShockLog™ recorder recording data, it may be up to 10 minutes before the ShockLog™ recorder actually starts the recording.)

Change …

Click this button to change the Setup start date/time using the Date/Time editor .

Sounder

The ShockLog™ recorder can drive an external sounder connected to connector B. This sounder can be set to sound if any warns or alarms are present. In order to save power you can leave the *battery pwr* option un-ticked so that the sounder will only operate if the ShockLog™ recorder is connected to an external power source. The maximum current drain permitted for the sounder is 20mA at 4.5V – at this load the battery life of the ShockLog™ recorder is reduced to less than 5% of normal.

Wake up

The ShockLog™ recorder conserves battery energy by keeping its microprocessor in a low power sleep mode as much as possible. When an event occurs it takes about 1mS for the processor to wake up and start measuring – this means that the first 1mS of the event is lost. In many applications, an event will be preceded by accelerations at a lower level. If the processor wakes up it will not then miss the beginning of the event. The wake up is usually driven by the levels on the accelerometers (set by the wake up threshold) but for special applications, can be controlled by levels on the Ext1 analogue input on connector B. Wake up driven by Ext1 is not implemented on the current software release so all the options in the Wake Up box are greyed out to indicate that they can not be altered.

Thresholds

The principle of the thresholds also applies to the RD317 Micro ShockLog™ recorder, see Setup tab (Micro ShockLog™ recorder) topic for the variations.

Four thresholds determine the characteristics of event recording. All four are set as percentages of the range set in the Range box. For example: if the Range is set to 10g and the wake threshold to 15% the wake level will be 10 * 15/100 = 1.5g. The wake up threshold is the same for all three axes but you have the option of using different warn, alarm and drop out thresholds for each axis.

The threshold box refers to 'acc' thresholds even when a velocity range is selected.

The *Acceleration wake* threshold sets the level at which the processor will be woken from its sleep mode and will be ready to record an event with no further delay. If you set this level too low the ShockLog™ recorder may spend too great a proportion of its time awake and the battery life will be drastically reduced. Never try to set a level below 5% (try to keep above 10%) and always set the level at the highest acceptable if battery life is a concern.

If the *LinkXYZ* box is ticked, the warn, alarm and drop out thresholds will be the same for all three axes. If the box is cleared (click on it to change its setting,) then you can set different thresholds for each axis. If the ShockLog™ recorder embedded software version is 96 or less, the *LinkXYZ* feature is not supported.

The *Acceleration warn* threshold sets the level at which event recording will start if the section of memory reserved for warn level events is not full. You should always set the warning threshold higher than the wake threshold.

The *Acceleration alarm* threshold sets the level at which event recording will start if the section of memory reserved for alarm level events is not full. You should always set the alarm threshold higher than the warn threshold.

The *Acceleration drop out* threshold sets the level at which event recording will stop (subject to RAM buffer availability and the Max Record Time setting). Never try to set a level below 5% or above the warn or alarm thresholds.

Micro View

This is a toggle button to switch between the ShockLog™ view and the Micro view. See the Setup tab (Micro ShockLog™ recorder) topic for more information.

Wizard

This displays the Setup Wizard to provide a step-by-step process in selecting your setup.

Comment

Press this button to edit the mission comment. The mission comment is stored in the ShockLog™ recorder after the setup has been sent, and can be read from the ShockLog™ recorder using the *Read* button. The mission statement is not altered when the *Disk Load* and *Disk Save* buttons are pressed, and it is not saved in the setup files.

Disk Load

Press this button to load a setup from the selection stored on disk.

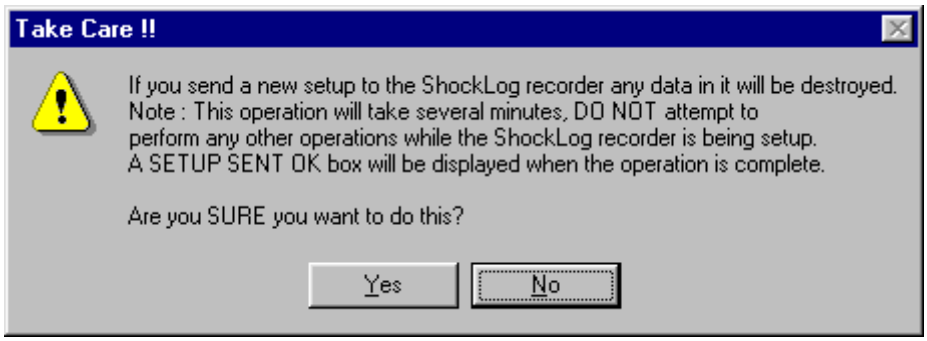
Disk Save

Press this button to save the currently displayed setup on disk. The setup will be saved with the name shown in the *Setup Name* box. If a setup with that name already exists you will be advised and offered a chance to cancel the save and alter the name for the setup before saving it.

Send

Press this button to send the currently displayed setup to the ShockLog™ recorder. This operation will destroy any data stored in the ShockLog™ recorder. If passwords are enabled you will need a level 2 password.

Once the send operation starts, you will be prompted by this message:



When you accept this, you will be prompted to enter or confirm the Mission comment.

Next, you will be asked whether you want the ShockLog™ recorder clock to be synchronised to the PC clock. This is advisable.

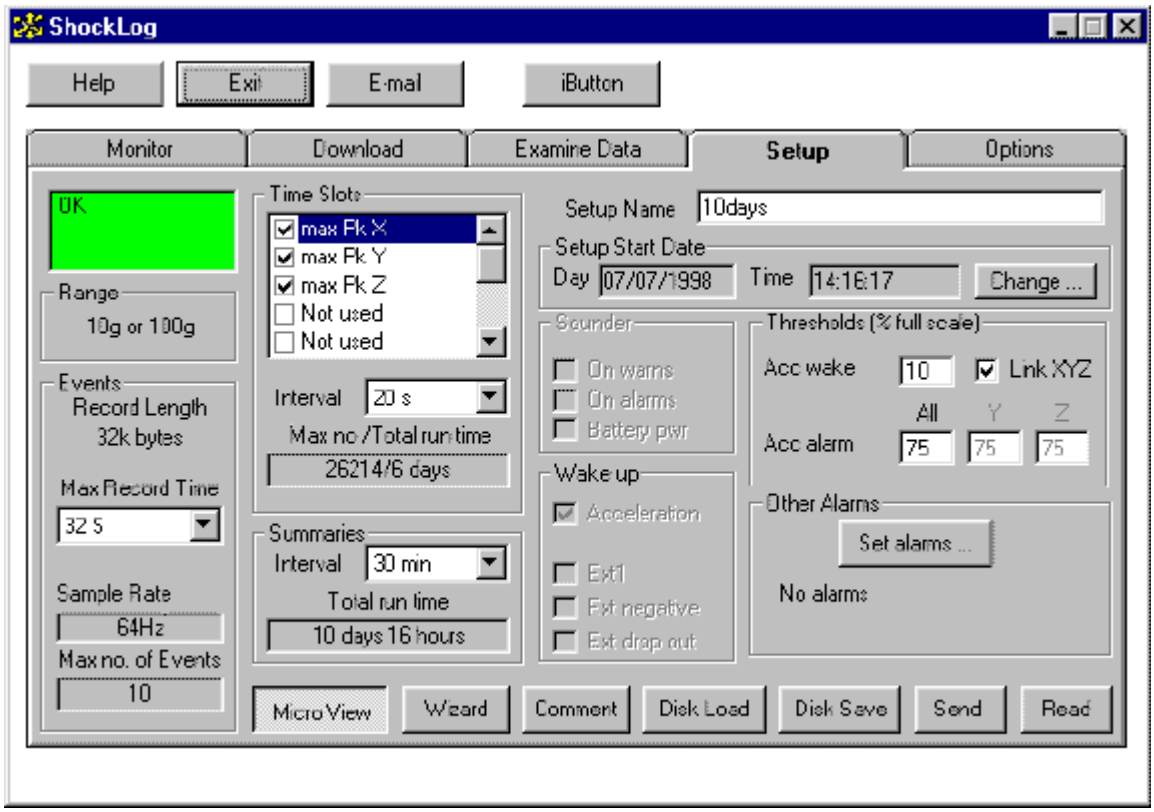
The program will then work its way through the setup checklist. See the Setup Checklist topic for more information.

Read

Press this button to read and display the setup from an attached ShockLog™ recorder.

Setup tab (Micro ShockLog™ recorder)

This topic displays the Setup tab as it looks when switched to Micro view. The Setup Tab describes all the features, this topic just focuses on the features that are different for this view.



Range

The acceleration range is fixed in the hardware and cannot be altered by the setup. When the software reads the setup from the Micro ShockLog™ recorder, it will display "last read: 10g" for a 10g unit, or "last read: 100g" for a 100g unit.

The ShockLog™ recorder will not accurately measure acceleration amplitudes much greater than the range value.

Record Length

Record Length is always 32k bytes in the Micro ShockLog™ recorder and cannot be altered.

Max Record Time

The available *Max Record Time* values have been reduced to 4s, 8s, 16s and 32s.

Max no. of Events

Always 10 for the Micro ShockLog™ recorder.

Time Slots

The external parameters and the HPT parameters are marked as ‘Not used’ and cannot be selected, except for the Humidity, which is available on some Micro ShockLog™ recorder models.

Thresholds

The Micro ShockLog™ recorder only uses 2 levels, the *Acc wake* and the *Acc alarm*. The Micro ShockLog™ recorder does not have warning events and as the events are fixed duration, the *Acc drop out* is not required.

The *Acc wake* level will correct any entries to 10% and above in steps of 5%, i.e. 10%, 15%, 20% … 95% and 100% are the only valid entries.

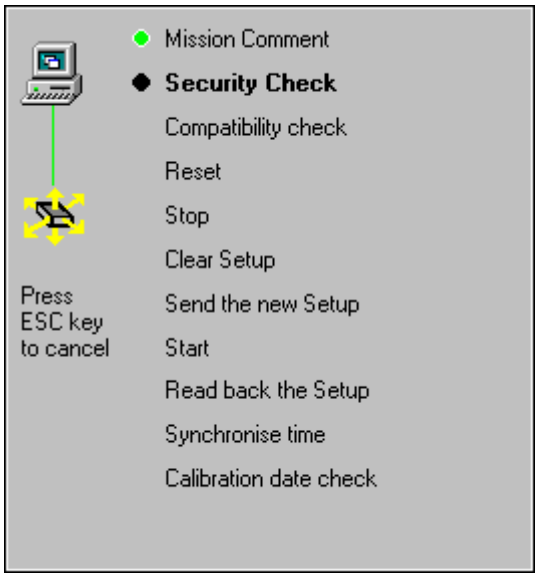
You will get a warning message when switching views, and the *Acc alarm* value is less than the *Acc warn* value. When setting levels in the standard view, the *Acc alarm* is always compared with the *Acc warn* value to make sure that the *Acc alarm* value is the highest. When in Micro view, there is no *Acc warn* level and so the *Acc alarm* level can be set to any value regardless. When switching back to the standard view, it checks these two values are still in the correct order.

Other Alarms

This feature only exists for the Micro ShockLog™ recorder. It sets the temperature and humidity high and low alarms levels. The humidity alarms are only available on the humidity model. See Set Other Alarms topic for more information.

Setup Checklist

The setup checklist is displayed when a setup is sent to the connected ShockLog™ recorder from the Setup Tab .



If there are communication problems, a flashing '?' will appear on the flashing green line and a message to press F1 for help will also appear. You should then press F1 for help on solving communication problems. Press the ESC key to cancel the setup.

The complete operation usually takes about 2 minutes. A *ShockLog Setup sent ok* box will appear when successful completion of the operation.

The key for the status of the items on the checklist



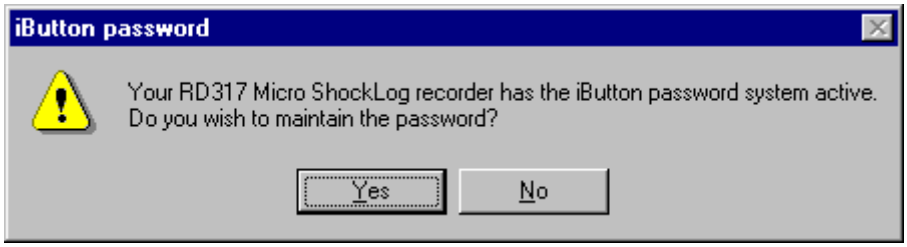
Mission Comment

Indicates that the Mission comment has been entered. This is usually green when the Checklist is shown.

Security Check

Checks the password status of the unit.

If you are sending a setup to a Micro ShockLog™ recorder with the iButton password system activated, then you will be prompted with the following message box.



If you click *Yes* then the iButton password will remain in the Micro ShockLog™ recorder.

If you click *No* then you will be prompted to enter the iButton password to clear it.

Compatibility check

Checks that the setup sent to the unit is compatible with the hardware i.e. RD298 ShockLog™ recorder, RD317 ShockLog™ recorder with or without humidity, RD298 ShockLog™ recorder with HPT fitted.

Reset

Resets the ShockLog™ recorder and clears any data.

Stop

Stops the ShockLog™ recorder while sending the setup.

Clear Setup

Clears the setup currently stored in the ShockLog™ recorder.

Send the new setup

Sends the new setup to the ShockLog™ recorder.

Start

Start the ShockLog™ recorder, which forces the ShockLog™ recorder to read the new setup and configure itself. The ShockLog™ recorder will only start recording, if the setup start date/time indicates so.

Read back the setup

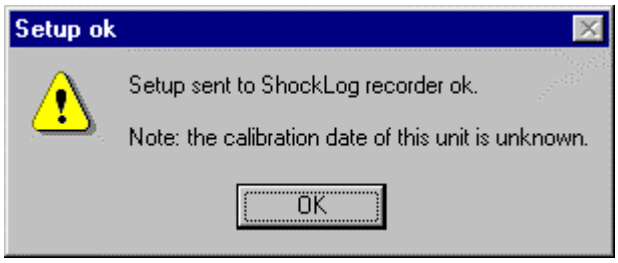
Verify the setup in the ShockLog™ recorder.

Synchronise time

Set the ShockLog™ recorder clock to the PC system clock. This item will only appear if you have requested for time synchronisation.

Calibration date check

This checks the calibration date in the ShockLog™ recorder. If the unit does not have a calibration date in it, then the following message will appear and the date cannot be checked.



If the date is within the warning period (11 months), or the setup start date is within the warning period, then you will see a message warning that the calibration is about to expire.

If the date is outside the calibration period (12 months), or the setup start date is outside the calibration period, then you will see a message indicating that the calibration has expired.

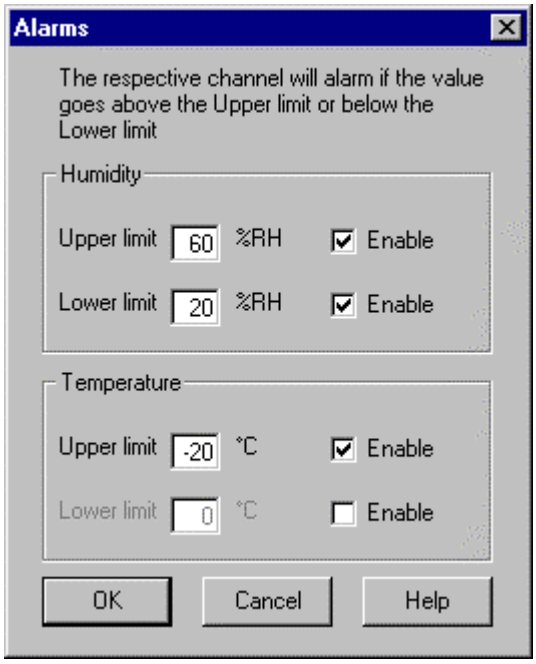
Set Other Alarms

This window is used to setup the temperature and humidity alarms on the Micro ShockLog™ recorder.

Although this window allows you to set Humidity alarms, this setup will not be compatible with a Micro ShockLog™ recorder without a humidity sensor.

The temperature alarms are compatible with any Micro ShockLog™ recorder.

These alarms do not require their respective Time Slots to be recorded, i.e. you do not need to tick the humidity on the *Time slots* tick list on the *Setup Tab* to use the humidity alarm. Any humidity readings are recorded in the Summaries records.



Humidity Upper Limit

Tick the *Enable* check box to activate the upper humidity alarm. This will trigger an alarm if the humidity reading is above the number entered in the Humidity *Upper limit* box.

Humidity Lower Limit

Tick the *Enable* check box to activate the lower humidity alarm. This will trigger an alarm if the humidity reading is below the number entered in the Humidity *Lower limit* box.

Temperature Upper Limit

Tick the *Enable* check box to activate the upper humidity alarm. This will trigger an alarm if the humidity reading is above the number entered in the Humidity *Upper limit* box.

Humidity Lower Limit

Tick the *Enable* check box to activate the lower humidity alarm. This will trigger an alarm if the humidity reading is below the number entered in the Humidity *Lower limit* box.

OK

Close this window and apply the alarms.

Cancel

Close this window and ignore any changes.

Help

Show the Online Help file.

Setup Wizard

The Setup Wizard provides a step-by-step process to help you select the most appropriate settings for your ShockLog™ recorder's mission. There are 10 steps in total, 3 of them are optional.

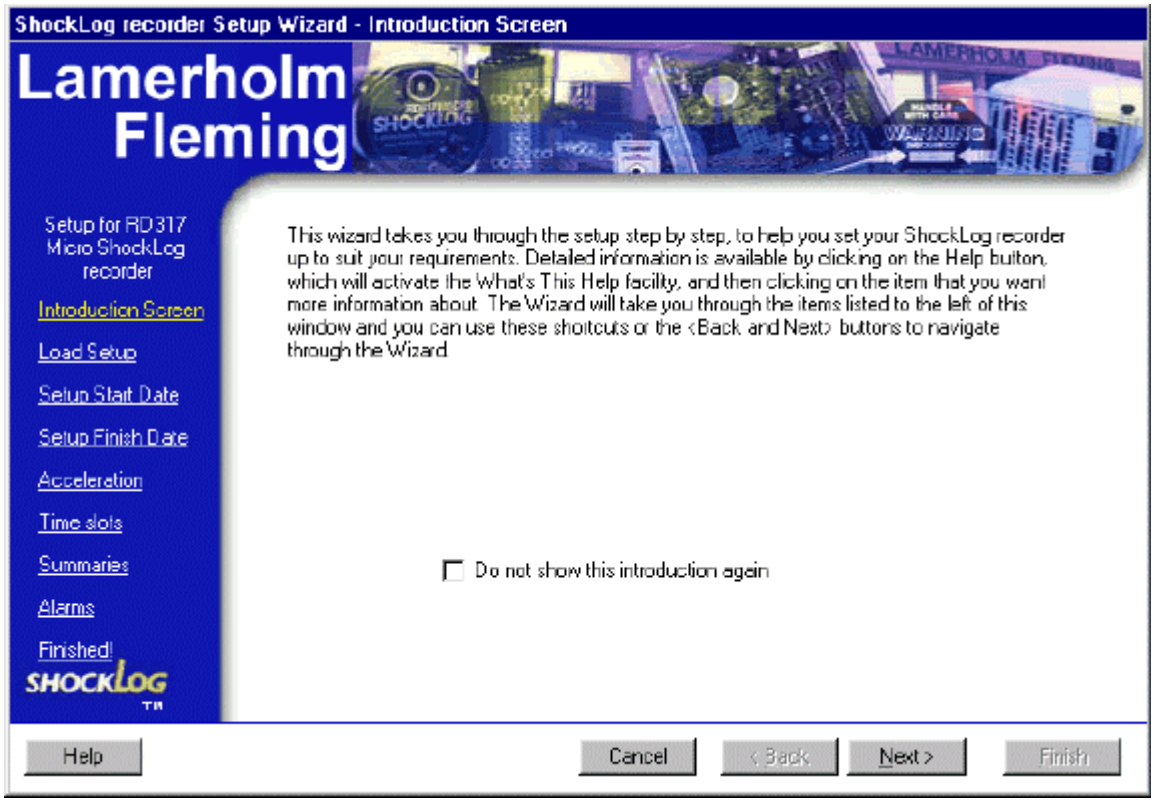
There are two ways to navigate about the Wizard, one is to use the *<Back* and *Next>* buttons, which take you through each step one-by-one. The other is to use the short cuts listed in the left column.

Additional detailed information can be obtained by using the *Help* button, which changes the mouse pointer to a help pointer. You can then click on the item you wish to know more about.

The *Cancel* button closes the window without any action.

The *Finish* button is only available on the 'Finished!' screen and applies the Setup built in the Wizard.

The steps are customised for the type of ShockLog™ recorder. The type is initially defined by the view on the Setup tab, the type can change if a Setup file is loaded on the 'Load Setup' step. The Wizard type is shown at the top of the left column.



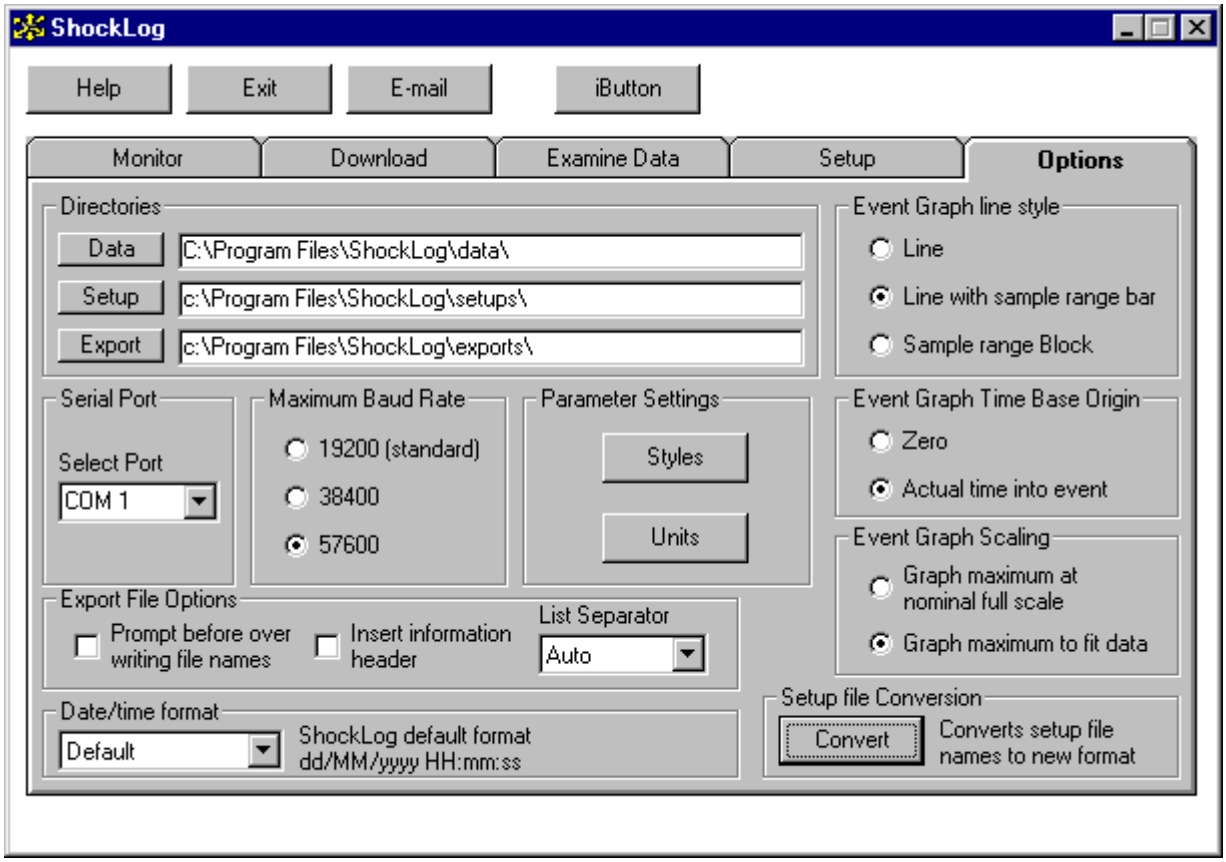
Setup Wizard steps

Introduction screen	Introduction to the Wizard. Shown above.
Load Setup	Gives the option of starting a new setup, using the setup currently displayed on the Setup tab, or load a setup from a files.
Setup Start Date	Defines the setup start date as either immediately or a later date.
Setup Finish Date (optional)	Specifies a target finish date by duration or a date. This date is used to derive slot/summary intervals.

Acceleration	Select acceleration range for RD298 ShockLog™ recorder.
Advanced Event settings (optional)	Gives a choice of criteria to help set the event recording parameters.
Advanced Accelerations (optional)	Provides a window to setup the acceleration Thresholds.
Times slots	Select slot parameters for recording and selecting the slot interval.
Summaries	Select summaries interval.
Alarms	Set humidity/temperature alarms. Only available for RD317 Micro ShockLog™ recorder setups.
Finished!	Enter a new setup name and select whether the settings are to be saved or saved and then sent to the ShockLog™ recorder.

Options Tab

The *Options* tab allows you to select the serial port to use, the default directories for data files, setup files and exported files, set the maximum serial port baud rate, set global export file options, set global Event Graph options, change settings associated with the data parameters and define the date/time format of the software. For comprehensive details on file types study the Filenames topic.



Directories

When you load or save data to the disk drive on your PC the ShockLog™ recorder software will use the directories defined in the Directories box in the *Options* tab.

Serial Port

In this box, you can select Offline working to analyse data you have already downloaded from your ShockLog™ recorder to your disk drive, or which has been sent to you from other sources.

If you need to communicate directly with a ShockLog™ recorder to download data or control its operation then select a Com port from the drop-down list. The drop-down list provides the option to go Offline or to select a port between 1 and 8. Choose a PC serial port, which is not in use by other programs. If you do not know what serial ports are available on your PC then consult the documentation for your machine or choose Com1 and try it!

Consult the Connecting the PC to the ShockLog™ recorder topic for more hints.

Maximum Baud Rate

This sets the maximum baud rate at which the program will try to communicate with a connected ShockLog™ recorder. The program will automatically try lower baud rates if it is having difficulty attaching.

Note! If you are having problems attaching to a connected ShockLog™ recorder, try a lower baud rate. Some slower PC's will not be able to run at the fastest rate.

Export File Options

This sets the global export file options.

If the 'Prompt before over writing file names' option is selected you will be asked to confirm the over-writing of files that already exist in the export directory.

If the ‘Insert information header’ option is selected any exported files will contain extra lines of data source information. See Export File Information Header for more information.

The List Separator option has two modes: ‘auto’ and ‘fixed’. In auto mode, the list separator is automatically selected according to the regional settings of your computer (default). In fixed mode, the list separator selected is always used, ignoring the regional settings of your computer.

Note! These options can be changed locally when exporting data.

Parameter settings

The *Styles* button presents the Parameter Style Option window to alter and save the style settings at a global level.

The *Units* button presents the Parameter units window

Event Graph line style

This sets the global default Event Graph line style. See Event Graph

Note! This option can be changed locally on each event graph.

Event Graph Time Base Origin

This sets the global default Event Graph Time Base Origin. See Event Graph

Note! This option can be changed locally on each event graph.

Event Graph Scaling

This sets the global default Event Graph Scaling. See Event Graph

Note! This option can be changed locally on each event graph.

Date/time format

There are 3 format options:

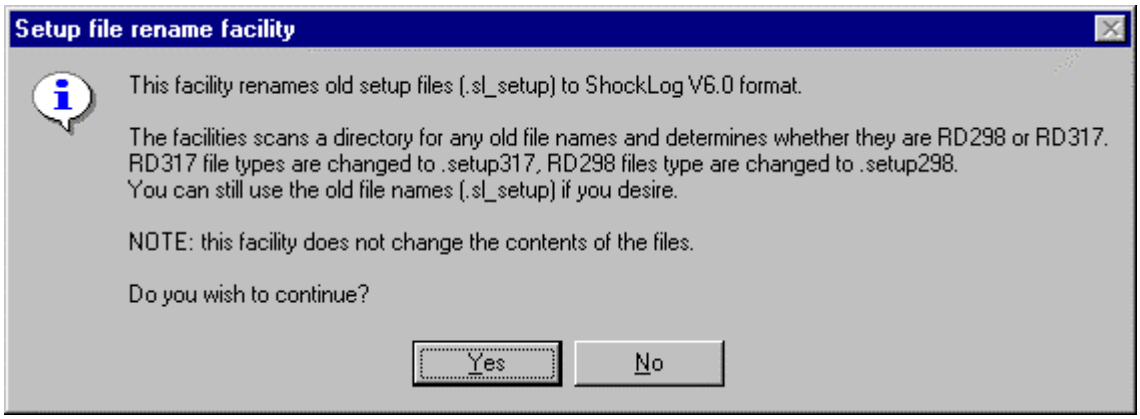
Option	Format	Description
Default	dd/MM/yyyy HH:mm:ss	Default format from previous versions of the software.
Local	system setting	Format to which the Windows system is set to.
ISO 8601	yyyy-MM-ddThh:mm:ss	Format as defined by the ISO 8601 standards.

This applies the selected date/time format to all displayed date and times. The only exception is the date/times in the exported files (from the Export window), which are exported using the Windows system format so that any software reading these files can correctly interpret the dates.

Convert

This provides the facility to convert setup file names from the old format (*.sl_setup) to the new format (*.setup298 or *.setup317). The facility scans files with the old setup name and renames them to the appropriate name, within a specified directory. This process does not alter the file, only renames the file.

When you click the convert button the following message will be displayed.



If you click *No* then the message box closes and there are no further actions.

If you click *Yes* then you will be prompted to select the directory containing the setup files which you wish to convert.

When you click *Ok* the renaming will start. Click *Cancel* to stop the renaming process and return to the *Options* tab.

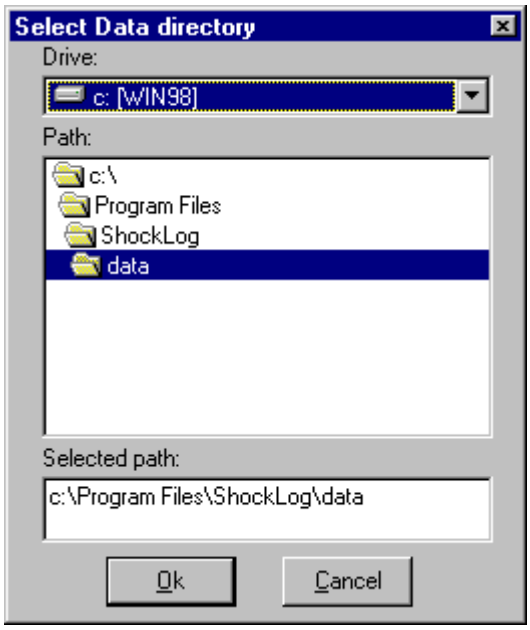
When the renaming has completed, you will get a report window defining how many files were identified for renaming, how many were successful and how many failed.

If all files failed, then the most likely reason is that you do not have the required access to the directory for renaming files. You will need to consult your IT engineer to resolve this.

If a small number of files have failed, then it could be that an updated version of this file already exists e.g. you could have "file1.sl_setup" and "file1.setup298" in the same directory, therefore "file1.sl_setup" cannot be renamed to "file1.setup298" because it already exists.

Select Directory Window

This window provides a facility to select a directory path.



Drive

Select a drive on your PC, this includes hard drive, floppy drives, CD-ROMs, DVD-ROMs, network drives and substitute drives. Changing the drive will automatically update the *Path* (showing the current path for that drive) and the *Selected path*.

Note that if you type in a *Selected path*, which refers to a network location e.g. "\\server\shared\" this will appear blank.

Path

Select a folder contained on the selected drive or network location. Changing this will change the *Selected path*.

Selected Path

This displays the current path selection. You can also type in a path name which can be either a full path name, a folder within the path displayed in the *Path* window, ".." (two periods) which will move you to the parent folder, or "\" (backward slash) which will move you to the top of the drive.

This box is actively changing the *Drive* and *Path* windows to match what you are typing. If your entry causes a change in the *Drive* or *Path* windows, then they in turn will update this box. The drive and folder will change as soon as the path you are typing matches a drive/folder on your PC.

If you want to type in a network path (e.g. "\\server\shared\"), then the first slash that you enter will move you to the top folder of the current drive, you will then need to type the first of 2 slashes again.

If the path you have typed is not recognised on the system, then the path displayed in the *Drive* and *Path* windows will be applied when the *Ok* button is clicked.

Ok

Accept the selected path and close the window.

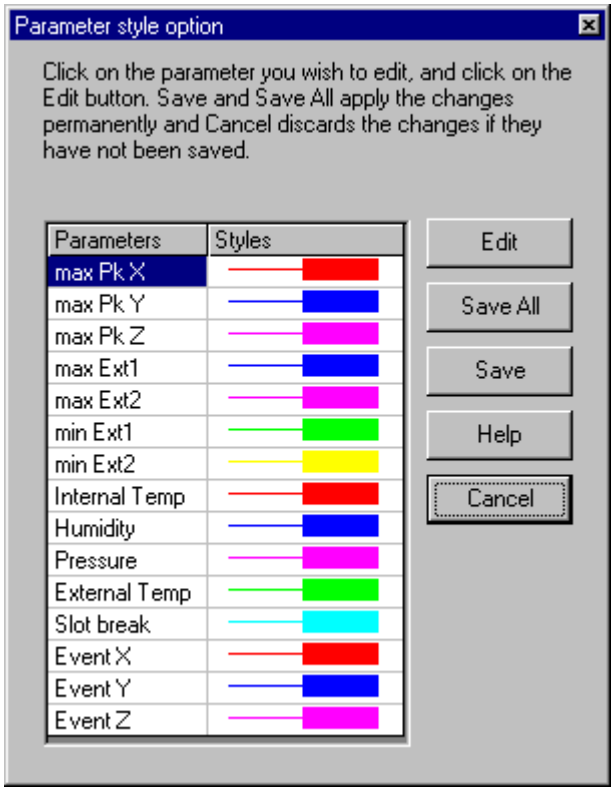
Cancel

Ignore the selected path and close the window.

Options

Parameter Style Options

This window allows you to view and edit the parameter styles as they would appear on the Time Slots graph and event graphs. The window has 2 display modes, one for when the window is opened from the Options tab, which provides global features only, and the other is from either the Time Slots graph or the Event Options window, which provides global changes as well as local changes. This is displayed below.



Edit

Opens the Fill and Line styles window.

Save All

Saves all the parameter style settings as the global settings, which will be applied from this moment on.

Save

Saves the selected parameter style settings as the global setting, which will be applied from this moment on.

Help

Click to access on line help.

OK

Apply the changes to the current graph and closes the window, without saving it as a global setting. This button does not appear when calling the Parameter Style Options window from the *Options* tab.

Cancel

This closes the window with out applying the settings. You cannot cancel the settings if they have been saved using the *Save* or *Save All* buttons.

Fill and Line style variations on printers

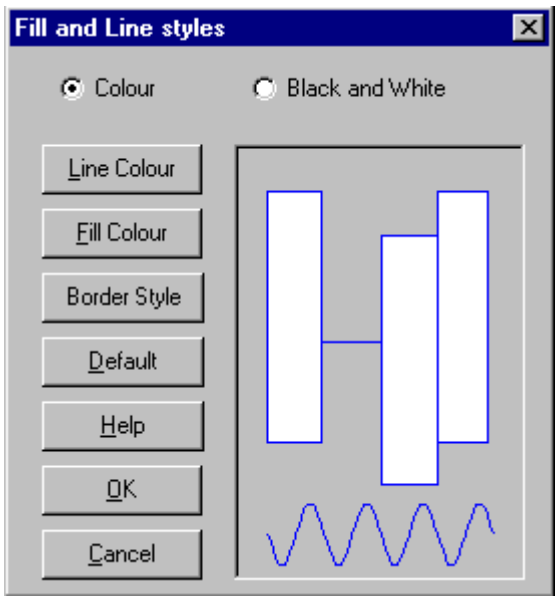
Due to the manner in which metafiles work (which is the medium that all graphics are created in the ShockLog™ software), the dashed lines and fill styles may vary between printers, or even operating systems. You may find that what appears on the printer is not exactly the same as on the screen, and if you resize the graph windows, the size of the dashes do not alter with respect to the graph window, but maintain their size with respect to the screen.

When a metafile draws a dashed line, it specifies that the line to be drawn is a dashed line (as opposed to actually drawing the dashes) and each device receiving these commands will have its own parameters for the dashed style. Some devices will draw longer dashes, some will be shorter and some older printers will draw a solid line.

This also applies to graphs that have been copied to other applications as metafiles.

Fill and Line Styles window

This window can be opened from the Parameter Styles Option window, or from the Time Slot graph or event graph . This window will display the origin parameter style, when opened. The picture in the right side of the window displays how the settings would appear on the slots graph and events graph.



Colour/Black and White option

Switch between colour and Black and White styles. The Colour options provide the ability to change the line colour, fill colour and border style, keeping the line and fill styles solid. The Black and White option will fix the line colour to black, but provide line style and fill style options.

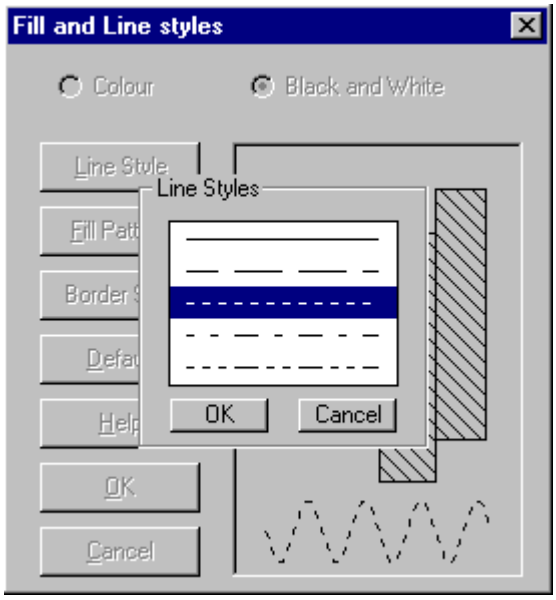
When the window is opened, the style settings are set to the origins style, and the alternative is set to the default. For example, if your style is originally colour, when you switch to the Black and White option you will see the default Black and White settings for that parameter.

Line Colour (Colour option only)

Presents the system Colour dialog box to select a colour for the lines.

Line Style (Black and White option only)

Displays a small window, which presents the available line style options. The window will open with current line style selected.



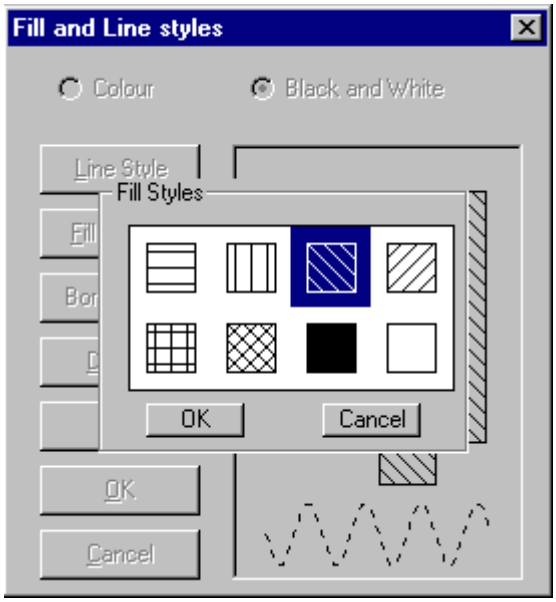
Click on a line style to select it and click on *OK* to apply it and close the Line Styles window. *Cancel* will close the window without applying the selected style.

Fill colour (Colour option only)

Presents the system Colour dialog box to select the fill colour.

Fill Style (Black and White option only)

Displays a small window, which presents the available fill style options. The window will open with current fill style selected.



Click on a fill style to select it and click on *OK* to apply it and close the Fill Styles window. *Cancel* will close the window without applying the selected style.

Border Style

Displays a small window (same as the Line Style window) which presents the available border style options. The window will open with current border style selected. Click on a border style to select it and click on *OK* to apply it and close the Fill Styles window. *Cancel* will close the window without applying the selected style.

Default

This displays the default settings for the respective parameter. If the Colour option is selected, the colour default setting will be presented without affecting the current Black and White style. If the Black and White option is selected, the Black and White default setting will be presented without affecting the current colour style

Help

Click to access on line help.

OK

Apply the displayed style and close the window

Cancel

Ignore the displayed style and close the window.

Parameter Units

This window allows the user to select which units they wish to apply to their data, and can be opened from the *Options* tab.

The available optional units are as follows:

Temperature	°C, °F
Acceleration	g, m/s^2, ft/s^2
Pressure	bar, lb/sq in.
Velocity	cm/s, m/s, ft/s, in/s

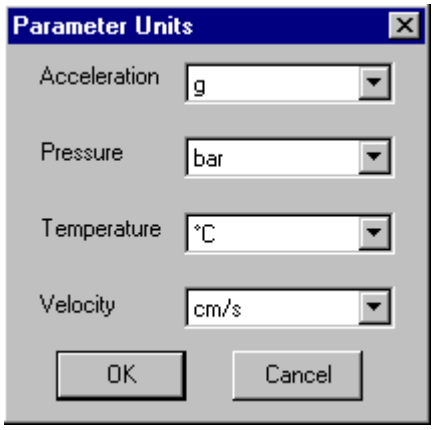
The units are applied when the data is presented in graphs, tables or exported files, but it does not affect the download or slots files, which remain in the original units (g, bar, °C and cm/s).

Once the file is downloaded the user can select and re-select the units and this facility can be applied to earlier downloaded data.

This does not affect the operation of the ShockLog™ recorder, which will record data in the standard units.

The units on the *Setup* tab will remain as the original units in order to keep the setup process as simple as possible.

Note: On some operating systems the °C, °F will appear as C, F, and ft/s^2 and m/s^2 will appear as ft/s2 and m/s2. When specifying the operating range of the unit, the units are not applied, i.e. it will always show 100g regardless of the acceleration units applied.



Acceleration

Has the option of g, metre/sec^2 or $feet/s^2$, g being the default and original unit. This is applied to all acceleration data in the Time Slots and Events. Is not applied if the ShockLog™ recorder setup is for measuring velocity.

Pressure

Has the option of bar or pound/square inch., bar being the default and original unit. This is applied to pressure data from the HPT sensor.

Temperature

Has the option of °Celsius or °Fahrenheit, °Celsius being the default and original unit. This is applied to external temperature data from the HPT sensor and internal temperature data.

Velocity

Has the option of centimetre/second, metre/second, feet/second or inches/second , centimetre/second being the default and original unit. This is applied to all velocity data in the Time Slots and Events. Is not applied if the ShockLog™ recorder setup is for measuring accelerations.

OK

Apply the selected units and close the window

Cancel

Ignore the new unit selection and close the window

Printer Options Window

This window allows the user to select the printer, page orientation and picture size when printing graphs. It is accessed from the *Print* buttons on the Time slot graphs , Event graphs , Event summary graph and the Download Report .

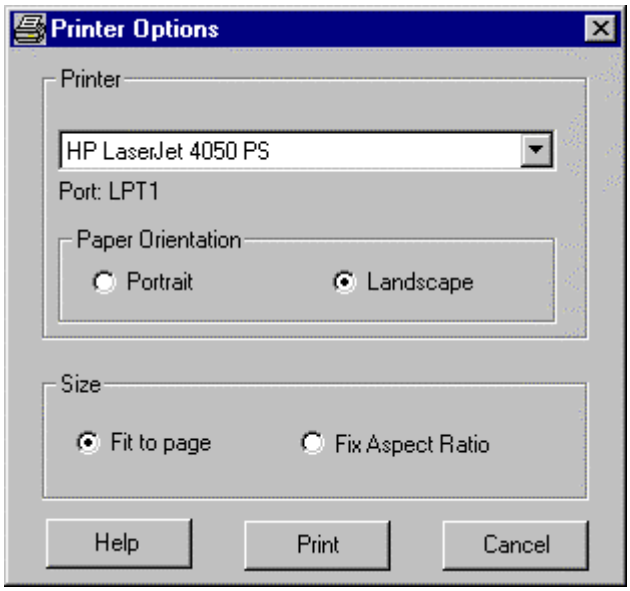
The system default printer is the initial target printer when the software is started. The drop-down list provides a list of printers on the computer, and any selection made is applied for subsequent prints, until the software is restarted.

The picture below shows the Printer Options window in its complete form. Some options may be hidden when this window is presented. For example, the Download Report is designed to fit to A4 landscape page so it will only provide the printer drop-down list box with no other options, and will print it Landscape and Fit to page.

On all print outs, the date/time will be printed in the bottom left-hand corner, and information concerning the data source will be printed in the bottom right-hand corner as follows:



The information is arranged as the first 3 columns on the *Examine Data* Tab .



Printer drop-down list box

This provides a list of printers detected on the computer. Select the printer to which you wish to print to. The selected printer will apply until changed. The computer system default printer will not be affected by the selections made here.

Port

Displays the port of the selected printer

Paper orientation

When the Printer Options window is initially displayed, the software (as a recommendation) may define the orientation. If the software is recommending an orientation, the orientation will not change with printer selections, otherwise the orientation will change to match the printer's current orientation.

Changing the orientation in this window will not affect the printer settings.

Size

Fit to page stretches the picture to fill the whole page

Fix Aspect Ratio will maintain the aspect ratio of the picture and will fill the paper as best as possible.

Data

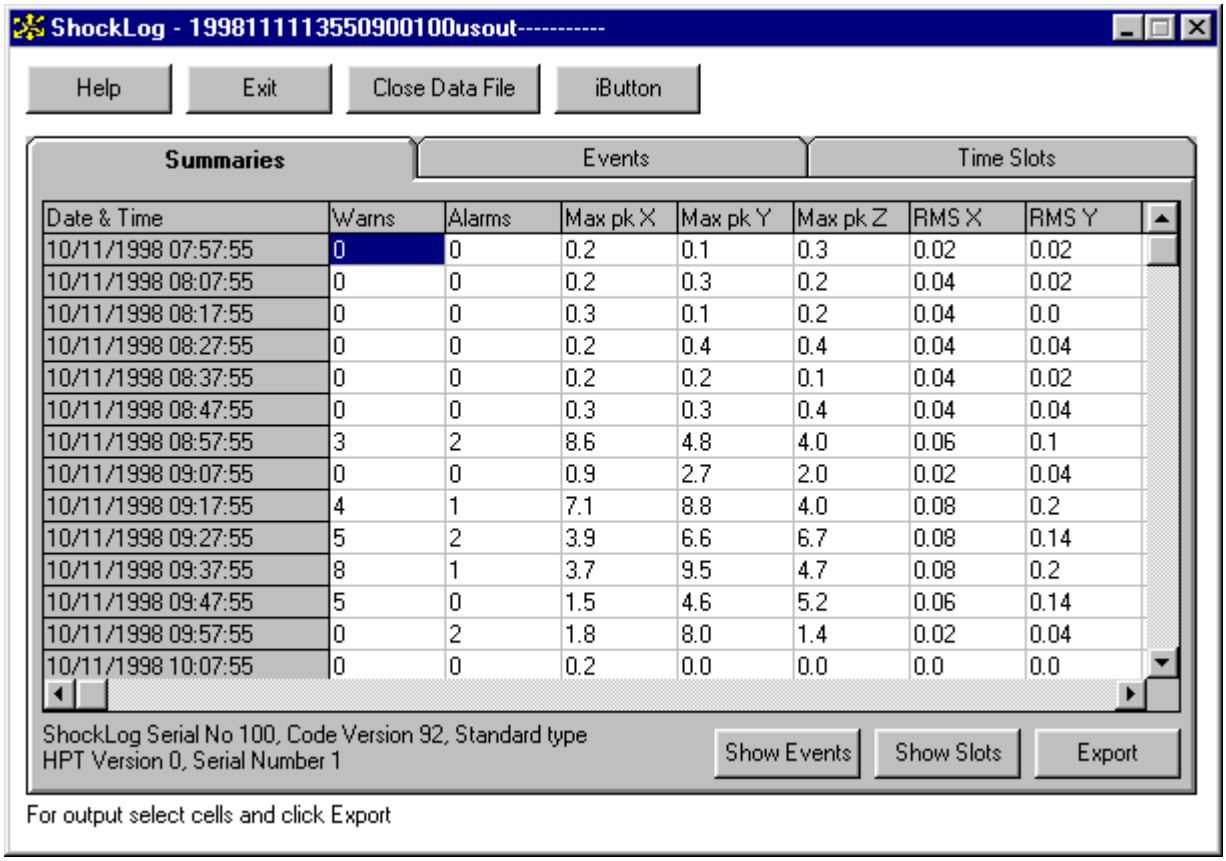
Summaries Tab

The *Summaries* tab allows you to examine and export the summary data recorded in a file. The data is arranged in a grid of columns that you can view by using the scroll bars to navigate in the table. If you select a range of cells, you can export them as a text file readable by Excel or other programs.

The Summaries table has 4 modes of display, customised to the ShockLog™ recorder hardware from which the data has been downloaded. These variations are listed at the end of this topic.

The following column descriptions describe all data that could be displayed. Depending upon the table mode depends upon what columns will be available.

A temporary summaries record may be seen on the table if a Micro ShockLog™ recorder has recorded humidity/temperature alarms. The temporary record is described in more detail towards the end of this topic.



Date & Time

This is the download date and time. This information is embedded in the file name and, like all dates, is always displayed in dd/mm/yyyy format regardless of your PC settings.

Warns

This is the number of events that occurred at the warning level in each summary period.

Alarms, Acc Alarms

This is the number of events that occurred at the alarm level in each summary period.

Temp Alarms

Displays if a temperature alarm has occurred during this summary period. The following list displays the possible contents of this column. For the purpose of these examples, the lower temperature alarm is –20 and the upper temperature alarm is 60.

Blank	No alarms
<-20	Temperature has gone below –20
>60	Temperature has gone above 60
<-20 >60	Temperature has gone below –20 and above 60

RH Alarms

Displays if a humidity alarm has occurred during this summary period. The following list displays the possible contents of this column. For the purpose of these examples, the lower humidity alarm is 20%RH and the upper humidity alarm is 60%RH.

Blank	No alarms
<20	Temperature has gone below 20%RH
>60	Temperature has gone above 60%RH
<20 >60	Temperature has gone below 20%RH and above 60%RH

Max Pk X, Max Pk Y, Max Pk Z

This is the maximum peak hold (time slots) acceleration level measured during each summary period when the ShockLog™ recorder processor was awake.

Max X, Max Y, Max Z

This is the maximum positive acceleration level measured during each summary period when the ShockLog™ recorder processor was awake. This value should be treated with caution if no events have been recorded in the summary period in question since the ShockLog™ recorder would only have been awake for very short times at quite long intervals and may have missed low level variations in acceleration peaks which were below the wake up threshold.

Min X, Min Y, Min Z

This is the maximum negative acceleration level measured during each summary period when the ShockLog™ recorder processor was awake. This value should be treated with caution if no events have been recorded in the summary period in question since the ShockLog™ recorder would only have been awake for very short times at quite long intervals and may have missed low level variations in acceleration peaks which were below the wake up threshold.

RMS X, RMS Y, RMS Z

This is the true RMS acceleration in each summary period. It is calculated from sampling the acceleration level on each axis once every 10 seconds. This level is accurate and useful for random vibration measurements whose average level does not change much during each summary period, and for summary periods greater than 30 minutes. Extreme caution must be exercised if the summary period is shorter or the vibration is cyclic in nature because the 10 second sampling time may synchronise with cyclic vibration (e.g. that from rotating machines) and give ***completely false indications***.

Max Temp, Min Temp

This is the temperature range during each summary period as measured by the ShockLog™ recorder's internal temperature sensor. The temperature is only measured once every 10 minutes so if the summary interval is also set to 10 minutes the max and min readings will be the same.

Max RH, Min RH

This is the humidity range during each summary period as measured by the Micro ShockLog™ recorder's humidity sensor.

Range

This is the acceleration or velocity range to which the ShockLog™ recorder was set during each summary period. In the current software release, this will be the same for all the summary periods in a data file but future releases of software may be capable of changing range during a recording.

Show Events

Press this button to Hyper-Link to all the events that fall within the selected summary period. There may be a discrepancy between the number of events presented in the 'Warn' and 'Alarms' columns, and the number of events displayed. This is due to an event occurring at the end of a summary period, which registers in that summary interval, but the event itself continues into the next summary period where, with respect to time, it exists, thus you may find that there is one extra event displayed at the beginning of a summary period, or one less at the end.

Show Slots

Press this button to Hyper-Link to all slots that fall within the selected summary period.

Export

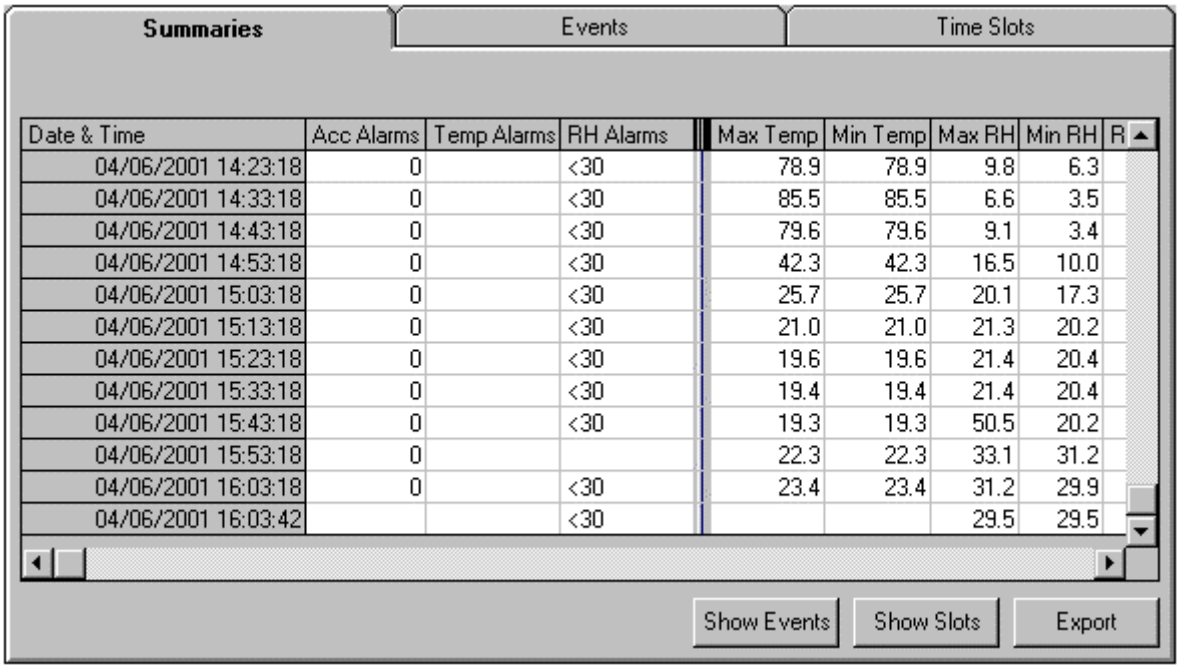
Press this button to export a selected summary or range of summaries to a text file. See Exporting from *Summaries* tab.

You can select all the cells by clicking in the *Date & Time* cell or select a whole column by clicking in the grey cell in the top row.

Temporary summaries data

This occurs with Micro ShockLog™ recorders with embedded code 128 and above, with temperature/humidity alarms activated.

If a humidity or temperature alarm occurs between summary intervals, then a temporary summary record is recorded to make a record of this alarm occurrence. As the summary interval is not complete, then standard summary data i.e. Max Pk X, RMS X, etc. are not recorded. If a temporary recorded has been recorded, then the last entry in the table may appear as below (note that the Max Pk and RMS columns have been reduced in width for clarity, they contain no data on the bottom row):



When a temperature or humidity alarm occurs, the data relevant to the alarm is also recorded, as above where a humidity alarm occurred before the next summary interval and the humidity data is also recorded, with no other data. Note that the time displayed with the temporary record is 24 seconds after the previous record, this is due to the summaries recording system being 24 seconds out of phase with the time slots system (which the humidity reading system is phased with).

When the summaries interval has been reached, this temporary record will be replaced with a complete summaries record, accounting for the data it replaces.

Summaries table configurations

The table below lists all possible columns against the different hardware. A ✓ indicates that the data will be displayed with this hardware configuration.

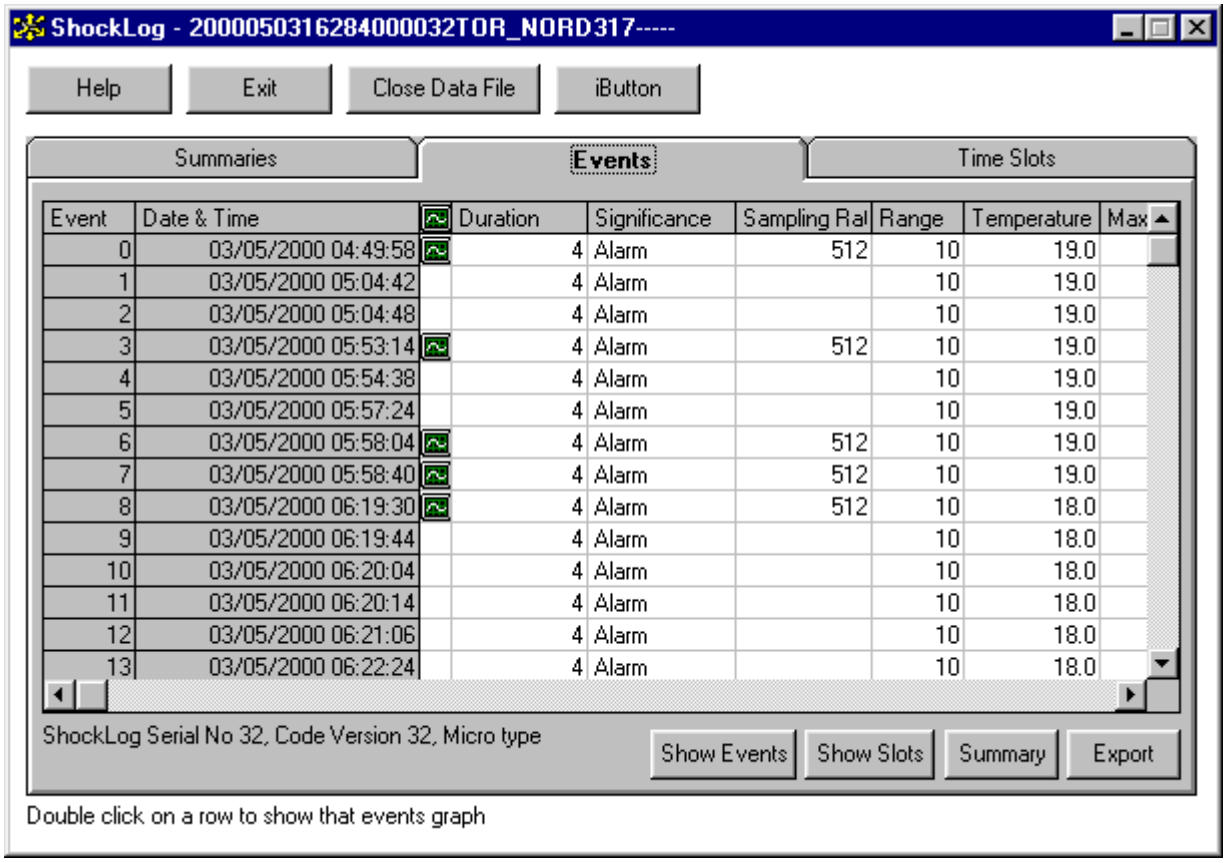
	RD298	RD298 OEM	RD317	RD317 with humidity
Date & Time	✓	✓	✓	✓
Warns	✓	✓		
Alarms/Acc Alarms	✓	✓	✓	✓
Temp Alarms			✓	✓
RH Alarms				✓
Max Pk X, Y, Z	✓		✓	✓
Max X, Y, Z		✓		
Min X, Y, Z		✓		
RMS X, Y, Z	✓	✓	✓	✓
Max/Min Temp	✓	✓	✓	✓
Max/Min RH				✓
Range	✓	✓	✓	✓

Events Tab

The *Events* tab allows you to select an event from those recorded in the file so that you can examine the data in detail. Move the mouse pointer to the row containing the event you are interested in, and double-click to select that event for analysis, or select a range of events and press the *Show Events* button.

More than one event graph can be displayed at once.

This table displays both events and event summaries. The ShockLog™ recorder does not have any event summaries data, whereas the Micro ShockLog™ recorder can have up to 128. An event summary can be identified by not having  symbol next to it.



Event

This is the event number. For the ShockLog™ recorder, this is the actual event number. The Micro ShockLog™ recorder uses the event date/time to order the events and applies a sequential number to them. See the Micro ShockLog™ recorder Events topic for more information on how the PC manages the Micro ShockLog™ recorder events.

Date & Time

This is the date/time that the event started recording on the ShockLog™ recorder.

The date and time are obtained from the ShockLog™ recorder's internal clock – if that has been set incorrectly, the dates and times may not match those on your PC.

The time stamp is read from the ShockLog™ recorder's clock at the end of the event, and the event duration is used to derive the start of the event.



Indicates that an event graph can be shown for this data, i.e. the event is not an event summary. The ShockLog™ recorder data will have one of these for every event, whereas the Micro ShockLog™ recorder data will not, if there are more than 10 events.

Duration

The ShockLog™ recorder can measure events lasting from 1 to 128 seconds according to the actual event data and the ShockLog™ recorder settings. The Duration cell tells you how long each individual event lasted. The Micro ShockLog™ recorder has events of fixed duration.

Significance

For the ShockLog™ recorder, each event is graded for significance once the event data has been captured into the ShockLog™ recorder's volatile RAM memory and is being written into its non-volatile FLASH memory. If any samples exceed the Alarm threshold, it is an Alarm; if any samples exceed the Warn threshold, but not the Alarm threshold, it is a Warn. Study the *Setup* tab and Events topics for more details.

The Micro ShockLog™ recorder does not support the warning level and thus the Significance parameter will always be 'Alarm'. See the Micro ShockLog™ recorder Events topic for more details.

Sampling Rate

This is the effective sample rate of the event. This varies with event duration and record length as defined in the ShockLog™ recorder set up.

This parameter is fixed for the Micro ShockLog™ recorder, as the duration and the record length are both fixed for every event.

Range

This is the acceleration or velocity range to which the ShockLog™ recorder was set when the event was recorded. In the current software release, this will be the same for all the events in a data file but future releases of software may be capable of changing range during a recording.

Temperature

This is the temperature measured on the ShockLog™ recorder's internal temperature sensor when the event was recorded.

Max X, Y, Z

This data is the maximum acceleration levels reached during the event, for each axis. The ShockLog™ recorder values are derived from the event data in the PC, whereas the Micro ShockLog™ recorder values are recorded during the actual event recording and are more realistic. They are part of the event summaries data.

Modulus

The maximum vector modulus of all 3-axis that occurred during the event. The ShockLog™ recorder values are derived from the event data in the PC, whereas the Micro ShockLog™ recorder values are recorded during the actual event recording and are more realistic. They are part of the event summaries data.

Show Events

Press this button to display graphs of all the  events that are selected on the grid.

Show Slots

Press this button to Hyper-Link to all the time slots that fall within the selected event or range of events period.

Summary

Display the Event Summary graph .

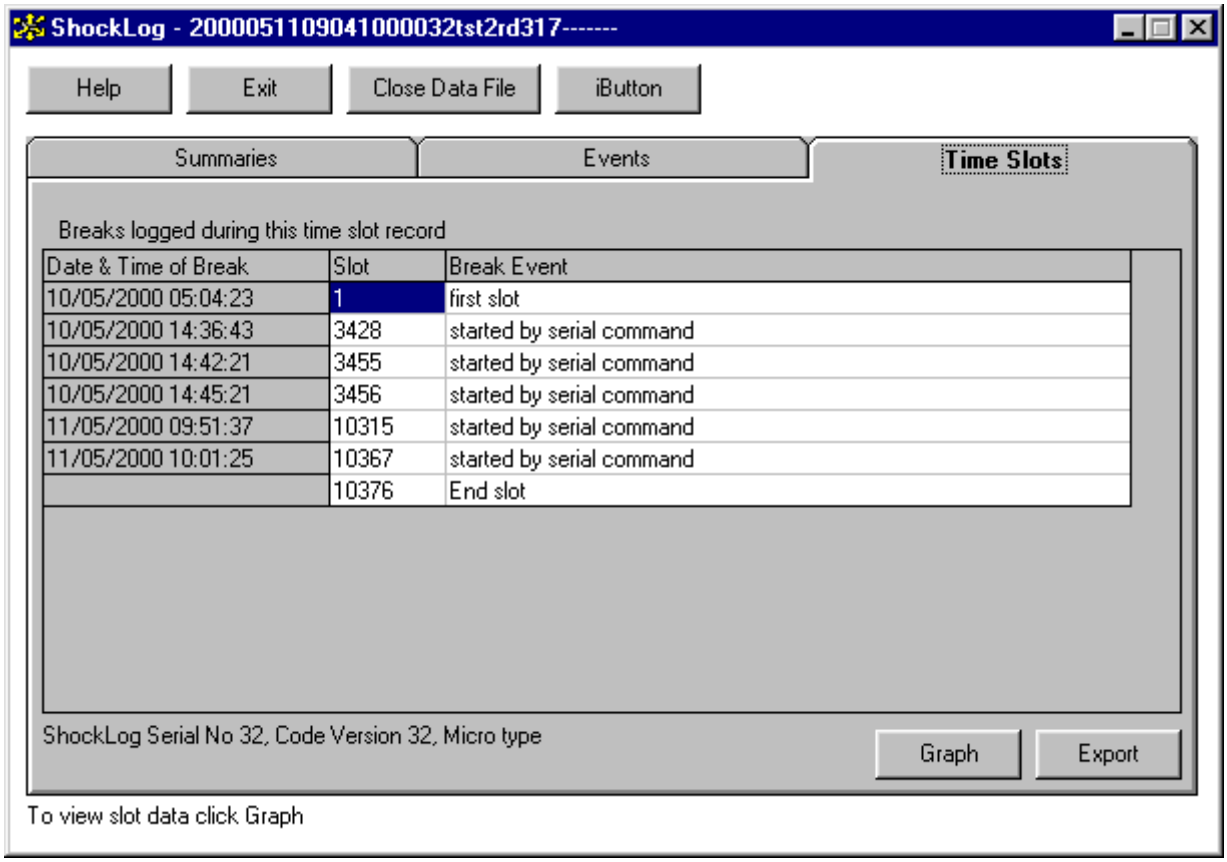
Export

Press this button to export a selected event or range of events to a text file. See Exporting from *Events* tab .

You can select all the cells by clicking in the grey cell in the top row.

Time Slots Tab

The *Time Slots* tab gives a very brief summary of the time slot recording process. It allows you to check the validity of a time slot record before exporting or examining it. For further details of the principles of Time Slot recording, study the Time Slots topic.



The main display of the *Time Slots* tab is a table of break events. These are discontinuities in the time slot recording process and there should always be two – the *first slot* and the *end slot*. If there is more than two break events the time sequence of the slot record may have been broken and care must be taken in interpreting it. The possible break events are listed in the Slot Breaks topic.

Date & Time

This is the date and time at which the ShockLog™ recorder recorded a break event.

Slot

This is the number of the time slot at which the break event occurred.

Break Event

If something happens during the recording process, which might affect the continuity of the time slot, recording process this event will be recorded in the Time Slot break event log. See the Slot Breaks topic for more information.

Graph

Press this button to display the time slot data graphically.

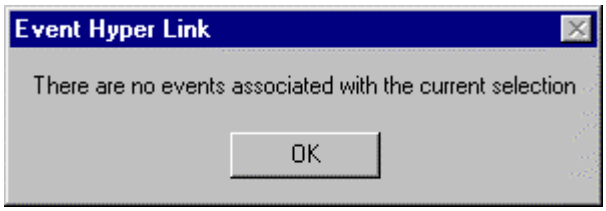
Export

Press this button to export the time slot data. See Exporting from the *Time Slots* tab .

Hyper-Linking

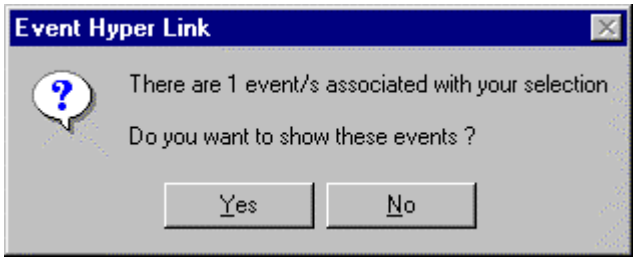
Data Hyper-Linking enables the user to move around related data, Summaries to Slots and Events, Events to Slots, and Slots to Events. The Hyper-Linking works by checking for associated data in the same period.

In general, if there are no slots or Events to Hyper-Link to, a dialog box will be shown to indicate this.



Summaries to Events

To Hyper-Link to Events from the *Summaries* tab select a summary or selection of summaries from the grid. Then click the *Show Events* button, if there are any associated Events, a dialog box gives the user the option to show them.



Summaries to Slots

To Hyper-Link to Slots from the *Summaries* tab select a summary or selection of summaries from the grid. Then click the *Show Slots* button, if there are any associated Slots the program will jump to the slots window. The Slots shown in the slot graph will represent the period of the selected summaries and is displayed at the lowest zoom level possible to give maximum detail.

Events to Slots

There are two methods to Hyper-Link to Slots from Events.
The first is from the *Events* tab. Select an Event or Events from the Event grid and then click the *Show Slots* button. If there are any associated Slots the program will jump to the slot window and display them. There is a difference between selecting one Event and a range of Events. A single Event selection is the same as if the *Slots* button were clicked on an Event window (see second method). Whereas a range selection shows all of the slots in the select period at the at the lowest zoom level possible to give maximum detail, in the same way as the summaries to slots.

The second method is from an Event window. Once the event window is displayed, click on the *Slots* button. If there are any associated Slots, the program will jump to the Slot Window. The Slot graph will be displayed centred about the slot related to the Event and the cursor will hi-light that slot. The graph will be automatically set to its lowest level.

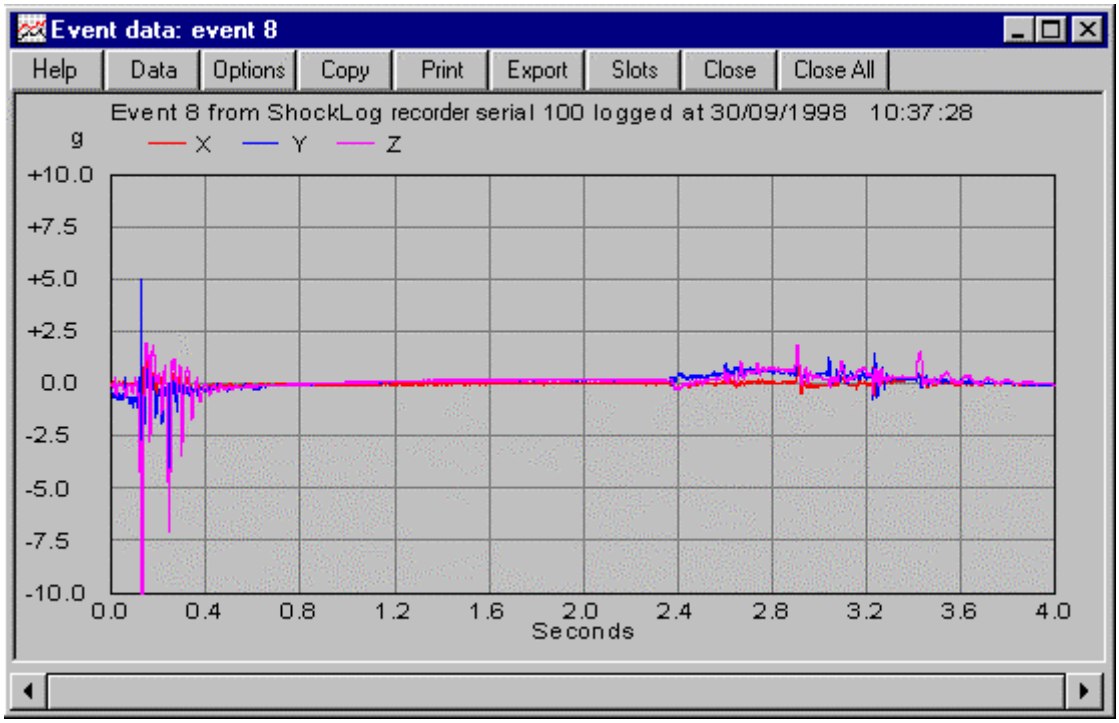
Slots to Events

To Hyper-Link to an Event or Events from Slots, open the Slots window, place the cursor over the slot or slots of interest, and then click the *Events* button. If there are any Events associated with slots hi-lighted by the cursor, the user will be given the option to jump to these.

Events

Event Graph

The Event Graph is a graphical display of a selection of acceleration data from an event. The graph can be manipulated by means of mouse clicks in the graph window. The graph initialises itself by zooming to the important part of the event.



Mouse Control

Left-click and drag	Select an area of data to zoom in to. This action can be cancelled by pressing the ESC key.
Left click in the grid area	zoom in on time axis
Right click in the grid area	zoom out on time axis, or revert to previous zoom if current view was selected by dragging the mouse
Left click to left of the grid area	move graph window to show earlier times
Left click to right of the grid area	move graph window to show later times
Left click on X, Y or Z legends	Change the line style for the respective axis. This will present the Fill and Line styles window which will only alter the style for this graph and not globally. If you wish to alter the style globally, then access the Parameter Style Options window through the Options and then *Styles* button.

Scroll Bar

The scroll bar size and position indicates the window of data you are viewing, and can be used to change the view.

You can move the bar by:-

Dragging the scroll bar control to a new position using the left mouse button

Clicking on the small buttons at either end of the bar to move in small steps

Clicking on the bar area between the buttons and bar to move in big steps

You can resize the scroll bar control by:

Dragging the scroll bar control with the right mouse button. Click on the left side of the control to resize to the left, and the right side to resize to the right.

Help

Click this button to display the On Line Help.

Data

Click this button to show the Event Data window.

Options

Click this button to display the Graph Options box, this box allows you to change the way the graph is plotted. The graph options you select only effect the current graph. See Event Graph Options .

Copy

Click this button to copy the graph at the zoom level and time position displayed on your computer screen, to the Windows clipboard as a metafile. This will copy the picture at its current size and can be pasted in to other programs.

Print

Click this button to open the ShockLog™ Printer Options window. The print function will print the graph at the zoom level and time position displayed on your computer screen.

Export

Click this button to export the Event Graph data to a text file. See Exporting from Event Graphs .

Slots

Click this button to Hyper-Link to all the slots that fall within the Event Graph period.

Close

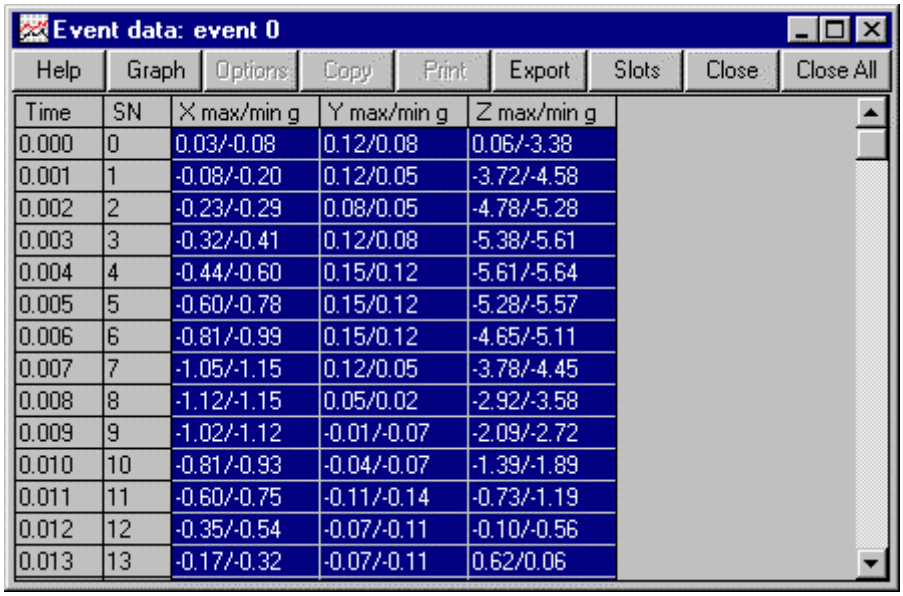
Click this button to close the graph window. You may wish to close the graph in order to reduce screen clutter, but you do not need to.

Close All

Click this button to close all the event graph windows.

Event Data

The Event Data window enables you to select a group of data points and either export them or return to the graph to plot them. You can select all the cells in the table by clicking in the *Time* or *SN* cells, or select a whole column by clicking in the grey cell in the top row. You can select a range of cells by clicking on a cell and dragging the mouse pointer to another cell.



Time	SN	X max/min g	Y max/min g	Z max/min g
0.000	0	0.03/-0.08	0.12/0.08	0.06/-3.38
0.001	1	-0.08/-0.20	0.12/0.05	-3.72/-4.58
0.002	2	-0.23/-0.29	0.08/0.05	-4.78/-5.28
0.003	3	-0.32/-0.41	0.12/0.08	-5.38/-5.61
0.004	4	-0.44/-0.60	0.15/0.12	-5.61/-5.64
0.005	5	-0.60/-0.78	0.15/0.12	-5.28/-5.57
0.006	6	-0.81/-0.99	0.15/0.12	-4.65/-5.11
0.007	7	-1.05/-1.15	0.12/0.05	-3.78/-4.45
0.008	8	-1.12/-1.15	0.05/0.02	-2.92/-3.58
0.009	9	-1.02/-1.12	-0.01/-0.07	-2.09/-2.72
0.010	10	-0.81/-0.93	-0.04/-0.07	-1.39/-1.89
0.011	11	-0.60/-0.75	-0.11/-0.14	-0.73/-1.19
0.012	12	-0.35/-0.54	-0.07/-0.11	-0.10/-0.56
0.013	13	-0.17/-0.32	-0.07/-0.11	0.62/0.06

Time

This column displays the time of each sample, counted from the start of the event, in seconds.

SN

This column displays the number of each sample, counted from the start of the event.

X max/min g, Y max/min g, Z max/min g

These three columns display the maximum and minimum values of acceleration measured during each sample period. The maximum value (displayed first) is the largest of these four and the minimum value (displayed second) is the lowest of these four. For a detailed explanation of the ShockLog™ recorder's event sampling system, study the Events topic.

Graph

Click this button to return to the graph window.

Export

Click this button to export the Event Graph data to a text file. See Exporting from Event Graphs.

Slots

Click this button to Hyper-Link to all the slots that fall within the event graph period.

Close

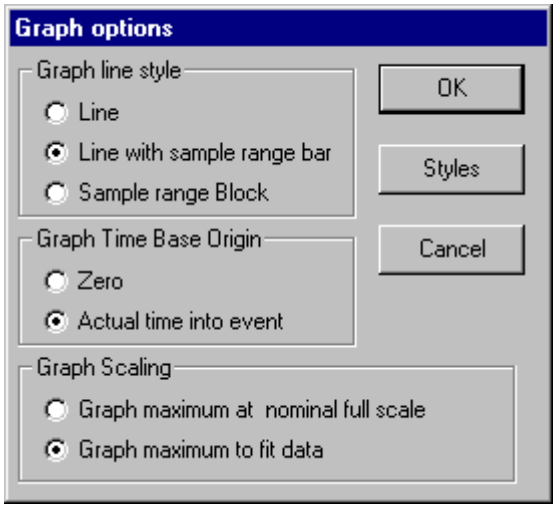
Click this button to close the graph window. You may wish to close the window to reduce screen clutter, but you do not need to.

Close All

Click this button to close all the Event Graph windows.

Event Graph Options

The Graph Options box allows you to change the way that the graph is plotted. The graph options you select only effect the current graph, to change the global Graph Options see *Options* tab.



Graph Line Style

As discussed in the Events and Event Table topics, every data point in an event is represented by a max/min pair of values. This pair of values represents a range for the data point. If the two values are close, the range in the measurement (from sampling related causes) will be small. This effect can be represented on the graph by plotting in *Line with sample range bar* or *Sample range Block* modes.

The *Line* mode plots the acceleration or velocity as a line connecting the average value of each max/min pair. This gives a conventional appearance but may give a very false impression of the actual variation of the acceleration or velocity when long duration events containing high frequency information are plotted.

The *Line with sample range bar* mode plots a line as above but superimposes a bar for each data point drawn between the max and min values for the point. This is the default mode of plotting and gives a good compromise between conventional appearance and correct representation of the facts.

The *Sample range Block* mode is the most mathematically rigorous way of displaying the data - but gives the least conventional appearance and can cause confusion when presented to the non mathematically minded. The *Sample range Block* mode does not connect points by a line (where there was no sample there is no information) and represents each data point by a block whose width represents the sample interval and height the sample amplitude range. It can then be stated with reasonable confidence that the actual data values during each sample interval fell within the error block. For short duration events this mode can often produce plots which look very similar to the *Line* mode – this demonstrates that the sampling induced errors are very small. For long duration events with high frequency content (and especially where short record sizes are used) there may be very significant differences between the two modes. It is a good idea to check data sets using the *Sample range Block* mode.

Graph Time Base Origin

You can set the start time value of the time axis of the graph to always be zero or to let it track the actual time into the event (this is the default setting). It can be useful to zero the origin when you need to compare different events.

Graph Scaling

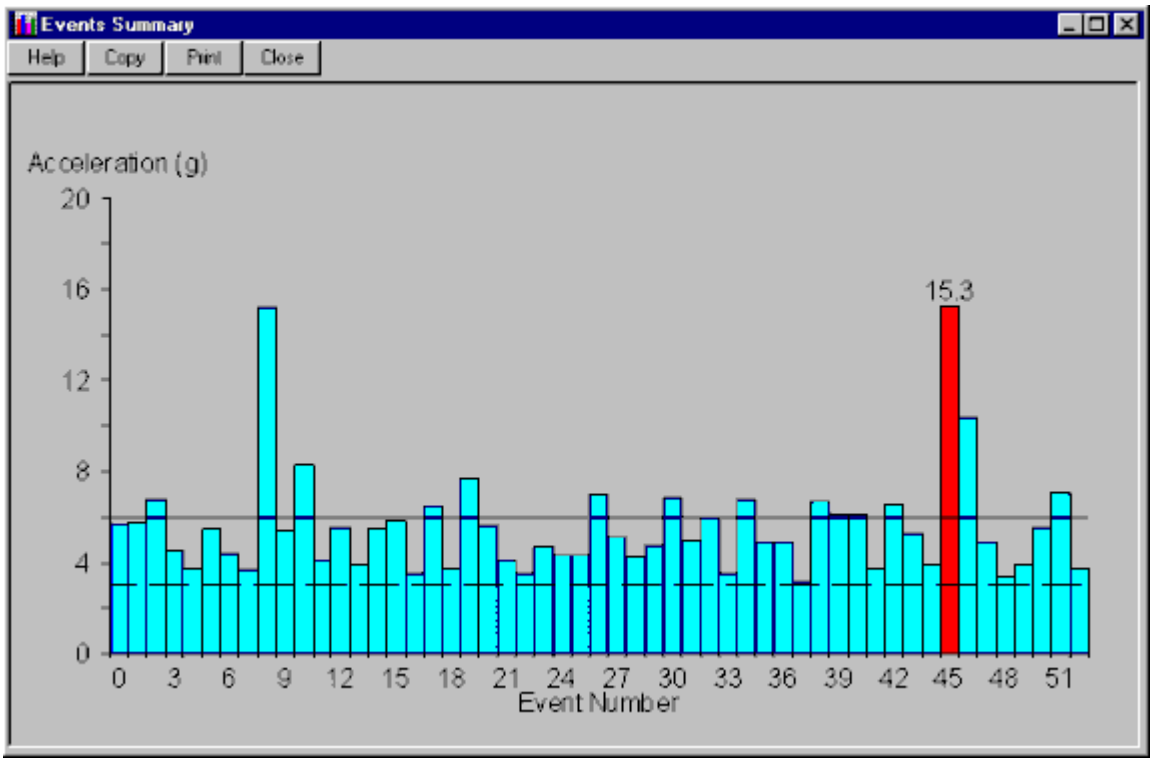
The graph amplitude scale can be fixed at the full-scale range the ShockLog™ recorder was set to during the recording or allowed to auto range to fit the data. The graph defaults to the fixed scale to facilitate comparison of event plots.

Styles

This presents the Parameter Style Option window to alter and save the style settings.

Event Summary graph

The Event Summary graph displays the maximum modulus of each event, highlighting the maximum excursion in red and providing its value. The warning and alarm levels are shown on the graph (solid line for alarms, dashed line for warnings) but only if the all three-axis are linked (LinkXYZ option on the Setup tab). As the values displayed on this graph are a resultant of all 3-axis, warning events may exceed the alarm level.



Help

Click this button to display the On Line Help.

Copy

Click this button to copy the graph displayed on your computer screen to the Windows clipboard as a metafile. This will copy the picture at its current size and can be pasted in to other programs.

Print

Click this button to open the ShockLog™ Printer Options box. The print function will print the graph at the zoom level and time position displayed on your computer screen.

Close

Click this button to close the graph window. You may wish to close the graph window in order to reduce screen clutter, but you do not need to.

Time Slots

Time Slot Graph

The Time Slot Graph is a graphical display of a selection of the time slot data. The graph can be manipulated by means of the control buttons or by mouse clicks in the graph window. The tools in this window allow very effective and rapid navigation of very large data sets, (up to 262,144 points for the ShockLog™ recorder, or 131,072 for the Micro ShockLog™ recorder).

The data is represented by up to ten graphs arranged vertically. All the graphs share a common horizontal time axis and scale, but the vertical scaling for each will depend on the parameter it displays. The graph parameters can be chosen in the drop down boxes on the right of the graph display area. When you click on the down arrow of one of these boxes you will be offered a choice of the parameters recorded in the time slot record. It is possible (but pointless) to select the same parameter for all of the displayed graphs – usually each graph is used to display a different parameter. The slot graph will display a graph for each channel, up to a maximum of 4 when it is opened.

A measurement cursor (identified by a large red triangle at the bottom of each graph and on the left in the example below) is used to provide a numerical value for data points on the graph. The status line at the top of each graph details the data values at the cursor position. In the example, for the top graph, the status line reads:

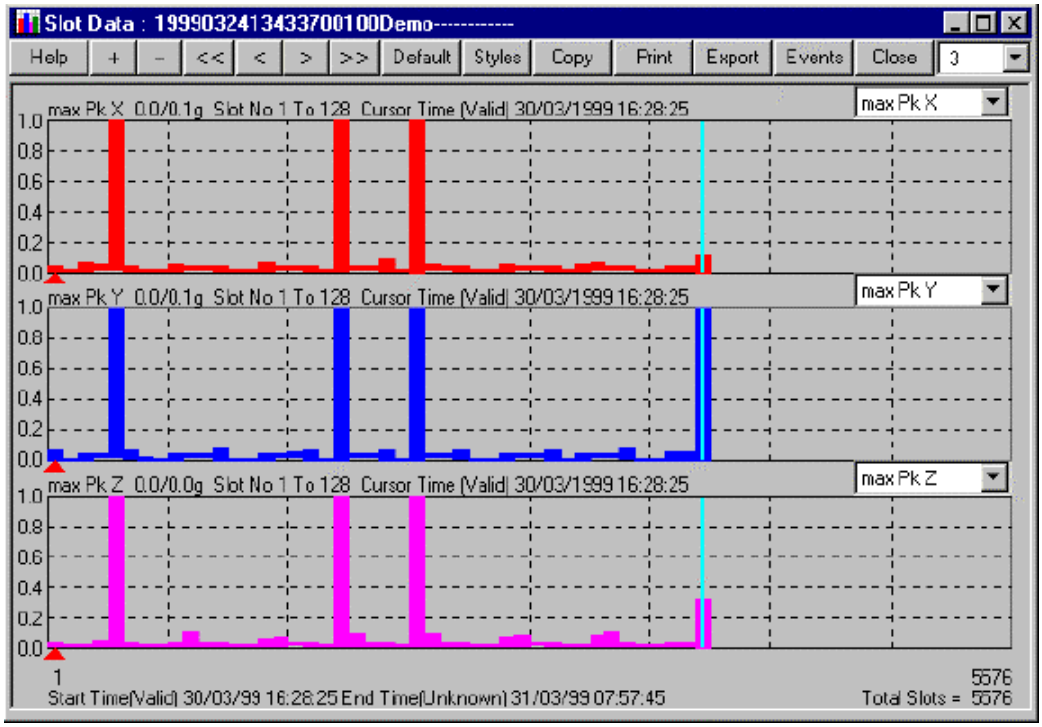
max pk X 0/0.1g Slots No 1 to 128 Cursor Time (Valid) 30/03/1999 16:28:25

This means that the parameter displayed is max pk X (study *Summaries* tab or Time Slots topics for details), the value at the cursor position ranged from 0 to 0.1 g, the cursor position covers slots numbers 1 to 128, the cursor time is valid (no slot break events between the start of recording and this cursor position) and that the cursor position represents a date and time of 30/03/1999 16:28:25.

If slot break events have occurred thick vertical bars drawn through all the graphs represent them, cursor time after the breaks could be labelled as *uncertain* or *unknown* depending on the type of break. See the Slot Breaks topic for more information.

The bottom line in the graph window indicates that the clock was valid at the start time, but unknown at the end time (due to the slot breaks) and that 5576 slots were recorded in total.

The numbers 1 (at the left) and 5576 (at the right) just below the bottom graph indicate the range of slots displayed on the graphs.



Mouse Clicks

Left click in graph area	moves cursor to mouse pointer position
Left double-click in graph area	moves cursor to mouse pointer position and zoom in on time axis
Right click in graph area	zooms out on time axis
Left click with Shift button	Displays the Fill and Line styles window for the parameter displayed. This will only alter the settings for the graph and not globally. If you wish to save the settings globally, then use the Parameter Style Options window that can be accessed by clicking on the *Styles* button.

Help

Click to access on line help.

+

Click to zoom in on time axis at the cursor position. At the maximum zoom level the + button will be greyed out. The maximum zoom level is that at which 64 individual time slots are displayed. (If the record is shorter than 64 slots, it is the level at which all the time slots are individually displayed.)

-

Click to zoom out on the time axis. At the minimum zoom level the – button will be greyed out and all the time slots in the record will be displayed as one block. When you do this the amplitude data minimum and maximum in each graph's status line represents the complete range for that parameter for the entire record. This is a very quick and easy way of checking the full data range of a recording. You can then zoom in to examine interesting details of the record using the left mouse button.

<<, <, >, >>

Click these buttons to move the graph window left or right through the data set without changing the level. The < and > buttons make small steps and the << and >> buttons make larger steps. If you need to step a long way through a record it will be faster to zoom out, re-position the cursor and zoom in again.

Default

Returns the graphs to their default time range

Styles

This presents the Parameter Style Option window to alter and save the style settings.

Copy

Click this button to copy the graph at the zoom level and time position displayed on your computer screen to the Windows clipboard as a metafile. This can then be pasted in other programs like Word, Excel, etc.

Print

Click this button to open the ShockLog™ Printer Options window. The print function will print the graph at the zoom level and time position displayed on your computer screen.

Export

Click this button to export the Event Graph data to a text file. See Exporting from the Slot Graph .

Events

Click this button to Hyper-Link to any events that fall within the period of the slots indicated by cursor.

Close

Click to close the Time Slot graph window. You can close the graph window in order to reduce screen clutter, but you do not need to. Keep the window open if you need to export data and wish to export the range of data displayed in the graph window.

Number of Graphs

Click the down arrow next to the number on the extreme right of the control bar to change the number of graphs displayed in the slot window (maximum of ten).

Key presses

+	as the + button
-	as the – button
<, >	makes single slot steps

Slot Breaks

Slot breaks are generated when the continuity of the slot recording is disrupted. They provide a time and type of action.

Up to 32 such events may be recorded. There are eight possible event types and it is possible for more than one to occur at the same time.

As the Micro ShockLog™ recorder stops every time you apply an iButton or talk to it through the serial COM port (not monitoring), the Micro ShockLog™ recorder may have many log entries.

first slot	slot recording starts – event expected shows clock at start time
clock reset by sw	a serious fault has occurred and the software has detected the internal clock to be in error and reset it (to date 1/1/1990 and time 00:00:00)
clock set by PC	the internal ShockLog™ recorder clock was reset by the PC
pwr on clock OK	the ShockLog™ recorder power was restored after being off but the clock was still correct so the power was off for less than 2 hours
pwr on clock reset	the ShockLog™ recorder power was restored after being off but the clock was not correct so the power was off for more than one hour
started by serial command	the ShockLog™ recorder received a start command from a PC
stopped by serial command	the ShockLog™ recorder received a stop command from a PC
started by iButton	the ShockLog™ recorder received a start command from an iButton
stopped by iButton	the ShockLog™ recorder received a stop command from an iButton

If there are break events recorded then it is a good idea to check the Security Log which may give further insight into what has happened.

Building slot times from the breaks

All slot breaks are analysed and assessed of their validity in the process of deriving slot times. Generally, the ‘first slot’, the ‘clock set by PC’ and the ‘started by …’ breaks are taken as valid times, thus any slots following these breaks are considered valid.

The ‘pwr on clock reset’ is considered as a bad time and the duration of the ShockLog™ recorder being powered off cannot be determined, so slots following these breaks are considered as ‘uncertain’, until a valid time is encountered.

The times from the slot breaks are checked for validity, in case a corrupt time exists. They are compared to their expected time (time of last break + the number of slots since the last break × slot interval). If they are after their expected time then they are applied as a new time base, if they are before their expected time then an assessment of time duplication is made.

Duplicate slot times

If for example, a ShockLog™ recorder was recording data and the user realised that the ShockLog™ recorder clock was 5 minutes fast. The user then corrected it by setting the ShockLog™ recorder’s clock to match the PC clock. This is a situation where a genuine change to the clock should be applied, but the ShockLog™ recorder now has 5 minutes of slots that have the same time.

If this situation arises, then the PC software will mark the 5 minutes following the slot break and the number of samples, equivalent to 5 minutes before the slot break as ‘duplicate’. This means that the status of a slot period can change without the presence of a slot break.

This may cause inconsistencies when Hyper-Linking slots and events.

If a step back in time is before the start of the slots, then the time is applied and duplication testing is done for this break only, any following breaks will not be tested for duplication.

Exporting Data

Exporting Data Overview

The same interface is used to export all types of data. You can export anything from one slot to the contents of the entire data directory, in one export session. All data is automatically allocated a file name. This is made up of the file base name plus some extra letters to identify it. The only exception to this is the setup data, which is exported binary format and retains its original name. So if the entire contents of a Micro ShockLog™ recorder data file called 199903011546371005 8Manual03_____.sl_data, which contained summaries, 2 events, event summaries, slots, and a default setup, were exported the file names would be :-

199903011546371005 8Manual03_____Sum.csv	for the summary data
199903011546371005 8Manual03_____E000.csv	for Event 0
199903011546371005 8Manual03_____E001.csv	for Event 1
199903011546371005 8Manual03_____EvSum.csv	for the Event summaries (Micro ShockLog™ recorder only)
199903011546371005 8Manual03_____Slot.csv	for the Slot data
factory default setup.setup317	for the setup data (binary format only)

All exported data, except for Setup files, are saved as text files in which a user definable list separator separates the data values. These files are saved with the file extension .csv. This type of file can be read by other applications, including Microsoft Excel.

To export any data you have to follow the same four-step procedure.

1. Click any one of the Export buttons.
2. In the Export window, select the items you want to export and adjust their export parameters.
3. Click the *Export* button.
4. In the Export Status Window, check the correct items are going to be exported, and Click the *Export* button.

Tip: Set up all the export parameters for all the items you wish to export then export them all in one go!

It is recommended that if there are Date & Time values associated with the data they should always be exported with that data, even if you select only one item or column of data. This is to ensure that the exported data can be sensibly interpreted by other applications.

When exporting Events remember that the time intervals associated with each row are not exact numbers of ms, and that the time interval can vary according to the event data and the ShockLog™ recorder setup. If possible use the Time values to drive the time axis of any graph generated.

Tip on viewing exported data

If you would like to view an exported file without leaving the ShockLog software, you can click on the *Export file name,* which will display a Save dialog window. Find and select the file you wish to view, right-click on it and select *Open* from the pop-up menu. This will start-up the application that your system associates with .csv files. Note that if your PC is not setup to associate .csv files with an application, then you will not get the *Open* option on the pop-up menu.

To help in locating the file you would like to view, you can replace the ".csv" with "*" in the *File name:* box, which will display the single file of interest. For example, if you leave the *File name:* box as "19980626143407 10023MouseMat----------Slot.csv", then it will display all .csv files. If you change the *File name:* box to "19980626143407 10023MouseMat----------Slot*" then it will only display the "19980626143407 10023MouseMat--------Slot.csv" file.

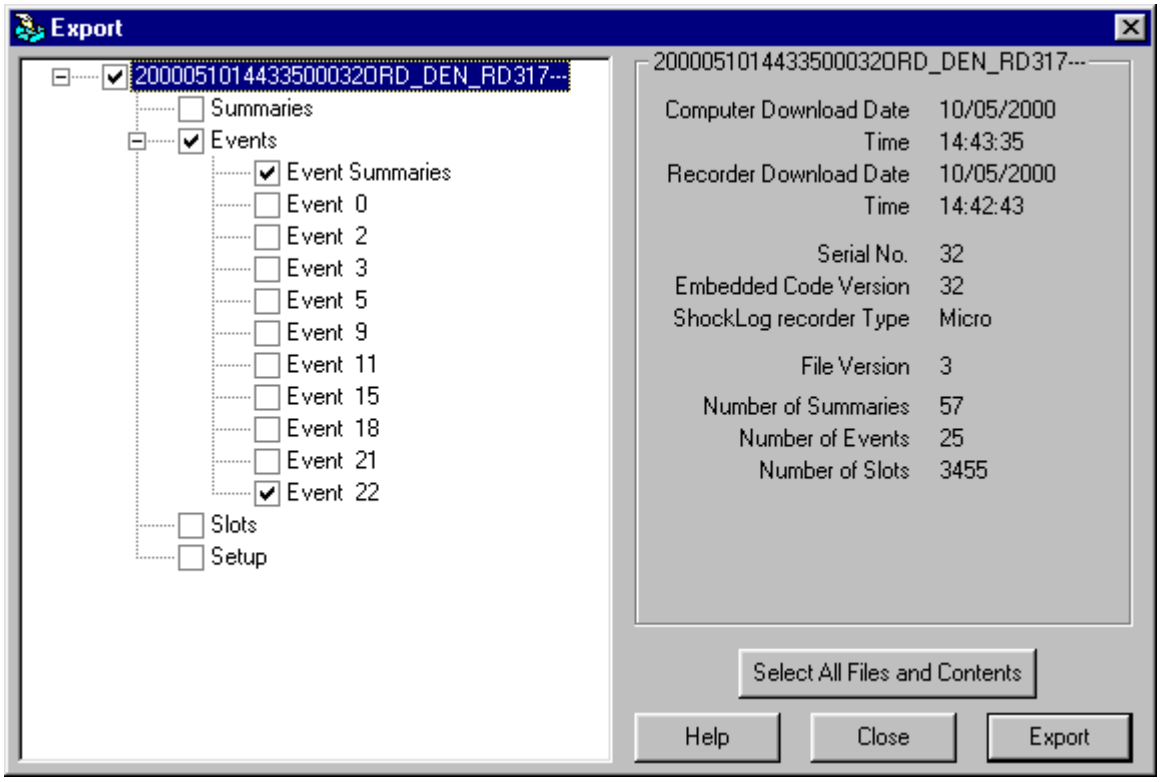
Export File Information Header

On the Export Status window and the *Options* tab there is an option to insert an information header into the exported files. This inserts eight lines at the top of the export file providing information about the source of the data. Although most of this information can be interpreted from the export file name, this provides a more readable format, also allowing the export file name to be changed without losing any source information.

Information	**Description**
ShockLog Serial	ShockLog™ recorder serial number
HPT Serial	HPT serial number. If no HPT is fitted, then ‘N/A’ will appear.
Download Date	Date of download in local format
Download Time	Time of download in local format
Save Set	Description provided by the user at download time e.g. ‘SalesTrip’
Data type	Can be ‘Slots’, ‘Summaries’, ‘Event summary’ or ‘Event *nnn*’, where *nnn* is the event number
From, To	Data range selected at the export window

Export Window

The Export window allows the user to explore and view the details of one or many data files. The left side of the window displays the contents of the data file in an explorer type tree. This operates in the usual explorer manner, clicking on a + expands branches and – closes branches. In the export topics, it mentions selecting items and ticking items, which are two different actions. To tick an item, click on the tick box, which will change the tick status of the item without selecting the item. To select an item, click on the item's text and the item will highlight with out changing the tick status.



Viewing an items Export parameters

To view an items export parameters, click on the items name in the tree. That part of the tree will be hi-lighted and the items export parameters will be loaded and shown on the right side. See relevant sections for explanation of these parameters.

Selecting items for Export

Clicking the box next to an item's name on the tree will select and deselect that item. Boxes with ticks in will be exported.

To select or deselect all the items in one data file, click the box next to the file name, the highest level.

To select or deselect all the events in one data file, click the box labelled ‘Events’.

Select All Files and Contents

Click this button to select every item in export tree for export. Be careful even items that are not visible are selected.

Help

Click this button to access the on line help.

Close

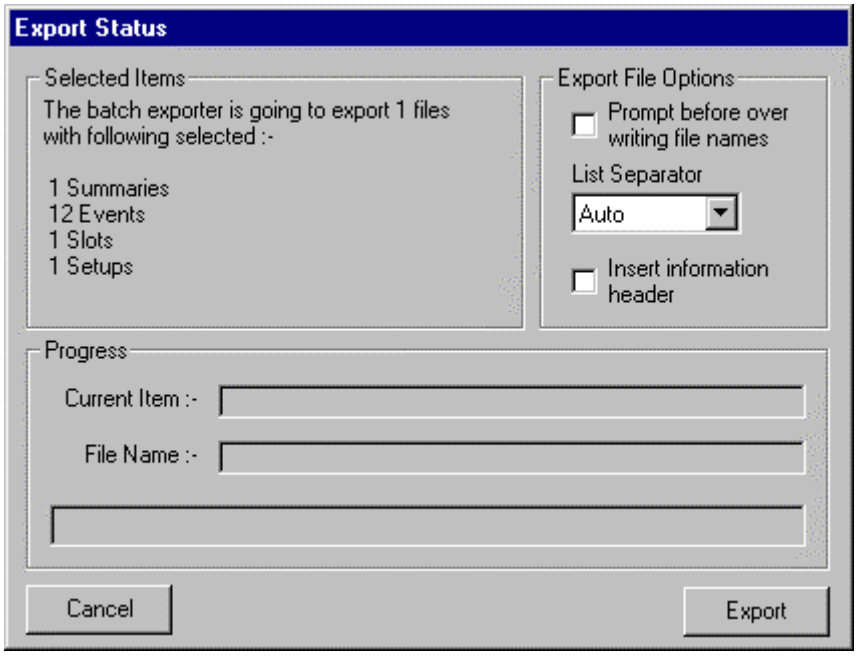
Click this button to close the export window.

Export

Click this button to show the Export Status window.

Export Status

This window is displayed when *Export* button in the Export window is clicked.



Selected Items

The Selected Items frame shows all the items that have been selected for export. The user should always check this before proceeding with an export to avoid unexpected results.

Export File Options

You can over ride the default export file options from this dialogue box on a per export basis. See the *Option* tab topic for details.

Progress

While items are being exported, the progress frame shows the current item, file name, status of the whole export.

Cancel

Click this button to cancel the export.

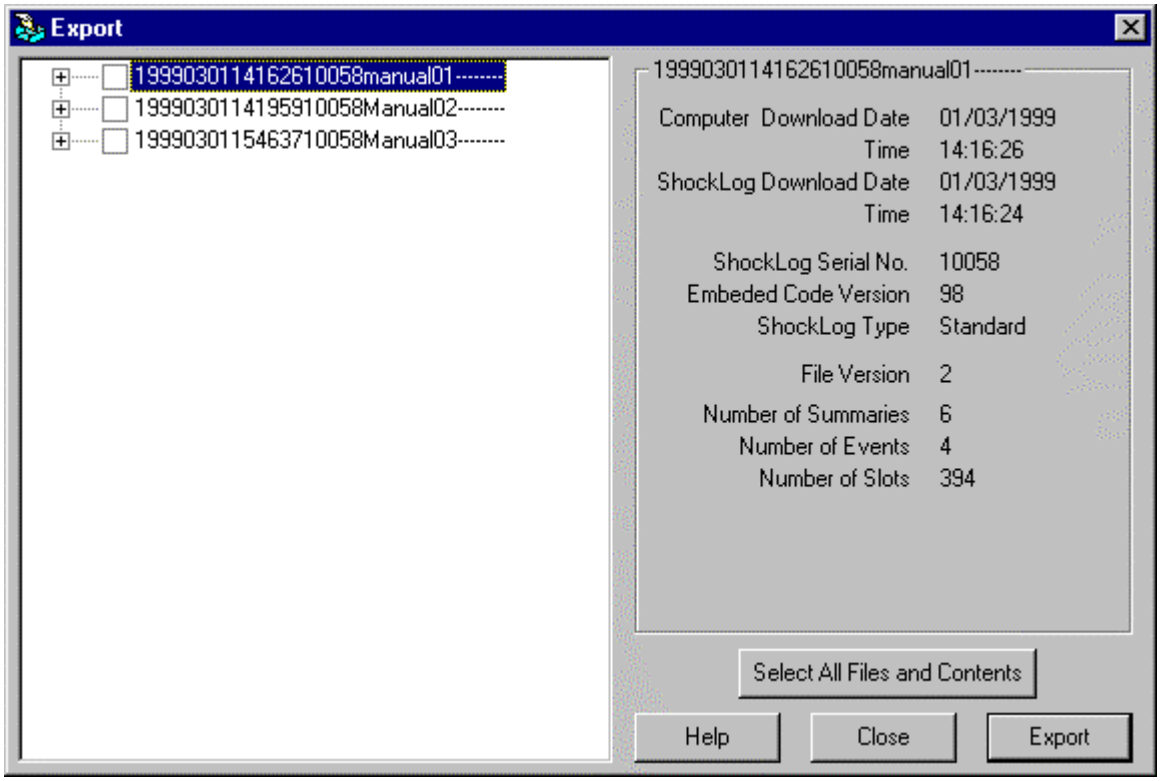
Export

Click this button to export all the items shown in the selected item frame. The export can be cancelled at any time, by pressing the *Cancel* button.

Exporting Multiple Files

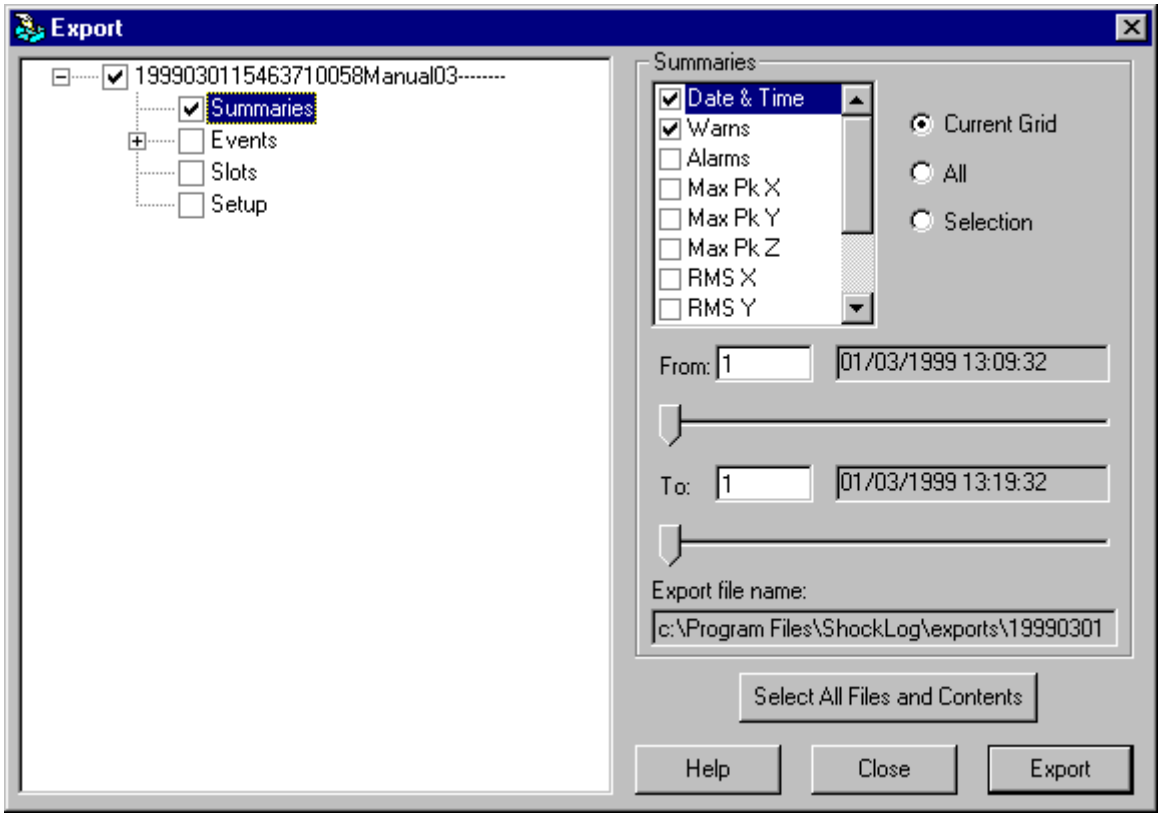
To export the contents of more than one data file you must first move to the *Examine Data* tab. Select a range of files and click the *Export* button. You can select all of the files by clicking on any of the grey cells in the top row. The Export window will pop up displaying the files to be exported on the left side. Select the items you want to export and if required adjust their export parameters before continuing with the export. See Export Window for a more detailed explanation.

You can export the contents of more than one file at a time from the *Examine Data* tab.



Exporting from the Summaries Tab

To export the Summaries from a data file, open up the file and move to the *Summaries* tab. Select a range of cells and click the *Export* button. You can select all the cells by clicking in the *Date & Time* cell or select a whole column by clicking in the grey cell in the top row. The summary item will automatically be selected in the export tree with its export parameters displayed. The current grid option will be selected to indicate that the export parameters represent your summary grid selection. Using the controls in the Summaries frame, you can adjust the export parameters, before continuing with the export.



Summary Export Data Contents

The Summary Data Contents box is used to select and deselect summary export parameters. Items with their boxes ticked will be included in the export. The above example will export the Date & Time and Alarms.

Summary Export Options

There are three Export Options

Current Grid will reset the export parameters to mirror the *Summaries* tab data grid.

All will select all the summary data.

Selection is automatically selected when any changes are made.

Summary Export Range

The Export Range is shown in the From and To sections. There are two boxes in each section: one displays the number of summaries and other the Date/Time that number relates to. The range can be adjusted by moving the slide bars or entering numbers directly in the From and To boxes.

Export File Name

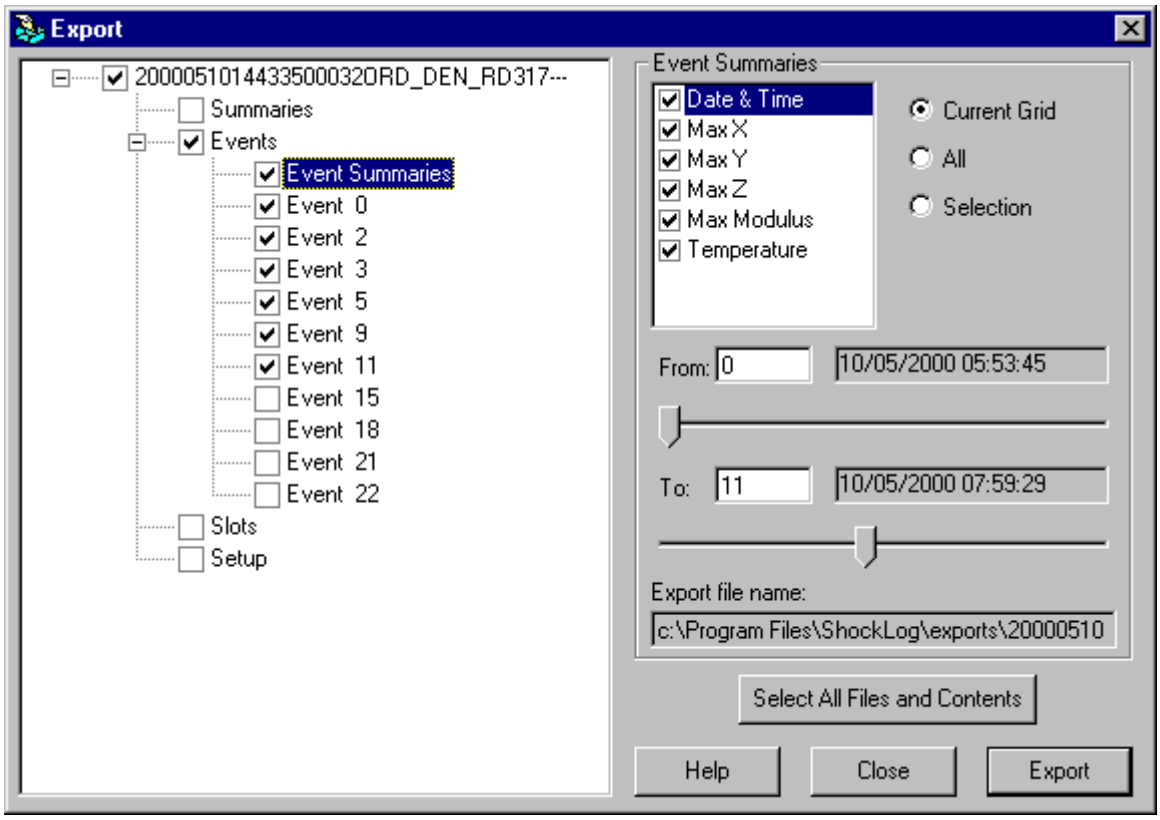
If you need to change the default name, click on the box, a dialogue box will appear. The full name can be seen as the tool-tip for this box, which can be displayed by hovering the mouse over the name box.

Exporting from the Events Tab

To export the Events from a data file, open up the file and move to the *Events* tab. Select a range of cells and click the *Export* button. You can select all the cells by clicking in the *Date & Time* cell or select a whole column by clicking in the grey cell in the top row. The Event or Events items will automatically be selected in the export tree with the first events export parameters displayed, unless there are event summaries and then that will be displayed. For the events, the current graph option will only be enabled if the Event graph for that event is open. Before continuing with the export, you can adjust the export parameters using the controls in the Event frame.

The *Current Grid* option is only enabled when you are exporting from the Events tab.

The events are listed in numerical order, which is equivalent to date/time order.



For details on the events, see Exporting from Event Graphs.

Event Summaries Export Data Contents

The Event Summaries Data Contents box is used to select and deselect export parameters. Items with their boxes ticked will be included in the export. The above example will export all the parameters.

Event Summaries Export Options

There are three Export Options

Current Grid	will reset the export parameters to mirror the *Events* tab data grid.
All	will select all the event summary data.
Selection	is automatically selected when any changes are made.

Event Summaries Export Range

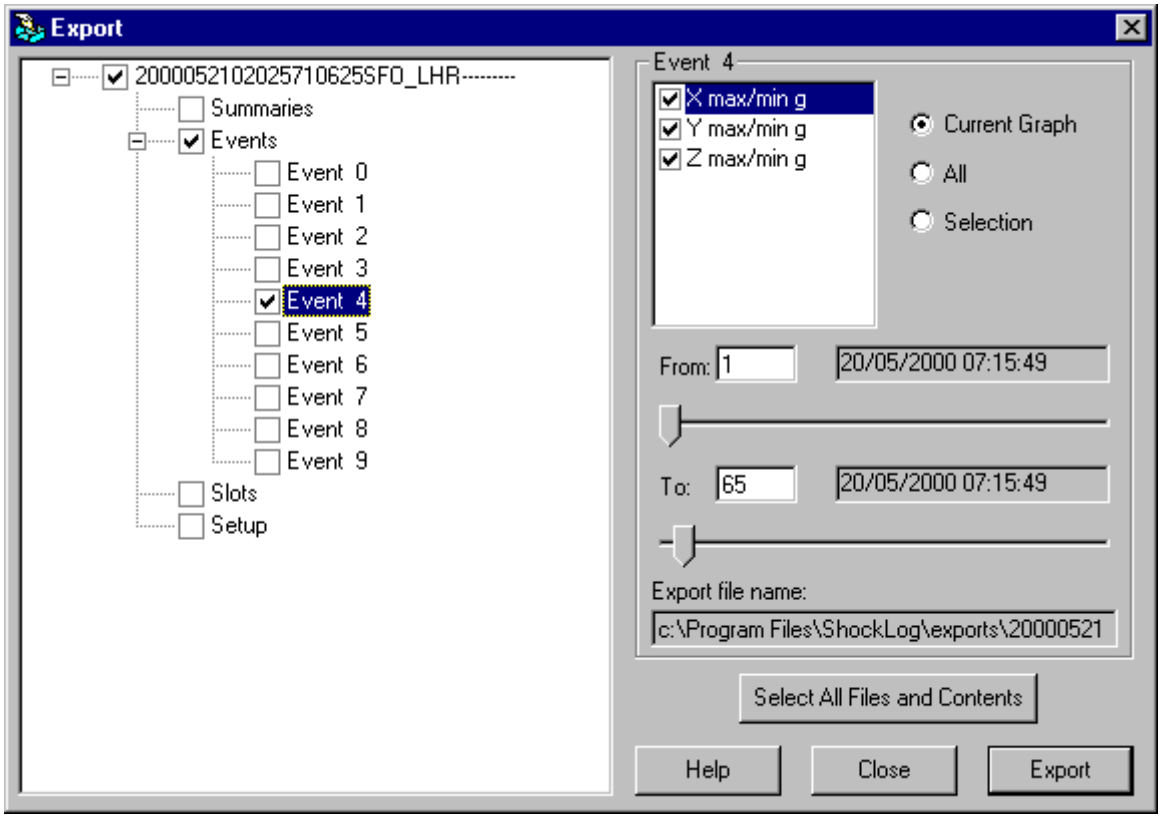
The Export Range is shown in the From and To sections. There are two boxes in each section: one displays the number of event summaries and other the Date/Time that number relates to. The range can be adjusted by moving the slide bars or entering numbers directly in the From and To boxes.

Export File Name

If you need to change the default name, click on the box, a dialogue box will appear. The full name can be seen as the tool-tip for this box, which can be displayed by hovering the mouse over the name box.

Exporting from Event Graphs

To export an Event from an Event Graph, open the file, move to the *Events* tab and open the event. Setup the graph to display the required data then click the *Export* button in the Event graph window. The Event will automatically be selected in the export tree with its export parameters displayed. The current graph option will be selected to indicate that the export parameters represent the selected Event Graph. Using the controls in the Event frame, you can adjust the export parameters, before continuing with the export.



Event Export Data Type

The Event Data Contents box is used to select and deselect event export parameters. Items with their boxes ticked will be included in the export.

The above example will export the X max/min g, Y max/min g and Z max/min g.

Event Export Options

There are three Export Options

Current Graph	will reset the export parameters to mirror the Event Graph.
All	will select all the Event samples for this Event.
Selection	is automatically selected when any changes are made.

Event Export Range

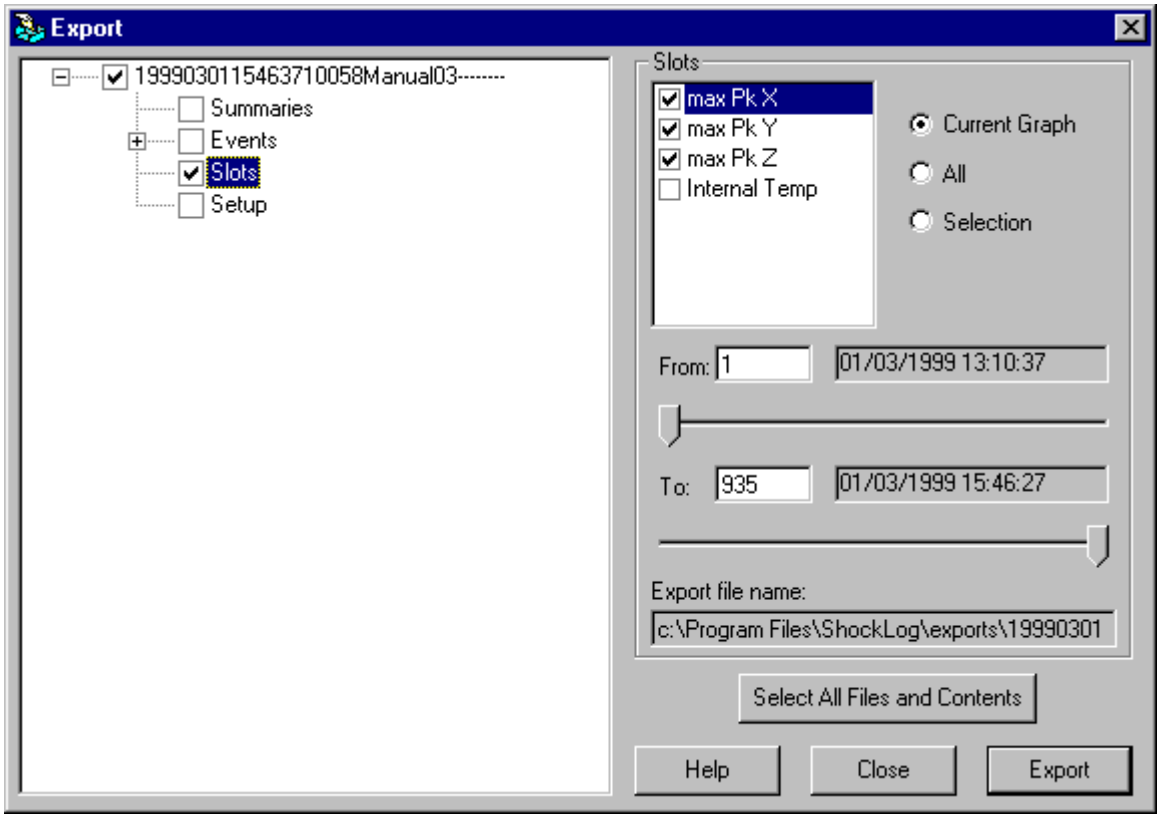
The Export Range is shown in the From and To sections. There are two boxes in each section one displays the number of Event samples and other the Date/Time to which that number relates. The range can be adjusted by moving the slide bars or entering numbers directly in the From and To boxes.

Export File Name

If you need to change the default name, click on the box, a dialogue box will appear. The full name can be seen as the tool-tip for this box, which can be displayed by hovering the mouse over the name box.

Exporting from the Time Slots Tab

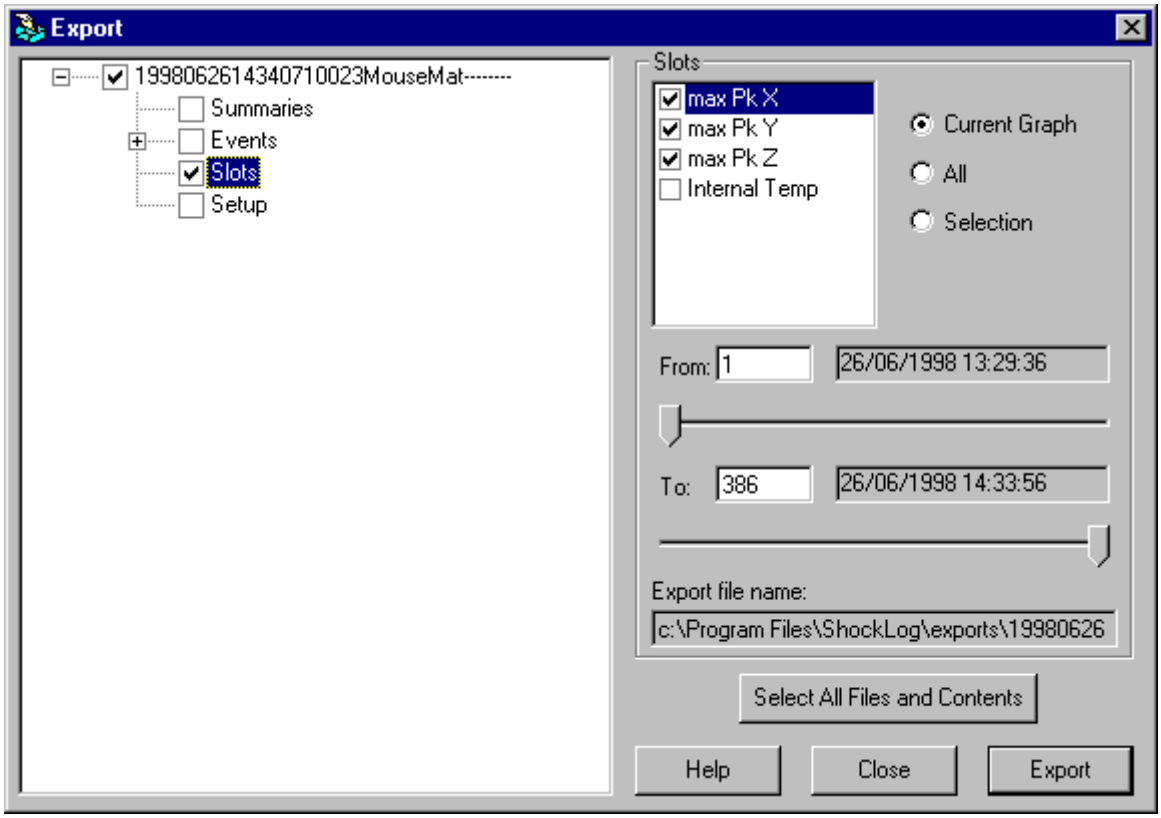
To export the Time Slots from a data file, open the file and move to the *Time Slots* tab. Click the *Export* button. The Slots item will automatically be selected in the export tree with its export parameters displayed. The All option will be selected to indicate that all the slots will be exported. The current grid option is only enabled if the slot data grid is open. Using the controls in the Slots frame, you can adjust the export parameters, before continuing with the export.



For details see Exporting from the slot Graph.

Exporting from the Slot Graph

To export the Slots from a Slot graph, open up the file, move to the *Time Slots* tab, and open the Slot Graph. Set up the graph to display the required data then click the *Export* button in the Slot graph window. The Slots item will automatically be selected in the export tree with its export parameters displayed. The current graph option will be selected to indicate that the export parameters represent the Slot graph. Using the controls in the Slots frame, you can adjust the export parameters, before continuing with the export.



Slot Export Data Type

The Slot Data Contents box is used to select and deselect Slot export parameters. Items with their boxes ticked will be included in the export. The above example will export the max pk X, max pk Y, and max pk Z.

Slot Export Options

There are three Export Options

Current Graph will reset the export parameters to mirror the Slot Graph.

All will select all the Slot samples.

Selection is automatically selected when any changes are made.

Slot Export Range

The Export Range is shown in the From and To sections. There are two boxes in each section one displays the number of Slots and other the Date/Time that number relates to. The range can be adjusted by moving the slide bars or entering numbers directly in the From and To boxes.

Export File Name

If you need to change the default name, click on the box, a dialogue box will appear. The full name can be seen as the tool-tip for this box, which can be displayed by hovering the mouse over the name box.

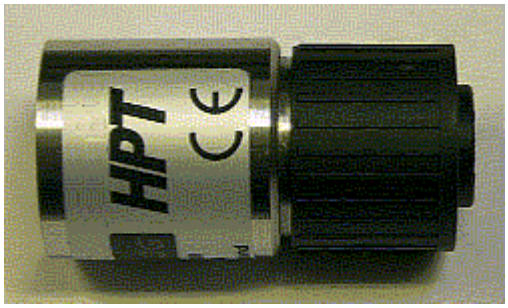
HPT Sensor

Introduction to the HPT sensor

The HPT is a combined humidity, pressure and temperature sensor for use with the RD298 ShockLog™ recorder. It enables the ShockLog™ recorder to monitor an extended range of environmental factors and is fully supported by the ShockLog™ recorder software.

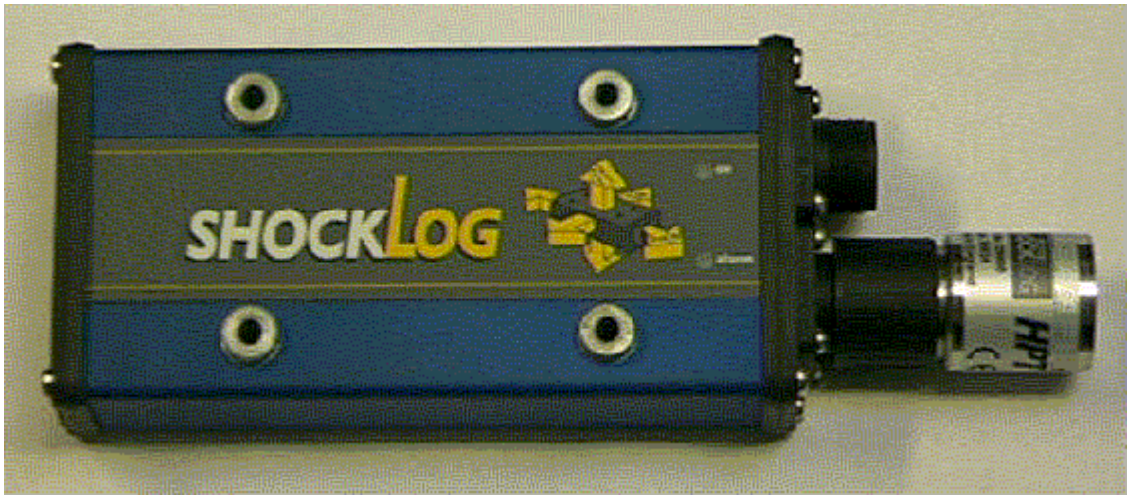
See HPT Sensor Specification for more information.

Very Important Note! The HPT sensor will only work correctly when used with a ShockLog™ recorder running embedded software version 93 or later and when used with PC software version 1.2 or later. If you need to upgrade your software, please contact your suppler. See Software Versions .



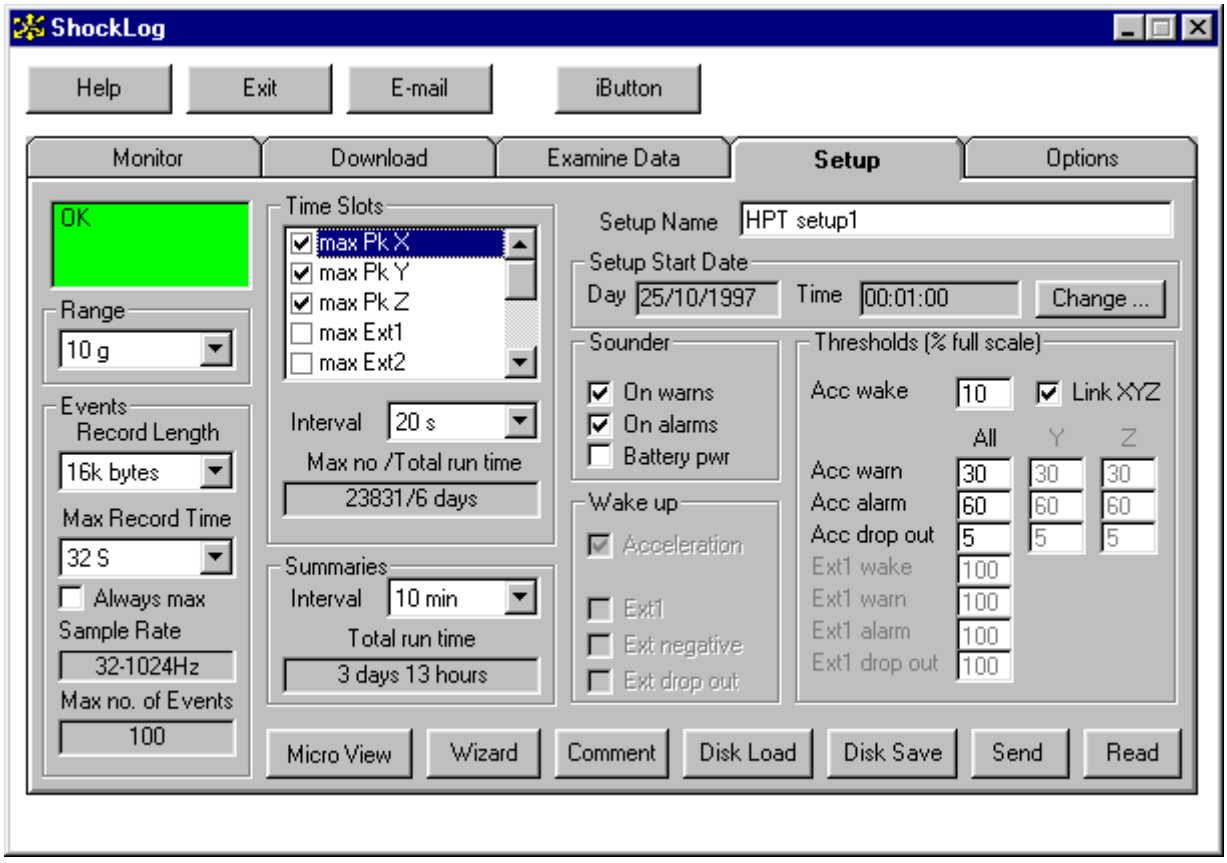
Connecting the HPT

The HPT is attached to connector A on the ShockLog™ recorder by means of its own integral connector. No damage will result if you connect the HPT to the ShockLog™ recorder with a battery fitted or inadvertently use connector B on the ShockLog™ recorder.



Setting up your ShockLog™ recorder to use the HPT

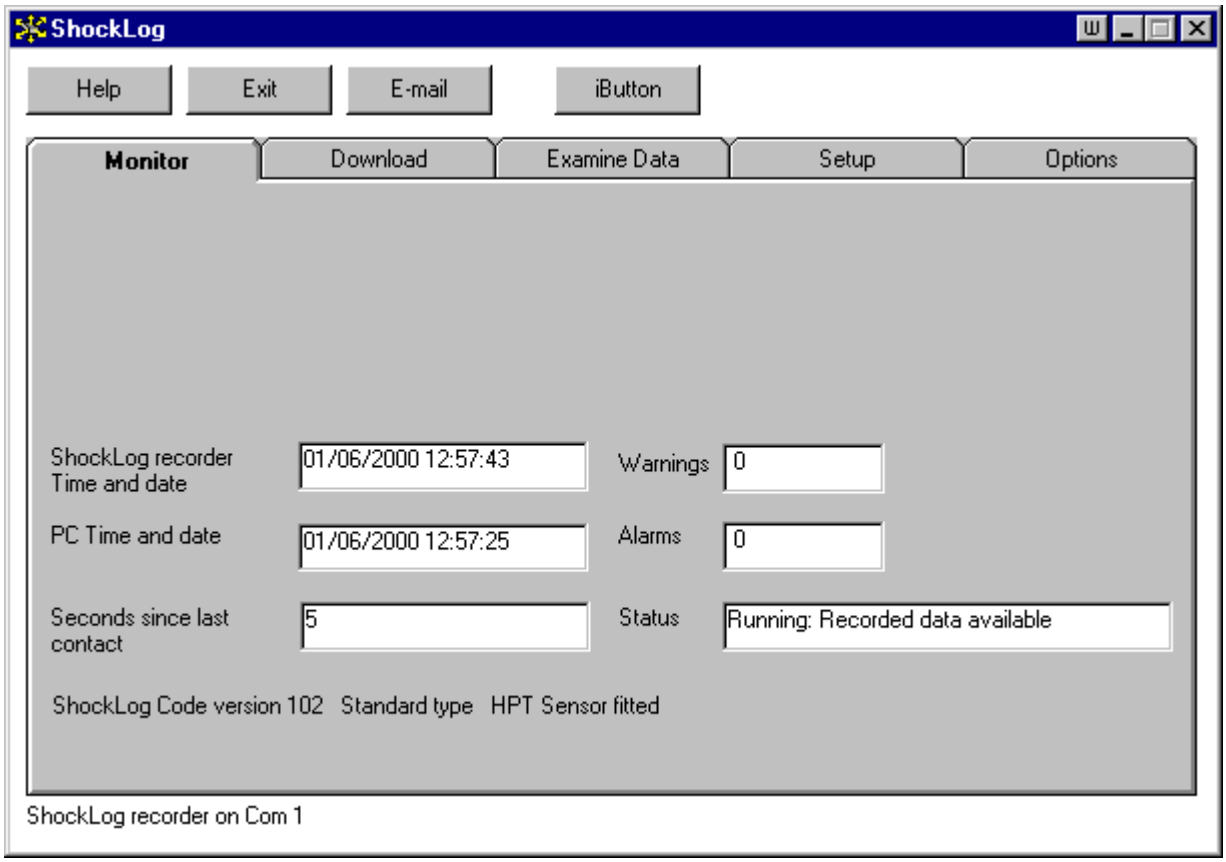
HPT data is recorded in the Time Slot memory. To record data from the HPT click on ‘Humidity’, ‘Pressure’ or ‘External Temp’ in the ‘Slot Contents’ boxes in the *Setup* tab. If you select ‘Humidity’ or ‘Pressure’, ‘External Temp’ will be automatically selected so that the sensor’s temperature correction functions can operate.



Operating the ShockLog™ recorder with an HPT

The HPT must remain connected to the ShockLog™ recorder at all times during setup, operation and download. The ShockLog™ recorder only checks for an HPT when the processor is reset which happens when you change the setup, remove and re-apply power or use the *Clear and Reset to defaults* button in the *Download* tab.

The ShockLog™ recorder software will inform you in the *Monitor* tab if an HPT sensor has been detected.



The same HPT sensor must be fitted during setup; recording *and data download* to function correctly. If you remove the sensor before downloading the data the calibration information for the sensor (which is stored in the HPT itself) will not be available and the data will not be displayed. If you record data with one HPT and download it with a different HPT connected to the ShockLog™ recorder the data will be incorrect but may not appear so.

Setup and Applications

Setting up your ShockLog™ recorder

This guide is aimed mainly at users who intend to use the ShockLog™ recorder to monitor equipment in transit. Although some text contains information specific to the RD298 ShockLog™ recorder, this topic is also for the RD317 Micro ShockLog™ recorder. It does contain some more general information but does not cover the specialised topic of velocity measurements. Users are advised not to use the velocity ranges unless they are confident in their understanding of vibration measurement techniques.

Before you can set up your ShockLog™ recorder for any specific application, you need answers to the following questions:-

- How large are the accelerations I need to measure?
- How long must the ShockLog™ recorder go on recording?
- How many shock events must I record?
- Do I need to record special parameters such as humidity or pressure?
- What is the expected temperature range?

If you have a specification for the equipment you are monitoring this may give a figure for the maximum permissible acceleration level, otherwise you may have to determine this for yourself. As a (very) general guide the 30g and 100g ranges are the most useful for smaller items (< 50 kg) and the 10g range for larger items (> 100 kg). The 1g and 3g ranges are not normally useful for shipping protection or investigation and are intended much more for vibration measurement.

Before you start work on altering the ShockLog™ recorder setup – first check the ShockLog™ recorder clock in the *Monitor* tab and reset it from the *Download* tab if necessary.

If the ShockLog™ recorder contains data that you wish to preserve, make sure it has been downloaded to your PC – the process of altering its setup destroys any data in the ShockLog™ recorder. There is no point in executing the *Clear and Reset to Defaults* command if you plan to alter the setup – the *Send* setup command will automatically clear any data stored in the ShockLog™ recorder.

Once you have decided on an acceleration range and the duration of your planned recording you can select a standard setup from the set supplied and installed on your disk drive. (Use the *Disk Load* function in the *Setup* tab .) These files have names like 30g1month.setup298 or 1month.setup317 – the first part of the name is the acceleration range and the second part is the length of time the recording will run.

Now you can modify this standard setup file to suit your particular application.

First, change the *Setup Name* so you run no risk of overwriting the standard file.

Set the Acceleration Alarm level to the level above which your equipment will be damaged.

Set the Acceleration Warn level to 70% of the alarm level. (Not applicable to the Micro ShockLog™ recorder)

Set the Acceleration Wake level to 30% of the alarm level.

These are general settings and you can alter them to fit your application better.

The Wake level should ideally be at least 10% and never less than 5%.

If your equipment will be damaged by a small number of shocks at the alarm level set the Record Length to 16k or 32k, which will allow you to record 100 or 50 events in total. If you have little idea of how many shocks your equipment will stand it may be better to set a shorter Record Length and have the ability to record more events.

If you know the duration of probable events then set the Max Record Time to suit. If it is possible that several events could occur in very rapid succession then set a Max Record Length of at least 32 seconds – this will ensure that event data is never lost until the event memory is full.

If you set a Max Record Time of less than 16 seconds you may miss the second or third of a series of events which occur very close together. This is because the ShockLog™ recorder may not have enough memory buffers to simultaneously record a new event, write an event to Flash and hold another event pending. If you set the Max Record Time to 16 seconds or more the ShockLog™ recorder will extend event lengths as required or always use the longer length if you tick the Always Max box.

Set the Slot Contents to capture the parameters you are interested in. If you increase the number of items selected for the Slot Contents, you may need to increase the Slot Interval to ensure that the slot memory lasts the full length of your planned recording.

Now set the Start Time for the recording. If you want to start straight away, leave the default time from the example setup.

Send the setup to the ShockLog™ recorder using the *Send* command in the *Setup* tab and then, once that process has completed, replace the battery if necessary.

(If you plan to replace the battery then remove the cover before you use the *Send* command and change the battery as soon as the operation has completed (a dialogue box appears to confirm completion). This will ensure that there are no breaks in your recording if you have set it to start immediately.)

Make sure you use a battery suitable for the environment to which the ShockLog™ recorder will be exposed. Study the Battery topic for details.

If you will be using the ShockLog™ recorder for critical missions then devise a method of testing your setup and ensuring that you are capturing the data you need. If events occur beyond the parameters you have set it is not usually possible to re-construct them.

ShockLog™ Recorder Hardware Installation

The ShockLog™ recorder must be securely attached to the equipment or structure it is monitoring.

Direct Attachment (RD298 ShockLog™ recorder)

The RD298 ShockLog™ recorder kit includes a set of four M5 * 55mm bolts, a set of four M5 x 60mm bolts and four rubber isolating mounts. The four mounting holes are at the corners of a 77.5 x 53.0mm rectangle. Attempt to maintain an accuracy of ± 0.2mm in the relative positions of the holes. Use a 5mm drill for clearance holes or an M5 tapping size and drill and tap the holes to M5. Use the shorter of the supplied M5 bolts with tapped holes and tighten the bolts to 2 Nm

Direct Attachment (RD317 Micro ShockLog™ recorder)

The four mounting holes are at the corners of a 68mm square. Attempt to maintain an accuracy of ± 0.2mm in the relative positions of the holes. Use a 5mm drill for clearance holes or an M5 tapping size and drill and tap the holes to M5. Tighten the bolts to 2 Nm.

Attachment Using Rubber Isolators

Due to our policy of continuous improvement, the RD317 Micro ShockLog™ recorder is more tolerant of high frequency shocks and rubber isolators are not normally required.

Use the rubber isolating mounts if it is difficult to achieve the required level of accuracy for the hole positions, or you are not able to tap the holes. It is almost impossible to drill the holes accurately enough with a hand held pistol drill. The rubber isolating mounts give an improved rather than degraded performance, can absorb rather more error in hole position and do not require the holes to be tapped.

Drill 4 holes at the corners of a 77.5 x 53.0 mm rectangle with a final drill size of 10mm. Insert the rubber isolators and attach the ShockLog™ recorder to them using the longer of the supplied M5 bolts. Tighten the bolts to 0.6 Nm.

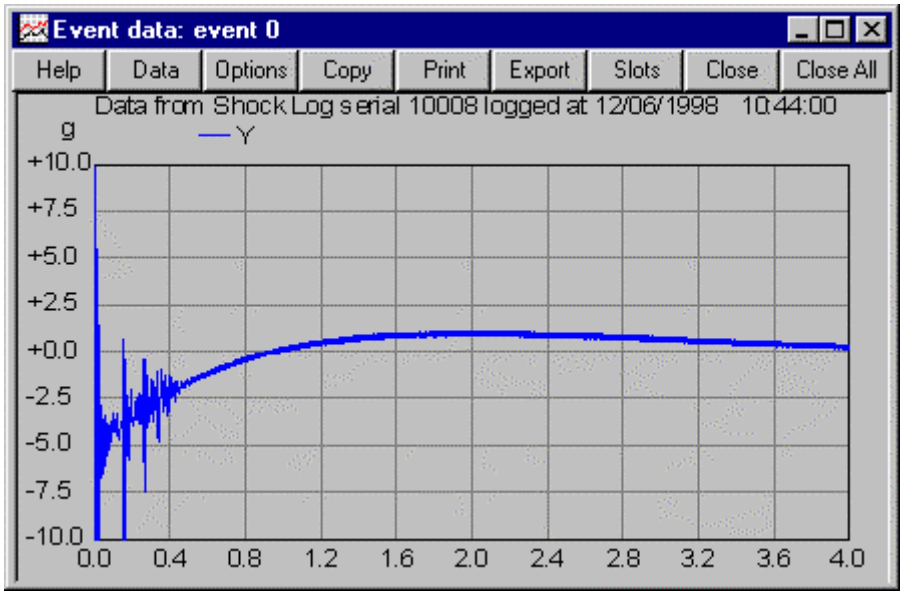
High Frequency Shock Isolation

When a ShockLog™ recorder is bolted to a resonant metal structure, such as an aluminium or steel beam or girder and this structure is struck with a metal object, very large high frequency accelerations will be applied to the ShockLog™ recorder. By way of example – if ShockLog™ recorder is bolted to the centre of an aluminium alloy plate 12mm thick, 15cm wide and 100 cm long and that plate is struck (hard) with a 0.5 kg hammer, accelerations up to 20,000g at about 10kHz will be produced at the ShockLog™ recorder base.

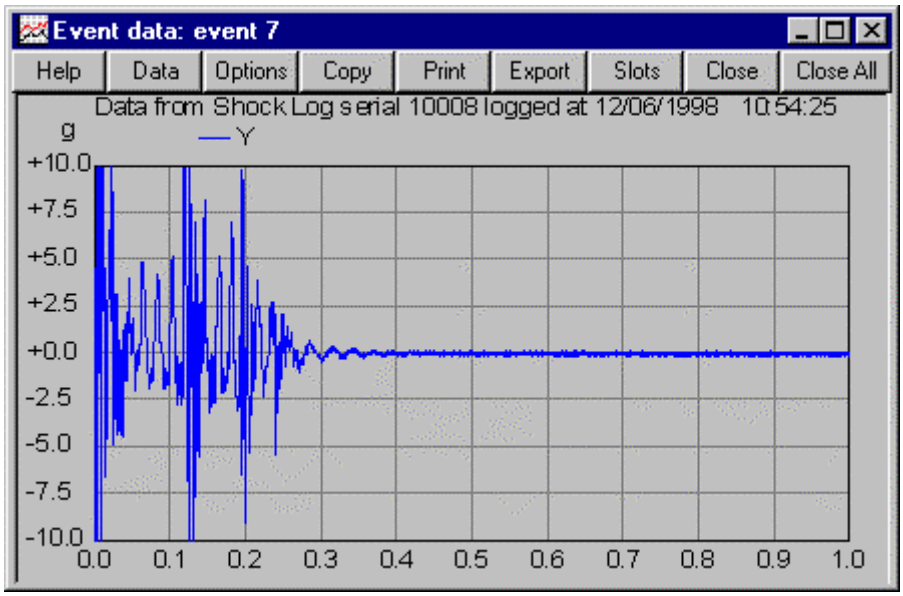
These accelerations are out of the measuring band of the ShockLog™ recorder and ideally would produce no indication at all. In practice, very slight non-linearities in the ShockLog™ recorder sensors can convert the high frequency acceleration signals into an ‘offset’ which decays away over a period of a few seconds. The ShockLog™ recorder can discriminate between wanted signals of a few g at below 150 Hz and unwanted signals of several thousand g at high frequencies. Its discrimination is further improved by installing it on the supplied vibration isolators, (These do not significantly affect performance below 150Hz).

If there is a possibility of the structure you are monitoring receiving metal to metal impacts you should check that the ShockLog™ recorder does not give unwanted responses with the Setup parameters you will intend to use. Installing the ShockLog™ recorder on the supplied vibration isolators will reduce its, (already small), susceptibility to this effect.

The first graph, for event zero, is a typical false response to a very large 20,000g impact – note that the false 5 g signal takes about 4 seconds to decay away to negligible amplitude.



The second graph, for event 7, shows the effect of a similar impact on the same ShockLog™ recorder but using the vibration isolators. The large amplitude vibration signals in both graphs are because the flexible mounting system used to secure the aluminium plate allows it to vibrate at about 100 Hz. The vibration isolators eliminate the 'offset' effect of the high frequency shock.



Air Cargo Applications

The ShockLog™ recorder has no specific air cargo approvals (e.g. certificates) at the present time. Before using a ShockLog™ recorder to monitor air cargo.

Please be advised that it is the responsibility of the operators of the aircraft or airlines to ensure that any ‘carried-on’ equipment will not be a source of hazard to the aircraft or its occupants. Therefore, permission from the aircraft operator or airline must be sought before your product is to be carried on their aircraft.

The British CAA (Civil Aviation Authority) advises that the RD298 ShockLog™ recorder would not need to be declared as dangerous goods, so long as the battery complies in full with Special Provision A45 of the ICAO Technical Instructions (including sub paragraph 10).

The following points should be borne in mind:-

- The recommended lithium batteries may be classed as restricted by European and worldwide carrier organisations.
- A suitably qualified technician should carry out Battery replacement for air cargo applications.

Subject to changes outside our control continual progress and it is advisable to contact Technical Support for the latest information.

Your supplier can provide a compliant battery, part no. 88704 (RD298) or part no. 88706 (RD317).

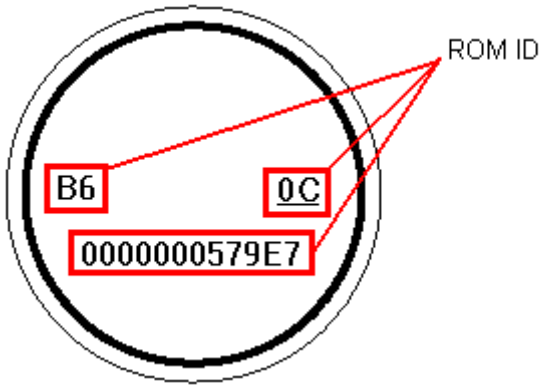
iButtons

Introduction to iButtons

An iButton is a 16mm computer chip armoured in a stainless steel can and is rugged enough to withstand harsh outdoor environments. iButtons can be dropped, scratched or stepped on, and has been wear-tested for 10-year durability. The iButton comes in many varieties of which 3 types are used for the Micro ShockLog™ recorder. These are configured as ShockLog™ Stop, Start, Setup, Download and User ID iButtons.

Identifying the iButton

The iButton's type and unique ROM ID can be identified by looking at the areas on the bottom of the iButton shown below:



The ROM ID number is broken into three parts. In this example, the '0C' is the type of chip in the iButton, the 'B6' is the CRC16 ID validity check number and the rest is a unique ID number for the iButton. In this example, the iButton ROM ID is B60000000579E70C.

iButtons used with the Micro ShockLog™ recorder

The Micro ShockLog™ recorder uses the iButton in five different ways: Stop, Start, Setup, Download and User ID. They are programmable from the PC, with the ability of password protection.

Setup iButton

This is used to load a setup into the Micro ShockLog™ recorder, resetting and clearing the data. This can be applied with the Micro ShockLog™ recorder in any operational state, except if passwords are set, then the Micro needs to be in a stopped state. This iButton also changes the iButton passwords. The Setup iButton contains an internal clock, which maintains the correct time as set by your PC when the setup was programmed into the iButton.

Start iButton

This is used to start the Micro ShockLog™ recorder. If the Micro ShockLog™ recorder is in a stopped, paused or waiting state this iButton will start the Micro ShockLog™ recorder. If the Micro ShockLog™ recorder is already running, then the iButton will be ignored.

Stop iButton

This is used to stop the Micro ShockLog™ recorder. The Micro ShockLog™ recorder will not restart unless a Start iButton is applied, or started by a serial COM command. If the Micro ShockLog™ recorder has already stopped, then this iButton is ignored.

Download iButton

This iButton is used to collect data from the Micro ShockLog™ recorder in a compressed format. This data can then be downloaded on the PC to display a Download Report.

User ID

This iButton is used to identify a user to the Micro ShockLog™ recorder. It places an entry in the security log with an identifying number associated with a user. This iButton does not alter the state of the Micro ShockLog™ recorder. This iButton is not iButton password sensitive.

Setting up the iButton on your PC

Before you can use the iButton, you need to set up the PC end of the iButton system. You will require a COM port or a parallel port. Provided are iButton buses (port adapters) that will provide you with the option of parallel port or serial COM port connection. The DS1410E is provided for the parallel port. The DS9097U or DS1411 are provided for the serial COM ports. The DS1410E works with parallel ports (e.g. a printer port) and uses the DB8 type blue-dot connector. The DS9097U works with 9-pin serial ports (e.g. COM ports) and uses the DR8 type blue-dot connector. The DS1411 works with the 9-pin serial ports and uses the DB8 type blue-dot-connector.

DS1410E bus and DS1402-DB8 blue-dot connector for parallel ports



DS9097U bus and DS1402-DR8 blue-dot connector for serial ports



DS1411 bus for serial ports



Connect the appropriate bus and blue-dot connector to the PC and start the ShockLog™ software.

Start up the ShockLog™ software, click on the ‘1’ button and go to the *Options* tab. If you have plugged the DS9097U or DS1411bus in to a COM port, check that the *Serial port* setting on the *Options* tab does not conflict with the iButton COM port. If they are conflicting or you are not sure, then set the *Serial port* setting to 'OffLine'.

The DS1410E should have no conflict problems, even if you have a printer setup for that port.

Click on the iButton button at the top of the main window. Select the *Bus* tab in the iButton window.

Plug one of the buses in to your PC. It is not necessary to have a blue-dot connector attached at this stage.

Note that the DS1411 bus appears as a DS9097U bus on the software, thus if you are using a DS1411 bus, you need to select the DS9097U on the *Bus* tab.

If you know what port and type of bus you are connecting to, then it is recommended that you set the COM/LPT port and bus type manually and click the Apply button.

If this fails and you are using either DS9097U or DS1411 buses, then check that the COM port is not being used by other software or even the ShockLog™ software. If you are unsure of the iButton buses parameters, then click the Auto Detect button.

If the bus is not detected, then check that your COM ports are enabled and fully functional.

Once the software detects the bus, go to the Read tab and click on the Read button. Place a pre-programmed iButton provided, on to the blue-dot receptor and check that the iButton has been detected and read. You are now ready for iButton operations.

Although more than 1 iButton can be connected to the blue-dot connector, and they can be talked to individually, the ShockLog™ software has been written to complain if there is more than 1 iButton. The reason is to avoid confusion as to which iButton is being programmed/read. If there is one iButton connected, there is no confusion about which iButton is active.

iButton Exercises

This topic will guide you through programming the iButton and then using them with a Micro ShockLog™ recorder. The exercise will load a setup to the Micro ShockLog™ recorder, start it, record data, stop it and then download data.

This exercise assumes that you have the iButton working with the PC. If you have not then see the Setting up the iButton on your PC topic.

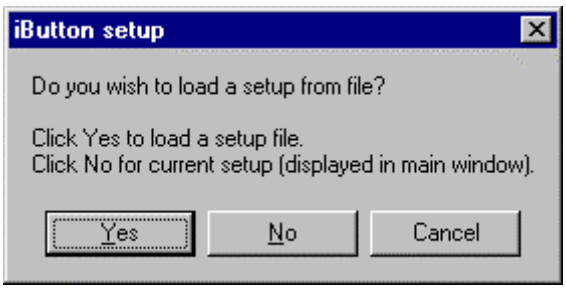
Exercise 1: Sending a setup

1 First to get a fresh start, clear and reset the ShockLog™ recorder. This is done by connecting the Micro ShockLog™ recorder to the PC and then clicking on the Clear and Reset button on the Download tab.

1. Now go to the Setup tab and read the Micro ShockLog™ recorder's setup, this will happen automatically when you first view the Setup tab. Confirm that the Setup Start date has a year 2050.

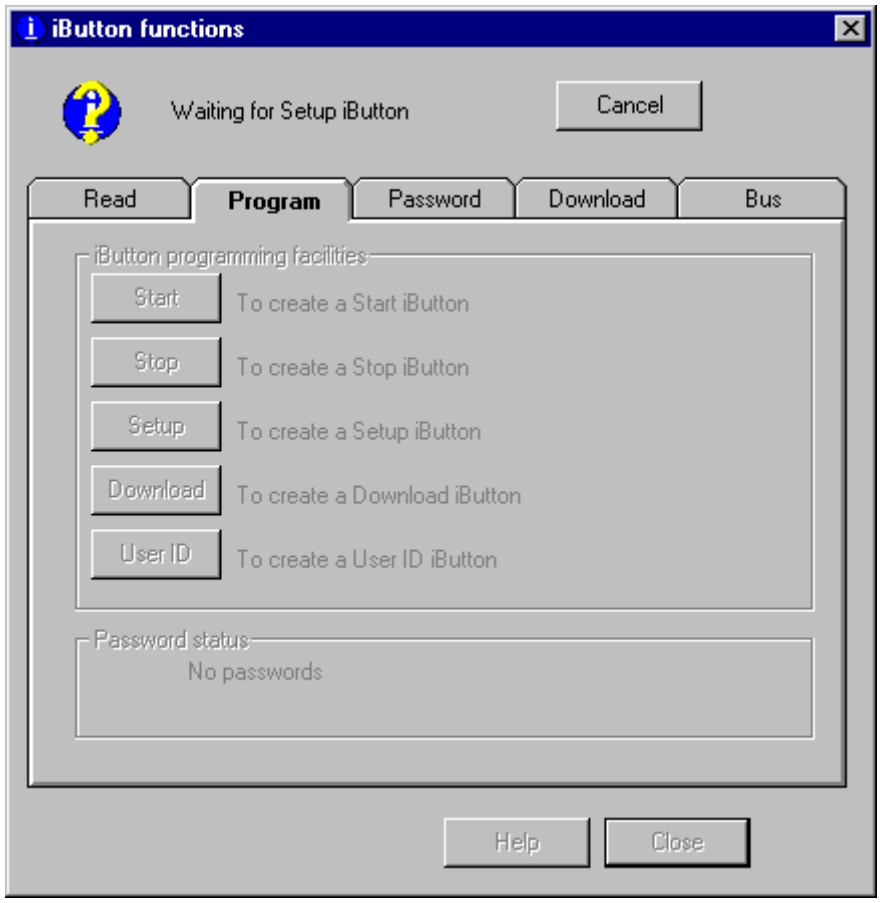
2. Now click on the iButton button at the top of the main window, this will open the iButton functions window.

3. Click on the Program tab and click the Setup button. You will see the following message box:

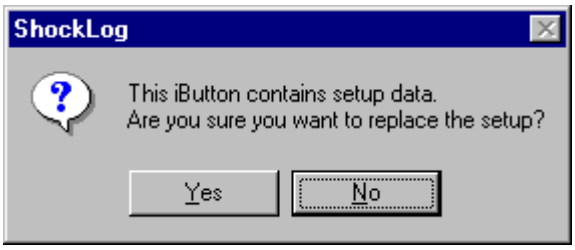


Click the *No* button.

1. You will see 'Waiting for Setup iButton' message at the top of the iButton functions window. As below:



1. Place the Setup iButton on the blue-dot connector. The Mission comment window should now appear, click on the Accept button. You may get the following message:



1. Click *Yes*. The message at the top should change to 'Talking to iButton' and eventually 'Completed'. The Setup iButton is now ready to be applied to the Micro ShockLog™ recorder.
2. Place the iButton on the Micro ShockLog™ recorder's iButton ring. You should see the iButton green 'in' LED come on briefly (less than 1 second).
3. When the red 'ok' LED comes on, you can remove the iButton from the Micro ShockLog™ recorder and the setup has now been sent to the Micro ShockLog™ recorder. The red 'ok' LED will remain lit for approximately 30 seconds, while the Micro ShockLog™ recorder clears its data and prepares itself for new data.
4. This should have set the Micro ShockLog™ recorder clock to the PC time, which can be checked on the Monitor tab.
5. As the setup in the iButton had a start date in the year 2050, the Micro ShockLog™ recorder will remain in a waiting state until then.
6. For the following exercise we will get the Micro ShockLog™ recorder started now so that we can record some data.

Exercise 2: Starting the Micro ShockLog™ recorder

1 If you wish to use the pre-programmed start iButton provided in the Micro ShockLog™ recorder starter kit, then go to step 6. If you wish to create you own Start iButton then follow the next steps.

1. Open the iButton function window from the main window by clicking on the iButton button.
2. Move to the program tab and click on the Start button.

3. A ‘Waiting for an iButton’ message will appear at the top of the window.
4. Apply the Start iButton to the blue-dot connector and wait for the message at the top to say ‘Completed’. The iButton is now ready to start the Micro ShockLog™ recorder.
5. Apply the Start iButton to the Micro ShockLog™ recorder until the red OK light comes on, which should be within 5 seconds. If the Micro ShockLog™ recorder is already running, then the Micro ShockLog™ recorder will ignore the iButton and the red ‘ok’ LED will not come on.
6. The Micro ShockLog™ recorder will start running in about 1 minute. You can check this on the Monitor tab.

Exercise 3: Downloading data from the Micro ShockLog™ recorder

1 Go to the Monitor tab and check that the Micro ShockLog™ recorder is running.

1. Create some events by dropping the Micro ShockLog™ recorder from about 3 cm on to a mouse mat. Check that the number of Alarms is increasing as you generate the events. Create about 12 events, and leave the Micro ShockLog™ recorder running for about another 5 minutes.
2. If you wish to use the pre-programmed Download iButton provided in the Micro ShockLog™ recorder starter kit, then go to step 9. If you wish to create you own Download iButton then follow the next steps.
3. Open the iButton function window from the main window by clicking on the iButton button.
4. Move to the program tab and click on the Download button. A ‘Waiting for Download iButton’ message will appear at the top of the window.
5. Apply the Download iButton to the blue-dot connector. You may get the following message. Say Yes for this exercise.



1. Wait for the message at the top to say ‘Completed’. The iButton is now ready to read data from the Micro ShockLog™ recorder.
2. Apply the Download iButton to the Micro ShockLog™ recorder. The green ‘in’ LED light should come on within 5 seconds.
3. The iButton needs to be held for about 20 seconds, until the red ‘ok’ LED comes on. When the red 'ok' LED comes on, the data has been successfully read and ready to download to the PC.
4. On the PC go to the iButton function window and click on the Download tab. Click on the Download button, a ‘Waiting for Download iButton’ message will appear at the top of the window.
5. Apply the iButton to the blue-dot connector. You will be prompted for a User file name. Enter a name, for example, 'Download_test' and click OK.
6. The download should now proceed. When the download is complete, close the iButton function window and go to the Examine Data tab. You should see your data file, which will have a image next to it to indicate that it is an iButton data file
7. Select the file and click on the Report button. The iButton data file can only be displayed as a Report.
8. That completes the Download exercise.

Exercise 4: Stopping the Micro ShockLog™ recorder

1 Go to the Monitor tab and wait until the Micro ShockLog™ recorder is running again.

1. If you wish to use the pre-programmed start iButton provided in the Micro ShockLog™ recorder starter kit, then go to step 7. If you wish to create you own Stop iButton then follow the next steps.
2. Open the iButton function window from the main window by clicking on the iButton button.
3. Move to the program tab and click on the Stop button. A ‘Waiting for an iButton’ message will appear at the top of the window.
4. Apply the Stop iButton to the blue-dot connector and wait for the message at the top to say ‘Completed’. The iButton is now ready to stop the Micro ShockLog™ recorder.
5. Apply the Stop iButton to the Micro ShockLog™ recorder until the red OK light comes on, which should be within 5 seconds.
6. Check on the Monitor tab that the Micro ShockLog™ recorder has stopped.
7. That is the end of Stop iButton exercise.

Exercise 5: Identifying the user on the Micro ShockLog™ recorder

1 Open the iButton function window from the main window by clicking on the iButton button.

1. Move to the program tab and click on the User ID button.
2. You will be prompted to enter a User ID number. For the purpose of this exercise, enter 10. Click *OK*. A 'Waiting for an iButton' message will appear at the top of the window.
3. Apply the User ID iButton to the blue-dot connector and wait for the message at the top to say 'Completed'. The iButton is now ready to apply to the Micro ShockLog™ recorder.
4. Apply the User ID iButton to the Micro ShockLog™ recorder until the red OK light comes on, which should be within 5 seconds.

2 Close the *iButton function* window and go to the *Download* tab. Click on the *Security Log* button. Click *OK* on the following message box.

3 When the Micro ShockLog™ recorder has attached and downloaded the security log, scroll to the bottom of the security log table. The last entry should read "iButton User ID", with 10 in the *Data* column.

iButton security

This topic explains the iButton security operation.

The iButton stores two passwords; the ShockLog™ recorder password and the iButton password, both up to eight alphanumeric characters.

The ShockLog™ recorder password is required when the ShockLog™ recorder has passwords enabled. The iButton must contain the level 2 password, which can either be the 8-digit number supplied with the ShockLog™ recorder, or the user-defined password. See the Password Editor topic for more information on ShockLog™ recorder passwords.

The iButton password is required when the iButton password has been set, which is explained later in this topic.

ShockLog™ recorder password and iButton passwords are both required if the Micro ShockLog™ recorder has both passwords set.

Setting passwords

The ShockLog™ recorder password is set from the main Download tab, using the Passwords button. See the Download Tab topic for more information.

The iButton password is set by the Setup iButton. Before programming the Setup iButton, the required iButton password should be set as the iButton password on the iButton Window Passwords tab . Set the ShockLog™ recorder password if the Micro ShockLog™ recorder has the passwords enabled. Program the Setup iButton. When this iButton is applied to the Micro ShockLog™ recorder, the iButton password becomes enabled. If the Micro ShockLog™ recorder already has an iButton password, then the Micro ShockLog™ recorder must be in a stopped state (not waiting or paused) for the new setup and iButton password to be accepted.

Once the Micro ShockLog™ recorder is programmed with the iButton password, only an iButton containing the same 8-character alphanumeric password will be accepted by the Micro ShockLog™ recorder.

Note that if the Micro ShockLog™ recorder does have an iButton password enabled, the only way the password can be changed is by a Setup iButton when the Micro ShockLog™ recorder is in a stopped state. The only way a Micro ShockLog™ recorder can be in a stopped state is to apply a Stop iButton (you cannot achieve a stopped state through the serial comms). To stop the Micro ShockLog™ recorder you need to know its current iButton password.

Clearing passwords

The ShockLog™ recorder password can be cleared from the Download tab, using the Passwords button. See the Download Tab topic for more information.

The iButton password is cleared by the Setup iButton. Before programming the Setup iButton, disable the iButton password from the iButton Window Passwords tab . Set the ShockLog™ recorder password if the Micro ShockLog™ recorder is password enabled. Program the Setup iButton.

When this iButton is applied to the Micro ShockLog™ recorder, the iButton password is disabled. If the Micro ShockLog™ recorder already has an iButton password, then the Micro ShockLog™ recorder must be in a stopped state (not waiting or paused) for the new setup can be accepted.

Once the Micro ShockLog™ recorder is programmed with this setup, the Micro ShockLog™ recorder will accept any iButton, unless the ShockLog™ recorder password is set.

Security Log

All iButton actions are logged in the security log. The only iButton actions that are not logged, are the circumstances where a password is invalid or an iButton action is thought to be unnecessary e.g. starting a running Micro ShockLog™ recorder.

You may expect to see these entries:

Description	**Data**	**Explanation**
iButton presented	1	Start iButton presented
iButton presented	2	Stop iButton presented
iButton presented	3	Setup iButton presented
iButton presented	4	Download iButton presented
iButton setup successful	0	The setup was loaded to the Micro ShockLog™ recorder successfully.
iButton Setup failed		Setup iButton failed
iButton download successful	0	Data successfully written to iButton.
iButton download failed		*Data* value gives indication where the download failed.
iButton failed		iButton failed. Could be corrupt data.
IButton User ID	n	IButton identifying user *n* has been applied.

Using the iButton with the Micro ShockLog™ recorder

This topic will provide a guide to applying the iButton to the Micro ShockLog™ recorder.

The main indicators of the Micro ShockLog™ recorder/iButton interaction are the two LEDs either side of the iButton receptor. If the red 'ok' LED lights up, then the iButton action is a success.

Expected responses of a successful action

When applying the iButton to the Micro, you must hold it in, never letting go of the iButton, as it may lose contact and fail to complete its operations.

When an iButton is applied, it may not be acknowledged for a few seconds, as the Micro ShockLog™ recorder checks the iButton once every 4 seconds. When it has been acknowledged, then depending what iButton has been applied depends upon what happens next.

Start/Stop/User ID iButton: red 'ok' LED lights up almost immediately.

Setup: Green 'in' LED lights for 1 second, then red 'ok' LED for about 15 seconds.

Download: Green 'in' LED for about 20 seconds, then red 'ok' and green 'in' LED for about 1 seconds.

In all cases, once the red 'ok' LED has lit up, you can remove the iButton from the Micro ShockLog™ recorder. You must keep the iButton on the Micro ShockLog™ recorder while the green 'in' LED is lit up.

Reasons for an unsuccessful action

If the Micro ShockLog™ recorder has not responded to an iButton, then the iButton has been considered as invalid. If this persists, the iButton interface will lock out any iButton operations for 30 minutes.

An iButton lock out is indicated by the green 'in' LED flashing on for 2 seconds, then off for 2 seconds.

These are the following causes of a lock out, or an invalid presentation:-

1 Locked out for 30 seconds if the interface is shorted to ground. This could happen with very bad presentation of button or lump of metal.

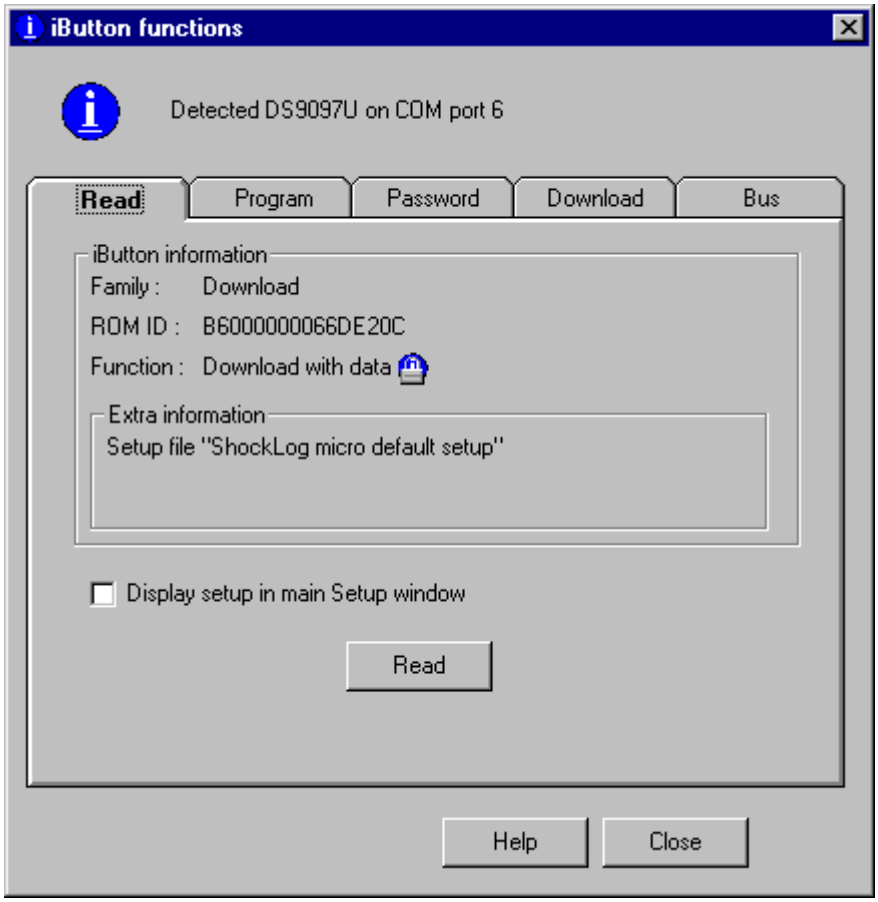
1. Locked out for 1 minute if button is unrecognised type.
2. If you get 10 invalid presentations in a row then it locks out for 30 minutes. An invalid presentation is one where the header fails to process – i.e. it is a recognised type of button but the action fails.

   The following count as invalid presentations:

   - iButton function not recognised.
   - iButton function not compatible with iButton type e.g. Download function in a Setup iButton.
   - Start iButton applied to a running Micro ShockLog™ recorder.
   - Stop iButton applied to a Micro ShockLog™ recorder that is in a stopped state.
   - Passwords do not match, that is both the ShockLog™ recorder and the iButton passwords.
   - iButton contains corrupt data.

PC utilities

iButton Window Read tab



The status at the top of this window is explained in the iButton Window status topic.

Family

This displays the iButton family i.e. ‘Start/Stop’, ‘Setup’ or ‘Download’.

ROM ID

This displays unique ROM ID of the iButton.

Function

Shows the current function of the iButton, which can be ‘Stop’, ‘Start’, ‘Setup’, ‘Download request’, ‘Download with data’ or ‘User ID’. A ‘Download request’ iButton is prepared to collect data from a Micro ShockLog™ recorder and does not contain any data. A ‘Download with data’, contains data from a Micro ShockLog™ recorder. If the iButton is password protected then a small icon will appear.

Extra Information

This will display any additional information about the iButton contents.

The Setup iButton will display the setup file name and the iButton clock.

The Download iButton will display the setup file name associated with its data.

The User ID iButton will display the User ID number of the iButton.

Display setup in main Setup window

If this is ticked, and the iButton currently being read contains a setup, then the setup will be loaded and displayed on the Setup tab on the main window, if the setup tab is visible.

Read

Reads the iButton currently connected to the PC.

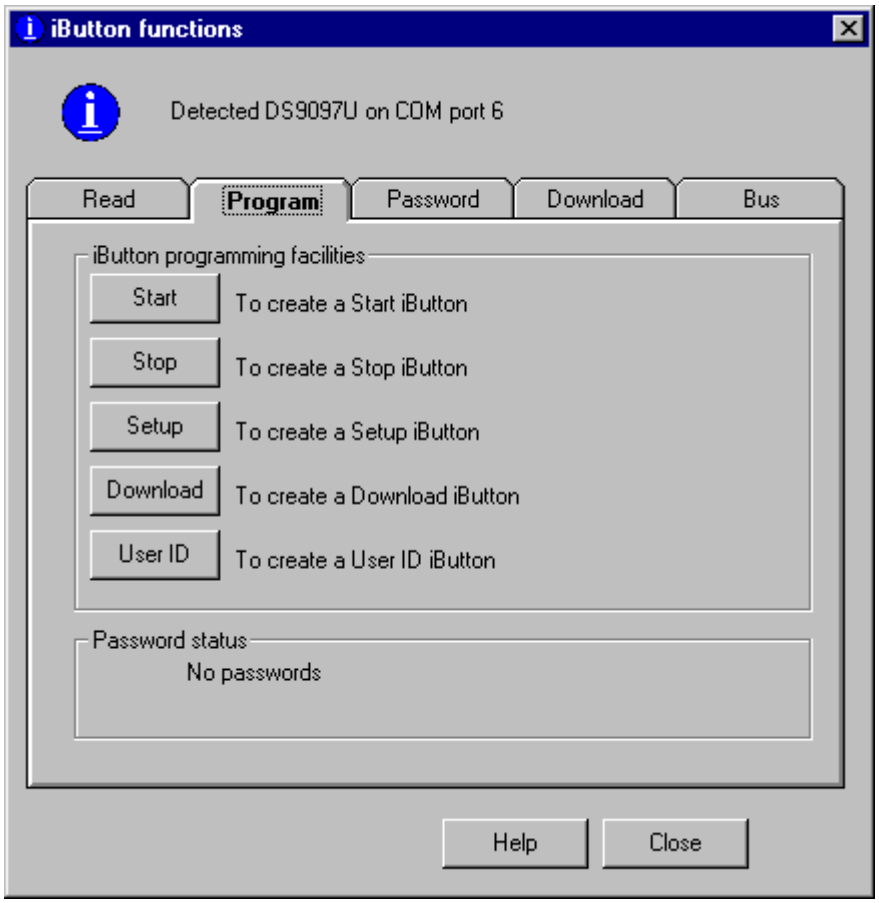
You may be prompted to enter a password, if your iButton has an iButton password.



Enter the password and click *OK*, to gain access to your iButton. If you enter the wrong password, you will be prompted again. If you click *Cancel*, the window will close and only limited information about the iButton will be displayed.

This window will also appear when trying to download data from the iButton. You will not be able to download data unless you know the password.

iButton Window Program tab



The status at the top of this window is explained in the iButton Window status topic.

Start

This creates a Start iButton. This starts the Micro ShockLog™ recorder if it is stopped, paused or waiting.

Stop

This creates a Stop iButton. This stops (not pauses) the Micro ShockLog™ recorder if it is running or waiting.

Setup

This creates a Setup iButton. There is the option to program the iButton the setup data currently loaded on the Setup tab if it is a the Micro ShockLog™ recorder setup) or to load a setup from file. The Setup iButton is the only iButton for this function, as it has the memory capacity and an internal clock, from which it sets the Micro ShockLog™ recorder clock when loading a setup down to it.

Download

Creates a Download request iButton, which is used to collect data from a Micro ShockLog™ recorder. The Download iButton is the only iButton for this function because of its high memory capacity.

User ID

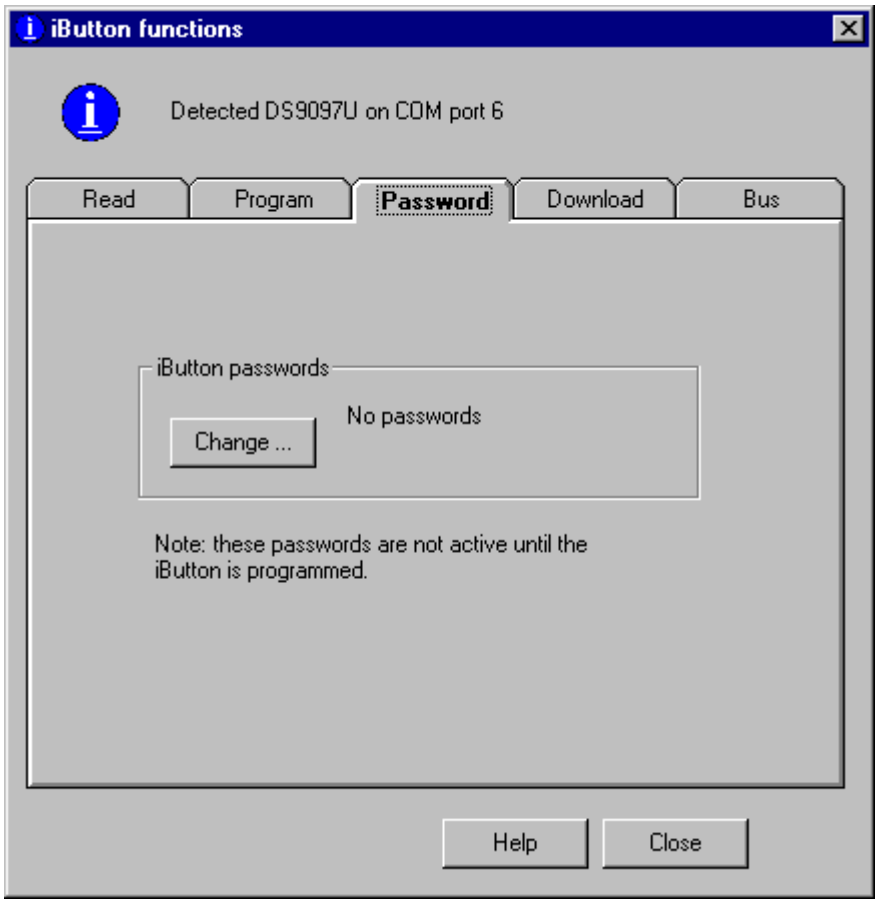
Creates a user identification iButton.

Password status

Displays the current password status that will be entered into any iButton that is currently being programmed. It will indicate whether the iButton or the ShockLog passwords are set. If the iButton password is set, the  symbol will appear.

See the iButton security topic for more information on iButton passwords.

iButton Window Passwords tab



The status at the top of this window is explained in the iButton Window status topic.

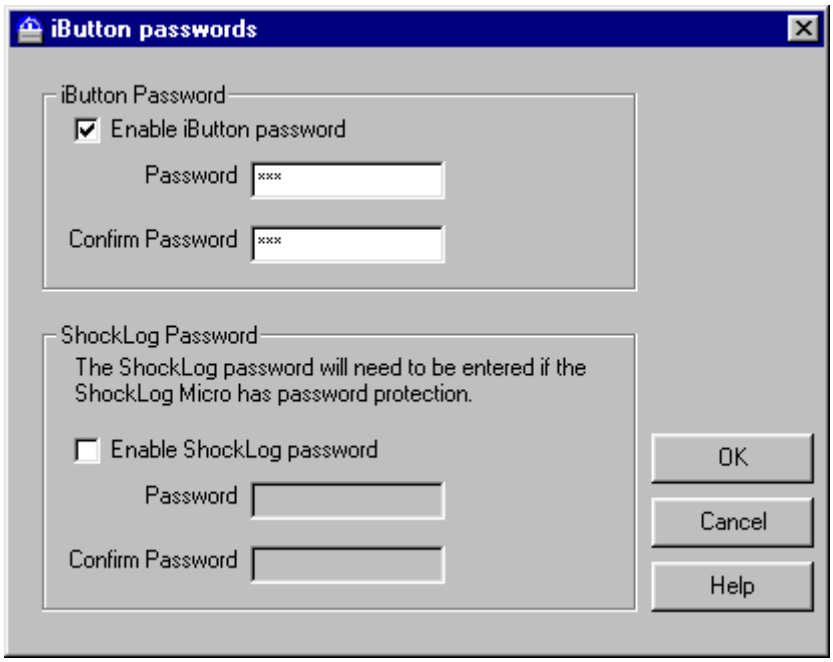
Click the *Change …* button to open the iButton passwords window, which enables you to edit and disable/enable the iButton and ShockLog™ recorder passwords. The current password status is displayed next to the *Change …* button.

See iButton security topic for more information on iButton passwords.

Note: the iButton passwords are not enabled until the iButton is programmed from the *Program* tab.

iButton passwords window

This window can be accessed by clicking on the *Change…* button on the Passwords tab on the iButton function window. This window is used to edit/enable/disable passwords in the iButton.



The iButton contains two passwords, one to match the ShockLog™ recorder password and one to match/set the iButton password.

See iButton security topic for more information on the iButton and passwords.

iButton password

This password is required if the iButton is to talk to a Micro ShockLog™ recorder with the iButton password enabled. It is also required if the user wishes to change the iButton password on the Micro ShockLog™ recorder.

Tick *Enable iButton password* box to enable the iButton passwords. You will then need to enter a password in to the *Password* box and *Confirm Password* box. If these boxes are left empty then the program will disable the iButton passwords.

ShockLog password

This password is required if the iButton is to talk to a Micro ShockLog™ recorder with the ShockLog™ recorder password enabled.

Tick *Enable ShockLog password* box to enable the ShockLog™ recorder passwords. You will then need to enter the Level 2 password in the *Password* box and *Confirm Password* box. If these boxes are left empty then the program will disable the ShockLog™ recorder passwords.

OK

Apply the passwords in the window and close the window.

Cancel

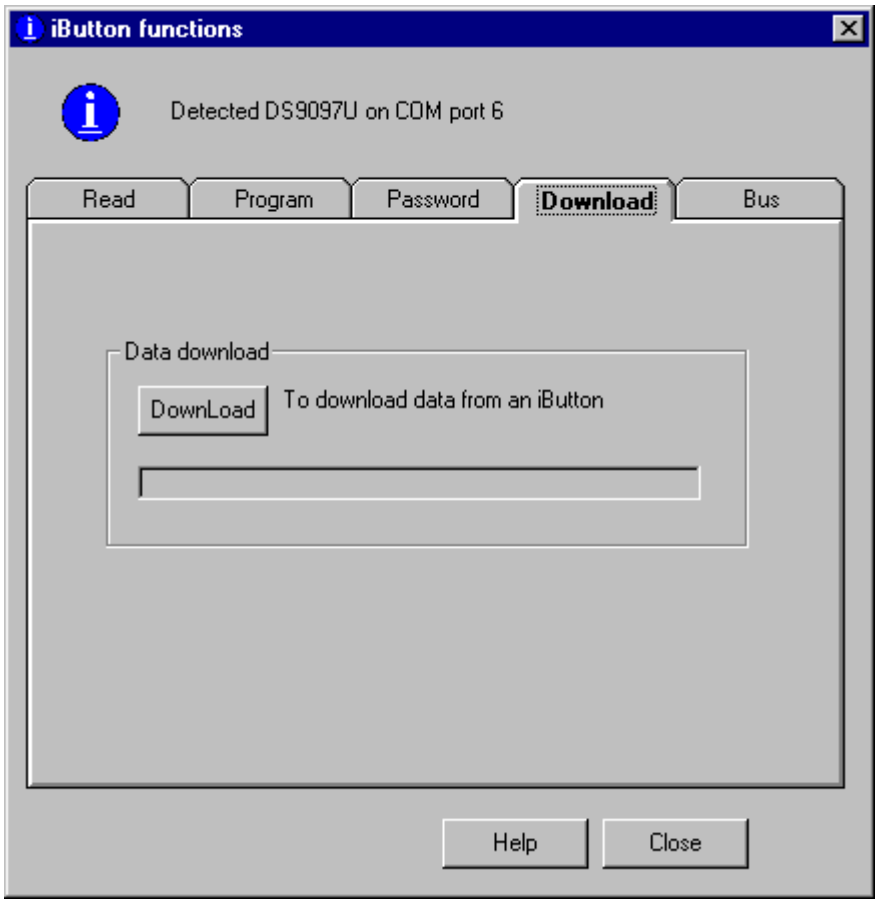
Close the window, ignoring any changes.

Help

This displays the online help.

Note: the iButton passwords are not enabled until the iButton is programmed from the *Program* tab.

iButton Window Download tab



The status at the top of this window is explained in the iButton Window status topic.

This downloads data from a Download iButton containing data from a Micro ShockLog™ recorder to a data file.

Apply the iButton to the blue-dot connector and click the *Download* button to start the download. You may be prompted to enter a password, if your iButton has an iButton password. See the iButton window Read tab topic for more information.

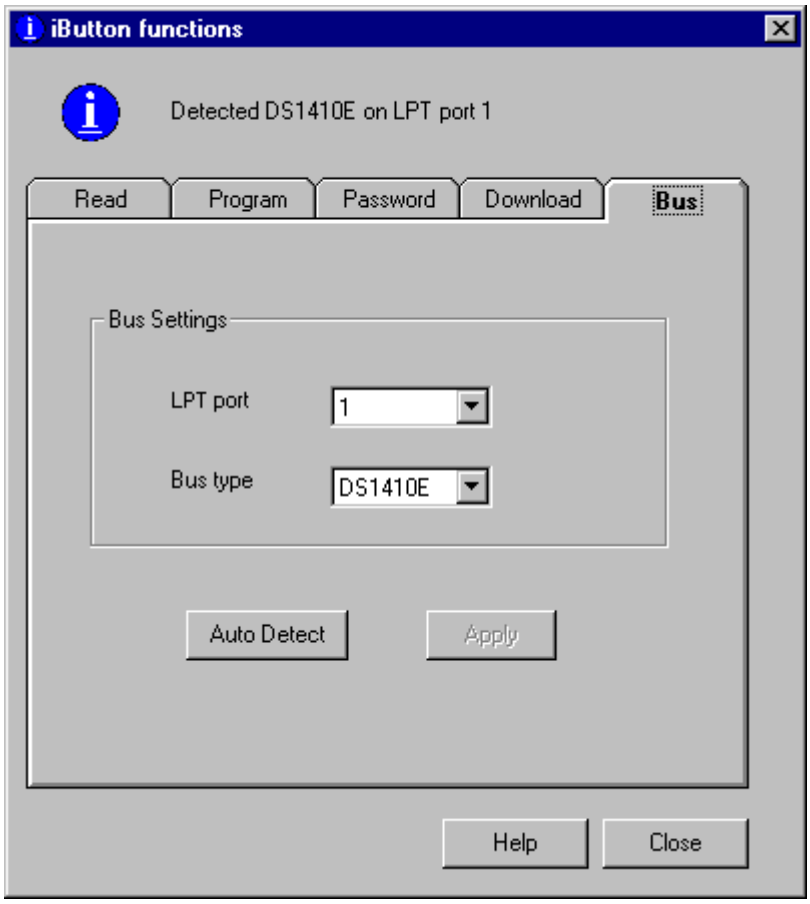
You will then be prompted for a user file name, like when downloading from a ShockLog™ recorder through the COM port. During the download, the *Download* button will change to a Stop button and will allow you to stop the download at any time. The data file will appear on the Examine Data Tab with a small symbol next to it, indicating that it is a data file from an iButton.

iButton Download Data

The data in the iButton contains only enough information to display a Download report. As there is only 1/8th the capacity of the Micro ShockLog™ recorder, the data has been compressed. The iButton stores the following data parameters:

- Time slots data compressed to 64 slot blocks.
- 30 slot breaks.
- 1 detailed event data. This is the most severe event and is compressed to 128 samples. The data will focus upon the interesting part of the event. The data compression is dependent upon how long the interesting area is.
- Data and maximum modulus of the 128 event summaries and the 10 detailed events.
- No summaries data.
- No event temperature data

iButton Window Bus tab



The status at the top of this window is explained in the iButton Window status topic.

This window is required when setting up a new iButton bus, or changing buses. See the Setting up the iButton on your PC topic.

The bus can be detected, either automatically (with caution), or can be set manually.

Displays the current bus settings

LPT/COM port

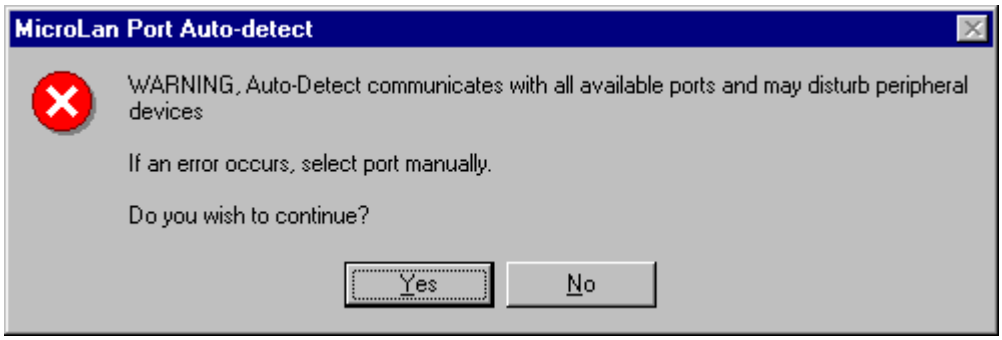
Displays the COM port number for the DS9097U or DS1411 buses or displays the LPT port number for the DS1410E bus.

Bus type

Displays the selected iButton bus type.

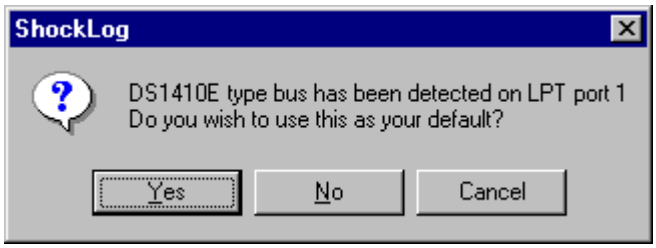
Auto Detect

Click this button to scan all COM ports and LPT ports for any of the defined buses. If you do, you will get the following message first:



Click *Yes* to continue the search. Clicking *No* will not do any searching.

If *Yes* is clicked, then the program will first search for the DS9097E bus on com ports 1 to 8, then for DS1410E on LPT ports 1 to 8, and then DS9097U/DS1411 on Comm ports 1 to 8. If a bus is found, then you will receive the following message:



Click *Yes* and the bus will be applied and the search will stop.

Click *No* and the program will continue searching for other possible buses.

Click *Cancel* and the search will stop and will not apply the detected bus.

If no bus was found or accepted, then the search will end with a message of 'No bus detected' and the bus settings will remain unchanged.

Apply

Will apply the port and bus type settings. If the bus exists, then the status on the iButton function window will read



If the bus failed to initialise, or was not detected, you will see an error message and the status on the iButton function window will read:



Click the *Help* button for Help on how to resolve the problem.

iButton Window status

The iButton window status is displayed at the top of the iButton function window. It indicates the progress or state of an iButton.



This is a normal state, where no processing is in progress and the iButton bus is working.



Flashes, when it is waiting for an iButton. This could be any iButton, or a particular type e.g. a Setup iButton for a programming a Setup. The comment should say what type of iButton it is expecting.

A Cancel button should also be present, allowing the user to cancel any pending actions.



Flashes, when writing or reading data from the iButton.



Displayed when a process has completed successfully.



Displayed if a process has failed or cancelled, or the current iButton bus settings do not work.

iButton Trouble-shooting

This topic largely concerns itself with errors while operating iButtons with the PC. If you have problems with iButtons and the Micro ShockLog™ recorder, then see the Using the iButtons with the Micro ShockLog™ recorder topic.

Some error messages refer to the MicroLAN, which is the iButton bus and blue-dot connector on the PC.

Code	Description	Solution
17001	MicroLAN not initialised with TMSetup	See Communication problems
17002	Specified MicroLAN non-existent	See Communication problems
17003	Function not supported	See Communication problems
17004	Error reading or writing a packet	Contact Technical Support
17005	Packet larger than provided buffer	Contact Technical Support
17006	Not enough room for packet on device	Contact Technical Support
17007	Device not found	Contact Technical Support
17008	Block transfer too long	Contact Technical Support
17009	Wrong type of device for this function	Contact Technical Support
17010	The page being read is redirected	Contact Technical Support
17011	The device is written in a way that can not be changed	Contact Technical Support
17012	Failure to communicate with hardware adapter	See Communication problems
17013	An unsolicited event occurred on the 1-Wire	Contact Technical Support
17100	NO_PRESENCE No presence on MicroLAN	The software was expecting an iButton to be connected, but it did not find one. The most likely cause is that the iButton was removed during a read/write operation. Try again. If this problem persists, contact Technical Support.
17110	TMSetup - Setup failed	Contact Technical Support
17112	TMSetup - Setup ok but MicroLAN shorted	Contact Technical Support
17113	MicroLAN does not exist	See Communication problems
17114	TMSetup not supported	Contact Technical Support
17120	Clock - This iButton does not contain a clock	An iButton other than a Setup iButton has been applied.
17121	Clock - Real-time clock is write protected	Contact Technical Support
17101	iButton is Read only	Contact Technical Support
17102	iButton belongs to a family that is not fully compatible with this function	An iButton type is being used that is not recognised by the ShockLog™ software. See Introduction to iButtons to help identify the iButton type.

17103	Memory addresses are not valid for this iButton	Wrong type of iButton is being used.
17104	Bad Check Sum	There are 3 possible reasons for this error:- 1. The data in the iButton is corrupt. 2. The iButton was removed or lost contact while reading the data, if so try again. 3. The iButton bus or cables disconnected while reading the data.
17105	Too many iButtons	To make sure that you are reading/programming the correct iButton, connect only that iButton to the bus.
17200	Session not valid	Contact Technical Support
17201	Hardware specific driver not found and is required	You are missing the system files that are required to communicate with the iButton bus. There are 2 possible reasons for this:- 1. The ShockLog™ software has not installed the drivers properly. 2. The bus your are using is not compatible with the ShockLog™ software.

Communication problems

Your bus may not be communicating to your PC correctly. Check the following things:-

1. Check that the MicroLAN cable is plugged into the MicroLAN bus adapter
2. Check that the MicroLAN bus adapter is plugged in correctly
3. If you have an extension cable, check that this is plugged in correctly
4. Check that the cable is plugged in the correct port on the PC
5. Check that the bus port number is correct

Specifications and Declarations

RD298 ShockLog™ recorder

THE DATA IN THE ON-LINE HELP OR MANUAL MAY NOT BE THE LATEST AVAILABLE. CHECK WITH TECHNICAL SUPPORT FOR THE LATEST SPECIFICATION DATA.

ShockLogTM tri-axial Shock and Vibration Monitor

The RD298 combines Lamerholm Electronics advanced tri-axial piezo electric accelerometer technology with sophisticated electronics and software to offer an advanced shock and vibration monitoring instrument.



- **Completely self contained (battery operated)**
- **12 month battery life**
- **Three built-in accelerometers**
- **Velocity or acceleration measurements**
- **Built-in temperature sensor**
- **Optional external sensors**
- **Adjustable Warning and alarm thresholds**
- **LED operation, warning and alarm status indicators**
- **Tamper proof – factory and user passwords**
- **RF screened and CE certified**
- **Date and time stamping**
- **Non volatile memory records 500 day history**
- **Low cost standard C size lithium or alkaline battery**
- **Detailed record significant events**

Features

The RD298 has been designed to monitor shock and vibration based on acceleration or velocity measurements. It has several unique features which make it especially suitable for applications where the cost of exposure to out of specification environmental influences is very high. The instrument is equally suitable for protecting high value fixed or mobile installations and investigating shock and vibration during transportation.

In normal operation the device checks the output of the sensors (the three built in accelerometers, the built in temperature sensor and any external sensors) once every 10 seconds. The information from the sensors is merged into a record for each recording period and recorded in non volatile memory. The length of the recording period can be set between 10 minutes and 24 hours and there is sufficient memory for 512 periods.

If any of the accelerometer signals or the first external input exceeds the 'wake up' threshold the processor will be turned on and will check the sensor outputs at a much faster rate (up to 4000 samples per second). If the output of any sensor exceeds the warning or trip thresholds the RD298 will flash its status lamps accordingly. In addition the detailed time history of the first event to set a warning, the first to set an alarm and subsequent severe events up to the installed memory capacity will be recorded. The RD298 will adjust the sample rate during the event recording (within parameters set up by the user) to make the most efficient use of memory and capture the full extent of any events.

The RD298 also supports peak recording in fixed time slots. In this mode the highest and lowest signal level present on each input is recorded for each time slot. The time slot length may be set between 10 seconds and 1 hour and as many as 262,144 slots may be recorded.

Security

The RD298 stores all data and status information in high performance sector erase FLASH memory. This memory requires no power to retain data and offers special hardware protection against accidental erasure. The instrument can be configured by connecting it to a PC running the data analysis and set up software supplied free with each RD298. During the configuration process the operator can set the levels for warnings and alarms, determine the sensor types to be used and set up user passwords for subsequent access to data.

Before the software will communicate with the RD298 the user must supply any user passwords which may have been set to restrict access to data, resetting, calibration or other functions.

A special section of the flash memory is reserved for the security log – this records the timing of such actions as removal of the battery cover, re-setting the clock or clearing out data and can not be easily modified by the operator. It is intended that the security log last the operating life of the instrument and should only be cleared when the ShockLog™ is re-calibrated by Lamerholm Electronics.

Packaging and Environment

The RD298 has been designed to function reliably in difficult environments. The electronic components are assembled using surface mount technology and the latest automatic assembly equipment. The complete electronic and transducer package is coated with acrylic resin and enclosed in the metal case. The securing bolts pass right through the body of the instrument to guarantee a reliable mechanical installation.

This construction technique, in combination with the absence of cables for power or sensors (unless additional external sensors are used) results in a very high immunity to electrical interference and very low levels of RF emission. The RD298 may safely be used in close proximity to sensitive instruments or in difficult electrical environments.

The RD298 has been designed to meet IP67 (including connectors) and is capable of operating at temperatures between –20 and + 70°C. (-40 to +85°C to special order.)

Specification

			min	max	units
Complete instrument					
Operating temperature range			-20	+70	°C
Re-programming temperature range			+10	+30	°C
Drop test survival			1		m
Size (over connectors)		180 x 84x 42			mm
Case material		aluminium			
Weight				0.7	kg
A-D converter resolution			10		bits
Flash memory		(for code)	32		k bytes
		(for data)	1920		k bytes
Battery	1 x 3.6V lithium thionyl chloride		8		Ah
	1 x 1.5V Alkaline size C MN1400, LR14 or equivalent				
Indicators		Red and Green LEDs			
Interface	RS232 levels, Rx and Tx Baud rates		19200	57600	
External power source option			4.75	18	V
External power source average current (normal)				20	mA
External power source average current (clearing or downloading)				250	mA
External power source start-up current				500	mA

EMC EN50081-1, EN50082-1, FCC CFR47(July1996) Part 15 Limit B

Accelerometers	**min**	**max**	**units**
Low frequency cut off (-3dB 10g – 100g)	0.1	0.3	Hz
Low frequency cut off (-3dB 1g – 3g)	0.5	2	Hz
High frequency cut off (-3dB)	200	300	Hz
Resolution (% of full scale)	0.3		%
Scale factor accuracy at 5g (event record)	-2	+2	%
additional error other ranges	-2	+2	%
additional error peak capture	-5	+5	%
Change of scale factor over temperature	-4	+4	%
Acceleration ranges	±1	±100	g
Velocity ranges	±1	±100	cm/s
Wake up threshold (% of range)	10	90	%
Warning and alarm thresholds (% of range)	10	90	%
Wake up time		1.5	mS

External Sensors	**min**	**max**	**units**
Number of external inputs		2	
Input voltage range	0.0	4.5	V
Low frequency cut off	0.0	0.0	Hz
High frequency cut off Ext 1 (-3dB)	200	280	Hz
High frequency cut off Ext 2 (-3dB)	60	85	Hz
Resolution	5		mV
Scale factor accuracy at 4V	-2	+2	%
Change of scale factor over temperature	-2	+2	%
Wake up threshold	0.5	4.0	V
Warning and alarm thresholds	0.5	4.0	V

Connector Details

Connectors	Hirschman CM (MIL-C-5015)
Environment	IP67

Connector A

Pin A	Switched Power (for approved external sensors only)
Pin B	Input 2
Pin C	
Pin D	
Pin E	Signal Ground
Pin F	Auxiliary digital IO 1
Pin G	Auxiliary digital IO 2

Connector B

Pin A	Switched Power (for approved external sensors or approved alarm sounder only)
Pin B	Input 1
Pin C	Power Ground
Pin D	External Power
Pin E	Signal Ground
Pin F	RS232 Rx
Pin G	RS232 Tx

Air Cargo currently seeking CAA approval for air cargo applications

Software

The RD298 is supplied with software which runs on a desktop or portable PC using either the Windows 95, 98, 2000 or Windows NT4 operating systems. Additional operating systems may be supported at a later date.

The software allows the operator to configure the RD298 and to extract and examine data records from the instrument.

Reports

Reports may be viewed on screen and selected data exported to other applications. Five different reports are available: summary data, events summary, event details, time slot data and log data.

Summary report parameters: date, time, number of warnings, number of alarms, max x|y|z, min x|y|z, humidity, pressure, max pk x|y|z, min pk x|y|z, rms x|y|z, max/min temperature, range

Events summary report parameters: date, time, duration, significance, range, temperature

Event Details report parameters (text or graphical): sample time, sample number, max/min x|y|z

Time slot report parameters (graphical): date, time, max pk x|y|z, min pk x|y|z, max ext1|ext2, min ext1|ext2, internal temperature, humidity, pressure, external temperature

Log report parameters: date and time of: password changes, setup changes, battery changes, data clearing operations or resets.

Lamerholm Electronics makes no warranty for the use of its products, other than those expressly contained in the Company's standard Terms and Conditions of Sale which are available on request. Lamerholm Electronics assumes no responsibility for any errors which may appear in this document, reserves the right to change devices or specifications detailed herein at any time without notice, and does not make any commitment to update the information contained herein. No licenses to patents or other intellectual property of Lamerholm Electronics Ltd are granted by the Company in connection with the sale of Lamerholm Electronics products, expressly or by implication. Lamerholm Electronics products are not authorised for use as critical components in life support devices or systems.

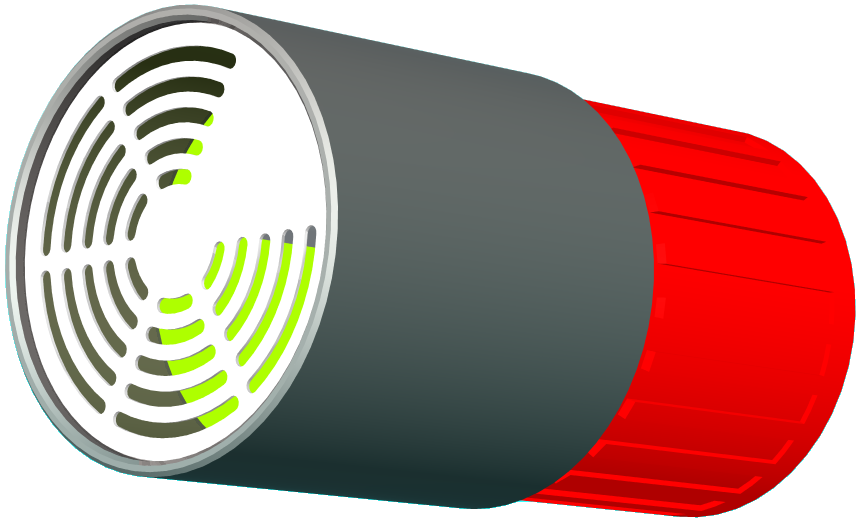
Issue 2.6 July 2001

HPT Sensor

THE DATA IN THE ON-LINE HELP OR MANUAL MAY NOT BE THE LATEST AVAILABLE. CHECK WITH TECHNICAL SUPPORT FOR THE LATEST SPECIFICATION DATA.

HPT Humidity, Pressure and Temperature Sensor

The RD298HPT is a combined humidity, pressure and temperature sensor for use with the RD298 ShockLog™ shock and vibration recorder. It enables the ShockLog™ to monitor an extended range of environmental factors and is fully supported by the ShockLog™ software.



- **Direct connection to RD298 ShockLog™ recorder**
- **Built-in calibration memory independent of ShockLog™ recorder calibration**
- **Fully supported by ShockLog™ software**
- **Extended temperature range**
- **Robust stainless steel housing**
- **Obtains power from ShockLog™ recorder**
- **No installation – plug and play operation**
- **Fast temperature response**
- **Negligible effect on ShockLog™ recorder battery life**

Packaging and Environment

The RD298HPT has been designed to function reliably in difficult environments. The electronic components are assembled using surface mount technology and the latest automatic assembly equipment. The complete electronic and transducer package is enclosed in a stainless steel case and bonded to the military quality connector which provides electrical and mechanical attachment to the ShockLog™.

This construction technique, in combination with the absence of cables for power or signal results in a very high immunity to electrical interference and very low levels of RF emission. The RD298HPT may safely be used in close proximity to sensitive instruments or in difficult electrical environments.

The RD298HPT has been designed to meet IP30 and is capable of operating at temperatures between -40 and +85°C. An extension cable is available as an optional extra for applications where the HPT must be mounted remotely from the ShockLog™.recorder.

Specification

		min	max	units
Complete instrument				
Operating temperature range		-40	+85	°C
Drop test survival		1		m
Size	60 long x 32 diameter			mm
Case material	stainless steel + plastic			
Weight			0.09	kg
Power	obtained from ShockLog™ recorder			
EMC	EN50081-1, EN50082-1			

Humidity		**Min**	**Max**	**units**
Measuring range		0	100	% RH
Accuracy (@25 °C, 25-75%RH)		-3	+3	% RH
Resolution		0.5		% RH

Pressure		**Min**	**max**	**units**
Measuring range		0	1.1	Bar
Accuracy (@ 0.2-1.1 Bar, 25 °C)		-10	+10	mBar
Accuracy (@ 0.0-0.2 Bar, 25 °C)		-30	+30	mBar
Resolution		2		mBar

Temperature		**Min**	**max**	**units**
Measuring range		-40	+85	°C
Accuracy (-20 to +70°C)		-2	+2	°C
Resolution		0.5		°C

Lamerholm Electronics makes no warranty for the use of its products, other than those expressly contained in the Company's standard Terms and Conditions of Sale which are available on request. Lamerholm Electronics assumes no responsibility for any errors which may appear in this document, reserves the right to change devices or specifications detailed herein at any time without notice, and does not make any commitment to update the information contained herein. No licenses to patents or other intellectual property of Lamerholm Electronics Ltd are granted by the Company in connection with the sale of Lamerholm Electronics products, expressly or by implication. Lamerholm Electronics products are not authorised for use as critical components in life support devices or systems.

Issue 1.3 July 2001

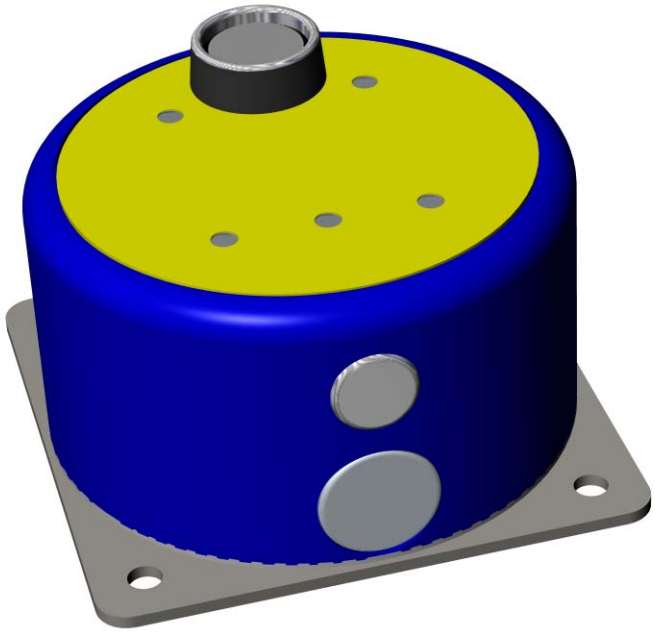
RD317 Micro ShockLog™ recorder

THE DATA IN THE ON-LINE HELP OR MANUAL MAY NOT BE THE LATEST AVAILABLE. CHECK WITH TECHNICAL SUPPORT FOR THE LATEST SPECIFICATION DATA.

Low Cost tri-axial Shock and Vibration Monitor

The RD317 combines the latest developments in Lamerholm Electronics advanced tri-axial piezo electric accelerometer technology with state of the art electronics and field proven software to offer an advanced shock and vibration monitoring instrument at an amazingly low price.

This new instrument has been designed to offer new levels of user friendliness and is the first full function shock recorder to allow setup and data extraction in the field without a PC or other hand held computer.



- **9 month life from single AA battery**
- **Three built in accelerometers**
- **iButton interface – no PC required in the field**
- **Very low cost**
- **Non volatile memory records 500 day history**
- **Records first and up to nine most significant events in detail**
- **Records time and amplitude of 128 most recent events**
- **Humidity sensor option**
- **Time slot recording for complete shock and vibration history**

Features

The RD317 has been designed to offer a cost effective solution to the increasing need to monitor environmental influences, especially shock and vibration, on high value goods in transit. This new instrument offers several novel features which significantly reduce the cost of deployment in the field and permit the effective use of shock monitoring equipment by unskilled personnel after minimal training. In normal circumstances it is not necessary for field staff to use a PC or similar hand held computer to fully utilise the RD317.

Recording

During operation low power analogue circuits continuously monitor the signals from the three built in accelerometers. The peak value of acceleration in each timeslot period is recorded in the timeslot memory. The timeslot period can be set to as little as 10 seconds or as long as one hour.

If the level of acceleration from any sensor exceeds a preset threshold then the detailed event recording system will be triggered. This will make a detailed recording of the event at a rate of up to 1024 measurements per second on each accelerometer. Sampling rates and event duration can be set by the user. Since only a finite amount of memory is available the detailed recordings for the first and the nine most significant events are recorded. In addition the maximum values for X, Y, Z and the modulus for the 128 most recent events are recorded along with the event time stamp.

The RD317 is fitted with an internal temperature sensor as standard and a humidity sensor is available as a factory fitted option. Temperature and humidity data can be recorded in the timeslot memory.

User Interface

The RD317 can be configured by attaching it to a PC running Lamerholm's standard ShockLog software by means of a low cost serial cable. All the data stored in the ShockLog can be downloaded to the PC and analysed off line.

It is recognised that the cost of deploying PCs in the field is very considerable so the RD317 offers an iButton interface. This is a simple socket on the front panel which is activated by touching a button sized device to it. The iButton is a standard product of Dallas Semiconductor.

You can set up iButtons yourself on a PC or buy them pre-initialised from Lamerholm to configure the RD317 and set its clock. In addition you can extract a summary of the RD317 recorded data into a memory iButton and read this on a remote PC.

The RD317 uses two LEDs to guide the operator in the use of the iButton and to confirm successful data transfer.

Security

The RD317 stores all data and status information in high performance sector erase FLASH memory. This memory requires no power to retain data and offers special hardware protection against accidental erasure.

Before the software will communicate with the RD317 the user must supply any user passwords which may have been set to restrict access to data, resetting, calibration or other functions. If the iButton interface is used passwords may still be configured if required.

A special section of the flash memory is reserved for the security log – this records the timing of such actions as removal of the battery, re-setting the clock or clearing out data and can not be easily modified by the operator. It is intended that the security log last the operating life of the instrument and should only be cleared when the ShockLog is re-calibrated by Lamerholm Electronics.

Packaging and Environment

The RD317 has been designed to function reliably in difficult environments. The electronic components are assembled using surface mount technology and the latest automatic assembly equipment. The complete electronic and transducer package is coated with acrylic resin and enclosed in a metal case.

This construction technique, in combination with the absence of cables for power or sensors results in a very high immunity to electrical interference and very low levels of RF emission. The RD317 may safely be used in close proximity to sensitive instruments or in difficult electrical environments.

The RD317 has been designed to meet IP67 (including connector with cap fitted) and is capable of operating at temperatures between –40 and + 85°C.

Specification

		min	max	units
Complete instrument				
Operating temperature range (recording)		-40	+85	°C
Operating temperature range (recording + communications)		-20	+85	°C
Temperature recording accuracy	(-40 to +85 °C)	-3	+3	°C
	(-10 to +65 °C)	-2	+2	°C
Drop test survival		1		m
Size (over all)	85 x 85 x 50			mm
Case material	aluminium and steel			
Weight			0.3	kg
A-D converter resolution		10		bits
Flash memory	(for code)	128		k bytes
	(for data)	512		k bytes
Battery	1 x 3.6V lithium thionyl chloride	2.2		Ah
	1 x 1.5V Alkaline size AA			
Indicators	3 x Red and 2 x Green LEDs			
Interface	RS232 levels, Rx and Tx Baud rates	19200	57600	
EMC	EN55022, EN50082-1, FCC CFR47(July1998) Part 15 Limit B			
Accelerometers				
Low frequency cut off (-3dB 10g – 100g)		0.1	0.5	Hz
High frequency cut off (-3dB, option F1)		220	280	Hz
High frequency cut off (-3dB, option F2)		35	45	Hz
Resolution (% of full scale)		0.5		%
Scale factor accuracy at 5/50g (event record)		-5	+5	% (of reading)
Additional error for peak capture		-5	+5	% (of range)
Change of scale factor over temperature		-4	+4	%
Additional offset error		-1	+1	g
Acceleration ranges	(option R1)		±100	g

Acceleration ranges (option R2)		±10	g
Wake up threshold (% of range)	10	90	%
Alarm threshold (% of range)	10	90	%
Wake up time		1.5	mS

Humidity Sensor

(NB IP67 rating does not apply to humidity sensor)

Measuring range (non condensing)	5	95	% RH
Accuracy (@25 °C, 25 – 75 %RH)	-3	+3	% RH
Resolution	0.5		% RH

Connector Details

3 pole 3.5mm min jack DIN with screw on cover

Data Collection

Timeslot Interval	10	3600	Seconds
Number of timeslots (depends on slot contents)		131072	
Samples per event		2048	
Number of events (detailed)		10	
Number of events (time, date and magnitude)		128	

Battery Endurance

Lithium (operating, -10 to +45 °C)	6	months
Lithium (operating, +5 to +35 °C)	9	months
Lithium (waiting, -10 to +45 °C)	24	months (estimated)
Alkaline (operating, +5 to +45 °C)	1	month

Software

The RD317 is supplied with software which runs on a desktop or portable PC using Windows 95, 98, 2000 or Windows NT4 operating systems. Additional operating systems may be supported at a later date.

The software allows the operator to configure the RD317, either directly or via iButtons and to extract and examine data records from the instrument.

Reports

Reports may be viewed on screen and selected data exported to other applications. Six different reports are available: summary data, events summary, event details, time slot data, mission report and security log data.

Summary report: The mission is split into as many as 512 summary periods which may be from 10 minutes to twenty four hours long and for each period the following parameters are reported in spreadsheet form: date, time, number of alarms, max x|y|z, (humidity), rms x|y|z, max/min temperature, range

Events summary report: The first and 128 most recent events are presented in a graphical or spreadsheet form. For each event the following parameters are available**:** date, time, range, temperature, max/min x/y/z, modulus. In addition the maximum modulus of all the events may be displayed graphically.

Event Details report: For the first and the (nine) most significant events the detailed information is available in spreadsheet or graphical form. When the graphical form is used pan and zoom controls are available.

Time slot report: Data recorded in the timeslot memory can be displayed in graphical form. The following parameters are available: date, time, max pk x|y|z, internal temperature, humidity.

Mission Report: The mission report can be extracted in the field by means of an iButton. It offers a summary of the complete mission data set including a condensed view of the timeslot data, the Events Summary report for up to 128 events and a condensed plot of the most significant event.

Security Log report: The security log data can be displayed in spreadsheet form. The following parameters are available: date and time of password changes, setup changes, battery changes, data clearing operations or resets.

Options

R1	10g range
R2	100g range
F1	250Hz maximum frequency
F2	40Hz maximum frequency
H0	No humidity sensor
H1	Built in humidity sensor

Lamerholm Electronics makes no warranty for the use of its products, other than those expressly contained in the Company's standard Terms and Conditions of Sale which are available on request. Lamerholm Electronics assumes no responsibility for any errors which may appear in this document, reserves the right to change devices or specifications detailed herein at any time without notice, and does not make any commitment to update the information contained herein. No licenses to patents or other intellectual property of Lamerholm Electronics Ltd are granted by the Company in connection with the sale of Lamerholm Electronics products, expressly or by implication. Lamerholm Electronics products are not authorised for use as critical components in life support devices or systems.

Issue 1.7 July 2001

RD298 ShockLog™ recorder EMC Declaration

Manufacturer's name: Lamerholm Electronics Limited

Manufacturer's address: The Pixmore Centre, Pixmore Avenue,
Letchworth, Hertfordshire, UK SG6 1JG

declares that the product

Product name: RD298 ShockLog™ Recorder

Product number: 298xx

conforms to the following Product Specifications:

EMC:

EN 55022 : 1994 Including amendment A1:1995 Class B	
FCC Rules CFR 47 (July 1996) Part 15 Limit B Verification	
EUROCAE ED-14D/RTCA D0-160D (July 1997) Radiated Emission Category B verification	
EN 50082-1 : 1997	
EN 61000-4-2 : 1995	±8kV AD
EN 61000-4-3 : 1996	3V/m 80% AM
EN 61000-4-4 : 1995	±0.5kV Signal Line
	±0.5kV DC Power Lines
EN 61000-4-5 : 1995	±0.5kV Voltage surge
EN 61000-4-6 : 1995	3V RMS 0.15 to 80 MHz DC Power, signal control lines.
ENV 50204 : 1995	900MHz Keyed Carrier

Supplementary Information:

1. The products herewith comply with the requirements of the EMC Directive 89 / 336 / EEC.
2. The ShockLog™ Recorder was tested in a typical configuration with a DELL personal computer.
3. All voltages in the ShockLog™ Recorder are less that 50V ac and 75V dc.

A. Kay , Quality Manager

Stevenage, November 2000.

HPT EMC Declaration

Manufacturer's name:	Lamerholm Electronics Limited
Manufacturer's address:	The Pixmore Centre, Pixmore Avenue, Letchworth, Hertfordshire, UK SG6 1JG

declares that the product

Product name:	RD298HPT Humidity, Pressure and Temperature Sensor
Product number:	29900, 29920

conforms to the following Product Specifications:

EMC:

EN 55022 : 1994 Including amendment A1:1995 Class B

FCC Rules CFR 47 (July 1996) Part 15 Limit B Verification

EUROCAE ED-14D/RTCA D0-160D (July 1997) Radiated Emission Category B verification

EN 50082-1 : 1997

EN 61000-4-2 : 1995	±8kV AD
EN 61000-4-3 : 1996	3V/m 80% AM
EN 61000-4-4 : 1995	±0.5kV Signal Line
	±0.5kV DC Power Lines
EN 61000-4-6 : 1995	3V RMS 0.15 to 80 MHz DC Power, signal control lines.
ENV 50204 : 1995	900MHz Keyed Carrier

Supplementary Information:

1. The products herewith comply with the requirements of the EMC Directive 89 / 336 / EEC.
2. The HPT was tested connected to an RD298 in typical configuration with a DELL personal computer.
3. All voltages in the ShockLog are less that 50V ac and 75V dc.

A. Kay , Quality Manager

Stevenage, July 1999.

RD317 Micro ShockLog™ recorder EMC Declaration

Manufacturer's name: Lamerholm Electronics Limited

Manufacturer's address: The Pixmore Centre, Pixmore Avenue,

Letchworth, Hertfordshire, UK SG6 1JG

declares that the product

Product name: RD317 Micro ShockLog™ Recorder

Product number: 317xx (Rx Fx Hx)

conforms to the following Product Specifications:

EMC:

EN 55022 : 1998 Class B

FCC Rules CFR 47 (July 1998) Part 15 Limit B

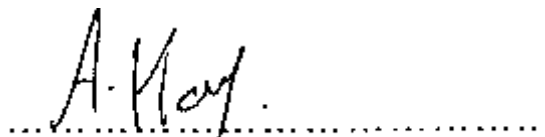
RTCA/D0-160D Section 21 Radiated Emission Category B

EN 50082-1 : 1997

EN 61000-4-2 : 1995	±8kV AD
EN 61000-4-3 : 1996	3V/m 80% AM
EN 61000-4-4 : 1995	±0.5kV Signal Line
EN 61000-4-6 : 1995	3V RMS 0.15 to 80 MHz signal control lines.
ENV 50204 : 1995	900MHz Keyed Carrier

Supplementary Information:

1. The products herewith comply with the requirements of the EMC Directive 89 / 336 / EEC.
2. The Micro ShockLog™ Recorder was tested in a typical configuration with a DELL personal computer.
3. All voltages in the Micro ShockLog™ Recorder are less that 50V ac and 75V dc.



A. Kay , Quality Manager

Stevenage, November 2000.

Calibration Declaration

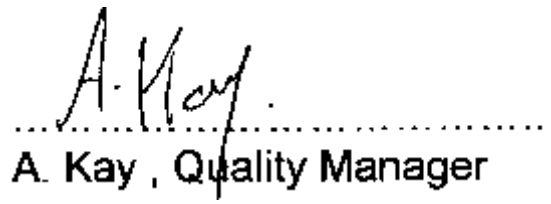
RD298 ShockLog™ recorder recorded, RD317 Micro ShockLog™ recorder and RD298HPT sensor certificate of calibration

At the time of manufacture, this certifies that the above product(s) was (were) calibrated in accordance with applicable Works Instructions and Procedures.

At scheduled intervals, in line with Industry best practice, a NAMAS accredited test house calibrates the test equipment used to National Standards.

At the time of shipment, your instrument met its published operating specifications.

Signed



A. Kay , Quality Manager

Ref QC288

Spare Parts List

RD298 ShockLog™ recorder spares

PART NO.	DESCRIPTION
29821	Battery Cover Seal
29832	Carrying Case
29833	CD ROM
29834	Manual
29835	Communication Cable
29845	Battery Cover Assembly
60070	Battery Cover Screw (pack of 4)
60072	Mounting Screw (pack of 4)
62244	Anti-Vibration Fastener (pack of 4)
71107	Connector Cap (pack of 2)
88702	Battery 1.5V Alkaline
88704	Battery 3.7V Lithium

RD317 Micro ShockLog™ recorder spares

PART NO.	DESCRIPTION
31719	Fixing Kit
29833	CD ROM
29834	Manual
31716	Battery Access Plug
31717	Comms Access Plug
31723	Carrying Case
31750	Communication Cable
31759	User ID iButton
31761	Start iButton
31762	Stop iButton
31763	Download iButton
31764	Setup iButton
31790	Support Kit
62226	Battery Access Plug O Ring
62227	Comms Access Plug O Ring
65000	iButton Bus, Parallel blue-dot Connector
65001	iButton Bus Parallel
65004	iButton Bus, Serial
88705	Battery 1.5V Alkaline
88706	Battery 3.7V Lithium

Index

A

Air Cargo Applications 121
Always Max 20
Attach 43
Auto Detect 140

B

Battery 7, 13, 14, 15, 20
Blue-dot connector 124, 125

C

Calibration date 70
Calibration declaration 159
Connecting 115
  HPT 115
  iButton to your PC 124
  PC to the ShockLog recorder 15

D

DATA MEMORY CORRUPTED 45
Data Sheets 145, 149, 151
Date/Time editor 39, 40, 41
Dates
  changing format 75
Download iButton 122, 135, 139
Download Report 51
Download Tab 47

E

E-mail options 34
EMC Declarations 156, 157
Event Data 21, 98
Event Graph 96, 97, 99, 112
Event Graph Options 99
Event recording 21
Event Summary graph 100
Events 21, 25, 45, 91, 92, 93, 96, 98, 99, 100, 111, 112
Events Tab 91, 111
Examine Data Tab 60

Examining Data from....19
ShockLog recorder....19
Examining Data from the ShockLog recorder....19
Export File Information Header....106
Export Status....108
Export Window....107
Exporting....109
Multiple Files....109
Exporting Data Overview....105
Exporting from....110, 111, 112, 113, 114
Event Graphs....112
Events Tab....111
Multiple Files....109
Slot Graph....114
Summaries Tab....110
Time Slots Tab....113

F

Filenames....42
Floppy Disk Installation....11, 12

G

Getting Started....11, 19
Graphs....95, 96, 100, 101, 102, 103, 114

H

Health Check....57, 59
Health Check window....57
HPT....115, 149, 150, 157
Connecting....115
HPT Sensor....115, 149, 157
Humidity alarms....23, 44, 71, 87
Hyper-Linking....95

I

iButton... 11, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144
Download Data....139
Introduction....122
Programming....135
ROM ID....122, 133
Setting up the PC....124
Trouble-shooting....143
User ID....122, 123, 135
Using....132
Using with the Micro ShockLog recorder....132
iButton Exercise....128
iButton passwords window....138
iButton security....130

iButton Trouble-shooting....143
iButton Window Bus tab....140
iButton Window Download tab....139
iButton Window Passwords tab....137
iButton Window Program tab....135
iButton window Read tab....133
iButton Window status....142
Installation
  Hardware....119
  Software....11, 12
Introduction....7, 115, 122
  iButtons....122
  ShockLog recorder....7
Introduction to iButtons....122
Introduction to the HPT sensor....115

L

LED operations....28
Licence Agreement....4

M

Main window....29
Max Record Time....21, 67, 73
Micro Operation
  Principles....23
Micro ShockLog recorder....23, 24, 67
Micro ShockLog recorder Operation....23
MicroLAN....143, 144
Monitor Tab....46
Multiple Files....109
  Exporting....109

N

New Features....9

O

Online Viewer....55
Operating the ShockLog recorder with an HPT....117
Options Tab....75
Other alarms....23, 46, 71, 87
Over-range alarm....23, 27

P

Parameter Style Options....79
Parameter Units....83

Password Editor 32, 33
Passwords 31, 32, 33, 122, 130, 132
PC 15, 16, 124, 125
Principles 20, 23
  Micro ShockLog Recorder Operation 23
  ShockLog Recorder Operation 20
Principles of Micro ShockLog recorder Operation 23
Principles of Operation 20
Printer Options Window 85

R

Range 21, 24, 63, 65, 67
RD298 ShockLog recorder 7, 20, 145, 156
RD298 ShockLog recorder Data sheet 145
RD298 ShockLog Recorder Operation 20
RD298 ShockLog recorder ShockLog Events 20
RD317 Micro ShockLog recorder 7, 151
Record Length 21, 22, 63, 67
Running 17
  ShockLog recorder 17
Running the ShockLog recorder 17

S

Security Log 36, 37, 38
Select Directory Window 78
Serial Port 15, 16
Set Other Alarms 71
Setting up 16, 116, 118, 124
  ShockLog recorder 16
Setting up the ShockLog recorder 16
Setting up your ShockLog recorder 116, 118
Setting up your ShockLog recorder to use the HPT 116
Setup Checklist 69
Setup iButton 122, 130, 133, 135
Setup Tab 62, 63, 64, 65, 67
Setup tab (Micro ShockLog recorder) 67
Setup Wizard 16, 73
ShockLog recorder 7, 15, 16, 17, 19, 23, 24, 67, 118, 119, 132, 145, 156
  Examining Data from 19
  Introduction 7
  Running 17
  Setting up 16
ShockLog Recorder Details 19
ShockLog Recorder Hardware Installation 119

ShockLog Recorder Operation 20
Principles 20
ShockLog Recorder Time 44
ShockLog software versions 8, 44
Slot Breaks 101, 104
Slot Graph 101, 103
Software Installation 11
Software Versions 8
Start iButton 122, 135
Stop iButton 122, 135
Summaries 26, 87, 89, 90, 110
Summaries Tab 87, 110

T

Temperature alarms 23, 44, 71, 87
Temporary summaries 87, 89
Time Slot Graph 101
Time Slots 20, 26, 94, 102, 113
Time Slots Tab 94, 113
Trademarks 3

U

Units
changing 75, 83
User ID iButton 122, 135
Using 132
iButtons 132

W

Waiting 45
Wake Up 20, 21, 65, 67
Warnings and Alarm Lamps 27
Warranty 6

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP