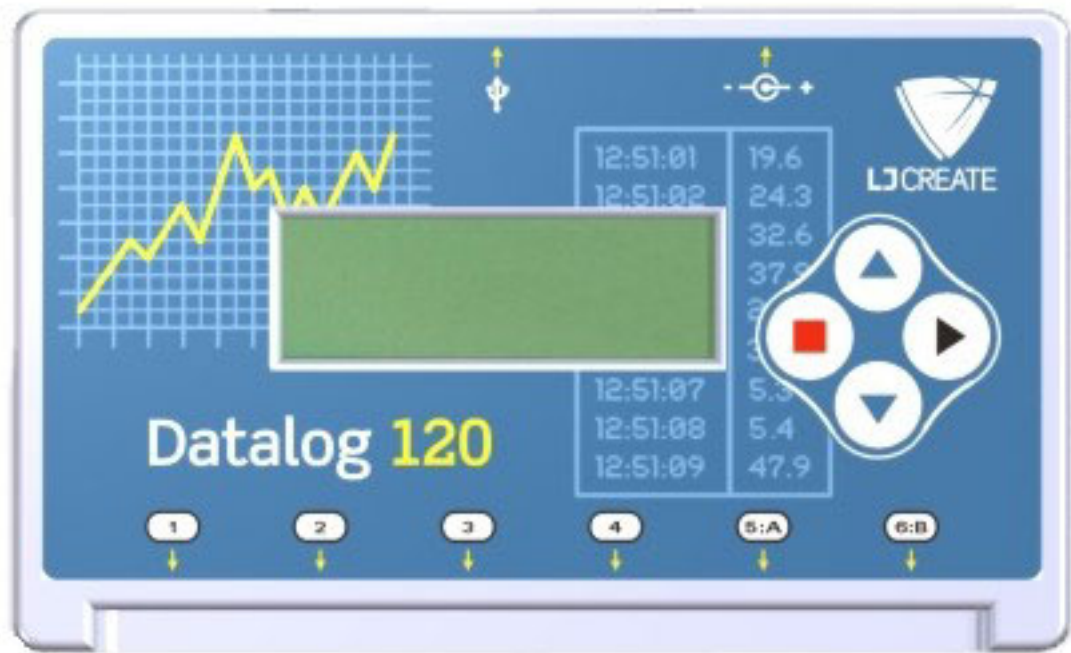


Datalog 120 User Manual



CONTENTS

What's in the storage bag?	- 3 -
The Datalog 120 data logger	- 4 -
Datalog 120 buttons	- 4 -
<i>Smart Q</i> Sensors	- 5 -
Ways to capture data with Datalog 120	- 6 -
Using Datalog 120 connected to a computer for the first time	- 6 -
Using Datalog 120 with the computer after initial setup	- 8 -
The Datalog software overview	- 8 -
Using Datalog 120 without a computer	- 10 -
Meter	- 10 -
Set sensor range	- 11 -
Snapshot	- 12 -
Easy Log	- 14 -
Logging	- 16 -
Time & Motion	- 20 -
Downloading stored data sets into the Datalog software	- 22 -
System menu	- 23 -
Switch off	- 25 -
Technical information	- 25 -
Selecting the sensor range	- 25 -
Hard Reset	- 26 -
Powering Datalog 120	- 26 -
Specifications	- 28 -
Care & Maintenance	- 28 -
Updating Datalog 120's Firmware	- 29 -
Appendix 1: EasyLog Logging	- 30 -
Appendix 2: Duration and Interval Table for Logging	- 31 -
Appendix 3: Logging menu	- 35 -
Appendix 4: Timer Interrupters and Parameters	- 36 -
Appendix 5: Timing options	- 37 -
Appendix 6: System Menu	- 43 -
Trouble shooting	- 44 -
Warranty	- 46 -

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DO160 LJ/C

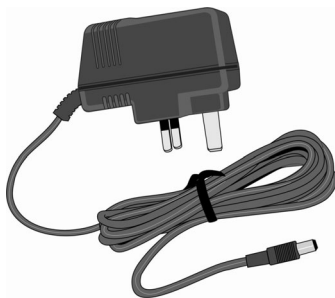
What's in the storage bag?



The Datalog 120 data logger



The Datalog software with Quick Start Guide



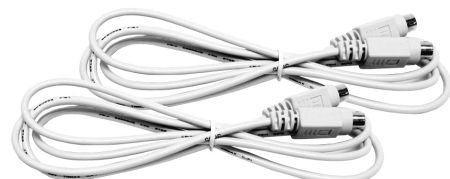
A power supply unit
(UK version shown)



Two short *Smart Q* sensor leads



A USB communication cable



Two long *Smart Q* sensor leads

Notes:

- If Datalog 120 is to be connected via a USB port, it is only suitable for use on a computer with an operating system that supports USB e.g. 98SE, 2000, Me, XP and Vista. It will not be supported by Windows 95, 98 or Windows NT (workstation and server).
- The battery pack in Datalog 120 is fully charged before it leaves LJ Create. Even when turned off, Datalog 120 will use a small amount of current, and the battery will slowly discharge. If the unit is to be stored for long periods without use then it is a good idea to recharge the batteries fully every 6 – 8 weeks. See page 25.

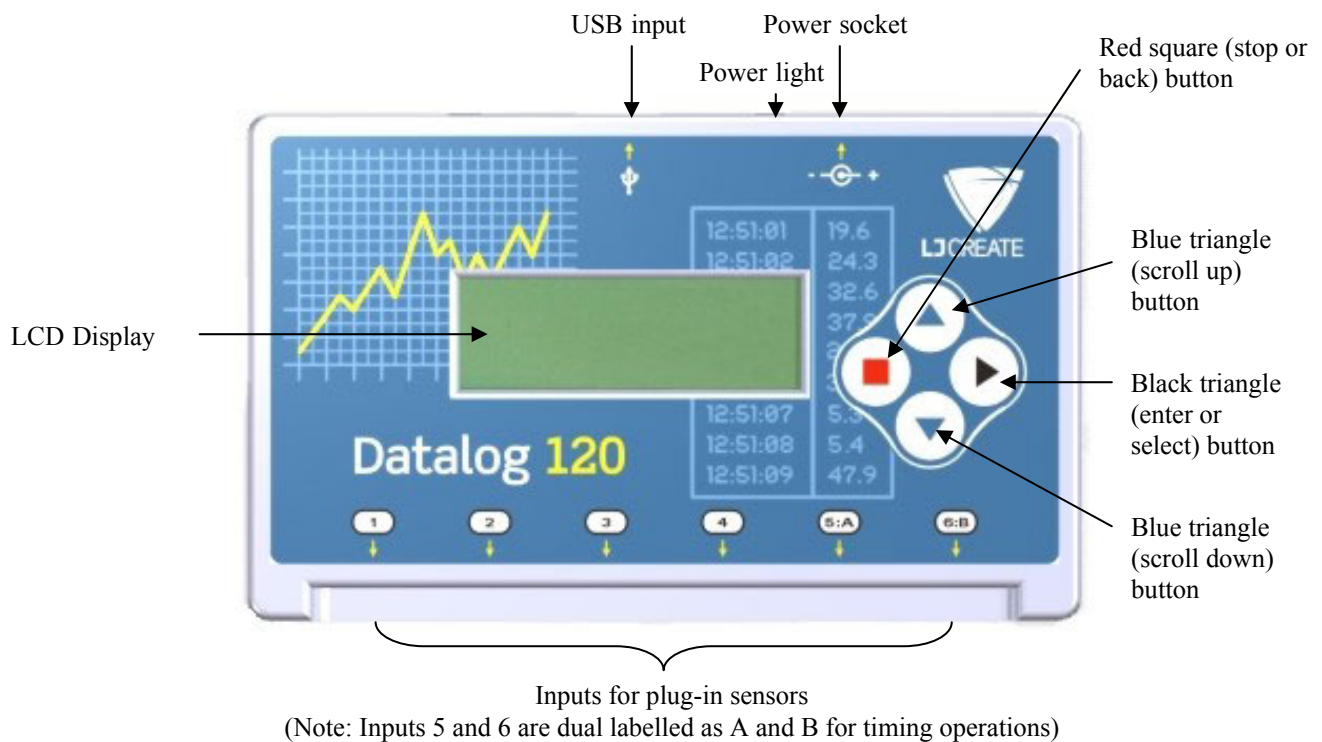
The Datalog 120 data logger

Datalog 120 is a fully self-contained portable data logger, which can be used:

1. As an interface connected to a computer
2. As a stand alone instrument

In its stand alone mode Datalog 120 can:

- Display meter readings of the sensor attached
- Record the data from sensors in its memory for transferring later to a computer for analysis.



Datalog 120 buttons

- ▶ The black (ENTER) button is used to start data collection, to confirm a choice or take a sample.
- The red (STOP) button is used to stop data being recorded or return to the previous screen.
- ▲ The blue buttons (SCROLL) are used to scroll through menus on the LCD screen or to browse measurements during data logging.

To wake up Datalog 120, press any of the buttons on the top panel.

Smart Q Sensors

Smart Q Sensors are each equipped with a sophisticated microprocessor that greatly improves the sensor's accuracy, precision and consistency. The auto-identification circuitry dramatically simplifies set up procedures and allows for greater flexibility when logging data.

The six inputs on Datalog 120 may be used with analogue and digital sensors. Both will be recorded side by side during logging operations e.g. whilst recording with traditional analogue sensors, a digital sensor can be used to create a 'blip' on the graph to mark an event. Once a *Smart Q* Sensor is connected it will automatically be detected and displayed on the LCD display.

To maintain consistency with existing software, sensor inputs 5 and 6 are dual labelled as A and B. These inputs are used with digital sensors which must be connected to either Input 5:A or Input 5:A and 6:B during Timing operations.



Four sensor leads have been provided to connect *Smart Q* Sensors to Datalog 120.

1. Hold the *Smart Q* sensor housing with label on top.
2. Push one end of the sensor cable into the socket on the sensor housing with the flat of the connecting plug facing upwards.
3. Connect the other end of the cable to the shaped input socket on the Datalog 120.



Input socket

Sensor cable with
locating arrows
facing upwards

Sensor housing



Smart Q Sensors are available to purchase separately and are **not** supplied with Datalog 120.

Sensors can be divided into two main types:

1. Analogue – which are used to measure physical quantities such as temperature, sound, light, pH, etc.
2. Digital - which are switch-type sensors for measuring ON/OFF conditions such as light gates and timing mats used for calculating time, speed and acceleration.



Please contact your supplier for an up-to-date list of *Smart Q* Sensors.

Ways to capture data with Datalog 120

There are different ways that Datalog 120 can be used to collect data.

1. **PC connected.** In this mode Datalog 120 is entirely driven by the software on the host computer. The data from the sensors is transmitted immediately to the computer and displayed on the computers screen using the applications in the Datalog software. This method of collection is useful for many classroom-based experiments.
2. **Stand alone.** In this mode Datalog 120 is used to collect and store data while disconnected from the computer. Data collection can either be:
 - a) Setup using Datalog 120 menu options (e.g. Easy Log, Snapshot, Logging or Time & Motion – see stand-alone operation on page 9).
 - or
 - b) Setup via Setup Remote in the Datalog software to log data for a set time period. The data collected in remote mode is stored in the memory of Datalog 120 to be retrieved later by the computer.

Using Datalog 120 connected to a computer for the first time

Step 1:

Do **NOT** connect Datalog 120 to the USB port before the Datalog software is installed.

Install the Datalog software, if it is not already on your computer. For details of how to install and operate this program, please refer to the instructions provided with the Datalog software.

Step 2:

a) If Datalog 120 is to be connected via the **USB port**, the USB drivers will need to be installed.

Windows XP and Vista users: You need to be logged on as administrator (or with equivalent access rights) to install the Datalog 120 USB drivers.

- Connect the ‘square’ USB plug of the USB cable to the USB input on the side of Datalog 120.
- Connect the ‘flat’ USB plug to a USB port on your computer.
- Windows will automatically detect that a new device has been connected and a Wizard will be generated to aid installation.

Windows XP Users: Select to install the software automatically. You may be warned that the drivers have not passed Windows Logo signing, please ‘continue anyway’ at this point.

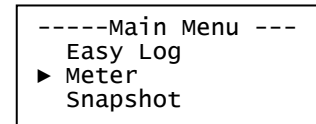
Window Vista users: Select to ‘Locate and install driver software’ then ‘I don’t have the disc, show me other options’, select to ‘browse my computer for the driver software’ and browse to the Dhg Drivers folder [default location is Computer ► System (C:) ► Program Files ► \DHG ► Drivers ► USB Drivers] and click on OK. You may be warned that Windows can’t verify the publisher of this driver, please ‘install anyway’ at this point.

- Connect the Datalog 120 unit to each USB port on the computer that maybe used so that the drivers can be installed.

Step 3:

- Check that the LCD screen on Datalog 120 is displaying the 'Main Menu'.

Note: In most circumstances Datalog 120 will **not** communicate with the PC if it is taking samples. If the LCD screen shows samples being taken press the red square button to stop and then the black triangle ► to confirm.



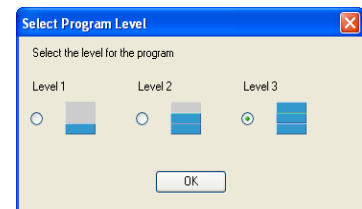
- Open the Datalog software program.



Step 4:

The first time the Datalog program is opened a 'Select Program Level' window will automatically open. Select a suitable user's level.

- Level 1 is aimed at 'start' level (e.g. up to 9 years old).
- Level 2 is aimed at 'mid' level (e.g. 9 – 15 years old)
- Level 3 is aimed at 'exam' level (e.g. 15 years plus).



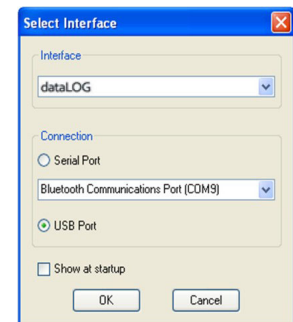
Note: The program level can be altered at anytime using the Level icon once a logging option has been opened.



Step 5:

An Interface option window will open.

1. Select the Interface as Datalog.
2. Select the method of connection
 - If you are connecting via the **USB** port select 'USB port'.



Note: If you use different interfaces or methods of connection, tick the 'Show at startup' option so you can check your current selection and make adjustments as necessary when Datalog opens.

3. Click on OK. The program will save your selection so it will be automatically configured when next used.

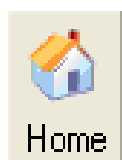
When a connection is established the Home window will open. Select one of the New experiment modes i.e. EasyLog, Graph, Meters, Scope, Snapshot or Timing.

Note: If you are unable to connect see troubleshooting on page 48.

Using Datalog 120 with the computer after initial setup

- **USB users:** Use the USB cable to connect Datalog 120 to the computer.
- Open the Datalog software program.
- Select one of the recording modes e.g. EasyLog from the Home window.

The Datalog software overview




Home is the main navigation window. On this window are the icons for all of Datalog 120 logging options.

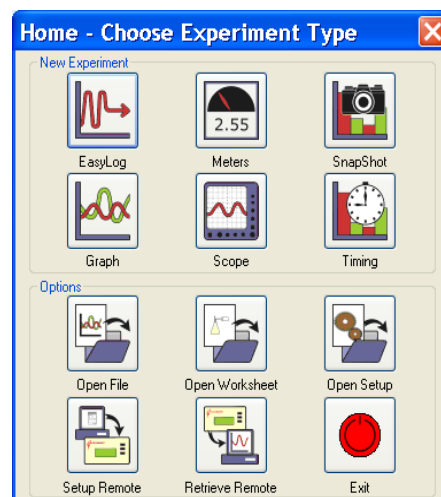


EasyLog

EasyLog will open pre-set to record sensor values **continuously** as a line graph until stopped.

Click on the **Start/Stop** icon  to start recording.

Logging will start with a time span of 30 seconds and when this has elapsed the time will double automatically. This will continue until the recording is stopped by clicking on the **Start/Stop** icon. 



The Home window
(Level 2 & 3)



Meters

The Meters window gives an introduction to sensors and how they respond to change. Up to four section displays can be open at any one time and they can be any combination of sensors and displays.



The program will open with live data from one sensor in a Numeric window. Click on the appropriate picture icon on the Menu bar to open other section displays i.e. Numeric, Gauge, Colour Change or Bar. To alter the sensor displayed in a section, right click in the individual section window and select the sensor from the list.

Click on the **Start/Stop** icon  to stop recording.



Snapshot


Snapshot will open pre-set to record sensor values on demand (**manual sampling**) with a bar graph display.

Click on the **Start/Stop** icon  to start recording. Click in the graph area to record the current value for each active sensor. Click on the **Start/Stop** icon  to stop data being recorded.



Graph

Graph is pre-set to record sensor values against a **chosen time span** as a line graph display. The window opens with the real time logging wizard from which the time span, interval between samples, start condition and triggers for the recording can be chosen. (The options available will depend on the level you have selected to work at). When the selection has been made, click on Finish.

Click on the **Start/Stop**  icon and the recording will start when the start condition you have selected is met e.g. if None was the selected trigger then the recording will start as soon as the Start/Stop icon is clicked. The recording will stop when the selected time span has passed.

Note: If you want to stop a recording before it has run the full term, click on the Start/Stop icon.



Scope


(Level 2 and 3 only)

Click on the **Start/Stop**  icon. The data from the sensor is redrawn continuously on the screen in an oscilloscope type display.



Timing

Timing is used to allow students to study Time, Velocity, Acceleration, Momentum and Kinetic Energy relationships using switch-type (digital) sensors such as light gates. A recording wizard will open with these options available to select before recording data. Sensors are connected to inputs 5:A or 5:A & 6:B. (The options available will depend on the level you have selected to work at). When the selection has been made, click on Finish.

Click on the **Start/Stop**  icon and a reading will be displayed when a change is detected in signal from the digital sensors.



Open File

Used to load a previously saved .sid or .ssl file. Locate the correct file and click on open.



Open Worksheet

To select and open a worksheet and its accompanying experimental set up file.



Open Setup

(Level 2 and 3 only)

To select and open an experimental set up file. This will pre-set the software for a specific operation.



Set up Remote

(Level 2 and 3 only)

Used to set up the available options for capturing data while disconnected from the computer (remote). These options can include the duration of a recording, the time between each sample, and the trigger event.






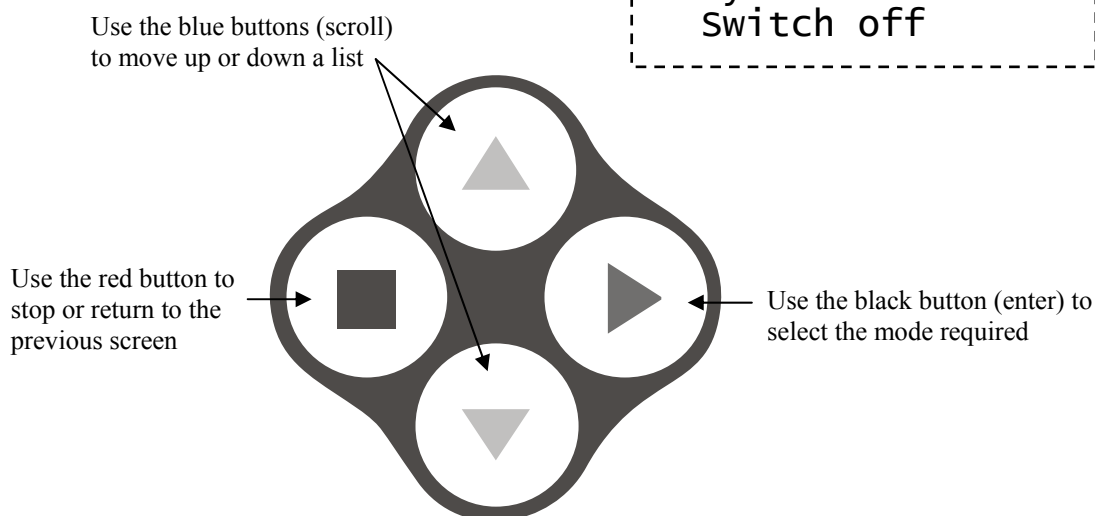
Retrieve Remote

Use this option to retrieve a data set stored in your Datalog 120 unit's memory for display and analysis.

Using Datalog 120 without a computer

Datalog 120 has a menu of different options available, which are displayed on the built-in LCD screen.

A menu option is selected by using the blue buttons to move the list up  or down  until the pointer is pointing at the required option (the pointer stays in the same position). Press the black  button to select.



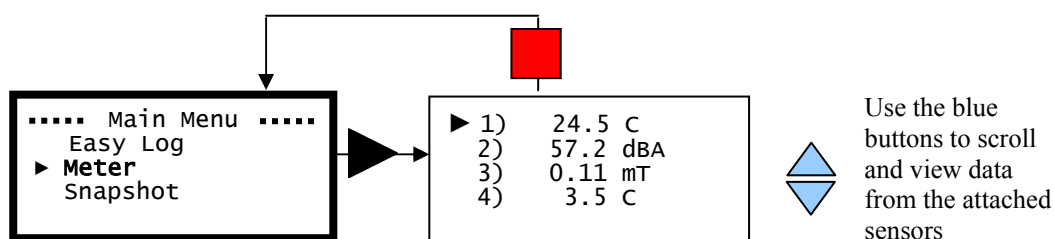
Datalog 120 has no ON switch. To 'switch' Datalog 120 **on** press any button on the top panel.

If Datalog 120 is operating on battery power and is not being used, it will automatically switch itself **off**. Press any button to resume operation.





Datalog 120 will not auto switch off when accepting power from either the USB port or a mains power supply.

Meter

In this mode Datalog 120 will display measurements from the active sensors on the LCD screen but will not store any data. The display is updated every half second. The range of a *Smart Q* sensor can be altered whilst in Meter mode.



- Connect the sensors. If the display is turned off, press any button to wake up Datalog 120.

- Use the blue  buttons to scroll the list until the pointer is pointing at Meter.
- Press the black  button to select Meter.
The blue  buttons can be used to scroll and view data from the active sensors
- Press the red  button to exit Meter mode and return to the main menu.



```

----- Main Menu -----
Easy Log
▶ Meter
Snapshot

```

Set sensor range

Some *Smart Q* sensors have multiple ranges e.g. sound can be in decibels (dBA) or milli volts (mV). The range of a sensor can be altered whilst in Meter mode.



- Whilst in Meter use the blue  buttons to scroll through the list until the pointer is pointing at the appropriate sensor.
- Press the black  button to view the ranges available.

```

▶ 2) 57.2 dBA
3) 0.11 mV
4) 30.5 C

```

Note: If there isn't a choice of range available for the selected sensor then pressing enter will have no effect.

- An asterisk * will indicate the present range selected. Use the blue  buttons to scroll the list until the pointer is pointing at the required range.
- Press the black  button to select the range and return to Meter.

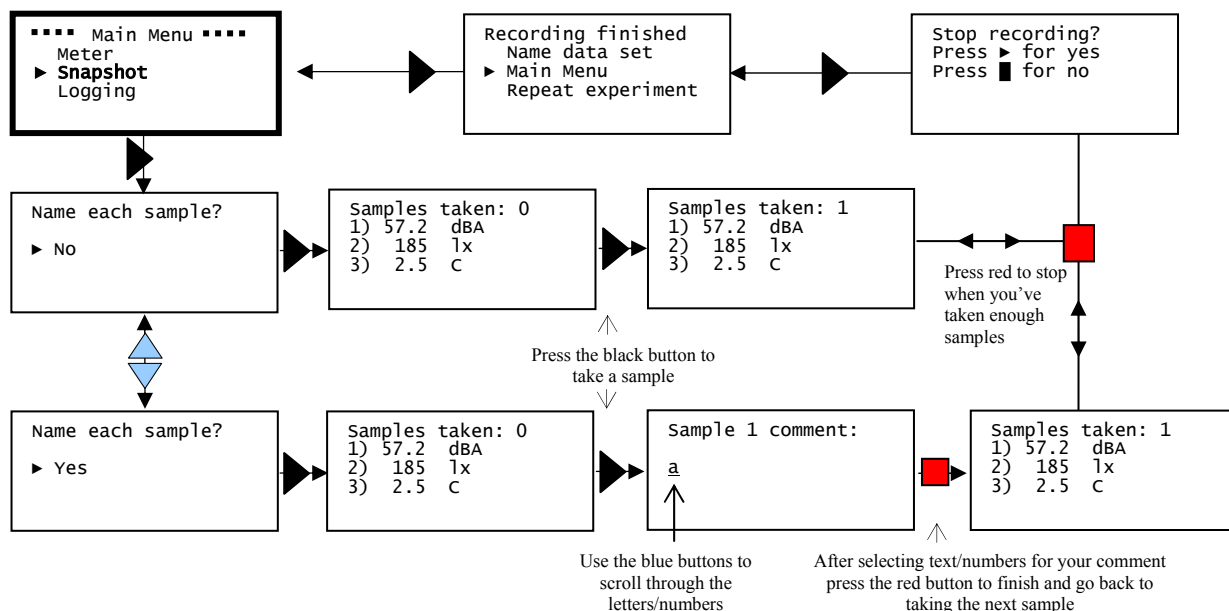
```

Set Sound:
Sound (dBA)
▶ *Sound (mV)

```

Snapshot

Snapshot mode enables you to capture sensor readings every time the black ► button is pressed, rather than at a regular time intervals. The readings are stored as a data set in Datalog 120's memory.



- Connect the sensors. If the display is turned off, press any button to wake up Datalog 120.
- Use the blue ◀▶ buttons to scroll through the menu until the pointer is pointing at Snapshot.
- Press the black ► button to select Snapshot.
- Each data sample can be given a name/number e.g. the location at which the sample was taken. Use the blue ◀▶ buttons to select from either yes or no for this option.
- From now on each time you press the black ► button on Datalog 120; a reading will be taken from all sensors connected. Datalog 120 will display the number of samples taken so far and the current value from the sensors.

```

----- Main Menu -----
Meter
► Snapshot
Logging
    
```

```

Samples taken: 2
1) 25.6 C
2) 54.8 dBA
3) 178 lx
    
```

The blue ◀▶ buttons can be used to scroll and view data from the list of sensors.

If yes to 'name each sample' was selected a window will open for adding a comment to the sample. Use the blue ◀▶ buttons to scroll through the letters and numbers. Press the black ► button to select as appropriate.

```

Sample 1 comment:
a
    
```

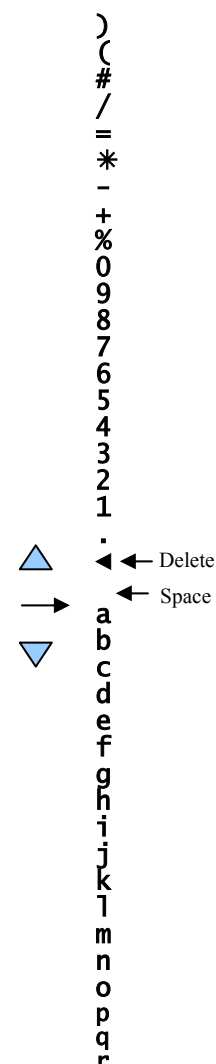
The list starts each time at the same point; use the up button to go through the numbers, and the down button to go through the alphabet. Select the ◀ symbol (two presses up from 'a') to delete a mistake.

Press the red ■ button when you have finished entering your comment. This will take you back to the 'samples taken' window ready to take the next sample.

Note: If Datalog 120 goes into 'sleep' mode, press any button to wake up the unit and then press ▶ to take a reading.

- When you have finished sampling press the red ■ button to close the data set, then black ▶ to confirm your choice and enter the Recording finished menu.

Recording finished
 Name data set
 ▶ Main Menu
 Repeat experiment



- Press the black ▶ button to return to the **Main Menu**, or scroll to Repeat the experiment, Name the data set or Delete data set?


Repeat experiment will take you direct to the Samples taken window (the choice of whether to name or not name each sample will still apply).

Samples taken: 0
 1) 25.6 C
 2) 54.8 dBA
 3) 178 lx

Name data set will open a window in which text or numbers can be selected for the name of the data set. Use the blue ◀▶ buttons to scroll through the letters and numbers. Press the green button to select as appropriate. Press the red button to finish and go to the recording finished menu.

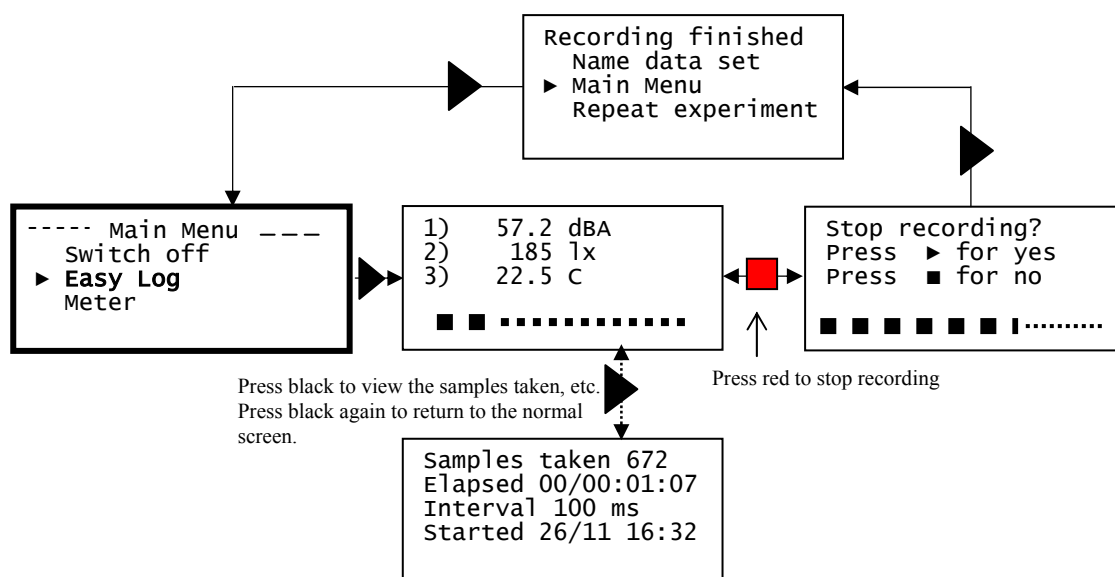
Name data set:
 a

Delete data set? Use to delete the set of data just created. Press the black ▶ button to confirm your choice and then the red ■ button to return to the main menu.


- The readings taken will be stored as a data set. Over 1000 samples can be stored in one data set. The data set can be downloaded to the computer for display and analysis using Retrieve remote  from the Home window in the Datalog program.


Easy Log

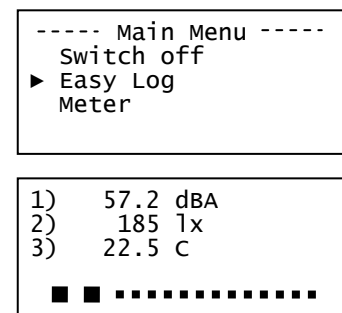
In Easy Log it is not necessary to set the duration of the recording – Datalog 120 will capture data until stopped (up to a maximum of 41 days). The data set will then be stored in Datalog 120's memory.




- Connect the sensors. If the display is turned off, press any button to wake up Datalog 120.



- Use the blue  buttons to scroll through the menu until the pointer is pointing at EasyLog.


- Press the black  button to select EasyLog and automatically begin recording. The bottom line of the LCD screen is a visual indicator of the logging as it takes place.




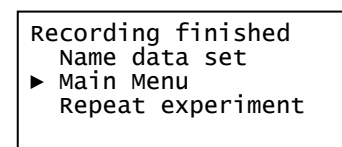
The blue  buttons can be used to scroll and view the values from the sensors on the LCD screen whilst still logging.

Note: If Datalog 120 goes into 'sleep' mode, press any button to wake up the unit.




- When the experiment is complete press the red  button. Datalog 120 will continue to log data until you press the black  button to confirm your choice and go to the Recording finished menu.

Note: If the Stop button was not pressed intentionally, press the red  button to continue logging.



- Press the black  button to return to the **Main Menu**, or scroll to Repeat the experiment, Name the data set or Delete data set?



Repeat experiment will take you back to EasyLog in the Main Menu.

Name data set will open a window in which text or numbers can be selected for the name of the data set. Use the blue  buttons to scroll through the letters and numbers. Press the black  button to select as appropriate. Press the red  button to finish and go to the recording finished menu.

Name data set:
<u>a</u>


Delete data set? Use to delete the set of data just created. Press the black  button to confirm your choice and then the red  button to return to the main menu.

- The data recorded will be stored as a data set. The data set can be downloaded to the computer for display and analysis using Retrieve remote from the Home window in the Datalog software.



Datalog 120 records data at a rate of 40 samples per second until it has captured 1000 samples. At this point, the sample rate halves (i.e. 20 samples per second) and alternate samples are discarded (leaving 500 samples). It will continue at this speed until it has captured another 500 samples (1000 total), then the sample rate halves again (i.e. 10 samples per second) and it discards half the stored data, and so on. See page 29 for full details.

While battery powered Datalog 120 will stay awake until the interval between readings reaches 5 seconds or greater – at this point it will begin to sleep between samples to conserve battery power. When Datalog 120 is asleep, sensor readings can be viewed by pressing any button to ‘wake’ it up.

Press the black button while still logging to see a logging summary i.e. samples taken, elapsed time, current logging interval and the time started. Press  again to return to the normal screen.

Samples taken	269
Elapsed	00/00:32:45
Interval:	5 secs
Started	27/11 16:31

When the sample interval is greater than or equal to one second (i.e. after logging for more than 8 minutes and 20 seconds), it is possible to download data from Datalog 120 to a computer (without interrupting the recording) using Retrieve remote from the Home window in the Datalog software.

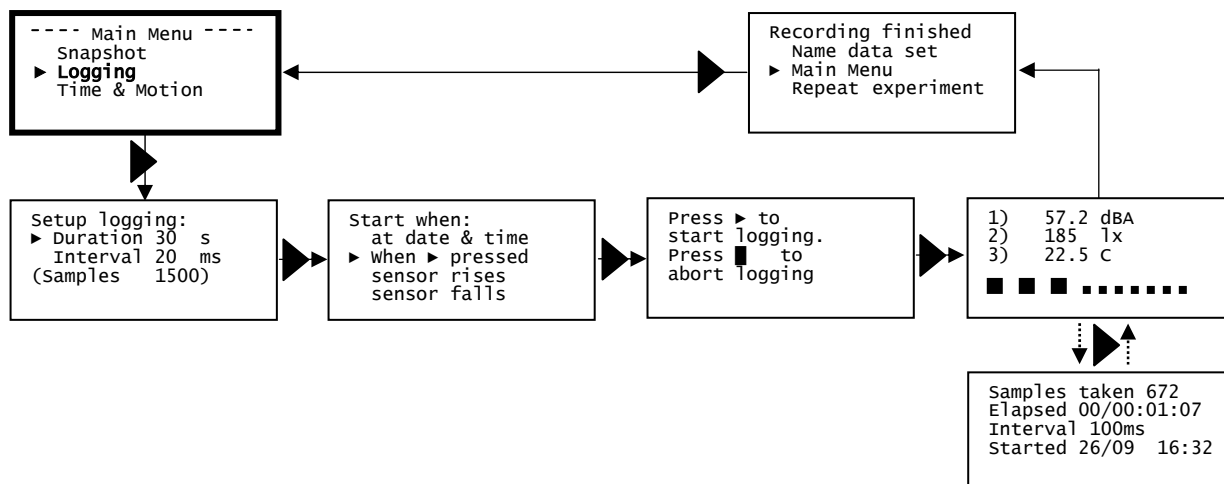
The maximum duration of any one Easy Log recording is 41 days (1000 hours - 1000 readings at a 1 hour interval).

Note: If you would prefer to record for a specified time span then set up Q Advanced using Logging (see page 15) or the Setup remote option in the Datalog program.



Logging

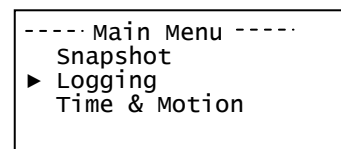
In Logging mode, the total recording time, interval between readings and trigger condition can be set. The data set collected will be stored in Datalog 120's memory.



Example of logging using enter as the trigger - see page 29 for the full menu.

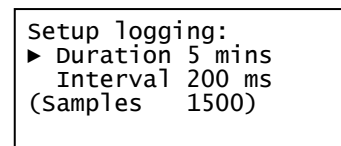




- Connect the sensors. If the display is turned off, press any button to wake up Datalog 120.

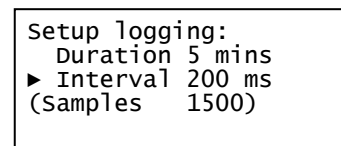
- Use the blue  buttons to scroll through the menu until the pointer is pointing at Logging. Press the black  button to select.




- Line 2 - Scroll  through the choices to find a suitable duration of recording from those available [a full list of the choices is on page 34). Press the black  button to select.

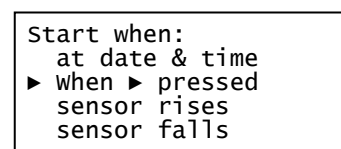


- Line 3 - Scroll  through the choices to find a suitable interval between each sample. Press the black  button to select.



The number of samples will automatically alter as the time duration and interval between samples are selected.

- Select the start condition required from the following choices:
 1. **'When ► pressed'** – logging will be started by pressing the black  button.
 2. **'at date & time'** – the recording will start at the time and date specified.
 3. **'sensor rises'** - logging will not start until the value from a sensor rises above a set level.
 4. **'sensor falls'** - logging will not start until the value from a sensor falls below a set level.



When ► pressed

Use the blue ◀▶ buttons to scroll through the menu until the pointer is pointing at 'When ► pressed'. Press the black ► button to select.

Press the black ► button on the Datalog 120 unit and logging will start.

Press ► to
start logging.
Press ■ to
abort logging.

At date & time

Note: When you select this option the LCD screen will show time, date, and the date format currently set. If these are not correct change the settings in the System menu (see page 23).

Use the blue ◀▶ buttons to scroll through the menu until the pointer is pointing at 'at date & time'. Press the black ► button to select.

Set the time and date that you want the recording to start:

- Use the blue ◀▶ buttons to select the correct hour (using the 24 hour clock), press ► to select, repeat for minutes and then seconds.

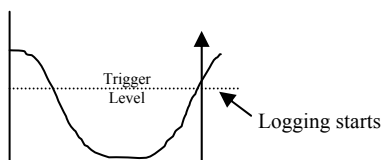
Start when:
► Time 10:05:30
Date 21/10/05
DD/MM/YY

- Use the blue ◀▶ buttons to select the correct day, press ► to select, repeat for month and then year.

- Press the black ► button to select the time and date set. Logging will not start until the date and time selected have been reached.

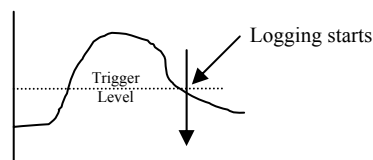
waiting for
Time trigger
Press ■ to
Abort logging

Sensor rises above or falls below



Sensor rises above

Logging will not start until the value rises to above the set level.



Sensor falls below

Logging will not start until the value falls to below the set level.

- Use the blue ◀▶ buttons to scroll through the menu until the pointer is pointing at 'sensor rises' or 'sensor falls' as appropriate. Press the black ► button to select.

Start when:
when ► pressed
► sensor rises
sensor falls

- Scroll ◀▶ through the connected sensors until the pointer is pointing at the sensor that will be used as a trigger. Press the black ► button to select.

Start when:
3) Temperature
► 1) Temperature
2) Temperature

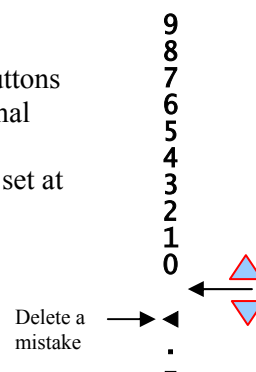
- Enter the level at which the sensor will trigger the start - use the blue buttons to scroll up or down through the numbers. Press the black ► button to select a number. When the trigger level is selected press the red ■ button.

1) Temperature °C
sensor rises
—

Notes:

- The list starts each time at the same point (a space); use the blue buttons to scroll up through the numbers and down to the delete (◀), decimal place and minus sign.
- The trigger level for a digital sensor e.g. light gate is automatically set at 50%.
- Press the black ► button to confirm your choice.

Logging will not start until the value rises above or falls below the set level as appropriate.



Pre-trigger

If 'sensor rises' or 'sensor falls' has been selected as the trigger event and the selected logging duration/interval is fast enough, an option to set a pre-trigger will be available [None, 25%, 50%, 75%, and 100%].

```
Pretrigger:
100%
► None
25%
```

Pre-trigger will cause a percentage of samples to be taken before the trigger condition is met and the remainder to be taken afterwards e.g. if 1,000 readings are to be taken and a 25% pre-trigger is selected, 249 readings will be taken before the trigger condition is met.

Scroll ◀ through the choices and press the black ► button to select. If pre-trigger readings are not required leave the selection as None.

- Recording will start as soon as the trigger condition is reached. The bottom line of the LCD screen is a visual indicator as logging progresses (each square takes a 20th of the selected duration to fill in).
- When the recording is complete the LCD will show the 'recording finished' menu and the data recorded will be stored as a data set. Either press the black ► button to return to the **Main Menu**, or scroll to Repeat the experiment, Name the data set or Delete data set?


```
Recording finished
Name data set
► Main Menu
Repeat experiment
```


Repeat experiment will enable you to repeat the experiment with the same settings. If a date & time trigger was selected, you will return to the 'start when' window so you can set a new time.

Name data set will open a window in which text or numbers can be selected for the name of the data set. Use the blue ◀ buttons to scroll through the letters and numbers. Press the black ► button to select as appropriate. The list starts each time at the same point; use the up button to go through the numbers, and the down button to go through the alphabet. Press the red ■ button to finish and go to the recording finished menu.



```
Name data set:
a
```

Delete data set? Use to delete the set of data just created. Press the black ► button to confirm your choice and then the red ■ button to return to the main menu.


- The data set can be downloaded to the computer for display and analysis using Retrieve remote  from the Home window in the Datalog software.

While recording with a sampling interval of 20 ms or more, the blue  buttons can be used to scroll and view the sensor readings on the LCD screen whilst still logging.

If recording over a long duration with Datalog 120 operating on battery power, the unit will sleep between samples to conserve battery power. Press any of the buttons to 'wake up' the unit so the current value from the sensors can be viewed.

While logging press the black  button to see a logging summary i.e. samples taken, the time elapsed since the recording was started, the current logging interval and the time started (using the date and time set in the Datalog 120's clock as a reference). Press  again to return to the normal screen.

Samples Taken	269
Elapsed	00/00:32:45
Interval:	5 secs
Started	27/09 16:31

To stop logging before the duration is complete, press  and then  to confirm.

When the sample interval is greater than or equal to one second, it is possible to download data from Datalog 120 (without interrupting the recording) using the Retrieve remote option in the Datalog software.

For very fast sample rates there is a limit to the number of sensors that can be connected, this is indicated in the maximum sensors column on page 30. For slower rates the internal temperature sensor and up to six external sensors can be used.

The following *Smart Q* Sensors are not able to provide readings at intervals of less than 20 ms (50 Hz): Ohaus Scout Pro Top-pan Balance Adapter (Product No. 3060), Carbon Dioxide Gas Sensor (Product No. 3152), Drop Counter and Bubble Sensor (Product No. 3266), Geiger Muller Sensor (Product No. 3265), the beats per minute range of the Heart Rate and Pulse Waveform Sensor (Product No. 3147), Motion Sensor (Product No. 3705 or 3270) and the Polar Heart Rate Exercise Sensor (Product No. 3148).

Time & Motion

Used to setup and store time measurement from either one digital sensor connected to Input 5:A, or two connected to Input 5:A and Input 6:B.

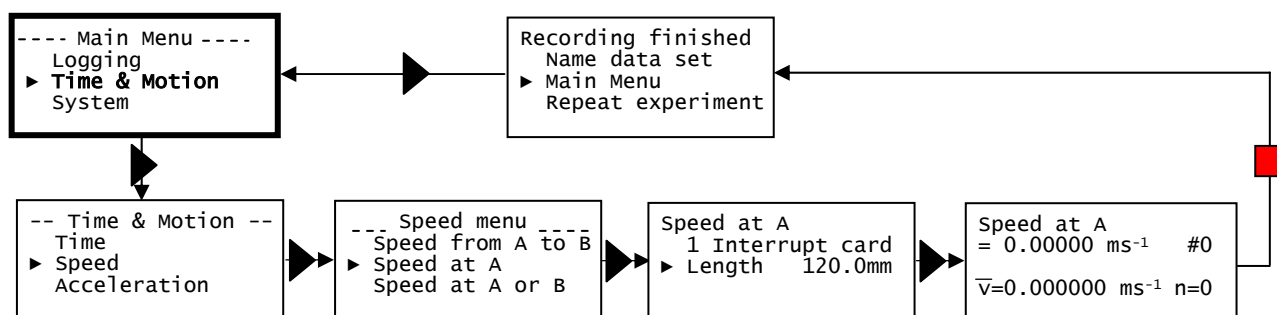
Digital switch type sensors e.g. Light Gates, have two states ON (low) or OFF (high).

Speed, Velocity and **Acceleration** are calculated by Q Advanced using time data and the dimensions of the interrupter used in an investigation.

$$\text{E.g. Speed at A} = \frac{\text{Length of single interrupt card}}{\text{Time}}$$

The choice of interrupter and its dimensions are preset in Datalog 120's memory.

Example: Speed at A - see page 35 for further details.









- Either connect a digital sensor to Input 5:A or a pair of digital sensors to Input 5: A and 6:B. If the display is turned off, press any button to wake up Datalog 120.
- Use the blue buttons to scroll the menu until the pointer is pointing at Time & Motion. Press the black button to select.
- Use the blue buttons to scroll the menu until the pointer is pointing at Time, Speed or Acceleration as appropriate. Press the black button to select.
- Use the blue buttons to scroll the sub menu until the pointer is pointing at the option required. Press the black button to select.





---Time menu -----
Stopwatch A to A
► Time at A
Time at A or B
Time from A to B
Period at A


---Speed menu ----
Speed from A to B
► Speed at A
Speed at A or B
3 Speeds at A or B

-Acceleration menu-
► Accel. at A
Accel. A to B


- If **Speed** or **Acceleration** is selected enter the choice of interrupt and its measurement. The choices will be:

Line 1 – What is being measured	Line 2 – Interrupter	Line 3 – Measurements available to select
Speed at A	1 Interrupt card 	Length of card = 30, 40, 50, 95, 100 or 120 mm
	2 Interrupt card 	Length of segment = 30, 40, 50, 95, 100 or 120 mm
	Picket fence 	Pitch (width of black + clear stripe) = 10, 20, 40, 60 or 80 mm
	10 Spoked pulley 	For use with the Spoked Pulley, which has a 47 mm diameter
Speed at A or B	1 Interrupt card 	Length of card = 30, 40, 50, 95, 100 or 120 mm
3 Speeds at A or B	1 Interrupt card 	Length of card = 30, 40, 50, 95, 100 or 120 mm
Speed from A to B	Distance A to B	Distance between A and B = 100, 200, 300, 400, 500, 600, 700, 800, 900 mm, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0 m

Accel. at A	2 Interrupt card 	Length of segment = 30, 40, 50, 95, 100 or 120 mm
	Picket fence 	Pitch (width of black + clear stripe) = 10, 20, 40, 60 or 80 mm
	10 Spoked pulley 	For use with the Spoked Pulley, which has a 47 mm diameter
Accel. A or B	1 Interrupt card 	Length of card = 30, 40, 50, 95, 100 or 120 mm

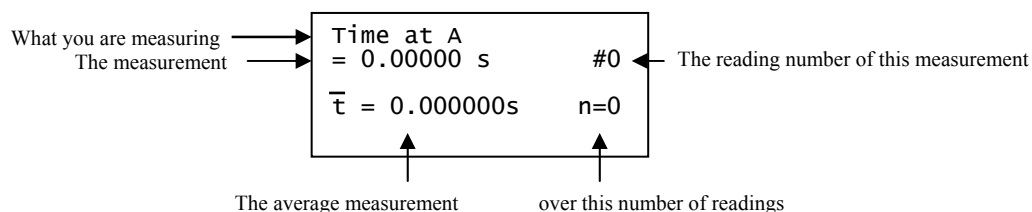
Line 2 - If you are measuring Speed or Velocity at A, scroll through the list of interrupters to find the type you are going to use. Press the black  button to select.


Speed at A
► 1 Interrupt card
Length 30.0mm

Line 3 – Scroll through the list of dimensions and select the one to be the used. Press the black  button to select.

- Datalog 120 will be ready to start taking measurements. When a signal change from the digital sensor/sensors is received, the timing measurement will be displayed in seconds (s) on the LCD screen.



Example:



The second line shows the current reading, the # number indicates the number of the reading. The blue  buttons can be used to scroll back and forward through the readings already taken, the # number will indicate the reading number of the




measurement shown. The bottom line shows the average measurement and number of readings used to calculate this average.

Note: Whilst recording in this mode, Datalog 120 will stay awake.

- Press the red  button to finish or cancel timing. The LCD will show the 'recording finished' menu and the data set will be stored.
- Either press the black  button to return to the **Main Menu**, or scroll to Repeat the experiment, Delete data set? or Name the data set.



Recording finished
 Name data set
 ► Main Menu
 Repeat experiment
 Delete data set?


Repeat experiment will take you direct back to the recording window.

Name data set will open a window in which text or numbers can be selected for the name of the data set. Use the blue  buttons to scroll through the letters and numbers. Press the black  button to select as appropriate. The list starts each time at the same point; use the up button to go through the numbers, and the down button to go through the alphabet. Press the red  button to finish and go to the recording finished menu.

Name data set:

 a

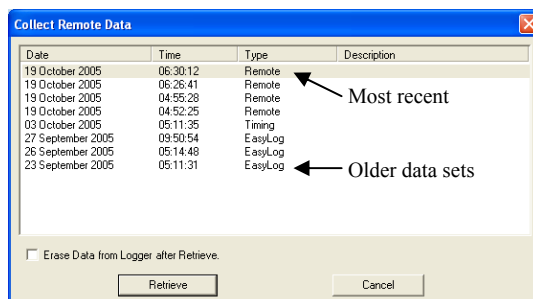
Delete data set? Use to delete the set of data just created. Press the black  button to confirm your choice and then the red  button to return to the main menu.

- The data set can be downloaded to the computer for display and analysis using Retrieve remote  from the Home window in the Datalog software.



Downloading stored data sets into the Datalog software

- Connect Datalog 120 to the computer and open the Datalog program.
- Select the Retrieve remote option from the Home page.
- Select the data set from the list and click on Retrieve.



Note: The most recent data set is first in the list



System menu

Use the blue  buttons to scroll the menu until the pointer is pointing at System. Press the black  button to select.

```
---- Main Menu ----  
Time & Motion  
► System  
Switch off
```

- Use the blue  buttons to scroll the menu until the pointer is pointing to the appropriate system menu item. Press the black  button to select.

```
---- System Menu ----  
Data sets  
► No Bluetooth  
Battery life  
Set date & time  
Internal Temp.
```

1. No Bluetooth

The System menu will show 'No Bluetooth'.

2. Battery life:

Note: If Datalog 120 has been on charge, disconnect the power supply and/or USB cable for at least 15 seconds before checking values.


```
Battery life:  
Awake:    5.7 hours  
EasyLog   91 days  
Level:    82%
```

Datalog 120 will determine the power requirements of the connected sensors and compare this with the charge level of the batteries.

The LCD will display an estimate of:

1. Battery Life Awake – the number of hours Datalog 120 could continuously operate without a power supply attached.
2. Battery Life EasyLog - some methods of logging i.e. EasyLog or Logging with a long duration, will switch Datalog 120 automatically into 'sleep' mode between samples to reduce power consumption. EasyLog will indicate the theoretical number of days that Datalog 120 could record in this mode.
3. The percentage capacity charge level of the battery.

The LCD display will show 'Battery is charging' if power is being supplied to Datalog 120 (via a power supply or USB connection).








Press the red  button to return to the System menu.

Note: Ideally Datalog 120 should be stored with at least 40% or more charge. Do not store Datalog 120 with its battery fully discharged or with sensors connected. Some reserve charge is needed to retain data and settings in memory. See page 25 for powering information.


3. Set date & time:

Data and time are automatically set by the Datalog software (using the settings from your computer's clock). If Q Advanced is not used with the software the date and time can be set on the unit.

```
Set date & time:
► Time 15:57:43
  Date 11/11/07
    DD/MM/YY
```

- Set date format: Select how you would like the date displayed. Use the blue  to scroll through the choice of formats: DD-MM-YY, MM-DD-YY, YYYY-MM-DD until your choice of format is shown. Press  to select.
- Set Time: uses a 24 hour clock. Use the blue  buttons to scroll the numbers up or down until the correct hour is shown, press  to select, the cursor will move onto minutes. Repeat for minutes and then seconds.
- Set Date: day/month/year. Use the blue  buttons to scroll the numbers up or down until the correct day is shown, press  to select. Repeat for month and then year; press the black  button to return to the System menu.

4. Internal Temp:


Use the blue  buttons to toggle the internal temperature sensor On or Off.

If set to On, the temperature sensor will be recognised as Input No. 7.

```
Internal Temperature
► sensor is off
```

The internal temperature sensor can be used to measure the temperature of Datalog 120's environment. For convenience the built-in temperature sensor is displayed on the same scale as the plug-in temperature sensors. However Datalog 120 can only be used in an environment of 0 to 40°C, 0 to 95%RH (non-condensing).

Note: The speed of reaction to a change in temperature will be slow in comparison to a plug-in Temperature sensor due to Datalog 120's plastic case.





Press  to return to the System menu.


5. Data sets

Data Sets Stored – Indicates the number of individual data sets stored.

Memory Used – Indicates the amount of memory used in storing the captured data as a percentage of the total memory.

```
Data sets:
12 data sets stored
29 % memory used
► for delete menu
```



To delete all or some data sets – Press  for the delete menu. Either leave as 'All data sets' or use the scroll buttons to choose an individual set of data. Press  to select and then  to confirm your choice. Press  to return to Data sets.

Press  to return to the System menu.

Switch off

Use this option to send Datalog 120 directly into low power (sleep mode), even when a supply of power is attached.

----- Main Menu -----
System
▶ Switch off
Easy Log

Use the blue  buttons to scroll the menu until the pointer is pointing at Switch off in the Main Menu. Press the black  button to select.



Press any button to 'wake up' the unit.

Note: If Datalog 120 is operating on battery power you do not have to use this option to switch the unit off, after a period of inactivity the logger will auto power down.

Technical information




Selecting the sensor range

Some plug-in *Smart Q* Sensors have more than one range. The range can be altered either on Datalog 120 (see below) or on the computer by using Sensor Config from Settings in a logging option in the Datalog program. Once a range is selected Datalog 120 will use the range until it is changed.

- Whilst in Meter mode use the blue  buttons to move the list until the pointer is pointing at the appropriate sensor.
- Press the black  button to view the ranges available.

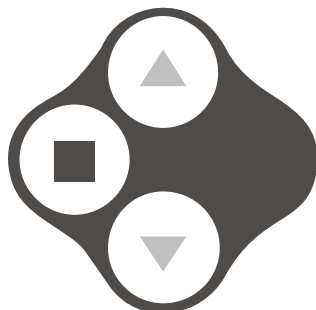
1)	24.5 °C
▶ 2)	57.2 dBA
3)	11 mT
4)	3.5 °C

Note: If there isn't a choice of range available for the selected sensor then pressing this button will have no effect.

- An asterisk * will indicate the present range selected. Use the blue  buttons to scroll the list until the pointer is pointing at the required range.
- Press the black  button to select the range and return to Meter mode.
- Press the red  button to exit Meter mode and return to the Main Menu.

Hard Reset

Should Datalog 120 fail to respond to the computer or a button press, carry out a HARD RESET.



1. If necessary attach Datalog 120 to mains power.
2. Hold the red square and both blue triangle buttons down (at the same time) for a second and then release.

If the hard reset has been done correctly, the LCD will display Datalog 120 and the version number of its operating system before returning to the main menu

If Datalog 120 still fails to respond, please contact LJ Create.

Note: A Hard Reset does **not** erase any stored data sets but if a recording is interrupted by a reset, then the data being captured will not be stored.

Powering Datalog 120

Datalog 120 can be powered by:

1. Using the mains power supply provided
2. By the USB port (whilst connected to the computer)
3. By its internal batteries (when charged)

The power light on Q Advanced will light when the unit is accepting power from a mains power supply or via the USB cable.

Mains Power

The power supply unit supplied is used to power Datalog 120 while it is connected to the computer and to recharge its internal batteries in preparation for logging data away from the computer. Connect the mains power adaptor to the socket on the back of the unit marked



Power supply specifications: 5V DC mains adaptor, able to supply at least 500 mA, with a positive centre and negative outer pin.

Datalog 120 will not auto switch off when accepting power from either the USB port or a mains power supply.

Batteries

Datalog 120 is fitted with a rechargeable lithium ion battery pack. When the batteries are in good condition and fully charged they will power Datalog 120 in Easy Log or remote mode for at least 35 days.

Whenever Datalog 120 is connected to its mains power supply or the USB port on the computer, it will automatically re-charge the batteries. A full charge will take approximately 5 hours.

Notes:

- To accelerate a battery recharge select Switch off to send Q Advanced direct into low power (sleep mode).
- The drivers for Datalog 120 must be installed on the computer before charging will begin.
- If the computer is switched off or in sleep mode, charging via the USB port will stop.
- Datalog 120 can only be connected directly to a computers USB port or by using a **powered** USB hub. It will not work with an unpowered hub (Datalog 120 requires an output current of 500mA).

Lithium ion batteries are ‘memory-free’ and prefer a partial rather than a full discharge. Constant partial discharges with frequent recharges will not cause any harm. Frequent full discharges should be avoided whenever possible.

Ideally Datalog 120 should be stored at about **40% or more** charge.

Do **not** store Datalog 120 with its battery fully discharged. Even when turned off (sleep), Q Advanced will use a small amount of current, and the battery will slowly discharge. If Datalog 120 is to be stored for lengthy periods without use then it’s a good idea to recharge the batteries every 6 – 8 weeks.

The speed at which a lithium ion battery will age is governed by both its storage temperature (preferably less than 40°C) and state-of-charge. Eventually the battery pack will no longer deliver the stored energy and will need to be replaced. A fully charged battery that loses its charge quickly will demonstrate the need for replacement. When this happens contact LJ Create and request a battery replacement pack for Datalog 120.

The lithium batteries in Datalog 120 operate best at near room temperature, between 10 and 30°C, (50 to 86°F) but can be used at any temperature between 0 to 40°C (32 to 104°F). If Q Advanced has been left in the cold, let it warm to near room temperature before waking it from sleep.

Automatic Standby

- Datalog 120 has no ON switch. To operate, press any one of the buttons on the top panel.
- When Datalog 120 is disconnected from the power supply or USB port, it will go into low power sleep mode to reduce power consumption if more than two minutes have passed since any measurements have been taken or a button was pressed.
- Datalog 120 will wake up either when a button is pressed or will auto-wake up when communicating with the computer via the USB port.
- While remote recording Datalog 120 will stay awake until the interval between readings reaches 5 seconds or greater – at this point it will begin to sleep between samples (waking up just enough in front of the sample time to allow the sensors to stabilise).
- While taking measurements in the Time & Motion mode, Datalog 120 will stay awake.

Specifications

4 x 20 Character LCD Display

USB communication V1.1 & V2.0 compatible

Memory Capacity: 256 KB

Rate: max logging speed is 20 microseconds between samples (50 kHz)

Digital timing from A to B: 4 μ s resolution

12 bit sampling resolution

Firmware upgradeable

Operating range: 0 - 40°C and 0 to 95%RH (non-condensing).

Care & Maintenance

Clean with a damp cloth, do not immerse in water. Datalog 120 is **not** waterproof.

Datalog 120 is suitable for use in an operating range of 0 – 40°C and 0 to 95% RH (non-condensing).

If Datalog 120 has been left in the cold, let it warm to near room temperature before waking it from sleep.

Do not subject to extreme heat or cold or leave in a location where it will get wet.

Do not expose to direct sunlight for extended periods of time.

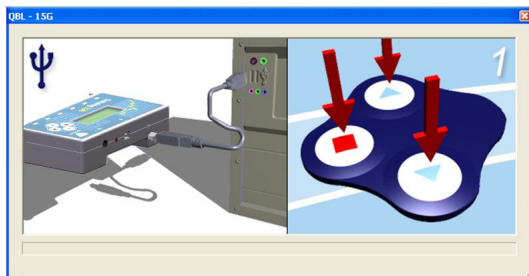
Do not expose to temperatures greater than 60°C, e.g. near a heater or inside a car in hot weather.

Do **not** store Datalog 120 with its battery fully discharged. Ideally Datalog 120 should be stored at about **40% or more** state-of-charge.

Updating Datalog 120's Firmware

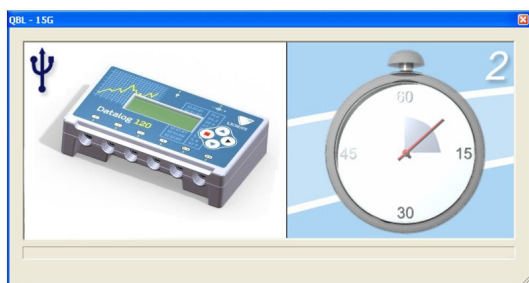
Occasionally LJ Create may release updated firmware which will contain improvements or new features. To update the firmware of your Datalog 120 unit:

Step 1. Copy the English Firmware Update onto the hard disc of your computer.

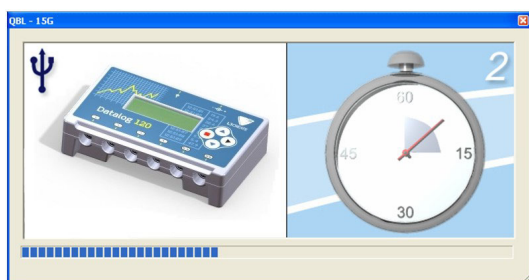


Step 2. Connect Datalog 120 to the computer using the USB cable.

Step 3. Carry out a HARD RESET on Q Advanced by holding down the red and both blue buttons for a second.



Wait for a few seconds.



A progress bar will indicate Datalog 120 being programmed.



A **tick** will indicate if the process was successful. Disconnect the Datalog 120 unit.

If you wish to repeat these processes, connect another Datalog 120 unit and click on the update window to return to the start screen (step 2).



A **cross** will indicate that an error occurred. Click in the update window to go back to start screen (step 2) and try again.

Step 4. Exit the program.

Appendix 1: EasyLog Logging

Datalog 120 records data at a rate of 40 samples per second until it has captured 1000 samples. At this point the sample rate halves (i.e. 20 samples per second) and alternate samples are discarded (leaving 500 samples). It will continue at this speed until it has captured another 500 samples (1000 total), then the sample rate halves again (i.e. 10 samples per second) and it discards half the stored data, and so on.

		DURATION				Samples
Sample Rate	Interval (seconds)	Days	Hours	Min	Sec	
40 per sec	0.025 (25ms)	0	0	0	25	0 - 1000
20 per sec	0.05 (50ms)	0	0	0	50	Compress to a half 500 - 1000
10 per sec	0.1 (100ms)	0	0	1	40	Compress to a half 500 - 1000
2 per sec	0.5 (500ms)	0	0	8	20	Compress to a fifth 200 - 1000
1 per sec	1	0	0	16	40	Compress to a half 500 - 1000
Every 5 sec	5	0	1	23	20	Compress to a fifth 200 - 1000
Every 15 sec	15	0	4	10	0	Compress to a third 330 - 1000
Every 30 sec	30	0	8	20	0	Compress to a half 500 - 1000
Every 1 min	60	0	16	40	0	Compress to a half 500 - 1000
Every 5 mins	300	3	11	20	0	Compress to a fifth 200 - 1000
Every 15 mins	900	10	10	0	0	Compress to a third 300 - 1000
Every 30 mins	1800	20	20	0	0	Compress to a half 500 - 1000
Every 1 hour	3600	41	16	0	0	Compress to a half 500 - 1000

Appendix 2: Duration and Interval Table for Logging

Pre-triggers are only available with fast recording times and when a trigger of **sensor rises** or **falls below** has been set.

For very fast sample rates there is a limit to the number of sensors that can be connected, this is indicated in the maximum sensors column. For slower rates the internal temperature sensor and up to six external sensors can be used.

The following *Smart Q* Sensors are not able to provide readings at intervals of less than 20 ms (50 Hz): Ohaus Scout Pro Top-pan Balance Adapter (Product No. 3060), Carbon Dioxide Gas Sensor (Product No. 3152), Drop Counter and Bubble Sensor (Product No. 3266), Geiger Muller Sensor (Product No. 3265), the beats per minute range of the Heart Rate and Pulse Waveform Sensor (Product No. 3147), Motion Sensor (Product No. 3705 or 3270) and the Polar Heart Rate Exercise Sensor (Product No. 3148).

Duration	Interval	Samples	Max. no. of sensors	Pre-trigger
0.02 s	20 μ s	1000	1	✓
(20 ms)	50 μ s	400	2	✓
	100 μ s	200	4	✓
	200 μ s	100		✓
	500 μ s	40		✓
	1 ms	20		✓
	2 ms	10		✓

Duration	Interval	Samples	Max. no. of sensors	Pre-trigger
0.05 s	20 μ s	2500	1	✓
(50 ms)	50 μ s	1000	2	✓
	100 μ s	500	4	✓
	200 μ s	250		✓
	500 μ s	100		✓
	1 ms	50		✓
	2 ms	25		✓
	5 ms	10		✓

Duration	Interval	Samples	Max. no. of sensors	Pre-trigger
0.1 s	50 μ s	2000	2	✓
(100ms)	100 μ s	1000	4	✓
	200 μ s	500		✓
	500 μ s	200		✓
	1 ms	100		✓
	2 ms	50		✓
	5 ms	20		✓
	10 ms	10		✓

	Interval	Samples	Max. no. of sensors	Pre-trigger
0.2 s	50 μ s	4000	2	✓
(200ms)	100 μ s	2000	4	✓
	200 μ s	1000		✓
	500 μ s	400		✓
	1 ms	200		✓
	2 ms	100		✓
	5 ms	40		✓
	10 ms	20		✓
	20 ms	10		✓

Duration	Interval	Samples	Pre-trigger
0.5 s	200 μ s	2500	✓
(500ms)	500 μ s	1000	✓
	1 ms	500	✓
	2 ms	250	✓
	5 ms	100	✓
	10 ms	50	✓
	20 ms	25	✓
	50 ms	10	

Duration	Interval	Samples	Pre-trigger
1 s	500 μ s	2000	✓
	1 ms	1000	✓
	2 ms	500	✓
	5 ms	200	✓
	10 ms	100	✓
	20 ms	50	✓
	50 ms	20	
	100 ms	10	

Duration	Interval	Samples	Pre-trigger
2 s	500 μ s	4000	✓
	1 ms	2000	✓
	2 ms	1000	✓
	5 ms	400	✓
	10 ms	200	✓
	20 ms	100	✓
	50 ms	40	
	100 ms	20	
	200 ms	10	

Duration	Interval	Samples	Pre-trigger
5 s	2 ms	2500	✓
	5 ms	1000	✓
	10 ms	500	✓
	20 ms	250	✓
	50 ms	100	
	100 ms	50	
	200 ms	25	
	500 ms	10	

Duration	Interval	Samples	Pre-trigger
10 s	5 ms	2000	✓
	10 ms	1000	✓
	20 ms	500	✓
	50 ms	200	
	100 ms	100	
	200 ms	50	
	500 ms	20	
	1 s	10	

Duration	Interval	Samples	Pre-trigger
20 s	5 ms	4000	✓
	10 ms	2000	✓
	20 ms	1000	✓
	50 ms	400	
	100 ms	200	
	200 ms	100	
	500 ms	40	
	1 s	20	
	2 s	10	

Duration	Interval	Samples	Pre-trigger
30 s	10 ms	3000	✓
	20 ms	1500	✓
	50 ms	600	
	100 ms	300	
	200 ms	150	
	500 ms	60	
	1 s	30	
	2 s	15	

Duration	Interval	Samples	Pre-trigger
1 min	20 ms	3000	✓
	50 ms	1200	
	100 ms	600	
	200 ms	300	
	500 ms	120	
	1 s	60	
	2 s	30	
	5 s	12	

Duration	Interval	Samples
2 min	50 ms	2400
	100 ms	1200
	200 ms	600
	500 ms	240
	1 s	120
	2 s	60
	5 s	24
	10 s	12

Duration	Interval	Samples
5 min	100 ms	3000
	200 ms	1500
	500 ms	600
	1 s	300
	2 s	150
	5 s	60
	10 s	30
	20 s	15
	30 s	10

Duration	Interval	Samples
10 min	200 ms	3000
	500 ms	1200
	1 s	600
	2 s	300
	5 s	120
	10 s	60
	20 s	30
	30 s	20
	1 min	10

Duration	Interval	Samples
20 min	500 ms	2400
	1 s	1200
	2 s	600
	5 s	240
	10 s	120
	20 s	60
	30 s	40
	1 min	20
	2 min	10

Duration	Interval	Samples
30 min	500 ms	3600
	1 s	1800
	2 s	900
	5 s	360
	10 s	180
	20 s	90
	30 s	60
	1 min	30
	2 min	15

Duration	Interval	Samples
1 hour	1 s	3600
	2 s	1800
	5 s	720
	10 s	360
	20 s	180
	30 s	120
	1 min	60
	2 min	30
	5 min	12

Duration	Interval	Samples
2 hours	2 s	3600
	5 s	1440
	10 s	720
	20 s	360
	30 s	240
	1 min	120
	2 min	60
	5 min	24
	10 min	12

Duration	Interval	Samples
3 hours	5 s	2160
	10 s	1080
	20 s	540
	30 s	360
	1 min	180
	2 min	90
	5 min	36
	10 min	18

Duration	Interval	Samples
4 hours	5 s	2880
	10 s	1440
	20 s	720
	30 s	480
	1 min	240
	2 min	120
	5 min	48
	10 min	24
	20 min	12

Duration	Interval	Samples
5 hours	5 s	3600
	10 s	1800
	20 s	900
	30 s	600
	1 min	300
	2 min	150
	5 min	60
	10 min	30
	20 min	15
	30 min	10

Duration	Interval	Samples
6 hours	10 s	2160
	20 s	1080
	30 s	720
	1 min	360
	2 min	180
	5 min	72
	10 min	36
	20 min	18
	30 min	12

Duration	Interval	Samples
7 hours	10 s	2520
	20 s	1260
	30 s	840
	1 min	420
	2 min	210
	5 min	84
	10 min	42
	20 min	21
	30 min	14

Duration	Interval	Samples
8 hours	10 s	2880
	20 s	1440
	30 s	960
	1 min	480
	2 min	240
	5 min	96
	10 min	48
	20 min	24
	30 min	16

Duration	Interval	Samples
12 hrs	20 s	2160
	30 s	1440
	1 min	720
	2 min	360
	5 min	144
	10 min	72
	20 min	36
	30 min	24
	1 hour	12

Duration	Interval	Samples
1 day	30 s	2880
	1 min	1440
	2 min	720
	5 min	288
	10 min	144
	20 min	72
	30 min	48
	1 hour	24

Duration	Interval	Samples
2 days	1 min	2880
	2 min	1440
	5 min	576
	10 min	288
	20 min	144
	30 min	96
	1 hour	48

Duration	Interval	Samples
3 days	2 min	2160
	5 min	864
	10 min	432
	20 min	216
	30 min	144
	1 hour	72

Duration	Interval	Samples
4 days	2 min	2880
	5 min	1152
	10 min	576
	20 min	288
	30 min	192
	1 hour	96

Duration	Interval	Samples
5 days	2 min	3600
	5 min	1440
	10 min	720
	20 min	360
	30 min	240
	1 hour	120

Duration	Interval	Samples
6 days	5 min	1728
	10 min	864
	20 min	432
	30 min	288
	1 hour	144

Duration	Interval	Samples
7 days	5 min	2016
	10 min	1008
	20 min	504
	30 min	336
	1 hour	168

Duration	Interval	Samples
10 days	5 min	2880
	10 min	1440
	20 min	720
	30 min	480
	1 hour	240

Duration	Interval	Samples
14 days	10 min	2016
	20 min	1008
	30 min	672
	1 hour	336

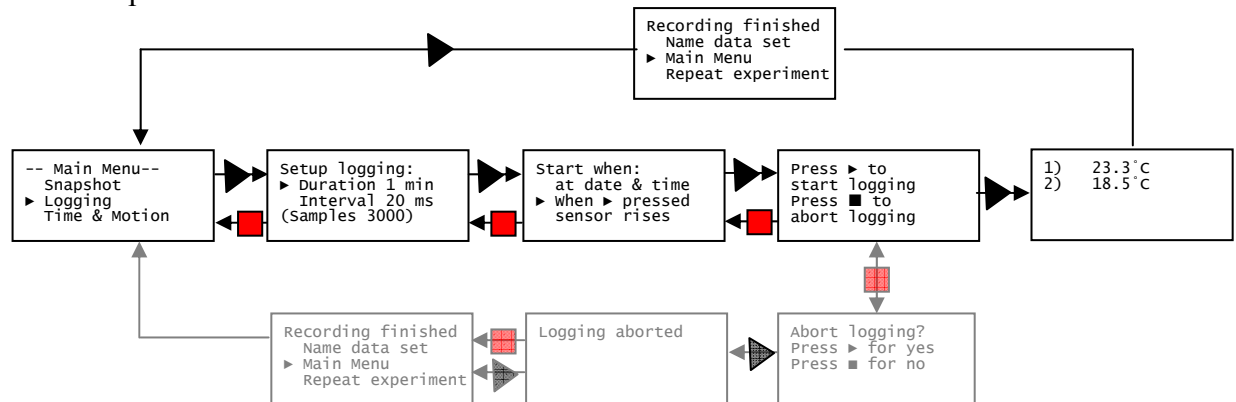
Duration	Interval	Samples
21 days	10 min	3024
	20 min	1512
	30 min	1008
	1 hour	504

Duration	Interval	Samples
28 days	20 min	2016
	30 min	1344
	1 hour	672

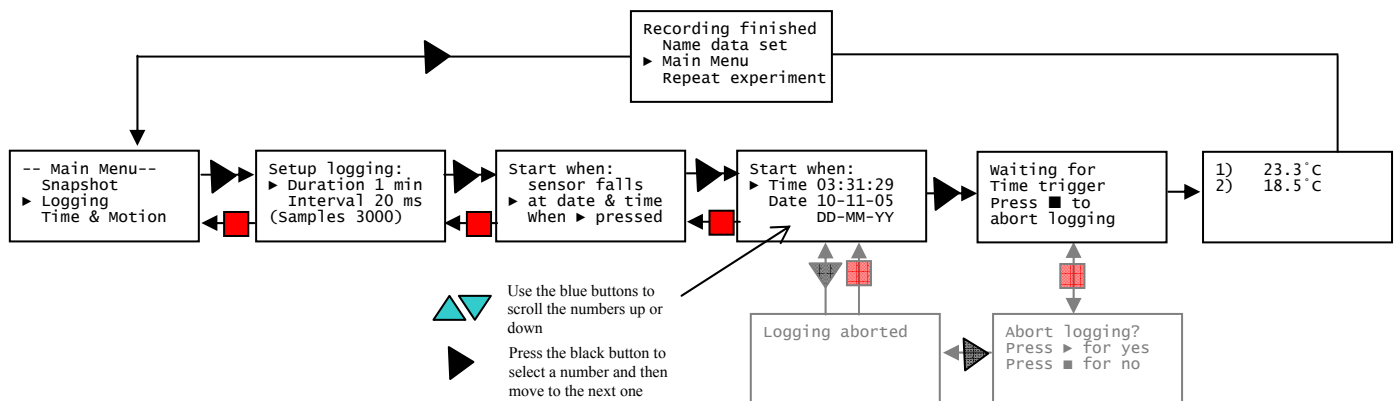
Duration	Interval	Samples
35 days	20 min	2520
	30 min	1680
	1 hour	840

Appendix 3: Logging menu

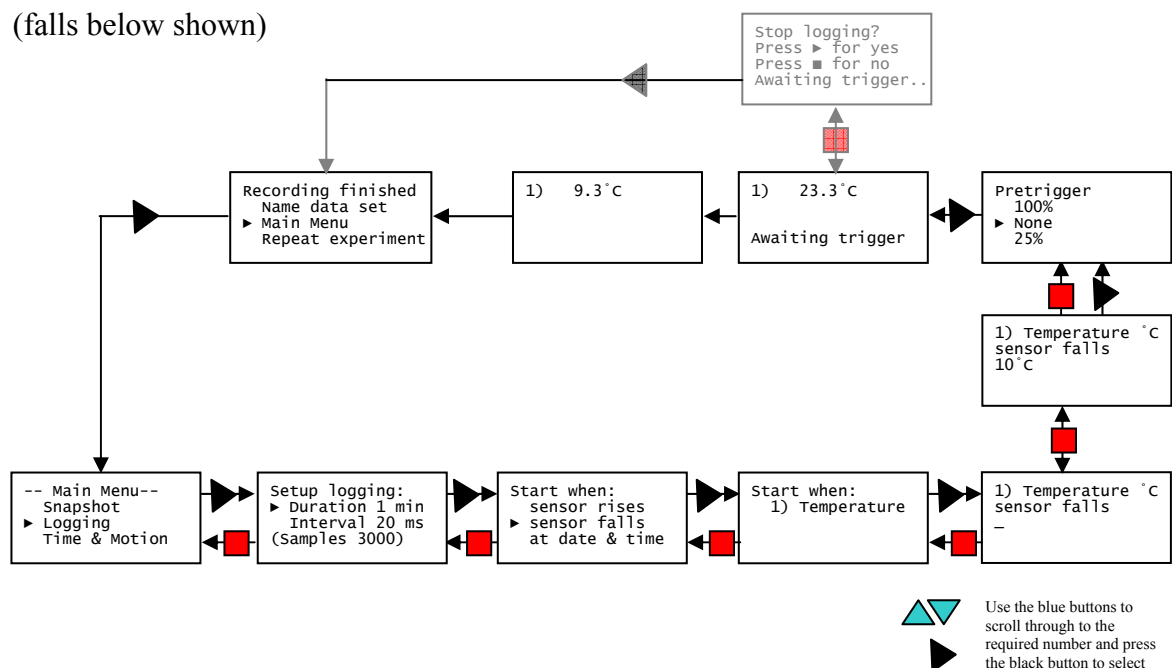
When ► pressed:



At date & time:

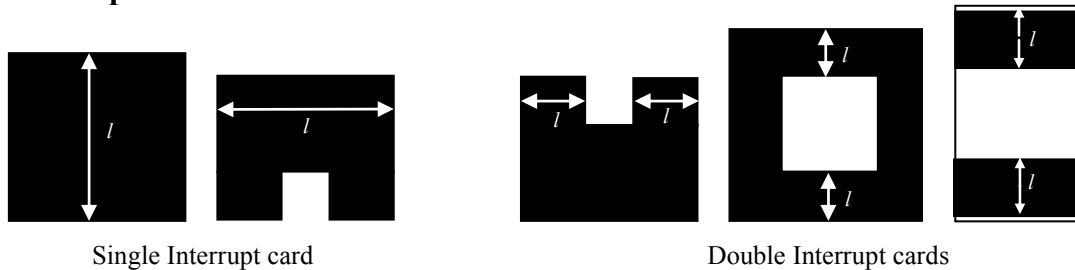


Sensor falls below or rises above:
(falls below shown)



Appendix 4: Timer Interrupters and Parameters

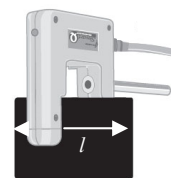
Interrupt cards



Preset values are **30.0, 40.0, 50.0, 95.0, 100.0 and 120.0 mm.**

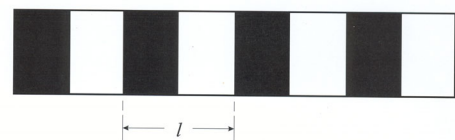
Measure the solid part of the card that will pass through the Light Gate.

The two segments of a double interrupt card must be equal in width.



Multi-segmented card (picket fence)

Preset values of pitch are = **10.0, 20.0, 40.0, 60.0, 80.0 mm.**



Measure from the start of one black edge to the start of the next black edge.

Picket fence

10 Spoked Pulley

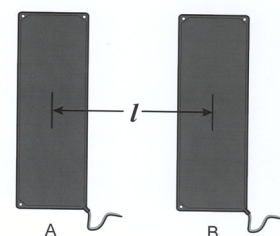
The measurements for the Spoked Pulley are pre-defined.



Distance

Preset values are 100, 200, 300, 400, 500, 600, 700, 800, 900 mm, 1.0, 2.0, 3.0, 4.0, 5.0 or 6.0m

Measure from the sensor connected to Input A to the sensor at Input B. E.g. with Timing mats measure from the centre of one mat to the centre of the other mat.




Timing mats

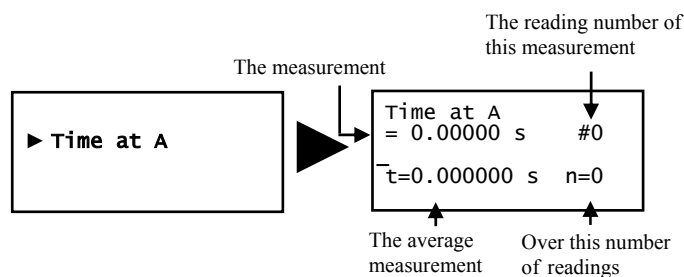
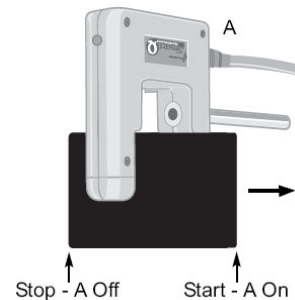
Appendix 5: Timing options

Time at A

Timing starts when the signal at input A changes and stops when the signal reverts back.

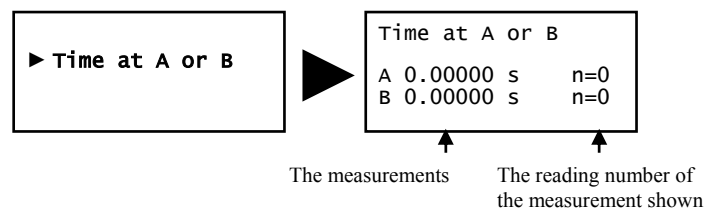
- With Light Gates it will be the time it takes for an object to pass through the light beam.
- For a Push Switch it will be the length of time that the switch is kept depressed.
- For Timing mats it will be the length of time someone stands on the mat.

Use the blue buttons  to scroll through and examine the readings already taken.

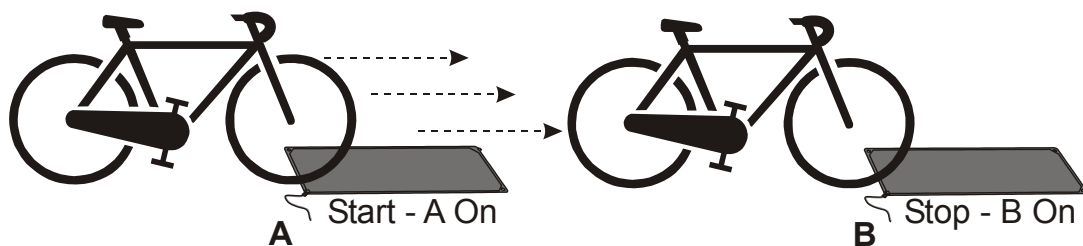


Time at A or B


A measurement will be taken each time a signal change is detected at **either** sensor A or sensor B. The current measurement from A or B will be displayed on the LCD screen.

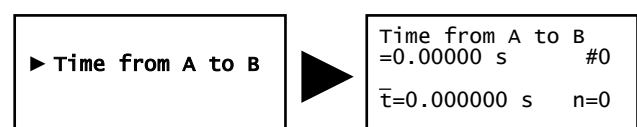


Time from A to B

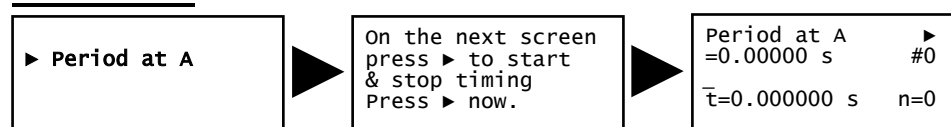


Timing will start when a signal change is detected at sensor A and stops when the signal at B changes (so it measures the time taken by an object to travel from sensor A to sensor B).

Use the blue buttons  to scroll through and examine the readings already taken.



Period at A

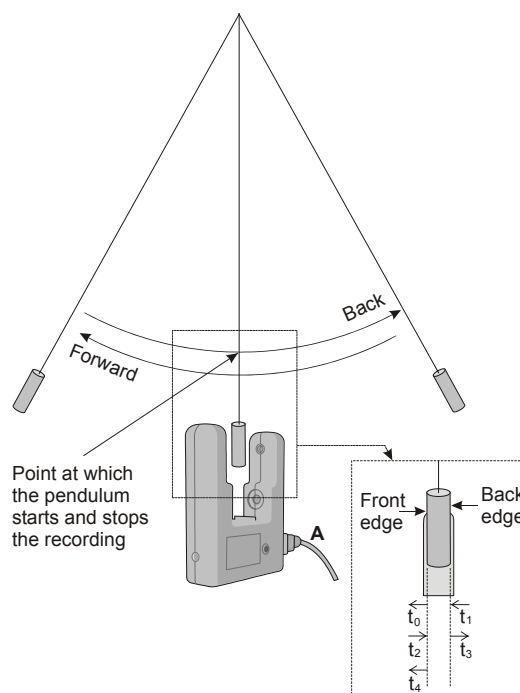


Start the pendulum swinging, and when it is moving freely press the black ► button on Q Advanced to start timing (the ► symbol will disappear from the first line).

The time will start to be measured when the pendulum first passes through the Light gate, it will ignore the second signal change (when the pendulum passes back through) and will stop at the third change (when the pendulum arrives back at the Light gate). The display will show the time for a complete period.

Press the black ► button on Datalog 120 to pause timing (the ► symbol will reappear in the first line). Use the blue buttons to scroll through and examine the data.

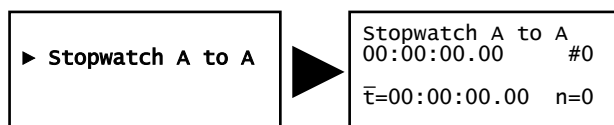
Press the black ► button to continue timing or the red ■ button to finish.



Period at A measures $t_0 \rightarrow t_4$

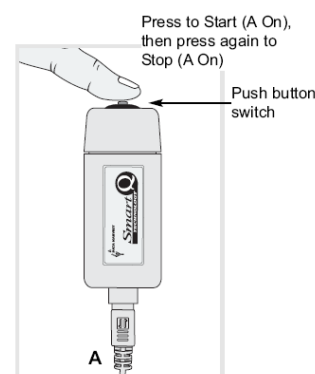
t_0 = Start (front edge of pendulum passes light gate – going forward)
 t_1 = ignored (back edge of pendulum passes light gate – going forward)
 t_2 = ignored (back edge of pendulum passes light gate – going back)
 t_3 = ignored (front edge of pendulum passes light gate – going back)
 t_4 = Stop (front edge of pendulum passes light gate – going forward)

Stopwatch A to A



The time will start to be measured when the signal at input A changes (ON) and will continue until the signal at A changes again (ON) i.e. like a stopwatch.

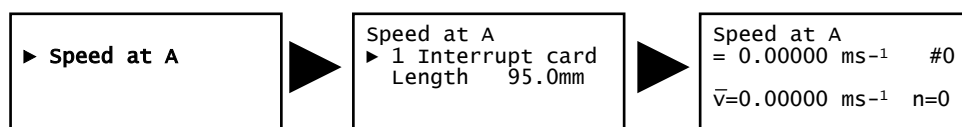
Use the blue buttons ◀▶ to scroll through and examine the readings already taken.



Speed at A

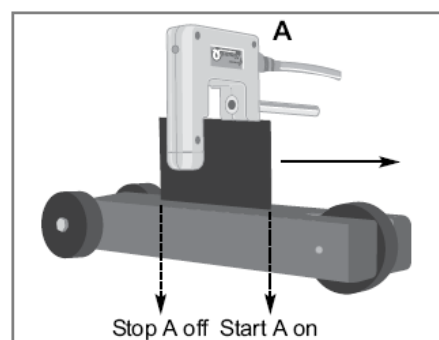
Timing will start when the signal at input A changes and stops when the signal changes back.


Single interrupt card



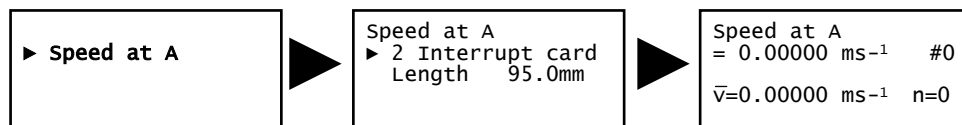
When a single interrupt card passes through a Light gate, the time measured is for how long the card took to pass through the Sensor.

Speed is calculated using the length of the interrupt card divided by the time taken for the card to pass.



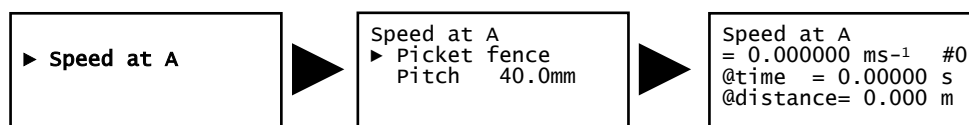
Use the blue buttons  to scroll through and examine the readings already taken.

Double interrupt card

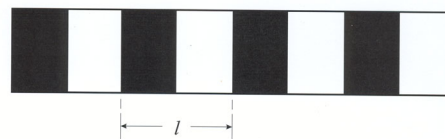


Each segment of the interrupt card is treated as a single card so two measurements will be taken.

Multi-segmented card (Picket fence)



When a picket fence is used to measure Speed at A, the measurements shown are for instantaneous speed i.e. at this distance, the speed was. This data can be used to plot a distance vs. time or instantaneous speed vs. time graph



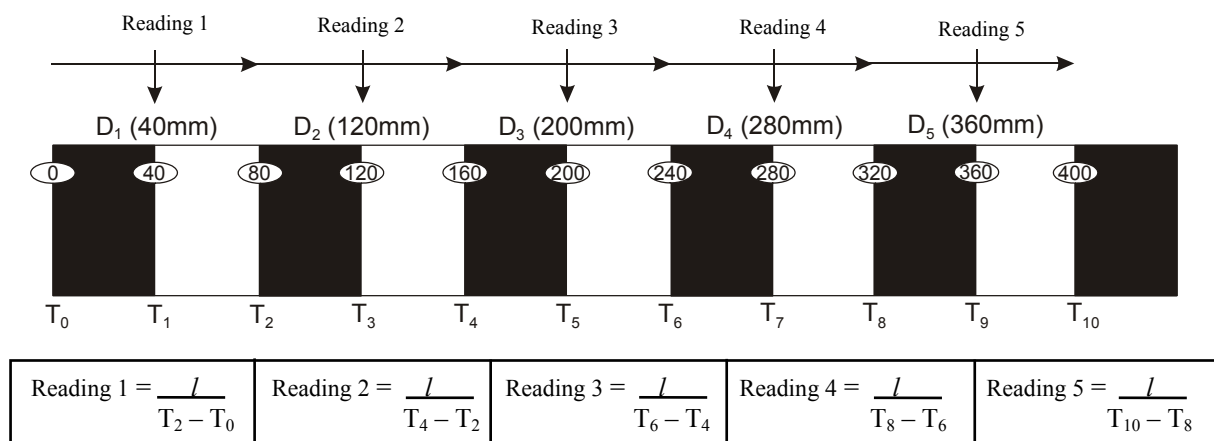
Picket fence

To improve the accuracy of readings, an increment is automatically applied to a picket fence with a pitch length of less than 60 mm. This will mean that there are fewer readings than number of pitches on a fence.

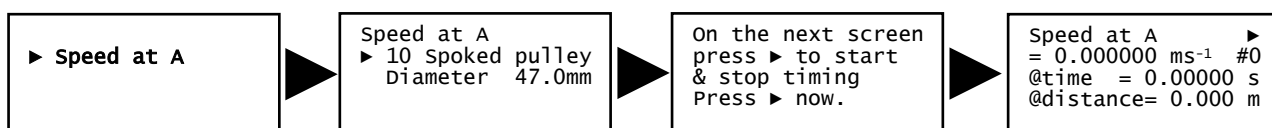
Note: It is envisaged that when a picket fence with a pitch length of 10 mm is used that it will be used on a buggy type investigations (which produce slower times than dropping thorough Light gates) the times are therefore averaged over less pitches

Pitch length (l)	Readings taken with a pitch increment of:
80 mm	1 (80 x 1 = 80 mm)
60mm	1 (60 x 1 = 60 mm)
40 mm	2 (40 x 2 = 80 mm)
20 mm	4 (20 x 4 = 80 mm)
10 mm	5 (10 x 5 = 50 mm)

For example: (l) = **80 mm** - readings taken with a pitch increment of 1 (80 mm).

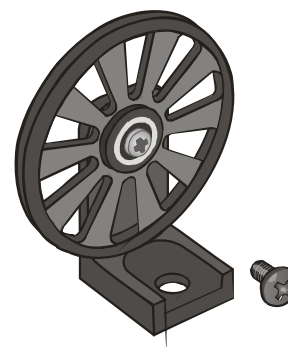


Spoked Pulley



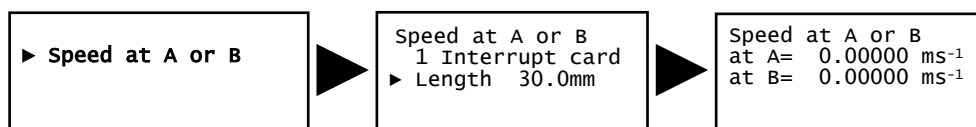
When a Spoked Pulley is used to measure Speed at A, the measurements shown are for instantaneous speed i.e. it took this amount of time to travel this distance and the speed was. The measurement of the Spoked Pulley is pre-defined.

Set up the investigation but do not press enter on Datalog 120 until you are ready to take readings (the spokes on the pulley can easily interrupt the Light gate beam and create false results). When all is ready press the black button for the recording to start (the ► symbol will disappear from the first line).



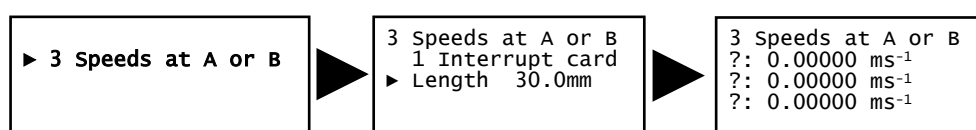
Press the black ► button on Datalog 120 to pause timing (the ► symbol will reappear in the first line). Use the blue buttons to scroll through and examine the data. Press the black ► button to continue timing or the red ■ button to finish.

Speed at A or B



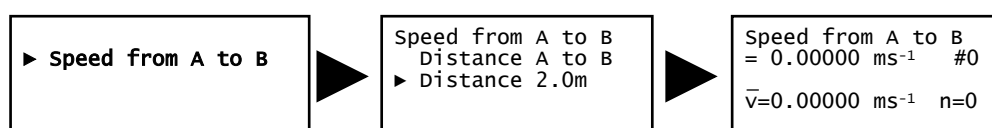
A measurement is taken each time a signal change is detected (when an object passes through) **either** sensor A **or** sensor B. The current measurement from A or B will be displayed on the LCD screen.

3 Speeds at A or B



Three measurements are taken for a signal change at either sensor A and/or sensor B e.g. for elastic or inelastic collision investigations. To take another three measurements press the red ■ button and select Repeat experiment.

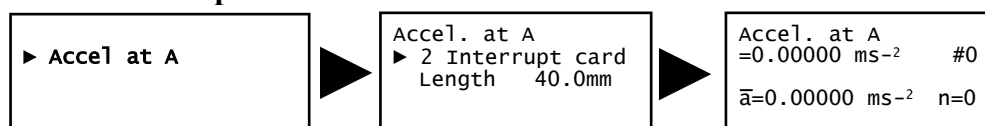
Speed from A to B




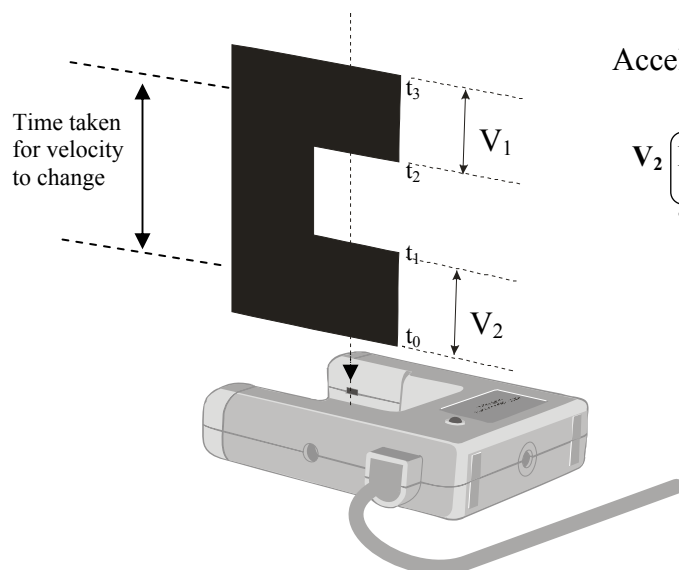
Timing will start when a signal change is detected at sensor A and stop when the signal at B changes (so it measures the speed of at which an object travels from sensor A to sensor B). Use the blue buttons ◀▶ to scroll through and examine the readings already taken.

Acceleration at A

Double interrupt card



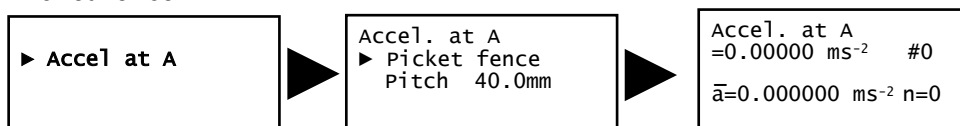
Average acceleration can be measured using a single light gate with a double interrupt card. Acceleration is calculated using the length of the segments on the double interrupt card. Use the blue buttons  to scroll through and examine the readings already taken.




$$\text{Acceleration} = \frac{\text{Change in Velocity}}{\text{Time taken}}$$

$$\frac{V_2 \left(\frac{\text{Length of segment}}{\text{Time } (t_3 - t_2)} \right) - V_1 \left(\frac{\text{Length of segment}}{\text{Time } (t_1 - t_0)} \right)}{\text{Time taken}}$$

Picket fence

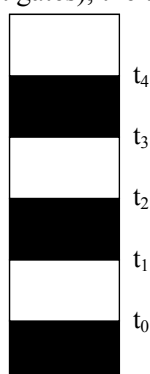


When a picket fence is used to measure Acceleration at A, the measurements shown are for instantaneous acceleration i.e. it took this amount of time to travel this distance and the acceleration was.

Use the blue buttons  to scroll through and examine the readings already taken.

To improve the accuracy of readings, an increment is automatically applied to a picket fence with a pitch length of less than 60 mm. This will mean that there are fewer readings than number of pitches on a fence.

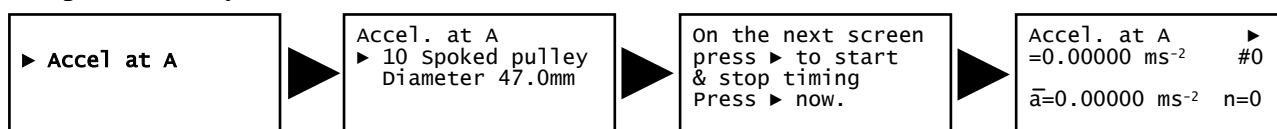
Note: It is envisaged that when a picket fence with a pitch length of 10 mm is used that it will be used on a buggy type investigations (which produce slower times than dropping thorough Light gates), the times are therefore averaged over less pitches.



Instantaneous Acceleration is calculated using the change in Velocity of 2 pitches divided by the time taken for the velocity to change.

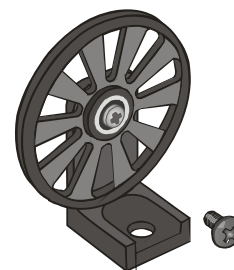
$$\frac{V_2 - V_1}{\frac{t_2 + t_3 - t_0 + t_1}{2}}$$

Spoked Pulley



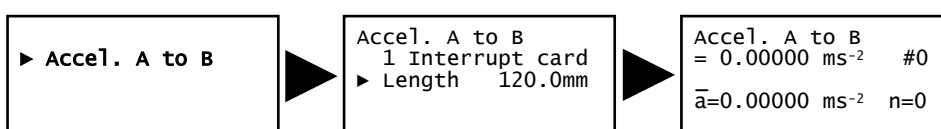
When a Spoked Pulley is used to measure Acceleration at A, the measurements shown are for **instantaneous acceleration** i.e. at this distance, the acceleration was. The measurement of the Spoked Pulley is pre-defined.

Set up the investigation but do not press enter on Datalog 120 until you are ready to take readings (the spokes on the pulley can easily interrupt the light gate beam and create false results). When all is ready press the black ► button for the recording to start (the ► symbol will disappear from the first line).



Press the black ► button on Datalog 120 to pause timing (the ► symbol will reappear in the first line). Use the blue buttons to scroll through and examine the data. Press the black ► button to continue timing or the red ■ button to finish.

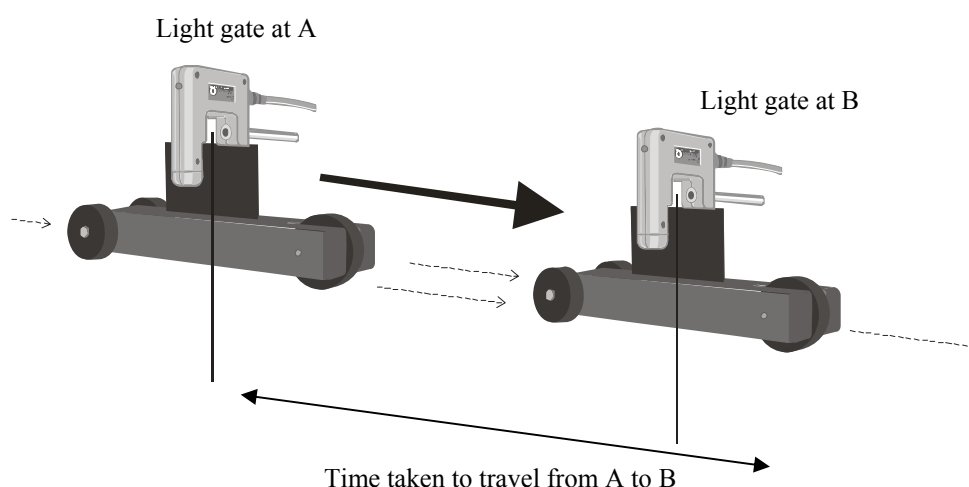
Acceleration A to B



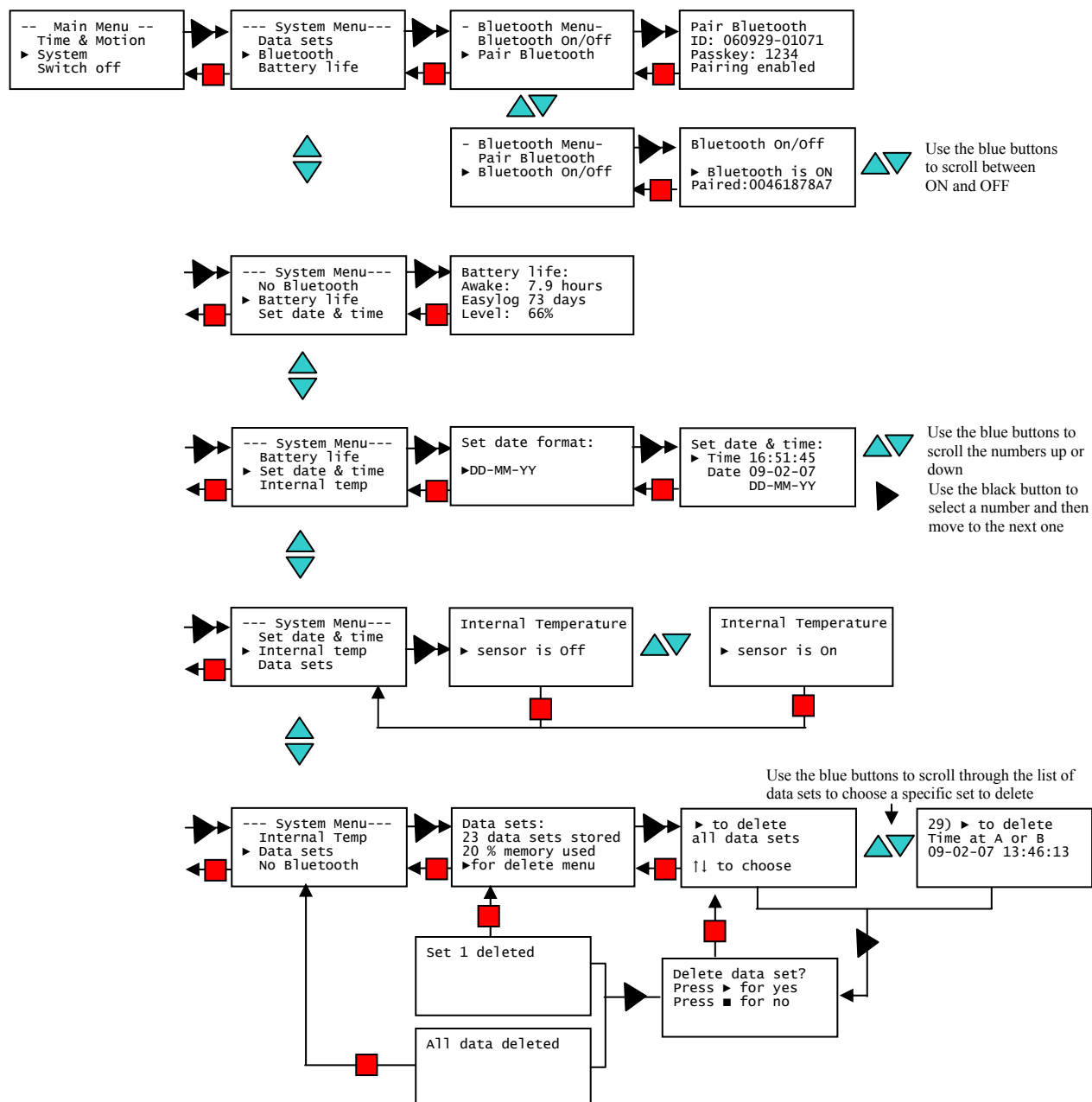
A single interrupt card is used to measure the Velocity at A, the Velocity at B and the time taken to travel from A to B.

$$\text{Acceleration} = \frac{\text{Change in Velocity}}{\text{Time taken}} = \frac{\text{Velocity at B} - \text{Velocity at A}}{\text{Time taken to travel from A to B}}$$

Use the blue buttons ◀▶ to scroll through and examine the readings already taken.



Appendix 6: System Menu



Trouble shooting

Before reporting faults please attempt a **HARD RESET** of the unit.

1. If necessary attach to power.
2. Hold down the red square and both blue triangle buttons and keep them all held down for 1 second and then release.

If the hard reset has been done correctly, the LCD will display Datalog 120 and the version number of its operating system before returning to the main menu.

Technical support

If you are experiencing a problem, please contact the Technical Support department at LJ Create. Please provide details of:

- The computer platform it is being used with.
- The software version number
- A description of the problem being encountered

If possible, telephone from a location where you can operate Datalog 120 with the computer.

Questions

Q 1. The LCD display on Datalog 120 is blank. When I press a button it doesn't wake it up.

Connect Datalog 120 to power and leave to charge for at least 5 minutes. **HARD RESET** the unit.

*Q 2. I am having a problem establishing a connection between Datalog 120 and the Datalog software when connected via a **USB port**.*

1. Check the LCD screen on Datalog 120 shows the Main Menu.
2. Check that the USB lead is plugged in at each end.
3. Open the Datalog software. Select Interface from the unable to connect message (or from the File menu). Check the interface is set to Datalog and that the method of connection is **USB port**.
4. If there is still a problem, check the USB drivers have installed correctly:

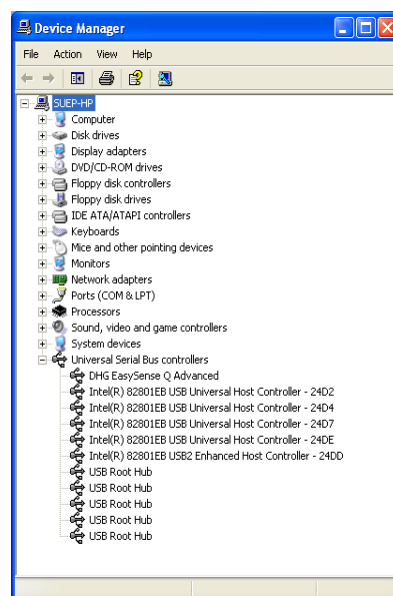
Go to Device manager i.e.

Windows 98 Users: Go to Start → Settings → Control Panel → System → Device Manager

Windows XP Pro & 2000 Users: Go to Start → Control Panel → (if necessary switch to Classic view) → System → Hardware tab → Device Manager.

Vista Users: Go to Start → Control Panel → (if necessary switch to Classic view) → Device Manager.

Check a Datalog 120 device is listed in the Universal Serial Bus controller's list. If there are any question marks or exclamation marks then the drivers haven't installed correctly. Delete the drivers (XP Users: right click on entry and select Uninstall). Disconnect the Datalog 120 from the USB port. Plug back in and re-install the drivers by following the initial setup instructions on page 5.



Q 3. What do I do when I get a Memory full message?

You will need to free some memory by deleting some or all data sets from Datalog 120's memory using delete in **Data Sets** from the System menu.

Q 4. Will I get a warning if the battery level is low?

When the charge level of the battery is very low (about 10 % or less) a 'Battery low' message will start to appear on the LCD screen. Connect Datalog 120 to its power supply or to the USB port on a computer to charge the batteries. Press any button to clear the message.

Note: If the battery low message is ignored, and the charge level drops even further, the logger will display “Recharge battery!” and switch off. Charge the batteries.

Q 5. Do the batteries need to be discharged/ reconditioned?

No, the batteries in Datalog 120 are lithium ion and are ‘memory-free’. Avoid full discharges when ever possible. Constant partial discharges with frequent recharges will not cause any harm.

Q 6. My batteries do not seem to hold their charge any more. Do I need to send the unit back for a replacement to be fitted?

No, order a replacement battery pack.

Warranty

Datalog 120 is warranted to be free from defects in materials and workmanship for a period of 12 months from the date of purchase provided it has been used in accordance with any instructions, under normal laboratory conditions. This warranty does not apply if the Datalog 120 has been damaged by accident or misuse.

In the event of a fault developing within the 12-month period, Datalog 120 must be returned to LJ Create for repair or replacement at no expense to the user other than postal charges.

<p>Note: Our products are designed for educational use and are not intended for use in industrial, medical or commercial applications.</p>
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