

STIL Trail CounterPad / Data Logger

Operation Manual



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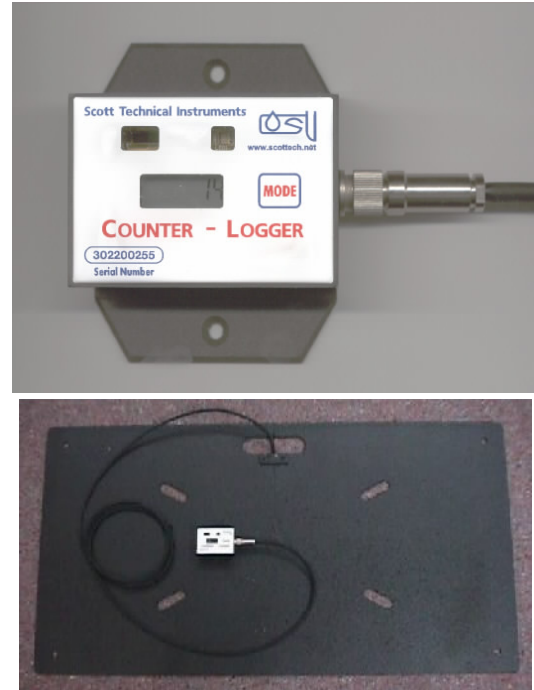
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1) INTRODUCTION

The Trail counter is a robust and sensitive, person or vehicle counting system designed for long term, maintenance free operation in rural and park environments.

It is a fully sealed system (IP67), maintenance free and made of strong durable materials. Only a minimal deflection of the Counterpad is required to advance the counter. Equipped with a battery life in excess of 10 years and a full sealing, the counterpad and logger can be completely buried. This subsurface installation makes the unit undetectable and therefore immune to vandalism, environmental damage, and mischievously enhanced counts. It is typically buried beneath 150mm of soil.



(a) FEATURES

- Detects, verifies and records Counterpad deflections.
- Proprietary mechano-acoustic sensing technology.
- Can be used to count people or vehicles; thin enough to fit under a doormat.
- Durable alloy pressure pad cannot be torn or punctured.
- Stores time linked events, recording about 160,000 events before overwriting the oldest stored information. (Larger capacity buffers available on request)
- Operates in single pad, double pad (for wide tracks) or directional mode (two pads).
- LCD Display shows totals and two directional totals (button selectable in directional mode only).
- Allows data to be downloaded repeatedly without deleting the dataloggers memory.
- Data can be exported as CSV, Excel or ASCII formats.
- Data can be downloaded on site by a notebook/laptop computer with Infrared capabilities.
- Available with output to trigger other monitoring devices, i.e. camera.
- Provides data integrity checking.
- Environmentally sealed system (IP67).
- 10 year Battery life.

(b) SPECIFICATIONS

CounterPad:

Size: 900 x 500 x 4 mm
Material: Marine grade alloy
Weight: 3.7 kg
Surface Covering: Rubberised non-slip compound

Logger Counter:

Size: 70 x 50 x 35 mm
Weight: 200gm
Memory: 500Kbytes Flash = approx. 160,000 time stamped counts (beyond this, oldest data is overwritten).
Battery: 4.8 Ah Lithium – shelf and operational life of 10 years
Communications: Fully Sealed, IRDA compatible
Display: 6 Digit LCD – Displays Totals
Inputs: Pad connector. Can be connected to two pads using a dual adapter.

2) BASIC OPERATION

After installation, the CounterPad Logger is configured so that a single swipe of a magnet over the top of the logger will reset the total count, and initiates the logging (if enabled). It will then accumulate and display a total count of the people stepping on the Counterpad. Any pre-configuration will not be altered by this manual reset (for example, if the logger is set for bi-directional counting, this will not be changed).

Note: - All totals are usually lost when the logger is reset. The stored time-linked event data is not over written; only the **Pointer** is reset to the start of the buffer. The stored event data can still be retrieved using the "**Download by Handset Pointers**" option (see **Software**).

3) INSTALLATION

(a) SITING CONSIDERATIONS

Selecting the right installation site will improve the accuracy of your counts.

A site on the trail should be chosen where foot traffic is free flowing and if possible, in single file. You should avoid sites near objects such as fence stiles, notice boards and trail junctions where there is a possibility of backtracking traffic or slow movement.

Where the trail passes between trees, be aware that tree roots can hinder digging to the correct depth and can shift the counterpad over time.

Both depth of pad burial and soil compaction are critical for continued, accurate counting. Select a site where the pad can be laid at a depth of not less than 150mm (6 inches), otherwise you risk damaging the sensor and plate. The surface for the pad to be laid on should be flat and compacted, as should the soil that is laid back over top. Holes have been machined into the plate to allow for water drainage and to aid with settling.

If the installation requires the counter logger to be some distance from the counterpad, extra length extension and dual adaptor cables are available to order.

Lay all pads with the cable clamping plate uppermost as this will give the best sensitivity and most accurate counting.

The counterpad can be either buried beneath soil, as Figures 1 & 2 show on the following page, or placed under a door entrance mat.

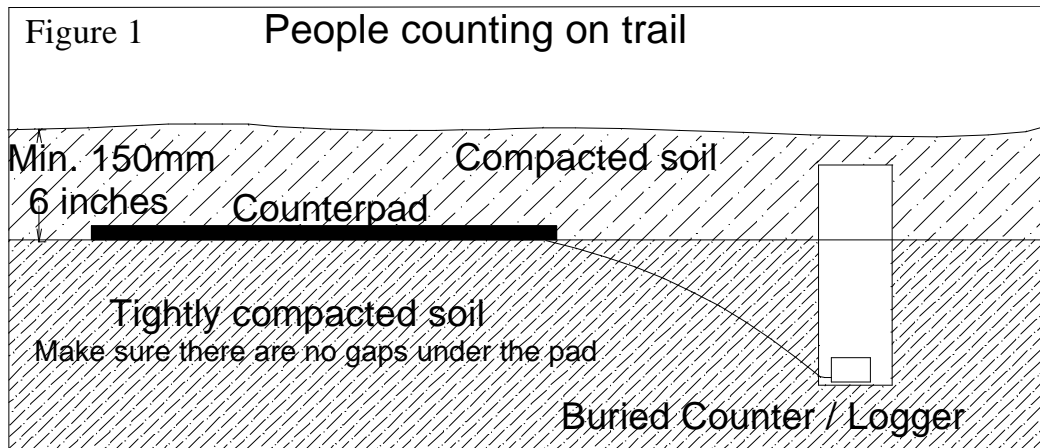
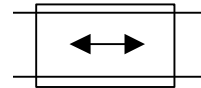
Ensure cable connectors are fixed as tight as possible by hand.

Water in the connectors will inhibit counting.

Nb: Original armoured steel signal cable available on request.

(b) DIAGRAM COUNTERPAD INSTALLATION FOR PEOPLE COUNTING

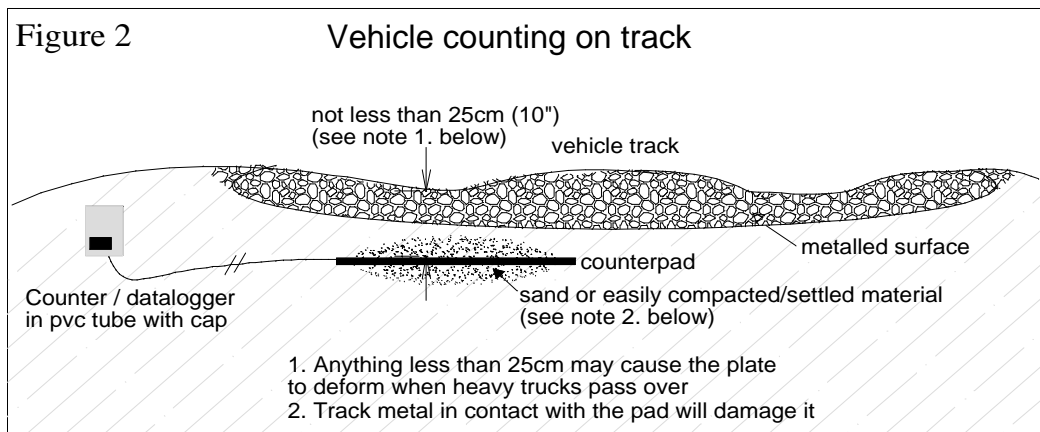
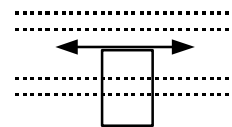
(see figure 1):



The CounterPad is buried and aligned underneath the walking track

(c) DIAGRAM COUNTERPAD INSTALLATION FOR VEHICLE COUNTING

(see figure 2)



CounterPad is buried beneath one wheel track only.

NOTE:

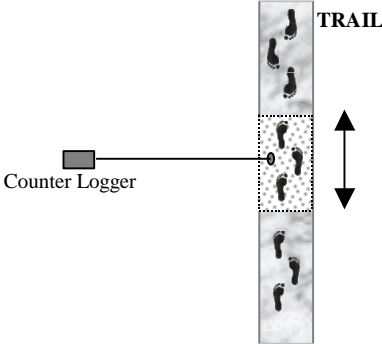
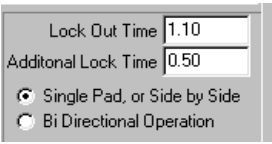
(1) The connector between the pad and the logger is watertight only if it is installed securely with the thread tightened fully.

(2) It is essential that the counterpad is installed on compacted sand or soil with no air gaps underneath it. Failure to bed the Counterpad correctly could result in the pad deforming which may lead to sensor damage.

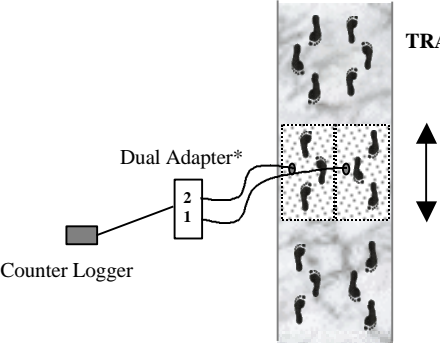
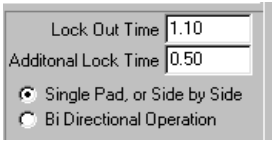
(d) OVERVIEW OF INSTALLATION CONFIGURATIONS

Note: People counting pads are aligned length-wise with the track to prevent traffic stepping over sensor pad.

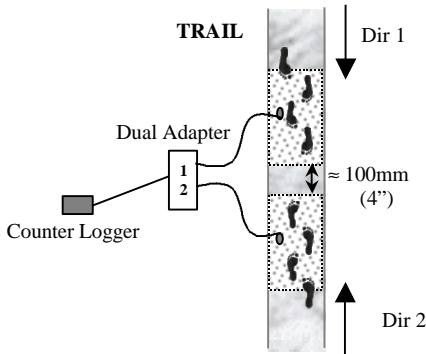
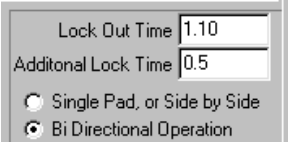
(i) Standard Install – Single Pad, People counts

Features	Install Diagram	Settings
<p>DIRECT CONNECT</p> <p>LCD DISPLAYS TOTAL COUNT ONLY</p> <p>EVENTS: Time and date recorded</p>		

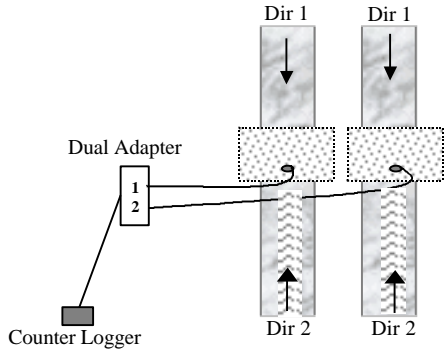
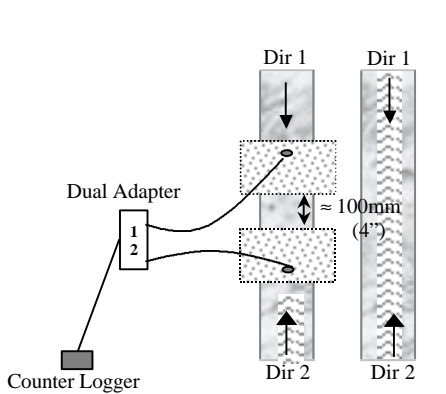
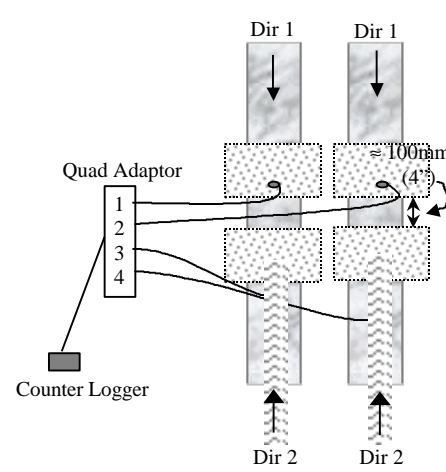
(ii) Extra Wide Trails, People counts

Features	Install Diagram	Settings
<p>2 PADS – DUAL ADAPTOR</p> <p>LCD DISPLAYS TOTAL COUNT ONLY</p> <p>EVENTS: Time and date recorded</p> <p>(A count on either pad will increment the total count)</p>		 <p>(* Size: Adapter box 30x20x12mm, Adapter cable 175mm)</p>

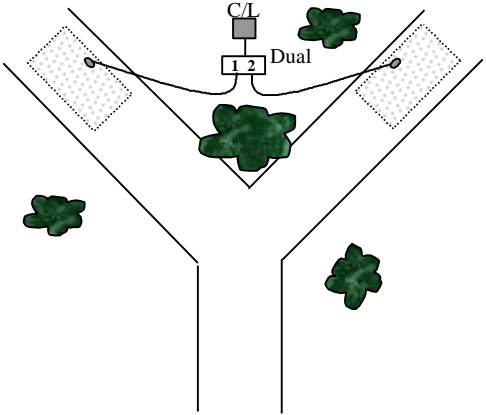
(iii) Direction Counts, People

Features	Install Diagram	Settings
<p>2 PADS – DUAL ADAPTOR</p> <p>LCD DISPLAYS: - TOTAL COUNT - DIR 1 COUNT - DIR 2 COUNT</p> <p>EVENTS: Time and date recorded</p>		

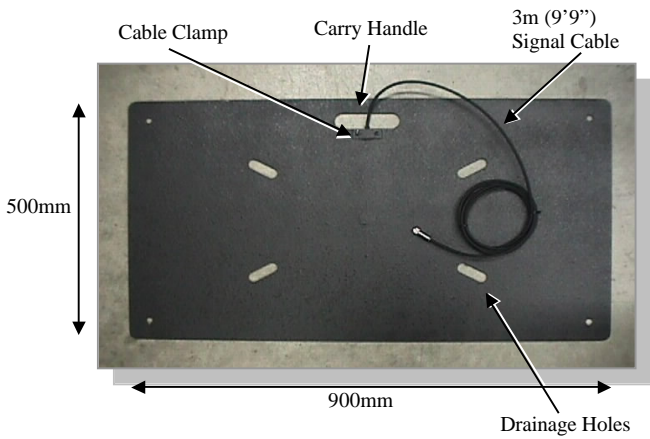
(iv) *One Way/Directional Counts, vehicles*

Features	Install Diagram	Settings
<p>2 PADS, DUAL ADAPTOR</p> <p>(i) one across each wheel rut for total count only.</p> <p>LCD DISPLAYS TOTAL COUNT ONLY</p> <p>EVENTS: Time and date recorded</p>		<p>Dual (i)</p> <div style="border: 1px solid gray; padding: 5px;"> <p>Lock Out Time <input type="text" value="1.10"/></p> <p>Additional Lock Time <input type="text" value="0.50"/></p> <p><input checked="" type="radio"/> Single Pad, or Side by Side</p> <p><input type="radio"/> Bi Directional Operation</p> </div>
<p>2 PADS, DUAL ADAPTOR, DIRECTIONAL</p> <p>(ii) pads laid one before the other in same wheel rut for directional counting of 4 wheeled vehicles.</p> <p>LCD DISPLAYS:</p> <ul style="list-style-type: none"> - TOTAL COUNT - DIR 1 COUNT - DIR 2 COUNT <p>EVENTS: Time and date recorded</p>		<p>Dual (ii)</p> <div style="border: 1px solid gray; padding: 5px;"> <p>Lock Out Time <input type="text" value="1.10"/></p> <p>Additional Lock Time <input type="text" value="0.5"/></p> <p><input type="radio"/> Single Pad, or Side by Side</p> <p><input checked="" type="radio"/> Bi Directional Operation</p> </div>
<p>4 PADS, QUAD ADAPTOR</p> <p>LCD DISPLAYS:</p> <ul style="list-style-type: none"> - TOTAL COUNT - DIR 1 COUNT - DIR 2 COUNT <p>EVENTS: Time and date recorded</p>		<p>Quad</p> <div style="border: 1px solid gray; padding: 5px;"> <p>Lock Out Time <input type="text" value="1.10"/></p> <p>Additional Lock Time <input type="text" value="0.5"/></p> <p><input type="radio"/> Single Pad, or Side by Side</p> <p><input checked="" type="radio"/> Bi Directional Operation</p> </div>

(v) Variation on standard people counting install

<u>Features</u>	<u>Install Diagram</u>	<u>Settings</u>
<p>2 PADS, DUAL ADAPTOR</p> <p>LCD DISPLAYS:</p> <ul style="list-style-type: none"> - TOTAL COUNT (1+2) - TOTAL COUNT (Dir 1) - TOTAL COUNT (Dir 2) <p>EVENTS: Time and date recorded</p> <p>economical use of both channels on counter logger!</p>		<p>Dual (i)</p> <div style="border: 1px solid gray; padding: 5px; width: fit-content;"> <p>Lock Out Time <input type="text" value="1.10"/></p> <p>Additional Lock Time <input type="text" value="0.5"/></p> <p> <input type="radio"/> Single Pad, or Side by Side <input checked="" type="radio"/> Bi Directional Operation </p> </div>

(vi) Parts

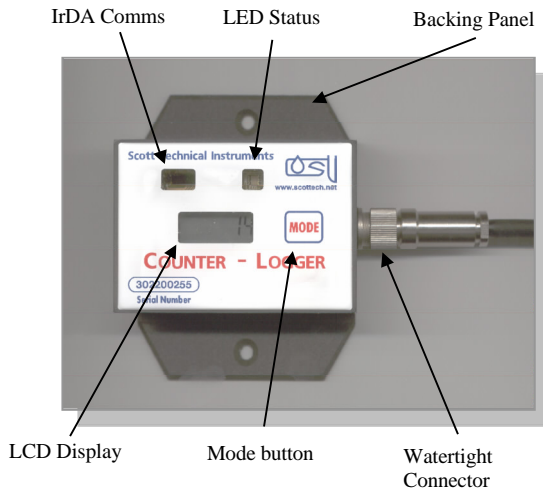


Trail Counter:
 STIL Pad 9050
 Sensor Plate
 3m Cable

 (STIL stock code: #24-071)

Data Logger:
 STIL Pad 9050
 LCD Counter
 Logger Module

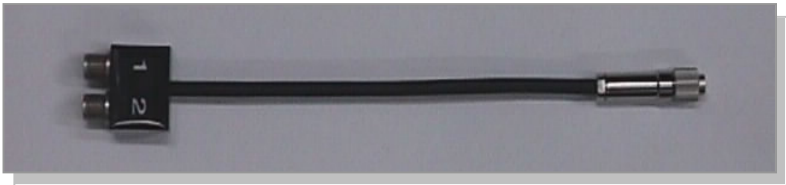
 (STIL stock code: #24-070)



Adaptors:
 STIL Pad 9050
 Quad Adaptor (Std 5m)

 (STIL stock code: #24-073)

 Other lengths available on request. Contact your supplier.



Adaptors:
 STIL Pad 9050
 Dual Adaptor (Std 200mm, 8'')

 (STIL stock code: #24-072)

4) THE SOFTWARE

Important note: This software can only be installed on IBM compatible computers.

The logger can be configured with the 'People Logger' software package, supplied with your Trail CounterPad. You will require an Infrared (IrDA) compatible device attached to your computer.

(a) INSTALLATION OF SOFTWARE

- (a) Insert diskette into drive.
- (b) Copy the 'People Counter.exe' file into the directory from where you wish to run the program. This is the only file required to run your application.
- (c) Run the application by double clicking on this file.

Note: This will also be the default directory where Trail Counter data files will be stored.

(b) SOFTWARE OPERATION

When you start the software, the following screen will be displayed: -

The screenshot shows the 'People Counting' software interface. The window title is 'People Counting'. The interface is divided into several sections:

- Status:** A section on the left containing fields for Site ID, Location ID, Serial No (302200261), Logger Version (1.1), Logger Time (00:00:00 00/00/0000), Battery Voltage (3.68), and Total Count (0). Below these are logging duration (11 D, 20 h, 6 m, 54 s), store size (540672), pointer (667), and store wrapped status (No). There are buttons for 'Set Logger Clock to PC Clock' and 'Clear and Re-start Logging'. At the bottom left are radio buttons for 'Download All Data', 'Download With Computer Stored Pointers', and 'Download by Hand Set Pointers' (which is selected). The STIL logo and 'Scott Technical Instruments' are at the bottom left.
- Communications:** A yellow section at the top right with a dropdown set to 'COM4' and a 'Close' button. Below it, it shows 'F03-06-16-14-21.dat' with 'no data' and buttons for 'Set Filename', 'DownLoad Data', 'Plotting / Export', 'Check File(s)', and 'About'.
- Read Pointer / Read Count:** A section showing 'Read Pointer 0' and 'Read Count 65'.
- Password:** A field for entering a password.
- Connect Change:** A section with radio buttons for 'Single Pad, or Side by Side' (selected) and 'Bi Directional Operation', and checked boxes for 'Magnet Resets Totals', 'Magnet Restarts Logging', and 'Logging Enabled'. Below this is a 'Set' button.
- Factory Defaults / Turn Logger Off:** A section with buttons for 'Factory Defaults' and 'Turn Logger Off', and fields for 'Total Count', 'Direction 1 Total', and 'Direction 2 Total', each with a 'Preset' button.
- Clear Memory / Load Firmware:** Buttons at the bottom right.

Note: This full display will only be shown when the "Download by Hand Set Pointers" is checked. This is an engineering mode. Some of the configuration requires a password to be entered.

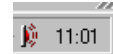
(c) INFRARED (IRDA) COMMUNICATIONS

The people logger software communicates via an international standard IrDA infrared link. Many laptops include this facility as standard for communications to cell phones etc. IrDA compatible units (usually with a USB connection) can be purchased from Scott Technical or at many retail computer outlets.

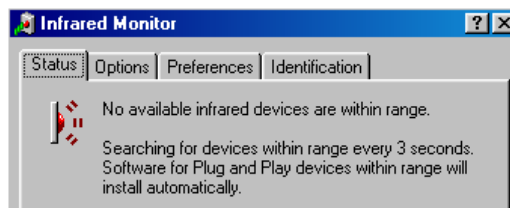
(d) ACTIVATING THE INFRARED LINK

The operation of IrDA varies from computer to computer, and among operating systems (Win 95, 98, 2000 etc), but the principles are the same.

When a computer has an IrDA port in operation, there is often a small icon next to the clock on the lower right hand side of the computer screen:



Alternatively, there will be a special infrared monitoring utility, usually available via the control panel (Start Menu/Settings/Control Panel). This displays a window as follows:



This display indicates when another device is in range. Bring the logger within approximately 5 to 10 centimetres (2 to 4 inches) of the Infrared window on the laptop. Press the MODE button on the logger five times. The LED will change from red to green during the IrDA communications initialisation. It will then give brief one second red flashes to indicate that the IrDA is still active. The display on the computer will change to: -



Which in turn will change to:



when serial communications is established.

This indicates that the computer sees the logger, and the logger sees the computer.

The PC software recognises different devices. The datalogger identifies itself as a “Generic IrDA” device. This sets up communications as a virtual serial port. This is usually “COM4”, but could be a different port. Some experimentation may be required.

In communications mode, the logger has much higher power consumption, and so will be automatically terminated after 20 seconds of no activity.

(e) OPERATING THE SOFTWARE

The following operations assume that IrDA communications between the logger and the computer have been activated, and the program started.

(i) Opening the serial Port

The serial port may be opened using the “Open” button, but any button in the program that communicates with the logger will attempt to open the port first. Opening the serial port allows the PC program to communicate with the PC's IrDA port.

The status of the port is shown in the top right panel, where a yellow colour indicates that the port is open. This also displays counts of all bytes sent and received.

(ii) Reading the logger status.

Use the “Read Status” Button. The status will be read and displayed. Note that almost all operations on the logger refresh the display of status. Note that sometimes a couple of attempts are needed before communication starts.

Site ID	--
Location ID	--
Serial No	302200263
Logger Version	1.1
Logger Time	17:05:49 03/06/2003 (-4)
Battery Voltage	3.67
Total Count	3
Direction 1 Count	0
Direction 2 Count	0
Logging Duration	4 D, 18 h, 44 m, 26 s
Store Size	540672
Pointer	317
Store Wrapped	No

The **Status** will be displayed as at left:

Site ID – An identifier for the site. The contents of this field are configurable (see below). It is displayed in the retrieved data files, and assist with file interpretation in environmental databases.

Location ID – A second identifier.

Serial No – should correspond with the label.

Logger Version – The version of the Firmware in the Datalogger.

Logger Time – The internal clock Calendar.

Battery voltage – Typically 3.6 volts. (Minimum is 3V)

Total Count – total number of events.

Direction 1 count (directional mode with two Counterpads only)

Direction 2 count (directional mode with two Counterpads only) Direction 1 count and Direction 2 count will add up to total count unless they have been preset in an alternative manner.

Logging Duration – The time in days, hours minutes and seconds since the start of logging.

Store Size – The capacity of the data logger in number of bytes.

Pointer – An internal value giving the current storage location used for the last event or time recorded. (See description later).

Store Wrapped – (Yes or No). A value of "Yes", indicates the buffer has overflowed and the values stored first are being overwritten. (This is normal operation).

(iii) Configuring the Logger

Items that can be configured without a password are:

- **Site ID** Logger and/or Installation information
- **Location ID** Logger and/or Installation information
- **Set Logger clock to PC clock**
This synchronises the Logger to the PC. Ensure the time is correct on your PC before use. We recommend the use of the Atomic Clock at www.worldtimeserver.com.

This option may be used for correcting for clock drift in the order of seconds, or at most a couple of minutes. If a significant change in the time is made (eg hours) then you should restart logging, as the current logged data will not be valid due to the clock error. The logger records details of the clock setting operation in its log, storing both the time before the correction and the time after.

- **Clear and restart Logging** Clears the Totals, resets the memory Pointer to the start of the buffer, and initialises the Time, ready for the Logging of events.

(iv) Passwords



Changing the configuration of the logger requires a four-character password. The default password is 'pass'.

Enter the password into the box, and then click "**Connect**". If the password is correct, then all options will become enabled.

To change the password, enter the new four-character password in the window then click "**Change**".

Note: a confirmation box displays the characters entered during password change. Do not allow others to see the computer screen while you are changing the password.

If you forget your password, please contact your supplier with the serial number of the logger.

(v) Password configured set-ups

- ***Lockout time***
This is the time interval after the first pulse from the Counterpad, during which the logger ignores succeeding pulses, which would probably be caused by the same person (or the rear wheels of vehicular traffic). This is typically set to 1.1 seconds. This interval has been found empirically to be an optimum. This can be increased for slower moving traffic by the user.
- ***Additional lockout time***
This is the time the lockout is extended should the person make multiple impacts on the pad. It is also the time the lockout is extended in multi-axle vehicular measurement. This is typically set to 0.5 seconds. This can also be user set, but not usually less than 0.5 sec.
- ***Directional operation***
Enables directional counting and logging. For directional counting, the logger displays the total count. A tap on the mode button shows direction 1 count, and second tap shows direction 2 count.
- ***Magnet Resets Totals***
If set, a pass of the magnet over the top of the logger resets the count(s). (Factory default)
- ***Magnet Restarts Logging***
If set, a pass of the magnet over the top of the logger resets the logging pointer, and logs an initial timestamp readying the logger for event recording. (This is the factory default setting)
- ***Logging Enabled***
Allows logging activity. (This is the factory default setting)
- ***Totals***
The totals can be preset to an arbitrary value.
- ***Factory Default***
Resets to default values: **Lock Out Time** and **Additional Lock Out Time**. Selects: **Magnet Resets Totals, Magnet Restarts Logging, Logging Enabled** and **Single Pad**. Does not alter Totals or event counts
- ***Turn Logger Off***
Disables the logger. Typically used for long-term storage. Battery consumption drops from approximately 25 micro amps to less than 1 micro amp. By reactivating logger with a magnet, it will return the logger to the user configuration prior to turnoff
- ***Clear memory***
For factory use only.
- ***Load Firmware***
For distributor use only.

(f) DATA LOGGING MEMORY STORAGE SIZE

The Datalogger stores three bytes of data for every time linked event. In addition, it stores the time four times per day, and at the start of logging. The time storage uses 14 bytes.

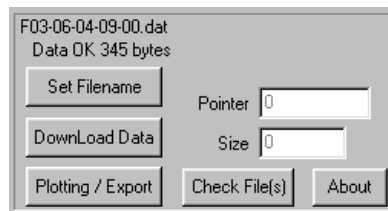
For most installations, the Logger will operate for a time period, the data will be retrieved, and then the logging restarted. In this case, the *Basic Data Retrieval* method should be used.

(i) Basic Data Retrieval

Data retrieval is simple. Choose the “Download data” option, enable the IrDA communications as described above, then click on “Download Data”. If there is no immediate response, try the button again.

The program always chooses a filename that represents the current date and time. This reduces the possibility file loss. An alternative filename can also be entered.

After download, the number of bytes retrieved is displayed as in the Status Panel below: -



In addition to count data, the data file contains the complete status of the Logger. It also has an encrypted Cyclic Redundancy Check Sum at the end of the file, to enable file integrity to be checked. The file may be validated with the “Check File(s)” option.

The maximum data file that can be unloaded in a single operation is 50 Kilobytes.

(ii) Alternative Data Retrieval options

The Datalogger operates what is known as a circular buffer. This means that when the memory is full, it starts overwriting the data at the beginning of the buffer – a process known as “wrapping”.

Using this method, the Datalogger always has either all of the data (if the store has not “wrapped”) or a full stores worth of data (500Kilobytes). In a wrapped store, the data starts just ahead of the current position (**Pointer**), and continues passed the initial start point, and finishes back at the Pointer.

When the data buffer is wrapped, the **Store Wrapped** status will show as "Yes".

(iii) Manual Pointer Operation

The basic data retrieval process collects the data since the last data retrieval, fetching only new data.

If you wish to collect all the current data in the buffer, choose the option “**Download by Hand set pointers.**” Always assume that the data for 300 bytes in front of the Pointer does not contain useful data. That is, when setting the Pointer manually, for a wrapped memory store, add at least 300 to the current **Pointer** shown in the status panel.

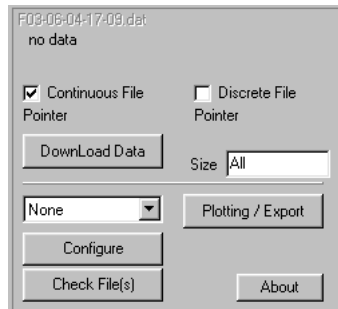
Enter values for the **Pointer** and **Size** (number of bytes to receive), and use the “**Download Data**” button. The data will be stored in the indicated Filename. This Filename is also based on the current date, hour and minute, designed to ensure that successive retrievals do not overwrite one another. As an option, the Filename can be set to the operators preference.

If the **Size** is left at zero, the program will unload the data from the **Pointer** value to the end of the data in the Datalogger, or 50 Kilobytes (whichever is smaller).

If the store is not wrapped, then use of the values 0 and 0 will download all data from the Datalogger, provided the Datalogger's current buffer size is less than 50 Kilobytes.

(iv) Computer Stored Pointers

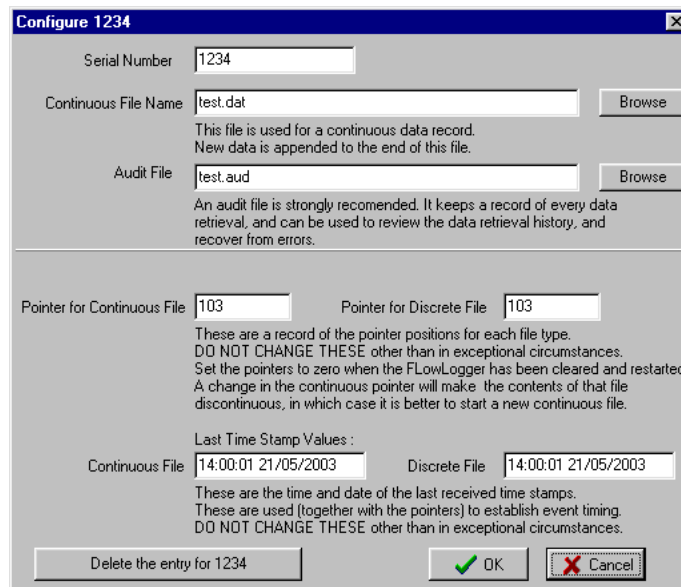
Managing pointers as above can be tedious. As an option, the computer can store the pointers for you. This is done using the computers registry. Choose the “Download with Computer Stored Pointers.” A panel will be displayed as below:



This sets the file download to one of two formats:

- **Continuous file** – New file downloads will be added to the end of the file.
- **Discrete file** – A new file is produced for each download, but the computer will remember the value of the last buffer location that was downloaded.

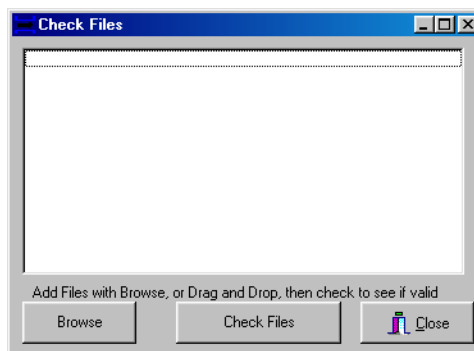
Use the “Configure” Button to bring up a configuration screen as shown:



For continuous files, both an **Audit File** name and a **Continuous File** name should be entered. The **Audit File** holds a record of every data download event. Set the **Pointer for Continuous File** and the **Pointer for Discrete File** to zero at the start of logging. Ignore the last time stamp values, as these are automatically updated as the data is retrieved.

(v) Checking Files

The “**Check Files**” button brings up a window as below: -



This is used to check the validity of data files. Add the files to the window using the browse button, or drag and drop as many files as required, then click on “**Check Files**”. All of the selected files will be checked for validity.

The check files option may be used for Discretely downloaded files and Audit files, but not for Continuous files.

(vi) File Checking Algorithm

The discrete and audit files have a last line as shown below: -

File Checking Value = 1794024146982095442

This line is checked for a match against all the other lines in the file. The check number is made by:

1. Calculating a 32 bit CRC of every character in the file.
2. Performing Triple DES encryption on that number
3. Inserting at the end of the file.

The same process is used for checking the file. Any modification to the file will mean that the file will subsequently fail the check described above. The check is sensitive to the most minor of modifications, such as modifying one letter or even swapping two digits about.

The Triple DES encryption is accepted as proof against any known code breaking techniques.

5) PLOTTING, PRINTING AND EXPORTING DATA

The data analysis window looks like:

