

7.5 Can not connect

The connection between the Control Unit and the Trolley is via Bluetooth. Obstacles such as metal and water (the human body is mostly water!) can degrade wireless signals – ensure that nothing is restricting ‘in the way’ of the signal.

Ensure that all batteries are fully charged (see section 3.1 for more information on the batteries).

7.6 Active Sync Connection Error

The most common cause of errors when trying to Active Sync the control unit to a PC is the PC firewall. Try temporarily disabling the firewall; if this works, add Active Sync to the ‘Exceptions’ list for the firewall.

If the firewall is not causing the problem, ensure that the Active Sync is listening on the correct COM port for the Bluetooth connection (see Section 4.6 - Bluetooth Active Sync Setup).



ABT4370 Data Logging Trolley



Instruction Manual

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7.0 Trouble shooter

7.1 Tips for Good Recording

The ABT4530 is a very accurate piece of equipment – many of the parameters that it measures rely on extremely sensitive sensors. Whilst every reasonable effort has been made to make it ‘railway proof’, users should treat it with extreme care.

The SE and Gradient measurements rely on accelerometers. As such, rogue accelerations can cause excessive errors – these can be caused by:

- Vibrations resulting from a dirty track/dirty wheels
- Starting/stopping suddenly or rapid changes in direction of travel

At all times, keep the measurement process as smooth and steady as possible.

The speed at which the trolley is pushed should be such that one measurement is taken every second.

e.g.

Recording Distance Interval	Walking Speed
1.00m	1m/s (slow/medium walking speed)
0.25m	0.25m/s (slow walking speed)

7.2 No Power

Check that both batteries are fully charged. The main beam takes approximately 6 hours to charge and the Control Unit takes approximately 3 hours.

7.3 No Beep

Power down the main beam, wait for 5 seconds and then switch back on. If there is still no beep, please refer to Section 7.2. If, after a full charge there is still no beep, please contact your local Abtus distributor.

7.4 Battery life is not to specification

If the battery’s duration does not last the normal time-frame specified, it may be time to change it.

The Control Unit battery may be replaced in the field. Replacing the batteries in the main trolley main requires that the trolley be returned to Abtus Ltd. Contact your local Abtus distributor for assistance.

See Sections 5.4 and 5.5 for additional information.

Twist is calculated as the measured difference in Super Elevation between the present position and the position one 'Twist Base' back. For this reason, no Twist data can be calculated until the distance travelled is greater than the Twist Base.

6.6 Vertical Versine

Accuracy	±0.2mm (@1.5m cord) ±10mm (@20m cord)
Resolution	1.0mm

The Cord Length used for calculating vertical versine can be defined by the user in **Settings** but must be in multiples of 1.0m.


A value for the local/instantaneous vertical versine (based on a 1.5m cord) is taken at every measurement point. When the trolley has travelled the same distance as the cord length specified by the user, the effect of all the instantaneous versine measurements is added together, this gives the required value for the user specified cord length³. For this reason, no vertical versine data is available for the first cord length of measurement.

³ This is **not** the same as an extrapolated versine value which assumes that the curvature at the local/instantaneous point represents the curvature over the larger cord length.

1.0 Item List

1. Main Beam
2. A-Frame
3. Control Unit
4. Weather-proof box for control unit.
5. Carry Bag
6. Instruction Manual
7. Trolley Charger
8. Control Unit Charger

2.0 Specification

Weight	- On Track - In Bag	15kg 18kg
Physical Dimensions	- On Track - In Bag	1750 x 1700 x 1200 (mm) 1750 x 1700 x 200 (mm)
Operating Temperature	-	-20°C to + 50°C (-4°F to 122°F)
Environmental Rating	-	IP65
Battery Life	- Control Unit - Trolley	5 hours ¹ 8 hours
Operating System	-	

¹ Spare batteries can be purchased separately and can be swapped during operation to extend operating time

3.0 Getting Started

3.1 Overview

The Abtus ABT4370 Trolley has been developed to provide the maximum degree of measurement from a small, lightweight apparatus.

The measurement sensors and data-logging electronics are embedded within the main trolley Beam. The raw measurement data is transmitted via Bluetooth to the Control Unit for interpretation, display and user interaction. The Control Unit uses the standard Windows operating system found on most mobile devices – this provides a familiar environment for the user to work in.

The use of wireless technology means that there are two separate batteries in your ABT4370:

- Main Trolley Beam
- Control Unit

Both of these batteries must be fully charged for the trolley to function for the specified operating period.

Please review Sections 5.0 and 7.1 prior to using your ABT4370 for the first time.

6.0 Measurement Characteristics

6.1 Distance

Accuracy	$\pm 0.25\%$
Resolution	0.01m
Min Interval	0.1m

Distance is measured by the front left wheel. Irregularities such as rail joints will adversely affect distance accuracy. Greasy, dirty or frosty rails will also degrade accuracy.

6.2 Gauge

Accuracy	$\pm 0.8\text{mm}$
Resolution	0.1mm

Gauge is measured as the distance between the rollers on the two gauging arms. Gauge is measured at a point 350mm behind the distance wheel.

6.3 Super-Elevation

Accuracy	$\pm 1.2\text{mm}$
Resolution	0.1mm

Super Elevation (SE) is a very sensitive measurement – 1mm of SE equates to approximately 0.038° . As it is so sensitive, excessive vibration will decrease accuracy.

6.4 Gradient

Accuracy	$\pm 0.05^\circ$
Resolution	0.1°

Gradient is a very sensitive measurement – see notes on Super Elevation.

6.5 Twist

Accuracy	$\pm 1.2\text{mm}$
Resolution	0.1mm

The Twist Base used for calculating twist can be defined by the user in **Settings** but must be in multiples of 1.0m.

5.5 Storage

If the trolley is not going to be used for a few days or more, it is recommended to keep batteries directly on charge.

If the trolley is not going to be used for a few weeks, it is strongly recommended that the batteries be fully charged and that the trolley be stored out of direct sunlight in a location of low humidity where the temperature will be between +20°C (+68°F) and +25°C (+77°F).

If the trolley has been stored for a long period of time, recharge the batteries completely prior to use.

If extended storage time is necessary, it is important to backup all data from the Control Unit to ensure no data is lost or corrupted.

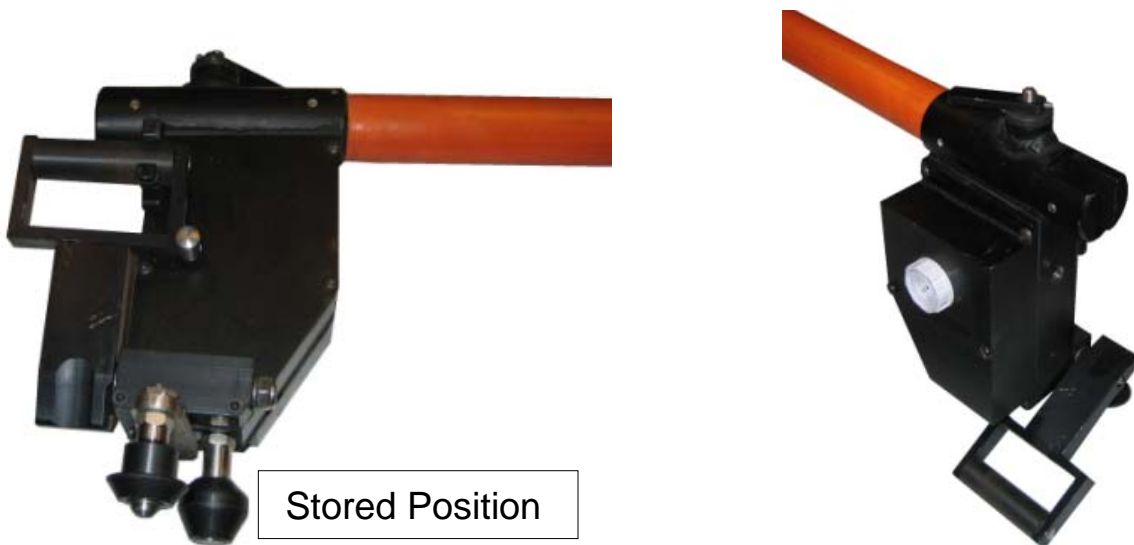
Keeping the trolley permanently on charge is also possible; however, this may affect the battery life and capacity over time.

3.2 Assembly

1. Lay the A-Frame and Main Beam out on the ground in approximately the correct place with the stabilising arms out flat on the ground.



2. On the Main beam release the vertical roller from its stowed position and rotate so that it contacts with the underside of the sensor.



3. Offer the two sections up to each other and fix in place using the knob on the A-Frame. Tighten the knob only a few turns to begin with as this enables the stabilising arms to be located to the main beam with greater ease with greater ease. With the stabilising arms located in the sockets on the main beam – fully tighten the knob on the A-Frame so that there is no gap between the Main Beam and the A-Frame.



4. Position the Hooked ends of the stabilising arms under the latch on the Main beam and pull down to tension.



5. To attach the control unit firstly ensure that it is sited with its protective box. Locate the two pins of the protective box onto the mounting plate (in the centre of the Handlebar). The connection is a push fit.



SD Card Reader

1. Remove the SD card from the control unit (always power down the control unit before removing the SD card) and insert it into the PC
2. Navigate to the above location on your PC using Windows Explorer and copy the Data Files as required

Abtus Ltd can supply SD Card readers that connect to a USB port.

5.0 Maintenance

5.1 Before Each Use

The following routine checks should be carried out immediately prior to use:

1. Ensure all batteries are fully charged (see section 3.1 for more information)
2. Ensure all wheels are clean and turn freely
3. Check that the Vertical roller is clean and turns freely
4. Wipe any accumulated grime/grease from the rollers on the gauge arms and guide wheels.
5. Ensure that the Gauge arms rotate freely and spring back easily

5.2 Every 3 Months

Check all rolling surfaces for flats – if any flats are found, the trolley should be returned to Abtus for the affected parts to be replaced.

5.3 Annual

The trolley must be returned to Abtus Ltd annually for re-calibration to ensure measurements are within specification.

The condition of all trolley components will be checked and any remedial work or replacement parts will be quoted at this time.

5.4 Control Unit Battery

The high-quality Lithium-Ion battery provided with the Control Unit may be re-charged over 500 times according to the battery manufacturer.

The main battery should last from 12 to 24 months if used under normal working conditions.

4.4 Fault Reports

It is possible to generate a fault report from a recorded Data File. A fault report is a condensed version of a recorded Data File which highlights any tolerance exceedences in the selected Data File. To create a fault report:

1. Ensure that the 'Settings Profile' you want to use for the fault report has been selected in the 'Settings' screen
2. Tap 'Fault Report' in the 'Options' screen
3. Select the file you want to create a fault report for
4. You will be notified by a message when the fault report has been created
5. You can review the fault report through the 'View Results' screen

Note – it is possible to create a fault report using a different tolerance profile than that which was used to record the file.

4.5 File Types

The ABT 4370 automatically saves two files for each recording. The file types are:

- *.csv
- *.sec

The CSV file is in a standard format which will open in almost any software package (e.g. Excel, Word, Notepad etc). This file contains all the Start and Finish information along with all the recorded data in an easy to read layout.

The SEC file contains exactly the same information as the CSV file but is encrypted. It is possible to view this 'secure' file through the 'View Results' screen (see section 4.3) however it is not possible to edit it. This file is tamper-proof and is suitable for auditing purposes.

4.6 Transferring Recorded Data Files to a PC

Bluetooth ActiveSync – Setup

ActiveSync

1. Connect the control unit to the PC using either a USB cable or a Bluetooth connection
2. Open Windows Explorer on the PC and in My Computer, select Mobile Device
3. Navigate to the above location and copy the Data Files as required

(Depending on the PC's Operating System, the PC may try to download ActiveSync from the internet when it has sensed the connection between the Control Unit and the PC – follow the on-screen instructions to complete this step)

3.3 Switching On

1. Turn on the Control Unit by pressing and holding the on button (please refer to manufacturers instructions as control units can vary).
2. Switch on the Trolley by firmly pressing and releasing the black button. The blue LED indicates that power is on. You should hear a short beep from the Trolley Beam shortly after switching it on. If you do not hear this beep, please refer to Section 7.0
3. Load the Abtus Gauge Interface software from the Start Menu
4. The software launches directly to the 'Connection' screen (as shown in Figure 1)

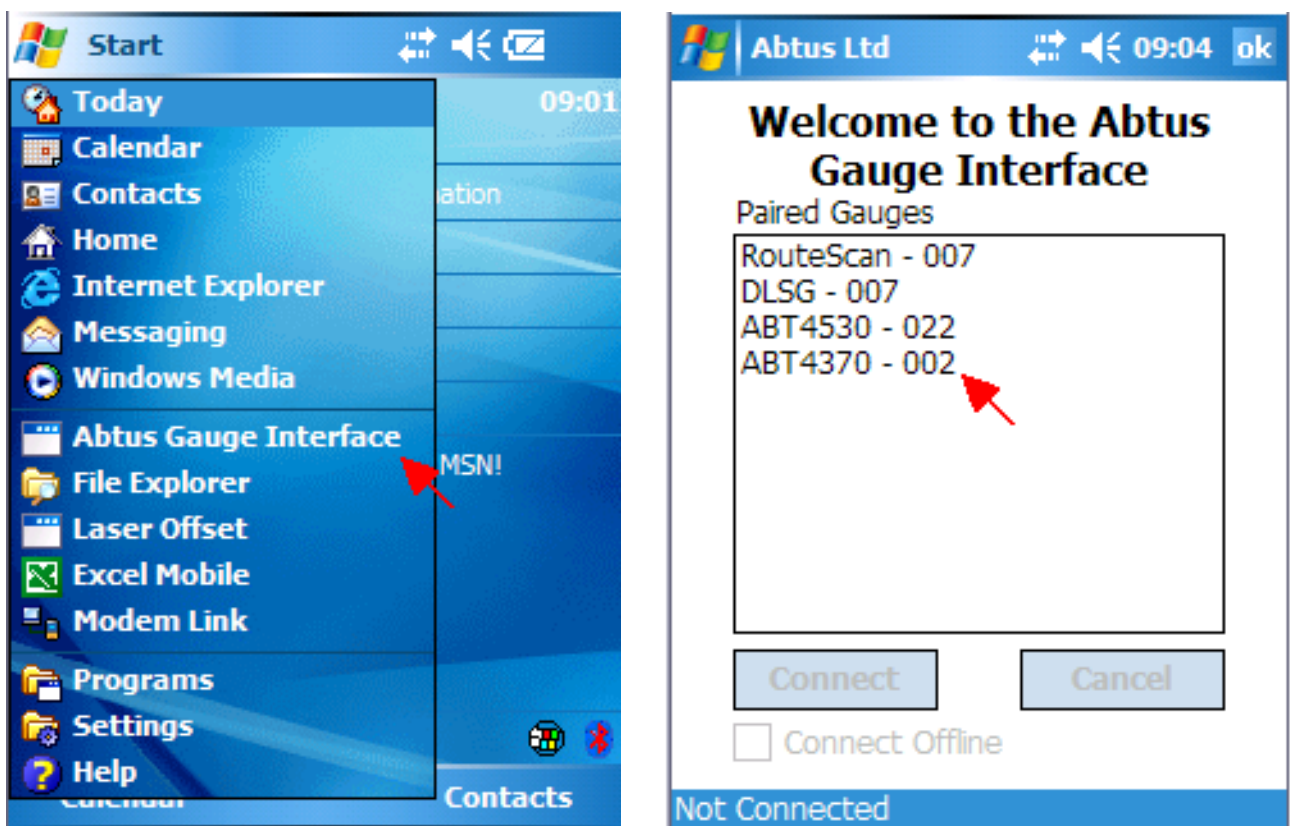


Figure 1

3.4 Bluetooth Connection

Before recording can start, a Bluetooth connection must be made between the Control Unit and the ABT4370 – imagine this step is like plugging in a cable between the Trolley and the Control Unit

1. Select the desired gauge from the list² and tap the 'Connect' button
2. Please be patient while the Control Unit makes the connection
3. When the connection has been made, the 'Options' screen (Figure 2) is displayed
4. If the connection fails, see Section 7.0 for help

3.5 Recording Data

The Abtus Gauge Interface software provides a versatile framework in which to record and analyse track data. These features are covered in depth in Section 4.0 – this section will only describe the steps necessary to start a recording.

1. Check that the gauging arms have been withdrawn by holding the black handles
2. Place the trolley carefully on the track and then release the gauging arms
3. Select 'Start Recording' from the 'Options' screen (Figure 2)

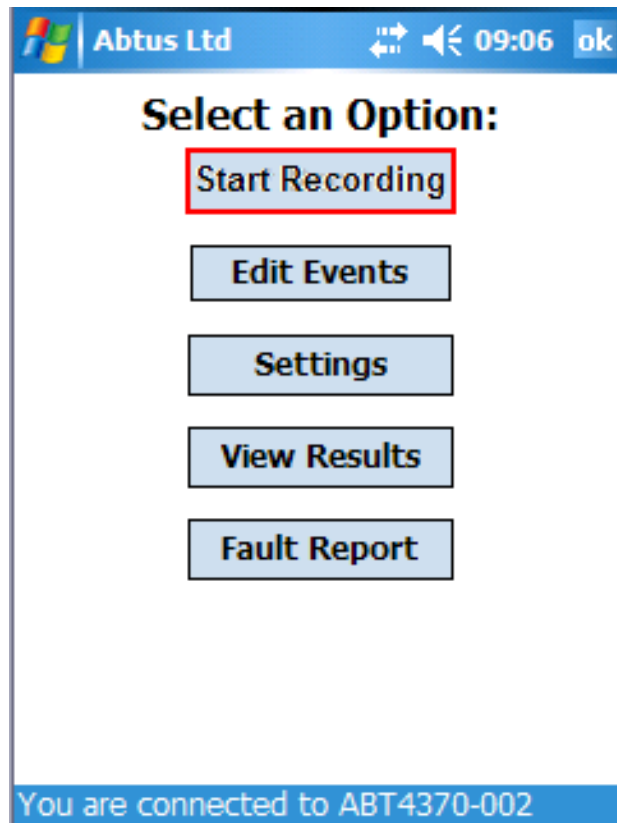


Figure 2

4. Input a file name for the recording in the 'Title' box (Figure 3)
 - 'Files' displays a list of existing recordings
 - Tapping 'More' will allow you to input additional information
 - Start Description
 - Start Distance

² The Abtus Gauge Interface software is common to all Abtus Bluetooth products and so it is possible to 'Pair' the Control Unit with a number of different gauges.

The coarse interval can not be less than 1.0m and is restricted to values which divide exactly into the specified Twist Base and Cord Lengths.

The fine interval must be less than the coarse interval and can not be less than 100mm. Fine interval values are restricted to values which divide exactly into the coarse interval.

Twist Base/Cord Length

To set the Twist Base /Cord Length:

1. Select the required measurement from the drop down list
2. Tap and Hold on the drop-down list box
3. Tap 'Change Twist Base/Cord Length'
4. Enter the new value and tap 'OK'

Bounds

Upper and lower bounds can be set for each measurement either as absolute values or as +/- values relative to the nominal value (e.g. 1435 +3/-2 is equivalent to 1438/1433). Check or uncheck 'Absolute' to toggle between the two modes

'Watching' a Measurement

When the tolerance of a watched measurement is exceeded while recording, the trolley gives an audible warning. The box containing the measurement (in the 'Results' screen) is also coloured in **RED** if over tolerance and **BLUE** if under.

Measurements must also be 'watched' to appear in a Fault Report (see section 4.4).

To create a new Settings Profile, select '*Create Profile...*' from the drop down box at the bottom of the screen.

To rename/delete a profile:

1. Select the required Settings Profile
2. Tap and Hold on the drop down list
3. Carry out the required action

4.3 View Results

To review recorded Data Files and Fault Reports (see section 4.4) tap the 'View Results' button in the Options screen. Select the file you wish to review from the drop down box at the bottom of the screen. Toggle between file types (see section 4.5) using the button in the bottom right of the screen.

The event text is inserted into the recorded Data File after the most recent measurement point.

4.2 Settings

The settings screen (Figure 6) is where recording parameters and tolerances are defined. Multiple Settings Profiles can be created to suit various requirements such as different line speeds.

To create a new Settings Profile, select 'Create profile...' from the 'Select a Settings Profile' drop-down list box.

To rename or delete a Settings Profile, select the required Settings Profile and then tap and hold on the drop-down list box.

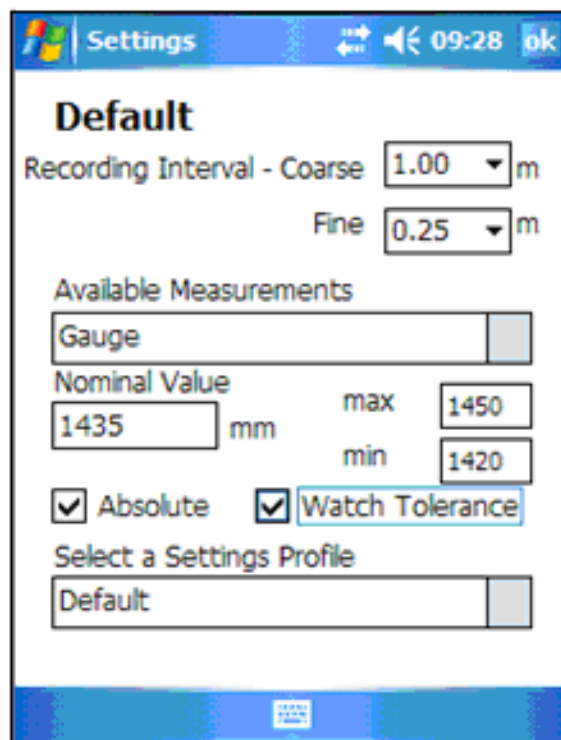


Figure 6

For each Settings Profile, the following parameters can be set:

- Coarse measurement interval
- Fine measurement interval
- Twist Base
- Upper and Lower bounds for each measurement
- Whether the measurement is 'watched' or not

Distance

Two different measurement intervals can be set up. It is possible to toggle between Coarse and Fine while recording.

- Whether the distance should 'Count Up' or 'Count Down'

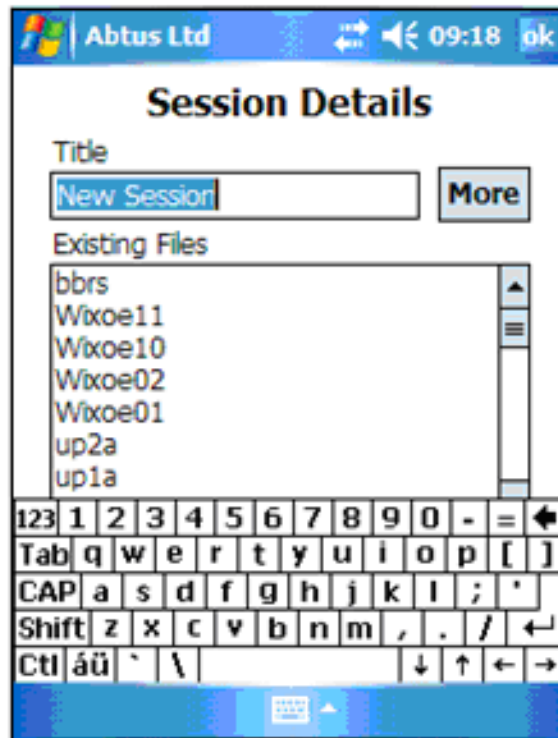


Figure 3

5. Check that the gauging arms have been released and that the trolley is in the correct position on the track.
6. Tap 'Start Recording' (You may need to remove the keyboard from the screen, to select this tap the icon at the bottom centre of the screen) – this will begin the data acquisition process and display the 'Results' screen (as shown in Figure 4).
 - Two measurements can be displayed on the screen at one time
 - Tap in the box containing the measurement to cycle through the available measurements
 - Tap in the yellow 'Interval' box to toggle between a coarse and a fine measurement interval
 - Data is recorded at every 'Interval', however, if the trolley is pushed very slowly or is stationary then the data on the screen is refreshed twice a second
7. When you have recorded the required length of track, tap 'Stop Recording'. This will take you back to the 'Session Details' screen
8. Input a 'Finish Description' if required
9. Tap 'Finish' to complete the recording process and save the file.

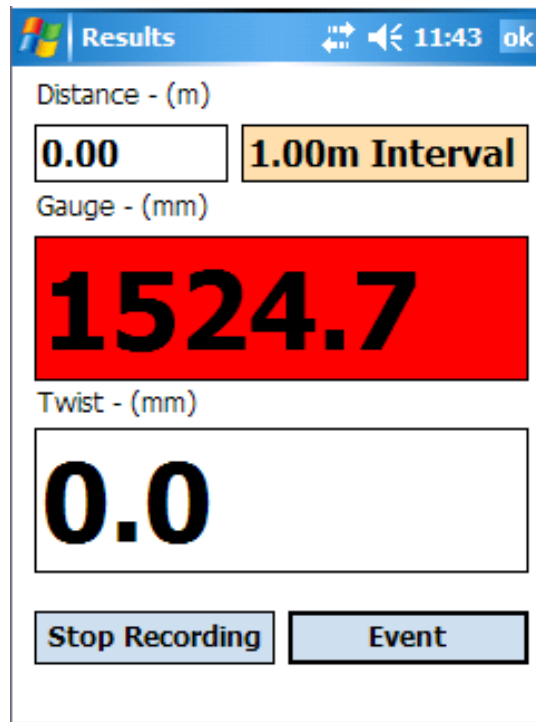
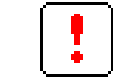


Figure 4

4.0 Software Features

4.1 Events

The ABT4370 trolley has the facility to store 12 separate events. Events are of one of three types:



Warning



Information



Marker

It is not possible to edit the events while recording. To edit the events:

1. Tap the 'Edit Events' button in the 'Options' screen (Figure 2)
2. Tap on the text of the event you want to edit (Figure 5)
3. Edit the text
or
4. Tap the icon to the left to change the event type

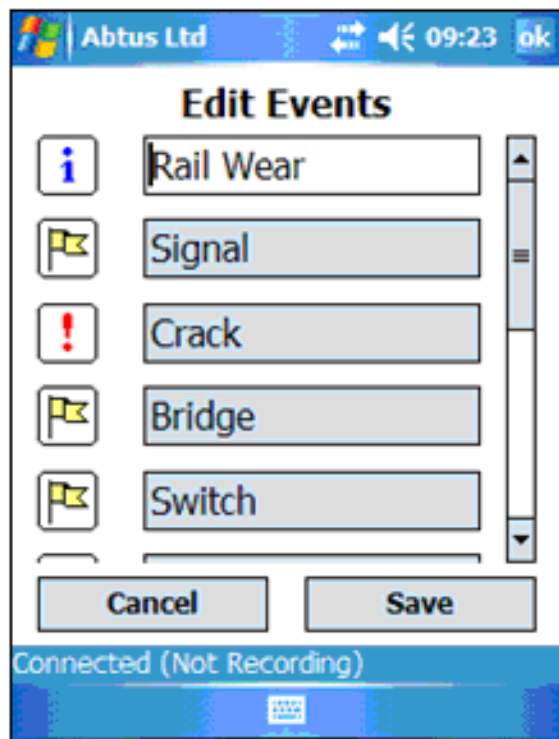


Figure 5

These events can be selected at any time while recording. To select an event:

1. Tap the 'Event' button when in the 'Recording' screen
2. Select the required event
3. Tap the 'Add Event' button