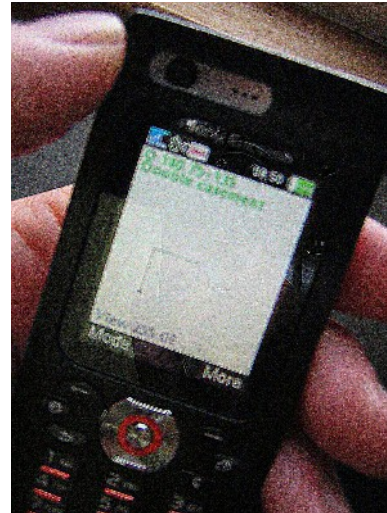


Surveyor

v.1.3

user guide



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Surveyor is a surveying tool for mobile phones. You can use your phone to log survey data. Used with a Leica Disto equipped with Bluetooth, transfer of the measurements from the Disto to the phone is largely automatic. The application can be used for almost any type of dimensional survey but is particularly useful for building surveys. You can record heights as well as plan dimensions and add comments. the survey plan is drawn on the screen as data is added and surveys may be transferred to a computer for viewing with the companion **Survey Viewer** application or for importing into a CAD system.

Pocket Britain is designed to run on most mobile phones on sale in the UK, though of course those without Bluetooth will not be able to communicate with a Bluetooth Disto. See the appendix for more notes on hardware and other technical aspects. **Version 1.3 adds survey data transfer to computer via Bluetooth for Bluetooth phones.**

getting started

Installation of the application varies according to the phone. Some come with software for your computer which allows you to install it from the two files provided: Surveyor.jad and Surveyor.jar. Some phones will install Java applications themselves once these files have been copied to the phone using a data cable, Bluetooth or infra-red.

With the application installed on your phone you will be able to start it from the *Applications* or *Games* screen (depending where you installed it). Later, when you have finished using **Surveyor**, use your phone's usual method to quit the application. This might be the *Exit* option on a Nokia Series 60 phone, Sony Ericsson's *activity menu* key or just pressing the 'hang up' button.

The illustrations show a 'platonic' mobile phone. Your phone will look different but the functionality, screen layout, options and phone features will all be similar.

At the bottom of the screen are labels for the option keys immediately below. The available options and the effects of these keys will vary according to the state of the application. Virtually every mobile phone has a numeric keypad and navigation keys (or a small joystick) usually incorporating an OK/SELECT key. The rest of the illustrations just show the screen.

Surveyor normally starts in the *survey list*. You can have several surveys stored on the phone and here you choose which you want to view or you can use the **New** option to create a new survey. The first time you use the program there will be no surveys to list and you will be invited to create a new survey. Give it a name and **Open** it.

Most of your work takes place in the *survey screen*. this shows a plan view of your survey. When you create a new survey a *Point* element is created and labelled 'START'. It appears a small square at the centre of the screen. Information about the last element entered is shown at the top of the screen in blue and a status message at the bottom of the screen confirms the survey name and that you are in *Draw* mode.

Draw mode is used when you are logging survey data and the survey plan is drawn on the screen. The other mode is *View* mode. More on this later.

The *Point* element is used to record survey features which have no significant length. Examples in a building survey might be rainwater pipes or manhole covers. There are three other types of survey element: *Distance*, *Wall* and *Opening*. The last of these is used for both windows and doors. All three of these must have a horizontal dimension and any survey element can be given one or more heights and/or a comment or label. The 'P 0+0' indicates that this element is a *Point* whose heights are 0.

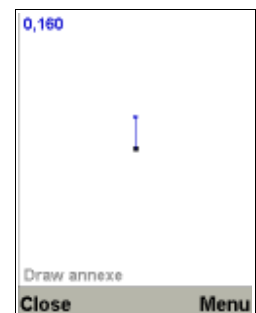
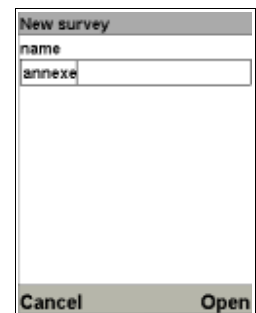
the first measurement

Before beginning a survey, decide where to start and how to orientate the plan. One answer would be to have north at the top of the screen and your first measurement might be the length of a wall, north from the start point. Use the UP key to move the cursor in this direction. The information line at the top of the screen now indicates the movement of the cursor. One pixel represents 5 *survey units* with positive values representing movement to the right and/or up the screen and negative values being left or down.

The application is agnostic in regard to measurement units. A *survey unit* can be what you wish. For building surveys the recommended unit is the centimetre, allowing a reasonably large survey with realistic survey accuracy. American surveyors may prefer their *survey unit* to be the inch. Only whole numbers may be entered, so reserve metres (or feet) for very large coarse-grained surveys.

Do not worry about moving the cursor by a particular distance – you will be entering the actual measurement in a moment. The aim is simply to indicate the direction. None-orthogonal directions may be judged by eye or can be set accurately by *triangulation*, discussed in detail later.

Press the SELECT key then choose the element type. Here it is a *Wall*.



Measure the length of the wall and type it into the phone. You may simply be recording plan dimensions and need no more information about the wall or you may want to move to other fields in the form and record heights or a *comment*, label or brief description.

All walls have a *height* and some may have a *base height* (above or below the datum level used for other walls) while if the wall top follows a sloping ceiling for example, the *end height* may differ from the height at the start.

Select the **Add** option and the wall is drawn to scale on the screen with the end of the new wall is at the screen centre. Information about the wall appears at the top.

Take care to enter the length correctly. If you make a mistake use the **Undo** option to remove the last element. Heights and comments are less critical and may be added or changed later, but changing a length may affect the geometry of the survey and must be right.

more survey elements

Use the *Distance* element for simple measurements which do not represent real objects and add windows and doors as *Openings*. These have *width* rather than *height* and the *base height* represents the height of the cill (above the bottom of the wall it is in). Most doors will have a *base height* of 0, but a value may be needed here for a raised threshold.

Distance elements have no *base height* but can have an end height. this might be useful to indicate changes of level, for example.

Wall elements are drawn black on the screen. *Opening* elements are grey and *Distance* elements are drawn blue.

To add a *Point* element, press the SELECT key without moving the cursor. This will by-pass the menu of element types and you can enter heights and/or comments straight away.

It is a good idea to save the survey data every so often. there is no separate 'save' option, but the data is saved when you use the **Close** option to return to the *survey list*. Just SELECT your survey again to continue logging data.

There are shortcuts which by-pass the *Element type* menu and take you straight to the data input screen. They are based on the letters associated with the numbered keys of the phone keypad. Press key 3 (D) to add a *Distance*, 6 for an *Opening*, 9 for a *Wall*, or 7 for a *Point* element.

View mode

You may want to pause and review what you have measured so far. To do this use the **Mode** option. This switches between the two modes of operation – *Draw* and *View*.

Information about the currently selected element now appears in green as a reminder that you are in *View* mode, while the selected element is drawn green and there is no blue cursor.

The function of the navigation keys changes in *View* mode: LEFT steps back

Wall
length 300
height 235
base height
end height
comment
100mm block + plaster
Cancel
Menu

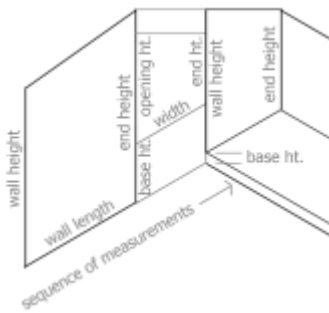
Wall
length 300
height 235
base height
end height
comment
100mm block
Menu
1 Add
2 Triangulate
Cancel
Menu

W 300 0+235
100mm block + plaster
Draw annexe
Close
Menu

Opening
width 120
height 118
base height 90
end height
comment
top hung
Menu
1 Add
2 Triangulate
Cancel
Menu

O 120 90+118
top hung
Draw annexe
Close
Menu

O 89 0+202
half-glazed door
Draw annexe
Menu
1 Mode
2 New
3 Undo
4 Leica BT
Close
Menu



to select the previous element and RIGHT moves to later elements. The current element always ends at the centre of the screen, so *View* mode not only shows you details of each element but allows you to move through a large survey which may extend beyond the confines of the screen. The UP key jumps straight to the first element in the survey (the START point) and DOWN jumps to the last element to be added.

Pressing SELECT allows you to edit or add data for the highlighted element though you cannot change horizontal dimensions.

When logging data you may not always be able to move in a smooth sequence around a building, but may need to go back to a previous point and branch off in a new direction. To do this, use *View* mode to navigate to the element which ends at the new point of departure then switch back to *Draw* mode and continue adding elements from there.

survey size

Surveyor records measurements and locations using integers in the range +/- 32768, so a survey cannot extend much more than 32000 survey units from the start point. If the survey unit is cm, for example, the maximum extent of the survey would be around 640m. This is plenty for most buildings, but millimetre accuracy (not very realistic anyway) would reduce the limit to around 64m which may be too small for a very large building. If survey size is an issue, be sure to use a suitable measurement unit and try to start near the centre of the area to be surveyed as this will allow the maximum extent in all directions.

triangulation

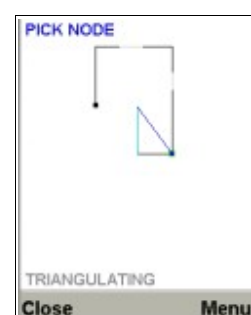
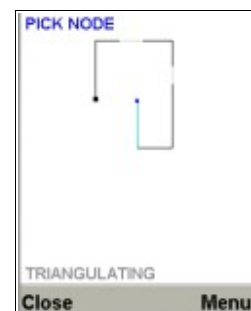
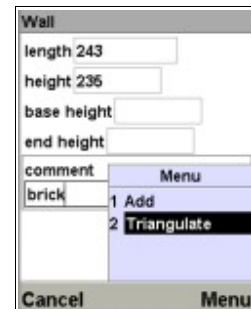
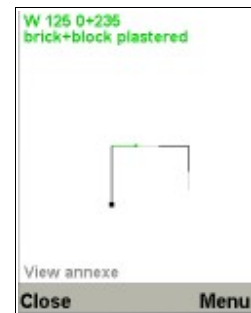
An essential technique for accurate surveying of irregularly shaped buildings, *triangulation* is built into **Surveyor**. If it is suspected, for example, that a wall is not exactly at right-angles to another, this technique uses measurements from two points to fix its exact direction.

Input the measurements for the element (a *Wall*, *Distance*, or *Opening* – you cannot triangulate a *Point*) in the usual way but then select the **Triangulate** option instead of the usual **Add**.

A screen message asks you to pick a node. The survey geometry will be determined by the length of the element you added, the location of its start and the location of another point whose position is already known and which should be far enough from the element for the three points (the start and end of the new element and the node you pick) to form a 'generous' triangle – one that is not too thin.

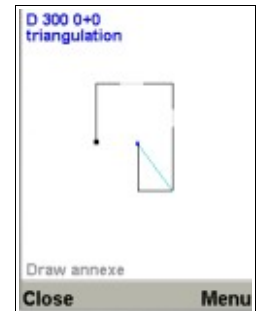
Use the navigation keys to move the cursor to a suitable node. Here it is the start of the previous element, the bottom wall on the screen. When the cursor is close enough to a node it is highlighted in green.

Press the SELECT key and measure and enter the distance from this point. this defines a new *Distance* element which is given the label 'triangulation' and which fixes the geometry of the element you were adding.



When you choose the **Add** option the new element will be drawn at the correct angle and length, along with the *Distance* element representing the triangulation measurement.

Triangulation is an essential tool when fixing locations around buildings, which will not usually be laid out orthogonally. Even in a building planned on the usual pattern of right-angled corners and rectangular rooms, some walls may be out of square (particularly in older buildings) or isolated from other parts of the layout. In some surveys it might be a good strategy to use a series of triangulated *Distance* elements to set out the geometry of the layout before making a second pass to measure specific features. The *Distance* elements can then be used as guides for the direction of these elements.



Bluetooth

So far, manual input of survey data has been described and mobile phones with their numeric keypads and one-handed operation make it very easy to log measurements, while the measurements themselves may be made with any suitable tool such as a tape or a measuring rod. But if you have a Bluetooth phone and a Bluetooth-enabled *Leica Disto* such as the A6 model collecting the data is easier still.

To make the wireless connection, turn the *Disto* on and press the **Bluetooth** button then select the **Leica BT** option in **Surveyor**. After a few seconds, you should see a list on screen of all Bluetooth devices within range. This may of course include any other phones, computers, etc. in the locality, but the *Disto* should be clearly recognisable.

SELECT the *Disto* from the list . Your phone may ask for permission to make the connection. After a few seconds the *Disto* should beep and the phone will show the survey screen again. Press the *Disto's* 2nd button to ensure it is operating in the communication mode.

You can continue to make measurements with the *Disto* in the usual way, but in the 2nd mode the measurements can be transmitted to the phone and the *Disto's* buttons used to control **Surveyor**.

You can move the cursor either with the phone navigation keys or using the directional buttons on the *Disto*, while the **Bluetooth** button sends a measurement to the phone and may be used to start the next survey element. The first measurement is used as the *length* (or *width*) of the element and you can transmit subsequent measurements into the other (height) fields in sequence, each press of the **Bluetooth** button moving on to the next field (and cycling back to the start) until you **Add** the element.

Using Bluetooth does not mean you cannot still enter measurements manually, you can mix both.



The first Bluetooth measurement goes into the *length* field; the next is the *height* and so on until you **Add** the element. Comments must be added manually.

data transfer

Surveyor is great for collecting survey data, but the real benefit is being able to transfer the survey from the phone to a computer and even into a CAD system.

There are three possible ways to **Transfer** data from the phone. If your phone has Bluetooth and/or a memory card you will be presented with a menu of the available methods which may include...

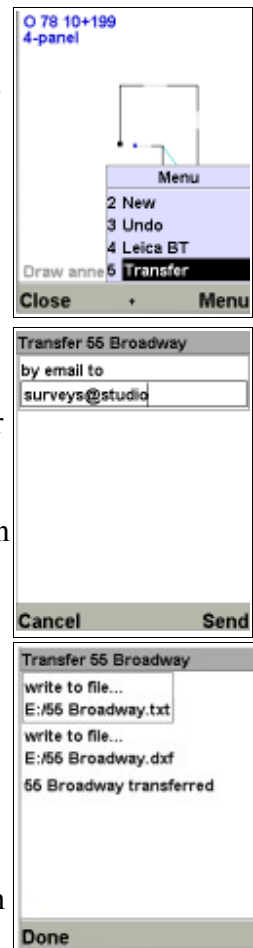
Bluetooth to transmit survey data files to a Bluetooth-equipped computer, **memory card** to save survey data files on the phone's memory card, and **email** to send compact survey data to any email address.

If neither Bluetooth nor memory card options are available you can still transfer a survey via **email** straight from your phone. You can do this anywhere you have a phone signal, provided your phone has been set up for internet access. Simply enter an email address and press **Send**. Your phone may ask permission to connect and you will see one or more status messages during the transfer. Press **OK** to return to the survey screen.

The email will arrive at the destination from postmaster@poco.org.uk with the survey name as the subject. The survey data is encoded as the message. Large surveys are split into two or more numbered emails.

Use the bundled **Survey Viewer** to translate the survey into text and DXF formats, to view it in plan and 3D, and to measure floor and wall areas.

The **Bluetooth** and **memory card** options save a survey as a text file which tabulates the survey data in a human-readable TXT file and as a DXF file which can be imported into a CAD system. After searching and listing available devices, you select the destination computer and Bluetooth sends the files straight there. Alternatively the files are saved on the memory card and can be copied to a computer using a data cable, Bluetooth or a card reader. Status messages confirm the transfer has taken place.



appendix

hardware

Surveyor will run on most mobile phones currently sold in the UK. To link to a Bluetooth *Leica Disto* or to transfer survey data direct to a computer your phone will need Bluetooth. For the more technically minded the minimum requirements are: Java MIDP 2 and CLDC 1.0. These are in fact standard on most mobile phones on the market in the UK. Java JSR-82 is needed for a Bluetooth link and JSR-75 to export data to a memory card. A modern phone with a memory card and Bluetooth is likely to implement these in Java.

security

Java has high levels of security built in as a precaution against rogue software accessing private data. It is part of this security to ask permission to make a Bluetooth connection or save data to the memory card. Your phone should allow you to set permissions for the application and setting the lowest level of security for **Surveyor** will minimise the requests. Other software will not be affected.

Surveyor was developed with the assistance of Leica Geosystems AG
www.leica-geosystems.com

