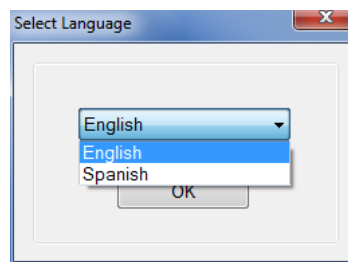


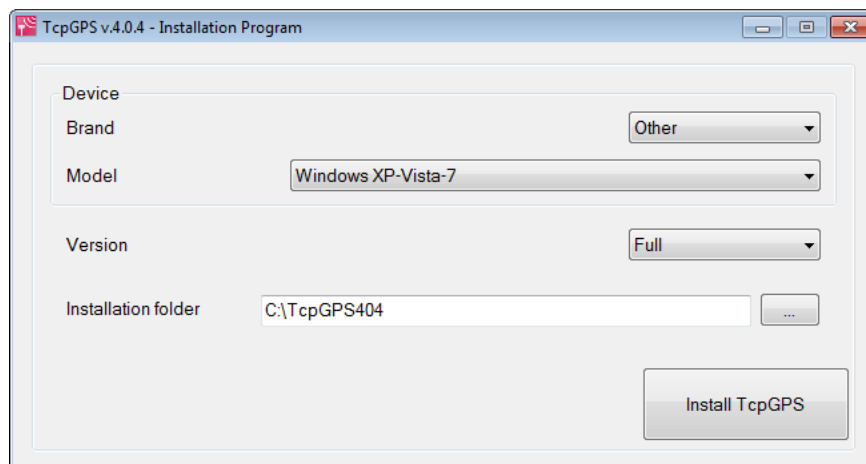
## Installation

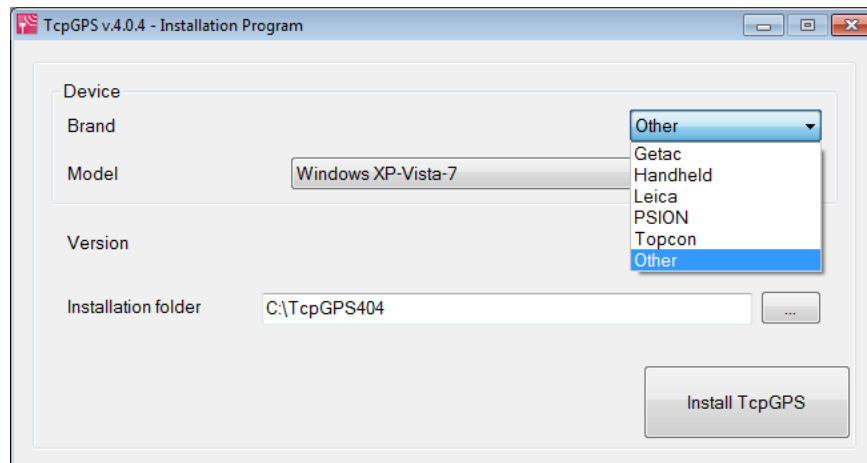
The steps below must be followed:

1. Decompress the file **TcpGPSSetup.zip**.
2. Execute the file **vc redistrib\_x86\_VS2008.exe**. This application will install the libraries required to execute the TcpGPS installation programme.
3. If you're going to execute the installation for Windows CE, synchronise the mobile device with the PC via Microsoft ActiveSync or Windows Mobile Device Centre.
4. Execute the file **TcpGPSSetup.exe**.
5. Select the installation programme language:

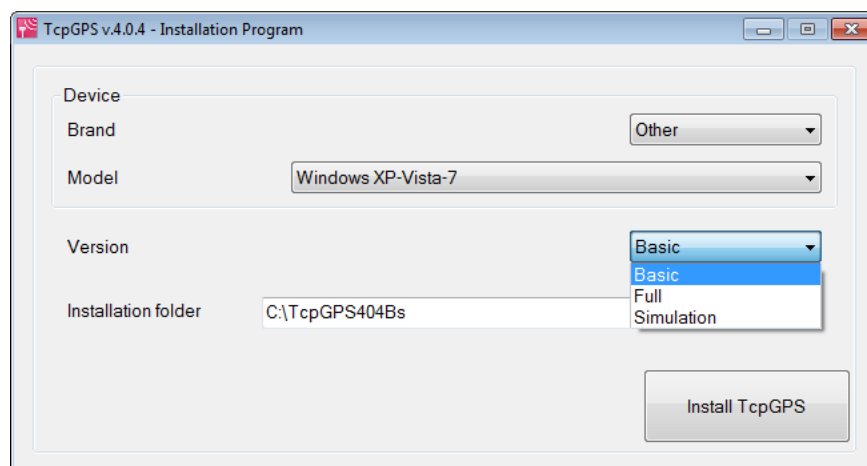


6. Select the **Brand** and the **Model** of the device; if you wish to install the application on a PC or on a mobile device which does not appear on the list, you must select **Others** as the brand.

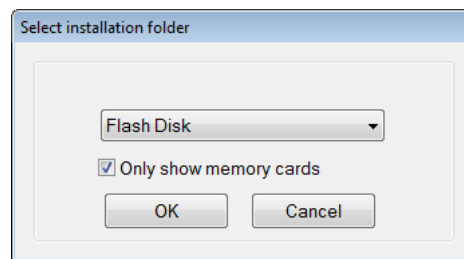
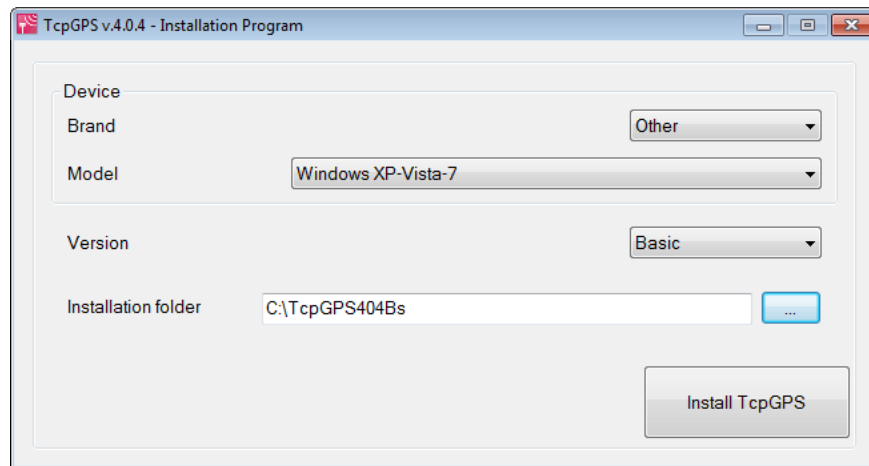




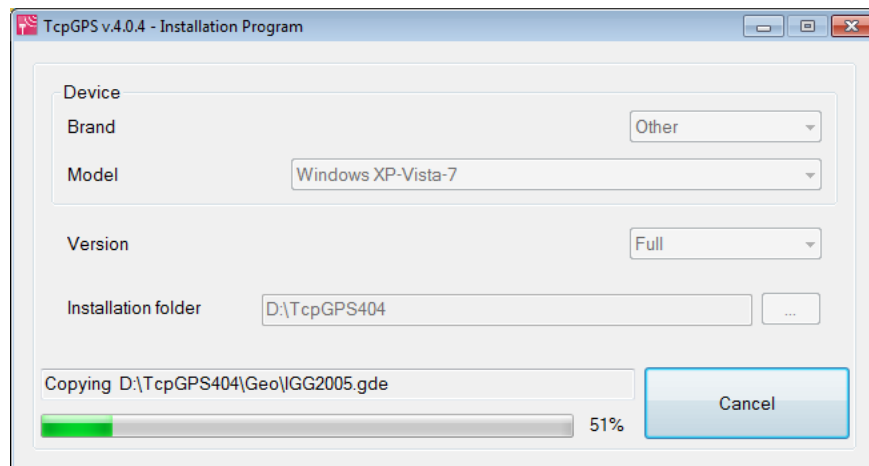
7. Select the *Version* to be installed. You can choose between **Basic** or **Full**. The difference between both is that the latter includes the road module. For PC there is a **Simulation** version distributed free-of-charge with the version for mobile device which allows works to be prepared on the PC and subsequently for them to be copied to the device.



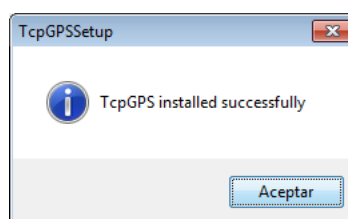
8. Select the *Installation Folder* by pressing the  button on the right of this box. On the mobile devices it is recommended to install the programme on permanent storage cards (SD, Compact Flash, etc). To see the list of those to be found on the device, the **Only show memory cards** box must be marked.



9. Press the *Install TcpGPS* button.



10. Once installation is complete, the following message appears:



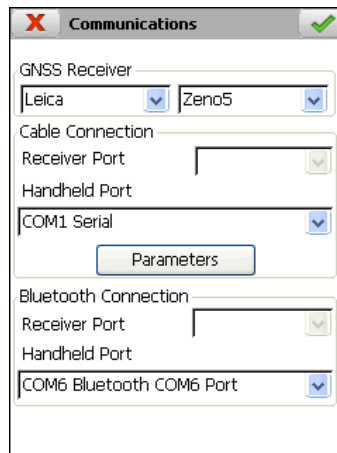
11. Press *Accept* and close the installation programme.

## Configuration

The first time the program is run, a dialog box will be displayed where at least the following data should be entered:

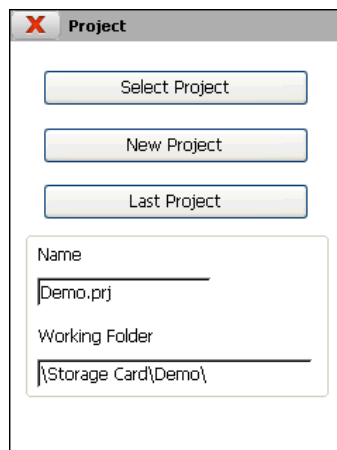
1. GNSS receiver brand and model.
2. Communications ports of the device and the GNSS receiver for cable or Bluetooth connections. The communication parameters (bits per second, parity, flow control, etc.) should be specified for the former.

This dialog box can also be accessed from the **Communications** option within **Settings** menu.




## Starting Up the Program

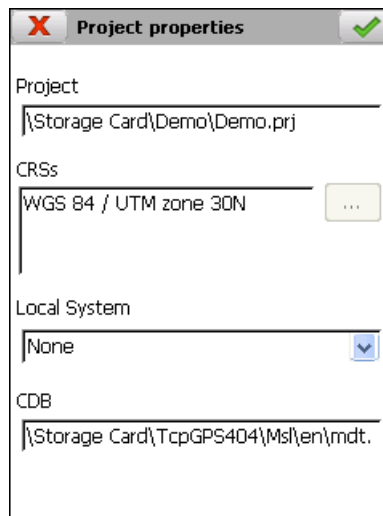
1. Choose the TcpGPS option from within the Program group or execute the program shortcut.
2. A new menu containing *Last Project*, *Select Project* and *New Project* will then be displayed. If it is the first time the program is run, you have to click on *New Project*.



## Creating a Project


The program requests a name for the project, as well as its location within the file system. It is highly recommended to save files in stable memory drives such as Compact Flash or SD memory cards, as otherwise the data will be lost when the device is rebooted due to a lack of battery power or other reasons. The name of the relevant folder will vary depending on the mobile device, and could, for instance, be: \Storage Card or \Flash Disk.

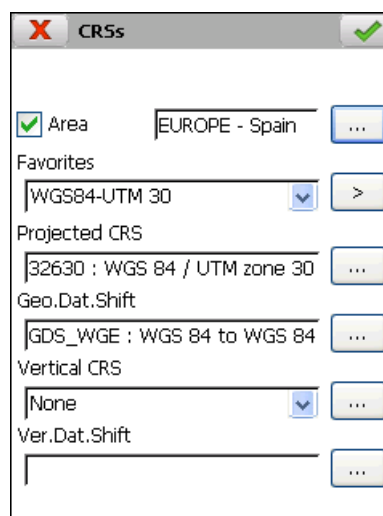
1. Select the folder desired, enter a valid file name and click on  button.
2. A dialog box is then displayed as follow:



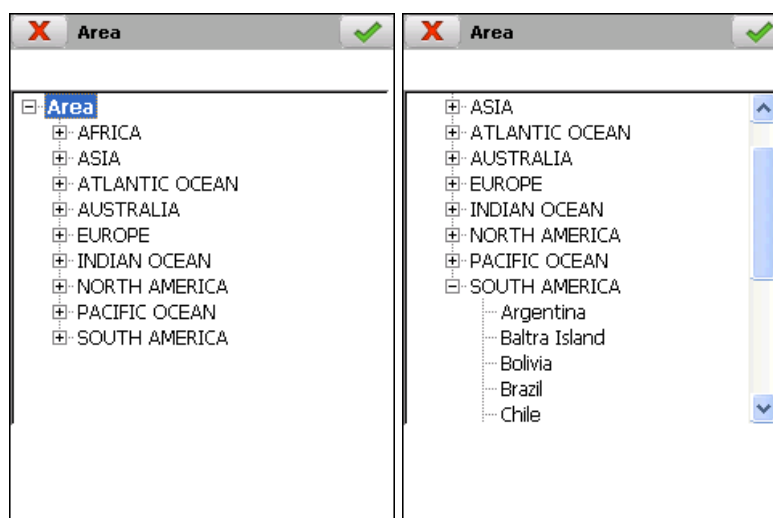
**Project:** Shows the project name and work directory.

**CRS:** Coordinate Reference System. Shows the datum and the projection system selected. if you are using a geoid to obtain orthometric altitudes, the vertical CRS is also shown. (See section **Settings > Geodesy**).

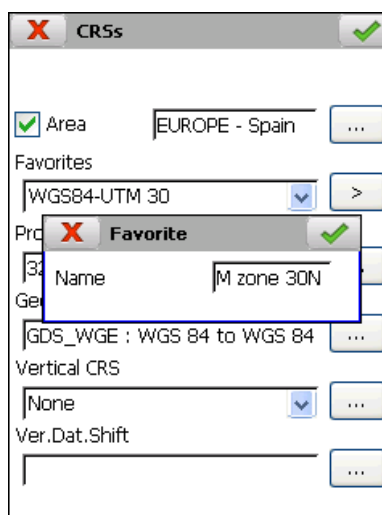
The current system parameters can be changed by pressing the  **button**



**Area:** Allows the filtering of the coordinate system parameter search, leaving only the elements of the selected zone. If you do not wish to use this filter, the box should be unchecked. By pressing the  button, the following list of continents and countries is shown:



**Favourites:** If a country is selected, a list is shown of the coordinates' systems most used in this zone. Each element of this list contains information about the 4 parameters which are requested below. A new favourite system can be added by pressing the  button and entering a name.



**Projected CRS:** Projected coordinate reference system. With this parameter the projection system is indicated (UTM, Lambert, etc) and the datum used. (See section **Settings > Geodesy**)

**Geo. Dat. Shift:** Indicates the transformation of geodetic datums used. It is necessary to transform the geographic coordinates received from the GNSS receiver at projected coordinates. (See section **Settings > Geodesy**)

**Vertical CRS:** Vertical coordinate reference system. Indicates the system used to correct the altitudes on the ellipsoid WGS84 which sends the GNSS receiver. (See section **Settings > Geodesy**)

**Ver. Dat. Shift:** Indicates the transformation of vertical datums used in the CRS. Only transformations based on geoid files are allowed. (See section **Settings > Geodesy**)

**Local System:** This allows a local transformation to be established in the project to be adjusted to the work area. (See section **Local System**)

**CDB:** Shows the directory and name of the file from the code data base which is used in the project.

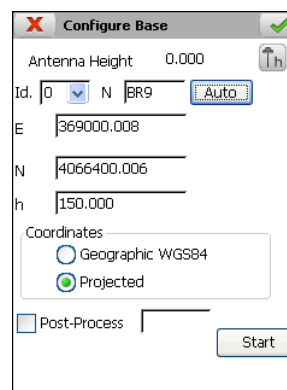
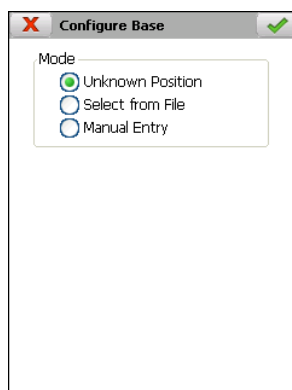
3. The program then creates a project file and displays a confirmation message. An empty point file, a stations file and a results file for setting out are additionally created having the same name as project.

## Configuring the GNSS Receiver

In the most common case, working in RTK with base and rover, proceed as follows, unless work styles have previously been configured.

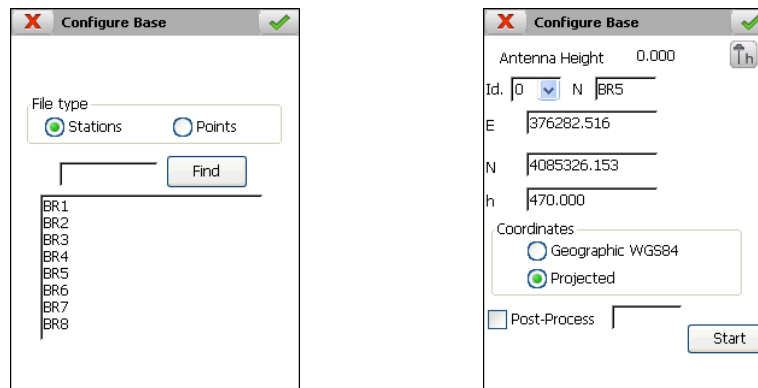
### Configuring the Base receiver with Random Coordinates

1. Select the **Configure Base > Unknown Position** option within the **GPS** menu.
2. In the next dialog box, an antenna height should be entered and a name assigned to the station. Then click on **Auto** button.
3. If the save with Post-Processing box is marked, you have to enter a file name or accept the file name proposed.
4. Click on the **Start** button. The message **GPS configured in station mode** will then be displayed.




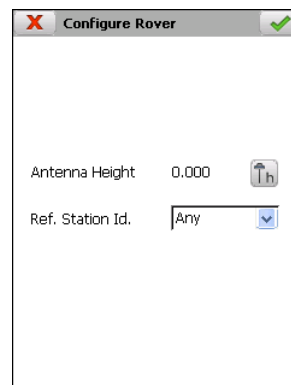
## Configuring the Base Receiver with Known Coordinates

1. Select the **Configure Reference** option in the **GPS** menu and on this screen either the **Select from File** or **Manual Entry** options.
2. If the **Select from File** option is chosen, select the coordinates from the project's points or station file.
3. The antenna's height should be entered in the next dialog box. Then enter the coordinates desired if **Manual Entry** was chosen.
4. If the save for Post-Processing box is activated, you have to enter a file name or accept the file name proposed.
5. Click on the **Start** button. The message **GPS configured in station mode** will then be displayed.



## Configuring the Rover Receiver

1. Select the **Configure Rover** option in the **GPS** menu.
2. Enter the antenna's height.
3. Click on  button. The program then waits to establish the data link with the base receiver.





## Survey


The receivers should have been properly configured in order to start surveying.

Click on the relevant option or the mobile device's physical key chosen in configuration to save a point. It is also possible to access the current precision parameters to modify them at any time.

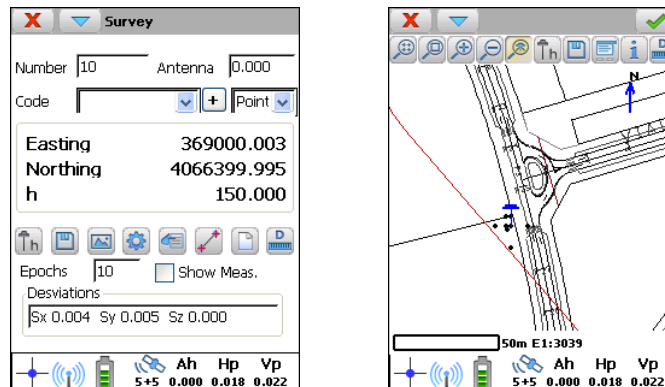
The following data can be modified for each point:

- Number of next point to save
- Antenna height
- Point's code (multiple codes are allowed)

Additionally, the current coordinates and the status bar containing essential information on the receiver's status are shown in real time. If a number of epochs greater than one has been chosen in saving style, the deviations reached are shown.

Clicking on the  button displays a graphic showing the points belonging to the file and the project's cartography (DXF file, Shape files, image files or WMS) if it exists.

If the type of position and precision values obtained do not correspond with the current saving style, the program will request the user for confirmation before saving a point.



## Local Systems


Various known coordinates at several pairs of source and target points should have been previously surveyed using the **Survey** option in the Surveying menu. The project mustn't have a local system assigned. If a list of source points in WGS-84 geographic coordinates is available, it will not be necessary to survey said points. A file with a W84 extension should be created using the following line format, where **Code** field is optional:

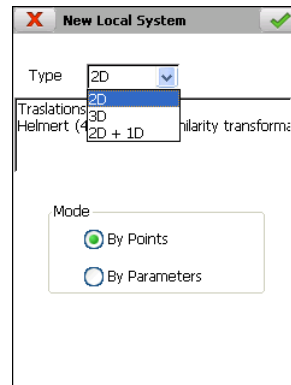
**Name, GLat MLat SLat NS, GLon MLon SLon EO, Altitude, Code**

Example: **BR1,36 45 5.6754343 N,4 28 6.5456787 W,145.423**

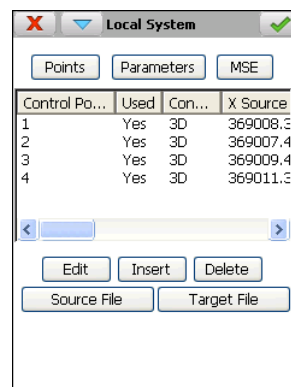
In addition, other points file should have been previously created whose point names coincide with the points surveyed but in the coordinates of the local system desired.


If these conditions are met, follow the steps set out below to define the local adjustment:

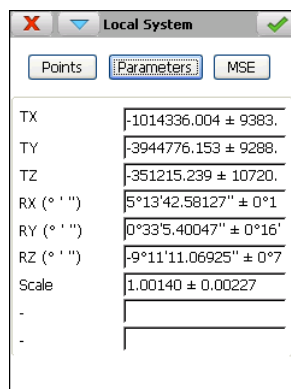
1. Click on **New** option in the **Local System** menu.
2. Select the type of local system, **2D**, **3D** or **2D + 1D**, select **By Points** mode and click on  button.



3. Click on **Source File** button and select the GPS coordinates file, and then, click on **Target File** button and select local coordinates file.



4. The program does automatically the calculations, shows the transformation parameters and informs about the mean square error and the maximum error obtained. If these values are acceptable, click on  button and enter a name for the local system. It must be saved in the current working folder.



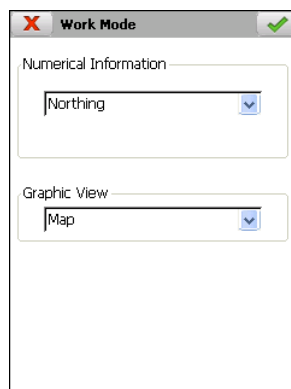
5. Go to **Project > Properties**, select the local system created and click on  button.

## Setting Out

The program is equipped with a large number of options to set out individual points, points on a line, line intersections, in addition to other specific options for highways, such as station and offset, station and code and slopes.

All the options draw a graphic that clearly indicates the current positions and the point to be set out, in addition to showing the distance to the point and the coordinate increments.

The user can choose how the program displays numerical information and the way the different graphic options are displayed through the following dialog box:



Click on the relevant option or the mobile device's physical key chosen in configuration to save a point. It is also possible to access the current precision parameters to modify them at any time.

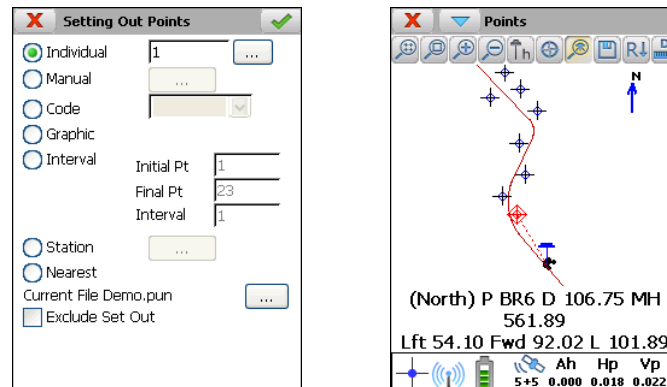
Any points set out are automatically saved in the project's results file.



## Points

The program displays a dialog box that allows one to choose the points to be set out. It has the following options:

- Individual point by specifying its number or selecting it from the list.

- A point specified by its coordinates that are entered manually.
- Points having a specific code.
- Point intervals, having to enter the initial and final points.
- A point chosen from CAD.
- Individual station selected from any station file.
- The nearest point to the current position.



Once the dialog box is accepted, the program will start setting out the first point of the points selected, allowing the user to go to the next or previous point using the   buttons. The program automatically goes to the next nearest point after saving the current point in the **Nearest Point** option.