Introduction

This documentation accompanies Version 1.0.1.3 of Ezifield.

While development is still ongoing, and the program is changing with time, this release is relatively well tested and the items documented in this Manual are reasonably stable.

If you find an item in the program that is not contained in this manual we ask for your understanding and will get the written word to correspond with the program as soon as possible.

The collection of Data with a Total Station (or a GPS) has been well tested and should operated as documented.

Likewise, setting out of a point with either a Total Station or a GPS is also relatively stable.

The Cogo and Contour options are also reasonably well established.

The Road routines are the most recent additions and as such are the most likely to vary from what is documented.

Installation

Before you attempt to Install Ezifield, you need to make sure that you have installed the software that came with your HandHeld/Palmtop and have established a successful ‘partnership’ with your desktop or notebook computer.

The Installation is actually performed on the Desktop/notebook and the program is then loaded onto the Handheld via the cable, hence the need for a successful connection before you begin.

Once you are connected and ready to proceed, select the Install Ezifield option.

If you are given the option please choose to run the program from its current location, and if you are bothered with messages about verification of the trust provider or other similar security gobbledygook please tell it to proceed regardless.

Please follow the instructions on the screen, and for the moment at least, we Strongly Advise you to accept the default folders suggested during installation.

Once the program has been installed on the handheld, you will find a shortcut has been placed on the desktop, and you can run Ezifield by double tapping the shortcut logo.

If you don't find a shortcut, don't panic – sometimes the particular flavor of the operating system implemented by the handheld manufacturer doesn't do it, so just choose Ezifield from the list of programs.

Please note that there are also two different formats of these 'handheld' devices, the 'larger' ones, which usually have a keyboard, (we call them Handhelds) and the smaller types which fit neatly in the palm of your hand and do not have a physical keyboard, and which we call Palmtops.

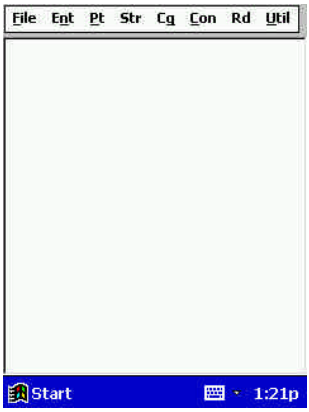
Where there is a significant difference in operation or menu items it will be detailed, otherwise we rely on you to please use a small amount of common sense and imagination to 'translate' what the manual is describing.

The program is essentially the same on both, but have different screen formats that you can see below, where the HandHeld program should load with a screen similar to that below.

The Palmtop program will appear as seen on top of Page 5.

Throughout this manual, the terms Handheld, Palmtop, HPC and PPC may all be used, and often somewhat interchangeably. We request that you please not sweat the small stuff – whatever the term we use, we are referring to the particular unit you are using.

On the Palmtop units you have a ‘virtual keyboard’ that appears on the screen when you tap the keyboard icon.



Many of the Palmtops also allow you to use handwriting instead of tapping the keys on the keyboard.

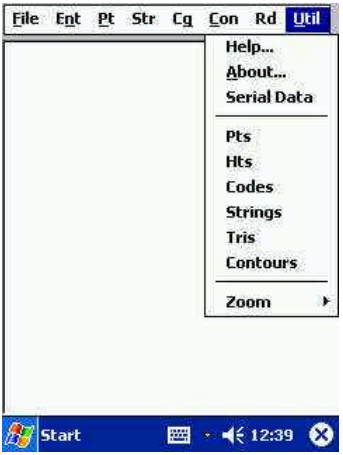
From the tests we have done, Ezifield doesn’t care whether you tap the key or write the letter or number, but if you do wish to use the handwriting, we suggest that you practice first to ensure the numbers in particular are legible.

Display Controls

Before you start to work in earnest, you should acquaint yourself with the following commands that will allow you to control what is displayed on the screen.

Please note that only one attribute of a point can be displayed at any given time, and at the moment the 'displayable' attributes are Point Number, Height and Code.

Also note that the Layer facility is not implemented, and probably will not be in the near future due to the limited nature of the display on your handheld units. If you use Codes within Ezifield then it is a simple matter to assign points to layers on your desktop by using the Feature Code Library.



If your unit has a keyboard, or your 'virtual keyboard' supports the Alt key, you can try using the 'Alt' method below, otherwise, pull down the Util menu and select the relevant attribute.

The following 'Display Toggles' act as On/Off switches, so if no attribute is displayed and you press AltP, or select Util followed by Points, the Point Numbers will appear. If you press AltP or select Util Points again the point numbers will be toggled Off.

To Display	Point Numbers press	Alt P
To Display	Heights press	Alt H
To Display	Point Codes press	Alt O
To Display	Contours press	Alt C
To Display	Strings press	Alt S
To Display	Triangles press	Alt T

As well as controlling what attributes are displayed on the screen, you can control how much of the job is displayed by using the Zoom facility.

You activate Zoom either by pressing the Z key or by using the 'magnifying glass' Icons on the toolbar.

If you press the Z key, you can then

(i) 'drag' your cursor to show the extents of the window you wish to display, or

(ii) press 'E' for Extents – i.e. to display the whole Job.

(iii) press I to zoom In on the job (or use the magnifying glass with a '+' on the toolbar

(iv) press O to zoom Out from the job (or use the magnifying glass with a '-' on the toolbar

Transferring Jobs To/From the Desktop

The simplest method of transferring jobs to and from the desktop is to store them in a synchronized folder.

If you do this, as we strongly suggest, then every time you connect your Handheld unit to the desktop the AvtiveSync program will automatically ensure that the relevant jobs are transferred.

This can make life a whole lot easier for you, and it completely overcomes the traditional problems associated with uploading and downloading to data collectors if it is used correctly.

Jobs in Ezifield are stored in the form of 'jobname.ezi'.

If you wish to open a Ezifield job with the Utilities, select File Open, and then pull down Files of Type and select the "Ezifield (*.ezi)" option.

If you have existing jobs in Ezicad on the desktop you should use File > Save As and then tick the box which says Ezifield Data.
Select OK, and you will find that a file called 'jobname.ezi will be stored for you to transfer to your Handheld.

So, for example if you have an Ezicad job called 'detail1' on your desktop computer you will find a file named 'detail1.ezi' which you can then store in the folder which is being synchronized with the handheld..

If you wish to take strings across from the desktop you will also need to copy across the file 'detail.str'.

File

When you access the File Menu the screen will appear as seen below, and each of the options is discussed below.

New

The New option will provide you with a new 'blank job' in which to work.

While the program is happy to work without having any job name assigned, we suggest that you get into the habit of saving the job and supplying a meaningful name as soon as you have added any worthwhile data..

You may use long job names if you wish, and any valid filename will be accepted. We suggest you confine yourself to letters and numbers to make up the job name, and while spaces are accepted, we would generally not encourage their use

Be aware that if you have an existing job displayed with contours and you go File New, the contours from the previous job will still display until you save the job with its own name.

Use ALT C to turn the contours off.

Open

Allows you to open existing Ezifield or Ezicad jobs.

Once you select the relevant file you will see a series of 'dots' representing the points appear on the screen together with their point numbers.
Refer to Display Controls above for how to control the display

Save

Once you have gathered any worthwhile amount of data we encourage you to use the Save function to save the data with a meaningful job name.

We also encourage you to use the Save option at regular intervals throughout the collection process.

Save As

Simply allows you to save an existing job with a new job name.

Simply type in the job name you wish to use and the convention of adding a suffix of ‘ezi’ will happen automatically.

Serial Transfer

Sends all points in the database to the serial port in a comma delimited format.

Mainly implemented for internal testing, but might be useful for some other applications.

File Transfer

Here you can save the coordinated points into either a CSV (comma separated value) file, or a file in SDR format, both of which can be ready by most Survey & engineering software packages.

You may also choose to transfer all of the Raw field readings into a file in SDR format for import and processing into some other software such as Least Squares programs and the like.

You will be given the option of providing a name for the file, as well as using the normal windows browsing options to determine which folder the file will be stored in.

Entry

The Entry menu lets you decide which particular type of instrument you wish to interface with.

You should use the Configure option detailed on Page 20 to specify which particular brand/model of each type of instrument you are going to use.

You should then use the Serial Config options detailed on Page 21 to ensure that your H/PC and your instrument are using the same communication parameters before proceeding.

Total Station

The process of using Ezifield with a Total Station consists of defining where you have set the instrument and how you have oriented it with Setup, and then either collecting points with Survey, or laying out point with the Setout option.

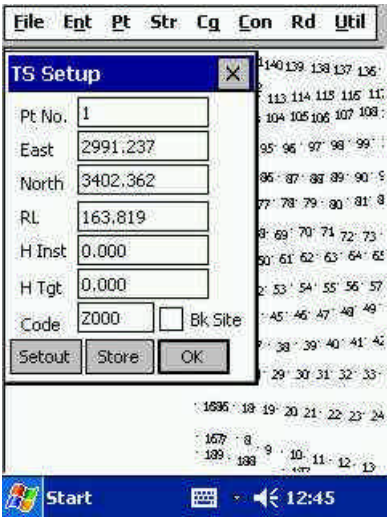
Each of the functions is defined in turn below.

When you access the Total Station option Ezifield will bring up the Setup Dialog box.

Setup

On the Handheld, this screen provides two columns to allow you to enter the details of the point you are occupying (the left-hand column), and the point you are using for a Backsight (if any in the right hand column).

On the Palmtop, the screen at right will appear allowing you to specify the occupied station. If you are using a Backsight station, you need to 'tick' the Bk Site box and when you choose OK, you will see another screen to identify your Backsight point.



If the point or points are in the database, you need only type in the relevant point number and press the Enter key and you will see the coordinate details collected from the database.

If you wish to add in details of a Station or Backsight point that is not already contained in the job you can enter the details into the relevant fields and then select the “Store” button to store the point.

Each of the Points will display the relevant East, North, and Reduced Level.

For the Setup point you should enter in the Height of the Instrument Axis in the field labeled ‘H Inst’

For the Backsight Point you should enter the height of the prism or target in the field labeled ‘H Tgt’.

Once you have entered or retrieved the details of the two points the correct bearing or azimuth between them will be calculated and store in the field titled ‘Azimuth’

If you know the azimuth you wish to use, you can type it into the Azimuth field.

Once the required Azimuth is displayed, you can set it into your Total Station by selecting the button titled ‘Set Az’ (if your particular instrument is capable of accepting the information)

Alternatively, if you wish to use a zero azimuth you can select the button titled ‘Set Zero’ (if your particular instrument is capable of accepting the information)

When you select either the Set Az or Set Zero options, the program will prompt you to confirm that you have targeted your instrument on the required Backsight point.

Once you select OK to confirm the correct pointing the relevant bearing will be transferred into your instrument.

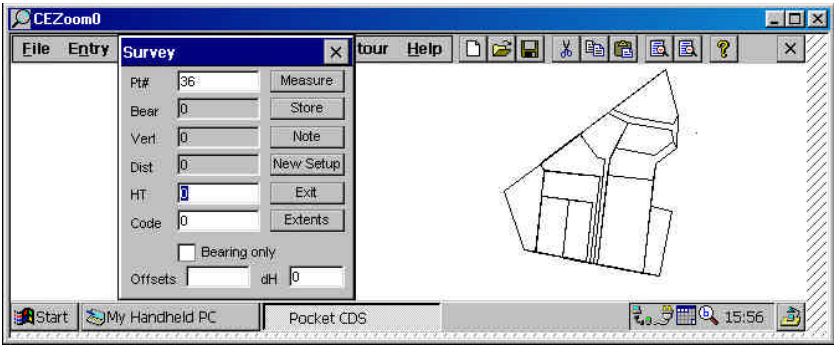
You are now ready to either collect points, or stake out points.

To Collect points simply select the “OK’ button on the bottom of the Setup box, and you will enter ‘Survey Mode”.

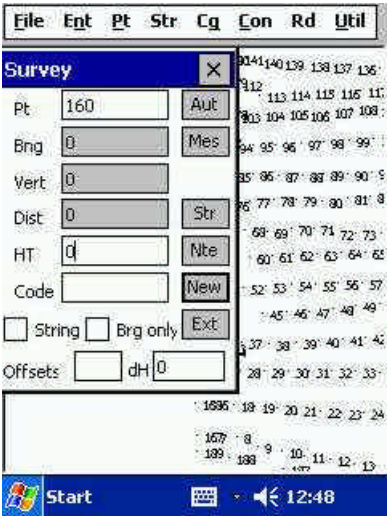
Survey

The ‘Survey’ allows you to collect and code points in the field, and you get to it by selecting the ‘OK’ button on the Setup screen.

When you enter the Survey mode you will see one of the two screen formats shown below.



If you have not elected to display a Code List, the screen will appear similar to that below. (For details of how to display Code Lists see page 23)



If you have elected to have a Code List displayed, your screen will appear similar to the one below, where you can see an additional window titled Code Library displayed when you make the ‘Code’ field active.

Regardless of whether or not a Code Library list is displayed, the process of collecting the data is conducted by using the facilities of the window titled ‘Survey’.

When the Survey Dialog box opens you will see fields titled Pt #, Bear, Vert, Dist, HT & Code in a column down the left, with command buttons titled Measure, Store, Note, New Setup, Exit & Extents in the right hand column.

The process of collecting data consists of pointing the instrument at the prism and then selecting the ‘Measure’ button.

This will initiate a measurement, and the measured values will be displayed in the fields titled Bear, Vert and Dist in the left-hand column.

You can then enter the Height of the Prism in the field titled HT,

To add a code to the point you should ensure that the cursor is in the field titled ‘Code’.

You can either type in the required code, or, if you have elected to display a Code List, you can simply pick the required code with your cursor, and it will be transferred into the Code field.
Note that you can also use a combination of the two, so you can pick a standard code of Kerb (or Curb if you are American) from the Code List, and then add 01 to it manually to end up with a code of Kerb01.

The “Bearing Only” option allows you to take ‘check bearings’ to points where you can’t record a distance. The reading is stored in the raw data file, but no point is placed in the database.

If you are unable to place the prism on the point you wish to record, you can use the offset facilities to indicate its position relative to the current pole location.

In the Offset field, you can enter one of the letters F,B,L,R followed by the distance in metres or feet as applicable.

F	Forward – away from the instrument on the current bearing
B	Back - towards the instrument on the current bearing
L	Left – perpendicular to the left of the line from the instrument to the current pole position.
R	Right – perpendicular to the right of the line from the instrument to the current pole position.

You can also indicate that the height of the point should be offset from the current pole position by entering a value in the field titled dH.

So, for example if you had the pole positioned on the edge of a creek bank, and wanted to record a point which was in the creek bed 2.5 metres further on, and 2 metres lower than the current position, you would enter an Offset of F2.5 and a dH of –2.

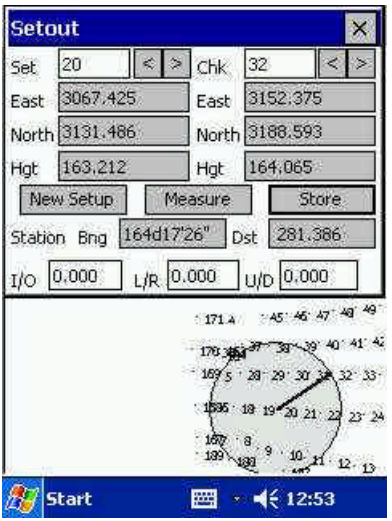
Once you have entered the relevant values you should select the ‘Store’ button and the point coordinates will be stored in the database.

As each point is collected it will be displayed on the screen, however, if the point falls off the existing screen extents, you may need to use the ‘Extents’ button to redraw the screen to take all points into account.

You simply repeat this process for all the points you wish to collect from the occupied station.

When you need to move the instrument to a new station, you simply select the ‘New Setup’ button to define the new values, and then return to the Survey routine to continue collecting points.

Setout



The Setout (aka Stakeout) routine allows you to lay in any point contained in the current job.

When you access the routine you will see a screen which has details of the point to be set out down the left-hand column, and the details of the check or pole point down the right hand column

The process is to enter the number of the point you wish to set out in the ‘Set Pnt’ field and then press enter.

The bearing and distance from the occupied station to the point to be set out will be displayed in the fields on the line titled ‘From Stn’.

Position the pole somewhere along the bearing indicated and press the Measure button.

On the graphic display you will see a shaded circle is drawn with a dark line from the edge of the circle to the centre.

The centre of this circle is the point you are setting out, and the intersection of the circle and the line shows the current location of your prism pole.

Obviously, to set out the point you need to move towards the centre of the circle in the direction indicated by the line.

As you move the prism pole, and take measurements to the new position the bearing and distance between the pole and the location of the setout point will be continually updated, as will the circle.

Normally you would then turn your instrument onto the bearing listed, tell the pole carrier to go back roughly the distance shown, line the prism up to the required bearing and then press the Measure button to take a measurement to the current pole location.

The location of the pole will then appear in the right hand column as the Chk Pnt, and the bearing and distance from the pole position to the point to be set out will then be displayed in the line titled ‘From Prism’.

You can then direct the pole carrier to move accordingly, and repeat this process until the point has been correctly located when both bearing and distance ‘From Prism’ to the setout point display zero (or whatever value approximating zero you might decide to accept)

If you wish to record the position of the point you have laid in you can then set the required Point Number in the Chk Pnt filed and press the ‘Store’ Button.

The ‘New Setup’ button simply allows you to return to the Setup screen to provide details of your new occupied station.

Digital Level

If you have a Digital Level you would like to use please provide details to your Ezifield Dealer and we will do our best to assist and implement it for a nominal fee.

GPS

Ezifield is capable of interfacing to your survey or mapping accuracy GPS units, and be used to collect data from them with an additional module

If you are interested in this additional option, contact your Ezifield Dealer for details.

Any GPS units that can output in NMEA standard format can be supported immediately (subject to suitable cabling) and other formats can be implemented as needed for a nominal fee.

Configure

Allows you to specify which brand and model of instrument you wish to interface to.

While we recommend the Futtura Total Station, we are mindful that there are a number of other manufacturers who have units in the marketplace and you can use a number of these with Ezifield.

The options currently available are.

Total station

Futtura – Futtura total Station.
Leica – generic – should talk to most Wild/Leica integrated total stations.
Leica T1000 – earlier model with ‘clip on’ DI4.
Nikon – C100
Sokkia 1Way – earlier models which have only one way communication
Sokkia 2 Way – later models implementing 2-way communication
Topcon GTS4 – should work for most Topcon GTS instruments

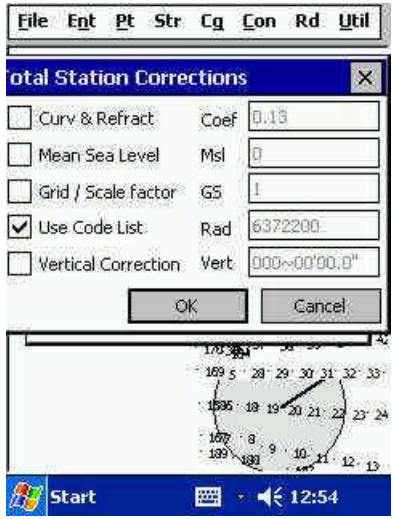
Digital Level

Sokkia SDL30 – provides a means of storing data.

GPS

NMEA standard output

In addition the Options button adjacent to the Total Station selection field will bring up a screen as seen below.



Here you can elect to have corrections applied to your measurements to take into account

Curvature & Refraction
Mean Sea Level
Grid Scale Factor

In addition you can elect to use a Code List when capturing data from the total station.

Code List

You can define a list of commonly used codes that you wish to have displayed on the screen as you collect data. You can then code any point by simply pointing to the relevant code from the displayed list.

At the moment, all the codes must be stored in a file named ‘road.fldcde’ in the Ezifield folder on the Handheld.

?? This file must contain One Code per line, and it MUST be stored in standard text format.
?? Each code must be no more than 8 characters and we recommend that you do not use spaces within codes.

You can either create or edit this file using Pocket Word on your HPC.

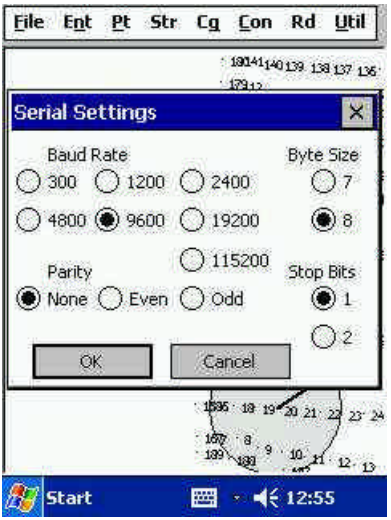
If you attempt to open the default file that comes with Ezifield, Pocket word will complain that it does not understand the format. Simply open it as a Text file.
When you save the file make sure that you also save it in Text format.

Serial Configuration

Since there is no such thing as a ‘standard’ in the world of communications, much less Survey Instruments, this option allows you to configure the serial communications parameters to work with your particular instrument.

Please note that in many instruments you can alter the settings on the instrument, and in that case it does not particularly matter what settings you have on the instrument providing you set EXACTLY the same settings on the HPC.

The Nikon C-100 is not configurable on the instrument, and operates at 4800 Baud, No Parity, 8 Data Bits and 1 Stop Bit, so you will need to set your HPC to match these settings.



Instrument Cabling

All HPC's are provided with a cable that connects the HPC to the Desktop computer. Most of these cables have a standard 9 pin female RS232 connector to allow connection to the computer., and whatever proprietary plug the particular manufacturer has chosen to connect to the HPC.

We suggest that the path of least resistance is to simply construct a cable that connects the HPC manufacturer's cable to the particular Total Station.

Just as there is no such thing as 'standard' in the communications world, the words standard and cable are almost mutually exclusive when considering Survey Total Stations.

Listed below are some of the configurations that worked at least once.

Leica

Instrument End Lemo Plug	HPC End 9 Pin Male
3	5
4	3
5	2

Nikon C-100

Instrument End Hirose Plug	HPC End 9 Pin Male
1	2
2	3
5	5 (Ground)

Sokkia SET Series

Instrument End Hirose Plug	HPC End 9 Pin Male
1	5
3	3
4	2

Topcon GTS Series

Instrument End Hirose Plug	HPC End 9 Pin Male
1	5
3	4
4	2

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POINTS

Allows you to Add and Edit/Delete points and obtain the bearing and distance between tow existing points.

Add

Brings up a series of fields where you can type in the relevant coordinates and other information of points you wish to add into a job.

Edit

Brings up a series of fields where you can type in the relevant coordinates and other information of points already in the database that you wish to change.

You can also remove of delete the current point by selecting the Remove button.

BE WARNED – think before you remove as there is currently no ‘OOPS’ facility.

Join – Inverse

The ‘connection’ between two point in the job is called an Inverse in the USA ands occasional other places, and a Join in many other locations.

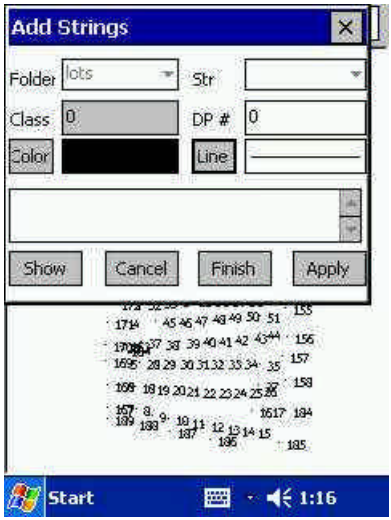
Whatever you choose to call it you can access the function from the Points menu, or by pressing Alt J on the keyboard.

Please note that in this version you need to type in the Point numbers. The ability to ‘Tap’ the points will be introduced in future versions.

STRINGS

Add

A “string’ in Ezifield terminology is simple a line joining two or more points. If you are used to CAD terminology, a string is equivalent to a polyline.



You can add in strings between existing points with this option.

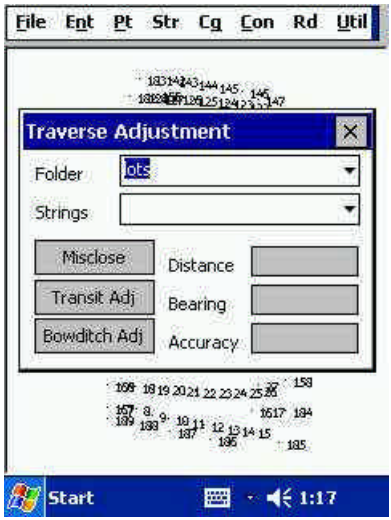
You must supply a valid String ID.

Then you simply list each of the point numbers separated by a comma.

Note that you can automatically create strings as you collect points by checking the ‘String’ box on the Survey screen.

Traverse Adjustment

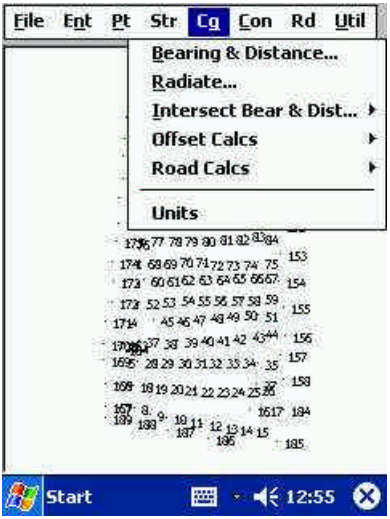
You can select any string in the job by picking it from the Pull Down list<. Click the Misclose button to see the bearing and distance of the current misclose, and the relative accuracy.



If you wish to adjust the particular string to form a perfect close, you can choose either Transit or Bowditch and the coordinates of all points in the string will be adjusted accordingly to provide a perfect close.

COGO

The Cogo Menu will present the options as seen in the following screen, and each of these options is described below.



Bearing & Distance

Allows you to calculate new points by specifying their bearing and distance form an existing point.

This facility works in ‘traverse mode’ so the point you calculate becomes the next ‘from’ point.

If you wish to calculate multiple points along a single bearing you can do so by entering the number of points you require into the ‘Multiple’ field.

If you wish to swing the azimuth, such as the case when working from old plans, you can type the correction required in the ‘Azimuth’ field, and the correction will be applied to the bearing you enter.

Radiate

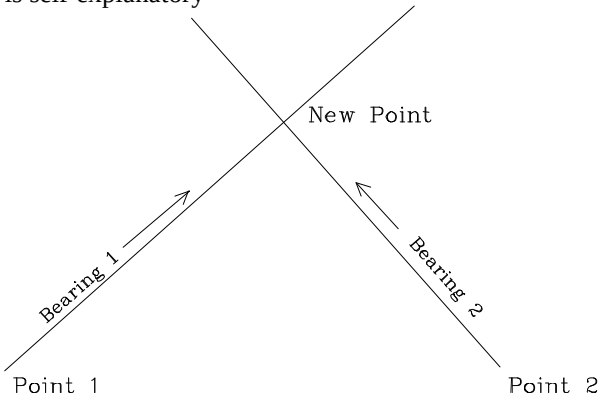
Allows you to calculate new points by specifying their bearing and distance form an existing point.

Unlike the Bearing and Distance routine above, here all points are calculated from the one ‘from’ point.

Intersect Bearing & Dist.

2 Bearing Intersection

This routine allows you to specify two existing points, and the bearing from each of them, and it will calculate and store the new point where the two bearings intersect**.**
The diagram below illustrates its function and the remainder or its operation is self-explanatory

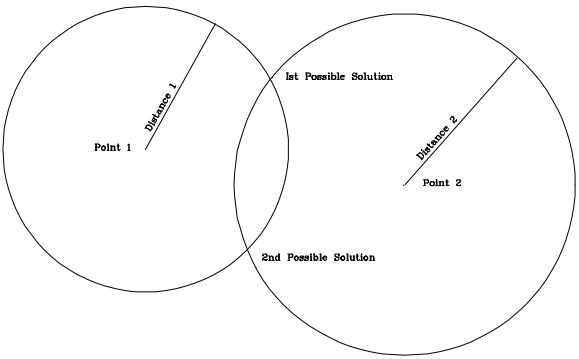


2 Distance Intersection

Here you can specify two existing Points, and a distance from each of them.

If the distances you have specified do intersect, the program will draw circles with the respective radii you have entered around each of the points.

Where these circles intersect provide the two possible solutions as seen below



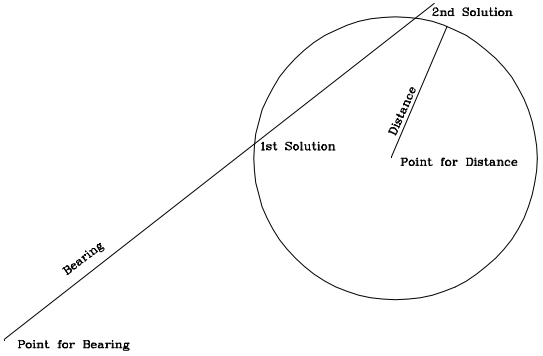
Use the ‘Pnt Set’ pull down to highlight whether you require Pnt1 or Pnt2, and select the Apply

button, and the new point will be added into the database.

Bearing & Distance Intersection

In this option you can intersect a bearing through one point with a distance from another point.

The program will display the two possible solutions and you can choose the point that suits your needs.



Use the 'Pnt Set' pull down to highlight whether you require Pnt1 or Pnt2, and select the Apply button, and the new point will be added into the database

Offset Calcs

Chainage & Offset

The Offset Calcs allow you to either create cross section type information, or to input field surveys done in the traditional method of establishing a baseline and then locating detail points by distance along that line (Chainage) and the distance from that line (Offset)

This allows you to calculate points by specifying their chainage and offset relative to either a line between two points, or a line on a given bearing /azimuth through a particular point.

If you are using **Points**, you need to type in the Point numbers for Point 1 and Point 2.

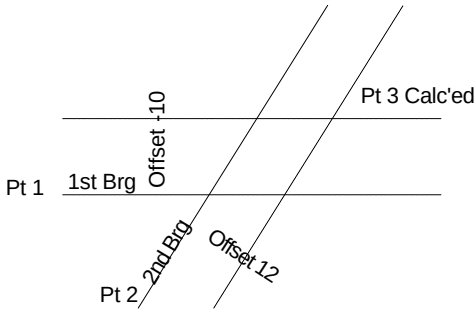
If you are using Bearing, you need to enter the point number of Point 1 and then type in the bearing through that point.

You then enter the Chainage from Point 1 and the offset to the line of the new point you wish to calculate, and press the Apply button**.**

New Point - you will be shown the next available Point Number. Remember that it often assists later identification if you 'group' points by starting new ranges on even hundreds or even thousands.

Parallel Offset

Refer to the sketch at right to see how this routine operates.
You need to specify 2 points, the bearings through those points, and the respective offsets to the bearings and the program will calculate and store the resulting point for you



Road Calcs

Parallel Offset

The purpose of this routine is to calculate a series of points on an alignment that is parallel to, and offset from an existing series of points.

Each of the new points is calculated on the half angle

If you refer to the sketch below, you will see that points 1,2,3,4,5 make up an existing alignment.

It is our intention to create a line offset 20 metres to the left of the existing line and parallel to it.

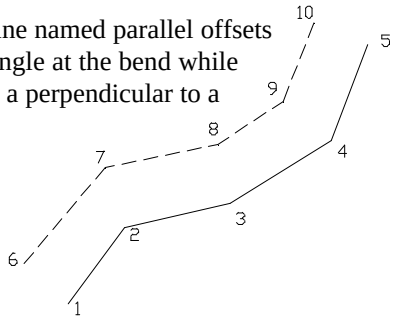
When you enter the routine a dialogue box will appear and the first two items you strike are check boxes for the First Offset Point and Last Offset Point.

The First point is 6 on the sketch, while the last point is 10.

If you wish to have them calculated check the boxes.
You will then see a field for New point, and the next available Point Number will be displayed.

The process consists of calculating the offset at each ‘bend’ by entering 3 points with the middle point being the ‘bend’

It differs from the earlier routine named parallel offsets in that this one uses the half angle at the bend while the previous routine only uses a perpendicular to a line to calculate the offset.



Simply enter in the relevant points and their respective widths or offsets, which in this case would be -20 to indicate 20 metres to the left.

Then choose the OK button, and the points will be calculated and stored.

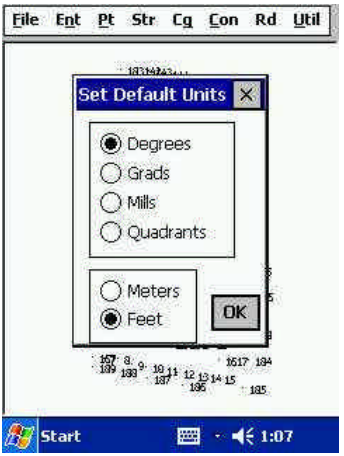
Note that in this version you cannot point to the points with your cursor, you need to type the numbers.

Units

Ezifield allows you to change both angle and distance units as needed.

Please note that we recommend that you do not units within a job.

Angular Units may be in of:



Degrees – 0 – 360 format ddd.mmss
Grads 0 – 400
Mills 0-6400
Quadrants format qdd.mmss where ‘q’ is the quadrant indicator –

1 is NE,
2 is SE,
3 is SW,
4 is NW

Distance units can be either ;

Metres
Feet

Contour

The Contour menu item gives you the ability to form a triangular Digital Terrain Model over the points you have collected.

You can then form contours to check that the data you have collected correctly represents the area you have just surveyed.

If you activate the options in order down the screen there is a reasonable chance that you will end up with a contour plan.

You might need to change some of the parameters to give closer contours in flat areas, but the general principle is to start at the top option and then work down to the bottom.

Surface Parameters

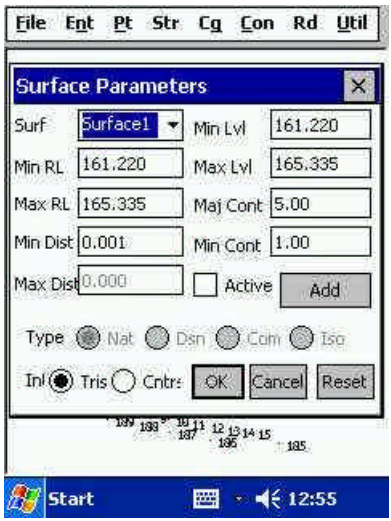
The following screen will appear when you select the Surface parameters option.

The surface parameters allow you to select from all the points in the database, the points that you wish to use to form a particular surface.

You can currently select by a range of heights.

You may also specify a filter to ensure that “check shots” which fall close to one another do not disrupt the model. To do this fill in the required value in the fields titled ‘Min Dist Between Points’.

Also the maximum distance along triangle edge can be used to prevent the formation of triangles across concave areas. You must first tick the ‘Active ‘ box, and then you can enter in the maximum distance.



You can also specify the values of the minor and major contours to be formed, and the range of those contours by filling in the relevant fields.

Form Model

Once you select the Form model option, you do not need to do anything else.

Simply wait until the triangles finish forming and you will be ready to calculate the contours

Calculate Contours

When you select the Calculate Contours option you will see the contours start to form on the screen.

At the end of the process you will be asked if you wish to save them.

If everything looks OK you can answer Yes, and the contours will be saved.

If you are not happy with the appearance, you should go back to the surface parameters option and alter one or more of the variables before forming the model and contours again.

Road Stakeout

There are two basic methods of obtaining the points needed to stake out a road.

1. Design points provided digitally, either in a coordinate file or in a DWG or DXF file can be read into an Ezicad job on the desktop/notebook and then the points required can be transferred into Ezifield.

2. Points can be calculated ‘on site’ using the Road routines in Ezifield.

While we generally recommend that wherever possible you use the greater resources available on your Desktop or Notebook to set up or calculate the points to stake out, and then transfer them into Ezifield, we also recognize that it is not always possible.

So, for those occasions where you arrive on site;

- ?? to be presented with the plan to be staked out for the first time, or
- ?? to find that there have been changes to the design location, or
- ?? to discover that a load of pipes have been delivered and laid out nicely along the 10 foot offset you planned to peg.
- ?? the supervisor wants the stakes you intended to place next week done today

Or whatever other crazy reason that afflicts logical planning on construction sites worldwide, we have implemented a set of routines in Ezifield to allow you to calculate the points you need when you need them.

Using the Road Routines in Ezifield.

Before you start, you need to be aware that there are a number of things which you must have available if you wish to use the ‘Road routines’ to calculate the points in an automated fashion.

If for whatever reason you don’t have these items available, you should still be able to use the Cogo routines in Ezifield to calculate individual points.

Required:

a. the Alignment of the road, usually but not necessarily the centerline, defined as a ‘string’
b. the Vertical Intersection Points (VIP’s) and Vertical Curves
c. the Design Section Template of the road to be constructed
d. the Station or Chainage interval at which to calculate the points.
e. if Catch/Slope/Batter (choose your own terminology) Points are to be calculated then the Model /TIN of the underlying natural surface is required.

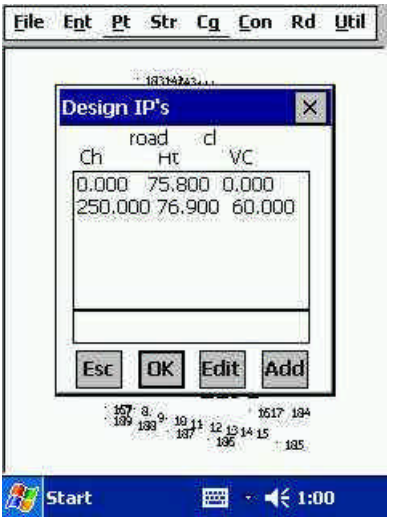
Alignment

The alignment is simply a ‘string’ or a polyline if you prefer to think in those terms, which consists of any combination of lines and curves.

If you need to add the alignment string on site, you should see the heading Strings for details of adding in the string.

Vertical Intersection Points – IP Table

When you access the IP table from the Road Menu you will see the following screen.



Obviously, when you first enter this screen on a new job it will be blank.

The screen comprises two sections; the upper table, which lists the VIPs in the job, and the Entry Line which is the lowest line, and where, as its name implies, you actually enter in the data.

Each VIP is identified by three ‘elements’ being;

1. Chainage/Station - the Chainage or Station along the alignment at which the VIP is located.
2. Ht - the Elevation/Height/Reduced Level of the VIP.
3. VC - the total length of the Vertical Curve

Entering a VIP.

All data entry is done on the “Entry Line”. You enter each of the 3 elements separated by a space.

So, to enter in a VIP at Chainage 100, with an Elevation of 224.25 and a vertical Curve length of 80, you would enter 100 224.25 80.

You would then select the Add button and the values will be placed into the Table.

Changing a VIP

If you wish to change or Edit the elements of a VIP which is already in the table, you should ‘select it’ by tapping it or picking it with the cursor

You will see that the details are now copied into the Entry Line.

You may change the values as required, and then choose the Edit button to place the edited values back into the table at the correct location.

Deleting a VIP.

If you wish to remove a VIP already in the table, select it, and then press the either the ‘D’ key (or ‘d’) or the Delete key if your device shows one.

Please be careful with any deletions, as there is no ‘Oops’ function and anything deleted will need to be re-entered if you find you need it again.

Inserting a VIP

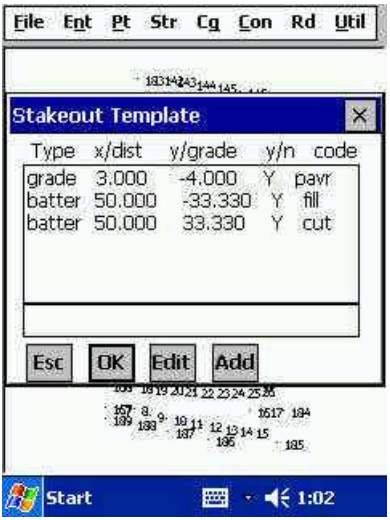
If you wish to insert a VIP into the table, you need to select the existing VIP that you wish to ‘move down’ when the new one is inserted.

Then tap the ‘I’ or ‘i’ key, or the ‘Ins’ button if your device has one on its keyboard.

This will insert a new blank line that you can then Edit the values on the Entry Line.

Templates

In Ezifield, a ‘template’ is used to specify or describe the right hand half of the design cross-section.



If you wish, the ‘template’ can then be mirrored about the alignment when the section is symmetrical, or, if needed, you can use different templates to the left and right of the alignment.

When you access the facility a screen similar to that shown will appear, and in a new job it will be blank.

The screen comprises two sections; the upper table, which lists the ‘legs’ in the template, and the Entry Line which is the lowest line, and where, as its name implies, you actually enter in the data.

A template is made up on a number of ‘legs’ and each ‘leg’ is defined by 5 elements;

1) ‘Entry Type’ – see the list of available entry types below
2) ‘X’ distance – the horizontal distance from the alignment or previous point
3) ‘Y’ distance – the vertical distance from the alignment or previous point
4) Stake - a Yes or No switch to specify whether this leg is to be staked or not,
5) Code – the feature code or label to be stored on points from this leg.

The Entry Types available are :

?? **grade** – specify a horizontal distance and percentage grade. e.g. the pavement may be 2.5 wide and slope at –4% (negative slope indicates that the end of the leg will be lower than the start of the leg)

?? **goto** – goes to an absolute offset and height relative to the alignment.
The ‘X’ distance specifies the ‘offset’ and the ‘Y’ distance provides

the height. e.g. goto 3 –1.5 would create a point 3 metres/feet to the right of the alignment and 1.5 metres/feet below it, regardless of where the 'leg' started from.

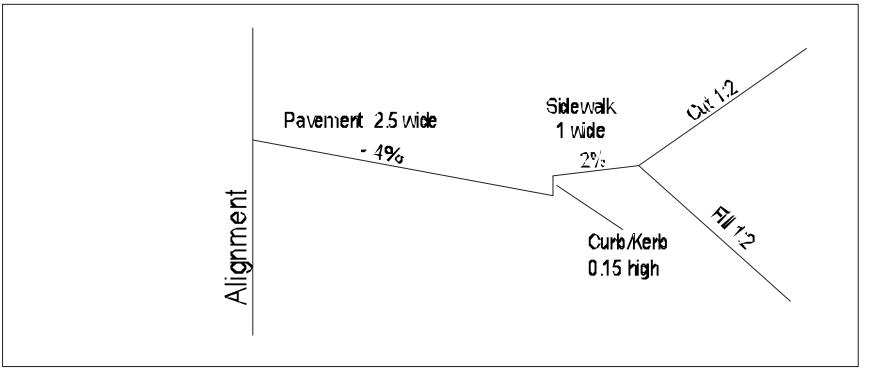
?? **move** – move from the current point for the 'X' and 'Y' values specified.
These distances are added to the offset and height at the start of the leg e.g if a 'move' of 0.5 0.1 came after a 'grade' of 2.5 –4 then the end of the leg would have an offset of 3 metres/feet from the alignment and be at the same level as the alignment. (confused ? – no need to be, the grade leg would end at an offset of 2.5 and a height –0.1 below the alignment – then add 0.5 and 0.1 to these values to get to the end of the 'move leg'.

?? **varies** – for use where the width or grade of the road varies, and refers the template to a "Variable Table" which provides a list of the Chainages/Stations and the relevant width and/or grade at each location. Here you need to enter a value of 0.0 for both 'X' and 'Y' distances, and Ezifield will substitute the values it finds in the variable table when it processes the job.

?? **batter** – batter from the previous point (sometimes called the 'hinge point') for the specified horizontal distance, or until the batter intersects the natural surface, whichever comes first. e.g. batter 50 –50 will batter 'downwards' i.e. a 'fill' batter at a percentage grade of 50% (aka 1:2 or 2 to 1 depending on the school you attended and the year you attended) until it intersects the existing or natural surface. If it has travelled 50 metres/feet horizontally before it intersects the surface it will stop.

A Sample Template

If you consider the sketch below you can see a simple example of a road cross-section that we will use to illustrate Ezifield's Stakeout Template.



Assume you wish to place a peg/stake at the edge of the pavement, and each of the catch points/batter slopes.

In a linguistic aside, if you are from the Americas you will see that we are not intending to mark the curb, while the remainder of the English speaking world will curb their desire to scream, and instead construct vertical concrete thingy called a kerb.

You may use whatever codes best suit your particular needs.

To enter this into the template you would use the following legs.

grade	2.5	–4	Y	pave
move	0.15	0	N	curb
grade	1	3	N	sw
batter	50	50	Y	cut
batter	50	-50	Y	fill

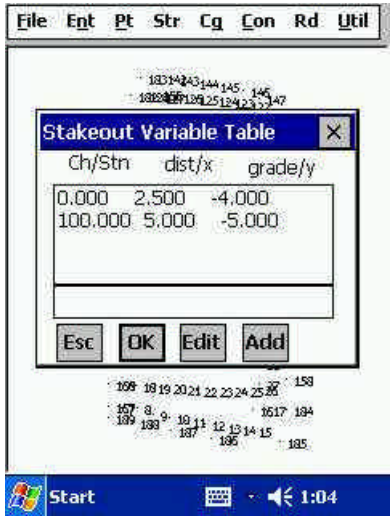
Variable Templates

Ezifield provides the capability to use ‘variable’ templates for situations where the road retains its same ‘basic shape’ but widens to encompass passing or turning lanes or the like, or changes grade for superelevation around curves.

We believe that this offers you a more efficient process than having to enter different templates, and assign them to different locations along the road.

Usually it is only the first leg in the template that alters in width, grade or both, and in this version Ezifield only allows you to vary the details of the first leg.
The screen comprises two sections; the upper table, which lists the variable entries currently in the job, and the Entry Line which is the lowest line, and where, as its name implies, you actually enter in the data.

If you wish to remove an entry in the table, select it, and then press the either the ‘D’ key (or ‘d’) or the Delete key if your device shows one.



If you wish to insert an entry into the table, you need to select the existing entry that you wish to ‘move down’ when the new one is inserted.

Then tap the ‘I’ or ‘i’ key, or the ‘Ins’ button if your device has one on its keyboard.

This will insert a new blank line that you can then Edit the values on the Entry Line.

In the table you enter the values of Chainage/Station for each particular change of ‘width’ or ‘grade’ .

The ‘X’ value is the horizontal distance (width) of the leg, and operates as a ‘move’ from the previous leg.
The ‘Y’ value can be either a grade or a distance.

If you wish to specify a grade, you need to follow the number with the percentage symbol '%'

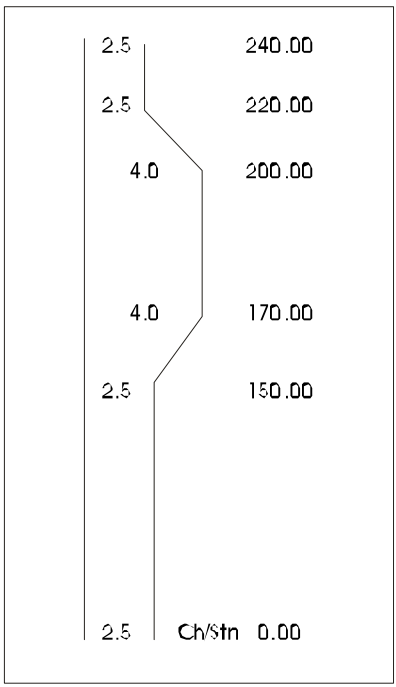
If the number is not followed with a percent sign, Ezifield will assume that it is a distance, and it will operate as a vertical 'move' relative to the previous leg..

An Example of the Variable Table

Consider the sketch to the right that shows a situation where a simple widening has occurred.
We will use this to illustrate the use of the Variable Table.

First, construct the template that has for its first line an entry of

varies 0 0 Y pave.



You then put whatever other template entries for sidewalks/footpaths, ditches and batter slopes that might be applicable.

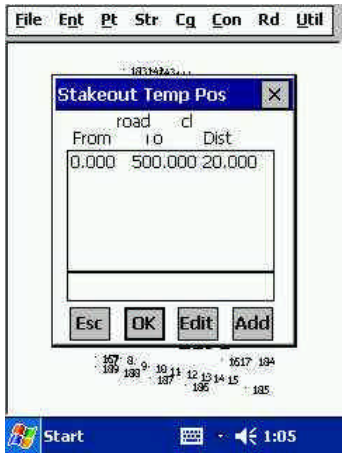
Assume that in this instance the pavement has a constant cross-fall of –4% and open the Variable Table and make the following entries.

0	2.5	-4%
150	2.5	-4%
170	4.0	-4%
200	4.0	-4%
220	2.5	-4%
240	2.5	-4%

While this is a simplistic example, the procedure is exactly the same regardless of whether the width, the grade or both are changing.

Simply list the points where one or other alter in the table and the points will be calculated for you without needing to worry about creating different templates and allocating the correct template to the correct location.

Template Position

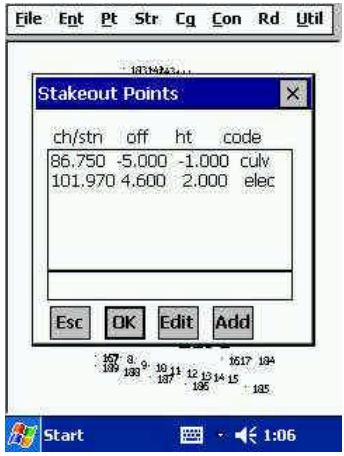


This option allows you to define the intervals at which you require sections along the road.

In simple cases you may only wish to place stakes every 20 metres along the road, and then a single entry would suffice.

When you wish to have different section intervals at different locations along the road you can achieve that quickly and easily by filling in the relevant start and end values for Chainage/Station, and the interval you require between those values.

Individual Points



There are many occasions in the staking out of a project where you are requested to peg or stake points that are not on the regular sections.

These can be the locations of where other services such as drains, electrical cables etc cross the project, or any of the things that need to be staked out between the regular sections.

There is a ‘table’ where you can specify the Chainage/Station and Offset of the point you need, and the height if you have one.

The Chainage/station and offset values should not need further elaboration.

The ‘ht’ value can be specified as either an absolute Reduced level/Elevation, or as a height difference relative to the design height at the location.

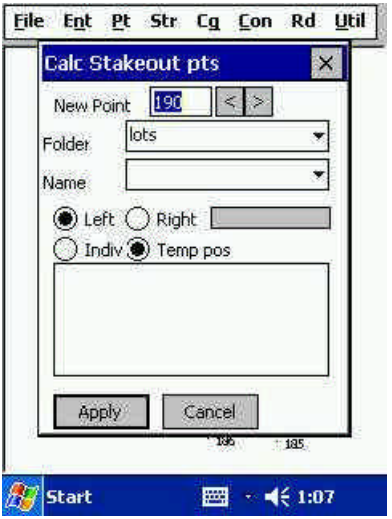
If you require an absolute reduced level or elevation you simply enter in the value.
If you wish to specify a vertical offset from the design height obtained from the templates, you can precede the value with either a '+' of a '-' sign to indicate the direction of the relative difference.

If you don't know the height at that particular location you can enter a value of –999 and Ezifield will determine the height of the location either from the templates, if the offset falls inside the range of the template in use, or from the underlying surface if one has been supplied.

Calculate Points

Once you have set up all the relevant 'design' information you can calculate the required points which are stored in the job ready to be staked out using either the Total Station or GPS Stakeout functions found under the Entry menu.

When you access 'Calculate Points' the following screen will appear.



In the top field titled 'Next Point' you will see the next available point number in the job. You may either accept that number, or start numbering from the next even hundred or thousand if you wish to 'block' points in that fashion.

The 'Folder' and 'Name' fields allow you to specify the alignment you wish to use to calculate the points.

On the next line you have 'Left' and 'Right' buttons to indicate which side of the alignment you wish to apply the template.

In this version of Ezifield you can only do one side at a time. This fits with one idea of stakeout methodology, particularly in rugged terrain, where you concentrate on placing all the pegs/stakes on one side of the slope, rather than having the pole man climbing from side to side.

If your job is one where you wish to calculate stakeout locations on both sides of the alignment before you commence pegging simply run the routine twice, choosing the alternate side each time.

To the right of the ‘Right’ button you will see an ‘activity bar’ which will be filled in as the points are calculated. The speed of calculation is not a major issue in relatively small jobs or sections, or if you are not calculating slope catch points. However, the calculation process can take a little while in some circumstances. To re-assure the less patient among you that something is in fact happening if you are calculating slope catch points over a large section the activity bar will be filled in. If you see movement in the activity bar, everything is progressing normally, so please wait and don’t start tapping the screen of pressing keys for the fun of it.

You will also see buttons titled “Indiv’ and ‘Temp’. By default, the ‘temp’ button will be selected to use the templates to calculate the required stakeout points.

If you wish to calculate ‘individual’ points not on the regular sections then choose the ‘Indiv’ button and Ezifield will use the information from your individual Points Table.

When you have specified what you require, pick the Apply button and wait until the activity bar stops moving.

Desktop Utilities

When you install Ezifield, you may also choose to install a set of utilities onto your desktop/notebook computer. These Utilities are part of the Ezicad suite of software and can be accessed by using the relevant shortcut installed on your Desktop during installation.

The following pages offer a reference for the main items in the utilities, and details of their operation can be found in the Getting Started and Tutorial Manual provided separately.

To open a job that you have collected with Ezifield, choose File followed by Open.
You will see that the Files of Type field has defaulted to Ezicad Jobs, but in you case you will most likely need to open a Field job, so choose that option from the 'Files of Type' field.

Menu Item	What can You Expect in this Menu
File	Allows you to create, open & save Jobs; import/export coordinate data; set up how you want a plan plotted; export DWG, DXF & FPF plots & VRML 3D models; and plot to a plotter or printer.
Entry	You can enter data from data collectors, manually enter traditional or electronic stadia; reduce level books or enter reduced levels, setup and apply feature codes, insert symbols, do traverse network adjustments or digitize.
Points	Lets you add points interactively, then select existing points and edit, transform, translate, rotate, alter, cut, copy, or delete them.
Strings	Where you set up string folders, decide which folders are displayed and/or active, add strings, and change, split, join, cut, copy, or delete existing strings.
Options	allows you to ReIndex the Database, Backup and Restore jobs, and perform Quality Assurance on your jobs
Window	Lets you display new windows, or arrange the ones you have so you can see them better.
Help	Gets you to an OnLine manual, and tells you what version of the program you are using.

File Menu

The File menu offers the following commands:

New

Allows you to create a New Job.
Any job you create on the Desktop will be a 'Database' – i.e it will have the naming "db.jobname'.

All you need do is type in the name of the job and whatever descriptive information you wish.

Open

You can Open existing jobs.

Use the 'Files of Type' field to choose the type of job to open.
'Databases' i.e jobs in the format 'db.jobname' which have been created on the desktop
'Field Jobs' i.e. jobs in the format 'jobname.ezi' created in the field on your Palm PC

Close

Closes the current job

Save

Saves the changes to the current job.

SaveAs

Allows you to
1. Save jobs with different names
2. Save jobs into the alternate format. I.e. you can save a 'Desktop' job into a Field job ready to be uploaded into your PalmPC and taken to the field.

Import

The Import option allows you to bring in coordinates and/or strings from other design packages.
Note this is not for bringing information from Drawings or DXF files that are handled under their own option of Import DWG/DXF
At the moment the following options are available;

- **Civilcad -** From Bloomfield Consulting/Topcon .You can read in the Version 4 ASCII Dump containing points and strings with certainty. The newer Version 5 ASCII Dump should work but may still need fine tuning.
- **GEOCOMP -** You can import information from Points, Strings and Cross Section files created by Geocomp software.
- **MOSS GENIO -** We have written the program to be able to understand all of the different headers and information in any of the MOSS files we have seen to date, so simply provide the file name and let it loose and you should end up with a recognisable job.
- Be warned that it can take a little while to import large MOSS jobs.
- **Variable ASCII. -** This option has been provided to allow you to read data from any file that is in normal ASCII or 'text' format and which contains coordinates of points.
- You can read data which is in columnar format, or is separated by commas, or which is stored one value per line.
- Identify the file you wish to import, and the program will bring up a screen which shows the first few lines of the file in a window, and allows you to either retrieve a saved variable format, or define what type of file you have, and what it contains.

Export

Export gives you the facility to take coordinates (and strings in some cases) and transfer them into a format suitable to be imported into various design packages.
Please note that you can also 'export' coordinates into a columnar format that you define by using the List option under the Points menu.
Also note that even if the particular package you wish to talk to is not listed, it will be quite capable of reading in one of the other formats implemented. Try not to be too fixated on a particular name, but rather look for a common format such as MOSS Genio which most serious engineering packages can read.
The following formats are currently implemented.

- **civilcad** - you can export to an ASCII Dump file in Version 4 format, which will transfer points and strings as well as layer information.

You can also save Cross Sections into a '.XXX' file which some version of civilcad were able to read.

?? **Foresight Old Format** - allows you to dump out into ASCII files defined by earlier versions of Foresight, and still used by some packages (such as Liscad) as a means of coordinate transfer.

?? **Genamap** transfers to a format which can be read by the Genamap GIS package.

?? **Geocomp** will write out Points and String Files suitable for transferring to Geocomp software

?? **Geovision** - will create file in the 'GINA' format

?? **KeaysTT** transfers data to a format readable by software from John Keays in Brisbane.

?? **Landmark** - this option will create a Landmark file with point and coordinates, however we suggest that since Landmark can also read civilcad ASCII files, and those files transfer strings in addition to points, that might be a more useful option. Note that if you find a problem in using this format, try using the civilcad version 4 ASCII dump file since landmark is happy to read it .

?? **Moss GENIO** - comprehensive method of transferring points and strings into this popular format that can be read in, not only by MOSS itself, but by all other packages which have serious claims in the engineering design market.

?? **Variable ASCII** allows you to specify your own format for transferring data.

?? You can arrange the data in delimited form, with Commas or Tabs separating the fields. In the comma-delimited format, you can create a file that can be read directly into spreadsheets such as Excel.
You can also specify data in a columnar format where you decide which attribute is in what column, and how wide the columns are.

Plot Parameters

The Plot parameters option brings up a series of tab forms that allow you to configure exactly what you wish to appear on the plot you are creating.

Each of the following forms is described in greater detail in the relevant section below.

Sheet Details

Please Note: If you are intending to transfer the job to a DWG or DXF file, then the only thing relevant from this set of parameters is the name of the file. Since the job is transferred in world coordinates, all other fields concerned with scaling, rotation, paper and grid sizes are irrelevant.

Name

If you only intend to Print the sheet directly from CDS you can ignore this field and leave it blank.

If however you wish to create a DWG, DXF, FPF or VRML file, you need to assign the name/number of the plot you are creating.

Printer

Allows you to select which printer you wish to configure the plot for, and which paper size and orientation you wish to use.

When you select this option the Windows Print Setup screen will appear and allow you to choose the printer and other details.

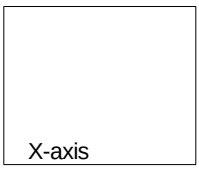
Bearing

The 'bearing' referred to is the bearing at which you wish to locate the 'X Axis' of your plot sheet, and the default is 90 degrees as seen in the sketch below.

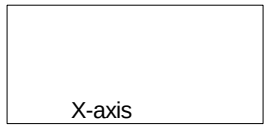
In other programs this may be referred to as 'Plot Rotation' or similar, but since rotation is at best ambiguous, and at worst confusing, we have chosen to stick with Bearing which you should understand.

Bear in mind here that you can use the Printer option to decide between Portrait or landscape orientation for your paper. In Portrait mode the short side of the paper is the 'X Axis' and if your are in landscape orientation, the long side of the paper is the X- Axis

Hopefully the sketches above will explain to you which edge of the paper you are attempting to rotate.



Portrait



Landscape

All you need to do is to type in the bearing that you would like this edge of the plot sheet to be at, and all should be well.

Scale
Set the scale, or reduction ratio you wish to use.
Simply type in the number you require, so if you want a scale of 1:500, you only enter the 500.
Note if you are using Feet as your distance units you need to convert 'feet scales such as 1"=20' to a ratio which is 1:240
Origin
The Origin is the bottom left hand corner of the plot sheet that you have already specified in the Printer setup.
If you wish to position the origin of the sheet at a specific location you can type in the coordinates, otherwise these coordinates will be updated as you move the plot sheet around using the Position Plot option which is described under its own heading.
Shift
The Shift distances allow you to specify where, in relation to the origin you have set, the plot will commence.
This will allow you to leave a clear border along the left edge and the bottom edge of the sheet of paper.
If you use it in conjunction with the Plot Area described below, it gives you complete control over where on the sheet of paper you have selected you require the actual plot area to be positioned.
Plot Area
These X and Y values allow you to specify the dimensions of the area on the sheet of paper that is available to plot in.
By using these dimensions, in conjunction with the Shift distances described above you can accommodate plotting on any pre-printed form, no matter where information is already printed.
The sketch above shows the plot area shaded and outlined in a dashed line within the sheet denoted by a solid line.

Border
You have two options as far as the Border is concerned, you can draw a rectangle around the area to be plotted, or you can insert a Named pre-drawn border that you have stored away as a Windows Metafile. (WMF)
1. Simple Border
If you wish to draw a border around the plot you are producing you should tick the box titled Border.
Of itself, this will simply draw a rectangle that is the size of the Plot Area you have specified, and this rectangle will be positioned on the sheet according to the Shift distances you have entered.
2. Named Border.

If you wish, you may draw plan borders and store them in a Windows Metafile Format to allow you to produce final plans.
These files should have names that start with ‘BORD’ e.g. ‘borda4.wmf’, and must be stored in the ‘Variable’ folder.
In addition, you need to make sure that each of these border metafiles appears in your Symbol Library, and that you have set the correct width and height values in the library.
You may then insert one of these borders into your plot by using the pull down option to select the relevant border, or by entering in its name,
Be aware that you need to adjust the Margins fields to position it in relation to the origin.
The Shift and Plot Area Fields already described should be used in conjunction with a Named Border to ensure that your plot appears in the correct position.
Note also that the named border will only appear in full at the Print Preview stage, and no attempt is made to display the complete border while you are positioning the plot.

Grid

You may elect to have a coordinate grid plotted on the plan by selecting one of the radio buttons titled Ticks, Crosses or Lines.

Interval

If you do elect to have a grid displayed, you should set the Interval required.

Annotation

If you wish to have the coordinate value of the grid drawn on the plot you need to turn the annotation ON by checking the box.

Tick Length

The Tick length field allows you to specify the size of the grid crosses you wish to have on the plot.
You should note that the Cross, if used, would be twice the size of the tick length you specify

Pen

The pen field allows you to determine what colour the grid will be drawn in.

Linetype

While grids are normally done in a solid line, this option allows you to choose from any of the available linetypes if you so desire.

Font

You may choose the font for the grid annotation, and can also set the size of the lettering.

Layer

You have two layer fields to use if required.
The one adjacent to the Linetype box controls the layer for the grid ticks.
The one below it allows you to determine which layer the grid annotation will be assigned to.

Point Parameters

First you need to decide whether or not the points are to be plotted, and if you want them to be plotted you need to select the Check Box next to Points so that a tick appears.
Once you have decided to plot some points, you need to assign a marker to be placed at the location of the point.
If you pull down the selection box, you can choose from the following options
by layer - the layers screen will decide which markers to be used
+ use a cross with the centre of the cross over the point - size as set
0 place a circle centred over the point, radius defined by size field
. mark the point with a dot
00 place concentric circles over the point - outer radius is 1.8x size set for inner
Next you can choose which attributes you wish to label the point with.
If you wish to use a particular attribute, select its Check Box.
To define the Pen/Colour, Font and Height of the label, select the Change button and then choose from the fonts, sizes and colours presented

Note for DWG/DXF devotees when you send a CDS job to Autocad, we make no attempt to send the point marker since this is easily definable within Autocad (try Format Point Style), and what is set in there will override any marker we try to send in any case.

Height

Note that the ‘Height’ is specified in Points, and if you are using earlier versions of Autocad this will be translated into an approximate millimetre size. (you may need to reduce size accordingly)

Offset

You can decide on the location of the label in relation to the point by using the Xoff and Yoff fields, and the ‘off’ refers to the offset of the text from the point location.
The offset is specified in millimetres
A positive ‘X’ offset will result in the label being to the right of the point location, and a negative offset puts the label to the left of the point
A positive ‘Y’ offset will result in the label being above the point location, and a negative offset puts the label below the point.

Angle

The Angle field defines the rotation of the label about the point starting from 0 at horizontal to the right.
If you wish to slope the text upwards use a positive angle, and if you wish to rotate it down below the horizontal use a negative angle.

Layer

Layer allows you control over which layer in the drawing the particular attribute will be stored on.

Accuracy

The cryptic Acc is short for Accuracy, and allows you to specify the number of decimal places to be used in plotting the particular attribute.

Point Selection

You have complete control over which points you wish to have plotted, and you can select the points based on this screen, the layers screen, the selected points, or only plot the points in the strings you are plotting.
You can either allow the layers screen to control which points are to be plotted, or use this screen to enter in details of which points you need plotted.

Layers

If you wish to hand control to the layers screen simply select the Bylayer button.
The points to be plotted are then determined by what you have entered in the Layers screen.

Point Selection

This indicates that you will control the point to be plotted by filling in the current screen.
You can select based on Point Number, Point Code and Layer.
If you position your cursor in the relevant Point, Code or Layer 'window' you can then Add a new range, or Edit the highlighted range by selecting the relevant button.
If you simply want to alter the status of an existing range from Include to Exclude, or vice versa, you only need select the relevant range and then pick the button.

Selected Points

This option allows you to plot only the points which you have already selected using the Select Points facilities.

String Points Only.

Only plots the points that are contained within the strings you decide to plot.

String Parameters

If you require Strings to be plotted, you should select the check box so that it has a tick in it.
You can then decide which if any of the other string attributes you wan to appear on the drawing by 'ticking' the relevant boxes.
The items available are
String Id's- for closed strings will be plotted at the centroid, and for open strings near the end .
Areas - for closed strings only, will be plotted about the centroid
Bearings - are normally plotted centred on the segment of the string to which they refer
Distance - normally centred on the segment of the string to which it refers
Angles.- for those areas which still need this arcane form of title detail.
You can set the pen or colour and font and font size for each item by selecting the 'Change' button and choosing from the options presented.
The Layer control allows you to assign each item to a particular layer if you wish.
You can also set the starting position for the short line table by specifying its coordinates relative to the bottom corner of the paper you are using.

Chainage HAO

If you wish to produce a typical road centreline plan with the chainages plotted at ‘half-angles’ along the road you need to turn this option ON by ticking the box.
You should then ensure that you use the String Selection options to make sure that only the strings representing the centrelines you need to plot are selected.
If you wish to have the points marked with a circle as is often the case then you need to use the options on the Point Parameters tab to set the Points to ON and assign a marker of a circle.
You should also use Point Selection and select String Points Only.

String Selection

The string selection Tab will display a hierarchical ‘tree’ showing each string folder within the job and each string within each folder.
You simply select each string you wish to appear on the particular plot.
If you wish to plot all the Strings in a particular Folder, simply select the Folder.
If you wish to select All the strings in the job, use the ‘Select All’ button on the right of the window.
If the folder box contains a ‘grey’ tick it indicates that some of the strings within that folder have been selected, while a black tick means all strings in the folder are selected.

Contours

While Ezifield allows you to form basic contours in the field, this is for verification of your data only, and the contours are not imported onto the Desktop.

If you wish to use contours on the desktop you will need to contact your dealer to purchase the module that contains this capability.

Plot Position

Once you have used Plot Parameters to set a scale, and decide what is to be plotted, and you have used Print Setup to select the correct paper size, you can select this option to move the border of the plot sheet around on screen so that the location of the job details within the plot sheet meet your needs.
When the position is correct, simply press the left mouse button to save away your preferred location.
Note that in this release, if you find that the plot sheet displayed is not adequate, you need to exit from the positioning routine and go back to you plot parameter screen to change the scale, rotation or paper size.

Export DWG

Make sure you have used Plot Control under Plot Parameters to set the appropriate Filename for the drawing before you select this option.
You can export your drawing directly into a Drawing file that Autocad can read.
Note that your Field Coordinates are exported to the DWG file, and as such scaling within is used only to determine how much of the current job you wish to Export.
Once the DWG file has been created you will be informed, and given the option of opening it .
Note that at this point we are only exporting Drawings in Release 12 format to maintain backward compatibility with older versions of Autocad. Both R13 and R14 will happily read in this format.
NOTES;
1. When we export to Autocad we export real world coordinates. Therefore, paper size, scale and rotation are ignored.
You may use Paper Space in Autocad to position and scale your plot as required.
2. Grid since we are exporting the DWG in real world coordinates (in Model Space) it is not logical to export a grid which relates only to a particular sheet of paper, so the Grid is NOT exported to the DWG.
3. Point Markers any points you select are sent into Autocad as Points, and since the point markers are easily formatted in Autocad does NOT export any markers.
Within Autocad use Format, Point Style to choose the marker and size you require for your points, and remember that the new Point markers will only appear after the drawing has been regenerated.
Export DXF
Make sure you have used Plot Control under Plot Parameters to set the appropriate Filename for the DXF file before you select this option.
The Drawing eXchange Format is a much less efficient method of storing drawing information than DWG, but it is almost universally recognised by CAD packages.
We do however recommend that you check carefully with the intended recipient of the exported file, and if they can accept a DWG file you should use it for preference.
Also, if the intended recipient of the data you are exporting is using another brand of Engineering Design Software, we recommend that you look at providing coordinate data in one of the formats listed under the Export option on the File Menu, and only use DXF as a last resort for transferring spatial information.

Export FPF

If you wish to use the old Foresight CAD Facilities you will need to export your drawing to this format. The program is mo longer supported and we recommend that you obtain a low cost Drafting program that that supports DWG files.

Export VRML 3D

This option allows you to export a file in the format defined for Virtual Reality Modeling Language.

Entry Menu

Data Collectors	collect data from data recorders, convert the raw data to stadia files. Note the ability to send coordinates back to the field is not yet implemented - please use Version 3.03 if you have this need
Electronic Stadia	lets you enter in 'stadia' taken with EDM including total and semi-total stations, and edit data from Data Collectors
Field Levels	you can enter readings taken in the field with a level and the program will automatically reduce them for you
Reduced levels	used to enter section data where you have chainage, offset and reduced level for each of the points
Traverse Network	for the entry and adjustment of traverses
Feature Codes	you can set up your own code library to automatically join strings and insert symbols on points, assign points to layers, and mask points as non-contourable
Symbols	allows you to define the symbols you wish to use and to insert them into a job, either attached to point in the database, or 'free-floating'
Text	Allows you to define any additional user defined text; either attached to a point in the database, or 'free-floating'.
Digitizing	Available as an optional extra module.

Data Collectors

Please note that the terms Data Collectors and Data Recorders are used interchangeably, and refer to any survey instrument, or box attached thereto which purports to record survey information in the field.
It can include hand held overgrown calculators, one piece total stations which record internally , reflectorless laser measurers, GPS systems, Electronic Levels and the like, so don't get too bogged down in the terminology..
The Data Collector Option gives you access to the following routines

NOTE: the Collect option only works with Data collectors that have the ability to send the data out from themselves.
If you own one of the units that requires the computer to interrogate it to retrieve the information, you will find that the manufacturer has supplied a program to perform the required interrogation.
We do not like re-inventing the wheel, so we have no intention of writing routines to 'interrogate' data collectors. You should organise to run the program supplied by the manufacturer, and store the resulting data into a file which you can then feed into our 'Import Raw Data Option'

Collect Raw Data From Data Collector

has its own internal communications program that gives you the ability to
import from a Data Collector,
convert the raw data to a Stadia File
calculate and Store the coordinates in the database .

It is not possible to give precise instructions for how to operate all the data collectors, but if you follow the steps outlined below, and intersperse them with instructions from your data recorder manual, you should achieve the result you are seeking.

1. From the Entry Menu select Data Collectors, and then Select the Option titled Collect Raw Data
   This will open the communications window.
2. First pull down Settings, followed by Communication In, and check that the various values are identical to those in use by your particular Data Collector
   NOTE that it is not particularly important what settings you choose to use, but it is IMPERATIVE that you use EXACTLY the same settings on both the computer and the Data Collector.
3. Next Pull Down the Transfer Menu and select Data to Computer.
   The screen will now be in 'terminal mode', waiting for data to arrive from the data collector.

   Start your Data Collector Transmitting and the data should start to scroll into the Window.
   If it does not then there is something wrong with one of the Settings, so press Escape to terminate the receiving mode, then go back and change the settings and then try again.

   Once the data has finished scrolling into the Window, press the Escape Key to terminate the transfer mode.
4. Now pull down the File menu and Select Save.

Use a filename that makes some sense within your system of operation, but for an example we could use a name of ‘raw1.xyz’ if we intended to store the data in Job ‘XYZ’.

When the file has been saved, Exit from the communications window

5. Pull down the Entry menu again, select Data Collectors followed by Import Raw Data.
6. First select the file containing the raw data (that is ‘raw1.xyz’ in the example).

   Next choose the type of data it is from the pull down list of data collectors.

   Then specify the job you wish to store it in, and the Survey number to be used and select the ‘OK’ button.
7. Now proceed to the Stadia screen to check and store coordinates in the database.

Import Raw Data

This routine is designed to take the many and varied native data recorder formats and convert them into a common format that we call a ‘Stadia File’ This ‘Stadia File’ can then be viewed and edited if necessary using the Electronic Stadia facilities, and the data is then stored into the database from within Electronic Stadia.

When you select this option you will first need to identify the file in which you have stored the raw data. You can use the normal Windows file locating procedure to track down and identify this file.

Next you need to identify the Data Type.

You have a Pull Down List that will allow you to select from numerous varieties of data collectors including

GCS - including Liscad format
Geodat
HP48SX
Kern
Nikon
PSION
Quarryman
SDR - native to SOKKIA, but various other can write to this format
Sharp - in MOSS Input Format
Topcon - a variety of options
Wild - now known as Leica - many options to choose from.

Once you have selected the correct input format, you need to identify the Job into which you wish to convert the data.

The program will default to the currently active Job, but you have the option to Browse and select another job if you wish.
Next you need to define the 'Survey Number' within the job you have chosen.
The Survey Number allows you to store the field data in a logical order as it arrives at the office, and its usage is many and varied.
Some clients prefer to download each day's work as it is completed and then start off the next day with a blank data collector. In this situation, the Survey Number is equivalent to the number of days spent on the job.
Other clients prefer to keep all the data in the data collector until the pickup is finished and then dump everything into the one single Survey Number. As long as you are aware that this is the electronic version of Russian Roulette that is OK by us.
Once you have completed all the relevant fields, simply select the OK button and the program will process the raw data and store it into the relevant Stadia file ready for you to inspect with the Electronic Stadia option.

Export Raw Data

This option allows you to convert point in your database into a format suitable for 'uploading' into you data collector, presumably for the purposes of taking into the field and setting out.
The routine is reasonably self-explanatory.
First you choose the Type of data collector from the list provided.
Next you choose the Job containing the coordinates you wish to convert.
You then need to specify the name of the file to store the coordinates in, and you achieve this by selecting the Browse button on this line and then entering the relevant folder and filename.
Once these items have been completed, select OK and you will be given a table that you fill out with the points required.
You can decide whether to send the natural height of the design height of the points as required.
Once the table is completed to your satisfaction, select OK and the file will be written ready for you to Send to the data recorder.

Send Raw Data to Data Collector

This is simple a communications program which takes the data file into which you have stored coordinates and sends it to the data collector.
When the program loads you need to check the Settings Out to ensure that both the computer and the data recorder are set to the same values.
Next use the File Open command to load the file in which the coordinates have been stored.

Then use the Transfer - Communications Out to send the file to your Data Recorder.

Electronic Stadia

For Details of how to use the stadia routines please refer to Tutorial 2 in the Getting Started and Tutorial Manual.
This will give you a complete run through of the operation of the routine, including storing data into the database.
The information below describes the function of each of the options within the Electronic Stadia routines.
Electronic Stadia allows you to manually enter data collected in the field using EDM, Semi-Total Stations, or Total Stations without data recorders. Facilities have been included to cater for all known data formats from these instruments.
It also allows you to edit data collected by data recorders, and once you Import the Raw Data from your data collector it will be presented in this format for you to view/edit before you store the coordinates into the database.

Survey Numbers ???

When you access the routine a window will appear with a “Survey Number” shown, and the possibility of either opening an existing file or creating a new one.
Each job may contain up to ninety-nine separate surveys, if required., and each survey is given a “Survey Number’
A survey may be simply one day's work, which can be processed by office staff while the field crew continues on.
Each day's results can be processed as a different survey number, and the job built up as it progresses.
This approach has been found to make errors much easier to find and correct.
You should enter in the Survey Number of your choice and then select either New to open a new survey, or Open Existing if you have already entered or imported data into that Survey Number.

Traverse Network

For details of how to use this feature please refer to Tutorial 2A in your Getting Started and Tutorial Manual.
This example takes you through an example of how to enter the traverse, calculate the misclose, adjust it and then store the adjusted coordinates into the database.

Feature Codes

Library Name

You may define different libraries for different purposes if you wish, and while you may use ‘long filenames’ under Windows 95 and NT you should be mindful that these can cause difficulty if you wish to revert to an earlier version of Windows at any stage.
You can use the pull down feature to select from existing libraries, or can simply type in the required name if you wish to start a new library.
Next you have the ability to define which characters you will use to signify ‘tag’ and ‘attributes’, and while it is common to use ‘+’ and ‘-‘ respectively, you have the option to define any character you choose to ensure compatibility with all forms of data recorders and coding systems.

Tag Character

Typically you would use ‘+’ unless your data collector decrees otherwise.
Used to tag points with multiple codes in the source file(eg.stadia) OR tag a code with multiple symbols in the code library.
The most common example of the use of this character would be a fence corner, where, for example, the fence defined by code F1 intersects with the fence defined by code F2.
Presuming you used '+' as the join character, you would code the point with 'F1+F2'.
The other method of usage of this feature is to place multiple symbols over the one point.
For example if you wanted a triangle and a circle over a point for special attention, and you had a symbol called TRI, and a symbol called CIRC.
The code could then be set up as S=TRI+S=CIRC.
This would result in both symbols being plotted over the point .
The idea is to enter in to the library each of the codes which you intend to use, and then describe what the code is to be used for.

Attribute Character

Signifies that the following items are attributes for that code.
Attributes available are :-
P-pen,
L-linetype,
M-magnification,-
Pens and linetypes are used for strings , magnification is used for symbols.
Attributes may be specified in the code library, or in the source file (eg.stadia), or in a combination of both places. If attributes are specified in both places, those in the source file will take precedence.
If no attributes are specified the defaults are P1, L1, M1,
If 90% of the time a code is to have certain attributes, then you would specify these in the code library and the other 10% of the time you would

put the attributes in the source file(eg.stadia) which would override the attributes that were in the code library for those points only.

Magnification.

The magnification applies to any symbols which the code will insert, and works in conjunction with the features of the Symbol Library to determine the size of the symbol on the final plan.
Symbols are initially drawn to occupy a square 10mm square.
If you wish to have the symbol drawn within a 5mm square you would use M0.5 to signify magnification of 0.5.
If you wish to have the symbol drawn 20mm then use M2

Definition of a 'Code'

Firstly let us define 'CODE', and in this program a code is made up of up to 8 characters which may be letters or numbers or a combination of both.
For example 'BLE' is a code, as is '110315', as is 'BLE23'.
It is also common to add to the code a string number which makes that code unique, so for example the code might be 'BLE' which stands for Bitumen Left Edge, but each distinct string of edge of bitumen on the left is also given a number unique to that string.
So we have BLE1, BLE2, BLE23 etc. to identify the different strings in the job.
Now from a field point of view we would have thought it logical to first identify the item, and then identify which one it is, thus BLE23.
However we are aware that there are other systems which insist that you identify the string number first, and then the item which would give a code of 23BLE.
We don't mind which way you do it, as long as it is done logically and consistently the program will cope with it.
Since you are going to define what each code means, and how it will operate, we do not care much what you choose to use as codes and would suggest that as long as the codes you choose are simple enough for the field party to remember, they should not cause the program any great degree of trouble.
When entering the code names, those codes with similar names can be added using wildcards.
There are two distinct wildcards, one which is a suffix, which means it comes after the code, and one which is a prefix which comes before the code.
The suffix wildcard is * and it will match any number of characters from one upwards. The wildcard can be used when entering codes such as PIT1, PIT2, PIT3 etc..
PIT* alleviates the need to enter each of these codes separately.

CARE must be taken when using the wildcard, however, as P* will match not only the PIT1, PIT2..... entries, but also POST or any other code that commences with P.
It is strongly recommended that you keep codes a certain length - two or three characters for example, and place the wildcard after them.
The prefix wildcard is ?, and you must use the exact number of characters which you are searching for.
So using our BLE example from above, if you wish to put the string number first, and decide that you will have up to 99 strings, you can have ??BLE as your entry in the code library.
It will happily handle any string from 01BLE to 99BLE and recognise them as unique entities BUT it will NOT recognise 1BLE. (It will also recognise TABLE as a unique entity - i.e. any two characters, followed by BLE will be recognised as a unique string)
Once you have entered a code, you need to define what type or types of activity are to be triggered by the code.
If you have entered a code, and the cursor has moved into the 'Type' column, you may use the pull down to choose from the types available which are.
Point - determine the layer, symbol and 'contourability' of a point
String - join points to form strings
Description - add a description to the point
Replace - replace one code with another

1. Point Codes

The point code facilities allow you to assign a point as non- contourable or to assign a symbol to that point, or to indicate that the point is a tree which is a special form of symbol.

Non-Contourable

If you do a full detail survey of an area it is highly likely that you will collect some points which you do not wish to be part of the contoured surface. For example inverts of pits, and temporary benchmarks placed on top of fence posts or up the trunks of trees can come into this category.
So, if you coded all your invert points with INV, you would type [INV] in the code column, select Point in the type column, and then N for non-contourable in the Action column.

Symbols

Symbols are created elsewhere, and stored as Windows metafiles.
Each symbol can then have magnifications specified for it either in the code library and/or the source file(eg.stadia).

Say for example you had used a code of MH in the field to describe each manhole which you picked up, and that you had a symbol called ‘MHOLE’, and that you required a manhole to be drawn on the plan at each point.
(For the potentially politically correct out there ‘man’ , properly considered, is a diminutive of ‘human’ and as such is equally appropriate to all three of the sexes)
The first thing to do is to put the code ‘MH’ in the code column.
You would then Select ‘Point’ in the type column,
The cursor would then be placed in the Action column.
If you simply wish to insert the ‘MHOLE’ symbol at unit size, you would enter S=MHOLE.
If however you wished to enlarge the symbol by a factor of two, you would enter [S=MHOLE-M2]

Trees

Trees are generally represented by two symbols, one for the trunk and one for the spread of the foliage, and while you can achieve this manually with two codes for each point, if you have a number of trees to identify you should use the specific tree code instead.
The tree code which you use in the field is made up of eight characters, or more specifically four sets of two character pairs which allow you to define the type of tree, the trunk diameter, the spread and the height of the tree.
For example consider a code of EU050913 and what each of the pairs mean.
First Pair: EU means eucalypt, and defines the Type of tree
Second Pair: 05 = 0.5 metres - specifies the trunk diameter from 0 to 9.9 metres. So, 05 indicates 0.5 metres, while 21 indicates a diameter of 2.1 metres.
Third Pair : 09 = 9 meters - specifies the diameter of the foliage spread in whole metres from 01 to 99.
Fourth pair: 13 = 13 metres - specifies the height of the tree in whole metres from 01 to 99.
To use the code you should proceed as follows.
In the Code column you enter EU or whatever two characters you have used to describe your tree
In the Type column, select a Point code,].
In the Action column you need to define the point as a TREE, and also specify the two symbols you wish to use.
For example if you had a symbol named Trunk and another named Spread, your Features column would read TREE=TRUNK+SPREAD.
Note that you must use the '+' sign here not the character you have specified for joining multiples together.

This would call out the symbol TRUNK and apply a magnification of 0.5, and then would call out the symbol SPREAD and magnify it 9 times its original size.
The height of the tree is stored in the Description field of the point, so you can plot out the heights adjacent to the symbols by simply turning the Description attribute on when you are ready to do the plot.
In this example the description would be '13m'
As well as the height which is automatically stored, you can also add a description if you wish.
To do this you need to enter a separate line in the code library with EU as your code, D for description as the Type of code, and in the Features column you enter TREE = EUCALYPT, or whatever description you choose.
The description you use is then combined with the height, and you have two possible options of how it can be stored, 13m EUCALYPT, or EUCALYPT 13m.
You can control which comes first by how you position your entries in the code library as seen below.
If you specify the symbols first, as below

Code	Type	Action	Layer
EU	P	TREE=TRUNK+SPREAD	
EU	D	TREE=EUCALYPT	

you will have a description of 13m Eucalypt.
Alternatively if you reverse the order of the two codes, as below,

Code	Type	Action	Layer
EU	D	TREE=EUCALYPT	
EU	P	TREE=TRUNK+SPREAD	

you will get a Description of EUCALYPT 13m.

2. String Code.

At this stage the strings are by increasing Point Number Order only, so if points 1, 10 and point 15 all had codes of EB1, the program would process them in point number order, with the result that a line would be drawn from 1 to 10 to 15.
The String Code can indicate either an open or a closed string.
OL - Open Line - as it suggests will draw a line between points with the same code, and the 'Open' merely indicates that the first point and the last point are not joined together.
CL - Closed Line - the last point is automatically connected to the first point to form a closed figure.
So, for example if you were picking up buildings, you might use the closed line facility to ensure the whole building was drawn correctly.

You may use the attribute key with both OL and CL to indicate pens and linetypes.
For example OL-P2L3 would draw the line in pen 2 and linetype 3.
Folder
For each string that you specify using the OL or CL function, you can specify which String Folder you want that string to go into.
You can get them to go into more than one string folder at a time by just putting two entries in the code library.

3. Description
This function will simply convert a code into a description.
This allows the field party to use cryptic abbreviations, or complex numeric codes which are then automatically translated to meaningful descriptions for the office staff.

4. Replace
This function is used to replace a code that is being stored in the database with the code that you specify in the Action column.
Note, that if the point is to be assigned a point or control code as well, the original code must be used in the Code column.
As an example, the following is the correct method of setting up the replace code.

Code	Type	Action
1234	P	S=TREE1-M2P3
1234	R	TREE

Symbols

Introduction to Symbols
A symbol is a drawing consisting of lines, arcs and text stored in Windows Enhanced MetaFile format (EMF). You can also use created in an Windows Metafile format(WMF) but they are not recommended as they don't containing any sizing information.
You can create symbols in most CAD packages by drawing what you wish and then using the Save As option to save the drawing as an EMF or WMF.
In addition there are a number of dedicated software packages, both commercial and shareware, which are designed specifically for creating and editing Metafiles. A program called Metafile Companion is recommended.
Before you get too far, you need to understand that a Metafile is 'elastic' in that it can be scaled either up or down uniformly, or it can be 'distorted' by 'stretching' the drawing in one or other direction. If you are dealing with

Enhanced Metafiles you can ignore the following as your metafile is already created at the size you want.
The WMF file itself contains no information which specifes what size it was created at, or what size it is intended to be.
So, it is important that you take care to note down what size you wish the symbol to be, and enter those values into the width and height columns in the symbols table as explained below.
Now while at first glance this 'elasticity' might be a little alarming, particularly to Engineers and Surveyors who are not accustomed to dealing with such abstract things, it can be used to your advantage.
For example, you can minimise the amount of time it takes you to create symbols by working smarter. Consider you need to represent a number of things on your plans that are 'rectangular' in shape. However some are square, some twice as wide as they are high and others twice as high as they are wide.
If you were to use your CAD package to draw a square with sides of 1 unit, you could then save this away as three different names, such as Square, Wide and High.
When you read the symbols into , you would then set width and heights as follows

Symbol	Width	Height
Square	1	1
Wide	2	1
High	1	2

Symbol Library

Any symbols you wish to use in should be stored in the 'Variable' Folder on whatever drive you have installed the Utilities.
When you access the Symbol Library option for the first time, the program will read through any WMF files it finds in the 'Variable' folder and display a 'thumbnail' of each of the symbols and the name of that symbol in a table. You then have a number of options.

Scaled

If you wish to draw the symbol at the same size regardless of the plot Scale you should clear the 'Scaled' box, and the symbol will become 'unscaled'**.**
If you have the Scaled box crossed, the symbol will be scaled according to the plot scale as explained below.
If a magnification is specified by Mn (where n is the number specifying the magnification required) then the symbol will be magnified and then adjusted according to the plot scale specified.
You may get some more understanding of scaling and unscaling from the table below.

e.g. a symbol that is a circle which you wish to have a 10mm diameter i.e. 10m diameter on ground you would specify both a width and height of 10 for this symbol in the symbols library table. The final size would then be.
(N.B.: symbols should all be created in mm i.e. at 1:1000).

Scale	(M1)	(M2)	(MU2)
1:1000	10mm	20mm	20mm
1:500	20mm	40mm	20mm
1:200	50mm	100mm	20mm
1:100	100mm	200mm	20mm

If a symbol's magnification is specified MUn it is a non-scaled symbol i.e.. it is to be magnified but is not to then be adjusted according to the plot scale

Width & Height.

Any enhanced Metafiles automatically fill in the width and height as they have been designed. It is not recommended that you change these values. You are better editing the enhanced metafile in metafile companion and resaving the metafile. Most of the supplied symbols have a default size of 5mm by 5mm.
If you wish you can alter this default value either up or down to suit by entering the relevant value.
Insert X & Insert Y allow you top specify the insertion point of a symbol to be offset from the centre of the square if needed**.**
The values are specified in millimetres**.**

ReRead

The ReRead button allows you to refresh the Symbols tables and again look through your 'Variable' folder an display a thumbnail and name of all WMF files which it finds.
BE WARNED however that this process will destroy any scaling or sizing information which you might have already placed in the symbols table.
If you only wish to add in a few new symbols, you should use the Add option instead of this one.

Add a Symbol.

When you select this option you will see a display of the names of all the WMF files which are currently in your ''Variable' directory.
If you select the name of the symbol you wish to add, and then select the OK option, the symbol will be added onto the end of the table without disturbing any of the sizing information of your existing symbols.

Symbol Display

This option provides you with a table that shows you where symbols have been inserted into the current job.
The name of the Symbol is shown in the left column.

Next you will either find that the symbol has been inserted in space, in which case values of East and North will be shown, OR, the symbols will be attached to a Point in the Database, in which case only the Point Number will be displayed.
The table will also show the Scale at which the symbol has been inserted, and a Rotation which at the moment will always be 90.
With the exception of Rotation, you may enter new values to alter the location or size of the symbols already shown, or you can insert a new symbol by typing in the relevant values.

Insert A Symbol.

As well as inserting symbols by using Feature Codes, you can use this option to insert them interactively.
You may either use the Pull Down option to select the name of the symbol you wish to insert, or type in the name if you know it.
You can then set the scale as necessary.
Once you select OK, you will see a square attached to your cursor and you should position it where required, and then select the location with the left mouse button.
If you Position the symbol directly over an existing Point the program will assume you wish to attach the symbol to the point and do so.
Otherwise you can place symbols wherever your creative desires dictate.
Note that if you wish to see the symbols on the Display you need to use Modes - Display and ensure that they are turned On.

Text

In preparing a plan, it is common to need to add items of text to describe the various features drawn on the plan, and to ensure that you can prepare a basic plan within we have included some basic facilities to allow text to be inserted into your plans..
Please note that we DO NOT intend the facilities provided here to replace a CAD package. If you wish to be able to move the text interactively, or format it to fit particular paths or have it justified then you should use your CAD package to insert it rather than this facility.

Insert Text

When you select the Insert Text option a window will appear to allow you to type in the text you require.
You should type the text you need in the top window.
You can then locate the starting position for the text, either by pointing with your cursor on the screen, or by typing in the coordinates of the point at which you wish to start.

You can specify the bearing of the text either

- by entering in the bearing you require,
- by using the 'P' option to get the bearing between two existing points, or
- by using the 'D' option to draw the bearing of the text on the screen.

You may use the pull up options to select font, colour, size and text attributes such as bold/italic etc in the normal fashion.
You can also define the layer on which you wish to store the text.

Text Display

This option will bring up a table showing you the location, bearing and size of all pieces of text you have entered.
If you wish you may type directly into the table to alter any of the values.
If you wish to delete a piece of text, highlight the relevant row in the table by clicking on the numbered row tag on the far left, and then press the delete key.

Points

Add

When you select this option, the program will enter 'Add Mode' which allows you to interactively 'click in' points on the graphic screen.
The cursor will change from the normal arrow to a cross to indicate you are in add mode.
If you wish to add points with specific coordinates, you can click anywhere on the screen to add a point, and then type in the coordinates you require in the table that appears.
When you are finished adding points, you should again select this option to turn it Off and your cursor will return to its normal arrow shape.
Note: you can also exit from the 'Add Point' mode by pressing the Escape key. The next time you move your cursor you will see that it changes back to the normal arrow.

Edit

Once you select the Edit option, a dialogue box will appear displaying the lowest point in the current Job, and all its attributes.
You may type in the point number of the point you are interested in, and then alter whatever value is necessary.

As well as specifying the Point Number of the point required you can point to the point with the cursor, or you may use the ‘Next’ or ‘Previous’ buttons to scroll through the database.

Select

This allows you to select the points that you wish to transform, translate, rotate, alter, cut or paste.
You can Select individual points, a range of points, and/or points within a polygon, and the selection mode is cumulative, which is a slight variation from what you might be used to in spreadsheets or the like.
In some other windows programs, if you select one item, it is unselected if you simply select a different item. You need to hold down either the Shift or the Ctrl key while selecting to ensure that all the things you point to are selected.
Here we have dispensed with the need to hold down other keys, and each point, or group of points you select is added to the points already selected. So, you might select three or four individual points, and then draw a polygon around another 10 points - you will end up with 13 or 14 points selected.
The options available under the select heading are;

?? Select All - all the points in the current job are selected
?? Select Individual Points - the cursor changes to a crosshair and you can then select individual points by placing the cursor over the point required and pressing the left mouse button.
As you select a point, the attributes displayed change colour.
?? Select by Range - here a dialogue box will appear which will allow you some reasonably sophisticated selection.
Each of the available attributes of a point is displayed, and you can select the Check Box down the left-hand side for the attributes you wish to use. Once the item is checked, the entry area to its right will become active and you can type in the selection criteria according to the following rules;

(i) individual items are separated by commas - e.g. 1,96,105 will specify those three points
(ii) start and end of range separated by ‘tilde’ - ~ - e.g. 21~35 will get all points between 21 and 35 inclusive.
(iii) the combination of attributes is an AND situation, so if you check Point Numbers with a range 1~100 and you check Point Codes and enter EBL the only points which will be selected are those which have Point Numbers between 1 and 100 AND have a Point Code of EBL

?? Select by Polygon - this allows you to draw a polygon around the area you are interested in.
Simply select a starting point, and then continue to select points in space which define the corners or nodes of your polygon.
You will see the polygon is drawn interactively as you pick the points so you can see what is being included as you go.
?? Select by selected Strings will select any points that belong to the strings currently selected.
?? Clear Selection - as its name implies, this option clears all currently selected points.

List

The List Option allows you to construct a list or printout of the points you have selected.
When you access the option you will see a table with four columns that are explained below;
On/Off - you need to 'tick' the box if you require the attribute to be included in the list
Order - you can decide in which order the items are printed. The item or attribute which you want to appear in the left hand column should be number 1 in order, and the remaining items then need to be numbered sequentially as you move to the right.
So, if your client wants a list showing Point Code, Chainage, Height, you can easily create it by ticking those 3 items and then giving Point Code order 1, Chainage order 2 and Height order 3.
Width - the width column allows you to specify how wide you require the field in which the particular attribute is to be written. Note that each of the columns is right justified, so if you wish to move the start of column 2 across to the right, you need to actually widen column 1 to achieve this.
Accuracy - allows you to specify how many decimal places are written out for those items that include decimals.
When you choose OK, the program will open WordPad in a new window and show you the list you have created which has been temporarily stored in a file called 'ptslist.wri' in the current Job folder.
You may then use the facilities of WordPad to alter or print the list, and when you are satisfied you should Save the list away.
You should be aware that if you simply try Save, WordPad will inform you that it could not save in the current format. Don't be concerned because to maintain compatibility with older Windows versions we need to write the list into a 'WRI' format that WordPad can read but not save.

Simply go along with its suggestion of saving in a different format, and choose one that suits you from the list that it presents.
You should also remember to use a more meaningful file name than the temporary 'ptslist' which we use.
If you use the Save As function, you can save the listing as a Word 6 Document, or alternatively you can save it as a plain Text file, either of which you should be able to import into other programs whether Word Processors, Spreadsheets or CAD packages.

Transform

This function will perform a Similarity transformation on all the currently selected points. It will scale and rotate at the same time if necessary.
Before you approach this routine, you need to have Two points already in the job (say 1 and 100) which are based on the original coordinate origin, and you also need to have two other points which represent the position of these points with respect to the new coordinate origin (say 1001 and 1100).
When you select Transform, a dialogue box will appear which asks you to enter Old Point 1 (1) and Old Point 2 (100) and then New Point 1 (1001) and New Point 2 (1100).
Once you press OK, all the selected points will be transformed by the required amount.
WARNING!! There is no OOPS or UNDO function on this routine, so be careful and of course make sure the original data is backed up before you start.

Translate

This option allows you to move or translate the selected points.
All that is required is to enter the bearing and distance by which you wish to move the points and then click OK.
The points will now appear in their new location
WARNING!! There is no OOPS or UNDO function on this routine, so be careful, but if you wish to put them back in the original position you only need to translate again for the same distance using the reverse bearing.

Rotate

You can rotate the selected points about a pivot point.
All you need do is specify the point you wish to rotate about (the Pivot Point), and the angle of rotation required.
Note that this is an angle, not a bearing, so you can enter a negative value if you wish to rotate anti-clockwise about the point.

WARNING!! There is no OOPS or UNDO function on this routine, so be careful, but if you wish to put them back in the original position you only need to rotate back about the same point.

Alter

Here you can change the values of the selected points.
You can Add (or subtract by entering a negative value) a constant amount to Point Numbers, East, North, Height, Rd No., Chainage, Offset and Design Height.
You can replace the existing Layer, Code and Description with a new value.
WARNING!! There is no OOPS or UNDO function on this routine, so be careful and of course make sure the original data is backed up before you start.

Compress Points

This option allows you to renumber the selected points, starting from the number specified, and numbering sequentially.
The effect of this operation is to remove gaps in the point numbers.
The program will automatically alter any Strings and triangle files that are in the current job.
Once you select the options, all you need to do is to enter the number you wish to start the compressed point numbers from.

Cut - Points

Use this command (or CtrlX) to remove the currently selected points from the Job and put them on the clipboard
If you have not selected any points, this command will not be available
Cutting data to the clipboard replaces the contents previously stored there.

Copy - Points

Use this command (or CtrlC)to copy selected points onto the clipboard.
Unlike the Cut command, this command does not delete the points from your Job, but, as its name implies, it makes a duplicate copy of them.
This command is unavailable if you haven't currently selected any points
Copying data to the clipboard replaces the contents previously stored there.
Note that the points are stored on the clipboard in a format specific to applications, so it is not possible to copy points to the clipboard and then paste them into a word processor or spreadsheet. If you wish to do this you need to list the points to a file, or export them

Paste - Points

Use this command (or CtrlV) to insert a copy of the clipboard into the current Job.

When you are paste Points into a job, the Alter screen will appear to allow you to add an amount to the point numbers so that the numbers from the clipboard do not attempt to overwrite the existing point numbers in the Job where you are trying to paste them.

This command is unavailable if you haven’t put anything on the clipboard.

Strings

What are Strings?
In our terminology a ‘string’ is simply a line joining two or more points. It may consist entirely of straight lines, or it may have a combination of straight lines and circular arcs.
A string may start on one point, and finish on a different point thus forming what we term an ‘open string’ e.g. the string defining a road centreline is an open string

String Attributes

This option allows you to determine how you want your strings displayed or plotted.
You can decide whether strings will be annotated with bearings and/or distances, with string ID’s or possibly chainages.
If the strings are closed, you may also have them filled with a particular colour or hatch pattern, and have their area shown at the centroid.

Class Name

When you Add strings, you are given the option of assigning each string to a particular Layer.
This “Layer” attribute can then be used to determine how all the strings that belong to a particular layer will be displayed and printed.
As an example of some uses of this facility, consider a subdivision that contains lots of different sizes as laid down under zoning guidelines. Say you had “normal” size lots, “super” lots and other lots to be used as “parks”. If you assigned the relevant strings around the boundaries of these lots to layers, you could then easily have all “Super” lots filled in and coloured red, all “Normal” lots filled in blue, and the “Park” lots coloured in green.
In addition, you might choose to put all the centrelines of the roads within the subdivision into a layer called “CL”. You could then decide that all strings in the layer CL should be drawn with Chainages plotted along them at the half angle offset to the sting.

Color
This is the color associated with each layer. Only strings with the ByLayer flag set use this string.

Linetype
This is the linetype associated with each layer. Only strings with the ByLayer flag set use this string.

Width
This is the width of the lines associated with each layer. Only strings with the ByLayer flag set use this string.

Break
This contains a comma-delimited list of surfaces in which these strings are used as break-lines/discontinuities. Only strings with the ByLayer flag set use this break line definition.

Fill
If you wish to have closed strings filled with a solid colour you should check this box for the classes required.

Fill Colour
You can select the colour required from the colour palette

Hatch
If you wish to fill closed strings with a hatching pattern check this box.
Please NOTE: at this stage does NOT export any of the hatching to a DWG or DXF file, and the hatching feature is intended only for those of you who wish to draw the plan directly from .

Hatch name
You need to enter the name of the hatching you wish to use.
Please note that the hatching format used by is compatible with the format published by Autodesk for use with their Autocad® products, and you can use existing Autocad hatch patterns if you wish, providing you put the definitions in the file named 'hatch' in the 'Variable' folder.
Utilities comes with the some standard hatching patterns, and you can choose by name only at this point.

Hatch Size
Allows you to increase or decrease the 'density' of the hatching pattern you have chosen.
You may need to experiment eith the value depending on the scale of the drawing.

Strings to Display/Print

This option allows you to select which strings you wish to display or print.
When you select the option you will see a 'tree' structure that lists the names of the string folders you have created.
If you see a '+' sign in the box to the left of the folder name, it indicates that there are a number of strings in that particular folder.
If you wish to see the individual strings within the folder, simply 'click on' the box with the plus sign, and the tree will expand to show you a list of the string Id's or names contained in the folder.
You will then see that each String has a 'box' to the left of it which may be 'ticked' if you require the string to be displayed, or 'unticked' if you do not wish to see the string.

Note that you may display all strings within a particular folder by simply ‘ticking’ the box adjacent to the folder name.
Obviously you can also ‘hide’ a particular folder by clearing its box.
Please Note If the string is defined as ByLayer ; you need to turn the appropriate string layer on or off to control the printing.

Short Line Table

When you have a job that contains small or short strings, it is often necessary to have the annotation of those strings placed in a table since the text will not fit adequately along the line.
Both the scale of the plan you are plotting, and the font size chosen determine whether or not the bearing/distance will fit along a line.

Short Line Parameters

This allows you to choose one of the following actions
Don’t Display Short Lines if the bearing and/or distance does not fit along the line don’t show it
Display Short Lines display bearings and distances adjacent to the lines regardless I will move them with CAD
Place Short Lines in a table - if the bearing and/or distance does not fit along the line, place the bearing and distance in a table with a reference number placed on the line.

Display Short Line table

Place the actual table within the active screen

Recalc Short Line Table

After the scale or font size has been changed recalculate whether the annotation will fit on the lines.

Add Strings

This is where you add strings into the job, but before you get around to adding you need to know about String Folders, and String Classes.

Folders

You can choose what folder the string will live in. If you like to think in terms of ‘layers’, then folders are simply ‘string layers’.
The important thing to understand is that does not insist that your lines or strings be on the same layer as the points that make them up. Simply put, we recognise that your field party picks up and lays out Points rather than lines, but your drafting staff are more used to working with Lines, and that the points are of lesser importance to them..

If you are of a mind to have the lines live on the point layer, then you can achieve that very simply by setting the folder name to be the same as the layer name.
However, the ability to differentiate between points and lines gives you a considerable degree of flexibility in what you have displayed or printed at any time.
As an example, consider you were working on a project such as a subdivision that is to be built in stages. It is conceivable that you might wish to place all the Points representing corners of the blocks onto a layer called 'Corner' for example.
If all the strings or lines were placed on the one layer it would be difficult to simply look at the blocks in Stage 3.
However, if you use folders named Stage1, Stage2 and Stage3 for storing the relevant strings, it now becomes a simple matter to only display the blocks in Stage 3 by turning that folder ON and all the other folders off.
If you wish to place the string in an existing folder you can use the pull down option to see the existing folder names, and select the one that suits your purposes.
If you wish to create a new folder, simply type the name of the folder into the space provided. Note for the time being please restrict Folder names to 8 characters or less.

Layers

As well as the folder, the Layer attribute gives you an additional menas of grouping strings of the same type together and then easily determining how all members of that layer will be displayed/printed.
As an example of some uses of this facility, consider a subdivision that contains lots of different sizes as laid down under zoning guidelines. Say for example you had "normal" size lots, "super" lots and other lots to be used as "parks".
If you assigned the relevant strings around the boundaries of these lots to layers, you could then easily have all "Super" lots filled in and coloured red, all "Normal" lots filled in blue, and the "Park" lots colourd in green.
In addition, you might choose to put all the centrelines of the roads within the subdivision into a layer called "CL". You could then decide that all strings in the layer CL should be drawn with Chainages plotted allong them at the half angle offset to the sting

Why have both Folders and Classes?

The folder in is of little practical benefit. There are a number of legacy routines in which still need the folder to help decide whether to use this string or not.

In general the Layer is the overriding attribute that decides on how a particular string acts and is displayed. The use can override this however via the use of the ByLayer flag associated with each layer.

The String ID

You need to give each string a name, or a number, or, in terminology an ID.

The string ID can be any combination of the letters A through Z and the numbers 0 through 9, and we strongly recommend that you so not include any characters other than these in string names.

It is possible to have more than one string with the same ID in a job.

Adding Simple Strings

You can add the points by pointing to the point on screen with your cursor (arrow) and pressing the left mouse button, or alternatively you can type in the point number.

If you choose to type in the point number, you should separate the points with commas.

Using a Sequence of Point Numbers

If you have a sequence of points in either ascending or descending order, you can have the program handle the sequence by entering the first point in the sequence followed by a full stop or period followed by the end point in the sequence.

E.g. points 1,2,3,4,5,6 can be represented 1.6, and points 6,5,4,3,2,1 can be represented 6.1

Adding Arcs to Strings

If you wish to add a circular curve or arc into a string you need to have the incoming Tangent Point, the Centre Point preceded by a + or - sign and the outgoing Tangent Point.

You use '+' if the curve is Right handed or Clockwise about the centre and '-' when the curve is Left handed, or anti-clockwise about the centre.

As you build up the string, you will see it drawn on the screen for confirmation.

The buttons on the bottom of the screen are as follows.

Show draw the string as it is defined so far

Cancel discard any changes I have made since I started adding

Finish finish the process of adding strings & save those added

Apply save the current string and wait for another to be added.

Change Strings

This option allows you to alter the definition of a string that is already defined in the current job.

You may select the string required by selecting the Folder name and String name from the relevant pull down boxes.
Alternatively, you may point to the string required with your cursor.
If you are pointing to the string, you should note that only strings that are displayed can be selected, and the closest string to the cursor will be selected.
Once the definition of the string is displayed you can edit it as you see fit to provide the new lot definition

Minimum Area

For a predefined string (ie a string already entered into the job) you need to either select this string from the screen; select from the drop down combo box's or type in the values for folder and name.
You have the option of adjusting the area by swing one point around an other or by sliding a string side in and out to change the area.

If you press the show area you are given the present area of the string. If you then type in the actual area you want and then press OK the appropriate point/points are modified to achieve the desired result. Otherwise an error message is displayed if there is no valid result.

Split Strings

This function splits an existing string either at a point or at a line.
You must have a single string selected before this function is activated on the Strings Menu.
Please note that unless only one string is currently selected, the option will not appear.
Once you select the Option, the program will display the String you have selected, and ask whether you wish to split it at a point, or at a line, and you should select according to your current needs.
If you wish you can assign new ID's to either or both of the new strings by typing in the relevant information.
Once you select OK the original string will be split in two, and the two resulting strings saved.

Join Strings

This option is only activated when you have two or more strings selected.
To use it, you MUST select the strings that you wish to join together IN the ORDER that you wish them to be joined.
Do not attempt to select a range of strings because there is no guarantee that the order will be correct even though the correct number of strings are selected.

Once you have two or more strings selected you should access the Strings - Join option.
You will see the strings you have selected listed in the top list box, while the bottom list box will display how the result will appear.
You will see +++ to indicate where one string joins another.
If you need to reverse the order of points in any particular string you can do so by selecting the relevant string in the top list box, and then selecting the reverse button.
You will see the order of the points reversed in the bottom list box.
Once you are satisfied that everything is correct you can select OK, and a new string will be created. The individual strings will be deleted unless you choose to deselect the box that says delete original strings.
Note that any duplicate points from the joining of the two strings will be automatically rectified in the final string.
The Info button allows you to look up any of the attributes (e.g. pen, linetype etc.) of any of the strings which you have selected.

Traverse Adjustment

This option allows you to pick any string and check on whether it closes or not.
It is typically used for ‘adjusting’ boundary strings entered from older plans which do not close exactly due to either ‘rounding’ of the bearings/distances shown on the plan, or plain old fashioned poor measurement in the first place.
Obviously for it to be of any meaning, the string you select should be meant to be closed.
Once you select the required string the window will display the bearing and distance of the misclose, along with a ratio which is the length of the misclose divided by the perimeter of the string.
If you are satisfied that the misclose is within acceptable tolerances you may choose to adjust it by either the Transit Method or the Bowditch Method.
The Bowditch method calculates the correction required to a side by multiplying the total misclose in east and/or north by the length of the corresponding side divided by the total length of the traverse. It can produce noticeable changes in lines which are north-south or east west.
The Transit method calculates a correction by multiplying the east/north misclosure of a side by the east/north of the side divided by the total east/north of the traverse. It generally produces a less pronounced change in the bearings. than does the Bowditch,
If the cause of your misclosure is the strange habit of rounding bearings on older plans, the Transit method may possibly give you a result which is

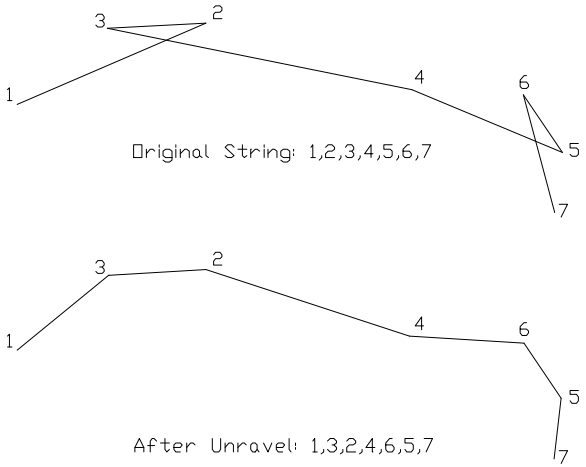
closer to what was originally intended, rather than the rounded values eventually written on the plan.
Be warned that there is no facility to ‘unadjust’ once you pick the relevant adjustment button, the adjustment is carried out immediately and the new coordinates of the points are stored in the database.

String Utilities

While the use of feature codes by the field party can save a large amount of time by automatically ‘stringing’ points according to their codes, it is often the case that an incorrect code, or a point with the correct code but out of sequence, will cause the string to be incorrectly formed.
To help in correcting these small anomalies we have provided a series of string utilities that can save you time and effort in attempting to get the string right.
Each situation needs a particular solution, so please read through the description, and check out the diagram to see which option best applies to your incorrect string.

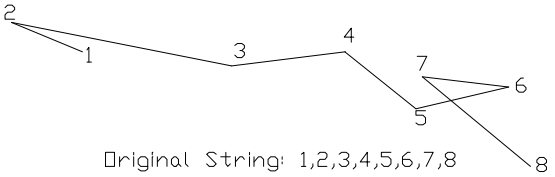
Unravel Twisted Strings

This option allows you to select a string that starts at the right point, but which has ‘loops’ or twists in the string. .
The program will then start from the first point in the existing string, and join to the next closest point. It will then continue joining to the next closest point until all the points in the existing string have been re-joined.
The string should now be formed correctly.
All you need do to get started is to point to the string that is twisted and select OK.

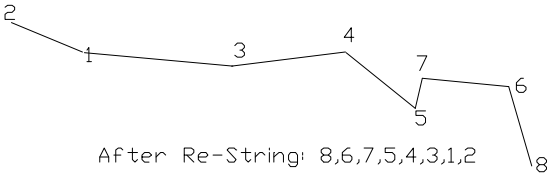


Re String

This option allows you to 'correct' a string where the first point in the existing string is not the correct point.
It assumes that the end point, or last point in the string is OK.
You should select the string in question, then select the end point (last point) of the string.
The program will then start from the end point in the existing string, and join to the next closest point, working backwards through the points in the string. It will then continue joining backwards to the next closest point until all the points in the existing string have been re-joined.



Original String: 1,2,3,4,5,6,7,8



After Re-String: 8,6,7,5,4,3,1,2

Splice Strings

This option allows you to splice or join two strings together.
It assumes that the two strings you choose are
(a) each correctly defined
(b) running in the correct order
When you select the option you are given a window to allow you to specify the strings.
You can either pick the strings on the screen with your cursor, or, use the pull down options in the dialog box to select the relevant strings.
Once you select OK, the program will create a new string which has the same ID as the first string you selected, and which will consist of the two strings spliced together.

Toe to Toe

Not yet operational – will be included in next update.

Drop Points from Strings

This option has been implemented to minimise the work required to remove extraneous points form existing strings.
Before you attempt to use this option you should use Points – Select to select the points you wish to remove from the strings.
Once the relevant points have been selected, you can then run this option and your string definition will be fixed and stored.

Select Strings

You can Select individual strings, a range of strings, and/or strings within a polygon, and the selection mode is cumulative, which is a slight variation from what you might be used to in spreadsheets or the like.
In some other windows programs, if you select one item, it is unselected if you simply select a different item. You need to hold down either the Shift or the Ctrl key while selecting to ensure that all the things you point to are selected.
Here we have dispensed with the need to hold down other keys, and each string, or group of strings you select is added to the strings already selected. So, you might select three or four individual strings, and then draw a polygon around another 10 strings - you will end up with 13 or 14 strings selected.
The options available under the select heading are;

- Select Individual Strings - the cursor changes to a cross and you can then select individual strings by placing the cursor over the string required and pressing the left mouse button.
  As you select a string, the string will be highlighted
- Select All - all the strings in the current job are selected
- Select by Range - here a hierarchical ‘tree’ diagram will appear which will show you all String Folders in the job, and each of the strings contained in those folders.
  Simply ‘tick’ the box of the strings you wish to plot. If you wish to plot all the strings in a Folder you may simply ‘tick’ the box adjacent to the folder.
- Select by Polygon - you can draw a polygon that encloses the area you are interested in. All strings that fall wholly within that Polygon will be selected.
- Clear Selection - once you have finished operating on the strings you have selected you can use this option to clear all currently selected

strings.

List Strings

This option operates on the currently selected Strings.
You will be asked if you want to list

?? Points only- a list of String Id's and the points that make up the String.
?? IDs Only - a list of String Ids only
?? Full Listing - lists Points on the string, bearings and distances between those points, and the coordinates of those points along with perimeter and area if applicable.

The listing is written directly into WordPad, and you use the facilities of WordPad to save or print the list to your printer.
You should be aware that if you simply try Save, WordPad will inform you that it could not save in the current format. Don't be concerned because to maintain compatibility with older Windows versions we need to write the list into a 'WRI' format that WordPad can read but not save.
Simply go along with its suggestion of saving in a different format, and choose one that suits you from the list that it presents.
You should also remember to use a more meaningful file name than the temporary 'lotlist' which we use.

Cut Strings

Use this command (or CtrlX) to remove the currently selected strings from the Job and put them on the clipboard.
Note only the string definitions are removed, not the points which make up the string.
If you wish to take the points that make up the string, you need to have those points selected as well as having the string selected.
If you have not selected any strings, this command will not be available
Cutting data to the clipboard replaces the contents previously stored there.

Copy Strings

Use this command(or CtrlC) to copy selected strings onto the clipboard.
Please note that the command only copies the definition of the string, i.e. a list of the point numbers that make up the string, and it does NOT take the points and their coordinates. (Unless the points which make up the string have also been selected using the Select Points option)
If you wish to copy strings from one job to another, you should first make sure that the Points are already in the second Job before you copy the string definitions.

Unlike the Cut command, this command does not delete the strings from your Job, but, as its name implies, it makes a duplicate copy of them.
This command is unavailable if you haven't currently selected any strings
Copying data to the clipboard replaces the contents previously stored there. Note that this data is stored on the clipboard in specific format so you can not past it into any programs other than a application.

Paste - Strings

Use this command (or CtrlV) to insert or paste a copy of the strings on the clipboard into the current Job.
You will be asked to specify which Folder in the job you wish to paste the strings into, and the program will default to the folder that the strings originated from.
This command is not available if you haven't put any strings on the clipboard with either cut or copy.