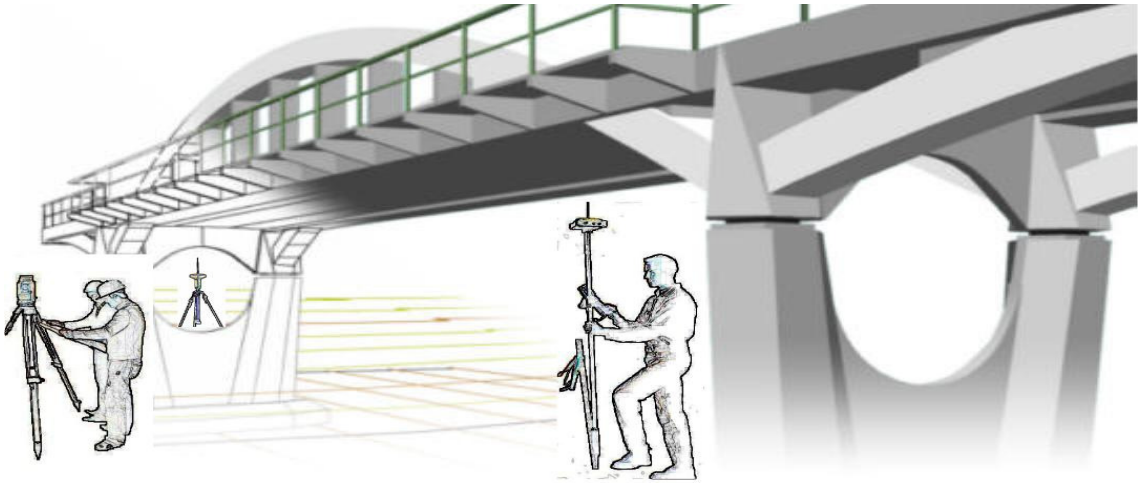
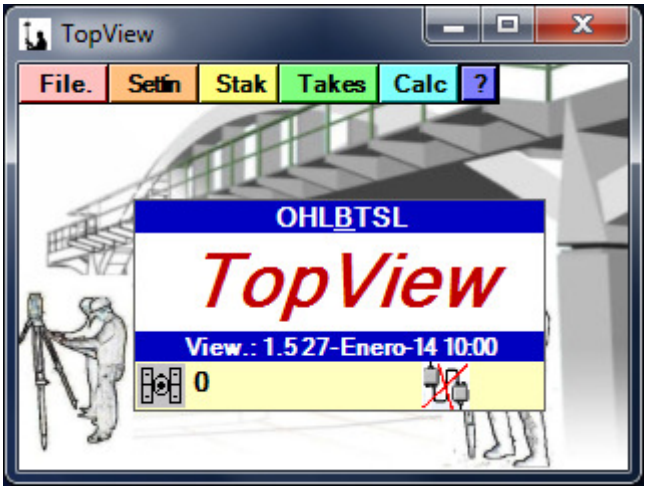


WORK PROGRAM FOR TOTAL STATION SURVEYING AND GPS



Versión 1.3 - February - 2014

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Preliminary Considerations.

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- Coordinate Editor
- Axis Editor Base + Elevation + Superelevations
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- Editor tunnel sections
- Editor Type Sections
- Import files
- Export files

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- Opt. GPS
- Datums and Geoides
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Contact Us

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INTRODUCTION:

Professionally, surveyors need to handle large amounts of data taken from computers that contain projects. Our professional effectiveness depends on the speed and accuracy with which we treat such information. The surveying equipment that we use today contains technical enhancements for the manipulation of large quantities of data and to store them on Pcs. However, the applications integrated into topographic devices are mostly scarce and inadequate, with limited memory and unwieldy to use due to small keyboards. Moreover our data storage inside the measurement equipment requires us to use only them and not others, or we would have to copy and even transform the data from one computer to another.

Therefore, an external tool is needed that can use the data transmission capacity of the topographic devices and manipulate this data in a more comfortable environment with a more versatile keyboard, a screen with acceptable resolution, and with a faster microprocessor. It also permits the use of any measuring device without having to pass data from one to another.

To meet this need we have developed a powerful, fast, intuitive and easy-to-use application. It integrates into any PDA and Tablet that has Windows Operating System, either Windows CE 3.0 or above, Pocket PC 2003 or higher, Windows Mobile, and Windows 95/XP/Vista/7.

Some industrial PDAs for field work are:







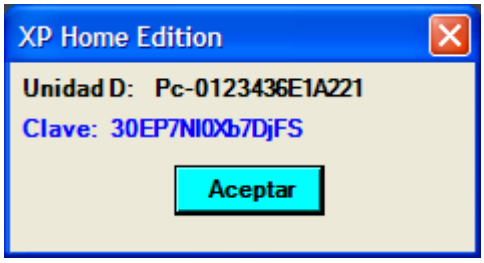

Some industrial Tablet PCs used for work in the field are:

PRELIMINARY SUGGESTIONS:

In all PDAs the Ram Memory is a volatile memory with the corresponding risk of losing all stored information when the batteries are depleted. They all also include one or two sockets that allow for the use of non-volatile memory cards such as PCMCIA, Compact Flash, MMC or SD types, and these offer another file system directory. We designed the application so you can choose any of these as the " Base Directory " on which to create the " Working Directory " so that if we choose a directory belonging to the Memory Card we will not lose anything if the batteries drain. Only the program uses the RAM on the PDA. If the PDA runs out of energy the program will be lost, but nothing else. By simply running the installation program on the Memory Card, the software is recovered. Also if we want to check the program on a different PDA, simply remove the card, insert it into the new PDA and run the new installation and the program will continue working with the same recent data that was in the previous PDA.

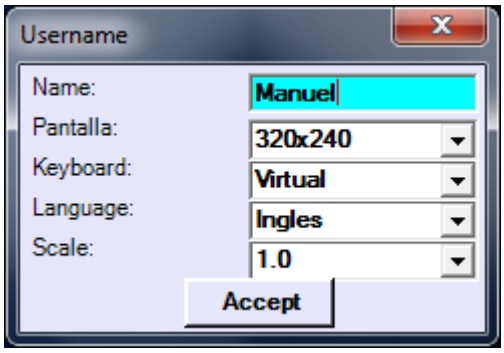
Beginning with Topview

When you run the program it informs you of the Serial Number and Password for the collector:



then it reads a file called "inicia.cfg" containing the last value of all program variables (work directory, device height, base height, base coordinates, etc ...). Then we are asked to confirm the name of the user or company that is to be shown at the top of the screen.

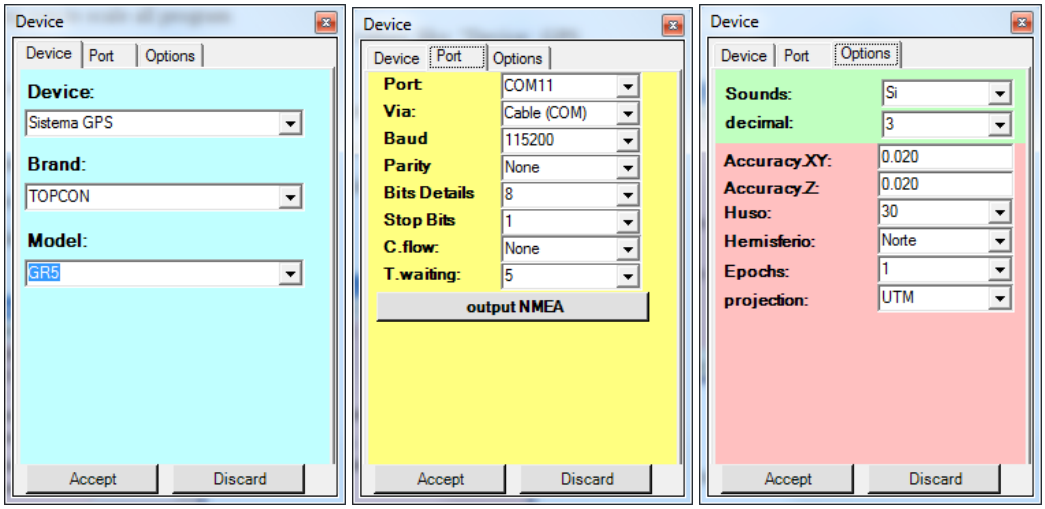
Main program, if the version is TopviewPc we indicate the Screen Size we want to emulate, and if we want to use the physical keyboard of the PDA or the Virtual Keyboard designed by us:



The "Scale" option only appears in the PC version allowing you to scale all program windows for better viewing on high resolution equipment.

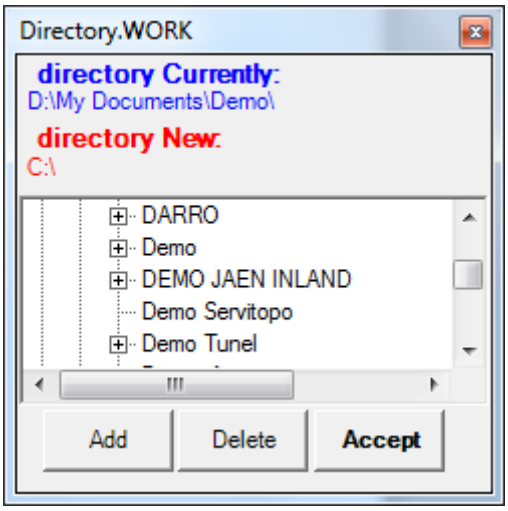
If this is the first time it runs, it shows some default values like "Device: GPS Emulator".

To choose a device we have to go to the Device Setup menu to a form where you are asked to choose between using a GPS or Total Station, we indicate the appropriate communication parameters and other options that are illustrated in the picture.

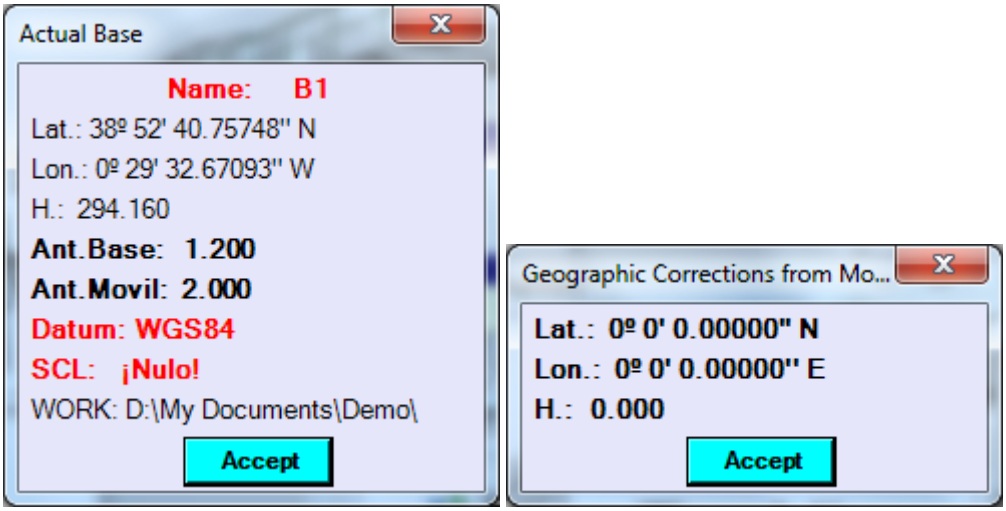


.

Similarly to delete, create or choose a working directory to house the data files we go to the Config menu. "Dir.WORK".



If we go to the Config menu CURRENT the program informs us of the current Base Total Station height, Jalon, Base Antenna, Mobile Antenna, Working Directory, Datum, SCL, Corrections from Mobile, etc...



After selecting the device and the working directory we can click on the drop-down menus to access all program options.

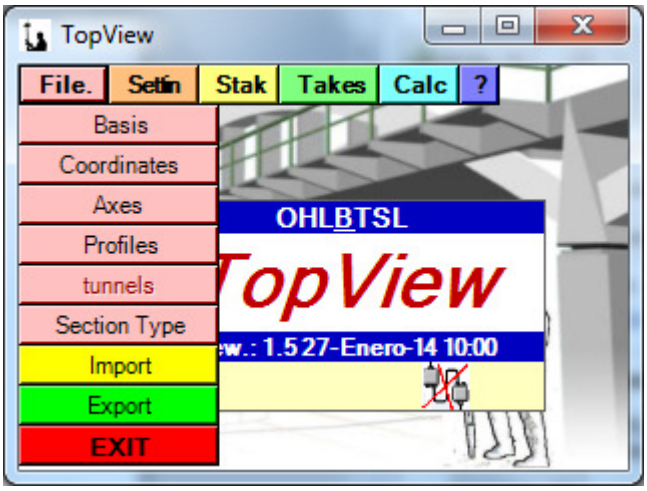
The drop-down menu "File" allows the creation and deletion of files used in other applications as well as the import and export of our project data or fieldwork.

The Setup menu allows configuration of certain parameters for starting work. The "Stake" menu allows staking out different dot structures such as files, Sections, digital models, etc.. The "Capture" menu is designed for data collection such as Highlights, Coordinates (stadia), Transversal, Longitudinal, etc.. The "Calc" menu allows additional calculations that do not require communication with the measuring device such as transformations or adjustments, "Utilities Cogo", recalculation of coordinates (stadia), etc..

In any information screen from a calculation allows us to act on it, pressing Enter to save the data or Esc to discard it and exit to a lower level of the application.

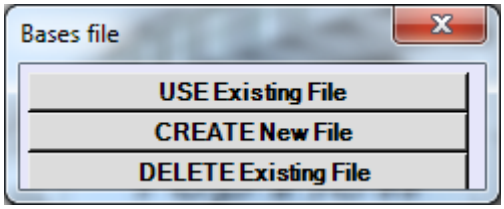
FILE MENU

Selecting Files in the TOPVIEW menu allows us to select the following options:



BASES EDITOR:

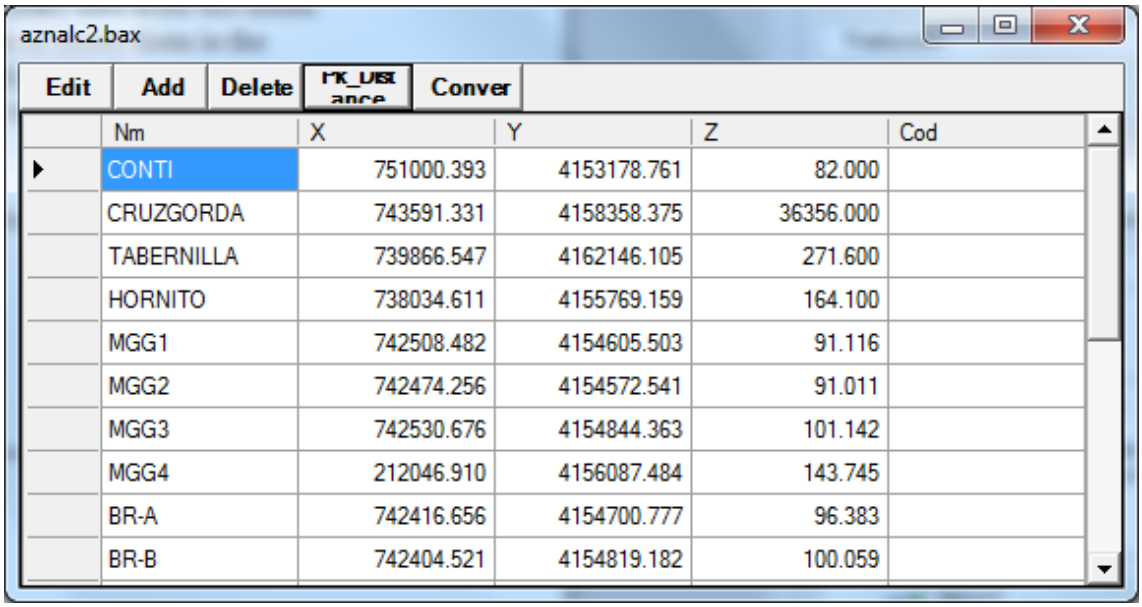
By selecting this option the following generic menu is shown:



The first time you want to do a job you can create all necessary files from this menu with the options from "Create New File" from the relevant module or create them in the Stakeout or Data menus in the relevant modules. If they are already created, we can go to "Use Existing File" and use the editing options. If the computer is to use a GPS, the program previously asks if we want Cartesian or Geographic coordinates.

Browsing the directory you can choose the desired file. We have the option, with the bottom tab of the dialog box, to choose geographical or xyz.

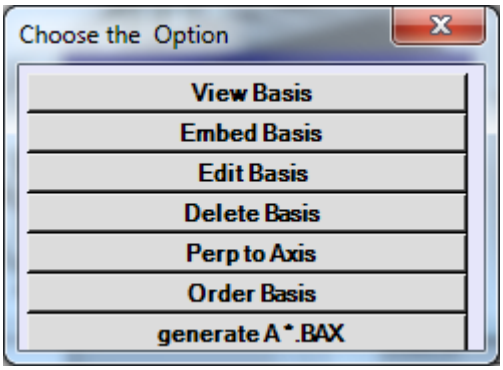
If we choose XYZ a table appears as follows:



	Nm	X	Y	Z	Cod
▶	CONTI	751000.393	4153178.761	82.000	
	CRUZGORDA	743591.331	4158358.375	36356.000	
	TABERNILLA	739866.547	4162146.105	271.600	
	HORNITO	738034.611	4155769.159	164.100	
	MGG1	742508.482	4154605.503	91.116	
	MGG2	742474.256	4154572.541	91.011	
	MGG3	742530.676	4154844.363	101.142	
	MGG4	212046.910	4156087.484	143.745	
	BR-A	742416.656	4154700.777	96.383	
	BR-B	742404.521	4154819.182	100.059	

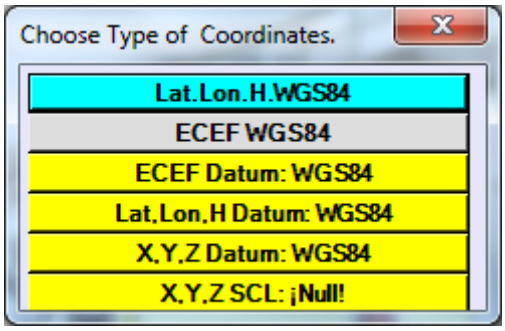
Where we can perform all the actions that appear in the header of each column. The Pk_Dist option allows you to analyze any base with respect to an axis. The Conver options (PC version) allows calculation of a geographical basis taking into account the chosen SCL and Datum. The result is expressed in WGS84 geographical.

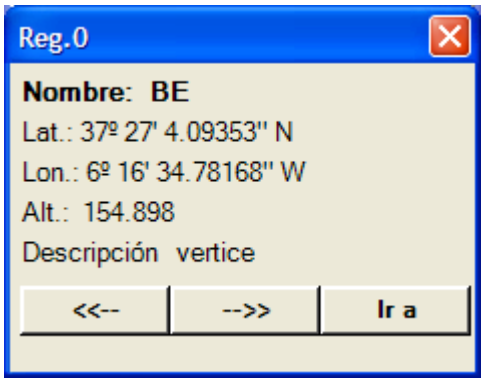
If you have chosen geographical bases, the editing options are:



View Bases

We can easily move using the cursors (🡐🡒) or go to a specific one by displaying the list of bases available in the file.

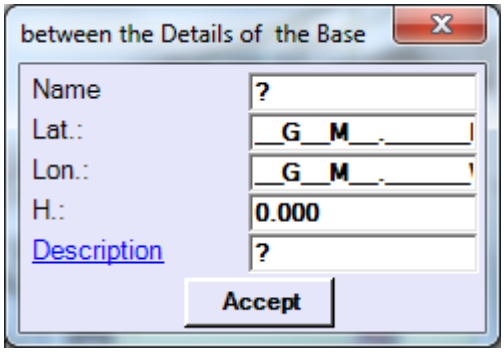




Bases: Insert Base or Add Base

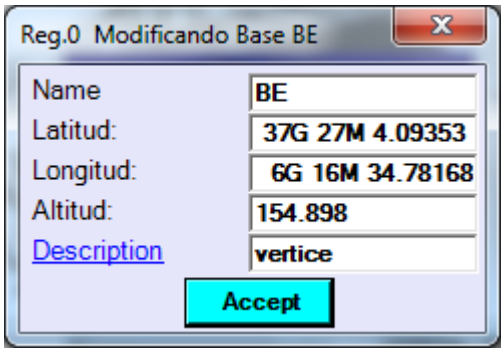
Insert is a function that allows you to insert bases. If the base already exists, TOPVIEW informs of the fact and forces you to change the name.

The data for insertion of the base are:



Bases: Edit Base

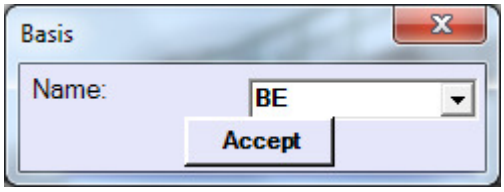
Once the data has been modified the following scheme is presented:

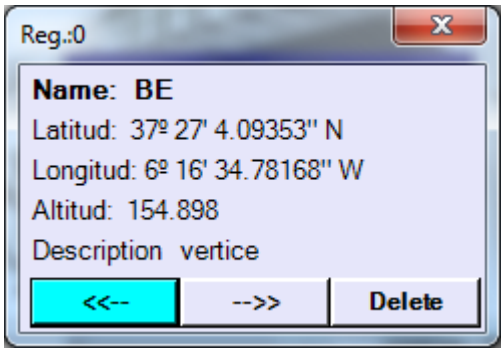


If you press <Enter> the base adopts the modified data as the new values, otherwise the base will still show the pre-edited data. If we have renamed and this already exists, the program lets us know and returns to the data to change screen.

Bases : Delete Base

This option deletes an existing base in the Bases file. It displays a dialog with the list of available bases, presenting the data on the screen and allowing us to move graphically between different records with cursors (🡐🡒) until we choose the base record we want to delete, by clicking "Delete".
The program will request confirmation of the deletion.





Perp to Axis

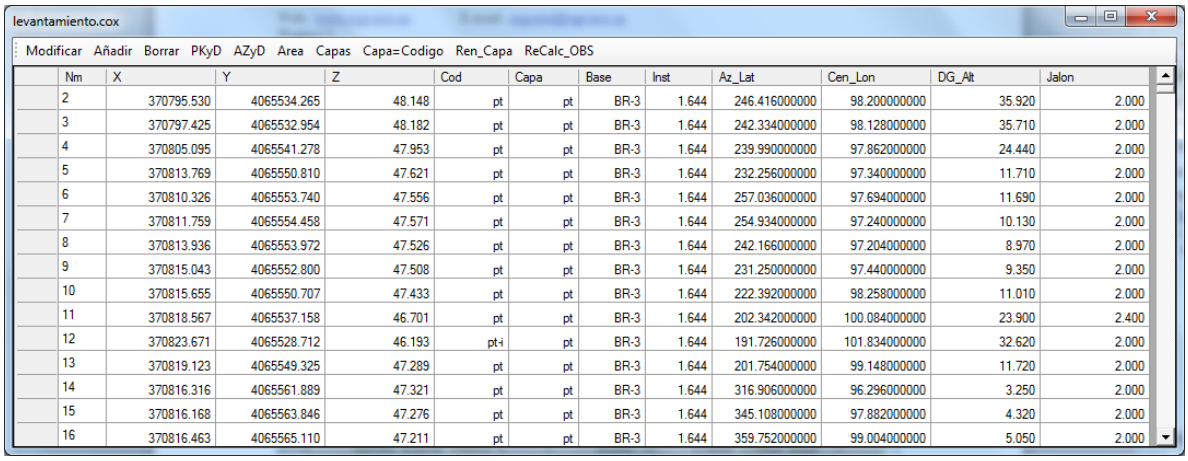
In this option we can choose a base and an axis by the name of the file it defines, indicating an approximate search PK to analyse, showing the station and resulting displacement.

Bases: Order Bases

This option allows you to sort numeric and alphanumeric bases by name. If you have used both designations, the program places the bases with numerical designation first and then the bases with alphanumeric designation.

EDIT COORDINATES:

In the new version the coordinates editor has the same appearance for both ET and GPS and is this:



levantamiento.cox

Modificar Añadir Borrar PKyD AZyD Area Capas Capa=Codigo Ren_Capa ReCalc_OBS

Nm	X	Y	Z	Cod	Capa	Base	Inst	Az_Lat	Cen_Lon	DG_Alt	Jalon
2	370795.530	4065534.265	48.148	pt	pt	BR-3	1.644	246.416000000	98.200000000	35.920	2.000
3	370797.425	4065532.954	48.182	pt	pt	BR-3	1.644	242.334000000	98.128000000	35.710	2.000
4	370805.095	4065541.278	47.953	pt	pt	BR-3	1.644	239.990000000	97.862000000	24.440	2.000
5	370813.769	4065550.810	47.621	pt	pt	BR-3	1.644	232.256000000	97.340000000	11.710	2.000
6	370810.326	4065553.740	47.556	pt	pt	BR-3	1.644	257.036000000	97.694000000	11.690	2.000
7	370811.759	4065554.458	47.571	pt	pt	BR-3	1.644	254.934000000	97.240000000	10.130	2.000
8	370813.936	4065553.972	47.526	pt	pt	BR-3	1.644	242.166000000	97.204000000	8.970	2.000
9	370815.043	4065552.800	47.508	pt	pt	BR-3	1.644	231.250000000	97.440000000	9.350	2.000
10	370815.655	4065550.707	47.433	pt	pt	BR-3	1.644	222.392000000	98.258000000	11.010	2.000
11	370818.567	4065537.158	46.701	pt	pt	BR-3	1.644	202.342000000	100.084000000	23.900	2.400
12	370823.671	4065528.712	46.193	pt-i	pt	BR-3	1.644	191.726000000	101.834000000	32.620	2.000
13	370819.123	4065549.325	47.289	pt	pt	BR-3	1.644	201.754000000	99.148000000	11.720	2.000
14	370816.316	4065561.889	47.321	pt	pt	BR-3	1.644	316.906000000	96.296000000	3.250	2.000
15	370816.168	4065563.846	47.276	pt	pt	BR-3	1.644	345.108000000	97.882000000	4.320	2.000
16	370816.463	4065565.110	47.211	pt	pt	BR-3	1.644	359.752000000	99.004000000	5.050	2.000

Mod.-

It allows us to modify data in the table

Añad.-

It allows you to add records in the table

Borr.-

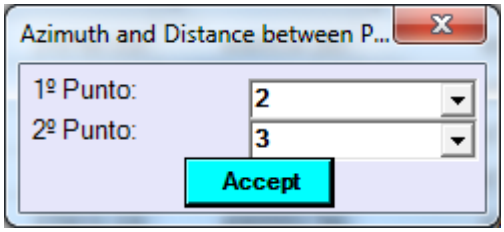
It allows you to delete records from the table

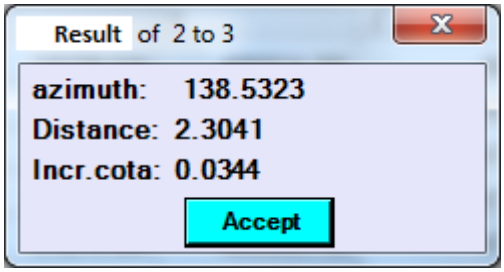
PkD.-

It allows us to analyze any point in the table with respect to an axis in TopView. Requests the axis to use and then shows the analysis of the result.

AzD.-

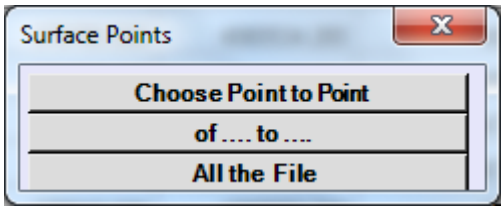
It allows us to calculate azimuth, distance and increase in dimension between points



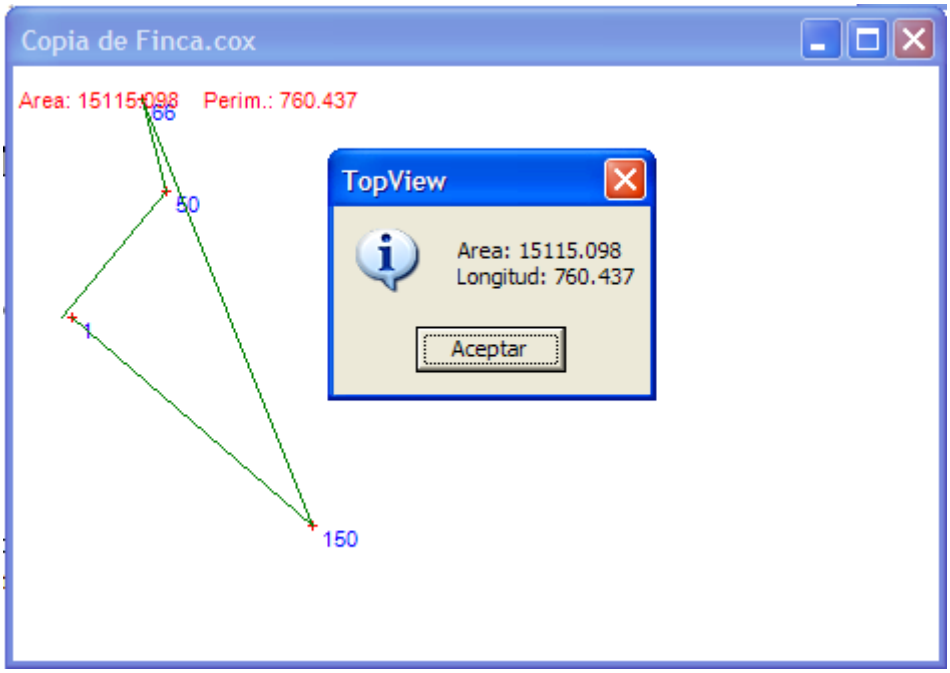


Area.-

This option allows us to calculate a surface and its perimeter from the names of the points that we choose, until you want to close with the first. A sketch of the figure formed by the chosen points, perimeter in metres and the surface in m2, Areas, and Has.will be displayed.



You can choose one by one the points we want to make up the figure, several sequences of points in ascending or descending order, or all the file in the order in which it was taken.



In TopView the extension of the coordinates files is *.cox. This kind of file is not editable from outside the environment of TopView. However on leaving the coordinates editor it always asks us if we are to generate the equivalent file *.coo, which can be edited with Notepad, Excel…-

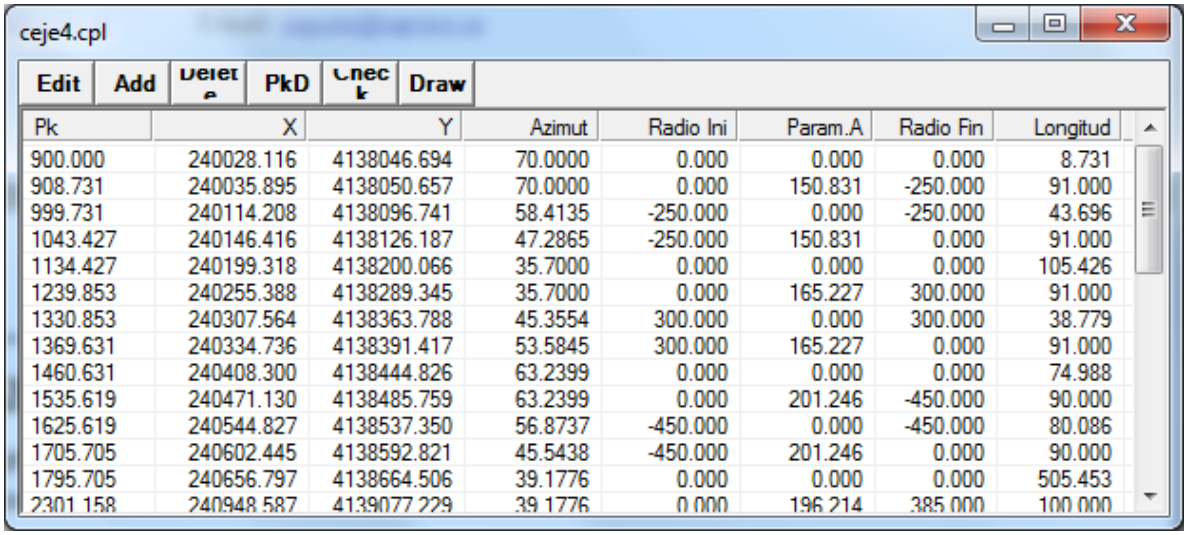
EDIT AXIS:

TOPVIEW allows the introduction of plans (importing files) automatically, manually or semiautomatically.

When you create a plan file another right elevation is generated, another one for the left elevation, and one for the Cambers table that are related to the plant with the same name but different extensions, thus deleting the plan also deletes the associated elevation and cambers files.

EDIT Axis:

Shows a table with this structure:

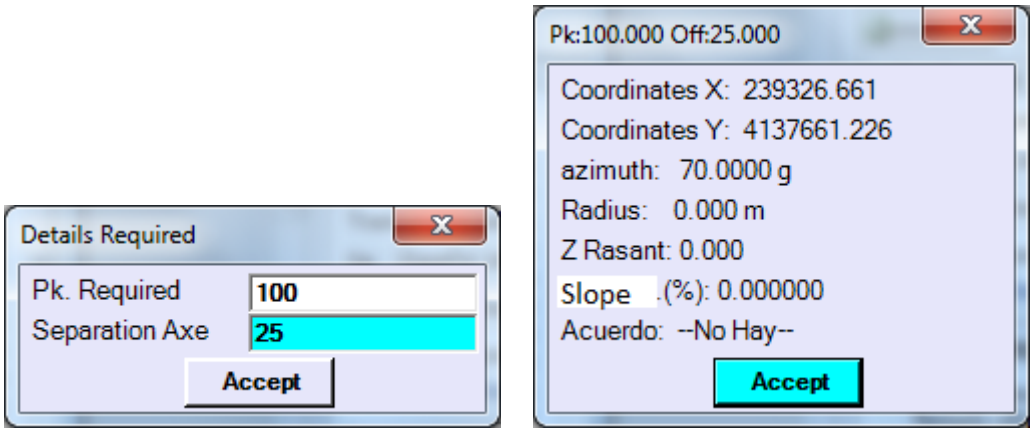


Pk	X	Y	Azimut	Radio Ini	Param.A	Radio Fin	Longitud
900.000	240028.116	4138046.694	70.0000	0.000	0.000	0.000	8.731
908.731	240035.895	4138050.657	70.0000	0.000	150.831	-250.000	91.000
999.731	240114.208	4138096.741	58.4135	-250.000	0.000	-250.000	43.696
1043.427	240146.416	4138126.187	47.2865	-250.000	150.831	0.000	91.000
1134.427	240199.318	4138200.066	35.7000	0.000	0.000	0.000	105.426
1239.853	240255.388	4138289.345	35.7000	0.000	165.227	300.000	91.000
1330.853	240307.564	4138363.788	45.3554	300.000	0.000	300.000	38.779
1369.631	240334.736	4138391.417	53.5845	300.000	165.227	0.000	91.000
1460.631	240408.300	4138444.826	63.2399	0.000	0.000	0.000	74.988
1535.619	240471.130	4138485.759	63.2399	0.000	201.246	-450.000	90.000
1625.619	240544.827	4138537.350	56.8737	-450.000	0.000	-450.000	80.086
1705.705	240602.445	4138592.821	45.5438	-450.000	201.246	0.000	90.000
1795.705	240656.797	4138664.506	39.1776	0.000	0.000	0.000	505.453
2301.158	240948.587	4139077.229	39.1776	0.000	196.214	385.000	100.000

With which, using each one of the functions listed in the table header, we can edit the axis as we like. It is always advisable to check it afterwards with the Check option.

PkD

This option allows you to consult the X, Y coordinates, azimuth and radius of any point on the path through a Pk and a shift to the left or right of the axis, returning the following information:

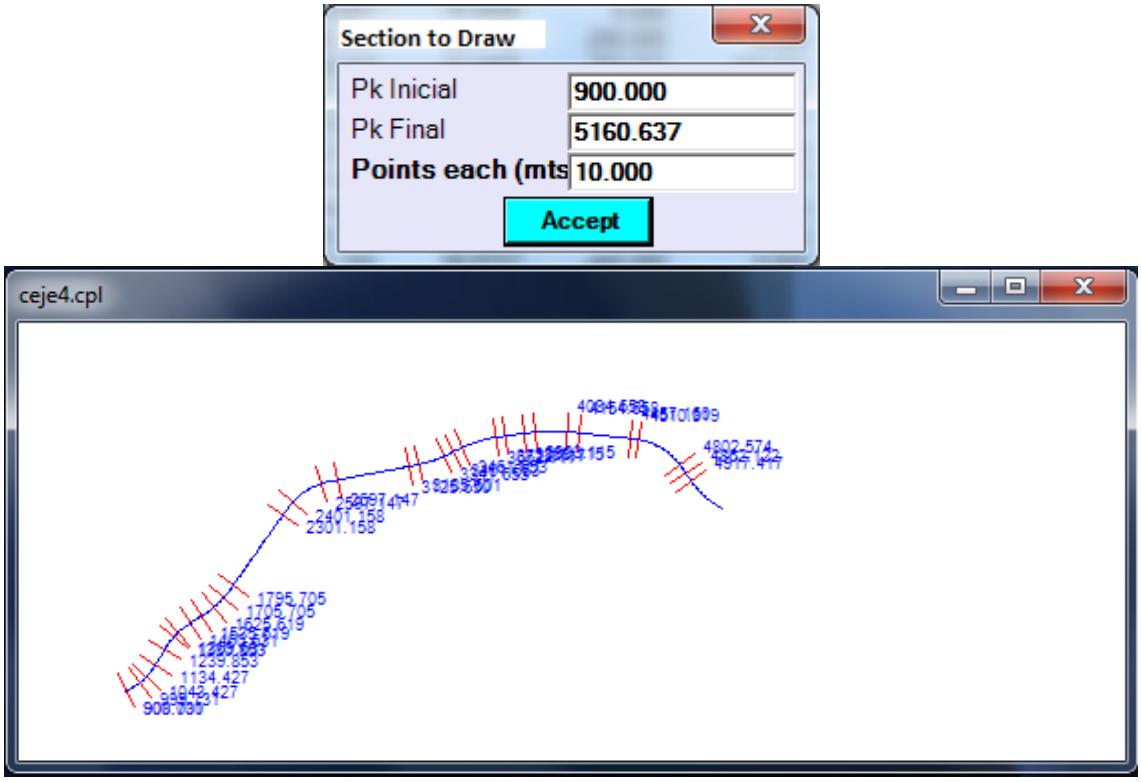


Check Axis

With this option you can verify that alignment data entered manually or via an import from a file, are correct and that there are no errors of overlap which give rise to the calculations of the PK data on the path being erroneous.

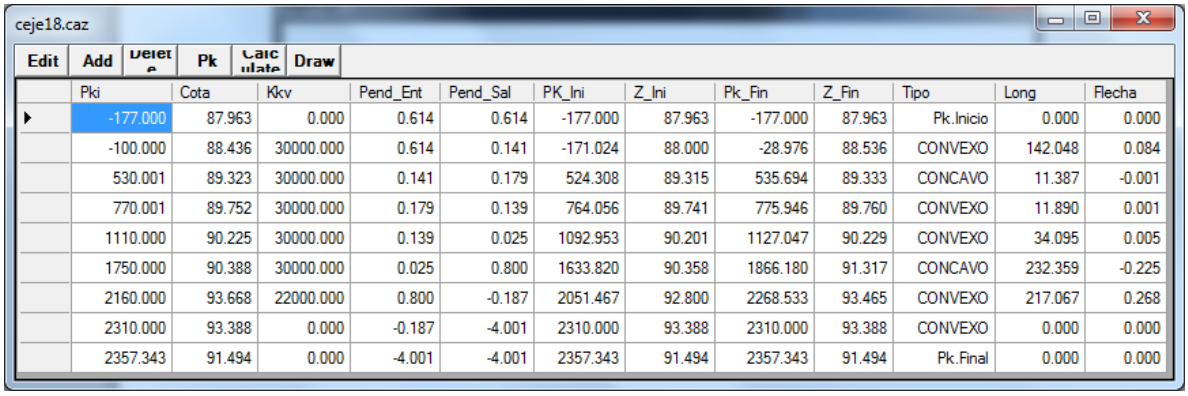
Draw

With this option you can draw the whole or a part of the axis by selecting Start Pk, final Pk, and the distance between points with which you get the polygon that will form the axis drawing. Transverse lines will be drawn at the starting point of the elements that make the axis (straight line, curve, ovoid, clotoide).



EDIT Elevation Axis :

In this option files cannot be created because they are created when the plan file is made, as we have exlained above. The name of an existing axis is requested, with which we want to operate:



Pki	Cota	Kkv	Pend_Ent	Pend_Sal	PK_Ini	Z_Ini	Pk_Fin	Z_Fin	Tipo	Long	Flecha
-177.000	87.963	0.000	0.614	0.614	-177.000	87.963	-177.000	87.963	Pk.Inicio	0.000	0.000
-100.000	88.436	30000.000	0.614	0.141	-171.024	88.000	-28.976	88.536	CONVEXO	142.048	0.084
530.001	89.323	30000.000	0.141	0.179	524.308	89.315	535.694	89.333	CONCAVO	11.387	-0.001
770.001	89.752	30000.000	0.179	0.139	764.056	89.741	775.946	89.760	CONVEXO	11.890	0.001
1110.000	90.225	30000.000	0.139	0.025	1092.953	90.201	1127.047	90.229	CONVEXO	34.095	0.005
1750.000	90.388	30000.000	0.025	0.800	1633.820	90.358	1866.180	91.317	CONCAVO	232.359	-0.225
2160.000	93.668	22000.000	0.800	-0.187	2051.467	92.800	2268.533	93.465	CONVEXO	217.067	0.268
2310.000	93.388	0.000	-0.187	-4.001	2310.000	93.388	2310.000	93.388	CONVEXO	0.000	0.000
2357.343	91.494	0.000	-4.001	-4.001	2357.343	91.494	2357.343	91.494	Pk.Final	0.000	0.000

Elevation: Edit

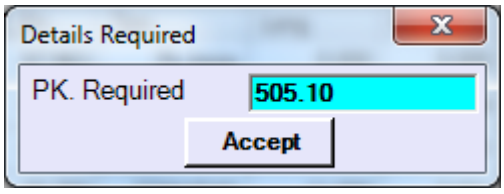
This option allows us to modify a point previously entered, asking for the Pk that we want to modify.

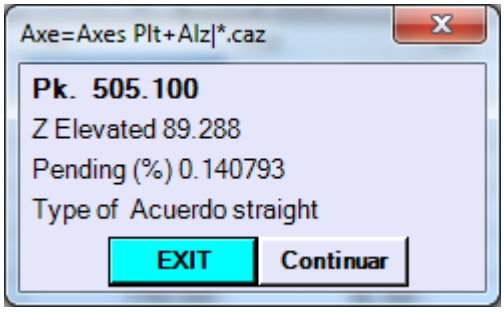
Elevation: Delete

This option allows us to delete a PK of the elevation.

Elevation: Pk

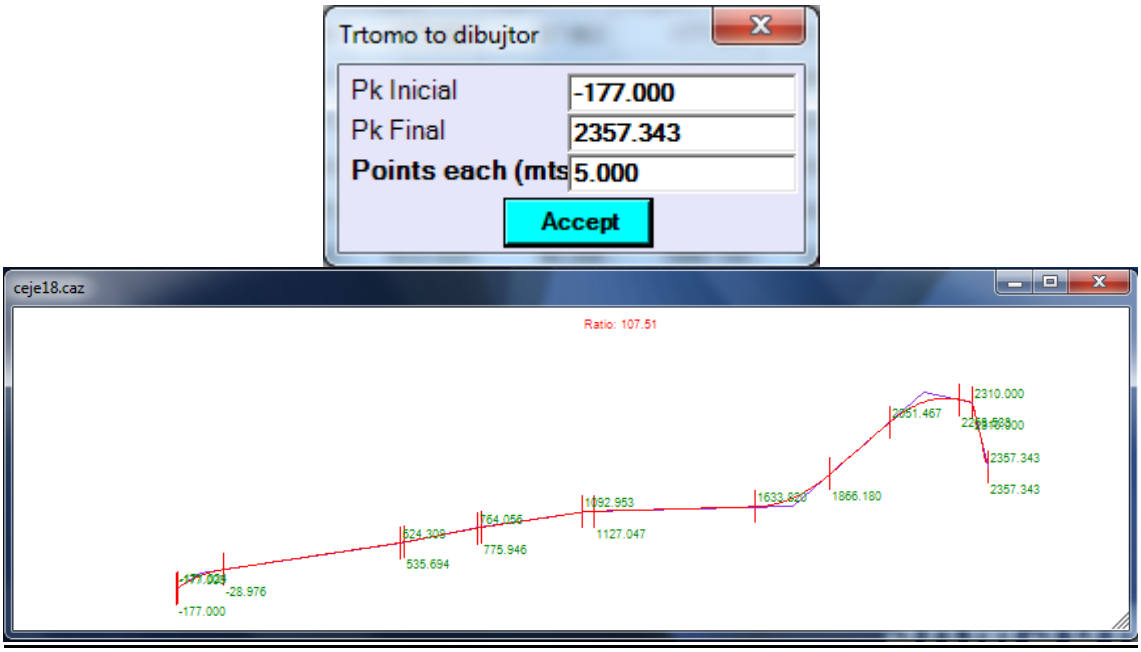
We can ask for the dimension corresponding to a PK of the elevation, with the results being shown on the screen.





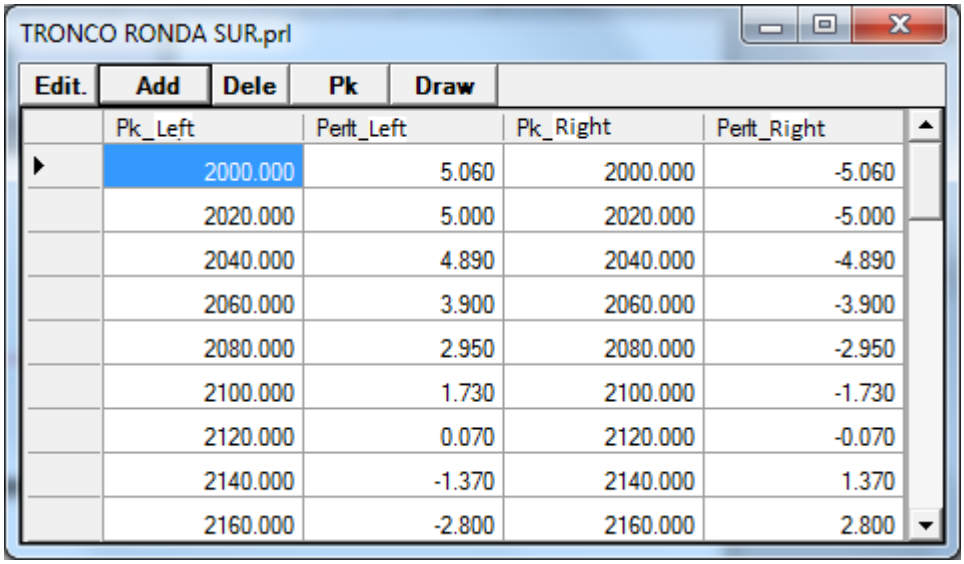
Elevation: Draw Axis

With this option you can draw the whole or a part of the axis by selecting Start Pk, final Pk, and the distance between points, with which you get the polygon that will form the drawing of the axis. A few vertical lines at the start points of the elements that compose the axis (straight or parabolic resolution) will also be drawn. After clicking "OK", the lines connecting the vertices of the parabolic resolution will be drawn.



EDIT CAMBER:

This table defines the applicable cambers in the section. You can enter them one by one, or they can be automatically generated according to previously-defined editable parameters, or can be imported from the corresponding PC via the import menu program.



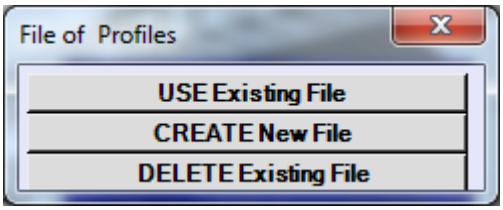
Pk_Left	Perlt_Left	Pk_Right	Perlt_Right
2000.000	5.060	2000.000	-5.060
2020.000	5.000	2020.000	-5.000
2040.000	4.890	2040.000	-4.890
2060.000	3.900	2060.000	-3.900
2080.000	2.950	2080.000	-2.950
2100.000	1.730	2100.000	-1.730
2120.000	0.070	2120.000	-0.070
2140.000	-1.370	2140.000	1.370
2160.000	-2.800	2160.000	2.800

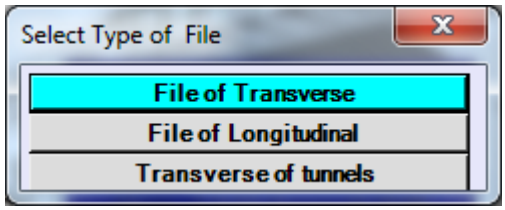
Header options have the functions already described in other sections of the program.

PROFILE EDITION:

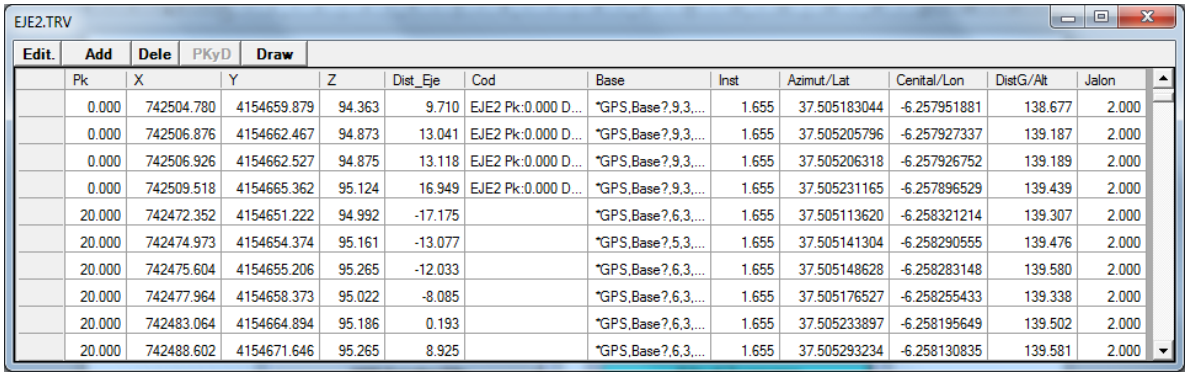
As in the rest of the preceding sections we have the same options, use, create and delete.

The program asks us if we want to edit, create, or delete a file of transversals, longitudinals, or tunnel transversals.





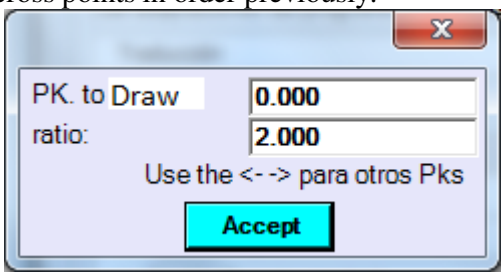
This module shows us this table:

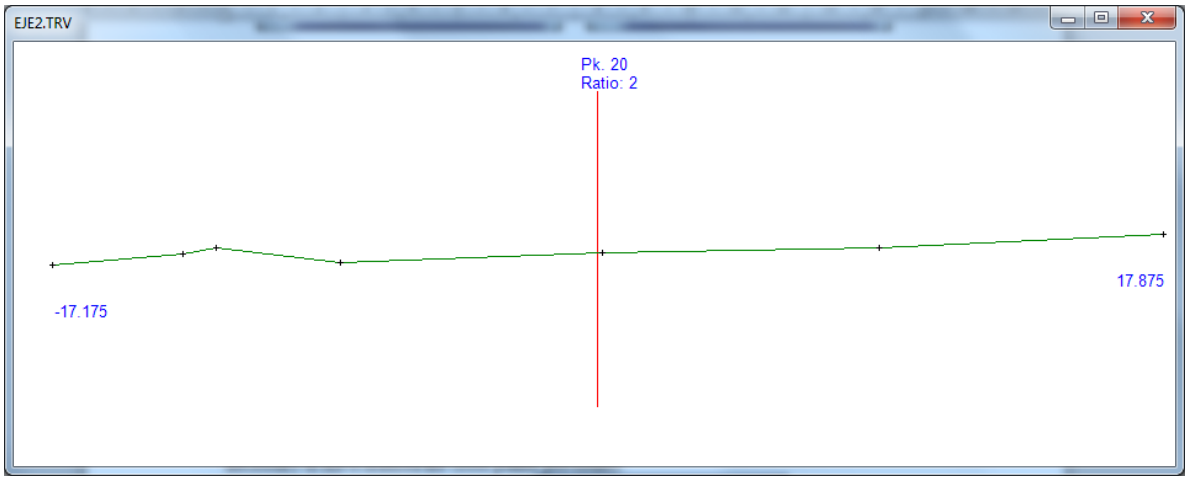


Pk	X	Y	Z	Dist_Eje	Cod	Base	Inst	Azimut/Lat	Cenital/Lon	DistG/Alt	Jalon
0.000	742504.780	4154659.879	94.363	9.710	EJE2 Pk:0.000 D...	*GPS,Base?,9,3,...	1.655	37.505183044	-6.257951881	138.677	2.000
0.000	742506.876	4154662.467	94.873	13.041	EJE2 Pk:0.000 D...	*GPS,Base?,9,3,...	1.655	37.505205796	-6.257927337	139.187	2.000
0.000	742506.926	4154662.527	94.875	13.118	EJE2 Pk:0.000 D...	*GPS,Base?,9,3,...	1.655	37.505206318	-6.257926752	139.189	2.000
0.000	742509.518	4154665.362	95.124	16.949	EJE2 Pk:0.000 D...	*GPS,Base?,9,3,...	1.655	37.505231165	-6.257896529	139.439	2.000
20.000	742472.352	4154651.222	94.992	-17.175		*GPS,Base?,6,3,...	1.655	37.505113620	-6.258321214	139.307	2.000
20.000	742474.973	4154654.374	95.161	-13.077		*GPS,Base?,5,3,...	1.655	37.505141304	-6.258290555	139.476	2.000
20.000	742475.604	4154655.206	95.265	-12.033		*GPS,Base?,6,3,...	1.655	37.505148628	-6.258283148	139.580	2.000
20.000	742477.964	4154658.373	95.022	-8.085		*GPS,Base?,6,3,...	1.655	37.505176527	-6.258255433	139.338	2.000
20.000	742483.064	4154664.894	95.186	0.193		*GPS,Base?,6,3,...	1.655	37.505233897	-6.258195649	139.502	2.000
20.000	742488.602	4154671.646	95.265	8.925		*GPS,Base?,6,3,...	1.655	37.505293234	-6.258130835	139.581	2.000

whose Edition is very similar to that described in other modules.

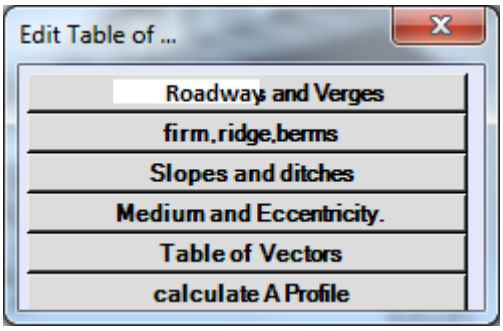
I must just comment that the draw option allows us to draw on screen a specific profile, using the entire width available and the ratio needed to use all the screen height. It is not necessary to have put the cross points in order previously.




EJE2.TRV
Pk. 20
Ratio: 2
-17.175
17.875

TYPE SECTIONS

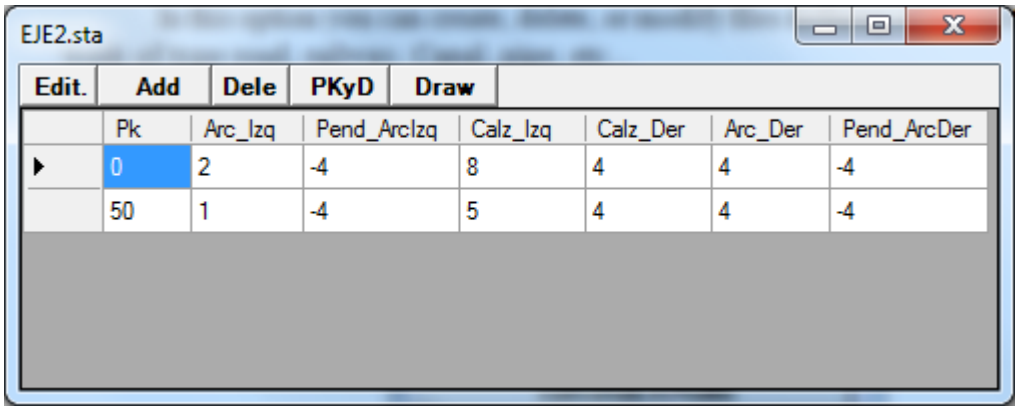
In this option you can create, delete, or modify files defining the sections of a linear building work such as a road, railway, canal, pipe, etc...



There are elements that are defined parametrically and others vectorially. All ditches, cut and fill slopes (including berms, clearance berms, crowns, etc.), Inadequate fixed platforms (i.e., car parks, pavements, etc.), and inadequate fixed sub-grade (i.e., different thicknesses under areas of parking, pavements, etc...) are defined vectorially. All others are defined as parameters.

- Roadways and Verges

Upon entering each of the tables there is an identical menu in all of them, where we are asked if we want to change, add, delete, view, or calculate the result at a particular Pk.



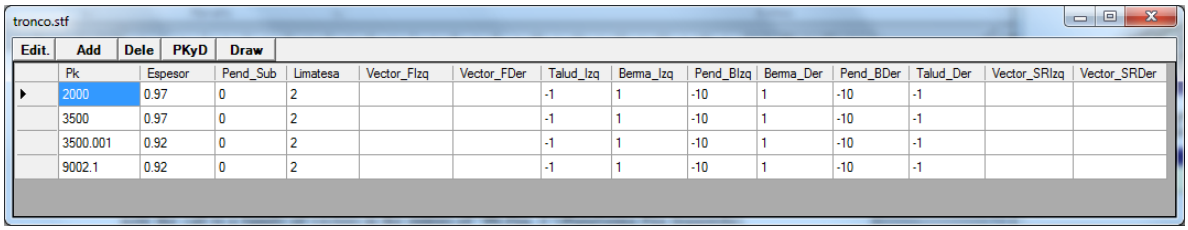
On the road shoulders you can specify a slope for the item which will be applied provided that the cant is less than this. Walkways will have the resulting slope of the interpolated cambers table applied.

If we consult a particular Pk we will get the result of the interpolation, in the absence of knowing the corresponding banking at the Pk.

You should take into account that the applicable slopes on the road shoulders are also interpolated and that they will be modified or not by the applicable bankings at the Pk.

- **SURFACE, RIDGE, BERMS**

This table defines the thickness of the surface, the slopes of the subgrade, the type of subgrade (automatic or parallel Ridge), the slope of the surface (in per one and negative), the widths of the berms of the surface and its slope (in per cent and negative). Here we also note the call to a family of vectors in the entries of "Plt.Fija. I:"(Plataforma Fija Izquierda), "Plt.Fija.D"(Plataforma Fija Derecha), "Sub.Fija.I"(SubRasante Fija Izquierda), "Sub.Fija.D"(SubRasante Fija Derecha). These are names of groups or families of vectors that are defined in the table of vectors and applied between the end of the hard shoulder and the top of the berm of the surface. These vectors are usually used to define areas of parking, pavements, and a host of unusual elements.



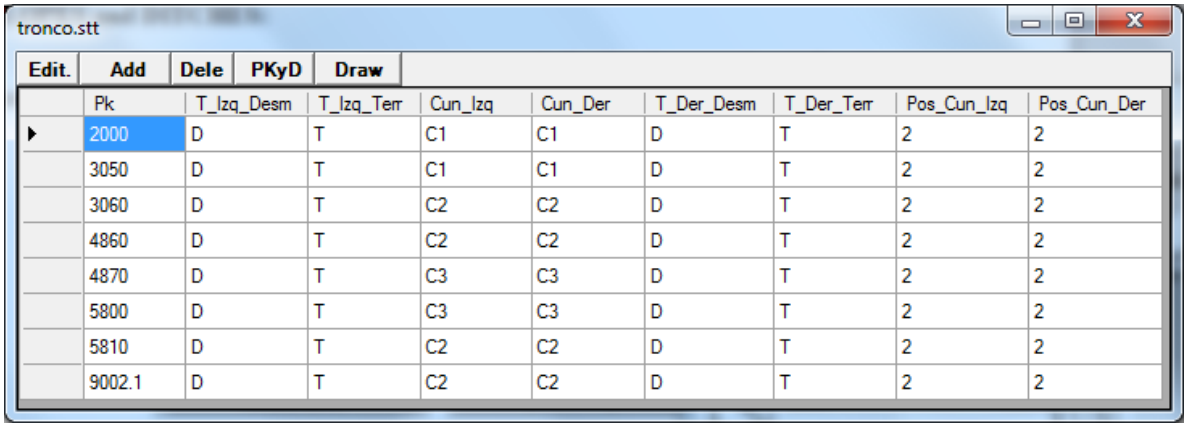
Pk	Espesor	Pend_Sub	Limatesa	Vector_FIzq	Vector_FDer	Talud_Izq	Berma_Izq	Pend_BIzq	Berma_Der	Pend_BDer	Talud_Der	Vector_SRIzq	Vector_SRDer
2000	0.97	0	2			-1	1	-10	1	-10	-1		
3500	0.97	0	2			-1	1	-10	1	-10	-1		
3500.001	0.92	0	2			-1	1	-10	1	-10	-1		
9002.1	0.92	0	2			-1	1	-10	1	-10	-1		

We can check the operation of the program if we request the result of the interpolation of a particular Pk.

In the elements where calls are defined family of vectors are two names that are found in Pks anterior and posterior to the one requested. Interpolation vector to vector of these families will get a new set of vectors that form the figure of the type section. The slopes of the subgrade and the berms of the firm can be altered in its final application depending on the slopes of the bankings in the Pk.

- SLOPES and DITCHES:

In this table is only shown at which Pk the family of vectores that define the figure of ditches and slopes is going to apply

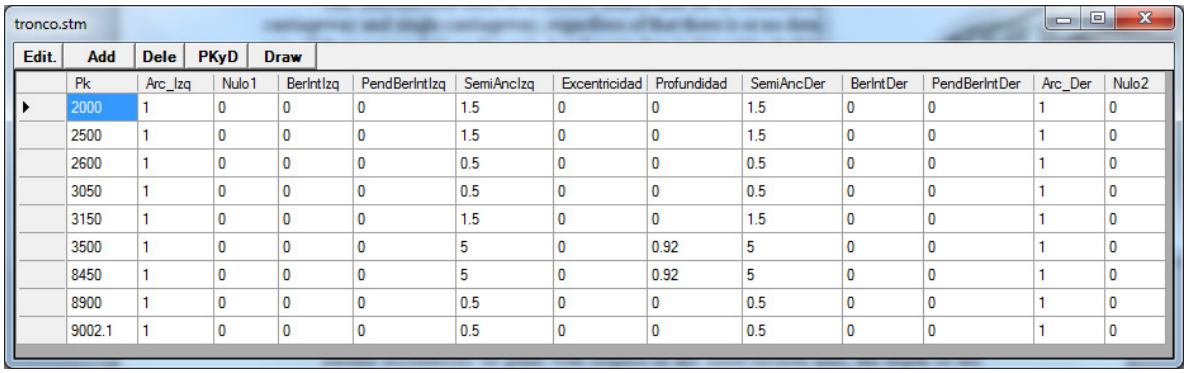

tronco.stt

Edit. | Add | Dele | PKyD | Draw

Pk	T_Izq_Desm	T_Izq_Terr	Cun_Izq	Cun_Der	T_Der_Desm	T_Der_Terr	Pos_Cun_Izq	Pos_Cun_Der
2000	D	T	C1	C1	D	T	2	2
3050	D	T	C1	C1	D	T	2	2
3060	D	T	C2	C2	D	T	2	2
4860	D	T	C2	C2	D	T	2	2
4870	D	T	C3	C3	D	T	2	2
5800	D	T	C3	C3	D	T	2	2
5810	D	T	C2	C2	D	T	2	2
9002.1	D	T	C2	C2	D	T	2	2

- MEDIUM and ECCENTRICITY:

The introduction here of a record makes it considered a typical section of dual carriageway or single carriageway, regardless of there being data or not in the left elevation axis. If there is no data in this axis, but there is data in this table the section is considered dual carriageway and the same dimensions apply (right axis elevation dimension) in both white bands. If there is data in both axes and data also in this table, separate dimensions for each white band apply. If there is no data in this table it is considered single carriageway.


tronco.stm

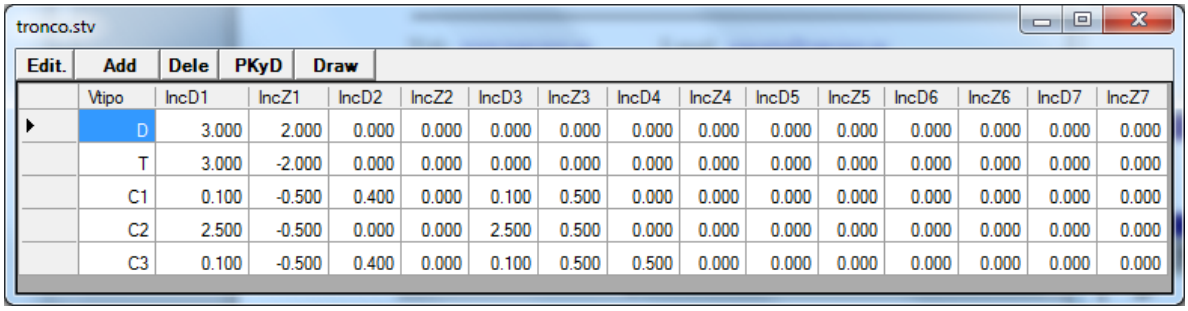
Edit. | Add | Dele | PKyD | Draw

Pk	Arc_Izq	Nulo1	BerIntIzq	PendBerIntIzq	SemiAncIzq	Excentricidad	Profundidad	SemiAncDer	BerIntDer	PendBerIntDer	Arc_Der	Nulo2
2000	1	0	0	0	1.5	0	0	1.5	0	0	1	0
2500	1	0	0	0	1.5	0	0	1.5	0	0	1	0
2600	1	0	0	0	0.5	0	0	0.5	0	0	1	0
3050	1	0	0	0	0.5	0	0	0.5	0	0	1	0
3150	1	0	0	0	1.5	0	0	1.5	0	0	1	0
3500	1	0	0	0	5	0	0.92	5	0	0	1	0
8450	1	0	0	0	5	0	0.92	5	0	0	1	0
8900	1	0	0	0	0.5	0	0	0.5	0	0	1	0
9002.1	1	0	0	0	0.5	0	0	0.5	0	0	1	0

The eccentricity of the plan axis with respect to the cross-section, the depth of the internal gutter and the halfwidth of the same ("SemiA.Izq"), the width of the internal hard-shoulder ("A.int.Izq:"), the width of the inner berm and its slope ("B.Int.Izq:" and "GDP.)Left").

- VECTORS:

This is where the power of this module lies as it is where the families of vectors that make up the figures of ditches, slopes of cuttings, embankment slopes, fixed platforms and fixed sub-grade are defined. These figures or family of vectors have a unique name, which is used to find them in the previous tables. It is important not to confuse the names of these families, to not apply a ditch where there is a slope or a fixed platform, etc.., so we recommend starting the names designating them with the following key words:



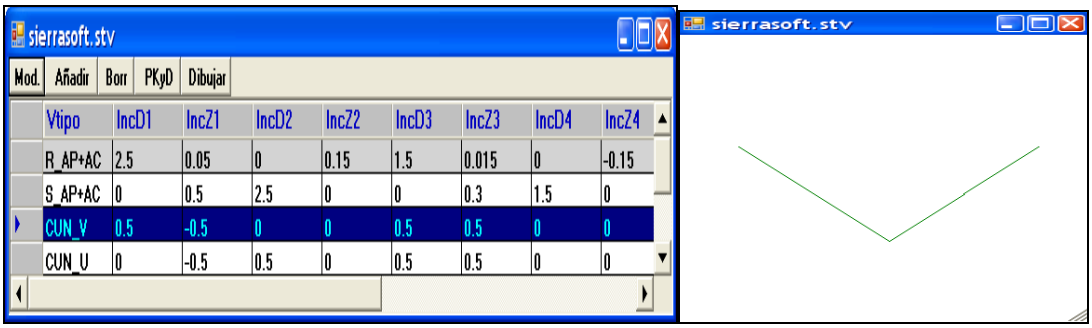
Vtipo	IncD1	IncZ1	IncD2	IncZ2	IncD3	IncZ3	IncD4	IncZ4	IncD5	IncZ5	IncD6	IncZ6	IncD7	IncZ7
D	3.000	2.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
T	3.000	-2.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
C1	0.100	-0.500	0.400	0.000	0.100	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
C2	2.500	-0.500	0.000	0.000	2.500	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
C3	0.100	-0.500	0.400	0.000	0.100	0.500	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000

If a name of a family of vectors for gutter is called "C1 v of..." can be called from the table of EMBANKMENTS and DITCHES as "C1 *", i.e. we can use wildcards for short calls to names.

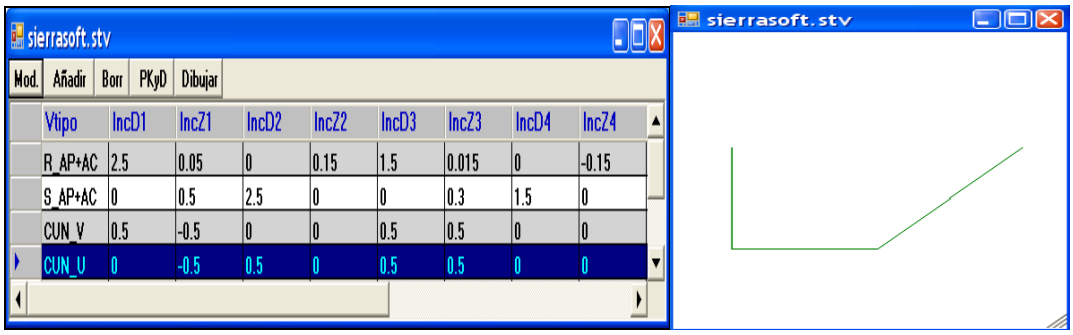
You can define a maximum of 7 vectors to define a figure as complex as you want. To define vectors SeudoVerticales we recommend putting "0.001" as a horizontal component.

When the Pk to be treated is between two different families of vectors, the program will proceed to interpolate vector to vector the components of these families. This allows us to perform complex shapes such as transitions between v-shaped ditches and 'U' ditches, slopes bermed climbing and dropping, slope inclination changing gradually, berms that appear and disappear, berms and crowns of clearing which change tilt and width, etc., and an endless number of possibilities.

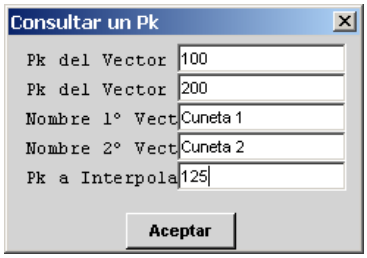
To understand this philosophy of work we will give you a simple example. Suppose we have a ditch in "U" at Pk 0 + 100 and another in "V" at the Pk 0 + 200 and we want to have a progressive transition in a way that the horizontal part of the "U" turns into the apex of the "V". For this we need to have the same vectors in both families and apparently we don't have them. The solution is to insert a vector of zero increment at the top of the "V" which is going to grow to become the horizontal part of the "U".

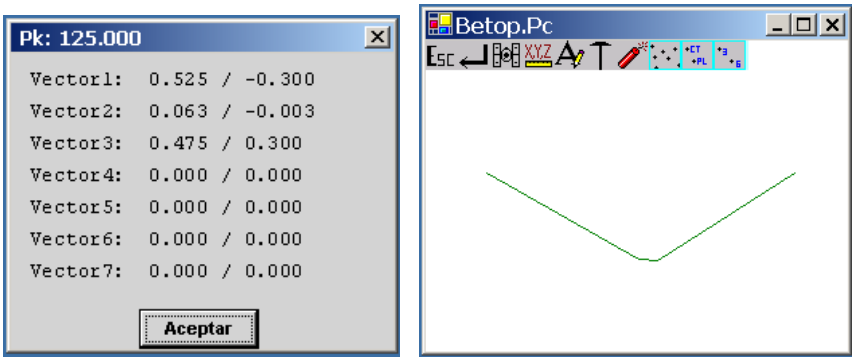


Vtipo	IncD1	IncZ1	IncD2	IncZ2	IncD3	IncZ3	IncD4	IncZ4
R_AP+AC	2.5	0.05	0	0.15	1.5	0.015	0	-0.15
S_AP+AC	0	0.5	2.5	0	0	0.3	1.5	0
CUN_V	0.5	-0.5	0	0	0.5	0.5	0	0
CUN_U	0	-0.5	0.5	0	0.5	0.5	0	0



In these images we see two different types of gutters, one V-shaped and one in form of U. We can check as the program operates when it comes to interpolate two families of vectors using the option consult a Pk. The Program will not request a Pk of application for each family of vectors, and a Pk to check the result of the interpolation:



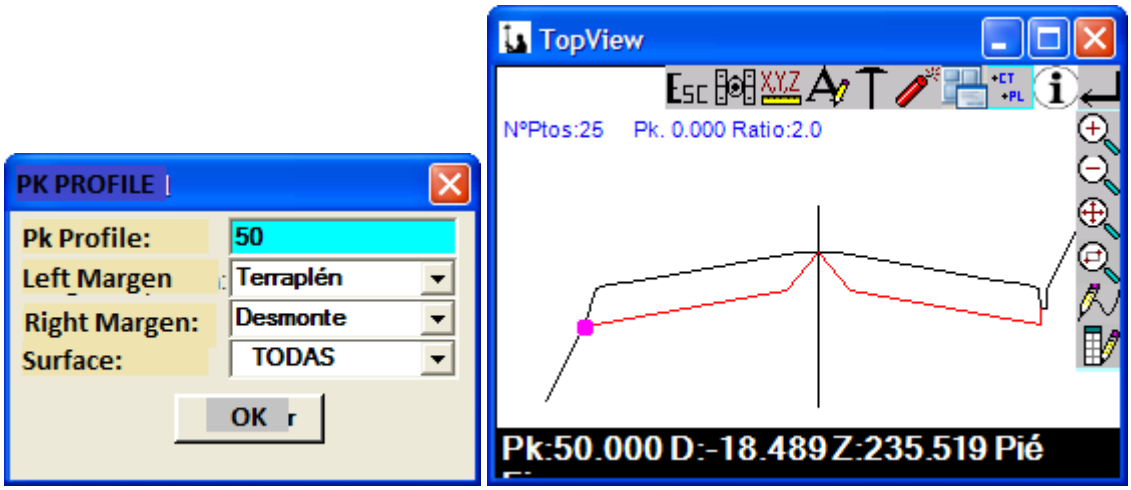


If we look at "Vector2" we can check if the desired interpolation has actually been made. Other vectors have not changed because they are the same in both families. If any of them were different we would have obtained a vector product of the two vector interpolation.

This philosophy applies to all the elements that are defined in this way such as Embankment slopes, slopes of Cuttings, fixed sub-grades and fixed platforms.

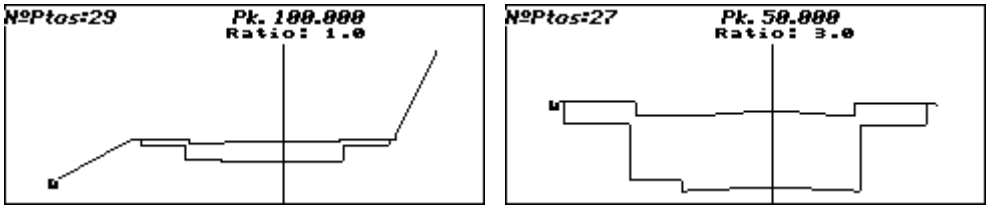
- Calculate PK Profile

This option calculates all the tables together resulting in a visual result of the generated section. To do this, the program asks for an axis, a Pk, cutting or embankment at each of the edges, and the surfaces that you want to draw that may be: all, flush, embankments, subgrade and slopes, single surface package.



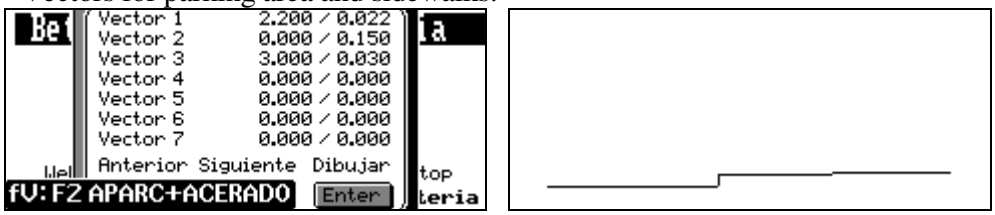
In this graphical display we can move through the points that make it showing at the top data about this point such as distance to axis, the dimension, the element that defines it, and the slope.

Here is an example of a street in a housing development with sidewalks on both sides and parking on the left:



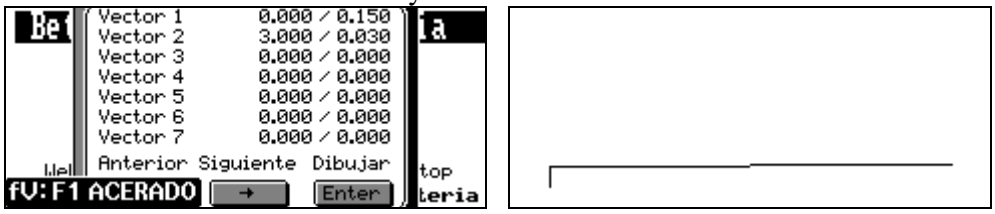
Consisting of the following vectors:

- Vectors for parking area and sidewalks:

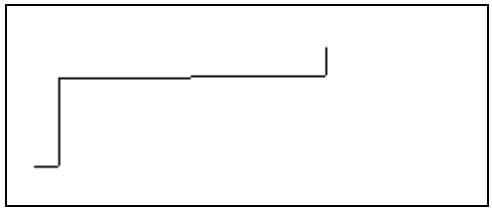


- Vectors of the subgrade in parking and sidewalks:

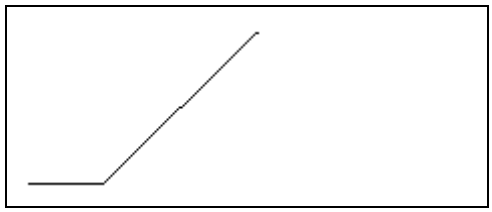
- Vector of the surface area of only sidewalks:

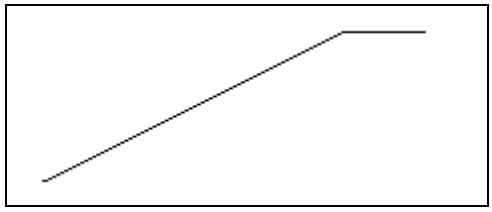


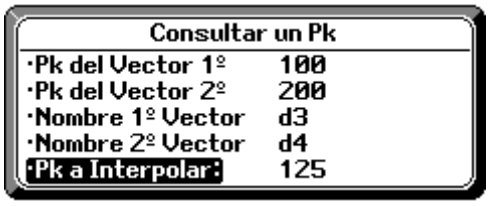
- Vectors of the subgrade in area of only sidewalks:

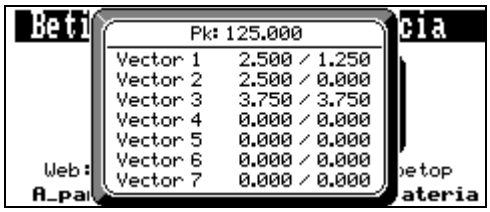


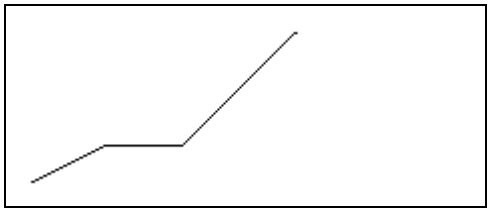
Here is an example of a disassembly with a berm that rises up while changing slope inclination of 1/1 at the outer side to 2/1 on the inner side:

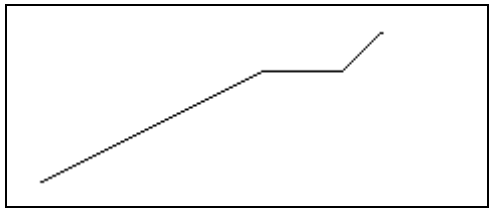




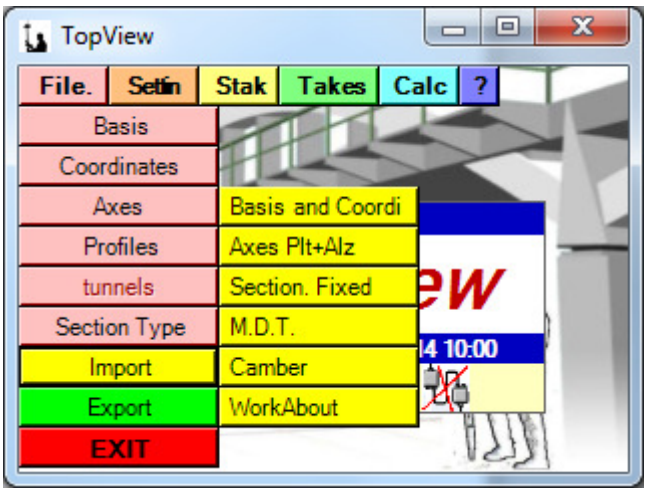






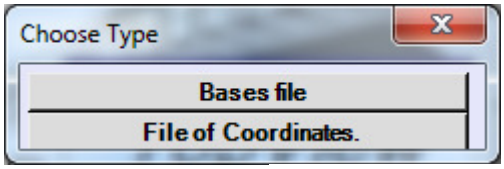


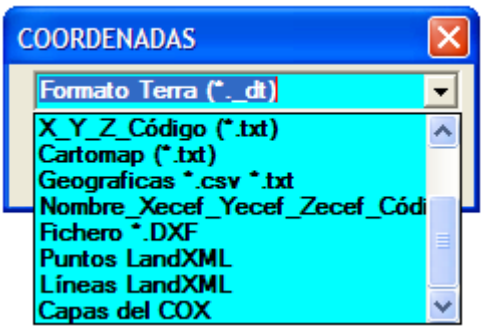
IMPORT MENU

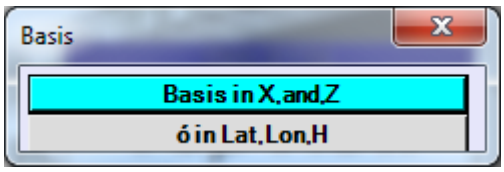


Bases&Coord.

This option imports data of BASES/COORDINATES in the following Ascii file formats:



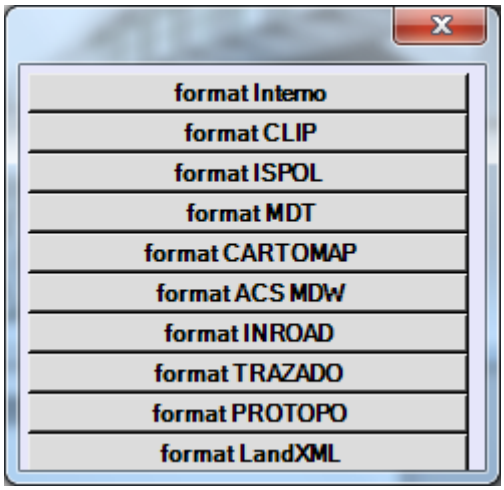




All menu options allow us to navigate the Pc, and to choose the file without having to write its name. The program automatically detects the field delimiter to avoid having to define it.

AXIS

In this option, data is imported for plan and elevation drawings (both at the same time), in Ascii format files:



Internal format:

```
* PLANTA
---------- ++++++++++ ---------- ++++++++++ ---------- ++++++++++ ---------- ++++++++++ ----------
0.0000           0.000  325180.945 4252061.317    229.5011       0.000       0.000       0.000     383.342
383.3420       383.342  325009.594 4251718.404    229.5011       0.000     200.000     500.000      80.000
463.3420       463.342  324971.949 4251647.840    234.5941     500.000       0.000     500.000      90.725
554.0670       554.067  324918.271 4251574.853    246.1456     500.000     200.000       0.000      80.000
634.0670       634.067  324862.128 4251517.894    251.2385       0.000     125.000    -270.000      57.870
691.9370       691.937  324821.899 4251476.335    244.4160    -270.000       0.000    -270.000     189.543
881.4800       881.480  324758.810 4251301.707    199.7247    -270.000     125.000       0.000      57.870
* ALZADO
---------- ++++++++++ ---------- ++++++++++ ---------- ++++++++++ ---------- ++++++++++ ---------- ++++++++++ ----------
0.0000           0.000     576.908       0.000      -4.556      -4.556       0.000     576.908       0.000     576.908 PK.INICIO
36.0000         36.000     575.268    3350.000      -4.556      -2.476       1.162     576.855      70.838     574.406 CONCAVO
147.0000       147.000     572.520    3600.000      -2.476      -0.511     111.633     573.396     182.367     572.339 CONCAVO
378.0000       378.000     571.340    9000.000      -0.511       0.506     332.263     571.574     423.737     571.571 CONCAVO
486.0000       486.000     571.886    2500.000       0.506      -3.741     432.917     571.618     539.083     569.900 CONVEXO
620.0000       620.000     566.873    2100.000      -3.741       3.101     548.158     569.561     691.842     569.101 CONCAVO
818.0000       818.000     573.013    5700.000       3.101      -0.617     712.050     569.727     923.950     572.360 CONVEXO
```

Format Clip:

```
*PLT1
VILLANUEVA DEL DUQUE - CRUCE CUARTENERO
      0.0000 ,  325180.9450 , 4252061.3170 , 229.5011   ,      0.0000 ,      0.0000
    383.3415 ,  325009.5936 , 4251718.4039 , 229.5011   ,      0.0000 ,      0.0000
    463.3415 ,  324971.9494 , 4251647.8399 , 234.5941   ,    500.0000 ,    200.0000
    554.0667 ,  324918.2708 , 4251574.8529 , 246.1456   ,    500.0000 ,      0.0000
    634.0667 ,  324862.1276 , 4251517.8941 , 251.2385   ,      0.0000 ,    200.0000
    691.9371 ,  324821.8985 , 4251476.3347 , 244.4160   ,   -270.0000 ,    125.0000* PLANTA

*ALZ1
VILLANUEVA DEL DUQUE-HINOJOSA DEL DUQUE
      0.000 ,  651.831C ,        0R
     10.000 ,  652.007C ,     2000R
     83.000 ,  652.871C ,    15000R
    191.000 ,   1.3096P ,      500R
    233.000 ,  652.623C ,        0R
    259.000 ,  651.487C ,    0.000T
```

ó también

```
Ü          VILLANUEVA DEL DUQUE - CRUCE CUARTENERO                    24-04-2002                    P g.   1

          PUNTOS SINGULARES

            P.K.       Longitud     Coord. X     Coord. Y     Azimut       Radio      Param.     X Centro     Y Centro
          ==========   =========   ==========   ==========   ==========   ==========   =========   ==========   ==========

               0.000       0.000   325180.945   4252061.317    229.5011       0.000
             383.342     383.342   325009.594   4251718.404    229.5011       0.000
             463.342      80.000   324971.949   4251647.840    234.5941     500.000     200.000   324543.972   4251906.365
             554.067      90.725   324918.271   4251574.853    246.1456     500.000                 324543.972   4251906.365
             634.067      80.000   324862.128   4251517.894    251.2385       0.000     200.000
             691.937      57.870   324821.899   4251476.335    244.4160    -270.000     125.000   325028.808   4251302.874
             881.480     189.543   324758.810   4251301.707    199.7247    -270.000                 325028.808   4251302.874

Ì      VILLANUEVA DEL DUQUE-CRUCE DEL CUART.       24-04-2002     P g.   1

                                DATOS DE ENTRADA

       N§     P.K.        Cota       p(%)        L         Kv        Flecha
       === ==========  ========= ========= ========= ========= =========

         1       0.000   576.908ù
         2      36.000   575.268   -4.5551ù    69.653      3350ù     0.181
         3     147.000   572.520ù  -2.4759     70.742      3600ù     0.174
         4     378.000   571.340   -0.5108ù    91.455      9000ù     0.116
         5     486.000   571.886ù   0.5053    106.148     -2500ù    -0.563
         6     620.000   566.873ù  -3.7406    143.667      2100ù     1.229
         7     818.000   573.013ù   3.1007    211.874     -5700ù    -0.984
```

Format ISPOL: Files “ceje1.res” y “rasa1.res”

```
 Istram5.12  23 Abr 2002 11:33                                                          pagina   1
 PROYECTO :
 EJE :   1: VILLANUEVA DEL DUQUE - PEÑARROLLA PUEBLONUEVO
```

```
                              ==========================================
                              * * *  LISTADO  DE  LAS  ALINEACIONES  * * *
                              ==========================================

Dato  TIPO    LONGITUD     P.K.       X TANGENCIA  Y TANGENCIA    RADIO        PARAMETRO    AZIMUT     Cos/Xc/Xinf  Sen/Yc/Yinf
---- ------- ------------ ---------- ------------ ------------ ------------ ------------ ---------- ------------ ------------
 1    RECTA      383.337       0.000   325180.945  4252061.317                            229.5011   -0.4469941   -0.8945369
 2    CLOT.       80.010     383.337   325009.596  4251718.408                 200.013    229.5011    325009.596   4251718.408
 3    CIRC.       90.720     463.347   324971.947  4251647.835      500.000               234.5947    324543.972   4251906.365
 4    CLOT.       80.000     554.067   324918.271  4251574.853                 200.000    246.1455    324862.127   4251517.894
 5    CLOT.       57.870     634.067   324862.127  4251517.894                 125.000    251.2385    324862.127   4251517.894
 6    CIRC.      189.543     691.937   324821.898  4251476.335     -270.000               244.4160    325028.808   4251302.874
 7    CLOT.       57.870     881.480   324758.810  4251301.707                 125.000    199.7247    324763.189   4251244.032


 Istram5.12  23 Abr 2002 11:33                                                                                  pagina   1
 PROYECTO :
 EJE :   1: VILLANUEVA DEL DUQUE - PEÑARROLLA PUEBLONUEVO

                                    ================================================
                                    * * *  E S T A D O   D E   R A S A N T E S  * * *
                                    ================================================

      PENDIENTE     LONGITUD      PARAMETRO        V E R T I C E          ENTRADA AL ACUERDO        SALIDA DEL ACUERDO
        ( % )        ( m )         ( kv )          p.k.        cota         p.k.        cota          p.k.        cota
     ------------ ------------ ------------ ------------ ------------ ------------ ------------ ------------ ------------
                                                                             0.000      576.908
       -4.555556       69.676     3350.000       36.000      575.268        1.162      576.855       70.838      574.406
       -2.475676       70.735     3600.000      147.000      572.520      111.633      573.396      182.367      572.339
       -0.510823       91.474     9000.000      378.000      571.340      332.263      571.574      423.737      571.571
        0.505556      106.165     2500.000      486.000      571.886      432.917      571.618      539.083      569.900
       -3.741045      143.683     2100.000      620.000      566.873      548.158      569.561      691.842      569.101
        3.101010      211.900     5700.000      818.000      573.013      712.050      569.727      923.950      572.360
```

Format MDT:

Planta:

```
        0.000     9259.885     5391.355  31.36654    0.000       0.000
       74.688     9295.213     5457.159  31.36654    0.000       0.000
       89.269     9302.110     5470.006  33.27631    0.000     -46.500
       95.961     9305.023     5476.025  24.15199    0.000       0.000
      142.065     9322.097     5518.850  24.15199    0.000       0.000
      213.841     9348.678     5585.523  25.73198    0.000      31.570
      234.440     9362.179     5600.596  67.27033    0.000       0.000
```

Alzado:

```
     0.000   16.000     0.000     0.000     0.000
   234.440   18.344     0.000     0.000     0.000
```

Format CARTOMAP:

Planta:

```
P.K.     X         Y         Cota     Azimut   Longitud Tipo     Radio    Parámetro
0+000.000          4622.835 9628.938 293.626  140.3711 130.223  Recta
0+130.223          4727.740 9551.782 294.110  140.3711 32.000   Clotoide -50.000  40.000
0+162.223          4755.263 9535.745 289.572  119.9992 53.789   Curva    -50.000
0+216.012          4805.218 9547.113 291.218  51.5131  32.000   Clotoide -50.000  40.000
0+248.012          4823.093 9573.480 287.917  31.1412  58.625   Recta
0+306.637          4850.640 9625.230 278.343  31.1412  32.000   Clotoide 50.000   40.000
0+338.637          4868.514 9651.597 276.561  51.5131  70.269   Curva    50.000
0+408.906          4933.029 9655.404 289.258  140.9827 32.000   Clotoide 50.000   40.000
```

Alzado:

```
ALINEACIONES EN ALZADO
INICIO  0                  150              -3.419
ENTRADA 6.586              149.7749         -3.419
VERTICE 25.353             149.1332         -1400
SALIDA  44.12              147.9884         -6.1
ENTRADA 271.8754           134.0954         -6.1
VERTICE 326.3254           130.7739         900
SALIDA  380.7754           134.0409         6
FINAL   384.1549           134.2437         6
```

Format ACS-MDW:

Planta:

```
1        7080.058 287236.375       4822172.866       153.1053 0.000    0.000    431.843
2        7511.901 287526.482       4821852.981       153.1053 -0.001   395.000  156.025
3        7667.926 287634.238       4821740.201       148.1389 -1000.000         0.000    624.655
4        8292.581 288189.243       4821476.309       108.3722 -1000.000         -395.000 156.025
5        8448.606 288344.734       4821463.922       103.4057 0.001    395.000  156.025
6        8604.631 288500.224       4821451.534       108.3722 1000.000 0.000    465.555
7        9070.186 288931.310       4821287.159       138.0103 1000.000 -395.000 156.025
8        9226.211 289055.573       4821192.875       142.9767 -0.001   265.000  127.682
9        9353.893 289158.199       4821117.040       135.5872 -550.000 0.000    365.526
10       9719.419 289507.854       4821036.385       93.2779  -550.000 -265.000 127.682
11       9847.101 289633.329       4821059.604       85.8883  0.001    265.000  140.450
12       9987.551 289771.516       4821084.016       94.8297  500.000  0.000    614.194
```

Alzado tipo 1:

```
1        7080.058 19.450   0.0060015         0.000    466.350
2        7546.408 22.249   0.0060015         26000.000         456.912
3        8003.320 29.006   0.0235750         0.000    398.690
4        8402.010 38.405   0.0235750         -25000.000        716.113
5        9118.123 45.031   -0.0050695        0.000    203.944
6        9322.068 43.997   -0.0050695        20000.000         595.931
7        9917.999 49.854   0.0247270         0.000    179.296
8        10097.295         54.288   0.0247270         20000.000         445.484
9        10542.779         70.265   0.0470012         0.000    723.163
10       11265.941         104.254  0.0470012         -40000.000        1678.033
```

```
11      12943.974       147.926  0.0050504       0.000    410.407
12      13354.381       149.999  0.0050504       25000.000       771.260
13      14125.642       165.791  0.0359008       0.000    457.458
```

Alzado tipo 2:

```
1       7080.058 19.450
2       7774.864 23.620  26000.000       456.902  1.004    0.0175732
3       8760.067 46.846  -25000.000      716.120  -2.564   -0.0286448
4       9620.032 42.486  20000.000       595.939  2.220    0.0297970
5       10320.037       59.795   20000.000       445.490  1.240    0.0222745
6       12104.958       143.689  -40000.000      1678.061 -8.800   -0.0419515
7       13740.012       151.946  25000.000       771.284  2.974    0.0308514
8       14583.100       182.214
```

Format InRoad:

Planta:

```
* BENTLEY HORIZONTAL ALIGNMENT TO ASCII
*
* Nombre de la alineación: ytu
* Descripción de la alineación:
* Estilo de alineación: default
*
{TYPE STATION RADIUS X_CRD Y_CRD DIRECTION SPI_LENGTH
LIN       0+000.000           0.000     1027846.961      116276.004         38.7272           0.000
SPI       0+031.076           0.000     1027864.721      116301.505         38.7272          40.000
CIR       0+071.076         100.000     1027889.671      116332.679         51.4596           0.000
SPI       0+127.323           0.000     1027938.875      116358.372         87.2676          40.000
LIN       0+167.323           0.000     1027978.716      116361.031        100.0000           0.000
CIR       0+192.076          50.000     1028003.468      116361.031        100.0000           0.000
```

Alzado:

```
* BENTLEY VERTICAL ALIGNMENT TO ASCII
*
* Nombre de la alineación: ytu
* Descripción de la alineación:
* Estilo de alineación: default
*
{ TYPE STATION ELEVATION SLOPE VC_LENGTH
LIN       0+000.332         292.901           0.039           0.000
PAR       0+068.374         295.536           0.039         100.000
LIN       0+168.374         296.728          -0.015           0.000
PAR       0+266.281         295.268          -0.015          50.000
LIN       0+316.281         293.709          -0.047           0.000
PAR       0+349.372         292.139          -0.047          80.000
LIN       0+429.372         289.975          -0.007           0.000
```

Format TRAZADO:

Planta:

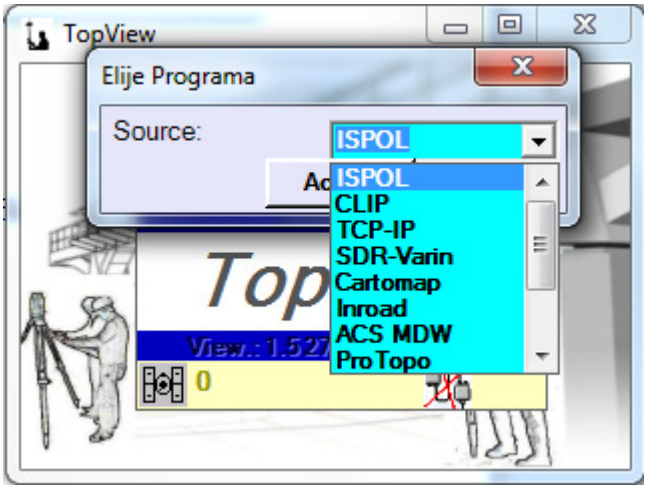
```
Fichero: C:\TRAZADO\CAMINOS\WIN\CAMINO1
 Título: C:\trazado\ejemplo1\win\CAMINO1
 Fecha: 22/02/04 20:31:26

 ALIN   TIPO      P.K.     LONGITUD     X Tang.     Y Tang.     AZIMUT      RADIO
                                        XC o I      YC o I              PARAMETRO

  1   RECTA       0,000     0,020  683396,793  4300226,714  26,6250      0,000
                                          0,000        0,000

  2   CIRC.       0,020     0,000  683396,801  4300226,732  26,6250      0,010
                                    683396,810  4300226,728

  3   RECTA       0,020   112,932  683396,801  4300226,732  26,9138      0,000
                                          0,000        0,000

  4   CIRC.     112,952    20,909  683443,135  4300329,722  26,9138    -80,000
                                    683370,178  4300362,544

  5   RECTA     133,861    42,325  683449,138  4300349,689  10,2746      0,000
                                          0,000        0,000
```

Alzado:

```
Nombre del fichero del alzado : C:\TRAZADO\CAMINOS\WIN\CAMINO1
Título: CAMINO1
Fecha/hora última modificación: 24/02/04 14:35:48

  NR                        P.K.        COTA     PENDIENTE%/PARAMETRO

          P.K. INICIO      0,0000    485,4800        1,5997

     TANGENTE ENTRADA      4,9999    485,5600        1,5997
  1  VERTICE               4,9999    485,5600        0,0010
     TANGENTE SALIDA       5,0000    485,5600        9,1333

     TANGENTE ENTRADA     11,2932    486,1348        9,1333
  2  VERTICE              19,9989    486,9299     -900,0000
     TANGENTE SALIDA      28,7046    487,5566        7,1987

     TANGENTE ENTRADA     57,5172    489,6307        7,1987
  3  VERTICE              73,7597    490,8000    -1000,0000
     TANGENTE SALIDA      90,0022    491,4416        3,9502
```

Fixed Sections

This option imports files of transverse mortises profiles or from Natural terrain files for subsequent field stakeout. The formats supported are:



ISPOL: You can import any surface in an Ispol profiles file. You only need to specify the number of axis and the line type to import.

CLIP:

- TER File: You can import in order to check if a mapping is similar to the real field, or simply to accompany the display of another layout (flush or subgrade) profiles

```
*TER
 0, 10 , 0 , 0
 -36.67, 577.09
 -17.32, 577.00
  -0.25, 576.91
  16.77, 576.72
  31.67, 576.67
  34.44, 575.65
  38.71, 575.63
  43.65, 575.73
  46.11, 576.22
  50.66, 576.00
```

- The CLIP profiles listing: You can import in order to stake it out or as a display surface.

```
#        VILLANUEVA DEL DUQUE-CRUCE DEL CUART.                    24-04-2002                    P g.   1

                                   LISTADO DE PUNTOS DE SUBRASANTE

      P.K.        ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ IZQUIERDA ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ  ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ DERECHA ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ
    C. Eje      Pie Tal.  Ext.Tal.   B.Ext.    Arista    B.Int.    B.Int.    Arista    B.Ext.   Ext.Tal.  Pie Tal.
 ==========    ========  ========  ========  ========  ========  ========  ========  ========  ========  ========

        0       EN ESTRUCTURA

       20          -7.20     -6.78     -6.76                                   0.00      6.76      6.78      7.17
  575.070       576.059   574.799   574.799                                 575.070   574.799   574.799   575.961

       40          -7.09     -6.78     -6.76                                   0.00      6.76      6.78      7.15
  574.331       574.780   574.061   574.061                                 574.331   574.061   574.061   575.176

       60          -6.96     -6.78     -6.76                                   0.00      6.76      6.78      7.08
  573.712       573.976   573.441   573.441                                 573.712   573.441   573.441   574.349

       80          -6.96     -6.78     -6.76                                   0.00      6.76      6.78      7.03
  573.199       573.480   572.928   572.928                                 573.199   572.928   572.928   573.689

      100          -7.09     -6.78     -6.76                                   0.00      6.76      6.78      7.03
  572.704       573.110   572.433   572.433                                 572.704   572.433   572.433   573.192
```

- Platform of the CLIP list: You can import with the purpose of staking out or as surface to visualize.

```
☼                    VILLANUEVA DEL DUQUE-CRUCE DEL CUART.              28-12-2001              P g.   1

                                        PUNTOS DE PLATAFORMA

      P.K.      Lado   Pie I.   Arc,n I.  Mediana   Calzada    Arc,n     Berma    Pie T.F.
 ===========  ====  ========  ========  ========  ========  ========  ========  ========

       0       Izq.                          0.00     -3.50     -4.00     -4.50     -6.76
                                           576.908   576.838   576.828   576.788   575.658

               Der.                          0.00      3.50      4.00      4.50      6.76
                                           576.908   576.838   576.828   576.788   575.658

      20       Izq.                          0.00     -3.50     -4.00     -4.50     -6.76
                                           576.050   575.980   575.970   575.930   574.799

               Der.                          0.00      3.50      4.00      4.50      6.76
                                           576.050   575.980   575.970   575.930   574.799

      40       Izq.                          0.00     -3.50     -4.00     -4.50     -6.76
                                           575.311   575.241   575.231   575.191   574.061
```

- Cross section of the CLIP list: You can import with the purpose of staking out or as a display surface of the same or as surface to visualize.

```
↕  VILLANUEVA DEL DUQUE-CRUCE DEL CUART.          30-04-2002        P g.   1

                LISTADO DE PUNTOS DE PERFILES TRANSVERSALES

    P.K.  20
    COTA RASANTE C.D.   576.050
    COTA RASANTE C.I.   576.050


    ÄÄÄÄÄÄÄÄÄTALUDESÄÄÄÄÄÄÄÄÄÄ    ÄÄÄÄÄÄÄPLATAFORMAÄÄÄÄÄÄÄ    ÄÄÄSUBRASANTEÄÄÄ
     Dist.    Cota    Talud      Dist.    Cota   Pend.      Dist.    Cota
    ======= ======== =======    ======= ======== =====    ======= ========
      -7.20  576.059
      -6.78  574.799   0.333
      -6.77  574.799    H
      -6.76  574.799    H                                   -6.76  574.799
                                 -4.50  575.930  -8.0
                                 -4.00  575.970  -2.0
                                 -3.50  575.980  -2.0
                                  0.00  576.050              0.00  575.070
                                  3.50  575.980  -2.0
                                  4.00  575.970  -2.0
                                  4.50  575.930  -8.0
       6.76  574.799                                        6.76  574.799
       6.77  574.799    H
       6.78  574.799    H
       7.17  575.961   0.333
```

TCP-IP:

- Transversal File *.tra:
- Multiple File Line Stakeout *.rep:

CARTOMAP:

- Terrain File *.txt:

```
P.K.    Distancia      X       Y       Cota terreno   Código
0+000.000      -30.000 4640.610       9653.105       301.707
        0.000   4622.835       9628.938       293.626
        0.010   4622.829       9628.930       293.624
        30.000  4605.060       9604.771       287.080
0+020.000      -30.000 4656.721       9641.256       306.226
        -21.600 4651.744       9634.489       303.838
        -0.530  4639.261       9617.515       296.994
        0.000   4638.947       9617.088       296.892
        11.980  4631.849       9607.437       294.566
        21.632  4626.130       9599.662       292.460 L. Eléctrica
        30.000  4621.172       9592.921       290.634
```

- Level File *.txt:

```
P.K.    Nivel   X       Y       Distancia      Cota terreno   Cota sección   Dif. cotas
0+000.000      Terreno real
        Nivel 1 4629.439       9637.917       -11.146 296.629 296.129 -0.500
                4626.380       9633.758       -5.983  295.238 299.570 4.333
```

```
              4626.034       9633.288       -5.400  295.081 299.862 4.781
              4625.146       9632.080       -3.900  294.677 299.922 5.245
              4622.835       9628.938       0.000   293.626 300.000 6.374
              4620.524       9625.796       3.900   292.775 299.922 7.147
              4619.636       9624.588       5.400   292.448 299.862 7.414
              4619.290       9624.118       5.983   292.320 299.570 7.250
              4609.051       9610.196       23.265  288.549 288.049 -0.500
       Nivel 2 4626.380      9633.758       -5.983  295.238 299.570 4.333
              4622.835       9628.938       0.000   293.626 299.690 6.064
              4619.290       9624.118       5.983   292.320 299.570 7.250
```

INROAD:

- RoadWay_Modeler_XYZ List *.dat:

```
January 7. 2002                Roadway Modeler W/xyz          Page   1 of  52
12:17 PM               Report Template: ROADWAY_MODELER_XYZ
Layer Name: w
        HA: 1
        VA: 1
Station               TC       Offset      X coord       Y coord      Z coord
0+000.814         Left_Uncon   -7.8728     4738.2903     9347.1126    243.5355
                                                        Orig. El.:    243.5355
                                                     Cut-Fill Ht.:      0.0000

0+000.814         Left_Uncon   -7.0000     4739.1085     9346.8086    242.6611
                                                        Orig. El.:    243.4627
                                                     Cut-Fill Ht.:     -0.8016

0+000.814         Left_Uncon   -3.5000     4742.3893     9345.5895    242.6811
                                                        Orig. El.:    242.3364
                                                     Cut-Fill Ht.:      0.3447

0+000.814         Centerline    0.0000     4745.6701     9344.3704    242.7011
                                                        Orig. El.:    241.4551
                                                     Cut-Fill Ht.:      1.2461

0+000.814         Centerline    0.0000     4745.6701     9344.3704    242.7011
                                                        Orig. El.:    241.4551
                                                     Cut-Fill Ht.:      1.2461
```

SDR-VARIN:

Listed Pk, Displacement, Chain of Sdr-Varin: You can import in order to stake out or display the surface.

```
0.000,-5.000,510.512
0.000,0.000,510.612
0.000,5.000,510.512
20.000,-5.000,510.725
20.000,0.000,510.825
20.000,5.000,510.725
```

CARTOMAP:

- **Terrain**

```
P.K.    Distancia      X       Y       Cota terreno   Código
0+000.000      -30.000 4640.610       9653.105       301.707
       0.000   4622.835       9628.938       293.626
       0.010   4622.829       9628.930       293.624
       30.000  4605.060       9604.771       287.080
0+020.000      -30.000 4656.721       9641.256       306.226
       -21.600 4651.744       9634.489       303.838
       -0.530  4639.261       9617.515       296.994
       0.000   4638.947       9617.088       296.892
       11.980  4631.849       9607.437       294.566
       21.632  4626.130       9599.662       292.460 L. Eléctrica
       30.000  4621.172       9592.921       290.634
```

- **Section**

```
.K.     Nivel   X       Y       Distancia      Cota terreno   Cota sección   Dif.
cotas
0+000.000      Terreno real
       Nivel 1 4629.439       9637.917       -11.146 296.629 296.129 -0.500
               4626.380       9633.758       -5.983  295.238 299.570 4.333
               4626.034       9633.288       -5.400  295.081 299.862 4.781
               4625.146       9632.080       -3.900  294.677 299.922 5.245
               4622.835       9628.938       0.000   293.626 300.000 6.374
```

```
                4620.524        9625.796        3.900   292.775 299.922 7.147
                4619.636        9624.588        5.400   292.448 299.862 7.414
                4619.290        9624.118        5.983   292.320 299.570 7.250
                4609.051        9610.196        23.265  288.549 288.049 -0.500
        Nivel 2 4626.380        9633.758        -5.983  295.238 299.570 4.333
                4622.835        9628.938        0.000   293.626 299.690 6.064
                4619.290        9624.118        5.983   292.320 299.570 7.250
        Nivel 3
        Nivel 4
        Nivel 5
        Nivel 6
        Nivel 7
        Nivel 8
        Nivel 9
```

INROAD:

- Fomat 1:

```
May 23, 2002                    Roadway Modeler W/xyz          Page   1 of 109
09:47 PM                Report Template: ROADWAY_MODELER_XYZ
Layer Name: bit
        HA: Haggarty Road
        VA: resurf
Station                 TC      Offset      X coord       Y coord      Z coord
0+588.265          Izquierda_   -3.8008  1028222.0617   116402.8019    295.1566
                                                          Orig. El.:    295.3567
                                                     Cut-Fill Ht.:     -0.2001

0+588.265             LEOM      -3.7399  1028222.1226   116402.8048    295.3596
                                                          Orig. El.:    295.3596
                                                     Cut-Fill Ht.:      0.0000

0+588.265          Izquierda_   -3.6604  1028222.2020   116402.8086    295.3611
                                                          Orig. El.:    295.3611
                                                     Cut-Fill Ht.:      0.0000
```

- format 2:

```
Fecha:  martes, 08 de marzo de 2005 13:14:58
Nombre superficie:  Ras5_5'D
Nombre alineación:  CALLED
0+000.000 -13.519 601.665 IZDA_Desmonte1
0+000.000 -12.430 601.120 IZDA_Ta_Sal_cuneta1
0+000.000 -11.430 601.120 IZDA_Ta_entrd_cune1
0+000.000 -9.510 602.400 IZDA_Berma_Izq1
0+000.000 -8.760 602.400 IZDA_Ace_Izq1
0+000.000 -5.760 602.340 IZDA_Bor_Izq1
0+000.000 -5.750 602.200 IZDA_Apar_Izq1
0+000.000 -3.250 602.150 IZDA_Calzada_Izq11
0+000.000 0.000 602.215 Eje
0+000.000 3.250 602.150 DCHA_Calzada_Der11
0+000.000 5.750 602.200 DCHA_Apar_Der1
0+000.000 5.760 602.340 DCHA_Bor_Der1
0+000.000 8.760 602.400 DCHA_Ace_Der1
0+000.000 9.510 602.400 DCHA_Berma_Der1
0+000.000 11.430 601.120 DCHA_Ta_entrd_cune1
0+000.000 12.430 601.120 DCHA_Ta_Sal_cuneta1
0+000.000 13.774 601.792 DCHA_Desmonte1
```

ACS-MDW:

```
9380.000
        -48.492                                 57.574
        -46.762                                 57.427
        -38.678                         56.705
        -38.158                         56.359
        -37.988                         56.246
        -36.988                         56.245
        -30.432                                 55.970
        -29.228                                 55.890
        -23.425                 42.681  42.681
        -19.825                 42.393
        -18.625                 42.193
        -18.156         41.635  41.635
        -18.025                 42.293
        -17.425 42.393          42.393
        -16.425 42.473
        -13.925 42.673
        -12.157                                 54.783
        -11.621                                 54.754
        -5.500  43.347
```

```
-4.500          42.727
-4.500  43.427
-3.500          42.807
-3.500  43.347
-0.187                                  54.133
-0.043                                  54.125
-0.040                                  54.125
0.000           43.087
0.000   42.764
3.500           43.447
3.500   44.067
4.500   44.147
4.500           43.527
5.500   44.227
12.500  44.787
15.000  44.987
16.000  44.907          44.907
16.600                   44.807
16.661          44.500   44.500
17.200                   44.707
18.400                   44.907
18.912                                  53.413
19.000                   44.955  44.955
19.683                                  53.391
26.991                          52.946
27.505                          52.946
27.942                          53.238
42.077                                  52.977
43.314                                  52.955
70.000                                  52.809
```

PROTOPO:

```
"PK",0.000, "P.K. Origen"
-10.971,819.171, Talud1
-6.400,814.600, Talud2
-6.000,814.200, Cuneta1
-4.800,814.600, Berma1
-3.000,814.600, Calzada1
0.000,814.600, Eje
3.000,814.600, Calzada2
4.800,814.600, Berma2
6.000,814.200, Cuneta2
6.400,814.600, Talud3
8.542,816.742, Talud4
```

EAGLE:

```
User Name: jpla                                                 Date: 07-14-05
Project: Bellpuig-Preixana                                      Time: 09:37:00
Subproject : Bellpuigpreixana , Sub Project No :6               Page: 1

                R O A D C A L C   C R O S S - S E C T I O N S
================================================================================
Surface Name :ExistPavement
STATION       OFFSET       ELEVATION
--------------------------------------------------------------------------------

0+060.000    -19.578     288.680
             -17.462     288.723
             -16.740     288.922
             -14.240     288.913
             -11.033     289.321
             -9.802      289.472
             -6.305      289.603
             -5.671      289.611
             -5.640      289.610
             -5.626      289.606
             -2.273      288.615
             -2.222      288.630
             -1.206      288.862
             -0.744      288.856
             0.000       288.857
             4.045       288.865
             4.678       288.715
             5.036       288.610
             5.501       288.359
             6.709       287.819
             21.945      287.834
             32.934      287.822
```

LANDXML:

```
<CrossSects name="CAMINO 1">
       <CrossSect       sta="0.000000"       areaCut="0.0000"       centroidCut="0.000000"
volumeCut="0.0000" areaFill="3.5280" centroidFill="0.235969" volumeFill="0.0000">
              <CrossSectSurf     name="Existing     Surface"     desc="TERRENO     NATURAL"
state="existing">
                     <PntList2D>-50.000000 235.068013 -45.173750 234.976433 -27.130210
234.661202  0.000000  234.392971  24.169036  234.154017  40.530949  234.453577  50.000000
234.234410</PntList2D>
              </CrossSectSurf>
              <CrossSectSurf name="Template Surface" desc="ASFALTO" state="proposed">
                     <PntList2D>0.000000  235.000000  -3.500000  234.930000  -3.500000
234.830000  0.000000  234.900000  3.500000  234.830000  3.500000  234.930000  0.000000
235.000000</PntList2D>
              </CrossSectSurf>
              <CrossSectSurf     name="Template     Surface"     desc="BASE     GRANULAR"
state="proposed">
                     <PntList2D>0.000000  234.900000  -3.500000  234.830000  -3.500000
234.930000  -4.500000  234.910000  -4.500000  234.710000  -3.500000  234.730000  0.000000
234.800000  3.500000  234.730000  4.500000  234.710000  4.500000  234.910000  3.500000
234.930000 3.500000 234.830000 0.000000 234.900000</PntList2D>
              </CrossSectSurf>
              <CrossSectSurf name="Match Slope" desc="Left" state="proposed">
                     <PntList2D>-4.500000 234.910000 -4.967912 234.442088</PntList2D>
              </CrossSectSurf>
              <CrossSectSurf name="Match Slope" desc="Right" state="proposed">
                     <PntList2D>  4.500000  234.910000  4.500000  234.910000  5.067126
234.342874</PntList2D>
              </CrossSectSurf>
              <CrossSectSurf name="Top Surface" desc="" state="proposed">
                     <PntList2D>-4.967912  234.442088  -4.500000  234.910000  -3.500000
234.930000  0.000000  235.000000  3.500000  234.930000  4.500000  234.910000  5.067126
234.342874</PntList2D>
              </CrossSectSurf>
       </CrossSect>
```

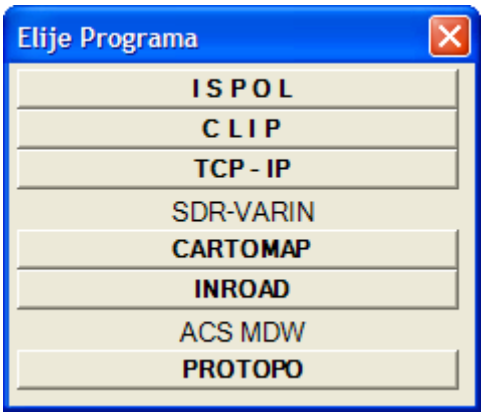
Digital Terrain Models.

In this option MDT files are imported for later field stakeout. The formats supported are:

Note: As of the publication of this Manual,a 4 it is only available for programs ISPOL, TCP-IP, inroad, and standard import DXF-3DFACE.

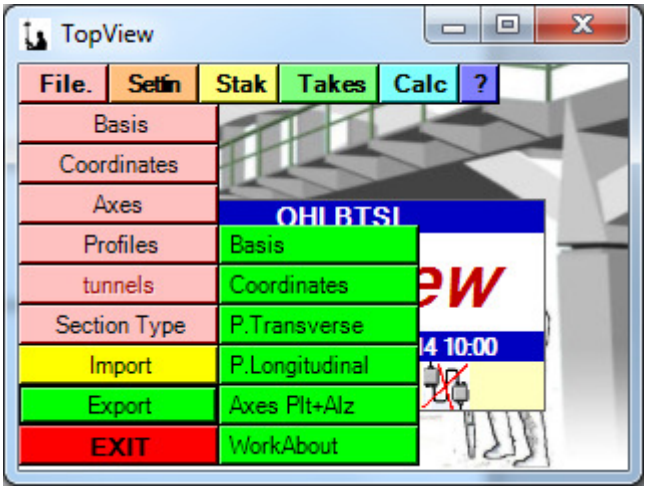
CAMBER Table.

In this option Camber Tables are imported for subsequent field stakeout. The formats supported are:



Note: As of the publication of this Manual this is only available for programs ISPOL, CLIP, TCP-IP, Cartomap, and Inroad.

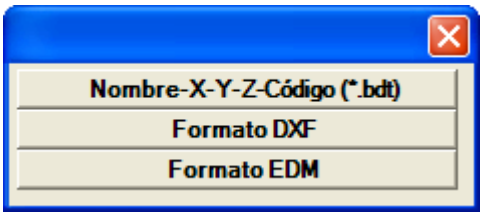
EXPORT MENU:



Bases & Coordinates

In this option the data from BASES/COORDINATES is exported in different ASCII File Formats:

Bases: If the active device is a GPS, the program will allow us to export bases in XYZ or in Lat.Lon.Alt.



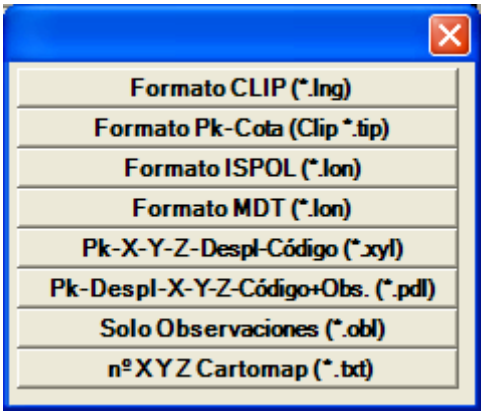
Coordinates: It allows you to export the following formats:

Transverse Profiles

In this option TRANSVERSE PROFILES data are exported in different Ascii file formats:

Longitudinal Profiles

In this option LONGITUDINAL PROFILES data exported in different ASCII File Formats:



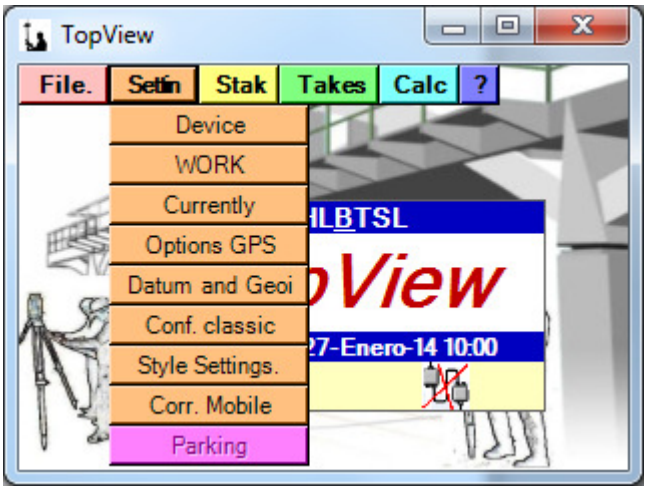
AXIS

In this option the plan layout and axis elevation data are exported in the same Ascii file:

TOPVIEW format file

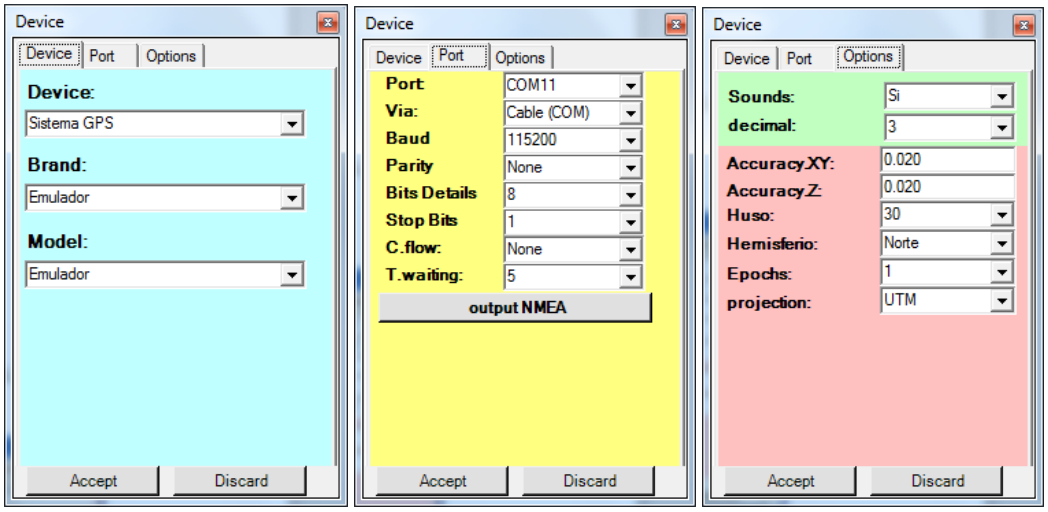
SETTINGS MENU

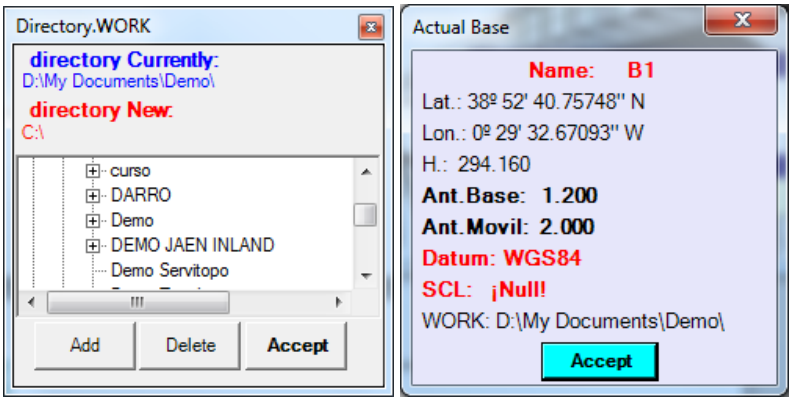
This is the appearance of this menu in the new version:

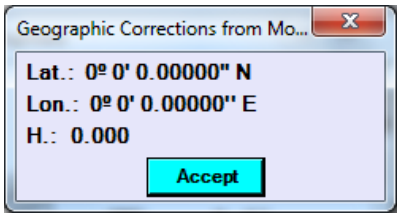


DEVICE, WORK, CURRENTLY

These three options have been previously described at the beginning, in the section "Starting with Topview".

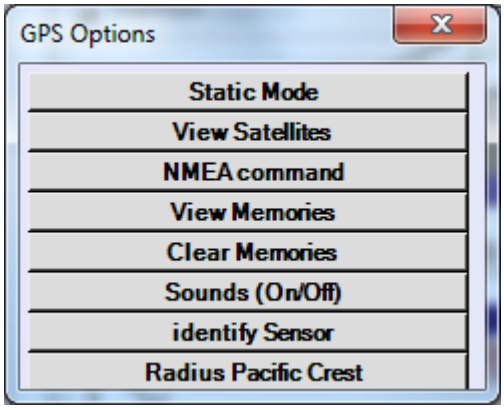






GPS Options: (GPS Only)

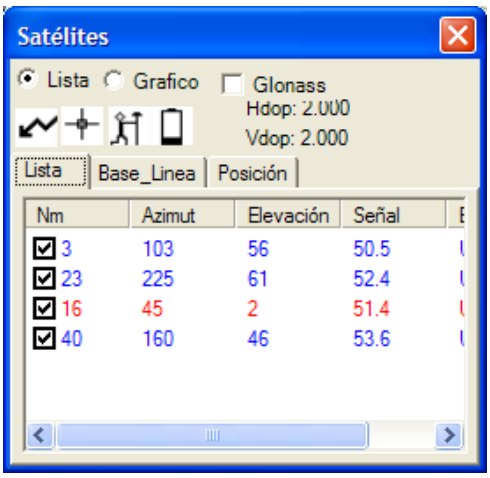
This menu allows us to act on the Sensor:

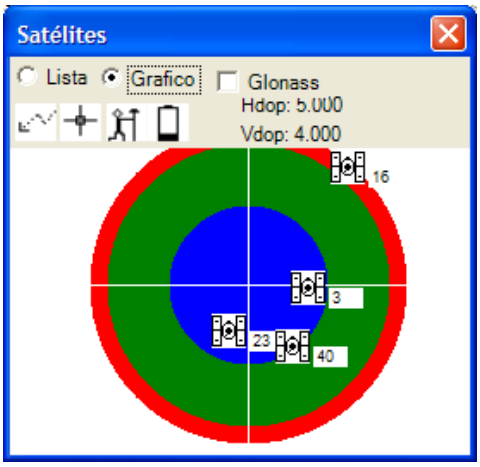


1.-Static Mode: In this section we can activate and stop the recording of observations in the internal memory of the receiver and then to perform post-processing. This operation is possible both in the GPS-Mobile and the GPS-Base, although GPS-base is not necessary because because the setting activates parallel recording of observations while resolving ambiguities in realtime (RTK).

During the course of this operation the programme will be taking periodic readings of the State of the satellites and Pdop information of the minimum, maximum, and average reading taken, using a determined time for the average.

2.- View Satellite: through this screen we have access to information regarding the status of satellites, their elevation, quality of signal, etc.





3.- NMEA Command.

This option allows the activation/deactivation of the emission of different NMEA messages via the serial port of the sensor.-

4.- View Memories

Displays the internal memory of the sensor.-

5.- Clear Memories

Delete the data in the internal memory of the sensor

6.- Sounds (On/Off)

We activate the emission of sounds in the program based on certain events.

7.- Identify Sensor

We can determine the type and serial number of the sensor connected to our notebook.

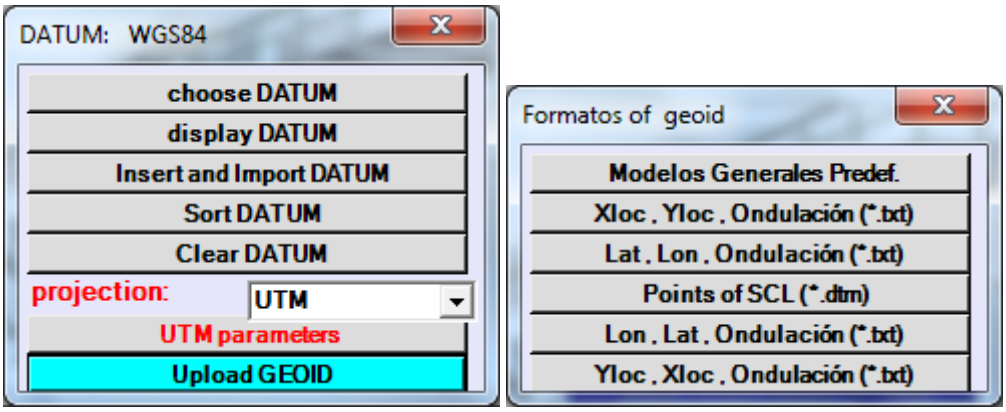
8.- Radio Channel

We can change the channels of our GPS (in some cases, the frequencies too), as well as certain changes in certain parameters of the transmission/reception via radio. In some sensors, such as Topcon GR3, the circuitboard which contains the radio also contains the GSM/GPRS and from here you can activate one or the other.
.

Datums and Geoid: (GPS Only)

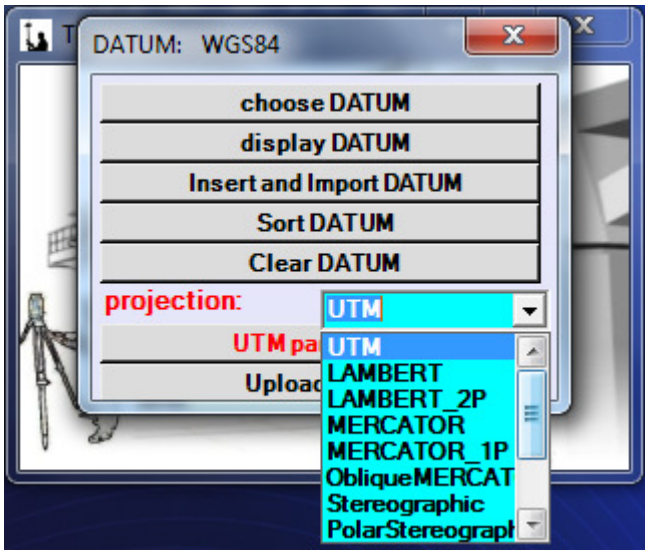
This option allows us to choose, create, or delete a Datum. Depending on the Datum selected we will obtain Cartesian coordinates that will be converted to local using the

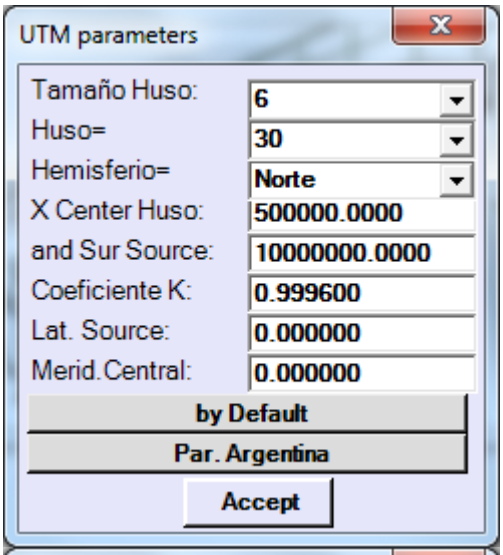
parameters of the SCL. Initially we could choose any Datum, but it is important to not change Datum while working, since it can lead to substantial errors.

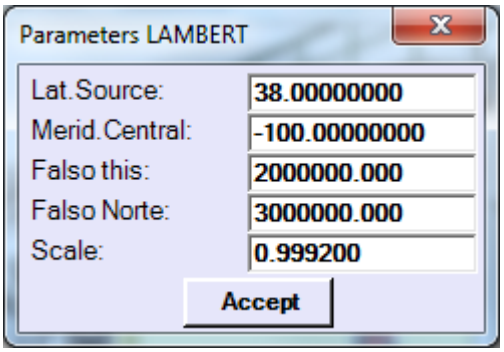


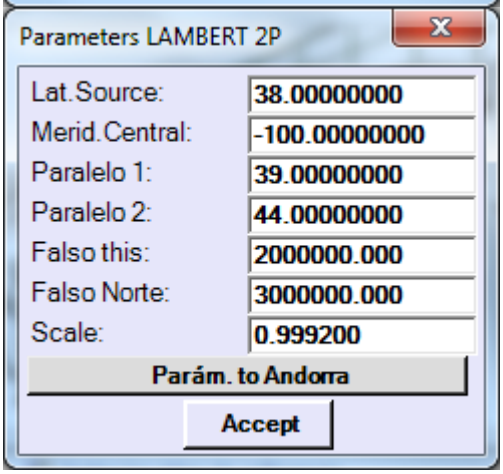
The "Upload Geoid" option has been incorporated with which we apply a model of increments relative to the ellipsoidal bounds obtained directly by the GPS to approach the geoid limit in the area.

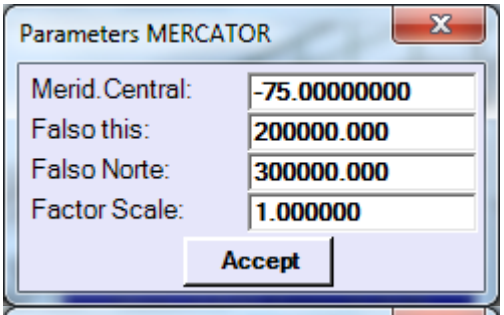
In UTM parameters, or parameters LAMBERT, or parameter ObliqueMERCATOR, etc..., you can specify multiple values influencing the conversion of geographical coordinates to XYZ prior to the SCL Coordenates.

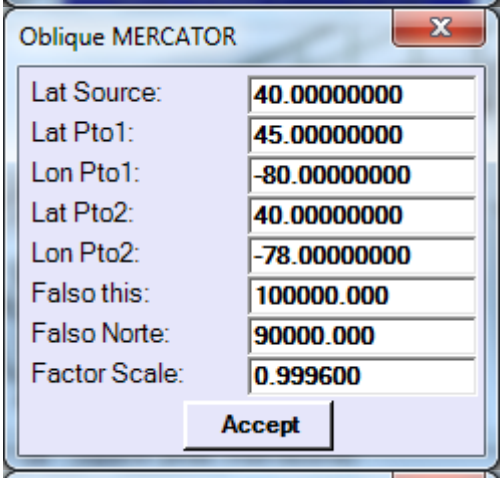


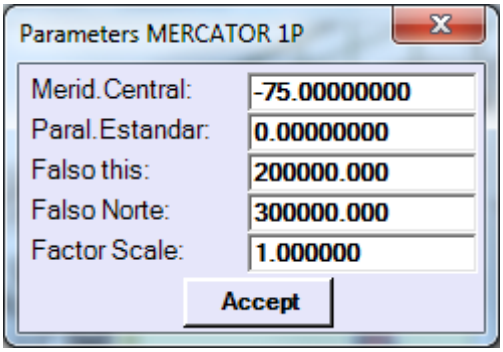

UTM parameters
Tamaño Huso: 6
Huso= 30
Hemisferio= Norte
X Center Huso: 500000.0000
and Sur Source: 10000000.0000
Coeficiente K: 0.999600
Lat. Source: 0.000000
Merid.Central: 0.000000
by Default
Par. Argentina
Accept

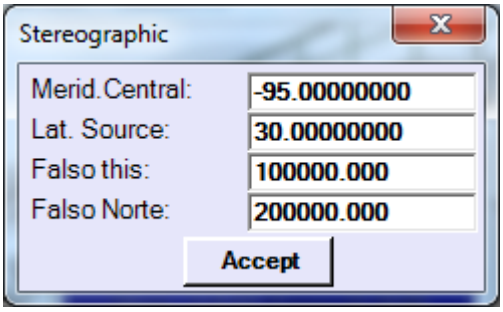

Parameters LAMBERT
Lat.Source: 38.00000000
Merid.Central: -100.00000000
Falso this: 2000000.000
Falso Norte: 3000000.000
Scale: 0.999200
Accept

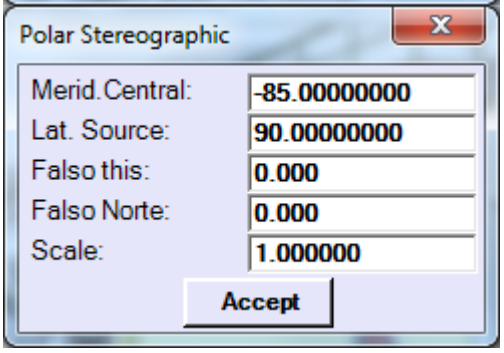

Parameters LAMBERT 2P
Lat.Source: 38.00000000
Merid.Central: -100.00000000
Paralelo 1: 39.00000000
Paralelo 2: 44.00000000
Falso this: 2000000.000
Falso Norte: 3000000.000
Scale: 0.999200
Parám. to Andorra
Accept


Parameters MERCATOR
Merid.Central: -75.00000000
Falso this: 200000.000
Falso Norte: 300000.000
Factor Scale: 1.000000
Accept


Oblique MERCATOR
Lat Source: 40.00000000
Lat Pto1: 45.00000000
Lon Pto1: -80.00000000
Lat Pto2: 40.00000000
Lon Pto2: -78.00000000
Falso this: 100000.000
Falso Norte: 90000.000
Factor Scale: 0.999600
Accept

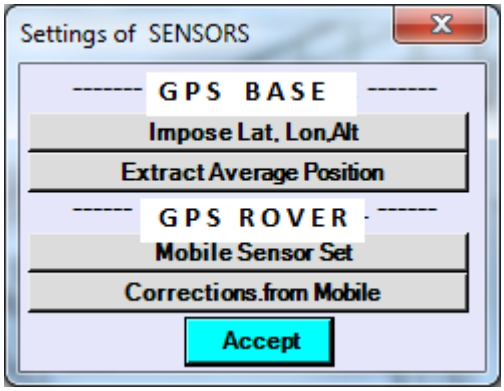

Parameters MERCATOR 1P
Merid.Central: -75.00000000
Paral.Estandar: 0.00000000
Falso this: 200000.000
Falso Norte: 300000.000
Factor Scale: 1.000000
Accept


Stereographic
Merid.Central: -95.00000000
Lat. Source: 30.00000000
Falso this: 100000.000
Falso Norte: 200000.000
Accept


Polar Stereographic
Merid.Central: -85.00000000
Lat. Source: 90.00000000
Falso this: 0.000
Falso Norte: 0.000
Scale: 1.000000
Accept

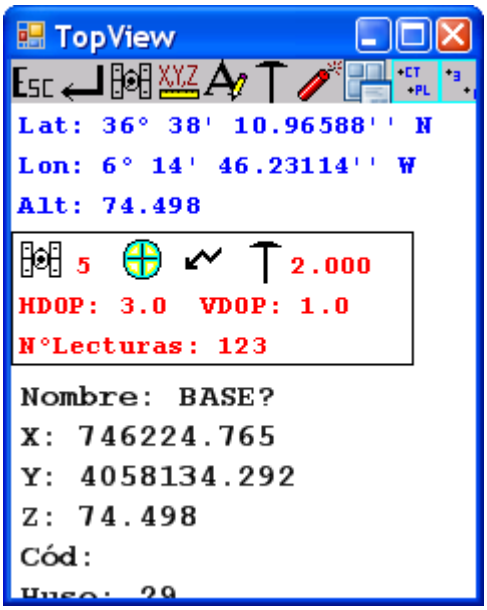
Classical Settings: (GPS Only)

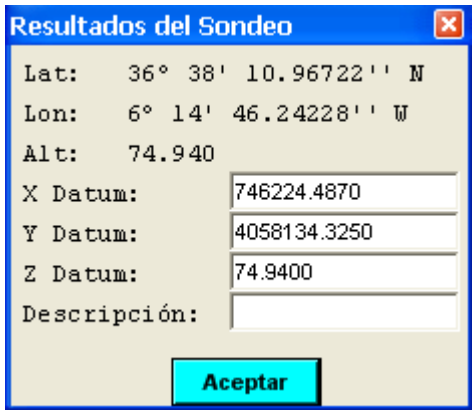
In this module we can configure the GPS equipment as equipment BASE or MOBILE, indicating the geographical coordinates of where GPS-BASE is as well as the antenna height, maximum angle of inclination of satellites in use, frequency of sending data to the GPS-mobile through the radio-modem and series parameters, etc..



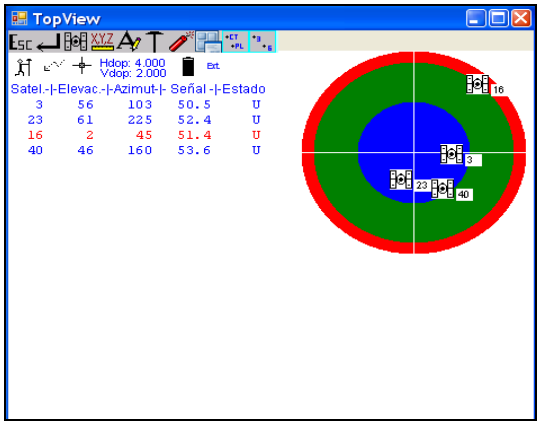
Extract Average Position:

When starting a new job we do not have the geographical coordinates WGS84 of the base where we will place the Base-GPS and should find a coordinate average for the area of work. This program will begin taking readings showing the incoming coordinates, the number of readings taken, satellites and Hdop and Vdop parameters until you press the ENTER or ESC key. Then the average result is displayed and this will be used for the receptor, also offering the ability to record the WGS84 geographical coordinate and Cartesian coordinate for the Datum used. In this module and the others the geographical coordinates recorded are always referred to WGS84 Datum. It is very important to know this
to avoid mistakes in calculations or further processing (eg., using another specialized program).





In any screen in which communication has been established with the Receiver and coordinates are being read, you can press the "s" key or the icon and a screen showing some icons will appear indicating: whether the receiver is in Base or Mobile mode, if the radio modem is receiving, if we are in navigation, floating or precision mode, HDOP, VDOP, and finally a list of satellites defined by the parameters of the number of satellite, altitude, Azimut, Signal level, computing state.



Information ICONOS

- GPS-Base
- GPS-Mobile
- Satellites
- Radio ON
- Radio OFF
- Navegation Mode
- Float Mode
- Precision Mode
- Battery Full
- Battery Half
- Battery Low

ICONOS and Active Keys

- Escape Key.
- Enter Key.
- Satellites.
- Accuracy, Times, Elevation Filters.
- Code Point.
- Change height of mobile antenna for GPS.
- RTK GPS reset.
- Switch between graphic display and text display in some modules.

Displays the number of point, codes, and the dimensions in a graphical display.


Additional information of a point and association with an image.


Zoom +.


Zoom -.


Zoom All.


Zoom Window.


Displays or hides the lines in graphical display.

The program will report on Settings with messages in the lower-right corner.

Special mention for the radio modem settings box. Here the communication COM parameters are specified for communication between sensor and Radio. Each sensor usually has a different radio modem with different parameters and it will be necessary to go to equipment specifications or consult the GPS dealer to find out what they are.

Once completed the following message is shown:

Impose latitude longitude altitude

This amounts to the same as the previous option but with the difference that the coordinate is taken from a file instead of the sensor. This coordinate must not seperate more than 50 meters from the autonomous position that the sensor calculates for the area because otherwise the Base will not send the Differential Corrections to the mobile or if they are sent, they will be discarded. Some sensors are even more stringent and the coordinate used must be closer.

Mobile Sensor Setup

This option instructs the sensor to act as receiver of Differential Corrections and we must set the serial communication parameters for Radiomodem as well as satellites elevation mask, Antenna Height, etc.

Corrections from Mobile

This option allows us to place GPS Base anywhere ("Extract Average Position") and continue using the geographical coordinates and the SCL we already have without having to re-read these bases and readjust the SCL setting.

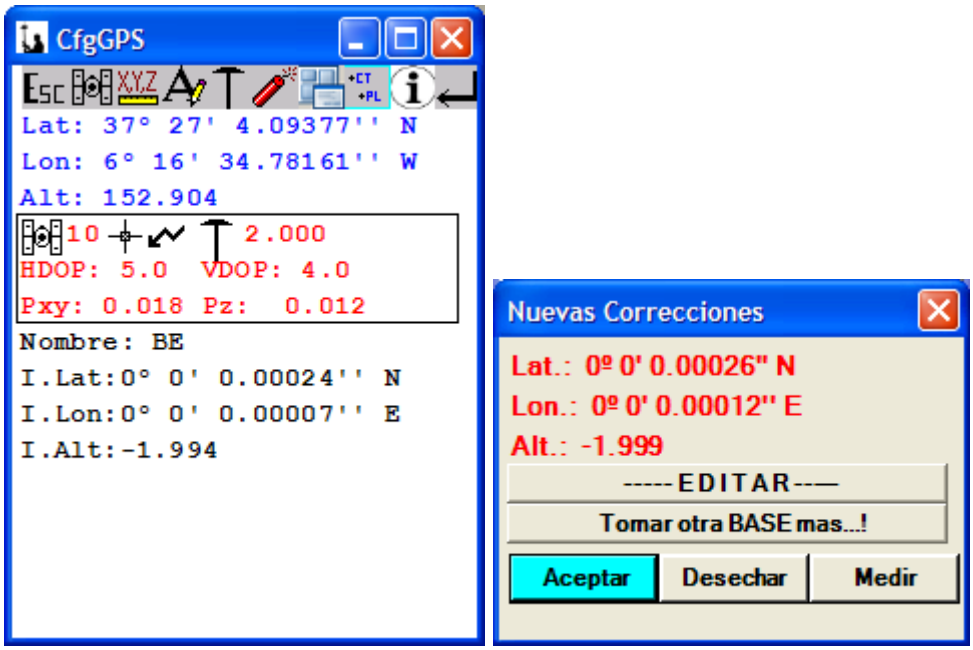
The principle is based on a translation of WGS84 geographical coordinates from the mobile. So we need to read the coordinates of a base that we had previously read. The program will show us the differences that exist from the current position of the base that will be just a few seconds or tenths of seconds. These differences are stored in a few variables, and recorded in the configuration file. From that moment all the coordinates received from mobile sensor will have these differences subtracted from them so that the position of the GPS Base is a known coordinate. If we have several mobile GPS we will have to perform the calculation for each of them.

Each time that you configure the GPS Base these variables go to zero, so if the Base sensor is not positioned in a known base we must perform the corrections again.

The advantages of this method are several:

1- The possibility of placing the GPS Base anywhere based on the current needs.
2- We can put the Base GPS antenna on the roof of our car and the sensor in the boot thus eliminating the need to monitor the equipment and reducing the Radio_MODEM emission distance, after reading all the bases, in the remaining days work will be done in nearby positions. Keep in mind that the car should not move during the work, and if moving it is necessary to calculate the correct differences again.
3- If a job already exists with a BASE-GPS emitting differential corrections, whose wireless modem is compatible with ours then the information that it emits is also compatible. We can use these Radio signals and corrections from mobile even if its coordinates are different from ours.

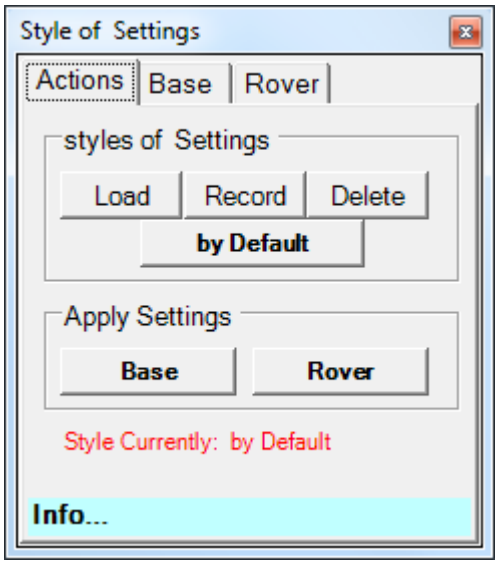
We will arrive at a picture like this:



We can also manually edit the measured data (EDIT), take averages with another base (Capture another BASE), or accept or discard the measurement

The option at the beginning of "Recover history" serves to retrieve previous measurements that may be valid, especially when working with networks of Bases NTRIP. Whenever we make a correction it is recorded in a file called "CorrMovil.inf" in each work directory with the measured values along with the name of the bases on which they were made, the date and the time.

Setting Styles (GPS Only)



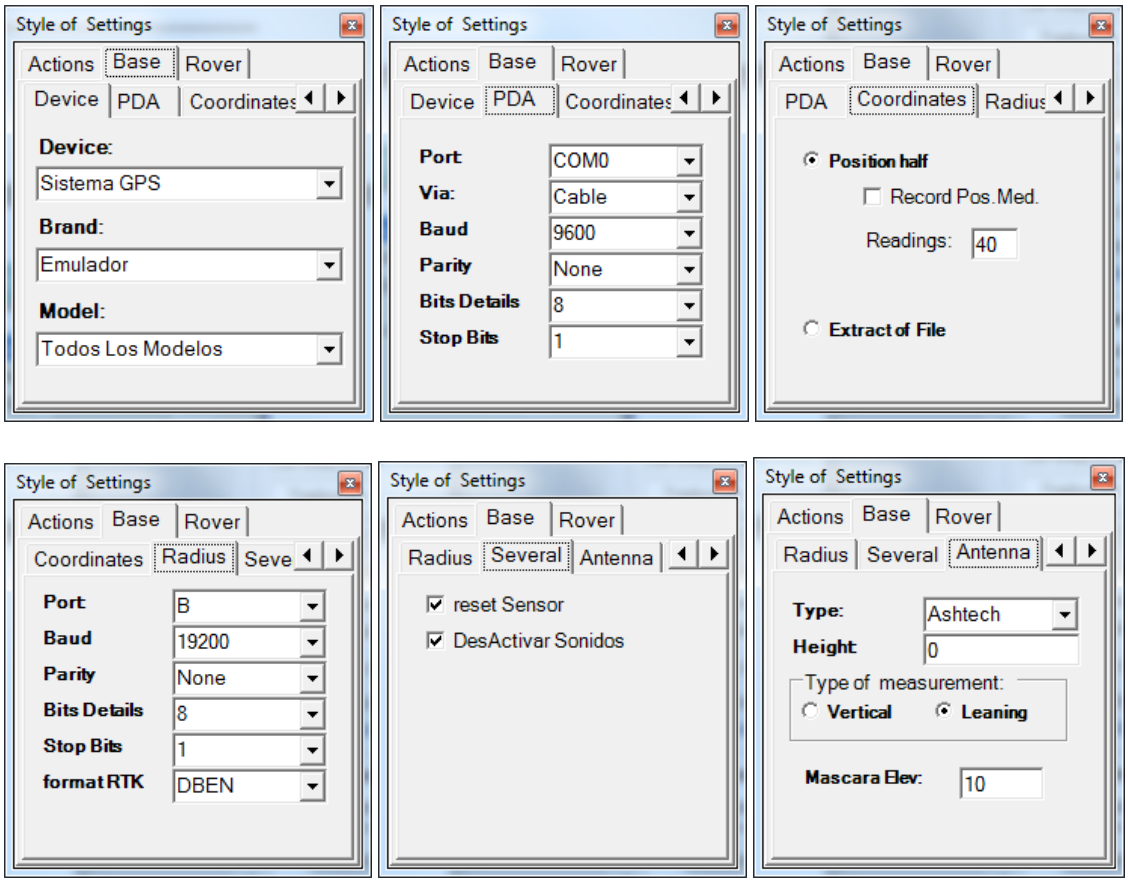
One of the multiple advantages offered by the use of TopView is the possibility of using it with practically all the equipment that is currently on the market. This fact makes it necessary to provide the ability to modify all configuration parameters, which can sometimes omplicate or slow down the Setup process of the GPS equipment, whose complexity makes the number of parameters to be set greater and therefore the time required to complete the configuration and knowledge required are greater.

The first setup of our equipment is a mandatory step we have to do, unless we have already set it up, we have to tell it all the parameters that will allow us, for example to connect our electronic notebook to the GPS, as that the GPS sends through the Radio -Modem the information that we need.

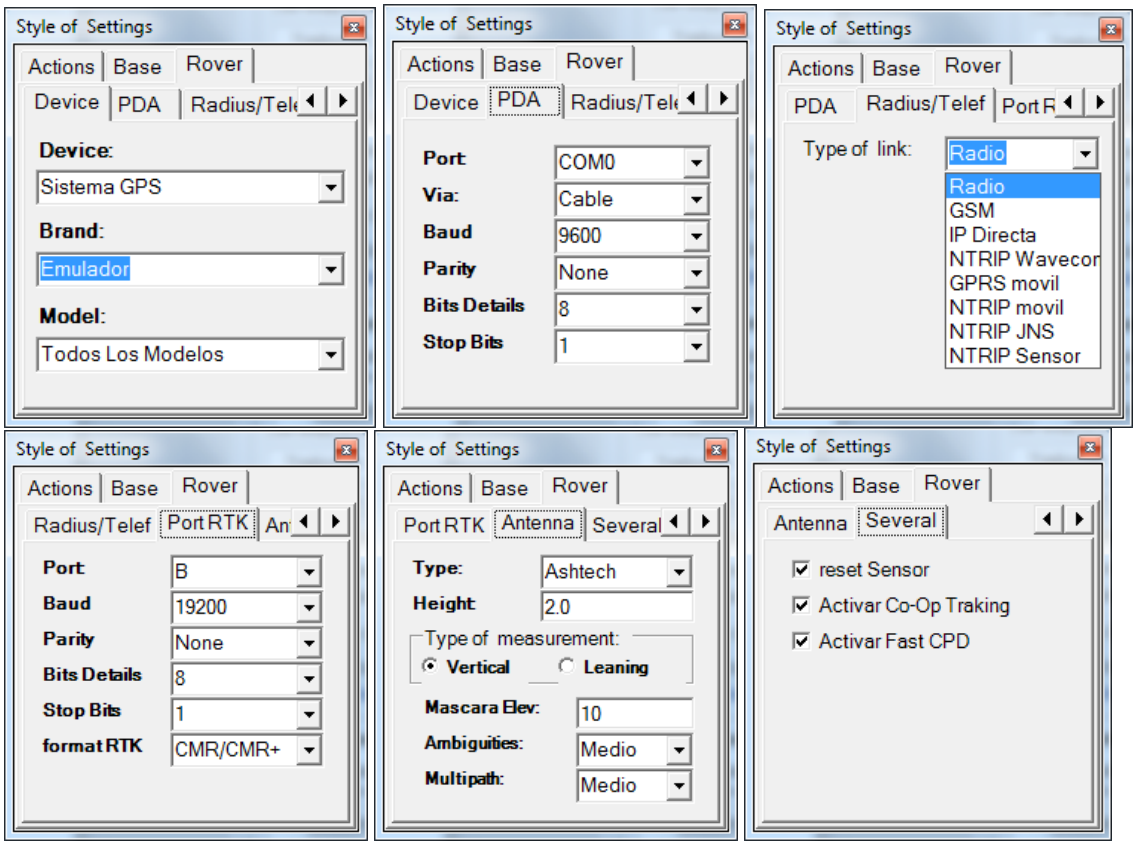
To begin we can use standard configuration that we can apply by default and then modify those parameters that vary in the configuration we want to use. Once this step has been done we can save the settings for use on subsequent jobs using the same equipment, even if you change workbook you can previously load a configuration and modify it, then save it and use it at another time, ie, from a configuration we can adapt it to another similar composition of similar equipment.

Now we will see how to configure a base GPS JAVAD and a Topcon FC- 100 electronic notebook connected via cable and GPS Mobile Hiper + BlueTooth connected, which has the following characteristics:

Base:


Style of Settings
Actions Base Rover
Device PDA Coordinates
Device:
Sistema GPS
Brand:
Emulador
Model:
Todos Los Modelos
Port: COM0
Via: Cable
Baud 9600
Parity None
Bits Details 8
Stop Bits 1
PDA Coordinates Radius
Position half
Record Pos.Med.
Readings: 40
Extract of File
Coordinates Radius Seve
Port: B
Baud 19200
Parity None
Bits Details 8
Stop Bits 1
format RTK DBEN
Radius Several Antenna
reset Sensor
DesActivar Sonidos
Type: Ashtech
Height: 0
Type of measurement:
Vertical
Leaning
Mascara Elev: 10

Mobile:


Style of Settings
Actions Base Rover
Device PDA Radius/Tel
Device:
Sistema GPS
Brand:
Emulador
Model:
Todos Los Modelos
Port: COM0
Via: Cable
Baud 9600
Parity None
Bits Details 8
Stop Bits 1
PDA Radius/Telef Port R
Type of link: Radio
Radio
GSM
IP Directa
NTRIP Wavecor
GPRS movil
NTRIP movil
NTRIP JNS
NTRIP Sensor
Radius/Telef Port RTK An
Port: B
Baud 19200
Parity None
Bits Details 8
Stop Bits 1
format RTK CMR/CMR+
Port RTK Antenna Several
Type: Ashtech
Height: 2.0
Type of measurement:
Vertical
Leaning
Mascara Elev: 10
Ambiguities: Medio
Multipath: Medio
Antenna Several
reset Sensor
Activar Co-Op Traking
Activar Fast CPD

DEFAULT PARAMETERS

We begin by selecting the device we are going to work with and we can enter into configuration profiles and apply a pre-configuration for the equipment that we have selected.

This setting is applied from the option Default, with which we will apply an initial configuration that will be the basis to adapt to the equipment with which we are going to work.

GPS BASE Parameters

We will begin by configuring the GPS Base, starting as already mentioned, with the default parameters that we have imposed on it.

Select the Base tab to start configuring:

PDA: this first option shows the communication parameters that we will use on the workbook so we can communicate with the GPS, such as Port, baud rate, etc. In this case we can see them in the picture above.-

Radio: the next option allows us to tell the GPS the port that will emit the differential corrections broadcast to the Radio Modem and the format of these, the Baud rate, etc. For our example, these are:

Several: in this case we can activate options for the type of sensor we have selected as our device, for example, enable/disable the sounds, we can also reset the sensor, etc. In our case, for the equipment we are using, we only have the option Reset the sensor.

Antenna: here we indicate information regarding the antenna, such as the type of antenna we are working with and the height at which it is located, the elevation mask, etc . In the previous image we can see the selection for our example:

Coordinates: here we will indicate what is going to be the origin of the coordinates for the GPS Base, offering two options.

- *Extract Medium Position*: the equipment measures its position the number of times we indicate. Once the sensor configuration is applied to we can save the measured coordinates.
- *Extract from file*: to apply this configuration we are asked for the file in which we have the base where we have positioned our sensor.

Post_Process: finally this allows us to record the sensor information for later processing in the office. We have to fill in the filename for the observations and the frequency of recording.

GPS MOBILE Parameters

Similar to the configuration of the Base, we start with parameters which we have as default, while the final configuration corresponds to that listed below :

PDA: usually the PDA setting will be the same for both sensors, except in cases where a sensor has a cable and Blue Tooth and the other has only a cable. In our case we have the following setup:

RTK-Link: here we can select the channel for reception of Differential Corrections. Usually they are by Radio but can also be by GSM / GPRS and in this case we must specify several parameters:

Antenna: This option has the same options as the base sensor, and permits indicating what the level of ambiguity and multipath is going to be.

RTK Port: here we select the COM_ port as that which is going to receive differential corrections, baud rate, parity, etc.

Various: similar to before has configuration features such as reset Sensor, enable Fast CPD, or as in the case of our equipment Enable co-op Traking, etc.

SAVE SETTING

The configuration can be saved to not have to do this repetitive work every time we work with the same computer, PDA, etc .

To do this, the Actions tab offers the option of the Record Base and Mobile Setup in one file, which, in following uses we only need to Load the saved configuration and apply it, without changing any settings.

In our case we will save it with the name of Hiper_Plus_FC100, as it is a configuration of Hyper+ equipment along with a FC-100 notebook, both supplied by Topcon.

APPLICATION SETTINGS

Once we have been defined what the configuration of each of the sensors will be and we've saved it, we must apply it. With the Actions tab we have the option of applying this configuration to each of the sensors, that must be connected to the PDA, which cannot be done simultaneously. So we begin by connecting the PDA to the sensor base, then applying the configuration, when we apply the settings on any equipent we will have set the Communication between the sensor and the PDA.

In the case we are discussing, using Bluetooth, there's an intermediate step that allows us to communicate via Bluetooth, which is why when applying the settings a window that offers the ability to select the name of the sensor you want to communicate with appears, but it's also possible that no equipment appears, also that those which appear don't interest us. In this case we have to click on the Scan option, which means the book will scan Bluetooth for equipment to communicate with.

After finishing this operation, the name of the sensor we want to communicate with must appear, and now we only have to hover on our sensor and clic the Select button, which is then selected and then the configuration is applied.

With this done we disconnect the base sensor and connect the mobile to the PDA and apply the settings.

In this way we can begin to work, since both sensors are already setup. Maybe we can't connect or we cannot send to or receive from the Radio Modem and then we change the settings we believe incorrect, resave the configuration file with the same name and apply it again.

COMMUNICATIONS PDA - SENSOR

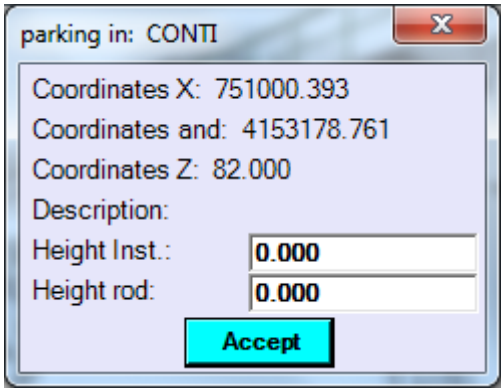
Communication can be set in three different ways: BluetT/Serial, Bluetooth, and Cable. Cable communication does not present any problem, so we will discuss the other two options.

The classic ports are known by the name of "COM" while the BlueTooth port is known with the name of "BSP", and to this must be added the number of the port ("COM1" or "BSP1"). Usually on a PDA the cable port is COM1 while the BlueTooth port may be BSP2 or BSP3. However, most PDAs incorporate a Driver which makes the BlueTooth port emulate a conventional serial "COM" port with a high number (6, 7, 8, or 9). In this case we must indicate to TopView that the comms. are by "BlueT/Serial".

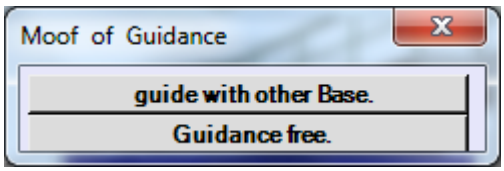
In some PDAs (Example: FC -100, Unitech with Socket) when TopView goes to Bluetooth the Windows CE Operating System (WinCE) automatically opens the Device Explorer to select BlueTooth, while in others this does not happen (Example: WorkAbout Pro, Unitec with Anycom) and if we want to change our connection we go to Bluetooth Manager to select it.

PARKING: (E.T. Only)

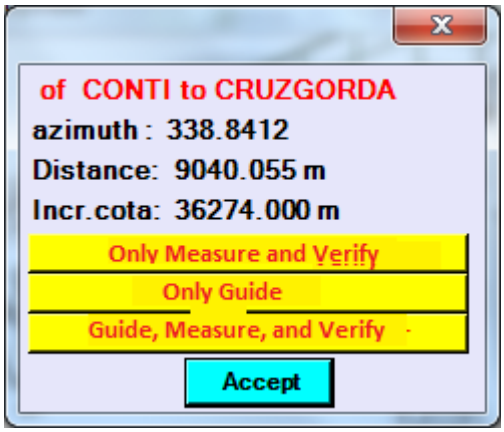
In this section you park the instrument in UTM or PLANE, through an orientation with another base or a free orientation. Choose Bases file, name of the Base where it's parked, instrument height, and position height.



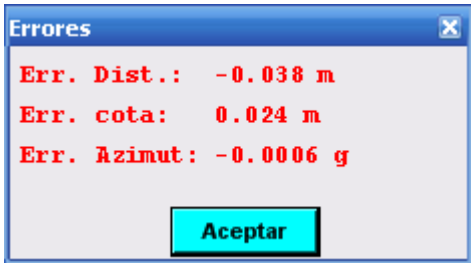
After this data we can position with another Base or freely position the device.



If any requested base does not exist in the Bases file, we have a screen where you can enter data and decide if we want to save this in the Bases file. After this we will be shown the result of calculating the orientation.



If we choose only to measure and verify we will have the option to read in direct and reverse cycles and get results similar to these:

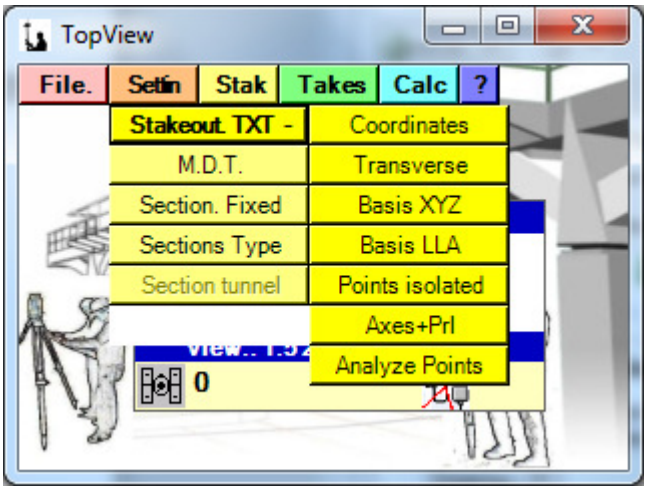


If we choose to just position the equipment, the program will impose an azimuth to the station, and with the third option we include the previous two, ie, connect to another base, read it and obtain the relative errors for distance, elevation and azimuth.

When you exit the application, the program informs us of the information from the base from which we will make all calculations of staking out or data collection, and the work subdirectory.

STAKEOUT MENU

All stakeout options allow to save the coordinaes of the stakeout point in a file called backup which is actually a file of points like any other tachometry or Stakeout coordinates files. This is often used to keep track of the points really staked in the field as well as the real terrain elevation at that point and these points are automated to indicate the original point which was staked and the residual error obtained.



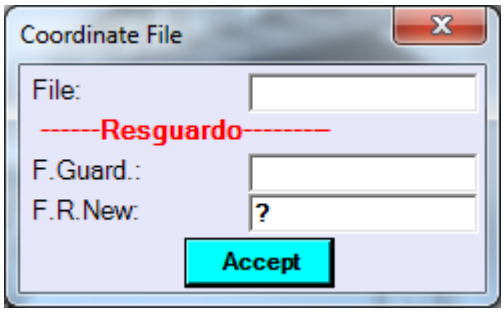
COORDINATES

In this option we can reposition groups of coordinates from different sources as well as recording the results of the repositioning in a backup file.

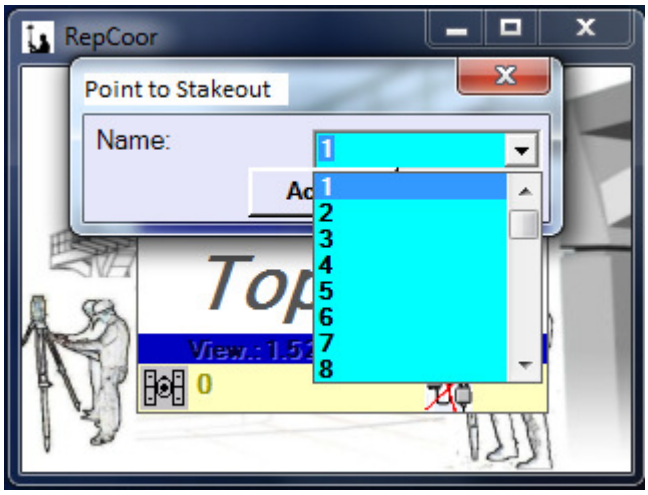
TOTAL STATION(E.T.):

FILE OF COORDINATES, CROSSSECTION, BASES

The application starts by asking if we want to record the readings in a backup file. If we answer affirmatively we are prompted for the name of a coordinates file different to the one we're using to store all the current data from the stakeout.

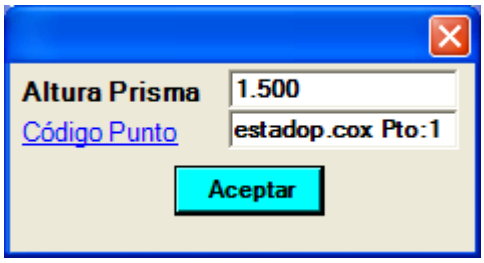


It starts by asking for the filename for the stakeout and then presents a screen where we can select the particular point we want to stake and the azimuth that we should put in the ET. We can change the dimension to be staked out by changing the "Inc.Z" value, which is added to or subtracted from the height to be staked.



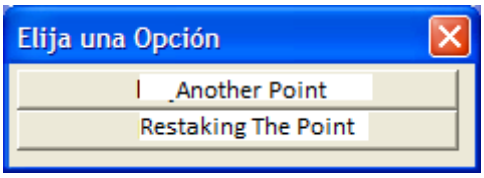
After placing the apparatus with the indicated azimuth and the linear operator, we can check it by pressing Enter. After taking the reading, the program asks for the height of the pole and the code we want to use for the point to save in the backup file.

Then we are shown the result of the stakeout and the action to take :



The action "Zoom In" can change to "Zoom Out" if the difference in distance is negative. The 'Right' action can be changed to "Left" and reflects the lack of alignment in the stakeout. . The action Up may change to Down depending on the difference between the real height and the height to be staked.

Then we can continue restaking the point or return to the Selection screen to choose another point to be staked.



ISOLATED POINT

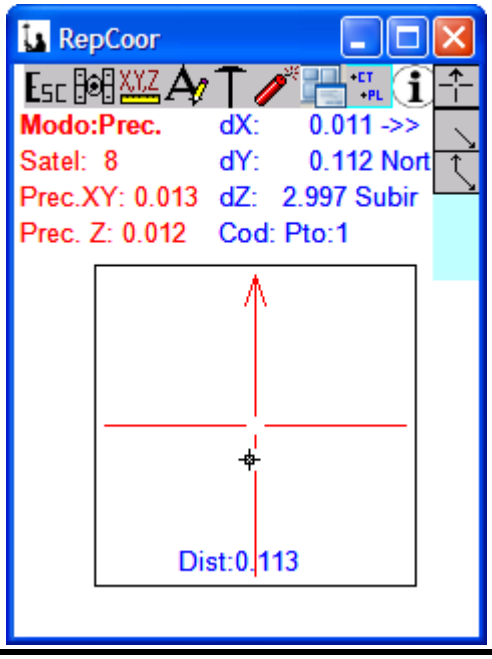
This option allows us to restake any isolated point by manually entering the coordinates and recording the stakeout results in a backup file.

The screens the application offers are similar to the ones explained in the coordinate file stakeout section.

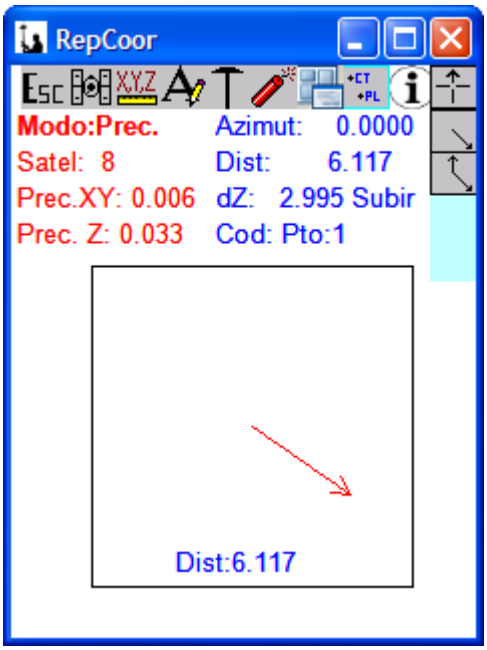
GPS:

For these three modules and the module "PLT + ALT Axis stakeout", the screens are common and the difference between E.T. and GPS is found from the option READ Prism. Failing this, we have the next screen showing the relative increases to the chosen orientation, along with a graphical display showing various graphic entities based on the chosen orientation:

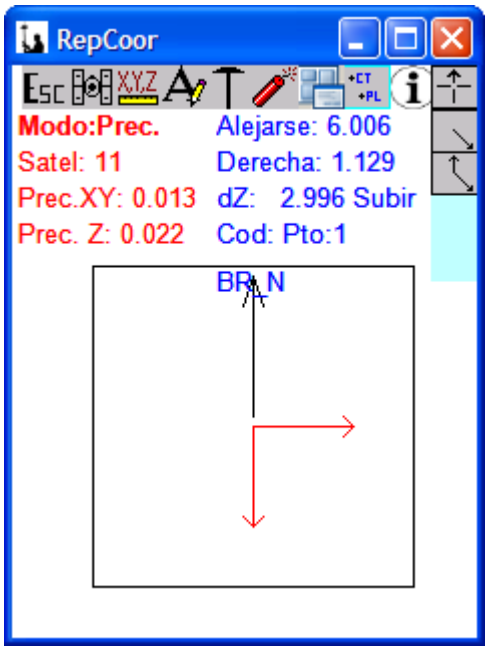
- **North Orientation**: Shows one Vertical and one Horizontal line (Cardinal Axes), an arrow at the top of the vertical line shows North, and a blinking cursor shows our current position which changes as we move. To place the antenna (GPS- Mobile) at the theoretical target position we must move towards the intersection of the axes placing the WorkAbout facing North. When the distance is less than 0.5 meter, the workbook emits a sound which is louder the closer we get to the point. The size of the cursor changes from small when at high precision, medium when floating or middle precision, and large when in Navigation.



- **Orientation Relative to Movement**: Displays a line from the center of the graphical display with an arrow indicating the direction to take and the distance to the Point. When the distance achieved is less than 1 meter the mode changes to "North Orientation".



- **Orientation Relative to Base**: Displays a vertical line from the center of the graphical display and an arrow at the end indicating the orientation to the Base, and a line that rotates and shows the direction of the point to stakeout and the distance to be moved



We can change from one mode to another by simply pressing the following keys:

Key "N" or icon changes to mode "North Orientation"
Key "M" or icon changes to mode "Orientation Relative to Movement"
Key "B" or icon changes to mode "Orientation Relative to a Base"

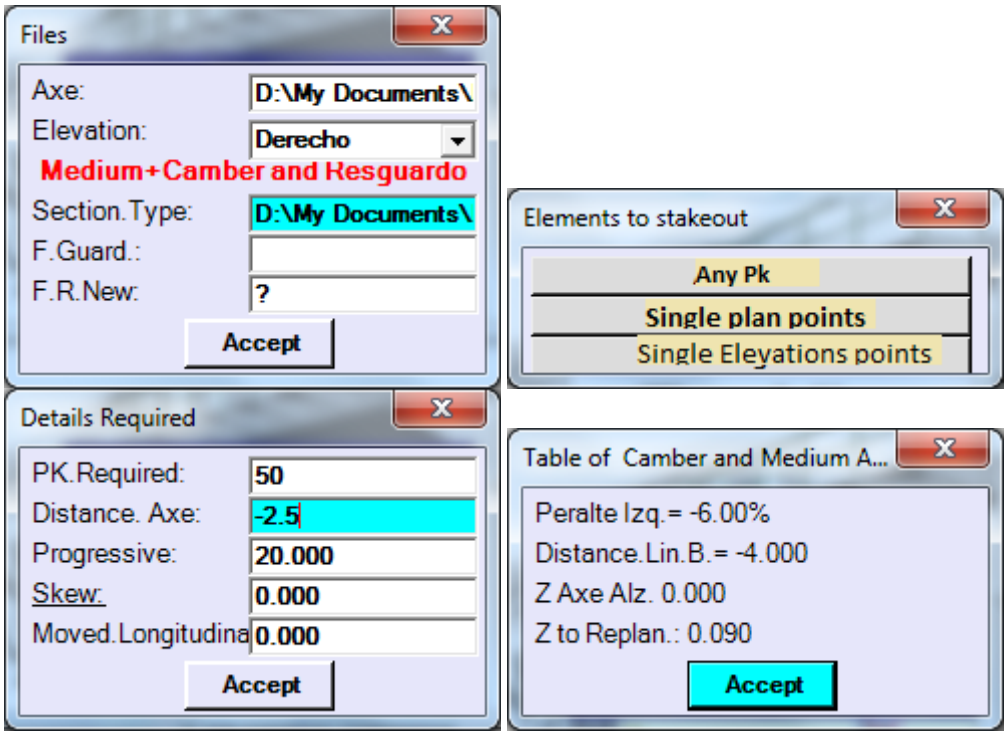
We can check the status of satellites and Pdop, batteries, etc. by pressing the "S" button or icon . We can also change the GPS-mobile antenna height or point code simply pressing "**C**" ó "**H**", or change the precision tolerances or reading frequency by pressing "**P**" . The buttons and icons described in this paragraph are available in all modules of Data Capture and Stakeout.

AXIS

This option can rearrange any point in a base + elevation + risers axis which is already created with its Pk and Displacement, as well as recording the stakeout results in a backup file.

The application starts by asking if we want to record the readings in a backup file. If we do we are asked for the name of a coordinates file different from that which we will use to store the real stakeout data.

We are then asked for the Projection to use (Bases or Utm). After that it asks If we want to apply the Superelevations and Average Table. If we only want to apply the Superelevations Table and not the Average, we must create a standard Section even if it's completely empty so that the program can continue the process



We can input any Pk or scan the table of points for the axis to extract the Pk of any given element.

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Progressive is the distance between Pk that we normally use to stakeout, so that after restaking 1520 Pk and returning to this screen, we are automatically offered the Pk 1520 +20 = 1540 to stakeout. Skew is a twist that is applied to stake a profile not perpendicular to the main axis and from this new rotated alignment the Separation from the Axis and the Longitudinal Displacement is applied in the direction of the Pk. This is typically used to stakeout Works that are not perpendicular to the trunk axis but knowing the angle alignments of the OF and Intersection Profile with the Trunk Axis (skew) we can easily stakeout based on the Trunk .

The screens that the program now shows are similar to those explained in the coordinate file Stakeout section.

ANALYSE POINT

This allows us to analyze our position with respect to an axis (both in base and elevation) and can also analyze a section created by us. The results of this calculation can be stored, as always, in a backup file .

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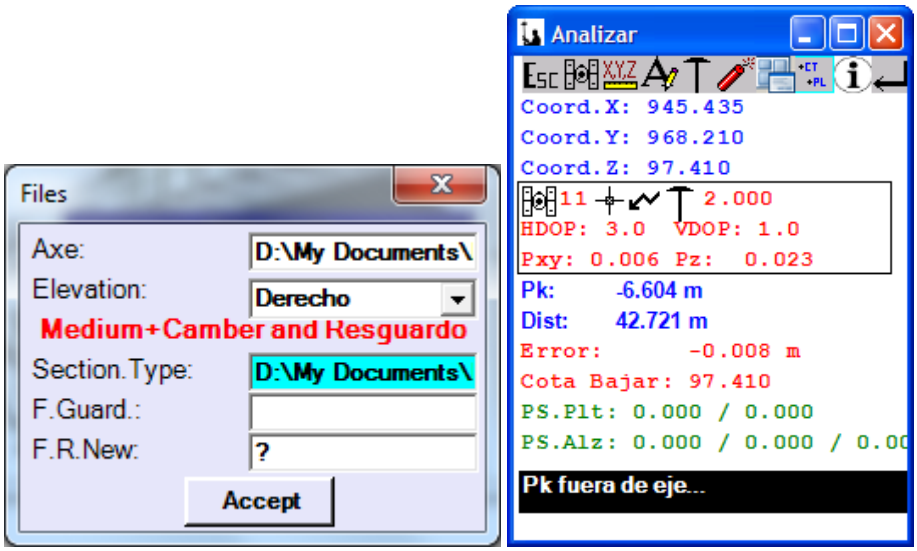


DIGITAL TERRAIN MODELS (DTM).

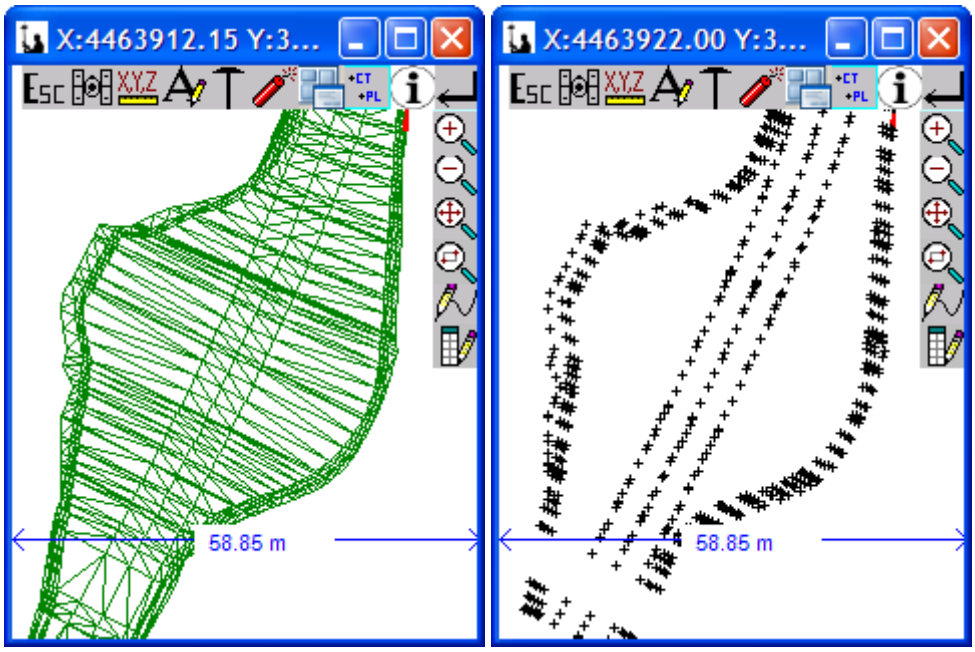
In the Menu "Imp" we have the necessary options for importing the DTM from the appropriate PC program. Once we have the DTM in our workbook we can visualize the DTM, zoom + and -, display the dimensions of the nodes, view the number of the node, etc..

We can take any point and the program displays its position, highlights the triangle it lies on and shows the increase in elevation needed to touch the plane forming the triangle.

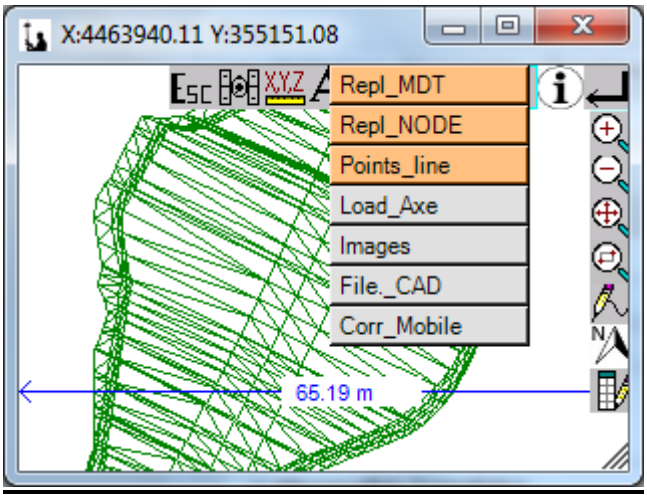
We can save the points being read, drawing them on the screen in the same way as in capture module. In this way we can have quality control and can also identify the area already captured and marked.

It also allows for staking out of an exact node by just indicating the node number.

We will be, in this case, redefining the coordinates x, y, z of the node. A line stakeout is also incorporated, selecting points from the digital model. In this case we analyze our actual position with respect to the line, but the stakeout is always referred to the theoretical value of the digital model at the position we find ourselves.



A number of new icons are included, whose functions are explained:



It displays a context menu where you can:

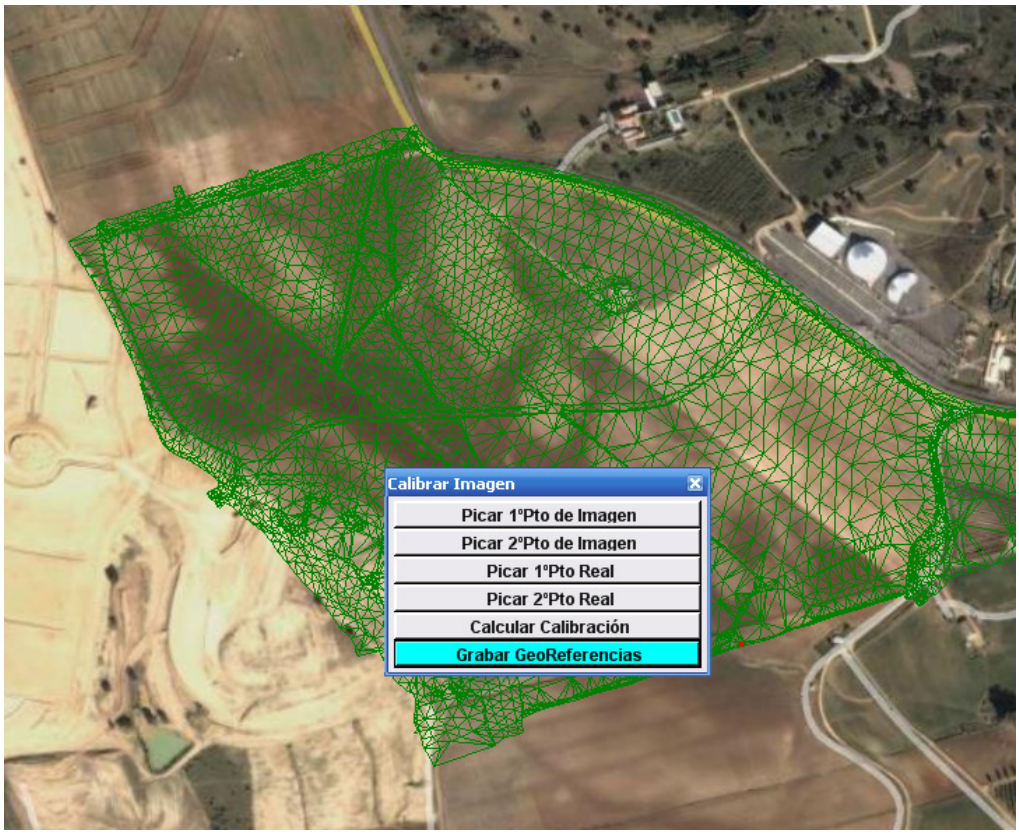
- **MDT Stakeout**: at any point in the digital model, we will have the increase in elevation relative to it. The triangle where we are located is highlighted in red.

- **NODE Stakeout:** is the same as point stakeout but in this case its an DTM node

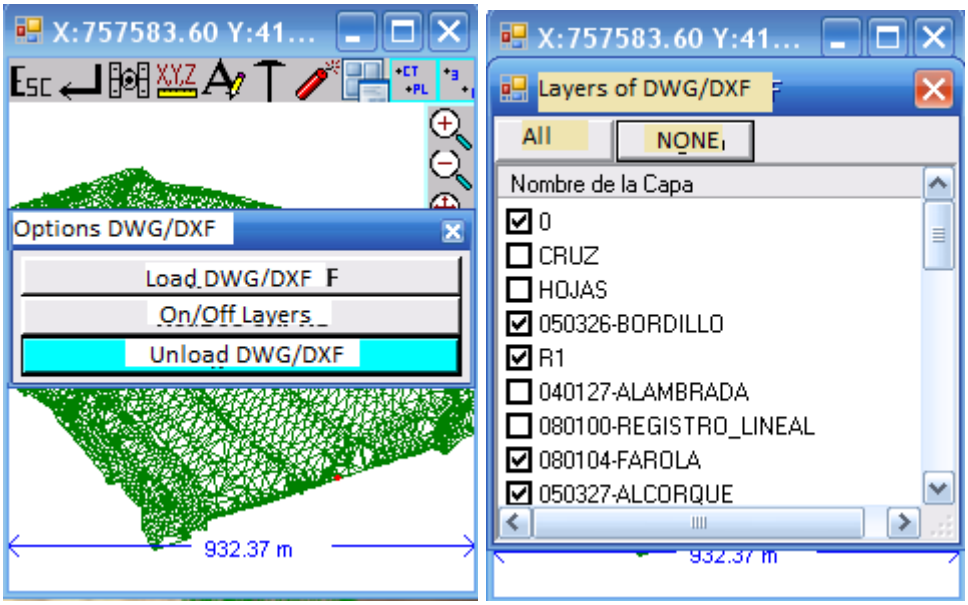
- **Points_line:** Allows you to mark two nodes of the DMT and analyze our position relative to the line while marking the MDT Triangle and the difference in elevation the triangle.

- **Load Axis**: we can load and draw an axis along the MDT. With the axis loaded we can go to "Stakeout MDT" option and automatically our position is analyzed with respect to this while the DTM triangle is marked where we are located along with the elevation difference to MDT. The Elevation axis is not used at all

- **Images**: We can upload, download and calibrate images in various formats (tiff, bmp, and jpeg). To calibrate the image, we would have to choose two common points for the digital model and the image itself. The procedure is simple and will be explained in more detail in the section on "Capture" "Coordinates".



- Use DWG/DXF: This is an option that we can upload / download autocad drawings in the above format, and also enable / disable layers to display or not.



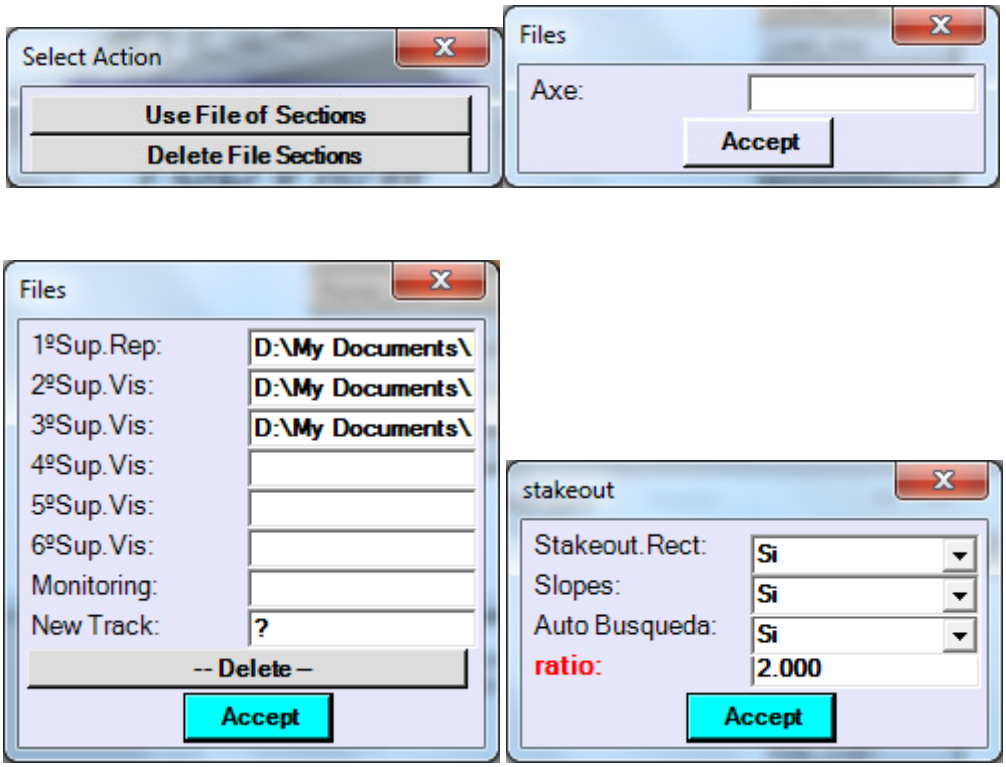
Fixed SECTIONS

with E.T.:

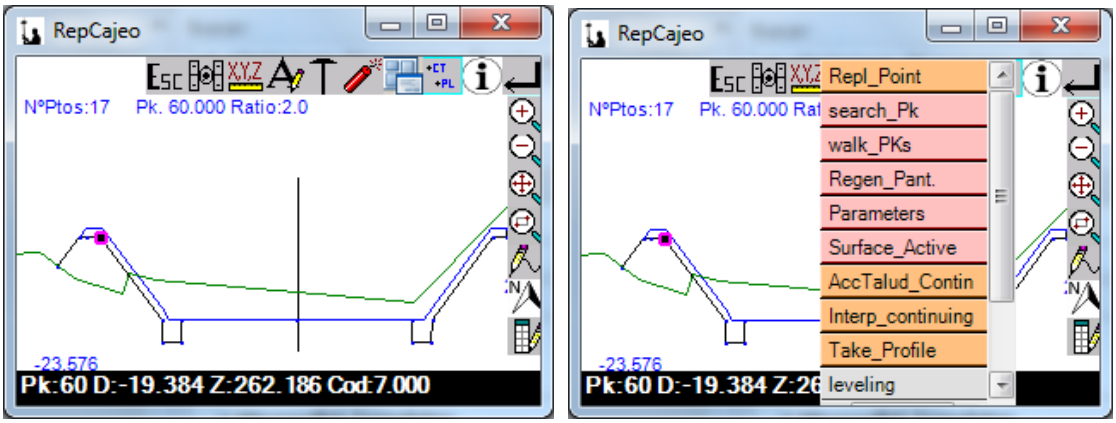
In this module we can stakeout any point of a cross section calculated in a PC programme such as Clip, Ispol, Sdr-Varin, etc., and imported into the corresponding option in the import menu. Likewise it allows storage of points read in a trace file for later export to your Pc and calculation of the monthly advance of the work. For any taken point, it allows for the calculation of the action to be taken to rectify the actual slope to reach the theoretical slope.

It begins by offering between deleting an existing file or use it to stakeout. The files are only created by importing them from the Pc.

Then it offers a display where we can indicate the names of the different files to load.



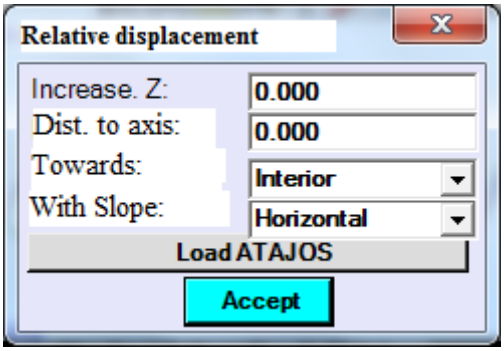
Then it will display the first Pk found in the file to stakeout.

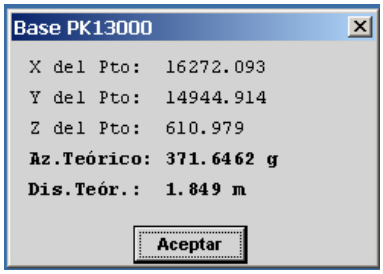


With cursors, we can move through all the points of the layout surface and when we have overcome the last point automatically move on to the next profile. We can do Zoom +-, settings with the pointer, etc..

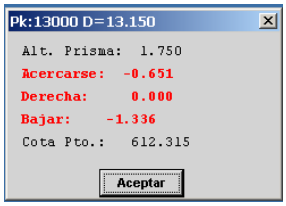
 We will have access to a menu of options:

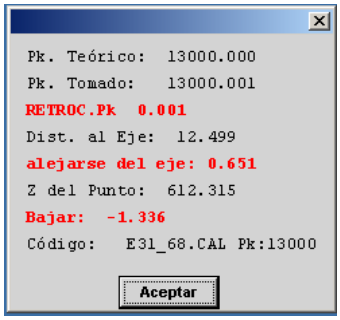
- Stakeout Point: We can stakeout the selected point from the current base with the cursor. It allows us to mark a setback on the profile for a distance towards the inside of the axis or to the outside of it, that follows a horizontal line or one of the slopes of the vectors that are supported at the apex, and on this new position, increase the height. It will show us the coordinate of the point to stakeout and azimuth and distance from the current database to the selected point. In "height to stakeout" offers you the default height that the point has in the file, but can directly place a distinct one or develop a mathematical expression such as "67.580 + 0 5" which would give the height "68.08" to stakeout. This is very useful for staking out parallel layers of heights, like the terrain blocks.





After taking a reading from the device the program informs us of the point with respect to the alignment with the base and the actions to take.

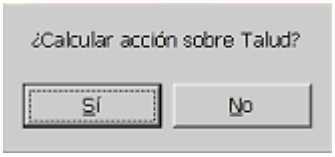


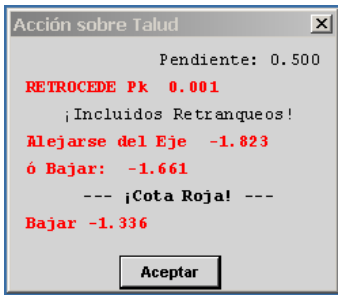


Afterwards, a cross shows the position of the projected point on the profile. Pressing a key displays the actual position of the point and the actions to be taken to position it correctly.

If we had opened a profile tracking file the program would ask us if we want to save the point.

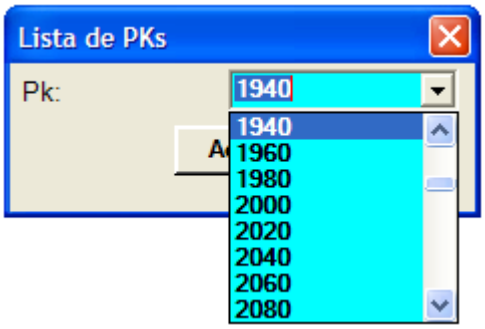
Then you are asked if you want to calculate the action to be performed on the slope. If we answer Yes, the program will tell us which movement we will have to do to put the point on the slope. This we will see in the bottom right of the screen. When these relative increases are zero we will be on the theoretical line of the slope.





The process ends with the question of whether we want to stakeout another point or continue with the same one.

- **Search PK**: We can move directly from one profile to another by pressing the up or down arrows, or we can search for a particular PK by clicking on the "Search" option and choosing from the list of all Pks included in the file stakout.



- **explore Pks:** We can explore profiles displaying them on screen until the end of the file is reached or press ESC.

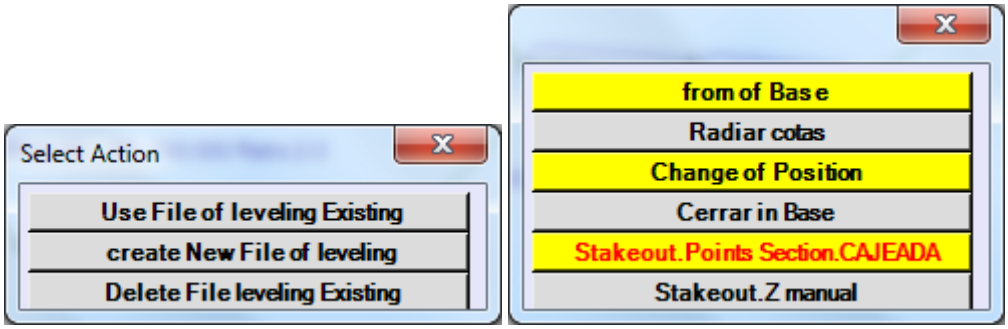
- Regen_Screen.: You can clean the screen of the points not saved and display the stakeout option.

- Parameters: such as the ratio (height/width) and others.

- Surface_Active: here we can choose the surface that we will stakeout if we want to change it.

- **Capture Profile**: allows us to take a transversal and save it as a surface. If we know the position of the profile in the field (because we have reference stakes) we can capture directly the profile points and record them without having to choose the theoretical stakeout point for each reading, and even calculate the action on the slope without having previously chosen the theoretical top and bottom points of the slope, as the program searches for the vertical point captured and which vectors to use for the calculation of the action (even though we have chosen to stakeout the point on the opposite side). Undoubtedly, it is a quick and convenient way to make tracking profiles for monthly reports while stating corrections on the slope shoulders .

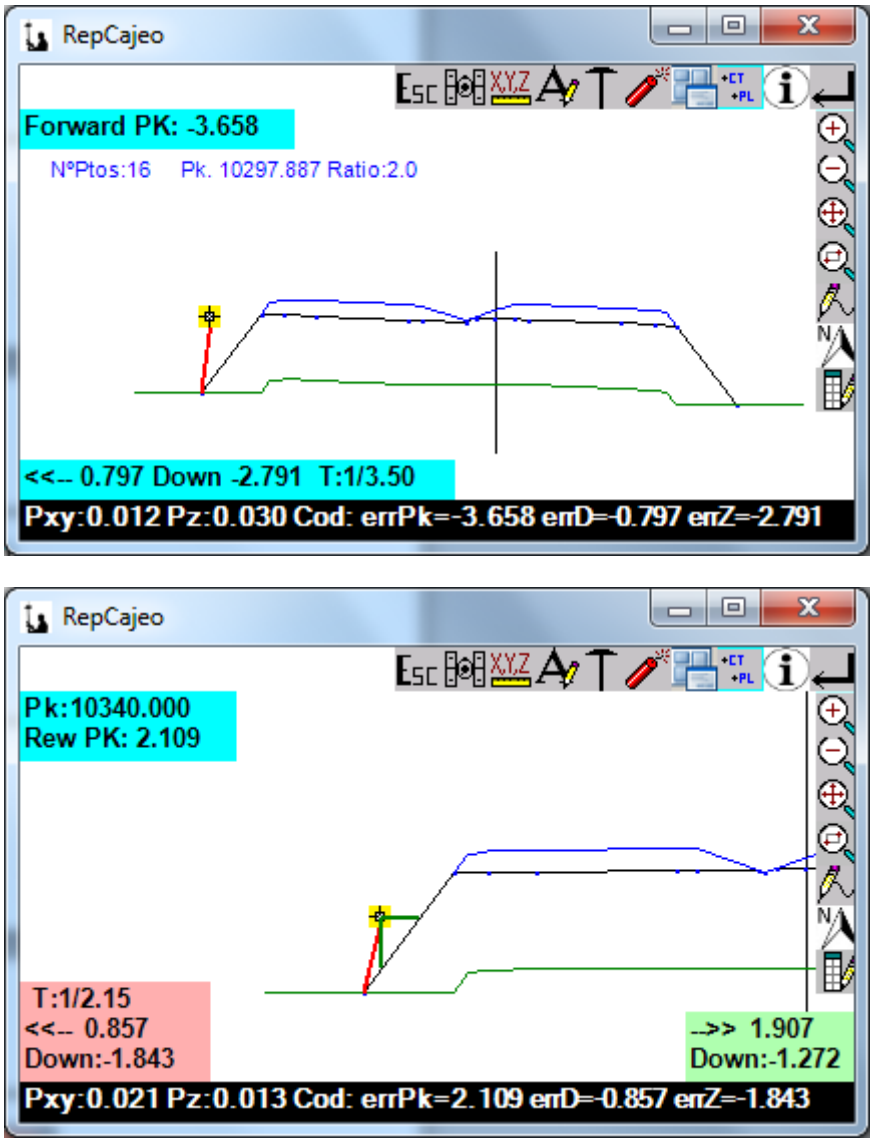
- leveling: This option is designed to use a conventional geometric level with the sight and based on the data we have in the software, we can stakeout any point of the section without taking papers to the field.



with GPS:

The difference between E.T. and GPS in this module, as in all data collection, is the omission of the readings of angles and geometric distance of incoming coordinates from the GPS receiver along with their parameters of Hdop, Vdop, XY accuracy, accuracy in Z, etc.

Along with this difference, we must also note that the coordinate entry occurs every 0.2 seconds which continuously updates the cursor representing the position of the GPS-Mobile, with which we can see our position on the working section and move towards the desired point in a graphical manner.



The image at the top shows the stakeout of a 1 meter recess towards the outside point following the slope of the previous item, and without any increase in additional height. The red line shows the way to continue from our position and the position of the point we want to stakeout.

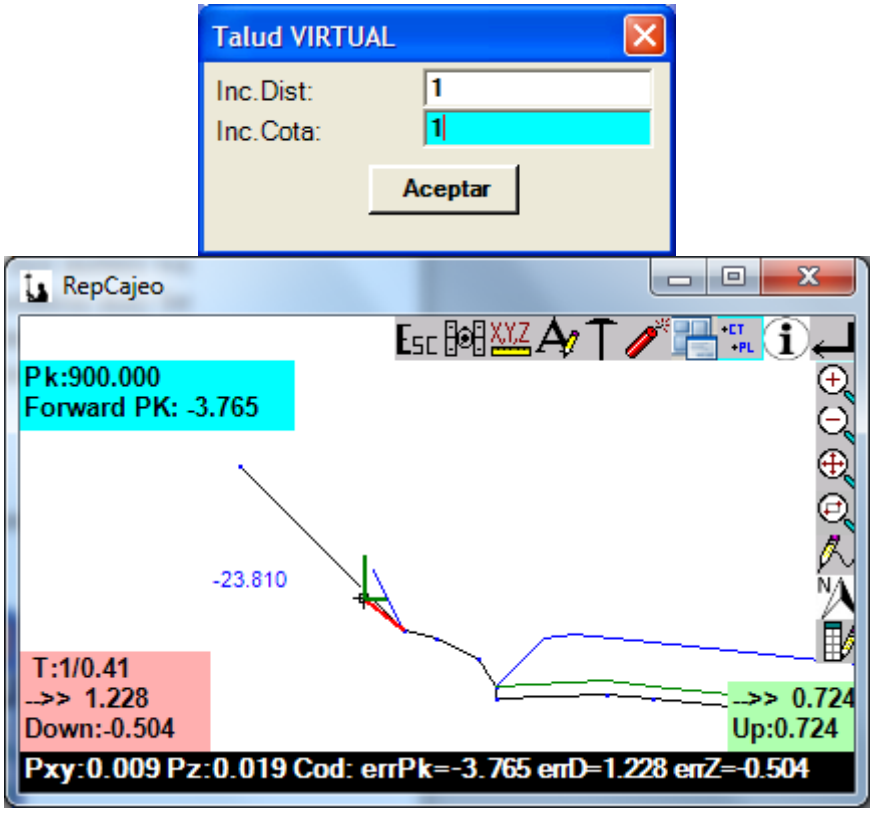
The image below it shows both the stakeout of a theoretical point without setbacks and the "action on slope". This "action on slope" processes Horizontal and Vertical movements that we would have to do so that our position sits on the vector under our vertical. Therefore these components may change dramatically depending on the vector that is under us, basing the calculation on different vectors as we move.

The size of the cursor will change between small when it is in High Precision, medium when it is Floating or medium precision, and big when it is in Navigation mode. Also the display shows the differences between the theoretical profile Pk and the Pk where the GPS antenna – Mobile is, and the differences between the distance to the axis of the theoretical point and the point where the GPS-mobile is, as well as the movement to make to reach the correct position. Movements to be carried out are therefore "move forward or backward in PK" and "zoom in or out from the axis".

You can check the status of satellites and Pdop, batteries, etc... by clicking on the corresponding icon. We can also change the height of the antenna GPS-mobile or code point, or change precision tolerances or frequency with which we read points.

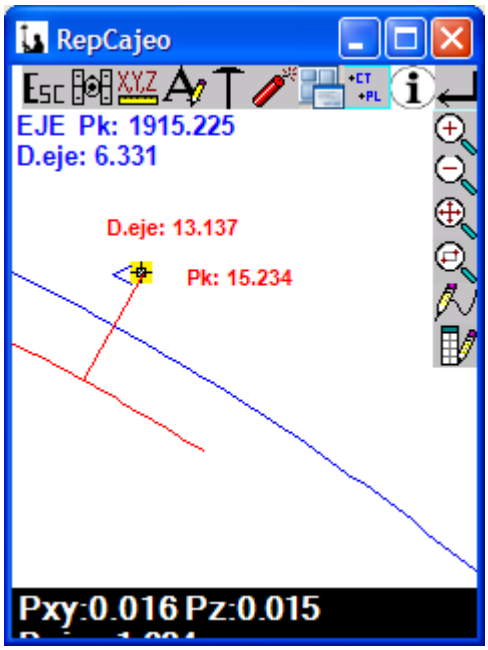
A new option "Continuous Interpolation" is included to stakeout any profile that is not found in the listing that appears with "Search Pk". We are asked how many metres we want to interpolate. Keep in mind that the result of this interpolation can be misleading in transition zones with complex sections, where we go from a number of segments per section to another. That is, it is a good option, knowing the precautions to take, not only in TopView, but in any PC program.

- Virtual slope: allows us to define a vector from the active point of the section and can be cut or filled inwards or outwards.



In this example we have defined a vertor 1/1 that starts at the ditch and is more sloped than the original (1/0.5), if we move until the data at the bottom right is ZERO we are at the intersection of the Virtual Slope and the ground.

- Stakeout Points Inline: Based on two points of the drawing that may be from the same Pk or a different one we are shown a drawing on the ground with the axis and the line formed through these points drawn. On these two lines is made an analysis of our position on axis and the line of the points


RepCajeo
EJE Pk: 1915.225
D.eje: 6.331
D.eje: 13.137
Pk: 15.234
Pxy:0.016 Pz:0.015

SECTION TYPES

In this module, its operation is identical to the staking out in Fixed Sections with the only difference being that instead of choosing the 1st surface to stakeout, we choose Section Type to stakeout.

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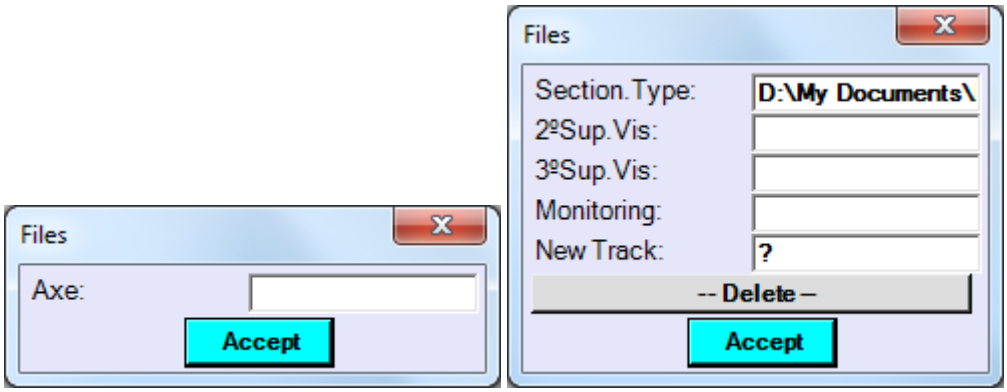
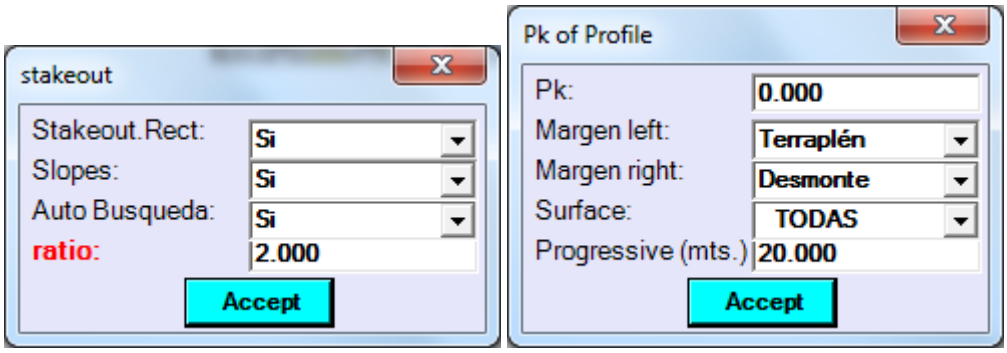


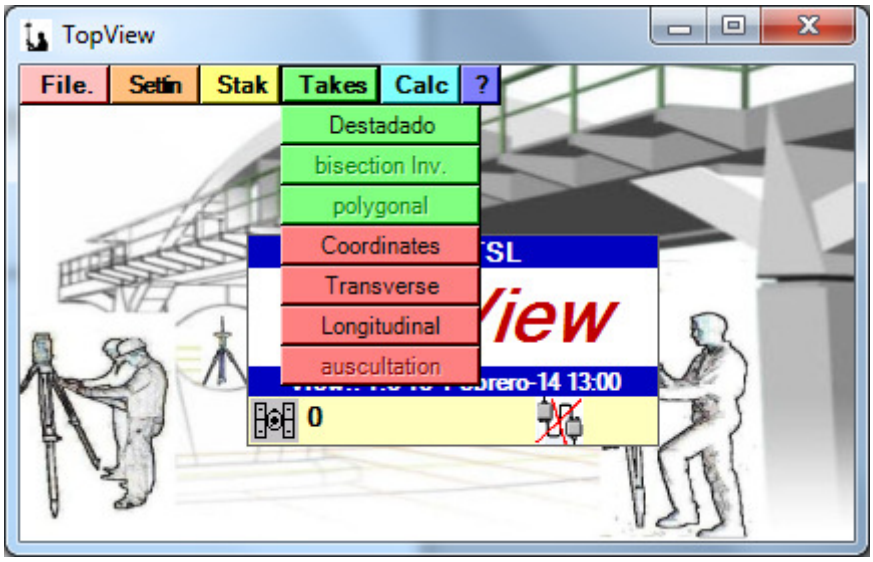
In contrast to the module of Fixed Sections here there is no file containing all the PKs already calculated, but the program will generate a file with the Pk and the slopes (remove or fill) that we specify. Cutting with the actual terrain will be found with the option "Action on Slope" and the decision whether it corresponds to cut or fill at each of the banks is ours, although it is quite clear that if the point taken in the field is drawn on the screen below the slope then we must apply Cut, or Fill otherwise.



Otherwise it behaves exactly like the previous module.

Note that to be able to load the imported Fixed Sections from the corresponding PC program (Clip, Cartomap, MDT, Ispol, etc ...) we can check if the lines that define the Section Type and the fixed lines overlap, then we have a well-defined geometry for the Work, and if not we can find out where the differences are and evaluate them. Once we decide it is fully defined we can delete the Fixed Sections files to free memory for other purposes.

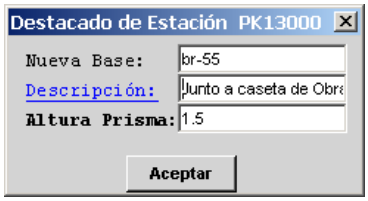
TAKES MENU (Capture)

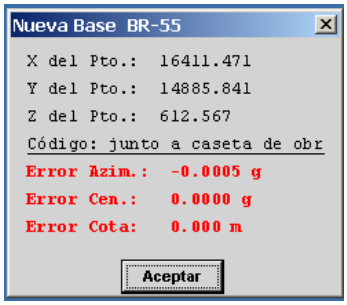


The options in this menu cover most operations involved in field data capture or a following data analysis

Featured Base(Destacado):

This section allows you to highlight or position a new base from the base where it was positioned, logging to a designated bases file.





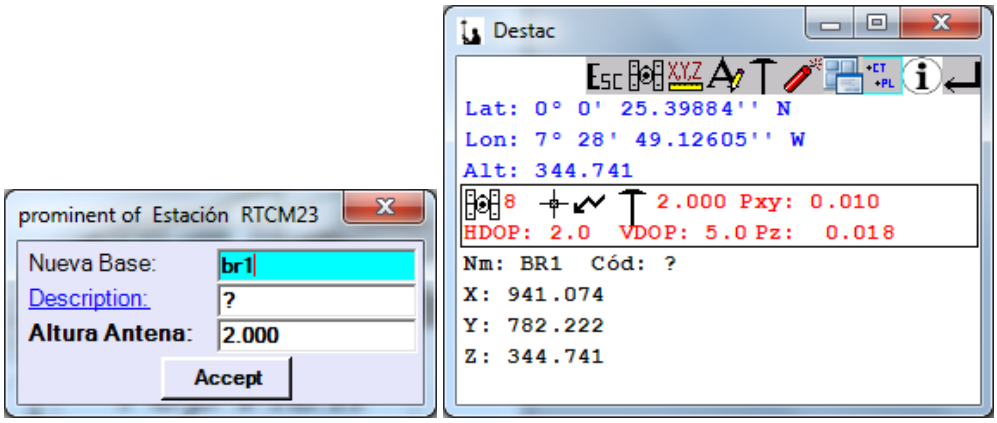
It should be noted that for greater accuracy of the data from the new base, two readings **(direct and reverse)** are taken.

The compensated readings can be recorded in a backup file along with its coordinates, just like in a file.

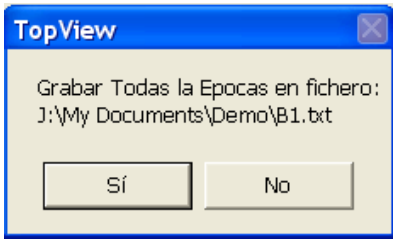
With GPS:

It begins by asking us if we want to capture the bases in XYZ or Lat.Lon.Alt. Then we're asked if we want the Cartesian of the Datum selected or in Local Cartesian based on the chosen SCL.

If the base exists and we're going to use the reading to process the SCL, we must choose "Bases in LLA". The difference between E.T. and GPS in this module, as in all those for data sampling, is the omission of the readings of the angles and the geometric distance for the Geographical and incoming Cartesian coordinates from the GPS receiver along with its HDOP, VDOP, precision XY , Z accuracy , etc. parameters. Beside this difference we must also note that the coordinate entry occurs every 0.2 seconds and we must press ENTER or ESC to stop data entry and capture the latest data to save as a result.

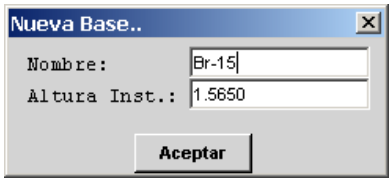


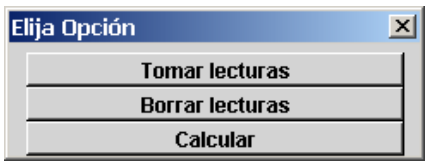
Next, if we have configured the program to get more than one range of readings, we are given the option to save the file, as shown:



Reverse Bisection: (E.T. Only)

This section allows the setting of a free base, using two or more known bases which capture coordinates into an existing file, and the results are written to the same file.

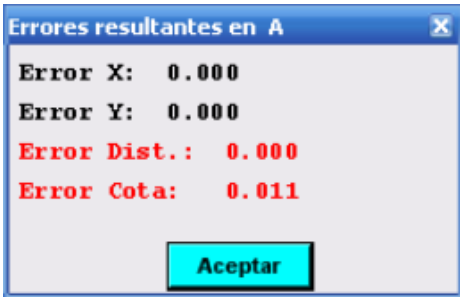


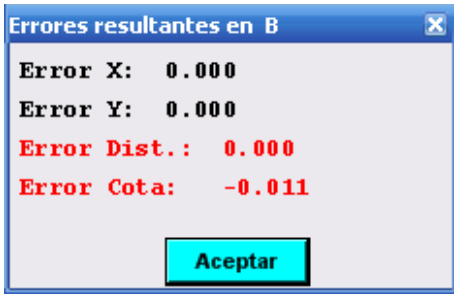


For a greater precision of data from the new base two readings are taken (direct and reverse). The order of the readings is of free choice, with the program being responsible for accurately positioning the new Calculated Base.

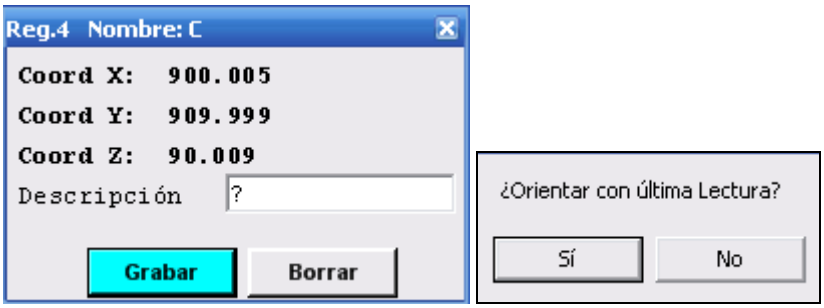
The program first calculates the errors between the coordinates read from existing bases and the coordinates stored in the file.

Later, it shows the errors resulting from the calculation with the bases..





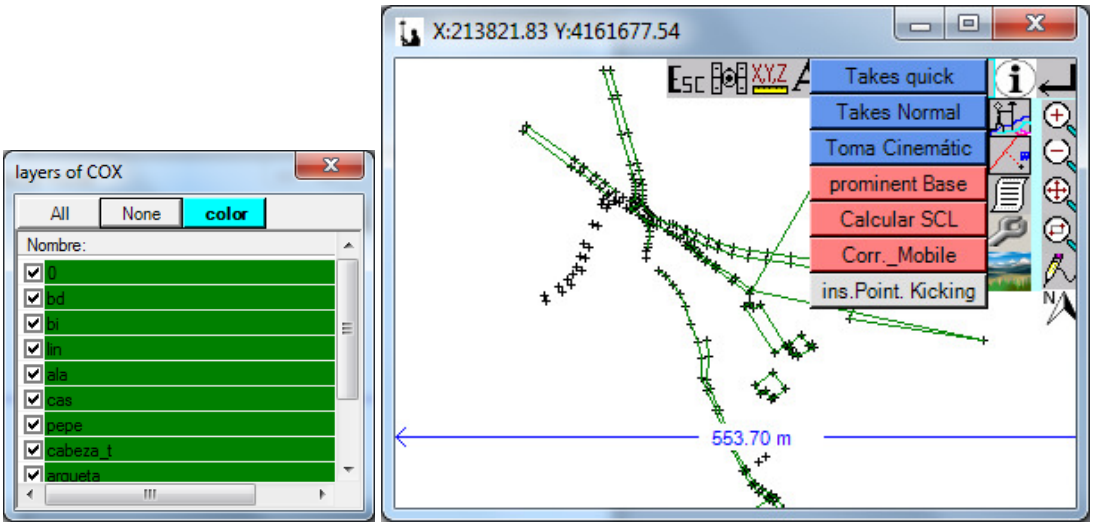
It then shows us the results to decide whether to save it or not. Then it asks us if we want to stake the last reading or if we want to save it in a comments file.



Coordinates:

This module allows both data collection as a tachimeter or the stakeout of previously taken points, imported points, DXF / DWG, Fixed Sections, Standard Sections, Areas, and others. ***This is the most complete and powerful module in the program.***

The first thing we have to load is a code library that can be edited and changed according to user preferences. You can even create multiple code libraries. When we open a coordinates file the program shows the layers, allowing us to enable or disable those we want and so accelerate the redrawing.



 Clicking this icon opens a pop-up menu with the following options of **"Points Capture"**:

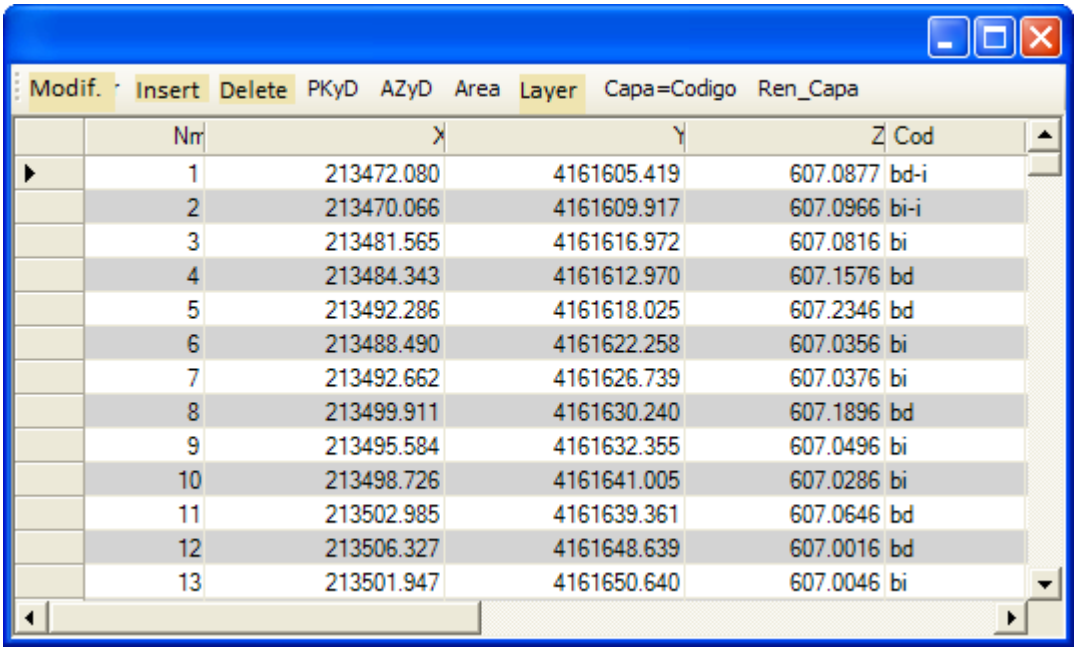
The "**Quick Capture**" option allows us to perform a quick reading of a point.

The "**Normal Capture**" option is the same as the previous one, but once taken, the point is shown on a screen where we can change the code, height, etc.

"**Moving Capture**" allows us to take a reading with Time, Distance, or Touch so that the program stores points automatically as the defined parameters are achieved.

An example of how the field codes should be taken so that exporting in DXF format gives us a fully elaborated map.

To start generating code for a line we must use the start sequence code "-i". This is, every time we record a point in the field from which a line starts it must be composed of the line code and the start sequence code, if the line is the slopes head and the line start code is "-i" and must be recorded as "ct- i". When the line finishes and we then want to use this code again, we simply begin the line with the line code and start sequence "ct -i". At any one point you can start up a maximum of two lines (eg "ct-i pt-i") and this may contain infinite lines of code (eg " ct-i pt-i to well t", point where the slopes head and foot start, which is also a Well and Power Line post)



Nm	X	Y	Z	Cod
1	213472.080	4161605.419	607.0877	bd-i
2	213470.066	4161609.917	607.0966	bi-i
3	213481.565	4161616.972	607.0816	bi
4	213484.343	4161612.970	607.1576	bd
5	213492.286	4161618.025	607.2346	bd
6	213488.490	4161622.258	607.0356	bi
7	213492.662	4161626.739	607.0376	bi
8	213499.911	4161630.240	607.1896	bd
9	213495.584	4161632.355	607.0496	bi
10	213498.726	4161641.005	607.0286	bi
11	213502.985	4161639.361	607.0646	bd
12	213506.327	4161648.639	607.0016	bd
13	213501.947	4161650.640	607.0046	bi

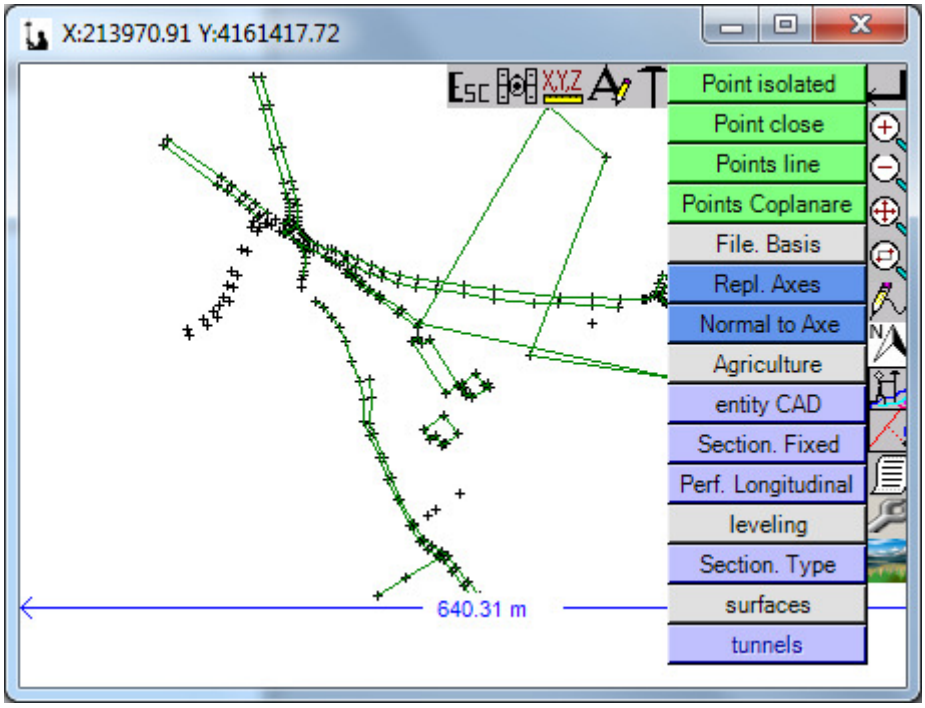
The "**Featured Base**" option allows you to capture a new base for this module, as in the Highlighted Base option but also allows you to record the Base as a tachimeter point where the code is "Highlighted Br1" if the new base is called "Br1".

The "**Calculate SCL**" option gives the option in this module to perform a coordinate transformation or adjustment. The details of this process will be explained in "Calc"
"Local.Coord.Syst SCL". The difference of doing this here is that you can use COX points or DXF / DWG as calibration points..

The "**Mobile Corrections**" option enables the function already explained with COX points or even points of DWG / DXF if we had them loaded.

The "**Insert Points by Clicking**" option can insert freehand points by clicking on the screen.

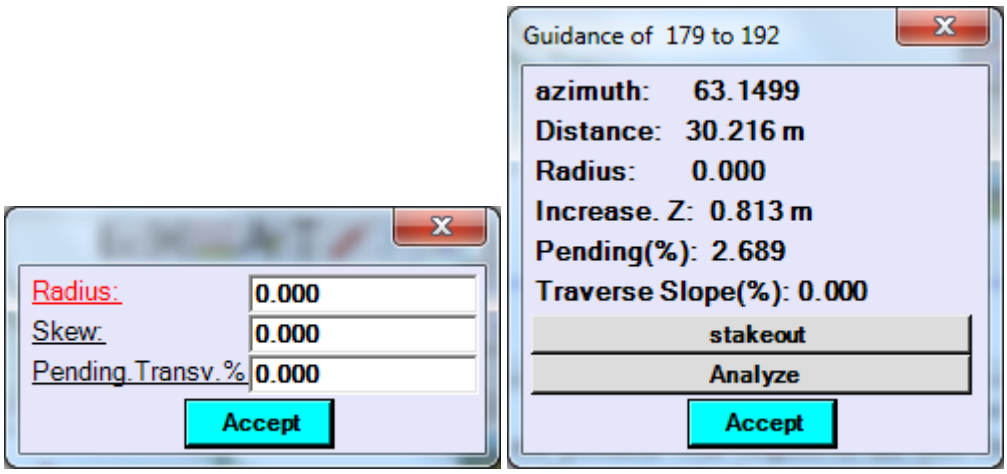
Clicking this icon opens a menu with the following layout options (**Stakeout**):



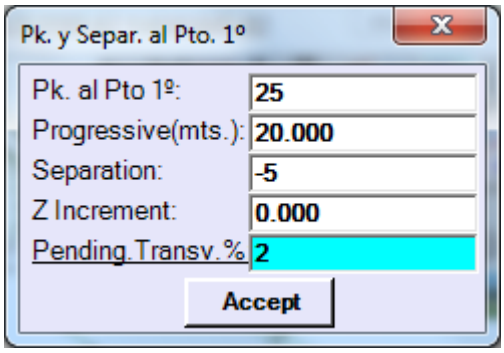
"**Isolated point**" option allows to stakeout any point. The point can be clicked on screen or be inserted from the list of coordinates. We can either choose, by clicking the icon, entering a stakeout to the north, to the point or base. We can also increase the height of the target point.

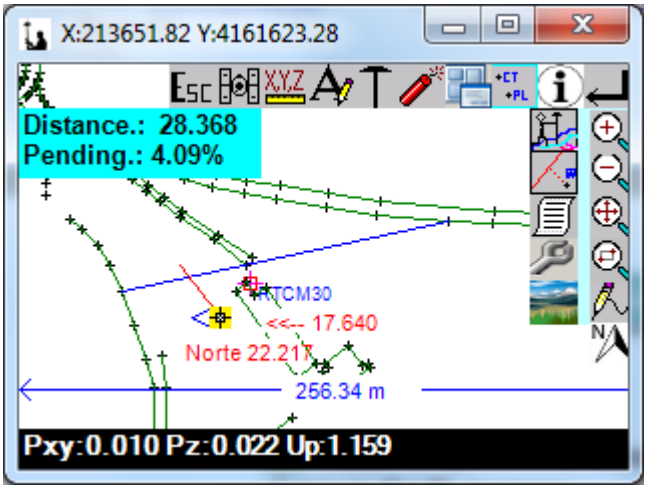
With the "**Close point**" option, the program calculates the nearest point to our position and may stakeout a set of them in a very comfortable way because it automatically changes the stakeout point as we approach another.

In "**Line Point**" allows both the stakeout of a Pk and offset or analyze our position relative to the axis formed by two points. With the selected points we can define a straight line or an arc between them, also a skew on point 1, and a transversal slope as a pumping position or slope.

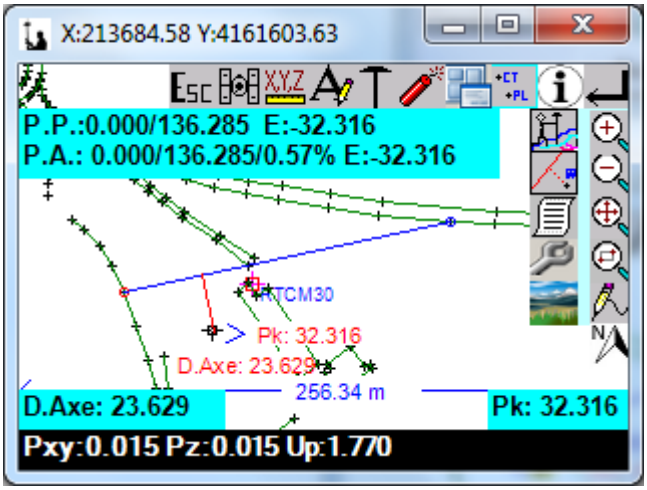


A.- Stake: Requests a Pk, distance to the axis, Z increment, transverse, and progressive slope as the Pk increases.



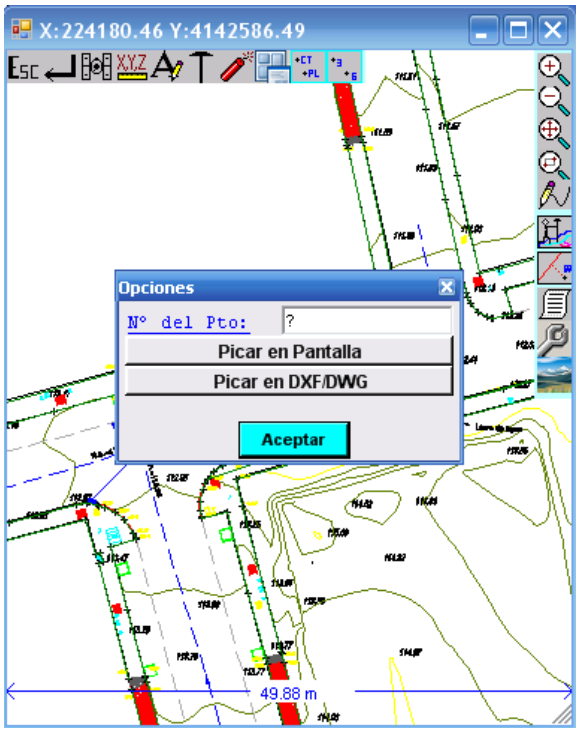


B.- Analyze: Does not request anything and directly analyzes our position with respect to the line showing the following information:

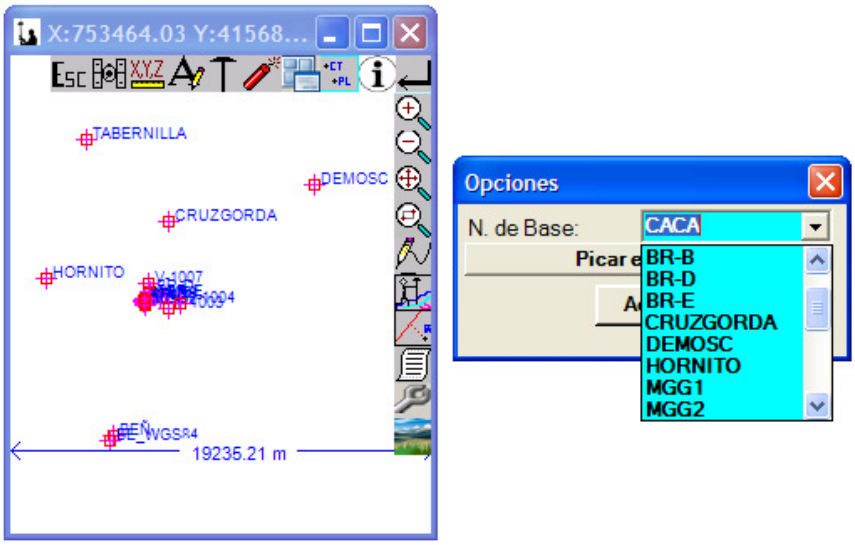


In "**Coplanar points**" after marking three points that define the plane the program draws the triangle from these three points and shows our position along with calculating the increase to reach the plane, when we're inside or outside it.

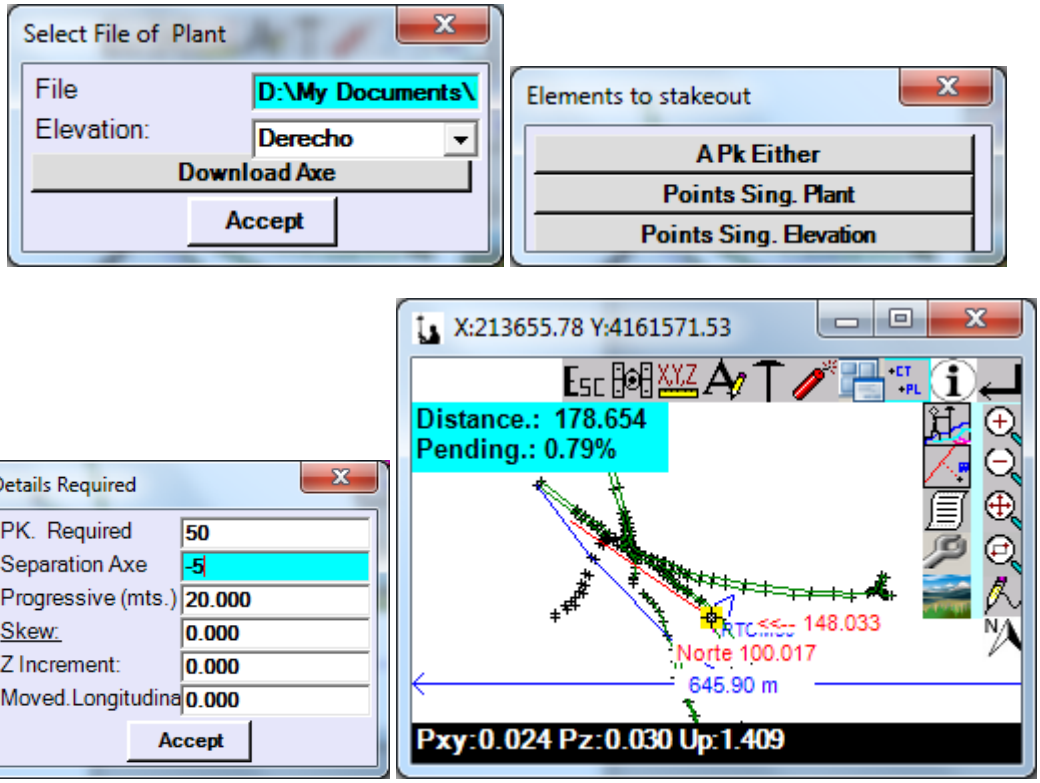
In these last three modules, if we have loaded an autocad drawing (dxf / dwg) we also have the option of selecting drawing entities, as shown in the image:



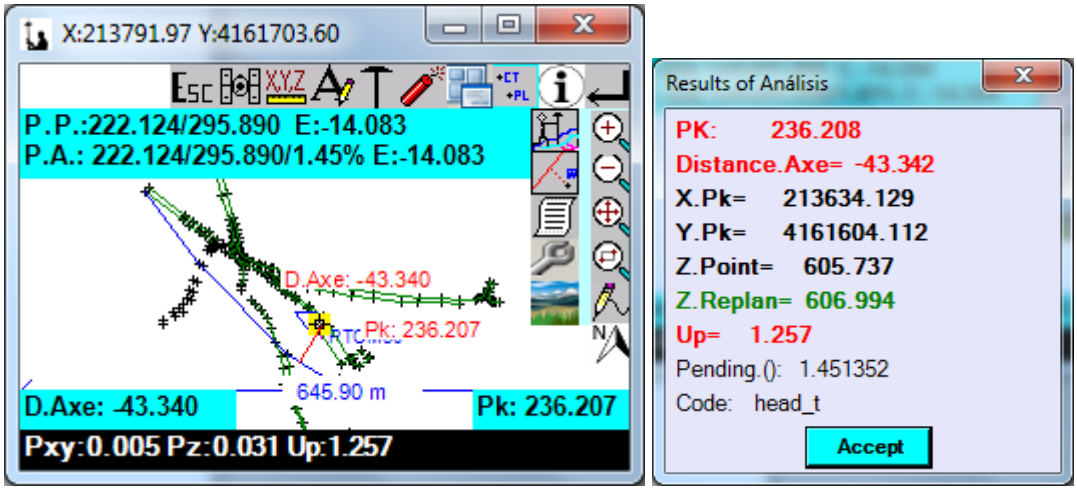
In "**File Bases**" the program requests the loading of a Bases file and runs a Zoom Extension to display them all onscreen. Afterwards we are asked to select the bases that we want to stakeout and from now on it behaves as in "Isolated Point Stakeout". The drawing of the base differs from the working points in that the crosses are bigger and have a box in the centre.



"**Axis Stakeout"** allows loading and drawing an axis along with all other entities, and after requesting the choice of Pk and the displacement we want. Behavior is similar to "Isolated Point Stakeout". The arrow indicates the direction of our movement.



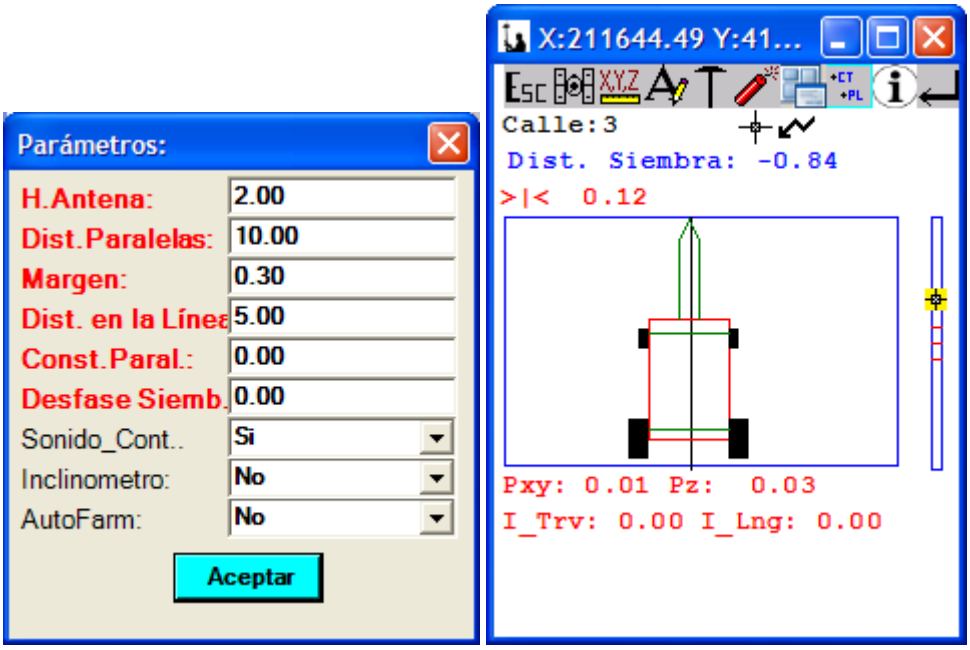
In "**Perp to Axis"** after loading, the program draws the normal from our position to the axis indicating the Pk and calculated displacements. The arrow indicates the direction of our movement.



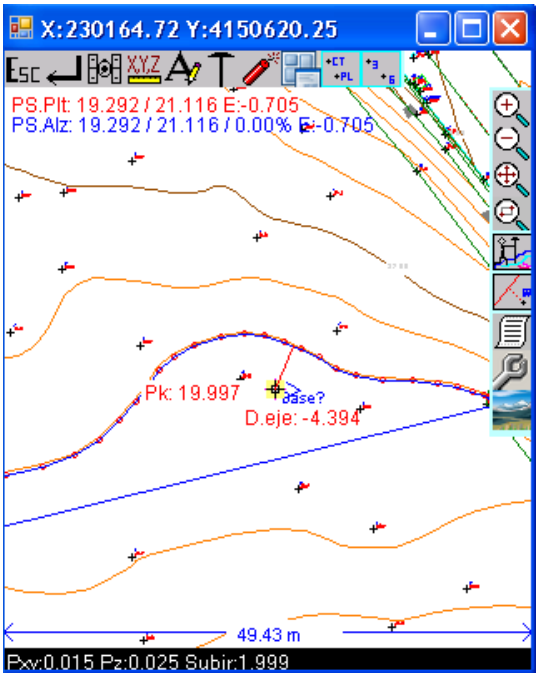
At the end of the process we can record this point in the current working file, and it will be in the "Control Point" layer.

"Agriculture" is used to stake / row sowing for crops with the appropriate machinery. The first thing the program asks us is to choose two points which serve as the

reference for planting. Then come a series of parameters whose values must be entered by the user according to their planting design, which has previously been chosen.

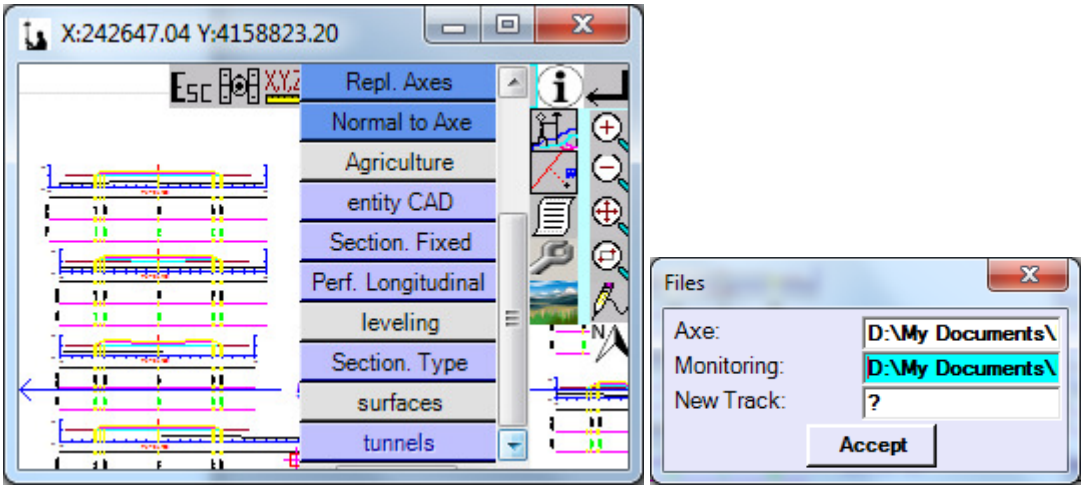


In "**DWG entity**" we can click on any cad entity, and the program automatically converts it into a temporary axis, and we can analyze our position relative to it. For the picture shown below, the entity chosen is a poly line, namely a standard curve.

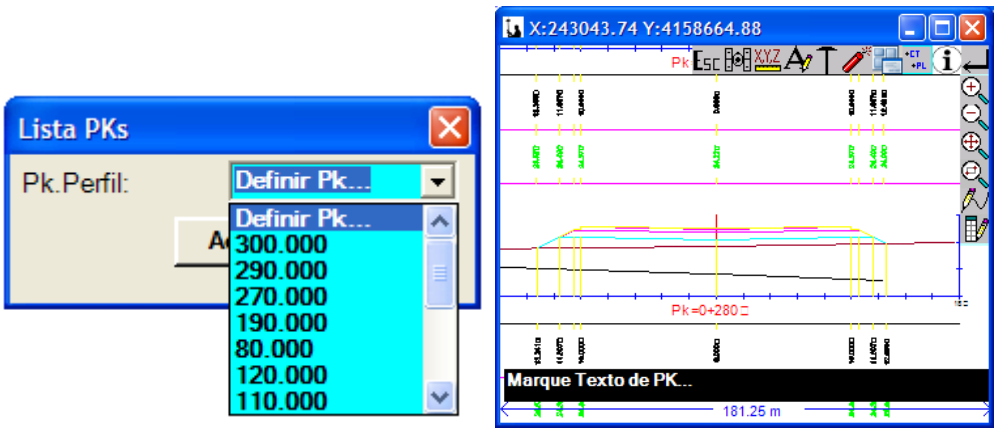


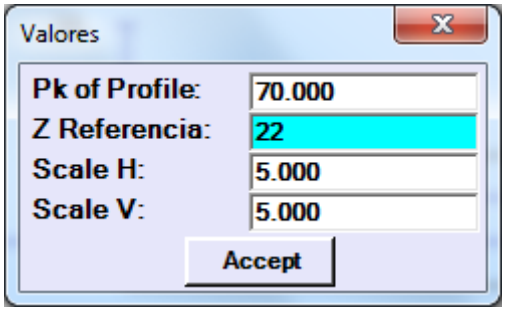
It is a very useful option in certain jobs (Staking boundaries, expropriations ...).

In "**Fixed Sections**" we need to first load a CAD file with the typical cross-section profiles for drawing a road, which usually come every 20 meters as shown in the picture.

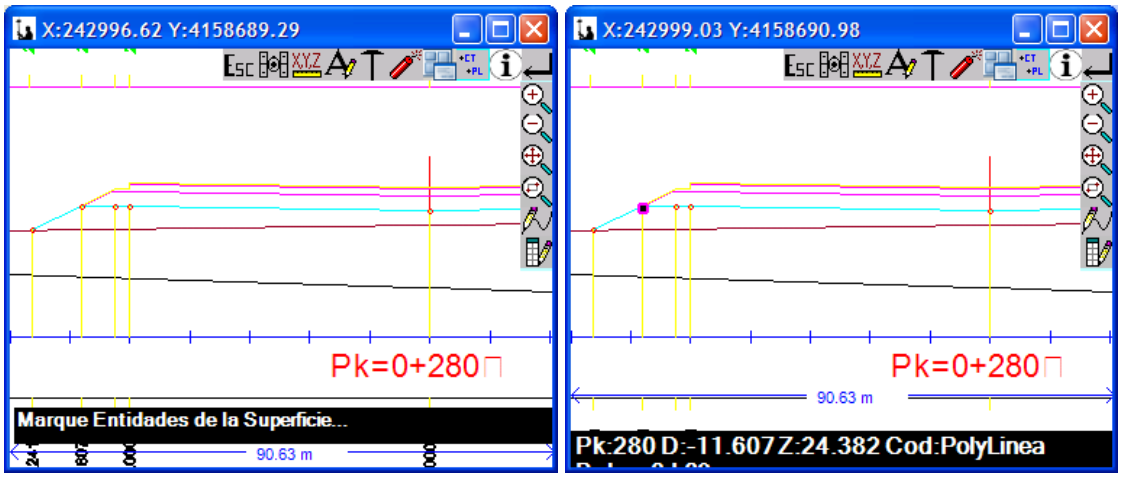


After we choose a file with base and height axis, and then we select a previously defined Pk or define a new one. As we can see in the first image, the file loaded doesn't have valid coordinates to work with and so we have to define the entities which allow us to place the drawing in this position and resize it to work with elevations, just as we do in "Fixed Sections" in the main menu for "Stakeout". To do this we have to indicate the CAD-text entity which shows the PKs profile, the vertical line that defines the position of the axis, the horizontal line which gives the height reference, the text reference....

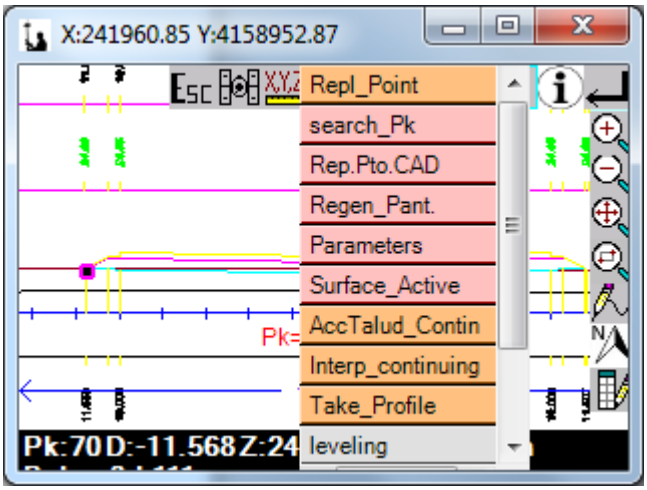




... afterwards we are shown this window where we can edit these values and also define the Horizontal and Vertical Scale in the CAD drawings.... and finally we are asked to select the lines
that define the work surface…

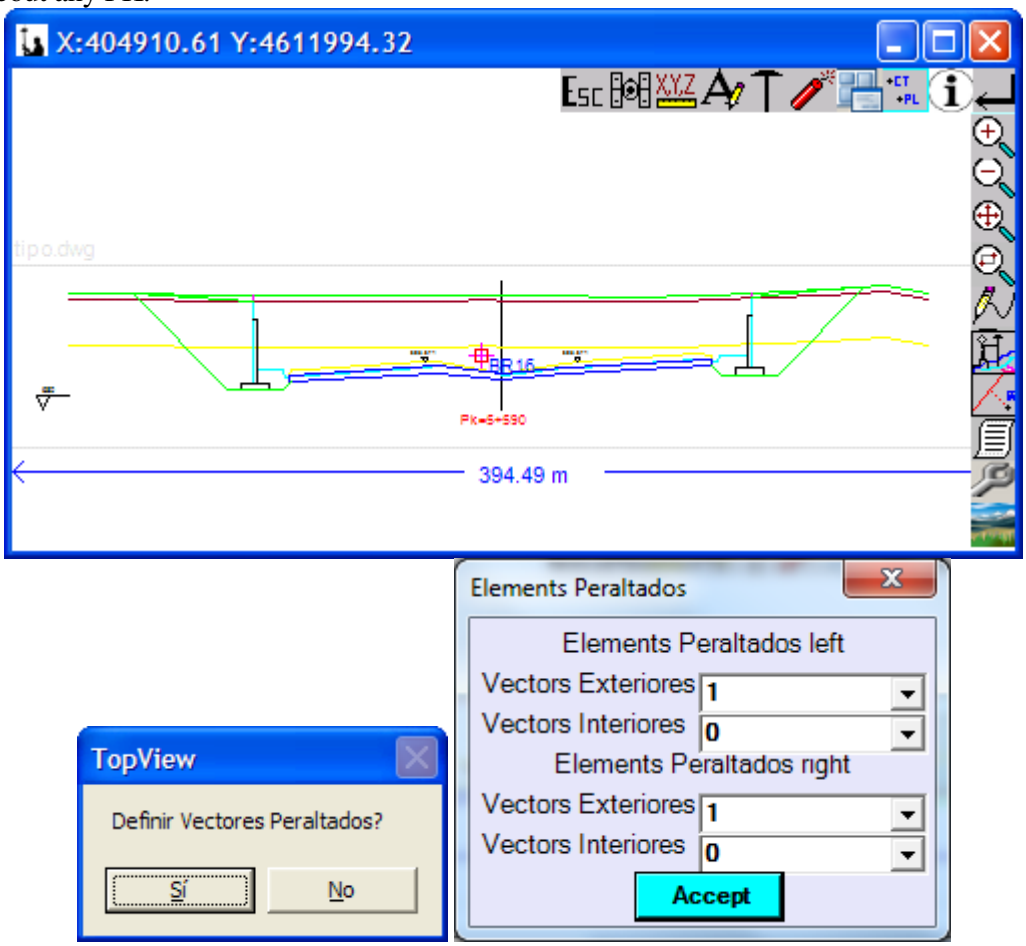


Starting from here already we can move through the section and stakeout any point. If you click on the icon  you access the same menu that we have already explained in the section "Menu Repl" - "Fixed Sections".

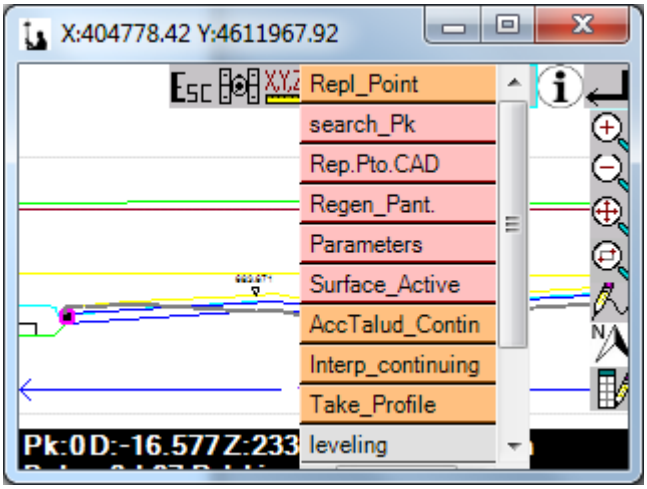


... with the only difference that the second option is "CAD Point Stakeout" that allows you to choose any CAD entity and stake it out in this environment. It is useful if we have elements such as retaining walls, footings, pipes, drains, etc ...

In "**Standard Sections**" the operations are the same as the section just explained but in this case with the AutoCAD drawing loaded we only use a Standard Section template to stakeout any PK.

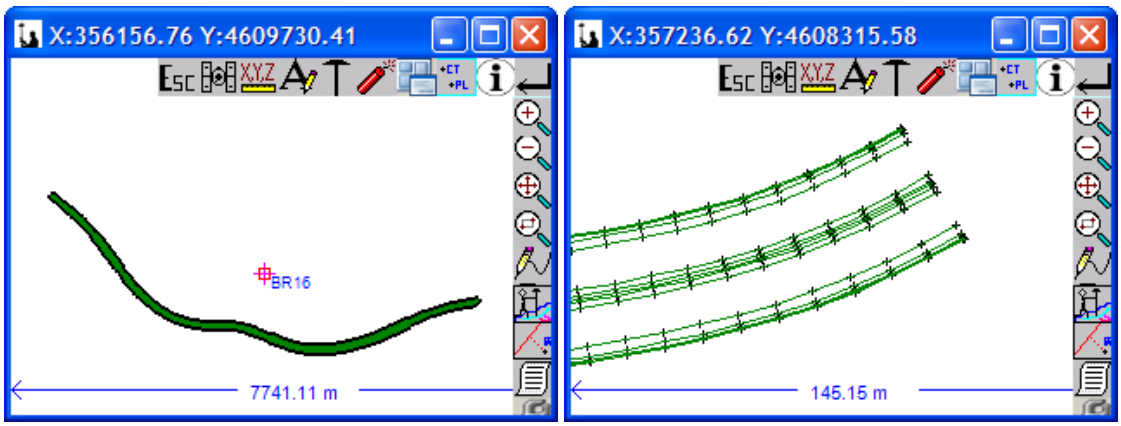


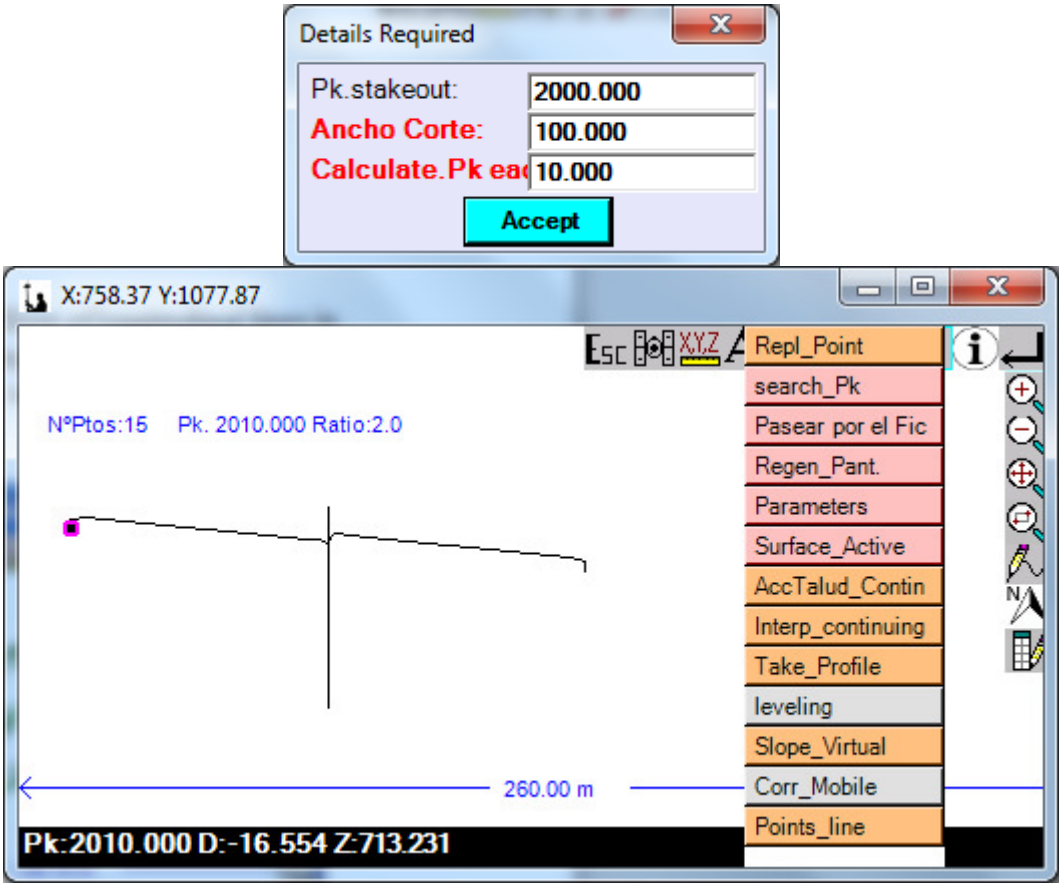
After defining the axis entity and the entity which defines the reference coordinates position, we are asked to select the lines that define the surface of the section and if we want to define camber vectors within those entities we can click on each side of the first cambered section. In this last window we specify how many vectored sections will be influenced by the camber table.



From this definition, the program marks a thick grey line which is the new definition of the surface according to the criteria defined by the cambers and axis. If you press on the icon  you access the same menu that we have already explained in the section "Stakeout Menu" - "Fixed Sections".

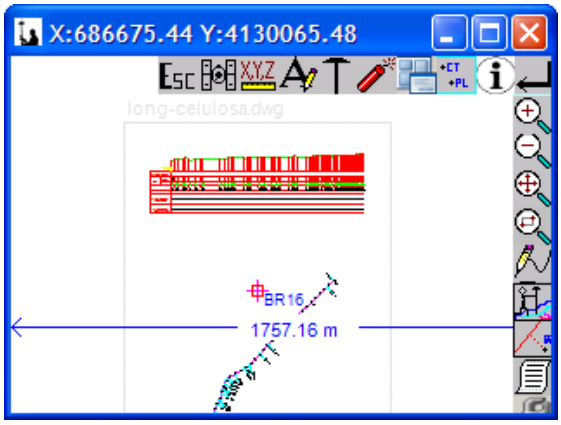
In "**Surface**" starting from a COX file containing the 3D drawing plan of longitudinal lines that define a road or similar geometry, we can, after loading the corresponding axis, generate cuts and stake it out, as we did in Fixed Sections.

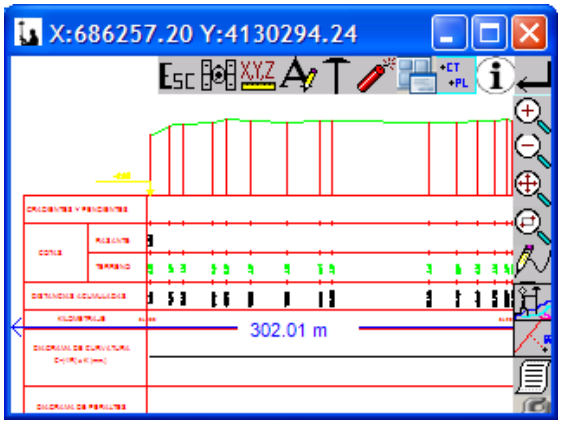




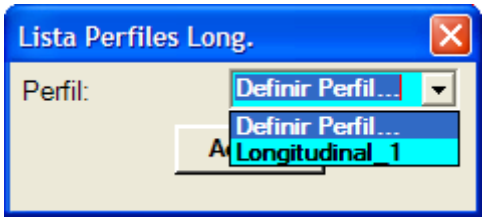
If you click on the icon  you access the same menu that we have already explained in the section "Stakeout Menu " - "Fixed Sections".

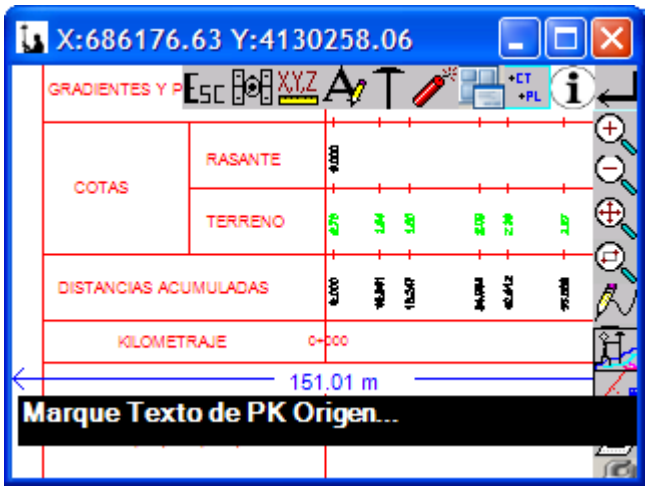
"**Longitudinal Profile**" is based on a loaded CAD drawing file containing a longitudinal profile that can be used to stakeout any point from the drawing or profile.

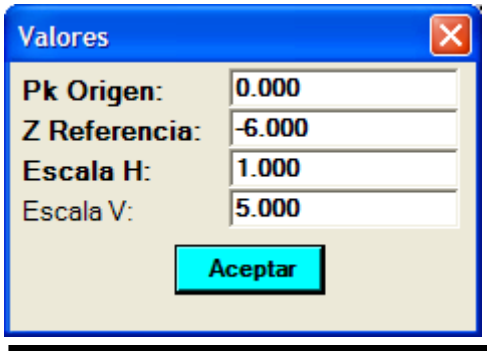


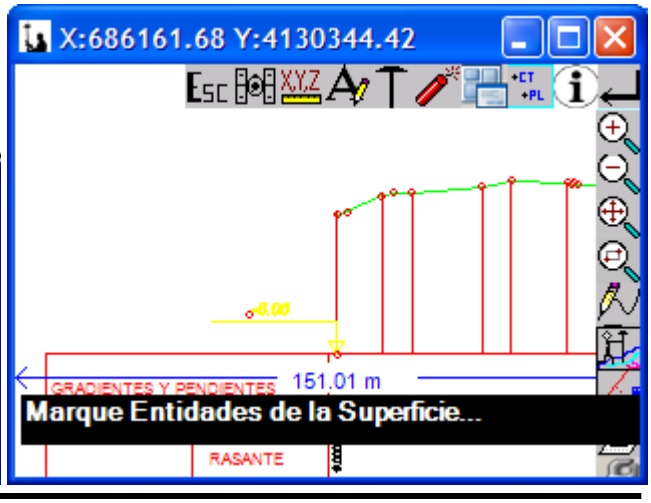


To do this we must select the entities that represent the Axis, and work surface ....





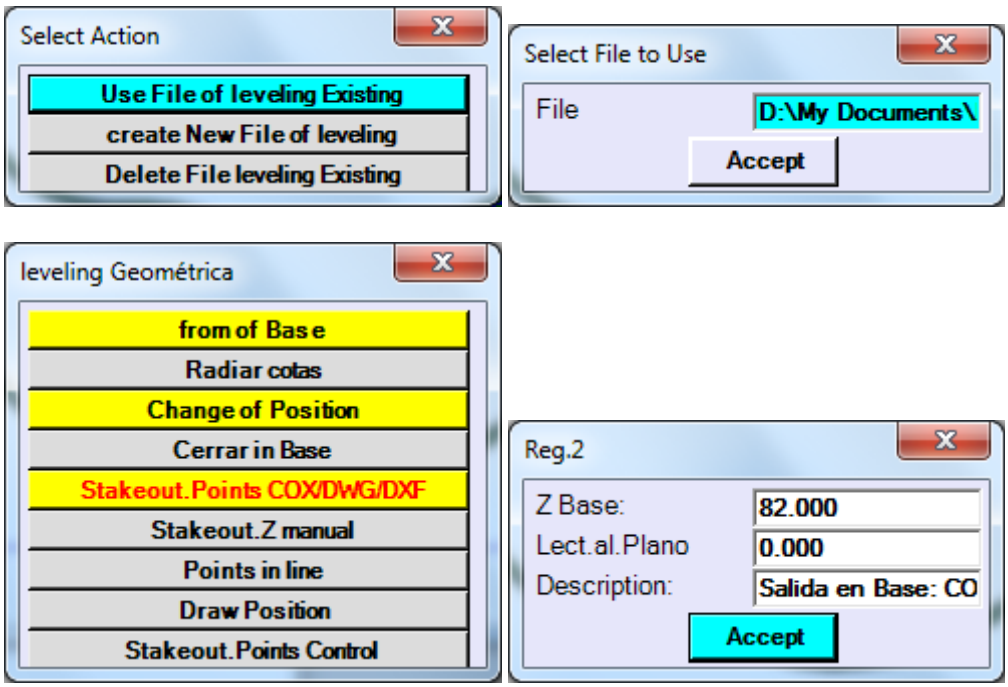




... together with the drawing scales.

If you click on the icon  we access the same menu that we have already explained in the section "Stakeout Menu " - "Fixed Sections". These options are similar to those described in the section "Stakeout Menu" - "Fixed Sections" but evidently adapted to Longitudinal staking.

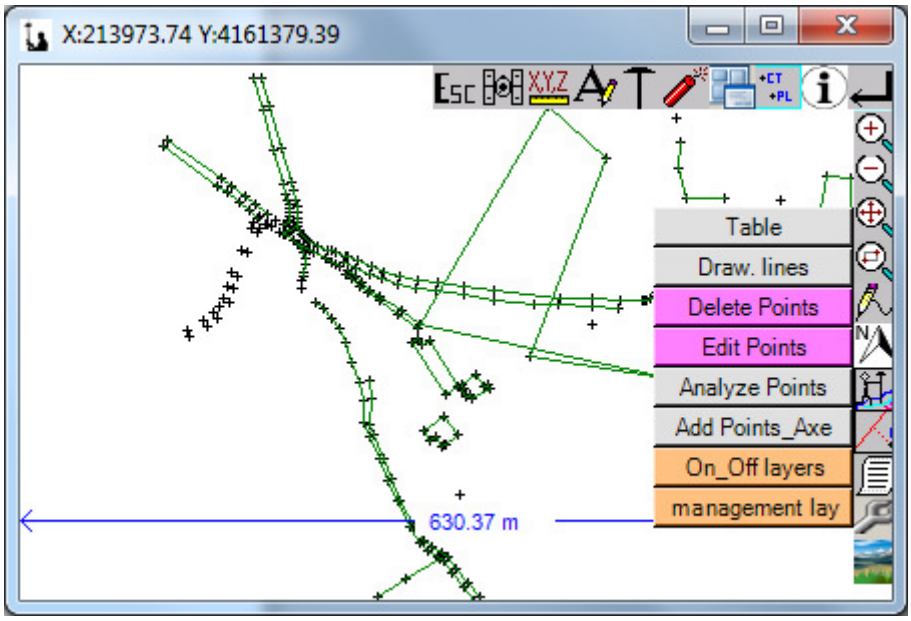
"**Geometric Leveling**" allows us to use a conventional Geometric Level to show the elevation of any point in a CAD or COX drawing.



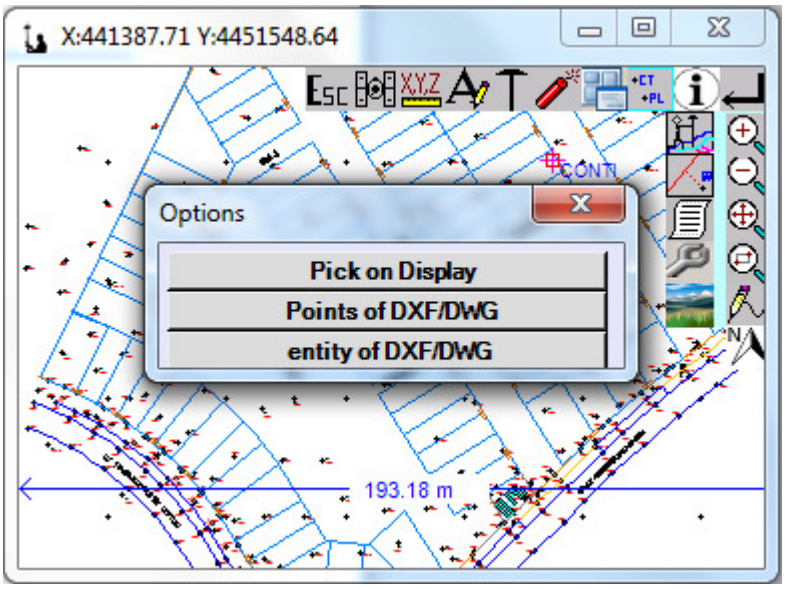
With this module we avoid using a leveling book as all readings (Read forward, Read back) are recorded in a file. Also the dimensions of the bases which are used are read from the same files that we use with ET or GPS, along with the points to stakeout, and are extracted from the COX / CAD file

.

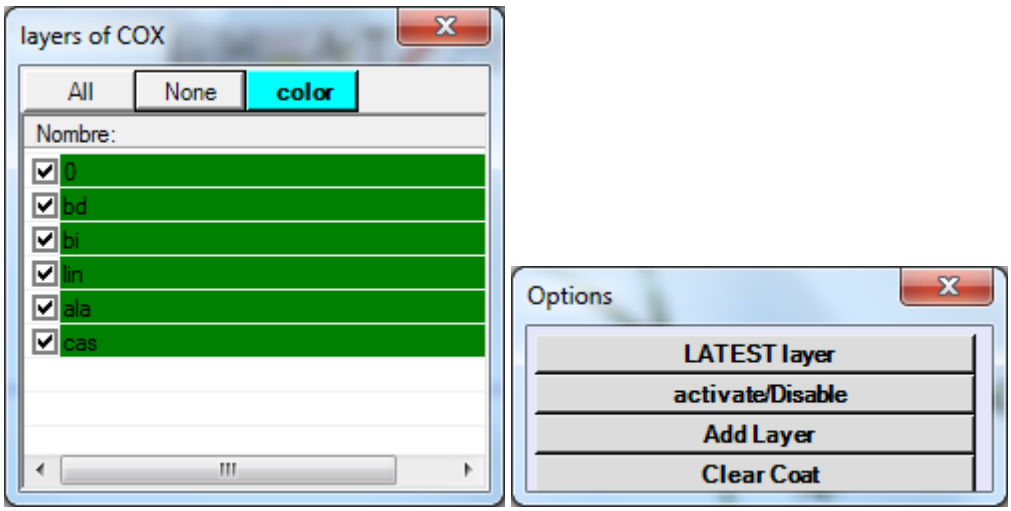
 This icon provides access to the following editing options:



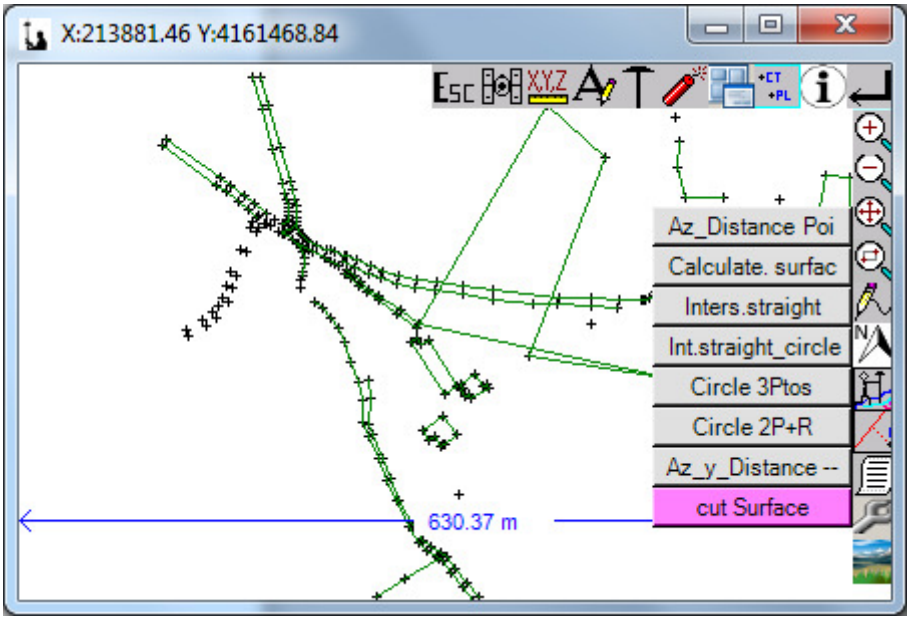
- **Data Table**: clicking this section shows a table in which we can edit the points taken so far, offering the possibility to modify the attributes (code, height,...), delete the points taken, add items to the file and perform calculations such as azimuth and distance between points, analysis with respect to an axis or calculate the area by selecting points from the file.
- **Draw Lines**: when taking readings in the field, for some reason, we may want to draw a line connecting points with a certain code that we're interested in. Using this utility we can do this by just choosing the code. The screen will refresh automatically and the points will appear connected with the established code, saving time when saving data and having to draw lines in cad.
- **Delete Points**: the first thing we are asked is if we want to select the point on the screen. If our answer is yes, the program will capture the closest point to the area we have selected with the marker. If not, it automatically captures the last point taken, asking for confirmation of deletion. We can, however, choose another point by moving through the file with the "previous" and "next" options. In both cases the file is then redrawn with timely updates.
- **Edit Points**: this only allows us to modify the code and target height. The behavior of the program is the same as in the previous module.
-**Analyze Points**: performs an analysis of any point taken or from the cad file loaded relative to the axis that we are asked to select and presents the result as follows:.
- **Add Points/Axis**: here we have the possibility of creating a new axis by clicking points taken, points from the current cad drawing or entities cad (and combinations of these options).
We can also choose an existing axis and add new elements in the same way.



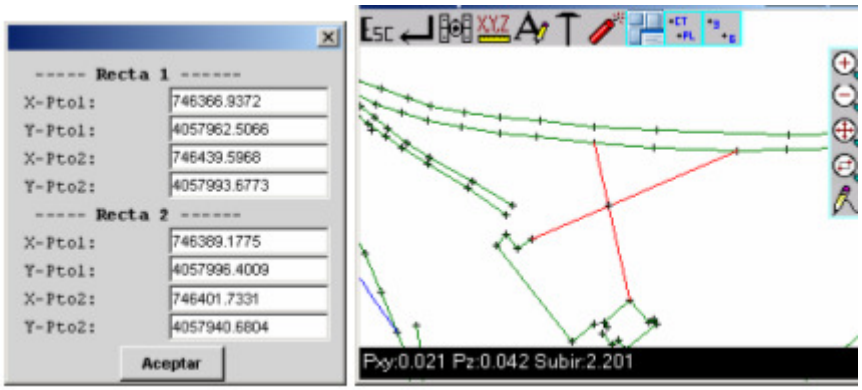
- **On/Off Layers**: shows a form with the existing layers in our drawing so we can enable or disable them on the display.
- **Layer Management**: displays these options, the meanings are clear:



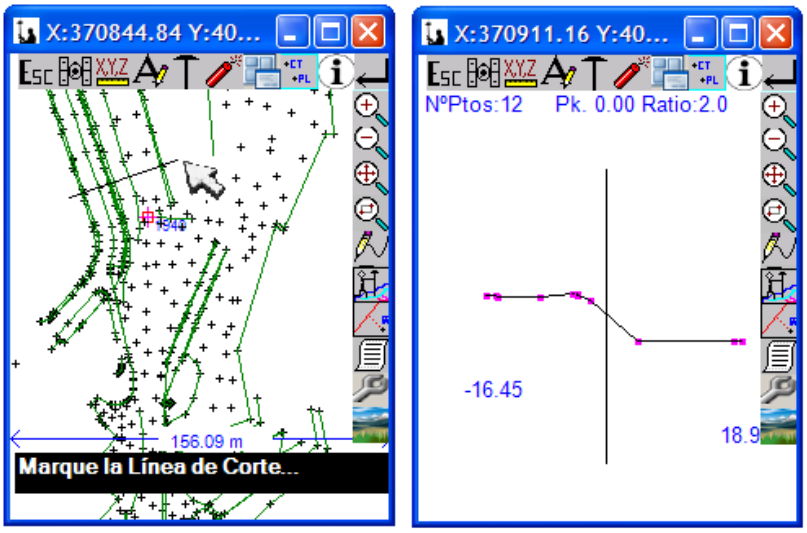
 This icon displays a menu of tools for common calculations:



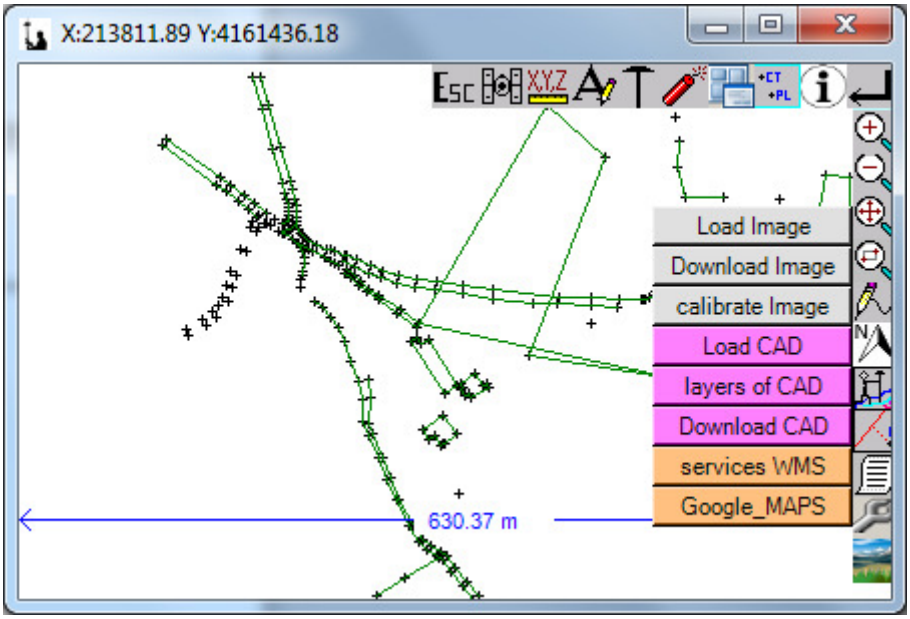
This allows us to perform multiple common computations extracting the coordinates from the points chosen on the screen and the results can be stored in the current file. The coordinates of the selected points can be edited and changed before the final calculation without altering the base.



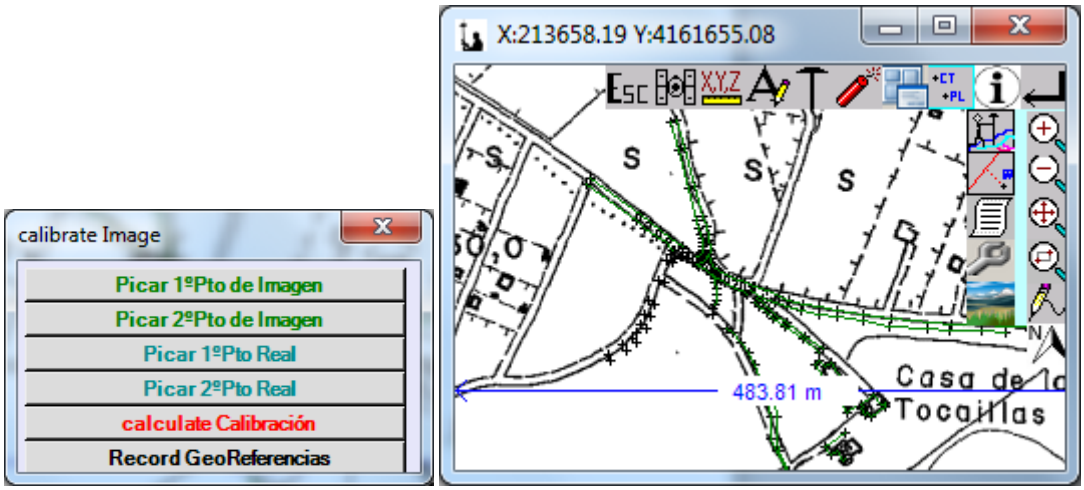
Special attention goes to to "cut surface" that allows a transversal cut on all visible lines on the screen (active layers) and draws that cut..



 The following menu which allows the loading of images:



- **Load Image**: It allows you to load an image in the formats TIF, JPG, BMP, ECW, JP2.
- **Download Image:** You can download the image.
- **Calibrate Image**: It allows to calibrate images TIF, JPG, and just by selecting two common points on the image and terrain.



- **Load CAD**: allows not only to have the autocad drawing on screen, but we can stakeout any graphical entity contained in it (lines, polylines, splines, dots, blocks..). In the stakeout module we already mentioned the existence of the "Stakeout Cad Entity" option and mentioned the versatility and power of this tool.

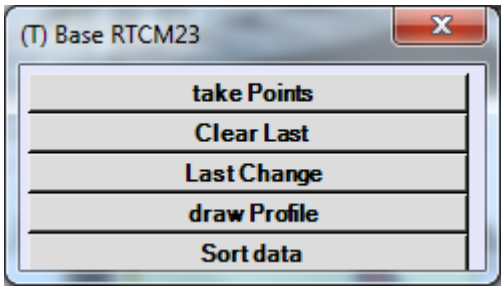
- **Layers of CAD**: It presents a dialog box that manages the activation and deactivation of layers which exist in the loaded Autocad file.

- **Download CAD**: downloads CAD file and shows on screen our file in TopView format (coo, cox).

Transverse Profiles:

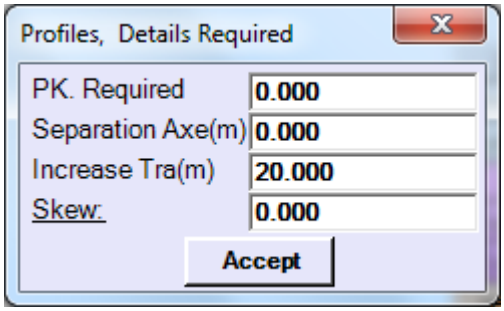
This option prompts you to select the Profiles file in which it will record the data taken, and then the plan file to analyze the data.

Then the following menu appears:



Options Delete Last and Modify Last operate as in Captures.

The following screen is displayed after the option to capture points:



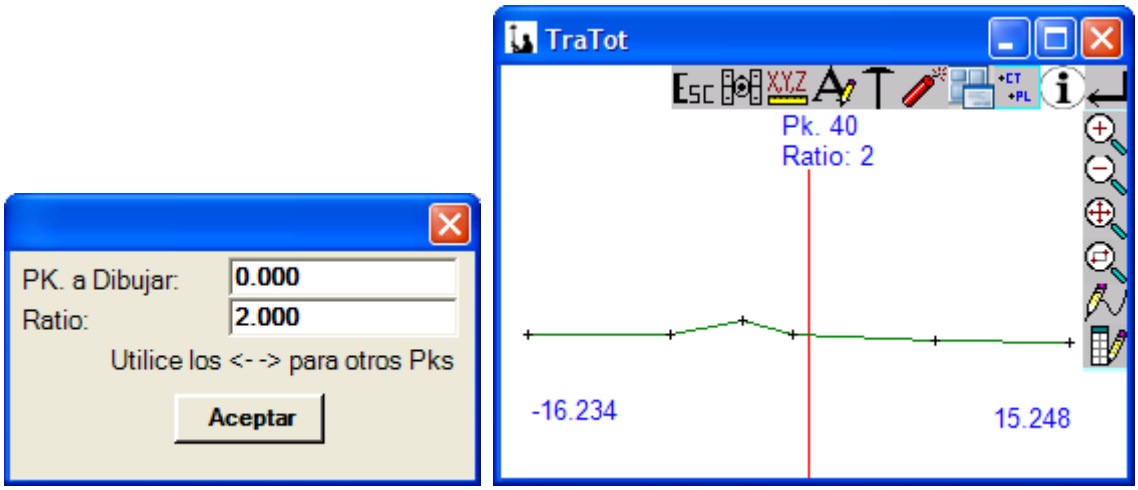
We specify the Pk belonging to the points that are going to be taken, if we take a profile with generic displacement, and the increment between profiles that will be added to the current Pk when we return to this screen, easing the process of data collection. Skew is a twist that applies to take a profile not perpendicular to the main axis. Typically used to take Factory Works profiles that are not perpendicular to the main axis but knowing the angle alignments of the OF and the profile intersecting the axis Trunk (skew) we can easily take it starting from the trunk.

After readings are taken, a screen will appear, showing the data of the normal to the axis and the lateral displacement of the point. When the point is not close to the theoretical Pk and we do not want to record the result, pressing ESC will not record the point, and in the opposite case <Enter> records the data.

Then the program asks if we want to keep taking points belonging to this profile or wish to take points belonging to another profile.

Points may be taken in any order you want, but one point should always be recorded in the theoretical profile, otherwise we could be recording a point in the previous or following profile. The program sorts the points automatically without the user requesting this.

Once taking points has finished we return to the main menu of this module and we can Delete or Edit any point starting the selection from the last point taken. We can draw a profile on the screen in the same way as in the File module -> Profiles -> Draw Profile.



With GPS:

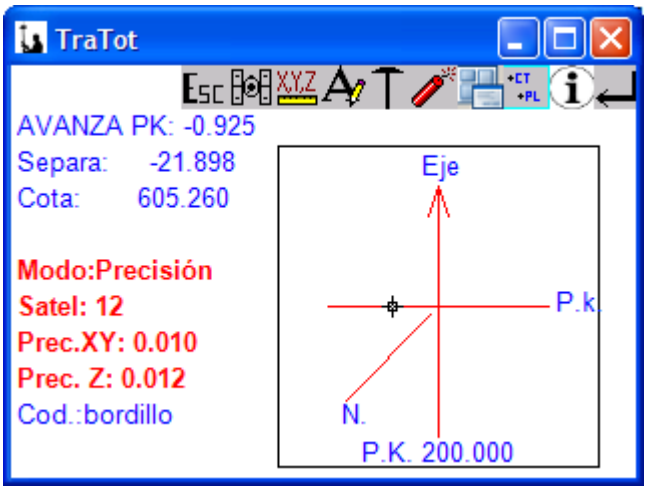
The difference between E.T. and GPS in this module, as in all data collection, is the omission of the readings of the angles and the geometric distance of the incoming Cartesian coordinates from the GPS receiver along with its parameters Hdop, VDOP, XY precision, Z accuracy, etc.

We are presented with a screen similar to the stakeout points in which the direction is not north but toward the forward direction of the plan axis and the horizontal line is that of the profile to be taken. Also we will be shown the cursor on that drawing and we must move until it is positioned on the line representing the profile.

Movements also appear in text to go "forward or backward in PK" and the distance at which we find the axis.

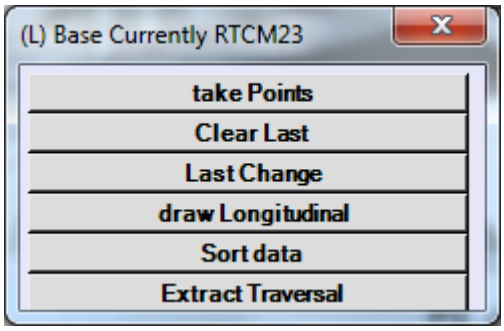
Note that the coordinate input occurs every 0.2 seconds which continuously updates the cursor representing the position of GPS-mobile until you press the ESC or ENTER key to stop receiving new data showing real PK and distance to axis coordinates from the moment the key is pressed.

The cursor will change size between small when in High accuracy, medium when in Floating or medium accuracy, and large when in Navigation.



Longitudinale Profile:

There are two ways to determine the dimensions of a longitudinal, one is by extracting data from a transversal file and the other by capturing data directly in the field.

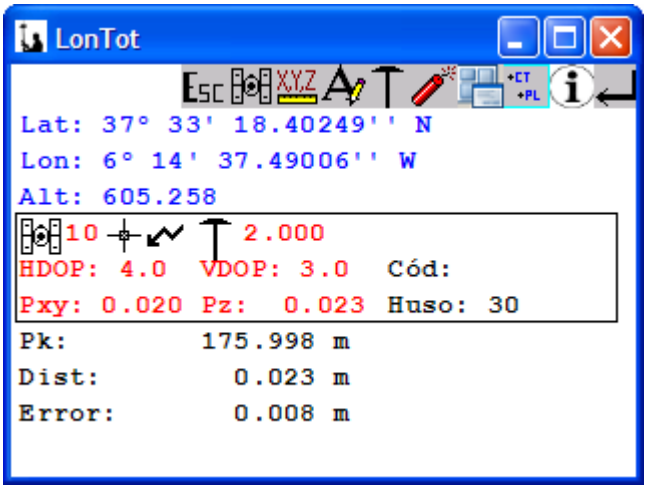


All options operate similarly to transverse profiles.

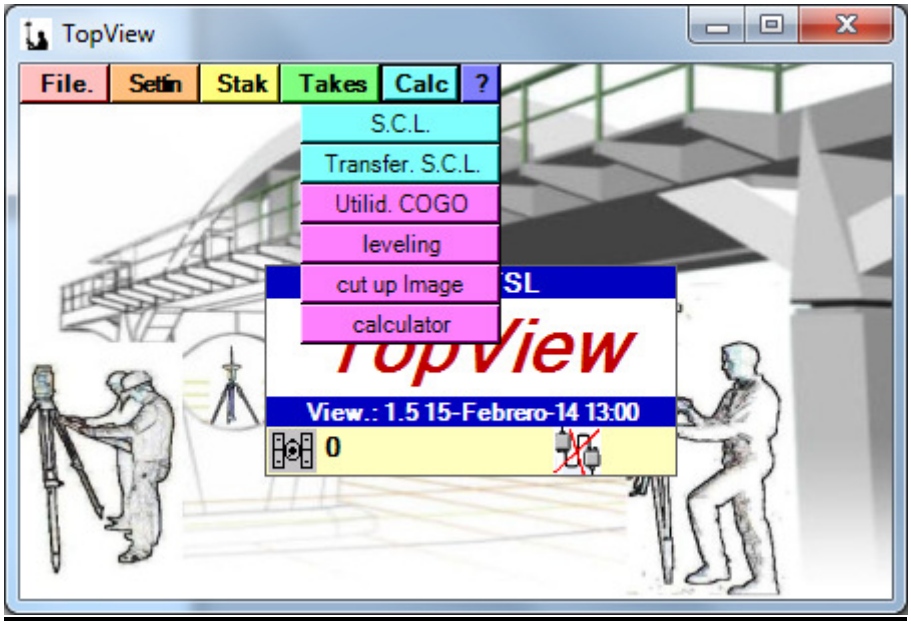
With GPS:

The difference between E.T. and GPS in this module, as in all data collection, is the omission of the readings of the angles and the geometric distance of the incoming Cartesian coordinates from the GPS receiver along with their parameters HDOP, VDOP, XY precision, Z accuracy, etc.

We are shown a screen similar to that of data collection in tachometer in non-graphical mode where the coordinates of the GPS own parameters appear. Note that the coordinate entry occurs every 0.2 seconds until you press the ESC or ENTER key to instantly stop receiving new coordinate data. The calculation of Pk and Displacement is iterative and as we're moving there is a residual error which will be zero if we stop or press ENTER or ESC to stop measuring and recording the data.

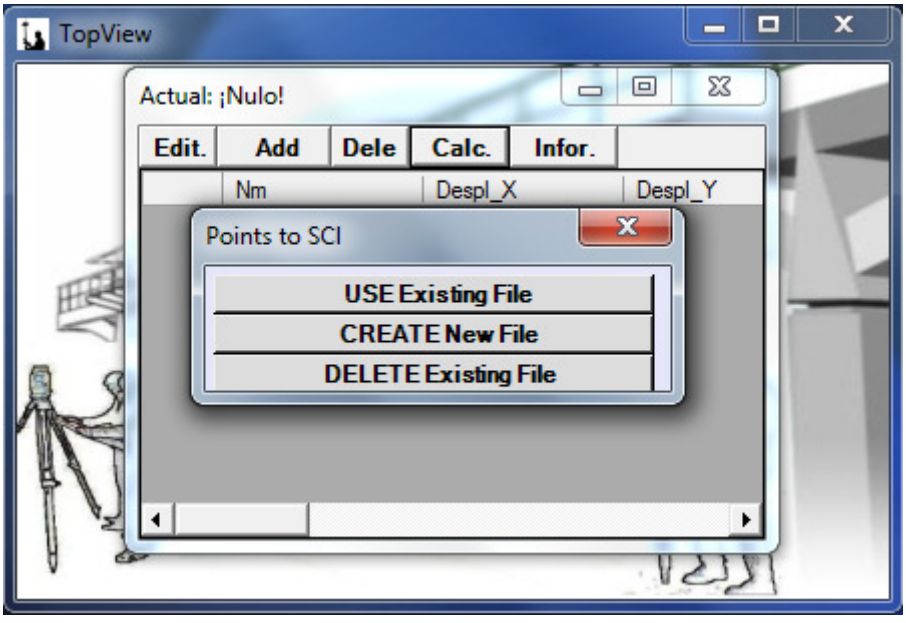


CALCULATIONS MENU

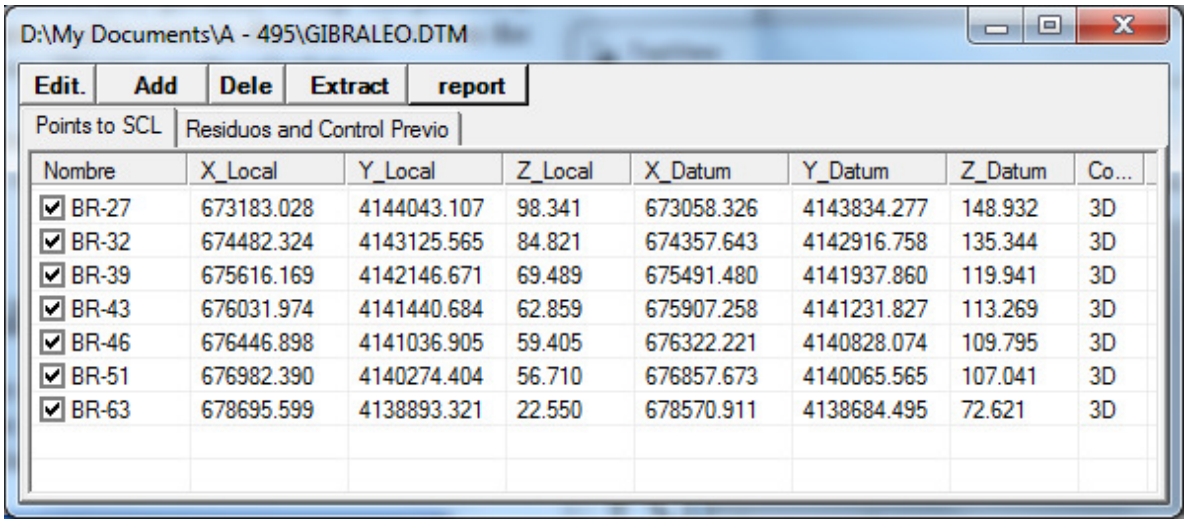


Local Coordinates System (S.C.L.): (GPS Only)

In this section we can select a previously created SCL or go to Edit, Add, Delete, or Calculate a new one. Edit, Add, and Delete work as in the other modules such as BASES or COORDINATES.



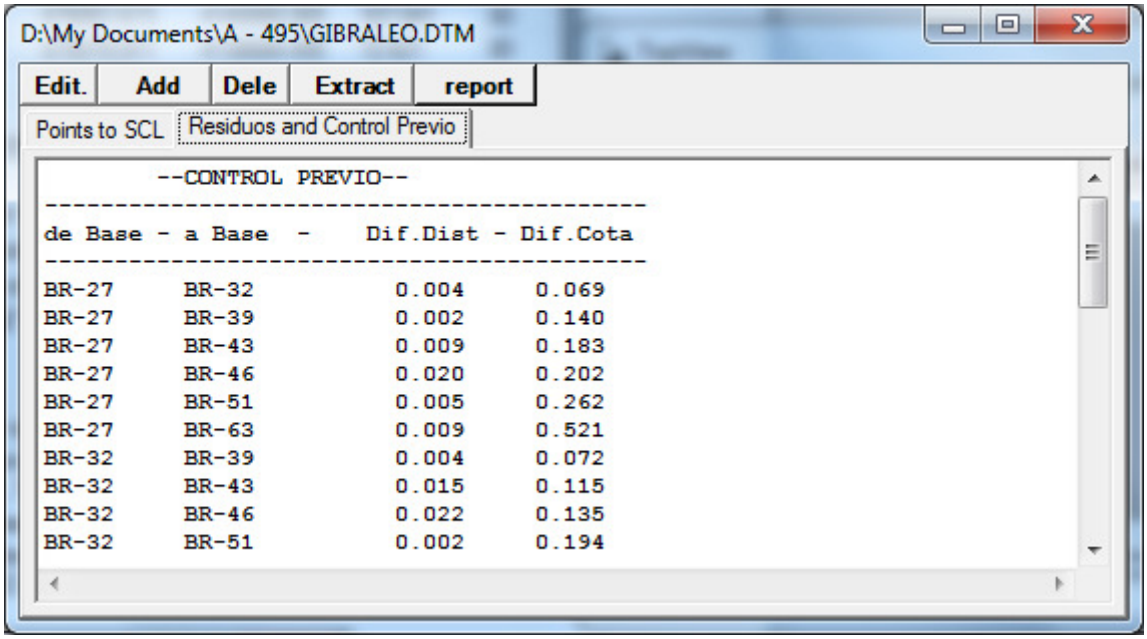
The calculation button creates a file with "Points for SCL" which consists of a register for each Base used for the SCL that has the base name, the Local Cartesian coordinates and the Cartesian coordinates taken by the GPS according to Datum, timezone, and the geoid used for the calculation. This file has the extension *.dtm and in TopView is shown thus:

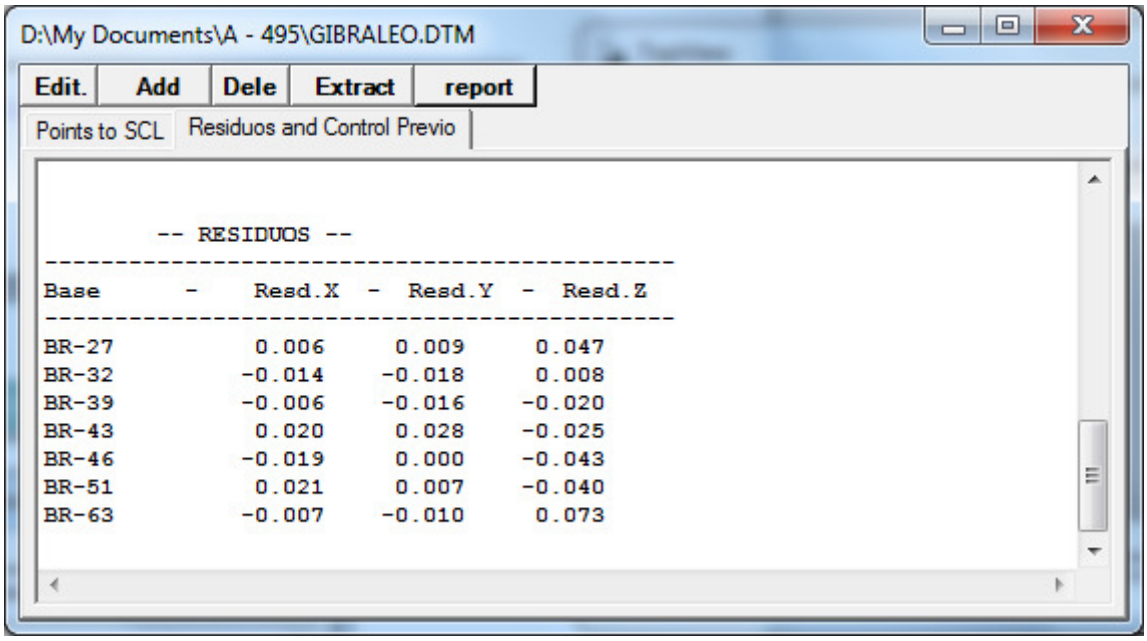


Nombre	X_Local	Y_Local	Z_Local	X_Datum	Y_Datum	Z_Datum	Co...
BR-27	673183.028	4144043.107	98.341	673058.326	4143834.277	148.932	3D
BR-32	674482.324	4143125.565	84.821	674357.643	4142916.758	135.344	3D
BR-39	675616.169	4142146.671	69.489	675491.480	4141937.860	119.941	3D
BR-43	676031.974	4141440.684	62.859	675907.258	4141231.827	113.269	3D
BR-46	676446.898	4141036.905	59.405	676322.221	4140828.074	109.795	3D
BR-51	676982.390	4140274.404	56.710	676857.673	4140065.565	107.041	3D
BR-63	678695.599	4138893.321	22.550	678570.911	4138684.495	72.621	3D

When entering a new "SCL Points" file, the table is empty and to fill it we can go to "Extract" button which requests a file of Bases XYZ (*.bas) and a Geographic Bases file (*.lla) where it looks for records with the same base name and places as those in the table. By clicking on "Control" we can switch between "3D", "2D" and "Z".

We have to have at least one point. In this case we can only calculate displacement in X, Y, Z, and results with zero error for the point used will be displayed. If there are two points it can calculate a displacement, a rotation and a scale factor (Helmert transformation) in X, Y, Z, showing zero error for the two points chosen. If it has three points, there shall be an adjustment for minimum squares for X, Y showing a zero error in Z for the three points used (three points define a plane) and non-zero errors for X, Y. With four or more points least squares adjustment is performed for X, Y, Z showing non-zero errors for X, Y, Z.





In the Tab "Result and Previous Control" we are shown a previous control of the data in which there is no calculation, but can serve to detect if we have made a mistake when typing the local coordinates, or the geographical coordinates from the GPS. The process is based on comparing the relative differences that exist in distance and increased height between the local coordinates and the GSP. The final part shows the "Spare" calculation results.

The "REPORT" generates a document in *.html format which records all information concerning the calibration once calculated.

Transform points to current SCL: (GPS Only)

This option allows you to transform one or all of the points contained in a file to local Cartesian coordinate using the parameters of the current SCL. We can perform all transformations we want since the original data is not lost, being saved in other sections of the file.

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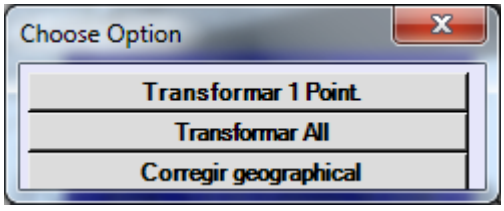
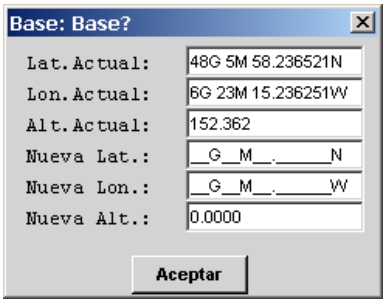


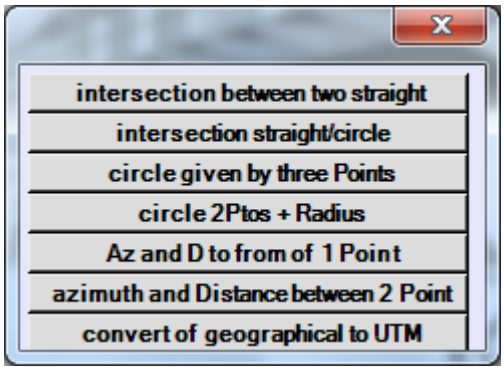
With the Geographic Correction a check of the base in which the sensor-base was positioned is made (taken from the Base file in Lat, Lon, Alt) and the new coordinates are asked for. The differences between the two coordinates are applied to all Geographic readings of the items contained in the file. It is equivalent to performing a post correction from Mobile. This operation is very delicate because the process alters all data and is not reversible unless introducing the geographical coordinates with differences in reverse.



It can also help if you have more than one mobile and have forgotten to make Mobile Corrections from each of them, and have to apply this correction. To do this we put the Current Geographic to ZERO and in NEW values we put the corrections read in the sensor in which they were made.

Cogo Utilities:

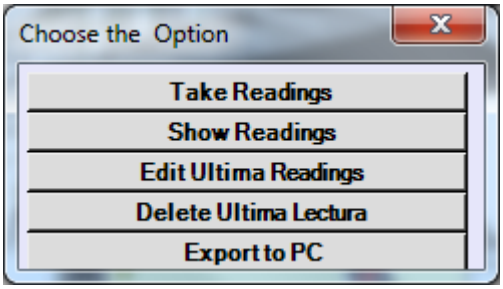
This section gives access to a number of relatively common calculations. The data entry is very simple and needs no explanation. The data can be extracted from different files and the results recorded in these or any other.

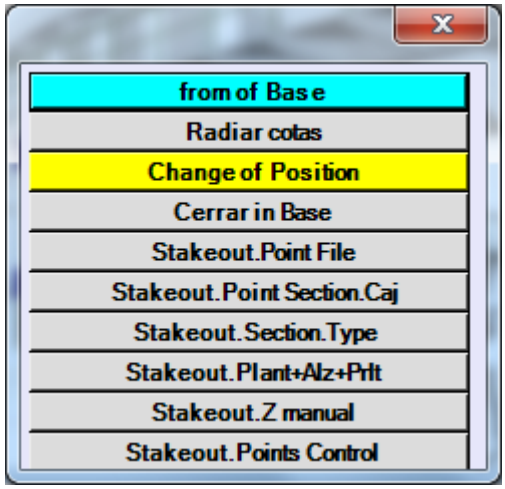


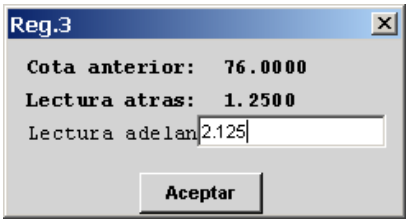
WorkBook Leveling

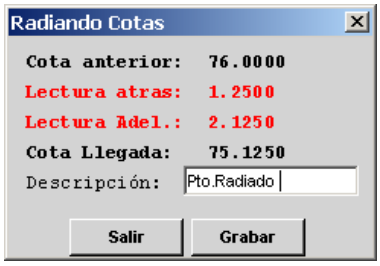
This section allows us to manage Levelling files (Use, Create, Delete), and introduction and modification of the data they contain.

It permits us to take readings sent from the same position, or perform continuous changes (Itinerary). At each point taken we can enter a code that will later serve to identify, modify, or delete it.







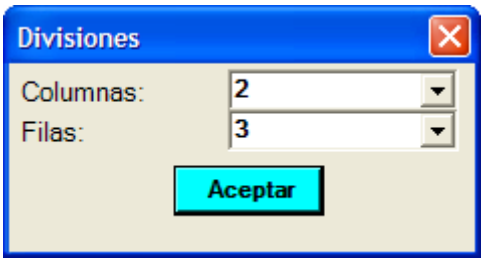


It links to files with Bases, Coordinates, Fixed Sections and Standard Sections to extract the dimensions from them. The description will automatically have the information of the point to stakeout and the elevation differences obtained.

We can also export data to Pc from this module. The resulting list is equivalent to the list of "bows" provided to helpers to mark points at their correct height, and can also be a valid list for quality control.

Cut Images.-

This utility is only available in the PC version of TopView. With it we can, from a large-sized image on disk, and whenever we have the corresponding calibration file in the same directory, divide the image so that the result can be processed more efficiently.



Once the image is cut, M * N image files will be created, where M is the number of columns entered and N the number of rows. A file extension ".ils" is created. In the "capture coordinates" module we have the option to load either one. The advantage of using the "ils" file is that the program will, knowing our position, show the corresponding cut file, so that if we move to another area contained in another file, the program automatically unloads the previous point from memory and the new one is loaded. This is useful in the field because normally we take a Pda with us.

CONTACT U.S.

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PDA INSTALLATION PROCEDURE

1. Download the installation package for PDA (TopView_V1_ARM.CAB) which is valid for any Windows operating system for PDAs and micro ARM. Depending on the PDA you can also request to install the add-on called ".Net Compact Framework", in this case we will have to download the appropriate version for the operating system that the PDA contains (Pocket Pc, Windows Ce, Windows Mobile).

2. After copying the file "*."CAB" to the PDA in the memory card, where the key disk is generated, we have to run it with the "My Computer" icon. Follow the default steps and change the default installation directory (" \ Program Files \ TopViewCe \") to the directory that gives access to the memory card, this will release the System Memory to load larger data files.

3. Once the installation is finished you will have a shortcut icon in "Start-> Programs-> TopViewCe". This icon is a file named "TopViewCe.Ink" located in the directory "\Windows\Programs" that when we start the application is automatically copied to the directory "\Windows\Desktop" to have a shortcut to the program from the desktop of the system.

4. The program uses the Base Directory on which the working directories are created in the memory card with the intention of not losing data in case of a loss of energy (" \ Storage Card" or similar ..).

5. Run the access icon. If it is the first time that the application is run it will display all possible Disc keys and their serial numbers. The program asks for the introduction of the Key corresponding to one of the serial numbers shown. If the key is correct the configuration is loaded and displays the main screen where we can see the date and version number which we have installed.

CONCLUSIONS

This program is designed to work with any Total Station and with any GPS in RTK mode or Static mode for post-processing, so that by just changing the cable connecting the PDA to the device, we are able to continue working using the same data files. So we can begin work with a GPS and then capture the points that could not be captured before, as we were near a building or similar, with a Total Station just by changing the cable and selecting the device.

Also noteworthy is that it is designed to complement the programs commonly used in Spain for PC such as Autocad, Clip, Mdt, and Istram and Ispol, Cartomap, Protopo, and others, being able to import their Base and Elevation axes, List of Bases, Coordinates stakeout list, Fixed Sections list and export Base, coordinates, Cross Section Profiles, Longitudinal Profiles, etc.

Being a program developed in Spain, the whole program, manuals and complementary programs for Pc, etc ... are written in Spanish and adapted to the usual Hardware and Software environments in Spain.

Adaptations to other types of import or export file formats will be done in the shortest time possible.